

ENGINE CONTROL SYSTEM

SECTION **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".

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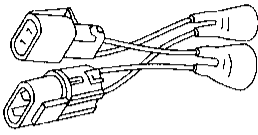
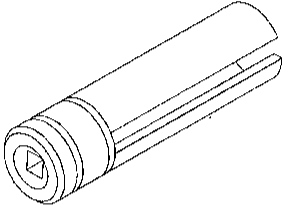
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PRECAUTIONS AND PREPARATION

Special Service Tools

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

Tool number (Kent-Moore No.) Tool name	Description
EG11160000 (—) Ignition coil adapter harness	 Measuring engine speed NT056
(J36471-A) Heated oxygen sensor wrench	 Loosening or tightening heated oxygen sensor NT379

Supplemental Restraint System (SRS) “AIR BAG”

The Supplemental Restraint System “Air Bag”, used along with a seat belt, helps 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 in the instrument panel on the passenger side), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

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

PRECAUTIONS AND PREPARATION

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

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PRECAUTIONS AND PREPARATION

Engine Fuel & Emission Control System

BATTERY

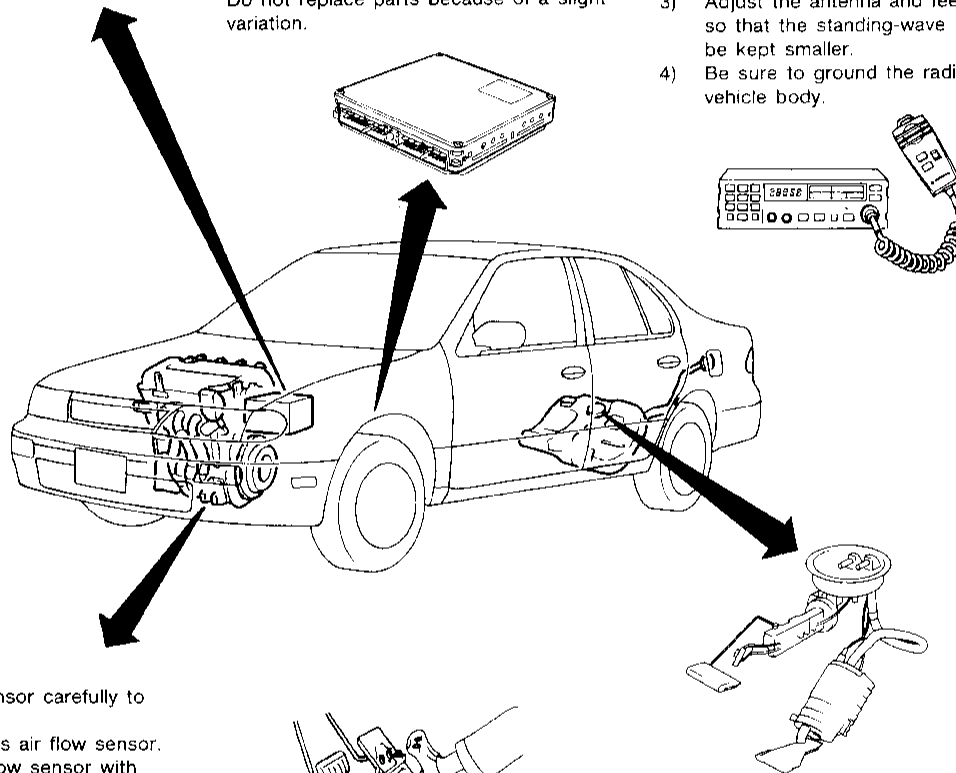
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

ECM

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

WIRELESS EQUIPMENT

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



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 IAC valve-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.

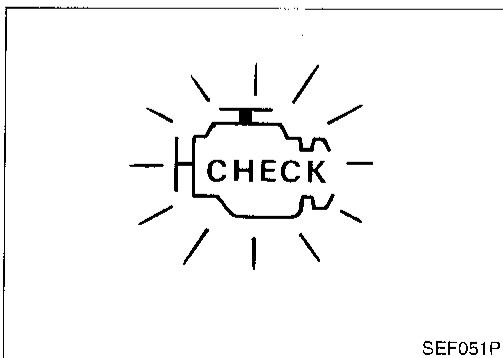
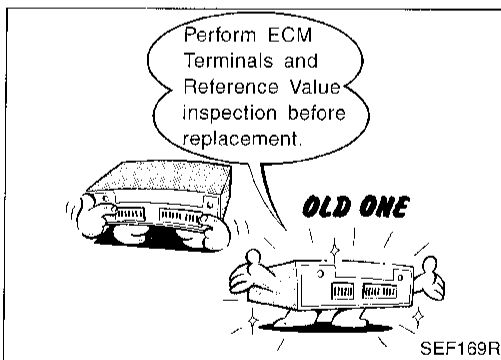
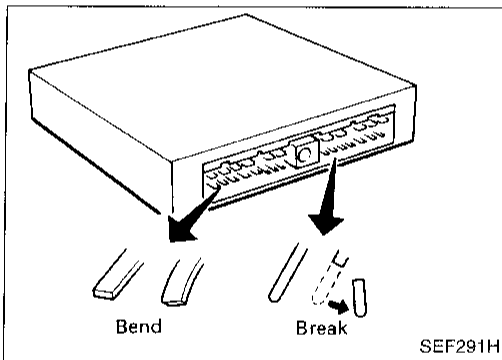
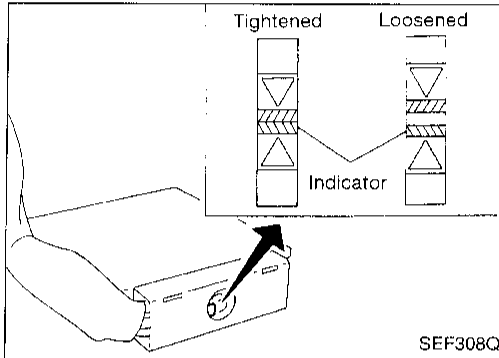
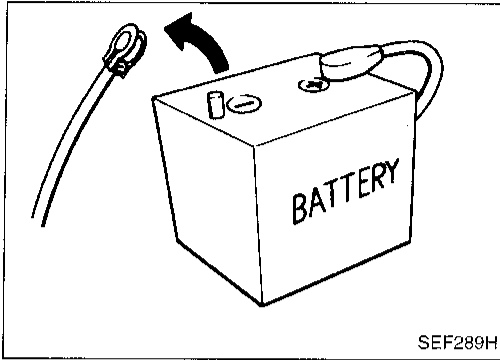
FUEL PUMP

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

ECM HARNESS HANDLING

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

PRECAUTIONS AND PREPARATION



Precautions

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

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

: 3.0 - 5.0 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)

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

- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-94.

- After performing each TROUBLE DIAGNOSIS, perform "OVERALL FUNCTION CHECK" or "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE". The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed. The "OVERALL FUNCTION CHECK" should be a good result if the repair is completed.

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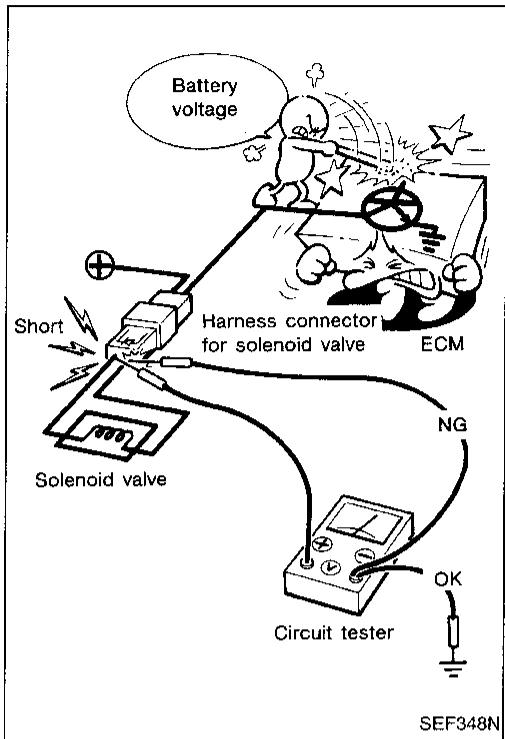
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PRECAUTIONS AND PREPARATION

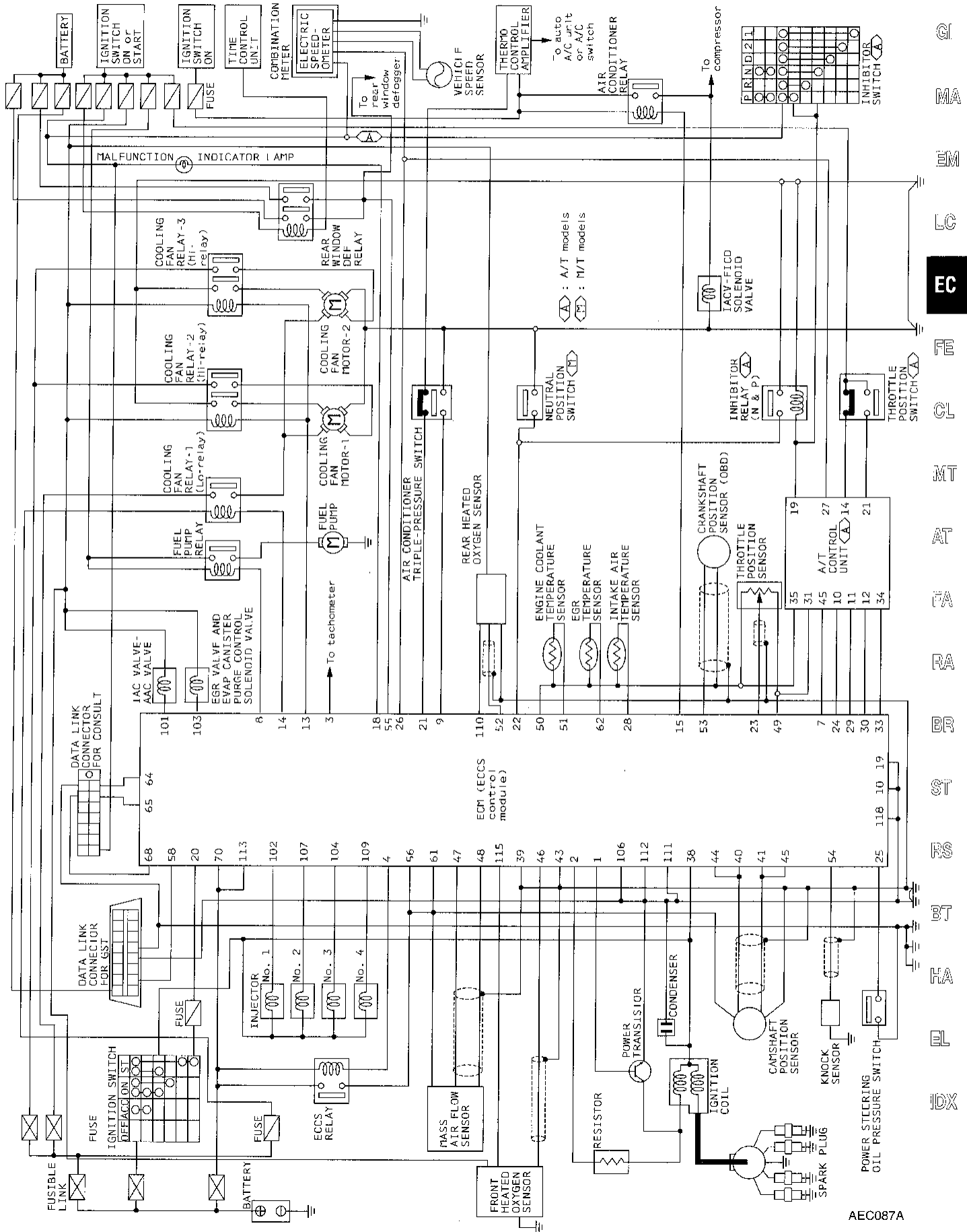
Precautions (Cont'd)



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

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

Circuit Diagram

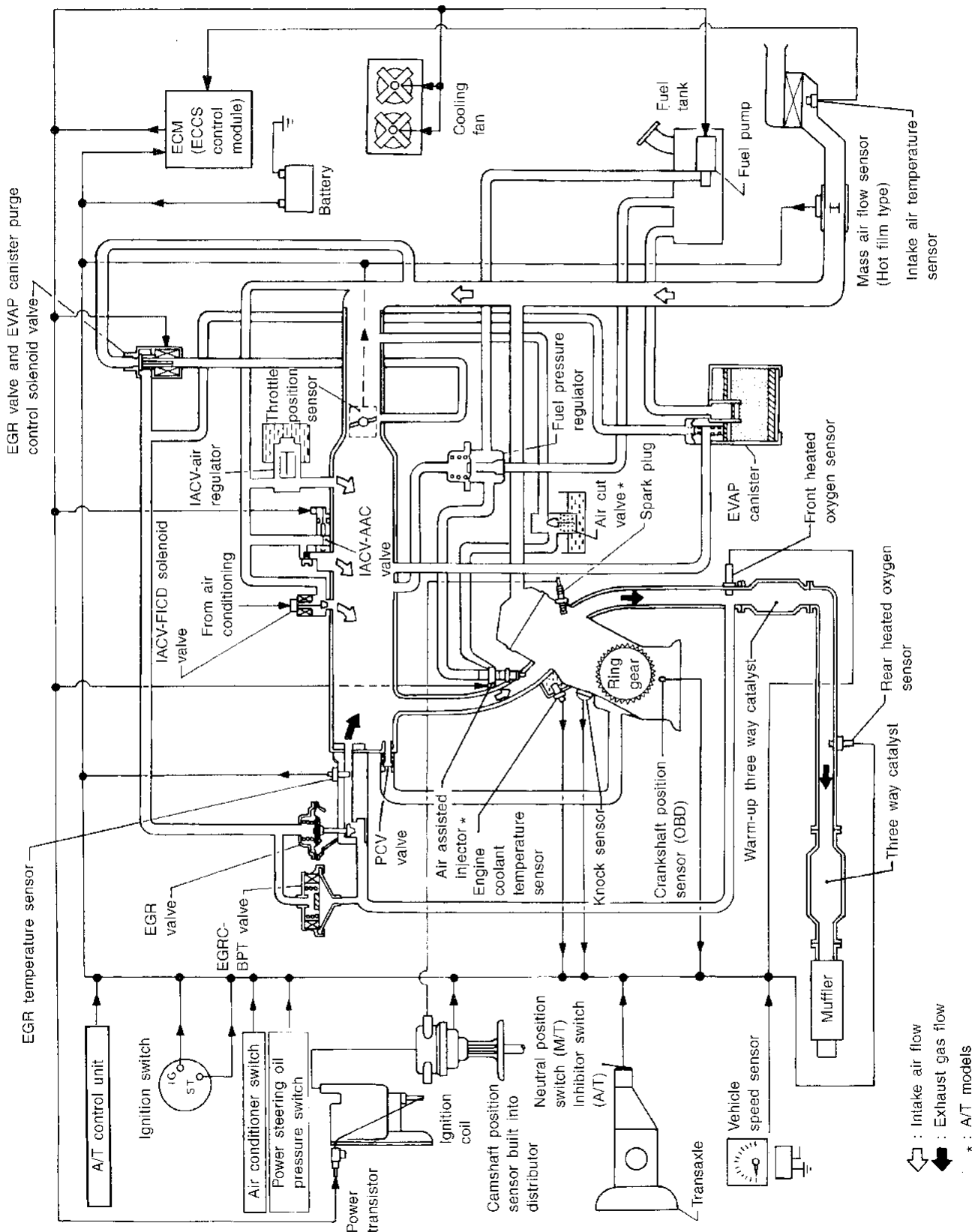


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ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Diagram

CALIFORNIA MODELS

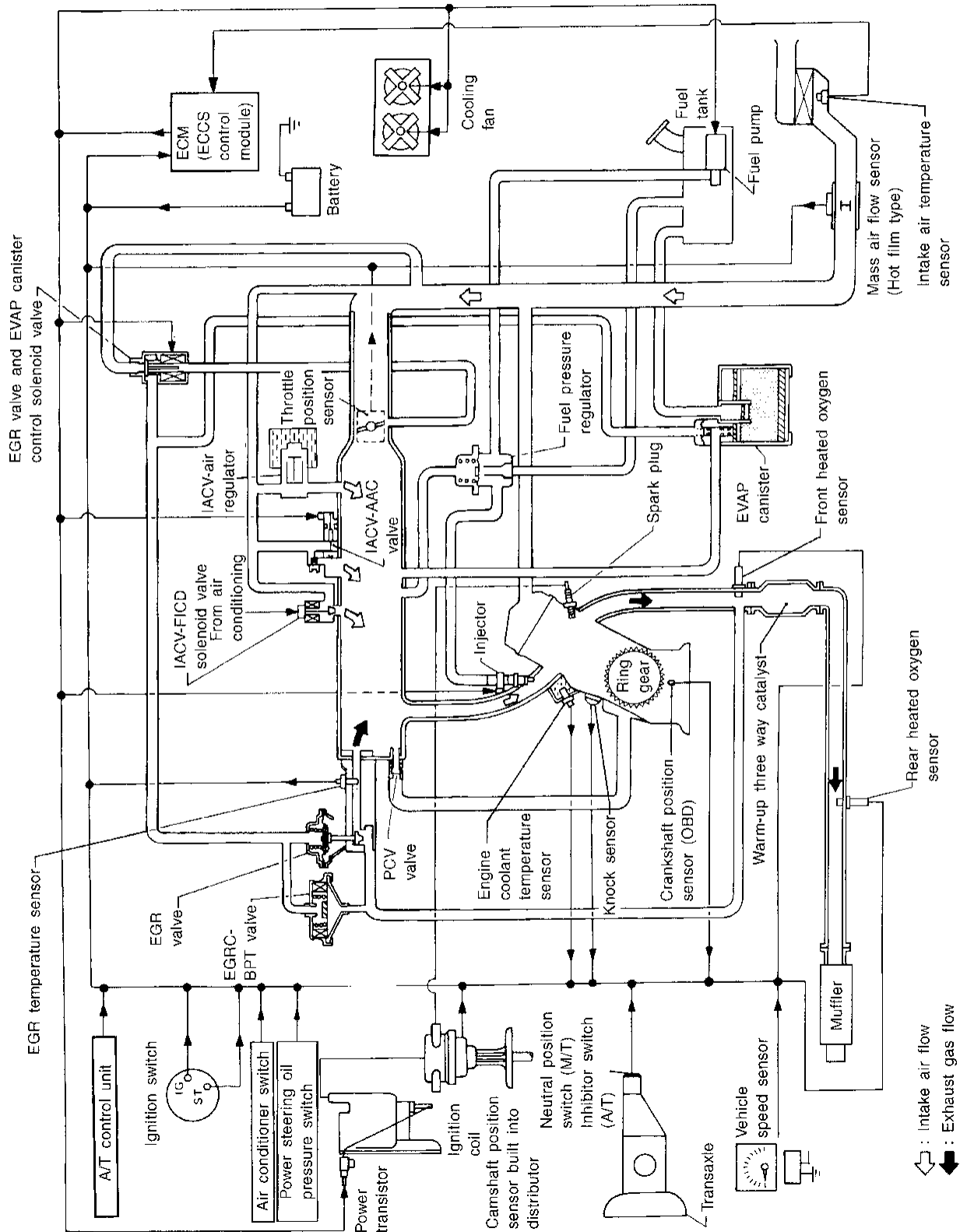


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ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Diagram (Cont'd)

NON-CALIFORNIA MODELS



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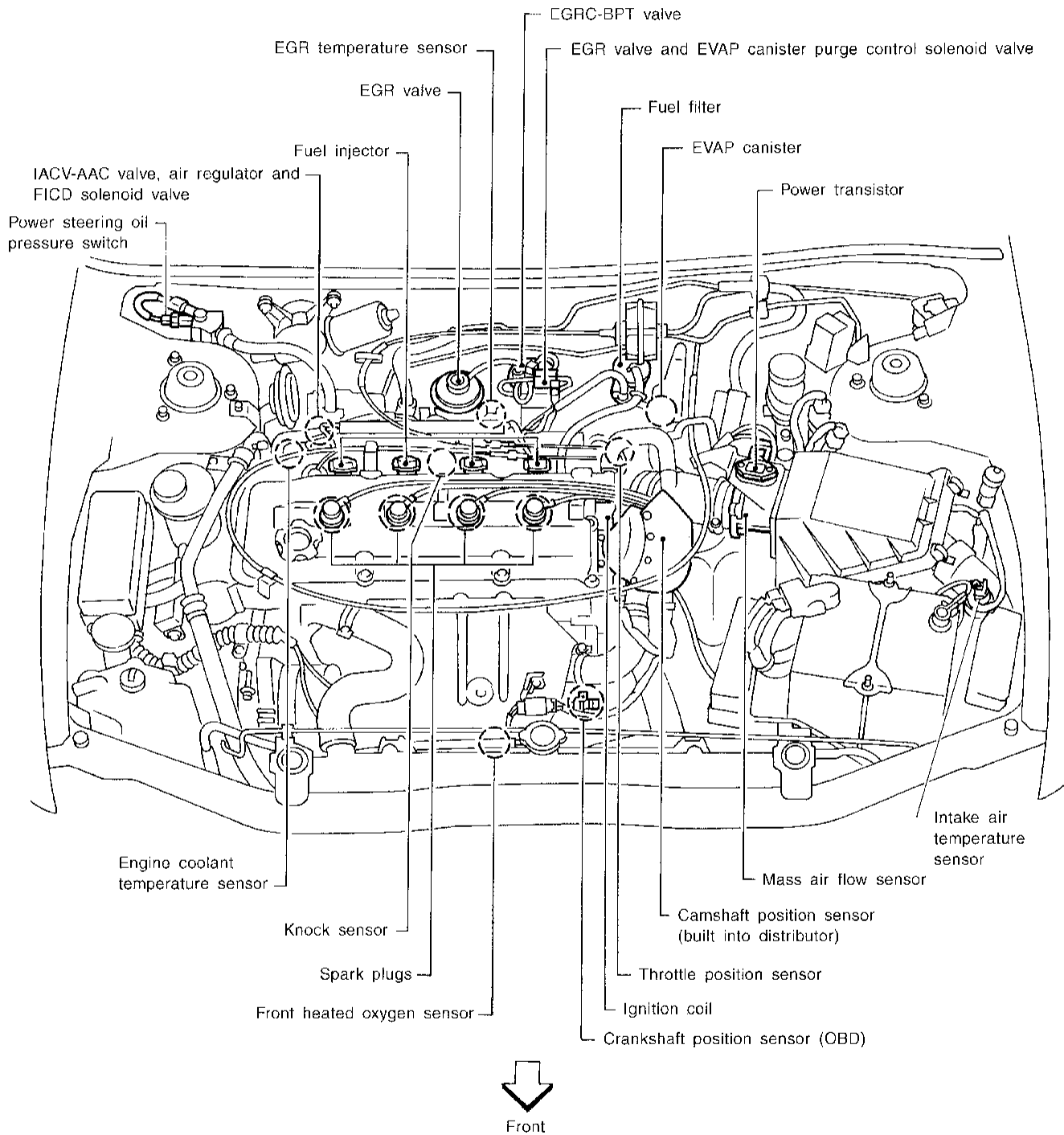
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↖ : Intake air flow
↘ : Exhaust gas flow

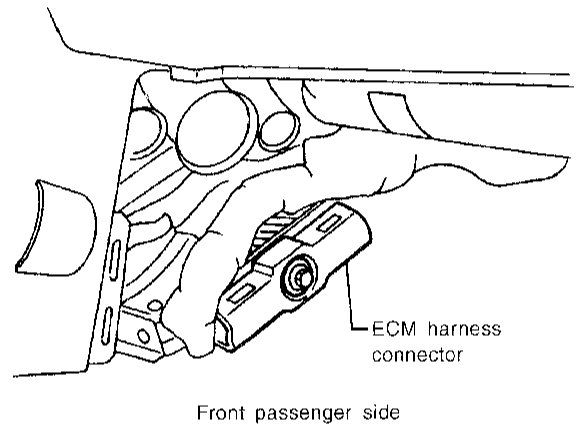
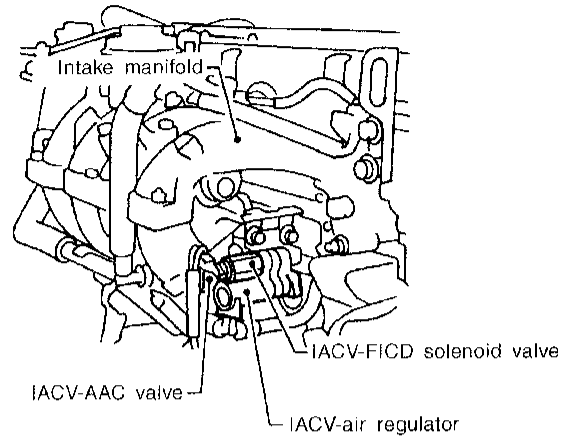
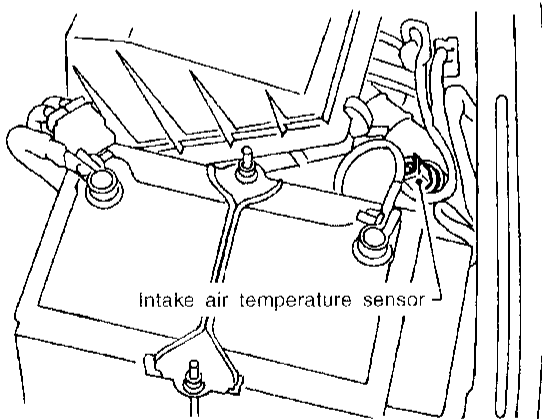
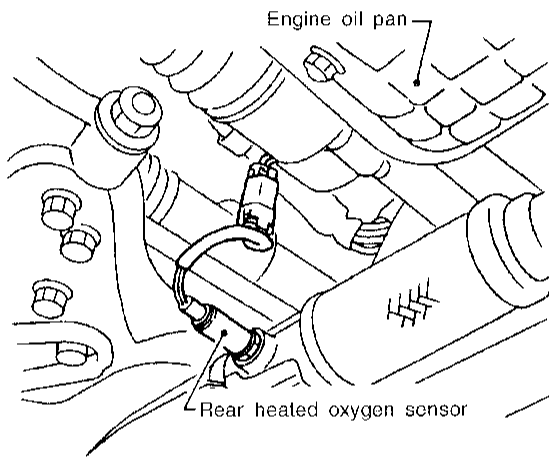
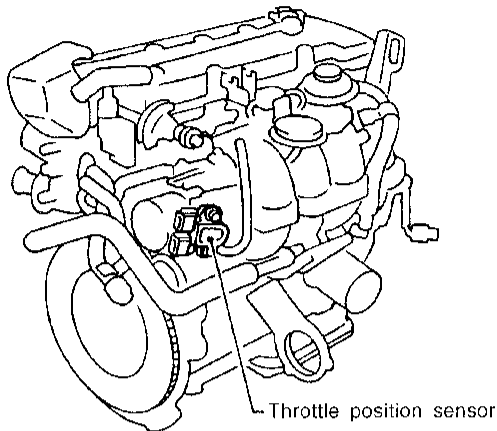
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

ECCS Component Parts Location



ENGINE AND EMISSION CONTROL OVERALL SYSTEM

ECCS Component Parts Location (Cont'd)



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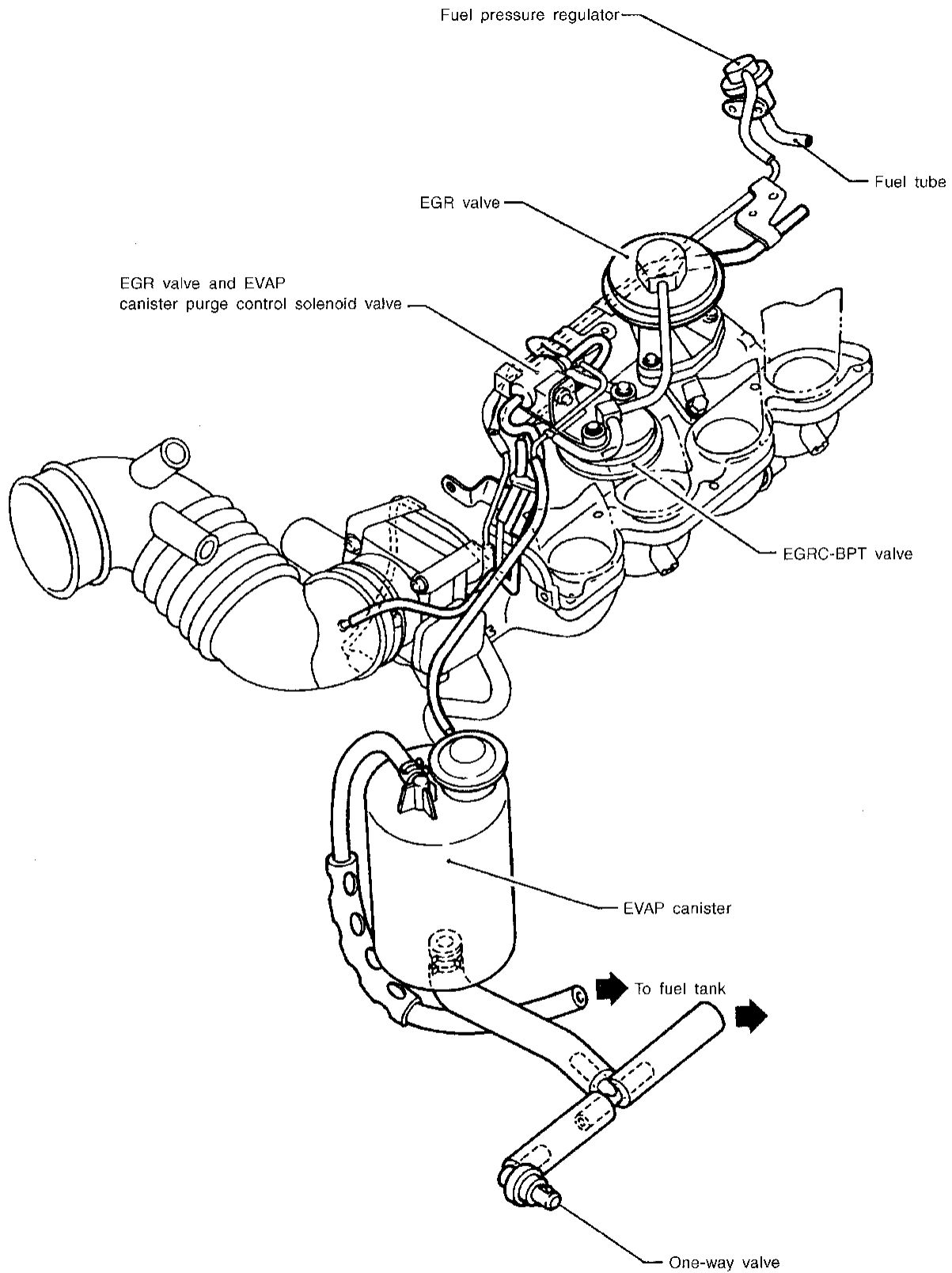
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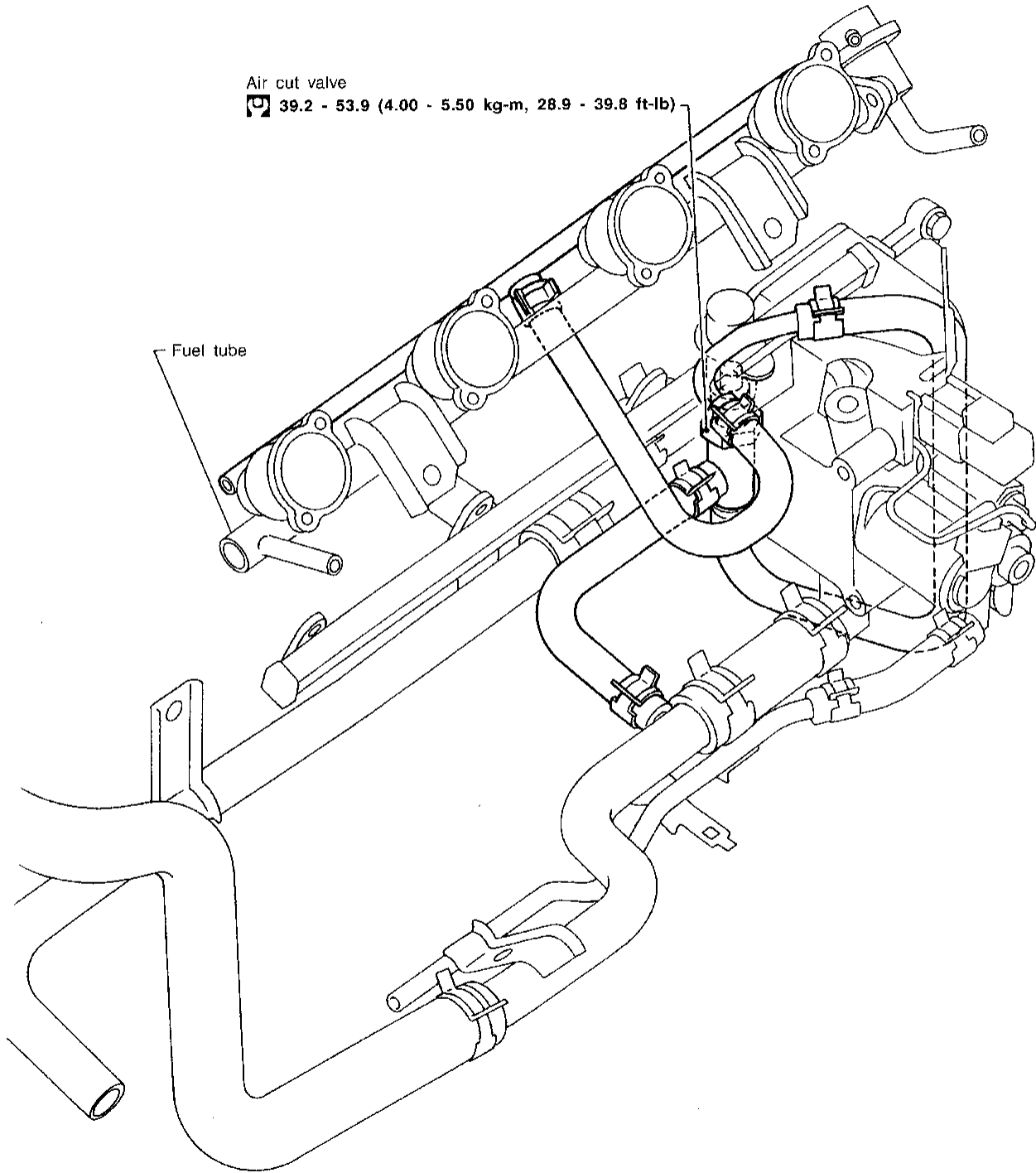
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Vacuum Hose Drawing



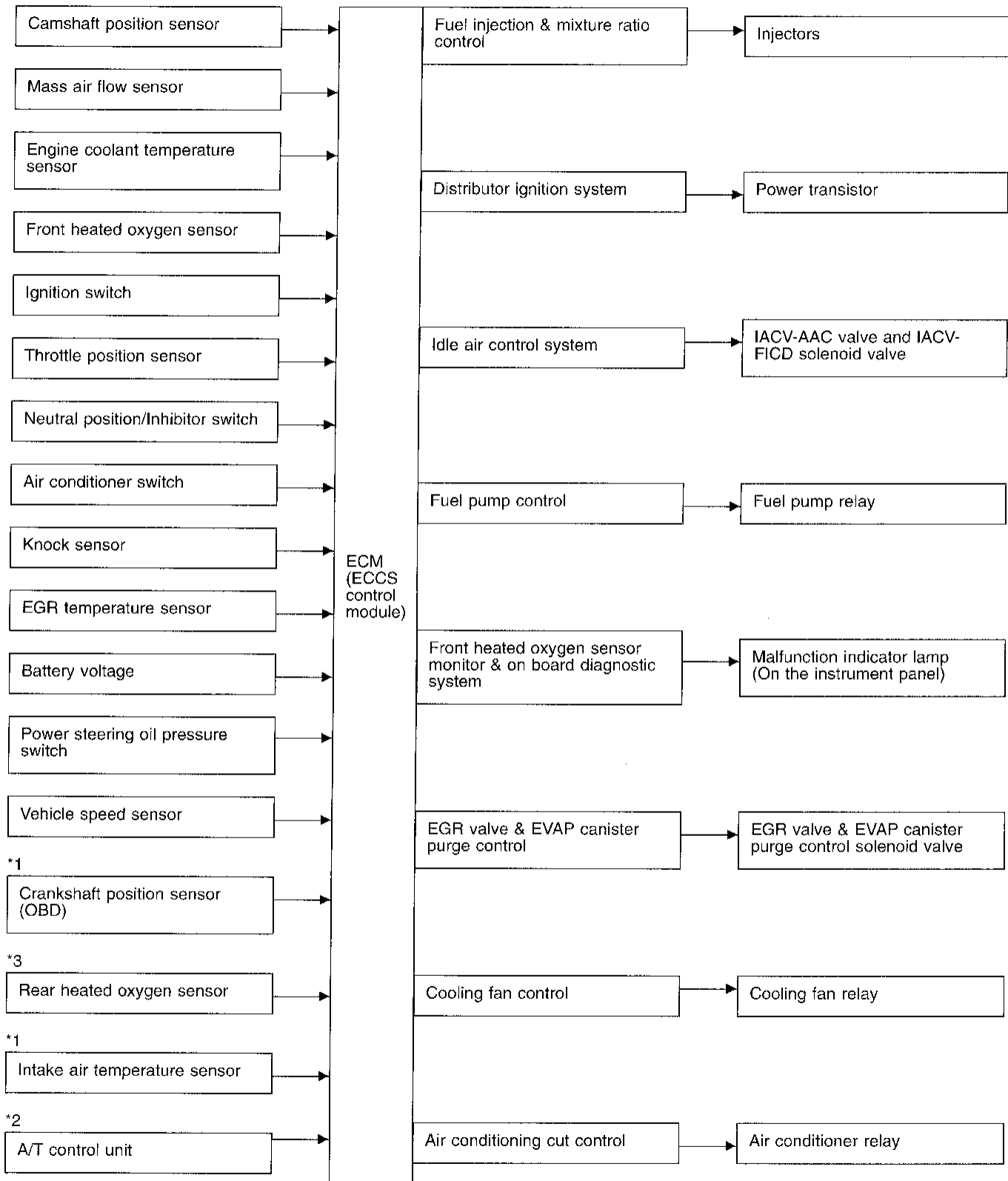
Air Assisted Injector System Hose Drawing

AT MODELS FOR CALIFORNIA



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- EL
- ICX

System Chart



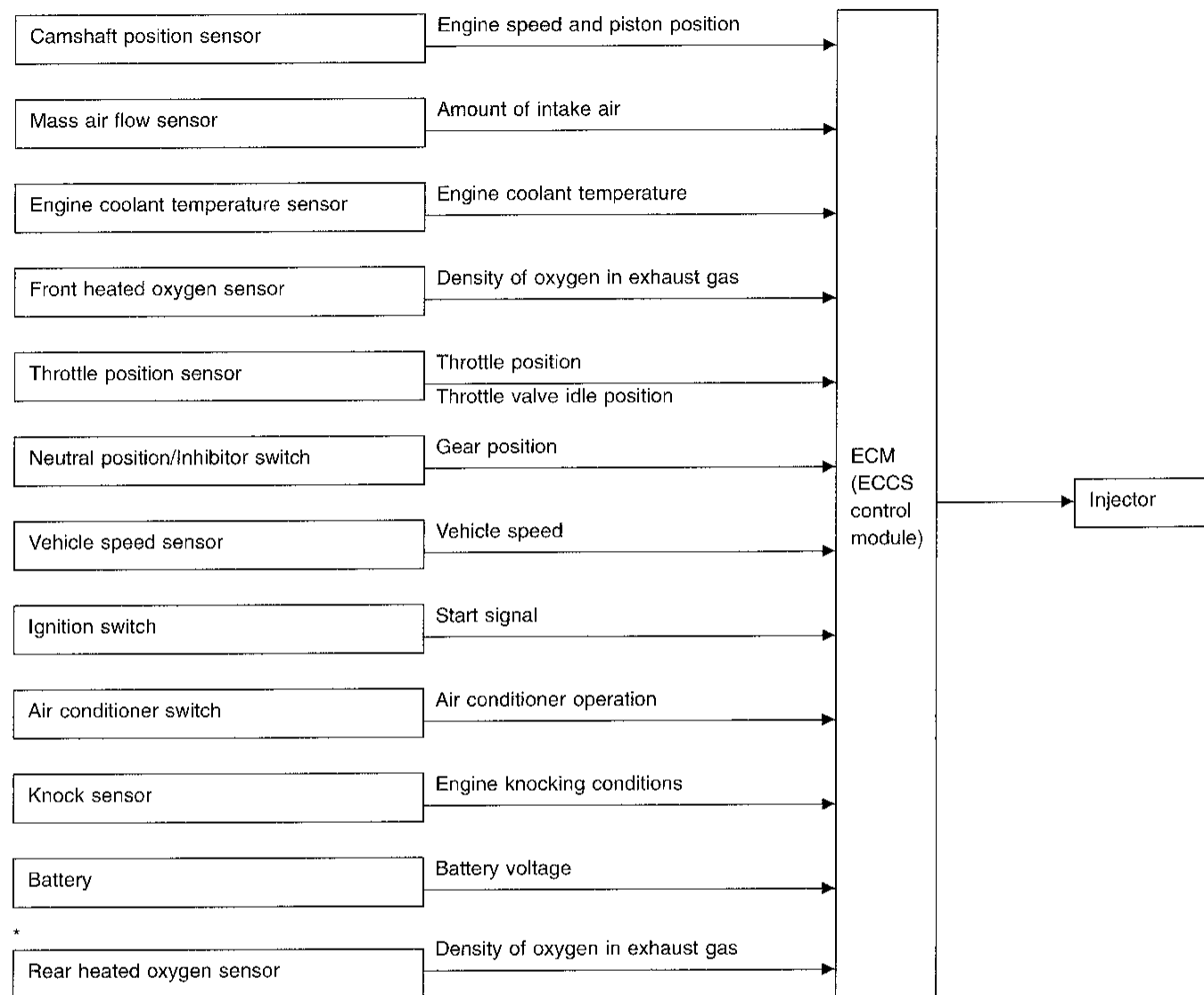
*1: These sensors are not directly used to control the engine system. They are used only for the on board diagnosis.

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

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

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



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

BASIC MULTIPORT FUEL INJECTION SYSTEM

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

〈Fuel increase〉

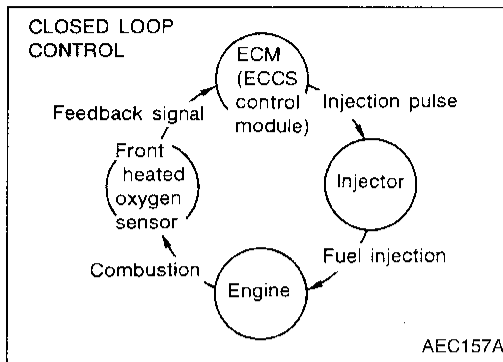
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from "N" to "D" (A/T models only)
- High-load, high-speed operation

〈Fuel decrease〉

- During deceleration
- During high speed operation

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

Multiport Fuel Injection (MFI) System (Cont'd) MIXTURE RATIO FEEDBACK CONTROL



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the front heated oxygen sensor, refer to EC-127. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

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

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

OPEN LOOP CONTROL

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

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

MIXTURE RATIO SELF-LEARNING CONTROL

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

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

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

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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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

"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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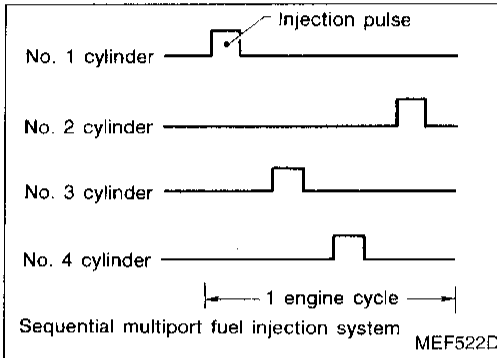
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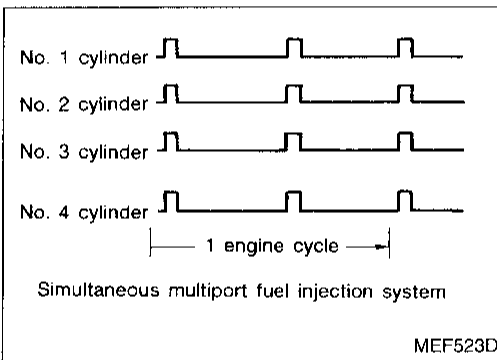


FUEL INJECTION TIMING

Two types of systems are used.

Sequential multiport fuel injection system

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



Simultaneous multiport fuel injection system

Fuel is injected simultaneously into all 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.

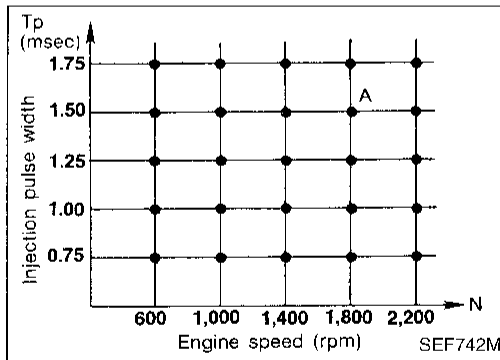
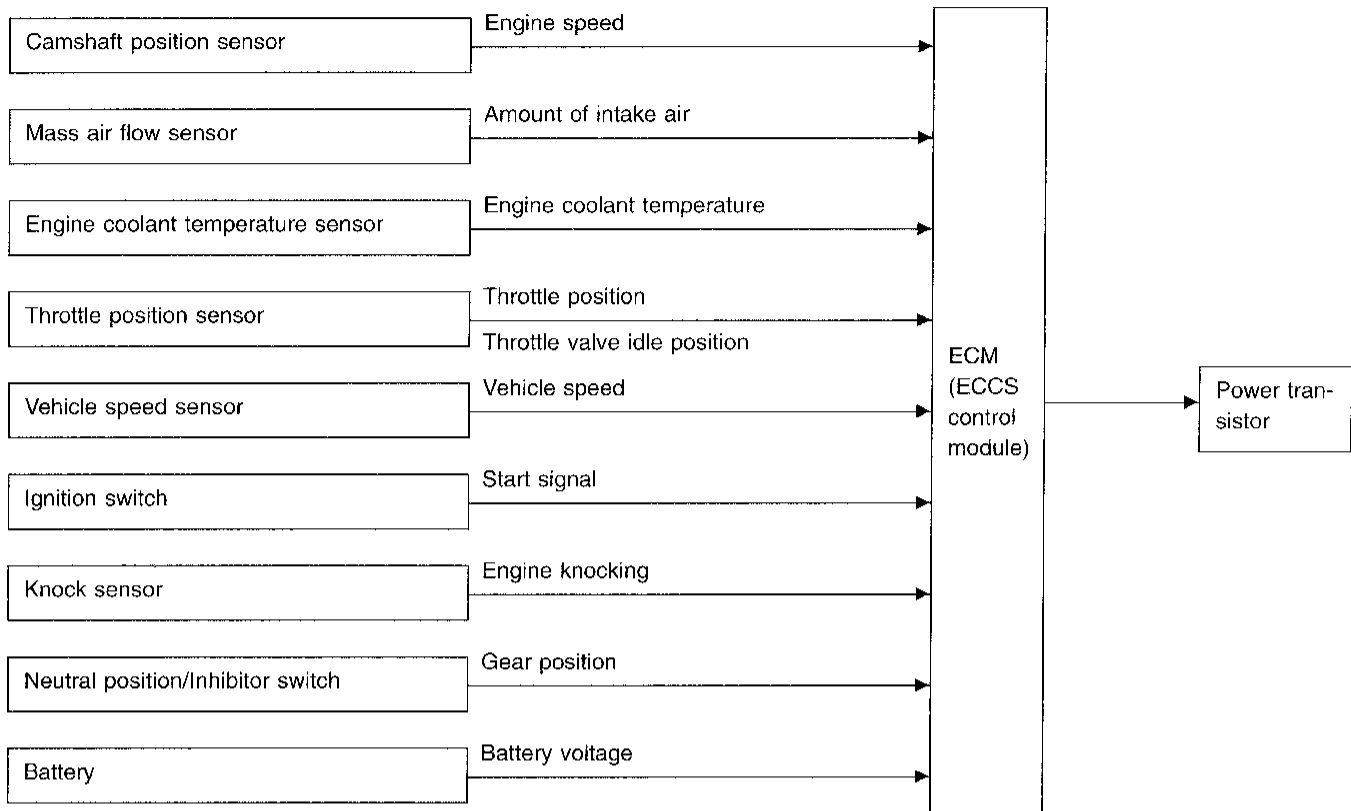
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

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



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.

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.

- At starting
- During warm-up
- At idle
- Hot engine operation
- During acceleration

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

Distributor Ignition (DI) System (Cont'd)

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.

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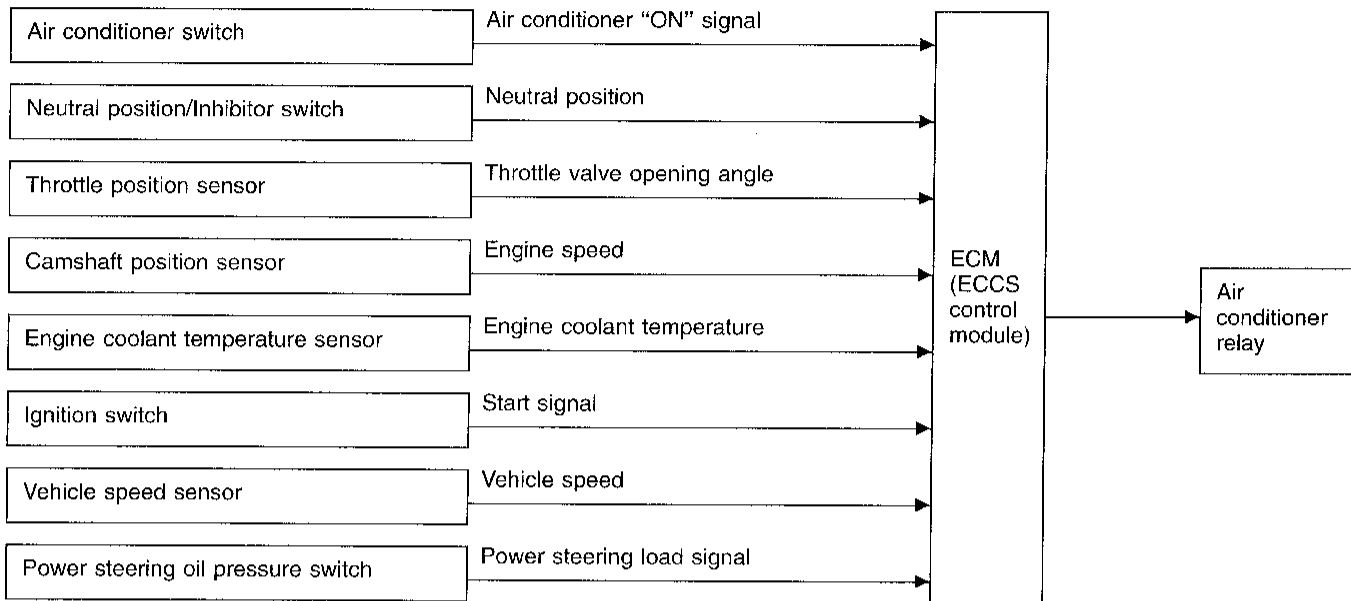
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Air Conditioning Cut Control

INPUT/OUTPUT SIGNAL LINE

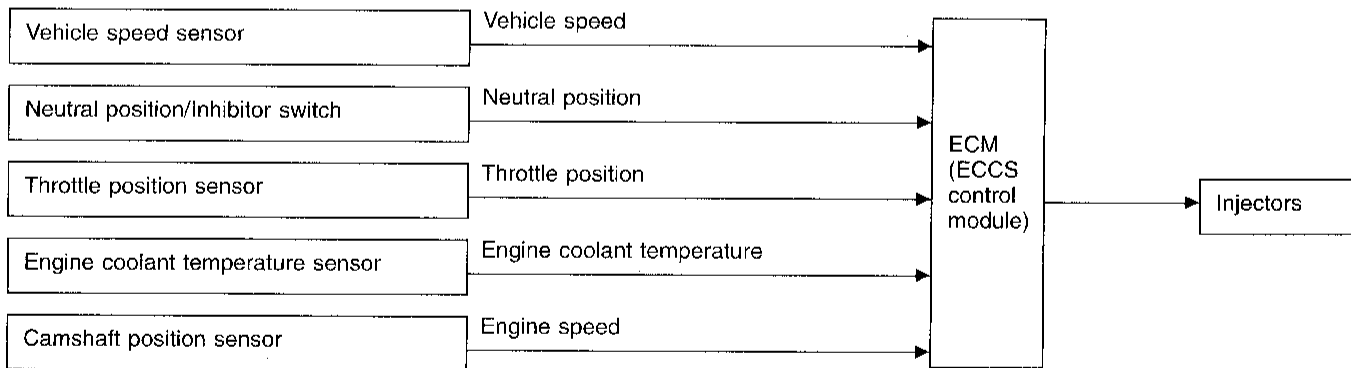


SYSTEM DESCRIPTION

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



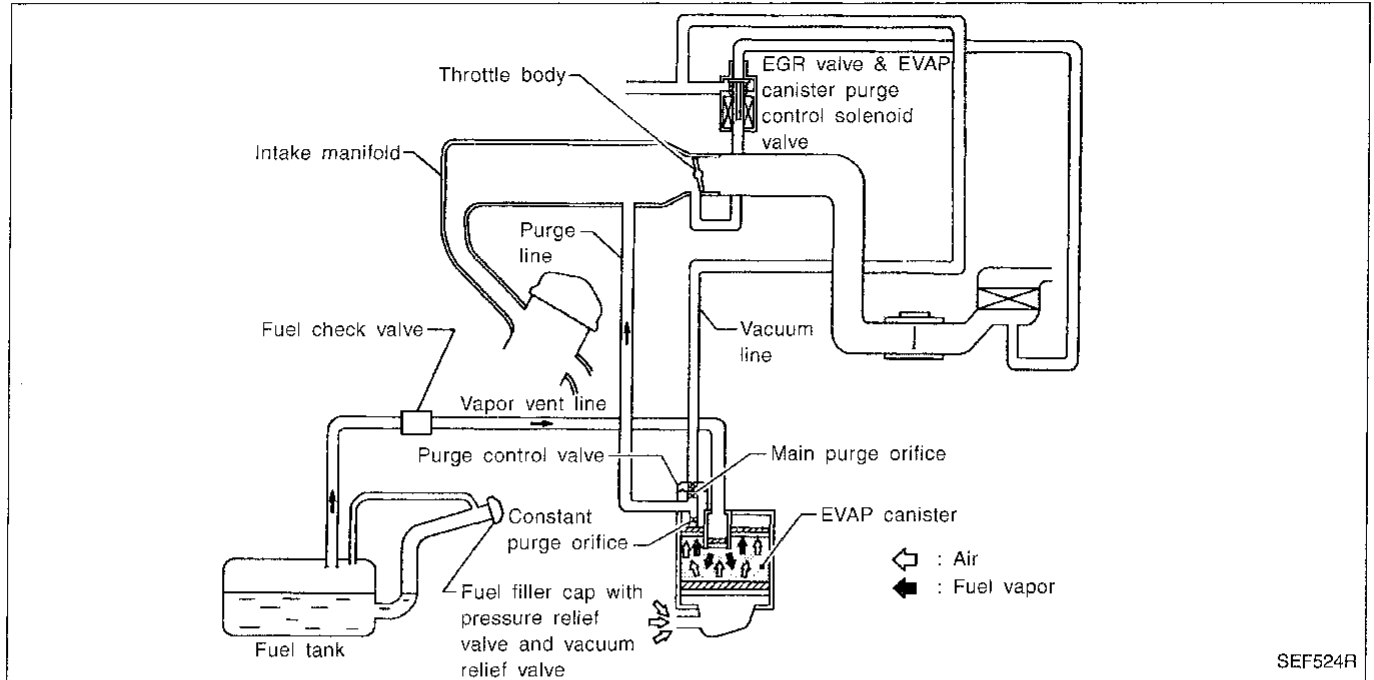
If the engine speed is above 3,000 rpm with no load (for example, in neutral and engine speed over 3,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:

This function is different than deceleration control listed under multiport fuel injection on EC-15.

Description



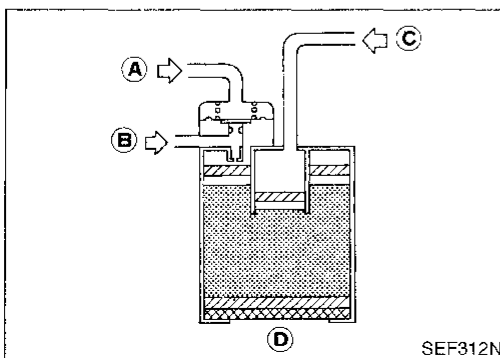
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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

When the engine is running, the air is drawn through the bottom of the EVAP 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

EVAP CANISTER

Check EVAP canister as follows:

1. Blow air in port (A) and check 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)]
3. Cover port (D) by hand.
4. Blow air in port (C) and check that it flows freely out of port (B).

EVAPORATIVE EMISSION SYSTEM

Inspection (Cont'd)

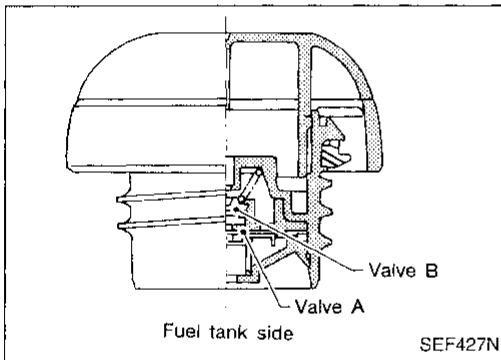
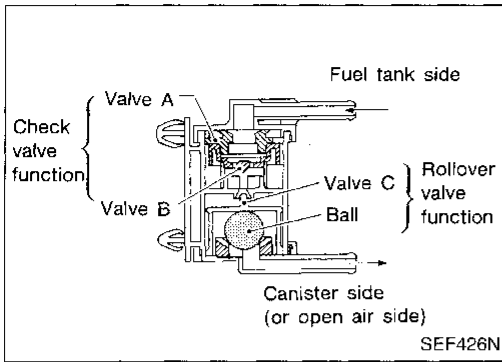
FUEL CHECK VALVE (With rollover valve)

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.

CAUTION:

Use only a genuine fuel filler cap as a replacement.

POSITIVE CRANKCASE VENTILATION

Description

This system returns blow-by gas to the intake collector.

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

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

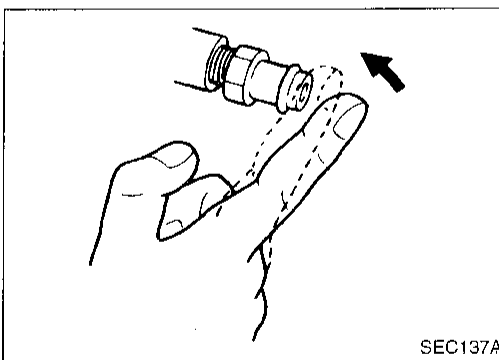
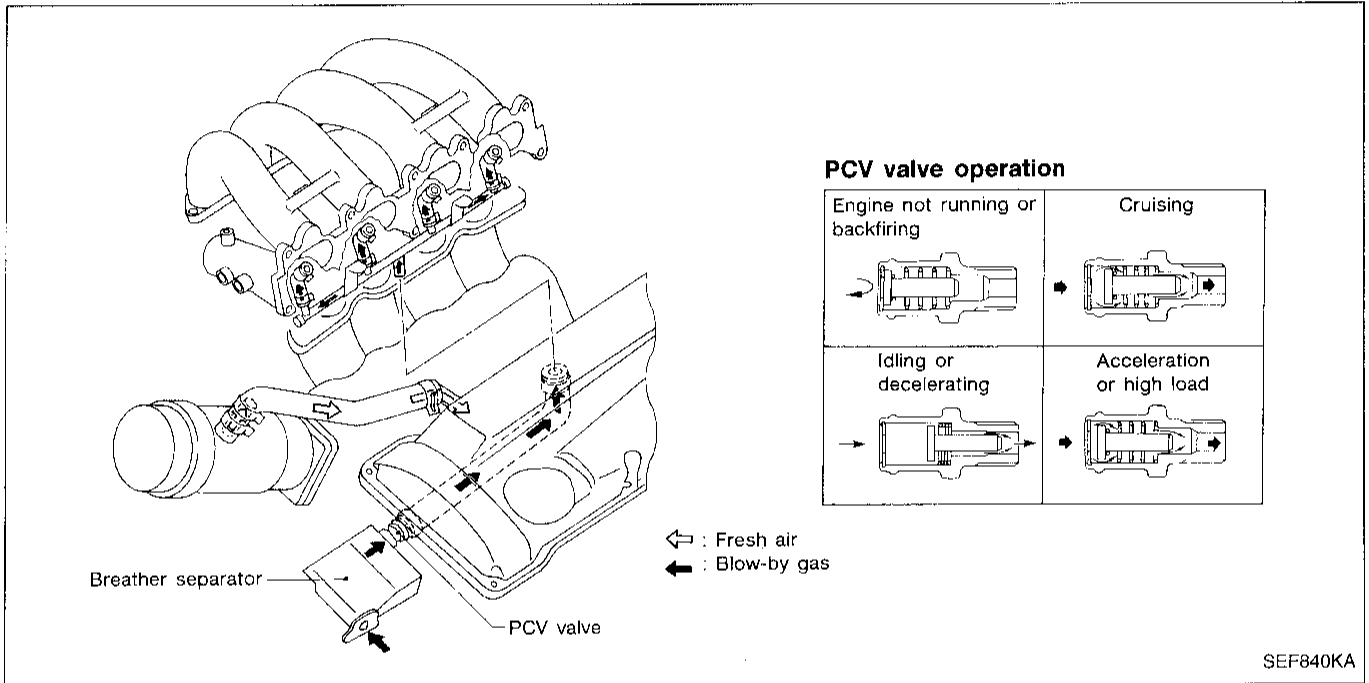
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air duct

into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

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

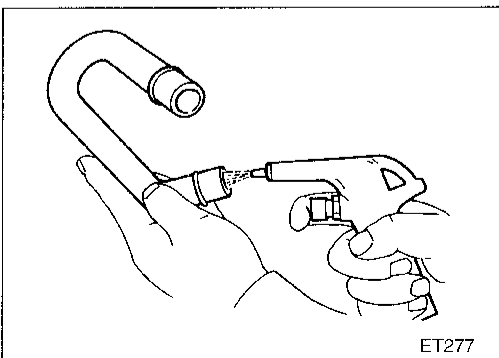
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the intake collector under all conditions.



Inspection

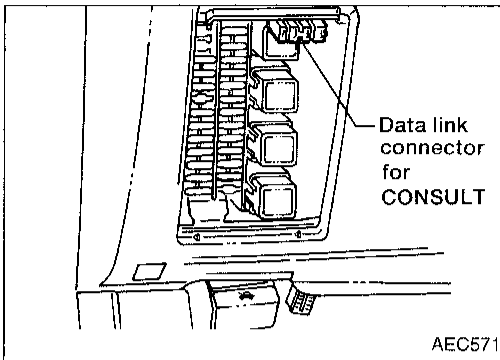
PCV (Positive Crankcase Ventilation)

With engine running at idle, remove PCV valve from breather separator. 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.



VENTILATION HOSE

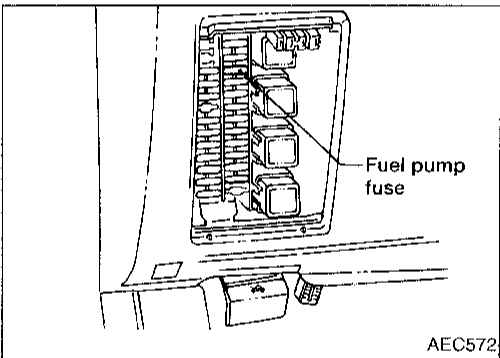
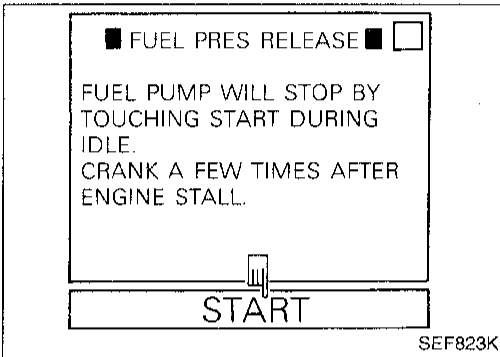
1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



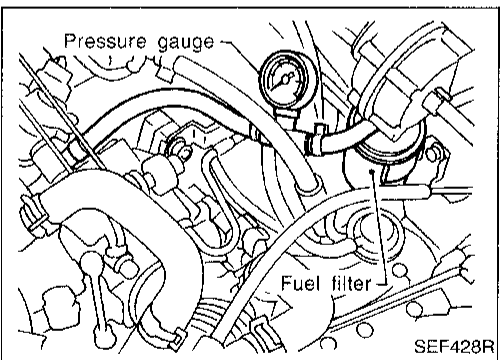
Fuel Pressure Release

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

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



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

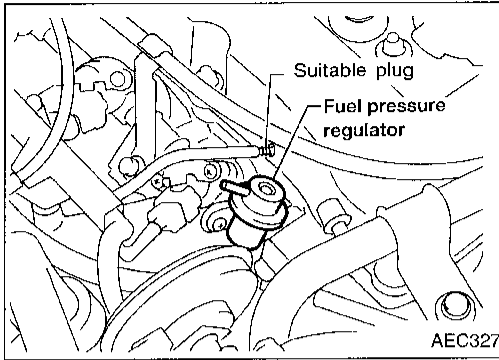


Fuel Pressure Check

- When reconnecting fuel line, always use new clamps.
 - Make sure that clamp screw does not contact adjacent parts.
 - Use a torque driver to tighten clamps.
 - Use Pressure Gauge to check fuel pressure.
 - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
1. Release fuel pressure to zero.
 2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
 3. Install pressure gauge between fuel filter and fuel tube.
 4. Start engine and check for fuel leakage.

BASIC SERVICE PROCEDURE

Fuel Pressure Check (Cont'd)



5. Read the indication of fuel pressure gauge.

At idling:

With vacuum hose connected

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

With vacuum hose disconnected

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

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

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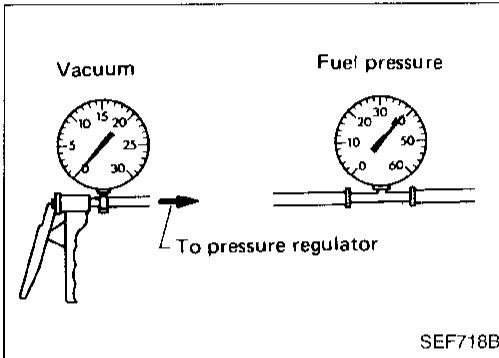
EL

IDX

Fuel Pressure Regulator Check

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.
4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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



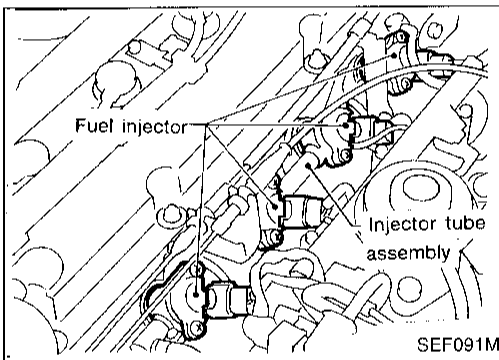
Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove injector tube assembly with injectors from intake manifold.
3. Remove injectors from injector tube assembly.
 - Push injector tail piece.
 - Do not pull on the connector.
4. Install injectors.
 - Clean exterior of injector tail piece.
 - Use new O-rings.

CAUTION:

After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.

5. Assemble injectors to injector tube assembly.
6. Install injector tube assembly to intake manifold.



Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

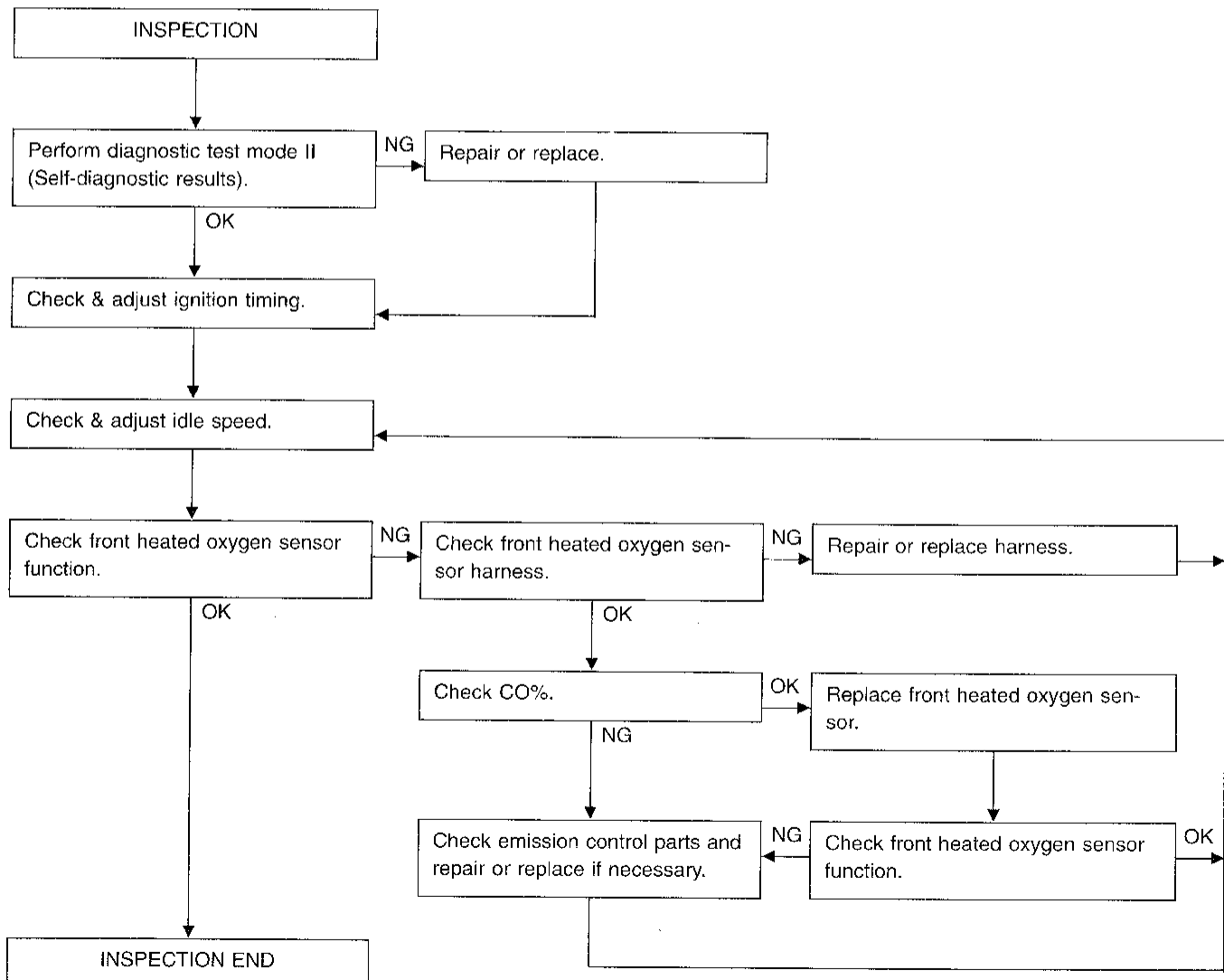
PREPARATION

- Make sure that the following parts are in good order.

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

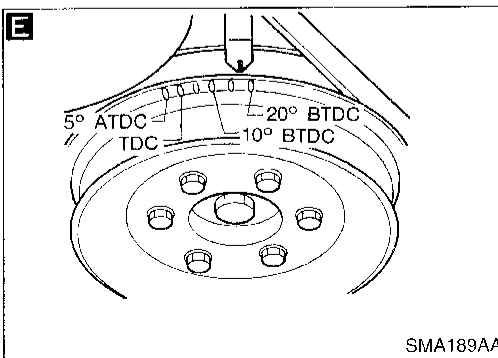
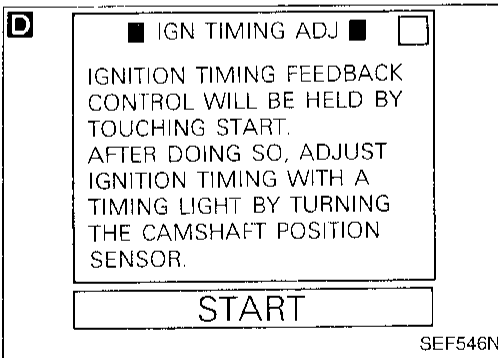
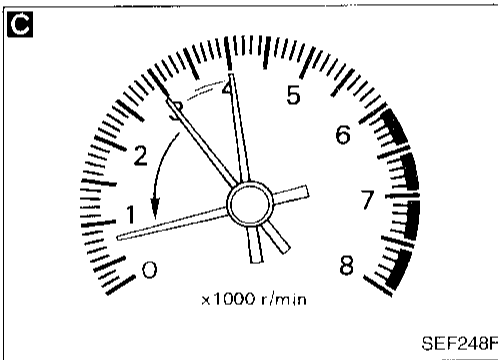
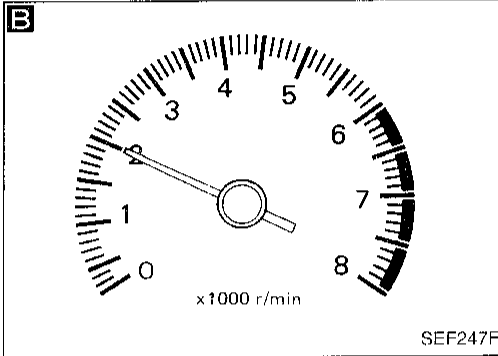
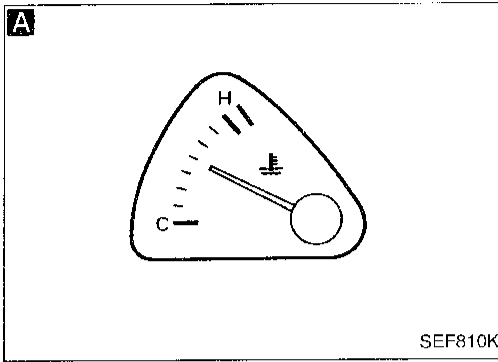
- On models equipped with air conditioner, checks should be carried out while the air conditioner is "OFF".
- On models equipped with automatic transaxle, when checking idle speed, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
- When measuring "CO"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

Overall inspection sequence



BASIC SERVICE PROCEDURE

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



START

Visually check the following:

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

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

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

Perform ECM Self-diagnosis.

OK → NG → Repair or replace components as necessary.

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

D

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

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

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

E Check ignition timing with a timing light.
20°±2° BTDC (A/T in "N" position)

OK → (Go to next page.)
NG → (Go to next page.)

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BASIC SERVICE PROCEDURE

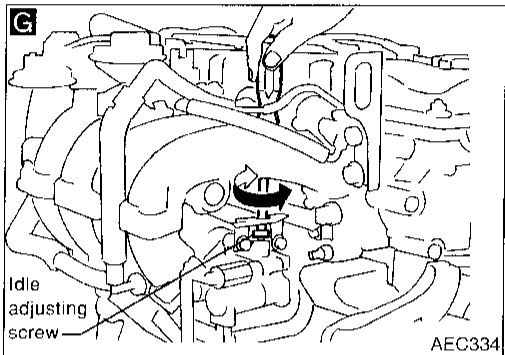
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

F ■ IGN TIMING ADJ ■ □

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

START

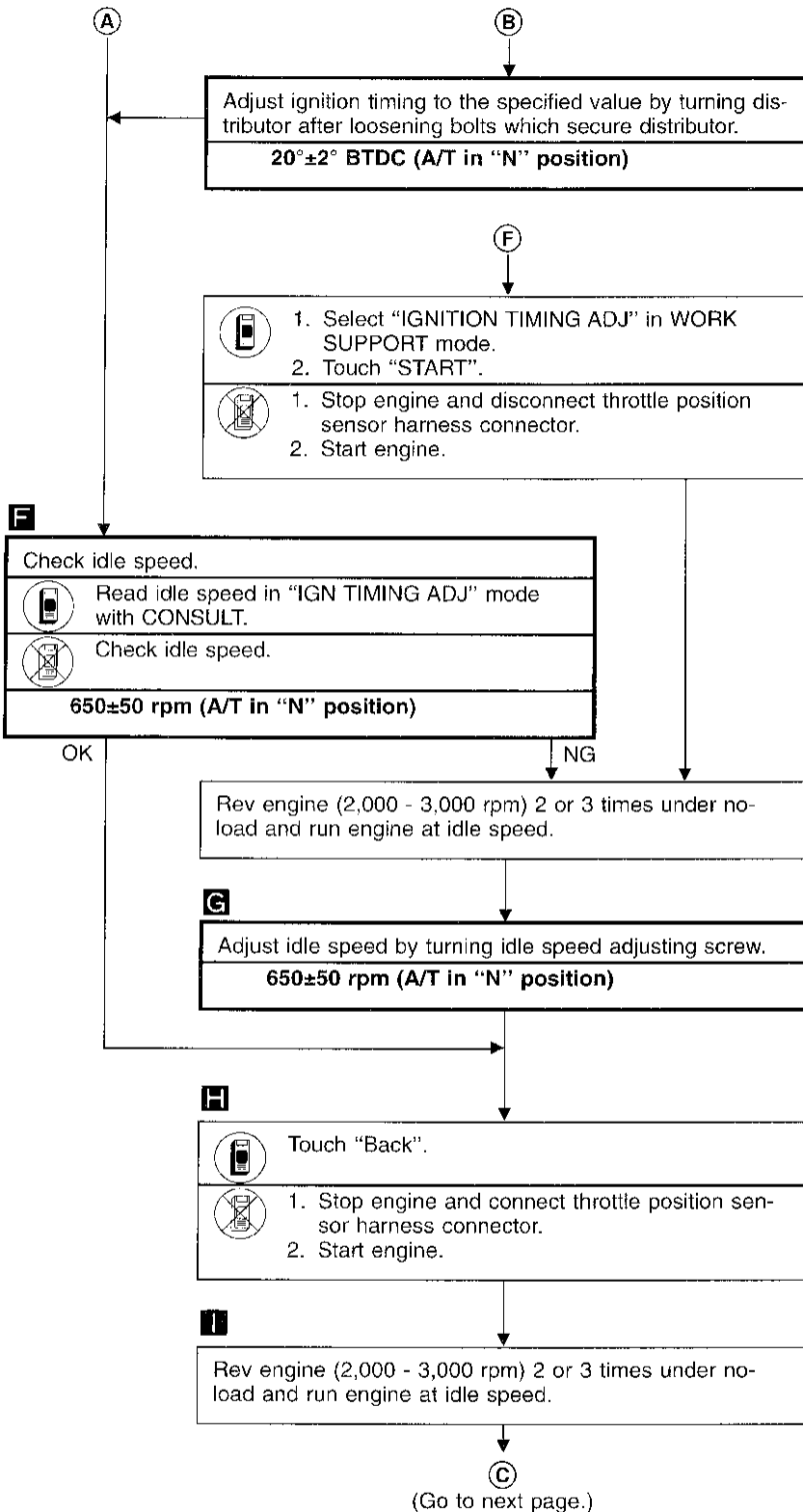
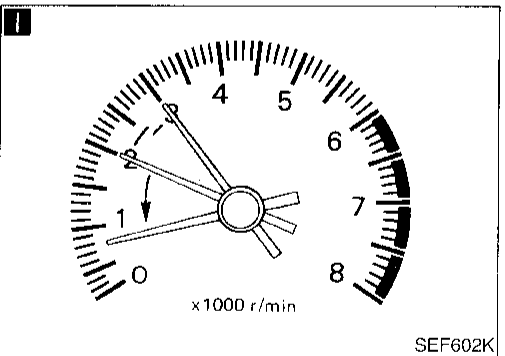
SEF546N



H

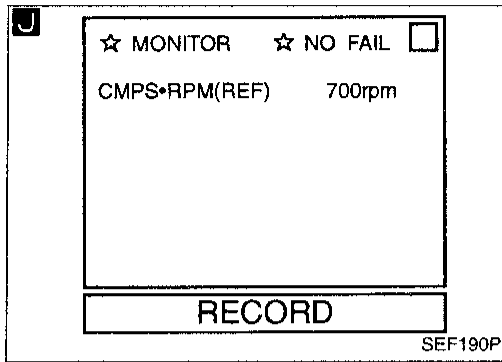
BACK	←	→	↑	↓	
MODE	LIGHT ON	LIGHT OFF	↑	↓	ENTER

SEF913J



BASIC SERVICE PROCEDURE

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



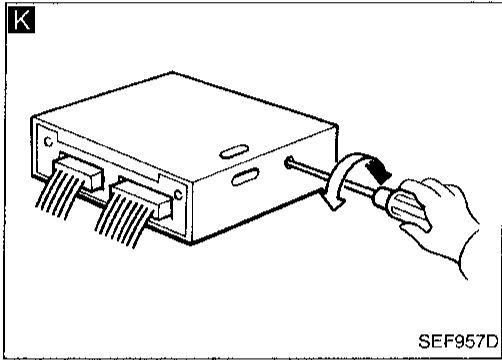
Ⓒ

Ⓝ

Check idle speed.

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

700±50 rpm (A/T in "N" position)



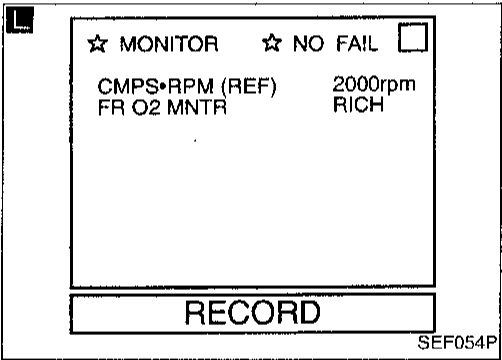
OK

NG

Check IACV-AAC valve and replace if necessary.

Check IACV-AAC valve harness and repair if necessary.

Check ECM function by substituting another known good ECM.

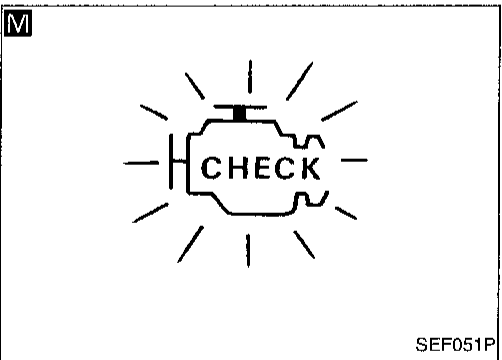


Ⓚ

Set the diagnostic test mode II (front heated oxygen sensor monitor).

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

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



Ⓛ Ⓜ

Check front heated oxygen sensor signal.

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

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

NG → Ⓓ (Go to next page.)

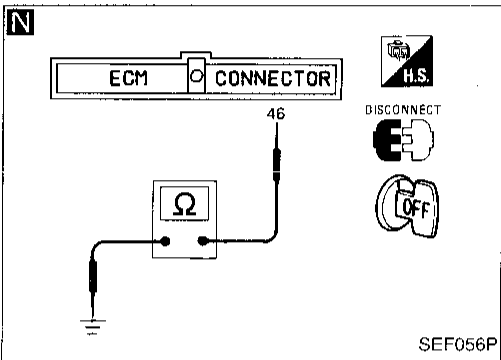
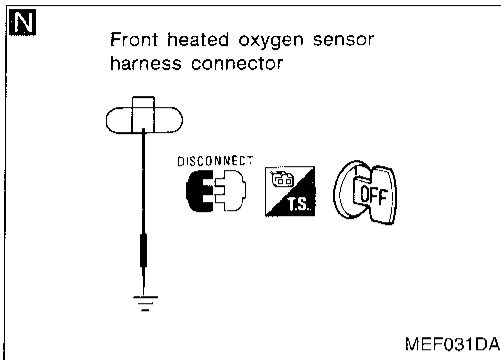
OK

INSPECTION END

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BASIC SERVICE PROCEDURE

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



D

N

Check front heated oxygen sensor harness:

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

Continuity exists ... OK
Continuity does not exist ... NG

OK

NG

Repair harness.

F
(Go to EC-28.)

Connect ECM harness connector to ECM.

- E**
1. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
 2. Set "COOLANT TEMP" at 5°C (41°F).
- X**
1. Disconnect engine coolant temperature sensor harness connector.
 2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.

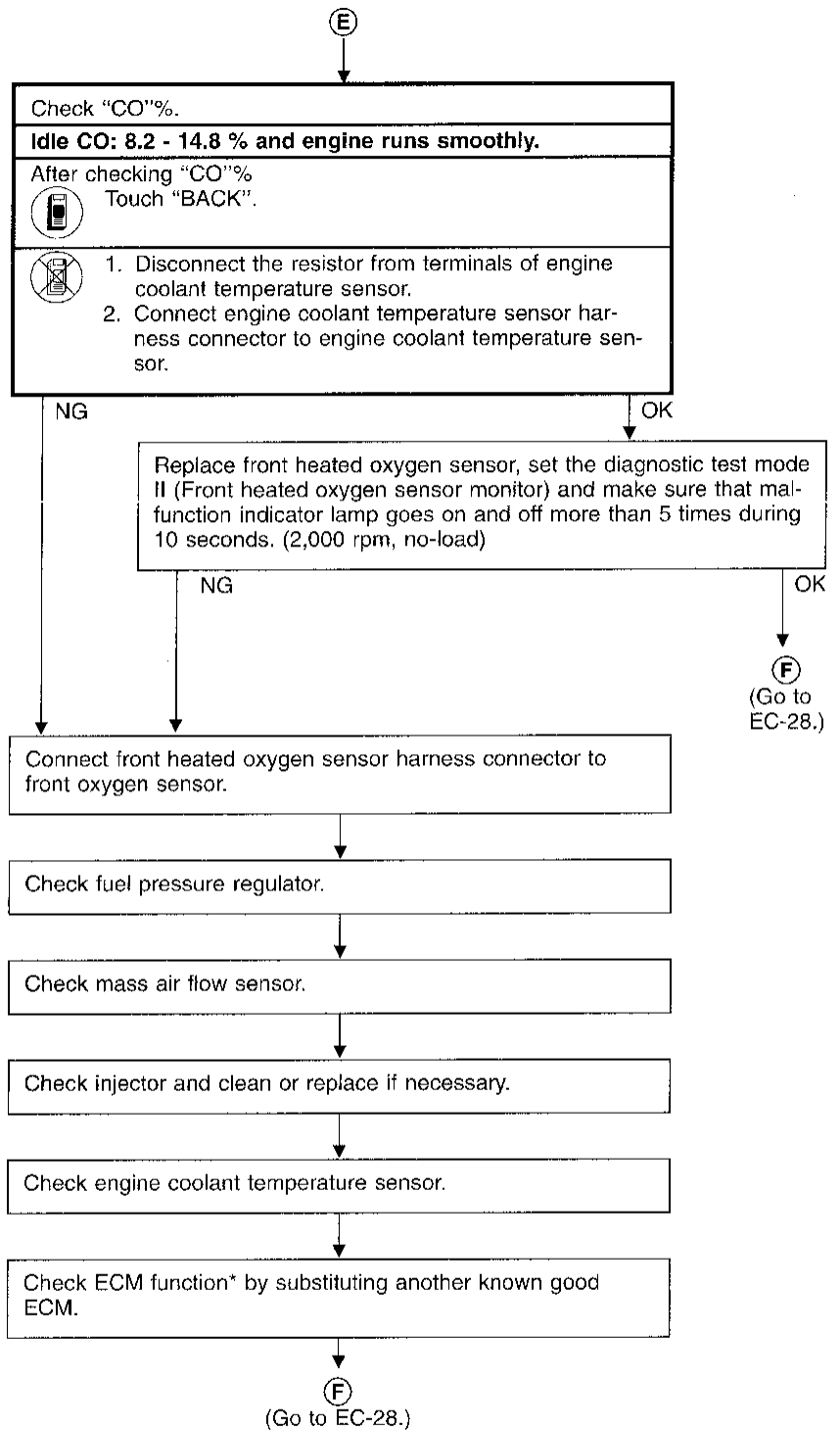
Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. (Be careful to start engine after setting "COOLANT TEMP" or installing a 4.4 kΩ resistor.)

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

E
(Go to next page.)

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.

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Introduction

The ECM (ECCS control module) has an on board diagnostic system, which detects engine system malfunctions related to sensors or actuators. The ECM also has a memory function which detects various emission-related diagnostic information. This includes:

- Diagnostic Trouble Code (DTC).....Mode 3 of SAE J1979
- Freeze Frame dataMode 2 of SAE J1979
- System Readiness Test (SRT) code.....Mode 1 of SAE J1979
- 1st Trip Diagnostic Trouble Code (1st Trip DTC)Mode 7 of SAE J1979
- 1st Trip Freeze Frame data
- Test values and Test limitsMode 6 of SAE J1979

These data can be verified using procedures listed in the table below.

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

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode (Refer to EC-83.).

Two Trip Detection Logic

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

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

Items	MIL			DTC		1st trip DTC	
	1st trip		2nd trip lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up					
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 (0701, 0605 - 0608) is being detected	X			X		X	
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 (0701, 0605 - 0608) has been detected		X		X		X	
Closed loop control — DTC: P0130 (0307)		X		X		X	
Fail-safe items (Refer to EC-83.)		X		X*1		X*1	
Except above			X		X	X	X

*1: Except "ECM".

Emission-related Diagnostic Information

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained after the ECM memory is cleared. When the self-diagnosis results in "NG" for the 1st trip, the 1st trip DTC is stored in the ECM memory. If the self-diagnosis results in "OK" for the 2nd trip, the 1st trip DTC will be cleared from the ECM memory. If, on the other hand, the self-diagnosis results in "NG" for the 2nd trip, both the DTC and the 1st trip DTC will be stored in the ECM memory and the MIL will illuminate. In other words, the DTC is stored in the ECM memory and the MIL illuminates when the self-diagnosis results in "NG" in two consecutive trips. If a non-diagnostic operation (For example: Driving pattern A. Refer to EC-42.) is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored in the ECM memory. For items whose diagnosis results in "NG" after only one trip (the MIL illuminates), both the DTC and the 1st trip DTC will be stored in the ECM memory.

The 1st trip DTC, along with the DTC, is cleared from the ECM memory in a method outlined later. (Refer to EC-40.) For items whose 1st trip DTCs are displayed, refer to EC-38. These items are prescribed by legal regulations to continuously monitored system/components. However, other items also can be displayed on the CONSULT screen or with the ECM set in Diagnostic Test Mode II (Self-diagnostic results). 1st trip DTC detection is performed without causing the MIL to light up. This does not warn the driver of a problem. Also, the result of the 1st trip DTC detection does not bring the vehicle owner any disadvantage when the vehicle is taken in for the I/M test. When the 1st trip DTC is detected, Nissan first clears it and then tries to perform "DTC confirmation procedure" or "Overall function check" to analyze the problem. If the problem is duplicated, Nissan determines the problem as a malfunctioning item, requiring repair.

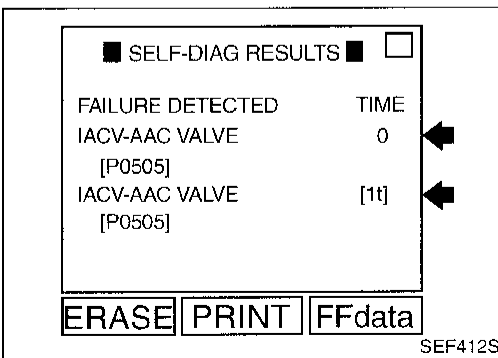
The 1st trip DTC is specified in Mode 7 of SAE J1979.

How to read DTC and 1st trip DTC

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

1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 0101, 0201, 1003, 1104, etc.
These DTCs are controlled by NISSAN.
2. CONSULT or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic 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 as shown below. Therefore, using CONSULT (if available) is recommended.**



Time data which is pointed by "←" indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be "0". On the other hand, if the 1st trip DTC is stored in the ECM, the time data will be "[1t]".

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

FREEZE FRAME DATA AND 1ST TRIP 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 term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction.

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

Only one, either 1st trip freeze frame data or freeze frame data can be displayed. Therefore, the ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 (0701, 0605 - 0608) Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114)
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 1st trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. If data already stored in the ECM memory and data which occurs later have the same priority, the preceding freeze frame data remains unchanged in the ECM memory. 1st trip freeze frame data is replaced by the most recent data. Both the freeze frame data and 1st trip freeze frame data are cleared from the ECM memory, along with DTC using procedures explained later. (Refer to EC-40.)

SYSTEM READINESS TEST (SRT) CODE


Inspection/Maintenance (I/M) tests of the on board diagnostic (OBD) II system may become the legal requirements in some states/areas. All SRT codes must be set in this case. Unless all SRT codes are set, conducting the I/M test may not be allowed.

SRT codes are set after diagnosis has been performed two or more times. This occurs regardless of whether the diagnosis results in “OK” or “NG”, and whether or not the diagnosis is performed in consecutive trips. The table below lists the four SRT items (7 diagnoses) for the ECCS used in U13 models.

SRT items	Self-diagnostic test items
Catalyst monitoring	● Three way catalyst function P0420 (0720)
Oxygen sensor monitoring	● Front heated oxygen sensor P0130 (0503) ● Rear heated oxygen sensor P0136 (0707)
Oxygen sensor heater monitoring	● Front heated oxygen sensor heater P0135 (0901) ● Rear heated oxygen sensor heater P0141 (0902)
EGR system monitoring	● EGR function P0400 (0302) ● EGRC-BPT valve function P0402 (0306)

Together with the DTC, the SRT code is cleared from the ECM memory using the method described later (Refer to EC-40). This means that after ECCS components/system are repaired or after battery terminals remain disconnected for more than 24 hours, all SRT codes are possibly cleared from the ECM memory.

How to display SRT code

 1. Selecting “SRT” in “SRT-OBT TEST VALUE” mode with CONSULT
For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT screen; for items whose SRT codes are not set, “INCMP” is displayed.

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

How to set SRT code

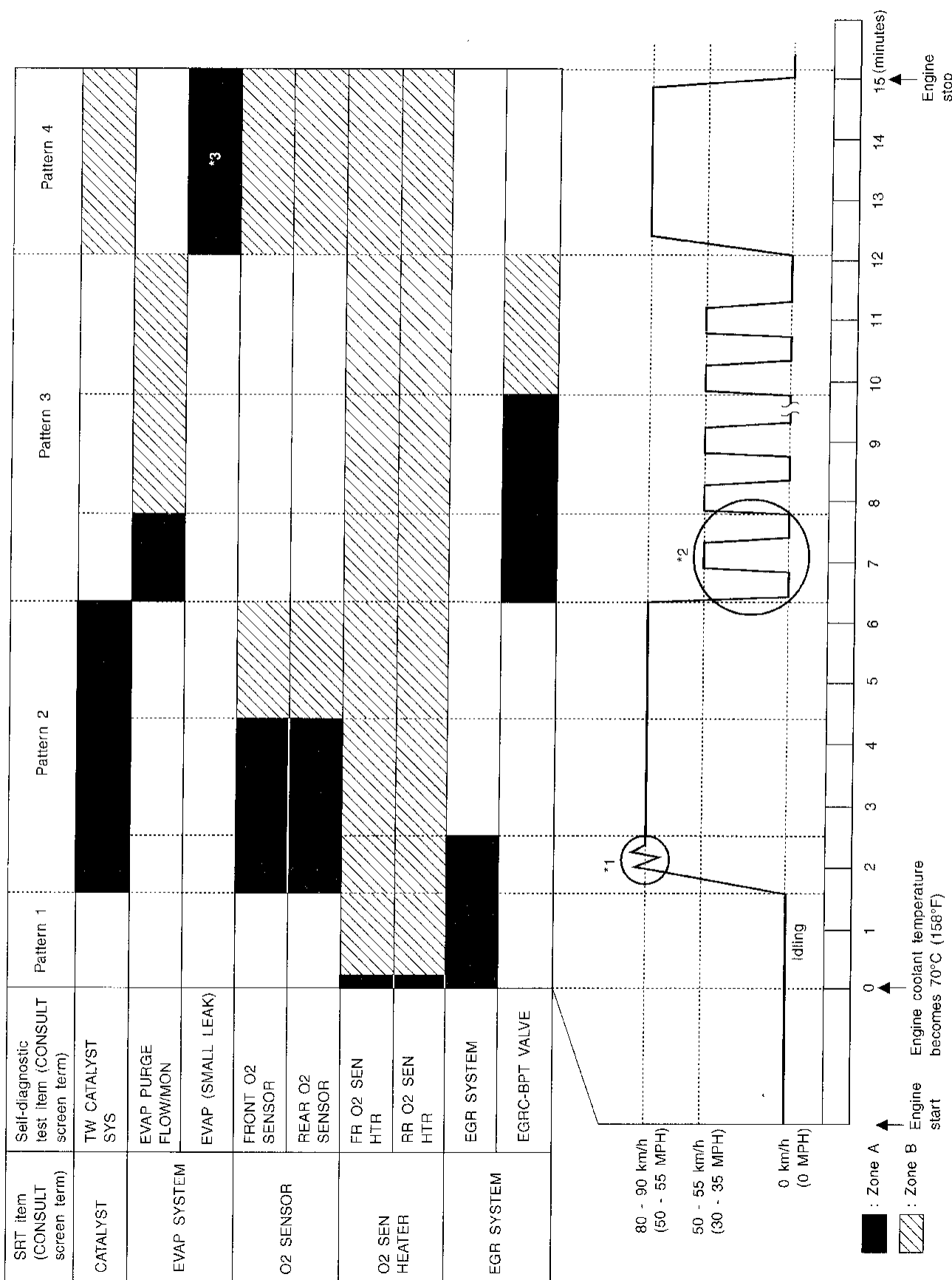
To set all SRT codes, all diagnoses indicated above must be performed two or more times. Each diagnosis may require a long period of actual driving under various conditions. The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. This type of driving pattern should be performed two times or more to set all SRT codes. Self-diagnoses of “EVAP PURGE FLOW/MON”, “EVAP (SMALL LEAK)” are not provided for U13 models. Using driving patterns 1 through 3 is adequate.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

Driving pattern

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

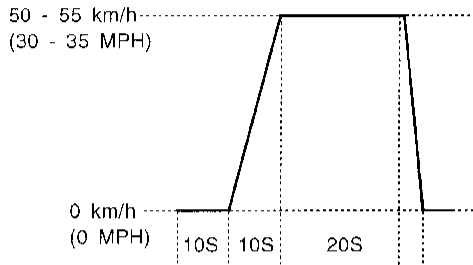


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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

- *1: Depress the accelerator pedal until vehicle speed is 80 km/h (50 MPH), then release the accelerator pedal. Depress the accelerator pedal until vehicle speed is 80 km/h (50 MPH) again.
- *2: Operate the vehicle in the following driving pattern.



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- *3: The driving pattern may be omitted when EVAP (SMALL LEAK) checks are performed using the FUNCTION TEST mode of CONSULT.

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
 - Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest. Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.
- *: Normal conditions refer to the following:
- Sea level
 - Flat road
 - Ambient temperature: 20 - 30°C (68 - 86°F)
 - Diagnosis is performed as quickly as possible under normal conditions.
- Under different conditions [For example: ambient temperature is other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

- Pattern 1:
- The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals ⑤1 and ⑤0 is 3.0 - 4.3V).
 - The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals ⑤1 and ⑤0 is lower than 1.4V).
- Pattern 2:
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.
- Pattern 3:
- The driving pattern outlined in *2 must be repeated at least 3 times.
 - On M/T models, shift gears following "suggested upshift speeds" schedule at right.
- Pattern 4:
- Tests are performed after the engine has been operated for at least 12 minutes.
 - The accelerator pedal must be held very steady during steady-state driving.
 - If the accelerator pedal is moved, the test must be conducted all over again.

Suggested transmission gear position for A/T models.

Set the selector lever in the "D" position with the overdrive on-off switch turned on.

Suggested upshift speeds for M/T models

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

For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:

Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)
1st to 2nd	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)
3rd to 4th	58 (36)	48 (30)
4th to 5th	64 (40)	63 (39)

For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:

Gear change	km/h (MPH)
1st to 2nd	24 (15)
2nd to 3rd	40 (25)
3rd to 4th	64 (40)
4th to 5th	72 (45)

Suggested maximum speed in each gear

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

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

TEST VALUE AND TEST LIMIT

The test value is a parameter used to determine whether diagnostic test is "OK" or "NG" while the ECM is monitored during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (7 diagnoses).

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

SRT item (CONSULT display)	Self-diagnostic test item	TID*1	CID*1	Test value	Test limit	Display
CATALYST	Warm-up three way catalyst function	01H	01H	Parameter 1	Max.	○
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Parameter 1	Max.	—
	EVAP control system purge flow monitoring	06H	83H	Parameter 2	Min.	—
O2 SENSOR	Front heated oxygen sensor	09H	04H	Parameter 1	Max.	○
		0AH	84H	Parameter 2	Min.	○
		0BH	04H	Parameter 3	Max.	○
		0CH	04H	Parameter 4	Max.	○
	Rear heated oxygen sensor	0DH	04H	Parameter 5	Max.	○
		19H	86H	Parameter 6	Min.	○
		1AH	86H	Parameter 7	Min.	○
		1BH	06H	Parameter 8	Max.	○
		1CH	06H	Parameter 9	Max.	○
O2 SENSOR HEATER	Front heated oxygen sensor heater	29H	08H	Parameter 1	Max.	○
		2AH	88H	Parameter 1	Min.	○
	Rear heated oxygen sensor heater	2DH	0AH	Parameter 1	Max.	○
		2EH	8AH	Parameter 1	Min.	○
EGR SYSTEM	EGR function	31H	8CH	Parameter 1	Min.	○
		32H	8CH	Parameter 2	Min.	○
		33H	8CH	Parameter 3	Min.	○
		34H	8CH	Parameter 4	Min.	○
		35H	0CH	Parameter 5	Max.	○
	EGRC-BPT valve function	36H	0CH	Parameter 6	Max.	○
		37H	8CH	Parameter 7	Min.	○

*1: TID and CID are hexadecimals and are shown only on GST.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
NO SELF-DIAGNOSTIC FAILURE INDICATED	P0000	0505	—	—	—	—
MASS AIR FLOW SEN	P0100	0102	—	—	X	EC-103
INT AIR TEMP SEN	P0110	0401	—	—	X	EC-108
COOLANT TEMP SEN	P0115	0103	—	—	X	EC-113
THROTTLE POSI SEN	P0120	0403	—	—	X	EC-117
*COOLANT TEMP SEN	P0125	0908	—	—	X	EC-122
CLOSED LOOP	P0130	0307	—	—	X	EC-132
FRONT O2 SENSOR	P0130	0503	X	X	X*3	EC-127
FR O2 SEN HTR	P0135	0901	X	X	X*3	EC-133
REAR O2 SENSOR	P0136	0707	X	X	X*3	EC-136
RR O2 SEN HTR	P0141	0902	X	X	X*3	EC-141
FUEL SYS LEAN	P0171	0115	—	—	X	EC-145
FUEL SYS RICH	P0172	0114	—	—	X	EC-150
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-155
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-155
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-155
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-155
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-155
KNOCK SENSOR	P0325	0304	—	—	X	EC-159
CRANK POS SEN (OBD)	P0335	0802	—	—	X	EC-162
CAMSHAFT POSI SEN	P0340	0101	—	—	X	EC-166
EGR SYSTEM	P0400	0302	X	X	X*3	EC-171
EGRC-BPT valve	P0402	0306	X	X	X	EC-180
TW CATALYST SYS	P0420	0702	X	X	X*3	EC-182

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

*2: These numbers are prescribed by SAE J2012.

*3: These are not displayed with GST.

*4: 1st trip DTC No. is the same as DTC No.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*3		SRT code	Test value	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
VEHICLE SPEED SEN	P0500	0104	—	—	X	EC-185
IACV-AAC VALVE	P0505	0205	—	—	X	EC-189
A/T COMM LINE	P0600	—	—	—	—	EC-193
ECM	P0605	0301	—	—	X	EC-196
PARK/NEUT POSI SW	P0705	1003	—	—	X	EC-198
INHIBITOR SWITCH	P0705	1101	—	—	X	AT section
FLUID TEMP SENSOR	P0710	1208	—	—	X	AT section
VHCL SPEED SEN A/T	P0720	1102	—	—	X	AT section
ENGINE SPEED SIG	P0725	1207	—	—	X	AT section
A/T 1ST SIGNAL	P0731	1103	—	—	X	AT section
A/T 2ND SIGNAL	P0732	1104	—	—	X	AT section
A/T 3RD SIGNAL	P0733	1105	—	—	X	AT section
A/T 4TH SIG OR TCC	P0734	1106	—	—	X	AT section
TOR CONV CLUTCH SV	P0740	1204	—	—	X	AT section
LINE PRESSURE S/V	P0745	1205	—	—	X	AT section
SHIFT SOLENOID/V A	P0750	1108	—	—	X	AT section
SHIFT SOLENOID/V B	P0755	1201	—	—	X	AT section
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-205
CRANK P/S (OBD) COG	P1336	0905	—	—	X	EC-210
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-214
EGR TEMP SENSOR	P1401	0305	—	—	X	EC-218
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-223
THRTL POSI SEN A/T	P1705	1206	—	—	X	AT section
OVERRUN CLUTCH S/V	P1760	1203	—	—	X	AT section
COOLING FAN	P1900	1308	—	—	X	EC-226

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

*2: These numbers are prescribed by SAE J2012.




*3: 1st trip DTC No. is the same as DTC No.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Emission-related Diagnostic Information (Cont'd)

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

The emission-related diagnostic information can be erased by the following methods.

-  Selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT
 -  Selecting Mode 4 with GST (Generic Scan Tool)
 -  Changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM (Refer to EC-48.)
- If the battery terminal is disconnected, the emission-related diagnostic information will be lost within 24 hours.
 - When you erase the emission-related diagnostic information, using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.

The following data are cleared from the ECM memory in the mode obtained.

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

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

How to erase DTC (With CONSULT)

Note: If the diagnostic trouble code is not for A/T related items (see EC-80), skip steps 2 through 4.

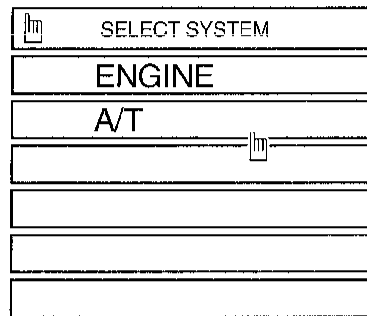
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
 2. Turn CONSULT "ON" and touch "A/T".
 3. Touch "SELF-DIAG RESULTS".
 4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

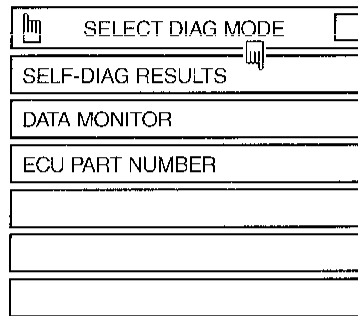
Emission-related Diagnostic Information (Cont'd)

How to erase DTC (With CONSULT)

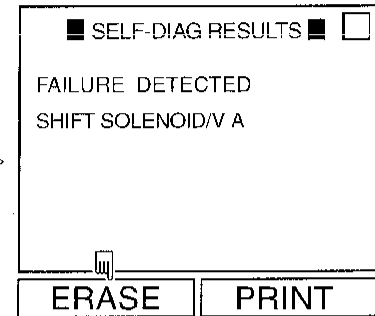
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.



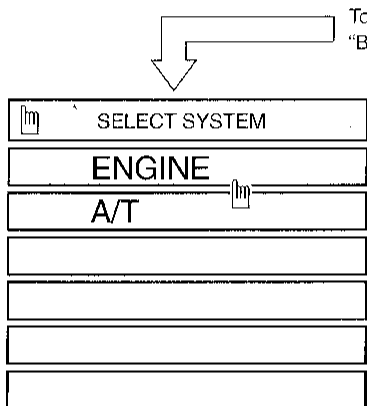
2. Turn CONSULT "ON", and touch "A/T".



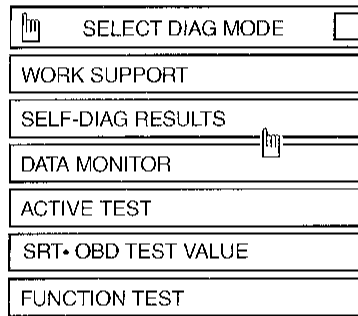
3. Touch "SELF-DIAG RESULTS".



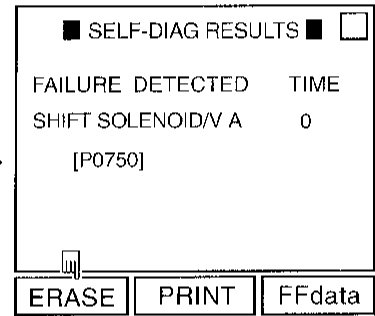
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)



5. Touch "ENGINE".



6. Touch "SELF-DIAG RESULTS".



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

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How to erase DTC (With GST)

Note: If the diagnostic trouble code is not for A/T related items (see page EC-80), skip step 2.

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

How to erase DTC (No Tools)

Note: If the diagnostic trouble code is not for A/T related items (see EC-80), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See EC-48.)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart

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

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-32.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset. The MIL will remain on until the vehicle is driven (in the recorded driving pattern) 3 times with no malfunction.
- The DTC and the freeze frame data can be displayed until the vehicle is driven 40 times (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data can be displayed until the vehicle is driven 80 times. The “TIME” IN “SELF-DIAGNOSTIC RESULTS” mode of CONSULT will count in response to the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the following conditions are met.
 - i) The self-diagnosis results in “OK” for the 2nd trip.

SUMMARY CHART

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

Details about patterns “A”, “B”, and “C” are on EC-44.

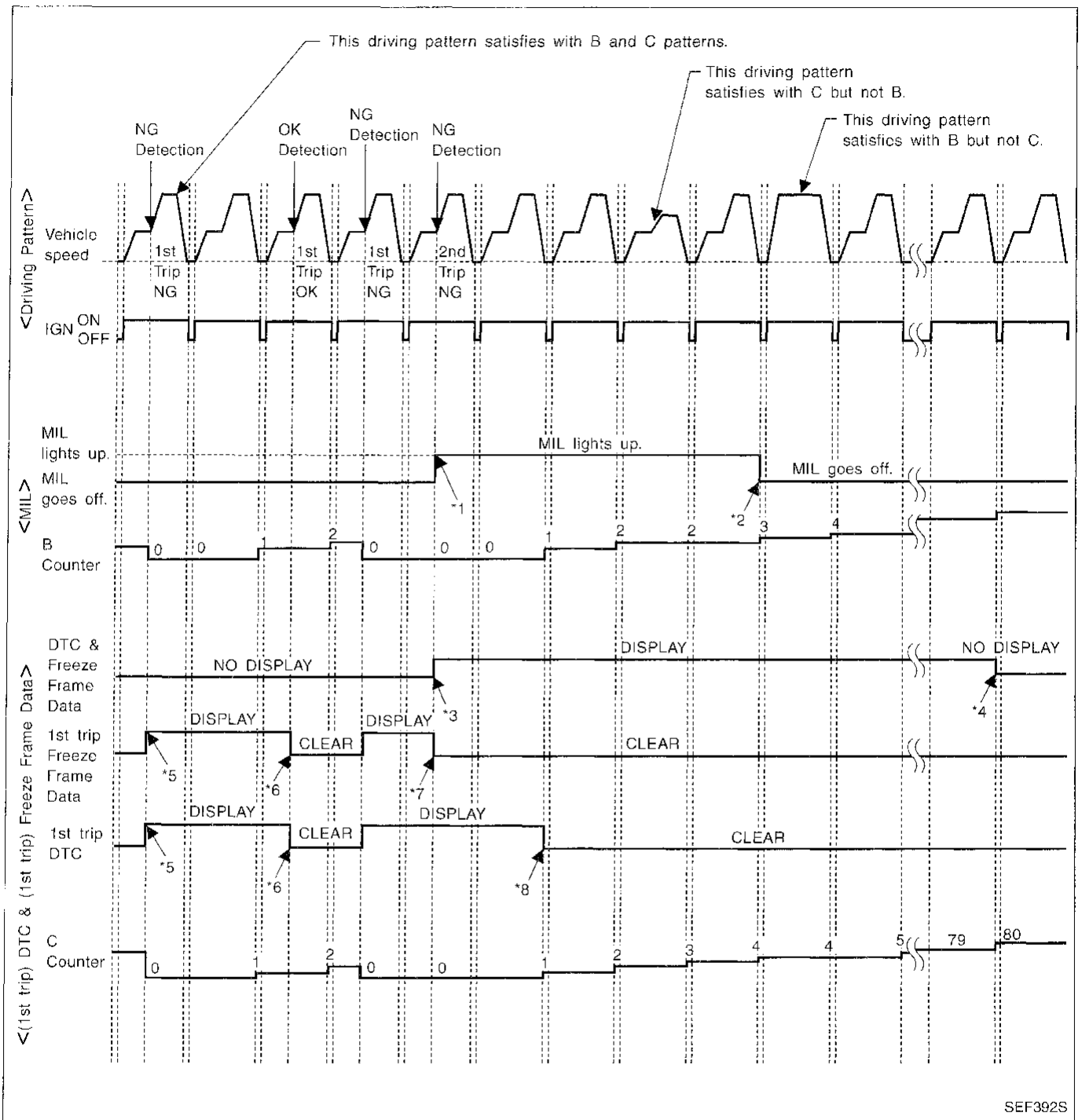
*1: Clear timing is at the moment OK is detected.

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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



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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

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

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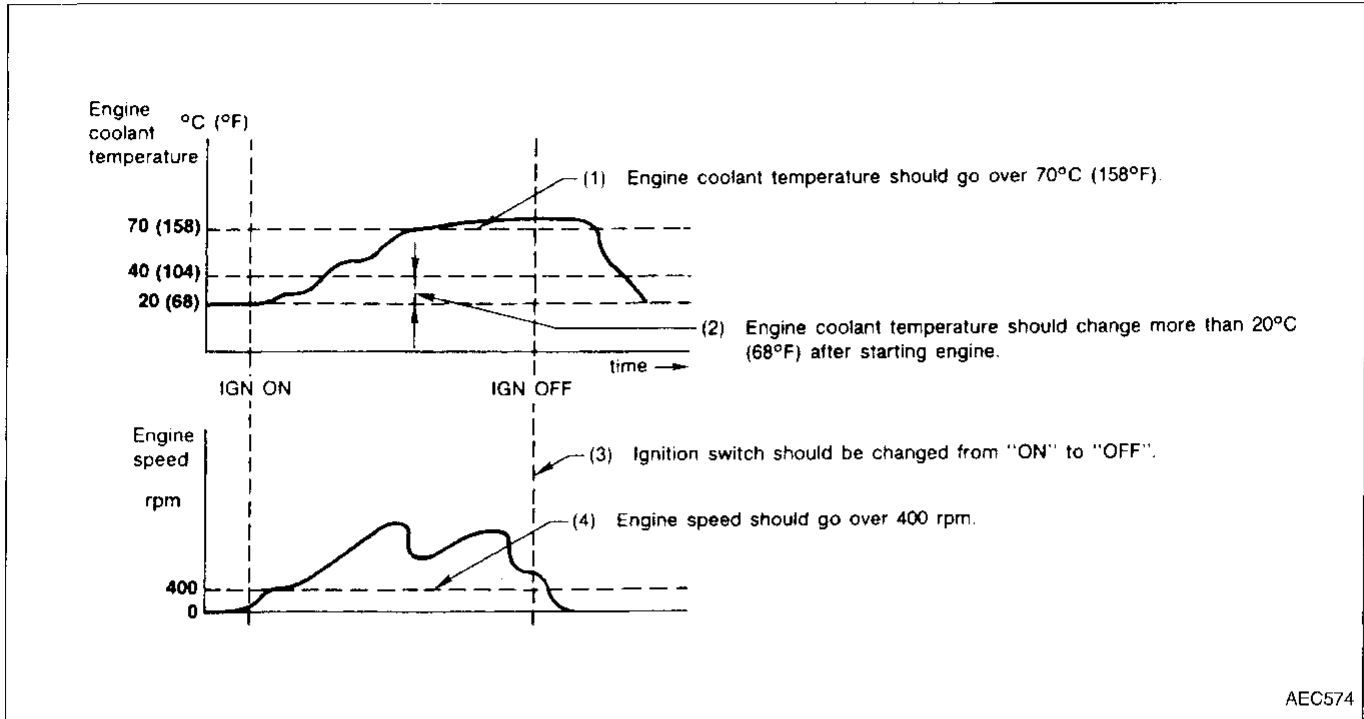
EL
DX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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

<Driving pattern A>



<Driving pattern B>

Driving pattern B means the vehicle operation as follows:

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

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

<Driving pattern C>

Driving pattern C means the vehicle operation as follows:

(1) The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature (T) condition:

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

Example:

If the stored freeze frame data is as follows:

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

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

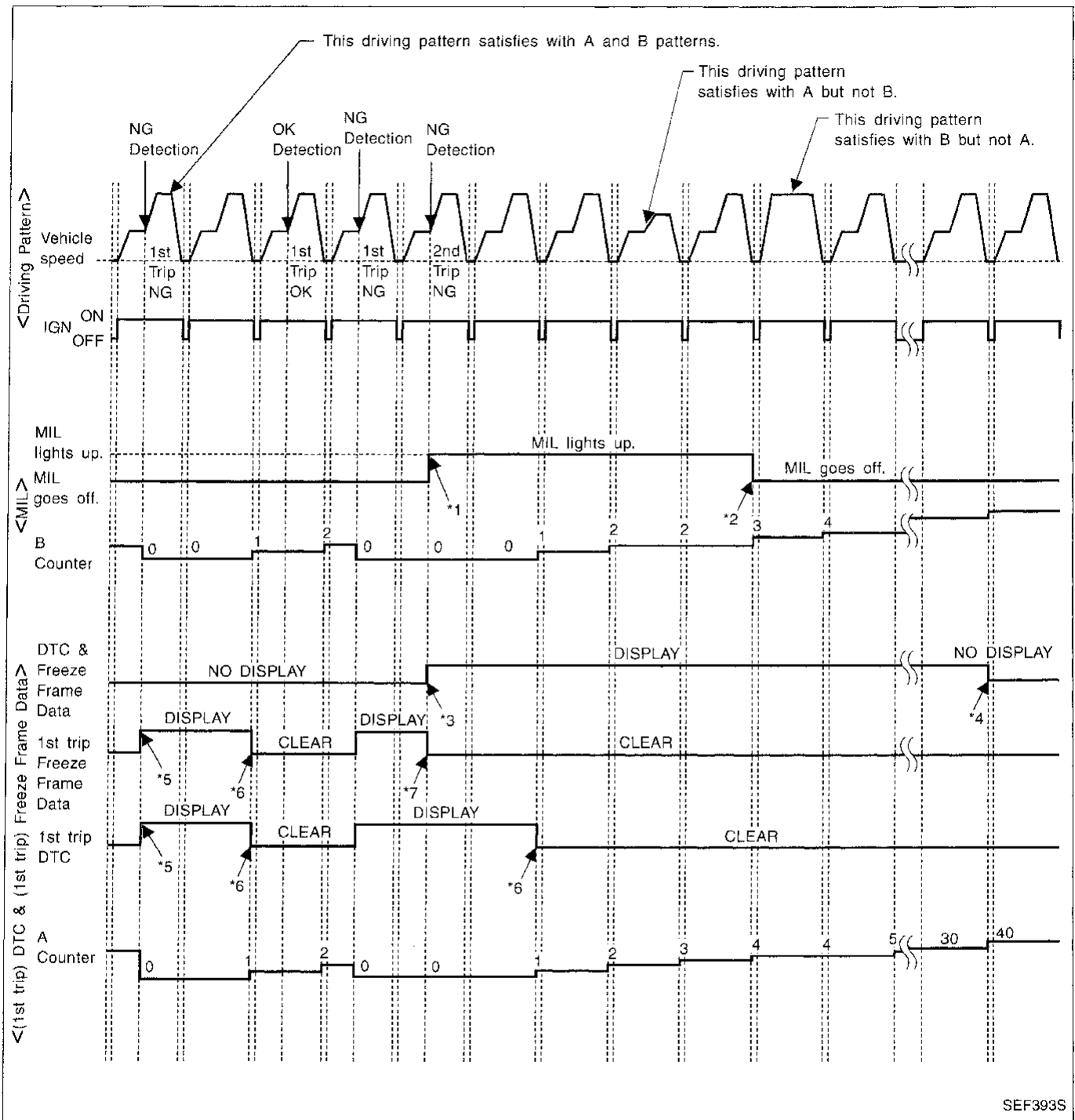
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than $\geq 70^\circ\text{C}$ (158°F)

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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



- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

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

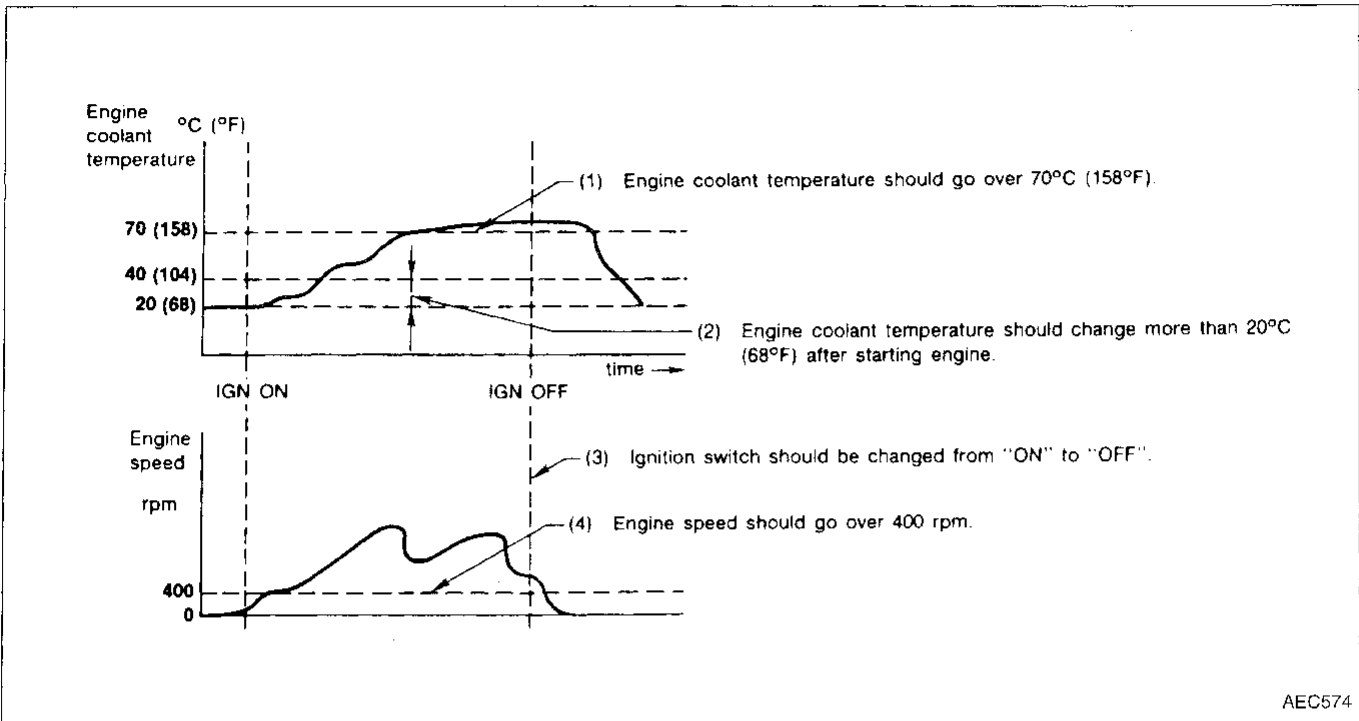
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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

OBD System Operation Chart (Cont'd)

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

⟨Driving pattern A⟩



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

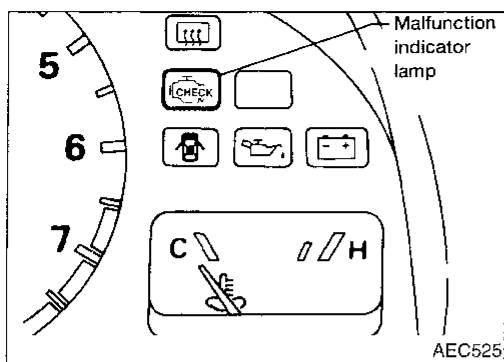
⟨Driving pattern B⟩

Driving pattern B means the vehicle operation as follows:

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

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION



Malfunction Indicator Lamp (MIL)




1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
 - If the malfunction indicator lamp does not light up, refer to WARNING LAMPS in EL section (or see EC-258).
2. When the engine is started, the malfunction indicator lamp should go off. If the lamp remains on, the on board diagnostic system has detected an engine system malfunction.

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four functions.

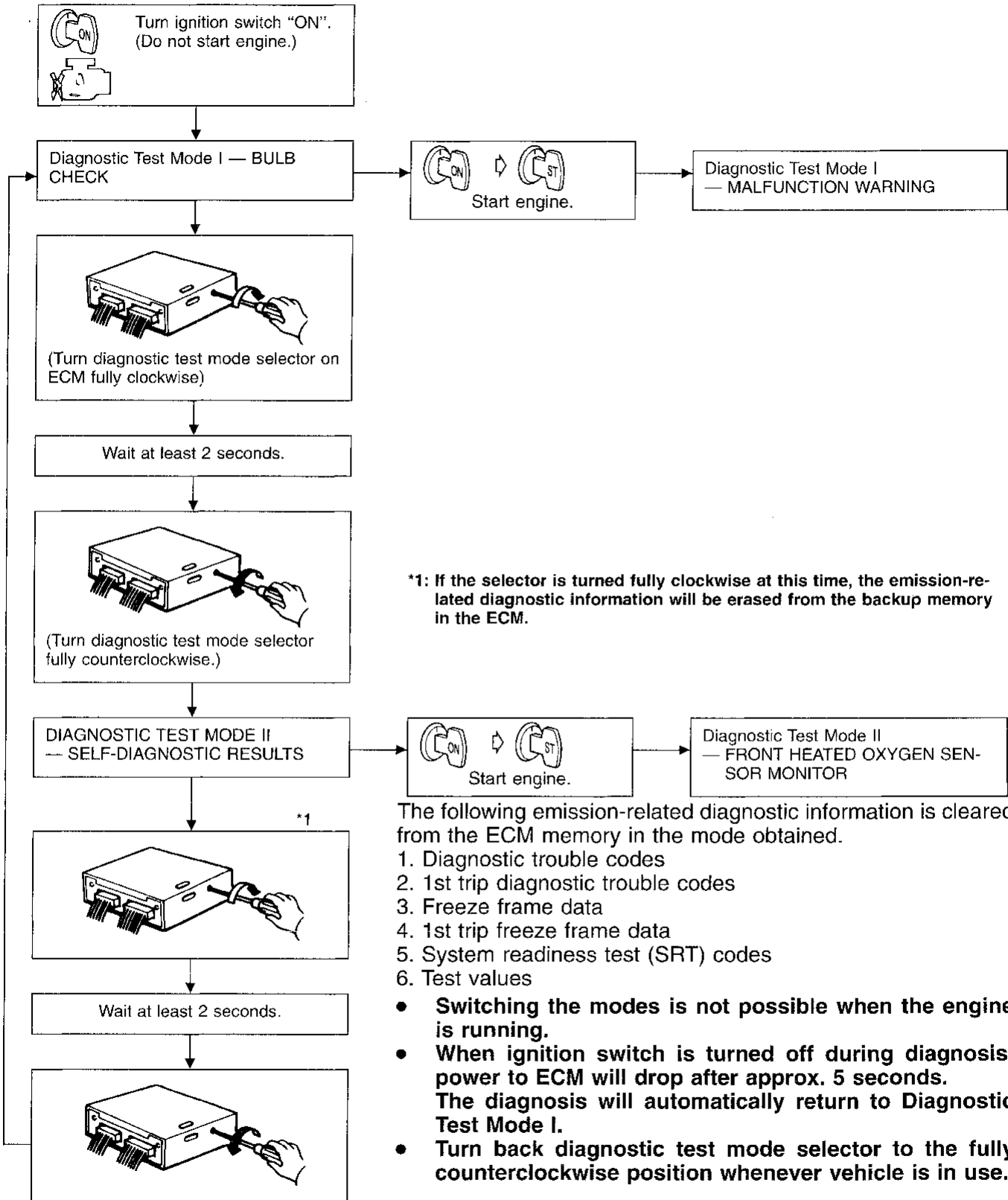
1. **BULB CHECK** : This function checks the MIL bulb for damage (blown, open circuit, etc.).
2. **MALFUNCTION WARNING** : This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. Only the following malfunctions will light up or blink the MIL even in the 1st trip.
 - "Misfire (Possible three way catalyst damage)"
 - "Closed loop control"
 - Fail-Safe item (EXCEPT "START SIGNAL CIRCUIT")
3. **SELF-DIAGNOSTIC RESULTS** : This function allows DTC and 1st trip DTC to be read.
4. **FRONT HEATED OXYGEN SENSOR MONITOR** : This function allows the fuel mixture condition (lean or rich), monitored by front heated oxygen sensor, to be read.

How to switch the diagnostic test (function) modes and details of the above functions are described later. Refer to EC-48.

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. (Refer to WARNING LAMPS AND CHIME in EL section or see EC-258.)

DIAGNOSTIC TEST MODE I—MALFUNCTION WARNING

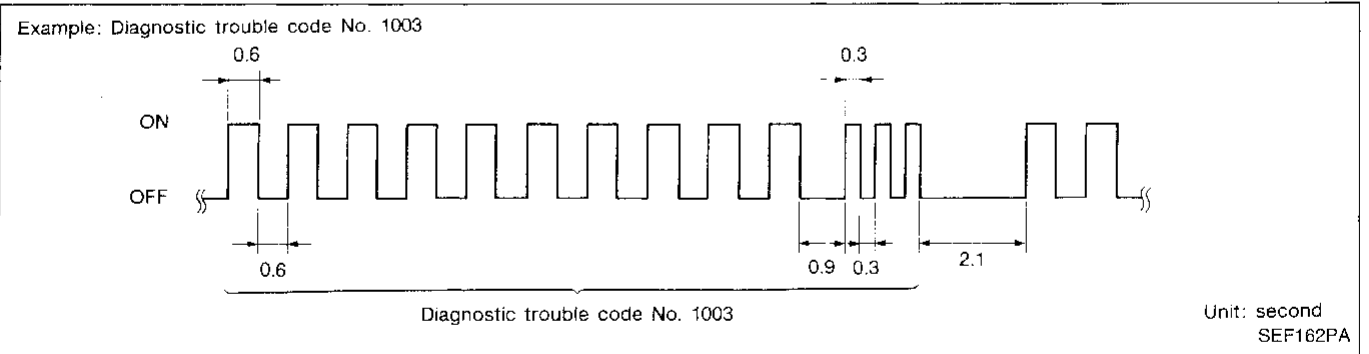
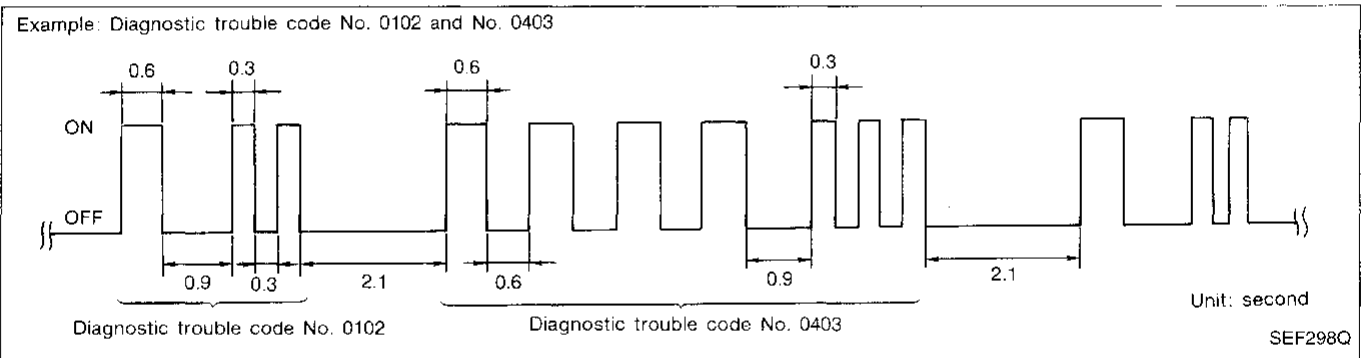
MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning (The "1 trip" or "2 trip" is shown in the "MIL Illumination" of the "DTC Chart". Refer to EC-72).
OFF	No malfunction

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

DIAGNOSTIC TEST MODE II—SELF-DIAGNOSTIC RESULTS

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

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



Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the malfunction indicator lamp blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position switch.

In this way, all the detected malfunctions are classified by their diagnostic trouble code numbers. The DTC "0505" refers to no malfunction. (See DIAGNOSTIC TROUBLE CODE CHART, refer to EC-72.)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL) (Cont'd)

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.

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.

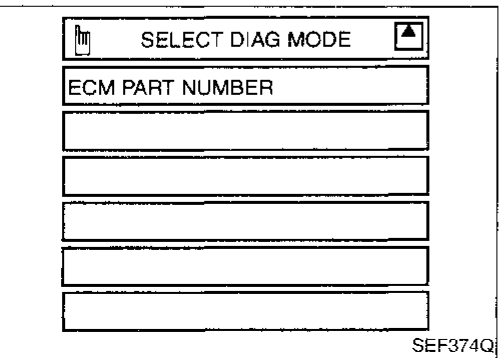
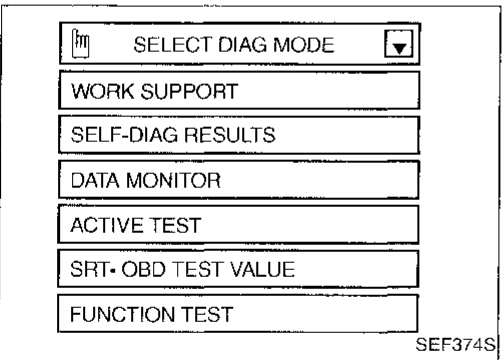
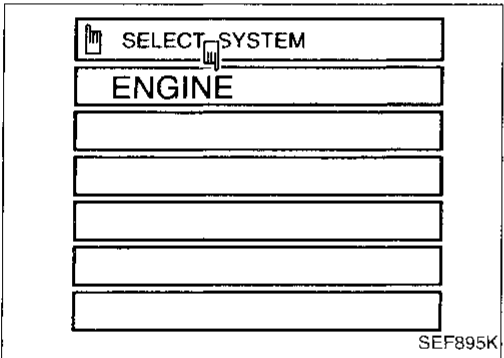
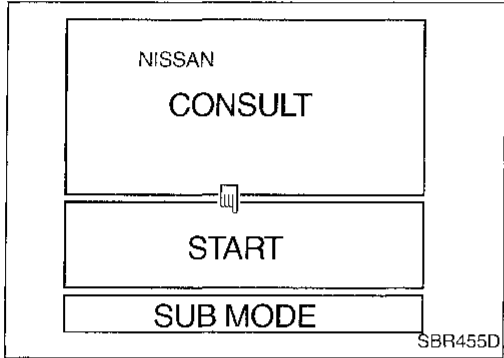
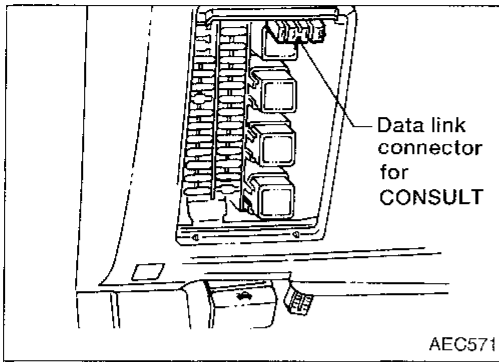
MALFUNCTION INDICATOR LAMP	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: 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 comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

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.)
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.

This sample uses UE951. Screen differs in accordance with the program card used.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

ECCS COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item		DIAGNOSTIC TEST MODE						
		WORK SUPPORT	SELF-DIAGNOSTIC RESULTS*1		DATA MONITOR	ACTIVE TEST	FUNCTION TEST	SRT-OBD TEST VALUE
				FREEZE FRAME DATA*2				
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		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 pressure switch				X		X	
	Air conditioner pressure switch				X			
	Battery voltage				X			
	OUTPUT	Injectors				X	X	X
	Power transistor (Ignition timing)	X	X (Ignition signal)		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	X	
	Front heated oxygen sensor heater		X		X			X
	Rear heated oxygen sensor heater		X		X			X
	EGR valve & EVAP canister purge control solenoid valve		X		X	X	X	
	Calculated load value			X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-34.

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 such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
SRT-OBD test value	The status of system monitoring tests and the test values/test limits can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".
ECM part numbers	ECM part numbers can be read.

*1 The following emission-related diagnostic information is cleared from the ECM memory in the mode obtained.

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

WORK SUPPORT MOD

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
IACV-AAC/V ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting 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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

SELF-DIAGNOSTIC MODE

DTC and 1st trip DTC

Regarding items of "DTC and 1st trip DTC", refer to "Diagnostic Trouble Code (DTC) Chart (See EC-72.)

Freeze frame data and 1st trip 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-259).]
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. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	<ul style="list-style-type: none"> ● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> ● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM [%]	<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.
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.
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> ● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> ● The vehicle speed at the moment a malfunction is detected is displayed.

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS-RPM (REF) [rpm]	<input type="radio"/>	<input type="radio"/>	<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"> Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS AIR/FL SE [V]	<input type="radio"/>	<input type="radio"/>	<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]	<input type="radio"/>	<input type="radio"/>	<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]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The signal voltage of the front heated oxygen sensor is displayed. 	
RR O2 SENSOR [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The signal voltage of the rear heated oxygen sensor is displayed. 	
FR O2 MNTR [RICH/LEAN]	<input type="radio"/>	<input type="radio"/>	<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]	<input type="radio"/>		<ul style="list-style-type: none"> Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively large. LEAN ... means the amount of oxygen after three way catalyst is relatively small. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
EGR TEMP SEN [V]	<input type="radio"/>		<ul style="list-style-type: none"> The signal voltage of the EGR temperature sensor is displayed. 	
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. 	
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.

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 signals	Main signals	Description	Remarks
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. 	
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 conditioning signal. 	
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. 	
PW/ST SIGNAL [ON/OFF]	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal. 	
LOAD SIGNAL	<input type="radio"/>	<input type="radio"/>	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the rear defogger signal. 	
IGNITION SW [ON/OFF]	<input type="radio"/>		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 	
A/C PRESS SW [ON/OFF]	<input type="radio"/>		<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner triple-pressure switch (medium-pressure side) determined by the pressure of the air conditioning high pressure side. 	
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.
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. 	
IGN TIMING [BTDC]		<input type="radio"/>	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	
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. 	
A/F ALPHA [%]		<input type="radio"/>	<ul style="list-style-type: none"> Indicates the mean value of the air-fuel ratio feedback correction factor per cycle. 	<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"> Indicates the air conditioner relay control condition (determined by ECM according to the input signal). 	
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"> Indicates the control condition of the cooling fan (determined by ECM according to the input signal). HI ... High speed operation LOW ... Low speed operation OFF ... Stop 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
EGRC SOL/V [ON/OFF]			<ul style="list-style-type: none"> Indicates the control condition of the EGR valve & EVAP canister purge control solenoid valve (determined by ECM according to the input signal). ON ... EGR valve and EVAP canister purge operation cut-off OFF ... EGR valve and EVAP canister purge operation not cut-off 	
FR O2 HEATER [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 	
RR O2 HEATER [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals. 	
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.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT. 	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 indication 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. ● Air conditioner 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. 		

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 positions	OFF	<ul style="list-style-type: none"> ● Harness and connector ● Neutral position switch or inhibitor switch ● Linkage or inhibitor switch adjustment
		In N/P positions	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 valve & EVAP canister purge 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 valve & EVAP canister purge 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. 	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. Before cranking, battery voltage and engine coolant temperature are displayed. During cranking, average battery voltage, mass air flow sensor output voltage and cranking speed are displayed. 	Start signal: OFF → ON		<ul style="list-style-type: none"> ● Harness and connector ● Ignition switch
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
		Neutral position	OFF	
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
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 camshaft position sensor or distributor) ● Camshaft position sensor drive mechanism
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

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% and at 20%.	<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

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

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

1. "AUTO TRIG" (Automatic trigger):

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

2. "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected.

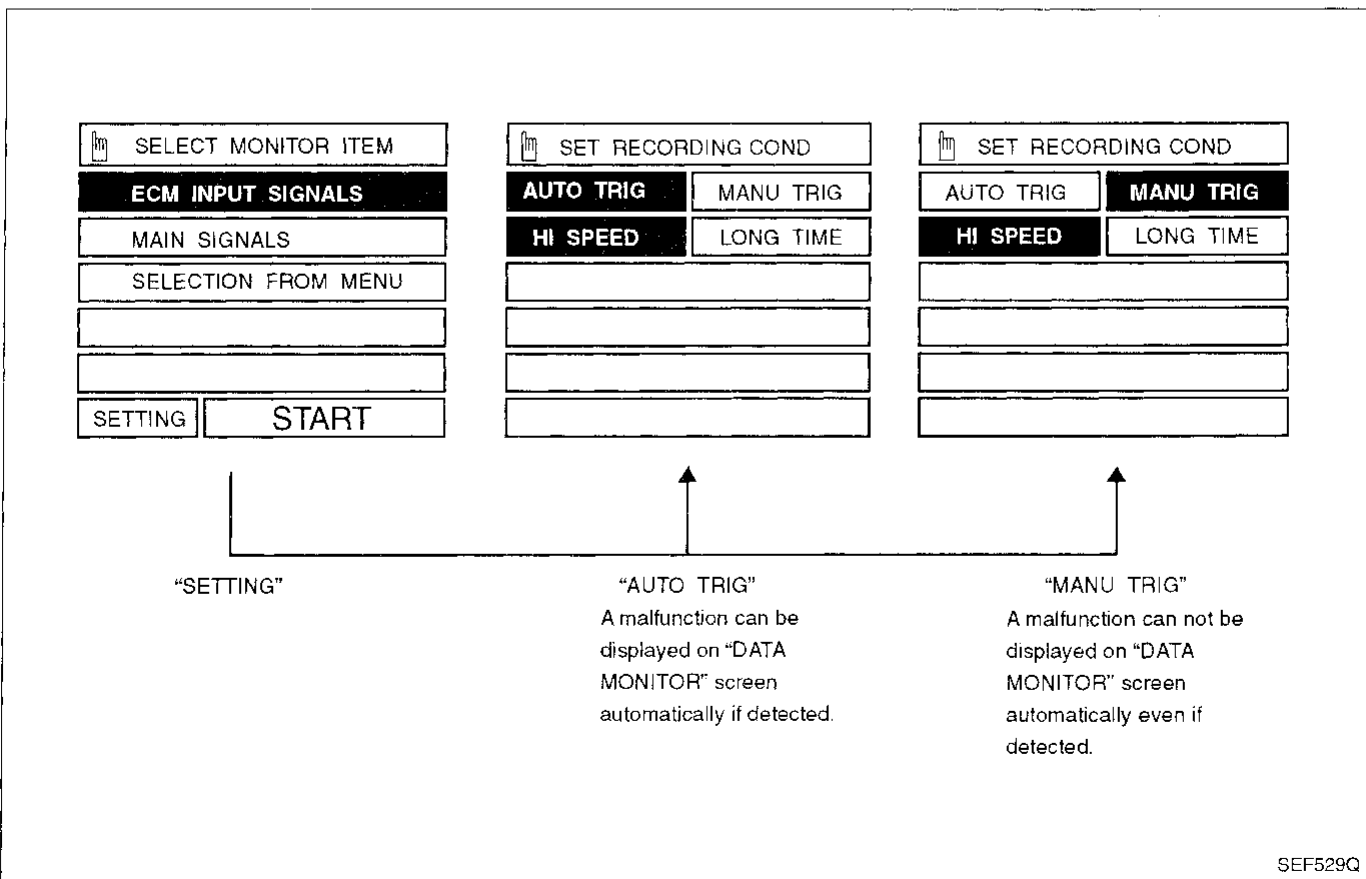
Use these triggers as follows:

1. "AUTO TRIG"

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

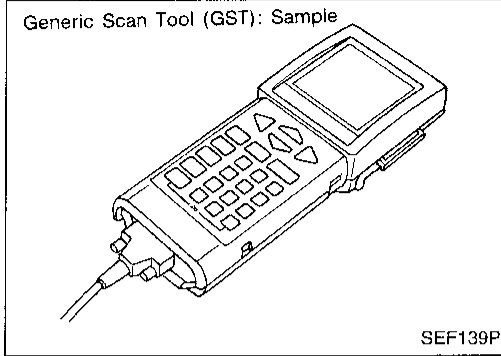
2. "MANU TRIG"

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



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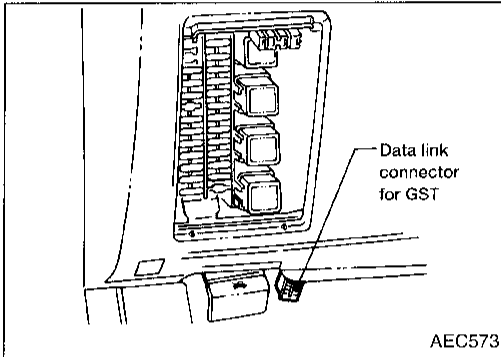
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION



Generic Scan Tool (GST)

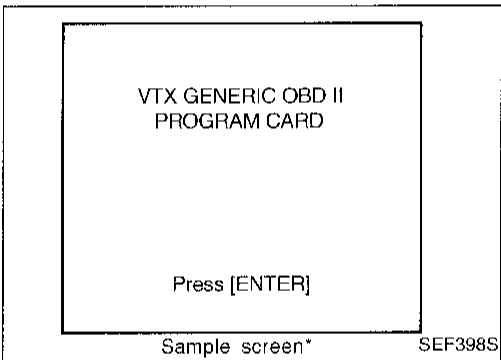
DESCRIPTION

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.



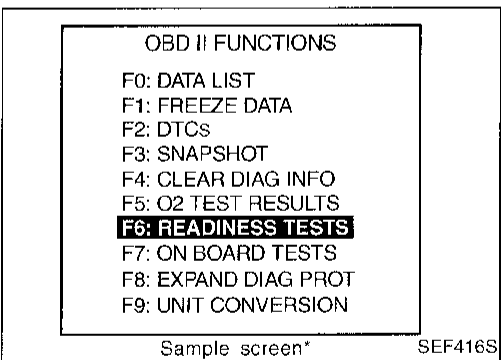
GST INSPECTION PROCEDURE

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



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

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



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

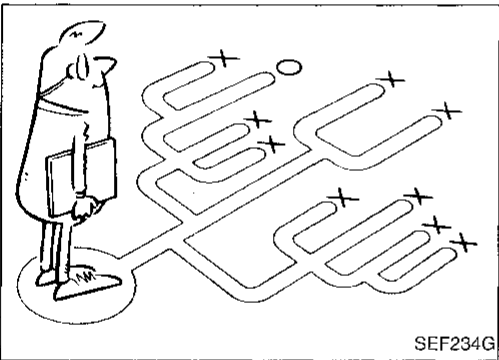
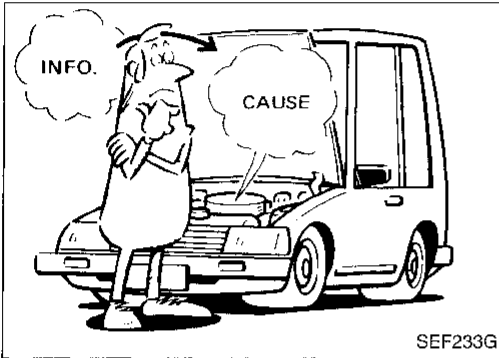
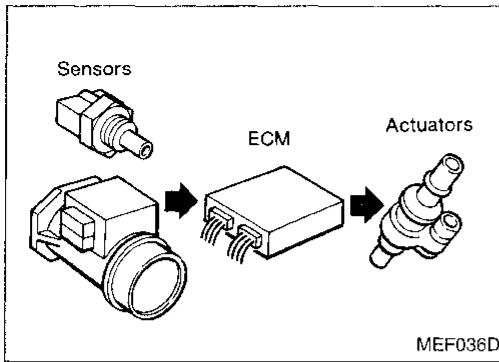
For further information, see the GST Operation Manual of the tool maker.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Generic Scan Tool (GST) (Cont'd)

FUNCTION

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-54).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none">● Clear number of diagnostic trouble codes (MODE 1)● Clear diagnostic trouble codes (MODE 3)● Clear trouble code for freeze frame data (MODE 1)● Clear freeze frame data (MODE 2)● Clear heated oxygen sensor test data (MODE 5)● Reset status of system monitoring test (MODE 1)● Clear on board monitoring test results (MODE 6 and 7)
MODE 5	(O2 TEST RESULTS)	This mode gains access to the on board heated oxygen sensor monitoring test results.
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.



Introduction

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on the next page. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on EC-66 should be used. Start your diagnosis by looking for "conventional" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

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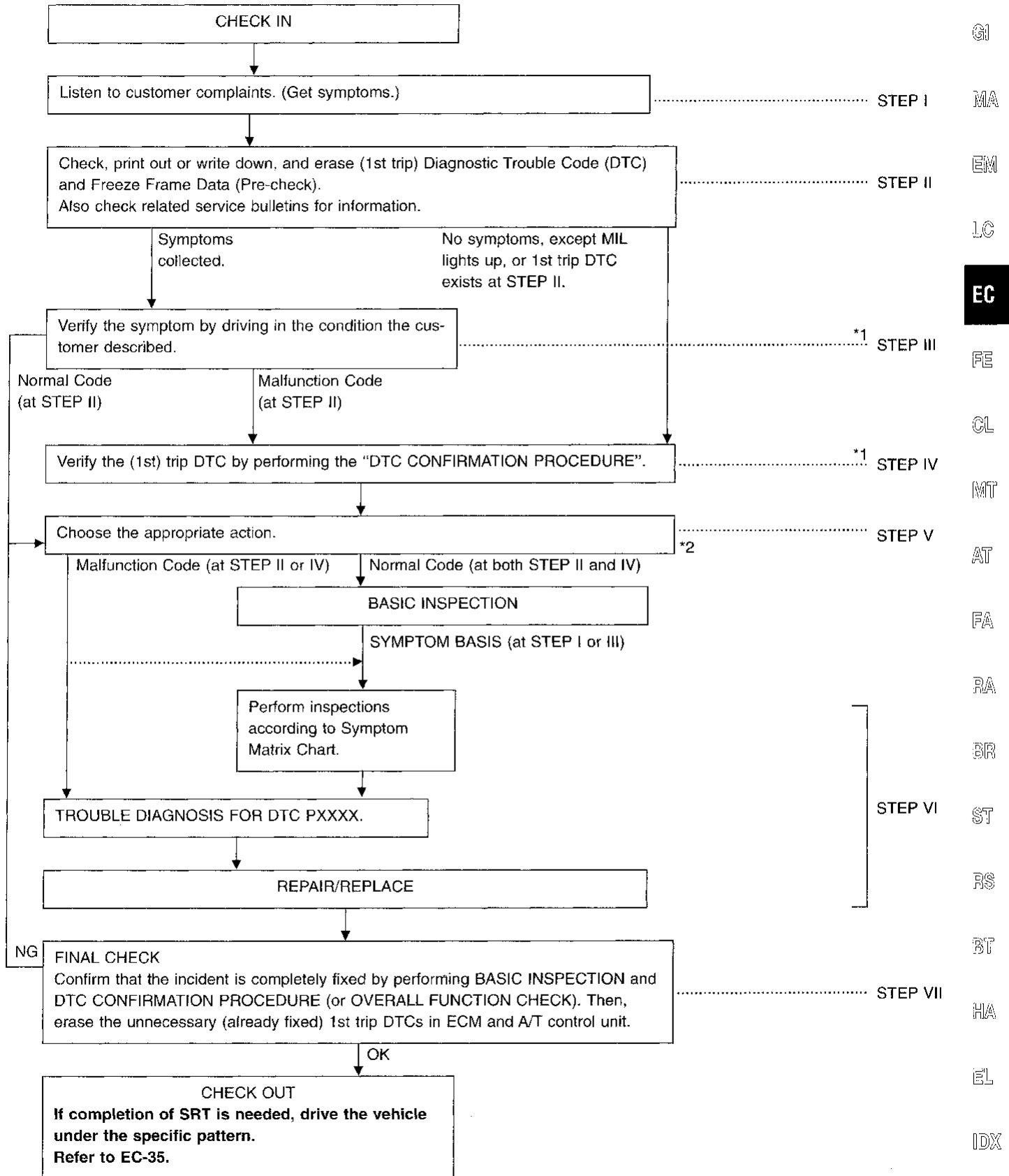
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TROUBLE DIAGNOSIS — Work Flow

Work Flow



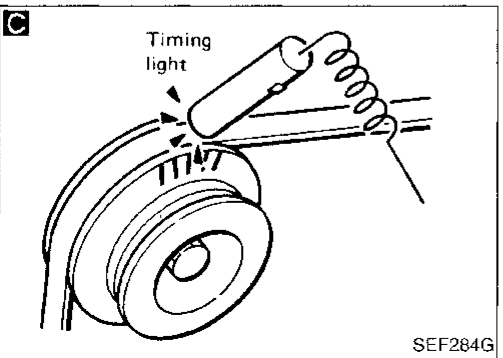
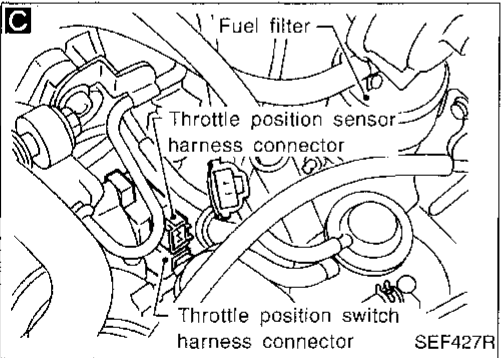
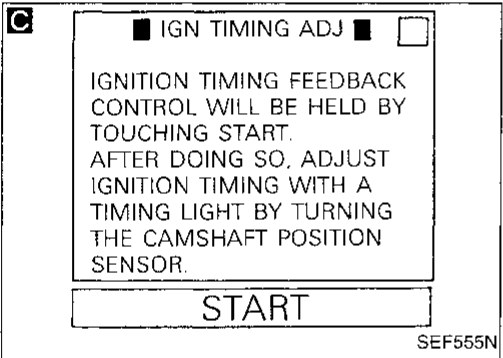
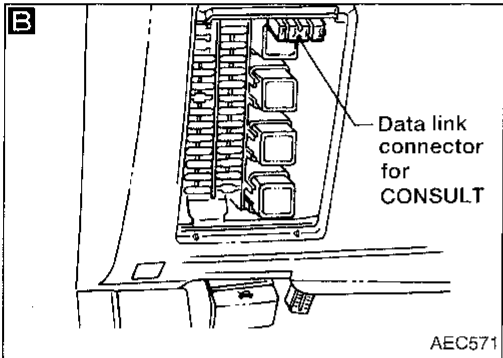
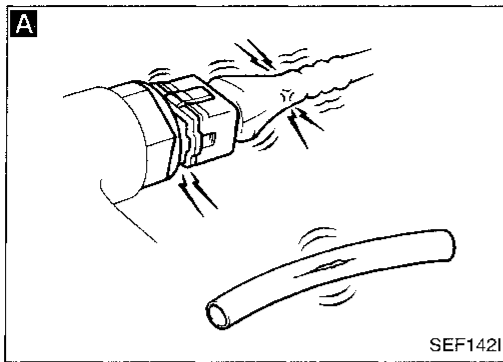
*1: If the incident cannot be duplicated, see "Incident Simulation Tests" of "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section.

*2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit (See TROUBLE DIAGNOSIS FOR POWER SUPPLY EC-100).

TROUBLE DIAGNOSIS — Work Flow

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-66.
STEP II	<p>Before confirming the concern, check and write down (print out using CONSULT or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-40.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV.</p> <p>Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-84.)</p> <p>Also check related service bulletins for information.</p>
STEP III	<p>Try to confirm the symptom and under what conditions the incident occurs.</p> <p>The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.</p> <p>If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.)</p> <p>If the malfunction code is detected, skip STEP IV and perform STEP V.</p>
STEP IV	<p>Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DTC CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT or Generic Scan Tool.</p> <p>During the (1st trip) DTC verification, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.</p> <p>If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. (Refer to GI section.)</p> <p>In case the "DTC CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative.</p> <p>The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.</p>
STEP V	<p>Take the appropriate action based on the results of STEP I through IV.</p> <p>If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX.</p> <p>If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-69.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-84.)</p>
STEP VI	<p>Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT set in "DATA MONITOR (AUTO TRIG)" mode.</p> <p>Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT. Refer to EC-90.</p> <p>The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection").</p> <p>Repair or replace the malfunction parts.</p>
STEP VII	<p>Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint.</p> <p>Perform the "DTC CONFIRMATION PROCEDURE" and confirm the normal code [Diagnostic trouble code No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one.</p> <p>Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and A/T control unit. (Refer to EC-40.)</p>



Basic Inspection

Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

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

A

BEFORE STARTING

1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Vacuum hoses for splits, kinks, or improper connections
 - Wiring for improper connections, pinches, or cuts

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-51.)

DOES ENGINE START?

Go to **E**.

C

CHECK IGNITION TIMING.

1. Warm up engine sufficiently.
2. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".
4. Check ignition timing at idle using timing light.

Ignition timing:
20°±2° BTDC

NG → Adjust ignition timing by turning camshaft position sensor.

1. Warm up engine sufficiently.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.
4. Check ignition timing at idle using timing light.

Ignition timing:
20°±2° BTDC

OK

(Go to next page.)

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TROUBLE DIAGNOSIS — Basic Inspection

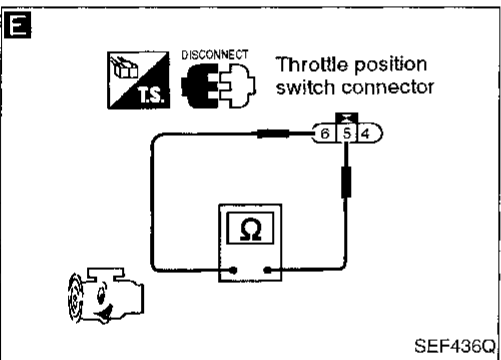
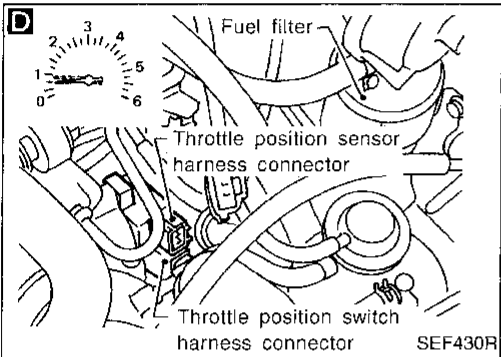
Basic Inspection (Cont'd)

D ■ IGN TIMING ADJ ■ □

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

START

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F ■ THRTL POS SEN ADJ ■ □

*** ADJ MONITOR ***

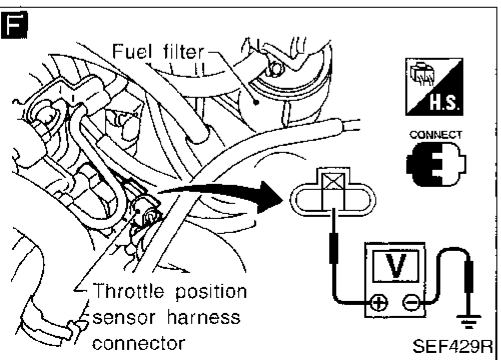
THRTL POS SEN 0.52V

===== MONITOR =====

CMPS-RPM (REF) 0rpm

CLSD THL/P SW ON

SEF441R



A

D CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.

2. When touching "START", does engine speed fall to the following speed?
650±50 rpm (A/T in "N" position)

OR

When disconnecting throttle position sensor harness connector, does engine speed fall to the following speed?
650±50 rpm (A/T in "N" position)

Adjust engine speed by turning idle adjusting screw.

NG

OK

E CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (A/T model only).

1. Disconnect throttle position sensor harness connector and closed throttle position switch harness connector.

2. Check continuity between closed throttle position switch connector terminals ⑤ and ⑥ as follows: Raise engine speed to 2,000 rpm then gradually lower.

Continuity should exist (closed throttle position switch should close) at **1,050±150 rpm (transaxle in "N" position).**

Adjust continuity signal by rotating throttle position sensor body. Then, go to **C**.

NG

OK

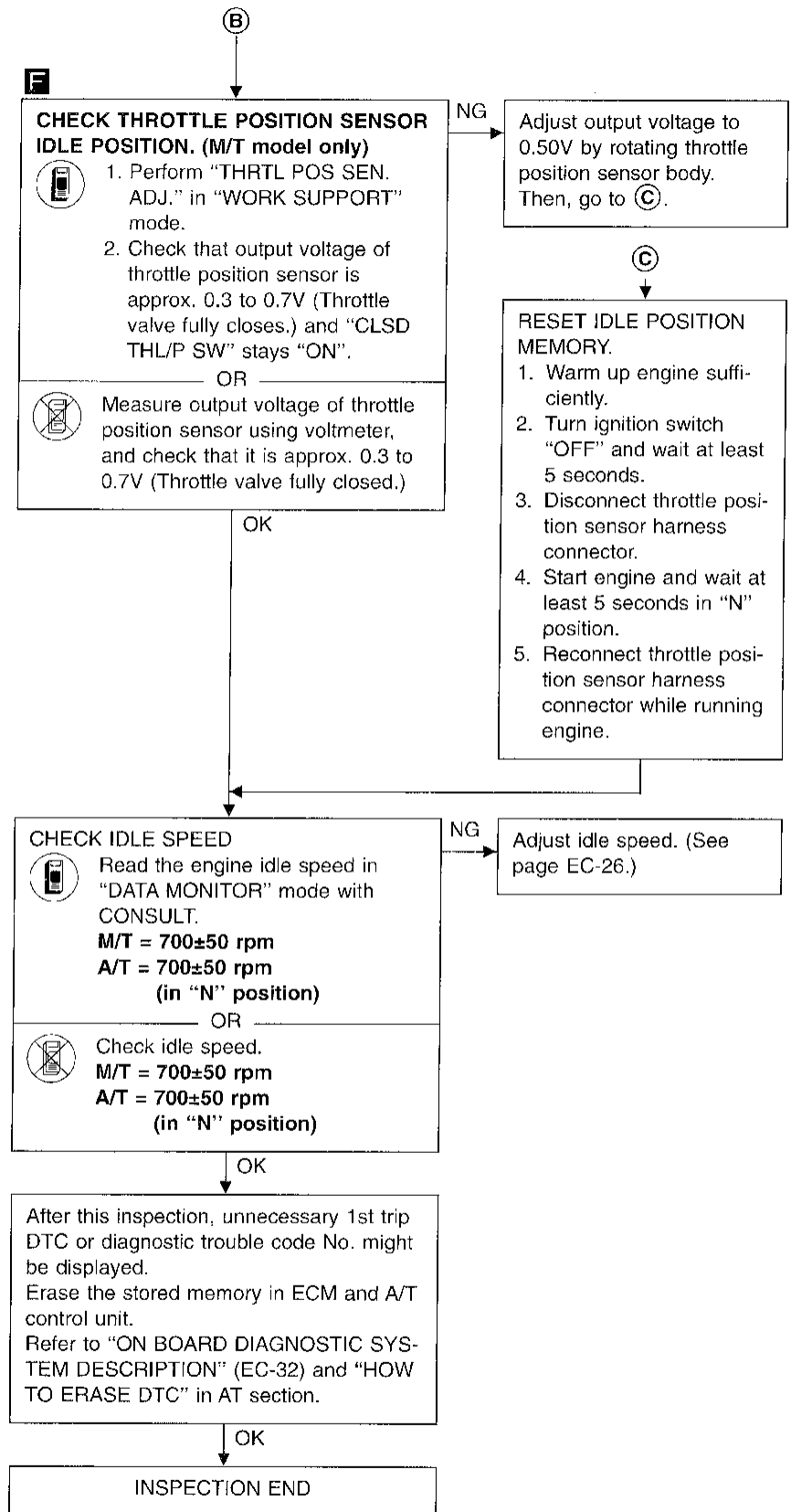
Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.

B

(Go to next page.)

TROUBLE DIAGNOSIS — Basic Inspection

Basic Inspection (Cont'd)



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TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart

ENGINE RELATED ITEMS

Diagnostic trouble code No.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
(P0000)	0505	No failure (NO SELF DIAGNOSTIC FAILURE INDICATED...)	<ul style="list-style-type: none"> ● No malfunction related to OBD system is detected by either ECM or A/T control unit.
P0100	0102	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. ● Voltage sent to ECM is not practical when compared with the camshaft position sensor signal and throttle position sensor signals.
P0110	0401	Intake air temperature sensor circuit (INT AIR TEMP SEN)	<ul style="list-style-type: none"> ● An excessively low or high voltage from the sensor is detected by the ECM. ● Voltage sent to ECM is not practical when compared with the engine coolant temperature sensor signal.
P0115	0103	Engine coolant temperature sensor circuit (COOLANT TEMP SEN)	<ul style="list-style-type: none"> ● An excessively high or low voltage from the sensor is detected by the ECM.
P0120	0403	Throttle position sensor circuit (THROTTLE POSI SEN)	<ul style="list-style-type: none"> ● An excessively low or high voltage from the sensor is detected by the ECM. ● Voltage sent to ECM is not practical when compared with the mass air flow sensor and camshaft position sensor signals.
P0125	0908	Engine coolant temperature sensor function (*COOLANT TEMP SEN)	<ul style="list-style-type: none"> ● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.
P0130	0303	Front heated oxygen sensor circuit (FRONT O2 SENSOR)	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is detected by the ECM. ● The voltage from the sensor is constantly approx. 0.3V. ● The specified maximum and minimum voltages from the sensor are not reached. ● It takes more than the specified time for the sensor to respond between rich and lean.
P0130	0307	Closed loop control (CLOSED LOOP)	<ul style="list-style-type: none"> ● The closed loop control function does not operate even when vehicle is driving in the specified condition.
P0135	0901	Front heated oxygen sensor 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. (An improper voltage drop signal is sent to ECM through the heater.)

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

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"

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.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"

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 to detect a malfunction (if one exists).

DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

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

*4: 1st trip DTC No. is the same as DTC No.

TROUBLE DIAGNOSIS — General Description

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

X: Applicable
—: Not applicable

Check Items (Possible Cause)	“DTC CONFIRMATION PROCEDURE” Quick Ref. *1	“OVERALL FUNCTION CHECK” Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
● No failure	—	—	—	—	—
● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor	RUNNING	RUNNING	X	2 trip	EC-103
● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor	IGN: ON	—	—	2 trip	EC-108
● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor	IGN: ON	—	X	2 trip	EC-113
● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor	LIFTING	IGN: ON	X	2 trip	EC-117
● Harness or connectors (High resistance in the sensor circuit) ● Engine coolant temperature sensor ● Thermostat	—	RUNNING	—	2 trip	EC-122
● Harness or connectors (The sensor circuit is open or shorted.) ● Front heated oxygen sensor ● Injectors ● Intake air leaks ● Fuel pressure	—	RUNNING	—	2 trip	EC-127
● The front heated oxygen sensor circuit is open or shorted. ● Front heated oxygen sensor	—	RUNNING	—	1 trip	EC-132
● Harness or connectors (The heater circuit is open or shorted.) ● Front heated oxygen sensor heater	RUNNING	—	—	2 trip	EC-133

*1: ● This is Quick Reference of “DTC CONFIRMATION PROCEDURE”.

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The “OVERALL FUNCTION CHECK” is a simplified and effective way to inspect a component or circuit.

In some cases, the “OVERALL FUNCTION CHECK” is used rather than a “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE”.

When no DTC CONFIRMATION PROCEDURE is available, the “NG” result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.

● During an “NG” OVERALL FUNCTION CHECK, the DTC might not be confirmed.

● This is Quick Reference of “OVERALL FUNCTION CHECK”.

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

TROUBLE DIAGNOSIS — General Description

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

ENGINE RELATED ITEMS

Diagnostic trouble code No.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...	
CONSULT GST	ECM*3			
P0136	0707	Rear heated oxygen sensor circuit (REAR O2 SENSOR)	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is detected by the ECM. ● The specified maximum and minimum voltages from the sensor are not reached. ● It takes more than the specified time for the sensor to respond between rich and lean. 	
P0141	0902	Rear heated oxygen sensor heater circuit (RR O2 SEN HEATER)	<ul style="list-style-type: none"> ● The current amperage in the heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the heater.) 	
P0171	0115	Fuel injection system function (FUEL SYS DIAG-LEAN)	<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.) 	
P0172	0114	Fuel injection system function (FUEL SYS DIAG-RICH)	<ul style="list-style-type: none"> ● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	
P0300	0701	Multiple cylinders' misfire (MULTI CYL MISFIRE)	(Warm-up three way catalyst damage) The misfire occurs, which will damage three way catalyst by overheating.	(Exhaust quality deterioration) The misfire occurs, which will not damage three way catalyst but will affect emission deterioration.
P0301	0608	No. 1 cylinder's misfire (CYL 1 MISFIRE)		
P0302	0607	No. 2 cylinder's misfire (CYL 2 MISFIRE)		
P0303	0606	No. 3 cylinder's misfire (CYL 3 MISFIRE)		
P0304	0605	No. 4 cylinder's misfire (CYL 4 MISFIRE)		

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

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"

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.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"

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 to detect a malfunction (if one exists).

DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

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

*4: 1st trip DTC No. is same as DTC No.

TROUBLE DIAGNOSIS — General Description

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

—: Not applicable

Check Items (Possible Cause)	*1 "DTC CONFIRMATION PROCEDURE" Quick Ref.	*2 "OVERALL FUNCTION CHECK" Quick Ref.	Fail Safe System	MIL Illumination	Reference Page
<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-136
<ul style="list-style-type: none"> ● Harness and connectors (The heater circuit is open or shorted.) ● Front heated oxygen sensor heater 	RUNNING	—	—	2 trip	EC-141
<ul style="list-style-type: none"> ● Intake air leak ● Front heated oxygen sensor ● Injectors ● Incorrect fuel pressure ● Mass air flow sensor ● Lack of fuel 	RUNNING	—	—	2 trip	EC-145
<ul style="list-style-type: none"> ● Front heated oxygen sensor ● Injectors ● Exhaust gas leak ● Incorrect fuel pressure ● Mass air flow sensor 	RUNNING	—	—	2 trip	EC-150
<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	—	—	(Warm-up three way catalyst damage) 1 trip (Exhaust quality deterioration) 2 trip	EC-155

*1: ● This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
 Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
 In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
 When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.

- During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.
- This is Quick Reference of "OVERALL FUNCTION CHECK".
 Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

TROUBLE DIAGNOSIS — General Description

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

ENGINE RELATED ITEMS

Diagnostic trouble code No.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
P0325 (*5)	0304	Knock sensor circuit (KNOCK SENSOR)	<ul style="list-style-type: none"> An excessively low or high voltage from the sensor is detected by the ECM.
P0335	0802	Crankshaft position sensor (OBD) circuit [CRANK POS SEN (OBD)]	<ul style="list-style-type: none"> The proper pulse signal from the sensor is not detected by the ECM while the engine is running at the specified rpm.
P0340	0101	Camshaft position sensor circuit (CAMSHAFT POSI SEN)	<ul style="list-style-type: none"> Either 1° or 180° signal is not detected by the ECM for the first few seconds during engine cranking. Either 1° or 180° signal is not detected by the 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.
P0400	0302	EGR function (EGR SYSTEM)	<ul style="list-style-type: none"> The EGR flow is excessively low or high during the specified driving condition.
P0402	0306	EGRC-BPT valve function (EGRC-BPT VALVE)	<ul style="list-style-type: none"> EGRC-BPT valve does not operate properly.
P0420	0702	Warm-up three way catalyst function (TW CATALYST SYSTEM)	<ul style="list-style-type: none"> Warm-up three way catalyst does not operate properly. Warm-up three way catalyst does not have enough oxygen storage capacity.
P0500	0104	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 detected by the ECM even when vehicle is driving.
P0505	0205	Idle speed control function (IACV-AAC VALVE)	<ul style="list-style-type: none"> The idle speed control function does not operate properly.

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

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"

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.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"

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 to detect a malfunction (if one exists).

DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

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

*4: 1st trip DTC No. is same as DTC No.

*5: Freeze frame data is not stored in the ECM for the "Knock sensor". The MIL will not light up for a "Knock sensor" malfunction.

TROUBLE DIAGNOSIS — General Description

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

X: Applicable
—: Not applicable

Check Items(Possible Cause)	“DTC CONFIRMATION PROCEDURE” Quick Ref. *1	“OVERALL FUNCTION CHECK” Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor 	RUNNING	—	—	—	EC-159
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open.) ● Crankshaft position sensor (OBD) 	RUNNING	—	—	2 trip	EC-162
<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) ● Dead (Weak) battery 	RUNNING	—	—	2 trip	EC-166
<ul style="list-style-type: none"> ● EGR valve stuck closed, open or leaking ● Passage blocked ● EGR valve and EVAP canister purge control solenoid valve ● Tube leaking for EGR valve vacuum ● EGRC-BPT valve leaking ● EGR temperature sensor 	—	RUNNING	—	2 trip	EC-171
<ul style="list-style-type: none"> ● EGRC-BPT valve ● Rubber tube (blocked or misconnected) 	—	RUNNING	—	2 trip	EC-180
<ul style="list-style-type: none"> ● Warm-up three way catalyst ● Exhaust tube ● Intake air leak ● Injectors ● Injector leak 	—	RUNNING	—	2 trip	EC-182
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Vehicle speed sensor 	DRIVING	LIFTING	—	2 trip	EC-185
<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is open.) ● IACV-AAC valve 	RUNNING	—	—	2 trip	EC-189
<ul style="list-style-type: none"> ● Harness or connectors (The valve circuit is shorted.) ● IACV-AAC valve 	RUNNING	—	—	2 trip	EC-189

*1: ● This is Quick Reference of “DTC CONFIRMATION PROCEDURE”.

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The “OVERALL FUNCTION CHECK” is a simplified and effective way to inspect a component or circuit.

In some cases, the “OVERALL FUNCTION CHECK” is used rather than a “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE”.

When no DTC CONFIRMATION PROCEDURE is available, the “NG” result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.

● During an “NG” OVERALL FUNCTION CHECK, the DTC might not be confirmed.

● This is Quick Reference of “OVERALL FUNCTION CHECK”.

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

TROUBLE DIAGNOSIS — General Description

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

ENGINE RELATED ITEMS

Diagnostic trouble code No.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
P0600 (*7)	—	Signal circuit from A/T control unit to ECM (A/T COMM LINE)	<ul style="list-style-type: none"> ● ECM receives incorrect voltage from A/T control unit continuously. This can be detected only by "DATA MONITOR (AUTO TRIG)".
P0605	0301	ECM (ECM)	<ul style="list-style-type: none"> ● ECM calculation function is malfunctioning.
P0705	1003	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.
P1320	0201	Ignition signal circuit (IGN SIGNAL-PRIMARY)	<ul style="list-style-type: none"> ● The ignition signal in the primary circuit is not detected by the ECM during engine cranking or running.
P1336	0905	Crankshaft position sensor (OBD) [CRANK P/S (OBD)-COG]	<ul style="list-style-type: none"> ● The chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.
P1400	1005	EGR valve and EVAP canister purge control solenoid valve circuit (EGRC SOLENOID/V)	<ul style="list-style-type: none"> ● An improper voltage signal is sent to the ECM through the solenoid valve.
P1401	0305	EGR temperature sensor circuit (EGR TEMP SENSOR)	<ul style="list-style-type: none"> ● An excessively low or high voltage from the sensor is detected by the ECM, even when engine coolant temperature is low or high.
P1605	0804	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 detected by the ECM.
P1900	1308	Cooling fan circuit (COOLING FAN)	<ul style="list-style-type: none"> ● Cooling fan does not operate properly. (Overheat) ● Cooling system does not operate properly. (Overheat) ● Engine coolant was not added to the system using the proper filling method.

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

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"

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.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"

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 to detect a malfunction (if one exists).

DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

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

*4: 1st trip DTC No. is same as DTC No.

*7: For details, refer to each DTC Confirmation Procedure in AT section.

TROUBLE DIAGNOSIS — General Description

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

X: Applicable
—: Not applicable

Check Items (Possible Cause)	*1 "DTC CONFIRMATION PROCEDURE" Quick Ref.	*2 "OVERALL FUNCTION CHECK" Quick Ref.	Fail Safe System	MIL Illumination	Reference Page
● Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.)	RUNNING	RUNNING	—	—	EC-193
● ECM (ECCS control module)	RUNNING	—	X	2 trip	EC-196
● Harness or connectors (The switch circuit is open or shorted.) ● Neutral position switch ● Inhibitor switch	—	IGN: ON	—	2 trip	EC-198
● 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-205
● Harness or connectors ● Crankshaft position sensor (OBD) ● Flywheel (Drive plate)	RUNNING	—	—	2 trip	EC-210
● Harness or connectors (The valve circuit is open or shorted.) ● EGR valve and EVAP canister purge control solenoid valve	—	IGN: ON (RUNNING)	—	2 trip	EC-214
● Harness or connectors (The sensor circuit is open or shorted.) ● EGR temperature sensor	RUNNING	—	—	2 trip	EC-218
● Harness or connectors (The communication line circuit is open or shorted.) ● Dead (Weak) battery ● A/T control unit	RUNNING	—	—	2 trip	EC-223
● Harness or connectors. (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", (EC-236).	—	IGN: ON (RUNNING)	—	2 trip	EC-226

*1: ● This is Quick Reference of "DTC CONFIRMATION PROCEDURE".

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.

In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".

When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.

● During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.

● This is Quick Reference of "OVERALL FUNCTION CHECK".

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

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.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
P0705	1101	Inhibitor switch circuit (INHIBITOR SWITCH)	● A/T control unit does not receive the correct voltage signal from the switch based on the gear position.
P0710	1208	Fluid temperature sensor (FLUID TEMP SENSOR)	● A/T control unit receives an excessively low or high voltage from the sensor.
P0720	1102	Revolution sensor (VHCL SPEED SEN-A/T)	● A/T control unit does not receive the proper voltage signal from the sensor.
P0725	1207	Engine speed signal (ENGINE SPEED SIG)	● A/T control unit does not receive the proper voltage signal from the ECM.
P0731	1103	Improper shifting to 1st gear position (A/T 1ST SIGNAL)	● A/T cannot be shifted to the 1st gear position even electrical circuit is good.
P0732	1104	Improper shifting to 2nd gear position (A/T 2ND SIGNAL)	● A/T cannot be shifted to the 2nd gear position even electrical circuit is good.
P0733	1105	Improper shifting to 3rd gear position (A/T 3RD SIGNAL)	● A/T cannot be shifted to the 3rd gear position even electrical circuit is good.
P0734	1106	Improper shifting to 4th gear position or TCC (A/T 4TH SIGNAL OR TCC)	● A/T cannot be shifted to the 4th gear position or perform lock-up even electrical circuit is good.
P0740	1204	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.
P0745	1205	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.
P0750	1108	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.
P0755	1201	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.
P1705	1206	Throttle position sensor Throttle position switch (THRTL POSI SEN-A/T)	● A/T control unit receives an excessively low or high voltage from the sensor.
P1760	1203	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.

*1: 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.

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

*4: 1st trip DTC No. is the same as DTC No.

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 CONFIRMATION PROCEDURE in AT section.

TROUBLE DIAGNOSIS — General Description

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

X: Applicable
—: Not applicable

Check Items (Possible Cause)	“DTC CONFIRMATION PROCEDURE” Quick Ref. ^{*1}	“OVERALL FUNCTION CHECK” Quick Ref. ^{*2}	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	
<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 sensor circuit is open or shorted.) ● Revolution sensor 	DRIVING (pattern 2)	—	X*7	2 trip*3	
<ul style="list-style-type: none"> ● Harness or connectors (The signal circuit is open or shorted.) 	DRIVING (pattern 5)	—	X*7	2 trip*3	
<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	See “Self-diagnosis”, “TROUBLE DIAGNOSES” in AT section.
<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.) ● 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 solenoid circuit is open or shorted.) ● Shift solenoid valve A 	IGN: ON	—	X*7	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*7	2 trip	
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor ● Throttle position switch 	DRIVING (pattern 4)	—	X*7	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	

*1: ● This is Quick Reference of “DTC CONFIRMATION PROCEDURE”.
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The “OVERALL FUNCTION CHECK” is a simplified and effective way to inspect a component or circuit.
In some cases, the “OVERALL FUNCTION CHECK” is used rather than a “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE”.
When no DTC CONFIRMATION PROCEDURE is available, the “NG” result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.

- During an “NG” OVERALL FUNCTION CHECK, the DTC or 1st trip DTC might not be confirmed.
- This is Quick Reference of “OVERALL FUNCTION CHECK”.
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

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

*8: ● The MIL illuminates after A/T control unit enters the fail-safe mode in two consecutive trips, if both the “Revolution sensor” and the “Engine speed signal” meet the fail-safe condition at the same time.

TROUBLE DIAGNOSIS — General Description

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

INSPECTION PRIORITY (ENGINE RELATED ITEMS)

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 (P0605, 0301) ● Mass air flow sensor circuit (P0100, 0102) ● Throttle position sensor circuit (P0120, 0403) ● EGRC solenoid valve circuit (P1400, 1005) ● A/T diagnosis communication line (P1605, 0804) 	<ul style="list-style-type: none"> ● Camshaft position sensor circuit (P0340, 0101) ● Vehicle speed sensor circuit (P0500, 0104) ● Intake air temperature sensor circuit (P0110, 0401) ● Knock sensor circuit (P0325, 0304) 	<ul style="list-style-type: none"> ● Engine coolant temperature sensor circuit (P0115, 0103) (P0125, 0908) ● Ignition signal circuit (P1320, 0201) ● Park/Neutral position switch circuit (P0705, 1003) ● Signal circuit from A/T control unit to ECM (P0600)
2	<ul style="list-style-type: none"> ● EGR temperature sensor circuit (P1401, 0305) ● A/T related sensors, solenoid valves and switches (P0705, 1101) (P0720, 1102) (P0750, 1108) (P0755, 1201) (P0740, 1204) (P0745, 1205) (P0725, 1207) (P0710, 1208) 	<ul style="list-style-type: none"> ● Crankshaft position sensor circuit (P0335, 0802) (P1336, 0905) ● Cooling fan circuit (P1900, 1308) ● Front heated oxygen sensor heater circuit (P0135, 0901) 	<ul style="list-style-type: none"> ● Front heated oxygen sensor circuit (P0130, 0303) ● Rear heated oxygen sensor circuit (P0136, 0707) ● Rear heated oxygen sensor heater circuit (P0141, 0902)
3	<ul style="list-style-type: none"> ● EGR function (P0400, 0302) ● EGRC-BPT valve function (P0402, 0306) ● IACV-AAC valve circuit (P0505, 0205) 	<ul style="list-style-type: none"> ● Misfire (P0300 - P0304, 0701 - 0605) ● Closed loop control (P0130, 0307) ● Improper shifting (P0731 - P0734, 1103 - 1106) 	<ul style="list-style-type: none"> ● Fuel injection system function (P0172, 0114) (P0171, 0115) ● Three way catalyst function (P0420, 0702)

TROUBLE DIAGNOSIS — General Description

Fail-Safe Chart

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to an open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates. However, the MIL will not illuminate if the "Start signal circuit" malfunctions.

DTC No.		Detected items	Engine operating condition in fail-safe mode														
CONSULT GST	ECM*																
P0100	0102	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.														
P0115	0103	Engine coolant temperature sensor circuit	<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> <p>When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates for 120 seconds after turning off the ignition switch.</p>	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)																
P0120	0403	Throttle position sensor circuit	<p>Throttle position will be determined based on the amount of mass air flow and the engine speed. Therefore, acceleration will be poor.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></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. This prevents extra enrichment. 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 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 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 style="width: 40%;"></th> <th style="text-align: center;">Operation</th> </tr> </thead> <tbody> <tr> <td>Engine speed</td> <td style="text-align: center;">Engine speed will not rise more than 3,000 rpm.</td> </tr> <tr> <td>Fuel injection</td> <td style="text-align: center;">Simultaneous multiport fuel injection system</td> </tr> <tr> <td>Ignition timing</td> <td style="text-align: center;">Ignition timing is fixed at the preset value.</td> </tr> <tr> <td>Fuel pump</td> <td style="text-align: center;">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 style="text-align: center;">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.																

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

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (For New CT/CS)

SYSTEM — Basic engine control system		SYMPTOM														Reference page	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	OVERCOOLS		OVERCHARGING
New CT/CS		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	1P	1X	
Fuel	Fuel pump circuit	●	●	●	○	●		●	●			○		○			EC-243
	Fuel pressure regulator system	●	●	●	○	○	○	●	●	○		●					EC-24
	Injector circuit	●	●	●	○	●		●	●			●					EC-238
	Evaporative emission system	○	○	○	○	○	○	○	○	○			○				EC-21
Air	Positive crankcase ventilation system	○	○	○	○	○	○	○	○	○		○	○				EC-23
	IACV-Air regulator	○	○	○	○	○	○	●	●	○		○					EC-251
	Incorrect idle speed adjustment	○	○				○	○	○	○		○					EC-26
	IACV-AAC valve circuit	●	●	●	○	○	●	●	●	●		●		○			EC-189
	IACV-FICD solenoid valve circuit	○	○	○	○	○	○	○	○	○		○					EC-252
Ignition	Incorrect ignition timing adjustment	○	○	●	●	●		●	●			●					EC-26
	Ignition circuit	●	●	●	●	●		●	●			●					EC-205
EGR	EGR valve & EVAP canister purge control solenoid valve circuit		○	●	○	○						○					EC-214
	EGR system	○	●	●	○	○	○	●	●	○		○					EC-171
Main power supply and ground circuit		○	○	○	○	○		○	○			○		○			EC-100
Cooling	Cooling fan circuit	○	○	○	○	○		○	○	○	○	○		○	●		EC-226
Air conditioner circuit		○	○	○	○	○		○	○	○		○		○			HA section

● : High Possibility Item
○ : Low Possibility Item

(continued on next page)

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (For New CT/CS) (Cont'd)

SYSTEM	SYMPTOM														Reference page	
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	OVERCOOLS		OVERCHARGING
New CT/CS	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	1P	1X	
ECCS — Basic engine control system	Camshaft position sensor circuit	○	○	○	○		○	○			○					EC-166
	Mass air flow sensor circuit	●	●	●	●	●	●	●			●					EC-103
	Front heated oxygen sensor circuit		●	●	○	●		●			●					EC-127
	Engine coolant temperature sensor circuit	●	●	●	○	●	○	●	●	○		●				EC-113, 122
	Throttle position sensor circuit		●	●		●	●	●	●		●					EC-117
	Incorrect throttle position sensor adjustment		●	○		○	●	○	○	●		○				EC-26
	Vehicle speed sensor circuit		○	○		○						○				EC-185
	Knock sensor circuit			●	○	○						○				EC-159
	ECM	○	○	○	○	○	○	○	○	○	○	○				EC-196, 83
	Start signal circuit	○														EC-241
	Park/Neutral position switch circuit			○		○		○	○			○				EC-198
Power steering oil pressure switch circuit		○					○	○							EC-248	

● : High Possibility Item
○ : Low Possibility Item

(continued on next page)

CI
 MA
 EM
 LC
EC
 FE
 CL
 MT
 AI
 FA
 RA
 BR
 ST
 RS
 BT
 HA
 EL
 IX

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (For New CT/CS) (Cont'd)

SYSTEM		SYMPTOM														Reference page		
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	OVERCOOLS		OVERCHARGING	
New CT/CS		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	1P	1X		
Fuel	Fuel tank	●	●														—	
	Fuel piping	○	○	○	○	○		○	○			○						
	Vapor lock		○															
	Valve deposit	○	○	○	○	○		○	○			○						
	Poor fuel (Heavy weight gasoline, Low octane)	○	○	○	○	○		○	○			○						
Air	Air duct		○	○		○		○	○			○					—	
	Air cleaner		●	●		○		●	●			●						
	Air leakage from air duct (Mass air flow sensor — throttle body)	○	○	○	○	○	○	○	○	○		○						
	Throttle body, Throttle wire	○	●	●		●	●	●	●	●		●						FE section
	Air leakage from intake manifold/Collector/Gasket	○	○	○	○	○	○	○	●	●	○		○					—
Cranking	Battery	○	○	○		○		○	○			○		○		○	—	
	Alternator circuit	○	○	○					○			○		○		○		EL section
	Starter circuit	●																—
	Flywheel/drive plate	●																CL section
	Clutch interlock switch	●																AT section
	Inhibitor switch	○																EL section
Engine	Cylinder head	○	○	○	○	○		○	○			○					—	
	Cylinder head gasket	○	●	○	○	○		○	○		○	○	○					
	Cylinder block	○	○	○	○	●		○	○			○	○					
	Piston	○	○	○	○	○		○	○			○	○					
	Piston ring	○	○	○	○	○		○	○			○	○					
	Connecting rod	○	○	○	○	○		○	○			○	○					
	Bearing	○	○	○	○	○		○	○			○	○					
	Crankshaft	○	○	○	○	○		○	○			○	○					
	Valve mechanism	○	○	○	○	○		○	○			○	○					
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	○	○	●	○	○		○	○			○					—	
	Warm-up three way catalyst	○	○	○	○	○		○	○			○						
	Lubrication	○	○	○	○	○		○	○			○	○					
Cooling	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	○	●	○	○	○		○	○			○	○				—	
	Oil level (Low)/Filthy oil	○	○	○	○	○		○	○			○	○					
	Radiator/Hose/Radiator filler cap	○	○	○	○	○		○	○		○	○						
	Thermostat	○	○	○	○	○		○	○		○	○			○			
	Water pump	○	○	○	○	○		○	○		○	○						
	Water gallery	○	○	○	○	○		○	○		○	○						
Cooling	Cooling fan	○	○	○	○	○		○	○		○	○			○			
	Coolant level (low)/Contaminated coolant	○	○	○	○	○		○	○		○	○						

● : High Possibility Item
○ : Low Possibility Item

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (For Old CT/CS)

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)	
Old CT/CS		1A	1B	1C	1F	1H	1R	1S	1M	1J	1L	1K	1T	1V	1N	1P	1X	1Y		
Fuel	Fuel pump circuit	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	EC-243
	Fuel pressure regulator system	●	○	●	●	●	○	○	○	○	○	○	○	●						EC-24
	Injector circuit	●	●	●	●	●	●		○	○	○	○		●						EC-238
	Evaporative emission system	○	○	○	○	○	○	○	○	○	○	○		○						EC-21
Air	Positive crankcase ventilation system	○	○	○	○	○	○	○	○	○	○	○		○	○					EC-23
	IACV-Air regulator	○	○	●	○	●	○	○	○	○	○			○						EC-251
	Incorrect idle speed adjustment	○	○	○	○			○						○						EC-26
	IACV-AAC valve circuit	●	○	●	●	●	○	●	○	○	○			○					○	EC-189
	IACV-FICD solenoid valve circuit	○	○	○	○	○	○	○	○	○	○			○						EC-252
Ignition	Incorrect ignition timing adjustment	○	○	●	○	●	●		●	○	○			●						EC-26
	Ignition circuit	●	●	●	●	●			●		○			●						EC-205
EGR	EGR valve & EVAP canister purge control solenoid valve circuit				○	●	○		○	○	○			○						EC-214
	EGR system	○	○	●	●	●	○	○	○	○				○						EC-171
Main power supply and ground circuit		○	○	○	○	○	○		○	○				○				○		EC-100
Cooling	Cooling fan circuit	○	○	○	○	○	○	○	○					○	●	●		○		EC-226
Air conditioner circuit		○	○	○	○	○	○	○	○					○				○		HA section

● : High Possibility Item
○ : Low Possibility Item

(continued on next page)

GI
 WA
 EV
 LC
EC
 FE
 CL
 MT
 AT
 FA
 RA
 BR
 ST
 RS
 BT
 HA
 EL
 DX

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (For Old CT/CS) (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)
Old CT/CS	1A	1B	1C	1F	1H	1R	1S	1M	1J	1L	1K	1T	1V	1N	1P	1X	1Y	
ECCS																		EC-166
Camshaft position sensor circuit	○	○	○	○	○	○		●	○	○		○						EC-103
Mass air flow sensor circuit	●	●	●	●	●	●		●	○	○		●						EC-127
Front heated oxygen sensor circuit			●	●	●	●		○	○	○		●						EC-113, 122
Engine coolant temperature sensor circuit	●	●	●	●	●	●	○	○	○	○		●						EC-117
Throttle position sensor circuit			●	●	●	●	●					●						EC-26
Incorrect throttle position sensor adjustment			○	●	○	○	●			○		○						EC-185
Vehicle speed sensor circuit				○	○	○						○						EC-159
Knock sensor circuit					●	○		○				○						EC-196, 83
ECM	○	○	○	○	○	○	○	○	○	○	○	○		○				EC-241
Start signal circuit	○	○																EC-198
Park/Neutral position switch circuit			○		○	○						○						EC-248
Power steering oil pressure switch circuit			○	○														

● : High Possibility Item
○ : Low Possibility Item

(continued on next page)

TROUBLE DIAGNOSIS — General Description

Symptom Matrix Chart (For Old CT/CS) (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)			
Old CT/CS		1A	1B	1C	1F	1H	1R	1S	1M	1J	1L	1K	1T	1V	1N	1P	1X	1Y				
Fuel	Fuel tank	●	○		●																	
	Fuel piping	○	○	○	○	○	○		○	○	○		○									
	Vapor lock	○	○		○	○	○															
	Valve deposit	○	○	○	○	○	○		○	○			○									
	Poor fuel (Heavy weight gasoline, Low octane)	○	○	○	○	○	○		○	○			○									
Air	Air duct			○	○	○	○						○									
	Air cleaner			●	●	●	○						●									
	Air leakage from air duct (Mass air flow sensor — throttle body)	○	○	○	○	○	○	○	○	○			○									
	Throttle body, Throttle wire	○		●	●	●	●	●						●							FE section	
	Air leakage from intake manifold/Collector/Gasket	○	○	●	○	○	○	○	○	○				○								
Cranking	Battery	○	○	○	○	○	○						○								EL section	
	Alternator circuit	○	○	○	○	○	○						○									
	Starter circuit	●	●																			
	Flywheel	●	○																			
	Clutch interlock switch	●	○																			
	Inhibitor switch	○	○																			CL section
	Theft warning circuit	○	○																			AT section
		○	○																			EL section
Engine	Cylinder head	○	○	○	○	○	○		○	○			○									
	Cylinder head gasket	○	○	○	●	○	○		○	○			○	○	○							
	Cylinder block	○	○	○	○	○	●		○	○			○	○	○							
	Piston	○	○	○	○	○	○		○	○			○	○	○							
	Piston ring	○	○	○	○	○	○		○	○			○	○	○							
	Connecting rod	○	○	○	○	○	○		○	○			○	○	○							
	Bearing	○	○	○	○	○	○		○	○			○	○	○							
	Crankshaft	○	○	○	○	○	○		○	○			○	○	○							
Valve mechanism	Timing chain	●	○	○	○	○	○		○	○			○									
	Camshaft	●	○	○	○	○	○		○	○			○									
	Intake valve	○	○	○	○	○	○		○	○			○	○								
	Exhaust valve	○	○	○	○	○	○		○	○			○	○								
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	○	○	○	○	●	○		○	○			○	○								
	Warm-up three way catalyst	○	○	○	○	○	○		○	○			○									
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	○	○	○	●	○	○		○	○			○	○								
	Oil level (Low)/Filthy oil	○	○	○	○	○	○		○	○			○	○								
Cooling	Radiator/Hose/Radiator filler cap	○	○	○	○	○	○		○	○			○		○							
	Thermostat	○	○	○	○	○	○	○	○	○			○		○							
	Water pump	○	○	○	○	○	○		○	○			○		○							
	Water gallery	○	○	○	○	○	○		○	○			○		○							
	Cooling fan	○	○	○	○	○	○	○	○	○			○		○							
	Coolant level (low)/Contaminated coolant	○	○	○	○	○	○		○	○			○		○							

● : High Possibility Item
○ : Low Possibility Item

GI
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BT
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TROUBLE DIAGNOSIS — General Description

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	1.0 - 1.7V
		2,000 rpm	1.5 - 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	California models 0 ↔ Approx. 1.0V
RR O2 MNTR			Non-California models 0 ↔ Approx. 2.2V 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	0.3 - 0.7V
		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
CLS D 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 	Air conditioner switch "OFF"	OFF
		Air conditioner switch "ON" (Compressor operates.)	ON
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever "P" or "N"	ON
		Except above	OFF

TROUBLE DIAGNOSIS — General Description

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

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch ON → OFF 		ON → OFF
A/C PRESS SW	<ul style="list-style-type: none"> ● Air conditioner high pressure side: Increasing to 1,422 - 1,618 kPa (14.5 - 16.5 kg/cm², 206 - 235 psi) ● Air conditioner high pressure side: Except above 		ON
			OFF
LOAD SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON 	Rear window defogger is operating.	ON
		Rear window defogger is not operating.	OFF
INJ PULSE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	2.4 - 3.2 msec.
		2,000 rpm	1.9 - 3.2 msec.
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
IGN TIMING	ditto	Idle	20° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	ditto	Idle	20 - 40%
		2,000 rpm	—
A/F ALPHA	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	55 - 154%
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch OFF → ON 		OFF → ON
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking ● When engine is stopped (stops in 1.0 seconds) 		ON
		Except as shown above	OFF
COOLING FAN	<ul style="list-style-type: none"> ● After warming up engine, idle the engine. ● Air conditioner switch "OFF" 	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH
EGRC SOL/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	ON
		2,000 rpm	ON → OFF → ON
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	10.0 - 25.0%
		2,500 rpm	11.0 - 25.5%
ABSOL TH/P/S	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	Throttle valve fully closed	0.0%
		Throttle valve fully opened	Approx. 89%
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever "N" ● No-load 	Idle	1.5 - 4.5 gm/s
		2,500 rpm	5.5 - 13.0 gm/s

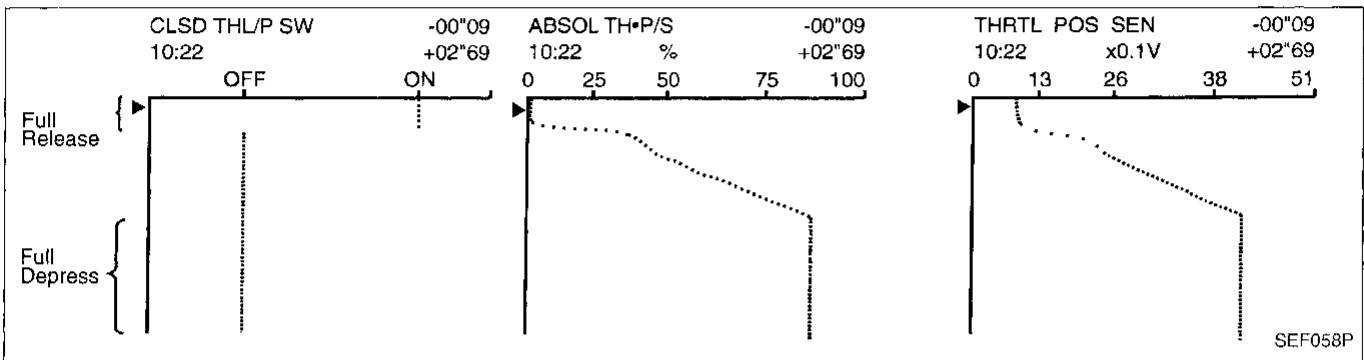
Major Sensor Reference Graph in Data Monitor Mode

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

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

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

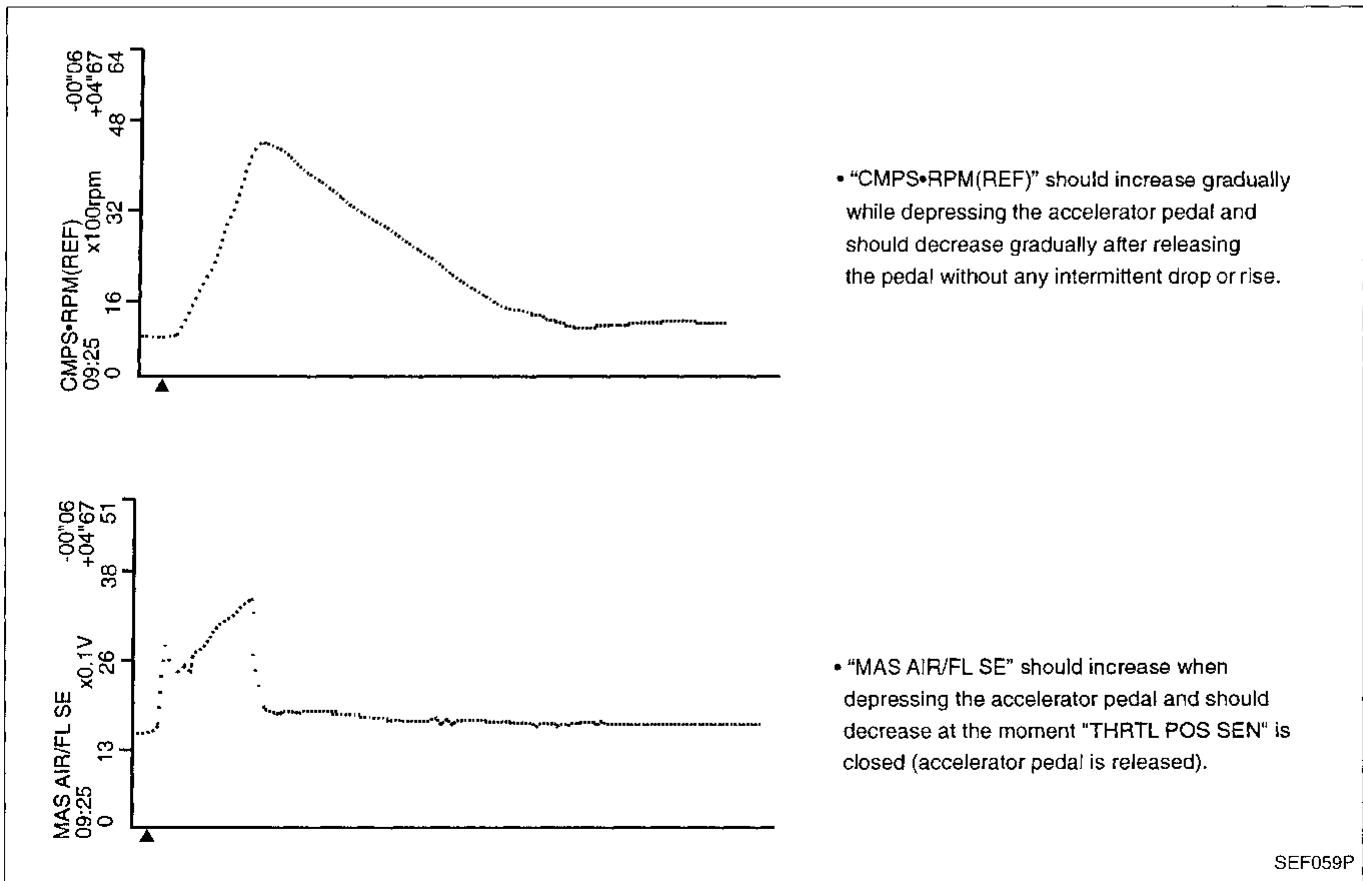
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL/P SW" is changed from "ON" to "OFF".



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

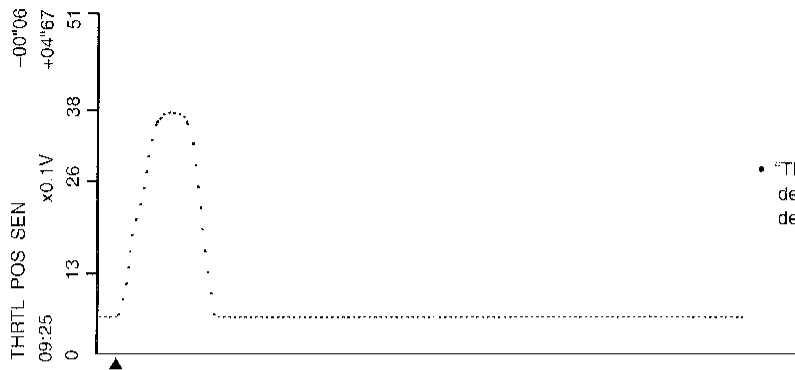
Below is the data for "CMPS·RPM (REF)", "MAS AIR/FL SE", "THRTL POS SEN", "RR O2 SENSOR", "FR O2 SENSOR" and "INJ PULSE" when racing quickly up to 4,800 rpm under no load after warming up engine sufficiently.

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

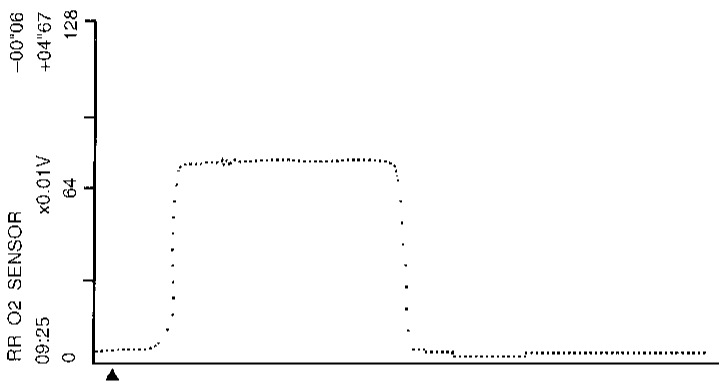


TROUBLE DIAGNOSIS — General Description

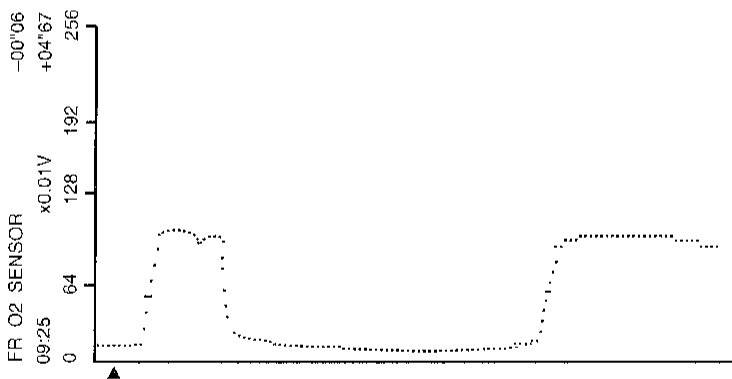
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



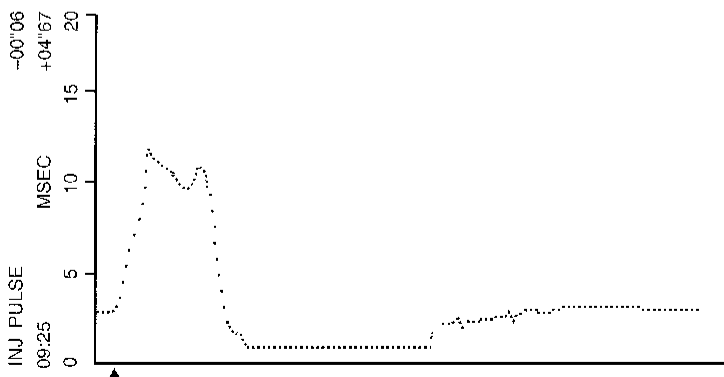
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "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.

CI

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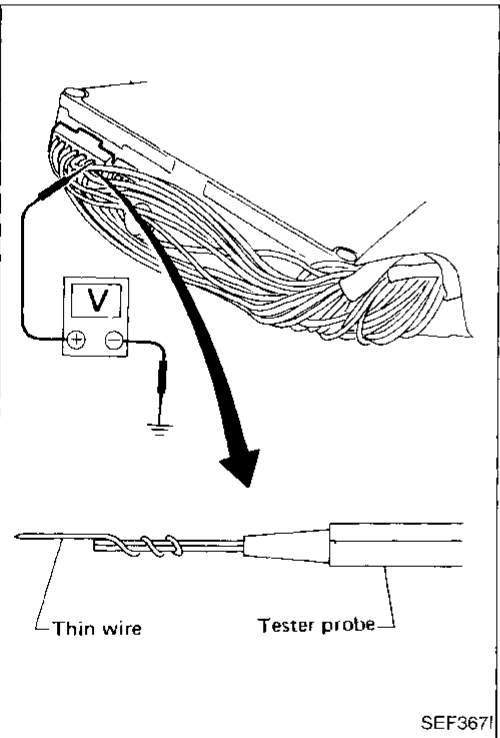
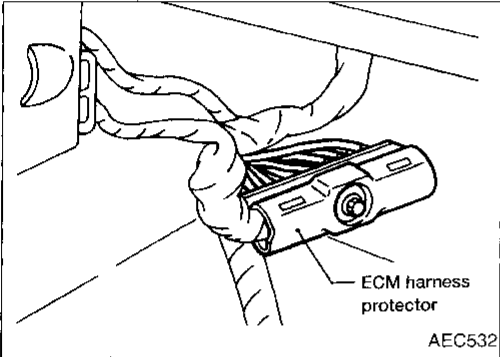
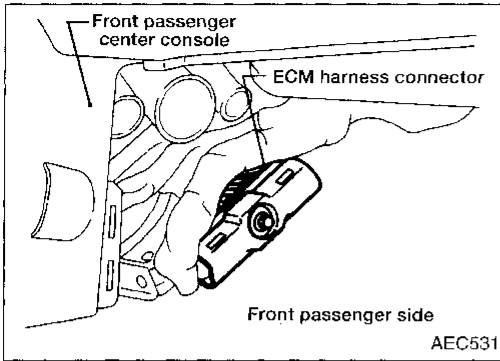
BT

HA

EL

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TROUBLE DIAGNOSIS — General Description

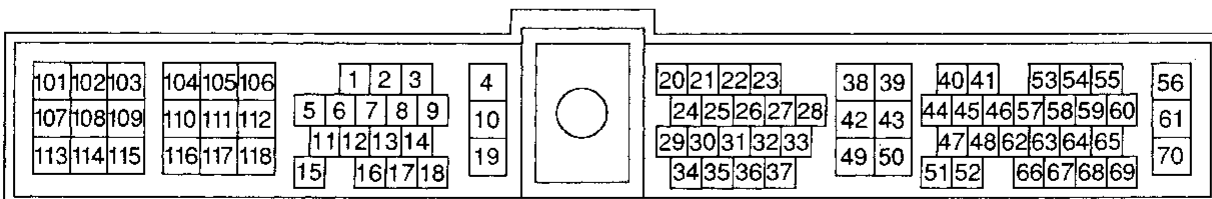


ECM Terminals and Reference Value

PREPARATION

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

ECM HARNESS CONNECTOR TERMINAL LAYOUT



SEF064P

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and Ⓒ (ECCS ground).

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
1	W	Ignition signal	Engine is running. └ Idle speed	0.3 - 0.6V*
			Engine is running. └ Engine speed is 2,000 rpm	Approximately 0.8 - 1.0V*
2	Y/R	Ignition check	Engine is running. └ Idle speed	Approximately 6 - 16V*
3	L/B	Tachometer	Engine is running. └ Idle speed	0.6 - 1.6V*
4	W/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	G/OR (A/T models)	A/T check signal	Ignition switch "ON" └ Engine is running.	6 - 16V
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	Air conditioner triple-pressure switch	Ignition switch "ON".	Approximately 6 - 16V
10	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
13	LG	Cooling fan relay (High)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan (High) is operating.	0.07 - 0.4V
14	LG/R	Cooling fan relay (Low)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. └ Cooling fan (Low) is operating.	0.07 - 0.20V

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

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
15	Y/L	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON".	0.08 - 0.2V
			Engine is running. └ A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
18	OR	Malfunction indicator lamp	Ignition switch "ON"	Approximately 70mV
			Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
20	G/B	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	G/OR	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 0 - 1.5V
			Ignition switch "ON" └ Except the above gear position	More than 4.4V
23	W	Throttle position sensor	Ignition switch "ON" └ Accelerator pedal released	0.3 - 0.7V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Less than 5.12V
24	BR/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.	More than 4.4V
26	Y/G	Vehicle speed sensor	Engine is running. └ Slowly rotating front wheels	More than 4.4V (AC voltage)

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)	
28	L	Intake air temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with intake air temperature.	GI MA
29	L/R	A/T signal No. 2	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V	EV
30	BR/W	A/T signal No. 3	Ignition switch "ON"	0 - 0.5V	LC
33	W/R	Throttle position sensor signal	Ignition switch "ON" └ Accelerator pedal released	Approximately 0.3 - 0.7V	EC FE
			Ignition switch "ON" └ Accelerator pedal fully depressed	Less than 5.12V	
38	B/R	Ignition switch	Ignition switch "OFF"	0V	CL
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)	
39	B	ECCS ground	Engine is running. └ Idle speed	Engine ground	WT
40 44	L L	Camshaft position sensor (Reference signal)	Engine is running.	Approximately 2.1 - 2.4V* (AC voltage)	AT
43	B	ECCS ground	Engine is running. └ Idle speed	Engine ground (Probe this terminal with ○ tester probe when measuring.)	FA RA
41	Y	Camshaft position sensor (Position signal)	Engine is running.	Approximately 2.1 - 2.4V* (AC voltage)	BR
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)	ST
47	OR	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	0.7 - 1.4V	RS BT
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	1.0 - 1.6V	
48	W	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	0.005 - 0.02V	HA
49	R/Y	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V	EL
50	B	Sensors' ground	Engine is running. (Warm-up condition) └ Idle speed	0.001 - 0.02V	IDX

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

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
51	L/OR	Engine coolant temperature sensor	Engine is running.	0 - 4.84V Output voltage varies with engine coolant temperature.
52	W	Rear heated oxygen sensor	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V
53	W	Crankshaft position sensor (OBD)	Engine is running. (A/T: N range, M/T: Neutral) └ Idle speed (Air conditioner switch "OFF".)	More than 0.2V* (AC range)
54	W	Knock sensor	Engine is running. └ Idle speed	2.0 - 3.0V
55	L/R	Rear defogger relay	Ignition switch "ON" └ Rear defogger is "OFF".	Approximately 0V
			Ignition switch "ON" └ Rear defogger is "ON".	BATTERY VOLTAGE (11 - 14V)
56 61	OR OR	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
58	OR	Data link connector for GST	Engine is running. └ Idle speed	Approximately 9V
62	R/L	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
			Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 3.0V
63	L	Intake air temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with intake air temperature.
64	Y/B	Data link connector for CONSULT	Engine is running.	Approximately 0.1V
65	Y/R		└ Idle speed (CONSULT is connected and turned on)	Approximately 4 - 9V
68	Y			Approximately 3.5V*
70	W	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	SB	IACV-AAC valve	Engine is running. └ Idle speed	Approximately 5 - 14V
			Engine is running. └ Steering wheel is being turned └ Air conditioner is operating └ Headlamps are in high position	5 - 9V

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

TROUBLE DIAGNOSIS — General Description

ECM Terminals and Reference Value (Cont'd)

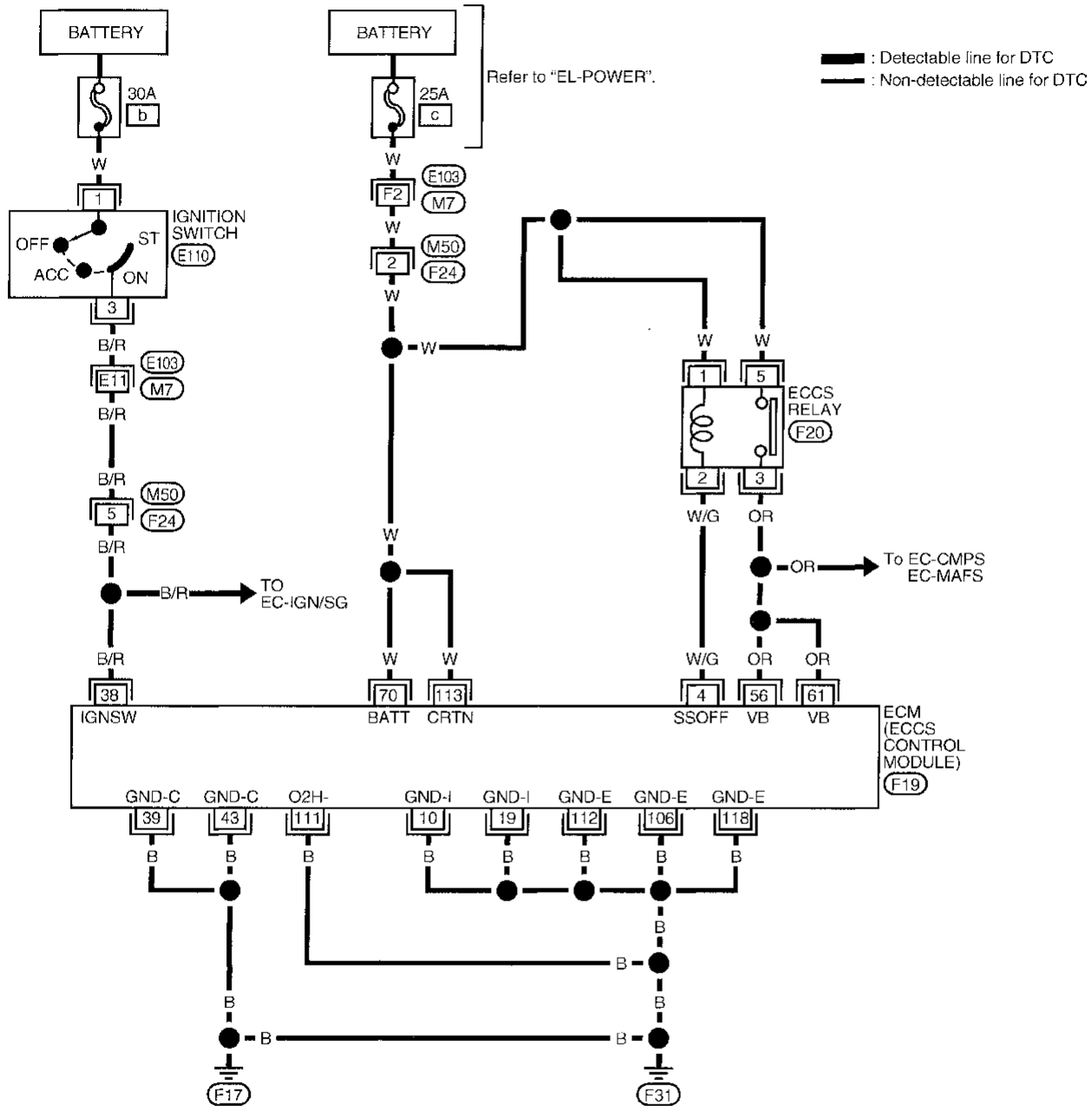
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA
102	BR	Injector No. 1	Engine is running	BATTERY VOLTAGE (11 - 14V)
104	BR/Y	Injector No. 3		
107	BR/W	Injector No. 2		
109	BR	Injector No. 4		
103	LG	EGR valve & EVAP canis- ter purge control solenoid valve	Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) └ Idle speed	Approximately 0 - 0.4V
106	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
110	Y	Rear heated oxygen sen- sor heater	Engine is running. └ Engine speed is below 3,600 rpm.	Approximately 0V
			Engine is running. └ Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
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 sen- sor heater	Engine is running. └ Engine speed is below 3,600 rpm.	Approximately 0V
			Engine is running. └ Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
118	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

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

TROUBLE DIAGNOSIS FOR POWER SUPPLY

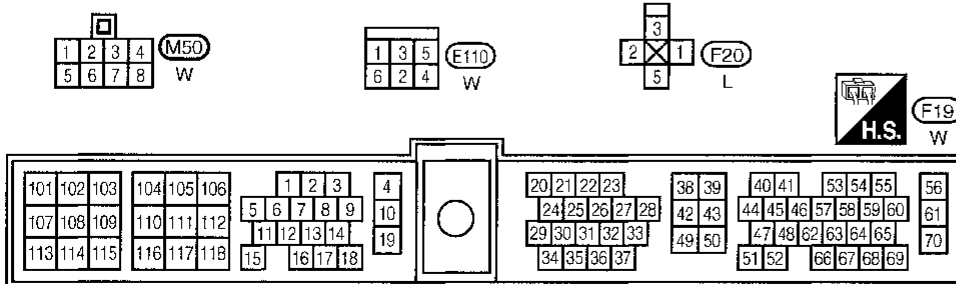
Main Power Supply and Ground Circuit

EC-MAIN-01



Refer to last page (Foldout page).

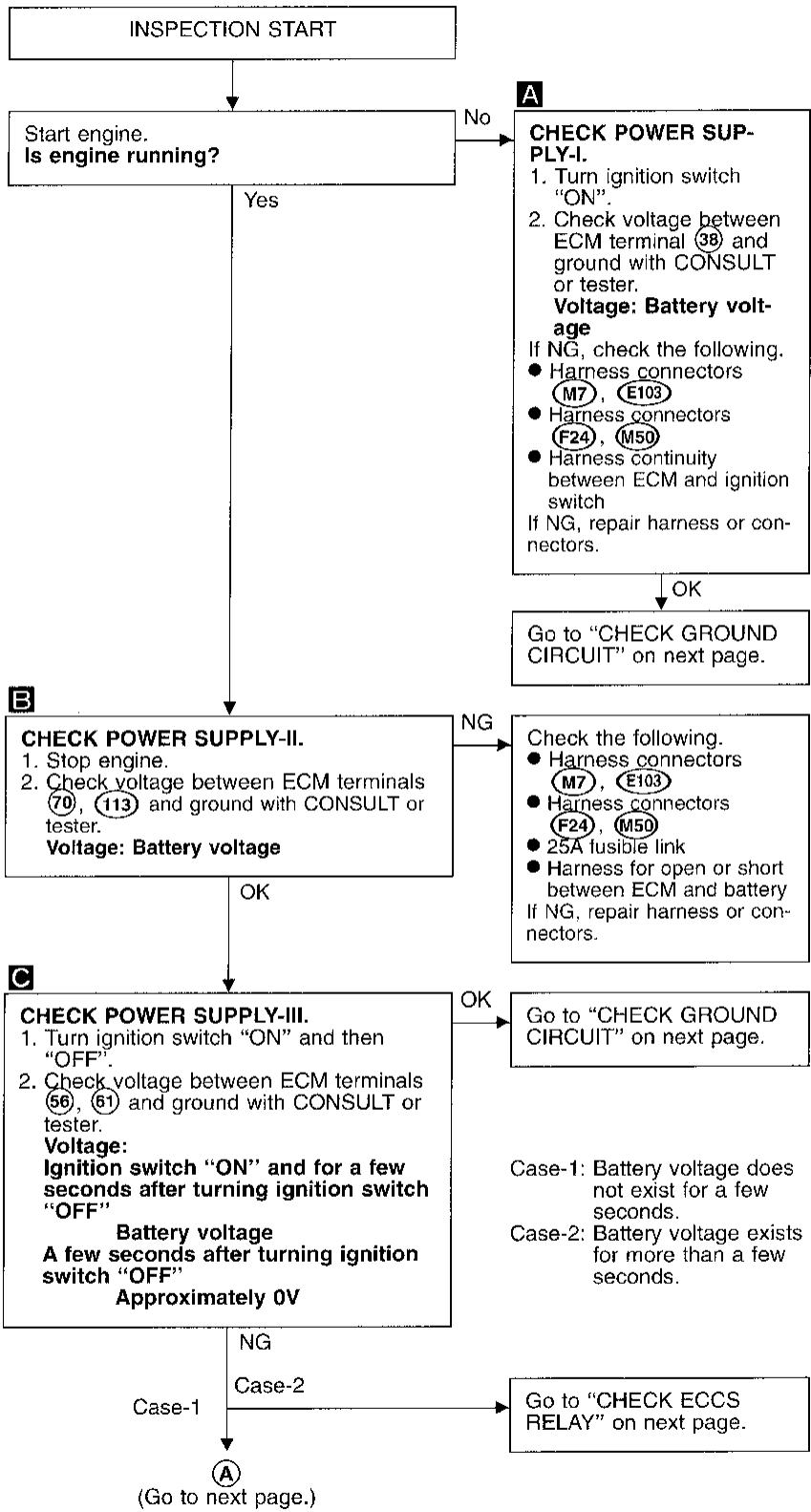
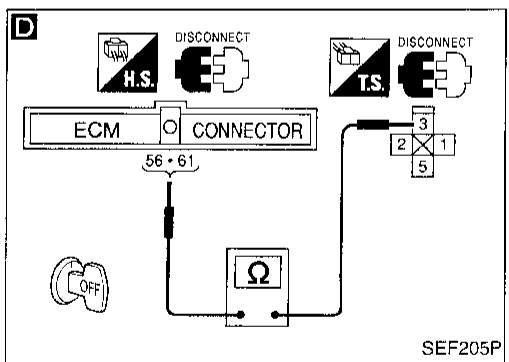
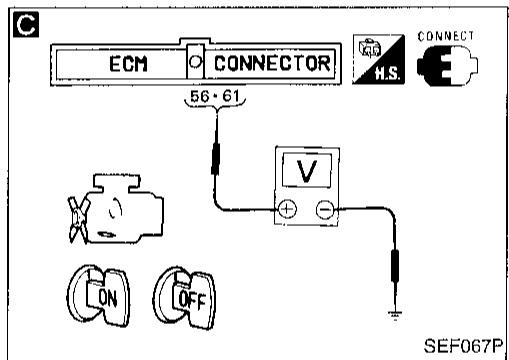
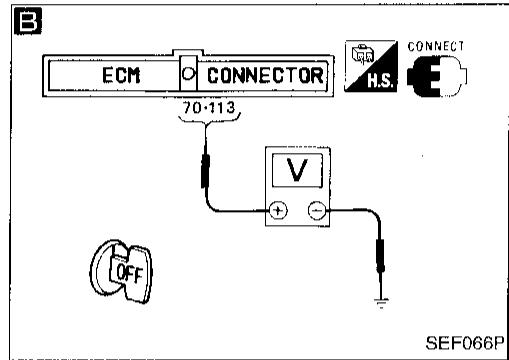
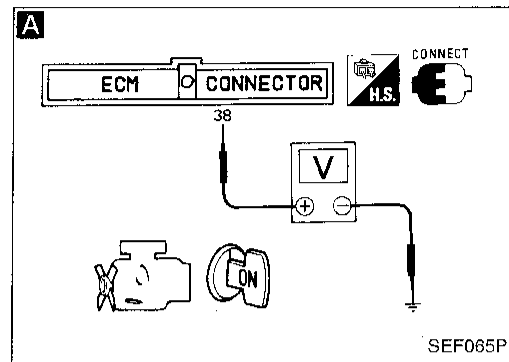
(M7), (E103)



TROUBLE DIAGNOSIS FOR POWER SUPPLY

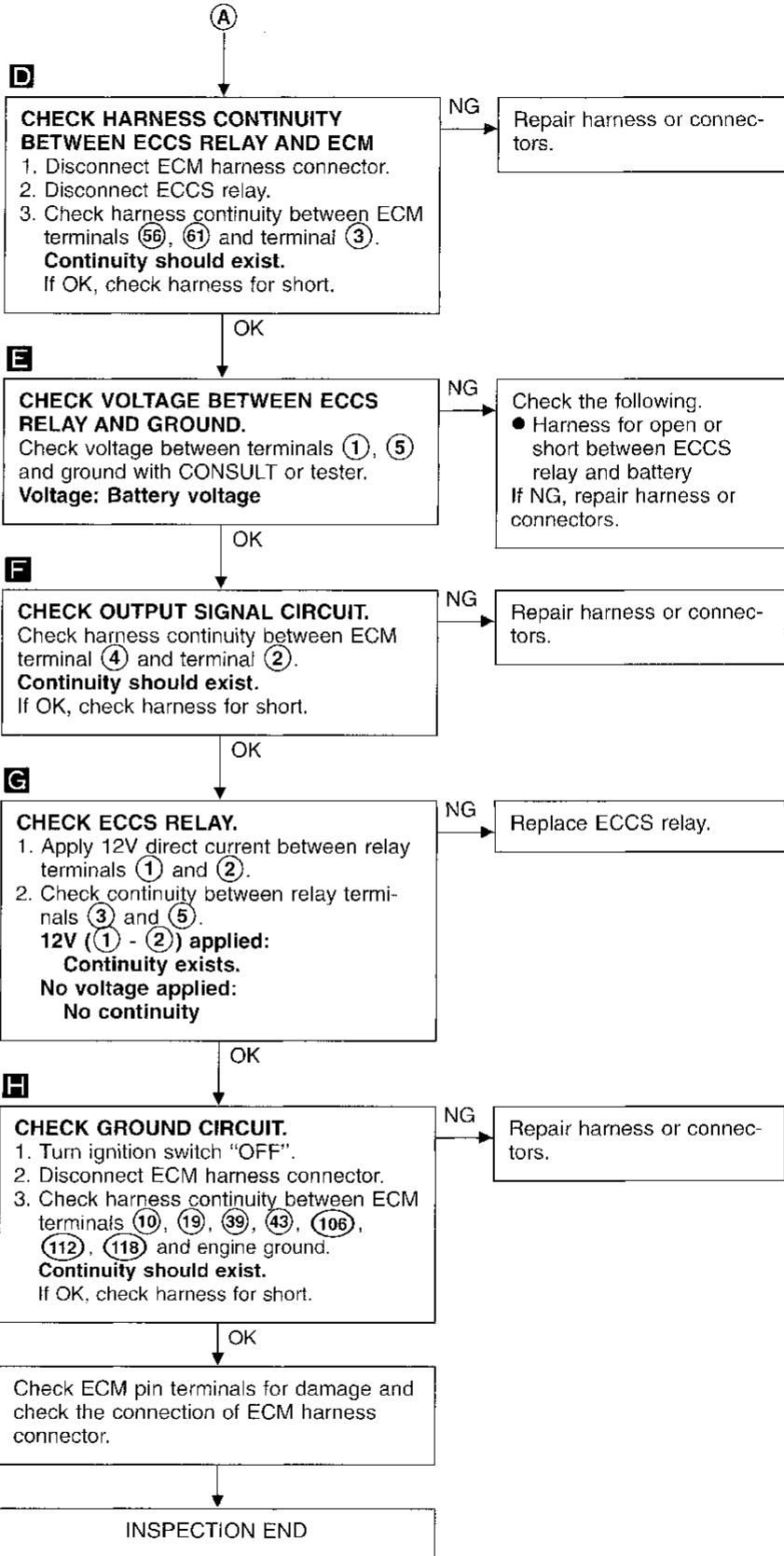
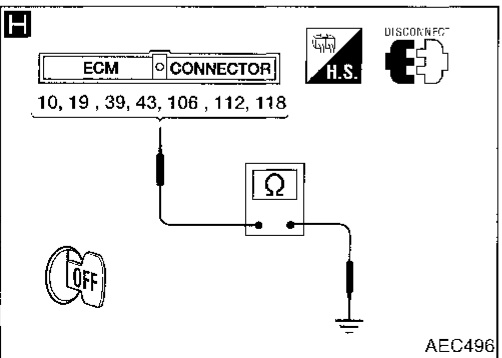
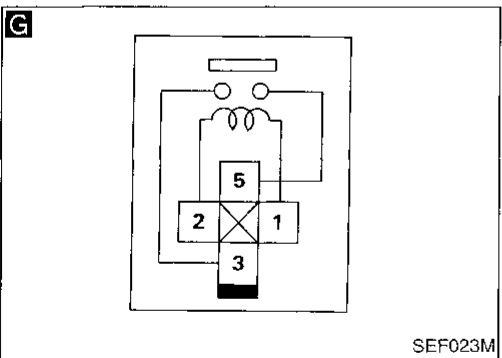
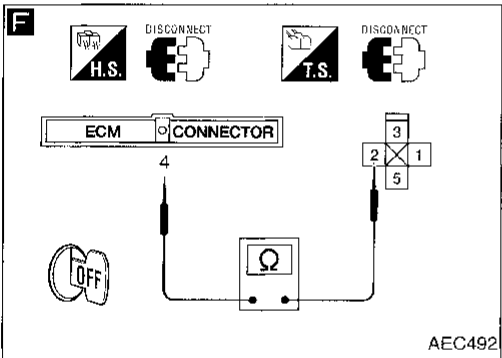
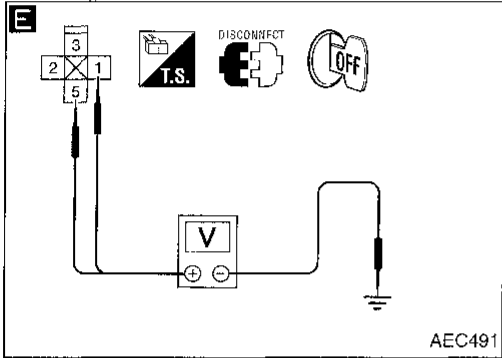
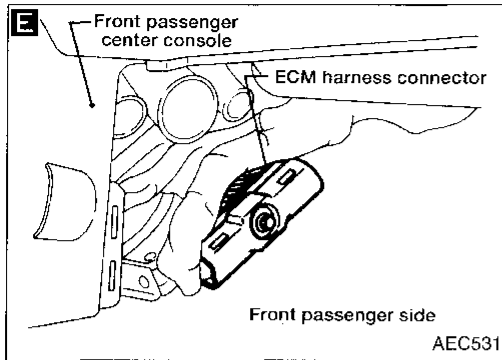
Main Power Supply and Ground Circuit (Cont'd)

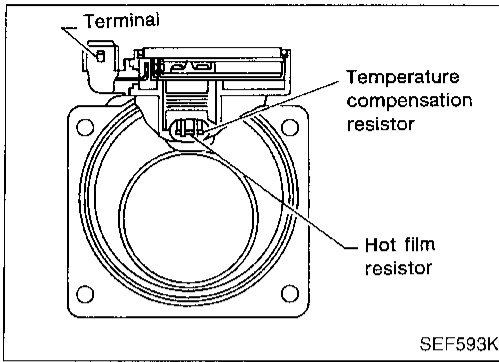
DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR POWER SUPPLY

Main Power Supply and Ground Circuit (Cont'd)





Mass Air Flow Sensor (MAFS) (DTC: 0102)

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

GE
 MA
 EM
 LC

EC

FE

CL

MT

AT

FA

RA

BR

ST

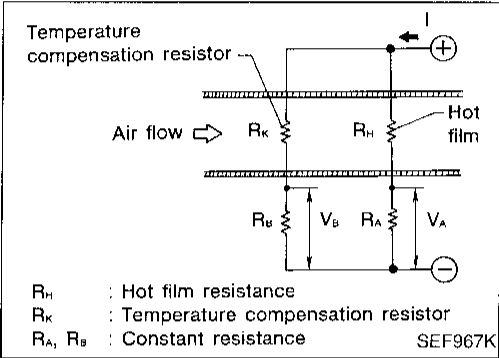
RS

BT

HA

EL

IDX



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0100 0102	A) An excessively high or low voltage from the sensor is sent to ECM. B), C) Voltage sent to ECM is not practical when compared with the camshaft position sensor and throttle position sensor signals.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B". If DTC still cannot be confirmed, perform "OVERALL FUNCTION CHECK", "Procedure for malfunction C".

Procedure for malfunction A

- 📱
 1) Turn ignition switch "ON", and wait at least 6 seconds.
 2) Select "DATA MONITOR" mode with CONSULT.
 3) Start engine and wait at least 3 seconds.
- OR
- 🔧
 1) Turn ignition switch "ON", and wait at least 6 seconds.
 2) Start engine and wait at least 3 seconds.
 3) Select "MODE 7" with GST.
- OR
- 🚫
 1) Turn ignition switch "ON", and wait at least 6 seconds.
 2) Start engine and wait at least 3 seconds.
 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
 4) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P0100

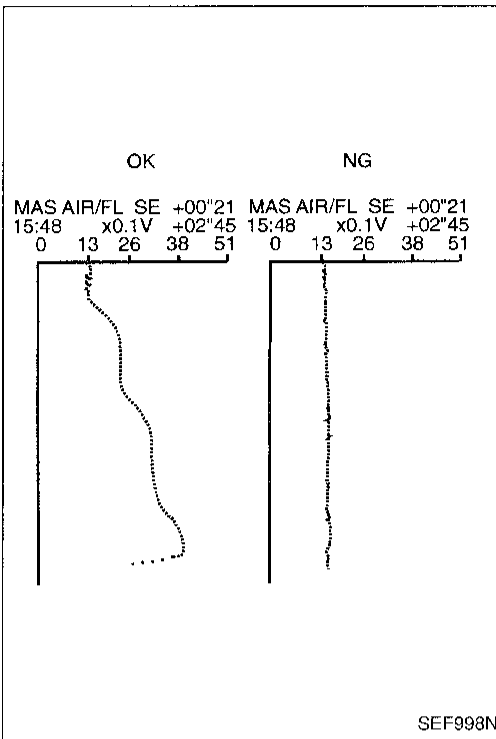
Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)

Procedure for malfunction B

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

- _____ OR _____
- 1) Turn ignition switch "ON".
 - 2) Start engine and warm it up sufficiently.
 - 3) Run engine for at least 10 seconds at idle speed.
 - 4) Select "MODE 7" with GST.

- _____ OR _____
- NO TOOLS
- 1) Turn ignition switch "ON".
 - 2) Start engine and warm it up sufficiently.
 - 3) Run engine for at least 10 seconds at idle speed.
 - 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
 - 5) Perform diagnostic test mode II (Self-diagnostic results) with ECM.



SEF998N

OVERALL FUNCTION CHECK

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

Procedure for malfunction C

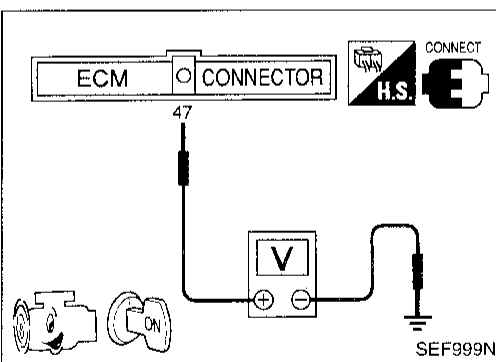
- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up sufficiently.
- 3) Select "DATA MONITOR" mode with CONSULT.
- 4) Check the voltage of mass air flow sensor with "DATA MONITOR".
- 5) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

- _____ OR _____
- GST
- 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 _____
- NO TOOLS
- 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.

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

SEF534P

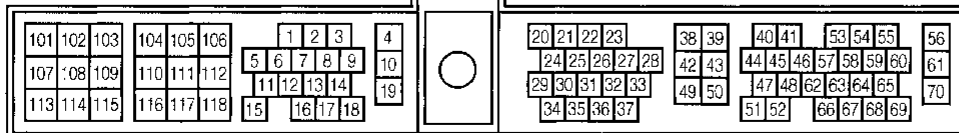
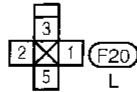
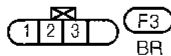
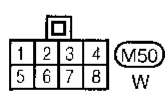
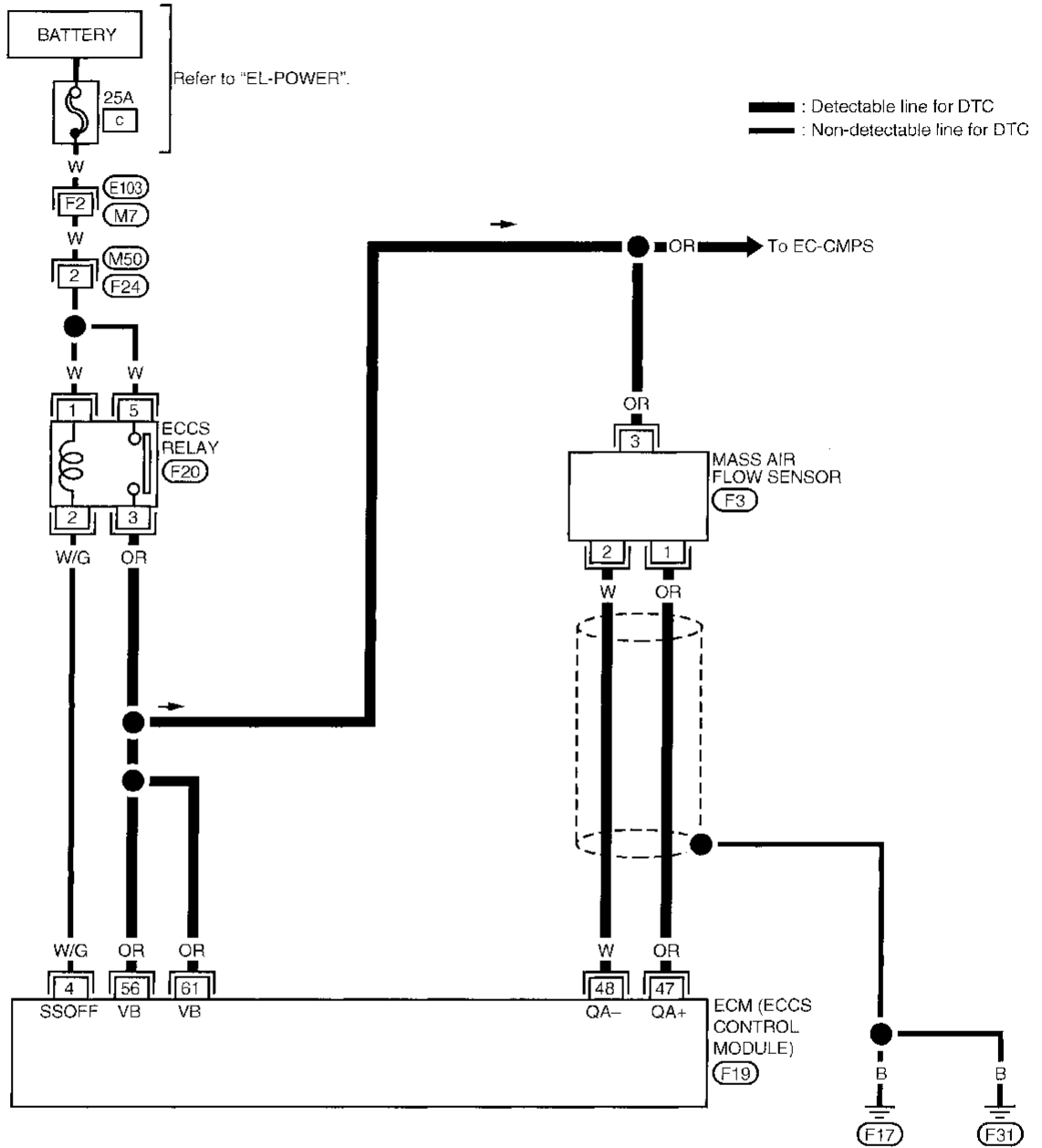


SEF999N

TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)

EC-MAFS-01

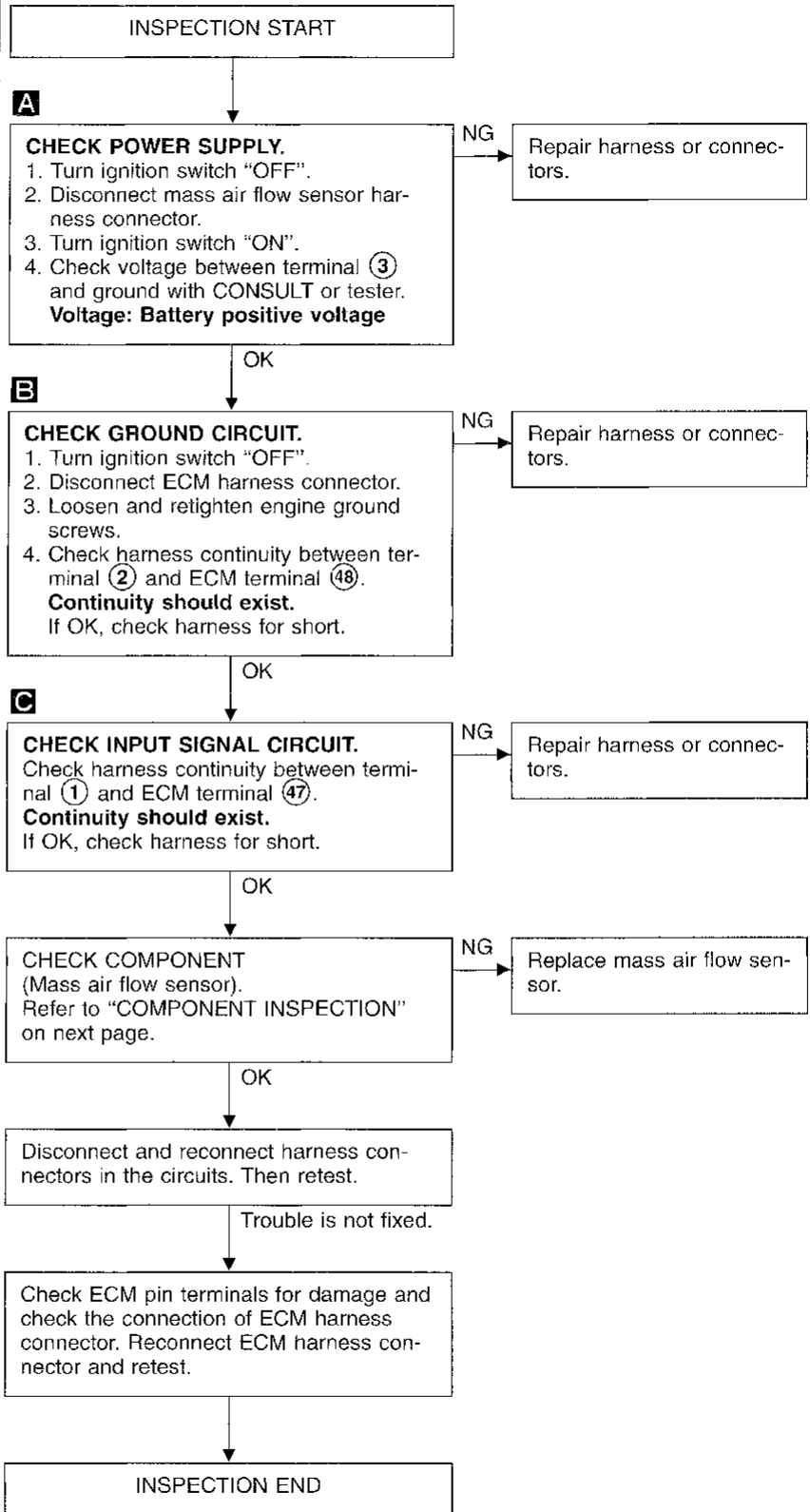
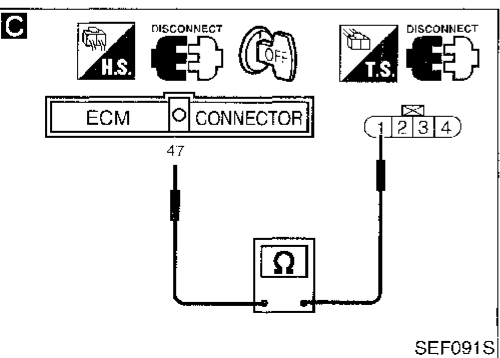
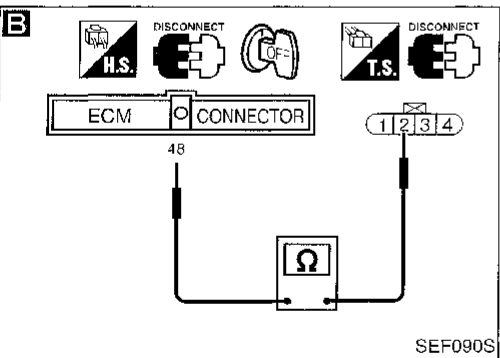
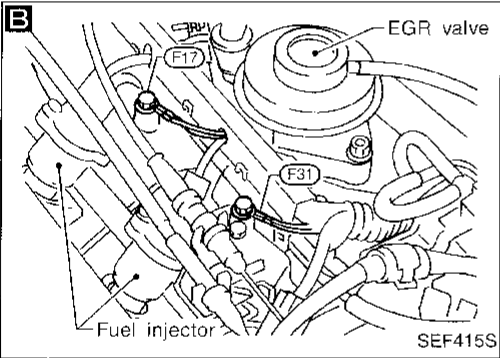
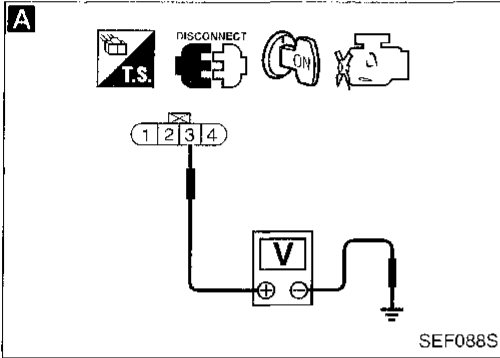
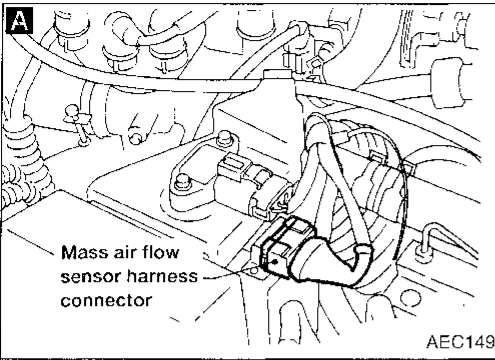


Refer to last page (Foldout page).
M7, E103

TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)

DIAGNOSTIC PROCEDURE



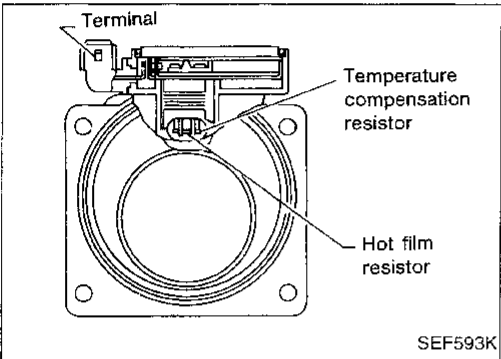
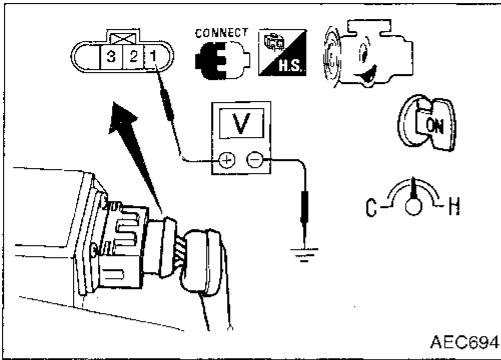
TROUBLE DIAGNOSIS FOR DTC P0100

Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)

COMPONENT INSPECTION

Mass air flow sensor

1. Turn ignition switch "ON".
2. Start engine and warm it up sufficiently.
3. Check voltage between terminal ① and ground.



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

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

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

GI

MA

EM

IC

EC

FE

CL

WT

AT

FA

RA

BR

ST

RS

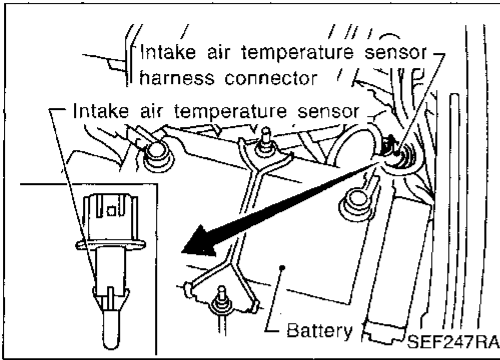
BT

HA

EL

DX

TROUBLE DIAGNOSIS FOR DTC P0110



Intake Air Temperature Sensor (DTC: 0401)

The intake air temperature sensor detects intake air temperature and transmits a signal to the ECM.

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

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0110 0401	A) An excessively low or high voltage from the sensor is sent to ECM. B) Voltage sent to ECM is not practical when compared with the engine coolant temperature sensor signal.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor.

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B".

Procedure for malfunction A



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

OR



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

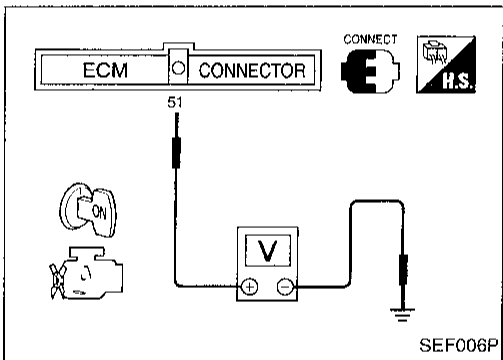
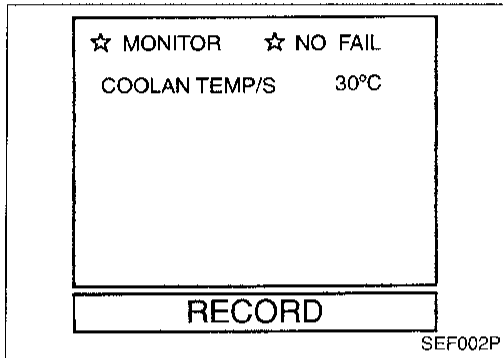
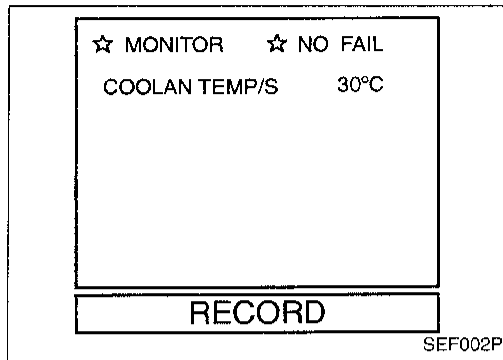
OR



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

TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (DTC: 0401) (Cont'd)



Procedure for malfunction B

- 1) Lift up vehicle and open engine hood.
- 2) Wait until engine coolant temperature is less than 90°C (194°F).
 - (a) Turn ignition switch "ON".
 - (b) Select "DATA MONITOR" mode with CONSULT.
 - (c) Check the engine coolant temperature.
 - (d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.
- Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 3) Turn ignition switch "ON".
- 4) Select "DATA MONITOR" mode with CONSULT.
- 5) Start engine.
- 6) Shift selector lever to "D" position.
- 7) Hold vehicle speed at 70 to 80 km/h (43 to 50 MPH) for 2 minutes.

OR

- 1) Lift up vehicle and open engine hood.
- 2) Wait until engine coolant temperature is less than 90°C (194°F).
 - (a) Turn ignition switch "ON".
 - (b) Select MODE 1 with GST.
 - (c) Check the engine coolant temperature.
 - (d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.
- Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 3) Start engine.
- 4) Shift selector lever to "D" position.
- 5) Hold vehicle speed at 70 to 80 km/h (43 to 50 MPH) for 2 minutes.
- 6) Select MODE 7 with GST.

OR





- 1) Lift up vehicle and open engine hood.
- 2) Wait until engine coolant temperature is less than 90°C (194°F).
 - (a) Turn ignition switch "ON".
 - (b) Check voltage between ECM terminal ⑤ and ground.

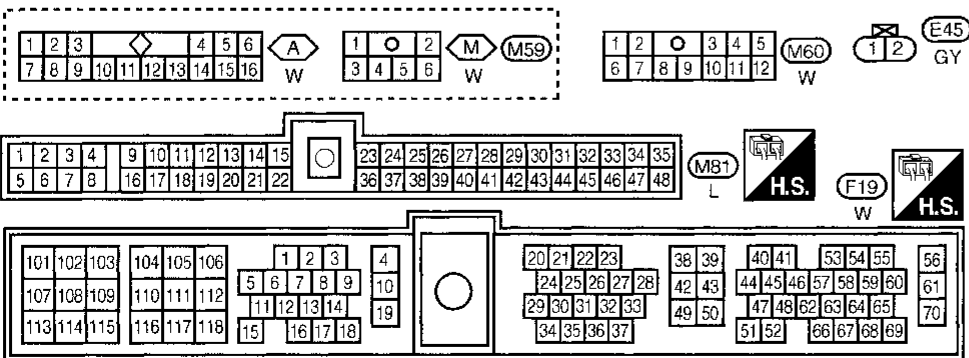
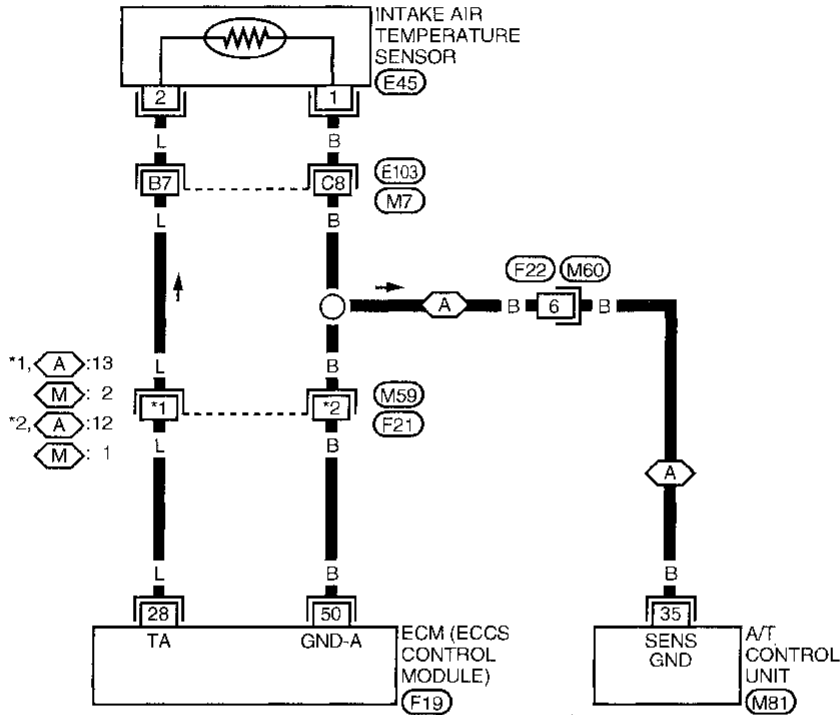
Voltage: More than 1.0 (V)
 - (c) If the voltage is not more than 1.0V, turn ignition switch "OFF" and cool down engine.
- Perform the following steps before the voltage is below 1.0V.
- 3) Start engine.
- 4) Shift selector lever to "D" position.
- 5) Hold vehicle speed at 70 to 80 km/h (43 to 50 MPH) for 2 minutes.
- 6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 7) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (DTC: 0401) (Cont'd)

EC-IATS-01

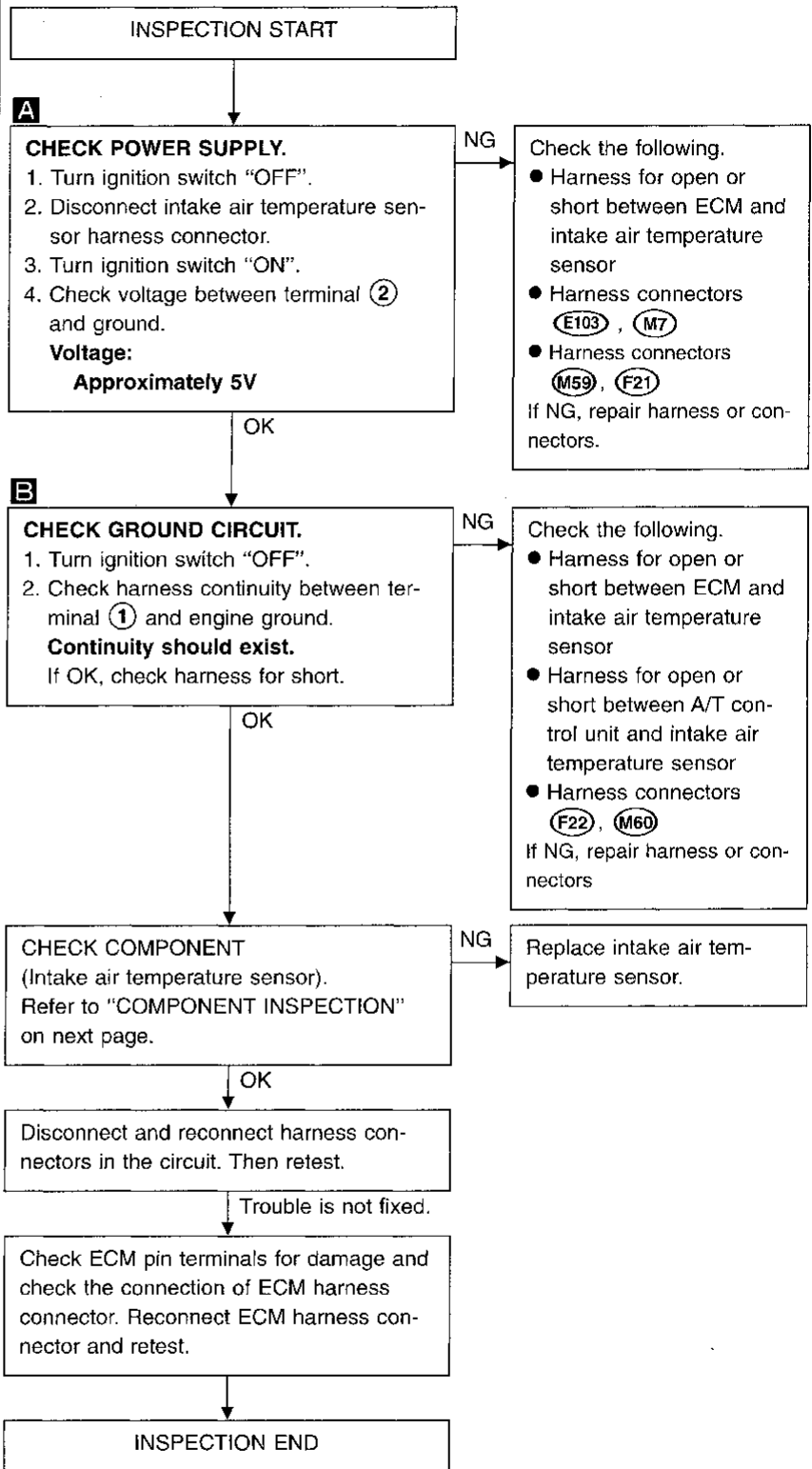
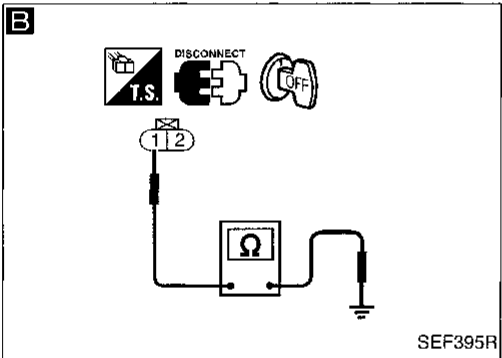
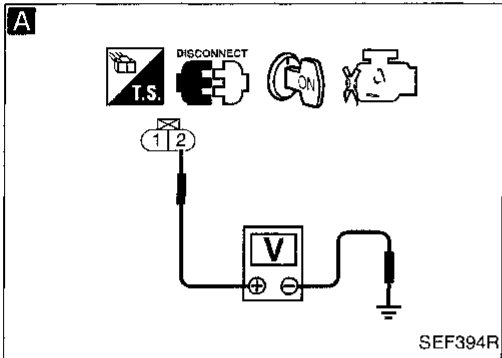
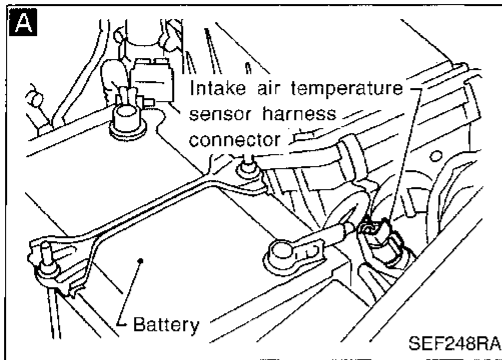
-  : Detectable line for DTC
-  : Non-detectable line for DTC
-  : A/T models
-  : M/T models



TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (DTC: 0401) (Cont'd)

DIAGNOSTIC PROCEDURE



CI
MA
EM
LC
EC
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HA
EL
DX

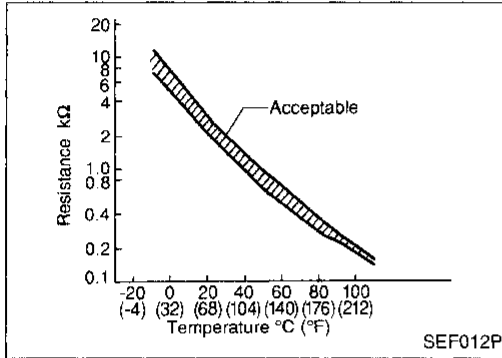
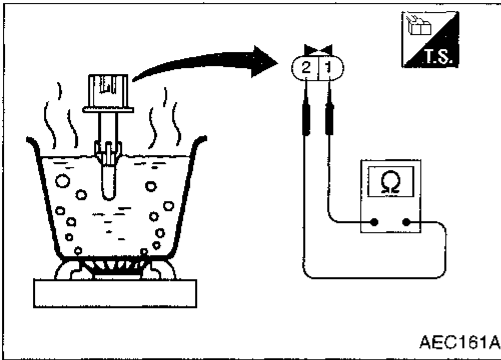
TROUBLE DIAGNOSIS FOR DTC P0110

Intake Air Temperature Sensor (DTC: 0401) (Cont'd)

COMPONENT INSPECTION

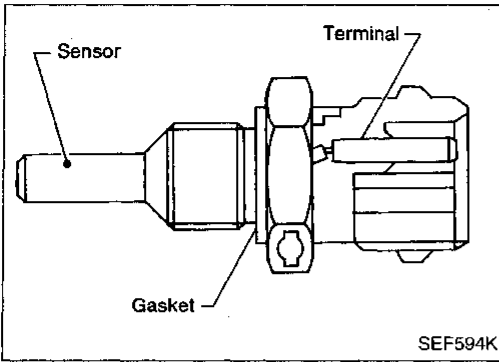
Intake air temperature sensor

Check resistance as shown in the figure.



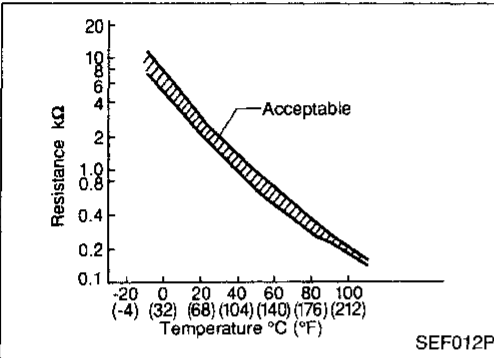
Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

TROUBLE DIAGNOSIS FOR DTC P0115



Engine Coolant Temperature Sensor (ECTS) (DTC: 0103)

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 Items (Possible Cause)
P0115 0103	<ul style="list-style-type: none"> An excessively high or low voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Engine coolant temperature sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

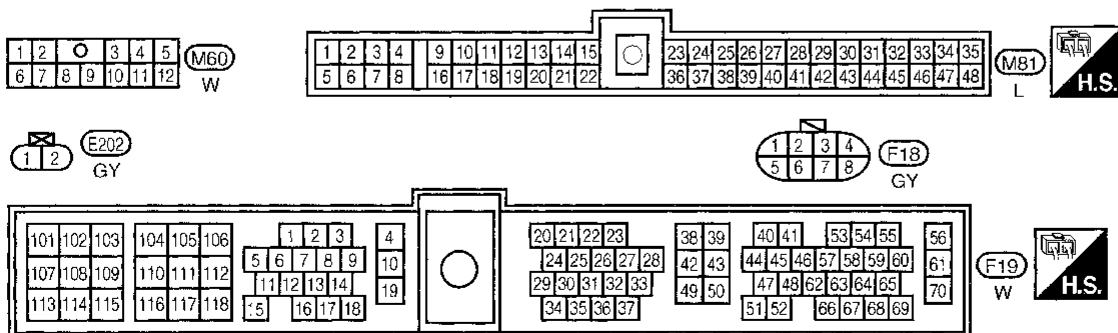
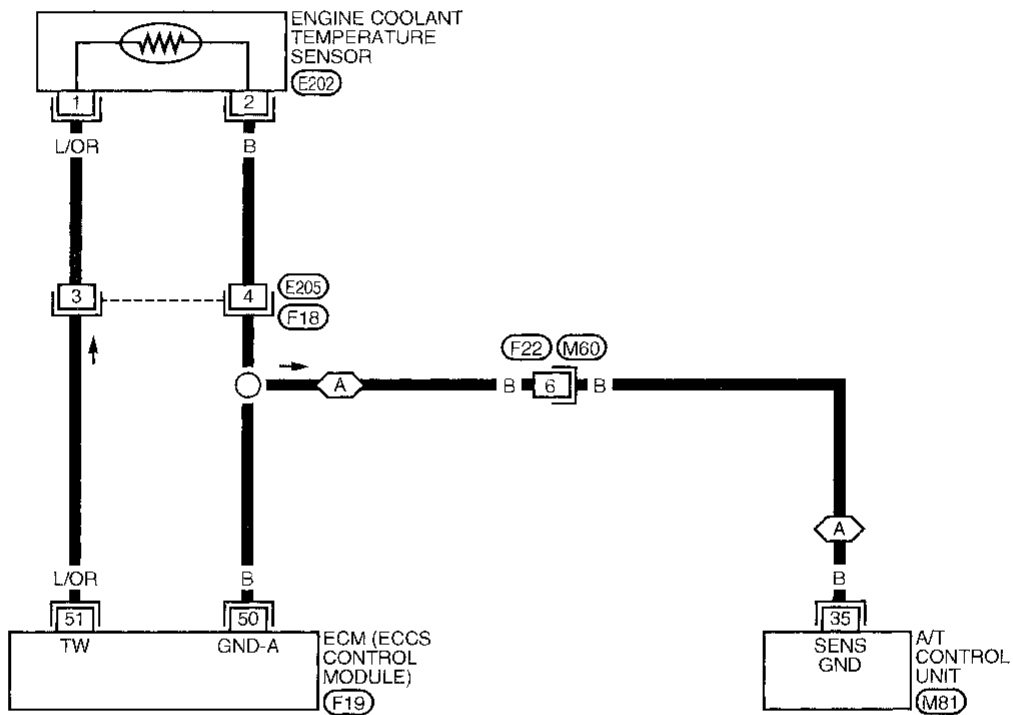
- 1) Turn ignition switch "ON".
 - 2) Select "DATA MONITOR" mode with CONSULT.
 - 3) Wait at least 5 seconds.
- OR
- 1) Turn ignition switch "ON" and wait at least 5 seconds.
 - 2) Select "MODE 7" with GST.
- OR
- 1) Turn ignition switch "ON" and wait at least 5 seconds.
 - 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
 - 3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P0115

Engine Coolant Temperature Sensor (ECTS) (DTC: 0103) (Cont'd)

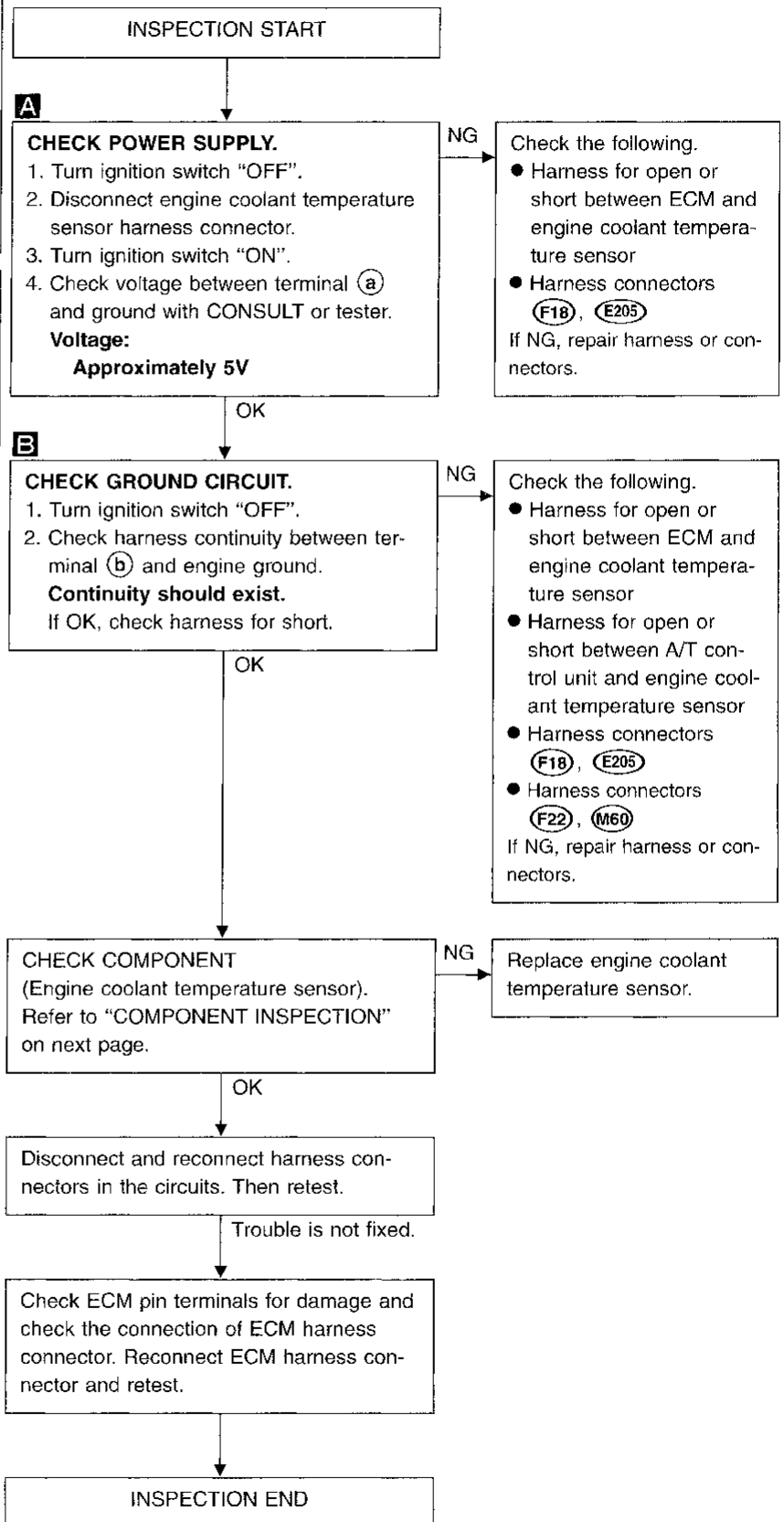
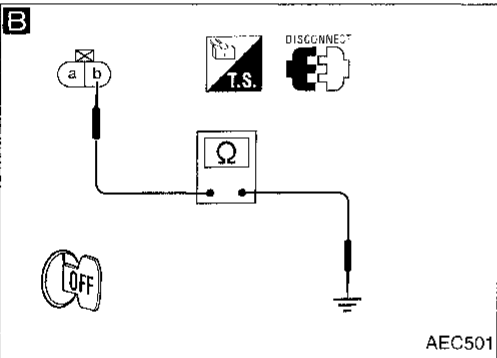
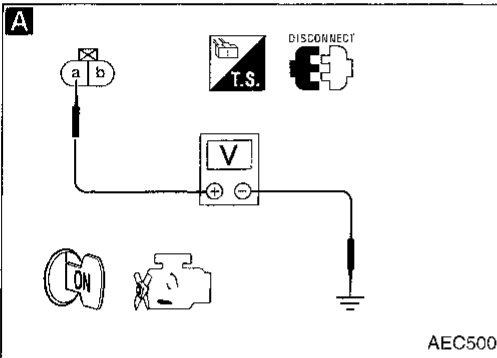
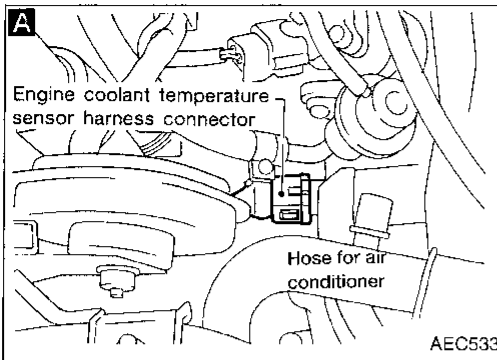
EC-ECTS-01

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



TROUBLE DIAGNOSIS FOR DTC P0115

Engine Coolant Temperature Sensor (ECTS) (DTC: 0103) (Cont'd) DIAGNOSTIC PROCEDURE



GI
MA
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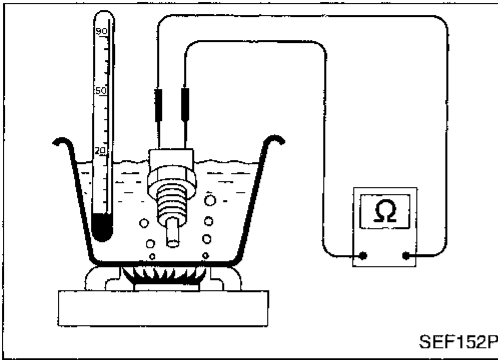
TROUBLE DIAGNOSIS FOR DTC P0115

Engine Coolant Temperature Sensor (ECTS) (DTC: 0103) (Cont'd)

COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.

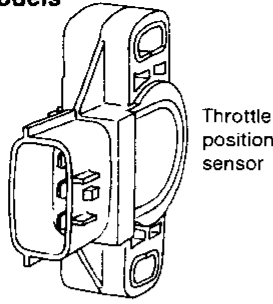


Temperature °C (°F)	Resistance k Ω
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.

TROUBLE DIAGNOSIS FOR DTC P0120

For M/T models



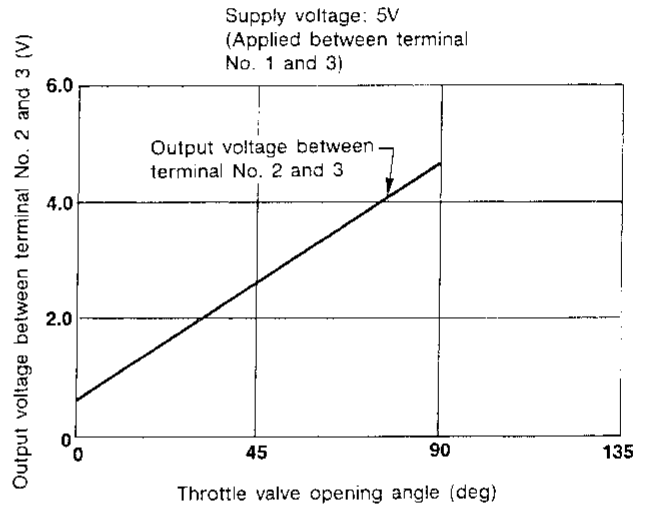
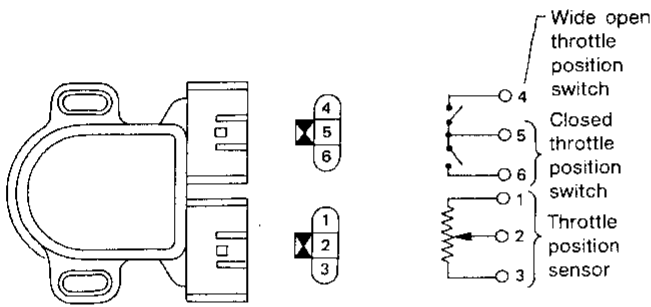
SEF089KC

Throttle Position Sensor (DTC: 0403)

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 controls engine operation such as fuel cut. In addition, for A/T models, "Wide open & closed throttle position switch" is built into the throttle position sensor unit.

For A/T models



SEF265QA

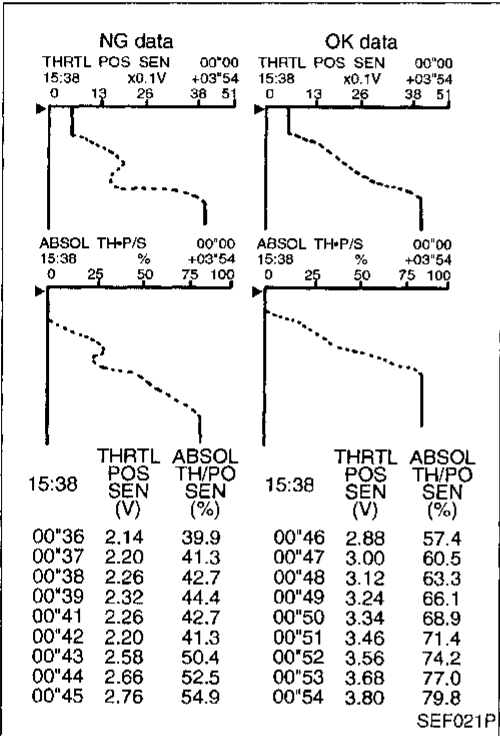
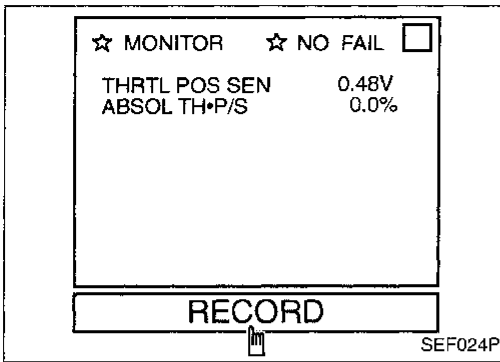
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0120 0403	<ul style="list-style-type: none"> ● An excessively low or high voltage from the sensor is sent to ECM. ● Incorrect voltage is sent to ECM compared with the signals from mass air flow sensor, camshaft position sensor and IACV-AAC valve. 	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor

TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (DTC: 0403) (Cont'd)

OVERALL FUNCTION CHECK

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

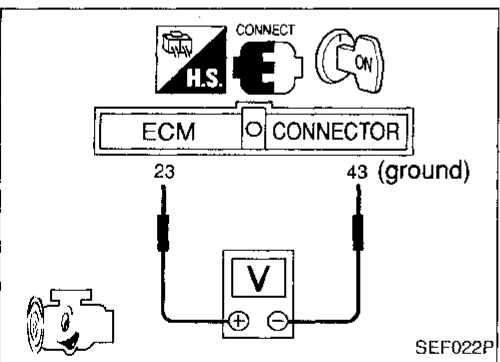


- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON".
- 4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
- 5) Select "THRTL POS SEN" and "ABSOL TH/PO SEN" in "DATA MONITOR" mode with CONSULT.
- 6) Press RECORD on CONSULT SCREEN at the same time accelerator pedal is depressed.
- 7) Print out the recorded data and check the following:
 - The voltage when accelerator pedal fully released is 0.3 - 0.7V.
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal fully depressed is approximately 4V.

OR



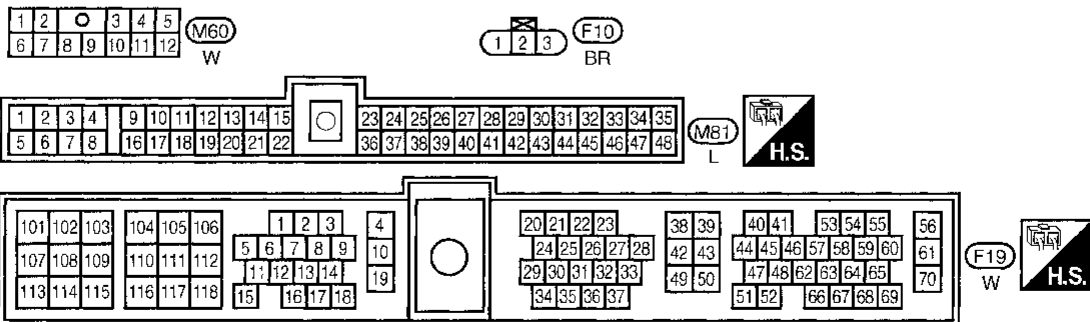
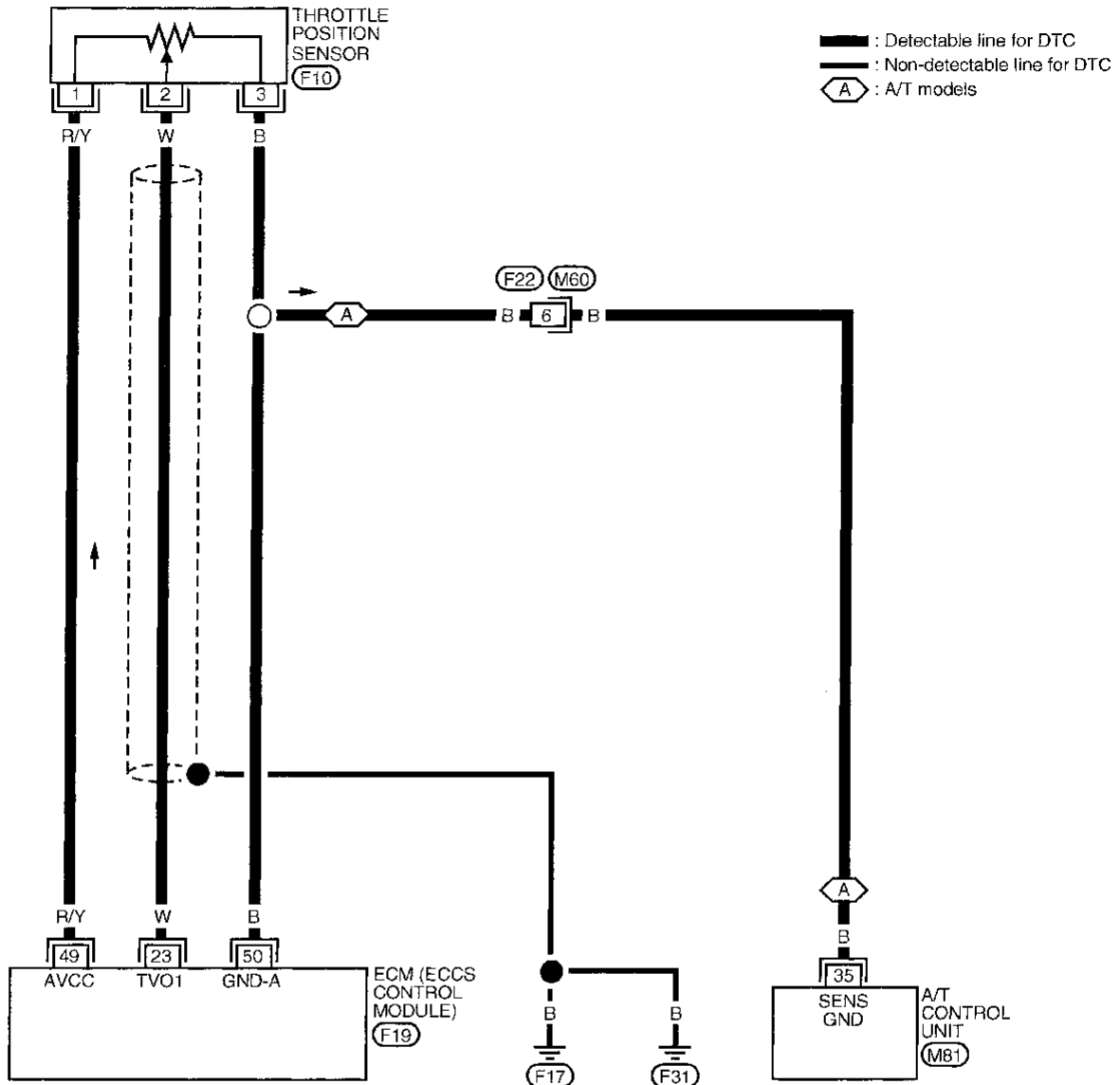
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON".
- 4) Check the voltage between ECM terminal ②③ and ④③ (ground) and check the following:
 - The voltage when accelerator pedal fully released is 0.3 - 0.7V.
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal fully depressed is approximately 4V.



TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (DTC: 0403) (Cont'd)

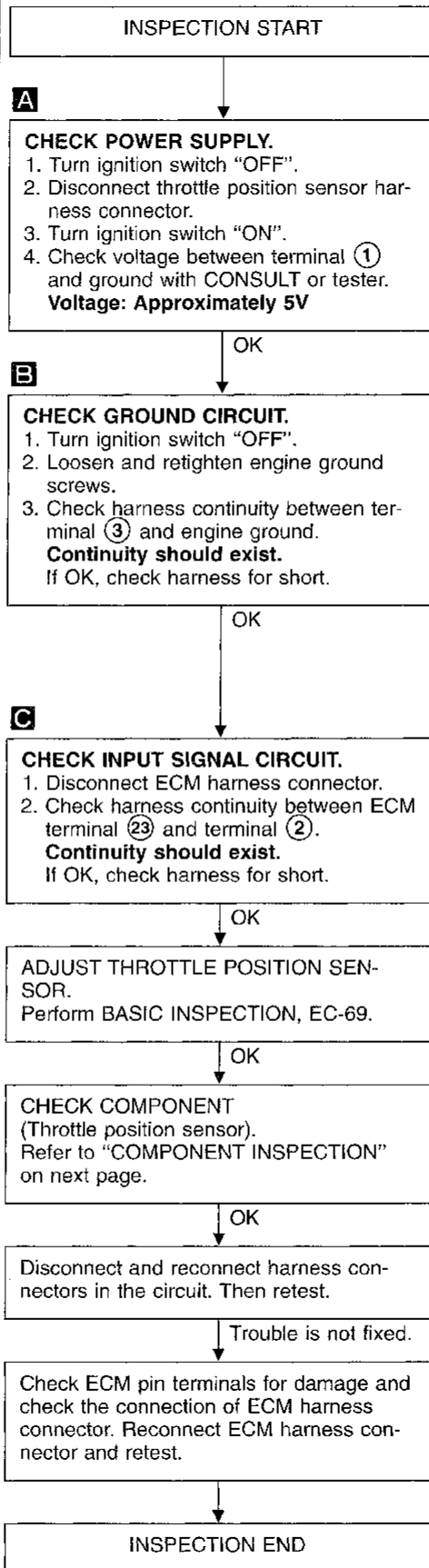
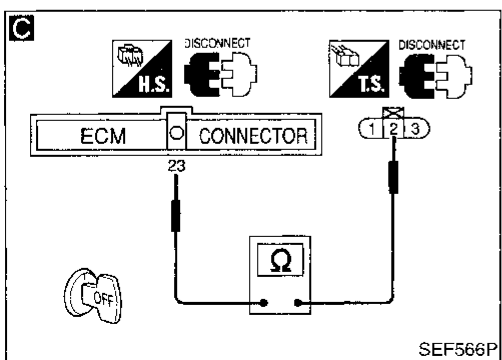
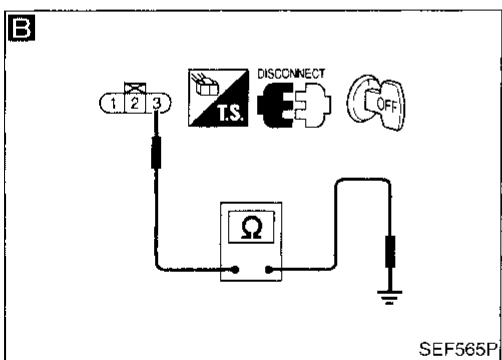
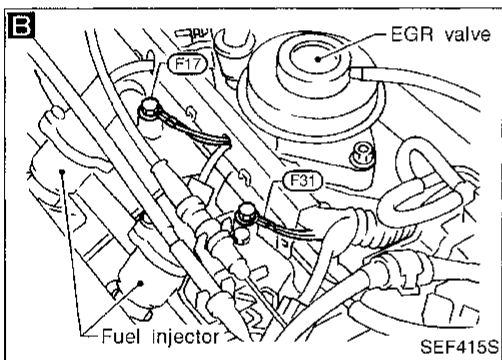
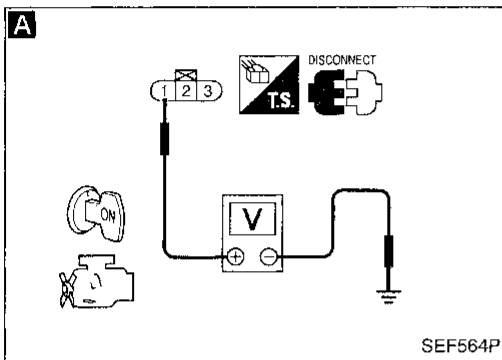
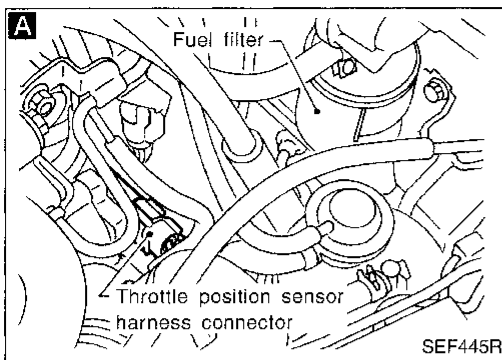
EC-TPS-01



TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (DTC: 0403) (Cont'd)

DIAGNOSTIC PROCEDURE



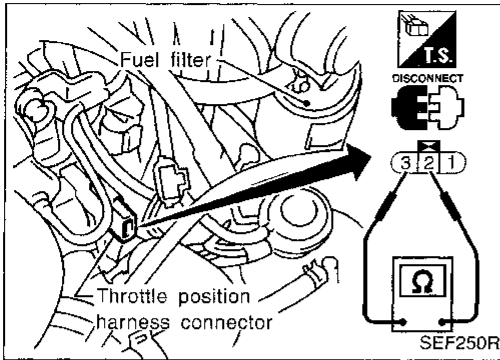
TROUBLE DIAGNOSIS FOR DTC P0120

Throttle Position Sensor (DTC: 0403) (Cont'd)

COMPONENT INSPECTION

Throttle position sensor

1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF".
3. Disconnect throttle position sensor harness connector.
4. Make sure that resistance between terminals ② and ③ changes when opening throttle valve manually.



Accelerator pedal conditions	Resistance
Completely released	Approximately 0.5 k Ω
Partially released	0.5 - 4.0 k Ω
Completely depressed	Approximately 4.0 k Ω

If NG, replace throttle position sensor.

To adjust throttle position sensor, perform "BASIC INSPECTION", EC-69.

GI

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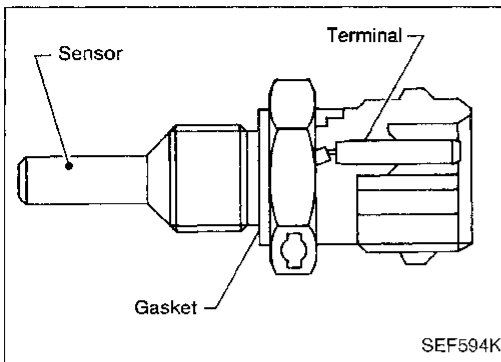
BT

HA

EL

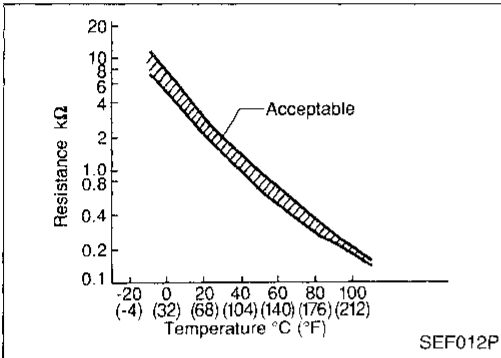
IDX

TROUBLE DIAGNOSIS FOR DTC P0125



Engine Coolant Temperature (ECT) Sensor (DTC: 0908)

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 Items (Possible Cause)
P0125 0908	<ul style="list-style-type: none"> ● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control. 	<ul style="list-style-type: none"> ● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

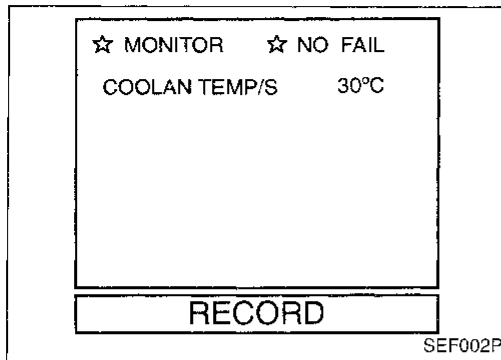
TROUBLE DIAGNOSIS FOR DTC P0125

Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

OVERALL FUNCTION CHECK

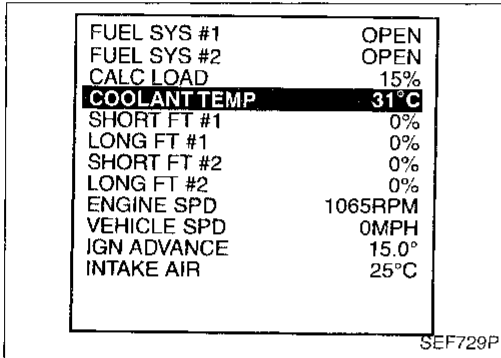
Use this procedure to check the overall function of the engine coolant temperature sensor circuit. During this check, a DTC might not be confirmed.

Note: If both DTC P0115 (0103) and P0125 (0908) are displayed, first perform TROUBLE DIAGNOSIS FOR DTC P0115. (See EC-113.)



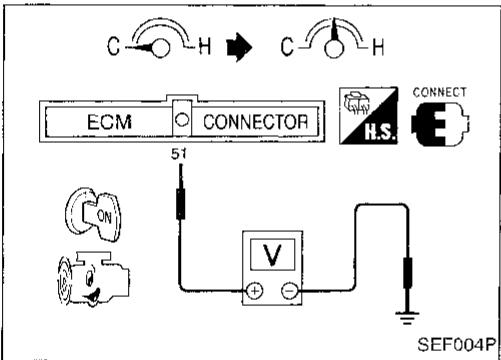
- 1) Turn ignition switch "ON".
- 2) Select "COOLANT TEMP/S" in "DATA MONITOR" mode with CONSULT.
- 3) Start engine and run it at idle speed.
- 4) Check that the engine coolant temperature rises to 25°C (77°F) or more within 15 minutes. (Be careful not to overheat engine.)

GI
MA
FM
LC
EC



- 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.)

FE
GI
MT






- 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.)

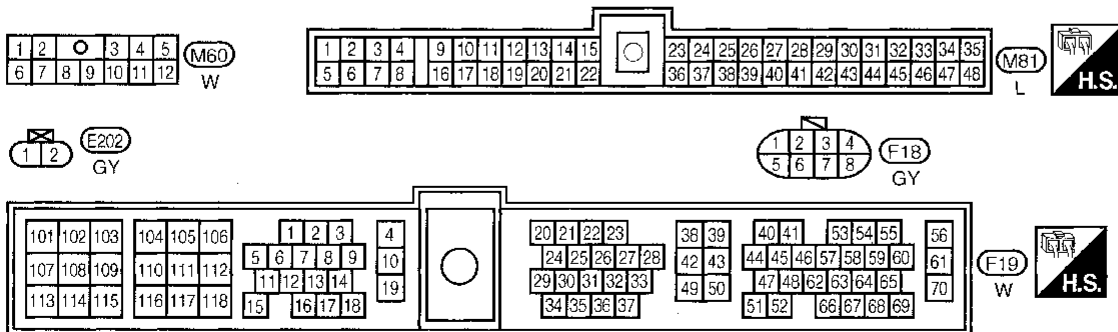
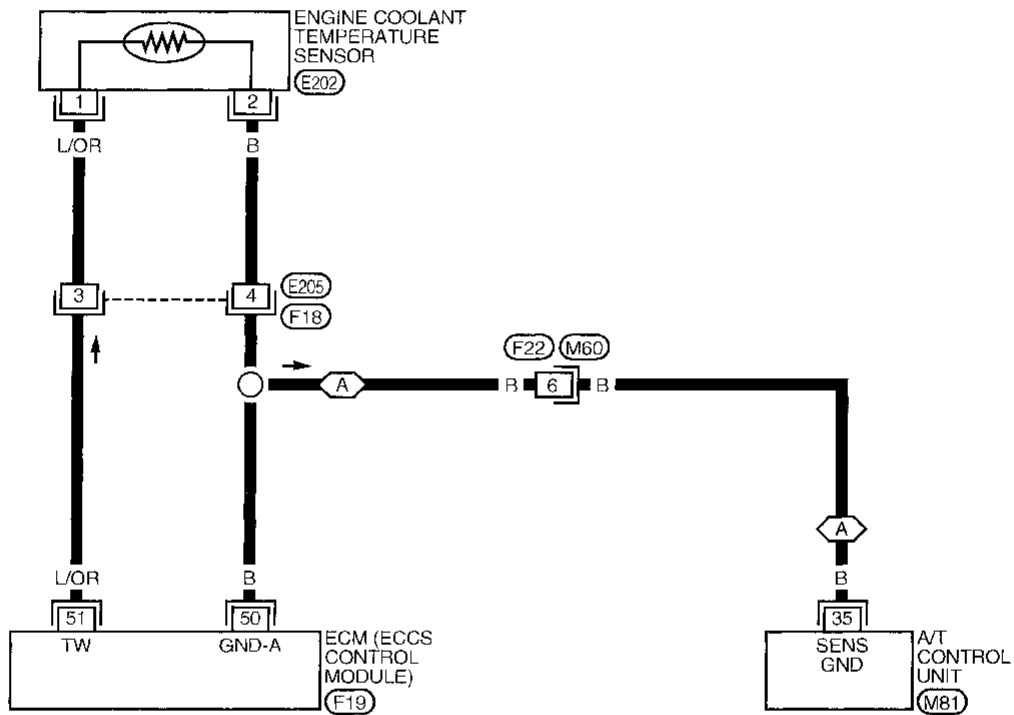
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TROUBLE DIAGNOSIS FOR DTC P0125

Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

EC-ECTS-01

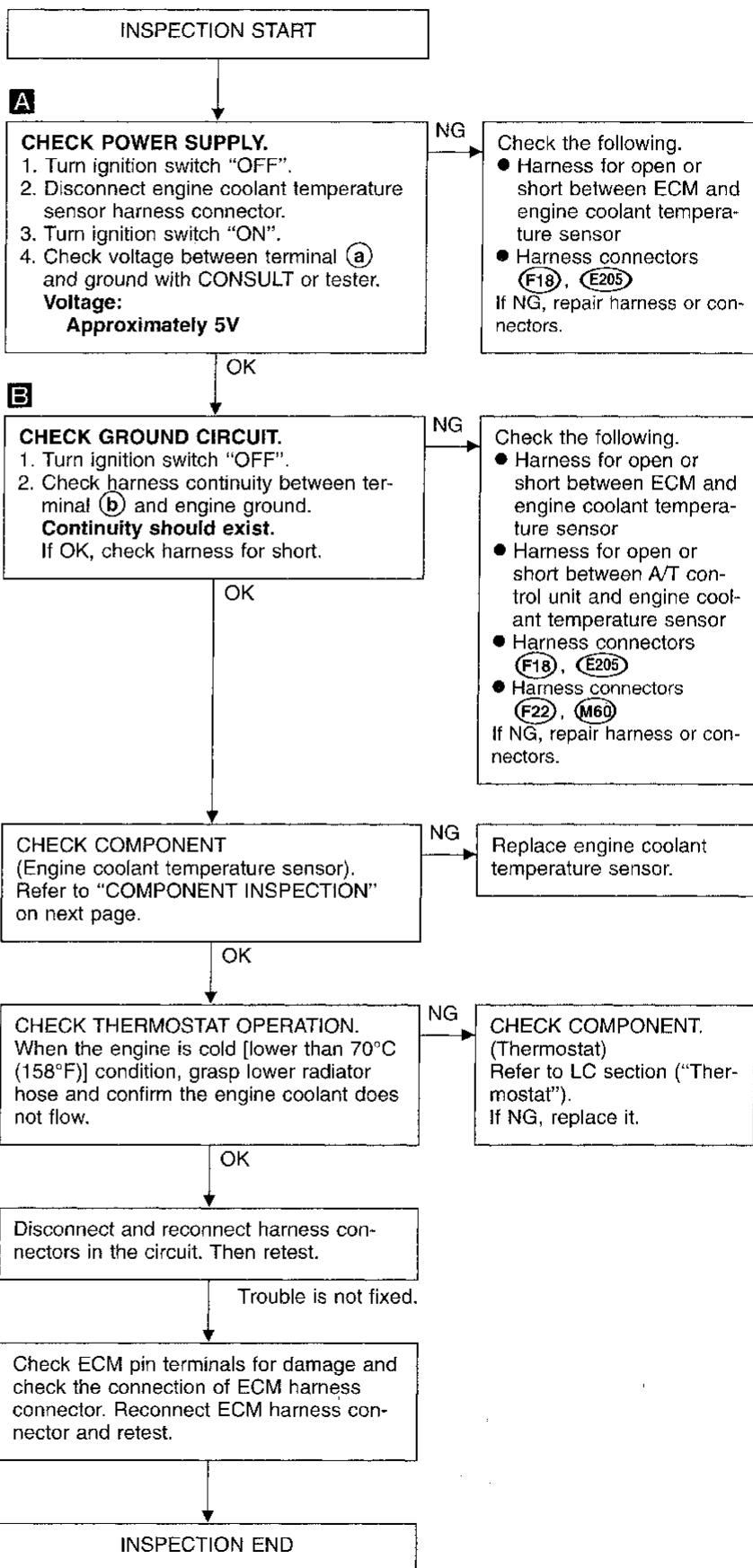
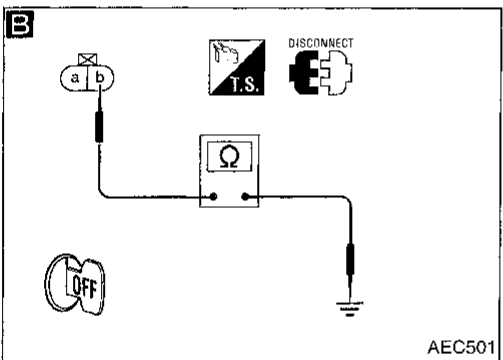
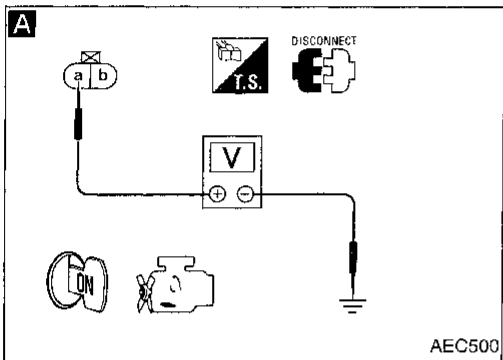
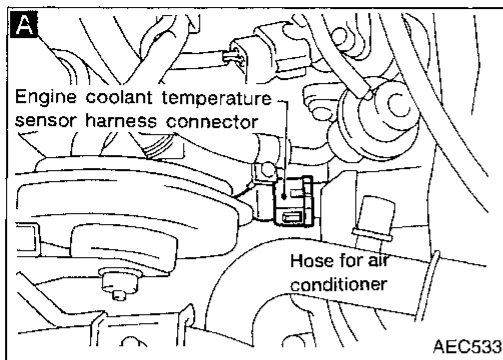
-  : Detectable line for DTC
-  : Non-detectable line for DTC
-  : A/T models



TROUBLE DIAGNOSIS FOR DTC P0125

Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

DIAGNOSTIC PROCEDURE



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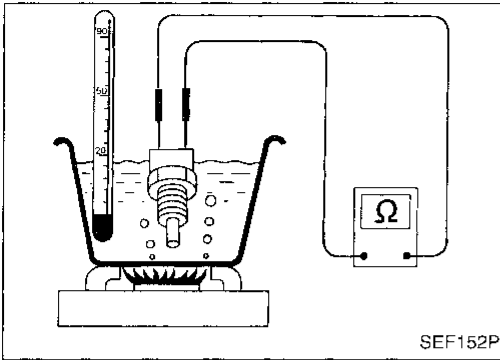
TROUBLE DIAGNOSIS FOR DTC P0125

Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

COMPONENT INSPECTION

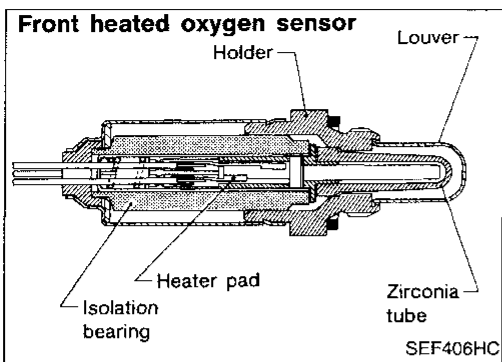
Engine coolant temperature sensor

Check resistance as shown in the figure.



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

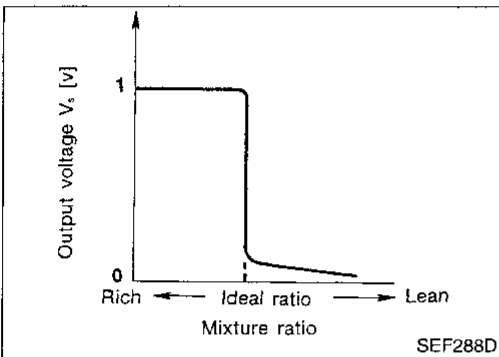
If NG, replace engine coolant temperature sensor.



Front Heated Oxygen Sensor (Front O2S) (DTC: 0303)

The front HO2S is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The 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 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.

A heater is used to activate the sensor.



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0303	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is sent to ECM. ● The voltage from the sensor is constantly approx. 0.3V. ● The maximum and minimum voltages from the sensor do not reach the specified voltages. ● The sensor does not respond between rich and lean within 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

GI
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TROUBLE DIAGNOSIS FOR DTC P0130

Front Heated Oxygen Sensor (Front O2S) (DTC: 0303) (Cont'd)

OVERALL FUNCTION CHECK

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

- 1) Start engine and warm it up sufficiently.
 - 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SENSOR" and "FR O2 MNTR".
 - 3) Hold engine speed at 2,000 rpm under no load during the following steps.
 - 4) Touch "RECORD" on CONSULT screen.
 - 5) Check the following.
 - "FR O2 MNTR" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
- 5 times (cycles) are counted as shown below:

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

R = "FR O2 MNTR", "RICH"
L = "FR O2 MNTR", "LEAN"

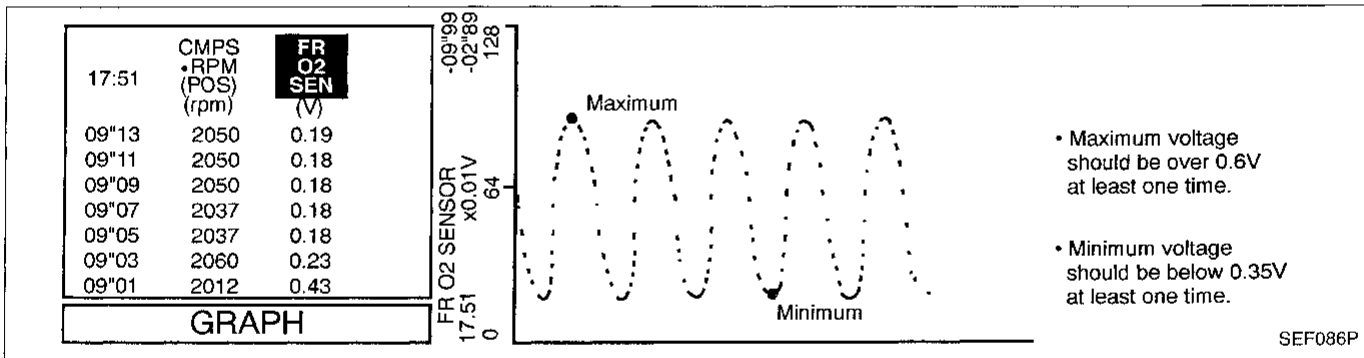
- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.35V at least once.

☆ MONITOR ☆ NO FAIL

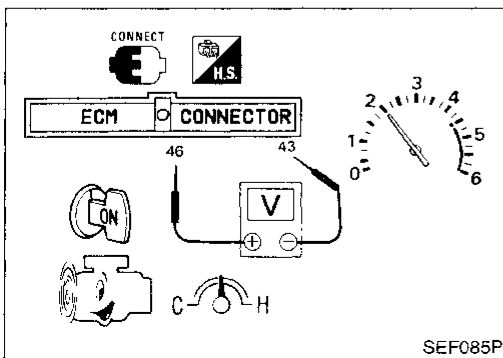
CMPS•RPM(REF)	2137rpm
MAS AIR/FL SE	1.96V
COOLAN TEMP/S	84°C
FR O2 SENSOR	0.37V
FR O2 MNTR	LEAN
INJ PULSE	2.6msec

RECORD

SEF084P



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.35V at least one time.



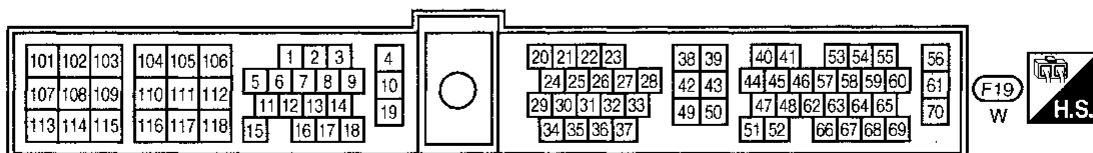
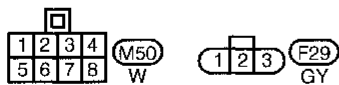
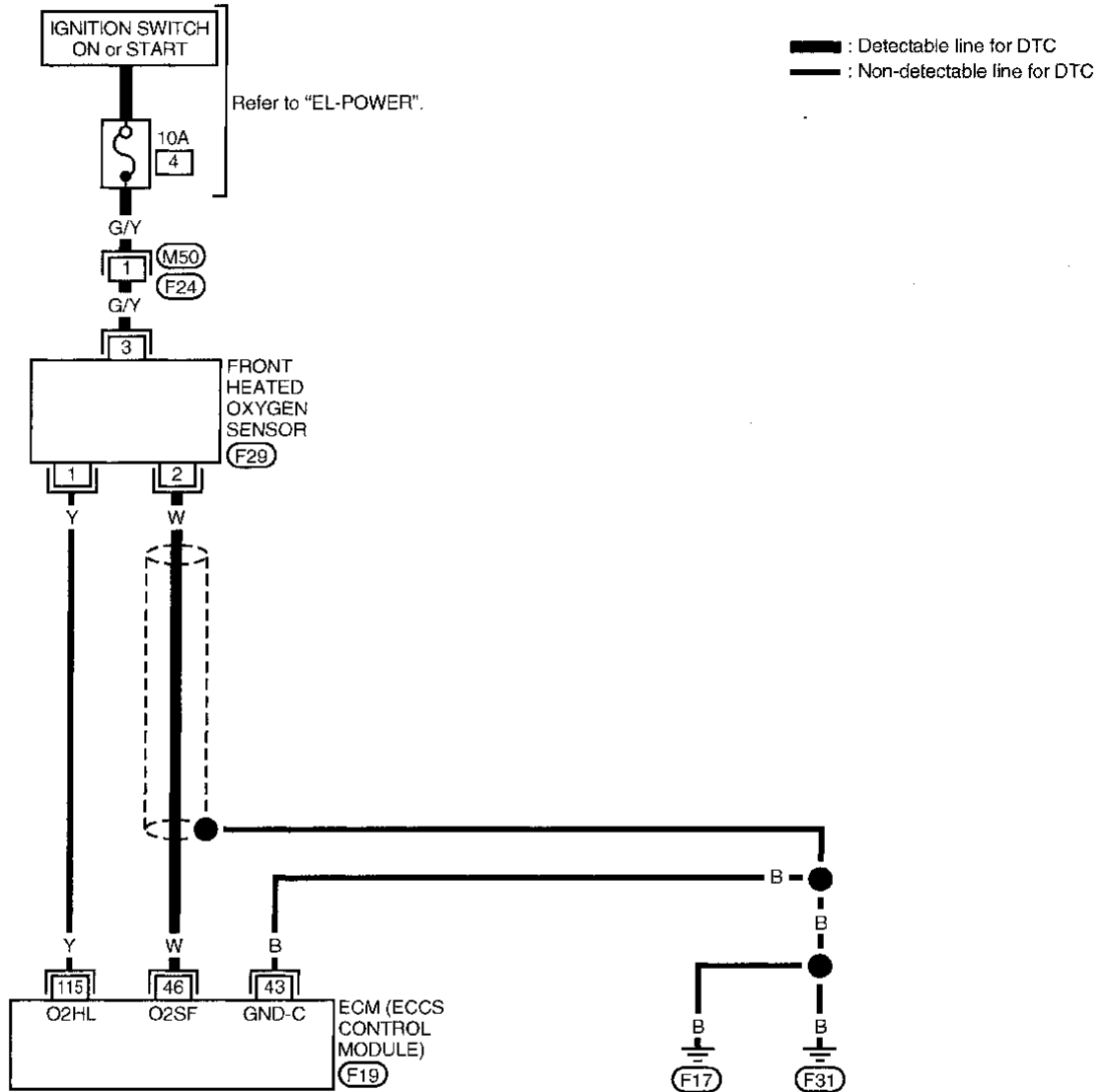
OR

- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeter probes between ECM terminal ④⑥ (sensor signal) and ④③ (engine ground).
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
 - 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 P0130

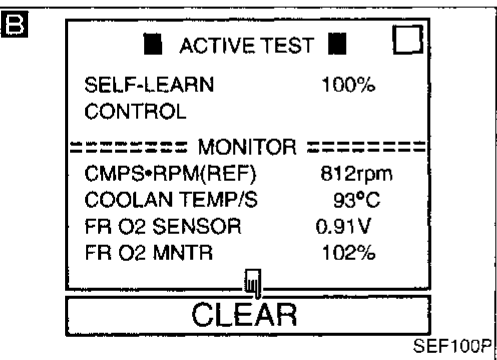
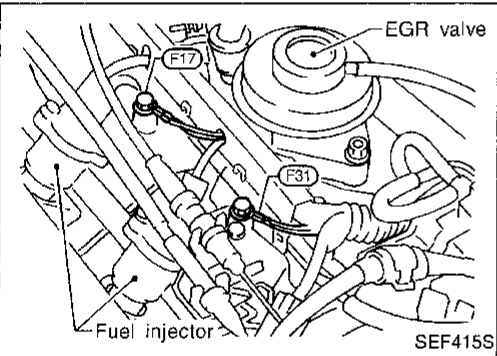
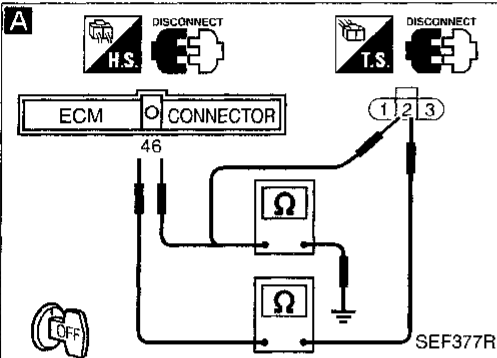
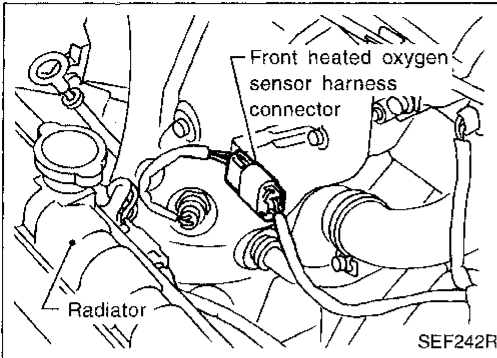
Front Heated Oxygen Sensor (Front O2S) (DTC: 0303) (Cont'd)

EC-FRO2-01



TROUBLE DIAGNOSIS FOR DTC P0130

Front Heated Oxygen Sensor (Front O2S) (DTC: 0303) (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 (2).
Continuity should exist.
4. Check harness continuity between ECM terminal (46) (or terminal (2)) 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. Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs P0171, P0172 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0172", EC-145, 150.

OR

2. Turn ignition switch "OFF" and wait at least 5 seconds.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.

Are the 1st trip DTCs 0114, 0115 detected? Is it difficult to start engine?

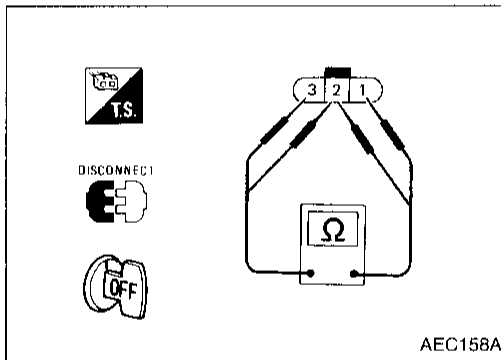
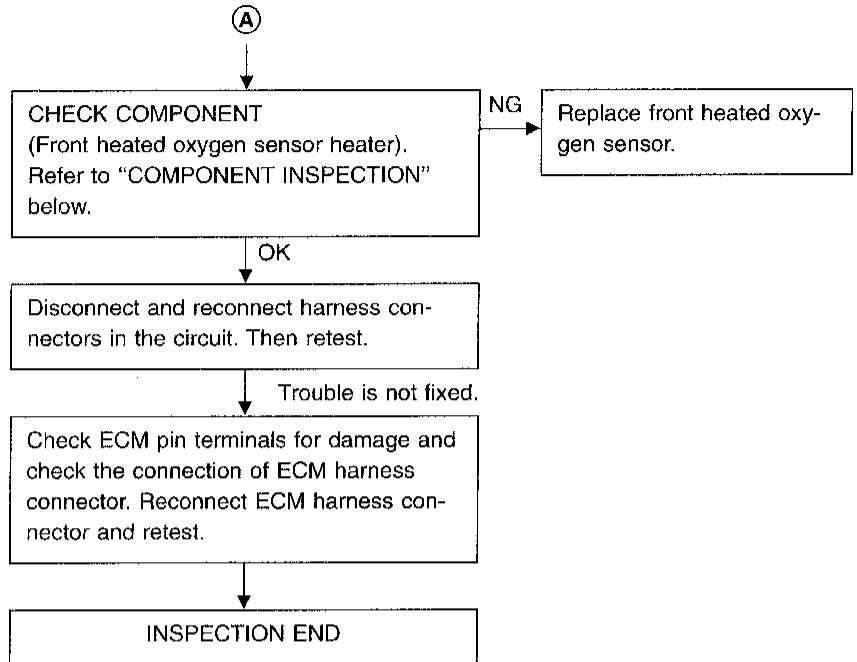
No

(A)

(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P0130

Front Heated Oxygen Sensor (Front O2S) (DTC: 0303) (Cont'd)



COMPONENT INSPECTION

Front heated oxygen sensor heater

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

If NG, replace the front heated oxygen sensor.

CAUTION:

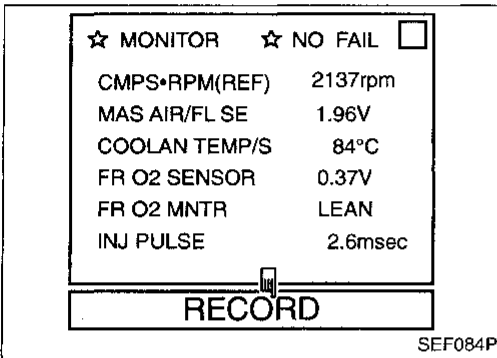
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

TROUBLE DIAGNOSIS FOR DTC P0130

Closed Loop Control (DTC: 0307)

- The closed loop control has one trip detection logic.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0307	<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 short. • Front heated oxygen sensor. • Front heated oxygen sensor heater



OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the closed loop control. During this check, a 1st trip DTC might not be confirmed.

- 1) Start engine and warm it up sufficiently.
 - 2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SENSOR" and "FR O2 MNTR".
 - 3) Hold engine speed at 2,000 rpm under no load during the following steps.
 - 4) Touch "RECORD" on CONSULT screen.
 - 5) Check the following.
 - "FR O2 MNTR" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
- 5 times (cycles) are counted as shown below:

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

R = "FR O2 MNTR", "RICH"
L = "FR O2 MNTR", "LEAN"
_____ OR _____

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

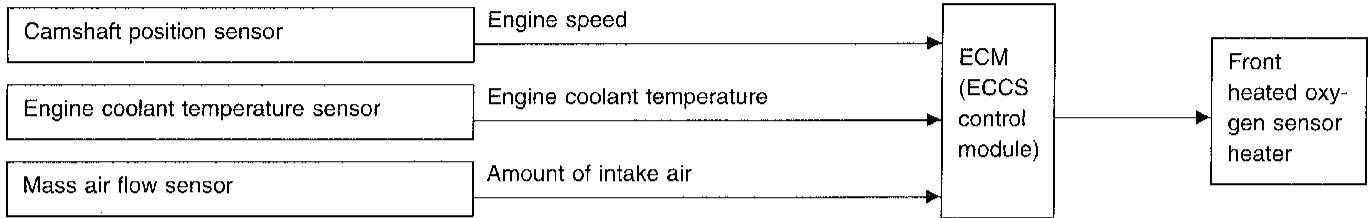
DIAGNOSTIC PROCEDURE

Refer to TROUBLE DIAGNOSIS FOR DTC P0130, EC-127.
Refer to TROUBLE DIAGNOSIS FOR DTC P0141, EC-141

TROUBLE DIAGNOSIS FOR DTC P0135

Front Heated Oxygen Sensor Heater (DTC: 0901)

SYSTEM DESCRIPTION






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

Engine speed (rpm)	Engine condition	Front heated oxygen sensor heater
Above 3,600	—	OFF
Below 3,600	Heavy load	OFF
	Except above	ON

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

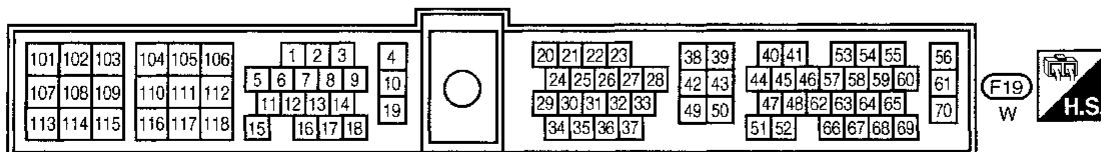
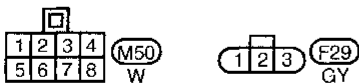
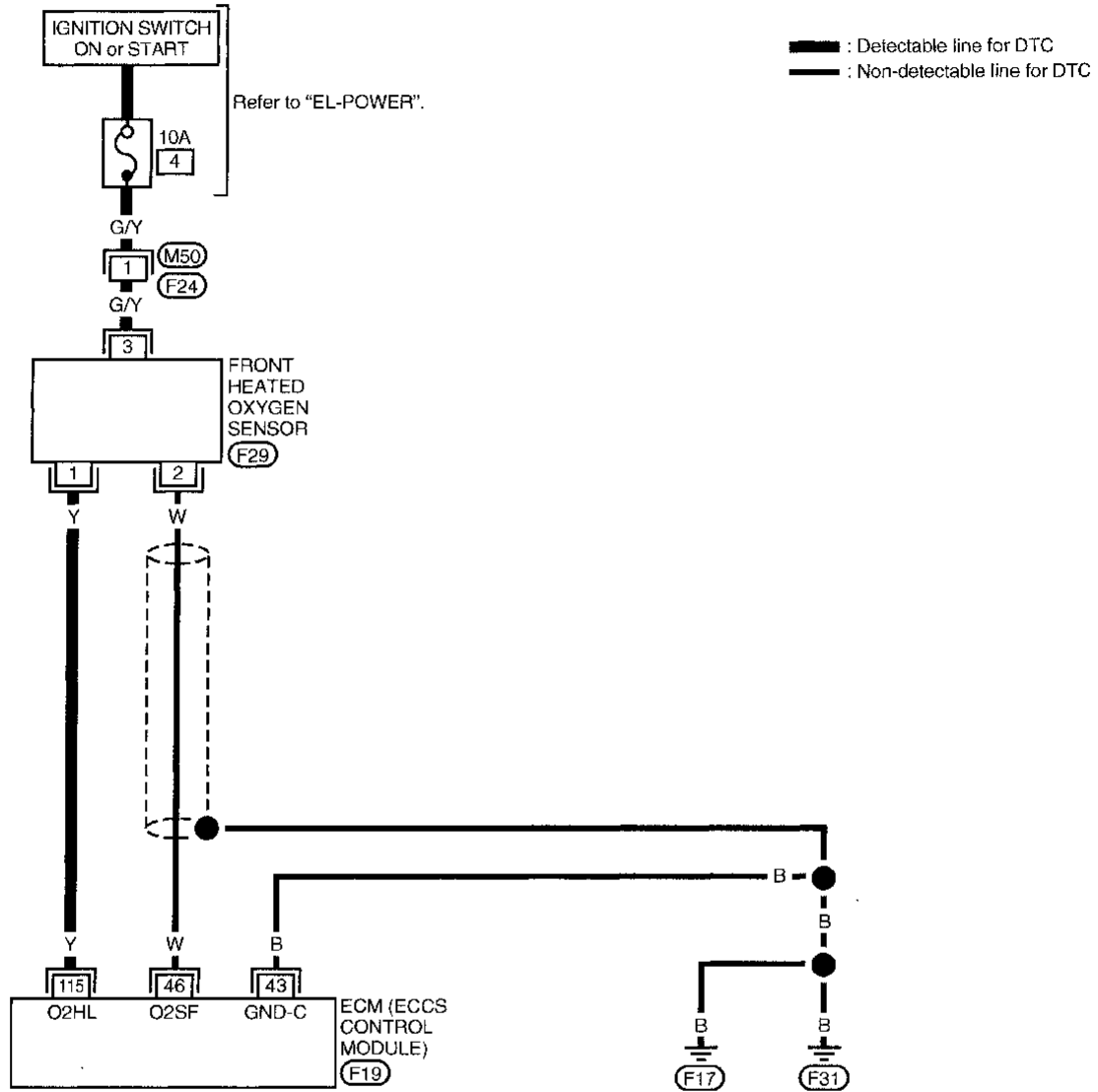
DIAGNOSTIC TROUBLE CODE DETECTING CONDITION

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

TROUBLE DIAGNOSIS FOR DTC P0135

Front Heated Oxygen Sensor Heater (DTC: 0901) (Cont'd)

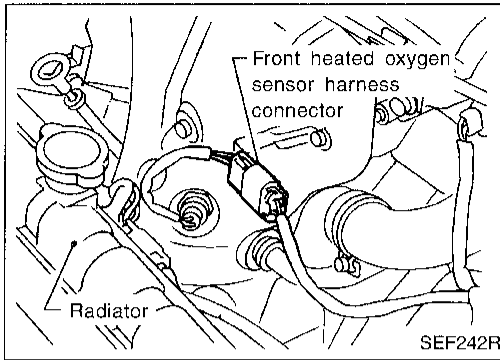
EC-FRO2/H-01



TROUBLE DIAGNOSIS FOR DTC P0135

Front Heated Oxygen Sensor Heater (DTC: 0901) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK POWER SUPPLY.

1. Disconnect front heated oxygen sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground.

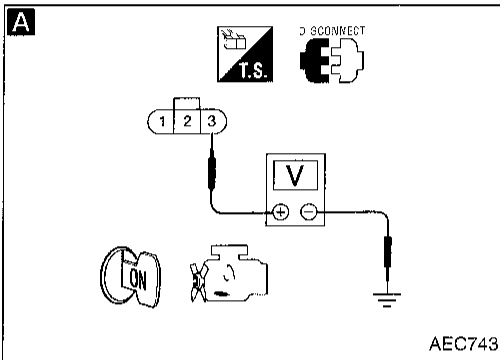
Voltage: Battery voltage

NG

Check the following.

- Harness connectors (F24, M50)
- 10A fuse
- Harness for open or short between front heated oxygen sensor and ignition switch

If NG, repair harness or connectors.



OK

B

CHECK GROUND CIRCUIT.

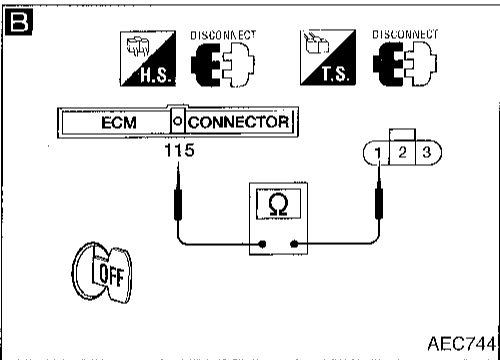
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal ⑪⑤.

Continuity should exist.

If OK, check harness for short.

NG

Repair harness or connectors.



OK

CHECK COMPONENT
(Front heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" below.

NG

Replace front heated oxygen sensor.

OK

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

Trouble is not fixed.

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

INSPECTION END

COMPONENT INSPECTION

Front heated oxygen sensor heater

Check resistance between terminals ③ and ①.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

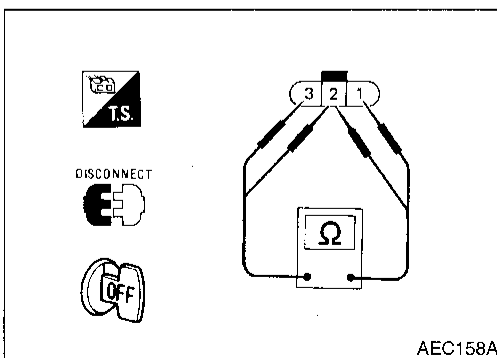
Check continuity between terminals ② and ①, ③ and ②.

Continuity should not exist.

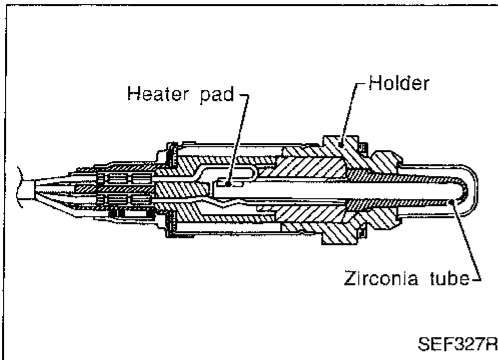
If NG, replace the front heated oxygen sensor.

CAUTION:

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

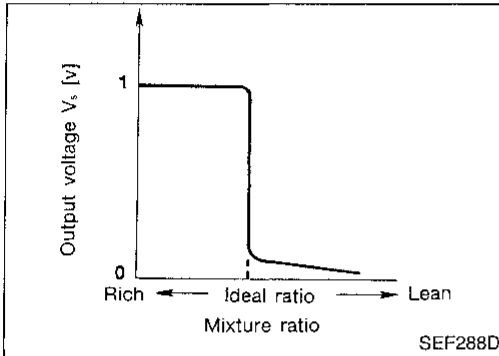


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Rear Heated Oxygen Sensor (Rear HO2S) (DTC: 0707)

The rear heated oxygen sensor is placed into the front exhaust tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The rear 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 rear 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.



ON BOARD DIAGNOSIS LOGIC

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the warm-up three way catalyst causes the longer switching time. 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)
P0136 0707	<ul style="list-style-type: none"> ● An excessively high voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open.) ● Rear heated oxygen sensor
	<ul style="list-style-type: none"> ● The specified maximum and minimum voltages from the sensor are not reached. ● It takes more than the specified time for the sensor to respond between rich and lean. 	<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 P0136

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: 0707) (Cont'd)

OVERALL FUNCTION CHECK

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

■ ACTIVE TEST ■ □

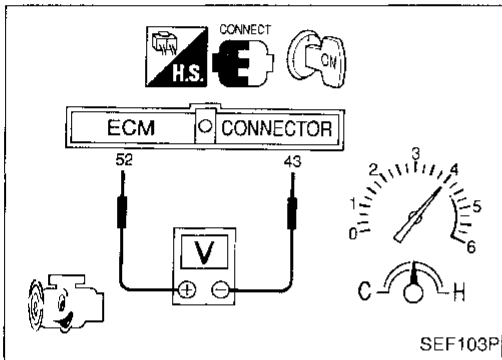
FUEL INJECTION 25%

===== MONITOR =====

CMPS•RPM(REF)	725rpm
FR O2 SENSOR	0.94V
RR O2 SENSOR	1.89V
FR O2 MNTR	RICH
RR O2 MNTR	RICH

Qu
UP
DWN
Qd

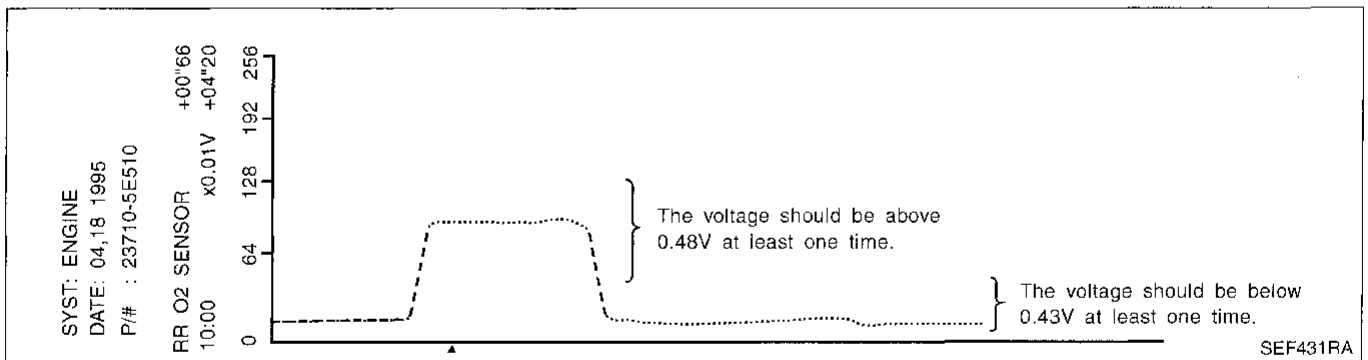
SEF102P



- 1) Start engine and warm it up sufficiently.
- 2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SENSOR" as the monitor item with CONSULT.
- 3) Check "RR O2 SENSOR" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.
"RR O2 SENSOR" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SENSOR" should be below 0.43V at least once when the "FUEL INJECTION" is -25%.

OR

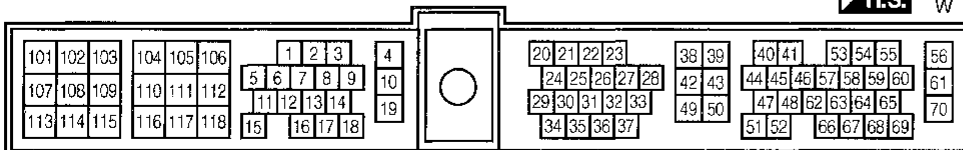
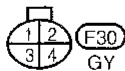
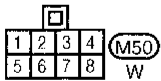
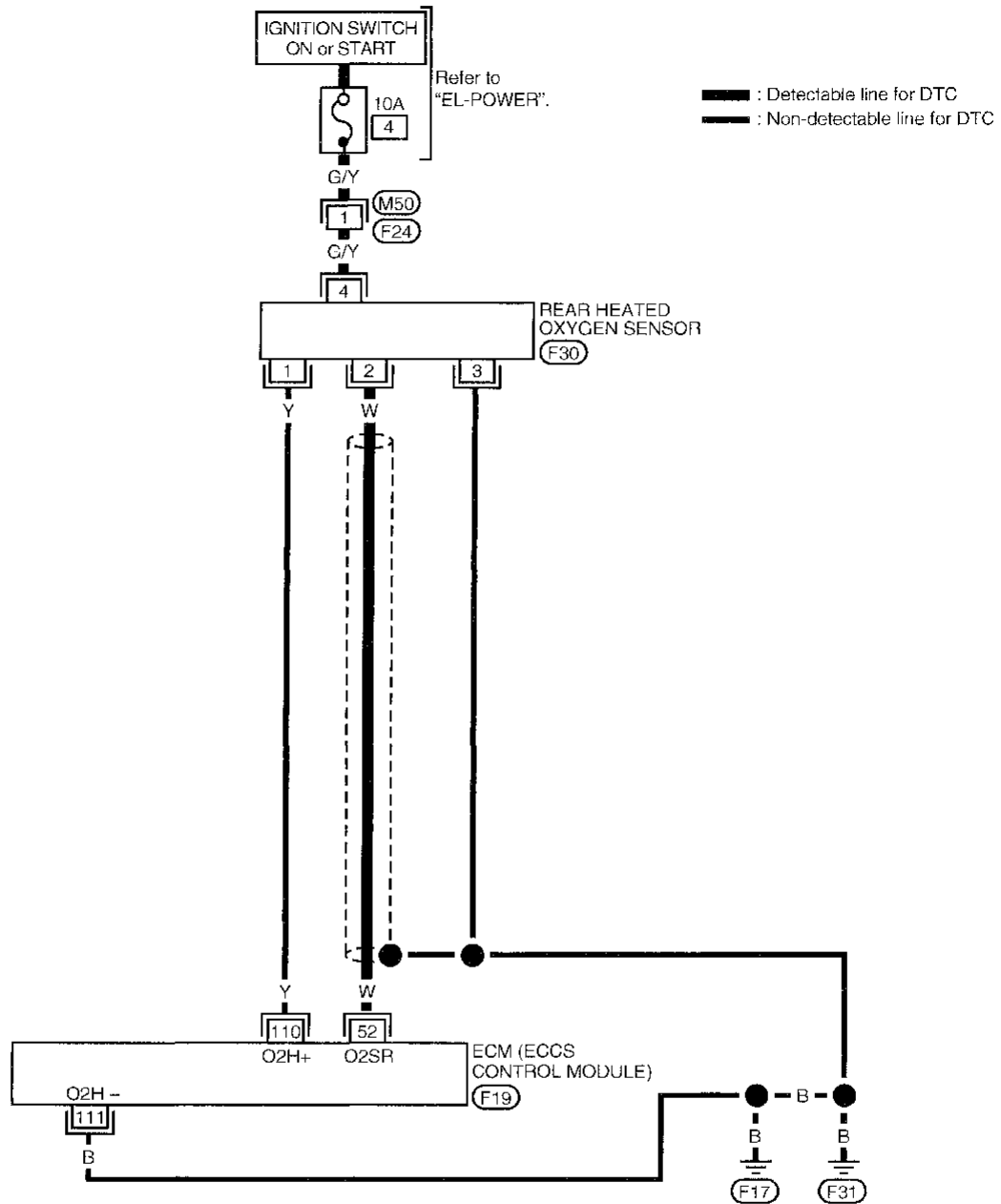
- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeter probes between ECM terminals ⑤② (sensor signal) and ④③ (engine ground).
- 3) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be above 0.48V at least once.
If the voltage is above 0.48V at step 3, step 4 is not necessary.
- 4) Check the voltage when racing up to 6,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
The voltage should be below 0.43V at least once.



TROUBLE DIAGNOSIS FOR DTC P0136

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: 0707) (Cont'd)

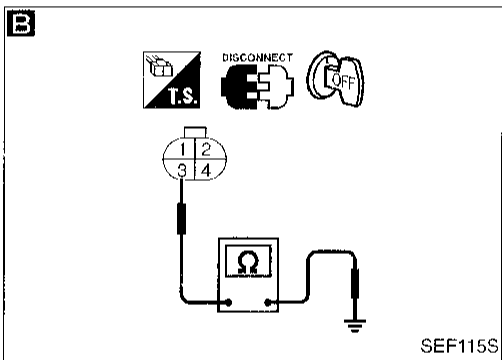
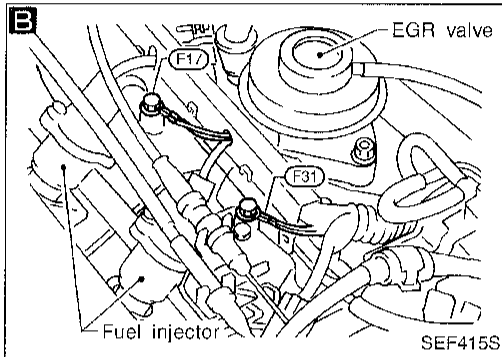
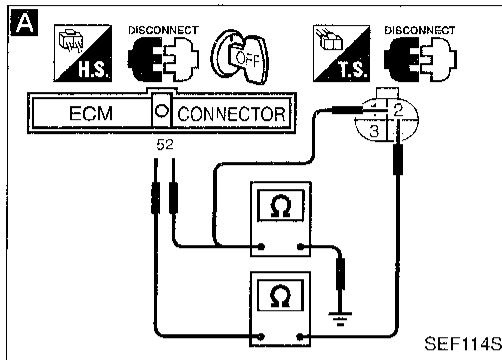
EC-RRO2-01



TROUBLE DIAGNOSIS FOR DTC P0136

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: 0707) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK INPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect rear heated oxygen sensor harness connector and ECM harness connector.
 3. Check harness continuity between ECM terminal ⑤② and terminal ②.
Continuity should exist.
 4. Check harness continuity between ECM terminal ⑤② (or terminal ②) and ground.
Continuity should not exist.

NG → Repair harness or connectors.

B
CHECK GROUND CIRCUIT.
 1. Loosen and retighten engine ground screws.
 2. Check harness continuity between terminal ③ and ground.
Continuity should exist.
 If OK, check harness for short.

NG → Check the following.
 • Harness for open or short between rear heated oxygen sensor and engine ground
 If NG, repair harness or connectors.

CHECK COMPONENT
 (Rear heated oxygen sensor heater).
 Refer to "COMPONENT INSPECTION", EC-140.

NG → Replace rear heated oxygen sensor.

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

Trouble is not fixed.

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

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P0136

Rear Heated Oxygen Sensor (Rear HO2S) (DTC: 0707) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

Check the following.

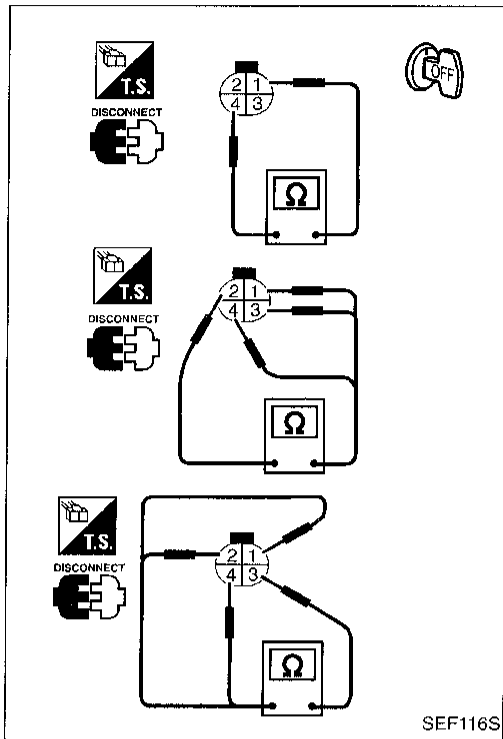
1. Check resistance between terminals ① and ④.
Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

Terminal No.	Continuity
② and ①, ③, ④	No
③ and ①, ②, ④	

If NG, replace the rear heated oxygen sensor.

CAUTION:

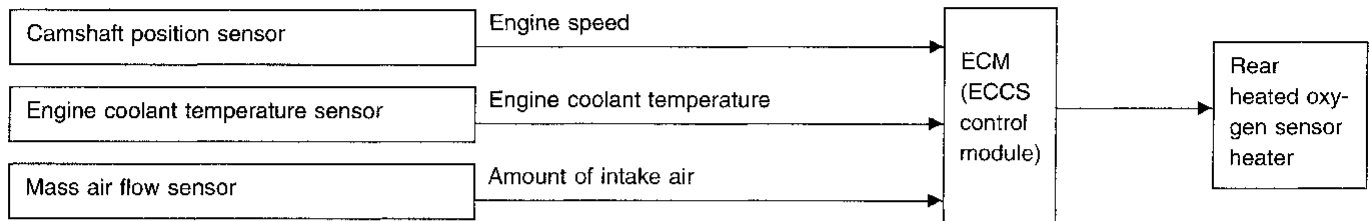
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.



TROUBLE DIAGNOSIS FOR DTC P0141

Rear Heated Oxygen Sensor Heater (DTC: 0902)

SYSTEM DESCRIPTION



The ECM performs ON/OFF control of the rear heated oxygen sensor heater corresponding to the engine conditions.

Engine speed (rpm)	Engine condition	Rear heated oxygen sensor heater
Above 3,600	—	OFF
Below 3,600	Heavy load	OFF
	Except above	ON

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141 0902	<ul style="list-style-type: none"> The current amperage in the rear heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.) 	<ul style="list-style-type: none"> Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) Rear heated oxygen sensor heater

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) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine and run it for at least 5 seconds at idle speed.
- 4) Select "MODE 3" with GST.

OR

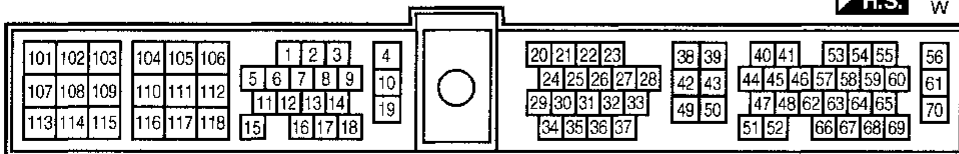
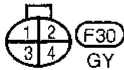
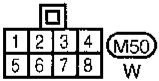
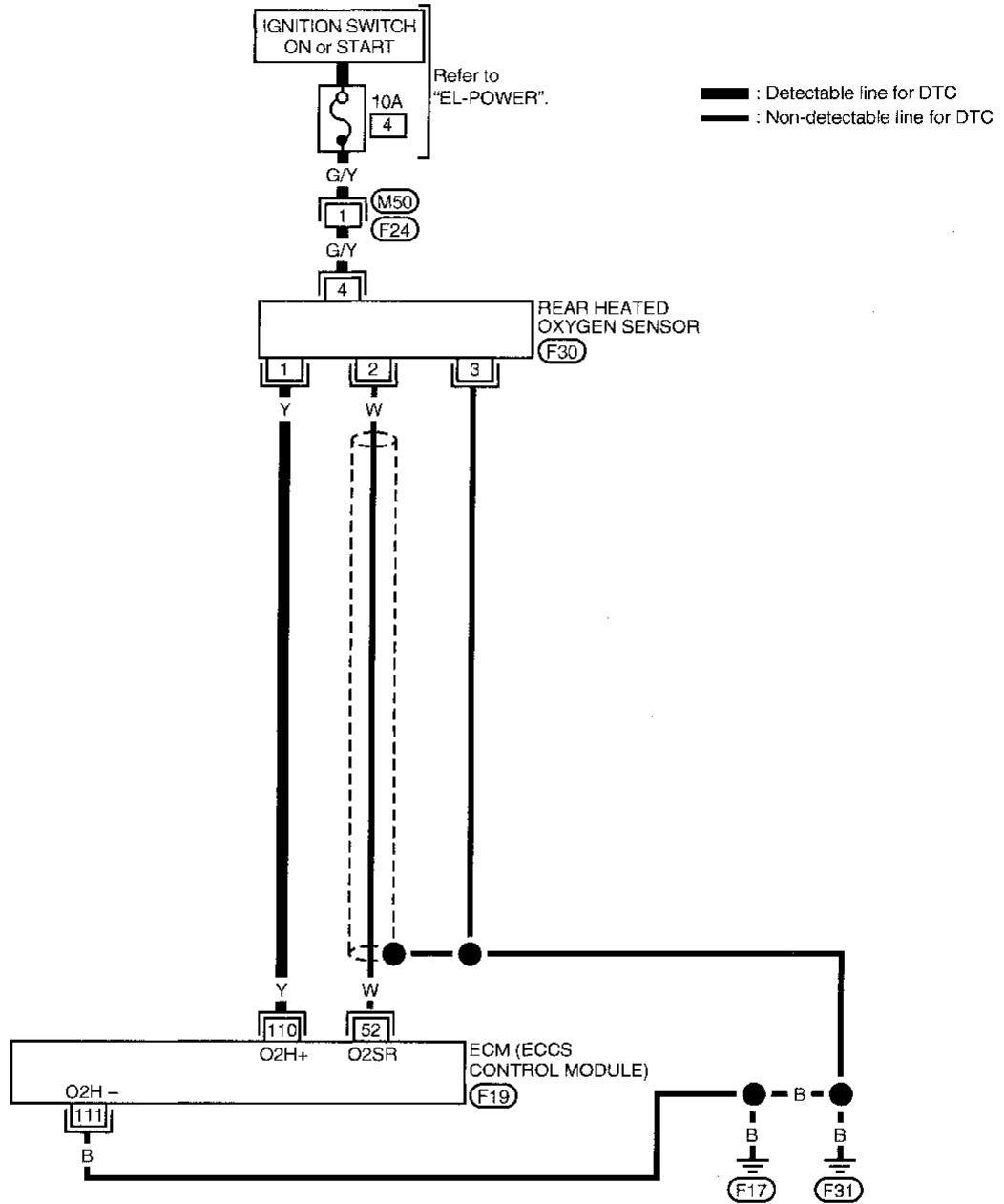
- 1) Start engine and run it for at least 5 seconds at idle speed.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

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

TROUBLE DIAGNOSIS FOR DTC P0141

Rear Heated Oxygen Sensor Heater (DTC: 0902) (Cont'd)

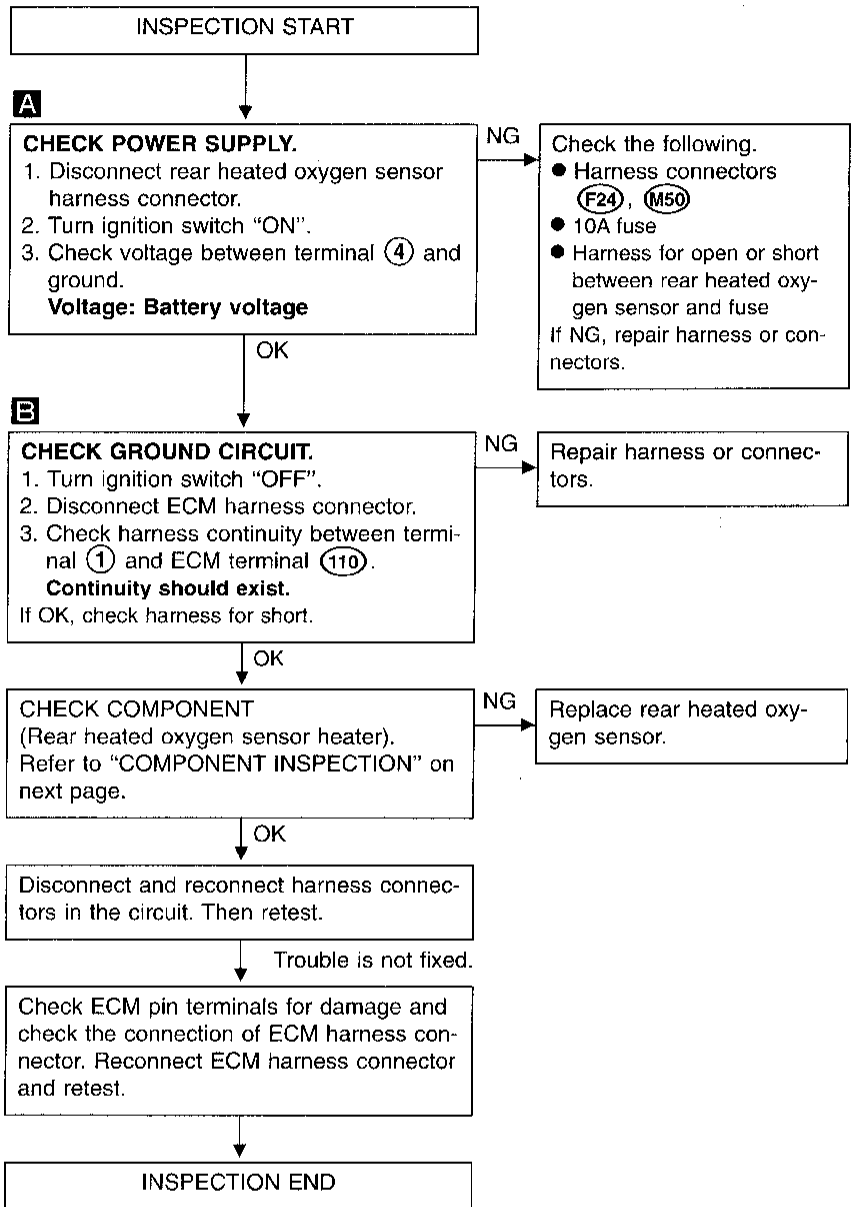
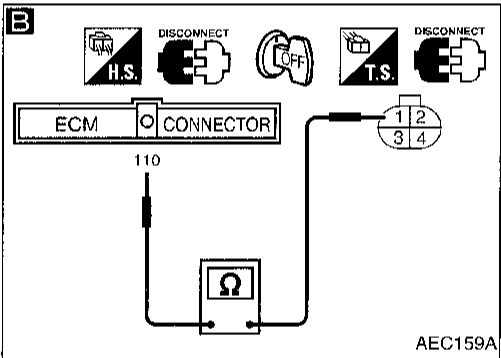
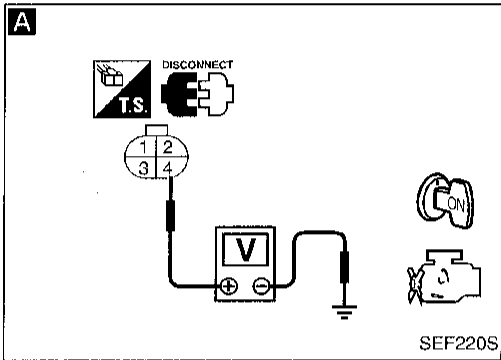
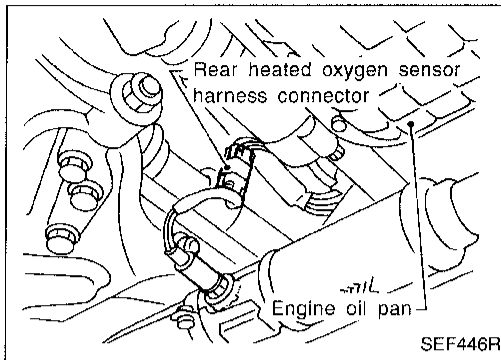
EC-RR02/H-01



TROUBLE DIAGNOSIS FOR DTC P0141

Rear Heated Oxygen Sensor Heater (DTC: 0902) (Cont'd)

DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P0141

Rear Heated Oxygen Sensor Heater (DTC: 0902) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

Check the following.

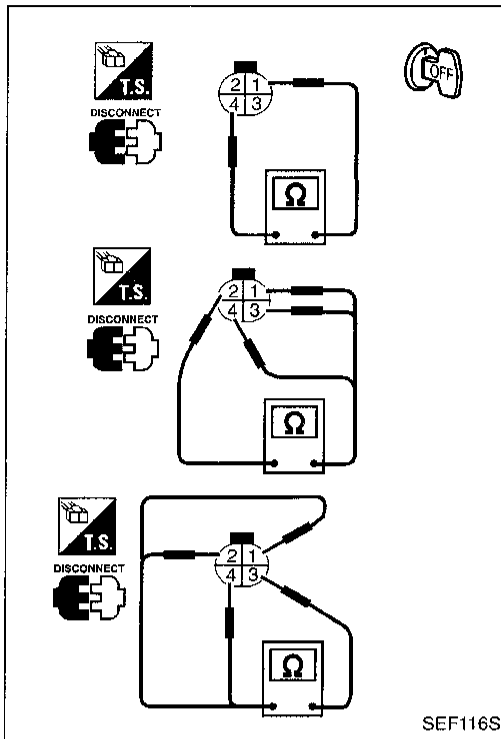
1. Check resistance between terminals ① and ④.
Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

Terminal No.	Continuity
② and ①, ③, ④	No
③ and ①, ②, ④	

If NG, replace the rear heated oxygen sensor.

CAUTION:

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



Fuel Injection System Function (Lean side)
(DTC: 0115)

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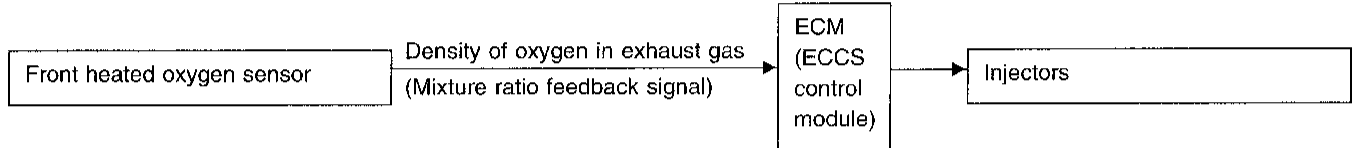
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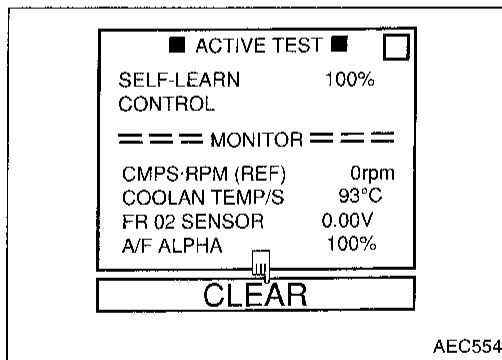
ON BOARD DIAGNOSIS LOGIC

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 system malfunction and light up the MIL (2 trip detection logic).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171 0115	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	<ul style="list-style-type: none"> Intake air leak Front heated oxygen sensor Injectors Exhaust gas leak Incorrect fuel pressure Lack of fuel Mass air flow sensor



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

- Start engine and warm it up sufficiently.
- Turn ignition switch "OFF" and wait at least 5 seconds.
- Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT.
- Start engine again and run it for at least 10 minutes at idle speed.
The 1st trip DTC should be detected at this stage, if a malfunction exists.
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

OR

Fuel Injection System Function (Lean side) (DTC: 0115) (Cont'd)



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- 4) Stop engine and reconnect mass air flow sensor harness connector.
- 5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
- 6) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
- 7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
- 8) Start engine again and run it for at least 10 minutes at idle speed.
The 1st trip DTC 0115 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 has a malfunction.

TROUBLE DIAGNOSIS FOR DTC P0171

Fuel Injection System Function (Lean side) (DTC: 0115) (Cont'd)

EC-FUEL-01

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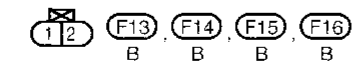
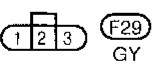
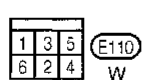
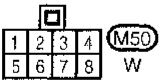
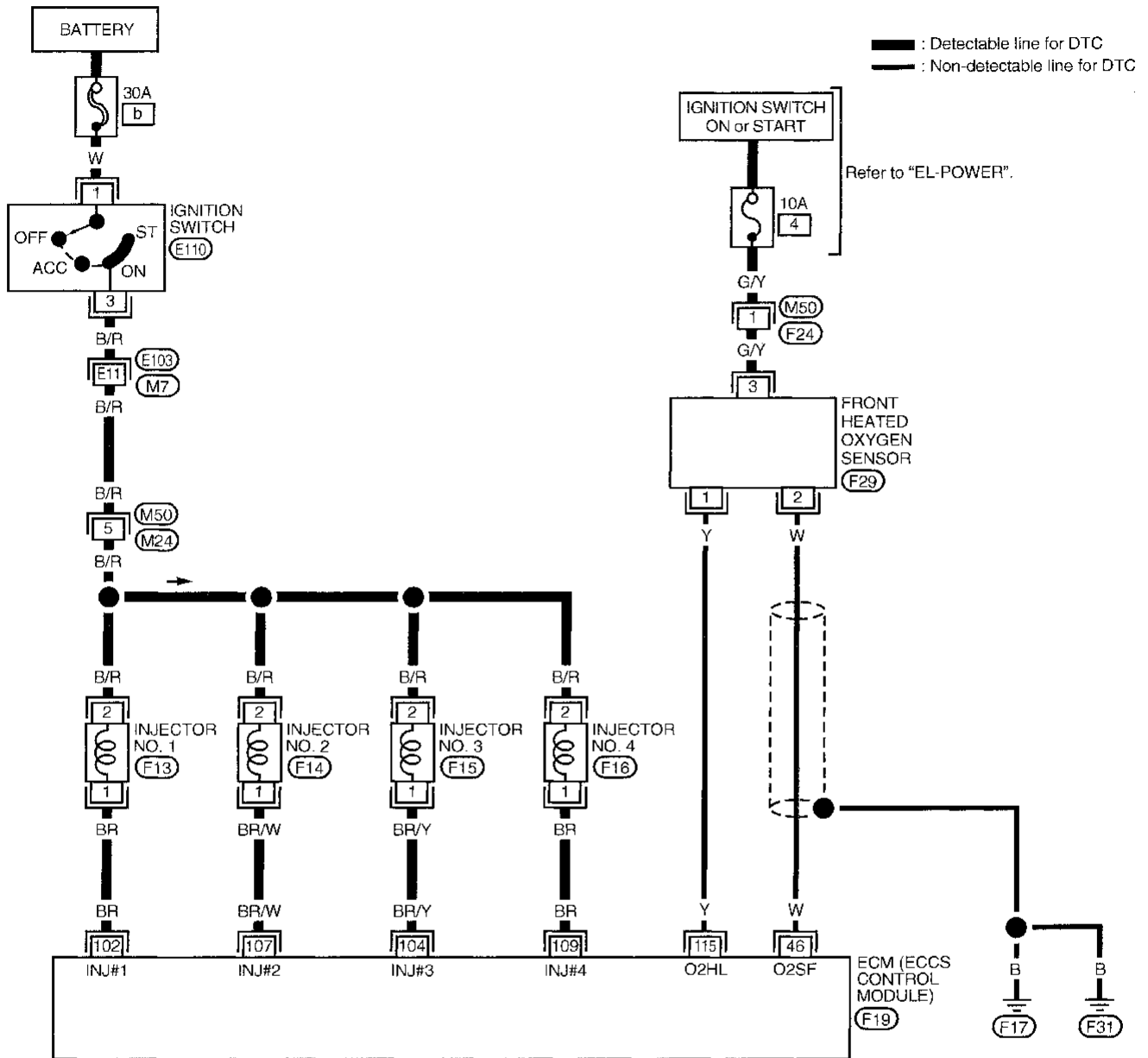
RS

BT

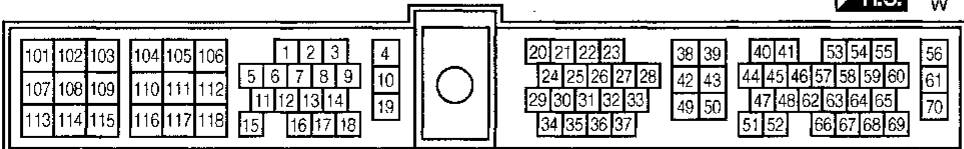
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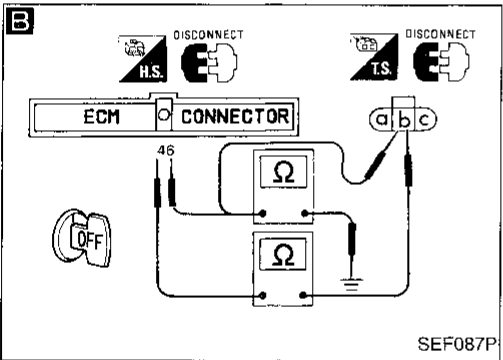
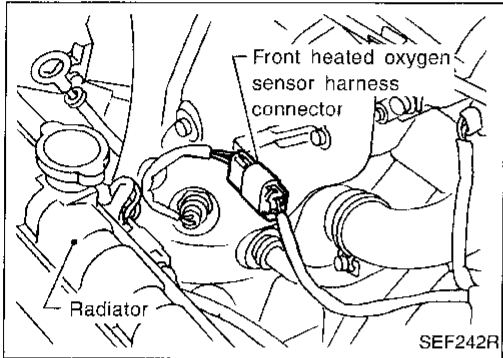
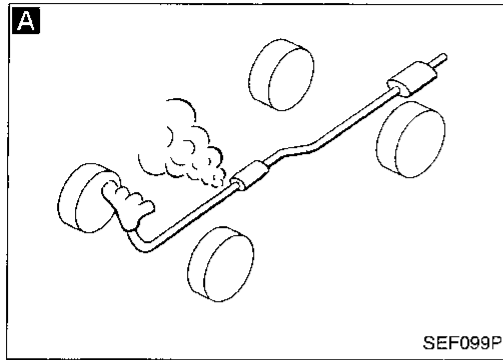


Refer to last page (Foldout page).
M7, E103



TROUBLE DIAGNOSIS FOR DTC P0171

Fuel Injection System Function (Lean side) (DTC: 0115) (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

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

NG → Repair or replace.

OK →

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

NG → Repair or replace.

OK →

B
CHECK FRONT HEATED OXYGEN SENSOR.

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

NG → Repair harness or connectors.

OK →

CHECK FUEL PRESSURE.

1. Release fuel pressure to zero. Refer to page EC-24.)
2. Install fuel pressure gauge and check fuel pressure.

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

A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pump and circuit. Refer to EC-243.

OK →

CHECK MASS AIR FLOW SENSOR.

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

1.5 - 4.5 gm/sec: at idling
5.5 - 13.0 gm/sec: at 2,500 rpm

OR

Check "mass air flow" in MODE 1 with GST.

1.5 - 4.5 gm/sec: at idling
5.5 - 13.0 gm/sec: at 2,500 rpm

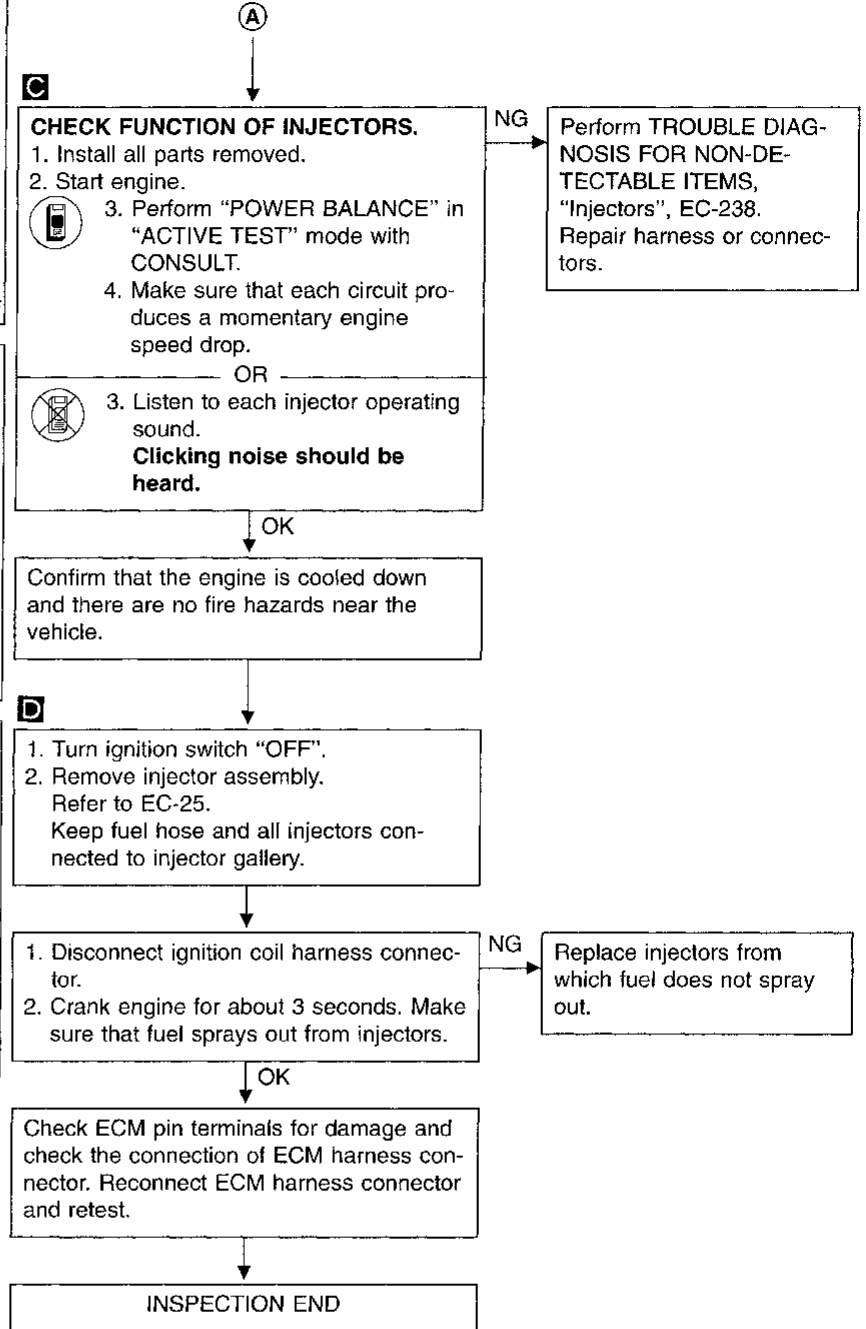
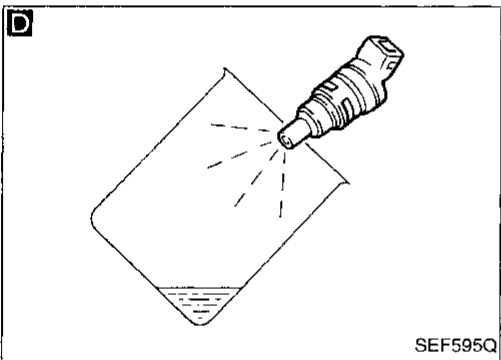
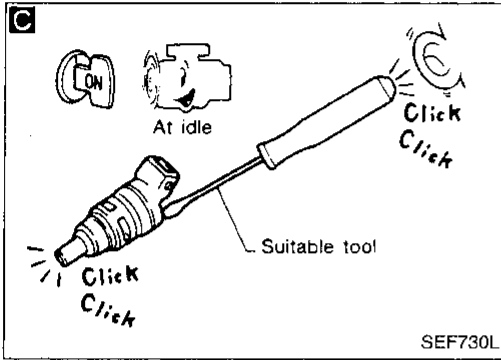
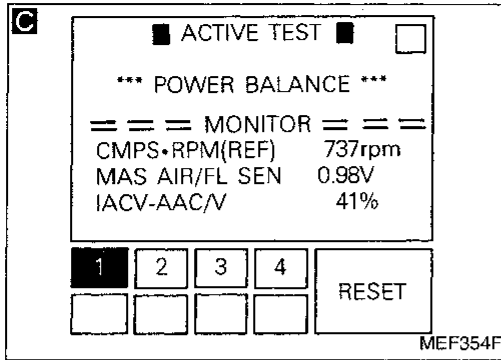
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-103.

OK →

(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P0171

Fuel Injection System Function (Lean side) (DTC: 0115) (Cont'd)



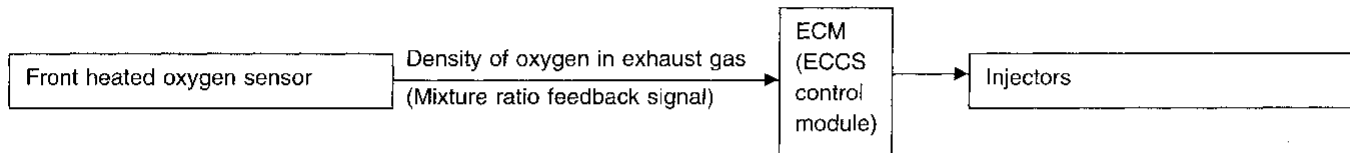
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Fuel Injection System Function (Rich side) (DTC: 0114)

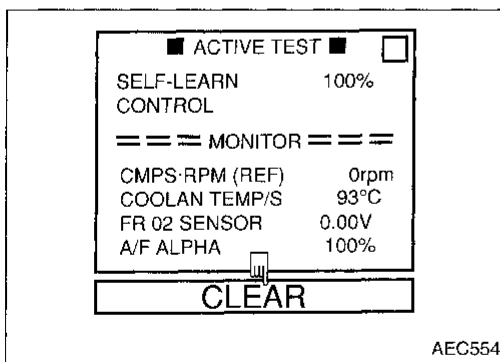
ON BOARD DIAGNOSIS LOGIC

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 system malfunction and light up the MIL (2 trip detection logic).



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 0114	<ul style="list-style-type: none"> ● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	<ul style="list-style-type: none"> ● Front heated oxygen sensor ● Injectors ● Exhaust gas leak ● Incorrect fuel pressure ● Mass air flow sensor



DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT.
- 6) Start engine again and run it for at least 10 minutes at idle speed.
The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

OR

- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.

TROUBLE DIAGNOSIS FOR DTC P0172

Fuel Injection System Function (Rich side) (DTC: 0114) (Cont'd)

- 3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed. GI
- 4) Stop engine and reconnect mass air flow sensor harness connector. MA
- 5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected. EM
- 6) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I. LC
- 8) Start engine again and run it for at least 10 minutes at idle speed. **EC**
The 1st trip DTC 0114 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 has a malfunction. FE

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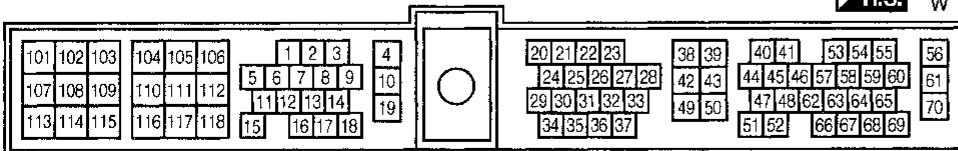
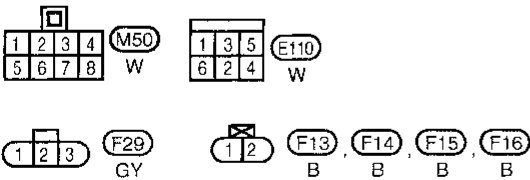
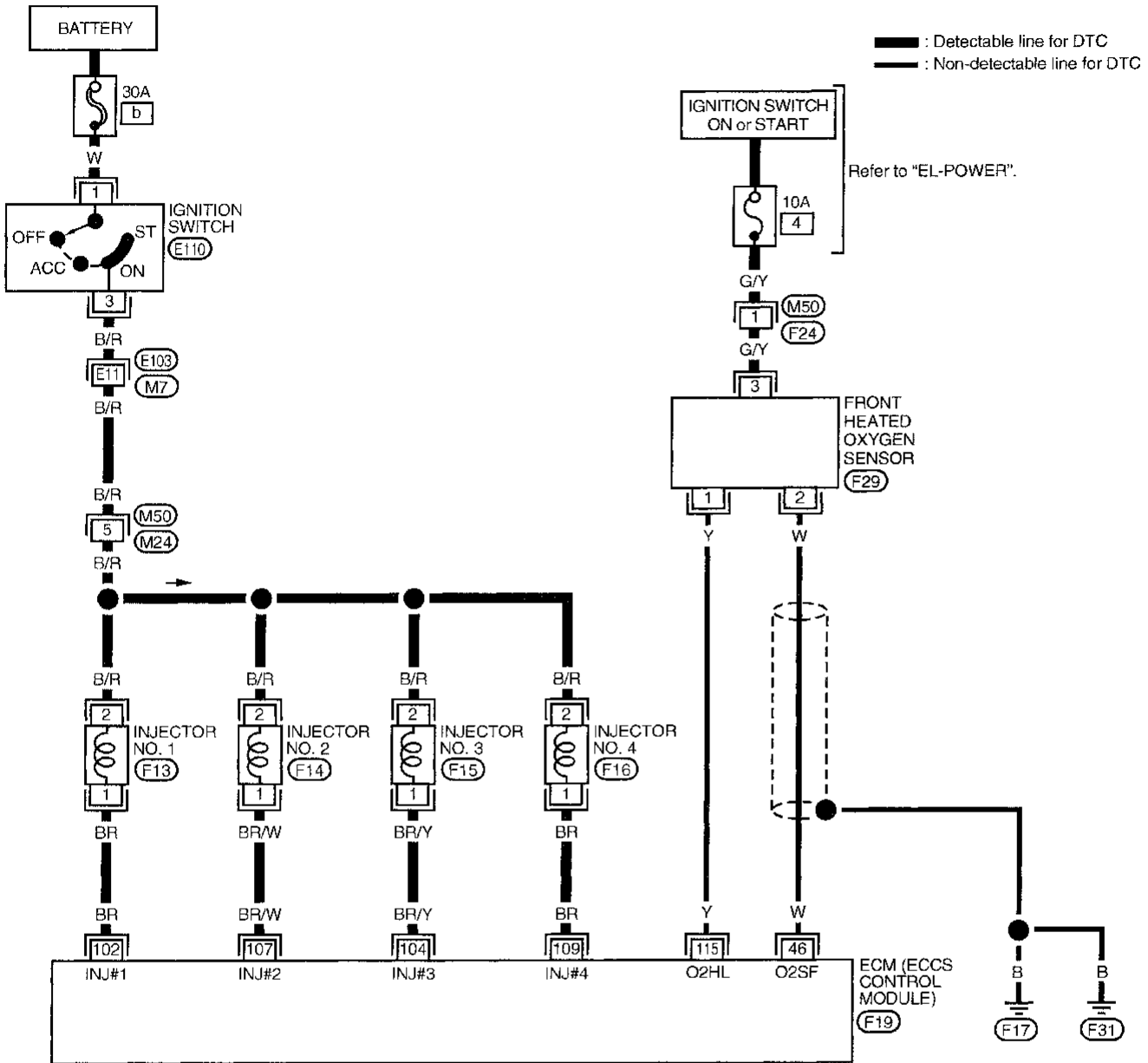
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TROUBLE DIAGNOSIS FOR DTC P0172

Fuel Injection System Function (Rich side) (DTC: 0114) (Cont'd)

EC-FUEL-01

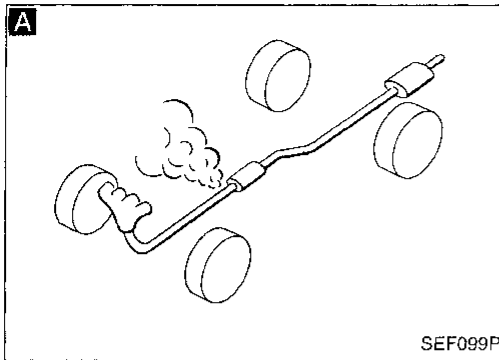


Refer to last page (Foldout page).

(M7), (E103)

TROUBLE DIAGNOSIS FOR DTC P0172

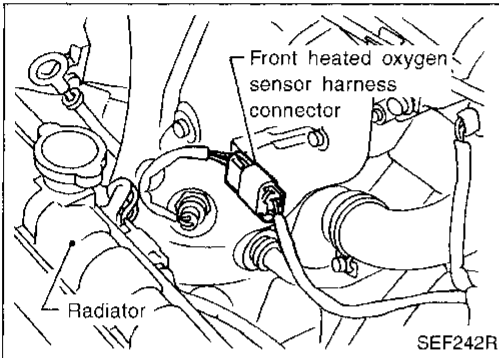
Fuel Injection System Function (Rich side) (DTC: 0114) (Cont'd) DIAGNOSTIC PROCEDURE



INSPECTION START

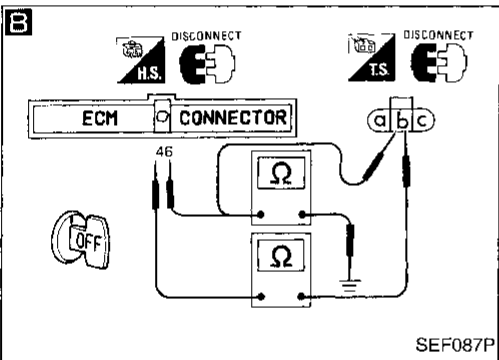
A
CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.

NG → Repair or replace.



B
CHECK FRONT HEATED OXYGEN SENSOR.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (46) and terminal (b).
Continuity should exist.
4. Check harness continuity between ECM terminal (46) (or terminal (b)) and ground.
Continuity should not exist.

NG → Repair harness or connectors.



OK
CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-24.
2. Install fuel pressure gauge and check fuel pressure.
At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pump and circuit. Refer to EC-243.

OK
CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
1.5 - 4.5 gm/sec: at idling
5.5 - 13.0 gm/sec: at 2,500 rpm
OR
Check "mass air flow" in MODE 1 with GST.
1.5 - 4.5 gm/sec: at idling
5.5 - 13.0 gm/sec: at 2,500 rpm

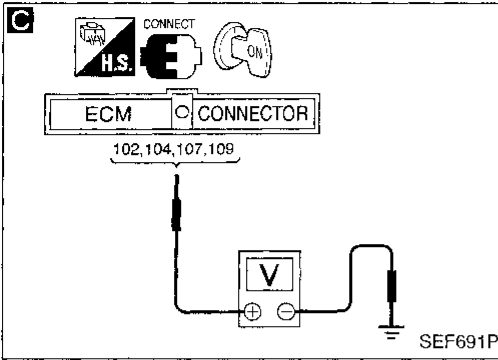
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-103.

OK
A
(Go to next page.)

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TROUBLE DIAGNOSIS FOR DTC P0172

Fuel Injection System Function (Rich side) (DTC: 0114) (Cont'd)



C

CHECK INJECTORS.

1. Turn ignition switch "ON".
2. Check voltage between ECM terminals (102), (104), (107), or (109) and ground with CONSULT or tester.
Battery voltage should exist.
3. Turn ignition switch "OFF".

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-238. Repair harness or connectors.

OK

Remove injector assembly.
Refer to EC-25.
Keep fuel hose and all injectors connected to injector gallery.

Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

1. Disconnect all injector harness connectors.
2. Disconnect ignition coil harness connector.
3. Crank engine for about 3 seconds.
Make sure fuel does not drip from injector.

Drips → Replace the injectors from which fuel is dripping.

Does not drip.

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

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0300 - P0304

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0605)

ON BOARD DIAGNOSIS LOGIC

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

The misfire detection logic consists of the following two conditions.



1. One Trip Detection Logic (Warm-up three Way Catalyst Damage)

When a misfire is detected which will overheat and damage the three way catalyst, the malfunction indicator lamp (MIL) will start blinking; even during the first trip. In this condition, ECM monitors the misfire every 200 revolutions.

If the misfire frequency decreases to a level that will not damage the three way catalyst, the MIL will change from blinking to lighting up.


(After the first trip detection, the MIL will light up from engine starting. If a misfire is detected that will cause warm-up three way catalyst damage, the MIL will start blinking.)

2. Two Trip Detection Logic (Exhaust quality deterioration)


When a misfire that will not damage the three way catalyst (but will affect exhaust emission) occurs, the malfunction indicator lamp will light up based on the second consecutive trip detection logic. In this condition, ECM monitors the misfire for every 1,000 revolutions of the engine.

Diagnostic Trouble Code Nos.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300 (0701)	● Multiple cylinders misfire.	● Improper spark plug ● Insufficient compression
P0301 (0608)	● No. 1 cylinder misfires.	● Incorrect fuel pressure ● EGR valve
P0302 (0607)	● No. 2 cylinder misfires.	● The injector circuit is open or shorted. ● Injectors
P0303 (0606)	● No. 3 cylinder misfires.	● Intake air leak ● The ignition secondary circuit is open or shorted.
P0304 (0605)	● No. 4 cylinder misfires.	● Lack of fuel ● Magnetized flywheel (drive plate)


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (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 at least 3 seconds.
 4) Start engine again and drive at 1,500 - 3,000 rpm for at least 8 minutes.

OR

-  1) Start engine and warm it up sufficiently.
 2) Turn ignition switch "OFF" and wait at least 3 seconds.
 3) Start engine again and drive at 1,500 - 3,000 rpm for at least 8 minutes.
 4) Select "MODE 7" with GST.

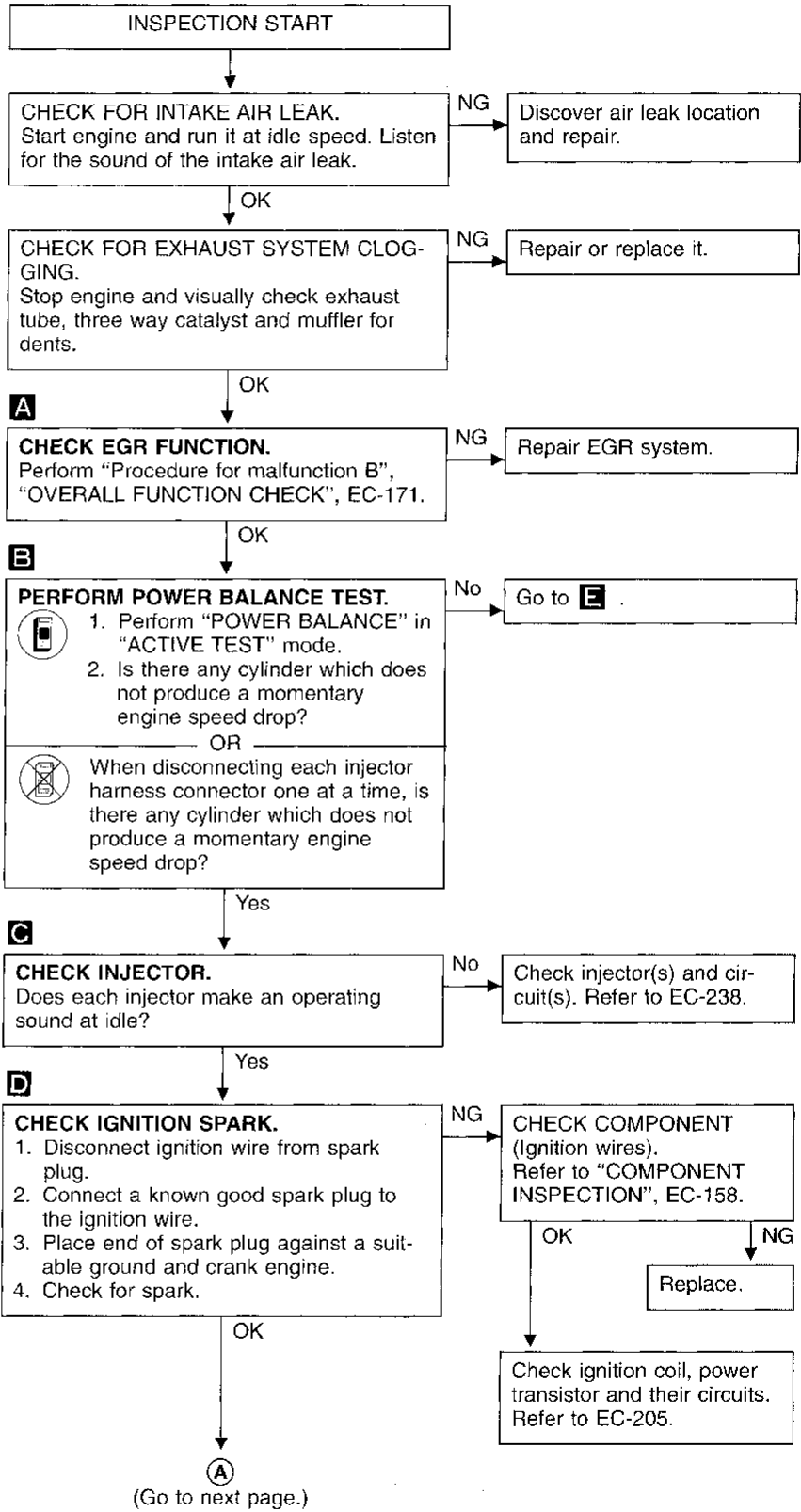
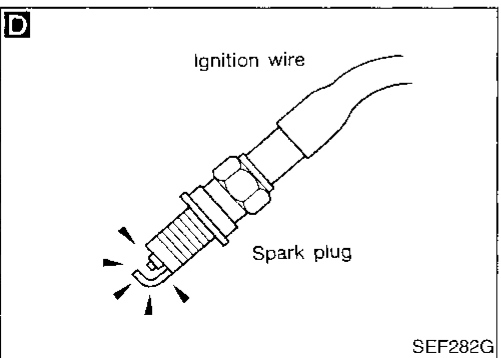
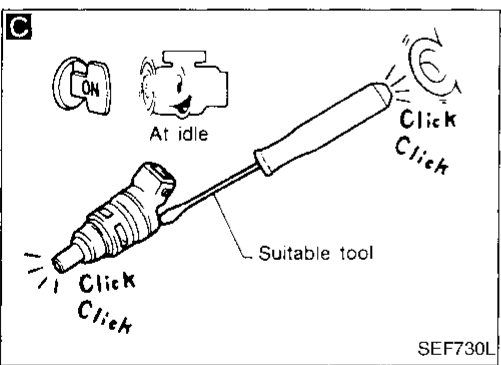
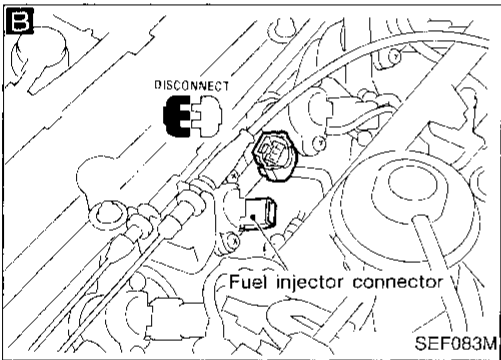
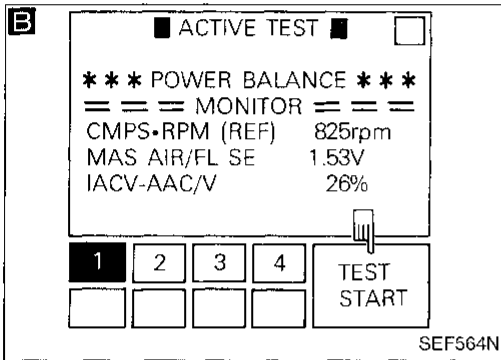
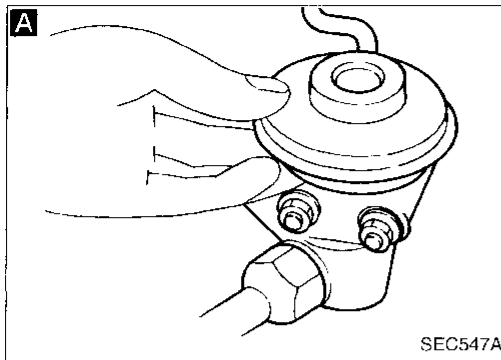
OR

-  1) Start engine and warm it up sufficiently.
 2) Turn ignition switch "OFF" and wait at least 3 seconds.
 3) Start engine again and drive at 1,500 - 3,000 rpm for at least 8 minutes.
 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P0300 - P0304

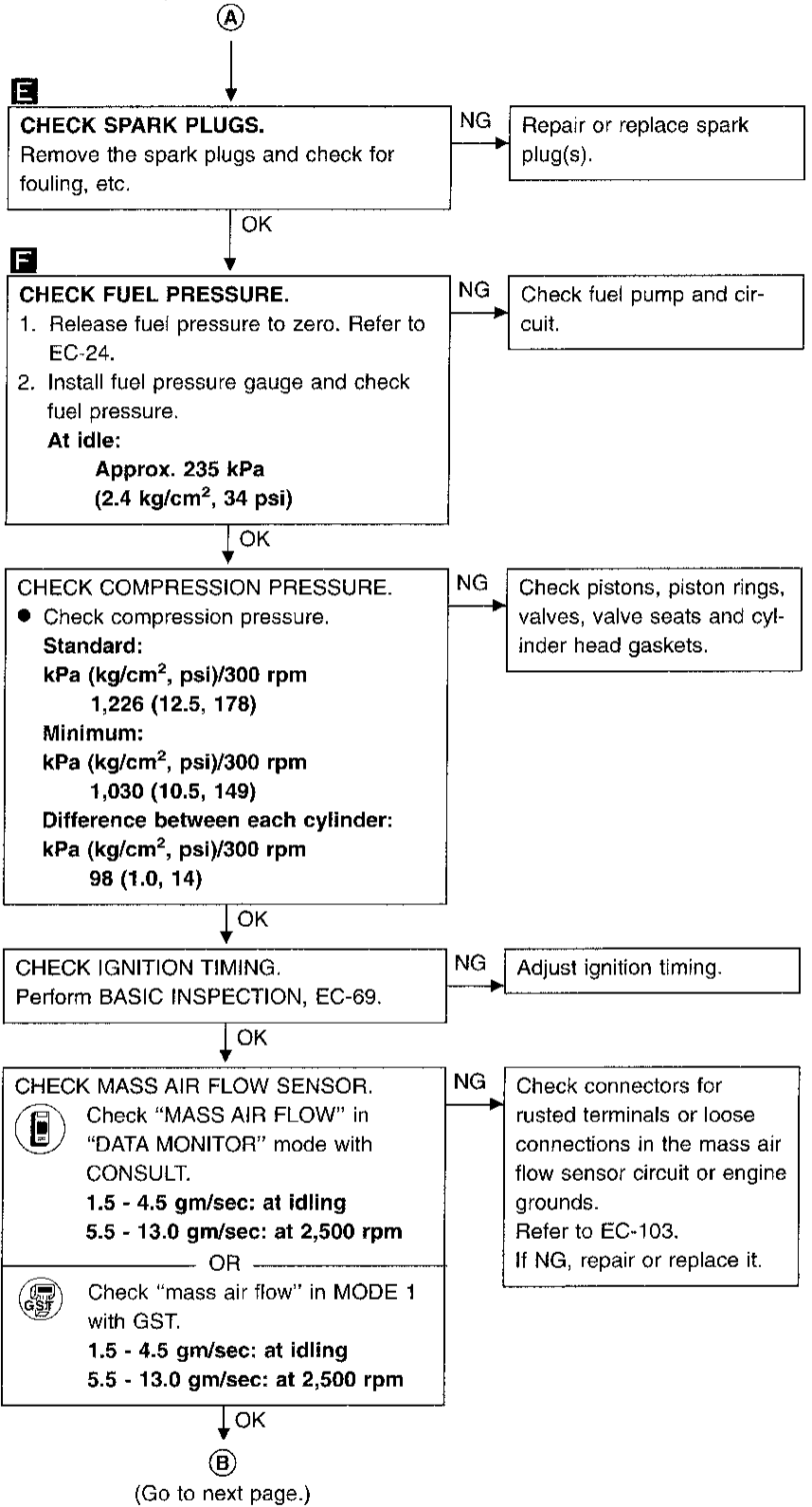
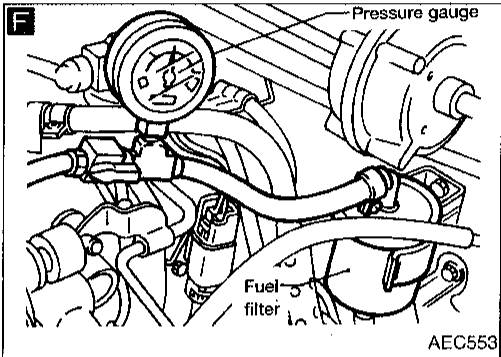
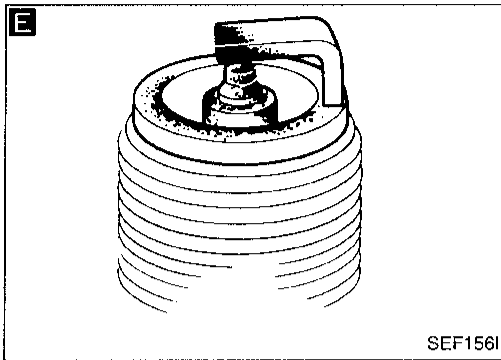
No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0605) (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0300 - P0304

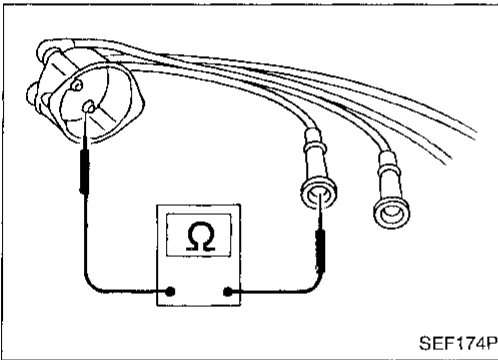
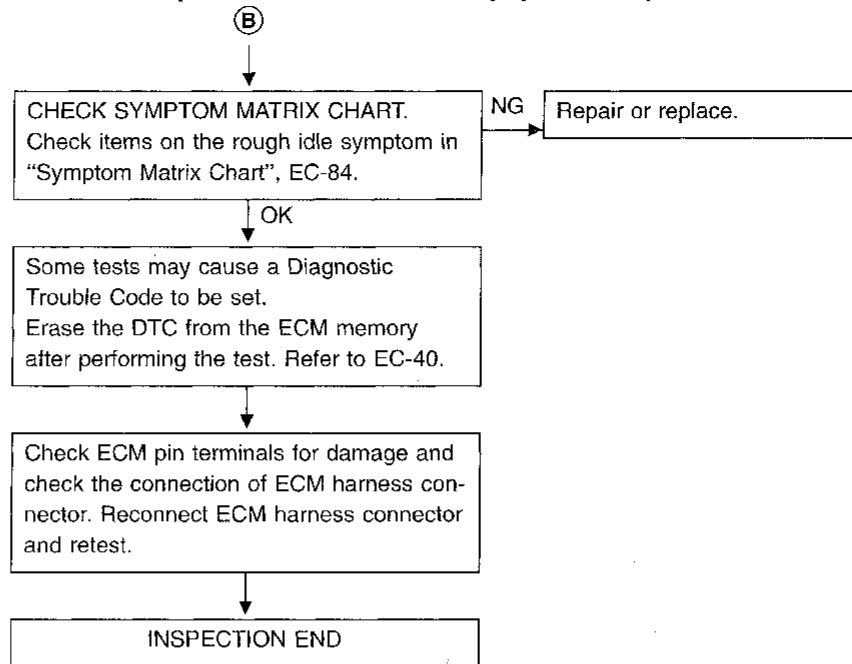
No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0605) (Cont'd)



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TROUBLE DIAGNOSIS FOR DTC P0300 - P0304

No. 4 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0605) (Cont'd)



COMPONENT INSPECTION

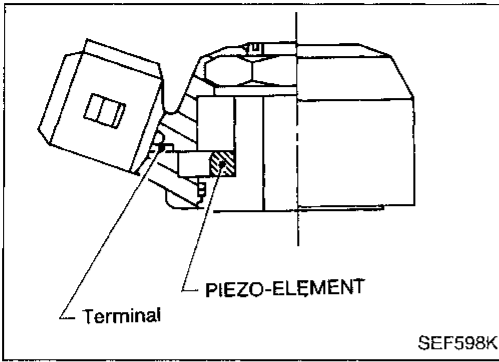
Ignition wires

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

Resistance:

13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.



Knock Sensor (KS) (DTC: 0304)

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

* Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0325 0304	<ul style="list-style-type: none"> An excessively low or high voltage from the knock sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The knock sensor circuit is open or shorted.) Knock sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: Before performing the following procedure, confirm that battery voltage is more than 10V.

- ① 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

- ② 1) Start engine and run it for at least 5 seconds at idle speed.
- 2) Select "MODE 7" with GST.

OR

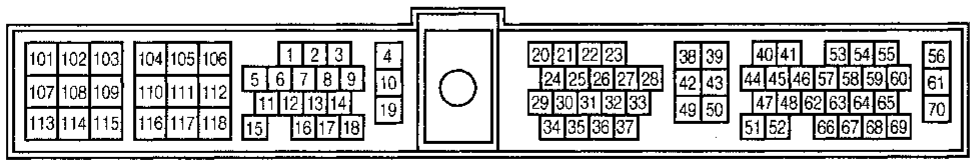
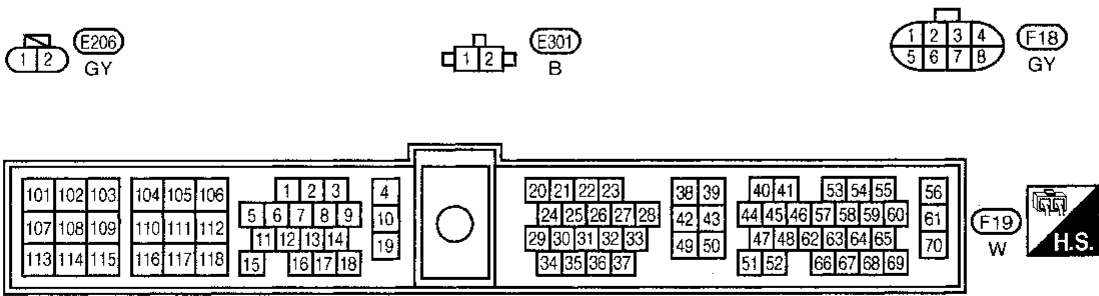
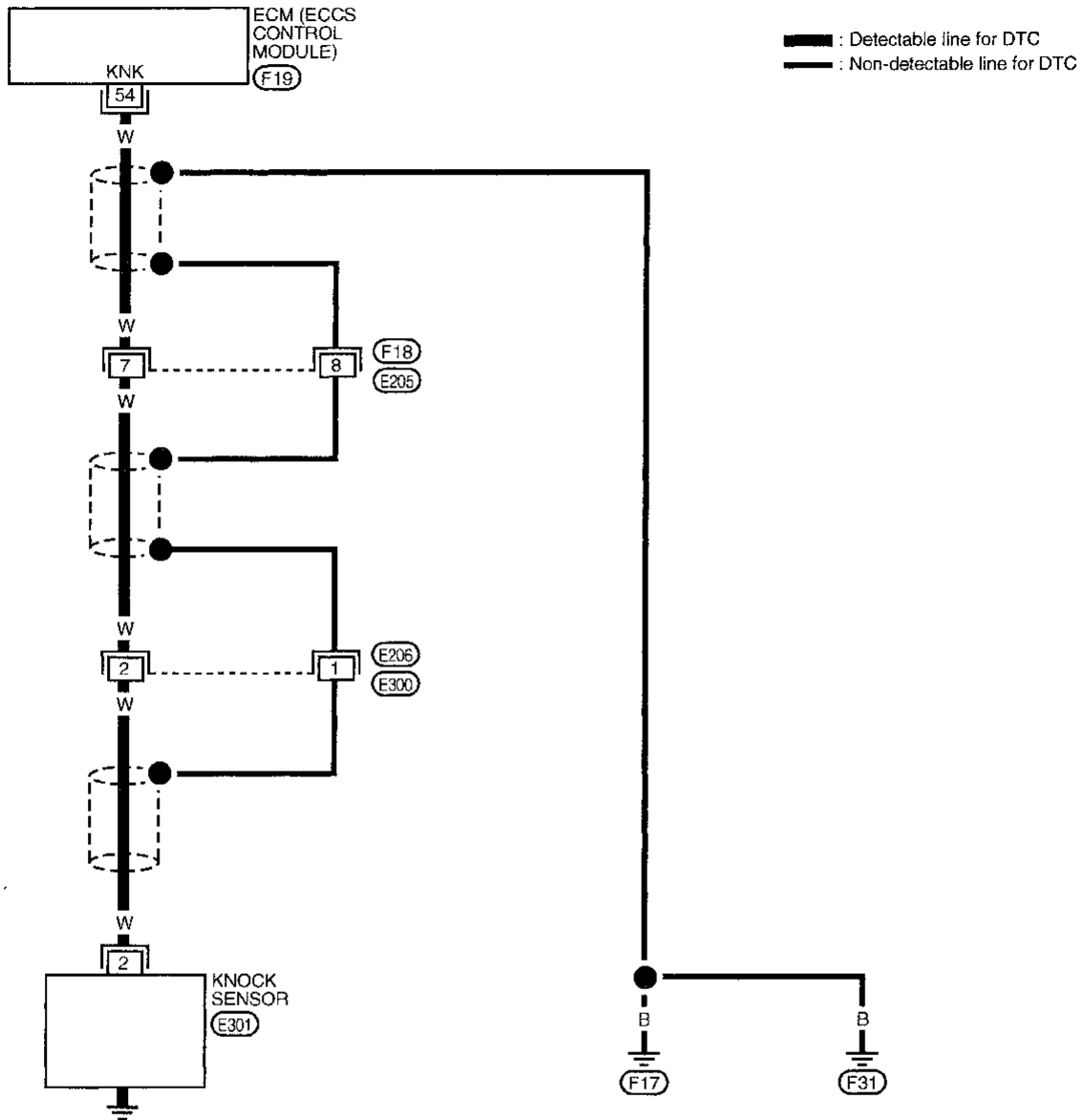
- ③ 1) Start engine and run it for at least 5 seconds at idle speed.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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TROUBLE DIAGNOSIS FOR DTC P0325

Knock Sensor (KS) (DTC: 0304) (Cont'd)

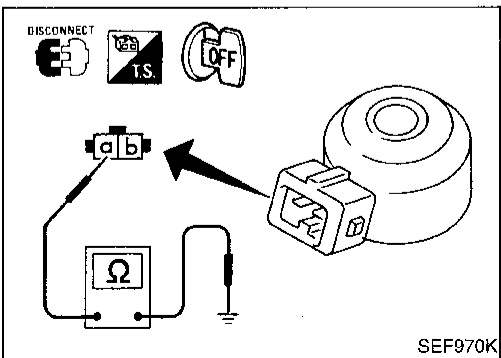
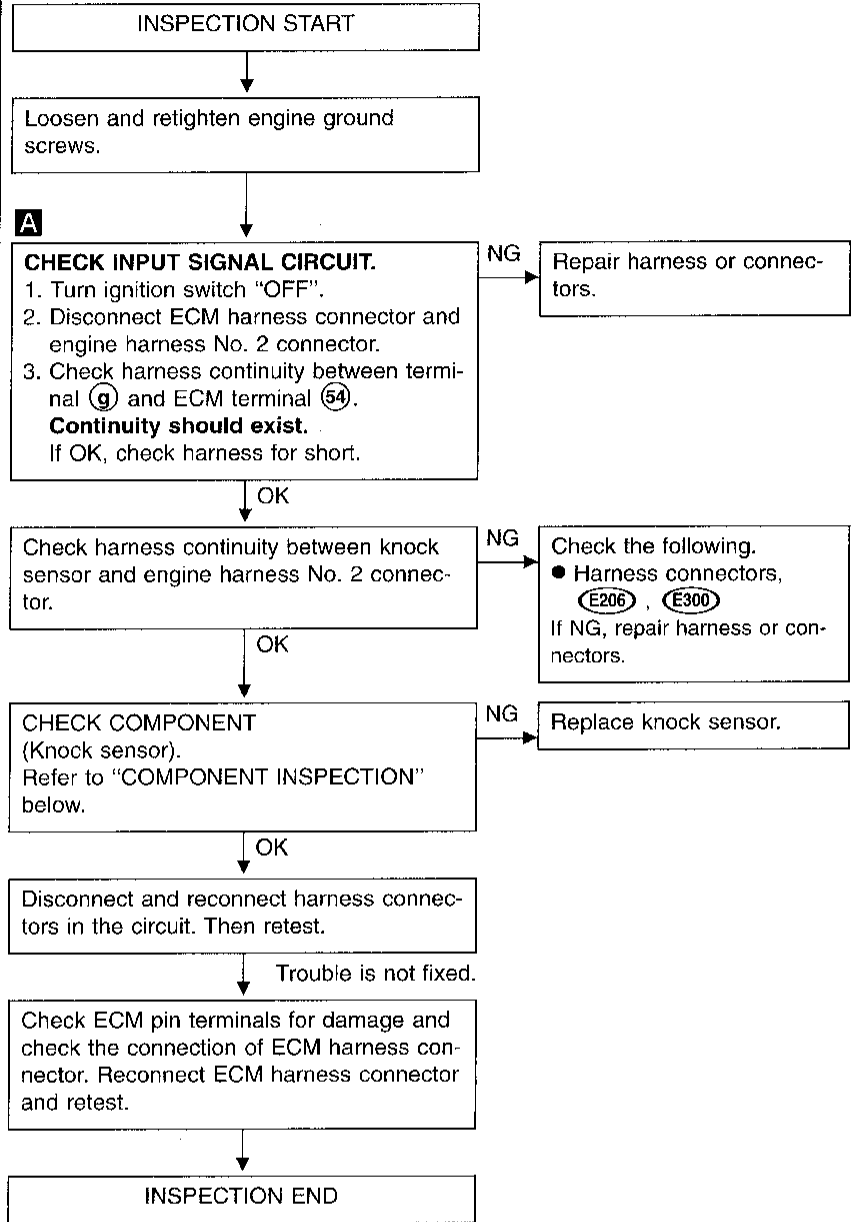
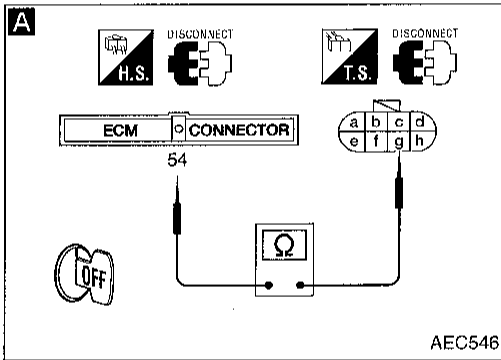
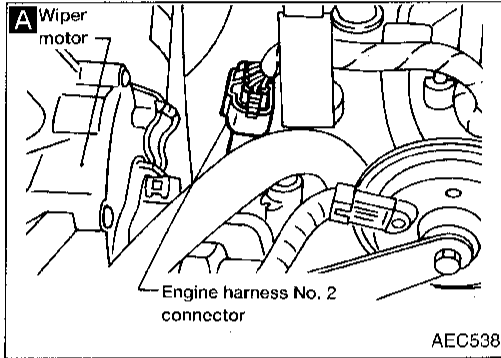
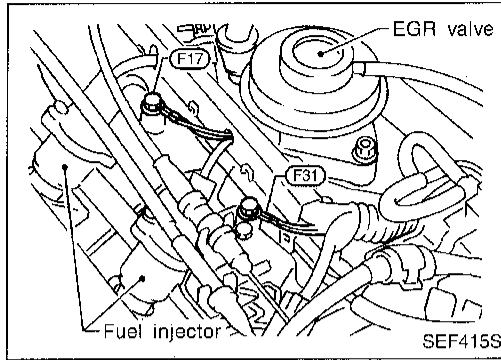
EC-KS-01



TROUBLE DIAGNOSIS FOR DTC P0325

Knock Sensor (KS) (DTC: 0304) (Cont'd)

DIAGNOSTIC PROCEDURE



COMPONENT INSPECTION

Knock sensor

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

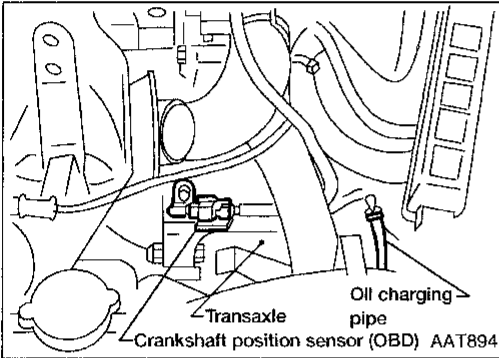
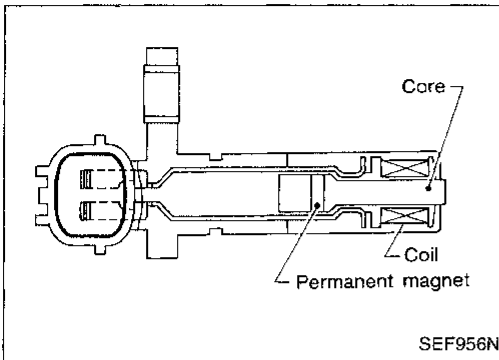
Resistance: 500 - 620 kΩ [at 25°C (77°F)]

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

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

TROUBLE DIAGNOSIS FOR DTC P0335



Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802)

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

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not 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)
P0335 0802	<ul style="list-style-type: none"> ● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. 	<ul style="list-style-type: none"> ● Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) ● Crankshaft position sensor (OBD)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



- 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 7" with GST.

OR

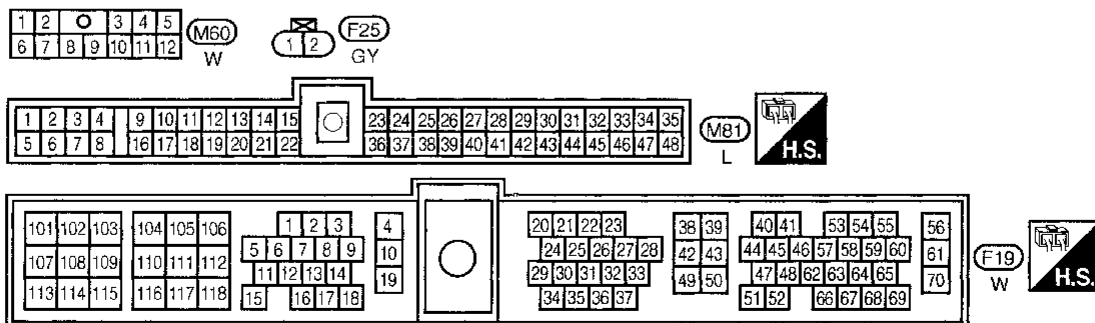
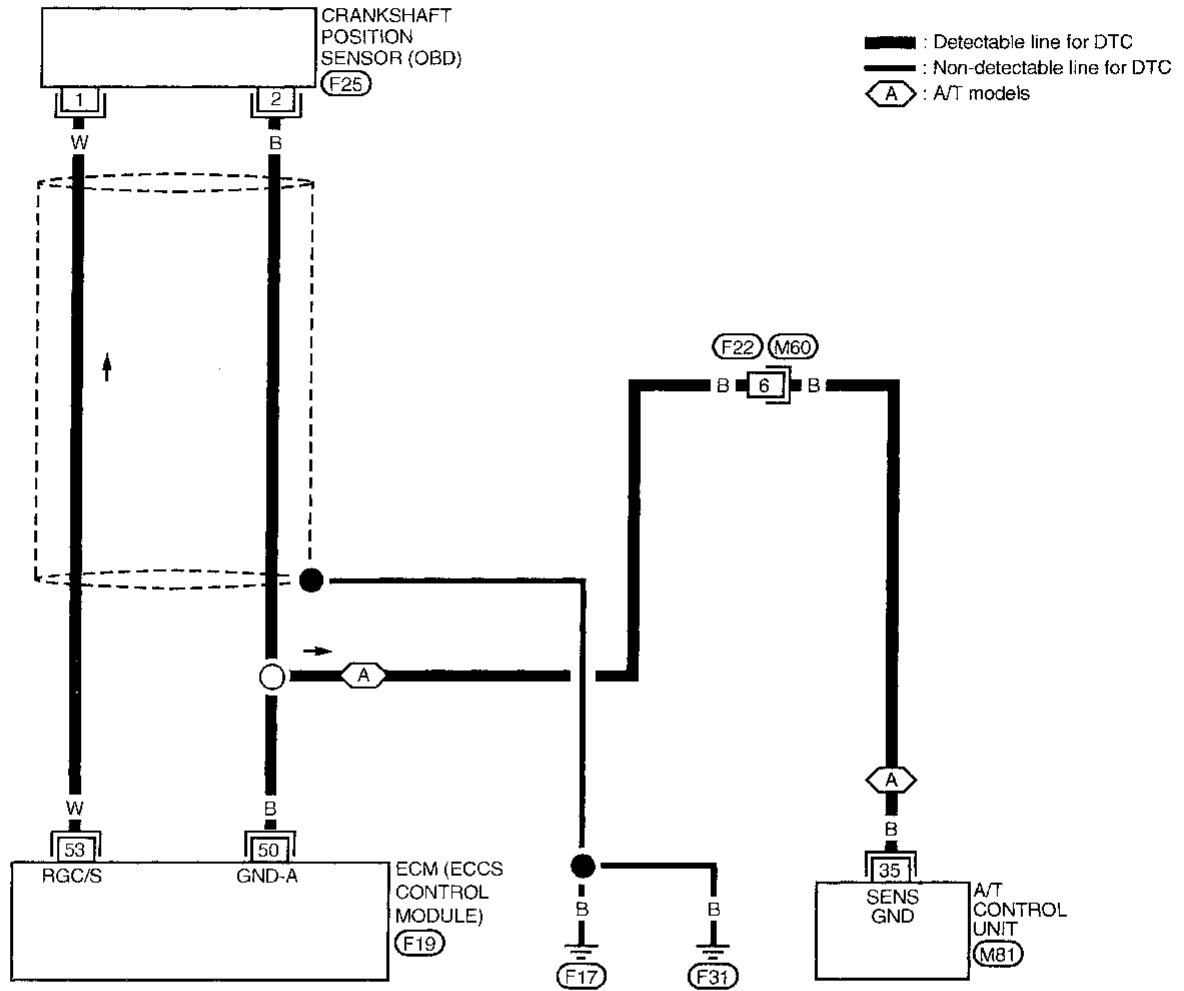


- 1) Start engine and run it for at least 15 seconds at idle speed.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P0335

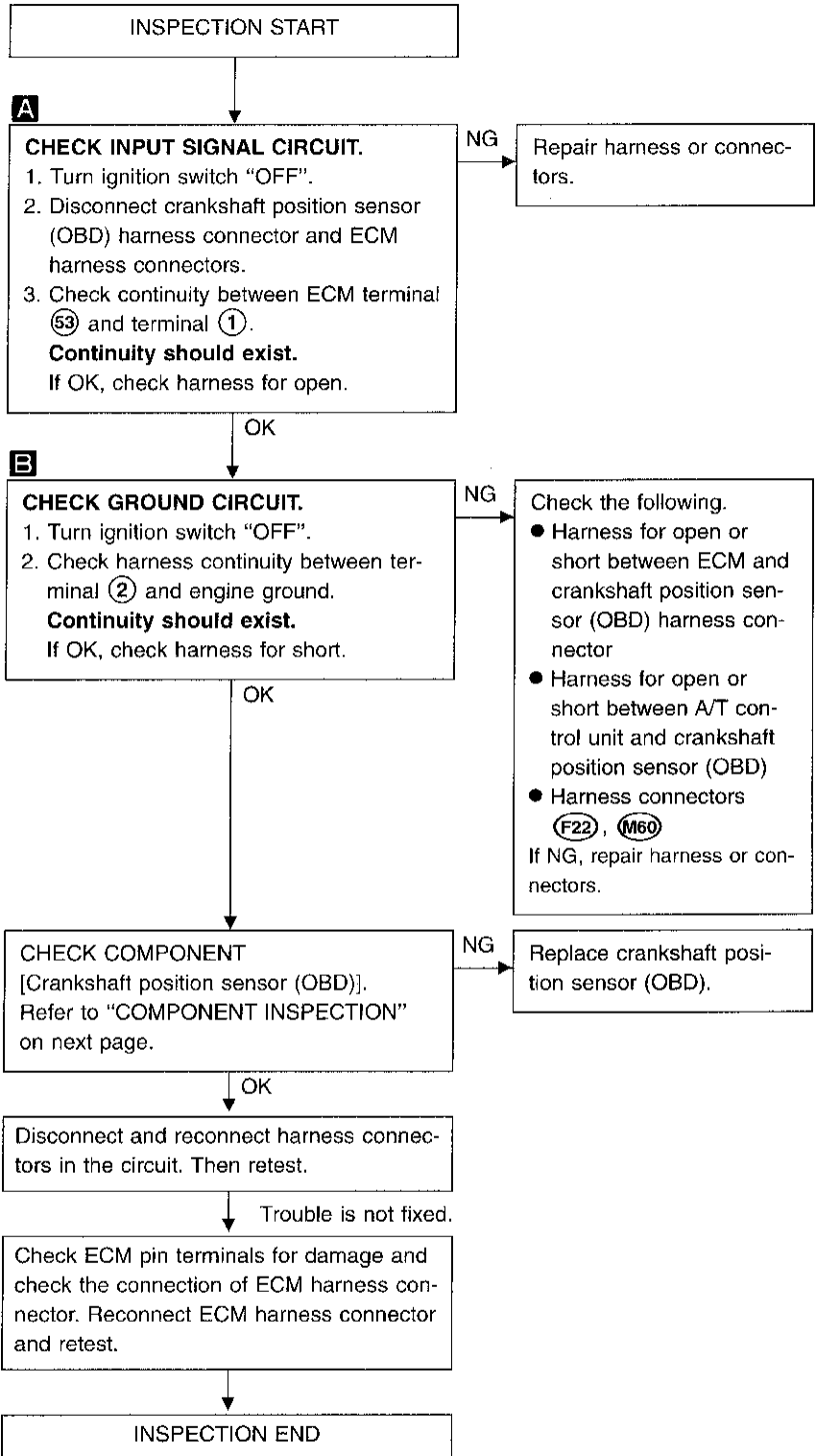
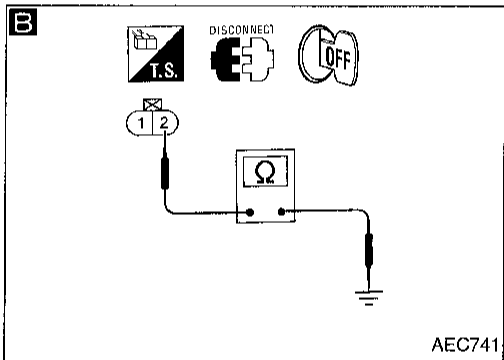
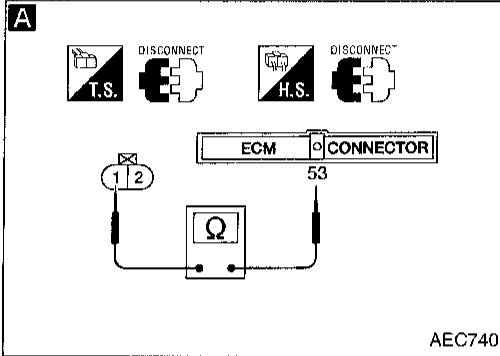
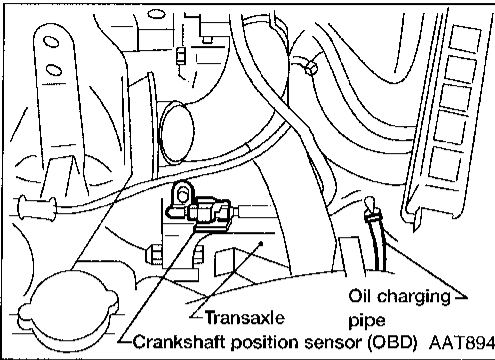
Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

EC-CKPS-01



TROUBLE DIAGNOSIS FOR DTC P0335

Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd) DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0335

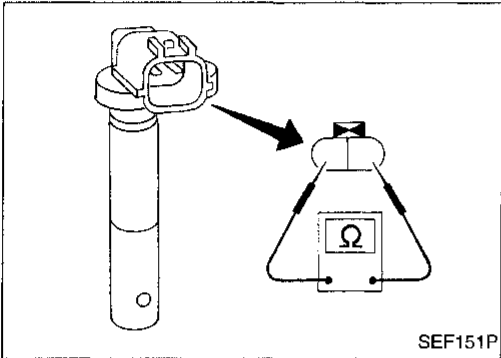
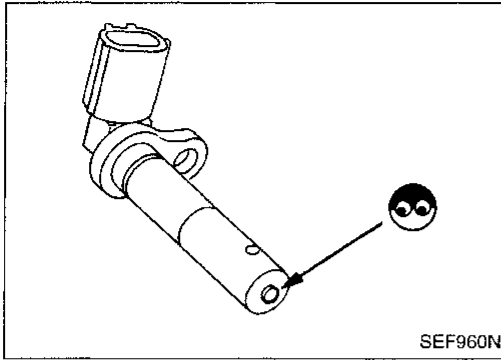
Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

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 432-528 Ω at 25°C (77°F)



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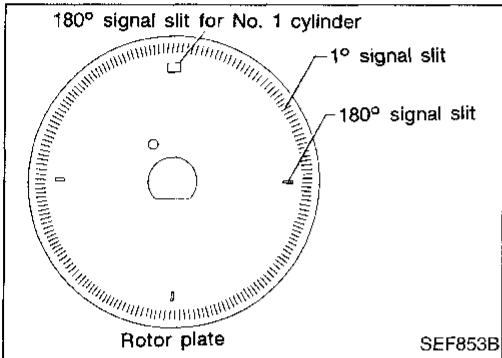
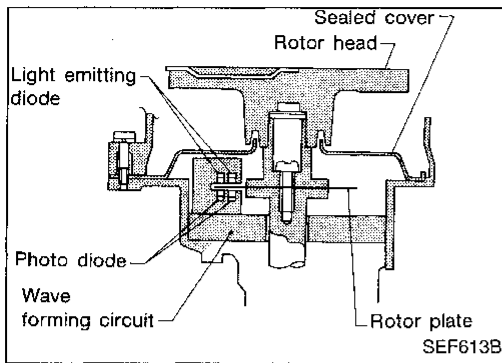
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TROUBLE DIAGNOSIS FOR DTC P0340



Camshaft Position Sensor (CMPS)(DTC: 0101)

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)
P0340 0101	<ul style="list-style-type: none"> • Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking. • Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed. • 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.) • Dead (Weak) battery

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: Before performing the following procedure, confirm that battery voltage is more than 10.5V.



- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)

OR



- 1) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 2) Select "MODE 7" with GST.

OR



- 1) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd)

EC-CMPS-01

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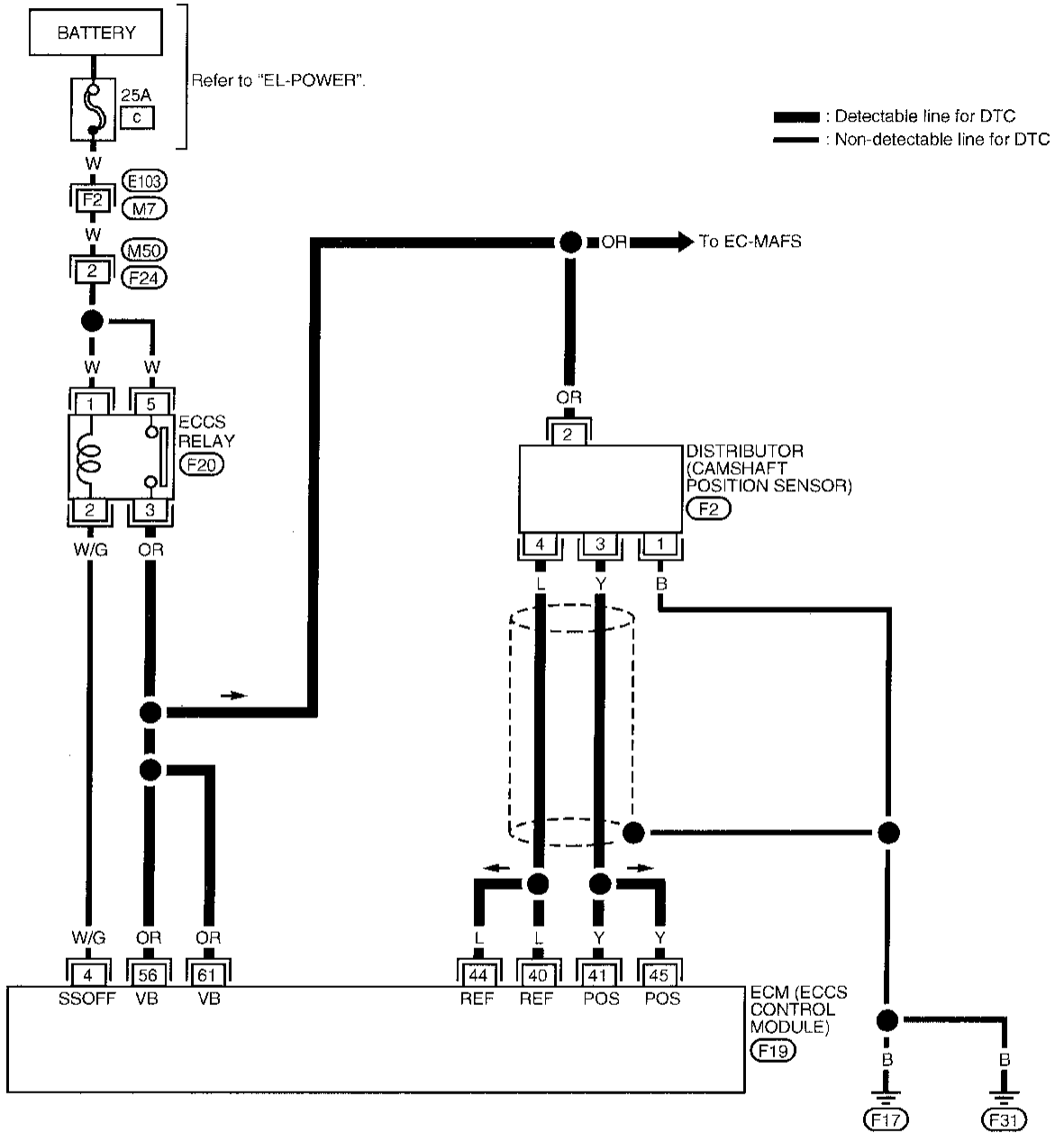
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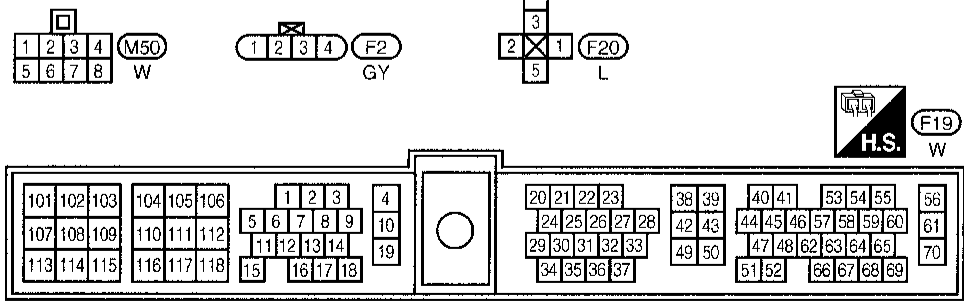
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Refer to last page (Foldout page).

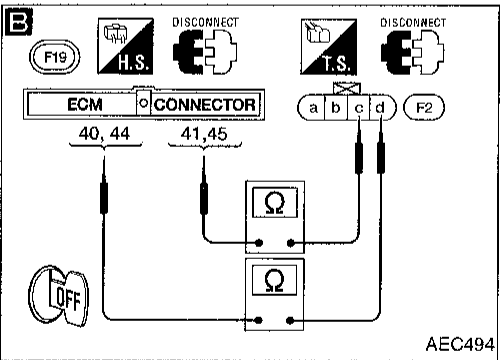
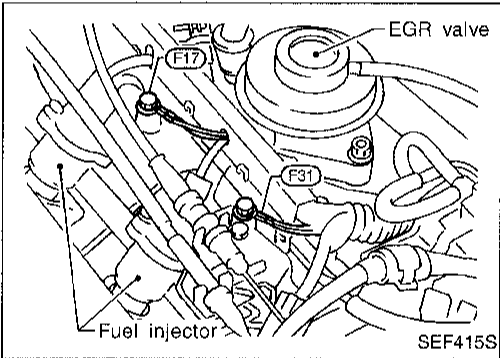
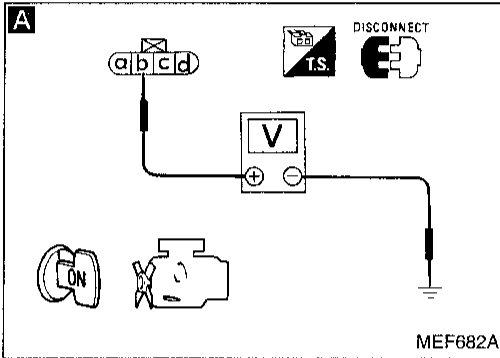
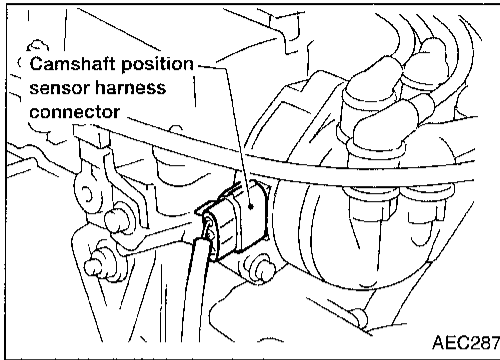
(M7), (E103)



TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd)

DIAGNOSTIC PROCEDURE (DETECTABLE CIRCUIT)



INSPECTION START

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

NG → Check the following.
● Harness for open or short between camshaft position sensor and ECCS relay
If NG, repair harness or connectors.

OK → Loosen and retighten engine ground screws.

B
CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal (c) and ECM terminals (41), (45) (180° signal), terminal (d) and ECM terminals (40), (44) (1° signal).
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK → **CHECK COMPONENT** (Camshaft position sensor). Refer to "COMPONENTS INSPECTION" on next page.

NG → Replace camshaft position sensor.

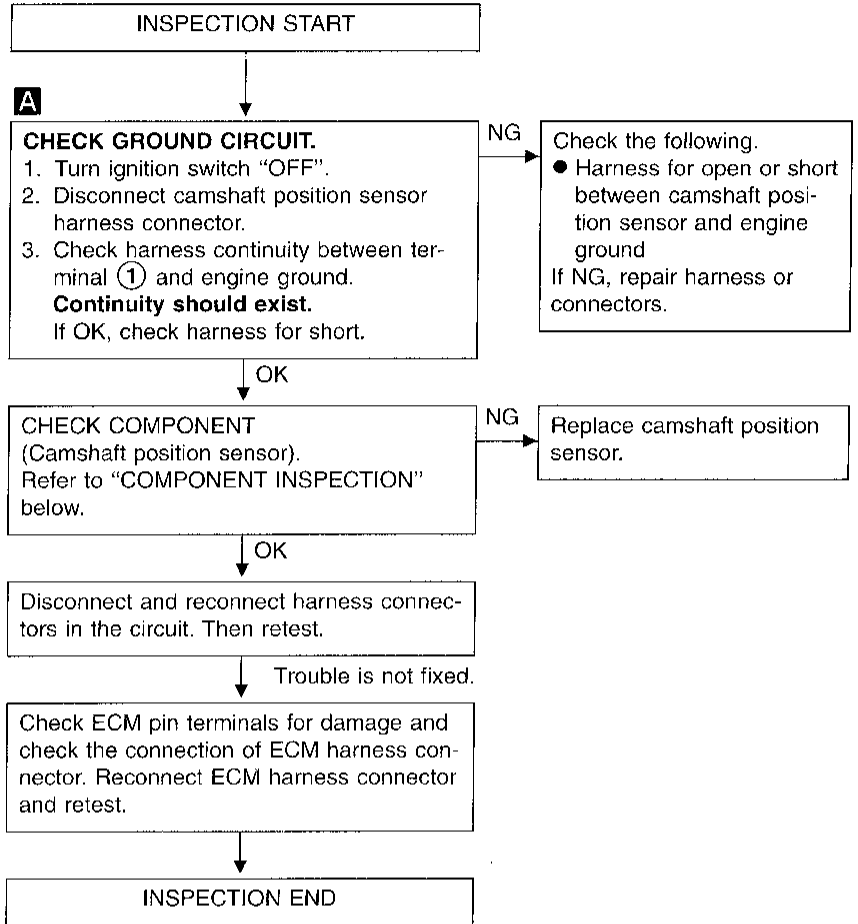
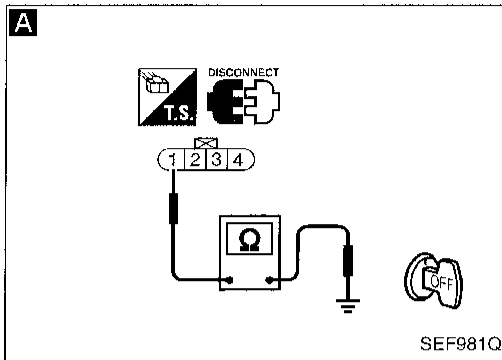
OK → Disconnect and reconnect harness connectors in the circuit. Then retest.

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

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd) DIAGNOSTIC PROCEDURE (NON-DETECTABLE CIRCUIT)



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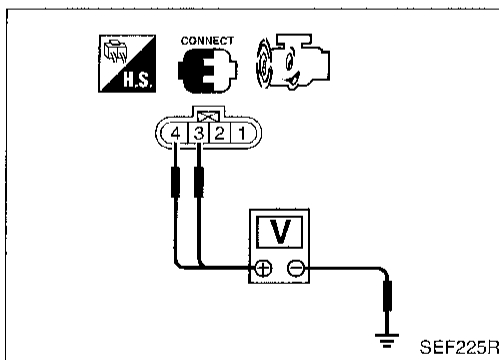
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COMPONENT INSPECTION

Camshaft position sensor

1. Start engine.
2. Check voltage between camshaft position sensor terminals ③, ④ and ground with AC range.

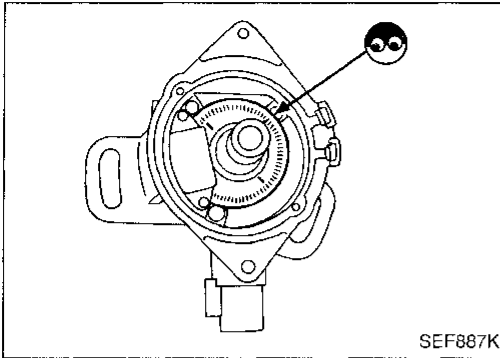
Condition	Terminal	Voltage
Engine running at idle	③ and ground	Approximately 2.3V* (AC)
	④ and ground	

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

If NG, replace camshaft position sensor.

TROUBLE DIAGNOSIS FOR DTC P0340

Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd)

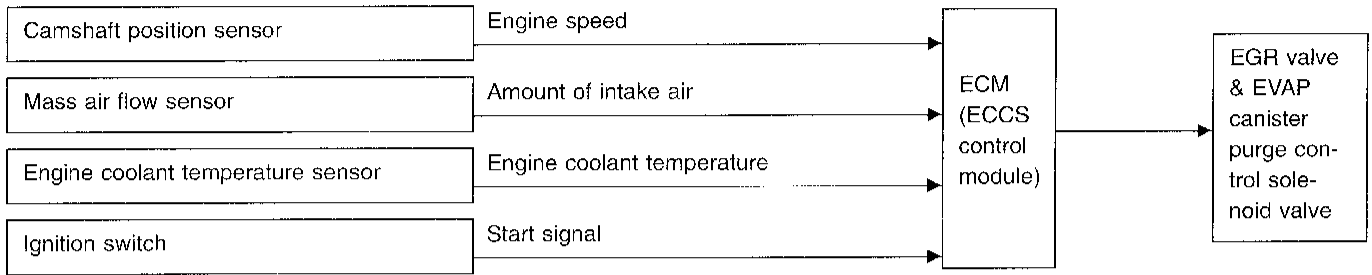


3. Remove camshaft position sensor cap and visually check signal plate for damage or dust.

After this inspection, diagnostic trouble code P0340 might be displayed with camshaft position sensor functioning properly. Erase the stored memory.

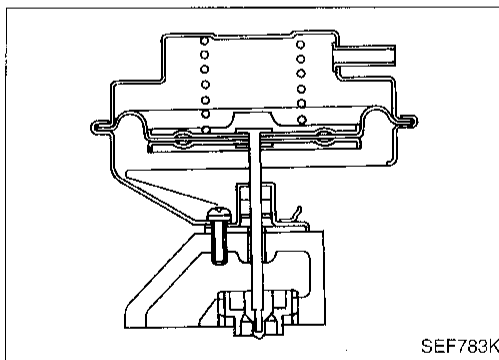
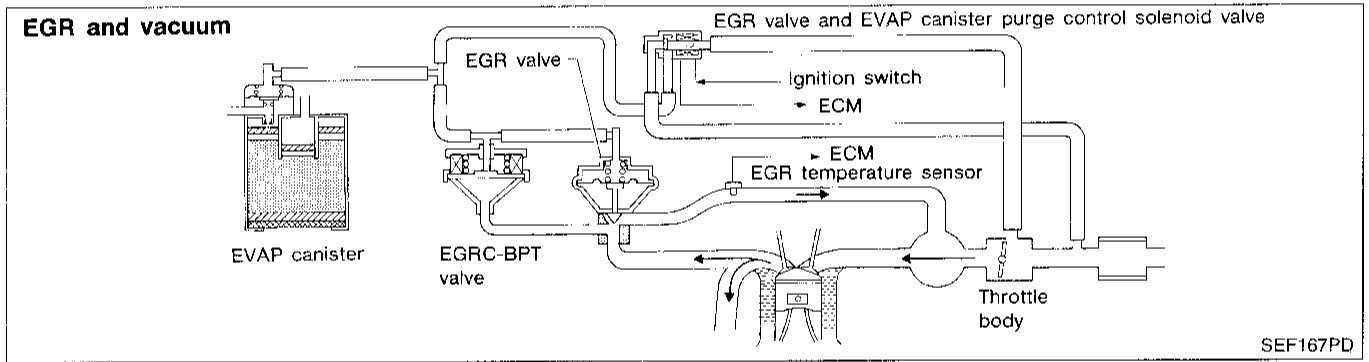
EGR Function (DTC: 0302)

SYSTEM DESCRIPTION



This system cuts and controls vacuum applied to the EGR valve and EVAP canister to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGR valve & EVAP canister purge 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 EVAP canister remain closed.

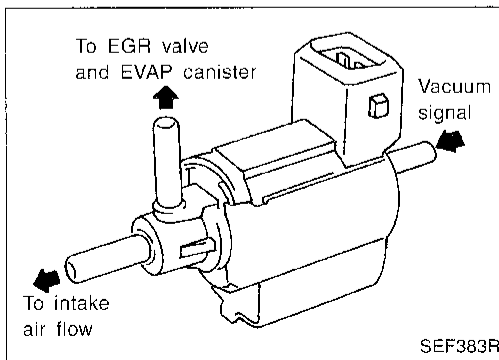
- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction



COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

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



EGR valve and EVAP canister purge control solenoid valve

The EGR valve and EVAP canister purge 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 EVAP 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 EVAP canister.

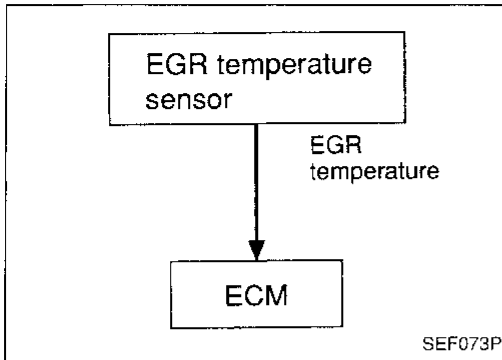
TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (DTC: 0302) (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)
P0400 0302	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 blocked ● EGRC-solenoid valve ● Tube leaking for EGR valve ● EGR temperature sensor
	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 ● EGR temperature sensor

OVERALL FUNCTION CHECK

Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

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 "Procedure for malfunction A".

If the engine coolant temperature is lower than 60°C (140°F), perform both "Procedure for malfunction A" and "Procedure for malfunction B".

If the 1st trip freeze frame data or the freeze frame data for another malfunction is stored in the ECM, perform both "Procedure for malfunction A" and "Procedure for malfunction B". In this case, check 1st trip DTCs and/or DTCs in the ECM and perform inspections one by one based on "INSPECTION PRIORITY", EC-82.

TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (DTC: 0302) (Cont'd)

Procedure for malfunction A

- 1) Start engine and warm it up sufficiently.
- 2) Check the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should lift up and down without sticking.

If EGR valve does not lift up and down, try again with either of the following methods:

- Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve OFF.

- Disconnect EGR valve and EVAP canister purge control solenoid valve harness connector. (The DTC for EGR valve and EVAP canister purge control solenoid valve will be displayed, however, ignore it.)

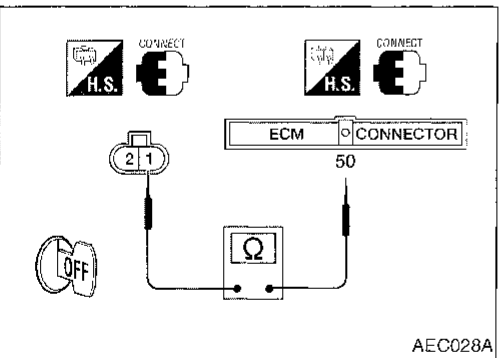
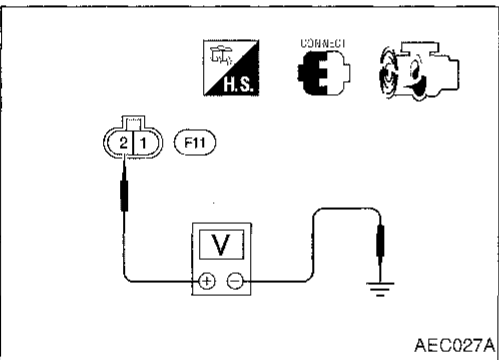
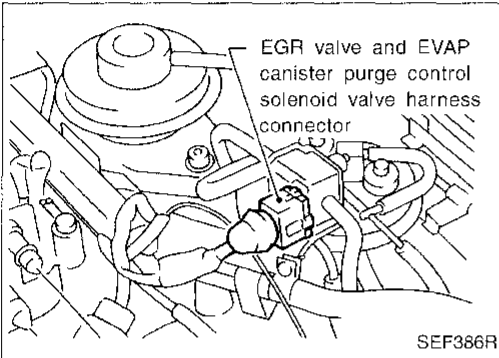
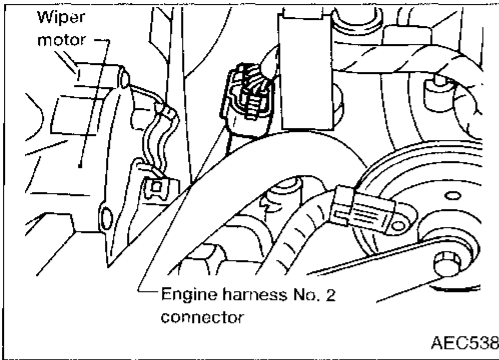
- 3) Check voltage between EGR temperature sensor harness connector terminal ② and ground at idle speed.

Less than 4.5V should exist.

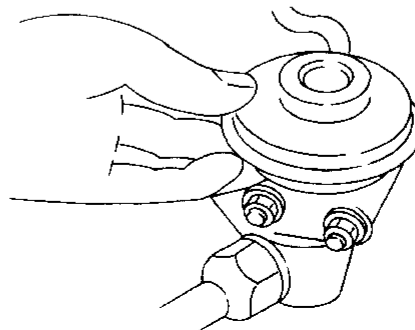
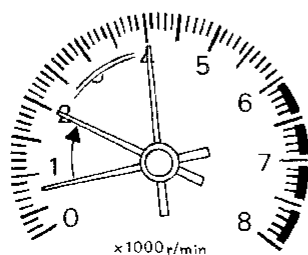
- 4) Turn ignition switch "OFF".
Check harness continuity between EGR temperature sensor harness connector terminal ① and ECM terminal ⑤0.

Continuity should exist.

- 5) Perform "COMPONENT CHECK", "EGR temperature sensor". (See page EC-218.)



Overall function check



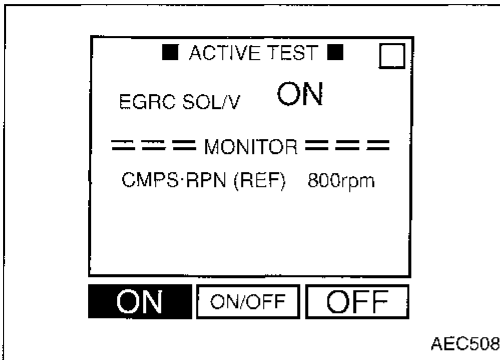
Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (DTC: 0302) (Cont'd)

Procedure for malfunction B



- 1) Start engine.
- 2) Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
- 3) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

OR

- 1) Turn ignition switch "ON".
- 2) Confirm the engine coolant temperature is lower than 60°C (140°F) in "Mode 1" with generic scan tool. Perform the following steps before its temperature becomes higher than 60°C (140°F).
- 3) Start engine.
- 4) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

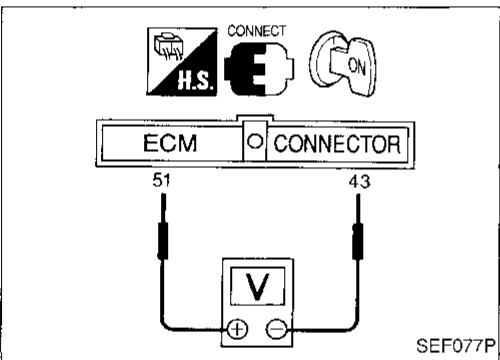
OR

FUEL SYS #1	OPEN
FUEL SYS #2	UNUSED
CALC LOAD	0%
COOLANT TEMP	28°C
SHORT FT #1	0%
LONG FT #1	0%
ENGINE SPD	0RPM
VEHICLE SPD	0km/h
IGN ADVANCE	5.0°
INTAKE AIR	25°C
MAF	0.0gm/sec
THROTTLE POS	0%
O2S LOCATION	3
O2S B1,S1	0.380V
O2FT B1,S1	0%
O2S B1,S2	0.000V

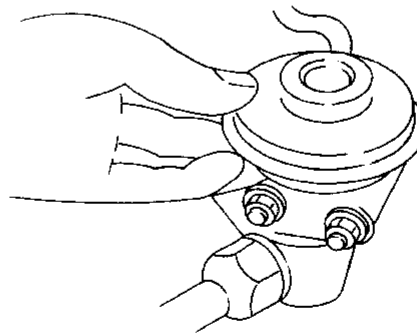
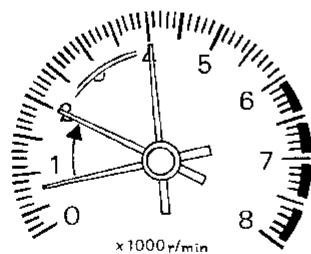
SEF950N

- 1) Turn ignition switch "ON".
- 2) Confirm the voltage between ECM terminal ⑤1 and ④3 is higher than 1.88V. Perform the following steps before the voltage becomes lower than 1.88V.
- 3) Start engine.
- 4) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.



Overall function check



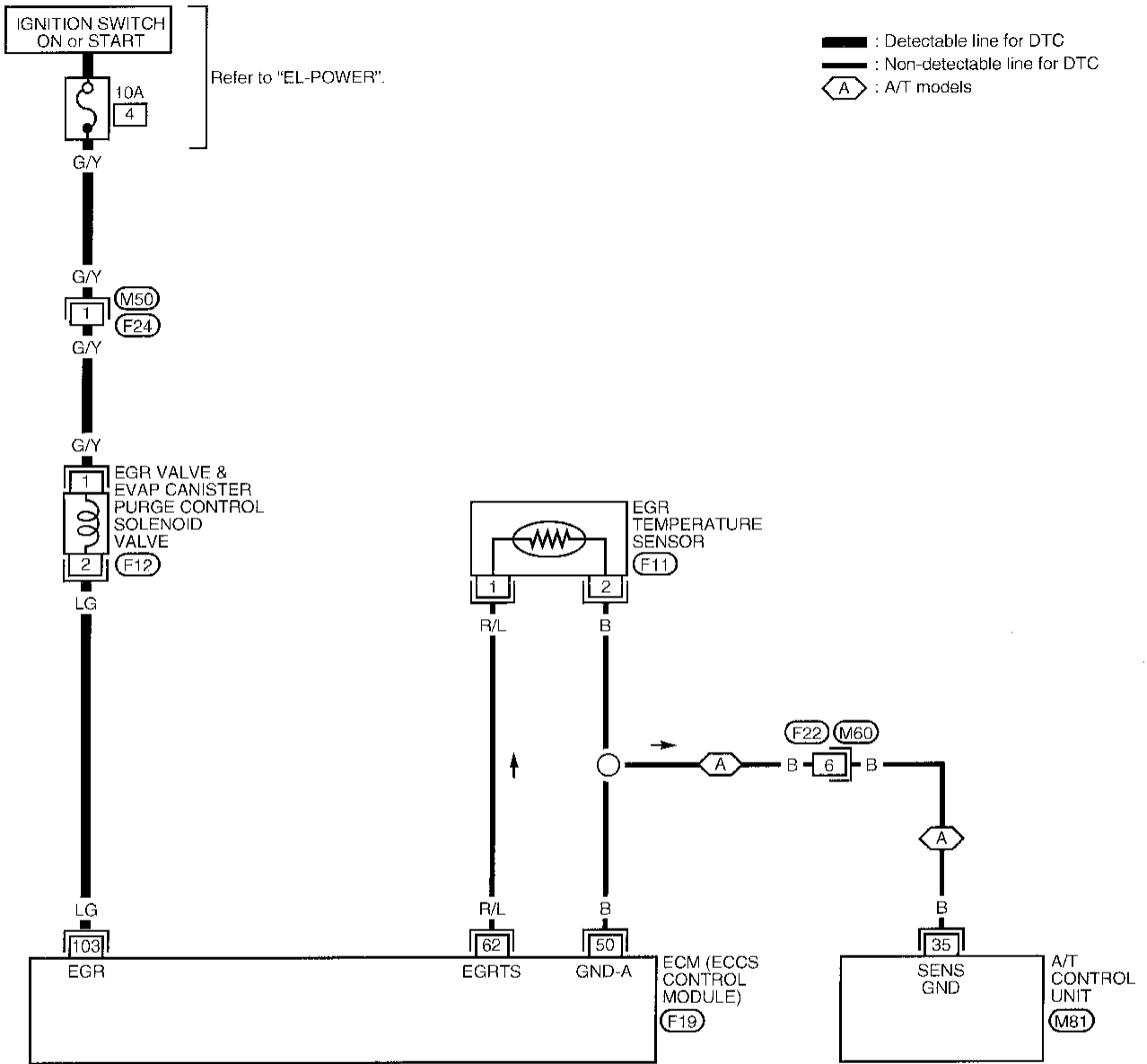
Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

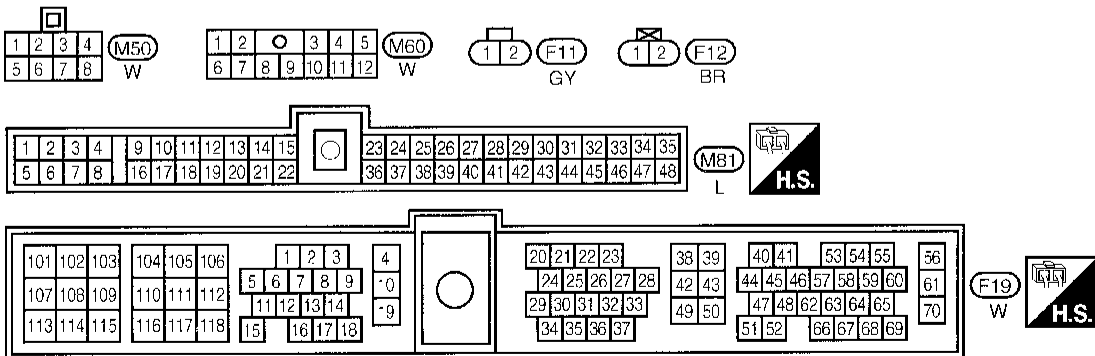
TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (DTC: 0302) (Cont'd)

EC-EGRC1-01



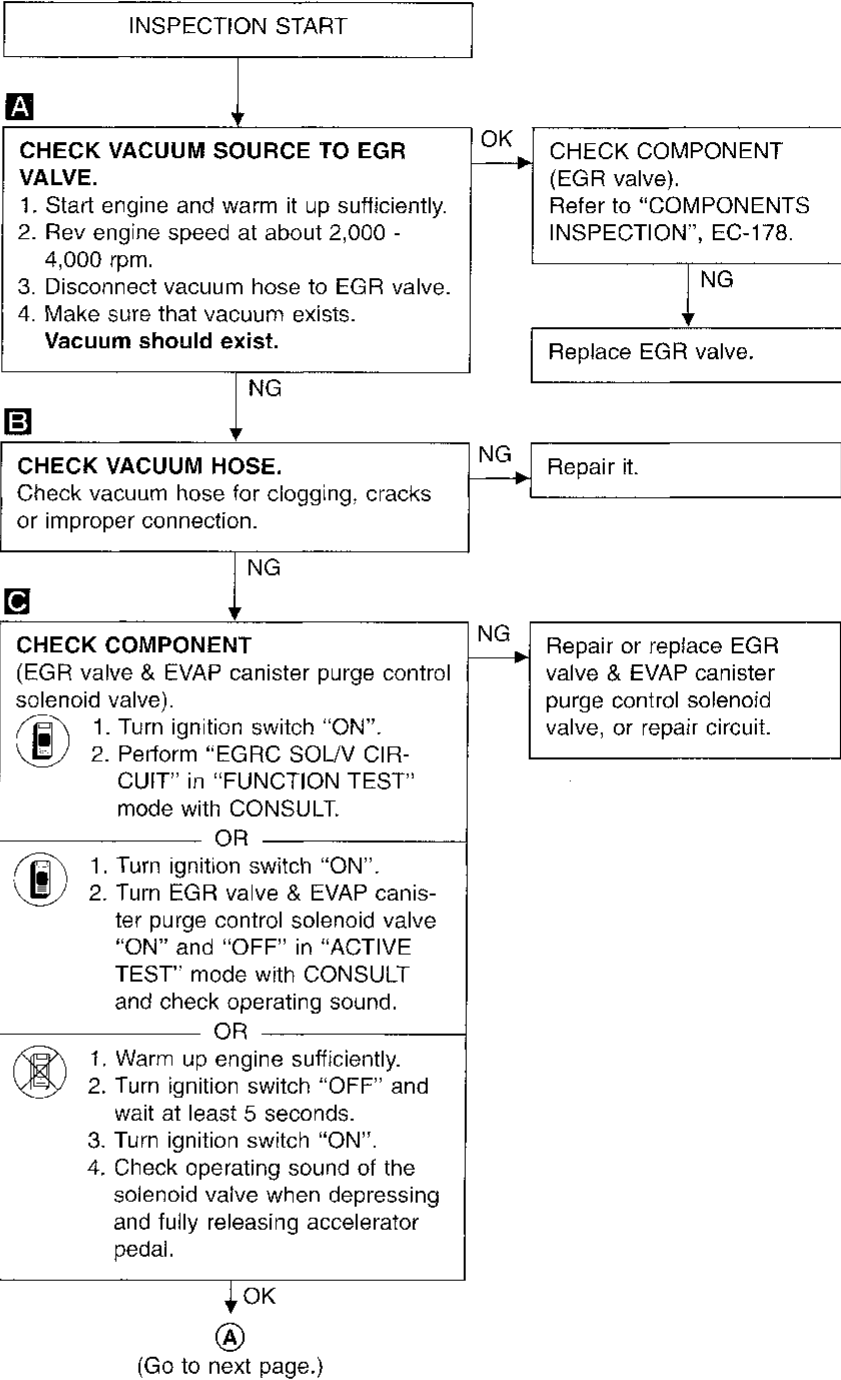
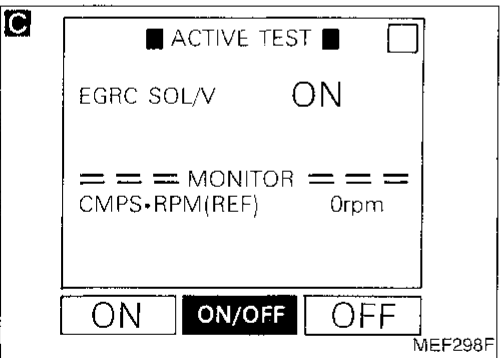
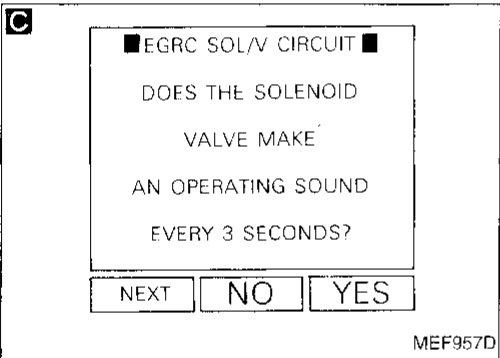
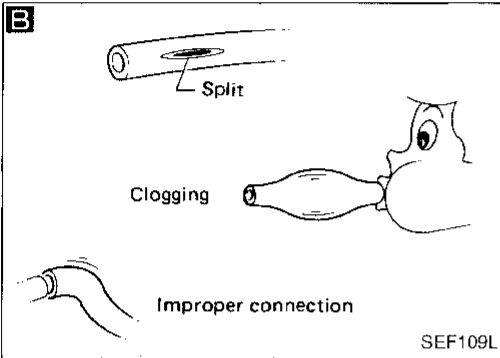
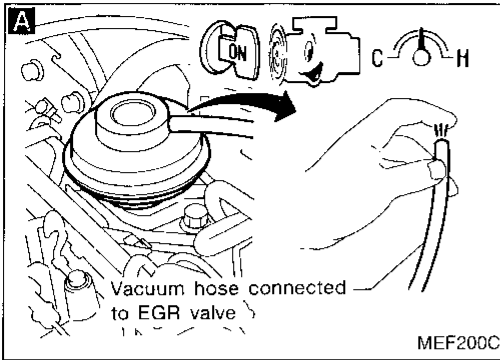
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TROUBLE DIAGNOSIS FOR DTC P0400

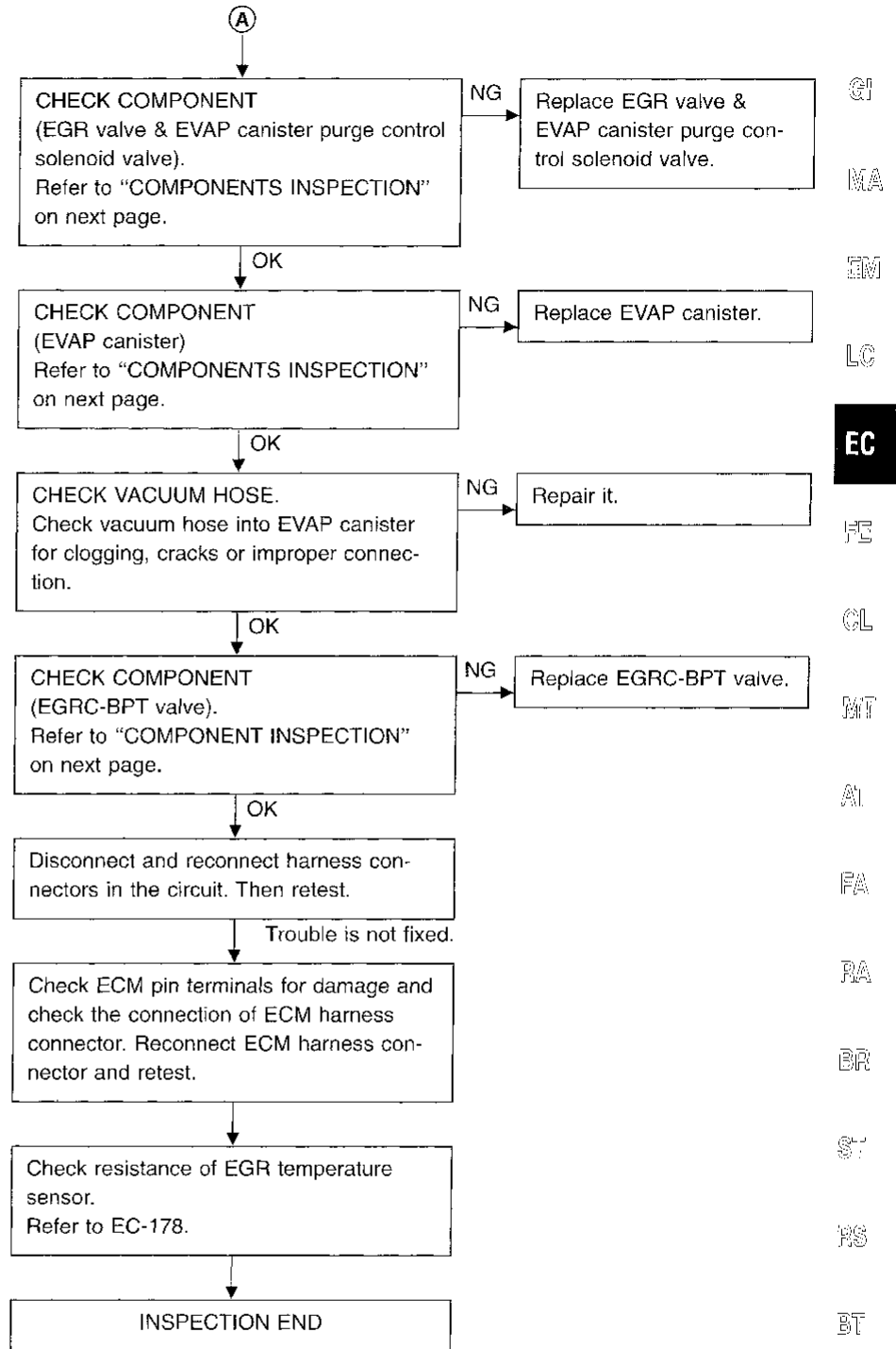
EGR Function (DTC: 0302) (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (DTC: 0302) (Cont'd)



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TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (DTC: 0302) (Cont'd)

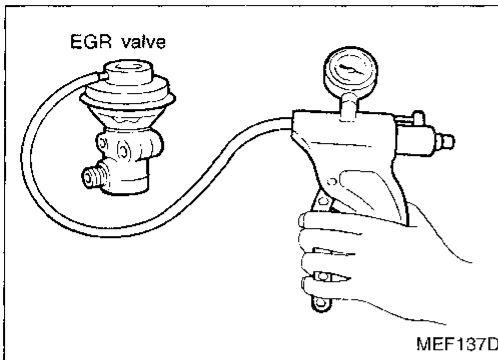
COMPONENTS INSPECTION

EGR valve

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

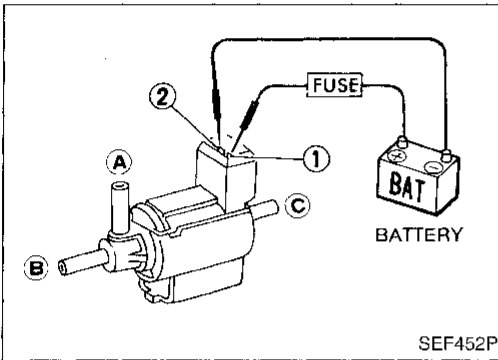
EGR valve spring should lift.

If NG, replace EGR valve.



EGR valve & EVAP canister purge control solenoid valve

Check solenoid valve, following the table as shown below:



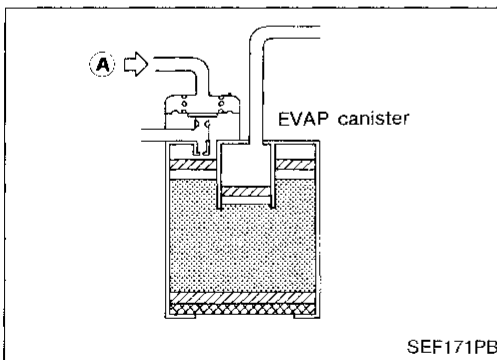
Conditions	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

If NG, replace EGR valve & EVAP canister purge control solenoid valve.

EVAP canister

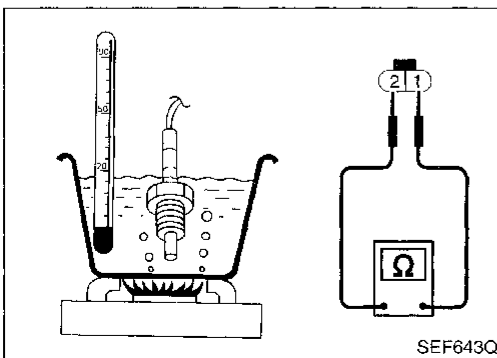
Gently blow air from (A).

No leakage should exist.



EGR temperature sensor

Check resistance change and resistance value.



EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

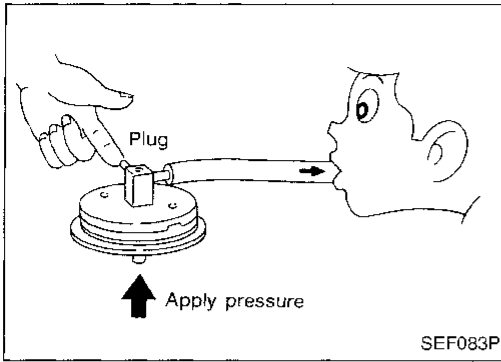
If NG, replace EGR temperature sensor.

TROUBLE DIAGNOSIS FOR DTC P0400

EGR Function (DTC: 0302) (Cont'd)

EGRC-BPT valve

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



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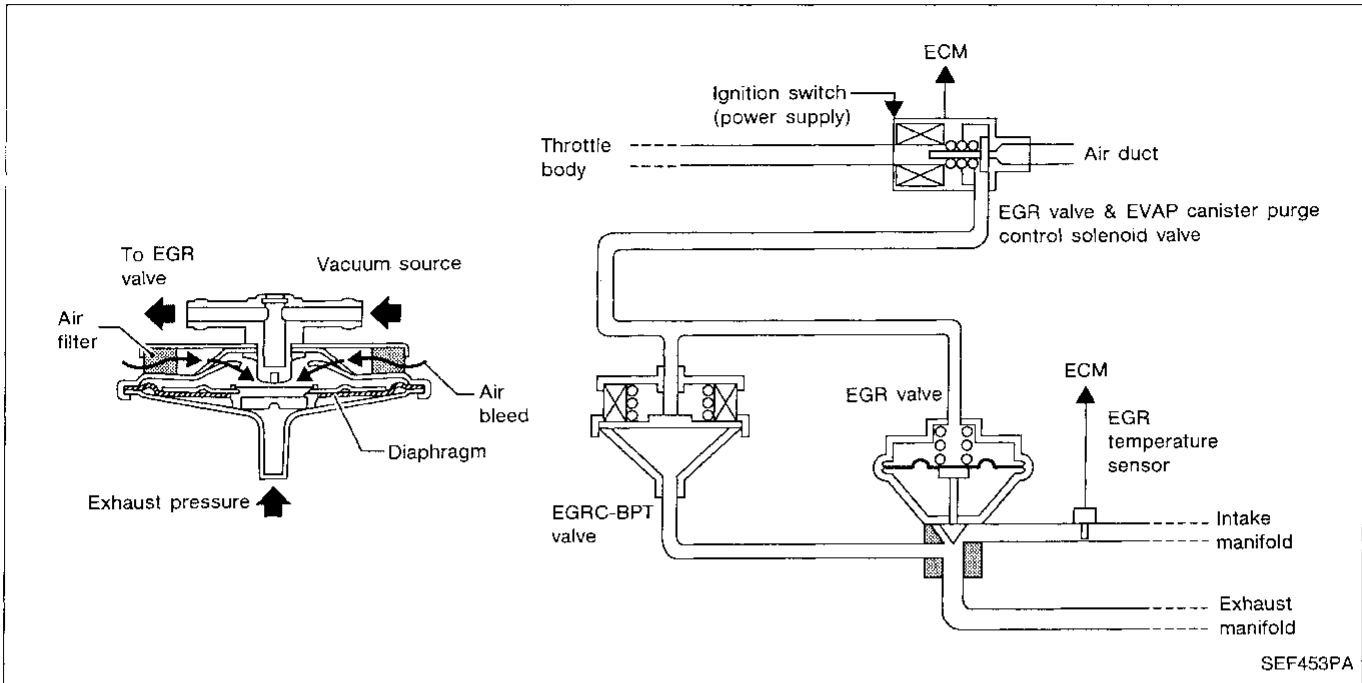
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EGRC-BPT Valve Function (DTC: 0306)



SYSTEM DESCRIPTION

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

ON BOARD DIAGNOSIS LOGIC

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGR valve & EVAP canister purge 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)
P0402 0306	<ul style="list-style-type: none"> ● The EGRC-BPT valve does not operate properly. 	<ul style="list-style-type: none"> ● EGRC-BPT valve ● Mismatched rubber tube ● Blocked rubber tube

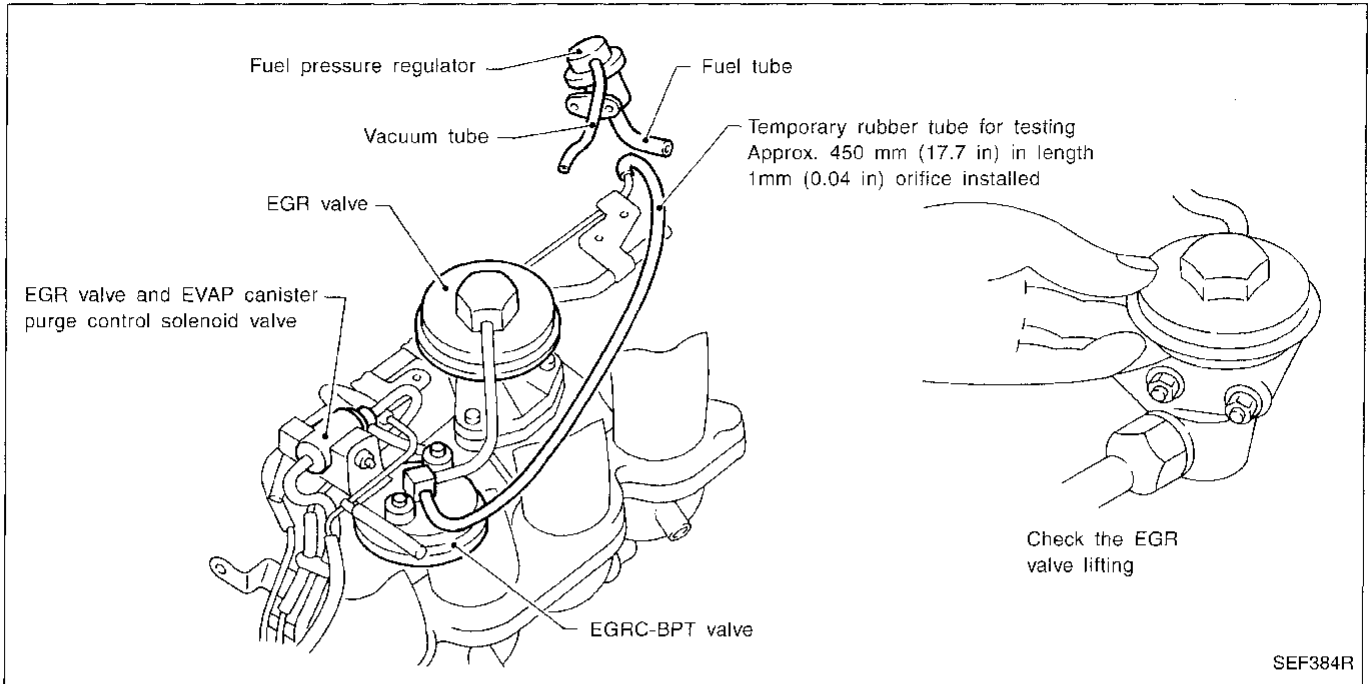
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a DTC might not be confirmed.

1. Disconnect the rubber tube to the fuel pressure regulator at the intake manifold.
2. Disconnect the rubber tube to the EGR valve & EVAP canister purge control solenoid valve at the EGRC-BPT valve.
Connect the intake manifold and the EGRC-BPT valve with a rubber tube that has 1 mm (0.04 in) dia. orifice installed. (The intake manifold vacuum will be directly applied to the EGRC-BPT valve.)
3. Start engine.
4. Check for the EGR valve lifting with engine at less than 1,500 rpm under no load.
EGR valve should remain closed.
5. Check the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.
EGR valve should lift up, and go down without sticking when the engine is returned to idle.
6. Check rubber tube between EGR valve & EVAP canister purge control solenoid valve and throttle body for misconnection, cracks or blockages.

TROUBLE DIAGNOSIS FOR DTC P0402

EGRC-BPT Valve Function (DTC: 0306) (Cont'd)



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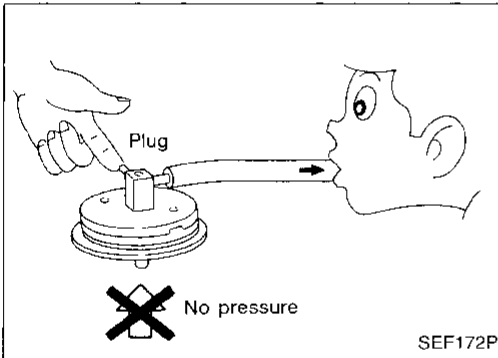
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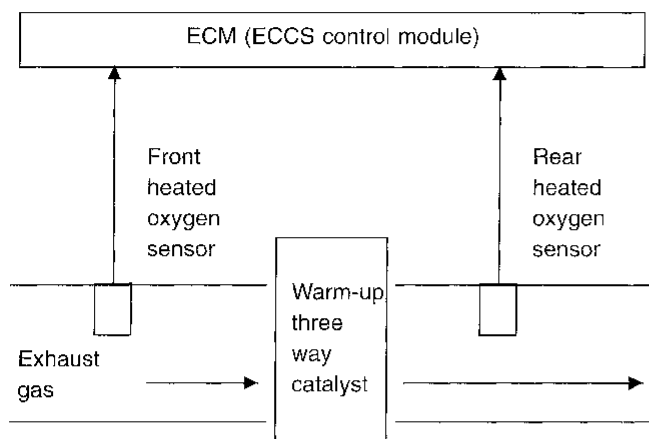
COMPONENT INSPECTION

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 EGR-BPT valve.
Leakage should exist.

Three Way Catalyst Function (DTC: 0702)

ON BOARD DIAGNOSIS LOGIC



The ECM monitors the switching frequency ratio of front heated oxygen sensor and rear heated oxygen sensor.

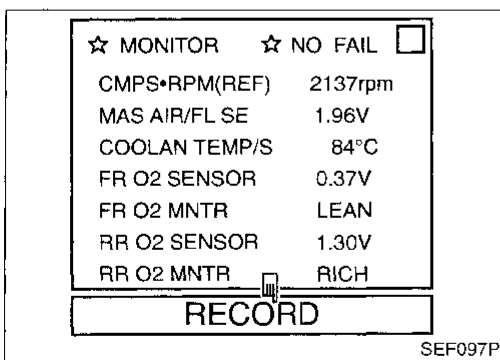
A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.

When the frequency ratio of front heated oxygen sensor and rear heated oxygen sensor approaches a specified limit value the warm-up three way catalyst malfunction is diagnosed.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702	<ul style="list-style-type: none"> ● Warm-up three way catalyst does not operate properly. ● Warm-up three way catalyst does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> ● Warm-up three way catalyst ● Exhaust tube ● Intake air leak ● Injectors ● Injector leak

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.



- 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 =

Rear heated oxygen sensor switching frequency

Front heated oxygen sensor switching frequency

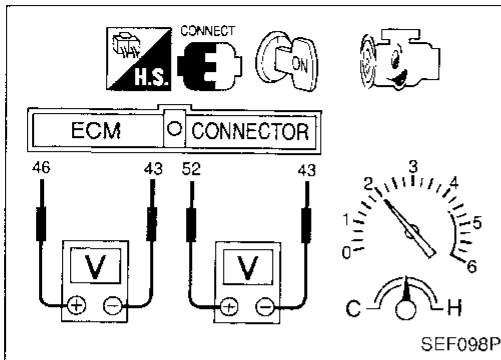
This ratio should be less than 0.7.

If the ratio is greater than 0.7 the warm-up three way catalyst is not operating properly.

OR

TROUBLE DIAGNOSIS FOR DTC P0420

Three Way Catalyst Function (DTC: 0702) (Cont'd)



- 1) Start engine and warm it up sufficiently.
- 2) Set voltmeter 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 ⑤② and ④③ is very less than that of ECM terminals ④⑥ 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 0.7.

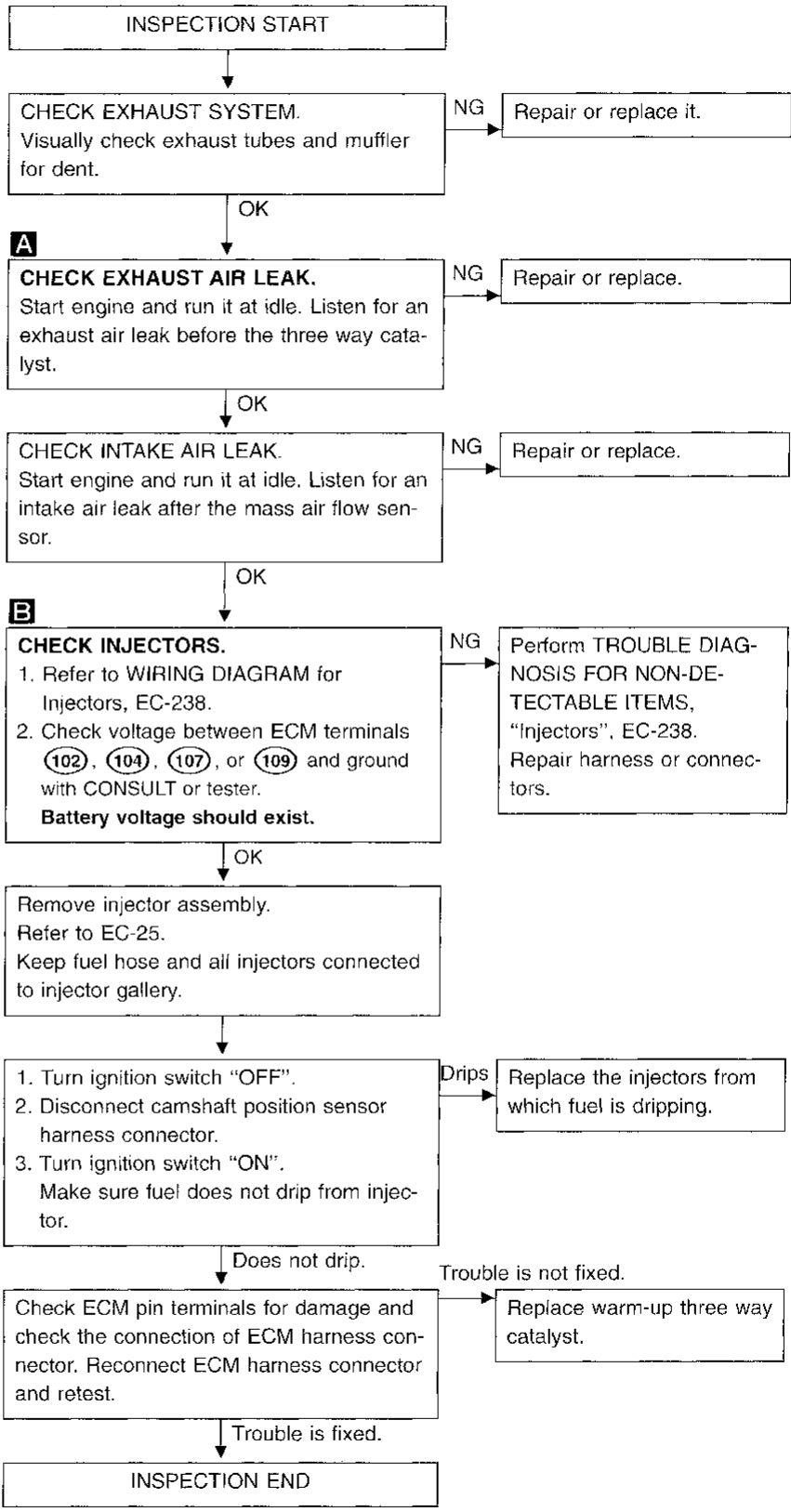
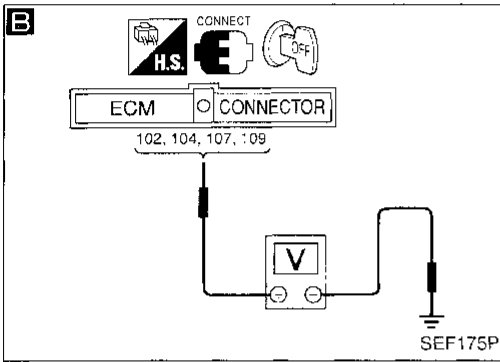
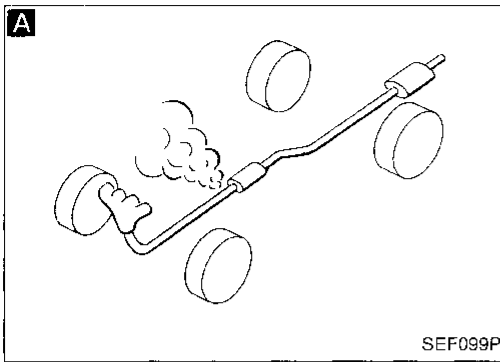
If the ratio is greater than 0.7, it means warm-up three way catalyst does not operate properly.

Note: If the voltage at terminal ④⑥ does not switch periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC P0130 (Front heated oxygen sensor) first. (See page EC-127.)

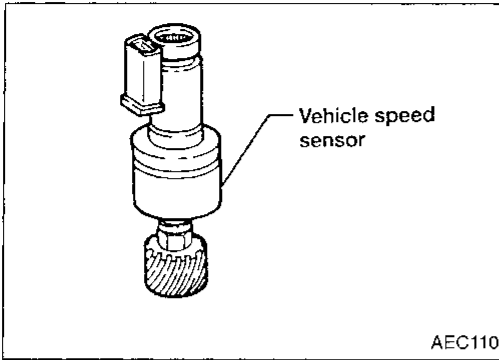
TROUBLE DIAGNOSIS FOR DTC P0420

Three Way Catalyst Function (DTC: 0702) (Cont'd)

DIAGNOSTIC PROCEDURE



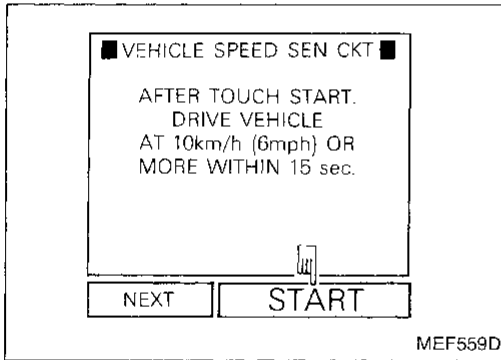
TROUBLE DIAGNOSIS FOR DTC P0500



Vehicle Speed Sensor (VSS) (DTC: 0104)

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)
P0500 0104	<ul style="list-style-type: none"> The almost 0 km/h (0 MPH) signal from the vehicle speed sensor is sent to ECM even when the vehicle is driving. 	<ul style="list-style-type: none"> Harness or connector (The vehicle speed sensor circuit is open or shorted.) Vehicle speed sensor



OVERALL FUNCTION CHECK

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

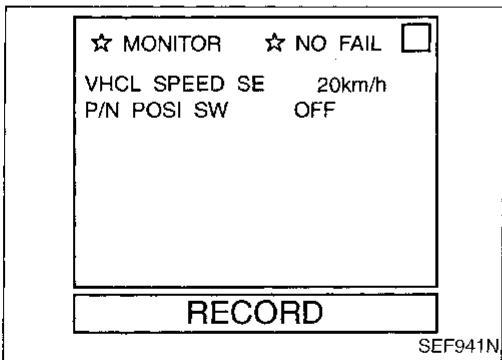
- 1) Jack up drive wheels.
- 2) Start engine.
- 3) Perform "VEHICLE SPEED SEN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

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



TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (DTC: 0104) (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 CONFIRMATION PROCEDURE



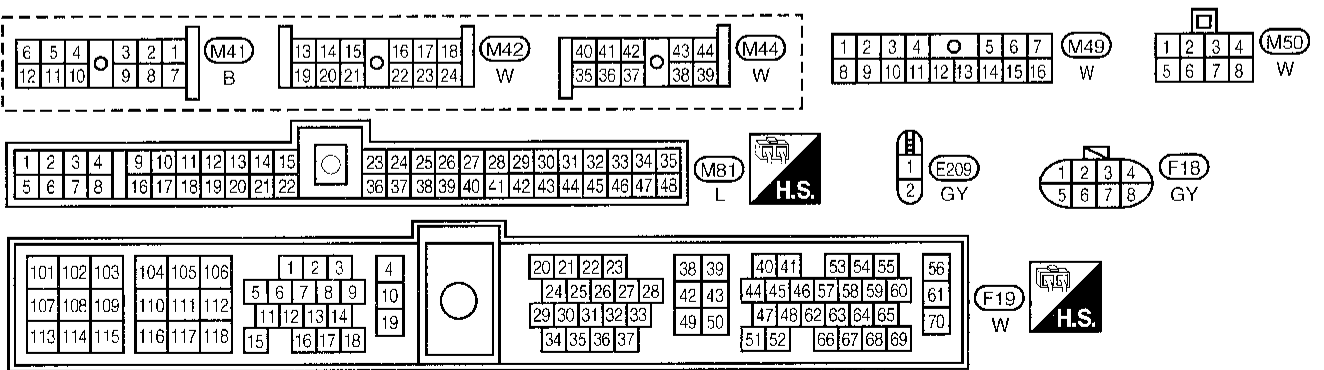
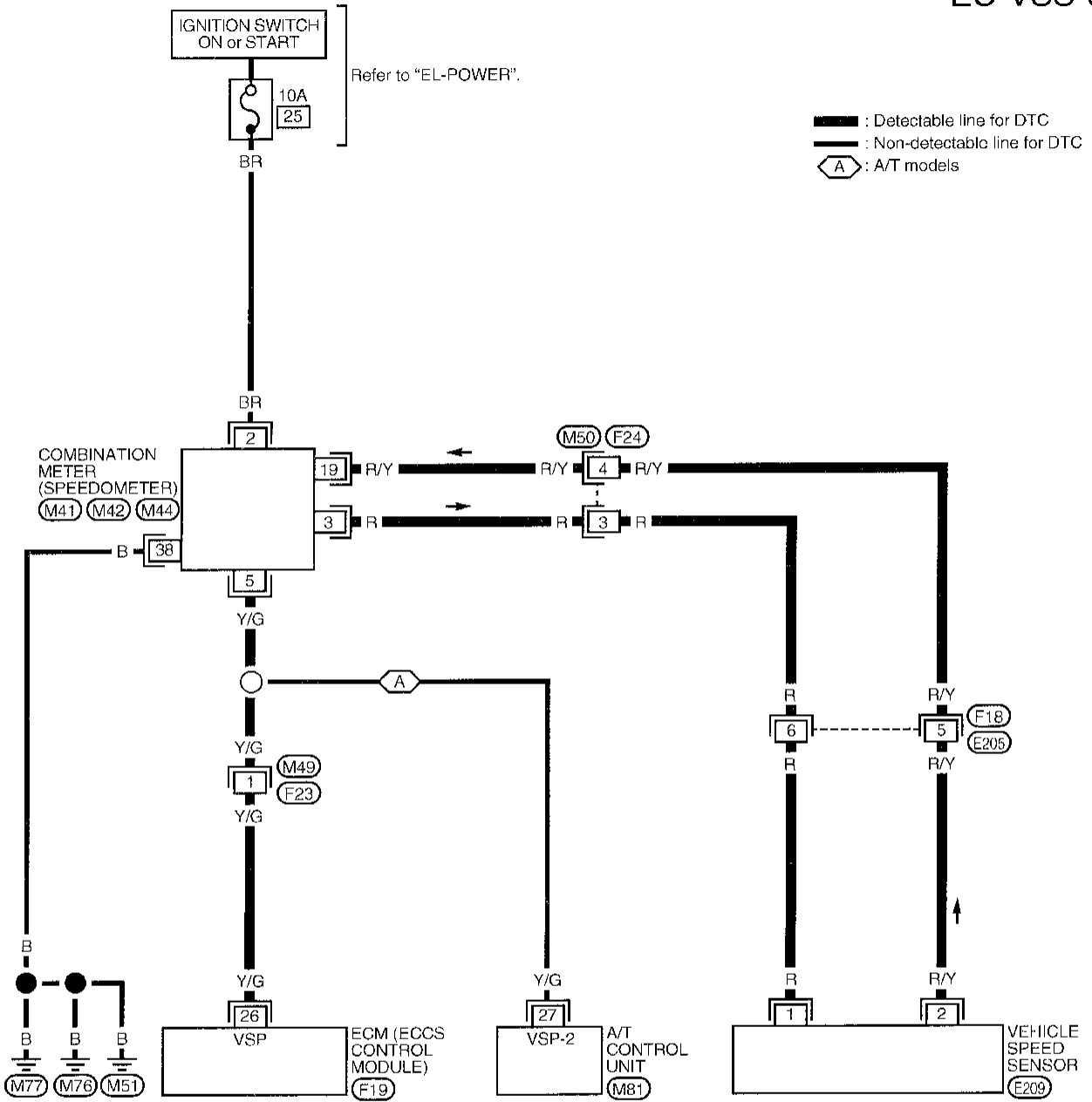
- 1) Start engine and warm it up sufficiently.
- 2) Perform test drive for at least 10 seconds continuously under the following recommended conditions.
 - Engine speed : (A/T models) 1,800 - 3,200 rpm
(M/T models) 1,700 - 3,600 rpm
 - Intake manifold vacuum: (A/T models) -46.7 to -20.0 kPa
(-350 to -150 mmHg, -13.78 to -5.91 inHg)
(M/T models) -46.7 to -33.3 kPa
(-350 to -250 mmHg, -13.78 to -9.84 inHg)
 - Gear position : Suitable position (except "N" or "P" position)
- 3) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Even though 1st trip DTC is not detected, perform the above test drive at least one more time.

TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (DTC: 0104) (Cont'd)

EC-VSS-01

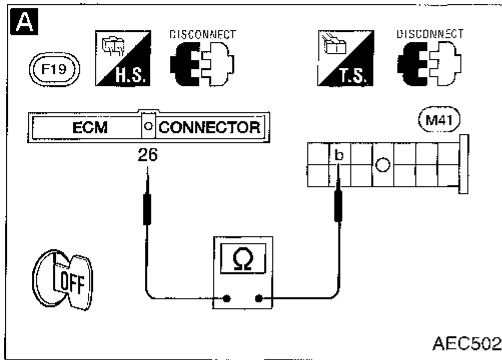


TROUBLE DIAGNOSIS FOR DTC P0500

Vehicle Speed Sensor (VSS) (DTC: 0104)

(Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK INPUT SIGNAL CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector and combination meter harness connector.
 3. Check harness continuity between ECM terminal (26) and terminal (b).
Continuity should exist.
 If OK, check harness for short.

NG
 Check the following.
 ● Harness connectors (F23), (M49)
 ● Harness for open or short between ECM and combination meter
 If NG, repair harness or connectors.

OK

CHECK SPEEDOMETER FUNCTION.
 Make sure that speedometer functions properly.

NG
 Check the following.
 ● Harness connectors (M50), (F24)
 ● Harness connectors (F18), (E205)
 ● Harness for open or short between combination meter and vehicle speed sensor.
 If NG, repair harness or connectors.
 Check vehicle speed sensor and its circuit.
 (Refer to EL section.)

OK

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

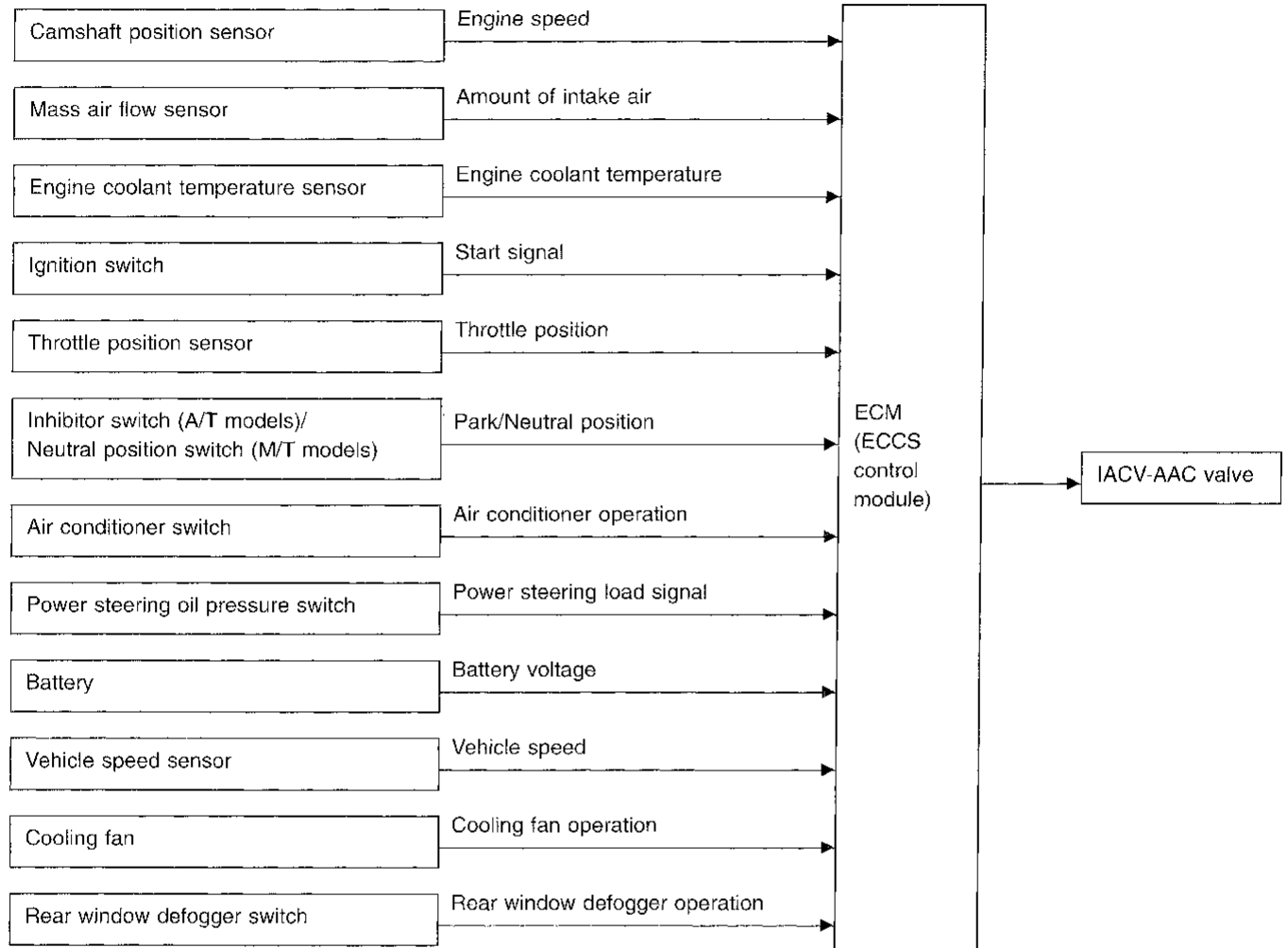
Trouble is not fixed.

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

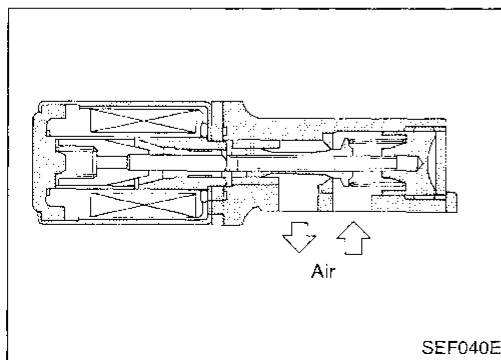
INSPECTION END

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205)

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

IACV-ACC valve

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

TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0505 0205	A) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is open.) ● IACV-AAC valve
	B) The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is shorted.) ● IACV-AAC valve

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Procedure for malfunction A



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

OR



- 1) Start engine and run it at idle for at least 2 seconds.
- 2) Select "MODE 7" with GST.

OR



- 1) Start engine and run it at idle for at least 2 seconds.
- 2) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Procedure for malfunction B



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
- 4) Start engine and run it for at least 30 seconds at idle speed.

OR



- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine again and run it for at least 30 seconds at idle speed.
- 4) Select "MODE 7" with GST.

OR



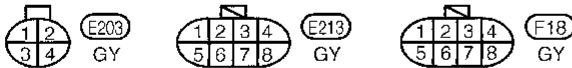
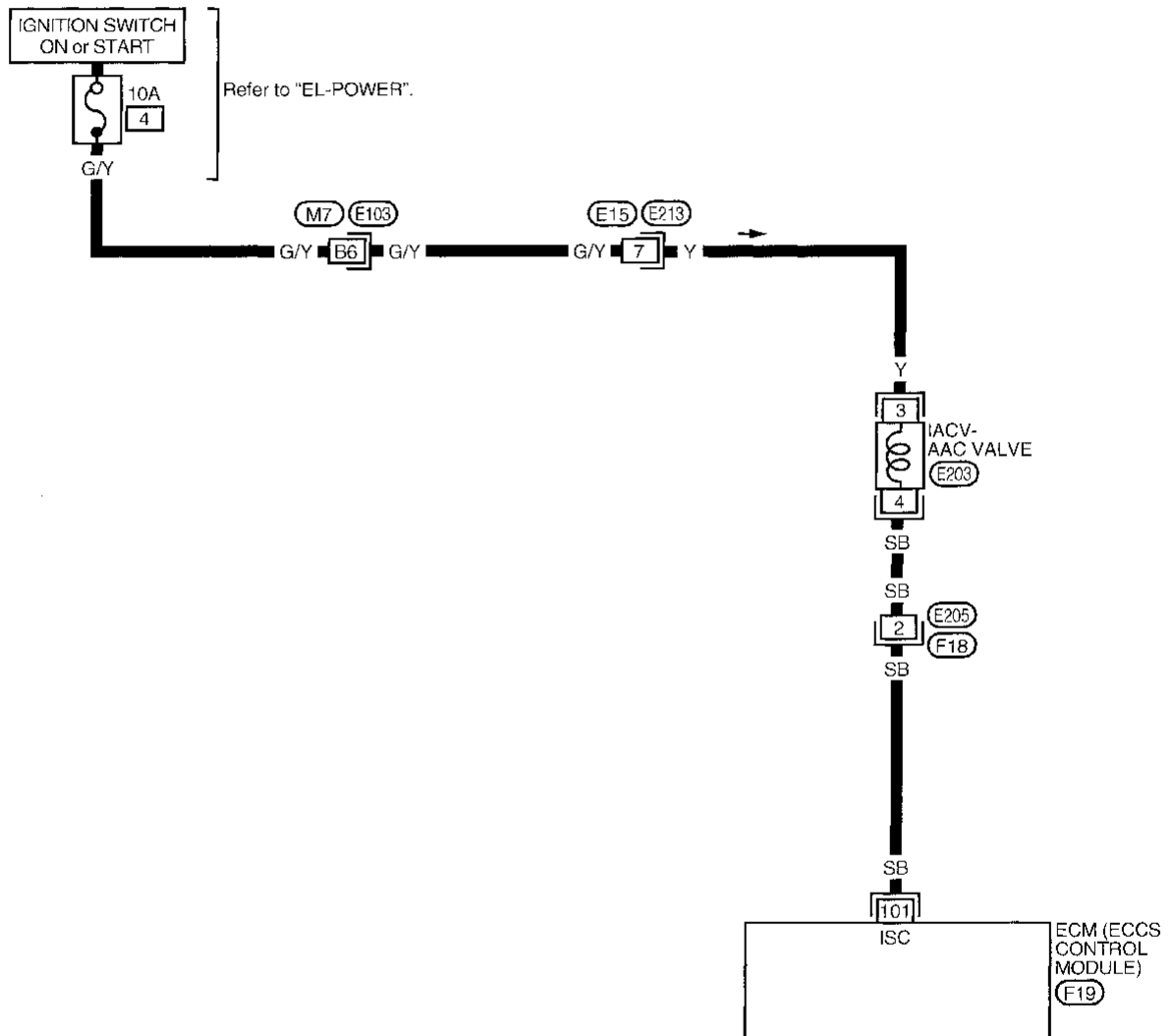
- 1) Start engine and warm it up sufficiently.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Start engine again and run it for at least 30 seconds at idle speed.
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic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

TROUBLE DIAGNOSIS FOR DTC P0505

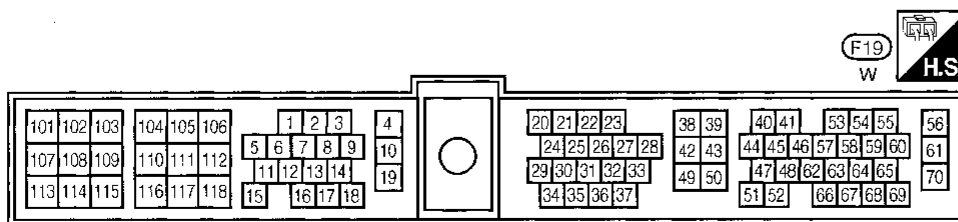
Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205) (Cont'd)

EC-AAC/V-01

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

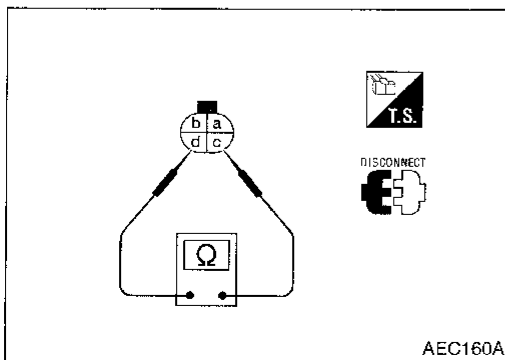
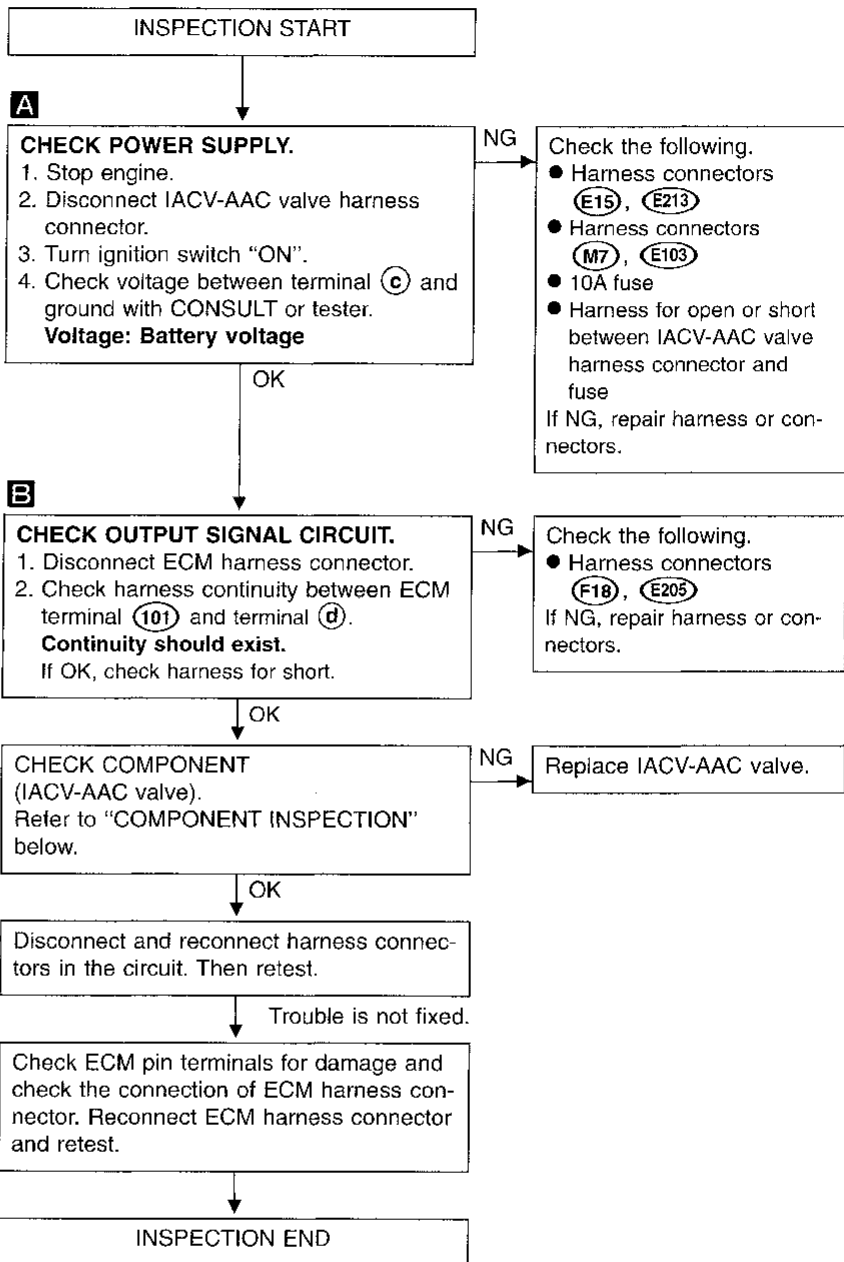
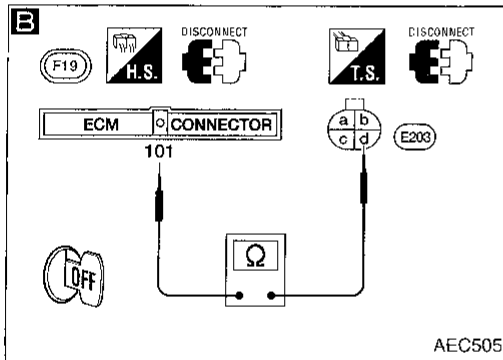
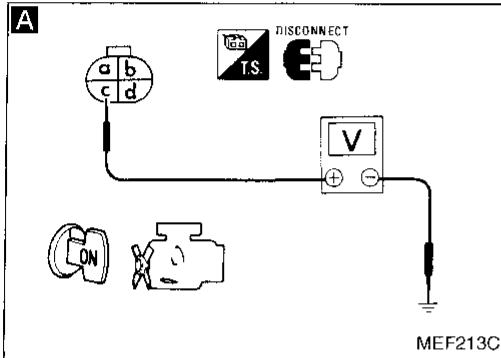
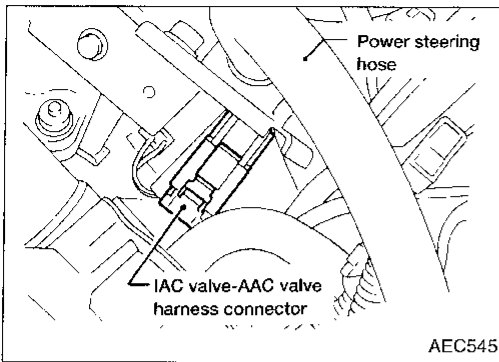


Refer to last page (Foldout page).



TROUBLE DIAGNOSIS FOR DTC P0505

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205) (Cont'd) DIAGNOSTIC PROCEDURE



COMPONENT INSPECTION

IACV-AAC valve

Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.

Resistance:

Approximately 10Ω at 25°C (77°F)

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

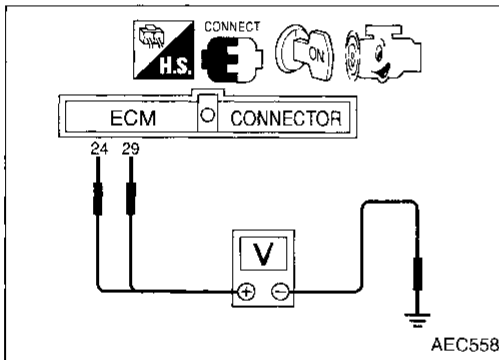
TROUBLE DIAGNOSIS FOR DTC P0600

A/T Control

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 CONFIRMATION PROCEDURE

- 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 at least 40 seconds.

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the A/T control. During this check, a 1st trip DTC might not be confirmed.




- 1) Turn ignition switch "ON".
- 2) Start engine.
- 3) Check voltage between
 - ECM terminal 24 and ground.
 - ECM terminal 29 and ground.

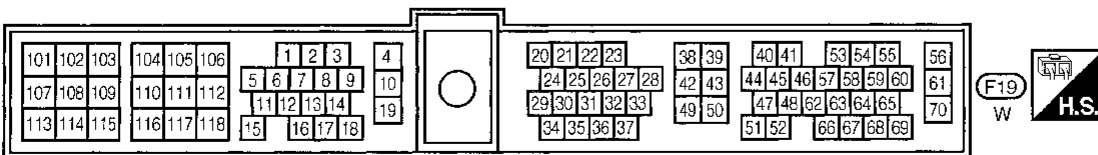
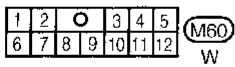
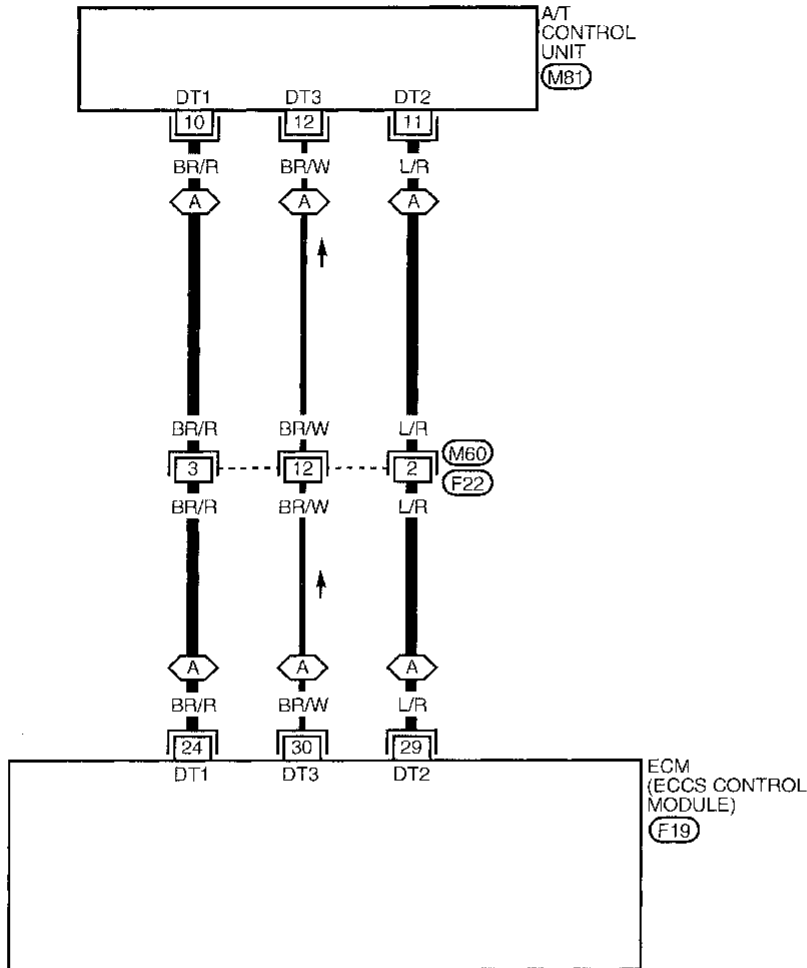
Voltage: Approximately 7V

TROUBLE DIAGNOSIS FOR DTC P0600

A/T Control (Cont'd)

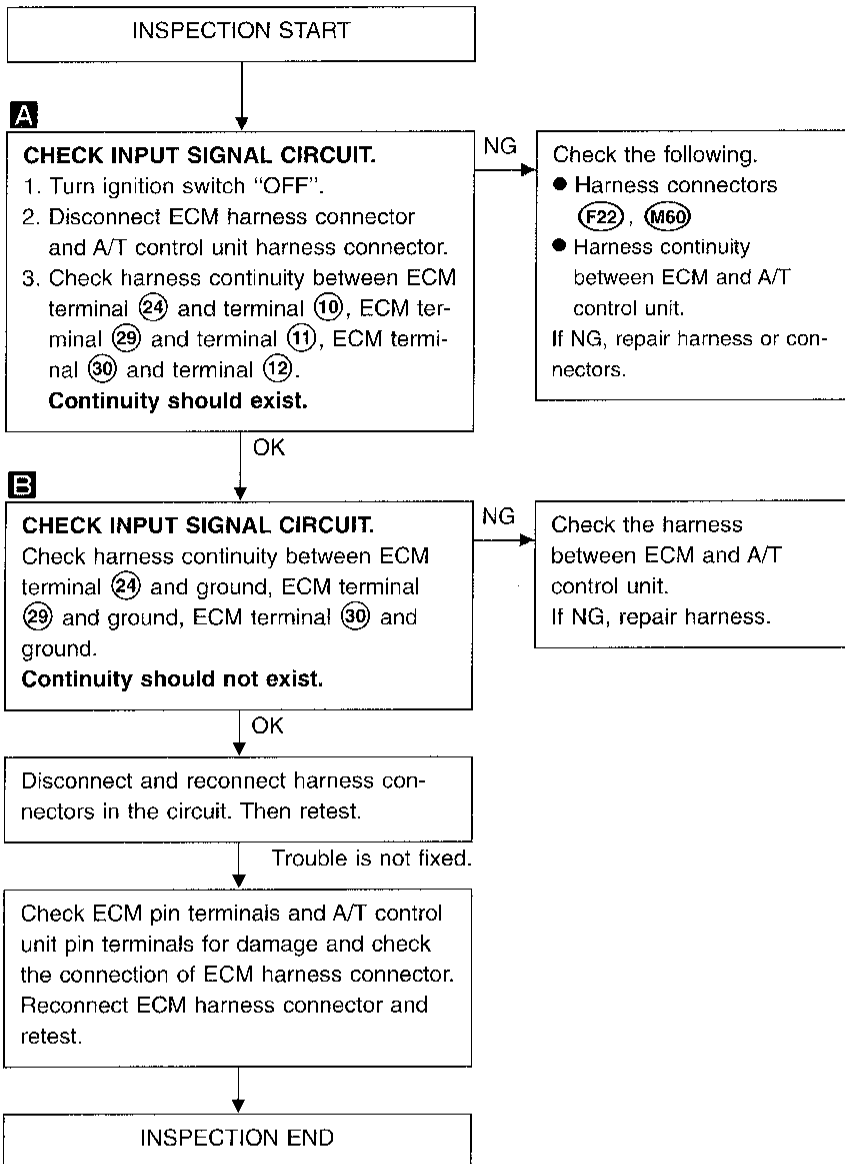
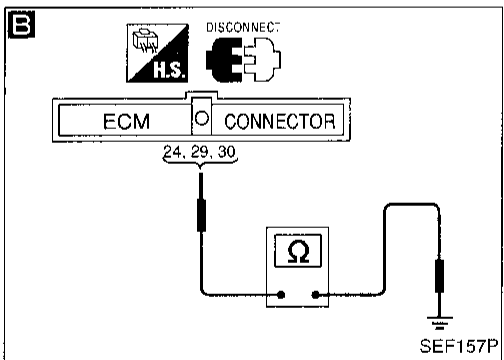
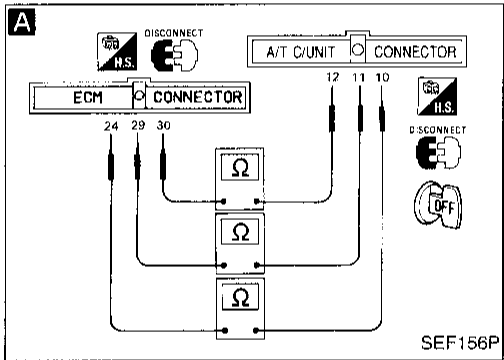
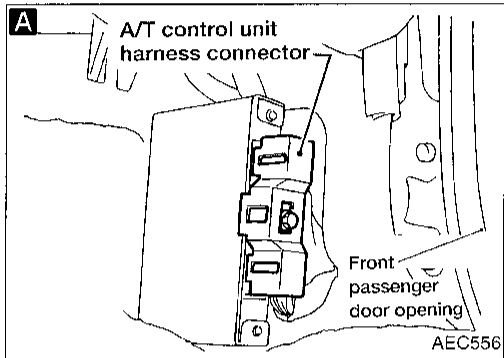
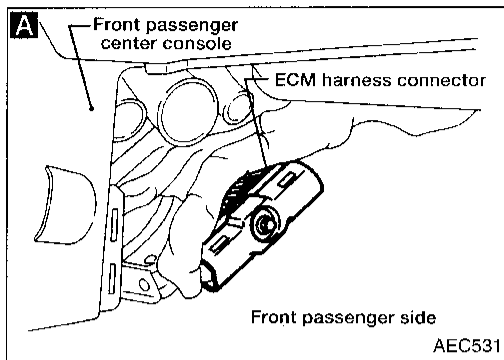
EC-AT/C-01

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



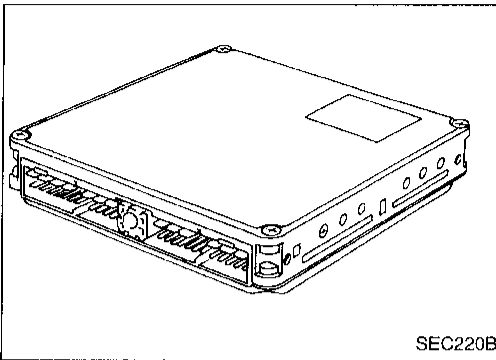
TROUBLE DIAGNOSIS FOR DTC P0600

A/T Control (Cont'd) DIAGNOSTIC PROCEDURE



GI
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TROUBLE DIAGNOSIS FOR DTC P0605



Engine Control Module (ECM)-ECCS Control Module (DTC: 0301)

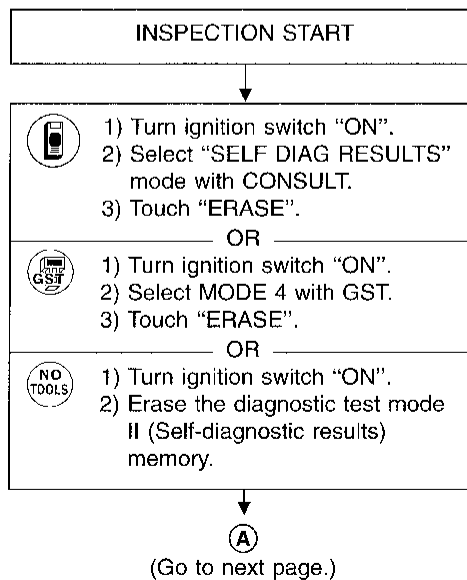
The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0605 0301	● ECM calculation function is malfunctioning.	● ECM (ECCS control module)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

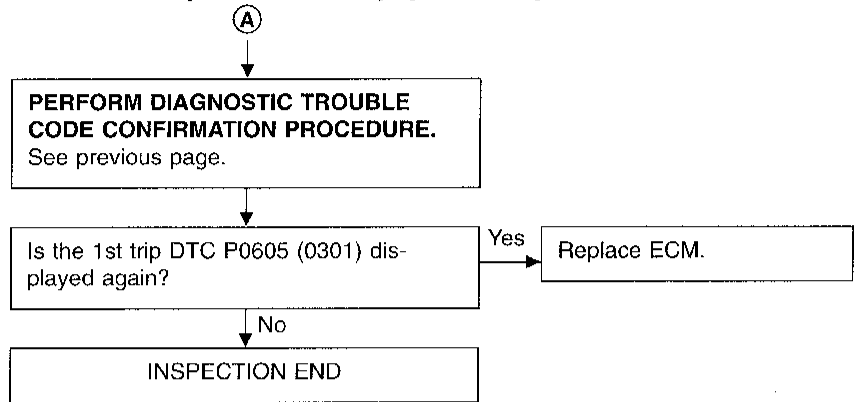
- 1) Turn ignition switch "ON".
 - 2) Select "DATA MONITOR" mode with CONSULT.
 - 3) Start engine.
 - 4) Run engine for at least 30 seconds at idle speed.
- OR
- 1) Turn ignition switch "ON".
 - 2) Select "Mode 7" with GST.
 - 3) Start engine.
 - 4) Run engine for at least 30 seconds at idle speed.
- OR
- 1) Turn ignition switch "ON".
 - 2) Start engine and wait at least 30 seconds.
 - 3) Turn ignition switch "OFF" and wait at least 5 seconds.
 - 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P0605

Engine Control Module (ECM)-ECCS Control Module (DTC: 0301) (Cont'd)



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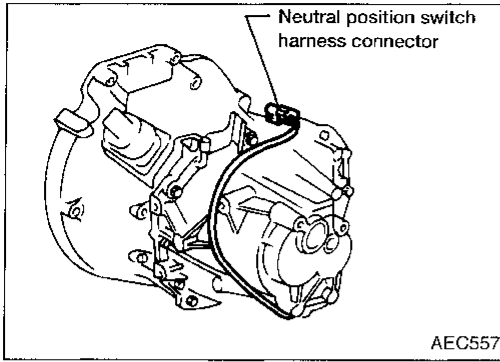
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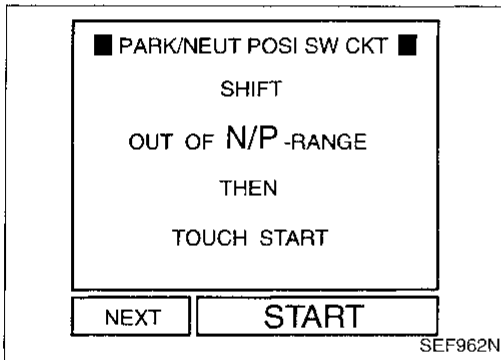
TROUBLE DIAGNOSIS FOR DTC P0705



Park/Neutral Position Switch (DTC: 1003)

When the gear position is "P" (A/T models only) or "N", park/neutral position switch is "ON".
ECM detects the park/neutral position when continuity with ground exists.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0705 1003	<ul style="list-style-type: none"> The signal of the park/neutral position switch is not changed in the process of engine starting and driving. 	<ul style="list-style-type: none"> Harness or connectors (The 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

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

- 1) Turn ignition switch "ON".
- 2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

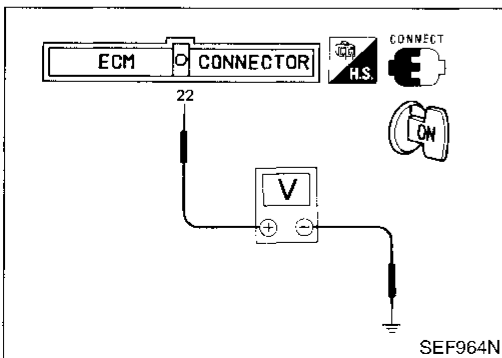
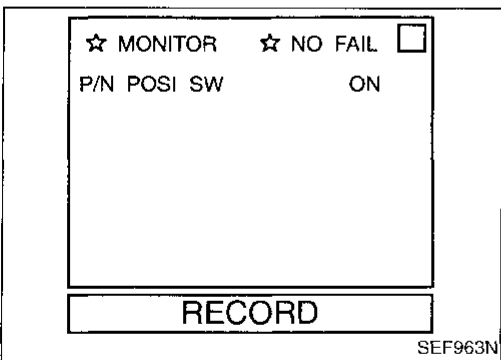
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
- 3) Check the "P/N POSI SW" signal under the following conditions.

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

OR

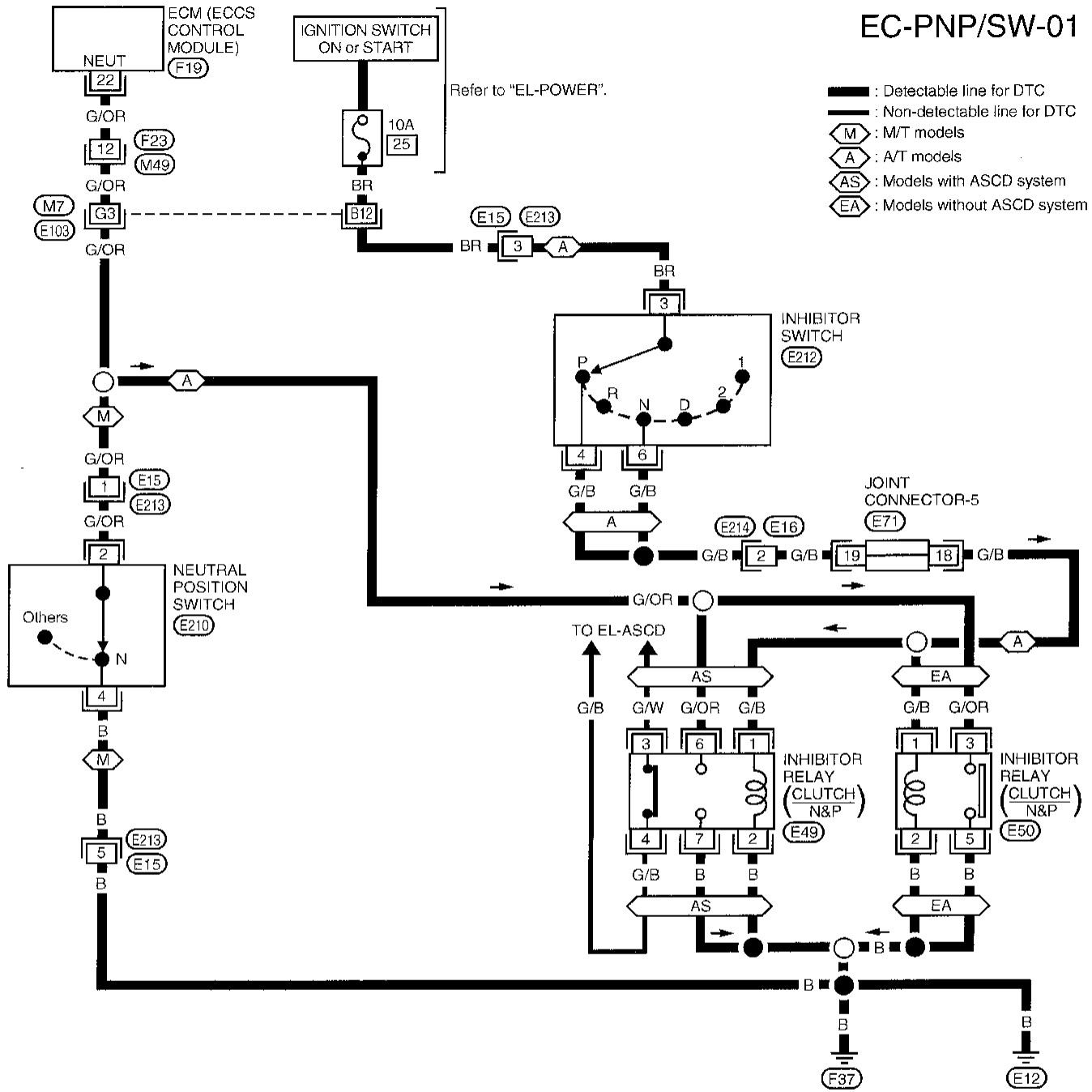
- 1) Turn ignition switch "ON".
- 2) Check voltage between ECM terminal ② and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"P" (A/T only) and "N" position	Approx. 0
Except the above position	Approx. 5

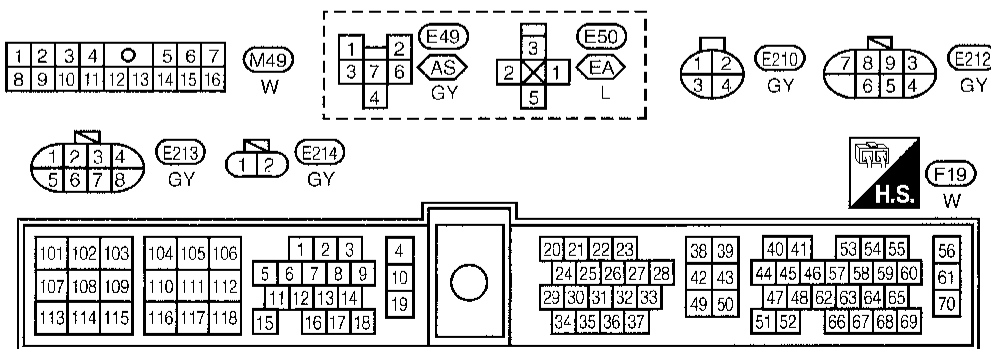


TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (DTC: 1003) (Cont'd)



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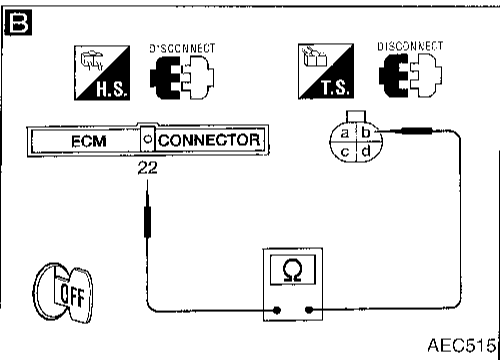
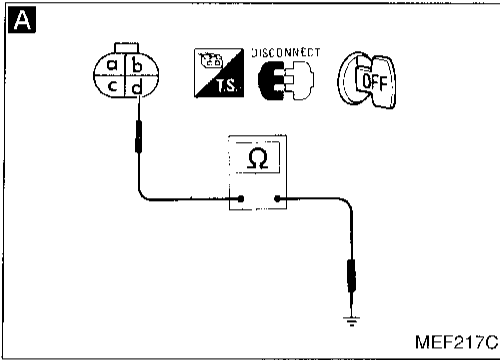
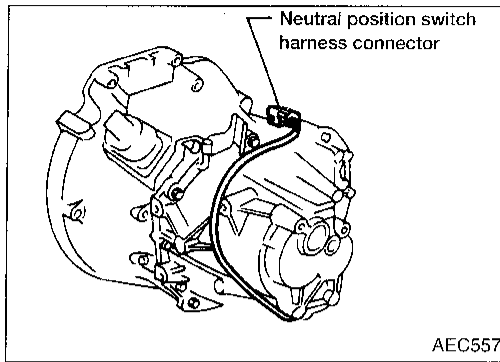


HA
EL
IDX

TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (DTC: 1003) (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 (d) and body ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
● Harness connectors (E213), (E15)
● Harness for open or short between neutral position switch and body ground
If NG, repair harness or connectors.

B
CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (22) and terminal (b).
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
● Harness connectors (F23), (M49)
● Harness connectors (E15), (E213)
● Harness connectors (M7), (E103)
● Harness for open or short between ECM and neutral position switch
If NG, repair harness or connectors.

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

NG → Replace neutral position switch.

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

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

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (DTC: 1003) (Cont'd)

C

■ NEUTRAL POSI SW CKT ■

SHIFT
OUT OF N/P -RANGE
THEN
TOUCH START

START

SEF689P

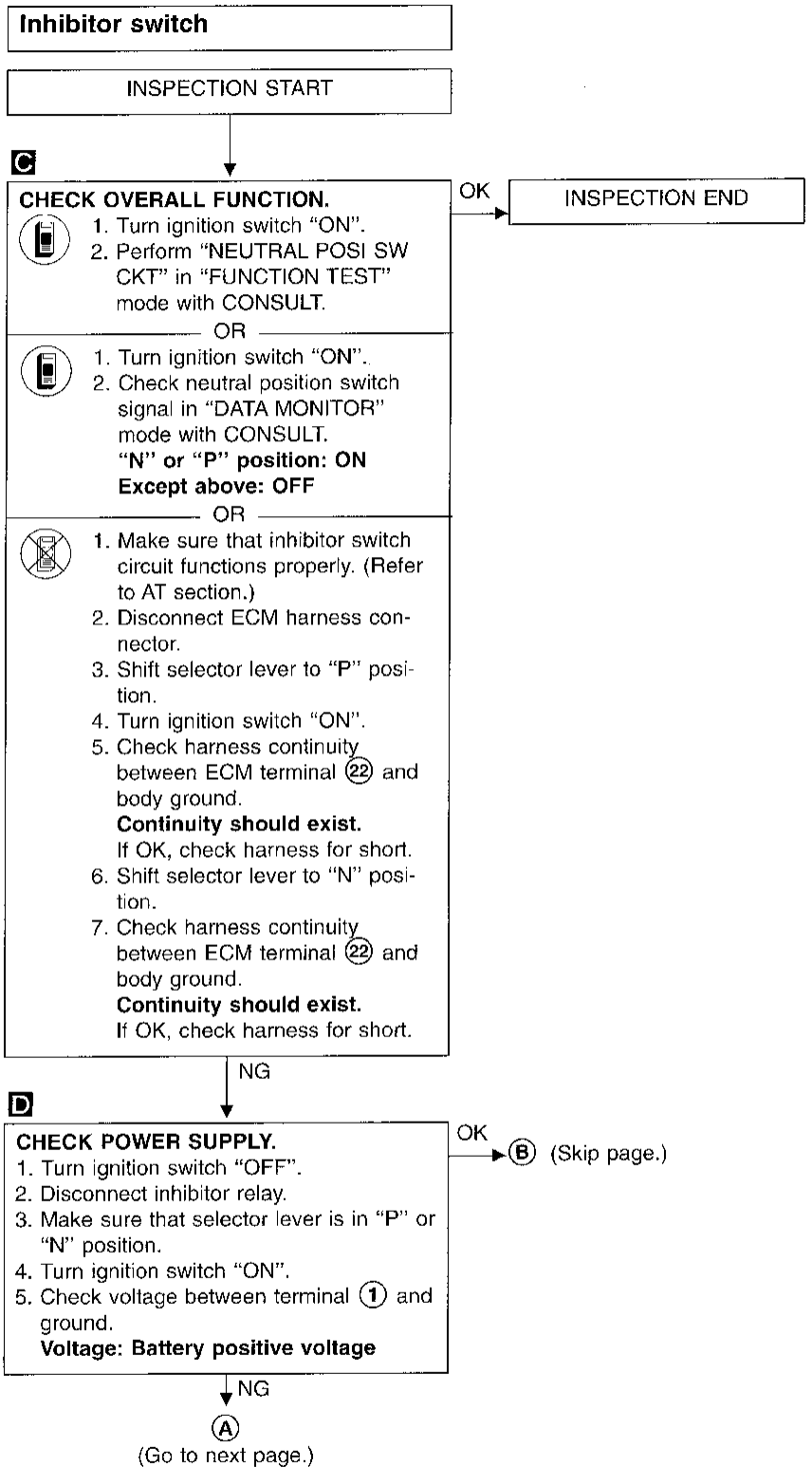
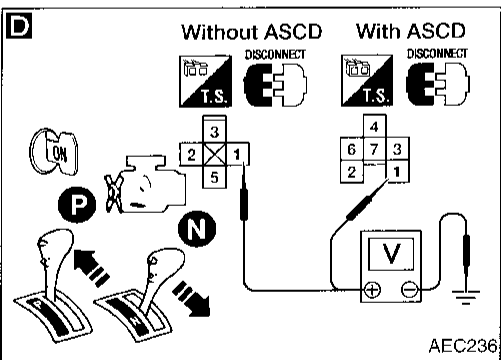
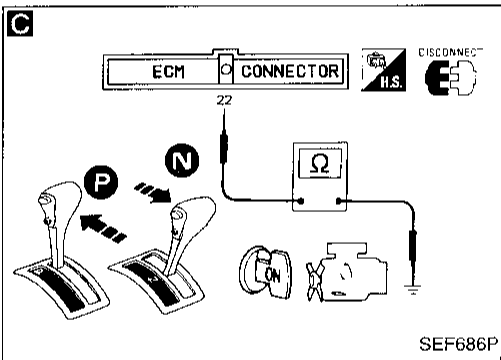
C

☆ MONITOR ☆ NO FAIL

START SIGNAL	OFF
CLSD TH/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

RECORD

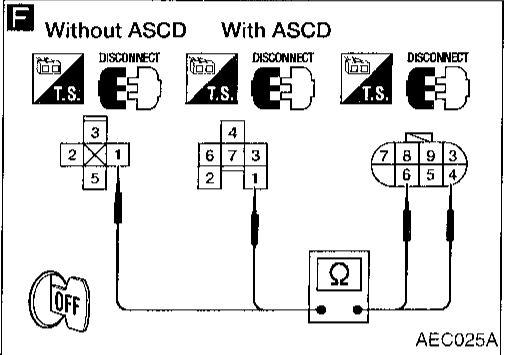
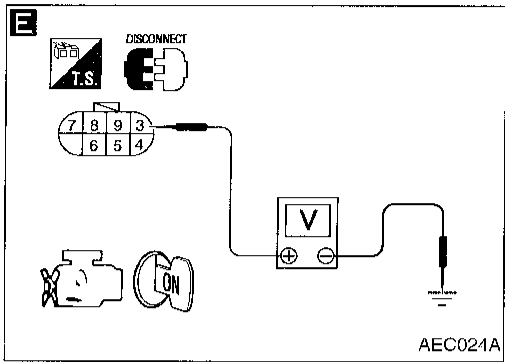
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TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (DTC: 1003) (Cont'd)



E

CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND BATTERY.

1. Turn ignition switch "OFF".
2. Disconnect inhibitor switch harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and ground.

Voltage: Battery positive voltage

NG

Check the following.

- Harness connectors (E213), (E15)
- Harness connectors (M7), (E103)
- 10A fuse
- Harness for open or short between fuse and inhibitor switch

If NG repair harness or connectors.

F

CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND INHIBITOR RELAY.

1. Turn ignition switch "OFF".
2. Check harness continuity between terminals ① and ⑥.

Continuity should exist.
If OK, check harness for short.

3. Check harness continuity between terminals ① and ④.

Continuity should exist.
If OK, check harness for short.

NG

Check the following.

- Joint connector-5
- Harness connectors (E214), (E16)
- Harness for open or short between inhibitor switch and inhibitor relay

If NG, repair harness or connectors.

CHECK COMPONENT (Inhibitor switch).
Refer to AT section.

NG

Replace inhibitor switch.

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

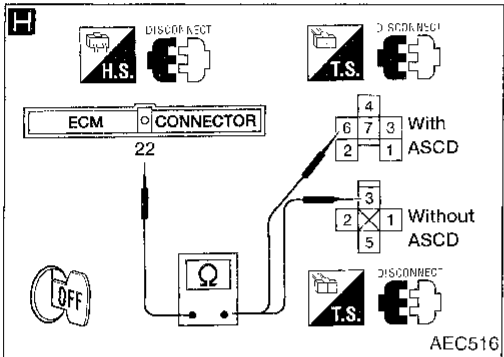
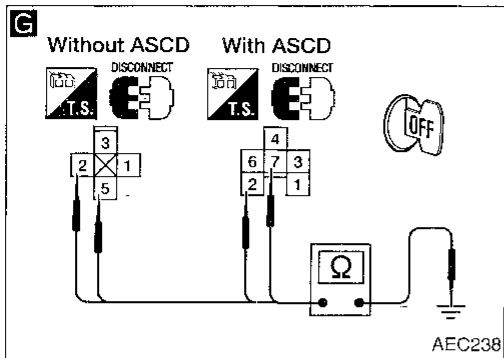
Trouble is not fixed.

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

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (DTC: 1003) (Cont'd)



(B)

G

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".

2. With ASCD:
Check harness continuity between terminals (2), (7) and body ground.

Without ASCD:
Check harness continuity between terminals (2), (5) and body ground.

NG → Repair harness or connectors.

OK

H

CHECK INPUT SIGNAL CIRCUIT.

With ASCD:
Check harness continuity between ECM terminal (22) and terminal (6).

Without ASCD:
Check harness continuity between ECM terminal (22) and terminal (3).

NG → Check the following.

- Harness connectors (M7), (E103)
- Harness connectors (M49), (F23)
- Harness for open or short between ECM and inhibitor relay

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Inhibitor relay).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace inhibitor relay.

OK

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

Trouble is not fixed.

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

INSPECTION END

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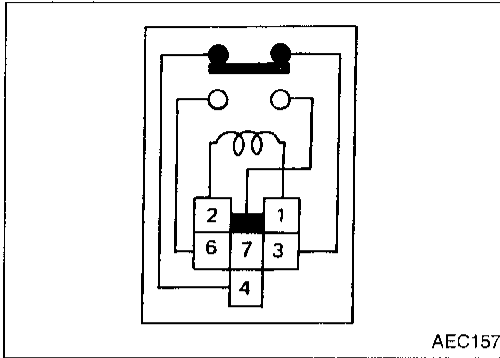
TROUBLE DIAGNOSIS FOR DTC P0705

Park/Neutral Position Switch (DTC: 1003) (Cont'd)

COMPONENT INSPECTION

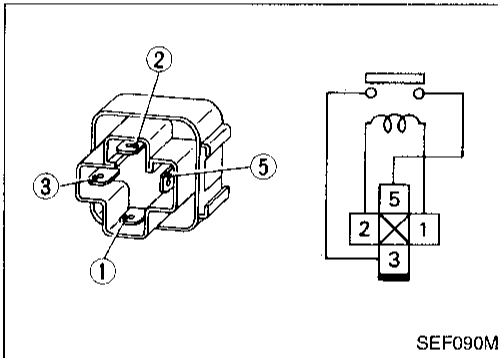
Inhibitor relay (A/T models with ASCD)

Check continuity between terminals ⑥ and ⑦.



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

If NG replace relay.



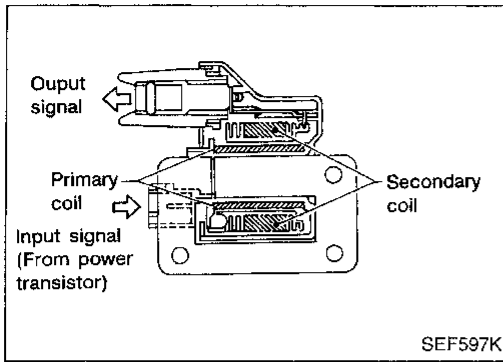
Inhibitor relay (A/T models without ASCD)

Check continuity between terminals ③ and ⑤.

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

If NG replace relay.

TROUBLE DIAGNOSIS FOR DTC P1320



Ignition Signal (DTC: 0201)

COMPONENT DESCRIPTION

Ignition coil & power transistor (Built into distributor)

The ignition coil is a small molded type. The ignition signal from the ECM is sent to the power transistor. The power transistor switches on and off the ignition coil primary circuit. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit.

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Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320 0201	<ul style="list-style-type: none"> ● The ignition signal in the primary circuit is not sent to ECM 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 CONFIRMATION PROCEDURE

Note: If both 1st trip DTC P0340 (0101) and P1320 (0201) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0340 first. (See EC-166.)



- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT.
- 3) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)

OR



- 1) Turn ignition switch "ON".
- 2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
- 3) Select MODE 7 with GST.

OR

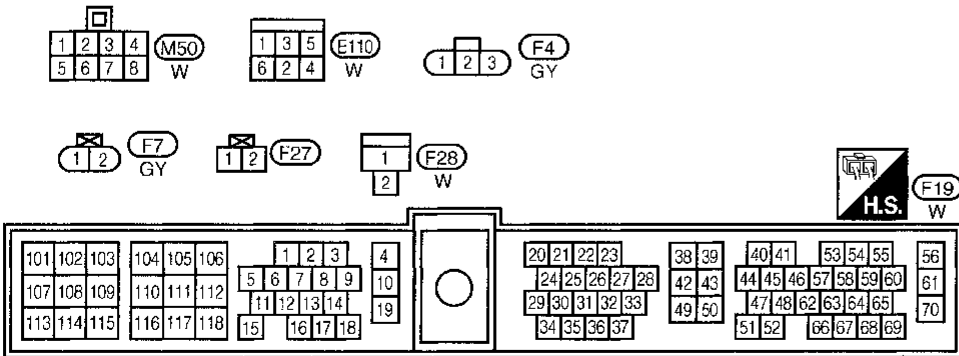
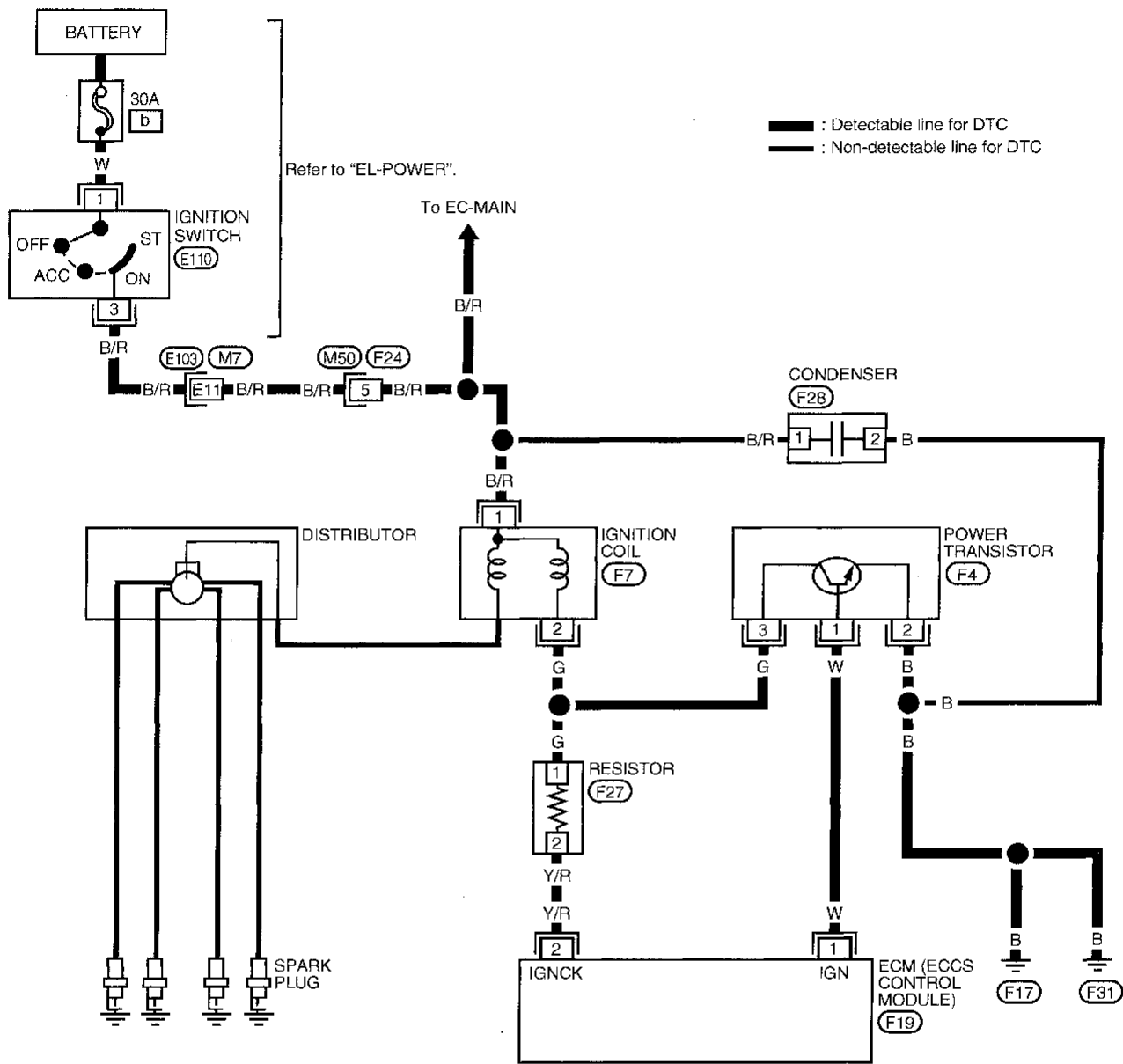


- 1) Turn ignition switch "ON".
- 2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (DTC: 0201) (Cont'd)

EC-IGN/SG-01



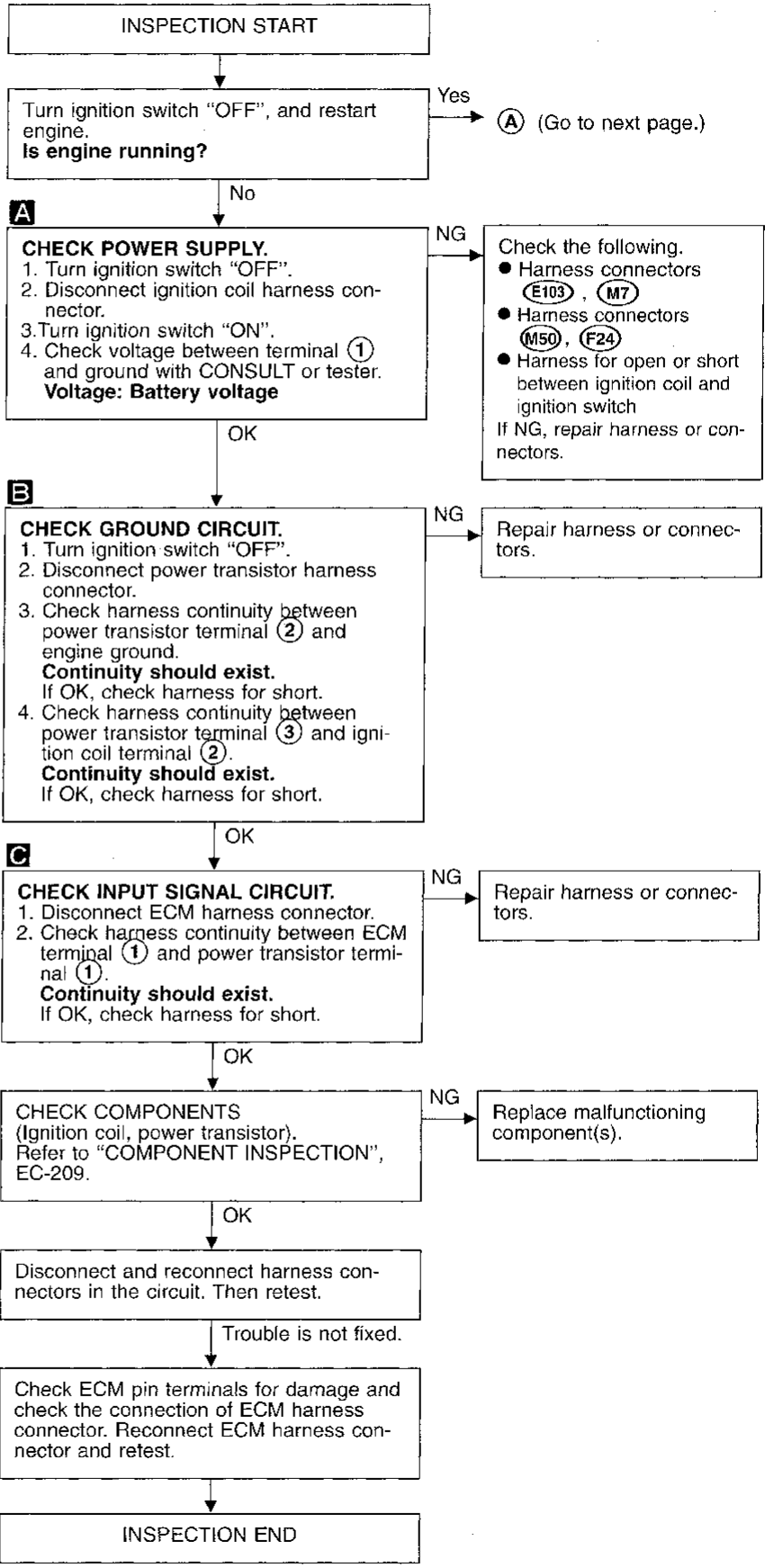
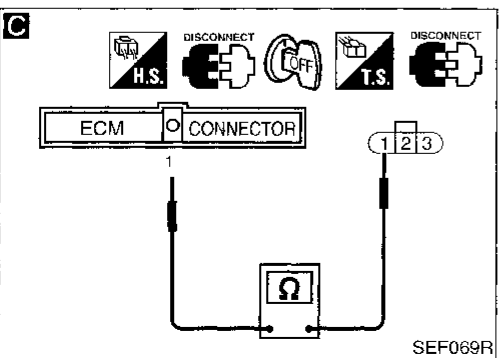
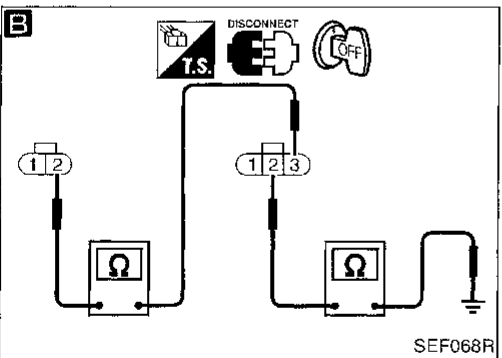
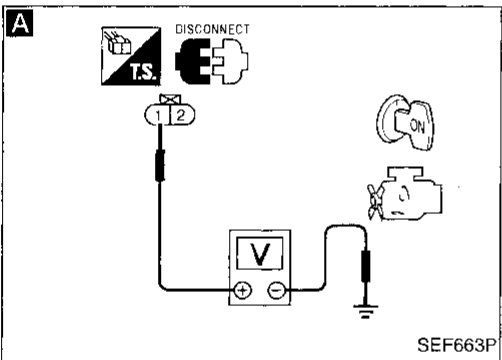
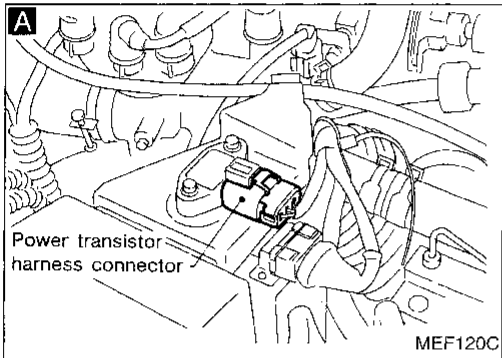
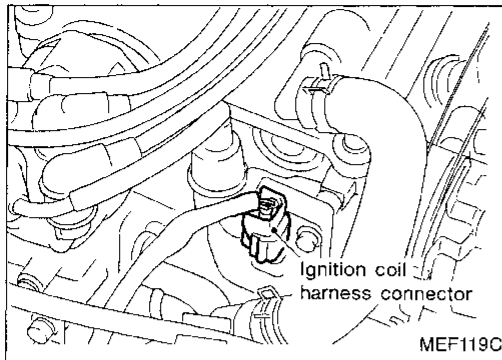
Refer to last page (Foldout page).

M7, E103

TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (DTC: 0201) (Cont'd)

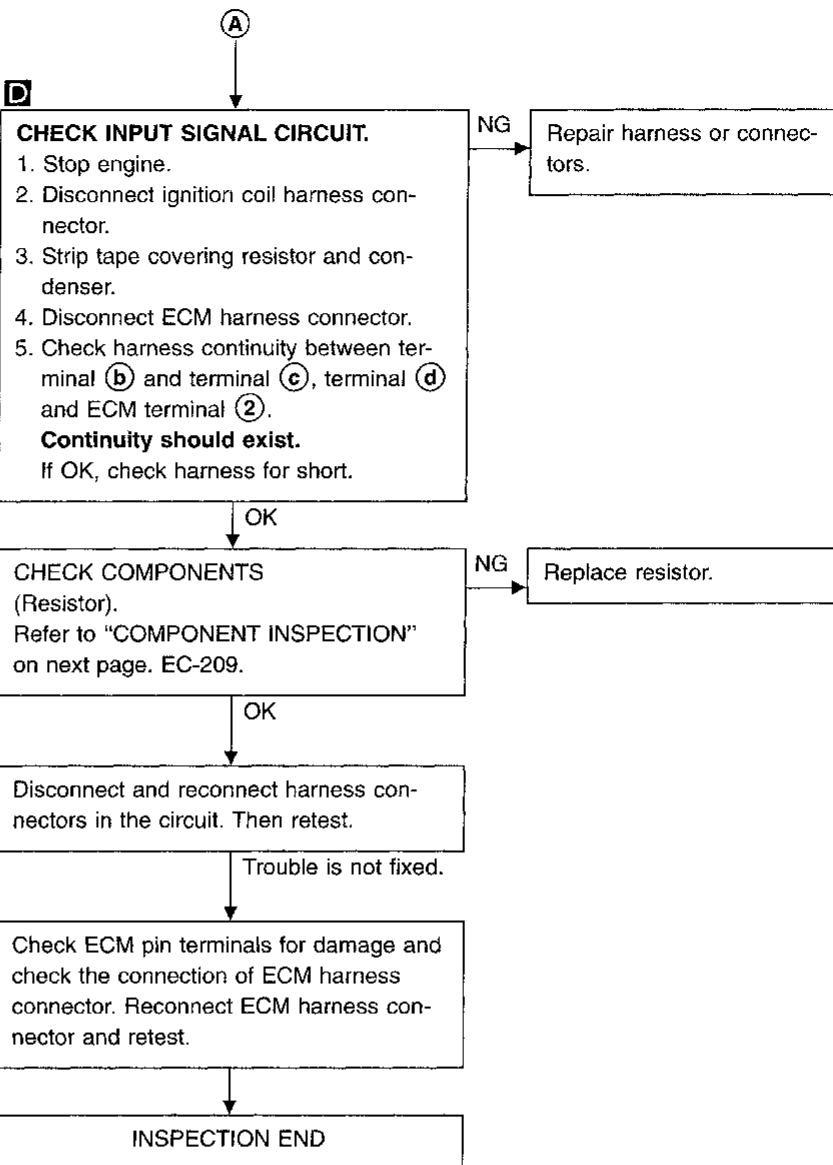
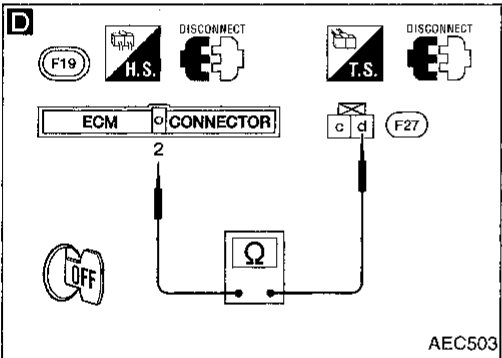
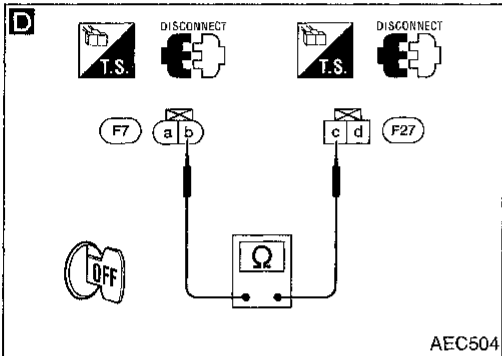
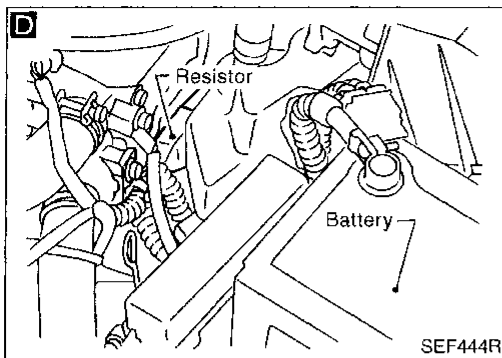
DIAGNOSTIC PROCEDURE



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TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (DTC: 0201) (Cont'd)



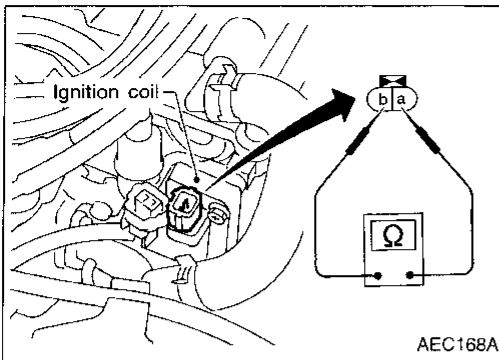
TROUBLE DIAGNOSIS FOR DTC P1320

Ignition Signal (DTC: 0201) (Cont'd)

COMPONENT INSPECTION

Ignition coil

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



Terminal	Resistance [at 20°C (68°F)]
Ⓐ - Ⓑ	Approximately 1 Ω

If NG, replace ignition coil.

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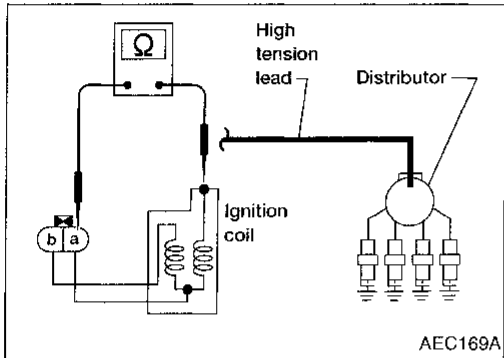
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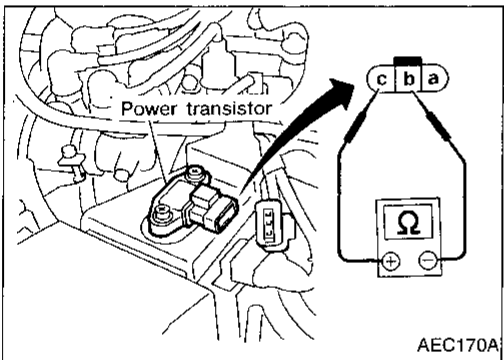
3. Disconnect the high tension lead.
4. Check resistance between ignition coil harness connector terminal Ⓐ and the connector on the ignition coil for the high tension lead.

Resistance: Approximately 10.0kΩ at 20°C (68°F)

If NG, replace ignition coil.

Power transistor

1. Disconnect power transistor harness connector.
2. Check power transistor resistance between terminals Ⓑ and Ⓒ.

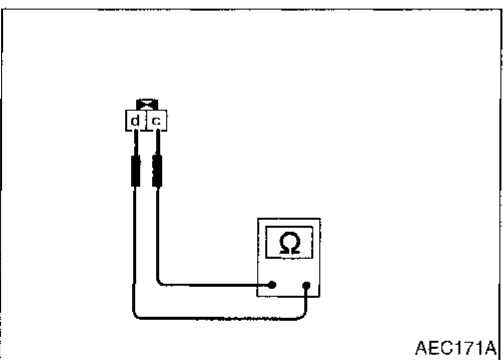


Terminals	Resistance	Result
Ⓑ and Ⓒ	Except 0Ω	OK
	0Ω	NG

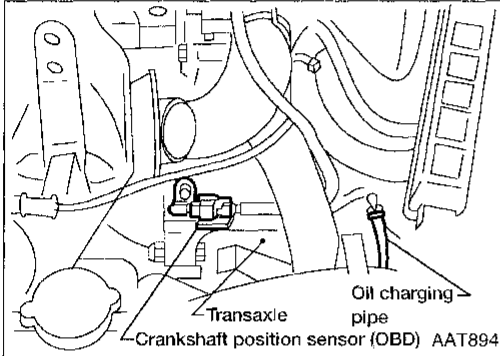
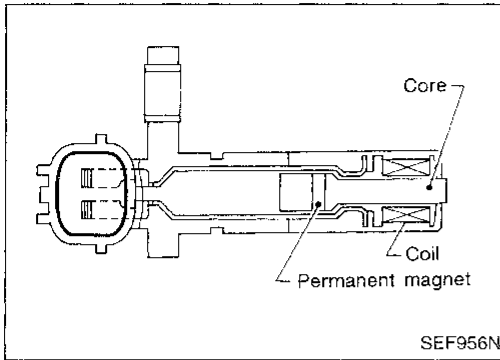
If NG, replace power transistor.

Resistor

1. Disconnect resistor harness connector.
 2. Check resistance between terminals Ⓒ and Ⓓ.
- Resistance: Approximately 2.2 kΩ at 25°C (77°F)**
- If NG, replace resistor.



TROUBLE DIAGNOSIS FOR DTC P1336



Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905)

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution. The sensor consists of a permanent magnet, core and coil. When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not 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)
P1336 0905	<ul style="list-style-type: none"> ● A chipping of the flywheel or 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)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE



- 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.

OR



- 1) Start engine and run it for at least 4 minutes at idle speed.
- 2) Select "MODE 7" with GST.

OR

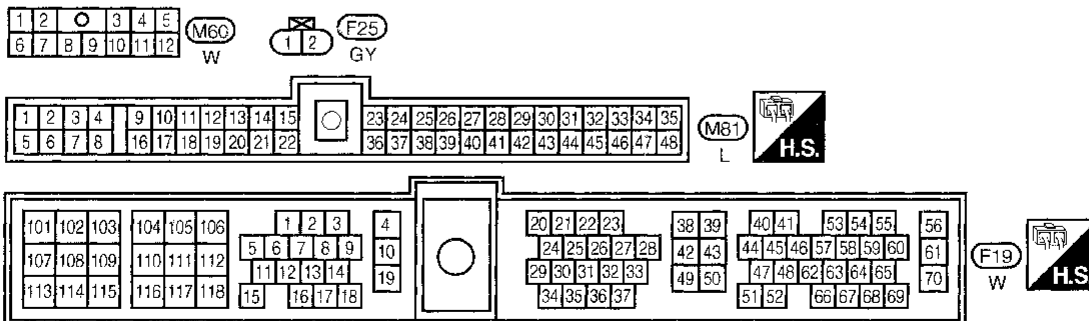
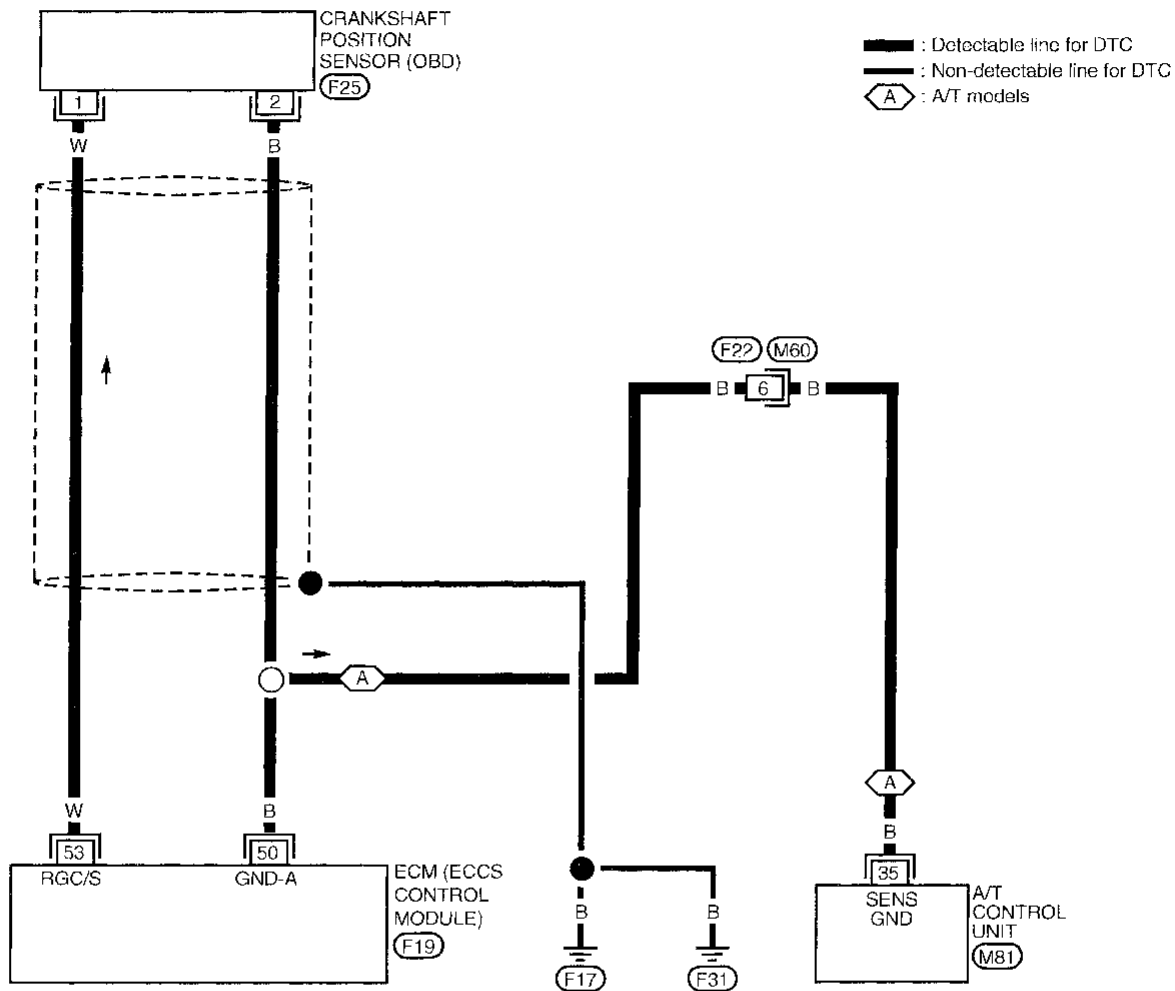


- 1) Start engine and run it for at least 4 minutes at idle speed.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

TROUBLE DIAGNOSIS FOR DTC P1336

Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

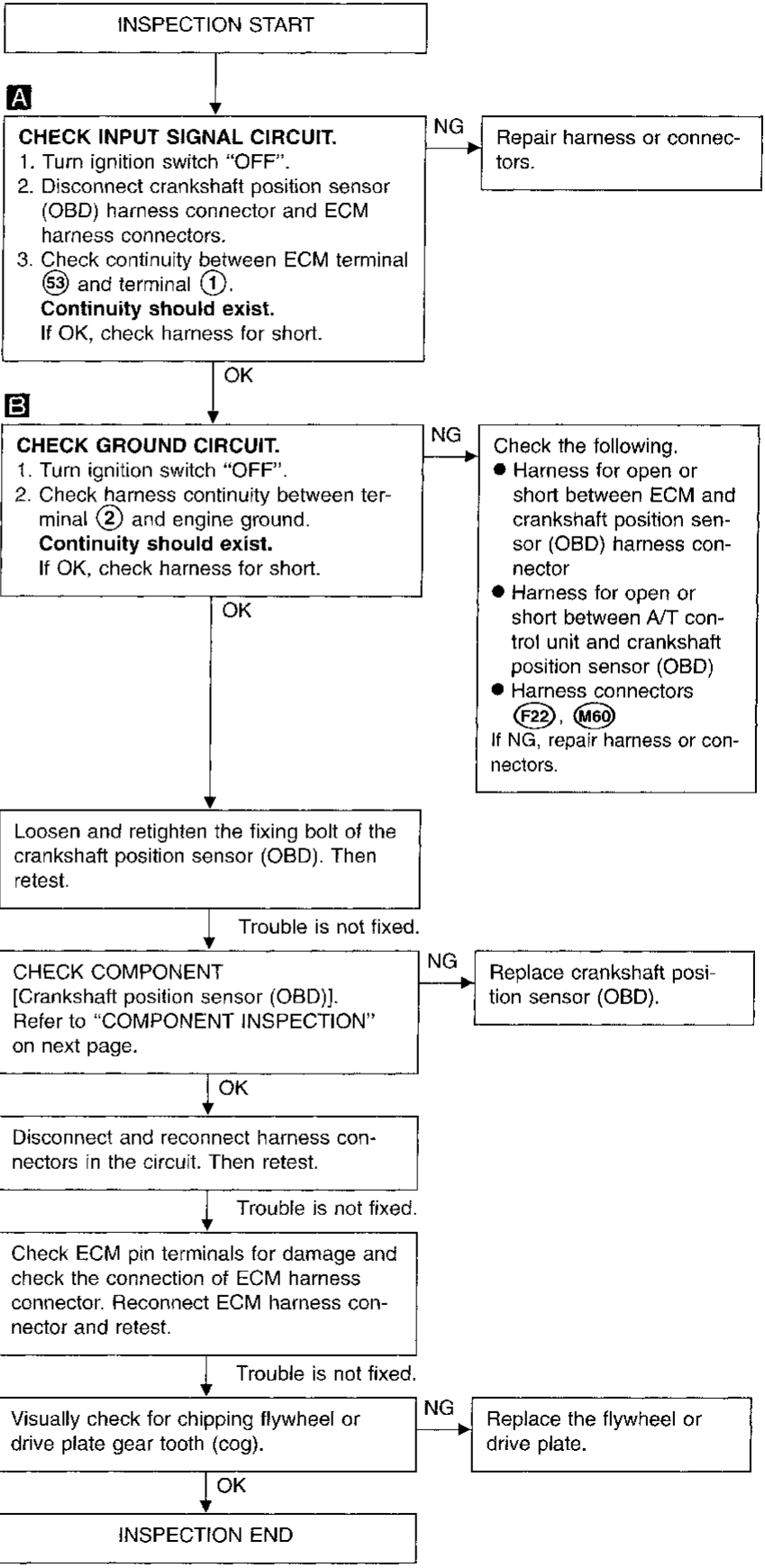
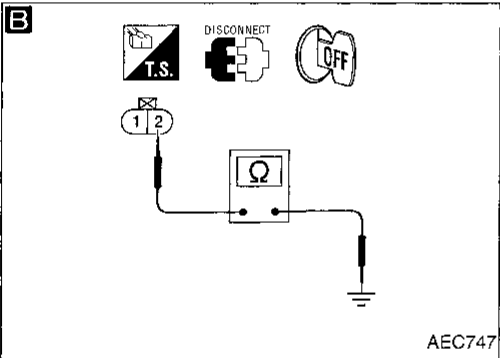
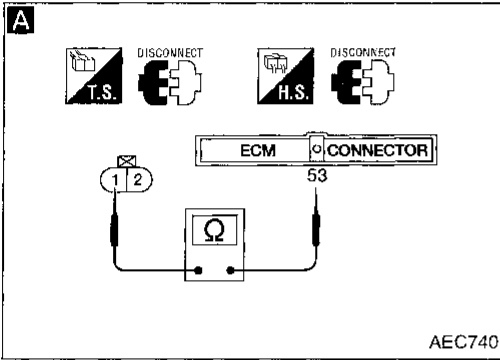
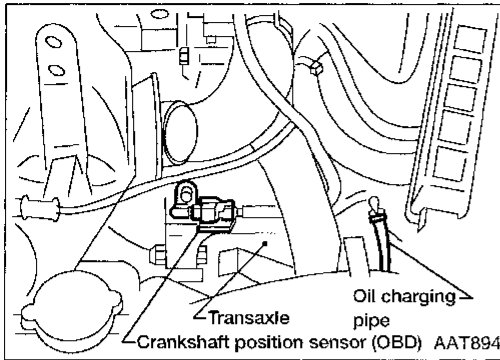
EC-CKPS-01



TROUBLE DIAGNOSIS FOR DTC P1336

Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR DTC P1336

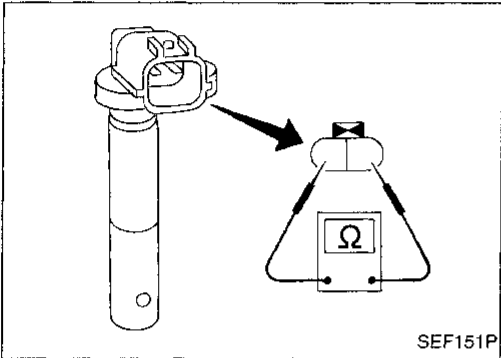
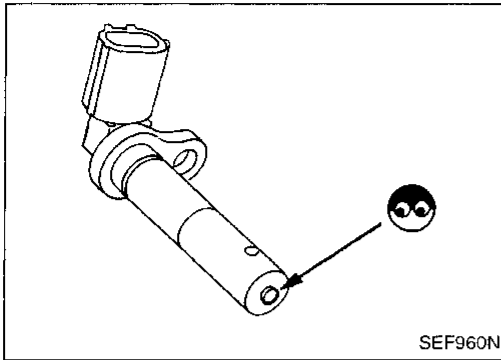
Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

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 $432\text{-}528\Omega$ at 25°C (77°F)



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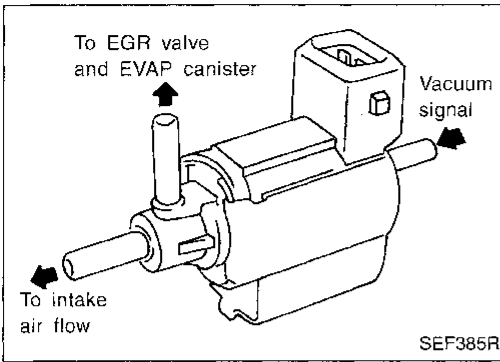
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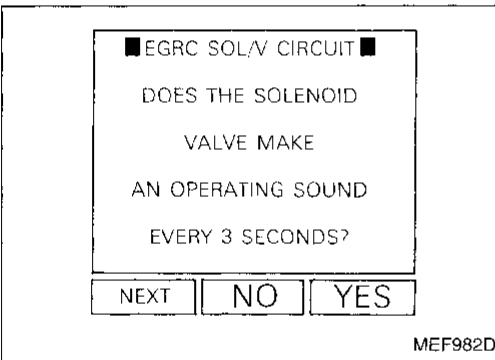
TROUBLE DIAGNOSIS FOR DTC P1400



EGR valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005)

The EGR valve and EVAP canister purge 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 EVAP 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 EVAP canister.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400 1005	<ul style="list-style-type: none"> An improper voltage signal is sent to ECM through EGR valve & EVAP canister purge control solenoid valve. 	<ul style="list-style-type: none"> Harness or connectors (The EGR valve & EVAP canister purge control solenoid valve circuit is open or shorted.) EGR valve & EVAP canister purge control solenoid valve



OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGR valve and EVAP canister purge control solenoid valve circuit. During this check, a 1st trip DTC might not be confirmed.

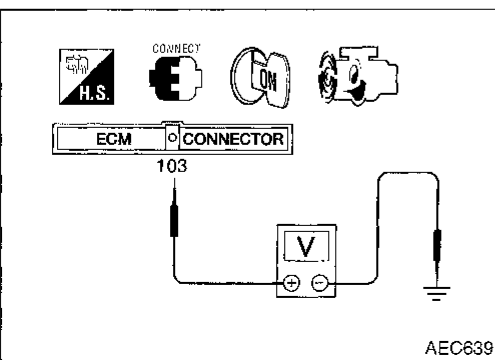
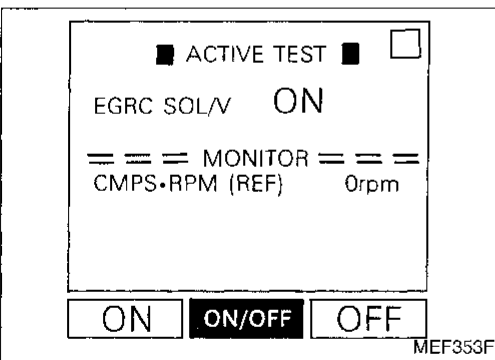
- 1) Turn ignition switch "ON".
 2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

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

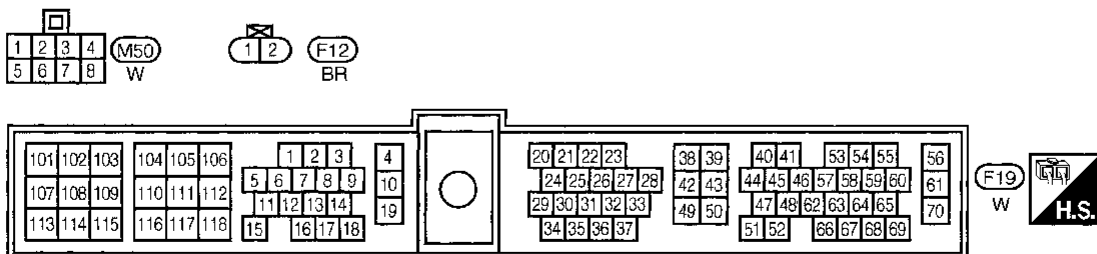
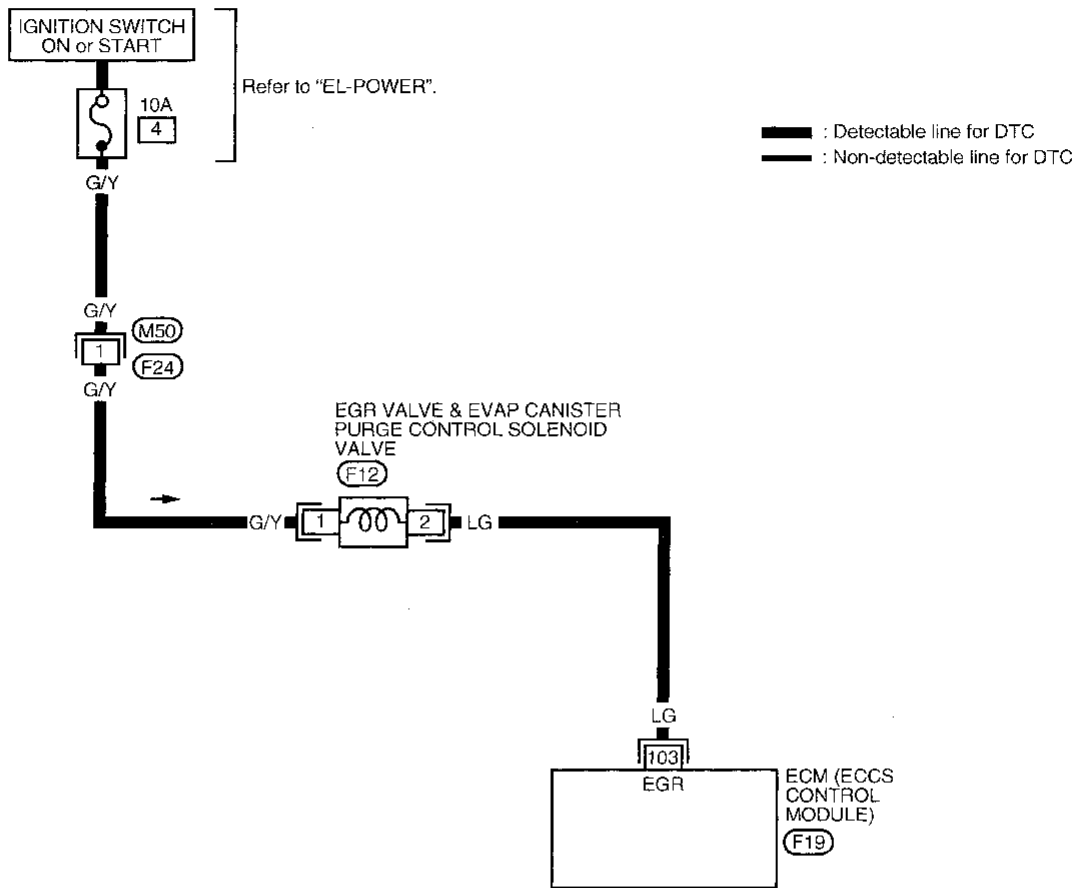
- 1) Start engine and warm it up sufficiently.
 2) Turn ignition switch "OFF" and wait at least 5 seconds.
 3) Start engine again.
 4) Check the voltage between ECM terminal (103) and ground at idle speed.
Voltage: 0.04 - 0.08V
 5) Check that the voltage changes to battery voltage and returns to 0.04 - 0.08V when the engine speed increases to about 2,500 rpm.



TROUBLE DIAGNOSIS FOR DTC P1400

EGR valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005) (Cont'd)

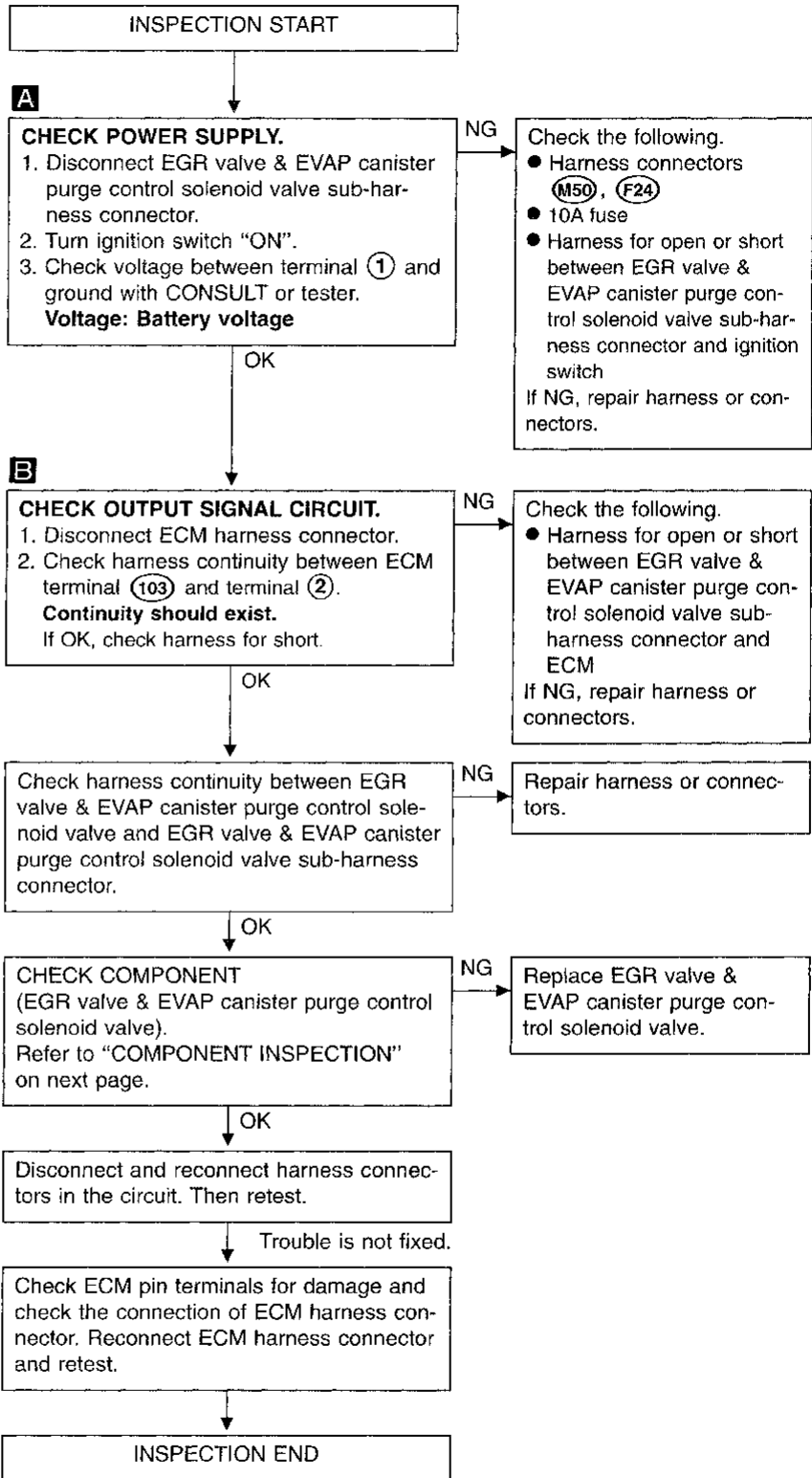
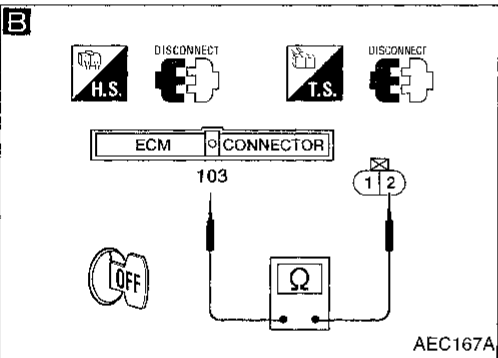
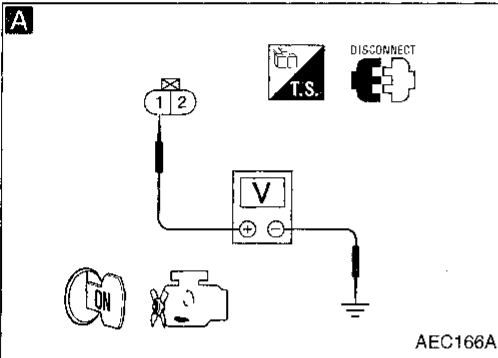
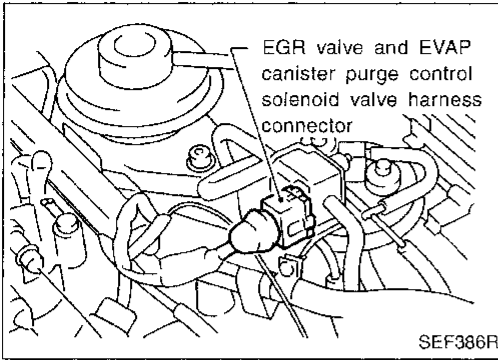
EC-EGRC/V-01



TROUBLE DIAGNOSIS FOR DTC P1400

EGR valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005) (Cont'd)

DIAGNOSTIC PROCEDURE



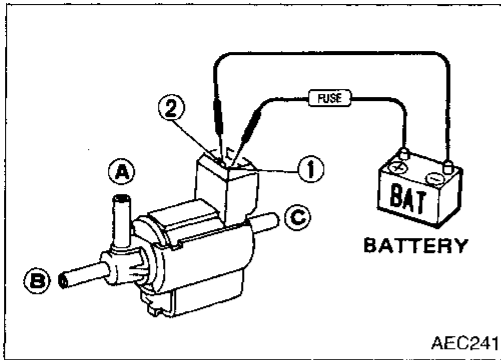
TROUBLE DIAGNOSIS FOR DTC P1400

EGR valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005) (Cont'd)

COMPONENT INSPECTION

EGR valve and EVAP canister purge 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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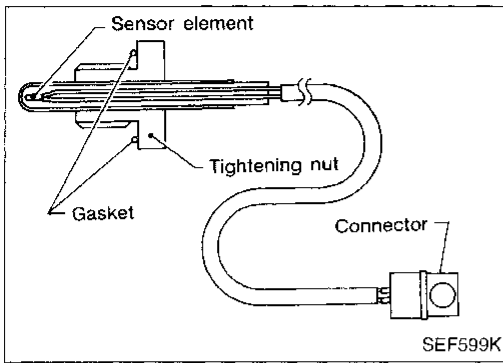
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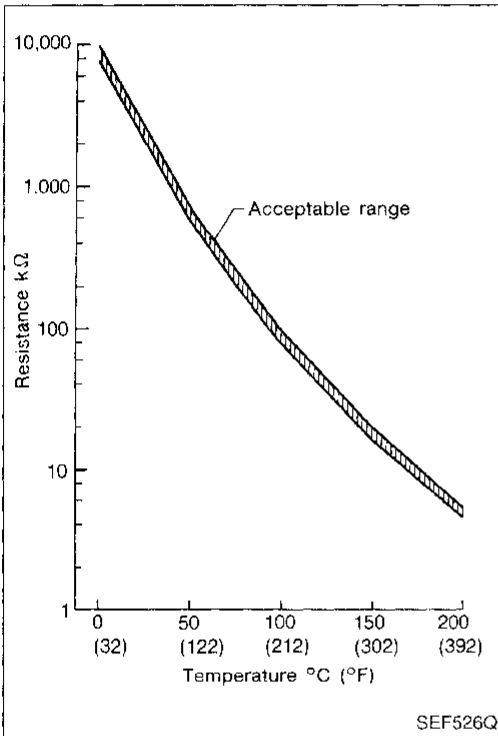
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TROUBLE DIAGNOSIS FOR DTC P1401



EGR Temperature Sensor (DTC: 0305)

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not directly used to control the engine system. It is used only for the on-board diagnosis.



(Reference data)

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1401 0305	A) An excessively low voltage from the EGR temperature sensor is sent to ECM, even when engine coolant temperature is low.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is shorted.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGR valve & EVAP canister purge control solenoid valve
	B) An excessively high voltage from the EGR temperature sensor is sent to ECM, even when engine coolant temperature is high.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGR valve & EVAP canister purge control solenoid valve

TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (DTC: 0305) (Cont'd)

OVERALL FUNCTION CHECK

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

Procedure for malfunction A and B

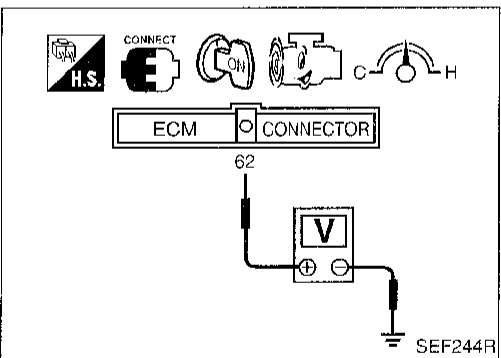
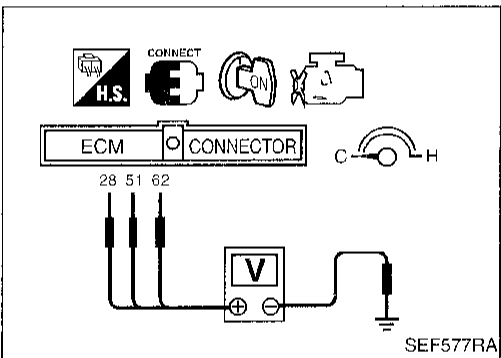
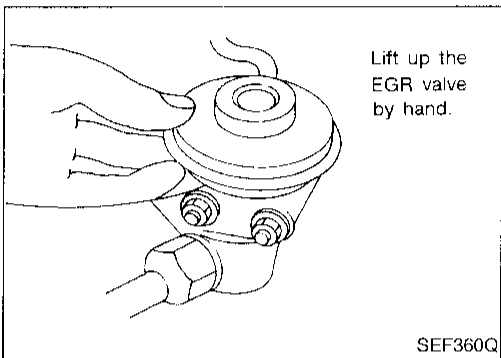
- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
- 2) Confirm that engine coolant temperature and intake air temperature are lower than 40°C (104°F). (If necessary, wait until the temperatures equal atmospheric temperature.)
- 3) Confirm that "EGR TEMP SEN" reading is between 3.45V and 5.0V.
- 4) Start engine and warm it up sufficiently.
- 5) Run engine at idle for at least 2 minutes.
- 6) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC P0400 and P0402. (See pages EC-171 and 180.)
- 7) Read "EGR TEMP SEN" at about 1,500 rpm with EGR valve lifted up to the full position by hand. **Voltage should decrease to less than 1.0V.**
- 8) If step 7 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1400. (See pages EC-171, 180 and 214.)

OR

- 1) Turn ignition switch "ON".
- 2) Confirm that voltage between ECM terminals ⑤1, ②8 and ground are more than 2.72V. (If necessary, wait until engine coolant temperature and intake air temperature equal atmospheric temperature.)
- 3) Confirm that voltage between ECM terminal ⑥2 and ground is between 3.45V and 5.0V.
- 4) Start engine and warm it up sufficiently.
- 5) Run engine at idle for at least 2 minutes.
- 6) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC 0302 (P0400) and P0402. (See pages EC-171 and 180.)
- 7) Check voltage between ECM terminal ⑥2 and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand. **Voltage should decrease to less than 1.0V.**
- 8) If step 7 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1400. (See pages EC-171, 180 and 214.)

★ MONITOR	★ NO FAIL	<input type="checkbox"/>
CMPS•RPM (REF)	0rpm	
COOLAN TEMP/S	20°C	
EGR TEMP SEN	4.3V	
INT/A TEMP SE	22°C	




SEF651R

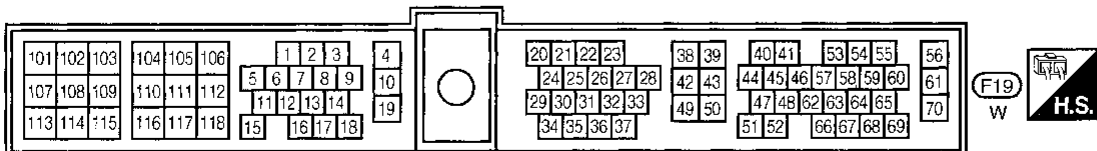
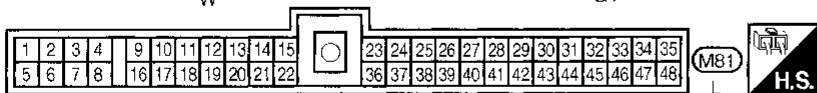
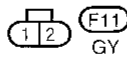
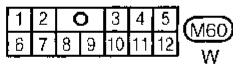
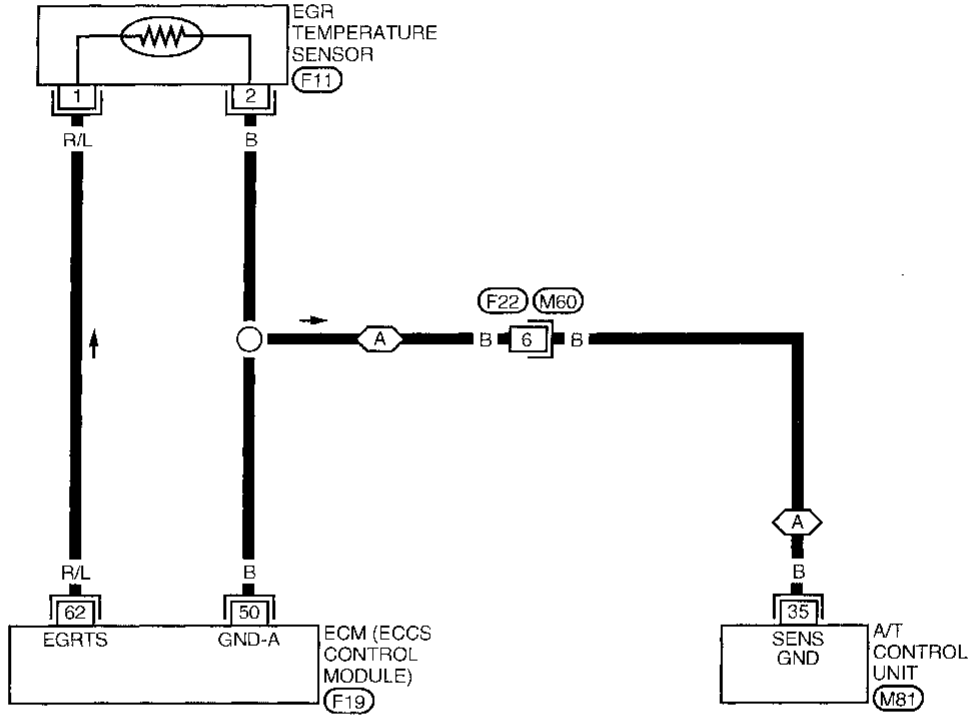


TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (DTC: 0305) (Cont'd)

EC-EGR/TS-01

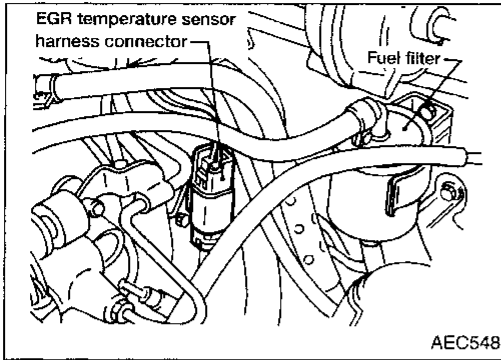
-  : Detectable line for DTC
-  : Non-detectable line for DTC
-  : A/T models



TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (DTC: 0305) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

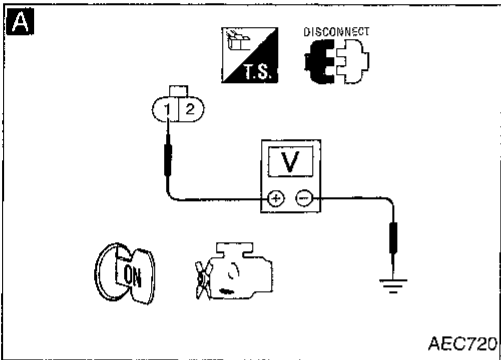
A

CHECK POWER SUPPLY.

1. Disconnect EGR temperature sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ① and ground with CONSULT or tester.

Voltage: Approximately 5V

NG → Repair harness or connectors.



B

CHECK GROUND CIRCUIT.

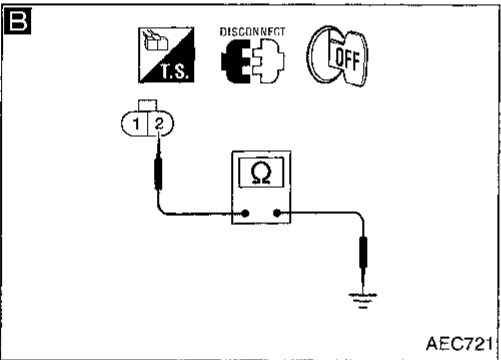
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ② and engine ground.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.

- Harness for open or short between ECM and EGR temperature sensor harness connector
- Harness for open or short between A/T control unit and EGR temperature sensor
- Harness connectors (F22), (M60)

If NG, repair harness or connector.



CHECK COMPONENT
(EGR temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGR temperature sensor.

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

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

INSPECTION END

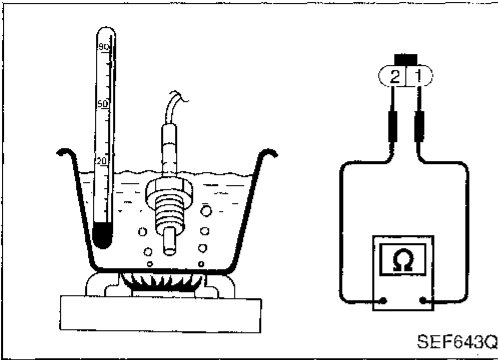
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TROUBLE DIAGNOSIS FOR DTC P1401

EGR Temperature Sensor (DTC: 0305) (Cont'd) COMPONENT INSPECTION

EGR temperature sensor

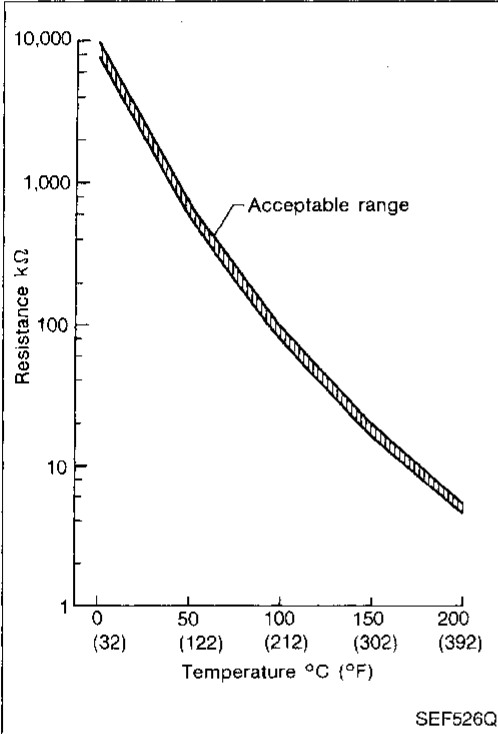
Check resistance change and resistance value.



SEF643Q

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

If NG, replace EGR temperature sensor.



SEF526Q


TROUBLE DIAGNOSIS FOR DTC P1605

A/T Diagnosis Communication line (DTC: 0804)


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.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605 0804	<ul style="list-style-type: none"> ● An incorrect signal from A/T control unit is sent 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 ● A/T control unit


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

OR

-  1) Turn ignition switch "ON".
 2) Wait at least 40 seconds or start engine and wait at least 40 seconds.
 3) Select "MODE 7" with GST.

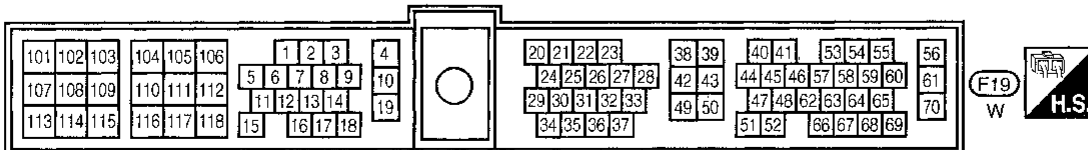
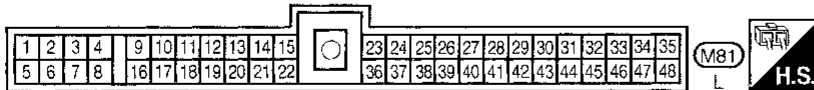
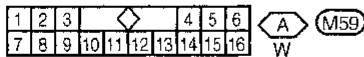
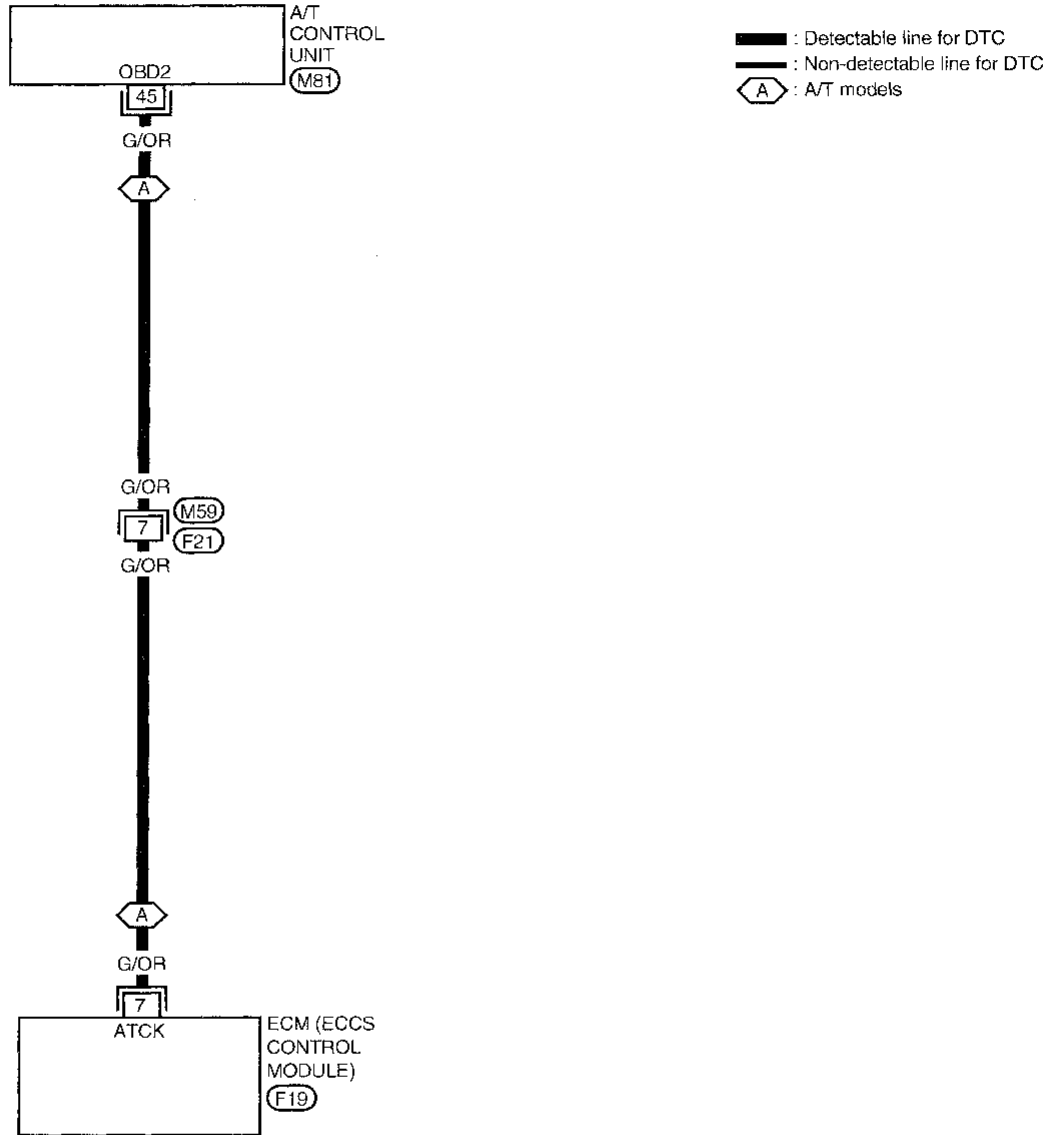
OR

-  1) Turn ignition switch "ON".
 2) Wait at least 40 seconds or start engine and wait at least 40 seconds.
 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
 4) Perform diagnostic test mode II (self-diagnostic results) with ECM.

TROUBLE DIAGNOSIS FOR DTC P1605

A/T Diagnosis Communication line (DTC: 0804) (Cont'd)

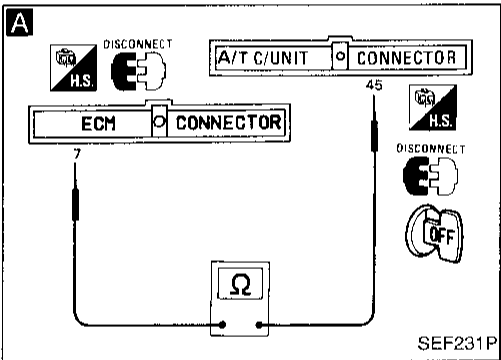
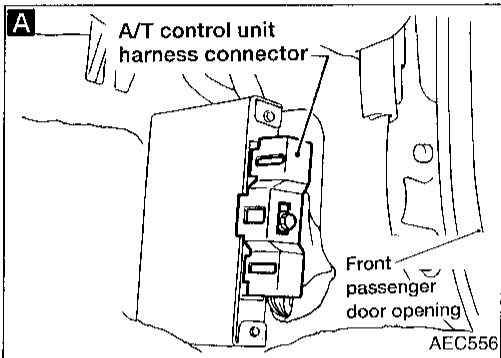
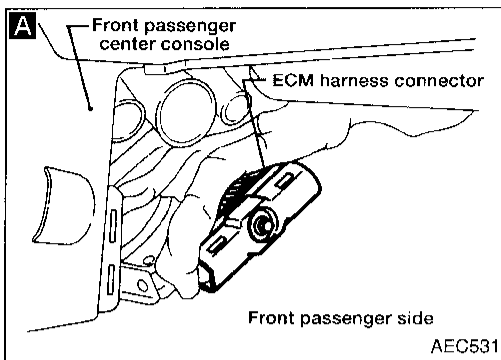
EC-ATDIAG-01



TROUBLE DIAGNOSIS FOR DTC P1605

A/T Diagnosis Communication line (DTC: 0804) (Cont'd)

DIAGNOSTIC PROCEDURE



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 (45).
Continuity should exist.
If OK, check harness for short.

NG

Check the following.

- Harness connectors (F21), (M59)
- Harness for open or short between ECM and A/T control unit.

If NG, repair harness or connectors.

OK

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

Trouble is not fixed.

Check ECM pin terminals and A/T control unit pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

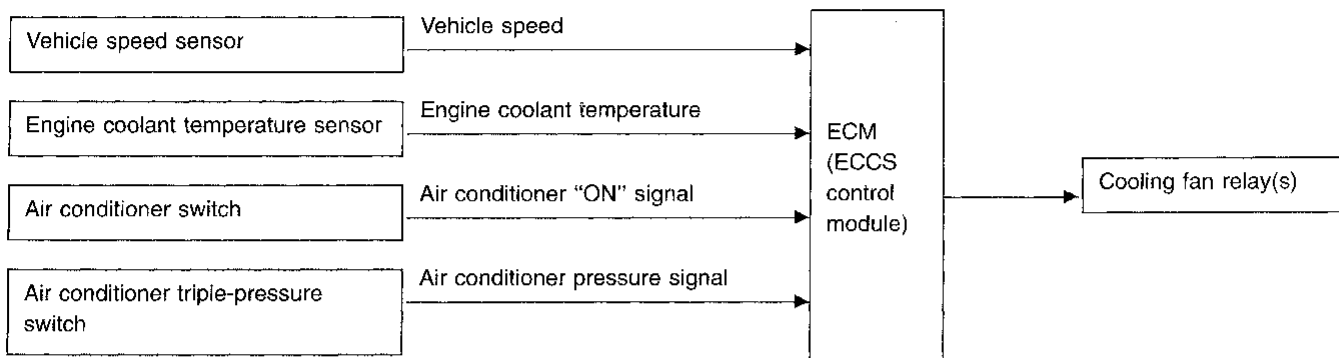
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TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308)

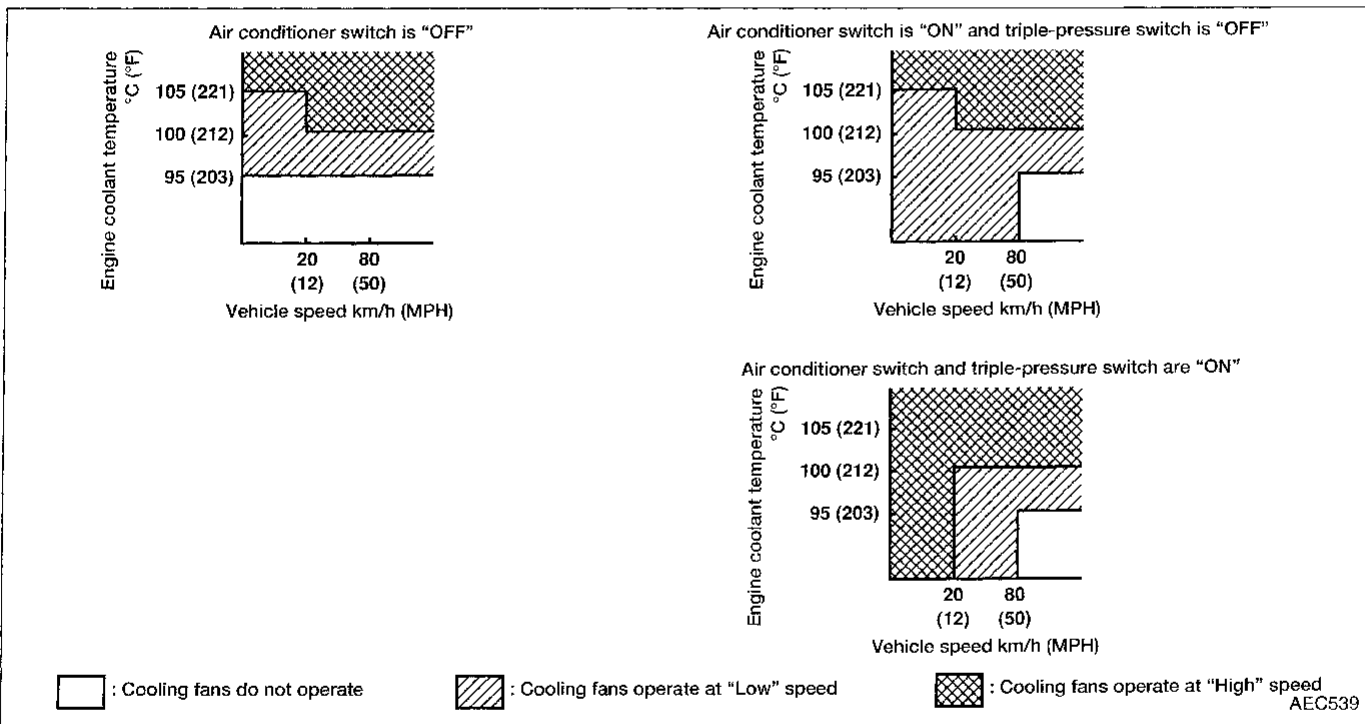
SYSTEM DESCRIPTION

Cooling fan control



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].

Operation



TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)

ON BOARD DIAGNOSIS LOGIC

This diagnosis continuously monitors the engine coolant temperature.

If the cooling fan or another component in the cooling system malfunctions, the engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Diagnostic trouble code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1900 1308	<ul style="list-style-type: none"> ● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. 	<ul style="list-style-type: none"> ● Harness or connectors. (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat <p>For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", (EC-236).</p>

CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil.

- a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS").
- b. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)

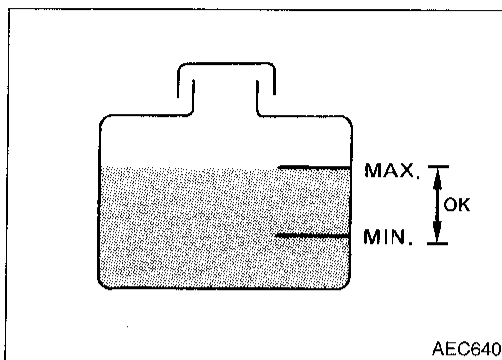
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the cooling fan. During this check, a 1st trip DTC might not be confirmed.

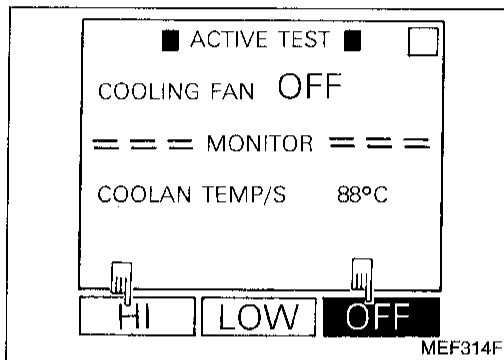
WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

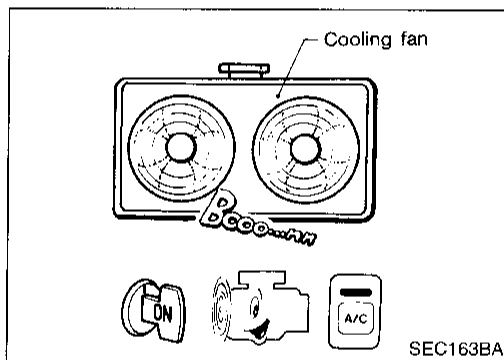
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



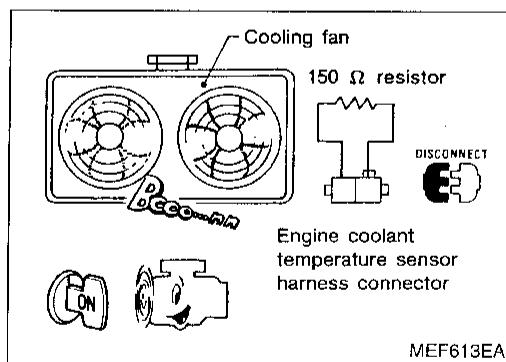
AEC640



MEF314F



SEC163BA



MEF613EA

- 1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "DIAGNOSTIC PROCEDURE" (EC-230).
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "DIAGNOSTIC PROCEDURE" (EC-230).
- 3) Turn ignition switch "ON".
- 4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT (LOW speed and HI speed).



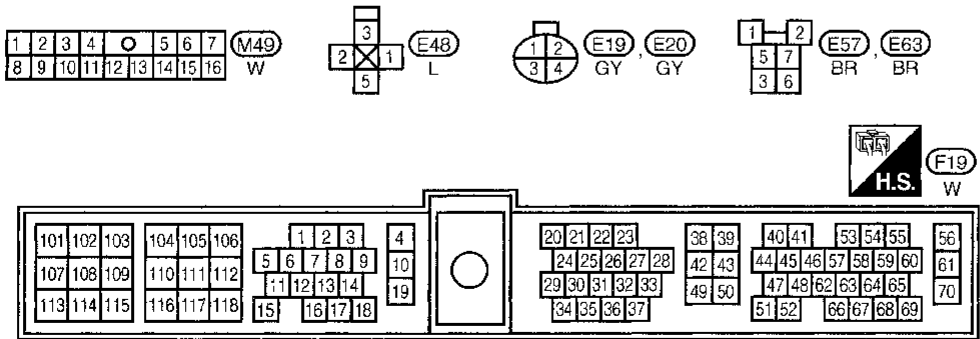
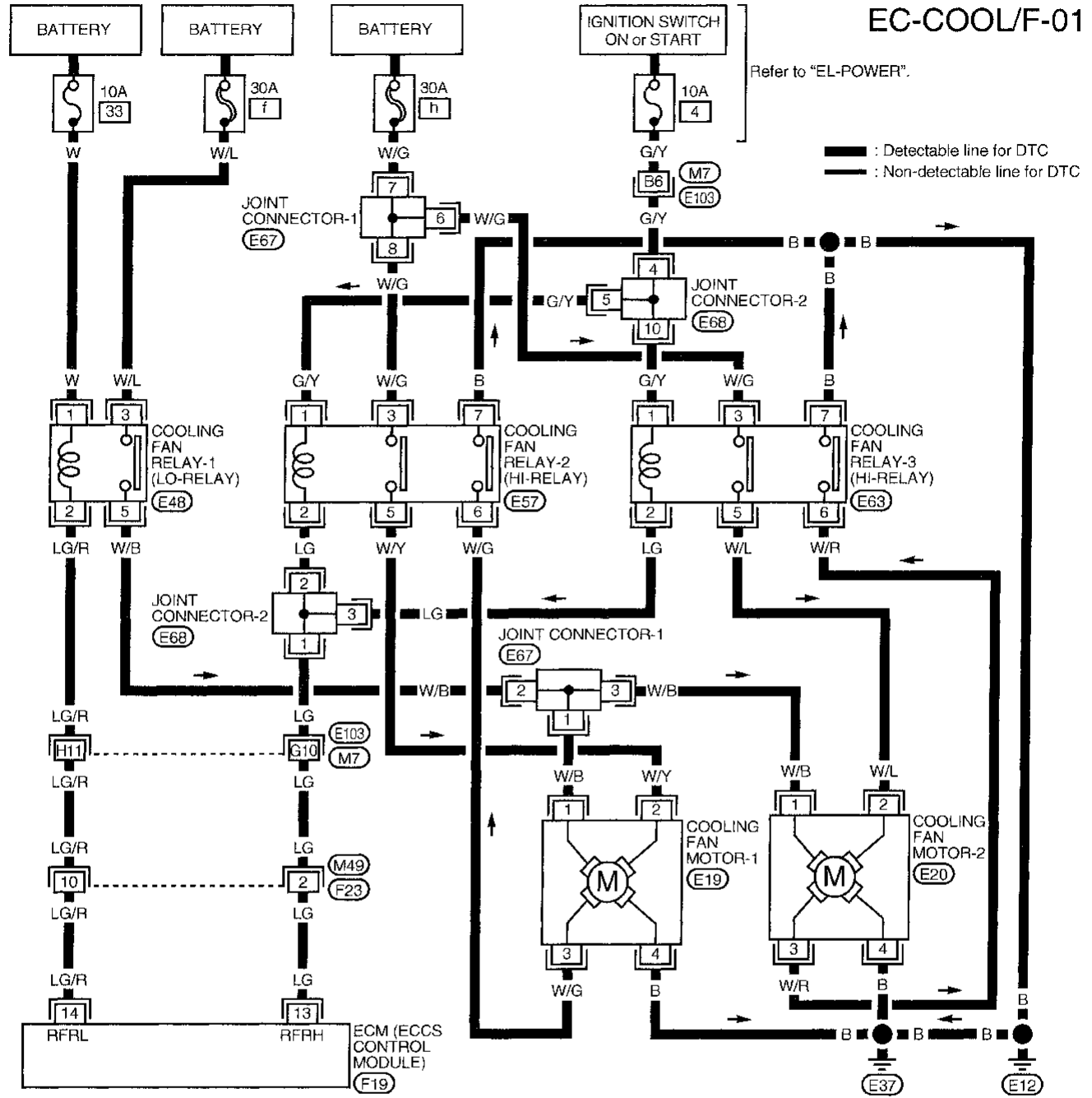
OR



- 3) Start engine.
Be careful not to overheat engine.
- 4) Set temperature control lever to full cold position.
- 5) Turn air conditioner switch "ON".
- 6) Turn blower fan switch "ON".
- 7) Run engine at idle for a few minutes with air conditioner operating.
Be careful not to overheat engine.
- 8) Make sure that cooling fan operates at low speed.
- 9) Turn ignition switch "OFF".
- 10) Turn air conditioner switch and blower fan switch "OFF".
- 11) Disconnect engine coolant temperature sensor harness connector.
- 12) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 13) Restart engine and make sure that cooling fan operates at higher speed than low speed.
Be careful not to overheat engine.

TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)



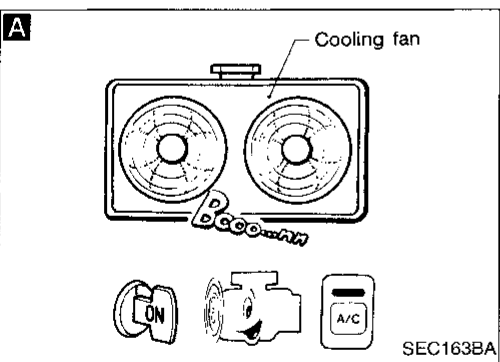
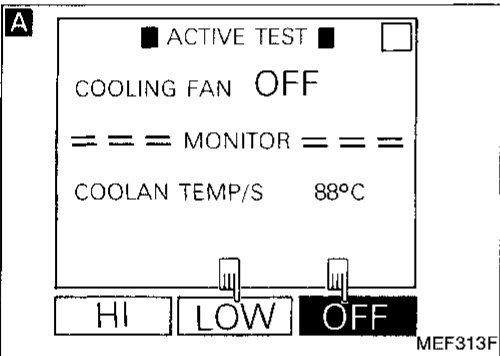
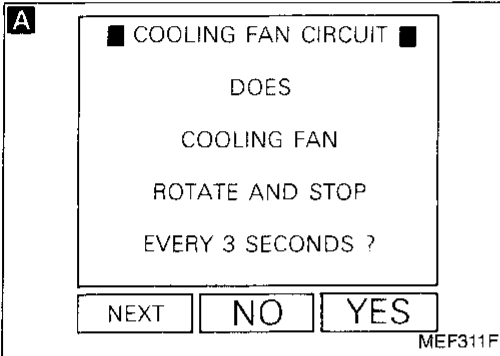
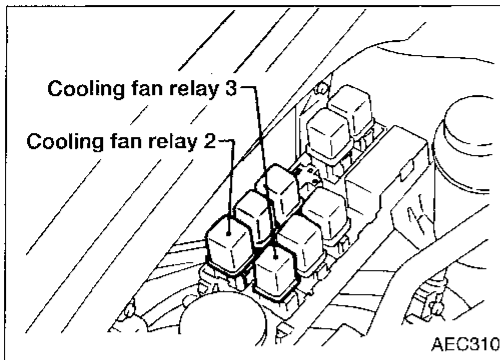
Refer to last page (Foldout page).
 (M7), (E103)
 (E67)
 (E68)

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TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK COOLING FAN LOW SPEED OPERATION.

1. Disconnect cooling fan relays-2 and -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.

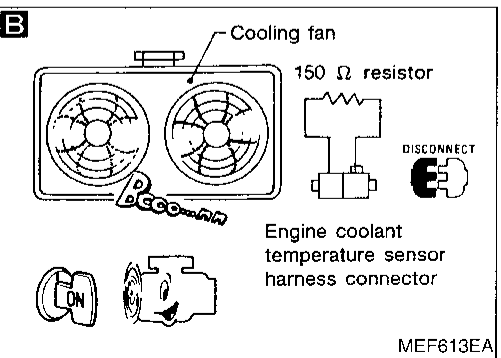
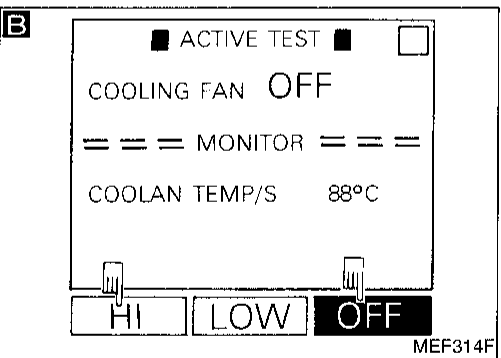
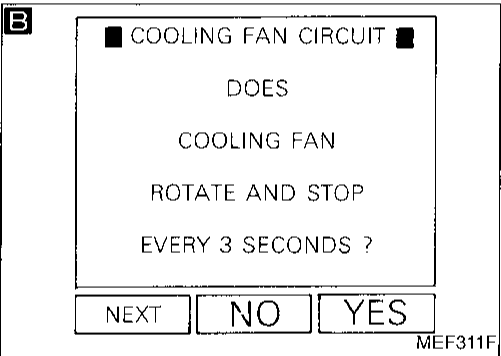
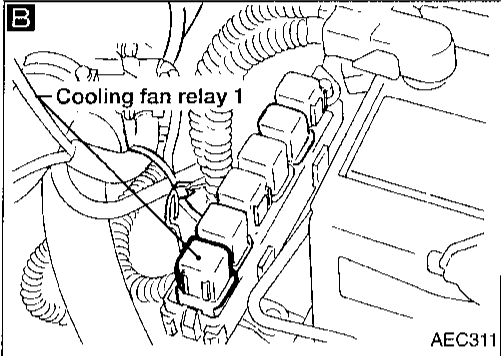
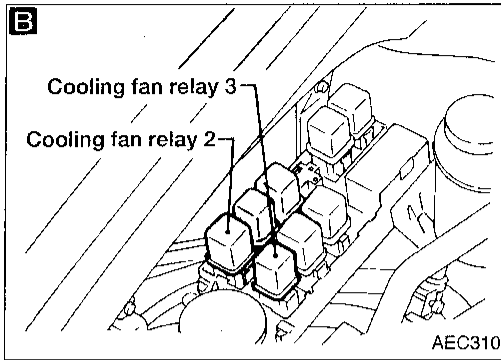
- OR
2. Start engine.
 3. Set temperature lever at full cold position.
 4. Turn air conditioner switch "ON".
 5. Turn blower fan switch "ON".
 6. Run engine at idle for a few minutes with air conditioner operating.
 7. Make sure that cooling fan operates at low speed.

NG → Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-232)

OK
A
(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)



(A)

B

CHECK COOLING FAN HIGH SPEED OPERATION.

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -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.

NG → Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-233)

OK

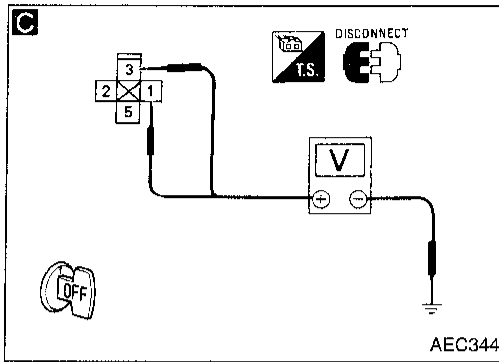
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(Go to EC-235).

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TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)



PROCEDURE A

INSPECTION START

C

CHECK POWER SUPPLY.

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

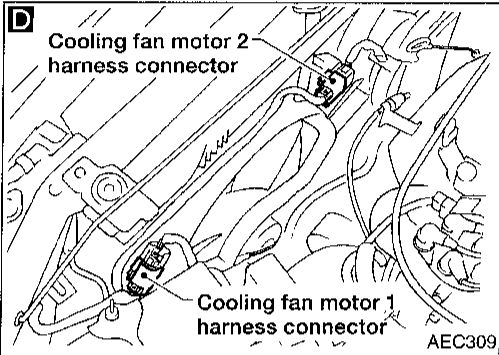
Voltage: Battery voltage

NG

Check the following.

- 10A fuse
- 30A fusible link
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

If NG, repair harness or connectors.



OK

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 ① and terminal ⑤.

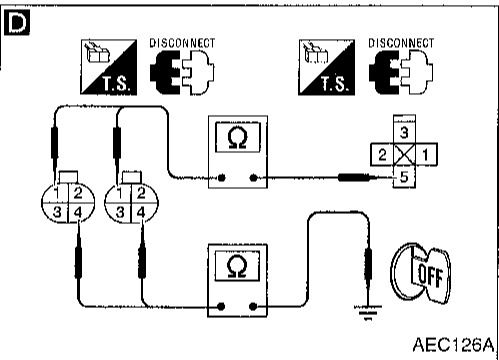
Continuity should exist.
If OK, check harness for short.

4. Check harness continuity between terminal ④ and body ground.

Continuity should exist.
If OK, check harness for short.

NG

Repair harness or connectors.



OK

E

CHECK OUTPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑭ and terminal ②.

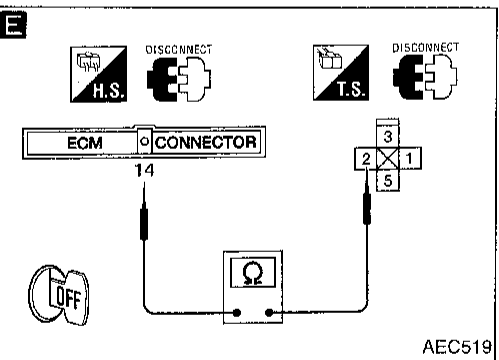
Continuity should exist.
If OK, check harness for short.

NG

Check the following.

- Harness connectors ⑭7, ⑩3
- Harness connectors ⑳3, ⑭9
- Harness for open or short between cooling fan relay-1 and ECM

If NG, repair harness or connectors.



OK

CHECK COMPONENT
(Cooling fan relay-1).
Refer to "COMPONENT INSPECTION", EC-237.

NG

Replace cooling fan relay.

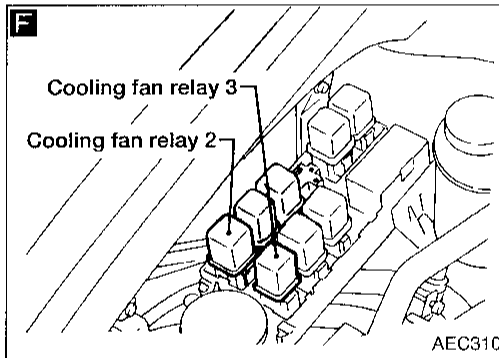
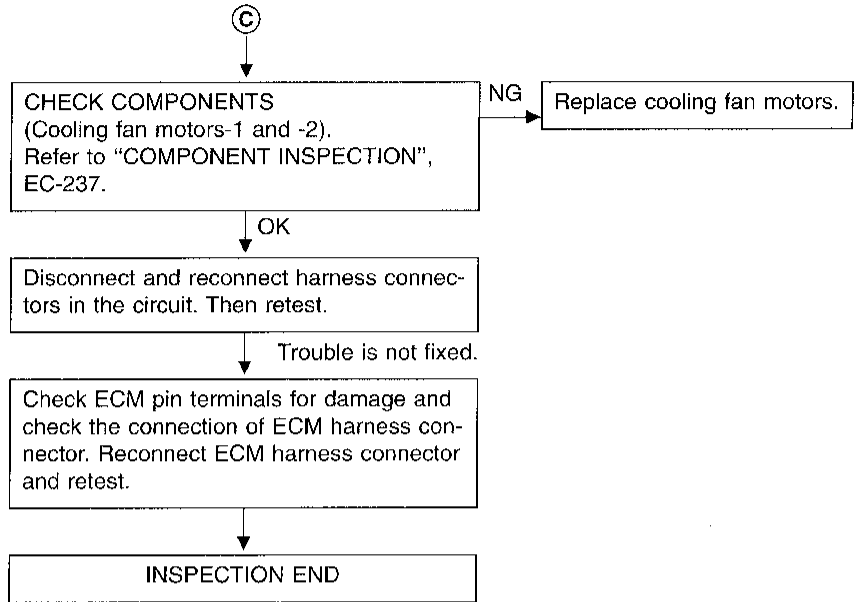
OK

Ⓢ

(Go to next page.)

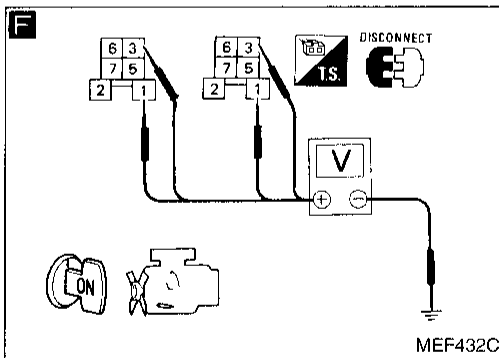
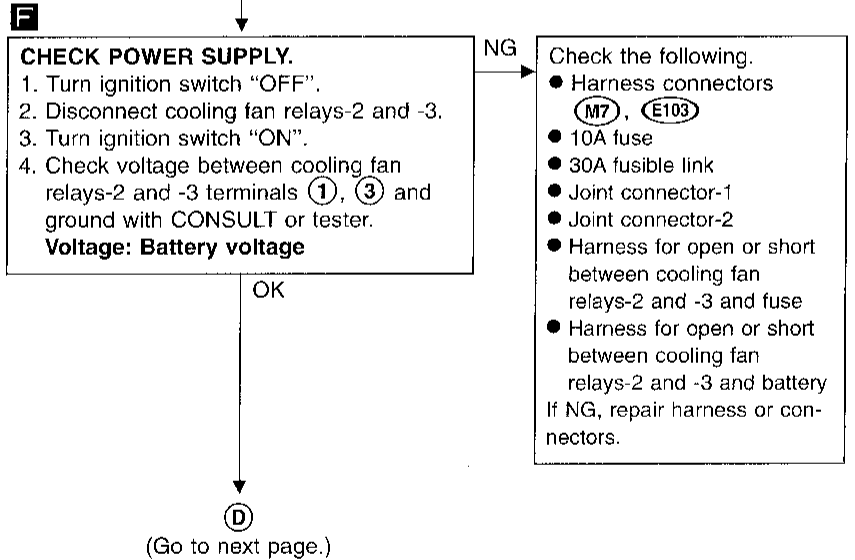
TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)



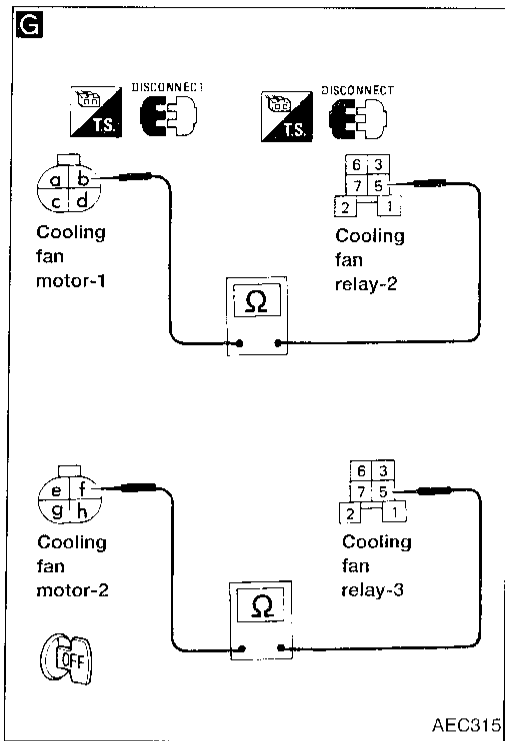
PROCEDURE B

INSPECTION START



TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)



D

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motors-1 and -2 harness connectors.
- G** 3. Check harness continuity between terminal **5** and terminals **b**, **f**. **Continuity should exist.** If OK, check harness for short.
- H** 4. Check harness continuity between terminal **6** and terminals **c**, **g**, terminal **7** and body ground. **Continuity should exist.** If OK, check harness for short.

NG → Repair harness or connectors.

OK →

I

CHECK OUTPUT SIGNAL CIRCUIT.

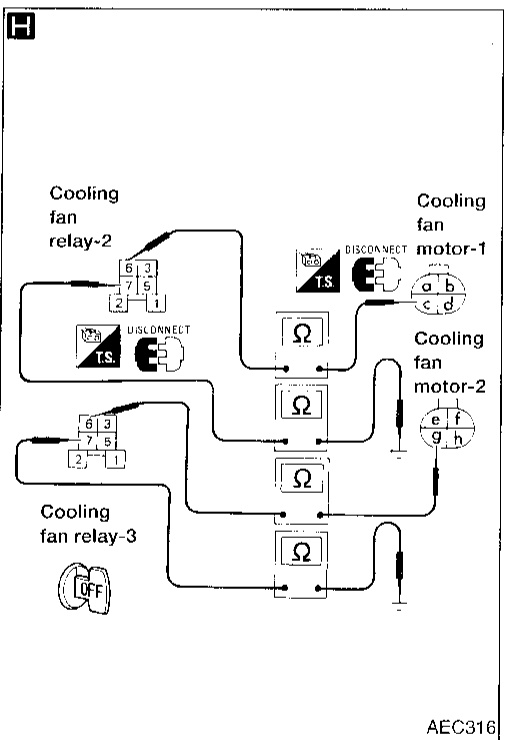
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal **13** and terminal **2**. **Continuity should exist.** If OK, check harness for short.

NG → Check the following.

- Harness connectors **M7**, **E103**
- Harness connectors **F23**, **M49**
- Joint connector-2
- Harness for open or short between cooling fan relays-2 and -3 and ECM

If OK, check harness for short. If NG, repair harness or connectors.

OK →



CHECK COMPONENTS
(Cooling fan relays-2 and -3).
Refer to "COMPONENT INSPECTION", EC-237.

NG → Replace cooling fan relays.

OK →

CHECK COMPONENTS
(Cooling fan motors).
Refer to "COMPONENT INSPECTION", EC-237.

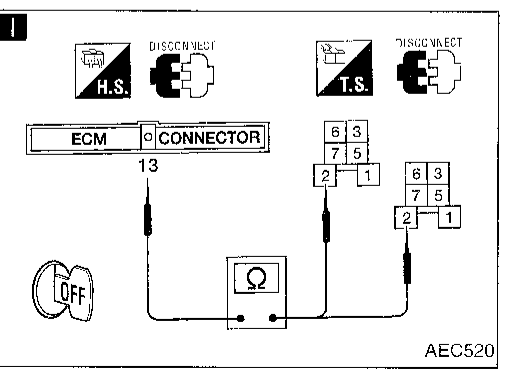
NG → Replace cooling fan motors.

OK →

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

Trouble is not fixed.

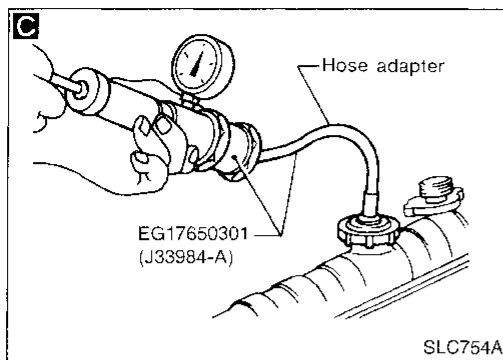
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.



INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P1900

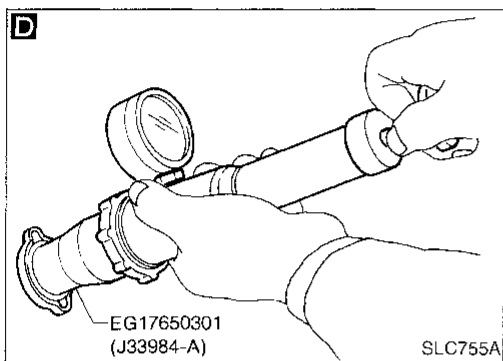
Cooling Fan (DTC: 1308) (Cont'd)



C

CHECK COOLING SYSTEM FOR LEAK.
Apply pressure to the cooling system with a tester, and check if the pressure drops.
Testing pressure:
157 kPa (1.6 kg/cm², 23 psi)
Pressure should not drop.
CAUTION:
Higher than the specified pressure may cause radiator damage.

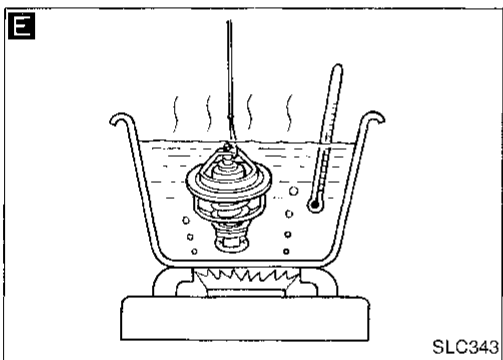
NG → Check the following for leak.
● Hose
● Radiator
● Water pump
Refer to LC section ("Water Pump").



D

CHECK RADIATOR CAP.
Apply pressure to cap with a tester.
Radiator cap relief pressure:
78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)

NG → Replace radiator cap.



E

CHECK THERMOSTAT.

1. Check valve seating condition at normal room temperatures. It should seat tightly.
2. Check valve opening temperature and valve lift.
Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 10 mm/90°C (0.39 in/194°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC section ("Thermostat").

NG → Replace thermostat

OK → Check engine coolant temperature sensor. Refer to "COMPONENT INSPECTION", EC-126.

NG → Replace engine coolant temperature sensor.

If the cause can not be isolated, go to "MAIN 12 CAUSES OF OVERHEATING" on next page.

INSPECTION END

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

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)

MAIN 12 CAUSES OF OVERHEATING

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
	4	● Radiator cap	● Pressure tester	78 - 98 kPa (0.8 - 1.0 kg/cm ² , 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	5	● Coolant leaks	● Visual	No leaks	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section
ON*1	7	● Cooling fan	● CONSULT	Operating	See "TROUBLE DIAGNOSIS FOR DTC P1900" (EC-226)
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA section
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM section
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM section

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section.

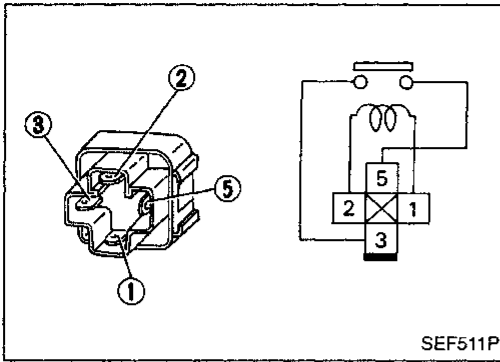
TROUBLE DIAGNOSIS FOR DTC P1900

Cooling Fan (DTC: 1308) (Cont'd)

COMPONENT INSPECTION

Cooling fan relay-1

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.

GI

MA

EM

LC

EC

FE

CL

MT

AT

FA

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BR

ST

RS

BT

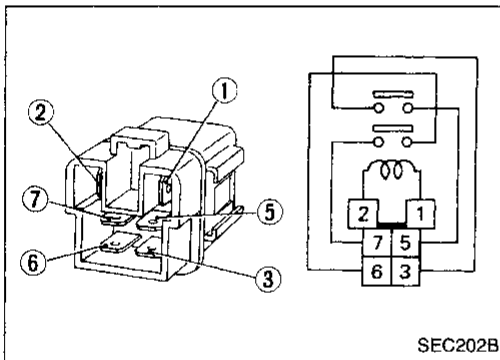
HA

EL

IDX

Cooling fan relays-2 and -3

Check continuity between terminals ③ and ⑤, ⑥ and ⑦

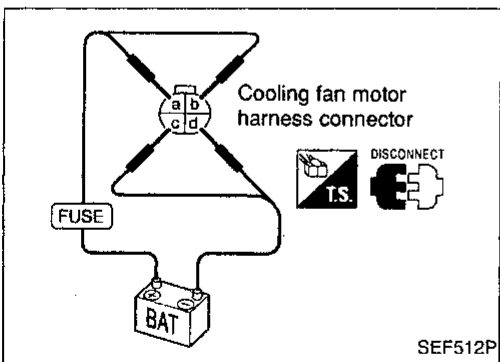


Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

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	Low	a	d
	High	a, b	c, d

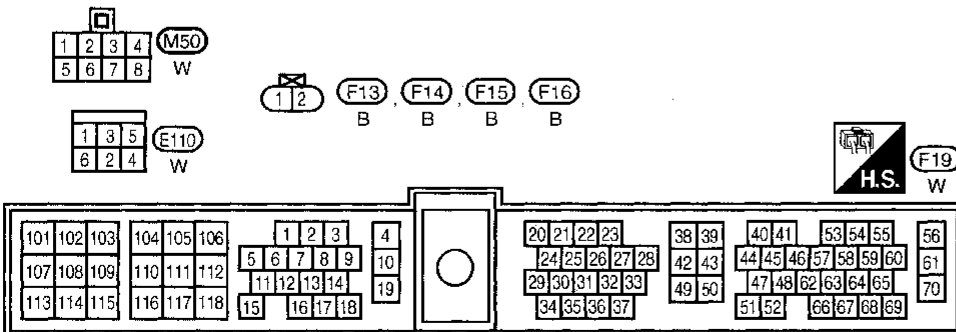
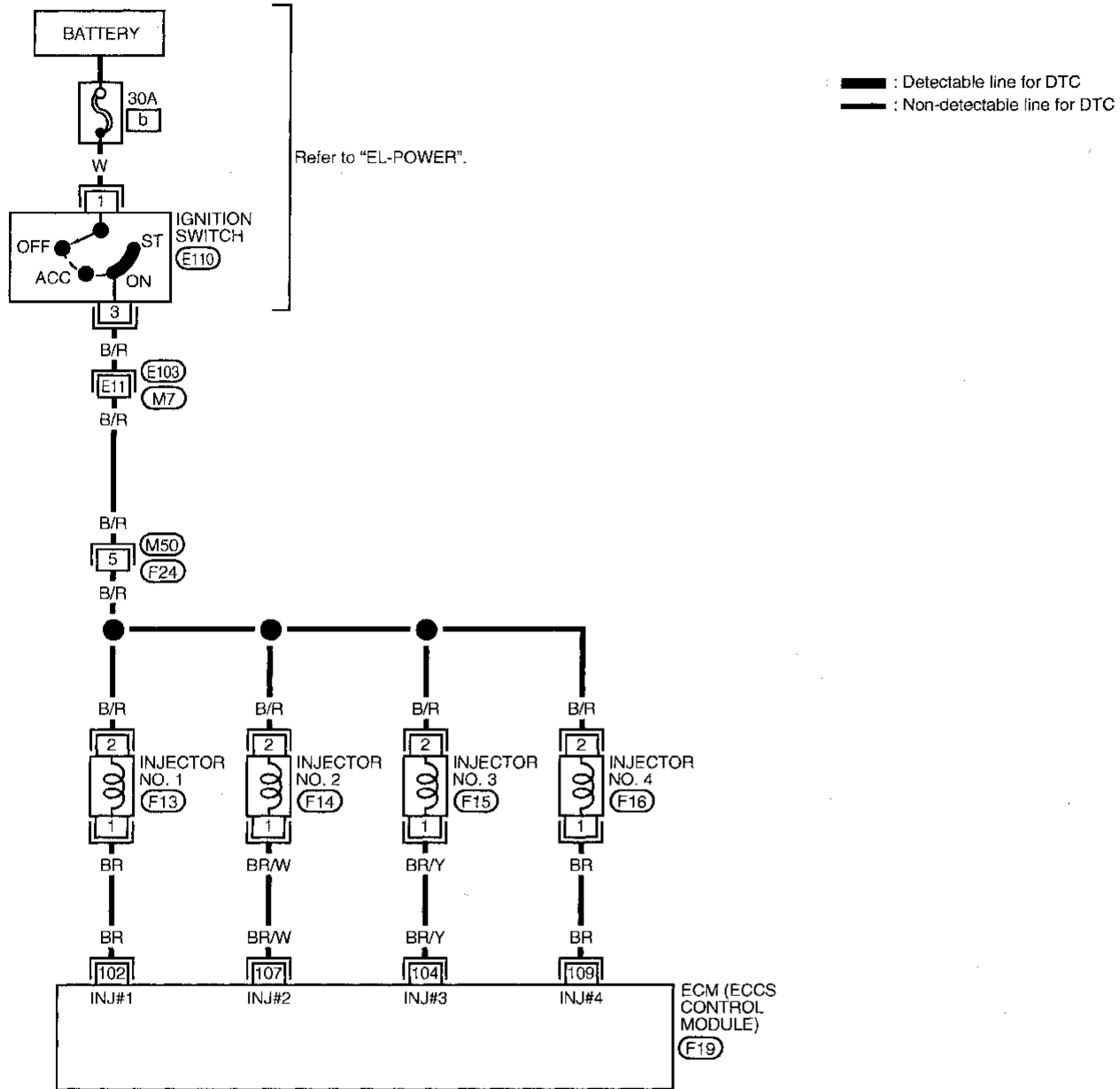
Cooling fan motor should operate.

If NG, replace cooling fan motor.

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector

EC-INJECT-01



Refer to last page (Foldout page).

(M7), (E103)

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.

GI
MA
EM

LC

EC

FE

CL

MT

AT

FA

RA

BR

ST

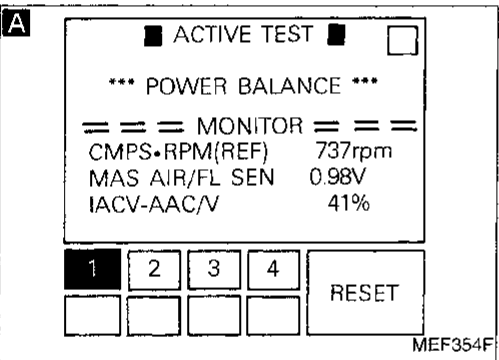
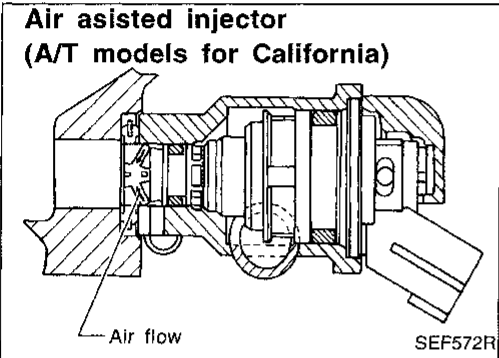
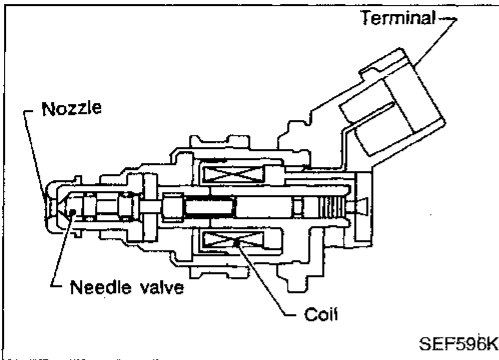
RS

BT

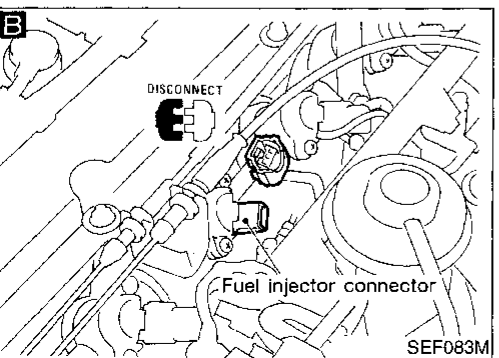
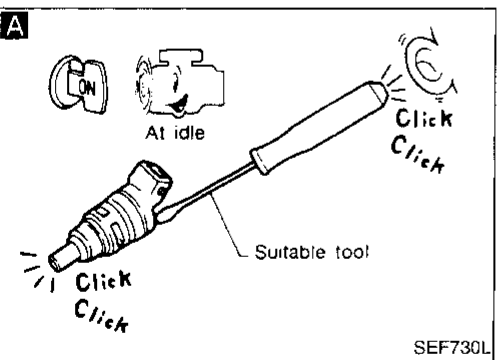
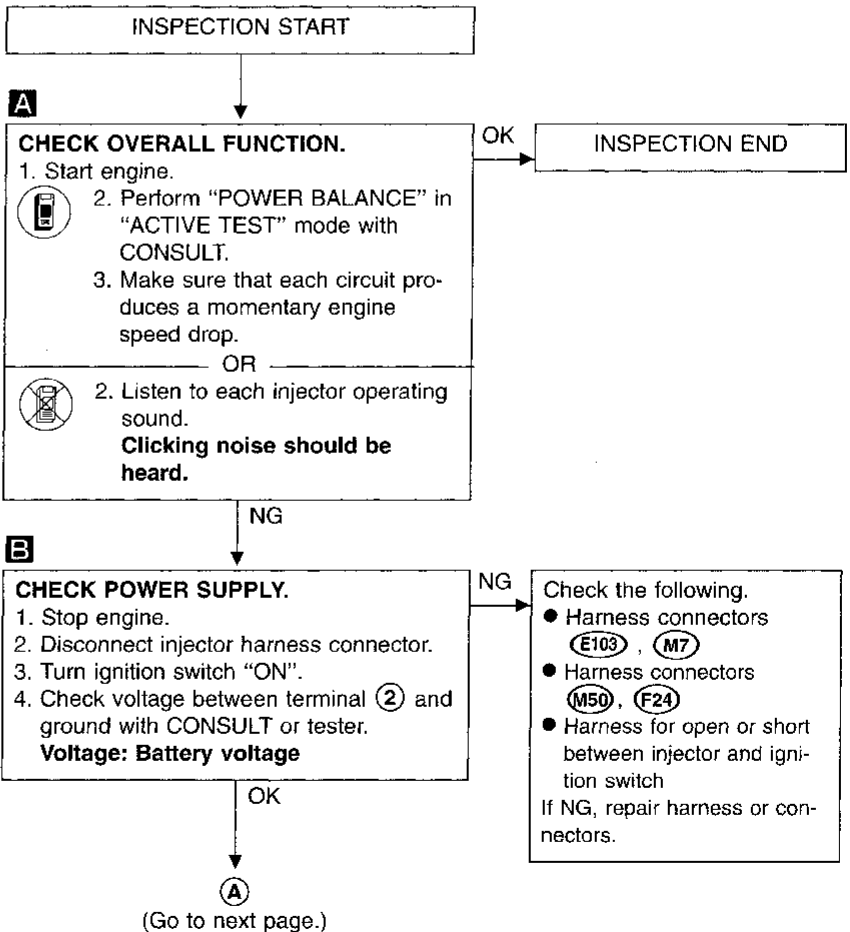
HA

EL

IDX

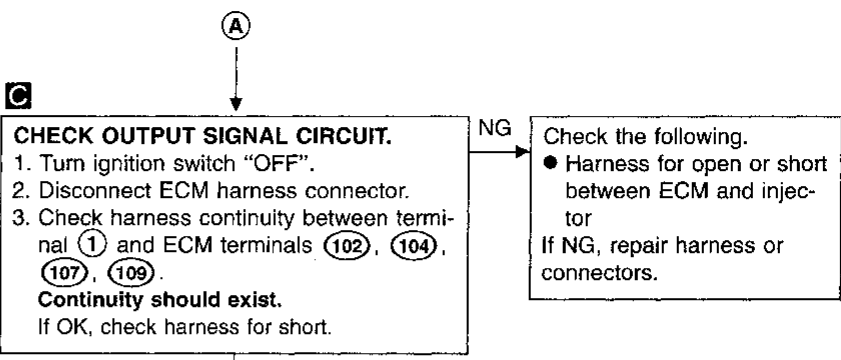
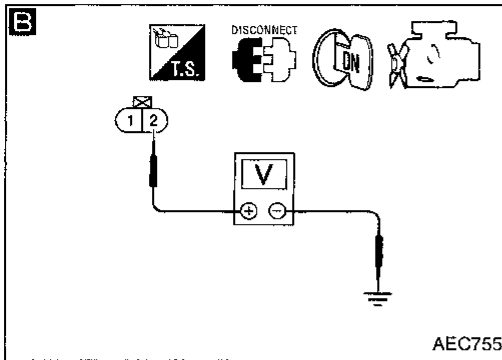


DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Injector (Cont'd)



C

CHECK OUTPUT SIGNAL CIRCUIT.

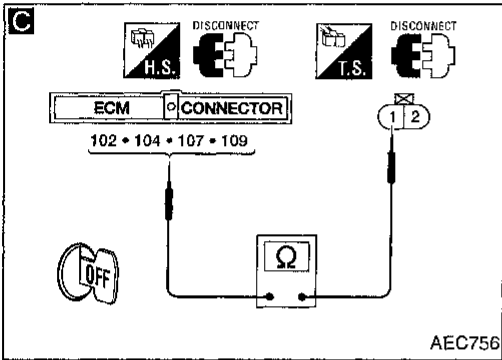
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminals ⑩②, ⑩④, ⑩⑦, ⑩⑨.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.

- Harness for open or short between ECM and injector

If NG, repair harness or connectors.



CHECK COMPONENT (Injector).
Refer to "COMPONENT INSPECTION" below.

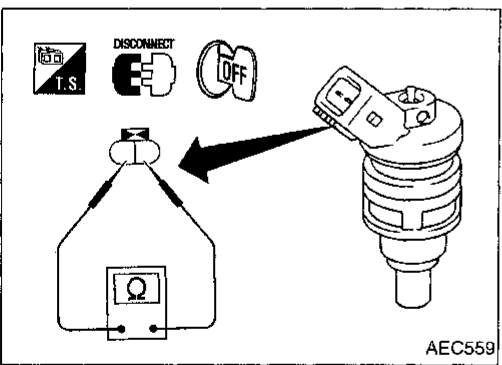
NG → Replace injector.

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

Trouble is not fixed.

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

INSPECTION END



COMPONENT INSPECTION

Injector

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
Resistance: 10 - 14Ω at 25°C (77°F)
If NG, replace injector.

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Start Signal

EC-S/SIG-01

GI

MA

EM

LC

EC

FE

CL

MT

AT

FA

RA

BR

ST

RS

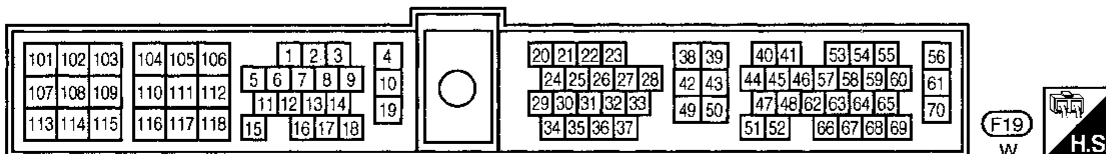
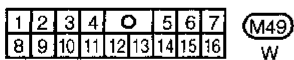
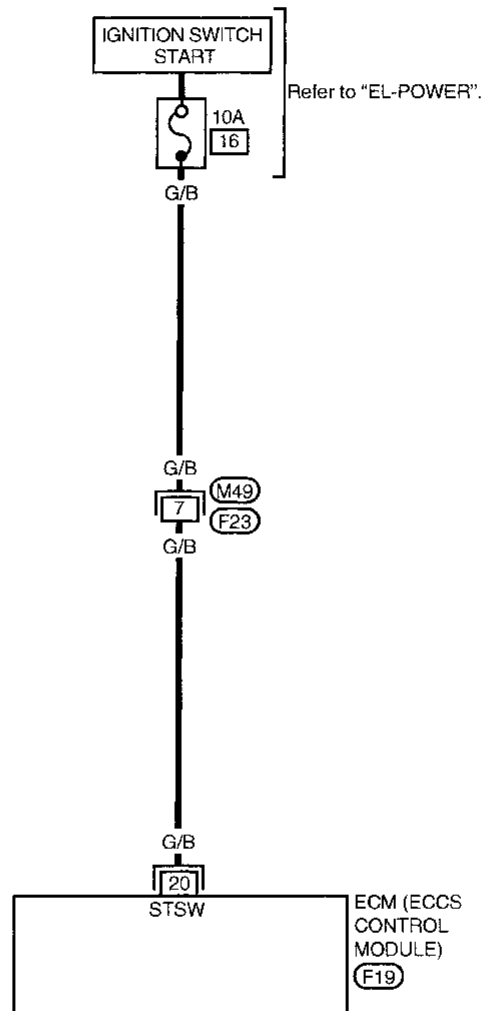
BT

HA

EL

IDX

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



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Start Signal (Cont'd) DIAGNOSTIC PROCEDURE

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

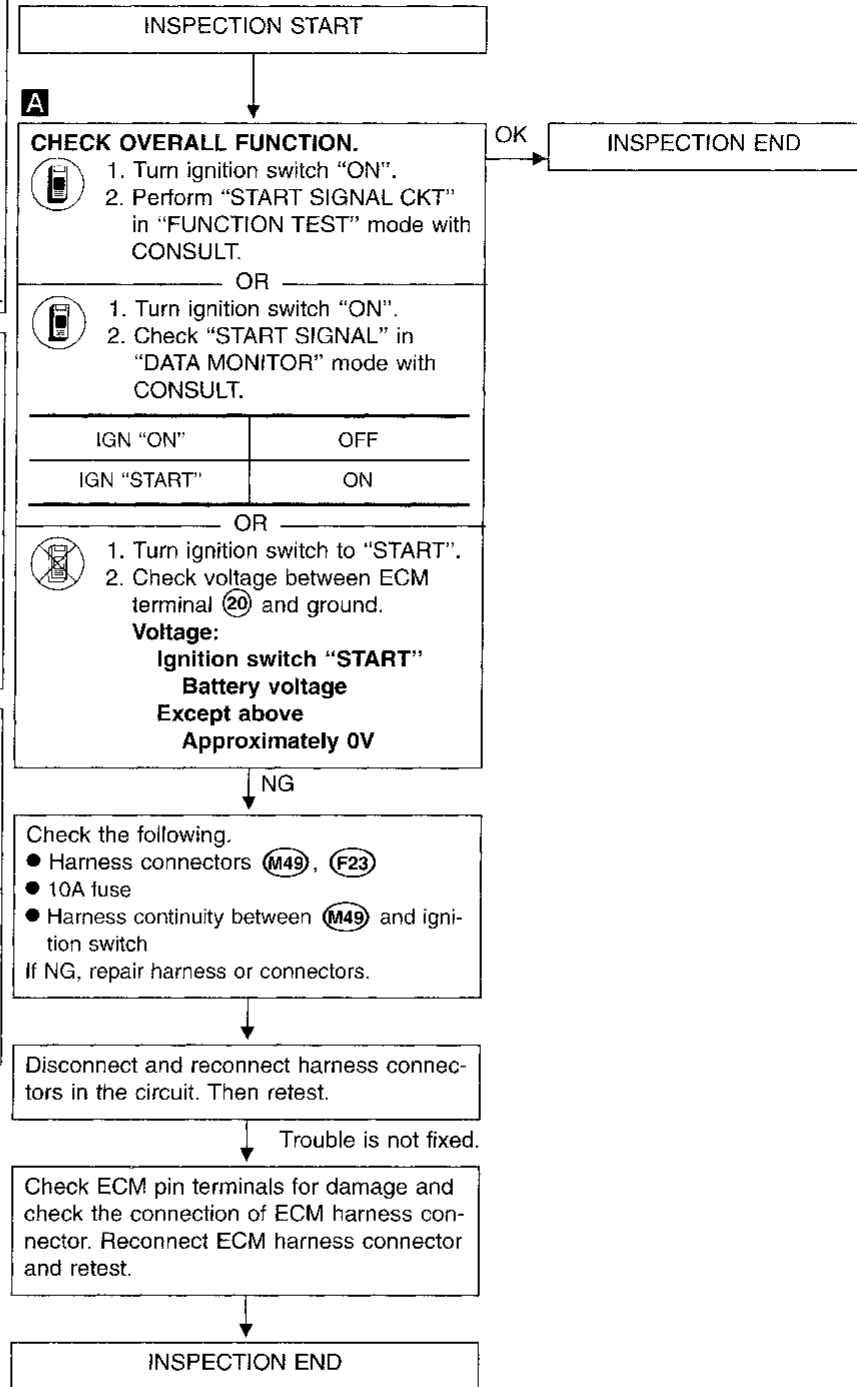
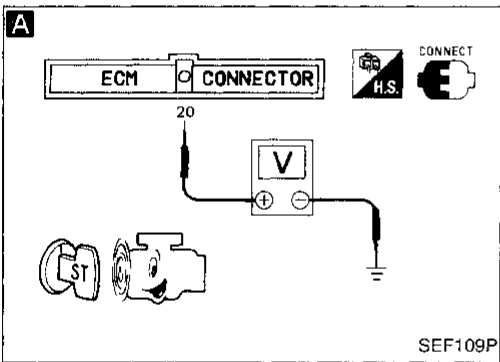
CLSD TH/P SW ON

AIR COND SIG OFF

P/N POSI SW ON

RECORD

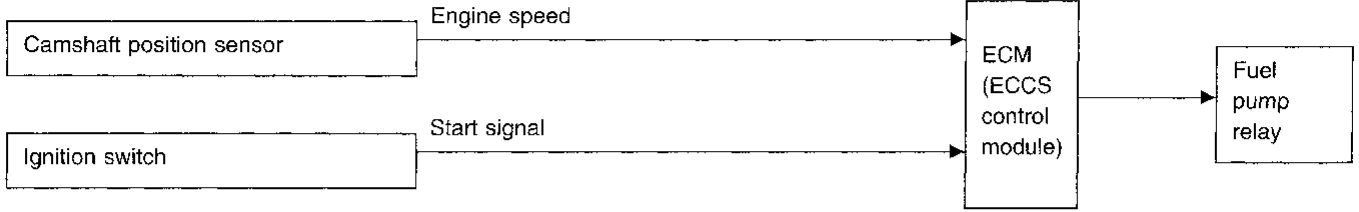
SEF111P



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

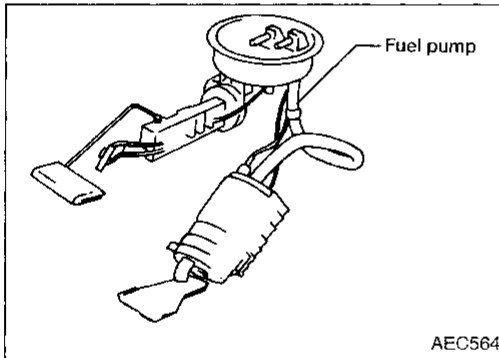
Fuel Pump

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



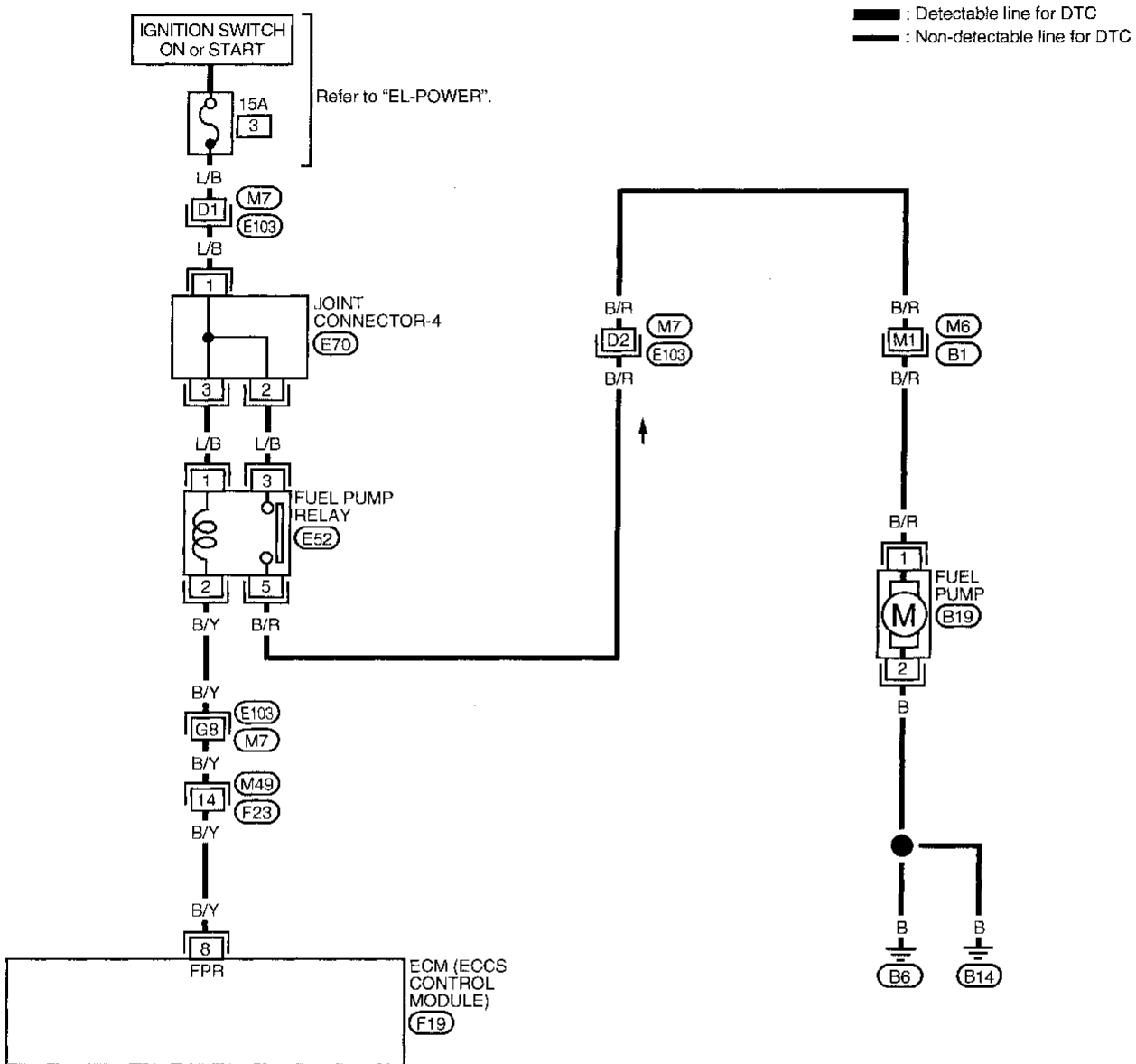
COMPONENT DESCRIPTION

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

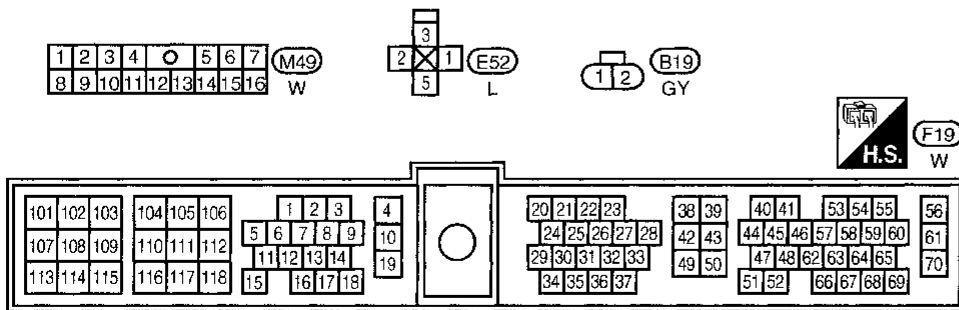
Fuel Pump (Cont'd)

EC-F/PUMP-01



Refer to last page (Foldout page).

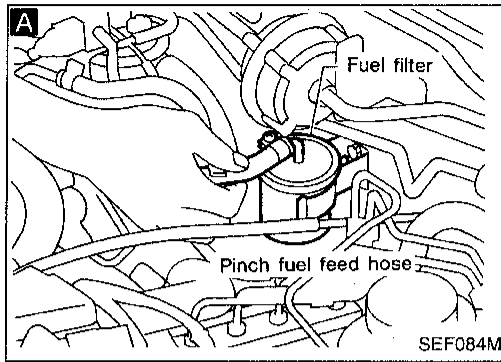
- (M6), (B1)
- (M7), (E103)
- (E70)



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd)

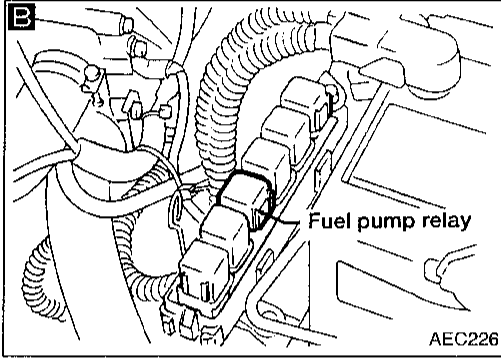
DIAGNOSTIC PROCEDURE



INSPECTION START

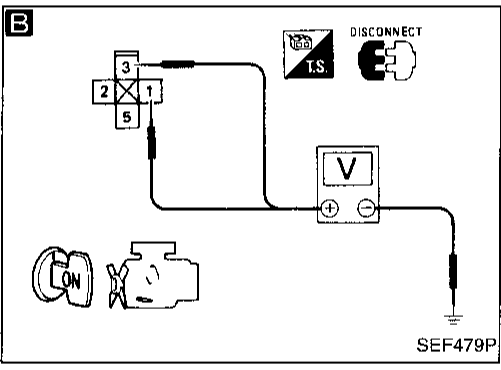
A
CHECK OVERALL FUNCTION.
 1. Turn ignition switch "ON".
 2. Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

OK → INSPECTION END



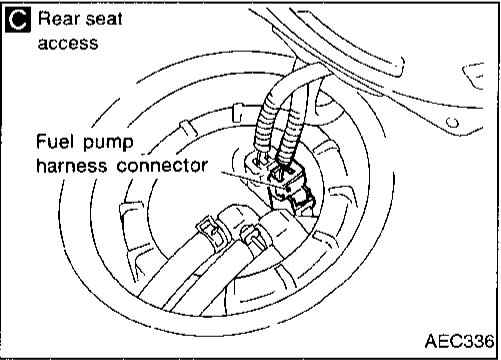
B
CHECK POWER SUPPLY.
 1. Turn ignition switch "OFF".
 2. Disconnect fuel pump relay.
 3. Turn ignition switch "ON".
 4. Check voltage between terminals ①, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
 ● 15A fuse
 ● Harness for open or short between fuse and fuel pump relay
 ● Joint connector-4
 ● Harness connectors (M7, E103)
 If NG, repair harness or connectors.



C
CHECK GROUND CIRCUIT.
 1. Turn ignition switch "OFF".
 2. Disconnect fuel pump harness connector.
 3. Check harness continuity between terminal ② and body ground, terminal ① and terminal ⑤.
Continuity should exist.
 If OK, check harness for short.

NG → Check the following.
 ● Harness connectors (M7, E103)
 ● Harness connectors (M6, B1)
 ● Harness for open or short between fuel pump and body ground
 ● Harness for open or short between fuel pump and fuel pump relay
 If NG, repair harness or connectors.



D
CHECK OUTPUT SIGNAL CIRCUIT.
 1. Disconnect ECM harness connector.
 2. Check harness continuity between ECM terminal ⑧ and terminal ②.
Continuity should exist.
 If OK, check harness for short.

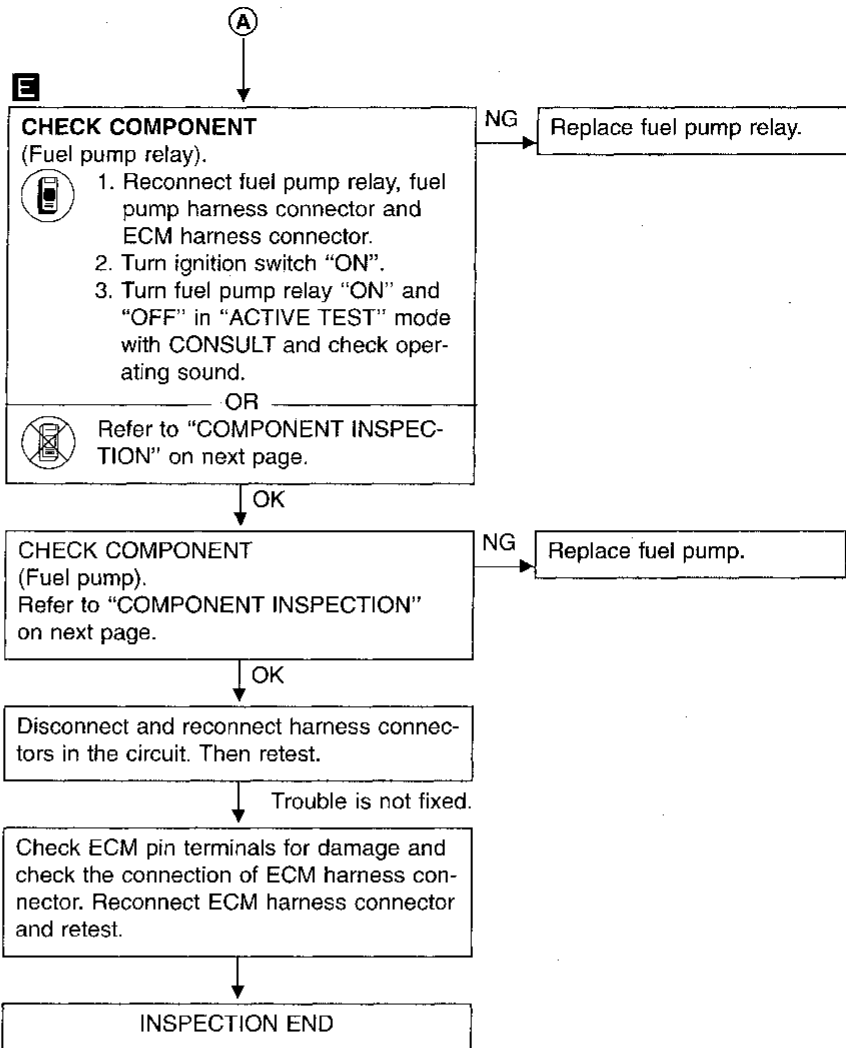
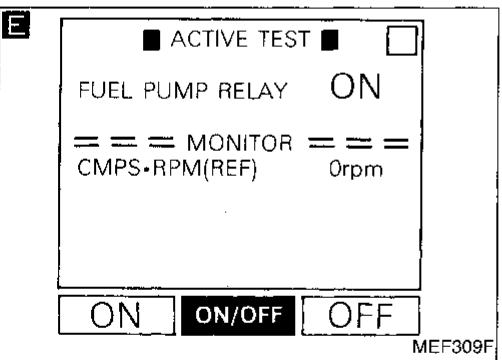
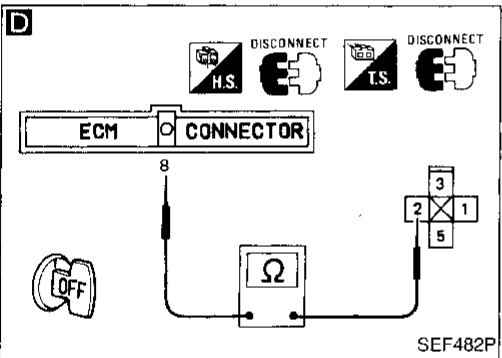
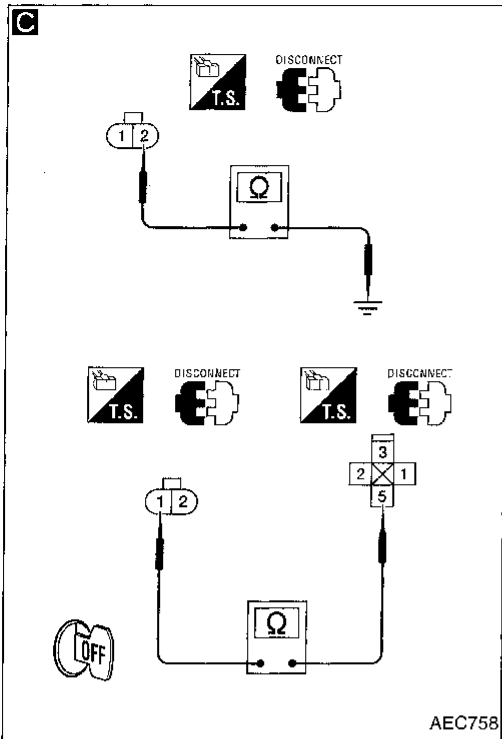
NG → Check the following.
 ● Harness connectors (M7, E103)
 ● Harness connectors (M49, F23)
 ● Harness for open or short between ECM and fuel pump relay
 If NG, repair harness or connectors.

OK → (Go to next page.)

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

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Fuel Pump (Cont'd)



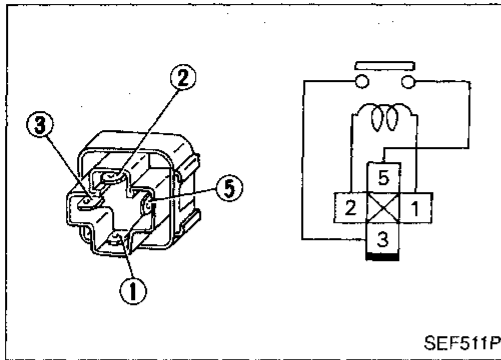
TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

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

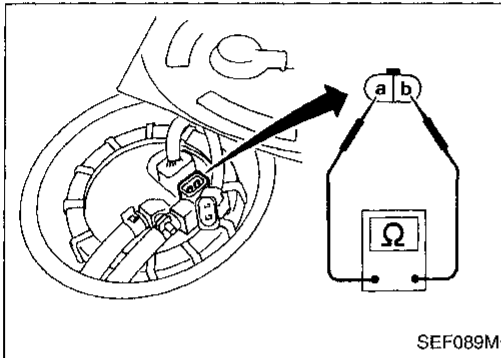
If NG, replace relay.

Fuel pump

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

Resistance: 0.2 - 5.0Ω at 25°C (77°F)

If NG, replace fuel pump.



GI

MA

EM

LC

EC

FE

CL

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FA

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BR

ST

RS

BT

HA

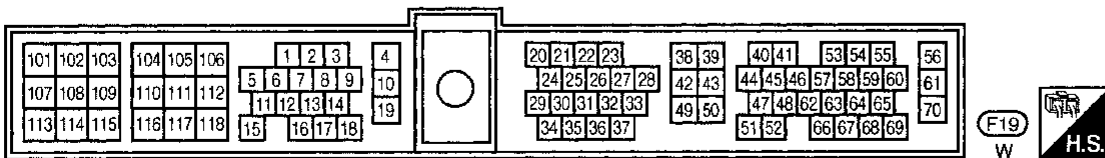
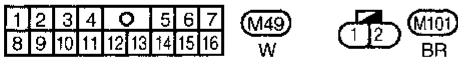
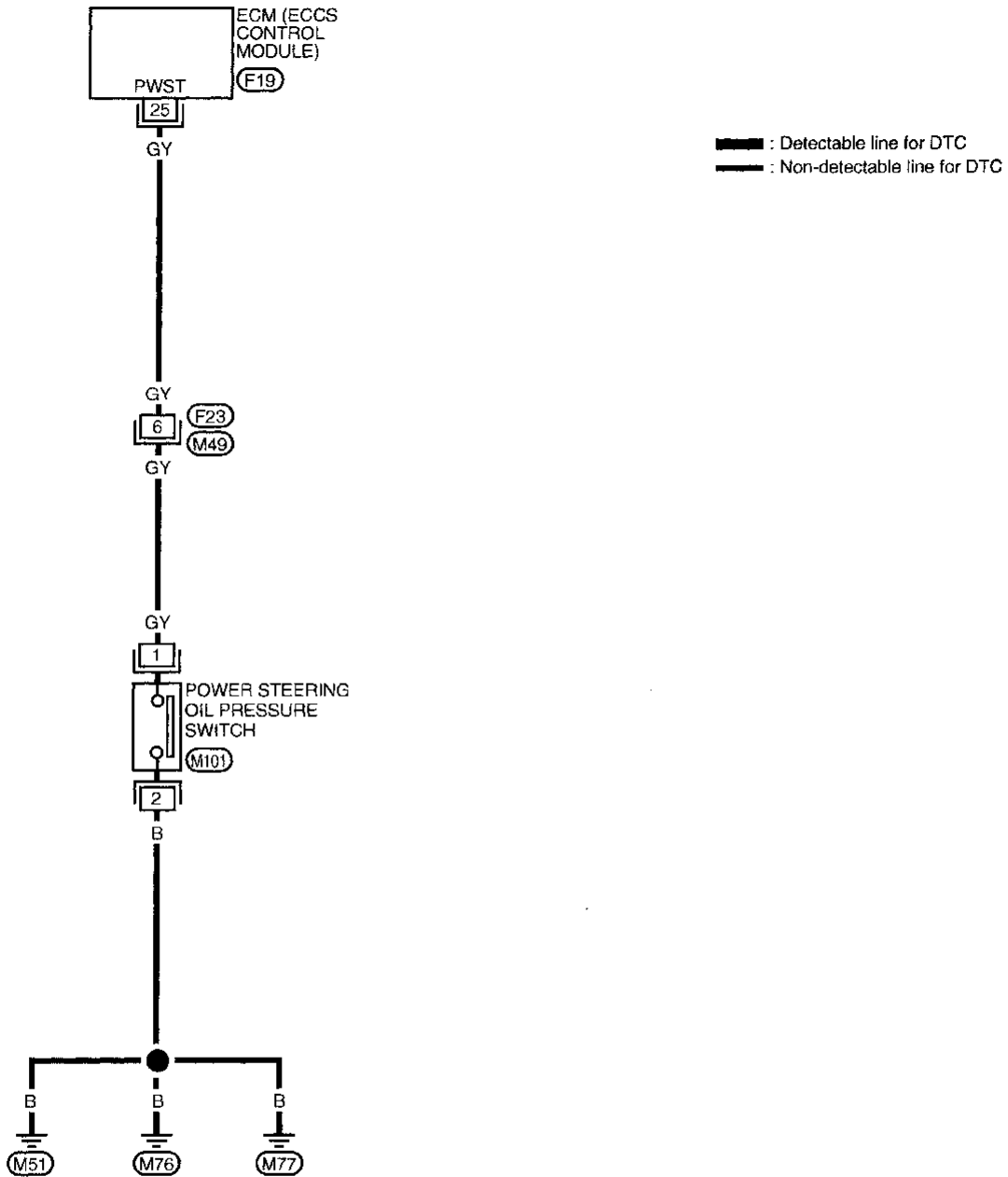
EL

IDX

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch

EC-PST/SW-01

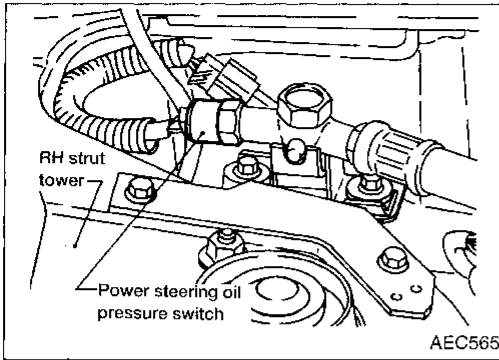


TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd)

COMPONENT DESCRIPTION

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-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

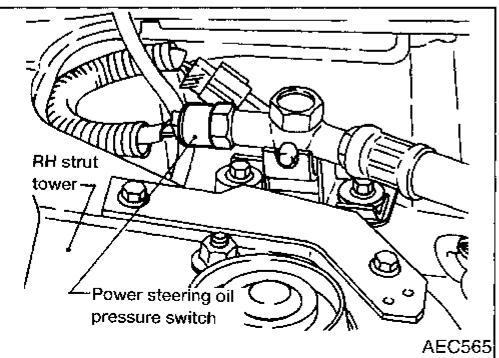
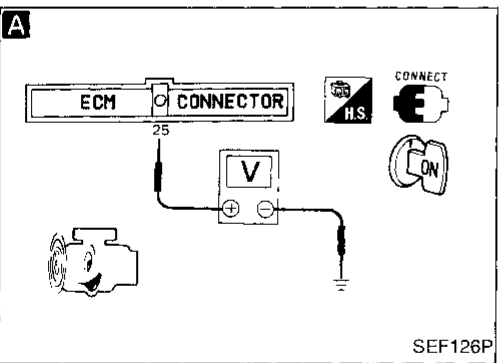
A

☆ MONITOR ☆ NO FAIL

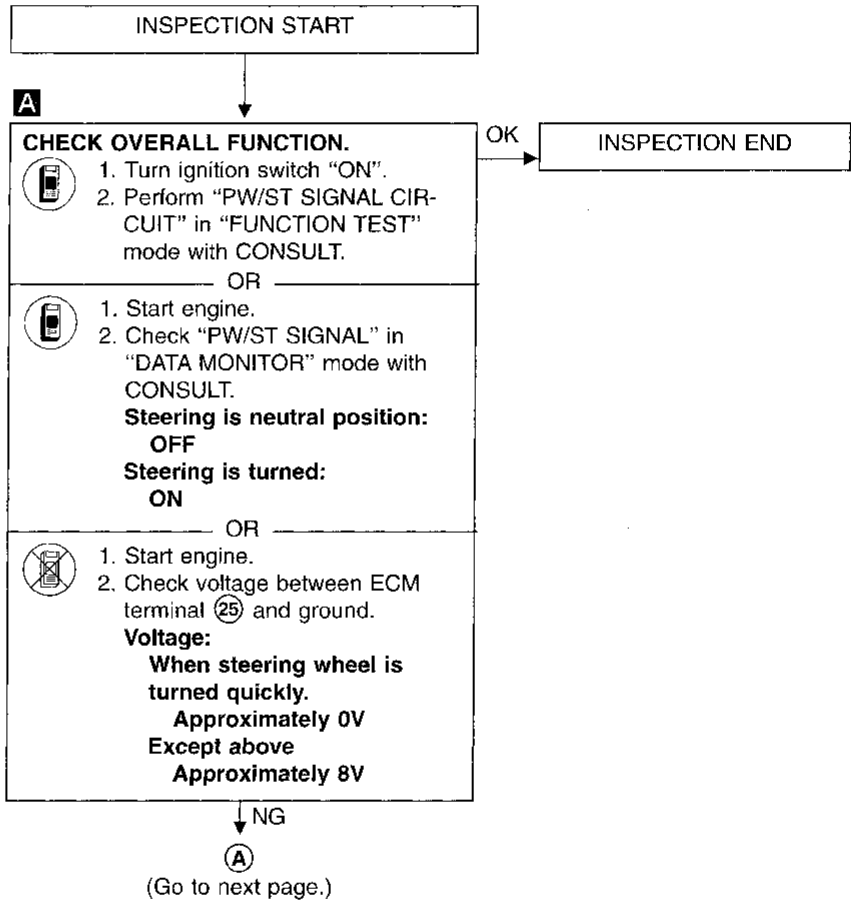
PW/ST SIGNAL OFF

RECORD

SEF591I



DIAGNOSTIC PROCEDURE



GI

MA

EM

LC

EC

FE

CL

MT

AT

FA

RA

BR

ST

RS

BT

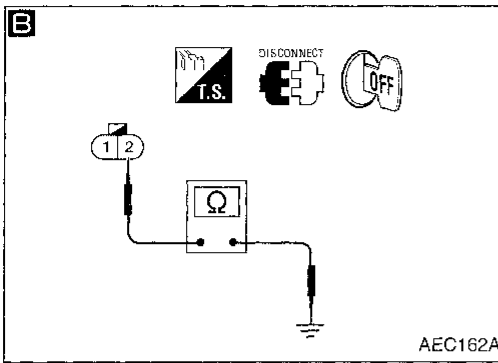
HA

EL

IDX

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Power Steering Oil Pressure Switch (Cont'd)



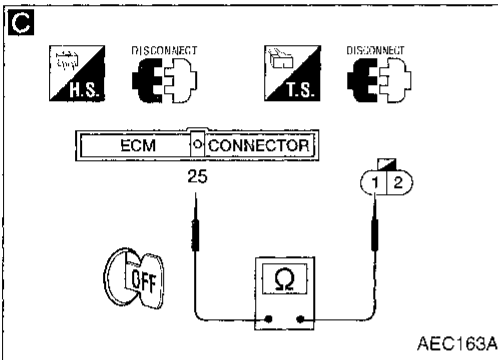
B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between terminal ② and engine ground.

Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.



C

CHECK INPUT SIGNAL CIRCUIT.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ②⑤ and terminal ①.

Continuity should exist.
If OK, check harness for short.

NG → Check the following.

- Harness connectors
- Harness for open or short between ECM and power steering oil pressure switch

If NG, repair harness or connectors.

CHECK COMPONENT
(Power steering oil pressure switch).
Refer to "COMPONENT INSPECTION" below.

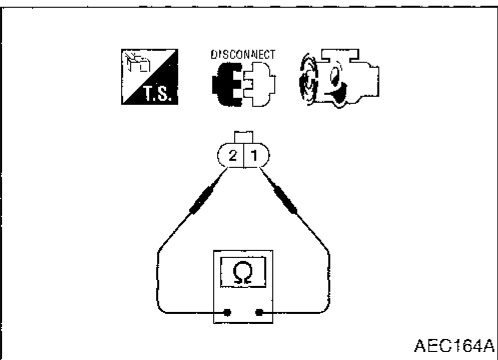
NG → Replace power steering oil pressure switch.

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

↓ Trouble is not fixed.

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

INSPECTION END



COMPONENT INSPECTION

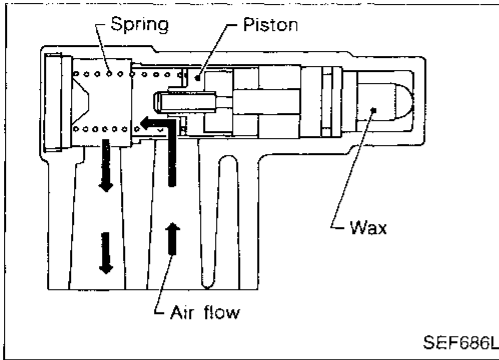
Power steering oil pressure switch

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals ① and ②.

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

If NG, replace power steering oil pressure switch.

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

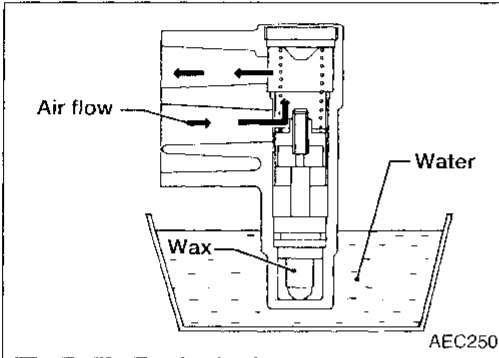


IACV-Air Regulator

COMPONENT DESCRIPTION

The IACV-air regulator contains wax, a piston and a spring. When the engine coolant is cold, the wax is compressed allowing an air by-pass port to open. This provides for a fast idle setting while the engine heats. As the engine coolant warms, the wax expands, closing the air by-pass port and decreasing the idle speed.

GI
MA
EM
LC



COMPONENT INSPECTION

1. Remove IACV-air regulator unit from engine.
2. Immerse IACV-air regulator unit in cold or hot water as shown, and check air flow

EC

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

FE
CL

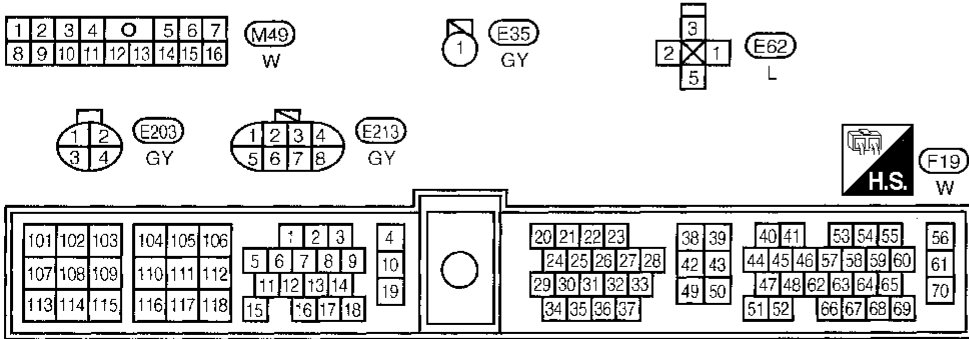
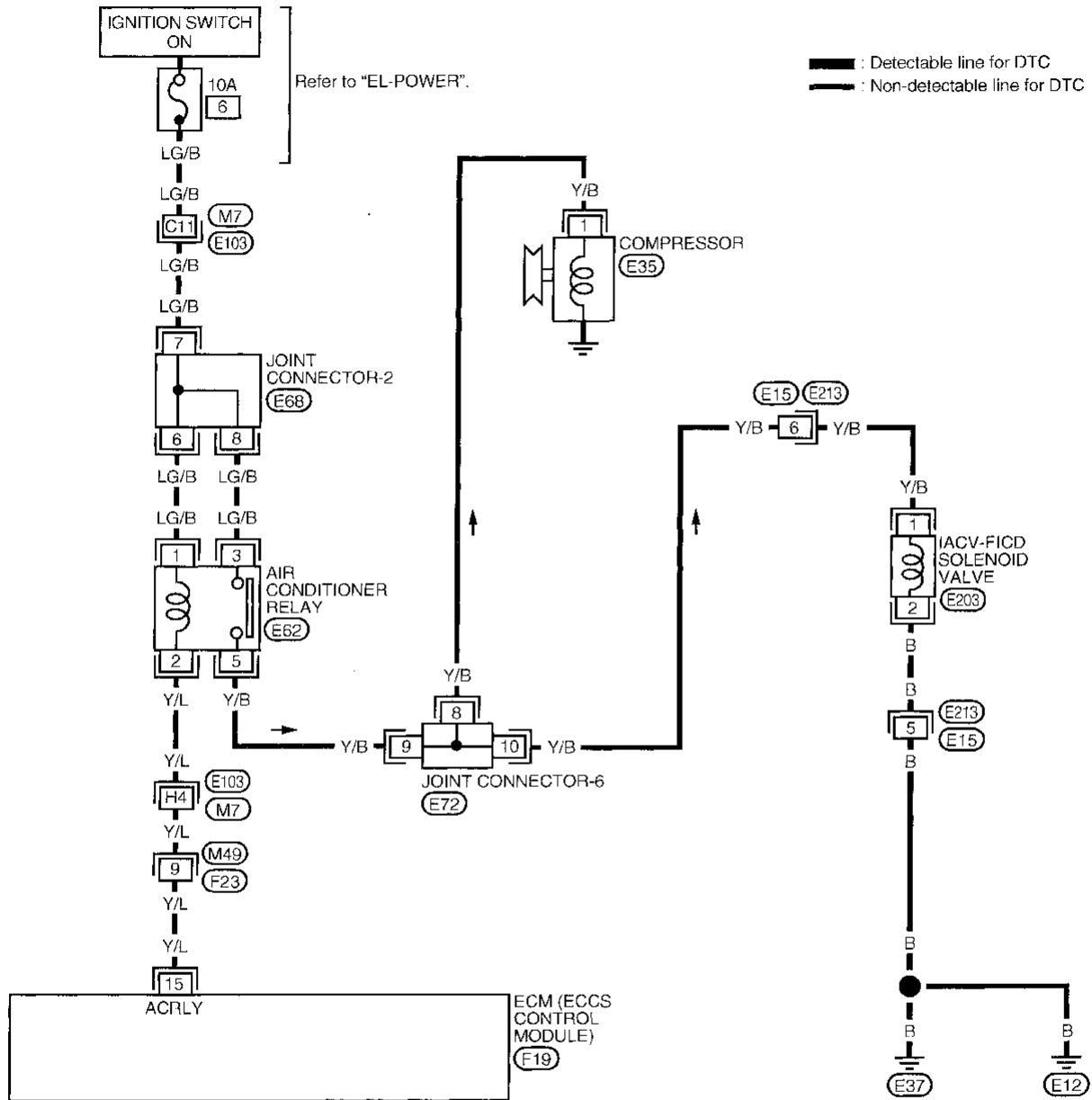
If NG, replace IACV-air regulator unit.

MT
AI
FA
RA
BR
ST
RS
BT
HA
EL
DX

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-FICD Solenoid Valve

EC-FICD-01



Refer to last page (Foldout page).

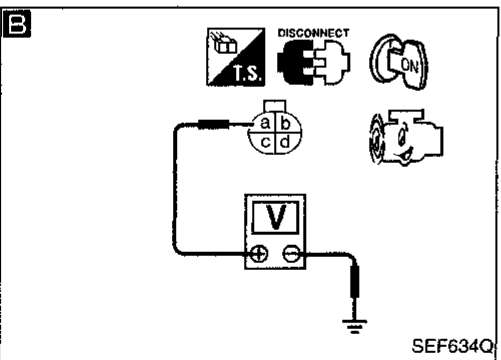
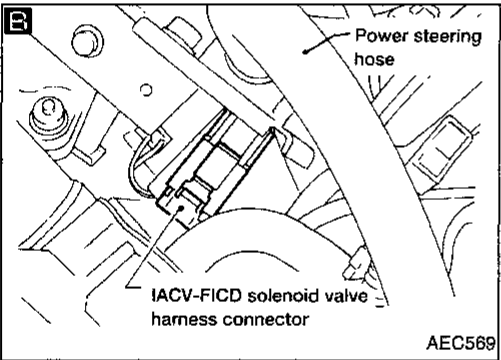
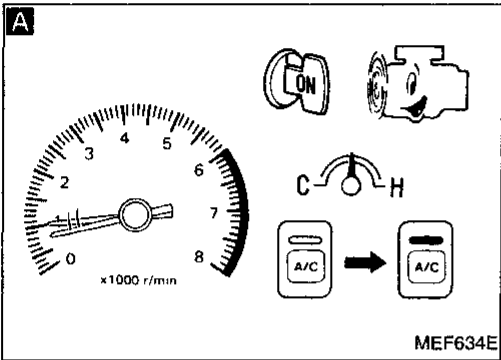
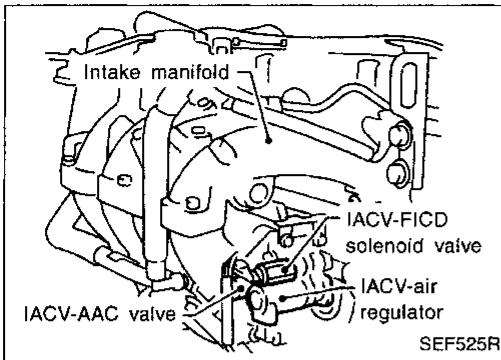
- M7 E103
- E68
- E72

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

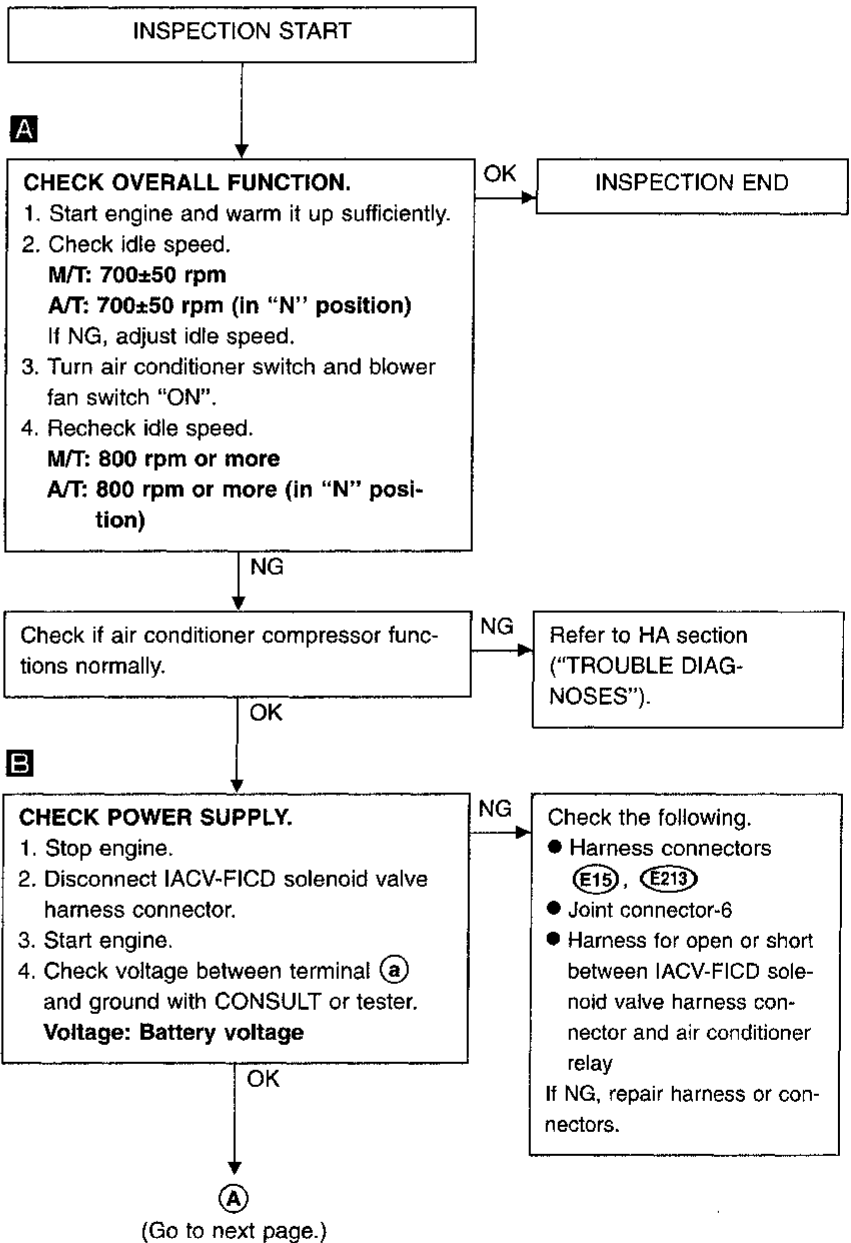
IACV-FICD Solenoid Valve (Cont'd)

COMPONENT DESCRIPTION

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.

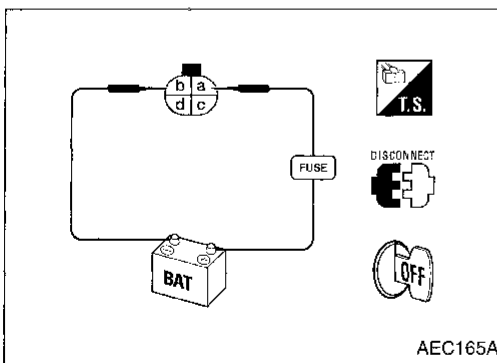
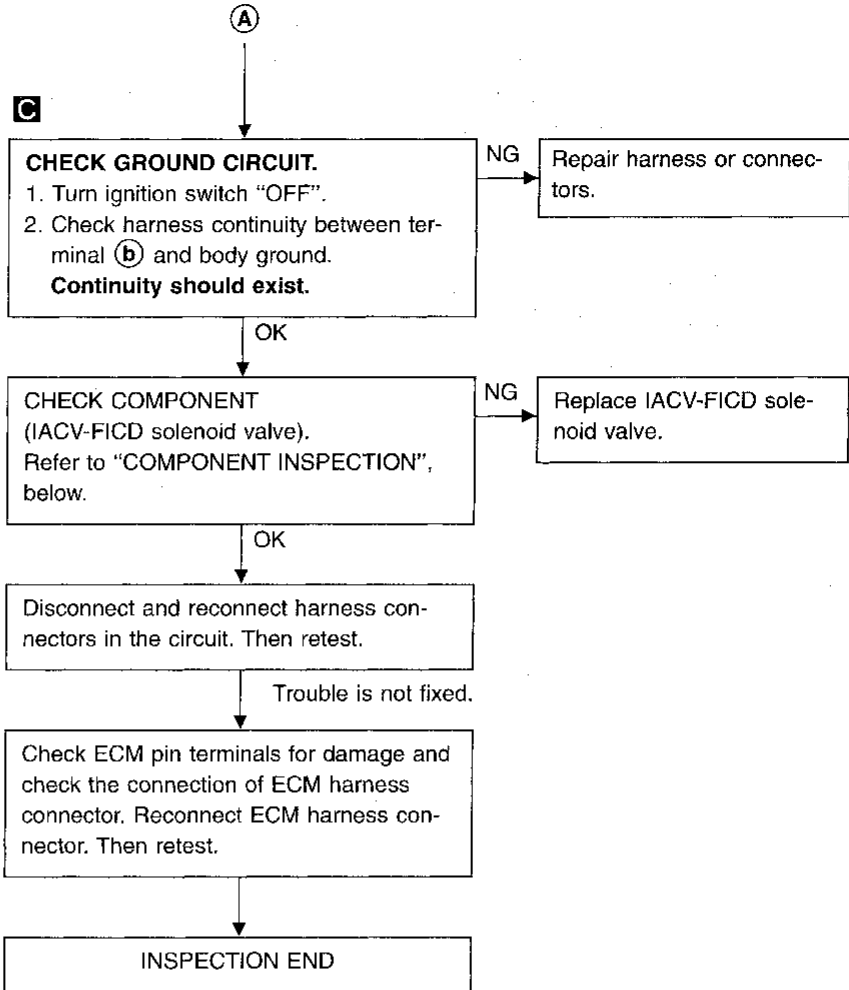
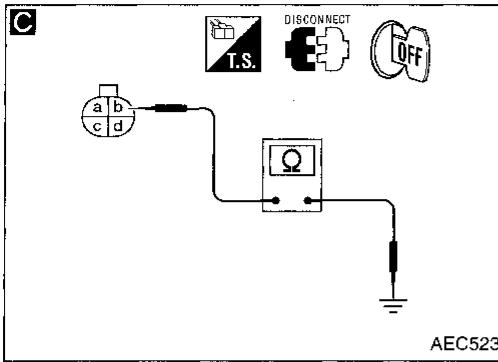


DIAGNOSTIC PROCEDURE



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

IACV-FICD Solenoid Valve (Cont'd)

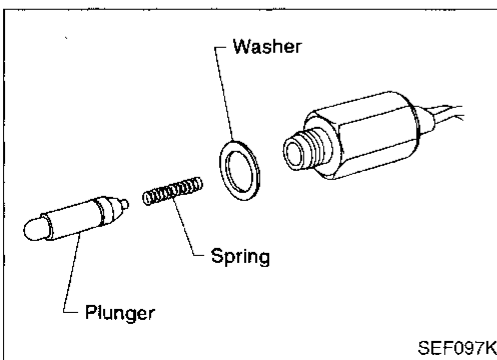


COMPONENT INSPECTION

IACV-FICD solenoid valve

Disconnect IACV-FICD solenoid valve harness connector.

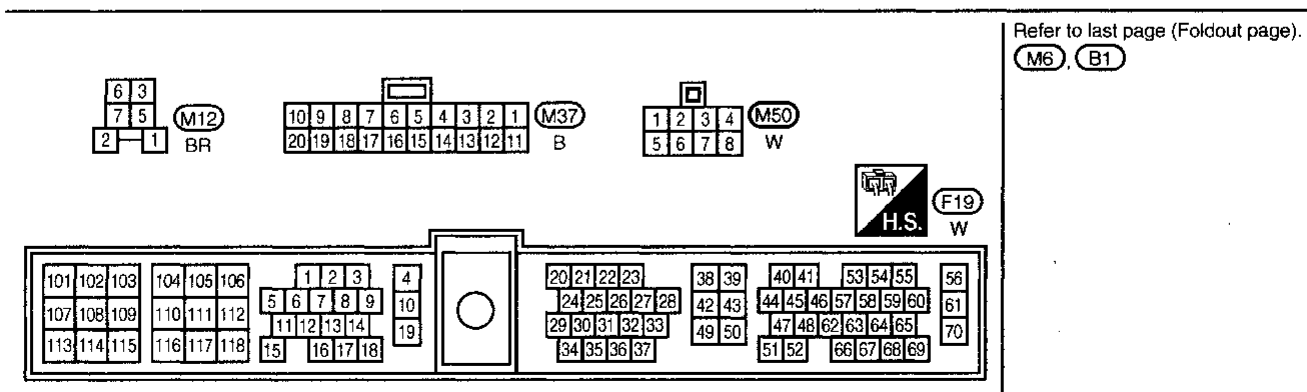
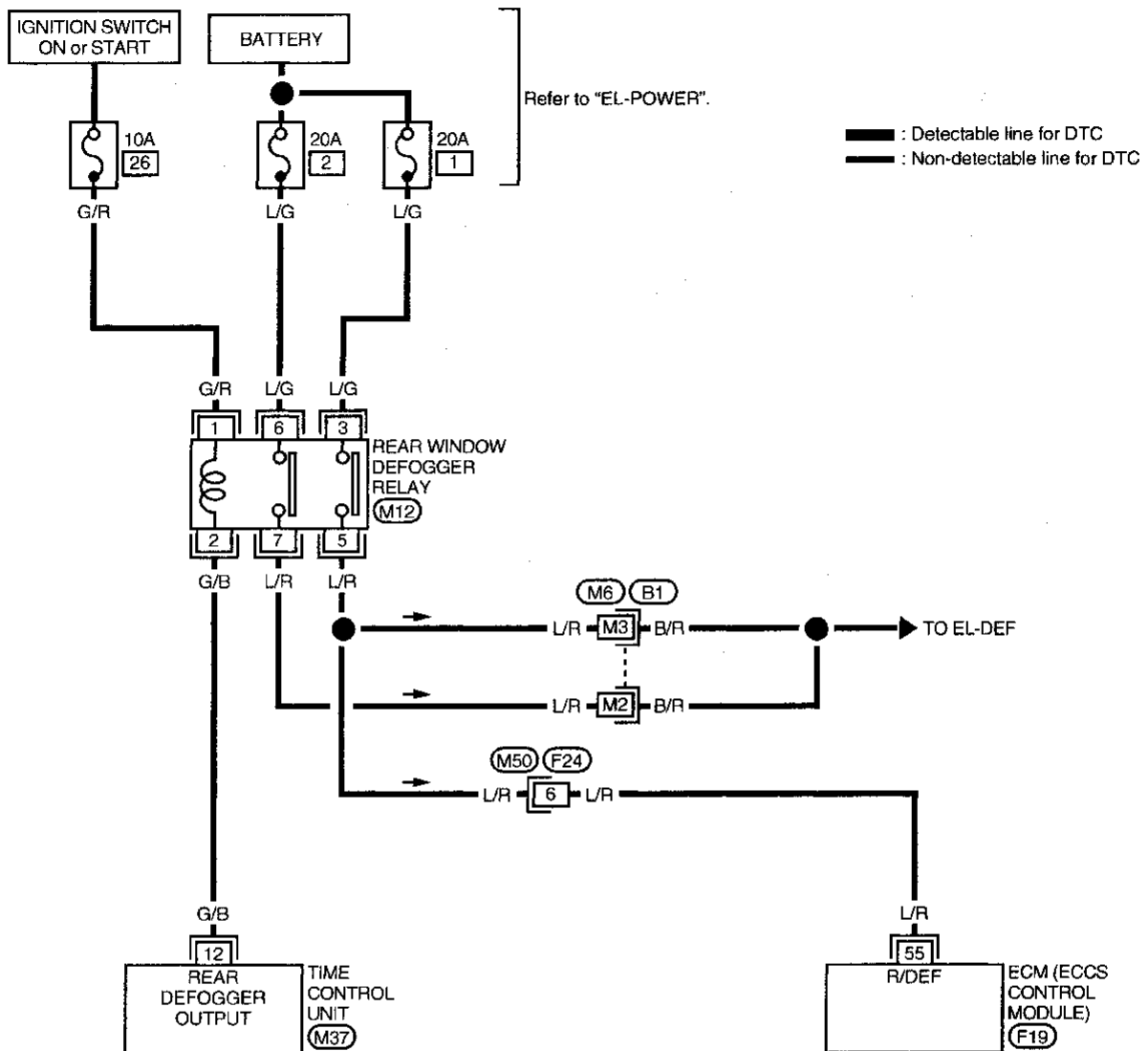
- Check for clicking sound when applying 12V direct current to terminals.
- Check plunger for seizing or sticking.
- Check for broken spring.



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Rear Window Defogger Signal

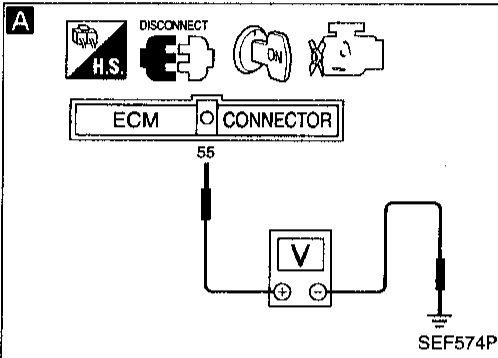
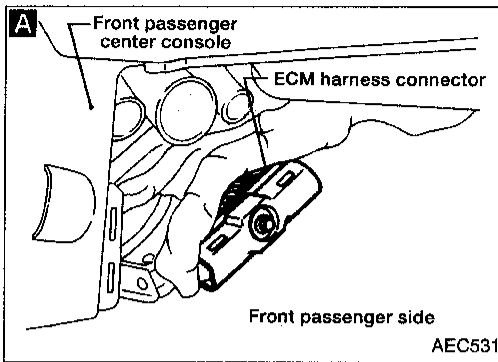
EC-DEF/S -01



TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

Rear Window Defogger Signal (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A
CHECK OVERALL FUNCTION.
 1. Turn ignition switch "OFF".
 2. Disconnect ECM harness connector.
 3. Turn ignition switch "ON".
 4. Check voltage between ECM terminal 55 and ground with CONSULT or tester.
Voltage:
 Rear window defogger "ON"
 Battery positive voltage
 Rear window defogger "OFF"
 0V

NG

Check the following.

- Harness connectors (M50, F24)
- Harness connectors (M6, B1)
- Harness for open or short between ECM and rear window defogger relay
- Harness for open or short between time control unit and rear window defogger relay

Refer to EL section ("REAR WINDOW DEFOGGER").

If NG, repair harness or connectors.

OK

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

Trouble is not fixed.

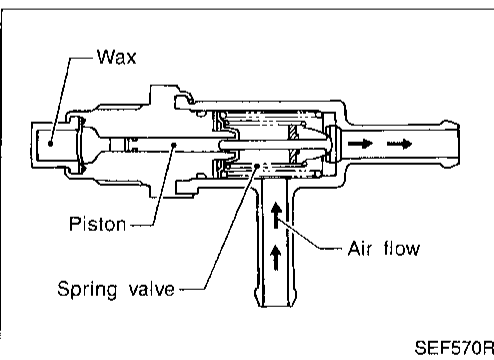
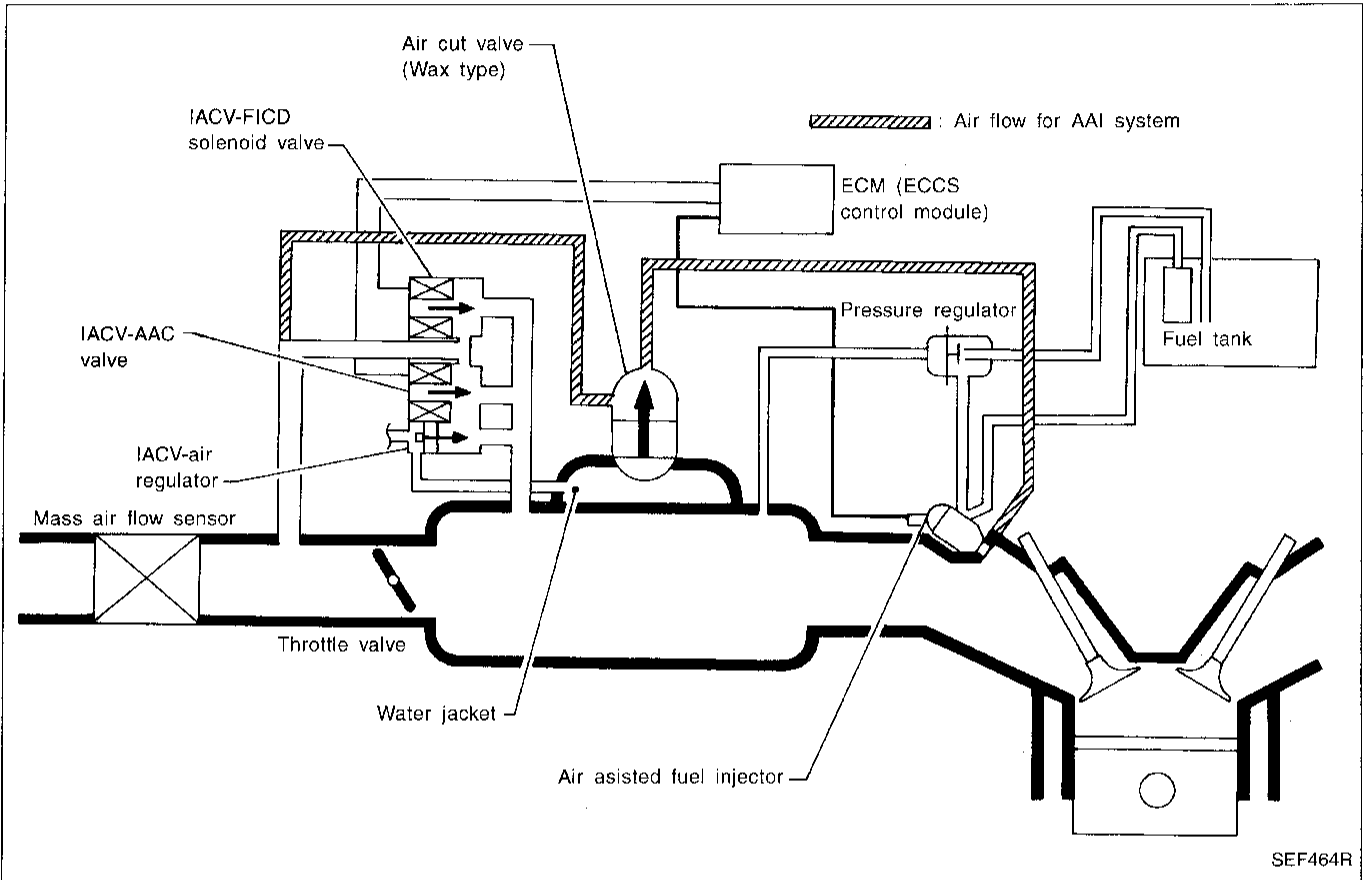
Check ECM pin terminals for damage and check loose connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Air Assisted Injector System (A/T models for California)

SYSTEM DESCRIPTION

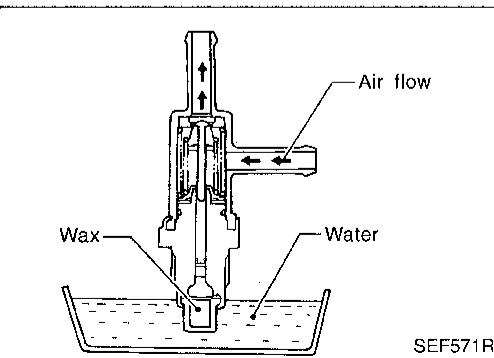
Air injected from the fuel injector tip accelerates the fuel atomization to improve exhaust emissions. The air is injected through the air cut valve which turns ON and OFF according to the engine coolant temperature.



Air Cut Valve

COMPONENT DESCRIPTION

The air cut valve contains wax, a piston and a spring valve. When the engine coolant is cold, the wax is compressed allowing an air by-pass port to open. As the engine coolant warms, the wax expands, closing the air by-pass port.



COMPONENT INSPECTION

1. Remove air cut valve from engine.
2. Immerse air cut valve in cold or hot water as shown, and check air flow

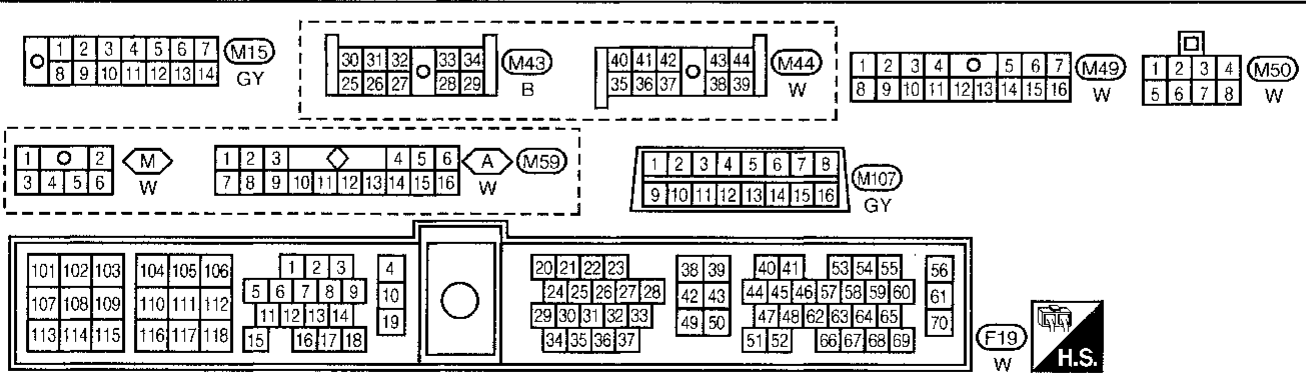
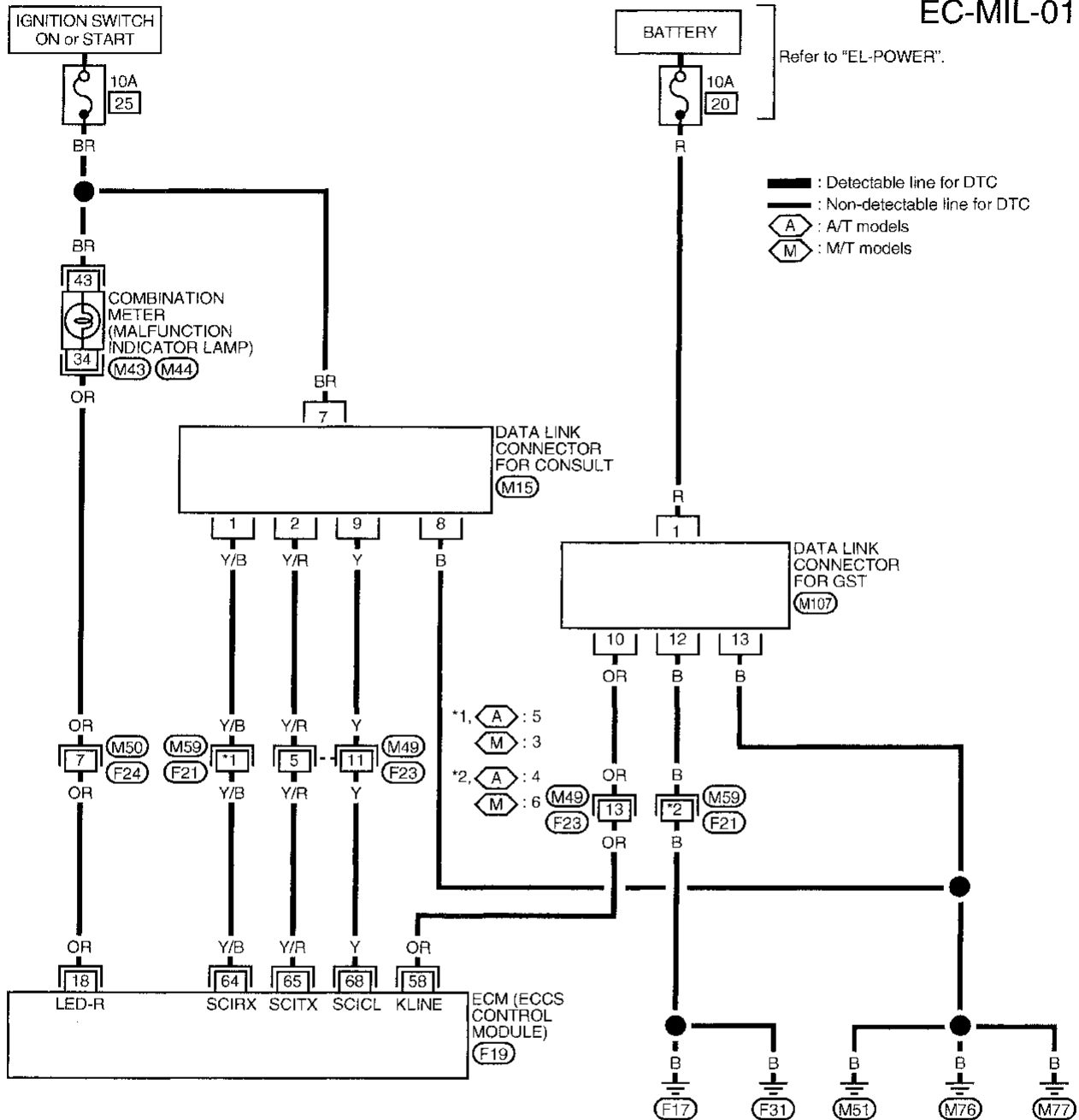
Water temperature	When blowing from air inlet hold
20°C (68°F)	Air flows
80°C (176°F) or more	Almost no air flows

If NG, replace air cut valve.

TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS

MIL & Data Link Connectors

EC-MIL-01



TROUBLE DIAGNOSIS — Index

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

P NO. INDEX FOR DTC

Items (CONSULT screen terms)	DTC*3		Reference page
	ECM*2	CONSULT GST*1	
*COOLANT TEMP SEN	0908	P0125	EC-122
A/T 1ST SIGNAL	1103	P0731	AT section
A/T 2ND SIGNAL	1104	P0732	AT section
A/T 3RD SIGNAL	1105	P0733	AT section
A/T 4TH SIG OR TCC	1106	P0734	AT section
A/T COMM LINE	—	P0600	EC-193
A/T DIAG COMM LINE	0804	P1605	EC-223
CAMSHAFT POSI SEN	0101	P0340	EC-166
CLOSED LOOP	0307	P0130	EC-132
COOLANT TEMP SEN	0103	P0115	EC-113
COOLING FAN	1308	P1900	EC-226
CRANK P/S (OBD) COG	0905	P1336	EC-210
CRANK POS SEN (OBD)	0802	P0335	EC-162
CYL 1 MISFIRE	0608	P0301	EC-155
CYL 2 MISFIRE	0607	P0302	EC-155
CYL 3 MISFIRE	0606	P0303	EC-155
CYL 4 MISFIRE	0605	P0304	EC-155
ECM	0301	P0605	EC-196
EGR SYSTEM	0302	P0400	EC-171
EGR TEMP SENSOR	0305	P1401	EC-218
EGRC SOLENOID/V	1005	P1400	EC-214
EGRC-BPT VALVE	0306	P0402	EC-180
ENGINE SPEED SIG	1207	P0725	AT section
FLUID TEMP SENSOR	1208	P0710	AT section
FR O2 SEN HEATER	0901	P0135	EC-133
FRONT O2 SENSOR	0303	P0130	EC-127
FUEL SYS DIAG-LEAN	0115	P0171	EC-145
FUEL SYS DIAG-RICH	0114	P0172	EC-150
IACV-AAC VALVE	0205	P0505	EC-189
IGN SIGNAL-PRIMARY	0201	P1320	EC-205
INHIBITOR SWITCH	1101	P0705	AT section
INT AIR TEMP SEN	0401	P0110	EC-108
KNOCK SENSOR	0304	P0325	EC-159
LINE PRESSURE S/V	1205	P0745	AT section
MASS AIR FLOW SEN	0102	P0100	EC-103
MULTI CYL MISFIRE	0701	P0300	EC-155
OVERRUN CLUTCH S/V	1203	P1760	AT section
PARK/NEUT POSI SW	1003	P0705	EC-198
RR O2 SEN HEATER	0902	P0141	EC-141
REAR O2 SENSOR	0707	P0136	EC-136
SHIFT SOLENOID/V A	1108	P0750	AT section
SHIFT SOLENOID/V B	1201	P0755	AT section
THROTTLE POSI SEN	0403	P0120	EC-117
THRTL POSI SEN A/T	1206	P1705	AT section
TOR CONV CLUTCH SV	1204	P0740	AT section
TW CATALYST SYS	0702	P0420	EC-182
VEHICLE SPEED SEN	0104	P0500	EC-185
VHCL SPEED SEN A/T	1102	P0720	AT section

DTC*3		Items (CONSULT screen terms)	Reference page
CONSULT GST*1	ECM*2		
P0000	0505	NO SELF DIAGNOSTIC FAILURE INDICATED	—
P0100	0102	MASS AIR FLOW SEN	EC-103
P0110	0401	INT AIR TEMP SEN	EC-108
P0115	0103	COOLANT TEMP SEN	EC-113
P0120	0403	THROTTLE POSI SEN	EC-117
P0125	0908	*COOLANT TEMP SEN	EC-122
P0130	0307	CLOSED LOOP	EC-132
P0130	0303	FRONT O2 SENSOR	EC-127
P0135	0901	FR O2 SEN HEATER	EC-133
P0136	0707	REAR O2 SENSOR	EC-136
P0141	0902	RR O2 SEN HEATER	EC-141
P0171	0115	FUEL SYS DIAG-LEAN	EC-145
P0172	0114	FUEL SYS DIAG-RICH	EC-150
P0300	0701	MULTI CYL MISFIRE	EC-155
P0301	0608	CYL 1 MISFIRE	EC-155
P0302	0607	CYL 2 MISFIRE	EC-155
P0303	0606	CYL 3 MISFIRE	EC-155
P0304	0605	CYL 4 MISFIRE	EC-155
P0325	0304	KNOCK SENSOR	EC-159
P0335	0802	CRANK POS SEN (OBD)	EC-162
P0340	0101	CAMSHAFT POSI SEN	EC-166
P0400	0302	EGR SYSTEM	EC-171
P0402	0306	EGRC-BPT VALVE	EC-180
P0420	0702	TW CATALYST SYS	EC-182
P0500	0104	VEHICLE SPEED SEN	EC-185
P0505	0205	IACV-AAC VALVE	EC-189
P0600	—	A/T COMM LINE	EC-193
P0605	0301	ECM	EC-196
P0705	1003	PARK/NEUT POSI SW	EC-198
P0705	1101	INHIBITOR SWITCH	AT section
P0710	1208	FLUID TEMP SENSOR	AT section
P0720	1102	VHCL SPEED SEN A/T	AT section
P0725	1207	ENGINE SPEED SIG	AT section
P0731	1103	A/T 1ST SIGNAL	AT section
P0732	1104	A/T 2ND SIGNAL	AT section
P0733	1105	A/T 3RD SIGNAL	AT section
P0734	1106	A/T 4TH SIG OR TCC	AT section
P0740	1204	TOR CONV CLUTCH SV	AT section
P0745	1205	LINE PRESSURE S/V	AT section
P0750	1108	SHIFT SOLENOID/V A	AT section
P0755	1201	SHIFT SOLENOID/V B	AT section
P1320	0201	IGN SIGNAL-PRIMARY	EC-205
P1336	0905	CRANK P/S (OBD) COG	EC-210
P1400	1005	EGRC SOLENOID/V	EC-214
P1401	0305	EGR TEMP SENSOR	EC-218
P1605	0804	A/T DIAG COMM LINE	EC-223
P1705	1206	THRTL POSI SEN A/T	AT section
P1760	1203	OVERRUN CLUTCH S/V	AT section
P1900	1308	COOLING FAN	EC-226

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

*1: These are prescribed by SAE J2012.

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

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

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)		700±50
Air conditioner: ON (in "N" position)		800 or more
Ignition timing		20°±2° BTDC
Throttle position sensor idle position	V	0.3 - 0.7

*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	Battery voltage (11 - 14)
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 10.0

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	1.0 - 1.7
Mass air flow	gm/sec	1.5 - 4.5 at idle* 5.5 - 13.0 at 2,500 rpm*

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

ENGINE COOLANT TEMPERATURE SENSOR

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

EGR TEMPERATURE SENSOR

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

FUEL PUMP

Resistance [at 25°C (77°F)]	Ω	0.2 - 5.0
-----------------------------	---	-----------

IACV-AAC VALVE

Resistance [at 25°C (77°F)]	Ω	Approximately 10.0
-----------------------------	---	--------------------

INJECTOR

Resistance [at 25°C (77°F)]	Ω	10 - 14
-----------------------------	---	---------

RESISTOR

Resistance [at 25°C (77°F)]	kΩ	Approximately 2.2
-----------------------------	----	-------------------

THROTTLE POSITION SENSOR

Accelerator pedal conditions	Resistance [at 25°C (77°F)]
Completely released	Approximately 0.5 kΩ
Partially released	0.5 - 4.0 kΩ
Completely depressed	Approximately 4.0 kΩ

SERVICE DATA AND SPECIFICATIONS (SDS)

Inspection and Adjustment (Cont'd)

CALCULATED LOAD VALUE

	Calculated load value %
At idle	10.0 - 25.0
At 2,500 rpm	11.0 - 25.5

INTAKE AIR TEMPERATURE SENSOR

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

REAR HEATED OXYGEN SENSOR HEATER

Resistance [at 25°C (77°F)]	Ω	2.3 - 4.3
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CRANKSHAFT POSITION SENSOR (OBD)

Resistance [at 25°C (77°F)]	Ω	432 - 528
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GI

MA

EM

LC

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MT

AT

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ST

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HA

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IDX