

ENGINE CONTROL SYSTEM

SECTION EC

GI
MA
EM
LC

EC

FE

AT

TF

PD

AX

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BR

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IDX

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NBEC0001

NBEC0001S01

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HO2S2 HTR (B1)	P0141	EC-286	
HO2S2 HTR (B2)	P0161	EC-286	SC
IACV/AAC VLV/CIRC	P0505	EC-422	
IGN SIGNAL-PRIMARY	P1320	EC-499	EL
INTK TIM S/CIRC-B1	P1140	EC-482	
INTK TIM S/CIRC-B2	P1145	EC-482	IDX
INT/V TIM CONT-B1	P1110	EC-446	
INT/V TIM CONT-B2	P1135	EC-446	

TROUBLE DIAGNOSIS — INDEX

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

Items (CONSULT-II screen terms)	DTC*1	Reference page
INT/V TIM V/CIR-B1	P1111	EC-451
INT/V TIM V/CIR-B2	P1136	EC-451
KNOCK SEN/CIRC-B1	P0325*2	EC-328
L/PRES SOL/CIRC	P0745	AT-174
MAF SEN/CIRCUIT*3	P0100	EC-150
MULTI CYL MISFIRE	P0300	EC-320
NATS MALFUNCTION	P1610 - P1615*2	EL-328
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—
O/R CLTCH SOL/CIRC	P1760	AT-223
P-N POS SW/CIRCUIT	P1706	EC-604
PNP SW/CIRC	P0705	AT-111
PURG VOLUME CONT/V	P0443	EC-367
PURG VOLUME CONT/V	P1444	EC-541
SFT SOL A/CIRC*3	P0750	AT-180
SFT SOL B/CIRC*3	P0755	AT-189
SWIRL CONT SOL/V	P1130	EC-458
SWL CON VC SW/CIRC	P1165	EC-493
TCC SOLENOID/CIRC	P0740	AT-165
TP SEN/CIRC A/T*3	P1705	AT-218
TRTL POS SEN/CIRC*3	P0120	EC-174
TW CATALYST SYS-B1	P0420	EC-347
TW CATALYST SYS-B2	P0430	EC-347
VC CUT/V BYPASS/V	P1491	EC-591
VC/V BYPASS/V	P1490	EC-585
VEH SPEED SEN/CIRC*4	P0500	EC-417
VEH SPD SEN/CIR A/T*4	P0720	AT-124
VENT CONTROL VALVE	P0446	EC-374
VENT CONTROL VALVE	P1446	EC-553
VENT CONTROL VALVE	P1448	EC-573

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

*2: This DTC is displayed with CONSULT-II only.

*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.

NOTE:

- Regarding R50 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.
- Bank 1 (-B1 or BK1) includes No. 1 cylinder.

TROUBLE DIAGNOSIS — INDEX

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

P NO. INDEX FOR DTC

=NBEC0001S02

DTC*1	Items (CONSULT-II screen terms)	Reference page	
—	Unable to access ECM	EC-117	GI
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	MA
P0100	MAF SEN/CIRCUIT*3	EC-150	EM
P0105	ABSL PRES SEN/CIRC	EC-158	LC
P0110	AIR TEMP SEN/CIRC	EC-164	
P0115	COOLANT T SEN/CIRC*3	EC-169	EC
P0120	THRTL POS SEN/CIRC*3	EC-174	
P0125	*COOLANT T SEN/CIRC	EC-187	FE
P0130	HO2S1 (B1)	EC-192	
P0131	HO2S1 (B1)	EC-202	AT
P0132	HO2S1 (B1)	EC-210	
P0133	HO2S1 (B1)	EC-218	TF
P0134	HO2S1 (B1)	EC-231	
P0135	HO2S1 HTR (B1)	EC-240	PD
P0137	HO2S2 (B1)	EC-247	
P0138	HO2S2 (B1)	EC-257	AX
P0139	HO2S2 (B1)	EC-267	
P0140	HO2S2 (B1)	EC-277	SU
P0141	HO2S2 HTR (B1)	EC-286	BR
P0150	HO2S1 (B2)	EC-192	
P0151	HO2S1 (B2)	EC-202	ST
P0152	HO2S1 (B2)	EC-210	
P0153	HO2S1 (B2)	EC-218	RS
P0154	HO2S1 (B2)	EC-231	
P0155	HO2S1 HTR (B2)	EC-240	BT
P0157	HO2S2 (B2)	EC-247	
P0158	HO2S2 (B2)	EC-257	HA
P0159	HO2S2 (B2)	EC-267	
P0160	HO2S2 (B2)	EC-277	SC
P0161	HO2S2 HTR (B2)	EC-286	
P0171	FUEL SYS-LEAN/BK1	EC-294	EL
P0172	FUEL SYS-RICH/BK1	EC-302	
P0174	FUEL SYS-LEAN/BK2	EC-294	IDX
P0175	FUEL SYS-RICH/BK2	EC-302	
P0180	FUEL TEMP SEN/CIRC	EC-309	

TROUBLE DIAGNOSIS — INDEX

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

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0217	ENG OVER TEMP	EC-314
P0300	MULTI CYL MISFIRE	EC-320
P0301	CYL 1 MISFIRE	EC-320
P0302	CYL 2 MISFIRE	EC-320
P0303	CYL 3 MISFIRE	EC-320
P0304	CYL 4 MISFIRE	EC-320
P0305	CYL 5 MISFIRE	EC-320
P0306	CYL 6 MISFIRE	EC-320
P0325*2	KNOCK SEN/CIRC-B1	EC-328
P0335	CPS/CIRCUIT (POS)	EC-334
P0340	CAM PS/CIRC (PHS)	EC-342
P0420	TW CATALYST SYS-B1	EC-347
P0430	TW CATALYST SYS-B2	EC-347
P0440	EVAP SMALL LEAK	EC-352
P0443	PURG VOLUME CONT/V	EC-367
P0446	VENT CONTROL VALVE	EC-374
P0450	EVAP SYS PRES SEN	EC-381
P0455	EVAP GROSS LEAK	EC-394
P0460	FUEL LV SE (SLOSH)	EC-407
P0461	FUEL LEVEL SENSOR	EC-411
P0464	FUEL LEVL SEN/CIRC	EC-413
P0500	VEH SPEED SEN/CIRC*4	EC-417
P0505	IACV/AAC VLV/CIRC	EC-422
P0510	CLOSED TP SW/CIRC	EC-431
P0600*2	A/T COMM LINE	EC-440
P0605	ECM	EC-444
P0705	PNP SW/CIRC	AT-111
P0710	ATF TEMP SEN/CIRC	AT-116
P0720	VEH SPD SEN/CIR A/T*4	AT-124
P0725	ENGINE SPEED SIG	AT-130
P0731	A/T 1ST GR FNCTN	AT-136
P0732	A/T 2ND GR FNCTN	AT-143
P0733	A/T 3RD GR FNCTN	AT-151
P0734	A/T 4TH GR FNCTN	AT-157
P0740	TCC SOLENOID/CIRC	AT-165
P0744	A/T TCC S/V FNCTN	AT-170
P0745	L/PRESS SOL/CIRC	AT-174

TROUBLE DIAGNOSIS — INDEX

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

DTC*1	Items (CONSULT-II screen terms)	Reference page	
P0750	SFT SOL A/CIRC*3	AT-180	GI
P0755	SFT SOL B/CIRC*3	AT-189	MA
P1110	INT/V TIM CONT-B1	EC-446	
P1111	INT/V TIM V/CIR-B1	EC-451	EM
P1130	SWIRL CONT SOL/V	EC-458	
P1135	INT/V TIM CONT-B2	EC-446	LC
P1136	INT/V TIM V/CIR-B2	EC-451	
P1140	INTK TIM S/CIRC-B1	EC-482	EC
P1145	INTK TIM S/CIRC-B2	EC-482	
P1148	CLOSED LOOP-B1	EC-491	FE
P1165	SWL CON VC SW/CIRC	EC-493	
P1168	CLOSED LOOP-B2	EC-491	AT
P1217	ENG OVER TEMP	LC-24	
P1320	IGN SIGNAL-PRIMARY	EC-499	TF
P1335	CPS/CIRCUIT (REF)	EC-510	
P1336	CPS/CIRC (POS) COG	EC-517	PD
P1441	EVAP VERY SMALL LEAK	EC-526	
P1444	PURG VOLUME CONT/V	EC-541	AX
P1446	VENT CONTROL VALVE	EC-553	
P1447	EVAP PURG FLOW/MON	EC-561	SU
P1448	VENT CONTROL VALVE	EC-573	BR
P1464	FUEL LEVEL SEN/CIRC	EC-582	
P1490	VC/V BYPASS/V	EC-585	ST
P1491	VC CUT/V BYPASS/V	EC-591	
P1605	A/T DIAG COMM LINE	EC-603	RS
P1610 - P1615*2	NATS MALFUNCTION	EL-328	
P1705	TP SEN/CIRC A/T*3	AT-218	BT
P1706	P-N POS SW/CIRCUIT	EC-604	
P1760	O/R CLTCH SOL/CIRC	AT-223	HA

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

*2: This DTC is displayed with CONSULT-II only.

*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.

NOTE:

- Regarding R50 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.
- Bank 1 (-B1 or BK1) includes No. 1 cylinder.

PRECAUTIONS

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

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

NBEC0002

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to INFINITI QX4 is as follows:

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

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

WARNING:

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

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

NBEC0003

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

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- 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-6, "HARNESS CONNECTOR (SLIDE-LOCKING TYPE)".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

PRECAUTIONS

Engine Fuel & Emission Control System

Engine Fuel & Emission Control System

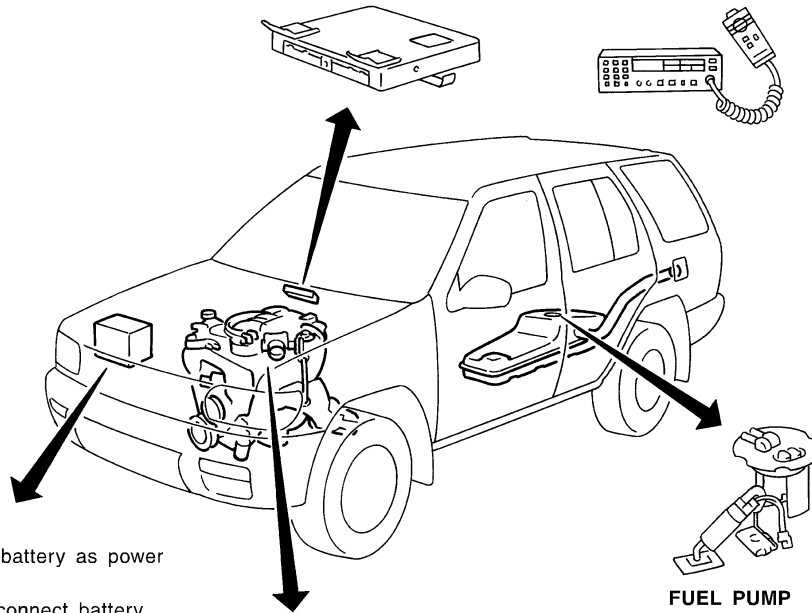
NBEC0004

ECM

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

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far away as possible from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.



BATTERY

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

WHEN STARTING

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

ECM PARTS HANDLING

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



FUEL PUMP

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

ECM HARNESS HANDLING

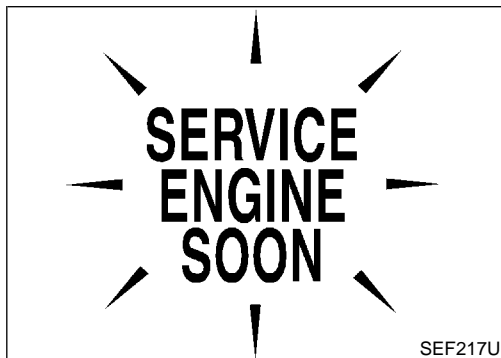
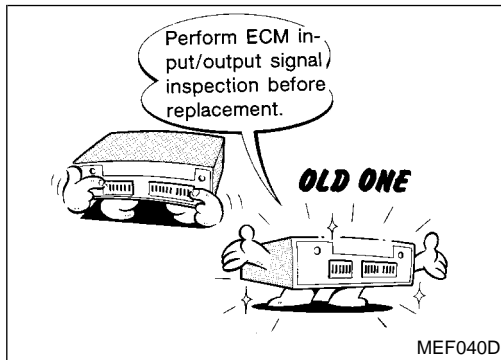
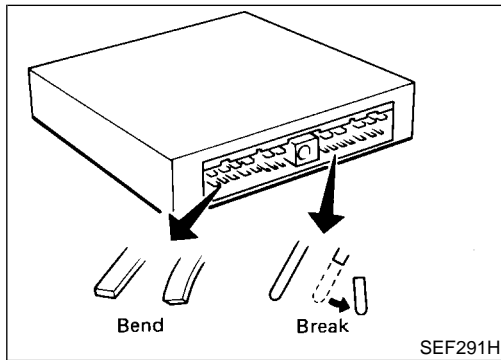
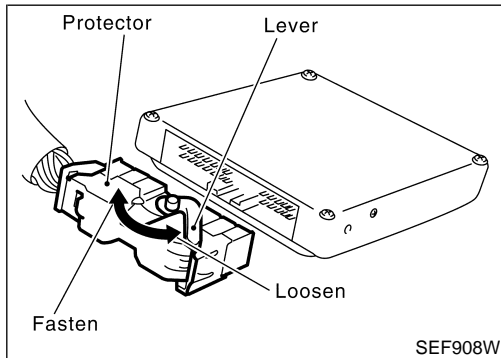
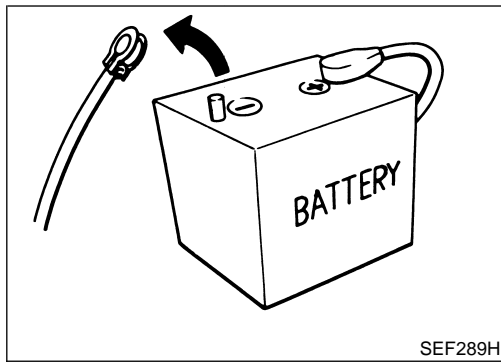
- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external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

GI
MA
EM
LC
EC
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SEF952RE

PRECAUTIONS

Precautions



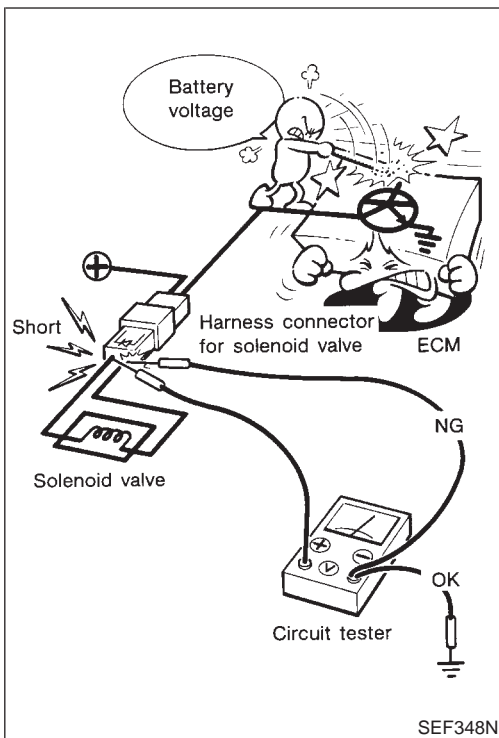
Precautions

NBEC0005

- 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, fasten it securely with a lever as far as it will go as shown at left.
- 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 Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-127.
- After performing each TROUBLE DIAGNOSIS, perform “DTC Confirmation Procedure” or “Overall Function Check”. The DTC should not be displayed in the “DTC Confirmation Procedure” if the repair is completed. The “Overall Function Check” should be a good result if the repair is completed.

PRECAUTIONS

Precautions (Cont'd)



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

GI

MA

EM

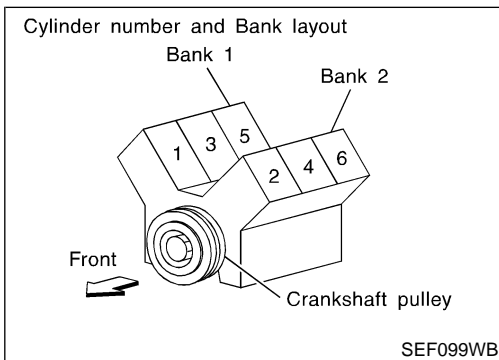
LC

EC

FE

AT

TF



- Regarding model R50, “-B1” indicates the right bank and “-B2” indicates the left bank as shown in the figure.
- Bank 1 includes No. 1 cylinder.

PD

AX

SU

BR

Wiring Diagrams and Trouble Diagnosis

NBEC0006

ST

When you read Wiring diagrams, refer to the following:

- GI-34, “HOW TO READ WIRING DIAGRAMS”
- EL-9, “POWER SUPPLY ROUTING” for power distribution circuit

RS

When you perform trouble diagnosis, refer to the following:

- GI-38, “HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS”
- GI-34, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

BT

HA

SC

EL

IDX

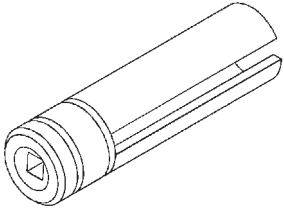
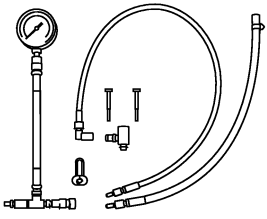
PREPARATION

Special Service Tools

Special Service Tools

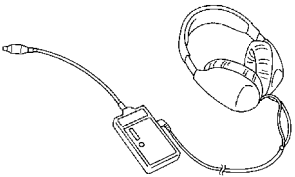
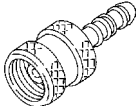

NBEC0007

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

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Front heated oxygen sensor wrench Rear heated oxygen sensor wrench		Loosening or tightening front and rear heated oxygen sensors with 22 mm (0.87 in) hexagon nut
(J44321) Fuel pressure adapter and gauge kit		Checking fuel pressure with pressure gauge

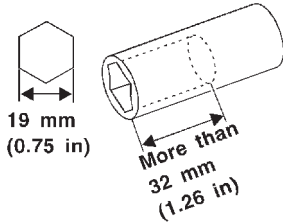
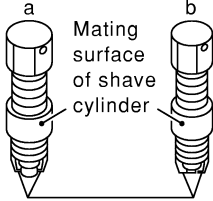
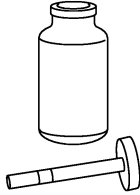
Commercial Service Tools

NBEC0008

Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)		Locating the EVAP leak
EVAP service port adapter (J41413-OBD)		Applying positive pressure through EVAP service port
Fuel filler cap adapter		Checking fuel tank vacuum relief valve opening pressure

PREPARATION

Commercial Service Tools (Cont'd)

Tool name (Kent-Moore No.)	Description	
Socket wrench	 <p>NT705</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p>
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 <p>NT828</p>	<p>EC</p> <p>FE</p> <p>AT</p>
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 <p>NT779</p>	<p>TF</p> <p>PD</p> <p>AX</p>

SU

BR

ST

RS

BT

HA

SC

EL

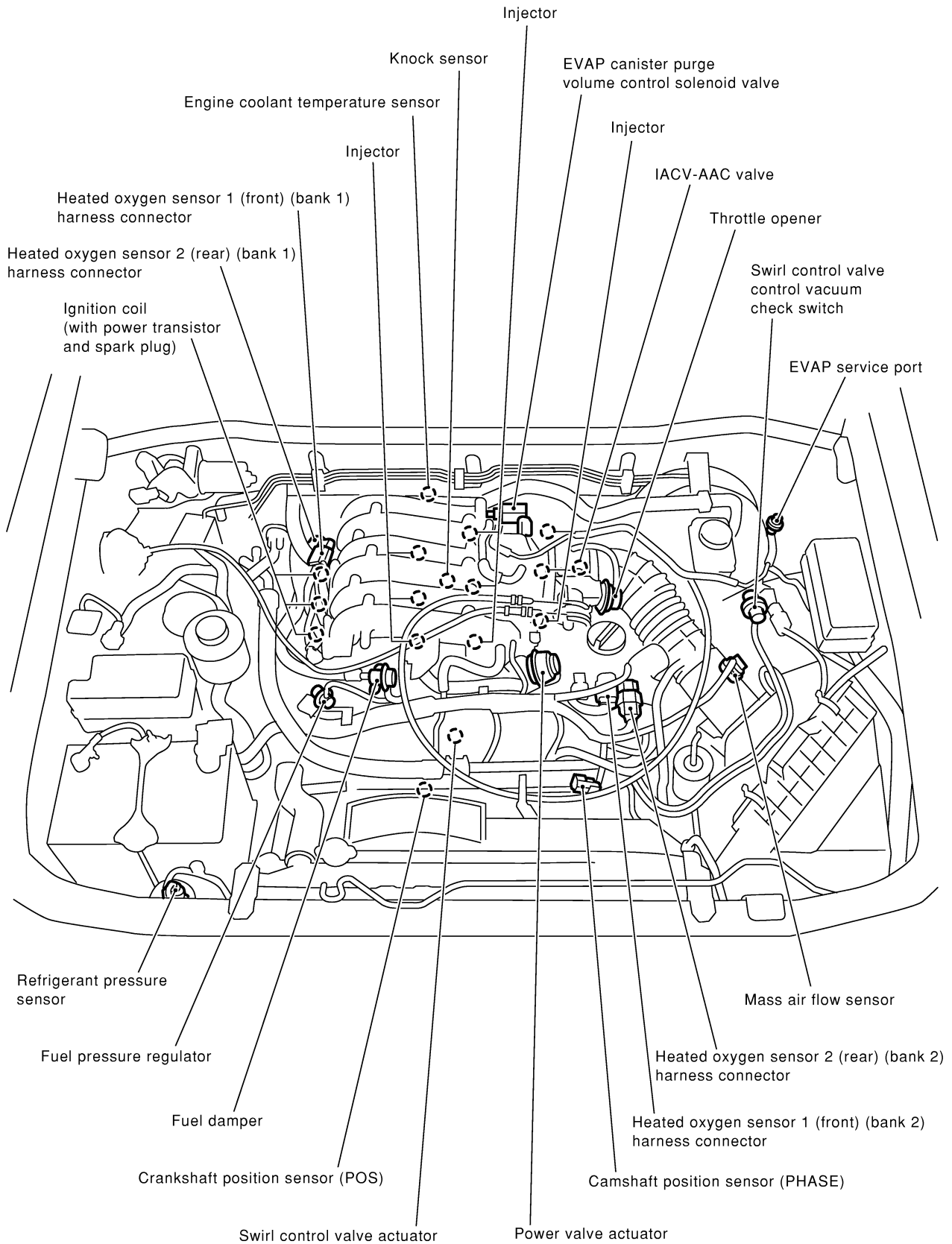
IDX

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Engine Control Component Parts Location

Engine Control Component Parts Location

NBEC0009



SEF929Y

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Engine Control Component Parts Location (Cont'd)

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

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RS

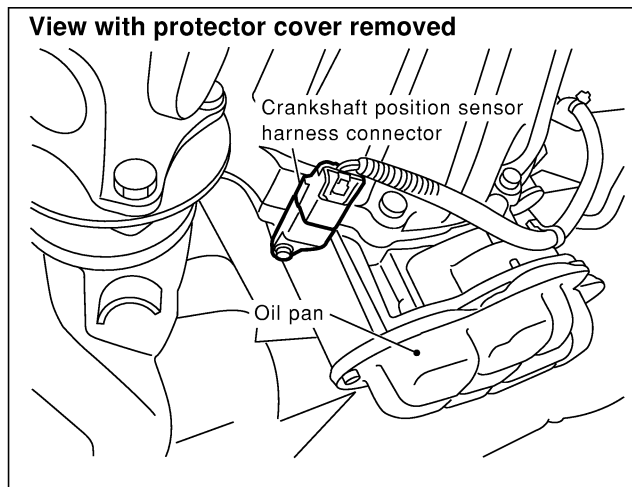
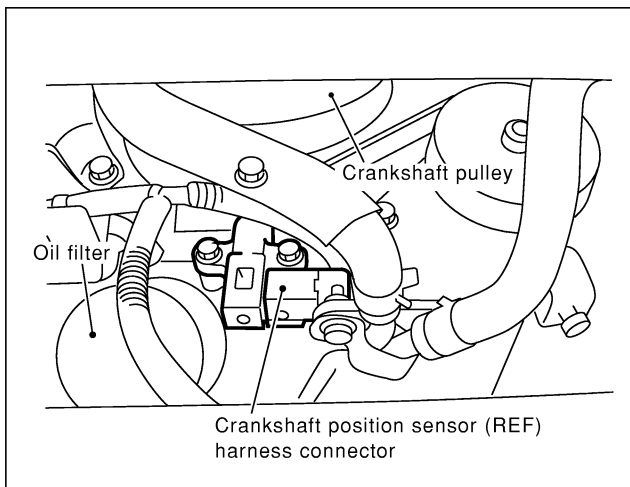
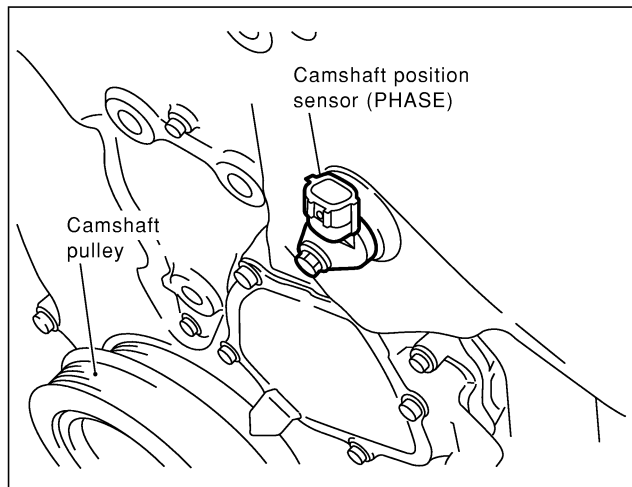
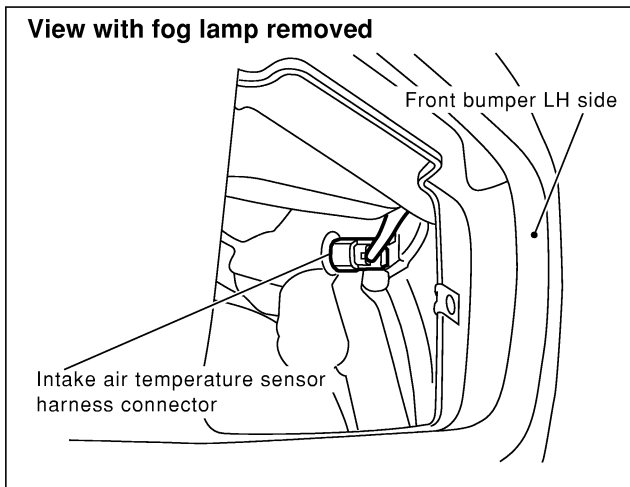
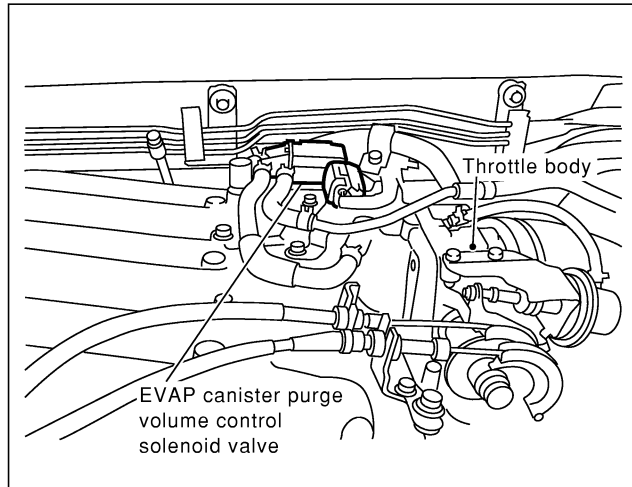
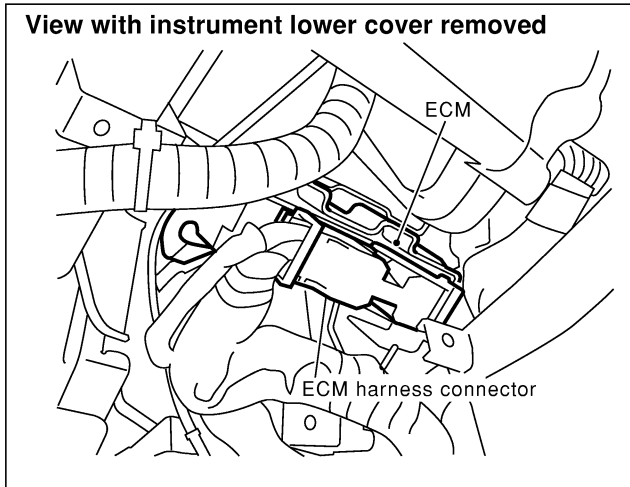
BT

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SC

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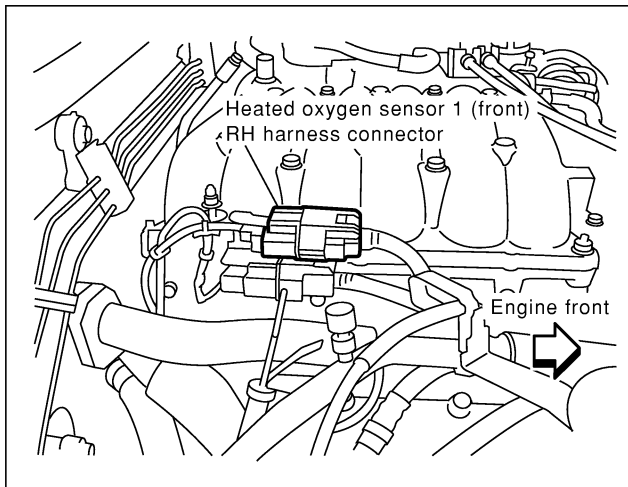
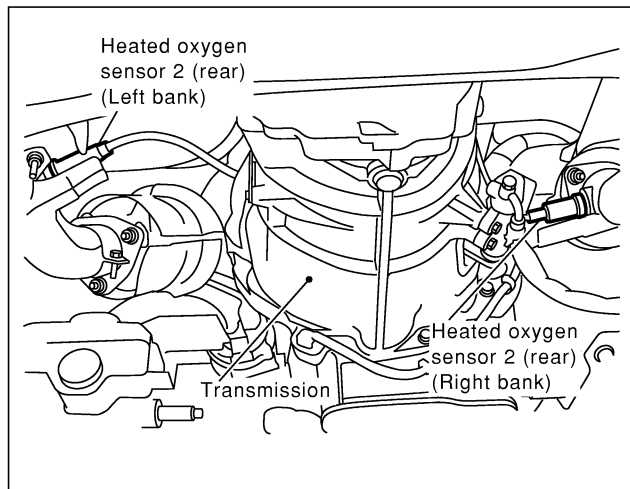
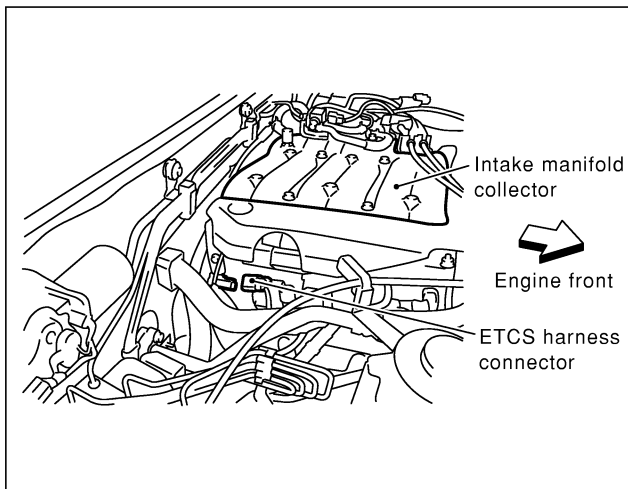
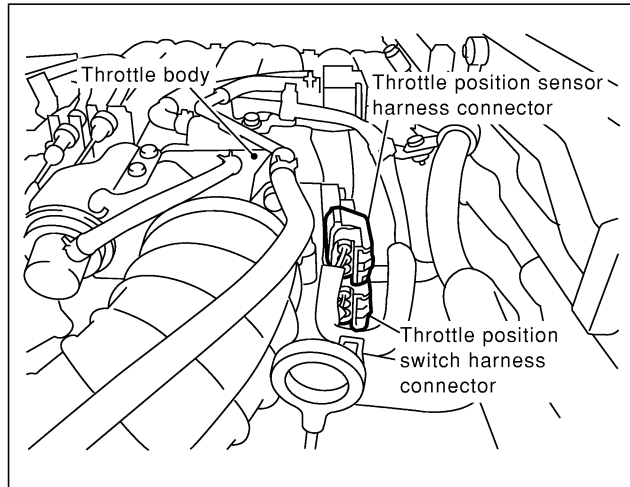
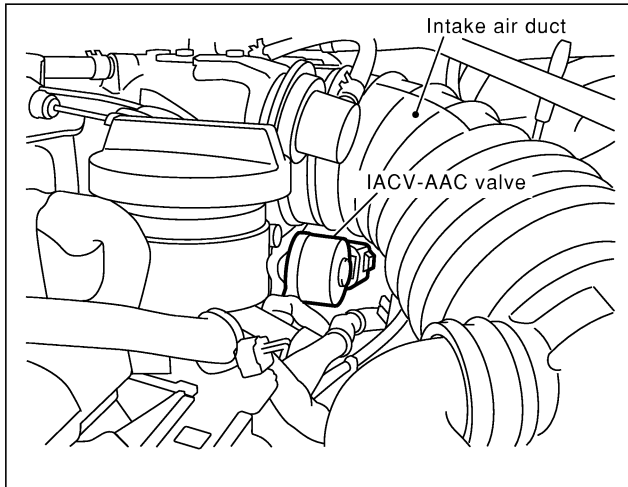
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SEF034Z

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

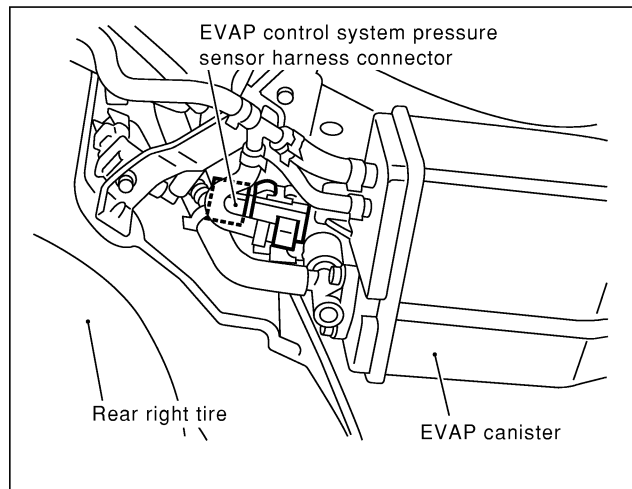
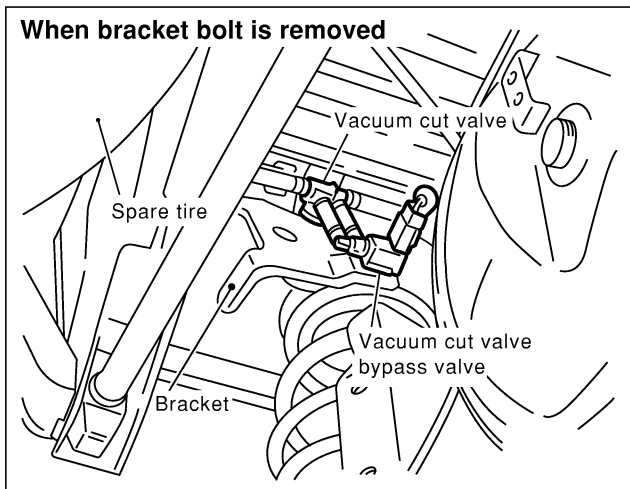
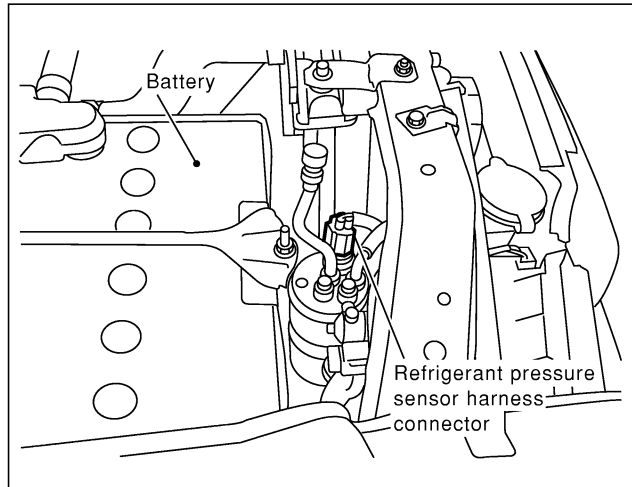
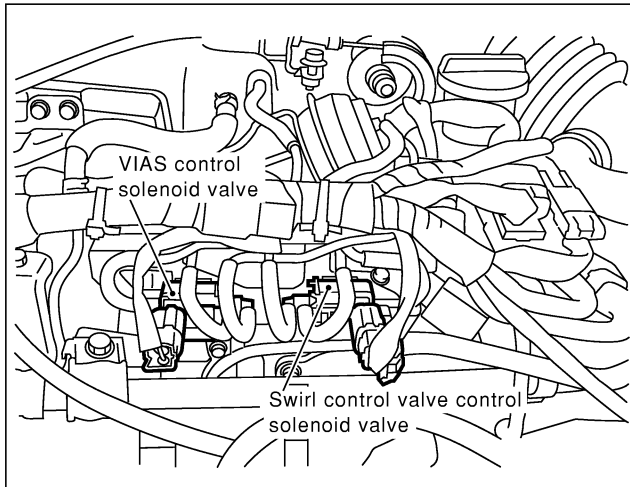
Engine Control Component Parts Location (Cont'd)



SEF584Z

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Engine Control Component Parts Location (Cont'd)



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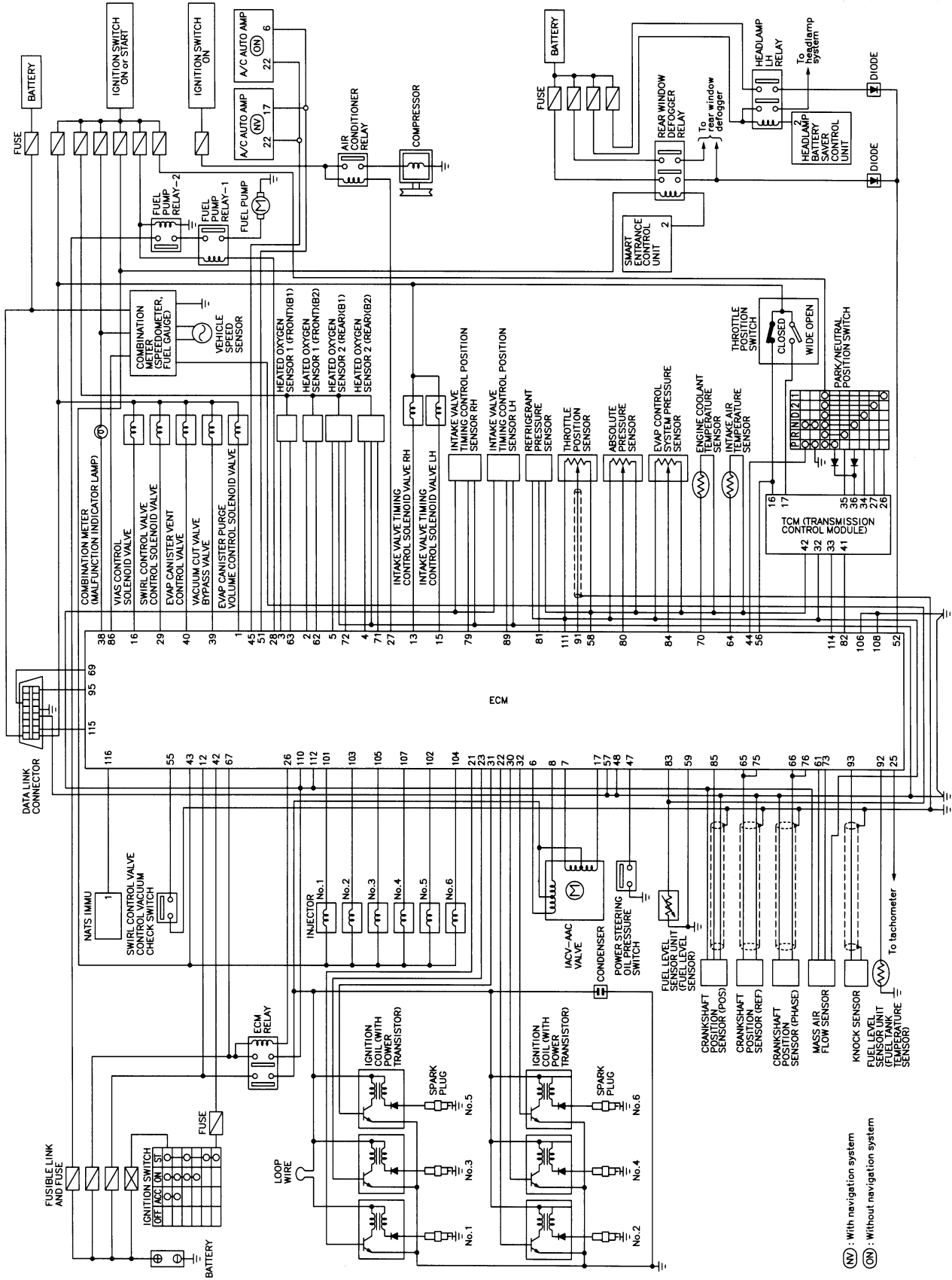
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ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Circuit Diagram

Circuit Diagram

NBEC0010



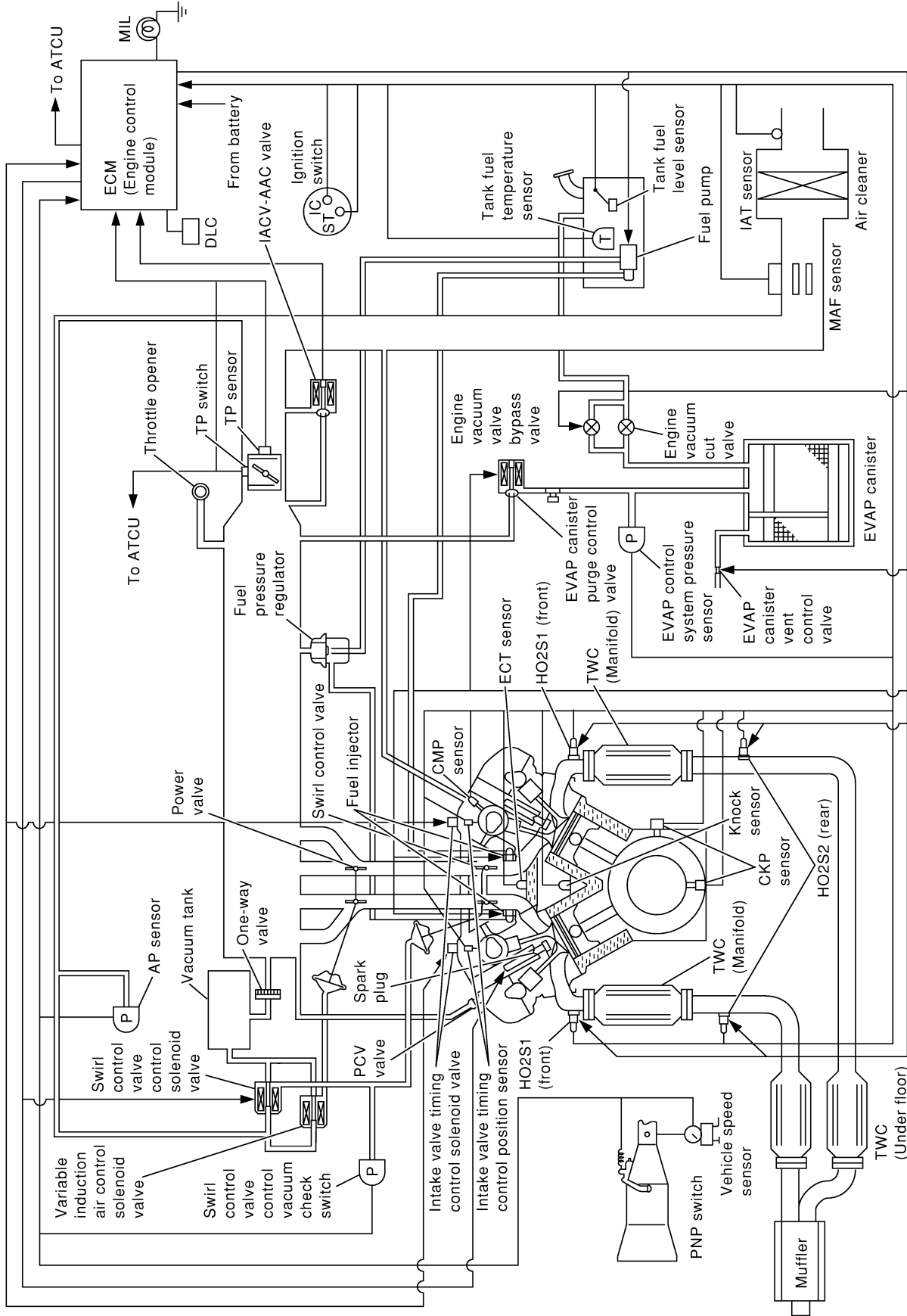
MEC939C

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Diagram

System Diagram

NBEC0011



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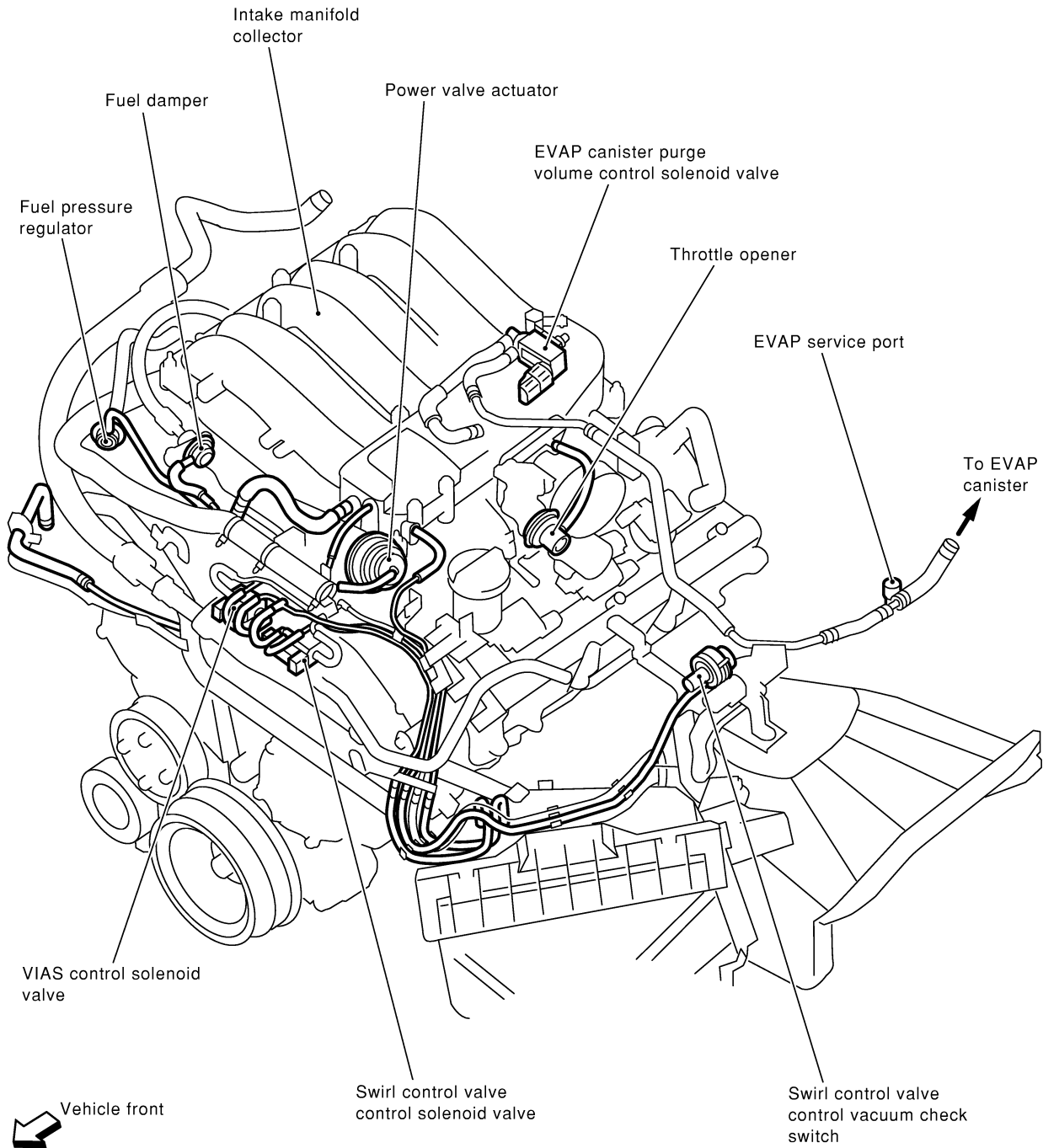
SEF930Y

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Vacuum Hose Drawing

Vacuum Hose Drawing

NBEC0012



NOTE:

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

SEF931Y

Refer to "System Diagram", EC-25 for Vacuum Control System.

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Chart

System Chart

NBEC0013

Input (Sensor)	ECM Function	Output (Actuator)	
<ul style="list-style-type: none"> ● Camshaft position sensor (PHASE) ● Crankshaft position sensor (REF) ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 (front) ● Ignition switch ● Throttle position sensor ● Closed throttle position switch*3 ● Park/neutral position (PNP) switch ● Air conditioner switch ● Knock sensor ● Intake air temperature sensor ● Absolute pressure sensor ● EVAP control system pressure sensor*1 ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Fuel tank temperature sensor*1 ● Crankshaft position sensor (POS) ● Heated oxygen sensor 2 (rear)*2 ● TCM (Transmission control module) ● Refrigerant pressure sensor ● Electrical load ● Fuel level sensor*1 	Fuel injection & mixture ratio control	Injectors	GI
	Electronic ignition system	Power transistor	MA
	Idle air control system	IACV-AAC valve	EM
	Fuel pump control	Fuel pump relay	EM
	On board diagnostic system	MIL (On the instrument panel)	LC
	Swirl control valve control	Swirl control valve control solenoid valve	EC
	Power valve control	VIAS control solenoid valve	FE
	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)	AT
	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)	TF
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve	PD
	Air conditioning cut control	Air conditioner relay	AX
	ON BOARD DIAGNOSIS for EVAP system	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● Vacuum cut valve bypass valve 	SU

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

*2: This sensor is not used to control the engine system under normal conditions.

*3: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Multiport Fuel Injection (MFI) System

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NBEC0014

NBEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Fuel injection & mixture ratio control	Injectors
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor	Ambient air barometric pressure		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NBEC0014S02

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 crankshaft position sensor and the mass air flow sensor.

Various Fuel Injection Increase/Decrease Compensation

NBEC0014S03

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

<Fuel increase>

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

<Fuel decrease>

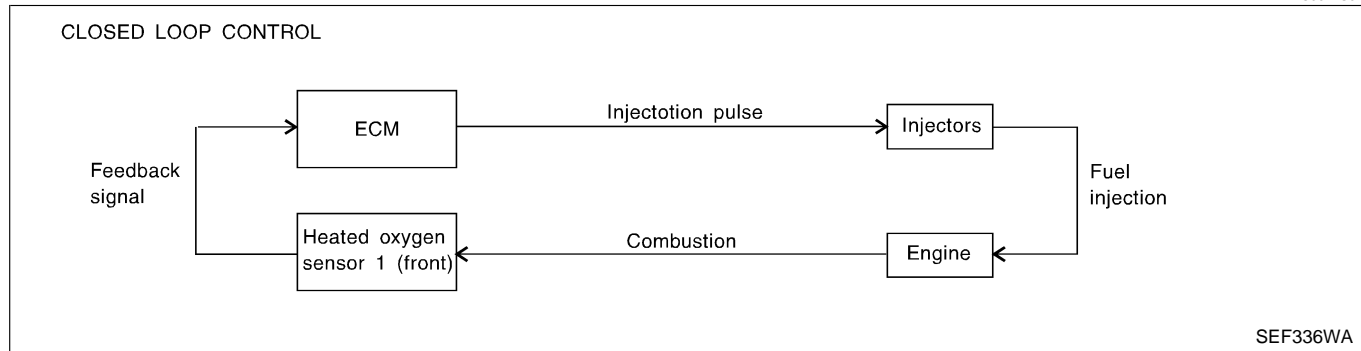
- During deceleration
- During high engine speed operation

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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

Mixture Ratio Feedback Control (Closed loop control)

NBEC0014S04



SEF336WA

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front), refer to EC-192. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 (rear) is located downstream of the warm-up three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NBEC0014S05

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

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from "N" to "D"
- When starting the engine

Mixture Ratio Self-learning Control

NBEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.

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

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

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 (front) 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.

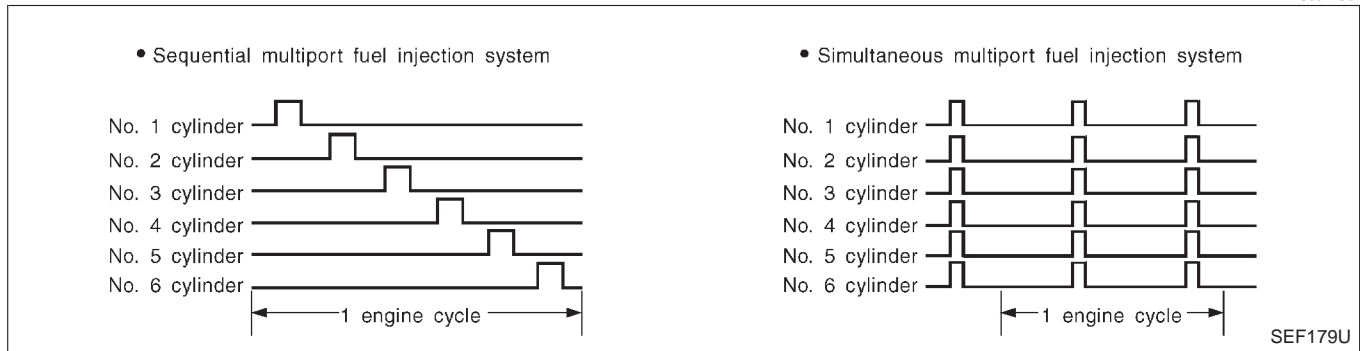
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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

Fuel Injection Timing

NBEC0014S07



Two types of systems are used.

Sequential Multipoint Fuel Injection System

NBEC0014S0701

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 Multipoint Fuel Injection System

NBEC0014S0702

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

The six injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

Fuel Shut-off

NBEC0014S08

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

Electronic Ignition (EI) System

DESCRIPTION

Input/Output Signal Chart

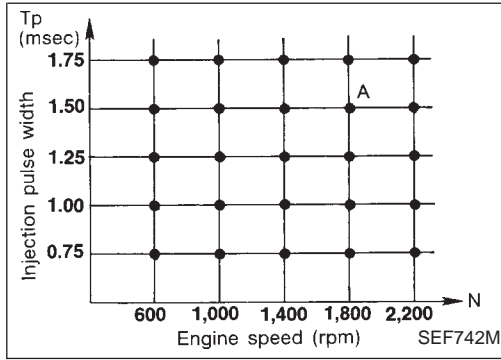
NBEC0015

NBEC0015S01

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

System Description

NBEC0015S02



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The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.

e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC

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During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

TF

PD

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.

AX

SU

Air Conditioning Cut Control

DESCRIPTION

Input/Output Signal Chart

NBEC0016

NBEC0016S01

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

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System Description

NBEC0016S02

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.

IDX

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Air Conditioning Cut Control (Cont'd)

- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

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

DESCRIPTION

Input/Output Signal Chart

NBEC0017

NBEC0017S01

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

If the engine speed is above 1,800 rpm with no load (for example, in neutral and engine speed over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

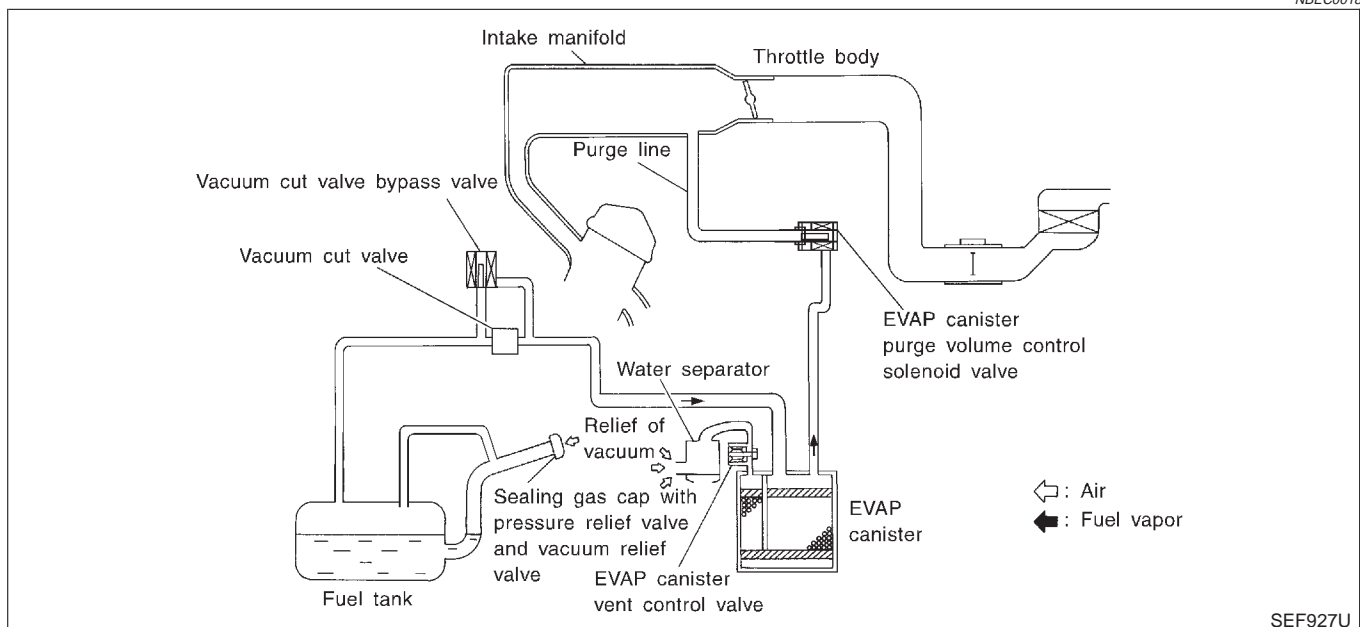
NOTE:

This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-28.

Evaporative Emission System

DESCRIPTION

NBEC0018



SEF927U

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

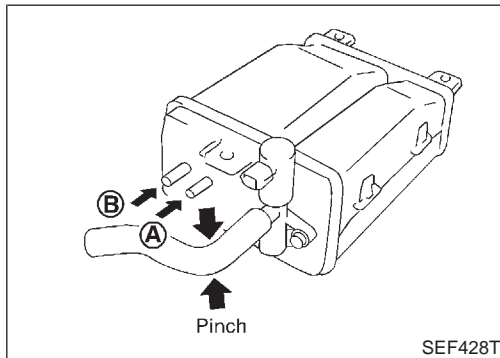
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Evaporative Emission System (Cont'd)

operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

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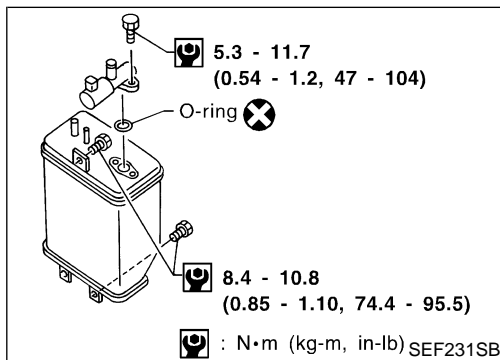
INSPECTION EVAP Canister

NBEC0019

NBEC0019S01

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.

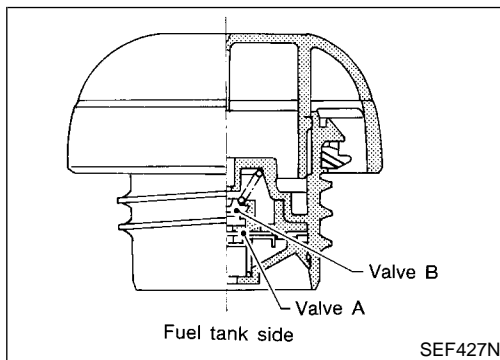


Tightening Torque

NBEC0019S02

Tighten EVAP canister as shown in the figure.

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



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

NBEC0019S03

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)

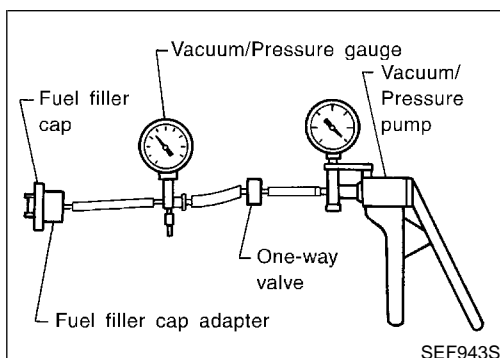
Vacuum:

-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.



ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Evaporative Emission System (Cont'd)

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve NBEC0019S04

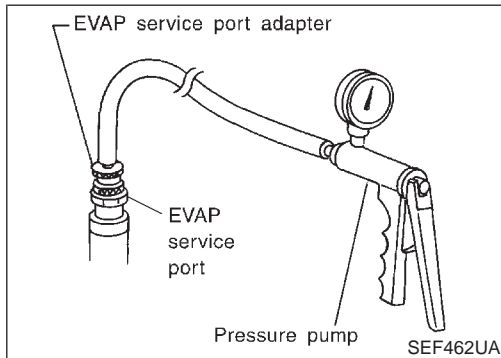
Refer to EC-591.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve NBEC0019S05

Refer to EC-367.

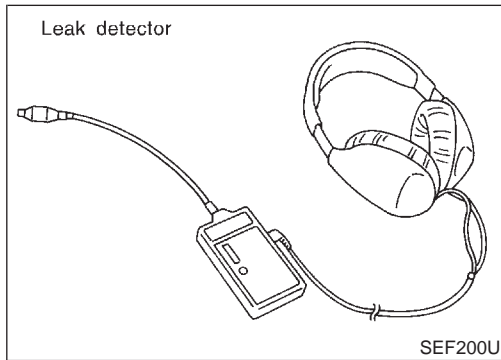
Fuel Tank Temperature Sensor NBEC0019S06

Refer to EC-309.



Evap Service Port NBEC0019S07

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 NBEC0019S08

CAUTION:

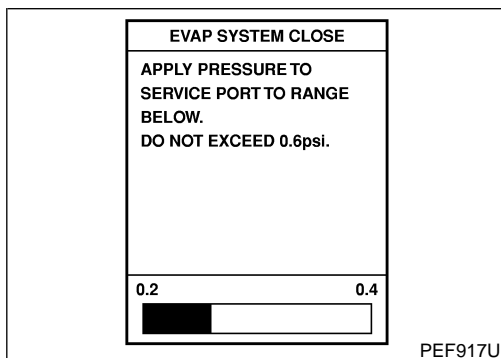
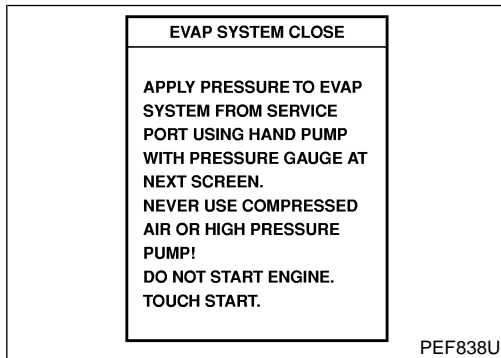
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

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

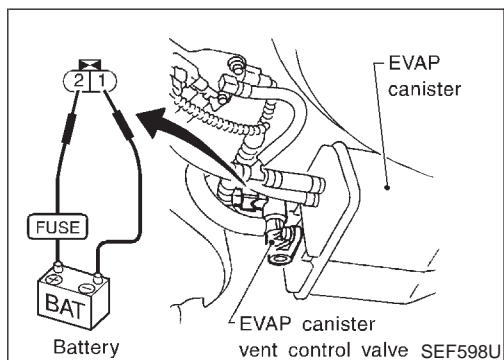
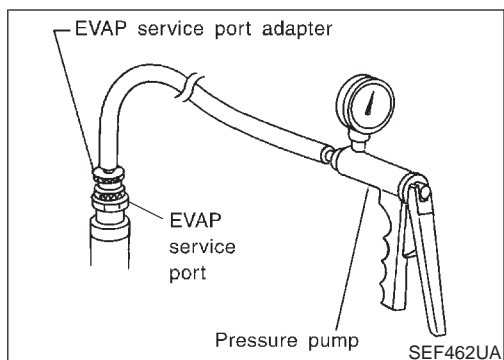
With CONSULT-II NBEC0019S0801

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump and hose to the EVAP service port adapter.
- 3) Turn ignition switch "ON".
- 4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-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 EVAP service port adapter and hose with pressure pump.
- 8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Evaporative Emission System (Cont'd)



⊗ Without CONSULT-II

NBEC0019S0802

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
- 3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
- 4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 5) Remove EVAP service port adapter and hose with pressure pump.
- 6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

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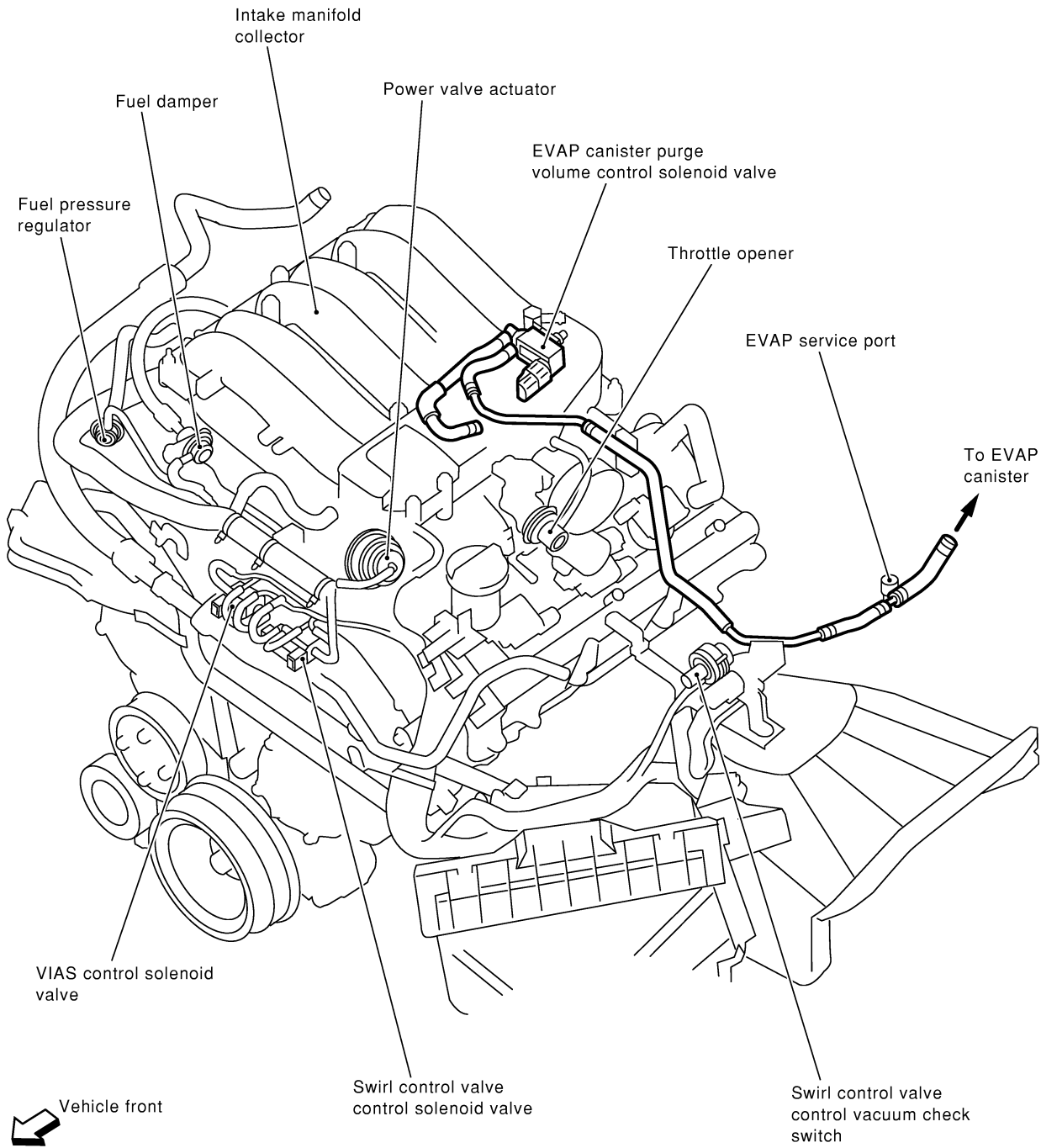
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

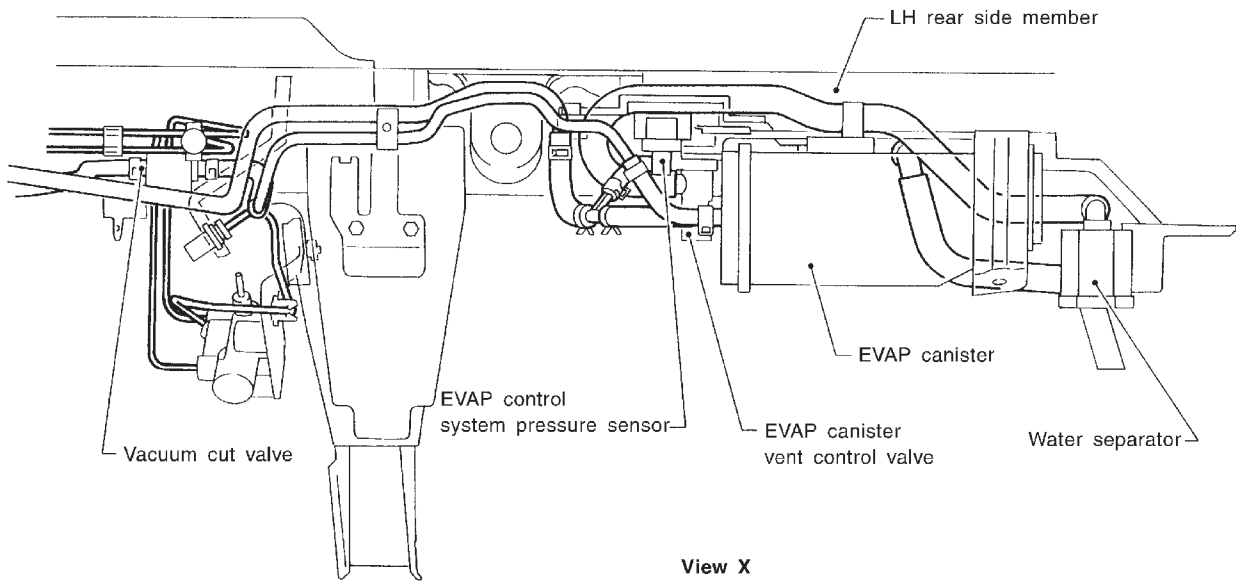
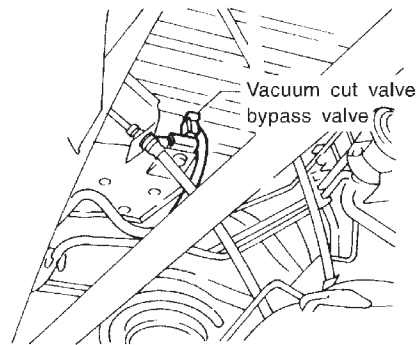
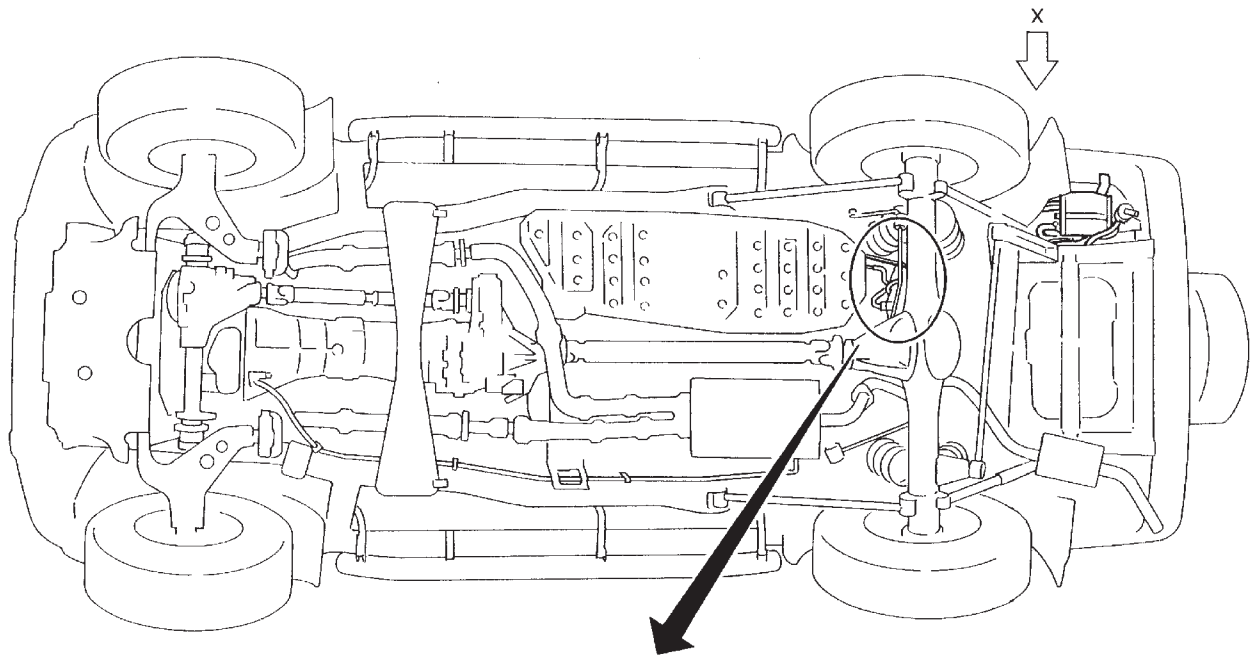
NBEC0020



SEF932Y

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Evaporative Emission System (Cont'd)



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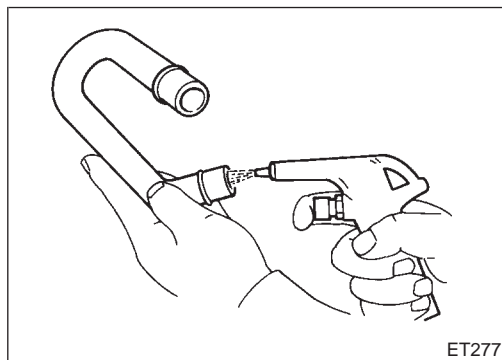
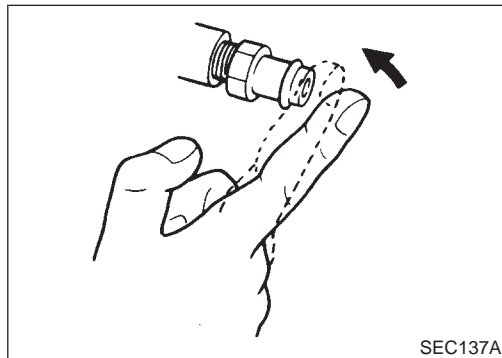
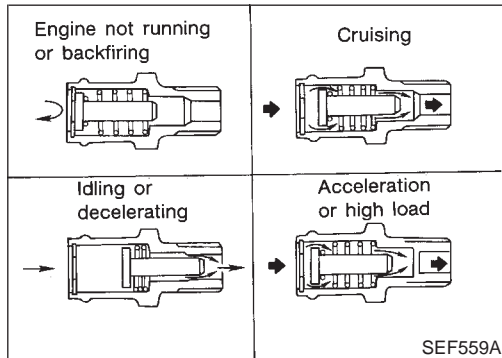
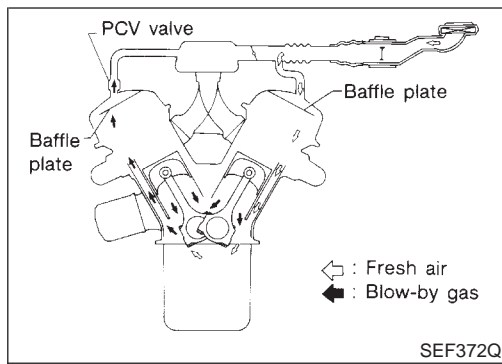
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SEF870T

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Positive Crankcase Ventilation



Positive Crankcase Ventilation DESCRIPTION

NBEC0021

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

INSPECTION

NBEC0022

PCV (Positive Crankcase Ventilation) Valve

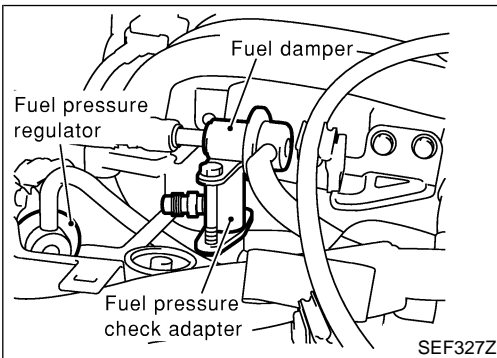
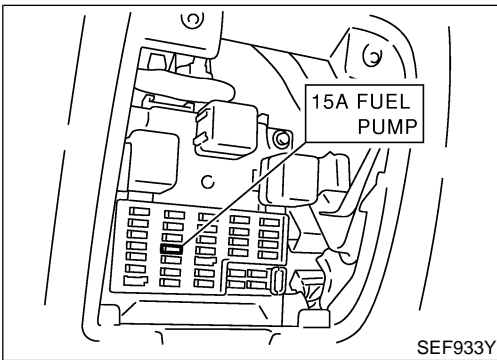
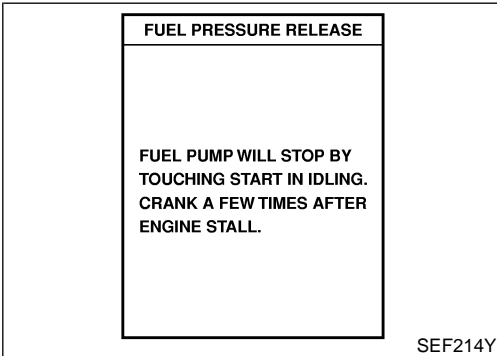
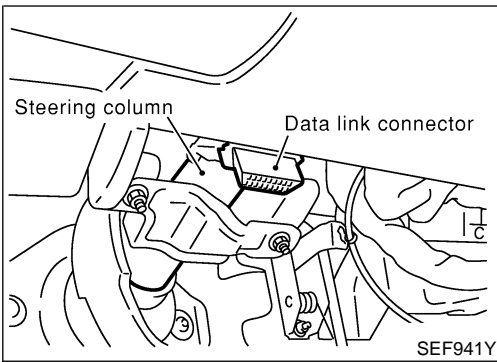
NBEC0022S01

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

PCV Valve Ventilation Hose

NBEC0022S02

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

NBEC0023

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

WITH CONSULT-II

NBEC0023S01

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

WITHOUT CONSULT-II

NBEC0023S02

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

Fuel Pressure Check

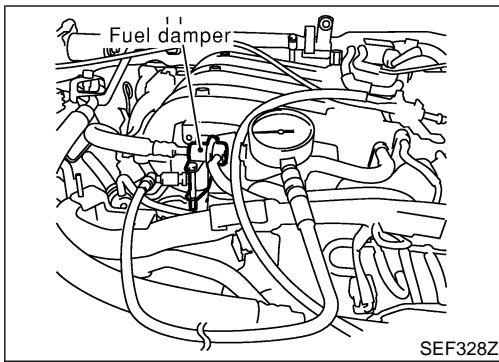
NBEC0024

- When reconnecting fuel line, always use new clamps.
 - Make sure that clamp screw does not contact adjacent parts.
 - Use a torque driver to tighten clamps.
 - Use Pressure Gauge to check fuel pressure.
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
1. Release fuel pressure to zero.
 2. Disconnect fuel tube joint between fuel damper and injector tube and set fuel pressure check adapter (J44321).

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BASIC SERVICE PROCEDURE

Fuel Pressure Check (Cont'd)



3. Install pressure gauge to the fuel pressure check adapter as shown in the figure.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

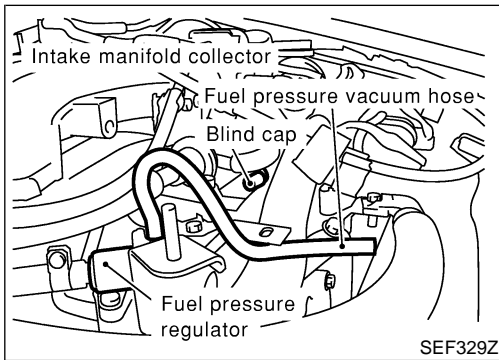
With vacuum hose connected

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

With vacuum hose disconnected

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

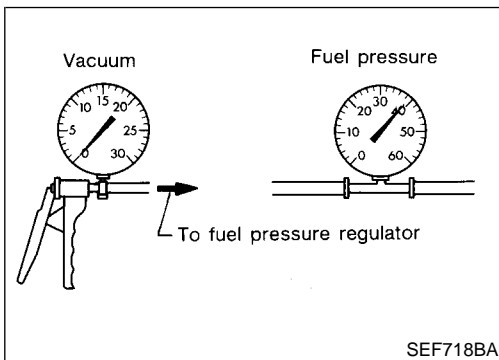
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

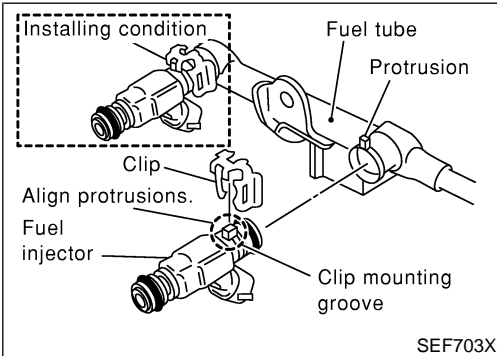
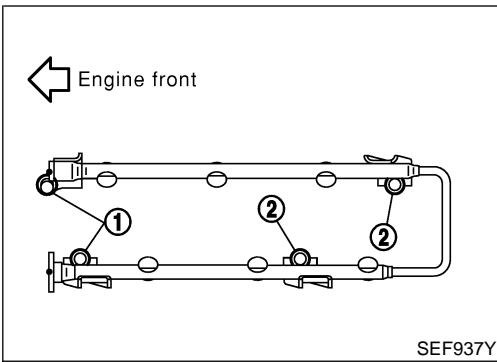
NBEC0025

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



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

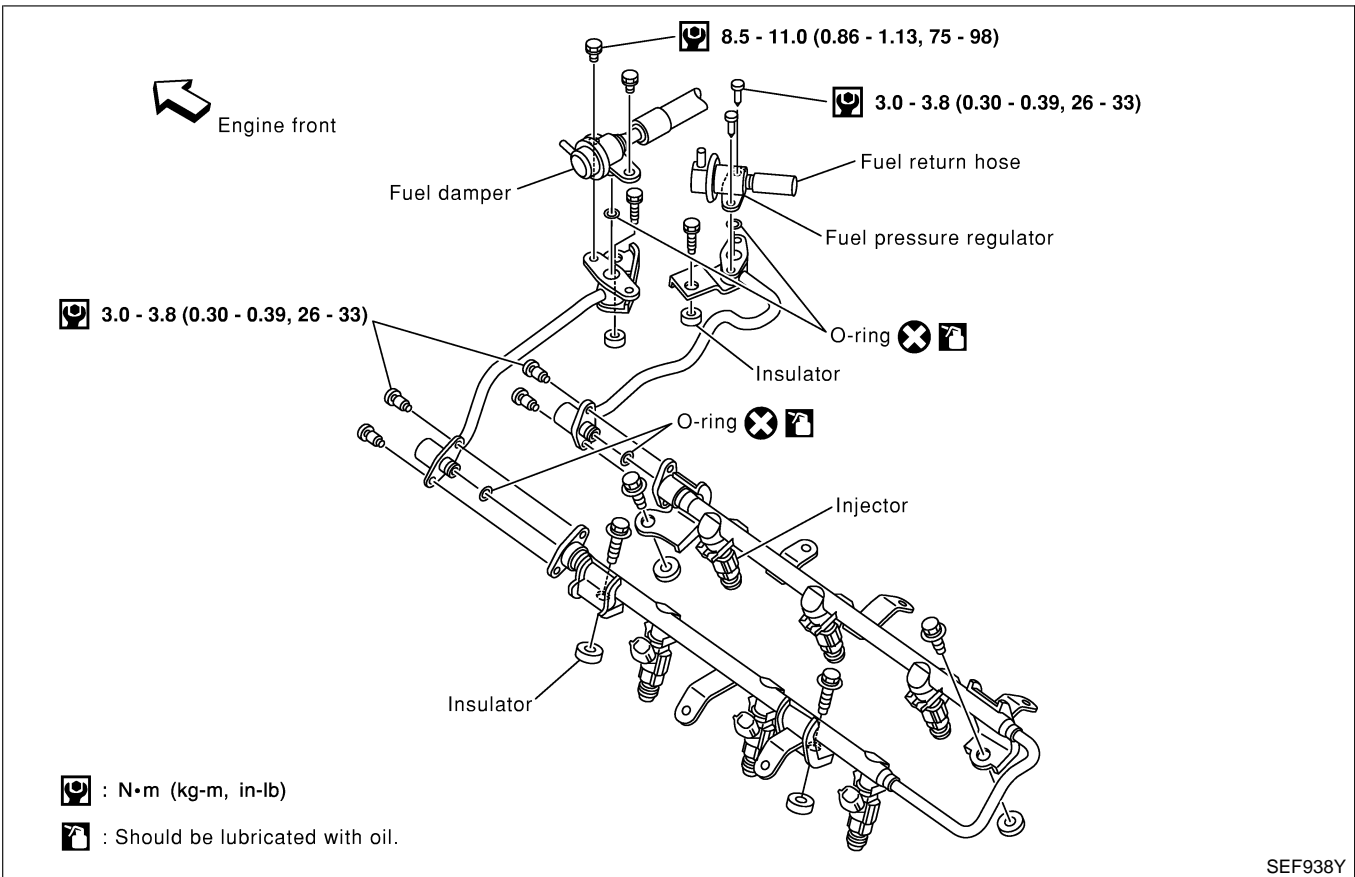
Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.



Injector REMOVAL AND INSTALLATION

NBEC0026

1. Release fuel pressure to zero.
2. Remove intake manifold collector. Refer to EM-20, "TIMING CHAIN".
3. Remove fuel tube assemblies in numerical sequence as shown in the figure at left.
4. Expand and remove clips securing fuel injectors.
5. Extract fuel injectors straight from fuel tubes.
 - **Be careful not to damage injector nozzles during removal.**
 - **Do not bump or drop fuel injectors.**
6. Carefully install O-rings, including the one used with the pressure regulator.
 - **Lubricate O-rings with a smear of engine oil.**
 - **Be careful not to damage O-rings with service tools, finger nails or clips. Do not expand or twist O-rings.**
 - **Discard old clips; replace with new ones.**
7. Position clips in grooves on fuel injectors.
 - **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**



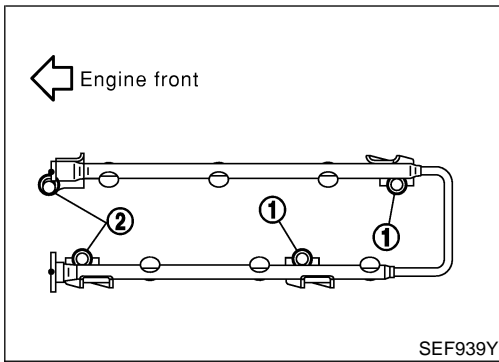
8. Align protrusions of fuel tubes with those of fuel injectors. Insert fuel injectors straight into fuel tubes.
9. After properly inserting fuel injectors, check to make sure that fuel tube protrusions are engaged with those of fuel injectors, and that flanges of fuel tubes are engaged with clips.

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BASIC SERVICE PROCEDURE

Injector (Cont'd)



10. Tighten fuel tube assembly mounting nuts in numerical sequence (indicated in the figure at left) and in two stages.

: Tightening torque N-m (kg-m, ft-lb)

1st stage:

9.3 - 10.8 (1.0 - 1.1, 6.9 - 7.9)

2nd stage:

20.6 - 26.5 (2.1 - 2.7, 16 - 19)

11. Install all parts removed in reverse order of removal.

CAUTION:

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

How to Check Idle Speed and Ignition Timing

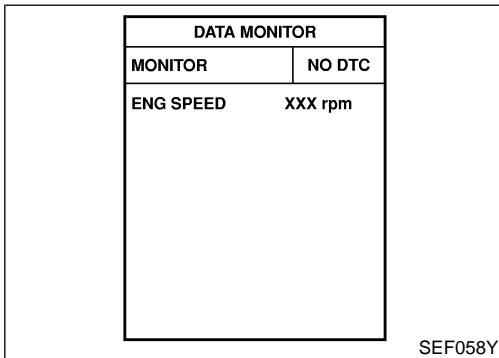
NBEC0607

IDLE SPEED

NBEC0607S01

- Using CONSULT-II

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



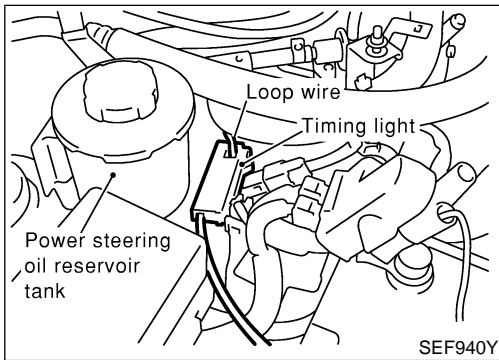
IGNITION TIMING

NBEC0607S02

Any of following two methods may be used.

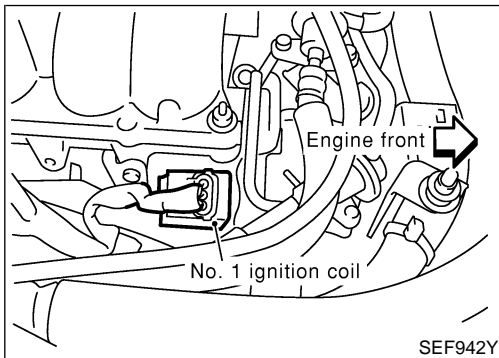
- Method A

- Attach timing light to loop wire as shown.
- Check ignition timing.



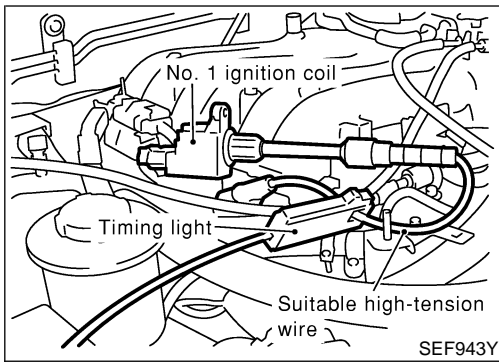
- Method B

- Remove No. 1 ignition coil.

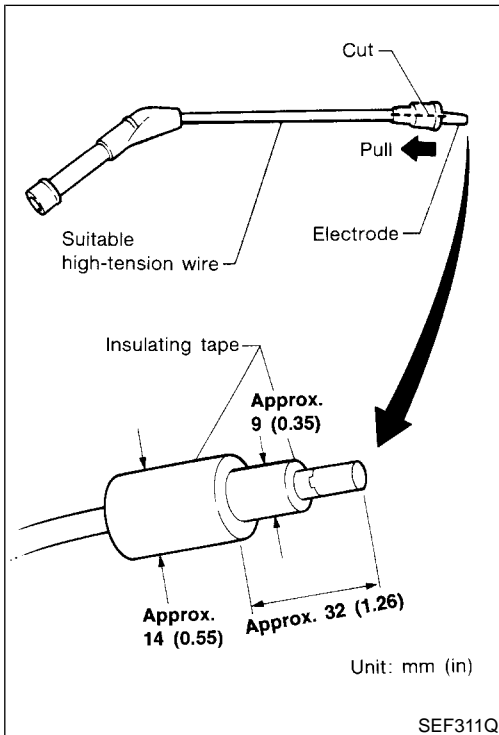
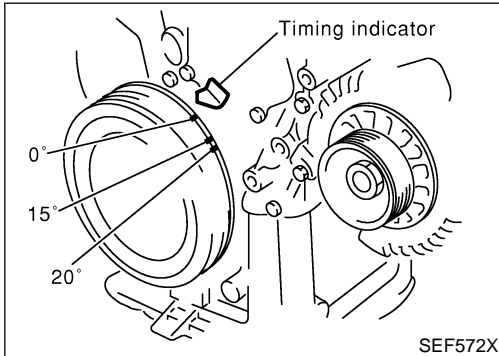


BASIC SERVICE PROCEDURE

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



- b) 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.
- c) Check ignition timing.



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

PREPARATION

- 1) Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - ECM harness connector
 - Vacuum hoses

NBEC0028

NBEC0028S01

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BASIC SERVICE PROCEDURE

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

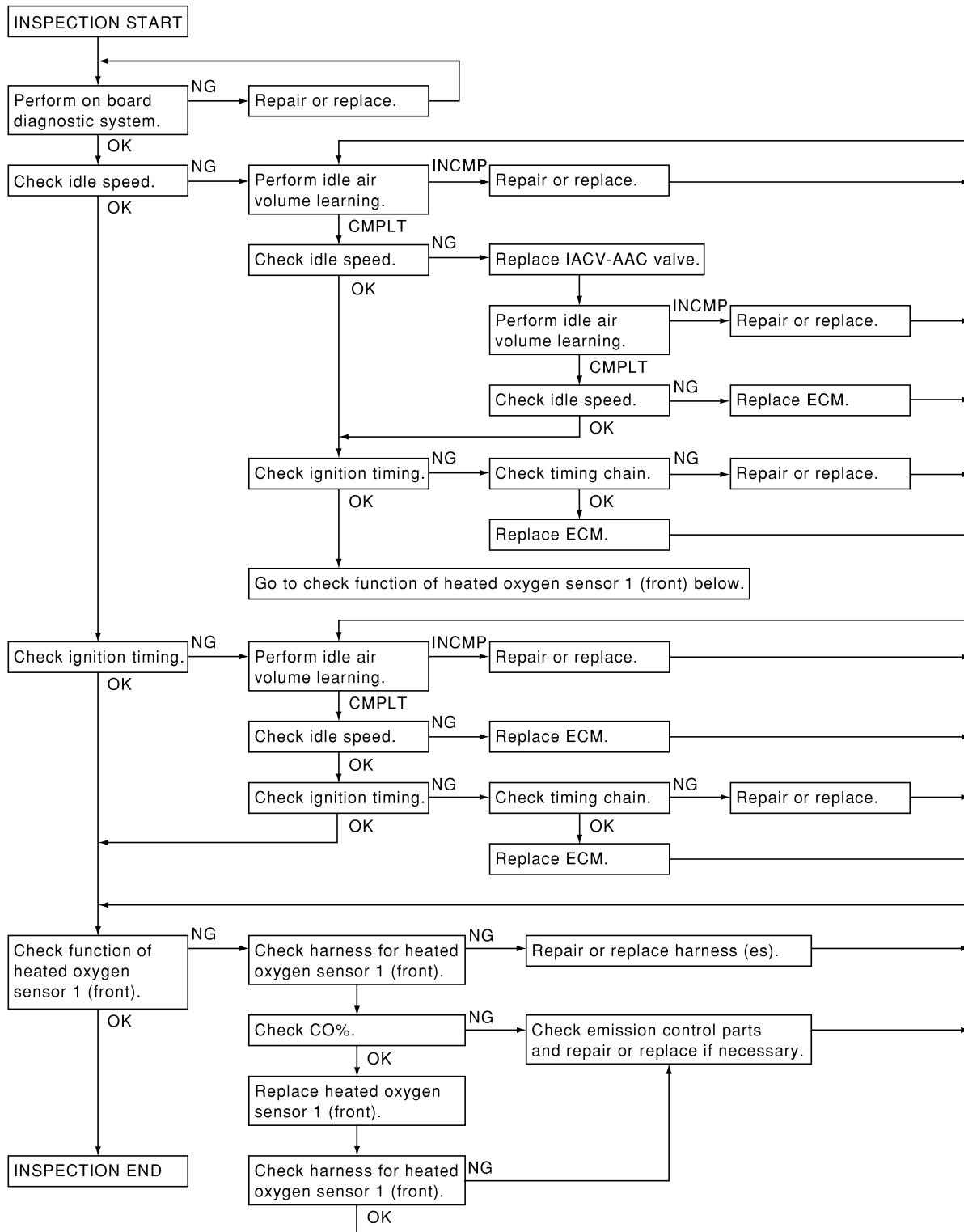
- Air intake system
(Oil filler cap, oil level gauge, etc.)
 - Fuel pressure
 - Engine compression
 - Throttle valve
 - Evaporative emission system
- 2) On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
 - 3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
 - 4) When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
 - 5) Turn off headlamps, heater blower, rear defogger.
 - 6) Keep front wheels pointed straight ahead.
 - 7) Make the check after the cooling fan has stopped.

BASIC SERVICE PROCEDURE

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

Overall Inspection Sequence

NBEC0028S0101



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.

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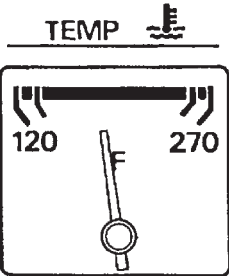
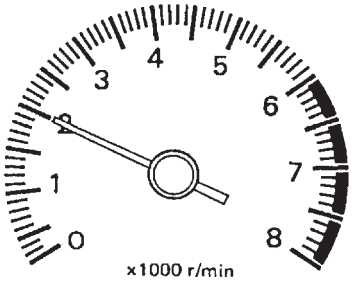
SEC141C

BASIC SERVICE PROCEDURE

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

=NBEC0028S02

INSPECTION PROCEDURE

1	INSPECTION START		
		<p>1. Visually check the following:</p> <ul style="list-style-type: none"> ● Air cleaner clogging ● Hoses and ducts for leaks ● Electrical connectors ● Gasket ● Throttle valve and throttle position sensor operation <p>2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.</p> <div style="text-align: center;">  <p style="font-size: small;">TEMP </p> </div>	
		<p>3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.</p> <div style="text-align: center;">  <p style="font-size: small;">x1000 r/min</p> </div>	SEF976U
		<p>4. Make sure that no DTC is displayed with CONSULT-II or GST.</p> <p style="text-align: center;">OK or NG</p>	SEF977U
	OK	▶	GO TO 3.
	NG	▶	GO TO 2.

2	REPAIR OR REPLACE		
		Repair or replace components as necessary according to corresponding "Diagnostic Procedure".	
		▶	GO TO 3.

3	CHECK TARGET IDLE SPEED		
		<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) 	
		<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center;">OK or NG</p>	
	OK	▶	GO TO 12.
	NG	▶	GO TO 4.

BASIC SERVICE PROCEDURE

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

4	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
CMPLT or INCMP		
CMPLT	▶	GO TO 5.
INCMP	▶	1. Follow the construction of "Idle Air Volume Learning". 2. GO TO 4.

5	CHECK TARGET IDLE SPEED AGAIN	
<input type="checkbox"/> With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position)		
<input checked="" type="checkbox"/> Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position)		
OK or NG		
OK	▶	GO TO 10.
NG	▶	GO TO 6.

6	REPLACE IACV-AAC VALVE	
Replace IACV-AAC valve.		
	▶	GO TO 7.

7	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
CMPLT or INCMP		
CMPLT	▶	GO TO 8.
INCMP	▶	1. Follow the construction of "Idle Air Volume Learning". 2. GO TO 4.

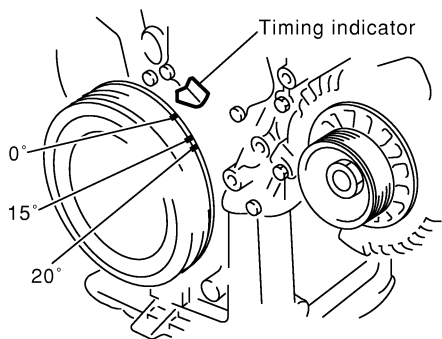
8	CHECK TARGET IDLE SPEED AGAIN	
<input type="checkbox"/> With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position)		
<input checked="" type="checkbox"/> Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position)		
OK or NG		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

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BASIC SERVICE PROCEDURE

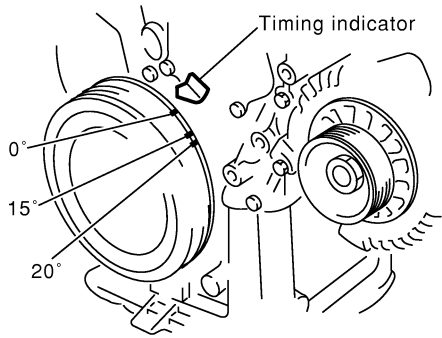
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

9	CHECK ECM FUNCTION
<ol style="list-style-type: none"> 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-74. 	
▶	GO TO 4.

10	CHECK IGNITION TIMING
<ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check ignition timing at idle using a timing light. 	
	
<p>15°±5° BTDC (in "P" or "N" position)</p> <p>OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ GO TO 11.

SEF572X

11	CHECK TIMING CHAIN INSTALLATION
Check timing chain installation. Refer to EM-29, "Installation".	
OK or NG	
OK	▶ GO TO 9.
NG	▶ <ol style="list-style-type: none"> 1. Repair the timing chain installation. 2. GO TO 4.

12	CHECK IGNITION TIMING
<ol style="list-style-type: none"> 1. Start engine and let it idle. 2. Check ignition timing at idle using a timing light. 	
	
<p>15°±5° BTDC (in "P" or "N" position)</p> <p>OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ GO TO 13.

SEF572X

BASIC SERVICE PROCEDURE

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

13	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
CMPLT or INCMP		
CMPLT	▶	GO TO 14.
INCMP	▶	1. Follow the construction of "Idle Air volume Learning". 2. GO TO 13.

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14	CHECK TARGET IDLE SPEED AGAIN	
<input type="checkbox"/> With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position)		
<input checked="" type="checkbox"/> Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position)		
OK or NG		
OK	▶	GO TO 16.
NG	▶	GO TO 15.

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15	CHECK ECM FUNCTION	
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-74.		
	▶	GO TO 13.

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16	CHECK IGNITION TIMING AGAIN	
Check ignition timing again. Refer to Test No. 12.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

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17	CHECK TIMING CHAIN INSTALLATION	
Check timing chain installation. Refer to EM-29, "Installation".		
OK or NG		
OK	▶	GO TO 15.
NG	▶	1. Repair the timing chain installation. 2. GO TO 13.


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BASIC SERVICE PROCEDURE

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

18	ERASE UNNECESSARY DTC	
<p>After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72 and AT-35, "HOW TO ERASE DTC".</p>		
With CONSULT-II	▶	GO TO 19.
Without CONSULT-II	▶	GO TO 20.

19	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL											
<p> With CONSULT-II</p> <ol style="list-style-type: none"> Run engine at about 2,000 rpm for about 2 minutes under no-load. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 												
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF945Y												
OK or NG												
OK	▶	GO TO 23.										
NG (Monitor does not fluctuate.)	▶	GO TO 28.										
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 21.										

20	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> Run engine at about 2,000 rpm for about 2 minutes under no-load. Set voltmeter probe between ECM terminal 62 and ground. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>		
OK or NG		
OK	▶	GO TO 23.
NG (Voltage does not fluctuate.)	▶	GO TO 28.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 21.

BASIC SERVICE PROCEDURE

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


21	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL	
<p>Ⓢ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 62 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II) ▶		GO TO 23.
OK (Without CONSULT-II) ▶		GO TO 24.
NG ▶		GO TO 22.


22	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-40. 2. Check mass air flow sensor and its circuit. Refer to EC-150. 3. Check injector and its circuit. Refer to EC-616. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-187. 5. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
▶		GO TO 3.

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BASIC SERVICE PROCEDURE

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

23	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL											
<p> With CONSULT-II</p> <p>1. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.</p> <p>2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITOR</th> <th style="text-align: center;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B1)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF945Y												
OK or NG												
OK	▶	INSPECTION END										
NG (Monitor does not fluctuate.)	▶	GO TO 27.										
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 25.										

24	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL	
<p> Without CONSULT-II</p> <p>1. Set voltmeter probe between ECM terminal 63 and ground.</p> <p>2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.</p> <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>		
OK or NG		
OK	▶	INSPECTION END
NG (Voltage does not fluctuate.)	▶	GO TO 27.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 25.

BASIC SERVICE PROCEDURE

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

25	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL	
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 63 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK		▶ INSPECTION END
NG		▶ GO TO 26.

GI
 MA
 EM
 LG
EC
 FE
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

26	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Check fuel pressure regulator. Refer to EC-40. ● Check mass air flow sensor and its circuit. Refer to EC-150. ● Check injector and its circuit. Refer to EC-616. Clean or replace if necessary. ● Check engine coolant temperature sensor and its circuit. Refer to EC-187. ● Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
		▶ GO TO 3.

27	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (front) (bank 1) harness connector. 4. Check harness continuity between ECM terminal 63 and heated oxygen sensor 1 (front) RH harness connector terminal 1. Refer to Wiring Diagram, EC-196. Continuity should exist. <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 30.
NG		▶ GO TO 29.

BASIC SERVICE PROCEDURE

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

28	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (front) (bank 2) harness connector. 4. Check harness continuity between ECM terminal 62 and front heated oxygen sensor LH harness connector terminal 1. Refer to Wiring Diagram, EC-197. <p style="margin-left: 20px;">Continuity should exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 30.
NG	▶	GO TO 29.

29	REPAIR OR REPLACE	
Repair or replace harness between ECM and heated oxygen sensor 1 (front).		
	▶	GO TO 3.

30	PREPARATION FOR "CO" % CHECK																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect ECM harness connector. 2. Turn ignition switch "ON". 3. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode. 4. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DOWN" and "Qd". 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG COOLANT TEMP</td> <td style="text-align: center;">XXX °C</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">INJ PULSE-B1</td> <td style="text-align: center;">XXX msec</td> </tr> <tr> <td style="text-align: center;">IGN TIMING</td> <td style="text-align: center;">XXX BTDC</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		ENG COOLANT TEMP	XXX °C	MONITOR		ENG SPEED	XXX rpm	INJ PULSE-B1	XXX msec	IGN TIMING	XXX BTDC								
ACTIVE TEST																						
ENG COOLANT TEMP	XXX °C																					
MONITOR																						
ENG SPEED	XXX rpm																					
INJ PULSE-B1	XXX msec																					
IGN TIMING	XXX BTDC																					
SEF172Y																						

<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Disconnect engine coolant temperature sensor harness connector. 3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector. 		
<p style="text-align: center;">Engine coolant temperature sensor harness connector</p> <p style="text-align: center;">4.4kΩ resistor</p>		
SEF982UA		
	▶	GO TO 31.

BASIC SERVICE PROCEDURE

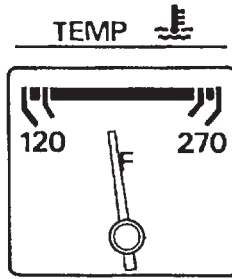
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

GI
MA
EM
LC
EC
FE
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

31 CHECK "CO" %

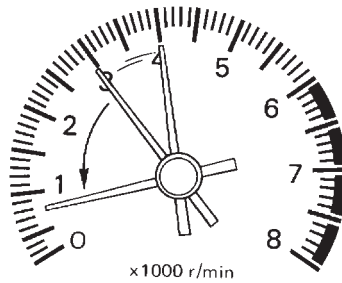
With CONSULT-II

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



SEF976U

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

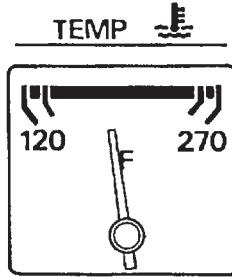


SEF978U

3. Check "CO" %.
Idle CO: 1.0 - 9.5%

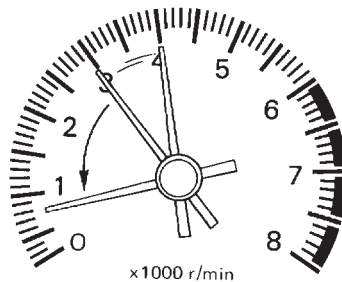
Without CONSULT-II

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



SEF976U

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



SEF978U

3. Check "CO" %.
4. After checking CO%,
 - a. Disconnect the resistor from terminals of engine coolant temperature sensor.
 - b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK or NG

OK	▶	GO TO 32.
NG	▶	GO TO 33.

BASIC SERVICE PROCEDURE

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

32	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) SIGNAL	
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1)/(bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode. 6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (front) (bank 1)/(bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 63 or 62 and ground. 6. Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 33.

33	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Connect heated oxygen sensor 1 (front) harness connectors to heated oxygen sensor 1 (front). ● Check fuel pressure regulator. Refer to EC-40. ● Check mass air flow sensor and its circuit. Refer to EC-150. ● Check injector and its circuit. Refer to EC-616. Clean or replace if necessary. ● Check engine coolant temperature sensor and its circuit. Refer to EC-187. ● Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
▶		GO TO 3.

NBEC0642

NBEC0642S01

NBEC0642S02

NBEC0642S03

NBEC0642S0301

SELECT WORK ITEM
TP SW/TP SEN IDLE POSI ADJ
FUEL PRESSURE RELEASE
IDLE AIR VOL LEARN
SELF-LEARNING CONT
EVAP SYSTEM CLOSE
TARGET ING TIM ADJ

SEF452Y

WORK SUPPORT	
IDLE AIR VOL LEARN	
MONITOR	
ENG SPEED	XXX rpm
START	

SEF454Y

WORK SUPPORT	
IDLE AIR VOL LEARN	CMPLT
MONITOR	
ENG SPEED	XXX rpm
Result appears.	
CMPLT: successful	
INCMP: unsuccessful	
START	

SEF455Y

Idle Air Volume Learning

DESCRIPTION

"Idle Air Volume Learning" is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time IACV-AAC valve, throttle body or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PRE-CONDITIONING

Before performing "Idle Air Volume Learning", make sure that all of the following conditions are satisfied.

Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 99°C (158 - 210°F)
- PNP switch: ON
- Electric load switch: OFF
(Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime running light systems, if the parking brake is applied before the engine is started the headlamp will not illuminate.

- Cooling fan motor: Not operating
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
For A/T models without CONSULT-II, drive vehicle for 10 minutes.

OPERATION PROCEDURE

④ With CONSULT-II

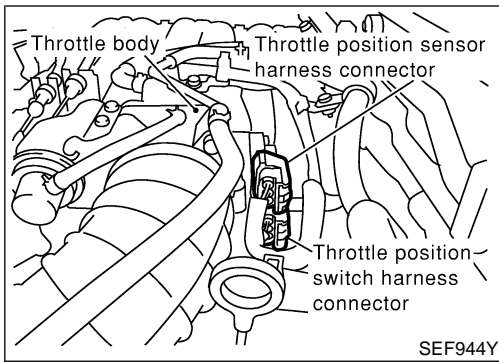
1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic "PRE-CONDITIONING" (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
8. Touch "START" and wait 20 seconds.
9. Make sure that "CMPLT" is displayed on CONSULT-II screen. If "INCMP" is displayed, "Idle Air Volume Learning" will not be carried out successfully. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	750±50 rpm (in "P" or "N" position)
Ignition timing	15°±5° BTDC (in "P" or "N" position)

GI
MA
EM
LC
EC
FE
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

BASIC SERVICE PROCEDURE

Idle Air Volume Learning (Cont'd)



⊗ Without CONSULT-II

NBEC0642S0302

1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic "PRE-CONDITIONING" (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Disconnect throttle position sensor harness connector (brown), then reconnect it within 5 seconds.
8. Wait 20 seconds.
9. Make sure that idle speed is within specifications. If not, the result will be incomplete. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	750±50 rpm (in "P" or "N" position)
Ignition timing	15°±5° BTDC (in "P" or "N" position)

NOTE:

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

- 1) Check that throttle valve is fully closed.
- 2) Check PCV valve operation.
- 3) Check that downstream of throttle valve is free from air leakage.
- 4) Adjust closed throttle position switch and reset memory. (Refer to Basic Inspection, EC-101.)
- 5) When the above four items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem. It is useful to perform "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-136.
- 6) If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform "Idle air volume learning" all over again:
 - Engine stalls.
 - Erroneous idle.
 - Blown fuses related to the IACV-AAC valve system.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Introduction

Introduction

NBEC0029

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

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

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

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	X	X	X	X	X	—
GST	X	X*1	X	—	X	X

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

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

Two Trip Detection Logic

NBEC0030

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

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

X: Applicable —: Not Exit

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0605 — 0608) is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0605 — 0608) is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148 (0307), P1168 (0308)	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-117.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information

Emission-related Diagnostic Information

NBEC0031

DTC AND 1ST TRIP DTC

NBEC0031S01

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

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

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-69. 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 EC-99. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

NBEC0031S0101

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

 With CONSULT-II

 With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, 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, GST does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

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

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

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

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS			DTC RESULTS	
	TIME			TIME	
	MAF SEN/CIRCUIT [P0100]	0		MAF SEN/CIRCUIT [P0100]	1t

SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NBEC0031S02

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-85.

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

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

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

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72.

SYSTEM READINESS TEST (SRT) CODE

NBEC0031S03

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

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

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

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

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

NOTE:

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

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

NOTE:

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

SRT Item

=NBEC0031S0310

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

SRT item (CONSULT-II indication)	Performance Priority*	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
	3	EVAP control system (very small leak) (negative pressure)/ (positive pressure)	P1441
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Heated oxygen sensor 1 (front) (circuit)	P0130, P0150
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131, P0151
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132, P0152
		Heated oxygen sensor 1 (front) (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (front) (high voltage)	P0134, P0154
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137, P0157
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138, P0158
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139, P0159
O2 SEN HEATER	3	Heated oxygen sensor 1 heater (front)	P0135, P0155
		Heated oxygen sensor 2 heater (rear)	P0141, P0161

*: 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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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 →
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:

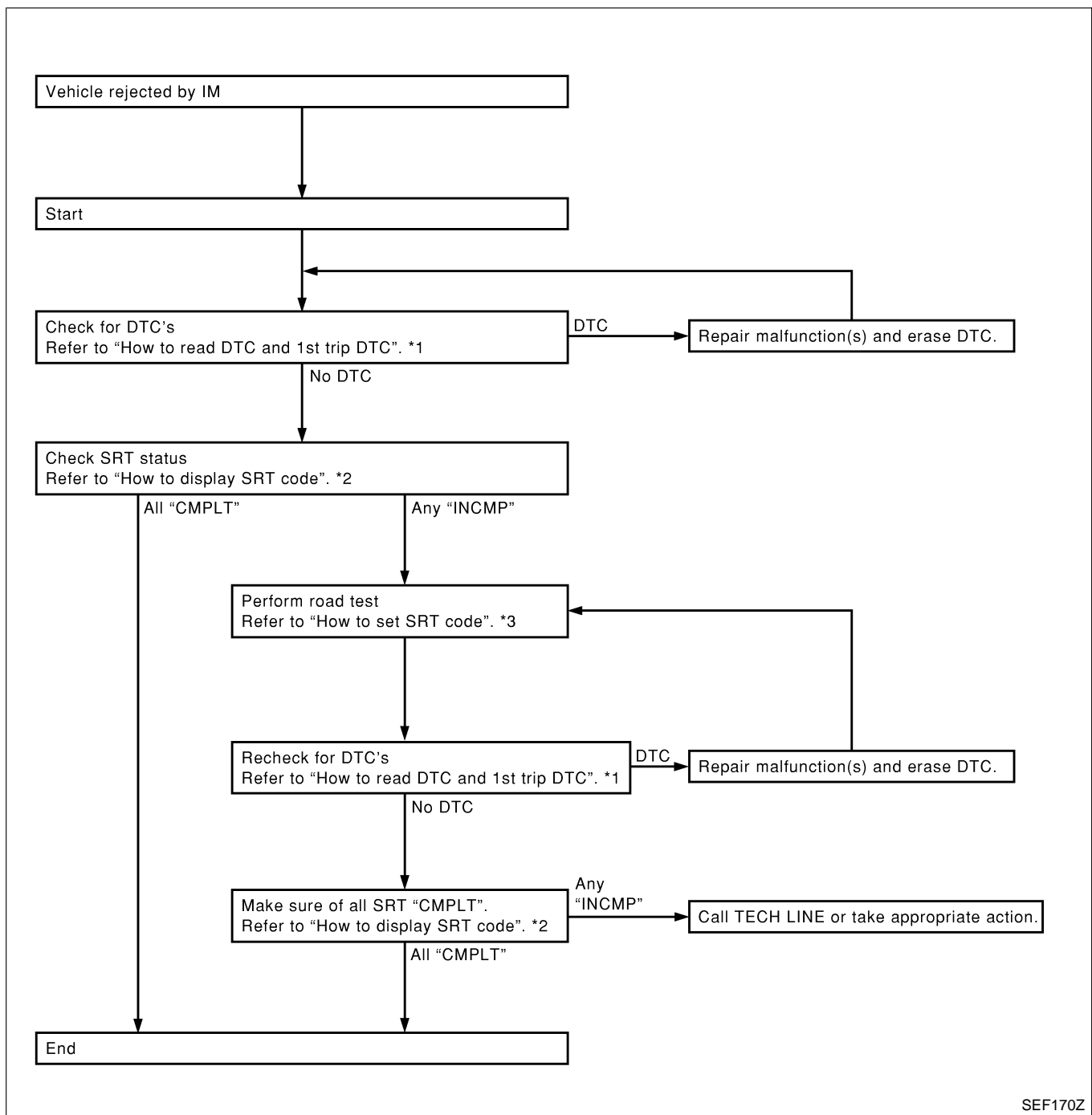
SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)



SEF170Z

*1 EC-60

*2 EC-64

*3 EC-65

How to Display SRT Code

With CONSULT-II

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

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

With GST

Selecting Mode 1 with GST (Generic Scan Tool)

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

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

NBEC0031S0301

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	CMPLT

SEF949Z

GI

MA

EM

LC

EC

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. NBEC0031S0302

With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-62.

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.

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

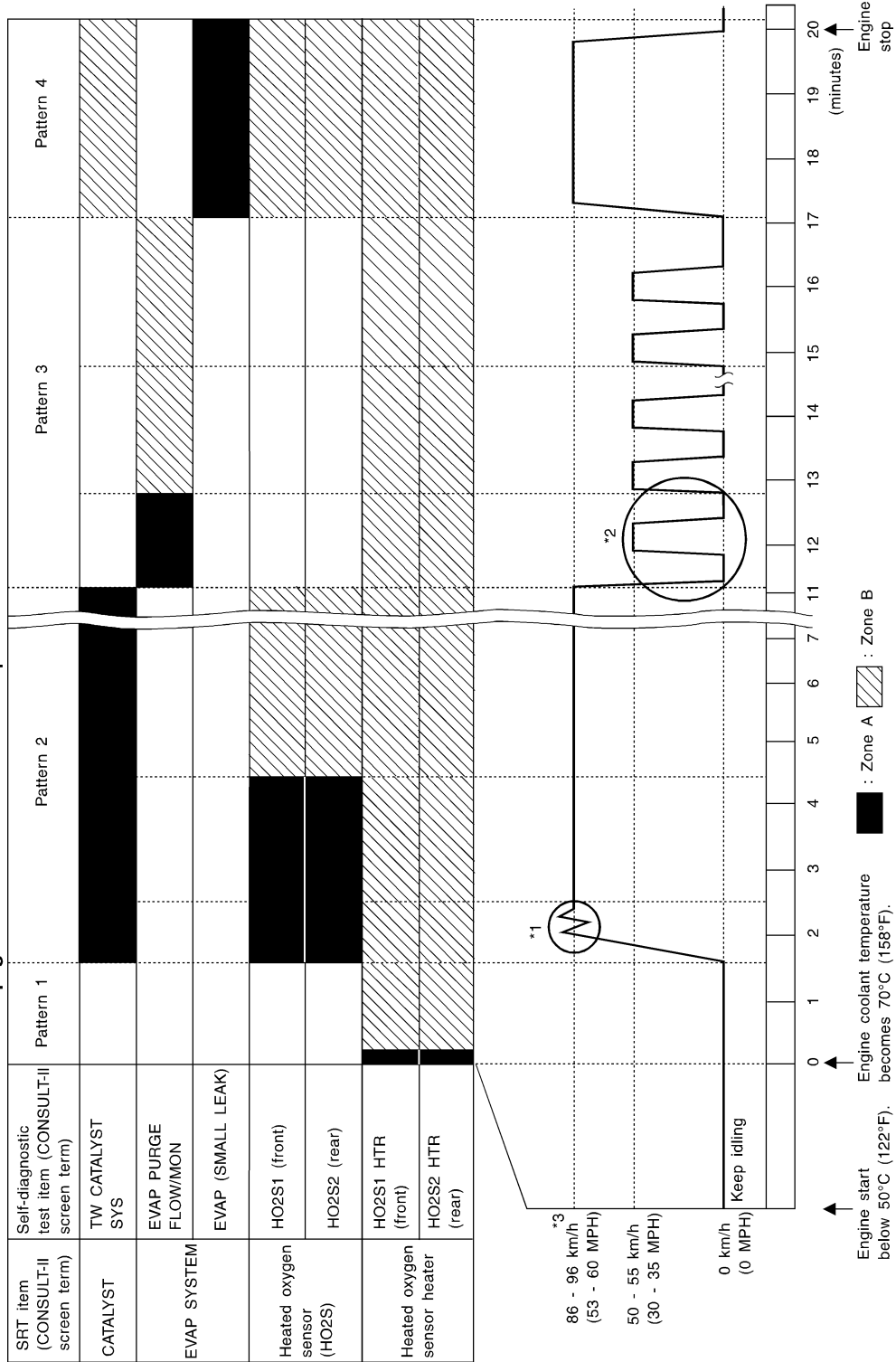
Emission-related Diagnostic Information (Cont'd)

Driving Pattern

NBEC0031S0303

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



SEF947Y

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

Pattern 1:

- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 70 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 70 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 92 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:

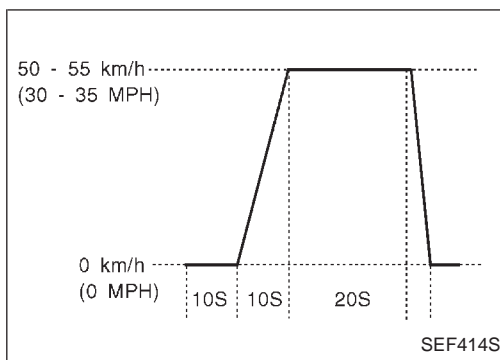
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*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.

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

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



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

Suggested Transmission Gear Position for A/T Models

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

Suggested upshift speeds for M/T models

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

Gear change	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	21 (13)	21 (13)	24 (15)
2nd to 3rd	37 (23)	26 (16)	40 (25)
3rd to 4th	53 (33)	44 (27)	64 (40)
4th to 5th	63 (39)	58 (36)	72 (45)

Suggested Maximum Speed in Each Gear

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

Gear	km/h (MPH)
1st	50 (30)
2nd	89 (55)
3rd	128 (80)
4th	—
5th	—

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

NBEC0031S04

The following is the information specified in Mode 6 of SAE J1979. The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).

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

X: Applicable —: Not applicable

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Heated oxygen sensor 1 (front) (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (front) (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
23H		07H	Max.	X	
24H		07H	Max.	X	
O2 SENSOR HEATER	Heated oxygen sensor 1 (front) heater (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 (front) heater (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 (rear) heater (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 2 (rear) heater (bank 2)	2FH	0BH	Max.	X
		30H	8BH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable NBEC0031S05

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-150
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-158
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-164
COOLANT T SEN/CIRC	P0115	—	—	X	EC-169

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
THRTL POS SEN/CIRC	P0120	—	—	X	EC-174
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-187
HO2S1 (B1)	P0130	X	X	X*2	EC-192
HO2S1 (B1)	P0131	X	X	X*2	EC-202
HO2S1 (B1)	P0132	X	X	X*2	EC-210
HO2S1 (B1)	P0133	X	X	X*2	EC-218
HO2S1 (B1)	P0134	X	X	X*2	EC-231
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-240
HO2S2 (B1)	P0137	X	X	X*2	EC-247
HO2S2 (B1)	P0138	X	X	X*2	EC-257
HO2S2 (B1)	P0139	X	X	X*2	EC-267
HO2S2 (B1)	P0140	X	X	X*2	EC-277
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-286
HO2S1 (B2)	P0150	X	X	X*2	EC-192
HO2S1 (B2)	P0151	X	X	X*2	EC-202
HO2S1 (B2)	P0152	X	X	X*2	EC-210
HO2S1 (B2)	P0153	X	X	X*2	EC-218
HO2S1 (B2)	P0154	X	X	X*2	EC-231
HO2S1 HTR (B2)	P0155	X	X	X*2	EC-240
HO2S2 (B2)	P0157	X	X	X*2	EC-247
HO2S2 (B2)	P0158	X	X	X*2	EC-257
HO2S2 (B2)	P0159	X	X	X*2	EC-267
HO2S2 (B2)	P0160	X	X	X*2	EC-277
HO2S2 HTR (B2)	P0161	X	X	X*2	EC-286
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-294
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-302
FUEL SYS-LEAN/BK2	P0174	—	—	X	EC-294
FUEL SYS-RICH/BK2	P0175	—	—	X	EC-302
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-309
ENG OVER TEMP	P0217	—	—	X	EC-314
MULTI CYL MISFIRE	P0300	—	—	X	EC-320
CYL 1 MISFIRE	P0301	—	—	X	EC-320
CYL 2 MISFIRE	P0302	—	—	X	EC-320
CYL 3 MISFIRE	P0303	—	—	X	EC-320
CYL 4 MISFIRE	P0304	—	—	X	EC-320
CYL 5 MISFIRE	P0305	—	—	X	EC-320
CYL 6 MISFIRE	P0306	—	—	X	EC-320

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page	
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-328	GI
CPS/CIRCUIT (POS)	P0335	—	—	X	EC-334	MA
CAM PS/CIRC (PHS)	P0340	—	—	X	EC-342	EM
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-347	EM
TW CATALYST SYS-B2	P0430	X	X	X*2	EC-347	LC
EVAP SMALL LEAK	P0440	X	X	X*2	EC-352	LC
PURG VOLUME CONT/V	P0443	—	—	X	EC-367	EC
VENT CONTROL VALVE	P0446	—	—	X	EC-374	EC
EVAP SYS PRES SEN	P0450	—	—	X	EC-381	FE
EVAP GROSS LEAK	P0455	X	X	X*2	EC-394	FE
FUEL LV SE (SLOSH)	P0460	—	—	X	EC-407	AT
FUEL LEVEL SENSOR	P0461	—	—	X	EC-411	AT
FUEL LEVEL SEN/CIRC	P0464	—	—	X	EC-413	TF
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-417	TF
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-422	PD
CLOSED TP SW/CIRC	P0510	—	—	X	EC-431	PD
A/T COMM LINE	P0600	—	—	—	EC-440	AX
ECM	P0605	—	—	X	EC-444	AX
PNP SW/CIRC	P0705	—	—	X	AT-111	SU
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-116	SU
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-124	BR
ENGINE SPEED SIG	P0725	—	—	X	AT-130	BR
A/T 1ST GR FNCTN	P0731	—	—	X	AT-136	ST
A/T 2ND GR FNCTN	P0732	—	—	X	AT-143	ST
A/T 3RD GR FNCTN	P0733	—	—	X	AT-151	RS
A/T 4TH GR FNCTN	P0734	—	—	X	AT-157	RS
TCC SOLENOID/CIRC	P0740	—	—	X	AT-165	BT
A/T TCC S/V FNCTN	P0744	—	—	X	AT-170	BT
L/PRESS SOL/CIRC	P0745	—	—	X	AT-174	HA
SFT SOL A/CIRC	P0750	—	—	X	AT-180	SC
SFT SOL B/CIRC	P0755	—	—	X	AT-189	SC
INT/V TIM CONT-B1	P1110	—	—	X	EC-446	EL
INT/V TIM V/CIR-B1	P1111	—	—	X	EC-451	EL
SWIRL CONT SOL/V	P1130	—	—	X	EC-458	IDX
INT/V TIM CONT-B2	P1135	—	—	X	EC-446	EL
INT/V TIM V/CIR-B2	P1136	—	—	X	EC-451	EL
INTK TIM S/CIRC-B1	P1140	—	—	X	EC-482	EL

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
INTK TIM S/CIRC-B2	P1145	—	—	X	EC-482
CLOSED LOOP-B1	P1148	—	—	X	EC-491
SWL CON VC SW/CIRC	P1165	—	—	X	EC-493
CLOSED LOOP-B2	P1168	—	—	X	EC-491
ENG OVER TEMP	P1217	—	—	X	LC-24
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-499
CPS/CIRCUIT (REF)	P1335	—	—	X	EC-510
CPS/CIRC (POS) COG	P1336	—	—	X	EC-517
EVAP VERY SMALL LEAK	P1441	X	X	X*2	EC-526
PURG VOLUME CONT/V	P1444	—	—	X	EC-541
VENT CONTROL VALVE	P1446	—	—	X	EC-553
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-561
VENT CONTROL VALVE	P1448	—	—	X	EC-573
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-582
VC/V BYPASS/V	P1490	—	—	X	EC-585
VC CUT/V BYPASS/V	P1491	—	—	X	EC-591
A/T DIAG COMM LINE	P1605	—	—	X	EC-603
TP SEN/CIRC A/T	P1705	—	—	X	AT-218
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-604
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-223

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

*2: These are not displayed with GST.

NOTE:

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

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (Ⓜ With CONSULT-II)

NBEC0031S06

NBEC0031S0601

NOTE:

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

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
 2. Turn CONSULT-II “ON” and touch “A/T”.
 3. Touch “SELF-DIAG RESULTS”.
 4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
 5. Touch “ENGINE”.
 6. Touch “SELF-DIAG RESULTS”.
 7. Touch “ERASE”. (The DTC in the ECM will be erased.)
- If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

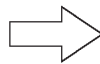
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

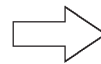
How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.

SELECT SYSTEM
ENGINE
A/T



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

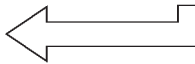
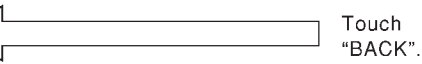
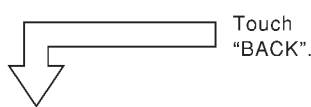


SELF-DIAG RESULTS	
DTC RESULTS	TIME
SHIFT SOLENOID/V A	

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
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT 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.)

SEF823YA

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

How to Erase DTC (GST) With GST

NBEC0031S0602

NOTE:

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

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

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

- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.
- The following data are cleared when the ECM memory is erased.
 - 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

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

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.

IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)

NBEC0031S08

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

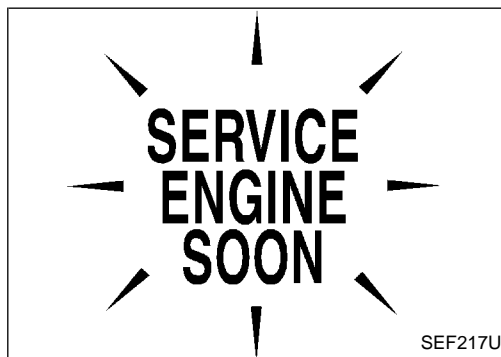
SEF515Y

- 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 Immobilizer System — NATS)” in EL section.
- Confirm no self-diagnostic results of IVIS (NATS) is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II.
- When replacing ECM, initialization of IVIS (NATS) system and registration of all IVIS (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 IVIS (NATS) initialization and IVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NBEC0032



The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
 - If the MIL does not light up, refer to EL-114, “WARNING LAMPS” or see EC-648.
2. When the engine is started, the MIL should go off.
If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.




On Board Diagnostic System Function

NBEC0032S01

The on board diagnostic system has the following two functions.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in "ON" position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> ● Coolant overtemperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL-114, "WARNING LAMPS" or see EC-648.

Diagnostic Test Mode I — Malfunction Warning

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

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-59.
- 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.

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)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

Items	Fuel Injection System	Misfire	Other
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see EC-78.

For details about patterns "A" and "B" under "Other", see EC-80.

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

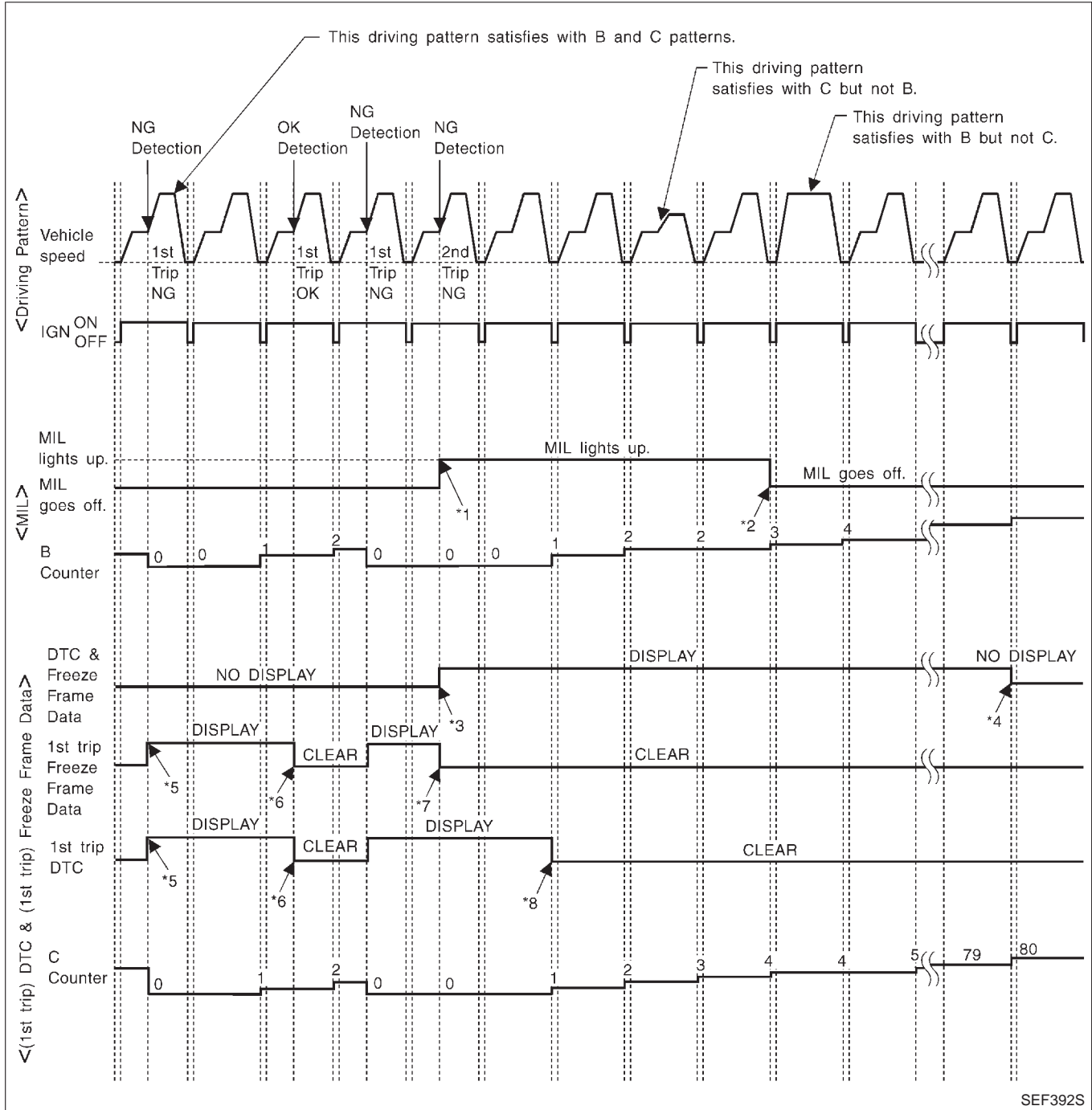
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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"

=NBEC0033S03



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame

- data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip

- freeze frame data will be cleared at the moment OK is detected.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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

NBEC0033S04

<Driving Pattern B>

NBEC0033S0401

Driving pattern B means the vehicle operation as follows:

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

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

<Driving Pattern C>

NBEC0033S0402

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).

Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

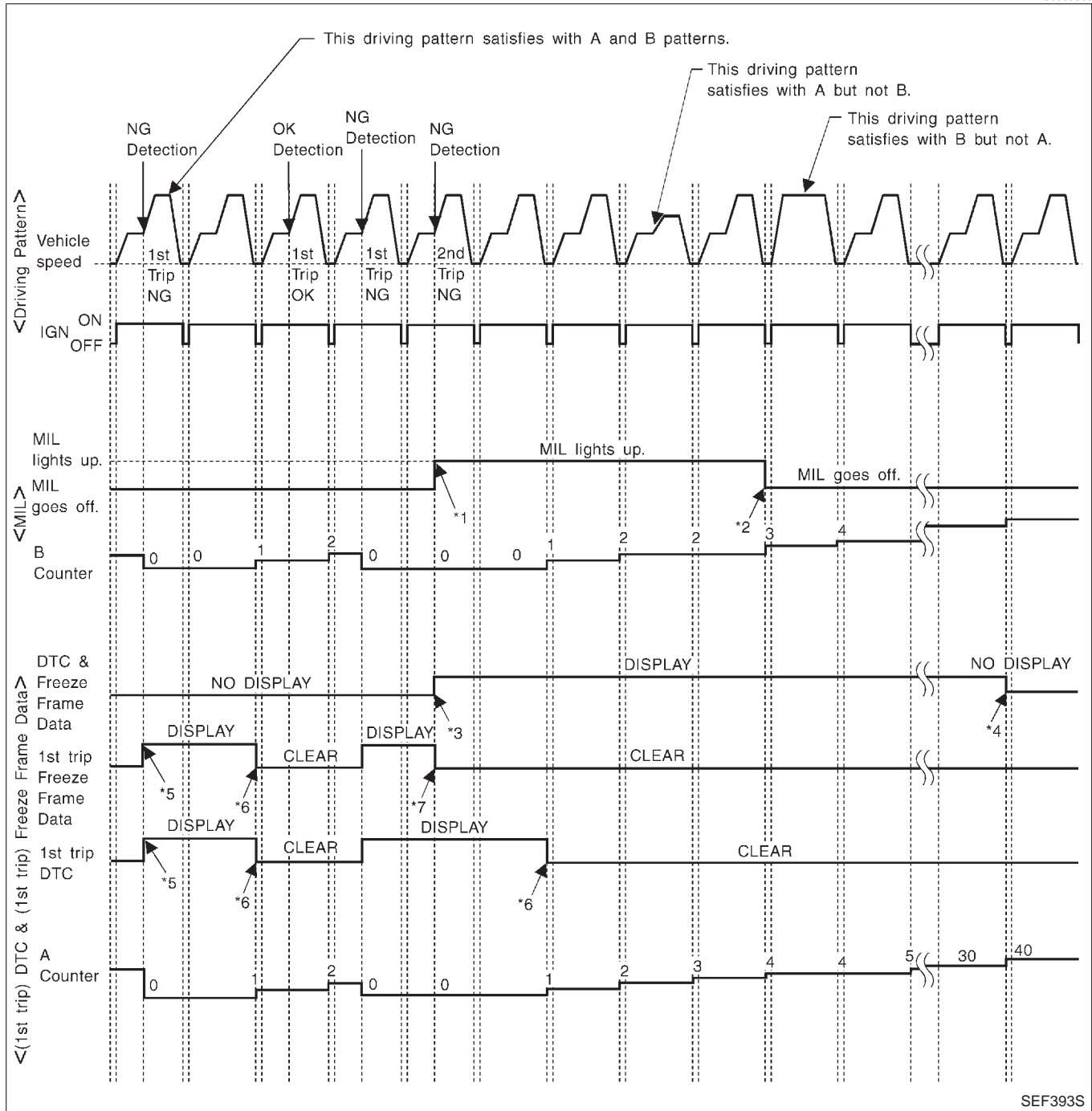
- The C counter will be cleared when the malfunction is detected regardless of (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without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

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"

NBEC0033S05



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

- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *5: When a malfunction is detected for the first time, the 1st trip DTC

- and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

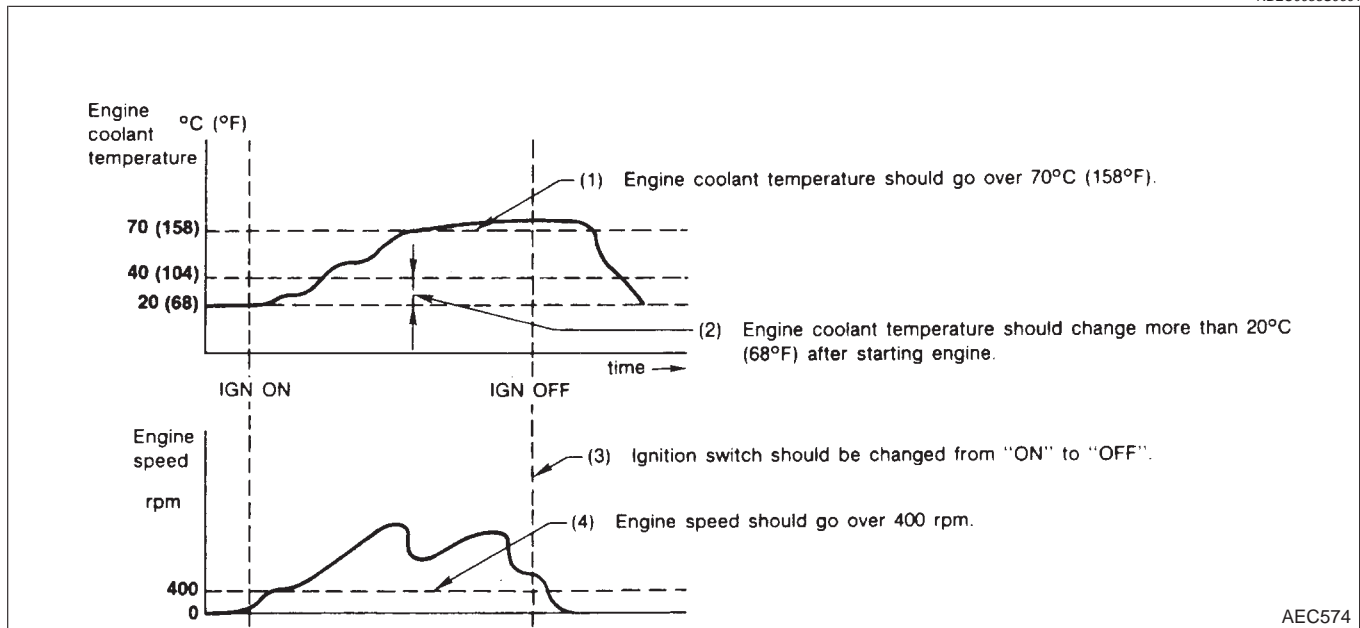
OBD System Operation Chart (Cont'd)

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

NBEC0033S06

<Driving Pattern A>

NBEC0033S0601



- 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.

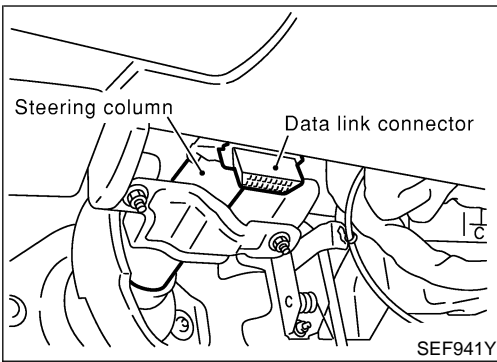
<Driving Pattern B>

NBEC0033S0602

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").



CONSULT-II

CONSULT-II INSPECTION PROCEDURE

=NBEC0034

NBEC0034S01

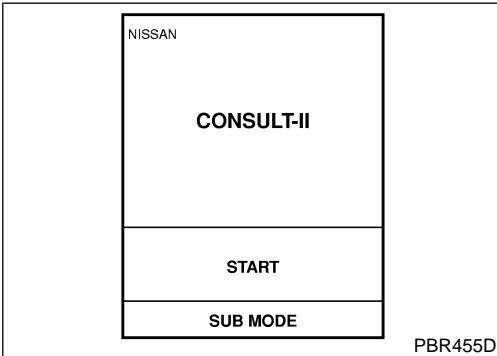
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located under LH dash panel near the fuse box cover.

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LC



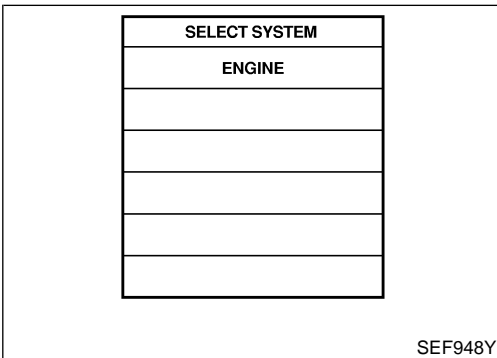
3. Turn ignition switch ON.
4. Touch "START".

EC

FE

AT

TF



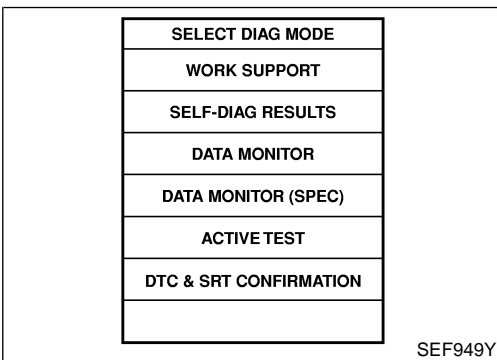
5. Touch "ENGINE".

PD

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

ST

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

RS

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NBEC0034S02

Item		DIAGNOSTIC TEST MODE							
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
			DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS INPUT	Crankshaft position sensor (POS)		X	X	X	X			
	Crankshaft position sensor (REF)		X		X	X			
	Mass air flow sensor		X		X	X			
	Engine coolant temperature sensor		X	X	X	X	X		
	Heated oxygen sensor 1 (front)		X		X	X		X	X
	Heated oxygen sensor 2 (rear)		X		X	X		X	X
	Vehicle speed sensor		X	X	X	X			
	Throttle position sensor		X		X	X			
	Fuel tank temperature sensor		X		X	X	X		
	EVAP control system pressure sensor		X		X	X			
	Absolute pressure sensor		X		X	X			
	Intake air temperature sensor		X		X	X			
	Knock sensor		X						
	Ignition switch (start signal)				X	X			
	Closed throttle position switch		X		X	X			
	Closed throttle position switch (throttle position sensor signal)				X	X			
	Air conditioner switch				X	X			
	Park/neutral position (PNP) switch		X		X	X			
	Power steering oil pressure switch				X	X			
	Battery voltage				X	X			
	Ambient air temperature switch				X	X			
	Load signal				X	X			
	Swirl control valve control vacuum check switch		X		X	X			
Fuel level sensor		X		X	X				
Intake valve timing control position sensor		X		X	X				

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Item		DIAGNOSTIC TEST MODE							GI MA EM LC EC FE AT TF PD AX SU BR	
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION		
			DTC*1	FREEZE FRAME DATA*2				SRT STATUS		DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS OUTPUT	Injectors				X	X	X			
	Power transistor (Ignition timing)		X (Ignition signal)		X	X	X			
	IACV-AAC valve		X		X	X	X			
	EVAP canister purge volume control solenoid valve		X		X	X	X		X	
	Air conditioner relay				X	X				
	Fuel pump relay	X			X	X	X			
	Heated oxygen sensor 1 (front) heater		X		X	X		X		
	Heated oxygen sensor 2 (rear) heater		X		X	X		X		
	EVAP canister vent control valve		X		X	X	X			
	Vacuum cut valve bypass valve		X		X	X	X		X	
	Swirl control valve control solenoid valve		X		X	X	X			
	VIAS control solenoid valve				X	X	X			
	Intake valve timing control solenoid valve		X		X	X	X			
	Calculated load value			X	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-60.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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.
Data monitor (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control valve and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

=NBEC0034S03

*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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

WORK SUPPORT MODE

=NBEC0034S04

WORK ITEM	CONDITION	USAGE	
TP SW/TP SEN IDLE POSI ADJ	<ul style="list-style-type: none"> FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL. 	When adjusting the idle throttle position	GI
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	MA
IDLE AIR VOL LEARN	<ul style="list-style-type: none"> THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM. 	When learning the idle air volume	EM
SELF-LEARNING CONT	<ul style="list-style-type: none"> THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When clearing the coefficient of self-learning control valve	EC
EVAP SYSTEM CLOSE	<p>OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.</p> <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 TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. <p>NOTE: WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.</p>	When detecting EVAP vapor leak point of EVAP system	FE AT TF PD AX SU
TARGET IGNITION TIMING ADJ*	<ul style="list-style-type: none"> IDLE CONDITION 	<ul style="list-style-type: none"> When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light. If once the "TARGET IDLE RPM ADJ" has been done, the Idle Air Volume Learning procedure will not be completed. 	BR ST RS
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> IDLE CONDITION 	When setting target idle speed	BT

*: This function is not necessary in the usual service procedure.

SELF-DIAGNOSTIC MODE

NBEC0034S05

DTC and 1st Trip DTC

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

Freeze Frame Data and 1st Trip Freeze Frame Data

NBEC0034S0502

Freeze frame data item*1	Description	
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to "TROUBLE DIAGNOSIS — INDEX", EC-8.) 	IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Freeze frame data item*1	Description
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. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2*2	
CAL/LD VALUE [%]	<ul style="list-style-type: none"> ● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> ● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● "Short-term fuel trim" at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2 [%]	
L-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● "Long-term fuel trim" at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> ● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> ● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH.P/S [% or degree]	<ul style="list-style-type: none"> ● The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> ● The base fuel schedule at the moment a malfunction is detected is displayed.
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.

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

*2: Regarding R50 model, "-B1" indicates right bank and "-B2" indicates left bank.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

DATA MONITOR MODE

=NBEC0034S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks	
ENG SPEED [rpm]	○	○	<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (120° signal) of the crankshaft position sensor (REF). 		GI
CKPS-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). 	<ul style="list-style-type: none"> Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated. 	MA EM LC
POS COUNT	○		<ul style="list-style-type: none"> Indicates the number of signal plate (Flywheel/Drive Plate) cogs (tooth) during one revolution of the engine. 		EC
MAS A/F SE-B1 [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. 	FE
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. 	AT TF
HO2S1 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the front heated oxygen sensor is displayed. 		PD
HO2S1 (B2) [V]	○	○			
HO2S2 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the rear heated oxygen sensor is displayed. 		AX
HO2S2 (B2) [V]	○	○			
HO2S1 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. 	SU BR
HO2S1 MNTR (B2) [RICH/LEAN]	○				
HO2S2 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. 	RS BT
HO2S2 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. 		SC
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 		EL
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 		IDX
FUEL T/TMP SE [°C] or [°F]			<ul style="list-style-type: none"> The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed. 		

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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. 	
EVAP SYS PRES [V]	○		<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
ABSOL PRES/SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the absolute pressure sensor is displayed. 	
FUEL LEVEL SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
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.
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. 	
CLSD THL/P SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch. 	
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. 	
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal. 	
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. 	
LOAD SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on. 	
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 	
SWRL CONT S/V [ON/OFF]	○		<ul style="list-style-type: none"> The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... Swirl control valve is closed. OFF ... Swirl control valve is opened. 	
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.
INJ PULSE-B2 [msec]				
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. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks	
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. 	GI MA
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. 		EM
PURG VOL C/V [%]			<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 		LC EC
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. 	FE
A/F ALPHA-B2 [%]		○			AT
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. 		TF
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. 		PD
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 		AX SU
HO2S1 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 		BR
HO2S1 HTR (B2) [ON/OFF]				ST	
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals. 		RS
HO2S2 HTR (B2) [ON/OFF]				BT	
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 		HA
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 		SC
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. 		EL IDX
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. 		

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INT/V TIM (B1) [°CA]			<ul style="list-style-type: none"> Indicate [°CA] of intake camshaft advanced angle. 	
INT/V TIM (B2) [°CA]				
INT/V SOL (B1) [%]			<ul style="list-style-type: none"> The control condition of the intake valve timing control solenoid valve is indicated. 	
INT/V SOL (B2) [%]				
TRVL AFTER MIL [km] or [Mile]			<ul style="list-style-type: none"> Distance traveled while MIL is activated 	
VIAS S/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the VIAS control solenoid valve (determined by ECM according to the input signal) is indicated. OFF ... VIAS control solenoid valve is not operating. ON ... VIAS control solenoid valve is operating. 	
SWL CON VC SW			<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the swirl control valve control vacuum check switch. ON ... Swirl control valve is not operational. OFF ... Swirl control valve is operational. 	
IDL A/V LEAN			<ul style="list-style-type: none"> Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully. INCMP ... Idle air volume learning has not been performed successfully. 	
Voltage [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	
Frequency [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.

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding R50 model, “-B1” indicates right bank and “-B2” indicates left bank.
- Bank 1 (-B1 or BK1) includes No. 1 cylinder.

DATA MONITOR (SPEC) MODE

NBEC0034S11

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor specification is displayed. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
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. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
A/F ALPHA-B1 [%]		○	● Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	● When the engine is running, specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding R50 model, "B1" indicates bank 1 and "B2" indicates bank 2.

ACTIVE TEST MODE

NBEC0034S07

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 ● Heated oxygen sensor
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 initial ignition timing
IACV-AAC/V OPENING	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> ● Harness and connector ● IACV-AAC valve
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 ● Power transistor ● Spark plugs ● Ignition coils
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
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
VIAS SOL VALVE	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen for operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
SWIRL CONT SOL VALVE	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen for operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
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 solenoid valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL/T TEMP SEN	<ul style="list-style-type: none"> Change the fuel tank temperature using CONSULT-II. 		
VENT CONTROL/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector Solenoid valve
VC/V BYPASS/V	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector Solenoid valve
TARGET INT/V TIM	<ul style="list-style-type: none"> Engine: After warming up, hold engine speed at 1,500 to 2,000 rpm. Change the intake valve timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Intake valve timing control solenoid valve

DTC & SRT CONFIRMATION MODE

NBEC0034S08

SRT STATUS Mode

NBEC0034S0801

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

SRT Work Support Mode

NBEC0034S0803

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

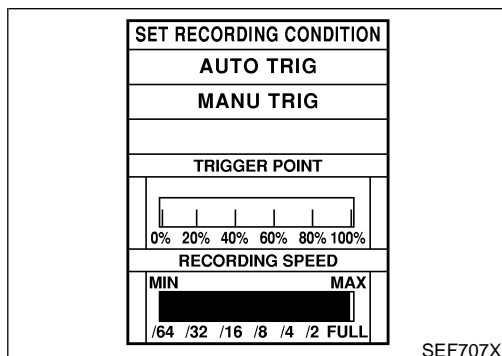
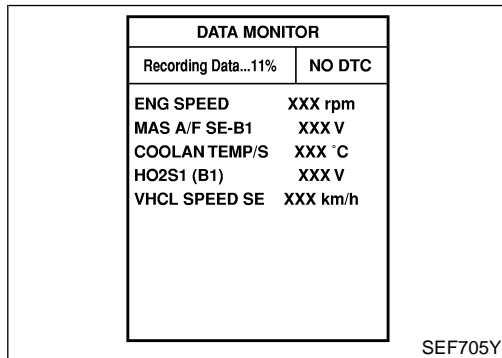
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

DTC Work Support Mode

NBEC0034S0802

Test mode	Test item	Condition	Reference page	
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-352	GI
	EVAP VERY SML LEAK P1441		EC-526	MA
	PURG VOL CN/V P1444		EC-541	EM
	PURGE FLOW P1447		EC-561	EM
	VC CUT/V BP/V P1491		EC-591	EM
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130	Refer to corresponding trouble diagnosis for DTC.	EC-192	LC
	HO2S1 (B1) P0131		EC-202	EC
	HO2S1 (B1) P0132		EC-210	FE
	HO2S1 (B1) P0133		EC-218	AT
	HO2S1 (B2) P0150		EC-192	TF
	HO2S1 (B2) P0151		EC-202	PD
	HO2S1 (B2) P0152		EC-210	AX
	HO2S1 (B2) P0153		EC-218	SU
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137	Refer to corresponding trouble diagnosis for DTC.	EC-247	BR
	HO2S2 (B1) P0138		EC-257	ST
	HO2S2 (B1) P0139		EC-267	RS
	HO2S2 (B2) P0157		EC-247	BT
	HO2S2 (B2) P0158		EC-257	HA
	HO2S2 (B2) P0159		EC-267	SC



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

NBEC0034S10

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

- "AUTO TRIG" (Automatic trigger):
 - The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM. At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during "Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.
- "MANU TRIG" (Manual trigger):
 - DTC/1st trip DTC and malfunction item will not be displayed

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

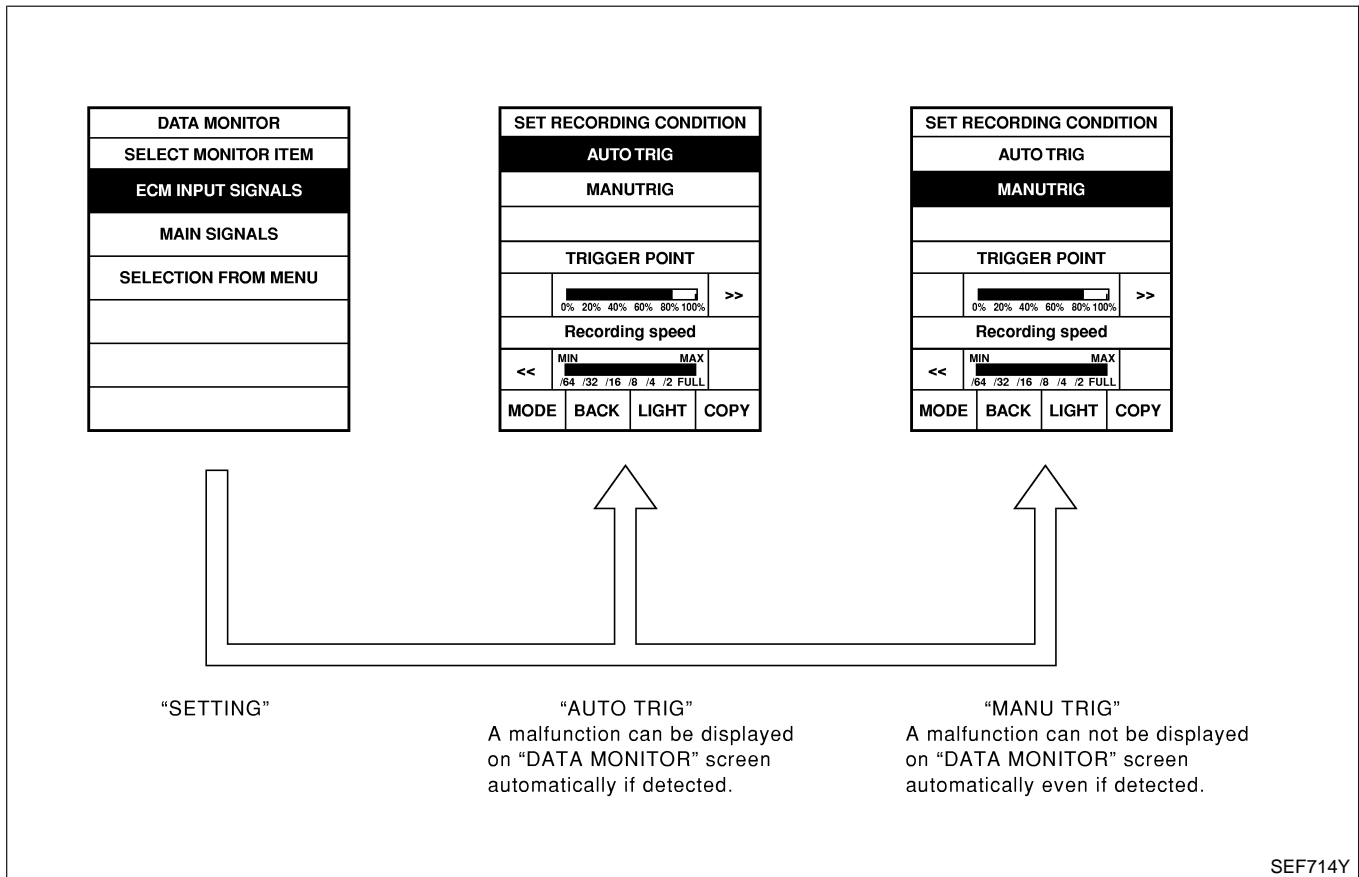
CONSULT-II (Cont'd)

automatically on CONSULT-II screen even though a malfunction is detected by ECM.

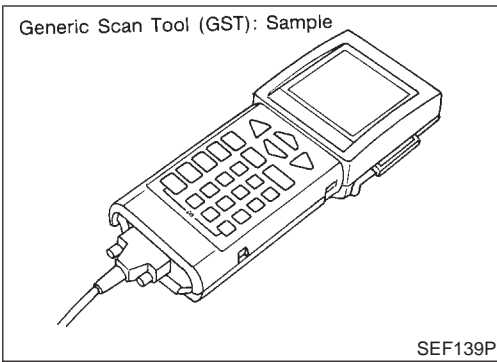
DATA MONITOR can be performed continuously even though a malfunction is detected.

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-36, "Incident Simulation Tests".)
- 2) "MANU TRIG"
 - If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



SEF714Y



Generic Scan Tool (GST)

=NBEC0035

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 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.

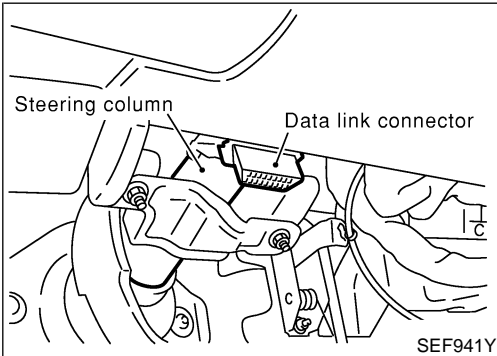
NBEC0035S01

GI

MA

EM

LC



GST INSPECTION PROCEDURE

NBEC0035S02

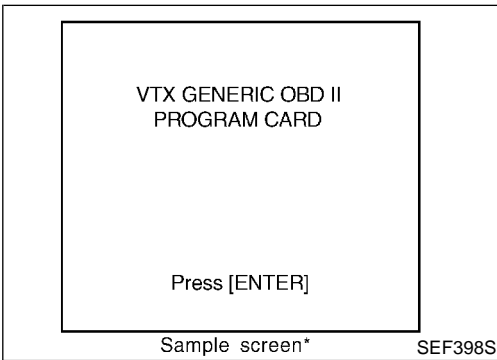
1. Turn ignition switch OFF.
2. Connect GST to data link connector, which is located under LH dash panel near the fuse box cover.

EC

FE

AT

TF



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

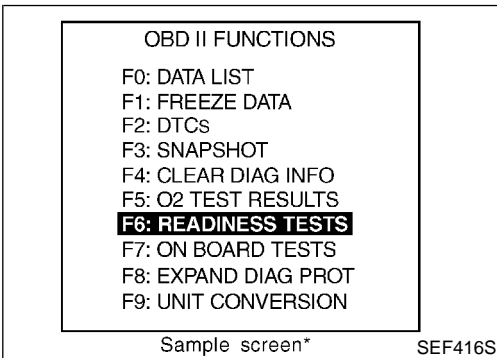
PD

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

AX

SU

BR



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

ST

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

RS

BT

HA

SC

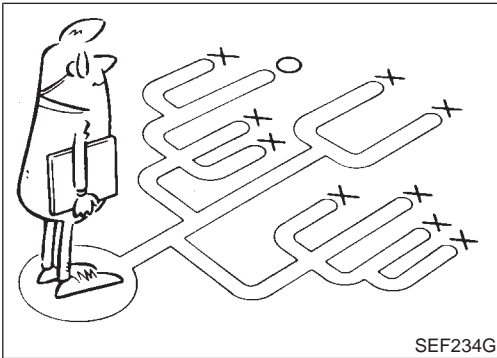
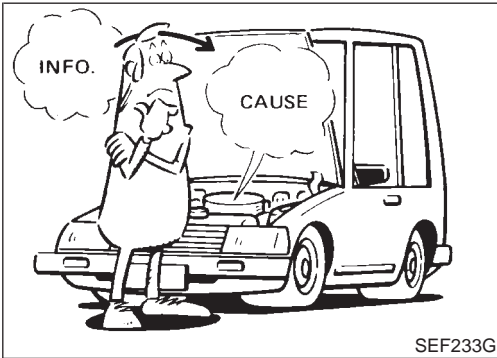
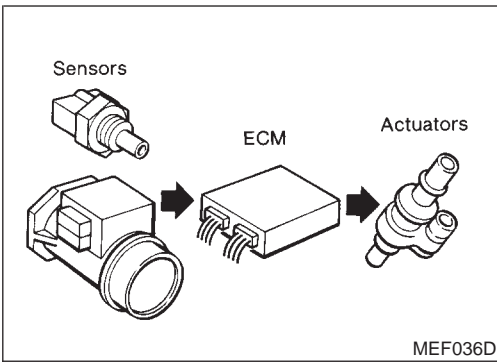
EL

IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Generic Scan Tool (GST) (Cont'd)

FUNCTION		<small>NBEC0035S03</small>
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-85).]
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 valve 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

NBEC0036

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-99.

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

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

DIAGNOSTIC WORKSHEET

NBEC0036S01

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

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

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

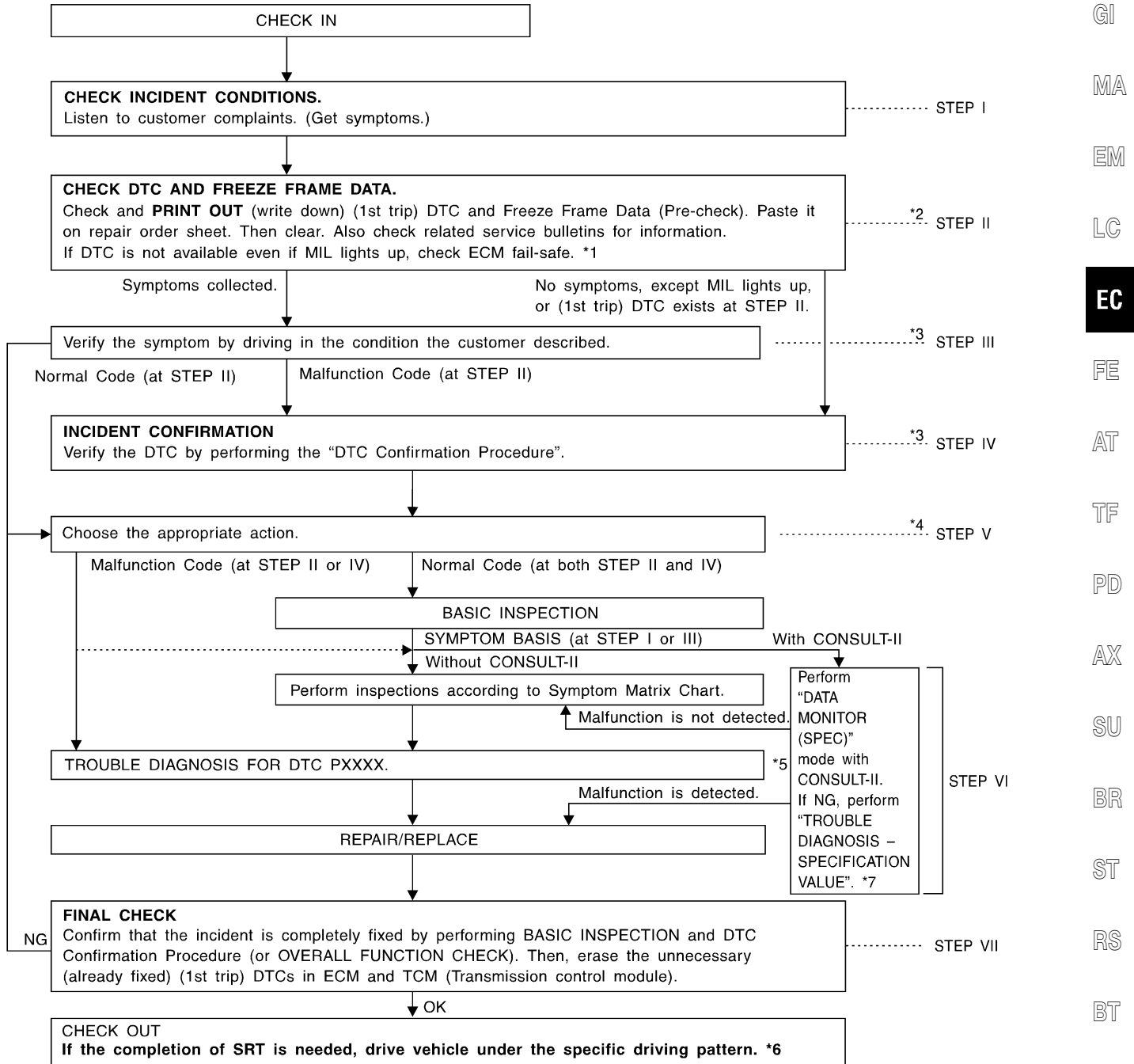
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

GI
MA
EM
LC
EC
FE
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

Work Flow

NBEC0037



*1 EC-117

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-142.

*5 If malfunctioning part cannot be

detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

*6 EC-66

*7 EC-136

TROUBLE DIAGNOSIS — INTRODUCTION

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NBEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-98.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-72.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-118.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-101.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-136. (If malfunction is detected, proceed to "REPAIR REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-118.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-122, 127. The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI-27, "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-72.)

Basic Inspection

NBEC0038

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.

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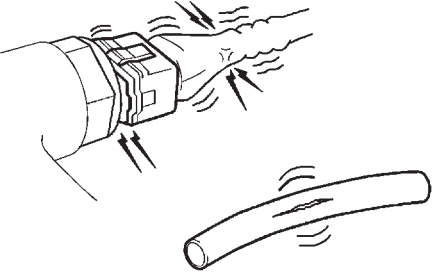
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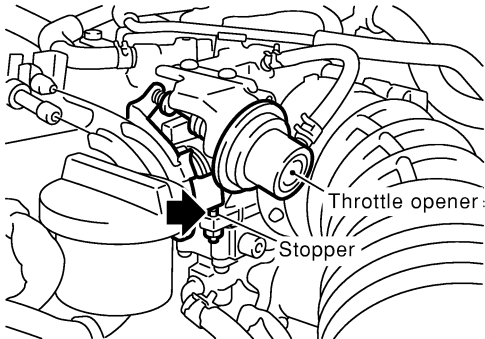
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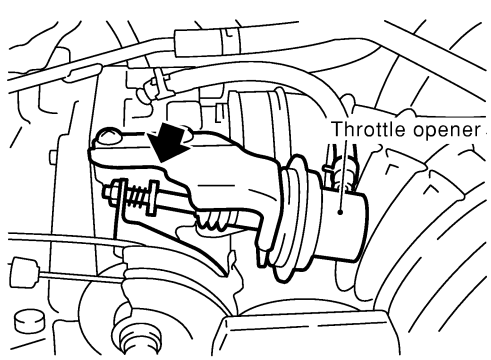
1	INSPECTION START
<p>1. Check service records for any recent repairs that may indicate a related problem, or a current need for scheduled maintenance.</p> <p>2. Open engine hood and check the following:</p> <ul style="list-style-type: none"> ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks and improper connections ● Wiring for improper connections, pinches and cuts ● Air cleaner clogging ● Hoses and ducts for leaks 	
	
SEF983U	
▶	GO TO 2.

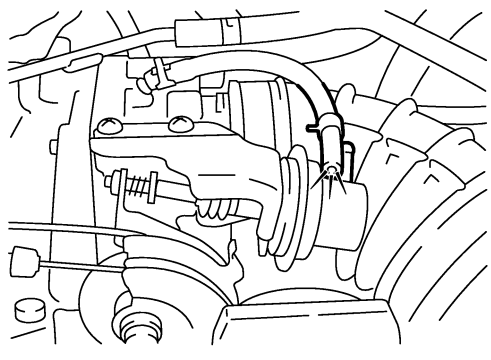
2	CHECK THROTTLE OPENER OPERATION-I
<p>Confirm that there is a clearance between throttle drum and stopper.</p>	
	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

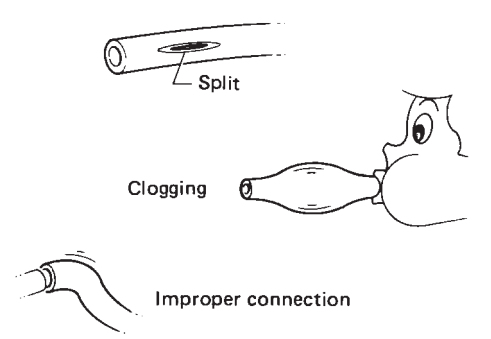
3	CHECK THROTTLE OPENER FIXING BOLTS	
Check throttle opener fixing bolts for loosening.		
OK or NG		
OK	▶	1. Repair or replace throttle body assembly. 2. GO TO 2.
NG	▶	1. Retighten the fixing bolts. 2. GO TO 2.

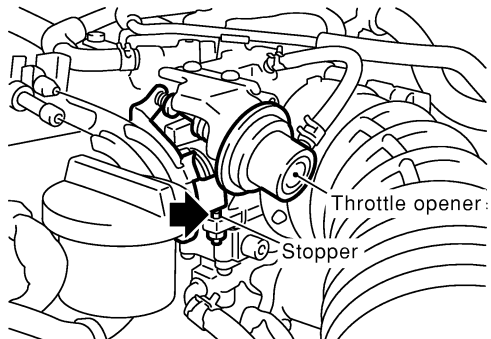
4	CHECK THROTTLE OPENER OPERATION-II	
1. Start engine and let it idle. 2. Confirm that throttle opener rod moves backward and there is a clearance between throttle drum and throttle opener rod.		
		
SEF951Y		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 5.

5	CHECK VACUUM SOURCE FOR THROTTLE OPENER	
1. Disconnect vacuum hose connected to throttle opener. 2. Check vacuum existence with engine running.		
		
SEF952Y		
OK or NG		
OK	▶	1. Repair or replace throttle body assembly. 2. GO TO 4.
NG	▶	GO TO 6.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

6	CHECK VACUUM HOSE		
<ol style="list-style-type: none"> 1. Stop engine. 2. Remove the vacuum hose. 3. Check the vacuum hose for splits, kinks and clogging. 			
			
SEF109L			
OK or NG			
OK	▶	<ol style="list-style-type: none"> 1. Clean vacuum port by blowing air. 2. GO TO 4. 	
NG	▶	<ol style="list-style-type: none"> 1. Replace vacuum hose. 2. GO TO 4. 	

7	CHECK THROTTLE DRUM OPERATION		
Confirm that throttle drum moves to contact the stopper.			
			
SEF950Y			
OK or NG			
OK	▶	GO TO 10.	
NG	▶	GO TO 8.	

8	CHECK ACCELERATOR WIRE INSTALLATION		
<ol style="list-style-type: none"> 1. Stop engine. 2. Check accelerator wire for slack. 			
OK or NG			
OK	▶	GO TO 9.	
NG	▶	<ol style="list-style-type: none"> 1. Adjust accelerator wire. Refer to FE-3, "Adjusting Accelerator Wire". 2. GO TO 7. 	

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TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

9	CHECK THROTTLE VALVE OPERATION	
<ol style="list-style-type: none"> 1. Remove intake air ducts. 2. Check throttle valve operation when moving throttle drum by hand. <p style="text-align: center;">OK or NG</p>		
OK	▶	<ol style="list-style-type: none"> 1. Retighten the throttle drum fixing nuts. 2. GO TO 7.
NG	▶	<ol style="list-style-type: none"> 1. Clean the throttle body and throttle valve. 2. GO TO 7.

10	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-I	
<p>NOTE: Always check ignition timing before performing the following.</p> <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Stop engine. 3. Remove the vacuum hose connected to the throttle opener. 4. Connect suitable vacuum hose to vacuum pump as shown below. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; font-size: small;">SEF793WA</p> <ol style="list-style-type: none"> 5. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum is free from the throttle opener rod. 		
	▶	With CONSULT-II
		GO TO 11.
	▶	Without CONSULT-II
		GO TO 15.

TROUBLE DIAGNOSIS — BASIC INSPECTION

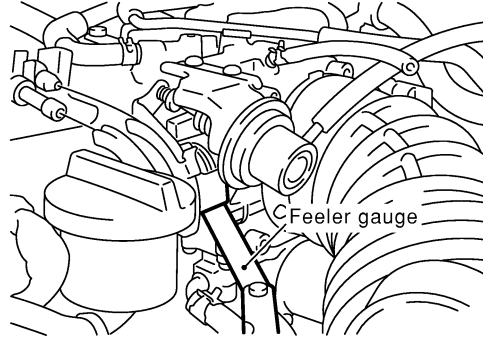
Basic Inspection (Cont'd)

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11 CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

Ⓟ With CONSULT-II

1. Turn ignition switch "ON".
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode with CONSULT-II.
3. Read "CLSD THL/P SW" signal under the following conditions.
 - Insert a 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between stopper and throttle drum as shown in the figure and check the signal.



SEF953Y

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	XXX °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF987Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.05 mm (0.0020 in) feeler gauge.
 "CLSD THL/P SW" signal should remain "OFF" while inserting 0.15 mm (0.0059 in) feeler gauge.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

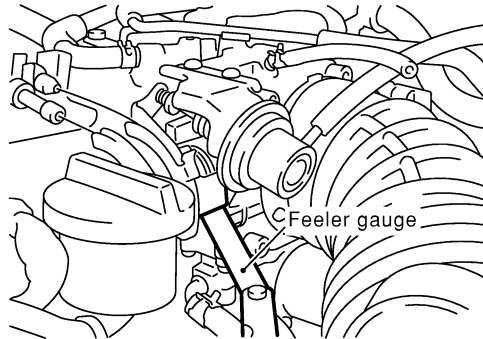
TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

12 | ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

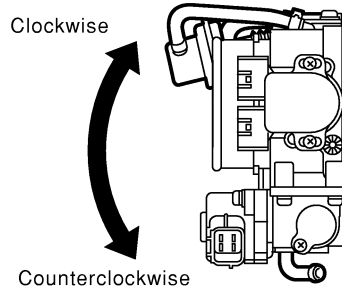
④ With CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



SEF953Y

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



SEF954Y

TP SW/TP SEN IDLE POJI ADJ	
MONITOR	
COOLAN TEMP/S	XXX °C
CLSD THL POS	ON
CLSD THL/P SW	OFF

SEF007Z

▶ GO TO 13.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

13	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Temporarily tighten sensor body fixing bolts as follows. <ul style="list-style-type: none"> ● Gradually move the sensor body clockwise and stop it when “CLSD THL/P SW” signal switches from “OFF” to “ON”, then temporarily tighten sensor body fixing bolts. <div data-bbox="625 352 966 640" style="text-align: center;"> <p>Clockwise</p> <p>Counterclockwise</p> </div> <ol style="list-style-type: none"> 2. Make sure two or three times that the signal is “ON” when the throttle valve is closed and “OFF” when it is opened. 3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge. 4. Make sure two or three times that the signal remains “OFF” when the throttle valve is closed. 5. Tighten throttle position sensor. 6. Check the “CLSD THL/P SW” signal again. <p>The signal remains “OFF” while closing throttle valve.</p> <p style="text-align: right;">SEF954Y</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 14.
NG	▶ GO TO 12.

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TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

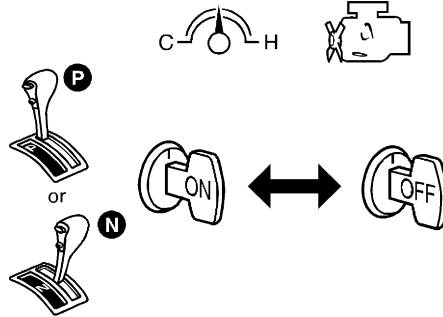
14 RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

 With CONSULT-II

NOTE:

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

1. Confirm that proper vacuum is applied. Refer to Test No. 10.
2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
3. Start engine.
4. Warm up engine to normal operating temperature.
5. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
6. Stop engine. (Turn ignition switch "OFF".)
7. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

8. Turn ignition switch "OFF" and wait at least 10 seconds.
9. Repeat steps 7 and 8 until "CLSD THL POS" signal changes to "ON".

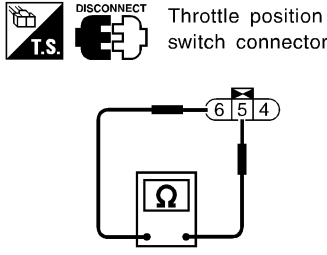
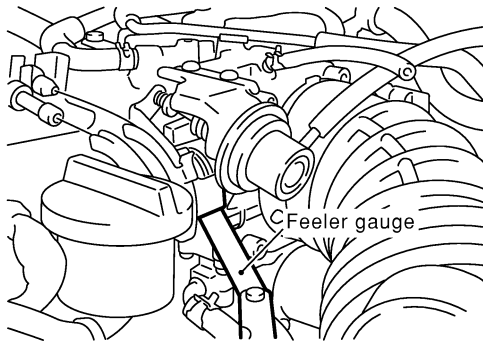
TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	XXX °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF987Y

 GO TO 19.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

15	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II	
<p>1. Disconnect closed throttle position switch harness connector. 2. Check continuity between closed throttle position switch terminals 6 and 5 under the following conditions.</p> <div style="text-align: center;">  <p>DISCONNECT Throttle position switch connector</p> </div> <p style="text-align: right;">SEF330Z</p> <ul style="list-style-type: none"> ● Insert the 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between the stopper and throttle drum as shown in the figure. <div style="text-align: center;">  <p>Feeler gauge</p> <p style="text-align: right;">SEF953Y</p> </div> <p>“Continuity should exist” while inserting 0.05 mm (0.0020 in) feeler gauge. “Continuity should not exist” while inserting 0.15 mm (0.0059 in) feeler gauge.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 18.
NG	▶	GO TO 16.

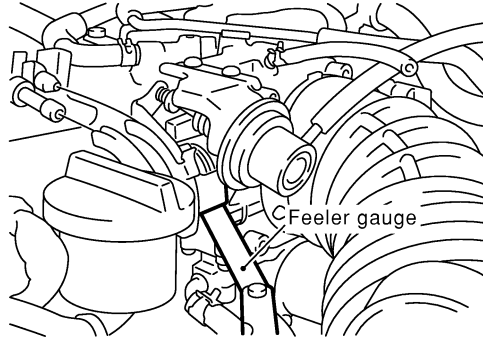
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TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

16 ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

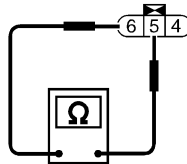
1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to Test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



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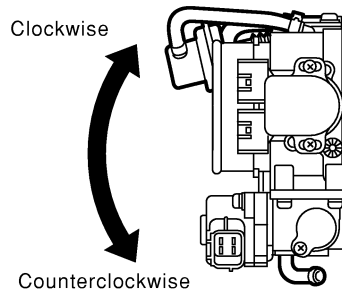


Throttle position switch connector



SEF330Z

4. Turn throttle position sensor body counterclockwise until continuity does not exist.



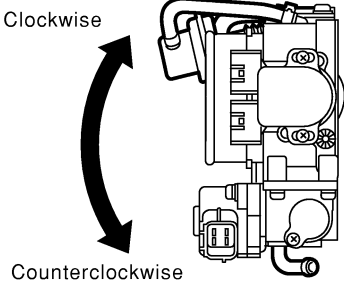
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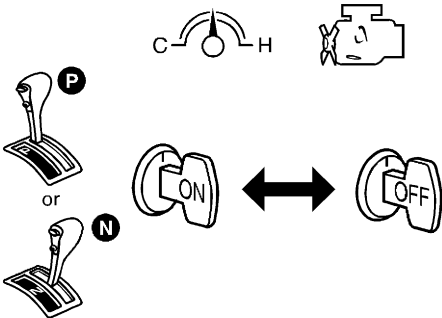
GO TO 17.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

17	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II
<p>1. Temporarily tighten sensor body fixing bolts as follows.</p> <ul style="list-style-type: none"> ● Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts. 	
	
SEF954Y	
<p>2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.</p> <p>3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.</p> <p>4. Make sure two or three times that the continuity does not exist when the throttle valve is closed.</p> <p>5. Tighten throttle position sensor.</p> <p>6. Check the continuity again.</p> <p style="text-align: center; color: blue;">Continuity does not exist while closing the throttle valve.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ GO TO 16.

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18	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY
<p>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.</p>	
<p>1. Confirm that proper vacuum is applied. Refer to Test No. 10.</p> <p>2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.</p> <p>3. Start engine.</p> <p>4. Warm up engine to normal operating temperature.</p> <p>5. Stop engine. (Turn ignition switch "OFF".)</p> <p>6. Turn ignition switch "ON" and wait at least 5 seconds.</p>	
	
SEF864V	
<p>7. Turn ignition switch "OFF" and wait at least 10 seconds.</p> <p>8. Repeat steps 6 and 7, 20 times.</p>	
▶	GO TO 19.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

19	CHECK (1ST TRIP) DTC	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Release vacuum from throttle opener. 3. Remove vacuum pump and vacuum hose from throttle opener. 4. Reinstall original vacuum hose to throttle opener securely. 5. Start engine and warm it up to normal operating temperature. 6. Rev (2,000 to 3,000 rpm) two or three times. 7. Make sure no (1st trip) DTC is displayed with CONSULT-II or GST. 		
OK or NG		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

20	REPAIR MALFUNCTION	
Repair or replace components as necessary according to corresponding "Diagnostic Procedure".		
▶ GO TO 19.		

21	CHECK TARGET IDLE SPEED	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) 		
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) 		
OK or NG		
OK	▶	GO TO 30.
NG	▶	GO TO 22.

22	PERFORM IDLE AIR VOLUME LEARNING	
<p>Refer to "Idle Air Volume Learning", EC-57. Which is the result CMLPT or INCMP?</p>		
CMLPT or INCMP		
CMLPT	▶	GO TO 23.
INCMP	▶	<ol style="list-style-type: none"> 1. Follow the construction of "Idle Air Volume Learning". 2. GO TO 22.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

23	CHECK TARGET IDLE SPEED AGAIN	
<p><input type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) 		
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 28.
NG		▶ GO TO 24.

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24	REPLACE IACV-AAC VALVE	
Replace IACV-AAC valve.		
		▶ GO TO 25.

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25	PERFORM IDLE AIR VOLUME LEARNING	
<p>Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?</p> <p style="text-align: center;">CMPLT or INCMP</p>		
CMPLT		▶ GO TO 26.
INCMP		▶ <ol style="list-style-type: none"> 1. Follow the construction of "Idle Air Volume Learning". 2. GO TO 22.

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26	CHECK TARGET IDLE SPEED AGAIN	
<p><input type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) 		
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 28.
NG		▶ GO TO 27.

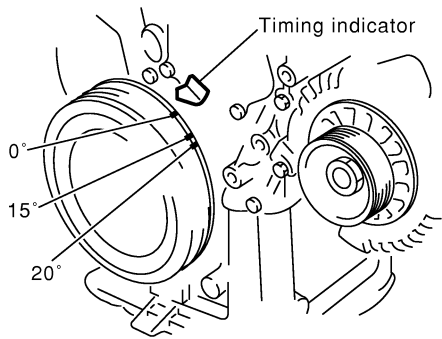
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27	CHECK ECM FUNCTION	
<ol style="list-style-type: none"> 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of IVIS (NATS) system and registration of IVIS (NATS) ignition key IDs. Refer to "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-74. 		
		▶ GO TO 22.

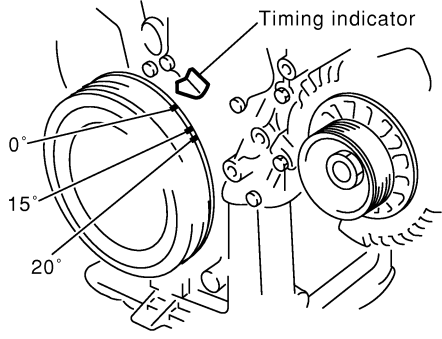
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TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

28	CHECK IGNITION TIMING	
<ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check ignition timing at idle using a timing light. 		
		
<p>Ignition timing: $15^{\circ} \pm 5^{\circ}$ BTDC (in "P" or "N" position)</p> <p style="text-align: right;">SEF572X</p>		
OK or NG		
OK	▶	GO TO 36.
NG	▶	GO TO 29.

29	CHECK TIMING CHAIN INSTALLATION	
Check timing chain installation. Refer to EM-29, "Installation".		
OK or NG		
OK	▶	GO TO 27.
NG	▶	<ol style="list-style-type: none"> 1. Repair the timing chain installation. 2. GO TO 22.

30	CHECK IGNITION TIMING	
<ol style="list-style-type: none"> 1. Start engine and let it idle. 2. Check ignition timing at idle using a timing light. 		
		
<p>Ignition timing: $15^{\circ} \pm 5^{\circ}$ BTDC (in "P" or "N" position)</p> <p style="text-align: right;">SEF572X</p>		
OK or NG		
OK	▶	GO TO 36.
NG	▶	GO TO 31.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Basic Inspection (Cont'd)

31	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-57. Which is the result CMPLT or INCMP?		
CMPLT or INCMP		
CMPLT	▶	GO TO 32.
INCMP	▶	1. Follow the construction of "Idle Air volume Learning". 2. GO TO 31.

GI
MA
EM

32	CHECK TARGET IDLE SPEED AGAIN	
<input type="checkbox"/> With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. 750±50 rpm (in "P" or "N" position)		
<input checked="" type="checkbox"/> Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position)		
OK or NG		
OK	▶	GO TO 34.
NG	▶	GO TO 33.

LC
EC
FE
AT
TF
PD

33	CHECK ECM FUNCTION	
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-74.		
	▶	GO TO 31.

AX
SU
BR

34	CHECK IGNITION TIMING AGAIN	
Check ignition timing again. Refer to Test No. 30.		
OK or NG		
OK	▶	GO TO 36.
NG	▶	GO TO 35.

ST
RS
BT

35	CHECK TIMING CHAIN INSTALLATION	
Check timing chain installation. Refer to EM-29, "Installation".		
OK or NG		
OK	▶	GO TO 33.
NG	▶	1. Repair the timing chain installation. 2. GO TO 31.

HA
SC
EL

36	ERASE UNNECESSARY DTC	
After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "How to Erase Emission-Related Diagnostic Information", EC-72 and AT-35, "HOW TO ERASE DTC".		
	▶	INSPECTION END

IDX

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

DTC Inspection Priority Chart

DTC Inspection Priority Chart

NBEC0039

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	<ul style="list-style-type: none"> ● P0100 Mass air flow sensor ● P0110 Intake air temperature sensor ● P0115 P0125 Engine coolant temperature sensor ● P0120 Throttle position sensor ● P0180 Fuel tank temperature sensor ● P0325 Knock sensor ● P0335 P1336 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0460 P0461 P0464 P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0605 ECM ● P1320 Ignition signal ● P1335 Crankshaft position sensor (REF) ● P1605 A/T diagnosis communication line ● P1706 Park/Neutral position (PNP) switch
2	<ul style="list-style-type: none"> ● P0105 Absolute pressure sensor ● P0130-P0134, P0150-P0154 Heated oxygen sensor 1 (front) ● P0135 P0155 Heated oxygen sensor 1 heater (front) ● P0137-P0140, P0157-P0160 Heated oxygen sensor 2 (rear) ● P0141 P0161 Heated oxygen sensor 2 (rear) heater ● P0217 Coolant overtemperature enrichment protection ● P0443 P1444 EVAP canister purge volume control solenoid valve ● P0446 P1446 P1448 EVAP canister vent control valve ● P0450 EVAP control system pressure sensor ● P0510 Closed throttle position switch ● P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches ● P1111 Intake valve timing control solenoid valve ● P1140 Intake valve timing control position sensor ● P1165 Swirl control valve control vacuum check switch ● P1441 EVAP control system (VERY SMALL LEAK) ● P1447 EVAP control system purge flow monitoring ● P1490 P1491 Vacuum cut valve bypass valve
3	<ul style="list-style-type: none"> ● P0171 P0172 P0174 P0175 Fuel injection system function ● P0306 - P0300 Misfire ● P0420 P0430 Three way catalyst function ● P0440 P1440 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0505 IACV-AAC valve ● P0600 A/T communication line ● P0731-P0734 P0744 A/T function ● P1110 Intake valve timing control ● P1130 Swirl control valve control solenoid valve ● P1148 P1168 Closed loop control

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Fail-safe Chart

Fail-safe Chart

=NBEC0040

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

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0100	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0115	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch "ON" or "START". CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II display)
		Just as ignition switch is turned ON or Start	40°C (104°F)
		More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
P0120	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
		Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
P1335	Crankshaft position sensor (REF) circuit	Compression TDC signal (120° signal) is controlled by camshaft position sensor (PHASE) signal and crankshaft position sensor (POS) signal. Ignition timing will be delayed 0° to 2°.	
Unable to access ECM	ECM	ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.	
		Engine control with fail-safe When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, IACV-AAC valve operation and cooling fan operation are controlled under certain limitations.	
		ECM fail-safe operation	
		Engine speed	Engine speed will not rise more than 3,000 rpm
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset valve
		Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Matrix Chart

Symptom Matrix Chart SYSTEM — BASIC ENGINE CONTROL SYSTEM

NBEC0041

NBEC0041S01

		SYMPTOM												Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-625
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-40
	Injector circuit	1	1	2	3	2		2	2			2			EC-616
	Evaporative emission system														EC-32
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-38
	Incorrect idle speed adjustment						1	1	1	1		1			EC-101
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-422
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-101
	Ignition circuit	1	1	2	2	2		2	2			2			EC-499
Main power supply and ground circuit											2				EC-142
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	HA section

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

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Matrix Chart (Cont'd)

		SYMPTOM													Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)		
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Engine control	Crankshaft position sensor (REF) circuit	2	2												EC-510	AT
	Crankshaft position sensor (POS) circuit															EC-334, 517
	Camshaft position sensor (PHASE) circuit	3													EC-342	PD
	Mass air flow sensor circuit	1			2										EC-150	
	Heated oxygen sensor 1 (front) circuit														EC-192	AX
	Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3	2				EC-169, 187	SU
	Throttle position sensor circuit						2									
	Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1			1		EC-101	BR
	Vehicle speed sensor circuit		2	3		3									EC-417	ST
	Knock sensor circuit			2									3		EC-328	
	ECM	2	2	3	3	3	3	3	3	3	3	3			EC-444, 117	RS
	Start signal circuit	2													EC-621	
	Park/Neutral position switch circuit			3		3							3		EC-604	BT
	Power steering oil pressure switch circuit		2					3	3						EC-634	HA
Electrical load signal circuit														EC-644		

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

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NBEC0041S02

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

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

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Matrix Chart (Cont'd)

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

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

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference section
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
IVIS (INFINITI Vehicle Immobilizer System — NATS)	1	1												EC-74 or EL section

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

CONSULT-II Reference Value in Data Monitor Mode

NBEC0042

Remarks:

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

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED CKPS-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.
POS COUNT	<ul style="list-style-type: none"> ● Engine: Running 	179 - 181
MAS A/F SE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle 1.2 - 1.8V
		2,500 rpm 1.6 - 2.2V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 	More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)		LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		LEAN ↔ RICH

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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

MONITOR ITEM	CONDITION	SPECIFICATION	
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	GI
BATTERY VOLT	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) 	11 - 14V	MA
THRTL POS SEN	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Throttle valve: fully closed	EM
	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON (Engine stopped) 	Throttle valve: fully opened	EM
START SIGNAL	<ul style="list-style-type: none"> Ignition switch: ON → START → ON 	OFF → ON → OFF	LC
CLSD THL POS CLSD THL/P SW	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	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
IGNITION SW	<ul style="list-style-type: none"> Ignition switch: ON → OFF → ON 	ON → OFF → ON	PD
INJ PULSE-B2 INJ PULSE-B1	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: "OFF" Shift lever: "N" No-load 	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: "OFF" Shift lever: "N" No-load 	Idle	2.0 - 3.2 msec
		2,000 rpm	1.4 - 2.6 msec
IGN TIMING	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: "OFF" Shift lever: "N" No-load 	Idle	15°±5° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: "OFF" Shift lever: "N" No-load 	Idle	2 - 10 step
		2,000 rpm	—
PURG VOL C/V	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: "OFF" Shift lever: "N" No-load 	Idle	0 %
		2,000 rpm	—
A/F ALPHA-B2 A/F ALPHA-B1	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	<ul style="list-style-type: none"> Ignition switch: ON 	Approx. 3.4V	EL
AIR COND RLY	<ul style="list-style-type: none"> Air conditioner switch: OFF → ON 	OFF → ON	EC
FUEL PUMP RLY	<ul style="list-style-type: none"> Ignition switch is turned to ON (Operates for 5 seconds) Engine running and cranking 	ON	FE
	Except as shown above	OFF	AT

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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

MONITOR ITEM	CONDITION		SPECIFICATION
VENT CONT/V	● Ignition switch: ON		OFF
HO2S1 HTR (B1)	● Engine speed: Below 3,600 rpm		ON
HO2S1 HTR (B2)	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Ignition switch: ON (Engine stopped) ● Engine speed: Above 3,200 rpm		OFF
HO2S2 HTR (B2)	● Engine speed: Below 3,200 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
ABSOL TH-P/S	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
ABSOL PRES/SE	● Ignition switch: ON		Approx. 4.4V
SWRL CONT S/V	● Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF
SWL CON VC SW	● Engine speed: Idle ● Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).		OFF
	● Engine speed: Idle ● Engine coolant temperature is above 55°C (131°F).		ON
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever "N" ● Quickly depressed accelerator pedal ● No-load	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever "N" ● Quickly depressed accelerator pedal ● No-load	Idle	0%
		2,000 rpm	Approximately 40%

Major Sensor Reference Graph in Data Monitor Mode

NBEC0043

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

THRTL POS SEN, ABSOL TH-P/S, CLSD THL POS

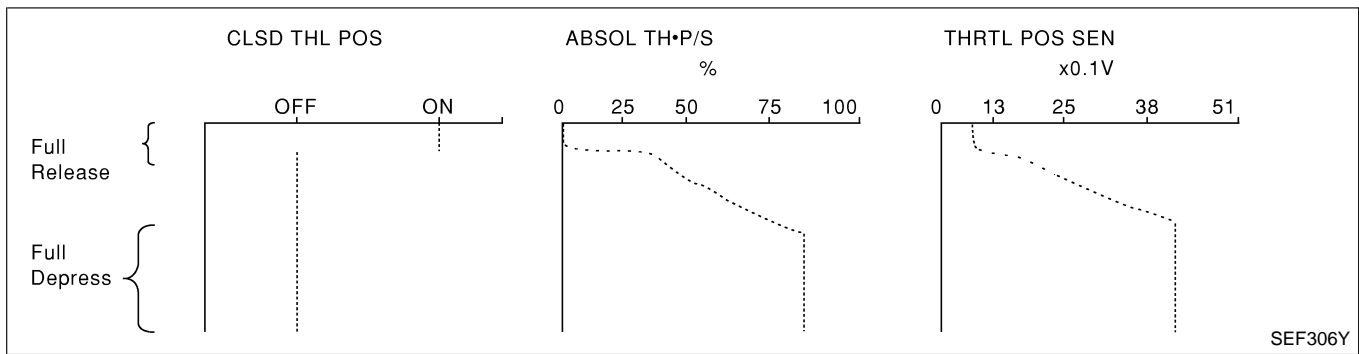
NBEC0043S01

Below is the data for "THRTL POS SEN", "ABSOL TH-P/S" and "CLSD THL POS" 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 POS" is changed from "ON" to "OFF".

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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



GI
MA
EM
LC

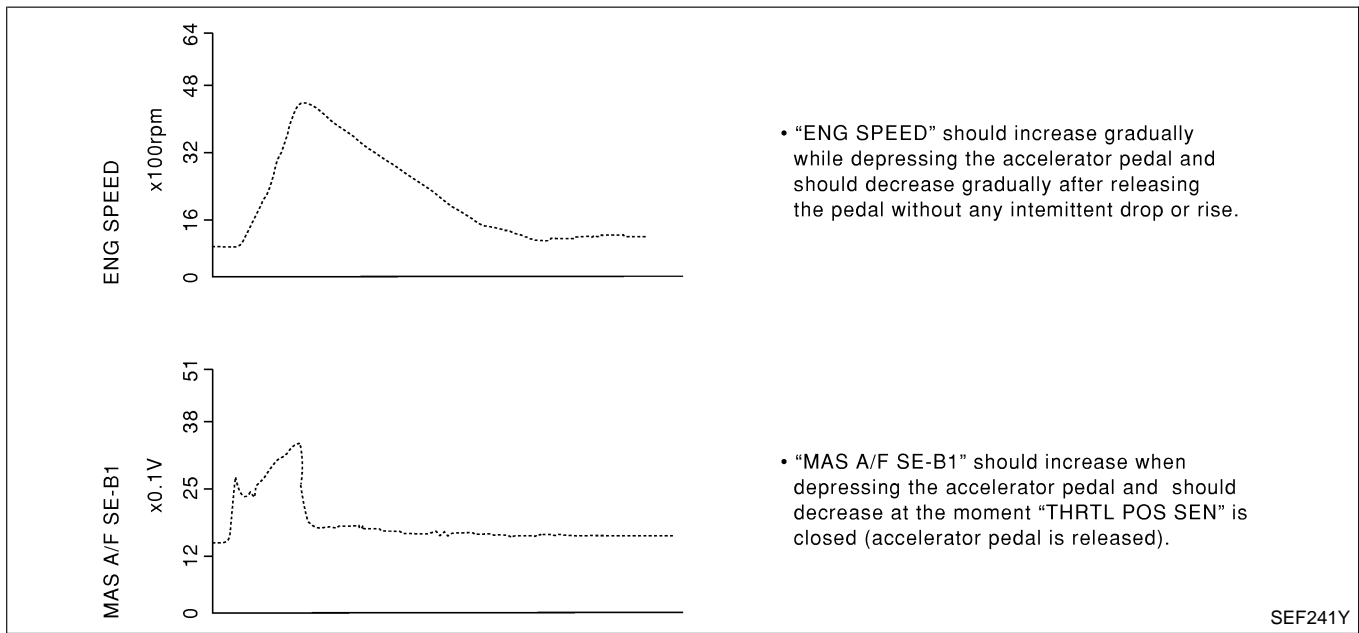
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently. NBEC0043S02

EC

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

FE



AT
TF
PD
AX
SU
BR
ST

RS

BT

HA

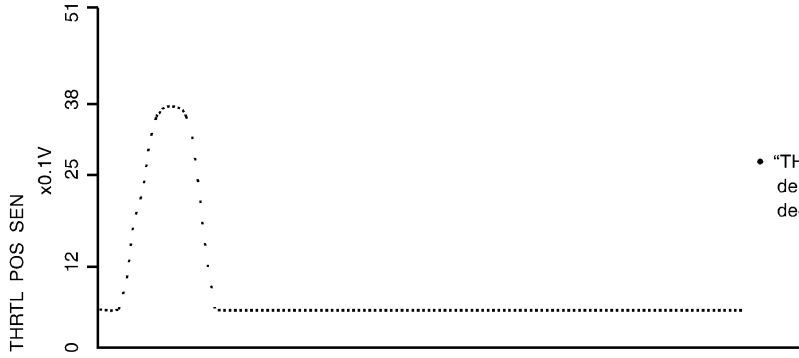
SC

EL

IDX

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

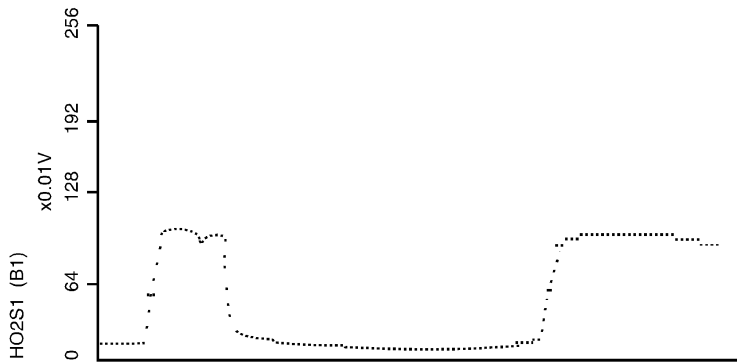
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



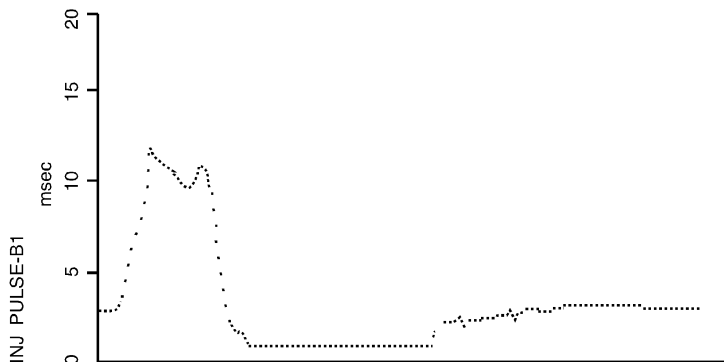
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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



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

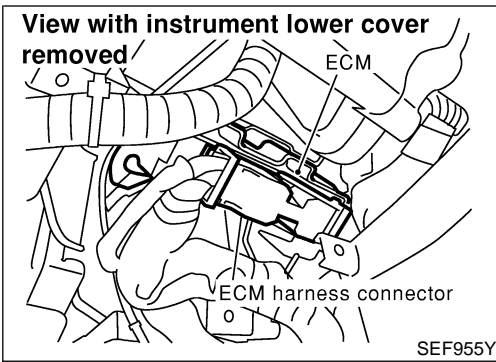


- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

SEF242YA

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value



ECM Terminals and Reference Value

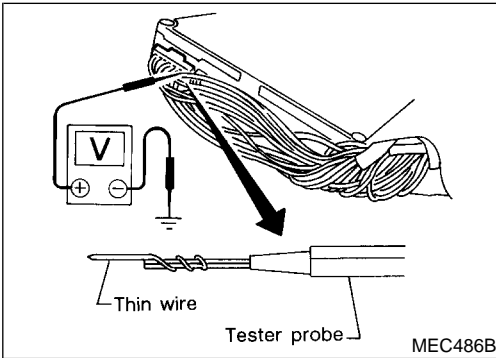
NBEC0044

PREPARATION

NBEC0044S01

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

2. Remove ECM harness protector.




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

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

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NBEC0044S02

101	102	1	2	3	4	5	6	7	8	9	10			58	59	60	61	62	63	64	65	66	67	109	110							
103	104	11	12	13	14	15	16	17	18	19	39	40	41	42	43	44	45	46	47	48	68	69	70	71	72	73	74	75	76	111	112	
105	106	20	21	22	23	24	25	26	27	28	29	49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	113	114
107	108	30	31	32	33	34	35	36	37	38											87	88	89	90	91	92	93	94	95	115	116	



SEF970W

ECM INSPECTION TABLE

NBEC0044S03

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

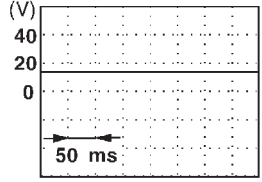
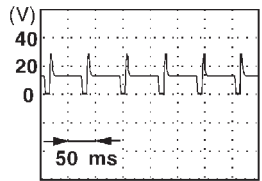
CAUTION:

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

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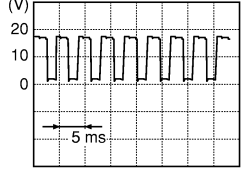
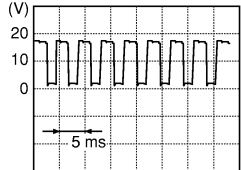
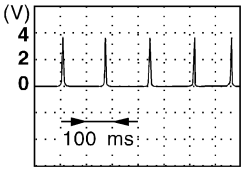
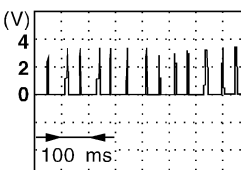
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L/Y	EVAP canister purge volume control sole- noid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine). 	BATTERY VOLTAGE (11 - 14V)  SEF995U
2	R/G	Heated oxygen sensor 1 (front) (bank 2) heater	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,600 rpm. 	0 - 1.0V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,600 rpm. 	BATTERY VOLTAGE (11 - 14V)
3	L/OR	Heated oxygen sensor 1 (front) (bank 1) heater	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,600 rpm. 	0 - 1.0V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,600 rpm. 	BATTERY VOLTAGE (11 - 14V)
4	R/W	Heated oxygen sensor 2 (rear) (bank 2) heater	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	0 - 1.0V
			[Ignition switch "ON"] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm. 	BATTERY VOLTAGE (11 - 14V)
5	P/B	Heated oxygen sensor 2 (rear) (bank 1) heater	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	0 - 1.0V
			[Ignition switch "ON"] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm. 	BATTERY VOLTAGE (11 - 14V)
6 7 8 17	PU/G GY Y GY/L	IACV-AAC valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	0.1 - 14V

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

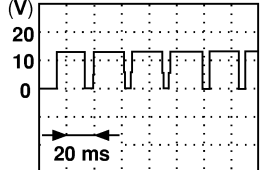
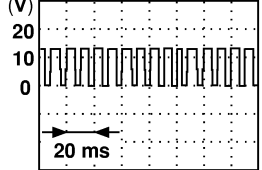
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	OR/B	Intake valve timing control solenoid valves (RH)	[Engine is running] ● Warm-up condition ● Idle speed	Battery voltage
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	7 - 8V  SEF350Z
15	P/L	Intake valve timing control solenoid valves (LH)	[Engine is running] ● Warm-up condition ● Idle speed	Battery voltage
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	7 - 8V  SEF350Z
16	Y/G	VIAS control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm.	0 - 1.0V
21 22 23 30 31 32	Y/R G/R L/R GY PU/W GY/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6	[Engine is running] ● Warm-up condition ● Idle speed	0 - 0.2V★  SEF399T
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEF645T

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	W/G	Tachometer	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	7 - 8V★  SEF579X
			[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Engine speed is 2,500 rpm. 	7 - 8V★  SEF580X
26	L/B	ECM relay (Self shutt-off)	[Engine is running] [Ignition switch "OFF"] <ul style="list-style-type: none"> • For a few seconds after turning ignition switch "OFF" 	0 - 1.5V
			[Ignition switch "OFF"] <ul style="list-style-type: none"> • A few seconds passed after turning ignition switch "OFF" 	BATTERY VOLTAGE (11 - 14V)
27	LG	Air conditioner relay	[Engine is running] <ul style="list-style-type: none"> • Both A/C switch and blower switch are "ON" (Compressor is operating). 	0 - 1.0V
			[Engine is running] <ul style="list-style-type: none"> • A/C switch is "OFF". 	BATTERY VOLTAGE (11 - 14V)
28	R/L	Fuel pump relay	[Ignition switch "ON"] <ul style="list-style-type: none"> • For 1 second after turning ignition switch "ON" [Engine is running]	0 - 1.5V
			[Ignition switch "ON"] <ul style="list-style-type: none"> • 1 second passed after turning ignition switch "ON". 	BATTERY VOLTAGE (11 - 14V)
29	G	Swirl control valve control solenoid valve	[Engine is running] <ul style="list-style-type: none"> • Idle speed • Engine coolant temperature is between 15 to 50°C (59 to 122°F). 	0 - 1.0V
			[Engine is running] <ul style="list-style-type: none"> • Idle speed • Engine coolant temperature is above 55°C (131°F). 	BATTERY VOLTAGE (11 - 14V)
38	OR	MIL	[Ignition switch "ON"]	0 - 1.0V
			[Engine is running] <ul style="list-style-type: none"> • Idle speed 	BATTERY VOLTAGE (11 - 14V)
39	G/W	Vacuum cut valve bypass valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
40	G/Y	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

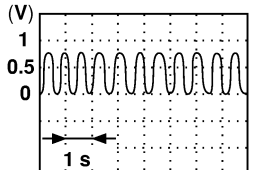
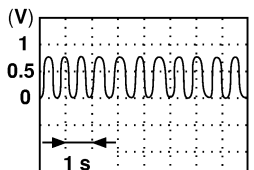
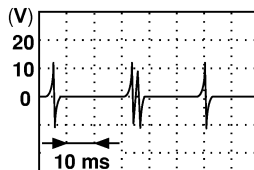
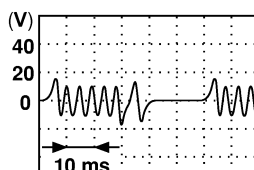
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
42	B/Y	Start signal	[Ignition switch "ON"]	Approximately 0V	GI
			[Ignition switch "START"]	9 - 12V	MA
43	R	Ignition switch	[Ignition switch "OFF"]	0V	EM
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)	LC
44	L	PNP switch	[Ignition switch "ON"] ● Gear position is "P" or "N".	Approximately 0V	EC
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)	FE
45	B/R	Air conditioner switch signal	[Engine is running] ● Both A/C switch and blower switch are "ON".	Approximately 0V	AT
			[Engine is running] ● A/C switch is "OFF".	Approximately 5V	TF
47	R/B	Power steering oil pressure switch	[Engine is running] ● Steering wheel is being turned.	0 - 1.0V	PD
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V	AX
48	B	ECM ground	[Engine is running] ● Idle speed	Engine ground	SU
51	BR	A/C cut signal	[Engine is running] ● Air conditioner is operating.	0 - 0.5V	BR
52	PU	Electrical load signal	[Engine is running] ● Rear window defogger: ON ● Hi-beam headlamp: ON	BATTERY VOLTAGE (11 - 14V)	ST
			[Engine is running] ● Electrical load: OFF	0V	RS
55	W/B	Swirl control valve con- trol vacuum check switch	[Engine is running] ● Idle speed ● Engine coolant temperature is between 15 to 50°C (59 to 122°F).	Approximately 5V	BT
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	0 - 1.0V	HA
56	OR/L	Throttle position switch (Closed position)	[Engine is running] ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)	SC
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V	EL
57	B	ECM ground	[Engine is running] ● Idle speed	Engine ground	IDX
58	B/P	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V	
59	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V	

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	OR	Mass air flow sensor	[Engine is running] ● Warm-up condition ● Idle speed	1.2 - 1.8V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm.	1.6 - 2.2V
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Peri- odically change)  SEF059V
63	G	Heated oxygen sensor 1 (front) (bank 1)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Peri- odically change)  SEF059V
64	Y/PU	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
65 75	LG LG	Crankshaft position sensor (REF)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 2.3V★ (AC voltage)  SEF581X
66 76	L L	Camshaft position sen- sor (PHASE)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 4.2V★ (AC voltage)  SEF582X
12 67	W/R	Power supply for ECM (Buck-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
70	LG/R	Engine coolant tem- perature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.

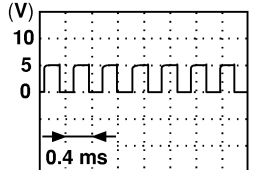
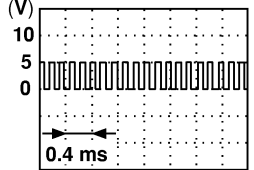
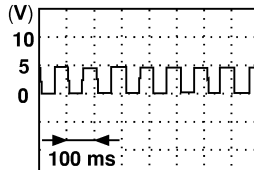
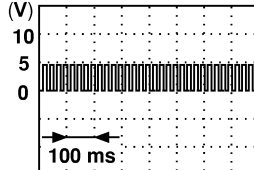
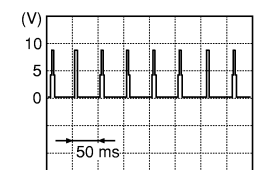
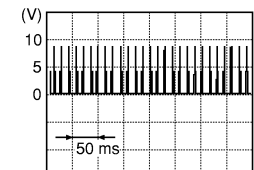
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	0 - Approximately 1.0V	GI MA
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	0 - Approximately 1.0V	EM
73	B/P	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V	LC
79	Y/G	Intake valve timing control position sensors (RH)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0.5V	<div style="text-align: right; background-color: black; color: white; padding: 2px; font-weight: bold;">EC</div> FE AT TF PD AX SU BR ST RS BT HA SC EL IDX
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	Approximately 0.5V	
80	L/R	Absolute pressure sensor	[Ignition switch "ON"]	Approximately 4.4V	
81	W/PU	Refrigerant pressure sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Both A/C switch and blower switch are "ON". (Compressor operates.) 	0.36 - 3.88V	
82	W	Throttle position sensor signal output	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Accelerator pedal fully released 	Approximately 0.4V	RS
			[Ignition switch "ON"] <ul style="list-style-type: none"> ● Accelerator pedal fully depressed 	Approximately 4V	BT
83	Y/PU	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.	HA
84	L/G	EVAP control system pressure sensor	[Ignition switch "ON"]	Approximately 3.4V	SC

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	Y	Crankshaft position sensor (POS)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 2.4V</p>  <p style="text-align: right;">SEF057V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm. 	<p>Approximately 2.3V</p>  <p style="text-align: right;">SEF058V</p>
86	W/L	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Jack up front wheels. ● In 1st gear position ● 10 km/h (6 MPH) 	<p>Approximately 2.5V</p>  <p style="text-align: right;">SEF583X</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Jack up front wheels. ● In 2nd gear position ● 30 km/h (19 MPH) 	<p>Approximately 2.0V</p>  <p style="text-align: right;">SEF584X</p>
89	OR	Intake valve timing control position sen- sors (LH)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>Approximatley 0.5V</p>  <p style="text-align: right;">SEF351Z</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>Approximatley 0.5V</p>  <p style="text-align: right;">SEF352Z</p>

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
91	R	Throttle position sensor	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	0.15 - 0.85V	GI MA
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V	EM
92	G/B	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.	LC
93	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V	EC
101 102 103 104 105 107	R/B L/W R/W PU/R R/Y R/L	Injector No. 1 Injector No. 5 Injector No. 2 Injector No. 6 Injector No. 3 Injector No. 4	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)	FE AT
106 108	B B	ECM ground	[Engine is running] ● Idle speed	Engine ground	TF
110 112	B/W B/W	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)	PD
111	P/B	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V	
114	G/R	Communication line (LAN)	[Engine is running] ● Idle speed	Approximately 2V	AX
115	LG/R	Data link connector	[Ignition switch "ON"] ● CONSULT-II or GST is disconnected.	Approximately 2V	SU

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

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TROUBLE DIAGNOSIS — SPECIFICATION VALUE

Description

Description

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions. NBEC0717

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

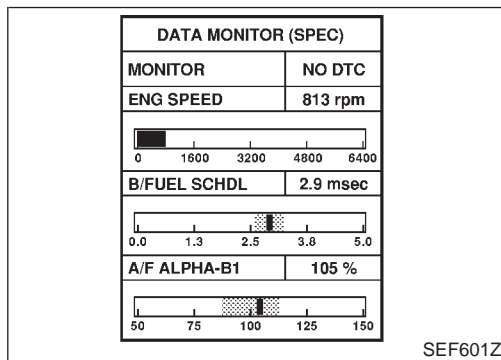
Testing Condition

- Vehicle driven distance: More than 5,000 km (3,100 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

NBEC0718

*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V.

*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Cooling fans are not operating. Steering wheel is straight ahead.



Inspection Procedure

NBEC0719

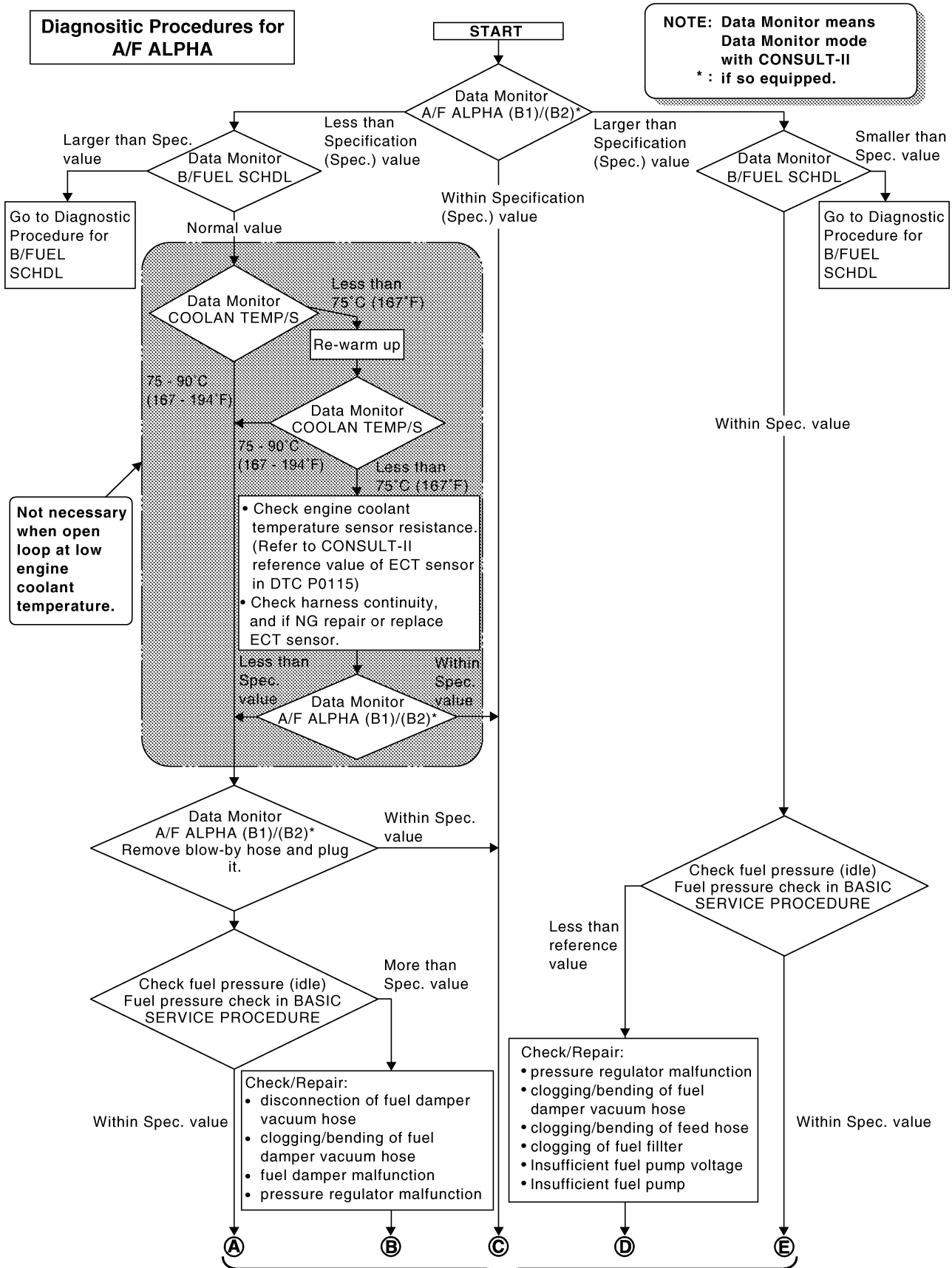
NOTE:

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

1. Perform “Basic Inspection”, EC-101.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-137.

Diagnostic Procedure

NBEC0720



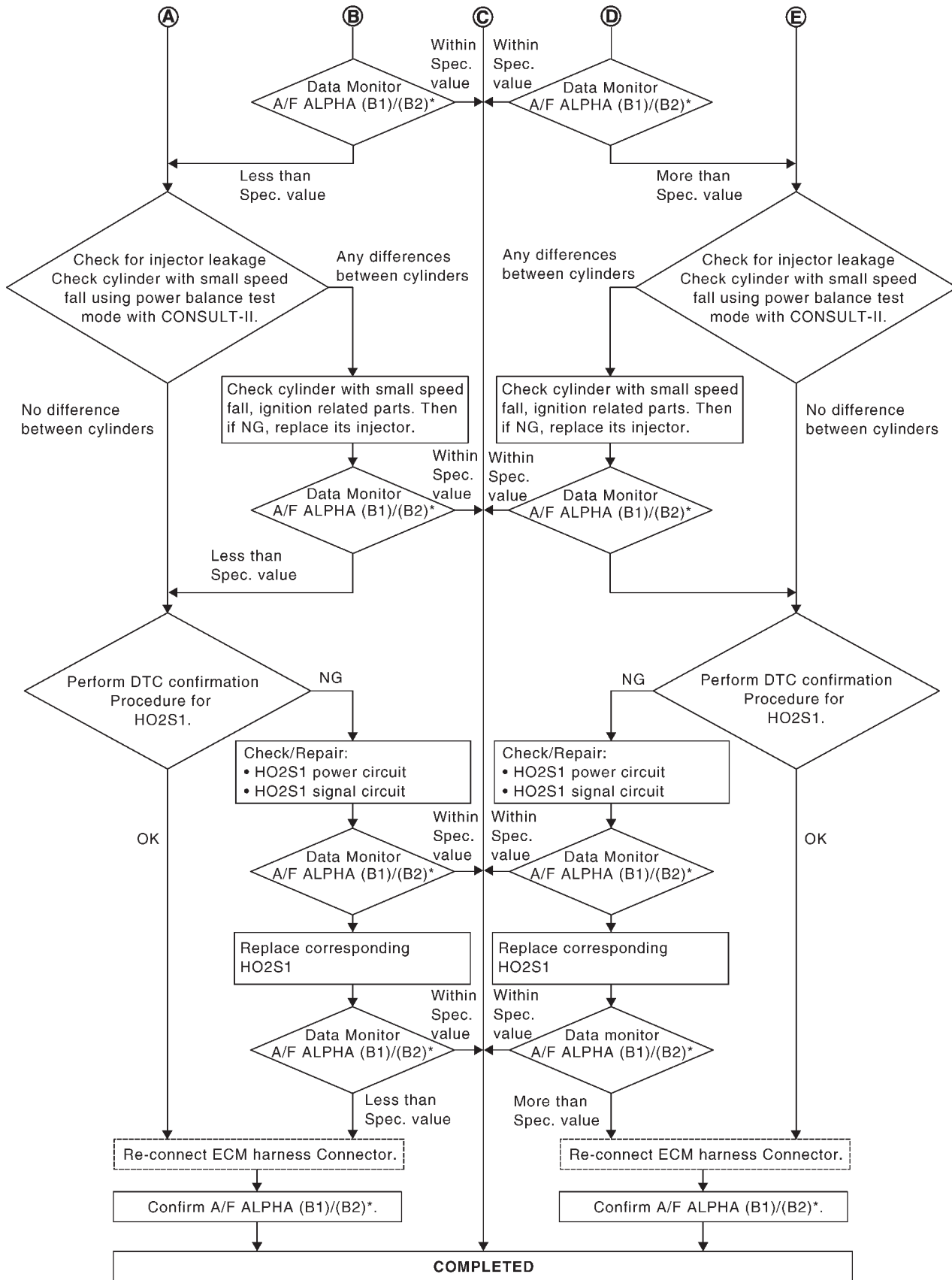
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(Go to next page.)

SEF613ZB

TROUBLE DIAGNOSIS — SPECIFICATION VALUE

Diagnostic Procedure (Cont'd)

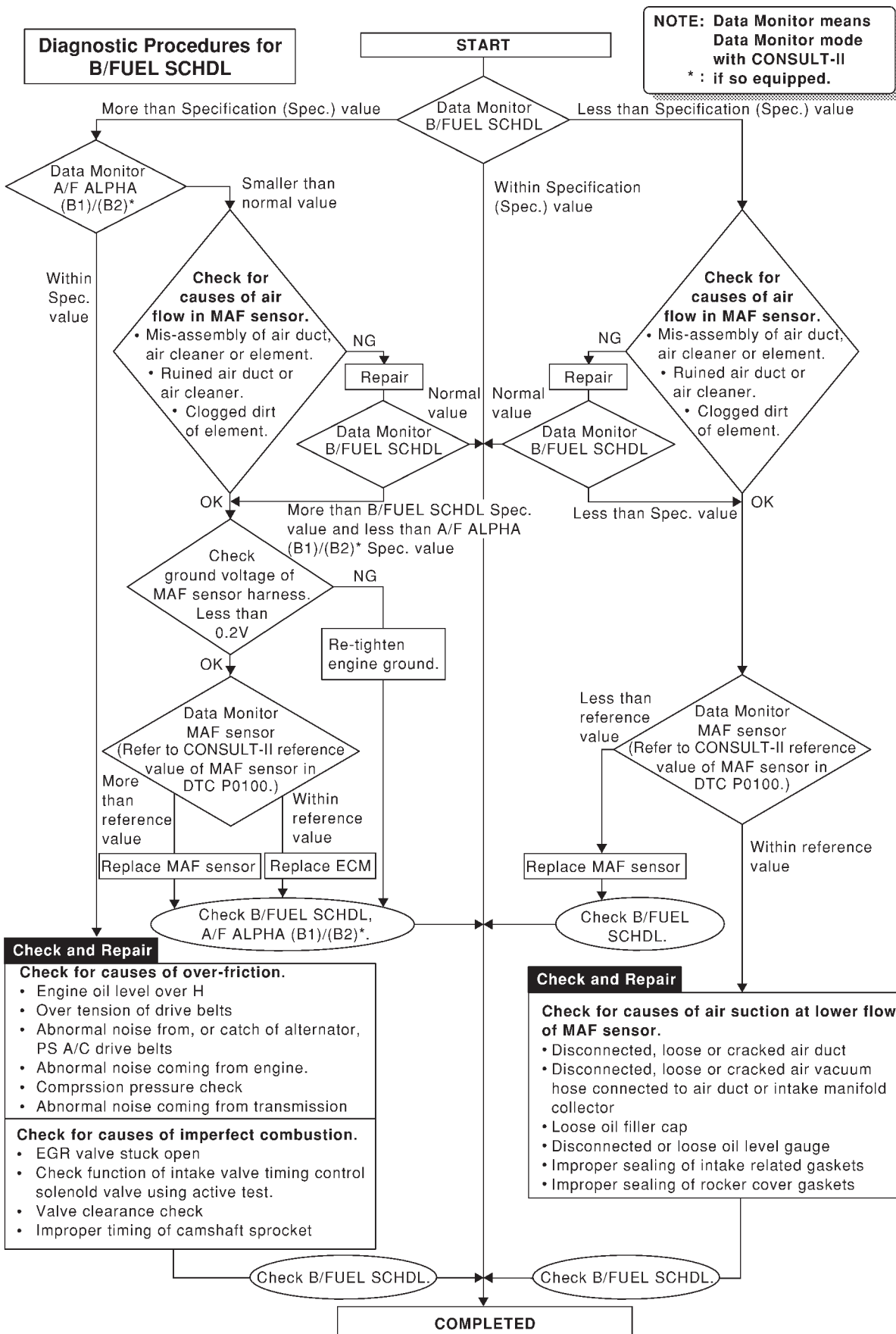


SEF768Z

TROUBLE DIAGNOSIS — SPECIFICATION VALUE

Diagnostic Procedure (Cont'd)

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SEF615Z

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

Description

NBEC0045

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

COMMON I/I REPORT SITUATIONS

NBEC0045S01

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

Diagnostic Procedure

NBEC0046

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-72.	
▶	GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to GI-30, "GROUND INSPECTION".	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.

3	SEARCH FOR ELECTRICAL INCIDENT
Perform GI-36, "Incident Simulation Tests".	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

4	CHECK CONNECTOR TERMINALS
Refer to GI-27, "How to Check Enlarged Contact Spring of Terminal".	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace connector.

TROUBLE DIAGNOSIS FOR POWER SUPPLY

ECM Terminals and Reference Value

ECM Terminals and Reference Value

NBEC0648

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	L/B	ECM relay (Self shutt-off)	[Engine is running] [Ignition switch "OFF"] ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
43	R	Ignition switch	[Ignition switch "OFF"]	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
48	B	ECM ground	[Engine is running] ● Idle speed	Engine ground [Probe this terminal with (-) tester probe when measuring]
57	B	ECM ground	[Engine is running] ● Idle speed	Engine ground
12 67	W/R	Power supply for ECM (Buck-up)	[Ignition switch "OFF"]	BATTERY VOLTAGE (11 - 14V)
108	B	ECM ground	[Engine is running] ● Idle speed	Engine ground
110 112	B/W B/W	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

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TROUBLE DIAGNOSIS FOR POWER SUPPLY

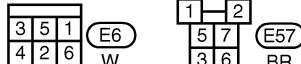
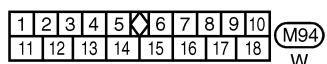
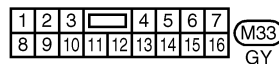
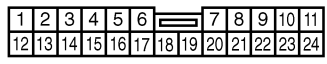
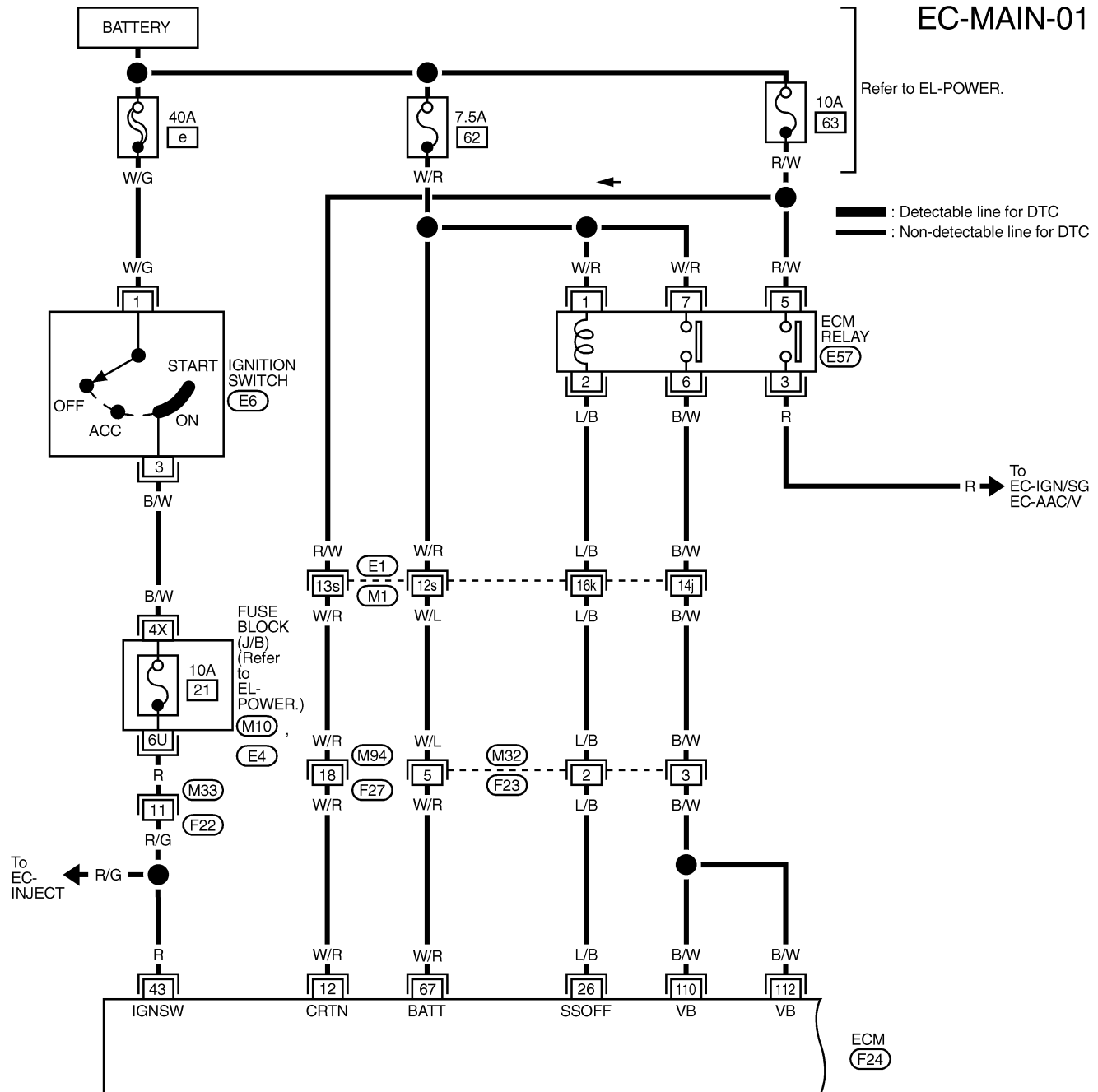
Main Power Supply and Ground Circuit

Main Power Supply and Ground Circuit

NBEC0047

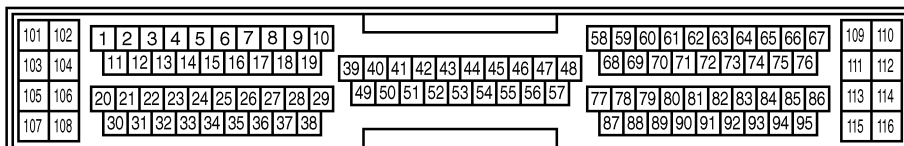
WIRING DIAGRAM

EC-MAIN-01



REFER TO THE FOLLOWING.

- (E1) -SUPER MULTIPLE JUNCTION (SMJ)
- (M10), (E4) -FUSE BLOCK-JUNCTION BOX (J/B)

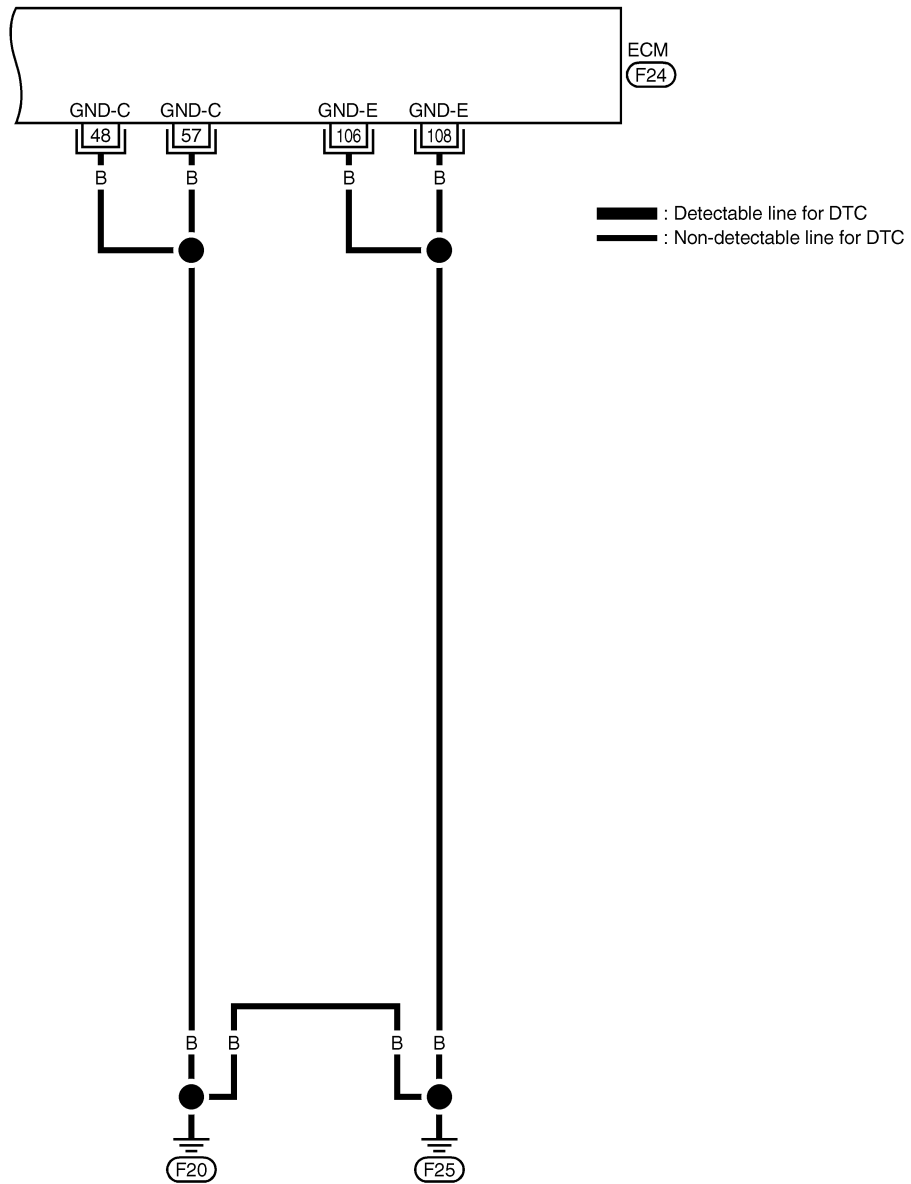


MEC940C

TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-02



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101	102	1	2	3	4	5	6	7	8	9	10			58	59	60	61	62	63	64	65	66	67	109	110							
103	104	11	12	13	14	15	16	17	18	19	39	40	41	42	43	44	45	46	47	48	68	69	70	71	72	73	74	75	76	111	112	
105	106	20	21	22	23	24	25	26	27	28	29	49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	113	114
107	108	30	31	32	33	34	35	36	37	38											87	88	89	90	91	92	93	94	95	115	116	

F24
GY



MEC941C

TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

DIAGNOSTIC PROCEDURE

NBEC0049

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

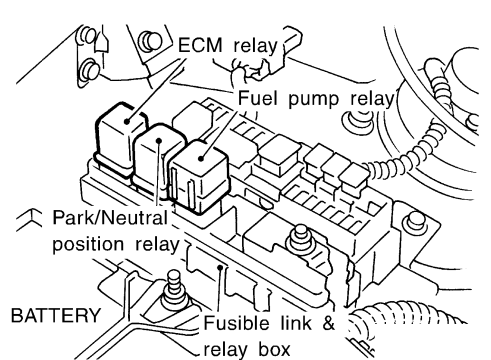
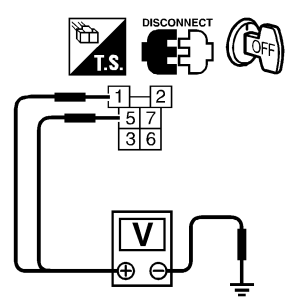
2	CHECK ECM POWER SUPPLY CIRCUIT-I	
1. Turn ignition switch "OFF" and then "ON". 2. Check voltage between ECM terminal 43 and ground with CONSULT-II or tester.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● 10A fuses ● Harness connectors M33, F22 ● Harness for open or short between ECM and ignition switch 		
▶		Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I	
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist.		
4. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

5	CHECK POWER SUPPLY-II								
		<p>1. Disconnect ECM relay.</p>  <p>2. Check voltage between ECM relay terminals 1, 5 and ground with CONSULT-II or tester.</p>  <p style="text-align: center;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p>						
		<table border="1" style="width: 100%;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td style="width: 75%;">GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 6.</td> </tr> </table>	OK	▶	GO TO 7.	NG	▶	GO TO 6.	<p>SEF681UB</p> <p>SEF956Y</p>
OK	▶	GO TO 7.							
NG	▶	GO TO 6.							

6	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● 7.5A and 10A fuses ● Harness for open or short between ECM relay and battery 	
	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

7	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Check harness continuity between ECM terminal 26 and ECM relay terminal 2. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
		<table border="1" style="width: 100%;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td style="width: 75%;">Go to "DTC P1320 IGNITION SIGNAL", EC-499.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>	OK	▶	Go to "DTC P1320 IGNITION SIGNAL", EC-499.	NG	▶	GO TO 8.	<p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p>
OK	▶	Go to "DTC P1320 IGNITION SIGNAL", EC-499.							
NG	▶	GO TO 8.							

8	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 and M32, F23 ● Harness for open or short between ECM relay and ECM 	
	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

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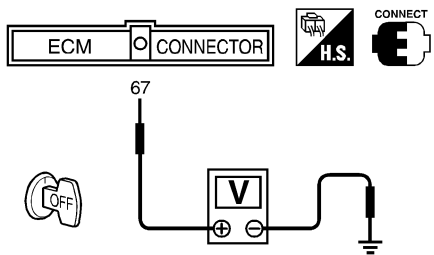
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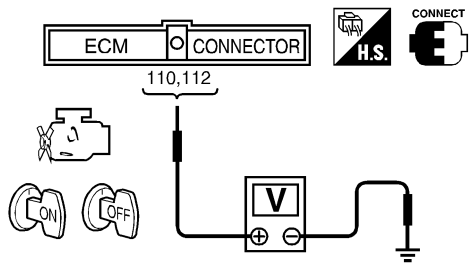
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TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

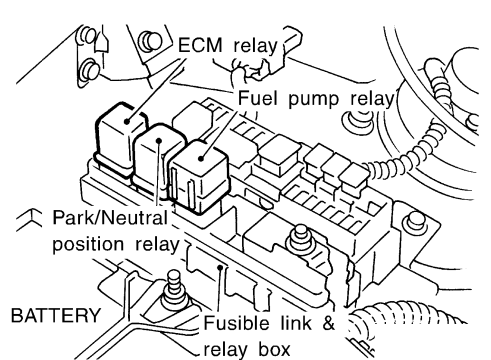
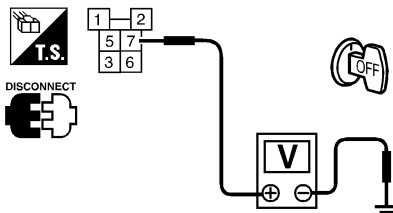
9	CHECK ECM POWER SUPPLY CIRCUIT-II	
<p>1. Stop engine. 2. Check voltage between ECM terminal 67 and ground with CONSULT-II or tester.</p>		
 <p style="text-align: right;">Voltage: Battery voltage</p>		
SEF293X		
OK or NG		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 and M32, F23 ● Harness for open or short between ECM and fuse 		
▶ Repair harness or connectors.		

11	CHECK ECM POWER SUPPLY CIRCUIT-III	
<p>1. Turn ignition switch "ON" and then "OFF". 2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.</p>		
 <p style="text-align: right;">Voltage: After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop approximately 0V.</p>		
SEF294X		
OK or NG		
OK	▶	GO TO 17.
NG (Battery voltage does not exist.)	▶	GO TO 12.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 14.

TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

12	CHECK ECM POWER SUPPLY CIRCUIT-IV
<p>1. Disconnect ECM relay.</p> <div style="text-align: center;">  </div>	
SEF681UB	
<p>2. Check voltage between ECM relay terminal 7 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="margin-left: 200px;">Voltage: Battery voltage</p> </div>	
SEF957Y	
OK or NG	
OK	▶ GO TO 14.
NG	▶ GO TO 13.

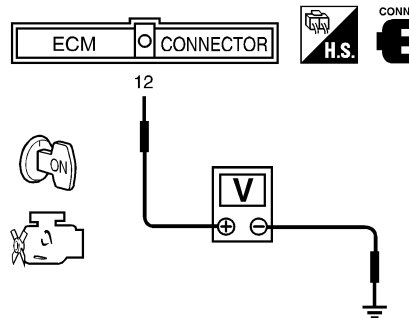
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13	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and 7.5A fuse 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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14	CHECK ECM POWER SUPPLY-V
<p>1. Turn ignition switch "OFF" and then "ON".</p> <p>2. Check voltage between ECM terminal 12 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="margin-left: 200px;">Voltage: Battery voltage</p> </div>	
SEF331Z	
OK or NG	
OK	▶ GO TO 16.
NG	▶ GO TO 15.

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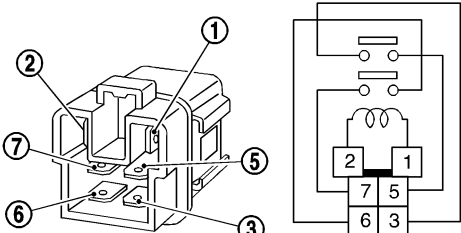
TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

15	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E1, M1 ● Harness connectors M94, F27 ● 10A fuse 	
▶	Repair harness or connectors.

16	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT
1. Check harness continuity between ECM terminals 110, 112 and ECM relay terminal 6. Refer to WIRING DIAGRAM. Continuity should exist.	
2. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 18.
NG	▶ GO TO 17.

17	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E1, M1 and M32, F23 ● Harness for open or short between ECM and ECM relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

18	CHECK ECM RELAY						
1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5, 6 and 7.							
							
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>OFF</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Condition	Continuity	12V direct current supply between terminals 1 and 2	Yes	OFF	No
Condition	Continuity						
12V direct current supply between terminals 1 and 2	Yes						
OFF	No						
SEF296X							
OK or NG							
OK	▶ GO TO 19.						
NG	▶ Replace ECM relay.						

19	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist.	
4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 20.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

20	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

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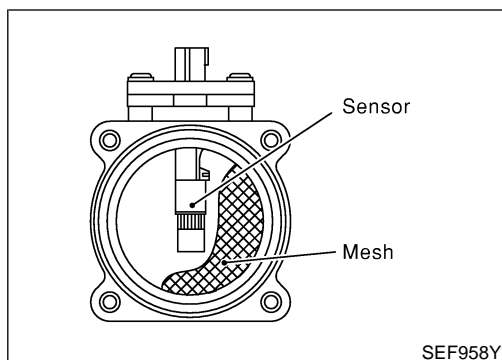
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DTC P0100 MASS AIR FLOW SENSOR (MAFS)

Component Description



Component Description

NBEC0050

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

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

CONSULT-II Reference Value in Data Monitor Mode

NBEC0051

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	1.2 - 1.8V
		2,500 rpm	1.6 - 2.2V
CAL/LD VALUE	ditto	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

ECM Terminals and Reference Value

NBEC0649

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	OR	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	1.2 - 1.8V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm. 	1.6 - 2.2V
73	B/P	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V
111	P/B	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V

On Board Diagnosis Logic

NBEC0053

Malfunction is detected when

(Malfunction A) an excessively high voltage from the sensor is sent to ECM when engine is not running,

(Malfunction B) an excessively low voltage from the sensor is sent to ECM when engine is running,

(Malfunction C) a high voltage from the sensor is sent to ECM under light load driving condition,

(Malfunction D) a low voltage from the sensor is sent to ECM under heavy load driving condition,

(Malfunction E) a voltage from the sensor is constantly approx. 1.0V when engine is running.

FAIL-SAFE MODE

NBEC0053S02

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

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

Possible Cause

MALFUNCTION A OR C

NBEC0426

- Harness or connectors
(The sensor circuit is open or shorted.)
- Mass air flow sensor

MALFUNCTION B, D OR E

NBEC0426S02

- Harness or connectors
(The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

DTC Confirmation Procedure

NBEC0054

Perform "PROCEDURE FOR MALFUNCTION A" first.

If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B AND E".

If there is no problem on "PROCEDURE FOR MALFUNCTION B AND E", perform "PROCEDURE FOR MALFUNCTION C".

If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

NOTE:

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

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

DTC Confirmation Procedure (Cont'd)

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

NBEC0054S01

NBEC0054S0101

- 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-155.

With GST

NBEC0054S0102

Follow the procedure "With CONSULT-II" above.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND E

With CONSULT-II

NBEC0054S02

NBEC0054S0201

- 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-155.

With GST

NBEC0054S0202

Follow the procedure "With CONSULT-II" above.

NOTE:

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

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NBEC0054S03

NOTE:

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

With CONSULT-II

NBEC0054S0301

- 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) Run engine for at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-155.

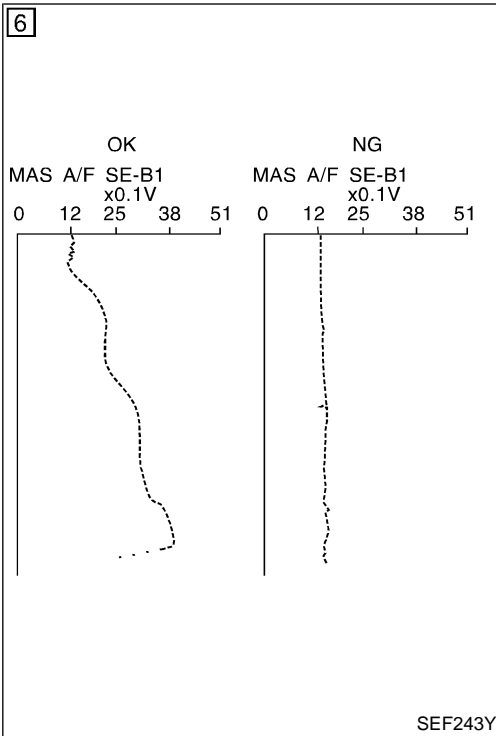
With GST

NBEC0054S0302

Follow the procedure "With CONSULT-II" above.

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

DTC Confirmation Procedure (Cont'd)



7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y

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

PROCEDURE FOR MALFUNCTION D

NBEC0054S04

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

NBEC0054S0402

- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-155.**
- 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-155.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	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-155.

Overall Function Check

NBEC0055

PROCEDURE FOR MALFUNCTION D

NBEC0055S01

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

With GST

NBEC0055S0101

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MODE 1" with GST.
- 3) Check the mass air flow sensor signal with "MODE 1".
- 4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
- 5) If NG, go to "Diagnostic Procedure", EC-155.

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

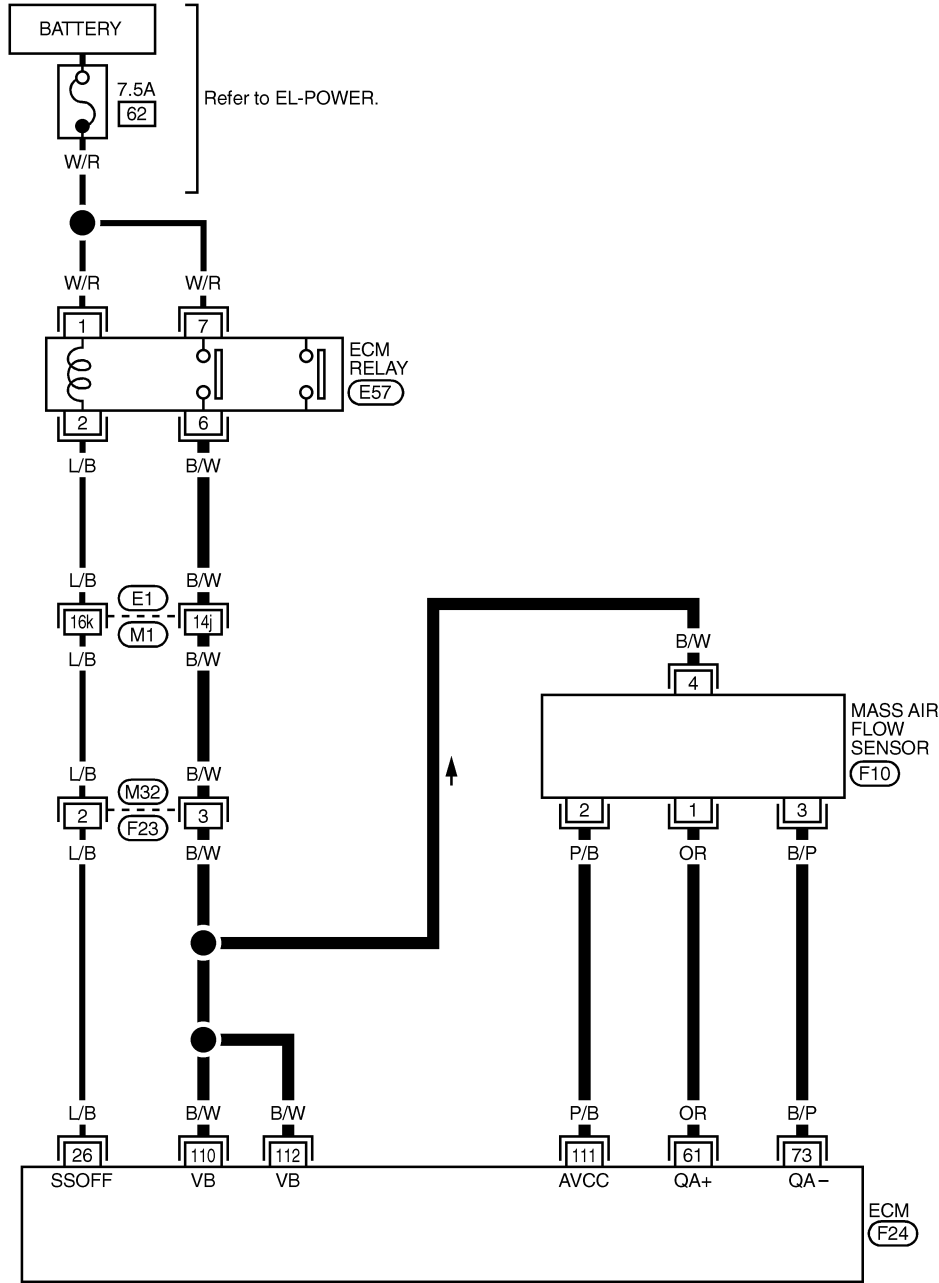
Wiring Diagram

Wiring Diagram

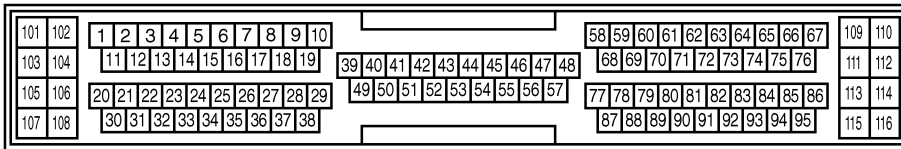
NBEC0056

EC-MAFS-01

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



REFER TO THE FOLLOWING.
 (E1) -SUPER
 MULTIPLE JUNCTION (SMJ)



MEC942C

Diagnostic Procedure

NBEC0057

1	INSPECTION START							
Which malfunction (A, B, C, D or E) is duplicated?								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">MALFUNCTION</th> <th style="text-align: center;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A and/or C</td> <td style="text-align: center;">I</td> </tr> <tr> <td style="text-align: center;">B, D and/or E</td> <td style="text-align: center;">II</td> </tr> </tbody> </table>			MALFUNCTION	Type	A and/or C	I	B, D and/or E	II
MALFUNCTION	Type							
A and/or C	I							
B, D and/or E	II							
MTBL0373								
Type I or Type II								
Type I	▶	GO TO 3.						
Type II	▶	GO TO 2.						

GI

MA

EM

LC

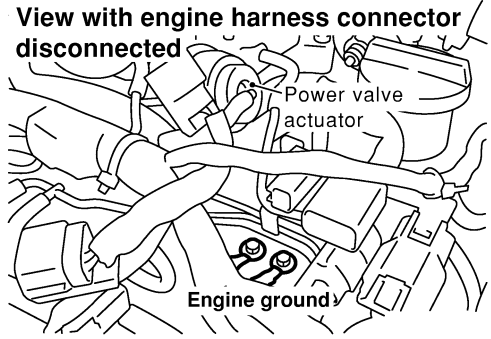
EC

2	CHECK INTAKE SYSTEM	
Check the following for connection.		
<ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

FE

AT

TF

3	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. 		
<p>View with engine harness connector disconnected</p>  <p>The diagram shows a top-down view of the engine area. A power valve actuator is labeled at the top. Below it, two engine ground screws are indicated with arrows and the label 'Engine ground'.</p>		
SEF959Y		
		▶ GO TO 4.

PD

AX

SU

BR

ST

RS

BT

HA

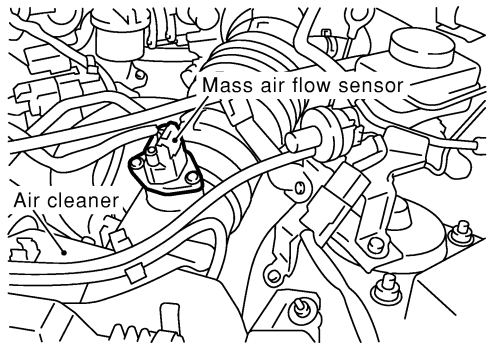
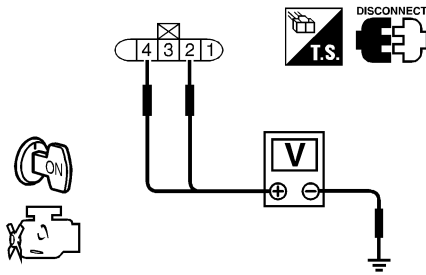
SC

EL

IDX

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

Diagnostic Procedure (Cont'd)

4	CHECK MAFS POWER SUPPLY CIRCUIT						
<p>1. Disconnect mass air flow sensor (MAFS) harness connector.</p> <div style="text-align: center;">  <p style="margin-left: 150px;">Mass air flow sensor</p> <p style="margin-left: 50px;">Air cleaner</p> </div> <p style="text-align: right;">SEF960Y</p> <p>2. Turn ignition switch "ON".</p> <p>3. Check voltage between MAFS terminals 2, 4 and ground with CONSULT-II or tester.</p> <div style="display: flex; align-items: center; justify-content: center;">  <table border="1" style="margin-left: 20px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Terminal</th> <th style="text-align: center;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Approximately 5</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Battery voltage</td> </tr> </tbody> </table> </div> <p style="text-align: right;">SEF297X</p> <p style="text-align: center;">OK or NG</p>		Terminal	Voltage	2	Approximately 5	4	Battery voltage
Terminal	Voltage						
2	Approximately 5						
4	Battery voltage						
OK	▶ GO TO 6.						
NG	▶ GO TO 5.						

5	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and mass air flow sensor ● Harness for open or short between mass air flow sensor and ECM <p style="text-align: right;">▶ Repair harness or connectors.</p>	

6	CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between MAFS terminal 3 and ECM terminal 73. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ Repair open circuit or short to power in harness or connectors.

DTC P0100 MASS AIR FLOW SENSOR (MAFS)

Diagnostic Procedure (Cont'd)

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between MAFS terminal 1 and ECM terminal 61. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

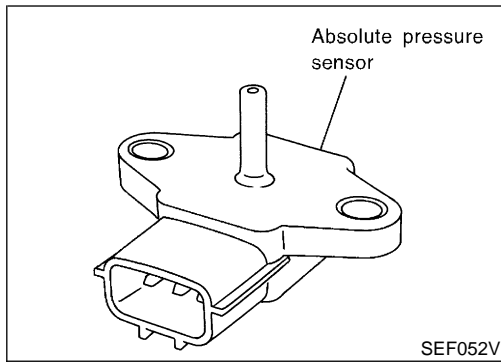
8	CHECK MASS AIR FLOW SENSOR											
<p>1. Reconnect harness connectors disconnected.</p> <p>2. Start engine and warm it up to normal operating temperature.</p> <p>3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.</p>												
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON" (Engine stopped.)</td> <td style="text-align: center;">Approx. 1.0</td> </tr> <tr> <td>Idle (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.2 - 1.8</td> </tr> <tr> <td>2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.6 - 2.2</td> </tr> <tr> <td>Idle to about 4,000 rpm*</td> <td style="text-align: center;">1.2 - 1.8 to Approx. 4.0</td> </tr> </tbody> </table> <p style="font-size: small;">*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.</p>	Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Approx. 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2	Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0
Condition	Voltage V											
Ignition switch "ON" (Engine stopped.)	Approx. 1.0											
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8											
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2											
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0											
<p>4. If the voltage is out of specification, disconnect MAFS harness connector and connect it again. Then repeat above check.</p> <p style="text-align: center;">OK or NG</p>												
OK	▶	GO TO 9.										
NG	▶	Replace mass air flow sensor.										

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
▶		INSPECTION END

GI
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DTC P0105 ABSOLUTE PRESSURE SENSOR

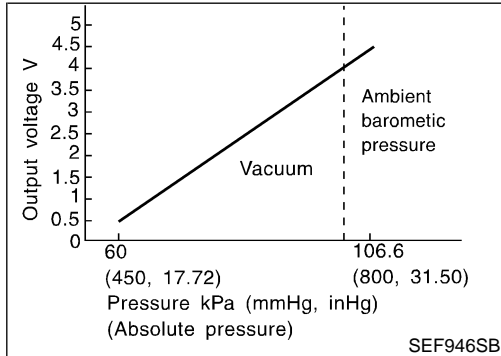
Component Description



Component Description

NBEC0725

The absolute pressure sensor detects ambient barometric pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.



ECM Terminals and Reference Value

NBEC0726

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
80	L/R	Absolute pressure sensor	[Ignition switch "ON"]	Approximately 4.4V
111	P/B	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V
58	B/P	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NBEC0727

Malfunction is detected when an excessively low or high voltage from the sensor is sent to ECM.

Possible Cause

NBEC0728

- Harness or connectors
(Absolute pressure sensor circuit is open or shorted.)
- Absolute pressure sensor

GI

MA

EM

LC

DTC Confirmation Procedure

NBEC0729

NOTE:

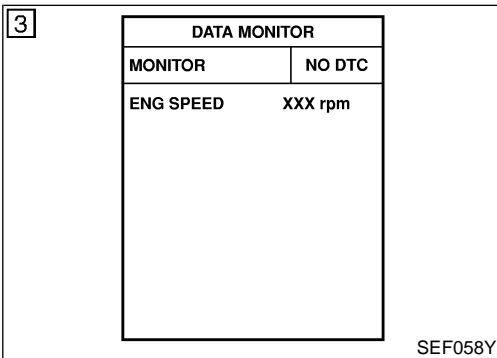
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

EC

FE

AT

TF



WITH CONSULT-II

NBEC0729S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-161.

PD

AX

WITH GST

NBEC0729S02

Follow the procedure "WITH CONSULT-II" above.

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P0105 ABSOLUTE PRESSURE SENSOR

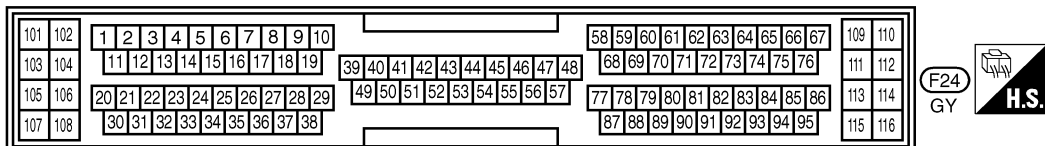
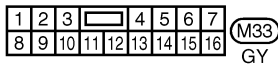
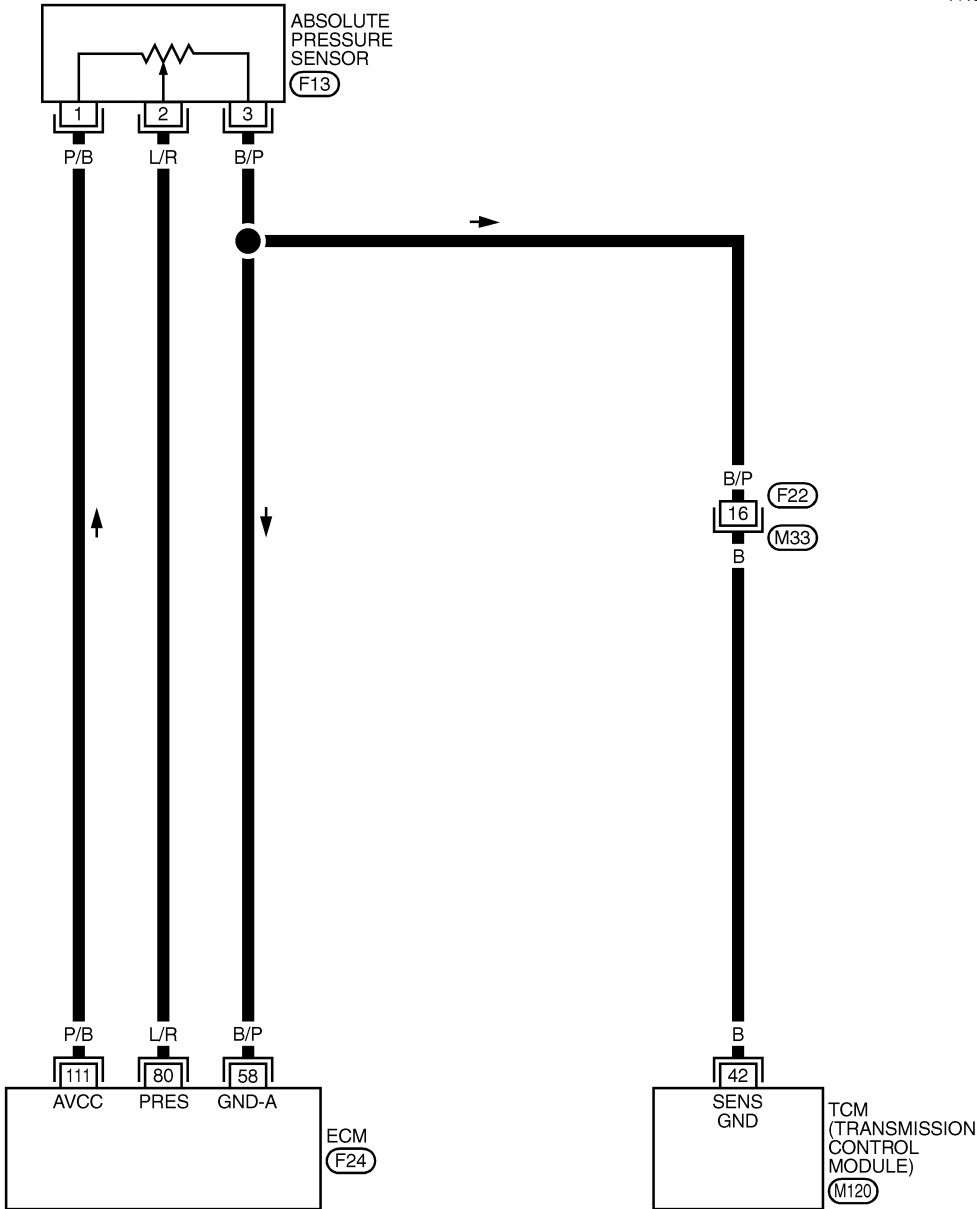
Wiring Diagram

Wiring Diagram

=NBEC0730

EC-AP/SEN-01

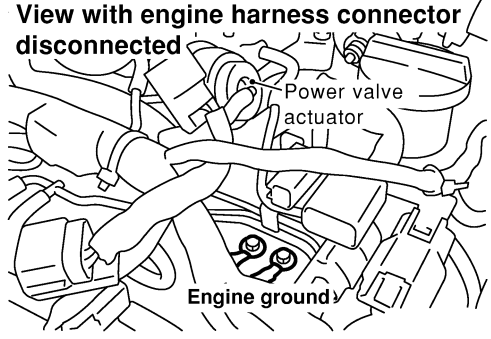
: Detectable line for DTC
 : Non-detectable line for DTC

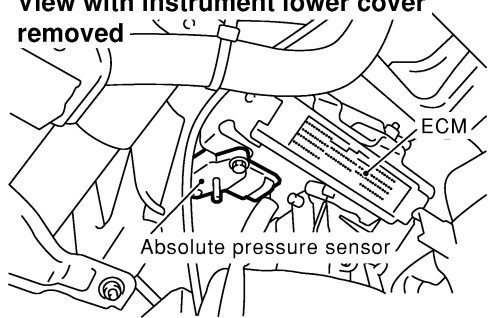


MEC943C

Diagnostic Procedure

NBEC0731

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>View with engine harness connector disconnected</p>  <p>Power valve actuator</p> <p>Engine ground</p> </div> <p style="text-align: right;">SEF959Y</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p>
▶		GO TO 2.	<p>AT</p> <p>TF</p>

2	CHECK ABSOLUTE PRESSURE SENSOR CONNECTOR FOR WATER	<p>1. Disconnect absolute pressure sensor harness connector.</p> <div style="text-align: center;"> <p>View with instrument lower cover removed</p>  <p>ECM</p> <p>Absolute pressure sensor</p> </div> <p style="text-align: right;">SEF961Y</p> <p>2. Check sensor harness connector for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>	<p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>
OK	▶	GO TO 3.	<p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
NG	▶	Repair or replace harness connector.	

DTC P0105 ABSOLUTE PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

3	CHECK ABSOLUTE PRESSURE SENSOR POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> Turn ignition switch "ON". Check voltage between absolute pressure sensor terminal 1 and ground with CONSULT-II or tester. 		
SEF299X		
OK	▶	GO TO 4.
NG	▶	Repair harness or connectors.

4	CHECK ABSOLUTE PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check harness continuity between absolute pressure sensor terminal 3 and engine ground. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● 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 		
		▶ Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK ABSOLUTE PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> Disconnect ECM harness connector. Check harness continuity between ECM terminal 80 and absolute pressure sensor terminal 2. Continuity should exist. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P0105 ABSOLUTE PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

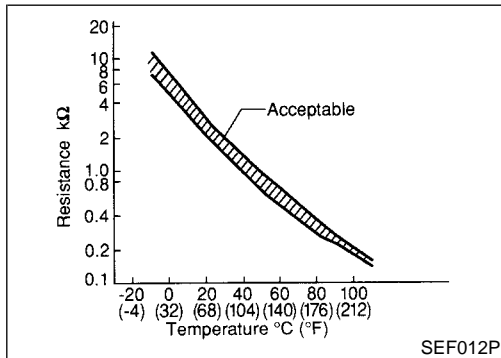
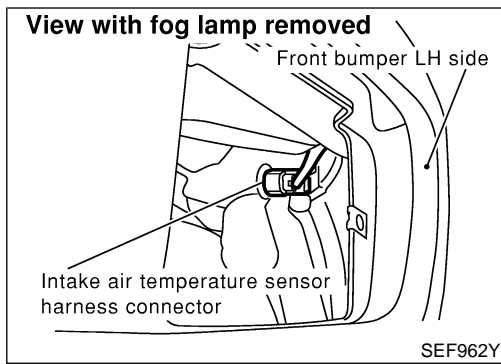
7	CHECK ABSOLUTE PRESSURE SENSOR						
<ol style="list-style-type: none"> 1. Remove absolute pressure sensor with its harness connector connected. 2. Remove hose from absolute pressure sensor. 3. Install a vacuum pump to absolute pressure sensor. 4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions. 							
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> </div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Applied vacuum kPa (mmHg, inHg)</th> <th style="padding: 5px;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Not applied</td> <td style="padding: 5px;">1.8 - 4.8</td> </tr> <tr> <td style="padding: 5px;">-26.7 (-200, -7.87)</td> <td style="padding: 5px;">1.0 to 1.4 lower than above value</td> </tr> </tbody> </table> </div> </div>		Applied vacuum kPa (mmHg, inHg)	Voltage V	Not applied	1.8 - 4.8	-26.7 (-200, -7.87)	1.0 to 1.4 lower than above value
Applied vacuum kPa (mmHg, inHg)	Voltage V						
Not applied	1.8 - 4.8						
-26.7 (-200, -7.87)	1.0 to 1.4 lower than above value						
SEF300XA							
<p>CAUTION:</p> <ul style="list-style-type: none"> ● 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. 							
OK or NG							
OK	▶ GO TO 8.						
NG	▶ Replace absolute pressure sensor.						

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

GI
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DTC P0110 INTAKE AIR TEMPERATURE SENSOR

Component Description



Component Description

NBEC0064

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

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

*: These data are reference values and are measured between ECM terminal 64 (Intake air temperature sensor) and body ground.

CAUTION:

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

On Board Diagnosis Logic

NBEC0065

Malfunction is detected when

(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,

(Malfunction B) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

Possible Cause

NBEC0428

- Harness or connectors
(The sensor circuit is open or shorted.)
- Intake air temperature sensor

DTC Confirmation Procedure

NBEC0066

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

NOTE:

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

DTC P0110 INTAKE AIR TEMPERATURE SENSOR

DTC Confirmation Procedure (Cont'd)

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

5	DATA MONITOR	
	MONITOR	NO DTC
	COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h	

SEF176Y

PROCEDURE FOR MALFUNCTION A

NBEC0066S01

With CONSULT-II

NBEC0066S0101

- 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-167.

GI

MA

EM

With GST

NBEC0066S0102

Follow the procedure "With CONSULT-II" above.

LC

PROCEDURE FOR MALFUNCTION B

NBEC0066S02

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.

EC

FE

AT

With CONSULT-II

NBEC0066S0201

- 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.
- 5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-167.

TF

PD

AX

SU

BR

ST

With GST

NBEC0066S0202

Follow the procedure "With CONSULT-II" above.

RS

BT

HA

SC

EL

IDX

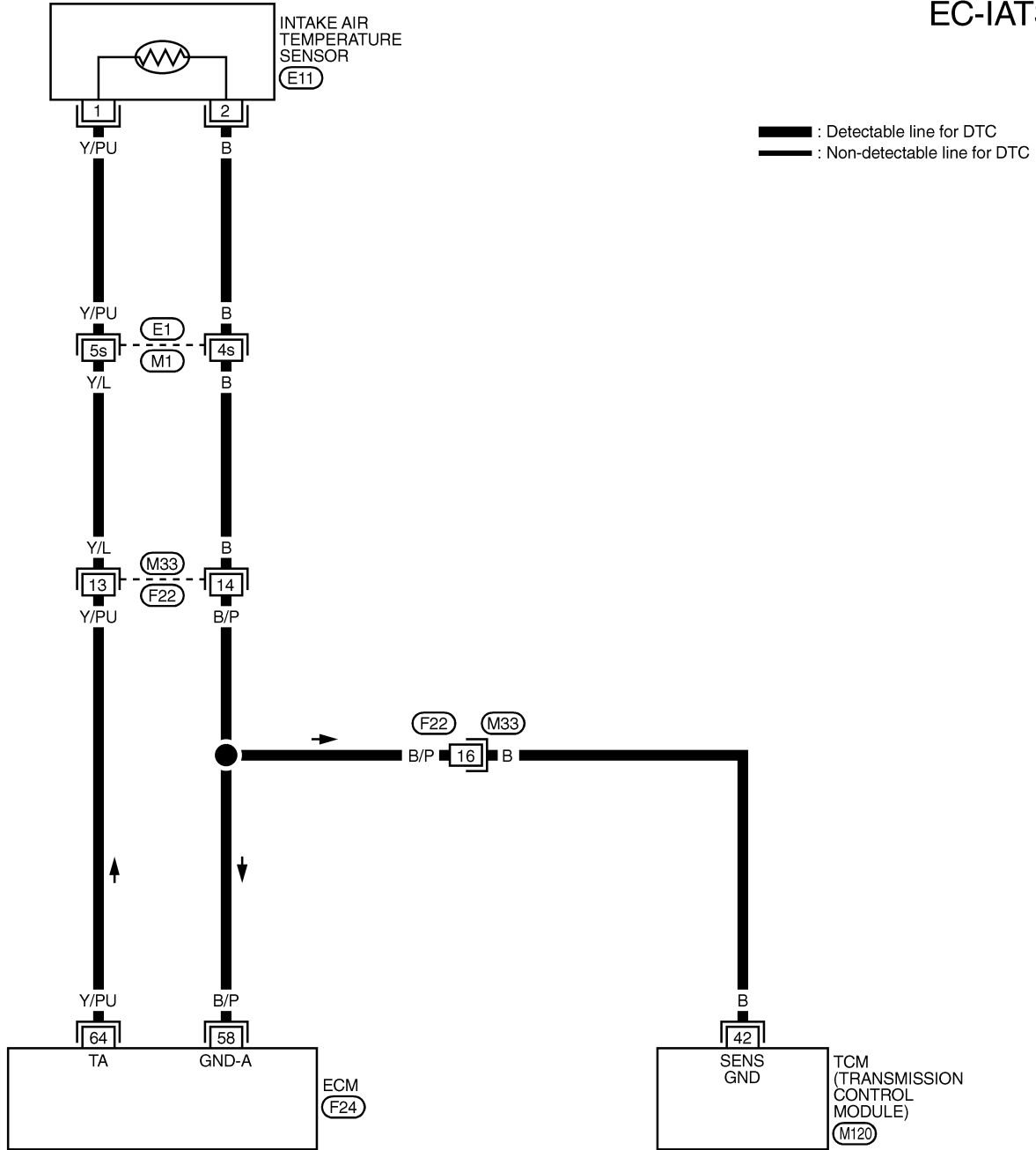
DTC P0110 INTAKE AIR TEMPERATURE SENSOR

Wiring Diagram

Wiring Diagram

NBEC0067

EC-IATS-01



25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42
43	44	45	46	47	48			



1	2	3	4	5	6	7		
8	9	10	11	12	13	14	15	16



REFER TO THE FOLLOWING.

(E1) -SUPER
MULTIPLE JUNCTION (SMJ)

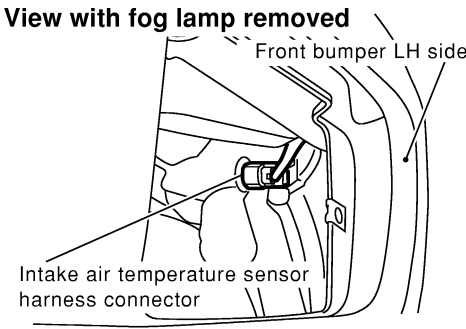
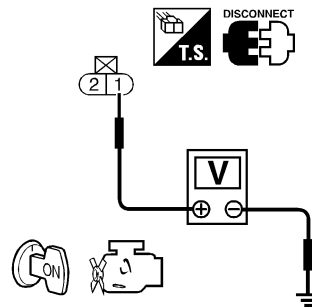
101	102	1	2	3	4	5	6	7	8	9	10				58	59	60	61	62	63	64	65	66	67	109	110										
103	104	11	12	13	14	15	16	17	18	19				39	40	41	42	43	44	45	46	47	48	68	69	70	71	72	73	74	75	76	111	112		
105	106	20	21	22	23	24	25	26	27	28	29			49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	113	114		
107	108	30	31	32	33	34	35	36	37	38																									115	116



MEC944C

Diagnostic Procedure

NBEC0068

1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF". 2. Disconnect intake air temperature sensor harness connector.</p> <div style="text-align: center;"> <p>View with fog lamp removed</p>  <p>Front bumper LH side</p> <p>Intake air temperature sensor harness connector</p> </div> <p>3. Turn ignition switch "ON". 4. Check voltage between terminal 1 and ground.</p> <div style="text-align: center;">  <p>Voltage: Approximately 5V</p> <p>OK or NG</p> </div>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p>						
<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td style="width: 75%;">GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>		OK	▶	GO TO 3.	NG	▶	GO TO 2.	<p>SEF962Y</p> <p>SEF301X</p>	<p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 3.							
NG	▶	GO TO 2.							

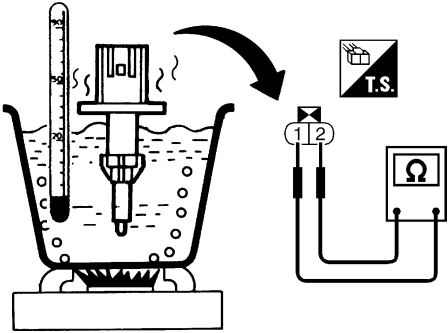
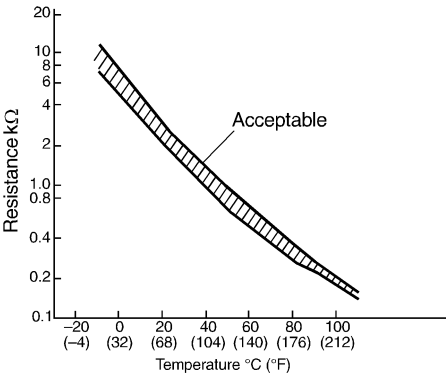
2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open or short between ECM and intake air temperature sensor <p style="text-align: right;">▶ Repair harness or connectors.</p>	
----------	-----------------------------------	---	--

3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch "OFF". 2. Check harness continuity between sensor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td style="width: 75%;">GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	GO TO 4.		
OK	▶	GO TO 5.							
NG	▶	GO TO 4.							

DTC P0110 INTAKE AIR TEMPERATURE SENSOR

Diagnostic Procedure (Cont'd)

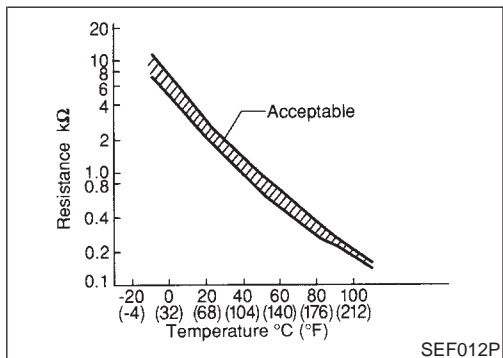
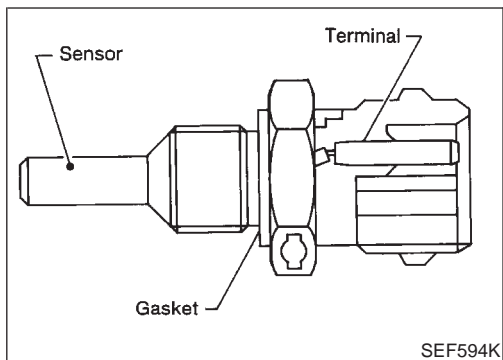
4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open between ECM and intake air temperature sensor ● Harness for open between TCM (Transmission Control Module) and intake air temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR						
<p>Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.</p>							
<p><Reference data></p> <table border="1" style="margin: auto;"> <thead> <tr> <th>Temperature °C (°F)</th> <th>Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td>20 (68)</td> <td>2.1 - 2.9</td> </tr> <tr> <td>80 (176)</td> <td>0.27 - 0.38</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	80 (176)	0.27 - 0.38
Temperature °C (°F)	Resistance kΩ						
20 (68)	2.1 - 2.9						
80 (176)	0.27 - 0.38						
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>							
SEF302X							
OK or NG							
OK	▶ GO TO 6.						
NG	▶ Replace intake air temperature sensor.						

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

Component Description



Component Description

NBEC0069

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

GI
MA
EM
LC

<Reference data>

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

EC
FE
AT

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.

TF

CAUTION:

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

PD
AX

On Board Diagnosis Logic

NBEC0070

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

ST

FAIL-SAFE MODE

NBEC0070S02

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

RS
BT

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

HA
SC
EL
IDX

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

Possible Cause

Possible Cause

NBEC0429

- Harness or connectors
(The sensor circuit is open or shorted.)
- Engine coolant temperature sensor

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NBEC0071

NOTE:

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

Ⓜ WITH CONSULT-II

NBEC0071S01

- 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-172.

Ⓜ WITH GST

NBEC0071S02

Follow the procedure "WITH CONSULT-II" above.

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

Wiring Diagram

Wiring Diagram

NBEC0072

EC-ECTS-01

GI

MA

EM

LC

EC

FE

AT

TF

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SU

BR

ST

RS

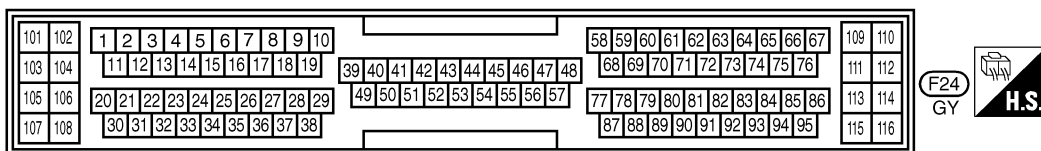
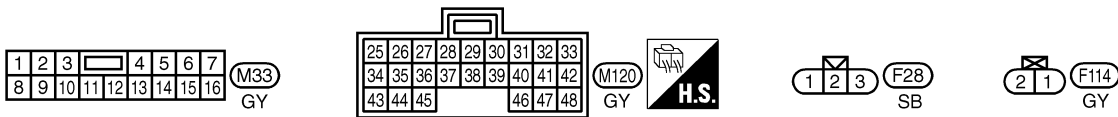
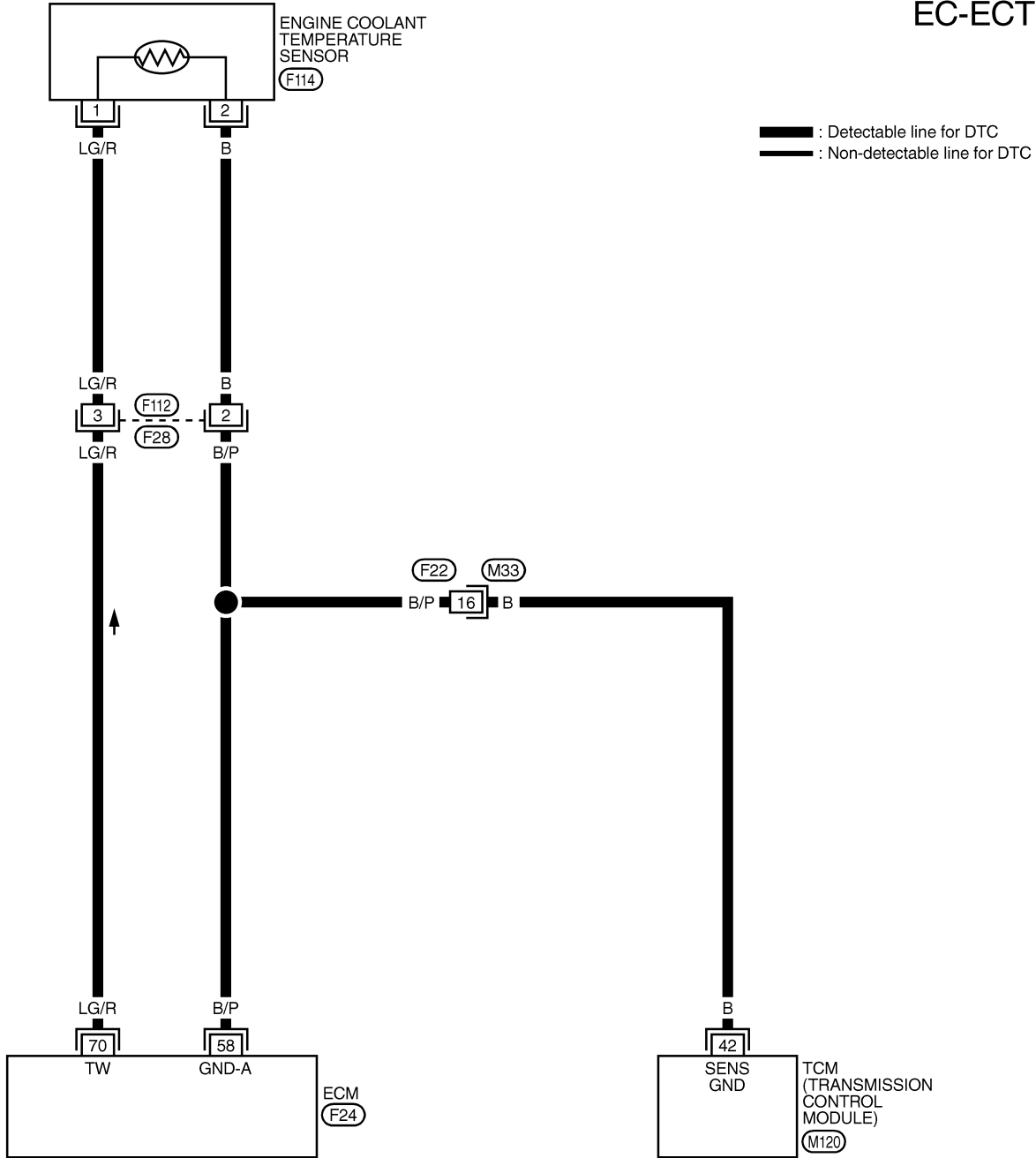
BT

HA

SC

EL

IDX



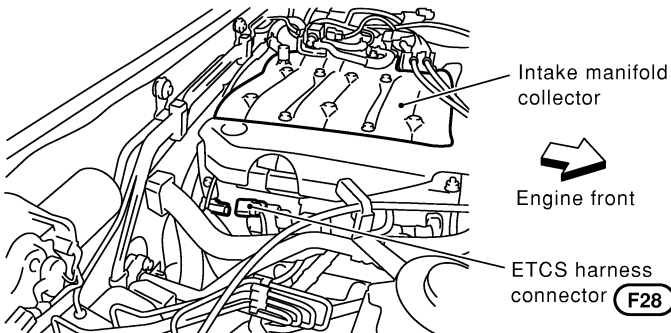
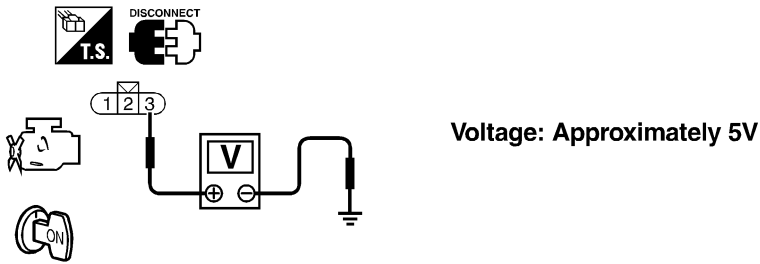
MEC945C

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

Diagnostic Procedure

Diagnostic Procedure

NBEC0073

1	CHECK ECTS POWER SUPPLY CIRCUIT		
<p>1. Turn ignition switch "OFF". 2. Disconnect engine coolant temperature sensor (ECTS) harness connector F112, F28.</p>			
			
<p>3. Turn ignition switch "ON". 4. Check voltage between ECTS harness connector F28 terminal 3 and ground with CONSULT-II or tester.</p>			
 <p style="text-align: right;">Voltage: Approximately 5V</p>			
OK or NG			
OK	▶	GO TO 3.	
NG	▶	GO TO 2.	

SEF370Z

SEF371Z

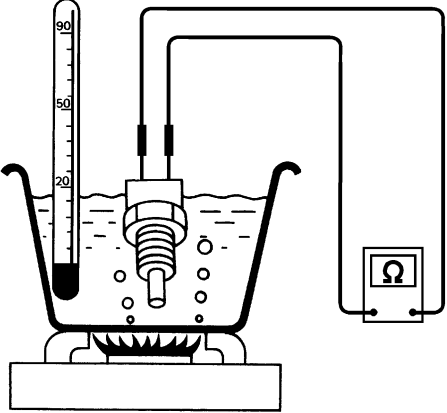
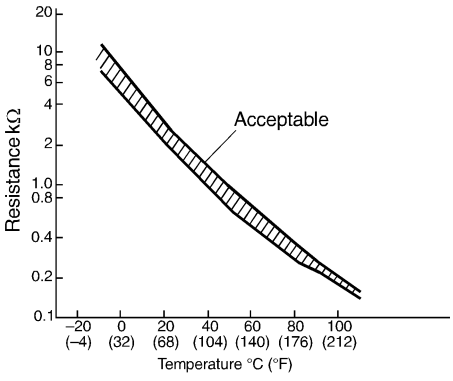
2	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F112, F28 ● Harness for open or short between ECM and engine coolant temperature sensor 			
▶		Repair harness or connectors.	

3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND CIRCUIT		
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

DTC P0115 ENGINE COOLANT TEMPERATURE SENSOR (ECTS) (CIRCUIT)

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F112, F28 ● Harness for open between ECM and engine coolant temperature sensor ● Harness for open between TCM (Transmission Control Module) and engine coolant temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR								
Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.									
	<p><Reference data></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.68 - 1.00</td> </tr> <tr> <td style="text-align: center;">90 (194)</td> <td style="text-align: center;">0.236 - 0.260</td> </tr> </tbody> </table> 	Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.1 - 2.9								
50 (122)	0.68 - 1.00								
90 (194)	0.236 - 0.260								
OK or NG									
OK	▶ GO TO 6.								
NG	▶ Replace engine coolant temperature sensor.								

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

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 EL
 IDX

DTC P0120 THROTTLE POSITION SENSOR

Description

Description

NBEC0074

NOTE:

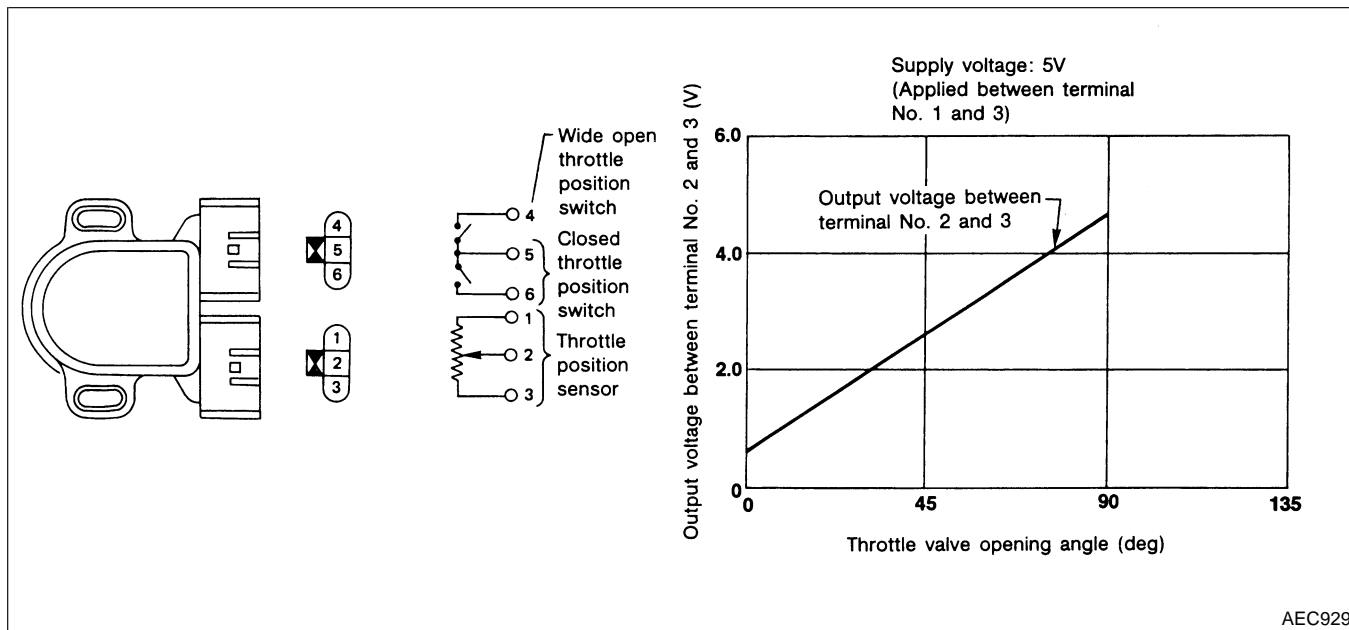
If DTC P0120 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-431.

COMPONENT DESCRIPTION

NBEC0074S01

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

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



CONSULT-II Reference Value in Data Monitor Mode

NBEC0075

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH-P/S	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

DTC P0120 THROTTLE POSITION SENSOR

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NBEC0651

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	R	Throttle position sensor	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
111	P/B	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V
58	B/P	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NBEC0077

Malfunction is detected when

(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,

(Malfunction B) a high voltage from the sensor is sent to ECM under light load driving conditions,

(Malfunction C) a low voltage from the sensor is sent to ECM under heavy load driving conditions.

FAIL-SAFE MODE

NBEC0077S02

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

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

Possible Cause

NBEC0430

MALFUNCTION A

NBEC0430S01

- Harness or connectors (The throttle position sensor circuit is open or shorted.)
- Throttle position sensor

MALFUNCTION B

NBEC0430S02

- Harness or connectors (The throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Fuel injector

DTC P0120 THROTTLE POSITION SENSOR

Possible Cause (Cont'd)

- Crankshaft position sensor (REF)
- Crankshaft position sensor (POS)
- Mass air flow sensor

MALFUNCTION C

NBEC0430S03

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Intake air leaks
- Throttle position sensor

DTC Confirmation Procedure

NBEC0078

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.
If there is no problem on “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE FOR MALFUNCTION C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NBEC0078S01

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.

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF

SEF065Y

With CONSULT-II

NBEC0078S0101

- 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.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except “P” or “N” position

- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-181.

With GST

NBEC0078S0102

Follow the procedure “With CONSULT-II” above.

DTC P0120 THROTTLE POSITION SENSOR

DTC Confirmation Procedure (Cont'd)

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NBEC0078S02

With CONSULT-II

NBEC0078S0201

- 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 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

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

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-181.

With GST

NBEC0078S0202

Follow the procedure "With CONSULT-II" above.

6	DATA MONITOR	
	MONITOR	NO DTC
	THRTL POS SEN	XXX V
	ABSOL TH-P/S	XXX %

SEF177Y

PROCEDURE FOR MALFUNCTION C

NBEC0078S03

CAUTION:

Always drive vehicle at a safe speed.

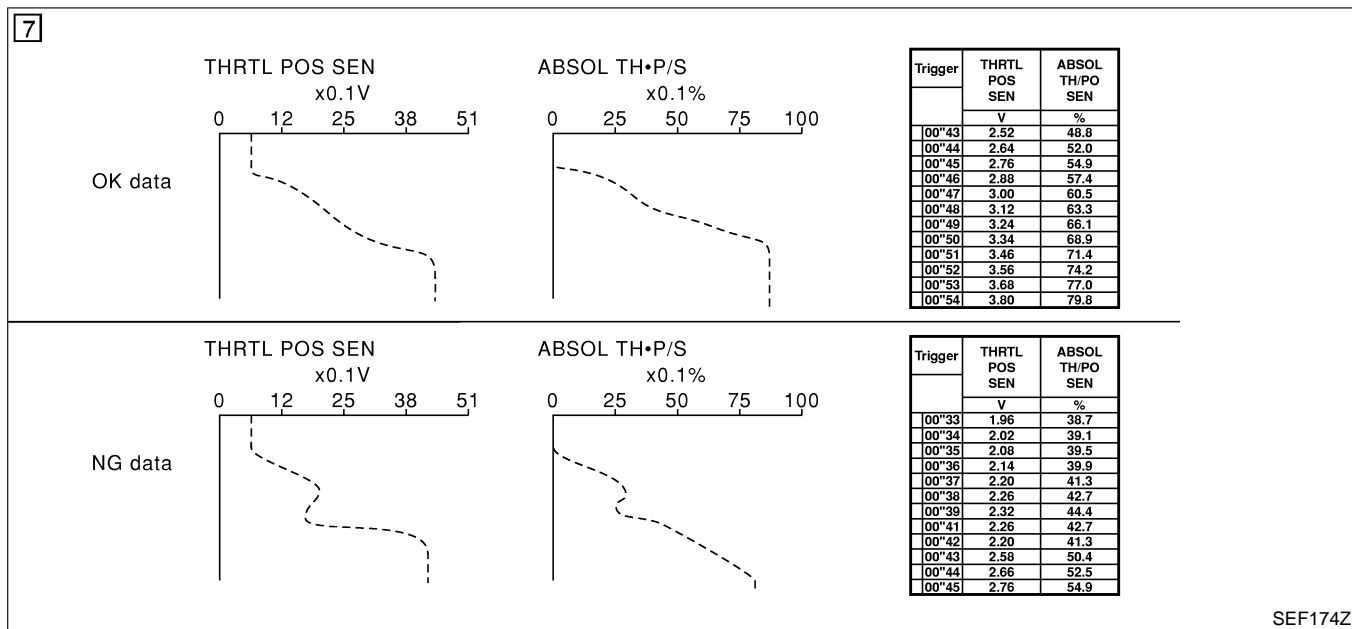
With CONSULT-II

NBEC0078S0301

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 5) Select "THRTL POS SEN" and "ABSOL TH-P/S" in "DATA MONITOR" mode with CONSULT-II.
- 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-181.
 If OK, go to following step.

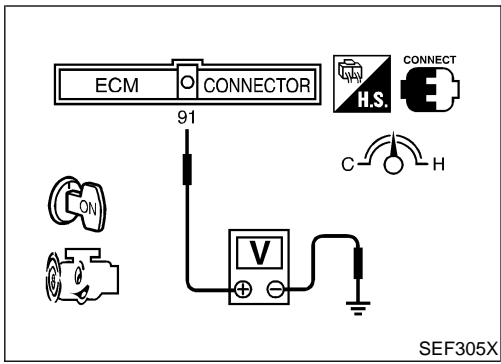
DTC P0120 THROTTLE POSITION SENSOR

DTC Confirmation Procedure (Cont'd)



DTC P0120 THROTTLE POSITION SENSOR

DTC Confirmation Procedure (Cont'd)



With GST

=NBEC007&S0302

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

Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)
Voltage between ECM terminal 91 (Mass air flow sensor signal) and ground	More than 3.2V

- 3) Select "MODE 7" with GST.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-181.

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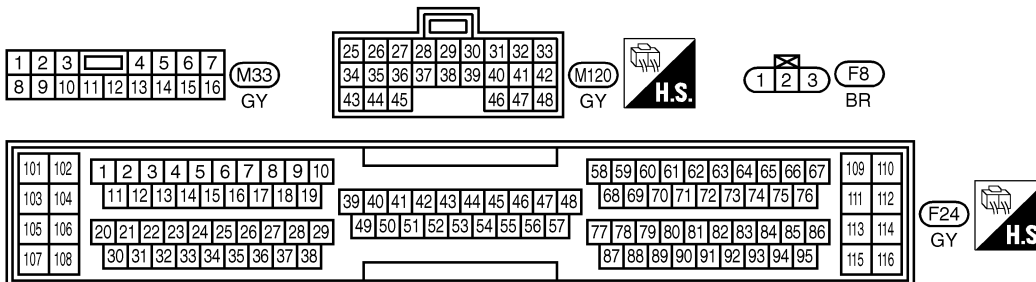
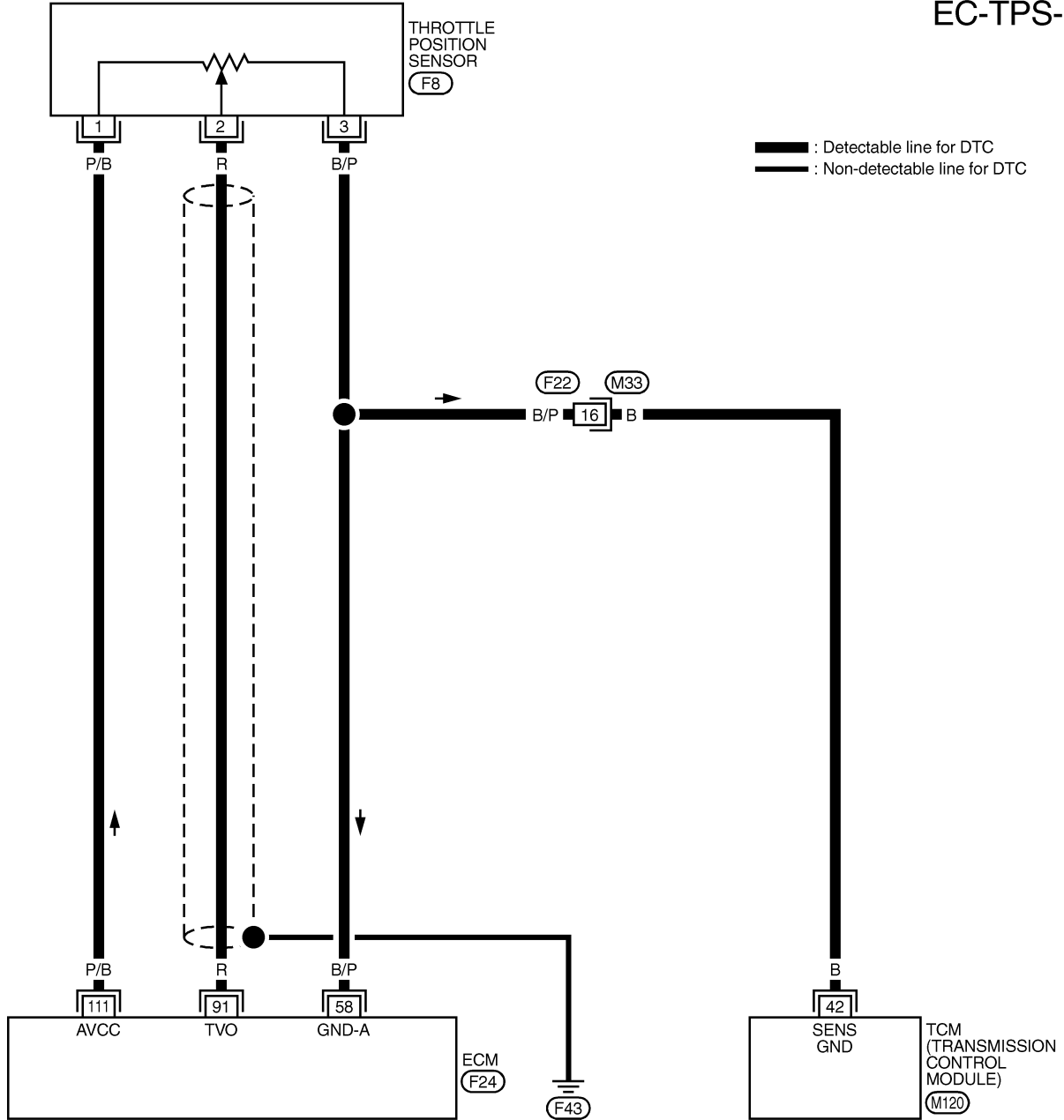
DTC P0120 THROTTLE POSITION SENSOR

Wiring Diagram

Wiring Diagram

NBEC0079

EC-TPS-01



MEC946C

Diagnostic Procedure

NBEC0080

1	INSPECTION START									
Which malfunction A, B or C is duplicated?										
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">C</td> </tr> </tbody> </table>			MALFUNCTION	Type	A	A	B	B	C	C
MALFUNCTION	Type									
A	A									
B	B									
C	C									
MTBL0066										
Type A, B or C										
Type A or B	▶	GO TO 4.								
Type C	▶	GO TO 2.								

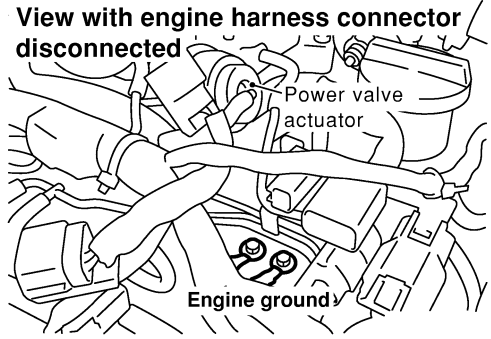
GI
MA
EM
LC
EC

2	ADJUST THROTTLE POSITION SENSOR									
Check the following items. Refer to "Basic Inspection", EC-101.										
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 40%;">Items</th> <th style="width: 60%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>15° ± 5° BTDC</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	15° ± 5° BTDC	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications									
Ignition timing	15° ± 5° BTDC									
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF									
Target idle speed	750 ± 50 rpm (in "P" or "N" position)									
MTBL0655										
	▶	GO TO 3.								

FE
AT
TF
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AX

3	CHECK INTAKE SYSTEM.	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check the following for connection. <ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

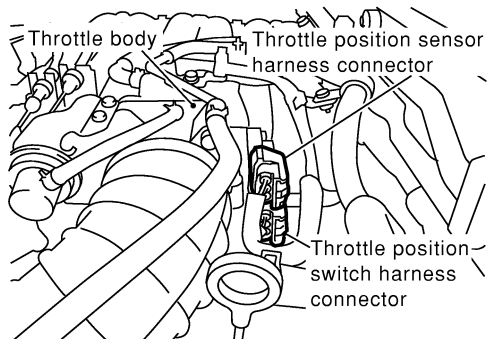
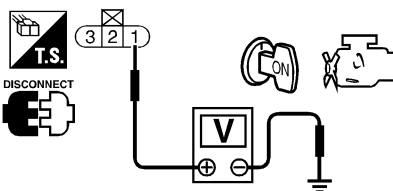
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4	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. 		
<p>View with engine harness connector disconnected</p>  <p>The diagram shows a top-down view of the engine's ground screws and power valve actuator. Labels include 'Power valve actuator' and 'Engine ground'.</p>		
SEF959Y		
	▶	GO TO 5.

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DTC P0120 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT						
<p>1. Disconnect throttle position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF944Y</p> <p>2. Turn ignition switch "ON".</p> <p>3. Check voltage between throttle position sensor terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="text-align: right;">Voltage: Approximately 5V</p> <p style="text-align: center;">SEF964Y</p> </div> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 6.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 6.					
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.					

6	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT						
<p>1. Turn ignition switch "OFF".</p> <p>2. Check harness continuity between sensor terminal 3 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 7.</td> </tr> </table>		OK	▶	GO TO 8.	NG	▶	GO TO 7.
OK	▶	GO TO 8.					
NG	▶	GO TO 7.					

7	DETECT MALFUNCTIONING PART			
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM and throttle position sensor ● Harness for open or short between TCM (Transmission Control Module) and throttle position sensor <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Repair open circuit or short to power in harness or connectors.</td> </tr> </table>			▶	Repair open circuit or short to power in harness or connectors.
	▶	Repair open circuit or short to power in harness or connectors.		

DTC P0120 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 91 and throttle position sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR																			
<p>With CONSULT-II</p> <ol style="list-style-type: none"> 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 -40.0kPa (-300mmHg, -11.81inHg)] until the throttle drum becomes free from the rod of the throttle opener. <div style="text-align: center;"> </div> <p style="text-align: right;">SEF793W</p> <ol style="list-style-type: none"> 6. Turn ignition switch ON. 7. Select "DATA MONITOR" mode with CONSULT-II. 8. Check voltage of "THRTL POS SEN" under the following conditions. Voltage measurement must be made with throttle position sensor installed in vehicle. <div style="display: flex; justify-content: space-around;"> <table border="1" style="margin-right: 20px;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Throttle valve conditions</th> <th>THRTL POS SEN</th> </tr> </thead> <tbody> <tr> <td>Completely closed (a)</td> <td>0.15 - 0.85V</td> </tr> <tr> <td>Partially open</td> <td>Between (a) and (b)</td> </tr> <tr> <td>Completely open (b)</td> <td>3.5 - 4.7V</td> </tr> </tbody> </table> </div> <p style="text-align: right;">SEF062Y</p> <p style="text-align: center;">OK or NG</p>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	THRTL POS SEN	XXX V	Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
DATA MONITOR																				
MONITOR	NO DTC																			
ENG SPEED	XXX rpm																			
COOLAN TEMP/S	XXX °C																			
THRTL POS SEN	XXX V																			
Throttle valve conditions	THRTL POS SEN																			
Completely closed (a)	0.15 - 0.85V																			
Partially open	Between (a) and (b)																			
Completely open (b)	3.5 - 4.7V																			
OK	▶	GO TO 12.																		
NG	▶	GO TO 11.																		

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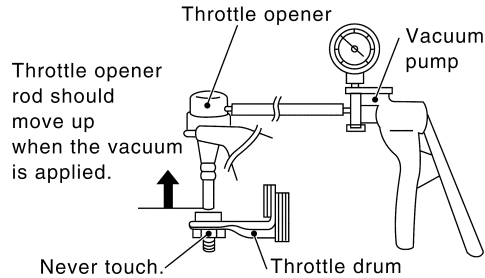
DTC P0120 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

10 CHECK THROTTLE POSITION SENSOR

⊗ Without CONSULT-II

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.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
Voltage measurement must be made with throttle position sensor installed in vehicle.

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

MTBL0231

OK or NG

- | | | |
|----|---|-----------|
| OK | ▶ | GO TO 12. |
| NG | ▶ | GO TO 11. |

11 ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-101.

Items	Specifications
Ignition timing	$15^\circ \pm 5^\circ$ BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0655

OK or NG

- | | | |
|----|---|---|
| OK | ▶ | GO TO 12. |
| NG | ▶ | Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-101. |

DTC P0120 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

12	CHECK MASS AIR FLOW SENSOR										
<ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Start engine and warm it up to normal operating temperature. 3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground. 											
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> </div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON" (Engine stopped.)</td> <td style="text-align: center;">Approx. 1.0</td> </tr> <tr> <td>Idle (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.2 - 1.8</td> </tr> <tr> <td>2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.6 - 2.2</td> </tr> <tr> <td>Idle to about 4,000 rpm*</td> <td style="text-align: center;">1.2 - 1.8 to Approx. 4.0</td> </tr> </tbody> </table> <p style="font-size: small; margin-top: 5px;">*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.</p> </div> </div>		Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Approx. 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2	Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0
Condition	Voltage V										
Ignition switch "ON" (Engine stopped.)	Approx. 1.0										
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8										
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2										
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0										
SEF298X											
<ol style="list-style-type: none"> 4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check. 											
OK or NG											
OK	▶	GO TO 13.									
NG	▶	Replace mass air flow sensor.									

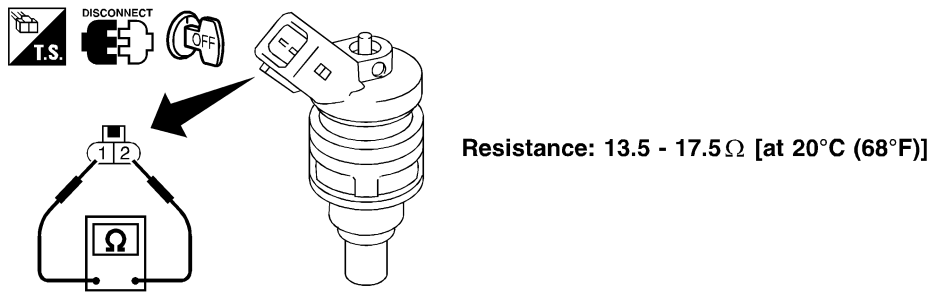
13	CHECK CRANKSHAFT POSITION SENSOR (POS)	
<ol style="list-style-type: none"> 1. Install all removed parts. 2. Perform "DTC Confirmation Procedure" for DTC P0335 and P1336. Refer to EC-336, 519. 		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace crankshaft position sensor (POS).

14	CHECK CRANKSHAFT POSITION SENSOR (REF)	
Perform "DTC Confirmation Procedure" for DTC P1335. Refer to EC-511.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Replace crankshaft position sensor (REF).

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DTC P0120 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

15	CHECK FUEL INJECTOR
1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.	
 <p>Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]</p> <p>OK or NG</p>	
OK	▶ GO TO 16.
NG	▶ Replace fuel injector.

SEF964XC

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

Description

Description

NBEC0081

NOTE:

If DTC P0125 is displayed with P0115, first perform the trouble diagnosis for DTC P0115. Refer to EC-169.

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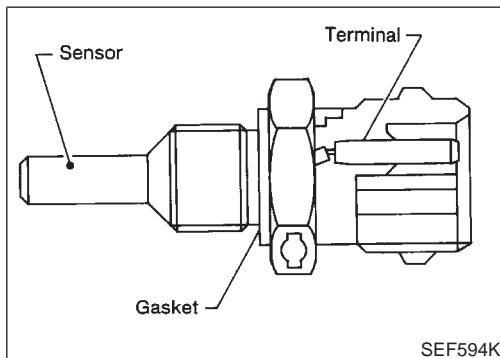
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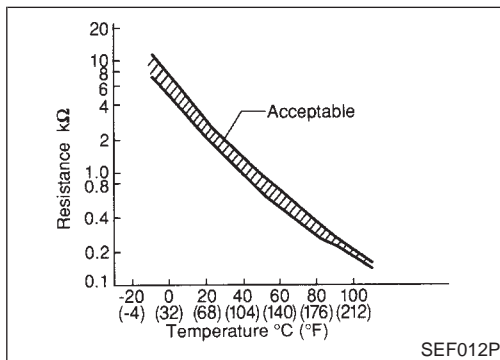
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COMPONENT DESCRIPTION

NBEC0081S01

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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NBEC0082

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

Possible Cause

Possible Cause

NBEC0431

- Harness or connectors
(High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NBEC0083

CAUTION:

Be careful not to overheat engine.

NOTE:

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

WITH CONSULT-II

NBEC0083S01

- 1) Turn ignition switch “ON”.
- 2) Select “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 trip DTC is detected, go to “Diagnostic Procedure”, EC-190.

WITH GST

NBEC0083S02

Follow the procedure “WITH CONSULT-II” above.

DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

Wiring Diagram

Wiring Diagram

NBEC0084

EC-ECTS-01

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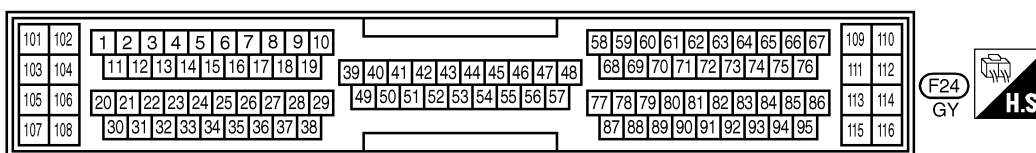
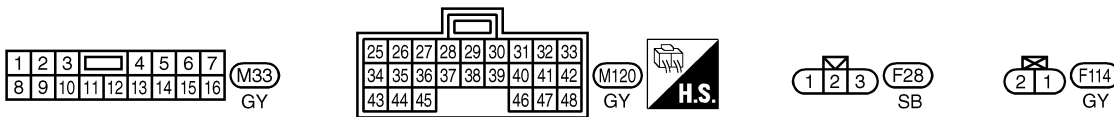
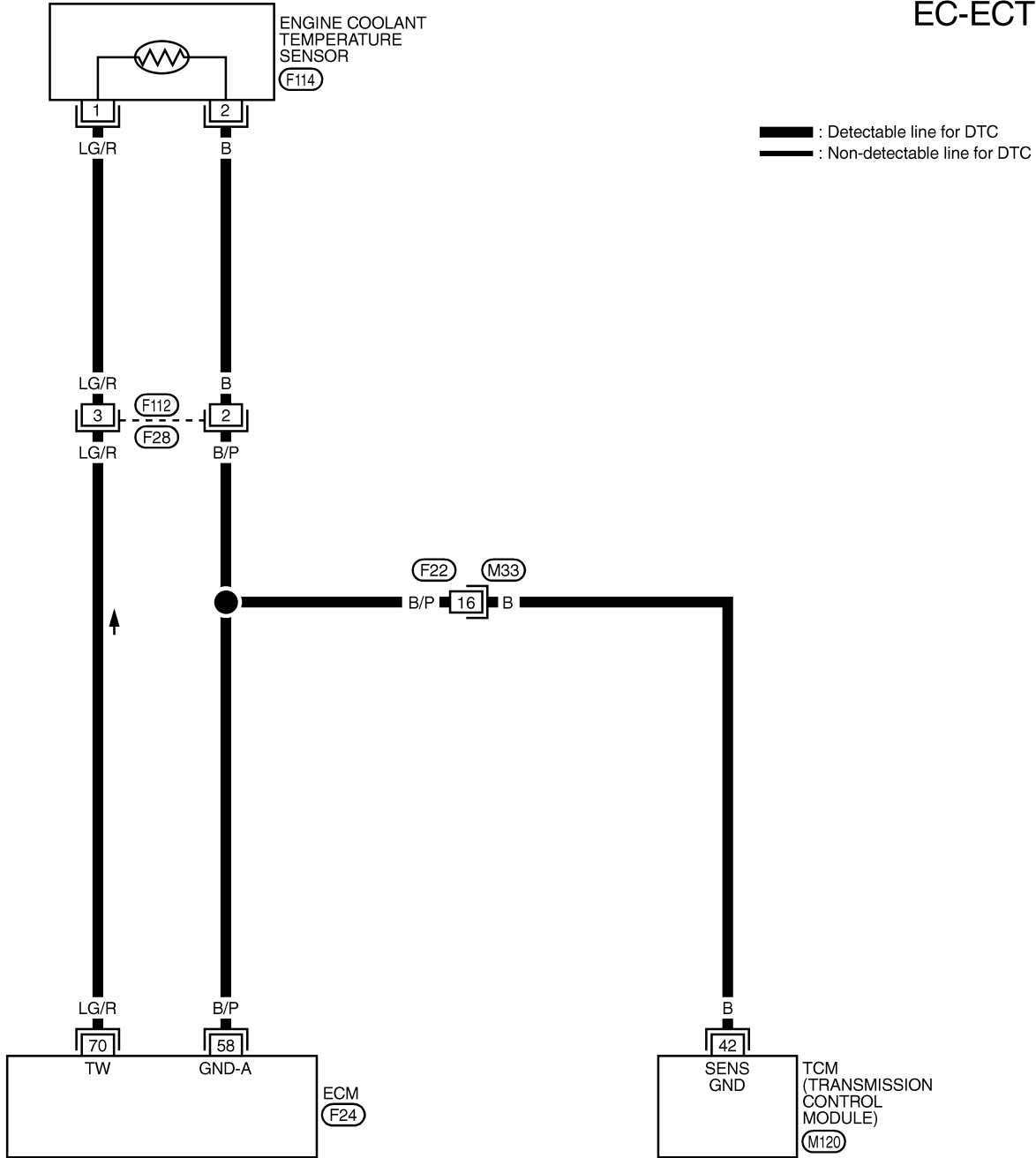
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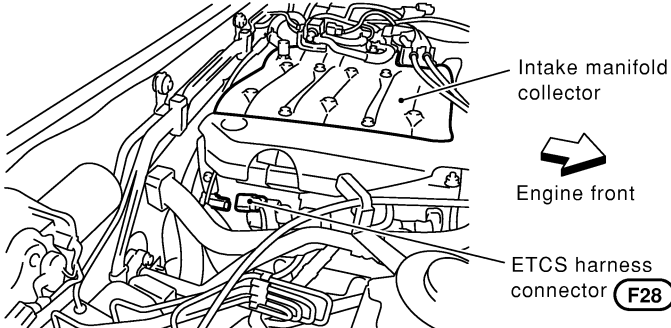
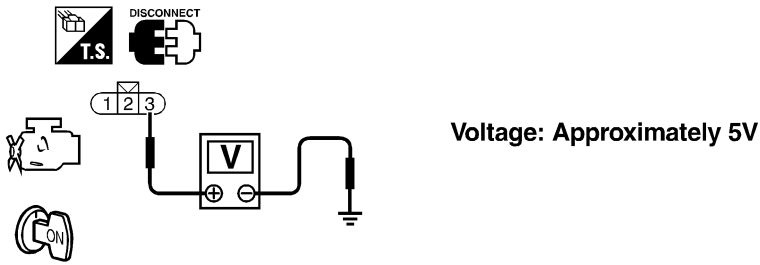
MEC945C

DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

Diagnostic Procedure

Diagnostic Procedure

NBEC0085

1	CHECK ECTS POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect engine coolant temperature sensor harness connector F112, F28.</p>  <p style="text-align: right;">Intake manifold collector Engine front ECTS harness connector F28</p> <p style="text-align: right;">SEF370Z</p> <p>3. Turn ignition switch "ON". 4. Check voltage between ECTS harness connector F28 terminal 3 and ground with CONSULT-II or tester.</p>  <p style="text-align: center;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SEF371Z</p>		
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

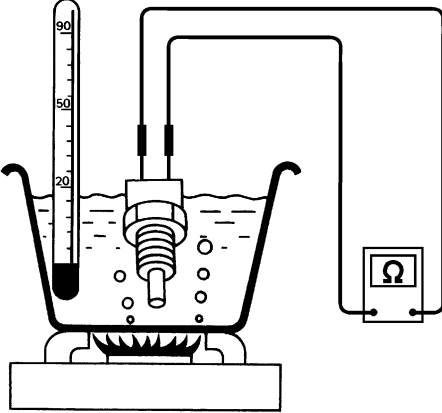
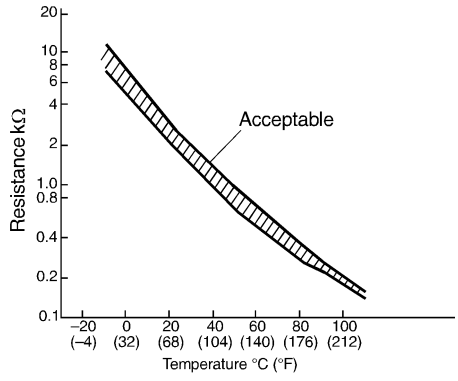
2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F112, F28 ● Harness for open or short between ECM and engine coolant temperature sensor <p style="text-align: right;">▶ Repair harness or connectors.</p>		

3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

DTC P0125 ENGINE COOLANT TEMPERATURE SENSOR (ECTS)

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F112, F28 ● Harness for open between ECM and engine coolant temperature sensor ● Harness for open between TCM (Transmission Control Module) and engine coolant temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR								
Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.									
	<p><Reference data></p> <table border="1"> <thead> <tr> <th>Temperature °C (°F)</th> <th>Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td>20 (68)</td> <td>2.1 - 2.9</td> </tr> <tr> <td>50 (122)</td> <td>0.68 - 1.00</td> </tr> <tr> <td>90 (194)</td> <td>0.236 - 0.260</td> </tr> </tbody> </table> 	Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.1 - 2.9								
50 (122)	0.68 - 1.00								
90 (194)	0.236 - 0.260								
OK or NG									
OK	▶ GO TO 6.								
NG	▶ Replace engine coolant temperature sensor.								

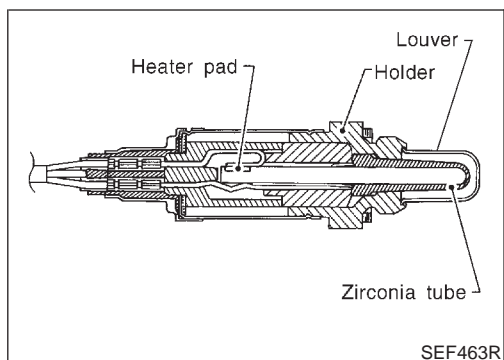
6	CHECK THERMOSTAT OPERATION
When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Repair or replace thermostat. Refer to LC-16, "Thermostat".

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

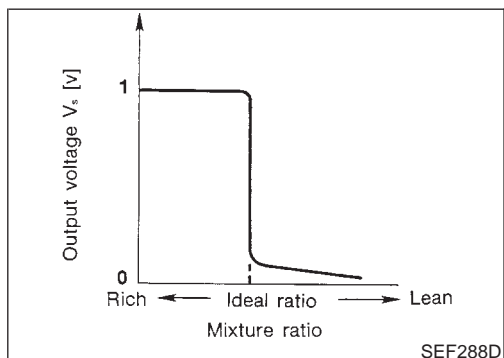
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) 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.

NBEC0086



CONSULT-II Reference Value in Data Monitor Mode

NBEC0087

Specification data are reference values.

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

ECM Terminals and Reference Value

NBEC0652

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

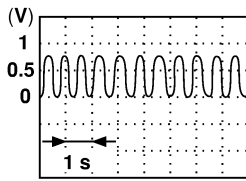
CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p> <p>SEF059V</p>

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p>  <p>SEF059V</p>

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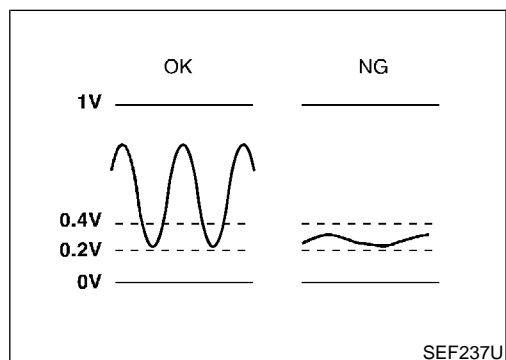
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On Board Diagnosis Logic

Under the condition in which the heated oxygen sensor 1 (front) 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.

Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.

Possible Cause

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

NBEC0089

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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

DTC Confirmation Procedure

5	HO2S1 (B1) P0130	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEF333Z

5	HO2S1 (B1) P0130	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEF333Z

5	HO2S1 (B1) P0130	
	COMPLETED	

SEF645Y

DTC Confirmation Procedure

NBEC0090

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

WITH CONSULT-II

NBEC0090S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "HO2S1 (B1)/(B2) P0130/P0150" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START".
- 4) Let it idle for at least 3 minutes.

NOTE:

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

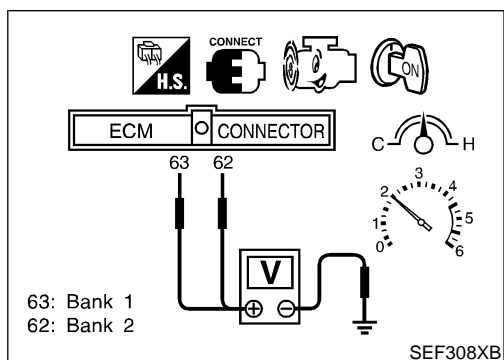
- 5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,500 - 2,800 rpm
Vehicle speed	70 - 100 km/h (43 - 62 MPH)
B/FUEL SCHDL	3.0 - 10 msec
Selector lever	Suitable position

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

- 6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-198.

During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

NBEC0091

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

WITH GST

NBEC0091S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

Overall Function Check (Cont'd)

- 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-198.

GI

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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

Wiring Diagram

Wiring Diagram

=NBEC0092

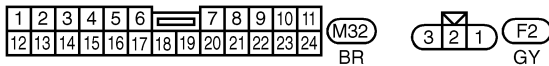
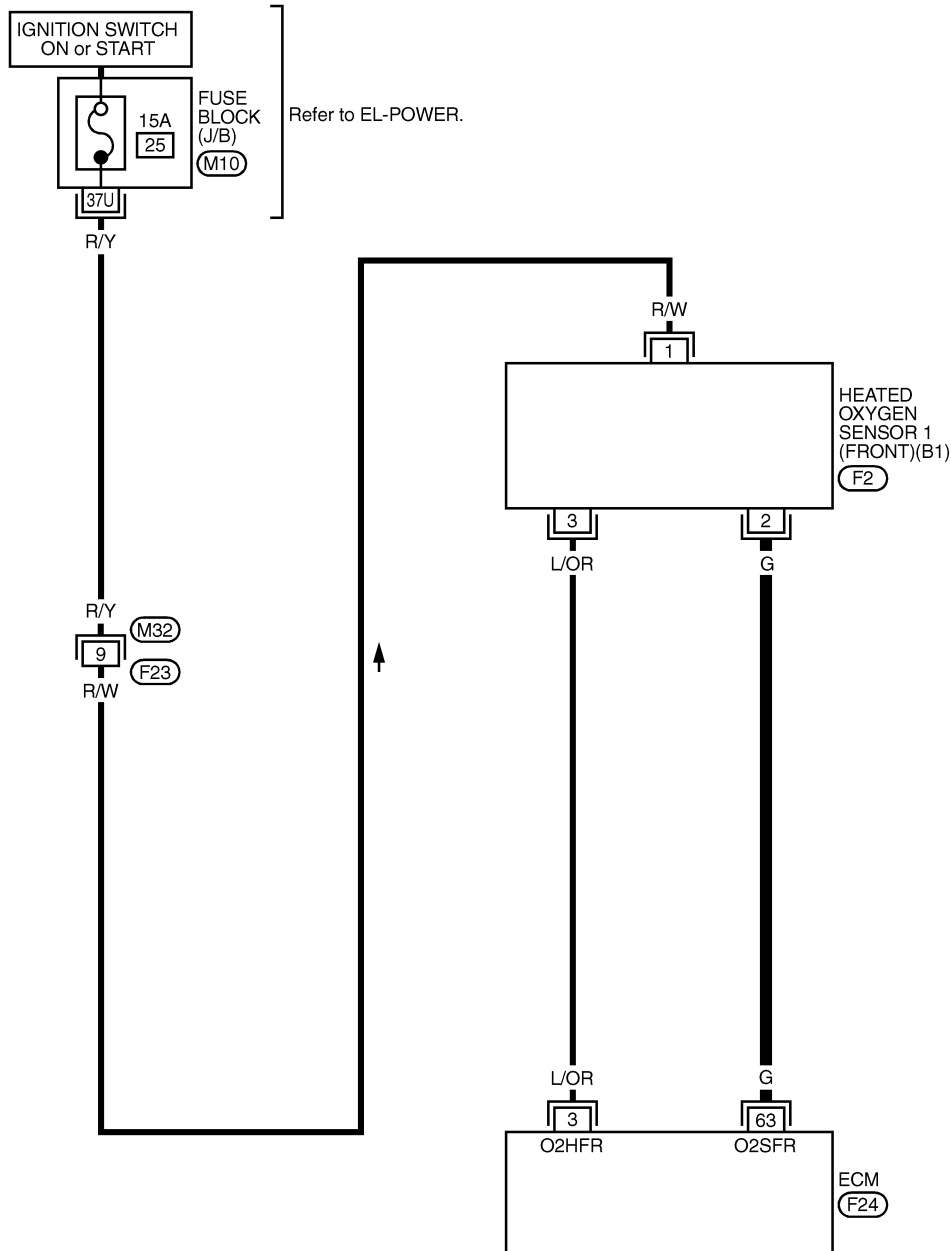
NBEC0092S01

RIGHT BANK

EC-O2S1B1-01

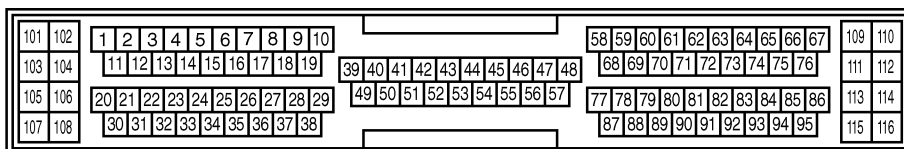
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

Wiring Diagram (Cont'd)

LEFT BANK

NBEC0092S02

EC-O2S1B2-01

GI

— : Detectable line for DTC

— : Non-detectable line for DTC

MA

EM

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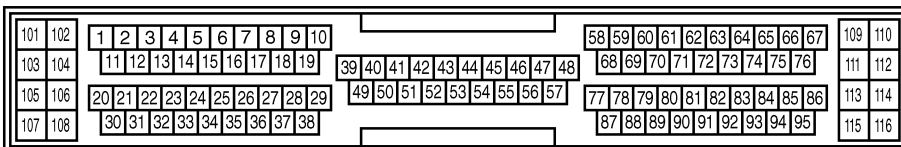
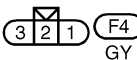
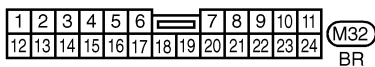
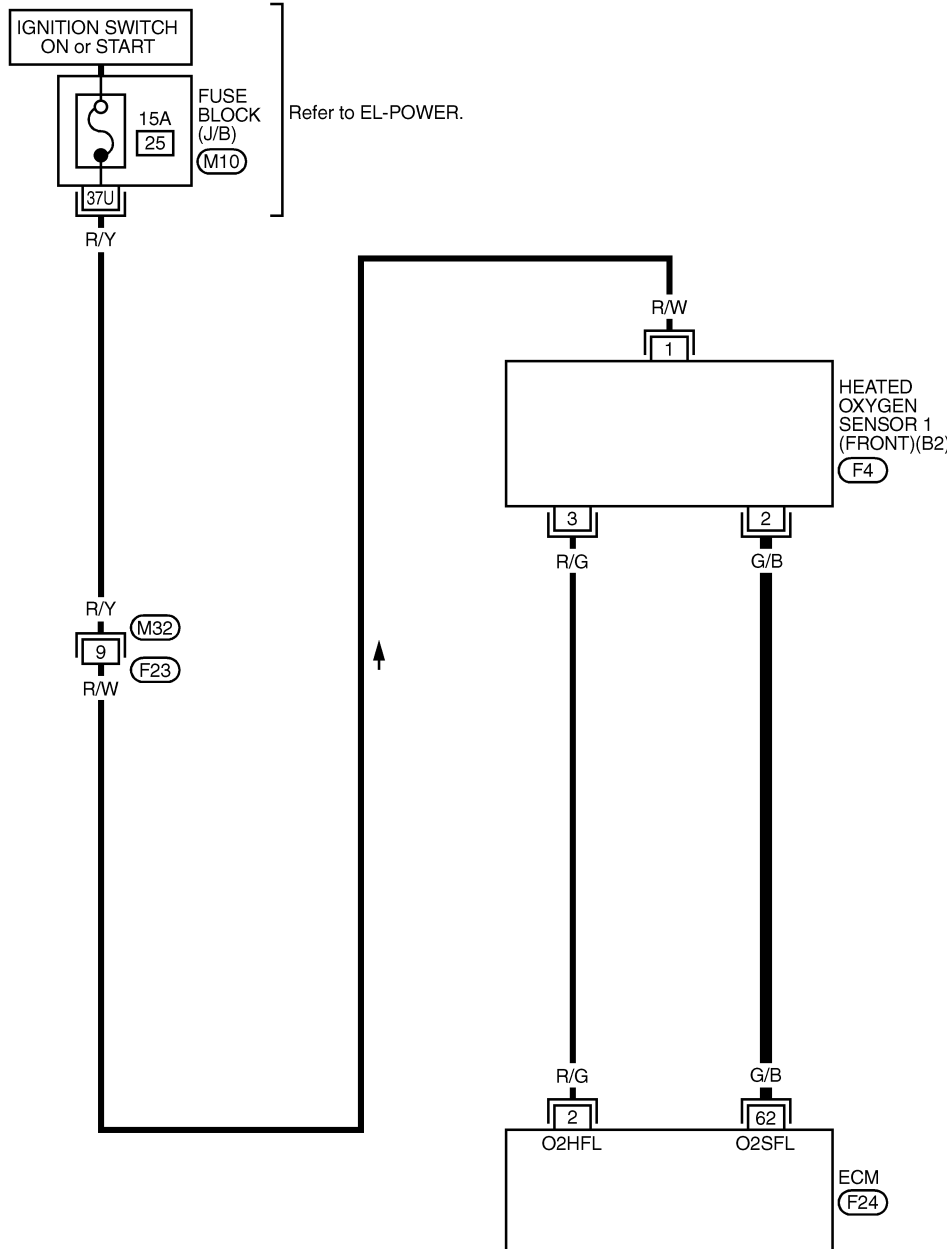
BT

HA

SC

EL

IDX



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)

(F24) GY



MEC948C

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

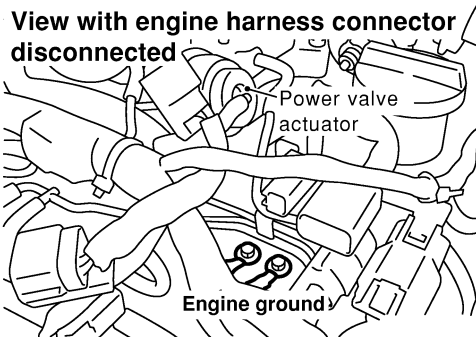
Diagnostic Procedure

Diagnostic Procedure

NBEC0093

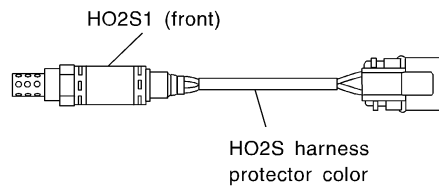
1 INSPECTION START

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



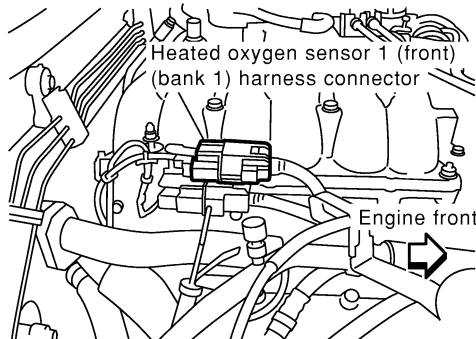
SEF959Y

3. Make sure HO2S1 (front) harness protector color, and disconnect corresponding heated oxygen sensor 1 (front) harness connector.

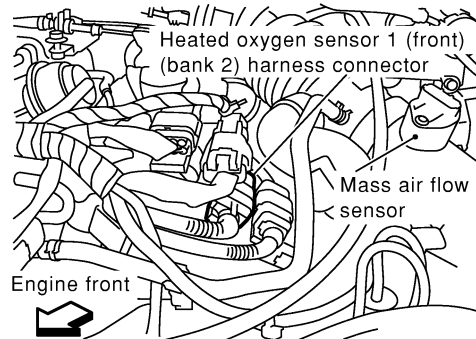


HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y



SEF965Y



SEF966Y

▶ GO TO 2.

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

Diagnostic Procedure (Cont'd)

2	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.																
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0130</td> <td>63</td> <td>2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0150</td> <td>62</td> <td>2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0130	63	2	Bank 1 (Right)	P0150	62	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0130	63	2	Bank 1 (Right)													
P0150	62	2	Bank 2 (Left)													
MTBL0471																
<p style="color: blue;">Continuity should exist.</p> 3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.																
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or Sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0130</td> <td>63 or 2</td> <td>Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0150</td> <td>62 or 2</td> <td>Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or Sensor	Ground	P0130	63 or 2	Ground	Bank 1 (Right)	P0150	62 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or Sensor	Ground														
P0130	63 or 2	Ground	Bank 1 (Right)													
P0150	62 or 2	Ground	Bank 2 (Left)													
MTBL0472																
<p style="color: blue;">Continuity should not exist.</p> 4. Also check harness for short to power.																
OK or NG																
OK (With CONSULT-II) ▶	GO TO 3.															
OK (Without CONSULT-II) ▶	GO TO 4.															
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.															

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DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

Diagnostic Procedure (Cont'd)

3 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.
 - "HO2S1 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.

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

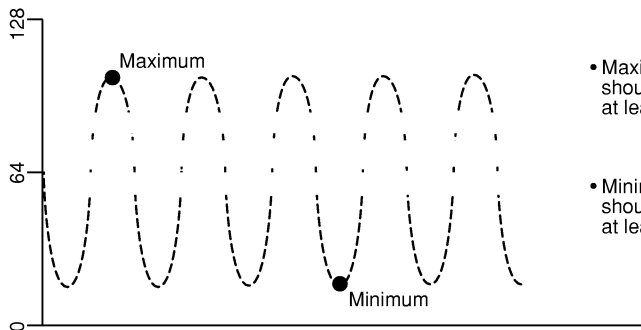
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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



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

SEF648Y

CAUTION:

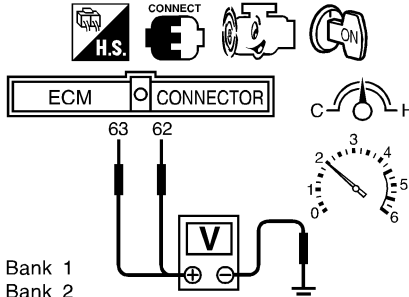
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

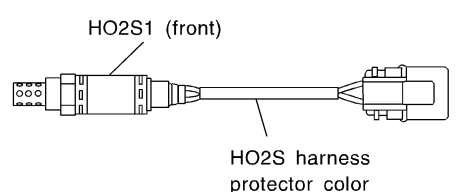
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  <p>63: Bank 1 62: Bank 2</p> </div> <div style="flex: 2;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF967XA	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

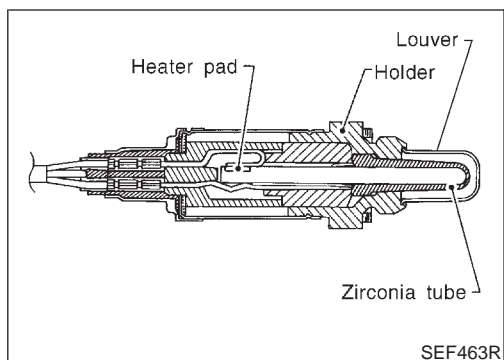
5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
 <p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

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DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

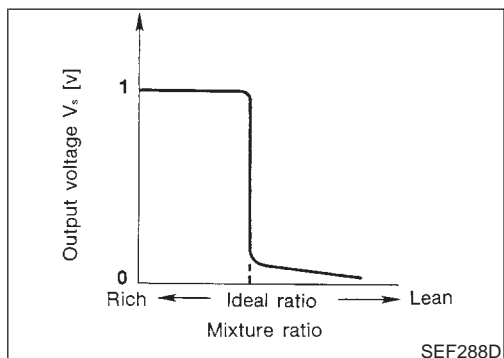
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) 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.

NBEC0094



CONSULT-II Reference Value in Data Monitor Mode

NBEC0095

Specification data are reference values.

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

ECM Terminals and Reference Value

NBEC0653

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

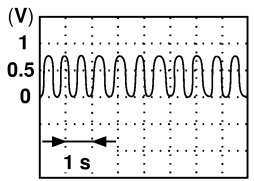
CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p> <p>SEF059V</p>

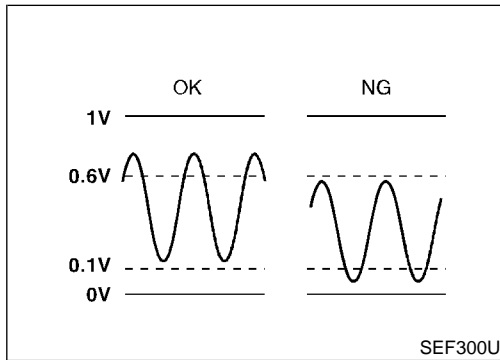
DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p>  <p>SEF059V</p>

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On Board Diagnosis Logic

To judge the malfunction, the output from the heated oxygen sensor 1 (front) 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.

Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

NBEC0097 PD
AX
SU
BR

Possible Cause

- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks

NBEC0433 ST
RS
BT

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing following procedure, confirm that battery voltage is more than 11V at idle.

NBEC0098 SC
EL
IDX

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

DTC Confirmation Procedure (Cont'd)

6	HO2S1 (B1) P0130	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

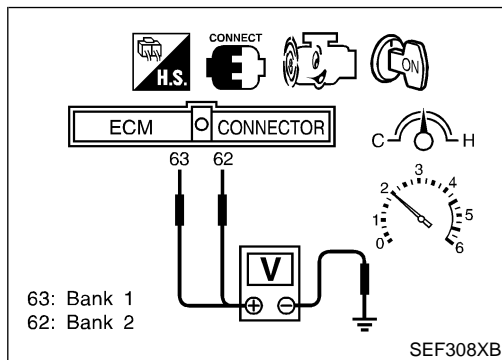
SEF334Z

6	HO2S1 (B1) P0131	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF335Z

6	HO2S1 (B1) P0131	
	COMPLETED	

SEF651Y



WITH CONSULT-II

NBEC0098S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 10 seconds.
- 3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0131/P0150" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,300 - 2,800 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	3 - 10 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-205.

Overall Function Check

NBEC0099

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

WITH GST

NBEC0099S01

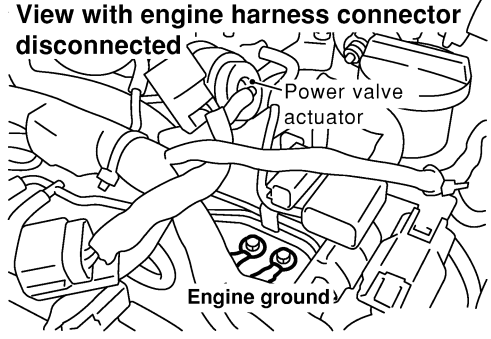

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-205.


DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

Diagnostic Procedure

Diagnostic Procedure

NBEC0100

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.</p> <p style="text-align: center;">View with engine harness connector disconnected</p>  <p style="text-align: right;">SEF959Y</p>	GI MA EM LC EC FE AT
		GO TO 2.	

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)	<p>Loosen and retighten corresponding heated oxygen sensor 1 (front).</p> <p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	TF PD AX SU BR ST RS BT HA SC EL IDX
		GO TO 3.	

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

Diagnostic Procedure (Cont'd)

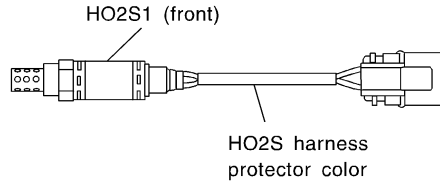
3	CLEAR THE SELF-LEARNING DATA									
<p><input type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="3" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td colspan="2"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF968Y</p> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?</p>		WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT										
SELF-LEARNING CONT	CLEAR	B1 100 %								
		B2 100 %								
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch "OFF". 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?</p> <p style="text-align: center;">Yes or No</p>										
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-294.									
No	▶ GO TO 4.									

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

Diagnostic Procedure (Cont'd)

4 CHECK HEATED OXYGEN SENSOR HEATER 1 (FRONT)

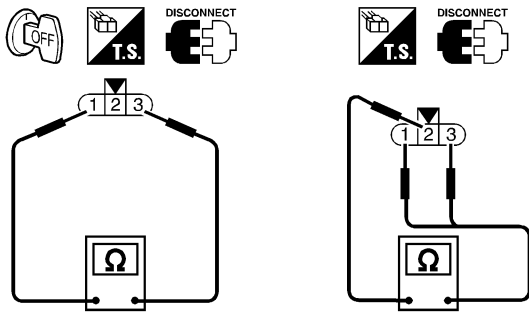
1. Stop engine.
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect HO2S1 harness connector.
4. Check resistance between HO2S1 terminals as follows.



Terminals	Resistance
1 and 3	2.3 - 4.3 Ω at 25°C (77°F)
1 and 2 2 and 3	∞ Ω (Continuity should not exist.)

SEF969Y

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.

OK or NG

OK (With CONSULT-II) ►	GO TO 5.
OK (Without CONSULT-II) ►	GO TO 6.
NG ►	GO TO 7.

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DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 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.

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

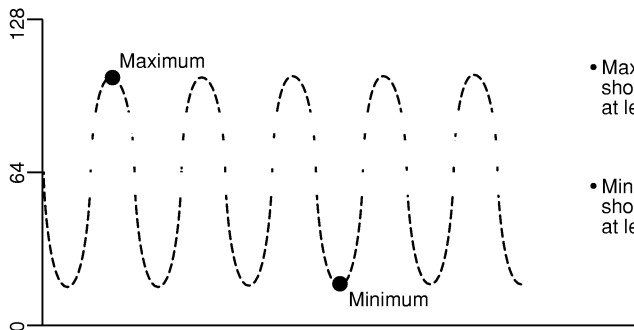
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

DTC P0131, P0151 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (LEAN SHIFT MONITORING)

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> </div> <div style="flex: 2;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF967XA	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

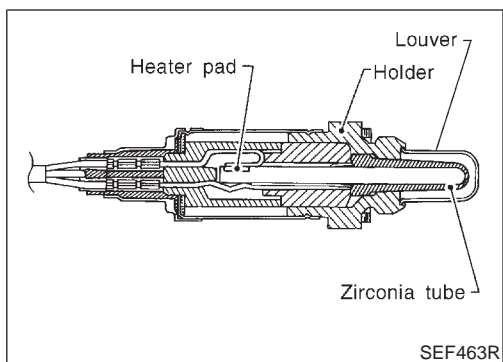
7	REPLACE FRONT HEATED OXYGEN SENSOR
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

8	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140. For circuit, refer to "DTC P0130 (RIGHT BANK 1), P0150 (LEFT BANK 2) HEATED OXYGEN SENSOR 1 (FRONT) [HO2S1 (FRONT) (BANK 1)/(BANK 2)] (CIRCUIT)", EC-192.</p>	
▶	INSPECTION END

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DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

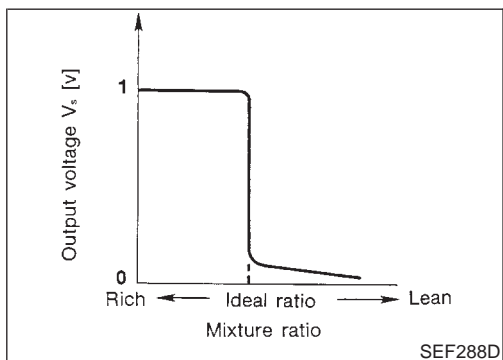
Component Description



Component Description

NBEC0101

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) 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

NBEC0102

Specification data are reference values.

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

ECM Terminals and Reference Value

NBEC0654

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

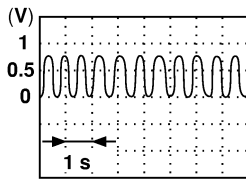
CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p> <p>SEF059V</p>

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p>  <p>SEF059V</p>

GI

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EM

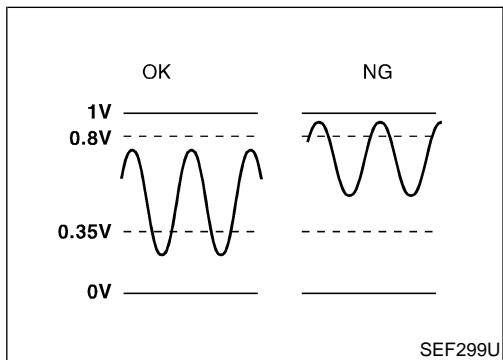
LC

EC

FE

AT

TF



On Board Diagnosis Logic

To judge the malfunction, the output from the heated oxygen sensor 1 (front) 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.

Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

NBEC0104

PD

AX

SU

BR

Possible Cause

- Heated oxygen sensor 1 (front)
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater (front)

NBEC0434

ST

RS

BT

HA

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

NBEC0105

SC

EL

IDX

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

DTC Confirmation Procedure (Cont'd)

6	HO2S1 (B1) P0132	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

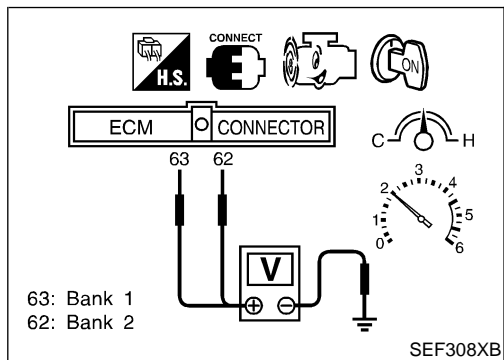
SEF336Z

6	HO2S1 (B1) P0132	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF337Z

6	HO2S1 (B1) P0132	
	COMPLETED	

SEF655Y



WITH CONSULT-II

NBEC0105S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0132/P0152" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,300 - 2,800 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	3 - 10 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-213.

Overall Function Check

NBEC0106

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

WITH GST

NBEC0106S01

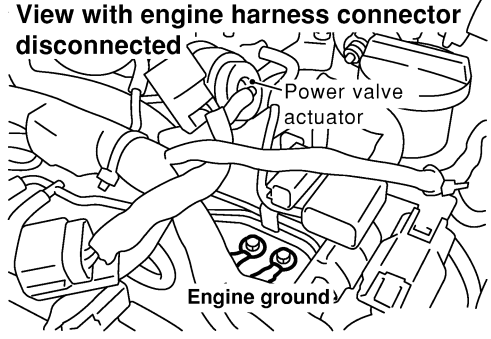

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-213.


DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

Diagnostic Procedure

Diagnostic Procedure

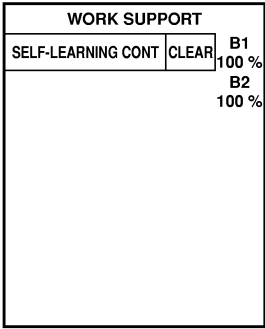
NBEC0107

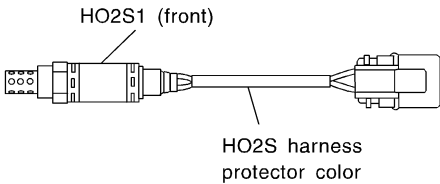
1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.</p> <p style="text-align: center;">View with engine harness connector disconnected</p>  <p>The diagram shows a top-down view of the engine compartment. A power valve actuator is labeled at the top right. Below it, two ground screws are labeled "Engine ground". The text "View with engine harness connector disconnected" is positioned above the diagram.</p> <p style="text-align: right;">SEF959Y</p>	GI MA EM LC EC FE AT
 GO TO 2.			

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)	<p>Loosen and retighten corresponding heated oxygen sensor 1 (front).</p> <p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	TF PD AX SU BR ST RS BT HA SC EL IDX
 GO TO 3.			

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

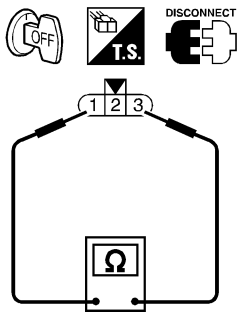
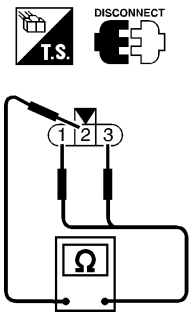
Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". 	
	
<p>4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?</p>	
SEF968Y	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch "OFF". Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0100 is displayed. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72. Make sure DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?</p>	
Yes or No	
Yes	▶ Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-302.
No	▶ GO TO 4.

4	CHECK HO2S 1 (FRONT) CONNECTOR FOR WATER
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<ol style="list-style-type: none"> Disconnect heated oxygen sensor 1 (front) harness connector. Check connectors for water. Water should not exist. 	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair or replace harness or connectors.

DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HEATER							
Check resistance between HO2S1 terminals as follows.								
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Terminals</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>1 and 3</td> <td>2.3 - 4.3Ω at 25°C (77°F)</td> </tr> <tr> <td>1 and 2 2 and 3</td> <td>∞Ω (Continuity should not exist.)</td> </tr> </tbody> </table>	Terminals	Resistance	1 and 3	2.3 - 4.3Ω at 25°C (77°F)	1 and 2 2 and 3	∞Ω (Continuity should not exist.)
Terminals	Resistance							
1 and 3	2.3 - 4.3Ω at 25°C (77°F)							
1 and 2 2 and 3	∞Ω (Continuity should not exist.)							
<p>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.</p>								
OK or NG								
OK (With CONSULT-II) ▶	GO TO 6.							
OK (Without CONSULT-II) ▶	GO TO 7.							
NG ▶	GO TO 8.							

SEF969Y

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DTC P0132, P0152 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RICH SHIFT MONITORING)

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>63: Bank 1 62: Bank 2</p> </div> <div style="flex: 2;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF967XA	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

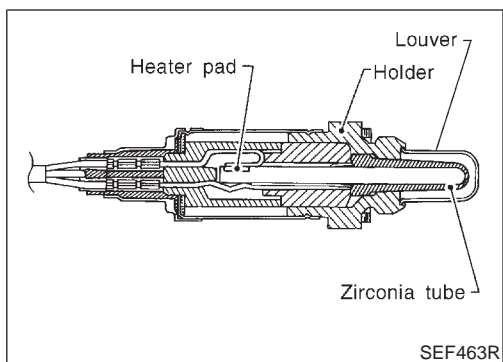
8	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
<p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

9	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140. For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) HEATED OXYGEN SENSOR 1 [HO2S1 (FRONT) (BANK 1)/(BANK 2)] (CIRCUIT)", EC-192.</p>	
▶	INSPECTION END

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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

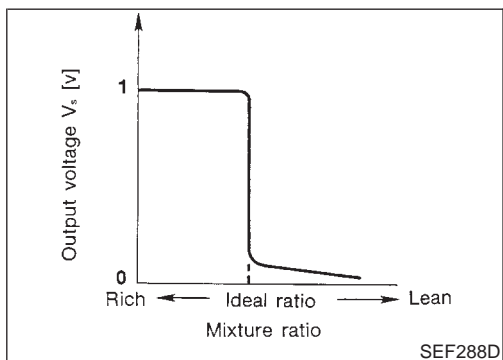
Component Description



Component Description

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) 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.

NBEC0108



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NBEC0109

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	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 ground.

NBEC0655

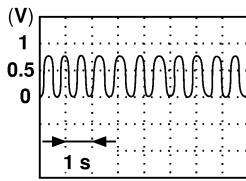
CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p> <p>SEF059V</p>

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p>  <p>SEF059V</p>

GI

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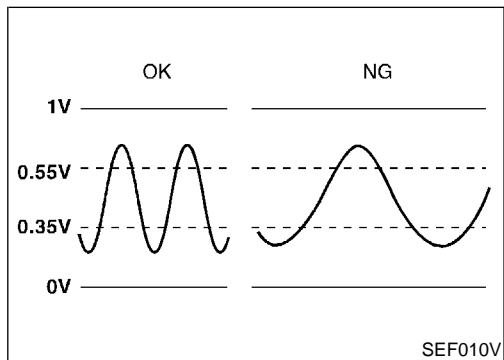
LC

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On Board Diagnosis Logic

To judge the malfunction of heated oxygen sensor 1 (front), this diagnosis measures response time of heated oxygen sensor 1 (front) signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 (front) temperature index. Judgment is based on whether the compensated time [heated oxygen sensor 1 (front) cycling time index] is inordinately long or not.

Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.

Possible Cause

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

NBEC0435

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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

DTC Confirmation Procedure

DTC Confirmation Procedure

NBEC0112

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

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

SEF338Z

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

SEF339Z

6	HO2S1 (B1) P0133	
	COMPLETED	

SEF658Y

WITH CONSULT-II

NBEC0112S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0133/P0153" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

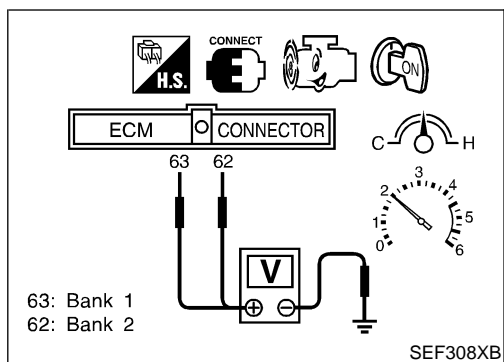
ENG SPEED	1,600 - 3,100 rpm
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	5 - 12 msec
Selector lever	Suitable position

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-224.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Overall Function Check



Overall Function Check

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

WITH GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
- 4) If NG, go to "Diagnostic Procedure", EC-224.

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DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Wiring Diagram

Wiring Diagram

NBEC0114

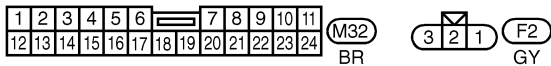
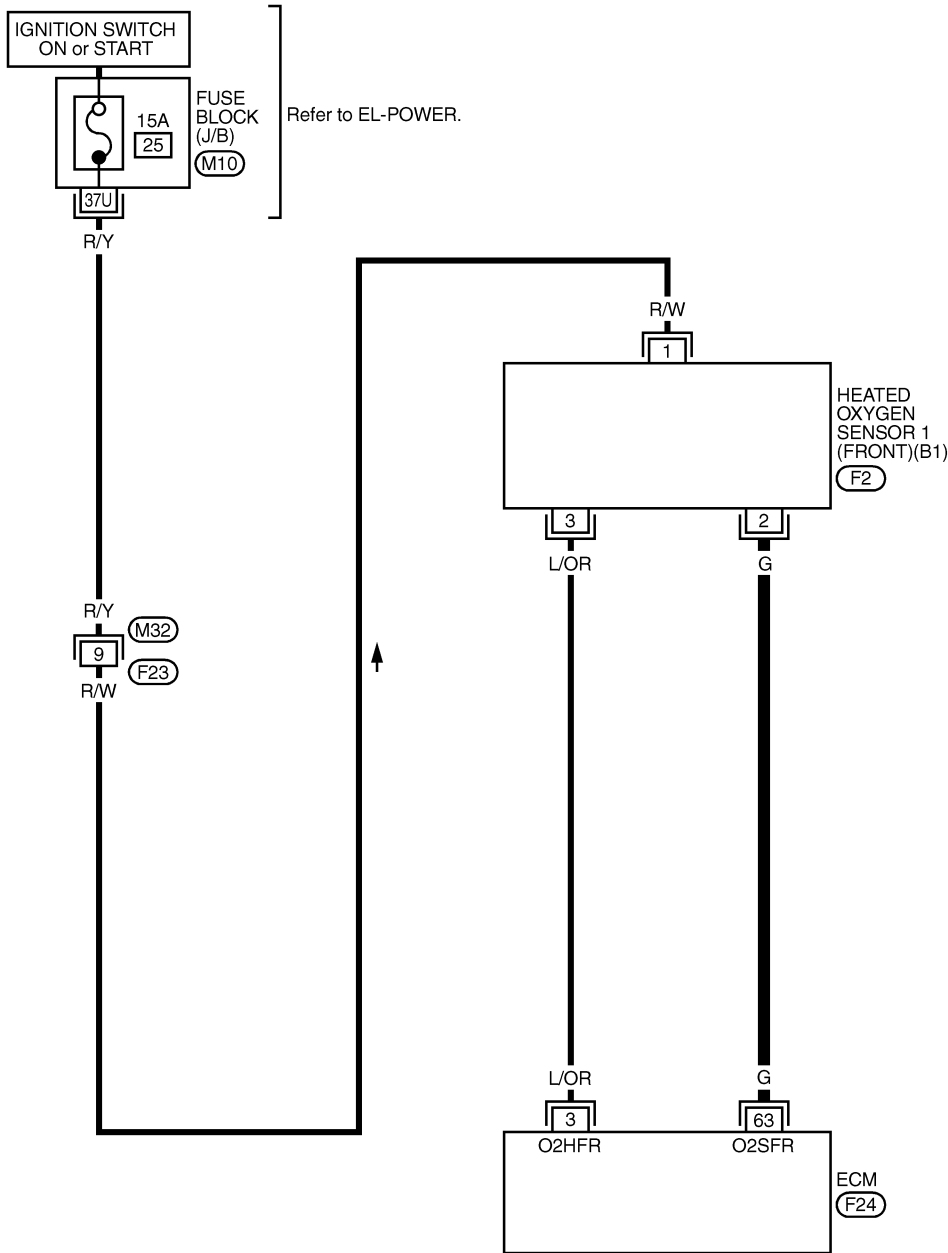
NBEC0114S01

RIGHT BANK

EC-O2S1B1-01

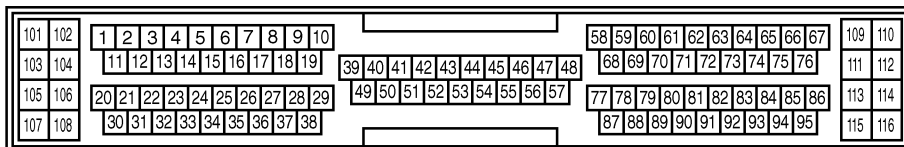
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



MEC947C

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Wiring Diagram (Cont'd)

LEFT BANK

NBEC0114S02

EC-O2S1B2-01

GI

— : Detectable line for DTC

— : Non-detectable line for DTC

MA

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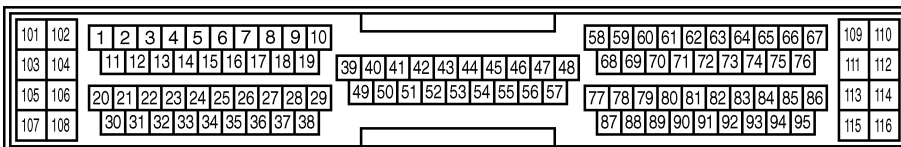
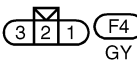
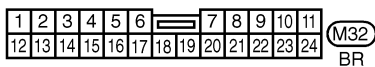
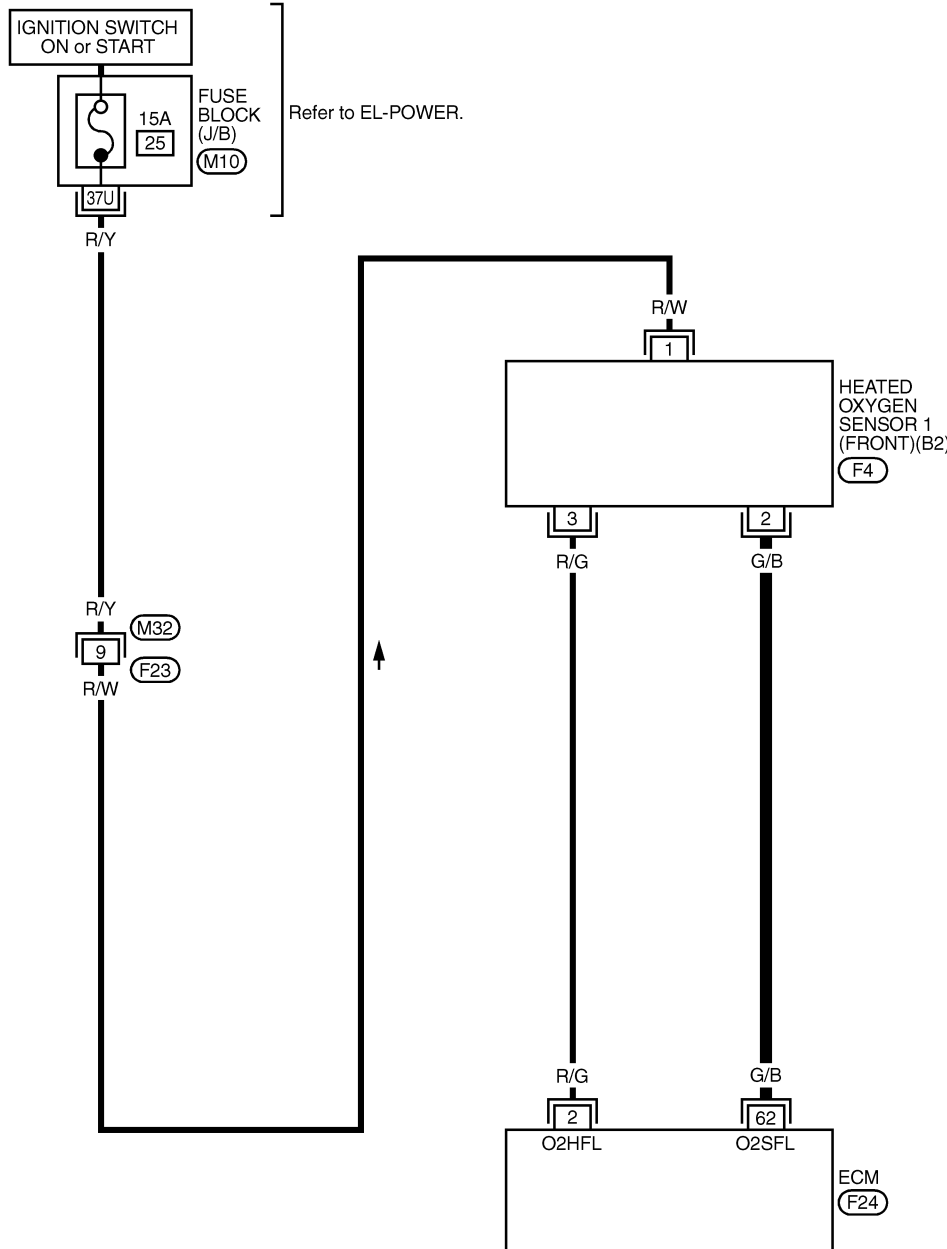
BT

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REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)

(F24) GY



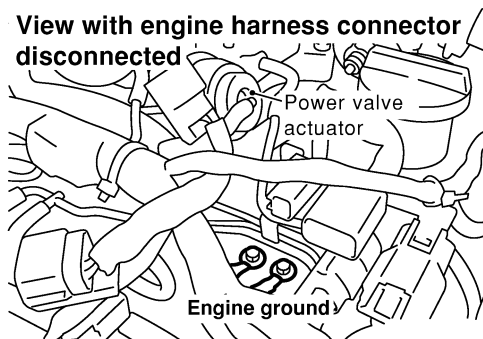
MEC948C

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

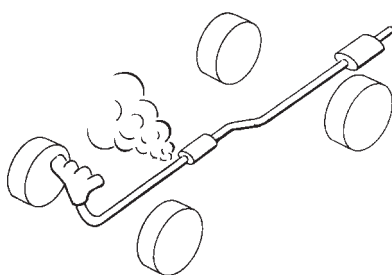
Diagnostic Procedure

Diagnostic Procedure

NBEC0115

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>View with engine harness connector disconnected</p>  <p>The diagram shows a top-down view of the engine compartment. A power valve actuator is labeled at the top right. Below it, two engine ground screws are indicated with arrows and the label 'Engine ground'.</p> </div> <p style="text-align: right;">SEF959Y</p>	
▶ GO TO 2.	

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>Loosen and retighten corresponding heated oxygen sensor 1 (front). Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
▶ GO TO 3.	

3	CHECK FOR EXHAUST AIR LEAK
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p> <div style="text-align: center;">  <p>The diagram shows a hand holding a hose to the exhaust pipe. A cloud of smoke is shown escaping from the joint, indicating a leak. The test is performed before the three-way catalyst.</p> </div> <p style="text-align: right;">SEF099P</p>	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

4	CHECK FOR INTAKE AIR LEAK
<p>Listen for an intake air leak after the mass air flow sensor.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ Repair or replace.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA										
<p><input type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="3">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td colspan="2"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF968Y</p> <ol style="list-style-type: none"> Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? 			WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT											
SELF-LEARNING CONT	CLEAR	B1 100 %									
		B2 100 %									
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch "OFF". Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0100 is displayed. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72. Make sure DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 5px;">Yes</td> <td style="width: 5%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-294, 302.</td> </tr> <tr> <td style="padding: 5px;">No</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 6.</td> </tr> </table>			Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-294, 302.	No	▶	GO TO 6.			
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-294, 302.									
No	▶	GO TO 6.									

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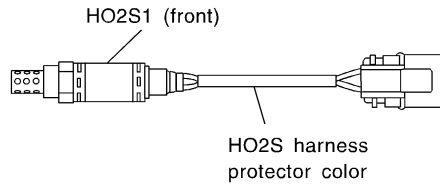
IDX

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

6 CHECK HO2S1 (FRONT) HARNESS PROTECTOR COLOR

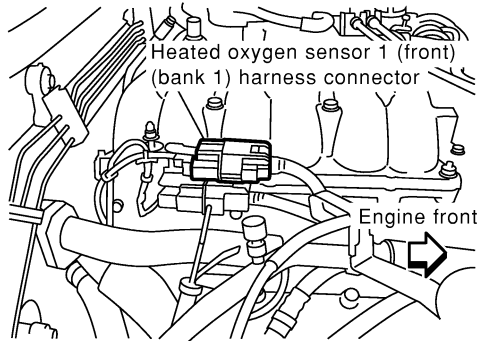
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector.



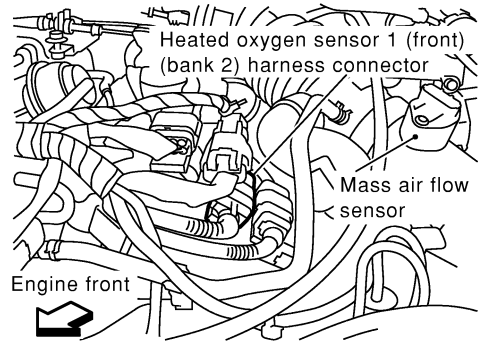
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



SEF965Y



SEF966Y



GO TO 7.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

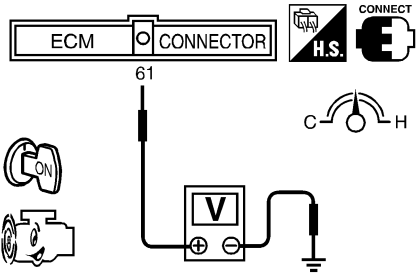
7	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0133</td> <td style="text-align: center;">63</td> <td style="text-align: center;">2</td> <td style="text-align: center;">Bank 1 (Right)</td> </tr> <tr> <td>P0153</td> <td style="text-align: center;">62</td> <td style="text-align: center;">2</td> <td style="text-align: center;">Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0133	63	2	Bank 1 (Right)	P0153	62	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0133	63	2	Bank 1 (Right)													
P0153	62	2	Bank 2 (Left)													
MTBL0473																
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal or FRONT HO2S terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or Sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0133</td> <td style="text-align: center;">63 or 2</td> <td style="text-align: center;">Ground</td> <td style="text-align: center;">Bank 1 (Right)</td> </tr> <tr> <td>P0153</td> <td style="text-align: center;">62 or 2</td> <td style="text-align: center;">Ground</td> <td style="text-align: center;">Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or Sensor	Ground	P0133	63 or 2	Ground	Bank 1 (Right)	P0153	62 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or Sensor	Ground														
P0133	63 or 2	Ground	Bank 1 (Right)													
P0153	62 or 2	Ground	Bank 2 (Left)													
MTBL0474																
<p>Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 8.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

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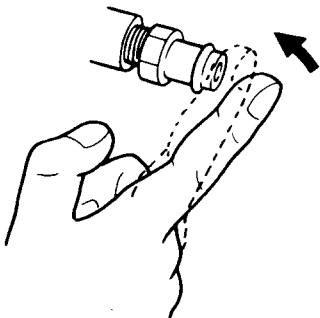
8	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
<p>Check resistance between HO2S1 (front) terminals as follows.</p>		
SEF969Y		
<p>CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 13.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

9	CHECK MASS AIR FLOW SENSOR											
<ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Start engine and warm it up to normal operating temperature. 3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground. 												
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Condition</th> <th style="width: 40%;">Voltage V</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON" (Engine stopped.)</td> <td style="text-align: center;">Approx. 1.0</td> </tr> <tr> <td>Idle (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.2 - 1.8</td> </tr> <tr> <td>2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.6 - 2.2</td> </tr> <tr> <td>Idle to about 4,000 rpm*</td> <td style="text-align: center;">1.2 - 1.8 to Approx. 4.0</td> </tr> </tbody> </table> <p style="font-size: small; margin-top: 5px;">*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.</p>	Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Approx. 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2	Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0
Condition	Voltage V											
Ignition switch "ON" (Engine stopped.)	Approx. 1.0											
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2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2											
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0											
<p>4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.</p> <p style="text-align: center;">OK or NG</p>												
OK	▶	GO TO 10.										
NG	▶	Replace mass air flow sensor.										

SEF298X

10	CHECK PCV VALVE	
<ol style="list-style-type: none"> 1. Install all removed parts. 2. Start engine and let it idle. 3. Remove PCV valve ventilation hose from PCV valve. 4. Make sure that 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. 		
		SEC137A
OK or NG		
OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace PCV valve.

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

11 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 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.

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

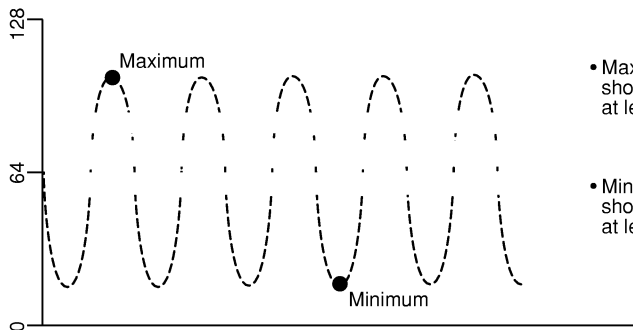
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

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 EL
 IDX

DTC P0133, P0153 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

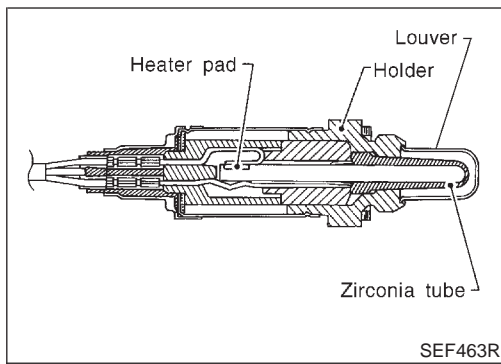
12	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> </div> <div style="flex: 2;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF967XA	
CAUTION:	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 14.
NG	▶ GO TO 13.

13	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

14	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Component Description

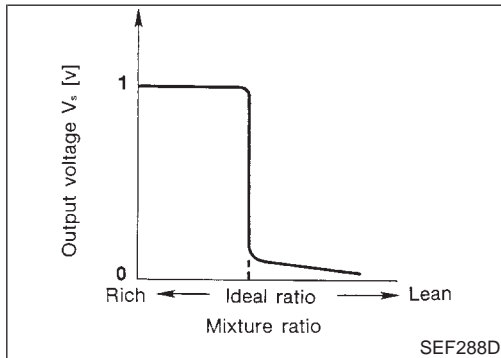


SEF463R

Component Description

NBEC0116

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) 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.



SEF288D

CONSULT-II Reference Value in Data Monitor Mode

NBEC0117

Specification data are reference values.

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

ECM Terminals and Reference Value

NBEC0656

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

CAUTION:

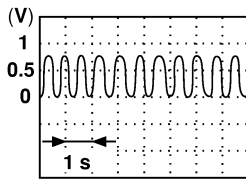
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

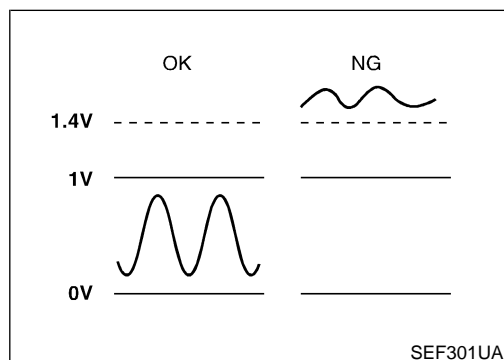
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	0 - Approximately 1.0V (Periodically change)

SEF059V

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>0 - Approximately 1.0V (Periodically change)</p>  <p>SEF059V</p>



On Board Diagnosis Logic

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

NBEC0119

Possible Cause

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

NBEC0436

5	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NOTE:

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

NBEC0120

WITH CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "DATA MONITOR" mode with CONSULT-II.

NBEC0120S01

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

DTC Confirmation Procedure (Cont'd)

- 5) Restart engine and let it idle for 25 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-236.

GI

WITH GST

NBEC0120S02

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Restart engine and let it idle for 25 seconds.
- 4) Turn ignition switch "OFF" and wait at least 10 seconds.
- 5) Restart engine and let it idle for 25 seconds.
- 6) Select "MODE 3" with GST.
- 7) If DTC is detected, go to "Diagnostic Procedure", EC-236.

MA

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

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DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Wiring Diagram

Wiring Diagram

NBEC0121

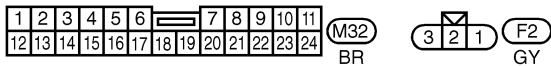
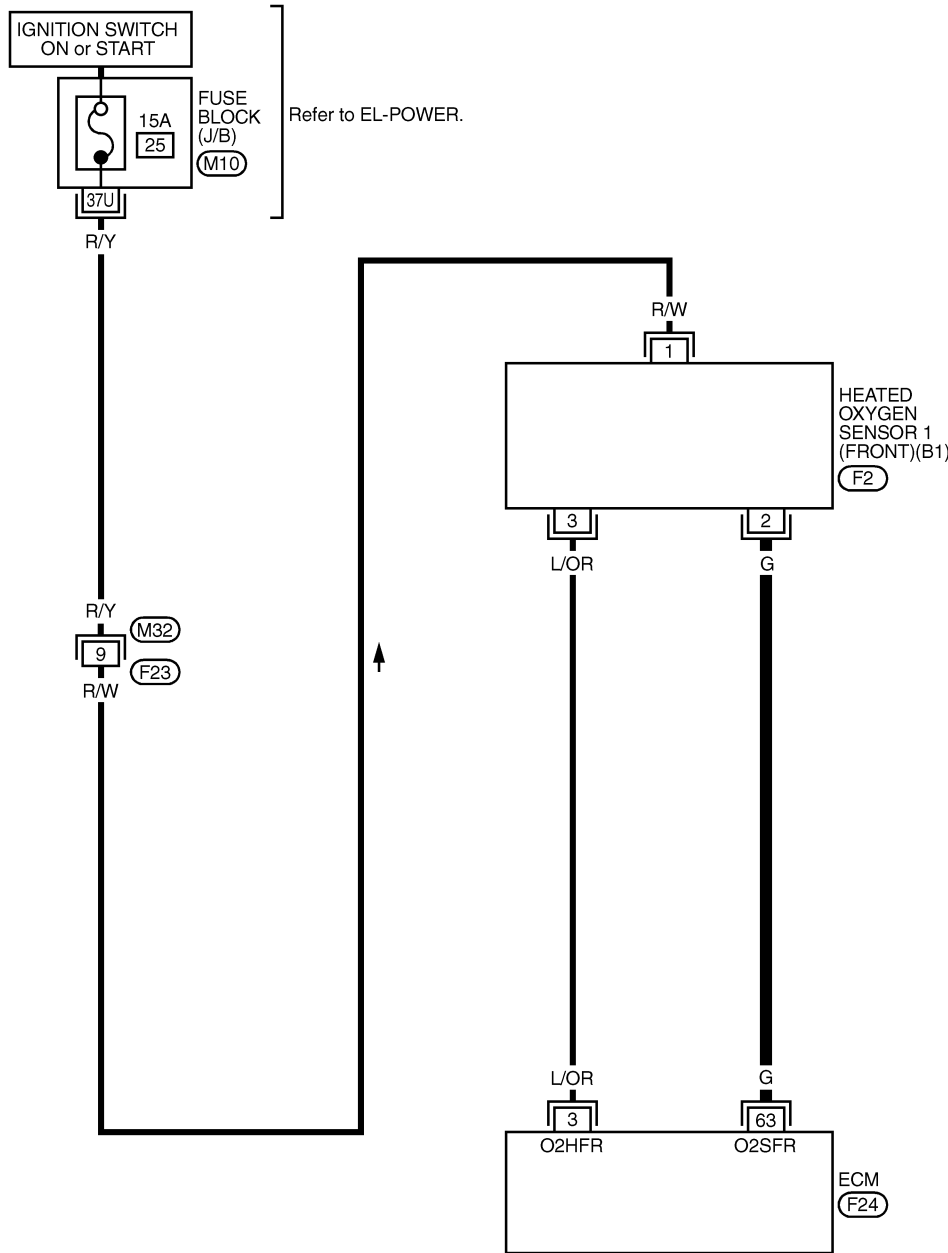
NBEC0121S01

RIGHT BANK

EC-O2S1B1-01

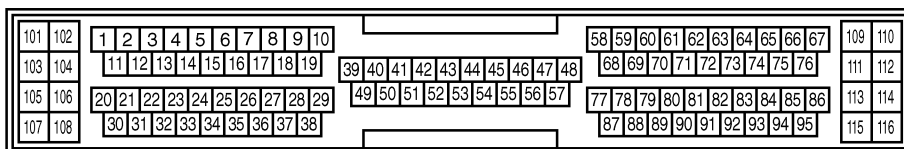
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



MEC947C

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Wiring Diagram (Cont'd)

LEFT BANK

NBEC0121S02

EC-O2S1B2-01

GI

— : Detectable line for DTC

— : Non-detectable line for DTC

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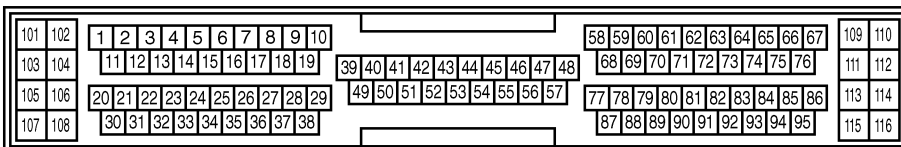
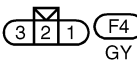
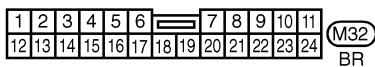
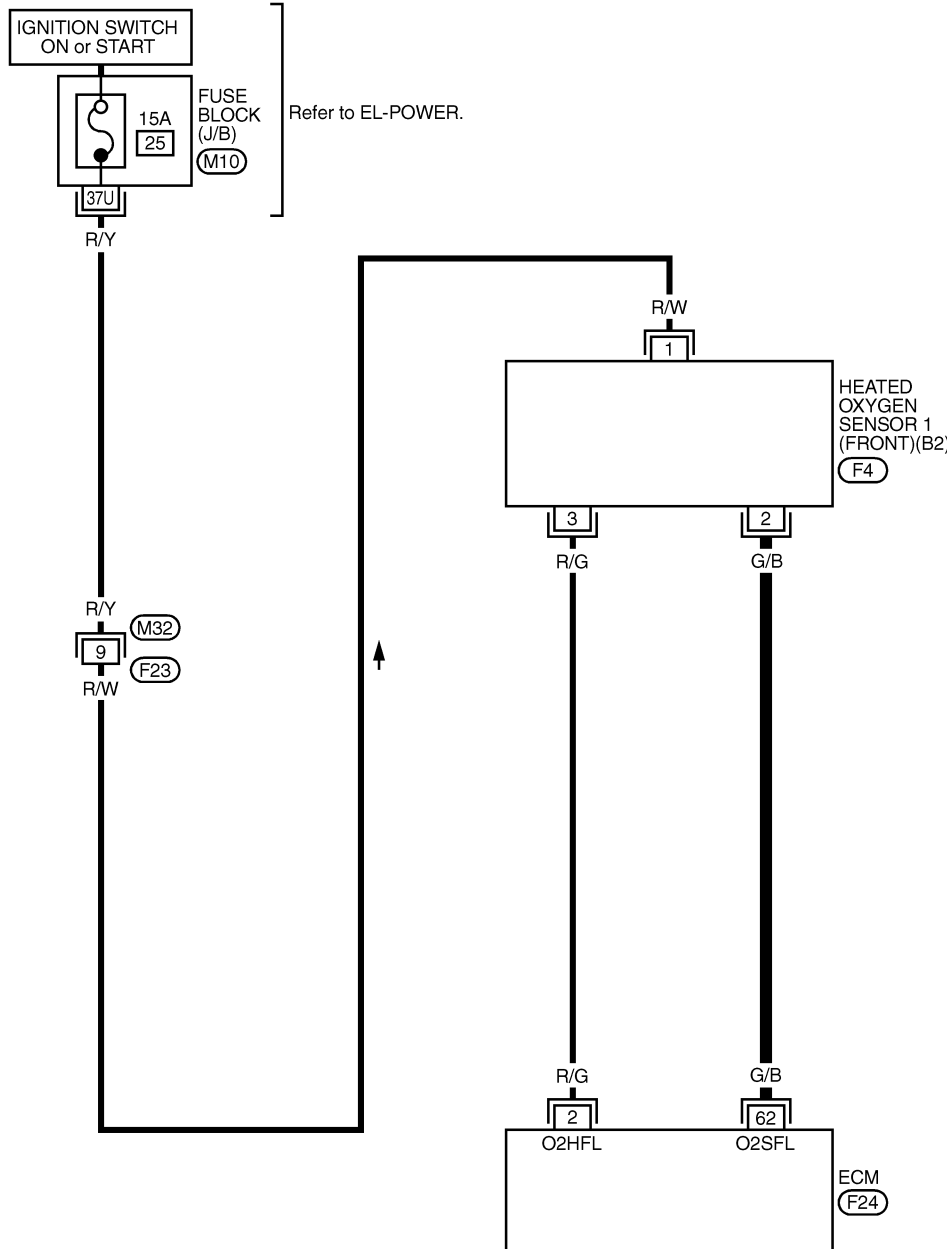
BT

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EL

IDX



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)

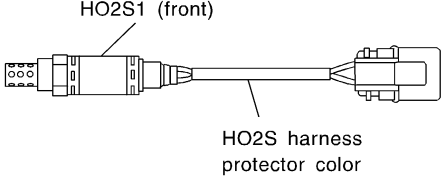
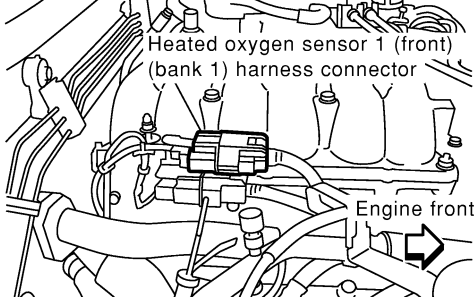
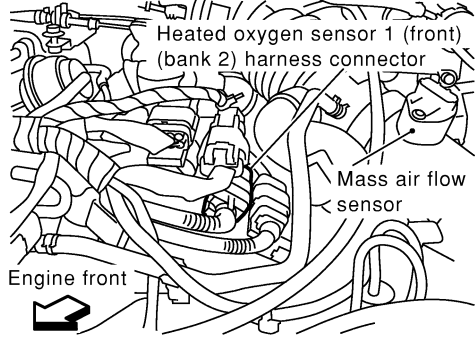
MEC948C

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Diagnostic Procedure

Diagnostic Procedure

NBEC0122

1	INSPECTION START
<p>1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 (front) harness protector color.</p>	
 <p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
<p>3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.</p>	
 <p>Heated oxygen sensor 1 (front) (bank 1) harness connector</p> <p>Engine front</p>	
 <p>Heated oxygen sensor 1 (front) (bank 2) harness connector</p> <p>Mass air flow sensor</p> <p>Engine front</p>	
<p>▶ GO TO 2.</p>	

SEF505Y

SEF965Y

SEF966Y

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)
<p>Loosen and retighten corresponding heated oxygen sensor 1 (front).</p> <p>Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
<p>▶ GO TO 3.</p>	

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0134</td> <td style="text-align: center;">63</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0154</td> <td style="text-align: center;">62</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0134	63	2	Bank 1 (Right)	P0154	62	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0134	63	2	Bank 1 (Right)													
P0154	62	2	Bank 2 (Left)													
MTBL0475																
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or Sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0134</td> <td style="text-align: center;">63 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0154</td> <td style="text-align: center;">62 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or Sensor	Ground	P0134	63 or 2	Ground	Bank 1 (Right)	P0154	62 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or Sensor	Ground														
P0134	63 or 2	Ground	Bank 1 (Right)													
P0154	62 or 2	Ground	Bank 2 (Left)													
MTBL0476																
<p>Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK HO2S1 (FRONT) CONNECTOR FOR WATER	
<p>1. Disconnect heated oxygen sensor 1 (front) harness connector. 2. Check connectors for water. Water should not exist.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

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DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Diagnostic Procedure (Cont'd)

5 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

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

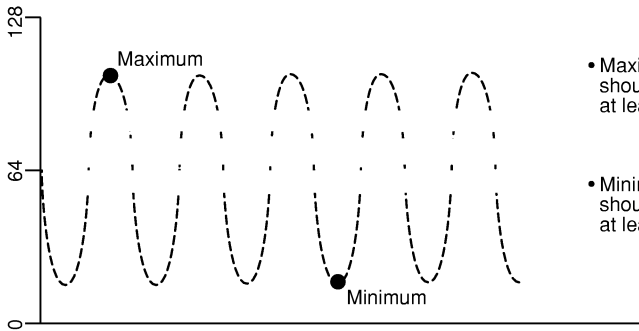
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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



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

SEF648Y

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>63: Bank 1 62: Bank 2</p> </div> <div style="flex: 2;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF967XA	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
<p>HO2S1 (front)</p> <p>HO2S harness protector color</p>	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
<p>CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

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DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

Description

Description

NBEC0123

SYSTEM DESCRIPTION

NBEC0123S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heaters (front)
Crankshaft position sensor (REF)			

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters (front) corresponding to the engine speed.

OPERATION

NBEC0123S02

Engine speed rpm	Heated oxygen sensor 1 heaters (front)
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

NBEC0124

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine speed: Below 3,600 rpm	ON
HO2S1 HTR (B2)	● Engine speed: Above 3,600 rpm	OFF

ECM Terminals and Reference Value

NBEC0657

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	L/OR	Heated oxygen sensor 1 heater (front) (bank 1)	[Engine is running] ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
2	R/G	Heated oxygen sensor 1 heater (front) (bank 2)	[Engine is running] ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when the current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater (front).]

NBEC0126

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Possible Cause

- Harness or connectors (The heated oxygen sensor 1 heater (front) circuit is open or shorted.)
- Heated oxygen sensor 1 heater (front)

NBEC0437

EC

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TF

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NOTE:

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

NBEC0127

PD

TESTING CONDITION:

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

AX

SU

WITH CONSULT-II

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and run it for at least 6 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-244.

NBEC0127S01

BR

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WITH GST

- 1) Start engine and run it for at least 6 seconds at idle speed.
 - 2) Turn ignition switch "OFF" and wait at least 10 seconds.
 - 3) Start engine and run it for at least 6 seconds at idle speed.
 - 4) Select "MODE 3" with GST.
 - 5) If DTC is detected, go to "Diagnostic Procedure", EC-244.
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

NBEC0127S02

RS

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DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

Wiring Diagram

Wiring Diagram

NBEC0128

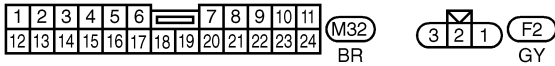
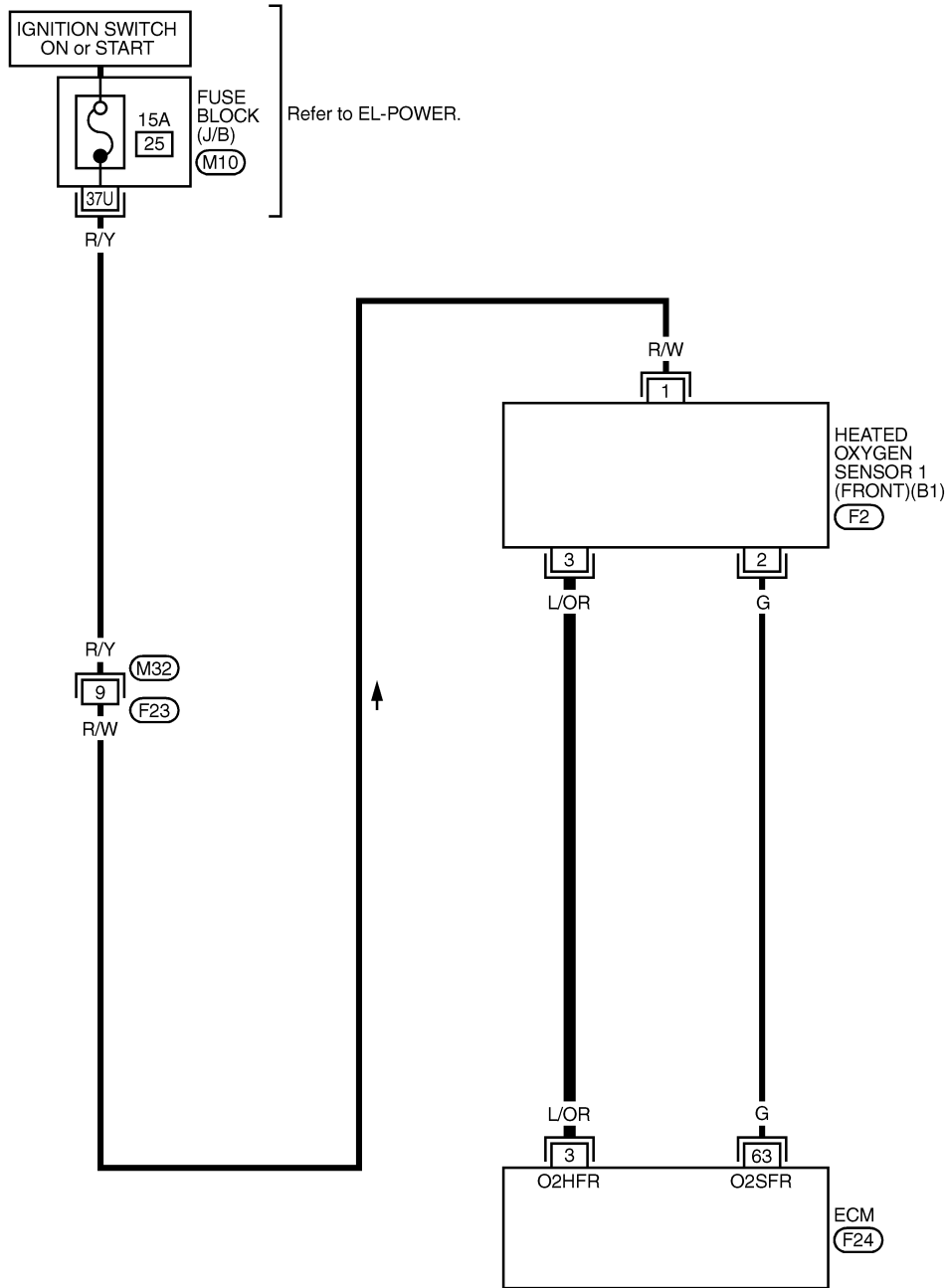
NBEC0128S01

RIGHT BANK

EC-O2H1B1-01

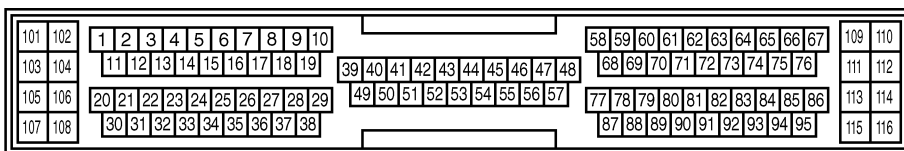
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK- JUNCTION BOX (J/B)



MEC949C

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

Wiring Diagram (Cont'd)

NBEC0128S02

LEFT BANK

EC-O2H1B2-01

GI

— : Detectable line for DTC

MA

— : Non-detectable line for DTC

EM

LC

EC

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ST

RS

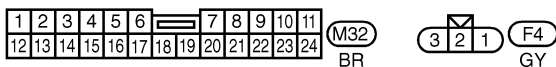
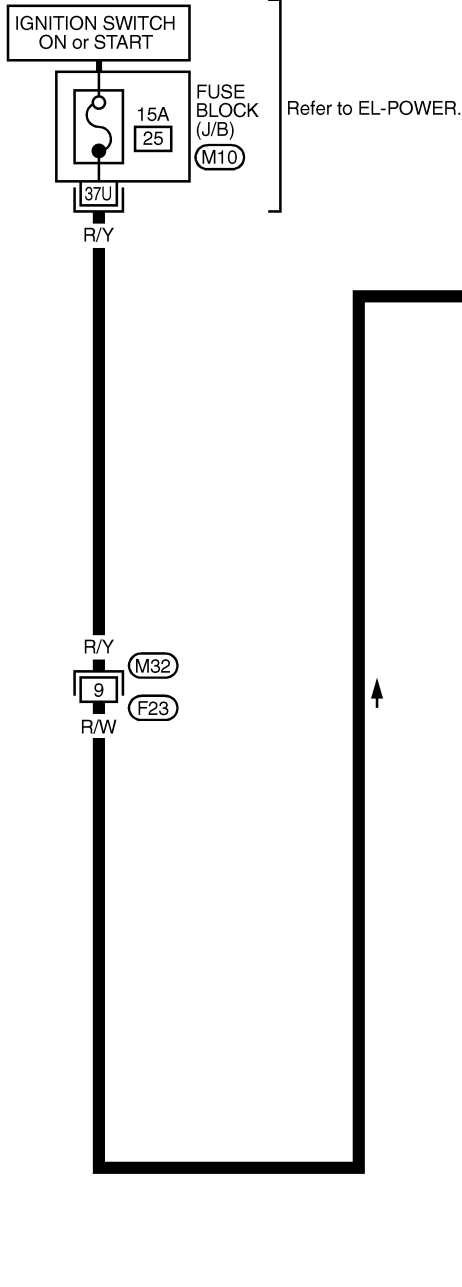
BT

HA

SC

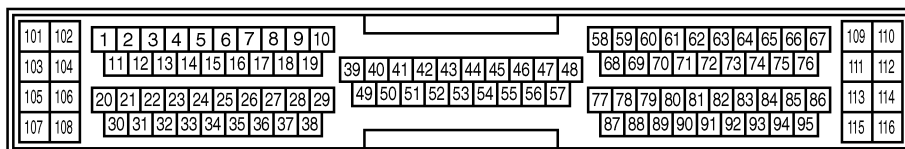
EL

IDX



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



MEC950C

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

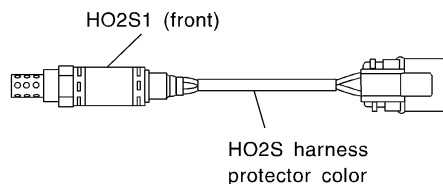
Diagnostic Procedure

Diagnostic Procedure

NBEC0129

1 CHECK HO2S1 (FRONT) POWER SUPPLY CIRCUIT

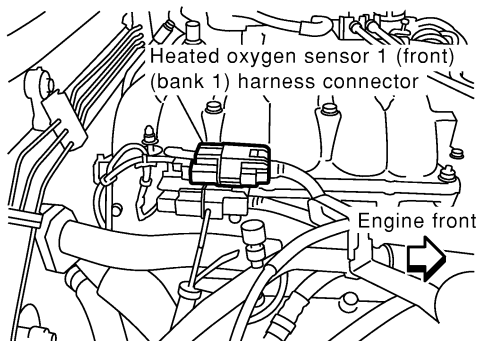
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



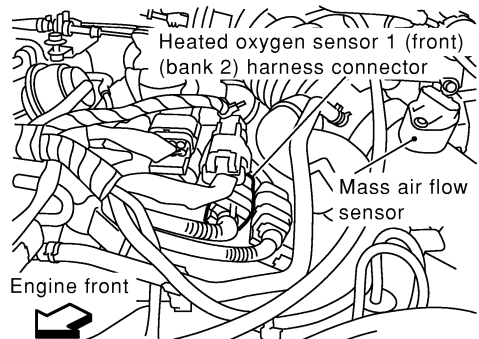
HO2S1 (front) (bank 1): Black
 HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.

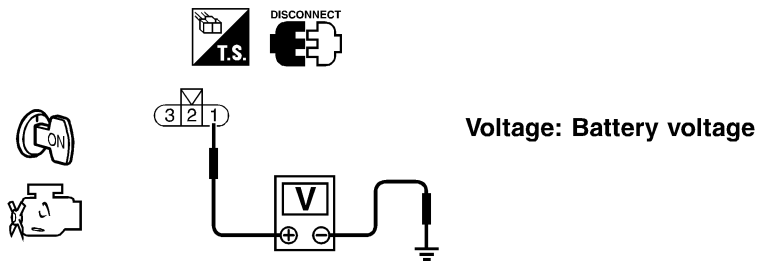


SEF965Y



SEF966Y

4. Turn ignition switch "ON".
5. Check voltage between HO2S1 (front) terminal 1 and ground with CONSULT-II or tester.



SEF970Y

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

Diagnostic Procedure (Cont'd)

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● Fuse block (J/B) connector M10 ● 15A fuse ● Harness for open or short between heated oxygen sensor 1 (front) and fuse 	
▶	Repair harness or connectors.

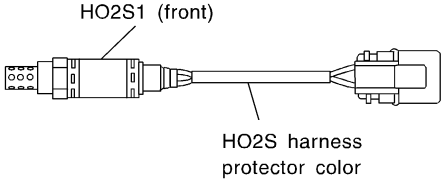
3	CHECK HO2S1 (FRONT) OUTPUT CIRCUIT FOR OPEN AND SHORT														
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>															
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0135</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0155</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>		DTC	Terminals		Bank	ECM	Sensor	P0135	3	3	Bank 1 (Right)	P0155	2	3	Bank 2 (Left)
DTC	Terminals		Bank												
	ECM	Sensor													
P0135	3	3	Bank 1 (Right)												
P0155	2	3	Bank 2 (Left)												
MTBL0520															
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>															
OK	▶ GO TO 4.														
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)						
<p>Check resistance between HO2S1 (front) terminals as follows.</p>							
SEF969Y							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th>Terminals</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>1 and 3</td> <td>2.3 - 4.3Ω at 25°C (77°F)</td> </tr> <tr> <td>1 and 2 2 and 3</td> <td>∞Ω (Continuity should not exist.)</td> </tr> </tbody> </table>		Terminals	Resistance	1 and 3	2.3 - 4.3Ω at 25°C (77°F)	1 and 2 2 and 3	∞Ω (Continuity should not exist.)
Terminals	Resistance						
1 and 3	2.3 - 4.3Ω at 25°C (77°F)						
1 and 2 2 and 3	∞Ω (Continuity should not exist.)						
<p>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.</p> <p style="text-align: center;">OK or NG</p>							
OK	▶ GO TO 6.						
NG	▶ GO TO 5.						

GI
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DTC P0135, P0155 HEATED OXYGEN SENSOR 1 HEATER (FRONT) (BANK 1)/(BANK 2)

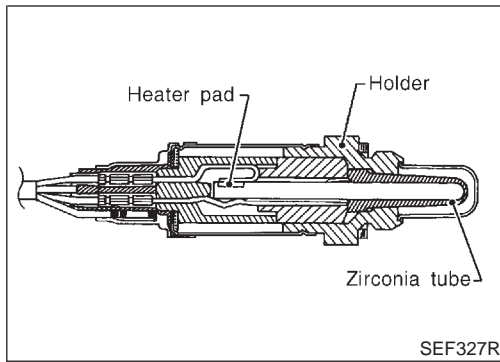
Diagnostic Procedure (Cont'd)

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<p>1. Turn ignition switch "OFF".</p> <p>2. Check heated oxygen sensor 1 (front) harness protector color.</p>	
 <p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p> <p>SEF505Y</p>	
<p>CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Component Description



Component Description

NBEC0130

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0131

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

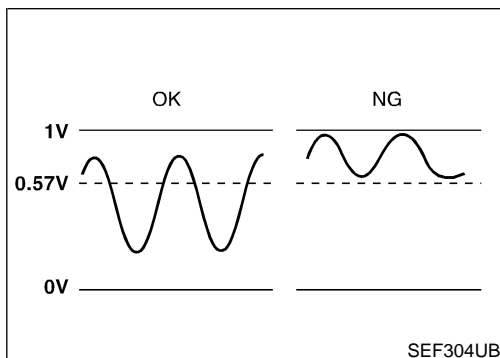
NBEC0658

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

NBEC0133

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.

Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

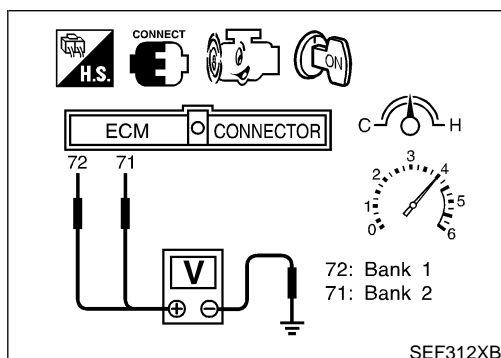
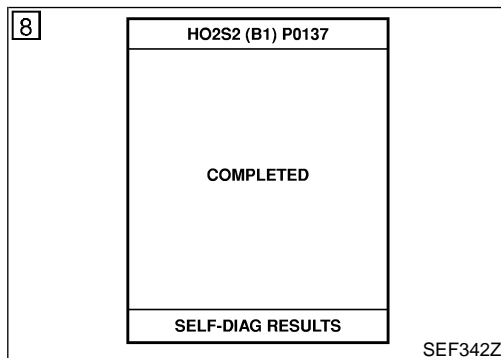
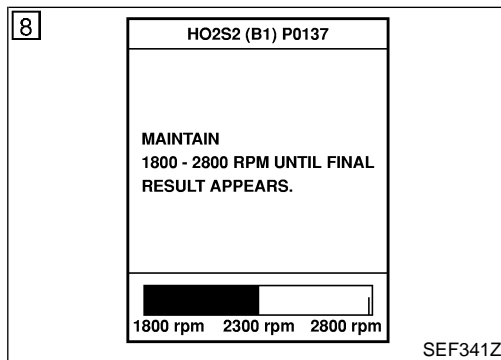
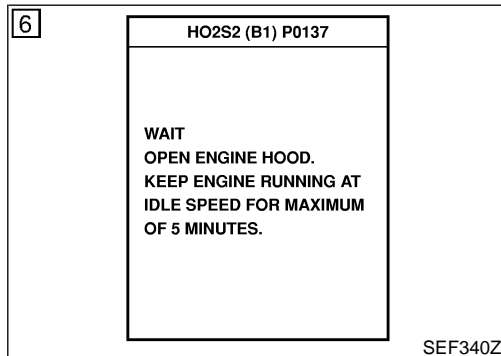
DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Possible Cause

Possible Cause

NBEC0438

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors



DTC Confirmation Procedure

NBEC0134

NOTE:

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

TESTING CONDITION:

Open engine hood before conducting following procedure.

WITH CONSULT-II

NBEC0134S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P0137/P0157" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instruction of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".

If NG is displayed, refer to "Diagnostic Procedure", EC-252.

If "CANNOT BE DIAGNOSED" is displayed, perform the following.

- a) Stop engine and cool down until "COOLAN TEMP/S" indicates less than 70°C (158°F).
- b) Turn ignition switch "ON".
- c) Select "DATA MONITOR" mode with CONSULT-II.
- d) Start engine.
- e) Return to step 6 again when the "COOLAN TEMP/S" reaches to 70°C (158°F).

Overall Function Check

NBEC0135

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NBEC0135S01

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Overall Function Check (Cont'd)

- 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 0.57V 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 0.57V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-252.

GI

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DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Wiring Diagram

Wiring Diagram

=NBEC0136

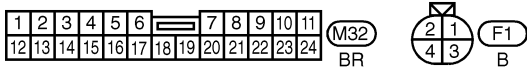
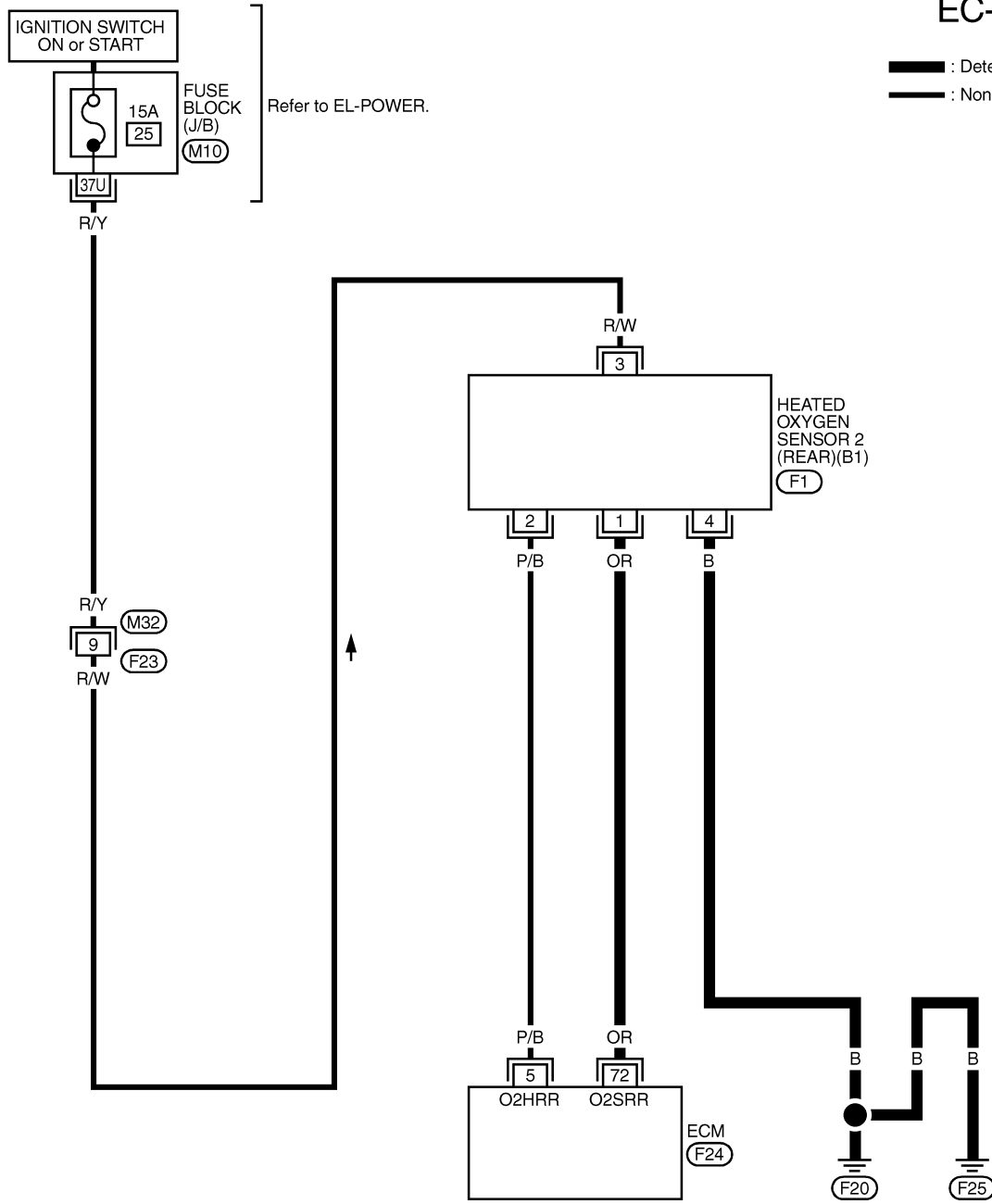
NBEC0136S01

RIGHT BANK

EC-O2S2B1-01

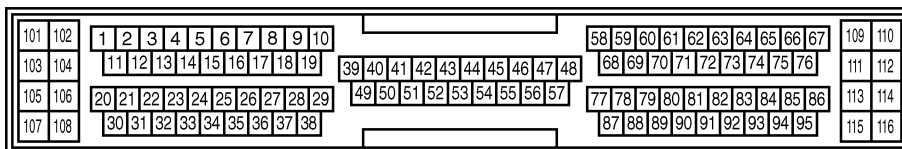
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Wiring Diagram (Cont'd)

LEFT BANK

NBEC0136S02

EC-O2S2B2-01

GI

— : Detectable line for DTC

— : Non-detectable line for DTC

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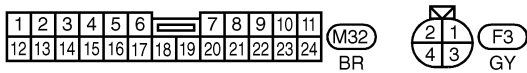
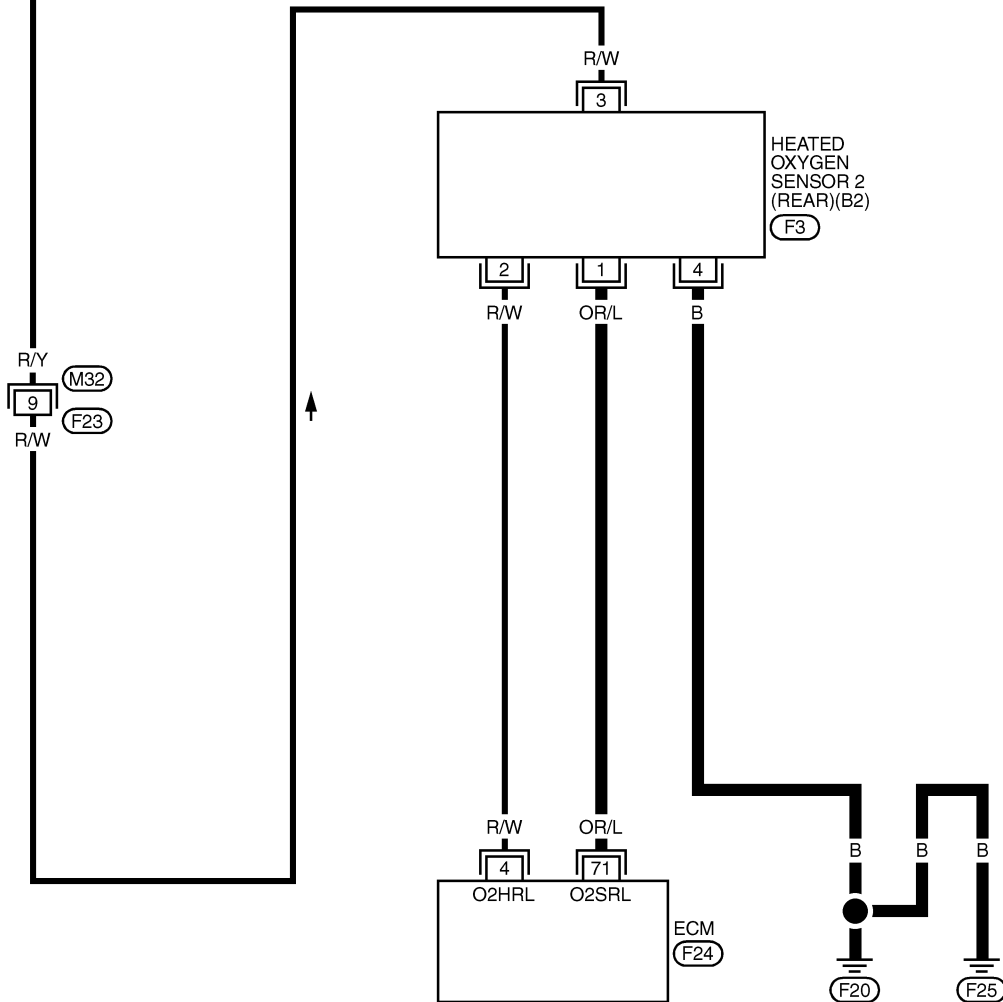
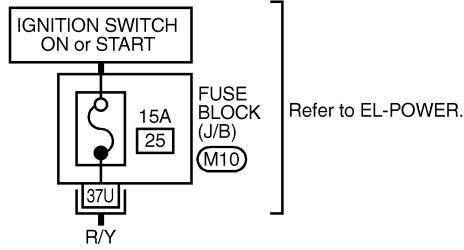
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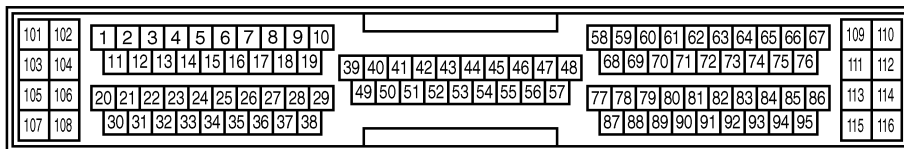
EL

IDX



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



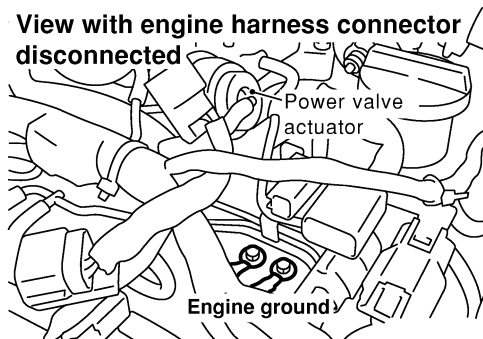
MEC952C

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Diagnostic Procedure

Diagnostic Procedure

NBEC0137

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. <div style="text-align: center; margin: 10px 0;"> <p>View with engine harness connector disconnected</p>  <p>The diagram shows a top-down view of the engine compartment. A power valve actuator is labeled at the top right. Below it, two ground screws are labeled 'Engine ground'. The engine harness connector is shown disconnected from the ground screws.</p> </div> <p style="text-align: right; margin-right: 20px;">SEF959Y</p>	
▶ GO TO 2.	

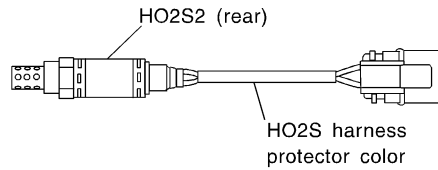
2	CLEAR THE SELF-LEARNING DATA									
<p><input type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="3">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td colspan="2"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF968Y</p> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? 		WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT										
SELF-LEARNING CONT	CLEAR	B1 100 %								
		B2 100 %								
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch "OFF". 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? <p style="text-align: center; margin: 10px 0;">Yes or No</p>										
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 2px;">Yes</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-302.</td> </tr> <tr> <td style="padding: 2px;">No</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 3.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-302.	No	▶	GO TO 3.			
Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-302.								
No	▶	GO TO 3.								

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Diagnostic Procedure (Cont'd)

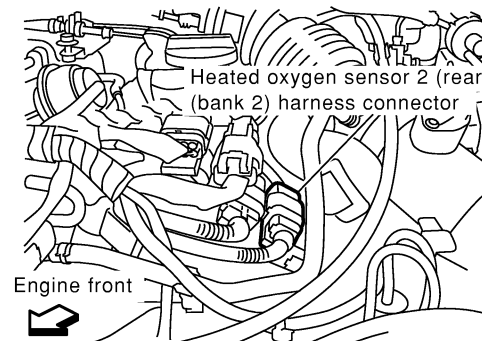
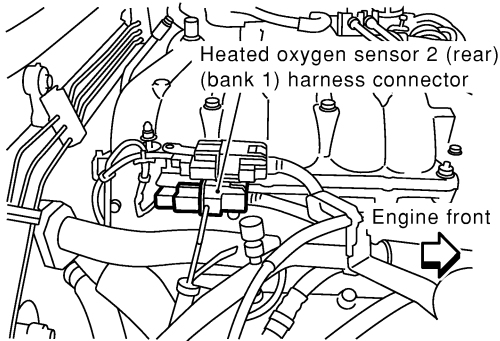
3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
 HO2S2 (rear) (bank 2): Red or Red/Brown

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and rear HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	72	1	Bank 1 (Right)
P0157	71	1	Bank 2 (Left)

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0137	72 or 1	Ground	Bank 1 (Right)
P0157	71 or 1	Ground	Bank 2 (Left)

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

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

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DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

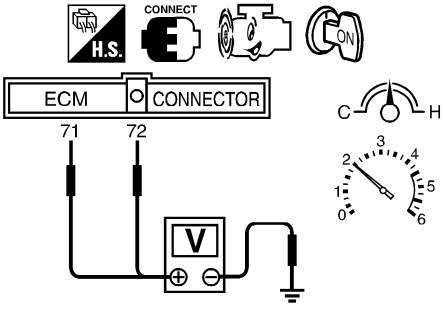
Diagnostic Procedure (Cont'd)

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to power in harness or connectors.

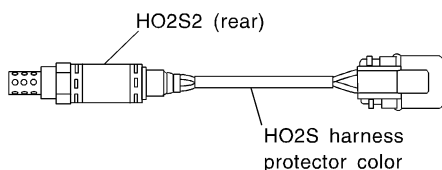
5	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 		
(Reference data)		
<p style="text-align: right;">SEF972Y</p>		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.57V at least once when the "FUEL INJECTION" is -25%.</p> <p>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.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)-I
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground. 4. Check the voltage when rewing up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) 	
 <p>The voltage should be above 0.62V at least once during this procedure.</p>	
SEF313XA	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 7.

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)-II
<p>Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.</p> <p>The voltage should go below 0.57V at least once during this procedure.</p> <p>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.</p>	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. 	
 <p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p>	
SEF372Z	
<p>CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

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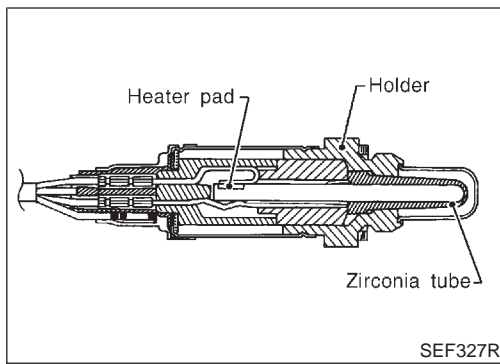
DTC P0137, P0157 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MIN. VOLTAGE MONITORING)

Diagnostic Procedure (Cont'd)

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Component Description



Component Description

NBEC0138

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0139

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

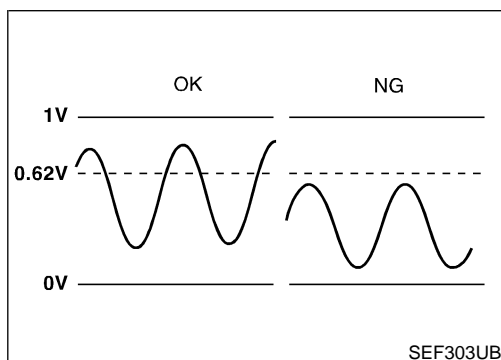
NBEC0659

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

NBEC0141

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

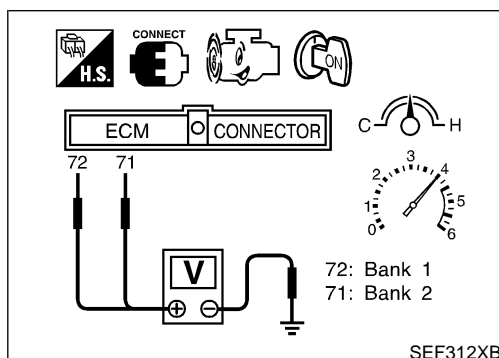
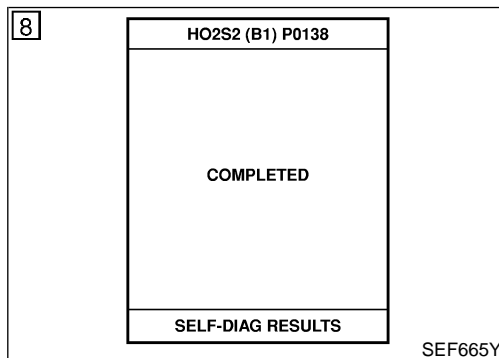
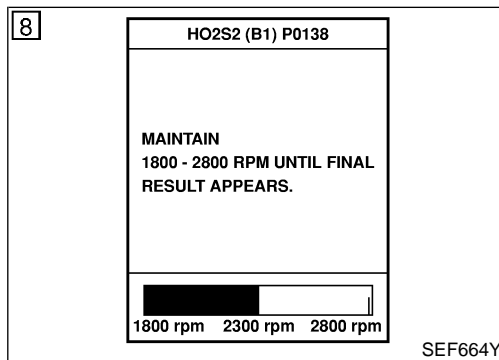
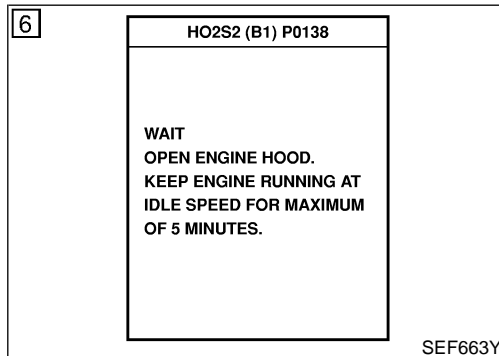
DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Possible Cause

Possible Cause

NBEC0439

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks



DTC Confirmation Procedure

NBEC0142

NOTE:

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

TESTING CONDITION:

Open engine hood before conducting following procedure.

WITH CONSULT-II

NBEC0142S01

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch "OFF" and wait at least 10 seconds.
 - 3) Turn ignition switch "ON".
 - 4) Select "DATA MONITOR" mode with CONSULT-II.
 - 5) Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
 - 6) Select "HO2S2 (B1)/(B2) P0138/P0158" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
 - 7) Start engine and follow the instruction of CONSULT-II.
 - 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
- If NG is displayed, refer to "Diagnostic Procedure", EC-262.
If "CANNOT BE DIAGNOSED" is displayed, perform the following.
- a) Stop engine and cool down until "COOLAN TEMP/S" indicates less than 70°C (158°F).
 - b) Turn ignition switch "ON".
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Return to step 6 again when the "COOLAN TEMP/S" reaches to 70°C (158°F).

Overall Function Check

NBEC0143

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NBEC0143S01

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Overall Function Check (Cont'd)

- 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.62V 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 0.62V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-262.

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Wiring Diagram

Wiring Diagram

=NBEC0144

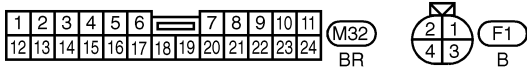
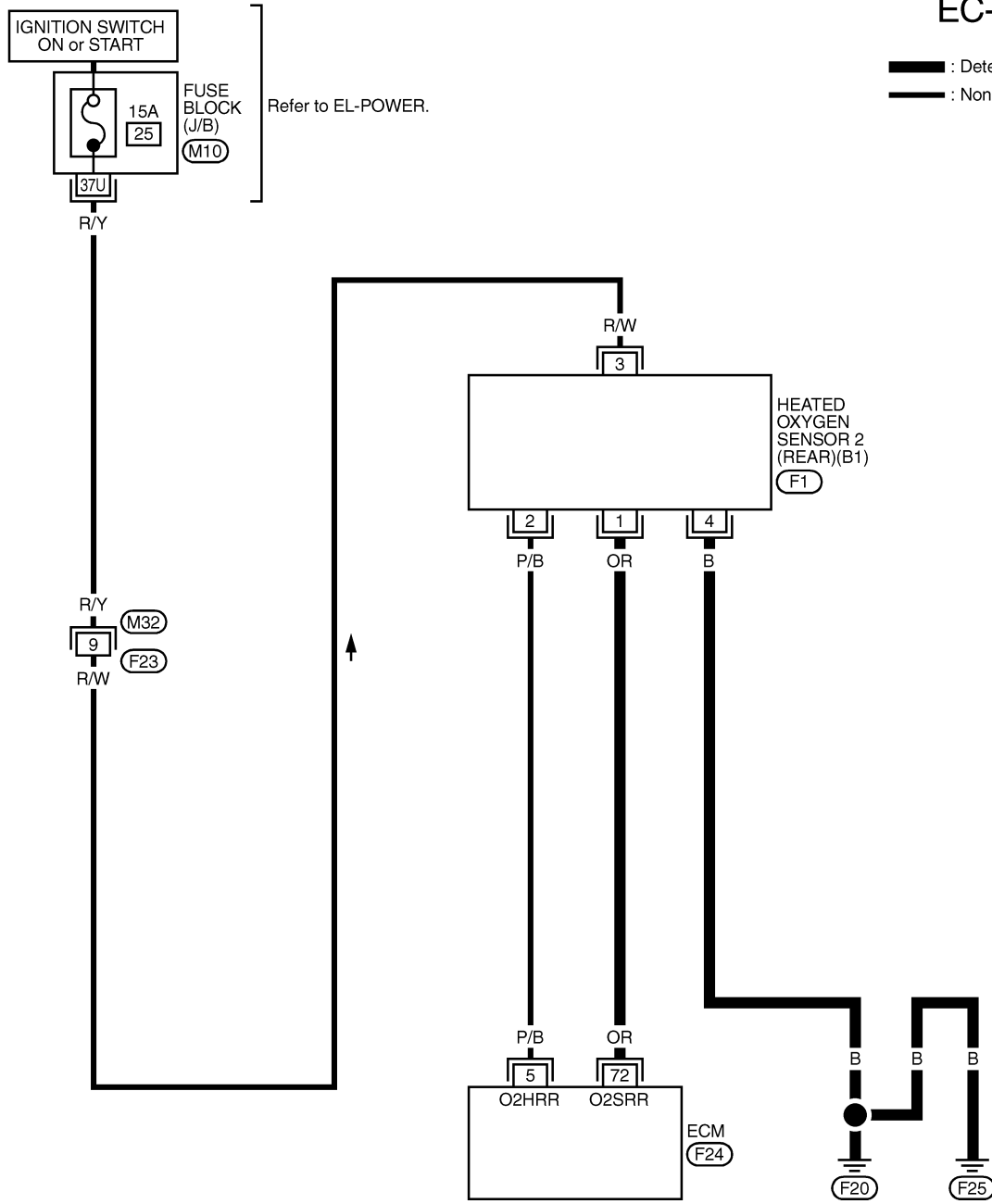
NBEC0144S01

RIGHT BANK

EC-O2S2B1-01

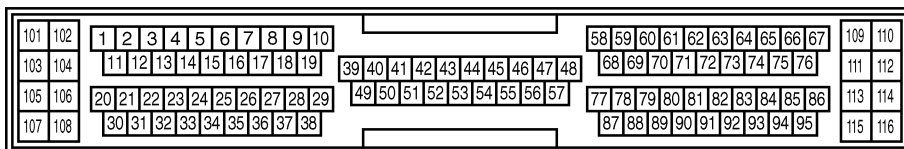
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



MEC951C

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

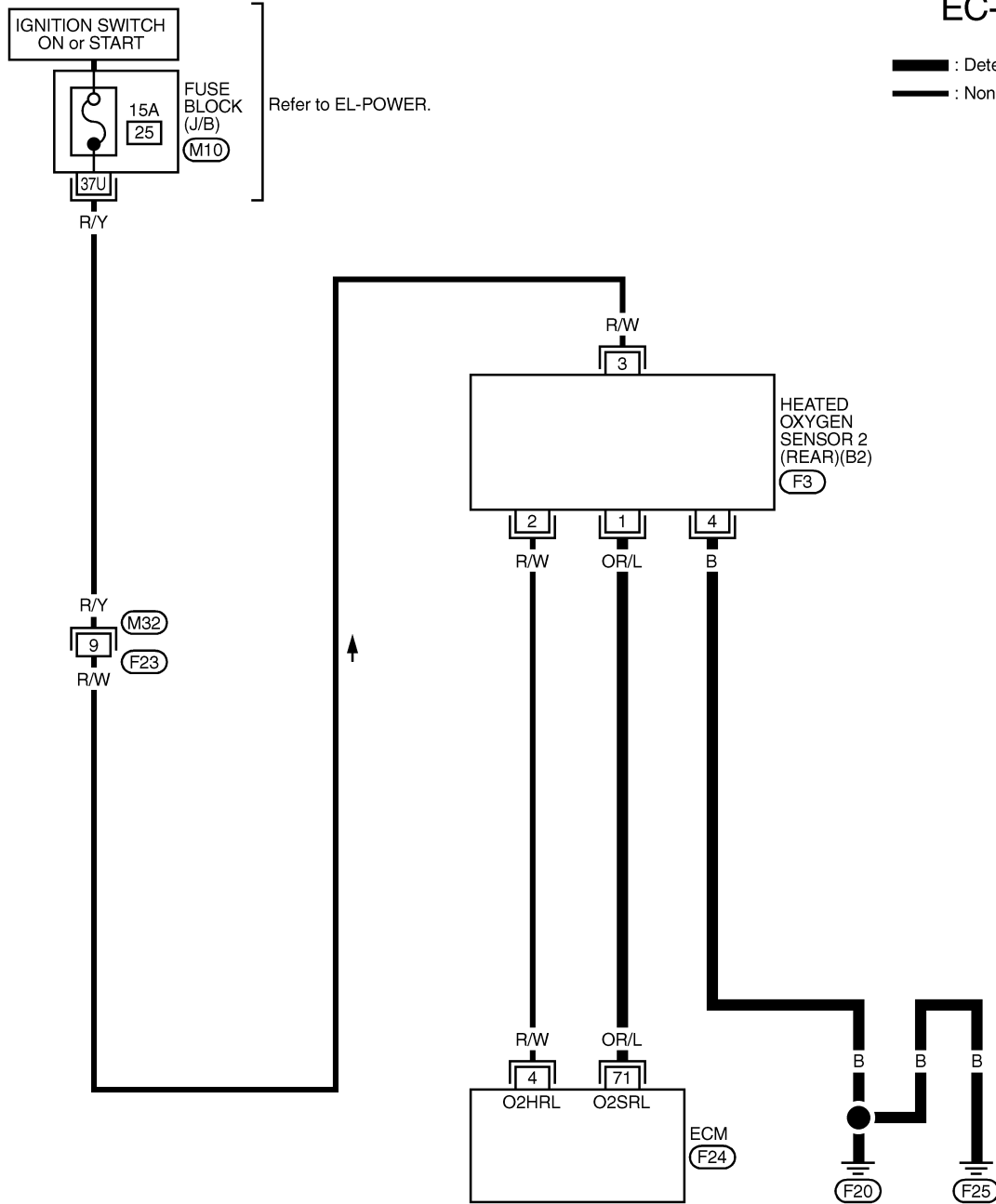
Wiring Diagram (Cont'd)

NBEC0144S02

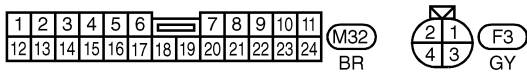
LEFT BANK

EC-O2S2B2-01

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

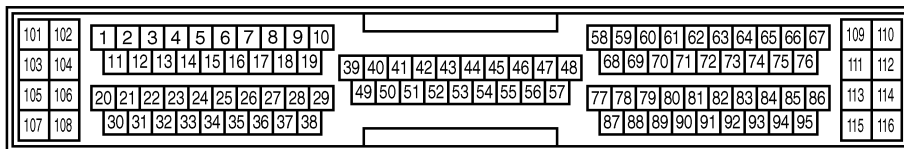


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REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



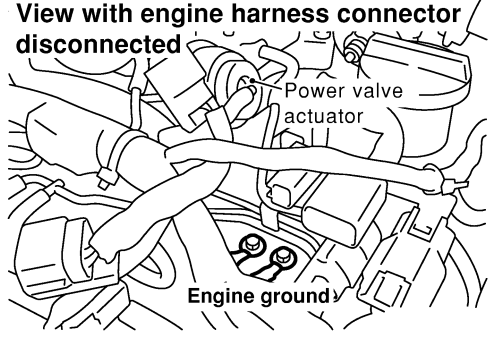
MEC952C

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Diagnostic Procedure

Diagnostic Procedure

NBEC0145

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. <div style="text-align: center; margin-top: 10px;"> <p>View with engine harness connector disconnected</p>  <p>The diagram shows a top-down view of the engine compartment. A power valve actuator is labeled at the top right. Below it, two ground screws are labeled 'Engine ground'. The engine harness connector is shown disconnected from the ground screws.</p> </div> <p style="text-align: right; margin-top: 10px;">SEF959Y</p>	
▶	GO TO 2.

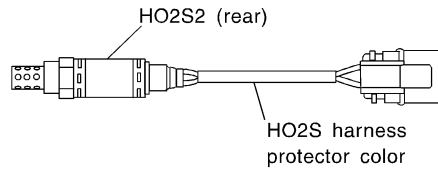
2	CLEAR THE SELF-LEARNING DATA									
<p><input type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin-top: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="3">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td colspan="2"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 10px;">SEF968Y</p> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? 		WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT										
SELF-LEARNING CONT	CLEAR	B1 100 %								
		B2 100 %								
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch "OFF". 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine? <p style="text-align: center; margin-top: 10px;">Yes or No</p>										
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-294.									
No	▶ GO TO 3.									

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Diagnostic Procedure (Cont'd)

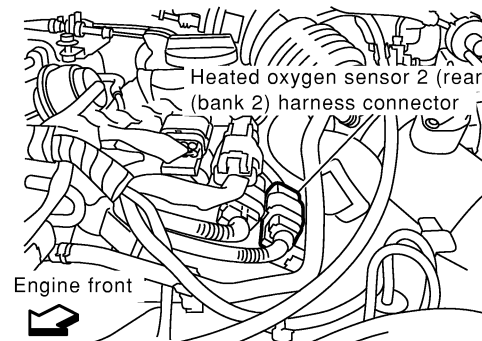
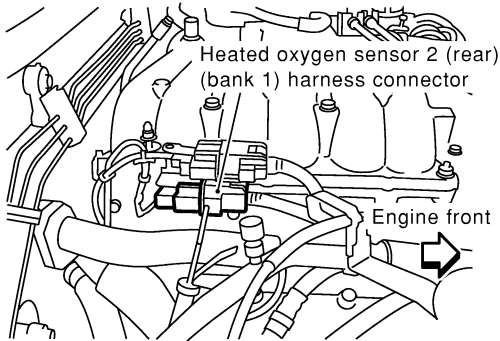
3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
 HO2S2 (rear) (bank 2): Red or Red/Brown

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	72	1	Bank 1 (Right)
P0158	71	1	Bank 2 (Left)

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0138	72 or 1	Ground	Bank 1 (Right)
P0158	71 or 1	Ground	Bank 2 (Left)

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

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

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DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

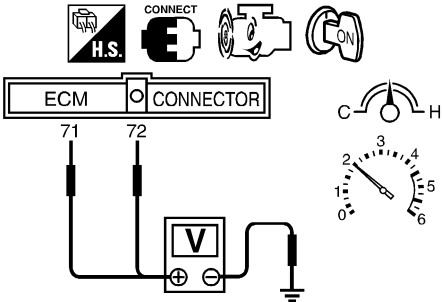
Diagnostic Procedure (Cont'd)

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to power in harness or connectors.

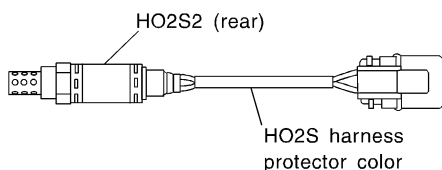
5	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
With CONSULT-II 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.		
(Reference data)		
<p>The voltage should be above 0.62V at least one time.</p> <p>The voltage should be below 0.57V at least one time.</p>		
SEF972Y		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.57V at least once when the "FUEL INJECTION" is -25%. CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)-I
<p>⊗ Without CONSULT</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S bank 2 left signal) and engine ground. 4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) 	
 <p style="text-align: right;">The voltage should be above 0.62V at least once during this procedure.</p>	
SEF313XA	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 7.

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)-II
<p>Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.</p> <p>The voltage should go below 0.57V at least once during this procedure.</p> <p>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.</p>	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch "OFF". 2. Check heated oxygen sensor 2 (rear) harness protector color. 	
	
<p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p>	
SEF372Z	
<p>CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

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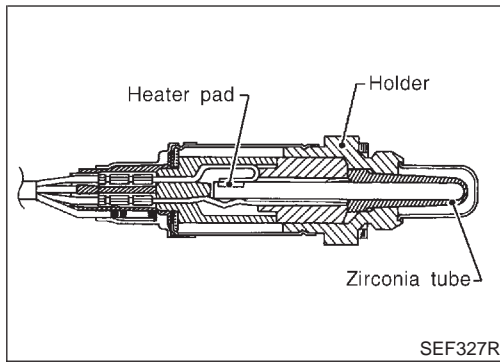
DTC P0138, P0158 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (MAX. VOLTAGE MONITORING)

Diagnostic Procedure (Cont'd)

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Component Description



Component Description

NBEC0146

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0147

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

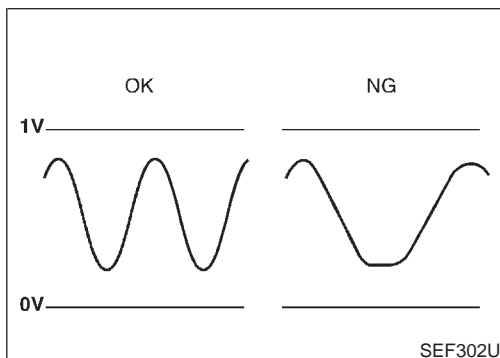
NBEC0660

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

NBEC0149

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

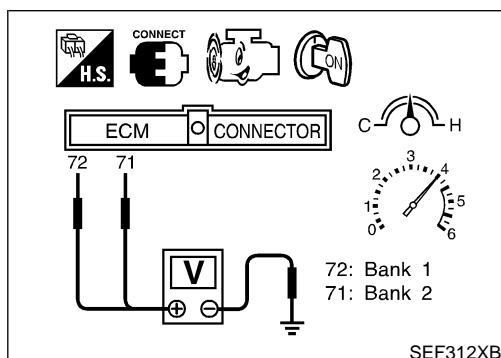
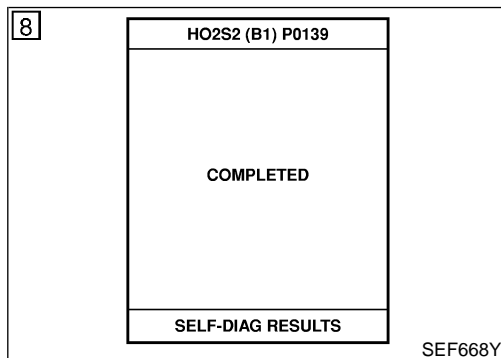
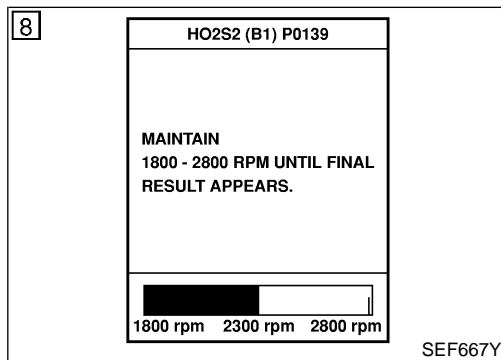
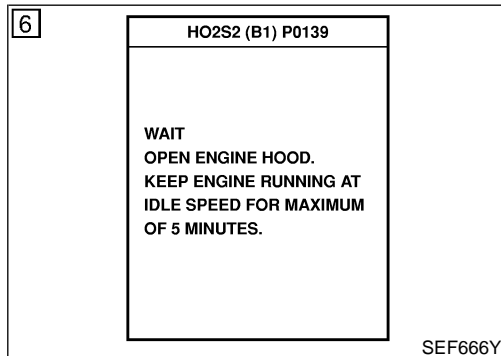
DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Possible Cause

Possible Cause

NBEC0440

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks



DTC Confirmation Procedure

NBEC0150

NOTE:

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

TESTING CONDITION:

Open engine hood before conducting following procedure.

WITH CONSULT-II

NBEC0150S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P0139/P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instruction of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".

If NG is displayed, refer to "Diagnostic Procedure", EC-272.

If "CANNOT BE DIAGNOSED" is displayed, perform the following.

- a) Stop engine and cool down until "COOLAN TEMP/S" indicates less than 70°C (158°F).
- b) Turn ignition switch "ON".
- c) Select "DATA MONITOR" mode with CONSULT-II.
- d) Start engine.
- e) Return to step 6 again when the "COOLAN TEMP/S" reaches to 70°C (158°F).

Overall Function Check

NBEC0151

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.

WITH GST

NBEC0151S01

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Overall Function Check (Cont'd)

- 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.
The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-272.

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DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Wiring Diagram

Wiring Diagram

=NBEC0152

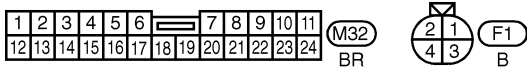
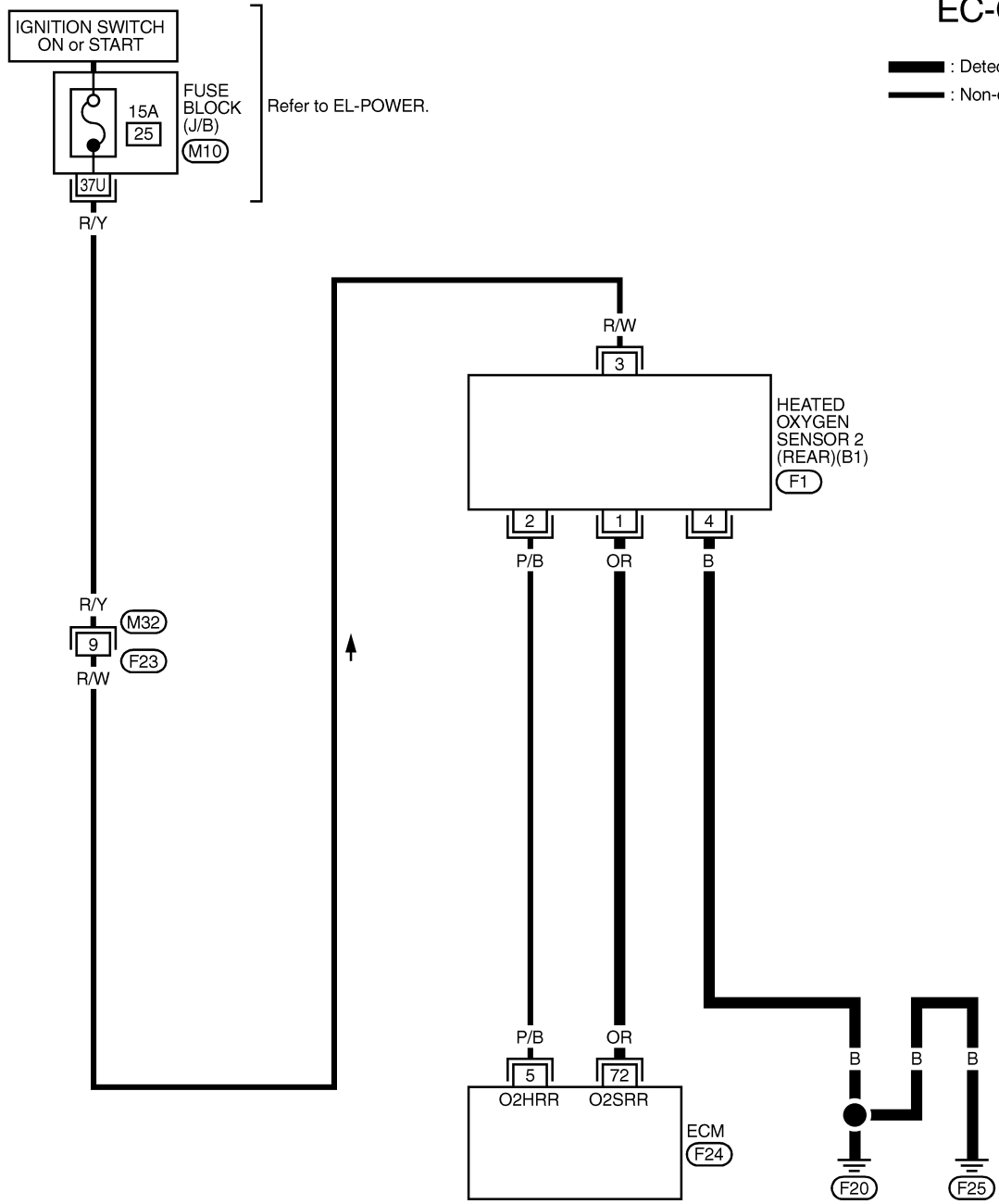
NBEC0152S01

RIGHT BANK

EC-O2S2B1-01

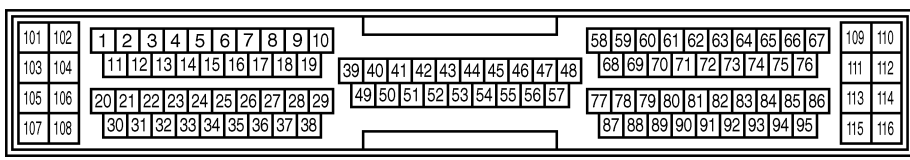
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Wiring Diagram (Cont'd)

LEFT BANK

NBEC0152S02

EC-O2S2B2-01

GI

— : Detectable line for DTC

— : Non-detectable line for DTC

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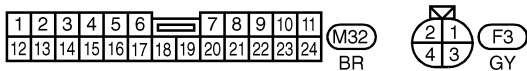
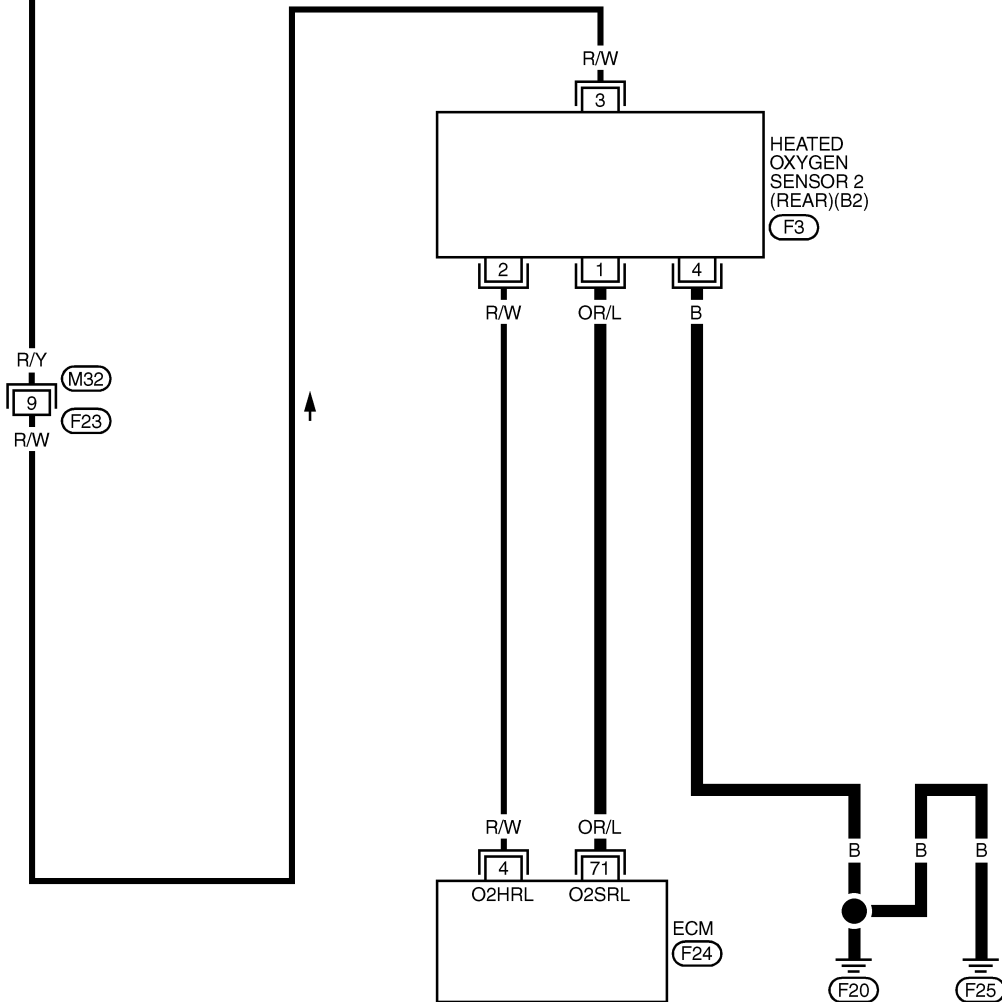
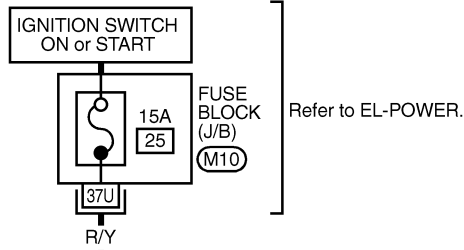
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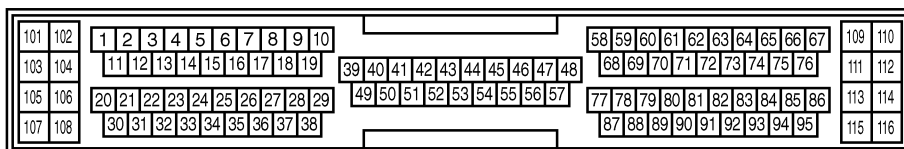
EL

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REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



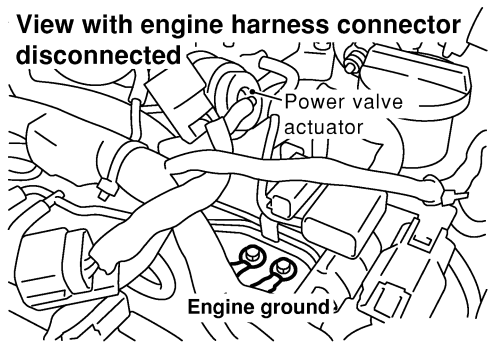
MEC952C

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure

Diagnostic Procedure

NBEC0153

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws. <div style="text-align: center; margin-top: 10px;"> <p>View with engine harness connector disconnected</p>  <p>The diagram shows a top-down view of the engine compartment. A power valve actuator is labeled at the top right. Below it, two ground screws are labeled 'Engine ground'. The view is taken with the engine harness connector disconnected.</p> </div> <p style="text-align: right; margin-top: 10px;">SEF959Y</p>	
▶	GO TO 2.

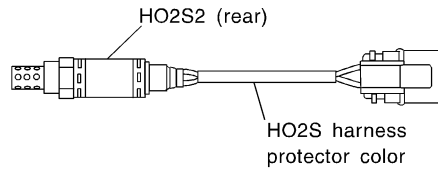
2	CLEAR THE SELF-LEARNING DATA									
<p><input type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin-top: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="3">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td colspan="2"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 10px;">SEF968Y</p> <ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? 		WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT										
SELF-LEARNING CONT	CLEAR	B1 100 %								
		B2 100 %								
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch "OFF". 3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. 4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC No. 0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-72. 7. Make sure DTC No. 0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? <p style="text-align: center; margin-top: 10px;">Yes or No</p>										
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-294, 302.									
No	▶ GO TO 3.									

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

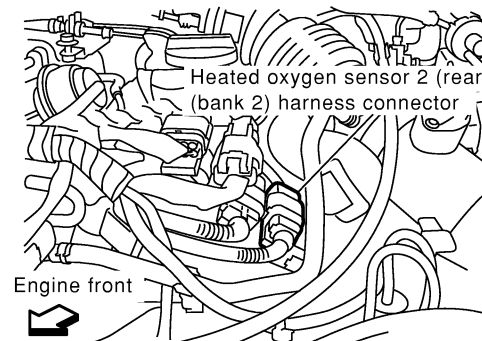
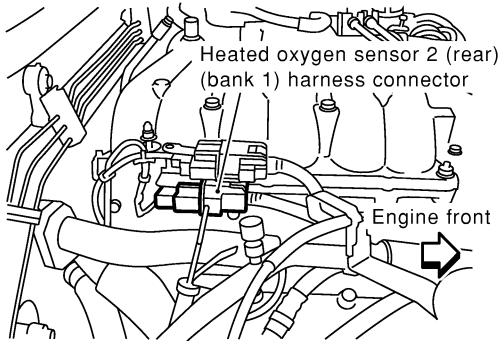
3 CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
 HO2S2 (rear) (bank 2): Red or Red/Brown

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	72	1	Bank 1 (Right)
P0159	71	1	Bank 2 (Left)

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0139	72 or 1	Ground	Bank 1 (Right)
P0159	71 or 1	Ground	Bank 2 (Left)

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

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

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DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

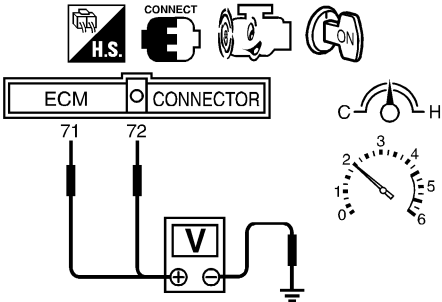
Diagnostic Procedure (Cont'd)

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to power in harness or connectors

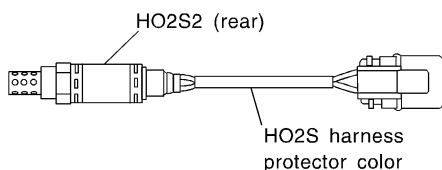
5	CHECK REAR HEATED OXYGEN SENSOR	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 		
(Reference data)		
<p style="text-align: right;">SEF972Y</p>		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.57V at least once when the "FUEL INJECTION" is -25%.</p> <p>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.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

6	CHECK REAR HEATED OXYGEN SENSOR 2 (REAR)-I
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground. 4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) 	
 <p style="text-align: right;">The voltage should be above 0.62V at least once during this procedure.</p>	
SEF313XA	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 7.

7	CHECK REAR HEATED OXYGEN SENSOR 2 (REAR)-II
<p>Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.</p> <p>The voltage should go below 0.57V at least once during this procedure.</p> <p>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.</p>	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	REPLACE REAR HEATED OXYGEN SENSOR
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch "OFF". 2. Check heated oxygen sensor 2 (rear) harness protector color. 	
	
<p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p>	
SEF372Z	
<p>CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

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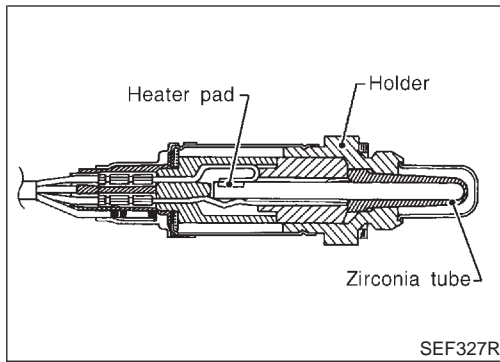
DTC P0139, P0159 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (RESPONSE MONITORING)

Diagnostic Procedure (Cont'd)

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Component Description



Component Description

NBEC0154

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0155

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

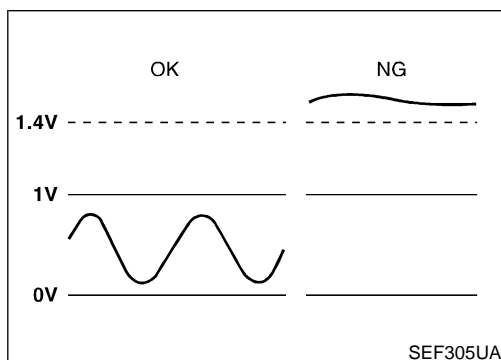
NBEC0661

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

NBEC0157

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.

Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

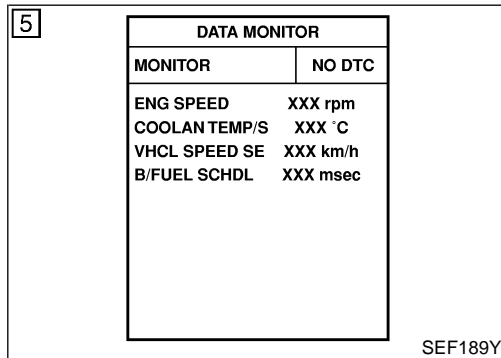
DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Possible Cause

Possible Cause

NBEC0441

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)



DTC Confirmation Procedure

NBEC0158

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

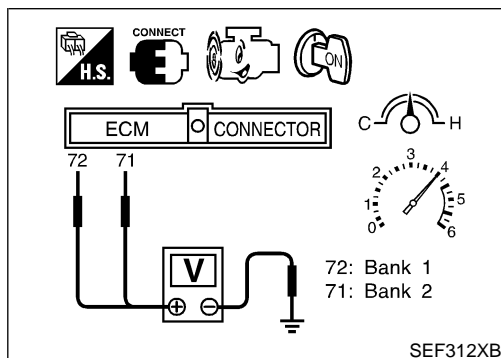
WITH CONSULT-II

NBEC0158S01

- 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) Stop vehicle with engine running.
- 4) Let engine idle for 1 minute.
- 5) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,300 - 3,100 rpm
VHCL SPEED SE	64 - 130 km/h (40 - 80 MPH)
B/FUEL SCHDL	0.5 - 6.4 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-282.



Overall Function Check

NBEC0159

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NBEC0159S01

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Overall Function Check (Cont'd)

- 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 1.4V during this procedure.
 - 5) If NG, go to "Diagnostic Procedure", EC-282.

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DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Wiring Diagram

Wiring Diagram

NBEC0160

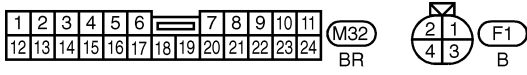
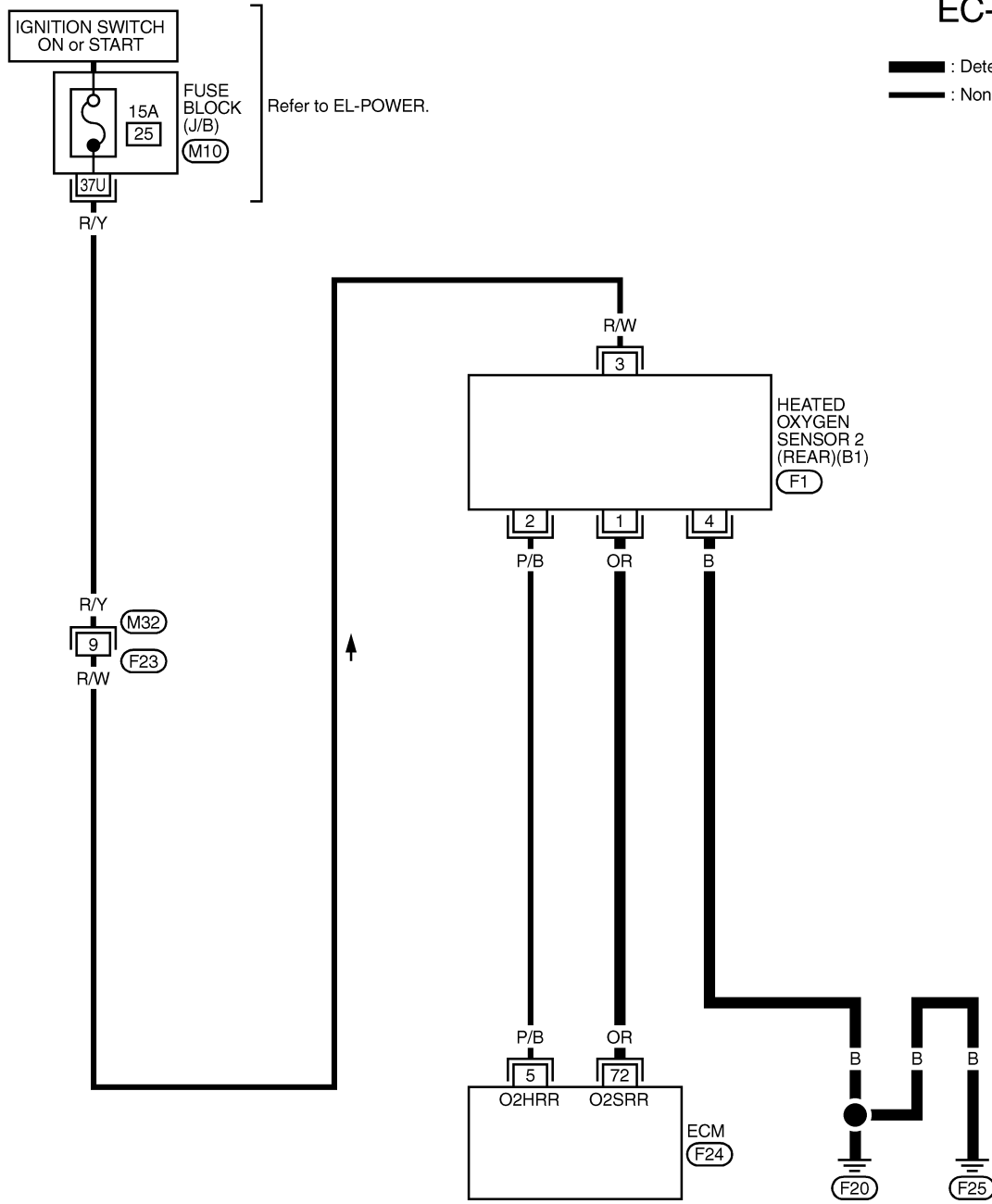
NBEC0160S01

RIGHT BANK

EC-O2S2B1-01

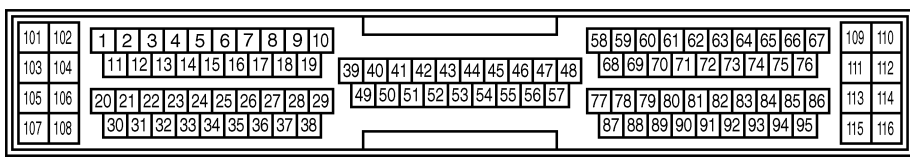
— : Detectable line for DTC

— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Wiring Diagram (Cont'd)

LEFT BANK

NBEC0160S02

EC-O2S2B2-01

GI

— : Detectable line for DTC

MA

— : Non-detectable line for DTC

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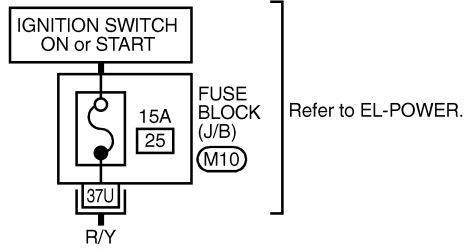
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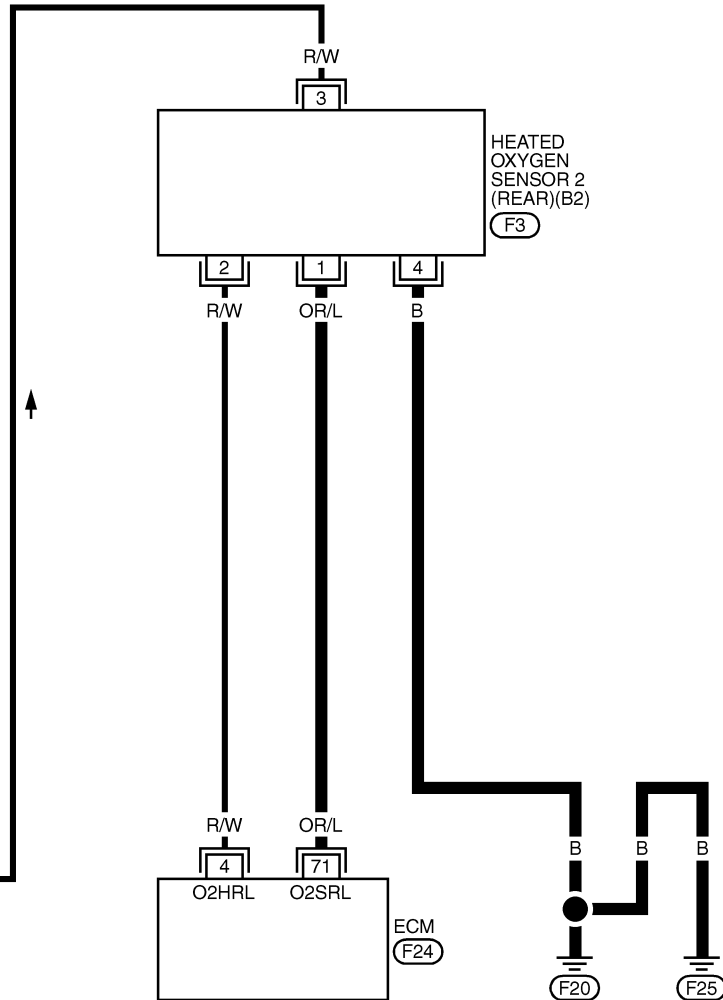


R/Y

R/Y

R/W

R/W



R/W

3

HEATED OXYGEN SENSOR 2 (REAR)(B2) F3

2

R/W

1

OR/L

4

B

R/Y

R/W

R/W

4

OR/L

71

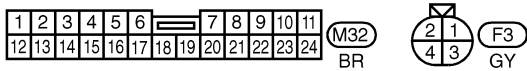
O2HRL

O2SRL

ECM F24

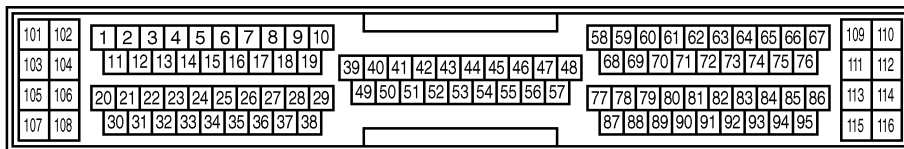
F20

F25



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



F24 GY H.S.

MEC952C

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

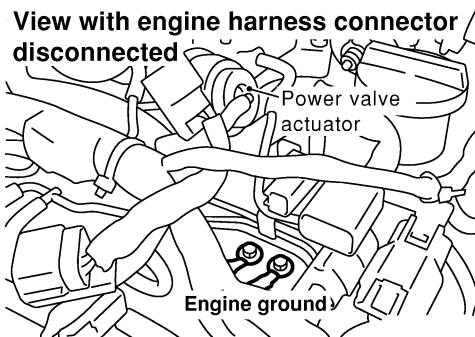
Diagnostic Procedure

Diagnostic Procedure

NBEC0161

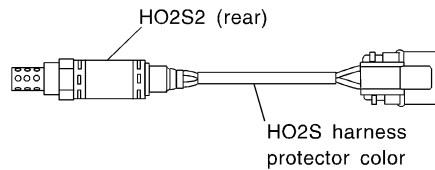
1 INSPECTION START

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



SEF959Y

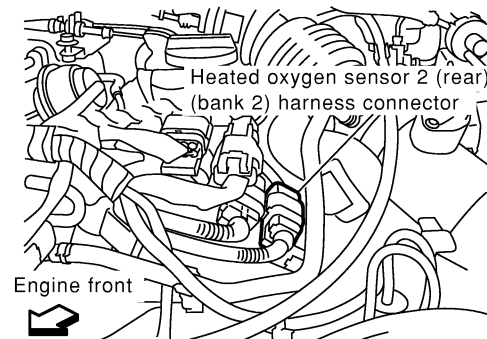
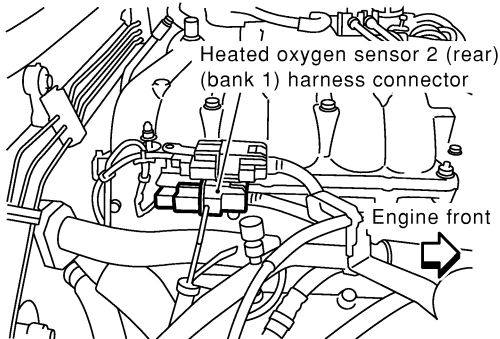
3. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

4. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



SEF971Y

5. Disconnect ECM harness connector.



GO TO 2.

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Diagnostic Procedure (Cont'd)

2	CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT																																			
<p>1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0140</td> <td style="text-align: center;">72</td> <td style="text-align: center;">1</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0160</td> <td style="text-align: center;">71</td> <td style="text-align: center;">1</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0527</p> <p>Continuity should exist.</p> <p>2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or Sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0140</td> <td style="text-align: center;">72 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0160</td> <td style="text-align: center;">71 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0528</p> <p>Continuity should not exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>			DTC	Terminals		Bank	ECM	Sensor	P0140	72	1	Bank 1 (Right)	P0160	71	1	Bank 2 (Left)	DTC	Terminals		Bank	ECM or Sensor	Ground	P0140	72 or 1	Ground	Bank 1 (Right)	P0160	71 or 1	Ground	Bank 2 (Left)	OK	▶	GO TO 3.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
DTC	Terminals			Bank																																
	ECM	Sensor																																		
P0140	72	1	Bank 1 (Right)																																	
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P0160	71 or 1	Ground	Bank 2 (Left)																																	
OK	▶	GO TO 3.																																		
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.																																		


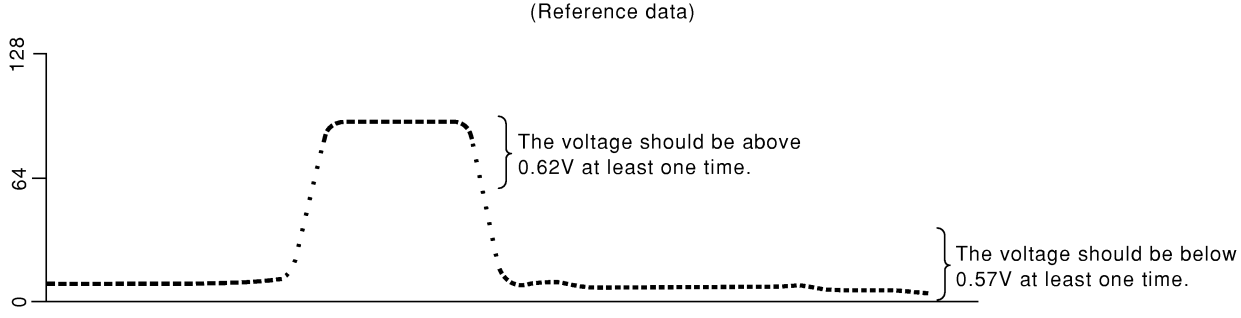
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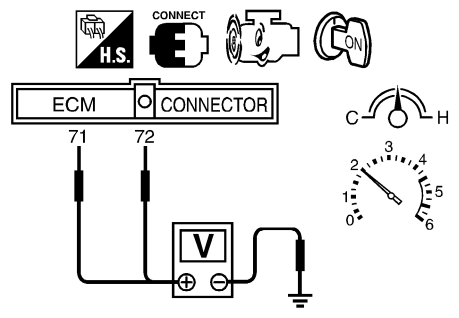
3	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT							
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to power in harness or connectors.</td> </tr> </table>			OK	▶	GO TO 4.	NG	▶	Repair open circuit or short to power in harness or connectors.
OK	▶	GO TO 4.						
NG	▶	Repair open circuit or short to power in harness or connectors.						

4	CHECK HO2S2 (REAR) CONNECTORS FOR WATER										
<p>Check heated oxygen sensor connector 2 (rear) and harness connector for water.</p> <p>Water should not exist.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK (With CONSULT-II)</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>OK (Without CONSULT-II)</td> <td style="text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair or replace harness or connectors.</td> </tr> </table>			OK (With CONSULT-II)	▶	GO TO 5.	OK (Without CONSULT-II)	▶	GO TO 6.	NG	▶	Repair or replace harness or connectors.
OK (With CONSULT-II)	▶	GO TO 5.									
OK (Without CONSULT-II)	▶	GO TO 6.									
NG	▶	Repair or replace harness or connectors.									

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 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 "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 	
(Reference data)	
	
SEF972Y	
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.57V at least once when the "FUEL INJECTION" is -25%.</p> <p>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.</p>	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

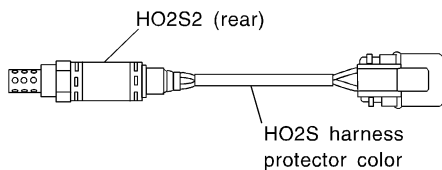
6	CHECK HEATED OXYGEN SENSOR 2 (REAR)-I
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground. 4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) 	
	
SEF313XA	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 7.

DTC P0140, P0160 HEATED OXYGEN SENSOR 2 (REAR) (BANK 1)/(BANK 2) (HIGH VOLTAGE)

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)-II	
<p>Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.</p> <p>The voltage should go below 0.57V at least once during this procedure.</p> <p>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.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

GI
MA
EM
LC

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)	
<p>1. Stop vehicle and turn ignition switch "OFF".</p> <p>2. Check heated oxygen sensor 2 (rear) harness protector color.</p>		
		
<p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p>		
SEF372Z		
<p>CAUTION: 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.</p>		
▶		Replace malfunctioning heated oxygen sensor 2 (rear).

EC
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9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
▶		INSPECTION END

ST
RS
BT
HA
SC
EL
IDX

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1/ (BANK 2)

Description

Description

NBEC0162

SYSTEM DESCRIPTION

NBEC0162S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heaters (rear)
Crankshaft position sensor (REF)			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters (rear) corresponding to the engine speed.

OPERATION

NBEC0162S02

Engine speed rpm	Heated oxygen sensor 2 heaters (rear)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NBEC0163

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Engine is running above 3,200 rpm. 	OFF
	<ul style="list-style-type: none"> Engine is running below 3,200 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	ON

ECM Terminals and Reference Value

NBEC0662

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	P/B	Heated oxygen sensor 2 heater (rear) (bank 1)	[Engine is running] <ul style="list-style-type: none"> Engine speed is below 3,200 rpm. After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	0 - 1.0V
			[Ignition switch "ON"] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed is above 3,200 rpm. 	BATTERY VOLTAGE (11 - 14V)
4	R/W	Heated oxygen sensor 2 heater (rear) (bank 2)	[Engine is running] <ul style="list-style-type: none"> Engine speed is below 3,200 rpm. After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	0 - 1.0V
			[Ignition switch "ON"] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed is above 3,200 rpm. 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when the current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]

NBEC0165

GI

MA

EM

LC

Possible Cause

NBEC0442

- Harness or connectors [The heated oxygen sensor 2 heater (rear) circuit is open or shorted.]
- Heated oxygen sensor 2 heater (rear)

EC

FE

AT

TF

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NBEC0166

NOTE:

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

TESTING CONDITION:

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

WITH CONSULT-II

NBEC0166S01

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine.
- 3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 4) Stop vehicle and let engine idle for at least 6 seconds.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-291.

PD

AX

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WITH GST

NBEC0166S02

- 1) Start engine.
 - 2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
 - 3) Stop vehicle and let engine idle for at least 6 seconds.
 - 4) Turn ignition switch "OFF" and wait at least 10 seconds.
 - 5) Start engine.
 - 6) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
 - 7) Stop vehicle and let engine idle for at least 6 seconds.
 - 8) Select "MODE 3" with GST.
 - 9) If DTC is detected, go to "Diagnostic Procedure", EC-291.
- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II

HA

SC

EL

IDX

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/ (BANK 2)

DTC Confirmation Procedure (Cont'd)

because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1/ (BANK 2)

Wiring Diagram

Wiring Diagram

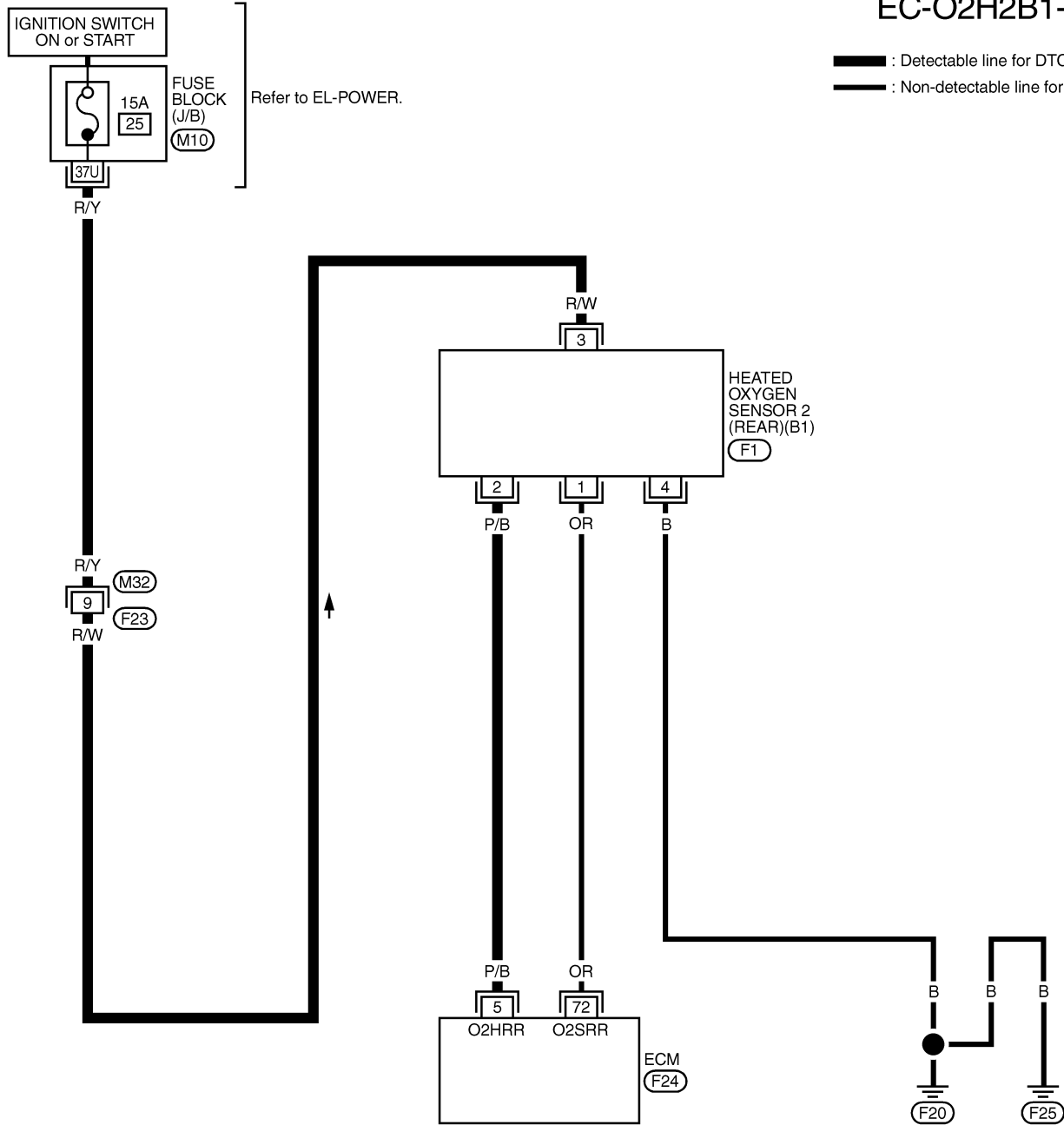
NBEC0167

NBEC0167S01

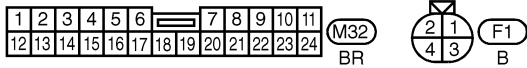
RIGHT BANK

EC-O2H2B1-01

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

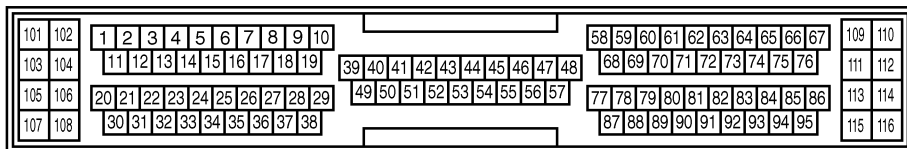


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- EL
- IDX



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)





DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/ (BANK 2)

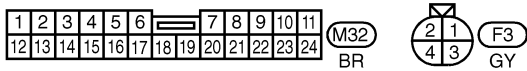
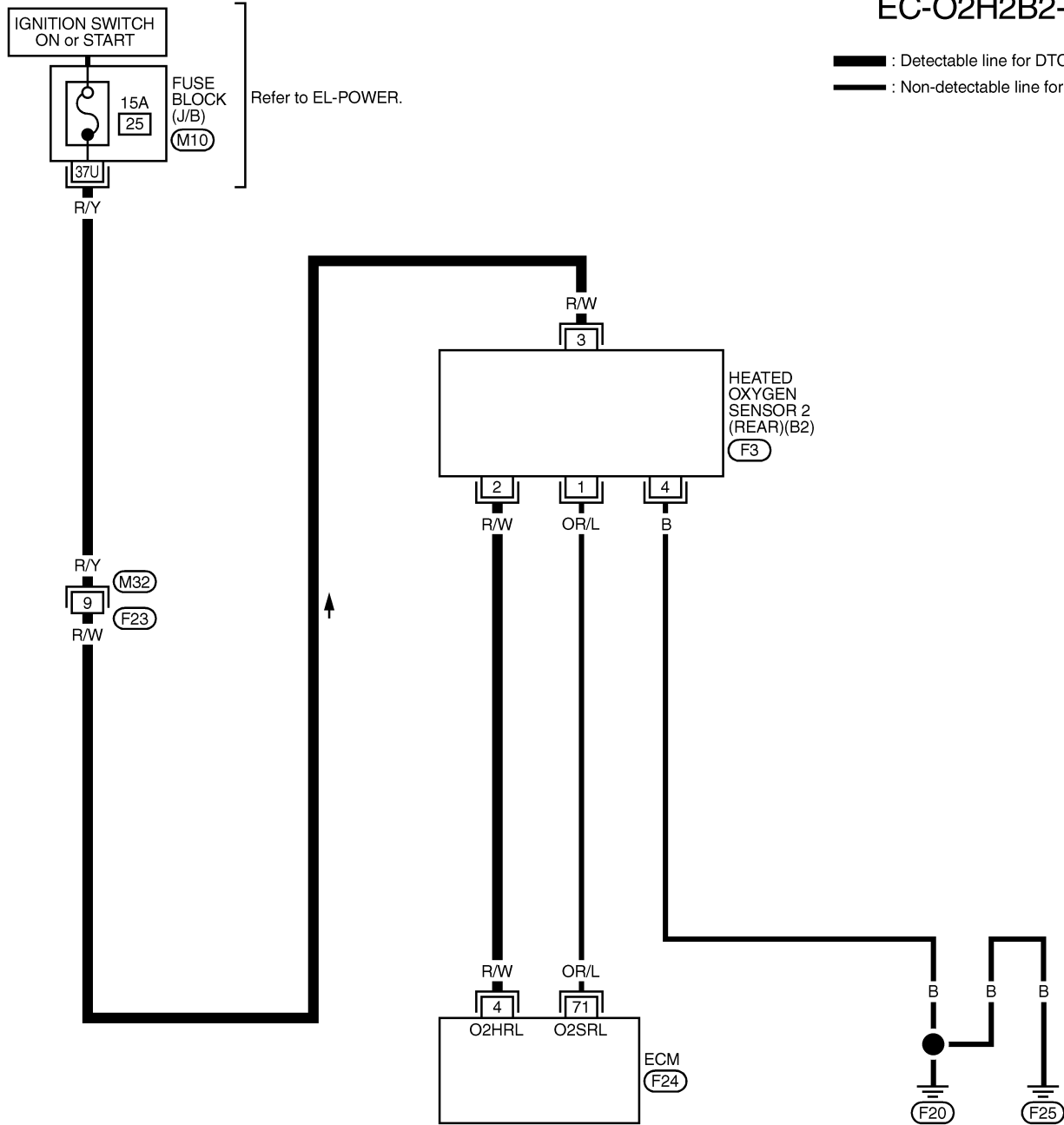
Wiring Diagram (Cont'd)

LEFT BANK

NBEC0167S02

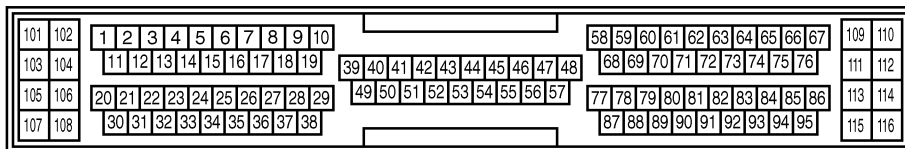
EC-O2H2B2-01

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



REFER TO THE FOLLOWING.

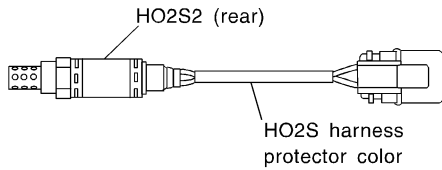
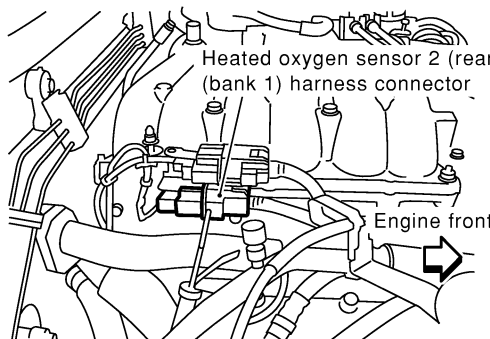
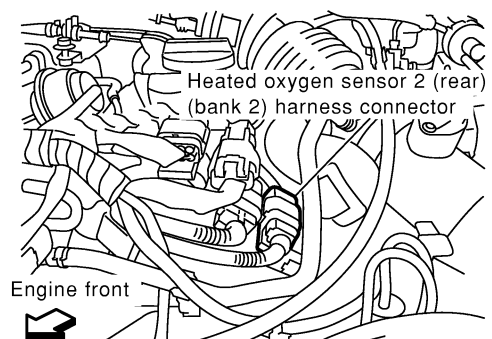
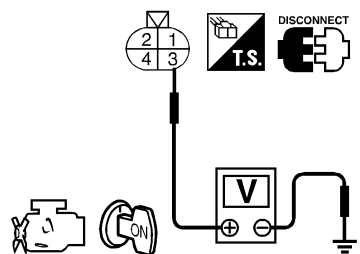
(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



MEC954C

Diagnostic Procedure

NBEC0168

1	CHECK HO2S2 (REAR) POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF". 2. Check heated oxygen sensor harness 2 (rear) protector color.</p> <div style="text-align: center;">  <p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p> </div> <p>3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Heated oxygen sensor 2 (rear) (bank 1) harness connector</p> <p>Engine front</p> </div> <div style="text-align: center;">  <p>Heated oxygen sensor 2 (rear) (bank 2) harness connector</p> <p>Engine front</p> </div> </div> <p>4. Turn ignition switch "ON". 5. Check voltage between HO2S2 terminal 3 and ground.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> </div> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p>
		<p>SEF372Z</p> <p>SEF971Y</p> <p>SEF314X</p>	
	OK	▶ GO TO 3.	
	NG	▶ GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● Fuse block (J/B) connector M10 ● 15A fuse ● Harness for open or short between heated oxygen sensor 2 (rear) and fuse <p style="text-align: center;">▶ Repair harness or connectors.</p>	<p>SC</p> <p>EL</p> <p>IDX</p>
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DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/ (BANK 2)

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 (REAR) OUTPUT CIRCUIT FOR OPEN AND SHORT														
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p>															
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0141</td> <td style="text-align: center;">5</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0161</td> <td style="text-align: center;">4</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>		DTC	Terminals		Bank	ECM	Sensor	P0141	5	2	Bank 1 (Right)	P0161	4	2	Bank 2 (Left)
DTC	Terminals		Bank												
	ECM	Sensor													
P0141	5	2	Bank 1 (Right)												
P0161	4	2	Bank 2 (Left)												
MTBL0529															
<p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>															
OK	▶ GO TO 4.														
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)
<p>Check the resistance between HO2S2 terminals as follows.</p>	
SEF315X	
<p style="color: red;">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.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 2 (REAR)
<p>Check heated oxygen sensor 2 harness (rear) protector color.</p>	
<p>HO2S2 (rear) (bank 1): White or Gray HO2S2 (rear) (bank 2): Red or Red/Brown</p>	
SEF372Z	
<p style="color: red;">CAUTION: 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.</p>	
▶	Replace malfunctioning heated oxygen sensor 2 (rear).

DTC P0141, P0161 HEATED OXYGEN SENSOR 2 HEATER (REAR) (BANK 1)/ (BANK 2)

Diagnostic Procedure (Cont'd)

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	INSPECTION END

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0169

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

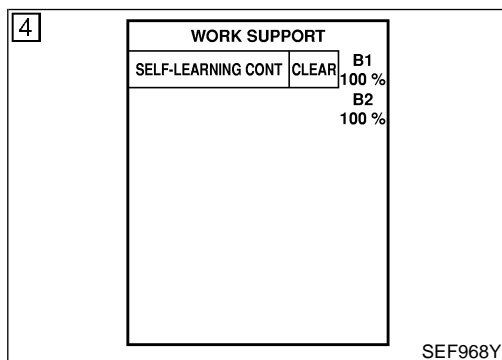
Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

Possible Cause

NBEC0487

- Intake air leaks
- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor



DTC Confirmation Procedure

NBEC0170

NOTE:

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

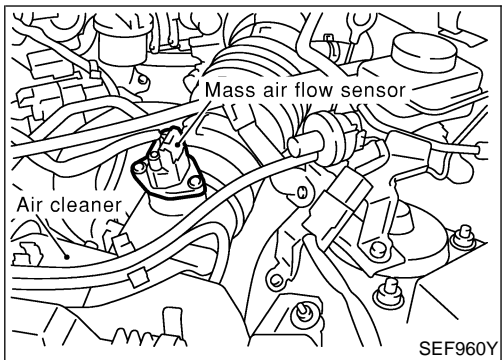
WITH CONSULT-II

NBEC0170S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-298.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-298. If engine does not start, check exhaust and intake air leak visually.

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

DTC Confirmation Procedure (Cont'd)



WITH GST

NBEC0170S02

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
- 6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
- 7) Start engine again and let it idle for at least 10 minutes.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-298.
- 9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
- 10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-298. If engine does not start, check exhaust and intake air leak visually.

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

Wiring Diagram

Wiring Diagram

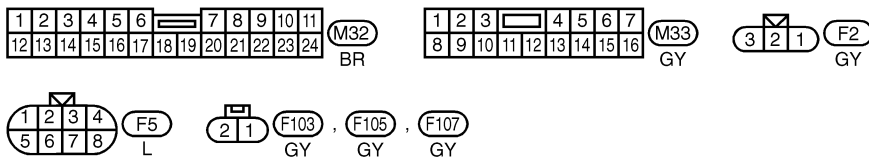
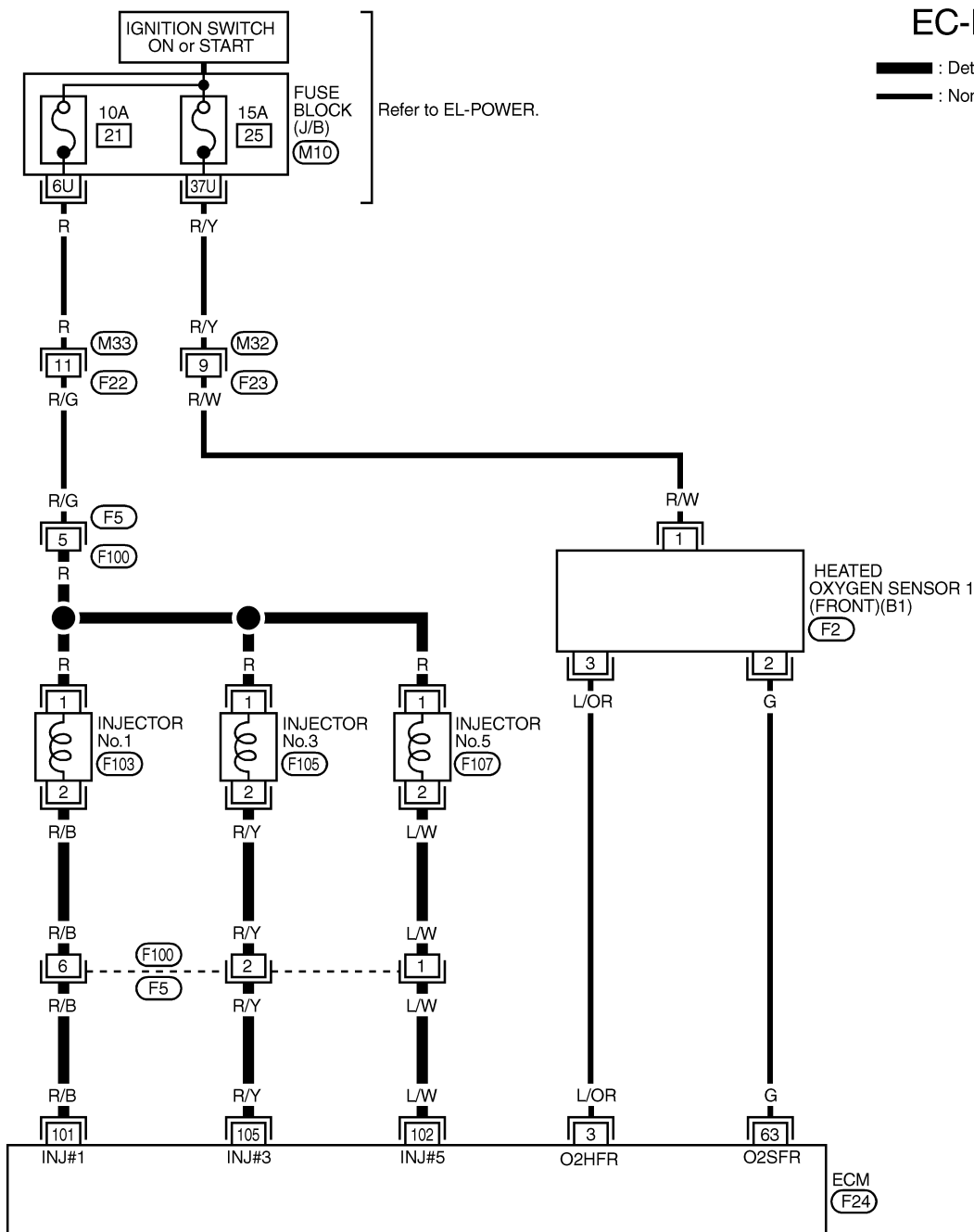
NBEC0171

NBEC0171S01

RIGHT BANK

EC-FUEL RH-01

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



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-
JUNCTION BOX (J/B)



MEC955C

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

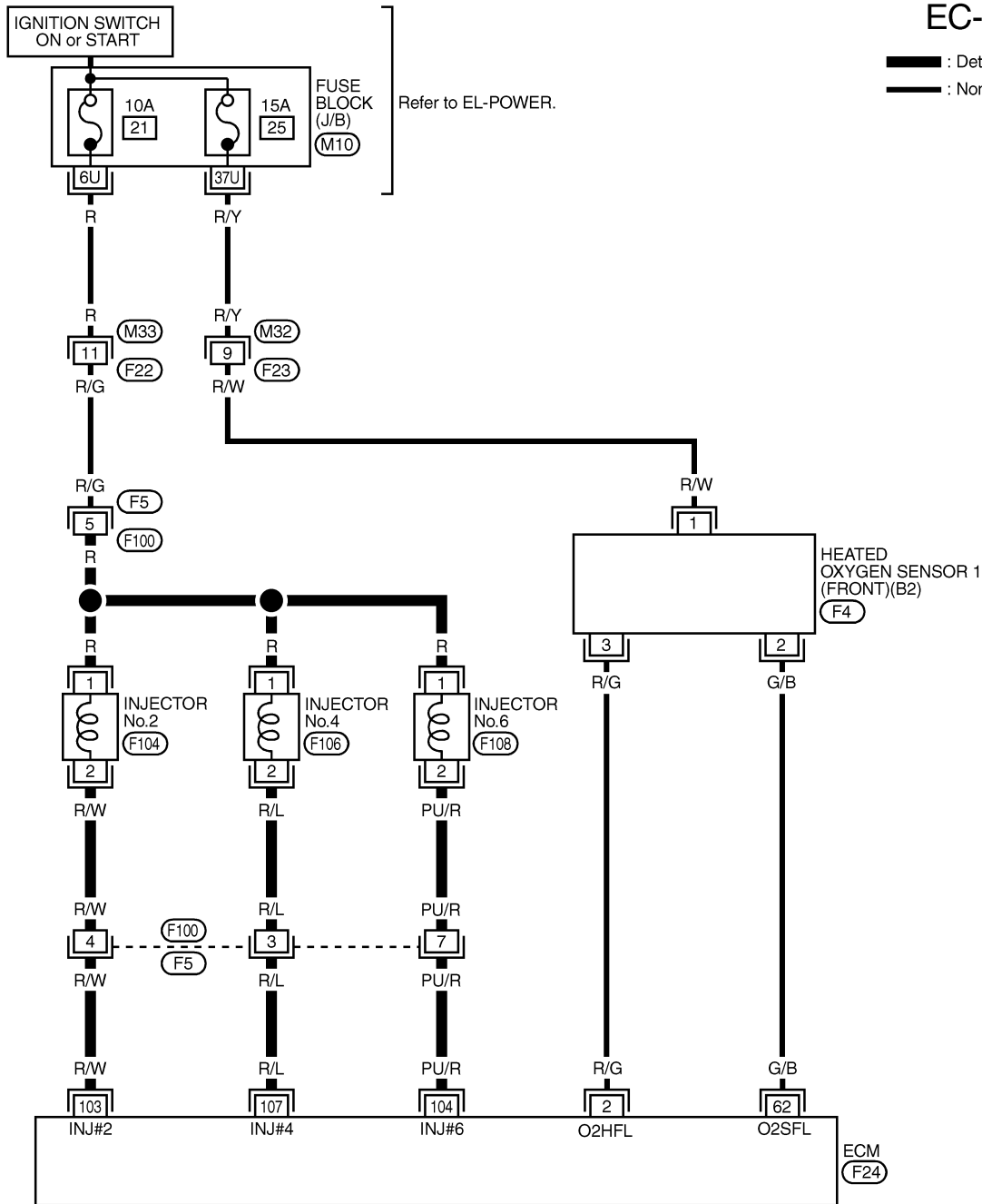
Wiring Diagram (Cont'd)

NBEC0171S02

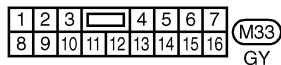
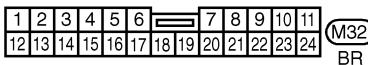
LEFT BANK

EC-FUELLH-01

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

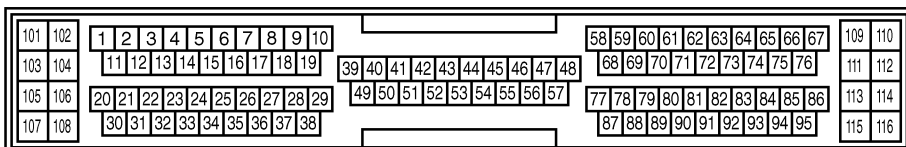


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REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK- JUNCTION BOX (J/B)



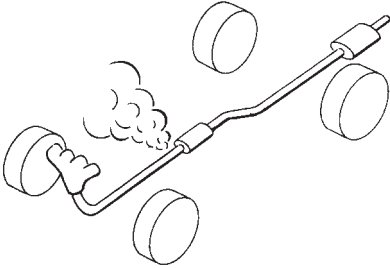
MEC956C

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

Diagnostic Procedure

Diagnostic Procedure

NBEC0172

1	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>		
		
SEF099P		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch "OFF". 2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector. 3. Disconnect ECM harness connector. 4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td>63</td> <td>2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td>62</td> <td>2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0171	63	2	Bank 1 (Right)	P0174	62	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0171	63	2	Bank 1 (Right)													
P0174	62	2	Bank 2 (Left)													
MTBL0477																
<p>Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or Sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0172</td> <td>63 or 2</td> <td>Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0175</td> <td>62 or 2</td> <td>Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or Sensor	Ground	P0172	63 or 2	Ground	Bank 1 (Right)	P0175	62 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or Sensor	Ground														
P0172	63 or 2	Ground	Bank 1 (Right)													
P0175	62 or 2	Ground	Bank 2 (Left)													
MTBL0478																
<p>Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

Diagnostic Procedure (Cont'd)

4	CHECK FUEL PRESSURE	
	<p>1. Release fuel pressure to zero. Refer to EC-39.</p> <p>2. Install fuel pressure gauge and check fuel pressure. Refer to EC-39.</p> <p style="margin-left: 20px;">At idling:</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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5	DETECT MALFUNCTIONING PART	
	<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-625.) ● Fuel pressure regulator (Refer to EC-40.) ● Fuel lines (Refer to MA-16, "Checking Fuel Lines".) ● Fuel filter for clogging 	
	▶	Repair or replace.

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6	CHECK MASS AIR FLOW SENSOR	
	<p> With CONSULT-II</p> <p>1. Install all removed parts.</p> <p>2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.</p> <p style="margin-left: 20px;">2.0 - 6.0 g-m/sec: at idling</p> <p style="margin-left: 20px;">7.0 - 20.0 g-m/sec: at 2,500 rpm</p>	
	<p> With GST</p> <p>1. Install all removed parts.</p> <p>2. Check mass air flow sensor signal in MODE 1 with GST.</p> <p style="margin-left: 20px;">2.0 - 6.0 g-m/sec: at idling</p> <p style="margin-left: 20px;">7.0 - 20.0 g-m/sec: at 2,500 rpm</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-150.

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DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

Diagnostic Procedure (Cont'd)

7 CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

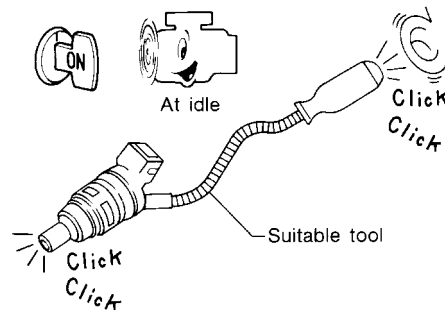
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

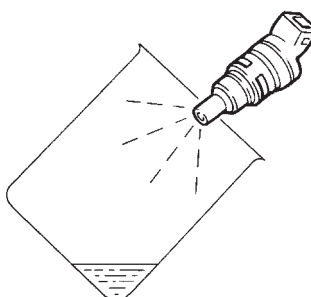
OK or NG

OK ► GO TO 8.

NG ► Perform trouble diagnosis for "INJECTORS", EC-616.

DTC P0171 (RIGHT, -B1), P0174 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (LEAN)

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch "OFF". 3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174). 4. Remove injector gallery assembly. Refer to EC-41. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected. 5. Disconnect all ignition coil harness connectors. 6. Prepare pans or saucers under each injector. 7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors. 		
		
<p>Fuel should be sprayed evenly for each injector.</p> <p>OK or NG</p>		
SEF595Q		
OK	▶	GO TO 9.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
▶ INSPECTION END		

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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0173

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

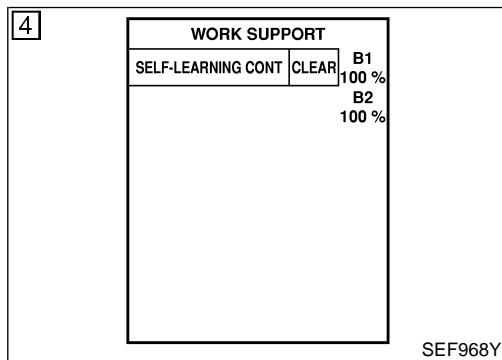
Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

Possible Cause

NBEC0488

- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor



DTC Confirmation Procedure

NBEC0174

NOTE:

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

WITH CONSULT-II

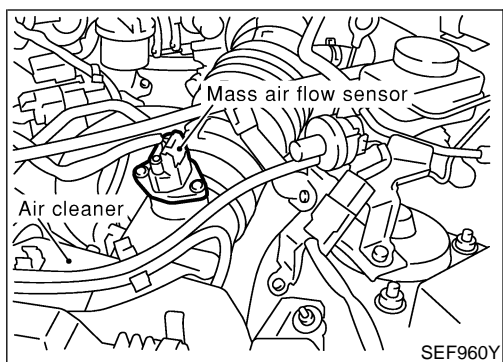
NBEC0174S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-306.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-306. If engine does not start, remove ignition plugs and check for fouling, etc.

EC-302

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

DTC Confirmation Procedure (Cont'd)



WITH GST

NBEC0174S02

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
- 6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
- 7) Start engine again and let it idle for at least 10 minutes.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-306.
- 9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
- 10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-306. If engine does not start, check exhaust and intake air leak visually.

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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

Wiring Diagram

Wiring Diagram

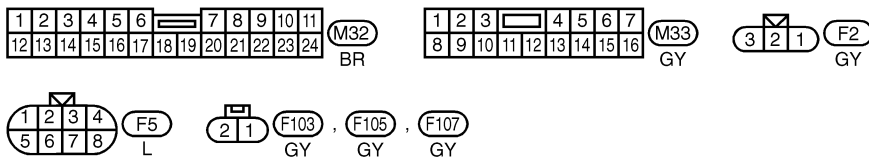
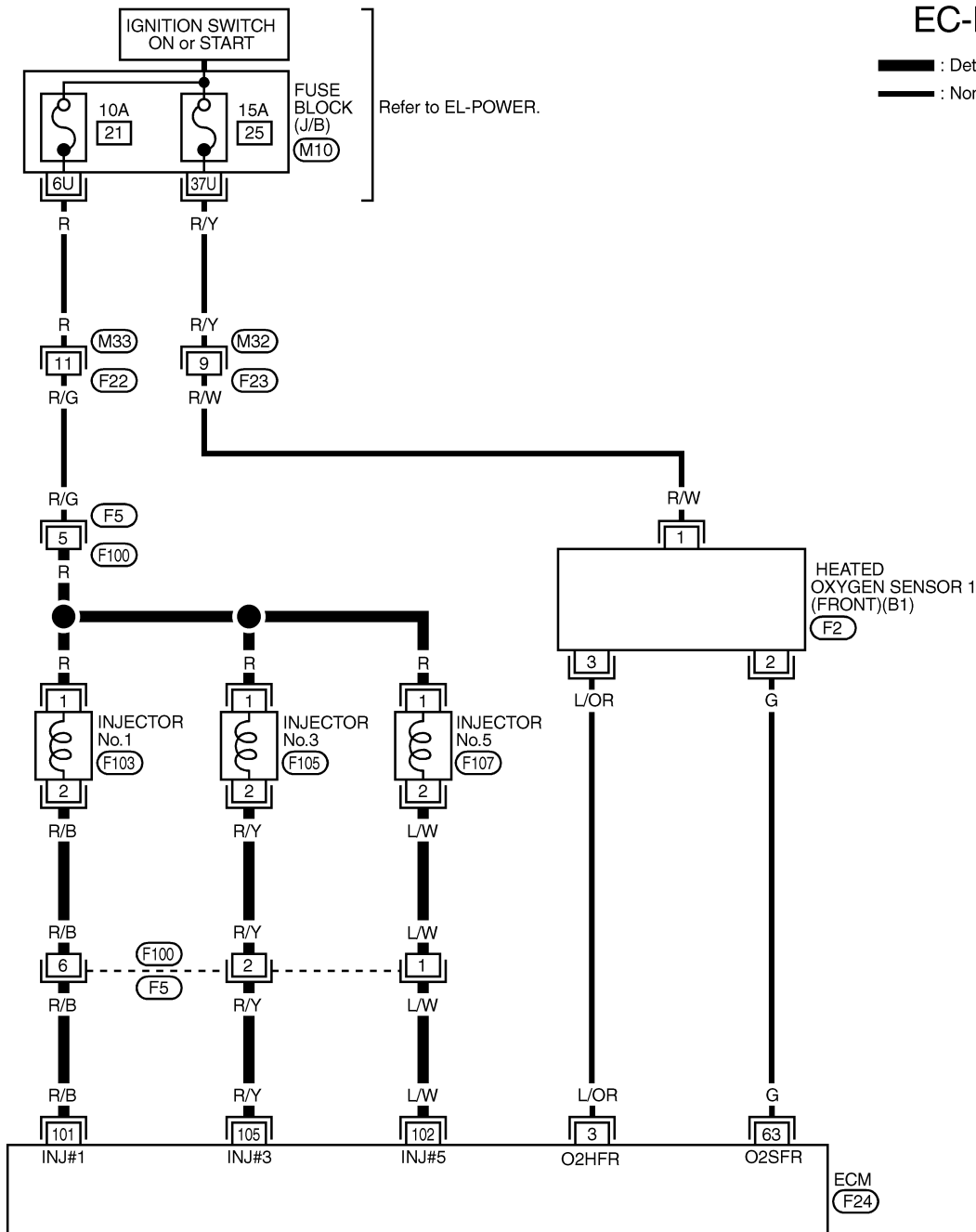
NBEC0175

NBEC0175S01

RIGHT BANK

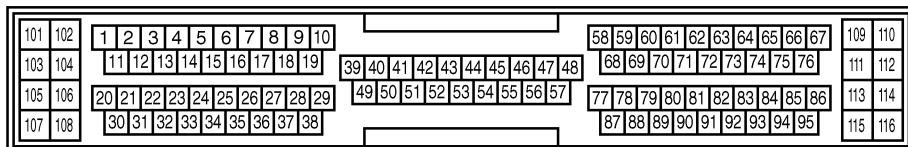
EC-FUEL RH-01

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



REFER TO THE FOLLOWING.

M10 - FUSE BLOCK-
 JUNCTION BOX (J/B)



MEC955C

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

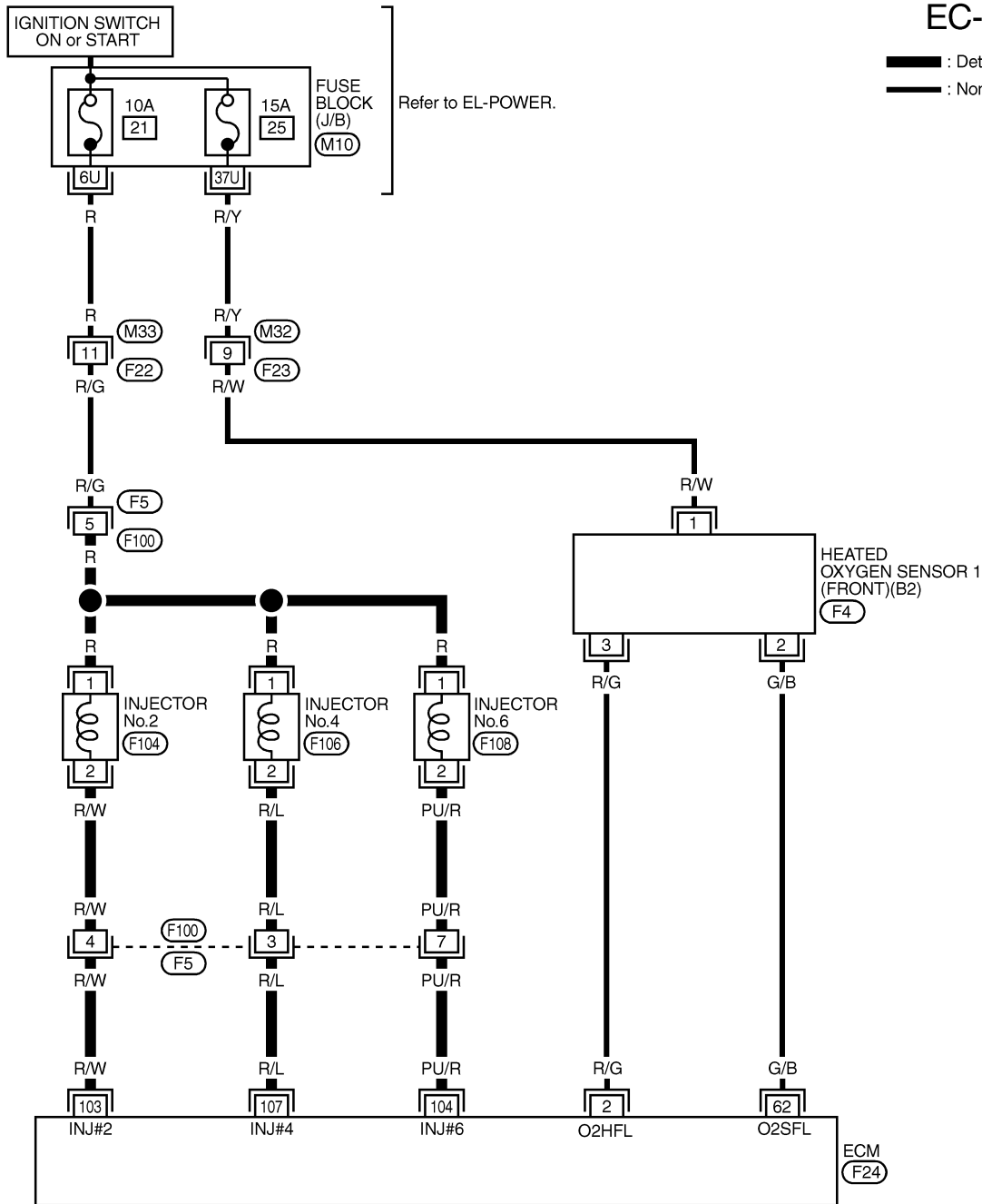
Wiring Diagram (Cont'd)

NBEC0175S02

LEFT BANK

EC-FUELLH-01

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



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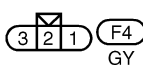
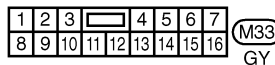
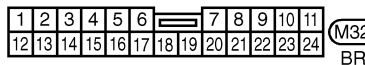
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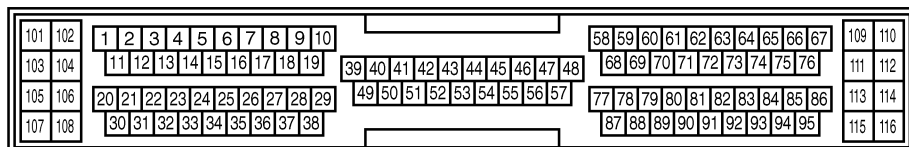
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REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-JUNCTION BOX (J/B)



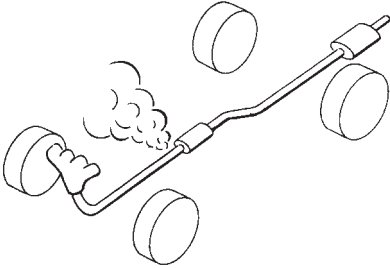
MEC956C

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

Diagnostic Procedure

Diagnostic Procedure

NBEC0176

1	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>		
		
SEF099P		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch "OFF". 2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector. 3. Disconnect ECM harness connector. 4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0172</td> <td>63</td> <td>2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0175</td> <td>62</td> <td>2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0172	63	2	Bank 1 (Right)	P0175	62	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0172	63	2	Bank 1 (Right)													
P0175	62	2	Bank 2 (Left)													
MTBL0479																
<p>Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
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	ECM or Sensor	Ground														
P0172	63 or 2	Ground	Bank 1 (Right)													
P0175	62 or 2	Ground	Bank 2 (Left)													
MTBL0480																
<p>Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

Diagnostic Procedure (Cont'd)

4	CHECK FUEL PRESSURE	
	1. Release fuel pressure to zero. Refer to EC-39. 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-39. At idling: When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi) When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)	
	OK or NG	
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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5	DETECT MALFUNCTIONING PART	
	Check the following. <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-625.) ● Fuel pressure regulator (Refer to EC-40.) 	
	▶	Repair or replace.

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6	CHECK MASS AIR FLOW SENSOR	
	ⓘ With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. 2.0 - 6.0 g-m/sec: at idling 7.0 - 20.0 g-m/sec: at 2,500 rpm	
	ⓘ With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. 2.0 - 6.0 g-m/sec: at idling 7.0 - 20.0 g-m/sec: at 2,500 rpm	
	OK or NG	
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-150.

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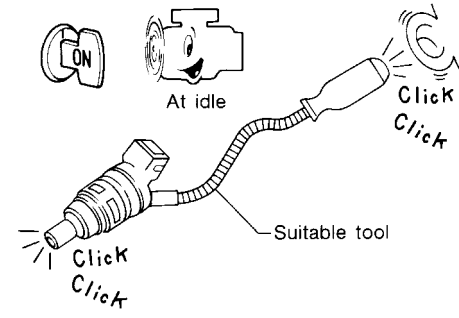
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DTC P0172 (RIGHT, -B1), P0175 (LEFT, -B2) FUEL INJECTION SYSTEM FUNCTION (RICH)

Diagnostic Procedure (Cont'd)

7	CHECK FUNCTION OF INJECTORS																				
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																					
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS AIF SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
ACTIVE TEST																					
POWER BALANCE																					
MONITOR																					
ENG SPEED	XXX rpm																				
MAS AIF SE-B1	XXX V																				
IACV-AAC/V	XXX step																				
<p>3. Make sure that each circuit produces a momentary engine speed drop.</p>																					
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Listen to each injector operating sound. 																					
																					
<p>Clicking noise should be heard.</p>																					
<p>OK or NG</p>																					
OK	▶ GO TO 8.																				
NG	▶ Perform trouble diagnosis for "INJECTORS", EC-617.																				

SEF070Y

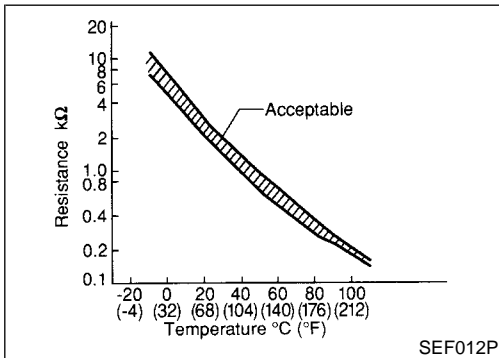
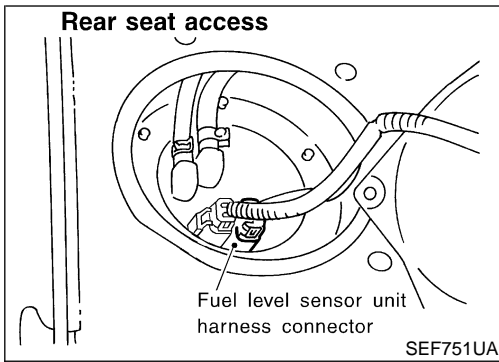
MEC703B

8	CHECK INJECTOR
<ol style="list-style-type: none"> 1. Remove injector assembly. Refer to EC-41. Keep fuel hose and all injectors connected to injector gallery. 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 3. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175). The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected. 4. Disconnect all ignition coil harness connectors. 5. Prepare pans or saucers under each injectors. 6. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. 	
<p>OK or NG</p>	
OK (Does not drip.)	▶ GO TO 9.
NG (Drips.)	▶ Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.</p>	
▶	INSPECTION END

DTC P0180 FUEL TANK TEMPERATURE SENSOR

Component Description



Component Description

NBEC0177

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.

GI
MA
EM
LC

<Reference data>

Fuel temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

EC
FE

*: These data are reference values and are measured between ECM terminal 92 (Fuel tank temperature sensor) and body ground.

CAUTION:

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

AT
TF
PD

On Board Diagnosis Logic

NBEC0178

Malfunction is detected when 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.

ST
RS
BT
HA

Possible Cause

NBEC0489

- Harness or connectors (The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

SC
EL
IDX

DTC P0180 FUEL TANK TEMPERATURE SENSOR

DTC Confirmation Procedure

DTC Confirmation Procedure

NBEC0179

NOTE:

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

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

WITH CONSULT-II

NBEC0179S01

- 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-312.
If the result is OK, go to following step.
- 4) Check "COOLAN TEMP/S" value.
If "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.
If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
- 5) Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- 6) Wait at least 10 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-312.

WITH GST

NBEC0179S02

Follow the procedure "With CONSULT-II" above.

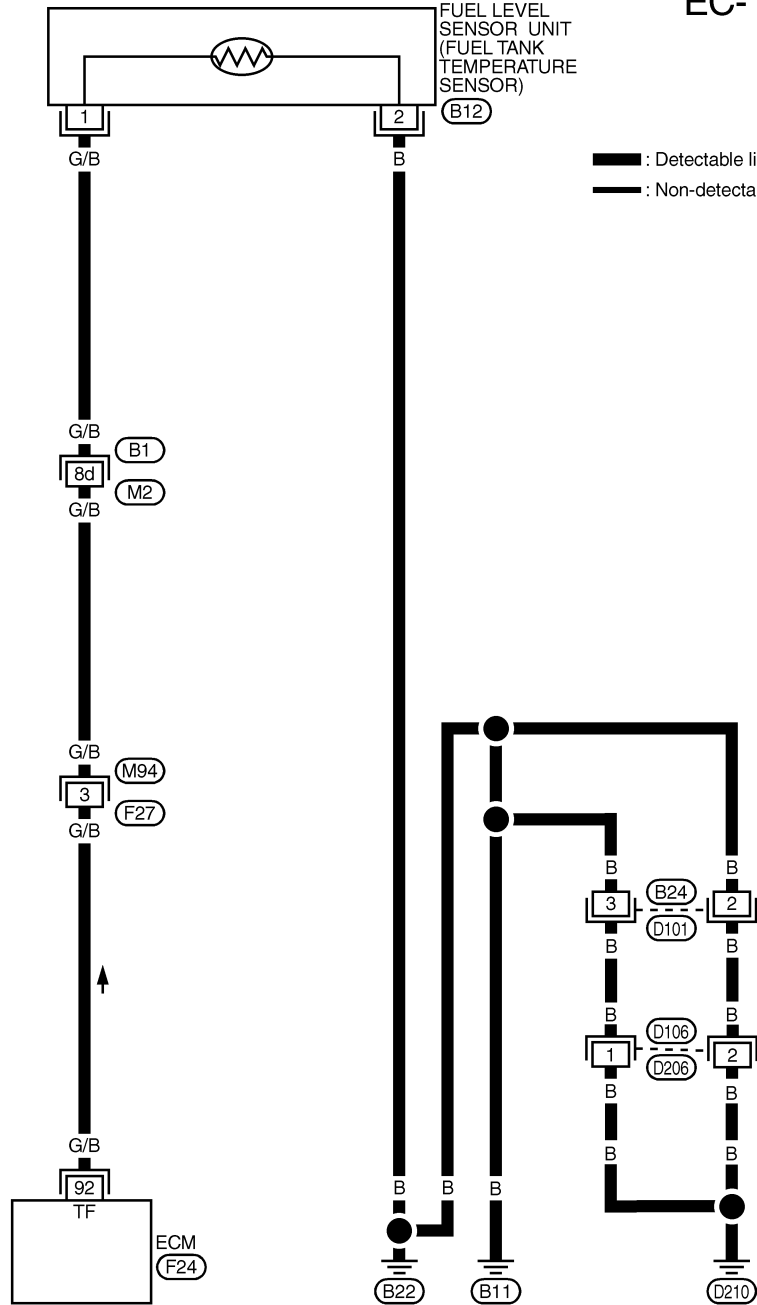
DTC P0180 FUEL TANK TEMPERATURE SENSOR

Wiring Diagram

Wiring Diagram

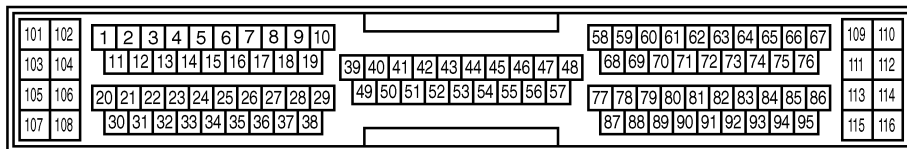
NBEC0180

EC-TFTS-01



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IDX

REFER TO THE FOLLOWING.
 (B1) -SUPER
 MULTIPLE JUNCTION (SMJ)



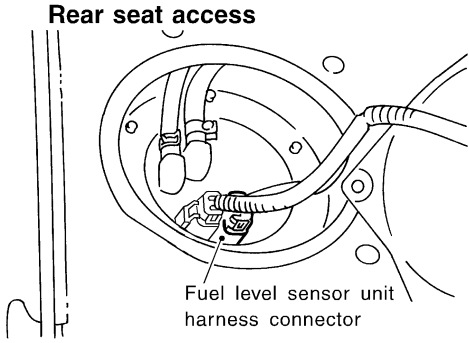
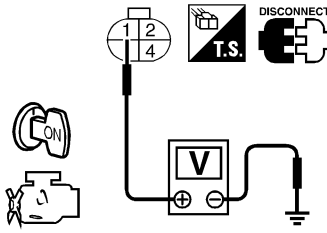
MEC957C

DTC P0180 FUEL TANK TEMPERATURE SENSOR

Diagnostic Procedure

Diagnostic Procedure

NBEC0181

1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit and fuel pump harness connector.</p> <div style="text-align: center;">  <p>Rear seat access</p> <p>Fuel level sensor unit harness connector</p> </div> <p>3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Approximately 5V</p> </div> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

SEF751UA

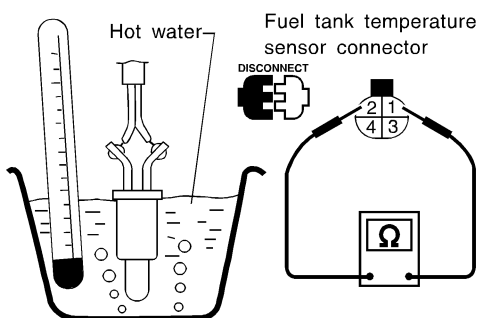
SEF973Y

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B1, M2 ● Harness connectors M92, F27 ● Harness for open or short between ECM and fuel level sensor unit and fuel pump 		
▶		Repair harness or connector.

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit and fuel pump terminal 2 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to power in harness or connectors.

DTC P0180 FUEL TANK TEMPERATURE SENSOR

Diagnostic Procedure (Cont'd)

4	CHECK FUEL TANK TEMPERATURE SENSOR							
<p>1. Remove fuel level sensor unit. 2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.</p>								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Temperature °C (°F)</th> <th>Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td>20 (68)</td> <td>2.3 - 2.7</td> </tr> <tr> <td>50 (122)</td> <td>0.79 - 0.90</td> </tr> </tbody> </table>			Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ							
20 (68)	2.3 - 2.7							
50 (122)	0.79 - 0.90							
SEF974Y								
OK or NG								
OK	▶	GO TO 5.						
NG	▶	Replace fuel level sensor unit.						

5	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
▶		INSPECTION END

GI
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 LC
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 FE
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 BT
 HA
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 EL
 IDX

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0610

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

Possible Cause

NBEC0611

- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-319.

Overall Function Check

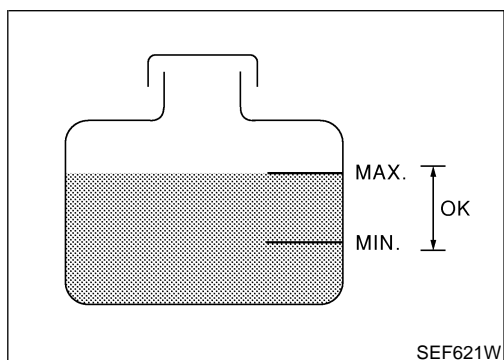
NBEC0612

Use this procedure to check the overall function of the coolant overtemperature enrichment protection check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



Ⓟ WITH CONSULT-II

NBEC0612S01


- 1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.

Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or radiator is below the proper range, go to "Diagnostic Procedure", EC-316.
 - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-14, "Changing Engine Coolant".
- a) Fill radiator with coolant up to specified level with a filling speed

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

Overall Function Check (Cont'd)

- of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "Anti-freeze Coolant Mixture Ratio".
- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. GI
 - c) After checking or replacing coolant, go to step 3 below. MA
 - 2) Ask the customer if engine coolant has been added. If it has been added, go to "Diagnostic Procedure", EC-316. After repair, go to the next step. EM
 - 3) Start engine and let it idle.
 - 4) Make sure that A/C switch is "OFF" and air conditioner is not operating. If NG, check air conditioner circuit. Refer to HA-30 or HA-35, "TROUBLE DIAGNOSES". After repair, go to the next step. LC
 - 5) Check for blocked coolant passage. EC
 - a) Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows. FE
If NG, go to "Diagnostic Procedure", EC-316. After repair, go to the next step. AT
 - Be extremely careful not to touch any moving or adjacent parts.**
 - 6) Check for blocked radiator air passage. TF
 - a) When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator. PD
 - b) Check the front end for clogging caused by insects or debris.
 - c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front. AX
If NG, take appropriate action and then go to the next step.
 - 7) Check function of ECT sensor. SU
Refer to step 7 of "Diagnostic Procedure", EC-316.
If NG, replace ECT sensor and go to the next step.
 - 8) Check ignition timing. Refer to basic inspection, EC-101. BR
Make sure that ignition timing is $15^{\circ}\pm 5^{\circ}$ at idle.
If NG, adjust ignition timing and then recheck.
-  **WITH GST** NBEC0612S02
- 1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator. RS
Allow engine to cool before checking coolant level and mixture ratio.
 - If the coolant level in the reservoir and/or radiator is below the proper range, and go to "Diagnostic Procedure", EC-316. BT
 - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-14, "Changing Engine Coolant". HA
 - a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "Anti-freeze Coolant Mixture Ratio". SC
 - b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. EL
 - c) After checking or replacing coolant, go to step 3 below. IDX
 - 2) Ask the customer if engine coolant has been added. If it has been added, go to "Diagnostic Procedure", EC-316. After repair, go to the next step.
 - 3) Start engine and let it idle.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

Overall Function Check (Cont'd)

- 4) Make sure that A/C switch is "OFF" and air conditioner is not operating. If NG, check air conditioner circuit. Refer to HA-35 or HA-30, "TROUBLE DIAGNOSES". After repair, go to the next step.
- 5) Check for blocked coolant passage.
 - a) Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to "Diagnostic Procedure", EC-316. After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.
- 6) Check for blocked radiator air passage.
 - a) When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
 - b) Check the front end for clogging caused by insects or debris.
 - c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.
- 7) Check function of ECT sensor.
Refer to step 6 of "Diagnostic Procedure", EC-316.
If NG, replace ECT sensor and go to the next step.
- 8) Check ignition timing. Refer to basic inspection, EC-101.
Make sure that ignition timing is $15^{\circ} \pm 5^{\circ}$ at idle.
If NG, adjust ignition timing and then recheck.

Diagnostic Procedure

NBEC0614

1	CHECK COOLING SYSTEM FOR LEAK	
<p>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) CAUTION: Higher than the specified pressure may cause radiator damage.</p>		
<p>Pressure should not drop.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

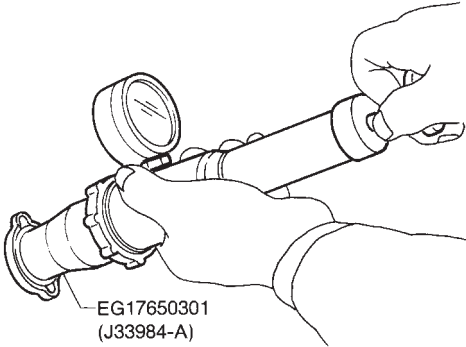
SLC754A

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

Diagnostic Procedure (Cont'd)

2	DETECT MALFUNCTIONING PART
Check the following for leak. <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump (Refer to LC-12, "Water Pump".) 	
▶	Repair or replace.

GI
MA

3	CHECK RADIATOR CAP
Apply pressure to cap with a tester and check radiator cap relief pressure.	
	
Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Replace radiator cap.

EM
LC

EC

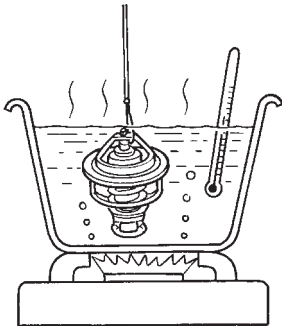
FE

AT

TF

PD

AX

4	CHECK THERMOSTAT
1. Remove thermostat. 2. Check valve seating condition at normal room temperatures. It should seat tightly. 3. Check valve opening temperature and valve lift.	
	
Valve opening temperature: 76.5°C (170°F) [standard] Valve lift: More than 8.6 mm/90°C (0.339 in/194°F)	
4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-16, "Thermostat".	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Replace thermostat

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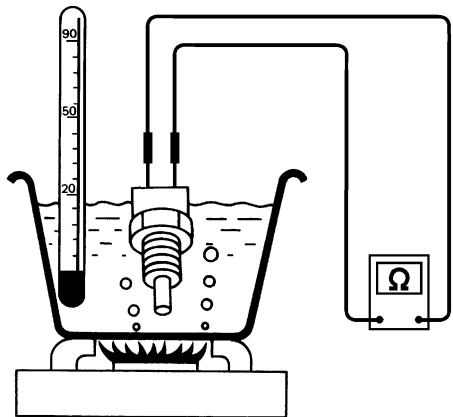
IDX

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

Diagnostic Procedure (Cont'd)

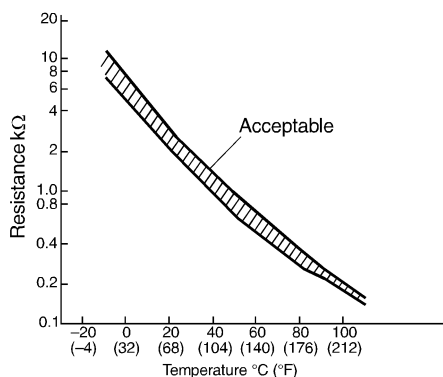
5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 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



SEF304X

OK or NG

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

6 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-319.

▶ **INSPECTION END**

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NBEC0615

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	—	GI
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	50 - 50% coolant mixture	See MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS".	MA
	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 MA-14, "Changing Engine Coolant".	EM
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-11, "System Check".	LC
ON*2	5	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	See LC-11, "System Check".	EC
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 LC-16, "Thermostat" and LC-19, "Radiator".	FE
ON*1	7*5	<ul style="list-style-type: none"> Cooling fan 	<ul style="list-style-type: none"> CONSULT-II 	Operating	See trouble diagnosis for DTC P0217 (EC-314).	AT
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	—	TF
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	—	PD
		<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 MA-14, "Changing Engine Coolant".	AX
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 MA-13, "ENGINE MAINTENANCE".	SU
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 EM-42, "Inspection".	BR
	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 EM-63, "Inspection".	ST

*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.

*5: Cooling fan is not applied to this vehicle.

For more information, refer to LC-24, "OVERHEATING CAUSE ANALYSIS".

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

On Board Diagnosis Logic

On Board Diagnosis Logic

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring. NBEC0182

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change. When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

Possible Cause

- Improper spark plug
 - Insufficient compression
 - Incorrect fuel pressure
 - The injector circuit is open or shorted
 - Injectors
 - Intake air leak
 - The ignition secondary circuit is open or shorted
 - Lack of fuel
 - Drive plate or flywheel
 - Heated oxygen sensor 1 (front)
- NBEC0490

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

DTC Confirmation Procedure

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF
	B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

NBEC0183

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

Ⓜ WITH CONSULT-II

NBEC0183S01

- 1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch "OFF" and wait at least 10 seconds.
- 4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-321.

Ⓜ WITH GST

NBEC0183S02

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NBEC0184

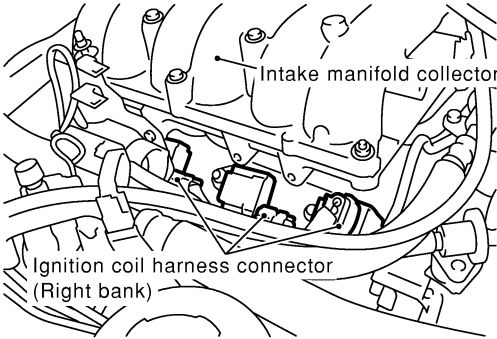
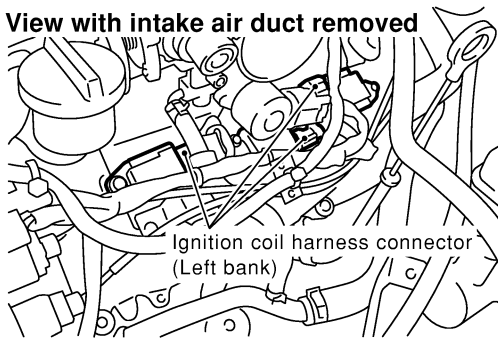
1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

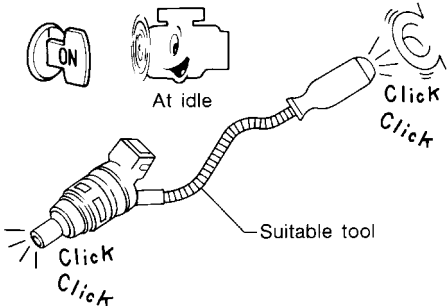
2	CHECK FOR EXHAUST SYSTEM CLOGGING	
1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

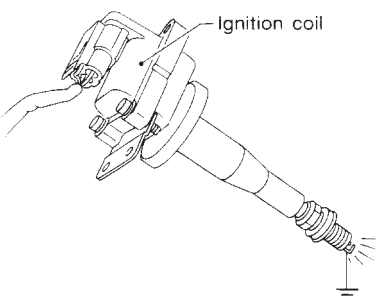
Diagnostic Procedure (Cont'd)

3	PERFORM POWER BALANCE TEST																
<p> With CONSULT-II</p> <p>1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.</p>																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>POWER BALANCE</td> <td></td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>MAS A/F SE-B1</td> <td>XXX V</td> </tr> <tr> <td>IACV-AAC/V</td> <td>XXX step</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX step				
ACTIVE TEST																	
POWER BALANCE																	
MONITOR																	
ENG SPEED	XXX rpm																
MAS A/F SE-B1	XXX V																
IACV-AAC/V	XXX step																
SEF190Y																	
<p>2. Is there any cylinder which does not produce a momentary engine speed drop?</p>																	
<p> Without CONSULT-II</p> <p>When disconnecting each ignition coil harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?</p>																	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Intake manifold collector</p> <p>Ignition coil harness connector (Right bank)</p> </div> <div style="text-align: center;"> <p>View with intake air duct removed</p>  <p>Ignition coil harness connector (Left bank)</p> </div> </div>																	
SEF975Y																	
Yes or No																	
Yes	▶ GO TO 5.																
No	▶ GO TO 4.																

4	CHECK INJECTOR
<p>Does each injector make an operating sound at idle?</p>	
	
MEC703B	
Yes or No	
Yes	▶ GO TO 5.
No	▶ Check injector(s) and circuit(s). Refer to EC-616.

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

Diagnostic Procedure (Cont'd)

5	CHECK IGNITION SPARK	
<ol style="list-style-type: none"> 1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark. 		
		
SEF575Q		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Check ignition coil, power transistor and their circuits. Refer to "DTC P1320 IGNITION SIGNAL", EC-499

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MA

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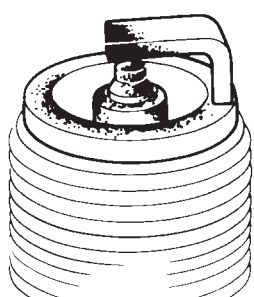
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6	CHECK SPARK PLUGS	
Remove the spark plugs and check for fouling, etc.		
		
SEF156I		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-13, "ENGINE MAINTENANCE".

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7	CHECK COMPRESSION PRESSURE	
Check compression pressure. Refer to EM-14, "Measurement of Compression Pressure".		
Standard: 1,275 kPa (13.0 kg/cm², 185 psi)/300 rpm		
Minimum: 981 kPa (10.0 kg/cm², 142 psi)/300 rpm		
Difference between each cylinder: 98 kPa (1.0 kg/cm², 14 psi)/300 rpm		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

HA

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

Diagnostic Procedure (Cont'd)

8	CHECK FUEL PRESSURE	
<p>1. Install all removed parts. 2. Release fuel pressure to zero. Refer to EC-39. 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-39.</p> <p style="margin-left: 20px;">At idle: Approx. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-625.) ● Fuel pressure regulator (Refer to EC-40.) ● Fuel lines (Refer to MA-16, "Checking Fuel Lines".) ● Fuel filter for clogging 		
		▶ Repair or replace.

10	CHECK IGNITION TIMING									
<p>Check the following items. Refer to "Basic Inspection", EC-101.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>15° ± 5° BTDC</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0655</p> <p style="text-align: center;">OK or NG</p>			Items	Specifications	Ignition timing	15° ± 5° BTDC	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications									
Ignition timing	15° ± 5° BTDC									
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF									
Target idle speed	750 ± 50 rpm (in "P" or "N" position)									
OK (With CONSULT-II)	▶	GO TO 11.								
OK (Without CONSULT-II)	▶	GO TO 12.								
NG	▶	Follow the "Basic Inspection".								

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

Diagnostic Procedure (Cont'd)

11 CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

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 "HO2S1 (B1)/(B2)" and "HO2S1 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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

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

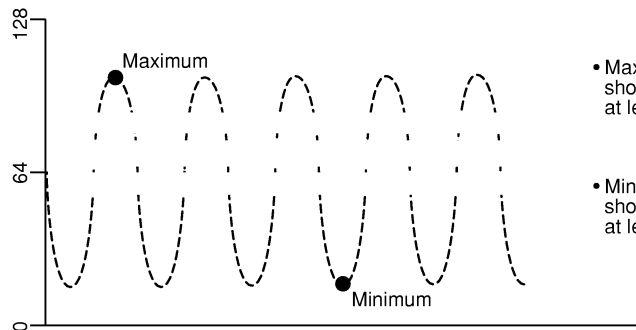
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

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



SEF648Y

CAUTION:

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

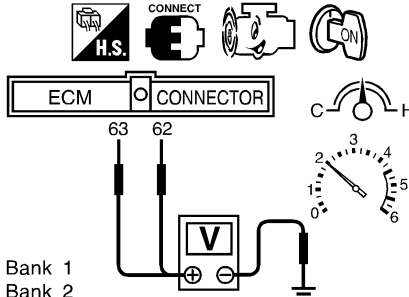
OK or NG

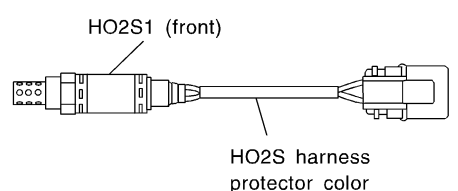
OK	▶	GO TO 14.
NG	▶	GO TO 13.

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE



Diagnostic Procedure (Cont'd)

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>63: Bank 1 62: Bank 2</p> </div> <div> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF967XA	
CAUTION:	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 14.
NG	▶ GO TO 13.

13	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 (front) harness protector color. 	
	
<p>HO2S1 (front) (bank 1): Black HO2S1 (front) (bank 2): Blue</p>	
SEF505Y	
▶	Replace malfunctioning heated oxygen sensor 1 (front).

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

Diagnostic Procedure (Cont'd)

14	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. 2.0 - 6.0 g-m/sec: at idling 7.0 - 20.0 g-m/sec: at 2,500 rpm</p>		
<p> With GST Check mass air flow sensor signal in MODE 1 with GST. 2.0 - 6.0 g-m/sec: at idling 7.0 - 20.0 g-m/sec: at 2,500 rpm</p>		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-150.

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15	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-118. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 16.
NG	▶	Repair or replace.

AT

TF

16	ERASE THE 1ST TRIP DTC	
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-72. Some tests may cause a 1st trip DTC to be set.		
	▶	GO TO 17.

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17	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
	▶	INSPECTION END

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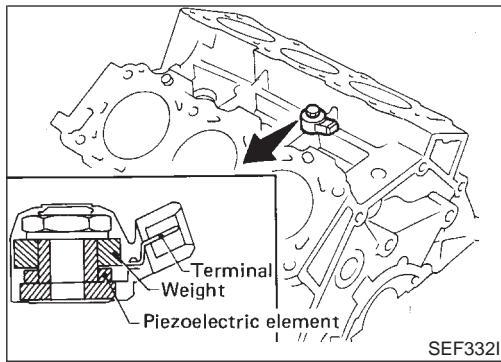
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DTC P0325 KNOCK SENSOR (KS)

Component Description



Component Description

NBEC0185

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. **Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.**

ECM Terminals and Reference Value

NBEC0663

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	W	Knock sensor	[Engine is running] • Idle speed	Approximately 2.5V

On Board Diagnosis Logic

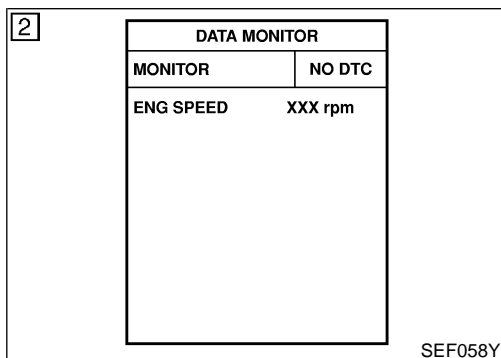
NBEC0187

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

Possible Cause

NBEC0491

- Harness or connectors
(The knock sensor circuit is open or shorted.)
- Knock sensor



DTC Confirmation Procedure

NBEC0188

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

DTC P0325 KNOCK SENSOR (KS)

DTC Confirmation Procedure (Cont'd)

④ WITH CONSULT-II

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II ^{NBEC0188S01}
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-331.

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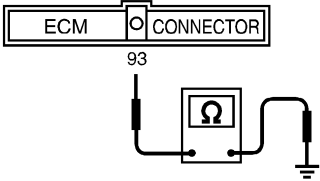
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Diagnostic Procedure

NBEC0190

1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I	
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check resistance between ECM terminal 93 and engine ground.</p> <p>NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>H.S. DISCONNECT</p> </div> <div style="text-align: center;">  <p>ECM CONNECTOR 93</p> </div> <div style="text-align: center;"> <p>Resistance: Approximately 500 - 620 kΩ [at 25°C (77°F)]</p> </div> </div> <p style="text-align: right;">SEF321X</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 2.

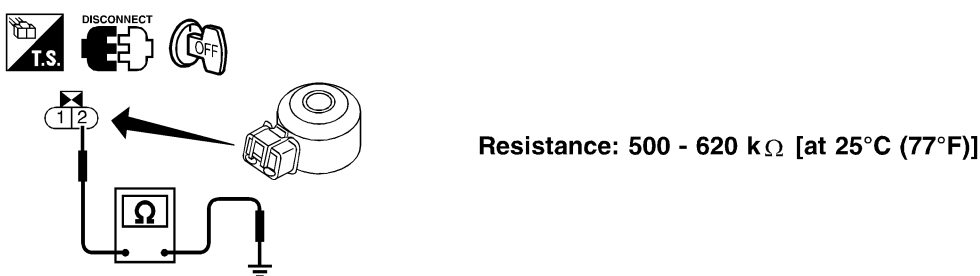
2	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II	
<p>1. Disconnect knock sensor harness connector. 2. Check harness continuity between ECM terminal 93 and knock sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

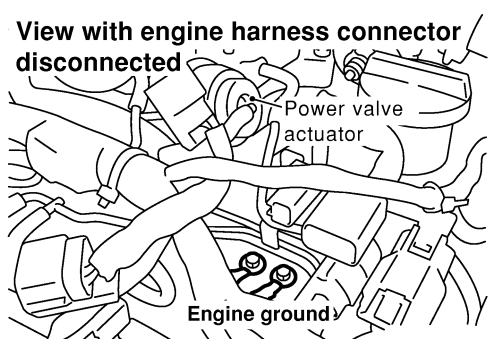
3	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F19, F116 ● Harness for open or short between ECM and knock sensor 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0325 KNOCK SENSOR (KS)

Diagnostic Procedure (Cont'd)

4	CHECK KNOCK SENSOR		
<p>Check resistance between knock sensor terminal 2 and ground.</p> <p>NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ.</p>			
			
SEF976Y			
<p>CAUTION: Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 8.	
NG	▶	Replace knock sensor.	

5	RETIGHTEN GROUND SCREWS		
<p>Loose and retighten engine ground screws.</p>			
<p>View with engine harness connector disconnected</p> 			
SEF959Y			
▶		GO TO 6.	

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT		
<ol style="list-style-type: none"> 1. Disconnect harness connectors F19, F116. 2. Check harness continuity between harness connector F19 terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 			
OK or NG			
OK	▶	GO TO 8.	
NG	▶	GO TO 7.	

7	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F19, F116 ● Harness for open or short between harness connector F19 and engine ground 			
▶		Repair open circuit or short to power in harness or connectors.	

DTC P0325 KNOCK SENSOR (KS)

Diagnostic Procedure (Cont'd)

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

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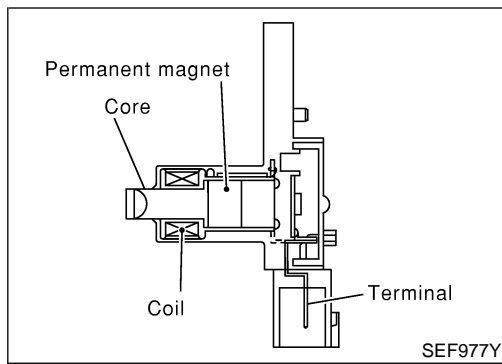
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DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

Component Description



Component Description

NBEC0191

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate (flywheel). It detects the crankshaft position signal (1° signal).

The sensor consists of a permanent magnet, core and coil.

When engine is running, the gap between the sensor and the gear teeth (cogs) will periodically change. Permeability near the sensor also changes.

Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.

The ECM receives the voltage signal and detects the crankshaft position signal (1° signal).

CONSULT-II Reference Value in Data Monitor Mode

NBEC0492

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-RPM (POS)	<ul style="list-style-type: none">Tachometer: ConnectRun engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

ECM Terminals and Reference Value

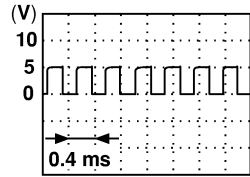
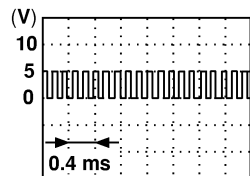
ECM Terminals and Reference Value

=NBEC0664

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	Y	Crankshaft position sensor (POS)	[Engine is running] ● Idle speed	Approximately 2.4V  SEF057V
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 2.3V  SEF058V

On Board Diagnosis Logic

NBEC0193

Malfunction is detected when 1° signal is not entered to ECM for the first few seconds during engine cranking, or 1° signal is not entered to ECM during engine running.

Possible Cause

NBEC0493

- Harness or connectors
(The crankshaft position sensor (POS) circuit is open or shorted.)
- Crankshaft position sensor (POS)
- Starter motor (Refer to EL section.)
- Starting system circuit (Refer to EL section.)
- Dead (Weak) battery

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

DTC Confirmation Procedure

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NBEC0194

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V.

WITH CONSULT-II

NBEC0194S01

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Crank engine for at least two seconds.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-338.

WITH GST

NBEC0194S02

Follow the procedure "With CONSULT-II" above.

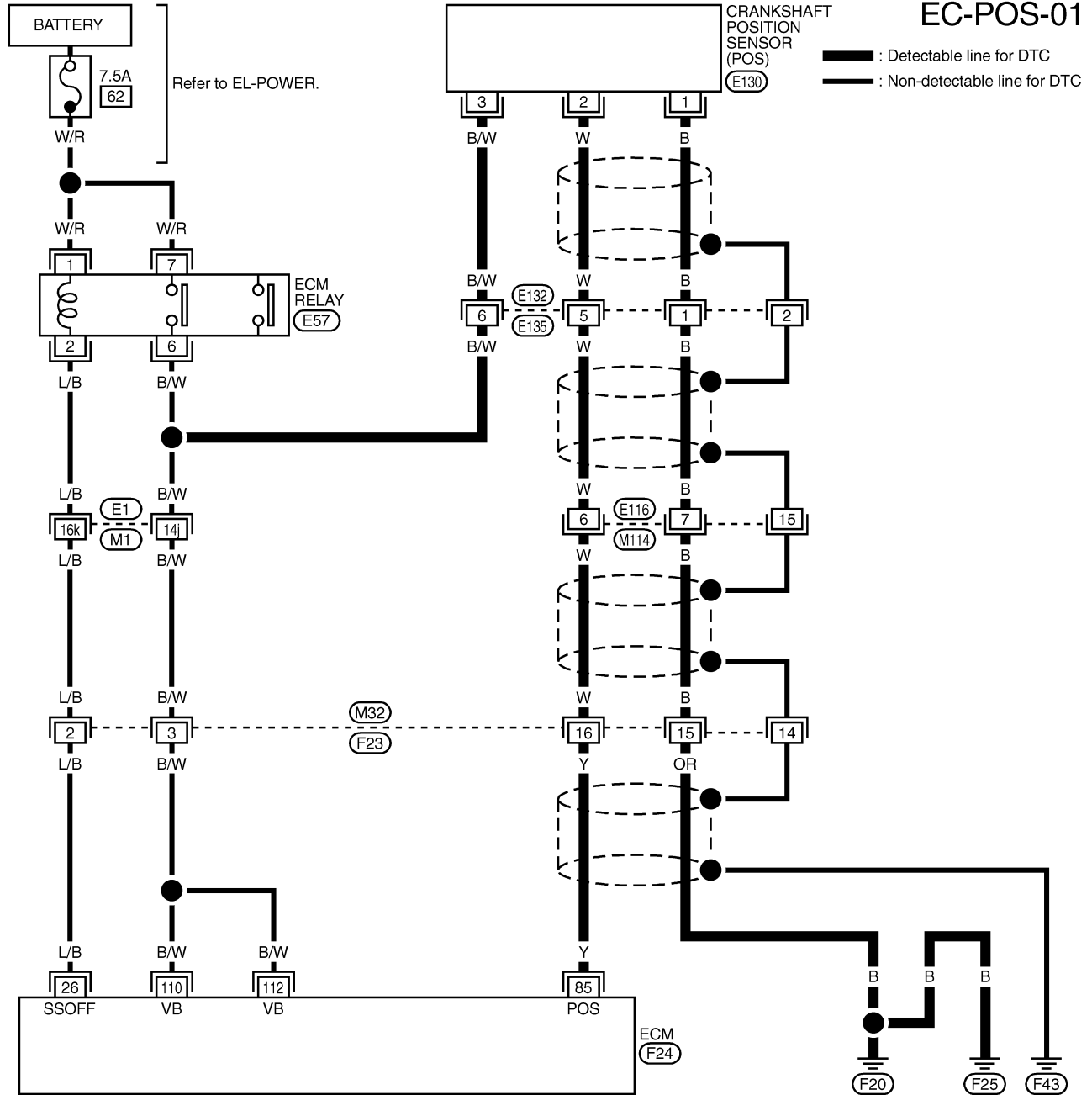
DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

Wiring Diagram

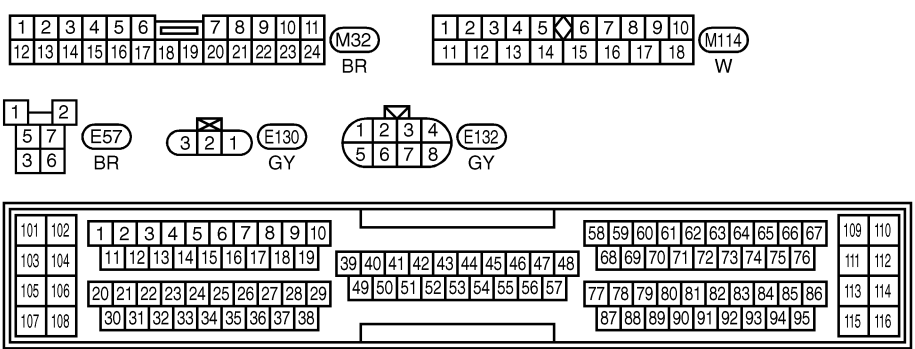
Wiring Diagram

NBEC0195

EC-POS-01



- GI
- MA
- EM
- LC
- EC**
- FE
- AT
- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT



REFER TO THE FOLLOWING.
 (E1) -SUPER
 MULTIPLE JUNCTION (SMJ)



- HA
- SC
- EL
- IDX

MEC959C

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

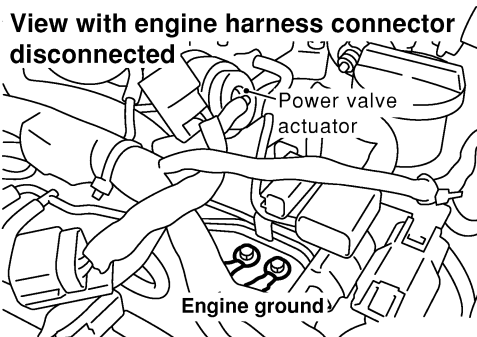
Diagnostic Procedure

Diagnostic Procedure

NBEC0196

1 RETIGHTEN GROUND SCREWS

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

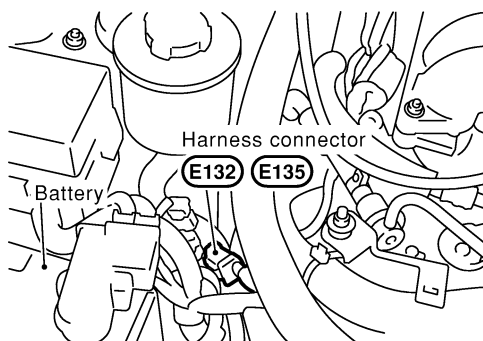


SEF959Y

▶ GO TO 2.

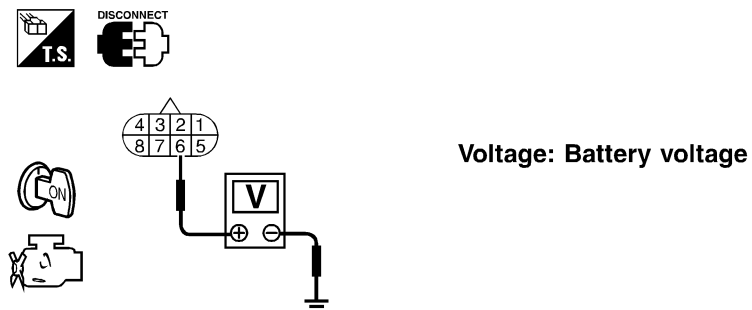
2 CHECK CKPS (POS) POWER SUPPLY CIRCUIT

1. Disconnect harness connectors E132, E135.



SEF978Y

2. Check voltage between harness connector E135 terminal 6 and ground with CONSULT-II or tester.



SEF979Y

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

OK or NG

OK ▶ GO TO 4.

NG ▶ GO TO 3.

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E132, E135 ● Harness for open or short between ECM and crankshaft position sensor (POS) ● Harness for open or short between ECM relay and crankshaft position sensor (POS) 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

GI

MA

EM

4	CHECK CKPS (POS) GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Check harness continuity between harness connector E135 terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to power.</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

LC

EC

FE

5	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open between crankshaft position sensor (POS) and ground. 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

AT

TF

PD

6	CHECK CKPS (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 85 and harness connector E135 terminal 5. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

AX

SU

BR

ST

7	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open or short between ECM and crankshaft position sensor (POS) 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

RS

BT

HA

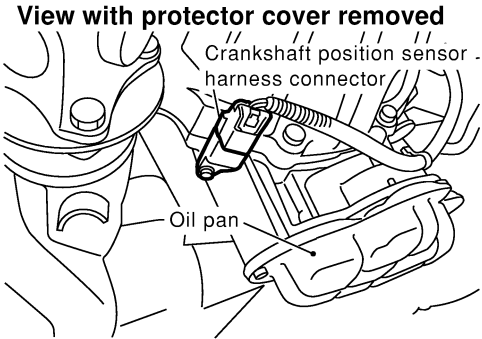
SC

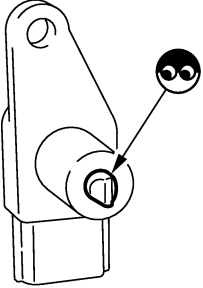
EL

IDX

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

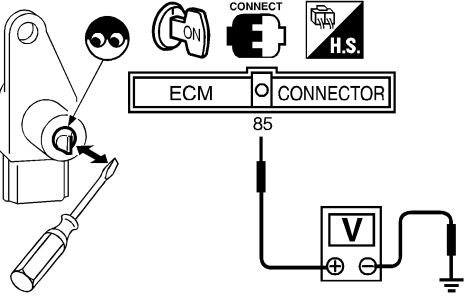
Diagnostic Procedure (Cont'd)

8	CHECK CKPS (POS) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT								
<p>1. Disconnect CKPS (POS) harness connector.</p> <div style="text-align: center;"> <p>View with protector cover removed</p>  <p>The diagram shows a side view of the engine block. A crankshaft position sensor harness connector is connected to the sensor. An oil pan is located below the sensor. Labels point to the 'Crankshaft position sensor harness connector' and the 'Oil pan'.</p> </div>									
<p>2. Check harness continuity between CKPS (POS) terminals and harness connector E132 terminals as follows.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th>CKPS (POS) terminal</th> <th>Harness connector E132 terminal</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">5</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">6</td> </tr> </tbody> </table>		CKPS (POS) terminal	Harness connector E132 terminal	1	1	2	5	3	6
CKPS (POS) terminal	Harness connector E132 terminal								
1	1								
2	5								
3	6								
SEF980Y									
<p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>									
OK	▶ GO TO 9.								
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.								

9	CHECK CRANKSHAFT POSITION SENSOR (POS)-I
<p>1. Disconnect crankshaft position sensor (POS) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping.</p> <div style="text-align: center;">  <p>The diagram shows a crankshaft position sensor. A bolt is shown being loosened from the sensor's mounting bracket. An eye icon indicates the viewing direction for the sensor.</p> </div>	
SEF981Y	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Replace crankshaft position sensor (POS).

DTC P0335 CRANKSHAFT POSITION SENSOR (CKPS) (POS)

Diagnostic Procedure (Cont'd)

10	CHECK CRANKSHAFT POSITION SENSOR (POS)-II									
<ol style="list-style-type: none"> 1. Reconnect disconnected harness connectors. 2. Turn ignition switch "ON". 3. Check voltage between ECM terminal 85 and ground by briefly touching the sensor core with a flat-bladed screwdriver. 										
<div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px; border-collapse: collapse;"> <thead> <tr> <th>ECM terminal</th> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">85</td> <td style="text-align: center;">Contacted</td> <td style="text-align: center;">Approximately 5V</td> </tr> <tr> <td style="text-align: center;">Pulled away</td> <td style="text-align: center;">Approximately 0V</td> </tr> </tbody> </table> </div> <p style="margin-left: 20px;">There should be a steady 5V as the flat-bladed screwdriver is drawn away slowly.</p>			ECM terminal	Condition	Voltage	85	Contacted	Approximately 5V	Pulled away	Approximately 0V
ECM terminal	Condition	Voltage								
85	Contacted	Approximately 5V								
	Pulled away	Approximately 0V								
SEF343Z										
OK or NG										
OK	▶	GO TO 11.								
NG	▶	Replace crankshaft position sensor (POS).								

11	CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Disconnect harness connectors E132, E135. 2. Check harness continuity between harness connector E135 terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 13.
NG	▶	GO TO 12.

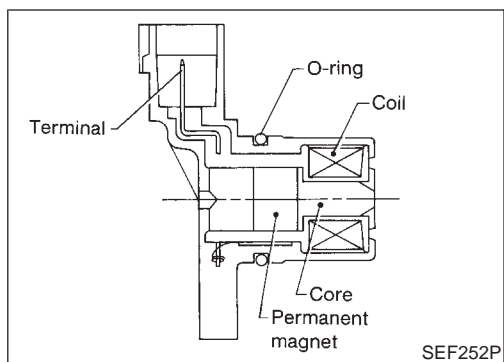
12	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open between harness connector E135 and engine ground 		
▶ Repair open circuit or short to power in harness or connectors.		

13	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
▶ INSPECTION END		

GI
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DTC P0340 CAMSHAFT POSITION SENSOR (CMPS) (PHASE)

Component Description



Component Description

NBEC0197

The camshaft position sensor (PHASE) is located on the engine front cover facing the camshaft sprocket. It detects the cylinder No. signal.

The sensor consists of a permanent magnet, core and coil.

When engine is running, the gap between the sensor and the camshaft sprocket will periodically change. Permeability near the sensor also changes.

Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.

The ECM receives the voltage signal and detects the cylinder No. signal.

ECM Terminals and Reference Value

NBEC0665

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66 76	L L	Camshaft position sensor (PHASE)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>Approximately 4.2V★ (AC voltage)</p> <p>SEF582X</p>

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

On Board Diagnosis Logic

NBEC0199

Malfunction is detected when

(Malfunction A) the cylinder No. signal is not sent to ECM for the first few seconds during engine cranking,

(Malfunction B) the cylinder No. signal is not sent to ECM during engine running,

(Malfunction C) the cylinder No. signal is not in the normal pattern during engine running.

DTC P0340 CAMSHAFT POSITION SENSOR (CMPS) (PHASE)

Possible Cause

Possible Cause

NBEC0494

- Harness or connectors
[The camshaft position sensor (PHASE) circuit is open or shorted.]
- Camshaft position sensor (PHASE)
- Starter motor (Refer to SC section.)
- Starting system circuit (Refer to SC section.)
- Dead (Weak) battery

GI

MA

EM

LC

DTC Confirmation Procedure

NBEC0200

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

EC

FE

AT

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

TF

PROCEDURE FOR MALFUNCTION A

NBEC0200S01

With CONSULT-II

NBEC0200S0101

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-345.

PD

AX

SU

With GST

NBEC0200S0102

Follow the procedure “With CONSULT-II” above.

BR

PROCEDURE FOR MALFUNCTION B AND C

NBEC0200S02

With CONSULT-II

NBEC0200S0201

- 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-345.

ST

RS

BT

With GST

NBEC0200S0202

Follow the procedure “With CONSULT-II” above.

HA

SC

EL

IDX

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC P0340 CAMSHAFT POSITION SENSOR (CMPS) (PHASE)

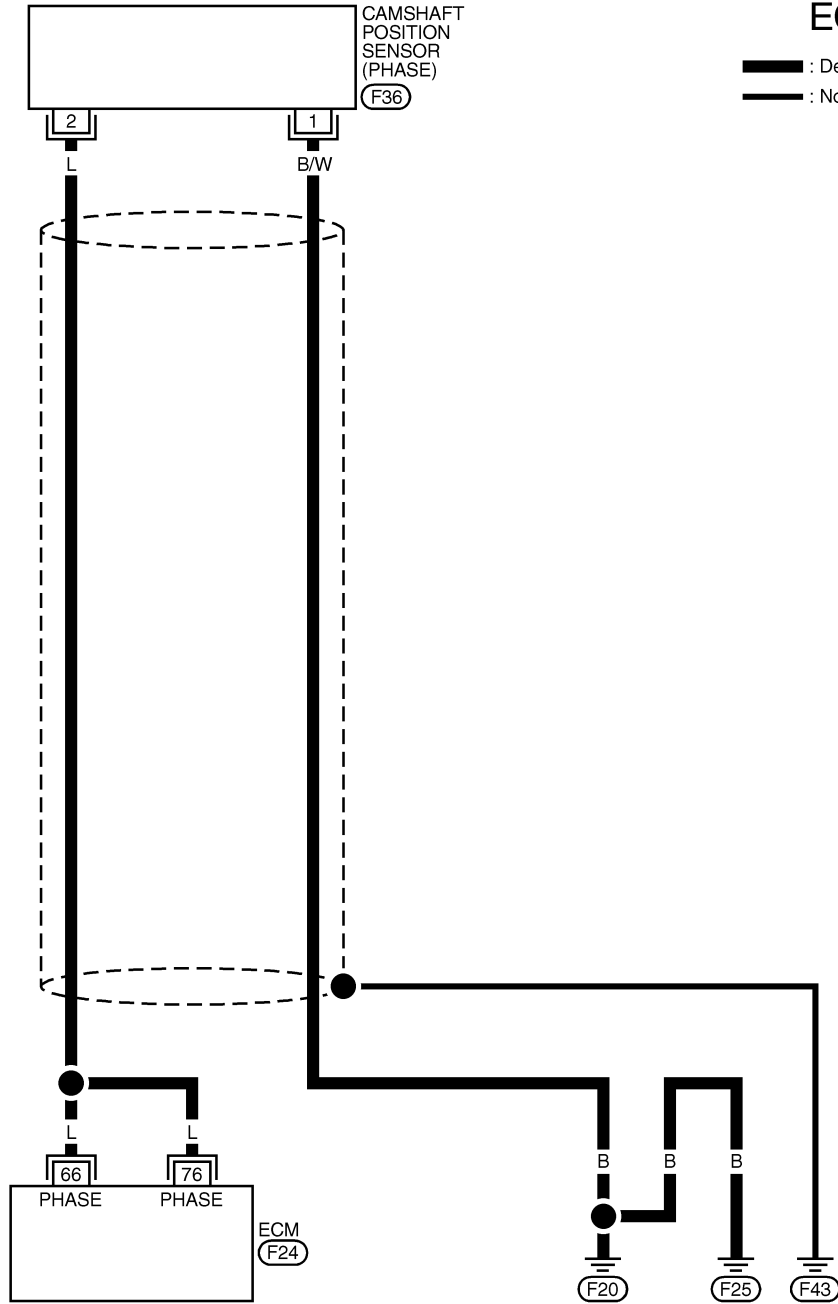
Wiring Diagram

Wiring Diagram

NBEC0201

EC-PHASE-01

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



101	102	1	2	3	4	5	6	7	8	9	10					58	59	60	61	62	63	64	65	66	67	109	110					
103	104	11	12	13	14	15	16	17	18	19	39	40	41	42	43	44	45	46	47	48	68	69	70	71	72	73	74	75	76	111	112	
105	106	20	21	22	23	24	25	26	27	28	29	49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	113	114
107	108	30	31	32	33	34	35	36	37	38											87	88	89	90	91	92	93	94	95	115	116	



MEC961C

DTC P0340 CAMSHAFT POSITION SENSOR (CMPS) (PHASE)

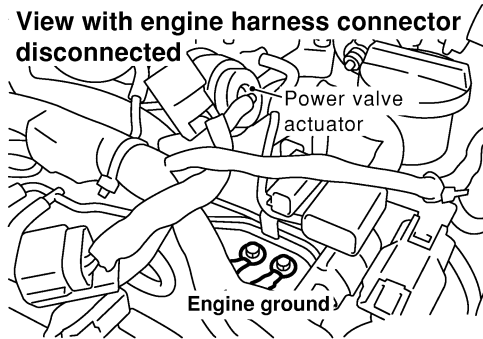
Diagnostic Procedure

Diagnostic Procedure

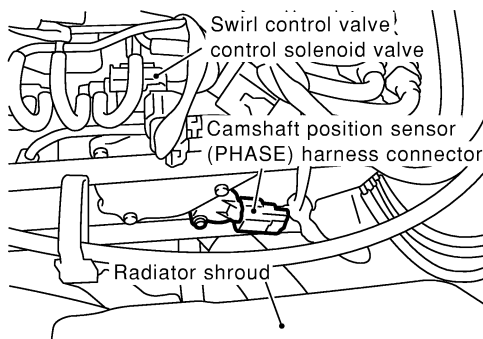
NBEC0202

1	CHECK STARTING SYSTEM	
Turn ignition switch to "START" position. Does the engine turn over? Does the starter motor operate?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to SC-10, "STARTING SYSTEM".)

GI
MA
EM
LC

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.		
View with engine harness connector disconnected		
 <p>The diagram shows a top-down view of the engine compartment. A hand is shown using a screwdriver to adjust a ground screw. Labels include 'Power valve actuator' and 'Engine ground'.</p>		
SEF959Y		
▶		GO TO 3.

EC
FE
AT
TF
PD
AX

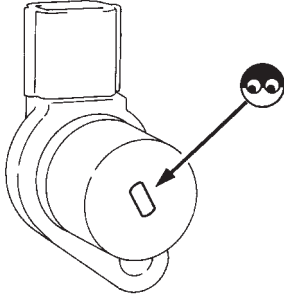
3	CHECK CMPS (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector and CMPS (PHASE) harness connector.		
 <p>The diagram shows the engine area with labels for 'Swirl control valve control solenoid valve', 'Camshaft position sensor (PHASE) harness connector', and 'Radiator shroud'. A hand is shown disconnecting the harness connector.</p>		
SEF982Y		
3. Check harness continuity between CMPS (PHASE) terminal 2 and ECM terminals 66, 76. Refer to Wiring Diagram. Continuity should exist.		
4. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

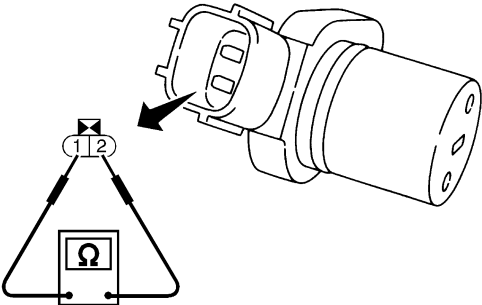
SU
BR
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IDX

DTC P0340 CAMSHAFT POSITION SENSOR (CMPS) (PHASE)

Diagnostic Procedure (Cont'd)

4	CHECK CMPS (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between CMPS (PHASE) terminal 1 and engine ground. Continuity should exist. 2. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair open circuit or short to power in harness or connector.

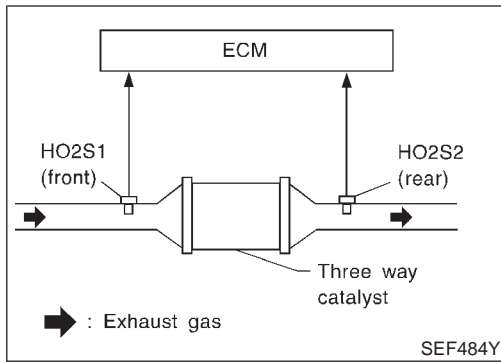
5	CHECK CAMSHAFT POSITION SENSOR (PHASE)-I
1. Loosen the fixing bolt of the camshaft position sensor (PHASE). 2. Remove the CMPS (PHASE). 3. Visually check the CMPS (PHASE) for chipping.	
	
SEF583P	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace camshaft position sensor (PHASE).

6	CHECK CAMSHAFT POSITION SENSOR (PHASE)-II
Check resistance between CMPS (PHASE) terminals 1 and 2 as shown below.	
	
Resistance: Approximately 1,440 - 1,760 Ω at 20°C (68°F) (HITACHI make) Approximately 2,090 - 2,550 Ω at 20°C (68°F) (MITSUBISHI make)	
SEF325X	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace camshaft position sensor (PHASE).

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

On Board Diagnosis Logic



On Board Diagnosis Logic

NBEC0214

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 (front) and 2 (rear).

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.

When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

GI

MA

EM

LC

EC

FE

AT

TF

Possible Cause

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

NBEC0504

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

DTC Confirmation Procedure

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

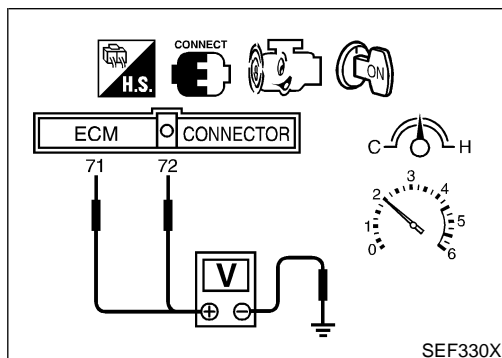
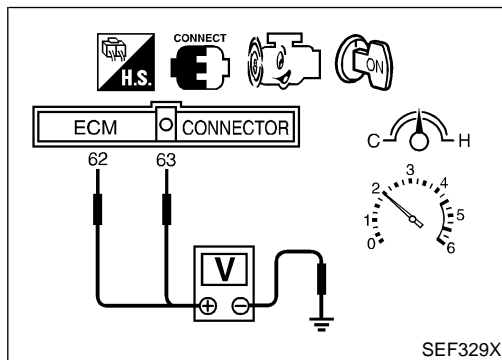
SEF344Z

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF345Z

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X



DTC Confirmation Procedure

NBEC0215

NOTE:

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

WITH CONSULT-II

NBEC0215S01

TESTING CONDITION:

- Open engine hood before conducting the following procedure.
- Do not hold engine speed for more than the specified minutes below.

- 1) Turn ignition switch "ON".
- 2) Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-II.
- 3) Start engine.
- 4) Rev engine up to 3,000±500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- 5) Wait 5 seconds at idle.
- 6) Rev engine up to 2,500±500 rpm and maintain it until "INCMP" of CATALYST changes to "CMPLT" (It will take approximately 5 minutes).
If not "CMPLT", stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
- 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II.
- 8) Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to "Diagnostic Procedure", EC-349.

Overall Function Check

NBEC0216

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

WITH GST

NBEC0216S01

- 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 63 [heated oxygen sensor 1 (front) right bank signal], 62 [heated oxygen sensor 1 (front) left bank signal] and engine ground, and ECM terminals 72 [heated oxygen sensor 2 (rear) right bank signal], 71 [heated oxygen sensor 2 (rear) left bank signal] and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminals 72 and engine ground, or 71 and engine ground is very less than that of ECM terminals 63 and engine ground, or 62 and engine ground.

Switching frequency ratio = A/B

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

Overall Function Check (Cont'd)

A: Rear heated oxygen sensor voltage switching frequency

B: Front heated oxygen sensor voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-349.

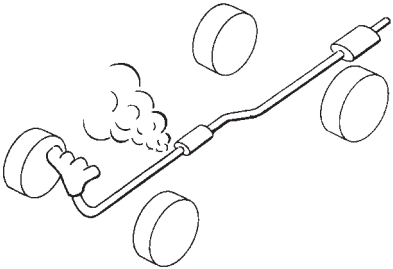
NOTE:

If the voltage at terminal 62 or 63 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-218.)

Diagnostic Procedure

NBEC0217

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

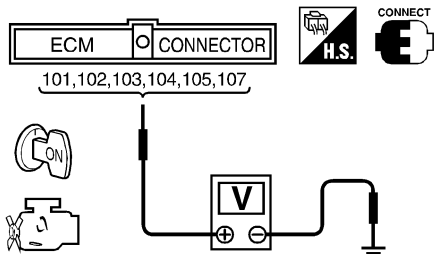
2	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the warm-up three way catalyst.		
		
OK or NG		
SEF099P		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

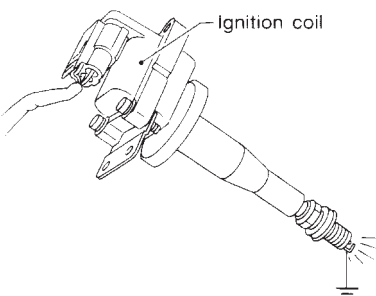
Diagnostic Procedure (Cont'd)

4	CHECK IGNITION TIMING									
Check the following items. Refer to "Basic Inspection", EC-101.										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>15° ± 5° BTDC</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	15° ± 5° BTDC	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications									
Ignition timing	15° ± 5° BTDC									
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF									
Target idle speed	750 ± 50 rpm (in "P" or "N" position)									
MTBL0655										
OK or NG										
OK	▶	GO TO 5.								
NG	▶	Follow the "Basic Inspection".								

5	CHECK INJECTORS	
<ol style="list-style-type: none"> 1. Refer to WIRING DIAGRAM for Injectors, EC-617. 2. Stop engine and then turn ignition switch "ON". 3. Check voltage between ECM terminals 101, 102, 103, 104, 105, 107 and ground with CONSULT-II or tester. 		
		
Battery voltage should exist.		
SEF331X		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-618.

DTC P0420 (RIGHT BANK, -B1), P0430 (LEFT BANK, -B2) THREE WAY CATALYST FUNCTION

Diagnostic Procedure (Cont'd)

6	CHECK IGNITION SPARK	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect ignition coil assembly from rocker cover. 3. Connect a known good spark plug to the ignition coil assembly. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark. 		
		
SEF575Q		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check ignition coil with power transistor and their circuit. Refer to EC-499.

7	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Remove injector assembly. Refer to EC-41. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect all ignition coil harness connectors. 4. Turn ignition switch "ON". Make sure fuel does not drip from injector. 		
OK or NG		
OK (Does not drip.)	▶	GO TO 8.
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
Trouble is fixed.	▶	INSPECTION END
Trouble is not fixed.	▶	Replace warm-up three way catalyst.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0218

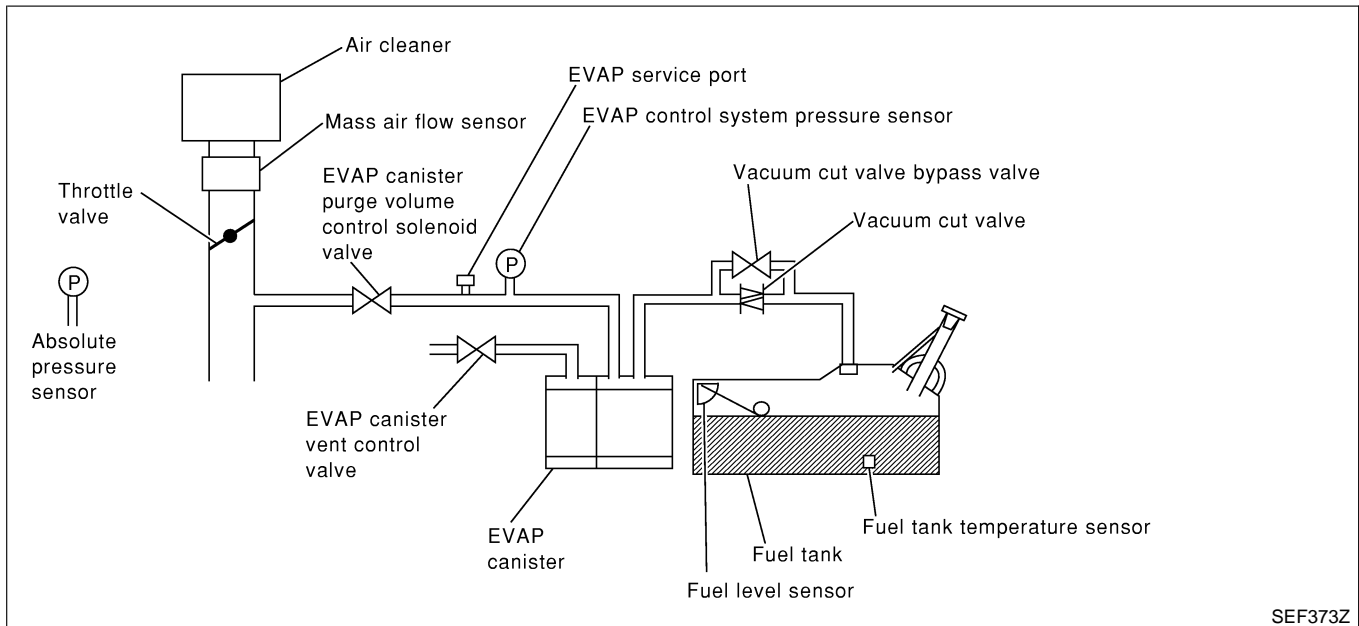
NOTE:

If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-573.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

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.

Possible Cause

NBEC0510

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Possible Cause (Cont'd)

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

DTC Confirmation Procedure

5

EVAP SML LEAK P0440/P1440
1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS. -FUEL LEVEL: 1/4-3/4 -AMBIENT TEMP: 0-30 C(32-86F) -OPEN ENGINE HOOD. 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART. 3)TOUCH START.

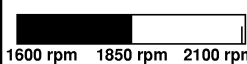
SEF565X

5

EVAP SML LEAK P0440/P1440
WAIT 2 TO 10 MINUTES. KEEP ENGINE RUNNING AT IDLE SPEED.

SEF566X

5

EVAP SML LEAK P0440/P1440
MAINTAIN 1600 - 2100 RPM UNTIL FINAL RESULT APPEARS. (APPROX. 3 MINUTES)
 1600 rpm 1850 rpm 2100 rpm

SEF874X

5

EVAP SML LEAK P0440/P1440
OK
SELF-DIAG RESULTS
NO DTC DETECTED. FURTHER TESTING MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NBEC0219

NOTE:

- If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-573.)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

WITH CONSULT-II

NBEC0219S01

- 1) Turn ignition switch “ON”.
- 2) Turn ignition switch “OFF” and wait at least 10 seconds.
- 3) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 4) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 30°C (32 - 86°F)
- 5) Select “EVAP SML LEAK P0440/P1440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-101.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, refer to “Diagnostic Procedure”, EC-355.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

WITH GST

NBEC0219S02

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-66 before driving vehicle.

- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-66.
- 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 10 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the “Driving Pattern”, EC-66.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
 - If P0440 or P1440 is displayed on the screen, go to “Diagnostic Procedure”, EC-355.
 - If P1447 is displayed on the screen, go to “Diagnostic Procedure” for DTC P1447, EC-564.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

DTC Confirmation Procedure (Cont'd)

- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.
- 10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

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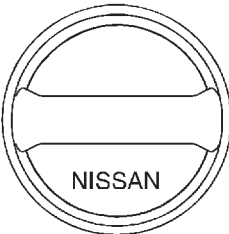
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Diagnostic Procedure

NBEC0220

1	CHECK FUEL FILLER CAP DESIGN	
<p>1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.</p>		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

EC

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2	CHECK FUEL FILLER CAP INSTALLATION	
<p>Check that the cap is tightened properly by rotating the cap clockwise.</p>		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

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3	CHECK FUEL FILLER CAP FUNCTION	
<p>Check for air releasing sound while opening the fuel filler cap.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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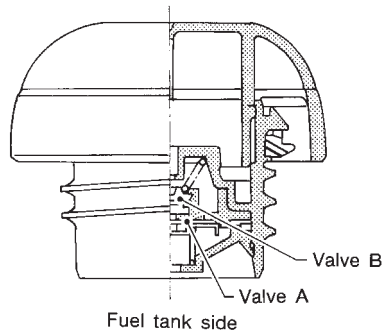
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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

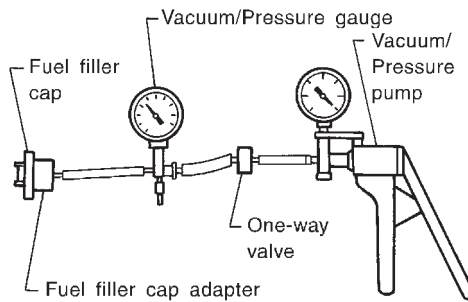
Diagnostic Procedure (Cont'd)

4 CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF427N



SEF943S

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)

CAUTION:

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

OK or NG

OK



GO TO 5.

NG



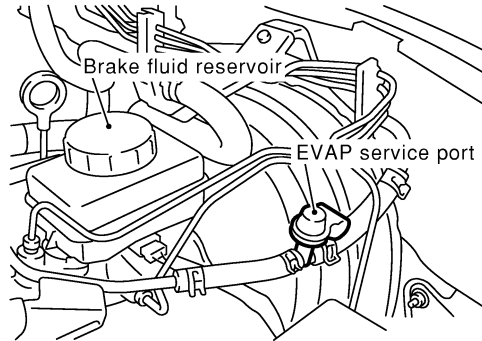
Replace fuel filler cap with a genuine one.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

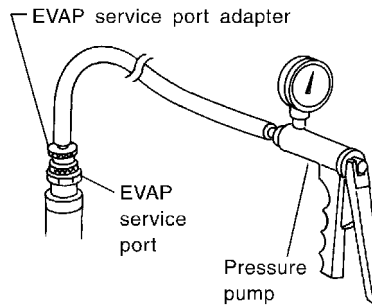
Diagnostic Procedure (Cont'd)

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ►	GO TO 6.
Models without CONSULT-II ►	GO TO 7.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

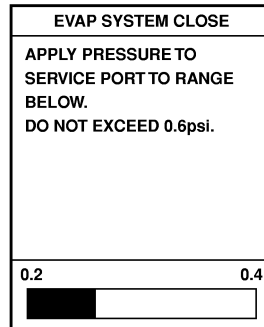
6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

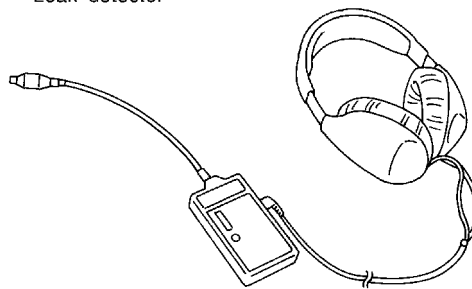
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

Leak detector



SEF200U

OK or NG

OK ► GO TO 8.

NG ► Repair or replace.

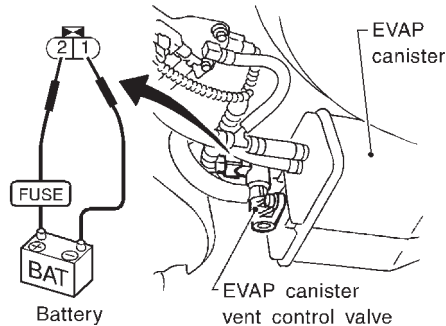
DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

7 CHECK FOR EVAP LEAK

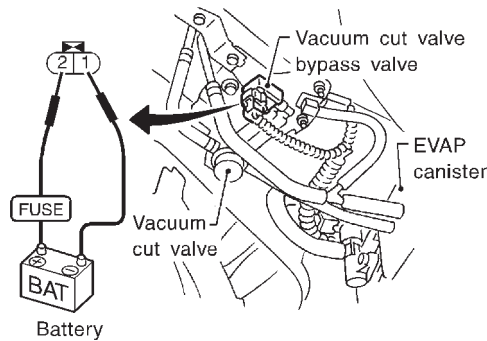
⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

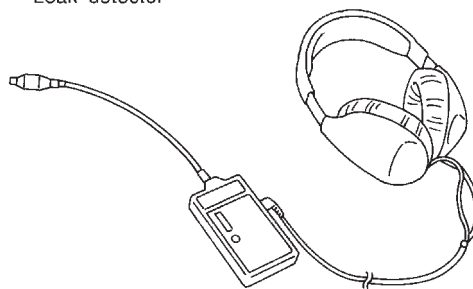
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

Leak detector



SEF200U

OK or NG

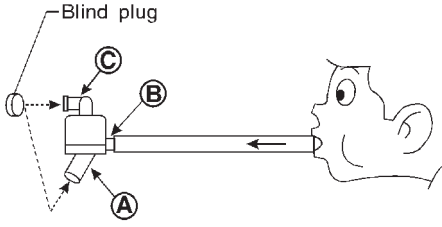
OK ► GO TO 8.

NG ► Repair or replace.

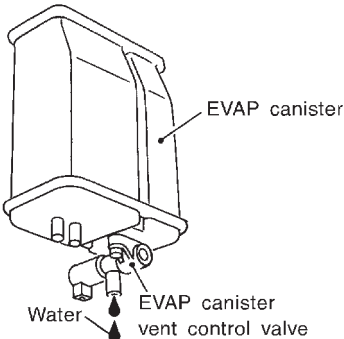
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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 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. <div style="text-align: center;">  <p>* A : Bottom hole (To atmosphere) B : Emergency tube (From EVAP canister) C : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p>	
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
<p>Refer to "DTC Confirmation Procedure", EC-375.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Does water drain from the EVAP canister? <div style="text-align: center;">  <p style="text-align: right;">EVAP canister</p> <p style="text-align: center;">Water</p> <p style="text-align: center;">EVAP canister vent control valve</p> </div> <p style="text-align: right;">SEF596U</p> <p style="text-align: center;">Yes or No</p>	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

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12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
	▶	Repair hose or replace EVAP canister.

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13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V			Vacuum should exist.
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
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OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

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14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. Vacuum should exist. 		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																				
<p> With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																					
<table border="1"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td>0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
PURG VOL CONT/V	0.0%																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
SEF985Y																					
OK or NG																					
OK ▶	GO TO 18.																				
NG ▶	GO TO 17.																				

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

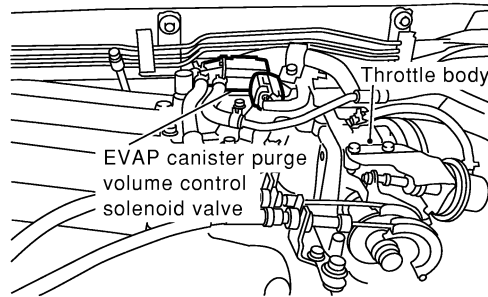
Diagnostic Procedure (Cont'd)

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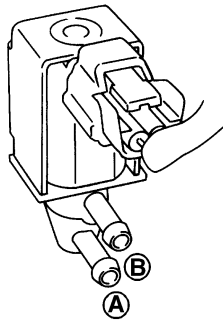
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

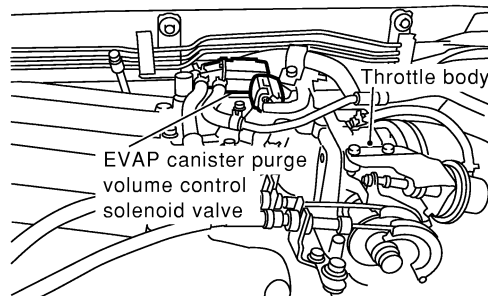


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

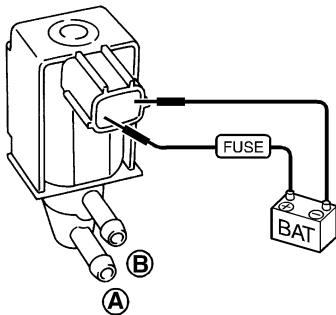
SEF334X

ⓧ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

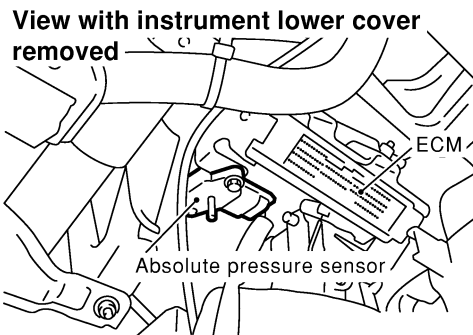
OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

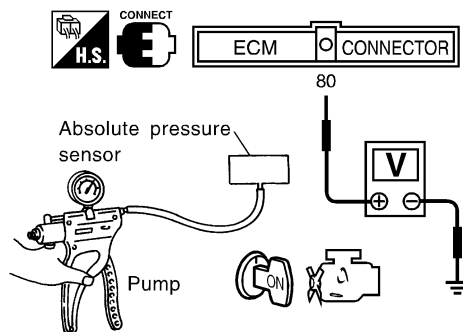
18 CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF961Y

2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4 lower than above value

SEF300XA

CAUTION:

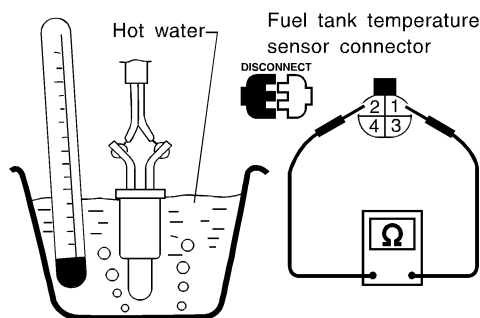
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace absolute pressure sensor.

19 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 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

SEF974Y

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR						
<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Never apply force to the air hole protector of the sensor if equipped. 							
SEF799W							
<p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● 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. <p>5. Check input voltage between ECM terminal 84 and ground.</p>							
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1; margin-left: 20px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Pressure (Relative to atmospheric pressure)</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 kPa (0 mmHg, 0 inHg)</td> <td style="text-align: center;">$3.0 - 3.6$</td> </tr> <tr> <td style="text-align: center;">-9.3 kPa (-70 mmHg, -2.76 inHg)</td> <td style="text-align: center;">$0.4 - 0.6$</td> </tr> </tbody> </table> </div> </div>		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)	$0.4 - 0.6$
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)	$0.4 - 0.6$						
SEF342X							
<p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one. <p style="text-align: center;">OK or NG</p>							
OK	▶ GO TO 21.						
NG	▶ Replace EVAP control system pressure sensor.						

21	CHECK EVAP PURGE LINE
<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-32.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 22.
NG	▶ Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE
<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p>	
▶	GO TO 23.

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DTC P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)

Diagnostic Procedure (Cont'd)

23	CHECK FUEL LEVEL SENSOR
Refer to EL-108, "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 24.
NG	▶ Replace fuel level sensor unit.

24	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

Description

Description SYSTEM DESCRIPTION

NBEC0221

NBEC0221S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

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This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

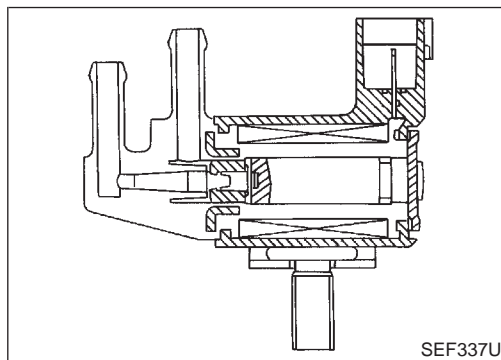
TF

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COMPONENT DESCRIPTION

NBEC0221S02

The EVAP canister purge volume control solenoid valve uses an ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

ST

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CONSULT-II Reference Value in Data Monitor Mode

NBEC0222

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever: "N" ● No-load	Idle (Vehicle stopped)
		2,000 rpm
		0%
		—

EL

IDX

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

ECM Terminals and Reference Value

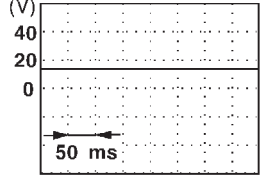
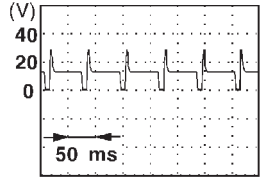
ECM Terminals and Reference Value

NBEC0666

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L/Y	EVAP canister purge volume control solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p>SEF994U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> Engine speed is about 2,000 rpm (More than 100 seconds after starting engine). 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p>SEF995U</p>

On Board Diagnosis Logic

NBEC0224

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

Possible Cause

NBEC0511

- Harness or connectors (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

DTC Confirmation Procedure

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NBEC0225

NOTE:

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

TESTING CONDITION:

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

WITH CONSULT-II

NBEC0225S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 13 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-371.

WITH GST

NBEC0225S02

Follow the procedure "WITH CONSULT-II" above.

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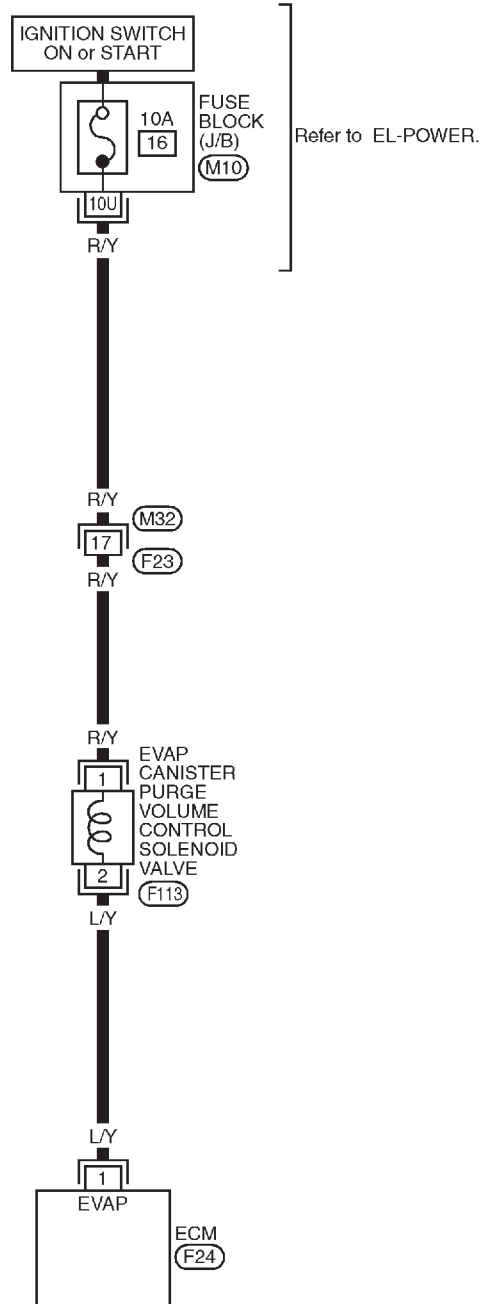
DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

Wiring Diagram

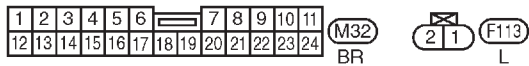
Wiring Diagram

NBEC0226

EC-PGC/V-01

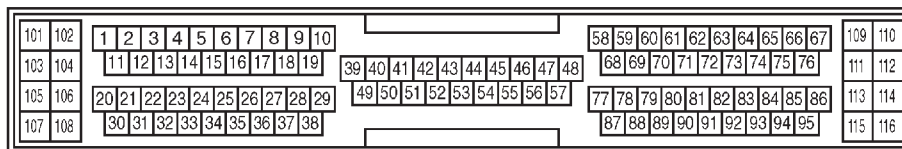


— : Detectable line for DTC
— : Non-detectable line for DTC



REFER TO THE FOLLOWING.

M10 - FUSE BLOCK-
JUNCTION BOX (J/B)



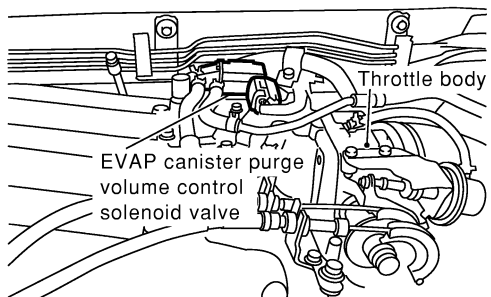
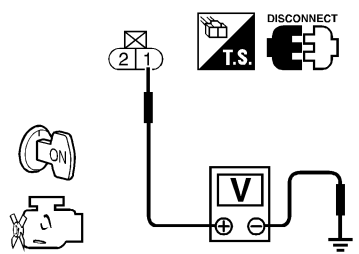
MEC962C

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

Diagnostic Procedure

Diagnostic Procedure

NBEC0227

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT	GI MA EM LC EC FE AT TF PD AX SU BR
<p>1. Turn ignition switch "OFF". 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Throttle body EVAP canister purge volume control solenoid valve</p> </div> <p style="text-align: right;">SEF986Y</p> <p>3. Turn ignition switch "ON". 4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="text-align: right;">Voltage: Battery voltage</p> </div> <p style="text-align: right;">SEF988Y</p> <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 3.
NG		▶ GO TO 2.

2	DETECT MALFUNCTIONING PART	ST RS BT HA SC EL IDX
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● Fuse block (J/B) connector M10 ● 10A fuse ● Harness for open or short between EVAP canister purge volume control solenoid valve and fuse 		
		▶ Repair harness or connectors.

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 1 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground and short to power in harness or connectors.

4	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p>Ⓟ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 6.																				
NG	▶	GO TO 5.																				

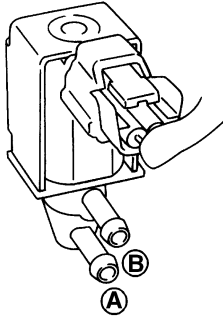
DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

5 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

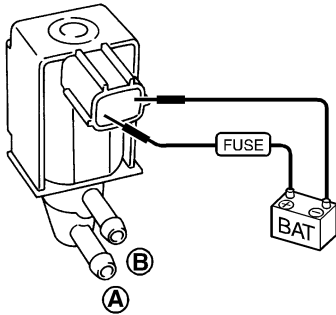


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

ⓧ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

6 CHECK INTERMITTENT INCIDENT

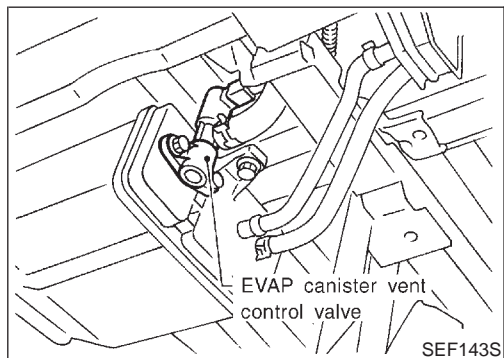
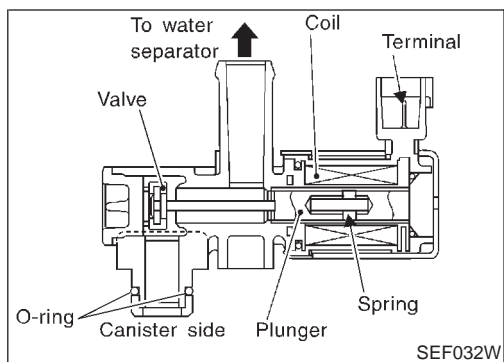
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

▶ INSPECTION END

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DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Component Description



Component Description

NBEC0228

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0229

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NBEC0667

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	G/Y	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NBEC0231

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Possible Cause

Possible Cause

NBEC0512

- Harness or connectors
(The valve circuit is open or shorted.)
- EVAP canister vent control valve

GI

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DTC Confirmation Procedure

NBEC0232

NOTE:

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

TESTING CONDITION:

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

EC

FE

AT

TF

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

WITH CONSULT-II

NBEC0232S01

- 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-377.

PD

AX

WITH GST

NBEC0232S02

Follow the procedure "WITH CONSULT-II" above.

SU

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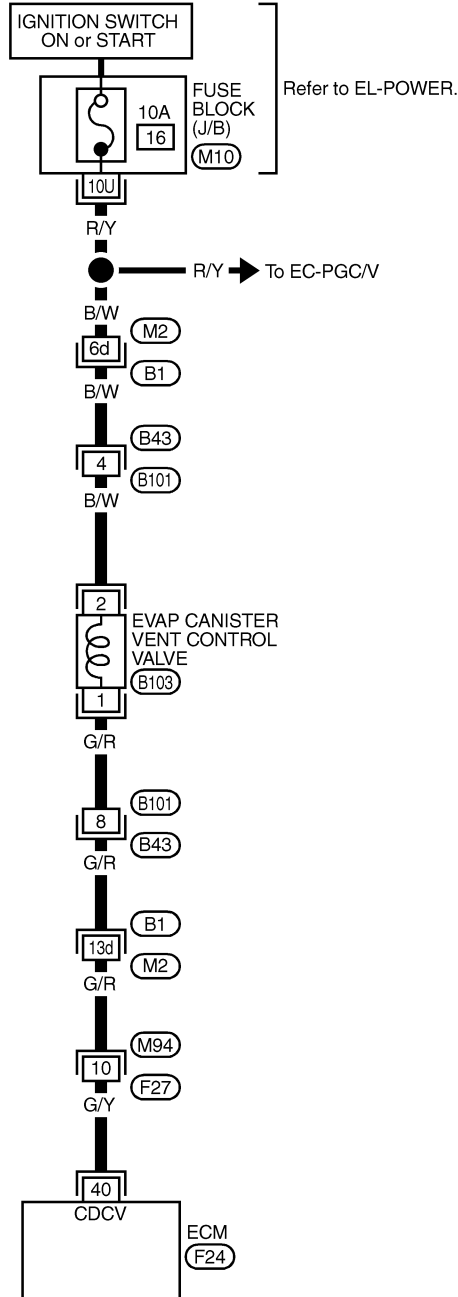
DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Wiring Diagram

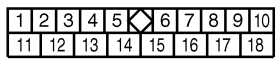
Wiring Diagram

NBEC0233

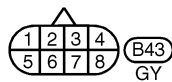
EC-VENT/V-01



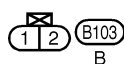
: Detectable line for DTC
 : Non-detectable line for DTC



W



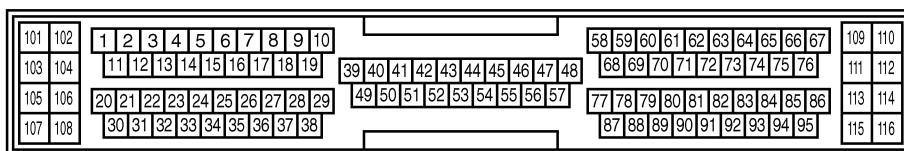
GY



B

REFER TO THE FOLLOWING.

- (B1) -SUPER
- MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK-
- JUNCTION BOX (J/B)



F24
GY



MEC963C

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Diagnostic Procedure

Diagnostic Procedure


NBEC0234

1	INSPECTION START	
1. Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

GI

MA

EM

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT																					
<p> With CONSULT-II</p> <p>1. Turn ignition switch "OFF" and then turn "ON".</p> <p>2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.</p> <p>3. Touch "ON/OFF" on CONSULT-II screen.</p>																						
<table border="1" style="margin: auto;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>HO2S1 (B2)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VENT CONTROL/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 (B1)	XXX V																					
HO2S1 (B2)	XXX V																					
THRTL POS SEN	XXX V																					
<p>4. Check for operating sound of the valve. Clicking noise should be heard.</p> <p style="text-align: center;">OK or NG</p>																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

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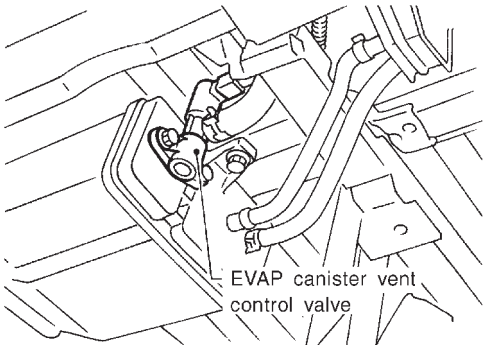
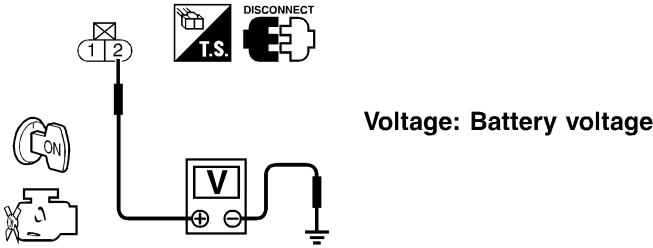
SC

EL

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DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect EVAP canister vent control valve harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF143S</p> <p>3. Turn ignition switch "ON". 4. Check voltage between EVAP canister vent control valve terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="text-align: center;">OK or NG</p> </div> <p style="text-align: right;">SEF990Y</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M2, B1 and B43, B101 ● Fuse block (J/B) connector M10 ● 10A fuse ● Harness for open or short between EVAP canister vent control valve and fuse <p style="text-align: center;">▶ Repair harness or connectors.</p>	

5	CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 40 and EVAP canister vent control valve terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors B101, B43 ● Harness connectors B1, M2 and M94, F27 ● Harness for open or short between EVAP canister vent control valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

GI

MA

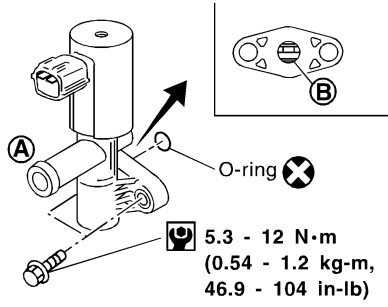
EM

7	CHECK RUBBER TUBE FOR CLOGGING
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Clean the rubber tube using an air blower.

LC

EC

FE

8	CHECK EVAP CANISTER VENT CONTROL VALVE-I
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.	
	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

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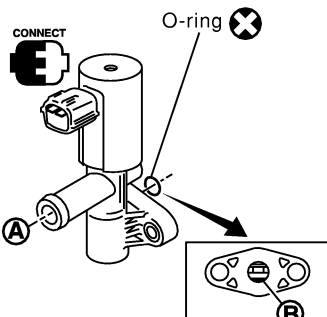
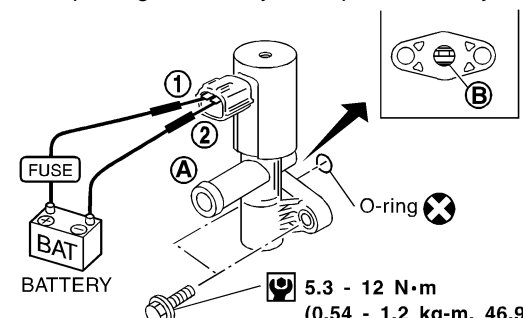
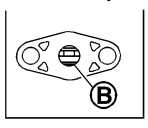
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DTC P0446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

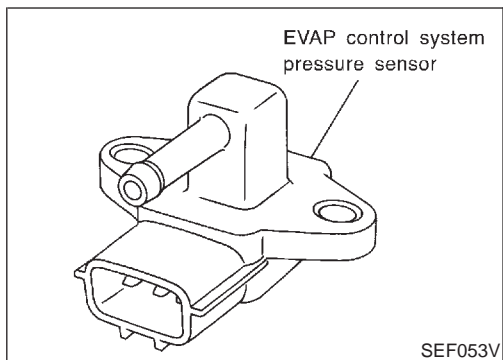
9	CHECK EVAP CANISTER VENT CONTROL VALVE-II																								
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Turn ignition switch "ON". 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time. 																									
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>HO2S1 (B2)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table> </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																									
VENT CONTROL/V	OFF																								
MONITOR																									
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Condition VENT CONTROL/V	Air passage continuity between A and B																								
ON	No																								
OFF	Yes																								
SEF991Y																									
<p>⊗ Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p>																									
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 40%;">  </div> <div style="width: 20%;">  </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes																		
Condition	Air passage continuity between A and B																								
12V direct current supply between terminals 1 and 2	No																								
OFF	Yes																								
SEF339X																									
<p>Make sure new O-ring is installed properly.</p> <p style="text-align: center;">OK or NG</p>																									
OK	▶	GO TO 11.																							
NG	▶	GO TO 10.																							

10	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
<ol style="list-style-type: none"> 1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform Test No. 9 again. 		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
	▶	INSPECTION END

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

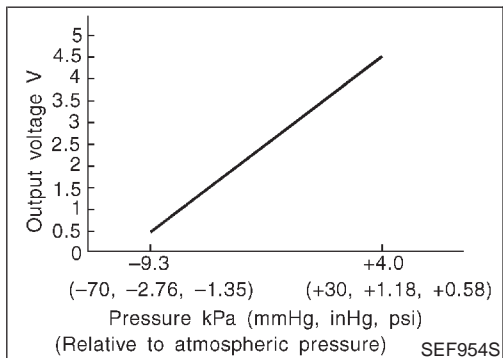
Component Description



Component Description

NBEC0235

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

NBEC0236

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NBEC0668

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B/P	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
84	L/G	EVAP control system pressure sensor	[Ignition switch "ON"]	Approximately 3.4V
111	P/B	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM. NBEC0238

Possible Cause

- Harness or connectors
(The EVAP control system pressure sensor circuit is open or shorted.) NBEC0513
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. NBEC0239

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

DTC Confirmation Procedure (Cont'd)

6

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

WITH CONSULT-II

NBEC0239S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "FUEL T/TEMP SE" is more than 0°C (32°F).
- 6) Start engine and wait at least 20 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-385.

GI

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WITH GST

NBEC0239S02

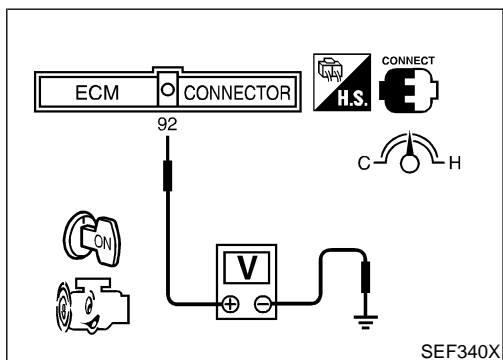
- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal 92 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
- 3) Turn ignition switch "OFF" and wait at least 10 seconds.
- 4) Start engine and wait at least 20 seconds.
- 5) Select "MODE 7" with GST.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-385.

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

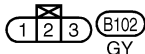
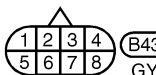
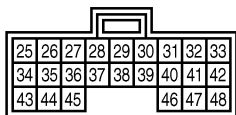
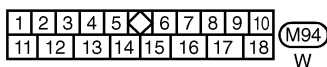
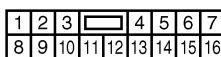
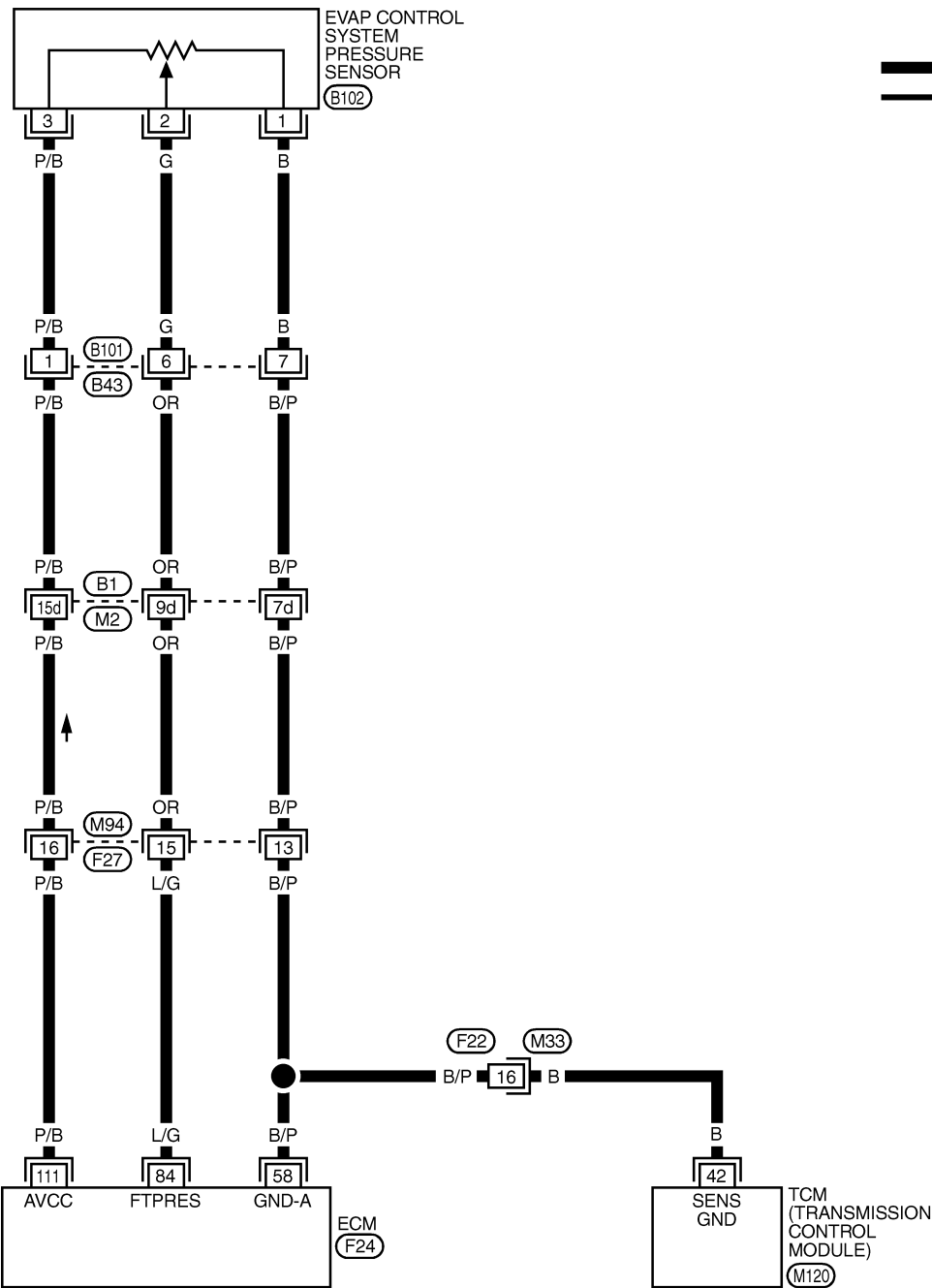
Wiring Diagram

Wiring Diagram

NBEC0240

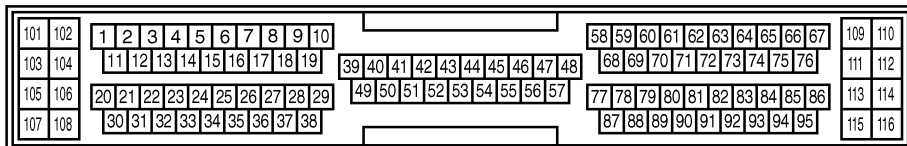
EC-PRE/SE-01

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



REFER TO THE FOLLOWING.

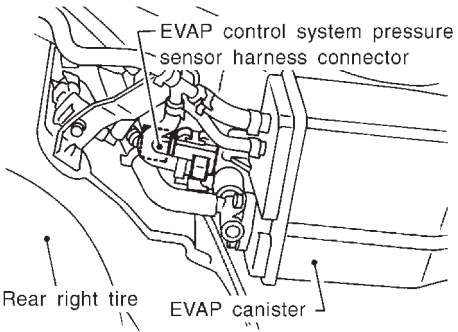
B1 -SUPER
 MULTIPLE JUNCTION (SMJ)

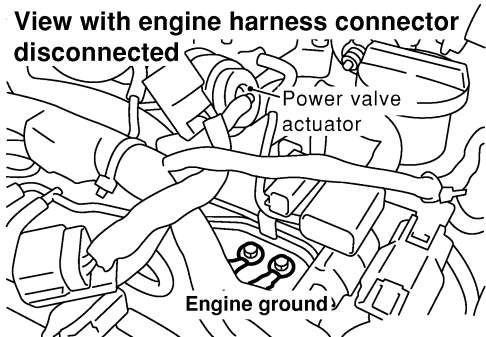


MEC964C

Diagnostic Procedure

NBEC0241

1	CHECK RUBBER TUBE		
<p>1. Turn ignition switch "OFF". 2. Check rubber tube connected to the EVAP control system pressure sensor for clogging, vent, kink, disconnection or improper connection.</p>			
			
SEF495R			
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Reconnect, repair or replace.	

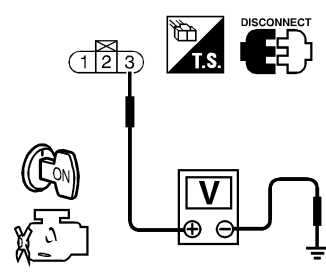
2	RETIGHTEN GROUND SCREWS		
<p>Loosen and retighten engine ground screws.</p>			
<p>View with engine harness connector disconnected</p> 			
SEF959Y			
		▶	GO TO 3.

3	CHECK CONNECTOR		
<p>1. Disconnect EVAP control system pressure sensor harness connector. 2. Check sensor harness connector for water. Water should not exist.</p>			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Repair or replace harness connector.	

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "ON". 2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.</p>		
 <p style="margin-left: 200px;">Voltage: Approximately 5V</p>		
SEF992Y		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, B43 ● Harness connectors B1, M2 and M94, F27 ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶ Repair harness or connectors.		

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, B43 ● Harness connectors B1, M2 and M94, F27 ● Harness for open between EVAP control system pressure sensor and ECM ● Harness for open between EVAP control system pressure sensor and TCM (Transmission Control Module) 		
▶ Repair open circuit or short to power in harness or connectors.		

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 84 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶▶	GO TO 10.
OK (Without CONSULT-II)	▶▶	GO TO 11.
NG	▶▶	GO TO 9.

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9	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, B43 ● Harness connectors B1, M2 and M94, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor 		
▶▶		Repair open circuit or short to ground or short to power in harness or connectors.

FE
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10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
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MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
OK or NG																						
OK	▶▶	GO TO 12.																				
NG	▶▶	GO TO 11.																				

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SEF985Y

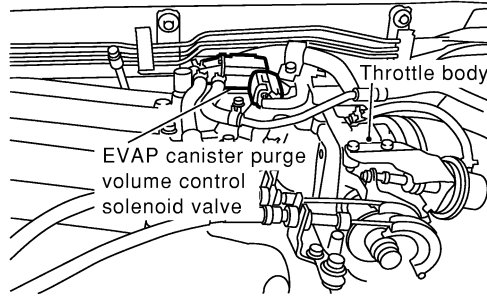
DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

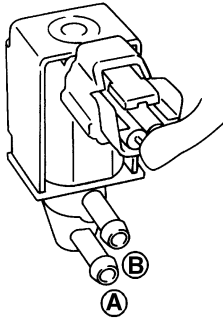
11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **With CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

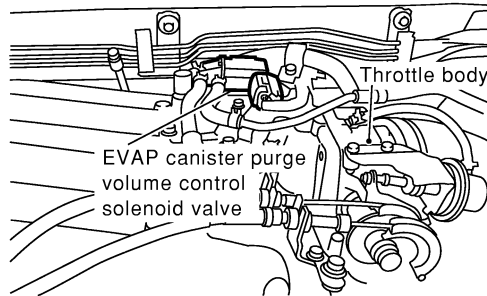


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

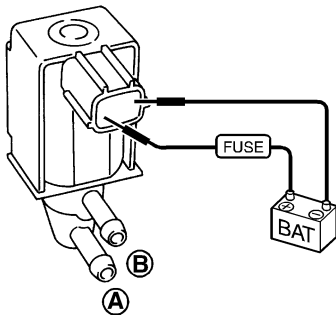
SEF334X

 **Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

12	CHECK RUBBER TUBE FOR CLOGGING	
	1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.	
	OK or NG	
OK	▶	GO TO 13.
NG	▶	Clean the rubber tube using an air blower.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
	1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.	
	OK or NG	
OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

14	CHECK EVAP CANISTER VENT CONTROL VALVE																												
<p> With CONSULT-II</p> <p>1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.</p> <p>2. Check air passage continuity and operation delay time under the following conditions.</p>																													
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> </div> <div style="width: 30%; border: 1px solid black; padding: 5px;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VENT CONTROL/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 (B1)</td><td>XXX V</td></tr> <tr><td>HO2S1 (B2)</td><td>XXX V</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th>Condition</th><th>Air passage continuity between A and B</th></tr> <tr><td>VENT CONTROL/V ON</td><td>No</td></tr> <tr><td>VENT CONTROL/V OFF</td><td>Yes</td></tr> </table> <p>Operation takes less than 1 second.</p> </div> </div>		ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V					Condition	Air passage continuity between A and B	VENT CONTROL/V ON	No	VENT CONTROL/V OFF	Yes
ACTIVE TEST																													
VENT CONTROL/V	OFF																												
MONITOR																													
ENG SPEED	XXX rpm																												
A/F ALPHA-B1	XXX %																												
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HO2S1 (B2)	XXX V																												
THRTL POS SEN	XXX V																												
Condition	Air passage continuity between A and B																												
VENT CONTROL/V ON	No																												
VENT CONTROL/V OFF	Yes																												
SEF991Y																													

<p> Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p>							
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> </div> <div style="width: 55%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th>Condition</th><th>Air passage continuity between A and B</th></tr> <tr><td>12V direct current supply between terminals 1 and 2</td><td>No</td></tr> <tr><td>OFF</td><td>Yes</td></tr> </table> <p>Operation takes less than 1 second.</p> </div> </div>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
SEF339X							
Make sure new O-ring is installed properly.							
OK or NG							
OK	▶	GO TO 16.					
NG	▶	GO TO 15.					

15	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
<p>1. Clean the air passage (portion A to B) of EVAP canister vent control valve using an air blower.</p> <p>2. Perform Test No. 14 again.</p>		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

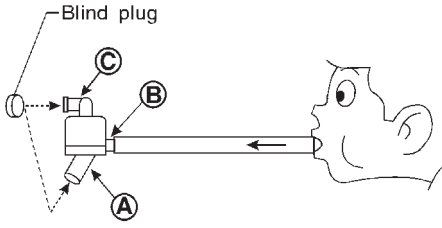
16	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR						
<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Never apply force to the air hole protector of the sensor if equipped. 							
SEF799W							
<p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● 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. <p>5. Check input voltage between ECM terminal 84 and ground.</p>							
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> </div> <div style="flex: 1; margin-left: 20px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Pressure (Relative to atmospheric pressure)</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 kPa (0 mmHg, 0 inHg)</td> <td style="text-align: center;">$3.0 - 3.6$</td> </tr> <tr> <td style="text-align: center;">-9.3 kPa (-70 mmHg, -2.76 inHg)</td> <td style="text-align: center;">$0.4 - 0.6$</td> </tr> </tbody> </table> </div> </div>		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)	$0.4 - 0.6$
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)	$0.4 - 0.6$						
SEF342X							
<p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard and 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. <p style="text-align: center;">OK or NG</p>							
OK	▶ GO TO 17.						
NG	▶ Replace EVAP control system pressure sensor.						

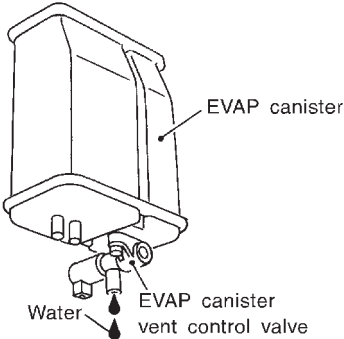
17	CHECK RUBBER TUBE
<p>Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ Clean rubber tube using an air blower, repair or replace rubber tube.

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DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

18	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 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. <div style="text-align: center; margin: 10px 0;">  </div> <p style="margin-left: 40px;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>	
SEF829T	
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 19.
NG	▶ Replace water separator.

19	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center;">Yes or No</p>	
SEF596U	
Yes	▶ GO TO 20.
No	▶ GO TO 22.

20	CHECK EVAP CANISTER
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 22.
NG	▶ GO TO 21.

DTC P0450 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

21	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● EVAP canister for damage● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

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22	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

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DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

On Board Diagnosis Logic

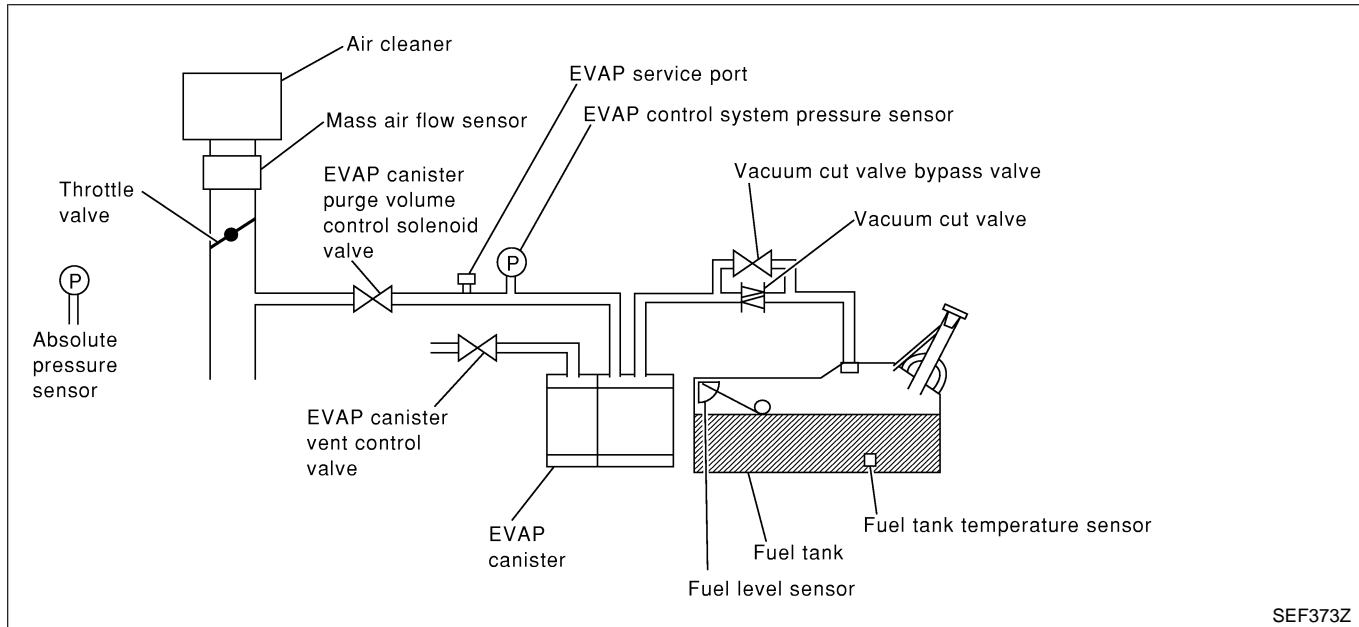
On Board Diagnosis Logic

NBEC0644

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-573.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



SEF373Z

Malfunction is detected when EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.

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.

Possible Cause

NBEC0645

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Possible Cause (Cont'd)

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor

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DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

DTC Confirmation Procedure

6

EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
-FUEL LEVEL: 1/4-3/4
-AMBIENT TEMP: 0-30 C(32-86F)
-OPEN ENGINE HOOD.
2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
3)TOUCH START.

SEF565X

6

EVAP SML LEAK P0440/P1440

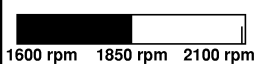
WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING AT IDLE SPEED.

SEF566X

6

EVAP SML LEAK P0440/P1440

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)



1600 rpm 1850 rpm 2100 rpm

SEF874X

6

EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

DTC Confirmation Procedure

NBEC0646

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-573.)
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

Ⓜ WITH CONSULT-II

NBEC0646S01

- 1) Tighten fuel filler cap securely until ratcheting sound is heard.
- 2) Turn ignition switch “ON”.
- 3) Turn ignition switch “OFF” and wait at least 10 seconds.
- 4) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that the following conditions are met.
COOLANT TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 60°C (32 - 140°F)
- 6) Select “EVAP SML LEAK P0440/P1440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-101.

- 7) Make sure that “OK” is displayed.
If “NG” is displayed, select “SELF-DIAG RESULTS” mode and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to “Diagnostic Procedure”, EC-397.
If P0440 is displayed, perform “Diagnostic Procedure” for DTC P0440.

Ⓜ WITH GST

NBEC0646S02

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-66 before driving vehicle.

- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-66.
- 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 10 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the “Driving Pattern”, EC-66.

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

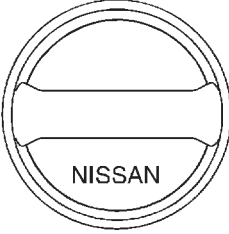
DTC Confirmation Procedure (Cont'd)

- 8) Stop vehicle.
- 9) Select "MODE 3" with GST.
 - If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-397.
 - If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0440, EC-355.
 - If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-564.
 - If P0455, P0440, P1440 and P1447 are not displayed on the screen, go to the following step.
- 10) Select "MODE 1" with GST.
 - If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 6.

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Diagnostic Procedure

NBEC0647

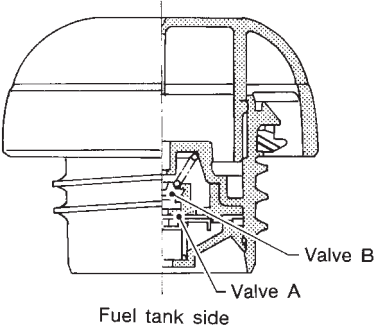
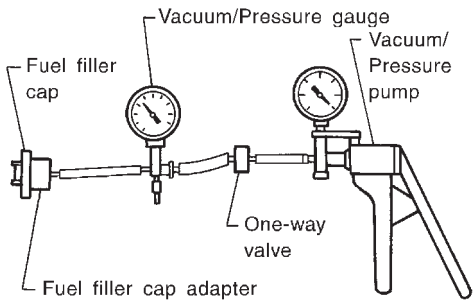
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE
<p>1. Wipe clean valve housing.</p> <p>2. Check valve opening pressure and vacuum.</p>	
	
SEF427N	
	
SEF943S	
<p>Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)</p> <p>Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)</p> <p>CAUTION: Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Replace fuel filler cap with a genuine one.

5	CHECK EVAP PURGE LINE
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-32.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair or reconnect the hose.

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

6	CLEAN EVAP PURGE LINE	
	Clean EVAP purge line (pipe and rubber tube) using air blower.	
	▶	GO TO 7.

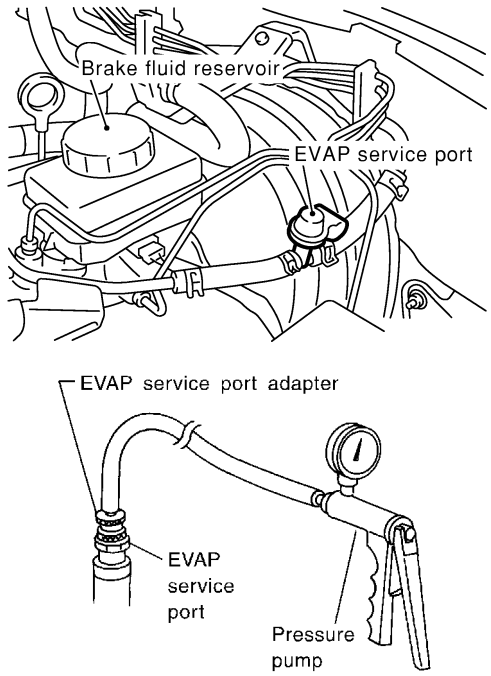
GI

7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
	Refer to "DTC Confirmation Procedure", EC-375.	
	OK or NG	
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

MA

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8	INSTALL THE PRESSURE PUMP	
	To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.	
		SEF983Y
	NOTE: Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.	SEF916U
	Models with CONSULT-II ▶	GO TO 9.
	Models without CON- SULT-II ▶	GO TO 10.

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DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

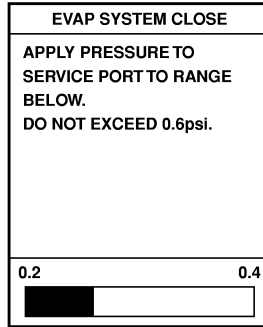
9 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

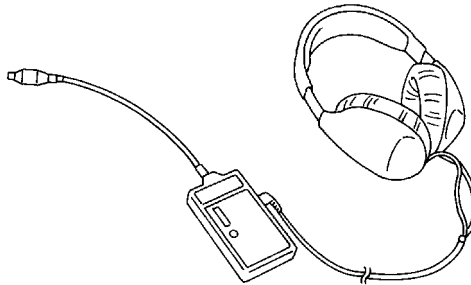
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

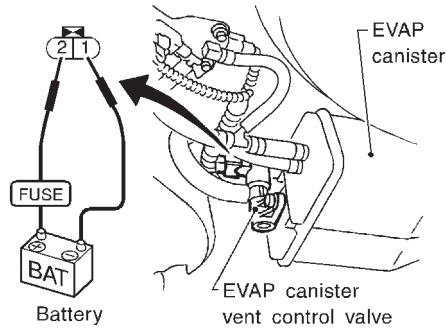
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

10 CHECK FOR EVAP LEAK

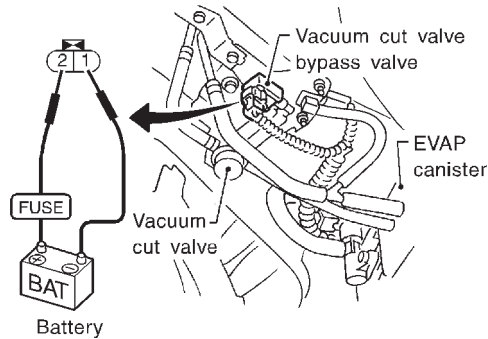
⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

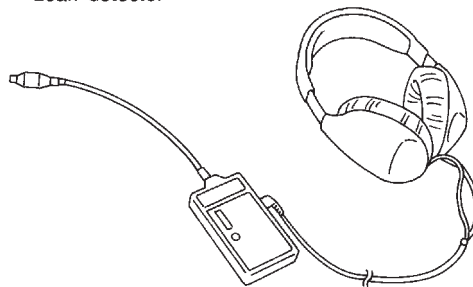
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

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DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">ACTIVE TEST</th></tr> <tr><td style="text-align: center;">PURG VOL CONT/V</td><td style="text-align: center;">XXX %</td></tr> <tr><th colspan="2" style="text-align: center;">MONITOR</th></tr> <tr><td style="text-align: center;">ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td style="text-align: center;">A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td style="text-align: center;">A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td style="text-align: center;">HO2S1 MNTR (B1)</td><td style="text-align: center;">LEAN</td></tr> <tr><td style="text-align: center;">HO2S1 MNTR (B2)</td><td style="text-align: center;">LEAN</td></tr> <tr><td style="text-align: center;">THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 14.																				
NG	▶	GO TO 13.																				

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="color: blue; text-align: center;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																						
<table border="1"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>0.0%</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>RICH</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>RICH</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

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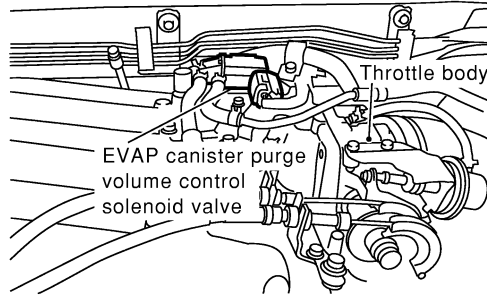
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

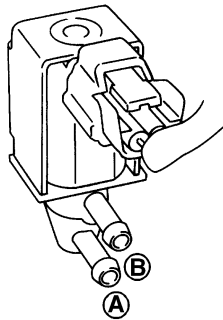
15 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

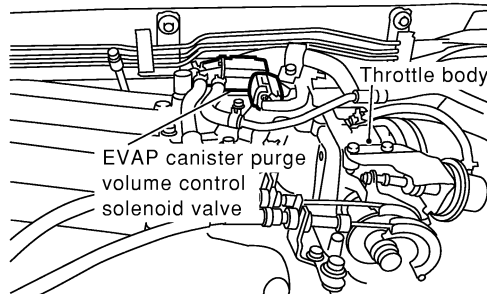


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

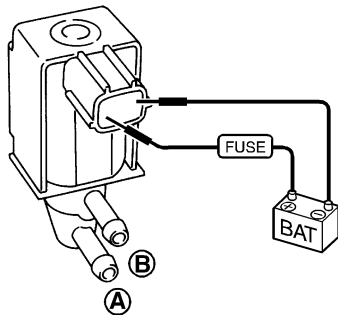
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

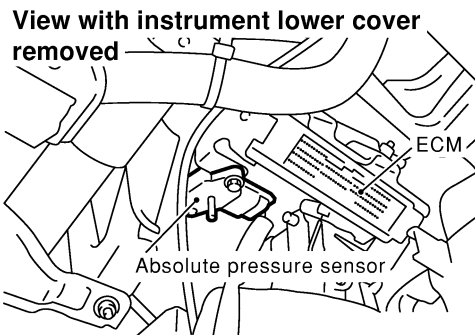
DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

Diagnostic Procedure (Cont'd)

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16 CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.

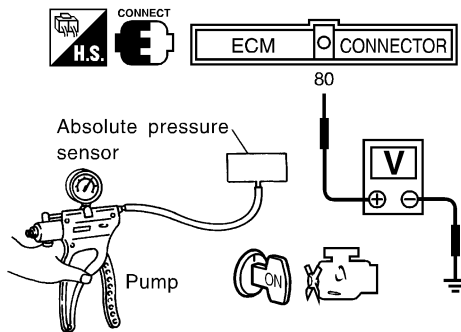


SEF961Y

2. Remove hose from absolute pressure sensor.

3. Install a vacuum pump to absolute pressure sensor.

4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4 lower than above value

SEF300XA

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.

OK or NG

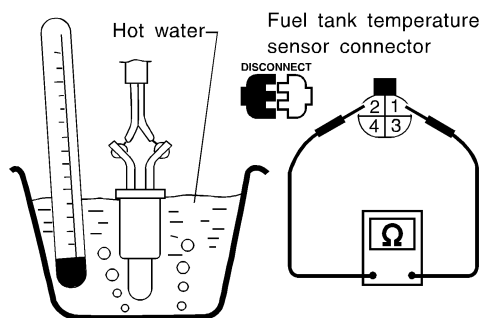
OK ► GO TO 17.

NG ► Replace absolute pressure sensor.

17 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.

2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 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

SEF974Y

OK or NG

OK ► GO TO 18.

NG ► Replace fuel level sensor unit.

DTC P0455 EVAP CONTROL SYSTEM (GROSS LEAK)

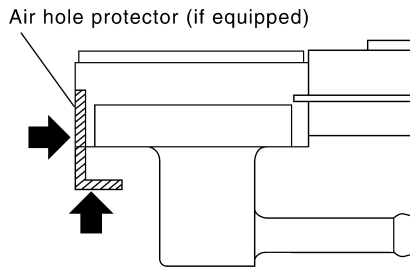
Diagnostic Procedure (Cont'd)

18 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

2. Remove hose from EVAP control system pressure sensor.

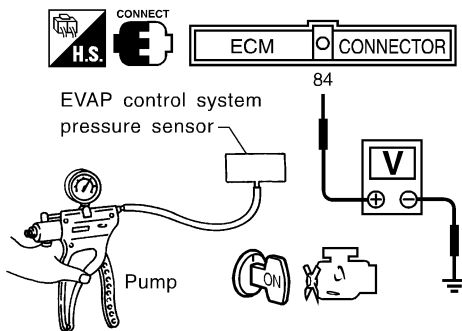
3. Turn ignition switch "ON".

4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

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.

5. Check input voltage between ECM terminal 84 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

SEF342X

CAUTION:

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK



GO TO 19.

NG



Replace EVAP control system pressure sensor.

19 CHECK INTERMITTENT INCIDENT

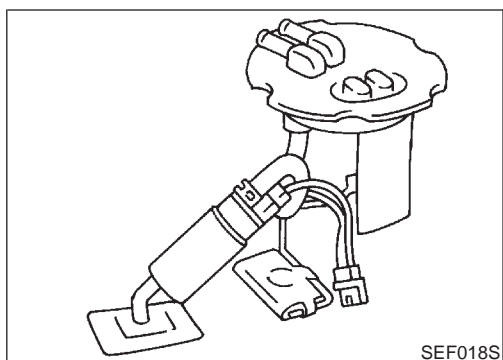
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.



INSPECTION END

DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

Component Description



Component Description

NBEC0616

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

GI

MA

EM

LC

On Board Diagnostic Logic

NBEC0617

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

EC

FE

AT

TF

Possible Cause

NBEC0618

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

PD

AX

SU

BR

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NBEC0619

NOTE:

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

ST

RS

WITH CONSULT-II

NBEC0619S01

- Turn ignition switch "ON".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and wait maximum of 2 consecutive minutes.
- If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-409.

BT

HA

SC

WITH GST

NBEC0619S02

Follow the procedure "WITH CONSULT-II" above.

EL

IDX

DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

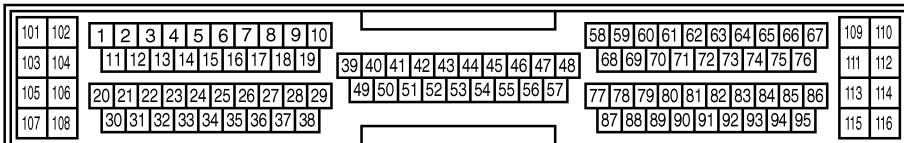
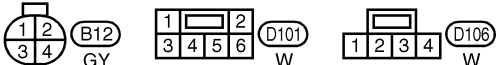
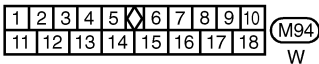
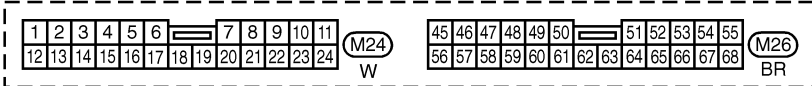
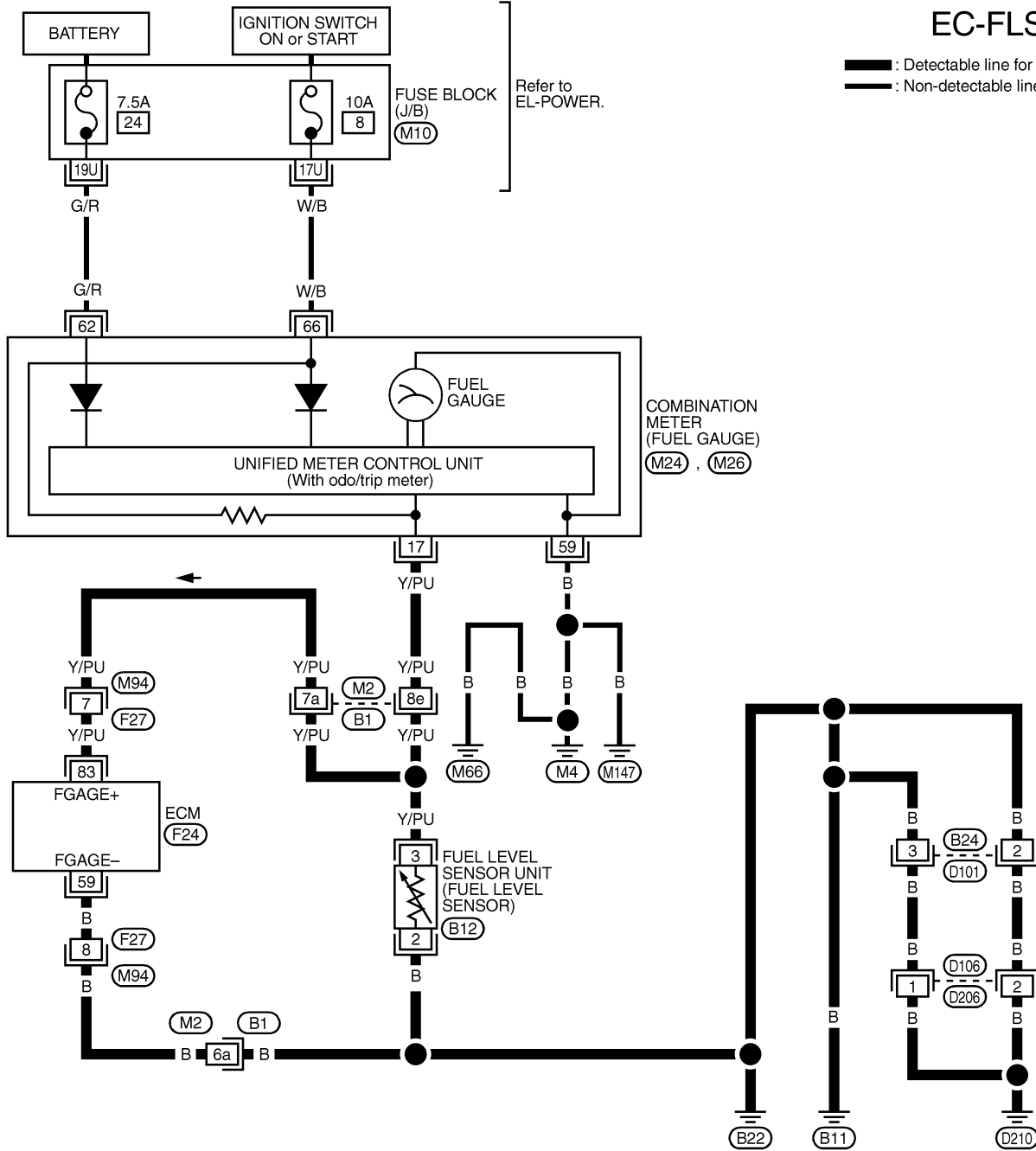
Wiring Diagram

Wiring Diagram

NBEC0620

EC-FLS1-01

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



REFER TO THE FOLLOWING.

- (B1) -SUPER
- MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK- JUNCTION BOX (J/B)



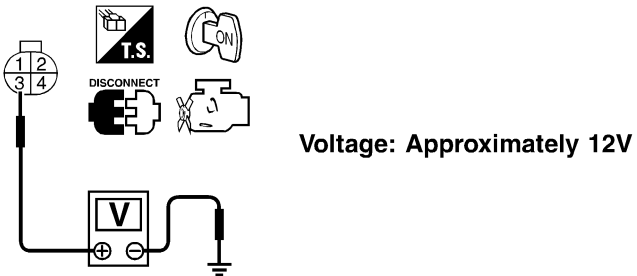
MEC983C

DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

Diagnostic Procedure

Diagnostic Procedure

=NBEC0621

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal 3 and ground with CONSULT-II or a tester.</p>		
 <p>Voltage: Approximately 12V</p>		
SEF993Y		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M2, B1 ● Harness for open or short between combination meter and fuel level sensor unit 		
▶ Repair or replace harness or connectors.		

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 2 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to power in harness or connectors.

4	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 83 and fuel level sensor terminal 3, ECM terminal 59 and fuel level sensor unit terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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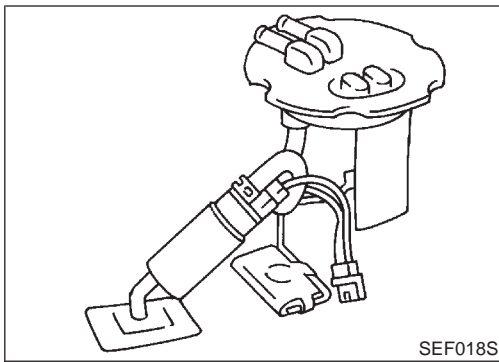
DTC P0460 FUEL LEVEL SENSOR FUNCTION (SLOSH)

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M2, B1● Harness connectors M94, F27● Harness for open or short between ECM and fuel level sensor	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.
6	CHECK FUEL LEVEL SENSOR
Refer to EL-108, "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.
7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P0461 FUEL LEVEL SENSOR FUNCTION

Component Description



Component Description

=NBEC0622

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

GI

MA

EM

LC

On Board Diagnostic Logic

NBEC0623

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

EC

FE

AT

TF

Possible Cause

NBEC0624

- Harness or connectors
(The level sensor circuit is open or shorted.)
- Fuel level sensor

PD

AX

SU

BR

Overall Function Check

NBEC0625

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

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to FE-5, "Fuel Tank".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

ST

RS

BT

HA

7

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

Ⓜ WITH CONSULT-II

NBEC0625S01

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-39.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.

SC

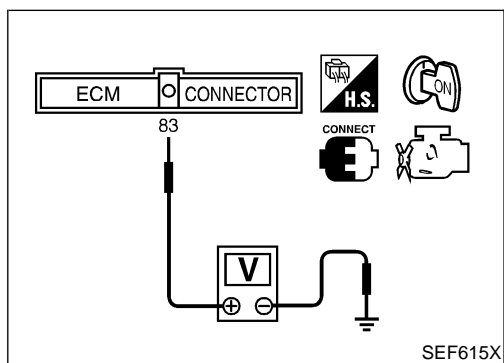
EL

IDX

DTC P0461 FUEL LEVEL SENSOR FUNCTION

Overall Function Check (Cont'd)

- 5) Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
- 6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
- 7) Check "FUEL LEVEL SE" output voltage and note it.
- 8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
- 9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Check "FUEL LEVEL SE" output voltage and note it.
- 12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to EL-108, "FUEL LEVEL SENSOR UNIT CHECK".



WITH GST

NBEC0625S02

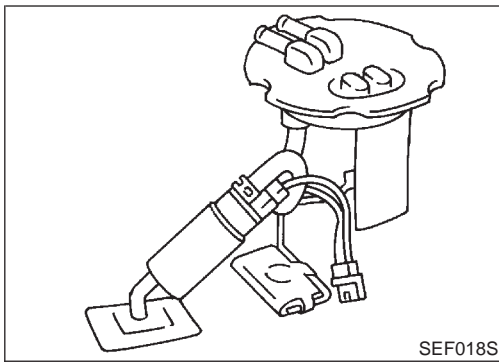
NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-39.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.
- 5) Turn ignition switch "OFF".
- 6) Set voltmeters probe between ECM terminal 83 (fuel level sensor signal) and ground.
- 7) Turn ignition switch "ON".
- 8) Check voltage between ECM terminal 83 and ground and note it.
- 9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Confirm that the voltage between ECM terminal 83 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to EL-108, "FUEL LEVEL SENSOR UNIT CHECK".

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

Component Description



Component Description

NBEC0626

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

GI

MA

EM

LC

On Board Diagnostic Logic

NBEC0627

ECM receives two signals from the fuel level sensor circuit.

One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the former, to detect open or short circuit malfunction.

Malfunction is detected when an excessively low or high voltage is sent from the sensor is sent to ECM.

EC

FE

AT

TF

Possible Cause

NBEC0628

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

PD

AX

SU

BR

DTC Confirmation Procedure

NBEC0629

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

ST

RS

BT

HA

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

Ⓜ WITH CONSULT-II

NBEC0629S01

- 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-415.

SC

EL

IDX

Ⓜ WITH GST

NBEC0629S02

Follow the procedure "WITH CONSULT-II" above.

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

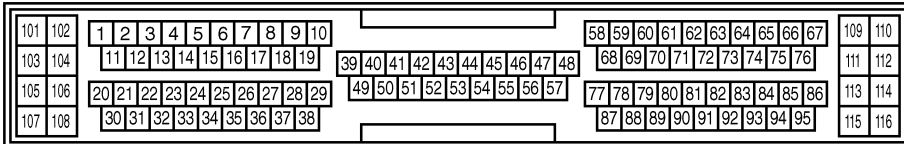
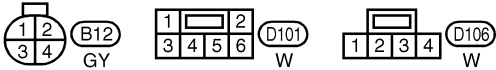
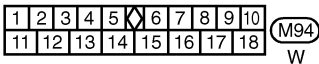
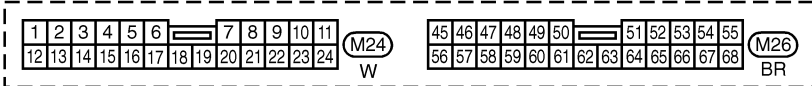
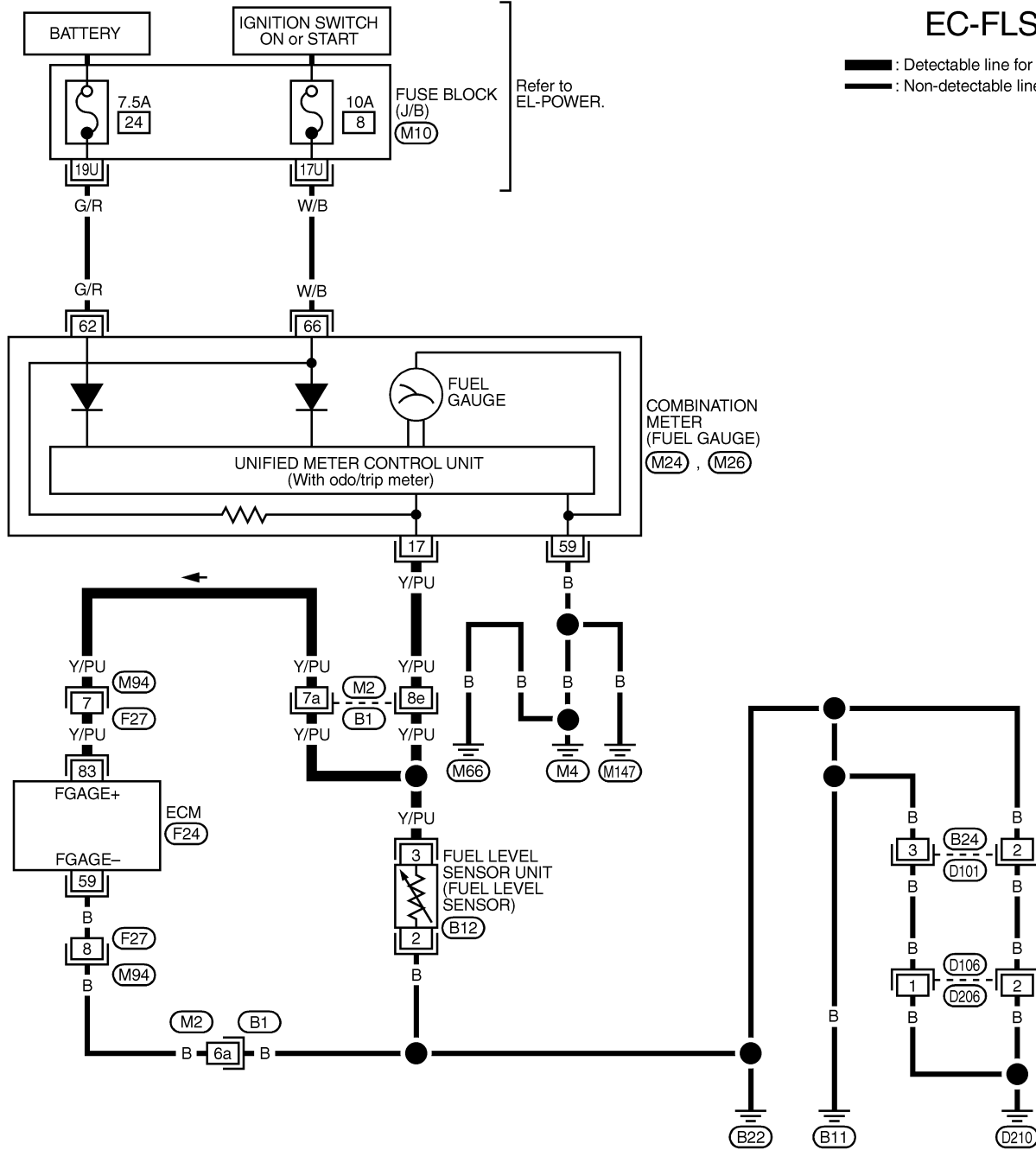
Wiring Diagram

Wiring Diagram

NBEC0630

EC-FLS2-01

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



REFER TO THE FOLLOWING.

- (B1) -SUPER
- MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK- JUNCTION BOX (J/B)



MEC984C

Diagnostic Procedure

=NBEC0631

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT		GI
		<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal 3 and ground, ECM terminal 83 and ground with CONSULT-II or tester. 	MA
		<p style="text-align: center;">Voltage: Approximately 12V</p>	EM
		OK or NG <p style="text-align: right;">SEF374Z</p>	LC
OK	▶	GO TO 3.	EC
NG	▶	GO TO 2.	FE

2	DETECT MALFUNCTIONING PART		PD
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M2, B1 and M94, F27 ● Harness for open or short between combination meter and fuel level sensor unit 	AX
		▶ Repair or replace harness or connectors.	SU

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT		BR
		<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 2 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 	ST
		OK or NG	RS
OK	▶	GO TO 4.	BT
NG	▶	Repair open circuit or short to power in harness or connectors.	HA

4	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT		SC
		<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 59 and fuel level sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 	EL
		OK or NG	IDX
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

DTC P0464 FUEL LEVEL SENSOR CIRCUIT

Diagnostic Procedure (Cont'd)

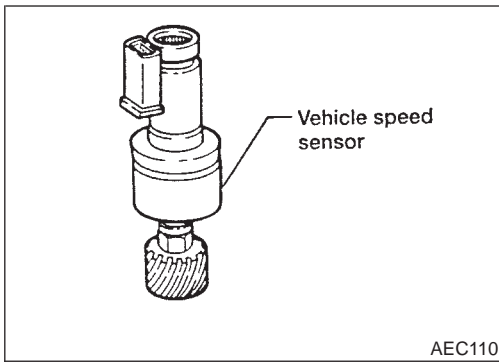
5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M2, B1● Harness connectors M94, F27● Harness for open between ECM and fuel level sensor	
	▶ Repair open circuit or short to power in harness on connectors.

6	CHECK FUEL LEVEL SENSOR
Refer to EL-108, "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P0500 VEHICLE SPEED SENSOR (VSS)

Component Description



Component Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM. =NBEC0242

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NBEC0669

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
86	W/L	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> Jack up front wheels. In 1st gear position 10 km/h (6 MPH) 	<p>Approximately 2.5V</p> <p>SEF583X</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> Jack up front wheels. In 2nd gear position 30 km/h (19 MPH) 	<p>Approximately 2.0V</p> <p>SEF584X</p>

On Board Diagnosis Logic

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. NBEC0244

DTC P0500 VEHICLE SPEED SENSOR (VSS)

Possible Cause

Possible Cause

NBEC0514

- Harness or connector
(The vehicle speed sensor circuit is open or shorted.)
- Vehicle speed sensor

DTC Confirmation Procedure

NBEC0245

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

5	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	B/FUEL SCHDL	XXX msec
	PW/ST SIGNAL	OFF
	VHCL SPEED SE	XXX km/h

SEF196Y

WITH CONSULT-II

NBEC0245S01

- 1) Start engine (TCS switch “OFF”).
- 2) Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
If NG, go to “Diagnostic Procedure”, EC-421.
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.

ENG SPEED	1,800 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 14.0 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

- 6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-421.

Overall Function Check

NBEC0246

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

WITH GST

NBEC0246S01

- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in “MODE 1” with GST.
The vehicle speed sensor on GST should be able to exceed

DTC P0500 VEHICLE SPEED SENSOR (VSS)

Overall Function Check (Cont'd)

10 km/h (6 MPH) when rotating wheels with suitable gear position.

- 4) If NG, go to "Diagnostic Procedure", EC-421.

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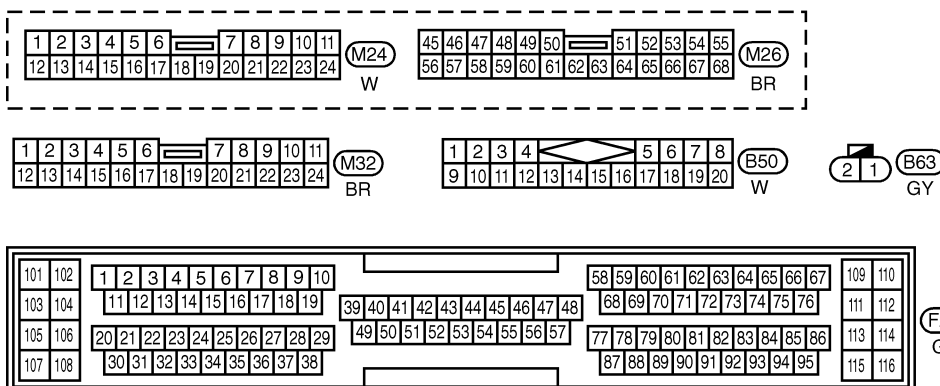
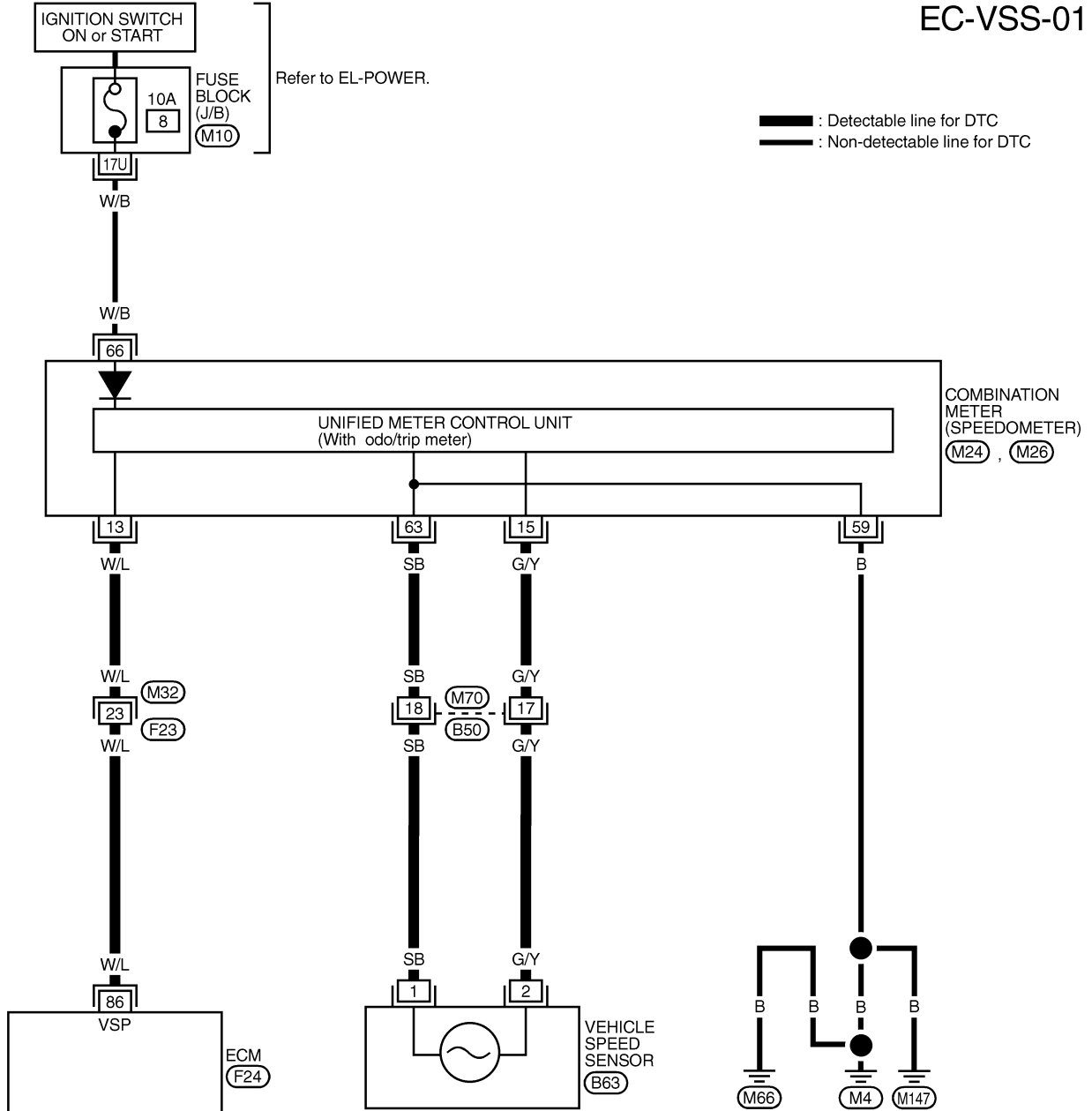
DTC P0500 VEHICLE SPEED SENSOR (VSS)

Wiring Diagram

Wiring Diagram

NBEC0247

EC-VSS-01



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-
JUNCTION BOX (J/B)

MEC965C

DTC P0500 VEHICLE SPEED SENSOR (VSS)

Diagnostic Procedure

Diagnostic Procedure

NBEC0248

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector and combination meter harness connector.</p> <p>3. Check harness continuity between ECM terminal 86 and combination meter terminal 13. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

GI

MA

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EC

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● Harness for open or short between ECM and combination meter 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

FE

AT

3	CHECK SPEEDOMETER FUNCTION	
<p>Make sure that speedometer functions properly.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

TF

PD

AX

4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M70, B50 ● Harness for open or short between combination meter and vehicle speed sensor ● Harness for open or short between vehicle speed sensor and ECM <p style="text-align: center;">OK or NG</p>		
OK	▶	Check combination meter and vehicle speed sensor. Refer to EL section.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

SU

BR

ST

RS

5	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.</p>		
▶		INSPECTION END

BT

HA

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DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

Description

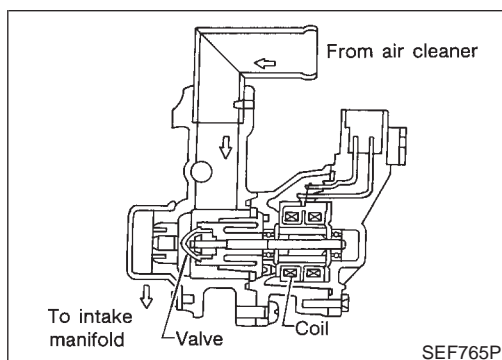
Description SYSTEM DESCRIPTION

NBEC0249

NBEC0249S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Idle air control	IACV-AAC valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometric pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which 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 crankshaft position sensor (POS) 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 IACV-AAC Valve

NBEC0249S02

NBEC0249S0201

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.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NBEC0250

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	14 - 20 step
		2,000 rpm	—

ECM Terminals and Reference Value

NBEC0670

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6 7 8 17	PU/G GY Y GY/L	IACV-AAC valve	[Engine is running] <ul style="list-style-type: none"> Idle speed 	0.1 - 14V

On Board Diagnosis Logic

NBEC0252

Malfunction is detected when

(Malfunction A) the IACV-AAC valve does not operate properly,
(Malfunction B) the IACV-AAC valve does not operate properly.

Possible Cause

NBEC0515

MALFUNCTION A

NBEC0515S01

- Harness or connectors
(The IACV-AAC valve circuit is open.)
- IACV-AAC valve

MALFUNCTION B

NBEC0515S02

- Harness or connectors
(The IACV-AAC valve circuit is shorted.)
- Air control valve (Power steering)
- IACV-AAC valve

DTC Confirmation Procedure

NBEC0253

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.
- Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

DTC Confirmation Procedure (Cont'd)

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NBEC0253S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch "ON".

With CONSULT-II

NBEC0253S0101

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Perform "Idle Air Volume Learning" (see EC-57).
- 4) Turn ignition switch "OFF" and wait at least 10 seconds.
- 5) Turn ignition switch "ON".
- 6) Select "DATA MONITOR" mode with CONSULT-II.
- 7) Start engine and let it idle.
- 8) Keep engine speed at 2,500 rpm for three seconds, then let it idle for three seconds.
Do not rev engine to more than 3,000 rpm.
- 9) Perform step 4 once more.
- 10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-426.

With GST

NBEC0253S0102

Follow the procedure "With CONSULT-II" above.

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NBEC0253S02

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.
- Always perform the test at a temperature above -10°C (14°F).

With CONSULT-II

NBEC0253S0201

- 1) Open engine hood.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch "OFF" and wait at least 10 seconds.
- 4) Perform "Idle Air Volume Learning" (see EC-57).
- 5) Turn ignition switch "OFF" and wait at least 10 seconds.
- 6) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II
- 7) Start engine and run it for at least 1 minute at idle speed.
- 8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-426.

With GST

NBEC0253S0202

Follow the procedure "With CONSULT-II" above.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

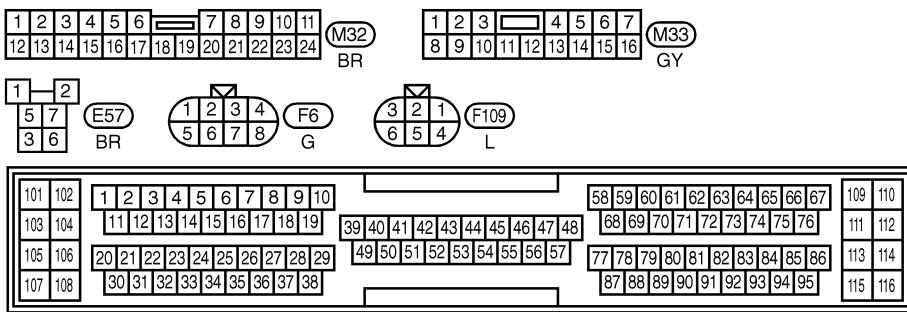
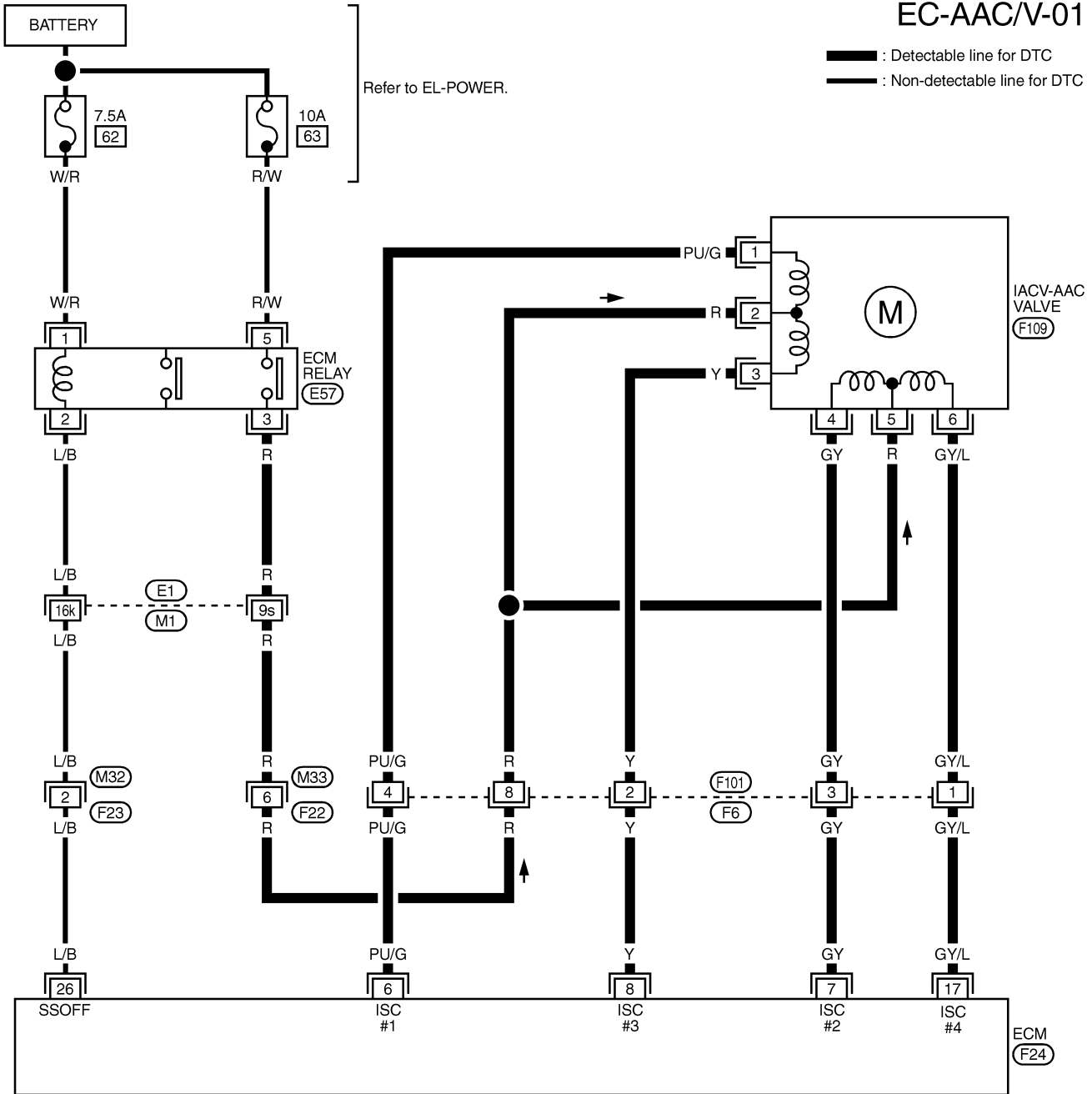
Wiring Diagram

Wiring Diagram

NBEC0254

EC-AAC/V-01

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REFER TO THE FOLLOWING.
 (E1) -SUPER
 MULTIPLE JUNCTION (SMJ)

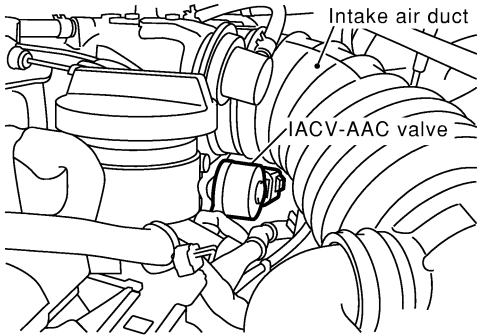
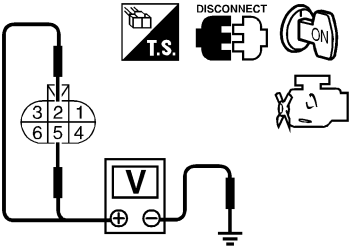


DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

Diagnostic Procedure

Diagnostic Procedure

NBEC0255

1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT	
<p>1. Stop engine. 2. Disconnect IACV-AAC valve harness connector.</p> <div style="text-align: center;">  <p>Intake air duct IACV-AAC valve</p> </div> <p>3. Turn ignition switch "ON". 4. Check voltage between IACV-AAC valve terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> </div> <p style="text-align: right;">SEF994Y</p> <p style="text-align: right;">SEF343X</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open or short between IACV-AAC valve and ECM relay 	
▶	
Repair harness or connectors.	

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

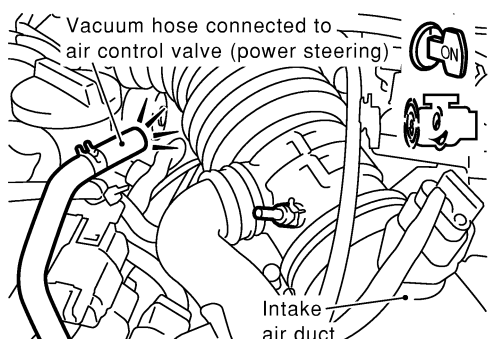
Diagnostic Procedure (Cont'd)

3	CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT											
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals and IACV-AAC valve terminals as follows. Refer to Wiring Diagram.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">ECM terminal</th> <th style="padding: 5px;">IACV-AAC valve terminal</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">6</td> <td style="text-align: center; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; padding: 5px;">7</td> <td style="text-align: center; padding: 5px;">4</td> </tr> <tr> <td style="text-align: center; padding: 5px;">8</td> <td style="text-align: center; padding: 5px;">3</td> </tr> <tr> <td style="text-align: center; padding: 5px;">17</td> <td style="text-align: center; padding: 5px;">6</td> </tr> </tbody> </table>			ECM terminal	IACV-AAC valve terminal	6	1	7	4	8	3	17	6
ECM terminal	IACV-AAC valve terminal											
6	1											
7	4											
8	3											
17	6											
MTBL0354												
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>												
OK	▶	GO TO 5.										
NG	▶	GO TO 4.										

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4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F101, F6 ● Harness for open or short between IACV-AAC valve and ECM 		
▶		Repair harness connectors.

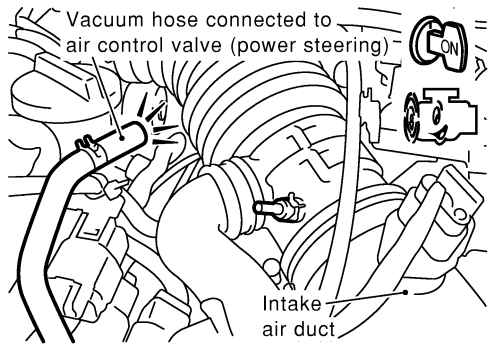
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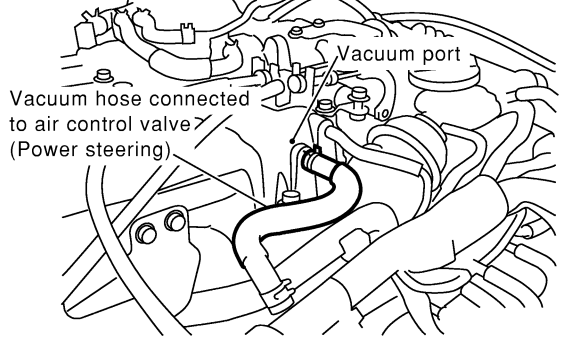

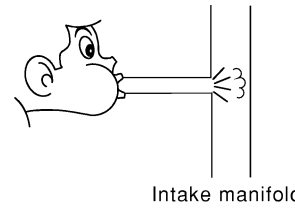
5	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-I	
<p>1. Reconnect ECM harness connector and IACV-AAC valve harness connector. 2. Disconnect vacuum hose connected to air control valve (Power steering) at intake air duct. 3. Start engine and let it idle. 4. Check vacuum hose for vacuum existence.</p>		
		
SEF995Y		
<p>Vacuum slightly exists or does not exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Replace air control valve (Power steering).

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DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

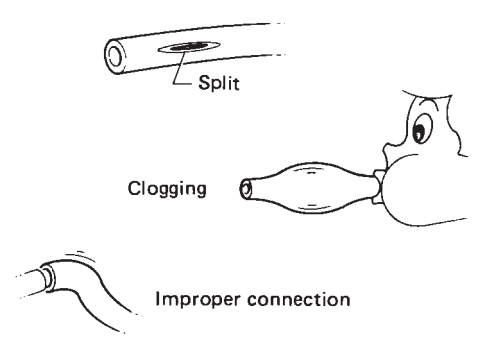
Diagnostic Procedure (Cont'd)

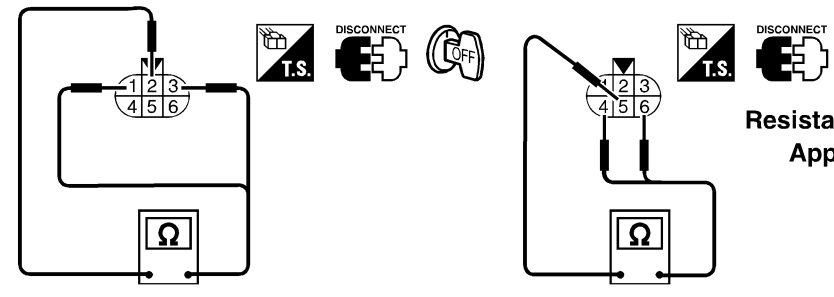
6	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II	
<p>Check vacuum hose for vacuum existence when steering wheel is turned.</p> <div style="text-align: center;">  </div> <p>Vacuum should exist.</p> <p style="text-align: right;">SEF995Y</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK VACUUM PORT	
<ol style="list-style-type: none"> 1. Stop engine. 2. Disconnect vacuum hose connected to air control valve (Power steering) at vacuum port. 3. Blow air into vacuum port. 4. Check that air flows freely. <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;">  </div> <div style="width: 10%; text-align: center;">  </div> <div style="width: 40%;">  </div> </div> <p style="text-align: right;">SEF996Y</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or clean vacuum port.

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

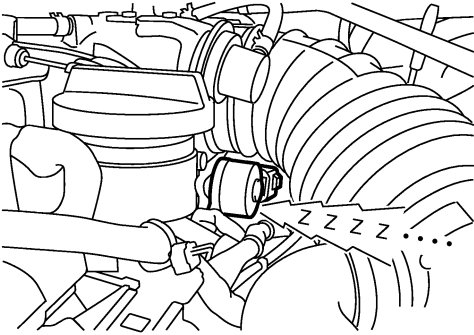
Diagnostic Procedure (Cont'd)

8	CHECK VACUUM HOSES AND TUBES	<ol style="list-style-type: none"> 1. Disconnect vacuum hoses between air control valve (Power steering) and vacuum port, air control valve (Power steering) and intake air duct. 2. Check the hoses and tubes for crack, clogging, improper connection or disconnection. 	GI MA EM LC EC FE AT	
		 <p style="text-align: center;">OK or NG</p>	SEF109L	
OK		▶	GO TO 9.	
NG		▶	Repair hoses or tubes.	

9	CHECK IACV-AAC VALVE-I	<ol style="list-style-type: none"> 1. Disconnect IACV-AAC valve harness connector. 2. Check resistance between IACV-AAC valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6. 	TF PD AX SU BR ST RS BT HA SC EL IDX	
		 <p style="text-align: center;">Resistance: Approximately 20 - 24Ω [at 20°C (68°F)]</p> <p style="text-align: center;">OK or NG</p>	SEF344XA	
OK		▶	GO TO 10.	
NG		▶	Replace IACV-AAC valve assembly.	

DTC P0505 IDLE AIR CONTROL VALVE (IACV) — AUXILIARY AIR CONTROL (AAC) VALVE

Diagnostic Procedure (Cont'd)

10	CHECK IACV-AAC VALVE-II	
<ol style="list-style-type: none"> 1. Reconnect IACV-AAC valve harness connector and ECM harness connector. 2. Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve makes operating sound according to the ignition switch position. 		
		
SEF997Y		
OK or NG		
OK	▶	GO TO 12.
NG	▶	GO TO 11.

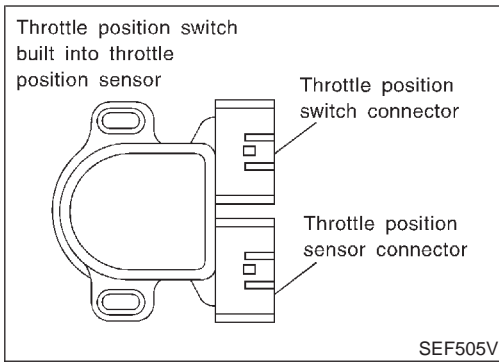
11	REPLACE IACV-AAC VALVE	
<ol style="list-style-type: none"> 1. Replace IACV-AAC valve assembly. 2. Perform "Idle Air Volume Learning", EC-57. <p style="text-align: center; color: blue;">Is the result CMPLT or INCMP?</p>		
CMPLT or INCMP		
CMPLT	▶	INSPECTION END
INCMP	▶	Follow the construction of "Idle Air Volume Learning".

12	CHECK TARGET IDLE SPEED	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Reconnect all harness connectors and vacuum hoses. 3. Start engine and warm it up to normal operating temperature. 4. Also warm up transmission to normal operating temperature. <ul style="list-style-type: none"> ● For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V. ● For A/T models without CONSULT-II, drive vehicle for 10 minutes. 5. Stop vehicle with engine running. 6. Check target idle speed. <p style="text-align: center; color: blue;">A/T: 750±50 rpm (in "P" or "N" position)</p>		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Perform "Idle Air Volume Learning", EC-57.

13	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
▶ INSPECTION END		

DTC P0510 CLOSED THROTTLE POSITION SWITCH

Component Description



Component Description

NBEC0256

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control. When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0257

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CLSD THL/P SW	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Throttle valve: Idle position
		Throttle valve: Slightly open

ECM Terminals and Reference Value

NBEC0671

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR/L	Throttle position switch (Closed position)	[Engine is running] <ul style="list-style-type: none"> Accelerator pedal fully released 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> Accelerator pedal depressed 	Approximately 0V

On Board Diagnosis Logic

NBEC0259

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

Possible Cause

NBEC0516

- Harness or connectors (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

DTC P0510 CLOSED THROTTLE POSITION SWITCH

DTC Confirmation Procedure

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	CLSD THL/P SW	ON

SEF197Y

6	DATA MONITOR	
	MONITOR	NO DTC
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

NBEC0260

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

WITH CONSULT-II

NBEC0260S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF", wait at least 10 seconds and then start engine.
- 3) Select "CLSD THL/P SW" in "DATA MONITOR" mode. If "CLSD THL/P SW" is not available, go to step 5.
- 4) Check the signal under the following conditions.

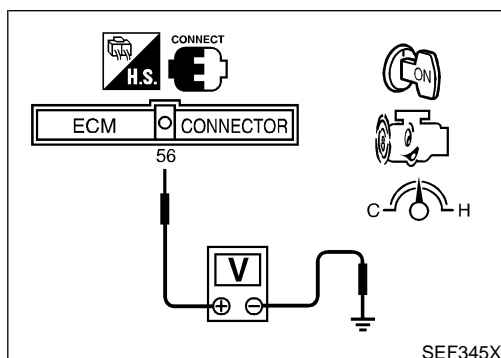
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to "Diagnostic Procedure", EC-435.
If OK, go to following step.

- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-435.



Overall Function Check

NBEC0261

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.

WITH GST

NBEC0261S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 56 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

EC-432

DTC P0510 CLOSED THROTTLE POSITION SWITCH

Overall Function Check (Cont'd)

At 2,000 rpm: Approximately 0V

3) If NG, go to "Diagnostic Procedure", EC-435.

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DTC P0510 CLOSED THROTTLE POSITION SWITCH

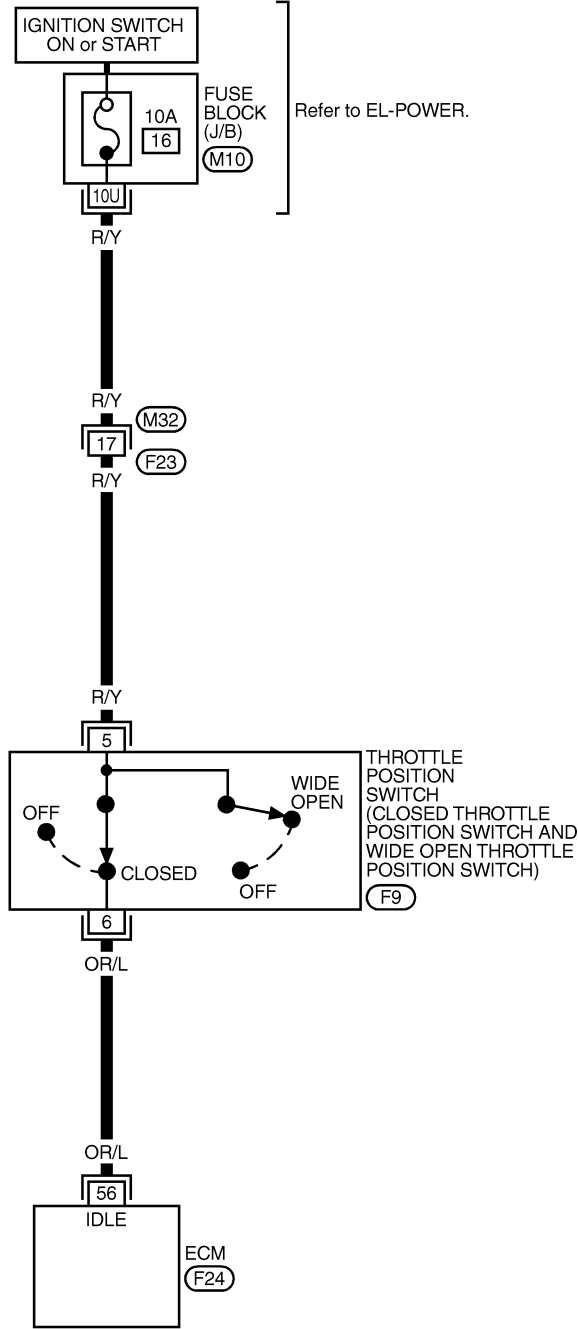
Wiring Diagram

Wiring Diagram

=NBEC0262

EC-TP/SW-01

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



1	2	3	4	5	6	7	8	9	10	11		
12	13	14	15	16	17	18	19	20	21	22	23	24

(M32) BR

4	5	6
---	---	---

(F9) GY

101	102	1	2	3	4	5	6	7	8	9	10	58	59	60	61	62	63	64	65	66	67	109	110									
103	104	11	12	13	14	15	16	17	18	19	39	40	41	42	43	44	45	46	47	48	68	69	70	71	72	73	74	75	76	111	112	
105	106	20	21	22	23	24	25	26	27	28	29	49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	113	114
107	108	30	31	32	33	34	35	36	37	38																					115	116

REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK- JUNCTION BOX (J/B)



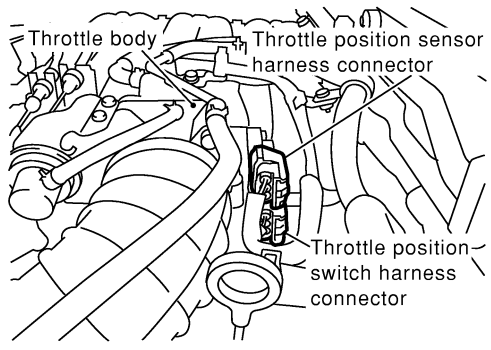
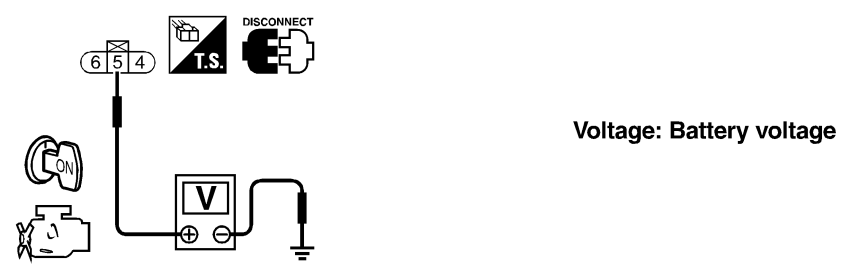
MEC967C

DTC P0510 CLOSED THROTTLE POSITION SWITCH

Diagnostic Procedure

Diagnostic Procedure

NBEC0263

1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect throttle position switch harness connector.</p>  <p style="text-align: right;">SEF944Y</p> <p>3. Turn ignition switch "ON". 4. Check voltage between throttle position switch terminal 5 and engine ground with CONSULT-II or tester.</p>  <p style="text-align: right;">SEF346X</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● Harness for open or short between throttle position switch and ECM 		
▶		Repair harness or connectors.


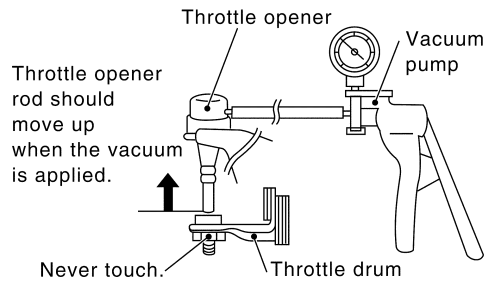
3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 56 and throttle position switch terminal 6. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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DTC P0510 CLOSED THROTTLE POSITION SWITCH

Diagnostic Procedure (Cont'd)

4	CHECK IGNITION TIMING AND ENGINE IDLE SPEED							
Check the following items. Refer to "Basic Inspection", EC-101.								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>15° ± 5° BTDC</td> </tr> <tr> <td>Idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	15° ± 5° BTDC	Idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications							
Ignition timing	15° ± 5° BTDC							
Idle speed	750 ± 50 rpm (in "P" or "N" position)							
MTBL0656								
Models with CONSULT-II	▶	GO TO 6.						
Models without CONSULT-II	▶	GO TO 6.						

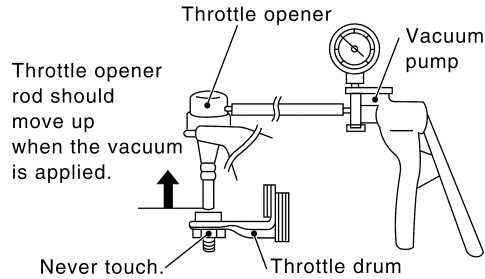
5	CHECK THROTTLE POSITION SWITCH							
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch "OFF". 3. Remove vacuum hose connected to throttle opener. 4. Connect suitable vacuum hose to vacuum pump and the throttle opener. 5. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener. 								
								
SEF793W								
<ol style="list-style-type: none"> 6. Turn ignition switch "ON". 7. Select "DATA MONITOR" mode with CONSULT-II. 8. Check indication of "CLSD THL/P SW" under the following conditions. Measurement must be made with throttle position switch installed in vehicle. 								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Throttle valve conditions</th> <th style="width: 50%;">CLSD THL/P SW</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td>ON</td> </tr> <tr> <td>Partially open or completely open</td> <td>OFF</td> </tr> </tbody> </table>			Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF
Throttle valve conditions	CLSD THL/P SW							
Completely closed	ON							
Partially open or completely open	OFF							
MTBL0355								
OK or NG								
OK (With CONSULT-II)	▶	GO TO 8.						
OK (Without CONSULT-II)	▶	GO TO 9.						
NG	▶	GO TO 7.						

DTC P0510 CLOSED THROTTLE POSITION SWITCH

Diagnostic Procedure (Cont'd)

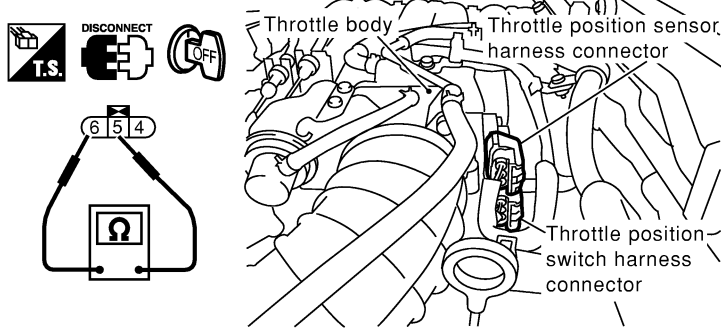
6 CHECK THROTTLE POSITION SWITCH

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



SEF793W

6. Disconnect closed throttle position switch harness connector.
7. Check continuity between closed throttle position switch terminals 6 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.



Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

SEF998Y

OK or NG


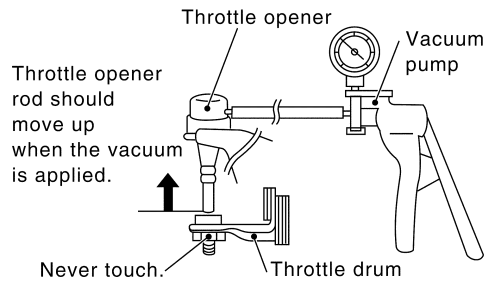
OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 7.

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DTC P0510 CLOSED THROTTLE POSITION SWITCH

Diagnostic Procedure (Cont'd)

7	ADJUST THROTTLE POSITION SWITCH									
Check the following items. Refer to "Basic Inspection", EC-101.										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>15° ± 5° BTDC</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	15° ± 5° BTDC	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications									
Ignition timing	15° ± 5° BTDC									
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF									
Target idle speed	750 ± 50 rpm (in "P" or "N" position)									
MTBL0655										
Is it possible to adjust closed throttle position switch?										
Yes or No										
Yes (With CONSULT-II) ▶	GO TO 9.									
Yes (Without CONSULT-II) ▶	GO TO 9.									
No ▶	Replace throttle position switch.									

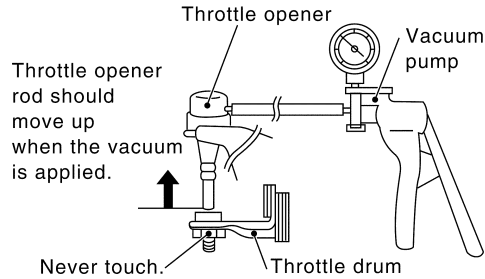
8	CHECK THROTTLE POSITION SENSOR									
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Remove the vacuum hose connected to the throttle opener. 4. Connect suitable vacuum hose to the 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. 										
										
SEF793W										
<ol style="list-style-type: none"> 6. Turn ignition switch ON. 7. Select "DATA MONITOR" mode with CONSULT-II. 8. Check voltage of "THRTL POS SEN" under the following conditions. Voltage measurement must be made with throttle position sensor installed in vehicle. 										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Throttle valve conditions</th> <th style="width: 50%;">THRTL POS SEN</th> </tr> </thead> <tbody> <tr> <td>Completely closed (a)</td> <td>0.15 - 0.85V</td> </tr> <tr> <td>Partially open</td> <td>Between (a) and (b)</td> </tr> <tr> <td>Completely open (b)</td> <td>3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	THRTL POS SEN									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
MTBL0230										
OK or NG										
OK ▶	GO TO 10.									
NG ▶	Replace throttle position sensor.									

DTC P0510 CLOSED THROTTLE POSITION SWITCH

Diagnostic Procedure (Cont'd)

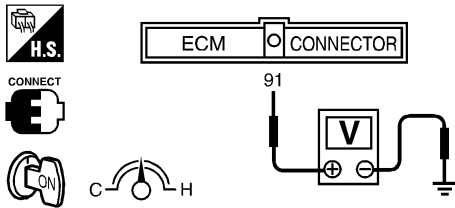
9 CHECK THROTTLE POSITION SENSOR

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.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
Voltage measurement must be made with throttle position sensor installed in vehicle.



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

SEF348X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

10 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

▶ INSPECTION END

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DTC P0600 A/T COMMUNICATION LINE

System Description

System Description

NBEC0264

This circuit line (LAN) is used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration.

Pulse signals are exchanged between ECM and TCM (Transmission Control Module).

Be sure to erase the malfunction information such as DTC not only in TCM but also ECM after the A/T related repair.

ECM Terminals and Reference Value

NBEC0672

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	G/R	Communication line (LAN)	[Engine is running] ● Idle speed	Approximately 2V

On Board Diagnosis Logic

NBEC0266

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.

Possible Cause

NBEC0517

- Harness or connectors
[The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.]
- TCM
- Dead (Weak) battery

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NBEC0267

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

NBEC0267S01

- 1) Turn ignition switch "ON".

DTC P0600 A/T COMMUNICATION LINE

DTC Confirmation Procedure (Cont'd)

- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 2 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-443.

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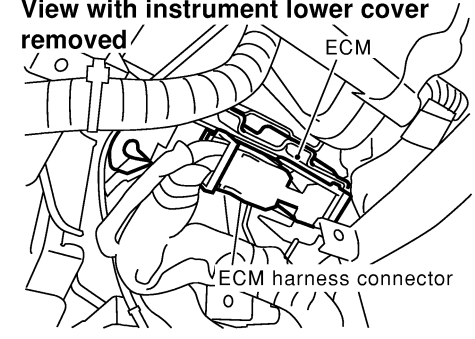
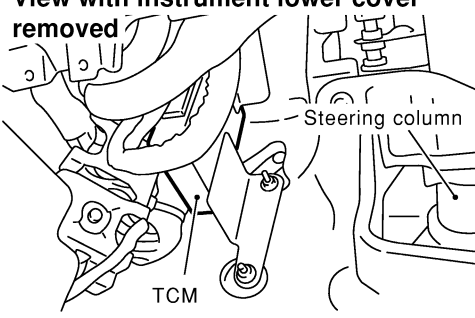
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Diagnostic Procedure

NBEC0270

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN								
		<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p> <div style="text-align: center;"> <p>View with instrument lower cover removed</p>  <p>ECM ECM harness connector</p> </div> <div style="text-align: center;"> <p>View with instrument lower cover removed</p>  <p>Steering column TCM</p> </div>	<p style="text-align: right;">GI</p> <p style="text-align: right;">MA</p> <p style="text-align: right;">EM</p> <p style="text-align: right;">LC</p> <p style="text-align: right; background-color: black; color: white;">EC</p> <p style="text-align: right;">FE</p> <p style="text-align: right;">AT</p> <p style="text-align: right;">TF</p> <p style="text-align: right;">PD</p> <p style="text-align: right;">AX</p> <p style="text-align: right;">SU</p>						
		<p>3. Check harness continuity between ECM terminal 114 and TCM terminal 33. Refer to Wiring Diagram. Continuity should exist.</p> <p style="text-align: center;">OK or NG</p>	<p style="text-align: right;">SEF955Y</p> <p style="text-align: right;">SEF001Z</p>						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td>▶</td> <td>GO TO 2.</td> </tr> </table>	OK	▶	GO TO 3.	NG	▶	GO TO 2.	<p style="text-align: right;">BR</p>
OK	▶	GO TO 3.							
NG	▶	GO TO 2.							

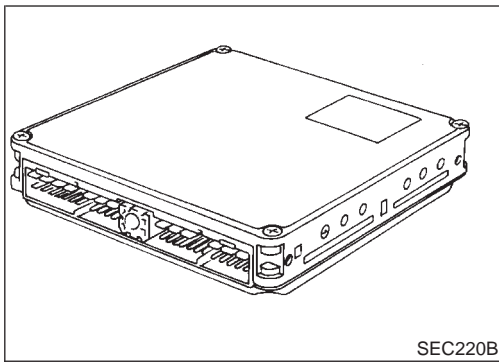
2	DETECT MALFUNCTION PART		
		<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M94, F27 ● Harness for open or short between ECM and TCM (Transmission control module) 	
		▶	Repair harness or connectors.

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT								
		<p>1. Check harness continuity between ECM terminal 114 and ground. Refer to Wiring Diagram. Continuity should not exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>NG</td> <td>▶</td> <td>Repair short to ground or short to power in harness or connectos.</td> </tr> </table>	OK	▶	GO TO 4.	NG	▶	Repair short to ground or short to power in harness or connectos.	<p style="text-align: right;">HA</p> <p style="text-align: right;">SC</p> <p style="text-align: right;">EL</p> <p style="text-align: right;">IDX</p>
OK	▶	GO TO 4.							
NG	▶	Repair short to ground or short to power in harness or connectos.							

4	CHECK INTERMITTENT INCIDENT		
		Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
		▶	INSPECTION END

DTC P0605 ECM

Component Description



Component Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. NBEC0271

On Board Diagnosis Logic

Malfunction is detected when ECM calculation function is malfunctioning. NBEC0272

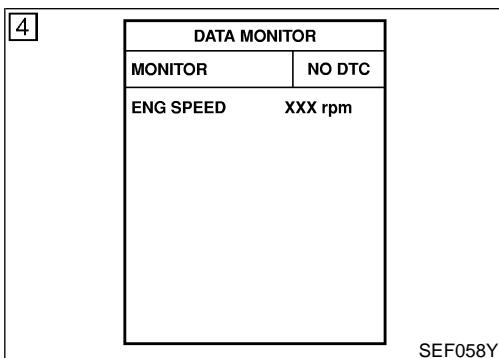
Possible Cause

- ECM NBEC0518

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. NBEC0273



Ⓜ WITH CONSULT-II



- 1) Turn ignition switch "ON". NBEC0273S01
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Run engine for at least 30 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-445.

Ⓜ WITH GST

Follow the procedure "WITH CONSULT-II" above. NBEC0273S02

Diagnostic Procedure

NBEC0274

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-444. 5. Is the 1st trip DTC P0605 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch "ON". 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-444. 5. Is the 1st trip DTC P0605 displayed again? 		
Yes or No		
Yes	▶	GO TO 2.
No	▶	INSPECTION END

2	REPLACE ECM	
<ol style="list-style-type: none"> 1. Replace ECM. 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (Nissan Vehicle Immobilizer System — NATS)", EC-74. 3. Perform "Idle Air Volume Learning", EC-57, Is the result CMPLT or INCMP? 		
CMPLT or INCMP		
CMPLT	▶	INSPECTION END
INCMP	▶	Follow the construction of "Idle Air Volume Learning".

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DTC P1110 (RIGHT, -B1), P1135 (LEFT, -B2) INTAKE VALVE TIMING CONTROL

Description

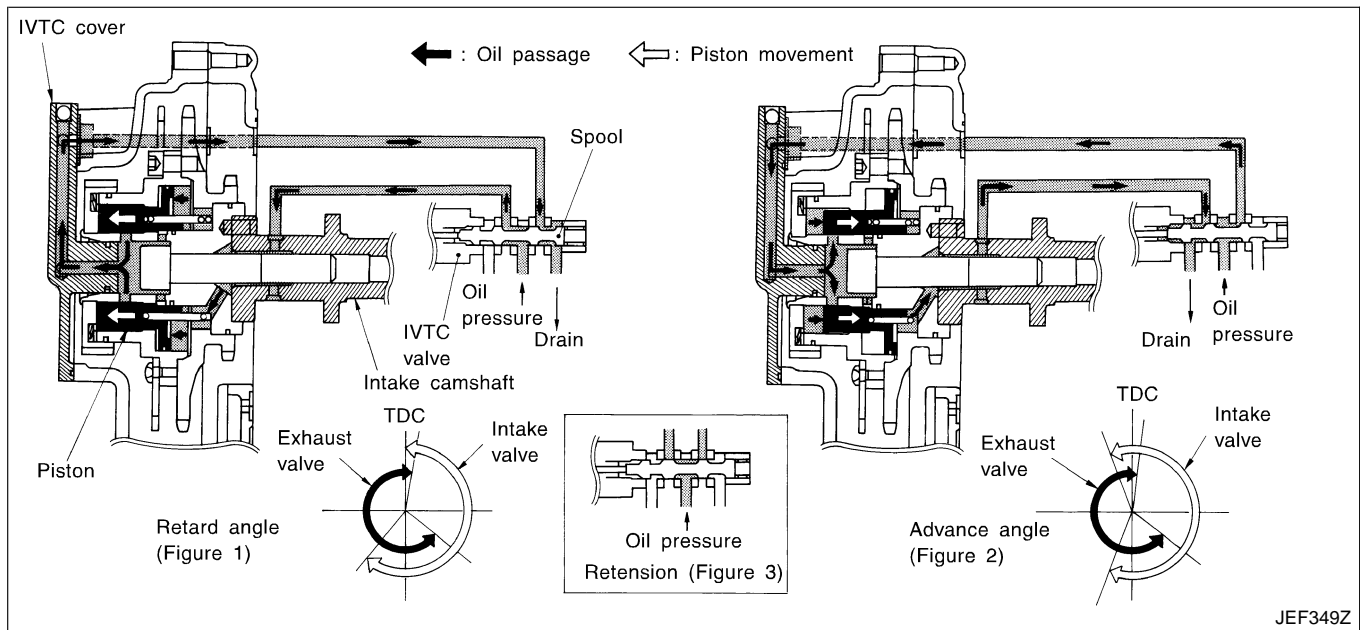
Description

NBEC0691

NBEC0691S01

SYSTEM DESCRIPTION

Sensor	Input signal to ECM function	ECM	Actuator
Crankshaft position sensor (POS)	Engine speed (POS)	Intake valve timing control	Intake valve timing control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF)		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed sensor	Vehicle speed		



JEF349Z

This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the camshaft timing control valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0692

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	<ul style="list-style-type: none"> Engine: After warming up Shift lever "N" Quickly depressed accelerator pedal No-load Idle	0° CA
	2,000 rpm	Approximately 12 - 18° CA
INT/V SOL (B1) INT/V SOL (B2)	<ul style="list-style-type: none"> Engine: After warming up Shift lever "N" Quickly depressed accelerator pedal No-load Idle	0%
	2,000 rpm	Approximately 40%

DTC P1110 (RIGHT, -B1), P1135 (LEFT, -B2) INTAKE VALVE TIMING CONTROL

ECM Terminals and Reference Value

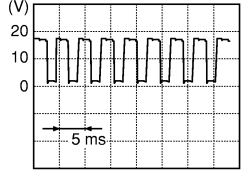
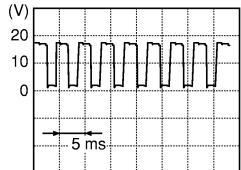
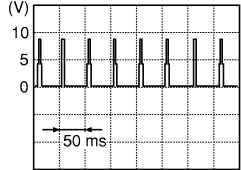
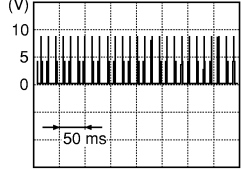
ECM Terminals and Reference Value

=NBEC0693

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

CAUTION:

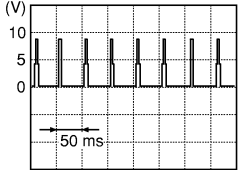
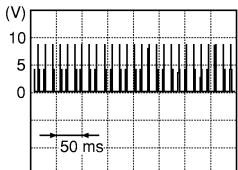
Do not use ECM ground terminals when measuring voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	OR/B	Intake valve timing control solenoid valves (RH)	[Engine is running] ● Warm-up condition ● Idle speed	Battery voltage
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	7 - 8V 
15	P/L	Intake valve timing control solenoid valves (LH)	[Engine is running] ● Warm-up condition ● Idle speed	Battery voltage
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	7 - 8V 
79	Y/G	Intake valve timing control position sensors (RH)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0.5V 
			[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm.	Approximately 0.5V 

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DTC P1110 (RIGHT, -B1), P1135 (LEFT, -B2) INTAKE VALVE TIMING CONTROL

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	OR	Intake valve timing control position sensors (LH)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>Approximately 0.5V</p>  <p>SEF351Z</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>Approximately 0.5V</p>  <p>SEF352Z</p>

On Board Diagnosis Logic

NBEC0694

Malfunction is detected when:

(Malfunction A)

The alignment of the intake valve timing control has been misregistered.

(Malfunction B)

There is a gap between angle of target and phase-control angle degree.

FAIL-SAFE MODE

NBEC0694S01

When malfunction A or B is detected, the ECM enters fail-safe mode and the MIL lights up.

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

Possible Cause

NBEC0695

MALFUNCTION A OR B

NBEC0695S01

- Harness or connectors (Intake valve timing control position sensor circuit is open or shorted.) Refer to EC-482.
- Crankshaft position sensor (REF)
- Crankshaft position sensor (POS)
- Camshaft position sensor (PHASE)

DTC Confirmation Procedure

NBEC0696

CAUTION:

Always drive at a safe speed.

NOTE:

- If both DTC P1111 (B1), P1136 (B2) or P1140 (B1), P1145 (B2) and P1110 (B1), P1135 (B2) are displayed, perform trouble diagnosis for “DTC P1111 (B1), P1136 (B2) or P1140 (B1), P1145 (B2)” first. (See EC-451, 482.)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NBEC0696S01

Ⓜ With CONSULT-II

NBEC0696S0101

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
COOLANT TEMPS	More than 70°C (158°F)
Selector lever	1st position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

- 4) Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	Idle
COOLANT TEMPS	More than 70°C (158°F)
Selector lever	“P” or “N” position

- 5) If 1st trip DTC is detected, go to “P1140, P1145 INTAKE VALVE TIMING CONTROL POSITION SENSOR”. Refer to EC-482.

Ⓜ With GST

NBEC0696S0102

Follow the procedure “With CONSULT-II” above.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLANTENP/S	XXX °C
VHCL SPEED SE	XXX km/h
INT/V TIM (B1)	XXX °CA
INT/V TIM (B2)	XXX °CA
INT/V SOL (B1)	XXX %
INT/V SOL (B2)	XXX %

SEF353Z

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DTC P1110 (RIGHT, -B1), P1135 (LEFT, -B2) INTAKE VALVE TIMING CONTROL

DTC Confirmation Procedure (Cont'd)

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLANTENP/S	XXX °C
VHCL SPEED SE	XXX km/h
INT/V TIM (B1)	XXX °CA
INT/V TIM (B2)	XXX °CA
INT/V SOL (B1)	XXX %
INT/V SOL (B2)	XXX %

SEF353Z

PROCEDURE FOR MALFUNCTION B

=NBEC0696S02

With CONSULT-II

NBEC0696S0201

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	2,000 - 3,000 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 90°C (158 - 194°F)
Selector lever	1st or position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

- 4) If 1st trip DTC is detected, go to "P1140, P1145 INTAKE VALVE TIMING CONTROL POSITION SENSOR". Refer to EC-482.

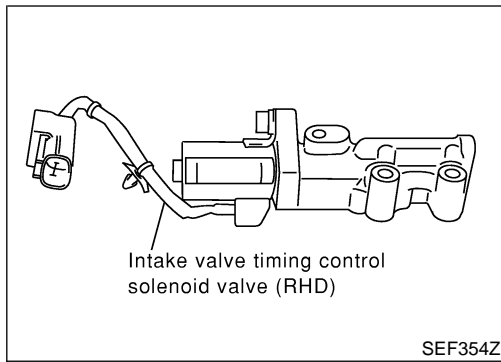
With GST

NBEC0696S0202

Follow the procedure "With CONSULT-II" above.

DTC P1111 (RIGHT, -B1), P1136 (LEFT, -B2) INTAKE VALVE TIMING CONTROL SOLENOID VALVE (CIRCUIT)

Component Description



Component Description

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM. ^{NBEC0697}

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0698

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	<ul style="list-style-type: none"> Engine: After warming up Shift lever "N" Idle	0%
	<ul style="list-style-type: none"> Quickly depressed accelerator pedal No-load 2,000 rpm	Approximately 40%

ECM Terminals and Reference Value

NBEC0699

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	OR/B	Intake valve timing control solenoid valves (RH)	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	Battery voltage
			[Engine is running] <ul style="list-style-type: none"> Warm-up condition Engine speed is 2,000 rpm. 	7 - 8V SEF350Z
15	P/L	Intake valve timing control solenoid valves (LH)	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	Battery voltage
			[Engine is running] <ul style="list-style-type: none"> Warm-up condition Engine speed is 2,000 rpm. 	7 - 8V SEF350Z

DTC P1111 (RIGHT, -B1), P1136 (LEFT, -B2) INTAKE VALVE TIMING CONTROL SOLENOID VALVE (CIRCUIT)

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage is sent to the ECM through intake valve timing control solenoid valve. NBEC0700

Possible Cause

- Harness or connectors
(Intake valve timing control solenoid valve circuit is open or shorted.)
- Intake valve timing control solenoid valve. NBEC0701

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLANTENP/S	XXX °C
VHCL SPEED SE	XXX km/h
INT/V TIM (B1)	XXX °CA
INT/V TIM (B2)	XXX °CA
INT/V SOL (B1)	XXX %
INT/V SOL (B2)	XXX %

SEF353Z

DTC Confirmation Procedure

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test. NBEC0702

WITH CONSULT-II

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II. NBEC0702S01
- 3) Maintain the following conditions for at least 5 seconds.

Engine speed	More than Idle speed
Selector lever	“P” or “N” position

- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-455.

WITH GST

Follow the procedure “With CONSULT-II” above. NBEC0702S02

DTC P1111 (RIGHT, -B1), P1136 (LEFT, -B2) INTAKE VALVE TIMING CONTROL SOLENOID VALVE (CIRCUIT)

Wiring Diagram

Wiring Diagram

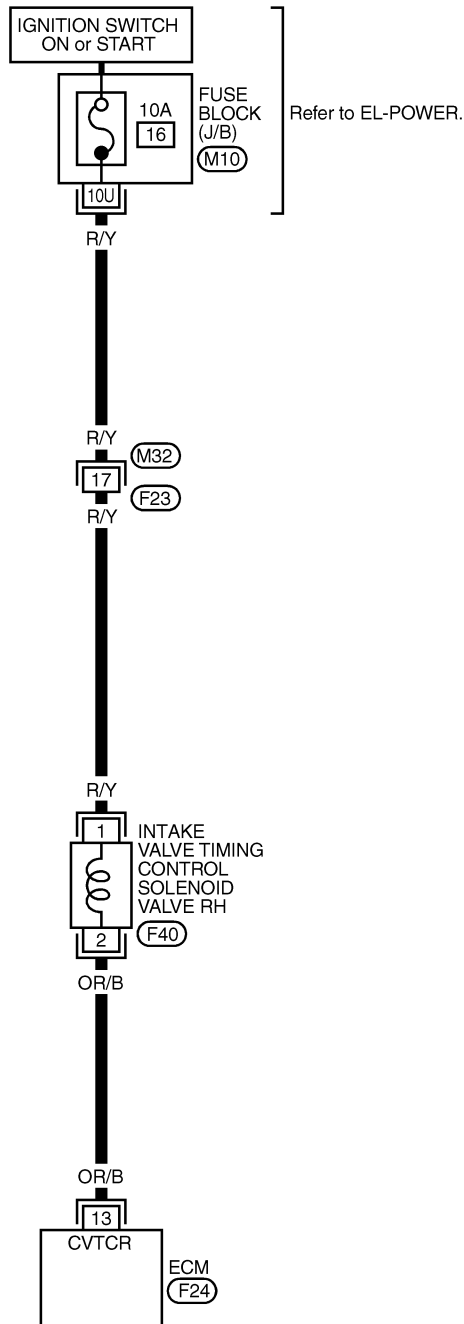
RIGHT BANK

NBEC0703

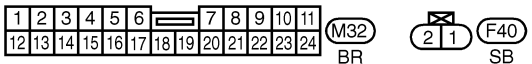
NBEC0703S01

EC-IVC-R-01

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

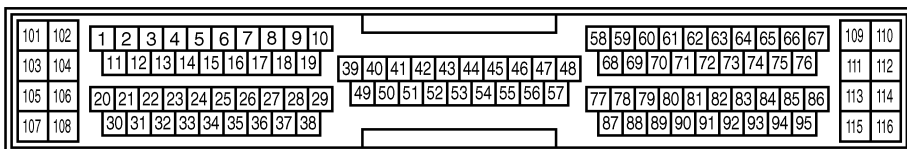


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REFER TO THE FOLLOWING.

M10 - FUSE BLOCK-JUNCTION BOX (J/B)





DTC P1111 (RIGHT, -B1), P1136 (LEFT, -B2) INTAKE VALVE TIMING CONTROL SOLENOID VALVE (CIRCUIT)

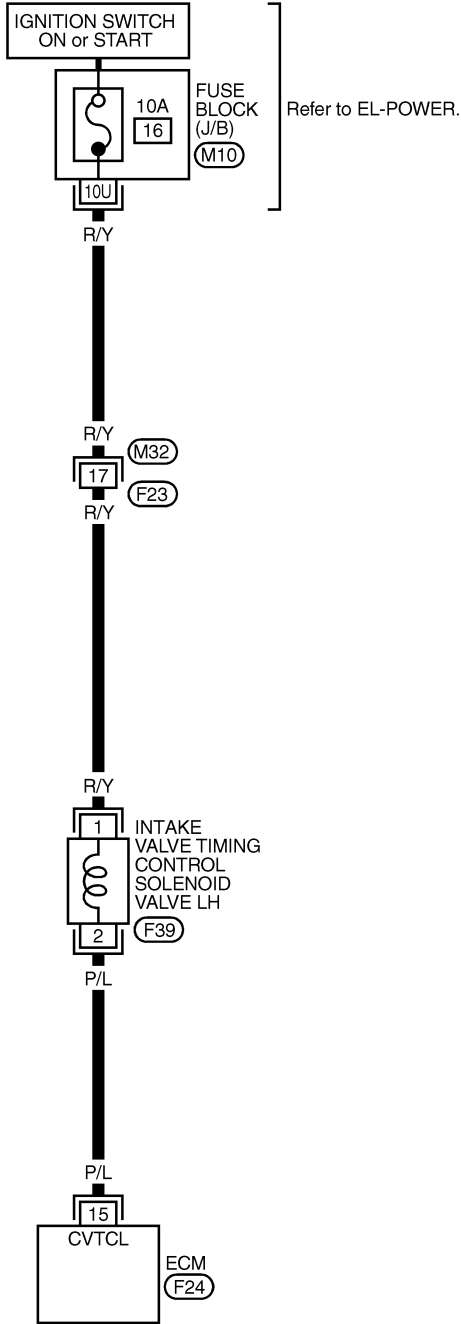
Wiring Diagram (Cont'd)

LEFT BANK

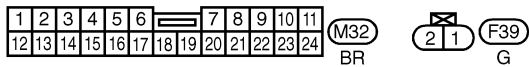
NBEC0703S02

EC-IVC-L-01



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

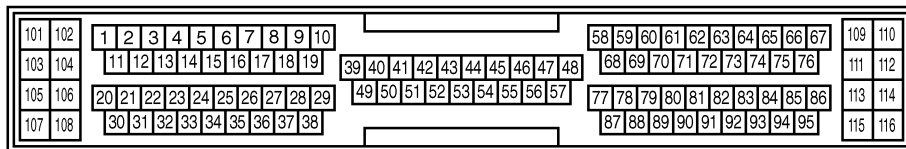


Refer to EL-POWER.



REFER TO THE FOLLOWING.

 - FUSE BLOCK-




MEC988C

Diagnostic Procedure

NBEC0704

1 CHECK OVERALL FUNCTION

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With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform "TARGET INT/V TIM" in "ACTIVE TEST" mode with CONSULT-II.
3. Hold engine speed at 1,500 to 2,500 rpm under the following step.
4. Touch "UP" or "DOWN" on CONSULT-II screen.

ACTIVE TEST	
TARGET INT/V TIM	0°
MONITOR	
ENG SPEED	XXX rpm
INT/V TIM (B1)	XXX °CA
INT/V TIM (B2)	XXX °CA
INT/V SOL (B1)	XXX %
INT/V SOL (B2)	XXX %

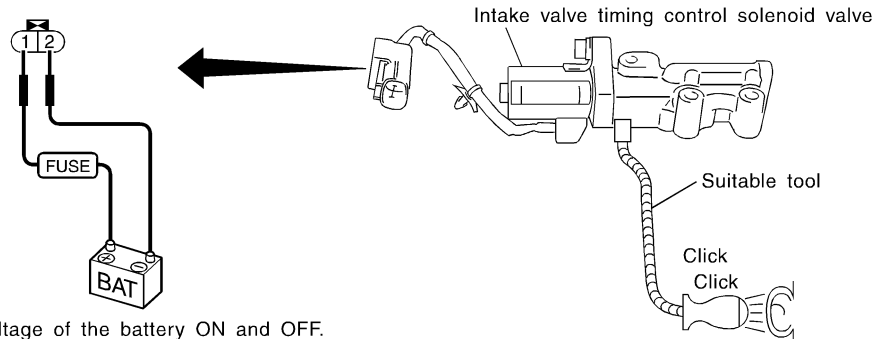
SEF355Z

5. Check the following.

- The angle of a corresponding INT/V TIM (B1)/(B2) to setting TARGET INT/V TIM confirms the variation.

Without CONSULT-II

1. Remove intake valve timing control solenoid valve.
2. Reconnect intake valve timing control solenoid valve harness connector.
3. Supply intake valve timing control solenoid valve terminals with battery voltage as shown below.



Turn the voltage of the battery ON and OFF.

Clicking noise should be heard.

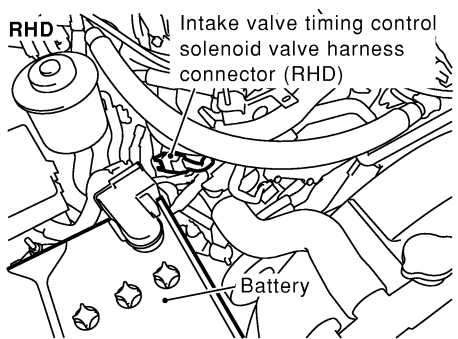
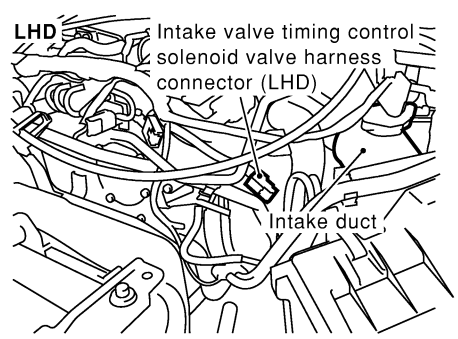
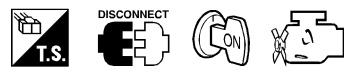
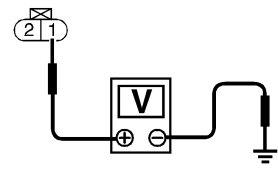
SEF356Z

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 2.

DTC P1111 (RIGHT, -B1), P1136 (LEFT, -B2) INTAKE VALVE TIMING CONTROL SOLENOID VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

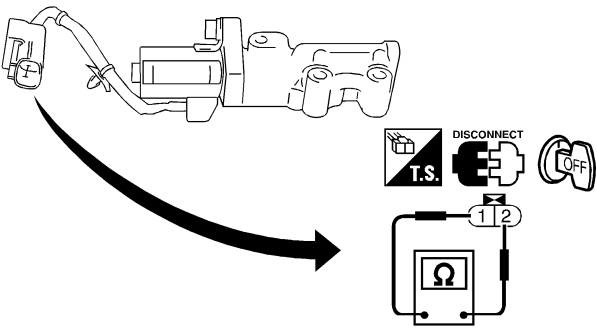
2	INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT	
<p>1. Stop engine. 2. Disconnect intake valve timing control solenoid valve harness connector.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>RHD Intake valve timing control solenoid valve harness connector (RHD) Battery</p> </div> <div style="text-align: center;">  <p>LHD Intake valve timing control solenoid valve harness connector (LHD) Intake duct</p> </div> </div> <p>3. Turn ignition switch "ON". 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> </div> <p style="text-align: right;">SEF357Z</p> <p style="text-align: right;">SEF603X</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTION PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● 10A fuse ● Harness continuity between fuse and intake valve timing control solenoid valve 		
▶		Repair harness or connectors.

4	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness connectors continuity between ECM terminal 13 (Right) or 15 (Left) and terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1111 (RIGHT, -B1), P1136 (LEFT, -B2) INTAKE VALVE TIMING CONTROL SOLENOID VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

5	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE							
Check resistance between intake valve timing control solenoid valve terminals as follows.								
								
<table border="1" style="border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Terminals</th> <th style="text-align: center;">Resistance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1 and 2</td> <td style="text-align: center;">5.5 - 9.2Ω at 20°C (68°F)</td> </tr> <tr> <td style="text-align: center;">1 or 2 and ground</td> <td style="text-align: center;">∞ Ω (Continuity should not exist.)</td> </tr> </tbody> </table>			Terminals	Resistance	1 and 2	5.5 - 9.2Ω at 20°C (68°F)	1 or 2 and ground	∞ Ω (Continuity should not exist.)
Terminals	Resistance							
1 and 2	5.5 - 9.2Ω at 20°C (68°F)							
1 or 2 and ground	∞ Ω (Continuity should not exist.)							
SEF358Z								
OK or NG								
OK	▶	GO TO 6.						
NG	▶	Repair intake valve timing control solenoid valve.						

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
▶		INSPECTION END

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DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Description

Description

If DTC P1130 is displayed with P1165, first perform trouble diagnosis for DTC P1165, EC-493. NBEC0523

SYSTEM DESCRIPTION

NBEC0523S01

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve control solenoid valve ↓ Vacuum signal Swirl control valve actuator ↓ Swirl control valve
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		

This system has a swirl control valve in the intake passage of each cylinder.

While idling and during low engine speed operation, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.

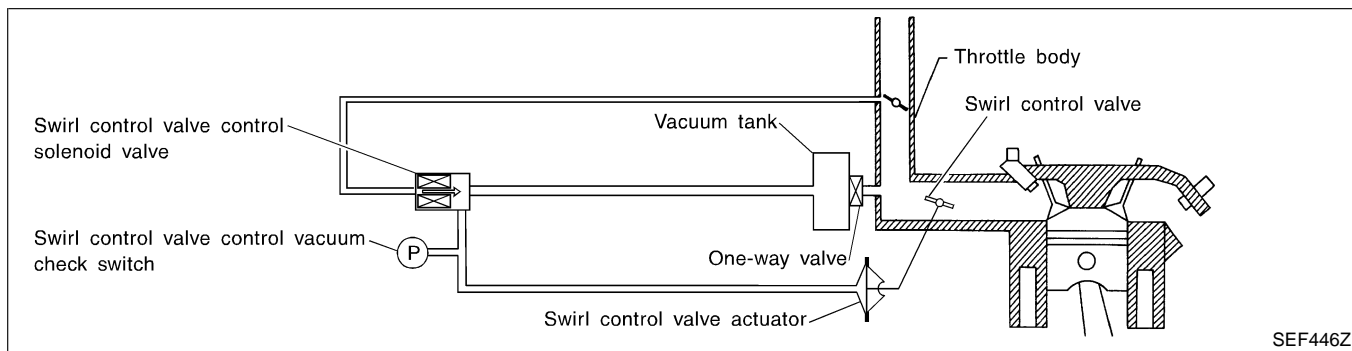
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

Also, except when idling and during low engine speed operation, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.

The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM.

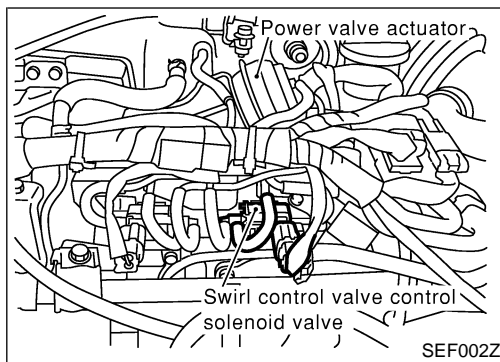
Throttle position sensor (Idle position)	Engine speed	Swirl control valve control solenoid valve	Swirl control valve
ON	Below 3,200 rpm	ON	Closed
OFF	Less than 3,200 rpm	ON	Closed
	More than 3,600 rpm	OFF	Open

When engine coolant temperature is below 10°C (50°F) and above 55°C (131°F), swirl control valve is kept open regardless of above condition.



DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Description (Cont'd)



COMPONENT DESCRIPTION

Swirl Control Valve Control Solenoid Valve

NBEC0523S02

NBEC0523S0201

The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0524

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SWRL CONT S/V	● Engine speed: Idle Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
	Engine coolant temperature is above 55°C (131°F).	OFF

ECM Terminals and Reference Value

NBEC0673

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G	Swirl control valve control solenoid valve	[Engine is running] ● Idle speed ● Engine coolant temperature is between 15 to 50°C (59 to 122°F).	0 - 1.0V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NBEC0526

Malfunction is detected when

(Malfunction A) An improper voltage signal is sent to ECM through swirl control valve control solenoid valve,

(Malfunction B) The vacuum signal is not sent to swirl control valve under specified driving conditions, even though swirl control valve control solenoid valve is ON,

(Malfunction C) The vacuum signal is sent to swirl control valve even though swirl control valve control solenoid valve is OFF.

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Possible Cause

Possible Cause

MALFUNCTION A

NBEC0527

NBEC0527S01

- Harness or connectors
(The swirl control valve control solenoid valve circuit is open or shorted.)
- Swirl control valve control solenoid valve

MALFUNCTION B

NBEC0527S02

- Harness or connector
(The swirl control valve control solenoid valve circuit is open.)
- Swirl control valve control solenoid valve
- Intake system
(Intake air leaks)
- Hoses and tubes between intake manifold, vacuum tank and swirl control valve actuator
- Swirl control valve actuator
- Swirl control valve control vacuum check switch
- Mass air flow sensor
- Crankshaft position sensor (REF)
- Throttle position sensor

MALFUNCTION C

NBEC0527S03

- Harness or connector
(The swirl control valve control solenoid valve circuit is shorted.)
- Swirl control valve control vacuum check switch
- Crankshaft position sensor (REF)
- Throttle position sensor
- Hoses and tubes between air cleaner and swirl control valve vacuum check switch
- Swirl control valve control solenoid valve

DTC Confirmation Procedure

NBEC0528

Perform “Procedure for malfunction A” first. If the 1st trip DTC cannot be confirmed, perform “Procedure for malfunction B”. If the 1st trip DTC is not confirmed on “Procedure for malfunction B”, perform “Procedure for malfunction C”.

NOTE:

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

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NBEC0528S01

NBEC0528S0101

With CONSULT-II

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Wait at least 5 seconds.
If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-463.

With GST

NBEC0528S0102

Follow the procedure “With CONSULT-II” above.

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

DTC Confirmation Procedure (Cont'd)

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NBEC0528S02

TESTING CONDITION:

- For best results, perform the test at a temperature above 5°C (41°F).
- Before performing the following procedure, confirm that battery voltage is more than 10V at idle, then stop engine immediately.

With CONSULT-II

NBEC0528S0201

- 1) Turn ignition switch "OFF" and wait at least 10 seconds.
- 2) Turn ignition switch "ON".
- 3) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
- 4) Confirm COOLAN TEMP/S value is 40°C (104°F) or less. If the value is more than 40°C (104°F), park the vehicle in a cool place and retry from step 1.
- 5) Start engine and wait until COOLAN TEMP/S value increases to more than 55°C (131°F). If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-463.

With GST

NBEC0528S0202

Follow the procedure "With CONSULT-II" above.

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NBEC0528S03

TESTING CONDITION:

- For best results, perform the test at a temperature above 5°C (41°F).
- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

NBEC0528S0301

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine and let it idle for at least 20 seconds. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-463.

With GST

NBEC0528S0302

Follow the procedure "With CONSULT-II" above.

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DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

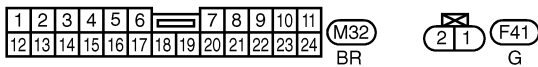
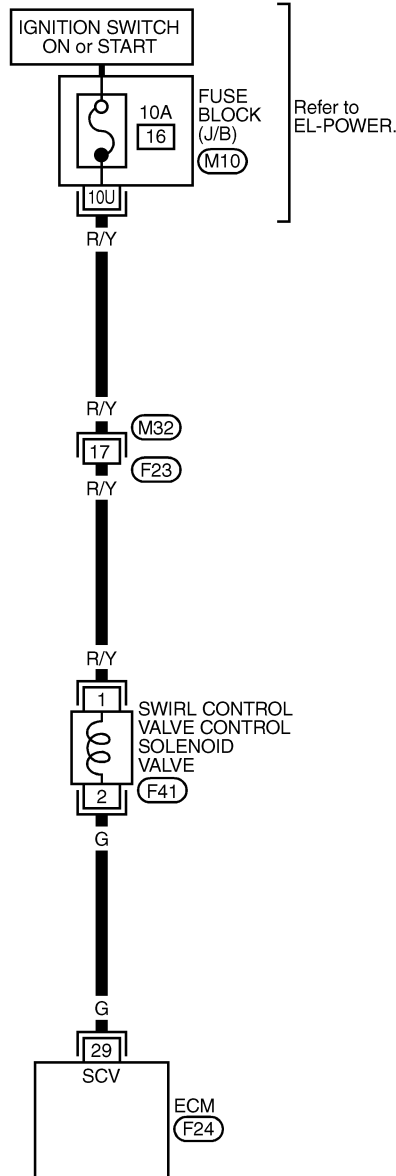
Wiring Diagram

Wiring Diagram

NBEC0529

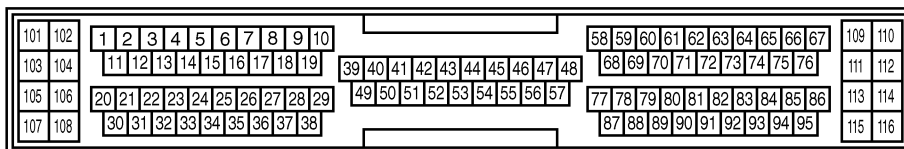
EC-SWL/V-01

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



REFER TO THE FOLLOWING.

M10 - FUSE BLOCK-
 JUNCTION BOX (J/B)



MEC980C

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE


Diagnostic Procedure

Diagnostic Procedure PROCEDURE A

NBEC0530

NBEC0530S01

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

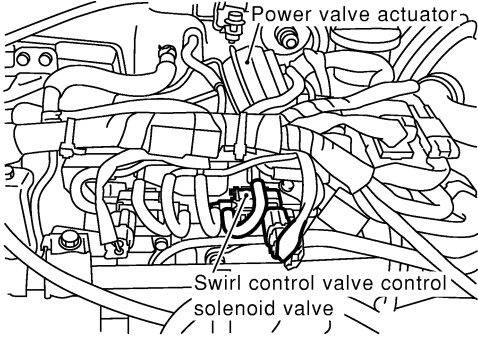
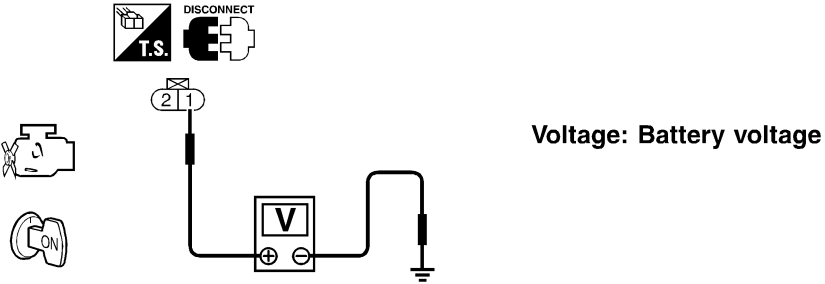
2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT																											
<p> With CONSULT-II</p> <ol style="list-style-type: none"> Turn ignition switch "ON". Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II. Touch "ON" and "OFF" on CONSULT-II screen. 																												
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>SWIRL CONT SOL VALVE</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>IACV-AAC/V</td> <td>XXX step</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		SWIRL CONT SOL VALVE	OFF	MONITOR		ENG SPEED	XXX rpm	IACV-AAC/V	XXX step																
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MONITOR																												
ENG SPEED	XXX rpm																											
IACV-AAC/V	XXX step																											
<p>4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.</p> <p style="text-align: center;">OK or NG</p>																												
OK	▶	GO TO 6.																										
NG	▶	GO TO 3.																										

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SEF003Z

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> Turn ignition switch "OFF". Disconnect swirl control valve control solenoid valve harness connector. 		
		
SEF002Z		
<ol style="list-style-type: none"> Turn ignition switch "ON". Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester. 		
		
SEF619X		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● 15A fuse ● Harness for open or short between swirl control valve control solenoid valve and fuse 		
▶ Repair harness or connectors.		

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> Turn ignition switch "OFF". Disconnect ECM harness connector. Check harness continuity between ECM terminal 29 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

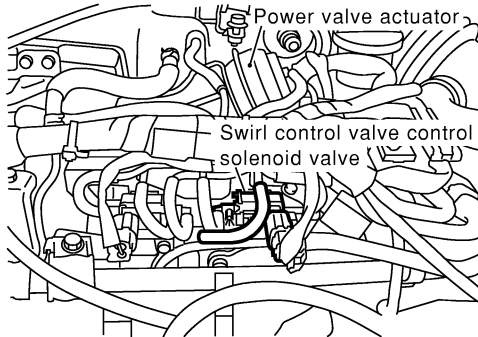
DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

6 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

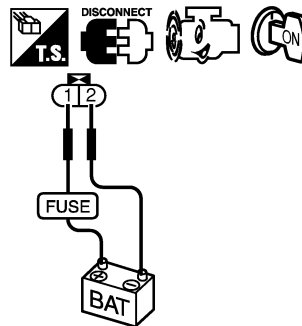
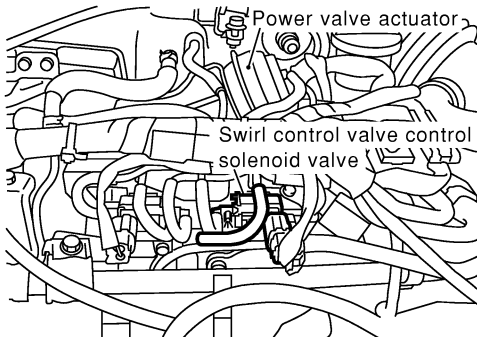
Operation takes less than 1 second.



SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.



Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF005Z

OK or NG

- | | | |
|----|---|---|
| OK | ▶ | GO TO 7. |
| NG | ▶ | Replace intake manifold collector assembly. |

7 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

▶ **INSPECTION END**

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DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

PROCEDURE B

NBEC0530S02

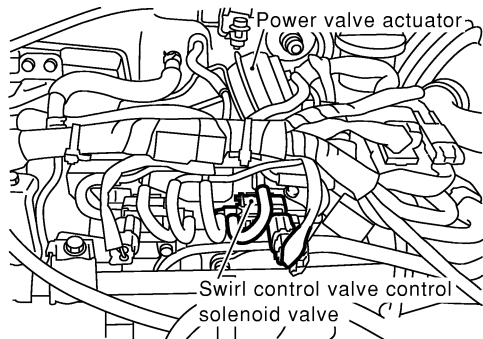
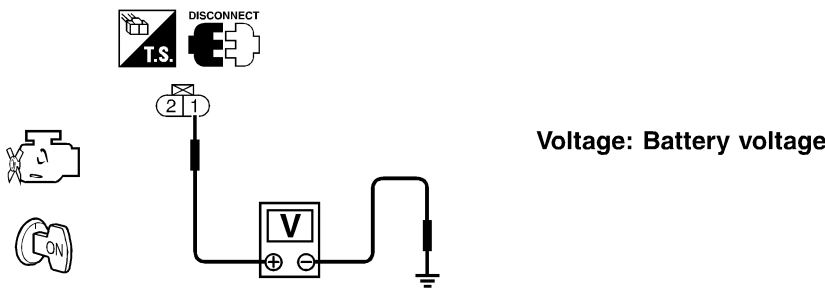
1	CHECK INTAKE SYSTEM	
1. Start engine and let it idle. 2. Check intake air system for air leaks.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair intake system.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT																			
(📱) With CONSULT-II 1. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II. 2. Touch "ON" and "OFF" on CONSULT-II screen.																				
<table border="1" style="margin: auto;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>SWIRL CONT SOL VALVE</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>IACV-AAC/V</td> <td style="text-align: center;">XXX step</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		SWIRL CONT SOL VALVE	OFF	MONITOR		ENG SPEED	XXX rpm	IACV-AAC/V	XXX step								
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SWIRL CONT SOL VALVE	OFF																			
MONITOR																				
ENG SPEED	XXX rpm																			
IACV-AAC/V	XXX step																			
3. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.																				
OK or NG																				
OK	▶	GO TO 6.																		
NG	▶	GO TO 3.																		

SEF003Z

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch "OFF". Disconnect swirl control valve control solenoid valve harness connector. 	
	
SEF002Z	
<ol style="list-style-type: none"> Turn ignition switch "ON". Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester. 	
	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

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4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● 15A fuse ● Harness for open or short between swirl control valve control solenoid valve and fuse 	
▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> Turn ignition switch "OFF". Disconnect ECM harness connector. Check harness continuity between ECM terminal 29 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair open circuit, short to ground or short to power in harness connectors.

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

6	CHECK HOSES
<p>Check hoses and tubes between intake manifold, and swirl control valve actuator for crack, clogging, improper connection or disconnection.</p> <div data-bbox="568 273 1055 630"><p>The diagrams show three types of hose problems: 1. A cylindrical tube with a longitudinal crack labeled 'Split'. 2. A hose that is severely swollen and blocked, labeled 'Clogging'. 3. A hose that is not properly seated or connected to a fitting, labeled 'Improper connection'.</p></div> <p style="text-align: right;">SEF109L</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ Repair hoses or tubes.

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

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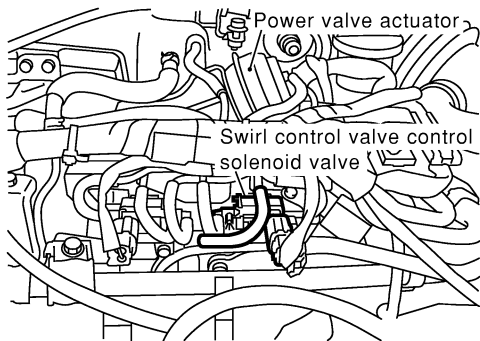
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7 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

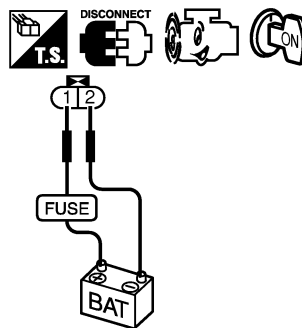
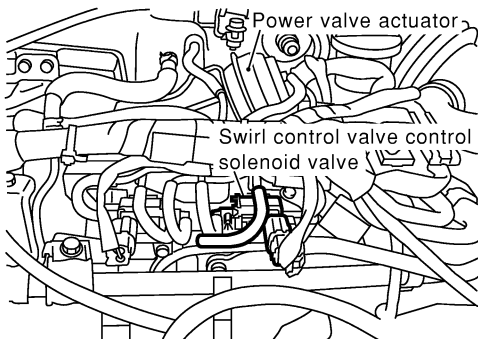
Operation takes less than 1 second.



SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.



Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF005Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

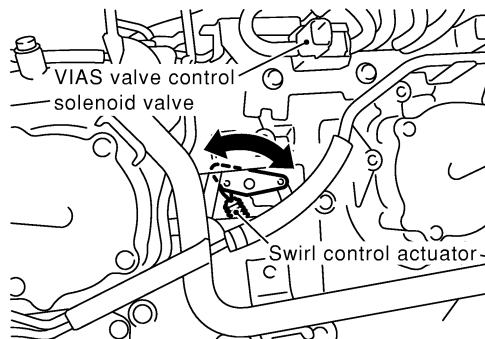
DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

8 CHECK SWIRL CONTROL VALVE ACTUATOR

With CONSULT-II

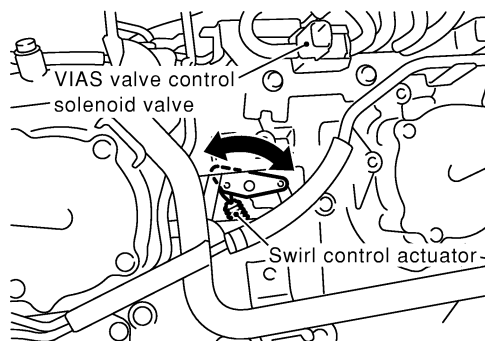
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.
4. Touch "ON" and "OFF" on CONSULT-II screen.
5. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT SOL/V" indication.



SEF006Z

Without CONSULT-II

1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Apply 12V direct current between swirl control valve control solenoid valve terminals 1 and 2.
4. Make sure that swirl control valve actuator rod moves according to 12V direct current being applied.



SEF006Z

OK or NG

OK



GO TO 9.

NG



Replace swirl control valve and actuator.

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

9	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH									
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch. 3. Attach vacuum pump to swirl control valve control vacuum check switch. 4. Turn ignition switch "ON". 5. Check voltage between ECM terminal 55 and ground under the following conditions. 										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied pressure</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">More than -20.0 kPa (-150 mmHg, -5.91 inHg)</td> <td style="text-align: center;">Engine ground</td> </tr> <tr> <td style="text-align: center;">-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)</td> <td style="text-align: center;">Engine ground or Approx. 4.8</td> </tr> <tr> <td style="text-align: center;">Less than -23.0 kPa (-172 mmHg, -6.77 inHg)</td> <td style="text-align: center;">Approx. 4.8</td> </tr> </tbody> </table>	Applied pressure	Voltage V	More than -20.0 kPa (-150 mmHg, -5.91 inHg)	Engine ground	-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)	Engine ground or Approx. 4.8	Less than -23.0 kPa (-172 mmHg, -6.77 inHg)	Approx. 4.8	<p>SEF709X</p>
Applied pressure	Voltage V									
More than -20.0 kPa (-150 mmHg, -5.91 inHg)	Engine ground									
-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)	Engine ground or Approx. 4.8									
Less than -23.0 kPa (-172 mmHg, -6.77 inHg)	Approx. 4.8									
OK or NG										
OK	▶	GO TO 10.								
NG	▶	Replace swirl control valve control vacuum check switch.								

10	CHECK MASS AIR FLOW SENSOR											
<ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Start engine and warm it up to normal operating temperature. 3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground. 												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition switch "ON" (Engine stopped.)</td> <td style="text-align: center;">Approx. 1.0</td> </tr> <tr> <td style="text-align: center;">Idle (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.2 - 1.8</td> </tr> <tr> <td style="text-align: center;">2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.6 - 2.2</td> </tr> <tr> <td style="text-align: center;">Idle to about 4,000 rpm*</td> <td style="text-align: center;">1.2 - 1.8 to Approx. 4.0</td> </tr> </tbody> </table> <p style="font-size: small;">*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.</p>	Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Approx. 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2	Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0	<p>SEF298X</p>
Condition	Voltage V											
Ignition switch "ON" (Engine stopped.)	Approx. 1.0											
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8											
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2											
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0											
<ol style="list-style-type: none"> 4. If the voltage is out of specification, disconnect MAFS harness connector and connect it again. Then repeat above check. 												
OK or NG												
OK (With CONSULT-II)	▶	GO TO 11.										
OK (Without CONSULT-II)	▶	GO TO 12.										
NG	▶	Replace mass air flow sensor.										

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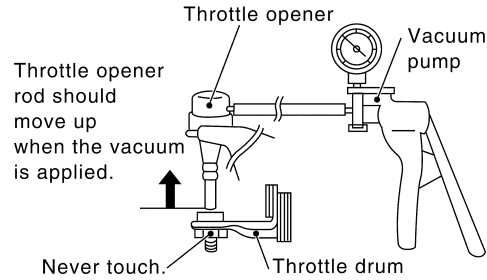
DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

11 CHECK THROTTLE POSITION SENSOR

With CONSULT-II

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.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

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

SEF062Y

OK or NG

- | | | |
|----|---|-----------|
| OK | ▶ | GO TO 14. |
| NG | ▶ | GO TO 13. |

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

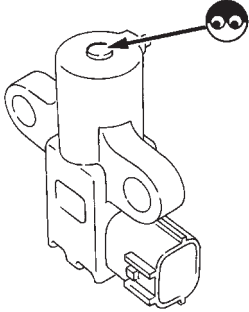
12	CHECK THROTTLE POSITION SENSOR								
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Remove the vacuum hose connected to the throttle opener. 4. Connect suitable vacuum hose to 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. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 6. Turn ignition switch ON. 7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground. Voltage measurement must be made with throttle position sensor installed in vehicle. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed (a)</td> <td style="text-align: center;">0.15 - 0.85V</td> </tr> <tr> <td style="text-align: center;">Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td style="text-align: center;">Completely open (b)</td> <td style="text-align: center;">3.5 - 4.7V</td> </tr> </tbody> </table>		Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage								
Completely closed (a)	0.15 - 0.85V								
Partially open	Between (a) and (b)								
Completely open (b)	3.5 - 4.7V								
SEF793W									
OK or NG									
OK	▶ GO TO 14.								
NG	▶ GO TO 13.								

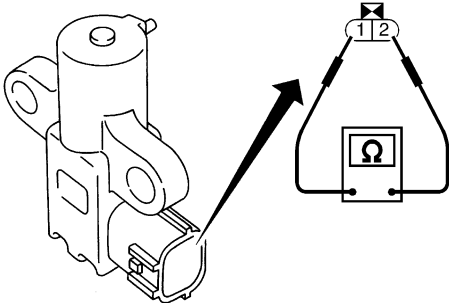
13	ADJUST CLOSED THROTTLE POSITION SWITCH								
<p>Adjust closed throttle position switch. Refer to "Basic Inspection", EC-101.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">$15^\circ \pm 5^\circ$ BTDC</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>		Items	Specifications	Ignition timing	$15^\circ \pm 5^\circ$ BTDC	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)								
MTBL0655									
OK or NG									
OK	▶ GO TO 14.								
NG	▶ Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-101.								

GI
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DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

14	CHECK CRANKSHAFT POSITION SENSOR (REF)-I		
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Loosen the fixing bolts and remove the CKPS (REF). 3. Visually check the CKPS (REF) for chipping. 			
			
SEF585P			
OK or NG			
OK	▶	GO TO 15.	
NG	▶	Replace crankshaft position sensor (REF).	

15	CHECK CRANKSHAFT POSITION SENSOR (REF)-II		
Check resistance between CKPS (REF) terminals 1 and 2.			
			
Resistance: Approximately 470 - 570 Ω [AT 20°C (68°F)]			
SEF350X			
OK or NG			
OK	▶	GO TO 16.	
NG	▶	Replace crankshaft position sensor (REF).	

16	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.			
▶		INSPECTION END	


PROCEDURE C

NBEC0530S03

1	INSPECTION START		
Do you have CONSULT-II?			
Yes or No			
Yes	▶	GO TO 2.	
No	▶	GO TO 3.	

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT																													
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "ON" and "OFF" on CONSULT-II screen. 																														
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SWIRL CONT SOL VALVE	OFF																													
MONITOR																														
ENG SPEED	XXX rpm																													
IACV-AAC/V	XXX step																													
<p>4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.</p> <p style="text-align: right;">SEF003Z</p>																														
OK or NG																														
OK	▶	GO TO 6.																												
NG	▶	GO TO 3.																												

GI

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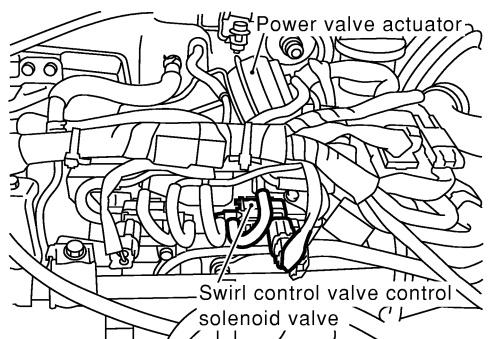
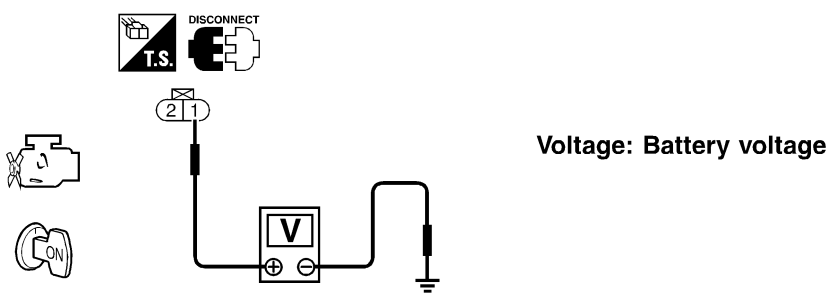
LC

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3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect swirl control valve control solenoid valve harness connector. 		
		
<p style="text-align: right;">SEF002Z</p>		
<ol style="list-style-type: none"> 3. Turn ignition switch "ON". 4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester. 		
		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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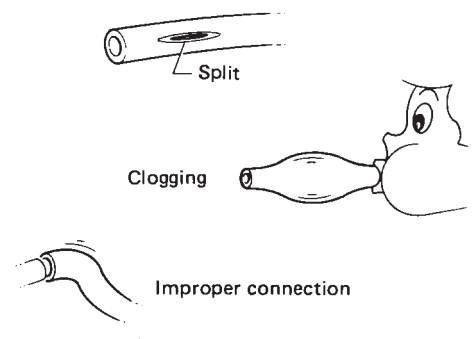
IDX

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● 15A fuse ● Harness for open or short between swirl control valve control solenoid valve and fuse 	
▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 29 and terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also, check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ Repair open circuit, short to ground or short to power in harness connectors.

6	CHECK HOSES
<p>Check hoses and tubes between air cleaner and swirl control valve vacuum check switch for clogging or improper connection.</p> <div style="text-align: center;">  <p>The diagram illustrates three common hose problems: 1. A 'Split' hose shown as a cylindrical tube with a longitudinal crack. 2. 'Clogging' shown as a hose with a bulbous, swollen section. 3. 'Improper connection' shown as a hose with a loose, unsealed joint.</p> </div> <p style="text-align: right;">SEF109L</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ Repair hoses or tubes.

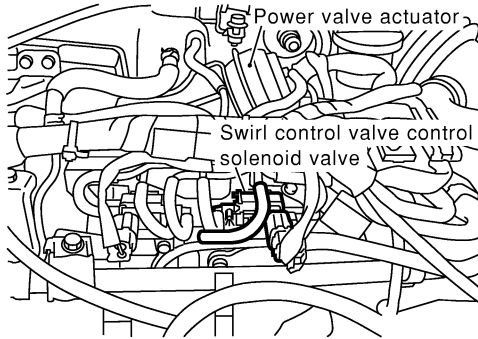
DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

7 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

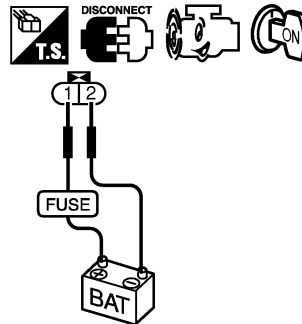
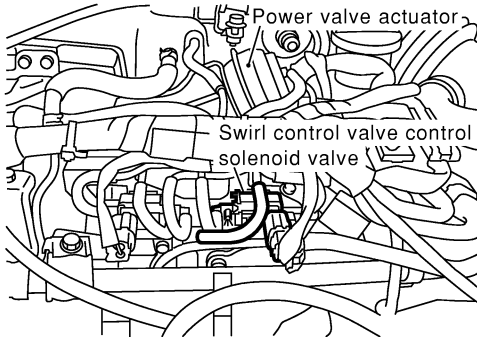
Operation takes less than 1 second.



SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.



Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF005Z

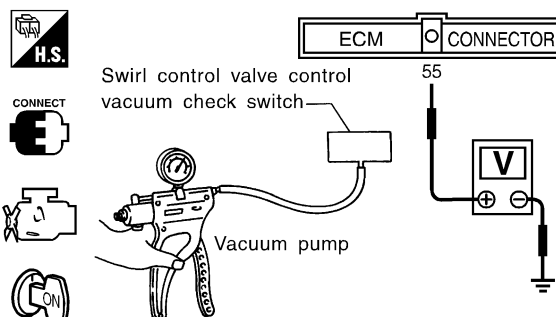
OK or NG

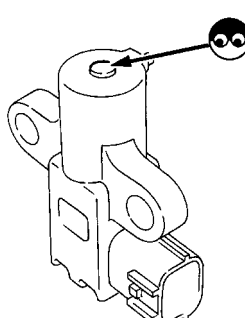
OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

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DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

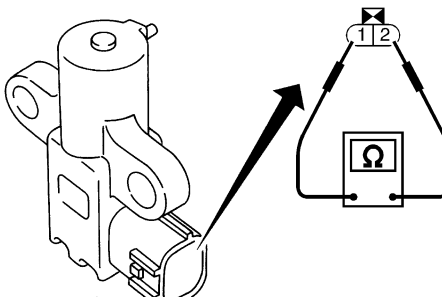
Diagnostic Procedure (Cont'd)

8	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH								
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch. 3. Attach vacuum pump to swirl control valve control vacuum check switch. 4. Turn ignition switch "ON". 5. Check voltage between ECM terminal 55 and ground under the following conditions. 									
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied pressure</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">More than -20.0 kPa (-150 mmHg, -5.91 inHg)</td> <td style="text-align: center;">Engine ground</td> </tr> <tr> <td style="text-align: center;">-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)</td> <td style="text-align: center;">Engine ground or Approx. 4.8</td> </tr> <tr> <td style="text-align: center;">Less than -23.0 kPa (-172 mmHg, -6.77 inHg)</td> <td style="text-align: center;">Approx. 4.8</td> </tr> </tbody> </table> </div> </div>		Applied pressure	Voltage V	More than -20.0 kPa (-150 mmHg, -5.91 inHg)	Engine ground	-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)	Engine ground or Approx. 4.8	Less than -23.0 kPa (-172 mmHg, -6.77 inHg)	Approx. 4.8
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-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)	Engine ground or Approx. 4.8								
Less than -23.0 kPa (-172 mmHg, -6.77 inHg)	Approx. 4.8								
SEF709X									
OK or NG									
OK	▶	GO TO 9.							
NG	▶	Replace swirl control valve control vacuum check switch.							

9	CHECK CRANKSHAFT POSITION SENSOR (REF)-I	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Loosen the fixing bolts and remove the CKPS (REF). 3. Visually check the CKPS (REF) for chipping. 		
		
SEF585P		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (REF).

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

10	CHECK CRANKSHAFT POSITION SENSOR (REF)-II	
Check resistance between CKPS (REF) terminals 1 and 2.		
		<p>Resistance: Approximately 470 - 570 Ω [AT 20°C (68°F)]</p>
OK or NG		SEF350X
OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace crankshaft position sensor (REF).

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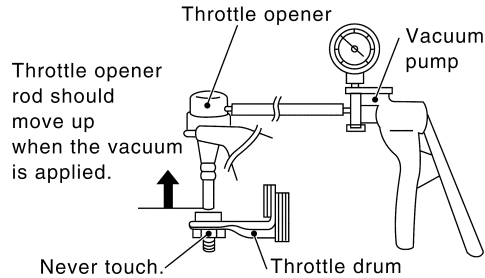
DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

11 CHECK THROTTLE POSITION SENSOR

With CONSULT-II

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.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

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

SEF062Y

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

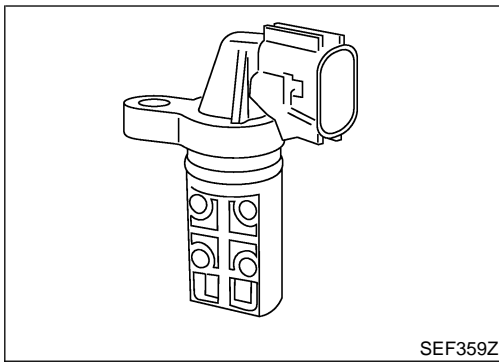
12	CHECK THROTTLE POSITION SENSOR								
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Remove the vacuum hose connected to the throttle opener. 4. Connect suitable vacuum hose to 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. 									
SEF793W									
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Throttle valve conditions	Voltage								
Completely closed (a)	0.15 - 0.85V								
Partially open	Between (a) and (b)								
Completely open (b)	3.5 - 4.7V								
MTBL0231									
OK or NG									
OK	▶ GO TO 14.								
NG	▶ GO TO 13.								

13	ADJUST CLOSED THROTTLE POSITION SWITCH								
Adjust closed throttle position switch. Refer to "Basic Inspection", EC-101.									
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF								
Target idle speed	750 ± 50 rpm (in "P" or "N" position)								
MTBL0655									
OK or NG									
OK	▶ GO TO 14.								
NG	▶ Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-101.								

14	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

Component Description



Component Description

NBEC0705

Intake valve advance unit position sensors are located in the front cylinder heads in both right/left banks. This sensor uses a Hall IC (element). The cam position is determined by the intake primary cam sprocket concave (in three places). The ECM provides feedback to the intake valve timing control for appropriate target valve open-close timing according to drive conditions based on detected cam position.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0706

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	<ul style="list-style-type: none"> Engine: After warming up Shift lever "N" Quickly depressed accelerator pedal No-load 	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA

ECM Terminals and Reference Value

NBEC0707

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79	Y/G	Intake valve timing control position sensors (RH)	<p>[Engine is running]</p> <ul style="list-style-type: none"> Warm-up condition Idle speed 	<p>Approximately 0.5V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> Warm-up condition Engine speed is 2,000 rpm. 	<p>Approximately 0.5V</p>

DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	OR	Intake valve timing control position sensors (LH)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>Approximately 0.5V</p> <p>SEF351Z</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm. 	<p>Approximately 0.5V</p> <p>SEF352Z</p>

On Board Diagnosis Logic

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

Possible Cause

- Harness or connectors (Intake valve timing control position sensor circuit is open or shorted)
- Intake valve timing control position sensor.
- Crankshaft position sensor (REF)
- Crankshaft position sensor (POS)
- Camshaft position sensor (PHASE)

DTC Confirmation Procedure

NOTE:

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

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Maintain the following conditions for at least 10 seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TENP/S	XXX °C
VHCL SPEED SE	XXX km/h
INT/V TIM (B1)	XXX °CA
INT/V TIM (B2)	XXX °CA
INT/V SOL (B1)	XXX %
INT/V SOL (B2)	XXX %

SEF353Z

DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

DTC Confirmation Procedure (Cont'd)

Engine speed	More than Idle speed
Selector lever	"P" or "N" position

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-487.

 **WITH GST**

Follow the procedure "With CONSULT-II" above.

NBEC0710S02

DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

Wiring Diagram

Wiring Diagram

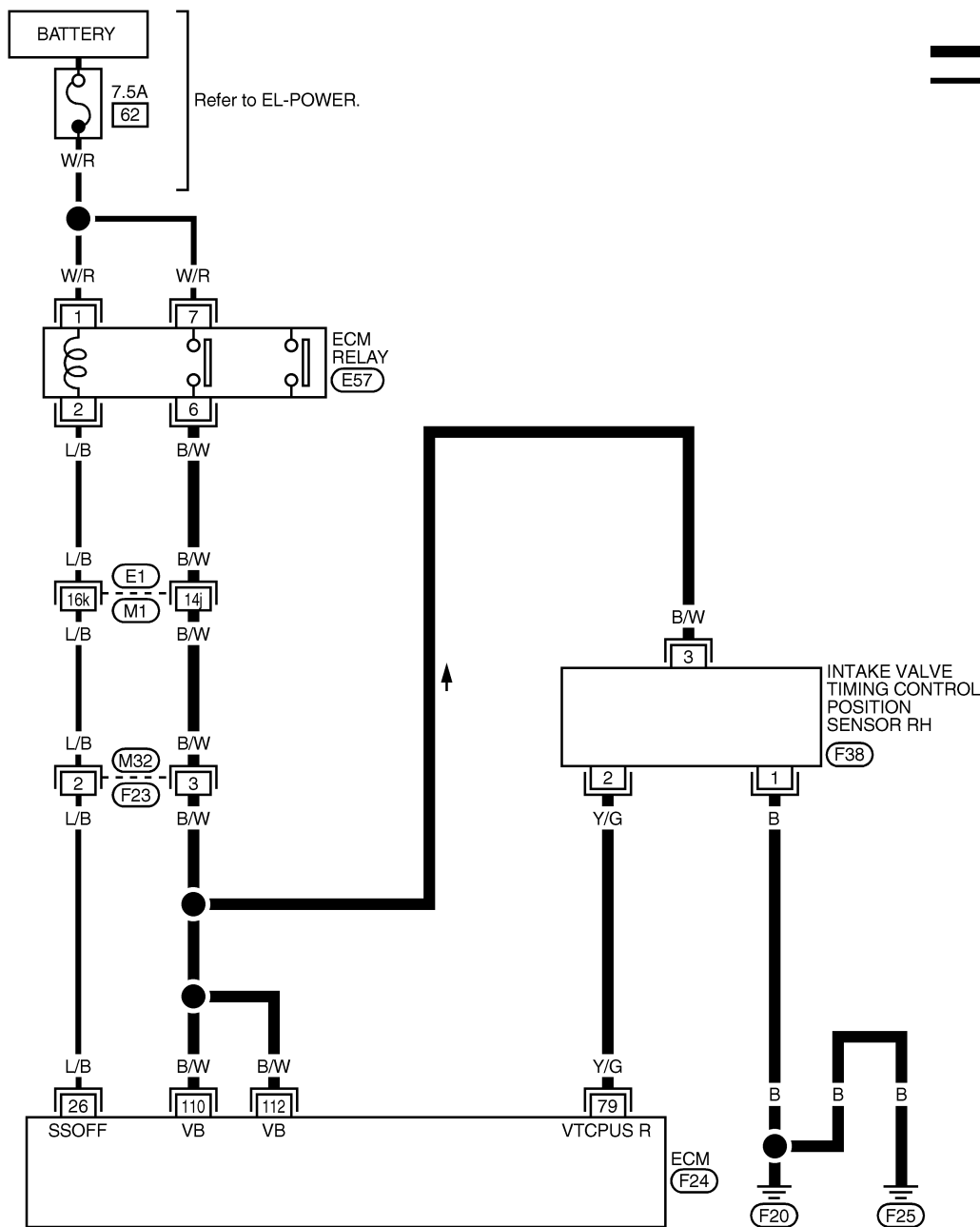
RIGHT BANK

NBEC0711

NBEC0711S01

EC-IVCS-R-01

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



GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

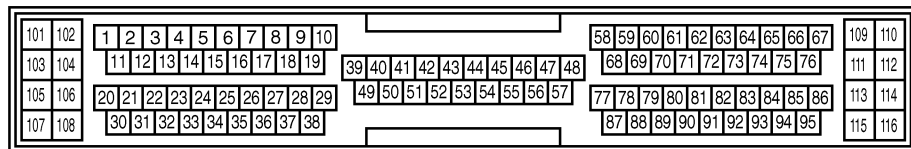
EL

IDX



REFER TO THE FOLLOWING.

(E1) -SUPER
 MULTIPLE JUNCTION (SMJ)



MEC987C

DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

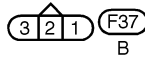
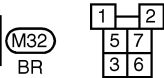
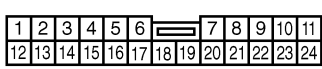
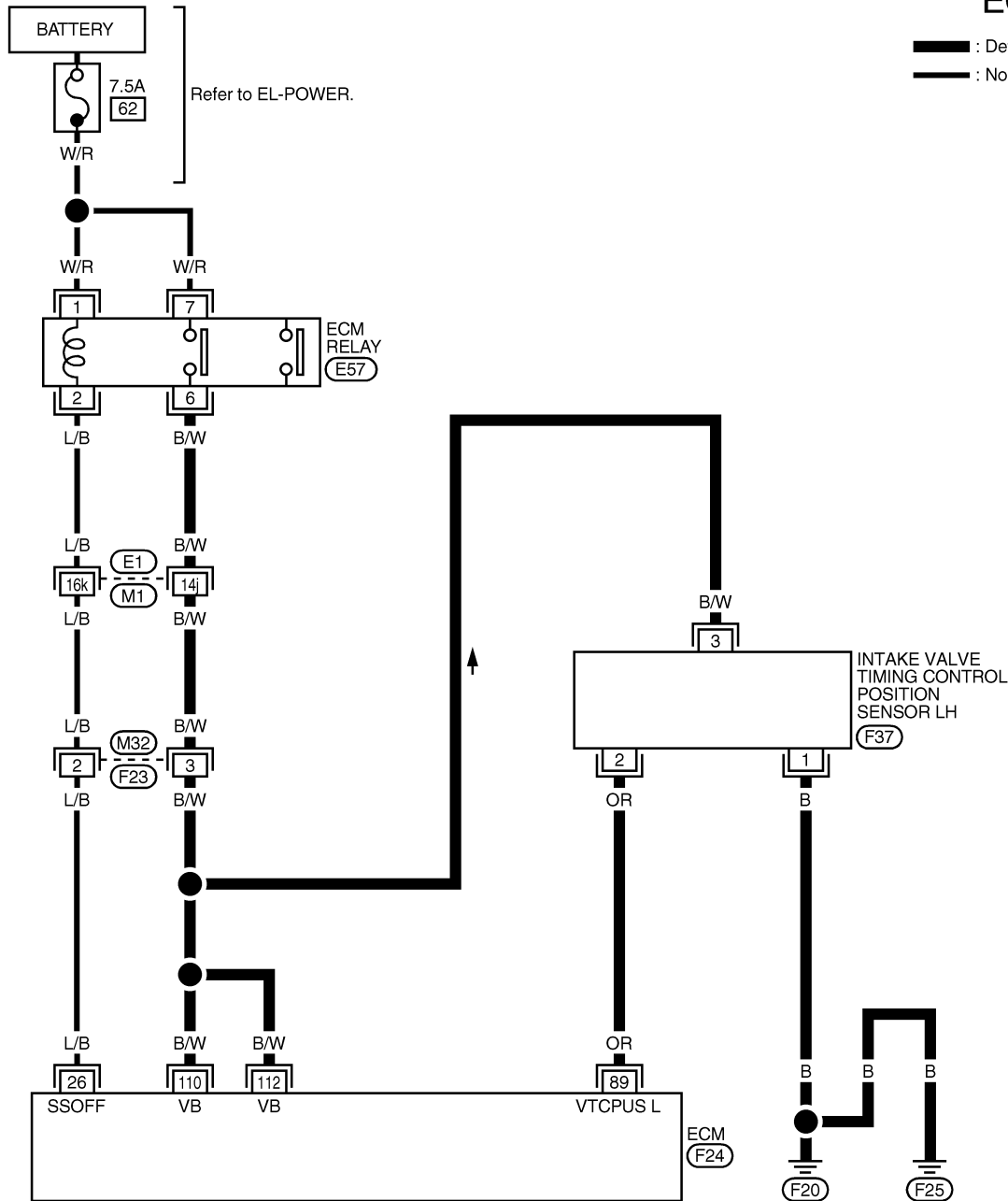
Wiring Diagram (Cont'd)

LEFT BANK

NBEC0711S02

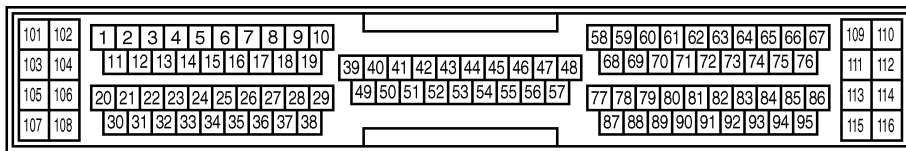
EC-IVCS-L-01

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



REFER TO THE FOLLOWING.

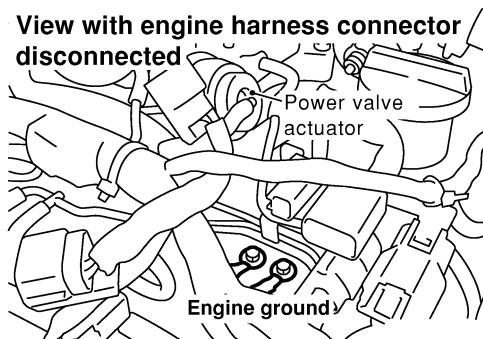
E1 -SUPER
 MULTIPLE JUNCTION (SMJ)

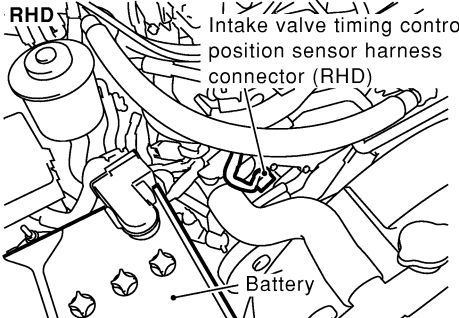
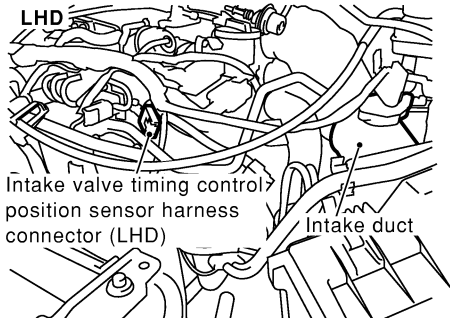
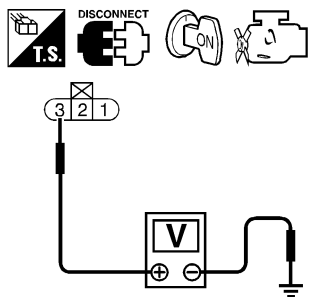


MEC986C

Diagnostic Procedure

NBEC0712

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch "OFF".</p> <p>2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>View with engine harness connector disconnected</p>  <p>Power valve actuator</p> <p>Engine ground</p> </div> <p style="text-align: right;">SEF959Y</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p>
▶		GO TO 2.	<p>AT</p>

2	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT	<p>1. Disconnect intake valve timing control position sensor harness connector.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>RHD</p>  <p>Intake valve timing control position sensor harness connector (RHD)</p> <p>Battery</p> </div> <div style="text-align: center;"> <p>LHD</p>  <p>Intake valve timing control position sensor harness connector (LHD)</p> <p>Intake duct</p> </div> </div> <p style="text-align: right;">SEF360Z</p> <p>2. Turn ignition switch "ON".</p> <p>3. Check voltage between intake valve timing control position sensor harness connector terminal 3 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> </div> <p style="text-align: right;">SEF370X</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
▶		GO TO 4.	
▶		GO TO 3.	

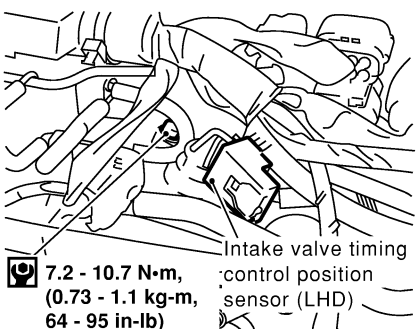
DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● Harness connectors E1, M1 ● Harness for open or short between ECM and intake valve timing control position sensor ● Harness for open or short between ECM relay and intake valve timing control position sensor 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch "OFF".</p> <p>2. Check harness connector continuity between intake valve timing control position sensor harness connector terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair open circuit or short to power in harness or connectors.

5	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness connectors continuity between ECM terminal 79 (Right) or 89 (Left) and terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INSTALLATION
<p>Check that intake valve timing control position sensor is installed correctly as shown below.</p>	
	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Install intake valve timing control position sensor correctly.

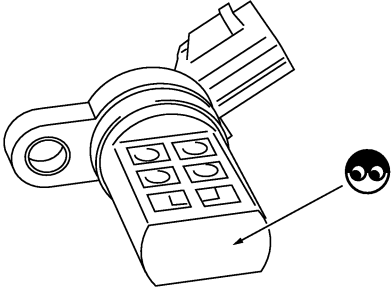
SEF361Z

DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

Diagnostic Procedure (Cont'd)

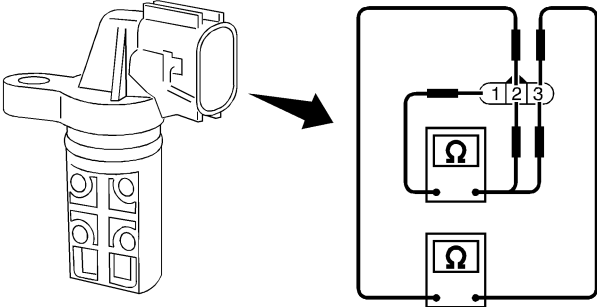
7	CHECK IMPROPER INSTALLATION	
<ol style="list-style-type: none"> Loosen and retighten the fixing bolt of the intake valve timing control position sensor. Reconnect harness connector disconnected. Perform "DTC Confirmation Procedure", EC-483 again. 		
Is a 1st trip DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) detected?		
Yes	▶	GO TO 8.
No	▶	INSPECTION END

GI
MA
EM

8	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR	
<ol style="list-style-type: none"> Disconnect intake valve timing control position sensor connector. Loosen the fixing bolt of the sensor. Remove the sensor. Visually check the sensor for chipping. 		
		
SEF362Z		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace intake valve timing control position sensor.

LC
EC

FE
AT
TF
PD
AX

9	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR-II	
Check resistance as shown below.		
		
SEF363Z		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace intake valve timing control position sensor.

BR
ST
RS
BT
HA
SC
EL
IDX

DTC P1140 (RIGHT, -B1), P1145 (LEFT, -B2) INTAKE VALVE TIMING CONTROL POSITION SENSOR (CIRCUIT)

Diagnostic Procedure (Cont'd)

10	CHECK CAMSHAFT
Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to step 35 of "Timing chain removal", EM-23.	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Remove debris and clean the signal pick-up cut out of camshaft.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL

On Board Diagnosis Logic

On Board Diagnosis Logic

★ The closed loop control has the one trip detection logic.

NBEC0282

Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

GI

MA

EM

LC

Possible Cause

NBEC0531

- The front heated oxygen sensor circuit is open or shorted.
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)

EC

FE

AT

TF

DTC Confirmation Procedure

NBEC0283

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

PD

AX

SU

TESTING CONDITION:

- Never raise engine speed above 3,600 rpm during the "DTC Confirmation Procedure". If the engine speed limit is exceeded, retry the procedure from step 2.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

BR

ST

RS

BT

HA

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	FR O2 SEN-B1	XXX V
	RR O2 SEN-B2	XXX V

SEF063Y

WITH CONSULT-II

NBEC0283S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Hold engine speed at 2,000 rpm and check one of the following.

- "HO2S1 (B1)/(B2)" voltage should go above 0.70V at least once.
- "HO2S1 (B1)/(B2)" voltage should go below 0.21V at least once.

If the check result is NG, perform "Diagnosis Procedure", EC-492.

SC

EL

IDX

DTC P1148 (RIGHT BANK, -B1), P1168 (LEFT BANK, -B2) CLOSED LOOP CONTROL

DTC Confirmation Procedure (Cont'd)

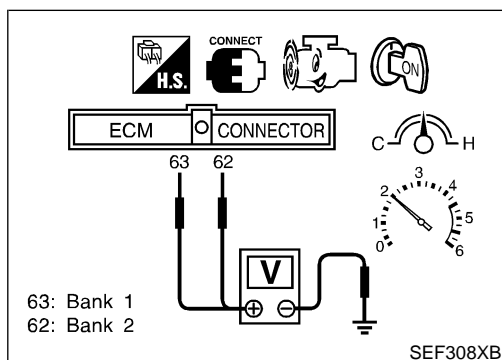
If the check result is OK, perform the following step.

- 4) Let engine idle at least 5 minutes.
- 5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.6 msec or more
ENG SPEED	1,500 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0130 and/or P0150 may be displayed on CONSULT-II screen.

- 6) If DTC is detected, go to "Diagnostic Procedure", EC-492.



Overall Function Check

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

WITH GST

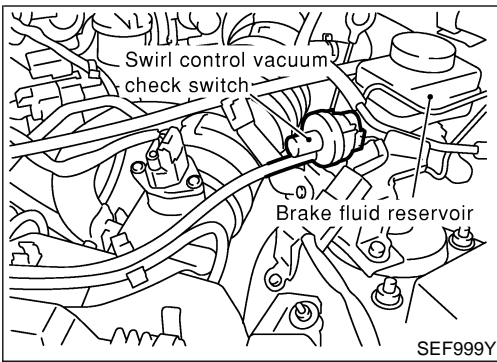
- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 63 [Heated oxygen sensor 1 (front) right bank signal] or 62 [Heated oxygen sensor 1 (front) left bank signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no-load.
 - The voltage should go above 0.70V at least once.
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "Diagnostic Procedure", EC-492.

Diagnostic Procedure

Perform trouble diagnosis for "DTC P0133, P0153", EC-218.

DTC P1165 SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

Component Description



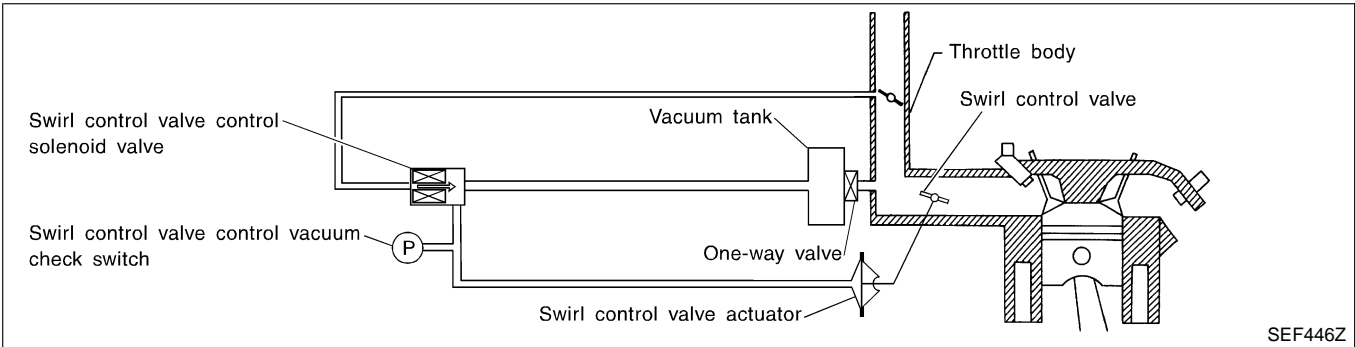
Component Description

NBEC0532

The swirl control valve control vacuum check switch detects vacuum signal to the swirl control valve, and sends "ON" or "OFF" signal to the ECM.

When vacuum is supplied to the valve, the swirl control valve control vacuum check switch sends "OFF" signal to the ECM.

The swirl control valve control vacuum check switch is not used to control the engine system, it is used for on board diagnosis.



CONSULT-II Reference Value in Data Monitor Mode

NBEC0533

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SWL CON VC SW	<ul style="list-style-type: none"> Engine speed: Idle Engine coolant temperature is between 15°C (59°F) to 50°C (122°F). 	OFF
	<ul style="list-style-type: none"> Engine speed: Idle Engine coolant temperature is above 55°C (131°F). 	ON

ECM Terminals and Reference Value

NBEC0674

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	W/B	Swirl control valve control vacuum check switch	[Engine is running] <ul style="list-style-type: none"> Idle speed Engine coolant temperature is between 15 to 50°C (59 to 122°F). 	Approximately 5V
			[Engine is running] <ul style="list-style-type: none"> Idle speed Engine coolant temperature is above 55°C (122°F). 	0 - 1.0V

DTC P1165 SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0535

Malfunction is detected when the swirl control valve control vacuum check switch remains "OFF" under specified engine conditions.

Possible Cause

NBEC0536

- Harness or connectors
(Swirl control valve control vacuum check switch circuit is open.)
- Hoses
(Hoses are clogged or connected incorrectly.)
- Swirl control valve control solenoid valve
- Swirl control valve control vacuum check switch

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NBEC0537

NOTE:

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

TESTING CONDITION:

For best results, perform the test at a temperature above 5°C (41°F).

WITH CONSULT-II

NBEC0537S01

- 1) Turn ignition switch "OFF" and wait at least 10 seconds.
- 2) Turn ignition switch "ON".
- 3) Select "DATA MONITOR" mode with CONSULT-II and wait at least 5 seconds.
If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-496.

WITH GST

NBEC0537S02

Follow the procedure "WITH CONSULT-II" above.

DTC P1165 SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH



Wiring Diagram

Wiring Diagram

NBEC0538

EC-S/VCSW-01

GI

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

MA

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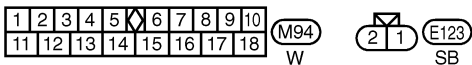
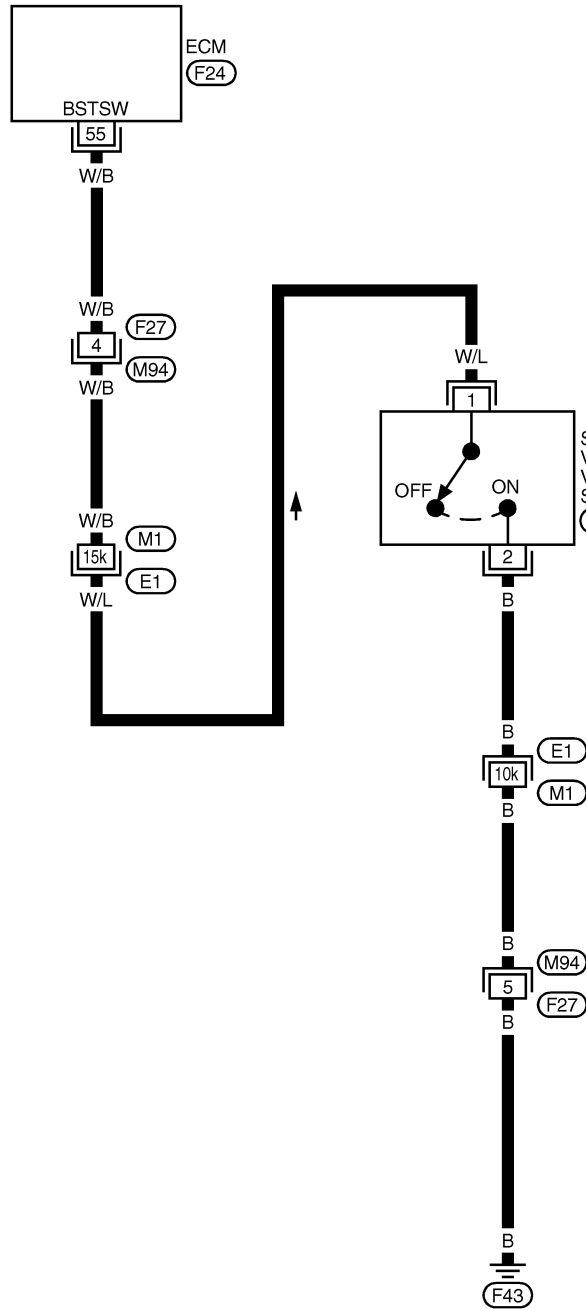
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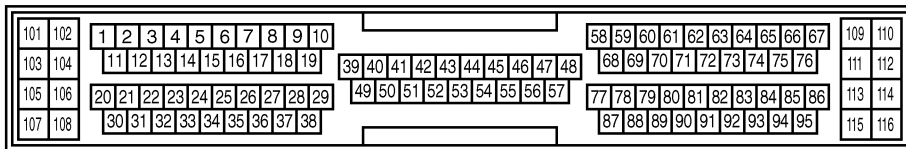
EL

IDX



REFER TO THE FOLLOWING.

 -SUPER
 MULTIPLE JUNCTION (SMJ)



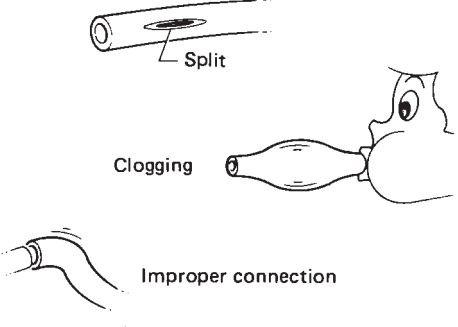
MEC981C

DTC P1165 SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

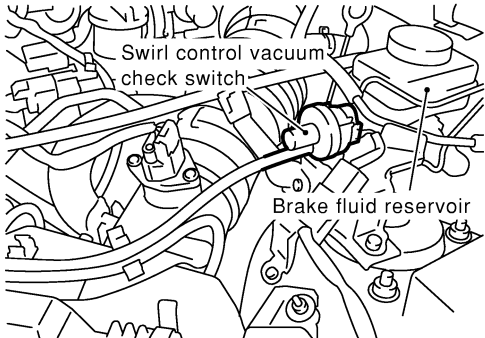
Diagnostic Procedure

Diagnostic Procedure

NBEC0539

1	CHECK HOSES		
<p>1. Turn ignition switch "OFF". 2. Check hose for clogging or improper connection.</p>			
			
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Repair or reconnect the hose.	

SEF109L

2	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH GROUND CIRCUIT FOR OPEN AND SHORT		
<p>1. Disconnect swirl control valve control vacuum check switch harness connector.</p>			
			
<p>2. Check harness continuity between terminal 2 and ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p>			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

SEF999Y

3	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 and M92, F27 ● Harness for open between swirl control valve control vacuum check switch and engine ground 			
		▶	Repair open circuit or short to power in harness connectors.

DTC P1165 SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

Diagnostic Procedure (Cont'd)

4	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 55 and swirl control valve control vacuum check switch terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

GI
MA
EM
LC

5	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH									
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch. 3. Attach vacuum pump to swirl control valve control vacuum check switch. 4. Turn ignition switch "ON". 5. Check voltage between ECM terminal 55 and ground under the following conditions. 										
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> </div> <div style="flex: 2;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied pressure</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">More than -20.0 kPa (-150 mmHg, -5.91 inHg)</td> <td style="text-align: center;">Engine ground</td> </tr> <tr> <td style="text-align: center;">-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)</td> <td style="text-align: center;">Engine ground or Approx. 4.8</td> </tr> <tr> <td style="text-align: center;">Less than -23.0 kPa (-172 mmHg, -6.77 inHg)</td> <td style="text-align: center;">Approx. 4.8</td> </tr> </tbody> </table> </div> </div>			Applied pressure	Voltage V	More than -20.0 kPa (-150 mmHg, -5.91 inHg)	Engine ground	-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)	Engine ground or Approx. 4.8	Less than -23.0 kPa (-172 mmHg, -6.77 inHg)	Approx. 4.8
Applied pressure	Voltage V									
More than -20.0 kPa (-150 mmHg, -5.91 inHg)	Engine ground									
-20.0 to -23.0 kPa (-150 to -172 mmHg, -5.91 to -6.77 inHg)	Engine ground or Approx. 4.8									
Less than -23.0 kPa (-172 mmHg, -6.77 inHg)	Approx. 4.8									
SEF709X										
OK or NG										
OK	▶	GO TO 6.								
NG	▶	Replace swirl control valve control vacuum check switch.								

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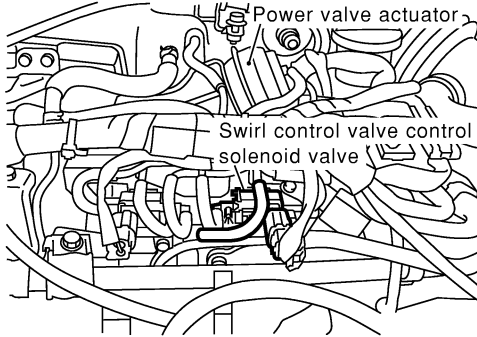
DTC P1165 SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

Diagnostic Procedure (Cont'd)

6 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

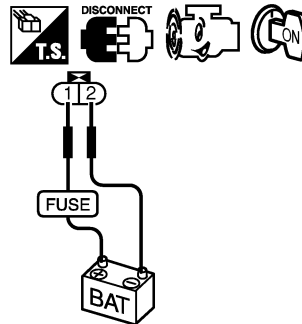
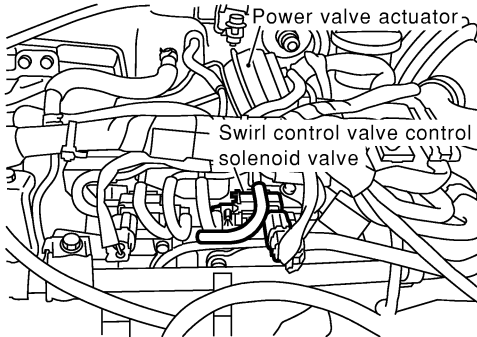
Operation takes less than 1 second.



SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals and 2.
5. Check vacuum existence and operation delay time under the following conditions.



Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF005Z

OK or NG

- | | | |
|----|---|---|
| OK | ▶ | GO TO 7. |
| NG | ▶ | Replace intake manifold collector assembly. |

7 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

▶ **INSPECTION END**

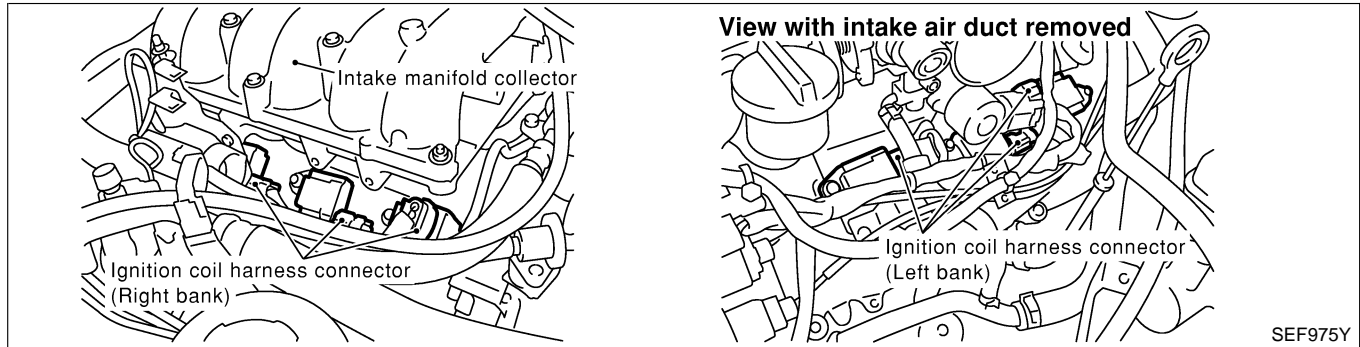
Component Description

NBEC0286

IGNITION COIL & POWER TRANSISTOR

NBEC0286S01

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.



ECM Terminals and Reference Value

NBEC0675

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21 22 23 30 31 32	Y/R G/R L/R GY PU/W GY/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>0 - 0.2V★</p> <p>SEF399T</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm. 	<p>0.1 - 0.3V★</p> <p>SEF645T</p>

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

On Board Diagnosis Logic

NBEC0288

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

DTC P1320 IGNITION SIGNAL

Possible Cause

Possible Cause

- Harness or connectors (The ignition primary circuit is open or shorted.) NBEC0572
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (REF)
- Crankshaft position sensor (REF) circuit

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.
- **If DTC P1320 is displayed with DTC P0335, P0340, P1335 or P1336, perform trouble diagnosis for DTC P0335, P0340, P1335 or P1336 first. Refer to EC-334, EC-342, EC-510 or EC-517.**

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-504.

WITH GST

Follow the procedure "WITH CONSULT-II" above.

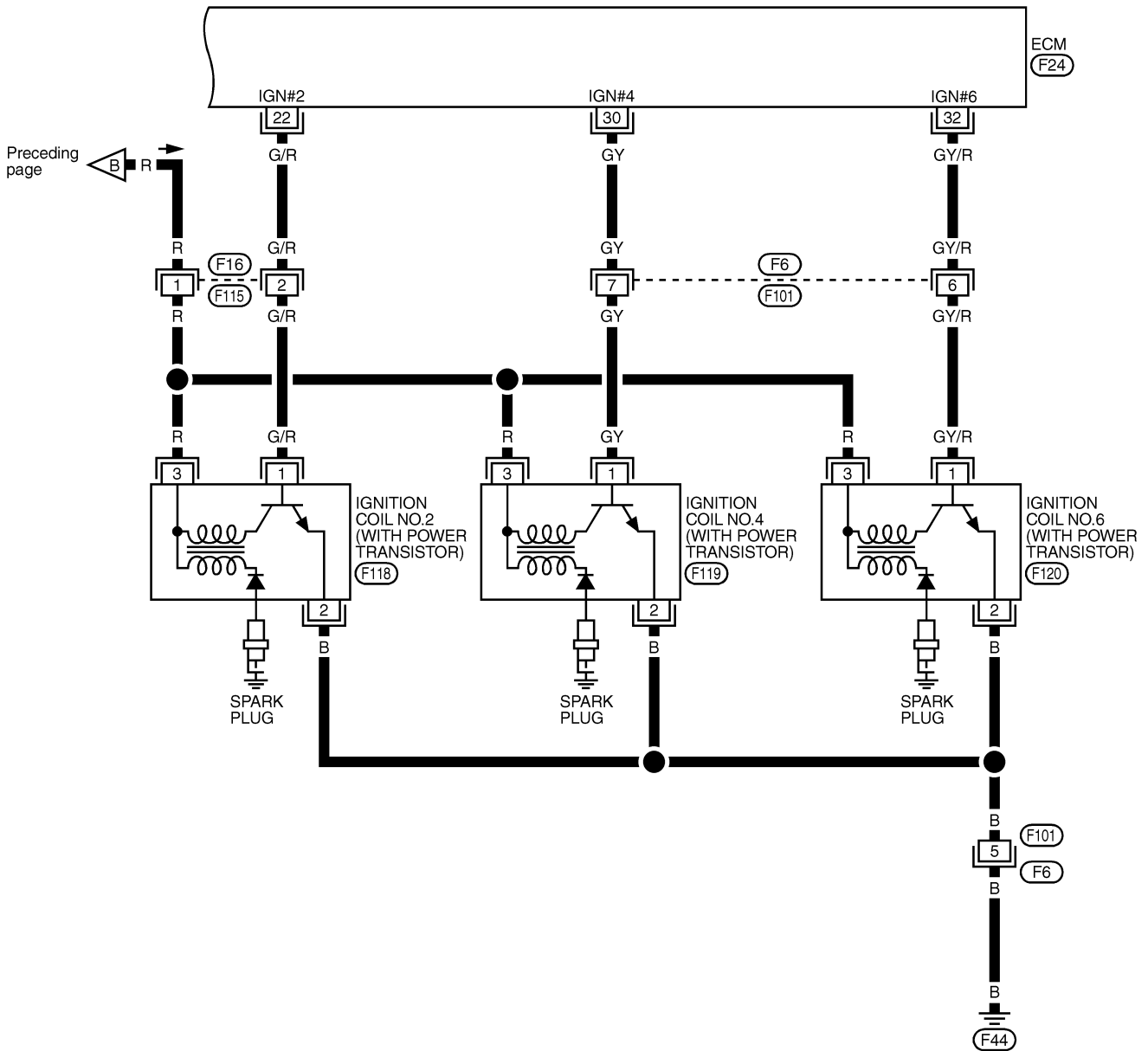
DTC P1320 IGNITION SIGNAL

Wiring Diagram (Cont'd)

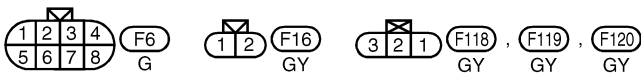
EC-IGN/SG-03

— : Detectable line for DTC

- - - : Non-detectable line for DTC



GI
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101	102	1	2	3	4	5	6	7	8	9	10	39	40	41	42	43	44	45	46	47	48	58	59	60	61	62	63	64	65	66	67	109	110											
103	104	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	111	112			
105	106	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	113	114			
107	108	30	31	32	33	34	35	36	37	38																																	115	116



HA
SC
EL
IDX

MEC971C

DTC P1320 IGNITION SIGNAL

Diagnostic Procedure

Diagnostic Procedure

NBEC0291

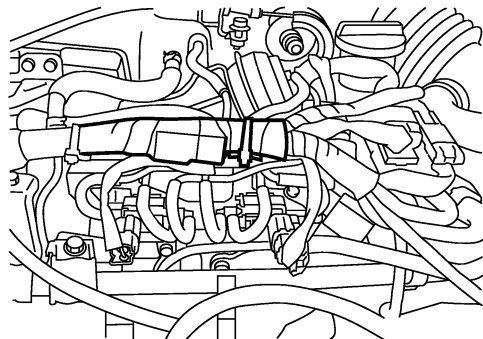
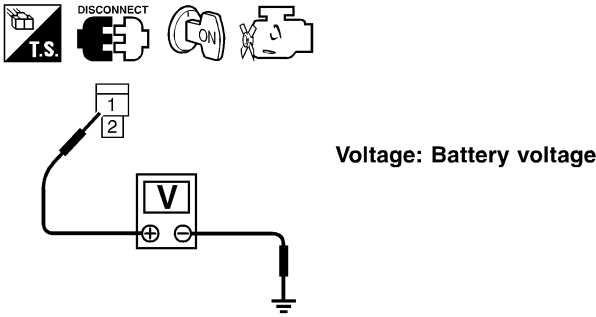
1	CHECK ENGINE START	
Turn ignition switch "OFF", and restart engine. Is engine running?		
Yes or No		
Yes (With CONSULT-II) ▶	GO TO 2.	
Yes (Without CONSULT-II) ▶	GO TO 12.	
No ▶	GO TO 3.	

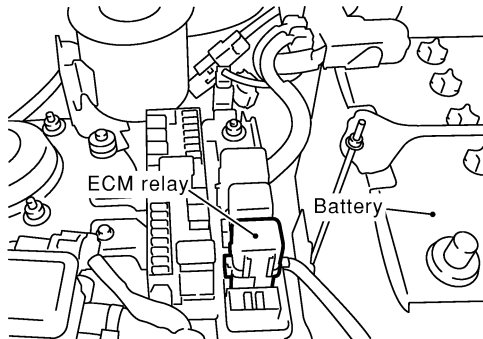
2	SEARCH FOR MALFUNCTIONING CIRCUIT																	
<p> With CONSULT-II</p> <p>1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Search for circuit which does not produce a momentary engine speed drop.</p>																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX step				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX step																	
SEF190Y																		
▶		GO TO 12.																

3	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I	
<p>1. Turn ignition switch ON. 2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.</p>		
SEF366X		
OK ▶	GO TO 4.	
NG ▶	Go to TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-142.	

DTC P1320 IGNITION SIGNAL

Diagnostic Procedure (Cont'd)

4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II		
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect condenser harness connector. 		<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p>	
		SEF008Z	
<ol style="list-style-type: none"> 3. Turn ignition switch ON. 4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester. 			
 <p style="text-align: center;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>		SEF367X	
OK	▶	GO TO 10.	
NG	▶	GO TO 5.	

5	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III		
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM relay. 		<p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>	
		SEF009Z	
<ol style="list-style-type: none"> 3. Check harness continuity between ECM relay terminal 3 and condenser terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 			
OK or NG			
OK	▶	GO TO 7.	
NG	▶	GO TO 6.	

DTC P1320 IGNITION SIGNAL

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E1, M1 and M33, F22 ● Harness for open or short between ECM relay and condenser 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV
Check voltage between ECM relay terminal 5 and ground with CONSULT-II or tester.	
SEF010Z	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● 10A fuse ● Harness for open and short between ECM relay and fuse 	
▶	Repair or replace harness or connectors.

9	CHECK ECM RELAY
1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.	
SEF296X	
OK or NG	
OK	▶ GO TO 17.
NG	▶ Replace ECM relay.

DTC P1320 IGNITION SIGNAL

Diagnostic Procedure (Cont'd)


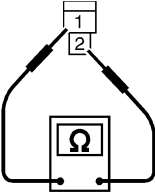
10	CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT	
	1. Turn ignition switch OFF. 2. Check harness continuity between condenser terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.	
	OK or NG	
OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to power in harness or connectors.

GI

MA

EM

LC

11	CHECK CONDENSER	
	Check resistance between condenser terminals 1 and 2.	
		
		
	Resistance: Above 1MΩ at 25°C (77°F)	
	SEF369X	
	OK or NG	
OK	▶	GO TO 12.
NG	▶	Replace condenser.

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

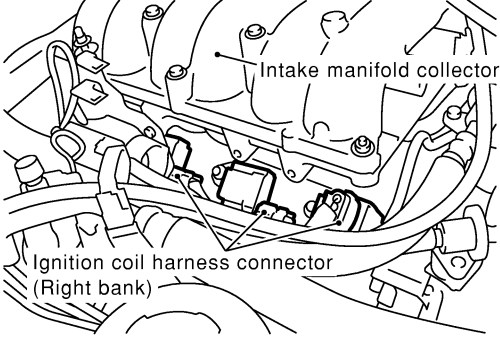
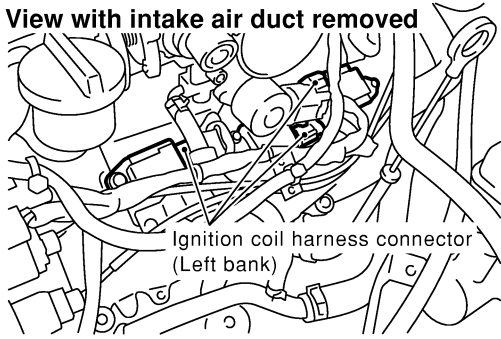
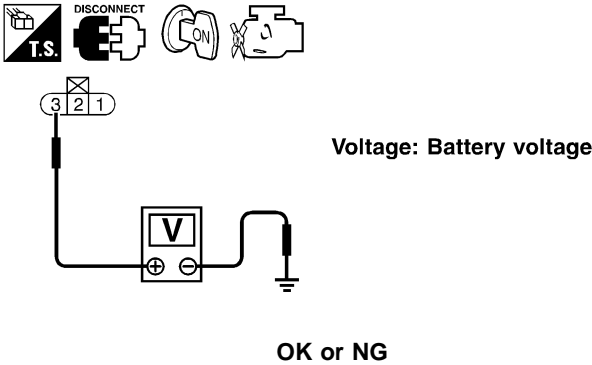
SC

EL

IDX

DTC P1320 IGNITION SIGNAL

Diagnostic Procedure (Cont'd)

12	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Reconnect harness connectors disconnected. 3. Disconnect ignition coil harness connector. 	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Intake manifold collector</p> <p>Ignition coil harness connector (Right bank)</p> </div> <div style="text-align: center;"> <p>View with intake air duct removed</p>  <p>Ignition coil harness connector (Left bank)</p> </div> </div>	
<ol style="list-style-type: none"> 4. Turn ignition switch ON. 5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester. 	
 <p>Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 14.
NG	▶ GO TO 13.

SEF975Y

SEF370X

13	DETECT MALFUNCTIONING PART
Check the harness for open or short between ignition coil and harness connector F22.	
▶	Repair or replace harness or connectors.

14	CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check harness continuity between ignition coil terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 	
OK or NG	
OK	▶ GO TO 15.
NG	▶ Repair open circuit or short to power in harness or connectors.

DTC P1320 IGNITION SIGNAL

Diagnostic Procedure (Cont'd)

15	CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
	1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminals 21, 22, 23, 30, 31, 32 and ignition coil terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.	
	OK or NG	
OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

GI
MA
EM
LC

16	CHECK IGNITION COIL WITH POWER TRANSISTOR									
	Check resistance between ignition coil terminals 2 and 3.									
		<table border="1"> <thead> <tr> <th>Terminals</th> <th>Resistance</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td rowspan="2">2 and 3</td> <td>Not 0Ω</td> <td>OK</td> </tr> <tr> <td>0Ω</td> <td>NG</td> </tr> </tbody> </table>	Terminals	Resistance	Result	2 and 3	Not 0Ω	OK	0Ω	NG
Terminals	Resistance	Result								
2 and 3	Not 0Ω	OK								
	0Ω	NG								
	SEF371X									
	OK or NG									
OK	▶	GO TO 17.								
NG	▶	Replace ignition coil with power transistor.								

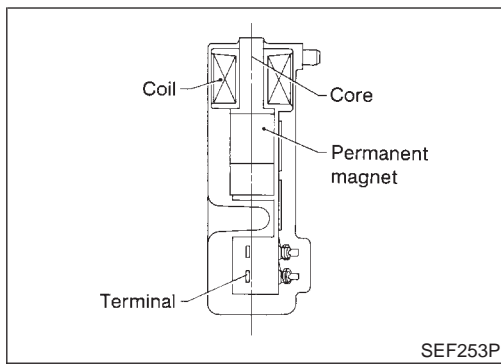
EC
FE
AT
TF
PD

17	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶	INSPECTION END

SU
BR
ST
RS
BT
HA
SC
EL
IDX

DTC P1335 CRANKSHAFT POSITION SENSOR (CKPS) (REF)

Component Description



Component Description

NBEC0573

The crankshaft position sensor (REF) is located on the oil pan (upper) facing the crankshaft pulley. It detects the TDC (Top Dead Center) signal (120° signal).

The sensor consists of a permanent magnet, core and coil.

When engine is running, the gap between the sensor and the crankshaft pulley will periodically change. Permeability near the sensor also changes.

Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.

The ECM receives the voltage signal and detects the TDC signal (120° signal).

CONSULT-II Reference Value in Data Monitor Mode

NBEC0574

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-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.
ENG SPEED		

ECM Terminals and Reference Value

NBEC0676

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65 75	LG LG	Crankshaft position sensor (REF)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 2.3V★ (AC voltage) SEF581X

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

DTC P1335 CRANKSHAFT POSITION SENSOR (CKPS) (REF)

On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0576

Malfunction is detected when
(Malfunction A) 120° signal is not entered to ECM for the first few seconds during engine cranking,
(Malfunction B) 120° signal is not entered to ECM during engine running,
(Malfunction C) 120° signal cycle excessively changes during engine running.

GI
MA
EM

FAIL-SAFE MODE

NBEC0576S01

When the ECM enters the fail-safe mode, the MIL illuminates.

LC

Detected items	Engine operating condition in fail-safe mode
Crankshaft position sensor (REF) circuit	Compression TDC signal (120° signal) is controlled by camshaft position sensor (PHASE) signal and crankshaft position sensor (POS) signal. Ignition timing will be delayed 0° to 2°.

EC

FE

AT

TF

Possible Cause

NBEC0577

- Harness or connectors
(The crankshaft position sensor (REF) circuit is open or shorted.)
- Crankshaft position sensor (REF)
- Starter motor (Refer to SC section.)
- Starting system circuit (Refer to SC section.)
- Dead (Weak) battery

PD

AX

SU

BR

DTC Confirmation Procedure

NBEC0578

NOTE:

- Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B AND C".
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

ST

RS

BT

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

HA

PROCEDURE FOR MALFUNCTION A

NBEC0578S01

NBEC0578S0101

With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-514.

SC

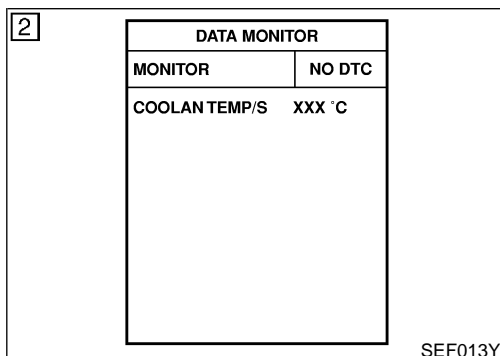
EL

IDX

With GST

NBEC0578S0102

Follow the procedure "With CONSULT-II" above.



DTC P1335 CRANKSHAFT POSITION SENSOR (CKPS) (REF)

DTC Confirmation Procedure (Cont'd)

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NBEC0578S02

With CONSULT-II

NBEC0578S0201

- 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-514.

With GST

NBEC0578S0202

Follow the procedure "With CONSULT-II" above.



DTC P1335 CRANKSHAFT POSITION SENSOR (CKPS) (REF)

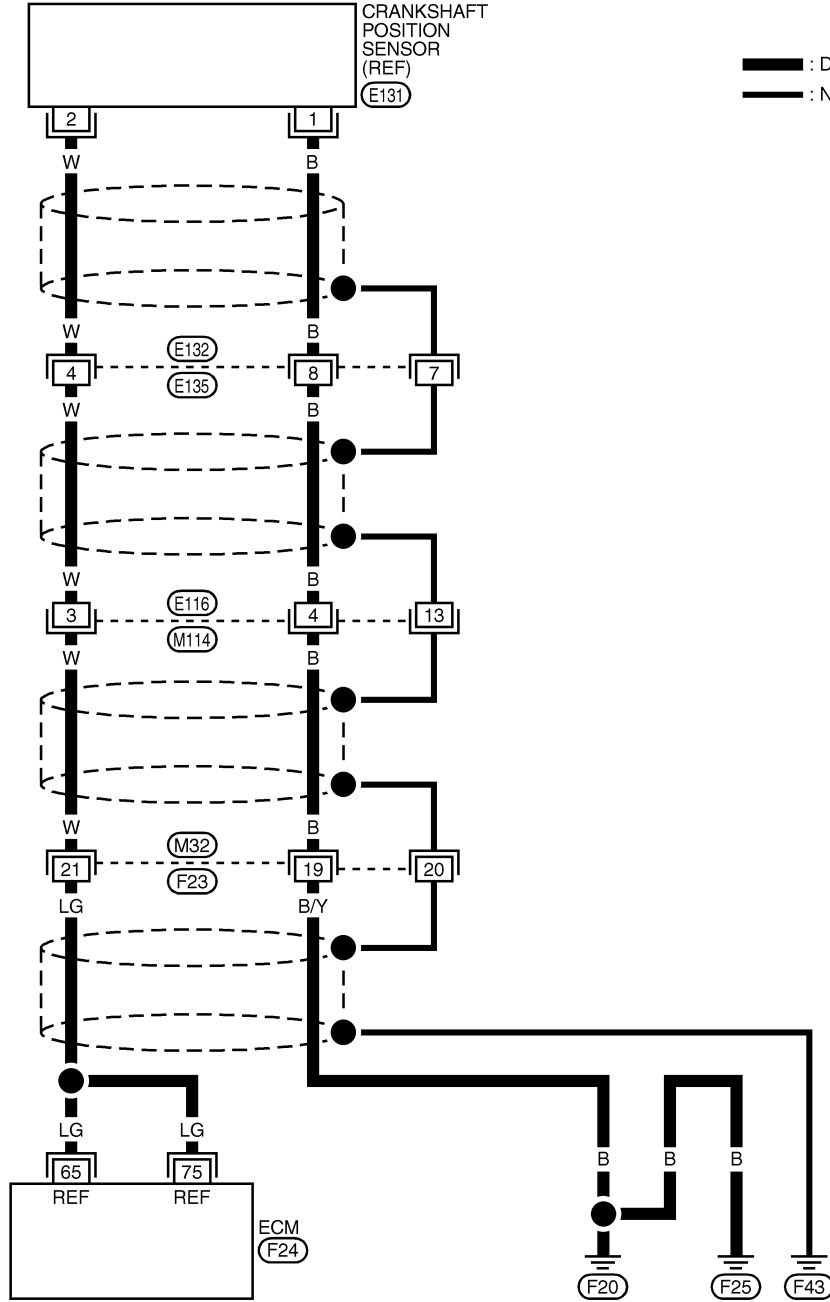
Wiring Diagram

Wiring Diagram

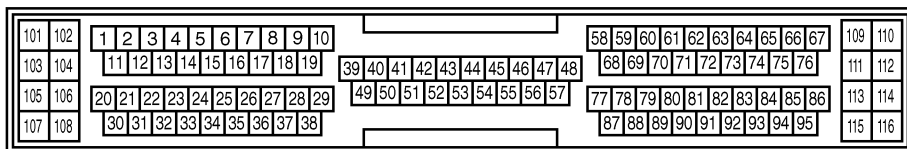
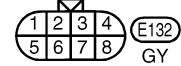
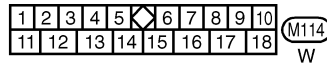
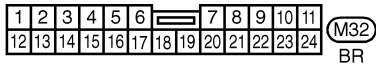
NBEC0579

EC-REF-01

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



- GI
- MA
- EM
- LC
- EC**
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- AT
- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX

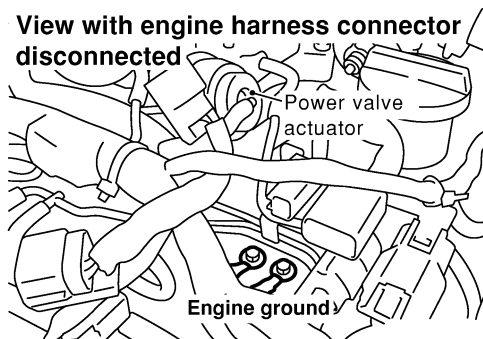


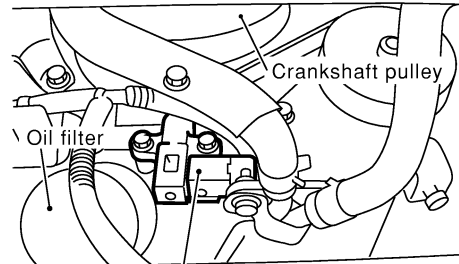
DTC P1335 CRANKSHAFT POSITION SENSOR (CKPS) (REF)

Diagnostic Procedure

Diagnostic Procedure

NBEC0580

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.</p>	
<p>View with engine harness connector disconnected</p>  <p>Power valve actuator Engine ground</p>	
SEF959Y	
▶	GO TO 2.

2	CHECK CKPS (REF) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Disconnect CKPS (REF) harness connector.</p>	
 <p>Oil filter Crankshaft pulley Crankshaft position sensor (REF) harness connector</p>	
SEF011Z	
<p>2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 65, 75 and CKPS (REF) terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none">● Harness connectors E132, E135● Harness connectors E116, M114 and M32, F23● Harness for open or short between crankshaft position sensor (REF) and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1335 CRANKSHAFT POSITION SENSOR (CKPS) (REF)

Diagnostic Procedure (Cont'd)

4	CHECK CKPS (REF) GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF".</p> <p>2. Check harness continuity between CKPS (REF) terminal 1 and engine ground. Continuity should exist.</p> <p>3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

GI

MA

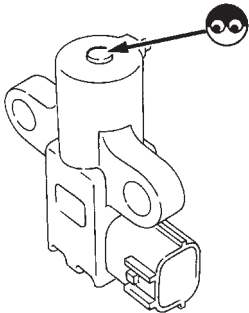
EM

LC

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E132, E135 ● Harness connectors E116, M114 and M32, F23 ● Harness for open between crankshaft position sensor (REF) and engine ground 		
▶ Repair open circuit or short to power in harness or connector.		

EC

FE

6	CHECK CKPS (REF)-I	
<p>1. Loosen the fixing bolts and remove the CKPS (REF).</p> <p>2. Visually check the CKPS (REF) for chipping.</p>		
		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (REF).

AT

TF

PD

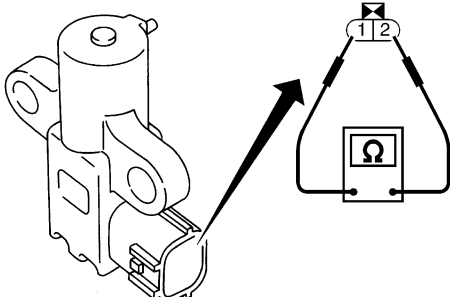
AX

SU

BR

ST

RS

7	CHECK CKPS (REF)-II	
<p>Check resistance between CKPS (REF) terminals 1 and 2.</p>		
		
<p>Resistance: Approximately 470 - 570 Ω [AT 20°C (68°F)]</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace crankshaft position sensor (REF).

BT

HA

SC

EL

IDX

DTC P1335 CRANKSHAFT POSITION SENSOR (CKPS) (REF)

Diagnostic Procedure (Cont'd)

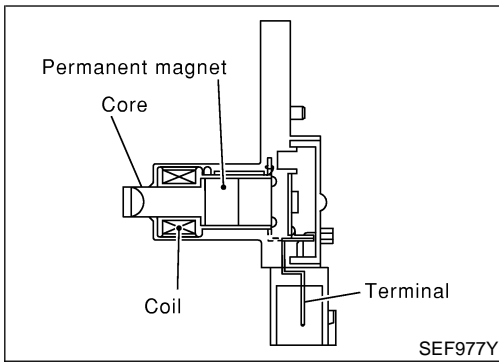
8	CHECK CKPS (REF) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect harness connectors E132, E135. 3. Check harness continuity between harness connector E135 terminal 7 and engine ground. Continuity should exist. 4. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E132, E135● Harness connectors E116, M114 and M32, F23● Harness for open between harness connector F23 and engine ground	
	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

Component Description



Component Description

NBEC0292

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate (flywheel). It detects the crankshaft position signal (1° signal).

The sensor consists of a permanent magnet, core and coil.

When engine is running, the gap between the sensor and the gear teeth (cogs) will periodically change. Permeability near the sensor also changes.

Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.

The ECM receives the voltage signal and detects the crankshaft position signal (1° signal).

GI

MA

EM

LC

EC

FE

AT

TF

CONSULT-II Reference Value in Data Monitor Mode

NBEC0581

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-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.
ENG SPEED		

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

ECM Terminals and Reference Value

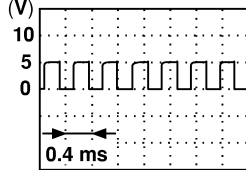
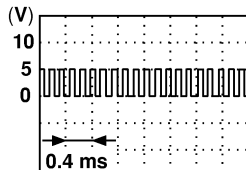
ECM Terminals and Reference Value

=NBEC0677

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	Y	Crankshaft position sensor (POS)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 2.4V</p>  <p>SEF057V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm. 	<p>Approximately 2.3V</p>  <p>SEF058V</p>

On Board Diagnosis Logic

NBEC0294

Malfunction is detected when chipping of the signal plate (flywheel or drive plate) gear tooth (cog) is detected by the ECM.

Possible Cause

NBEC0582

- Harness or connectors
- Crankshaft position sensor (POS)
- Signal plate (Drive plate/Flywheel)

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

DTC Confirmation Procedure

DTC Confirmation Procedure

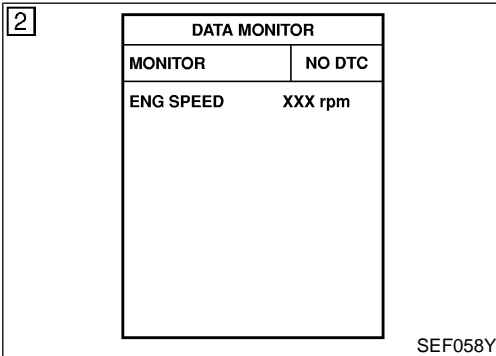
NBEC0295

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V.



WITH CONSULT-II

NBEC0295S01

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 70 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-521.

WITH GST

NBEC0295S02

Follow the procedure "WITH CONSULT-II" above.

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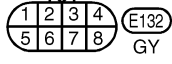
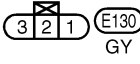
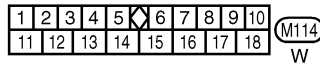
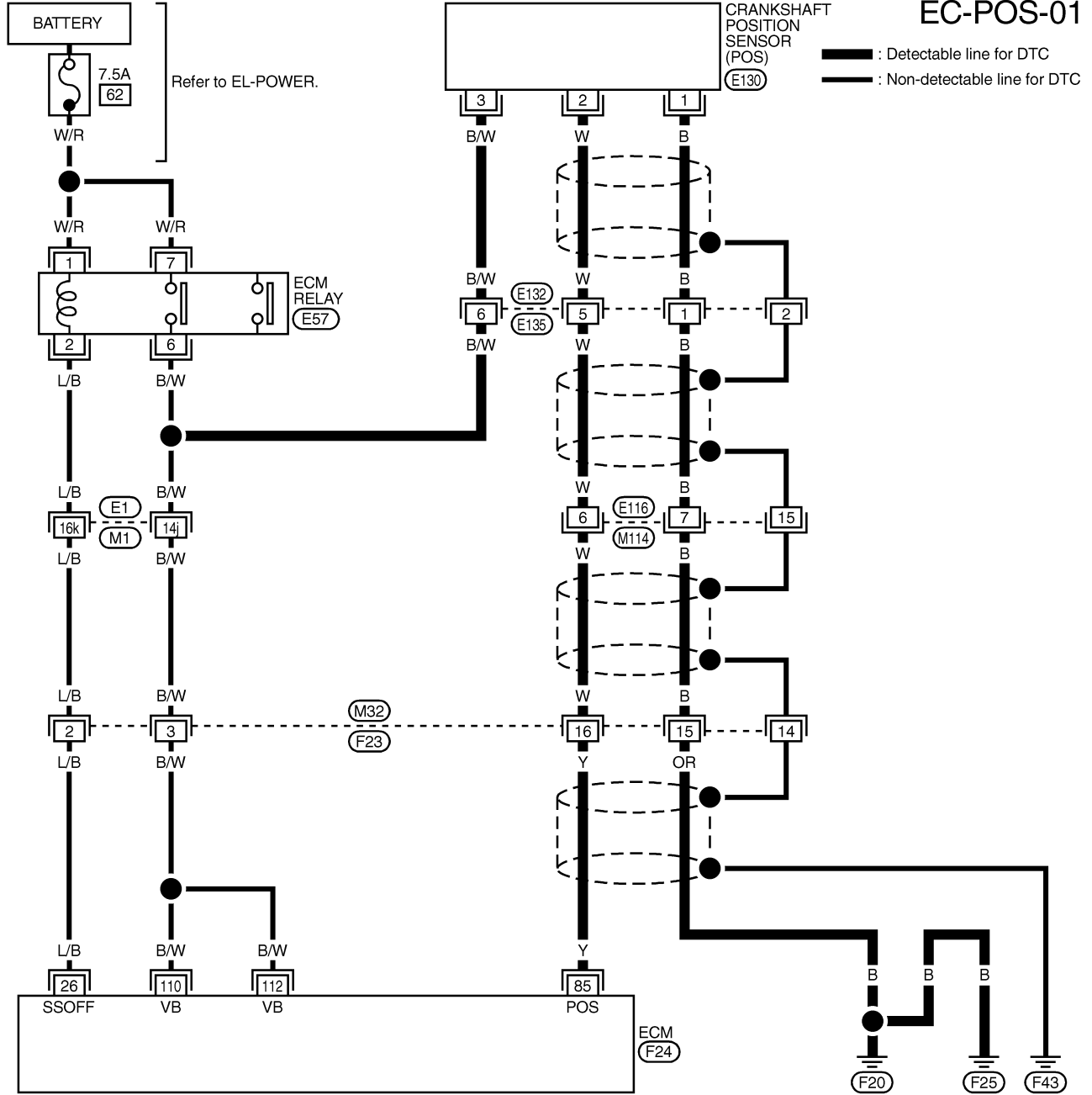
DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

Wiring Diagram

Wiring Diagram

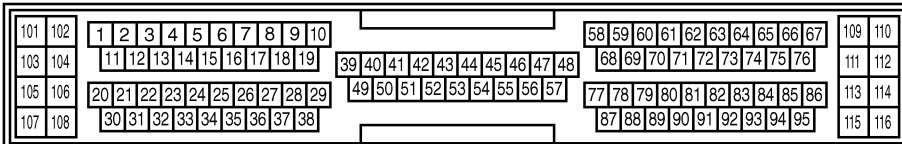
NBEC0296

EC-POS-01



REFER TO THE FOLLOWING.

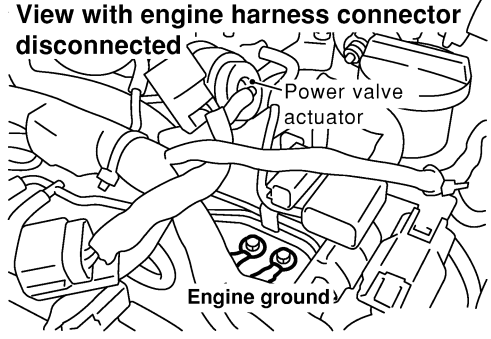
(E1) -SUPER
 MULTIPLE JUNCTION (SMJ)

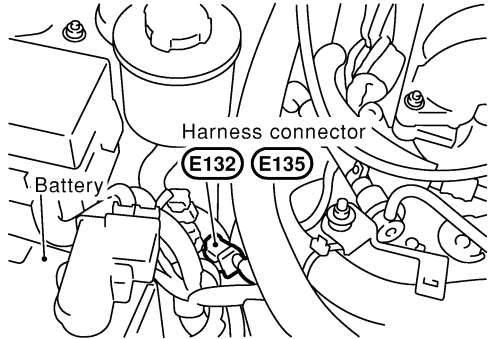
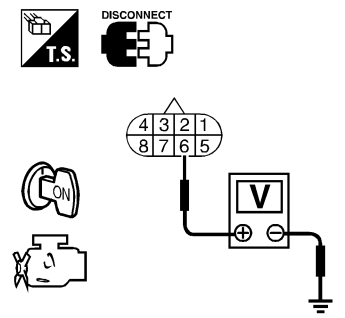


MEC959C

Diagnostic Procedure

NBEC0297

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>View with engine harness connector disconnected</p>  <p>Power valve actuator Engine ground</p> </div> <p style="text-align: right;">SEF959Y</p>	<p>GI MA EM LC EC FE AT</p>
▶ GO TO 2.			

2	CHECK CKPS (POS) POWER SUPPLY CIRCUIT	<p>1. Disconnect harness connectors E132, E135.</p> <div style="text-align: center;">  <p>Battery Harness connector E132 E135</p> </div> <p style="text-align: right;">SEF978Y</p> <p>2. Check voltage between harness connector E135 terminal 6 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> </div> <p style="text-align: right;">SEF979Y</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>TF PD AX SU BR ST RS BT HA SC EL</p>
▶ GO TO 4.			
▶ GO TO 3.			

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E132, E135● Harness for open or short between ECM and crankshaft position sensor (POS)● Harness for open or short between ECM relay and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK CKPS (POS) GROUND CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between harness connector E135 terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.	
2. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

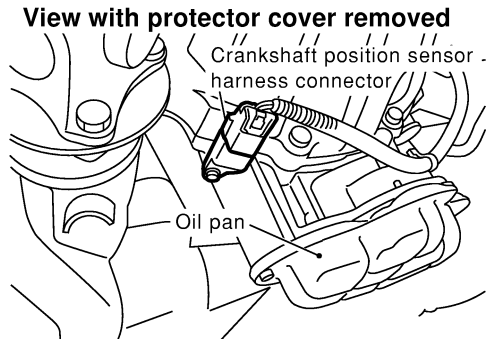
5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E132, E135● Harness connectors E116, M114● Harness connectors M32, F23● Harness for open between ECM and crankshaft position sensor (POS)	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK CKPS (POS) INPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector.	
2. Check harness continuity between ECM terminal 85 and harness connector F23 terminal 16. Refer to Wiring Diagram. Continuity should exist.	
3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E132, E135● Harness connectors E116, M114● Harness connectors M32, F23● Harness for open or short between ECM and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

Diagnostic Procedure (Cont'd)

8	CHECK CKPS (POS) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT										
		<p>1. Disconnect CKPS (POS) harness connector.</p> <div style="text-align: center;"> <p>View with protector cover removed</p>  </div>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p>								
		<p>2. Check harness continuity between CKPS (POS) terminals and harness connector E132 terminals as follows.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">CKPS (POS) terminal</th> <th style="text-align: center;">Harness conector E132 terminal</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">5</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">6</td> </tr> </tbody> </table>	CKPS (POS) terminal	Harness conector E132 terminal	1	1	2	5	3	6	<p>SEF980Y</p> <p>EC</p> <p>FE</p>
CKPS (POS) terminal	Harness conector E132 terminal										
1	1										
2	5										
3	6										
		<p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>AT</p> <p>TF</p>								
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td style="border-right: 1px solid black;">GO TO 9.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>	OK	▶	GO TO 9.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	<p>PD</p>		
OK	▶	GO TO 9.									
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.									

9	CHECK IMPROPER INSTALLATION								
		<p>1. Loosen and retighten the fixing bolt of the crankshaft position sensor (POS).</p> <p>2. Reconnect harness connectors disconnected.</p> <p>3. Perform "DTC Confirmation Procedure", EC-519 again.</p> <p style="text-align: center;">Is a 1st trip DTC P1336 detected?</p>	<p>AX</p> <p>SU</p>						
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td style="border-right: 1px solid black;">GO TO 10.</td> </tr> <tr> <td style="border-right: 1px solid black;">No</td> <td style="text-align: center;">▶</td> <td>INSPECTION END</td> </tr> </table>	Yes	▶	GO TO 10.	No	▶	INSPECTION END	<p>BR</p> <p>ST</p>
Yes	▶	GO TO 10.							
No	▶	INSPECTION END							

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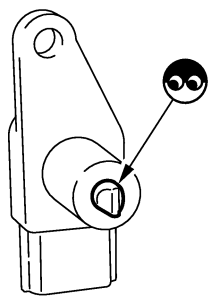
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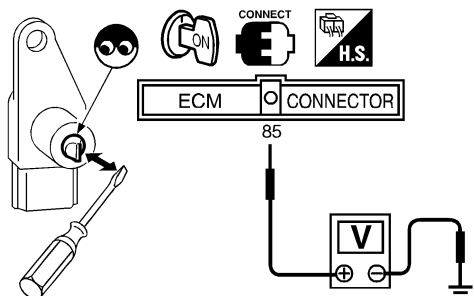
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DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

Diagnostic Procedure (Cont'd)

10	CHECK CRANKSHAFT POSITION SENSOR (POS)
<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (POS) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. 	
	
SEF981Y	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace crankshaft position sensor (POS).

11	CHECK CRANKSHAFT POSITION SENSOR (POS)-II								
<ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Turn ignition switch ON. 3. Check voltage between ECM terminal 85 and ground by briefly touching the sensor core with a flat-bladed screwdriver. 									
									
<table border="1" style="margin: auto;"> <thead> <tr> <th>ECM terminal</th> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">85</td> <td style="text-align: center;">Contacted</td> <td style="text-align: center;">Approximately 5V</td> </tr> <tr> <td style="text-align: center;">Pulled away</td> <td style="text-align: center;">Approximately 0V</td> </tr> </tbody> </table>		ECM terminal	Condition	Voltage	85	Contacted	Approximately 5V	Pulled away	Approximately 0V
ECM terminal	Condition	Voltage							
85	Contacted	Approximately 5V							
	Pulled away	Approximately 0V							
<p>There should be a steady 5V as the flat-bladed screwdriver is drawn away slowly.</p>									
SEF343Z									
OK or NG									
OK	▶ GO TO 12.								
NG	▶ Replace crankshaft position sensor (POS).								

12	CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Disconnect harness connectors E132, E135. 2. Check harness continuity between harness connector E135 terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. 	
OK or NG	
OK	▶ GO TO 14.
NG	▶ GO TO 13.

DTC P1336 CRANKSHAFT POSITION SENSOR (CKPS) (POS) (COG)

Diagnostic Procedure (Cont'd)

13	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E132, E135● Harness connectors E116, M114● Harness connectors M32, F23● Harness for open between harness connector E135 and engine ground	
	▶ Repair open circuit or short to power in harness or connectors.
14	CHECK GEAR TOOTH
Visually check for chipping signal plate (flywheel or drive plate) gear tooth (cog).	
OK or NG	
OK	▶ GO TO 15.
NG	▶ Replace the signal plate (flywheel or drive plate).
15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

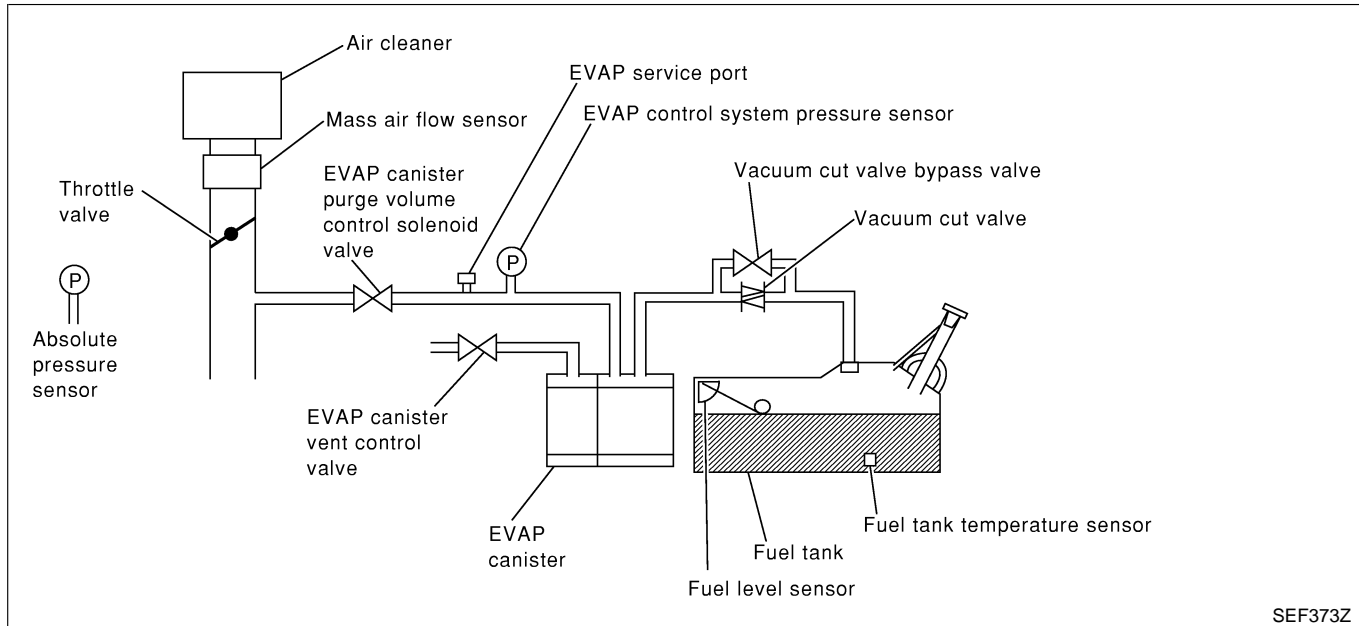
On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0316

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



SEF373Z

Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

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.

Possible Cause

NBEC0587

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Possible Cause (Cont'd)

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor

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EVAP V/S LEAK P1441	
CHECK FUEL LEVEL SENSOR(V). SEE SERVICE MANUAL FOR SPECIFICATION. IS THE VOLTAGE WITHIN THE SPECIFICATION?	
MONITOR	
FUEL LEVEL SE	XXX V

SEF881X

EVAP V/S LEAK P1441	
MAINTAIN 1800-2800 RPM UNTIL FINAL RESULT APPEARS.	
1800 rpm	2300 rpm 2800 rpm

SEF882X

EVAP V/S LEAK P1441	
OK	

SEF883X

DTC Confirmation Procedure

NBEC0317

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P1441 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1441 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.
- After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - Fuel filler cap is removed.
 - Refilled or drained the fuel.
 - EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓜ With CONSULT-II

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

- 2) Make sure the following conditions are met.

FUEL LEVEL SE: 1.08 - 0.2V

COOLAN TEMP/S: 0 - 32°C (32 - 90°F)

FUEL T/TMP SE: 0 - 35°C (32 - 95°F)

INT A/TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch “OFF” and leave the vehicle in a cool

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

DTC Confirmation Procedure (Cont'd)

place or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).

- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Turn ignition switch "ON".
- 5) Select "EVAP VERY/SML LEAK P1441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
Follow the instruction displayed.
- 6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-529.

NOTE:

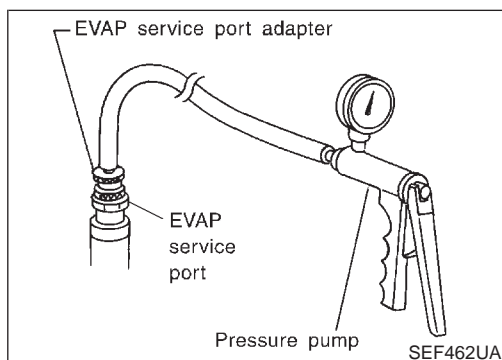
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-101.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

OVERALL FUNCTION CHECK

NBEC0317S05

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.



CAUTION:

- Never use compressed air, doing so may damage the EVAP system.
 - Do not start engine.
 - Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
 - 2) Set the pressure pump and a hose.
 - 3) Also set a vacuum gauge via 3-way connector and a hose.
 - 4) Turn ignition switch "ON".
 - 5) Connect GST and select mode 8.
 - 6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
 - 7) Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)

If NG, go to diagnostic procedure, EC-529.

NOTE:

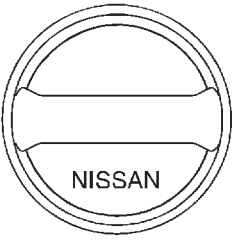
For more information, refer to GST instruction manual.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure

Diagnostic Procedure

NBEC0643

1	CHECK FUEL FILLER CAP DESIGN	
<p>1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF915U</p>		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION	
<p>Check that the cap is tightened properly by rotating the cap clockwise.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
<p>Check for air releasing sound while opening the fuel filler cap.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

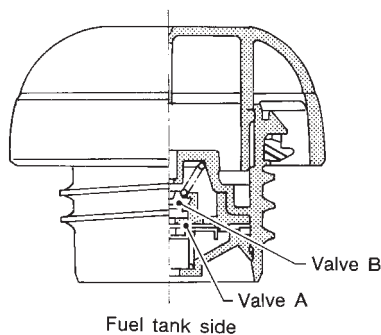
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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

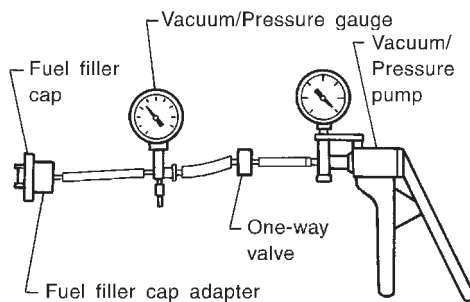
Diagnostic Procedure (Cont'd)

4 CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF427N



SEF943S

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)

CAUTION:

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

OK or NG

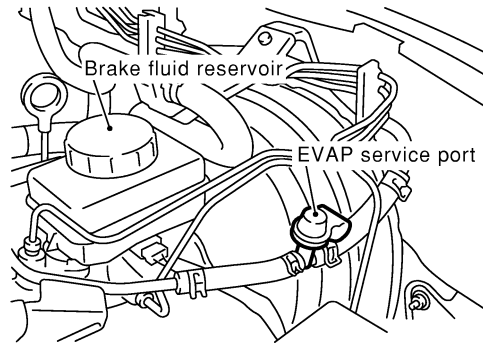
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

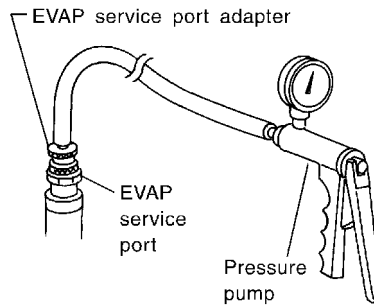
Diagnostic Procedure (Cont'd)

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶▶	GO TO 6.
Models without CON-SULT-II	▶▶	GO TO 7.

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure (Cont'd)

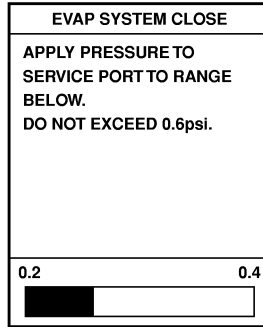
6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

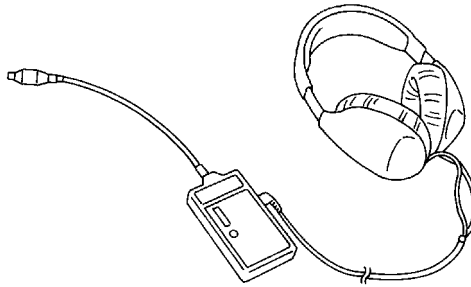
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

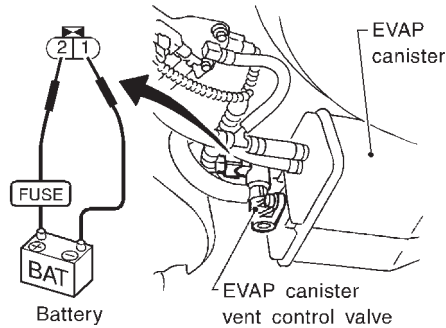
Diagnostic Procedure (Cont'd)

GI
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7 CHECK FOR EVAP LEAK

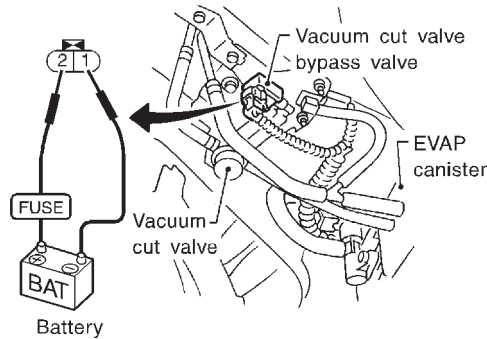
⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

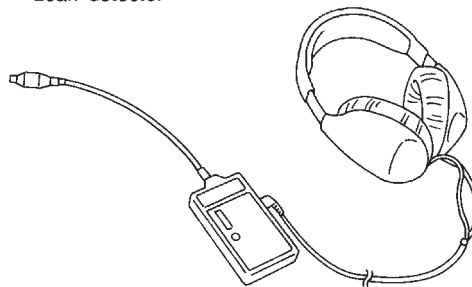
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

Leak detector



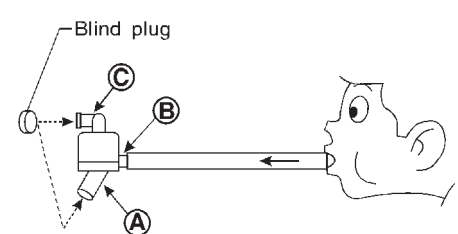
SEF200U

OK or NG

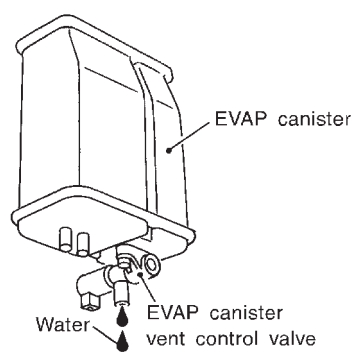
OK	▶	GO TO 8.
NG	▶	Repair or replace.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure (Cont'd)

8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 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. 	
	
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>	
SEF829T	
5. In case of NG in items 2 - 4, replace the parts.	
NOTE:	
<ul style="list-style-type: none"> ● Do not disassemble water separator. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-375.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Does water drain from the EVAP canister? 	
	
Yes or No	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

SEF596U

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

GI
MA
EM
LC

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
	▶	Repair hose or replace EVAP canister.

EC
FE

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V			Vacuum should exist.
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
SEF984Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

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14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. Vacuum should exist. 		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

RS
BT
HA
SC
EL
IDX

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓜ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

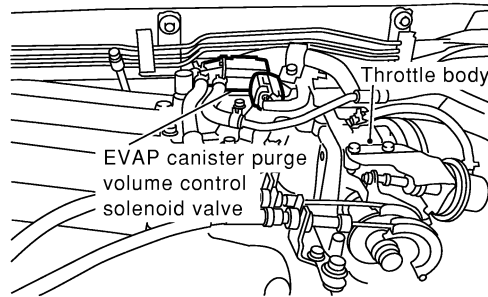
Diagnostic Procedure (Cont'd)

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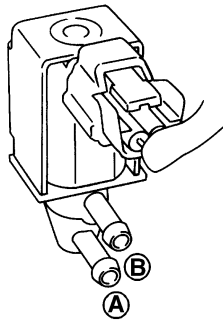
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

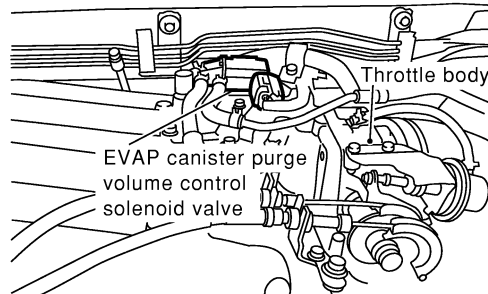


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

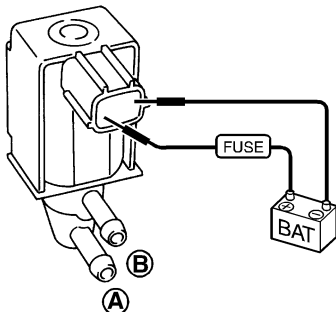
SEF334X

ⓧ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

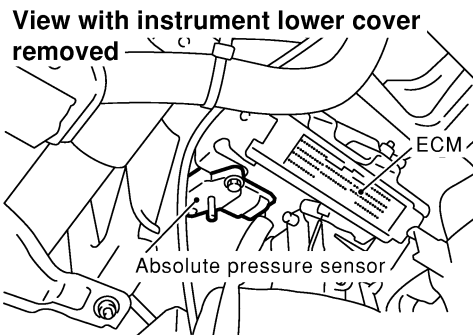
OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure (Cont'd)

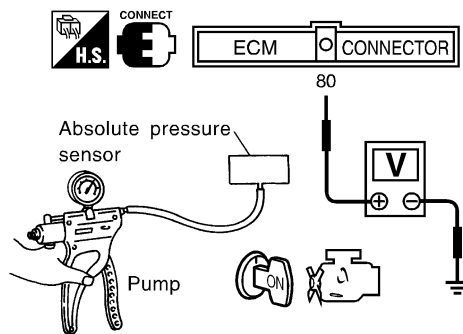
18 CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF961Y

2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	1.0 to 1.4 lower than above value

SEF300XA

CAUTION:

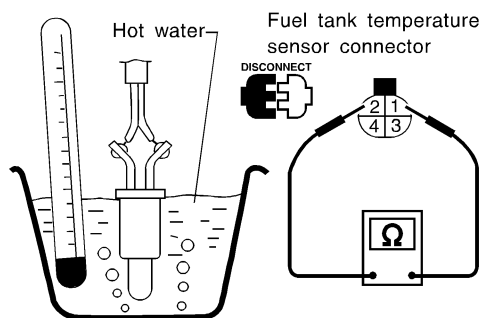
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace absolute pressure sensor.

19 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 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

SEF974Y

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure (Cont'd)

20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR						
<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Never apply force to the air hole protector of the sensor if equipped. 							
SEF799W							
<p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● 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. <p>5. Check input voltage between ECM terminal 84 and ground.</p>							
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Pressure (Relative to atmospheric pressure)</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 kPa (0 mmHg, 0 inHg)</td> <td style="text-align: center;">$3.0 - 3.6$</td> </tr> <tr> <td style="text-align: center;">-9.3 kPa (-70 mmHg, -2.76 inHg)</td> <td style="text-align: center;">$0.4 - 0.6$</td> </tr> </tbody> </table> </div> </div>		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)	$0.4 - 0.6$
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)	$0.4 - 0.6$						
SEF342X							
<p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one. 							
OK or NG							
OK	▶ GO TO 21.						
NG	▶ Replace EVAP control system pressure sensor.						

21	CHECK EVAP PURGE LINE
<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-32.</p>	
OK or NG	
OK	▶ GO TO 22.
NG	▶ Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE
<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p>	
▶	GO TO 23.

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DTC P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK)

Diagnostic Procedure (Cont'd)

23	CHECK FUEL LEVEL SENSOR
Refer to EL-108, "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 24.
NG	▶ Replace fuel level sensor unit.

24	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

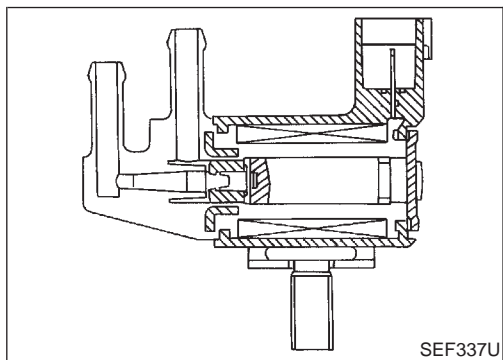
Description SYSTEM DESCRIPTION

NBEC0319

NBEC0319S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NBEC0319S02

The EVAP canister purge volume control solenoid valve uses an ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0320

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION	
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever: "N" ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

ECM Terminals and Reference Value

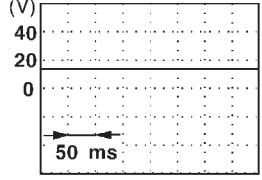
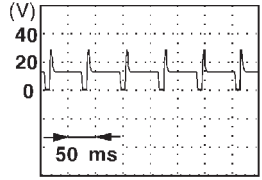
ECM Terminals and Reference Value

NBEC0678

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L/Y	EVAP canister purge volume control solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p>SEF994U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine). 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p>SEF995U</p>

On Board Diagnosis Logic

NBEC0322

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

Possible Cause

NBEC0588

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister
- Hoses
(Hoses are connected incorrectly or clogged.)

DTC Confirmation Procedure

NBEC0323

NOTE:

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

TESTING CONDITION:

Always perform test at a temperature of 0°C (32°F) or more.

6	PURG VOL CN/V P1444	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF205Y

6	PURG VOL CN/V P1444	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF206Y

6	PURG VOL CN/V P1444	
	COMPLETED	

SEF237Y

WITH CONSULT-II

NBEC0323S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
- 6) Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take for approximately 10 seconds.)
If "TESTING" is not displayed after 5 minutes, retry from step 2.
- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-545.

WITH GST

NBEC0323S02

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Start engine and let it idle for at least 20 seconds.
- 4) Select "MODE 7" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-545.

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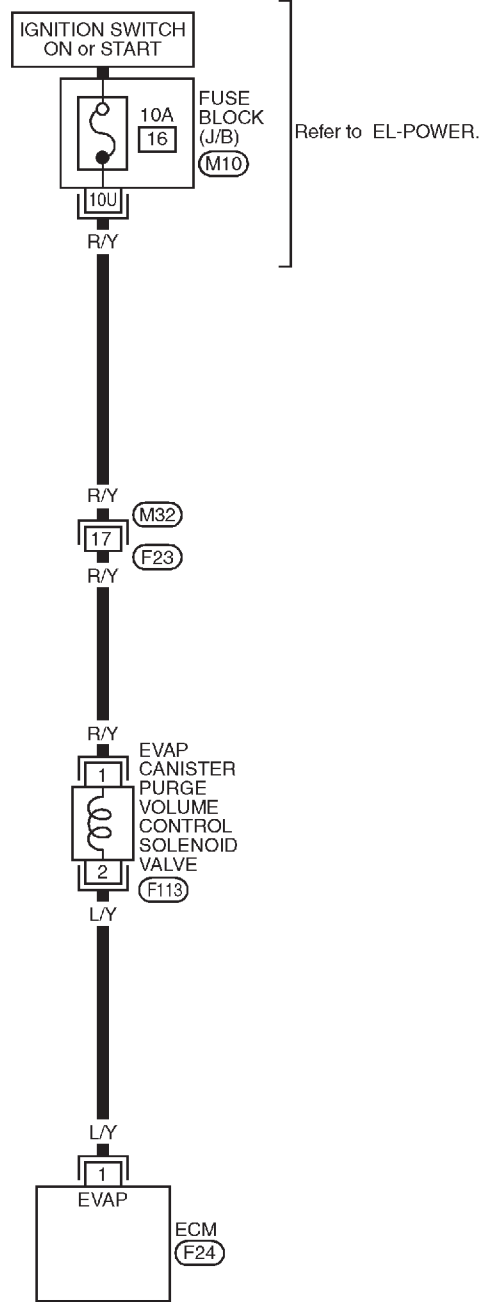
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Wiring Diagram

Wiring Diagram

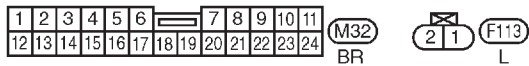
NBEC0324

EC-PGC/V-01



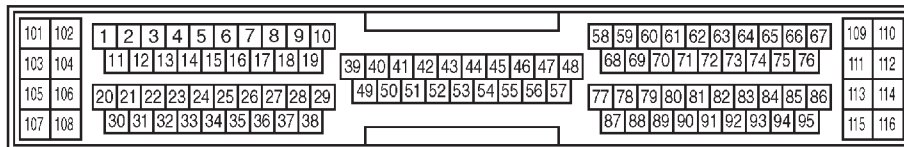
: Detectable line for DTC
 : Non-detectable line for DTC

Refer to EL-POWER.



REFER TO THE FOLLOWING.

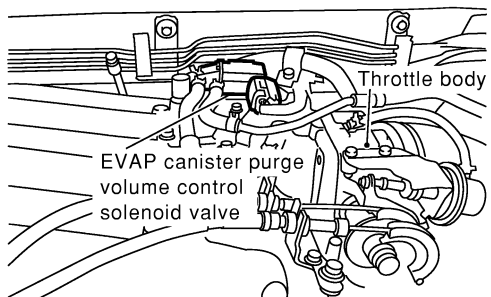
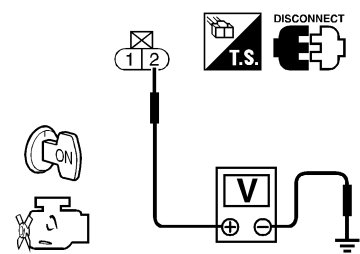
M10 - FUSE BLOCK- JUNCTION BOX (J/B)



MEC962C

Diagnostic Procedure

NBEC0325

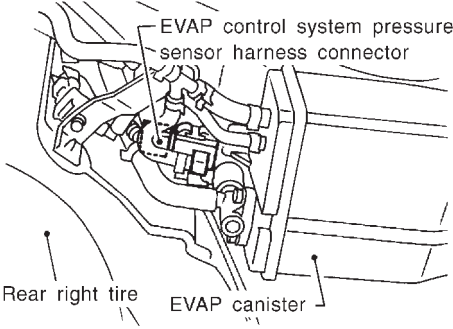
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF". 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Throttle body EVAP canister purge volume control solenoid valve</p> </div> <p style="text-align: right;">SEF986Y</p> <p>3. Turn ignition switch "ON". 4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> </div> <p style="text-align: right;">SEF333X</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE AT TF PD AX SU BR
OK	▶	GO TO 3.	
NG	▶	GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● Fuse block (J/B) connector M10 ● 10A fuse ● Harness for open or short between EVAP canister purge volume control solenoid valve and fuse <p style="text-align: right;">▶ Repair harness or connectors.</p>	ST RS BT
----------	-----------------------------------	---	----------------

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 1 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	HA SC EL IDX
OK	▶	GO TO 4.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
 <p>The diagram shows a top-down view of the rear right side of a vehicle. It highlights the location of the EVAP control system pressure sensor harness connector, the EVAP canister, and the rear right tire. The sensor harness connector is located near the rear right wheel well, and the EVAP canister is positioned below it. The rear right tire is shown on the left side of the diagram.</p>	
SEF495R	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair it.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector. 2. Check connectors for water. Water should not exist.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace EVAP control system pressure sensor.

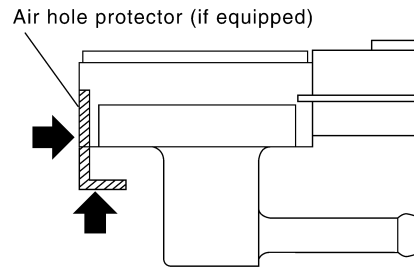
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6 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

2. Remove hose from EVAP control system pressure sensor.

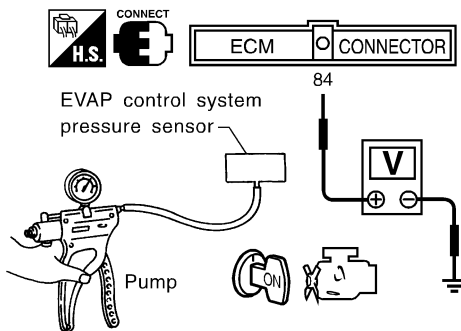
3. Turn ignition switch "ON".

4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

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.

5. Check input voltage between ECM terminal 84 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

SEF342X

CAUTION:


- Discard and 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.


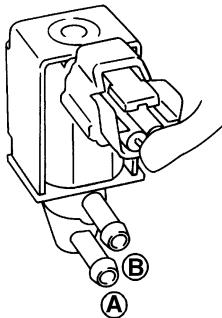
OK or NG


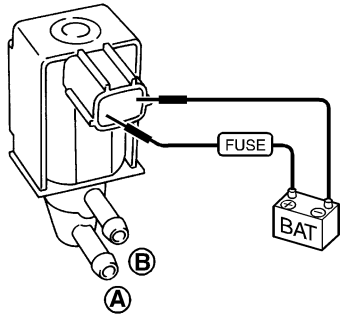
OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 8.
NG	▶	Replace EVAP control system pressure sensor.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																				
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Reconnect harness connectors disconnected. 3. Start engine. 4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td style="text-align: center;">0.0%</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td style="text-align: center;">XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td style="text-align: center;">XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td style="text-align: center;">RICH</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td style="text-align: center;">RICH</td></tr> <tr><td>THRTL POS SEN</td><td style="text-align: center;">XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
PURG VOL CONT/V	0.0%																				
MONITOR																					
ENG SPEED	XXX rpm																				
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A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
SEF985Y																					
OK or NG																					
OK	▶ GO TO 9.																				
NG	▶ GO TO 8.																				

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE						
<p> With CONSULT-II</p> <p>Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>							
							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition PURG VOL CONT/V value</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No
Condition PURG VOL CONT/V value	Air passage continuity between A and B						
100.0%	Yes						
0.0%	No						
SEF334X							

<p> Without CONSULT-II</p> <p>Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>							
							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">No supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
SEF335X							
OK or NG							
OK	▶ GO TO 9.						
NG	▶ Replace EVAP canister purge volume control solenoid valve.						

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

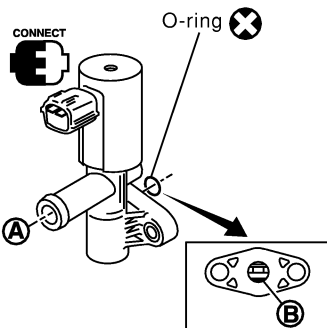
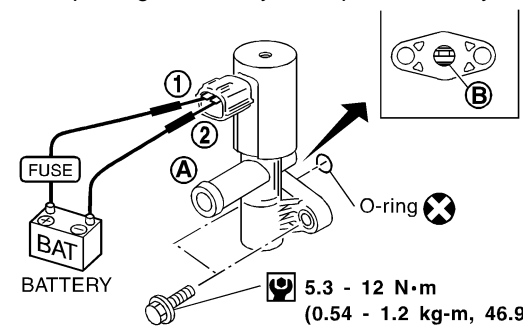
9	CHECK RUBBER TUBE FOR CLOGGING	
	1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.	
	OK or NG	
OK	▶	GO TO 10.
NG	▶	Clean the rubber tube using an air blower.

10	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
	1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.	
	<p style="text-align: center;"> 5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb) </p>	
	OK or NG	
OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

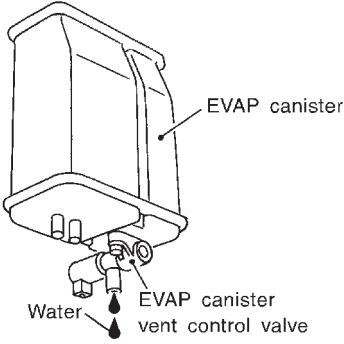
Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER VENT CONTROL VALVE-II																								
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Turn ignition switch "ON". 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time. 																									
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>HO2S1 (B2)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table> </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																									
VENT CONTROL/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
A/F ALPHA-B2	XXX %																								
HO2S1 (B1)	XXX V																								
HO2S1 (B2)	XXX V																								
THRTL POS SEN	XXX V																								
Condition VENT CONTROL/V	Air passage continuity between A and B																								
ON	No																								
OFF	Yes																								
SEF991Y																									
<p>⊗ Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p>																									
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 40%;">  </div> <div style="width: 55%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes																		
Condition	Air passage continuity between A and B																								
12V direct current supply between terminals 1 and 2	No																								
OFF	Yes																								
SEF339X																									
<p>Make sure new O-ring is installed properly.</p> <p>OK or NG</p>																									
OK	▶	GO TO 13.																							
NG	▶	GO TO 12.																							

12	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
<ol style="list-style-type: none"> 1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform procedure 9 again. 		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

13	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p>		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 14.
No	▶	GO TO 17.

GI

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14	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p>		
OK or NG		
OK	▶	GO TO 16.
NG	▶	GO TO 15.

TF

PD

AX

15	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

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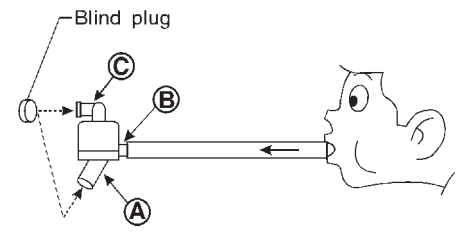
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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

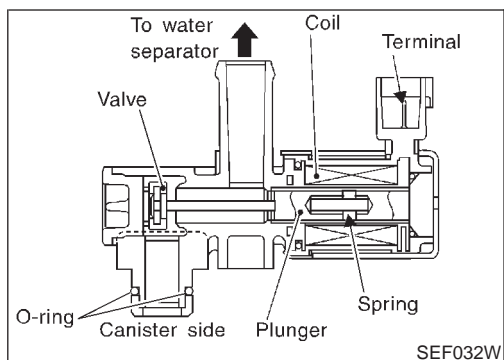
Diagnostic Procedure (Cont'd)

16	CHECK WATER SEPARATOR
<p>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.</p> <div style="text-align: center;"></div> <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none">Do not disassemble water separator. <p style="text-align: right;">SEF829T</p>	
OK or NG	
OK	▶ GO TO 17.
NG	▶ Clean or replace water separator.

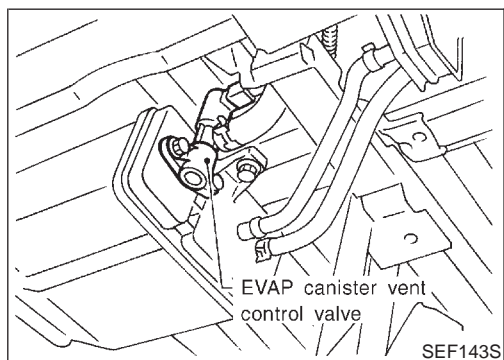
17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

Component Description



SEF032W



SEF143S

Component Description

NBEC0326

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

GI

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CONSULT-II Reference Value in Data Monitor Mode

NBEC0327

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

AX

SU

ECM Terminals and Reference Value

NBEC0679

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	G/Y	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

BR

ST

RS

BT

HA

On Board Diagnosis Logic

NBEC0329

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

SC

EL

IDX

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

Possible Cause

Possible Cause

NBEC0589

- 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.

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF201Y

DTC Confirmation Procedure

NBEC0330

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

WITH CONSULT-II

NBEC0330S01

- 1) Turn ignition switch “ON”.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine.
- 4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-556.

WITH GST

NBEC0330S02

Follow the procedure “WITH CONSULT-II” above.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

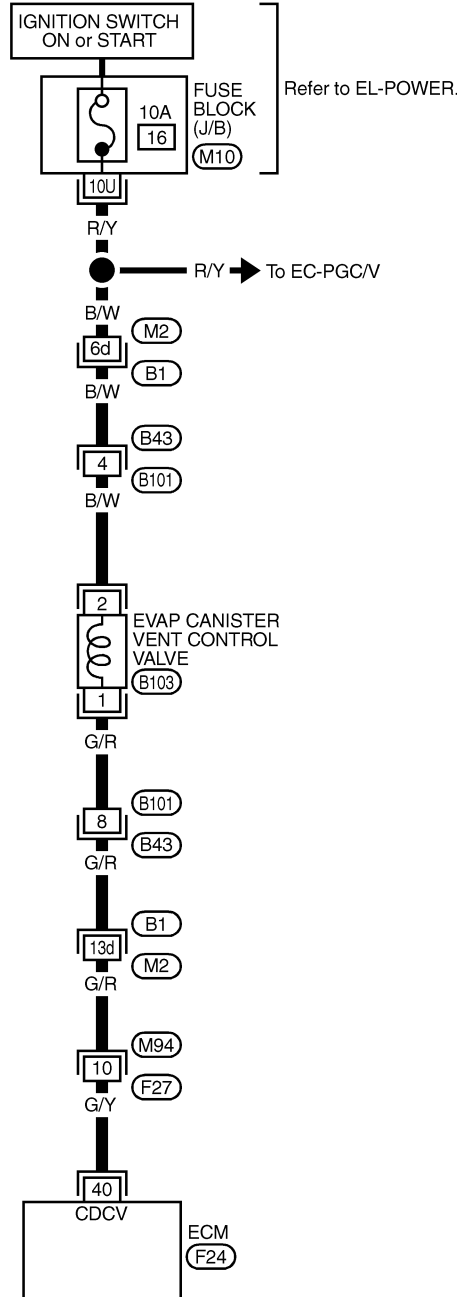
Wiring Diagram

Wiring Diagram

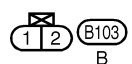
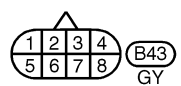
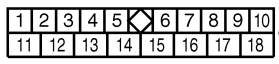
NBEC0331

EC-VENT/V-01

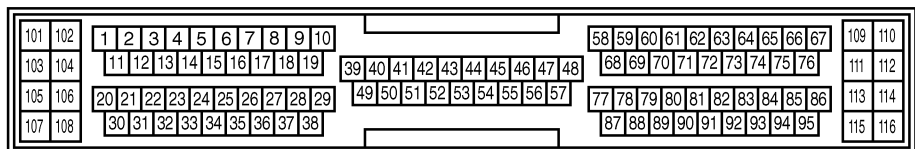
: Detectable line for DTC
 : Non-detectable line for DTC



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REFER TO THE FOLLOWING.
 (B1) -SUPER
 MULTIPLE JUNCTION (SMJ)
 (M10) -FUSE BLOCK-
 JUNCTION BOX (J/B)



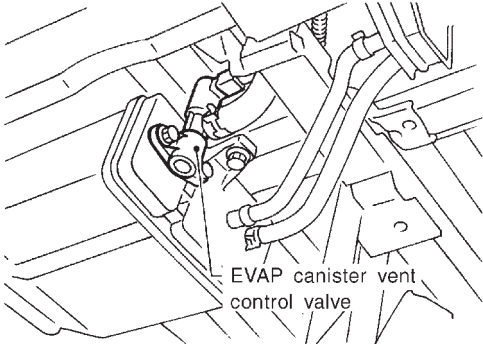
MEC963C

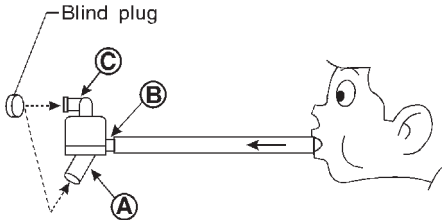
DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

Diagnostic Procedure

Diagnostic Procedure

NBEC0332

1	CHECK RUBBER TUBE		
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect rubber tube connected to EVAP canister vent control valve. 3. Check the rubber tube for clogging. 			
			
SEF143S			
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Clean rubber tube using an air blower.	

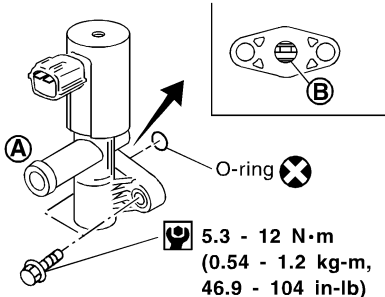
2	CHECK WATER SEPARATOR		
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 			
			
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>			
SEF829T			
5. In case of NG in items 2 - 4, replace the parts.			
NOTE:			
● Do not disassemble water separator.			
OK or NG			
OK	▶	GO TO 3.	
NG	▶	Clean or replace water separator.	

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

Diagnostic Procedure (Cont'd)

3 CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



5.3 - 12 N·m
(0.54 - 1.2 kg-m,
46.9 - 104 in-lb)


SEF337X

OK or NG

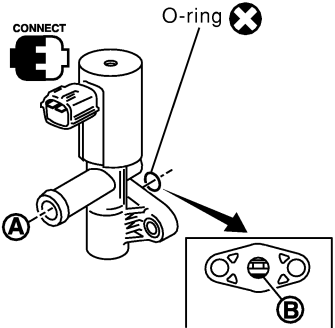
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve.

GI
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4 CHECK EVAP CANISTER VENT CONTROL VALVE-II

 **With CONSULT-II**

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.




ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

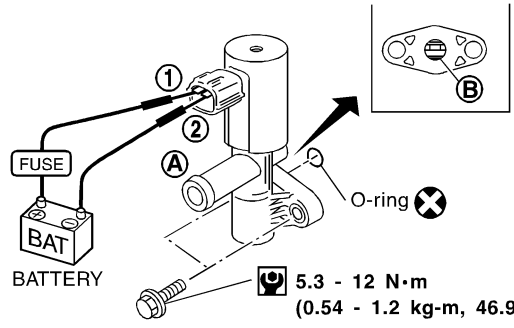
Operation takes less than 1 second.

SEF991Y

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 **Without CONSULT-II**

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

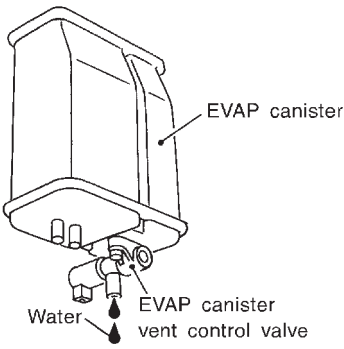
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform the procedure 4 again.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace EVAP canister vent control valve.

6	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
		
Yes or No		
Yes	▶	GO TO 7.
No	▶	GO TO 9.

SEF596U

7	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair it.

DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <div data-bbox="581 237 1027 562" style="text-align: center;"> <p>The diagram shows a top-down view of the rear right side of a vehicle. A line points to the 'EVAP control system pressure sensor harness connector' located near the rear suspension. Another line points to the 'EVAP canister' located below the sensor. A third line points to the 'Rear right tire'.</p> </div> <p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: right;">SEF495R</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

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DTC P1446 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (CLOSE)

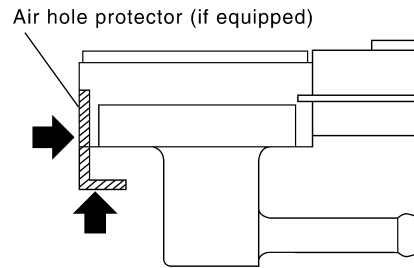
Diagnostic Procedure (Cont'd)

11 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

2. Remove hose from EVAP control system pressure sensor.

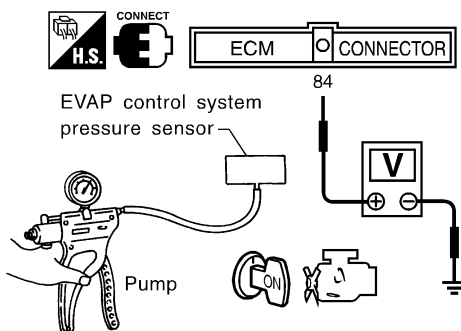
3. Turn ignition switch "ON".

4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

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.

5. Check input voltage between ECM terminal 84 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

SEF342X

CAUTION:

- Discard and 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.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

	▶	INSPECTION END
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DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

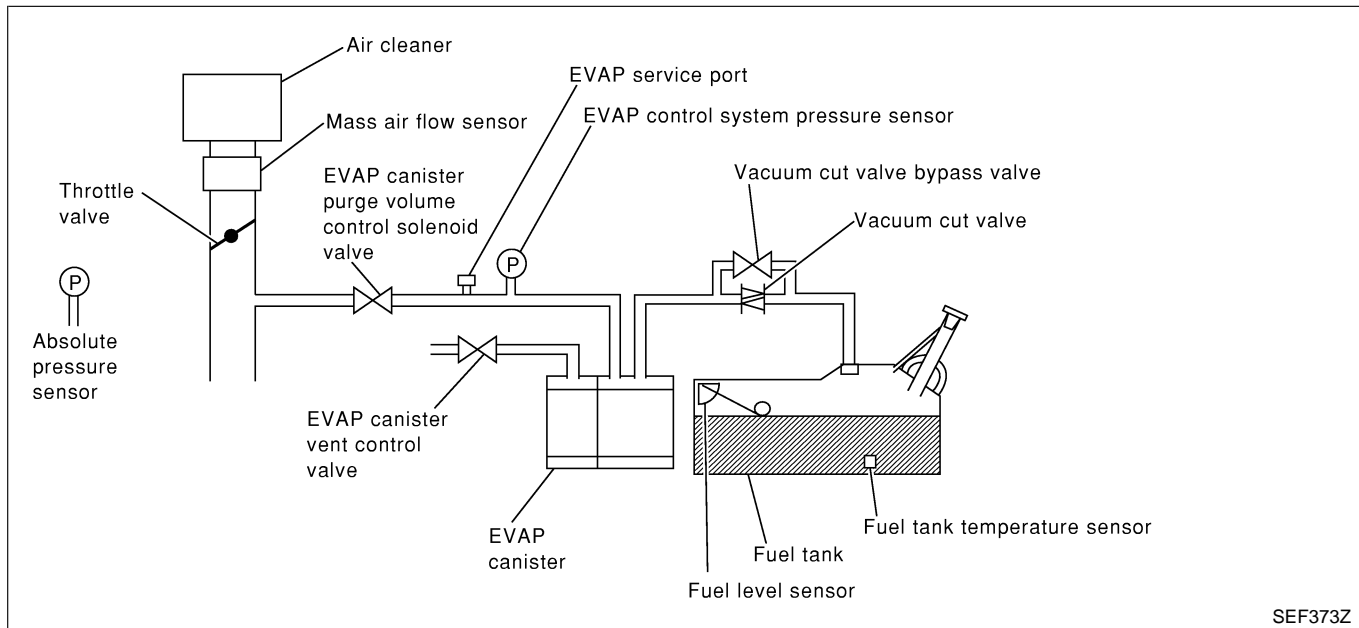
System Description

System Description

NBEC0333

NOTE:

If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-431.)



SEF373Z

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NBEC0334

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

Possible Cause

NBEC0590

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Possible Cause (Cont'd)

- EVAP canister vent control valve

5	PURG FLOW P1447
	OUT OF CONDITION
	MONITOR
	ENG SPEED XXX rpm
	THRTL POS SEN XXX V
	B/FUEL SCHDL XXX msec
	SEF207Y

6	PURG FLOW P1447
	TESTING
	MONITOR
	ENG SPEED XXX rpm
	THRTL POS SEN XXX V
	B/FUEL SCHDL XXX msec
	SEF208Y

6	PURG FLOW P1447
	COMPLETED
	SEF238Y

DTC Confirmation Procedure

NBEC0335

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

NBEC0335S01

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 10 seconds.
- 3) Start engine and let it idle for at least 70 seconds.
- 4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC CONFIRMATION" mode with CONSULT-II.
- 5) Touch "START".
If "COMPLETED" is displayed, go to step 7.
- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

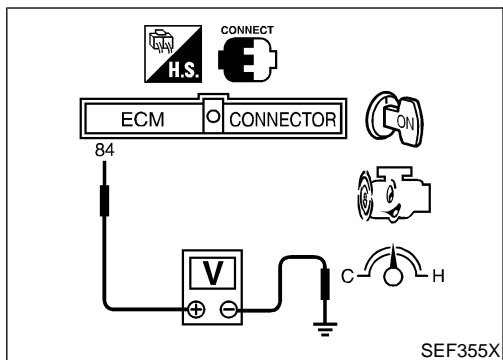
Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.0 - 10 msec
Engine coolant temperature	More than 70°C (158°F)

If "TESTING" is not changed for a long time, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-564.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Overall Function Check



Overall Function Check

NBEC0336

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NBEC0336S01

- 1) Lift up drive wheels.
- 2) Start engine (TCS switch "OFF") and warm it up to normal operating temperature.
- 3) Turn ignition switch "OFF", wait at least 10 seconds.
- 4) Start engine and wait at least 70 seconds.
- 5) Set voltmeter probes to ECM terminals 84 (EVAP control system pressure sensor signal) and ground.
- 6) Check EVAP control system pressure sensor value at idle speed and note it.
- 7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than "P", "N" or "R"

- 8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
- 9) If NG, go to "Diagnostic Procedure", EC-564.

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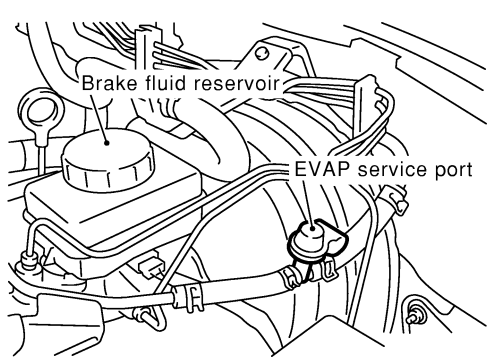
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure

Diagnostic Procedure

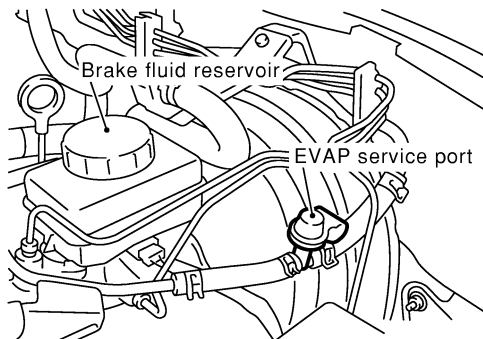
=NBEC0337

1	CHECK EVAP CANISTER	
1. Turn ignition switch "OFF". 2. Check EVAP canister for cracks.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW																									
④ With CONSULT-II 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.																										
																										
SEF983Y																										
2. Start engine and let it idle. 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. 4. Rev engine up to 2,000 rpm. 5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening and check vacuum existence.																										
<table border="1" style="display: inline-table; margin-right: 20px;"> <thead> <tr><th colspan="2">ACTIVE TEST</th></tr> </thead> <tbody> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> </tbody> </table> <table border="1" style="display: inline-table;"> <thead> <tr><th>PURG VOL CONT/V</th><th>VACUUM</th></tr> </thead> <tbody> <tr><td>100.0%</td><td>Should exist</td></tr> <tr><td>0.0%</td><td>Should not exist</td></tr> </tbody> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V	PURG VOL CONT/V	VACUUM	100.0%	Should exist	0.0%	Should not exist
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100.0%	Should exist																									
0.0%	Should not exist																									
SEF012Z																										
OK or NG																										
OK	▶	GO TO 7.																								
NG	▶	GO TO 4.																								

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

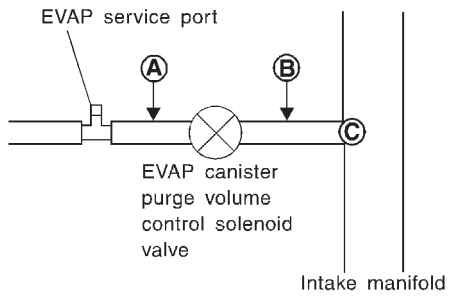
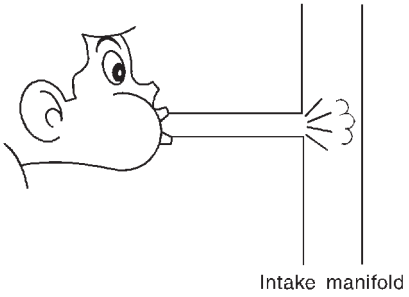
Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum gauge indication when revving engine up to 2,000 rpm. Vacuum should exist. 6. Release the accelerator pedal fully and let idle. Vacuum should not exist. <p style="text-align: center; margin-top: 10px;">OK or NG</p>	GI MA EM LC EC FE AT TF PD
OK	▶	GO TO 7.	
NG	▶	GO TO 4.	

4	CHECK EVAP PURGE LINE	<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36. <p style="text-align: center; margin-top: 10px;">OK or NG</p>	AX SU BR ST RS BT HA SC EL IDX
OK (With CONSULT-II)	▶	GO TO 5.	
OK (Without CONSULT-II)	▶	GO TO 6.	
NG	▶	Repair it.	

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure (Cont'd)

5	CHECK EVAP PURGE HOSE AND PURGE PORT
<p>1. Disconnect purge hoses connected to EVAP service port A and EVAP canister purge volume control solenoid valve B.</p>	
	
<p>2. Blow air into each hose and EVAP purge port C.</p> <p>3. Check that air flows freely.</p>	
	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair or clean hoses and/or purge port.

SEF367U

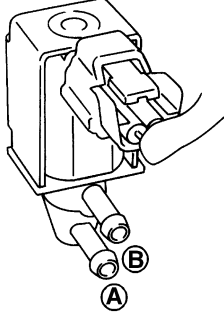
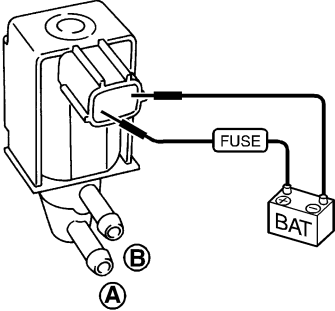
SEF368U

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																				
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
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HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
OK or NG																					
OK	▶ GO TO 8.																				
NG	▶ GO TO 7.																				

SEF985Y

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure (Cont'd)

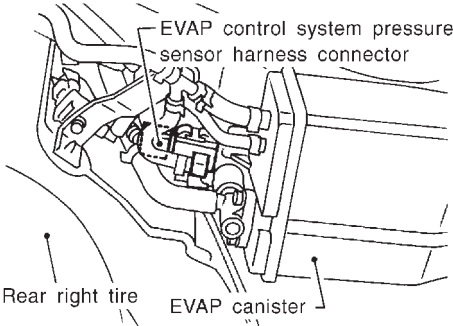
7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
<p>Ⓟ With CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>		
		
SEF334X		
<p>ⓧ Without CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>		
		
SEF335X		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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 BR
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8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>1. Turn ignition switch "OFF". 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it.

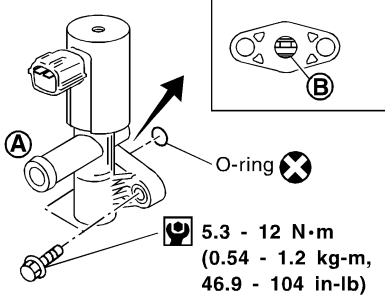
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure (Cont'd)

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <div style="text-align: center;">  <p style="font-size: small;">EVAP control system pressure sensor harness connector Rear right tire EVAP canister</p> </div>		
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: right;">SEF495R</p>		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

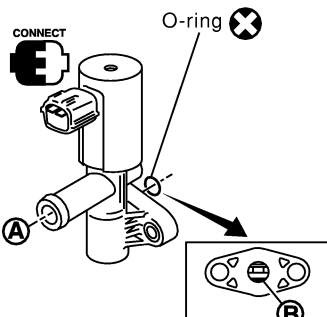
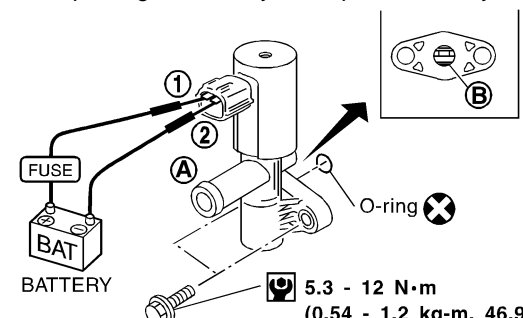
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
<p>Refer to "DTC Confirmation Procedure" for DTC P0450, EC-382.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING	
<p>1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 12.
NG	▶	Clean the rubber tube using an air blower.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
<p>1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.</p> <div style="text-align: center;">  <p style="font-size: small;">O-ring 5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb)</p> </div> <p style="text-align: right;">SEF337X</p>		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure (Cont'd)

13	CHECK EVAP CANISTER VENT CONTROL VALVE-II																								
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Turn ignition switch "ON". 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time. 																									
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>HO2S1 (B2)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table> </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p> </div> </div>		ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
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SEF991Y																									
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SEF339X																									
Make sure new O-ring is installed properly.																									
OK or NG																									
OK	▶ GO TO 15.																								
NG	▶ GO TO 14.																								

14	CHECK EVAP CANISTER VENT CONTROL VALVE-III
<ol style="list-style-type: none"> 1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform Test No. 13 again. 	
OK or NG	
OK (With CONSULT-II)	▶ GO TO 16.
OK (Without CONSULT-II)	▶ GO TO 16.
NG	▶ Replace EVAP canister vent control valve.

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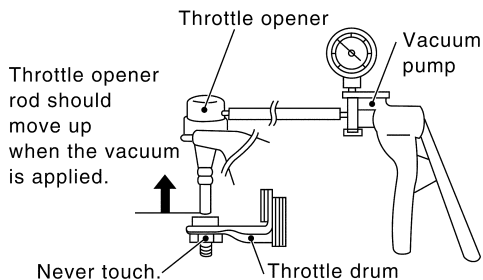
DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure (Cont'd)

15 CHECK THROTTLE POSITION SWITCH

With CONSULT-II

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



SEF793W

7. Turn ignition switch "ON".
8. Select "DATA MONITOR" mode with CONSULT-II.
9. Check indication of "CLSD THL/P SW" under the following conditions.
Measurement must be made with throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

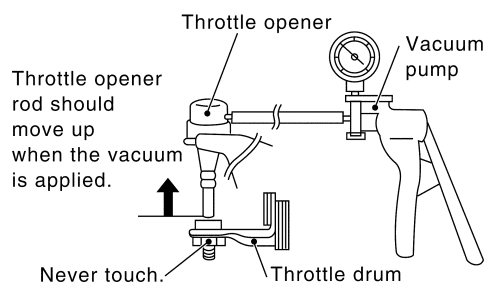
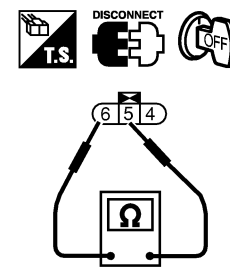
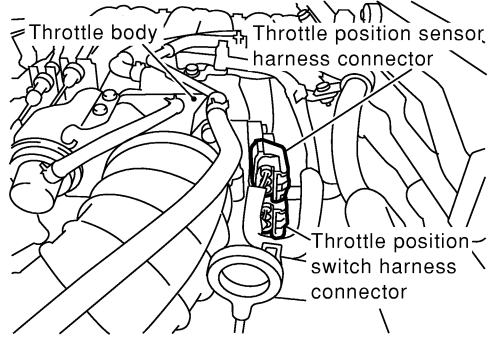
MTBL0355

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure (Cont'd)

16	CHECK THROTTLE POSITION SWITCH						
<ol style="list-style-type: none"> 1. Install all removed parts. 2. Start engine and warm it up to normal operating temperature. 3. Turn ignition switch "OFF". 4. Remove vacuum hose connected to throttle opener. 5. Connect suitable vacuum hose to vacuum pump and the throttle opener. 6. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener. 							
							
SEF793W							
<ol style="list-style-type: none"> 7. Disconnect closed throttle position switch harness connector. 8. Check continuity between closed throttle position switch terminals 6 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle. 							
<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div style="margin-right: 20px;">  </div> <div> <table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Continuity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">Partially open or completely open</td> <td style="text-align: center;">No</td> </tr> </tbody> </table> </div> </div>		Throttle valve conditions	Continuity	Completely closed	Yes	Partially open or completely open	No
Throttle valve conditions	Continuity						
Completely closed	Yes						
Partially open or completely open	No						
SEF998Y							
OK or NG							
OK	▶ GO TO 18.						
NG	▶ GO TO 17.						

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17	ADJUST THROTTLE POSITION SWITCH								
<p>Check the following items. Refer to "Basic Inspection", EC-101.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>15° ± 2° BTDC</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>		Items	Specifications	Ignition timing	15° ± 2° BTDC	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF								
Target idle speed	750 ± 50 rpm (in "P" or "N" position)								
MTBL0470									
<p>Is it possible to adjust closed throttle position switch?</p> <p style="text-align: center;">Yes or No</p>									
Yes	▶ GO TO 18.								
No	▶ Replace throttle position switch.								

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

Diagnostic Procedure (Cont'd)

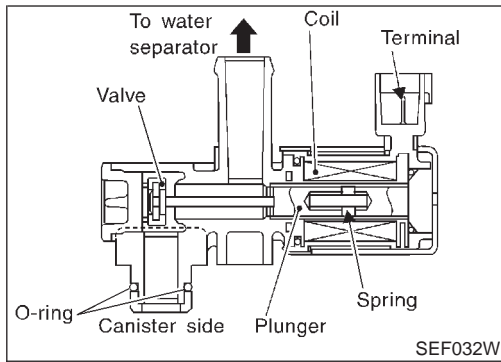
18	CHECK EVAP PURGE LINE
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.	
OK or NG	
OK	▶ GO TO 19.
NG	▶ Replace it.

19	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
	▶ GO TO 20.

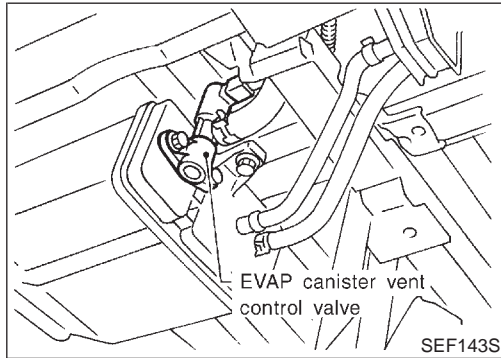
20	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Component Description



SEF032W



SEF143S

Component Description

NBEC0338

NOTE:

If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0339

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NBEC0680

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	G/Y	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NBEC0341

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Possible Cause

Possible Cause

NBEC0591

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

DTC Confirmation Procedure

NBEC0342

NOTE:

- If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

EVAP SML LEAK P0440/P1440

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEF565X

EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEF566X

EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEF567X

WITH CONSULT-II

NBEC0342S01

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.
 - 1) Turn ignition switch “ON”.
 - 2) Turn ignition switch “OFF” and wait at least 10 seconds.
 - 3) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
 - 4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

- 5) Select “EVAP SML LEAK P0440/P1440” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-101.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, go to the following step.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

- 7) Stop engine and wait at least 10 seconds, then turn “ON”.
- 8) Disconnect hose from water separator.
- 9) Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
- 10) Touch “ON” and “OFF” alternately.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

DTC Confirmation Procedure (Cont'd)

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

SEF013Z

11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

If the result is NG, go to "Diagnostic Procedure", EC-577.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-355.

5.3 - 12 N·m
(0.54 - 1.2 kg-m,
46.9 - 104 in-lb)

AEC783A

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.

WITH GST

- 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-577.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-355.

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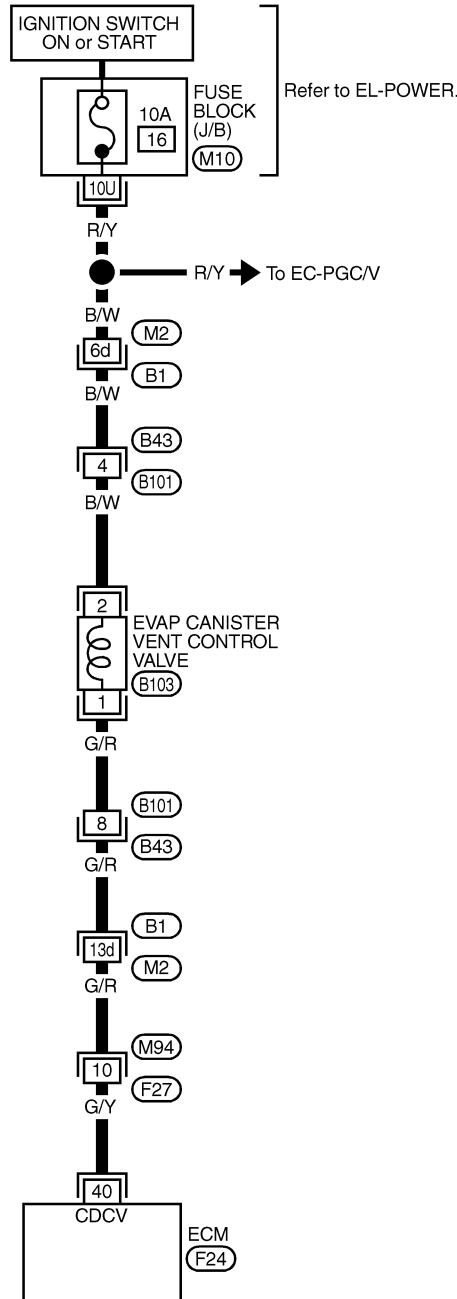
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Wiring Diagram

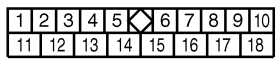
Wiring Diagram

NBEC0344

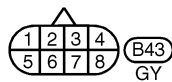
EC-VENT/V-01



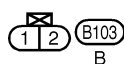
: Detectable line for DTC
 : Non-detectable line for DTC



W



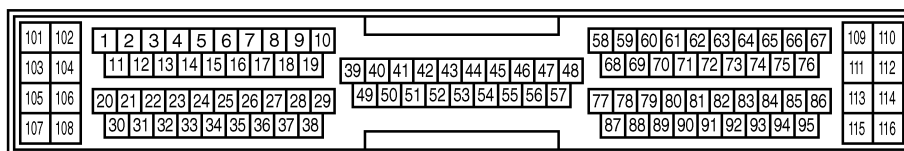
GY



B

REFER TO THE FOLLOWING.

- (B1) -SUPER
- MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK-
- JUNCTION BOX (J/B)



F24
GY



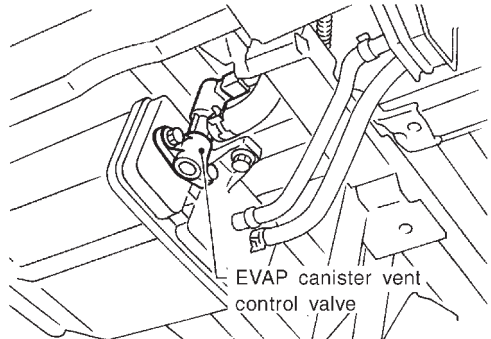
MEC963C

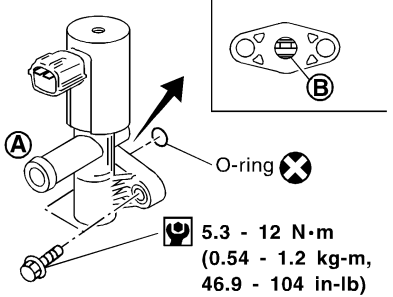
DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Diagnostic Procedure

Diagnostic Procedure

NBEC0345


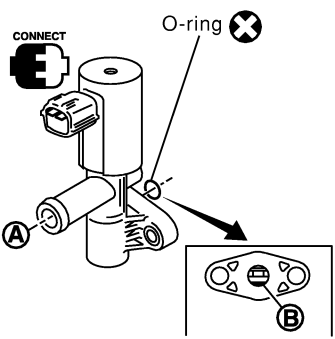
1	CHECK RUBBER TUBE	<p>1. Turn ignition switch "OFF". 2. Disconnect rubber tube connected to EVAP canister vent control valve. 3. Check the rubber tube for clogging.</p>  <p style="text-align: right;">SEF143S</p>	
OK or NG		OK	▶ GO TO 2.
		NG	▶ Clean rubber tube using an air blower.


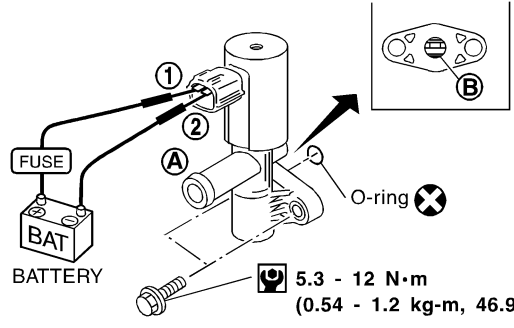
2	CHECK EVAP CANISTER VENT CONTROL VALVE-I	<p>1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.</p>  <p style="text-align: right;">SEF337X</p>	
OK or NG		OK	▶ GO TO 3.
		NG	▶ Replace EVAP canister vent control valve.

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DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Diagnostic Procedure (Cont'd)

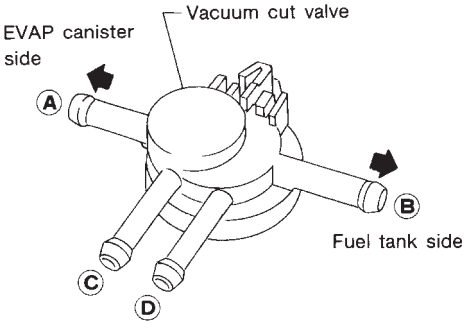
3	CHECK EVAP CANISTER VENT CONTROL VALVE-II																								
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ON	No																								
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SEF991Y																									

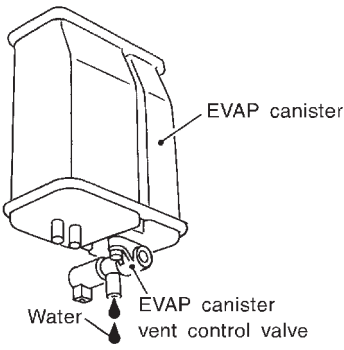
<p> Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p>							
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12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
SEF339X							
Make sure new O-ring is installed properly.							
OK or NG							
OK	▶	GO TO 5.					
NG	▶	GO TO 4.					

4	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
<ol style="list-style-type: none"> Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. Perform Test No. 3 again. 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace EVAP canister vent control valve.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Diagnostic Procedure (Cont'd)

5	CHECK VACUUM CUT VALVE		
		<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve. 3. Check vacuum cut valve as follows: 	GI MA EM LC EC FE AT TF PD
			SEF379Q
		<ol style="list-style-type: none"> a. Plug port C and D with fingers. b. Apply vacuum to port A and check that there is no suction from port B. c. Apply vacuum to port B and check that there is suction from port A. d. Blow air in port B and check that there is a resistance to flow out of port A. e. Open port C and D. f. Blow air in port A check that air flows freely out of port C. g. Blow air in port B check that air flows freely out of port D. 	
		OK or NG	
OK	▶	GO TO 6.	AX
NG	▶	Replace vacuum cut valve.	SU BR ST RS BT HA SC

6	CHECK IF EVAP CANISTER SATURATED WITH WATER		
		<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. 	SU BR ST RS BT HA SC
			SEF596U
		Yes or No	
Yes	▶	GO TO 7.	EL
No	▶	GO TO 9.	IDX

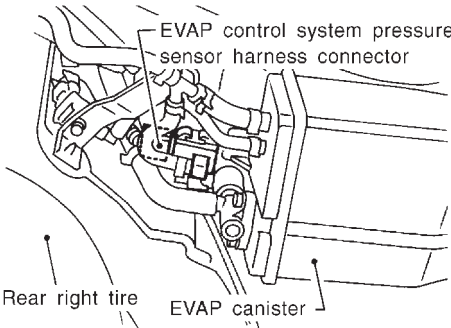
7	CHECK EVAP CANISTER		
		Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).	EL IDX
		OK or NG	
OK	▶	GO TO 9.	
NG	▶	GO TO 8.	

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Diagnostic Procedure (Cont'd)

8	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 	
▶	Repair hose or replace EVAP canister.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair it.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	
 <p style="text-align: right;">SEF495R</p>	
2. Check connectors for water. Water should not exist.	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace EVAP control system pressure sensor.

DTC P1448 EVAPORATIVE EMISSION (EVAP) CANISTER VENT CONTROL VALVE (OPEN)

Diagnostic Procedure (Cont'd)

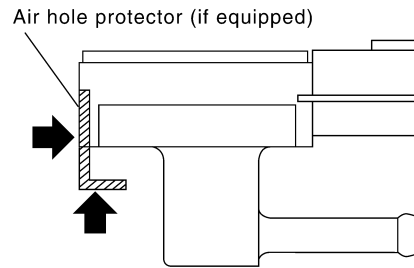
GI
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TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

11 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

2. Remove hose from EVAP control system pressure sensor.

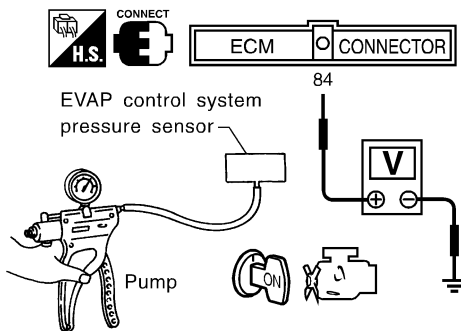
3. Turn ignition switch "ON".

4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

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.

5. Check input voltage between ECM terminal 84 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

SEF342X

CAUTION:

- Discard and 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.

OK or NG

OK ► GO TO 12.

NG ► Replace EVAP control system pressure sensor.

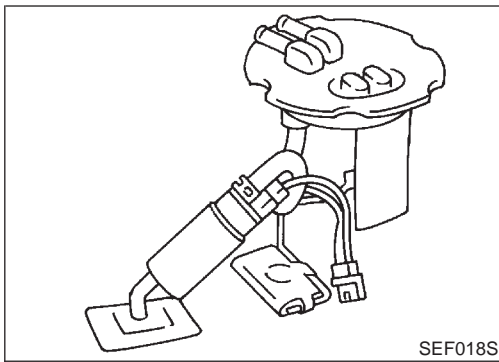
12 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.

► INSPECTION END

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM. NBEC0632

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

ECM receives two signals from the fuel level sensor. NBEC0633

One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) NBEC0634

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. NBEC0635

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

- Turn ignition switch "ON". NBEC0635S01
- Select "DATA MONITOR" mode with CONSULT-II.
- Wait at least 5 seconds.
- If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-584.

WITH GST

Follow the procedure "WITH CONSULT-II" above. NBEC0635S02

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

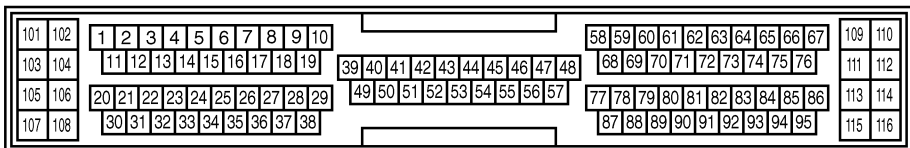
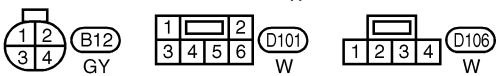
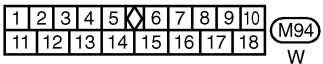
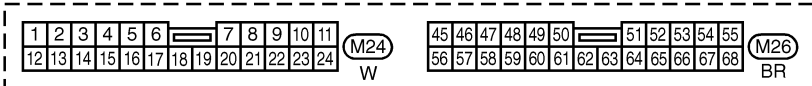
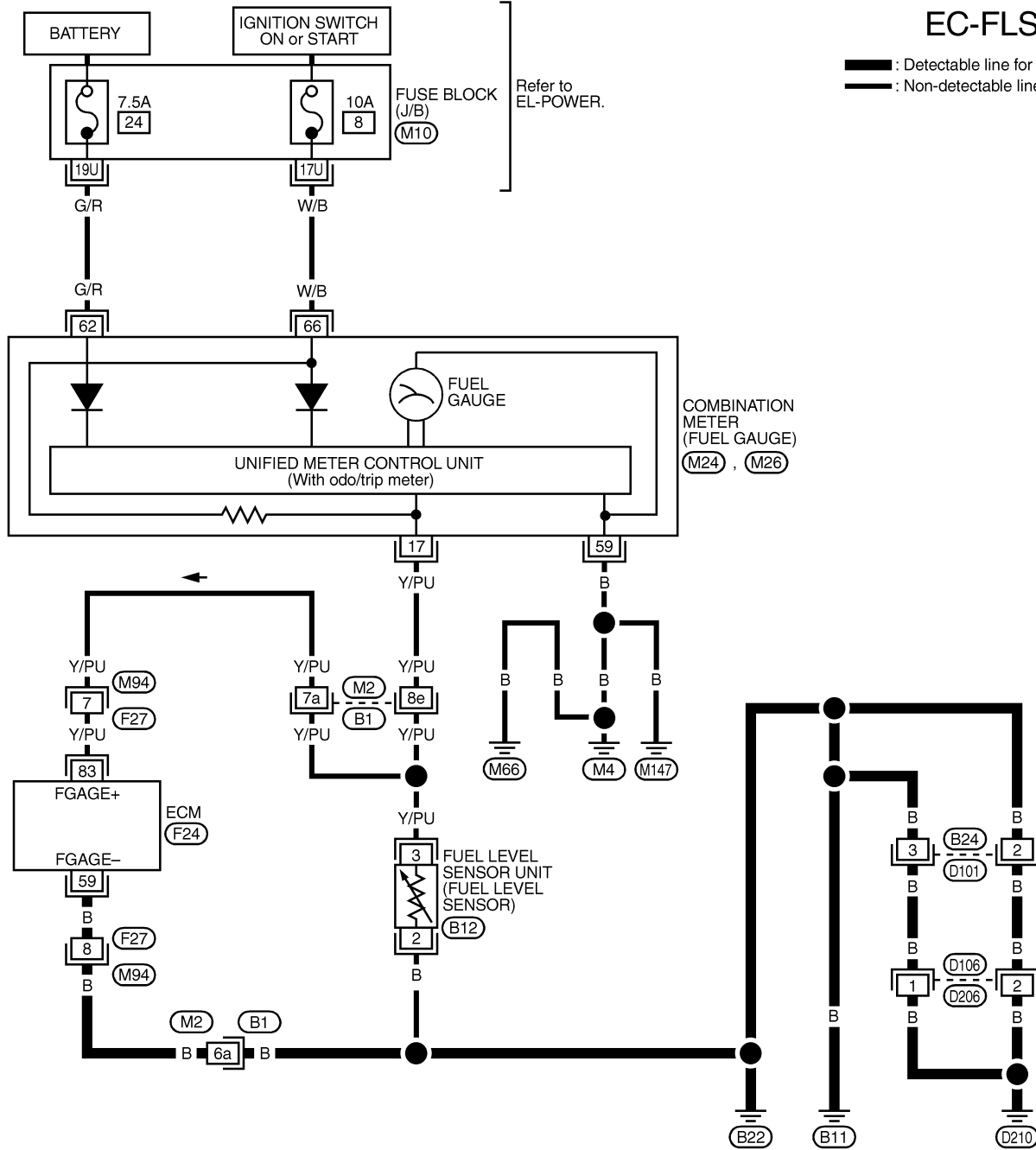
Wiring Diagram

Wiring Diagram

NBEC0640

EC-FLS3-01

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



REFER TO THE FOLLOWING.

- (B1) -SUPER
- MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK- JUNCTION BOX (J/B)



GI
 MA
 EM
 LC
EC
 FE
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

MEC985C

DTC P1464 FUEL LEVEL SENSOR CIRCUIT (GROUND SIGNAL)

Diagnostic Procedure

Diagnostic Procedure

=NBEC0641

1	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 59 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

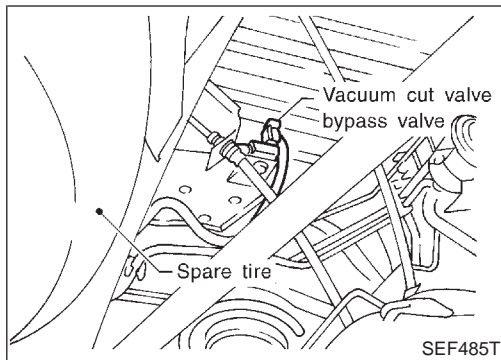
2	DETECT MALFUNCTIONING PART
1. Check the following. <ul style="list-style-type: none">● Harness connectors F27, M94● Harness connectors M2, B1● Harness for open between ECM and body ground	
	▶ Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR
Refer to EL-108, "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
OK or NG	
	▶ INSPECTION END

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

Description



Description

COMPONENT DESCRIPTION

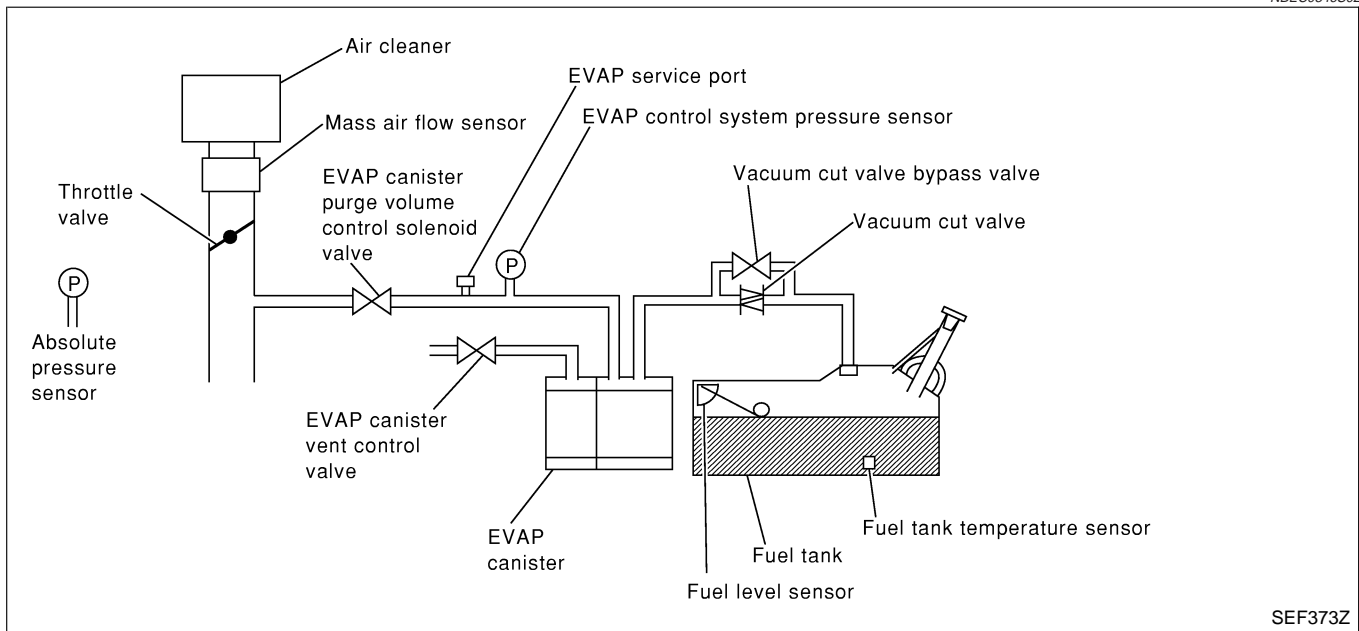
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

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 ground.

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	G/W	Vacuum cut valve bypass valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve. NBEC0349

Possible Cause

- Harness or connectors
(The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve NBEC0592

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. NBEC0350

TESTING CONDITION:

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

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II. NBEC0350S01
- 3) Start engine and wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-588.

WITH GST

Follow the procedure "WITH CONSULT-II" above. NBEC0350S02

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

Wiring Diagram

Wiring Diagram

NBEC0351

EC-BYPS/V-01

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

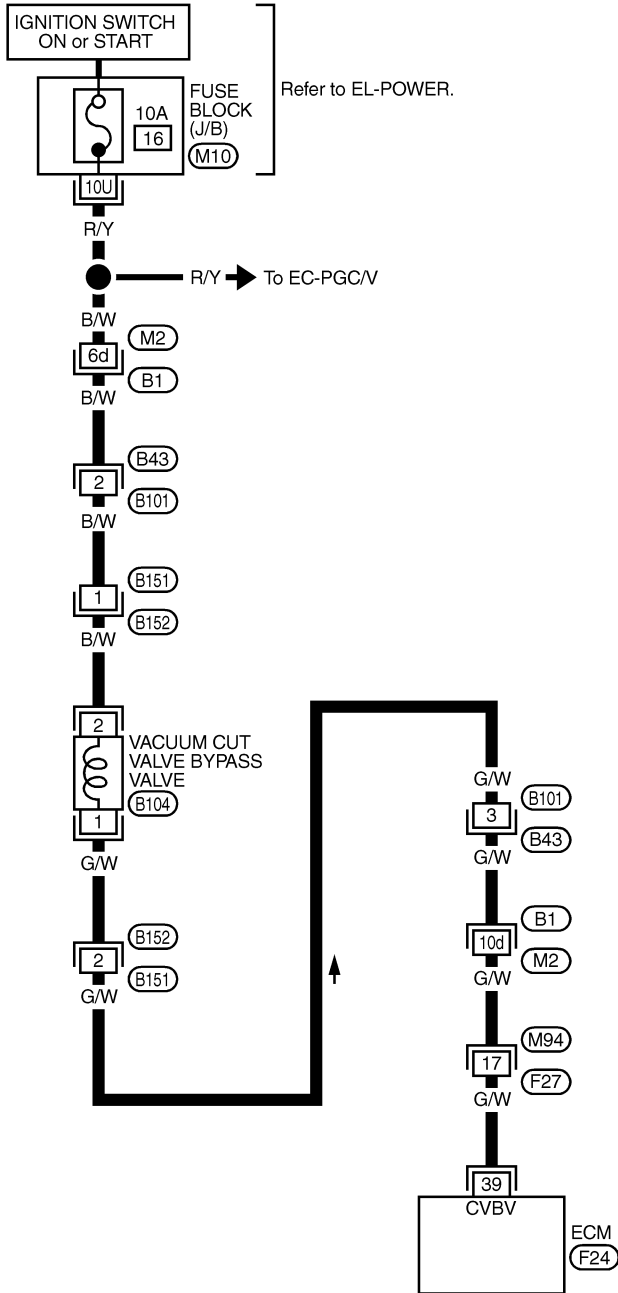
BT

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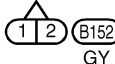
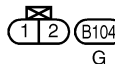
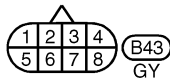
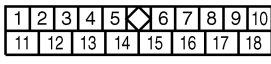


— : Detectable line for DTC
 — : Non-detectable line for DTC

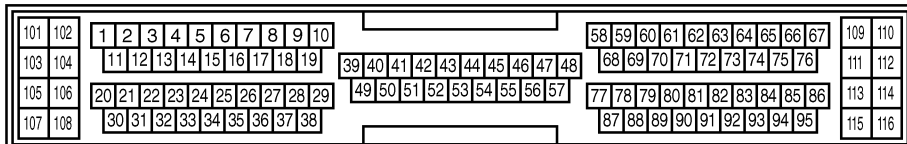
Refer to EL-POWER.

VACUUM CUT VALVE BYPASS VALVE (B104)

ECM (F24)



REFER TO THE FOLLOWING.
 (B1) -SUPER
 MULTIPLE JUNCTION (SMJ)
 (M10) - FUSE BLOCK-JUNCTION BOX (J/B)



MEC972C


DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

Diagnostic Procedure

Diagnostic Procedure

NBEC0352

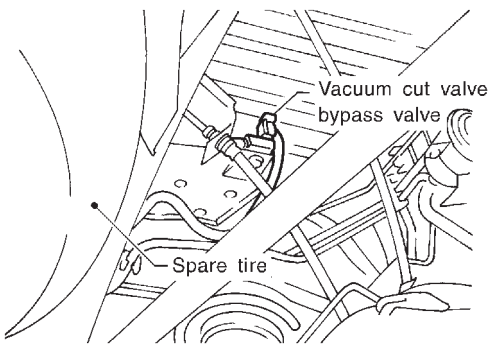
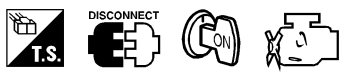
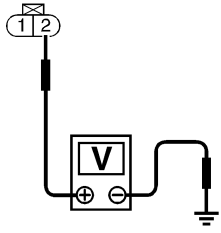
1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes	▶ GO TO 2.
No	▶ GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT																				
 With CONSULT-II																					
1. Turn ignition switch "OFF" and then "ON".																					
2. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II.																					
3. Touch "ON/OFF" on CONSULT-II screen.																					
<table border="1"><thead><tr><th colspan="2">ACTIVE TEST</th></tr><tr><th>VC/V BYPASS/V</th><th>OFF</th></tr><tr><th colspan="2">MONITOR</th></tr></thead><tbody><tr><td>ENG SPEED</td><td>XXX rpm</td></tr><tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr><tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr><tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr><tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr><tr><td>THRTL POS SEN</td><td>XXX V</td></tr><tr><td> </td><td> </td></tr></tbody></table>		ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																					
VC/V BYPASS/V	OFF																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	LEAN																				
HO2S1 MNTR (B2)	LEAN																				
THRTL POS SEN	XXX V																				
4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.																					
OK or NG																					
OK	▶ GO TO 7.																				
NG	▶ GO TO 3.																				

SEF014Z

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch "OFF". 2. Disconnect vacuum cut valve bypass valve harness connector.</p>	
	
<p>3. Turn ignition switch "ON". 4. Check voltage between vacuum cut valve bypass valve terminal 2 and ground with CONSULT-II or tester.</p>	
	
 <p style="text-align: right;">Voltage: Battery voltage</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

SEF485T

SEF015Z

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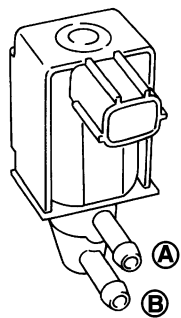
4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M2, B1 ● Fuse block (J/B) connector M10 ● Harness connectors B43, B101 and B151, B152 ● 10A fuse ● Harness for open or short between vacuum cut valve bypass valve and fuse 	
▶	Repair harness or connectors.


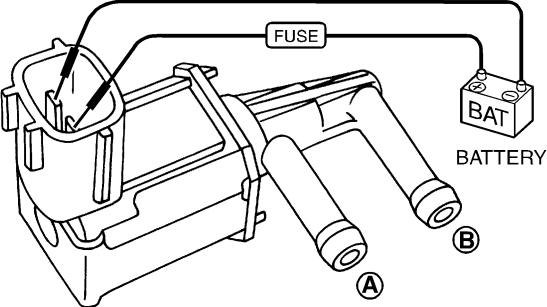
5	CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 39 and vacuum cut valve bypass valve terminal 1. Refer to Wiring Diagram. Continuity should exist.</p>	
<p>4. Also check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

DTC P1490 VACUUM CUT VALVE BYPASS VALVE (CIRCUIT)

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B152, B151 and B101, B43 ● Harness connectors B1, M2 and M94, F27 ● Harness for open or short between vacuum cut valve bypass valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK VACUUM CUT VALVE BYPASS VALVE																								
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect harness disconnected connectors. 2. Turn ignition switch ON. 3. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time under the following conditions. 																									
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>VC/V BYPASS/V</th> <th>OFF</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Condition VC/V BYPASS/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>Yes</td> </tr> <tr> <td>OFF</td> <td>No</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V	Condition VC/V BYPASS/V	Air passage continuity between A and B	ON	Yes	OFF	No
ACTIVE TEST																									
VC/V BYPASS/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
A/F ALPHA-B2	XXX %																								
HO2S1 MNTR (B1)	LEAN																								
HO2S1 MNTR (B2)	LEAN																								
THRTL POS SEN	XXX V																								
Condition VC/V BYPASS/V	Air passage continuity between A and B																								
ON	Yes																								
OFF	No																								
SEF016Z																									

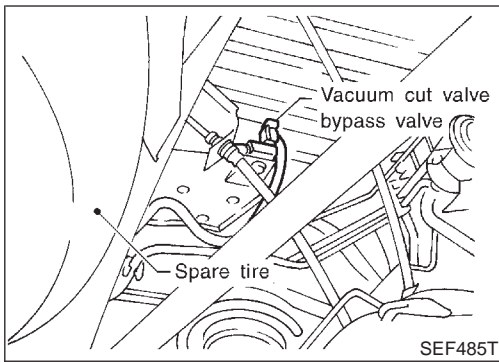
<p> Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p>							
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>Yes</td> </tr> <tr> <td>No supply</td> <td>No</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
OK or NG							
SEF358X							

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Description



Description

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.

NBEC0353

NBEC0353S01

GI

MA

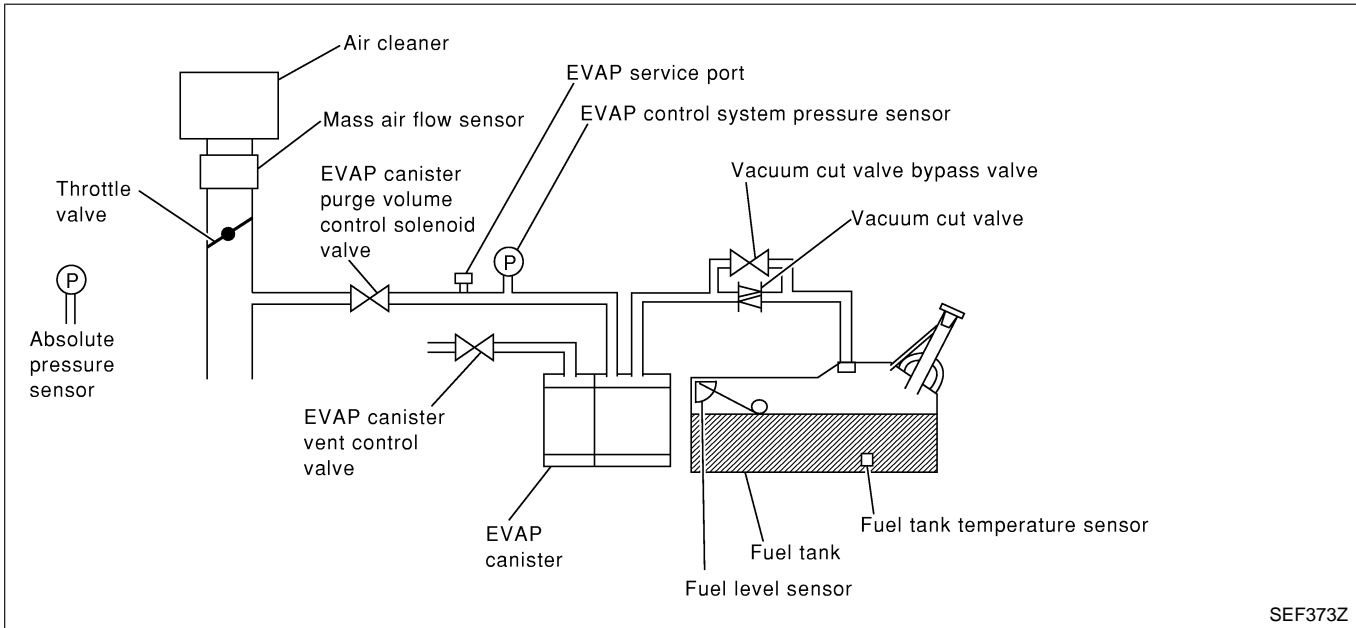
EM

LC

EC

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NBEC0353S02



SEF373Z

FE

AT

TF

PD

AX

SU

BR

CONSULT-II Reference Value in Data Monitor Mode

NBEC0354

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

RS

BT

ECM Terminals and Reference Value

NBEC0682

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

CAUTION:

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

HA

SC

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	G/W	Vacuum cut valve bypass valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

EL

IDX

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

On Board Diagnosis Logic

On Board Diagnosis Logic

NBEC0356

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

NBEC0593

- Vacuum cut valve bypass valve
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

NBEC0357

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

For best results, perform test at a temperature of 5 to 30°C (41 to 86°F).

7	VC CUT/V BP/V P1491	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	B/FUEL SCHDL	XXX msec

SEF210Y

7	VC CUT/V BP/V P1491	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	B/FUEL SCHDL	XXX msec

SEF211Y

7	VC CUT/V BP/V P1491	
	COMPLETED	

SEF239Y

WITH CONSULT-II

NBEC0357S01

- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch "OFF" and wait at least 10 seconds.
- 4) Start engine and let it idle for at least 70 seconds.
- 5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 6) Touch "START".
- 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 at least 30 seconds.)

ENG SPEED	Idle speed or more
Selector lever	Suitable position
Vehicle speed	37 km/h (23 MPH) or more
B/FUEL SCHDL	1.3 - 10 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

- 8) Make sure that "OK" is displayed after touching "SELF-DIAG

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

DTC Confirmation Procedure (Cont'd)

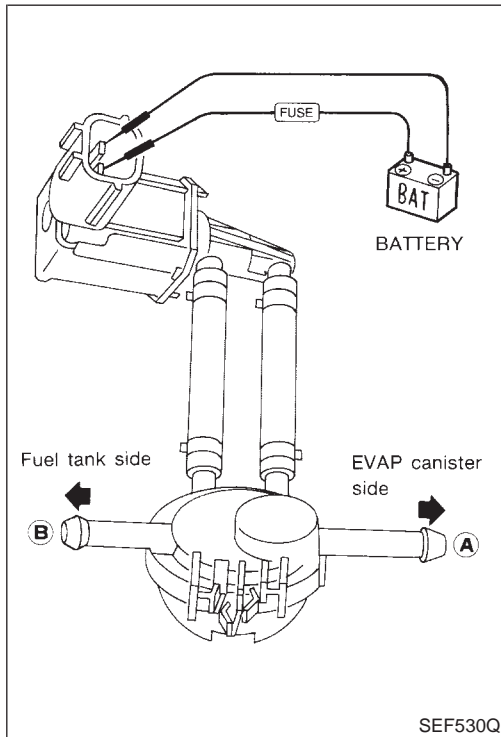
RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-595.

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Overall Function Check

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

NBEC0358

EC

WITH GST

NBEC0358S01

- 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-595.

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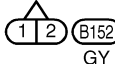
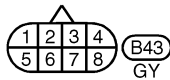
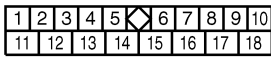
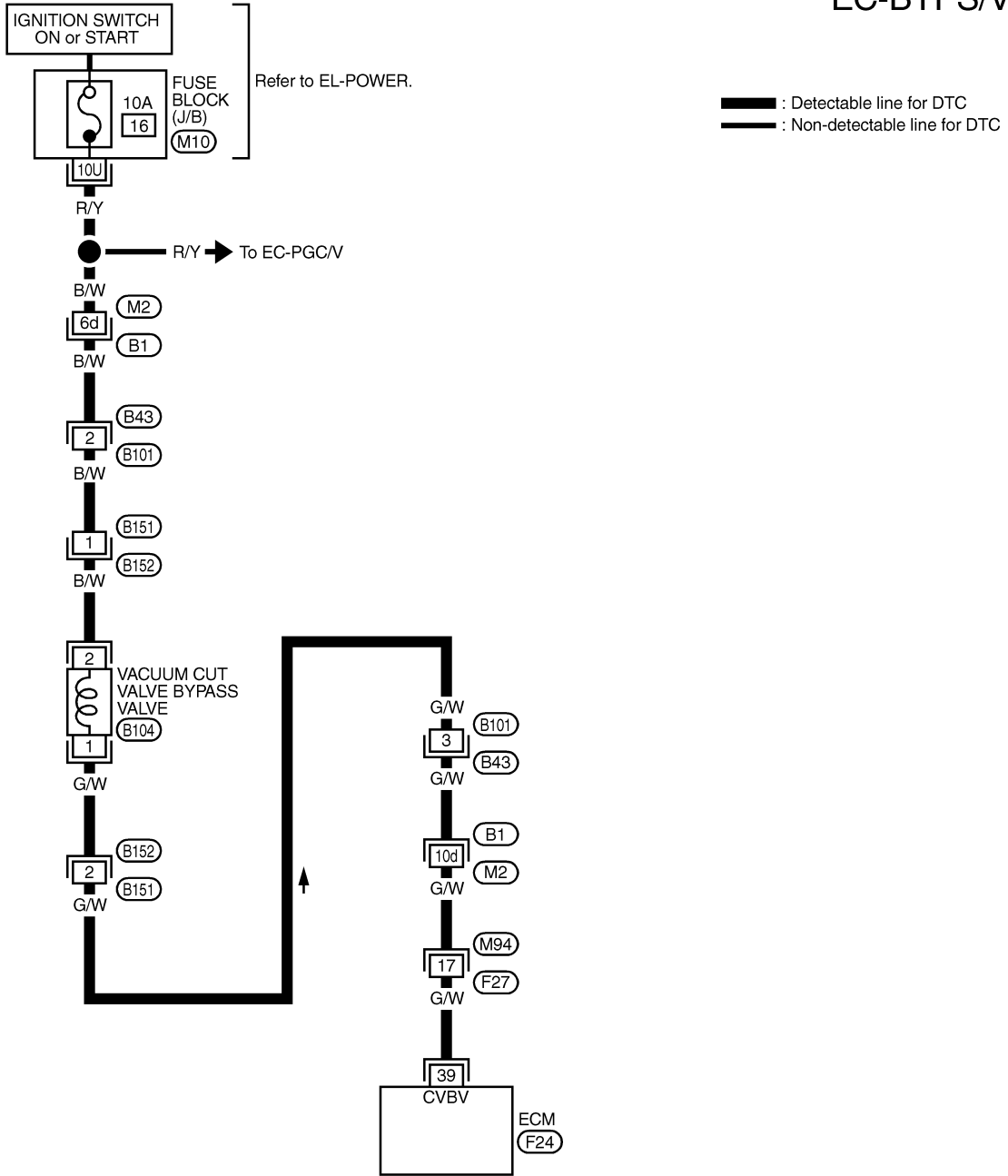
DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Wiring Diagram

Wiring Diagram

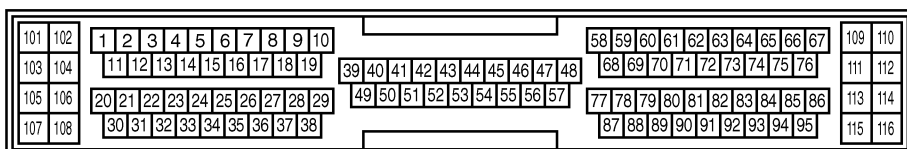
NBEC0359

EC-BYPS/V-01



REFER TO THE FOLLOWING.

- (B1) -SUPER
- MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK-JUNCTION BOX (J/B)



MEC972C

DTC P1491 VACUUM CUT VALVE BYPASS VALVE


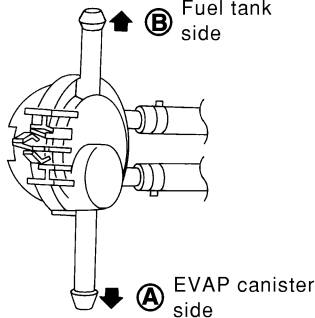
Diagnostic Procedure

Diagnostic Procedure

NBEC0360

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

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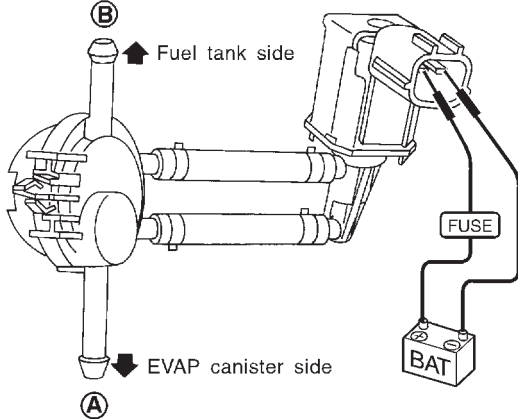
2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> Turn ignition switch "OFF". Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. Apply vacuum to port A and check that there is no suction from port B. 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. Turn ignition switch "ON". Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON". 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. 																						
																						
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VC/V BYPASS/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
SEF017Z																						
OK or NG																						
OK	▶	GO TO 4.																				
NG	▶	GO TO 5.																				

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DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Disconnect vacuum cut valve bypass valve harness connector. 7. Supply battery voltage to the terminal. 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 		
		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 7.

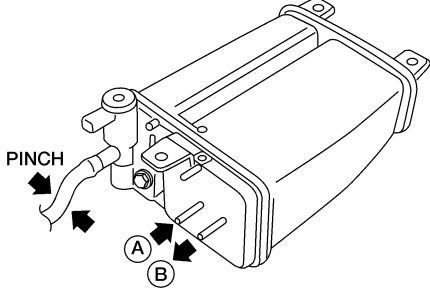
SEF914U

4	CHECK EVAP PURGE LINE	
Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP PURGE PORT	
Check EVAP purge port of fuel tank for clogging.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Clean EVAP purge port.

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Diagnostic Procedure (Cont'd)

6		CHECK EVAP CANISTER
1. Pinch the fresh air hose. 2. Blow air into port A and check that it flows freely out of port B .		
		
		AEC630A
		OK or NG
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister.

7		CHECK BYPASS HOSE
Check bypass hoses for clogging.		
		OK or NG
OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

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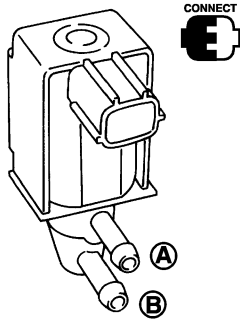
DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Diagnostic Procedure (Cont'd)

8 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

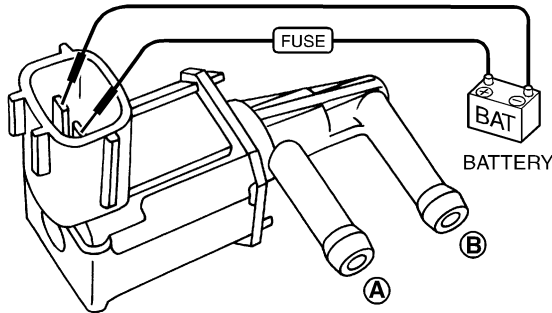
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

Without CONSULT-II

- Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.

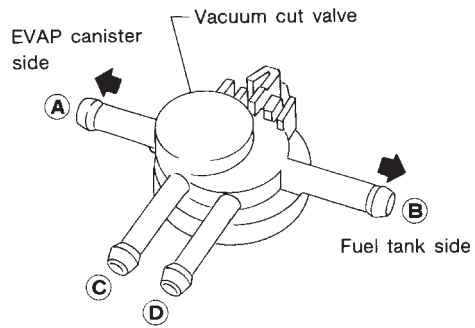
SEF358X

OK or NG

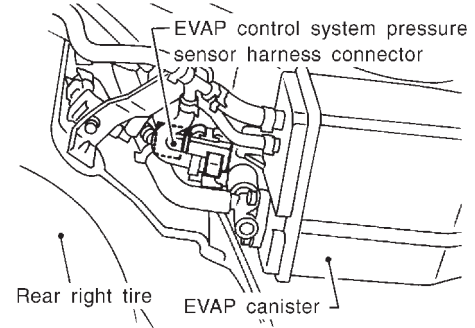
OK	▶	GO TO 9.
NG	▶	Replace vacuum cut valve bypass valve.

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Diagnostic Procedure (Cont'd)

9	CHECK VACUUM CUT VALVE								
		<p>Check vacuum cut valve as follows:</p> 	<p>GI MA EM LC EC FE AT TF PD</p>						
		<p>a. Plug port C and D with fingers. b. Apply vacuum to port A and check that there is no suction from port B. c. Apply vacuum to port B and check that there is suction from port A. d. Blow air in port B and check that there is a resistance to flow out of port A. e. Open port C and D. f. Blow air in port A check that air flows freely out of port C. g. Blow air in port B check that air flows freely out of port D.</p> <p style="text-align: center;">OK or NG</p>	<p>SEF379Q</p>						
		<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 10.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace vacuum cut valve.</td> </tr> </table>	OK	▶	GO TO 10.	NG	▶	Replace vacuum cut valve.	
OK	▶	GO TO 10.							
NG	▶	Replace vacuum cut valve.							

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE								
		<p>1. Turn ignition switch "OFF". 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p> <p style="text-align: center;">OK or NG</p>	<p>AX SU BR</p>						
		<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 11.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair or replace.</td> </tr> </table>	OK	▶	GO TO 11.	NG	▶	Repair or replace.	
OK	▶	GO TO 11.							
NG	▶	Repair or replace.							

11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR								
		<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> 	<p>ST RS BT HA SC EL IDX</p>						
		<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>	<p>SEF495R</p>						
		<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 12.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace EVAP control system pressure sensor.</td> </tr> </table>	OK	▶	GO TO 12.	NG	▶	Replace EVAP control system pressure sensor.	
OK	▶	GO TO 12.							
NG	▶	Replace EVAP control system pressure sensor.							

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

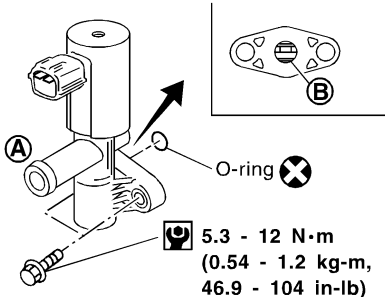
Diagnostic Procedure (Cont'd)

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR
<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Never apply force to the air hole protector of the sensor if equipped. 	
SEF799W	
<p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● 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. <p>5. Check input voltage between ECM terminal 84 and ground.</p>	
SEF342X	
<p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard and 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. 	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Replace EVAP control system pressure sensor.


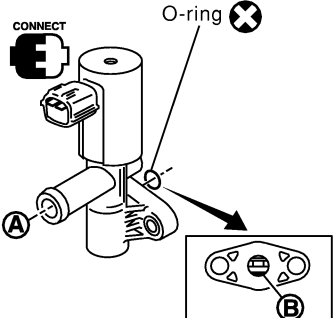
13	CHECK RUBBER TUBE FOR CLOGGING
<p>1. Disconnect rubber tube connected to EVAP canister vent control valve.</p> <p>2. Check the rubber tube for clogging.</p>	
OK or NG	
OK	▶ GO TO 14.
NG	▶ Clean the rubber tube using an air blower.

DTC P1491 VACUUM CUT VALVE BYPASS VALVE


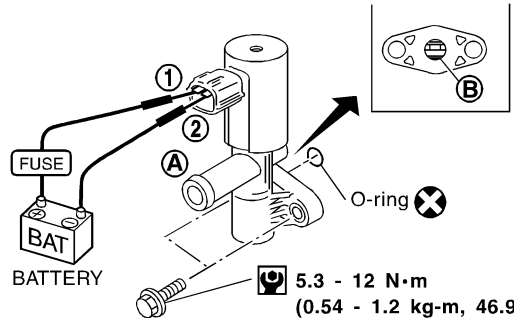
Diagnostic Procedure (Cont'd)

14	CHECK EVAP CANISTER VENT CONTROL VALVE-I
<p>1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.</p> <div style="text-align: center;">  <p>5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb)</p> </div>	
SEF337X	
OK or NG	
OK	▶ GO TO 15.
NG	▶ Replace EVAP canister vent control valve.

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15	CHECK EVAP CANISTER VENT CONTROL VALVE-II																								
<p> With CONSULT-II</p> <p>1. Reconnect harness disconnected connectors. 2. Turn ignition switch ON. 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">  <p>5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb)</p> </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VENT CONTROL/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>HO2S1 (B2)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table> </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																									
VENT CONTROL/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
A/F ALPHA-B2	XXX %																								
HO2S1 (B1)	XXX V																								
HO2S1 (B2)	XXX V																								
THRTL POS SEN	XXX V																								
Condition VENT CONTROL/V	Air passage continuity between A and B																								
ON	No																								
OFF	Yes																								
SEF991Y																									

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<p> Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">  <p>5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb)</p> </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
SEF339X							
Make sure new O-ring is installed properly.							
OK or NG							
OK	▶ GO TO 17.						
NG	▶ GO TO 16.						

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DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Diagnostic Procedure (Cont'd)

16	CHECK EVAP CANISTER VENT CONTROL VALVE-III
1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform the Test No. 15 again.	
OK or NG	
OK	▶ GO TO 17.
NG	▶ Replace EVAP canister vent control valve.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

Component Description

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

NBEC0361

GI

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EM

LC

On Board Diagnosis Logic

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

NBEC0363

EC

FE

AT

TF

Possible Cause

- Harness or connectors
[The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.]
- Dead (Weak) battery
- TCM (Transmission control module)

NBEC0594

PD

AX

SU

BR

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NBEC0364

ST

NOTE:

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

RS

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

BT

Ⓜ WITH CONSULT-II

NBEC0364S01

HA

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 40 seconds.
- 4) If 1st trip DTC is detected, go to "DTC P0600 A/T COMMUNICATION LINE Diagnostic Procedure", EC-443.

SC

EL

Ⓜ WITH GST

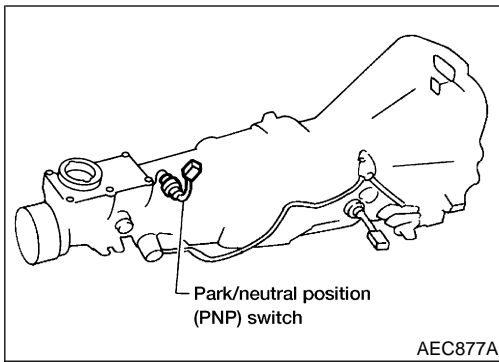
NBEC0364S02

Follow the procedure "WITH CONSULT-II" above.

IDX

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

Component Description



Component Description

NBEC0367

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON".

ECM detects the position because the continuity of the line (the "ON" signal) exists.

For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0368

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

NBEC0683

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
44	L	PNP switch	[Ignition switch "ON"] ● Gear position is "P" or "N" (A/T models).	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NBEC0370

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

Possible Cause

NBEC0595

- Harness or connectors
[The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

DTC Confirmation Procedure

DTC Confirmation Procedure

NBEC0371

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

2	DATA MONITOR	
	MONITOR	NO DTC
	P/N POSI SW	ON

SEF212Y

5	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec	

SEF213Y

WITH CONSULT-II

NBEC0371S01

- 1) Turn ignition switch "ON".
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
"N" and "P" position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-608.

If OK, go to following step.

- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine and warm it up to normal operating temperature.
- 5) Maintain the following conditions for at least 60 consecutive seconds.

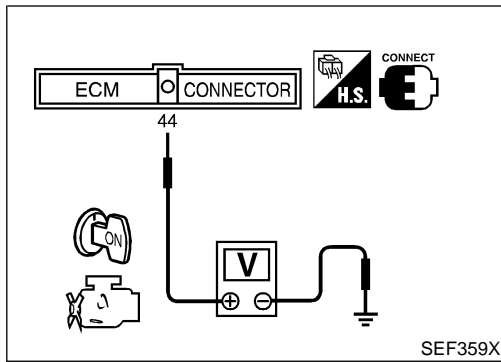
ENG SPEED	1,500 - 2,500 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.6 - 12 msec
VHCL SPEED SE	70 - 100 km/h (43 - 62 MPH)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-608.

GI
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DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

Overall Function Check



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. =NBEC0372

WITH GST

- 1) Turn ignition switch "ON". NBEC0372S01
- 2) Check voltage between ECM terminal 44 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	Battery voltage

- 3) If NG, go to "Diagnostic Procedure", EC-608.

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

Wiring Diagram

Wiring Diagram

NBEC0373

EC-PNP/SW-01

GI

MA

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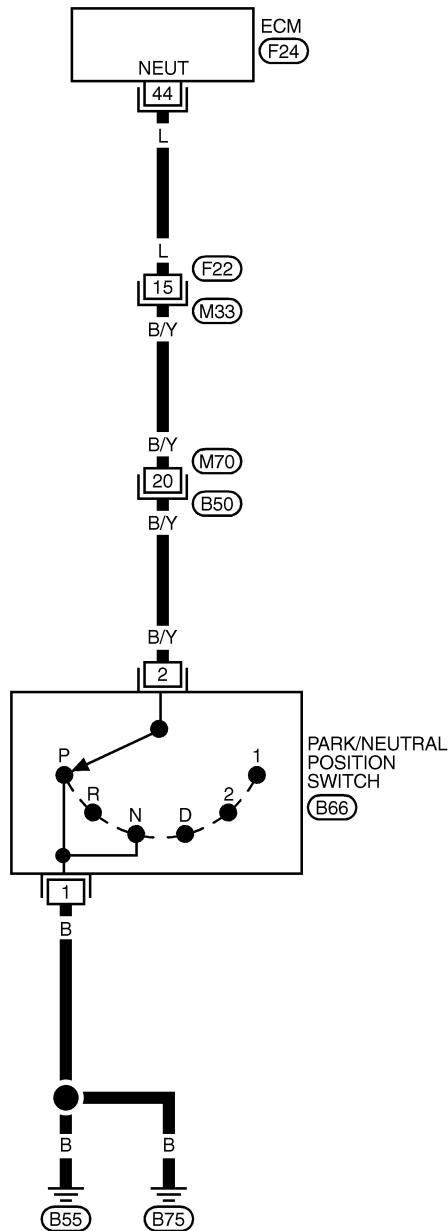
BT

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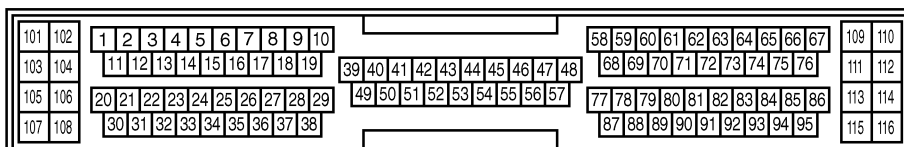
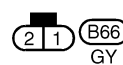
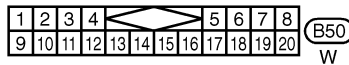
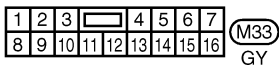
SC

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IDX



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



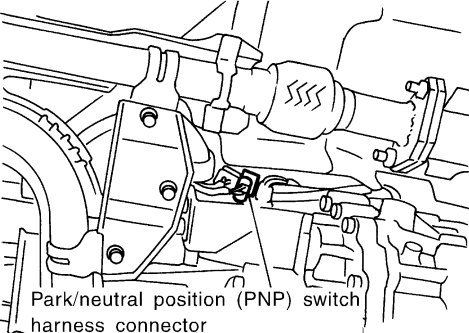
MEC973C

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure

Diagnostic Procedure

NBEC0374

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Disconnect park/neutral position (PNP) switch harness connector.</p>		
		
<p>3. Check harness continuity between PNP switch terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to power.</p>		
SEF011SA		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
Check harness for open or short between park/neutral position (PNP) switch and engine ground.		
▶ Repair open circuit or short to power in harness or connectors.		

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 44 and PNP switch terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Harness connectors F22, M33 and M70, B50 ● Harness for open or short between ECM and park/neutral position (PNP) switch 		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
Refer to AT-115, "Diagnostic Procedure".		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

DTC P1706 PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure (Cont'd)

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

GI

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IDX

VARIABLE INDUCTION AIR CONTROL SYSTEM (VIAS)

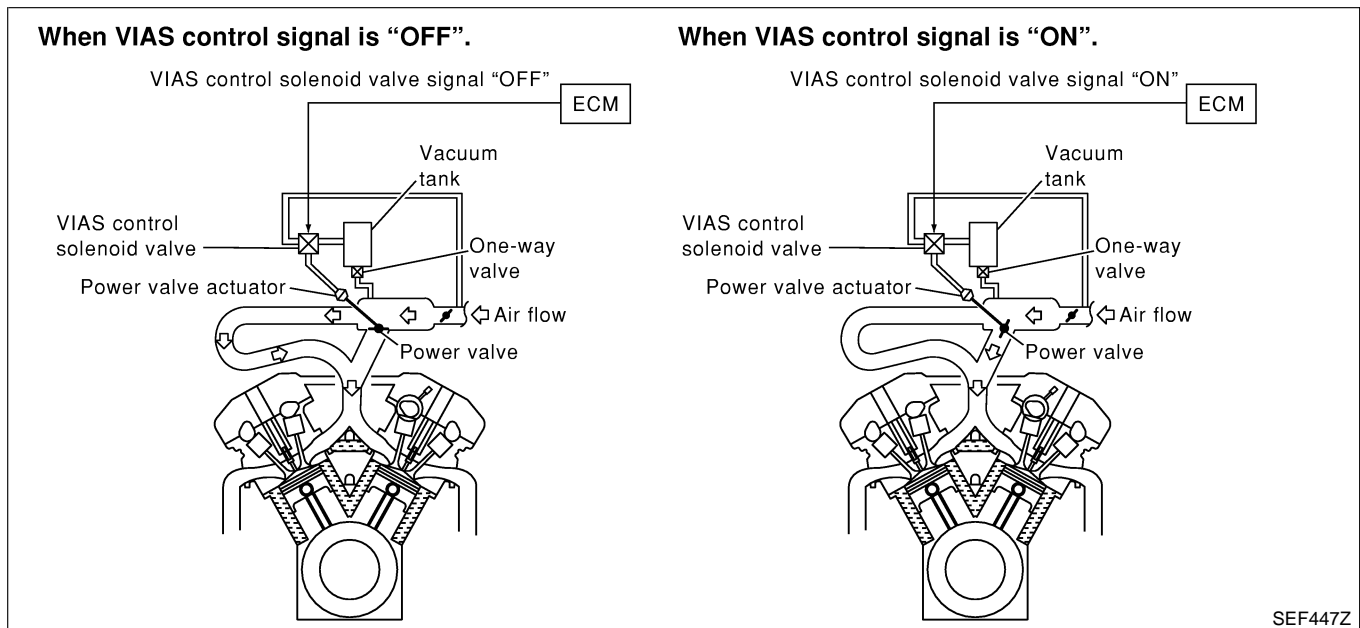
Description

Description SYSTEM DESCRIPTION

NBEC0596

NBEC0596S01

Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Closed throttle position	Throttle valve idle position		
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Engine coolant temperature sensor	Engine coolant temperature		



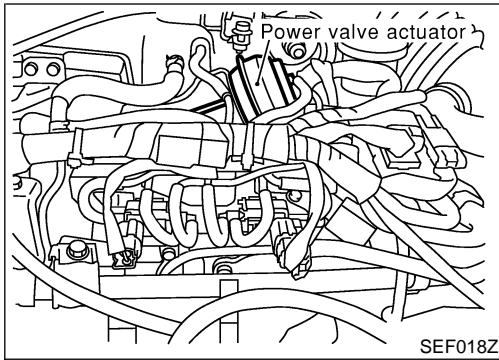
When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

VARIABLE INDUCTION AIR CONTROL SYSTEM (VIAS)

Description (Cont'd)



COMPONENT DESCRIPTION

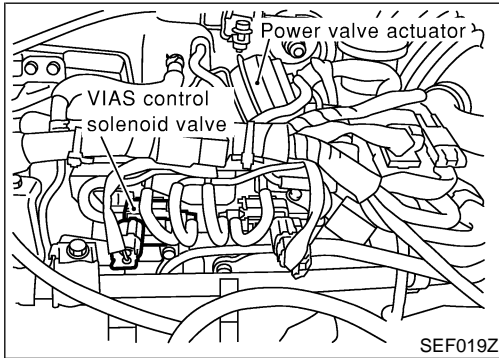
Power Valve

NBEC0596S02

NBEC0596S0201

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.

GI
MA
EM
LC



VIAS Control Solenoid Valve

NBEC0596S0202

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

EC
FE
AT
TF

ECM Terminals and Reference Value

NBEC0684

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

CAUTION:

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

PD
AX
SU

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	Y/G	VIAS control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm.	0 - 1.0V

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VARIABLE INDUCTION AIR CONTROL SYSTEM (VIAS)

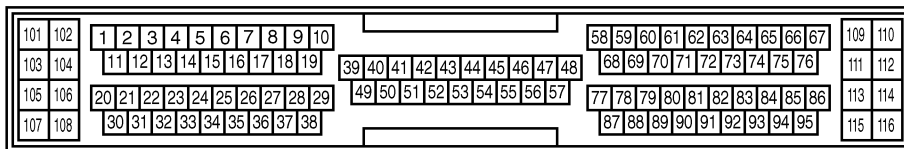
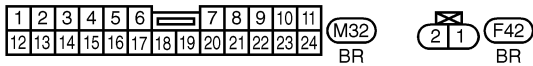
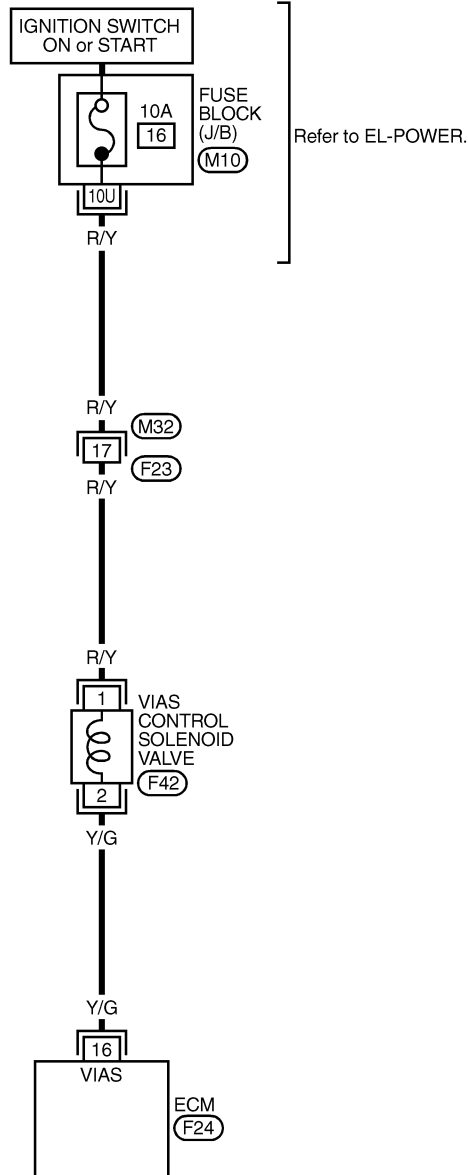
Wiring Diagram

Wiring Diagram

NBEC0597

EC-VIAS/V-01

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



REFER TO THE FOLLOWING.

M10 - FUSE BLOCK -
 JUNCTION BOX (J/B)

MEC990C

VARIABLE INDUCTION AIR CONTROL SYSTEM (VIAS)

Diagnostic Procedure

Diagnostic Procedure

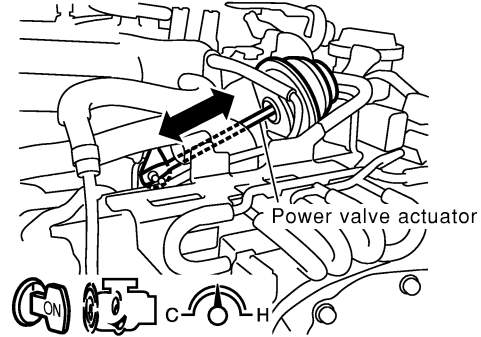
NBEC0598

1 CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform "VIAS SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
3. Turn VIAS control solenoid valve "ON" and "OFF", and make sure that power valve actuator rod moves.

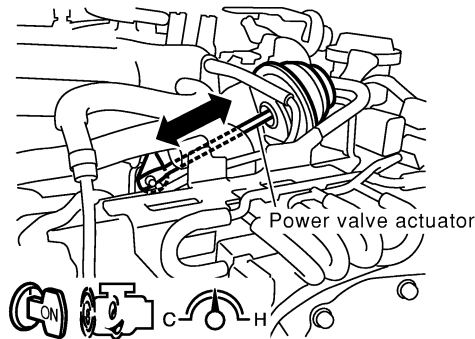
ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step



SEC304C

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



SEF021Z

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 2.

GI

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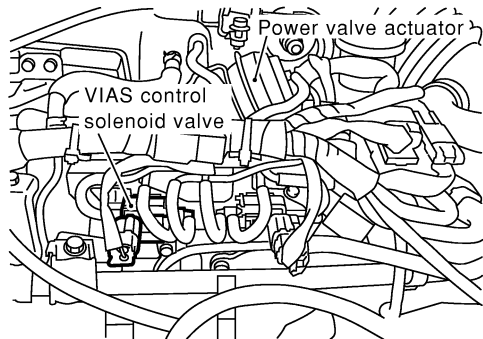
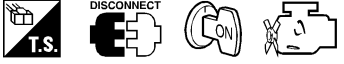
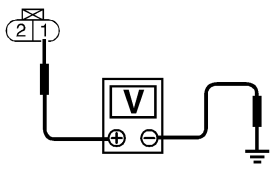
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VARIABLE INDUCTION AIR CONTROL SYSTEM (VIAS)

Diagnostic Procedure (Cont'd)

2	CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Stop engine. 2. Disconnect VIAS control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Power valve actuator VIAS control solenoid valve</p> </div> <p style="text-align: right;">SEF019Z</p> <p>3. Turn ignition switch "ON". 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="text-align: right;">Voltage: Battery voltage</p>  </div> <p style="text-align: right;">SEF603X</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M32, F23 ● 10A fuse ● Harness continuity between fuse and VIAS control solenoid valve 	
▶	Repair harness or connectors.

4	CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 16 and terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

VARIABLE INDUCTION AIR CONTROL SYSTEM (VIAS)

Diagnostic Procedure (Cont'd)

5	RETEST OVERALL FUNCTION	
1. Reconnect harness connectors disconnected. 2. Perform Test No. 1 again.		
OK or NG		
OK	▶	INSPECTION END
NG	▶	GO TO 6.

6	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
OK or NG		
OK	▶	Replace VIAS control solenoid valve as intake manifold collector assembly.
NG	▶	Repair or replace harness or connectors.

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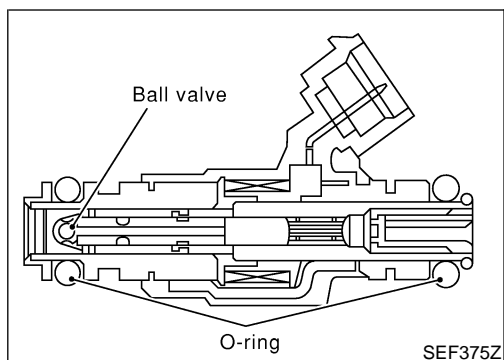
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IDX

INJECTOR

Component Description



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.

NBEC0383

CONSULT-II Reference Value in Data Monitor Mode

NBEC0384

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	2.0 - 3.2 msec
		2,000 rpm	1.4 - 2.6 msec

ECM Terminals and Reference Value

NBEC0685

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/B	Injector No. 1	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
102	L/W	Injector No. 5		
103	R/W	Injector No. 2		
104	PU/R	Injector No. 6		
105	R/Y	Injector No. 3		
107	R/L	Injector No. 4		

INJECTOR

Wiring Diagram

Wiring Diagram

NBEC0386

EC-INJECT-01

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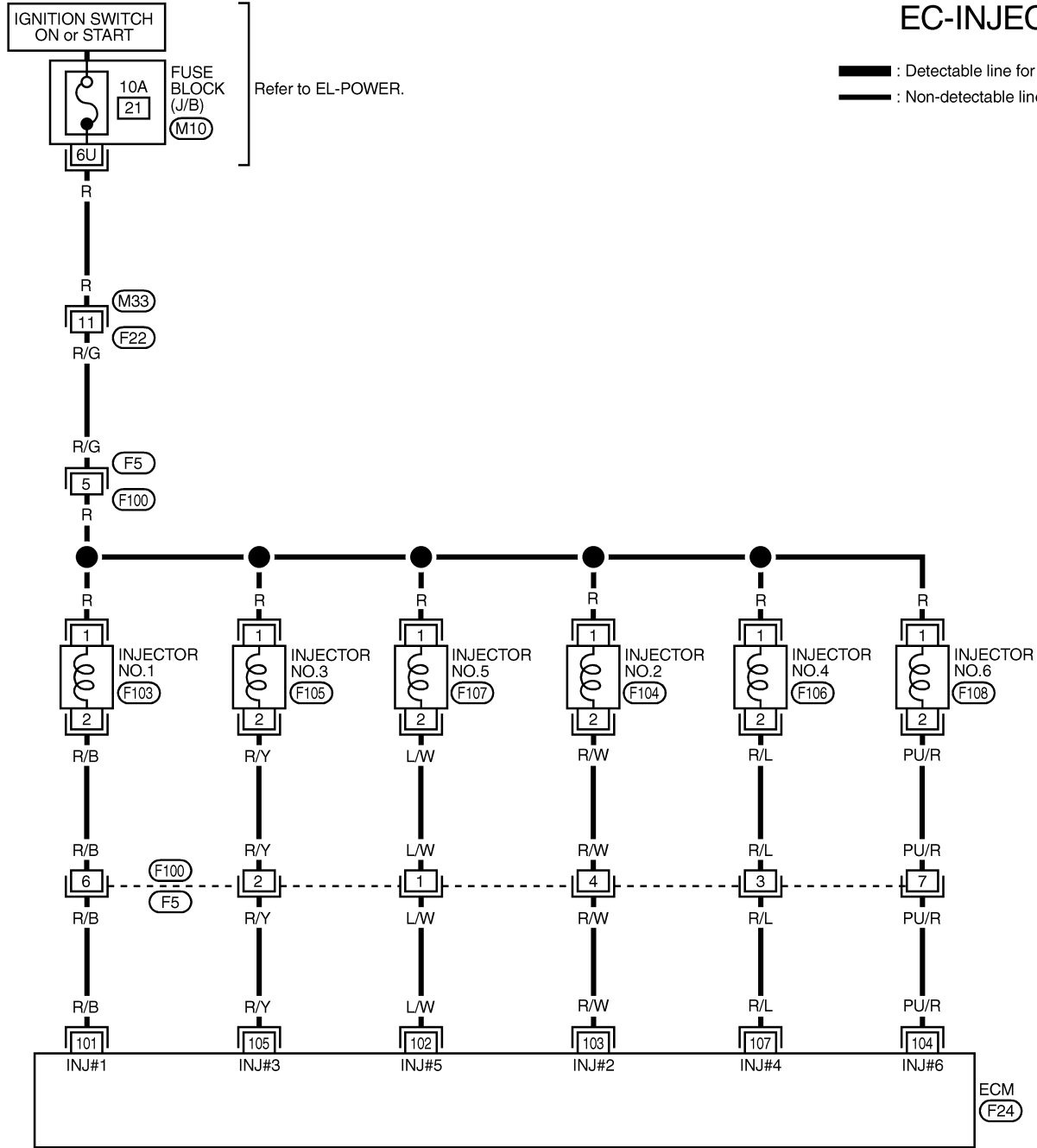
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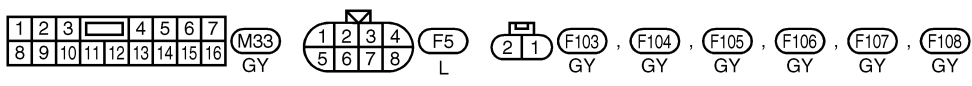
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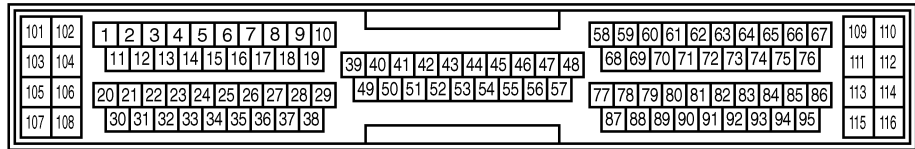
IDX



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



REFER TO THE FOLLOWING.
M10 - FUSE BLOCK-
 JUNCTION BOX (J/B)




INJECTOR


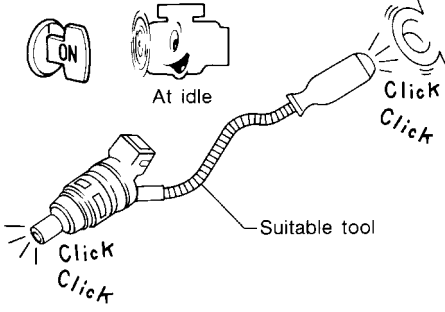
Diagnostic Procedure

NBEC0387

1	INSPECTION START	
Turn ignition switch to "START". Is any cylinder ignited?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION																	
<p> With CONSULT-II</p> <p>1. Start engine. 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.</p>																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX step				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX step																	
<p>3. Make sure that each circuit produces a momentary engine speed drop.</p>																		

SEF190Y

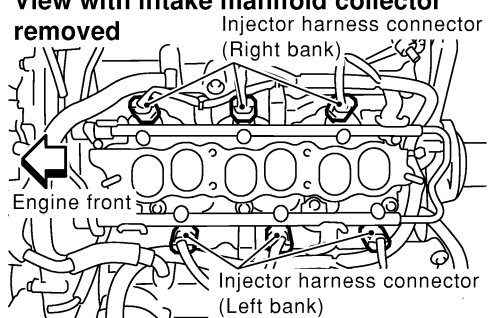
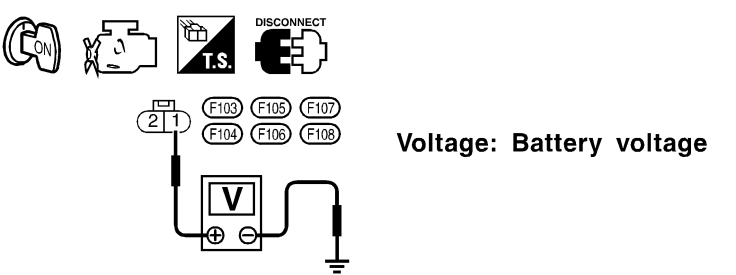
<p> Without CONSULT-II</p> <p>1. Start engine. 2. Listen to each injector operating sound.</p>		
		
<p>Clicking noise should be heard.</p>		
OK or NG		

MEC703B

OK	▶	INSPECTION END
NG	▶	GO TO 3.

INJECTOR

Diagnostic Procedure (Cont'd)

3	CHECK INJECTOR POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch "OFF".</p> <div style="text-align: center;"> <p>View with intake manifold collector removed</p>  </div> <p>2. Turn ignition switch "ON".</p> <p>3. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> </div> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>SEF023Z</p> <p>EC</p> <p>FE</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>SEF364Z</p> <p>AX</p>	
	OK	▶	GO TO 5.	
	NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M33, F22 ● Harness connectors F5, F100 ● Fuse block (J/B) connector M10 ● 10A fuse ● Harness for open or short between injector and fuse 		
		▶	Repair harness or connectors.	

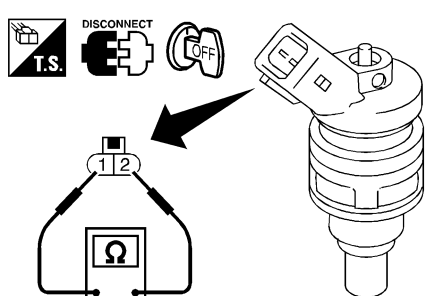
5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch "OFF".</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between injector terminal 2 and ECM terminals 103, 104, 107, 101, 105, 102. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
	OK	▶	GO TO 7.	
	NG	▶	GO TO 6.	

INJECTOR

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F100, F5 ● Harness for open or short between harness connector F5 and ECM ● Harness for open or short between harness connector F100 and injector 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK SUB-HARNESS CIRCUIT FOR OPEN AND SHORT						
<p>1. Remove intake manifold collector. 2. Disconnect injector harness connectors. 3. Check harness continuity between the following terminals. Refer to Wiring Diagram.</p>							
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">Harness connector F100</td> <td style="padding: 5px;">Injector F103, F105, F107, F104, F106, F108</td> </tr> <tr> <td style="padding: 5px; text-align: center;">5</td> <td style="padding: 5px; text-align: center;">1</td> </tr> <tr> <td style="padding: 5px; text-align: center;">6, 2, 1, 4, 3, 7</td> <td style="padding: 5px; text-align: center;">2</td> </tr> </table>		Harness connector F100	Injector F103, F105, F107, F104, F106, F108	5	1	6, 2, 1, 4, 3, 7	2
Harness connector F100	Injector F103, F105, F107, F104, F106, F108						
5	1						
6, 2, 1, 4, 3, 7	2						
MTBL0483							
Continuity should exist.							
OK or NG							
OK ▶	GO TO 8.						
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.						

8	CHECK INJECTOR
<p>1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.</p>	
 <p style="margin-left: 200px;">Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]</p>	
SEF964XC	
OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace injector.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

START SIGNAL

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NBEC0388

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NBEC0688

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/Y	Start signal	[Ignition switch "ON"]	Approximately 0V
			[Ignition switch "START"]	9 - 12V

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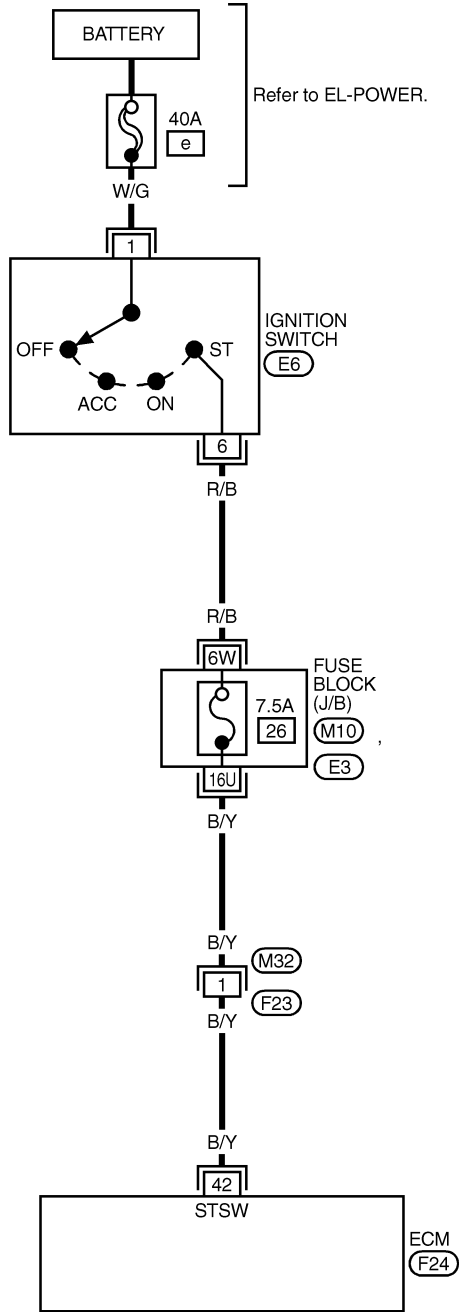
START SIGNAL



Wiring Diagram

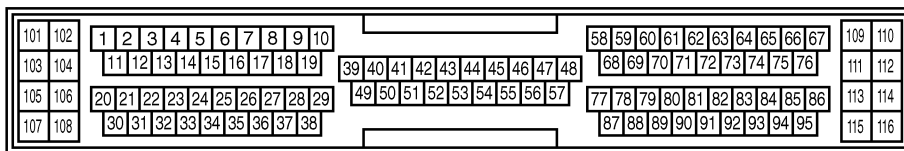
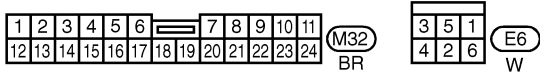
Wiring Diagram

=NBEC0390

EC-S/SIG-01



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



REFER TO THE FOLLOWING.
 (M10), (E3) - FUSE BLOCK-
 JUNCTION BOX (J/B)



MEC975C

START SIGNAL


Diagnostic Procedure

Diagnostic Procedure


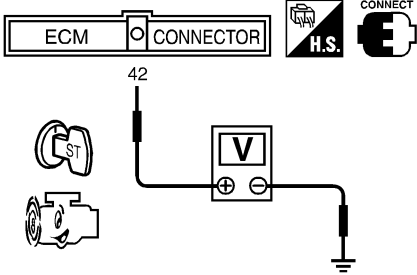
NBEC0391

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

GI
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2	CHECK OVERALL FUNCTION													
<p> With CONSULT-II</p> <p>1. Turn ignition switch "ON". 2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.</p>														
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>START SIGNAL</td> <td>OFF</td> </tr> <tr> <td>CLSD THL POS</td> <td>ON</td> </tr> <tr> <td>AIR COND SIG</td> <td>OFF</td> </tr> <tr> <td>P/N POSI SW</td> <td>ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	START SIGNAL	OFF	CLSD THL POS	ON	AIR COND SIG	OFF	P/N POSI SW	ON
DATA MONITOR														
MONITOR	NO DTC													
START SIGNAL	OFF													
CLSD THL POS	ON													
AIR COND SIG	OFF													
P/N POSI SW	ON													
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>"START SIGNAL"</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON"</td> <td>OFF</td> </tr> <tr> <td>Ignition switch "START"</td> <td>ON</td> </tr> </tbody> </table>			Condition	"START SIGNAL"	Ignition switch "ON"	OFF	Ignition switch "START"	ON						
Condition	"START SIGNAL"													
Ignition switch "ON"	OFF													
Ignition switch "START"	ON													
SEF072Y														
OK or NG														
OK	▶	INSPECTION END												
NG	▶	GO TO 4.												

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3	CHECK OVERALL FUNCTION							
<p> Without CONSULT-II</p> <p>Check voltage between ECM terminal 42 and ground under the following conditions.</p>								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "START"</td> <td>Battery voltage</td> </tr> <tr> <td>Other positions</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Ignition switch "START"	Battery voltage	Other positions	Approximately 0V
Condition	Voltage							
Ignition switch "START"	Battery voltage							
Other positions	Approximately 0V							
SEF362X								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

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4	CHECK STARTING SYSTEM	
Turn ignition switch "OFF", then turn it to "START". Does starter motor operate?		
Yes or No		
Yes	▶	GO TO 5.
No	▶	Refer to SC-10, "STARTING SYSTEM".

IDX

START SIGNAL

Diagnostic Procedure (Cont'd)

5	CHECK FUSE
1. Turn ignition switch "OFF". 2. Disconnect 7.5A fuse. 3. Check if 7.5A fuse is OK.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace 7.5A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Disconnect ignition switch harness connector. 3. Check harness continuity between ECM terminal 42 and fuse block, ignition switch and fuse block. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M32, F23● Fuse block (J/B) connectors M10, E3● Harness for open or short between ignition switch and fuse● Harness for open or short between ECM and fuse	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

FUEL PUMP

System Description

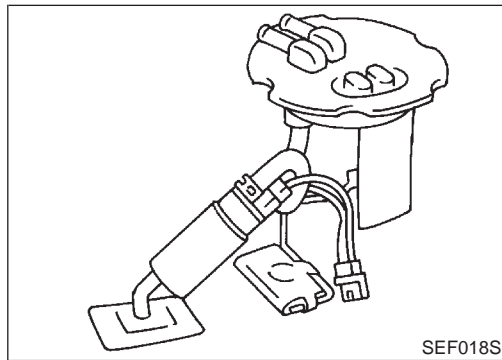
System Description

NBEC0392

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Fuel pump control	Fuel pump relay
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the crankshaft position sensor (REF), it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.



Component Description

NBEC0393

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NBEC0394

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

FUEL PUMP

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NBEC0686

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	R/L	Fuel pump relay	[Ignition switch "ON"] ● For 1 second after turning ignition switch "ON" [Engine is running]	0 - 1.5V
			[Ignition switch "ON"] ● 1 second passed after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

FUEL PUMP

Wiring Diagram

Wiring Diagram

NBEC0396

EC-F/PUMP-01

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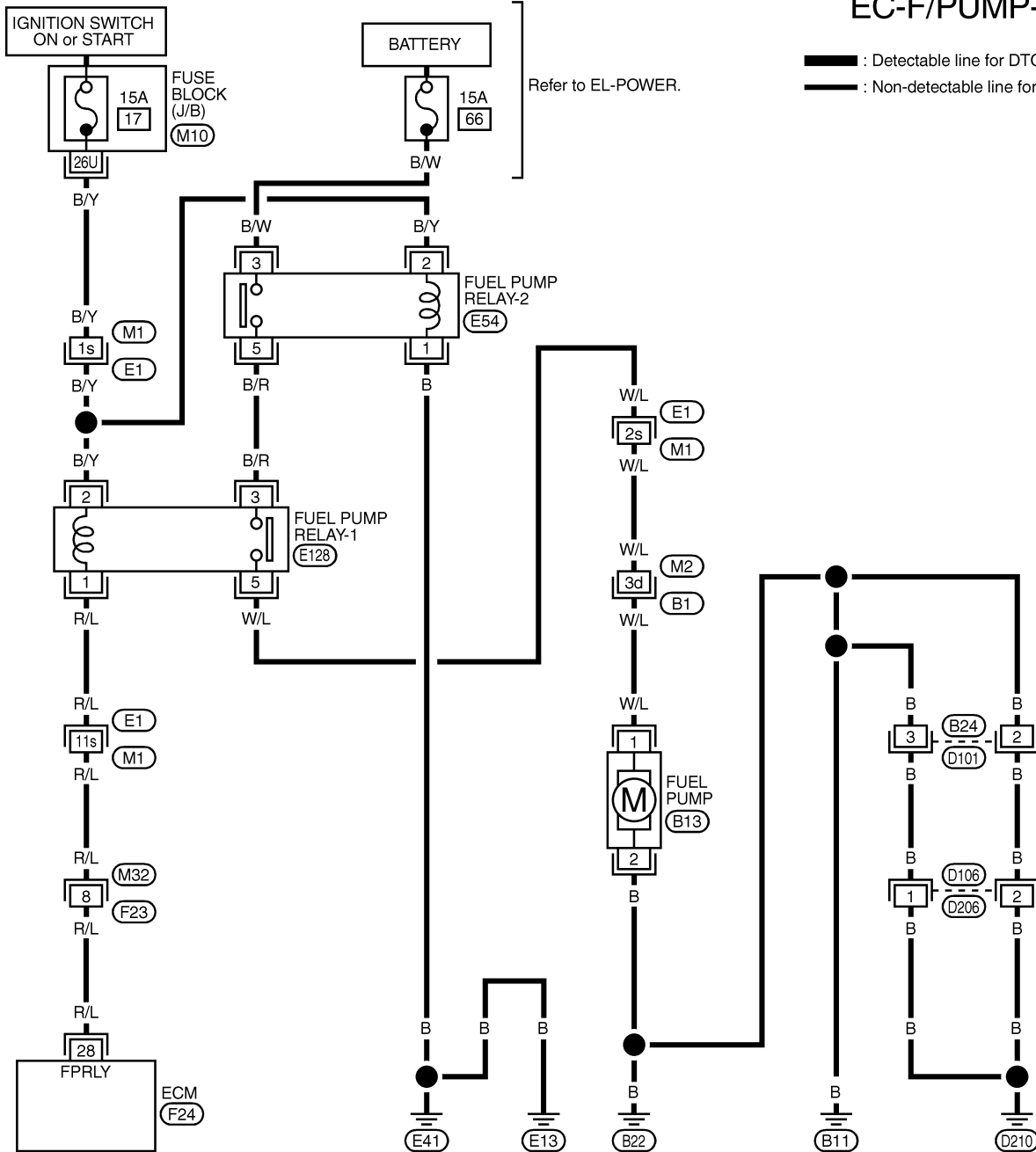
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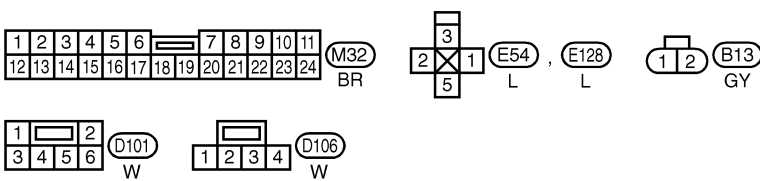
EL

IDX



Refer to EL-POWER.

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



REFER TO THE FOLLOWING.

(E1), (B1) -SUPER
MULTIPLE JUNCTION (SMJ)
(M10) -FUSE BLOCK-
JUNCTION BOX (J/B)

101	102	1	2	3	4	5	6	7	8	9	10	58	59	60	61	62	63	64	65	66	67	109	110									
103	104	11	12	13	14	15	16	17	18	19	39	40	41	42	43	44	45	46	47	48	68	69	70	71	72	73	74	75	76	111	112	
105	106	20	21	22	23	24	25	26	27	28	29	49	50	51	52	53	54	55	56	57	77	78	79	80	81	82	83	84	85	86	113	114
107	108	30	31	32	33	34	35	36	37	38																					115	116

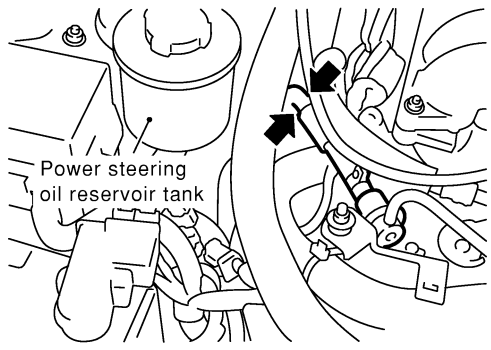


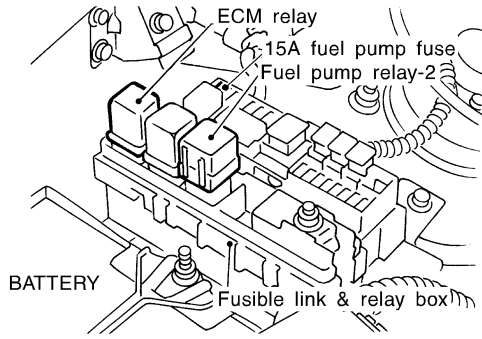
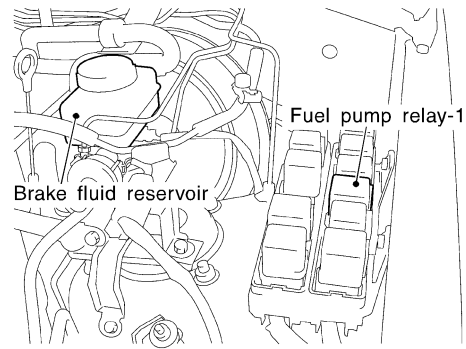
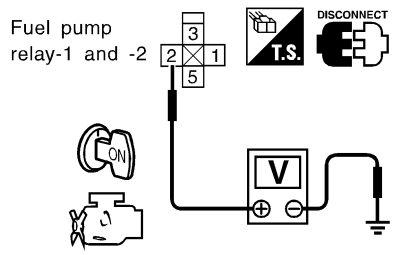
MEC976C

FUEL PUMP

Diagnostic Procedure

NBEC0397

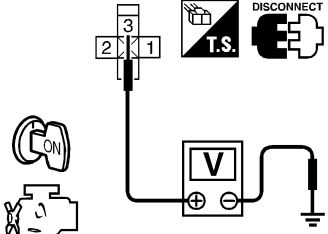
1	CHECK OVERALL FUNCTION	<p>1. Turn ignition switch "ON". 2. Pinch fuel feed hose with two fingers.</p>  <p style="text-align: right;">SEF025Z</p> <p style="text-align: center;">Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned "ON".</p> <p style="text-align: center;">OK or NG</p>
OK	▶	INSPECTION END
NG	▶	GO TO 2.

2	CHECK FUEL PUMP RELAY-1 and -2 POWER SUPPLY CIRCUIT-I	<p>1. Turn ignition switch "OFF". 2. Disconnect fuel pump relay-1 and -2.</p>   <p style="text-align: right;">SEF346Z</p> <p>3. Turn ignition switch "ON". 4. Check voltage between terminals 2 and ground with CONSULT-II or tester.</p>  <p style="text-align: right;">Voltage: Battery voltage</p> <p style="text-align: right;">SEF347Z</p> <p style="text-align: center;">OK or NG</p>
OK	▶	GO TO 4.
NG	▶	GO TO 3.

FUEL PUMP

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector M10 ● 15A fuse in fuse block (J/B) ● Harness connectors M1, E1 ● Harness for open or short between fuse and fuel pump relay-1 and fuel pump relay-2 	
▶	Repair harness or connectors.

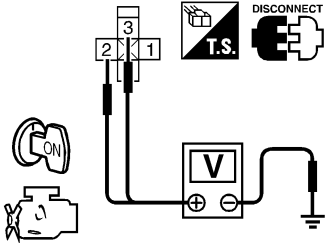
4	CHECK FUEL PUMP RELAY-1 POWER SUPPLY CIRCUIT-II
<p>Check voltage between terminal 3 and ground with CONSULT-II or tester.</p>	
 <p style="text-align: right; margin-right: 100px;">Voltage: Battery voltage</p>	
SEF348Z	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 5.

5	CHECK FUEL PUMP RELAY-2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Disconnect fuel pump relay-2. 2. Check harness continuity between fuel pump relay-2 terminal 5 and fuel pump relay-1 terminal 3. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. 	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

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FUEL PUMP

Diagnostic Procedure (Cont'd)

6	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT-III	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect fuel pump relay-2. 3. Turn ignition switch "ON". 4. Check voltage between terminals 2, 3 and ground with CONSULT-II or tester. 		
 <p style="text-align: right;">Voltage: Battery voltage</p>		
SEF026Z		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● 15A fuse in fusible link and relay box ● Harness for open or short between fuse and fuel pump relay-2 		
▶ Repair harness or connectors.		

8	CHECK FUEL PUMP RELAY-2 GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Check harness continuity between fuel pump relay-2 terminal 1 and ground. Continuity should exist. 2. Also check harness for short to power. 		
OK or NG		
▶ Repair open circuit or short to power in harness or connector.		

FUEL PUMP

Diagnostic Procedure (Cont'd)

9	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> Turn ignition switch "OFF". Disconnect fuel level sensor unit and fuel pump harness connector. 		
<ol style="list-style-type: none"> Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay-1 terminal 5. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

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10	DETECT MALFUNCTIONING PART	
Check harness for open or short between fuel pump relay and fuel pump.		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

PD

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11	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> Disconnect ECM harness connector. Check harness continuity between ECM terminal 28 and fuel pump relay-1 terminal 1. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 13.
NG	▶	GO TO 12.

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12	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> Harness connectors E1, M1 Harness connectors M32, F23 Harness for open or short between ECM and fuel pump relay-1 		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

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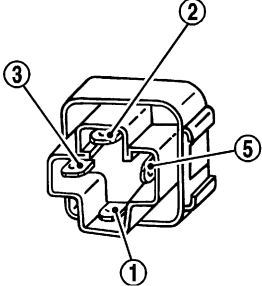
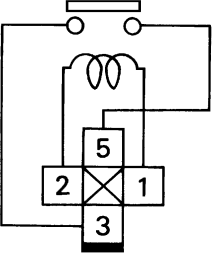
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FUEL PUMP

Diagnostic Procedure (Cont'd)

13	CHECK FUEL PUMP RELAY-1 AND -2								
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect fuel pump relay-1 and -2, fuel level sensor unit and fuel pump harness connector and ECM harness connector. 2. Turn ignition switch "ON". 3. Turn fuel pump relay-1, -2 "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound. 									
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>FUEL PUMP RELAY</td><td>ON</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> </table>		ACTIVE TEST		FUEL PUMP RELAY	ON	MONITOR		ENG SPEED	XXX rpm
ACTIVE TEST									
FUEL PUMP RELAY	ON								
MONITOR									
ENG SPEED	XXX rpm								
SEF073Y									

 **Without CONSULT-II**
 Check continuity between terminals 3 and 5 under the following conditions.

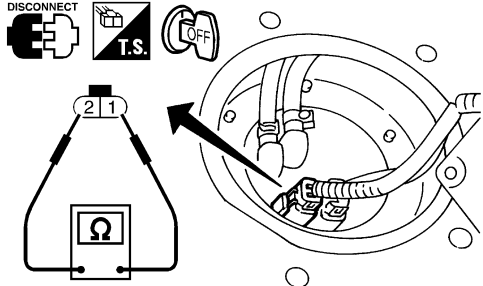



Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace fuel pump relay.

SEF608X

14	CHECK FUEL PUMP	
<ol style="list-style-type: none"> 1. Disconnect fuel level sensor unit and fuel pump harness connector. 2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2. 		
 <p style="margin-left: 200px;">Resistance: 0.2 - 5.0 Ω [at 25°C (77°F)]</p>		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Replace fuel pump.

SEF027Z

FUEL PUMP

Diagnostic Procedure (Cont'd)

15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

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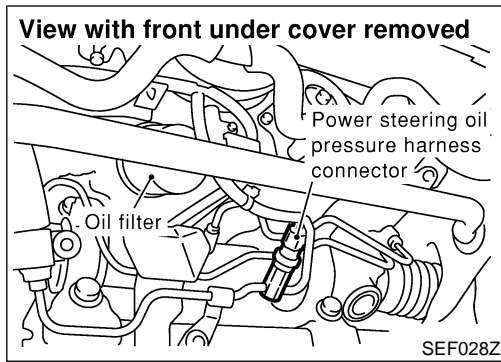
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POWER STEERING OIL PRESSURE SWITCH

Component Description



Component Description

NBEC0398

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NBEC0399

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 fully turned.	ON

ECM Terminals and Reference Value

NBEC0687

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R/B	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> Steering wheel is being turned. 	0 - 1.0V
			[Engine is running] <ul style="list-style-type: none"> Steering wheel is not being turned. 	Approximately 5V


POWER STEERING OIL PRESSURE SWITCH


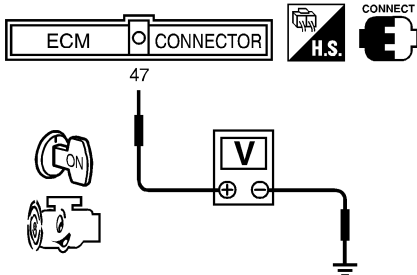
Diagnostic Procedure

Diagnostic Procedure

NBEC0402

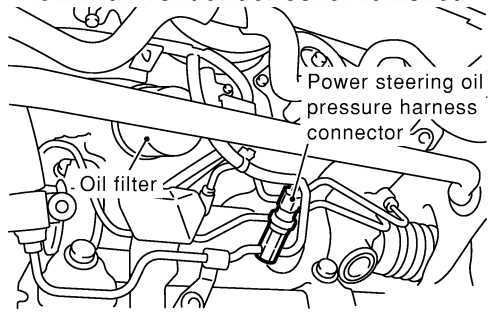
1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION											
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.</p>												
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>PW/ST SIGNAL</td> <td>OFF</td> </tr> </tbody> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Steering is in neutral position</td> <td>OFF</td> </tr> <tr> <td>Steering is turned</td> <td>ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	PW/ST SIGNAL	OFF	Steering is in neutral position	OFF	Steering is turned	ON
DATA MONITOR												
MONITOR	NO DTC											
PW/ST SIGNAL	OFF											
Steering is in neutral position	OFF											
Steering is turned	ON											
SEF228Y												
OK or NG												
OK	▶	INSPECTION END										
NG	▶	GO TO 4.										

3	CHECK OVERALL FUNCTION							
<p> Without CONSULT-II</p> <p>1. Start engine.</p> <p>2. Check voltage between ECM terminal 47 and ground under the following conditions.</p>								
 <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Conditions</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Steering is neutral position.</td> <td>Approximately 5V</td> </tr> <tr> <td>Steering is turned to full position.</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Conditions	Voltage	Steering is neutral position.	Approximately 5V	Steering is turned to full position.	Approximately 0V
Conditions	Voltage							
Steering is neutral position.	Approximately 5V							
Steering is turned to full position.	Approximately 0V							
SEF363X								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

POWER STEERING OIL PRESSURE SWITCH

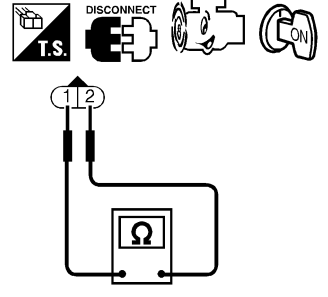
Diagnostic Procedure (Cont'd)

4	CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT						
<p>1. Turn ignition switch "OFF". 2. Disconnect power steering oil pressure switch harness connector.</p> <p style="text-align: center;">View with front under cover removed</p>  <p style="text-align: right;">SEF028Z</p> <p>3. Check harness continuity between power steering oil pressure switch terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	Repair open circuit or short to power in harness or connectors.
OK	▶	GO TO 5.					
NG	▶	Repair open circuit or short to power in harness or connectors.					

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TF

5	CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 47 and power steering oil pressure switch terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 6.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 6.					
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.					

PD
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6	CHECK POWER STEERING OIL PRESSURE SWITCH												
<p>1. Disconnect power steering oil pressure switch harness connector then start engine. 2. Check continuity between power steering oil pressure switch terminals 1 and 2 under the following conditions.</p> <div style="display: flex; align-items: flex-start;">  <table border="1" style="margin-left: 20px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Conditions</th> <th style="text-align: center;">Continuity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Steering wheel is being fully turned.</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">Steering wheel is not being turned.</td> <td style="text-align: center;">No</td> </tr> </tbody> </table> </div> <p style="text-align: right;">SEF364X</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace power steering oil pressure switch.</td> </tr> </table>		Conditions	Continuity	Steering wheel is being fully turned.	Yes	Steering wheel is not being turned.	No	OK	▶	GO TO 7.	NG	▶	Replace power steering oil pressure switch.
Conditions	Continuity												
Steering wheel is being fully turned.	Yes												
Steering wheel is not being turned.	No												
OK	▶	GO TO 7.											
NG	▶	Replace power steering oil pressure switch.											

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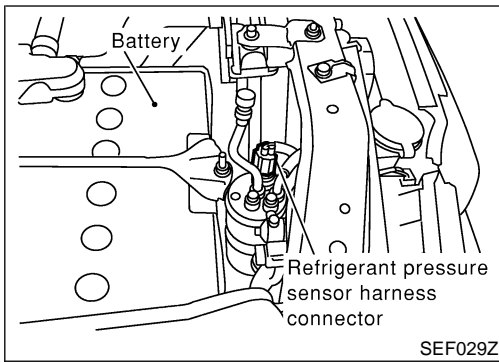
POWER STEERING OIL PRESSURE SWITCH

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
▶	INSPECTION END

REFRIGERANT PRESSURE SENSOR

Description

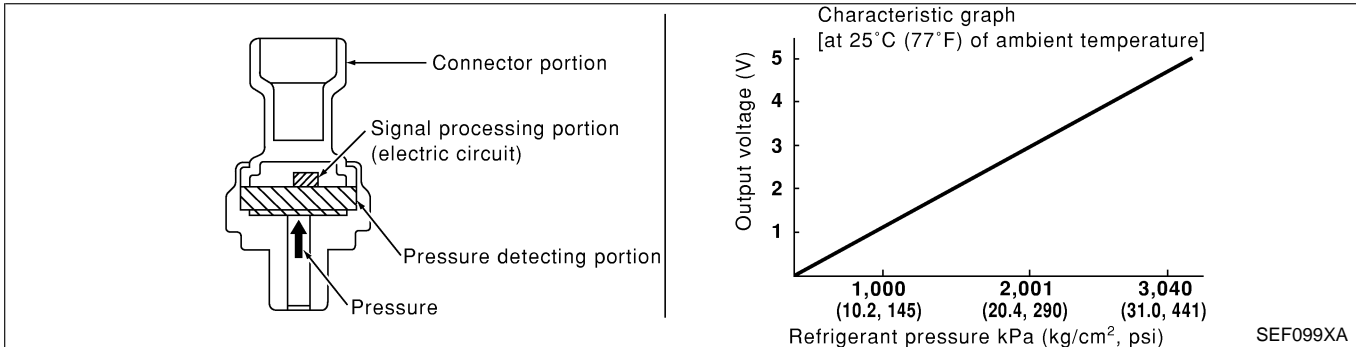


Description

NBEC0636

The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

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ECM Terminals and Reference Value

NBEC0689

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

CAUTION:

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

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TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B/P	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
81	W/PU	Refrigerant pressure sensor	[Engine is running] ● Warm-up condition ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 4.0V
111	P/B	Sensors' power supply	[Ignition switch "ON"]	Approximately 5V

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REFRIGERANT PRESSURE SENSOR

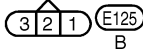
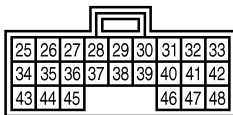
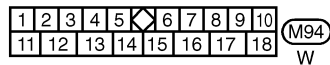
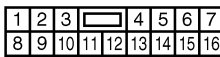
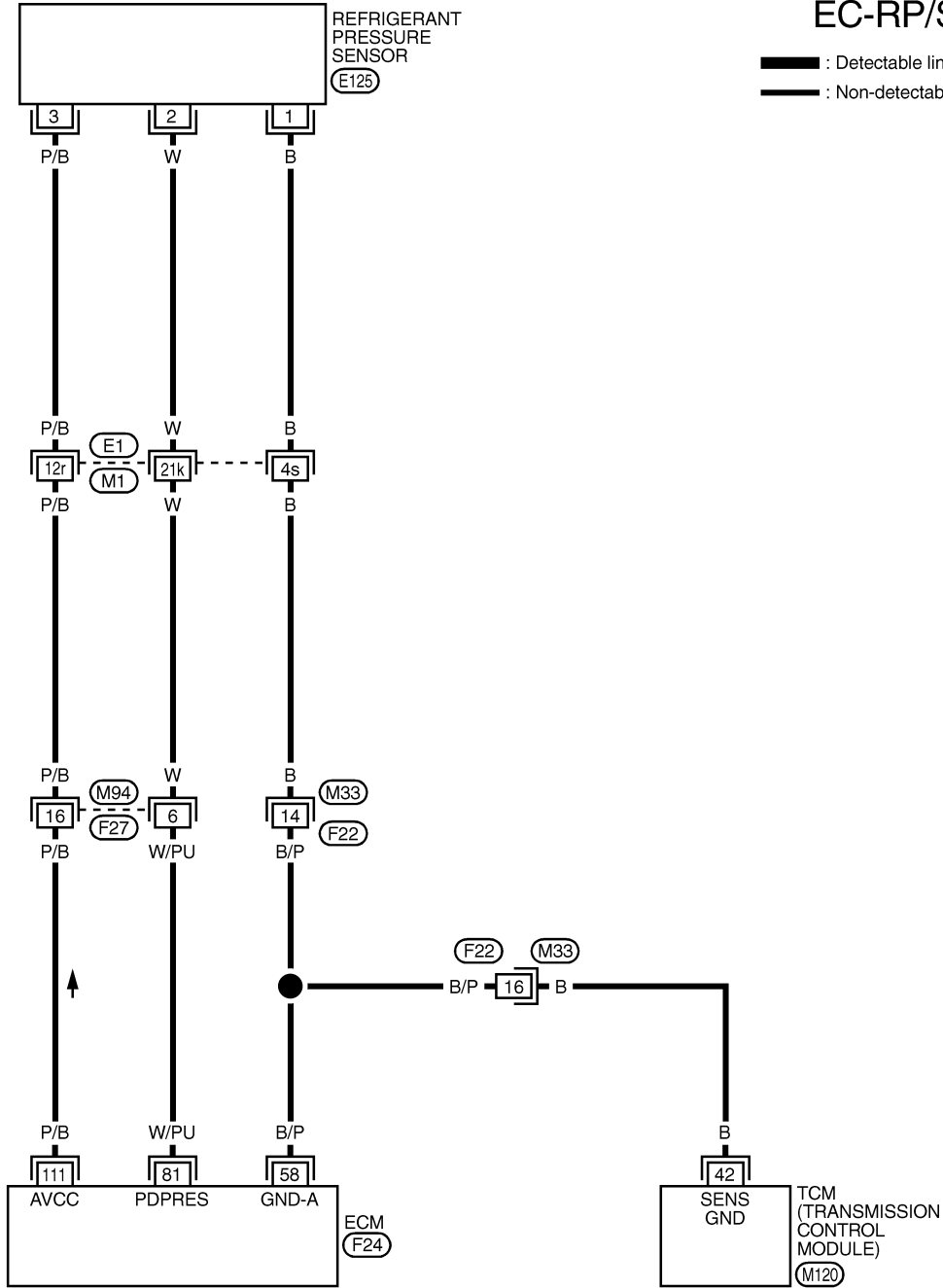
Wiring Diagram

Wiring Diagram

NBEC0637

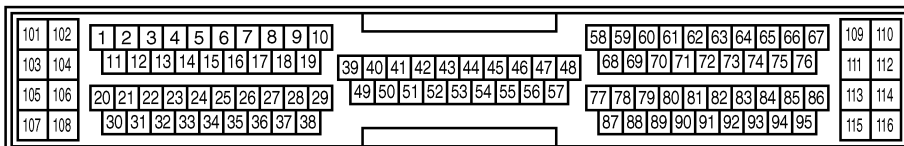
EC-RP/SEN-01

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



REFER TO THE FOLLOWING.

(E1) - SUPER
 MULTIPLE JUNCTION (SMJ)



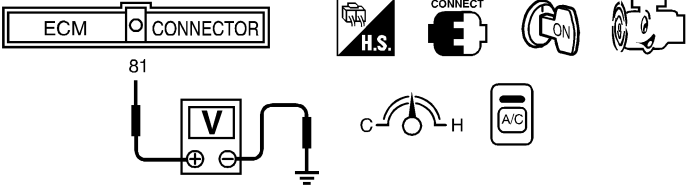
MEC982C

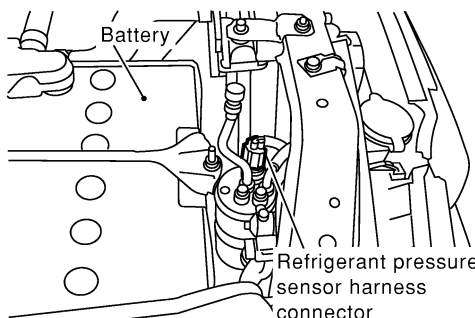
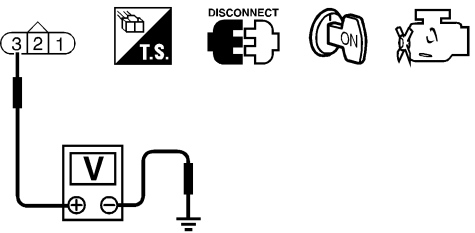
REFRIGERANT PRESSURE SENSOR

Diagnostic Procedure

Diagnostic Procedure

NBEC0638

1	CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION		GI
<p>1. Start engine and warm it up to normal operating temperature. 2. Turn A/C switch and blower switch "ON". 3. Check voltage between ECM terminal 81 and ground with CONSULT-II or tester.</p>			
			
			Voltage: 1 - 4V
SEF617XA			
OK or NG			
OK	▶	INSPECTION END	AT
NG	▶	GO TO 2.	TF

2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT		PD
<p>1. Turn A/C switch and blower switch "OFF". 2. Stop engine. 3. Disconnect refrigerant pressure sensor harness connector.</p>			
			
			SEF029Z
<p>4. Turn ignition switch "ON". 5. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester.</p>			
			
			Voltage: Approximately 5V
SEF030Z			
OK or NG			
OK	▶	GO TO 4.	BR
NG	▶	GO TO 3.	ST

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REFRIGERANT PRESSURE SENSOR

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E1, M1● Harness for open or short between ECM and refrigerant pressure sensor	
	▶ Repair harness or connectors.

4	CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Check harness continuity between refrigerant pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E1, M1 and M33, F22● Harness connectors F23, M32● Harness for open between ECM and refrigerant pressure sensor● Harness for open between TCM (Transmission control module) and refrigerant pressure sensor	
	▶ Repair open circuit or short to power in harness or connectors.

6	CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 81 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors E1, M1 and M94, F27● Harness for open or short between ECM and refrigerant pressure sensor	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK REFRIGERANT PRESSURE SENSOR
Refer to HA-14, "Refrigerant pressure sensor".	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Replace refrigerant pressure sensor.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.	
	▶ INSPECTION END

ELECTRICAL LOAD SIGNAL

ECM Terminals and Reference Value

ECM Terminals and Reference Value

NBEC0690

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	PU	Electrical load signal	[Engine is running] <ul style="list-style-type: none"> ● Rear window defogger: ON ● Hi-beam headlamp: ON 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Electrical load: OFF 	0V

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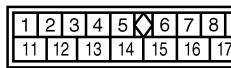
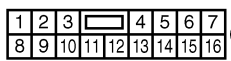
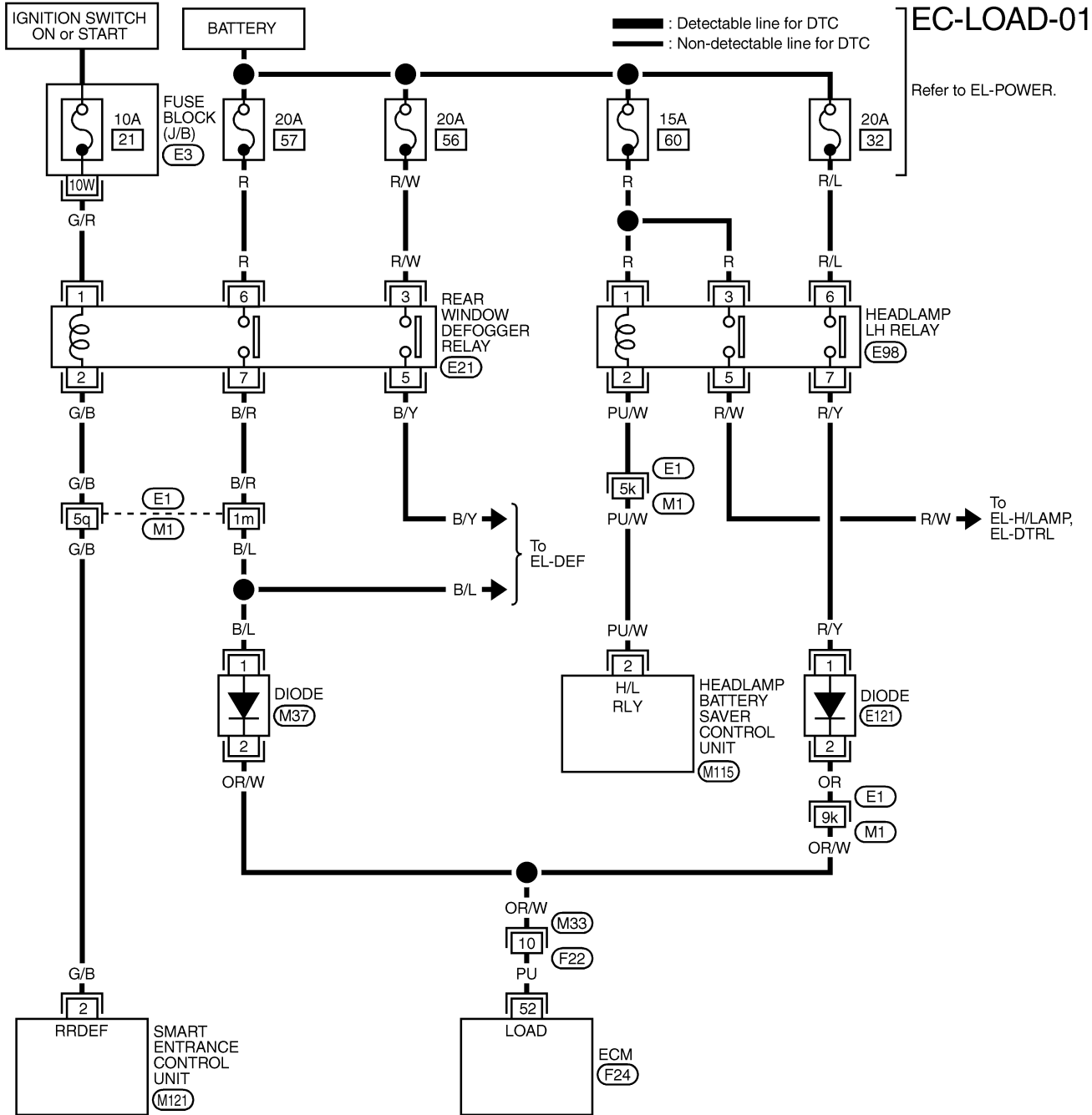
IDX

ELECTRICAL LOAD SIGNAL

Wiring Diagram

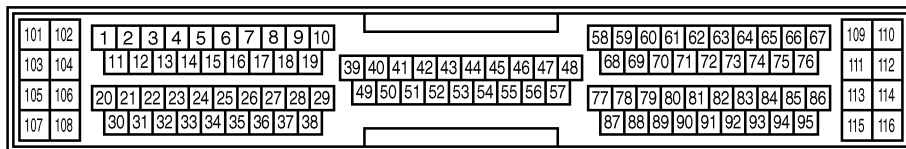
Wiring Diagram

NBEC0604



REFER TO THE FOLLOWING.

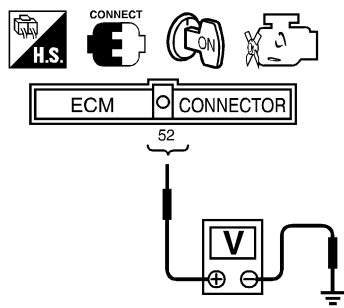
- (E1) - SUPER
- MULTIPLE JUNCTION (SMJ)
- (E3) - FUSE BLOCK- JUNCTION BOX (J/B)



MEC421D

Diagnostic Procedure

NBEC0605

1	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I							
<p>1. Turn ignition switch "ON". 2. Check voltage between ECM terminal 52 and ground under the following conditions.</p>								
								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 60%;">Condition</th> <th style="width: 40%;">Voltage</th> </tr> </thead> <tbody> <tr> <td>Rear window defogger switch "ON"</td> <td>BATTERY VOLTAGE</td> </tr> <tr> <td>Rear window defogger switch "OFF"</td> <td>0V</td> </tr> </tbody> </table>			Condition	Voltage	Rear window defogger switch "ON"	BATTERY VOLTAGE	Rear window defogger switch "OFF"	0V
Condition	Voltage							
Rear window defogger switch "ON"	BATTERY VOLTAGE							
Rear window defogger switch "OFF"	0V							
SEF610X								
OK or NG								
OK	▶	GO TO 2.						
NG	▶	GO TO 3.						

GI

MA

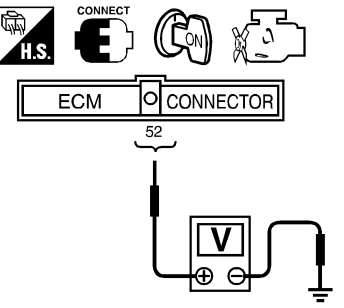
EM

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2	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II							
<p>Check voltage between ECM terminal 52 and ground under the following conditions.</p>								
								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 60%;">Condition</th> <th style="width: 40%;">Voltage</th> </tr> </thead> <tbody> <tr> <td>Lighting switch "ON" at 1st position</td> <td>BATTERY VOLTAGE</td> </tr> <tr> <td>Lighting switch "OFF"</td> <td>0V</td> </tr> </tbody> </table>			Condition	Voltage	Lighting switch "ON" at 1st position	BATTERY VOLTAGE	Lighting switch "OFF"	0V
Condition	Voltage							
Lighting switch "ON" at 1st position	BATTERY VOLTAGE							
Lighting switch "OFF"	0V							
SEF611X								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 7.						

TF

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3	CHECK REAR WINDOW DEFOGGER FUNCTION	
<p>1. Start engine. 2. Turn "ON" the rear window defogger switch. 3. Check the rear windshield. Is the rear windshield heated up?</p>		
Yes or No		
Yes	▶	GO TO 4.
No	▶	Refer to EL-151, "Rear Window Defogger".

BT

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ELECTRICAL LOAD SIGNAL

Diagnostic Procedure (Cont'd)

4	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT							
<ol style="list-style-type: none"> 1. Stop engine. 2. Disconnect ECM harness connector. 3. Disconnect rear window defogger relay. 4. Check harness continuity between ECM terminal 52 and rear window defogger relay terminals 7. 								
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>CONDITION 1</p> </div> <div style="text-align: center;"> <p>CONDITION 2</p> </div> </div>								
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 20%;">CONDITION</th> <th style="width: 80%;">CONTINUITY</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Should exist.</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Should not exist.</td> </tr> </tbody> </table>	CONDITION	CONTINUITY	1	Should exist.	2	Should not exist.
CONDITION	CONTINUITY							
1	Should exist.							
2	Should not exist.							
<p>5. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>								
OK	▶	GO TO 6.						
NG	▶	GO TO 5.						

SEF031Z

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Diode M37 ● Harness for open and short between ECM and rear window defogger relay 		
		▶ Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.		
		▶ INSPECTION END

7	CHECK HEADLAMP FUNCTION	
<ol style="list-style-type: none"> 1. Start engine. 2. Turn the lighting switch "ON" at 1st position with high beam. 3. Check that headlamps are illuminated. 		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Refer to EL-60, "HEADLAMP (FOR USA)" or EL-123, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM".

ELECTRICAL LOAD SIGNAL

Diagnostic Procedure (Cont'd)

8	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT						
<p>1. Stop engine. 2. Disconnect ECM harness connector. 3. Disconnect headlamp LH relay. 4. Check harness continuity between ECM terminal 52 and headlamp LH relay terminal 7 under the following conditions.</p>							
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>CONDITION 1</p> </div> <div style="text-align: center;"> <p>CONDITION 2</p> </div> </div>							
<table border="1" style="border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">CONDITION</th> <th>CONTINUITY</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Should exist.</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Should not exist.</td> </tr> </tbody> </table>		CONDITION	CONTINUITY	1	Should exist.	2	Should not exist.
CONDITION	CONTINUITY						
1	Should exist.						
2	Should not exist.						
<p>5. Also check harness for short to ground and short to power.</p> <p style="text-align: right;">SEF031Z</p>							
OK or NG							
OK	▶	GO TO 10.					
NG	▶	GO TO 9.					

9	DETECT MALFUNCTIONING PART			
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Diode E121 ● Harness for open and short between ECM and headlamp LH relay or daytime light control unit 				
<table border="1" style="border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>			▶	Repair open circuit or short to ground or short to power in harness or connectors.
	▶	Repair open circuit or short to ground or short to power in harness or connectors.		

10	CHECK INTERMITTENT INCIDENT			
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-140.</p>				
<table border="1" style="border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="text-align: center;">▶</td> <td>INSPECTION END</td> </tr> </table>			▶	INSPECTION END
	▶	INSPECTION END		

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MIL & DATA LINK CONNECTORS

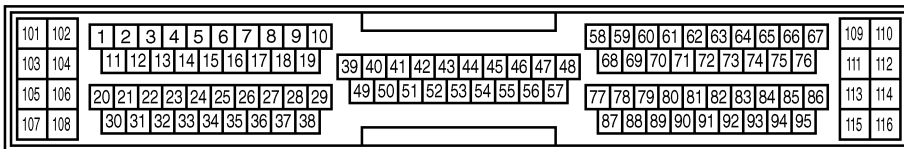
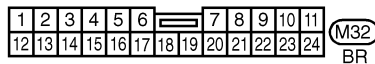
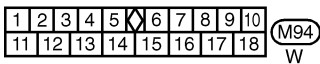
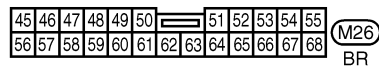
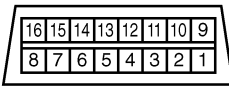
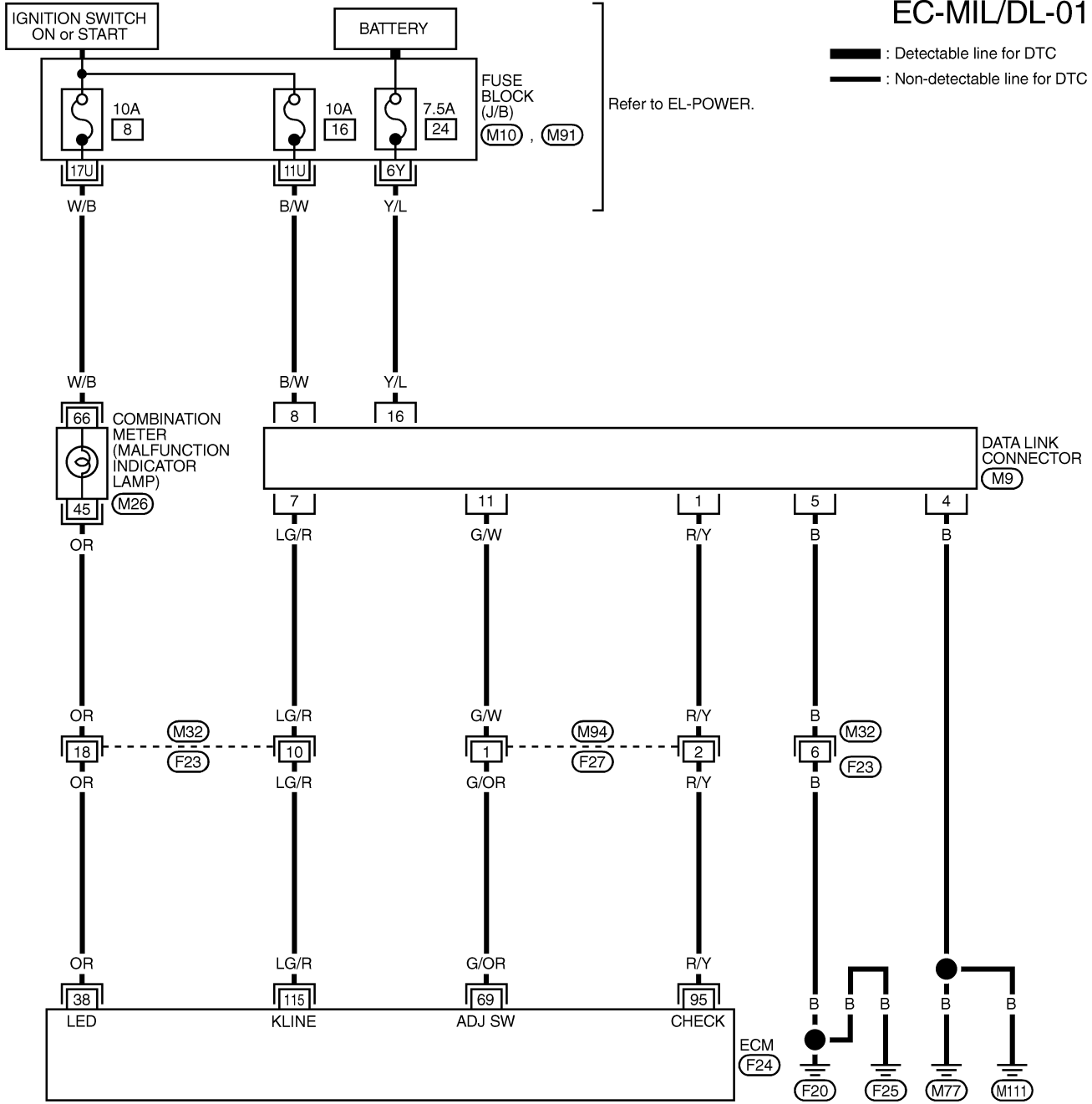
Wiring Diagram

Wiring Diagram

NBEC0407

EC-MIL/DL-01

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



REFER TO THE FOLLOWING.
 (M10), (M91) - FUSE BLOCK-JUNCTION BOX (J/B)



MEC978C

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure Regulator

Fuel Pressure Regulator

NBEC0408

Fuel pressure at idling kPa (kg/cm ² , psi)	
Vacuum hose is connected.	Approximately 235 (2.4, 34)
Vacuum hose is disconnected.	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NBEC0409

Target idle speed*1	No-load*2 (in "P" or N" position)	750±50 rpm
Air conditioner: ON	In "P" or N" position	825 rpm or more
Ignition timing*1	In "P" or N" position	15°±5° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector connected

*2: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

NBEC0411

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.2 - 1.8 ^o V
Mass air flow (Using CONSULT-II or GST)	2.0 - 6.0 g-m/sec at idle* 7.0 - 20.0 g-m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NBEC0412

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

Heated Oxygen Sensor 1 Heater (Front)

NBEC0414

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
-----------------------------	------------

Fuel Pump

NBEC0415

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω
-----------------------------	------------

IACV-AAC Valve

NBEC0416

Resistance [at 20°C (68°F)]	Approximately 20 - 24Ω
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Injector

NBEC0417

Resistance [at 20°C (68°F)]	13.5 - 17.5Ω
-----------------------------	--------------

Resistor

NBEC0418

Resistance [at 25°C (77°F)]	Approximately 2.2 kΩ
-----------------------------	----------------------

SERVICE DATA AND SPECIFICATIONS (SDS)

Throttle Position Sensor

Throttle Position Sensor

NBEC0419

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON, throttle opener disengaged)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Calculated Load Value

NBEC0420

	Calculated load value % (Using CONSULT-II or GST)
At idle	14.0 - 33.0
At 2,500 rpm	12.0 - 25.0

Intake Air Temperature Sensor

NBEC0421

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

Heated Oxygen Sensor 2 Heater (Rear)

NBEC0422

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
-----------------------------	------------

Crankshaft Position Sensor (REF)

NBEC0423

Resistance [at 20°C (68°F)]	470 - 570Ω
-----------------------------	------------

Fuel Tank Temperature Sensor

NBEC0424

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

Camshaft Position Sensor (PHASE)

NBEC0639

Resistance [at 20°C (68°F)]	HITACHI make	1,440 - 1,760Ω
	MITSUBISHI make	2,090 - 2,550Ω