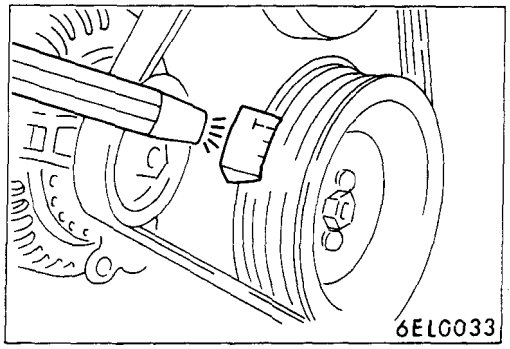
SERVICE ADJUSTMENT PROCEDURES

CURB IDLE SPEED INSPECTION M13FHAB

(1) The vehicle should be prepared as follows before the inspection.

- Engine coolant temperature: 85–95°C (185–205°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: Neutral (P for vehicles with an automatic transaxle)

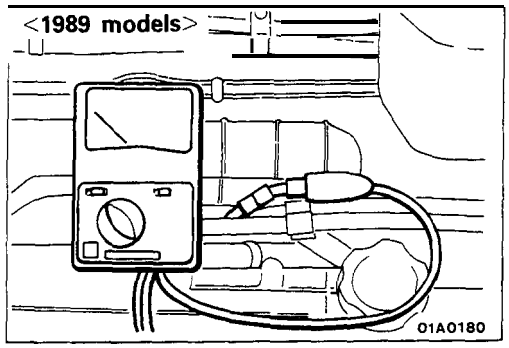


(2) Connect a tachometer.

NOTE
1. Refer to P.13-246 for information concerning connection of a tachometer.
2. For tachometer, one-half of the actual engine rpm is indicated, so the actual engine rpm in two times the indicated value shown by the tachometer. <From 1990 models>

(3) Set a timing light in position.
(4) Ground the terminal for adjustment of ignition timing.
(5) Start the engine and let it idle.
(6) Check whether or not the ignition timing is the standard value; if not, adjust.

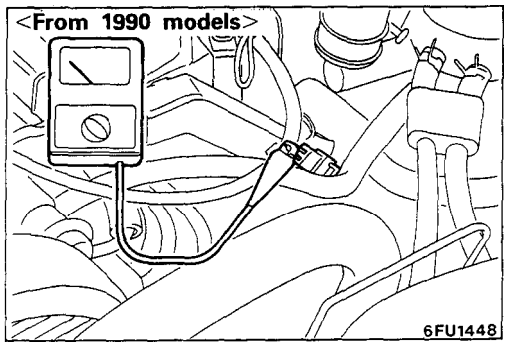
Standard value: 5°BTDC ± 2"



(7) Stop grounding the terminal for adjustment of ignition timing.
(8) Let the engine idle for two minutes.
(9) Check the idling rpm.

Curb idle speed: 750 ± 100 rpm <Non-Turbo>
800 ± 100 rpm <Turbo>

NOTE
The idling rpm is automatically regulated by the idle air system.



(10) If not within the standard value range, refer to the **CHECK** CHART CLASSIFIED BY PROBLEM SYMPTOMS and check the MFI component.

BASIC IDLE SPEED ADJUSTMENT M13FHBT

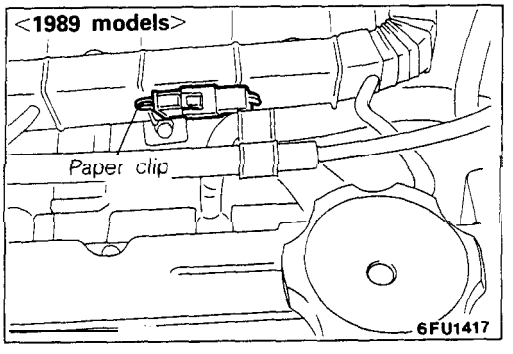
NOTE
1. The standard idling speed has been adjusted, by the engine speed adjusting screw (RPM adjusting screw), by the manufacturer, and there should usually be no need for readjustment.
2. Use the following procedure to adjust when the idling speed drops due to an incorrect adjustment, high idling speed, or when a load such as the air conditioning is applied **on the engine.**
3. The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle air control motor, the compression pressure, etc. are all normal.

TSB Revision

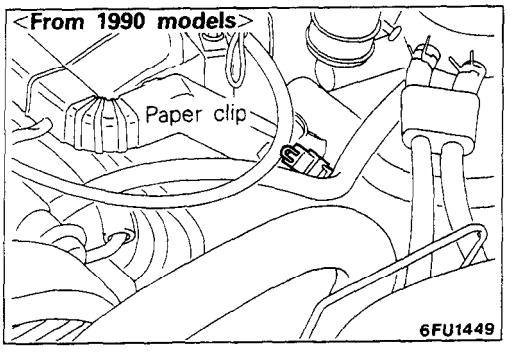
(1) The vehicle should be prepared as follows before the inspection and adjustment.
- Engine coolant temperature: 85–95°C (185–205°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: Neutral
  (P for vehicles with an automatic transaxle)

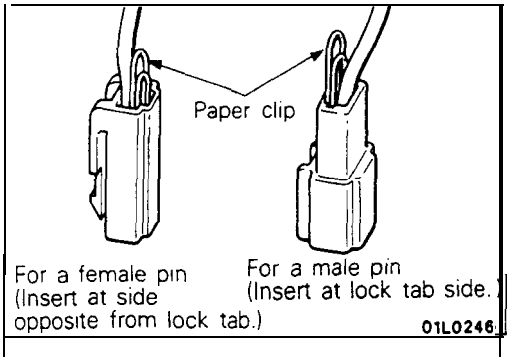
(2) Connect the scan tool to the data link connector (white).

NOTE
When the scan tool is connected, the diagnostic test mode control terminal is grounded.

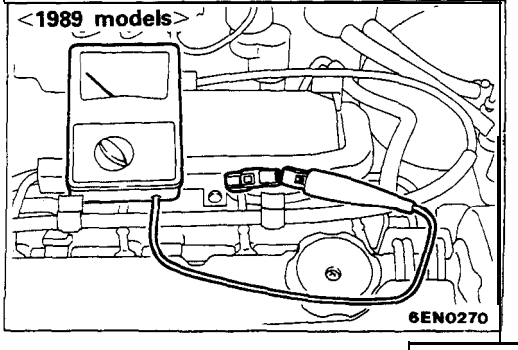


(3) If the scan tool is not used, follow the steps below.
① Insert a paper clip (from the harness side) into the I-pin connector shown in the figure at the left.
Take care not to disconnect the connector.





Caution
The paper clip should be inserted between the terminals as shown in the figure at the left.



② Connect a primary-voltage-detection type of tachometer to the paper clip.

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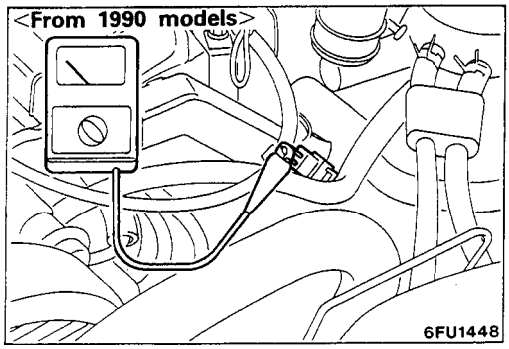
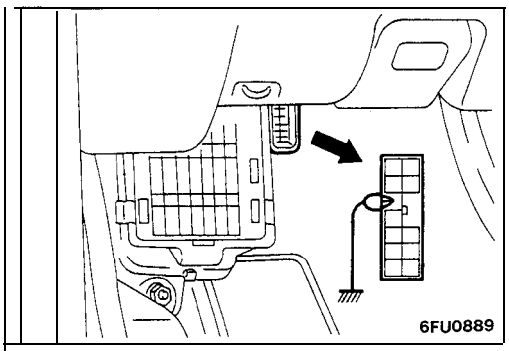
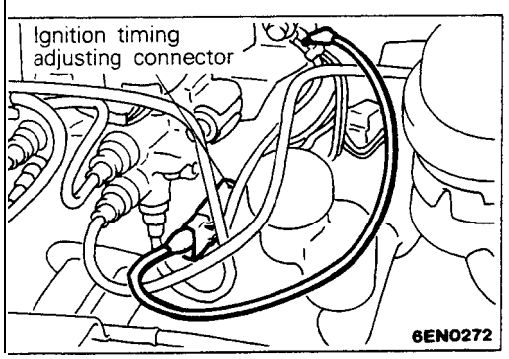


NOTE
For rpm, one-half of the actual engine rpm is indicated, so the actual engine rpm in two times the indicated value shown by the tachometer. <From 1990 models>



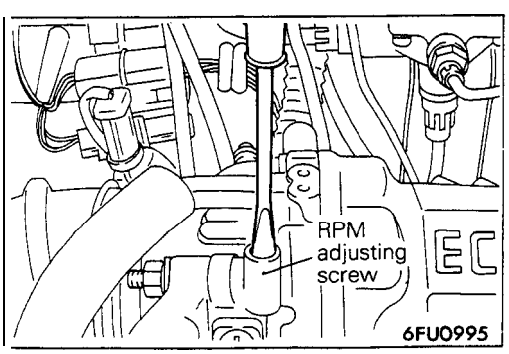
③ Use a jumper wire to ground the diagnostic test mode control terminal of the data link connector.



(4) Use a jumper wire to ground the terminal for adjustment of ignition timing.
(5) Start the engine and let it idle.
(6) Check the standard idling rpm.
If the scan tool is used, select item No.22 and read out the idling rpm.

Basic idle speed: 750 ± 50 rpm <Non-Turbo>
800 ± 50 rpm <Turbo>

NOTE
1. The engine speed may be 20 to 100 rpm lower than indicated above for a new vehicle [driven approximately 500 km (300 miles) or less], but no adjustment is necessary.
2. If the engine stalls or the rpm is low even though the vehicle has been driven approximately 500 km (300 miles) or more, it is probable that deposits are adhered to the throttle valve, so clean it. (Refer to P.13-248.)



(7) If not within the standard value range, turn the engine speed adjusting screw (RPM adjusting screw) to make the necessary adjustment.

NOTE
If the idling speed is higher than the standard value range even when the RPM adjusting screw is fully closed, check whether or not there is any indication that the CTP switch (fixed SAS) has been moved.
If there is an indication that it has been moved, adjust the CTP switch (fixed SAS). If there are no indications that it has been moved, it is possible that there is leakage as a result of deterioration of the fast idle air valve (FIAV), and, if so, the throttle body should be replaced.

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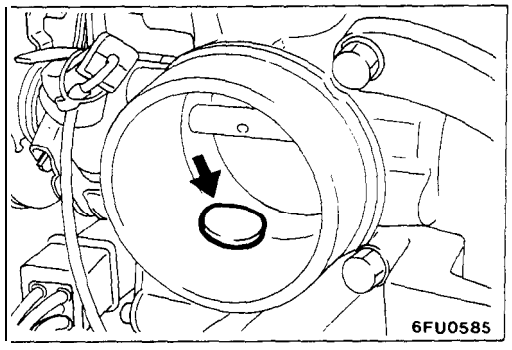
(8) Switch OFF the ignition switch.
(9) If the scan tool was not used, disconnect the jumper wire from the diagnostic test mode control terminal.
(10) Disconnect the jumper wire from the terminal for adjustment of ignition timing, and return the connector to its original condition.
(11) Start the engine again and let it run at idle speed for about ten minutes; check to be sure that the idling condition is normal.



THROTTLE BODY (THROTTLE VALVE AREA) CLEANING M13FICL

(1) Start the engine and warm it up until the temperature of the engine coolant reaches 80°C (176°F) or higher; then stop the engine.
(2) Disconnect the air intake hose at the throttle body side.
(3) Plug the bypass passage entrance of the throttle body.

Caution
Be absolutely sure that no cleaning liquid enters the bypass passage.

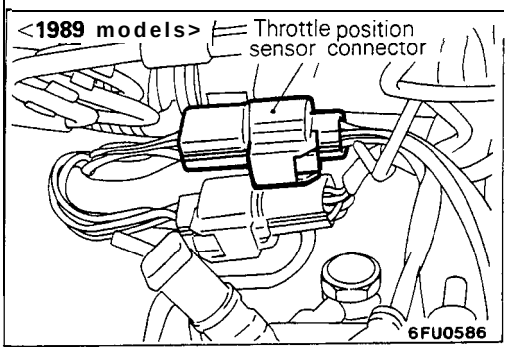
(4) Spray cleaning liquid (from the intake port of the throttle body) onto the valve, and then leave as is for about five minutes.
(5) Start the engine and race it a few times; then let it run at idle speed for about one minute.

NOTE
If, because the bypass passage is plugged, the engine idling speed is unstable (or the engine stalls), let the engine run with the throttle valve slightly open.

(6) If deposits are not removed from the throttle valve, repeat steps (4) and (5).
(7) Remove the plug from the bypass passage entrance.
(8) Connect the air intake hose.
(9) Using the scan tool, erase the diagnostic trouble code, or disconnect the battery's ground cable for ten seconds or longer and then reconnect it.
(10) Adjust the basic idle speed (engine speed adjusting screw). (Refer to P.13-245.)

THROTTLE POSITION SENSOR ADJUSTMENT M13FIEE

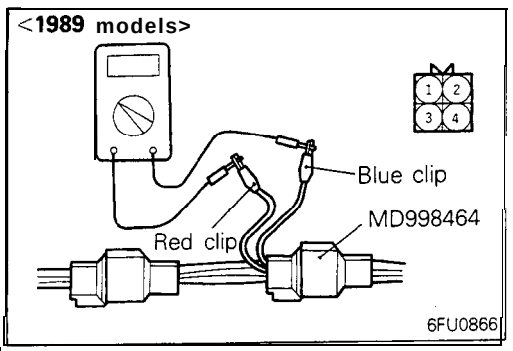
(1) Connect the scan tool to the data link connector (white).



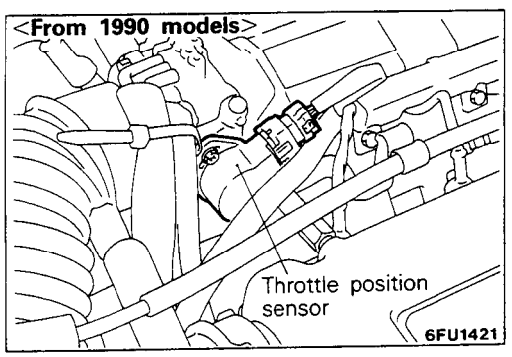
(2) If a scan tool is not used, perform the following operation.

<1989 models>

① Disconnect the throttle-position sensor connector, and connect the special tool (test harness) between the disconnected connectors.

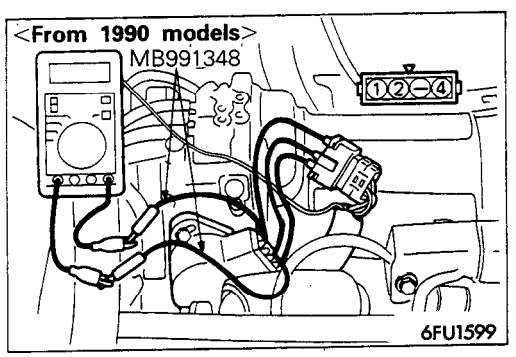


② Connect a digital-type voltmeter between the ② terminal (red clip, sensor ground) and the ④ terminal (blue clip, sensor output) of the throttle-position sensor connector.



<From 1990 models>

① Disconnect the throttle position sensor connector and use the special tool (test harness set) between the disconnected connector.

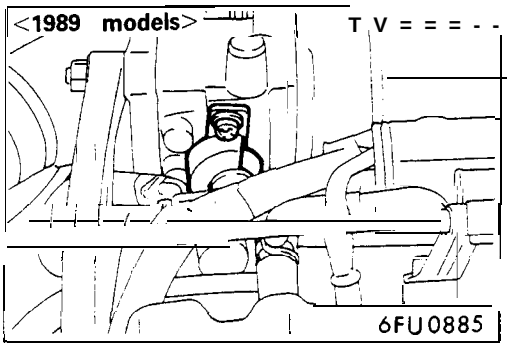


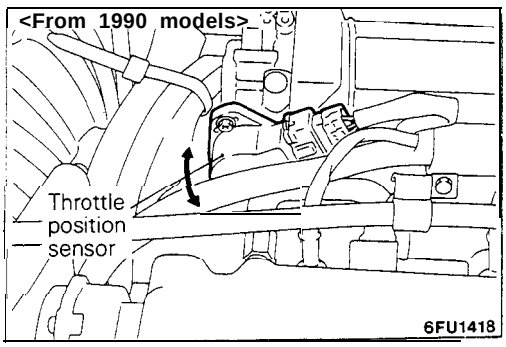
② Connect a digital type voltmeter between terminal ② (sensor output) of the throttle position sensor and terminal ④ (sensor ground).

(3) Switch ON the ignition switch.
(Do not start the engine.)

(4) Check the throttle-position sensor's output voltage.
When a scan tool is used, select Item No.14 to read the throttle position sensor output voltage.

Standard value: 0.48–0.52 V.



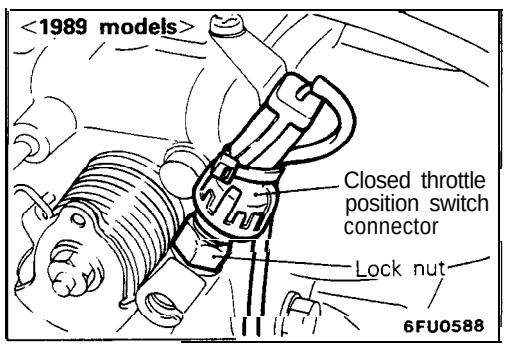


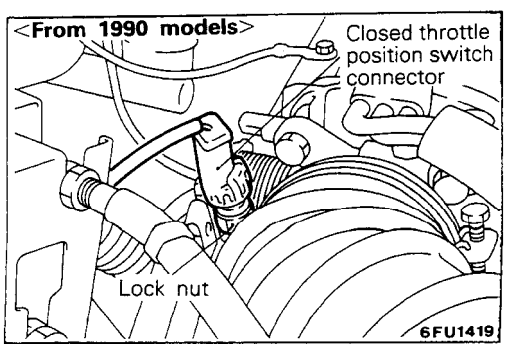
(5) If there is a deviation from the standard value, loosen the throttle-position sensor installation bolt and then turn the throttle-position sensor itself to make the adjustment after the throttle body was removed. Be sure to securely retighten the bolt after making the adjustment.

NOTE
The output voltage becomes higher when the throttle-position sensor is turned clockwise.
For removal and installation of throttle body, refer to "Engine Service Manual".

(6) Switch OFF the ignition switch.
(7) If the diagnostic trouble code is output while adjusting the throttle position sensor, use a scan tool to erase the diagnostic trouble code, or disconnect the battery cable from the negative terminal of the battery for more than 10 seconds and then reconnect the cable. (This will cancel the memory of the failure code due to throttle position sensor adjustment.)

CLOSED THROTTLE POSITION SWITCH (FIXED SAS) ADJUSTMENT M13FIDA





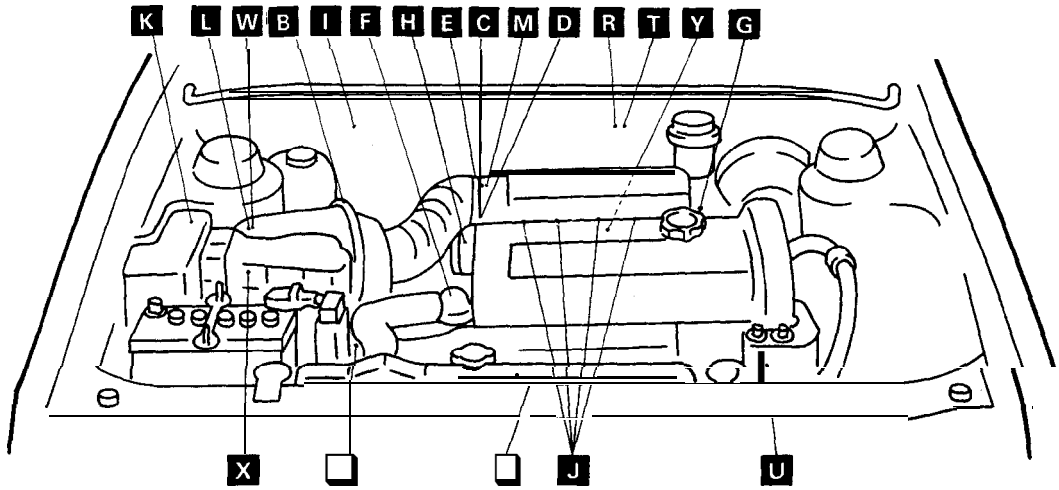
NOTE
1. The closed throttle position switch has been precisely adjusted by the manufacturer; it should not, therefore, be moved to another setting.
2. If however, the adjustment is for any reason accidentally disturbed, or the closed throttle position switch is replaced, make the necessary readjustment by following the steps below.

(1) Sufficiently relax the tension of the accelerator cable.
(2) Disconnect the connector of the closed throttle position switch (fixed SAS).
(3) Loosen the lock nut of the closed throttle position switch (fixed SAS).
(4) Turn the closed throttle position switch (fixed SAS) in the counter-clockwise direction until it is sufficiently loosened, and securely close the throttle valve fully.
(5) Connect an ohmmeter between the closed throttle position switch terminal and the body.
(6) Begin tightening the closed throttle position switch and locate the point at which the closed throttle position switch is switched ON (conductive with body). (This is the point at which the throttle valve begins to open.) From that point, then tighten the closed throttle position switch 15/16 turn.
(7) Securely tighten the lock nut while holding the closed throttle position switch so that it won't turn.
(8) Adjust the tension of the accelerator cable.
(9) Adjust the basic idling speed (engine speed adjusting screw). (P.13-245.)
(10) Adjust the throttle-position sensor. (P.13-248.)

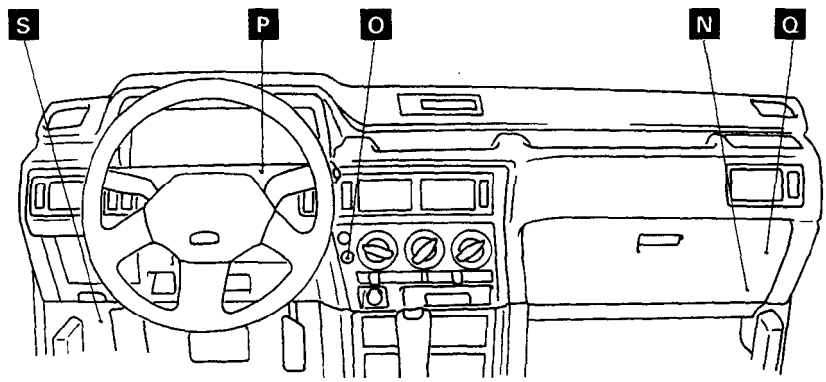
ON VEHICLE INSPECTION OF MFI COMPONENTS

M13YA-A

COMPONENT LOCATION



6EM0166



6FU0843

Name	Symbol
Air conditioning compressor clutch relay	K
Air conditioning switch	0
Closed throttle position switch (fixed SAS)	E
Crankshaft position sensor and camshaft position sensor	H
Data link connector	S
Engine control module	Q
Engine coolant temperature sensor	F
EGR solenoid	L
EGR temperature sensor	M
Evaporative emission purge solenoid	I
Fuel pressure solenoid	W
Fuel pump check terminal	T
Heated oxygen sensor	**A**
idle air control motor (stepper motor)	C
Ignition coil (ignition power transistor)	G
Ignition timing adjustment terminal	R
Injector	J
Knock sensor	Y
Multiport fuel injection relay	N
Park/neutral position switch <A/T>	V
Power steering pressure switch	U
Throttle position sensor	D
Turbocharger waste gate solenoid	X
Vehicle speed sensor (reed switch)	P
Volume air flow sensor (incorporating intake air temperature sensor and barometric pressure sensor)	B

NOTE
The "Name" column is arranged in alphabetical order.

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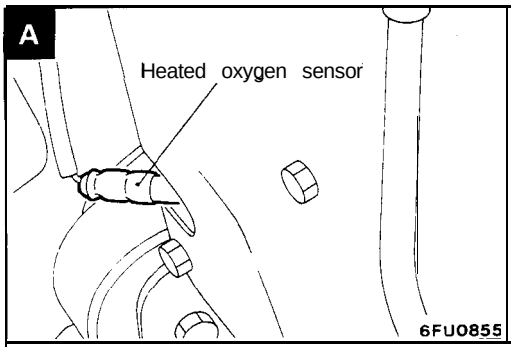
A



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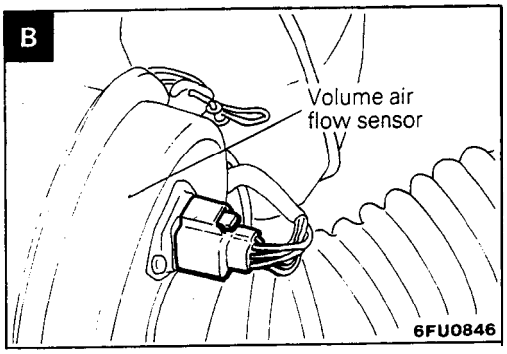

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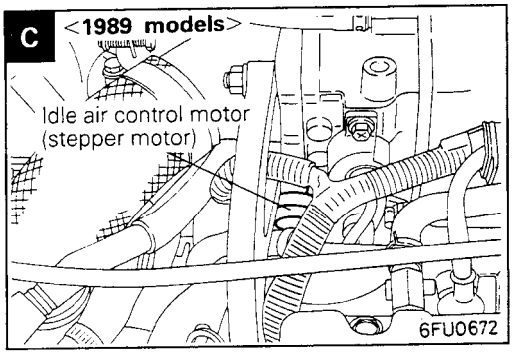

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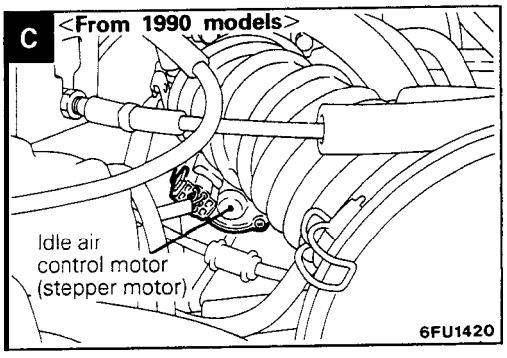

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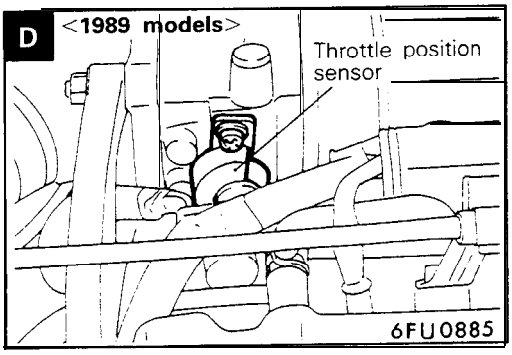

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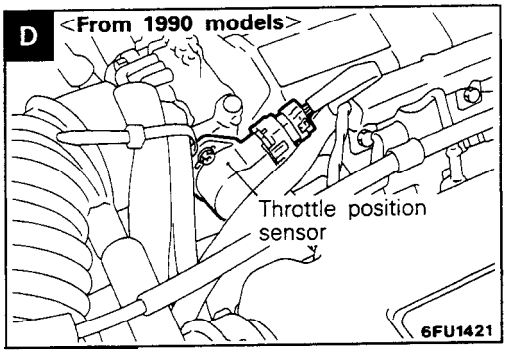

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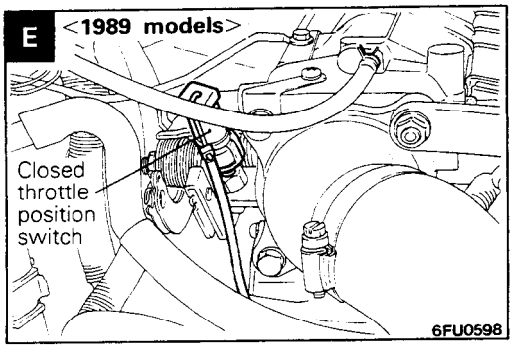

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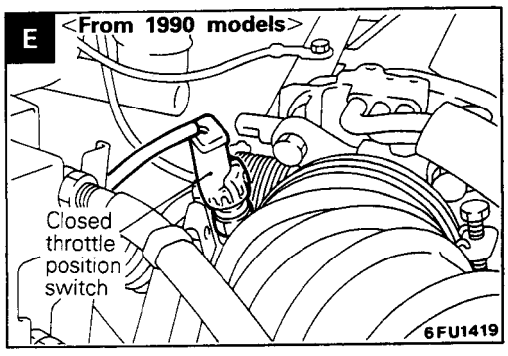

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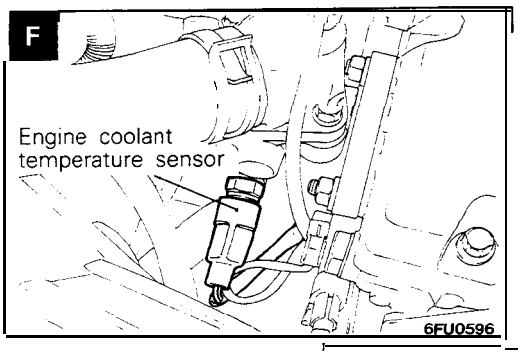

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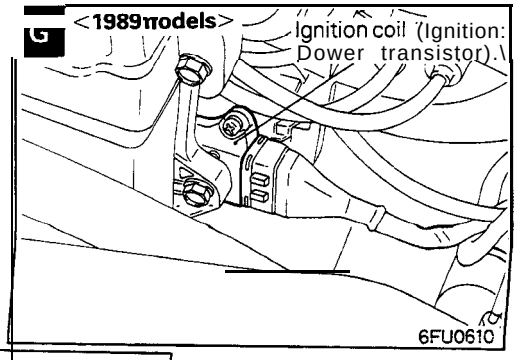

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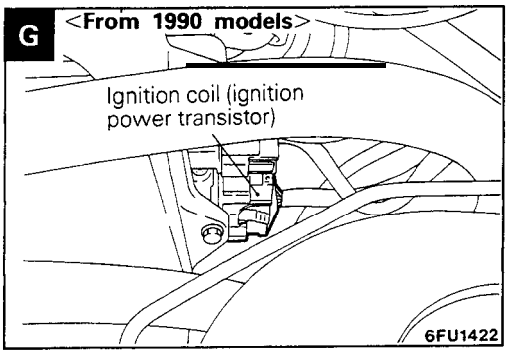
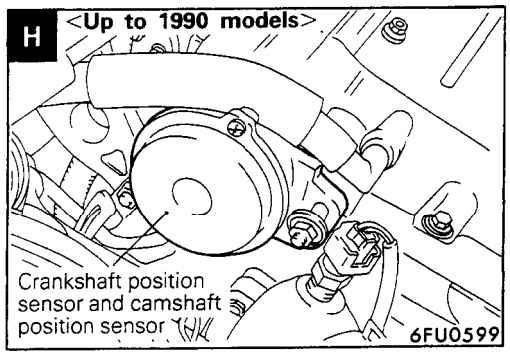


H <Up to 1990 models>



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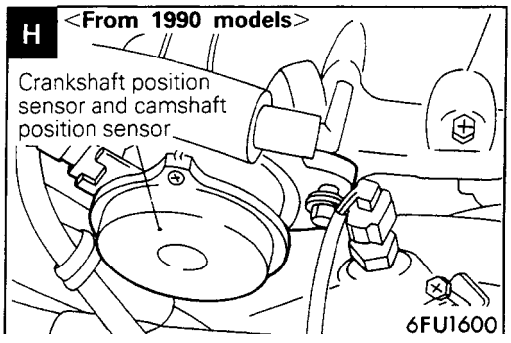

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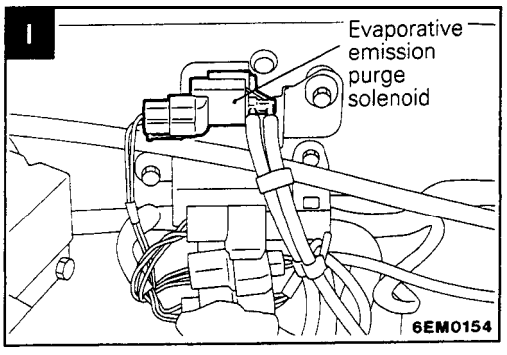

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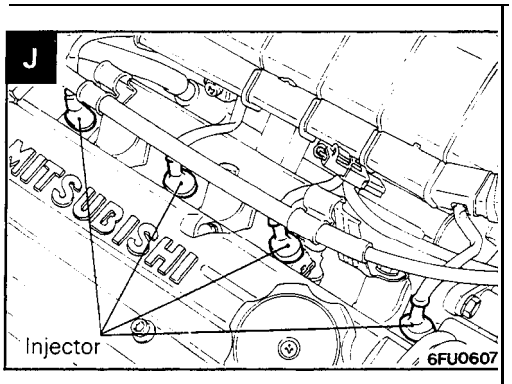

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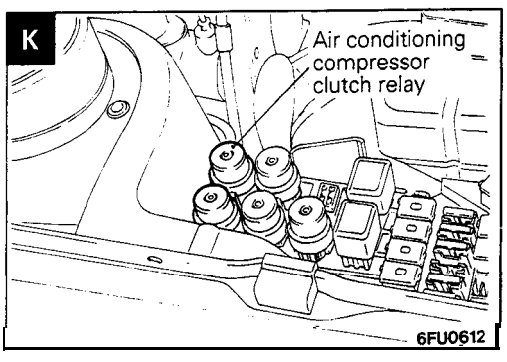

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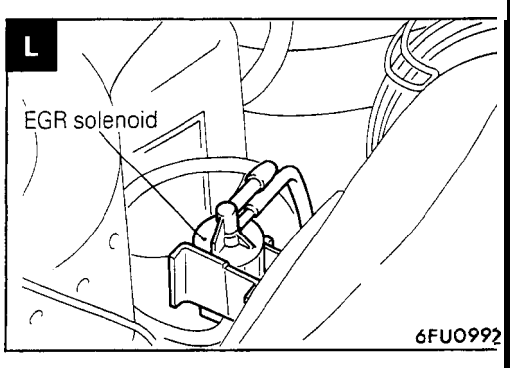

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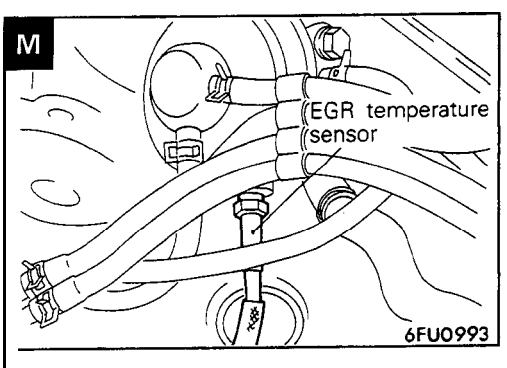

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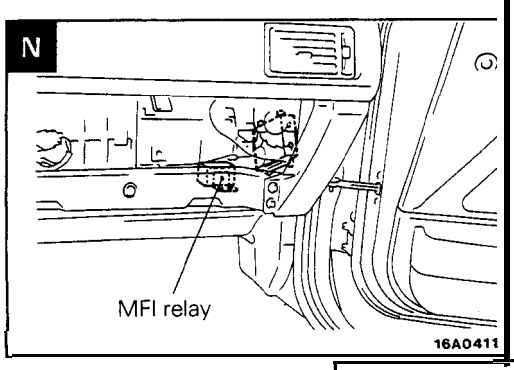
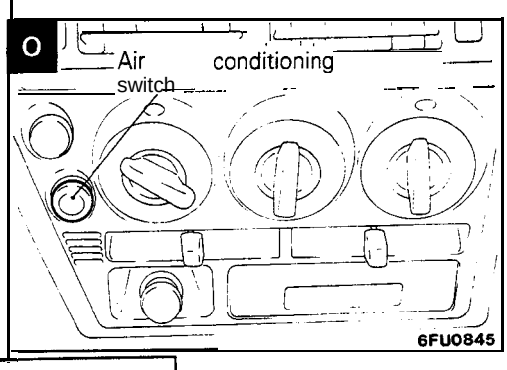
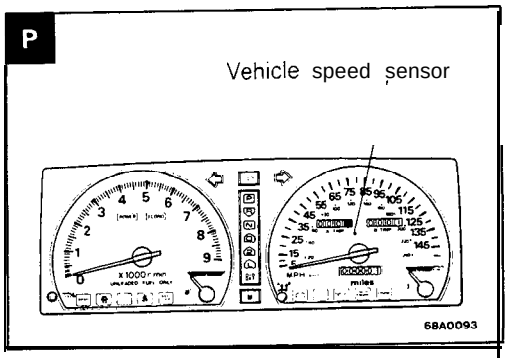


O



TSB Revision

P



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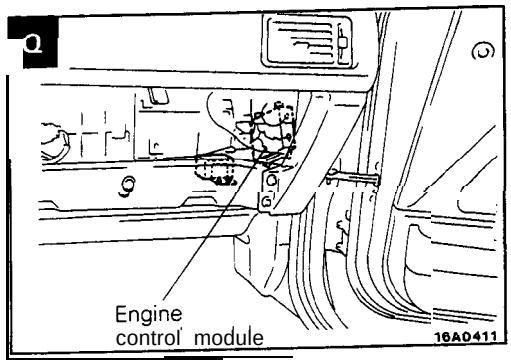

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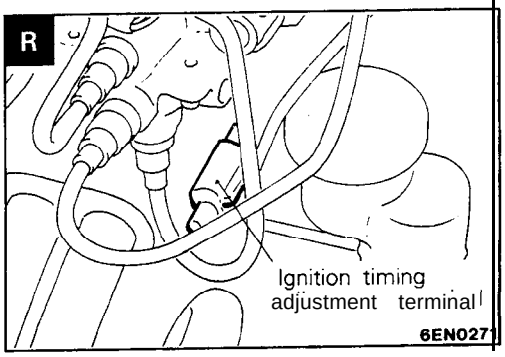

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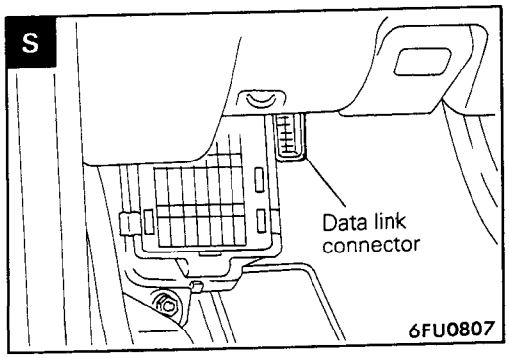

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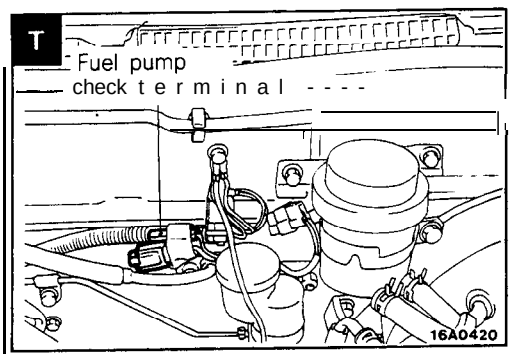

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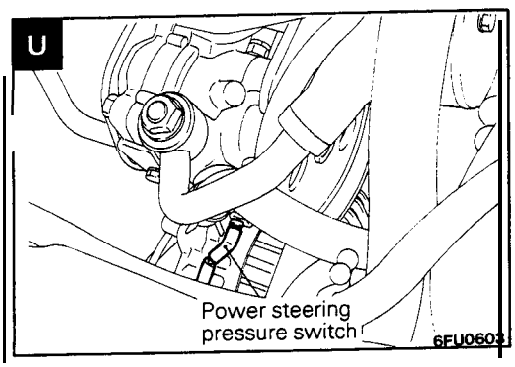
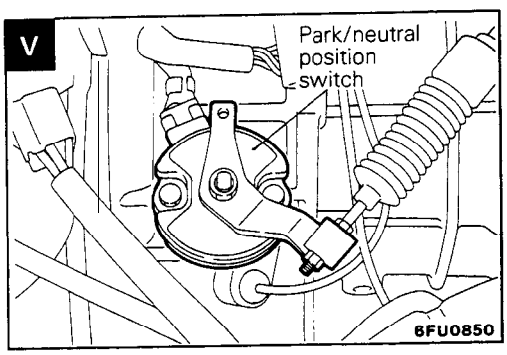


V



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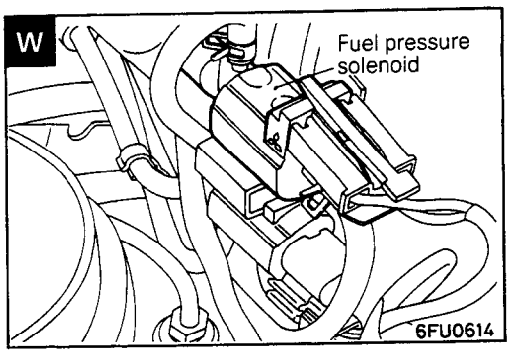
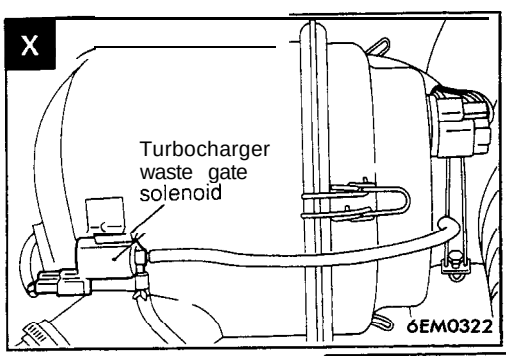
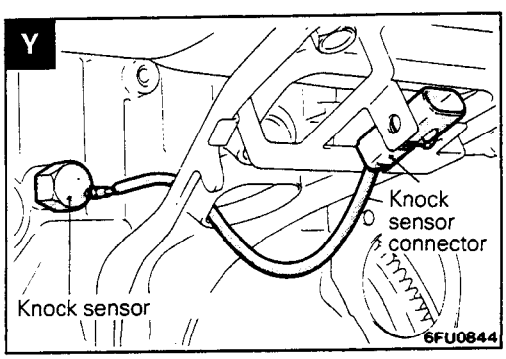


X



Y



TSB Revision

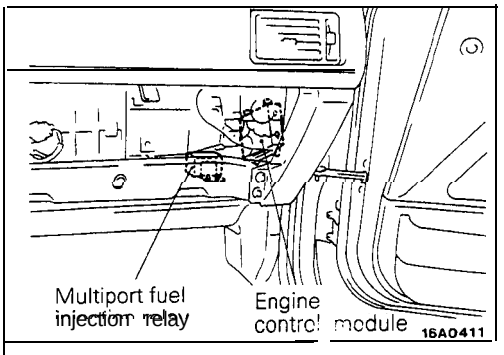
COMPONENTS INSPECTION PROCEDURE– Using Scan Tool

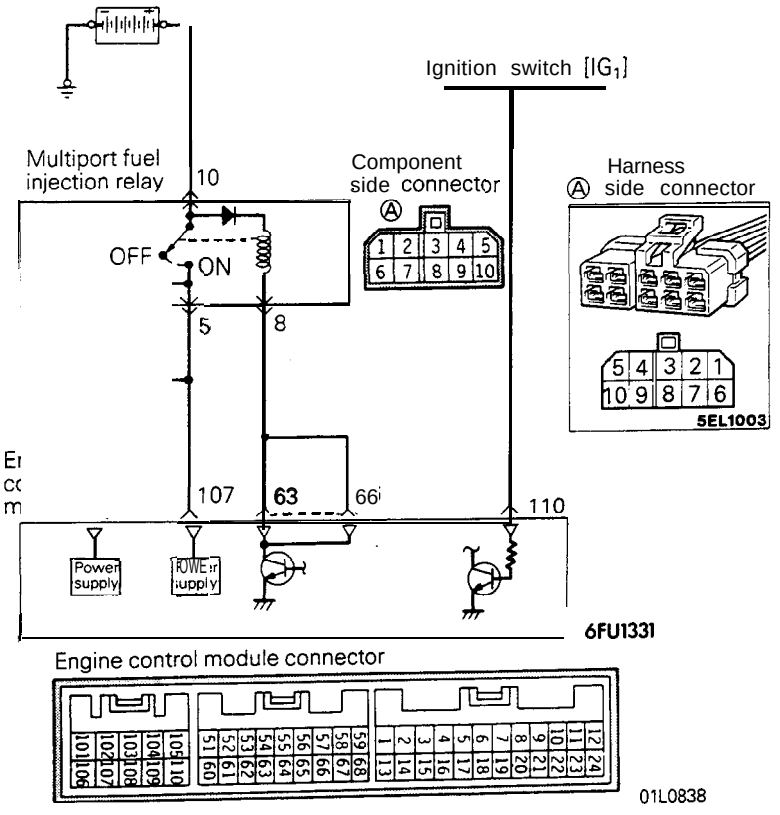
M13YBAGa

Refer to P.13-41.

POWER SUPPLY AND IGNITION SWITCH-IG

M13YCAB





OPERATION

- While the ignition switch is ON, battery power supply is supplied to the engine control module, injectors, volume air flow sensor, etc.
- When the ignition switch is switched ON, current flows from the ignition switch, via the multiport fuel injection relay coil to ground.

As a result, the multiport fuel injection relay switch is switched ON, and power is supplied, by way of the multiport fuel injection relay switch, from the battery to the engine control module.

INSPECTION

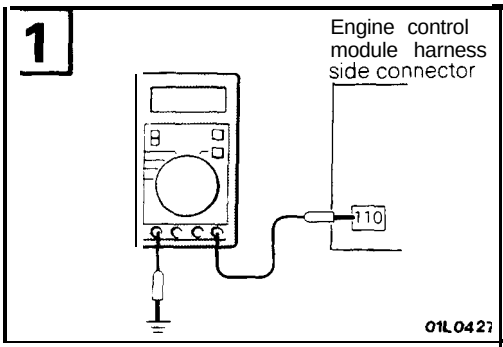
Using Scan tool

Function	Item No.	Data display	Check conditions	Standard value
Data reading	16	Engine control module power-supply voltage	Ignition switch: ON	Battery positive voltage

TSB Revision

HARNESS INSPECTION

1



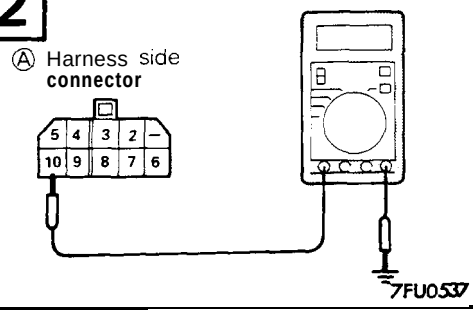
Measure the ignition switch terminal input voltage.
. Engine control module connector: Disconnected
. Ignition switch: ON

Voltage (V)
Battery positive voltage

OK → STOP

NG → Repair the harness. (Ignition switch – 110)

2



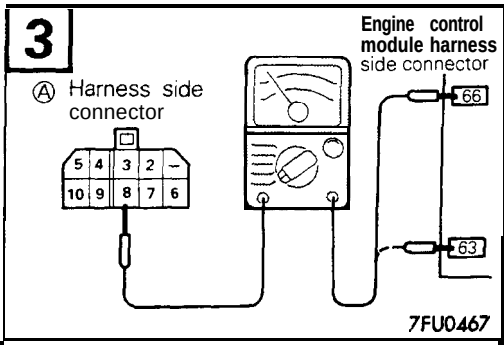
Measure the power supply voltage of the multiport fuel injection relay.
. Connector: Disconnected

Voltage (V)
Battery positive voltage

OK → 3

NG → Repair the harness. (Battery – Ⓐ10)

3

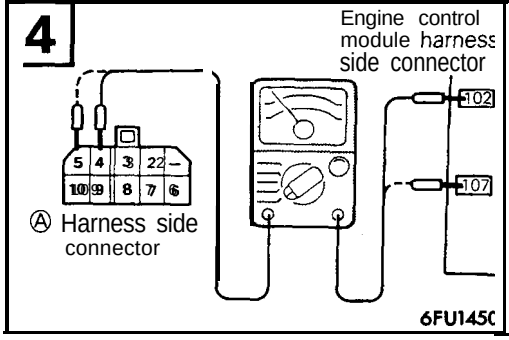


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the multiport fuel injection relay.
. Engine control module connector: Disconnected
. Multiport fuel injection relay connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓐ8 – 63, Ⓐ8 – 68)

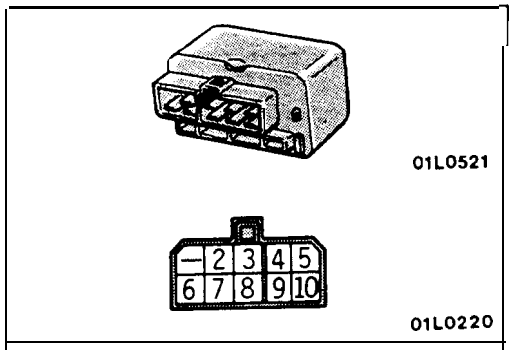
4



Check for an open-circuit, or a short-circuit to ground, between the engine control module and the multiport fuel injection relay.
. Multiport fuel injection relay connector: Disconnected
. Engine control module connector: Disconnected

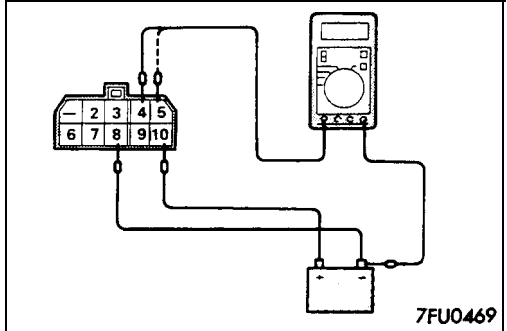
OK → STOP

NG → Repair the harness. (Ⓐ4, 5 – 102, 107)



MULTIPORT FUEL INJECTION RELAY INSPECTION

(1) Remove the multiport fuel injection relay.

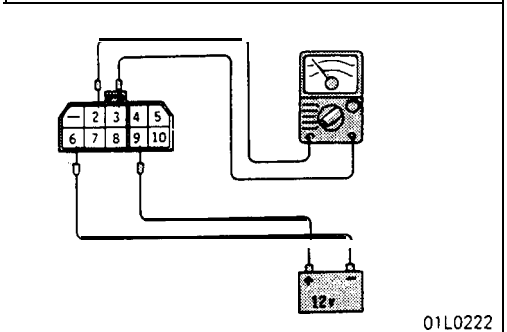


(2) Use jumper wires and connect multiport fuel injection relay terminal ⑩ to the battery ⊕ terminal and terminal ⑧ to the battery ⊖ terminal.

Caution
Be very careful when connecting the jumper wires because the relay will be damaged if a mistake is made with the contact terminals.

(3) With battery ⊖ terminal jumper wire connected and disconnected, measure the voltage at multiport fuel injection relay terminals ④ and ⑤.

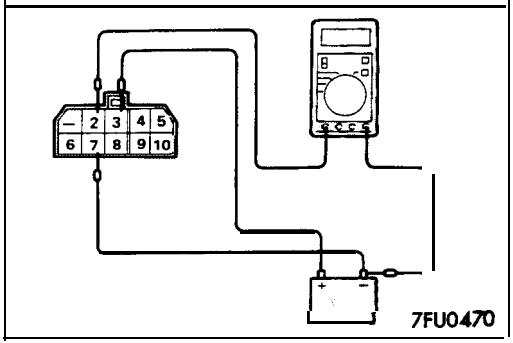
Jumper wire	Terminal voltage ④	Terminal voltage ⑤
Connection	Battery positive voltage	Battery positive voltage
Not connected	0V	0V



(4) Use jumper wires to connect multiport fuel injection relay terminal ⑨ to the battery ⊕ terminal and terminal ⑥ to the battery ⊖ terminal.

(5) Disconnecting the jumper wire on the terminal ⊖ side of the battery, check whether or not continuity exists across terminals ② and ③ of the multiport fuel injection relay.

Jumper wire	Continuity between terminals ②–③
Connection	Yes
Not connected	No



(6) Use jumper wires and connect multiport fuel injection relay terminal ③ to the battery ⊕ terminal and terminal ⑦ to the battery ⊖ terminal.

(7) With the battery ⊖ terminal jumper wire connected and disconnected, measure the voltage at multiport fuel injection relay terminal ②.

Jumper wire	Terminal Voltage ②
Connection	Battery positive voltage
Not connected	OV

(8) Replace the multiport fuel injection relay if faulty

ENGINE CONTROL MODULE POWER GROUND

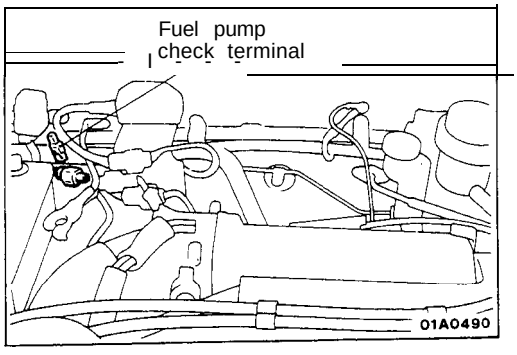
M13YDDAAa

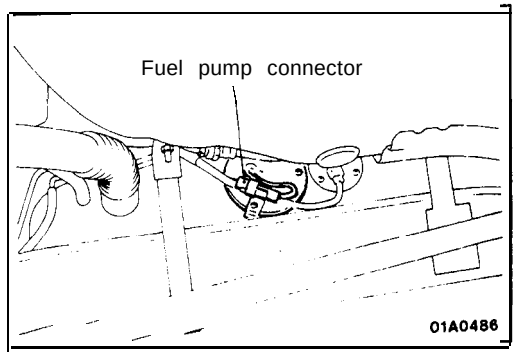
Refer to P.13-45.

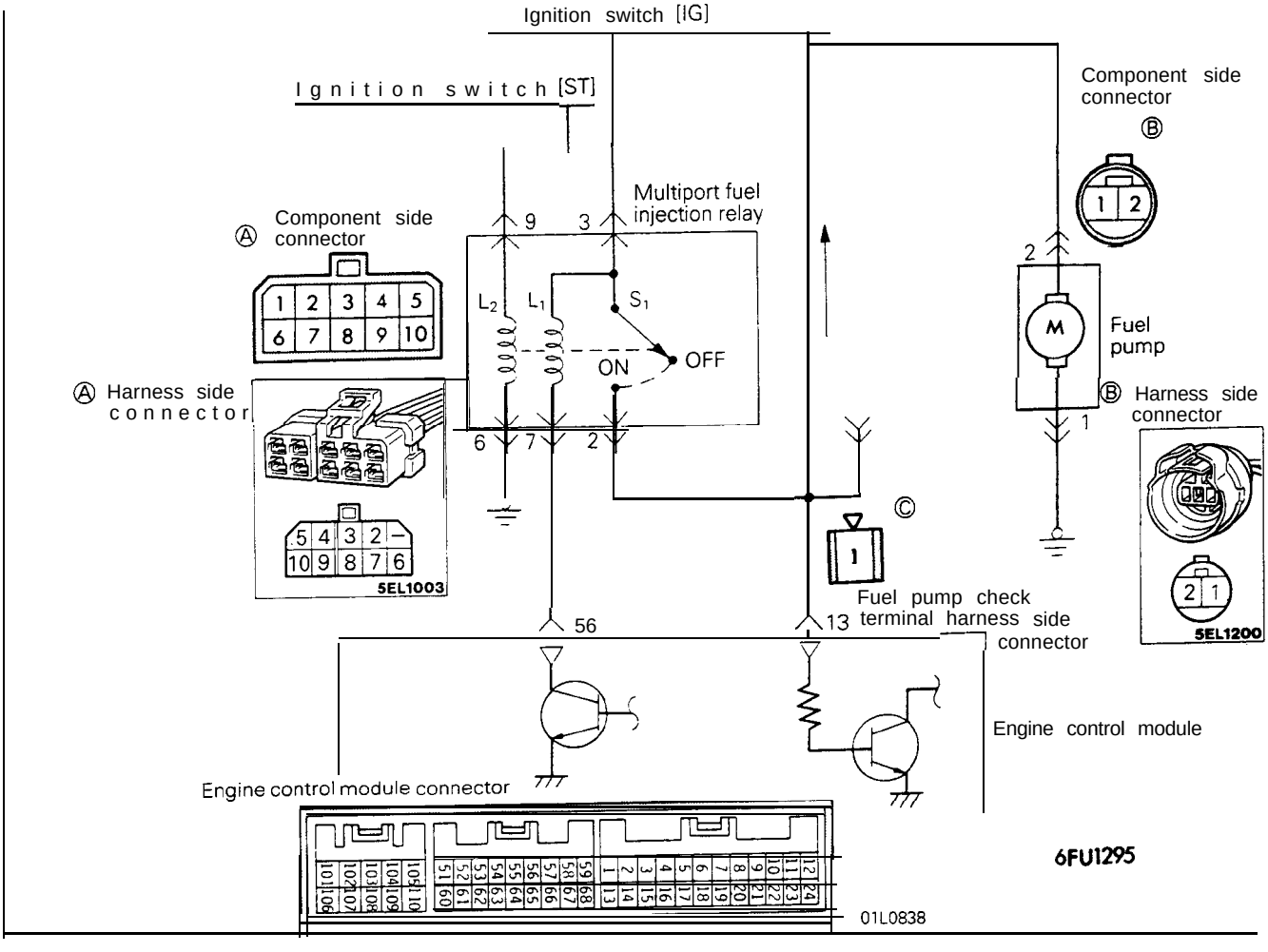
TSB Revision

M13YEABa

FUEL PUMP







OPERATION

- Activates the fuel pump during engine cranking and while the engine is running.
- When the ignition switch is set to the START position, the current flows, by way of the multiport fuel injection relay coil, from the ignition switch to ground. As a result, the multiport fuel injection relay switch is switched ON, and the power for activation of the fuel pump is supplied, by way of the multiport fuel injection relay switch, from the battery to the fuel pump.
- While the engine is running, the engine control module switches ON the power transistor, after which current flows to the multiport fuel injection relay coil, and the power for activation of the fuel pump is supplied to the fuel pump.
- When the multiport fuel injection relay switch is switched ON, battery voltage is also applied to the engine control module, and so the engine control module detects the fact that the power for activation of the fuel pump is being supplied to the fuel pump.

TSB Revision

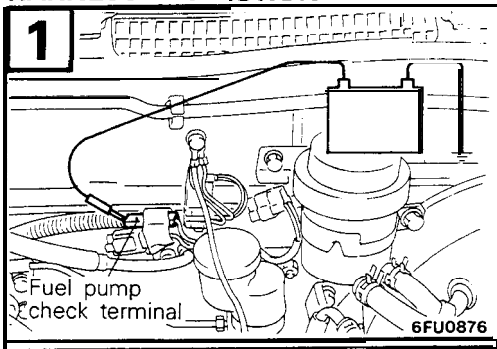
INSPECTION

Using Scan tool

Function	Item No.	Actuation	Inspection conditions	Description	Normal condition
Actuator test	07	Actuates fuel pump, circulating fuel.	. Engine cranking . Fuel pump forced activation The inspection should be conducted for both of the above conditions.	Hold the return hose between two fingers so as to feel the pulsation of the flowing of fuel.	Pulsation can be felt.
				Listen to the pump sound at a place near the fuel tank.	Pump sound can be heard.

HARNESS INSPECTION

1

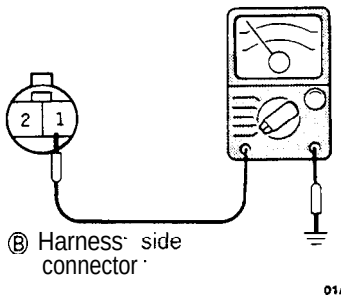


Check the fuel pump.
. Apply battery voltage to the checking terminal and operate the pump.

OK → 4

NG → 2

2

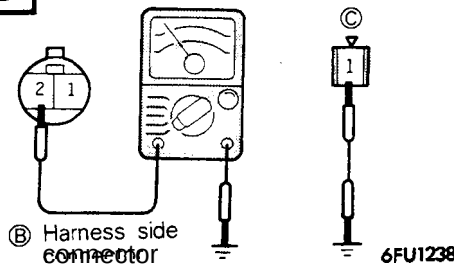


Check the ground circuit of the fuel pump.
Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓑ1 – Ground)

3

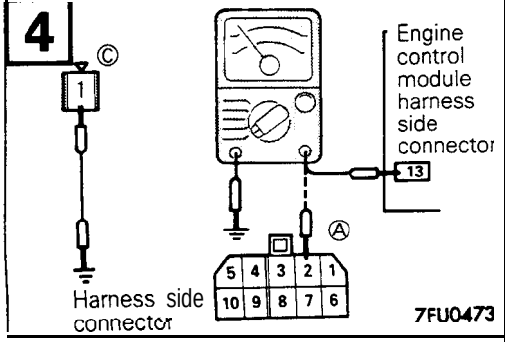


Check for continuity between the fuel pump and the checking terminal.
· Connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓑ2 – Ⓒ1)

4



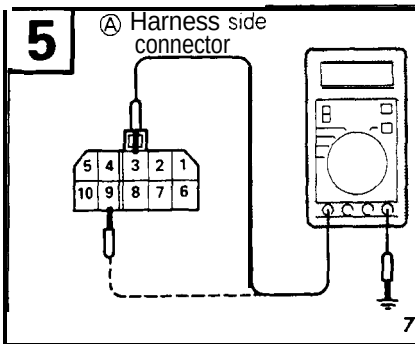
Check for continuity between the checking terminal and the engine control module, and between the multiport fuel Injection relay terminals.
·Multiport fuel injection relay connector: Disconnected
· Engine control module connector: Disconnected
· Fuel pump connector: Disconnected

OK → 5

NG → Repair the harness. (Ⓐ2 – Ⓒ1, Ⓒ1 – 13)

TSB Revision

5

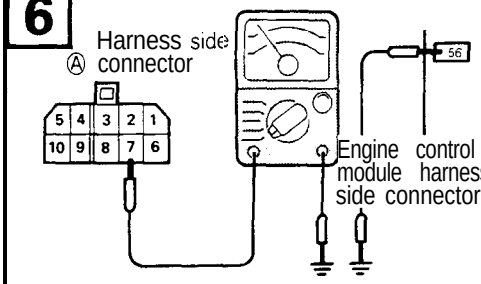


Measure the power supply voltage of the multiport fuel injection relay ignition switch.
Connector: Disconnected
. Ignition switch: START (Ⓐ9 when checked)
. Ignition switch: ON (Ⓐ3 when checked)

Voltage (V)
8 or more

OK → 6
Repair the harness. (Ignition switch [ON] – Ⓐ3 Ignition switch [ST] – Ⓐ9)

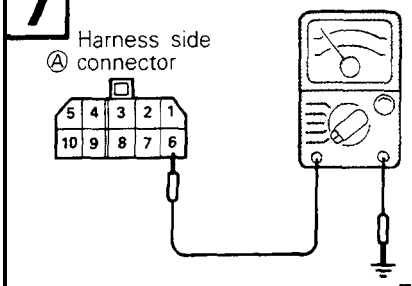
6



Check for an open-circuit, or a short-circuit, to ground between the multiport fuel injection relay and the engine control module.
. Multiport fuel injection relay connector: Disconnected
. Engine control module connector: Disconnected

OK → 7
Repair the harness. (Ⓐ7 – 56)

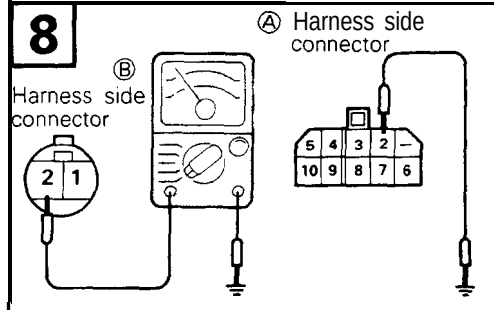
7



Check for continuity, of the ground circuit.
. Connector: Disconnected.

OK → 8
Repair the harness. (Ⓐ6 – Ground)

8



Check for an open-circuit, or a short-circuit to ground, between the multiport fuel injection relay and the fuel pump.
- Multiport fuel injection relay connector: Disconnected
- Fuel pump connector: Disconnected

OK → STOP
Repair the harness. (Ⓐ2 – Ⓑ2)

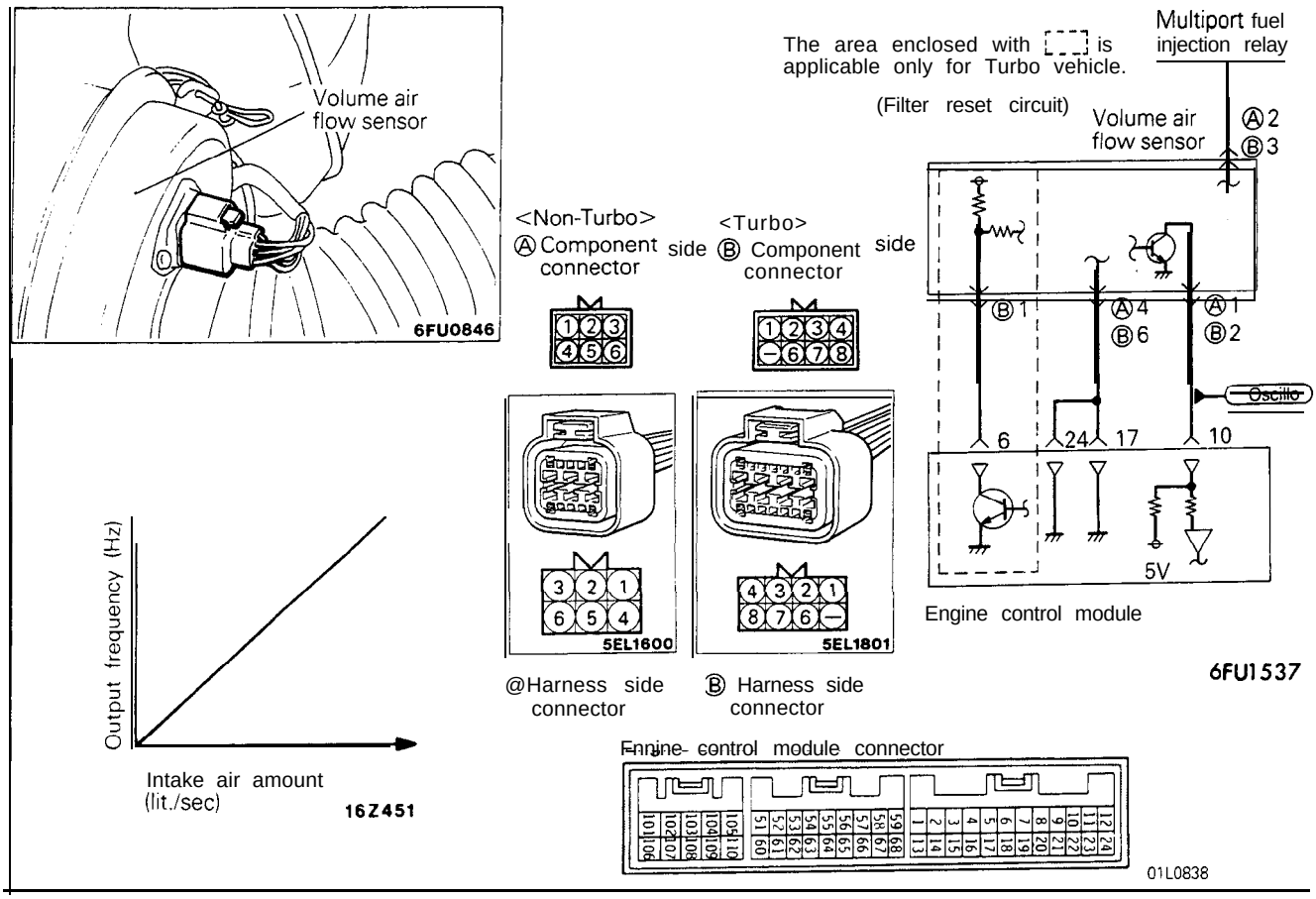
MULTIPORT FUEL INJECTION RELAY INSPECTION

Refer to P. 13-257.

TSB Revision

VOLUME AIR FLOW SENSOR

M13YFAAa



OPERATION

- The volume air flow sensor is incorporated within the air cleaner; it functions to convert the amount of engine air intake to pulse signals of a frequency proportional to the amount of engine air intake, and to input those/signals to the engine control module. The engine control module then, based upon those signals, calculates the amount of fuel injection, etc.
- The power for the volume air flow sensor is supplied from the multiport fuel injection relay to the volume air flow sensor, and is grounded at the engine control module. The volume air flow sensor, by intermitting the flow of the 5V voltage applied from the engine control module, produces pulse signals.

TROUBLESHOOTING HINTS

HINT 1:

If the engine sometimes stalls, try starting the engine and shaking the volume air flow sensor harness.

If the engine then stalls, incorrect or improper contact of the volume air flow sensor connector is the probable cause.

Hint 2:

If, when the ignition switch is switched ON (but the engine is not started), the volume air flow sensor output frequency is any value other than zero, a malfunction of the volume air flow sensor or of the engine control module is the probable cause.

Hint 3:

If idling is possible even though the volume air flow sensor output frequency is deviated from the standard value, the cause is usually a malfunction other than of the volume air flow sensor.

Examples:

(1) The flow of air within the volume air flow sensor is disturbed. (Air duct disconnection or clogged air cleaner element)
(2) Incomplete combustion within a cylinder. (Malfunction of spark plugs, ingnition coil, injectors, compression pressure, etc.)
(3) Air is taken into the intake manifold through a leaking gasket, etc.
(4) Incomplete close contact of the EGR valve seat.

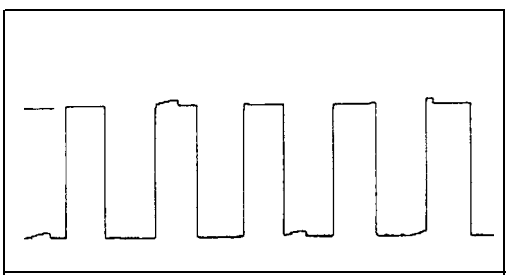
TSB Revision

INSPECTION

Using Scan tool

Function	Item No.	Data display	Inspection conditions	Engine condition	Standard value
Data reading	12	Sensor detection air volume (frequency)	. Engine coolant temperature: 85–95°C (185–205°F) . Lights, cooling fan, electrical accessories: OFF . Transaxle: neutral (A/T models: "P" range)	Idling	25–50 Hz <Non-Turbo> 30–50 Hz <Turbo>
				2,000 rpm	60–90 Hz <Non-Turbo> 50–80 Hz <Turbo>
				Racing	Frequency increases as racing rpm increases.

NOTE
The volume air flow sensor output frequency may be about 10% higher than indicated above when the vehicle is new [driven approximately 500 km (300 miles) or less].

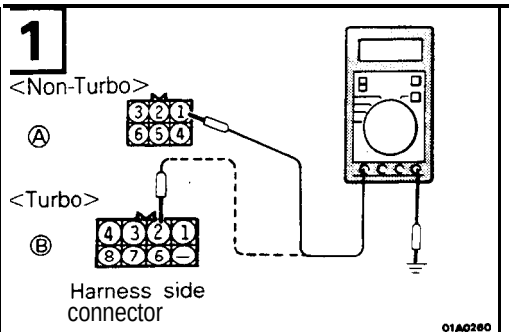

Regular waveform 03A0203

Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the osilloscope pick-up point as shown in the circuit diagram, and check the wave form.

HARNESS INSPECTION

1



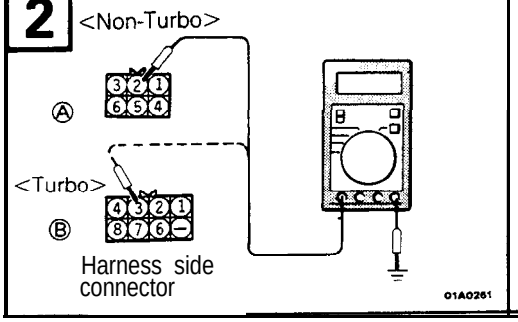
Measure the terminal voltage.
. Connector: Disconnected
. Ignition switch: ON

Voltage (V)
4.8–5.2

OK → **2**

NG → Repair the harness. (Ⓐ1–10 Ⓑ2–10)

2 <Non-Turbo>



Measure the power supply voltage.
. Connector: Disconnected
. Ignition switch: ON

Voltage (V)
Battery positive voltage

OK → **3**

NG → Repair the harness. (Ⓐ2–Multiport fuel injection relay Ⓑ3–Multiport fuel injection relay) or check the multiport fue injection relay.

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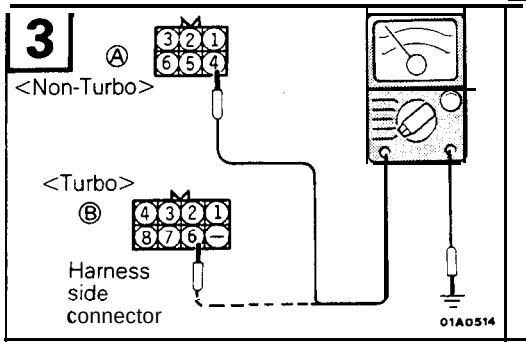
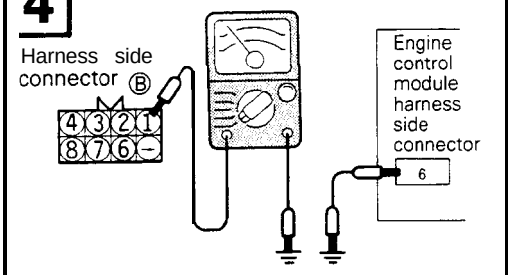
3



Check for continuity of the ground circuit of the VAF sensor.
. Connector: Disconnected

OK → <Non-Turbo> STOP
OK → <Turbo> 4 (Ⓐ4–17, 24 Ⓑ6–17, 24)

4

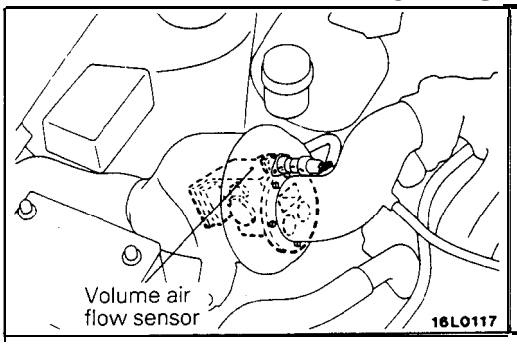


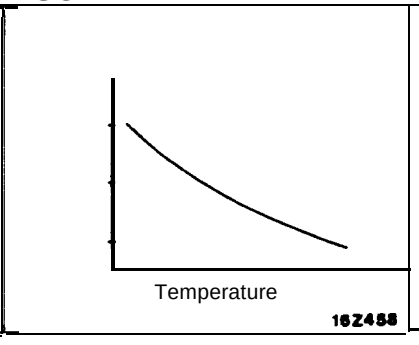
Check for continuity between the engine control module and volume air flow sensor.
. Engine control module connector: Disconnected
• Volume air flow sensor connector: Disconnected

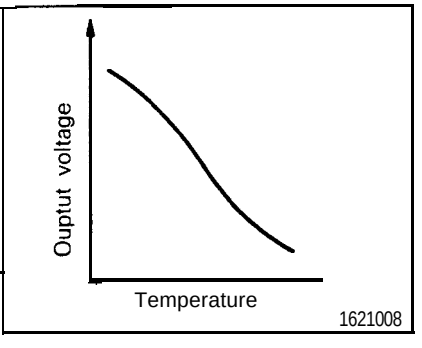
OK → A STOP
OK → Repair the harness. (Ⓑ1–6)

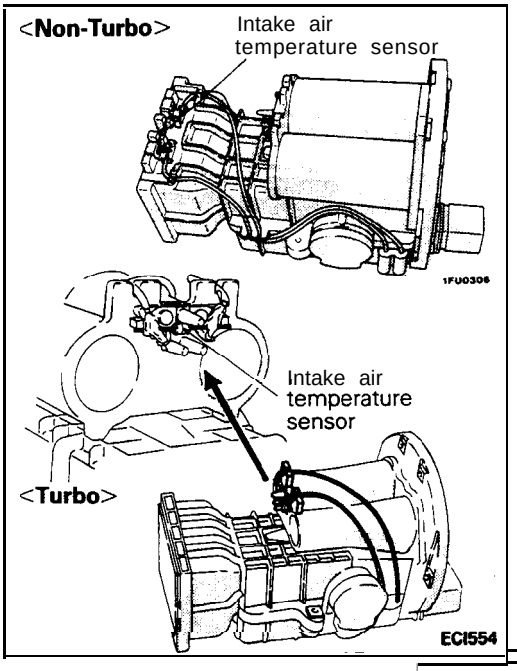
INTAKE AIR TEMPERATURE SENSOR

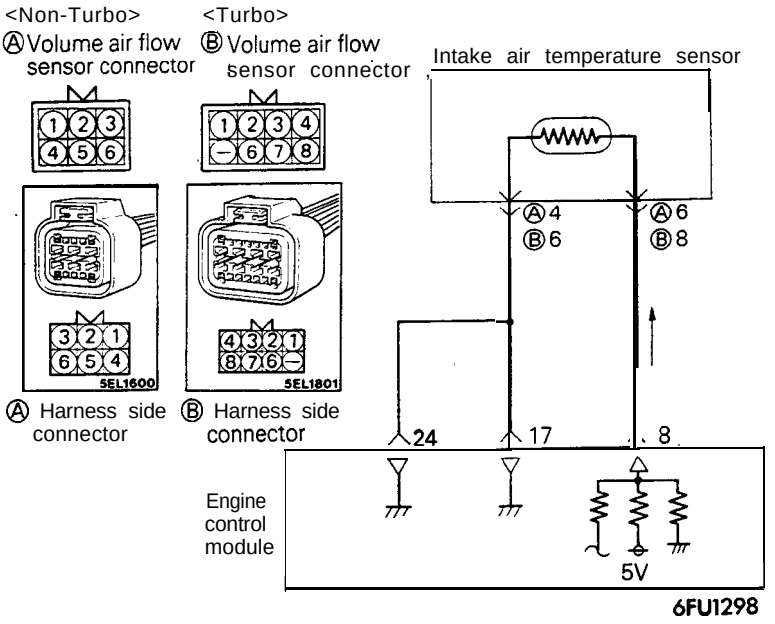
M13YGAA1











TSB Revision

OPERATION

- The intake air temperature sensor functions to convert the temperature of the air (intaken to the engine) to voltage, and to input that voltage (as signals) to the eingine control module. The engine control module, based upon those signals, then corrects the amount of fuel injection, etc.
- The 5V power supply within the engine control module is supplied, by way of the resistance within the unit, to the intake air temperature sensor; it passes through the intake air temperature sensor, which is a type of resistor, and is grounded at the engine control module.

Note that the resistance of the intake air temperature sensor decreases when the temperature of the intake air increases.

* The intake air temperature sensor terminal voltage becomes higher when the resistance of the intake air temperature sensor increases, and becomes lower when the resistance decreases. Consequently, the intake air temperature sensor terminal voltage varies in accordance with the temperature of the intake air, becoming lower when the temperature of the intake air increases.

TROUBLESHOOTING HINTS

Because the intake air temperature sensor detects the temperature of the intake air in the air cleaner, it indicates a temperature different than the temperature of the outside air when the engine is running.

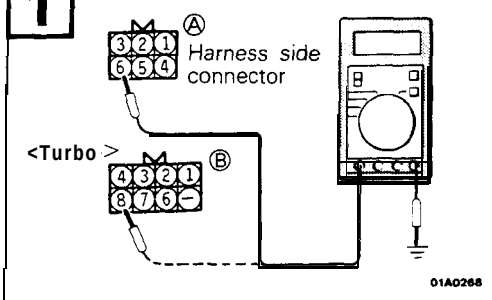
INSPECTION

Using Scan tool

Function	Item No.	Data display	Check conditions	Intake air temp.	Standard value
Data reading	13	Sensor detection temperature	Ignition switch: ON Or, engine running	At −20°C (−4°F)	−20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

1 <Non-Turbo>



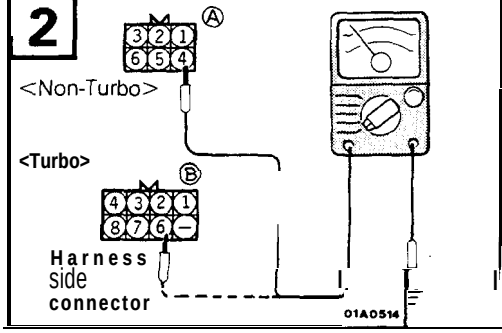
Measure the power supply voltage.
· Connector: Disconnected
. Ignition switch: ON

Voltage (V)
4.5–4.9

OK → 2

OK → Repair the harness. (Ⓐ6–8 Ⓑ8–8)

2

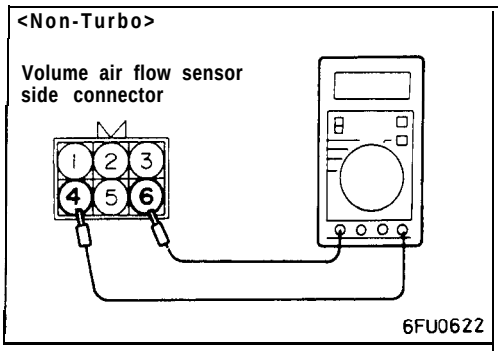


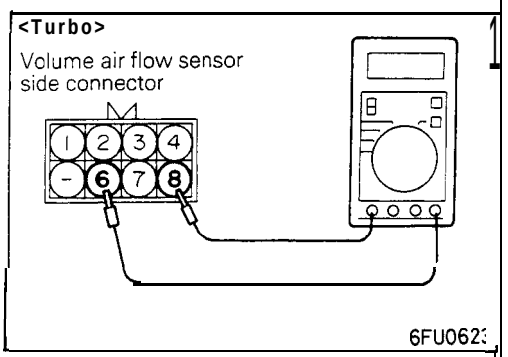
Check for continuity of the ground circuit of the intake air temperature sensor.
. Connector: Disconnected

OK → STOP

OK → Repair the harness. (Ⓐ4–17, 24 Ⓑ6–17, 24)

TSB Revision

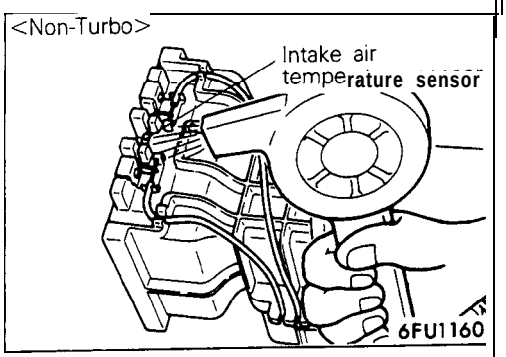




SENSOR INSPECTION

(1) Disconnect the volume air flow sensor connectors.
(2) Measure resistance between terminals ④ and ⑥. <Non-Turbo>
(3) Measure resistance between terminals ⑥ and ⑧. <Turbo>

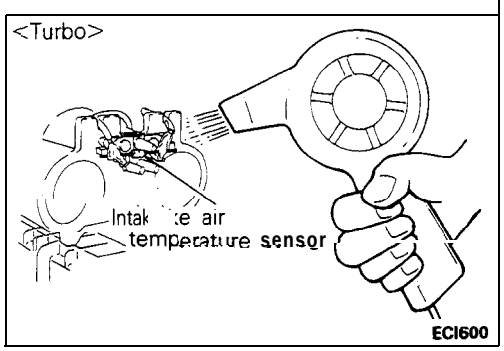
Temperature °C (°F)	Resistance (kΩ)
0 (32)	6.0
20 (68)	2.7
80 (176)	0.4



(3) Measure resistance while heating the sensor using a hair drier.

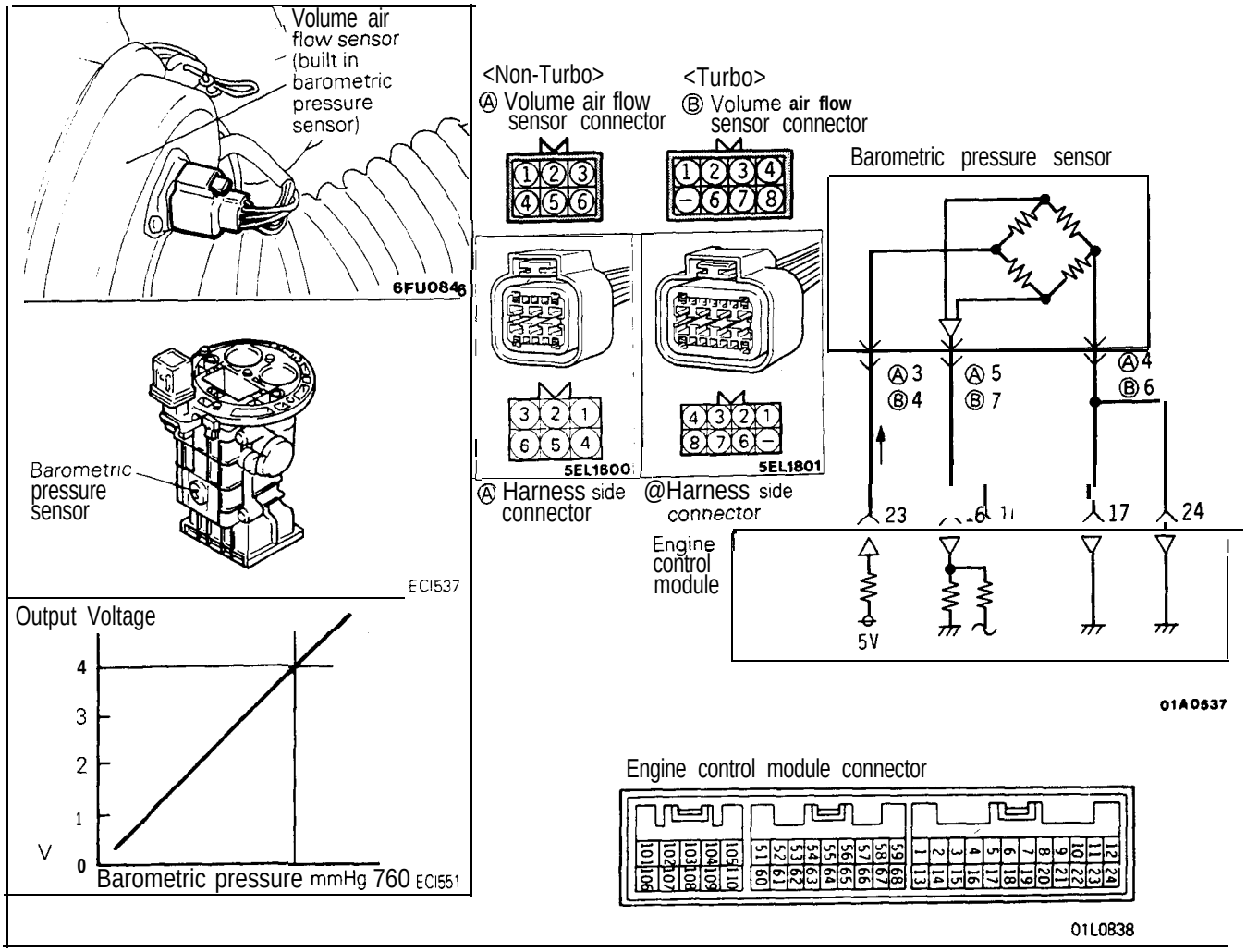
Temperature °C (°F)	Resistance (kΩ)
Higher	Smaller

(4) If the value deviates from the standard value or the resistance remains unchanged, replace the volume air flow sensor assembly.



BAROMETRIC PRESSURE SENSOR

M13YHAA1



OPERATION

- The barometric-pressure sensor functions to convert the barometric pressure to voltage, and to input that voltage (as signals) to the engine control module.
  The engine control module, based upon those signals, then corrects the amount of fuel injection, etc.
- The 5V power supply within the engine control module is supplied to the barometric-pressure sensor; it passes through the circuitry within the sensor, and is grounded at the engine control module.
- The barometric-pressure sensor output voltage is sent to the engine control module in proportion to the barometric pressure (absolute pressure).

TROUBLESHOOTING HINTS

Hini 1:
If there is a malfunction of the barometric-pressure sensor, driveability of the vehicle will become worse particularly at high altitude.

Hint 2:
If. during high-speed driving, there is a noticeable sharp drop of the displayed pressure of the barometric-pressure sensor, check for clogging of the air cleaner.

TSB Revision

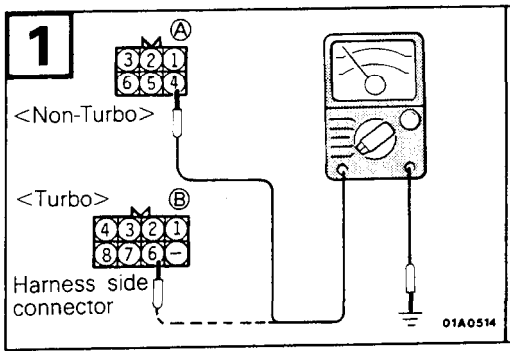
INSPECTION

Using Scan tool

Function	Item No.	Data display	Check conditions	Altitude	Standard value
Data reading	25	Sensor detection pressure	Ignition switch: ON	At 0 m (0 ft.)	760 mmHg
				At 600 m (1,969 ft.)	710 mmHg
				At 1,200 m (3,937 ft.)	660 mmHg
				At 1,800 m (5,906 ft.)	610 mmHg

HARNESS INSPECTION

1

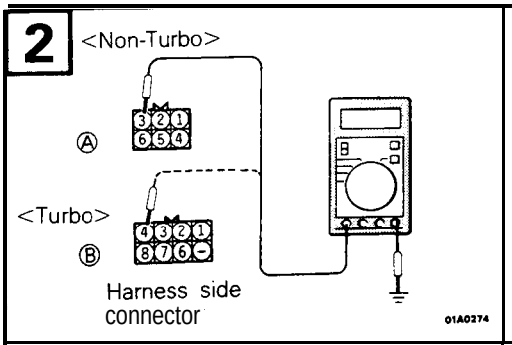


Check for continuity of the ground circuit.
. Connector: Disconnected

OK → **2**

NO → Repair the harness. (Ⓐ4–17, 24 Ⓑ6–17, 24)

2



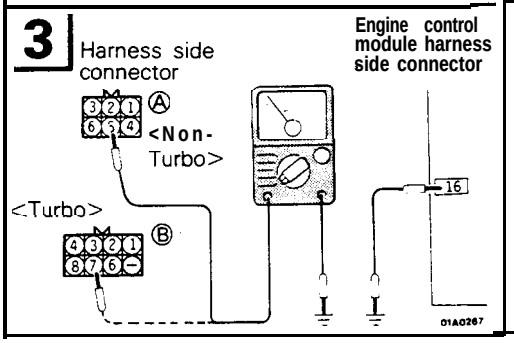
Measure the power supply voltage of the barometric pressure sensor.
· Connector: Disconnected
· Ignition switch: ON

Voltage (V)
4.8–5.2

OK → **3**

NO → Repair the harness. (Ⓐ3–23 Ⓑ4–23)

3



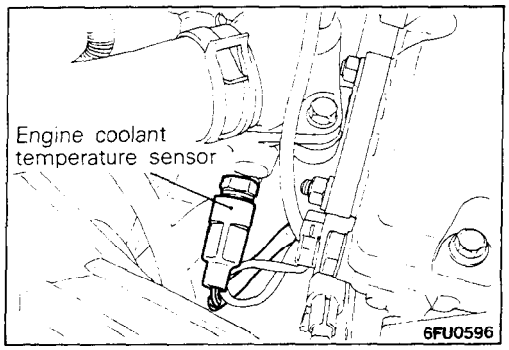
Check for an open-circuit, or a short-circuit to ground, between the engine control module and the barometric pressure sensor.
. Volume air flow sensor connector: Disconnected
· Engine control module connector: Disconnected

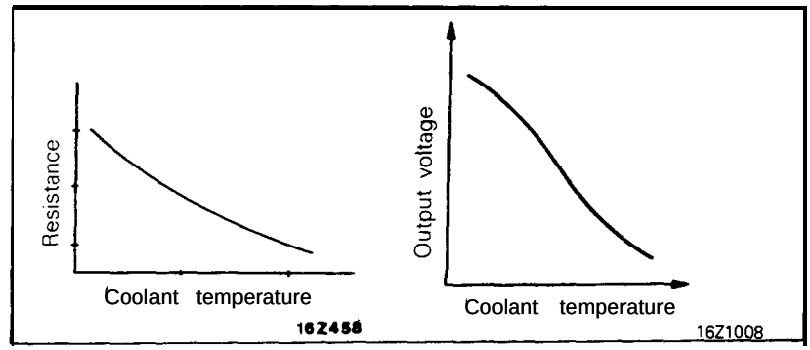
OK → STOP

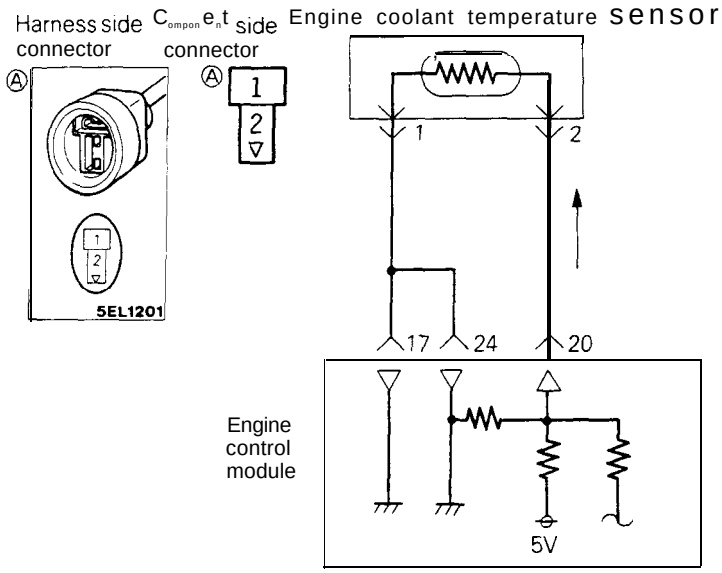
NO → Repair the harness. (Ⓐ5–16 Ⓑ7–16)

ENGINE COOLANT TEMPERATURE SENSOR

M13YIAB1







OPERATION

- The engine coolant temperature sensor functions to convert the barometric pressure to voltage, and to input that voltage (as signals) to the engine control module.
  The engine control module, based upon those signals, regulates the amount of fuel injection and the fast-idling speed when the engine is cold.
- The 5V power supply within the engine control module is supplied, by way of the resistance within the unit, to the engine coolant temperature sensor; it passes through the engine coolant temperature sensor, which is a type of resistor, and is grounded at the engine control module.
  Note that the resistance of the engine coolant temperature sensor decreases when the temperature of the coolant increases.
- The engine coolant temperature sensor terminal voltage becomes higher when the resistance of the engine coolant temperature sensor increases, and becomes lower when the resistance decreases. Consequently, the engine coolant temperature sensor terminal voltage varies in accordance with the temperature of the coolant, becoming lower when the temperature of the coolant increases.

TROUBLESHOOTING HINTS

If, during engine warm-up, the fast-idling speed is not correct, or black smoke is emitted, the problem is usually a malfunction of the engine coolant temperature sensor.

TSB Revision

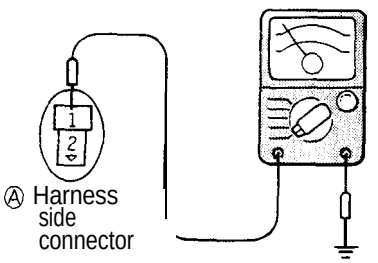
INSPECTION

Using Scan tool

Function	Item No.	Data display	Check conditions	Coolant temperature	Standard value
Data reading	21	Sensor detection temperature	Ignition switch: ON Or, engine running	At –20°C (–4°F)	–20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

1

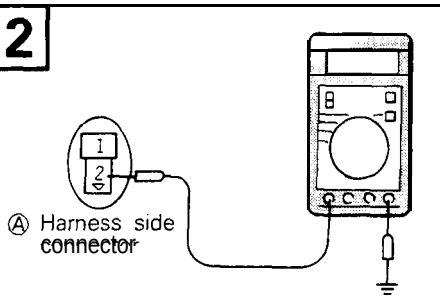


Check for continuity of the ground circuit.
. Connector: Disconnected

OK → 2

NG → Repair the harness. (Ⓐ1–17, 24)

2



Measure the power supply voltage.
. Connector: Disconnected
. Ignition switch: ON

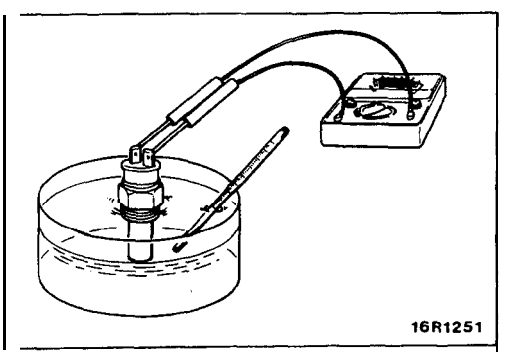
Voltage (V)
4.5-4.9

OK → STOP

NG → Repair the harness. (Ⓐ1–20)

SENSOR INSPECTION

(1) Remove engine coolant temperature sensor from the intake manifold.
(2) With temperature sensing portion of engine coolant temperature sensor immersed in hot water check resistance.



Temperature °C (°F)	Resistance (kΩ)
0 (32)	5.9
20 (68)	2.5
40 (104)	1.1
80 (176)	0.3

(3) If the resistance deviates from the standard value greatly replace the sensor.

TSB Revision

INSTALLATION

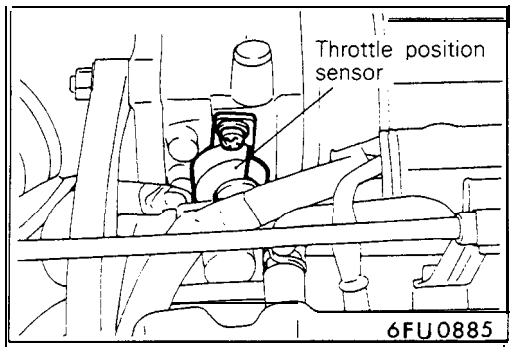
(1) Apply sealant 3M NUT locking No.4171 or equivalent to threaded portion.
(2) Install engine coolant temperature sensor and tighten it to specified torque.

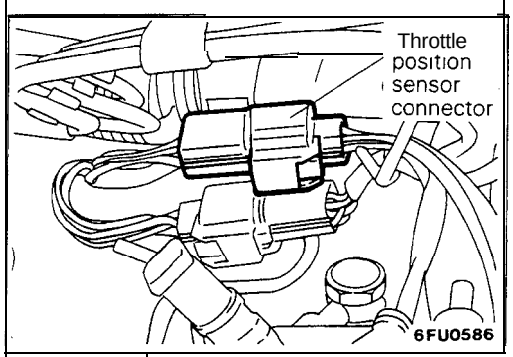
Sensor tightening torque:
20–40 Nm (15-29 ft.lbs.)

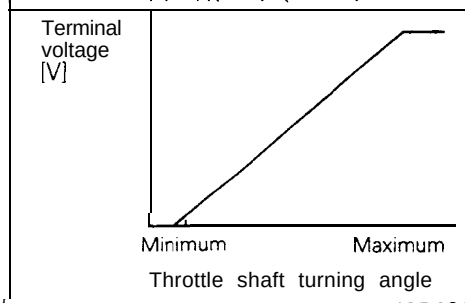
(3) Fasten harness connectors securely.

THROTTLE POSITION SENSOR <1989 models>

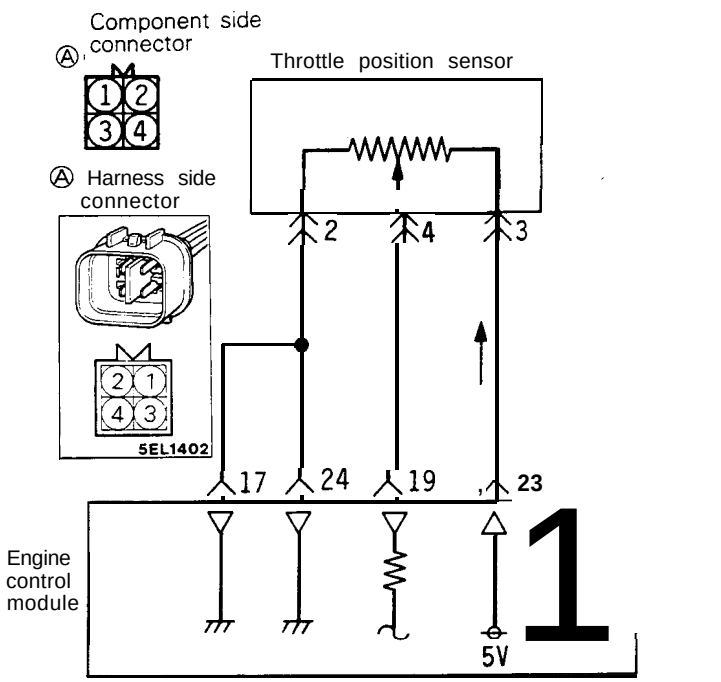
M13YJAE1







16Z461



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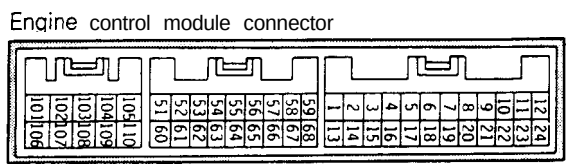


01L0838

OPERATION

- The throttle-position sensor functions to convert the degree of opening of the throttle valve to voltage, and to input that voltage (as signals) to the engine control module. The engine control module, based upon those signals, then regulates the amount of fuel injection, etc.
- The 5V power supply within the engine control module is supplied to the throttle-position sensor, after which it passes through the resistance within the sensor and is grounded at the engine control module.
- When the throttle valve shaft is rotated all the way from the idling position to the fully open position, the resistance between the throttle-position sensor's variable-resistance terminal and the ground terminal also increases in accordance with that rotation, and, as a result, the voltage of the throttle-position sensor's variable-resistance terminal also becomes higher in accordance with that rotation.

TSB Revision

TROUBLESHOOTING HINTS

Hint 1:
The signals of the throttle-position sensor are more important for control of the automatic transaxle than for control of the engine; shifting "impact shocks" are produced if there is a malfunction of the throttle-position sensor.

Hint 2:
If the voltage of the throttle-position sensor deviates from the standard value, check once again after making the throttle-position sensor adjustment. In addition, if there are any indications that the fixed SAS has been moved, adjust the fixed SAS.

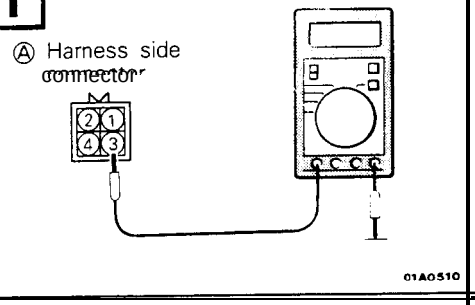
INSPECTION

Using Scan tool

Function	Item No.	Data display	Inspection conditions	Throttle valve	Standard value
Data reading	14	Sensor detection voltage	Ignition switch: ON	To idle position	450–550 mV
				Gradually opening	Becomes higher proportional to valve opening.
				To fully open	4,500–5,500 mV

HARNESS INSPECTION

1



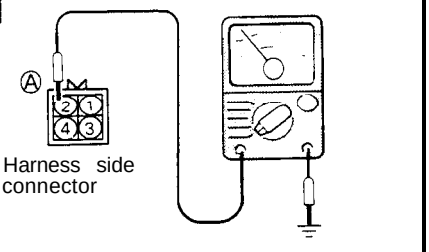
Measure the power supply voltage of the TPS.
. Connector: Disconnected
. Ignition switch: ON

Voltage (V)
4.8–5.2

OK → 2

NG → Repair the harness. (Ⓐ1–23)

2

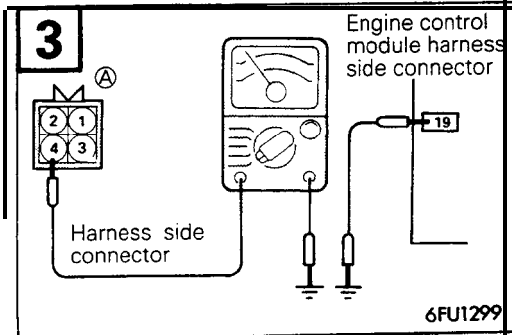


Check for continuity of the ground circuit of the TPS.
. Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ2–17, 24)

3

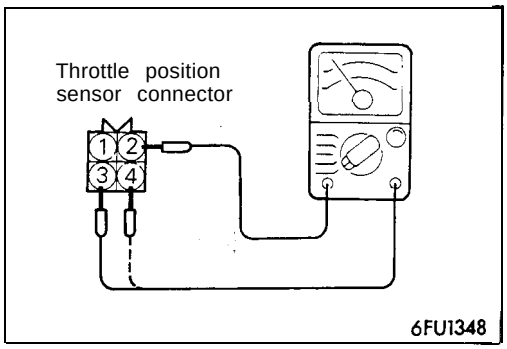


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the throttle position sensor.
. Throttle position sensor connector: Disconnected
. Engine. control module connector: Disconnected

OK → △

NG → Repair the harness. (Ⓐ4–19)

TSB Revision



SENSOR INSPECTION

(1) Disconnect the throttle position sensor connector.
(2) Measure resistance between terminal ② (sensor ground) and terminal ③ (sensor power).

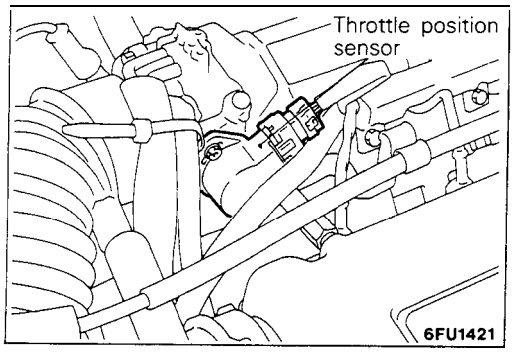
Standard value: 3.5-6.5 kΩ

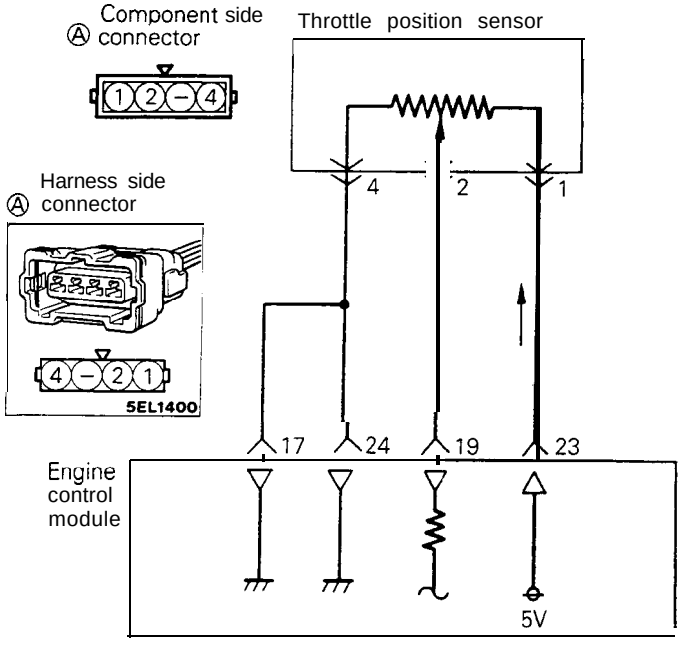
(3) Connect a pointer type ohmmeter between terminal ② (sensor ground) and terminal ④ (sensor output).
(4) Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
(5) If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

Throttle position sensor installation torque: 1.5-2.5 Nm (1.1-1.8 ft.lbs.)

THROTTLE POSITION SENSOR <From 1990 models>

M13YJAF1





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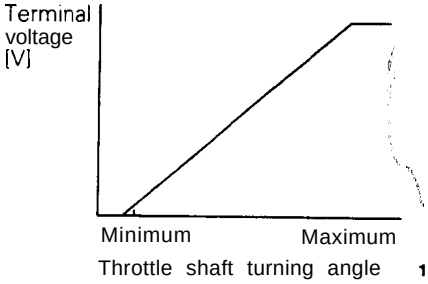
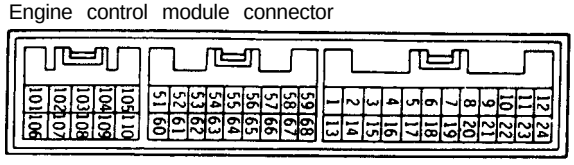




OPERATION

TROUBLESHOOTING HINTS

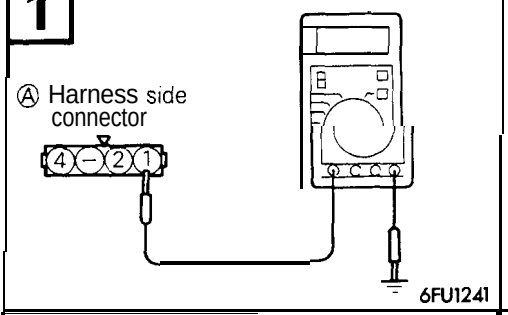
INSPECTION-Using Scan tool

Refer to P.13-270.

TSB Revision

HARNESS INSPECTION

1



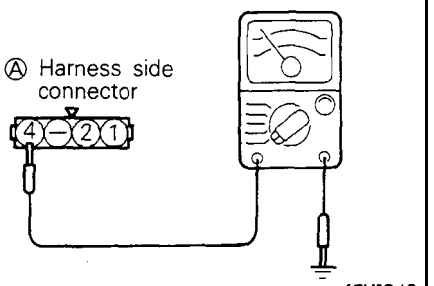
Measure the power supply voltage of the throttle position sensor.
. Connector: Disconnected
. Ignition switch: ON

Voltage (V)
4.8–5.2

OK → 2

NG → Repair the harness. (Ⓐ1–23)

2

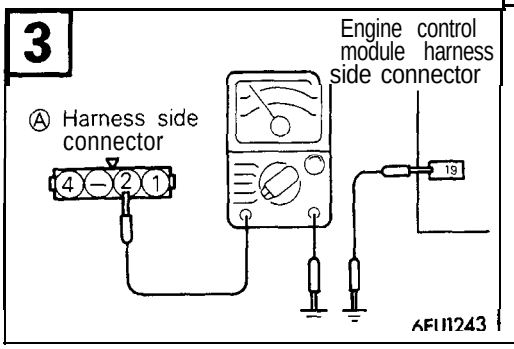


Check for continuity of the ground circuit.
. Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ4–17, 24)

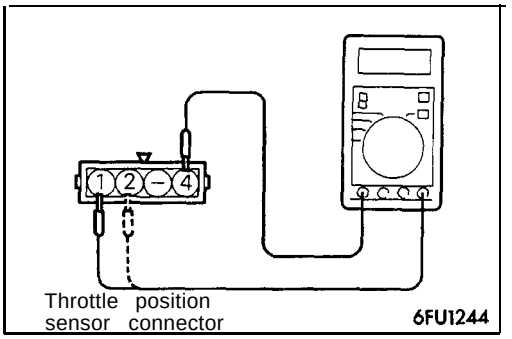
3



Check for an open-circuit, or a short-circuit to ground, between the engine control module and the throttle position sensor.
• Throttle aosition sensor connector: Disconnected
. Engine control module connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ2–19)



SENSOR INSPECTION

(1) Disconnect the throttle position sensor connector.
(2) Measure resistance between terminal ④ (sensor ground) and terminal ① (sensor power).

Standard value: 3.5-6.5 kΩ

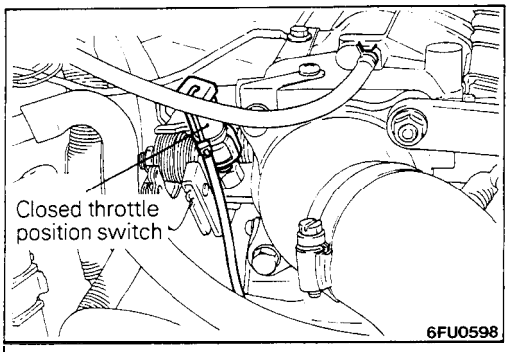
(3) Connect a pointer type ohmmeter between terminal ④ (sensor ground terminal) and terminal ② (sensor output terminal).
(4) Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
(5) If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

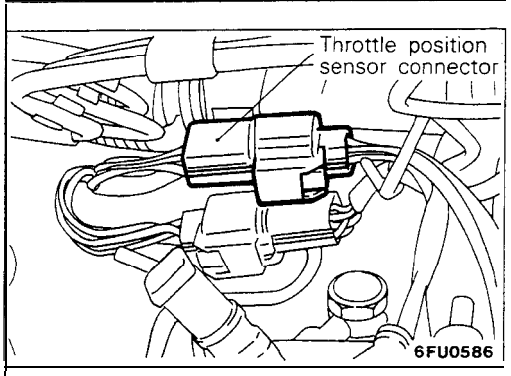
Throttle. position sensor installation torque: 1.5-2.5 Nm (1.1-1.8 ft.lbs.)

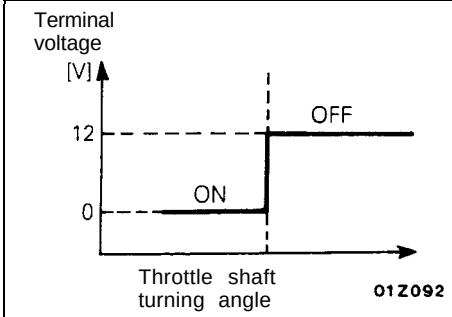
TSB Revision

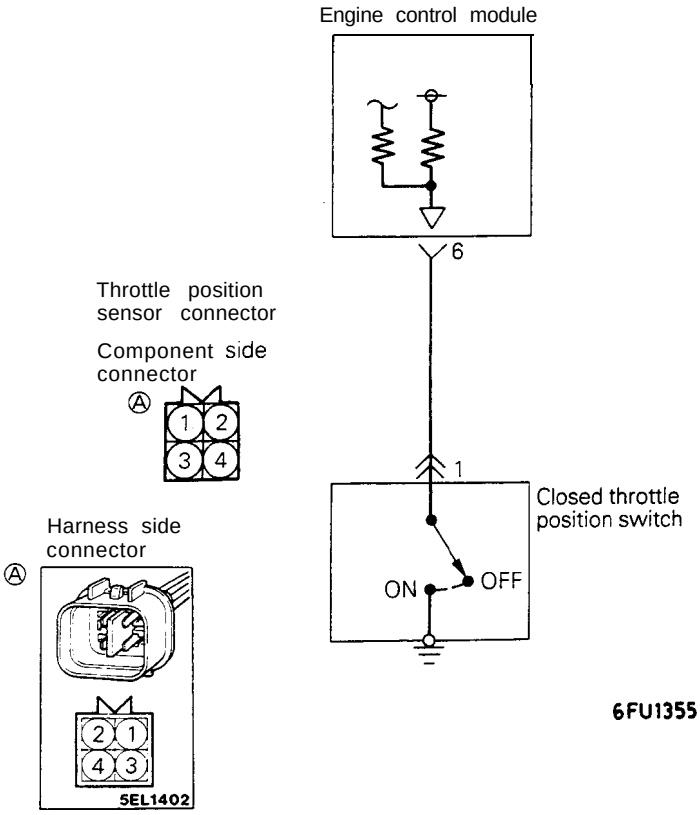
CLOSED THROTTLE POSITION SWITCH <1989 models>

M13YKAE1









OPERATION

- The closed throttle position switch functions to convert (to HIGH/LOW-level voltage) data as to whether the accelerator is depressed or released, and to input that voltage (as signals) to the engine control module. The engine control module, based upon those signals, regulates the idle air control motor.
- Voltage within the engine control module is applied, by way of the resistance, to the closed throttle position switch.
  When the foot is taken off the accelerator, the closed throttle position switch is switched ON, so the current is grounded.
  As a result, the closed throttle position terminal voltage changes from HIGH to LOW level.

TROUBLESHOOTING HINTS

If there is an abnormal condition of the closed throttle position switch switch output even though the results of the checking of the closed throttle position switch harness and of the component itself indicate a normal condition, the cause may be presumed to be one of the following.

(1) Improper adjustment of the accelerator cable or the automatic-cruise-control cable.
(2) Improper adjustment of the closed throttle position switch (fixed SAS).

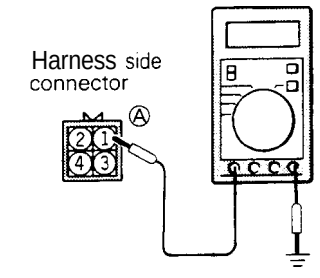
INSPECTION

Using Scan tool

Function	Item No.	Data display	Inspection conditions	Throttle valve	Normal indication
Data reading	26	Switch status	Ignition switch: ON (Check after pumping accelerator several times.)	To idle position	ON
				Slightly opened	OFF

HARNESS INSPECTION

1

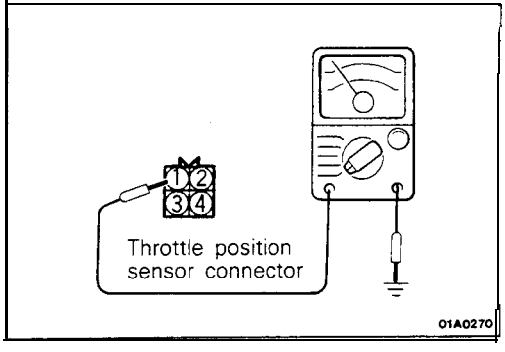


Measure the power supply voltage of the closed throttle position switch.
. Connector: Disconnected
. Ignition switch: ON

Voltage (V)
4 **or more**

OK → STOP

NG → Repair the harness. (Ⓐ1–6)



SENSOR INSPECTION

(1) Disconnect the throttle position sensor connector
(2) Check the continuity between terminal ① and body ground.

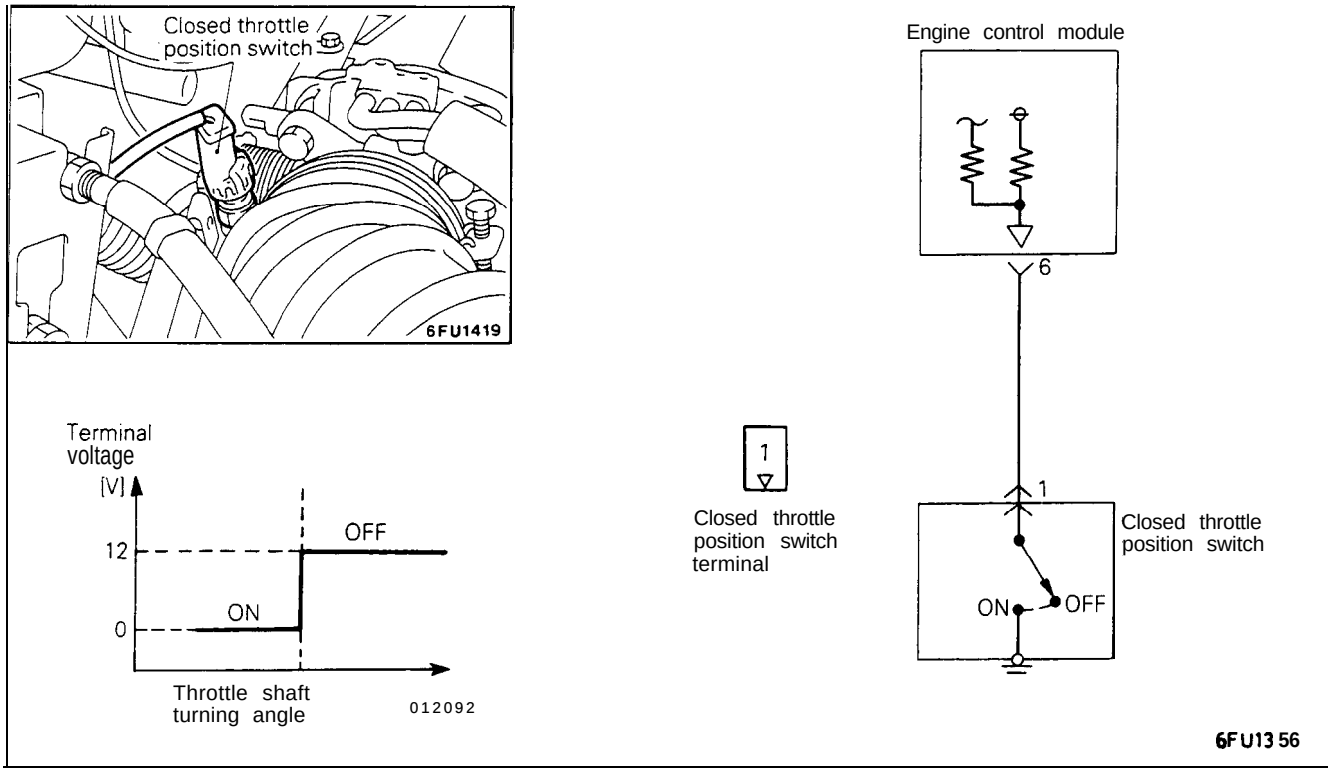
Accelerator pedal	Continuity
Depressed	Non-conductive (∞ Ω)
Released	Conductive (0 Ω)

(3) If out of specification, replace the throttle position sensor assembly.

TSB Revision

CLOSED THROTTLE POSITION SWITCH <From 1990 models>

M13YKAF1



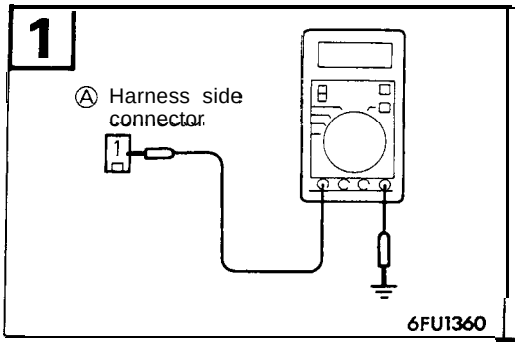
OPERATION

TROUBLESHOOTING HINTS

INSPECTION-Using Scan tool

Refer to P.13-274.

HARNESS INSPECTION

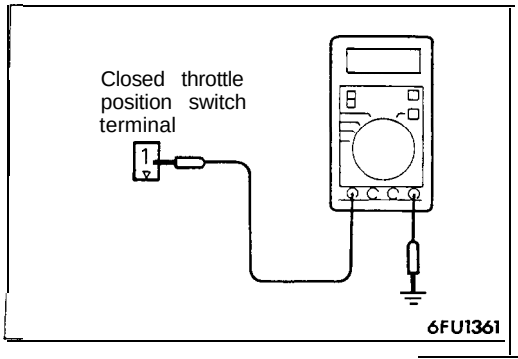


Measure the power supply voltage of the closed throttle position switch.
. Connector: Disconnected
. Ignition switch: ON

Voltage (V)
4 or more

OK → STOP

NO → Repair the harness. (Ⓐ1–6)



SENSOR INSPECTION

(1) Disconnect the closed throttle position switch connector.
(2) Check the continuity between terminal ① and sensor ground.

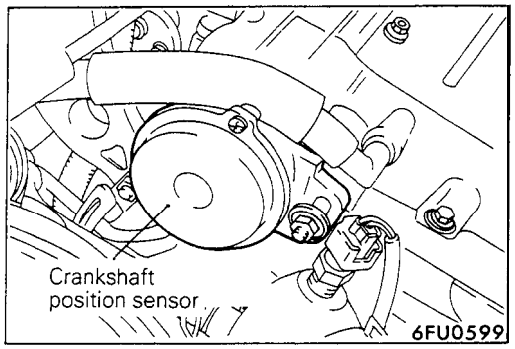
Accelerator pedal	Continuity
Depressed	Non-conductive (∞ Ω)
Released	Conductive (0 Ω)

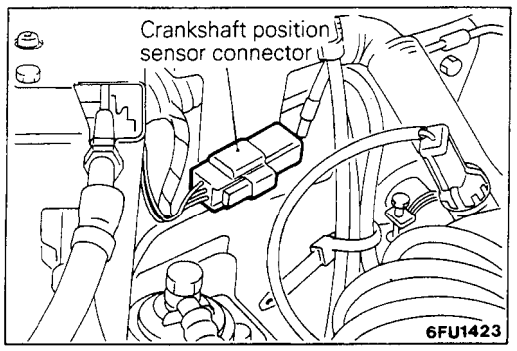
(3) If out of specification, replace the closed throttle position switch.

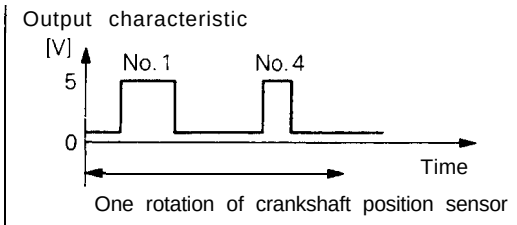
TSB Revision

CAMSHAFT POSITION SENSOR <Up to 1990 models>

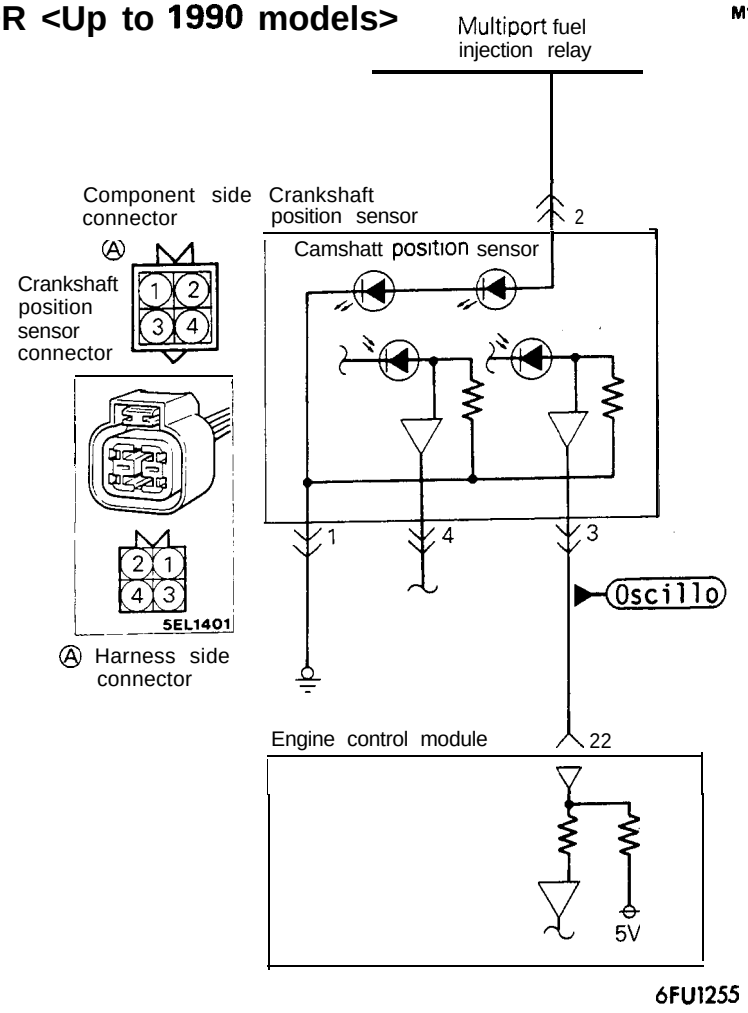
M13YLAAa







01A0528

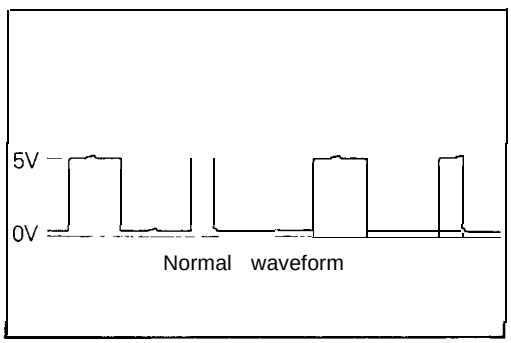


OPERATION

- The camshaft position sensor functions to detect the top dead center position of the No.1 cylinder and to convert those data to pulse signals that are input to the engine control module. The engine control module, based upon those signals, calculates the sequence of fuel injection.
- The power for the camshaft position sensor is supplied from the multiport fuel injection relay and is grounded to the vehicle body. The camshaft position sensor, by intermitting the flow (to ground) of the 5V voltage applied from the engine control module produces pulse signals.

TROUBLESHOOTING HINTS

If there is a malfunction of the camshaft position sensor, the sequential injection will not be correct, resulting in such problems as engine stalling, unstable idling, and poor acceleration.



INSPECTION

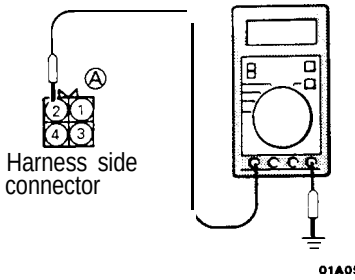
Using Oscilloscope

(1) Run the engine at an idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

TSB Revision

HARNESS INSPECTION

1



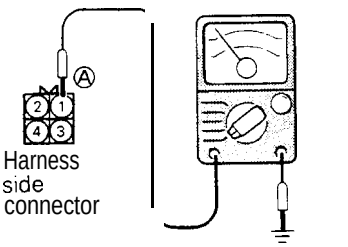
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
Battery positive voltage

OK → 2

NG → Repair the harness. (Ⓐ2 – Multi-port fuel injection relay)

2

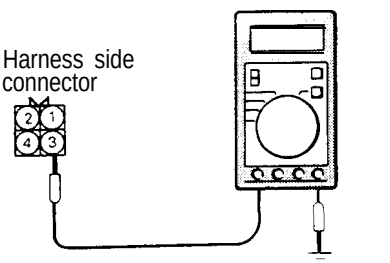


Check for continuity of the ground circuit.
Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ1 – Ground)

3



Check the output circuit voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8–5.2

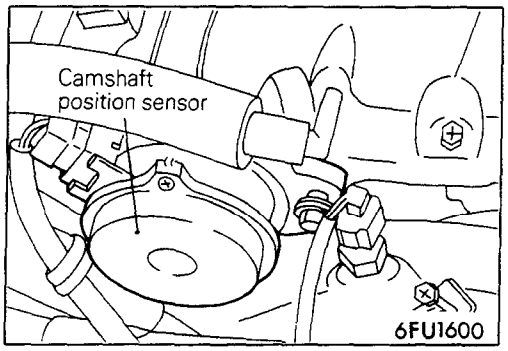
OK → STOP

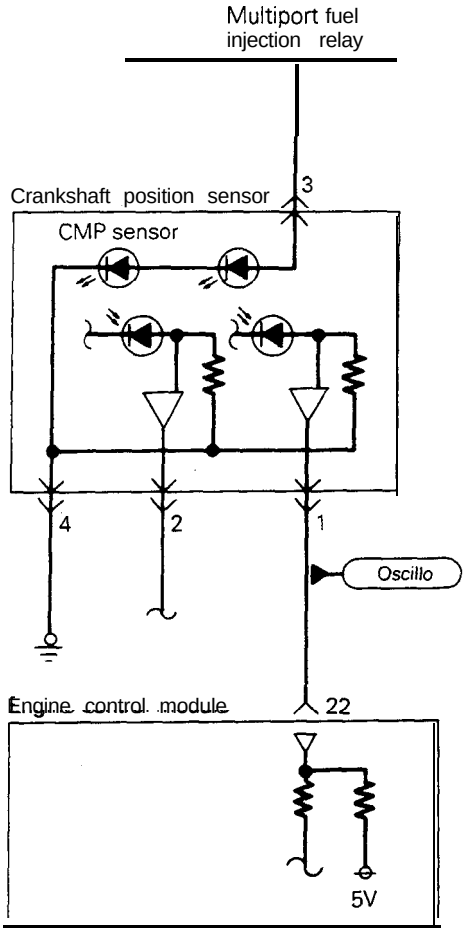
NG → Repair the harness. (Ⓐ3 – 22)

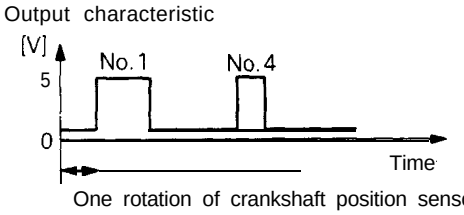
TSB Revision

CAMSHAFT POSITION SENSOR <From 1991 models>

M13YLAB1







01A0528

7FU0493

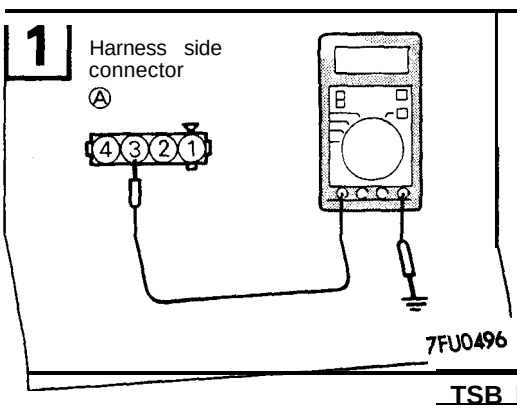
OPERATION

TROUBLESHOOTING HINTS

INSPECTION-Using Oscilloscope

Refer to P.13-277.

HARNESS INSPECTION



Measure the power supply voltage.
. Connector: Disconnected
. Ignition switch: ON

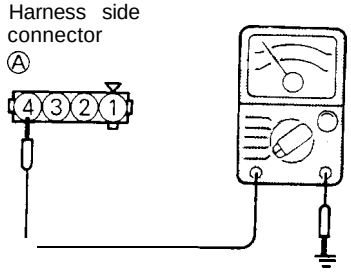
Voltage (V)
Battery positive voltage

OK → 2

NG → Repair the harness. (Ⓐ3 – Multiport fuel injection relay)

TSB Revision

2 Harness side connector Ⓐ



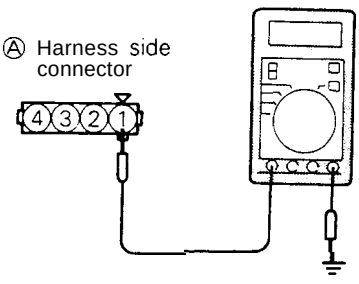
7FU0497

Check for continuity of the ground circuit.
. Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ4 – Ground)

3 Ⓐ Harness side connector



7FU0498

Check the output circuit voltage.
. Connector: Disconnected
. Ignition switch: ON

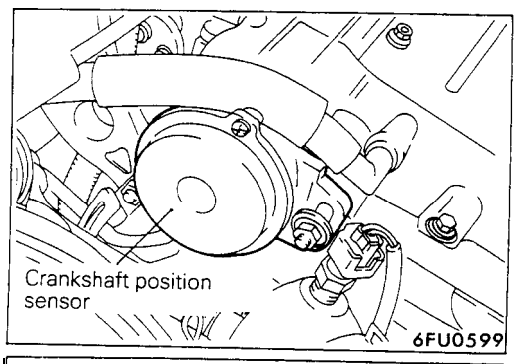
Voltage (V)
4.8–5.2

OK → STOP

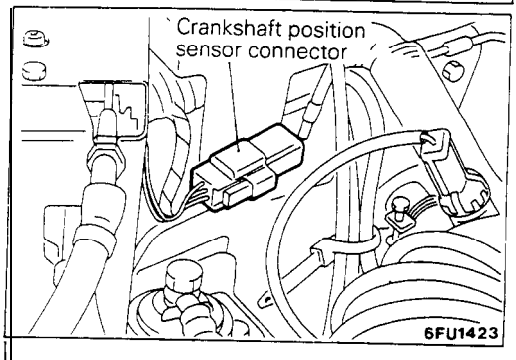
NG → Repair the harness. (Ⓐ1 – 22)

CRANKSHAFT POSITION SENSOR <Up to 1990 models>

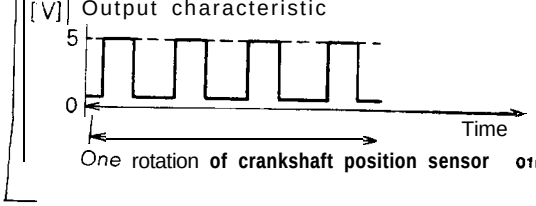
M13YMAA1



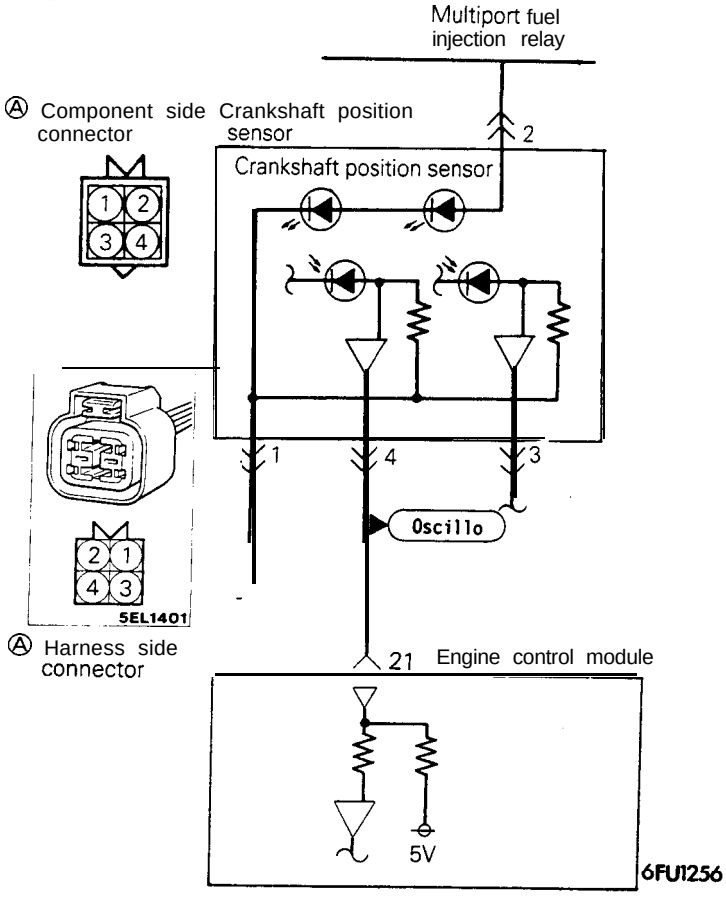
6FU0599



6FU1423



One rotation of crankshaft position sensor 01R0103



6FU1256

OPERATION

- The crankshaft position sensor functions to detect the crank angle (position) of each cylinder, and to convert those data to pulse signals, which are then input to the engine control module. The engine control module, based upon those signals, calculates the engine rpm, and also regulates the fuel injection timing and the ignition timing.
- The power for the crankshaft position sensor is supplied from the ignition switch–IG and is grounded to the vehicle body. The crankshaft position sensor, by intermitting the flow (to ground) of the 5V voltage applied from the engine control module, produces pulse signals.

TROUBLESHOOTING HINTS

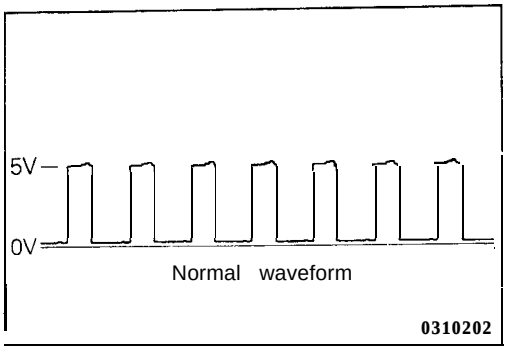
Hint 1:
If an impact is suddenly felt during driving or the engine suddenly stalls during idling, try shaking the crankshaft position sensor during idling.
If the engine stalls, the cause may be presumed to be improper or incomplete contact of the crankshaft position sensor's connector.
Hint 2:
If the crankshaft position sensor output rpm is 0 rpm during cranking when the engine cannot be started, the cause may be presumed to be a malfunction of the crankshaft position sensor or a broken timing belt.
Hint 3:
If the indicated value of the crankshaft position sensor output rpm is 0 rpm during cranking when the engine cannot be started, the cause may be presumed to be a failure of the ignition coil's primary current to intermittently pulse correctly, so a malfunction of the ignition system circuitry, the ignition coil and/or the power transistor is the probable cause.
Hint 4:
If idling is possible even though the crankshaft position sensor indicated rpm is a deviation from the standard value, the cause is usually a malfunction of something other than the crankshaft position sensor.
Examples:
(1) Malfunction of the coolant-temperature sensor.
(2) Malfunction of the idle air control motor.
(3) Improper adjustment of the standard idling speed.

INSPECTION

Using Scan tool

Function	Item No.	Data display	Inspection conditions	Description	Normal condition
Data reading	22	Cranking rpm	. Engine: Cranking . Tachometer connection (Check intermittent flow of ignition coil primary current by tachometer.)	Compare cranking rpm and scan tool indicated rpm.	Both agree.

Function	Item No.	Data display	Inspection conditions	Engine coolant temp.	Standard value
Data reading	22	Idling rpm	· Engine: Idling · Closed throttle position switch: ON	At –20°C (–4°F)	1,450–1,700 rpm
				At 0°C (32°F)	1,350–1,600 rpm
				At 20°C (68°F)	1,180–1,450 rpm
				At 40°C (104°F)	1,000–1,250 rpm
				At 80°C (176°F)	650–850 rpm <Non-Turbo> 700–900 rpm <Turbo>



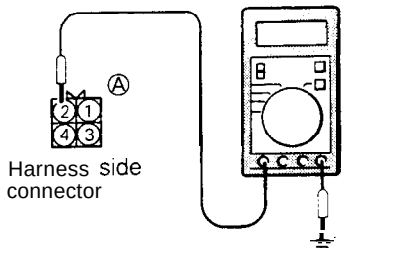
Using Oscilloscope

(1) Run the engine at an idle speed.

(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

HARNESS INSPECTION

1



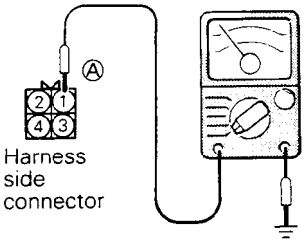
Measure the power supply voltage.
. Connector: Disconnected
. Ignition switch: ON

Voltage (V)
Battery positive voltage

OK → 2

NG → Repair the harness. (Ⓐ2 – Multi-port fuel injection relay)

2

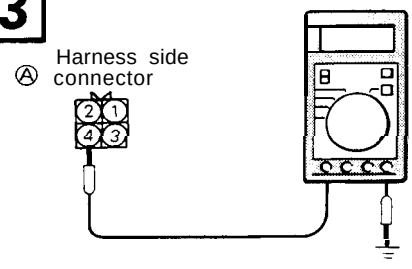


Check for continuity of the ground circuit.
. Connector: Disconnected

OK → 3

NG → Repair the harness. (K&III-Ground)

3



Check the voltage of the output circuit.
. Connector: Disconnected
. Ignition switch: ON

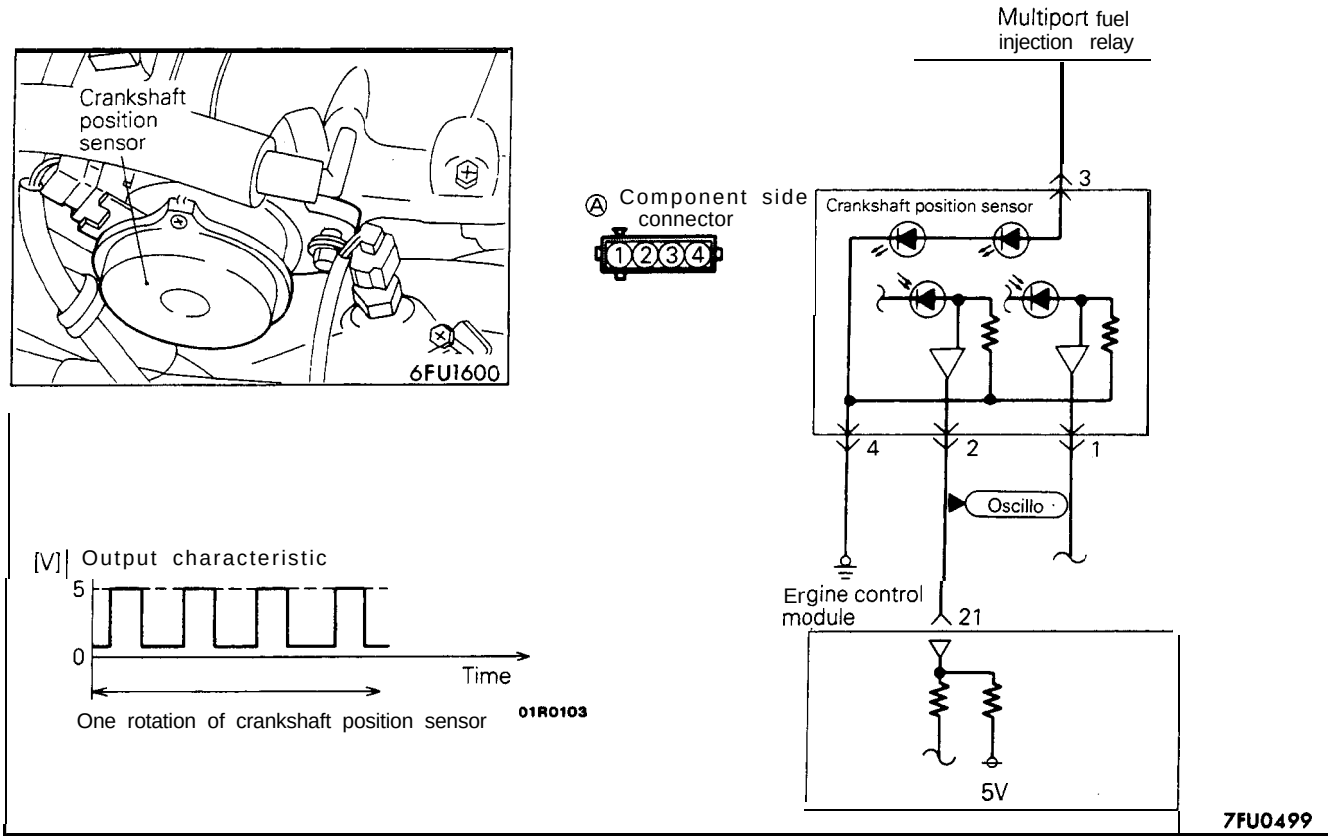
Voltage (V)
4.8–5.2

OK → STOP

NG → Repair the harness. (Ⓐ4 – 21)

CRANKSHAFT POSITION SENSOR <From 1991 models>

M13YMAB1



OPERATION

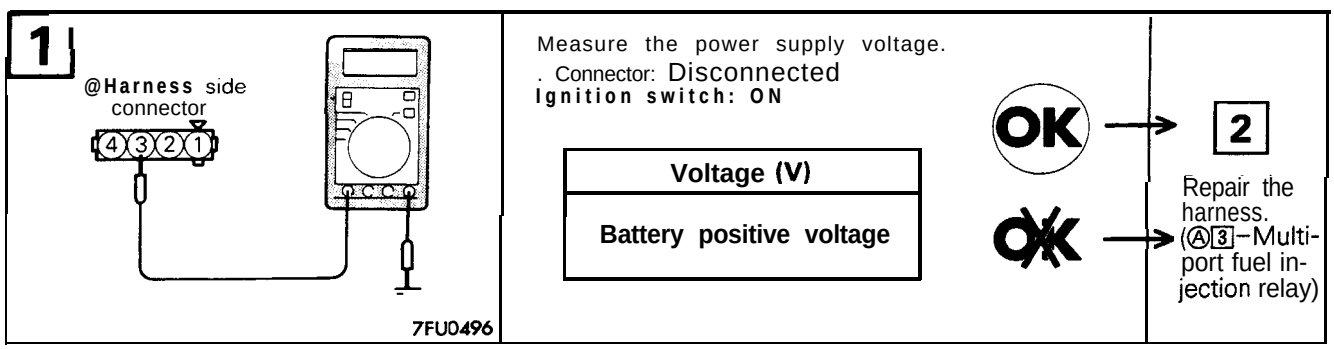
TROUBLESHOOTING HINTS

INSPECTION-Using Scan tool

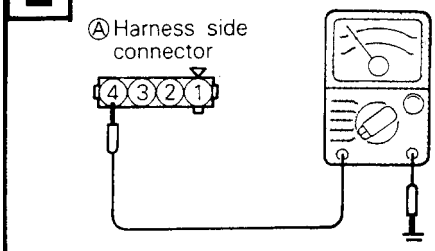
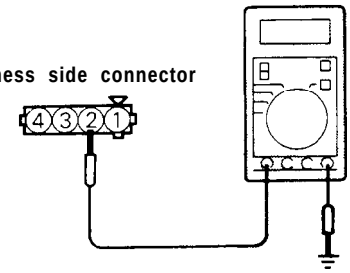
INSPECTION-Using Oscilloscope

Refer to P.13-281.

HARNESS INSPECTION



TSB Revision

2  7FU0497	Check for continuity of the ground circuit. . Connector: Disconnected	OK →	**3**
		OK →	Repair the harness. (Ⓐ4 – Ground)
3 Ⓐ **Harness side connector**  7FU0501	Check the voltage of the output circuit. . Connector: Disconnected . Ignition switch: ON **Voltage (V)**: **4.8–5.2**	OK →	STOP
		OK →	Repair the harness. (Ⓐ2 – 21)

IGNITION SWITCH-ST M13YNAAa

Refer to P.13-77.

IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH M13YOAc

Refer to P.13-78.

VEHICLE SPEED SENSOR M13YPAAa

Refer to P.13-80.

POWER STEERING PRESSURE SWITCH M13YQAAa

Refer to P.13-81.