

ENGINE CONTROL SYSTEM

SECTION **EC**

GI
MA
EM
LC
EC

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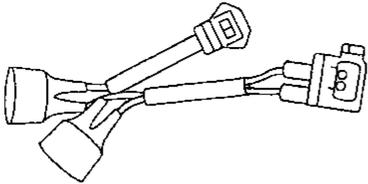
When you read wiring diagrams:

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

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

PRECAUTIONS AND PREPARATION

Special Service Tool

Tool number (Kent-Moore No.) Tool name	Description
EG11140000 (J36777-6) Adapter harness	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">NT338</div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 20%;">Measuring engine speed</div> </div>

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

The Supplemental Restraint System “Air Bag” and “Seat Belt Pre-tensioner”, used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, sensors, a diagnosis unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, 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.
- All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS “Air Bag”.

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

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

CAUTION:

- Be sure to turn the ignition switch “OFF” and disconnect the negative battery terminal before the repair/inspection work. The open/short circuit of the related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after the work. The loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure to connect the connector without any water, grease, dirt, bent terminals, etc. in it.)
- Be sure to route and clamp the harnesses properly after the work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after the work. The misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or the fuel injection system, etc.
- Be sure to erase the unnecessary (already fixed) malfunction information in the ECM or A/T control unit before returning the vehicle to the customer.

Engine Fuel & Emission Control System

BATTERY

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

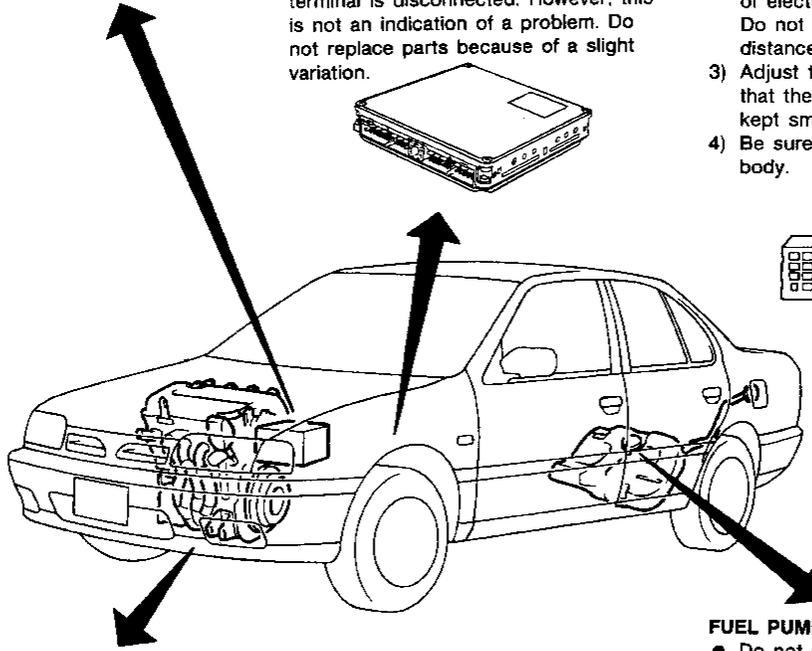
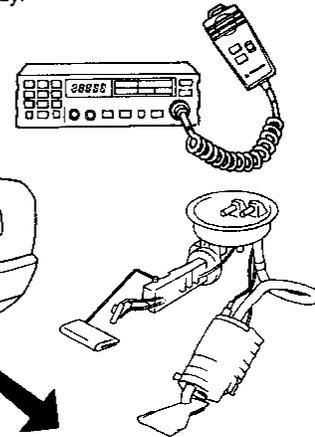
ECM

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



WIRELESS EQUIPMENT

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far as possible away from the ECM.
 - 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.



FUEL PUMP

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

ECCS 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.



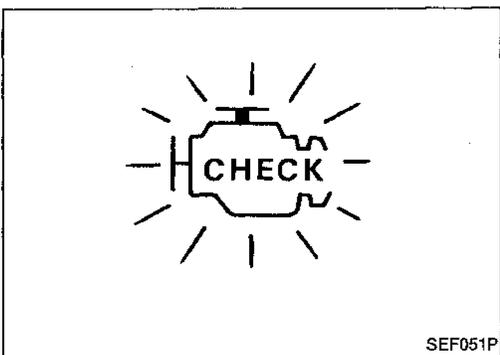
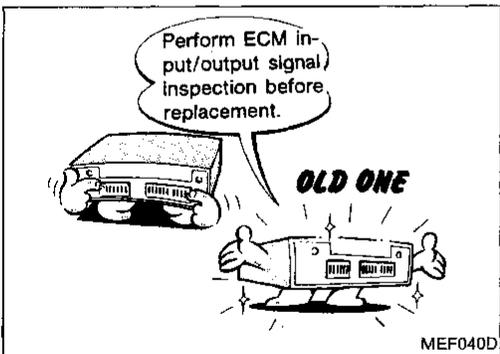
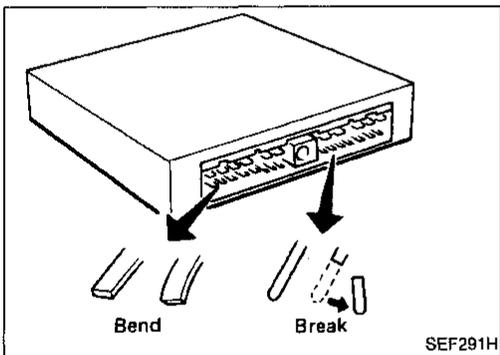
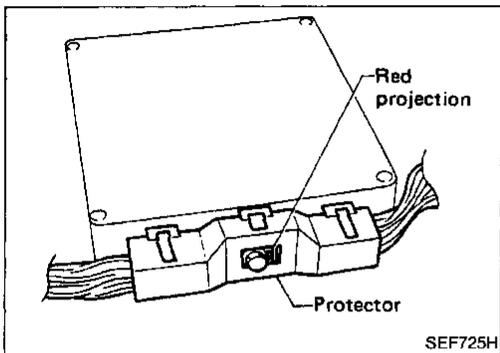
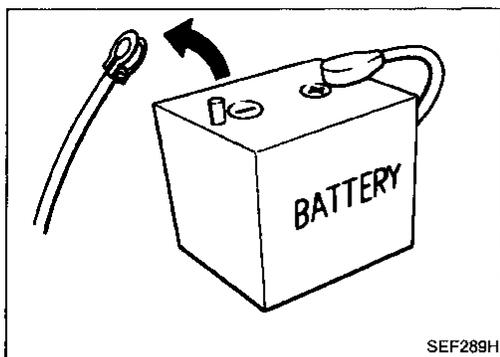
WHEN STARTING

- 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.

ECCS HARNESS HANDLING

- Securely connect ECCS 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 ECCS harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECCS system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECCS parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

PRECAUTIONS AND PREPARATION



Precautions

1. 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.
2. When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.
3. When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
4. Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
5. Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EC-81.)
6. After performing each TROUBLE DIAGNOSIS, perform "OVERALL FUNCTION CHECK" or "DTC (Diagnostic Trouble Code) DETECTING CONDITION". The DTC should not be displayed in the "DTC DETECTING CONDITION" if the repair is completed. The "OVERALL FUNCTION CHECK" should be a good result if the repair is completed.

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3. When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

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4. Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

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5. Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EC-81.)

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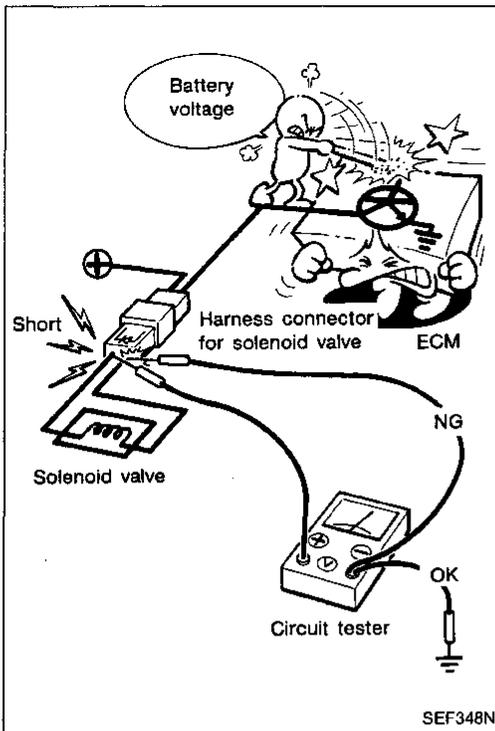
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PRECAUTIONS AND PREPARATION

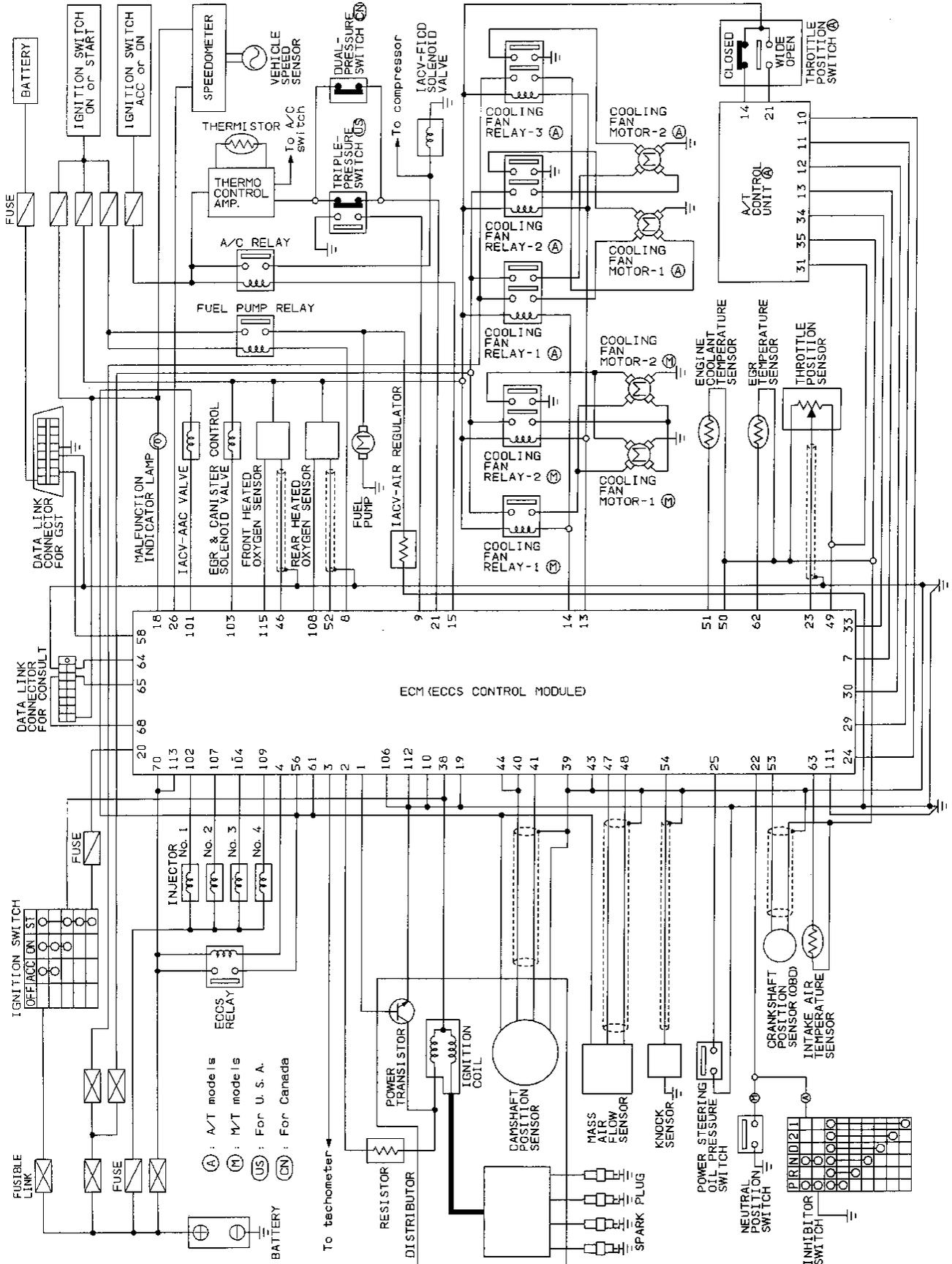
Precautions (Cont'd)

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



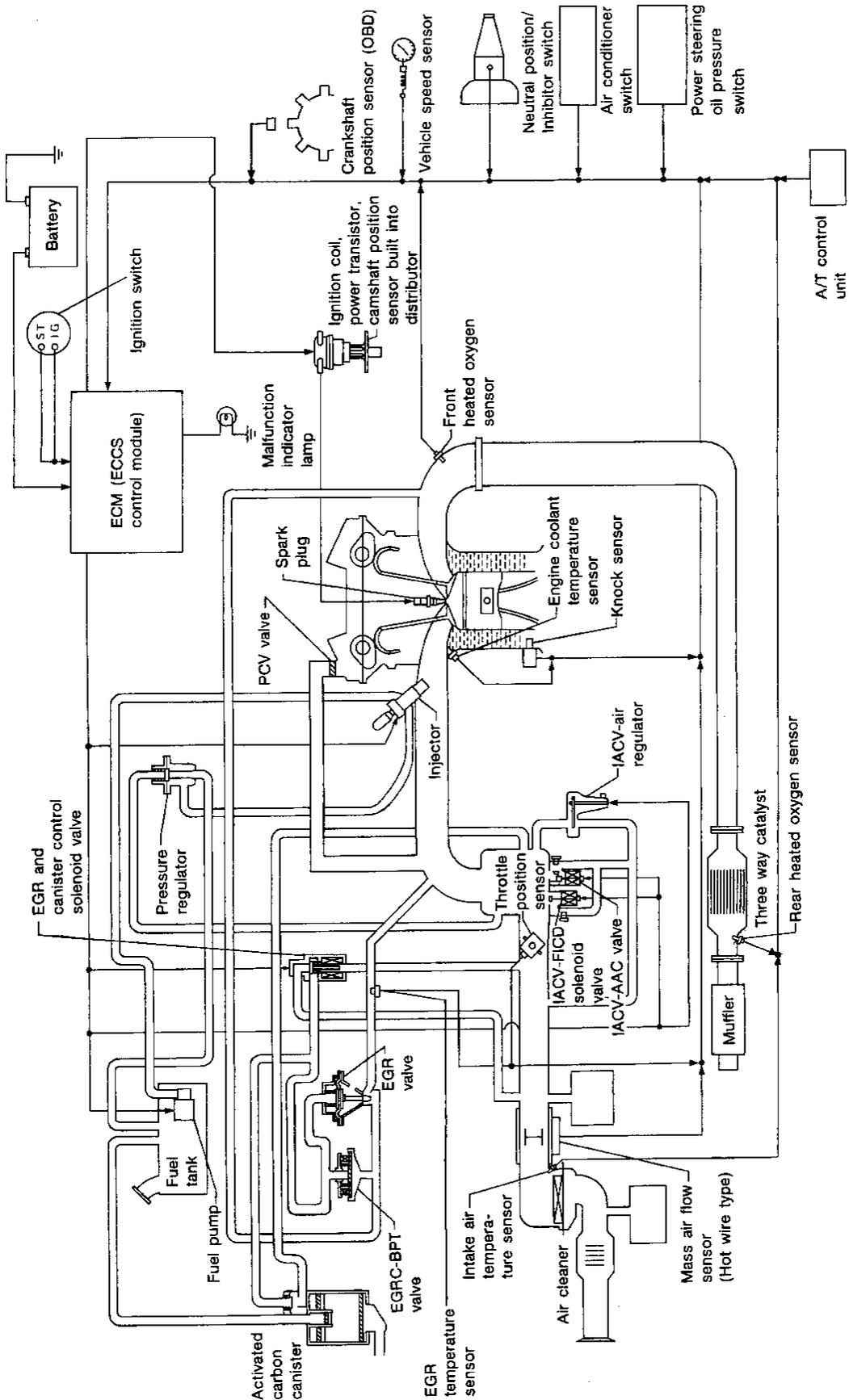
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Circuit Diagram

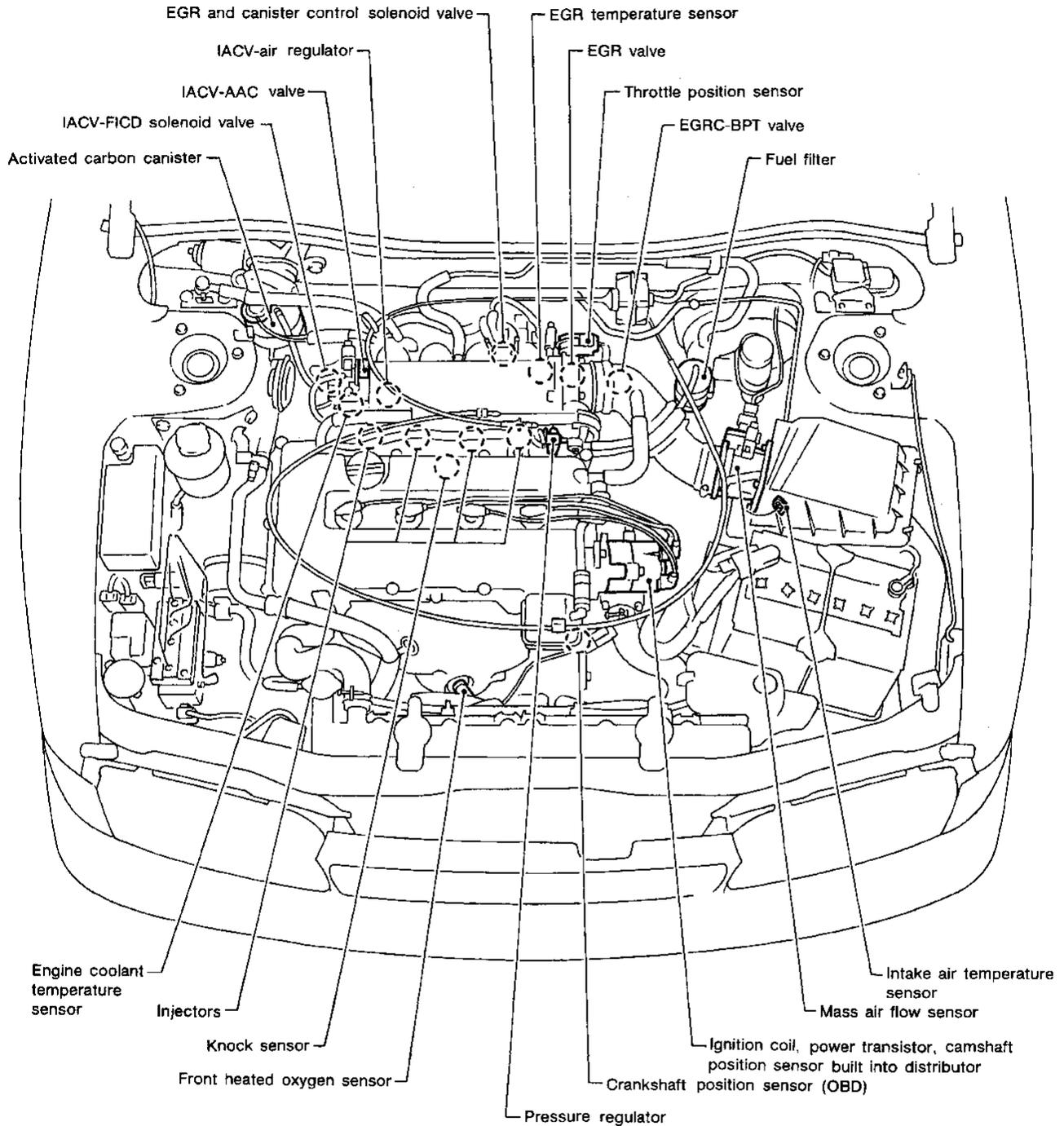


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System Diagram



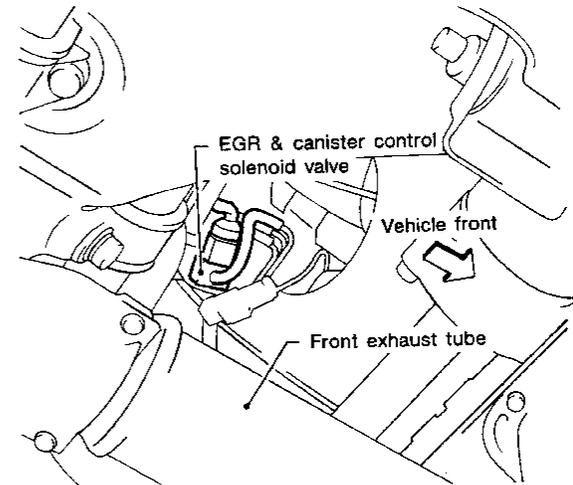
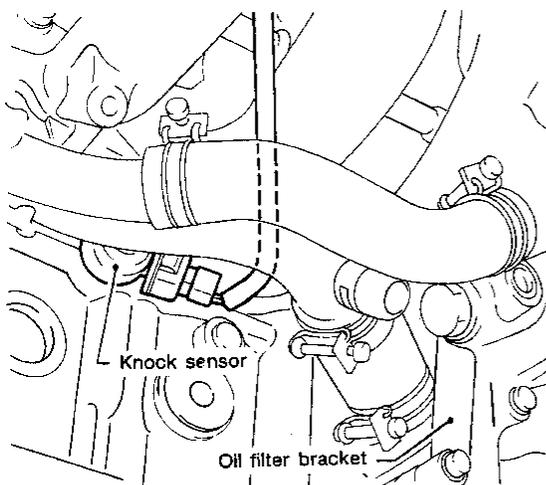
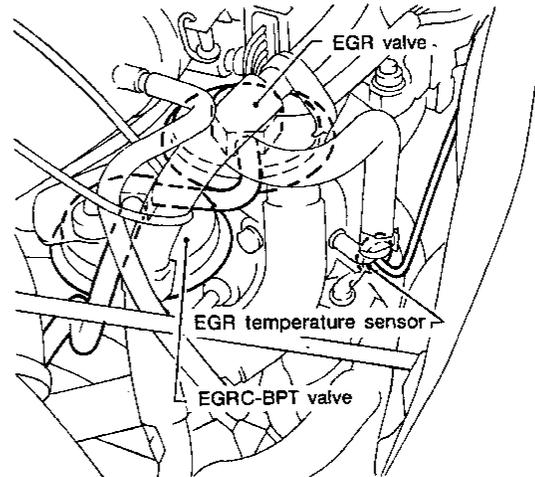
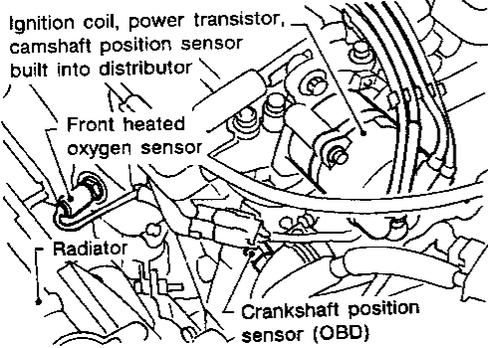
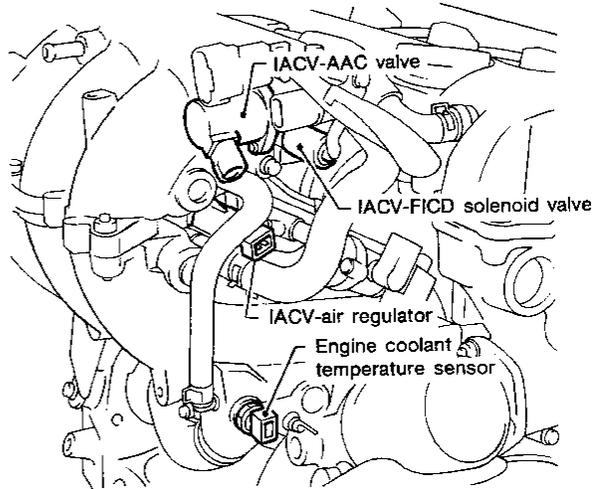
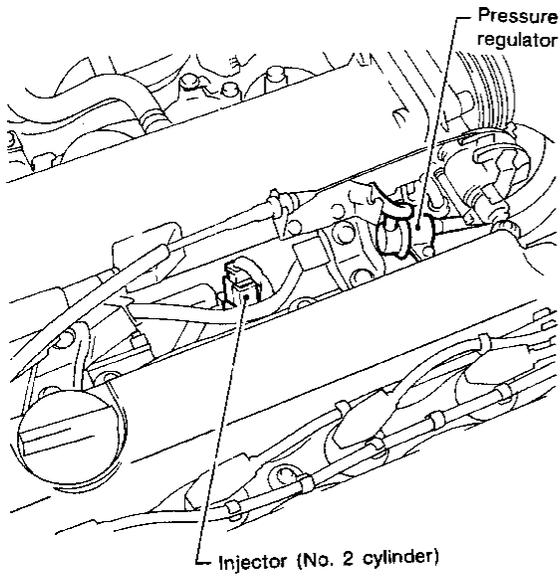
ECCS Component Parts Location



- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- FA
- RA
- BR
- ST
- BF
- HA
- EL
- IDX

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

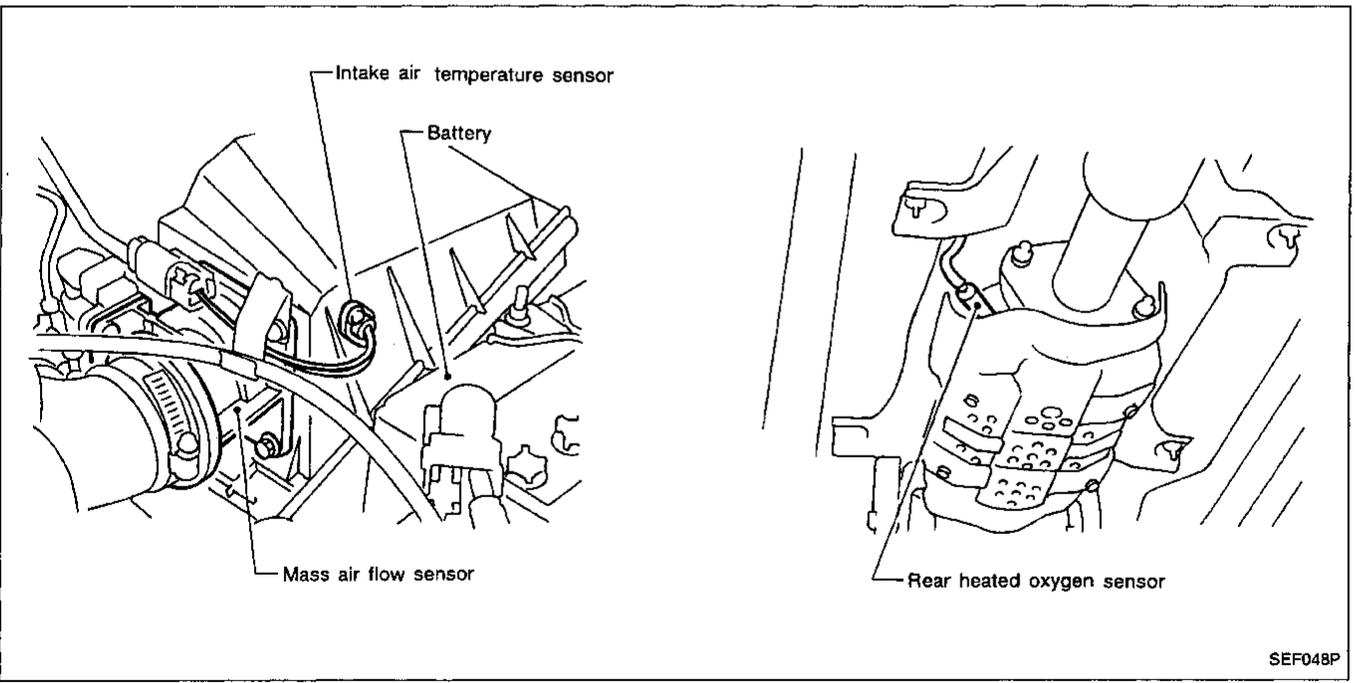
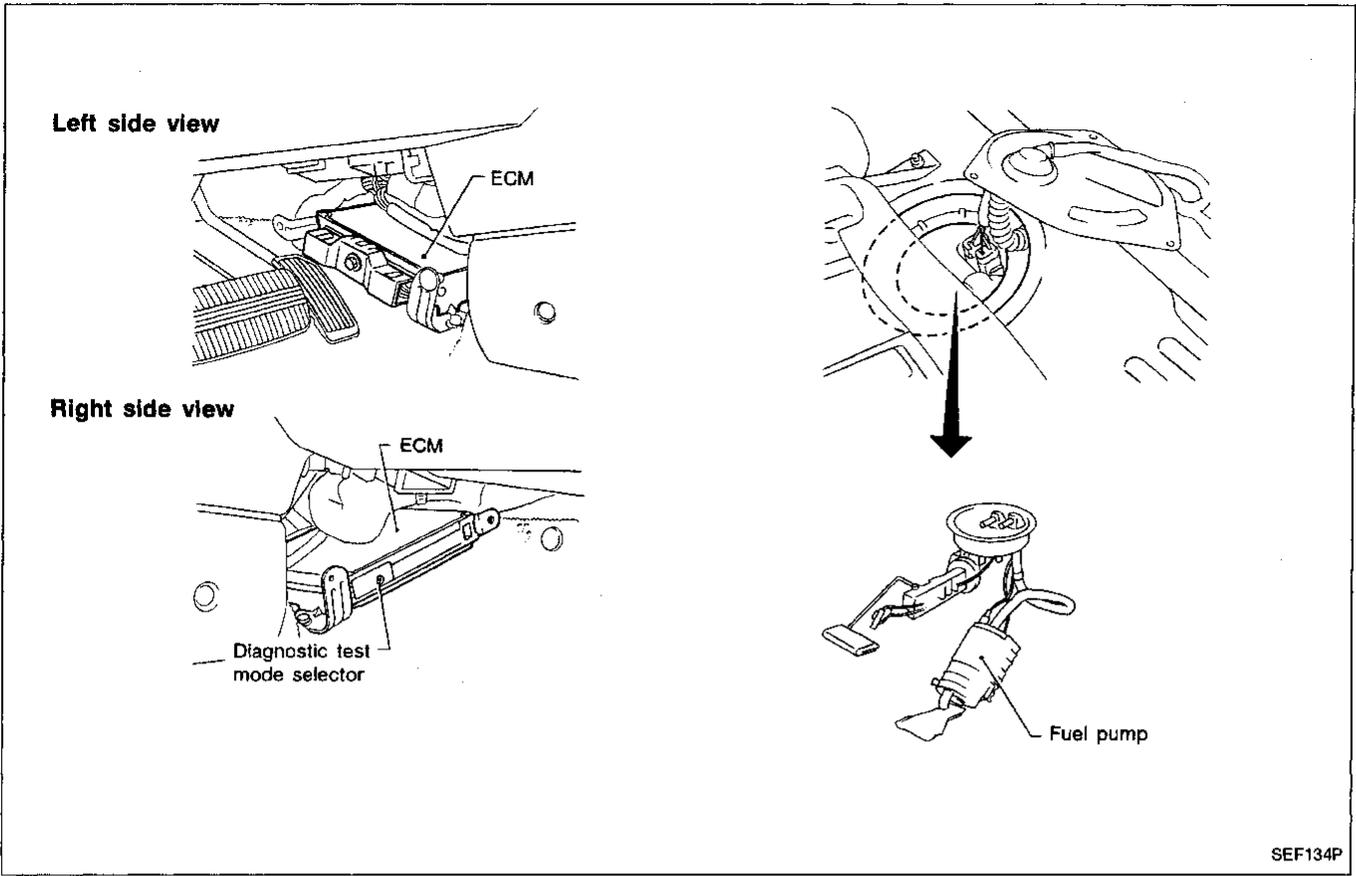
ECCS Component Parts Location (Cont'd)



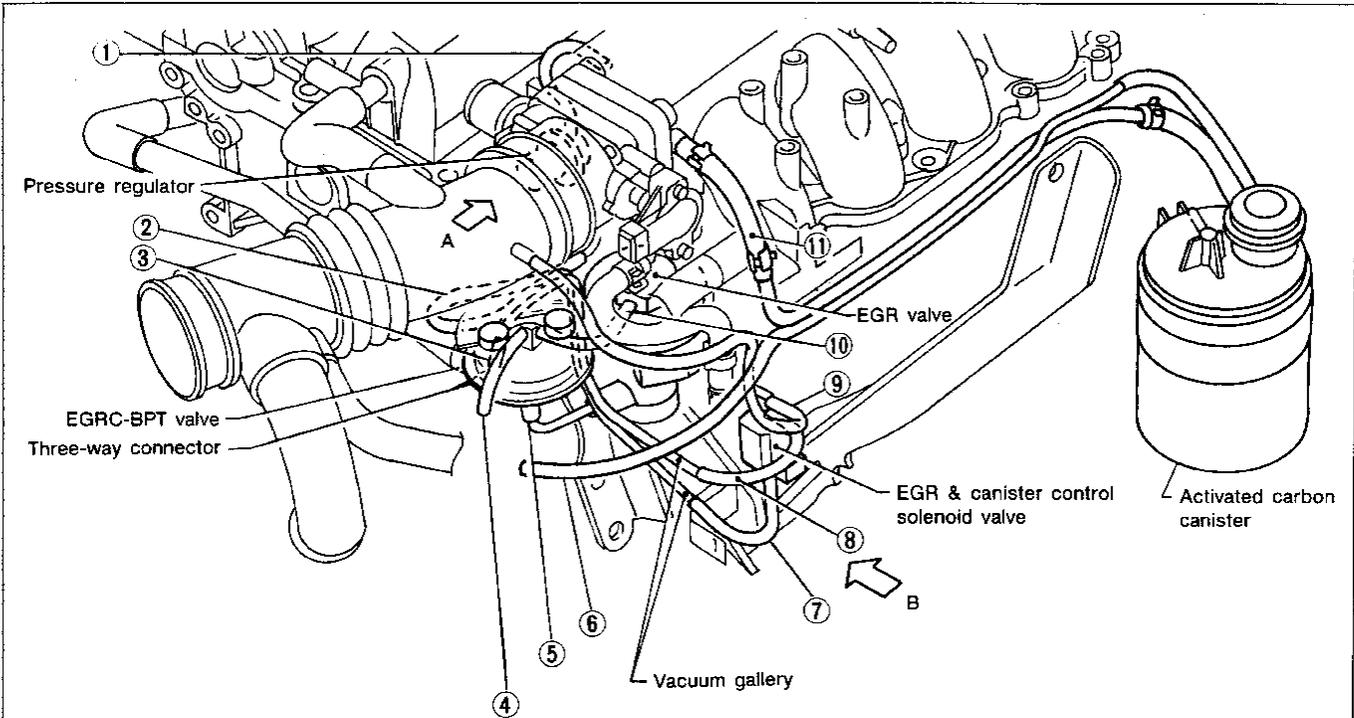
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

ECCS Component Parts Location (Cont'd)

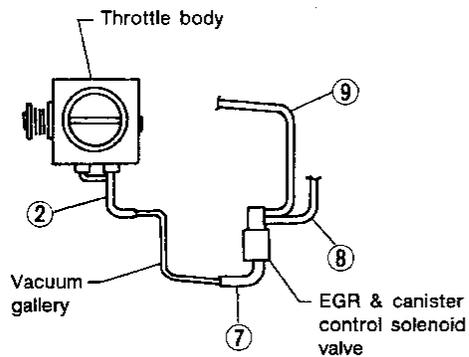
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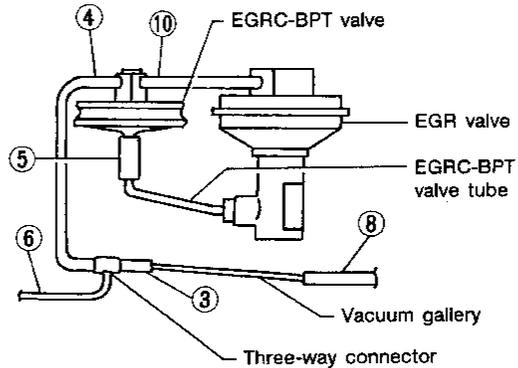
Vacuum Hose Drawing



View A



View B

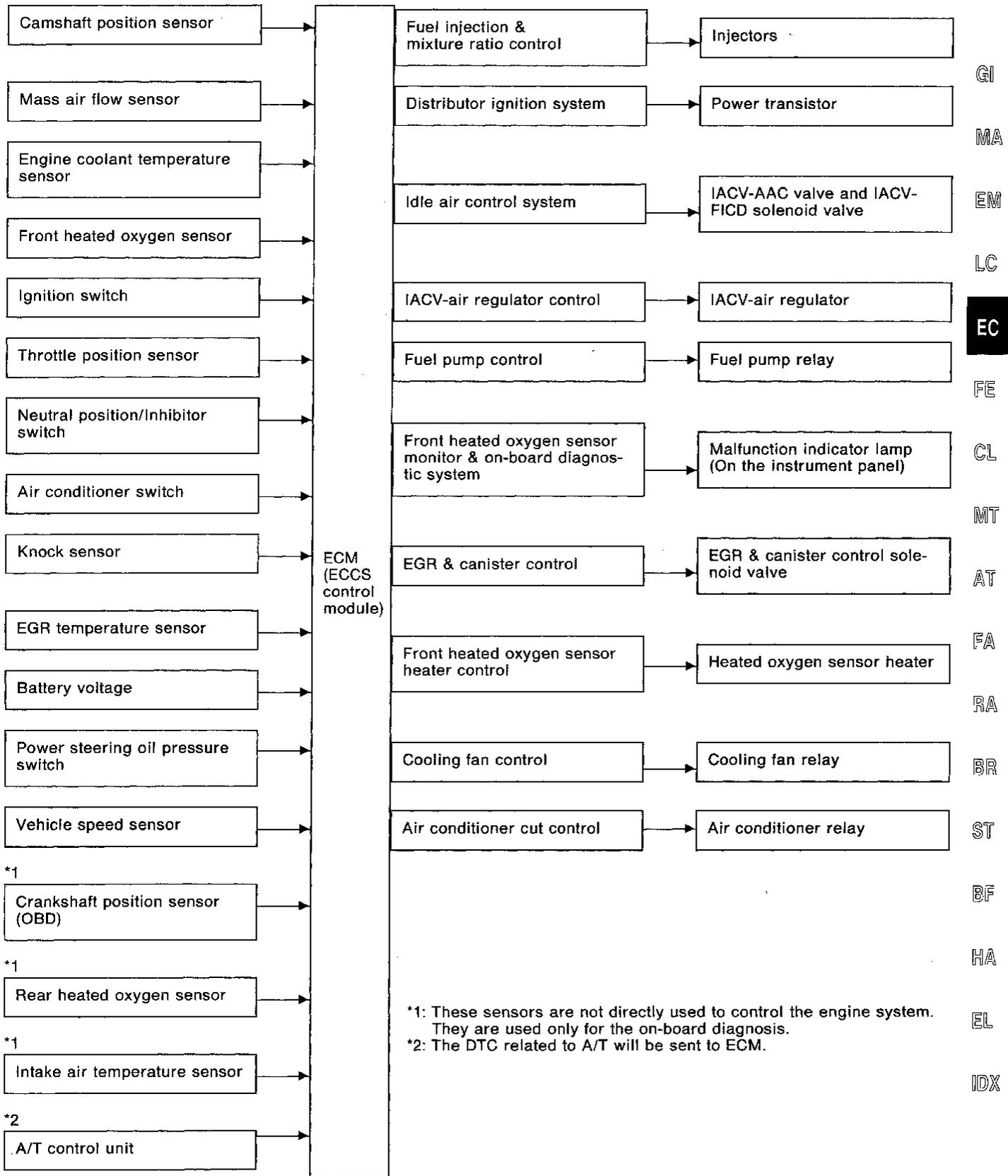


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- ① Pressure regulator to intake manifold collector
- ② Throttle body to vacuum gallery
- ③ Three-way connector to vacuum gallery
- ④ EGRC-BPT valve to three-way connector
- ⑤ EGRC-BPT valve to EGRC-BPT valve tube
- ⑥ Three-way connector to activated carbon canister (vacuum line)
- ⑦ EGR & canister control solenoid valve to vacuum gallery (for throttle body)
- ⑧ EGR & canister control solenoid valve to vacuum gallery (for three-way connector)
- ⑨ EGR & canister control solenoid valve to air duct
- ⑩ EGRC-BPT valve to EGR valve
- ⑪ Activated carbon canister (purge line) to intake manifold collector

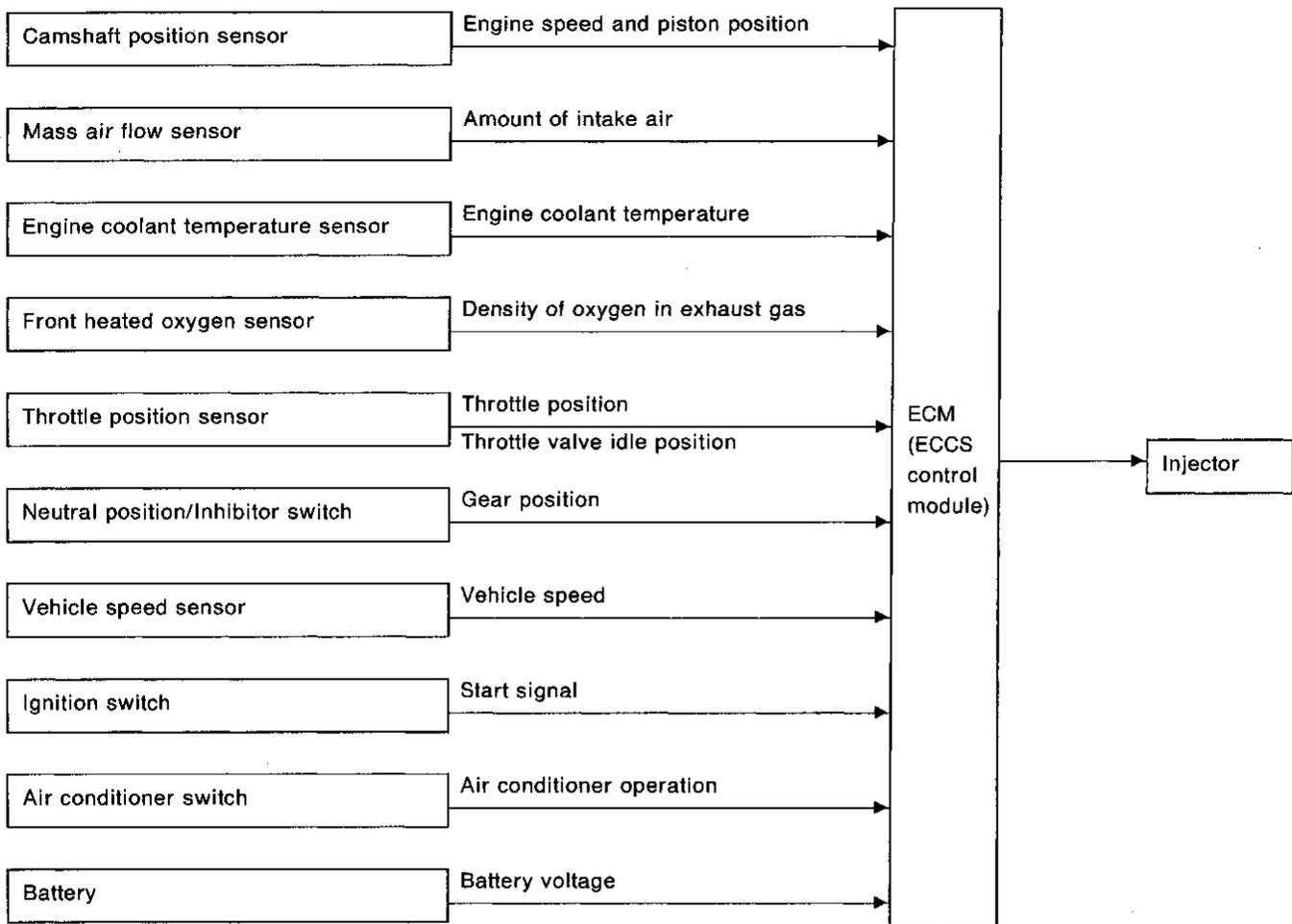
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Chart



Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



BASIC MULTIPOINT FUEL INJECTION SYSTEM

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

< Fuel increase >

- 1) During warm-up
- 2) When starting the engine
- 3) During acceleration
- 4) Hot-engine operation
- 5) When selector lever is changed from "N" to "D" (A/T models only)
- 6) High-load, high-speed operation

< Fuel decrease >

- 1) During deceleration

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

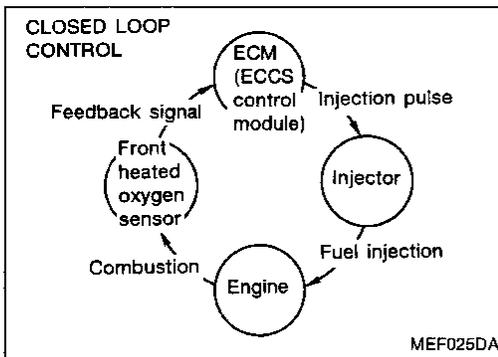
Multiport Fuel Injection (MFI) System (Cont'd)

MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is used for precise control of the air-fuel ratio to the stoichiometric point. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor the mixture ratio. The ECM adjusts the injection pulse width according to the sensor voltage signal. 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.

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OPEN LOOP CONTROL

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

- 1) Deceleration and acceleration
- 2) High-load, high-speed operation
- 3) Engine idling
- 4) Malfunction of front heated oxygen sensor or its circuit
- 5) Insufficient activation of front heated oxygen sensor at low engine coolant temperature
- 6) Engine starting
- 7) High-engine coolant temperature
- 8) After shifting from "N" to "D"
- 9) During warm-up
- 10) When starting the engine

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MIXTURE RATIO SELF-LEARNING CONTROL

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

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

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

"Short-term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the front heated oxygen sensor indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

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

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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

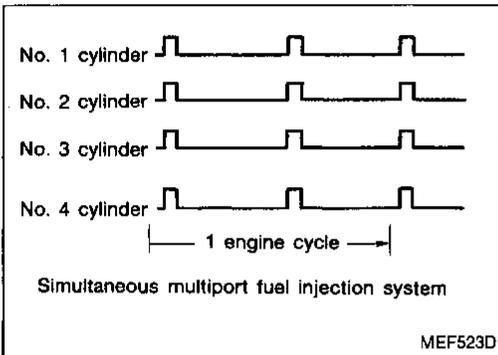
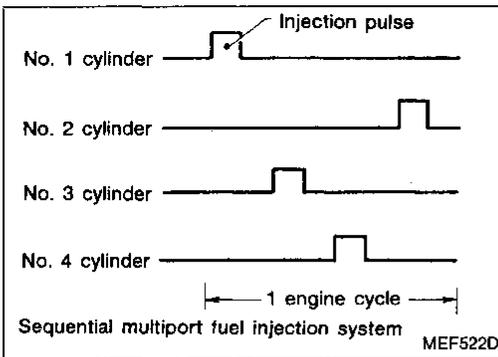
FUEL INJECTION SYSTEM

Two types of systems are used — sequential multiport fuel injection system and simultaneous multiport fuel injection system.

1) Sequential multiport fuel injection system
Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

2) Simultaneous multiport fuel injection system
Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM. The four 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.

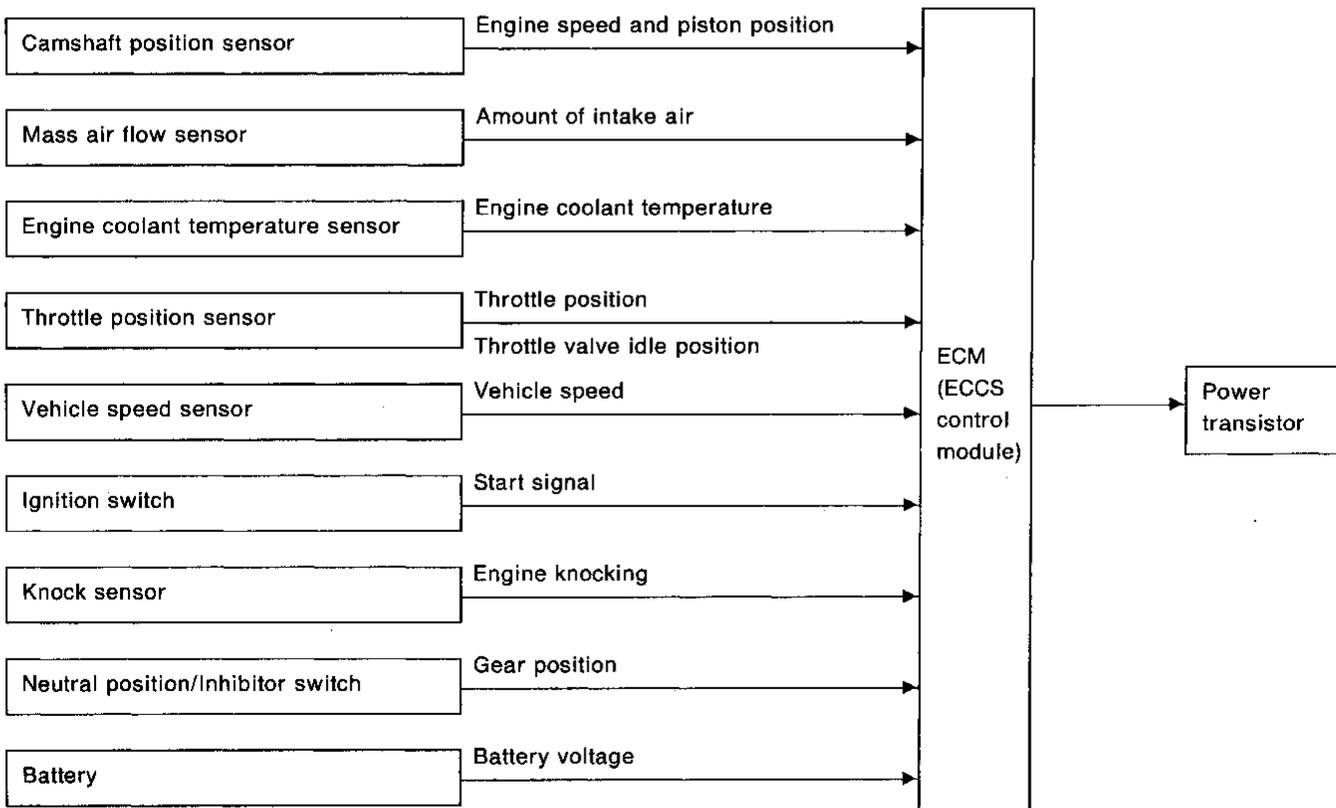


FUEL SHUT-OFF

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

Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Distributor Ignition (DI) System (Cont'd)

SYSTEM DESCRIPTION

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

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

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

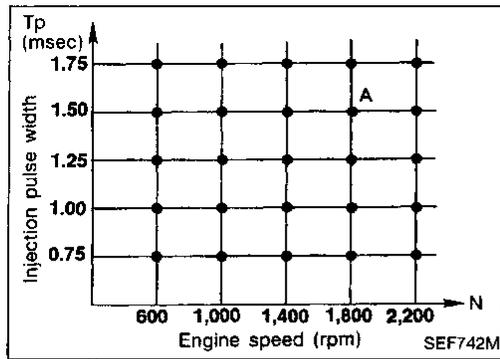
e.g. N: 1,800 rpm, Tp: 1.50 msec
A °BTDC

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

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

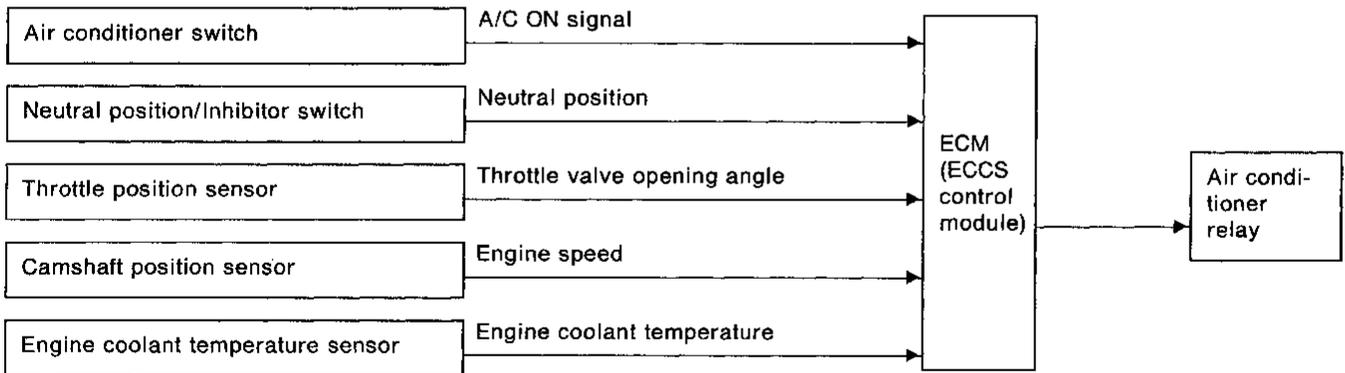
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions.

If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM (ECCS control module). The ECM retards the ignition timing to eliminate the knocking condition.



Air Conditioner Cut Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

This system improves acceleration when the air conditioner is used.

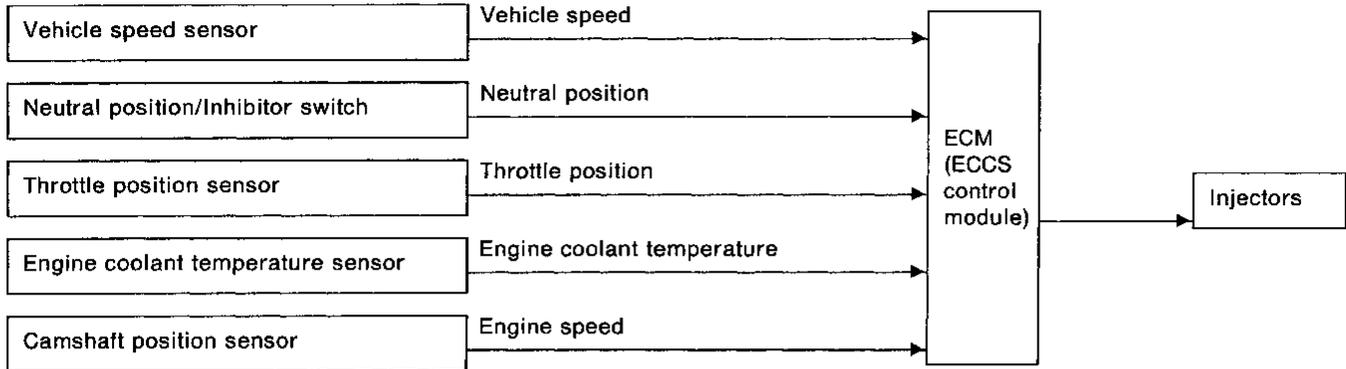
When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.

When engine coolant temperature becomes excessively high, the air conditioner is turned off.

This continues until the coolant temperature becomes normal again.

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

INPUT/OUTPUT SIGNAL LINE



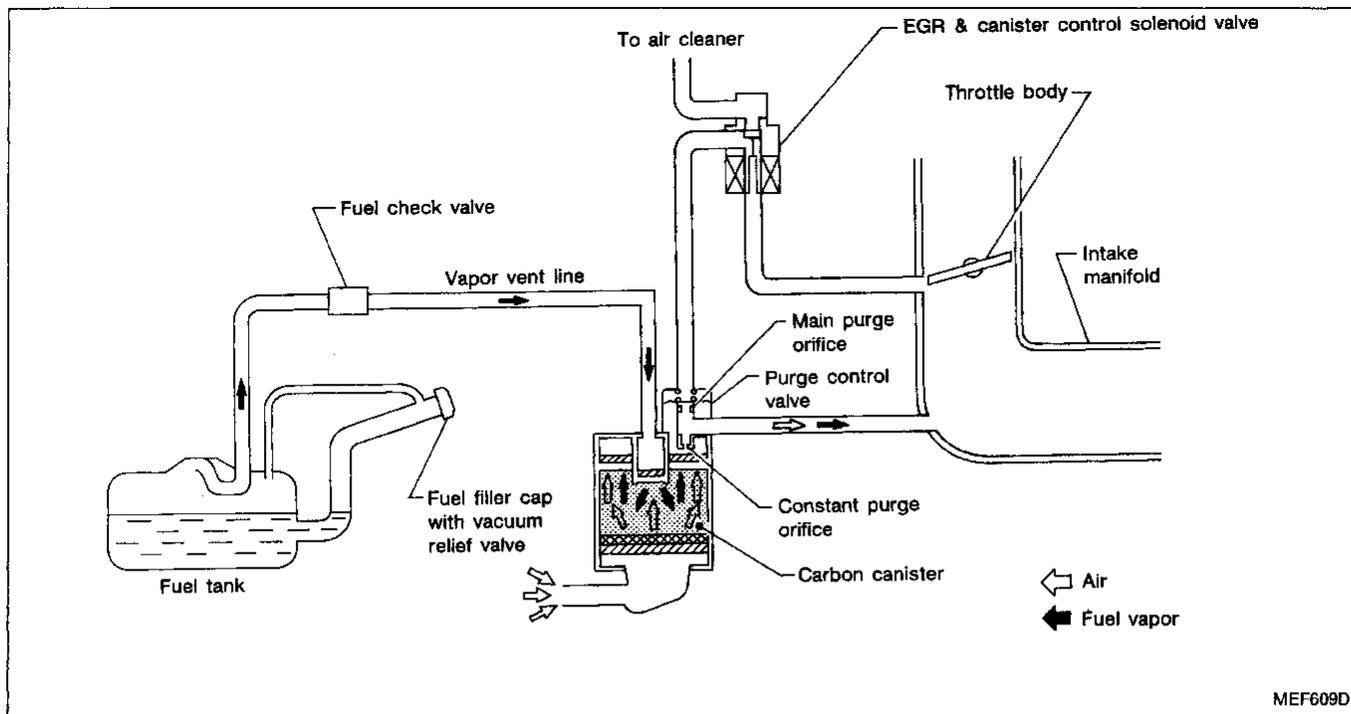
Fuel to each cylinder is cut off when the engine speed goes over 3,950 rpm after the following condition. (The fuel cut is recovered when the engine speed drops below 1,150 rpm.)

< Vehicle condition >

The engine running at above idle speed is continued for the specified time under no load.

(The specified time varies with the engine speed.)

Description



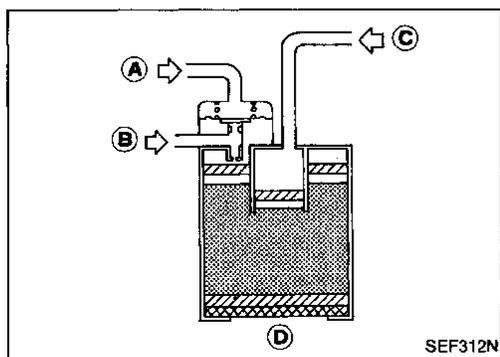
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

The fuel vapor from sealed fuel tank is led into the canister when the engine is off. The fuel vapor is then stored in the canister. The canister retains the fuel vapor until the canister is purged by air.

When the engine is running, the air is drawn through the bottom of the canister. The fuel vapor will then be led to the intake manifold.

When the engine runs at idle, the purge control valve is closed. Only a small amount of vapor flows into the intake manifold through the constant purge orifice.

As the engine speed increases and the throttle vacuum rises, the purge control valve opens. The vapor is sucked through both main purge and constant purge orifices.



Inspection

ACTIVATED CARBON CANISTER

Check carbon canister as follows:

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

EVAPORATIVE EMISSION SYSTEM

Inspection (Cont'd)

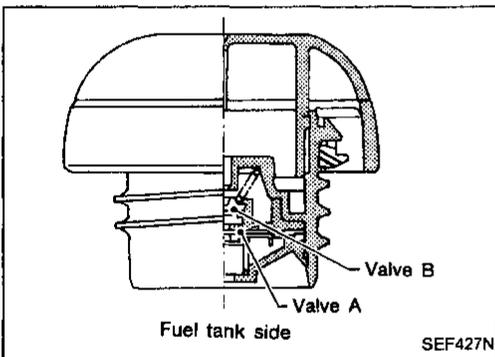
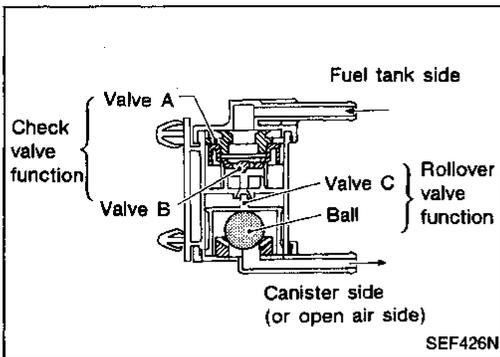
FUEL CHECK VALVE (With rollover valve)

Check valve operation

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

Rollover valve operation

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

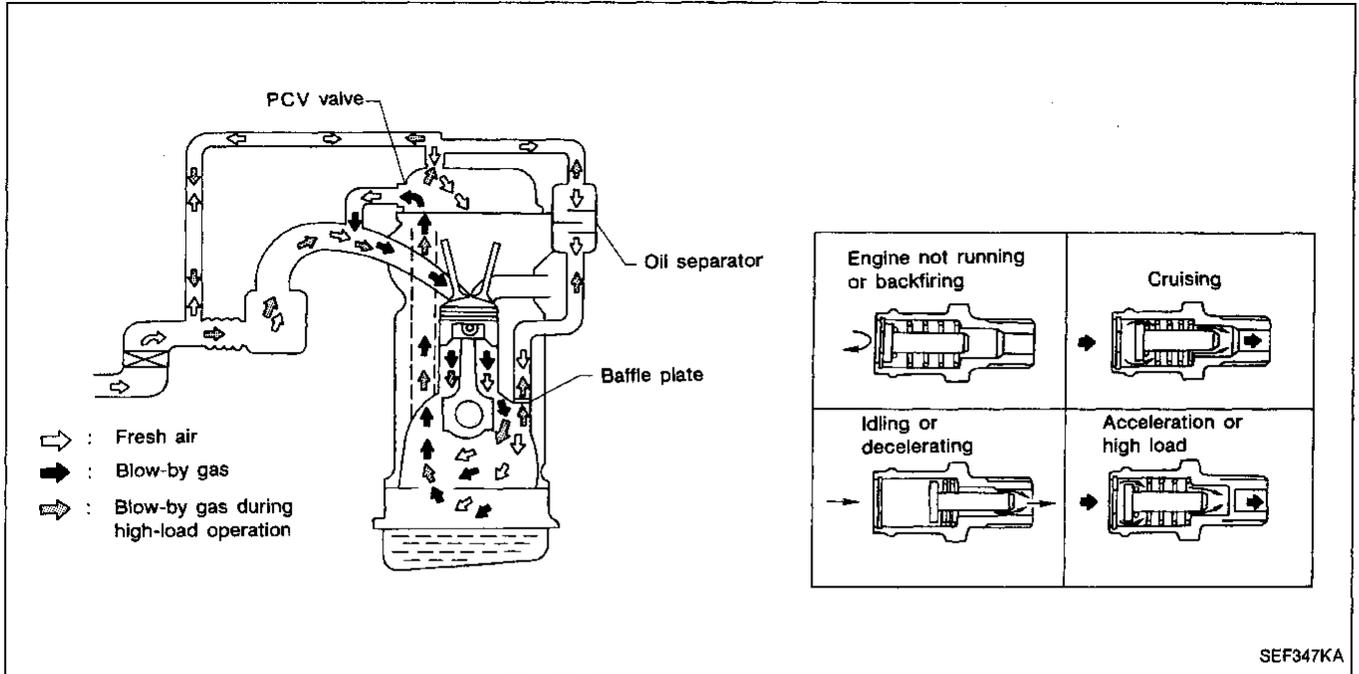


FUEL TANK VACUUM RELIEF VALVE

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

POSITIVE CRANKCASE VENTILATION

Description



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

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 air inlet tubes into crankcase through a hose. The hose connects the air inlet tubes and the rocker cover.

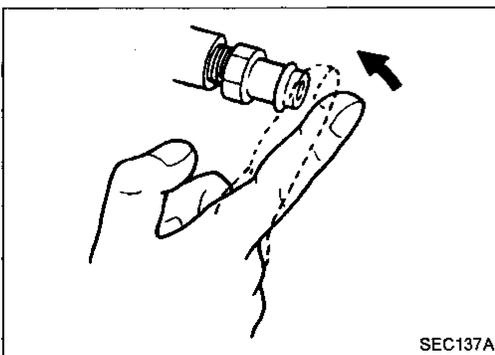
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. Flow then goes through the hose connection in the reverse direction.

Under any condition, some of the flow goes through the hose connection to the air inlet tubes. This will occur on vehicles with an excessively high blow-by.

Inspection

PCV (Positive Crankcase Ventilation)

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

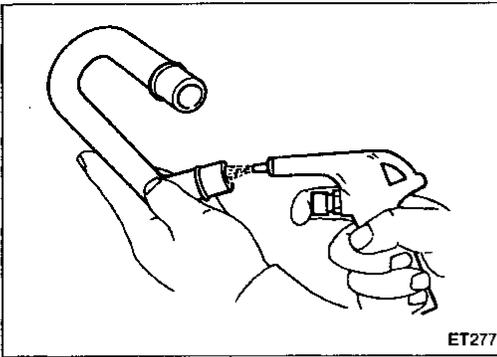


POSITIVE CRANKCASE VENTILATION

Inspection (Cont'd)

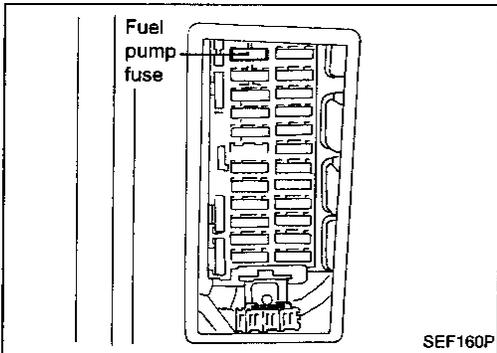
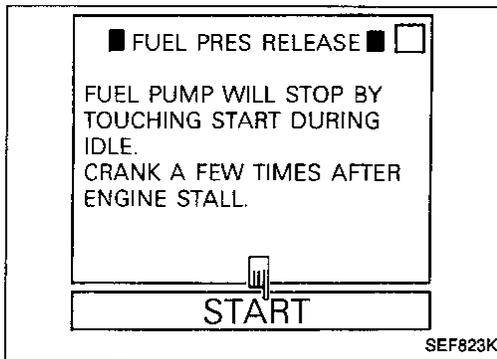
VENTILATION HOSE

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



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BASIC SERVICE PROCEDURE



Fuel Pressure Release

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

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

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

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Fuel Pressure Check

- a. When reconnecting fuel line, always use new clamps.
- b. Make sure that clamp screw does not contact adjacent parts.
- c. Use a torque driver to tighten clamps.
- d. Use Pressure Gauge to check fuel pressure.

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

At idling:

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

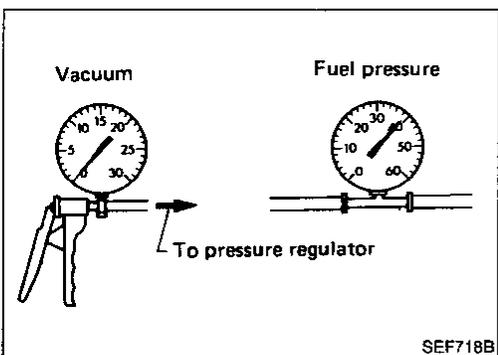
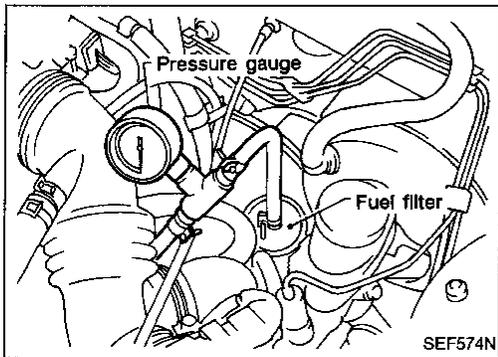
A few seconds after ignition switch is turned OFF to ON:

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

6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.
9. Start engine and read indication of fuel pressure gauge as vacuum is changed.

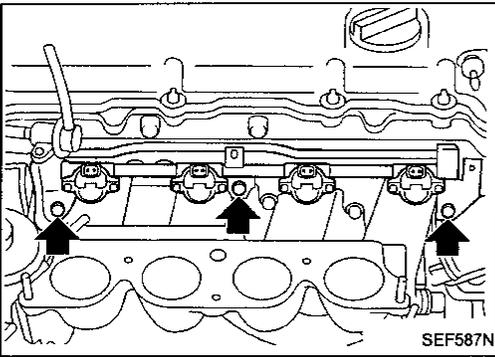
Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.

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Injector Removal and Installation

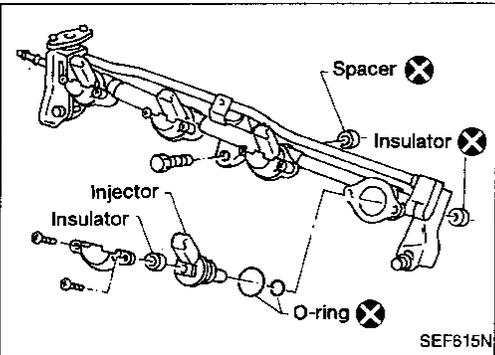
1. Release fuel pressure to zero.
2. Remove intake manifold collector (Refer to CYLINDER HEAD in EM section).
3. Disconnect vacuum hose from pressure regulator.
4. Disconnect fuel hoses from fuel tube assembly.
5. Disconnect injector harness connectors.
6. Remove injectors with fuel tube assembly.



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

Do not extract injector by pinching connector.

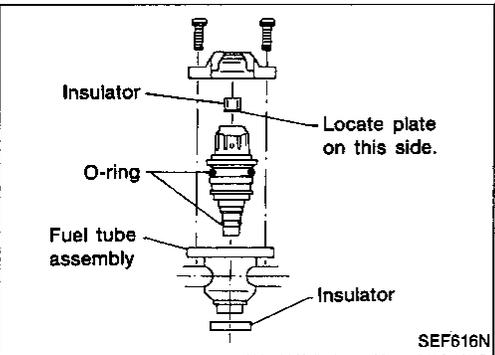
8. Replace or clean injector as necessary.



9. Install injector to fuel tube assembly.

Always replace O-rings and insulators with new ones.

Lubricate O-rings with a smear of silicone oil.



10. Install injectors with fuel tube assembly to intake manifold.

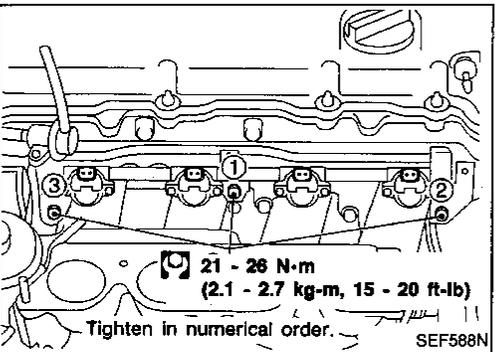
11. Install fuel hoses to fuel tube assembly.

Lubricate fuel hoses with a smear of silicone oil.

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

CAUTION:

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



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
- Air intake system (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation

- Throttle valve

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. When checking idle speed, ignition timing and mixture ratio of A/T models, shift lever to "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.

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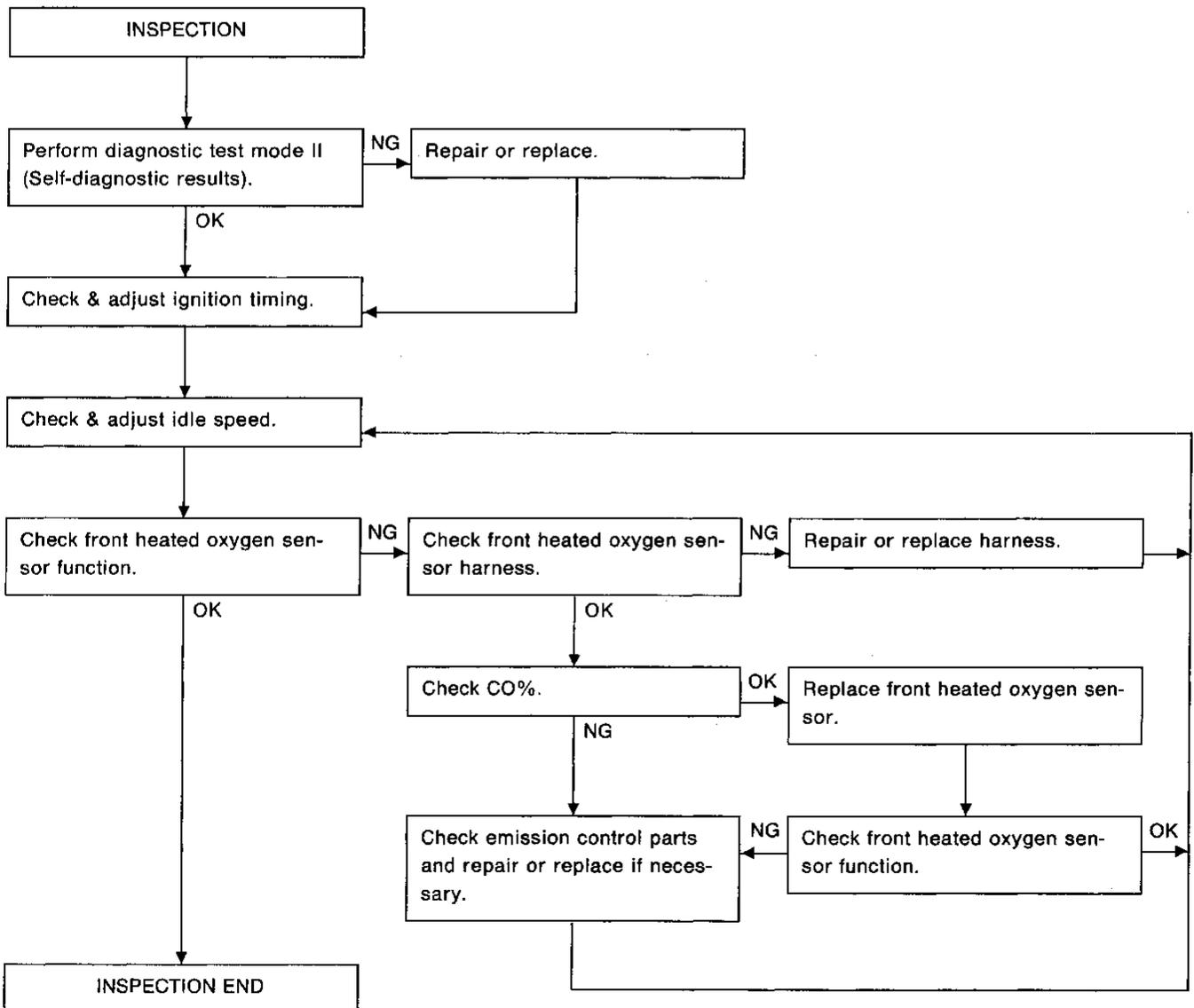
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Overall inspection sequence



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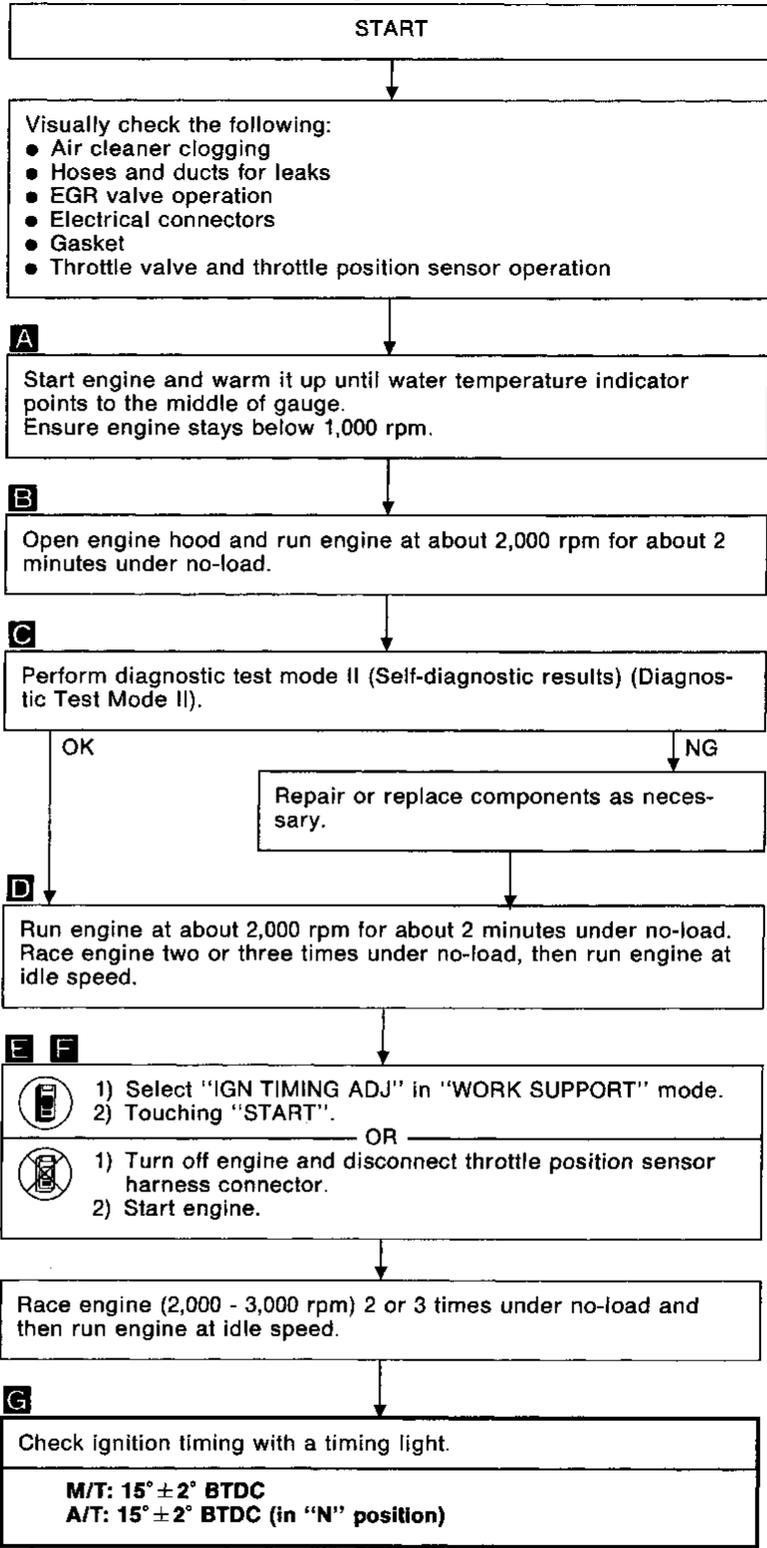
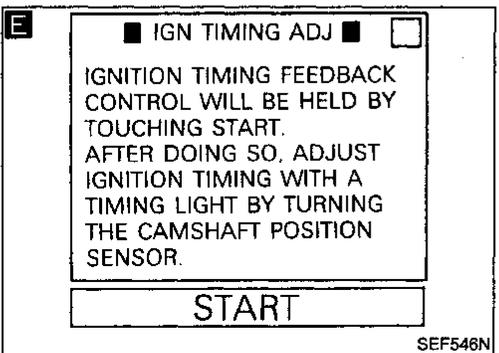
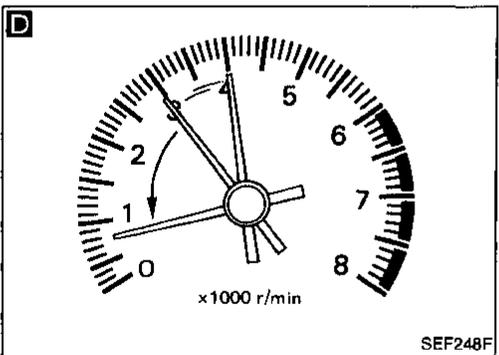
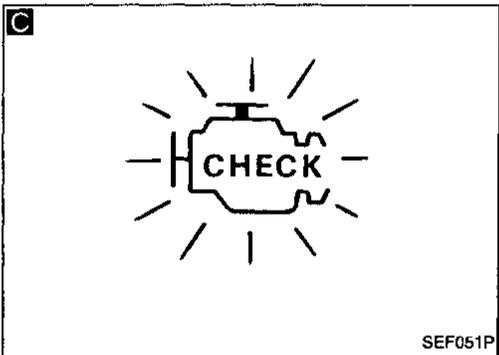
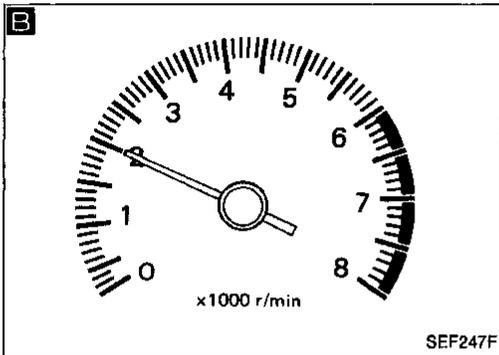
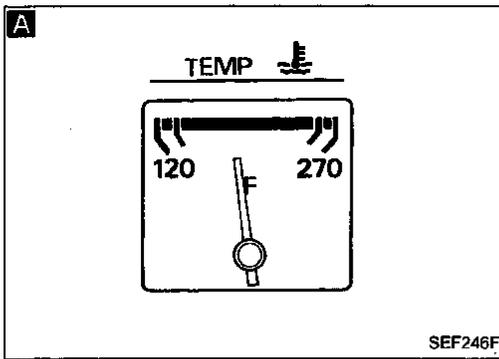
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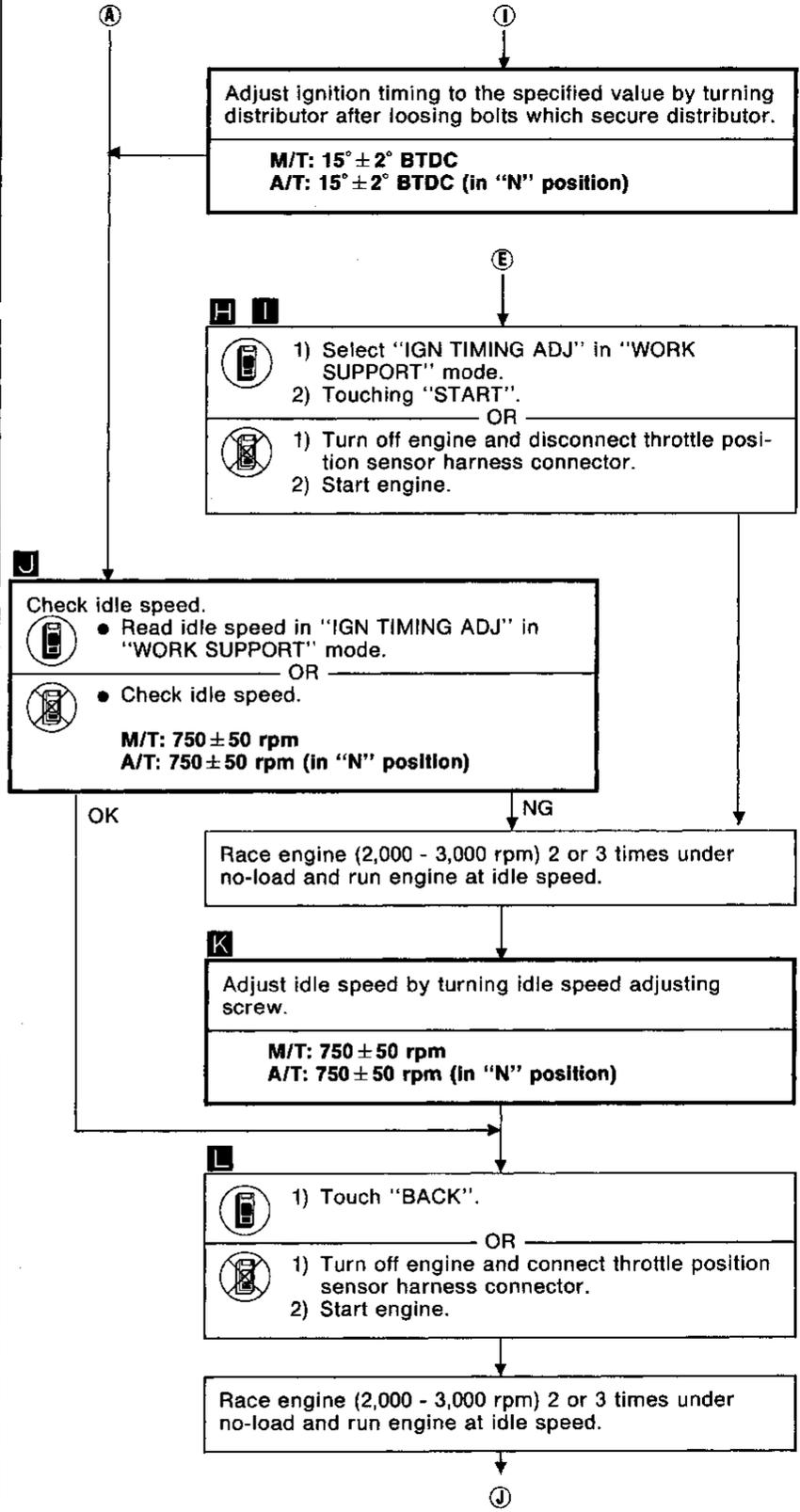
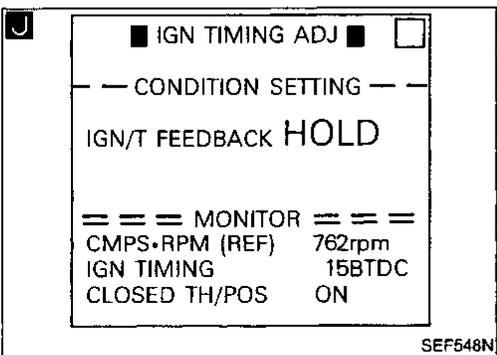
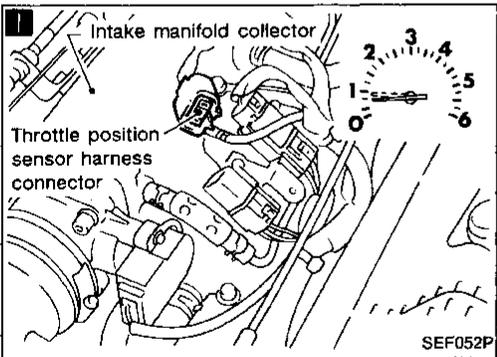
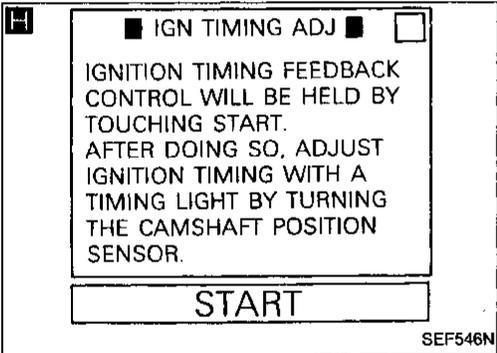
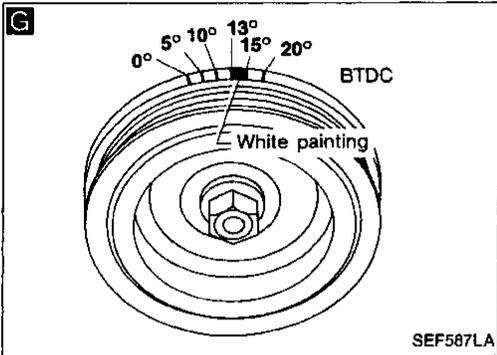
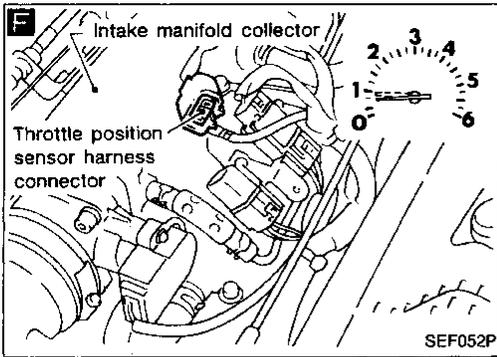
BASIC SERVICE PROCEDURE

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



BASIC SERVICE PROCEDURE

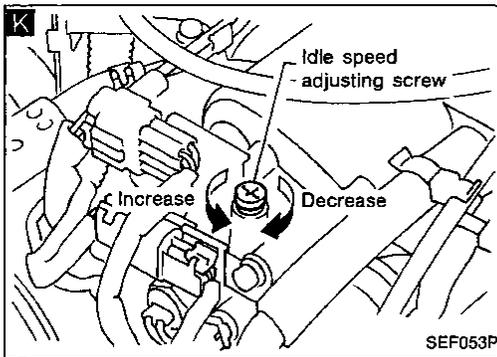
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



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BASIC SERVICE PROCEDURE

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

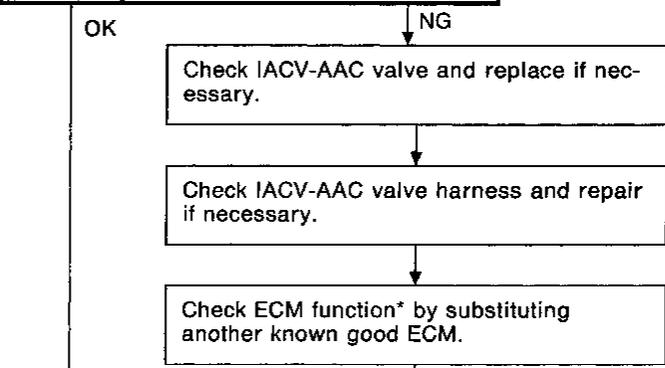
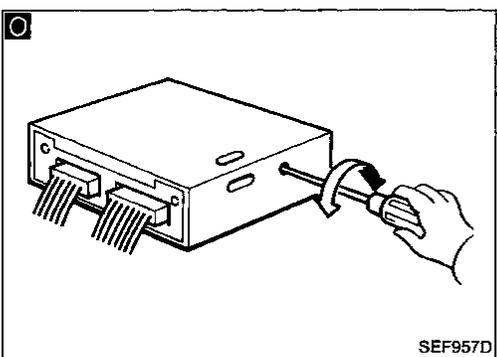
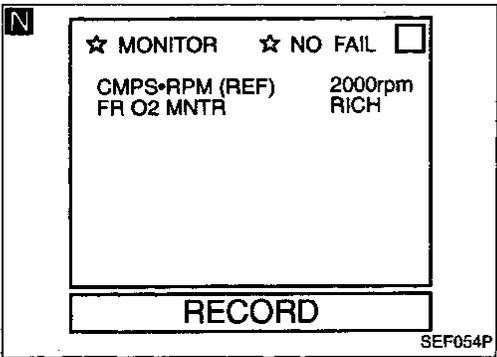
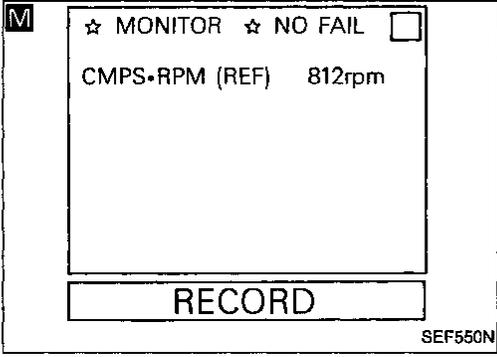
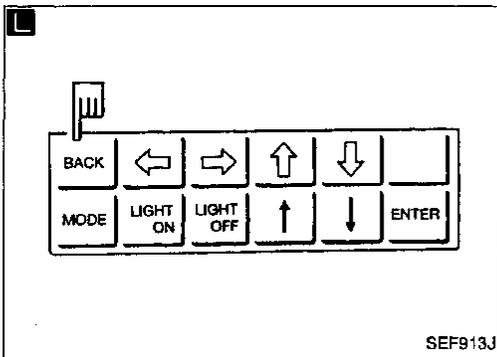


M

Check idle speed.

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

M/T: 800 ± 50 rpm
A/T: 800 ± 50 rpm (in "N" position)



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

N O P

1. See "FR O2 MNTR" in "Data monitor" mode.

2. Run engine at about 2,000 rpm for about 2 minutes under no-load.

3. Maintain engine at 2,000 rpm under no-load (engine is warmed up sufficiently). Check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

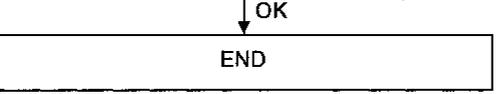
1 cycle: RICH → LEAN → RICH
2 cycles: RICH → LEAN → RICH → LEAN → RICH

OR

1. Set "Front heated oxygen sensor monitor" in the Diagnostic Test Mode II. (See page EC-38.)

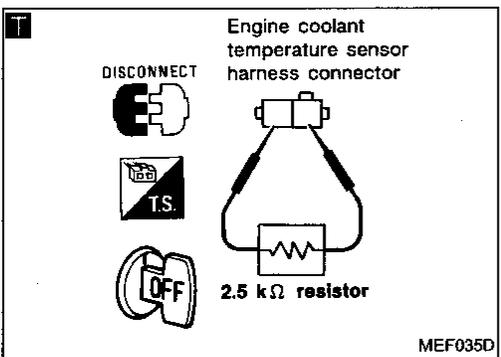
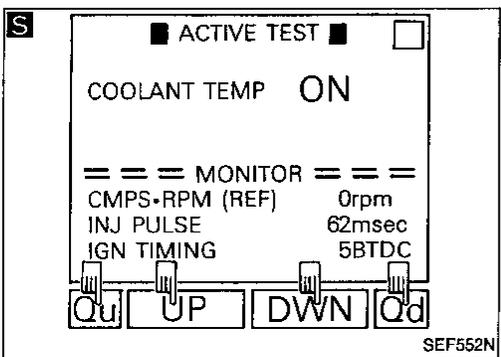
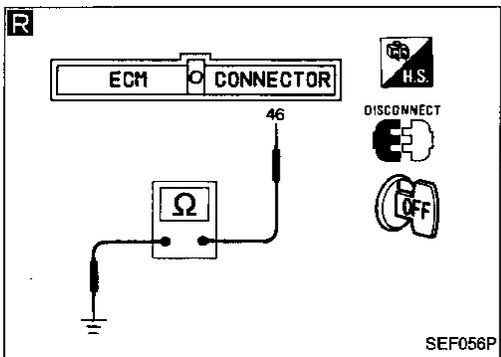
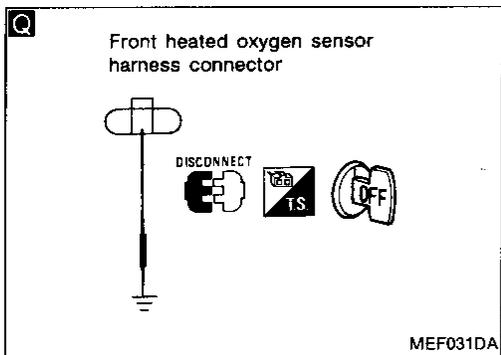
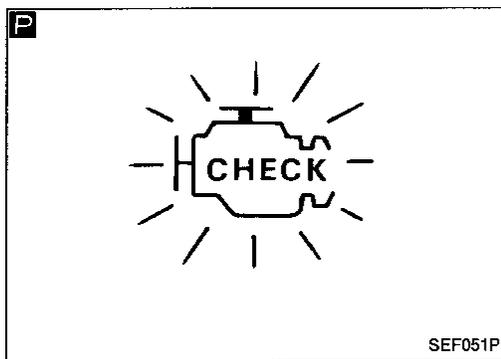
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.

3. Maintain engine at 2,000 rpm under no-load. Check that the malfunction indicator lamp goes ON and OFF more than 5 times during 10 seconds.



BASIC SERVICE PROCEDURE

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



Q R

Check front heated oxygen sensor harness:

- 1) Turn off engine and disconnect battery ground cable.
- 2) Disconnect ECM SMJ harness connector from ECM.
- 3) Disconnect front heated oxygen sensor harness connector. Then connect harness side terminal for front heated oxygen sensor to ground with a jumper wire.
- 4) Check for continuity between terminal No. 46 of ECM SMJ harness connector and body ground.

Continuity existsOK
Continuity does not exist.....NG

OK

NG

Repair or replace harness.

Connect ECM SMJ harness connector to ECM.

S T

1) Connect battery ground cable.

2) Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.

3) Set "COOLANT TEMP" to 20°C (68°F) by touching "Qu" and "Qd" and "UP", "DOWN".

OR

1) Disconnect engine coolant temperature sensor harness connector.

2) Connect a resistor (2.5 kΩ) between terminals of engine coolant temperature sensor harness connector.

3) Connect battery ground cable.

U

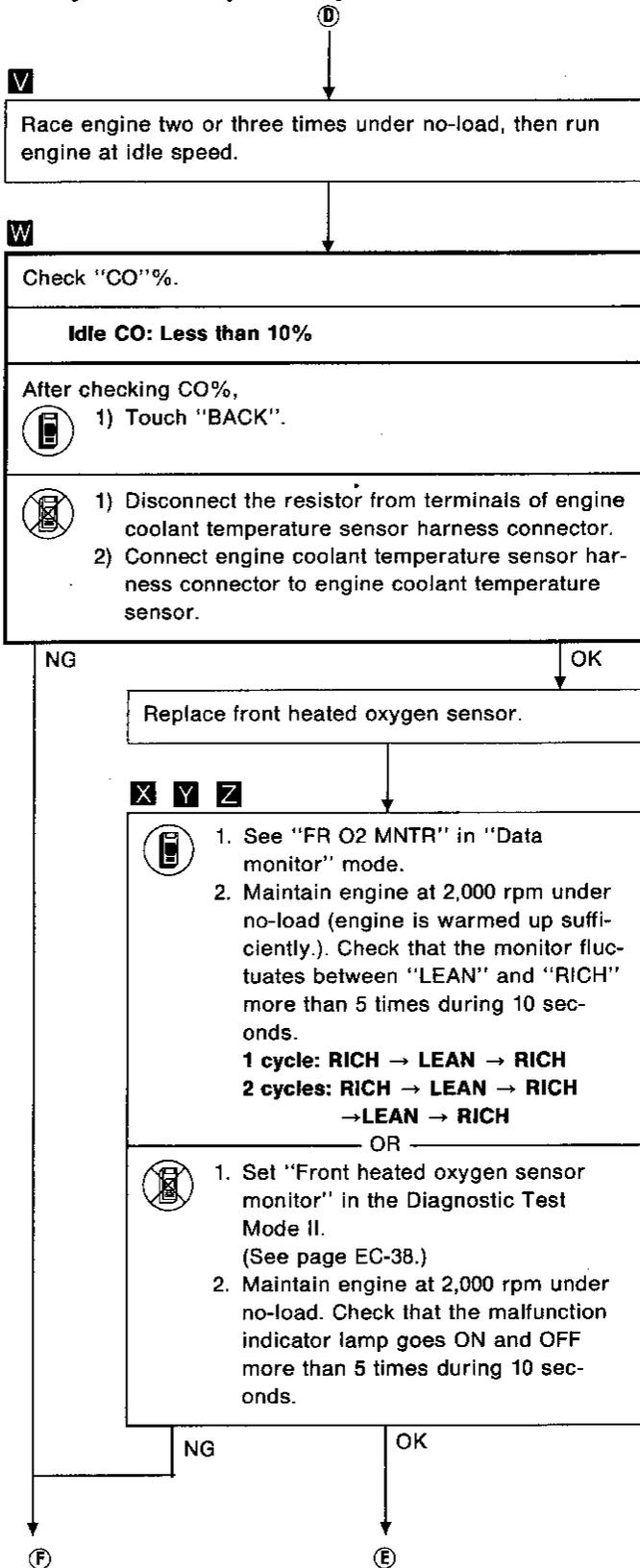
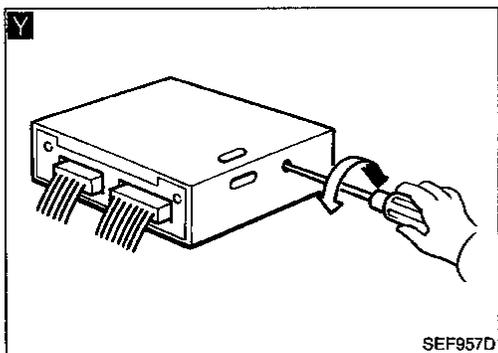
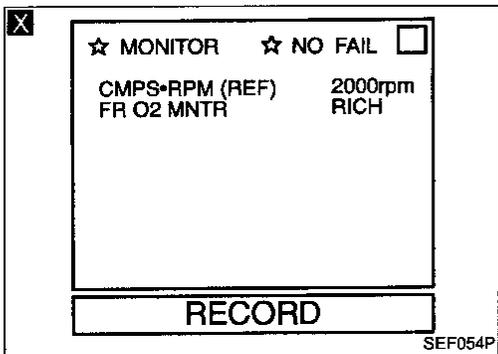
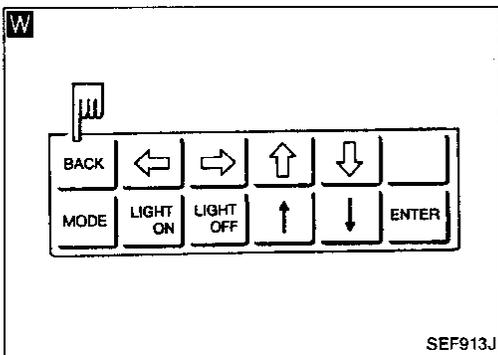
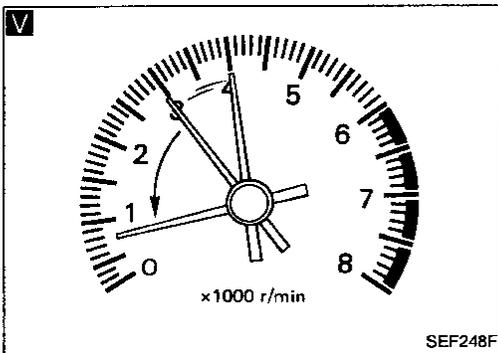
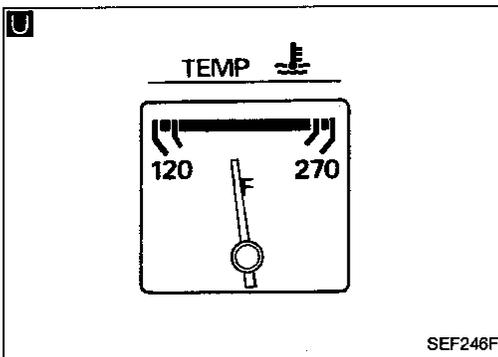
Start engine and warm it up until water temperature indicator points to middle of gauge.

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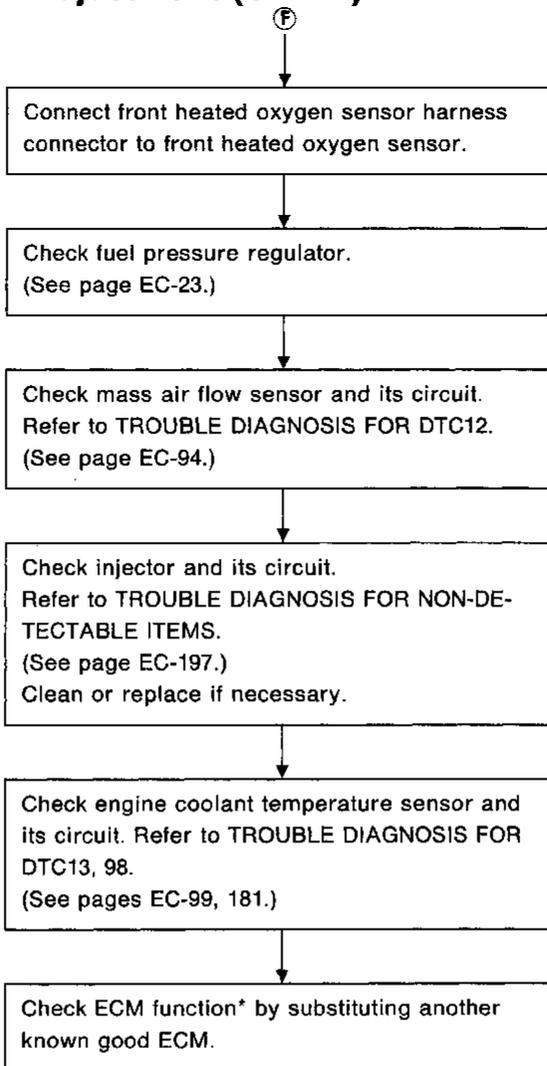
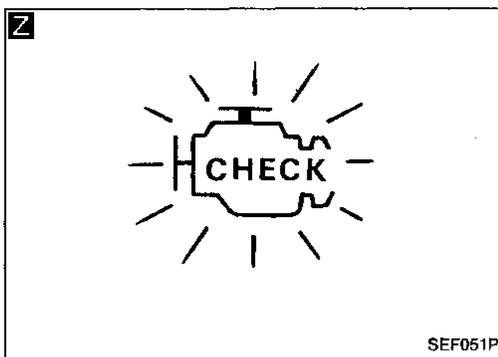
BASIC SERVICE PROCEDURE

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



BASIC SERVICE PROCEDURE

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



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

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NOTE

Introduction

The ECM (ECCS control module) has an on-board diagnostic system, which detects engine system malfunctions related to sensors or actuators. The malfunction indicator lamp (MIL) on the instrument panel lights up when a malfunction is detected twice (two trip detection logic).

Two Trip Detection Logic

When a malfunction is detected for the first time, the malfunction (DTC and freeze frame data) is stored in the ECM memory. < 1st trip > The malfunction indicator lamp will not light up at this stage.

If the same malfunction is detected again during next drive, this second detection causes the malfunction indicator lamp to light up. < 2nd trip > (See page EC-38.)

The "trip" in the "Two Trip Detection Logic" means performing of the "DTC Detecting Condition". Only the following on-board diagnostic items will light up or blink the MIL even in the 1st trip.

- "Misfire (Criterion which will damage three way catalyst)" — DTC: 65-71 (P0304-P0300)
- "Three way catalyst function" — DTC: 72 (P0420)

Diagnostic Trouble Code (DTC)

HOW TO READ DTC

The diagnostic trouble code can be read by the following methods.
(Either code for the 1st trip or the 2nd trip can be read.)

1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 11, 21, 103, 114, etc.
These DTCs are controlled by NISSAN.
2. CONSULT or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.

- **Output of the trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**

CONSULT can identify them. Therefore, using CONSULT (if available) is recommendable.

HOW TO ERASE DTC

The diagnostic trouble code can be erased by the following methods.

1. Changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM. (Refer to page EC-36.)
2. Selecting "ERASE" in the "SELF DIAG RESULTS" mode with CONSULT
3. Selecting Mode 4 with GST (Generic Scan Tool)

- **If the battery terminal is disconnected, the diagnostic trouble code will be lost within 24 hours.**
- **When you erase the DTC, using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.**

HOW TO ERASE DTC (With CONSULT)

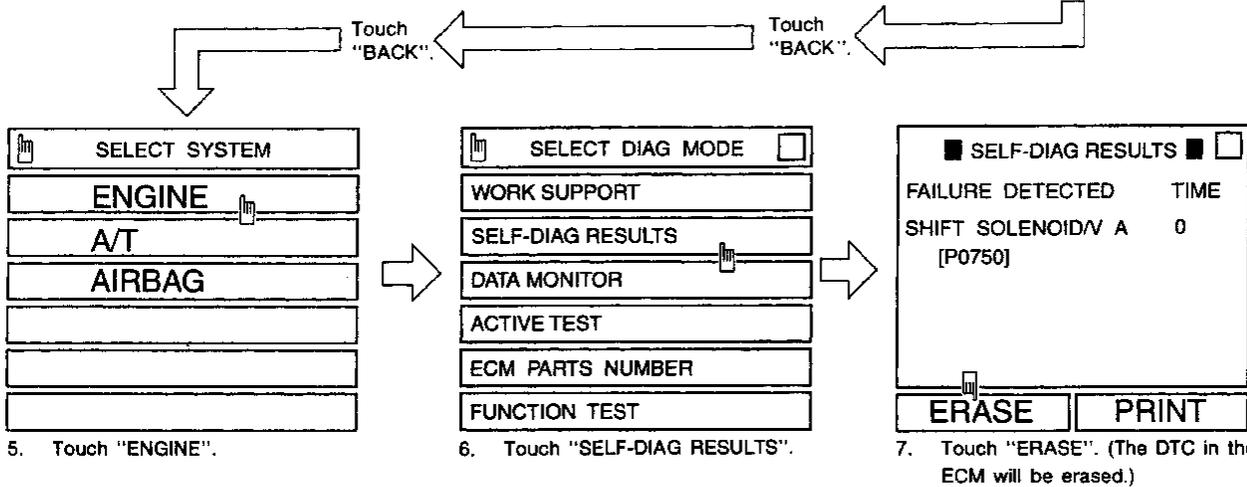
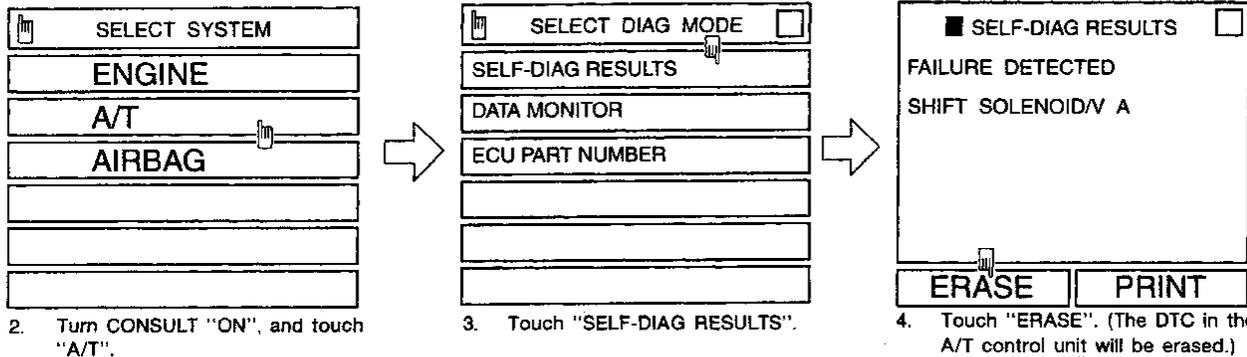
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 3 seconds and then turn it "ON" again.
2. Turn CONSULT "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.) And touch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

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Trouble Code (DTC) (Cont'd)

How to erase DTC (With CONSULT)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 3 seconds and then turn it "ON" again.



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HOW TO ERASE DTC (Without CONSULT)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 3 seconds and then turn it "ON" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis".
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See page EC-36.)

Freeze Frame Data

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short fuel trim, long fuel trim, engine speed, vehicle speed at the moment the ECM detects a malfunction.

Stored data is called Freeze Frame Data.

This data is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

This data can be utilized to duplicate the malfunction and to diagnose the trouble.

This data will be erased at the same time with the diagnostic trouble code by the above mentioned methods.

The data can be stored only at the 1st trip. It can not be renewed even at the 2nd trip. The freeze frame data can be stored for only one item. Therefore, the ECM has the following priorities to update the data.

Priority	Detected items
1	Misfires — DTC: 65-71 (P0304-P0300) Fuel Injection System Function — DTC: 76 (P0170)
2	Except the above items (includes A/T items)

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Freeze Frame Data (Cont'd)

For example, the EGR malfunction was detected and the freeze frame data was stored in the 1st trip. After that when the misfire is detected in another trip, the freeze frame data will be updated from the EGR malfunction for the misfire.

GI

MA

EM

LC

EC

FE

CL

MT

AT

FA

RA

BR

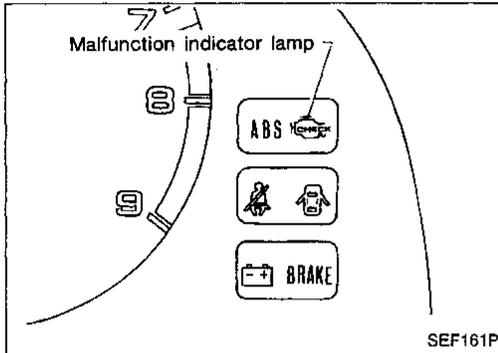
ST

BF

HA

EL

IDX



Malfunction Indicator Lamp (MIL)

- The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is for checking the blown lamp.
 - If the malfunction indicator lamp does not light up, see the WARNING LAMPS AND CHIME (BUZZER) in the EL section. (Or see EC-231.)
- When the engine is started, the malfunction indicator lamp should go off. If the lamp remains on, the on-board diagnostic system has detected an engine system malfunction.

ON-BOARD DIAGNOSTIC SYSTEM FUNCTION

The on-board diagnostic system has the following four functions.

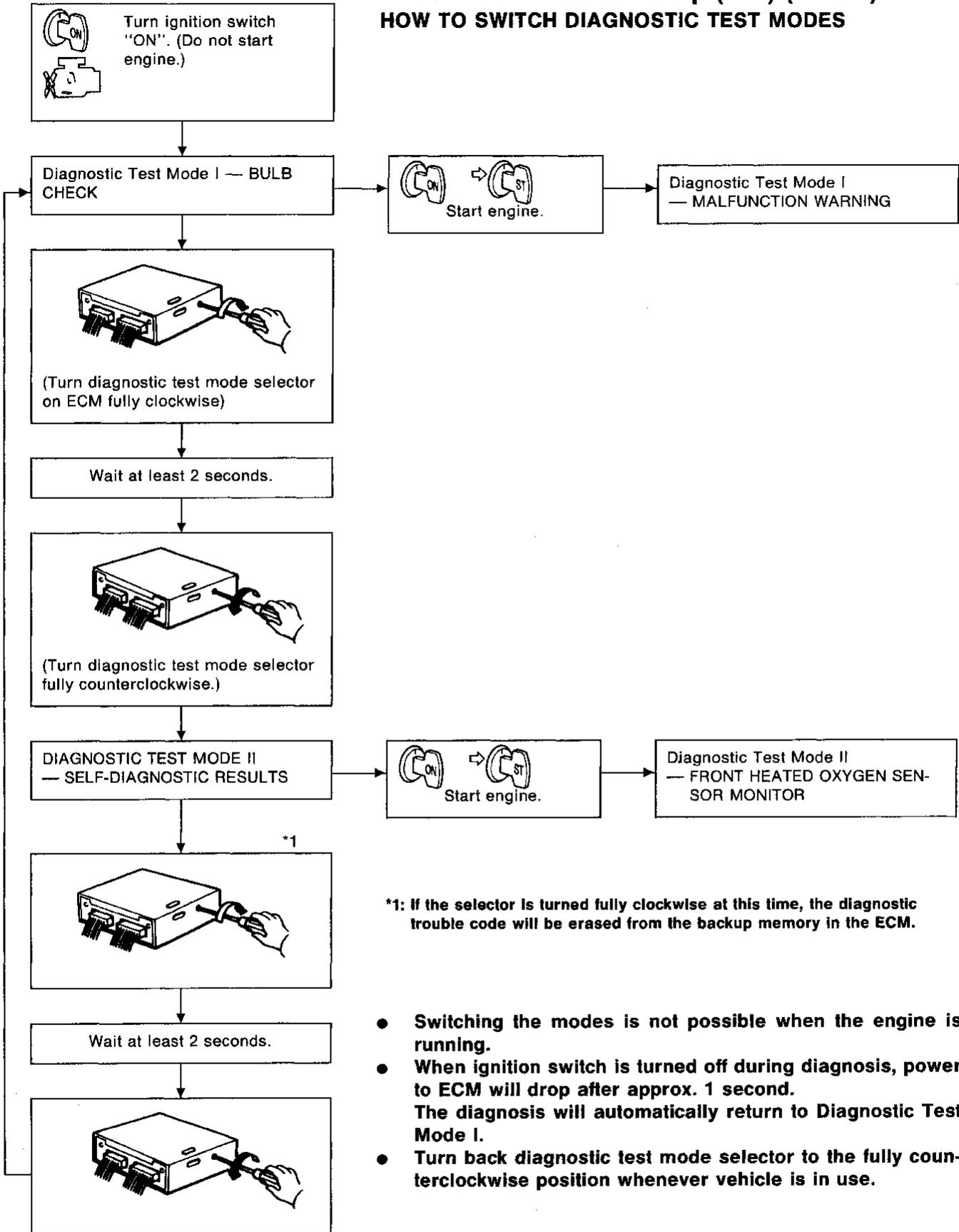
- BULB CHECK** : This function checks the bulb for damage (blown, open circuit, etc.) of the malfunction indicator lamp.
- MALFUNCTION WARNING** : This is a usual driving condition. When a malfunction is detected twice (2 trip detection logic), the malfunction indicator lamp will light up to inform the driver that a malfunction has been detected. Only the following malfunctions will light up or blink the MIL even in the 1st trip.
 - "Misfire (criterion which will damage three way catalyst)"
 - "Three way catalyst function"
- SELF-DIAGNOSTIC RESULTS** : By using this function, the diagnostic trouble codes can be read. (The detected items can be found out.)
- FRONT HEATED OXYGEN SENSOR MONITOR** : In this mode, the fuel mixture condition (lean or rich) monitored by front heated oxygen sensor can be read.

How to switch the diagnostic test (function) modes and details of the above functions are described later. (See page EC-36.)

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

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd) HOW TO SWITCH DIAGNOSTIC TEST MODES



ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

DIAGNOSTIC TEST MODE I—BULB CHECK

In this mode, the MALFUNCTION INDICATOR LAMP on the instrument panel should stay ON. If it remains OFF, check the bulb. (See the WARNING LAMPS AND CHIME in the EL section. Or see EC-231.)

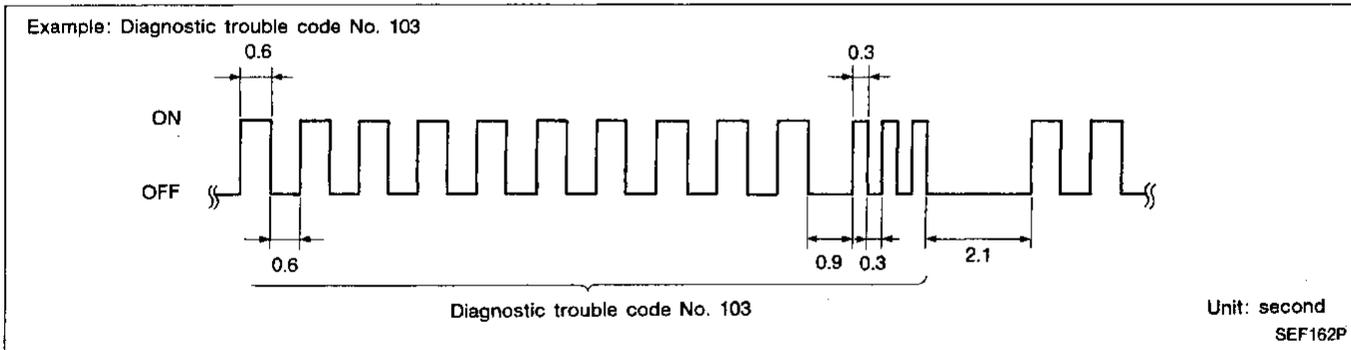
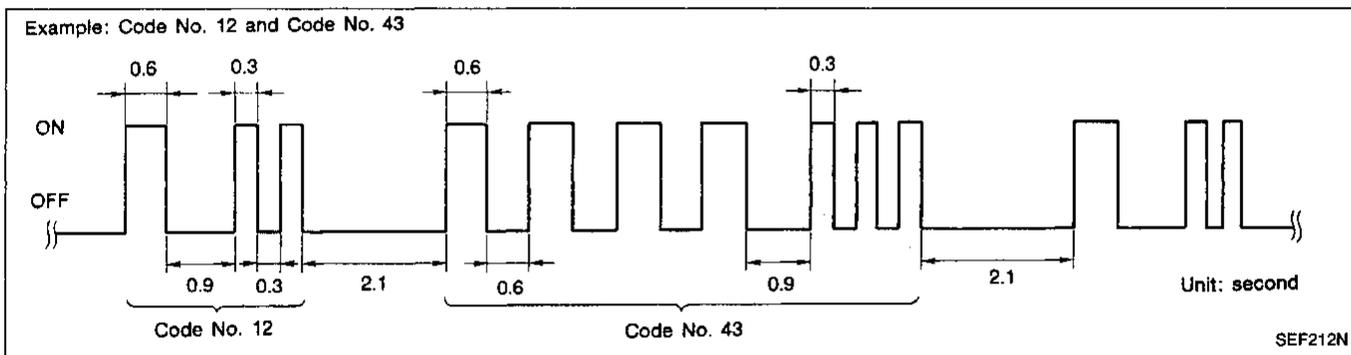
DIAGNOSTIC TEST MODE I—MALFUNCTION WARNING

MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction (The "1 trip" or "2 trip" is shown in the "MIL Illumination" of the "DTC Chart". See page EC-60.) is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction

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

DIAGNOSTIC TEST MODE II—SELF-DIAGNOSTIC RESULTS

In this mode, a diagnostic trouble code is indicated by the number of blinks of the MALFUNCTION INDICATOR LAMP as shown below.



Long (0.6 second) blinking indicates the number of ten digits, and short (0.3 second) blinking indicates the number of single digits. For example, the malfunction indicator lamp blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "103" and refers to the malfunction of the park/neutral position switch.

In this way, all the detected malfunctions are classified by their diagnostic trouble code numbers. The DTC "55" refers to no malfunction. (See DIAGNOSTIC TROUBLE CODE CHART, refer to page EC-60.)

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

The diagnostic trouble code can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)

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

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

DIAGNOSTIC TEST MODE II—FRONT HEATED OXYGEN SENSOR MONITOR

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

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

*: Maintains conditions just before switching to open loop.

To check the front heated oxygen sensor function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.

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

OBD System Operation Chart

RELATIONSHIP BETWEEN MIL, DTC, CONSULT AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the DTC and the freeze frame data will be stored in ECM.
- When the same malfunction is detected twice, MIL will automatically light up.
- MIL will go off automatically after 3 drivings without any malfunctions.
- The DTC and the freeze frame data will not be displayed any longer after 40 drivings (except for Misfire, Fuel Injection System), 80 drivings (for Misfire, Fuel Injection System) without the same malfunction.
- The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will be counted up in response to the number of drivings (pattern A or C) without the same malfunction.

SUMMARY CHART

Items	MIL (goes off)	DTC, Freeze Frame Data (goes off)	TIME in SELF-DIAG RESULTS (counts up)
Fuel Injection System	3 (pattern C)	80 (pattern B)	Pattern C
Misfire	3 (pattern C)	80 (pattern B)	Pattern C
Except the aboves	3 (pattern B)*1	40 (pattern A)	Pattern A

*1: Without any malfunctions except for Misfire, Fuel Injection System.

□: Without the same malfunction.

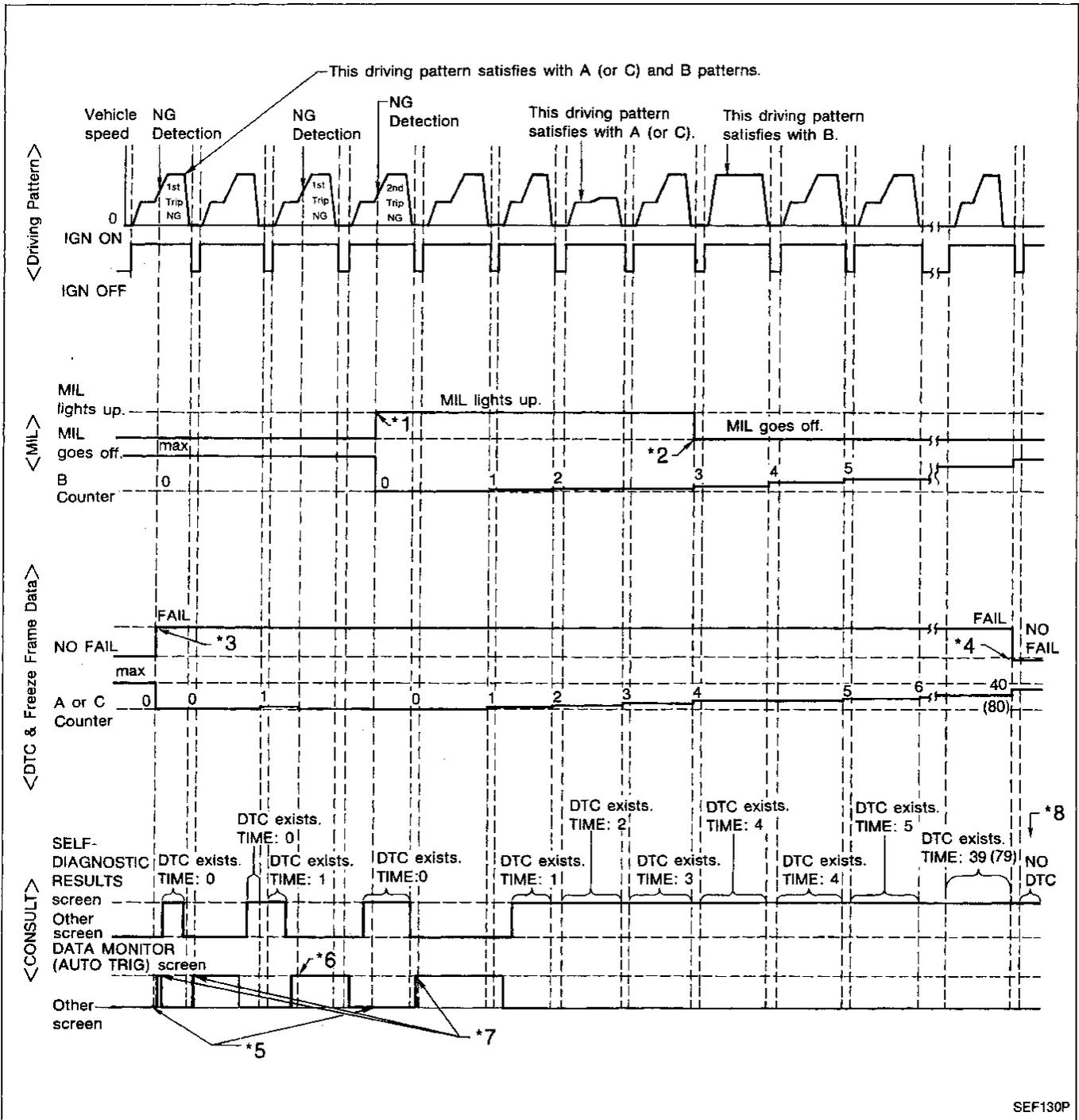
Pattern C = Pattern A + Freeze Frame Data

Details are explained next.

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OB D System Operation Chart (Cont'd)

Relationship between MIL, DTC, CONSULT and driving patterns



- *1: When the same malfunction is detected twice, MIL will automatically light up.
- *2: MIL will go off automatically after 3 drivings (pattern B: except for "Misfire", "Fuel Injection System", pattern C: for "Misfire", "Fuel Injection System") without any malfunctions.
- *3: When a malfunction is detected for the first time, the DTC and the freeze frame data will be stored in ECM.

- *4: <Except for "Misfire", "Fuel Injection System">
The DTC and the freeze frame data will not be displayed any longer after 40 drivings (pattern A) without the same malfunction.
<For "Misfire", "Fuel Injection System">
The DTC and the freeze frame data will not be displayed any longer after 80 drivings (pattern B) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)
- *5: Other screen except DATA MONITOR (AUTO TRIG) can not display the malfunction.
- *6: DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.
- *8: NO DTC

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBd System Operation Chart (Cont'd)

*7: The malfunction can not be displayed because the timing to set DATA MONITOR (AUTO TRIG) screen was missed against the NG detection.

*8: <Except for "Misfire", "Fuel Injection System">
The DTC and the freeze frame data will not be displayed any longer after 40 drivings (pattern A) without the same malfunction.

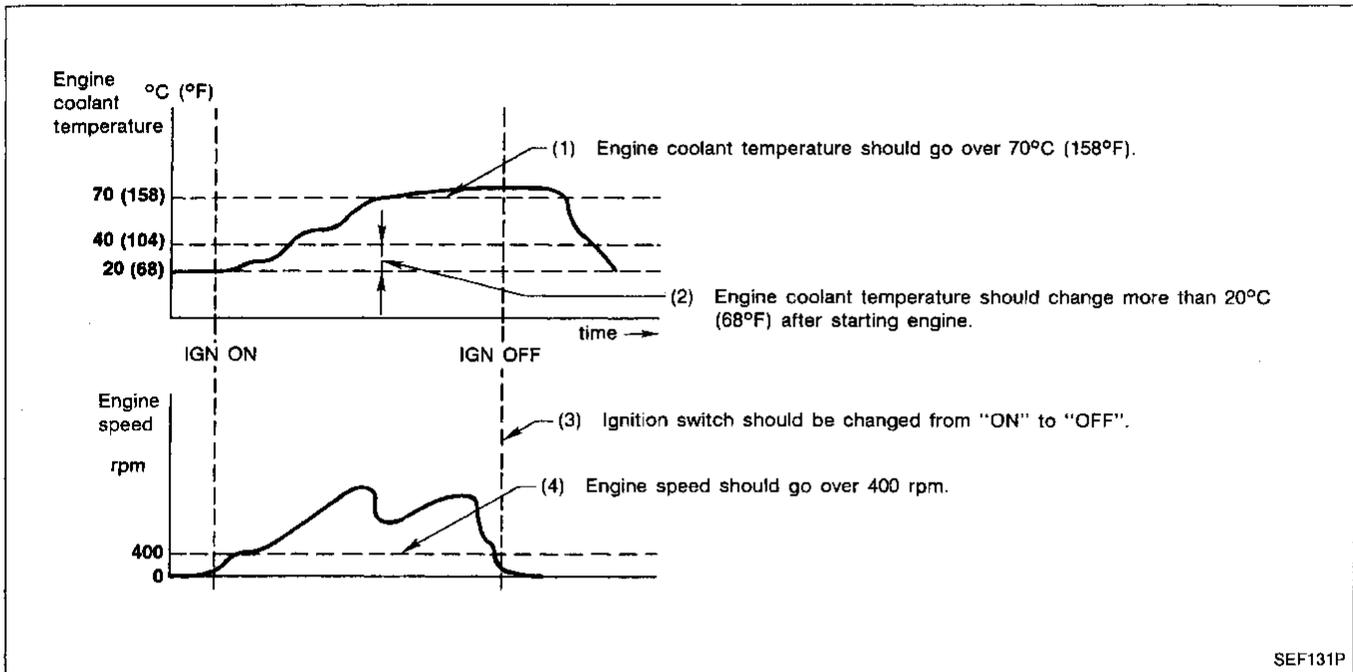
<For "Misfire", "Fuel Injection System">

The DTC and the freeze frame data will not be displayed any longer after 80 drivings (pattern B) without the same malfunction.

(The DTC and the freeze frame data still remain in ECM.)

EXPLANATION FOR DRIVING PATTERNS

<Driving pattern A> (Except for "Misfire", "Fuel Injection System")



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

<Driving pattern B>

Driving pattern B means the vehicle operation as follows:

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

- The B counter will be counted up when the driving pattern B is satisfied without the malfunction.
- The B counter will be cleared when the malfunction is detected twice regardless of the driving pattern.
- The MIL will go off when the B counter becomes 3. (Except for "Misfire", "Fuel Injection System".)
- The DTC will not be displayed any longer after the B counter becomes 80. (For "Misfire", "Fuel Injection System".)

<Driving pattern C> (For "Misfire", "Fuel Injection System".)

Driving pattern C means the vehicle operation as follows:

(1) Driving pattern A should be satisfied.

(2) The following condition should be satisfied:

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: $T \geq 70^\circ\text{C}$ (158°F), $T < 70^\circ\text{C}$ (158°F)

Example:

If the stored freeze frame data is as follows:

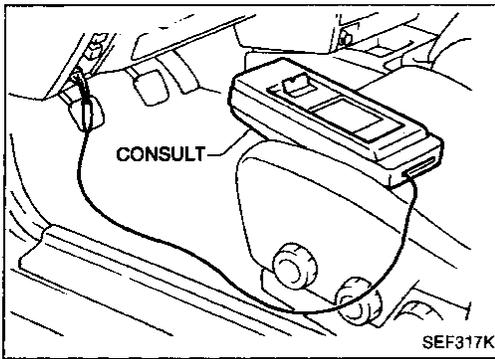
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

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 $\geq 70^\circ\text{C}$ (158°F)

- The C counter will be counted up when (1), (2) are satisfied without the malfunction.
- The C counter will be cleared when the malfunction is detected regardless of (1), (2).
- The MIL will go off when the C counter becomes 3.

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION



Consult

CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located behind the fuse box cover.)

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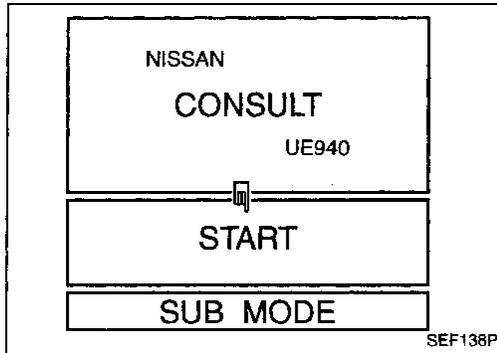
ST

BF

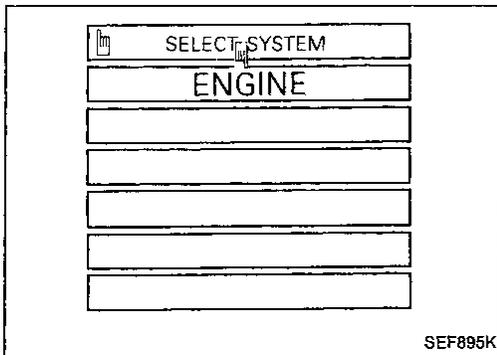
HA

EL

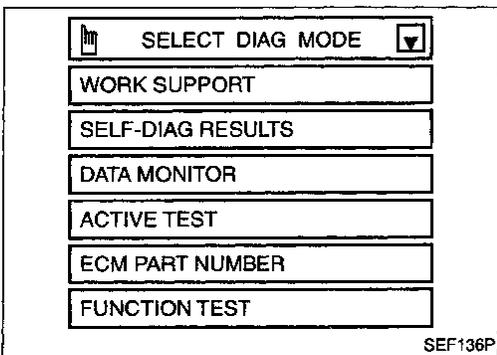
IDX



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

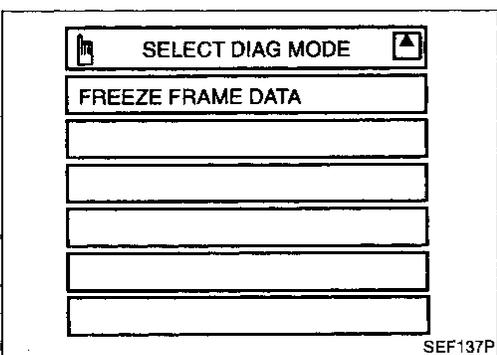


5. Touch "ENGINE".



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

For further information, see the CONSULT Operation Manual.



ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

ECCS COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE					
			WORK SUP-PORT	SELF-DIAG-NOSTIC RESULTS	DATA MON-ITOR	ACTIVE TEST	FUNC-TION TEST	FREEZE FRAME DATA
ECCS COMPONENT PARTS	INPUT	Camshaft position sensor		X	X			X
		Mass air flow sensor		X	X			
		Engine coolant temperature sensor		X	X	X		X
		Front heated oxygen sensor		X	X		X	
		Rear heated oxygen sensor		X	X			
		Vehicle speed sensor		X	X		X	X
		Throttle position sensor	X	X	X		X	
		EGR temperature sensor		X	X			
		Intake air temperature sensor		X	X			
		Crankshaft position sensor (OBD)		X				
		Knock sensor		X				
		Ignition switch (start signal)			X		X	
		Closed throttle position switch			X		X	
		Air conditioner switch			X			
		Park/Neutral position switch		X	X		X	
		Power steering oil pump switch			X		X	
		Air conditioner pressure switch			X			
	Battery voltage			X				
	OUTPUT	Injectors			X	X	X	
		Power transistor (Ignition timing)	X	X (Igni-tion sig-nal)	X	X	X	
		IACV-AAC valve	X	X	X	X	X	
		Air conditioner relay			X			
		Fuel pump relay	X		X	X	X	
		Cooling fan			X	X	X	
		EGR & canister control solenoid valve		X	X	X	X	
		Front heated oxygen sensor heater		X	X			
		Calculated load value			X			X

X: Applicable

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (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 unit.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECM part numbers	ECM part numbers can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".
Freeze frame data	ECM stores the driving condition at the moment a malfunction is detected, and the stored data can be read. [Regarding the details, refer to "Freeze Frame Data" (EC-34).]

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● IGN SW "ON" ● ENG NOT RUNNING ● ACC PEDAL NOT PRESSED 	When adjusting throttle position sensor initial position
IGNITION TIMING ADJ	<ul style="list-style-type: none"> ● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR. 	When adjusting initial ignition timing
IACV-AAC VALVE ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting idle speed
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line

GI

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ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

SELF-DIAGNOSTIC MODE

Regarding items detected in "SELF-DIAG RESULTS" mode, refer to "Diagnostic Trouble Code (DTC) chart" (See page EC-60.)

DATA MONITOR MODE

Monitored item [Unit]	ECM input sig- nals	Main sig- nals	Description	Remarks
CMPS-RPM (REF) [rpm]	○	○	<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor. 	<ul style="list-style-type: none"> The accuracy of detection 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.
MAS AIR/FL SE [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
FR O2 SENSOR [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the front heated oxygen sensor is displayed. 	
RR O2 SENSOR [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the rear heated oxygen sensor is displayed. 	
FR O2 MNTR [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.
RR O2 MNTR [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen downstream three way catalyst is relatively large. LEAN ... means the amount of oxygen downstream three way catalyst is relatively small. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
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. 	

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

Monitored item [Unit]	ECM input sig- nals	Main sig- nals	Description	Remarks	
BATTERY VOLT [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 		GI
THRTL POS SEN [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 		MA
EGR TEMP SEN [V]	<input type="radio"/>		<ul style="list-style-type: none"> The signal voltage of the EGR temperature sensor is displayed. 		EM
INT/A TEMP SE [°C] or [°F]	<input type="radio"/>		<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 		LC
START SIGNAL [ON/OFF]	<input type="radio"/>	<input type="radio"/>	<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. 	EC
CLSD THL/P SW [ON/OFF]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the closed throttle position switch signal. 		FE
AIR COND SIG [ON/OFF]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 		CL
P/N POSI SW [ON/OFF]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position switch signal. 		MT
PW/ST SIGNAL [ON/OFF]	<input type="radio"/>	<input type="radio"/>	<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. 		AT
IGNITION SW [ON/OFF]	<input type="radio"/>		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 		FA
A/C PRESS SW [ON/OFF]	<input type="radio"/>		<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioning triple-pressure switch (medium-pressure side) determined by the pressure of the air conditioning high pressure side. 		RA BR
INJ PULSE [msec]		<input type="radio"/>	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated. 	ST
B/FUEL SCHDL [msec]		<input type="radio"/>	<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. 		BF HA
IGN TIMING [BTDC]		<input type="radio"/>	<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. 	EL
IACV-AAC/V [%]		<input type="radio"/>	<ul style="list-style-type: none"> Indicates the idle air control valve (AAC valve) control value computed by ECM according to the input signals. 		IDX

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

Monitored item [Unit]	ECM input sig- nals	Main sig- nals	Description	Remarks
A/F ALPHA [%]		○	<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.
AIR COND RLY [ON/OFF]			<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signal) is indicated. 	
FUEL PUMP RLY [ON/OFF]			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
COOLING FAN [HI/LOW/OFF]			<ul style="list-style-type: none"> The control condition of the cooling fan (determined by ECM according to the input signal) is indicated. HI ... High speed operation LOW ... Low speed operation OFF ... Stop 	
EGRC SOL/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the EGR & canister control solenoid valve (determined by ECM according to the input signal) is indicated. ON ... EGR and canister purge operation cut-off OFF ... EGR and canister purge operation not cut-off 	
O2 SEN HEATER [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor's heater determined by ECM according to the input signals. 	
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	
ABSOL TH·P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 	
MASS AIRFLOW [gm/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor. 	
VOLTAGE [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	
PULSE [msec] or [Hz] or [%]			<ul style="list-style-type: none"> Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> Only "#" is displayed if item is unable to be measured. Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGMENT	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. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Fuel injectors ● Front heated oxygen sensor
IACV-AAC/V OPENING	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> ● Harness and connector ● IACV-AAC valve
ENG COOLANT TEMP	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Engine coolant temperature sensor ● Fuel injectors
IGNITION TIMING	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Adjust initial ignition timing
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. 	Engine runs rough or dies.	<ul style="list-style-type: none"> ● Harness and connector ● Compression ● Injectors ● Power transistor ● Spark plugs ● Ignition coils
COOLING FAN	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn the cooling fan "ON" and "OFF" using CONSULT. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> ● Harness and connector ● Cooling fan motor
FUEL PUMP RELAY	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound. 	Fuel pump relay makes the operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Fuel pump relay
EGRC SOLENOID VALVE	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
SELF-LEARNING CONT	<ul style="list-style-type: none"> ● In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen. 		

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ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

FUNCTION TEST MODE

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Displays the results of on-board diagnostic system. 	—		Objective system
CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.) 	Throttle valve: opened	OFF	<ul style="list-style-type: none"> ● Harness and connector ● Throttle position sensor (Closed throttle position switch) ● Throttle position sensor (Closed throttle position switch) adjustment ● Throttle linkage ● Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Throttle position sensor circuit is tested when throttle is opened and closed fully. 	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	<ul style="list-style-type: none"> ● Harness and connector ● Throttle position sensor ● Throttle position sensor adjustment ● Throttle linkage ● Verify operation in DATA MONITOR mode.
PARK/NEUT POSI SW CKT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Inhibitor/Neutral position switch circuit is tested when shift lever is manipulated. 	OUT OF N/P-RANGE	OFF	<ul style="list-style-type: none"> ● Harness and connector ● Neutral position switch/ Inhibitor switch ● Linkage + Inhibitor switch adjustment
		IN N/P-RANGE	ON	
FUEL PUMP CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched. 	There is pressure pulsation on the fuel feed hose.		<ul style="list-style-type: none"> ● Harness and connector ● Fuel pump ● Fuel pump relay ● Fuel filter clogging ● Fuel level
EGRC SOL/V CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● EGR & canister control solenoid valve circuit is tested by checking solenoid valve operating noise. 	The solenoid valve makes an operating sound every 3 seconds.		<ul style="list-style-type: none"> ● Harness and connector ● EGR & canister control solenoid valve
COOLING FAN CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Cooling fan circuit is tested when cooling fan is rotated. 	<ul style="list-style-type: none"> ● The cooling fan rotates and stops every 3 seconds. 		<ul style="list-style-type: none"> ● Harness and connector ● Cooling fan motor ● Cooling fan relay

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)	
START SIGNAL CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON → START ● Start signal circuit is tested when engine is started by operating the starter. Battery voltage and water temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed. 	Start signal: OFF → ON		<ul style="list-style-type: none"> ● Harness and connector ● Ignition switch 	GI MA EM LC
PW/ST SIGNAL CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine running) ● Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position. 	Locked position	ON	<ul style="list-style-type: none"> ● Harness and connector ● Power steering oil pressure switch ● Power steering oil pump 	EC FE
		Neutral position	OFF		CL
VEHICLE SPEED SEN CKT	<ul style="list-style-type: none"> ● Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher. 	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)		<ul style="list-style-type: none"> ● Harness and connector ● Vehicle speed sensor ● Electric speedometer 	MT AT
IGN TIMING ADJ	<ul style="list-style-type: none"> ● After warming up, idle the engine. ● Ignition timing adjustment is checked by reading ignition timing with a timing light and checking whether it agrees with specifications. 	The timing light indicates the same value on the screen.		<ul style="list-style-type: none"> ● Adjust ignition timing (by moving crankshaft position sensor or distributor) ● Camshaft position sensor drive mechanism 	FA RA BR
MIXTURE RATIO TEST	<ul style="list-style-type: none"> ● Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the front heated oxygen sensor output at 2,000 rpm under non-loaded state. 	● Front heated oxygen sensor COUNT: More than 5 times during 10 seconds		<ul style="list-style-type: none"> ● INJECTION SYS (Injector, fuel pressure regulator, harness or connector) ● IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector) ● VACUUM SYS (Intake air leaks) ● Front heated oxygen sensor circuit ● Front heated oxygen sensor operation ● Fuel pressure high or low ● Mass air flow sensor 	ST BF HA EL IDX

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	<ul style="list-style-type: none"> ● After warming up, idle the engine. ● Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multipoint fuel injection system is used.) 	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.	<ul style="list-style-type: none"> ● Injector circuit (Injector, harness or connector) ● Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector) ● Compression ● Valve timing
IACV-AAC/V SYSTEM	<ul style="list-style-type: none"> ● After warming up, idle the engine. ● IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%. 	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% (102 steps) and at 20% (25 steps).	<ul style="list-style-type: none"> ● Harness and connector ● IACV-AAC valve ● Air passage restriction between air inlet and IACV-AAC valve ● IAS (Idle adjusting screw) adjustment

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

FREEZE FRAME DATA

Freeze frame data item	Description	
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ECCS component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC (EC-59).] 	GI
FUEL SYS DATA	<ul style="list-style-type: none"> "Fuel injection system status" at the moment a malfunction is detected is displayed. One mode in the following is displayed. <ul style="list-style-type: none"> "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using heated oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop 	MA EM LC
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. 	EC
S-FUEL TRIM [%]	<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. 	FE
L-FUEL TRIM [%]	<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. 	CL
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> The engine speed at the moment a malfunction is detected is displayed. 	MT
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> The vehicle speed at the moment a malfunction is detected is displayed. 	AT
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ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Consult (Cont'd)

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

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

1. "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT screen in real time. In other words, DTC and malfunction item will be displayed automatically at the moment the malfunction is detected by ECM. DATA MONITOR can be performed continuously till a malfunction is detected. However, DATA MONITOR can not be continued any longer after the malfunction detection.

2. "MANU TRIG" (Manual trigger):

- DTC and malfunction item will not be displayed automatically on CONSULT screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected.

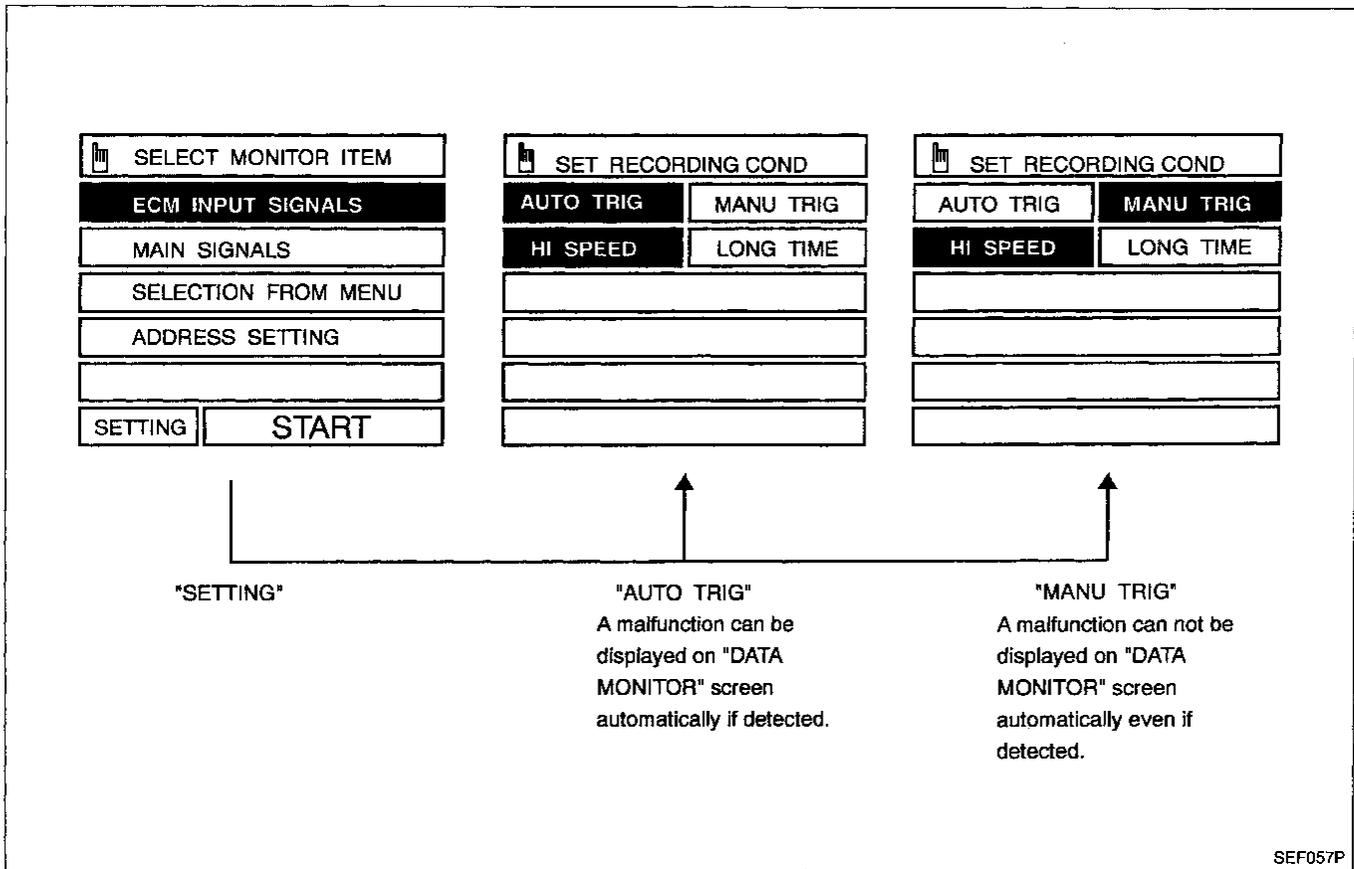
Utilize these trigger as follows:

1. "AUTO TRIG"

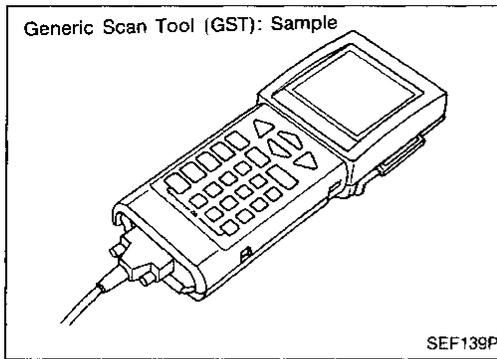
- While trying to detect the DTC by performing the "DTC DETECTING CONDITION", be sure to set to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT should be set in "DATA MONITOR (AUTO TRIG)" mode, especially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

2. "MANU TRIG"

- In case the malfunction is displayed whenever you look at the "DATA MONITOR" screen, it is inconvenient for you to monitor (investigate) the data of the suspicious parts. In such cases, 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 in the normal operating condition.



ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION



Generic Scan Tool (GST)

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has five different functions explained on the next page.

ISO9141 is used as the protocol.

The name "GST" or "Generic Scan Tool" is used in this service manual.

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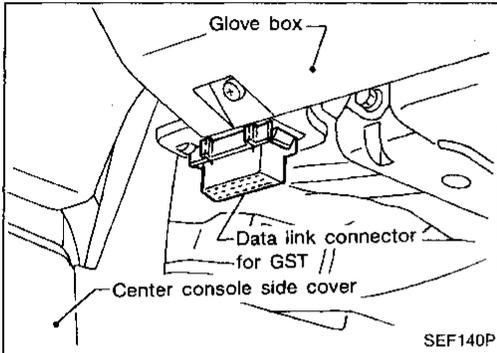
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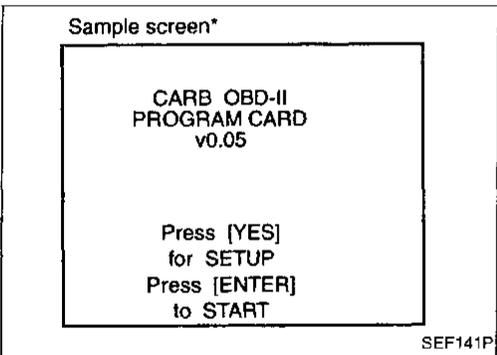
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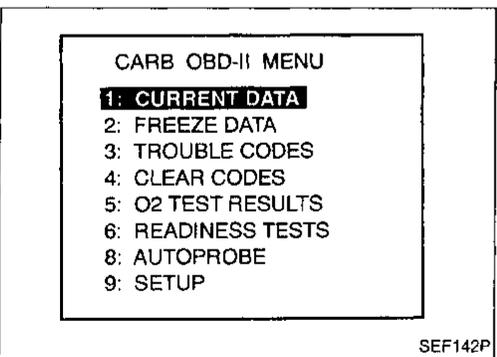
GST INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "GST" to data link connector for GST. (Data link connector for GST is located under the glove box.)



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

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



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

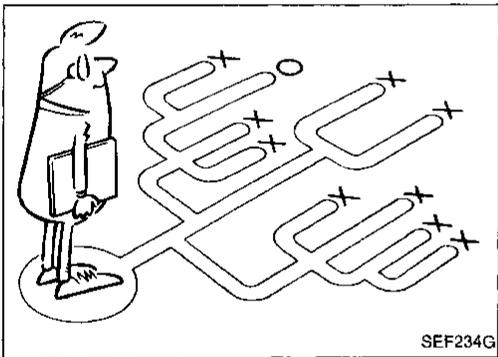
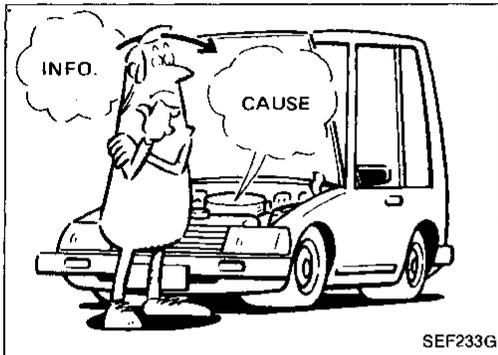
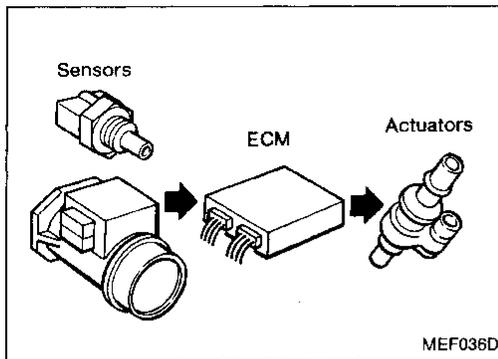
For further information, see the GST Operation Manual of the tool maker.

ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Generic Scan Tool (GST) (Cont'd)

FUNCTION

Diagnostic test mode		Function
MODE 1	(Current data)	This mode accesses 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 accesses to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-51).]
MODE 3	(Trouble codes)	This mode accesses to emission-related power train trouble codes which were stored by ECM.
MODE 4	(Clear codes)	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)● Clear heated oxygen sensor test data (MODE 5)● Reset status of system monitoring test (MODE 1)
MODE 5	(O2 test results)	This mode accesses to the on-board heated oxygen sensor monitoring test results.



Introduction

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both kinds of signals are proper and stable. At the same time, it is important that there are no conventional 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, so a road test with CONSULT (or GST) or a circuit tester connected to a suspected circuit should be performed.

Before checking, talk with the customer about driveability complaints. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present and under what conditions they occur.

Start your diagnosis by looking for "conventional" problems first. This is one of the best ways to troubleshoot driveability problems on an electronically controlled engine vehicle.

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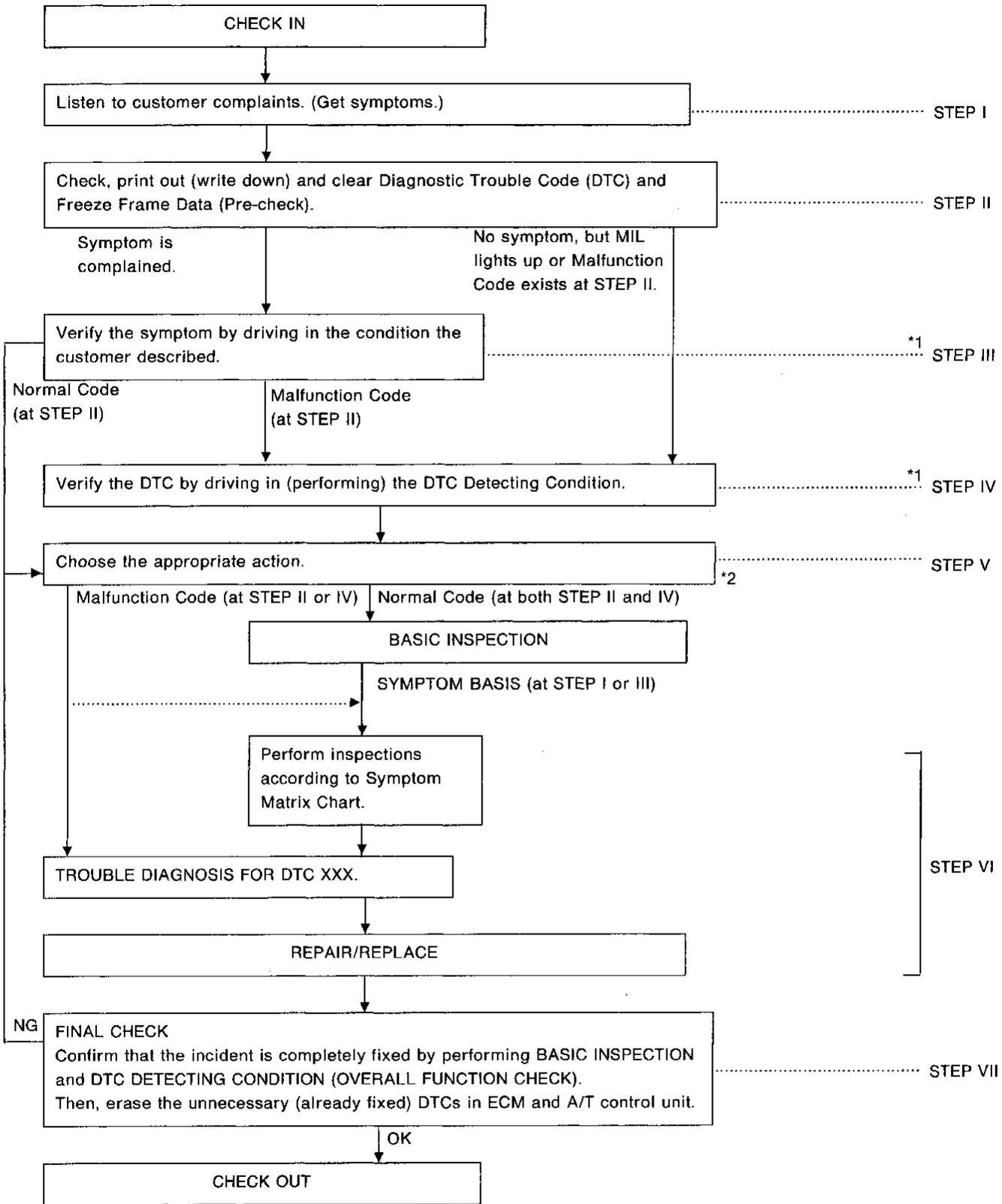
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TROUBLE DIAGNOSIS — General Description

Work Flow



*1: If the Incident cannot be duplicated, see "Incident Simulation Tests" of "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section.

*2: If the on-board diagnostic system cannot be performed, check main power supply and ground circuit (See TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-87).

TROUBLE DIAGNOSIS — General Description

Description for Work Flow

STEP	DESCRIPTION	
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET" as shown on the next page.	GI
STEP II	Before confirming the incident/symptom, check and write down (print out using CONSULT or Generic Scan Tool) the Diagnostic Trouble Code (DTC) and the freeze frame data, then erase the code and the data. (Refer to page EC-33.) The DTC and the freeze frame data can be utilized when duplicating the incident at STEP III & IV. Study the relationship between the incident cause, which is specified by DTC, and the incident/symptom the customer described. (The "Symptom Matrix Chart" will be useful. See page EC-73.)	MA EM
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. During the verification of the incident, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be duplicated, perform INCIDENT SIMULATION TESTS during the verification. (Refer to GI section.) If the malfunction code is detected at this stage, the STEP IV can be skipped and STEP V can be performed next.	LC EC FE
STEP IV	Try to detect the Diagnostic Trouble Code (DTC) by driving in (or performing) the "DTC Detecting Condition". Check and read the DTC and freeze frame data by using CONSULT or Generic Scan Tool. During the DTC verification, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be duplicated, perform INCIDENT SIMULATION TESTS during the verification. (Refer to GI section.) In case the "DTC DETECTING CONDITION" is not available, perform the "OVERALL FUNCTION CHECK" instead. The DTC cannot be displayed by this "CHECK", however, this simplified "CHECK" is effective enough to cover the "DTC DETECTING CONDITION". In other words, the "NG" result of the "CHECK" means the same as the DTC detection.	CL MT AT FA
STEP V	Perform the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC XX. If the normal code is indicated, proceed to the BASIC INSPECTION. (See page EC-70.) Then perform inspections according to the Symptom Matrix Chart. (See page EC-73.)	RA
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", and narrow down the possible causes. Gently shaking the related connectors, components or wiring harness with CONSULT set in "DATA MONITOR (AUTO TRIG)" mode will be effective in narrowing down possible causes. Checking the voltage of the related ECM terminals or monitoring the output data from the related sensors with CONSULT will also be effective in narrowing down possible causes. (See page EC-76.) Repair or replace the malfunction parts.	BR ST BF
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. Drive in (perform) the DTC Detecting Condition and confirm the normal code is detected. If the incident still exists 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) DTC in ECM and A/T control unit. (See EC-33.)	HA EL IDX

TROUBLE DIAGNOSIS — General Description

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

Items (CONSULT screen terms)	DTC		Reference page
	MIL*1	CONSULT GST*2	
*COOLANT TEMP SEN	98	P0125	EC-181
A/T 1ST SIGNAL	113	P0731	AT section
A/T 2ND SIGNAL	114	P0732	AT section
A/T 3RD SIGNAL	115	P0733	AT section
A/T 4TH SIG OR TCC	116	P0734	AT section
A/T COMM LINE	—	P0600	EC-194
A/T DIAG COMM LINE	84	P1605	EC-171
CAMSHAFT POSI SEN	11	P0340	EC-90
CLOSED LOOP	37	P0130	EC-139
COOLANT TEMP SEN	13	P0115	EC-99
CRANK P/S (OBD) COG	95	P1336	EC-177
CRANK POS SEN (OBD)	82	P0335	EC-167
CYL 1 MISFIRE	68	P0301	EC-150
CYL 2 MISFIRE	67	P0302	EC-150
CYL 3 MISFIRE	66	P0303	EC-150
CYL 4 MISFIRE	65	P0304	EC-150
ECM	31	P0605	EC-116
EGR SYSTEM	32	P0400	EC-117
EGR TEMP SENSOR	35	P1401	EC-133
EGRC SOLENOID/V	105	P1400	EC-190
EGRC-BPT VALVE	36	P0402	EC-137
ENGINE SPEED SIG	127	P0725	AT section
FLUID TEMP SENSOR	128	P0710	AT section
FR O2 SEN HEATER	91	P0135	EC-174
FRONT O2 SENSOR	33	P0130	EC-125
FUEL INJ SYSTEM	76	P0170	EC-157
IACV-AAC VALVE	25	P0505	EC-112
IGN SIGNAL-PRIMARY	21	P1320	EC-107
INHIBITOR SWITCH	111	P0705	AT section
INT AIR TEMP SEN	41	P0110	EC-140
KNOCK SENSOR	34	P0325	EC-130
LINE PRESSURE S/V	125	P0745	AT section
MASS AIR FLOW SEN	12	P0100	EC-94
OVERRUN CLUTCH S/V	123	P1760	AT section
PARK/NEUT POSI SW	103	P0705	EC-186
RANDOM MISFIRE	71	P0300	EC-150
REAR O2 SENSOR	77	P0136	EC-162
SHIFT SOLENOID/V A	118	P0750	AT section
SHIFT SOLENOID/V B	121	P0755	AT section
THROTTLE POSI SEN	43	P0120	EC-145
THRTL POSI SEN A/T	126	P1705	AT section
TOR CONV CLUTCH SV	124	P0740	AT section
TW CATALYST SYSTEM	72	P0420	EC-154
VEHICLE SPEED SEN	14	P0500	EC-103
VHCL SPEED SEN A/T	112	P0720	AT section

P NO. INDEX FOR DTC

DTC		Items (CONSULT screen terms)	Reference page
CONSULT GST*2	MIL*1		
P0100	12	MASS AIR FLOW SEN	EC-94
P0110	41	INT AIR TEMP SEN	EC-140
P0115	13	COOLANT TEMP SEN	EC-99
P0120	43	THROTTLE POSI SEN	EC-145
P0125	98	*COOLANT TEMP SEN	EC-181
P0130	37	CLOSED LOOP	EC-139
P0130	33	FRONT O2 SENSOR	EC-125
P0135	91	FR O2 SEN HEATER	EC-174
P0136	77	REAR O2 SENSOR	EC-162
P0170	76	FUEL INJ SYSTEM	EC-157
P0300	71	RANDOM MISFIRE	EC-150
P0301	68	CYL 1 MISFIRE	EC-150
P0302	67	CYL 2 MISFIRE	EC-150
P0303	66	CYL 3 MISFIRE	EC-150
P0304	65	CYL 4 MISFIRE	EC-150
P0325	34	KNOCK SENSOR	EC-130
P0335	82	CRANK POS SEN (OBD)	EC-167
P0340	11	CAMSHAFT POSI SEN	EC-90
P0400	32	EGR SYSTEM	EC-117
P0402	36	EGRC-BPT VALVE	EC-137
P0420	72	TW CATALYST SYSTEM	EC-154
P0500	14	VEHICLE SPEED SEN	EC-103
P0505	25	IACV-AAC VALVE	EC-112
P0600	—	A/T COMM LINE	EC-194
P0605	31	ECM	EC-116
P0705	103	PARK/NEUT POSI SW	EC-186
P0705	111	INHIBITOR SWITCH	AT section
P0710	128	FLUID TEMP SENSOR	AT section
P0720	112	VHCL SPEED SEN A/T	AT section
P0725	127	ENGINE SPEED SIG	AT section
P0731	113	A/T 1ST SIGNAL	AT section
P0732	114	A/T 2ND SIGNAL	AT section
P0733	115	A/T 3RD SIGNAL	AT section
P0734	116	A/T 4TH SIG OR TCC	AT section
P0740	124	TOR CONV CLUTCH SV	AT section
P0745	125	LINE PRESSURE S/V	AT section
P0750	118	SHIFT SOLENOID/V A	AT section
P0755	121	SHIFT SOLENOID/V B	AT section
P1320	21	IGN SIGNAL-PRIMARY	EC-107
P1336	95	CRANK P/S (OBD) COG	EC-177
P1400	105	EGRC SOLENOID/V	EC-190
P1401	35	EGR TEMP SENSOR	EC-133
P1605	84	A/T DIAG COMM LINE	EC-171
P1705	126	THRTL POSI SEN A/T	AT section
P1760	123	OVERRUN CLUTCH S/V	AT section

*1: These are controlled by NISSAN.

*2: These are prescribed by SAE J2012.

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF DIAG RESULTS" mode)	Malfunction is detected when ...
MIL	CONSULT GST		
11	P0340	Camshaft position sensor circuit (CAMSHAFT POSI SEN)	<ul style="list-style-type: none"> ● Either 1° or 180° signal is not entered to ECM for the first few seconds during engine cranking. ● Either 1° or 180° signal is not entered to ECM often enough while the engine speed is higher than the specified rpm. ● The relation between 1° and 180° signals is not in the normal range during the specified rpm.
12	P0100	Mass air flow sensor circuit (MASS AIR FLOW SEN)	<ul style="list-style-type: none"> ● An excessively high or low voltage is entered to ECM. ● Rationally incorrect voltage is entered to ECM, compared with the calculated value by camshaft position sensor signal and throttle position sensor signal.
13	P0115	Engine coolant temperature sensor circuit (COOLANT TEMP SEN)	<ul style="list-style-type: none"> ● An excessively high or low voltage from the sensor is entered to ECM.
14	P0500	Vehicle speed sensor circuit (VEHICLE SPEED SEN)	<ul style="list-style-type: none"> ● The almost 0 km/h (0 MPH) signal from the sensor is entered to ECM even when vehicle is driving.
21	P1320	Ignition signal circuit (IGN SIGNAL-PRIMARY)	<ul style="list-style-type: none"> ● The ignition signal in the primary circuit is not entered to ECM during engine cranking or running.
25	P0505	Idle speed control function (IACV-AAC VALVE)	<ul style="list-style-type: none"> ● The idle speed control function does not operate properly.
31	P0605	ECM (ECM)	<ul style="list-style-type: none"> ● ECM calculation function is malfunctioning.
32	P0400	EGR function (EGR SYSTEM)	<ul style="list-style-type: none"> ● The EGR flow is excessively low or high during the specified driving condition.
33	P0130	Front heated oxygen sensor circuit (FRONT O2 SENSOR)	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is entered to ECM. ● The voltage from the sensor is constantly approx. 0.3V. ● The maximum and minimum voltages from the sensor are not reached to the specified voltages. ● It takes more time for the sensor to respond between rich and lean than the specified time.
34	P0325 (*1)	Knock sensor circuit (KNOCK SENSOR)	<ul style="list-style-type: none"> ● An excessively low or high voltage from the sensor is entered to ECM.

*1: In case of Knock sensor, the freeze frame data will not be stored in ECM.
Knock sensor does not have the 2 trip detection logic, and will not light up the MIL.

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

Check Items (Possible Cause)	DTC *2 Detecting Condition Quick Ref.	*3 Overall Function Check	Fail Safe System	MIL Illumination	Reference Page	
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor ● Starting system circuit (EL section) 	RUNNING	—	—	2 trip	EC-90	GI MA EM LC
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor 	RUNNING	RUNNING	X	2 trip	EC-94	EC
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor 	IGN: ON	—	X	2 trip	EC-99	FE
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Vehicle speed sensor 	DRIVING	LIFTING	—	2 trip	EC-103	CL
<ul style="list-style-type: none"> ● Harness or connectors (The ignition primary circuit is open or shorted.) ● Power transistor unit ● Camshaft position sensor ● Camshaft position sensor circuit 	RUNNING	—	—	2 trip	EC-107	MT AT
<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is shorted.) ● IACV-AAC valve 	RUNNING	—	—	2 trip	EC-112	FA
<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is open.) ● IACV-AAC valve 	IGN: ON	—	—	2 trip	EC-112	RA
<ul style="list-style-type: none"> ● ECM (ECCS control module) 	IGN: ON	—	X	2 trip	EC-116	BR
<ul style="list-style-type: none"> ● EGR valve stuck closed, open or leaking ● Passage obstructed ● EGRC solenoid valve ● Tube leaking for EGR valve vacuum ● EGRC-BPT valve leaking 	—	RUNNING	—	2 trip	EC-117	ST BF
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Front heated oxygen sensor ● Injectors ● Intake air leaks ● Fuel pressure 	—	RUNNING	—	2 trip	EC-125	HA
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor 	RUNNING	—	—	—	EC-130	EL IDX

*2: This is Quick Reference of DIAGNOSTIC TROUBLE CODE DETECTING CONDITION.

Details are described in each TROUBLE DIAGNOSIS FOR DTC XXX.

Abbreviations are as follows:

IGN: ON : Turning the ignition switch ON is required for the ECM to detect a malfunction (if one exists).

RUNNING : Running engine is required for the ECM to detect a malfunction (if one exists).

LIFTING : Lifting up the vehicle, running engine and spinning wheels are required for the ECM.

DRIVING : Driving the vehicle in the specified pattern is required for the ECM.

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF DIAG RESULTS" mode)	Malfunction is detected when ...	
MIL	CONSULT GST			
35	P1401	EGR temperature sensor circuit (EGR TEMP SENSOR)	● An excessively low or high voltage from the sensor is entered to ECM, even when engine coolant temperature is low or high.	
36	P0402	EGRC-BPT valve function (EGRC-BPT VALVE)	● EGRC-BPT valve does not operate properly.	
37	P0130	Closed loop control (CLOSED LOOP)	● The closed loop control function does not operate even when vehicle is driving in the specified condition.	
41	P0110	Intake air temperature sensor circuit (INT AIR TEMP SEN)	● An excessively low or high voltage from the sensor is entered to ECM. ● Rationally incorrect voltage from the sensor is entered to ECM, compared with the voltage signal from engine coolant temperature sensor.	
43	P0120	Throttle position sensor circuit (THROTTLE POSI SEN)	● An excessively low or high voltage from the sensor is entered to ECM. ● Rationally incorrect voltage from the sensor is entered to ECM compared with the voltage signals from mass air flow sensor and camshaft position sensor.	
55	(P0000)	No failure (NO SELF DIAGNOSTIC FAILURE INDICATED...)	● No malfunction related to OBD system is detected by both ECM and A/T control unit.	
65	P0304	No. 4 cylinder's misfire (CYL 4 MISFIRE)	<Criterion A > The misfire occurs, which will damage three way catalyst by overheating.	<Criterion B > The misfire occurs, which will not damage three way catalyst but will affect emission deterioration.
66	P0303	No. 3 cylinder's misfire (CYL 3 MISFIRE)		
67	P0302	No. 2 cylinder's misfire (CYL 2 MISFIRE)		
68	P0301	No. 1 cylinder's misfire (CYL 1 MISFIRE)		
71	P0300	Multiple cylinders' misfire (RANDOM MISFIRE)		
72	P0420	Three way catalyst function (TW CATALYST SYSTEM)	● Three way catalyst does not operate properly. ● Three way catalyst does not have enough oxygen storage capacity.	
76	P0170	Fuel injection system function (FUEL INJ SYSTEM)	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is excessively large. (The mixture ratio is too lean or too rich.)	
77	P0136	Rear heated oxygen sensor circuit (REAR O2 SENSOR)	● An excessively high voltage from the sensor is entered to ECM. ● The maximum and minimum voltages from the sensor are not reached to the specified voltages. ● It takes more time for the sensor to respond between "rich" and "lean" than the specified time.	

*3: Overall Function Check is a simplified and effective method to cover the "DTC DETECTING CONDITION".

The DTC cannot be displayed by this Overall Function Check, however, the "NG" result of this means the same as the DTC detection.

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

Check Items (Possible Cause)	DTC Detecting Con- dition Quick Ref. *2	Overall Func- tion Check *3	Fail Safe System	MIL Illumination	Reference Page	
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● EGR temperature sensor 	RUNNING	—	—	2 trip	EC-133	GI MA
<ul style="list-style-type: none"> ● EGRC-BPT valve ● Rubber tube (obstructed or miscon- nected) 	—	RUNNING	—	2 trip	EC-137	EM
<ul style="list-style-type: none"> ● The front heated oxygen sensor circuit is open or shorted. ● Front heated oxygen sensor ● Front heated oxygen sensor heater 	—	RUNNING	—	2 trip	EC-139	LC
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor 	IGN: ON	—	—	2 trip	EC-140	EC
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor 	LIFTING	IGN: ON	X	2 trip	EC-145	FE CL
<ul style="list-style-type: none"> ● No failure 	—	—	—	—	—	MT
<ul style="list-style-type: none"> ● Improper spark plug ● The ignition secondary circuit is open or shorted. ● Insufficient compression ● Incorrect fuel pressure ● EGR valve ● The injector circuit is open or shorted. ● Injectors ● Intake air leak ● Lack of fuel ● Magnetized flywheel (drive plate) 	DRIVING	—	—	< Criterion A > 1 trip < Criterion B > 2 trip	EC-150	AT FA RA
<ul style="list-style-type: none"> ● Three way catalyst ● Front heated oxygen sensor ● Rear heated oxygen sensor ● Injector leak 	—	RUNNING	—	1 trip	EC-154	BR ST
<ul style="list-style-type: none"> ● Intake air leak ● Front heated oxygen sensor ● Injectors ● Exhaust gas leak ● Incorrect fuel pressure ● Mass air flow sensor ● Lack of fuel 	RUNNING	—	—	2 trip	EC-157	BF HA
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Rear heated oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks 	—	RUNNING (DRIVING)	—	2 trip	EC-162	EL IDX

*3: This is Quick Reference of Overall Function Check.

Details are described in each TROUBLE DIAGNOSIS FOR DTC XXX.

Abbreviations are as follows:

IGN: ON : Turning the ignition switch ON is required for checking the function of the sensor, switch, solenoid and circuit.

RUNNING : Running engine is required for checking the function of the sensor, switch, solenoid and circuit.

LIFTING : Lifting up the vehicle, running engine and spinning wheels are required.

DRIVING : Driving the vehicle in the specified pattern is required.

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF DIAG RESULTS" mode)	Malfunction is detected when ...
MIL	CONSULT GST		
82	P0335	Crankshaft position sensor (OBD) circuit [CRANK POS SEN (OBD)]	<ul style="list-style-type: none"> The proper pulse signal from the sensor is not entered to ECM while the engine is running with the specified rpm.
84	P1605	A/T diagnosis communication line (A/T DIAG COMM LINE)	<ul style="list-style-type: none"> An incorrect signal from A/T control unit is entered to ECM.
91	P0135	Front heated oxygen sensor's heater circuit (FR O2 SEN HEATER)	<ul style="list-style-type: none"> The current amperage in the heater circuit is out of the normal range. (The improper voltage drop signal is entered to ECM through the heater.)
95	P1336	Crankshaft position sensor (OBD) [CRANK P/S (OBD)-COG]	<ul style="list-style-type: none"> The chipping of the flywheel (drive plate) gear tooth (cog) is detected by ECM.
98	P0125	Engine coolant temperature sensor function (*COOLANT TEMP SEN)	<ul style="list-style-type: none"> Rationally incorrect voltage from the sensor is entered to ECM even when some time has passed after starting the engine. Engine coolant temperature is insufficient for closed loop fuel control.
103	P0705	Park/Neutral position switch circuit (PARK/NEUT POSI SW)	<ul style="list-style-type: none"> The signal of the park/neutral position switch is not changed in the process of engine starting and driving.
105	P1400	EGRC solenoid valve circuit (EGRC SOLENOID/V)	<ul style="list-style-type: none"> The improper voltage signal is entered to ECM through the solenoid valve.

X: Applicable

—: Not applicable

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

Check Items (Possible Cause)	DTC Detecting Condition Quick Ref. ^{*2}	Overall Func- tion Check ^{*3}	Fail Safe System	MIL Illumination	Refer- ence Page	
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open.) ● Crankshaft position sensor (OBD) 	RUNNING	—	—	2 trip	EC-167	GI MA
<ul style="list-style-type: none"> ● Harness or connectors (The communication line circuit is open or shorted.) ● Dead (Weak) battery 	RUNNING	—	—	2 trip	EC-171	EM LC
<ul style="list-style-type: none"> ● Harness or connectors (The heater circuit is open or shorted.) ● Front heated oxygen sensor's heater 	RUNNING	—	—	2 trip	EC-174	EC
<ul style="list-style-type: none"> ● Harness or connectors ● Crankshaft position sensor (OBD) ● Flywheel (Drive plate) 	RUNNING	—	—	2 trip	EC-177	FE CL
<ul style="list-style-type: none"> ● Harness or connectors (High resistance in the sensor circuit) ● Engine coolant temperature sensor ● Thermostat 	—	RUNNING	—	2 trip	EC-181	MT AT
<ul style="list-style-type: none"> ● Harness or connectors (The switch circuit is open or shorted.) ● Neutral position switch ● Inhibitor switch 	—	IGN: ON	—	2 trip	EC-186	FA
<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is open or shorted.) ● EGRC solenoid valve 	IGN: ON	IGN: ON	—	2 trip	EC-190	RA BR

Note: The dead (weak) battery will reduce the accuracy of the on-board diagnosis and may cause the MIL to light up without any malfunctions.

ST
BF
HA
EL
IDX

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

A/T RELATED ITEMS (Be sure to erase the DTC stored in ECM after the A/T related repair.)

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF DIAG RESULTS" mode)	Malfunction is detected when ...
MIL	CONSULT GST		
111	P0705	Inhibitor switch circuit (INHIBITOR SWITCH)	● A/T control unit does not receive the correct voltage signal from the switch based on the gear position.
112	P0720	Revolution sensor (VHCL SPEED SEN·A/T)	● A/T control unit does not receive the proper voltage signal from the sensor.
113	P0731	Improper shifting to 1st gear position (A/T 1ST SIGNAL)	● A/T can not be shifted to the 1st gear position even electrical circuit is good.
114	P0732	Improper shifting to 2nd gear position (A/T 2ND SIGNAL)	● A/T can not be shifted to the 2nd gear position even electrical circuit is good.
115	P0733	Improper shifting to 3rd gear position (A/T 3RD SIGNAL)	● A/T can not be shifted to the 3rd gear position even electrical circuit is good.
116	P0734	Improper shifting to 4th gear position or TCC (A/T 4TH SIGNAL OR TCC)	● A/T can not be shifted to the 4th gear position or perform lock-up even electrical circuit is good.
118	P0750	Shift solenoid valve A (SHIFT SOLENOID/V A)	● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
121	P0755	Shift solenoid valve B (SHIFT SOLENOID/V B)	● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
123	P1760	Overrun clutch solenoid valve (OVERRUN CLUTCH S/V)	● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
124	P0740	T/C clutch solenoid valve (TOR CONV CLUTCH SV)	● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
125	P0745	Line pressure solenoid valve (LINE PRESSURE S/V)	● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
126	P1705	Throttle position sensor (THRTL POSI SEN·A/T)	● A/T control unit receives an excessively low or high voltage from the sensor.
127	P0725	Engine speed signal (ENGINE SPEED SIG)	● A/T control unit does not receive the proper voltage signal from the ECM.
128	P0710	Fluid temperature sensor (FLUID TEMP SENSOR)	● A/T control unit receives an excessively low or high voltage from the sensor.
—	P0600	Signal circuit from A/T control unit to ECM (A/T COMM LINE)	● ECM receives incorrect voltage from A/T control unit continuously. * This can be detected only by "DATA MONITOR (AUTO TRIG)".

*2: DRIVING pattern 1-6 means as follows:

- Pattern 1 should meet b and c.
- Pattern 2 should meet a and c.
- Pattern 3 should meet a through e.
- Pattern 4 should meet a and b.
- Pattern 5 should meet a through c.
- Pattern 6 should meet a through d.

a: Selector lever is in "D" position.

b: Vehicle speed is over 10 km/h (6 MPH).

c: Throttle opening is over 1/8.

d: Engine speed is over 450 rpm.

e: A/T fluid temperature is 20 - 120°C (68 - 248°F).

*: For details, refer to each DTC DETECTING CONDITION in AT section.

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

Check Items (Possible Cause)	DTC *2 Detecting Condition Quick Ref.	Overall Function Check *3	Fail Safe System	MIL Illumination	Reference Page
<ul style="list-style-type: none"> ● Harness or connectors (The switch circuit is open or shorted.) ● Inhibitor switch 	DRIVING (pattern 1)	—	—	2 trip	See "Self-diagnosis", "TROUBLE DIAG- NOSES" in AT section.
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Revolution sensor 	DRIVING (pattern 2)	—	X	2 trip	
<ul style="list-style-type: none"> ● Shift solenoid valve A ● Shift solenoid valve B ● Overrun clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit 	DRIVING (pattern 3)	—	—	2 trip	
<ul style="list-style-type: none"> ● T/C clutch solenoid valve 					
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve A 	IGN: ON	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve B 	IGN: ON	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Overrun clutch solenoid valve 	IGN: ON	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● T/C clutch solenoid valve 	IGN: ON	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Line pressure solenoid valve 	IGN: ON	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor 	DRIVING (pattern 4)	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The signal circuit is open or shorted.) 	DRIVING (pattern 5)	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Fluid temperature sensor 	DRIVING (pattern 6)	—	X	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.) 	RUNNING	RUNNING	—	—	EC-194

GI
MA
EM
LC
EC
FE
CL
MT
AT
FA
RA
BR
ST
BF
HA
EL
IDX

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

INSPECTION PRIORITY

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"> ● ECM (31, P0605) ● Mass air flow sensor circuit (12, P0100) ● Throttle position sensor circuit (43, P0120) ● EGRC solenoid valve circuit (105, P1400) ● A/T diagnosis communication line (84, P1605) 	<ul style="list-style-type: none"> ● Camshaft position sensor circuit (11, P0340) ● Vehicle speed sensor circuit (14, P0500) ● Intake air temperature sensor circuit (41, P0110) ● Knock sensor circuit (34, P0325) 	<ul style="list-style-type: none"> ● Engine coolant temperature sensor circuit (13, P0115) (98, P0125) ● Ignition signal circuit (21, P1320) ● Park/Neutral position switch circuit (103, P0705) ● Signal circuit from A/T control unit to ECM (P0600)
2	<ul style="list-style-type: none"> ● EGR temperature sensor circuit (35, P1401) ● A/T related sensors, solenoid valves and switches (111-128) 	<ul style="list-style-type: none"> ● Crankshaft position sensor (OBD) circuit (82, P0335) (95, P1336) ● Front heated oxygen sensor's heater circuit (91, P0135) 	<ul style="list-style-type: none"> ● Front heated oxygen sensor circuit (33, P0130) ● Rear heated oxygen sensor circuit (77, P0136)
3	<ul style="list-style-type: none"> ● EGR function (32, P0400) ● EGRC-BPT valve function (36, P0402) ● IACV-AAC valve circuit (25, P0505) 	<ul style="list-style-type: none"> ● Misfire (65 - 71, P0304 - P0300) ● Closed loop control (37, P0130) ● Improper shifting (113 - 116, P0731 - P0734) 	<ul style="list-style-type: none"> ● Fuel injection system function (76, P0170) ● Three way catalyst function (72, P0420)

TROUBLE DIAGNOSIS — General Description

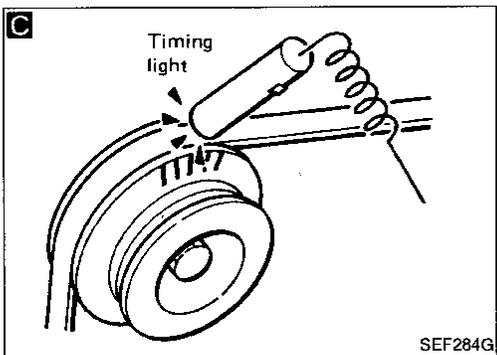
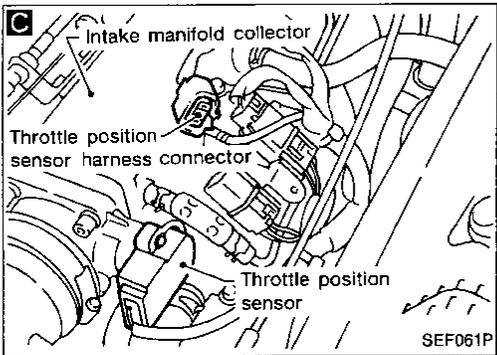
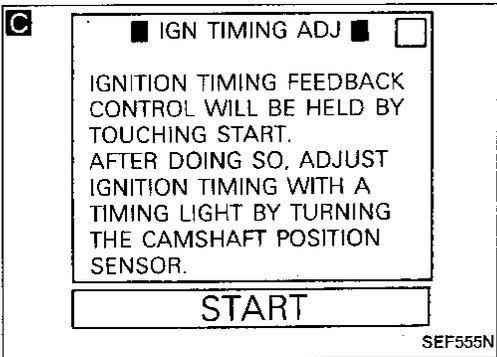
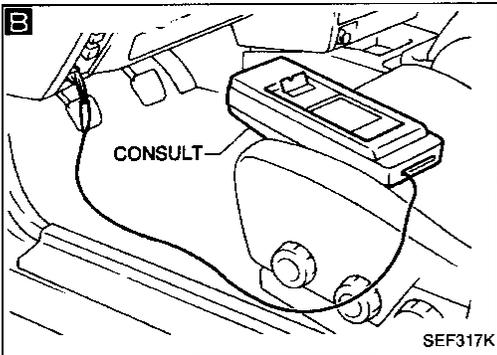
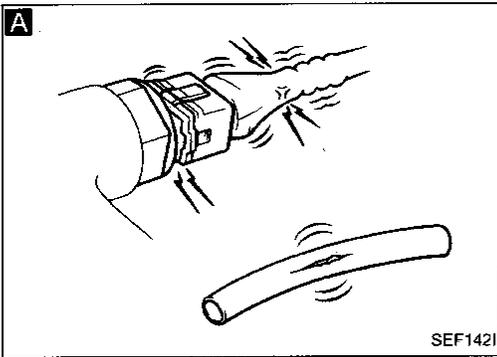
Fail-Safe Chart

The ECM enters fail-safe mode, if any of the following DTCs is recorded due to the open or short circuit.

DTC No.		Detected items	Engine operating condition in fail-safe mode														
MIL	CONSULT GST																
12	P0100	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.														
13	P0115	Engine coolant temperature sensor circuit	<p>Engine coolant temperature will be determined based on the time after turning ignition switch "ON" or "START".</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Engine coolant temperature decided</th> </tr> </thead> <tbody> <tr> <td>Just as ignition switch is turned ON or Start</td> <td style="text-align: center;">40°C (104°F)</td> </tr> <tr> <td>More than 4 minutes after ignition ON or Start</td> <td style="text-align: center;">80°C (176°F)</td> </tr> <tr> <td>Except as shown above</td> <td style="text-align: center;">40 - 80°C (104 - 176°F) (Depends on the time)</td> </tr> </tbody> </table>	Condition	Engine coolant temperature decided	Just as ignition switch is turned ON or Start	40°C (104°F)	More than 4 minutes after ignition ON or Start	80°C (176°F)	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)						
Condition	Engine coolant temperature decided																
Just as ignition switch is turned ON or Start	40°C (104°F)																
More than 4 minutes after ignition ON or Start	80°C (176°F)																
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)																
43	P0120	Throttle position sensor circuit	<p>Throttle position will be determined based on the injected fuel amount and the engine speed.</p> <p>Therefore, acceleration will be poor.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Driving condition</th> </tr> </thead> <tbody> <tr> <td>When engine is idling</td> <td style="text-align: center;">Normal</td> </tr> <tr> <td>When accelerating</td> <td style="text-align: center;">Poor acceleration</td> </tr> </tbody> </table>		Driving condition	When engine is idling	Normal	When accelerating	Poor acceleration								
	Driving condition																
When engine is idling	Normal																
When accelerating	Poor acceleration																
—	—	Start signal circuit	<p>If the ECM always receives a start signal, the ECM will judge the start signal "OFF" when engine speed is above 1,000 rpm.</p> <p>This prevents extra enrichment.</p> <p>After the engine speed is below 200 rpm, start-up enrichment will be allowed until the engine speed reaches 1,000 rpm.</p>														
—	—	ECM	<p>Fail-safe system activating condition when ECM is malfunctioning</p> <p>The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates, i.e. if the ECM detects a malfunction condition in the CPU of ECM, the MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver.</p> <p>Engine control, with fail-safe system, operates when ECM is malfunctioning</p> <p>When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, IACV-AAC valve operation and cooling fan operation are controlled under certain limitations.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Operation</th> </tr> </thead> <tbody> <tr> <td>Engine speed</td> <td>Engine speed will not rise more than 3,000 rpm.</td> </tr> <tr> <td>Fuel injection</td> <td>Simultaneous multiport fuel injection system</td> </tr> <tr> <td>Ignition timing</td> <td>Ignition timing is fixed at the preset value.</td> </tr> <tr> <td>Fuel pump</td> <td>Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.</td> </tr> <tr> <td>IACV-AAC valve</td> <td style="text-align: center;">Full open</td> </tr> <tr> <td>Cooling fans</td> <td>Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.</td> </tr> </tbody> </table>		Operation	Engine speed	Engine speed will not rise more than 3,000 rpm.	Fuel injection	Simultaneous multiport fuel injection system	Ignition timing	Ignition timing is fixed at the preset value.	Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.	IACV-AAC valve	Full open	Cooling fans	Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.
	Operation																
Engine speed	Engine speed will not rise more than 3,000 rpm.																
Fuel injection	Simultaneous multiport fuel injection system																
Ignition timing	Ignition timing is fixed at the preset value.																
Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.																
IACV-AAC valve	Full open																
Cooling fans	Cooling fan relay "ON" (High speed condition) when engine is running, and "OFF" when engine stalls.																

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Basic Inspection



A

BEFORE STARTING

1. Check service records for recent repairs of related problems, or the current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for proper connections
 - Vacuum hoses for splits, kinks, and proper connections
 - Wiring for proper connections, pinches, and cuts

B

CONNECT CONSULT TO THE VEHICLE

Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. (Refer to page EC-41.)

DOES ENGINE START?

No → Go to **E**

Yes

Warm up engine sufficiently.

C

CHECK IGNITION TIMING.

1. Start engine.
2. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
3. After touching "START", check ignition timing at idle using timing light.

Ignition timing:
15° ± 2° BTDC

OR

NG → Adjust ignition timing by turning camshaft position sensor.

1. Disconnect throttle position sensor harness connector.
2. Check ignition timing at idle using timing light.

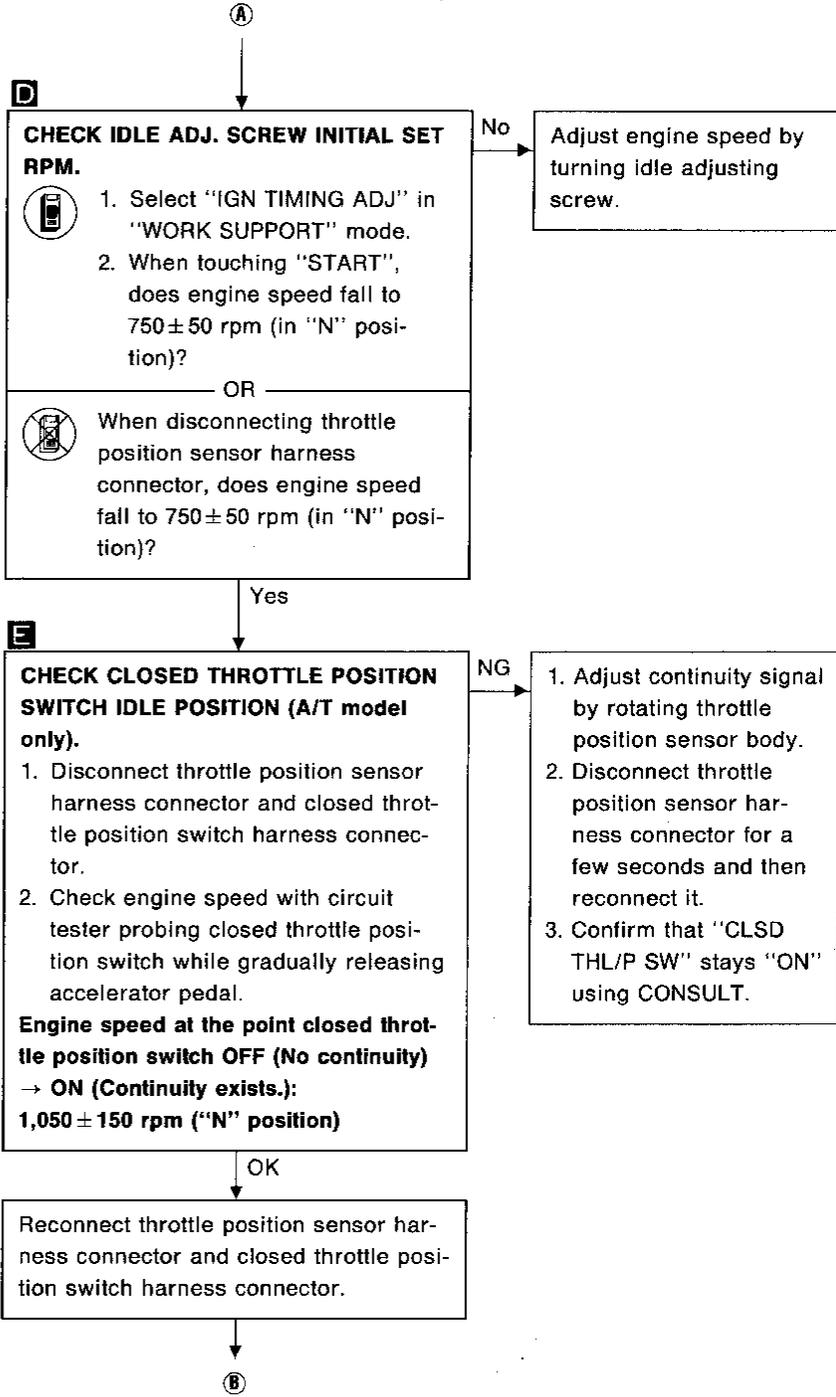
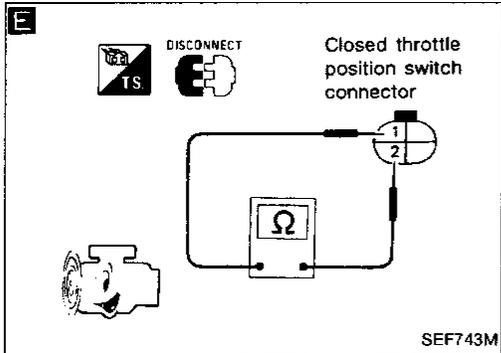
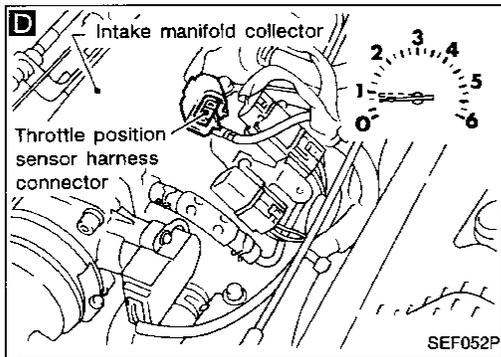
Ignition timing:
15° ± 2° BTDC

OK

(Go to **A** on next page.)

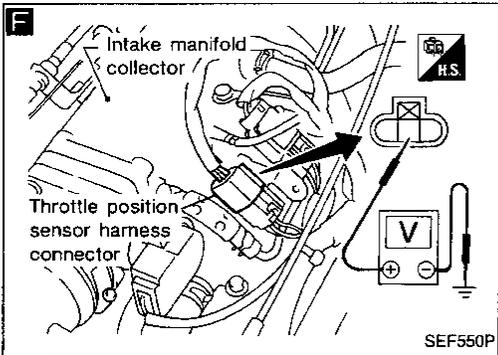
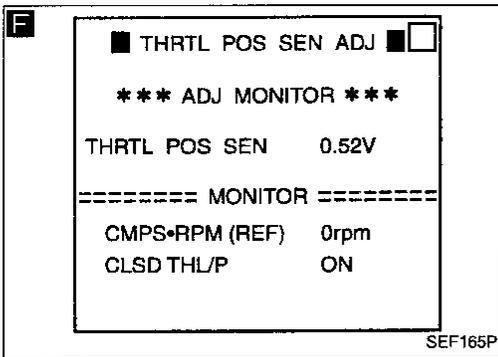
TROUBLE DIAGNOSIS — General Description

Basic Inspection (Cont'd)



TROUBLE DIAGNOSIS — General Description

Basic Inspection (Cont'd)



⑧

CHECK THROTTLE POSITION SENSOR IDLE POSITION (M/T model only).

1. Perform "THRTL POS SEN ADJ" in "WORK SUPPORT" mode.

2. Check that output voltage of throttle position sensor is 0.35 to 0.65V. (Throttle valve fully closes.) and "CLSD THL/P SW" stays "ON".

NG

1. Adjust output voltage by rotating throttle position sensor body.
2. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.
3. Confirm that "CLSD THL/P SW" stays "ON".

OR

2. Measure output voltage of throttle position sensor using voltmeter, and check that it is 0.35 to 0.65V. (Throttle valve fully closed.)

OK

1. Turn ignition switch "OFF" and wait at least 3 seconds.
2. Disconnect throttle position sensor harness connector.
3. Turn ignition switch "ON".
4. Reconnect throttle position harness connector. Then turn ignition switch "OFF".

CHECK IDLE SPEED

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

OR

2. Check idle speed.

M/T = 800 ± 50 rpm

A/T = 800 ± 50 rpm (in "N" position)

NG

Adjust idle speed. (See page EC-25.)

OK

INSPECTION END

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart

SYSTEM — Basic engine control system		SYMPTOM														Reference page			
		HARD/NO START (COLD)	HARD/NO RE-START (HOT)	ROUGH IDLE	ENGINE STALL	HESITATION/FLAT SPOT/SURGE	LACK OF POWER/POOR ACCELERATION	NO RETURN TO IDLE/HIGH IDLE	SPARK KNOCK (PINGING)	BACK FIRE	AFTER FIRE	ENGINE RUN ON (DIESELING)	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	OVERHEATS		OVERCOOLS	OVERCHARGING	BATTERY DEAD (UNDER CHARGE)
		1A	1B	1C	1F	1H	1R	1S	1M	1J	1L	1K	1T	1V	1N		1P	1X	1Y
Fuel	Fuel pump circuit	●	●	○	●	●	●	○	○	○	○	○	○	○	○	○	○	EC-202	
	Fuel pressure regulator system	●	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	EC-23	
	Injector circuit	●	●	●	●	●	●	○	○	○	○	●	○	○	○	○	○	EC-197	
	Evaporative emission system	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	EC-19	
Air	Positive crankcase ventilation system	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	EC-21	
	IACV-Air regulator circuit	●	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○	EC-224	
	Incorrect idle speed adjustment	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	EC-25	
	IACV-AAC valve circuit	●	○	●	●	●	●	○	○	○	○	●	○	○	○	○	○	EC-112	
Ignition	IACV-FICD solenoid valve circuit	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	EC-227	
	Incorrect ignition timing adjustment	○	○	●	○	●	●	○	○	○	○	●	○	○	○	○	○	EC-25	
EGR	Ignition circuit	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	EC-107	
	EGR & canister control solenoid valve circuit	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	EC-190	
	EGR system	○	○	●	○	●	○	○	○	○	○	○	○	○	○	○	○	EC-117	
	Main power supply and ground circuit	●	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	EC-87	
Cooling	Cooling fan circuit	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	EC-207	
	Air conditioner circuit	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	HA section	

● ; High Possibility Item
○ ; Low Possibility Item

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TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (Cont'd)

SYSTEM — ECCS system		SYMPTOM														Reference page			
		HARD/NO START (COLD)	HARD/NO RE-START (HOT)	ROUGH IDLE	ENGINE STALL	HESITATION/FLAT SPOT/SURGE	LACK OF POWER/POOR ACCELERATION	NO RETURN TO IDLE/HIGH IDLE	SPARK KNOCK (PINGING)	BACK FIRE	AFTER FIRE	ENGINE RUN ON (DIESELING)	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	OVERHEATS		OVERCOOLS	OVERCHARGING	BATTERY DEAD (UNDER CHARGE)
		1A	1B	1C	1F	1H	1R	1S	1M	1J	1L	1K	1T	1V	1N		1P	1X	1Y
ECCS	Camshaft position sensor circuit	●	○	●	●	●	●	●	○	○	○	○	○	○	○	○	○	EC-90	
	Mass air flow sensor circuit	●	○	●	●	●	●	○	○	○	○	●	○	○	○	○	○	EC-94	
	Front heated oxygen sensor circuit			●	○	●	●	○	○	○	○	●	○	○	○	○	○	EC-125	
	Engine coolant temperature sensor circuit	●	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	EC-99, 181	
	Throttle position sensor circuit			●	●	●	●	○				●						EC-145	
	Incorrect throttle position sensor adjustment			○	●	○	○	●			○	○						EC-25	
	Vehicle speed sensor circuit				○	○	○					○						EC-103	
	Knock sensor circuit				●	○		○				○						EC-130	
	ECM	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	EC-116, 69	
	Start signal circuit	○	○															EC-200	
Park/Neutral position switch circuit			○		○	○					○						EC-186		
Power steering oil pressure switch circuit			○	○													EC-221		

● ; High Possibility Item
○ ; Low Possibility Item

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (Cont'd)

SYSTEM — Engine mechanical & other		SYMPTOM																	Reference page	
		HARD/NO START (COLD)	HARD/NO RE-START (HOT)	ROUGH IDLE	ENGINE STALL	HESITATION/FLAT SPOT/SURGE	LACK OF POWER/POOR ACCELERATION	NO RETURN TO IDLE/HIGH IDLE	SPARK KNOCK (PINGING)	BACK FIRE	AFTER FIRE	ENGINE RUN ON (DIESELING)	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	OVERHEATS	OVERCOOLS	OVERCHARGING	BATTERY DEAD (UNDER CHARGE)		
		1A	1B	1C	1F	1H	1R	1S	1M	1J	1L	1K	1T	1V	1N	1P	1X	1Y		
Fuel	Fuel tank	○	○		○														—	EC
	Fuel piping	●	○	○	○	○	○		○	○	○		○							
	Vapor lock		○	○	○	○	○													
	Valve deposit	○	○	○	○	○	○		○	○			○							
	Poor fuel (Heavy weight gasoline, Low octane)	○	○	○	○	○	○		○	○		○							—	FE
Air	Air duct			○	○	○	○													
	Air cleaner			○	○	○	○					○								
	Air leakage from air duct (Mass air flow sensor — throttle body)	○	○	○	○	○	○	○	○	○			○							
	Throttle body, Throttle wire	○		○	○	○	○	○					○							
	Air leakage from intake manifold/Collector/Gasket	●	●	●	●	●	●	○	○	○			●							
Cranking	Battery	○	○	○	○	○	○					○					○	○	—	AT
	Alternator circuit	○	○	○	○	○	○					○					○	○		
	Starter circuit	●	○																	
	Flywheel	●	○																	
	Clutch interlock switch	●	○																	
	Inhibitor switch	●	○																	
	Theft warning circuit	○	○																	
Engine	Cylinder head	○	○	○	○	○	○		○	○		○							—	BR
	Cylinder head gasket	○	○	○	○	○	○		○			○	○	○						
	Cylinder block	●	○	○	●	○	○		○			○	○	○						
	Piston	○	○	○	○	○	○		○			○	○	○						
	Piston ring	○	○	○	○	○	○		○			○	○	○						
	Connecting rod	○	○	○	○	○	○		○			○	○	○						
	Bearing	○	○	○	○	○	○		○			○	○	○						
	Crankshaft	○	○	○	○	○	○		○			○	○	○						
Valve mechanism	Timing chain	●	○	○	●	○	○		○	○		○							—	BF
	Camshaft	○	○	●	●	○	○		○			○								
	Intake valve	○	○	○	○	○	○		○	○		○	○							
	Exhaust valve	○	○	○	○	○	○		○		○	○	○							
	Hydraulic lash adjuster			●	●	●	○		○	○		○								
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	○	○	●	○	●	○		○	○	○								—	HA
	Three way catalytic converter	○	○	○	○	○	○		○	○	○									
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	●	○	●	●	○	○		○			○	○						—	EL
	Oil level (Low)/Filthy oil	○	○	○	○	○	○		○			○	○							
Cooling	Radiator/Hose/Radiator filler cap	○	○	○	○	○	○		○			○		○					—	IDX
	Thermostat	○	○	○	○	○	○	○	○			○		○	○					
	Water pump	○	○	○	○	○	○		○			○		○	○					
	Water gallery	○	○	○	○	○	○		○			○		○	○					
	Cooling fan	○	○	○	○	○	○	○	○			○		○	○					
	Coolant level (low)/Contaminated coolant	○	○	○	○	○	○		○			○		○	○					

● ; High Possibility Item
○ ; Low Possibility Item

Consult Reference Value in Data Monitor Mode

Remarks:

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

MONITOR ITEM	CONDITION		SPECIFICATION
CMPS-RPM (REF)	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT value. 		Almost the same speed as the CONSULT value.
MAS AIR/FL SE	<ul style="list-style-type: none"> ● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load 	Idle	1.3 - 1.7V
		2,000 rpm	1.7 - 2.1V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 		More than 70°C (158°F)
FR O2 SENSOR	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
RR O2 SENSOR	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 ↔ Approx. 1.5V
RR O2 MNTR			LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT value 		Almost the same speed as the CONSULT value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 		11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	Throttle valve fully closed	0.35 - 0.65V
		Throttle valve fully opened	Approx. 4.0V
EGR TEMP SEN	<ul style="list-style-type: none"> ● Engine: After warming up 		Less than 4.5V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START 		OFF → ON
CLSD THL/P SW	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	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 	A/C switch "OFF"	OFF
		A/C 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

TROUBLE DIAGNOSIS — General Description

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

MONITOR ITEM	CONDITION		SPECIFICATION	
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF	GI
		The steering wheel is turned	ON	
IGNITION SW	● Ignition switch ON → OFF		ON → OFF	MA
A/C PRESS SW	● A/C high pressure side: Increasing to 1,422 - 1,618 kPa (14.5 - 16.5 kg/cm ² , 206 - 235 psi)		ON	EM
	● A/C high pressure side: Except above		OFF	
INJ PULSE	● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load	Idle	2.4 - 3.2 msec.	LC
		2,000 rpm	1.9 - 2.8 msec.	
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec	EC
		2,000 rpm	0.7 - 1.3 msec	
IGN TIMING	ditto	Idle	15° BTDC	FE
		2,000 rpm	More than 25° BTDC	
IACV-AAC/V	ditto	Idle	20 - 40%	CL
		2,000 rpm	—	
A/F ALPHA	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	53 - 155%	MT
AIR COND RLY	● Air conditioner switch OFF → ON		OFF → ON	AT
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds)		ON	FA
	Except as shown above		OFF	RA
COOLING FAN	● After warming up engine, idle the engine. ● A/C switch "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF	BR
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW	ST
		Engine coolant temperature is 105°C (221°F) or more	HIGH	BF
EGRC SOL/V	● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load	Idle	ON	HA
		2,000 rpm	OFF	EL
O2 SEN HEATER	● Engine speed: Idle		ON	IDX
	● Engine speed: Above 3,200 rpm		OFF	

TROUBLE DIAGNOSIS — General Description

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

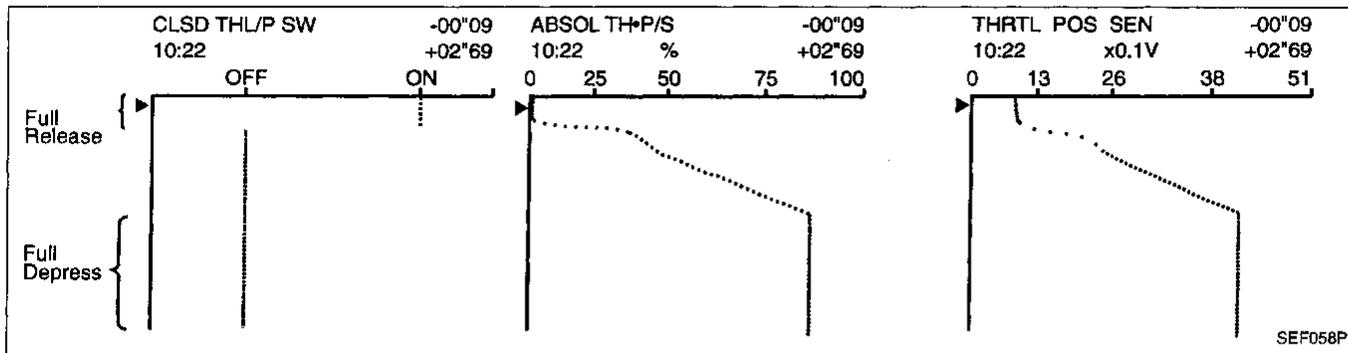
MONITOR ITEM	CONDITION	SPECIFICATION
CAL/LD VALUE	● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load	Idle 20.0 - 35.5%
		2,500 rpm 17.0 - 30.0%
ABSOLUTE TH-P/S	● Ignition switch: ON (Engine stopped)	Throttle valve fully closed 0.0%
		Throttle valve fully opened Approx. 88%
MASS AIRFLOW	● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load	Idle 2.5 - 5.0 gm/s
		2,500 rpm 7.1 - 12.5 gm/s

Major Sensor Reference Graph in Data Monitor Mode

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

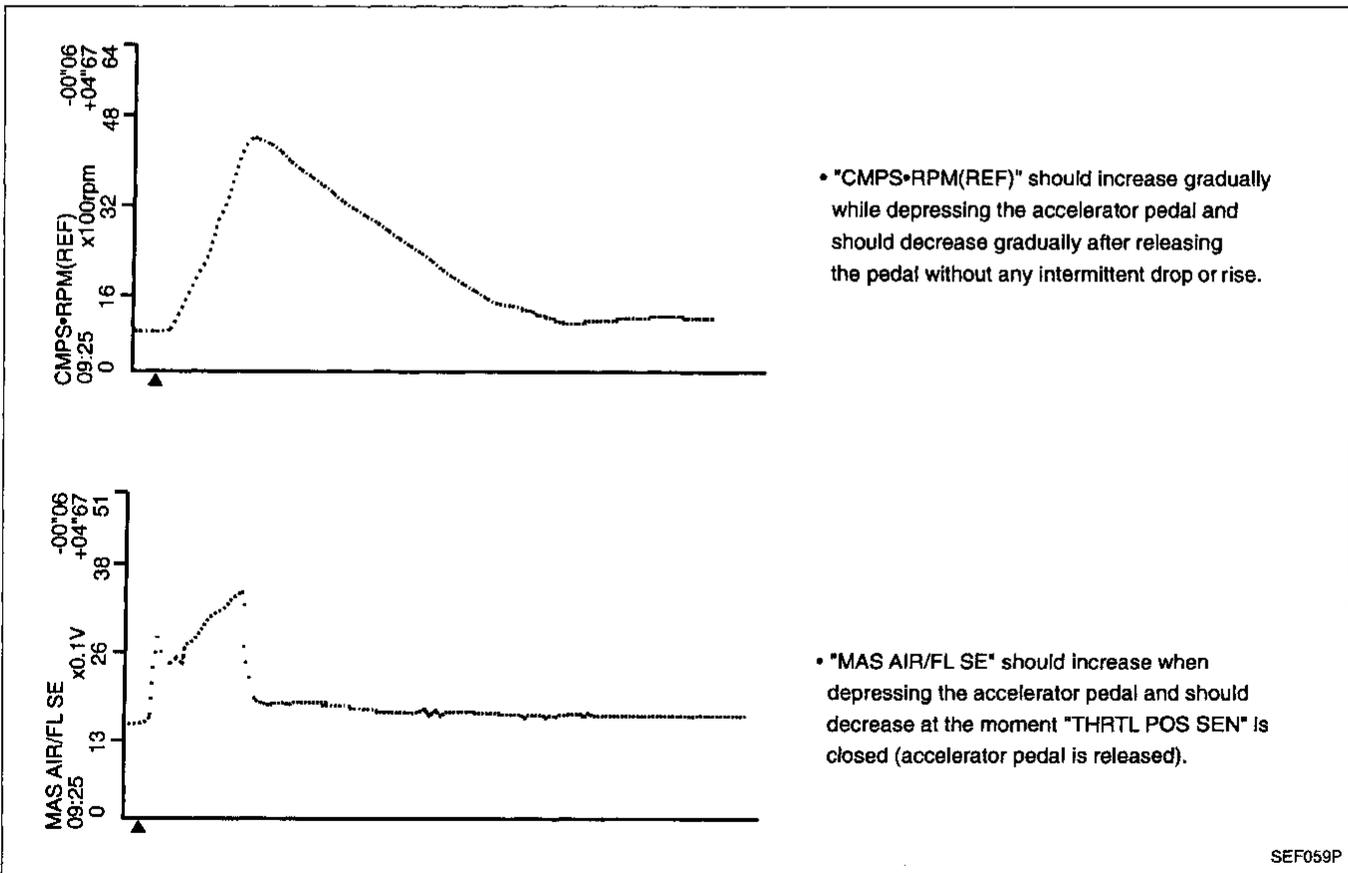
Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL/P SW" when depressing the accelerator pedal with the ignition switch "ON".

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



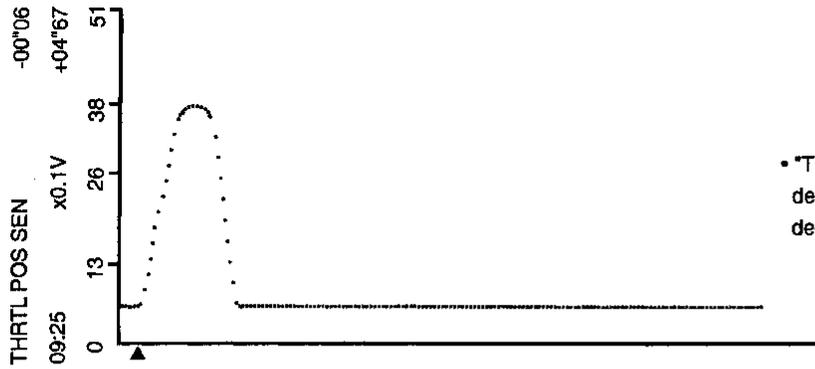
Below is the data for "CMPS·RPM (REF)", "MAS AIR/FL SE", "THRTL POS SEN", "RR O2 SENSOR", "FR O2 SENSOR" and "INJ PULSE" when racing quickly up to 4,800 rpm under no load after warming up engine sufficiently.

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

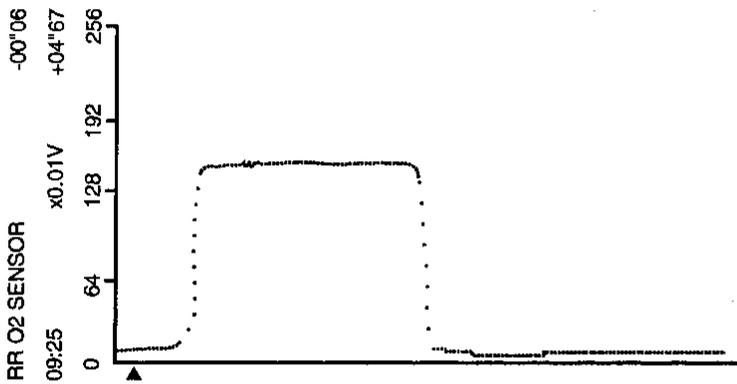


TROUBLE DIAGNOSIS — General Description

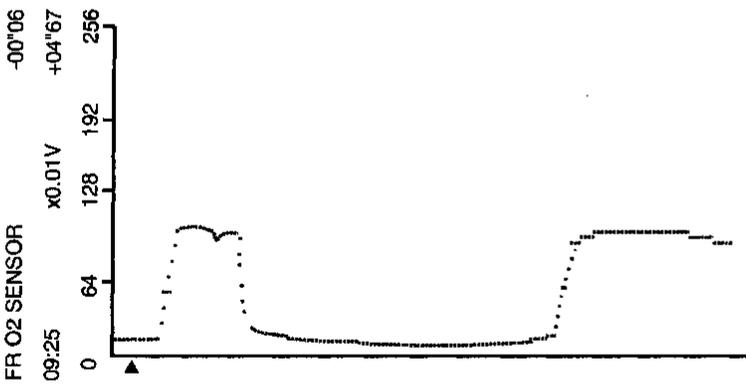
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



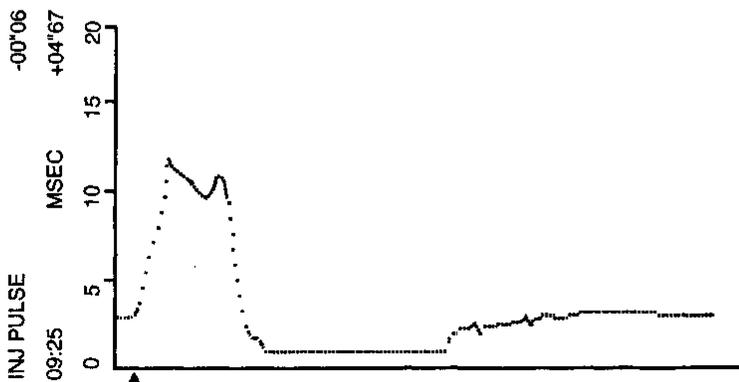
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



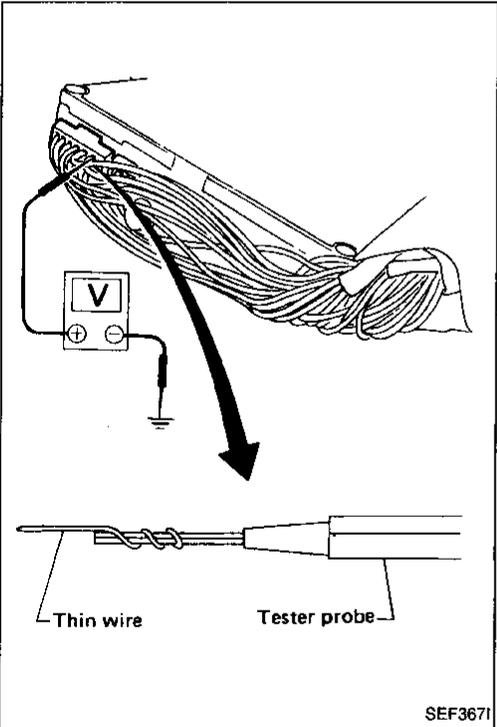
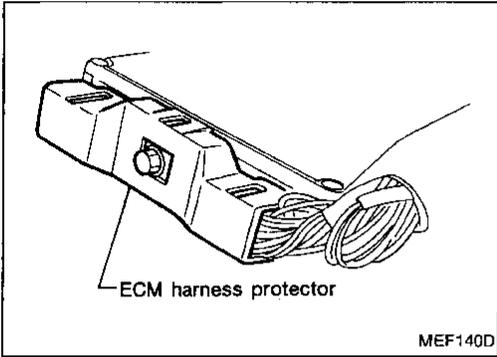
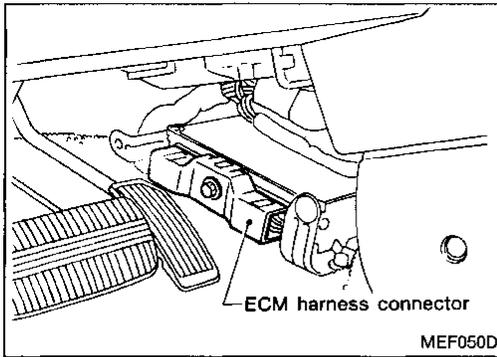
- "RR O2 SENSOR" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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



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



ECM Terminals and Reference Value

PREPARATION

1. ECM is located behind the center console panel. For this inspection, remove the center console under cover.
2. Remove ECM harness protector.
3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.

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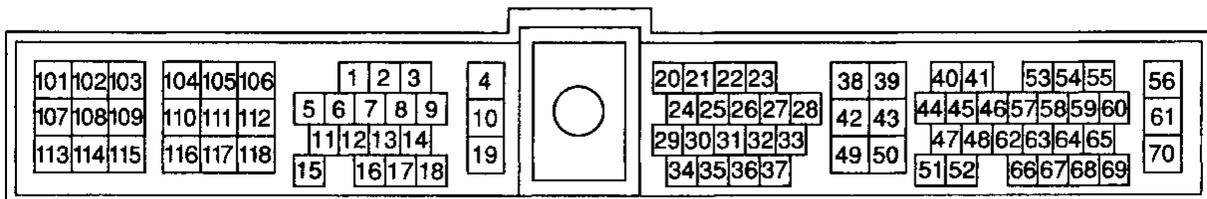
BF

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IDX

ECM HARNESS CONNECTOR TERMINAL LAYOUT



SEF064P

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

ECM INSPECTION TABLE

*Data are reference values.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	*DATA
1	W	Ignition signal	Engine is running. └ Idle speed	0.2 - 0.3V
			Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0.5V
2	Y/R	Ignition check	Engine is running. └ Idle speed	Approximately 12V
3	L/B	Tachometer	Engine is running. └ Idle speed	Approximately 0.9V
4	G	ECCS relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
7	L/W	A/T check signal	Ignition switch "ON" Engine is running.	1.0 - 8.0V
8	B/Y	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	0.07 - 0.10V
			Engine is running. Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
9	LG/R	Triple-pressure switch	Ignition switch "ON"	Approximately 5V
10	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
13 14	L B/L	Cooling fan relay (High) Cooling fan relay (Low)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan is operating.	0.07 - 0.10V
15	Y/L	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON".	0.08 - 0.11V
			Engine is running. └ A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

*Data are reference values.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	*DATA
18	Y	Malfunction indicator lamp	Ignition switch "ON"	Approximately 50mV
			Engine is running	BATTERY VOLTAGE (11 - 14V)
19	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
20	PU	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
21	LG/B	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON". (Compressor operates.)	Approximately 0V
			Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
22	BR/W	Neutral position switch (M/T models) Inhibitor switch (A/T models)	Ignition switch "ON" └ Gear position is "Neutral position" (M/T models) └ Gear position is "N" or "P" (A/T models)	Approximately 0V
			Ignition switch "ON" └ Except the above gear position	BATTERY VOLTAGE (11 - 14V)
23	W	Throttle position sensor	Ignition switch "ON" └ Accelerator pedal released	0.35 - 0.65V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 4V
24	W/R	A/T signal No. 1	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V
25	G/Y	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	0V
			Engine is running. └ Steering wheel is not being turned.	Approximately 5V
26	Y/G	Vehicle speed sensor	Engine is running. └ Slowly rotating front wheels	Approximately 1.3V
29	W/L	A/T signal No. 2	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V
30	W/B	A/T signal No. 3	Ignition switch "ON"	0V

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

*Data are reference values.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	*DATA
33	L/Y	Throttle position sensor signal	Ignition switch "ON" └ Accelerator pedal released	Approximately 0.4V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 3V
38	B/R	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
39	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
40 44	L L	Camshaft position sensor (Reference signal)	Engine is running. └ Do not run engine at high speed under no-load.	0.2 - 0.5V
41	Y Y	Camshaft position sensor (Position signal)	Engine is running. └ Do not run engine at high speed under no-load.	2.0 - 3.0V
43	B	ECCS ground	Engine is running. └ Idle speed	Engine ground (Probe this terminal with ⊖ tester probe when measuring.)
46	W	Front heated oxygen sensor	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V (periodically change)
47	OR	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.3 - 1.7V
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	1.7 - 2.1V
48	W	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	0.005 - 0.02V
49	R/Y	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
50	B	Sensors' ground	Engine is running. (Warm-up condition) └ Idle speed	0.001 - 0.01V
51	L/OR	Engine coolant temperature sensor	Engine is running.	0 - 4.84V Output voltage varies with engine coolant temperature.

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

*Data are reference values.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	*DATA
52	W	Rear heated oxygen sensor	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> └ After warming up sufficiently and engine speed is 2,000 rpm. 	0 - Approximately 1.5V *1
53	W	Crankshaft position sensor (OBD)	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> └ Idle speed (A/T = N range, M/T = Neutral) (Air conditioner switch "OFF".) 	More than 0.2V (AC range)
54	W	Knock sensor	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> └ Idle speed 	2.0 - 3.0V
56 61	OR OR	Power supply for ECM	<div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div>	BATTERY VOLTAGE (11 - 14V)
58	OR	Data link connector for GST	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> └ Idle speed 	BATTERY VOLTAGE (11 - 14V)
62	W	EGR temperature sensor	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) <ul style="list-style-type: none"> └ Idle speed 	Less than 4.5V
			<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) <ul style="list-style-type: none"> └ EGR system is operating. 	0 - 1.0V
63	L/Y	Intake air temperature sensor	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div>	0 - 5.0V Output voltage varies with intake air temperature.
64	Y/B	Data link connector for CONSULT	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div>	Approximately 0.1V
65	Y/R		<ul style="list-style-type: none"> └ Idle speed 	Approximately 4 - 9V
68	Y/W			Approximately 3.5V
70	W	Power supply (Back-up)	<div style="border: 1px solid black; padding: 2px;">Ignition switch "OFF"</div>	BATTERY VOLTAGE (11 - 14V)
101	SB	IACV-AAC valve	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> └ Idle speed 	Approximately 5 - 14V
			<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> └ Steering wheel is being turned. └ Air conditioner is operating. └ Rear defogger is "ON". └ Headlamp are in high position. 	5 - 9V

*1: During the on-board diagnosis for the open circuit, approx. 1.5 - 5V will appear. This is not a malfunction. (Refer to page EC-162.)

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

*Data are reference values.

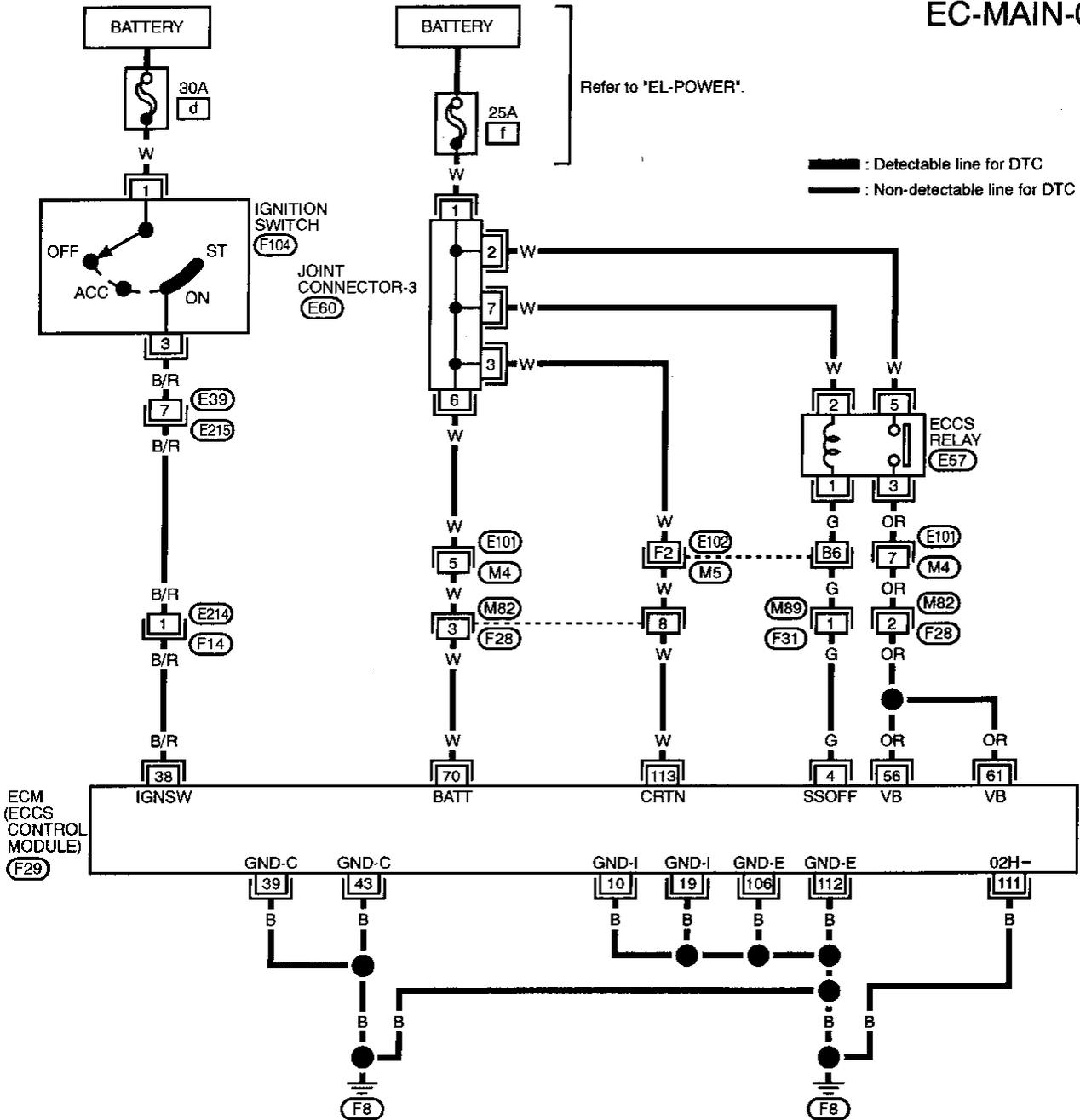
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	*DATA
102	BR	Injector No. 1	Engine is running	BATTERY VOLTAGE (11 - 14V)
104	BR/Y	Injector No. 3		
107	BR/W	Injector No. 2		
109	BR	Injector No. 4		
103	PU	EGR & canister control solenoid valve	Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) └ Idle speed	0.06 - 0.08V
108	Y	Rear heated oxygen sensor heater	Ignition switch "ON"	Approximately 0.2V
			Engine is running.	
111	B	Rear heated oxygen sensor heater ground	Engine is running. └ Idle speed	0.02 - 0.07V
112	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
113	W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
115	Y	Front heated oxygen sensor heater	Engine is running. └ Engine speed is below 3,200 rpm.	0V
			Engine is running. └ Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)

* The data is measured between each terminal and ④ (ECCS ground) with voltmeter.

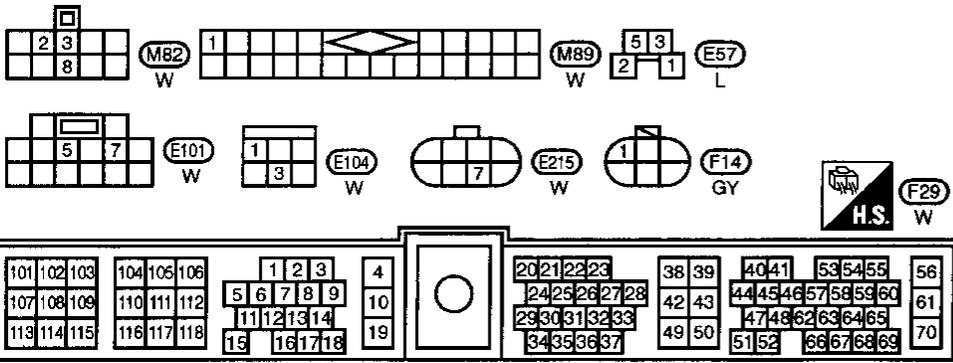
TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit

EC-MAIN-01



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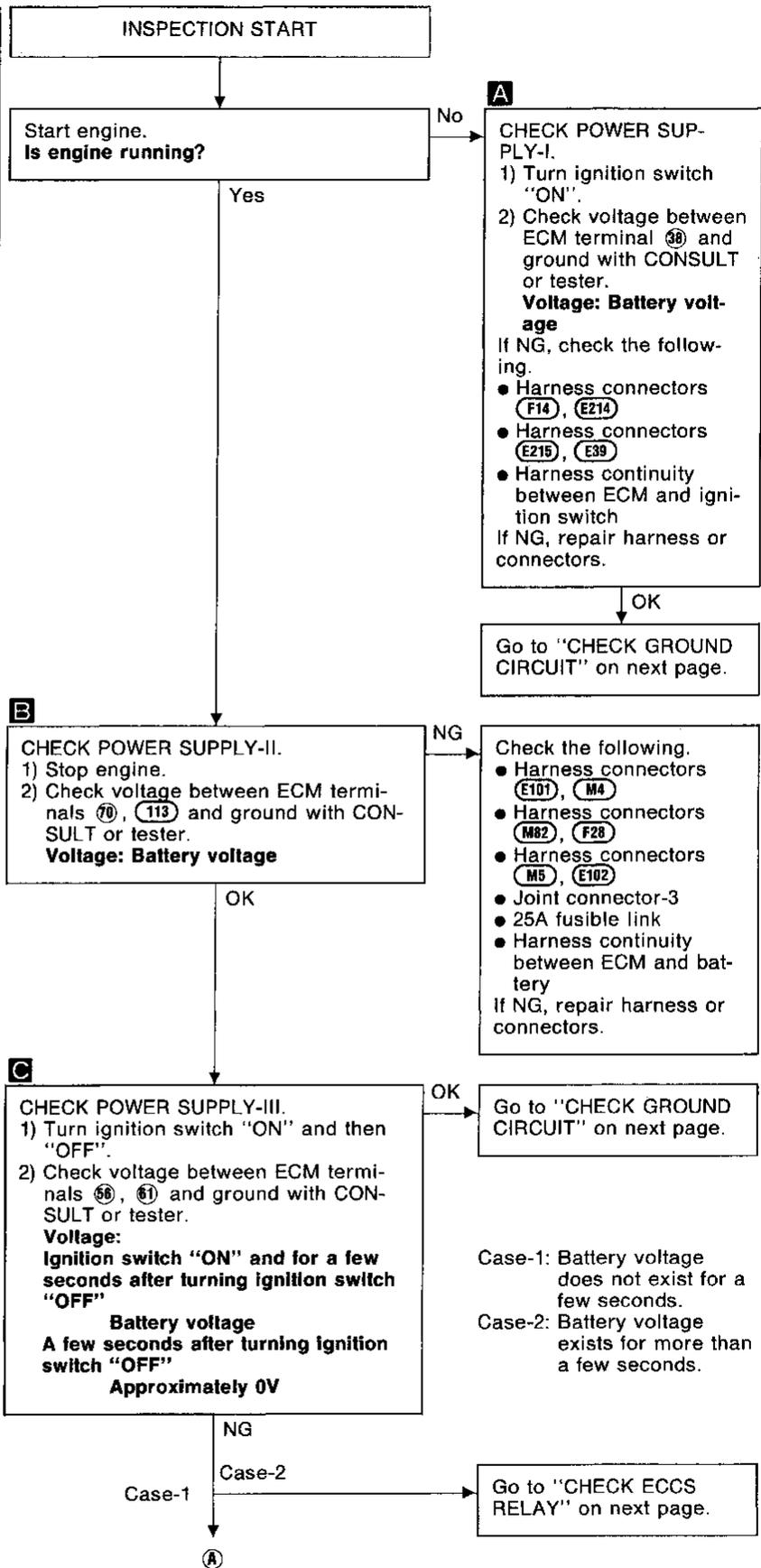
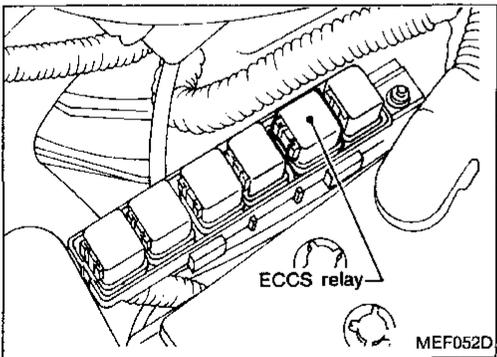
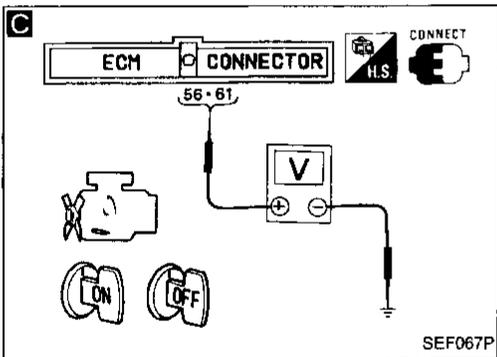
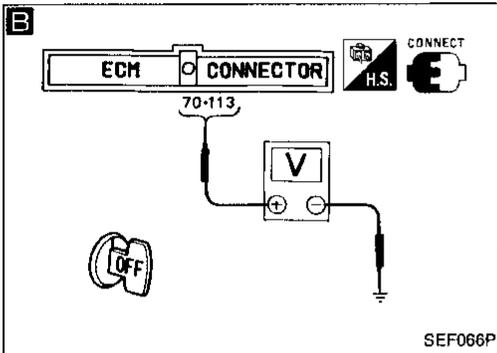
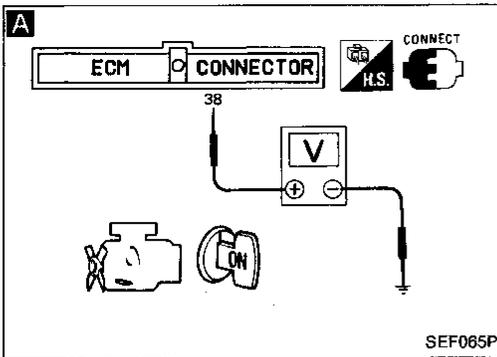


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 (E102) (M5)
 (E60)

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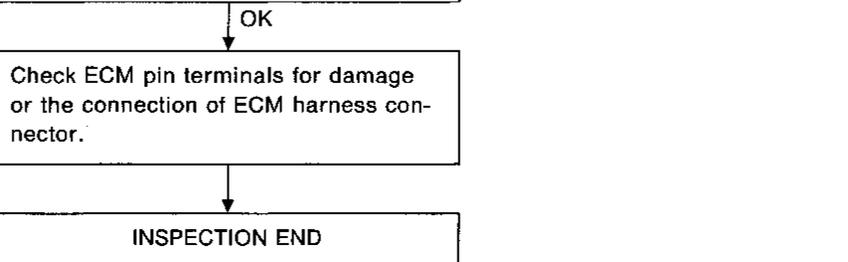
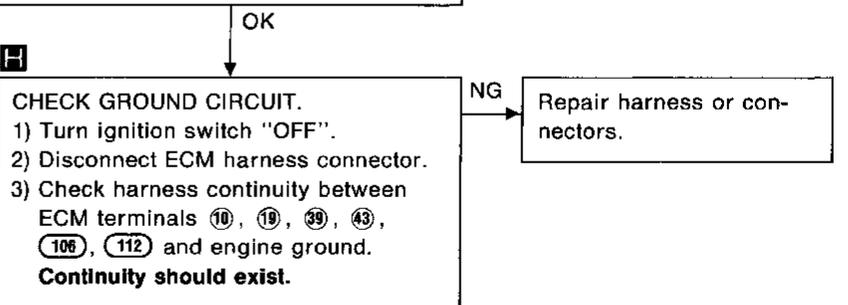
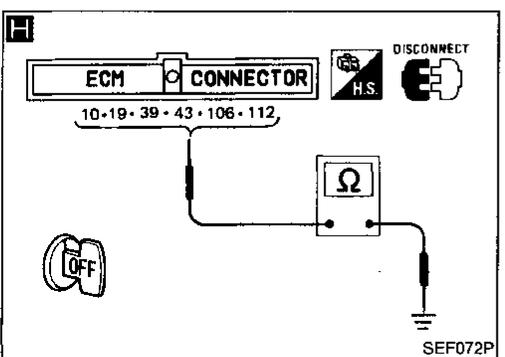
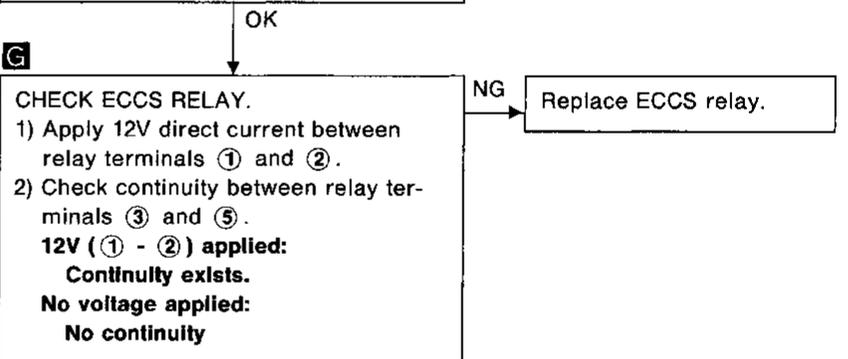
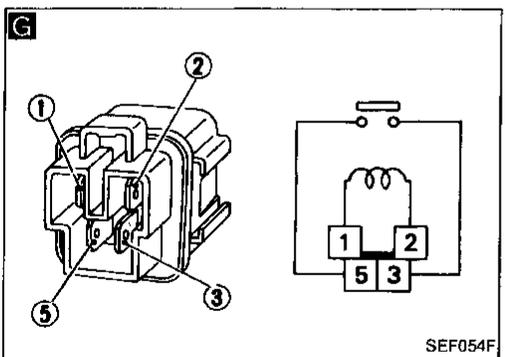
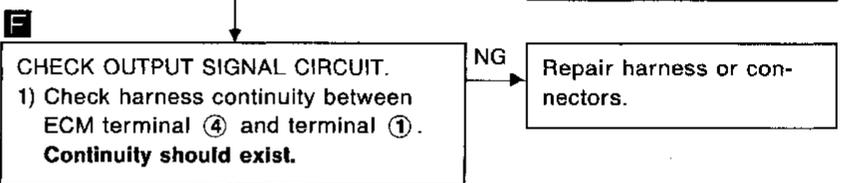
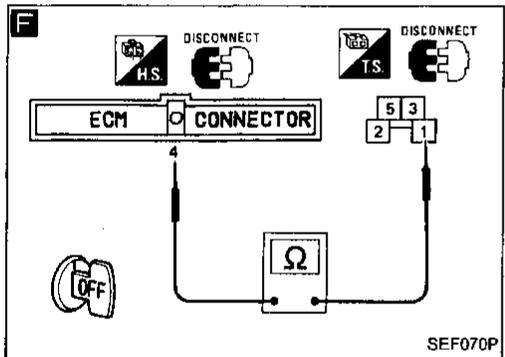
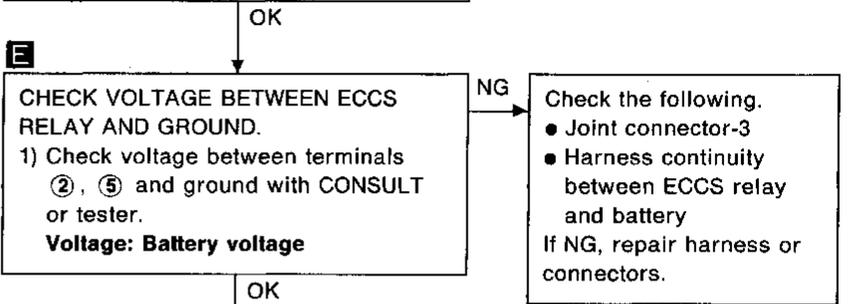
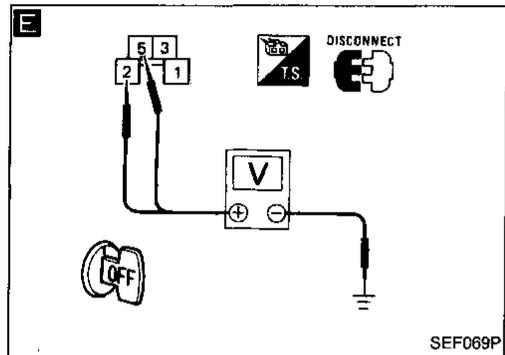
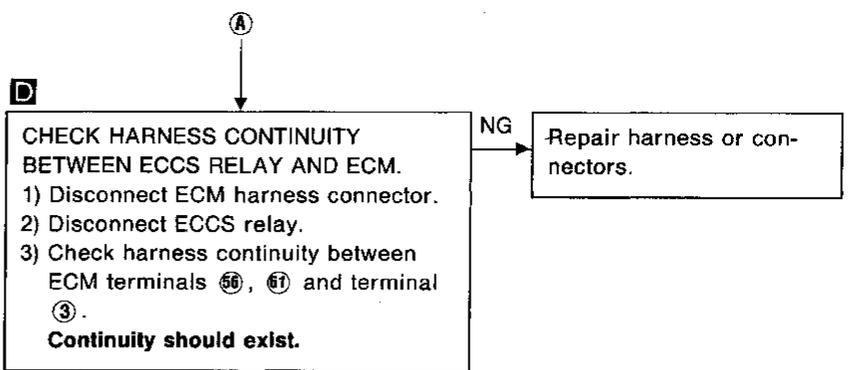
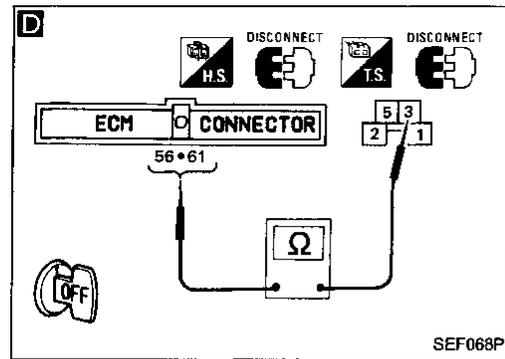
TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)

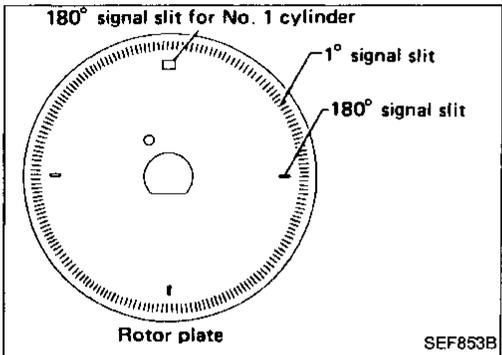
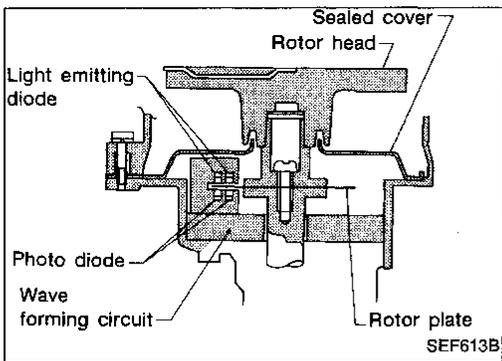


TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)



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Camshaft Position Sensor (CMPS)(DTC: P0340)

The camshaft position sensor is a basic component of the ECCS. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° signal and 4 slits for a 180° signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
11 P0340	<ul style="list-style-type: none"> ● Either 1° or 180° signal is not entered to ECM for the first few seconds during engine cranking. <hr style="border-top: 1px dotted black;"/> <ul style="list-style-type: none"> ● Either 1° or 180° signal is not entered to ECM often enough while the engine speed is higher than the specified engine speed. <hr style="border-top: 1px dotted black;"/> <ul style="list-style-type: none"> ● The relation between 1° and 180° signal is not in the normal range during the specified engine speed. 	<ul style="list-style-type: none"> ● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to EL section.) ● Starting system circuit (Refer to EL section.)

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and run it for at least 2 seconds at idle speed.

OR



- 1) Start engine and run it for at least 2 seconds at idle speed.
- 2) Select "MODE 3" with GST.

OR

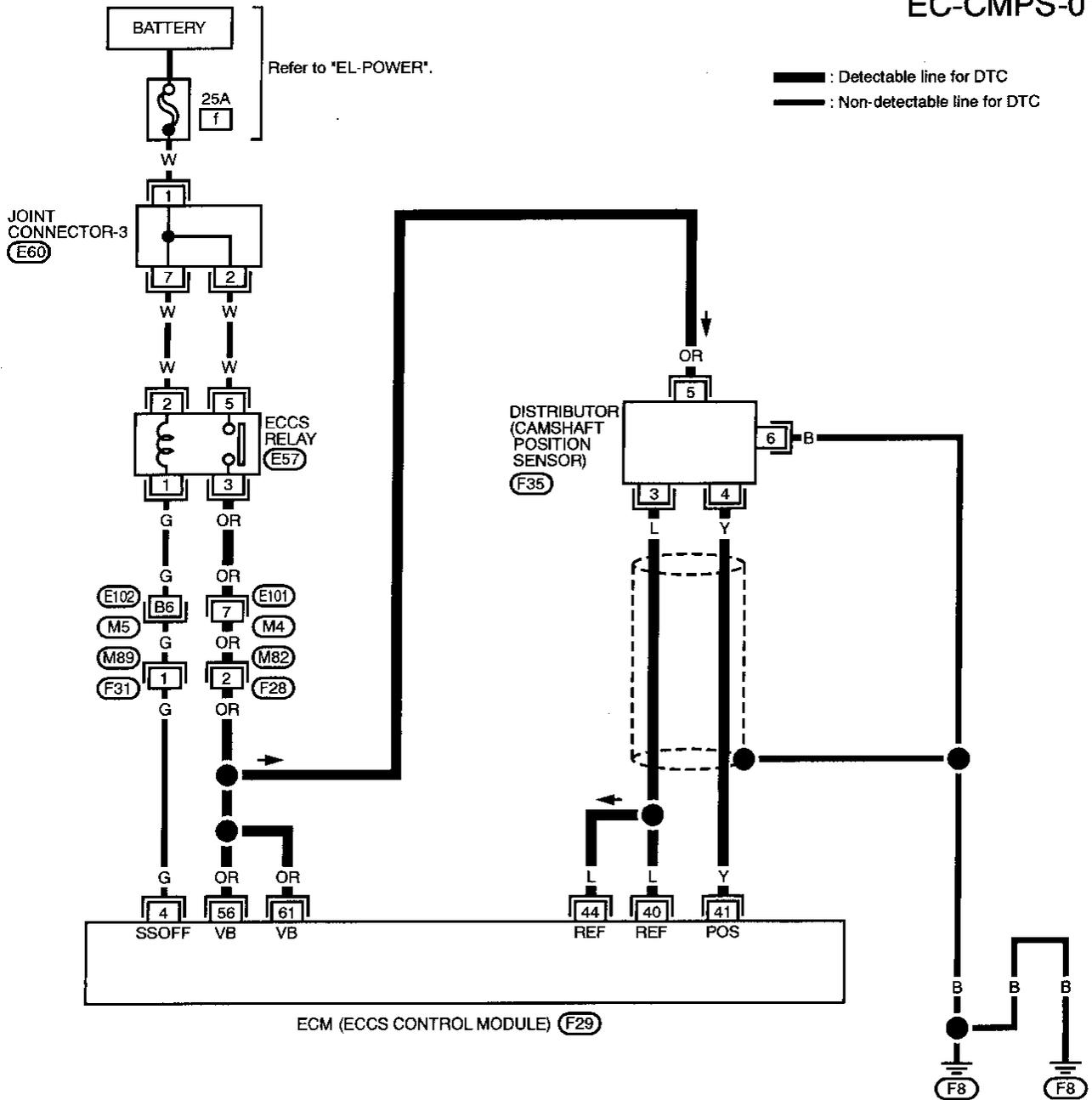


- 1) Start engine and run it for at least 2 seconds at idle speed.
- 2) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
- 3) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC 11

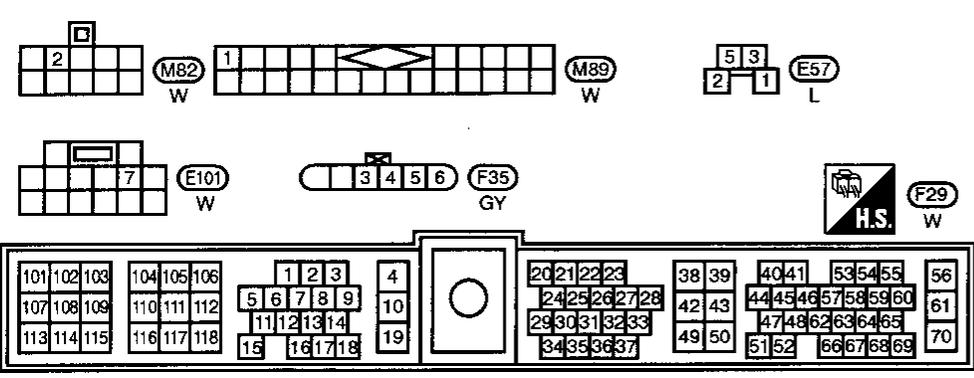
Camshaft Position Sensor (CMPS)(DTC: P0340) (Cont'd)

EC-CMPS-01



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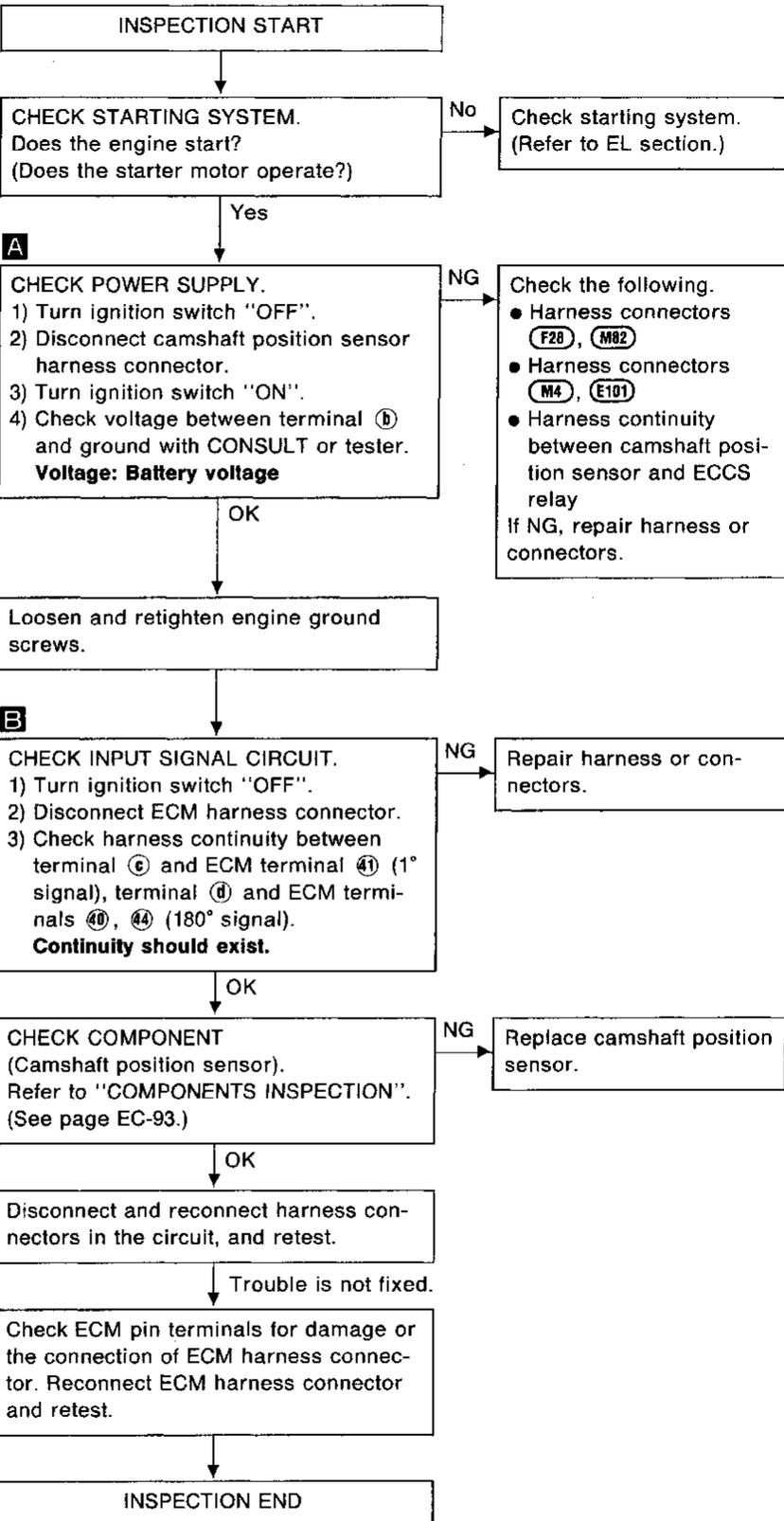
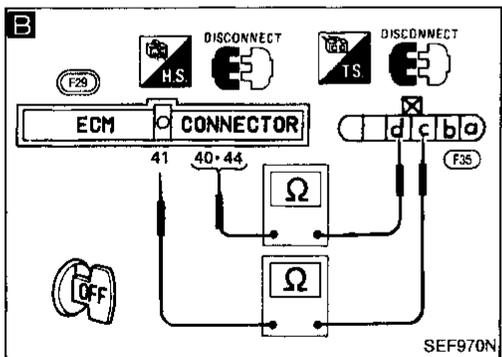
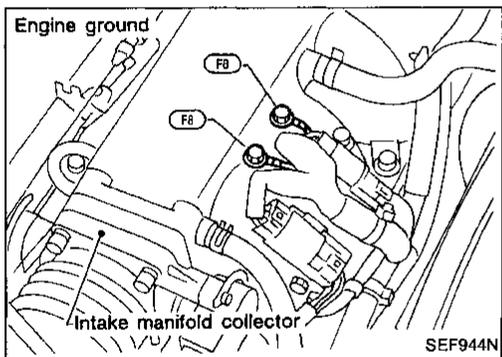
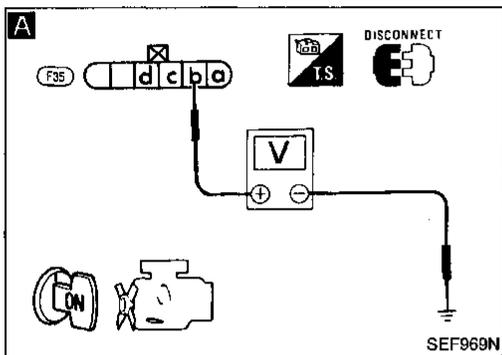
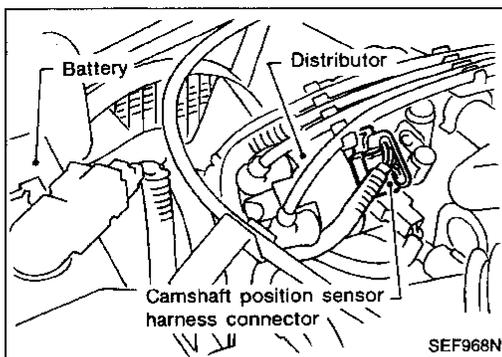


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TROUBLE DIAGNOSIS FOR DTC 11

Camshaft Position Sensor (CMPS)(DTC: P0340) (Cont'd)

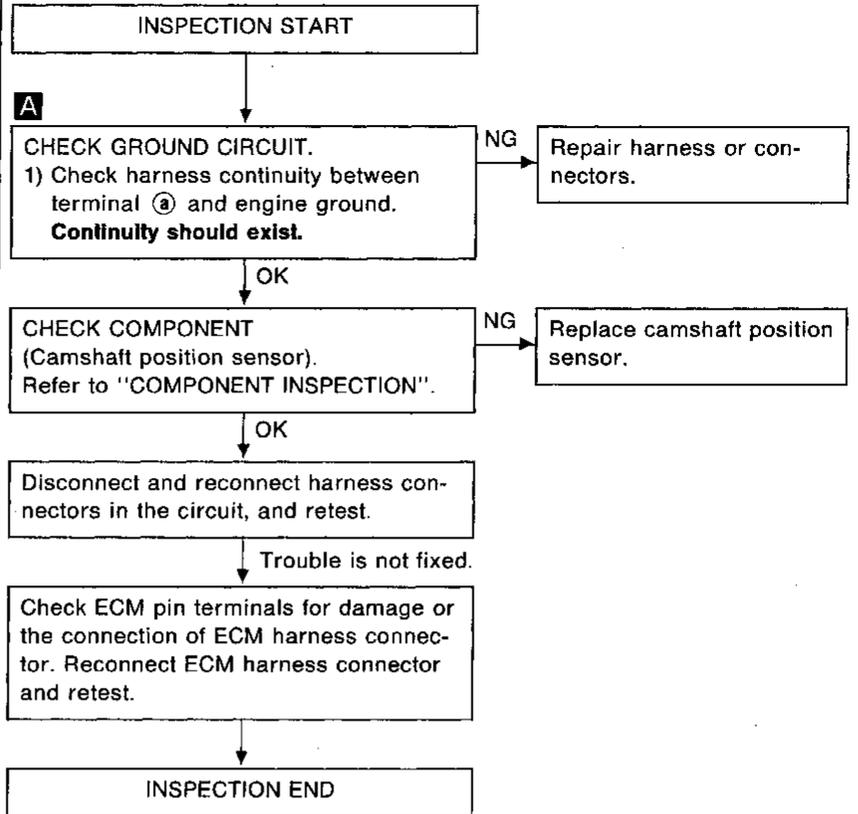
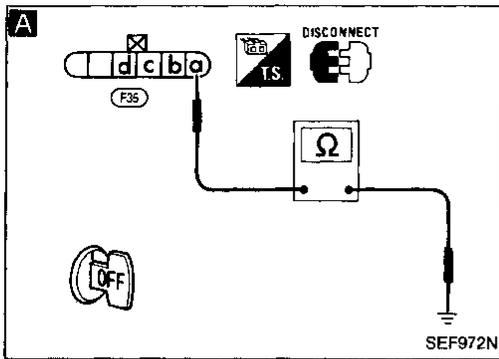
DIAGNOSTIC PROCEDURE (DETECTABLE CIRCUIT)



TROUBLE DIAGNOSIS FOR DTC 11

Camshaft Position Sensor (CMPS)(DTC: P0340) (Cont'd)

DIAGNOSTIC PROCEDURE (NON-DETECTABLE CIRCUIT)



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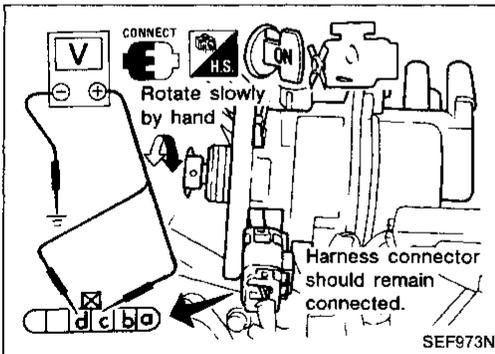
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COMPONENT INSPECTION

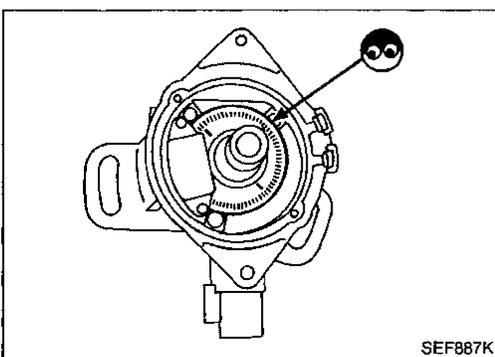
Camshaft position sensor

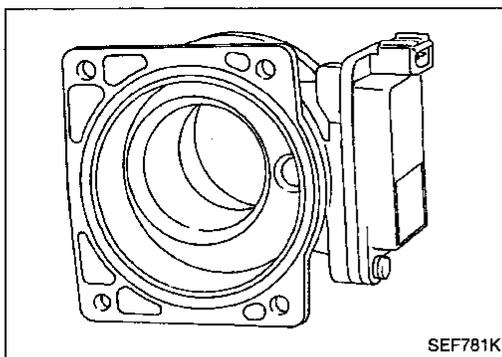
1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Disconnect ignition wires.
3. Disconnect injector sub-harness connector.
4. Turn ignition switch "ON".
5. Rotate distributor shaft slowly by hand and check voltage between terminals ③, ④ and ground.

Terminal	Voltage
④ (180° signal)	Tester's pointer fluctuates between 5V and 0V.
③ (1° signal)	

If NG, replace distributor assembly with camshaft position sensor.

6. Visually check signal plate for damage or dust.





Mass Air Flow Sensor (MAFS) (DTC: P0100)

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

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
12 P0100	a) An excessively high or low voltage from the sensor is entered to ECM. b)c) Rationally incorrect voltage is entered to ECM, compared with the calculated value by camshaft position sensor signal and throttle position sensor signal.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

For the above malfunction a)



- 1) Turn ignition switch "ON", and wait for at least 6 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine and wait for at least 3 seconds.

OR



- 1) Turn ignition switch "ON", and wait for at least 6 seconds.
- 2) Start engine and wait for at least 3 seconds.
- 3) Select "MODE 3" with GST.

OR



- 1) Turn ignition switch "ON", and wait for at least 6 seconds.
- 2) Start engine and wait for at least 3 seconds.
- 3) Turn ignition switch "OFF", wait for at least 3 seconds and then turn "ON".
- 4) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC 12

Mass Air Flow Sensor (MAFS) (DTC: P0100) (Cont'd)

For the above malfunction b)



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine and warm it up sufficiently.
- 4) Wait for at least 10 seconds at idle speed.

OR

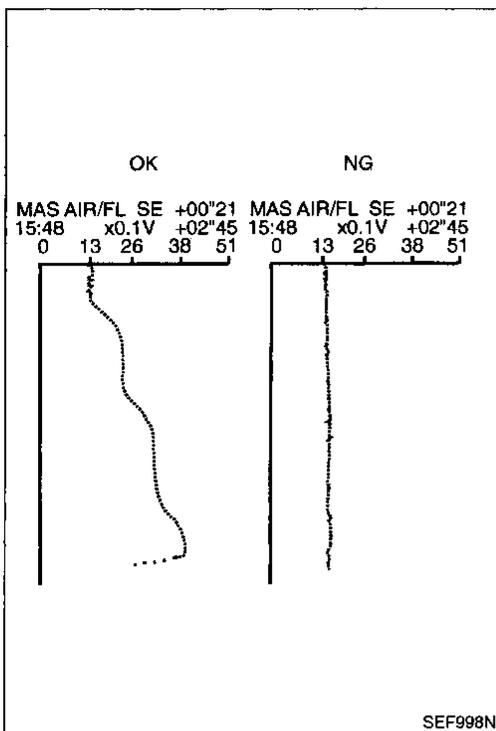


- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Wait for at least 10 seconds at idle speed.
- 4) Select "MODE 3" with GST.

OR

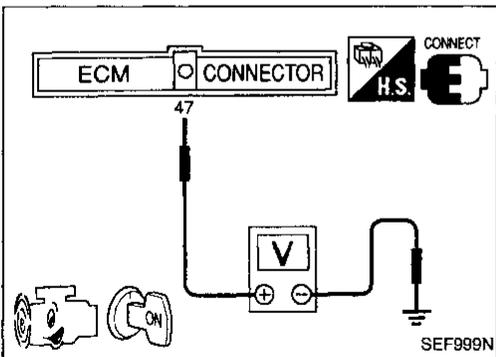


- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Wait for at least 10 seconds at idle speed.
- 4) Turn ignition switch "OFF", wait for at least 3 seconds and then turn "ON".
- 5) Perform diagnostic test mode II (Self-diagnostic results) with ECM.



FUEL SYS #1	OPEN
FUEL SYS #2	UNUSED
CALC LOAD	22%
COOLANT TEMP	30°C
SHORT FT #1	0%
LONG FT #1	2%
ENGINE SPD	1000RPM
VEHICLE SPD	0km/h
IGN ADVANCE	20.0°
INTAKE AIR	26°C
MAF	0.0gm/sec
THROTTLE POS	0%
O2S LOCATION	3
O2S B1,S1	0.680V
O2FT B1,S1	0%
O2S B1,S2	0.080V

SEF003P



OVERALL FUNCTION CHECK

Instead of performing the DTC Detecting Condition, the following method can be used for checking the function of the mass air flow sensor. (However, the DTC detection can not be confirmed.)

For the above malfunction c)



- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Select "DATA MONITOR" mode with CONSULT.
- 4) Check the voltage of mass air flow sensor with "DATA MONITOR".
- 5) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

OR



- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Select "MODE 1" with GST.
- 4) Check the mass air flow with "MODE 1".
- 5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.

OR

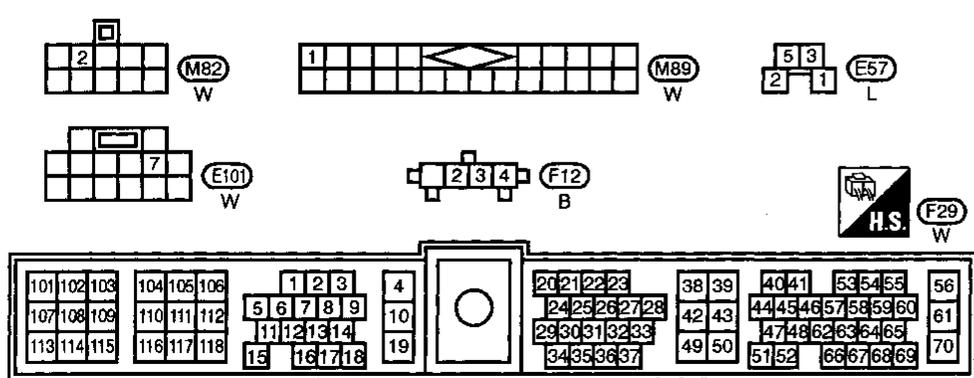
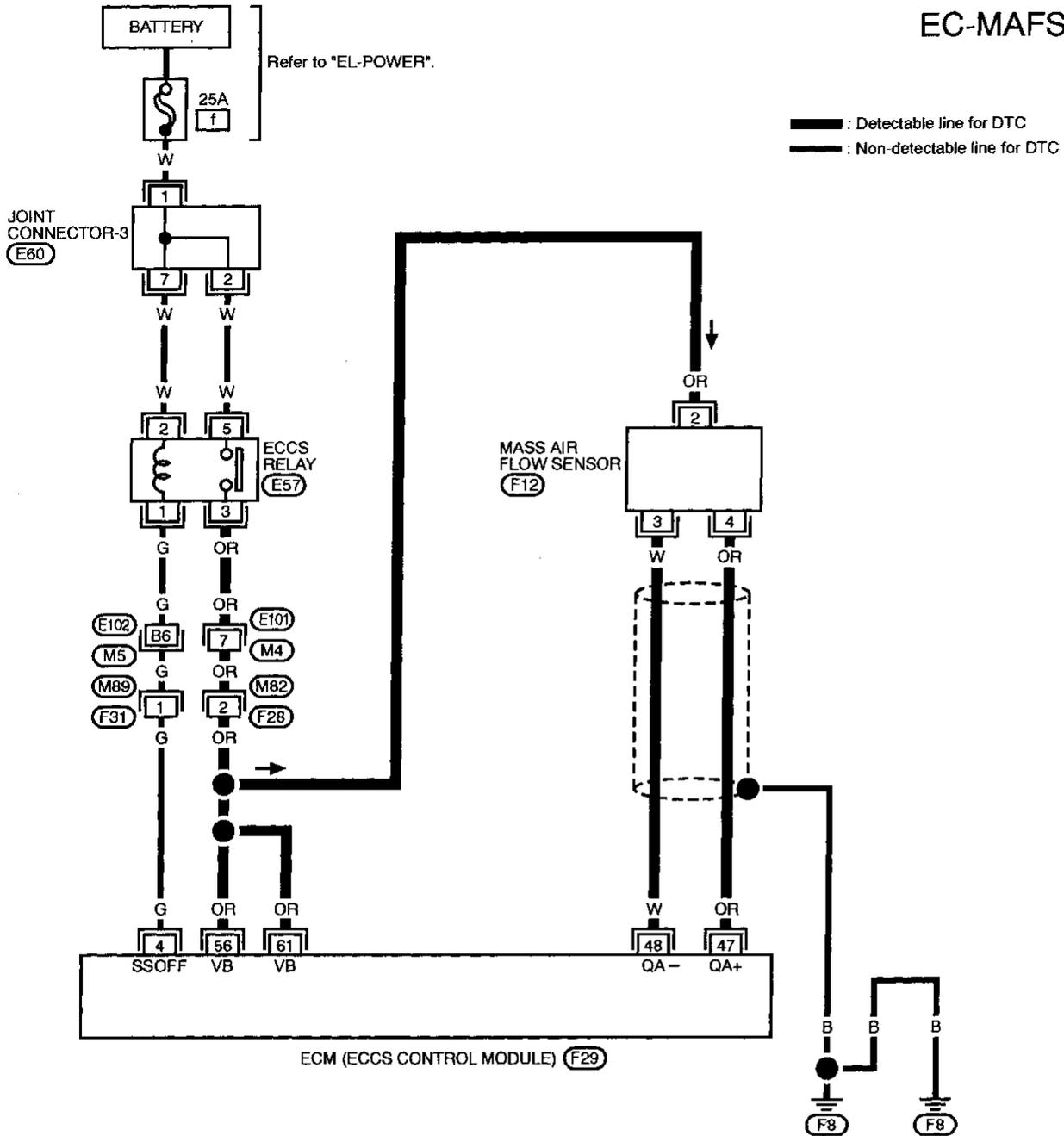


- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Check the voltage between ECM terminal 47 and ground.
- 4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

TROUBLE DIAGNOSIS FOR DTC 12

Mass Air Flow Sensor (MAFS) (DTC: P0100) (Cont'd)

EC-MAFS-01

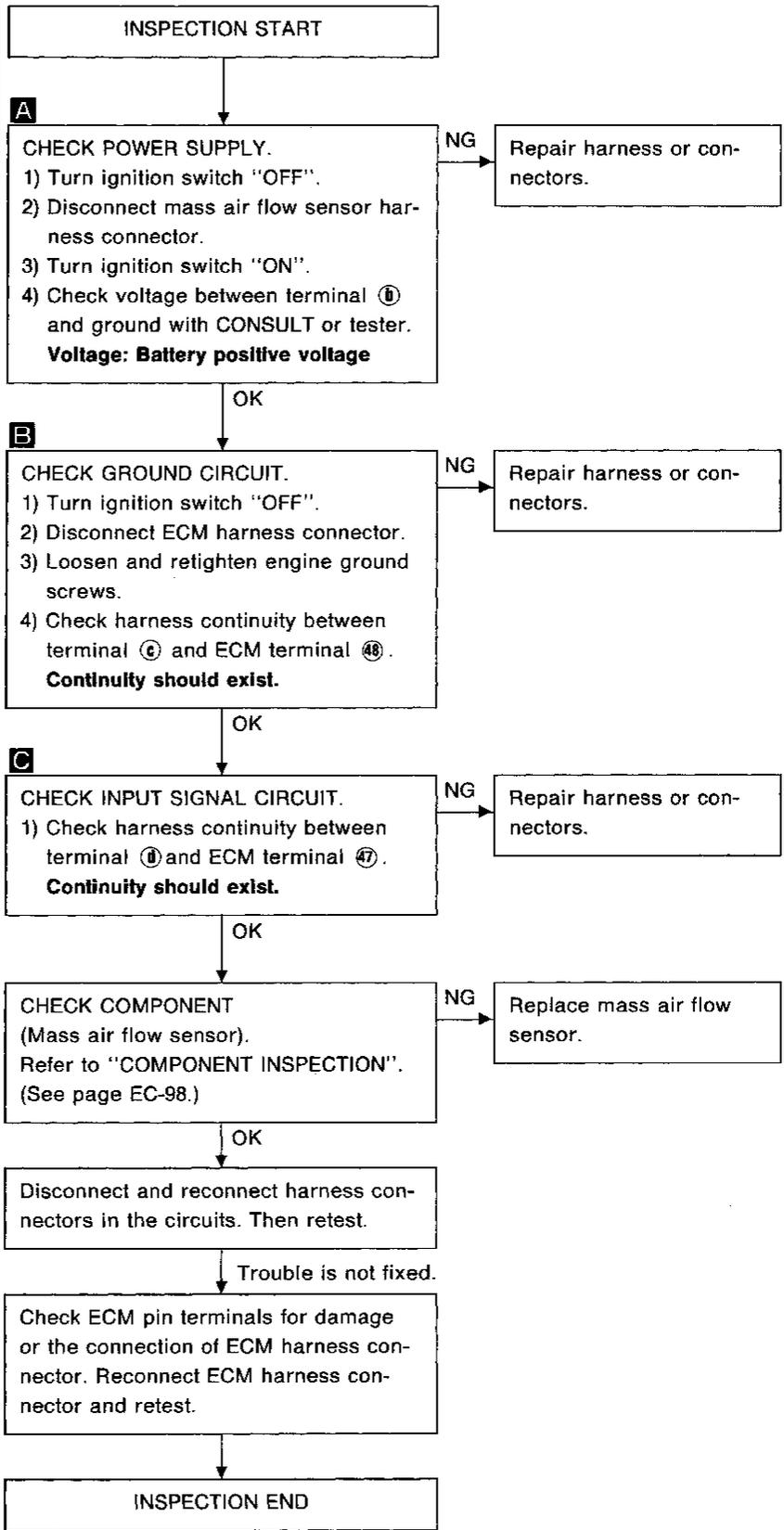
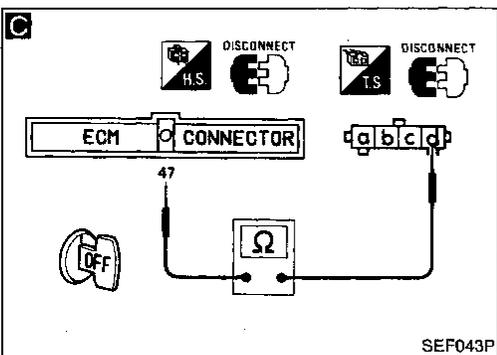
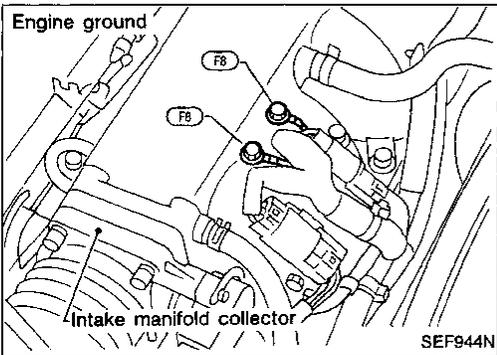
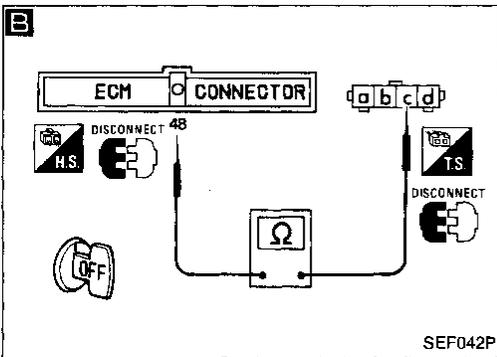
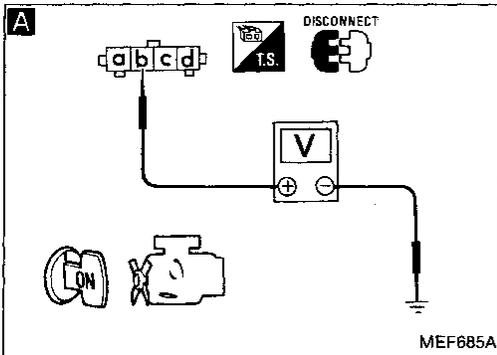
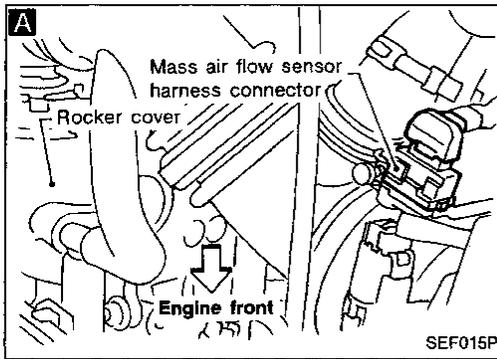


Refer to last page (Foldout page).
 (E102), (F5)
 (E60)

TROUBLE DIAGNOSIS FOR DTC 12

Mass Air Flow Sensor (MAFS) (DTC: P0100) (Cont'd)

DIAGNOSTIC PROCEDURE



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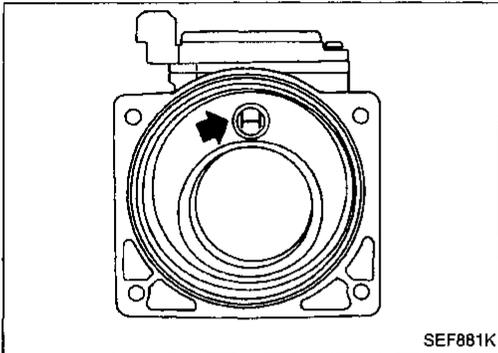
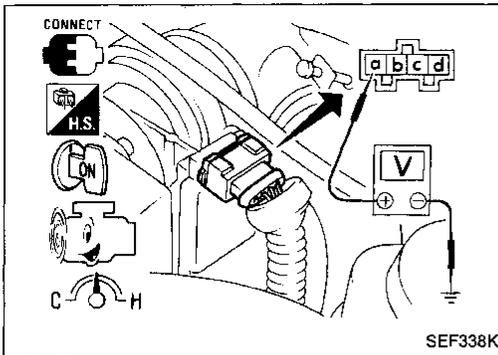
TROUBLE DIAGNOSIS FOR DTC 12

Mass Air Flow Sensor (MAFS) (DTC: P0100) (Cont'd)

COMPONENT INSPECTION

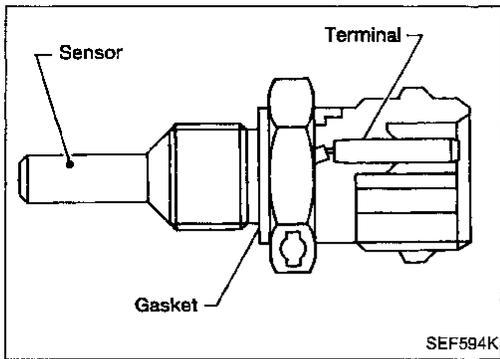
Mass air flow sensor

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



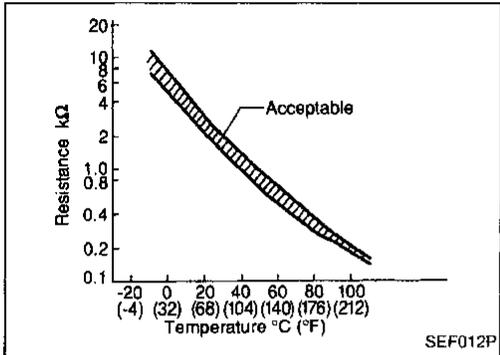
Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warm-up sufficiently.)	1.3 - 1.7V
Racing (Idle - about 4,000 rpm)	1.3 - 1.7V - Approx. 4.0V

5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



Engine Coolant Temperature Sensor (ECTS) (DTC: P0115)

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	2.5
50 (122)	2.2	0.8
90 (194)	0.9	0.2

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
13 P0115	<ul style="list-style-type: none"> An excessively high or low voltage from the sensor is entered to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Engine coolant temperature sensor

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Wait for at least 5 seconds.

OR



- 1) Turn ignition switch "ON" and wait for at least 5 seconds.
- 2) Select "MODE 3" with GST.

OR



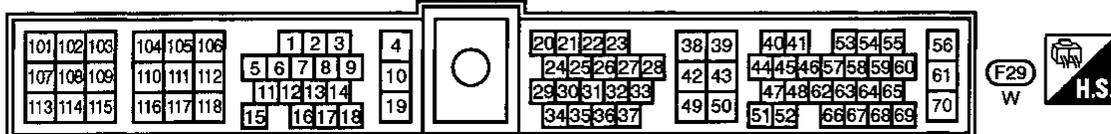
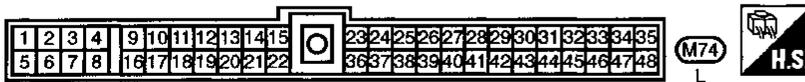
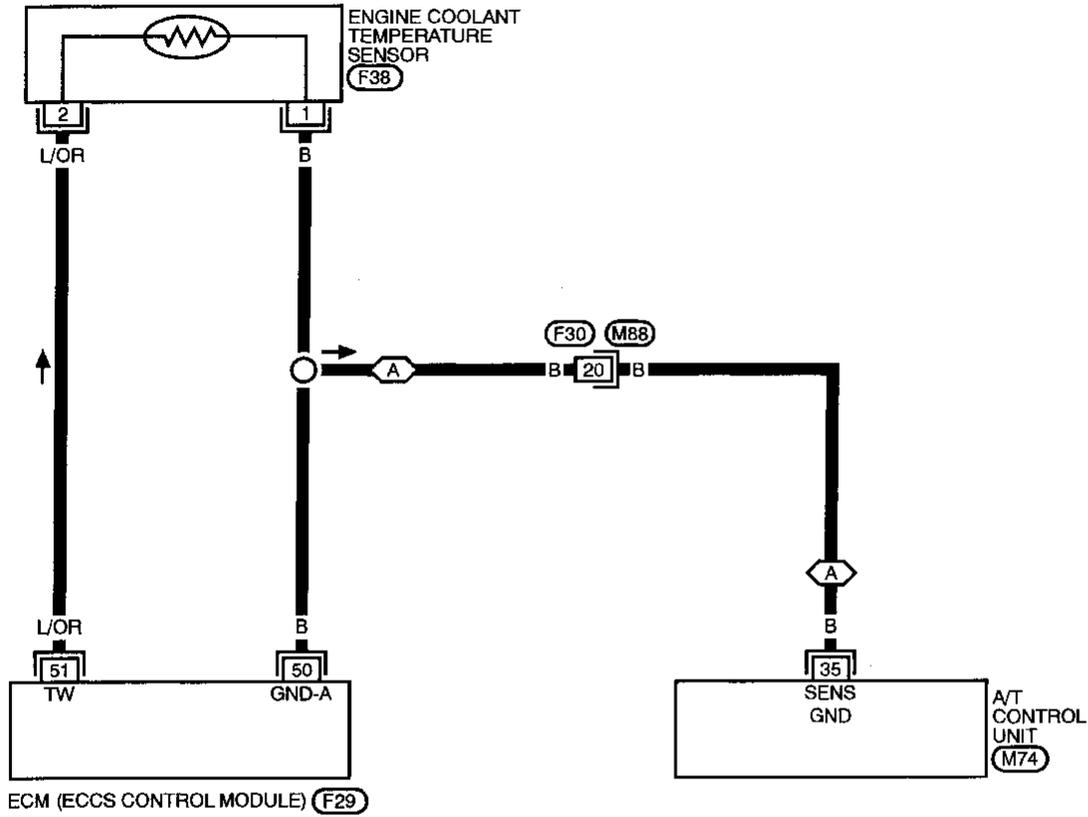
- 1) Turn ignition switch "ON" and wait for at least 5 seconds.
- 2) Turn ignition switch "OFF", wait for at least 3 seconds and then turn "ON".
- 3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC 13

Engine Coolant Temperature Sensor (ECTS) (DTC: P0115) (Cont'd)

EC-ECTS-01

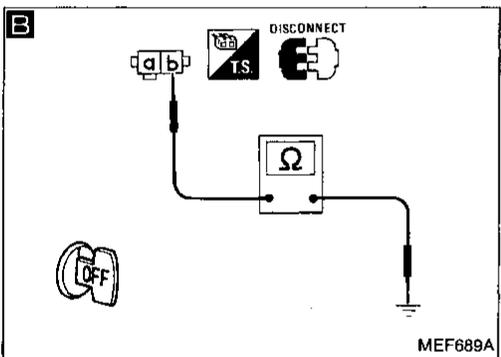
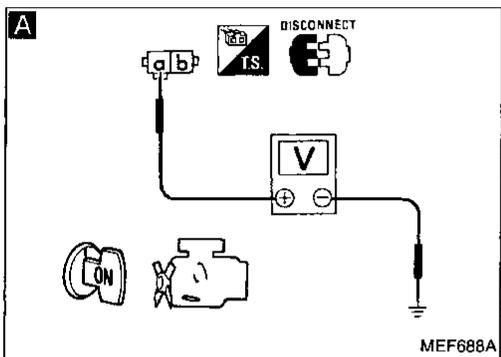
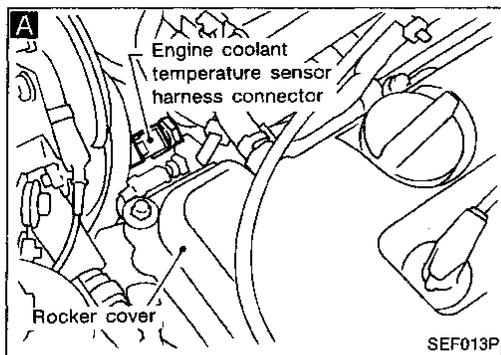
-  : Detectable line for DTC
-  : Non-detectable line for DTC
-  : A/T models



TROUBLE DIAGNOSIS FOR DTC 13

Engine Coolant Temperature Sensor (ECTS) (DTC: P0115) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect engine coolant temperature sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ③ and ground with CONSULT or tester.
Voltage:
Approximately 5V

NG → Check the following.
● Harness continuity between ECM and engine coolant temperature sensor
If NG, repair harness or connectors.

B
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ④ and engine ground.
Continuity should exist.

NG → Check the following.
● Harness continuity between ECM and engine coolant temperature sensor
● Harness continuity between A/T control unit and engine coolant temperature sensor.
If NG, repair harness or connectors.

CHECK COMPONENT (Engine coolant temperature sensor). Refer to "COMPONENT INSPECTION". (See page EC-102.)

NG → Replace engine coolant temperature sensor.

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

Trouble is not fixed.
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

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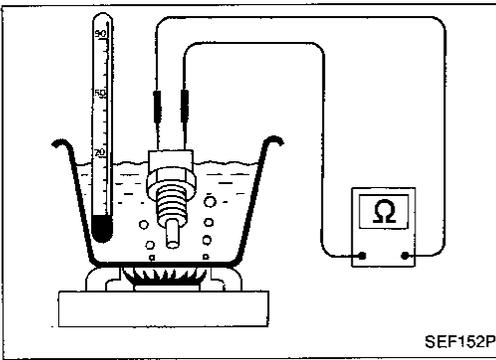
TROUBLE DIAGNOSIS FOR DTC 13

Engine Coolant Temperature Sensor (ECTS) (DTC: P0115) (Cont'd)

COMPONENT INSPECTION

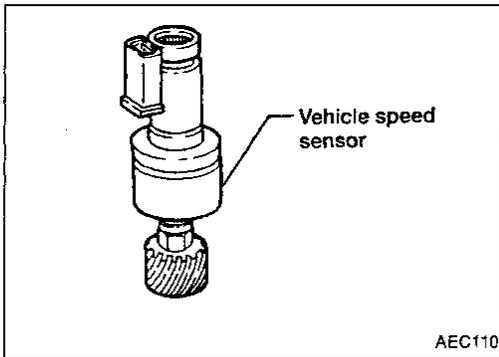
Engine coolant temperature sensor

Check resistance as shown in the figure.



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

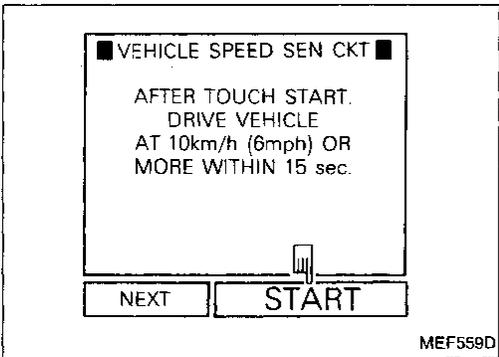
If NG, replace engine coolant temperature sensor.



Vehicle Speed Sensor (VSS) (DTC: P0500)

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.

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
14 P0500	<ul style="list-style-type: none"> The almost 0 km/h (0 MPH) signal from the vehicle speed sensor is entered to ECM even when the vehicle is driving. 	<ul style="list-style-type: none"> Harness or connector (The vehicle speed sensor circuit is open or shorted.) Vehicle speed sensor



OVERALL FUNCTION CHECK

Instead of performing the DTC DETECTING CONDITION, the following method can be used for checking the function of the vehicle speed sensor. (However, the DTC detection cannot be confirmed.)

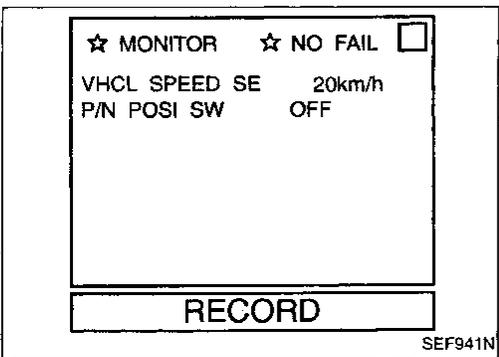
- 1) Jack up drive wheels.
- 2) Start engine.
- 3) Perform "VEHICLE SPEED SEN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

_____ OR _____

- 2) Start engine.
- 3) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT.

The vehicle speed on CONSULT should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

_____ OR _____



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TROUBLE DIAGNOSIS FOR DTC 14

Vehicle Speed Sensor (VSS) (DTC: P0500) (Cont'd)

FUEL SYS #1	CLOSED
FUEL SYS #2	UNUSED
CALC LOAD	57%
COOLANT TEMP	87°C
SHORT FT #1	1%
LONG FT #1	-3%
ENGINE SPD	2225RPM
VEHICLE SPD	57MPH
IGN ADVANCE	34.0°
INTAKE AIR	43°C
MAF	26.2gm/sec
THROTTLE POS	12%
O2S LOCATION	3
O2S B1,S1	0.090V
O2FT B1,S1	0%
O2S B1,S2	0.070V

SEF942N



- 1) Jack up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST.

The vehicle speed on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

OR

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

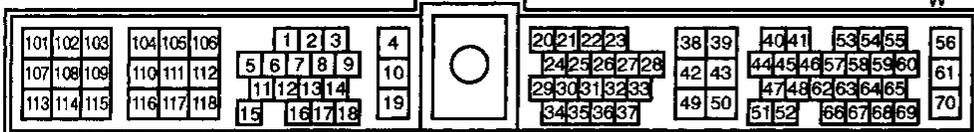
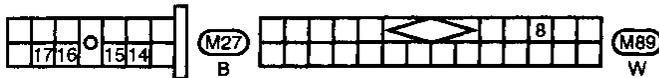
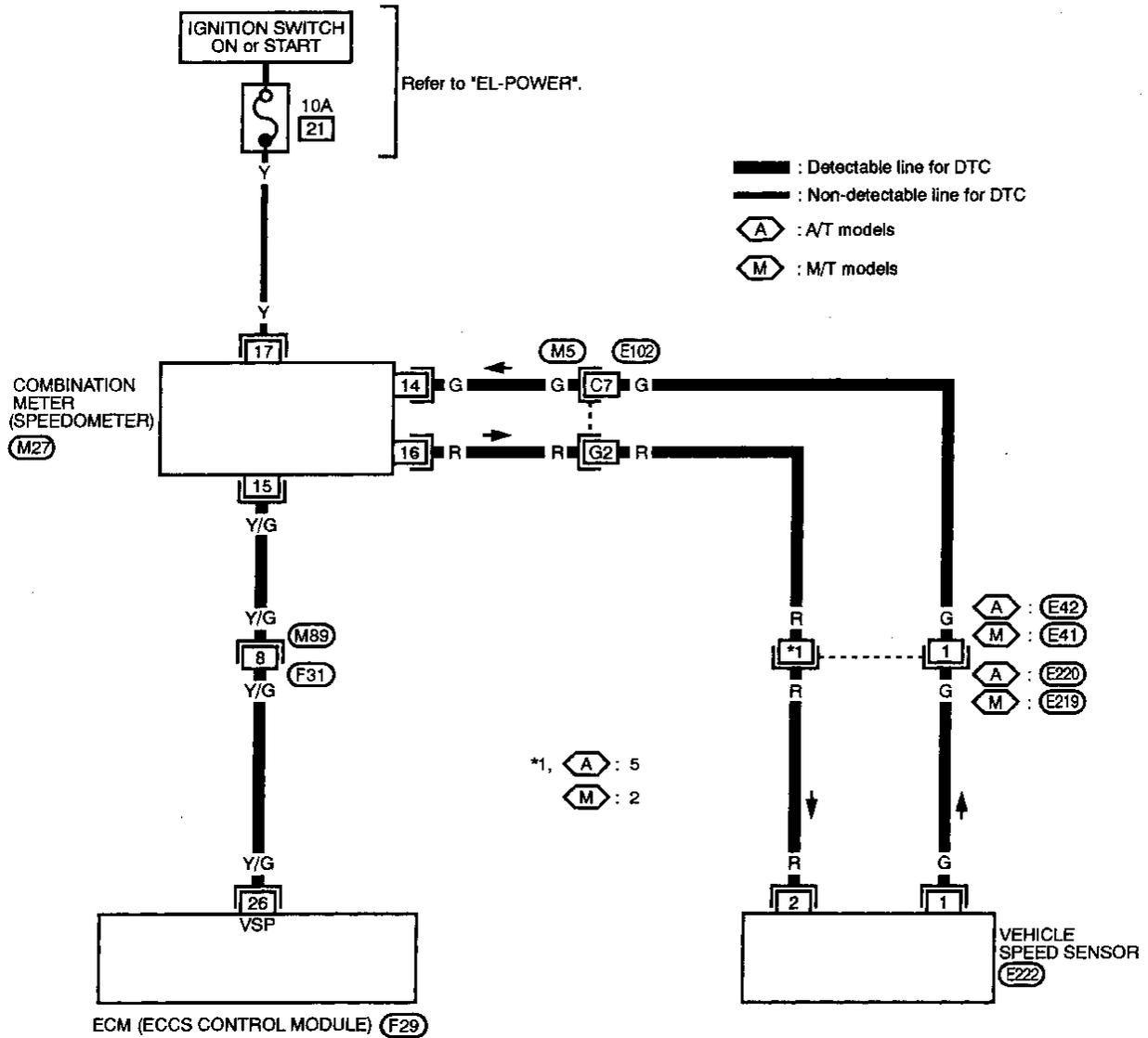


- 1) Start engine and warm it up sufficiently.
 - 2) Perform test drive for at least 10 seconds continuously in the following recommended condition.
 - Engine speed : 2,000 - 3,200 rpm
 - Intake manifold vacuum: -40.0 to -20.0 kPa
(-300 to -150 mmHg, -11.81 to -5.91 inHg)
 - Gear position : Suitable position (except "N" or "P" position)
 - 3) Stop the vehicle, turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
 - 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- *) Even though Diagnostic Trouble Code is not detected, perform the above test drive at least one more time.

TROUBLE DIAGNOSIS FOR DTC 14

Vehicle Speed Sensor (VSS) (DTC: P0500) (Cont'd)

EC-VSS-01

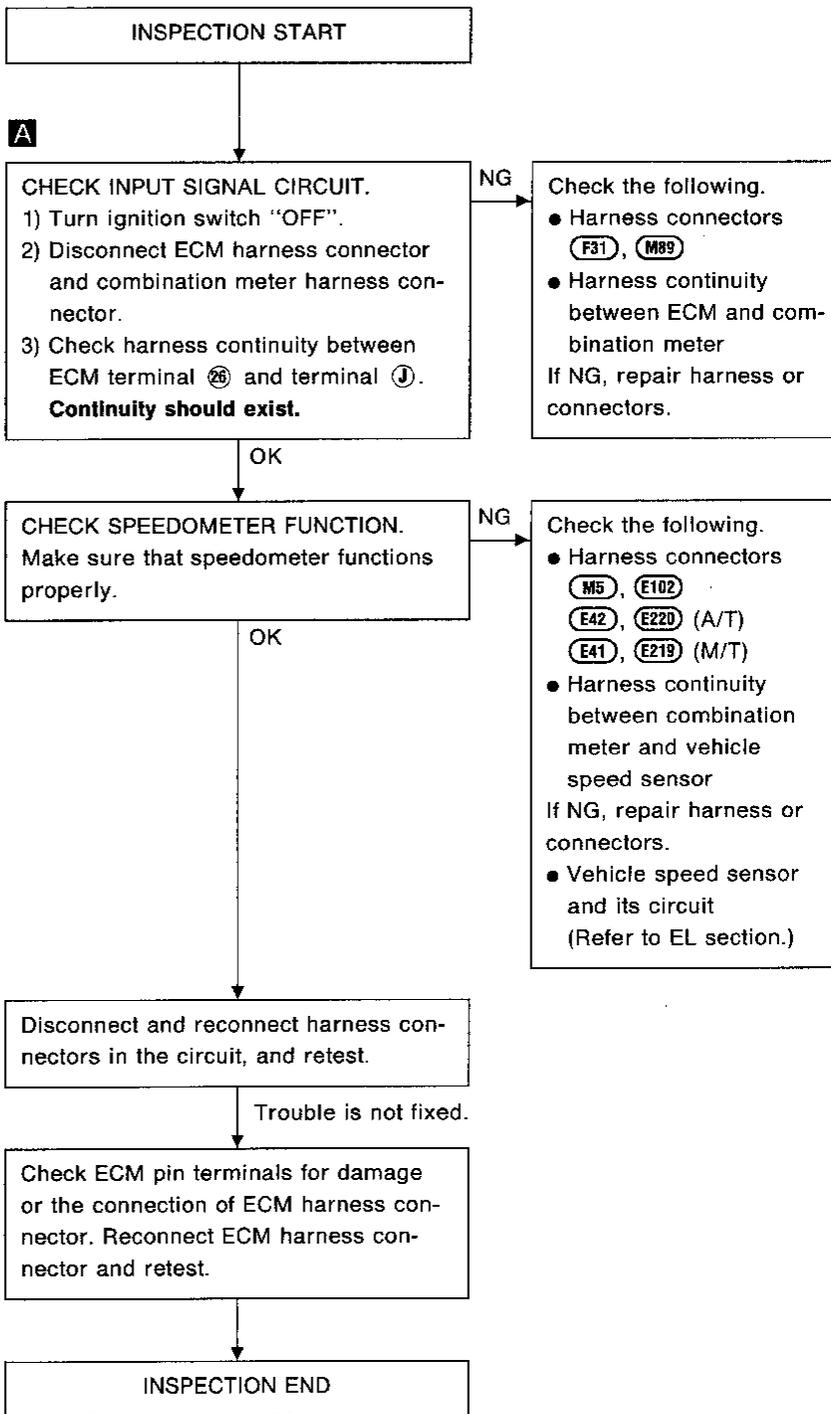
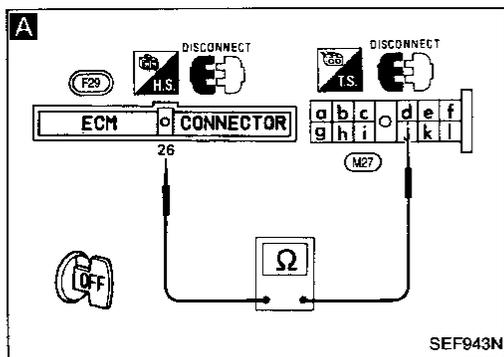


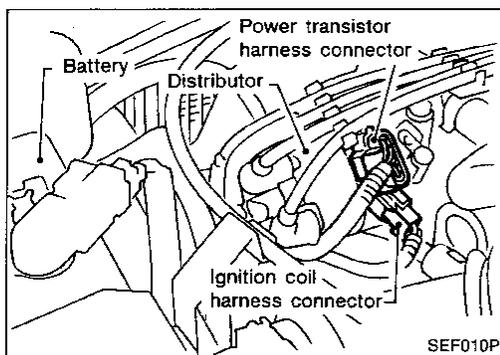
Refer to last page (Foldout page).
(E102), (M5)

TROUBLE DIAGNOSIS FOR DTC 14

Vehicle Speed Sensor (VSS) (DTC: P0500) (Cont'd)

DIAGNOSTIC PROCEDURE





Ignition Signal (DTC: P1320)

Ignition coil & power transistor (Built into distributor)

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.

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Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
21 P1320	<ul style="list-style-type: none"> ● The ignition signal in the primary circuit is not entered during engine cranking or running. 	<ul style="list-style-type: none"> ● Harness or connectors (The ignition primary circuit is open or shorted.) ● Power transistor unit. ● Resistor ● Camshaft position sensor ● Camshaft position sensor circuit

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

Note: If both DTC 11 (P0340) and 21 (P1320) are displayed, perform TROUBLE DIAGNOSIS FOR DTC 11 first. (See EC-90.)



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine.

OR



- 1) Turn ignition switch "ON".
- 2) Start engine.
- 3) Select MODE 3 with GST.

OR

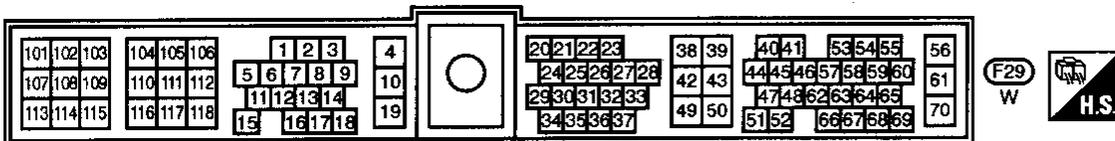
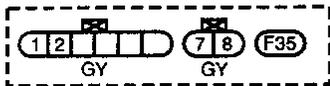
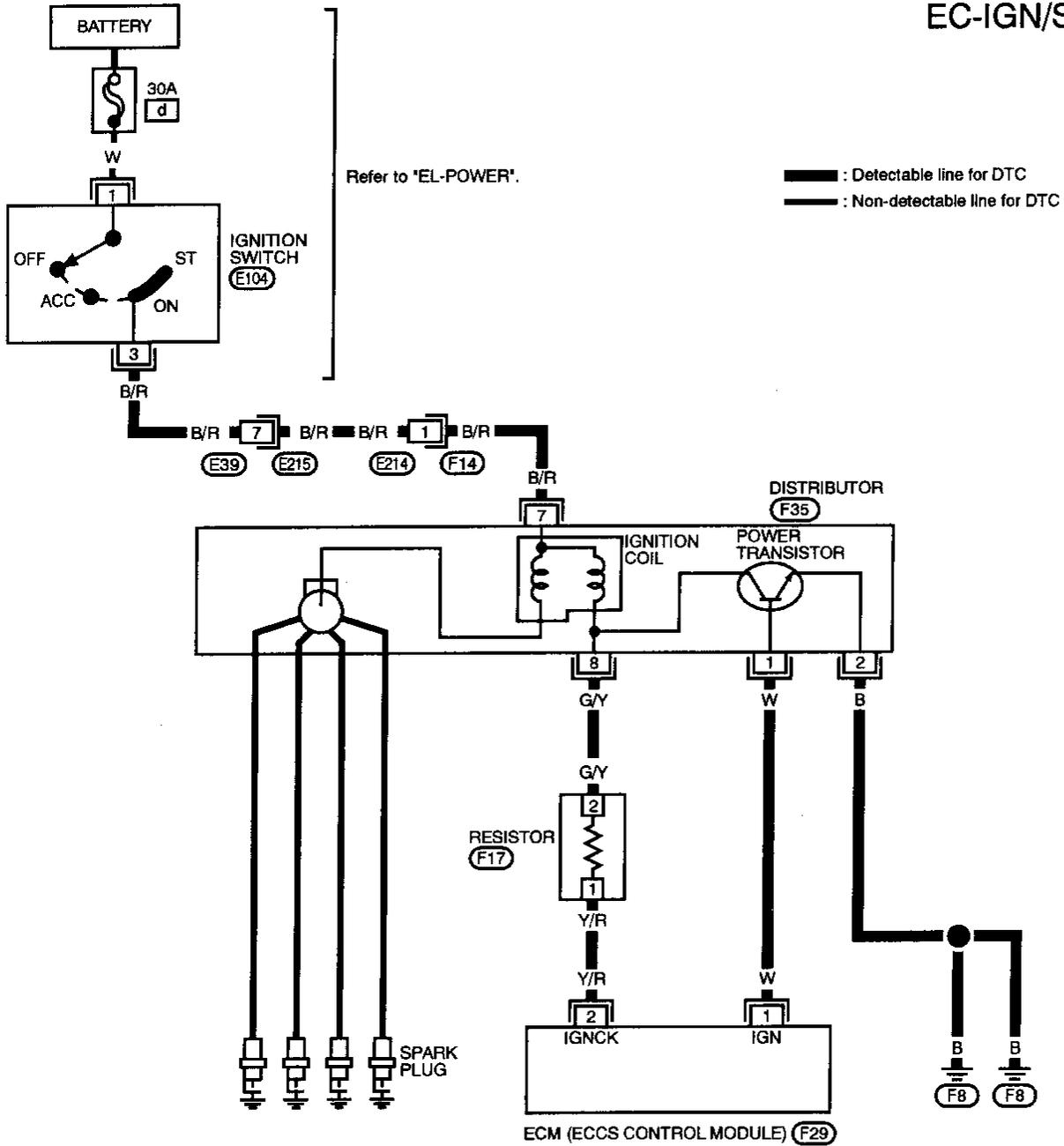


- 1) Turn ignition switch "ON".
- 2) Start engine.
- 3) Turn ignition switch "OFF" and wait for at least 3 seconds, then "ON".
- 4) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC 21

Ignition Signal (DTC: P1320) (Cont'd)

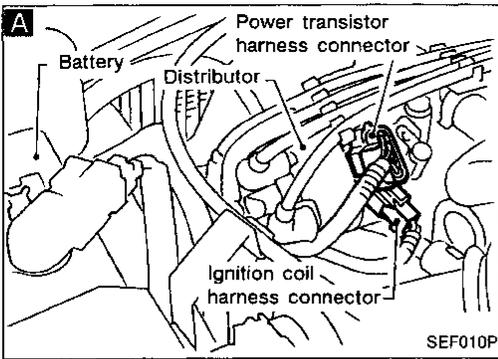
EC-IGN/SG-01



TROUBLE DIAGNOSIS FOR DTC 21

Ignition Signal (DTC: P1320) (Cont'd)

DIAGNOSTIC PROCEDURE



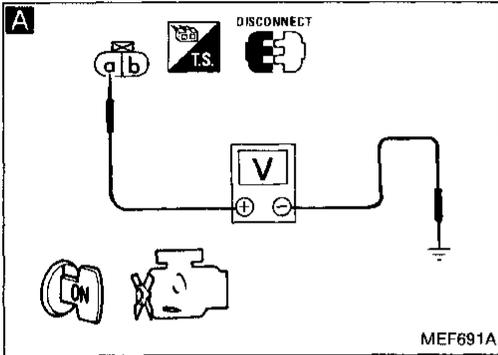
INSPECTION START

Turn ignition switch "OFF", and restart engine.
Is engine running?

Yes → A

No

A



CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect ignition coil harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Battery voltage

NG

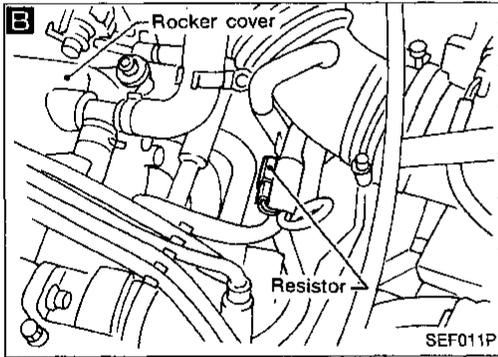
Check the following.

- Harness connectors (E39, E215)
- Harness connectors (E214, F14)
- Harness continuity between ignition coil and ignition switch

If NG, repair harness or connectors.

OK

B

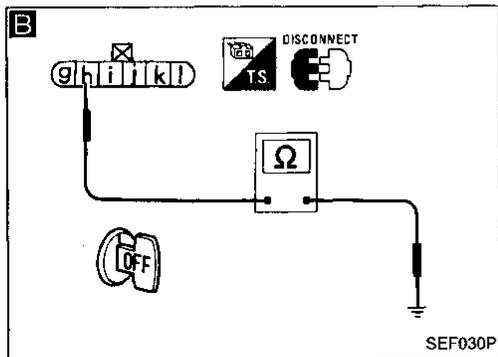
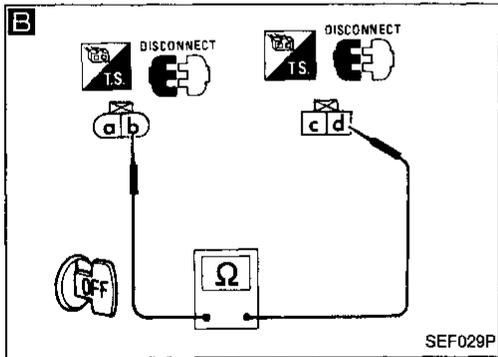


CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect power transistor harness connector.
3) Disconnect resistor harness connector.
4) Check harness continuity between terminal ② and terminal ④, terminal ③ and engine ground.
Continuity should exist.

NG

Repair harness or connectors.

OK

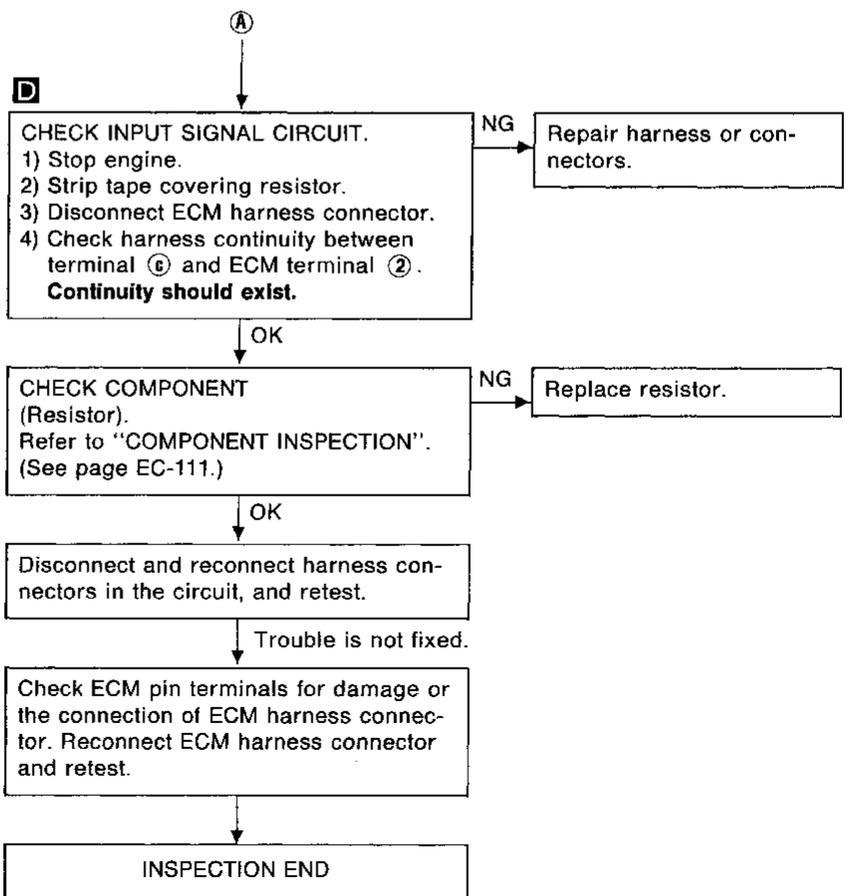
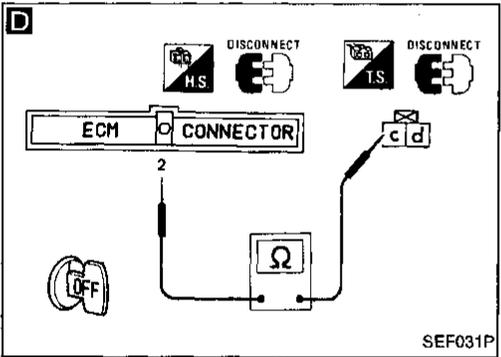
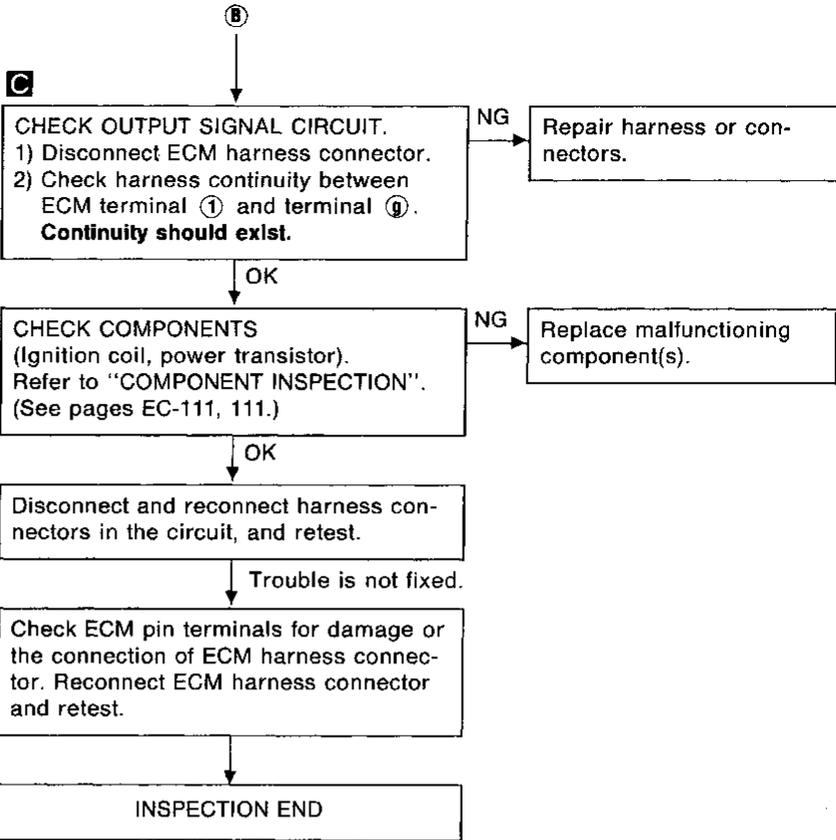
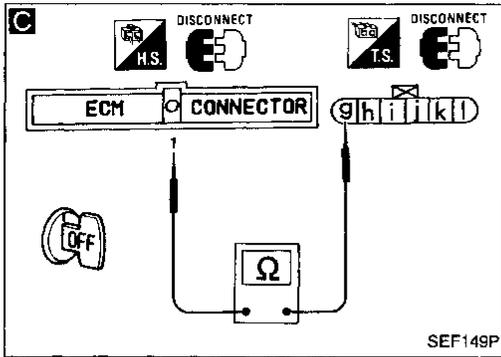


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TROUBLE DIAGNOSIS FOR DTC 21

Ignition Signal (DTC: P1320) (Cont'd)



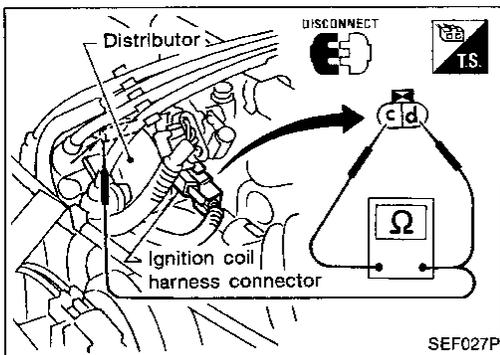
TROUBLE DIAGNOSIS FOR DTC 21

Ignition Signal (DTC: P1320) (Cont'd)

COMPONENT INSPECTION

Ignition coil

1. Disconnect ignition coil harness connector.
2. Remove distributor cap.
3. Check resistance as shown in the figure.



Terminal	Resistance
Ⓒ - Ⓓ	Approximately 1 Ω
Ⓒ - Ⓔ	Approximately 26 kΩ

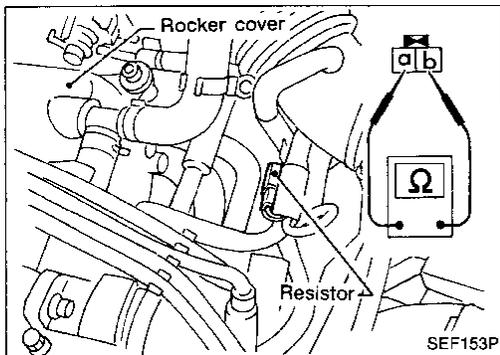
If NG, replace distributor assembly.

Resistor

1. Disconnect resistor harness connector.
2. Check resistance between terminals Ⓐ and Ⓑ.

Resistance: Approximately 2.2 kΩ

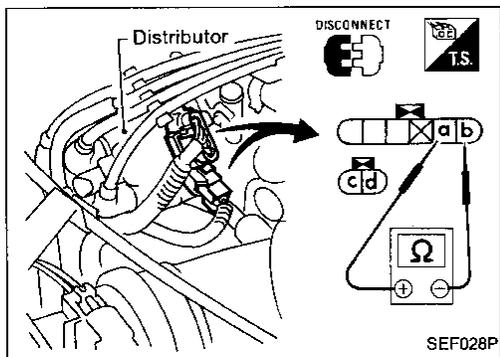
If NG, replace resistor.



Power transistor

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor continuity between terminals with a digital tester as shown in the figure.

- **The digital tester must have a diode check position and be able to measure up to 20 MΩ to perform this inspection.**

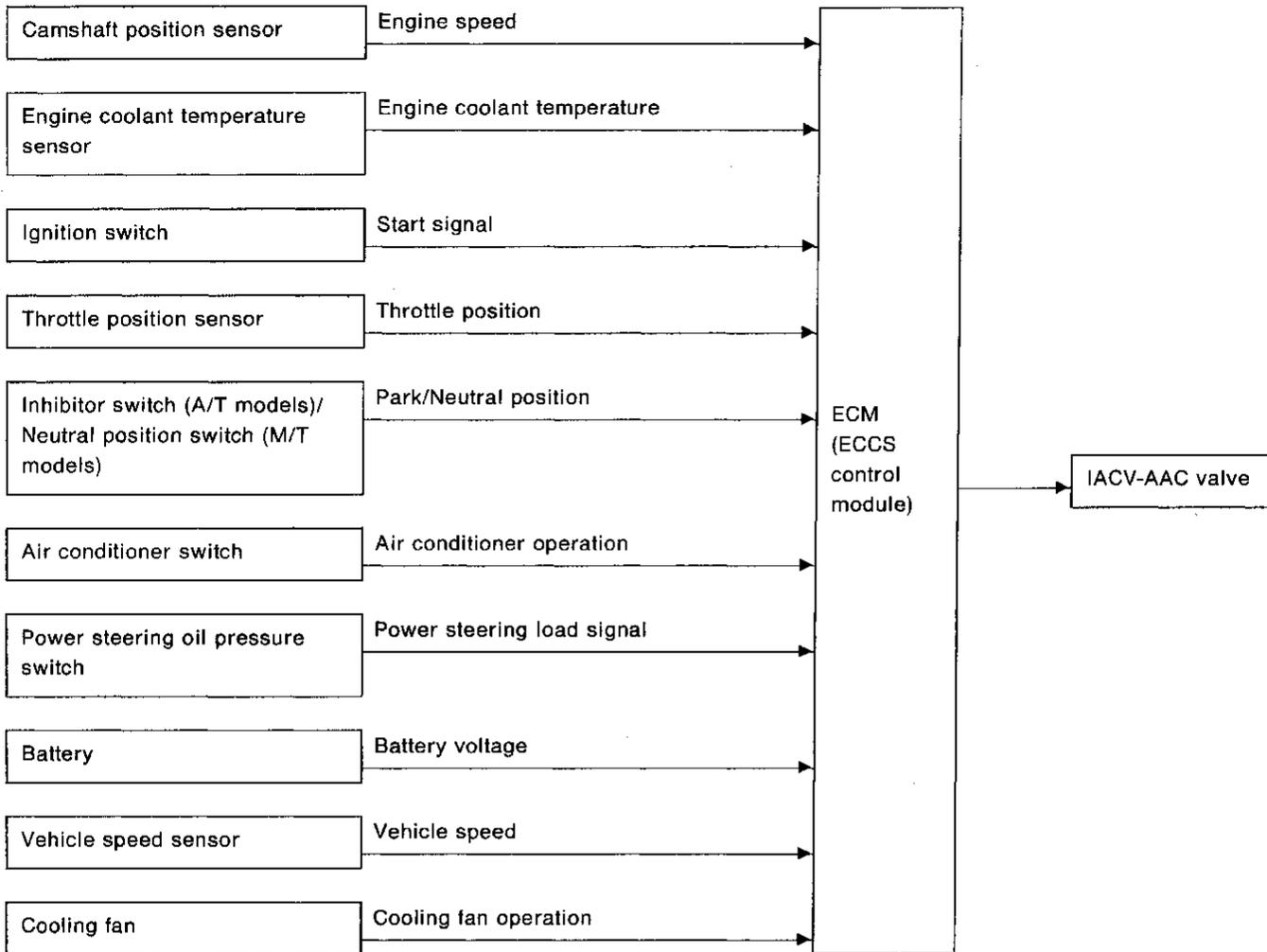


Terminal side	Terminal Ⓐ		Terminal Ⓑ		Terminal Ⓒ	
	Resistance Ω	Result	Resistance Ω	Result	Resistance Ω	Result
⊖ terminal side	—	—	∞	NG	∞	NG
⊕ terminal side	—	—	Not ∞ or 0	OK	Not ∞ or 0	OK
	—	—	0	NG	0	NG
	∞	NG	—	—	∞	NG
Terminal Ⓑ	Not ∞ or 0	OK	—	—	Not ∞ or 0	OK
	0	NG	—	—	0	NG
	∞	OK	∞	OK	—	—
Terminal Ⓒ	Not ∞ or 0	NG	Not ∞ or 0	NG	—	—
	0	NG	0	NG	—	—
	∞	OK	∞	OK	—	—

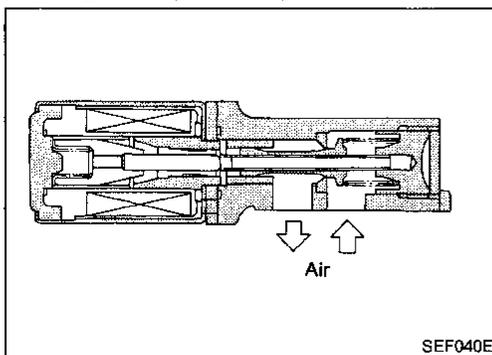
If NG, replace distributor assembly.

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: P0505)

SYSTEM DESCRIPTION



This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

TROUBLE DIAGNOSIS FOR DTC 25

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: P0505) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
25 P0505	a) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is open.) ● IACV-AAC valve
	b) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is shorted.) ● IACV-AAC valve

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

For the above malfunction a)



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Wait for at least 2 seconds.

OR



- 1) Turn ignition switch "ON" and wait for at least 2 seconds.
- 2) Select "MODE 3" with GST.

OR



- 1) Turn ignition switch "ON" and wait for at least 2 seconds.
- 2) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

For the above malfunction b)



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
- 4) Start engine and run it for at least 30 seconds at idle speed.

OR



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Start engine again and run it for at least 30 seconds at idle speed.
- 4) Select "MODE 3" with GST.

OR

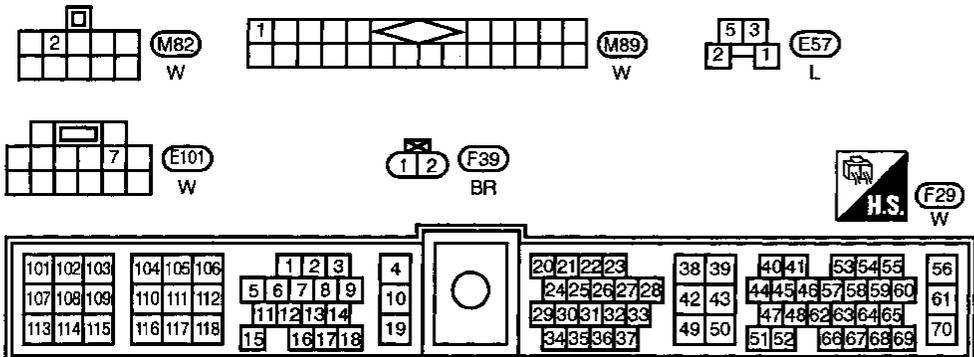
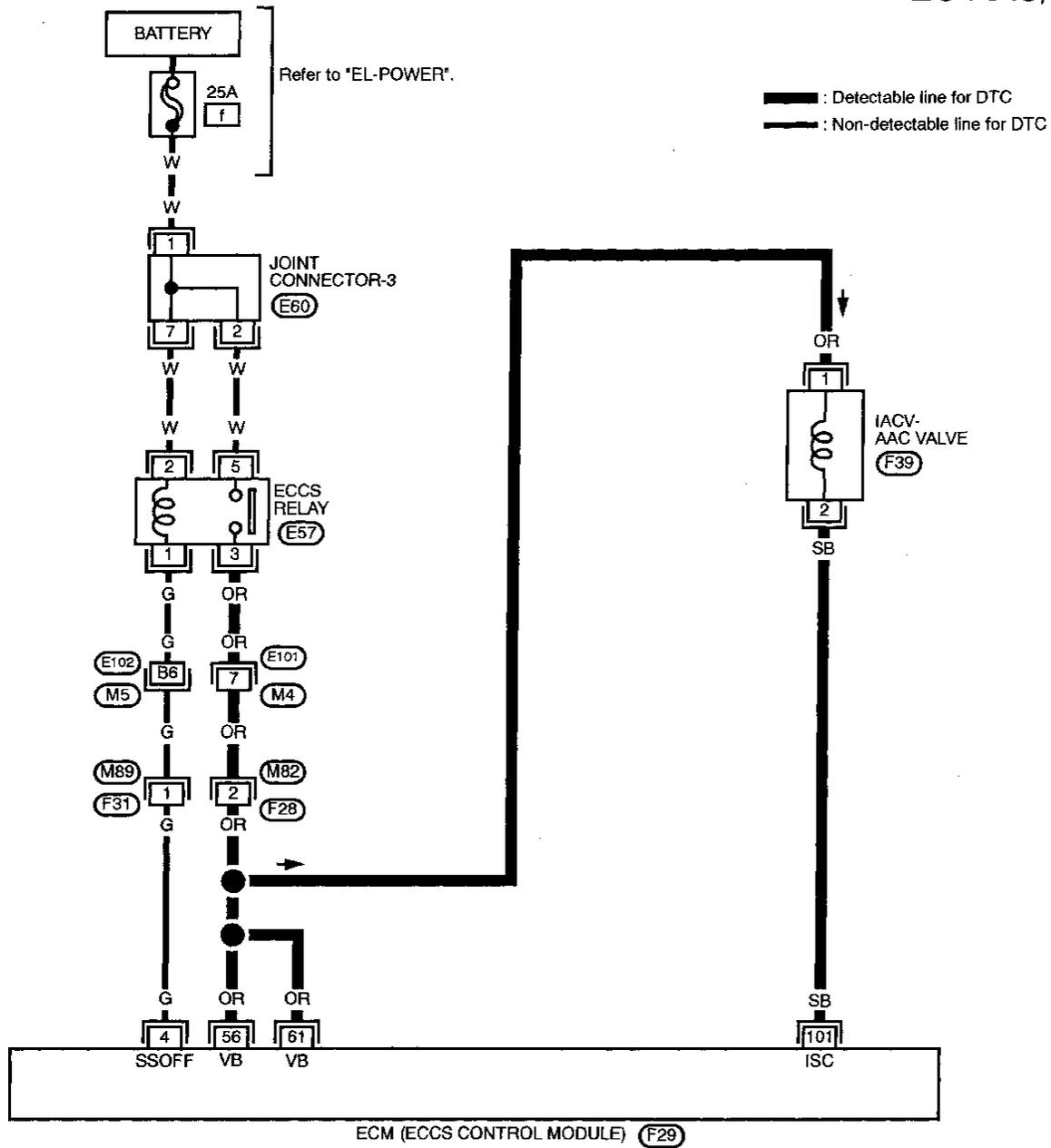


- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Start engine again and run it for at least 30 seconds at idle speed.
- 4) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC 25

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: P0505) (Cont'd)

EC-AAC/V-01



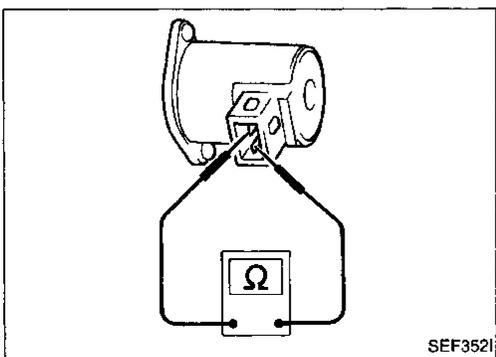
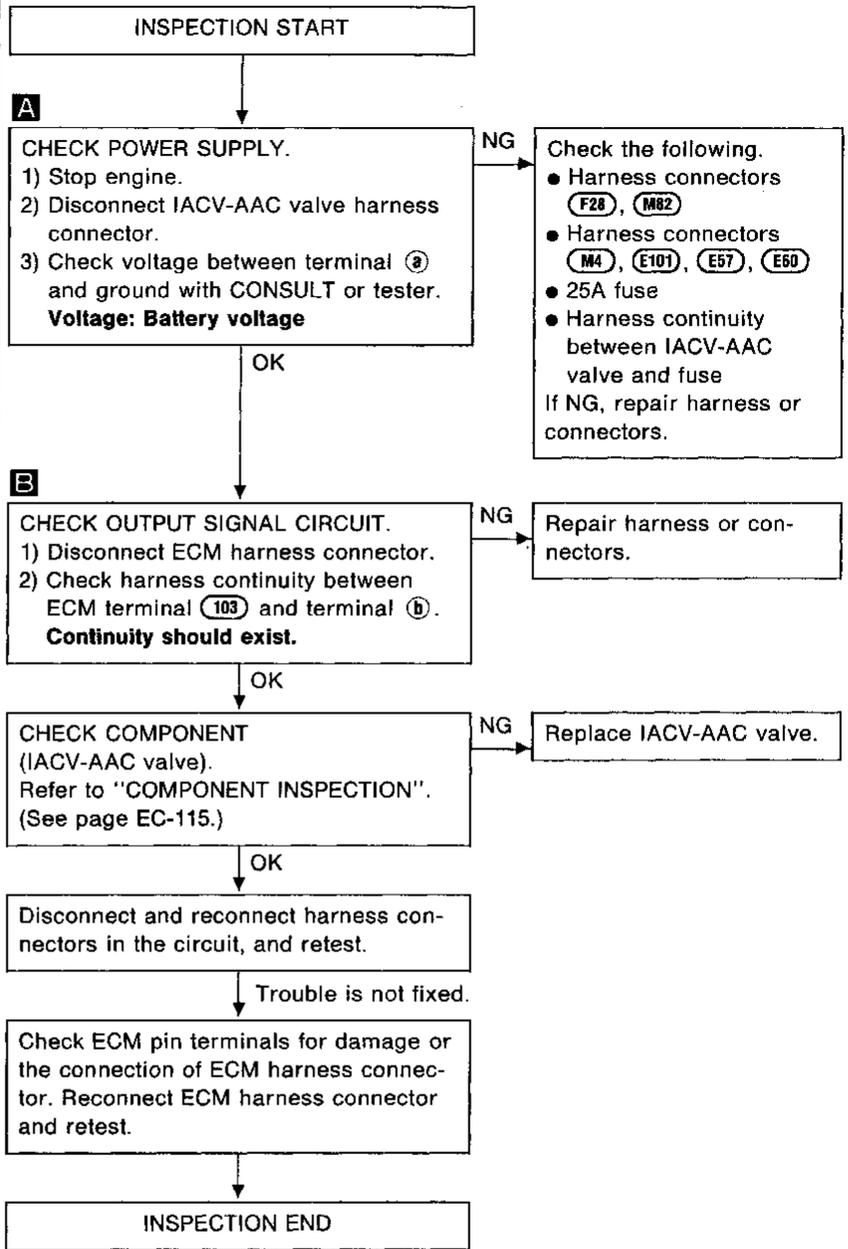
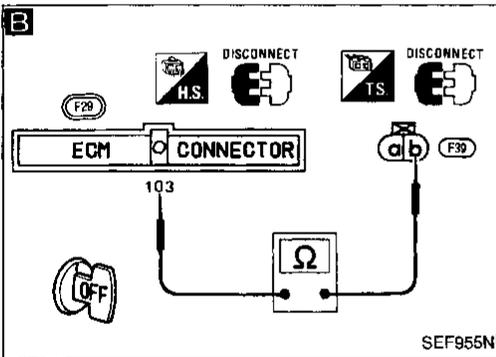
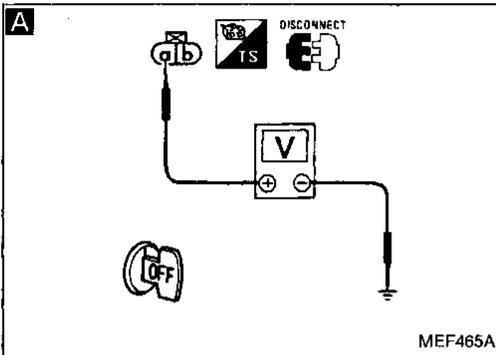
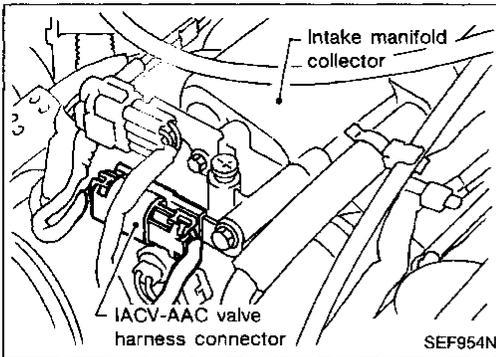
Refer to last page (Foldout page).

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E60

TROUBLE DIAGNOSIS FOR DTC 25

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: P0505) (Cont'd)

DIAGNOSTIC PROCEDURE



COMPONENT INSPECTION

IACV-AAC valve

Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.

Resistance:

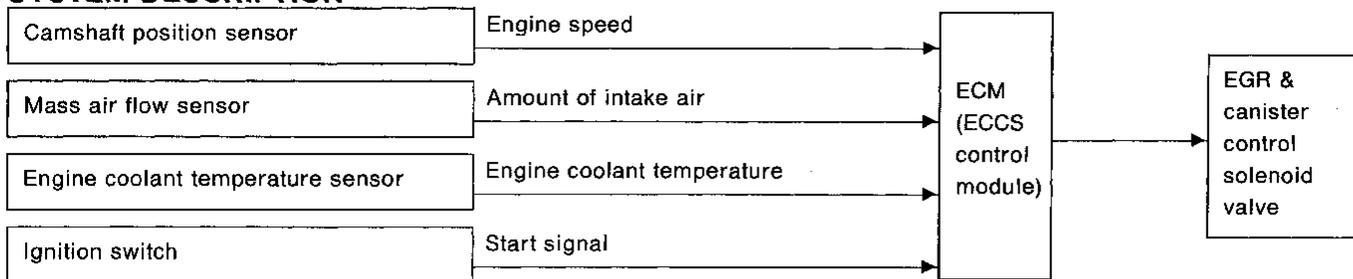
Approximately 10Ω

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

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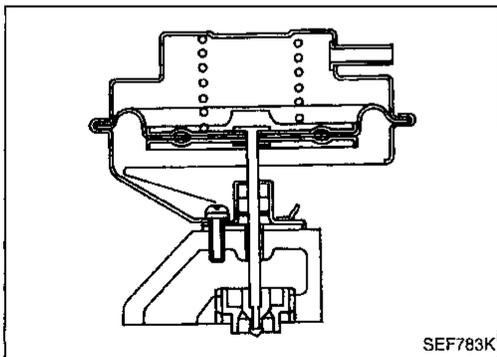
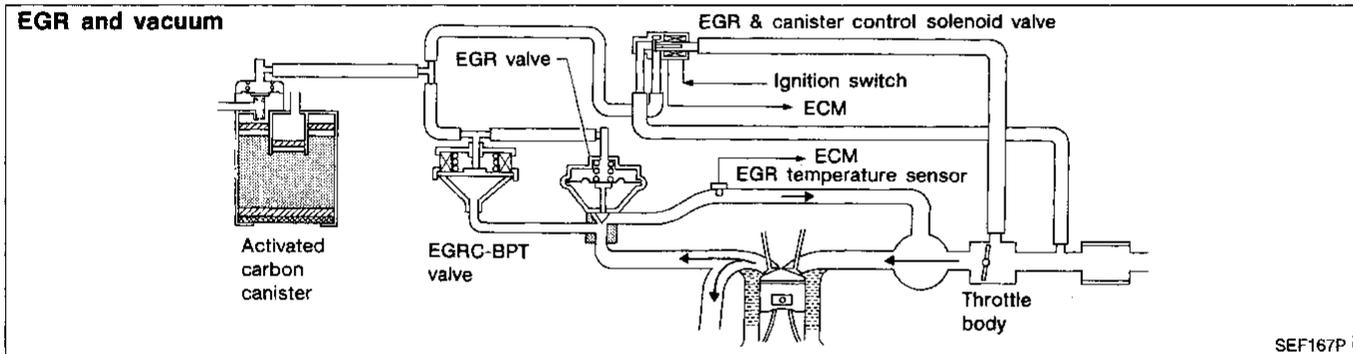
EGR Function (DTC: P0400)

SYSTEM DESCRIPTION



This system cuts and controls vacuum applied to EGR valve and canister to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGR & canister control solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve. This causes the port vacuum to be discharged into the atmosphere. The EGR valve and canister remain closed.

- 1) Low engine coolant temperature
- 2) Engine starting
- 3) High-speed engine operation
- 4) Engine idling
- 5) Excessively high engine coolant temperature
- 6) Mass air flow sensor malfunction



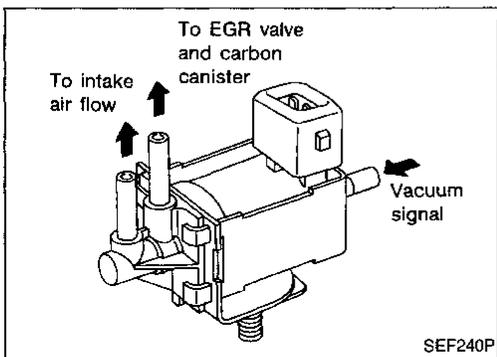
COMPONENTS DESCRIPTION

Exhaust gas recirculation (EGR) valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

EGR and canister control solenoid valve

The EGR and canister control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve and canister purge valve). When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve and carbon canister.



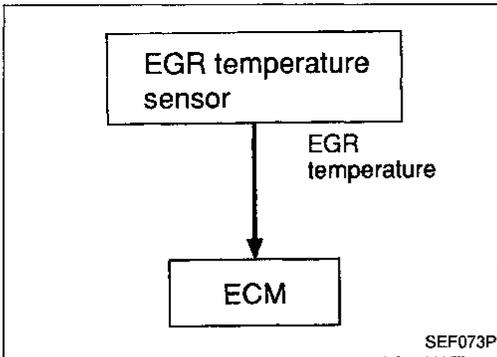
TROUBLE DIAGNOSIS FOR DTC 32

EGR Function (DTC: P0400) (Cont'd)

ON-BOARD DIAGNOSIS LOGIC

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
32 P0400	a) The exhaust gas recirculation (EGR) flow is excessively low during the specified driving condition.	<ul style="list-style-type: none"> ● EGR valve stuck closed ● EGRC-BPT valve leaking ● Passage obstructed ● EGRC solenoid valve ● Tube leaking for EGR valve
	b) The exhaust gas recirculation (EGR) flow is excessively high during the specified driving condition.	<ul style="list-style-type: none"> ● EGRC solenoid valve ● EGR valve leaking or stuck open

OVERALL FUNCTION CHECK

Instead of performing DTC DETECTING CONDITION, the following method can be used for checking the EGR function. (The "NG" of the OVERALL FUNCTION CHECK means the same as the DTC detection.)

Before starting with the following procedure, check the engine coolant temperature of the freeze frame data with CONSULT or Generic Scan Tool.

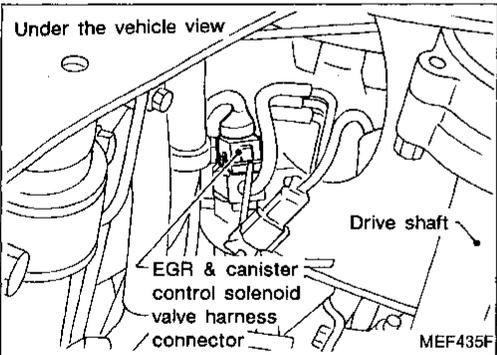
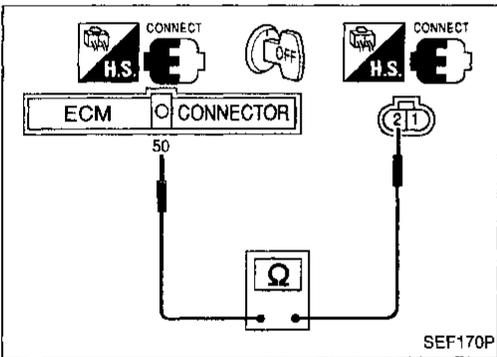
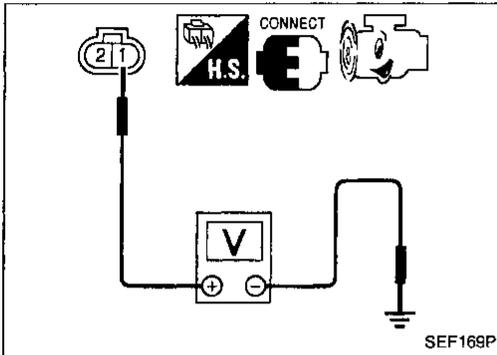
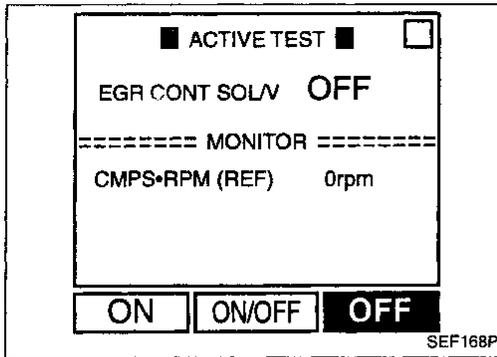
If the engine coolant temperature is higher than or equal to 60°C (140°F), perform only "For the above malfunction a".

If the engine coolant temperature is lower than 60°C (140°F), perform both "For the above malfunction a" and "For the above malfunction b".

TROUBLE DIAGNOSIS FOR DTC 32

EGR Function (DTC: P0400) (Cont'd)

For the above malfunction a



Overall function check

Check the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm.

- 1) Start engine.
- 2) Turn EGR & canister control solenoid valve "OFF" in "ACTIVE TEST" mode with CONSULT.
- 3) Check the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm under no load.
EGR valve should lift up and down without sticking.
- 4) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
Less than 4.5V should exist.
- 5) Turn ignition switch "OFF".
Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ⑤0.
Continuity should exist.
- 6) Perform "COMPONENT CHECK", "EGR temperature sensor". (See page EC-124.)

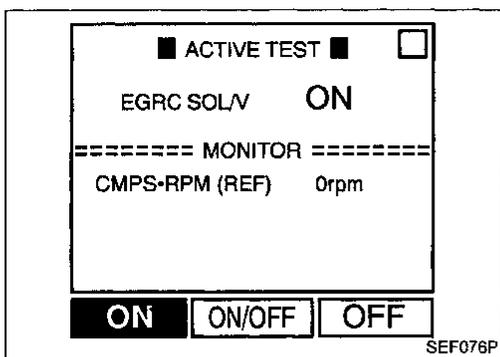
OR

- 1) Disconnect EGR & canister control solenoid valve harness connector.
(The DTC for EGR & canister control solenoid valve will be displayed, however, ignore it.)
- 2) Start engine.
- 3) Check the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm under no load.
EGR valve should lift up and down without sticking.
- 4) Reconnect its harness connector.
- 5) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
Less than 4.5V should exist.
- 6) Turn ignition switch "OFF".
Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ⑤0.
Continuity should exist.
- 7) Perform "COMPONENT CHECK", "EGR temperature sensor". (See page EC-124.)

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TROUBLE DIAGNOSIS FOR DTC 32

EGR Function (DTC: P0400) (Cont'd)



For the above malfunction b

- 1) Start engine.
- 2) Turn EGR & canister control solenoid valve "ON" in "ACTIVE TEST" mode with CONSULT.
- 3) Check for the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

OR

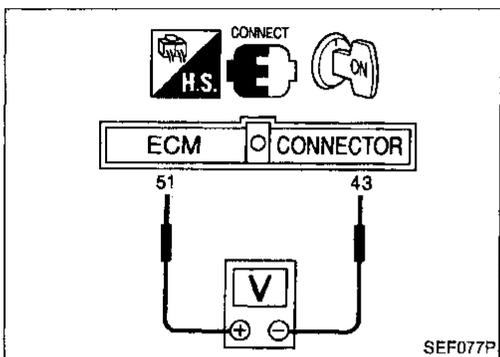
- 1) Confirm the engine coolant temperature is lower than 60°C (140°F) in "Mode 1" with GST.
- Perform the following steps before its temperature becomes higher than 60°C (140°F).
- 2) Start engine.
- 3) Check for the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

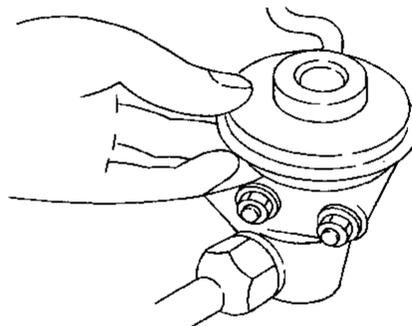
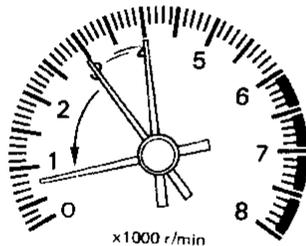
OR

- 1) Confirm the voltage between ECM terminal 51 and 43 is higher than 1.92V.
- Perform the following steps before the voltage becomes lower than 1.92V.
- 2) Start engine.
- 3) Check for the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm under no load.

EGR valve should be closed and should not lift up.



Overall function check



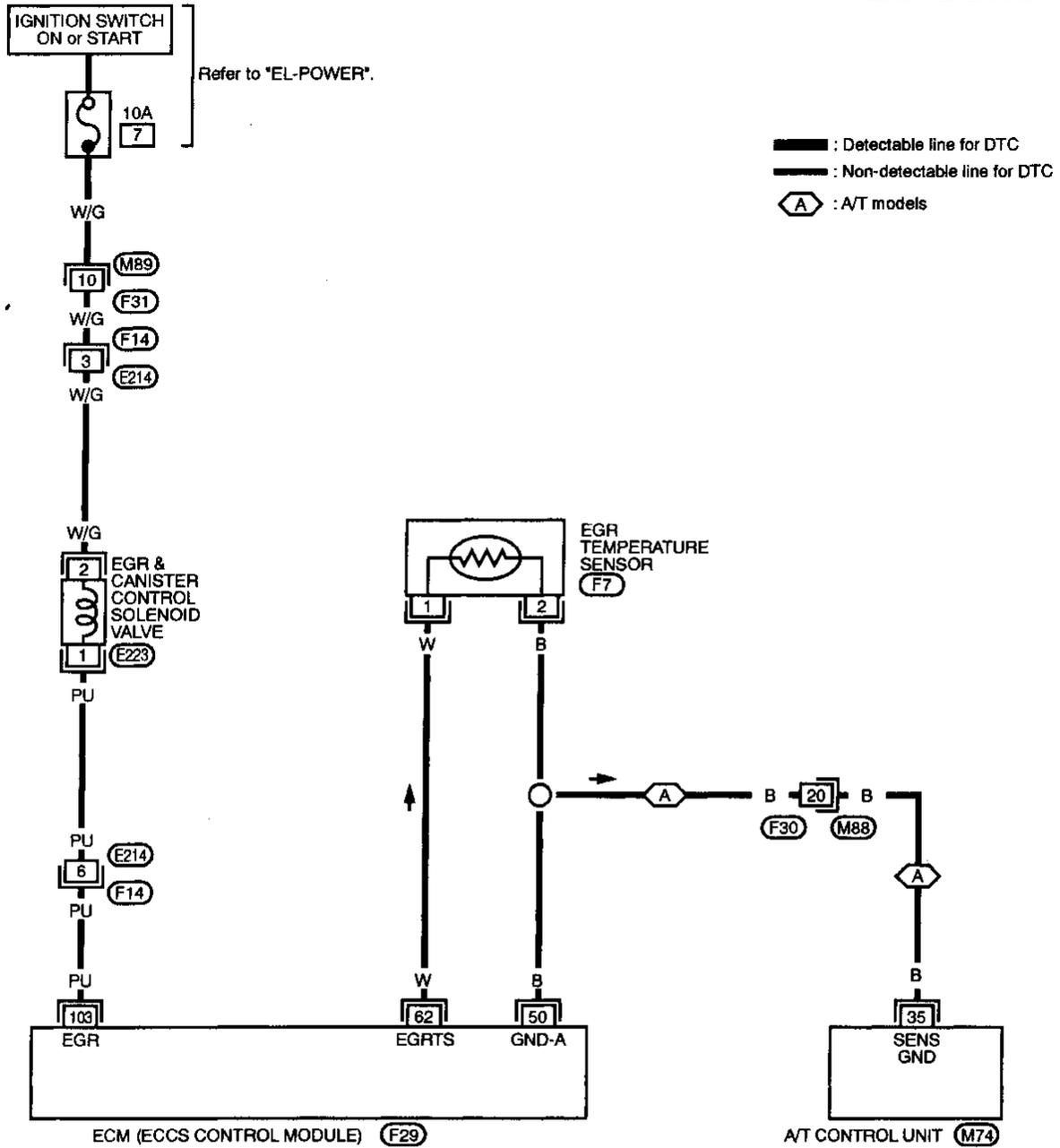
Check the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm.

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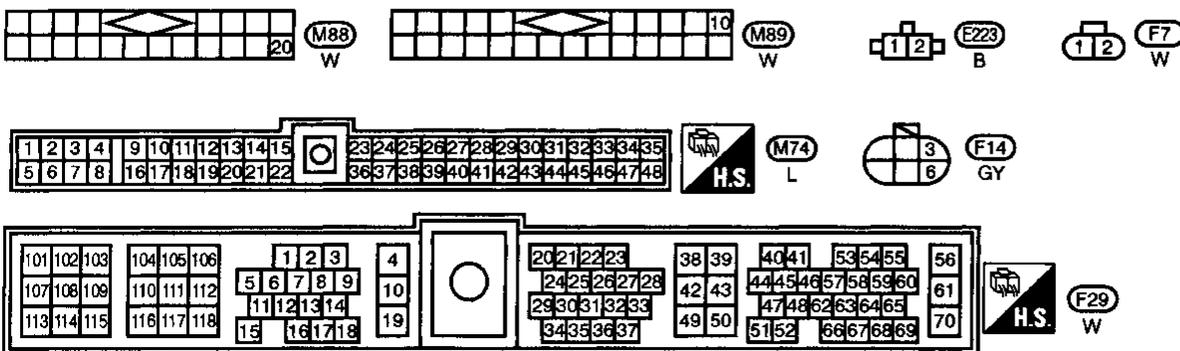
TROUBLE DIAGNOSIS FOR DTC 32

EGR Function (DTC: P0400) (Cont'd)

EC-EGRC1-01



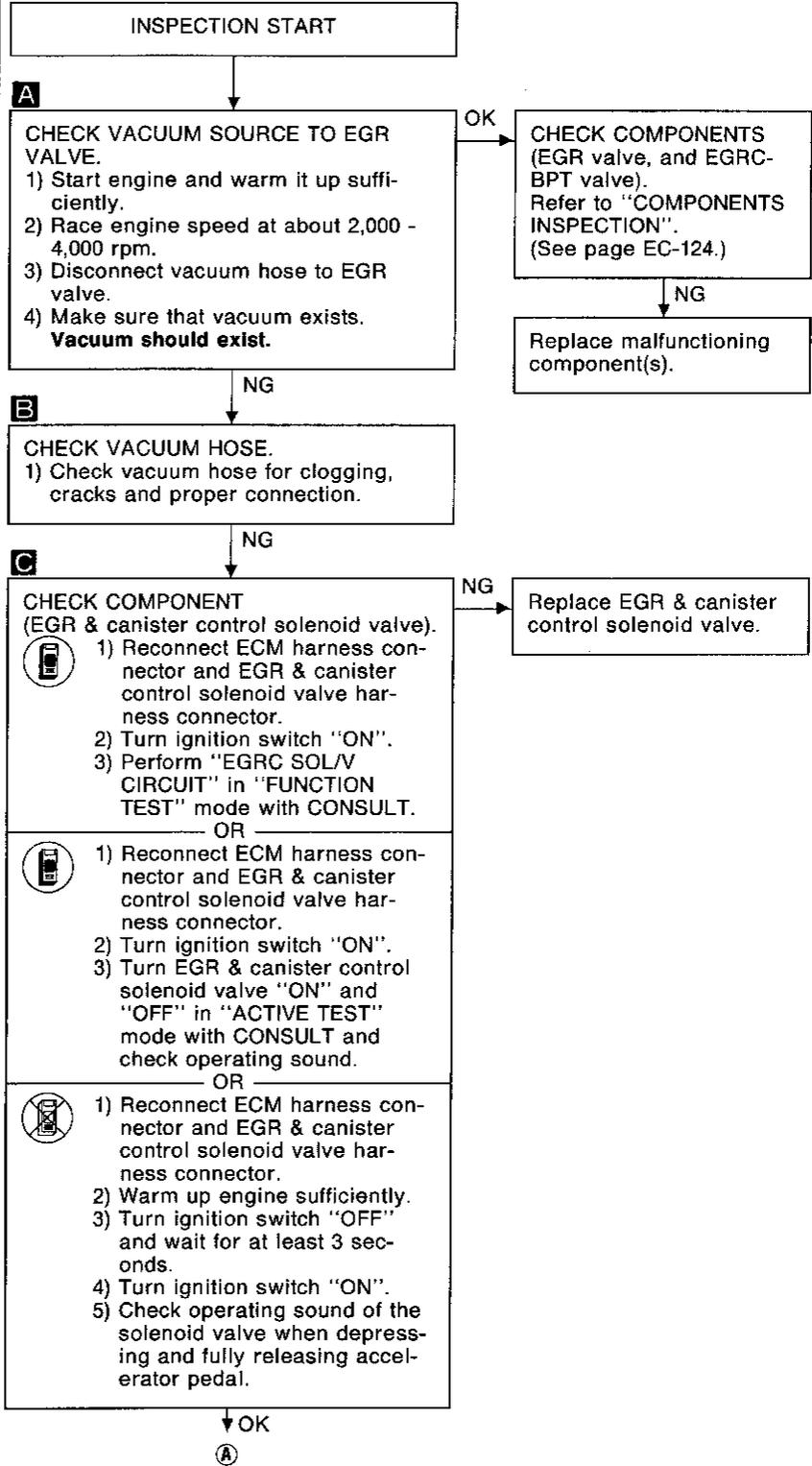
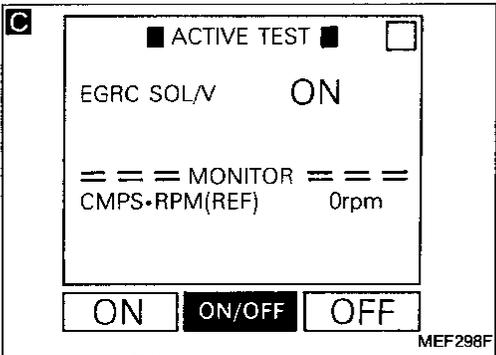
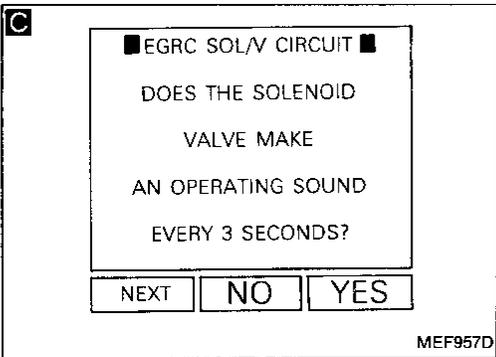
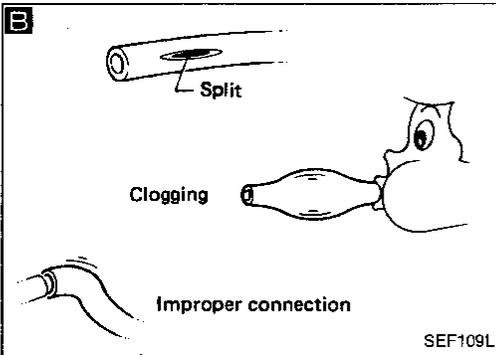
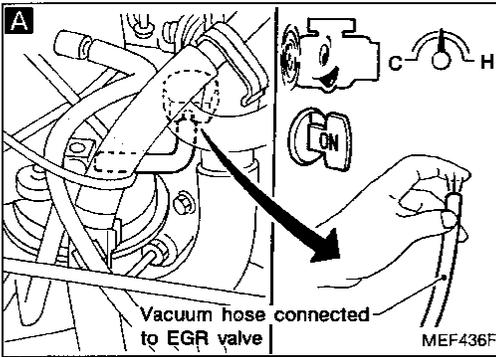
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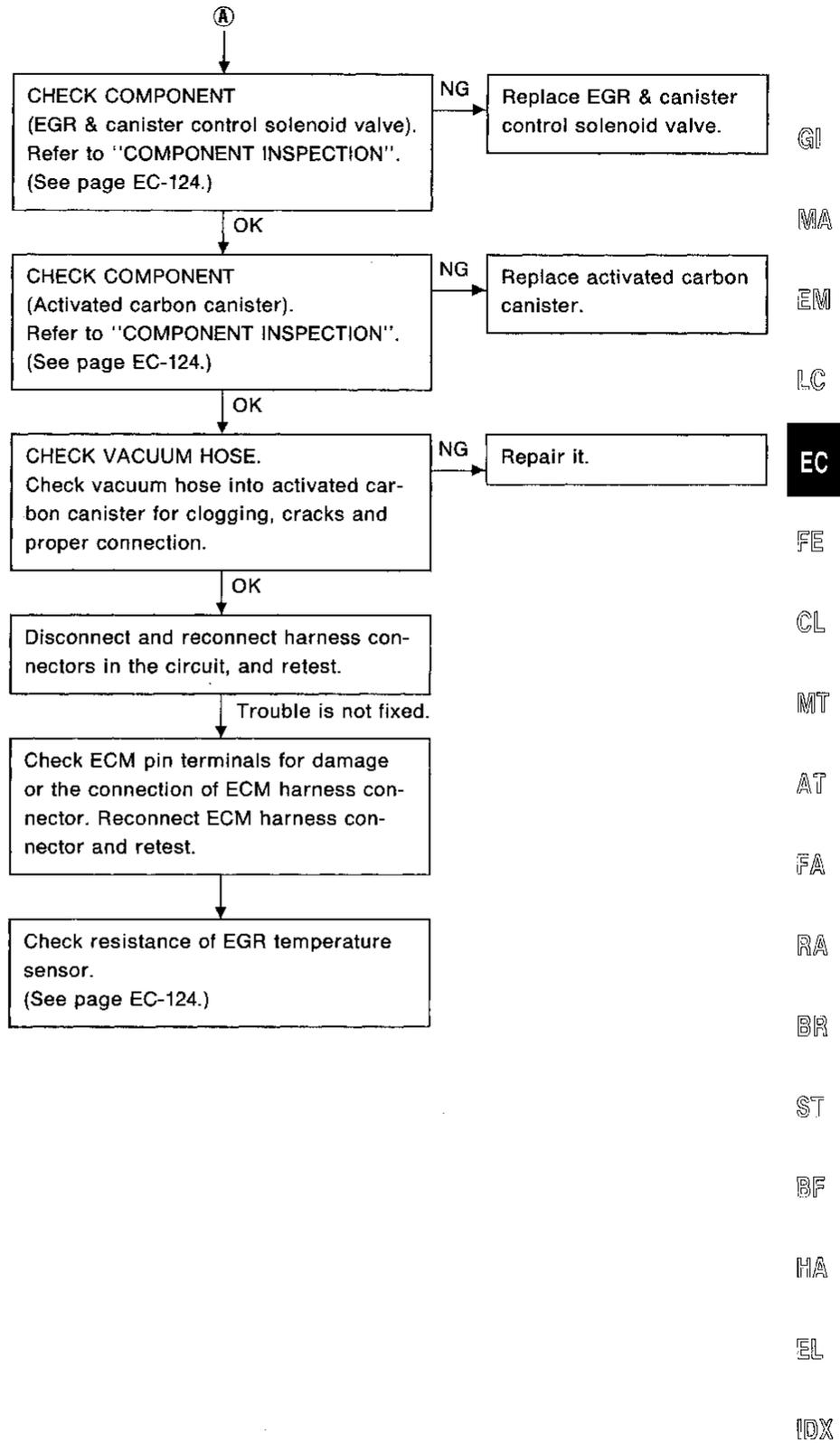
EGR Function (DTC: P0400) (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC 32

EGR Function (DTC: P0400) (Cont'd)



TROUBLE DIAGNOSIS FOR DTC 32

EGR Function (DTC: P0400) (Cont'd)

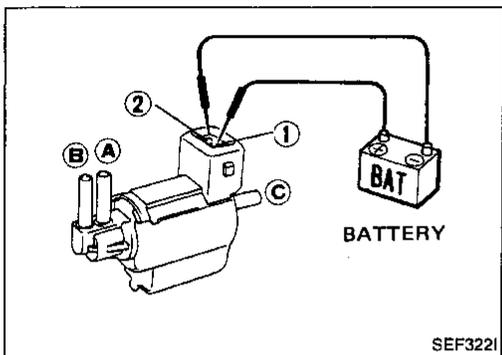
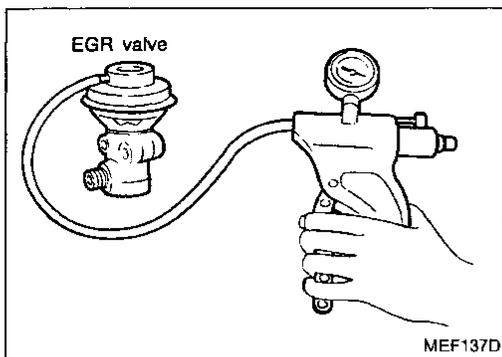
COMPONENTS INSPECTION

EGR valve

Apply vacuum to EGR vacuum port with a hand vacuum pump.

EGR valve spring should lift.

If NG, replace EGR valve.



EGR & canister control solenoid valve

Check solenoid valve, following the table as shown below:

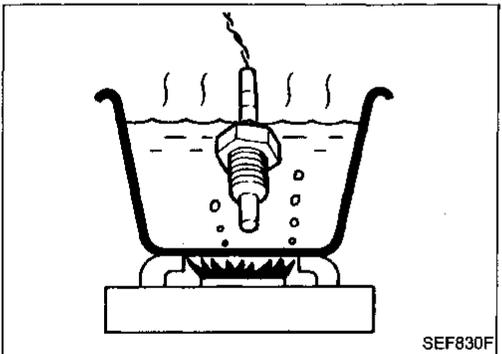
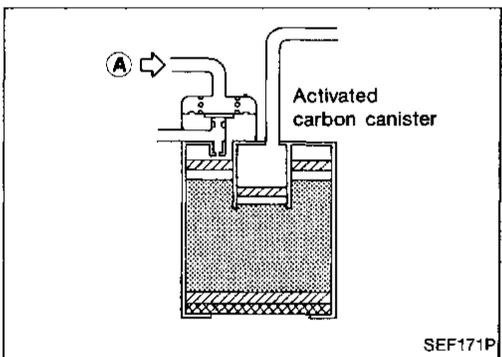
Conditions	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

If NG, replace EGR & canister control solenoid valve.

Activated carbon canister

Gently blow air from (A).

No leakage should exist.



EGR temperature sensor

Check resistance change and resistance value at 100°C (212°F).

- Resistance should decrease in response to temperature increase.

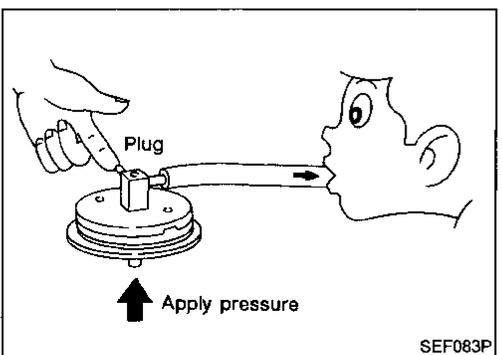
Resistance: 100°C (212°F)

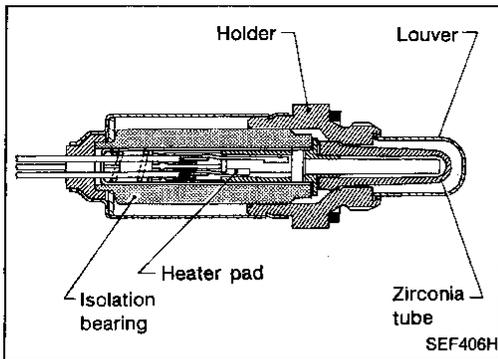
85.3 ± 8.53 kΩ

If NG, replace EGR temperature sensor.

EGRC-BPT valve

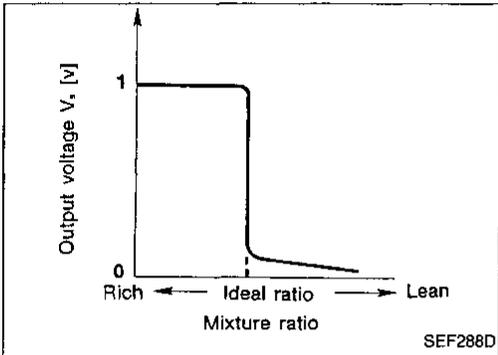
- 1) Plug one of two ports of EGRC-BPT valve.
- 2) Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.
- 3) If a leakage is noted, replace the valve.



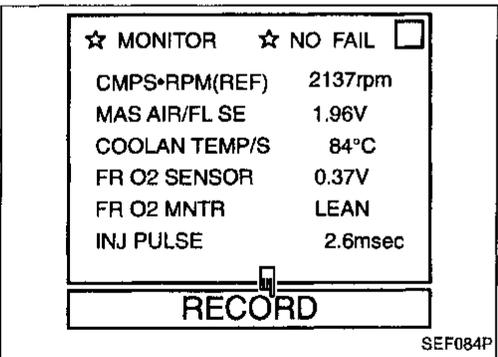


Front Heated Oxygen Sensor (Front HO2S) (DTC: P0130)

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



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
33 P0130	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is entered to ECM. ● The voltage from the sensor is constantly approx. 0.3V. ● The maximum and minimum voltages from the sensor are not reached to the specified voltages. ● It takes more time for the sensor to respond between rich and lean than the specified time. 	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Front heated oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks



OVERALL FUNCTION CHECK

Instead of performing DTC DETECTING CONDITION, the following method can be used for checking the front heated oxygen sensor function. (The "NG" of the OVERALL FUNCTION CHECK means the same as the DTC detection.)

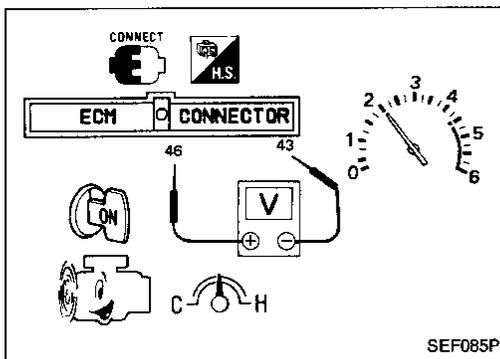
- 1) Start engine and warm it up sufficiently.
- 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SENSOR" and "FR O2 MNTR".
- 3) Touch "RECORD" on CONSULT screen with engine speed held at 2,000 rpm constant under no load.
- 4) Make sure of the following:
 - "FR O2 MNTR" in "DATA MONITOR" mode indicates "RICH" and "LEAN" periodically more than 5 times for 10 seconds.
 - The maximum voltage of "FR O2 SENSOR" is over 0.6V at least one time.
 - The minimum voltage of "FR O2 SENSOR" is below 0.35V at least one time.

OR

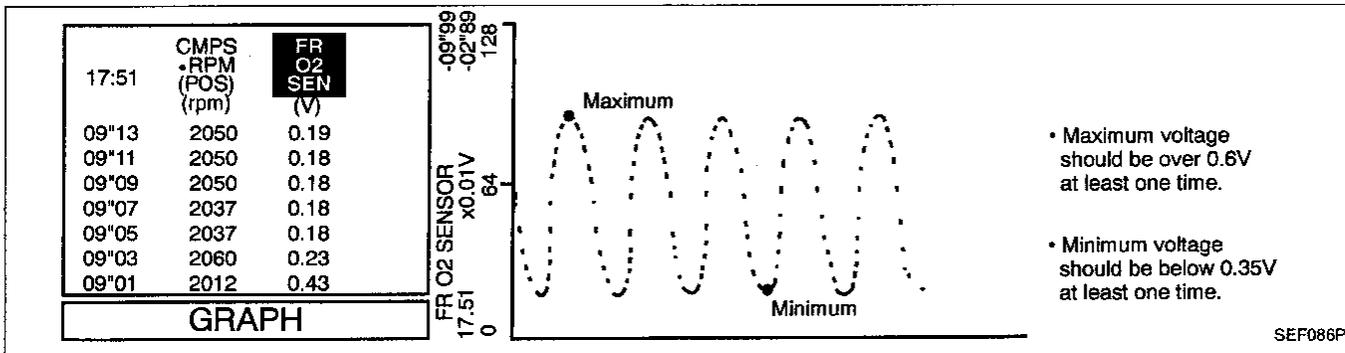
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TROUBLE DIAGNOSIS FOR DTC 33

Front Heated Oxygen Sensor (Front HO2S) (DTC: P0130) (Cont'd)



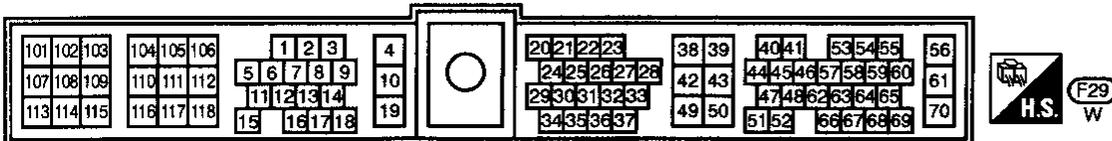
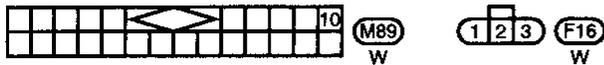
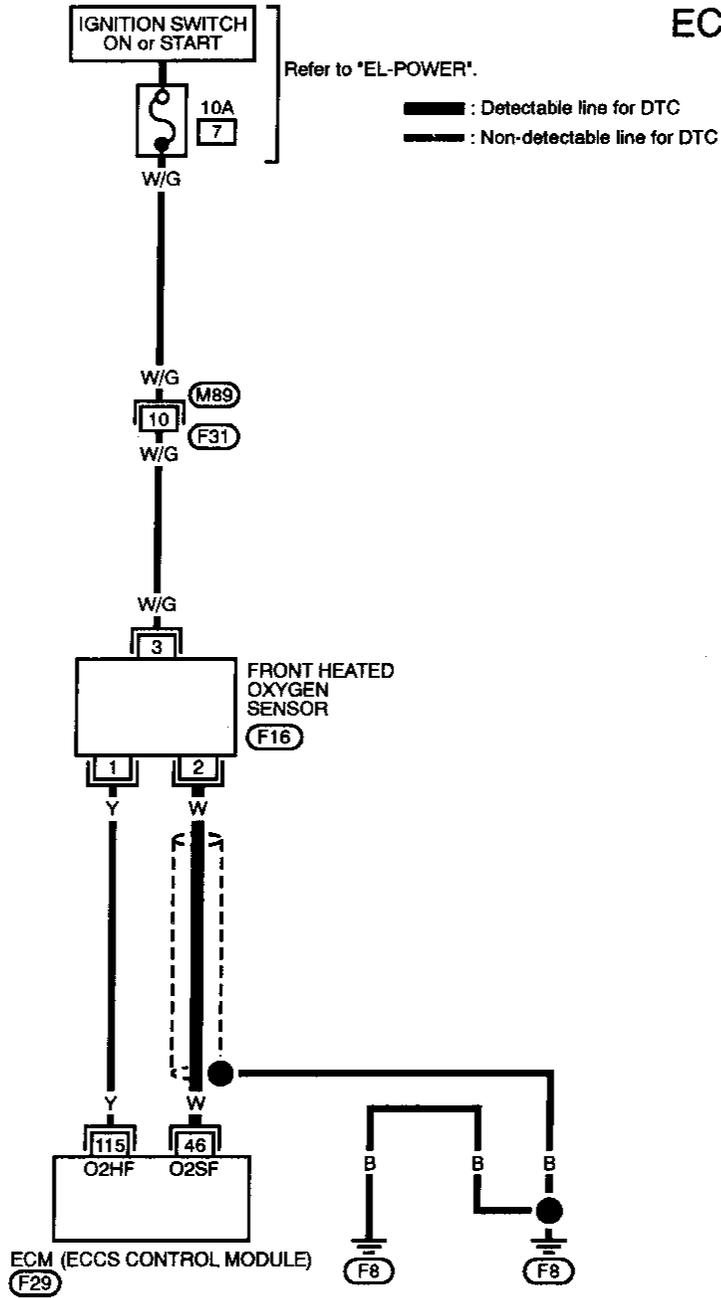
- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeter probes between ECM terminal 46 (sensor signal) and 43 (engine ground).
- 3) Make sure of the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on and off periodically more than 5 times for 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR).
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.35V at least one time.



TROUBLE DIAGNOSIS FOR DTC 33

Front Heated Oxygen Sensor (Front HO2S) (DTC: P0130) (Cont'd)

EC-FRO2-01

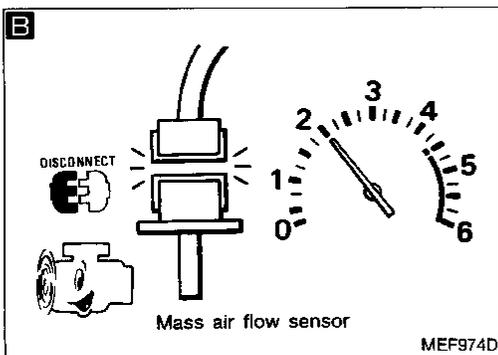
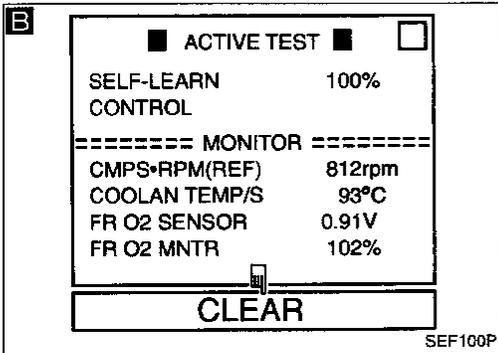
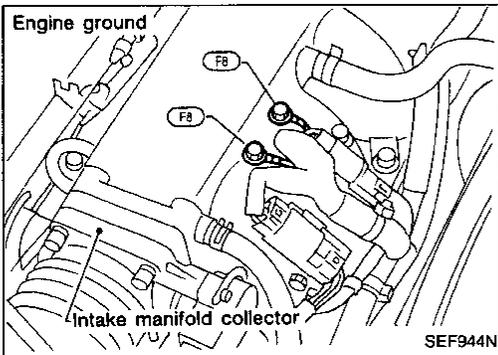
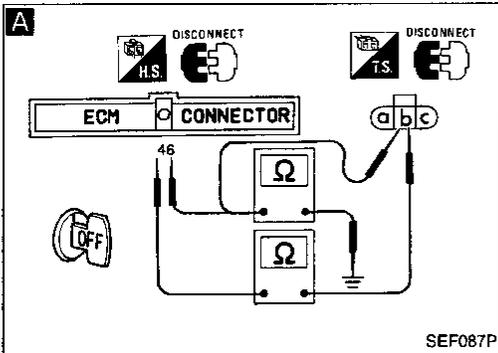
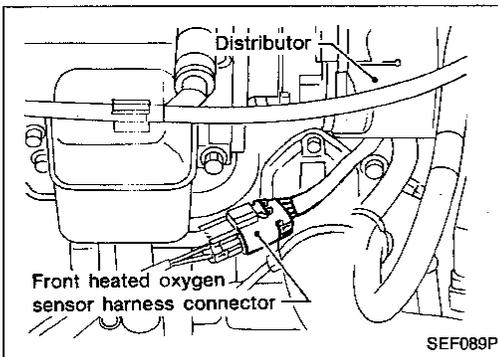


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TROUBLE DIAGNOSIS FOR DTC 33

Front Heated Oxygen Sensor (Front HO2S) (DTC: P0130) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect front heated oxygen sensor harness connector and ECM harness connector.
- 3) Check harness continuity between ECM terminal 46 and terminal ①. **Continuity should exist.**
- 4) Check harness continuity between ECM terminal 46 (or terminal ①) and ground. **Continuity should not exist.**

NG

Repair harness or connectors.

OK

Loosen and retighten engine ground screws.

B

Clear the self-learning data

- 1) Start engine and warm it up sufficiently.
- 2) Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
- 3) Clear the self-learning control coefficient by touching "CLEAR".
- 4) Wait for at least 10 minutes at idle speed.

Is the DTC P0170 detected? Is it difficult to start engine?

Yes

Go to "TROUBLE DIAGNOSIS FOR DTC 76". (See page EC-157.)

OR

- 2) Disconnect mass air flow sensor harness connector, and restart and run engine for at least 30 seconds at 2,000 rpm.
- 3) Stop engine and reconnect mass air flow sensor harness connector.
- 4) Make sure diagnostic trouble code No. 12 is displayed in Diagnostic Test Mode II.
- 5) Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode II.
- 6) Wait for at least 10 minutes at idle speed.

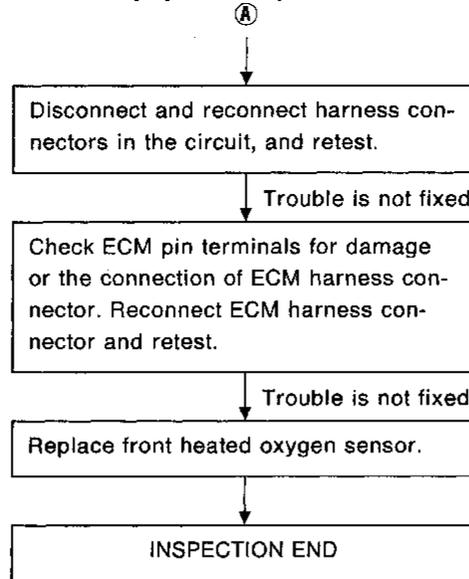
Is the DTC 76 detected? Is it difficult to start engine?

No

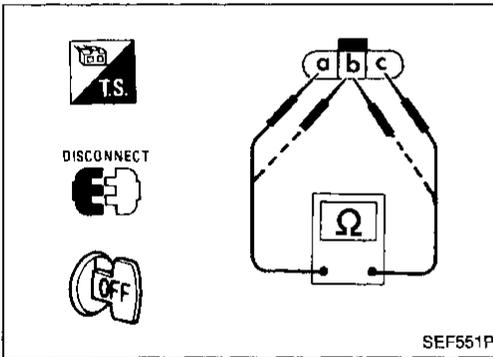
A

TROUBLE DIAGNOSIS FOR DTC 33

Front Heated Oxygen Sensor (Front HO2S) (DTC: P0130) (Cont'd)



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COMPONENT INSPECTION

Front heated oxygen sensor heater

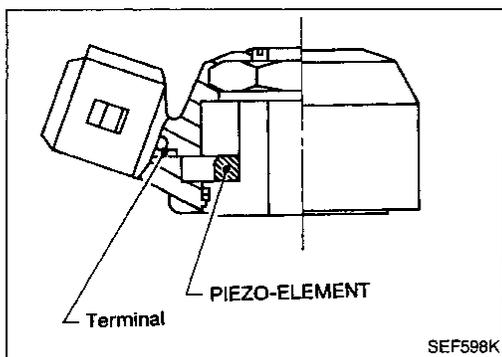
Check resistance between terminals Ⓐ and Ⓒ.

Resistance: $4.8 \pm 1.5\Omega$ at 25°C (77°F)

Check continuity between terminals Ⓑ and Ⓒ, Ⓐ and Ⓑ.

Continuity should not exist.

If NG, replace heated oxygen sensor.



Knock Sensor (KS) (DTC: P0325)

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.

*** In case of knock sensor, the freeze frame data will not be stored in ECM.
The knock sensor does not have the two trip detection logic, and will not light up the MIL.**

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
34 P0325	<ul style="list-style-type: none"> ● An excessively low or high voltage from the knock sensor is entered to ECM. 	<ul style="list-style-type: none"> ● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and run it for at least 5 seconds at idle speed.

OR



- 1) Start engine and run it for at least 5 seconds at idle speed.
- 2) Select "MODE 3" with GST.

OR

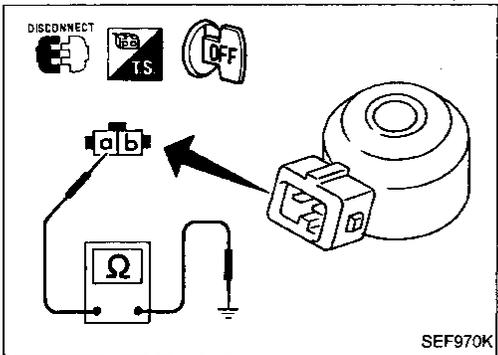
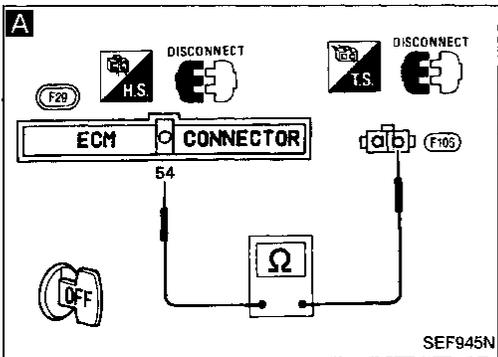
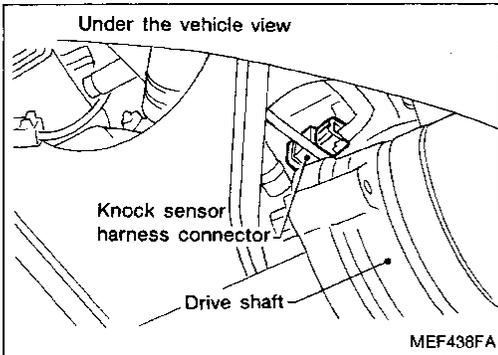
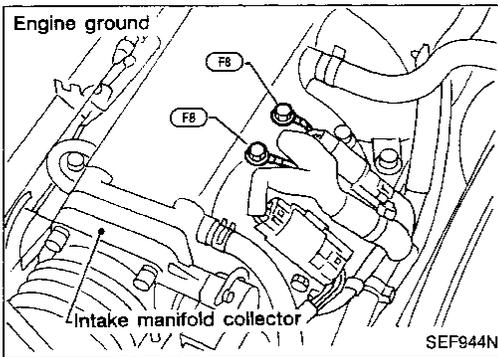


- 1) Start engine and run it for at least 5 seconds at idle speed.
- 2) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC 34

Knock Sensor (KS) (DTC: P0325) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

Loosen and retighten engine ground screws.

A
CHECK INPUT SIGNAL CIRCUIT.
 1) Turn ignition switch "OFF".
 2) Disconnect ECM harness connector and knock sensor harness connector.
 3) Check harness continuity between terminal **(b)** and ECM terminal **(54)**.
Continuity should exist.

NG
 Check the following.
 ● Harness connectors, **(F33)**, **(F100)**
 ● Harness continuity between ECM and knock sensor
 If NG, repair harness or connectors.

OK
CHECK COMPONENT (Knock sensor).
 Refer to "COMPONENT INSPECTION".
 (See page EC-132.)

NG
 Replace knock sensor.

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

Trouble is not fixed.
 Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

COMPONENT INSPECTION

Knock sensor

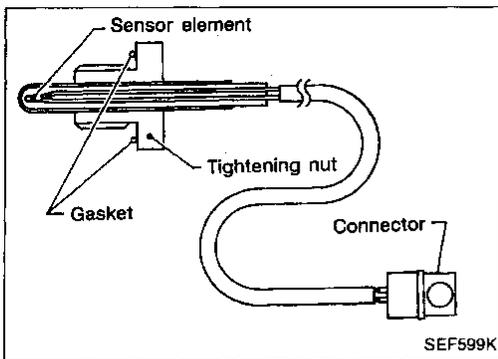
1. Disconnect knock sensor harness connector.
2. Check continuity between terminal **(a)** and ground.

Continuity should exist.

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

CAUTION:

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



EGR Temperature Sensor (DTC: P1401)

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.

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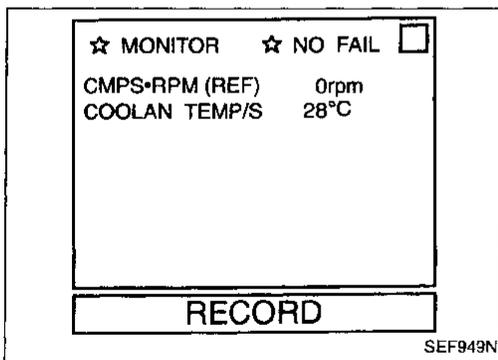
BF

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IDX

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
35 P1401	a) An excessively low voltage from the EGR temperature sensor is entered to ECM, even when engine coolant temperature is low.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is shorted.) ● EGR temperature sensor
	b) An excessively high voltage from the EGR temperature sensor is entered to ECM, even when engine coolant temperature is high.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor



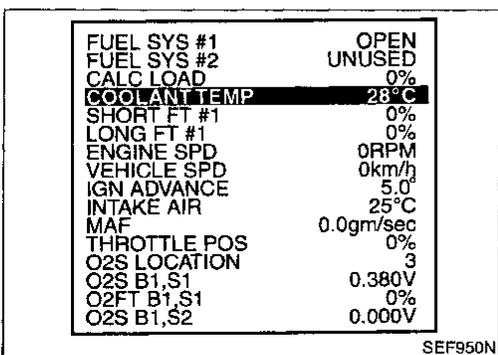
DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

For the above malfunction a)

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Confirm that the engine coolant temperature is lower than 50°C (122°F). (If necessary, wait until the engine coolant temperature is the same as atmosphere temperature.)
- 3) Start engine and run it for at least 8 seconds at idle speed. [Under the engine coolant temperature is lower than 50°C (122°F)].

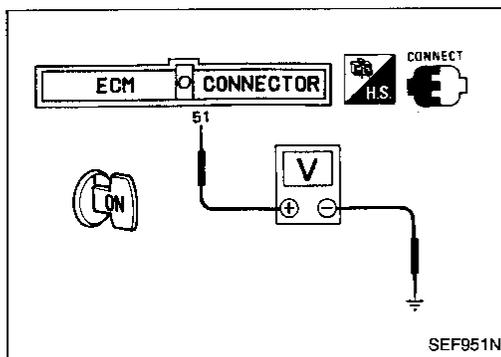
OR

- 1) Turn ignition switch "ON" and select "MODE 1" with GST.
- 2) Confirm that the engine coolant temperature is lower than 50°C (122°F). (If necessary, wait until the engine coolant temperature is the same as atmosphere temperature.)
- 3) Start engine and run it for at least 8 seconds at idle speed. [Under the engine coolant temperature is lower than 50°C (122°F)].
- 4) Select "MODE 3" with GST.



TROUBLE DIAGNOSIS FOR DTC 35

EGR Temperature Sensor (DTC: P1401) (Cont'd)



OR



- 1) Turn ignition switch "ON" and confirm that voltage between ECM terminal 51 and ground more than 2.35V. (If necessary, wait until the engine coolant temperature is the same as atmosphere temperature.)
- 2) Start engine and run it for at least 8 seconds at idle speed. (Under the voltage between ECM terminal 51 and ground more than 2.35V)
- 3) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

For the above malfunction b)



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF", wait for at least 3 seconds and then start engine again.
- 3) Select "DATA MONITOR" mode with CONSULT.
- 4) Run the engine for at least 5 seconds at idle speed.

OR



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF", wait for at least 3 seconds and then start engine again.
- 3) Run the engine for at least 5 seconds at idle speed.
- 4) Select "MODE 3" with GST.

OR



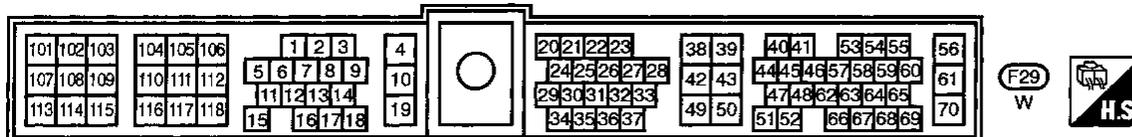
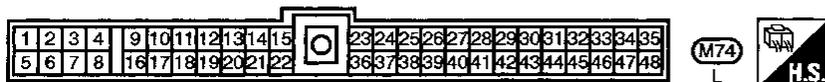
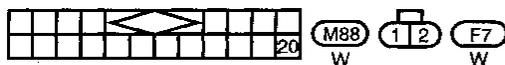
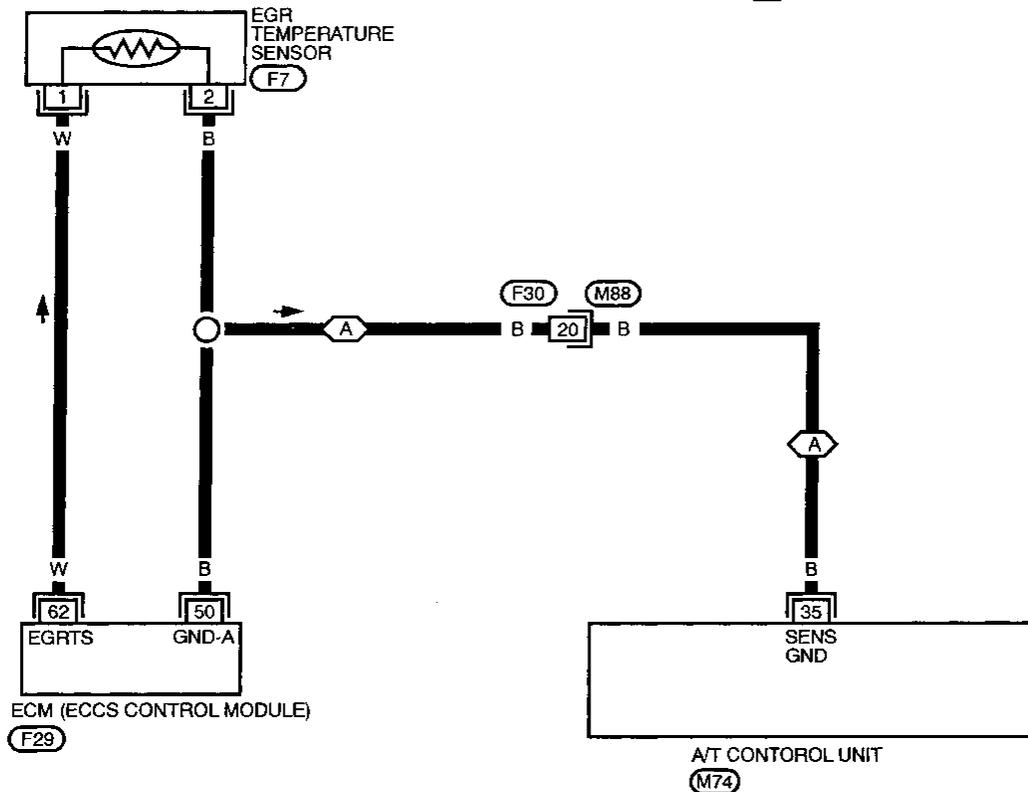
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF", wait for at least 3 seconds and then start engine again.
- 3) Run the engine for at least 5 seconds at idle speed.
- 4) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC 35

EGR Temperature Sensor (DTC: P1401) (Cont'd)

EC-EGR/TS-01

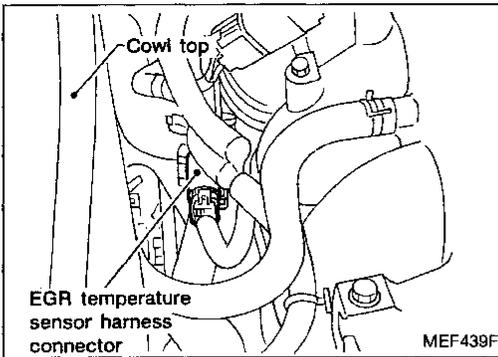
 : Detectable line for DTC
 : Non-detectable line for DTC
 : A/T models



TROUBLE DIAGNOSIS FOR DTC 35

EGR Temperature Sensor (DTC: P1401) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK POWER SUPPLY.
 1) Disconnect EGR temperature sensor harness connector.
 2) Turn ignition switch "ON".
 3) Check voltage between terminal (a) and ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Repair harness or connectors.

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

NG → Check the following.
 ● Harness continuity between ECM and EGR temperature sensor
 ● Harness continuity between A/T control unit and EGR temperature sensor
 If NG, repair harness or connector.

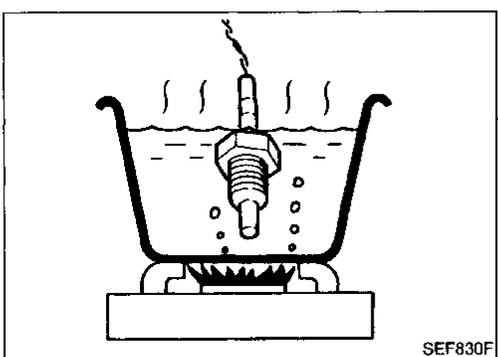
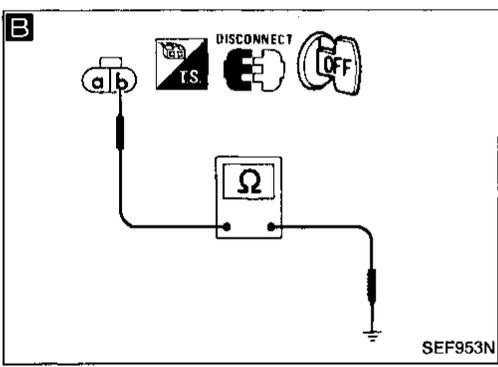
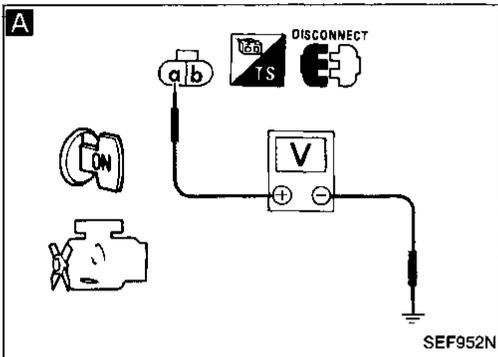
CHECK COMPONENT
 (EGR temperature sensor). Refer to "COMPONENT INSPECTION". (See page EC-136.)

NG → Replace EGR temperature sensor.

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

Trouble is not fixed.
 Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



COMPONENT INSPECTION

EGR temperature sensor

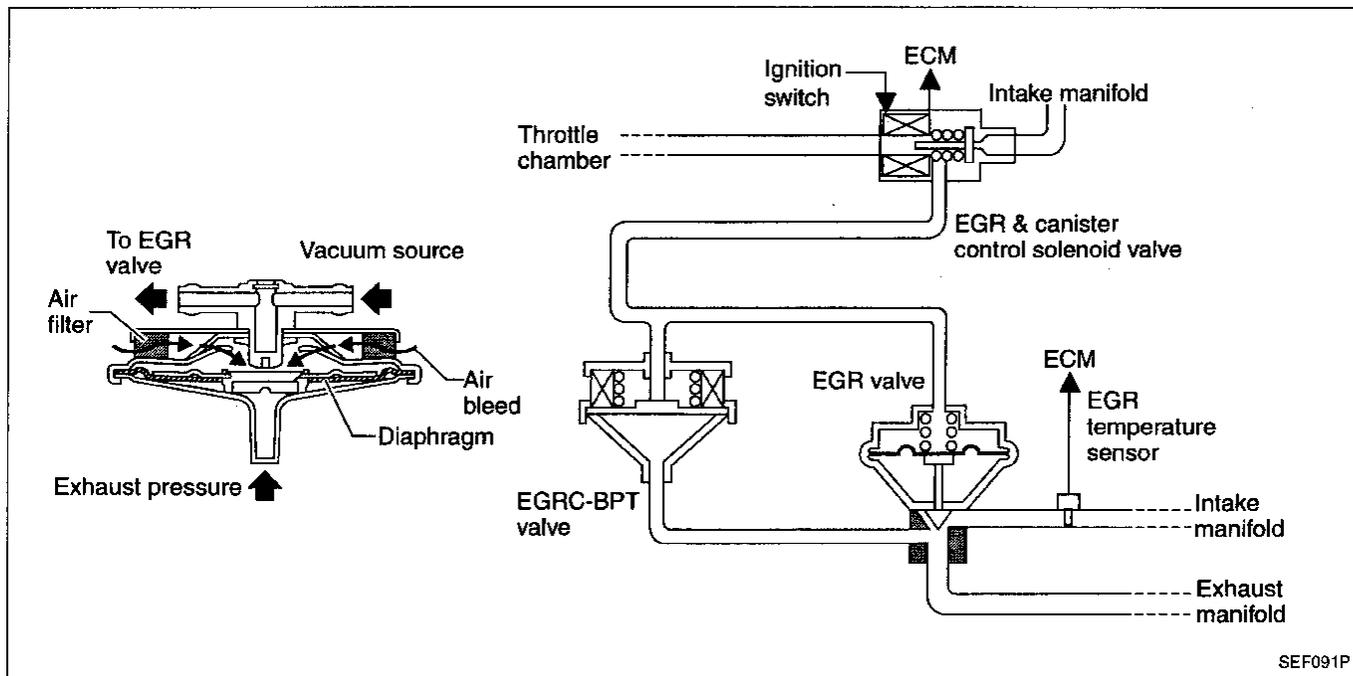
Check resistance change and resistance value at 100°C (212°F).

- Resistance should decrease in response to temperature increase.

Resistance: 100°C (212°F)
 85.3 ± 8.53 kΩ

If NG, replace EGR temperature sensor.

EGRC-BPT Valve Function (DTC: P0402)



SYSTEM DESCRIPTION

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

ON-BOARD DIAGNOSIS LOGIC

If the excess EGR flow exists due to the EGRC-BPT valve malfunction, the engine roughness will be increased. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGR & canister control solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
36 P0402	<ul style="list-style-type: none"> The EGRC-BPT valve does not operate properly. 	<ul style="list-style-type: none"> EGRC-BPT valve Misconnected rubber tube Obstructed rubber tube

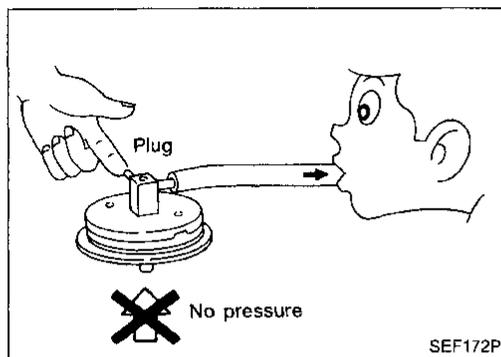
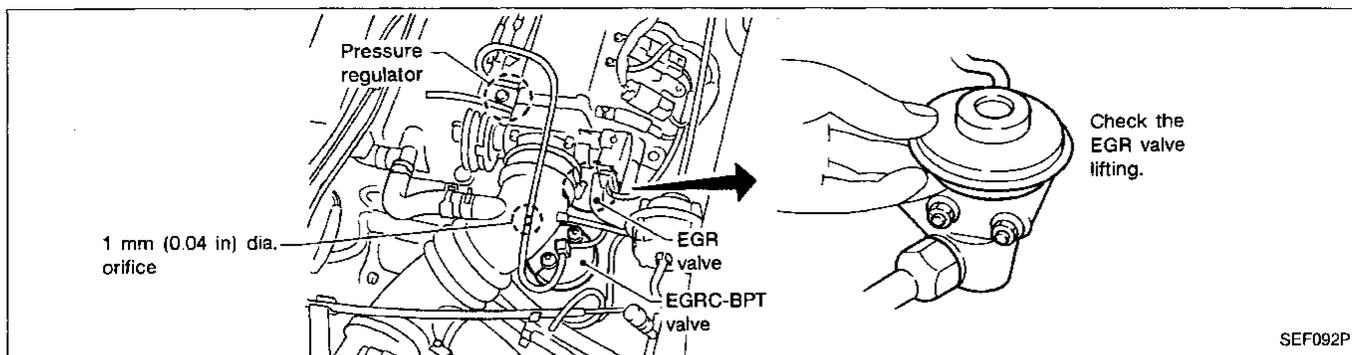
OVERALL FUNCTION CHECK

Instead of performing DTC DETECTING CONDITION, the following method can be used for checking the EGRC-BPT valve function. (The "NG" of the OVERALL FUNCTION CHECK means the same as the DTC detection.)

- 1) Disconnect the rubber tube to intake manifold, which comes from fuel pressure regulator.
- 2) Disconnect the rubber tube to EGRC-BPT valve, which comes from EGR & canister control solenoid valve.
Connect the intake manifold and the EGRC-BPT valve with rubber tube installed 1 mm (0.04 in) dia. orifice. (The intake manifold vacuum will be directly applied to the EGRC-BPT valve.)
- 3) Start engine.
- 4) Check for the EGR valve lifting when racing at lower than 1,500 rpm under no load.
EGR valve should be closed and should not lift up.
- 5) Check the EGR valve lifting when racing up to 2,000 rpm through 4,000 rpm under no load.
EGR valve should lift up and down without sticking.
- 6) Check rubber tube between EGR & canister control solenoid valve and throttle body for misconnection, cracks or obstruction.

TROUBLE DIAGNOSIS FOR DTC 36

EGRC-BPT Valve Function (DTC: P0402) (Cont'd)



COMPONENT INSPECTION

EGRC-BPT valve

- 1) Plug one of two ports of EGRC-BPT valve.
- 2) Vacuum from the other port and check leakage without applying any pressure from under EGRC-BPT valve.
Leakage should exist.

Closed Loop Control (DTC: P0130)

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
37 P0130	<ul style="list-style-type: none"> The closed loop control function does not operate even when vehicle is driving in the specified condition. 	<ul style="list-style-type: none"> The front heated oxygen sensor circuit is open or shorted. Front heated oxygen sensor. Front heated oxygen sensor heater

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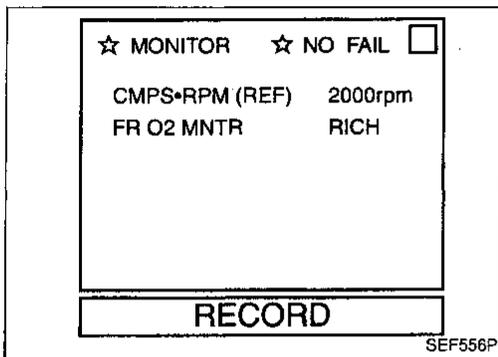
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OVERALL FUNCTION CHECK

Instead of performing the DTC Detecting Condition, the following method can be used for checking the function of the closed loop control. The "NG" of this check means the same as the DTC detection.

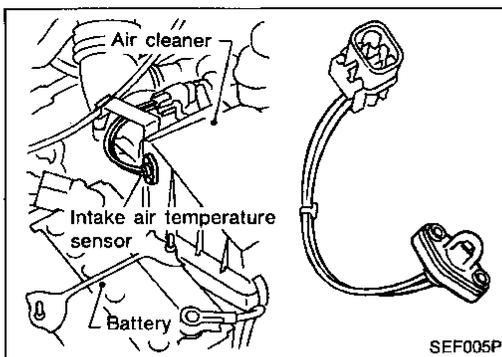
- 1) Start engine and warm it up sufficiently.
- 2) Select "FR O2 MNTR" in "DATA MONITOR" mode with CONSULT.
- 3) Maintaining engine at 2,000 rpm under no-load, check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

OR

- 1) Start engine and warm it up sufficiently.
- 2) Make sure that malfunction indicator lamp goes on and off periodically more than 5 times for 10 seconds while keeping at 2,000 rpm in Diagnostic Test Mode II.

DIAGNOSTIC PROCEDURE

Refer to TROUBLE DIAGNOSIS FOR DTC 33. (See page EC-125.)
Refer to TROUBLE DIAGNOSIS FOR DTC 91. (See page EC-174.)

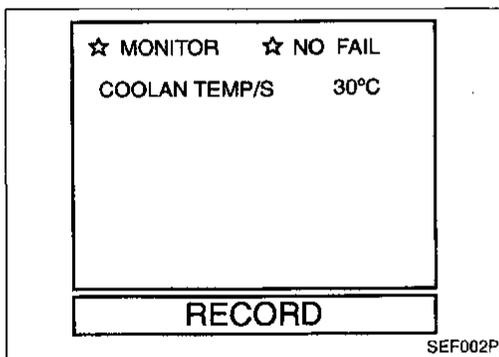


Intake air temperature Sensor (DTC: P0110)

The intake air temperature sensor is built into the air cleaner, detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decrease in response to the temperature rise. This sensor is not directly used to control the engine system. It is used only for the on-board diagnosis.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
41 P0110	a) An excessively low or high voltage from the sensor is entered to ECM. b) Rationally incorrect voltage from the sensor is entered to ECM, compared with the voltage signal from engine coolant temperature sensor.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor.



DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

For the above malfunction a), b)

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
 - (1) Turn ignition switch "ON".
 - (2) Select "DATA MONITOR" mode with CONSULT.
 - (3) Check the engine coolant temperature.
 - (4) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.
- 2) Turn ignition switch "ON".
- 3) Select "DATA MONITOR" mode with CONSULT.
- 4) Wait for at least 5 seconds.

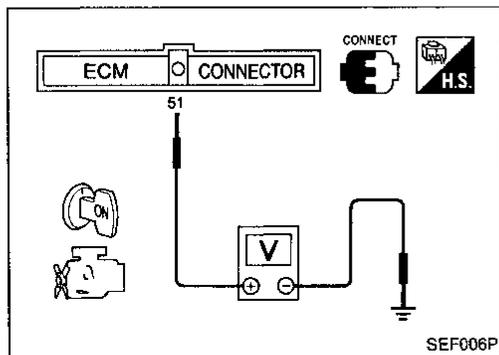
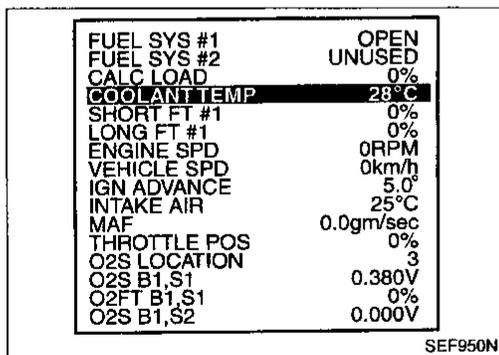
OR

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
 - (1) Turn ignition switch "ON".
 - (2) Select MODE 1 with GST.
 - (3) Check the engine coolant temperature.
 - (4) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.
- 2) Turn ignition switch "ON" and wait for at least 5 seconds.
- 3) Select MODE 3 with GST.

OR

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
 - (1) Turn ignition switch "ON".
 - (2) Check voltage between ECM terminal 51 and ground.

Voltage: More than 1.2 (V)
 - (3) If the voltage is not more than 1.2 (V), turn ignition switch "OFF" and cool down engine.



TROUBLE DIAGNOSIS FOR DTC 41

Intake air temperature Sensor (DTC: P0110) (Cont'd)

- 2) Turn ignition switch "ON" wait for at least 5 seconds.
- 3) Turn ignition switch "OFF", wait for at least 3 seconds and then turn "ON".
- 4) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

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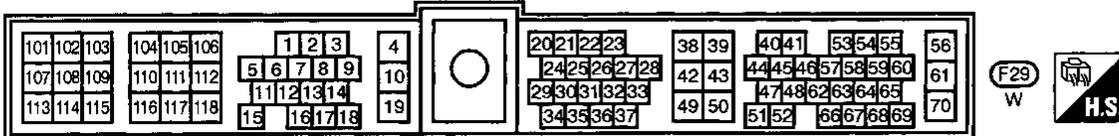
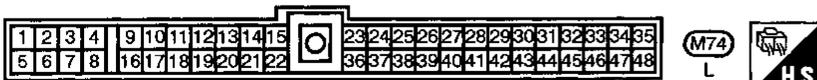
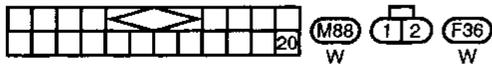
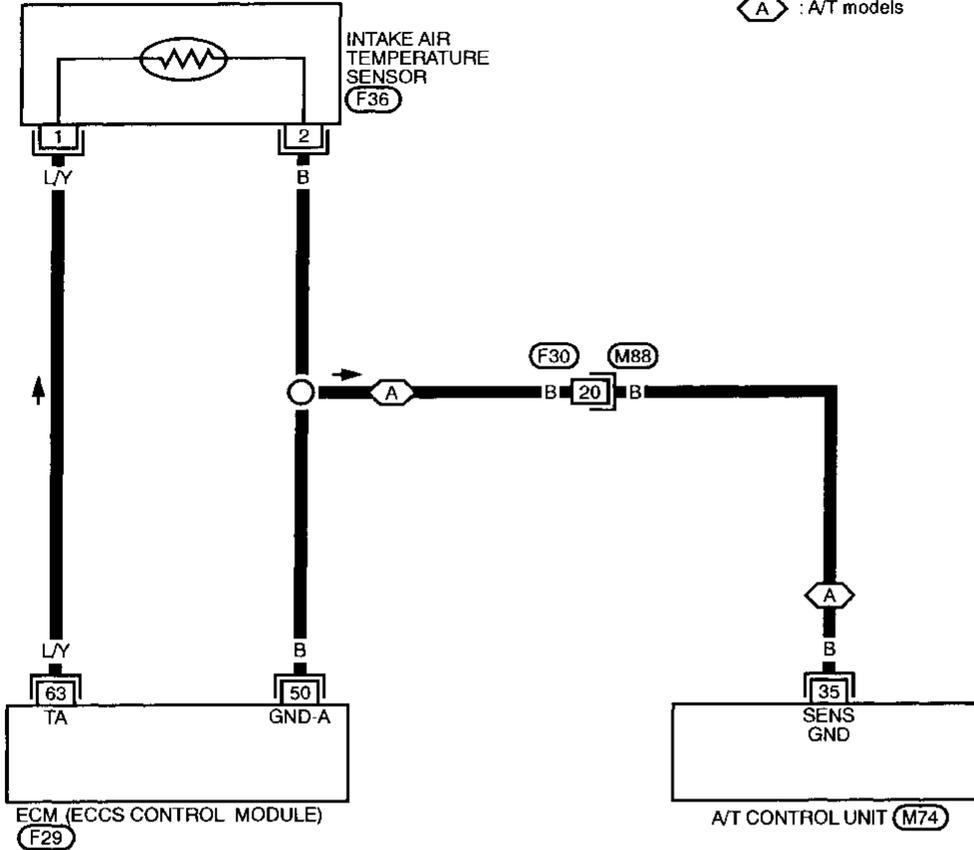
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TROUBLE DIAGNOSIS FOR DTC 41

Intake air temperature Sensor (DTC: P0110) (Cont'd)

EC-IATS-01

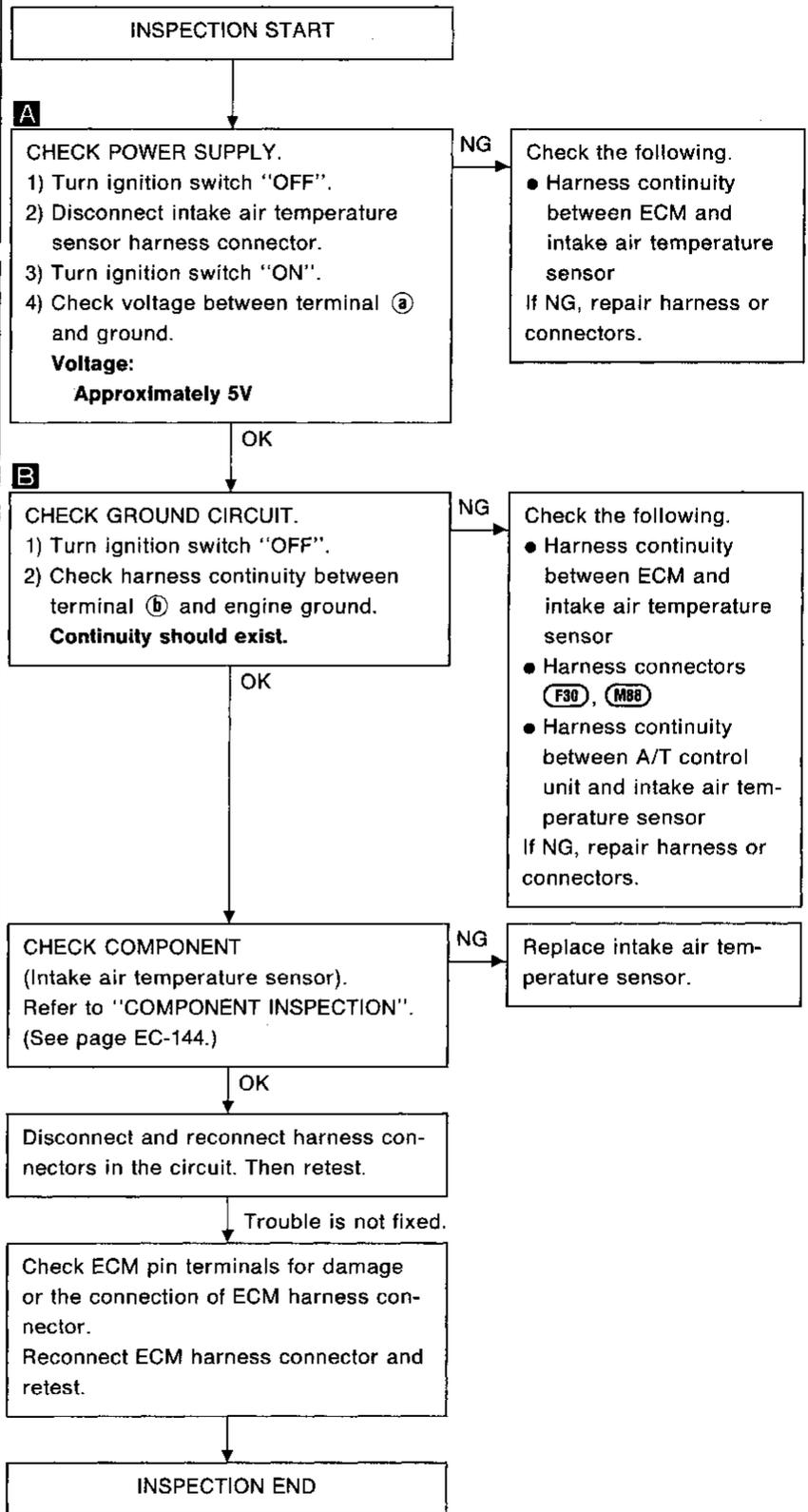
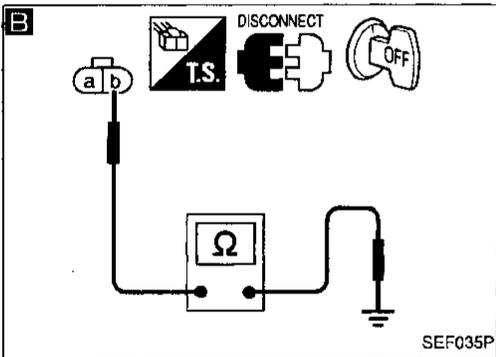
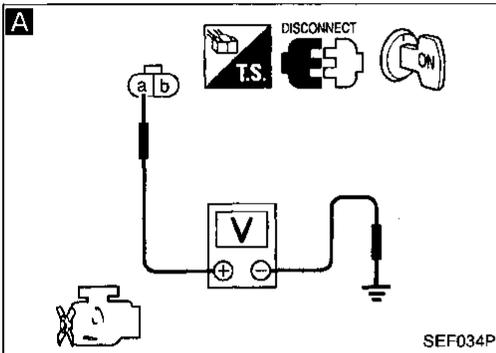
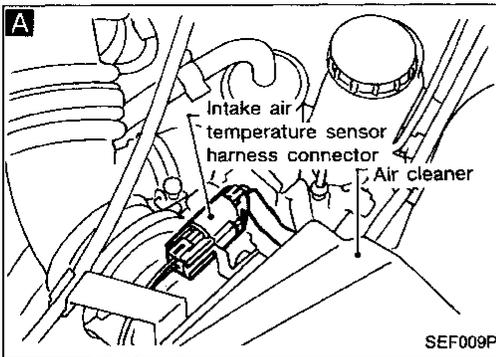
-  : Detectable line for DTC
-  : Non-detectable line for DTC
-  : A/T models



TROUBLE DIAGNOSIS FOR DTC 41

Intake air temperature Sensor (DTC: P0110) (Cont'd)

DIAGNOSTIC PROCEDURE



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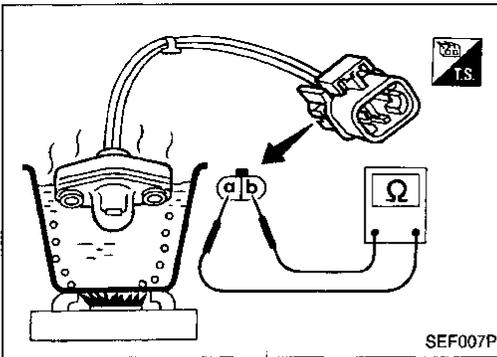
TROUBLE DIAGNOSIS FOR DTC 41

Intake air temperature Sensor (DTC: P0110) (Cont'd)

COMPONENT INSPECTION

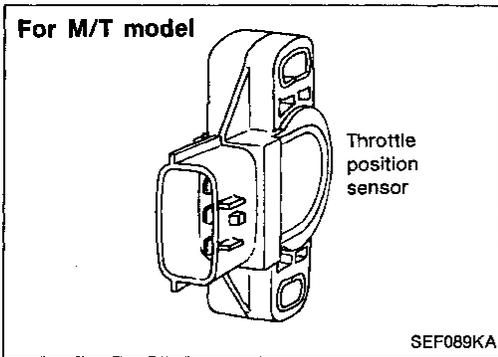
Intake air temperature sensor

Check resistance as shown in the figure.



SEF007P

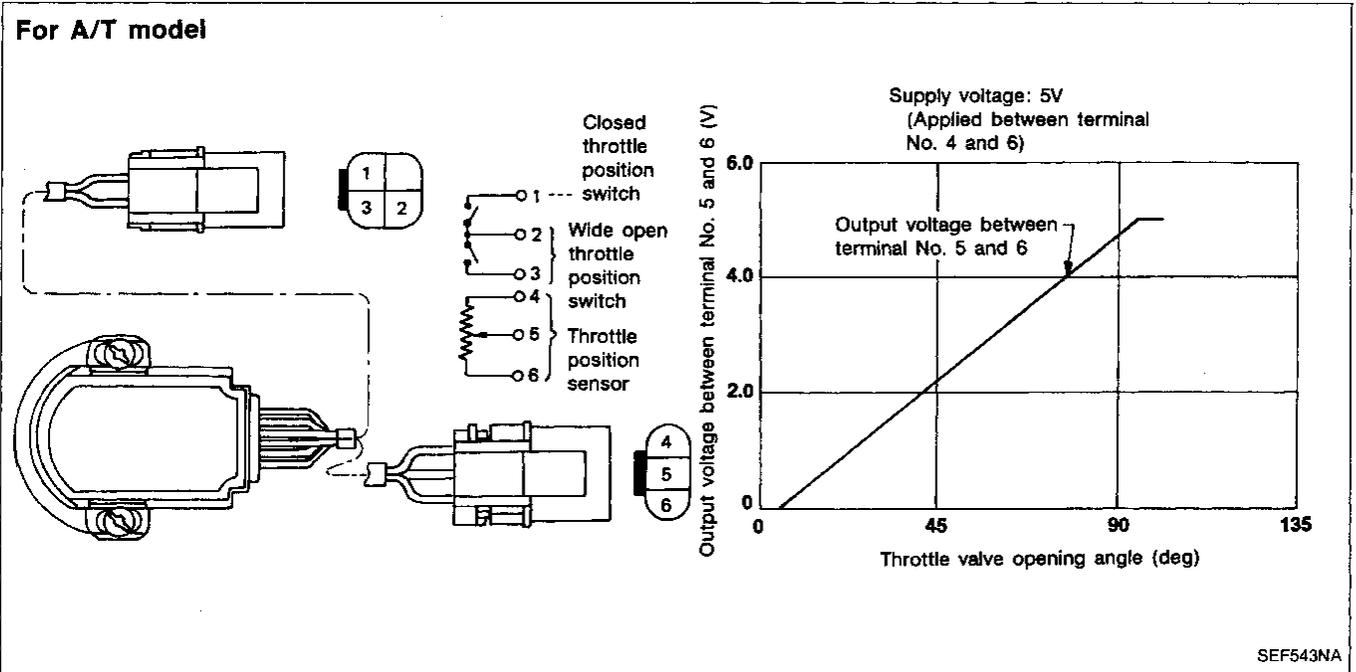
Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0



Throttle Position Sensor (DTC: P0120)

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

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



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
43 P0120	<ul style="list-style-type: none"> ● An excessively low or high voltage from the sensor is entered to ECM. ● Rationally incorrect voltage is entered to ECM compared with the voltage signals from mass air flow sensor and camshaft position sensor. 	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor

Throttle Position Sensor (DTC: P0120) (Cont'd)

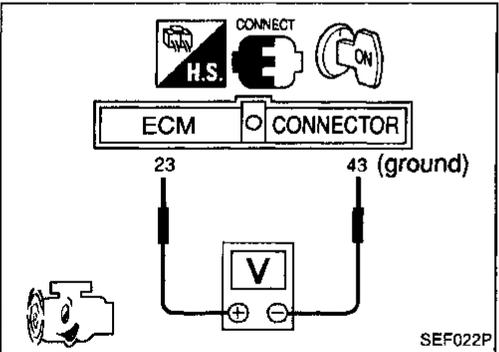
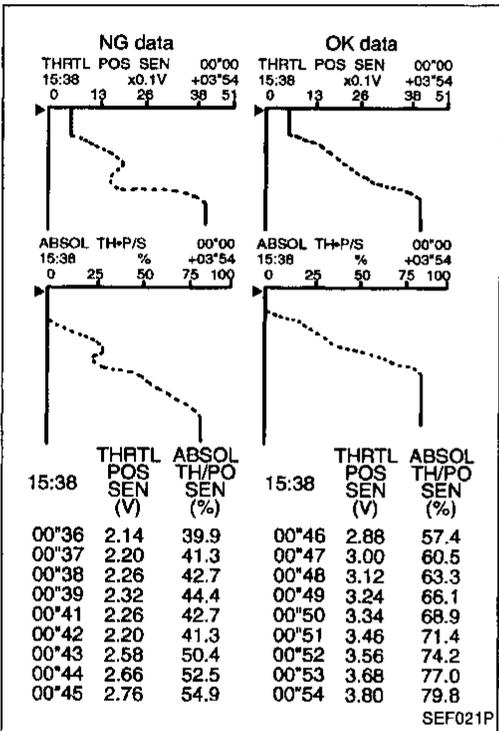
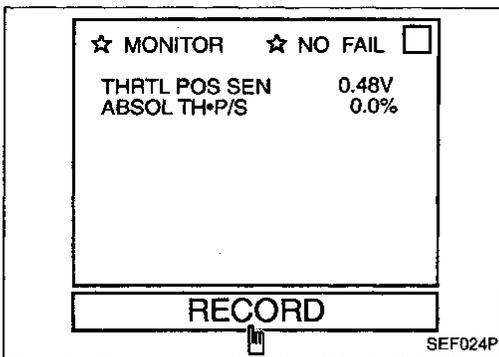
OVERALL FUNCTION CHECK

Instead of performing the DTC Detecting Condition, the following method can be used for checking the function of the throttle position sensor. (The "NG" of this check means the same as the DTC detection.)

- 1) Turn ignition switch "ON".
- 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
- 3) Select "THRTL POS SEN" and "ABSOL TH/PO SEN" in "DATA MONITOR" mode with CONSULT.
- 4) Press RECORD on CONSULT SCREEN at the same time accelerator pedal is depressed.
- 5) Print out the recorded data and make sure the followings:
 - (1) The voltage when accelerator pedal fully released is approximately 0.35 - 0.65V.
 - (2) The voltage rise is linear in response to accelerator pedal depression.
 - (3) The voltage when accelerator pedal fully depressed is approximately 4V.

OR

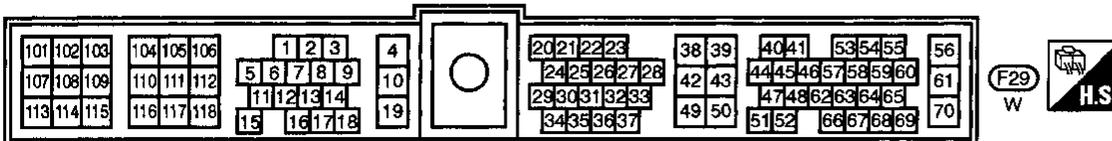
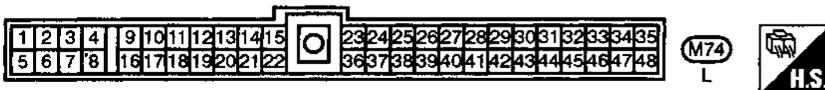
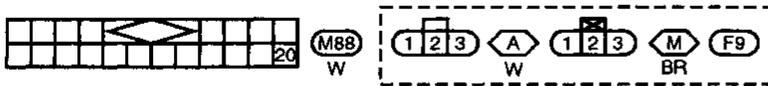
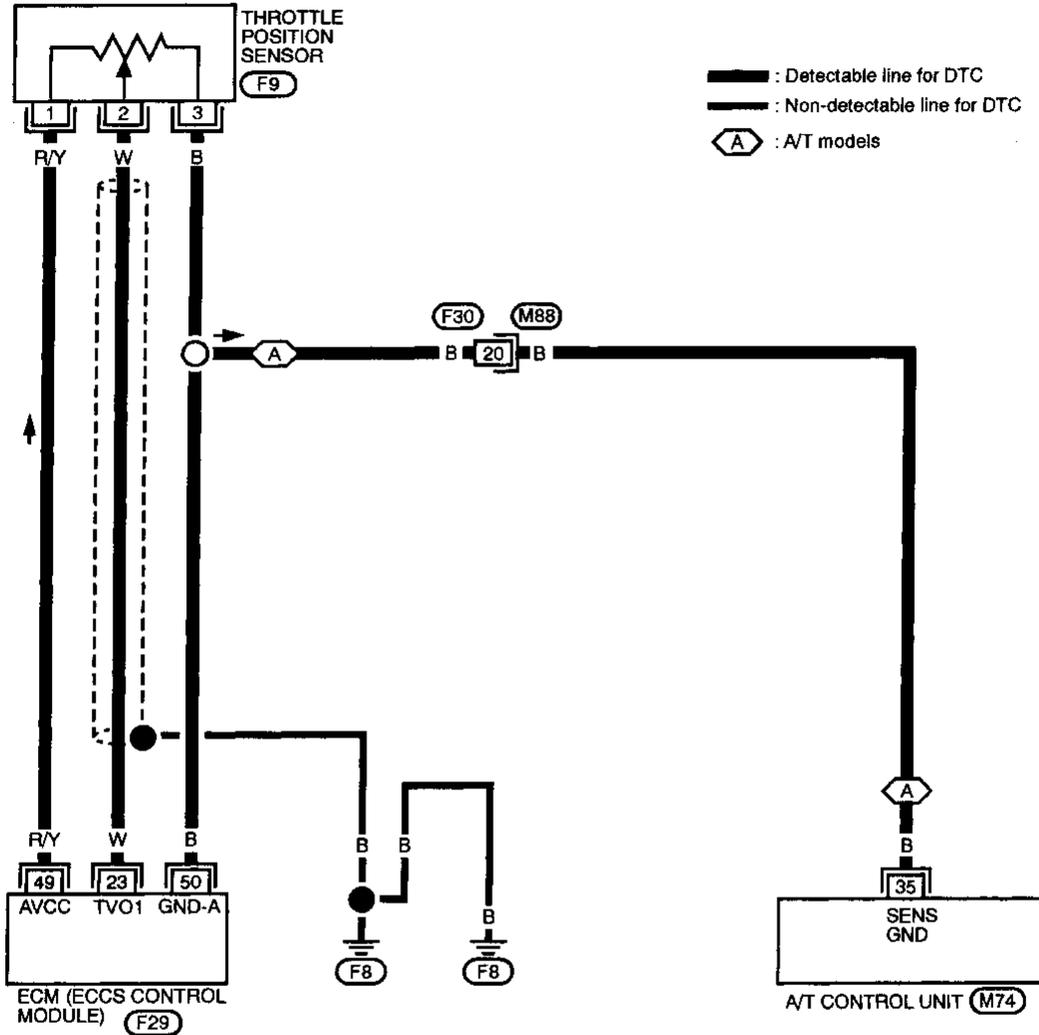
- 1) Turn ignition switch "ON".
- 2) Check the voltage between ECM terminal 23 and 43 (ground) and make sure the followings:
 - (1) The voltage when accelerator pedal fully released is approximately 0.35 - 0.65V.
 - (2) The voltage rise is linear in response to accelerator pedal depression.
 - (3) The voltage when accelerator pedal fully depressed is approximately 4V.



TROUBLE DIAGNOSIS FOR DTC 43

Throttle Position Sensor (DTC: P0120) (Cont'd)

EC-TPS-01



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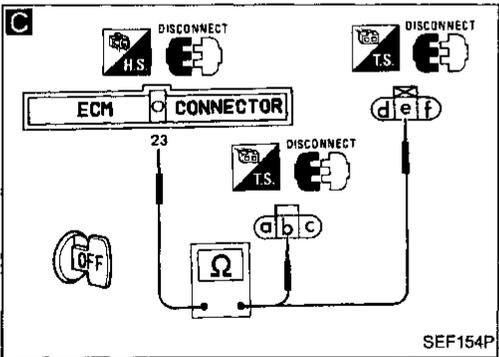
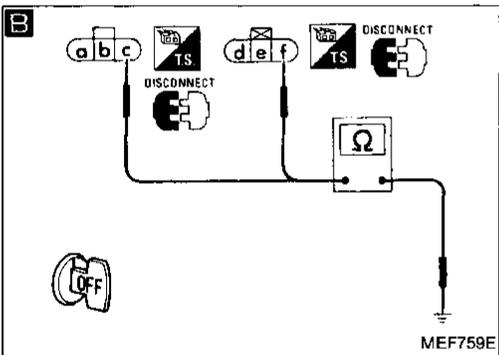
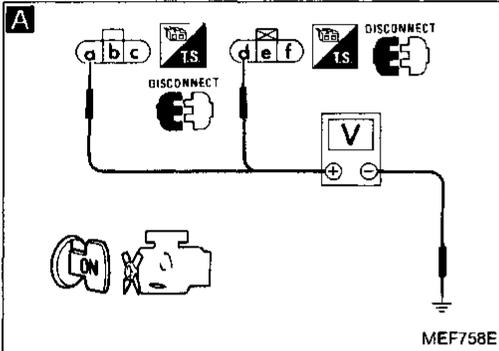
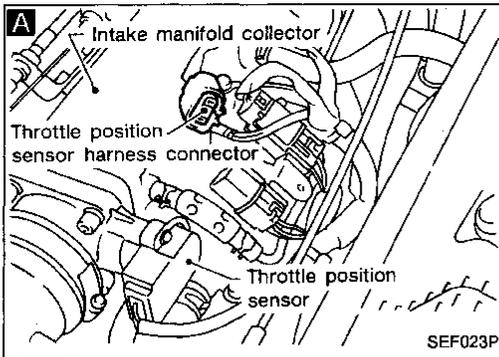
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**Throttle Position Sensor (DTC: P0120) (Cont'd)
DIAGNOSTIC PROCEDURE**



```

    graph TD
      Start[INSPECTION START] --> A[CHECK POWER SUPPLY.  
1) Turn ignition switch "OFF".  
2) Disconnect throttle position sensor harness connector.  
3) Turn ignition switch "ON".  
4) Check voltage between terminal a (A/T models), terminal d (M/T models) and ground with CONSULT or tester.  
Voltage: Approximately 5V]
      A -- NG --> NG1[Repair harness or connectors.]
      A -- OK --> B[CHECK GROUND CIRCUIT.  
1) Turn ignition switch "OFF".  
2) Loosen and retighten ground screw.  
3) Check harness continuity between terminal e (A/T models), terminal i (M/T models) and engine ground.  
Continuity should exist.]
      B -- NG --> NG2[Repair harness or connectors.]
      B -- OK --> C[CHECK INPUT SIGNAL CIRCUIT.  
1) Disconnect ECM harness connector.  
2) Check harness continuity between ECM terminal 23 and terminal d (A/T models), terminal e (M/T models).  
Continuity should exist.]
      C -- NG --> NG3[Repair harness or connectors.]
      C -- OK --> Adjust[ADJUST THROTTLE POSITION SENSOR.  
Perform BASIC INSPECTION.  
(See page EC-70.)]
      Adjust --> D[CHECK COMPONENT  
(Throttle position sensor).  
Refer to "COMPONENT INSPECTION".  
(See page EC-149.)]
      D -- NG --> NG4[Replace throttle position sensor. To adjust it, perform BASIC INSPECTION.  
(See page EC-70.)]
      D -- OK --> E[Disconnect and reconnect harness connectors in the circuit. Then retest.]
      E --> F[Trouble is not fixed.]
      F --> G[Check ECM pin terminals for damage or the connection of ECM harness connector.  
Reconnect ECM harness connector and retest.]
      G --> End[INSPECTION END]
  
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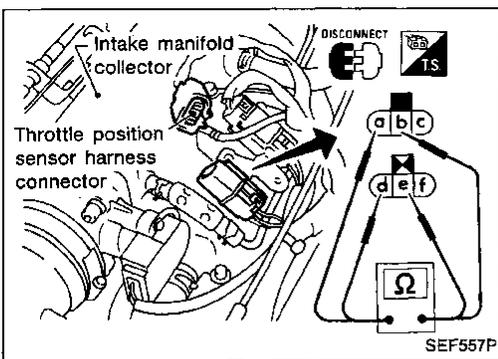
TROUBLE DIAGNOSIS FOR DTC 43

Throttle Position Sensor (DTC: P0120) (Cont'd)

COMPONENT INSPECTION

Throttle position sensor

1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ① and ②, ③ and ④ changes when opening throttle valve manually.



Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1
Partially released	1 - 10
Completely depressed	Approximately 10

If NG, replace throttle position sensor.

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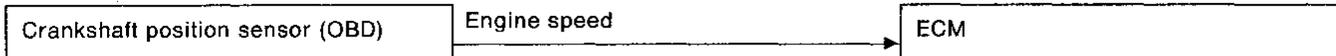
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No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: P0304 - P0300)

ON-BOARD DIAGNOSIS LOGIC

If misfire occurs, the engine speed will be fluctuated. If the fluctuation is detected by crankshaft position sensor (OBD), the misfire is diagnosed.

The misfire detection logic consists of the following two criteria.



1. A CRITERION (One Trip Detection Logic):

When the misfire is detected which will damage the three way catalyst by overheating, the malfunction indicator lamp will start blinking even if the drive is the first trip. In this criterion, ECM monitors the misfire for each 200 revolutions of the engine.

If the misfire frequency decreases to the level that will not damage the three way catalyst, the blinking of the indicator lamp will turn to the lighting up.

(After the first trip detection, the indicator lamp will light up from the engine starting till the next trip misfire detection which will damage the three way catalyst.)

2. B CRITERION (Two Trip Detection Logic):

When a misfire which will not damage the three way catalyst (but will affect the emission deterioration) occurs in this criteria, the malfunction indicator lamp will light up based on the two trip detection logic. In this criterion, ECM monitors the misfire for each 1,000 revolutions of the engine.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
65 (P0304)	● No. 4 cylinder misfires.	● Improper spark plug ● Insufficient compression
66 (P0303)	● No. 3 cylinder misfires.	● Incorrect fuel pressure ● EGR valve
67 (P0302)	● No. 2 cylinder misfires.	● The injector circuit is open or shorted. ● Injectors
68 (P0301)	● No. 1 cylinder misfires.	● Intake air leak ● The ignition secondary circuit is open or shorted.
71 (P0300)	● Multiple cylinders misfire.	● Lack of fuel ● Magnetized flywheel (drive plate)

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION (Overall)

- 1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and warm it up sufficiently.
- 3) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 4) Start engine again and drive at 1,500 - 4,000 rpm for at least 10 minutes.

OR

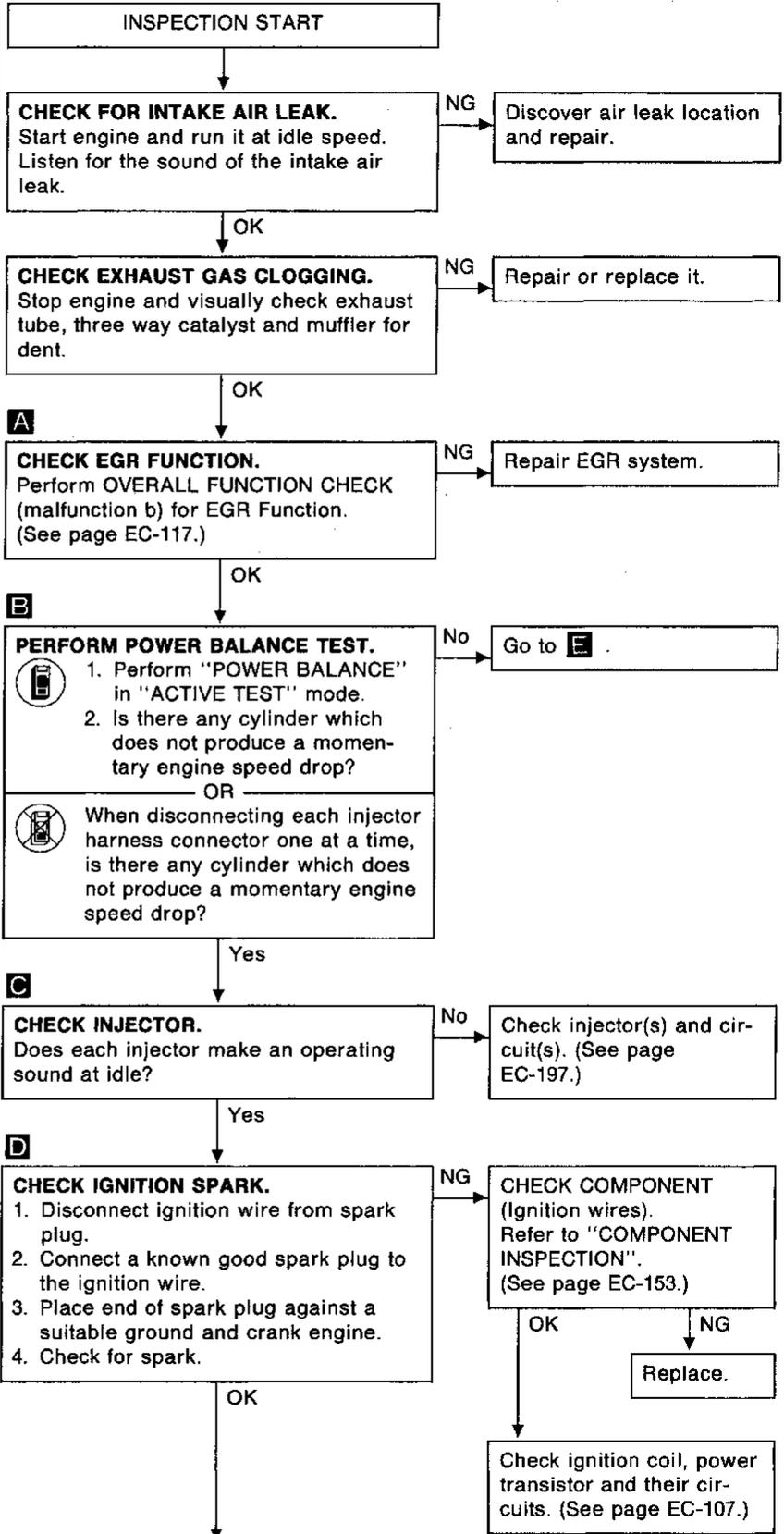
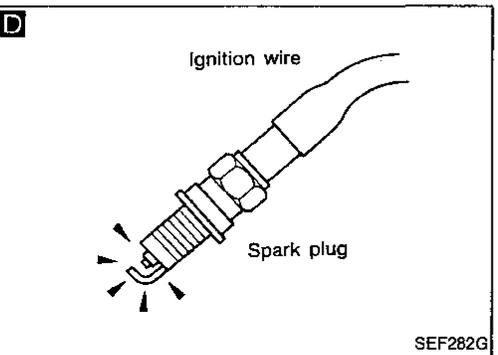
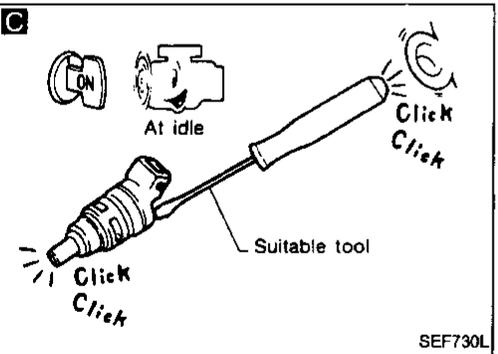
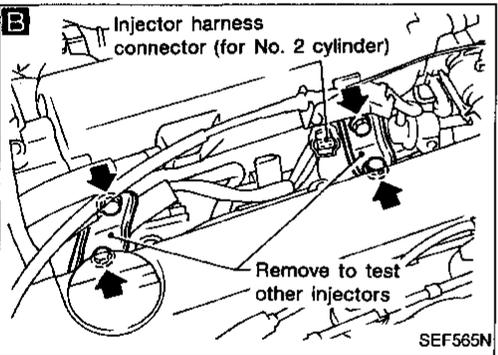
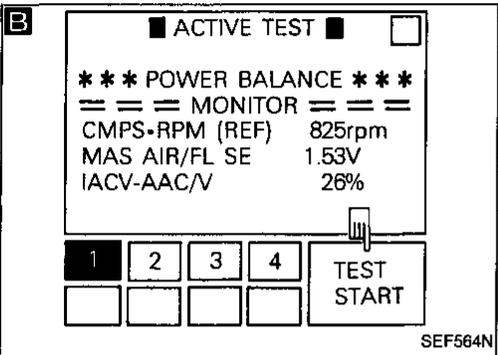
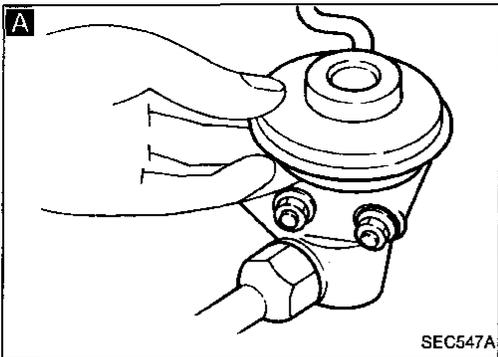
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Start engine again and drive at 1,500 - 4,000 rpm for at least 10 minutes.
- 4) Select "MODE 3" with GST.

OR

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Start engine again and drive at 1,500 - 4,000 rpm for at least 10 minutes.
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: P0304 - P0300) (Cont'd)

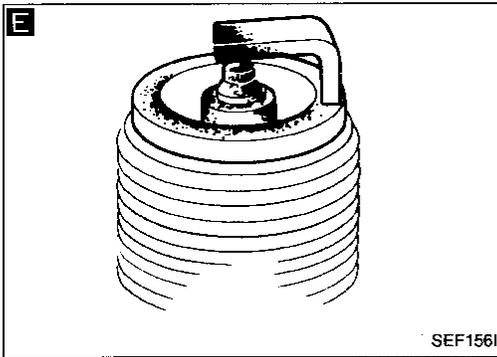
DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC 65 - 71

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: P0304 - P0300) (Cont'd)



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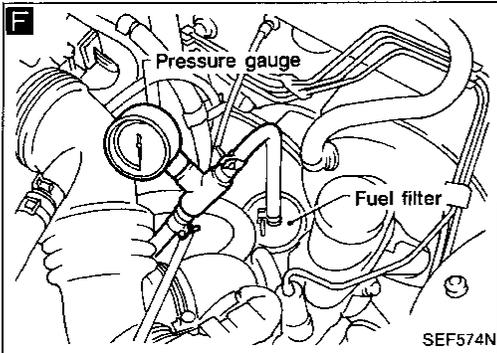
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E

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

OK



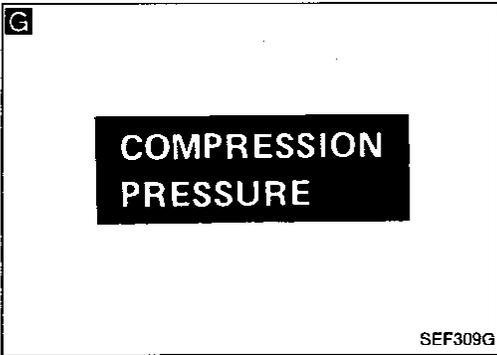
F

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EC-23.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 235 kPa
(2.4 kg/cm², 34 psi)

NG → Check fuel pump and circuit.

OK



G

CHECK COMPRESSION PRESSURE.
● Check compression pressure.

Standard:
kPa (kg/cm², psi)/300 rpm
1,226 (12.5, 178)

Minimum:
kPa (kg/cm², psi)/300 rpm
1,030 (10.5, 149)

Difference between each cylinder:
kPa (kg/cm², psi)/300 rpm
98 (1.0, 14)

NG → Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

OK

CHECK IGNITION TIMING.
Perform BASIC INSPECTION.
(See page EC-70.)

NG → Adjust ignition timing.

OK

CHECK MASS AIR FLOW SENSOR.

 Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
2.5 - 5.0 gm/sec: at idling
7.1 - 12.5 gm/sec: at 2,500 rpm

OR

 Check "mass air flow" in MODE 1 with GST.
2.5 - 5.0 gm/sec: at idling
7.1 - 12.5 gm/sec: at 2,500 rpm

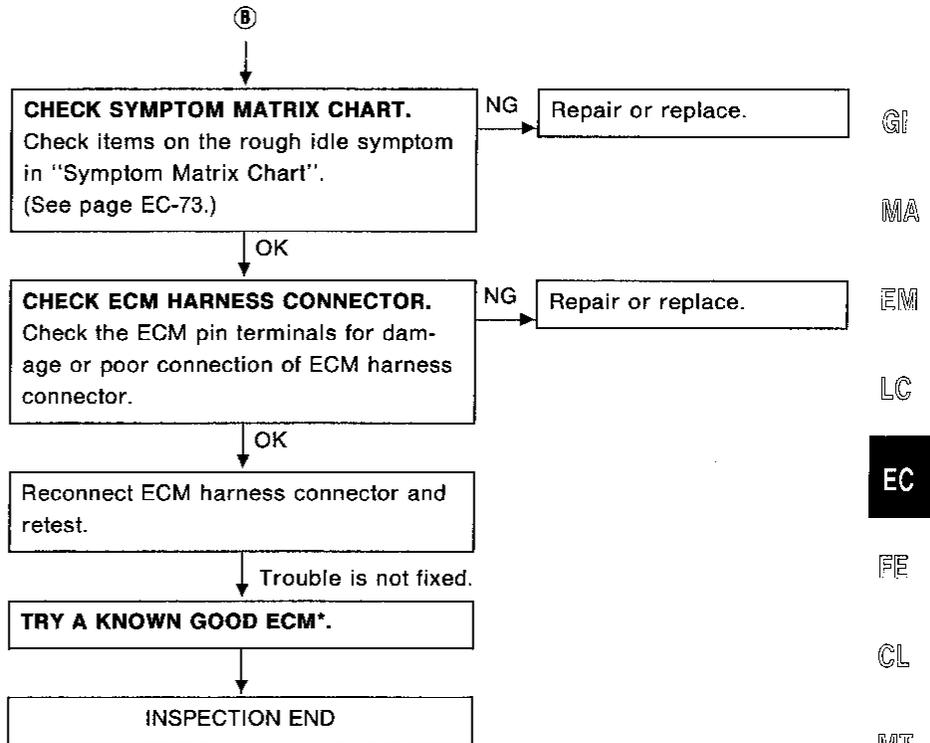
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. (See page EC-94.) If NG, repair or replace it.

OK

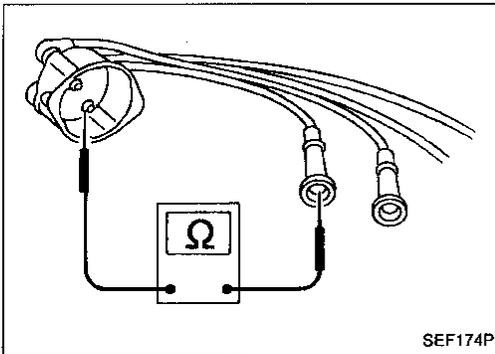
(Go to Ⓑ on next page.)

TROUBLE DIAGNOSIS FOR DTC 65 - 71

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: P0304 - P0300) (Cont'd)



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



COMPONENT INSPECTION

Ignition Wires

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires and check for intermittent breaks.

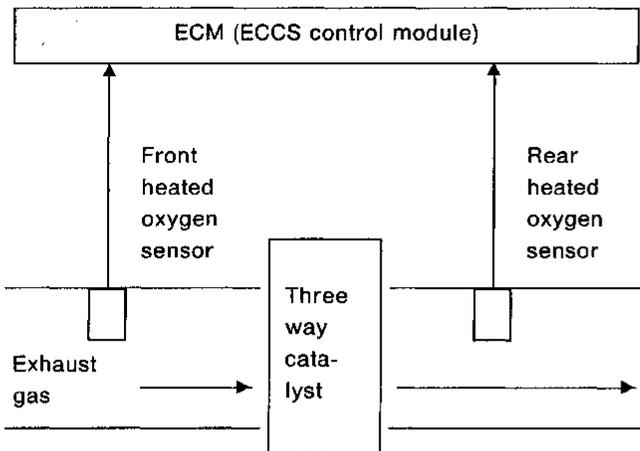
Resistance:

13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft)

If the resistance exceeds the above specification, replace the ignition wire with a new one.

Three Way Catalyst Function (DTC: P0420)

ON-BOARD DIAGNOSIS LOGIC

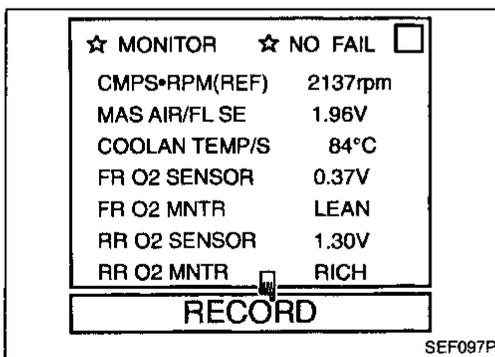


ECM monitors the switching frequency ratio of front and rear heated oxygen sensors. A three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase. When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the second stage diagnosis is applied. The second stage diagnosis switches the mixture ratio feedback control using front heated oxygen sensor to rear heated oxygen sensor. Then ECM measures the switching lag time between front and rear heated oxygen sensors. The longer lag time indicates the greater oxygen storage capacity. If the lag time is within the specified level, the three way catalyst malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
72 P0420	<ul style="list-style-type: none"> • Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> • Three way catalyst • Front heated oxygen sensor • Rear heated oxygen sensor • Injector leak

OVERALL FUNCTION CHECK

Instead of performing DTC DETECTING CONDITION, the following method can be used for checking the three way catalyst function. (The "NG" of the OVERALL FUNCTION CHECK means the same as the DTC detection.)



- 1) Start engine and warm it up sufficiently.
- 2) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SENSOR", "RR O2 SENSOR", "FR O2 MNTR", "RR O2 MNTR" in "DATA MONITOR" mode with CONSULT.
- 3) Touch "RECORD" on CONSULT screen with engine speed held at 2,000 rpm constant under no load.
- 4) Make sure that the switching frequency between "RICH" and "LEAN" of "RR O2 SENSOR" is very less than that of "FR O2 SENSOR".

Switching frequency ratio = $\frac{\text{Rear heated oxygen sensor switching frequency}}{\text{Front heated oxygen sensor switching frequency}}$

This ratio should be less than 1/2.

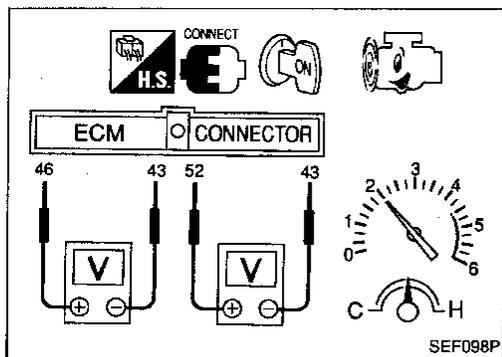
If the ratio is greater than 0.5, the three way catalyst is not operating properly.

Note: If the "FR O2 MNTR" does not indicate "RICH" and "LEAN" periodically more than 5 times for 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC 33 (Front heated oxygen sensor) first. (See page EC-125.)

OR

TROUBLE DIAGNOSIS FOR DTC 72

Three Way Catalyst Function (DTC: P0420) (Cont'd)



- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeters probes between ECM terminals 46 (front heated oxygen sensor signal) and 43 (engine ground), and ECM terminals 52 (rear heated oxygen sensor signal) and 43 (engine ground).
- 3) Keep engine speed at 2,000 rpm constant under no load.
- 4) Make sure that the voltage switching frequency (high & low) between ECM terminals 46 and 43 is very less than that of ECM terminals 52 and 43.

Switching frequency ratio =

Rear heated oxygen sensor voltage switching frequency

Front heated oxygen sensor voltage switching frequency

This ratio should be less than 1/2.

If the ratio is greater than 0.5, it means three way catalyst does not operate properly.

Note: If the voltage at terminal 46 does not switch periodically more than 5 times for 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC 33 (Front heated oxygen sensor) first. (See page EC-125.)

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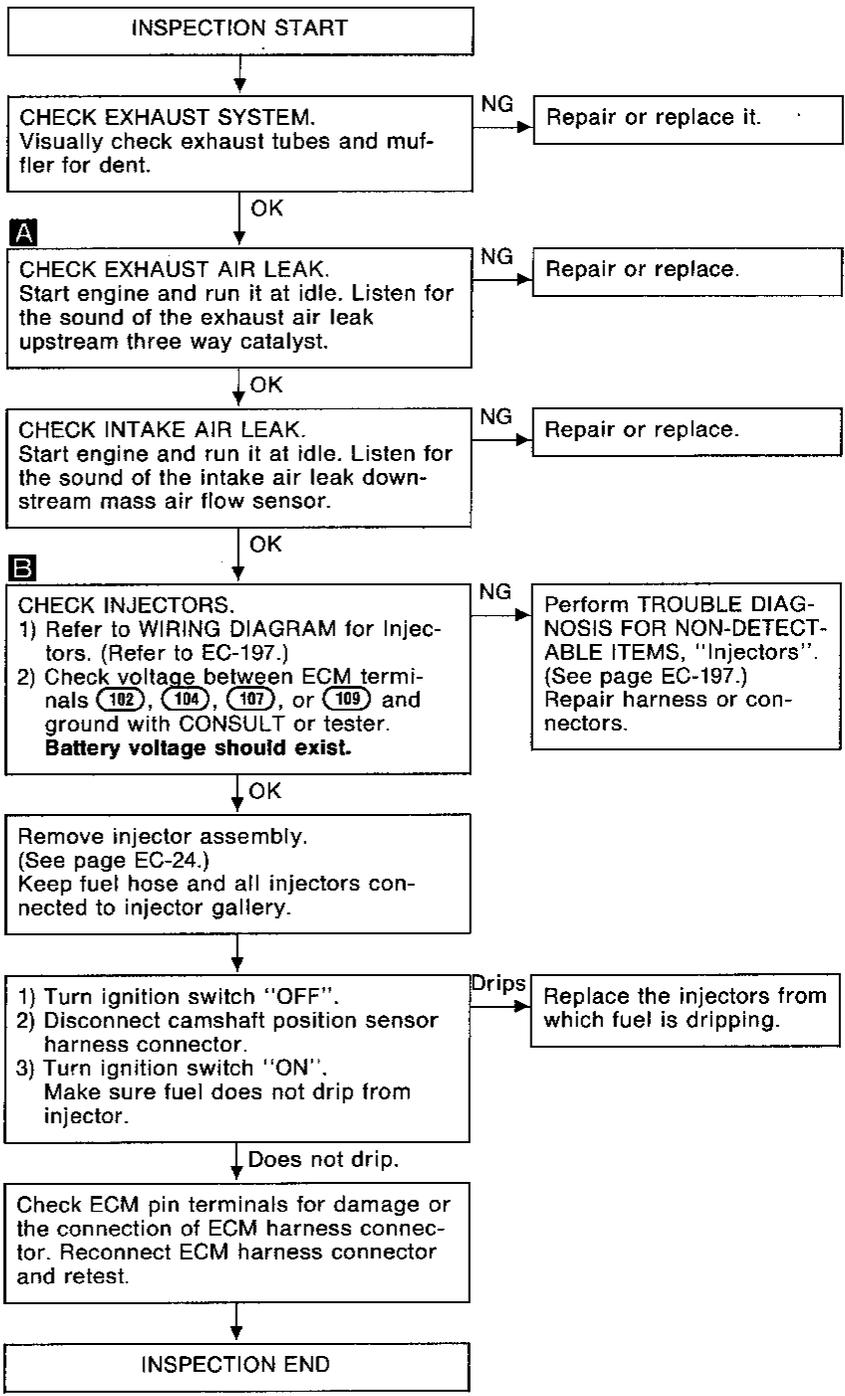
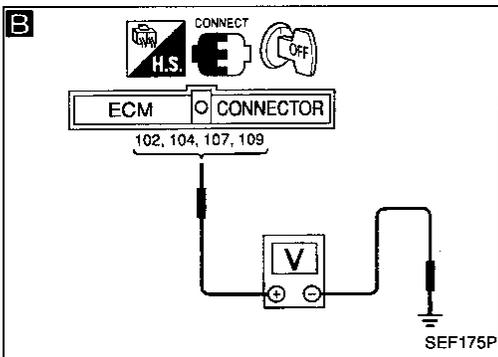
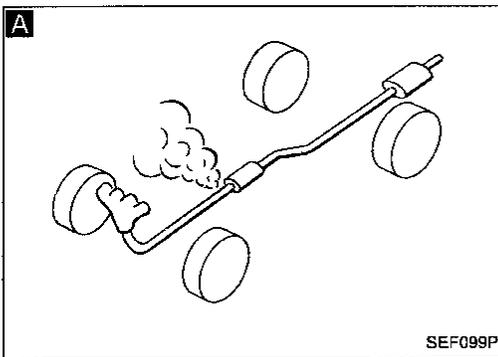
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TROUBLE DIAGNOSIS FOR DTC 72

Three Way Catalyst Function (DTC: P0420) (Cont'd)

DIAGNOSTIC PROCEDURE

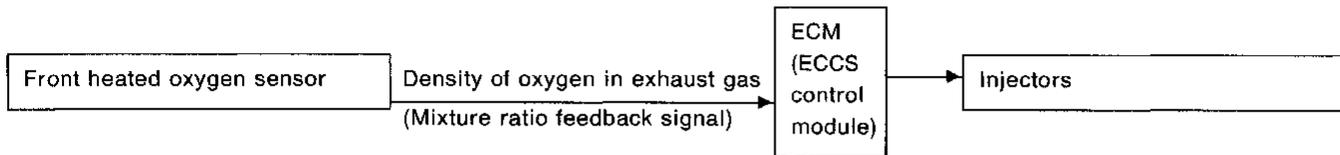


Fuel Injection System Function (DTC: P0170)

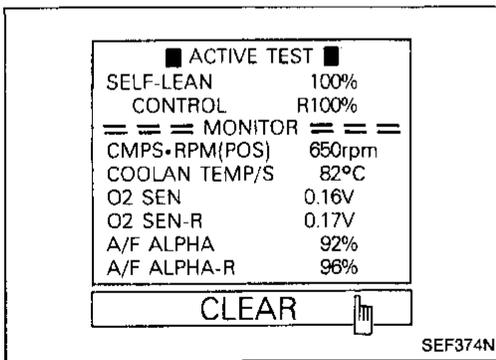
ON-BOARD DIAGNOSIS LOGIC

With Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensor. 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 ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
76 P0170	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean or too rich.) 	<ul style="list-style-type: none"> Intake air leak Front heated oxygen sensor Injectors Exhaust gas leak Incorrect fuel pressure Lack of fuel Mass air flow sensor



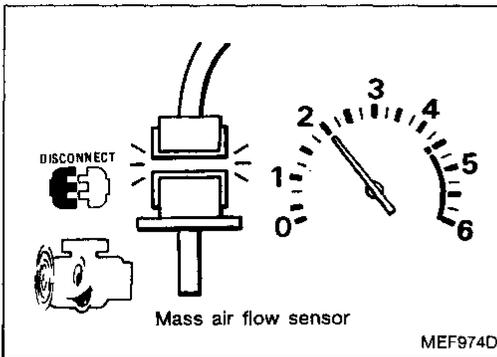
DIAGNOSTIC TROUBLE CODE DETECTING CONDITION (Overall)

- Start engine and warm it up sufficiently.
- Turn ignition switch "OFF" and wait for at least 3 seconds.
- Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
- Clear the self-learning control coefficient by touching "CLEAR".
- Start engine again and wait for at least 10 minutes at idle speed. The DTC should be detected at this stage, if a malfunction exists.
- If it is difficult to start engine at step 5, the fuel injection system has a malfunction, too.

OR

TROUBLE DIAGNOSIS FOR DTC 76

Fuel Injection System Function (DTC: P0170) (Cont'd)

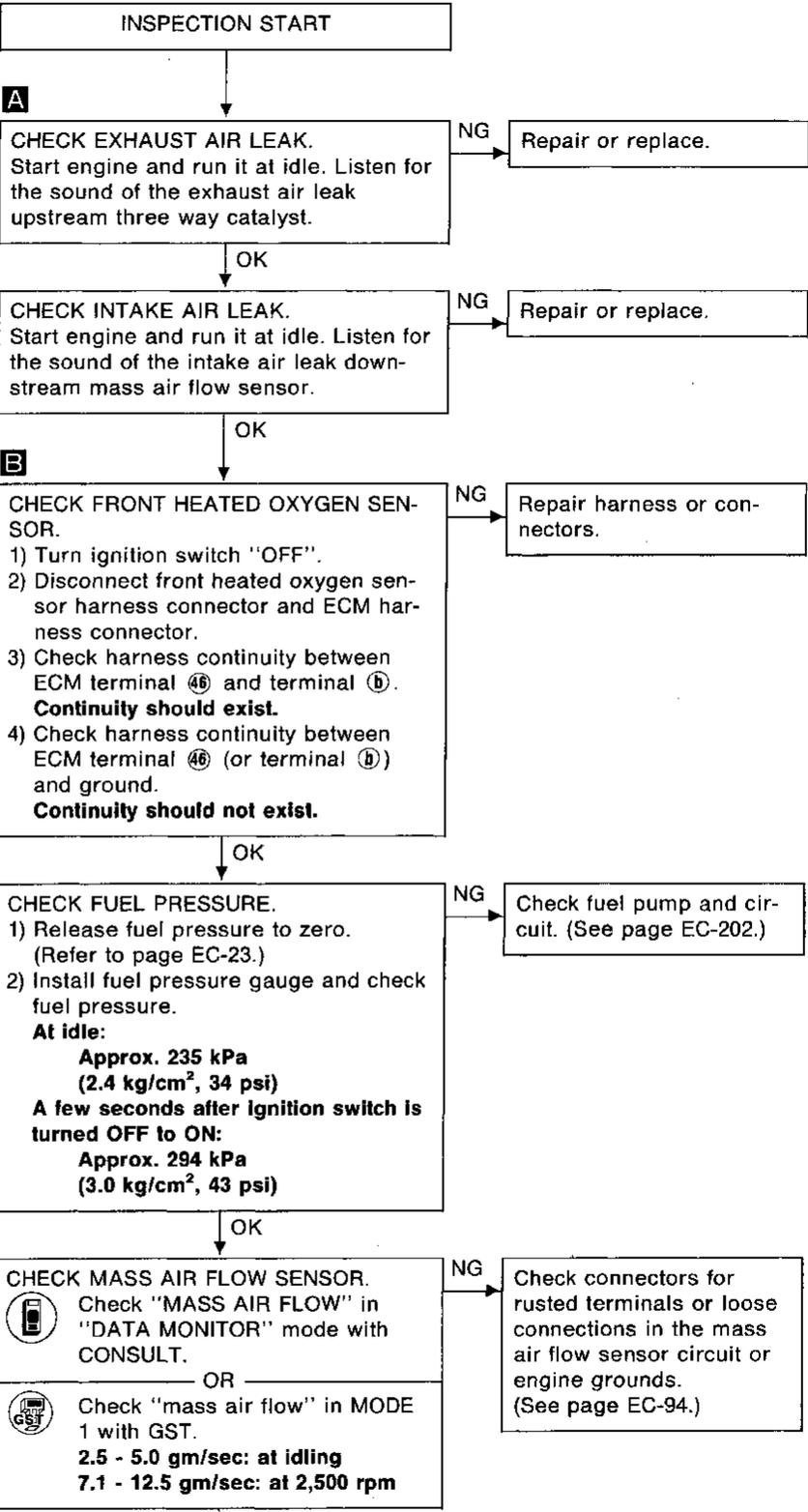
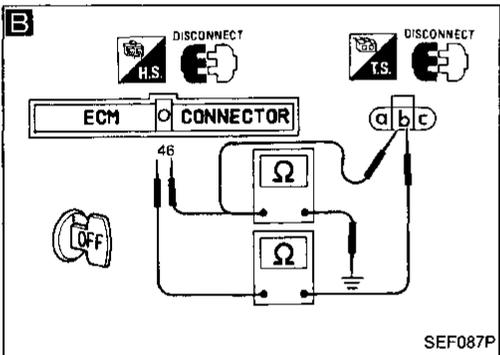
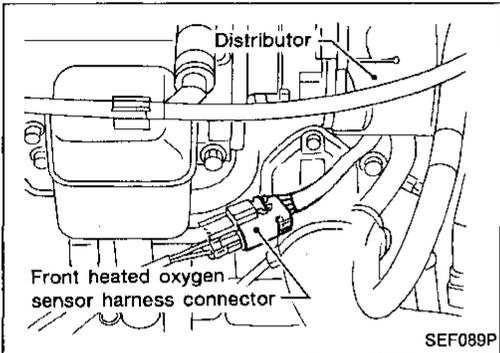
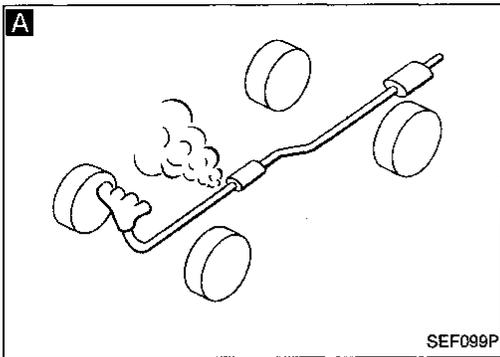


- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Disconnect mass air flow sensor harness connector. Restart and run engine for at least 30 seconds at 2,000 rpm.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 12 is detected.
- 6) Erase the DTC 12 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
- 7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 55 is detected.
- 8) Start engine again and wait for at least 10 minutes at idle speed.
The DTC 76 should be detected at this stage, if a malfunction exists.
- 9) If it is difficult to start engine at step 8, the fuel injection system also has a malfunction.

TROUBLE DIAGNOSIS FOR DTC 76

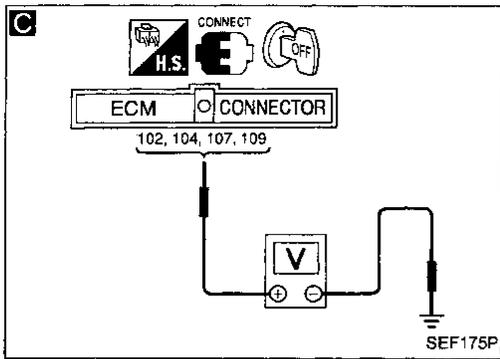
Fuel Injection System Function (DTC: P0170) (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC 76

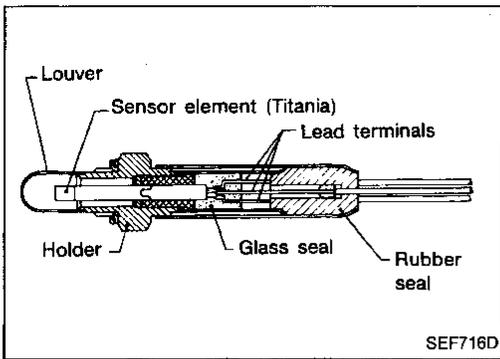
Fuel Injection System Function (DTC: P0170) (Cont'd)



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    graph TD
      Start((A)) --> Step1[CHECK INJECTORS.  
Check voltage between ECM terminals  
102, 104, 107, or 109 and ground  
with CONSULT or tester.  
Battery voltage should exist.]
      Step1 -- NG --> Step1a[Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors".  
(See page EC-197.)  
Repair harness or connectors.]
      Step1 -- OK --> Step2[Remove injector assembly.  
(See page EC-24.)  
Keep fuel hose and all injectors connected to injector gallery.]
      Step2 --> Step3[1) Turn ignition switch "OFF".  
2) Disconnect camshaft position sensor harness connector.  
3) Turn ignition switch "ON".  
Make sure fuel does not drip from injector.]
      Step3 -- Drips --> Step3a[Replace the injectors from which fuel is dripping.]
      Step3 -- Does not drip --> Step4[Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.]
      Step4 --> End[INSPECTION END]
  
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Rear Heated Oxygen Sensor (Rear HO2S) (DTC: P0136)

The rear heated oxygen sensor (Rear HO2S), downstream three way catalyst, monitors the oxygen level in the exhaust gas. This sensor is made of ceramic titania, the electric resistance of which drastically changes at the ideal air-fuel ratio. The output voltage of the sensor, depending on its resistance, is approximately 0 to 1.5V. The rear heated oxygen sensor is not directly used to control the engine system. It is used only for the on-board diagnosis of three way catalyst.

ON-BOARD DIAGNOSIS LOGIC

The rear heated oxygen sensor has a much longer switching time between rich and lean, due to the oxygen storage capacity of the up-stream three way catalyst. To judge the malfunctions of rear heated oxygen sensor, ECM monitors the sensor's voltage value and the switching response during the various driving condition such as fuel-cut.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
77 P0136	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is entered to ECM. <hr style="border-top: 1px dotted black;"/> <ul style="list-style-type: none"> ● The maximum and minimum voltages from the sensor are not reached to the specified voltages. ● It takes more time for the sensor to respond between rich and lean than the specified time. 	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open.) ● Rear heated oxygen sensor <hr style="border-top: 1px dotted black;"/> <ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is shorted.) ● Rear heated oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks

TROUBLE DIAGNOSIS FOR DTC 77

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: P0136) (Cont'd)

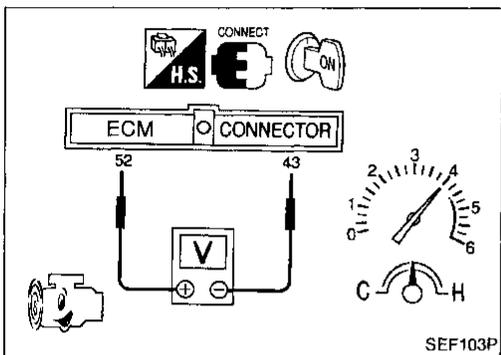
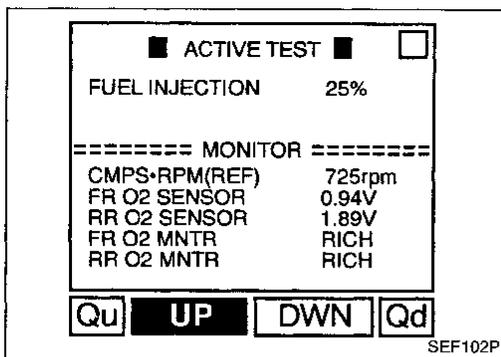
OVERALL FUNCTION CHECK

Instead of performing DTC DETECTING CONDITION, the following method can be used for checking the rear heated oxygen sensor function. (The "NG" of the OVERALL FUNCTION CHECK means the same as the DTC detection.)

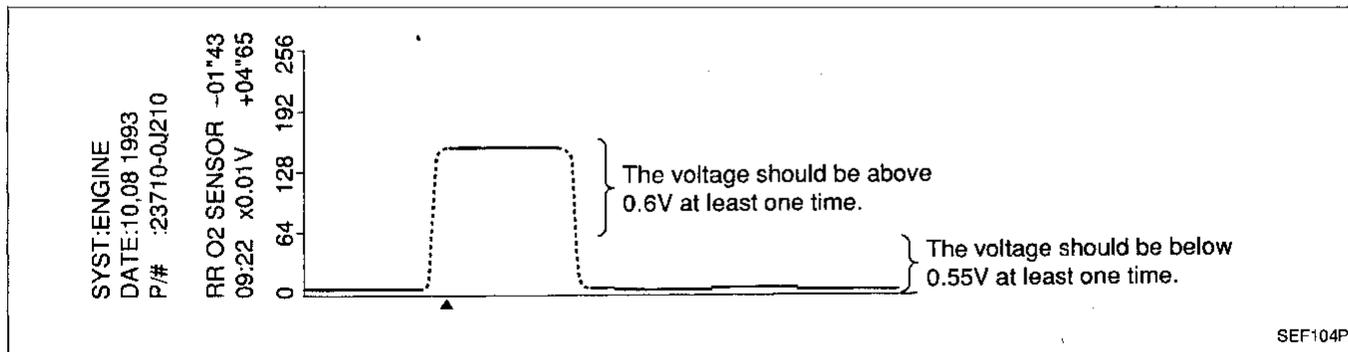
- 1) Start engine and warm it up sufficiently.
- 2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 MNTR" as the monitor item with CONSULT.
- 3) Check "RR O2 MNTR" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
 "RR O2 MNTR" should be "rich" when the "FUEL INJECTION" is +25%.
 "RR O2 MNTR" should be "lean" when the "FUEL INJECTION" is -25%.

OR

- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeter probes between ECM terminals 52 (sensor signal) and 43 (engine ground).
- 3) Check the voltage when racing up to 6,000 rpm under no load. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
The voltage should be above 0.6V at least one time.
- 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).
 Or keep vehicle at idling for 10 minutes, then check the voltage.
The voltage should be below 0.55V at least one time.



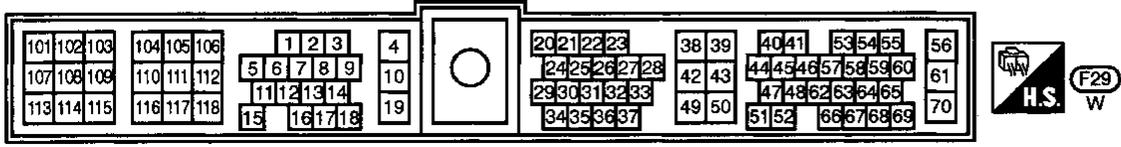
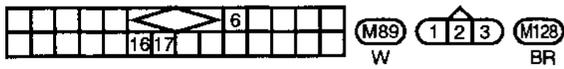
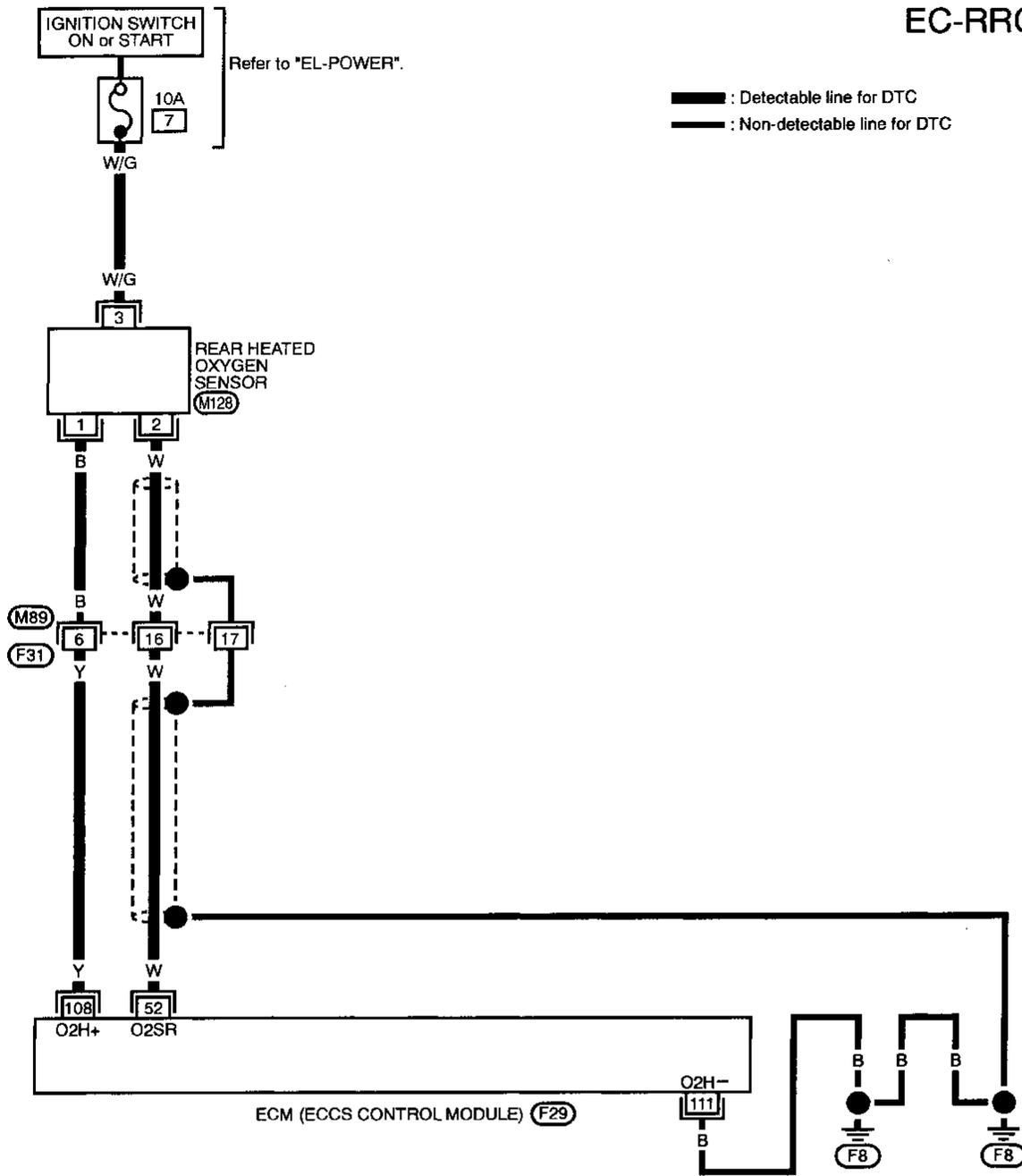
Note: After starting the engine, the output voltage of the rear heated oxygen sensor indicates higher voltage (approx. 5V at highest) than the normal operating range for about 7 seconds. This is due to checking for open circuits in rear heated oxygen sensor by on-board diagnosis. Therefore, if you measure the voltage (at ECM terminal 52) during this diagnosis, the higher voltage will appear. (CONSULT will also show the higher voltage, GST may show approx. 0V.) This is not a malfunction even though it is out of the normal range.



TROUBLE DIAGNOSIS FOR DTC 77

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: P0136) (Cont'd)

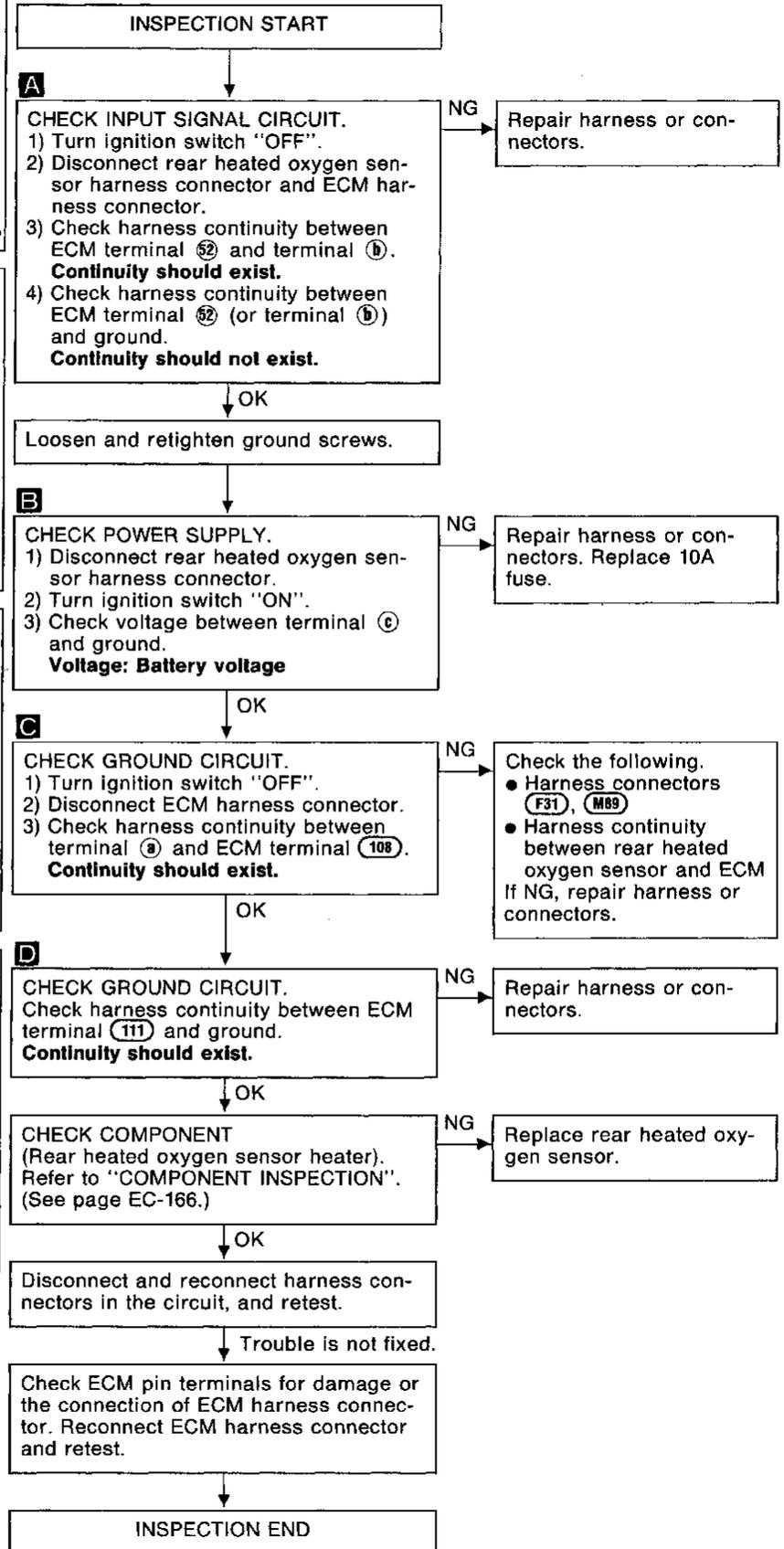
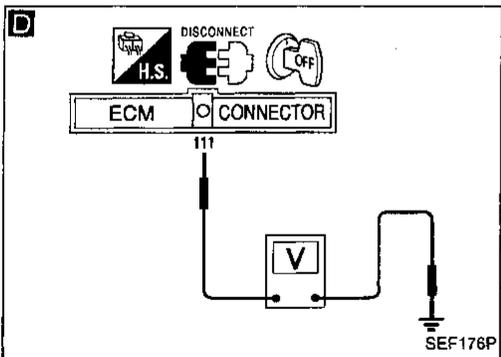
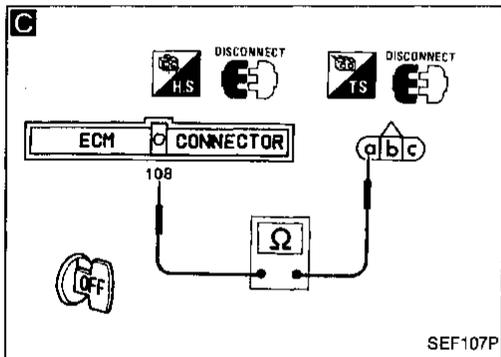
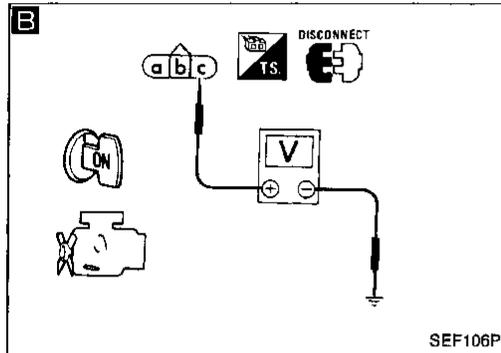
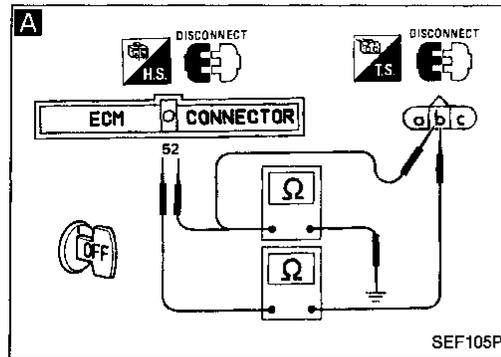
EC-RRO2-01



TROUBLE DIAGNOSIS FOR DTC 77

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: P0136) (Cont'd)

DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC 77

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: P0136) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

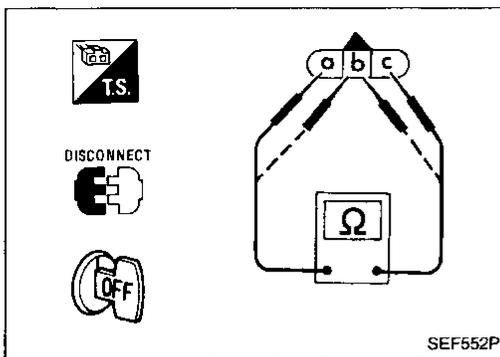
Check resistance between terminals **(a)** and **(c)**.

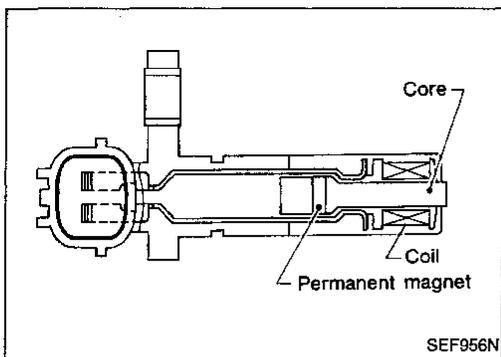
Resistance: $6.7 \pm 1.5\Omega$ at 25°C (77°F)

Check continuity between terminals **(b)** and **(c)**, **(a)** and **(b)**.

Continuity should exist.

If NG, replace heated oxygen sensor.





Crankshaft Position Sensor (CKPS) (OBD) (DTC: P0335)

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel (drive plate). It detects the fluctuation of the engine revolution.

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 fluctuation of the engine revolution.

This sensor is not directly used to control the engine system. It is used only for the on-board diagnosis of misfire.

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
82 P0335	<ul style="list-style-type: none"> The proper pulse signal from the crankshaft position sensor (OBD) is not entered to ECM while the engine is running with the specified engine speed. 	<ul style="list-style-type: none"> Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) Crankshaft position sensor (OBD)

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

- 
 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
 2) Start engine and run it for at least 15 seconds at idle speed.

OR

- 
 1) Start engine and run it for at least 15 seconds at idle speed.
 2) Select "MODE 3" with GST.

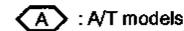
OR

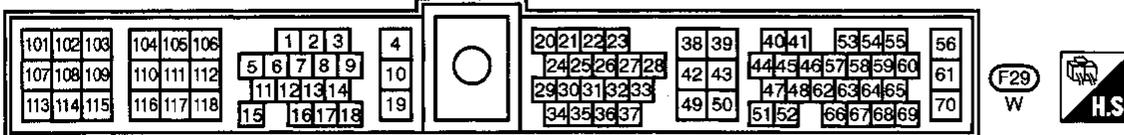
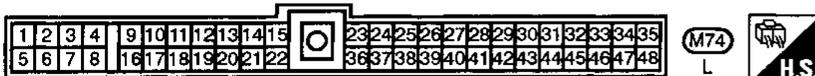
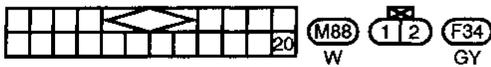
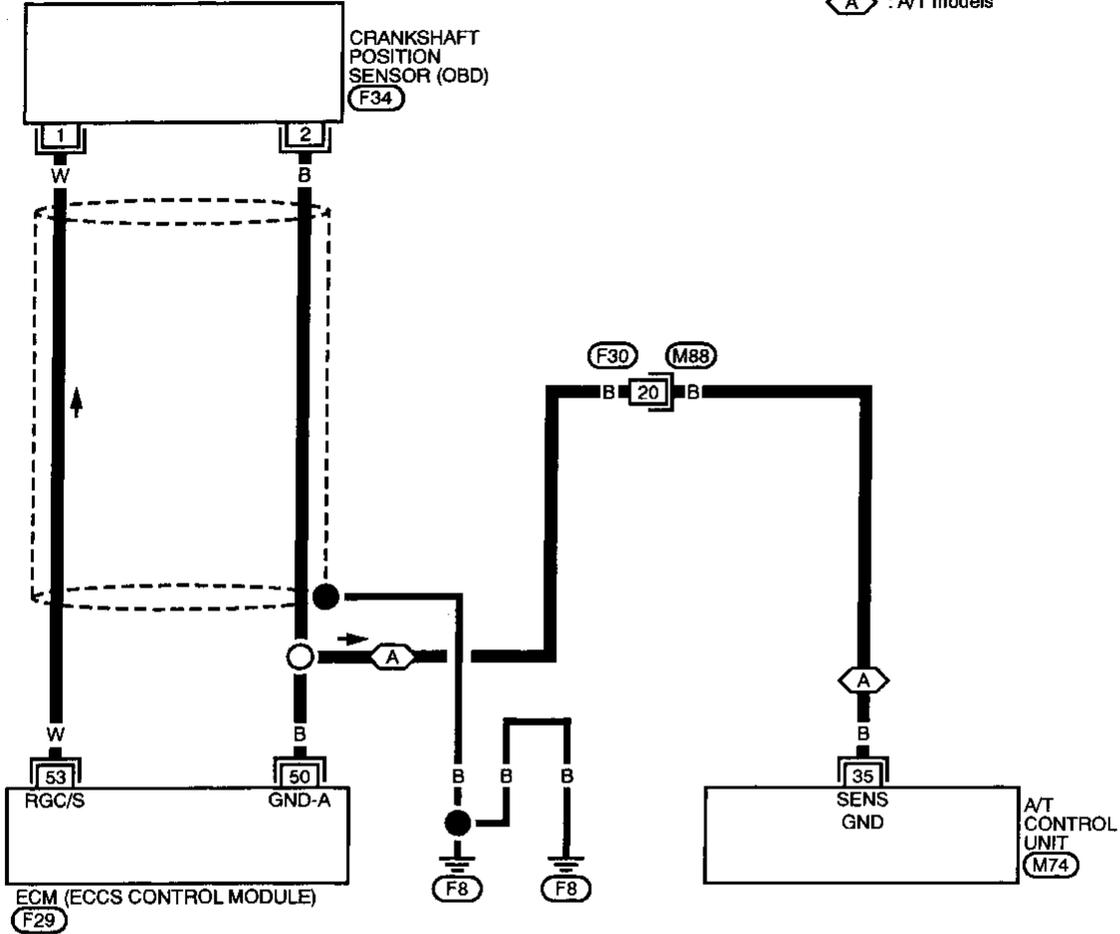
- 
 1) Start engine and run it for at least 15 seconds at idle speed.
 2) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC 82

Crankshaft Position Sensor (CKPS) (OBD) (DTC: P0335) (Cont'd)

EC-CKPS-01

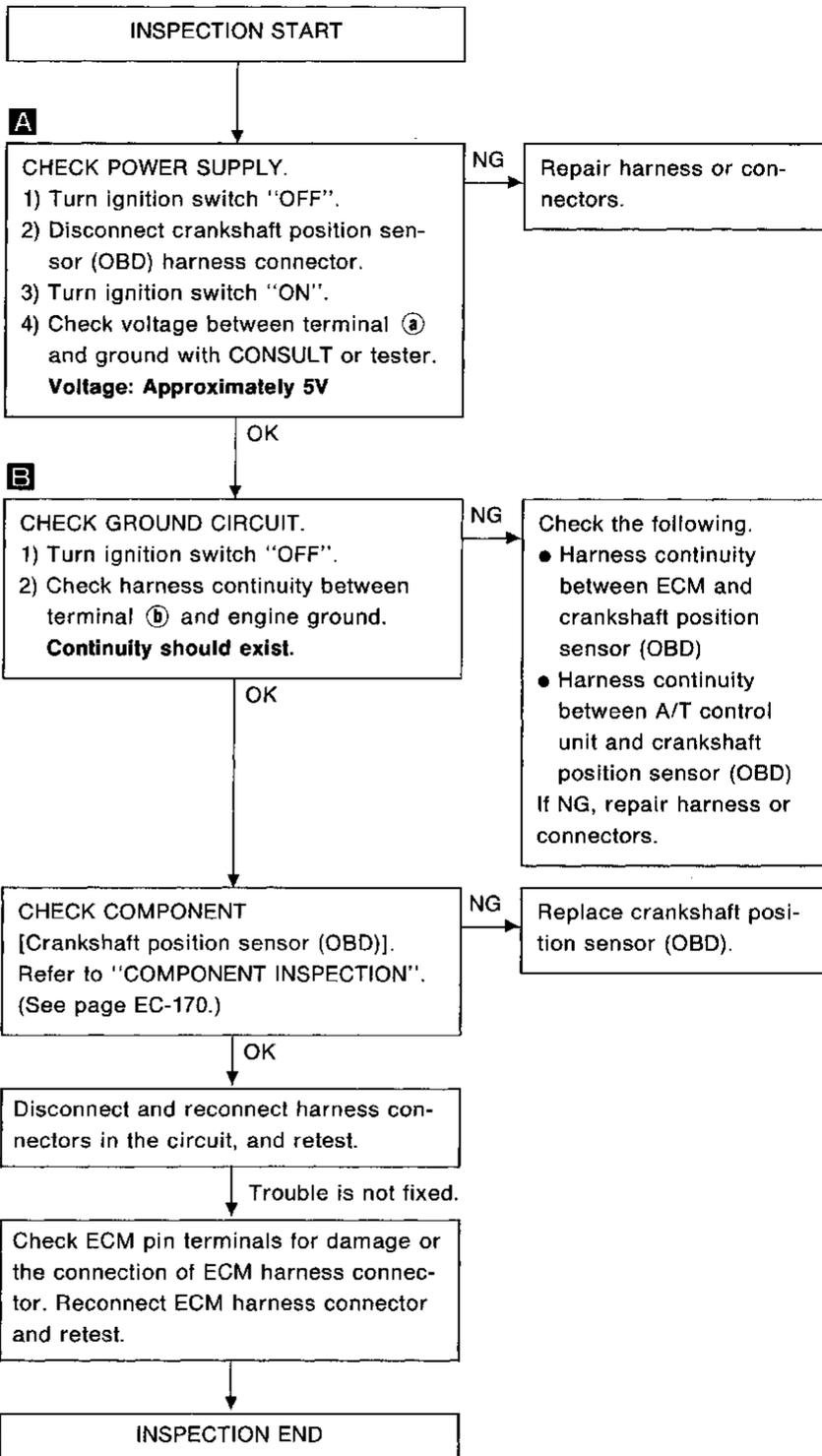
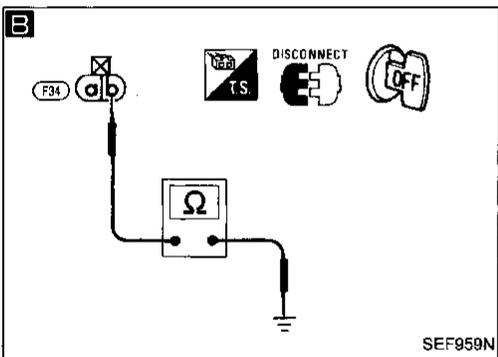
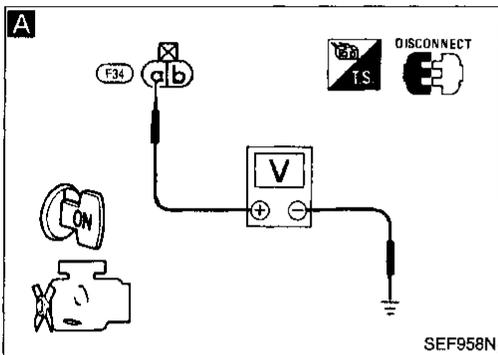
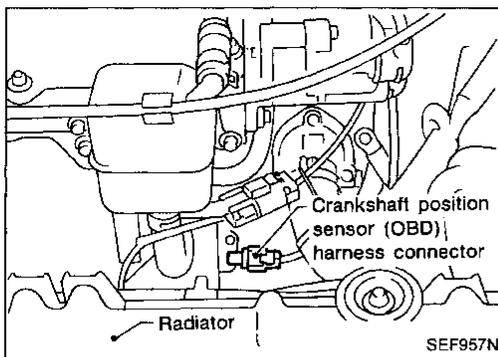
-  : Detectable line for DTC
-  : Non-detectable line for DTC
-  : A/T models



TROUBLE DIAGNOSIS FOR DTC 82

Crankshaft Position Sensor (CKPS) (OBD) (DTC: P0335) (Cont'd)

DIAGNOSTIC PROCEDURE



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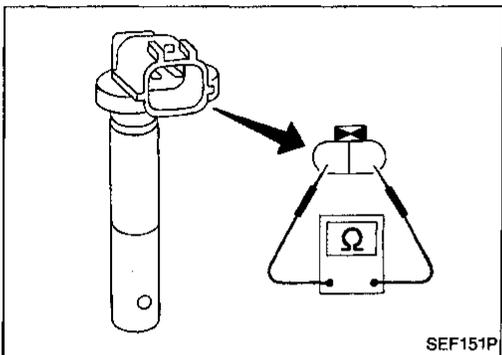
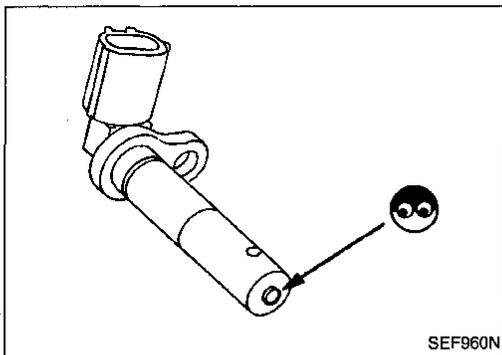
TROUBLE DIAGNOSIS FOR DTC 82

Crankshaft Position Sensor (CKPS) (OBD) (DTC: P0335) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.
Resistance: Approximately $185 \pm 19\Omega$ at 20°C (68°F)

TROUBLE DIAGNOSIS FOR DTC 84

A/T Diagnosis Communication line (DTC: P1605)

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from A/T control unit to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in A/T control unit but also ECM after the A/T related repair.

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Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
84 P1605	<ul style="list-style-type: none"> ● An incorrect signal from A/T control units is entered to ECM. 	<ul style="list-style-type: none"> ● Harness or connectors (The communication line circuit between ECM and A/T control unit is open or shorted.) ● Dead (Weak) battery

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Wait for at least 40 seconds or start engine and wait for at least 40 seconds.

OR



- 1) Turn ignition switch "ON".
- 2) Wait for at least 40 seconds or start engine and wait for at least 40 seconds.
- 3) Select "MODE 3" with GST.

OR

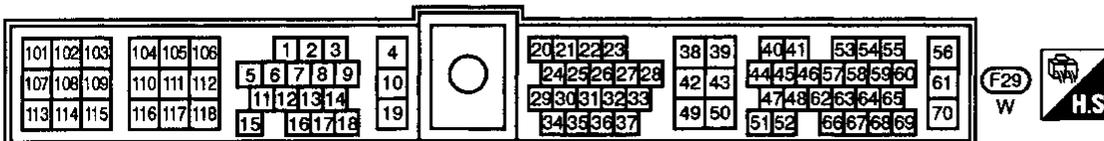
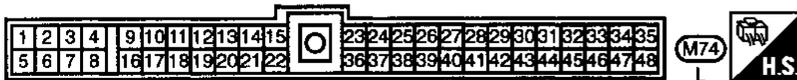
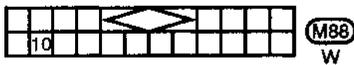
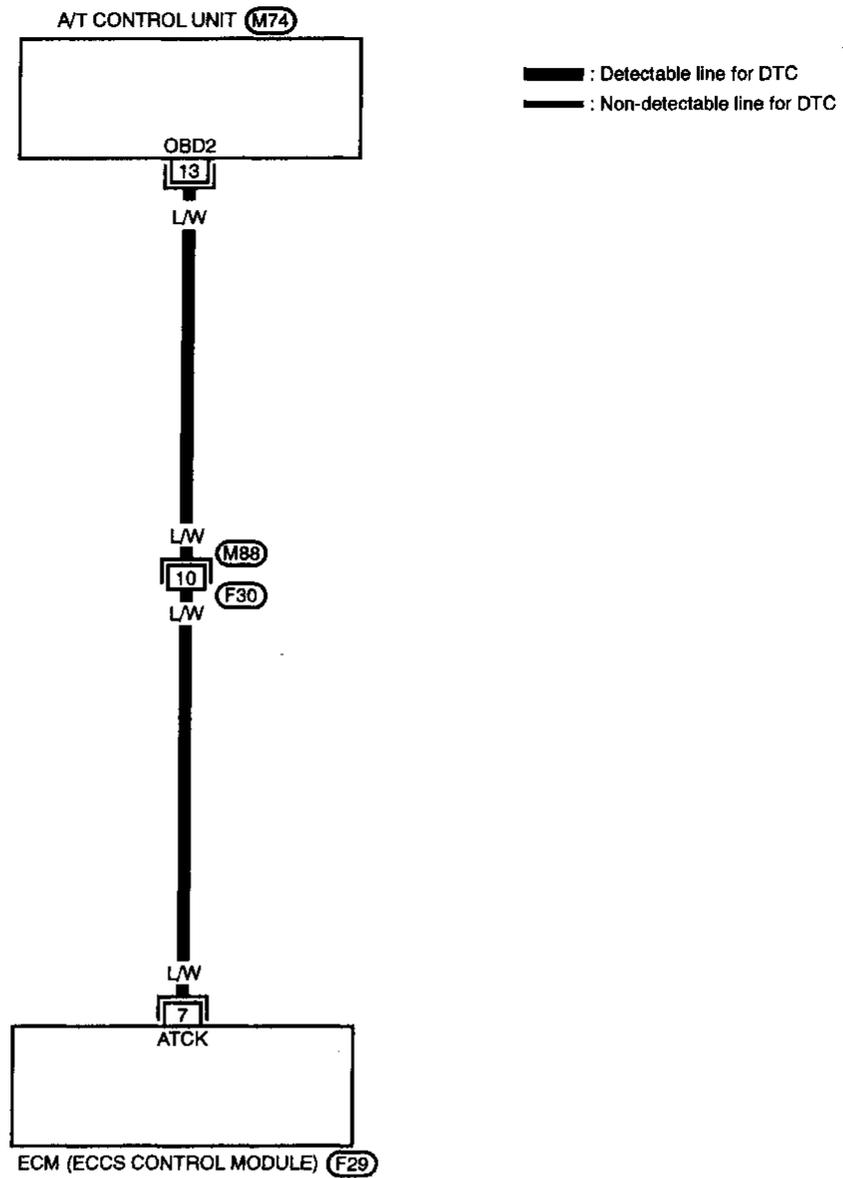


- 1) Turn ignition switch "ON".
- 2) Wait for at least 40 seconds or start engine and wait for at least 40 seconds.
- 3) Turn ignition switch "OFF", wait for at least 3 seconds and then turn "ON".
- 4) Perform diagnostic test mode II (self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC 84

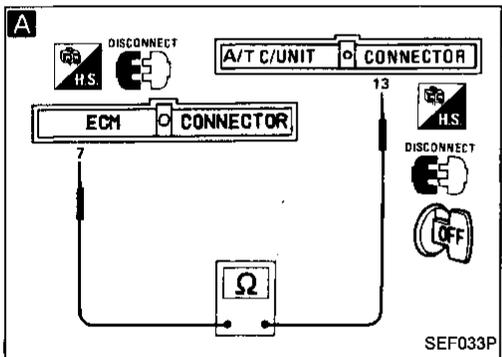
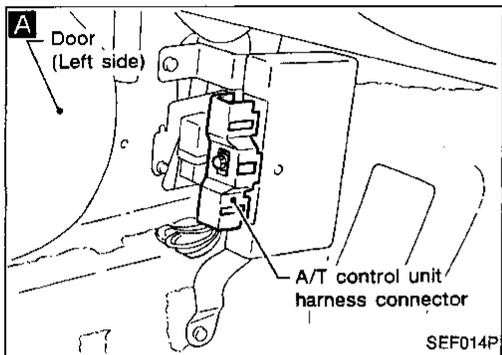
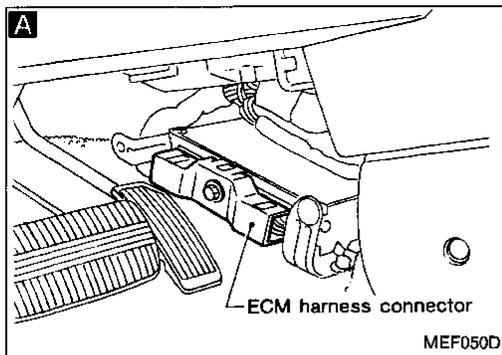
A/T Diagnosis Communication line (DTC: P1605) (Cont'd)

EC-ATDIAG-01



TROUBLE DIAGNOSIS FOR DTC 84

A/T Diagnosis Communication line (DTC: P1605) (Cont'd)



INSPECTION START

A
CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and A/T control unit harness connector.
3) Check harness continuity between ECM terminal ⑦ and terminal ⑬.
Continuity should exist.

NG → Check the following.
● Harness connectors
 (F30, M88)
● Harness continuity between ECM and A/T control unit
If NG, repair harness or connectors.

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

Trouble is not fixed.

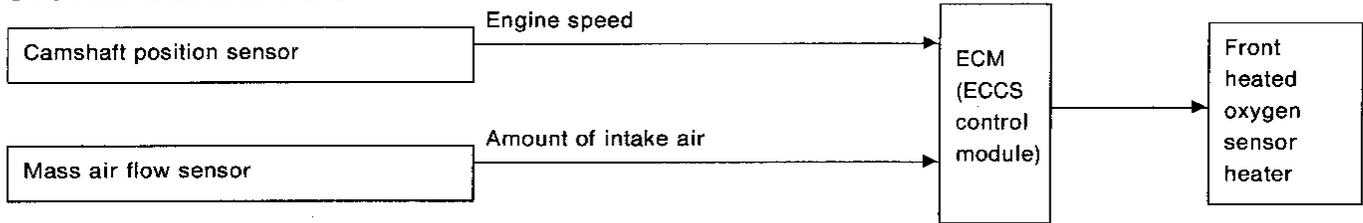
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

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Front Heated Oxygen Sensor Heater (DTC: P0135)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Engine load	Front heated oxygen sensor heater
Above 3,200	—	OFF
Below 3,200	Heavy load	OFF
	Middle or light load	ON

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

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and run it for at least 35 seconds at idle speed.

OR



- 1) Start engine and run it for at least 35 seconds at idle speed.
- 2) Select "MODE 3" with GST.

OR

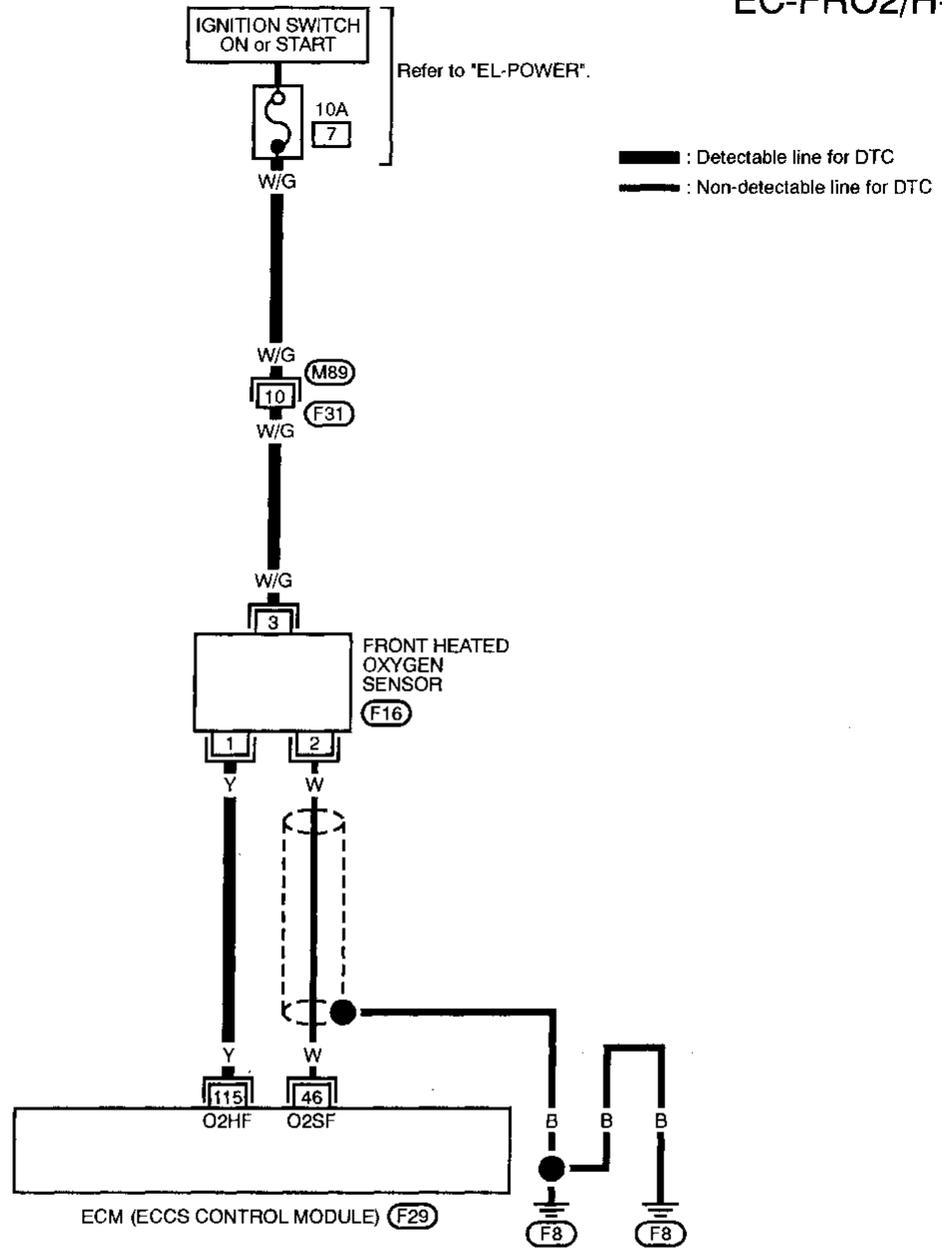


- 1) Start engine and run it for at least 35 seconds in idle condition.
- 2) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

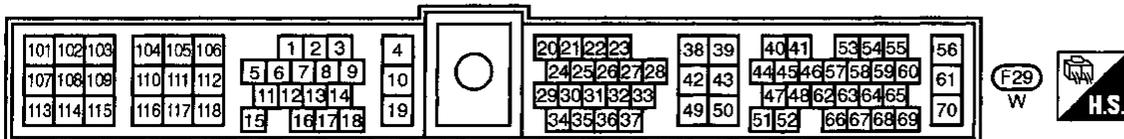
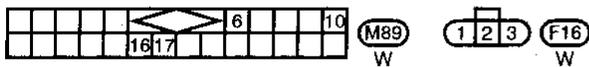
TROUBLE DIAGNOSIS FOR DTC 91

Front Heated Oxygen Sensor Heater (DTC: P0135) (Cont'd)

EC-FRO2/H-01



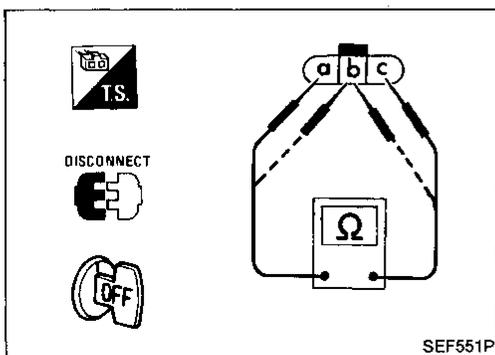
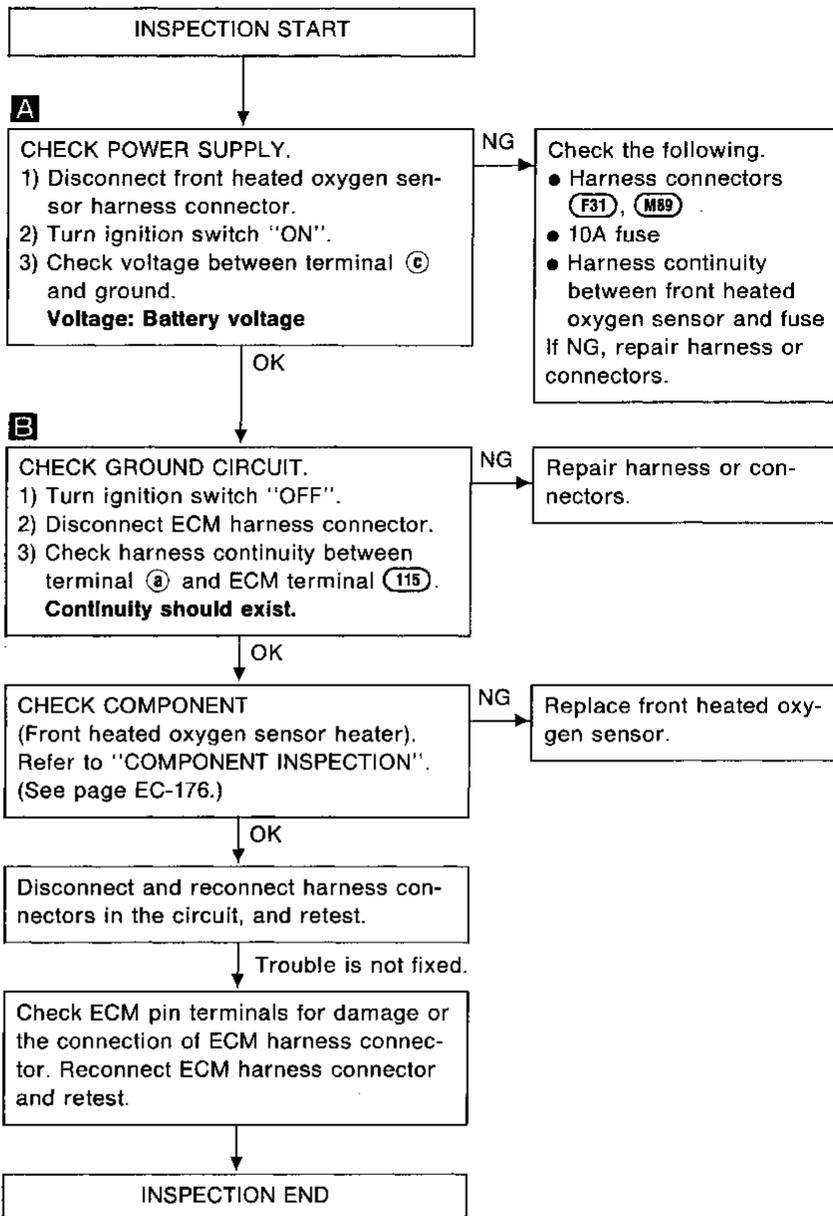
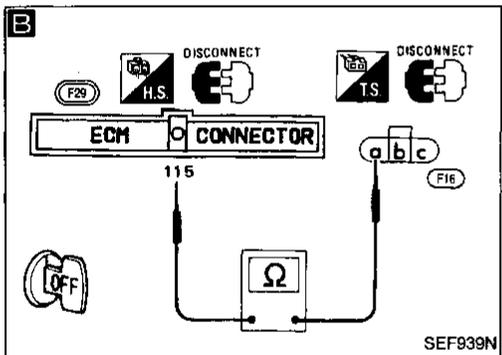
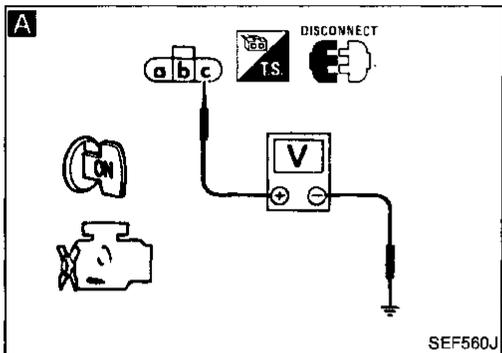
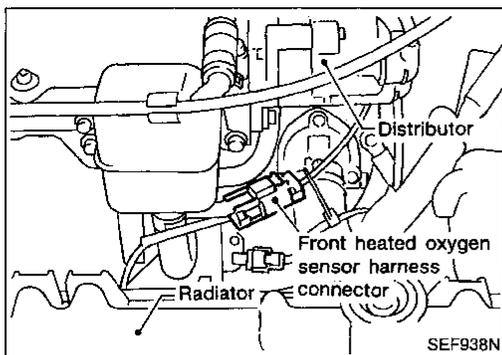
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TROUBLE DIAGNOSIS FOR DTC 91

Front Heated Oxygen Sensor Heater (DTC: P0135) (Cont'd)

DIAGNOSTIC PROCEDURE



COMPONENT INSPECTION

Front heated oxygen sensor heater

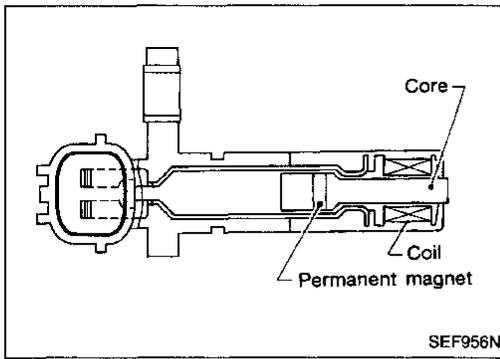
Check resistance between terminals (a) and (c).

Resistance: $4.8 \pm 1.5\Omega$ at 25°C (77°F)

Check continuity between terminals (b) and (c), (a) and (b).

Continuity should not exist.

If NG, replace heated oxygen sensor.



Crankshaft Position Sensor (CKPS) (OBD) (DTC: P1336)

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel (drive plate). It detects the fluctuation of the engine revolution.

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 fluctuation of the engine revolution.

This sensor is not directly used to control the engine system. It is used only for the on-board diagnosis of misfire.

GI

MA

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Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
95 P1336	<ul style="list-style-type: none"> • A chipping of the flywheel (drive plate) gear tooth (cog) is detected by the ECM. 	<ul style="list-style-type: none"> • Harness or connectors • Crankshaft position sensor (OBD) • Flywheel (Drive plate)

FE

CL

MT

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

- 
 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
 2) Start engine and run it for at least 4 minutes at idle speed.

AT

FA

- _____ OR _____
- 
 1) Start engine and run it for at least 4 minutes at idle speed.
 2) Select "MODE 3" with GST.

RA

- _____ OR _____
- 
 1) Start engine and run it for at least 4 minutes at idle speed.
 2) Turn ignition switch "OFF", wait for at least 3 seconds and then "ON".
 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

BR

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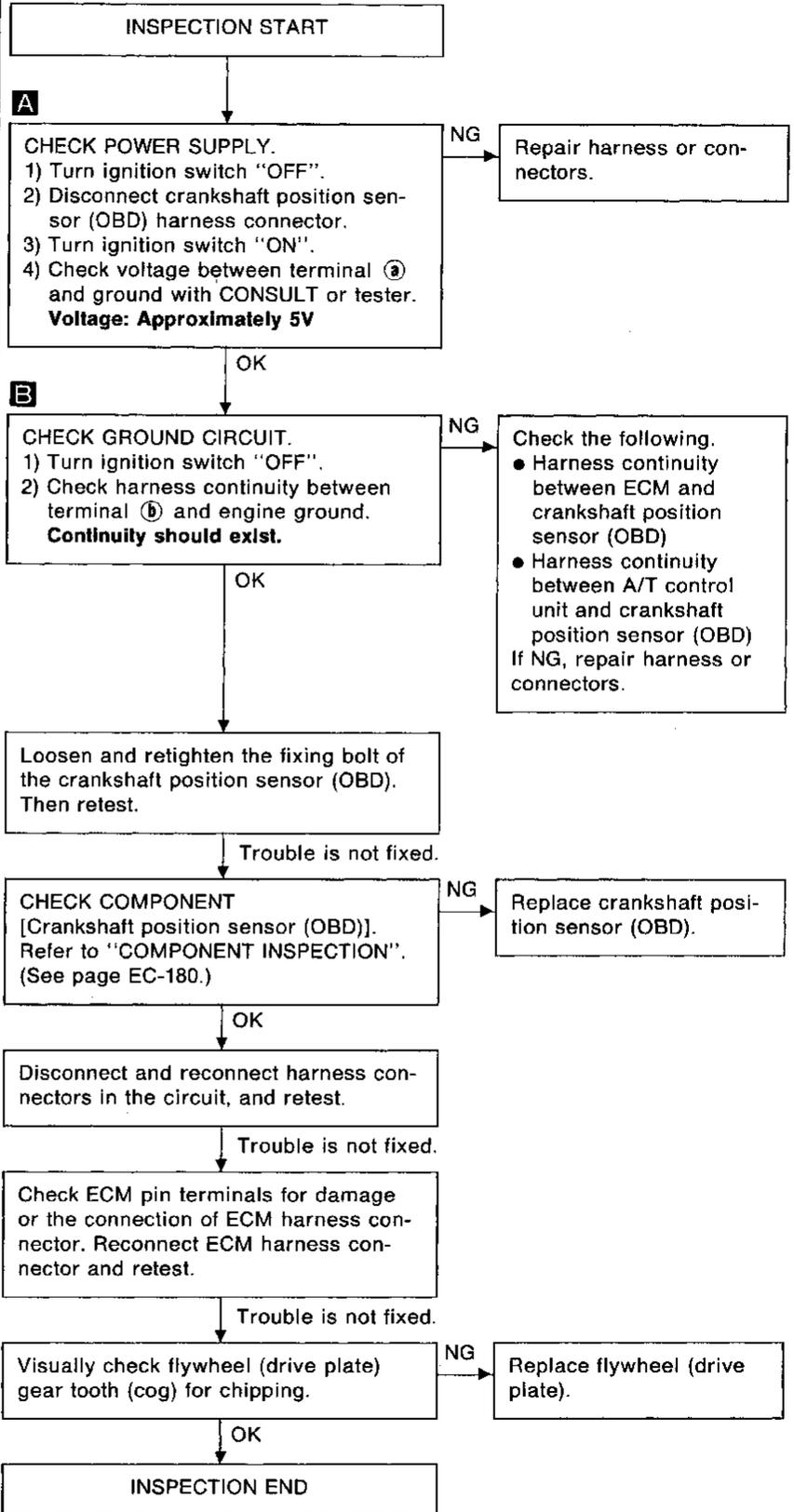
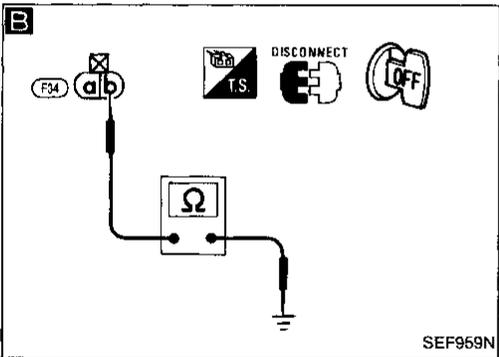
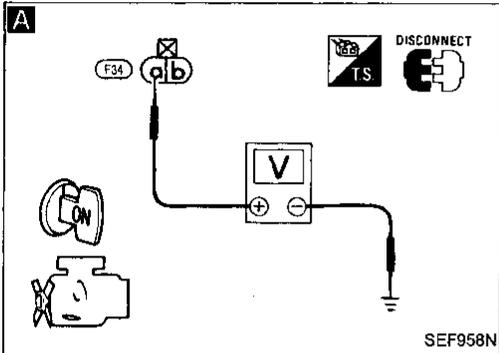
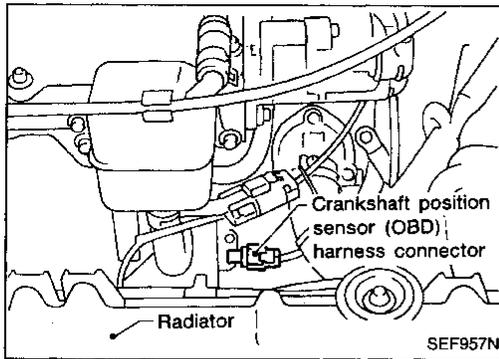
EL

IDX

TROUBLE DIAGNOSIS FOR DTC 95

Crankshaft Position Sensor (CKPS) (OBD) (DTC: P1336) (Cont'd)

DIAGNOSTIC PROCEDURE



GI
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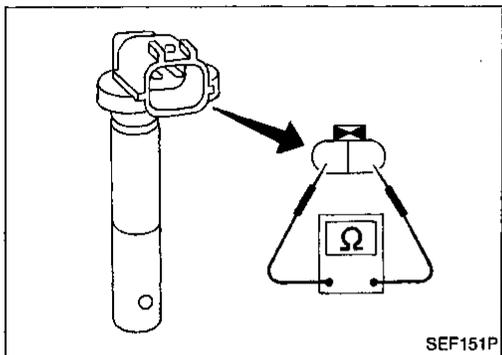
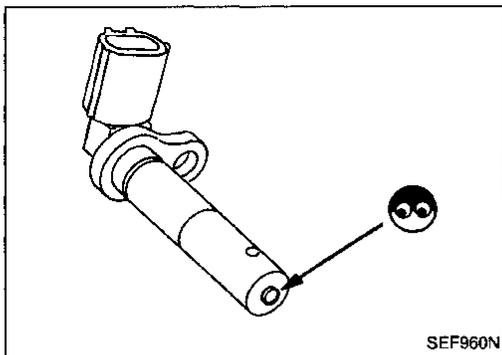
TROUBLE DIAGNOSIS FOR DTC 95

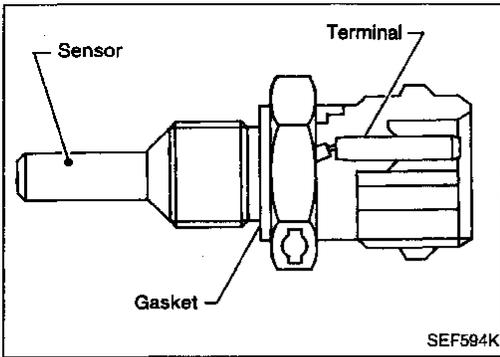
Crankshaft Position Sensor (CKPS) (OBD) (DTC: P1336) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.
Resistance: Approximately $185 \pm 19\Omega$ at 20°C (68°F)

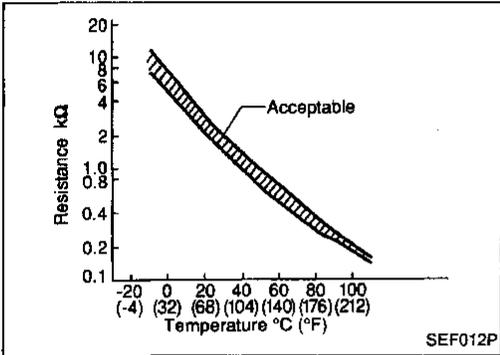




Engine Coolant Temperature (ECT) Sensor (DTC: P0125)

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



< Reference data >

Engine coolant temperature °C (°F)	Voltage (V)	Resistance (kΩ)
-10 (14)	4.4	9.2
20 (68)	3.5	2.5
50 (122)	2.2	0.8
90 (194)	0.9	0.2

LC
EC
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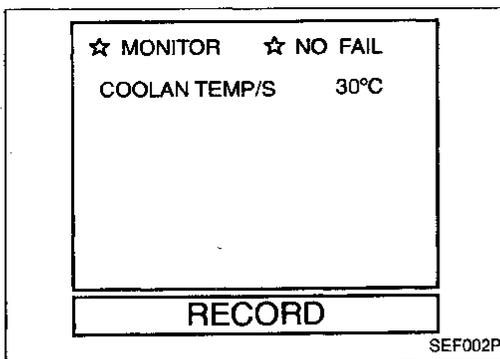
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
98 P0125	<ul style="list-style-type: none"> ● Rationally incorrect voltage from the sensor is entered to ECM, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control. 	<ul style="list-style-type: none"> ● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

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TROUBLE DIAGNOSIS FOR DTC 98

Engine Coolant Temperature (ECT) Sensor (DTC: P0125) (Cont'd)



OVERALL FUNCTION CHECK

Instead of performing the DTC Detecting Condition, the following method can be used for checking the function of the engine coolant temperature sensor. (However, the DTC detection cannot be confirmed.)

Note: If both DTC 13 (P0115) and 98 (P0125) are displayed, first perform TROUBLE DIAGNOSIS FOR DTC 13. (See EC-99.)



- 1) Turn ignition switch "ON".
- 2) Select "COOLANT TEMP/S" in "DATA MONITOR" mode with CONSULT.
- 3) Start engine and run it at idle speed.
- 4) Check that the engine coolant temperature rises to 25°C (77°F) or more within 15 minutes. (Be careful not to overheat engine.)

OR



- 1) Turn ignition switch "ON".
- 2) Select "MODE 1" with GST.
- 3) Start engine and run it at idle speed.
- 4) Check that the engine coolant temperature rises to 25°C (77°F) or more within 15 minutes. (Be careful not to overheat engine.)

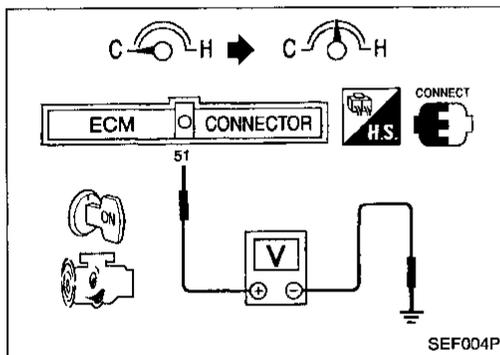
OR



- 1) Turn ignition switch "ON".
- 2) Probe voltage meter between ECM terminal ⑤1 and ground.
- 3) Start engine and run it at idle speed.
- 4) Check that voltage of engine coolant temperature changes to less than 3.3 (V) within 15 minutes. (Be careful not to overheat engine.)

FUEL SYS #1	OPEN
FUEL SYS #2	UNUSED
CALC LOAD	22%
COOLANT TEMP	30°C
SHORT FT #1	0%
LONG FT #1	2%
ENGINE SPD	1000RPM
VEHICLE SPD	0km/h
IGN ADVANCE	20.0°
INTAKE AIR	26°C
MAF	0.0gm/sec
THROTTLE POS	0%
O2S LOCATION	3
O2S B1,S1	0.680V
O2FT B1,S1	0%
O2S B1,S2	0.080V

SEF003P

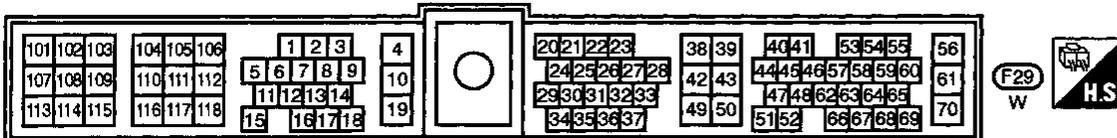
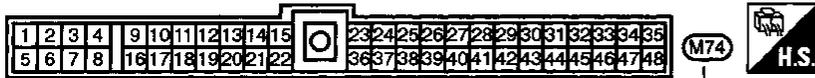
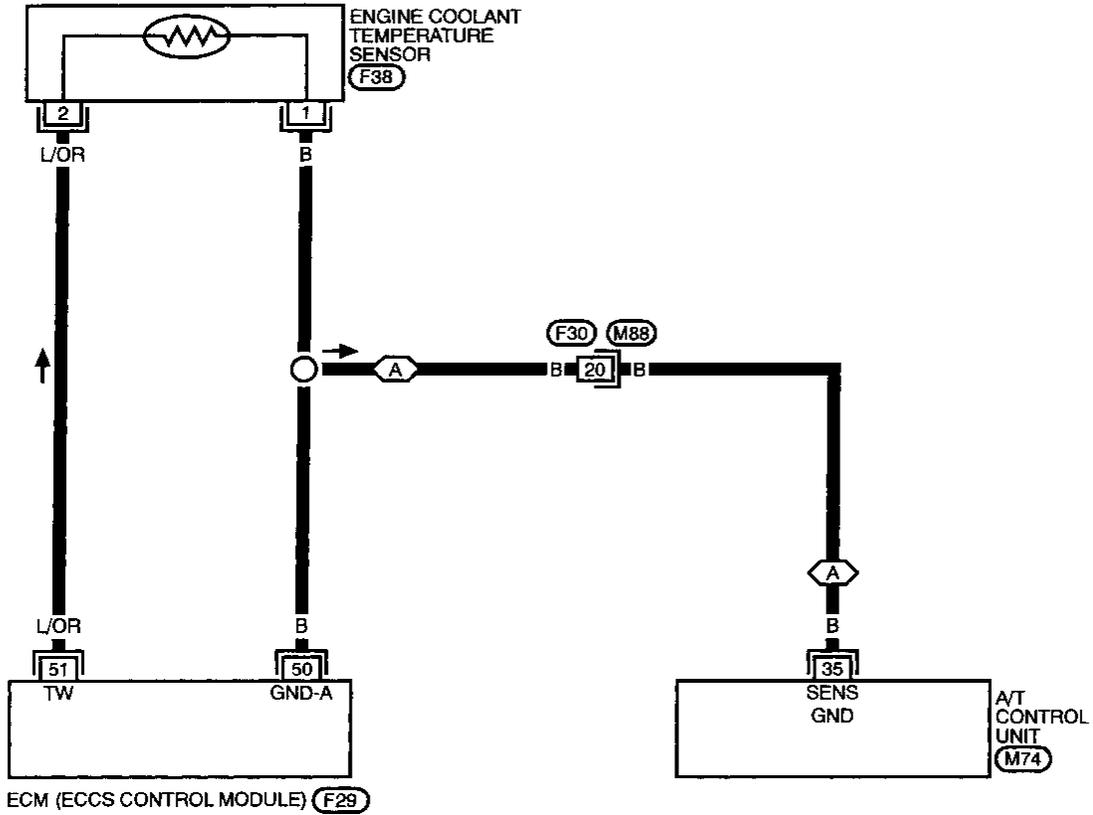


TROUBLE DIAGNOSIS FOR DTC 98

Engine Coolant Temperature (ECT) Sensor (DTC: P0125) (Cont'd)

EC-ECTS-01

-  : Detectable line for DTC
-  : Non-detectable line for DTC
-  : A/T models

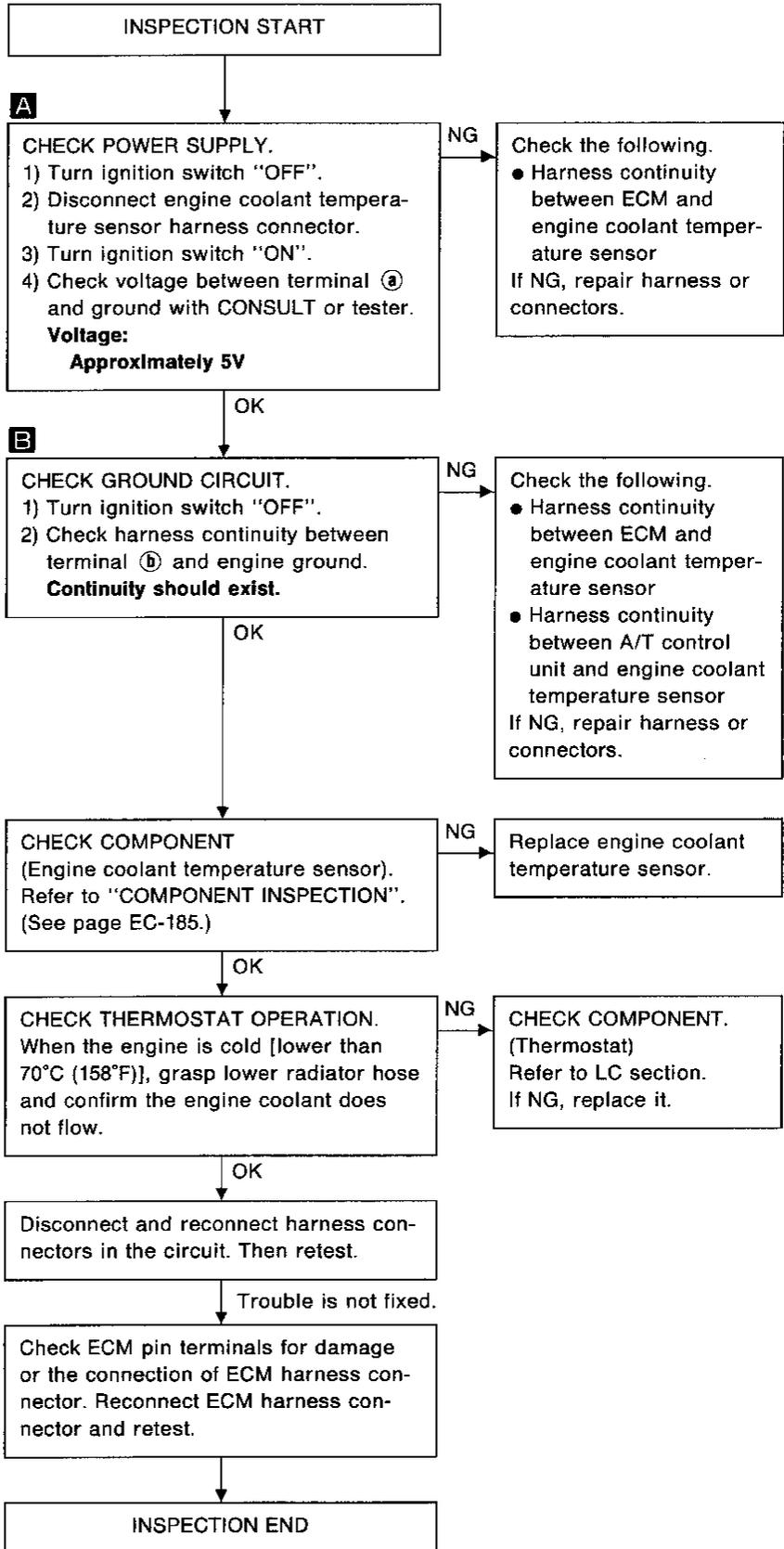
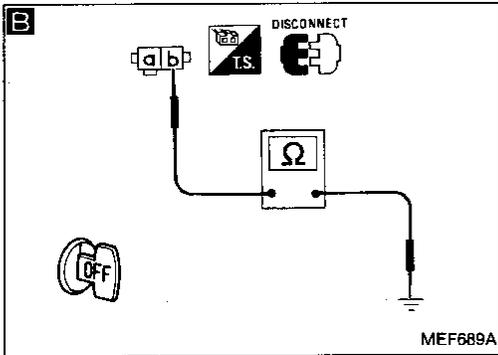
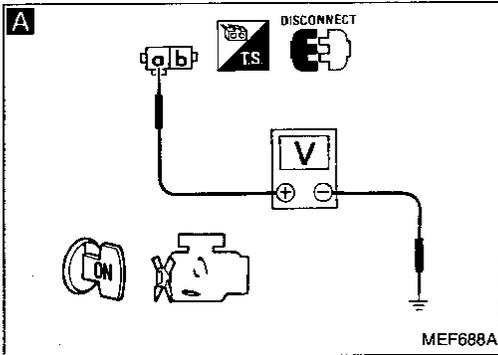
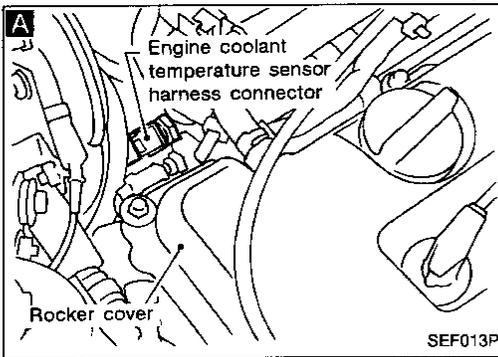


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TROUBLE DIAGNOSIS FOR DTC 98

Engine Coolant Temperature (ECT) Sensor (DTC: P0125) (Cont'd)

DIAGNOSTIC PROCEDURE



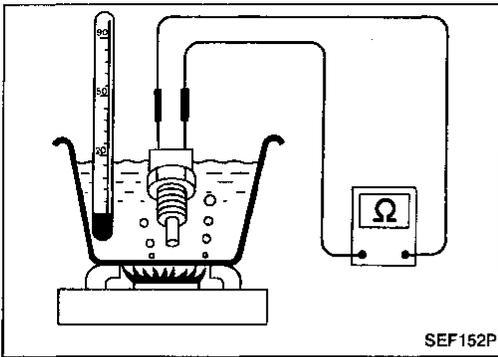
TROUBLE DIAGNOSIS FOR DTC 98

Engine Coolant Temperature (ECT) Sensor (DTC: P0125) (Cont'd)

COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.



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

If NG, replace engine coolant temperature sensor.

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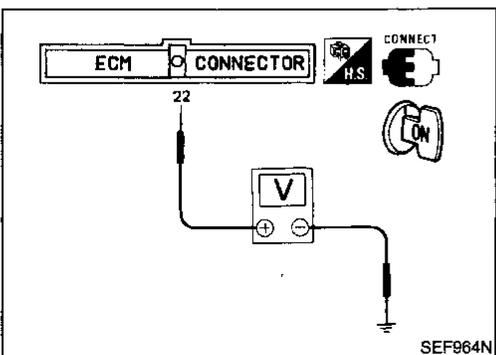
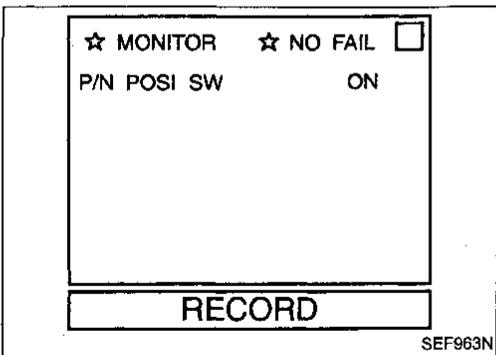
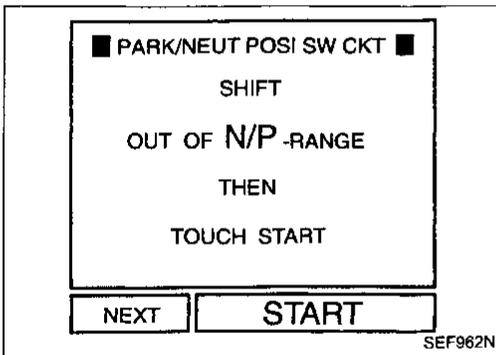
EL

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Park/Neutral Position Switch (DTC: P0705)

When the gear position is in "P" (A/T models only) or "N", park/neutral position is "ON". ECM detects the position because the continuity of the line (the "ON" signal) exists.

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
103 P0705	<ul style="list-style-type: none"> ● The signal of the park/neutral position switch is not changed in the process of engine starting and driving. 	<ul style="list-style-type: none"> ● Harness or connectors (The neutral position switch or inhibitor switch circuit is open or shorted.) ● Neutral position switch (M/T models) ● Inhibitor switch (A/T models)



OVERALL FUNCTION CHECK

Instead of performing the DTC DETECTING CONDITION, the following method can be used for checking the function of the park/neutral position switch. (However, the DTC detection can not be confirmed.)

- 1) Turn ignition switch "ON".
 - 2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.
- OR
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
 - 3) Check the "P/N POSI SW" signal in the following conditions.

Condition (Gear position)	Known good signal
"N" and "P" (A/T only) position	ON
Except the above position	OFF

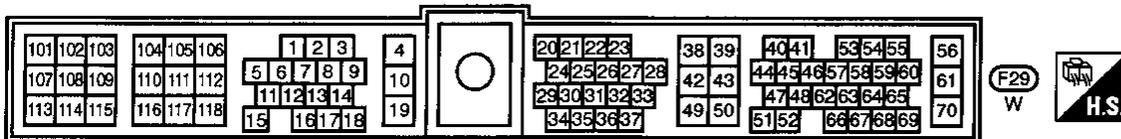
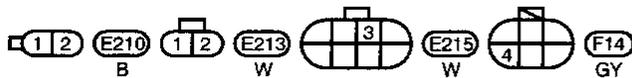
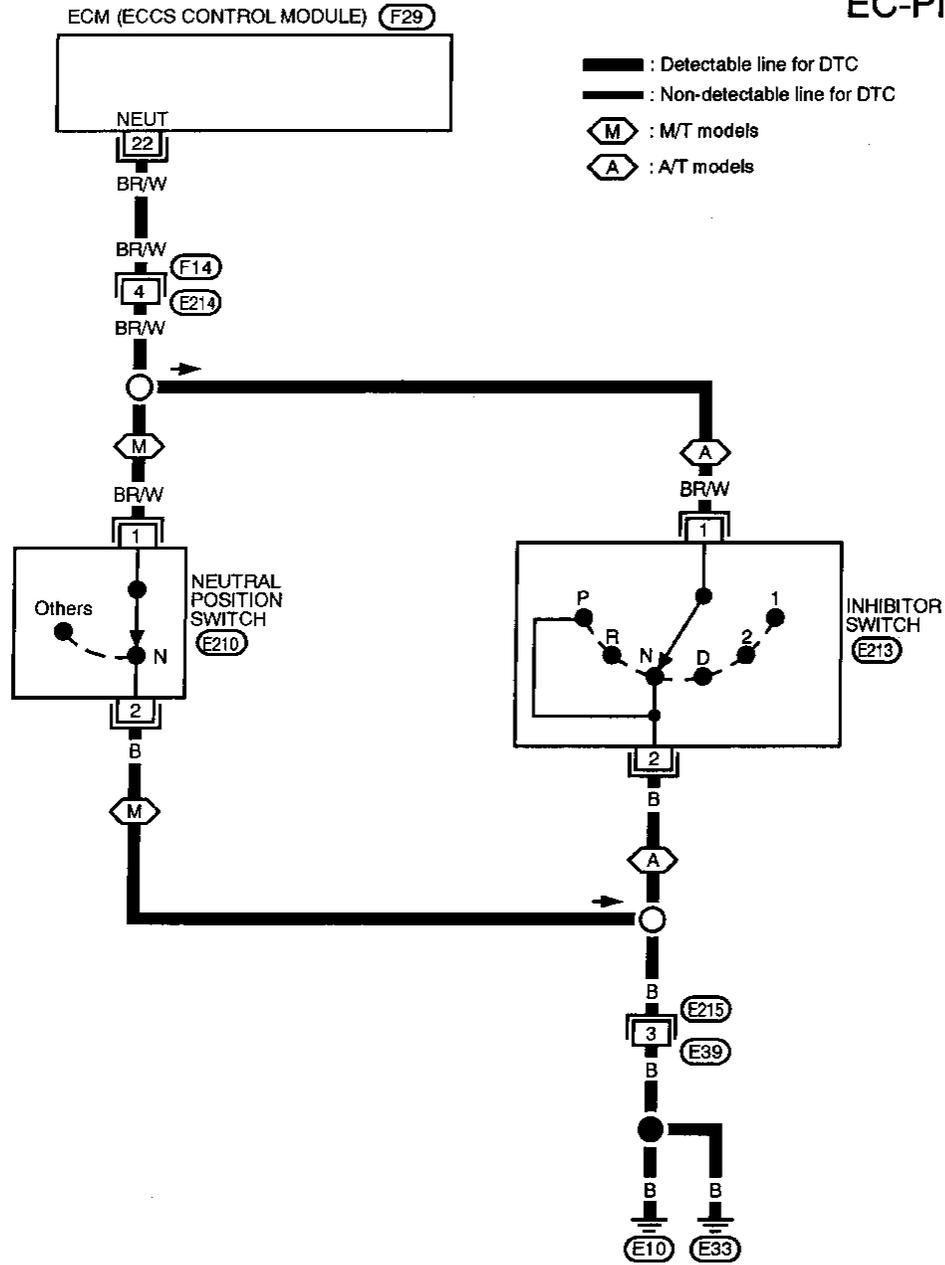
- OR
- 1) Turn ignition switch "ON".
 - 2) Check voltage between ECM terminal ② and body ground in the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"N" and "P" (A/T only) position	Approx. 0
Except the above position	Battery voltage

TROUBLE DIAGNOSIS FOR DTC 103

Park/Neutral Position Switch (DTC: P0705) (Cont'd)

EC-PNP/SW-01



TROUBLE DIAGNOSIS FOR DTC 103

Park/Neutral Position Switch (DTC: P0705) (Cont'd)

DIAGNOSTIC PROCEDURE

Neutral position switch

INSPECTION START

A

CHECK GROUND CIRCUIT.
1) Disconnect neutral position switch harness connector.
2) Check harness continuity between terminal Ⓐ and body ground.
Continuity should exist.

NG

Check the following.

- Harness connectors (E215), (E39)
- Harness continuity between neutral position switch and body ground

If NG, repair harness or connectors.

OK

B

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal Ⓑ and terminal Ⓒ.
Continuity should exist.

NG

Check the following.

- Harness connectors (F14), (E214)
- Harness continuity between ECM and neutral position switch

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Neutral position switch).
Refer to MT section.

NG

Replace neutral position switch.

OK

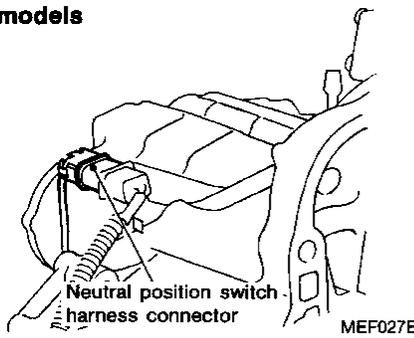
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

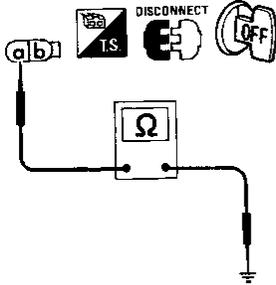
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

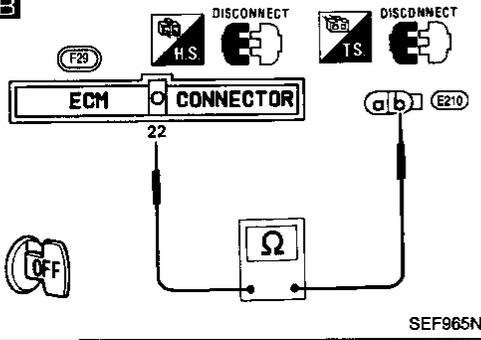
M/T models



A

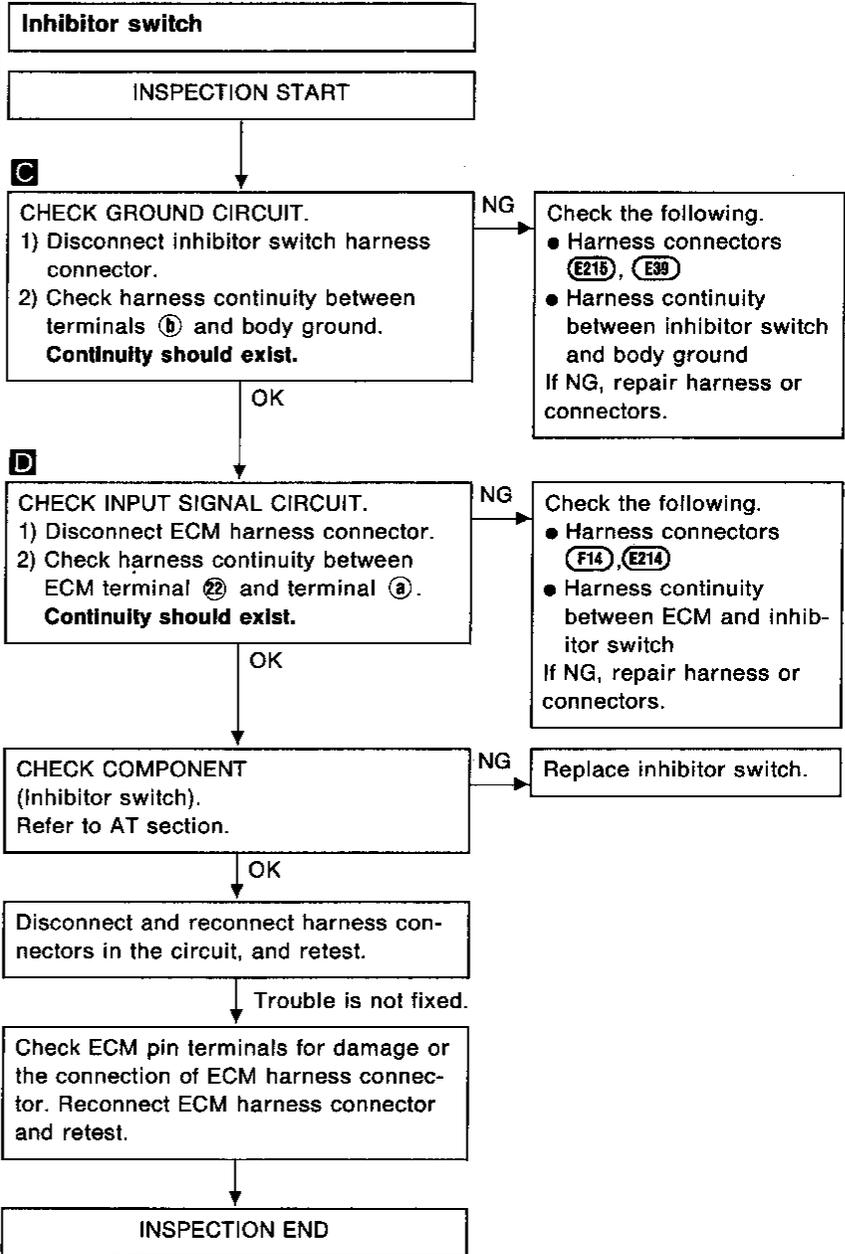
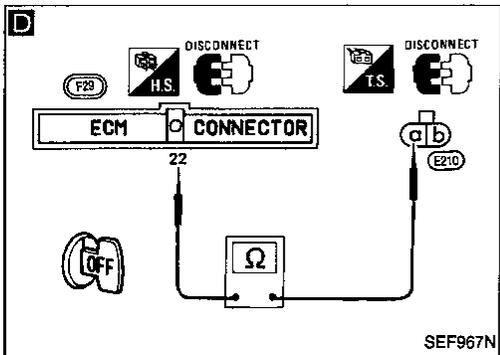
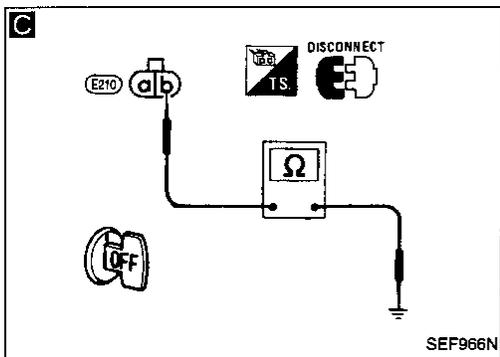
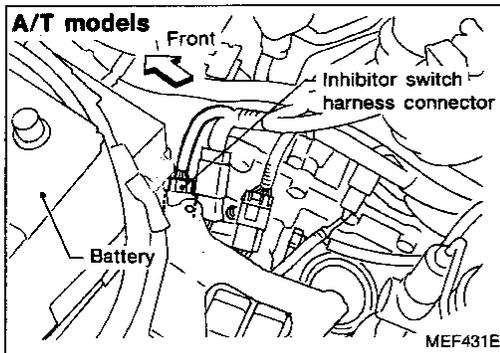


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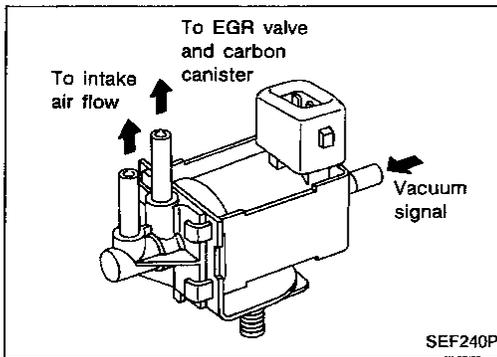


TROUBLE DIAGNOSIS FOR DTC 103

Park/Neutral Position Switch (DTC: P0705) (Cont'd)



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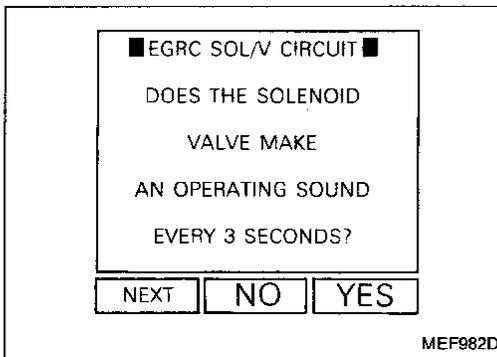


EGR and Canister Control Solenoid Valve (DTC: P1400)

The EGR and canister control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve and canister purge valve).

When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve and carbon canister.

Diagnostic Trouble Code No.	Malfunction is detected when	Check items (Possible cause)
105 P1400	<ul style="list-style-type: none"> ● The improper voltage signal is entered to ECM through EGR & canister control solenoid valve. 	<ul style="list-style-type: none"> ● Harness or connectors (The EGR & canister control solenoid valve circuit is open or shorted.) ● EGR & canister control solenoid valve



OVERALL FUNCTION CHECK

Instead of performing the DTC DETECTING CONDITION, the following method can be used for checking the function of the EGR and canister control solenoid valve. (However, the DTC detection can not be confirmed.)

- 1) Turn ignition switch "ON".
- 2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

- 1) Turn ignition switch "ON".
- 2) Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and check the operating sound, according to ON/OFF switching.

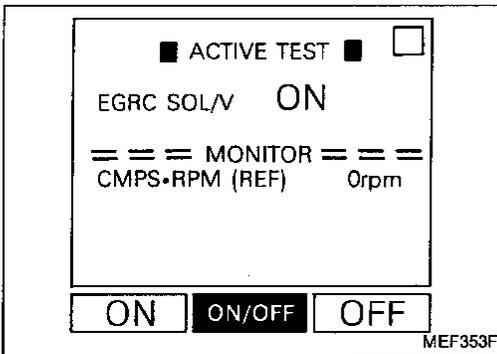
OR

DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Turn ignition switch "ON" and lightly depress the accelerator pedal for at least 5 seconds.
- 4) Select "MODE 3" with GST.

OR

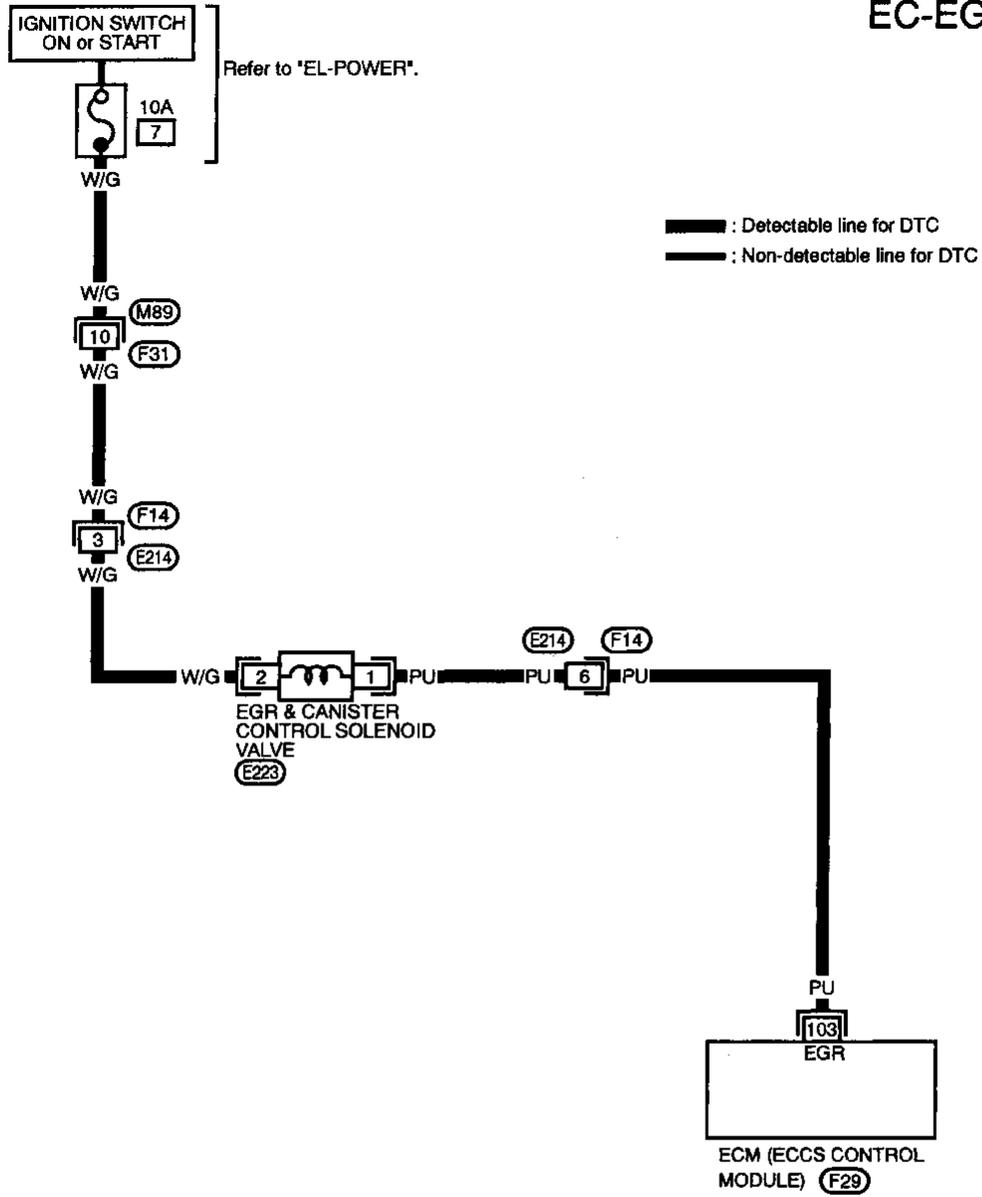
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait for at least 3 seconds.
- 3) Turn ignition switch "ON" and lightly depress the accelerator pedal for at least 5 seconds.
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.



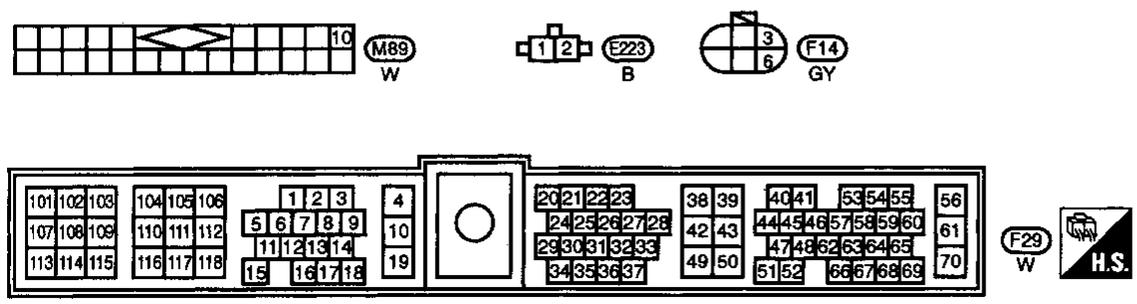
TROUBLE DIAGNOSIS FOR DTC 105

EGR and Canister Control Solenoid Valve (DTC: P1400) (Cont'd)

EC-EGRC/V-01



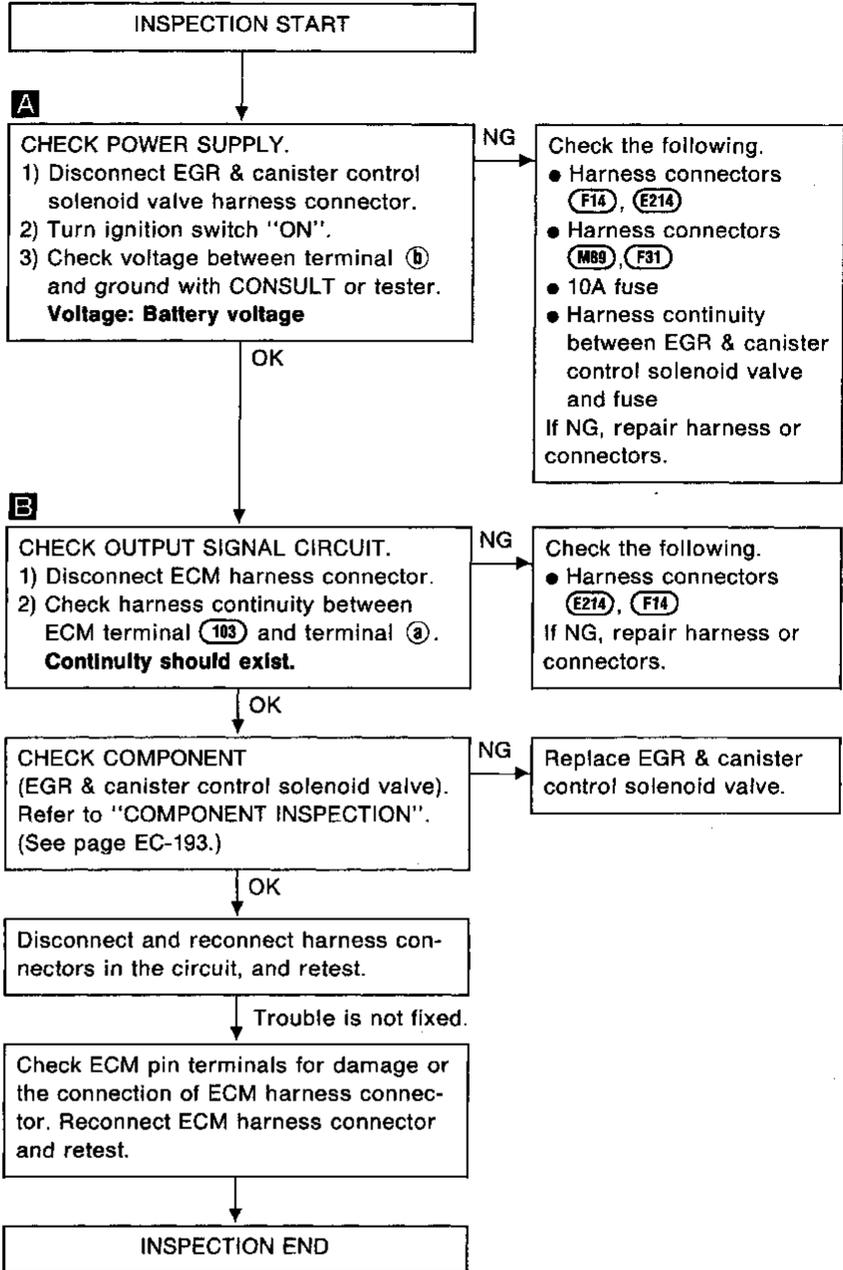
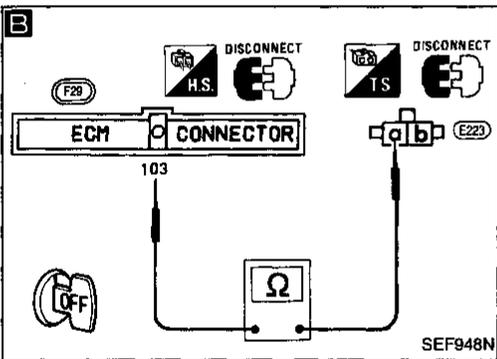
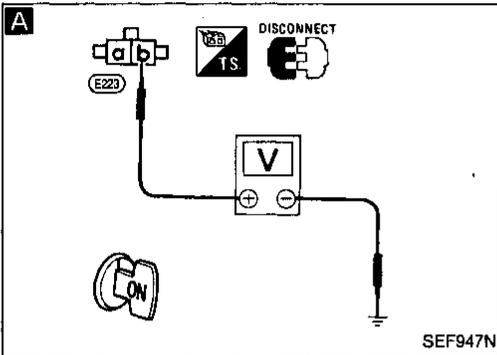
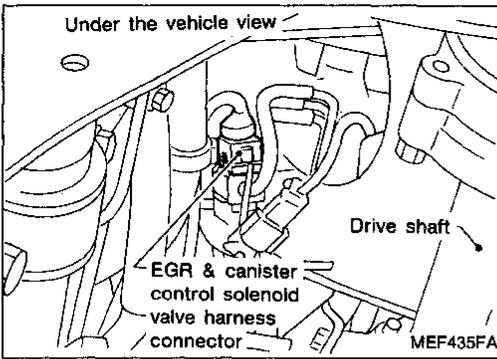
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TROUBLE DIAGNOSIS FOR DTC 105

EGR and Canister Control Solenoid Valve (DTC: P1400) (Cont'd)

DIAGNOSTIC PROCEDURE



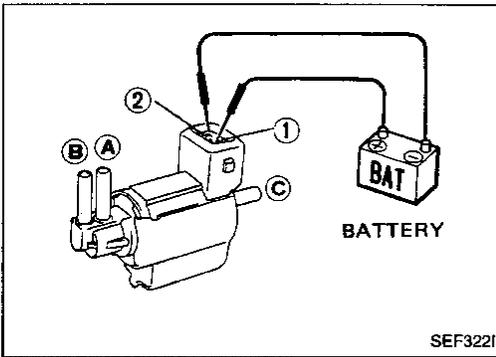
TROUBLE DIAGNOSIS FOR DTC 105

EGR and Canister Control Solenoid Valve (DTC: P1400) (Cont'd)

COMPONENT INSPECTION

EGR and canister control solenoid valve

Check air passage continuity.



Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

If NG, replace solenoid valve.

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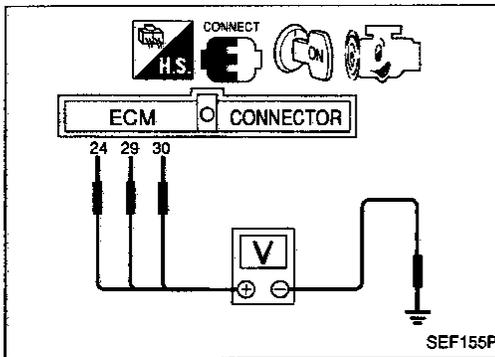
IDX

A/T Control (DTC: P0600)

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration. Voltage signals are exchanged between ECM and A/T control unit.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0600	<ul style="list-style-type: none"> ● ECM receives incorrect voltage from A/T control unit continuously. 	<ul style="list-style-type: none"> ● Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.)

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT.



DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine, and race more than 1,000 rpm once, then wait for at least 40 seconds.

OVERALL FUNCTION CHECK

Instead of performing the DTC DETECTING CONDITION, the following method can be used for checking the function of the A/T control function. (The "NG" of this check means the same as the DTC detection.)

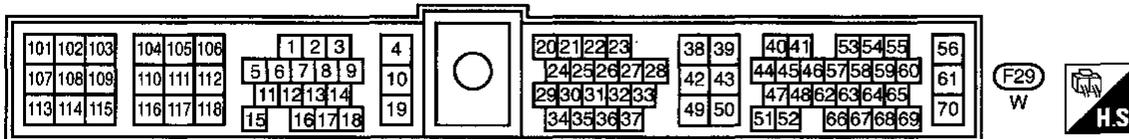
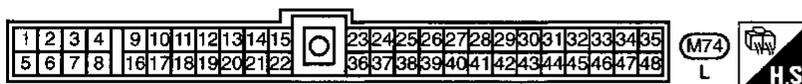
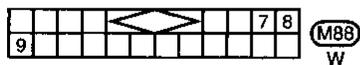
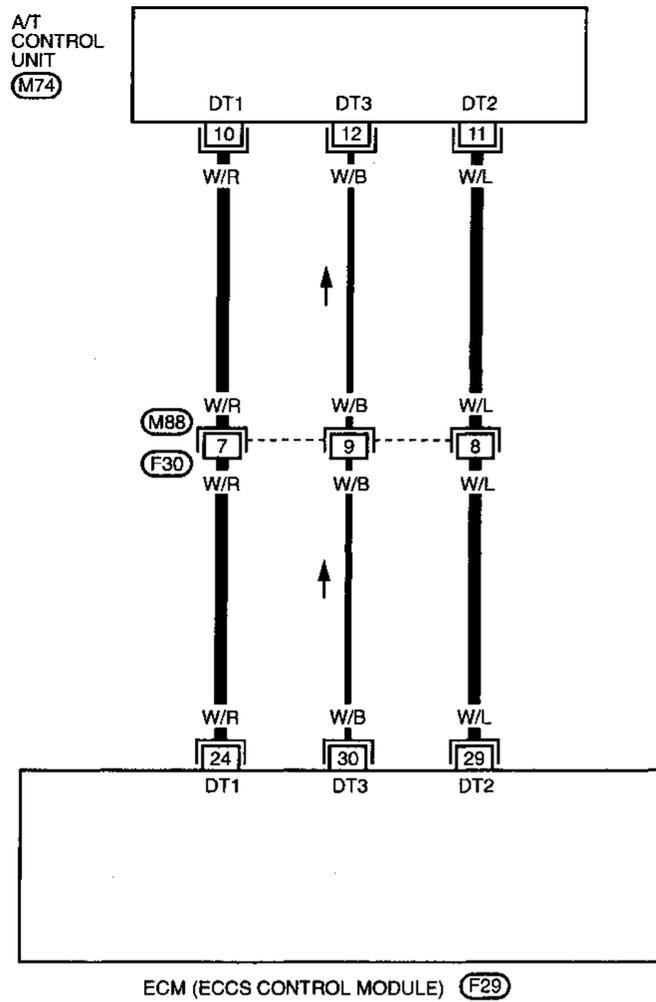
- 1) Turn ignition switch "ON".
- 2) Start engine.
- 3) Check voltage between ECM terminal 24 and ground.
ECM terminal 29 and ground.
Voltage: Approximately 7V
- 4) Check voltage between ECM terminal 30 and ground.
Voltage: Approximately 0V or 7V

TROUBLE DIAGNOSIS FOR DTC P0600

A/T Control (DTC: P0600) (Cont'd)

EC-AT/C-01

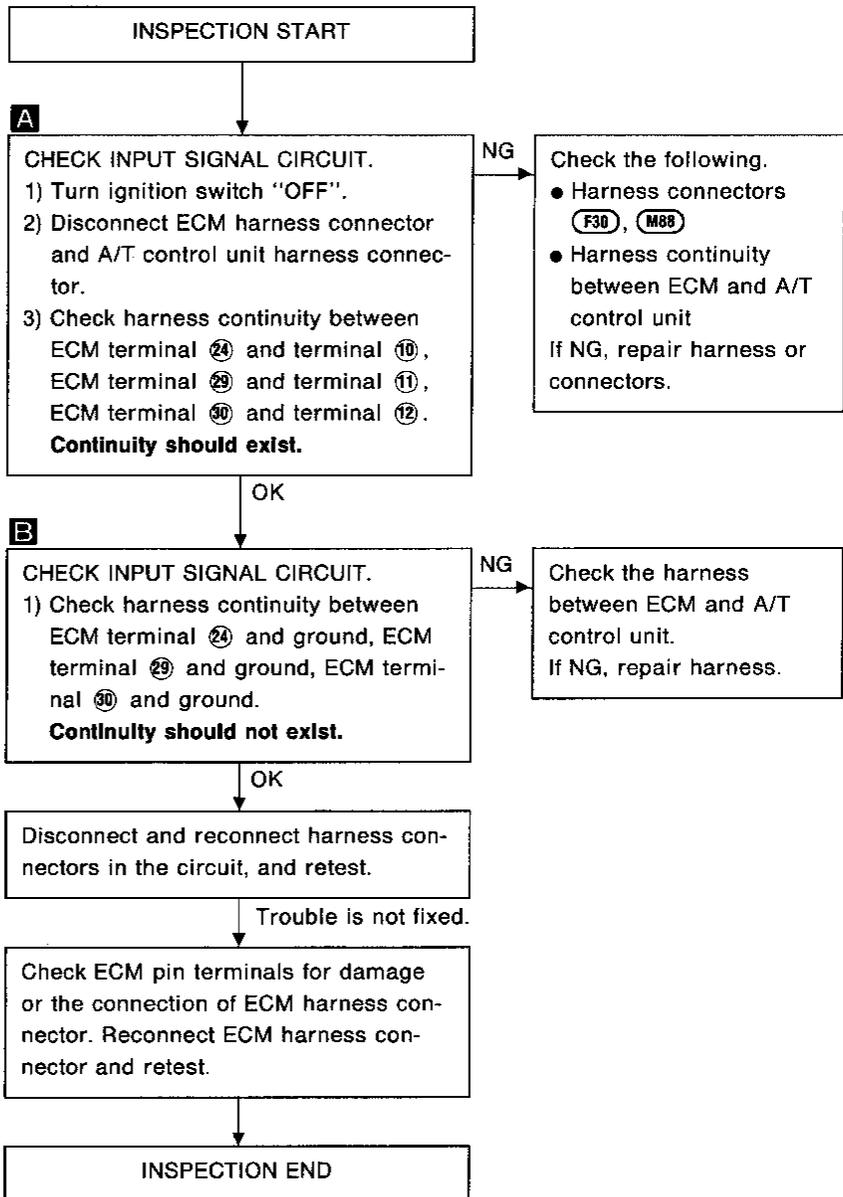
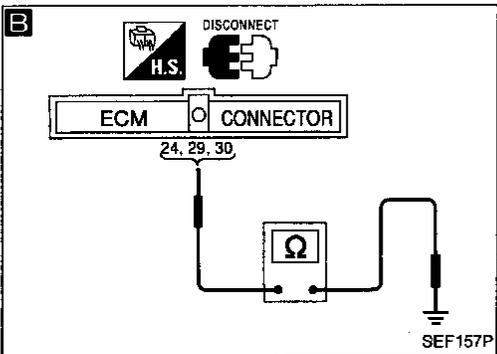
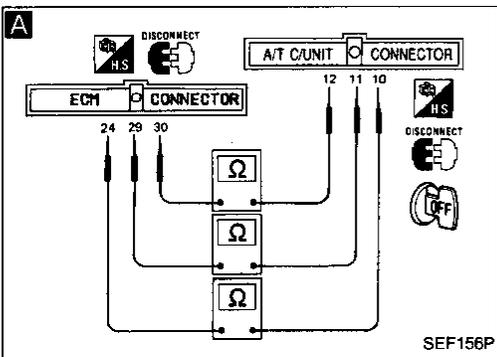
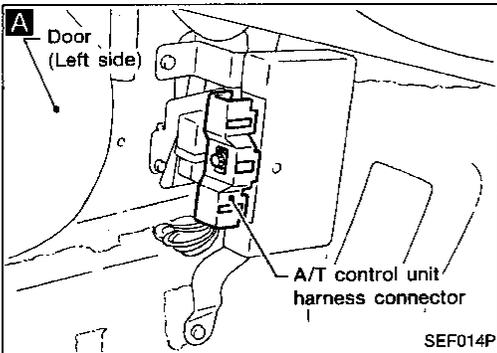
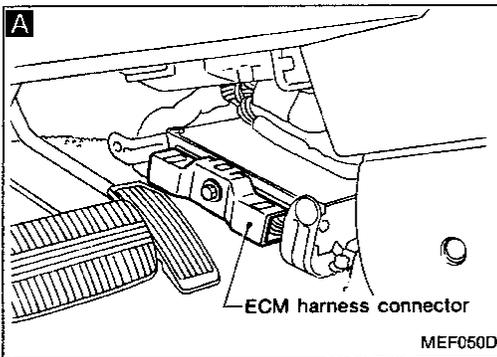
: Detectable line for DTC
 : Non-detectable line for DTC



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TROUBLE DIAGNOSIS FOR DTC P0600

A/T Control (DTC: P0600) (Cont'd)

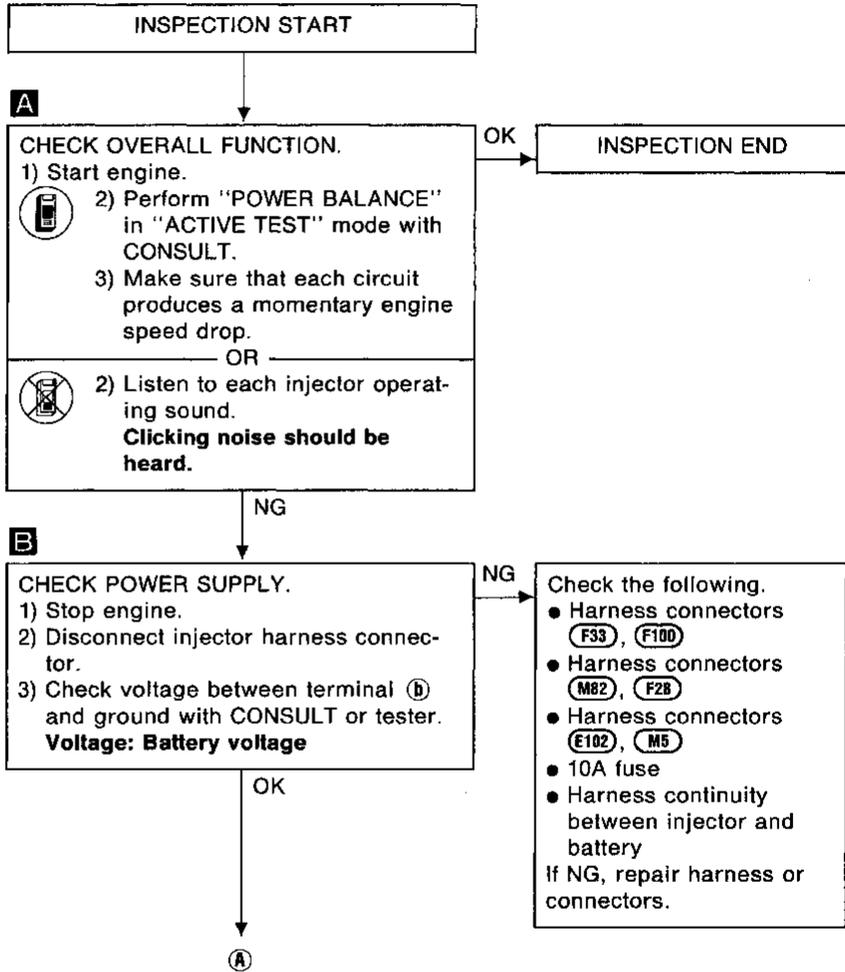
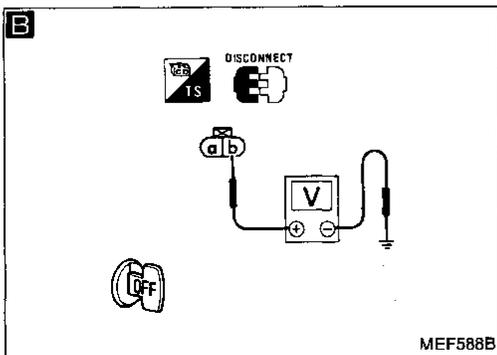
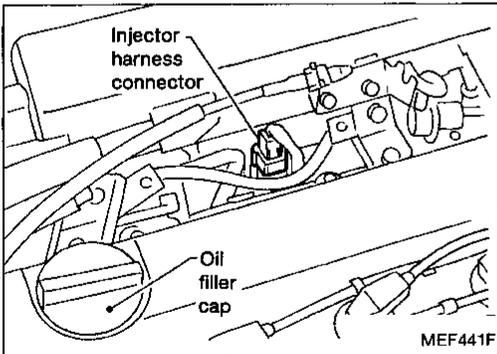
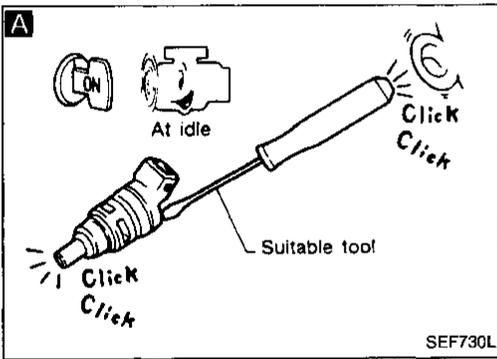
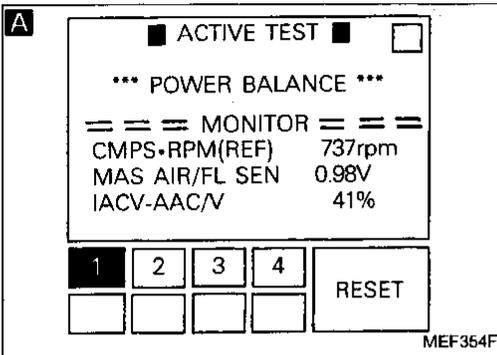
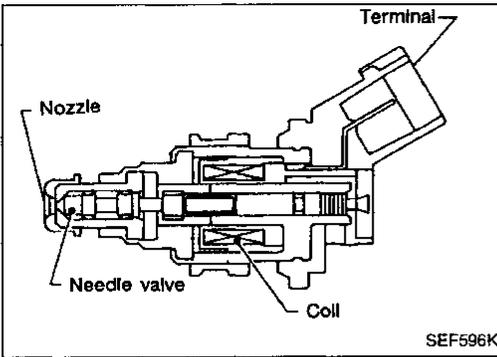


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd)

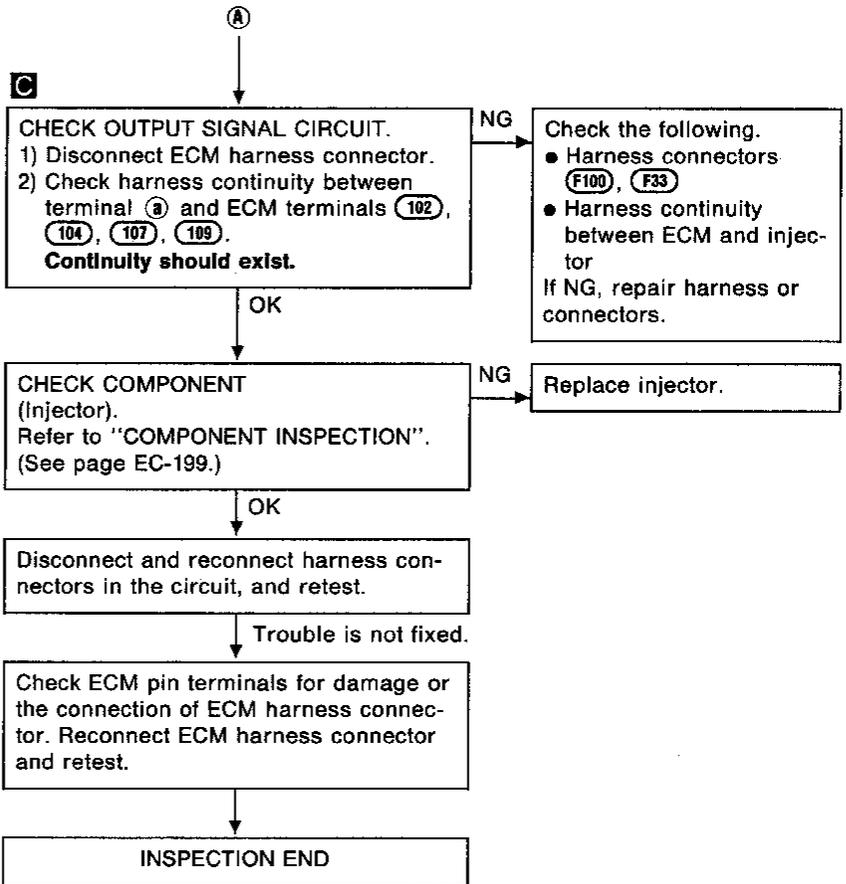
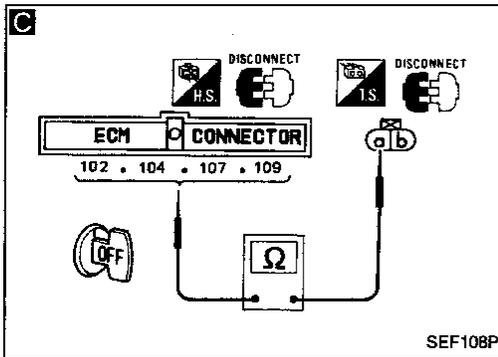
COMPONENT DESCRIPTION

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

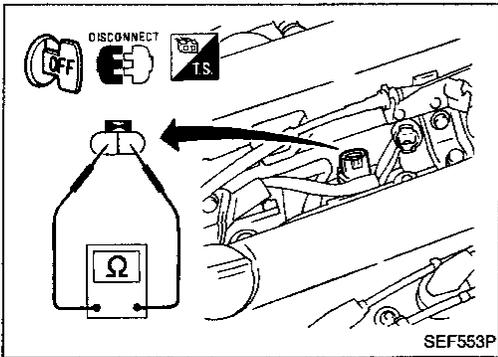


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd)



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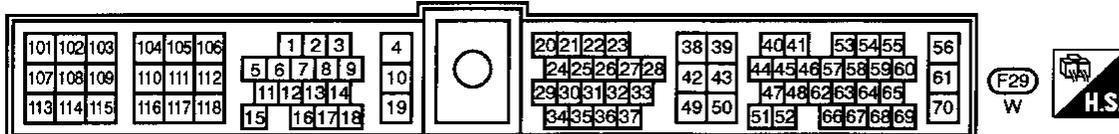
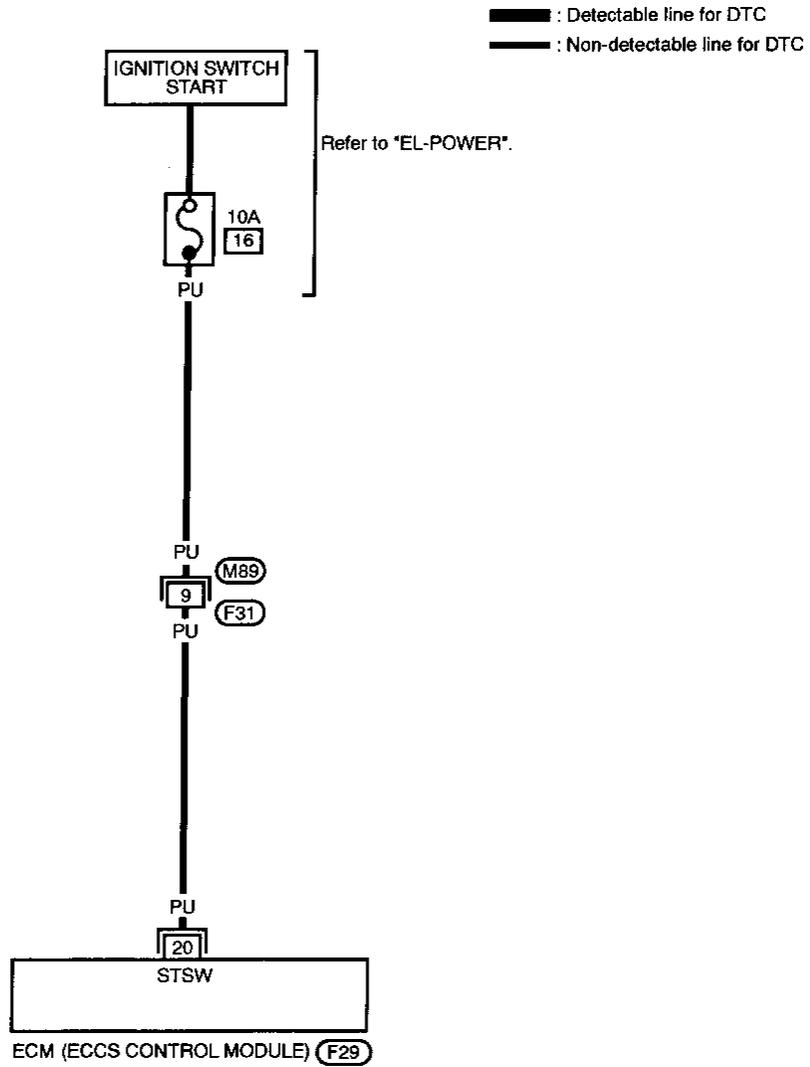
COMPONENT INSPECTION

Injector

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

Start Signal

EC-S/SIG-01



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Start Signal (Cont'd)

A

■ START SIGNAL CKT ■

1. CLOSE THROTTLE. SHIFT TO P OR N RANGE.
2. TOUCH START AND START ENGINE IMMEDIATELY.

NEXT START

SEF191L

A

☆ MONITOR ☆ NO FAIL

START SIGNAL OFF

CLSD TH/P SW ON

AIR COND SIG OFF

P/N POSI SW ON

RECORD

SEF111P

A

ECM CONNECTOR

20

V

CONNECT

SEF109P

B

M89

9

V

DISCONNECT

SEF110P

INSPECTION START

A

CHECK OVERALL FUNCTION.

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

OR

- 1) Turn ignition switch "ON".
- 2) Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT.

IGN "ON"	OFF
IGN "START"	ON

OR

- 1) Turn ignition switch to "START".
- 2) Check voltage between ECM terminal ⑳ and ground.

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

OK → INSPECTION END

NG

B

CHECK POWER SUPPLY.

- 1) Turn ignition switch "OFF".
- 2) Disconnect harness connector (M89), (F31).
- 3) Turn ignition switch to "START".
- 4) Check voltage between (M89) terminal ⑨ and ground.

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

NG → Check the following.

- Harness connector (M89)
- 10A fuse
- Harness continuity between (M89) and ignition switch

If NG, repair harness or connectors.

OK

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

Trouble is not fixed.

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

INSPECTION END

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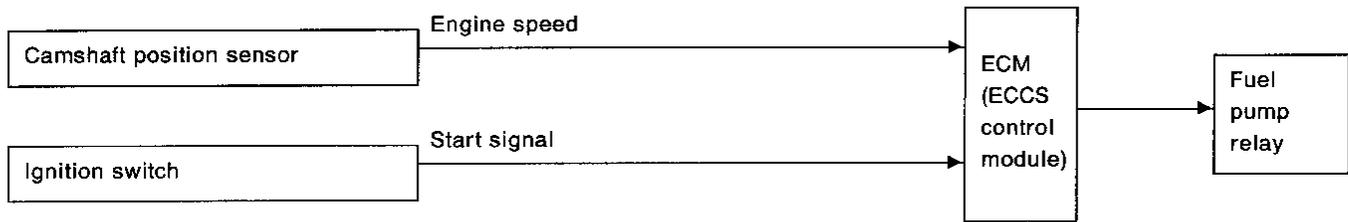
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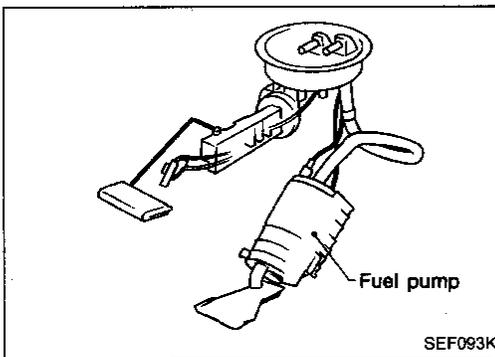
Fuel Pump

SYSTEM DESCRIPTION



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 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

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



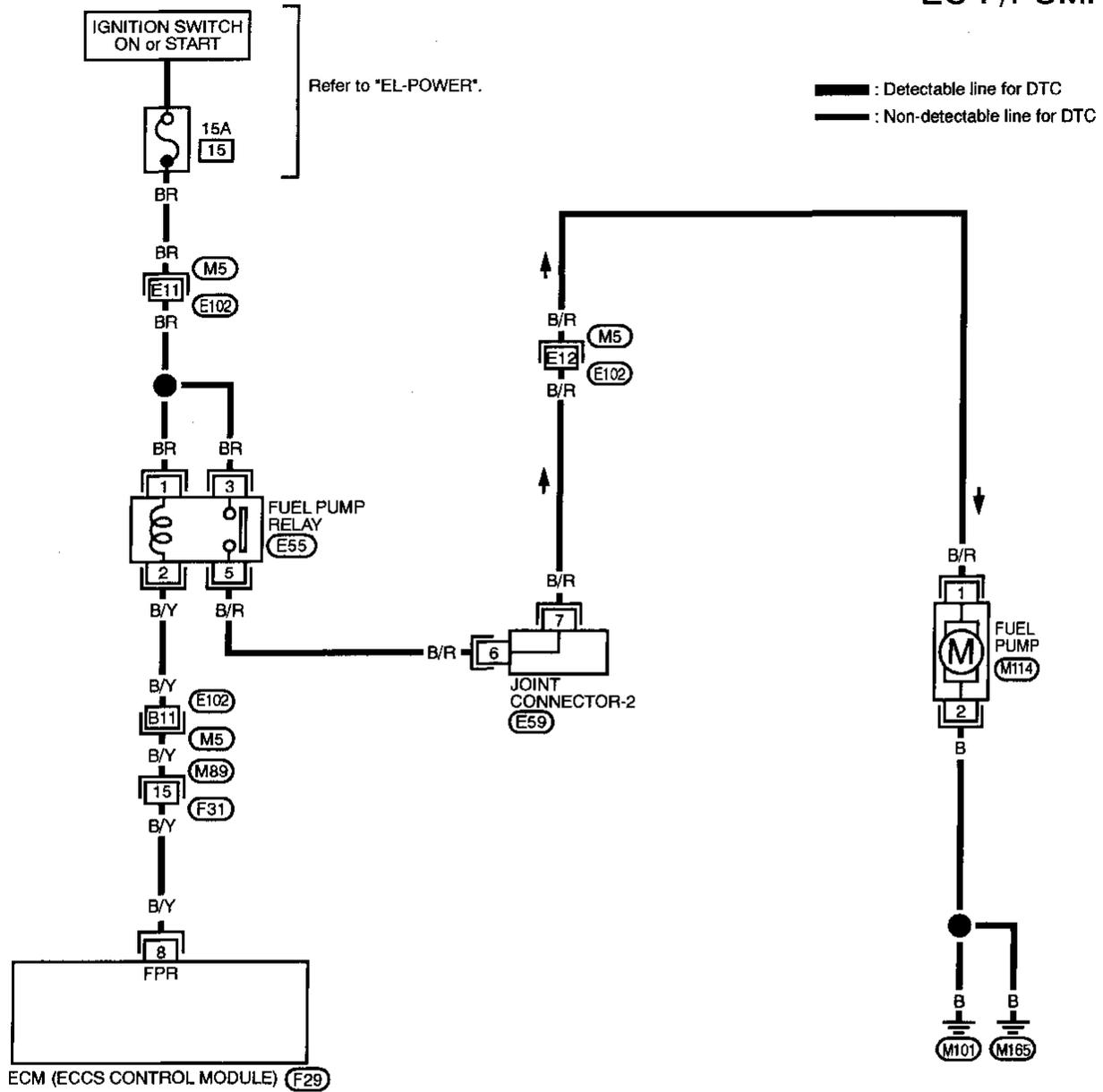
COMPONENT DESCRIPTION

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

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

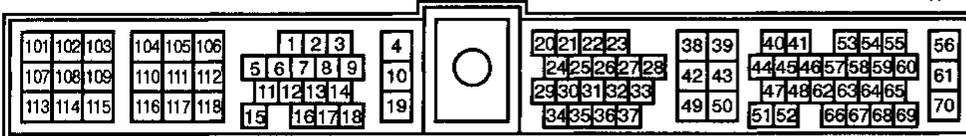
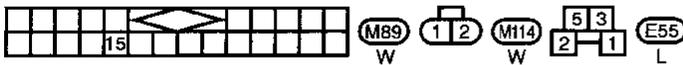
Fuel Pump (Cont'd)

EC-F/PUMP-01



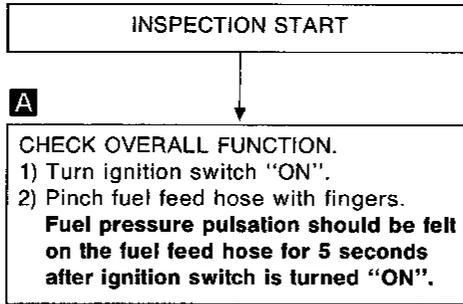
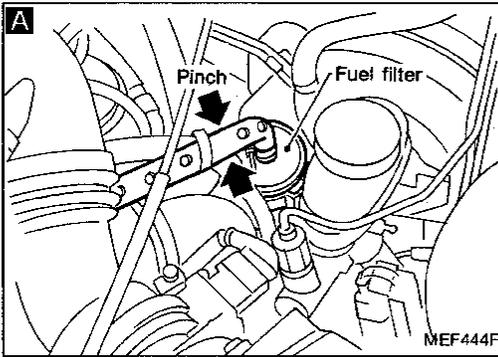
Refer to last page (Foldout page).

E102 , M5
E59

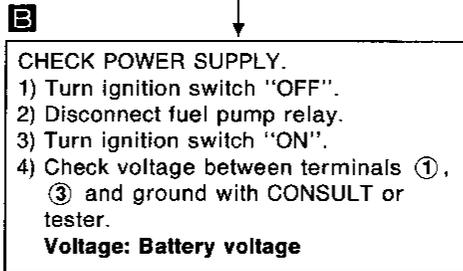
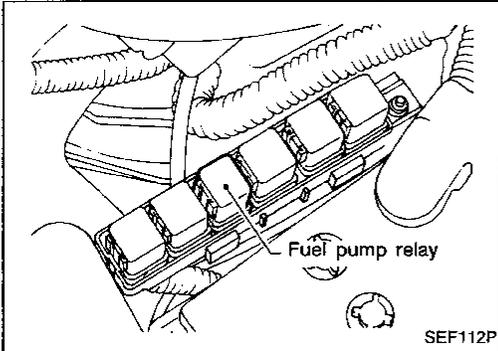


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd)



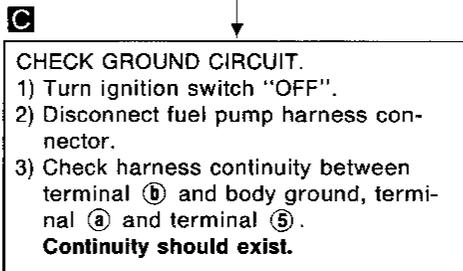
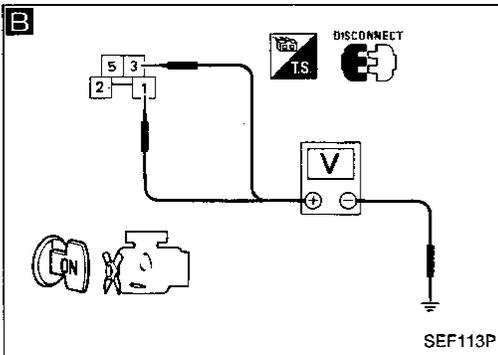
OK → INSPECTION END



NG → Check the following.

- Harness connectors (M5, E102)
- 15A fuse
- Harness continuity between fuse and fuel pump relay

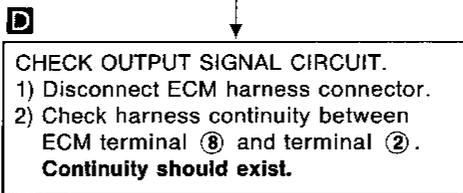
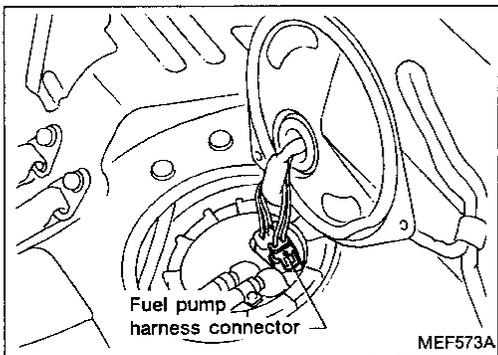
If NG, repair harness or connectors.



NG → Check the following.

- Harness connectors (M5, E102)
- Joint connector-2
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If NG, repair harness or connectors.



NG → Check the following.

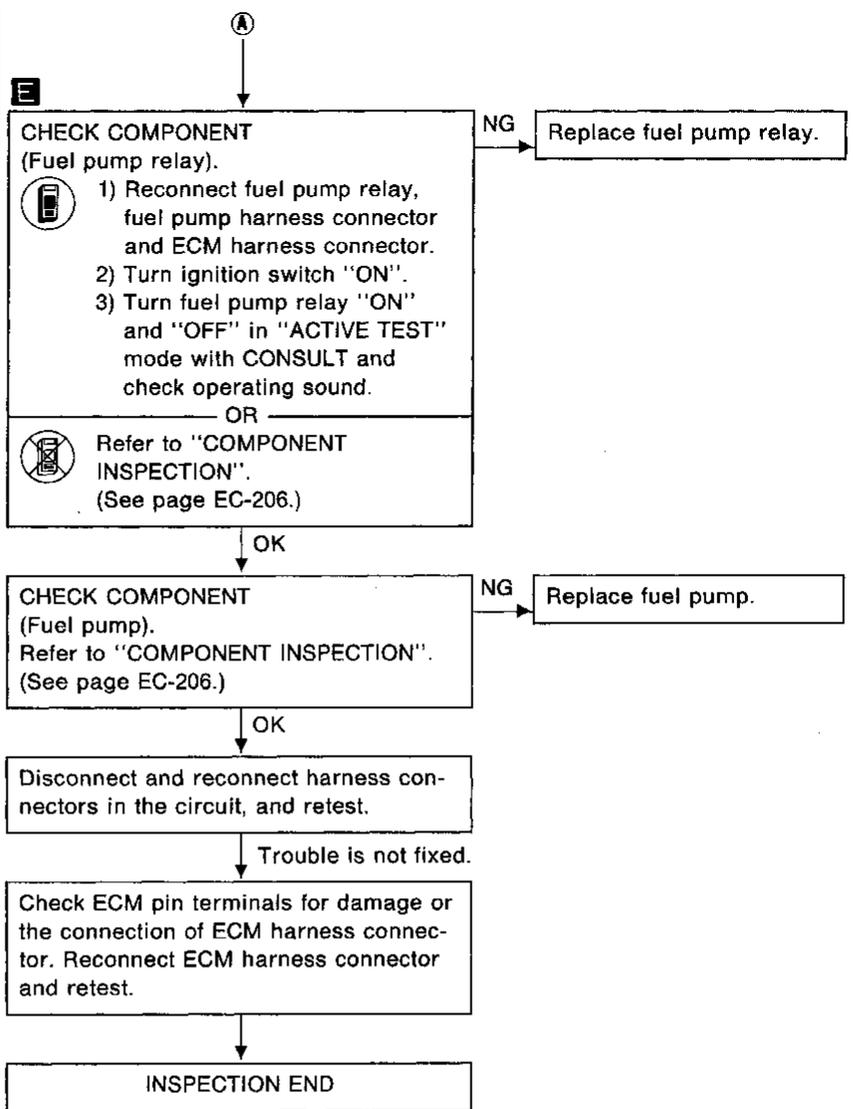
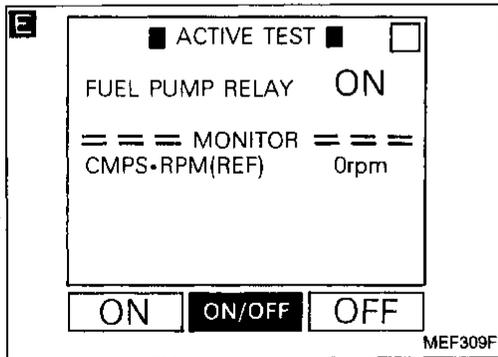
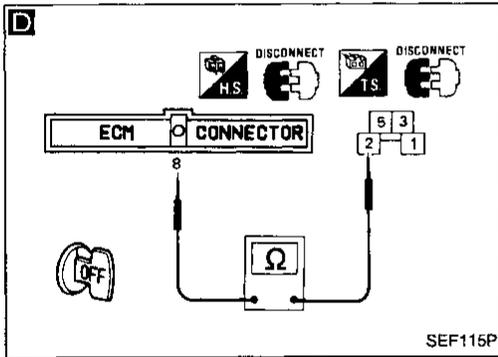
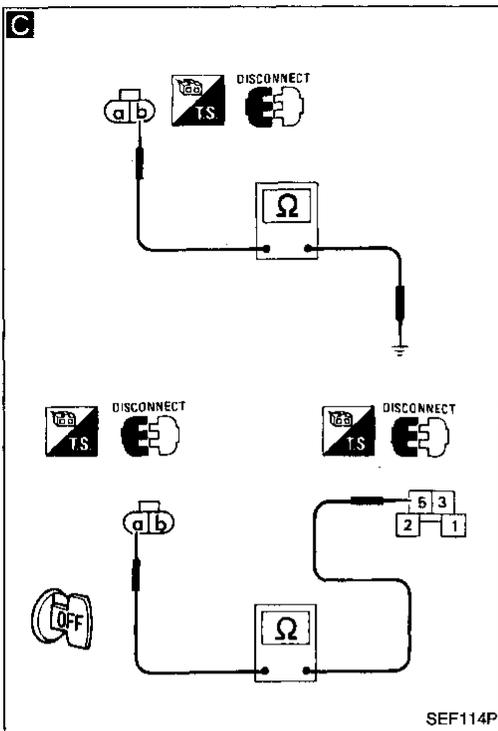
- Harness connectors (E102, M5)
- Harness connectors (M89, F31)
- Harness continuity between ECM and fuel pump relay

If NG, repair harness or connectors.

OK → A

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd)



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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd)

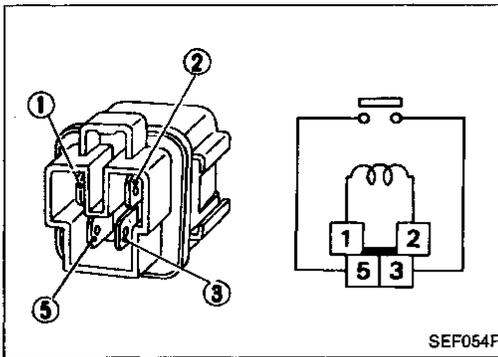
COMPONENT INSPECTION

Fuel pump relay

Check continuity between terminals ③ and ⑤.

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

If NG, replace relay.

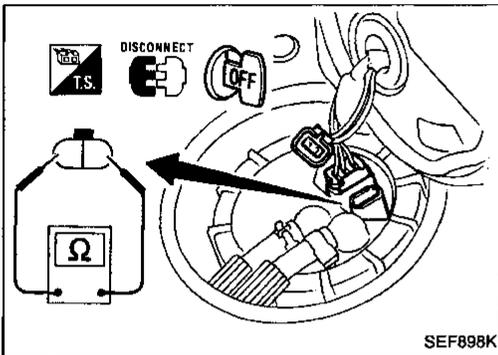


Fuel pump

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals a and b.

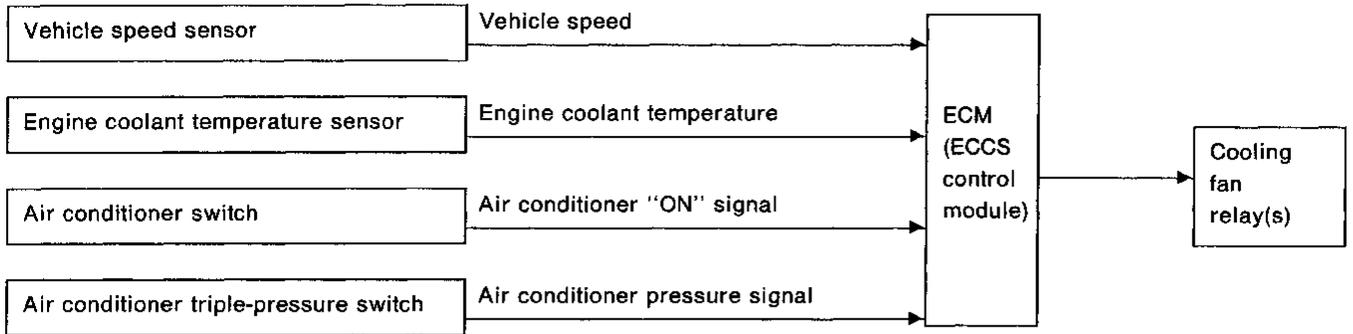
Resistance: Approximately 0.7Ω

If NG, replace fuel pump.



Cooling Fan Control

SYSTEM DESCRIPTION



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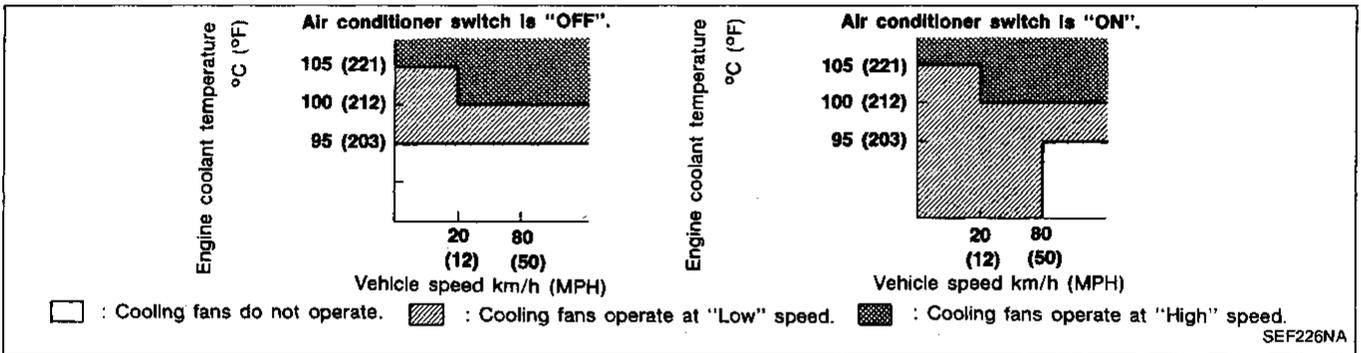
The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner system pressure and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

EC

Operation

For Canada

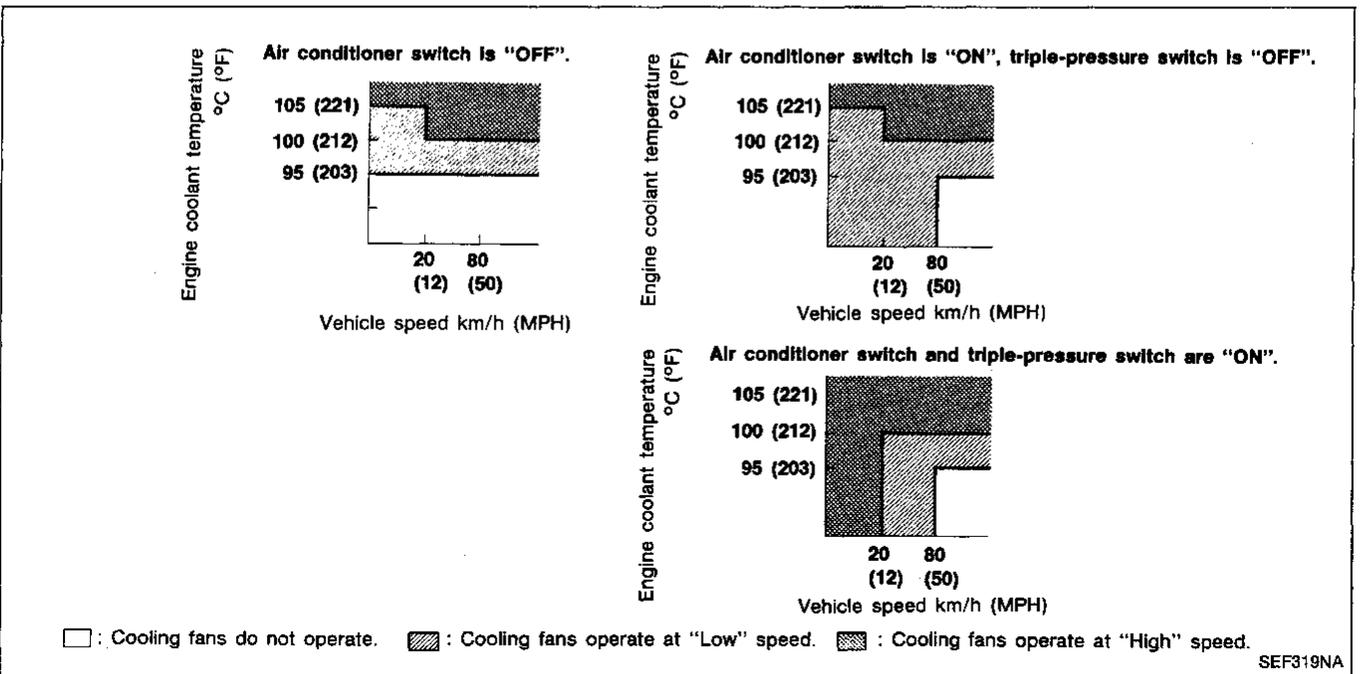
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For U.S.A.

RA

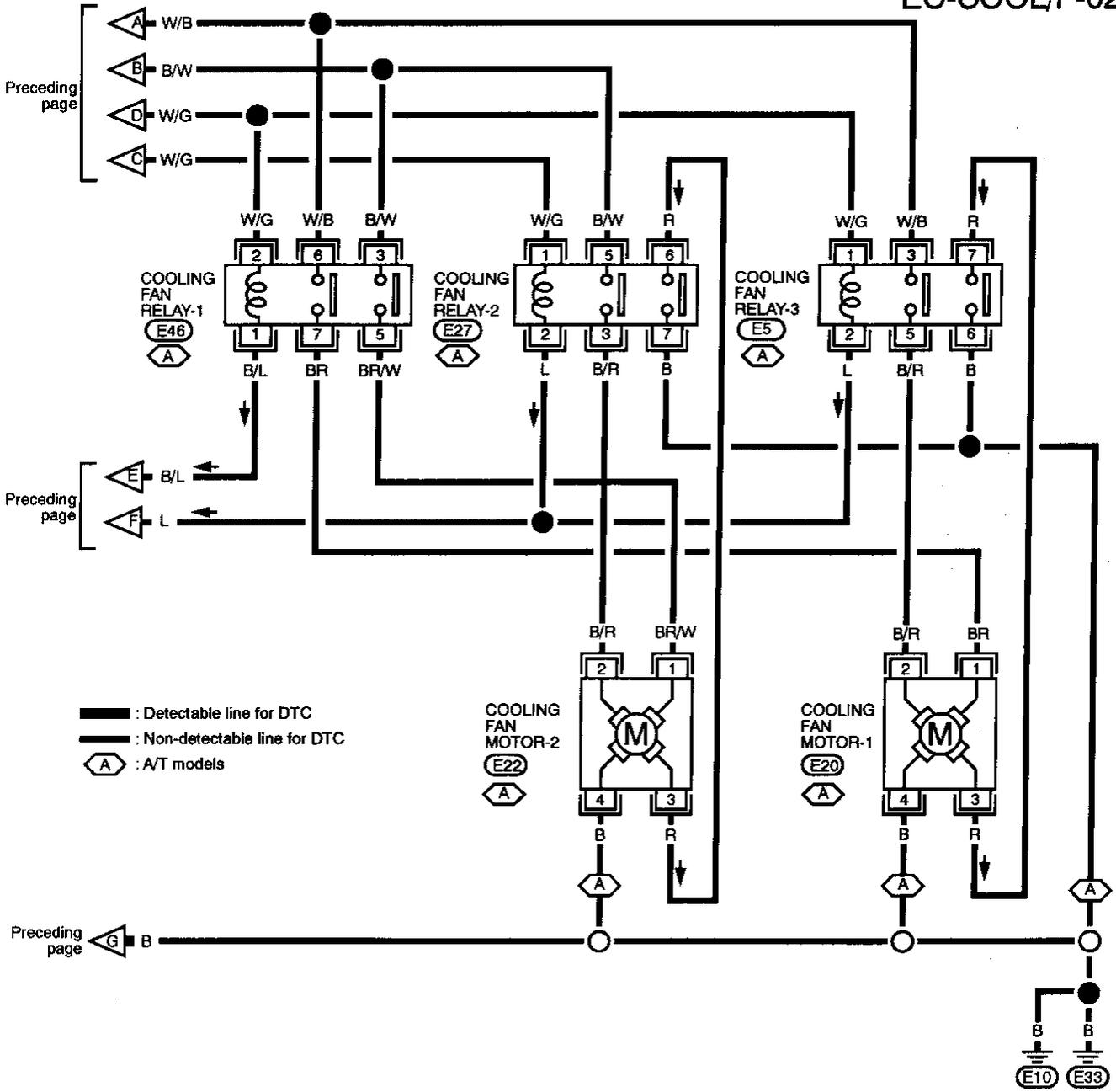


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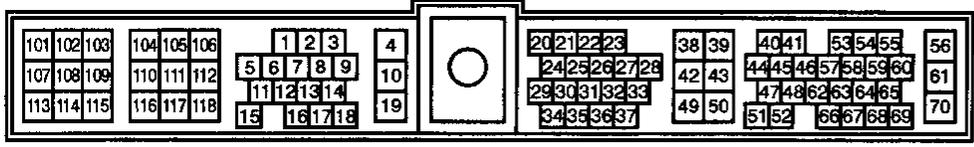
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)

EC-COOL/F-02

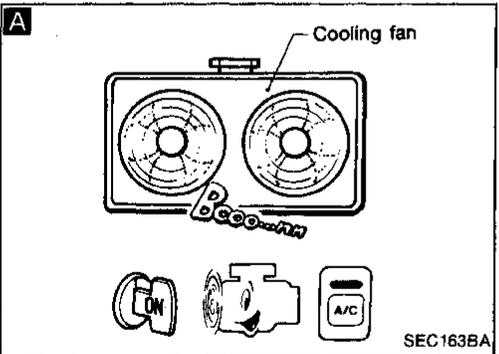
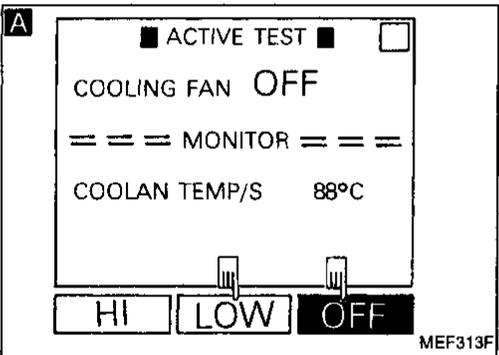
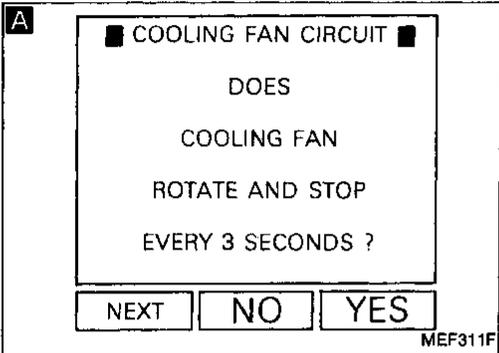
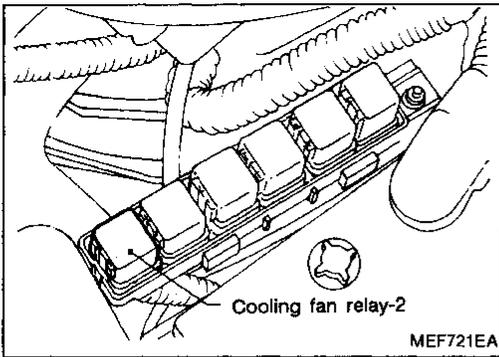


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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



M/T models

INSPECTION START

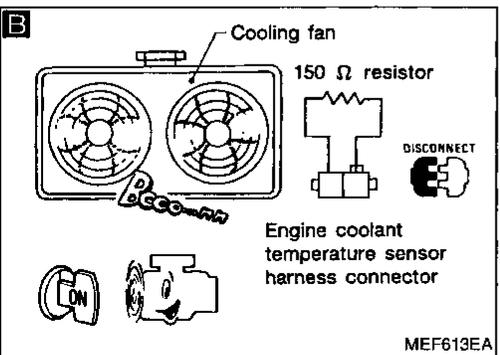
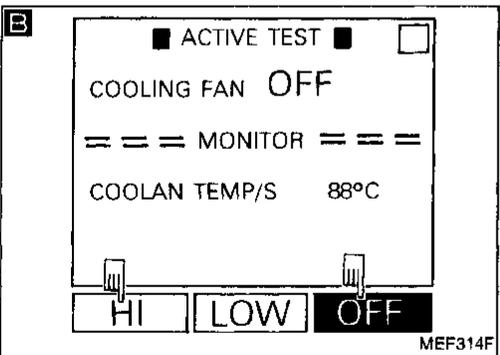
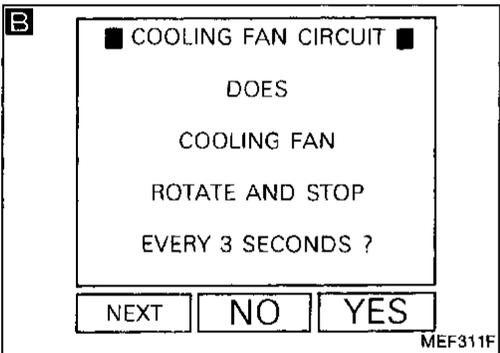
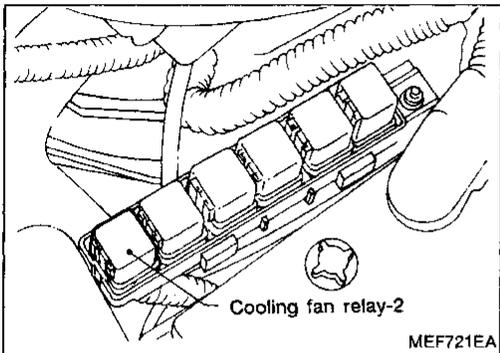
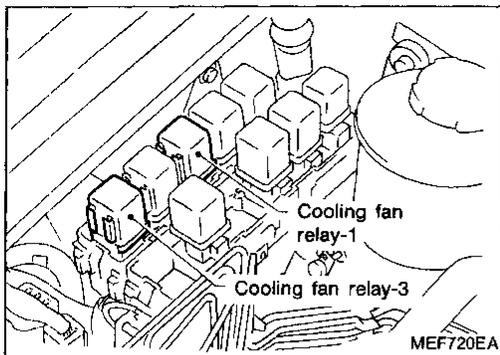
- A**
- CHECK COOLING FAN LOW SPEED OPERATION.
- 1) Disconnect cooling fan relay-2.
 - 2) Turn ignition switch "ON".
 - 3) Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.
- OR
- 2) Turn ignition switch "ON".
 - 3) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- OR
- 2) Start engine.
 - 3) Set temperature lever at full cold position.
 - 4) Turn air conditioner switch "ON".
 - 5) Turn blower fan switch "ON".
 - 6) Run engine at idle for a few minutes with air conditioner operating.
 - 7) Make sure that cooling fan operates at low speed.

NG → Check cooling fan low speed control circuit. (Go to PROCEDURE A.)

OK
A

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



A

B

CHECK COOLING FAN HIGH SPEED OPERATION.

- 1) Turn ignition switch "OFF".
- 2) Reconnect cooling fan relay-2.
- 3) Disconnect cooling fan relay-1.
- 4) Turn ignition switch "ON".
- 5) Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

- 4) Turn ignition switch "ON".
- 5) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

OR

- 4) Turn air conditioner switch and blower fan switch "OFF".
- 5) Disconnect engine coolant temperature sensor harness connector.
- 6) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 7) Restart engine and make sure that cooling fan operates at higher speed than low speed.

OK

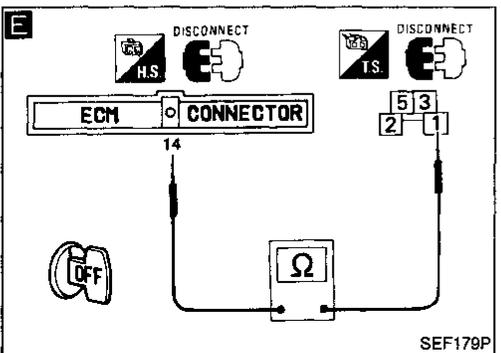
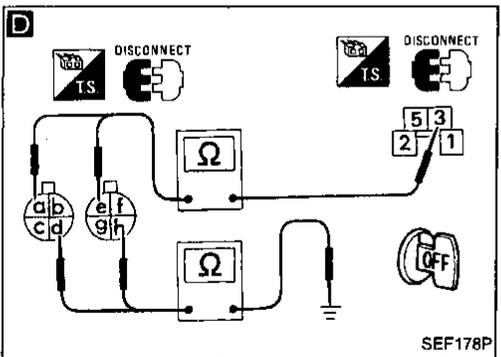
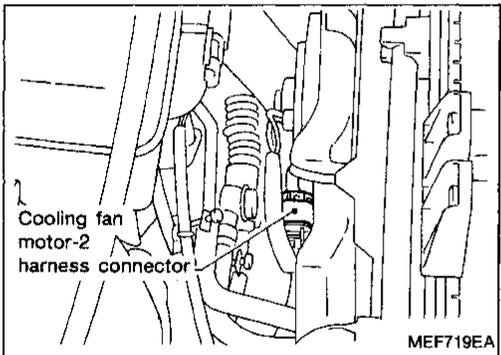
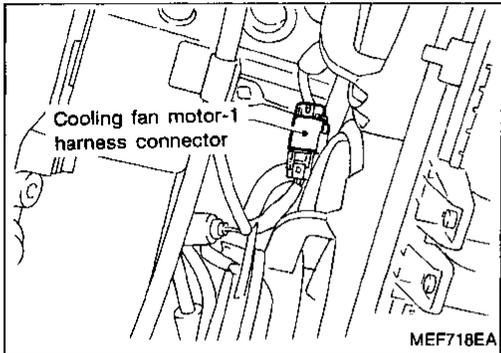
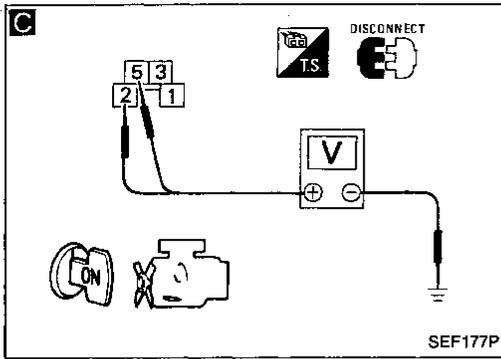
INSPECTION END

NG → Check cooling fan high speed control circuit. (Go to **PROCEDURE B**.)

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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



PROCEDURE A

INSPECTION START

C
CHECK POWER SUPPLY.
 1) Turn ignition switch "OFF".
 2) Disconnect cooling fan relay-1.
 3) Turn ignition switch "ON".
 4) Check voltage between terminals ②, ⑤ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
 ● Harness connectors (M5, E102)
 ● 10A fuse
 ● 30A fusible links
 ● 75A fusible link
 ● Joint connector-4
 ● Harness continuity between cooling fan relay-1 and fuse
 ● Harness continuity between cooling fan relay-1 and battery
 If NG, repair harness or connectors.

D
CHECK GROUND CIRCUIT.
 1) Turn ignition switch "OFF".
 2) Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
 3) Check harness continuity between terminal ③ and terminal ④, ⑥.
Continuity should exist.
 4) Check harness continuity between terminals ④, ⑧ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

E
CHECK OUTPUT SIGNAL CIRCUIT.
 1) Disconnect ECM harness connector.
 2) Check harness continuity between ECM terminal ⑭ and terminal ①.
Continuity should exist.

NG → Check the following.
 ● Harness connectors (E102, M5)
 ● Harness connectors (M89, F31)
 ● Harness continuity between cooling fan relay-1 and ECM
 If NG, repair harness or connectors.

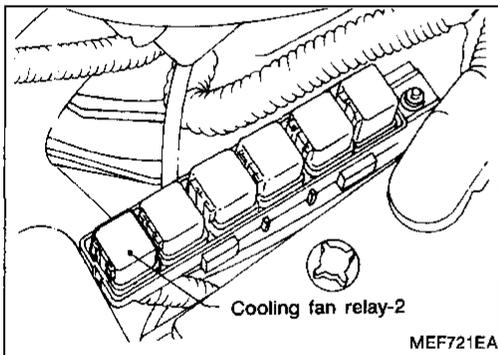
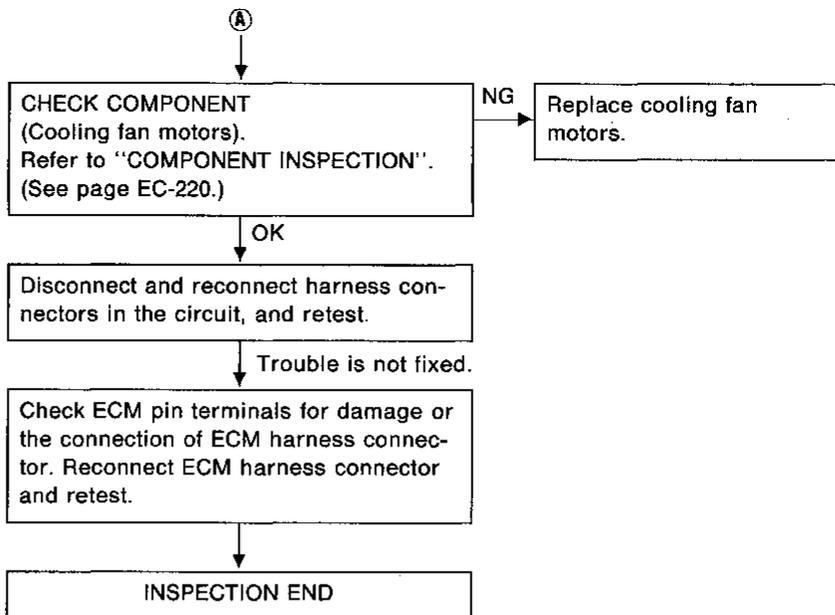
CHECK COMPONENT
 (Cooling fan relay-1).
 Refer to "COMPONENT INSPECTION".
 (See page EC-220.)

NG → Replace cooling fan relay.

OK
 ↓
 A

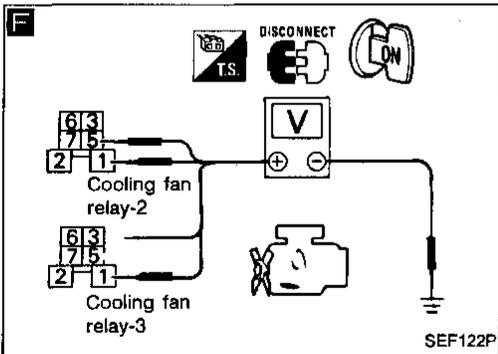
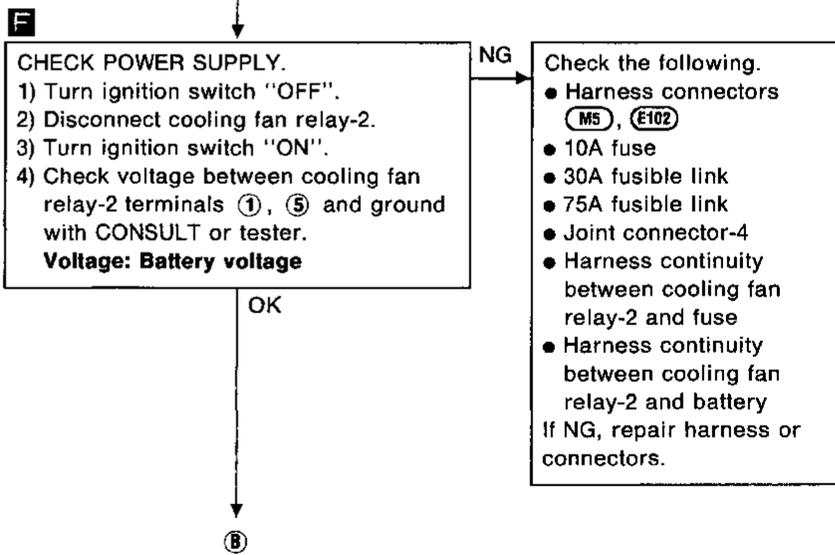
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



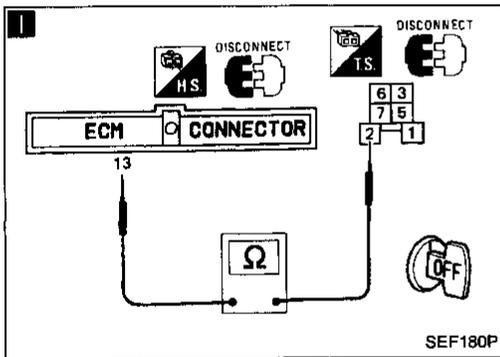
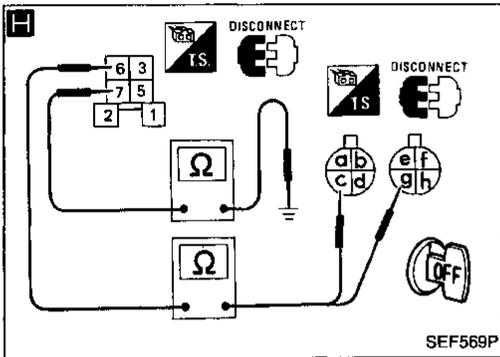
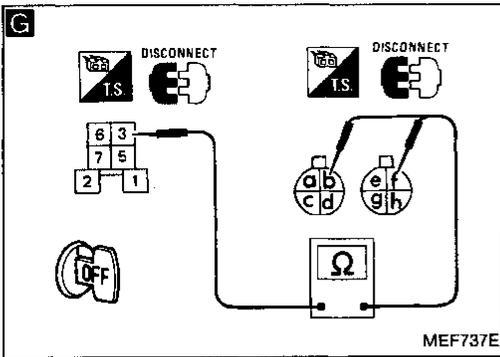
PROCEDURE B

INSPECTION START



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



⑧

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
- G** 3) Check harness continuity between terminal ③ and terminals ①, ②.
Continuity should exist.
- H** 4) Check harness continuity between terminal ⑥ and terminals ④, ⑤, terminal ⑦ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal ⑬ and terminal ②.
Continuity should exist.

NG → Check the following.

- Harness connectors (E102), (M5)
- Harness connectors (M82), (F28)
- Harness continuity between cooling fan relay-2, 3 and ECM

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Cooling fan relay-2).
Refer to "COMPONENT INSPECTION".
(See page EC-220.)

NG → Replace cooling fan relays.

OK

CHECK COMPONENTS
(Cooling fan motors).
Refer to "COMPONENT INSPECTION".
(See page EC-220.)

NG → Replace cooling fan motors.

OK

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

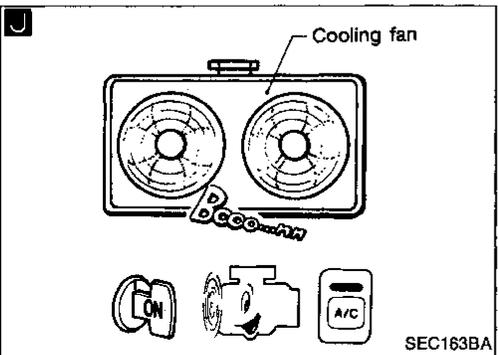
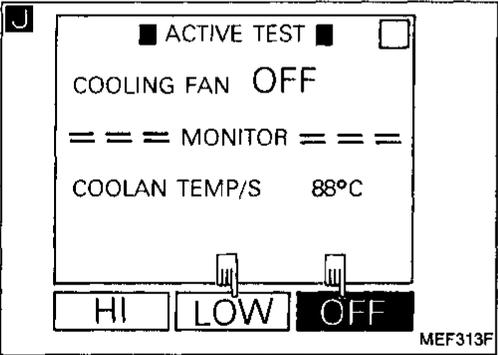
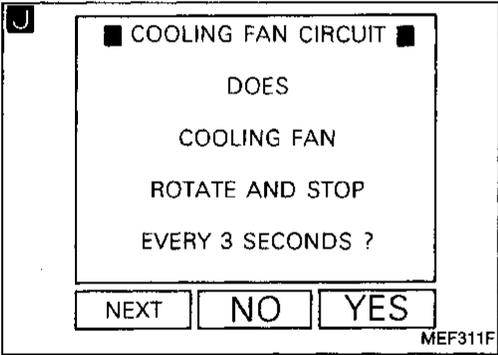
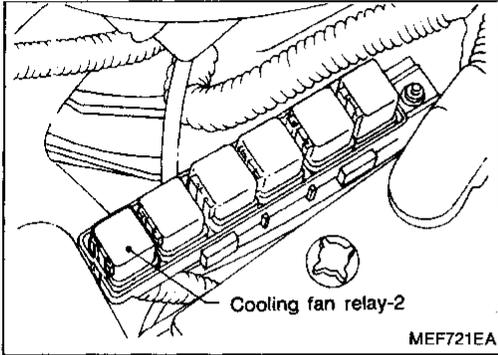
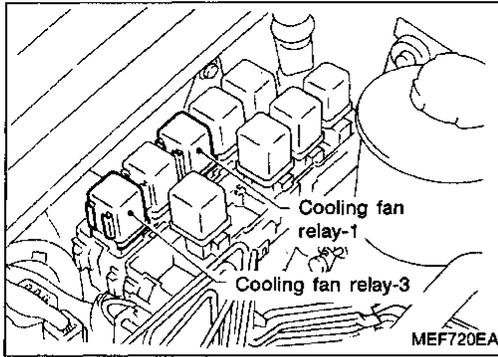
Trouble is not fixed.

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

INSPECTION END

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



A/T models

INSPECTION START

- U** CHECK COOLING FAN LOW SPEED OPERATION.
- 1) Disconnect cooling fan relay-2 and cooling fan relay-3.
 - 2) Turn ignition switch "ON".
 - 3) Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.
- OR
- 2) Turn ignition switch "ON".
 - 3) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- OR
- 2) Start engine.
 - 3) Set temperature lever at full cold position.
 - 4) Turn air conditioner switch "ON".
 - 5) Turn blower fan switch "ON".
 - 6) Run engine at idle for a few minutes with air conditioner operating.
 - 7) Make sure that cooling fan operates at low speed.

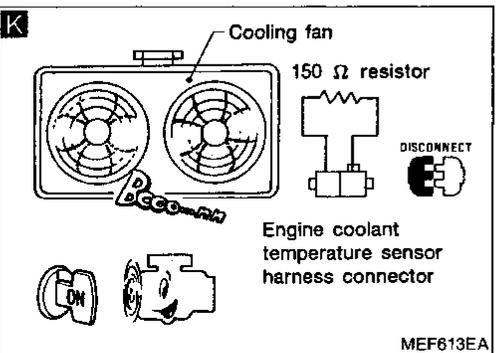
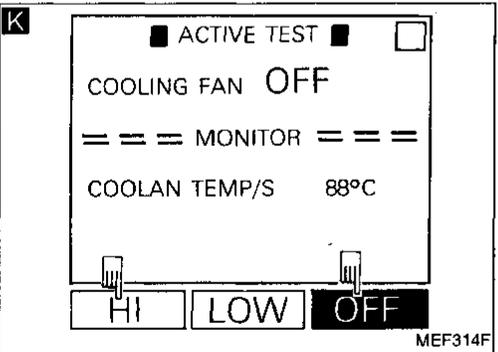
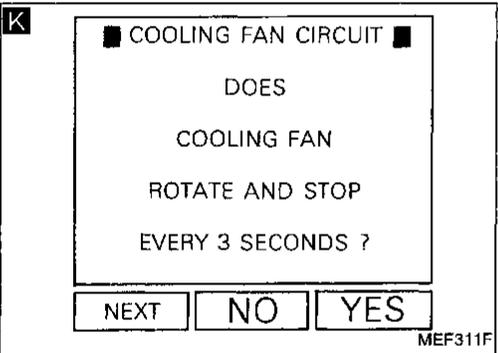
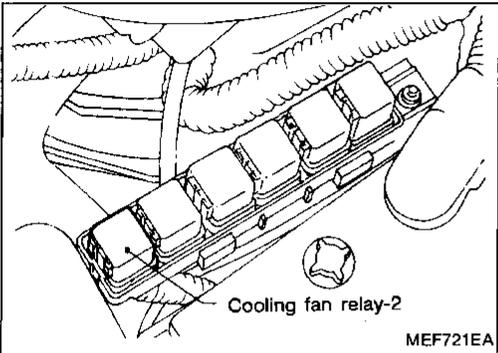
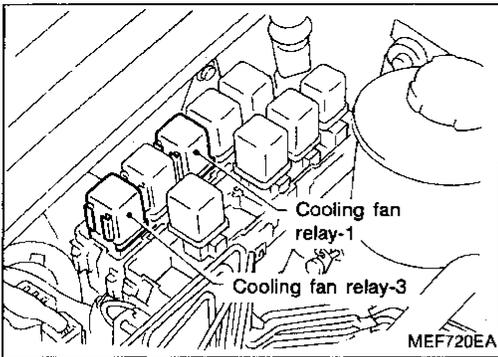
NG Check cooling fan low speed control circuit. (Go to PROCEDURE C.)

OK
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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



A

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K

CHECK COOLING FAN HIGH SPEED OPERATION.

- 1) Turn ignition switch "OFF".
- 2) Reconnect cooling fan relay-2 and cooling fan relay-3.
- 3) Disconnect cooling fan relay-1.
- 4) Turn ignition switch "ON".
- 5) Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

- 4) Turn ignition switch "ON".
- 5) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

OR

- 4) Turn air conditioner switch and blower fan switch "OFF".
- 5) Disconnect engine coolant temperature sensor harness connector.
- 6) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 7) Restart engine and make sure that cooling fan operates at higher speed than low speed.

OK

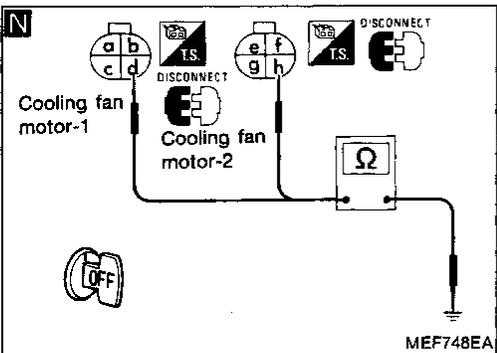
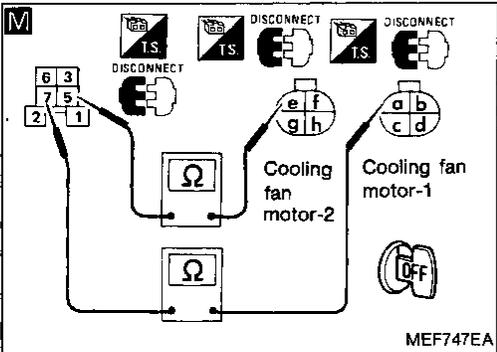
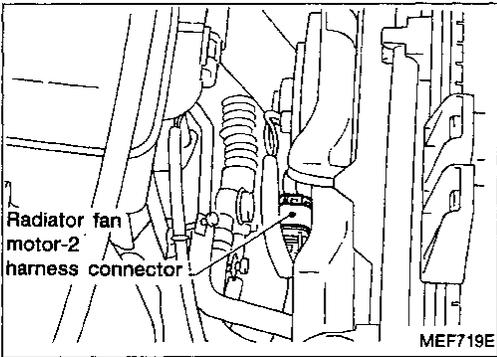
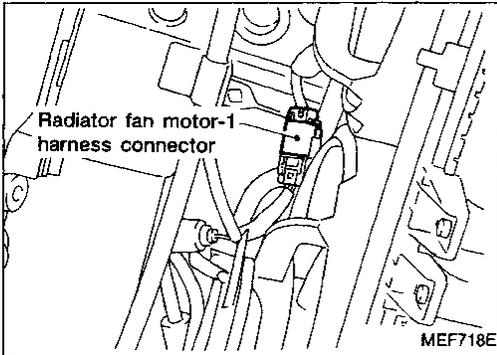
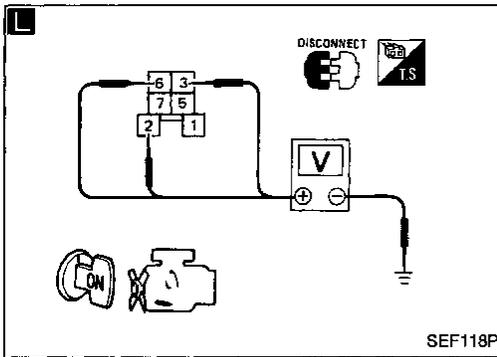
↓

INSPECTION END

NG → Check cooling fan high speed control circuit. (Go to PROCEDURE D.)

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



PROCEDURE C

INSPECTION START

L CHECK POWER SUPPLY.

- 1) Turn ignition switch "OFF".
- 2) Disconnect cooling fan relay-1.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminals ②, ③, ⑥ and ground with CONSULT or tester.

Voltage: Battery voltage

NG

Check the following.

- Harness connectors
- 10A fuse
- 30A fusible links
- 75A fusible link
- Joint connector-4
- Harness continuity between cooling fan relay-1 and fuse
- Harness continuity between cooling fan relay-1 and battery

If NG, repair harness or connectors.

OK

L CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.

M 3) Check harness continuity between terminal ⑦ and terminal ②, terminal ⑤ and terminal ⑥.

Continuity should exist.

N 4) Check harness continuity between terminals ⑧, ⑨ and body ground.

Continuity should exist.

NG

Repair harness or connectors.

OK

O CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal ⑩ and terminal ①.

Continuity should exist.

NG

Check the following.

- Harness connectors
- 10A fuse
- 30A fusible links
- 75A fusible link
- Joint connector-4
- Harness continuity between cooling fan relay-1 and ECM

If NG, repair harness or connectors.

OK

N CHECK COMPONENT (Cooling fan relay-1). Refer to "COMPONENT INSPECTION". (See page EC-220.)

NG

Replace cooling fan relay.

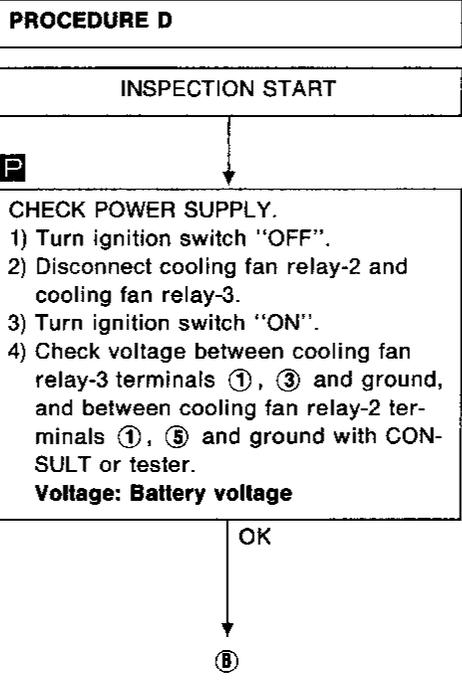
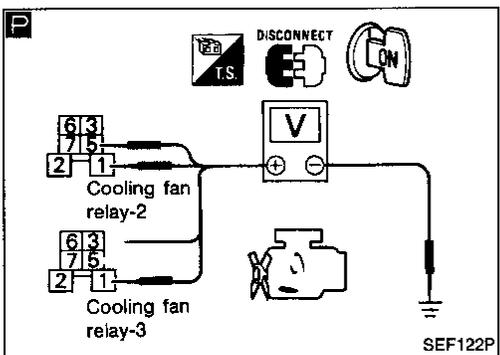
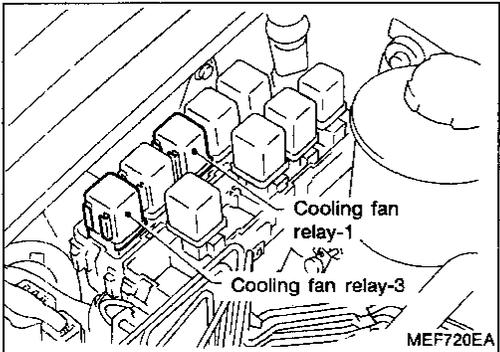
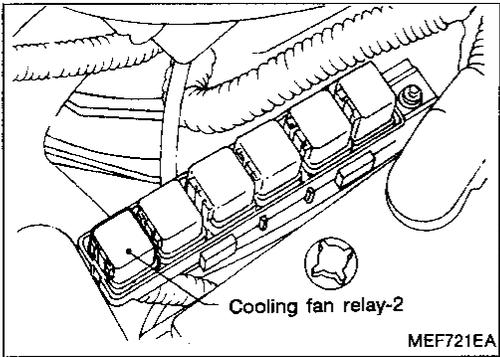
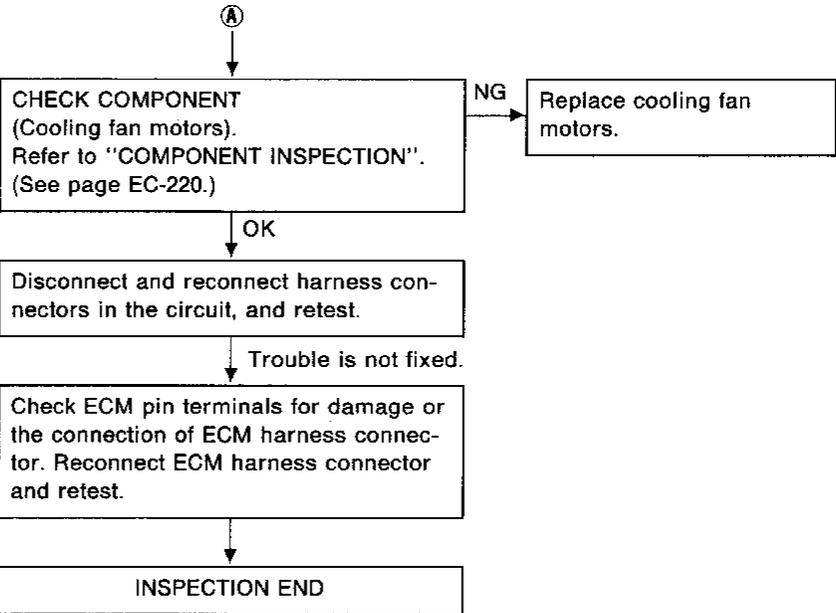
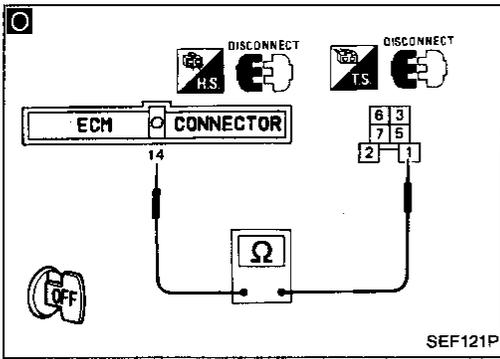
OK

Ⓐ

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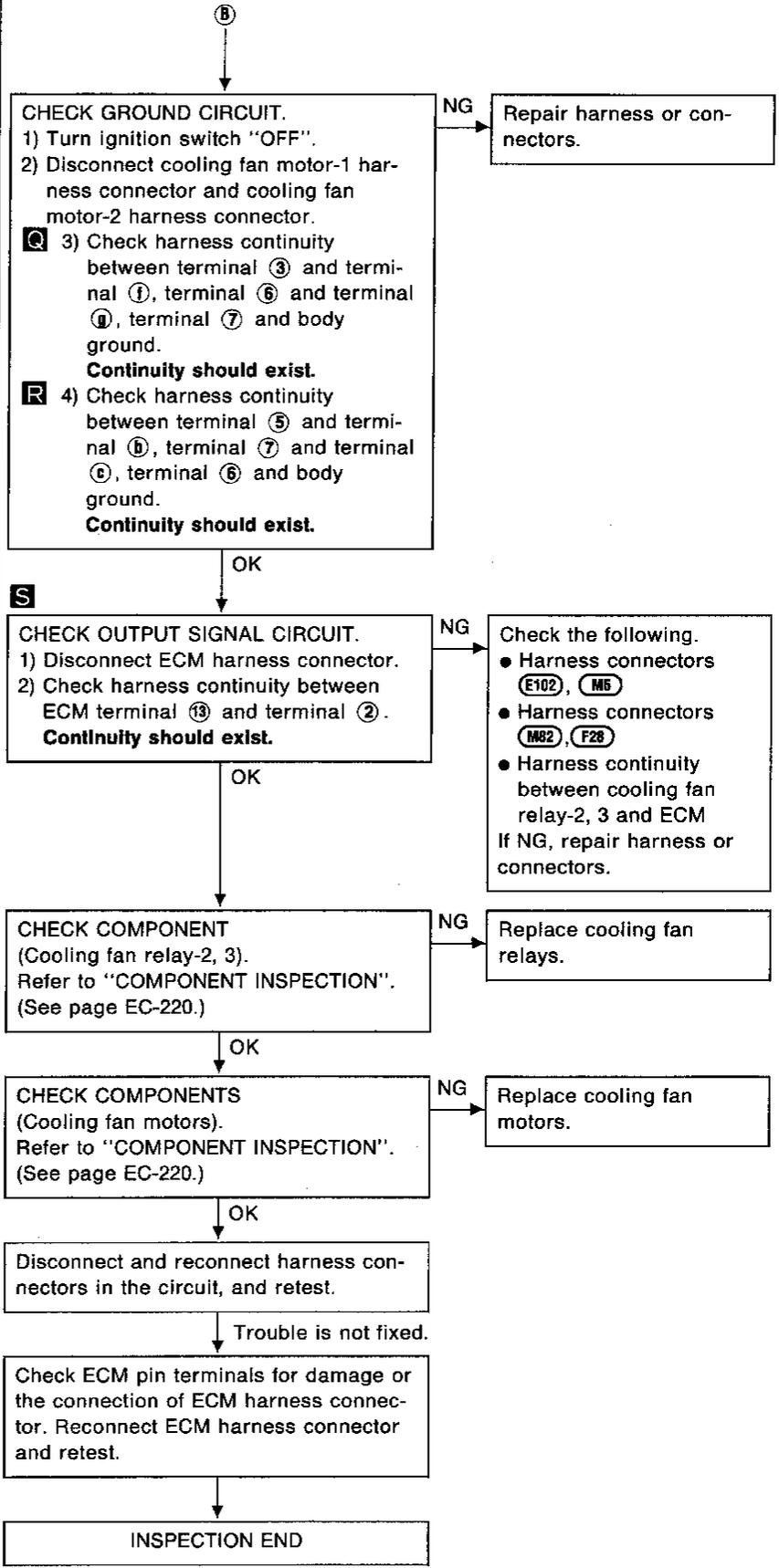
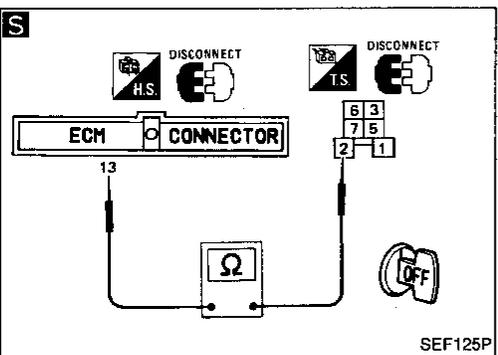
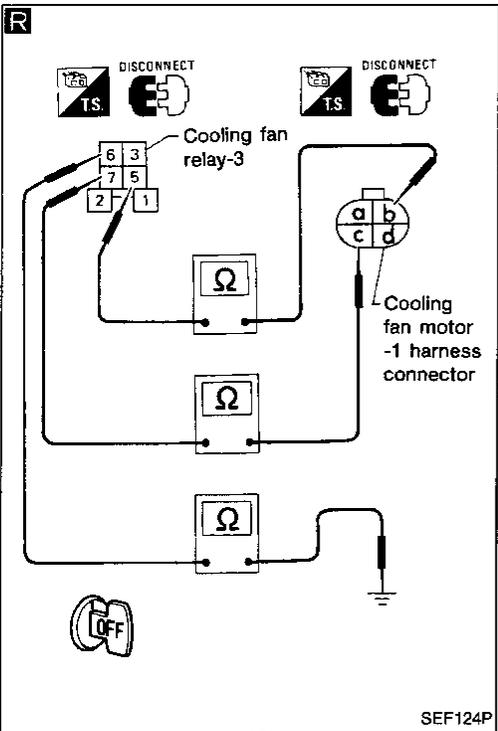
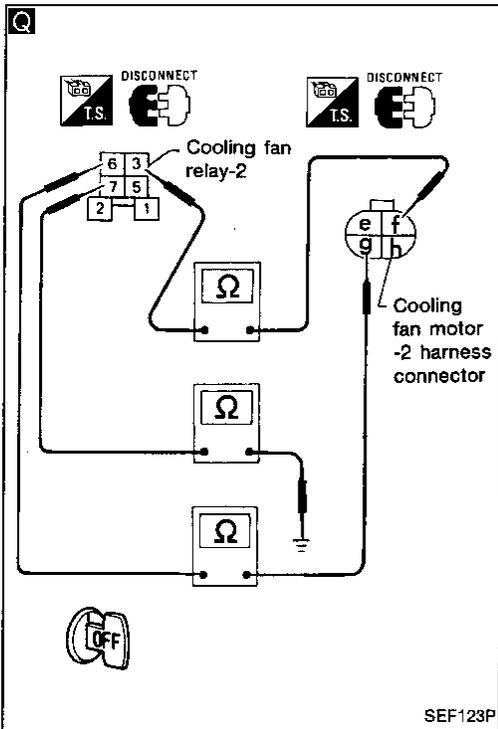
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)



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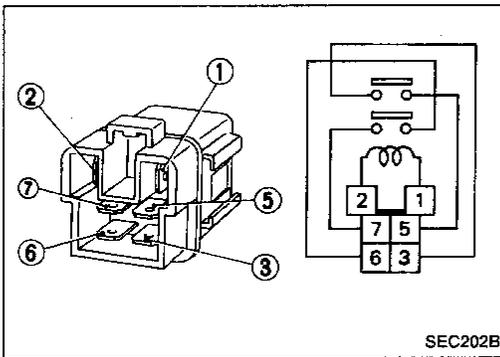
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Cooling Fan Control (Cont'd)

COMPONENT INSPECTION

Cooling fan relays-1, -2 and -3 for A/T models

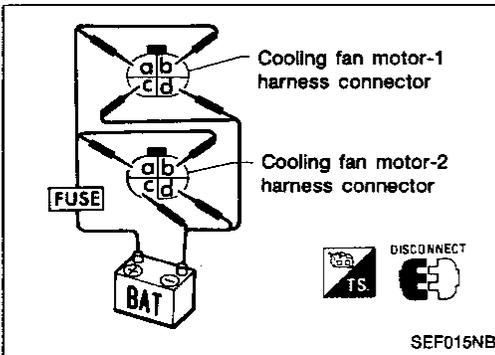
Check continuity between terminals ③ and ⑤, ⑥ and ⑦.



SEC202B

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

If NG, replace relay.



Cooling fan motors-1 and -2

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

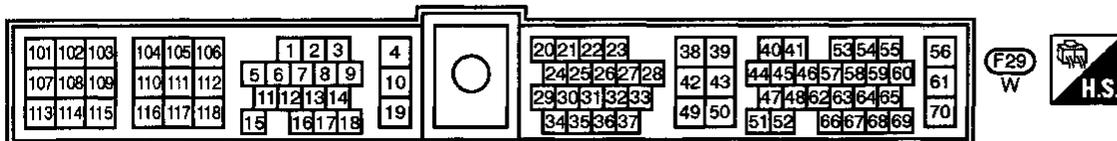
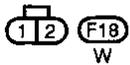
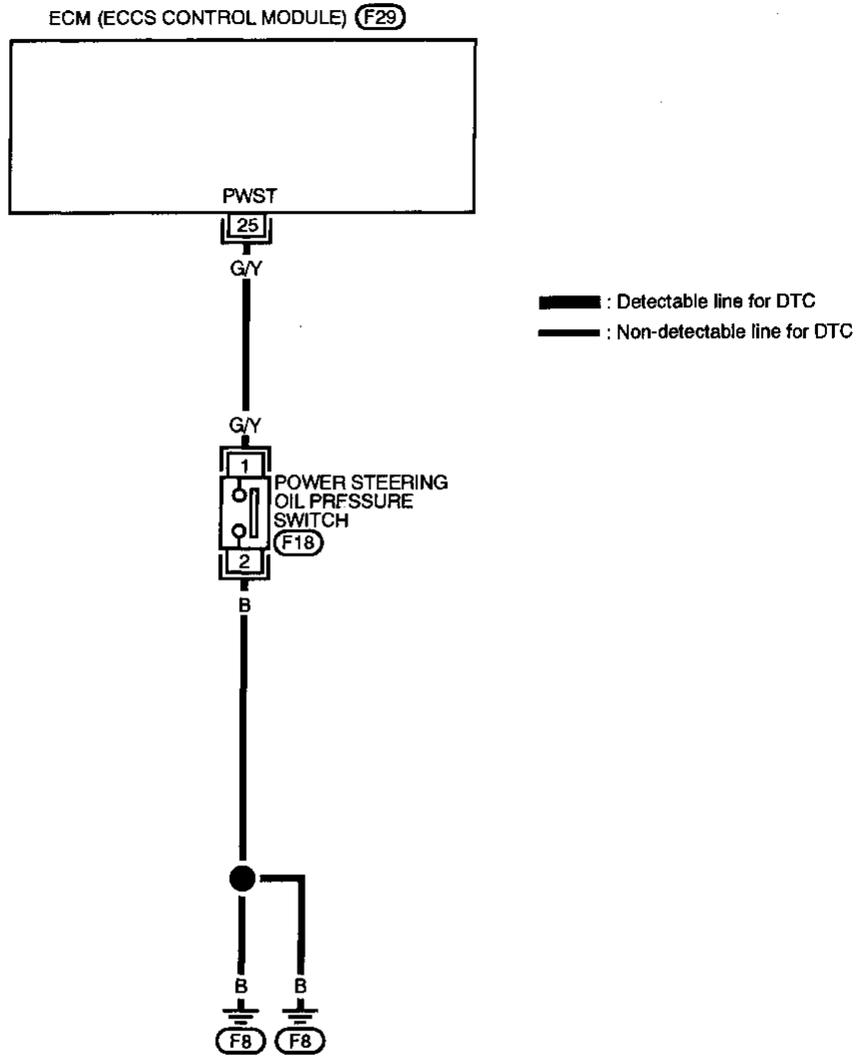
	Speed	Terminals	
		(⊕)	(⊖)
Cooling fan motor-1	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ
Cooling fan motor-2	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ

Cooling fan motor should operate.

If NG, replace cooling fan motor.

Power Steering Oil Pressure Switch

EC-PST/SW-01



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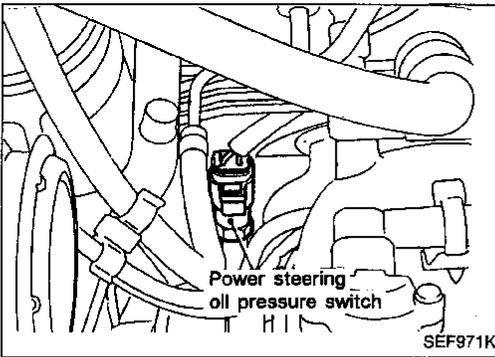
IDX

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd)

DESCRIPTION

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.



A

■ PW/ST SIGNAL CIRCUIT ■

HOLD STEERING WHEEL
IN A FULL
LOCKED POSITION
THEN
TOUCH START

NEXT START

MEF023E

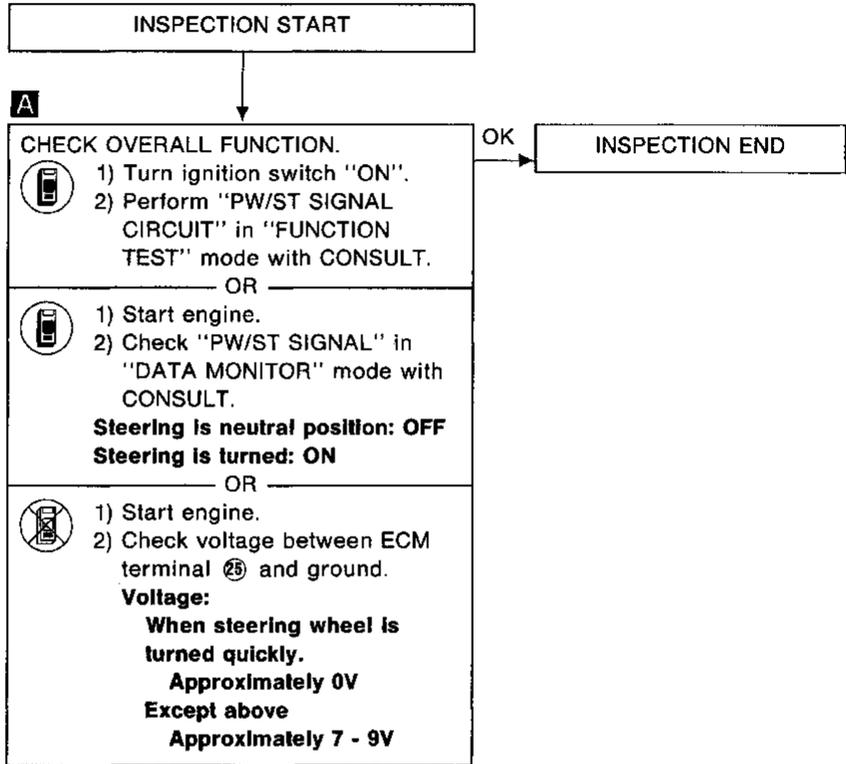
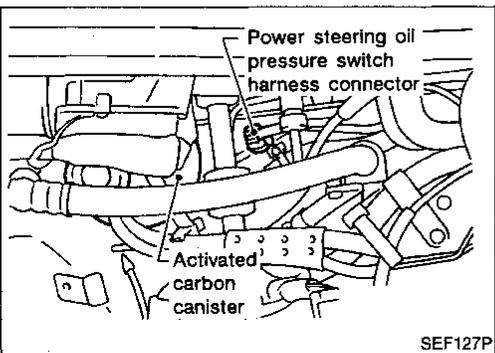
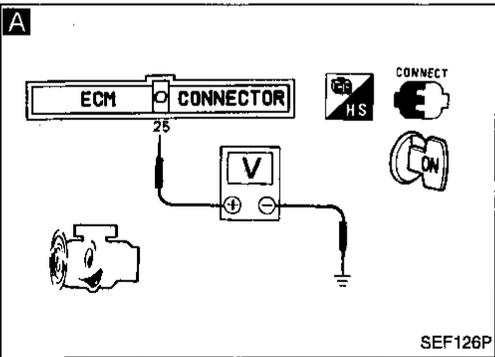
A

☆ MONITOR ☆ NO FAIL

PW/ST SIGNAL OFF

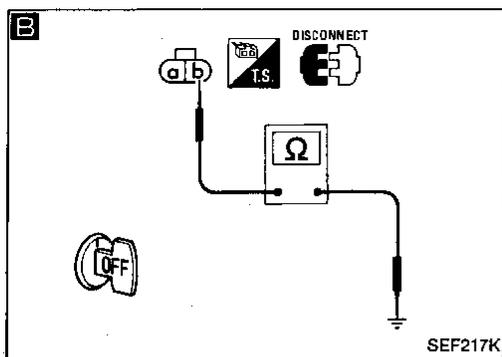
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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd)



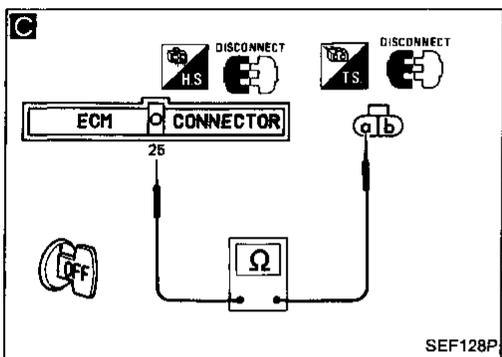
B

CHECK GROUND CIRCUIT.
 1) Turn ignition switch "OFF".
 2) Disconnect power steering oil pressure switch harness connector.
 3) Check harness continuity between terminal **(b)** and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK →

GI
MA
EM



C

CHECK INPUT SIGNAL CIRCUIT.
 1) Disconnect ECM harness connector.
 2) Check harness continuity between ECM terminal **(25)** and terminal **(a)**.
Continuity should exist.

NG → Repair harness or connectors.

OK →

LC
EC

CHECK COMPONENT
 (Power steering oil pressure switch).
 Refer to "Component Inspection".
 (See page EC-223.)

NG → Replace power steering oil pressure switch.

OK →

FE
CL

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

MT

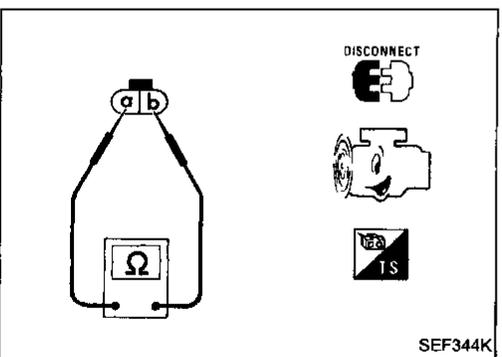
Trouble is not fixed.

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

AT
FA

INSPECTION END

RA



COMPONENT INSPECTION

Power steering oil pressure switch

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals **(a)** and **(b)**.

BR
ST
BF

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

HA

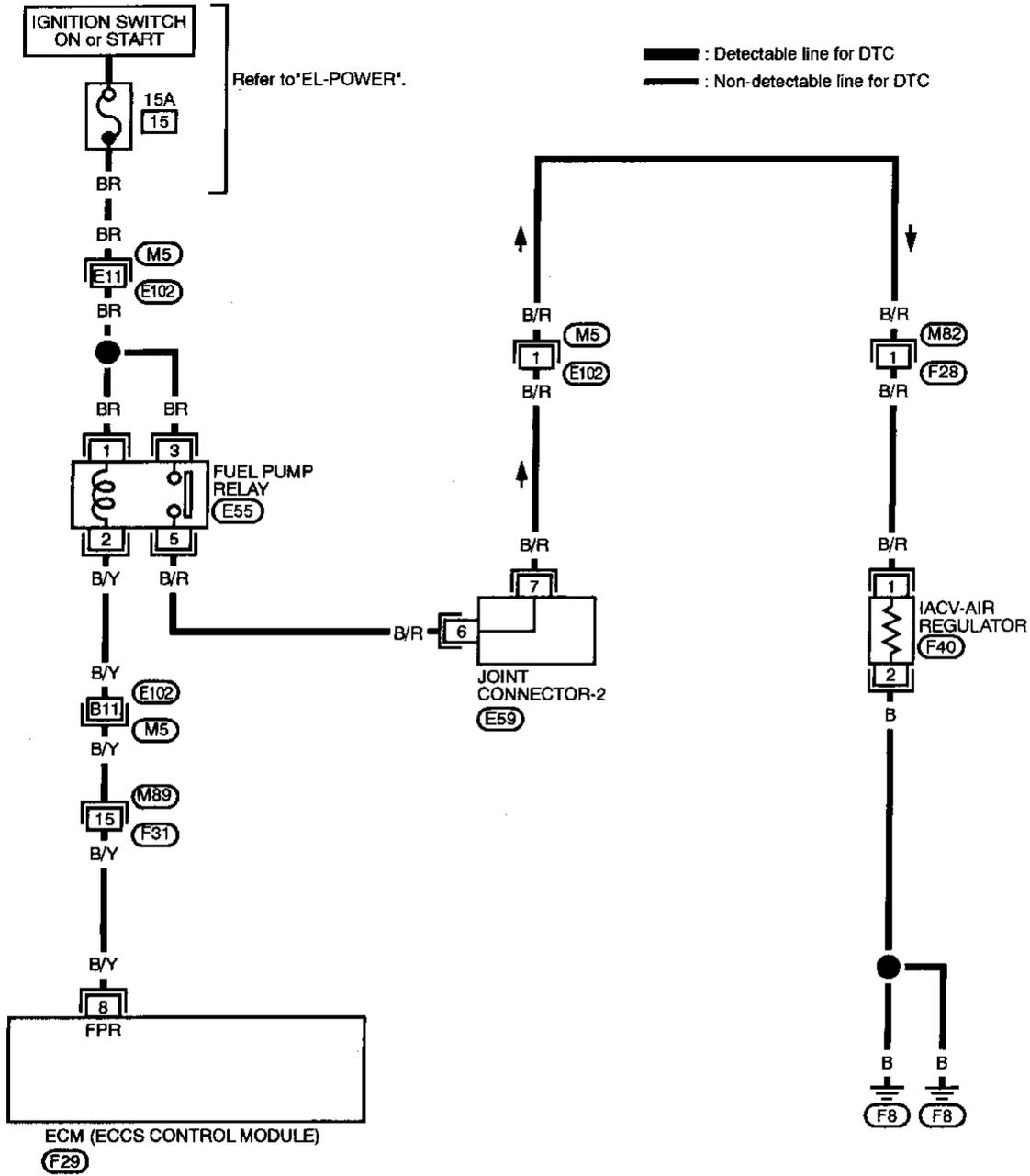
If NG, replace power steering oil pressure switch.

EL

IDX

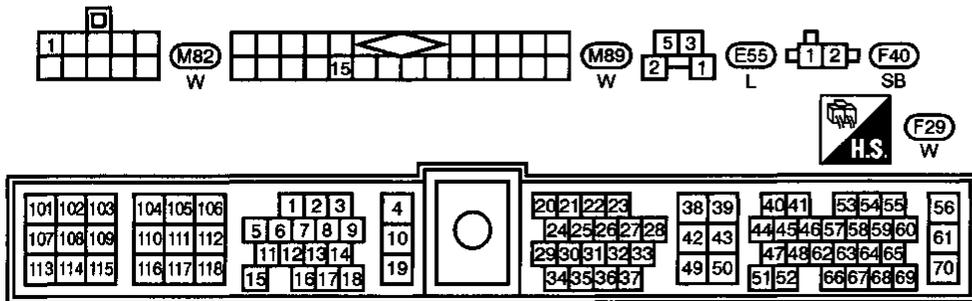
IACV-Air Regulator

EC-AIRREG-01



Refer to last page (Foldout page).

E102 M5
 E59

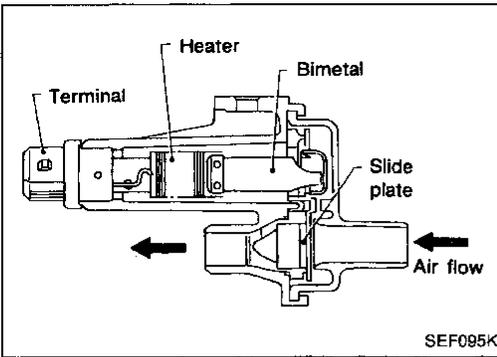


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-Air Regulator (Cont'd)

DESCRIPTION

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



A

■ FUEL PUMP CIRCUIT ■
 PINCH FUEL FEED HOSE WITH FINGERS IS THERE ANY PRESSURE PULSATION ON THE FUEL FEED HOSE?
 OR
 DOES THE FUEL PUMP RELAY MAKE AN OPERATING SOUND EVERY 3 SECONDS?

NEXT NO YES

MEF591B

A

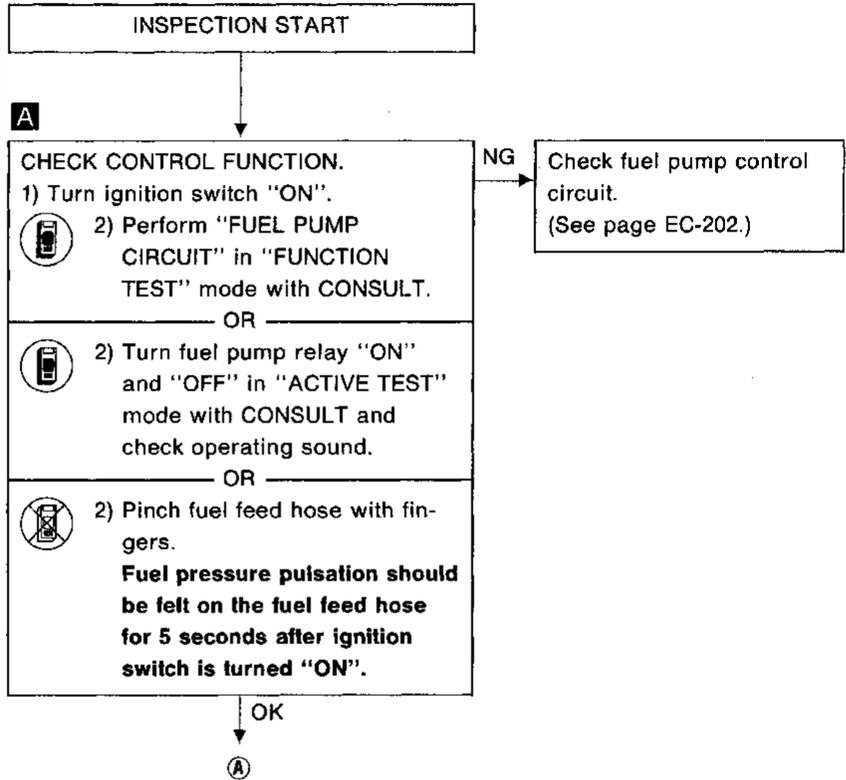
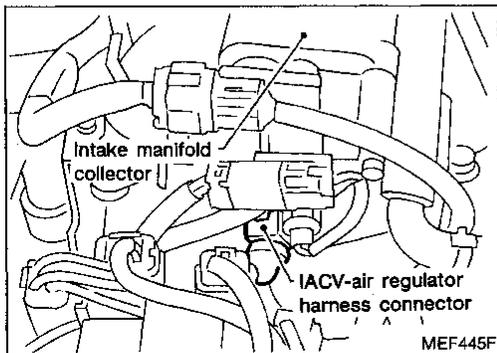
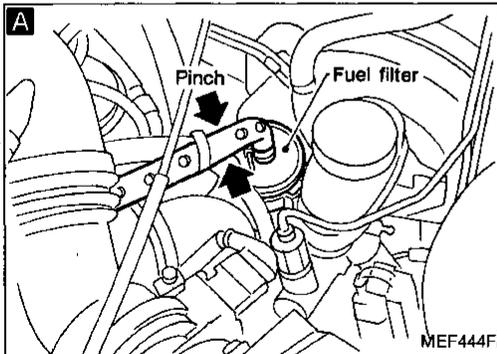
■ ACTIVE TEST ■

FUEL PUMP RELAY ON

== MONITOR ==
 CMPS•RPM(REF) 0rpm

ON ON/OFF OFF

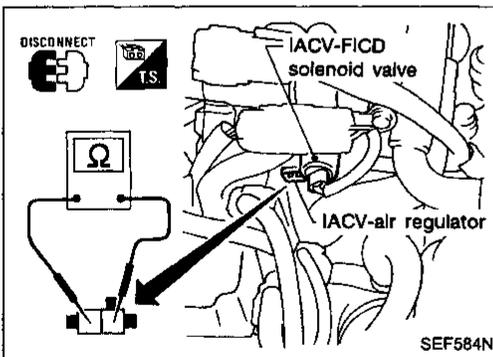
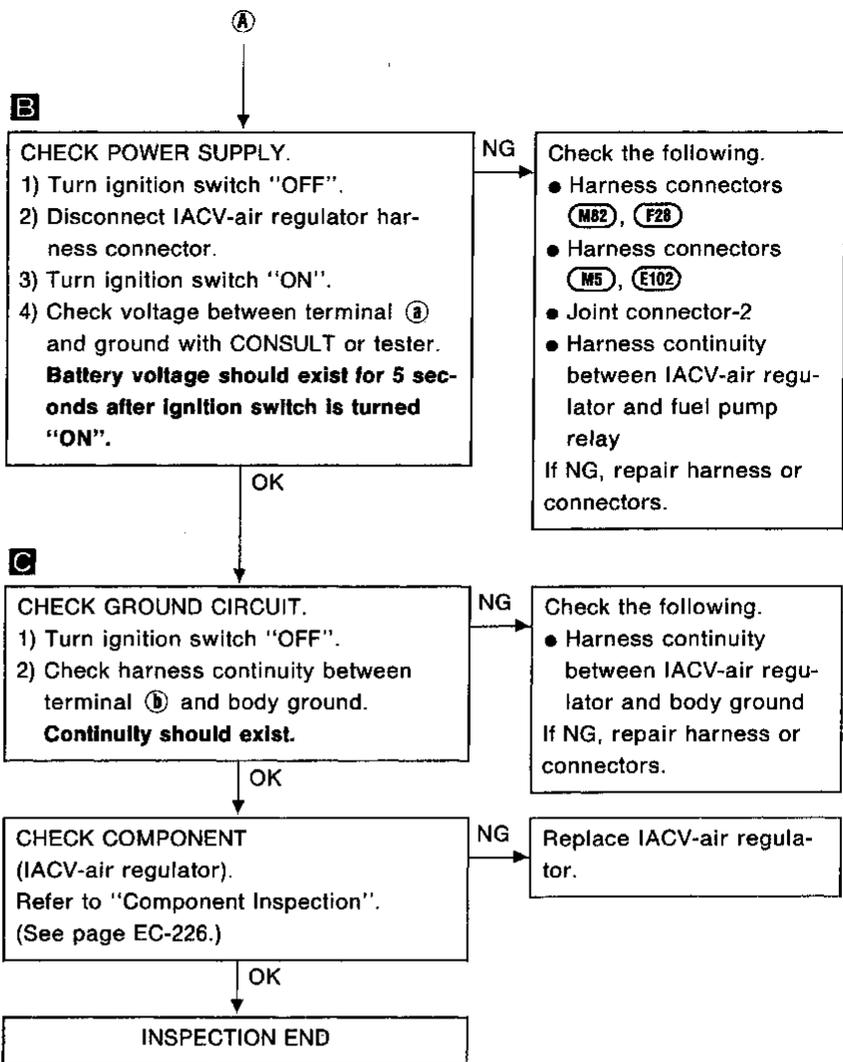
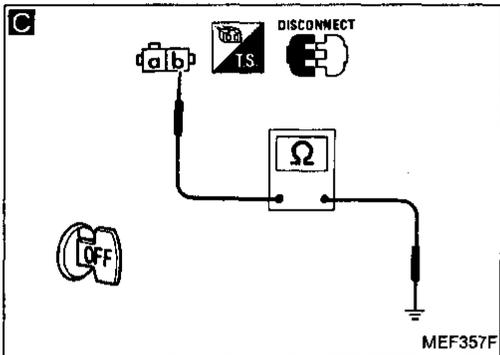
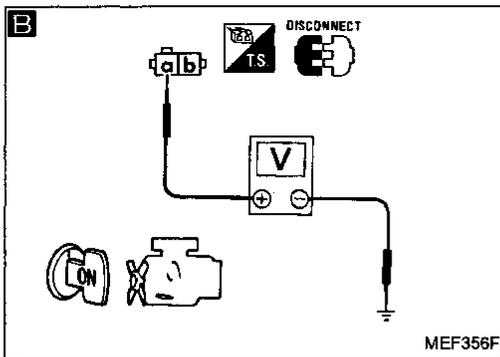
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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-Air Regulator (Cont'd)



COMPONENT INSPECTION

IACV-air regulator

Disconnect IACV-air regulator harness connector.

- Check IACV-air regulator resistance.

Resistance:

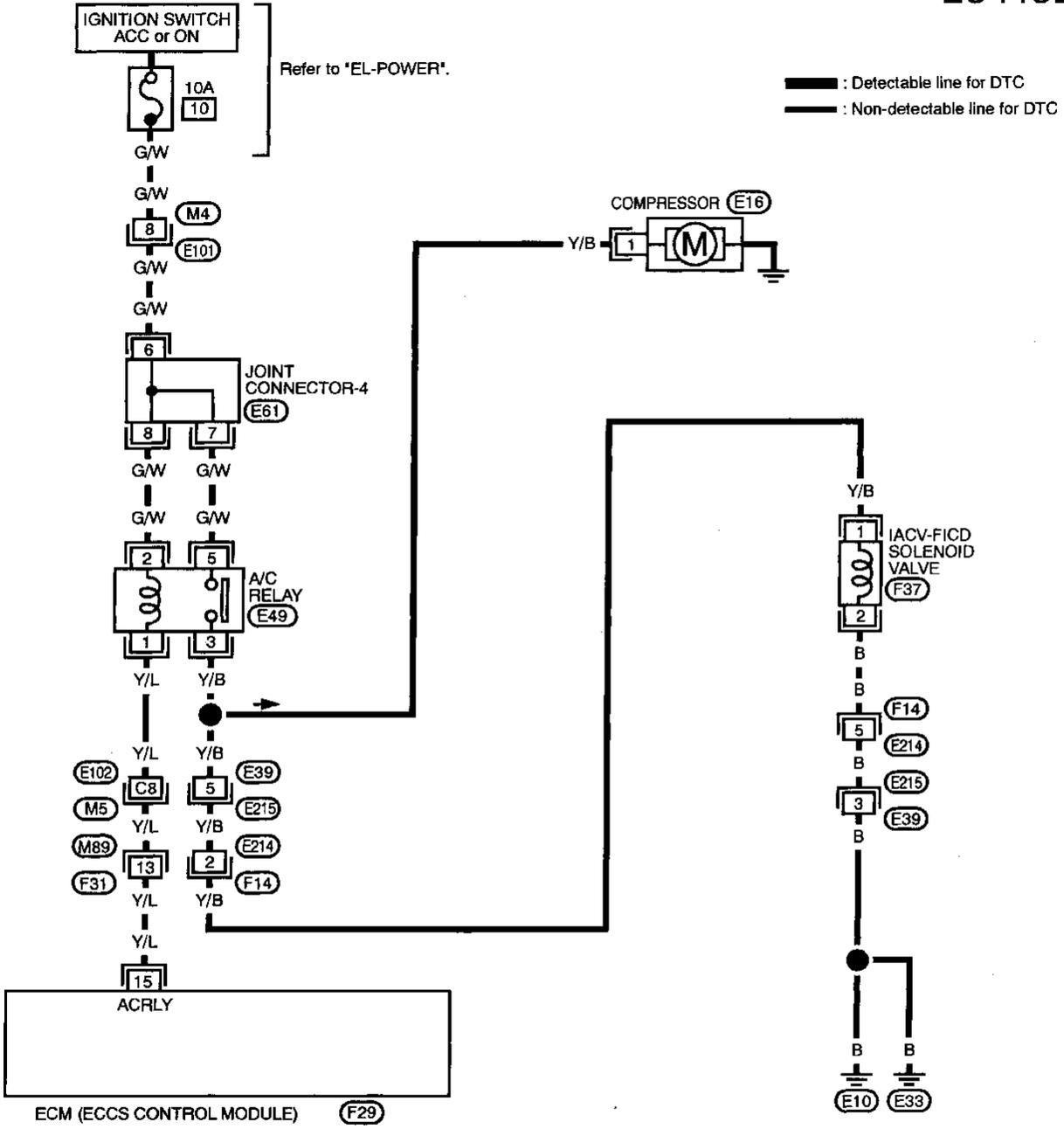
Approximately 70 - 80Ω

- Check IACV-air regulator for clogging.

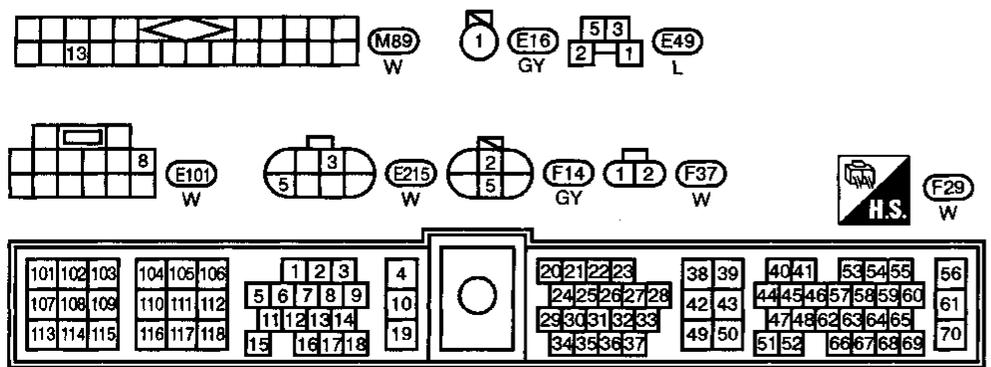
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-FICD Solenoid Valve

EC-FICD-01



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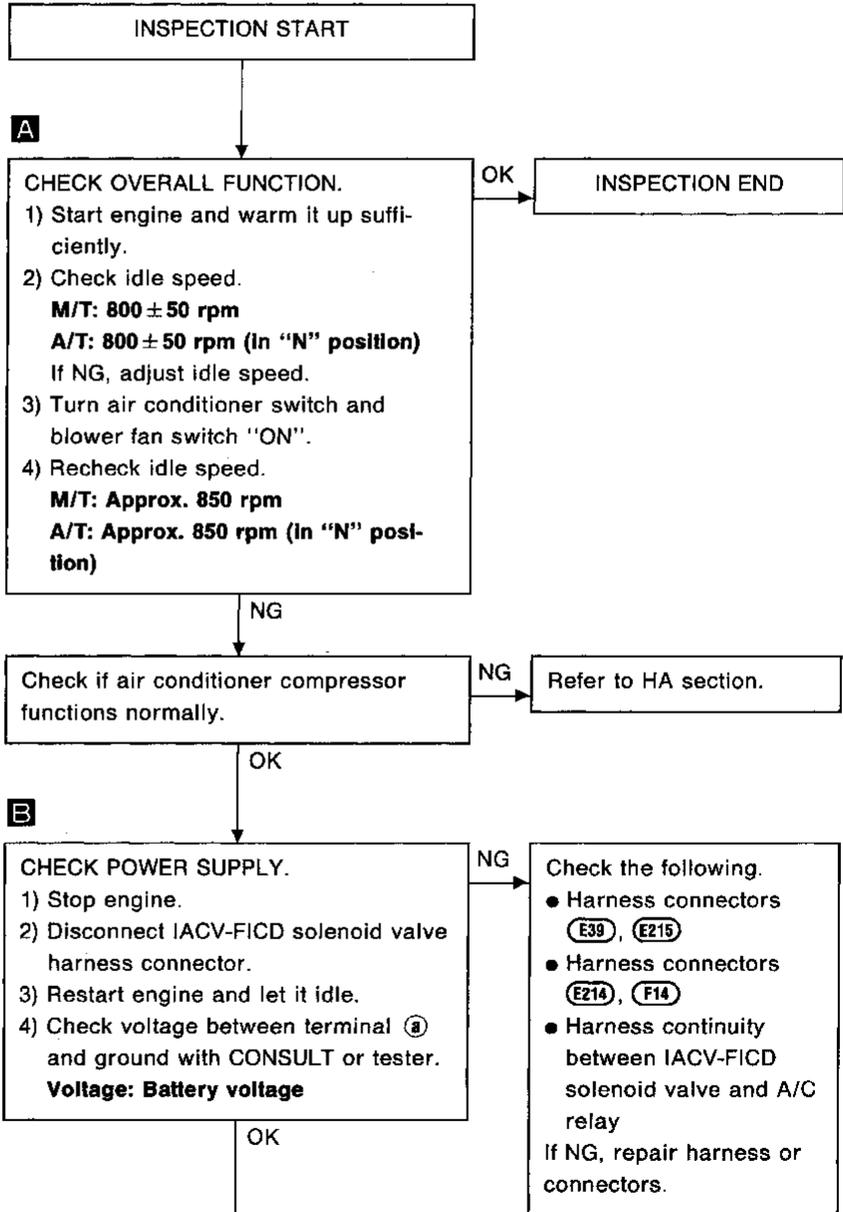
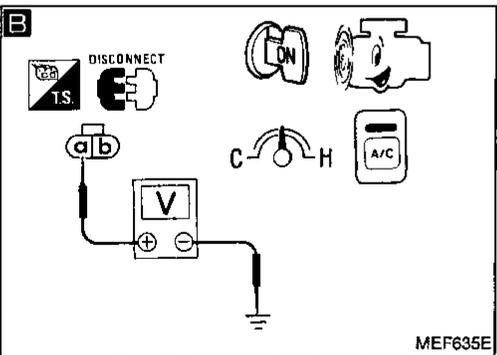
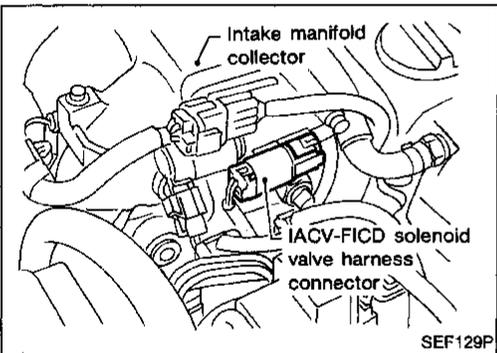
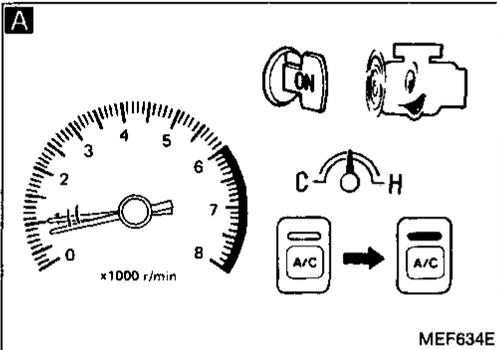
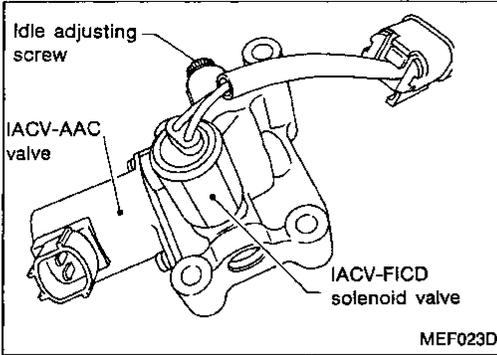
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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-FICD Solenoid Valve (Cont'd)

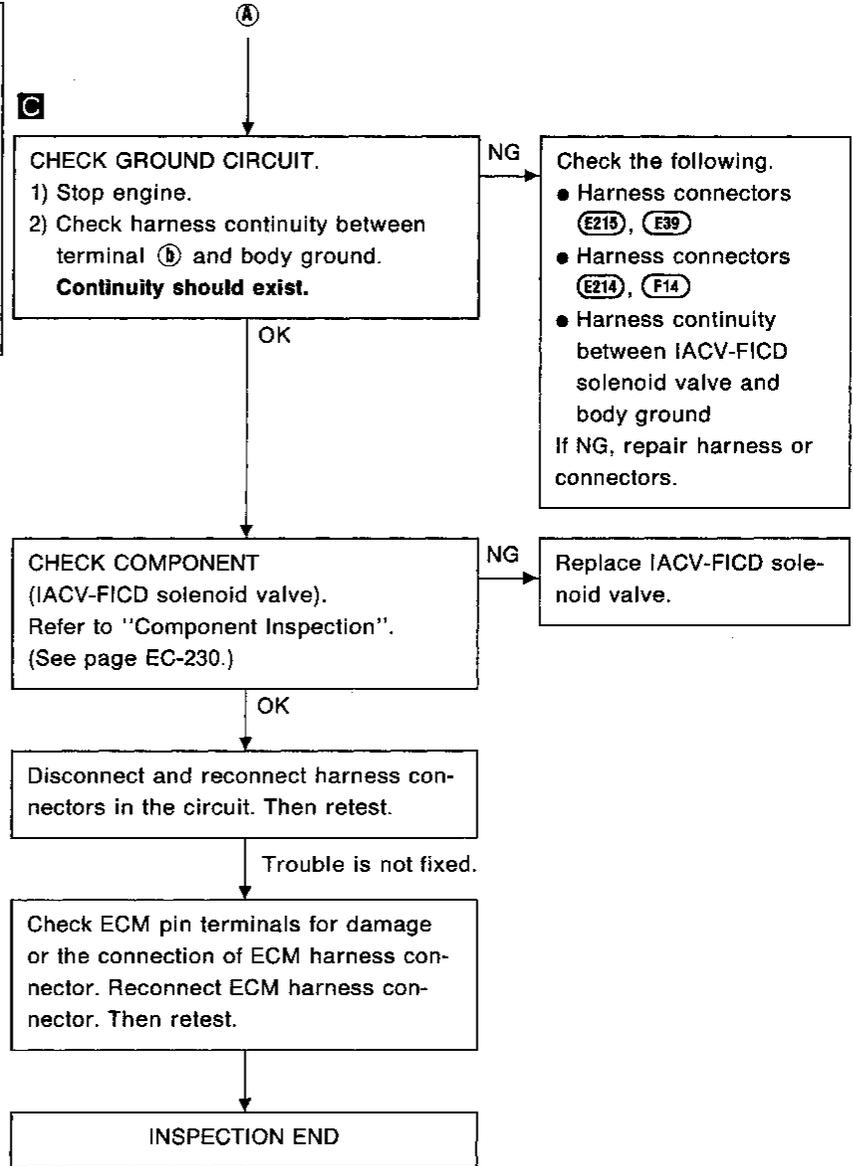
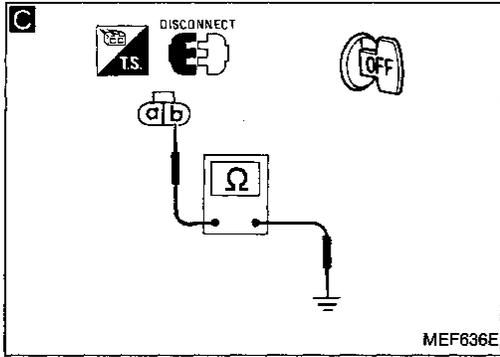
DESCRIPTION

The idle air adjusting (IAA) unit is made up of the IACV-AAC valve, IACV-FICD solenoid valve and idle adjusting screw. It receives the signal from the ECM and controls the idle speed at the preset value.



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-FICD Solenoid Valve (Cont'd)



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TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

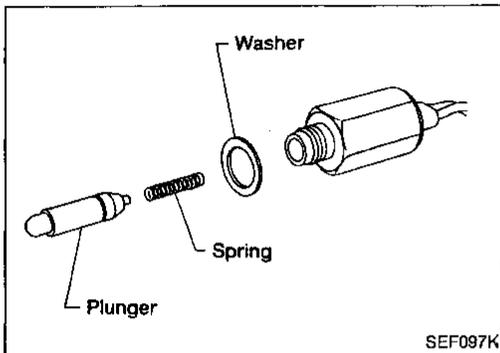
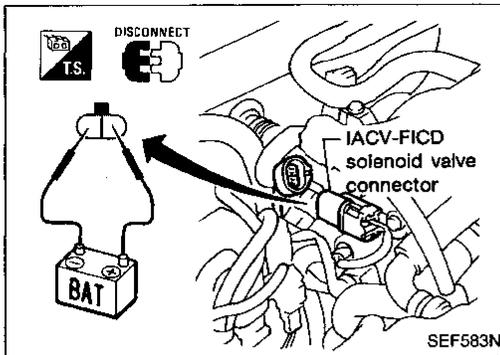
IACV-FICD Solenoid Valve (Cont'd)

COMPONENT INSPECTION

IACV-FICD solenoid valve

Disconnect IACV-FICD solenoid valve harness connector.

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



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

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

PRESSURE REGULATOR	
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)

Inspection and Adjustment

Idle speed*1	rpm	
No-load*2 (in "N" position)		800 ± 50
Air conditioner: ON (in "N" position)		850 or more
Ignition timing		15° ± 2° BTDC
Throttle position sensor idle position	V	0.35 - 0.65

*1: Feedback controlled and needs no adjustments

*2: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 26.0

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	1.3 - 1.7*
Mass air flow	gm/sec	2.5 - 5.0 at idle* 7.1 - 12.5 at 2,500 rpm*

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

ENGINE COOLANT TEMPERATURE SENSOR

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

EGR TEMPERATURE SENSOR

Resistance [at 100°C (212°F)]	kΩ	85.3 ± 8.53
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FRONT HEATED OXYGEN SENSOR HEATER

Resistance [at 25°C (77°F)]	Ω	4.8 ± 1.5
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FUEL PUMP

Resistance	Ω	Approximately 0.7
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IACV-AAC VALVE

Resistance	Ω	Approximately 10.0
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INJECTOR

Resistance	Ω	10 - 14
------------	---	---------

RESISTOR

Resistance	kΩ	Approximately 2.2
------------	----	-------------------

THROTTLE POSITION SENSOR

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Inspection and Adjustment (Cont'd)

CALCULATED LOAD VALUE

	Calculated load value %
At idle	20.0 - 35.5
At 2,500 rpm	17.0 - 30.0

INTAKE AIR TEMPERATURE SENSOR

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

REAR HEATED OXYGEN SENSOR HEATER

Resistance [at 25°C (77°F)]	Ω	6.7 ± 1.5
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CRANKSHAFT POSITION SENSOR (OBD)

Resistance [at 20°C (68°F)]	Ω	185 ± 19
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