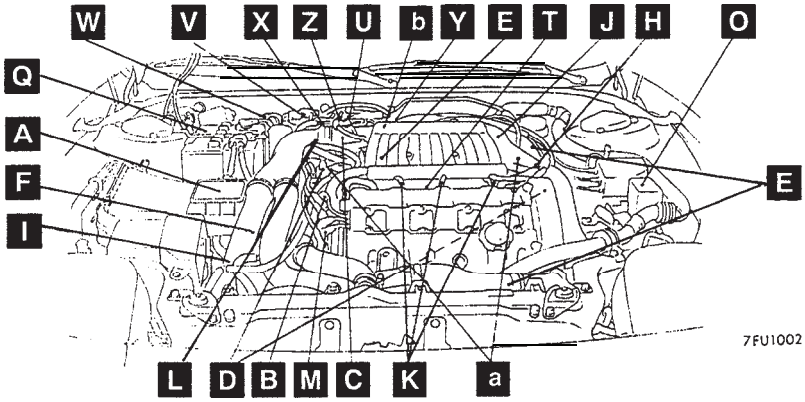
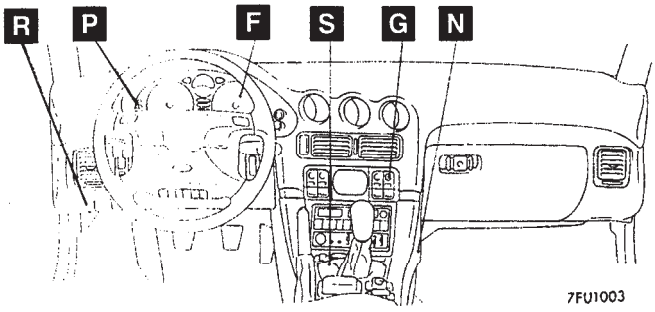
ON-VEHICLE INSPECTION OF MFI COMPONENTS <From 1994 Models except Non Turbo up to 1995 Models for Federal>

COMPONENT LOCATION

Name	Symbol	Name	Symbol
Air-conditioning relay	O	Ignition coil (ignition power transistor)	M
Air-conditioning switch	G	Ignition timing terminal	Q
Camshaft position sensor	a	Injector	K
Check engine/malfunction indicator lamp	P	Knock sensor	T
Crankshaft position sensor	D	Manifold differential pressure sensor <From 1996 models>	b
Diagnostic output terminal and diagnostic test mode control terminal	R	Multiport fuel injection (MFI) relay	N
		Park/Neutral position switch <A/T>	I
EGR solenoid <California – Non Turbo, Turbo, From 1996 Federal – Non Turbo>	Z	Power steering pressure switch	H
		Resistor <Turbo>	W
EGR temperature sensor <Up to 1995 California, Up to 1995 Federal Turbo>	Y	Throttle position sensor (with built-in closed throttle position switch)	C
Engine control module	S	Turbocharger waste gate solenoid <Turbo>	U
Engine coolant temperature sensor	B	Variable induction control motor (DC motor) (with built-in induction control valve position sensor) <Non Turbo>	J
Evaporative emission purge solenoid	X		
Fuel pressure solenoid <Turbo>	V	Vehicle speed sensor	F
Heated oxygen sensor	E	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)	A
Idle air control motor (stepper motor)	L		

NOTE: The "Name" column is in alphabetical order





A7FU1842

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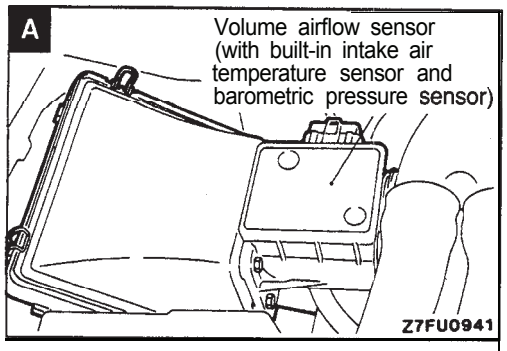
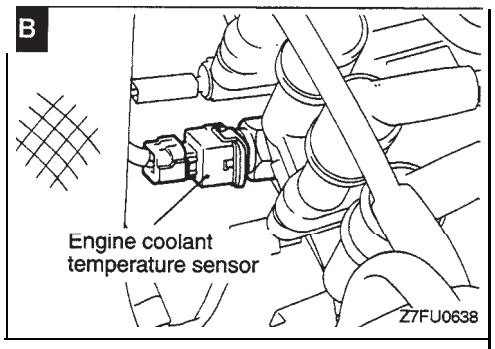
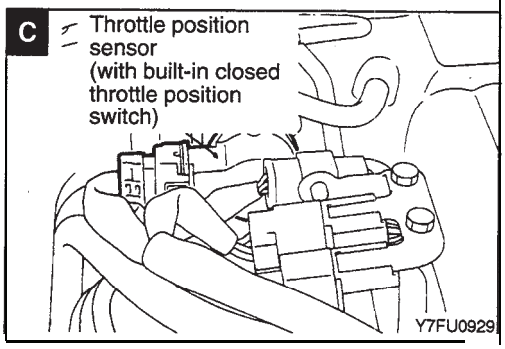
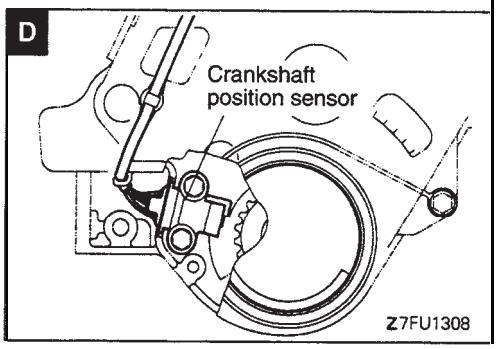
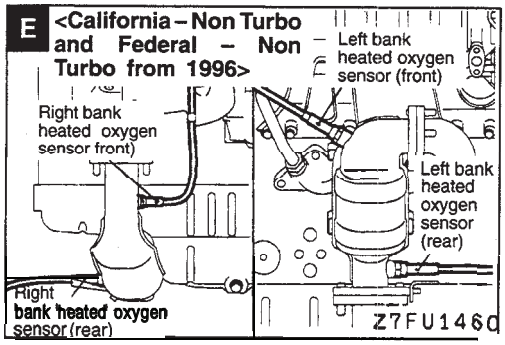
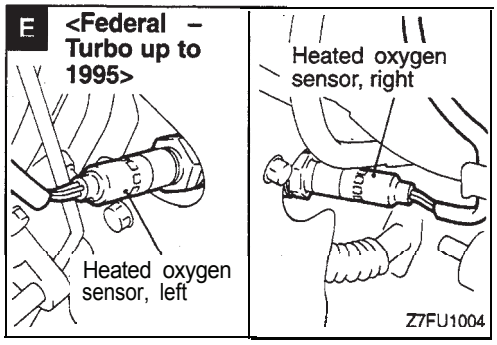

A
Volume airflow sensor (with built-in intake air temperature sensor and barometric pressure sensor)
Z7FU0941

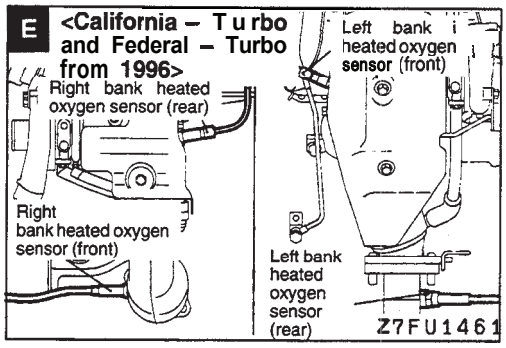

B
Engine coolant temperature sensor
Z7FU0638

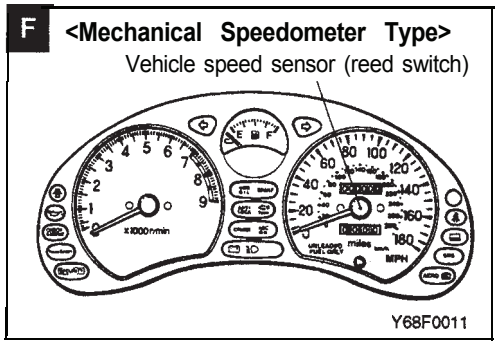

C
Throttle position sensor (with built-in closed throttle position switch)
Y7FU0929

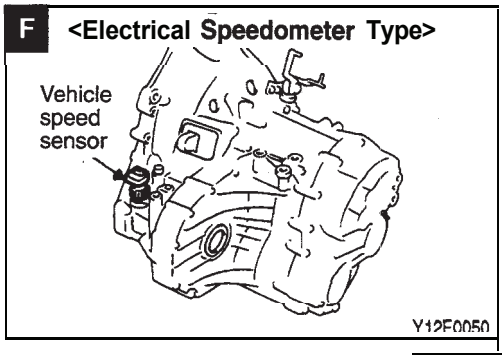

D
Crankshaft position sensor
Z7FU1308

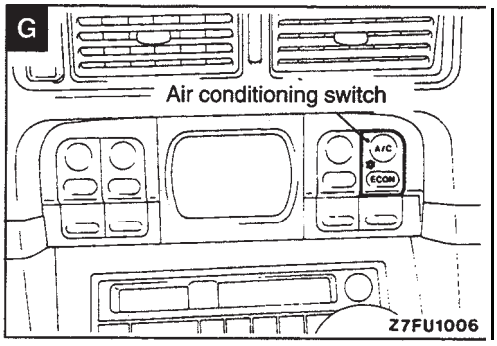

E
<California – Non Turbo and Federal – Non Turbo from 1996>
Left bank heated oxygen sensor (front)
Right bank heated oxygen sensor front)
Left bank heated oxygen sensor (rear)
Right bank heated oxygen sensor (rear)
Z7FU1460

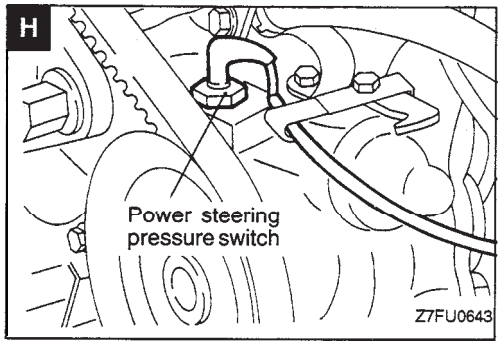

E
<Federal – Turbo up to 1995>
Heated oxygen sensor, left
Heated oxygen sensor, right
Z7FU1004

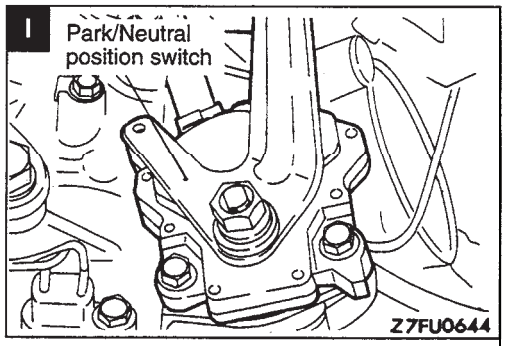

E
<California – Turbo and Federal – Turbo from 1996>
Right bank heated oxygen sensor (rear)
Left bank heated oxygen sensor (front)
Right bank heated oxygen sensor (front)
Left bank heated oxygen sensor (rear)
Z7FU1461

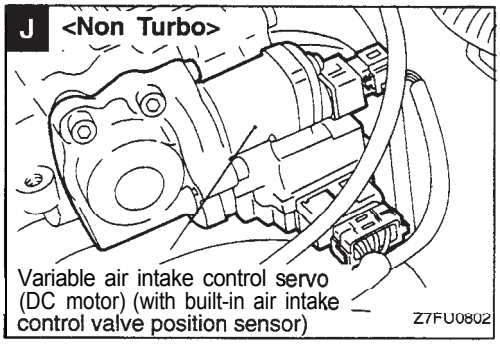

F
<Mechanical Speedometer Type>
Vehicle speed sensor (reed switch)
Y68F0011

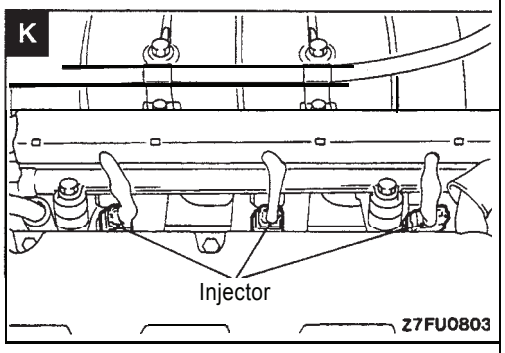

F
<Electrical Speedometer Type>
Vehicle speed sensor
Y12F0050

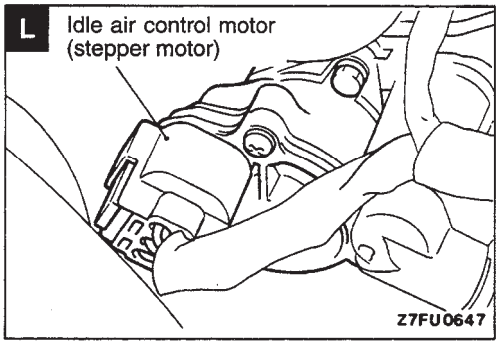

G
Air conditioning switch
Z7FU1006

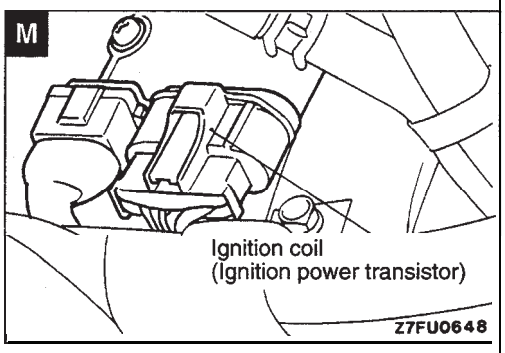


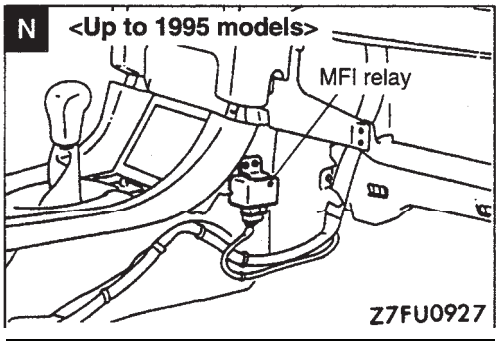


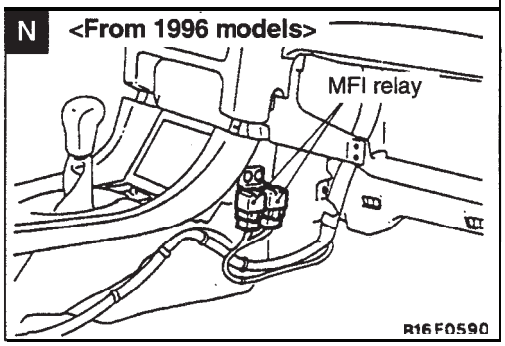


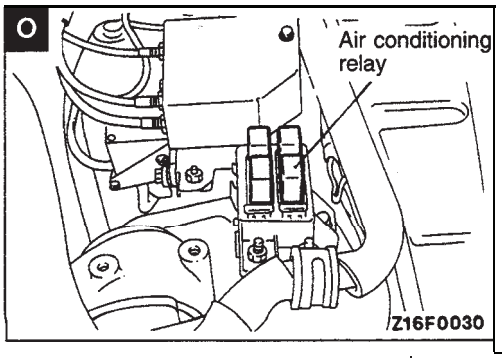


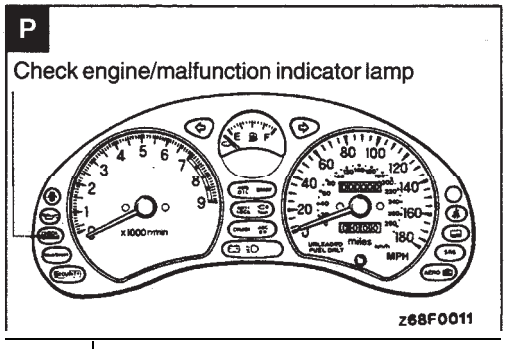












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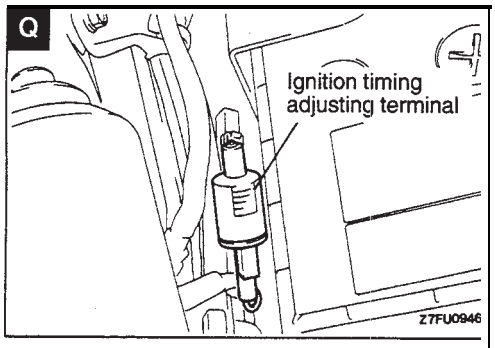
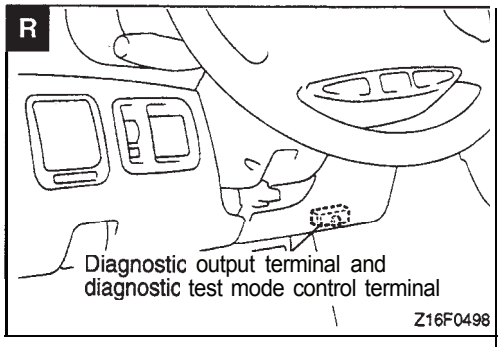
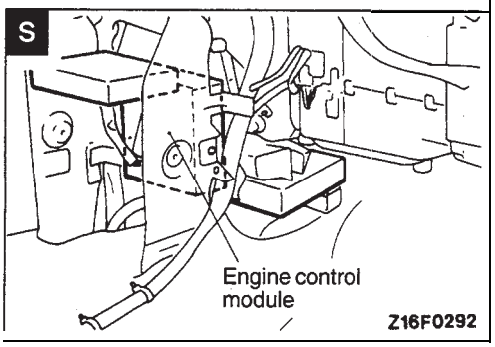
Q



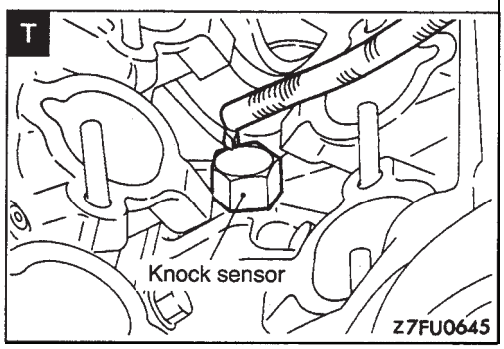
R



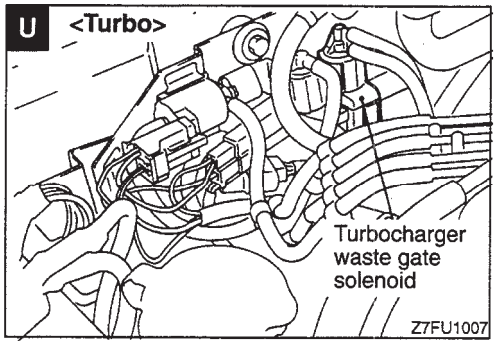
S



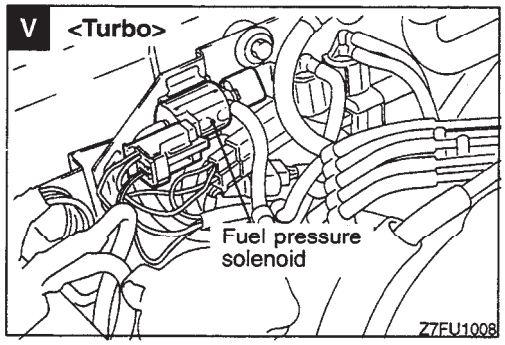
T



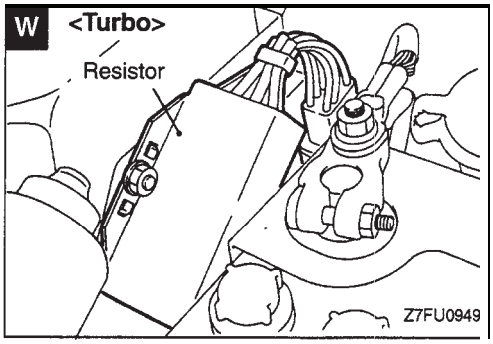
U <Turbo>



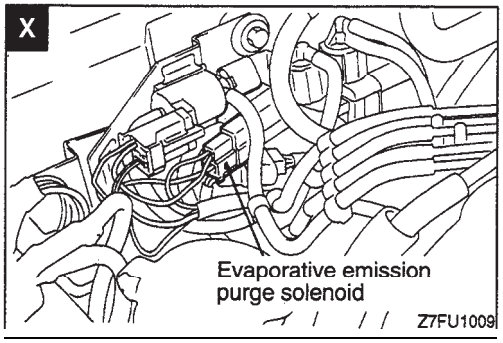
V <Turbo>



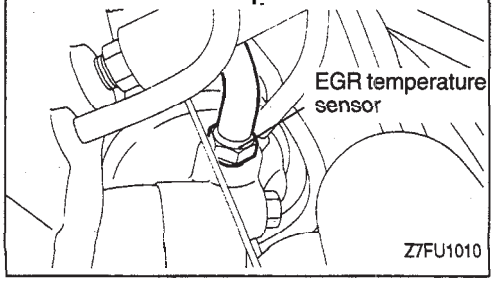
W <Turbo>



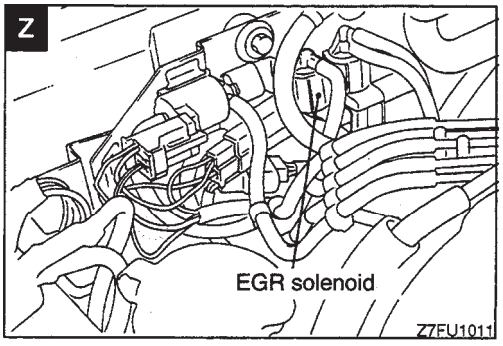
X



Y <California up to 1995 models, Federal -Turbo up to 1995 models>



Z



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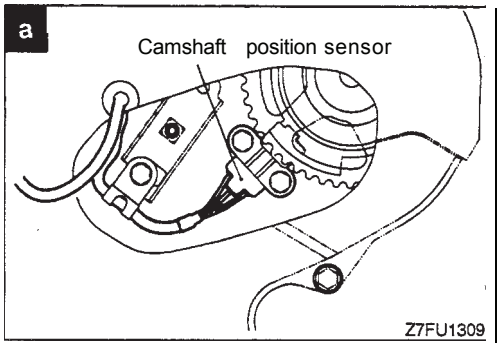
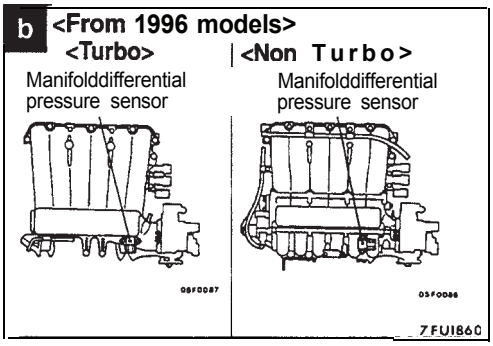

a
Camshaft position sensor
Z7FU1309

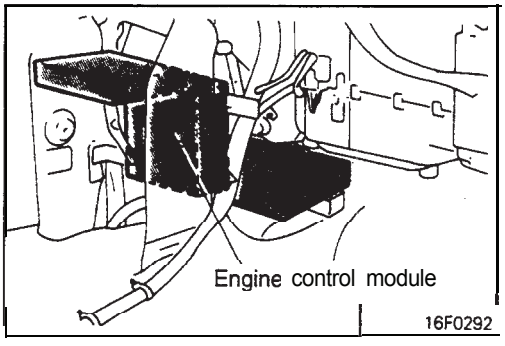

b
<From 1996 models>
<Turbo>
<Non Turbo>
Manifolddifferential pressure sensor
Manifolddifferential pressure sensor
Z7FU1860

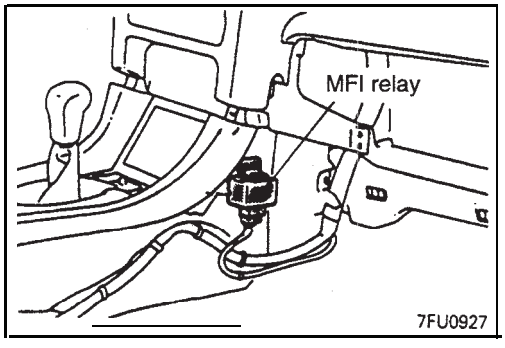
COMPONENTS INSPECTION PROCEDURE

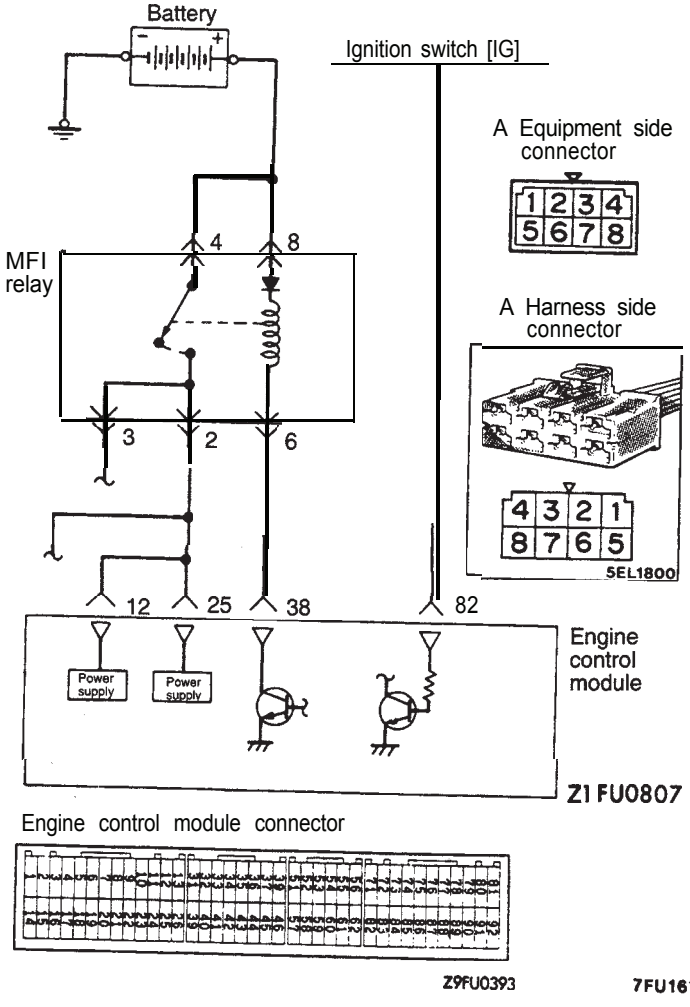
USING SCAN TOOL

Refer to P.13A-64.

POWER SUPPLY (MFI RELAY) AND IGNITION SWITCH – IG <Up to 1995 models>







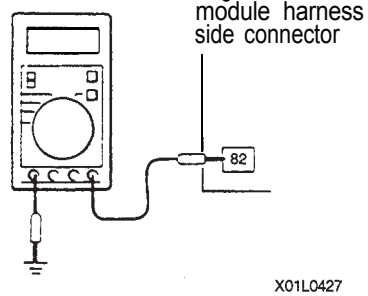
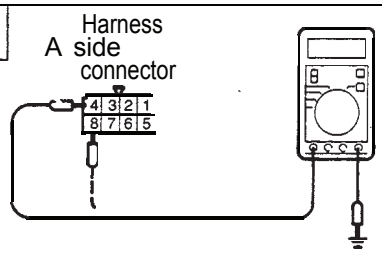
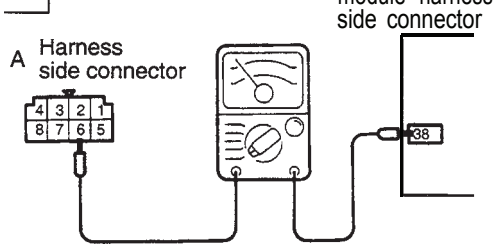
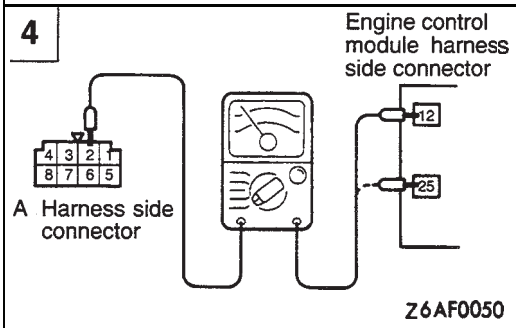
OPERATION

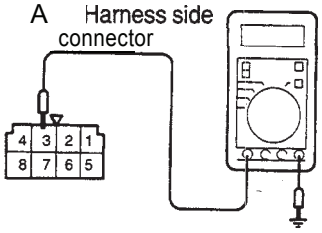
Refer to P.13A-65.

INSPECTION

Refer to P.13A-65.

HARNESS INSPECTION

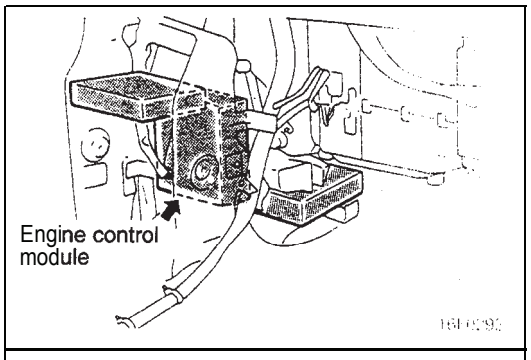
1 	Measure the ignition switch (IG) terminal input voltage. • Engine control module connector: Disconnected **Ignition switch OFF: O-l V** **Ignition switch ON: Battery voltage**	OK → 2 OK → Repair the harness: (Ignition switch – 82) or check the ignition switch	
2 	Measure the power supply voltage of the MFI relay. • Ignition switch: OFF • MFI relay connector: Disconnected **Battery voltage**	OK → 3 OK → Repair the harness. (Battery – A4, A8)	
3 	Check for an open-circuit, or a short-circuit to ground, between the engine control module and the MFI relay. • Engine control module connector: Disconnected • MFI relay connector: Disconnected	OK → 4 OK → Repair the harness. (A6–38)	
4 	Check for an open-circuit, or a short-circuit to earth between the engine control module and the MFI relay. • MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK → 5 OK → Repair the harness. (A2–12, 25)	

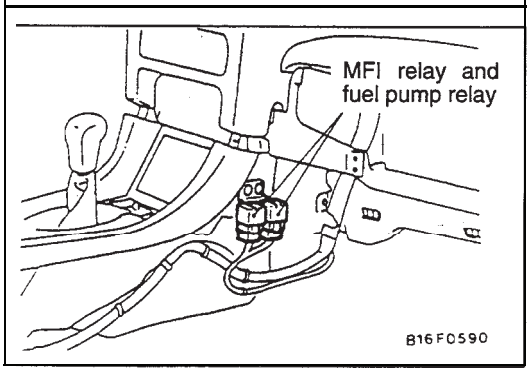
5	 Z6AF0051	Measure power voltage to the actuator. • MFI relay connector: Connected • Engine control module connector: Connected **Engine cranking: 8 V or higher** **Engine racing: Battery voltage**	OK →	STOP
			OK →	Replace the MFI relay or defective engine control module

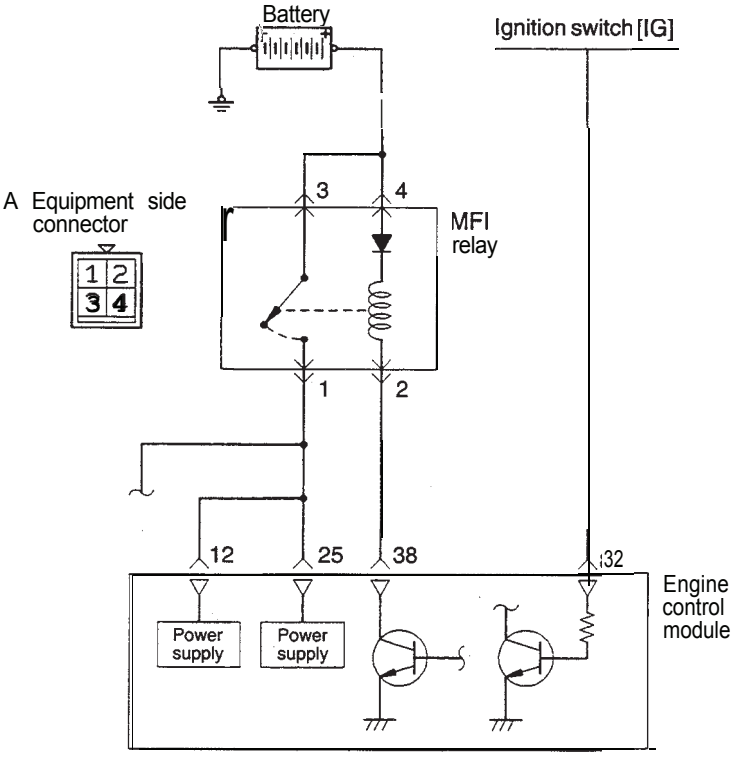
MFI RELAY INSPECTION

Refer to P.13A-70.

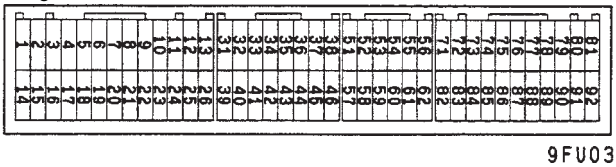
POWER SUPPLY (MFI RELAY) AND IGNITION SWITCH-IG <From 1996 models>







Engine control module connector



7FU1819

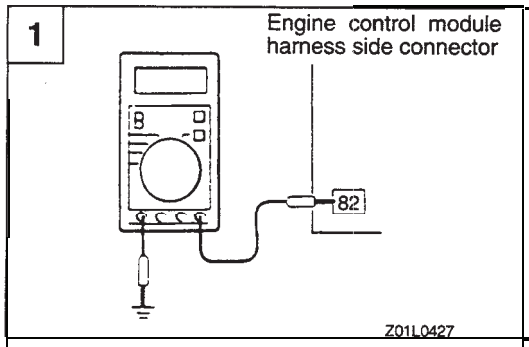
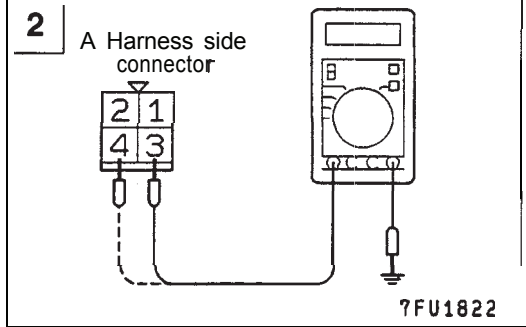
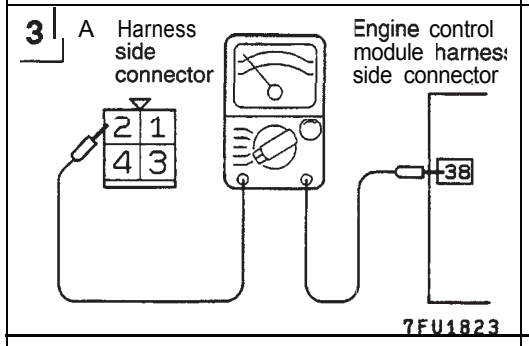
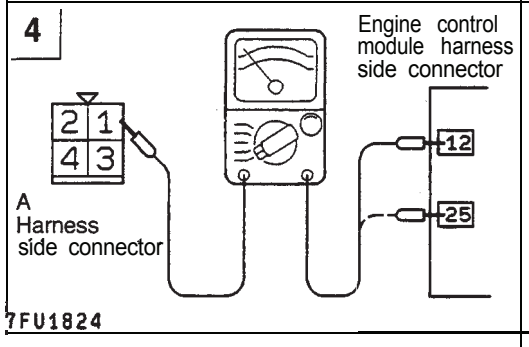
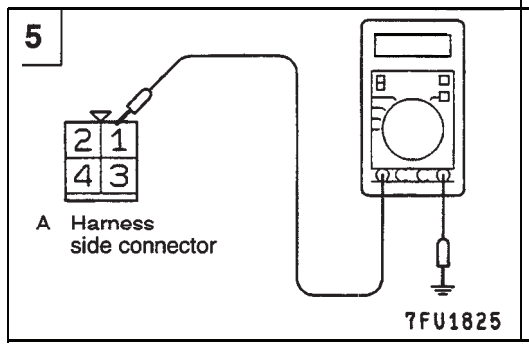
OPERATION

Refer to P.13A-65.

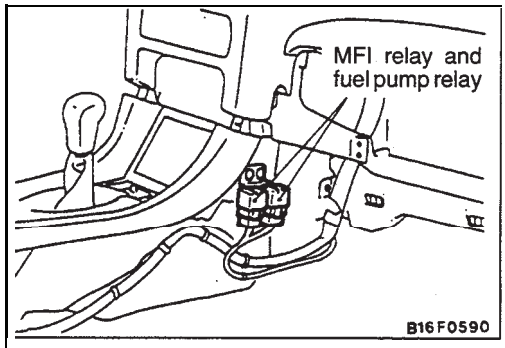
INSPECTION

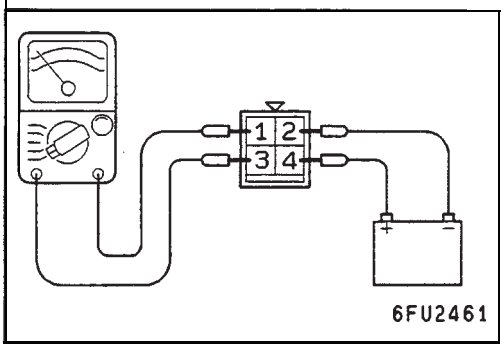
Refer to P.13A-65.

HARNESS INSPECTION

1 	Measure the ignition switch (IG) terminal input voltage. • Engine control module connector: Disconnected **Ignition switch OFF: 0- 1 V** **Ignition switch ON: Battery voltage**	OK →	2
		OK →	Repair the harness. (Ignition switch – 82) or check the ignition switch
2 	Measure the power supply voltage of the MFI relay. • Ignition switch: OFF • MFI relay connector: Disconnected **Battery voltage**	OK →	3
		OK →	Repair the harness. (Battery – A3, A4)
3 	Check for an open-circuit, or a short-circuit to ground. between the engine control module and the MFI relay. • Engine control module connector: Disconnected • MFI relay connector: Disconnected	OK →	4
		OK →	Repair the harness. (A2–38)
4 	Check for an open-circuit, or a short-circuit to ground between the engine control module and the MFI relay. • MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK →	5
		OK →	Repair the harness. (Al –12, 25)
5 	Measure power voltage to the actuator. • MFI relay connector: Connected • Engine control module connector: Connected **Engine cranking: 8V or higher** **Engine racing: Battery voltage**	OK →	STOP
		OK →	Replace the MFI relay or defective engine control module

TSB Revision





MULTIPORT FUEL INJECTION (MFI) RELAY AND FUEL PUMP RELAY INSPECTION

(1) Remove the relay.
(2) Check for continuity between the relay terminals.

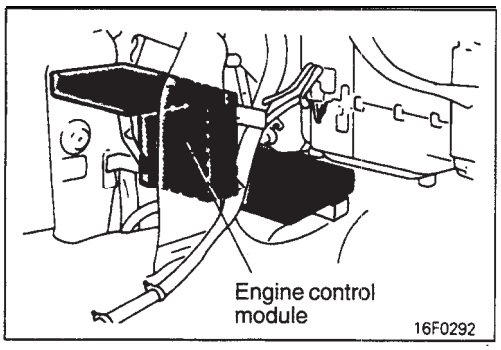
Inspection terminals	Continuity
2–4	Continuity (approx. 70 Ω)

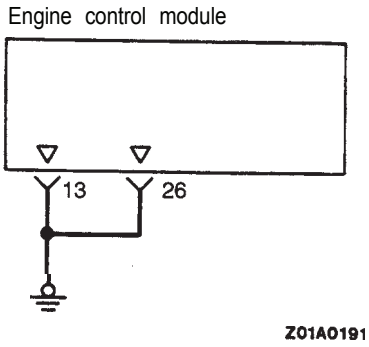
(3) Use the jumper leads to connect relay terminal 4 to the battery (+) terminal and terminal 2 to the battery (–) terminal.
(4) Check the continuity between relay terminals 1 – 3 while connecting and disconnecting the jumper lead at the battery (–) terminal.

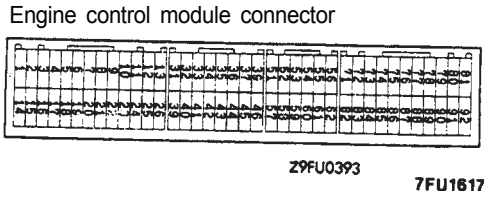
Jumper lead	Continuity across terminals I - 3
Connected	Continuity (0 Ω)
Disconnected	No continuity (∞ Ω)

(5) If there is a defect, replace the MFI relay or fuel pump relay.

ENGINE CONTROL MODULE POWER GROUND







OPERATION

Refer to 13A-71.

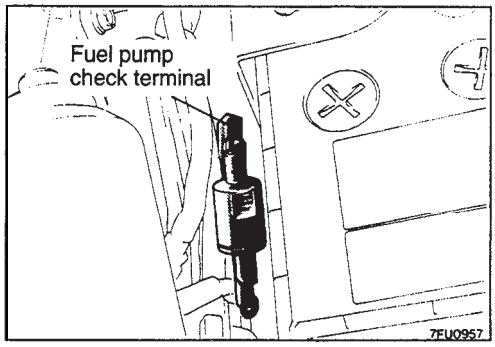
TROUBLESHOOTING HINTS

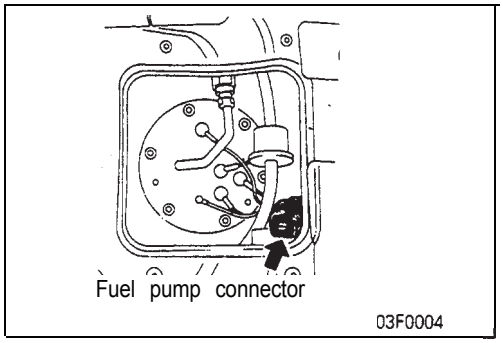
Refer to 13A-71.

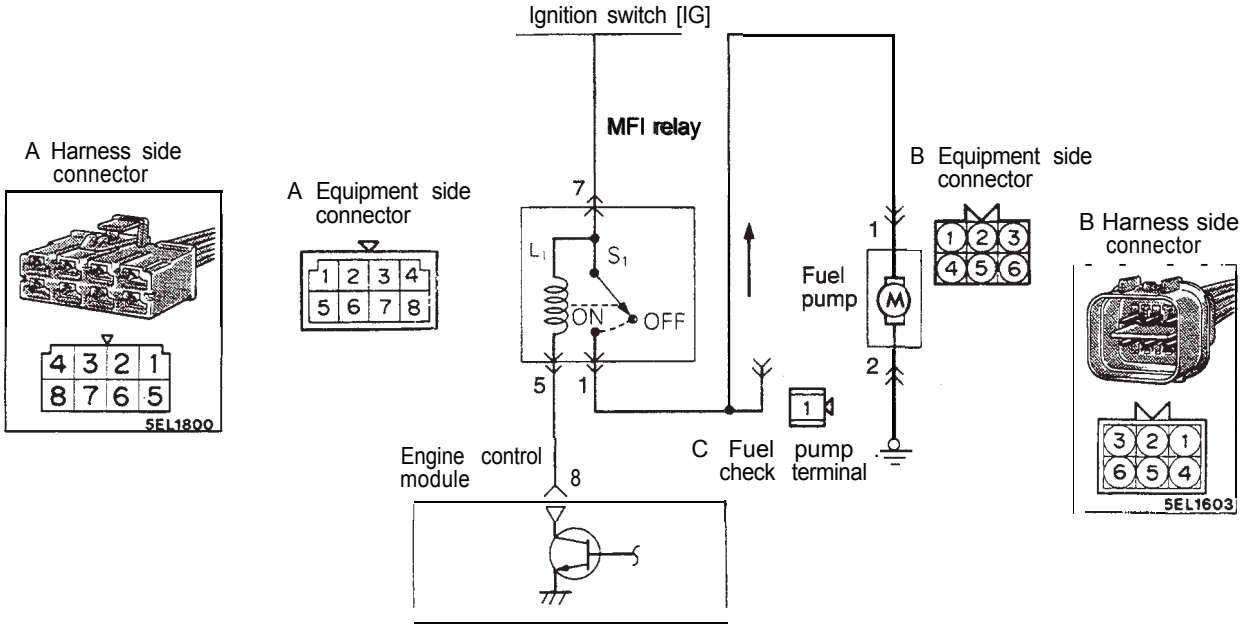
HARNESS INSPECTION

Refer to 13A-71.

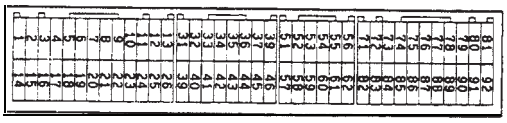
FUEL PUMP <Non Turbo – Up to 1995 models>







Engine control module connector



Z9FU0393

7FU1618

OPERATION

Refer to 13A-76.

INSPECTION

Refer to 13A-73.

HARNESS INSPECTION

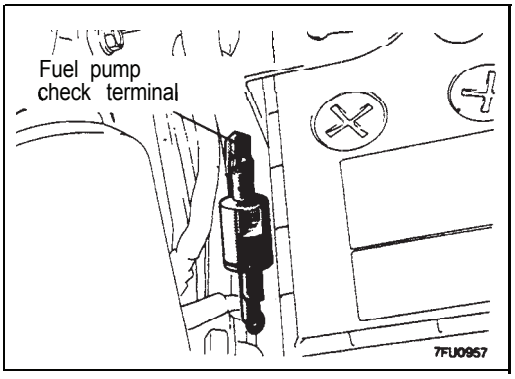
Refer to 13A-77.

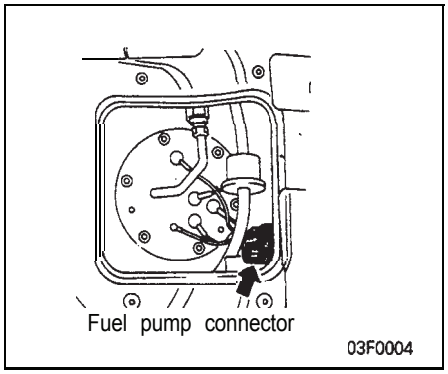
MFI RELAY INSPECTION

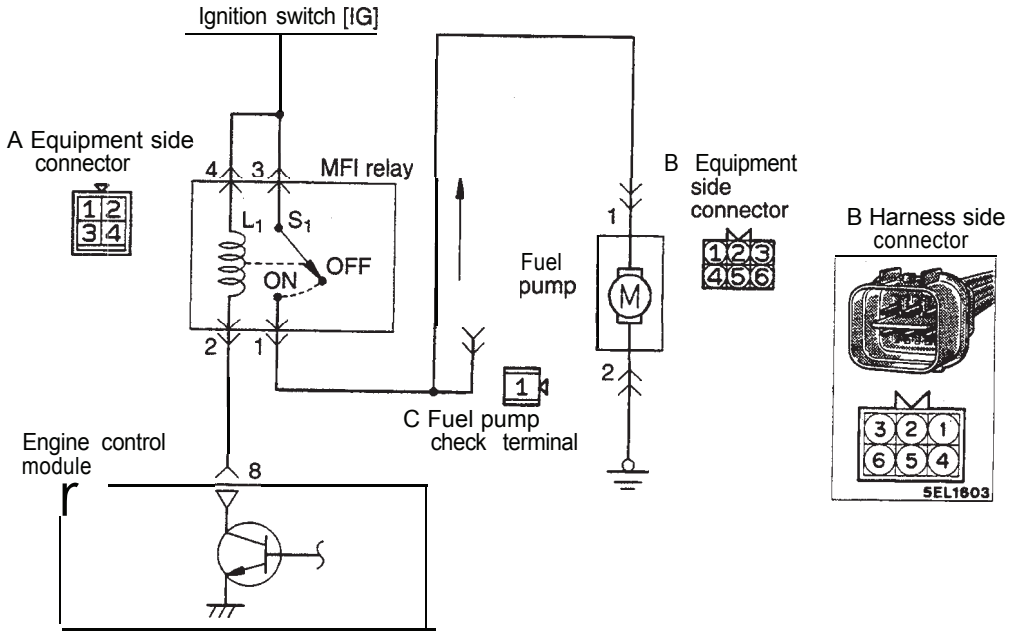
Refer to 13A-70.

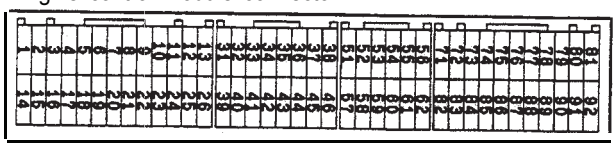
TSB Revision

FUEL PUMP <Non Turbo – From 1996 models>









7FU1821

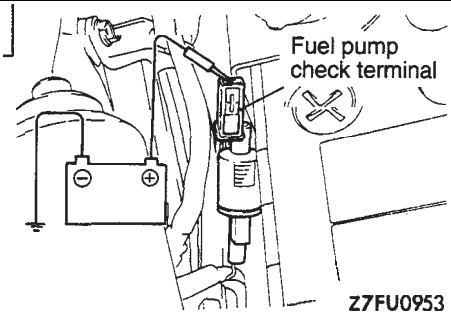
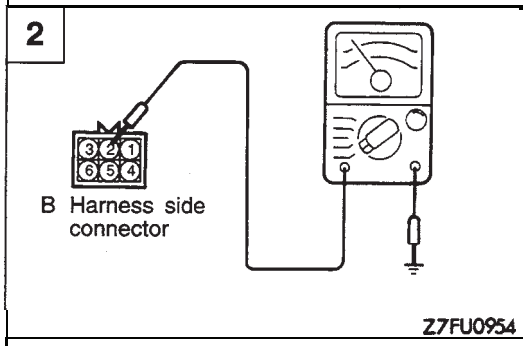
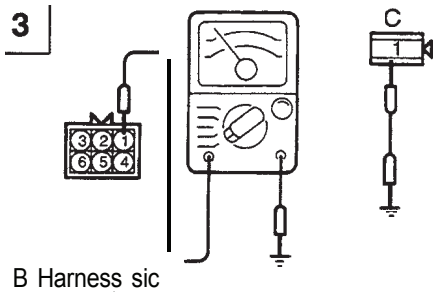
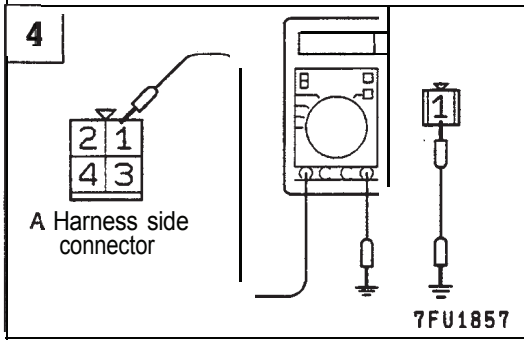
OPERATION

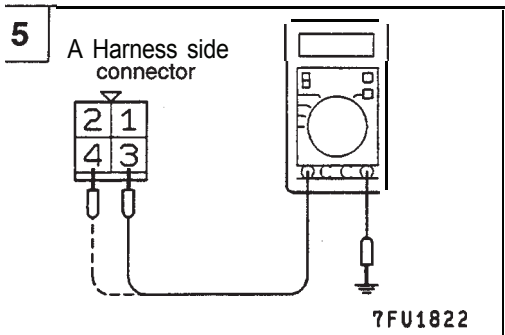
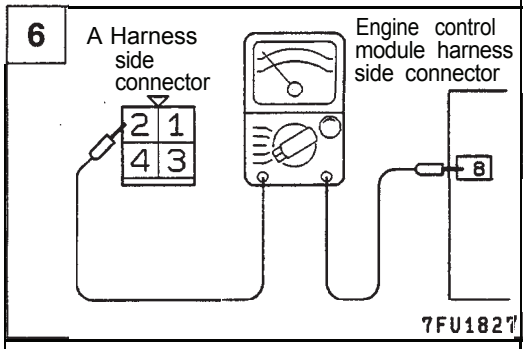
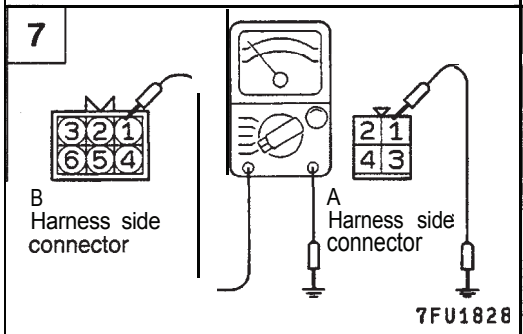
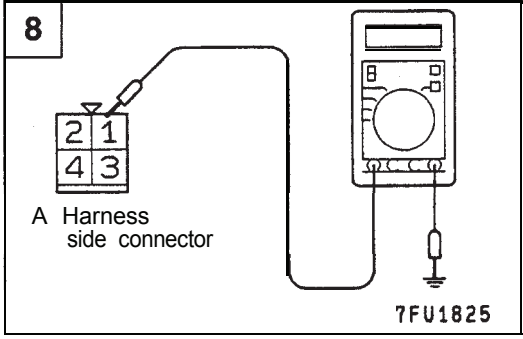
Refer to 13A-76.

INSPECTION

Refer to 13A-73.

HARNESS INSPECTION

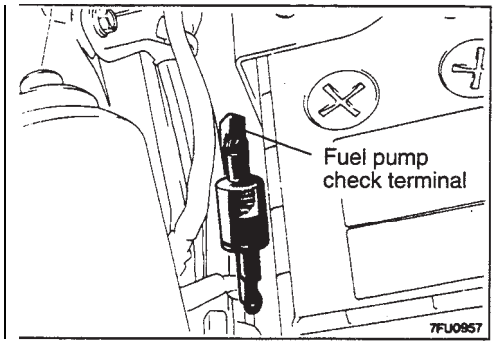
1 	Check the fuel pump. • Apply battery voltage to the checking terminal and operate the pump.	OK →	4
		OK →	2
2 	Check the ground circuit of the fuel pump. • Fuel pump connector: Disconnected	OK →	3
		OK →	Repair the harness. (B2 – bround)
3 	Check for continuity between the fuel pump and the checking terminal. • Connector: Disconnected	OK →	4
		OK →	Repair the harness. (B1 -CI)
4 	Check for continuity between the fuel pump checking terminal and the MFI relay terminals. • MFI relay connector: Disconnected • Fuel pump connector: Disconnected	OK →	5
		OK →	Repair the harness. (AI -CI)

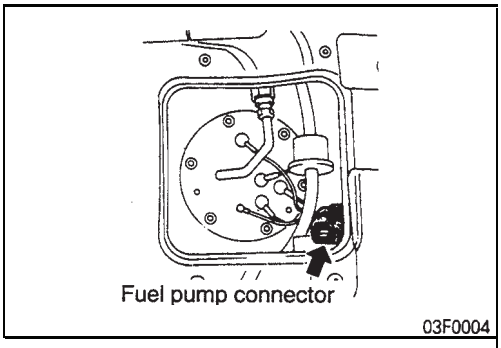
5 	Measure the power supply voltage of the MFI relay. • Control relay connector: Disconnected **Ignition switch OFF: 0- 1 V** **Ignition switch ON: Battery voltage**	OK →	6
		NG →	Repair the harness. (Ignition switch – A3, A4) or check the ignition switch.
6 	Check for an open-circuit, or a short-circuit to ground between the MFI relay and the engine control module. • MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK →	7
		NG →	Repair the harness. (A2–8)
7 	Check for an open-circuit, or a short-circuit to ground, between the MFI relay (for fuel pump) and the fuel pump. • MFI relay (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected	OK →	8
		NG →	Repair the harness. (Al –B1)
8 	Measure the power supply voltage of the fuel pump. • MFI relay connector: Connected • Engine control unit connector: Connected **Engine cranking: 8V or more** **Engine racing: Battery voltage**	OK →	STOP
		NG →	MFI relay or engine control module is defective.

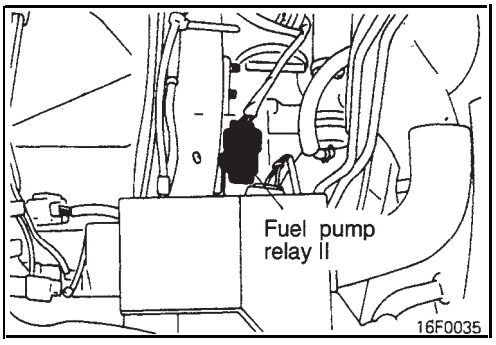
MULTIPORT FUEL INJECTION (MFI) RELAY AND FUEL PUMP RELAY INSPECTION

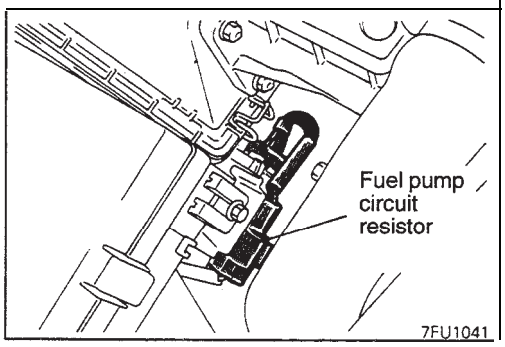
Refer to P.13A-198.

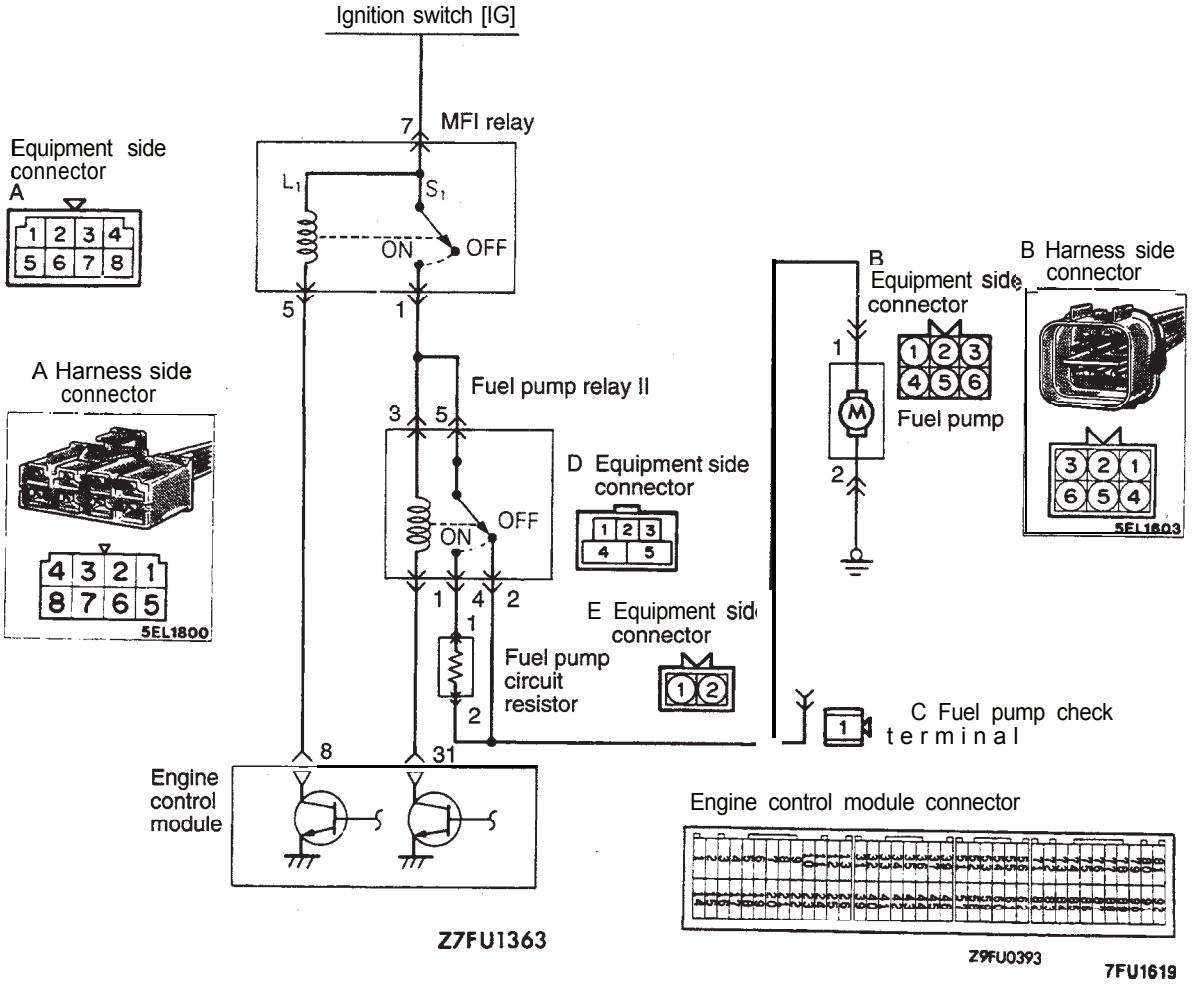
FUEL PUMP <Turbo – Up to 1995 models>











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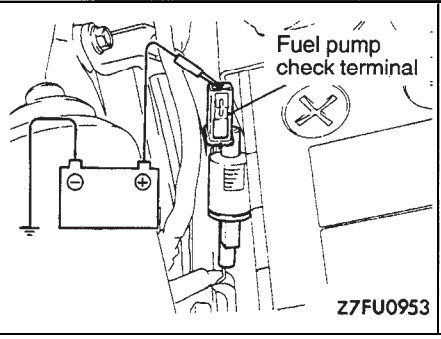
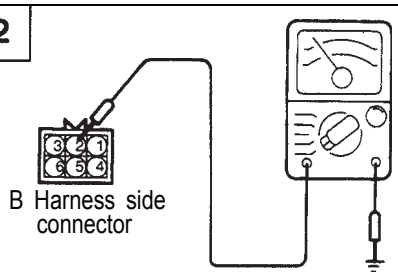
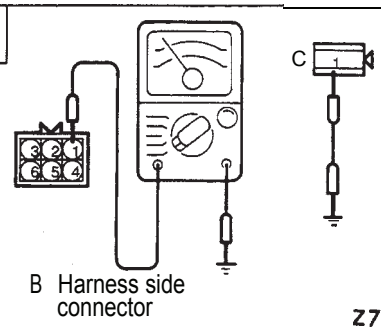
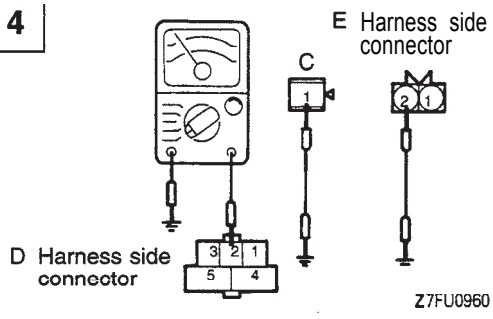
OPERATION

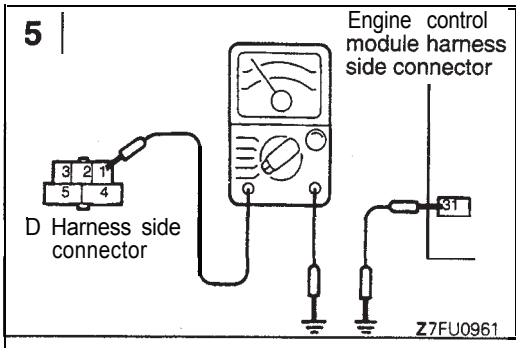
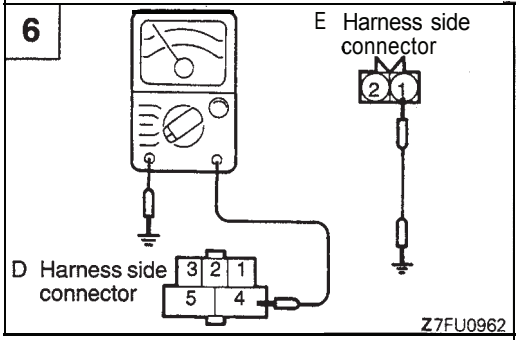
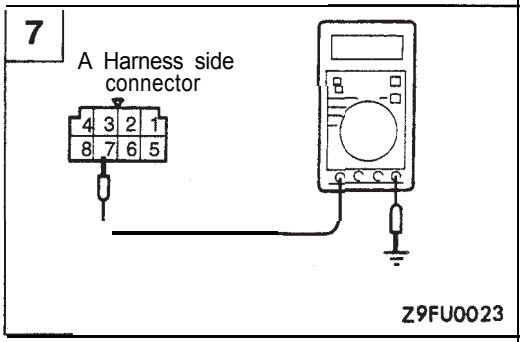
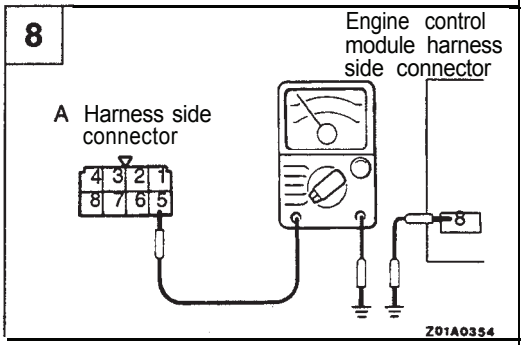
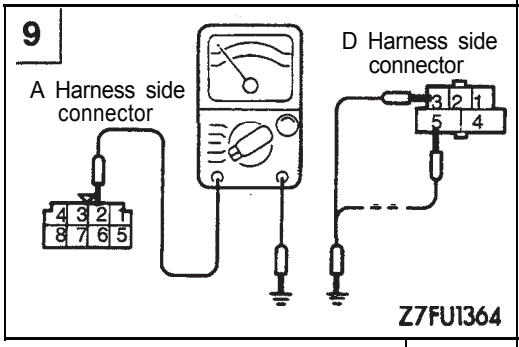
Refer to 13A-81.

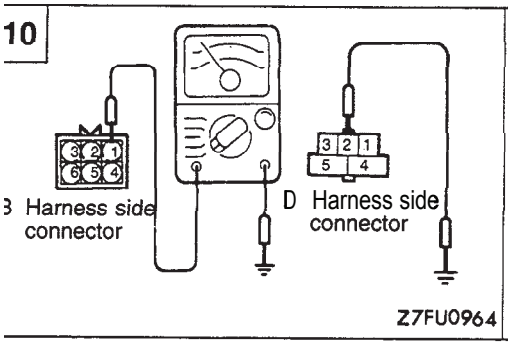
INSPECTION

Refer to 13A-81.

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. • Fuel pump connector: Disconnected	OK → 3 NG → Repair the harness. (B2 – Ground)
3		Check for continuity between the fuel pump and the checking terminal. • Fuel pump connector: Disconnected	OK → 4 NG → Repair the harness. (B1 -CI)
4		Check for continuity between the checking terminal and the fuel pump relay II, and between the resistor (for fuel pump). • Fuel pump relay II connector: Disconnected • Resistor (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected	OK → 5 NG → Repair the harness. (C1–D2) (D2–E2)

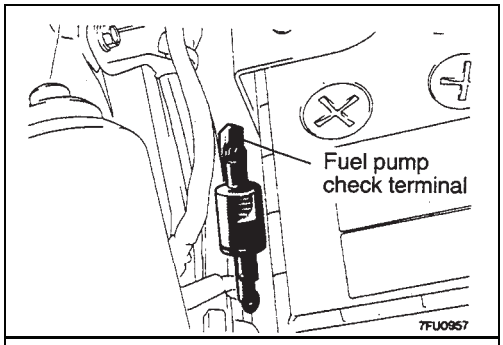
5		Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the engine control module. • Fuel pump relay II connector: Disconnected • Engine control module connector: Disconnected	OK →	6
			NG →	Repair the harness. (D1–31)
6		Check for continuity between the fuel pump relay II and the resistor (for fuel pump). • Fuel pump relay II connector: Disconnected • Resistor (for fuel pump) connector: Disconnected.	OK →	7
			NG →	Repair the harness. (D4–E1)
7		Measure the power supply voltage of the MFI relay. • MFI relay connector: Disconnected **Ignition switch OFF: 0 V** **Ignition switch ON: Battery voltage**	OK →	8
			NG →	Repair the harness. (Ignition switch [IG] – A7)
8		Check for an open-circuit, or a short-circuit to around, between the MFI relay and the engine control module. • MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK →	9
			NG →	Repair the harness. (A5–8)
9		Check for continuity between the MFI relay and the fuel pump relay II. • MFI relay connector: Disconnected • Fuel pump relay II connector: Disconnected	OK →	10
			NG →	Repair the harness. (A2–D3) (A2–D5)

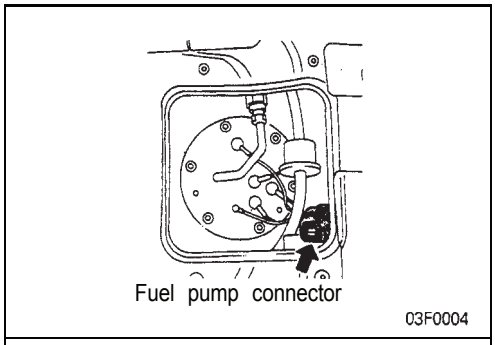
10		Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the fuel pump. • Fuel pump relay II connector: Disconnected • Fuel pump connector: Disconnected	OK →	STOP
			OK →	Repair the harness. (B1–D2)

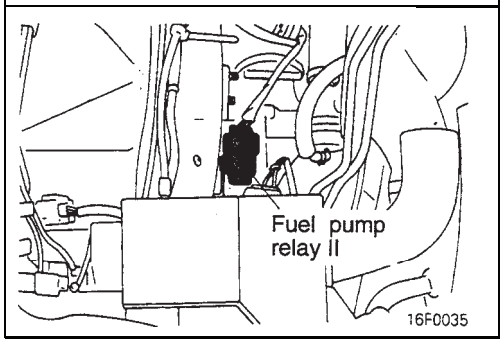
MFI RELAY INSPECTION

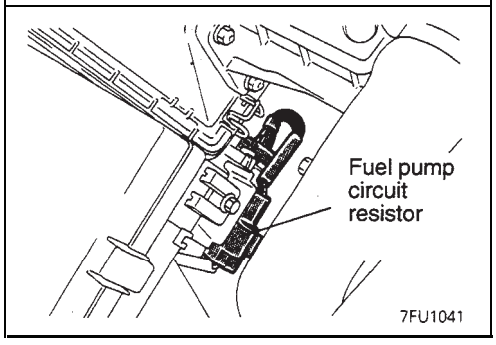
Refer to P.13A-70.

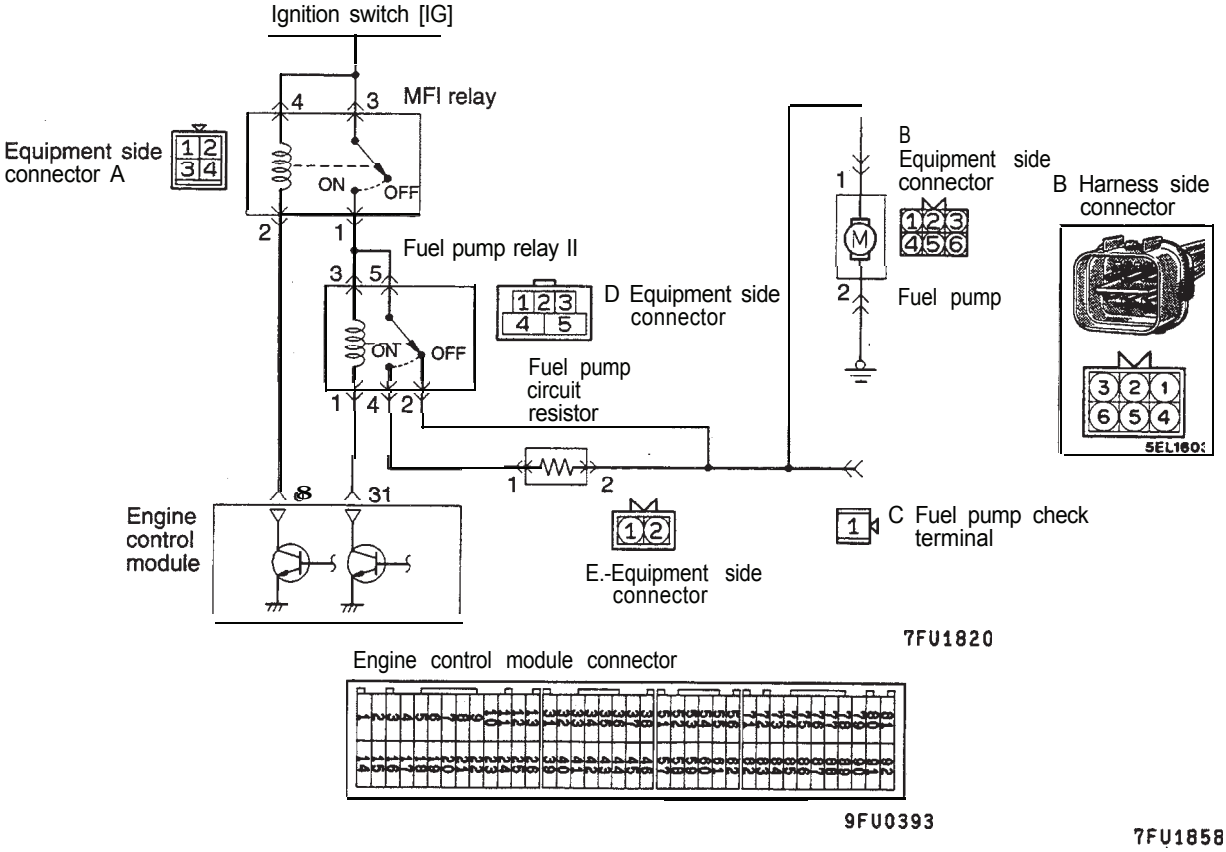
FUEL PUMP <Turbo – From 1996 models>











TSB Revision

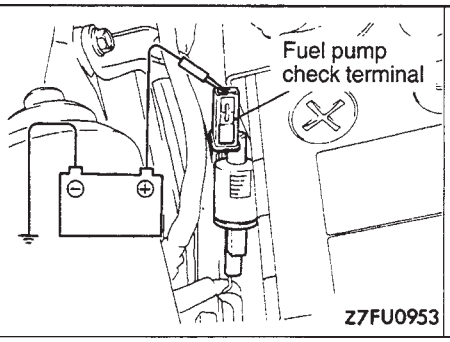
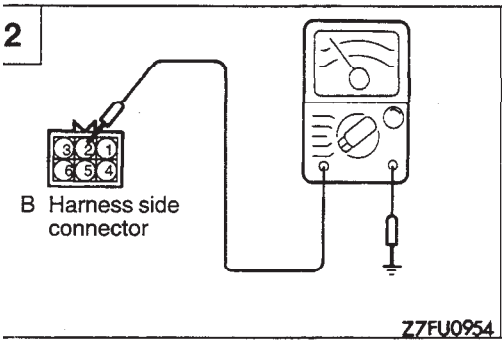
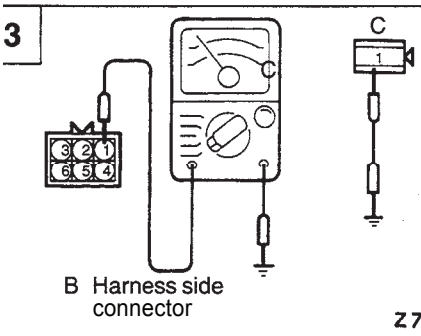
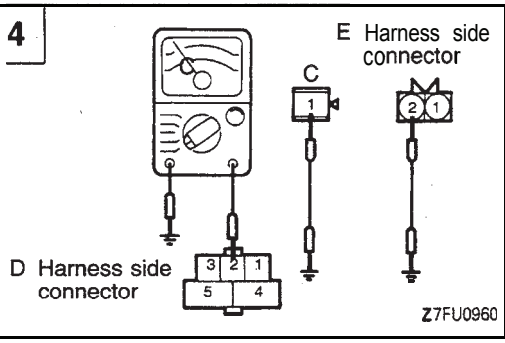
OPERATION

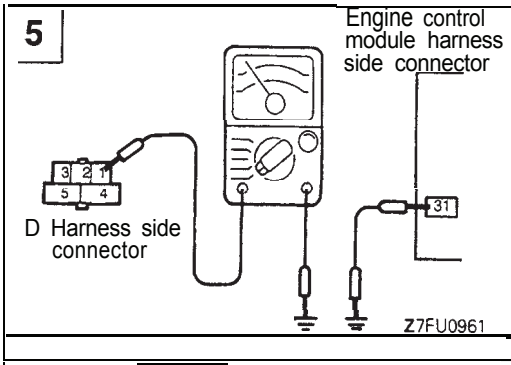
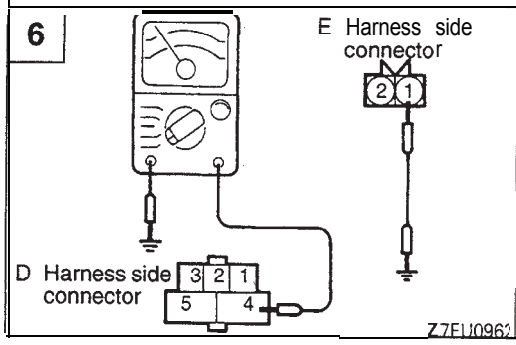
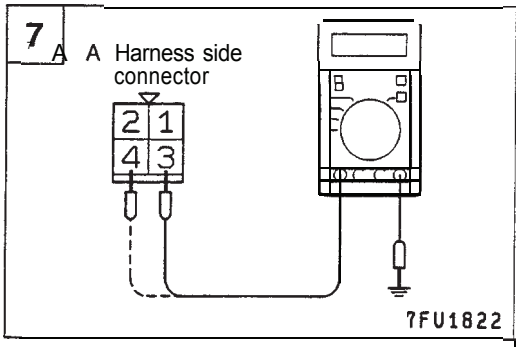
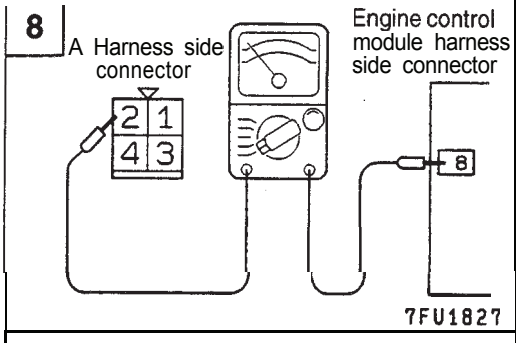
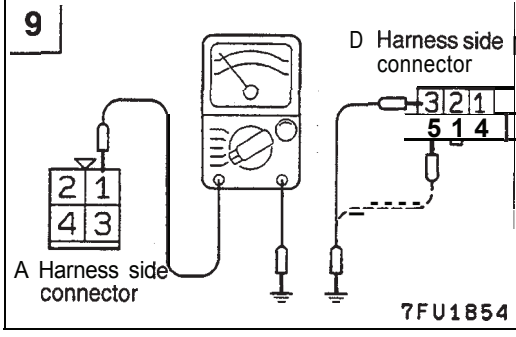
Refer to P.13A-81.

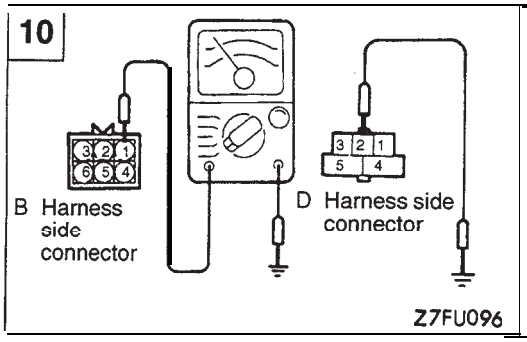
INSPECTION

Refer to P.13A-81.

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. • Fuel pump connector: Disconnected	OK → 3 NG → Repair the harness. (B2 – Ground)
3		Check for continuity between the fuel pump and the checking terminal. • Fuel pump connector: Disconnected	OK → 4 NG → Repair the harness. (B1–C1)
4		Check for continuity between the checking terminal and the fuel pump relay II, and between the resistor (for fuel pump). • Fuel pump relay II connector: Disconnected • Resistor (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected	OK → 5 NG → Repair the harness. (C1–D2) (D2–E2)

5		Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the engine control module. • Fuel pump relay II connector: Disconnected • Engine control module connector: Disconnected	OK →	6
			NG →	Repair the harness. (D1–31)
6		Check for continuity between the fuel pump relay II and the resistor (for fuel pump). • Fuel pump relay II connector: Disconnected • Resistor (for fuel pump) connector: Disconnected.	OK →	7
			NG →	Repair the harness. (D4–E1)
7		Measure the power supply voltage of the MFI relay. • MFI relay connector: Disconnected **Ignition switch OFF: 0 V** **Ignition switch ON: Battery voltage**	OK →	8
			NG →	Repair the harness. (Ignition switch [IG] – A3, A4)
8		Check for an open-circuit, or a short-circuit to ground, between the MFI relay and the engine control module. • MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK →	9
			NG →	Repair the harness. (A2–8)
9		Check for continuitv between the MFI relay and the fuel pump relay II. • MFI relay connector: Disconnected • Fuel pump relay II connector: Disconnected	OK →	10
			NG →	Repair the harness. (A1–D3) (Al –D5)

10 	Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the fuel pump. • Fuel pump relay II connector: Disconnected • Fuel pump connector: Disconnected	OK →	A STOP
		NG →	Repair the harness. (B1–D2)

MULTIPORT FUEL INJECTION (MFI) RELAY AND FUEL PUMP RELAY INSPECTION

Refer to P.13A-198.

FUEL PUMP RELAY II

INSPECTION

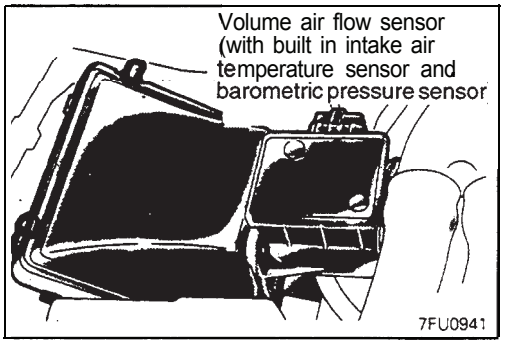
Refer to P.13A-84.

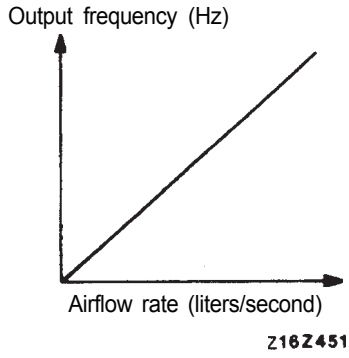
FUEL PUMP CIRCUIT RESISTOR

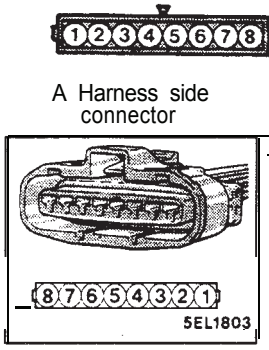
INSPECTION

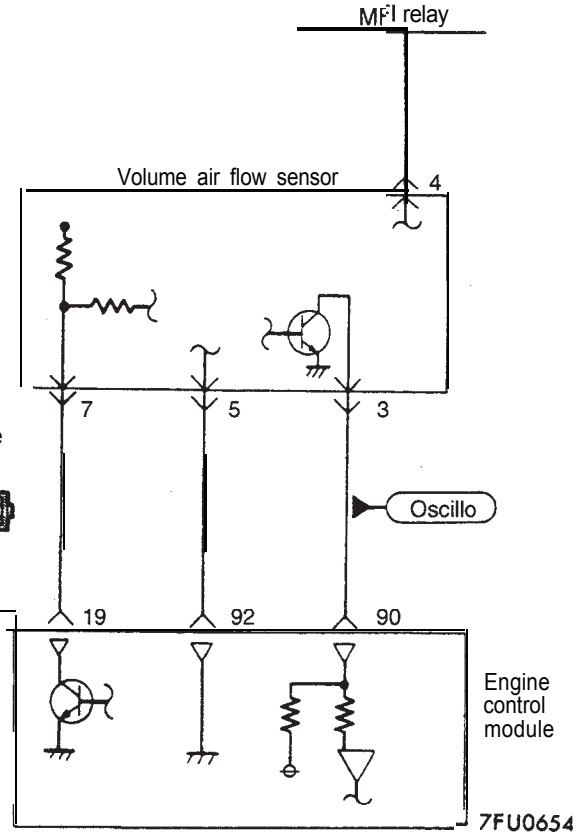
Refer to P.13A-84.

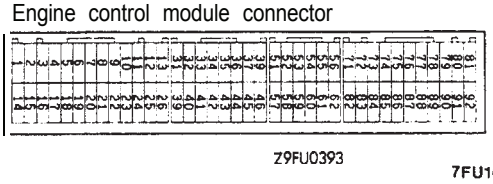
VOLUME AIR FLOW SENSOR











OPERATION

Refer to P.13A-85.

TROUBLESHOOTING HINTS

Refer to P.13A-85.

INSPECTION

Using Scan Tool

<Volume Air Flow Sensor>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	12	Sensor air volume (frequency)	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights and accessories: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	22–48 Hz <Up to 1995 models> 24–50 Hz <Non Turbo From 1996 models> 26–52 Hz <Turbo From 1996 models>
				2,000 rpm <Up to 1995 models>	50–90 Hz <Non Turbo> 68–108 Hz <Turbo>
				2,500 rpm <From 1996 models>	71-111 Hz <Non Turbo> 93– 133 Hz <Turbo>
				Racing	Frequency increases with racing

NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the volume air flow sensor output frequency may be about 10% higher.

TSB Revision

Function	Item No.	Data display	Check conditions	Engine state	Standard value
Data reading <From 1996 models>	12	Sensor air volume (Air-flow volume)	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan, accessories: OFF • Transaxle: Neutral (P range for A/T)	Idling	3.6-7.5 g/s <Non Turbo> 3.9-7.7 g/s <Turbo>
				2,500 rpm	10.6–16.5 g/s <Non Turbo> 13.9-19.8 g/s <Turbo>

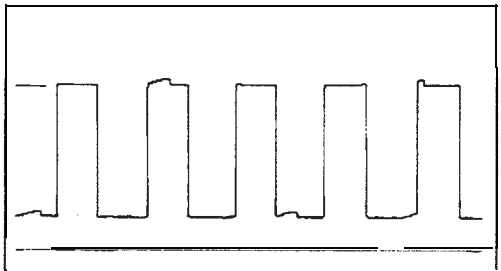
Function	Item No.	Data display	Check conditions	Engine state	Standard value
Data reading <From 1996 models>	87	Calculation load	• Engine: warm • Operation range: idling to maximum output	Engine is idling	15–35% <Non Turbo>
				2,500 rpm	10–30% <Turbo>

<Volume Air Flow Sensor Reset Signal>

Function	Data display	Check conditions	Engine conditions	Standard value
Data list	Reset signal condition	• Engine warm up	700 rpm (Idle)	ON
			2,500 rpm	OFF

<Volumetric Efficiency>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data list	37	Volumetric efficiency	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan and accessory operation: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	15–35 %
				2,500 rpm	15–35 %
				Racing	Frequency increases with racing



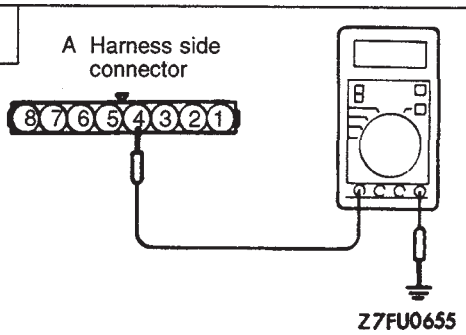
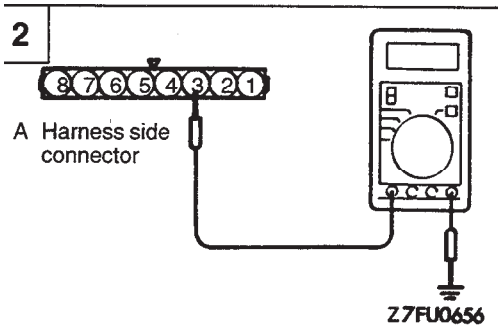
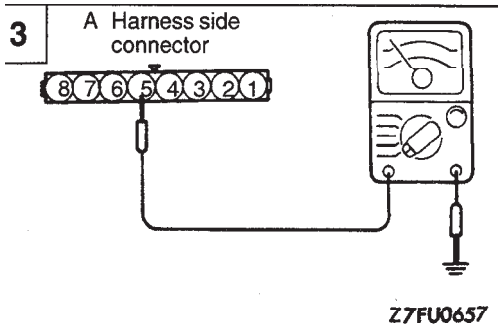
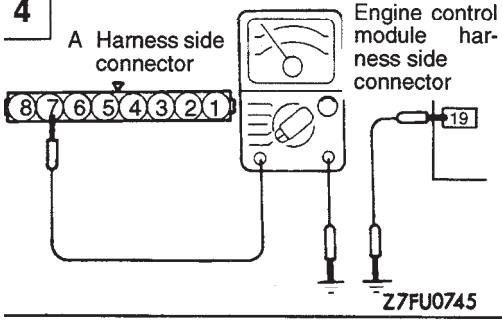
Regular waveform

Z03A0203

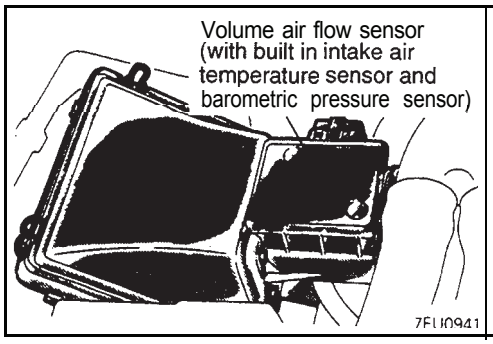
Using Oscilloscope

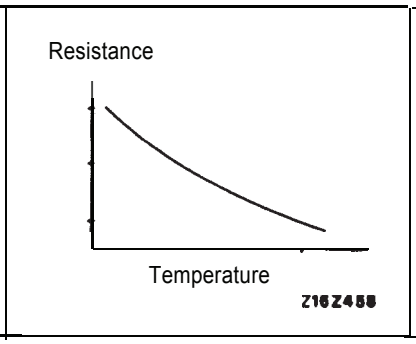
(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

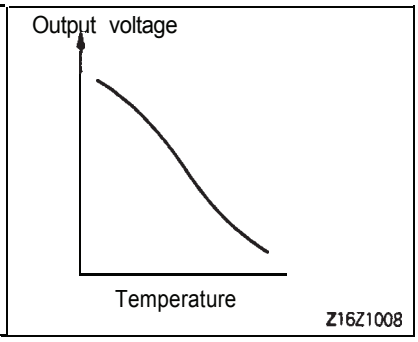
HARNESS INSPECTION

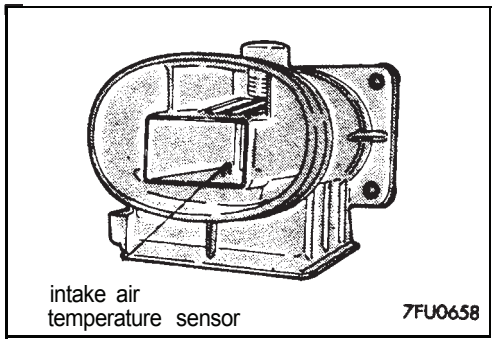
1		Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NG → Repair the harness (A4 – Control relay) or check the control relay.
2		Measure the terminal voltage. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → 3 NG → Repair the harness (A3–90)
3		Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness (A5–92)
4		Check for continuity between the volume air flow sensor and the engine control unit. • Volume air flow sensor connector: Disconnected • Engine control module connector: Disconnected	OK → STOP NG → Repair the harness. (A7–19)

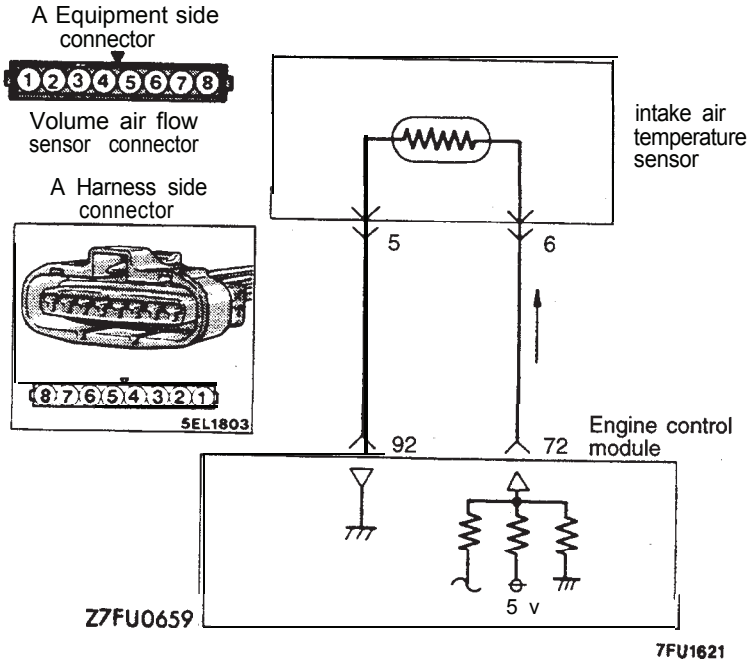
INTAKE AIR TEMPERATURE SENSOR











OPERATION

Refer to P.13A-88.

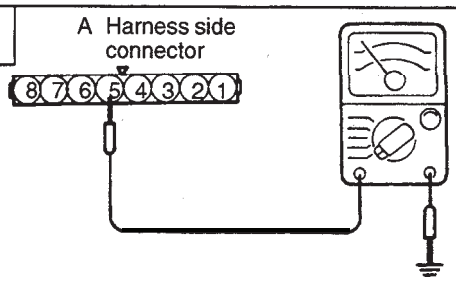
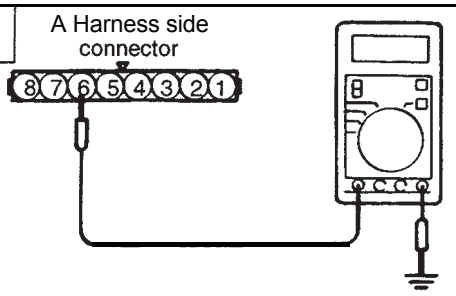
TROUBLESHOOTING HINTS

Refer to P.13A-88.

INSPECTION

Refer to P.13A-89.

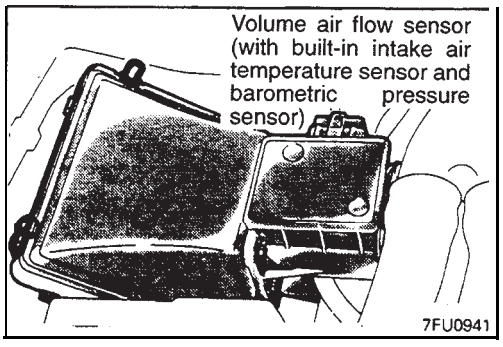
HARNESS INSPECTION

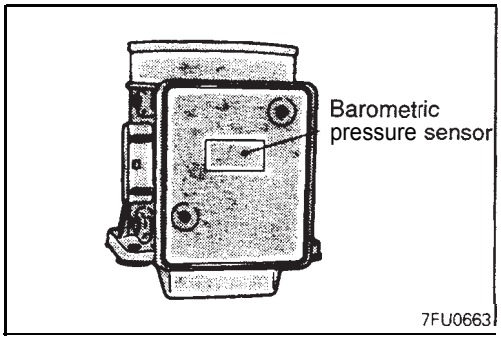
1	A Harness side connector 	Check for continuity of the ground circuit. • Connector: Disconnected	OK → 2 NG → Repair the harness. (A5–92)
2	A Harness side connector 	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON 4.5-4.9 v	OK → STOP NG → Repair the harness. (A6–72)

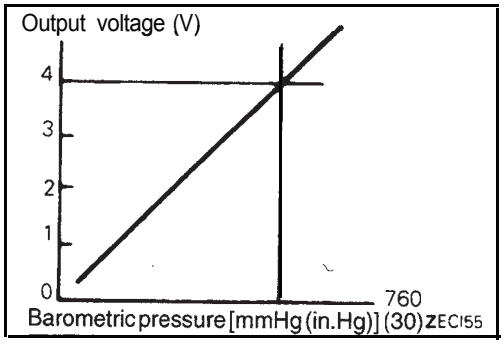
SENSOR INSPECTION

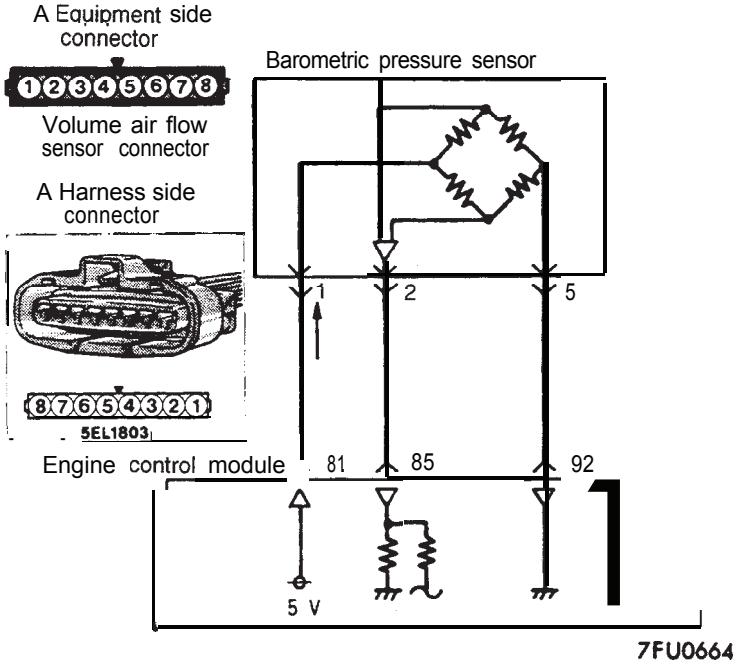
Refer to P.13A-89.

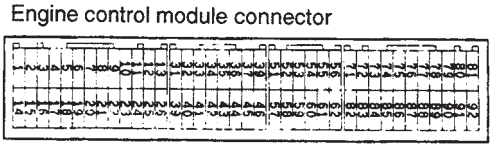
BAROMETRIC PRESSURE SENSOR











7FU1623

OPERATION

Refer to P.13A-91.

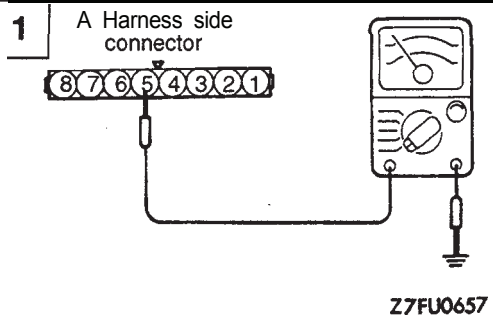
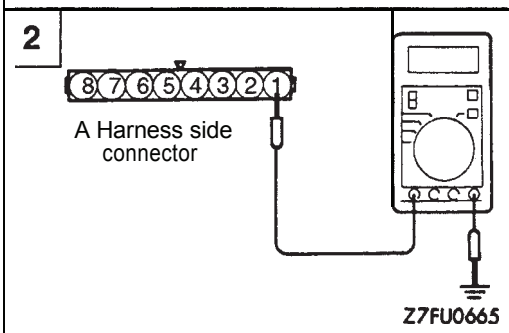
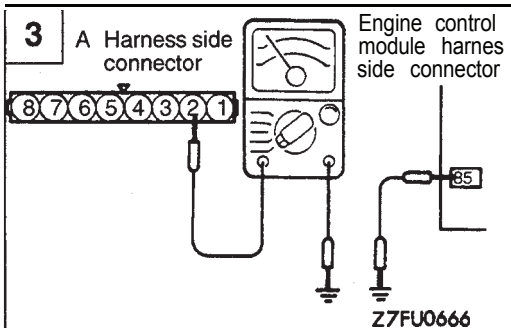
TROUBLESHOOTING HINTS

Refer to P.13A-92.

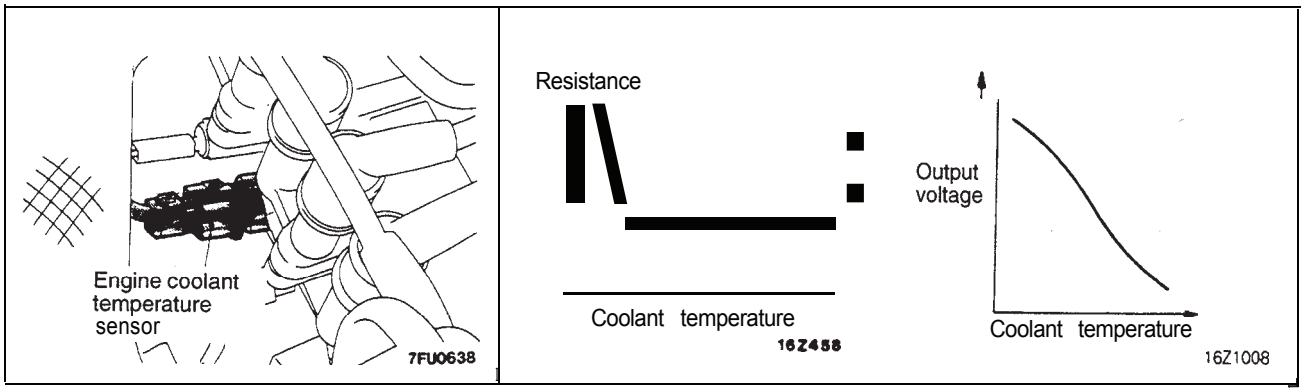
INSPECTION

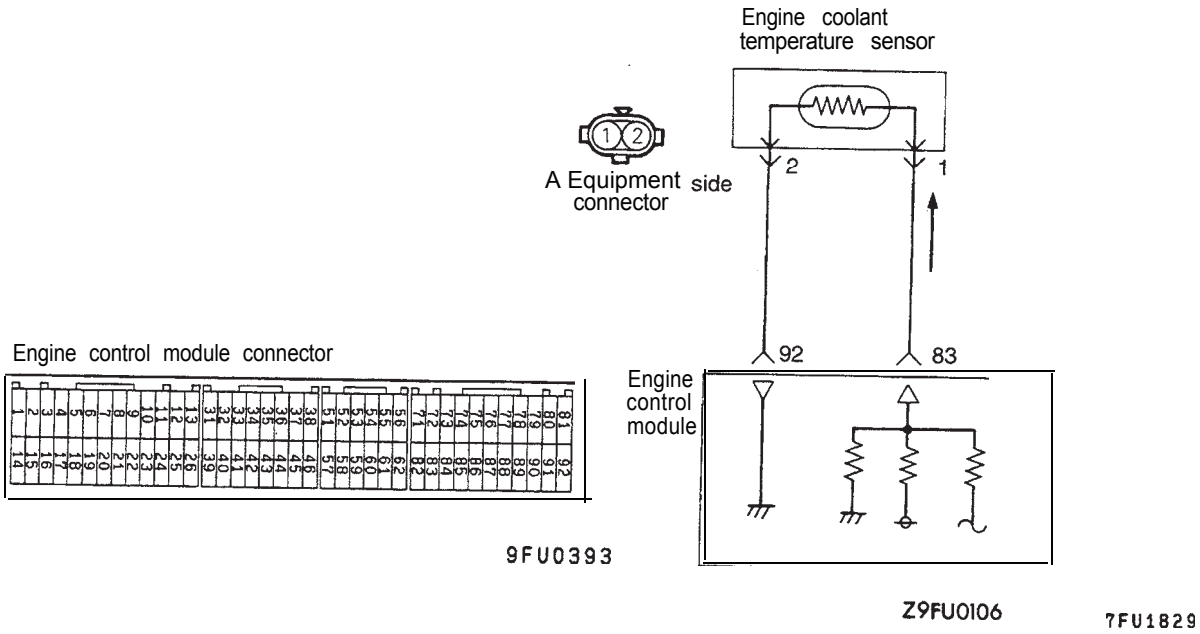
Refer to P.13A-92.

HARNESS INSPECTION

1 	Check for continuity of the ground circuit. • Connector: Disconnected	OK → 2 NG → Repair the harness. (A5–92)	
2 	Measure the power supply voltage of the barometric pressure sensor. • Connector: Disconnected • Ignition switch: ON **4.8–5.2** V	OK → 3 NG → Repair the harness. (AI -81)	
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 NG → Repair the harness. (A2–85)	

ENGINE COOLANT TEMPERATURE SENSOR





OPERATION

Refer to P.13A-93.

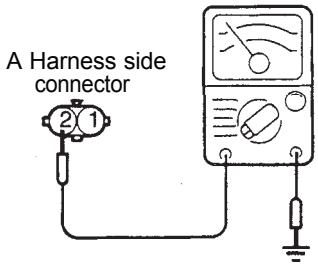
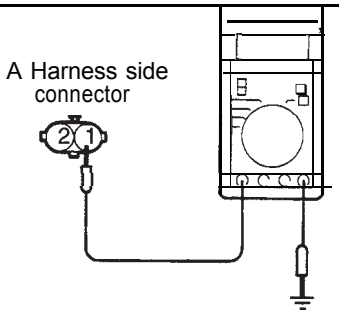
TROUBLESHOOTING HINTS

Refer to P.13A-93.

INSPECTION

Refer to P.13A-94.

HARNESS INSPECTION

1 	Check for continuity of the ground circuit • Engine coolant temperature sensor connector: Disconnected	OK →	2
		NG →	Repair the harness. (A2–92)
2 	Measure the impressed voltage. • Engine coolant temperature sensor connector: Disconnected • Engine control module connector: Connected • Ignition switch: ON 4.5-4.9 v	OK →	STOP
		NG →	Repair the harness. (AI -83)

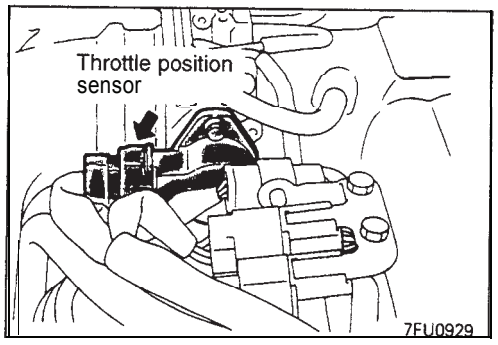
SENSOR INSPECTION

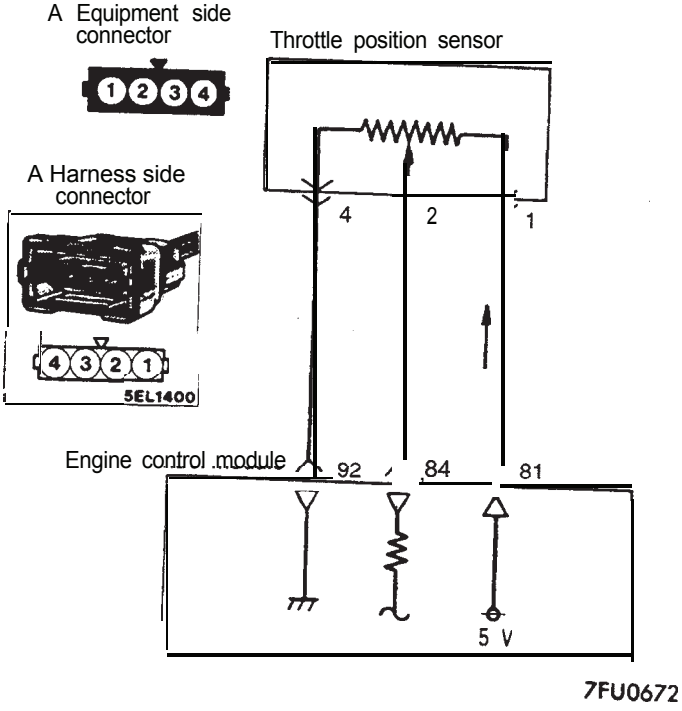
Refer to P.13A-95.

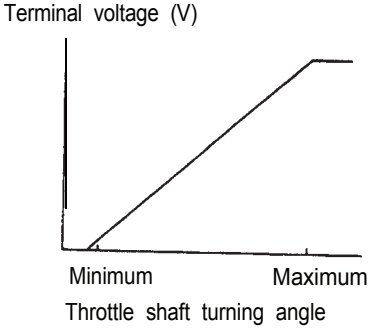
INSTALLATION

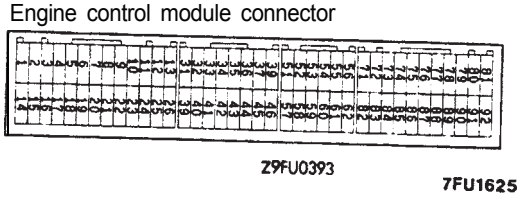
Refer to P.13A-95.

THROTTLE POSITION SENSOR









OPERATION

Refer to P.13A-98.

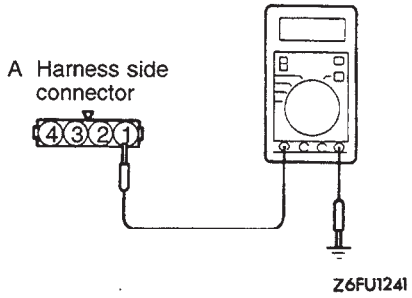
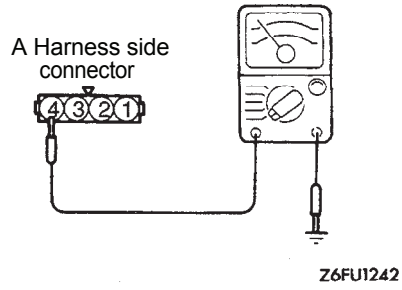
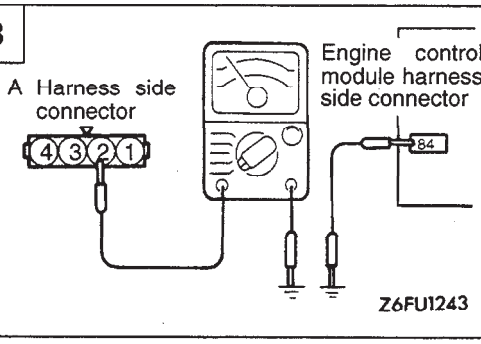
TROUBLESHOOTING HINTS

Refer to P.13A-98.

INSPECTION

Refer to P.13A-99.

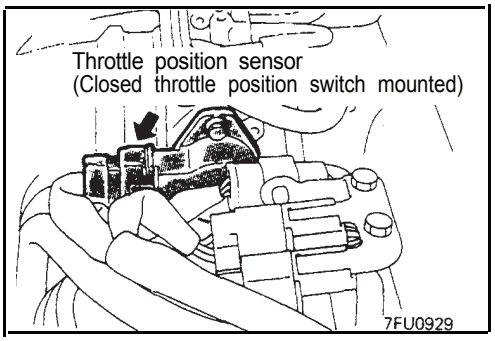
HARNESS INSPECTION

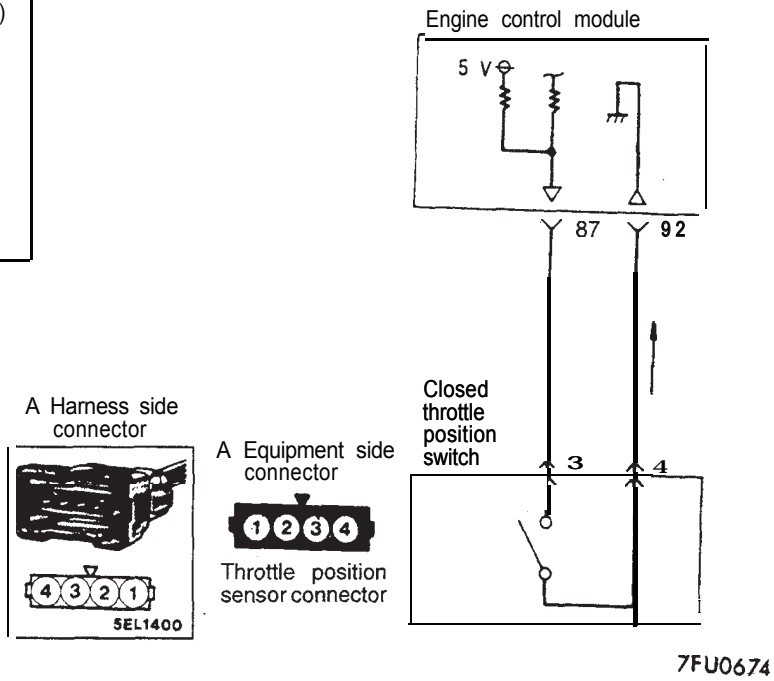
1		Measure the power supply voltage of the throttle position sensor • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → 2 NG → Repair the harness. (A1–81)
2		Check for continuity of the ground circuit. • Connector: Disconnected	OK → 3 NG → Repair the harness. (A4–92)
3		Check for an open-circuit, 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 • Connector of any control module which uses TPS output signals like ECM: Disconnected	OK → STOP NG → Repair the harness. (A2–84)

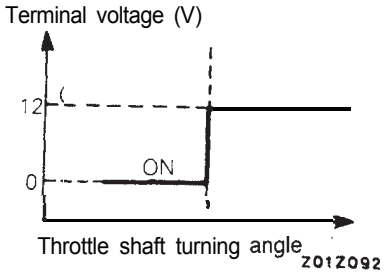
SENSOR INSPECTION

Refer to P.13A-100.

CLOSED THROTTLE POSITION SWITCH







OPERATION

Refer to P.13A-101.

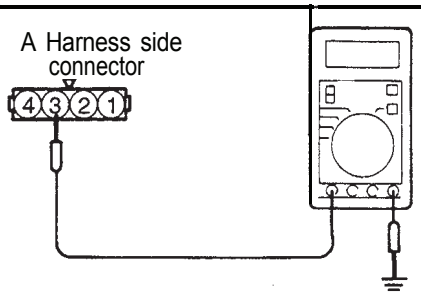
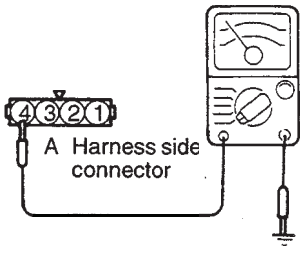
TROUBLESHOOTING HINTS

Refer to P.13A-101.

INSPECTION

Refer to P.13A-101.

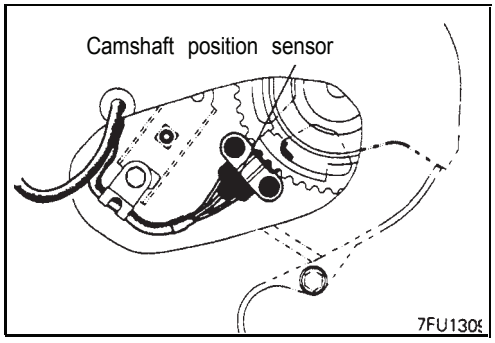
HARNESS INSPECTION

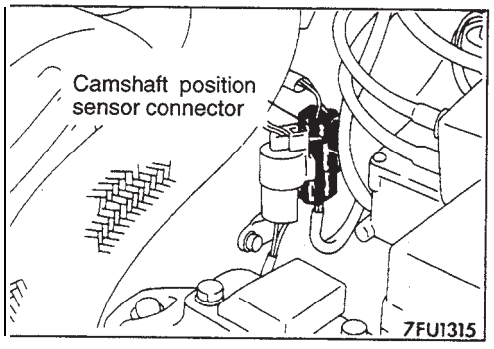
1	A Harness side connector  Z7FU0675	Measure the power supply voltage of the closed throttle position switch. • Connector: Disconnected • Ignition switch: ON 4 **V or more**	OK → 2 ~~OK~~ → Repair the harness. (A3–87)
2	 Z6FU1242	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP ~~OK~~ → Repair the harness. (A4–92)

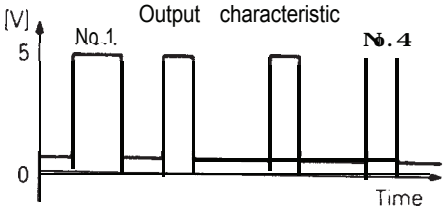
SENSOR INSPECTION

Refer to P.13A-102.

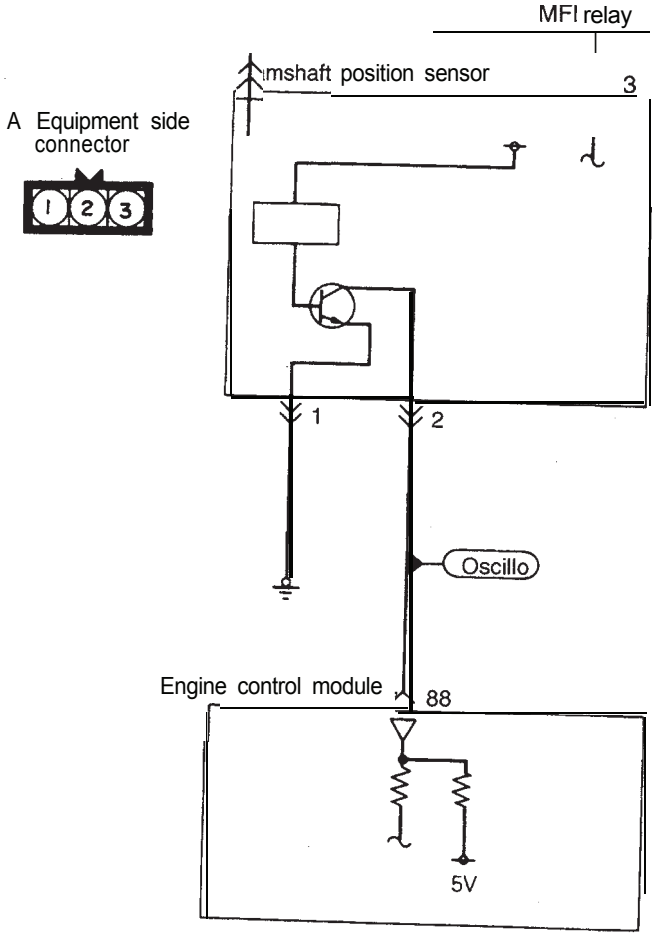
CAMSHAFT POSITION SENSOR





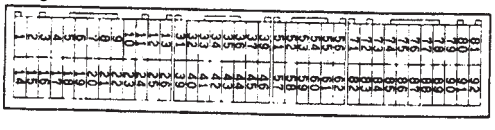


Z7FU0677



6A F0054

Engine control module connector



Z9FU0393

7FU1627

OPERATION

Refer to P.13A-103.

TROUBLESHOOTING HINTS

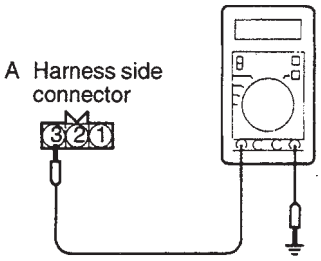
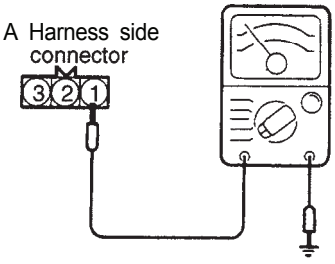
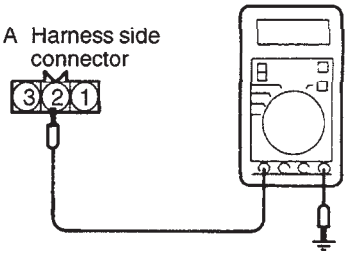
Refer to P.13A-103.

INSPECTION

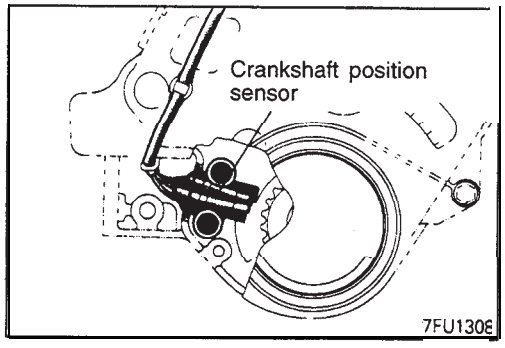
Refer to P.13A-104.

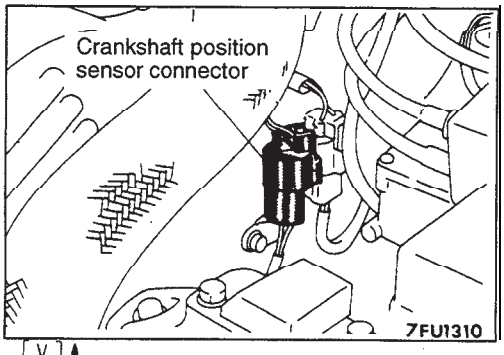
TSB Revision

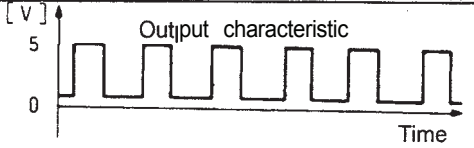
HARNESS INSPECTION

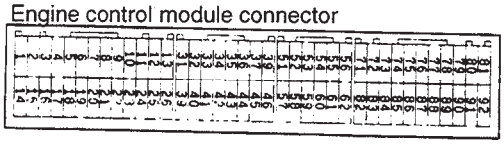
1  Z7FU1330	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK →	2
		NG →	Repair the harness. (A3 – MFI relay)
2  Z6AF0057	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	3
		NG →	Repair the harness. (A1 – Ground)
3  Z6AF0059	Measure the impressed voltage. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK →	STOP
		NG →	Repair the harness. (A2–88)

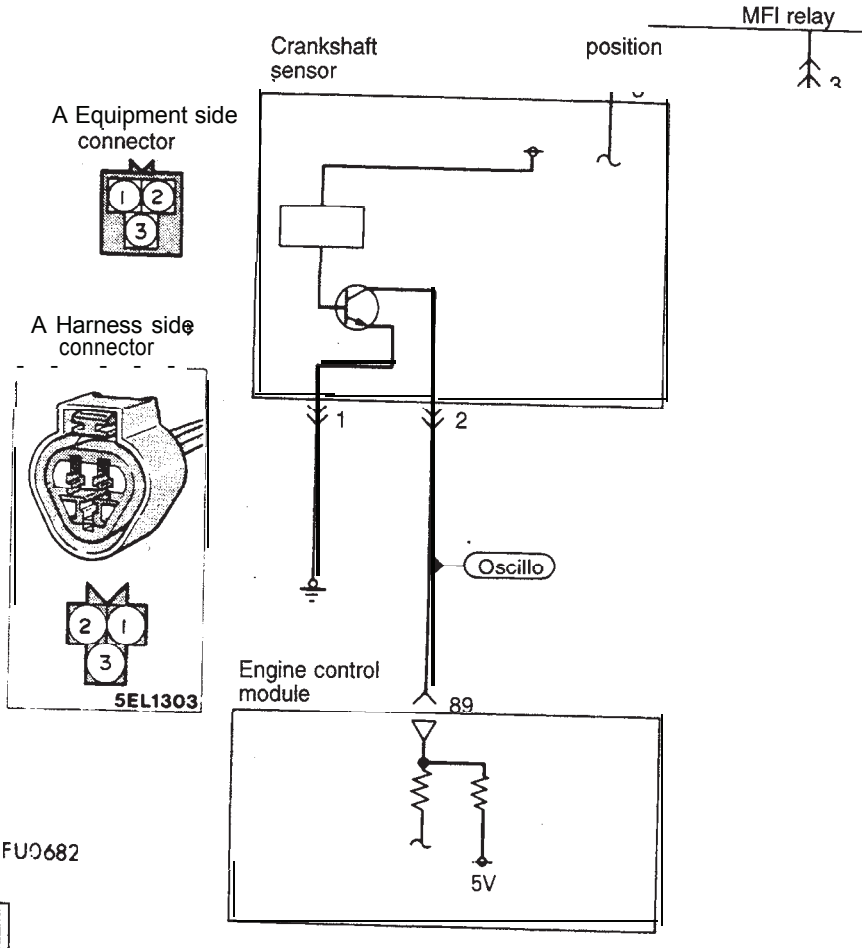
CRANKSHAFT POSITION SENSOR











7FU1628

OPERATION

Refer to P.13A-107.

TROUBLESHOOTING HINTS

Refer to P.13A-107.

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	• Engine cranking • Tachometer connected (check on and off of primary current of ignition coil by tachometer)	Compare cranking speed and scan tool reading	Indicated speed to agree

NOTE
(1) The tachometer indicates a third of the actual engine speed. Therefore, 3 times the tachometer indication is the actual engine speed.
(2) When the tachometer is set to the 2-cylinder range, it indicates actual engine speed.

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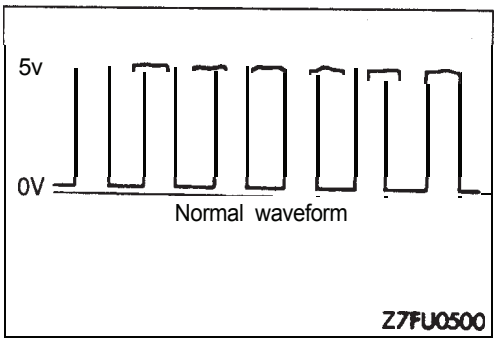
Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	• Engine: Running at idle • Closed throttle position switch: ON	At -20°C (–4°F)	1,275– 1,475 rpm*1 1,300-l ,500 rpm*2
				At 0°C (32°F)	1,225– 1,425 rpm*1 1,300-l ,500 rpm*2
				At 20°C(68°F)	1,100–1,300 rpm*1 1,300-l ,500 rpm*2
				At 40°C(104°F)	950–1,150 rpm*1 1,050-l ,250 rpm*2
				At 80°C(176°F)	600-800 rpm

NOTE
*1: Non Turbo, Turbo Up to 1995 models
*2: Turbo From 1996 models

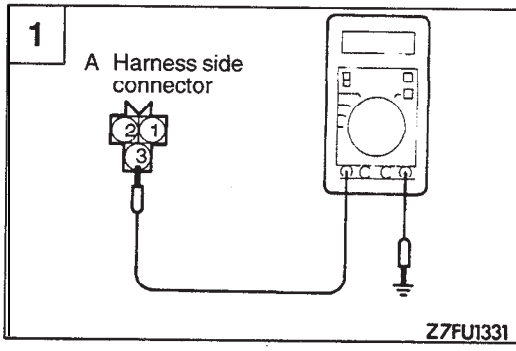


Using Oscilloscope

(1) Run the engine at 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



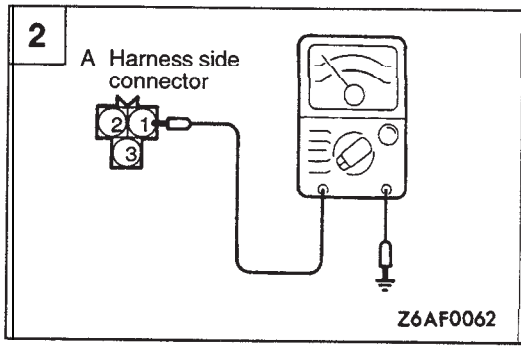
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A3 – MFI relay)

2



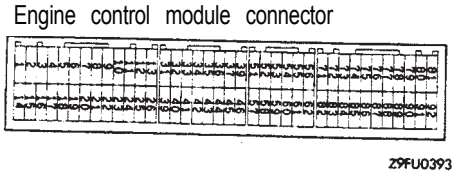
Check for continuity of the ground circuit.
- Connector. Disconnected

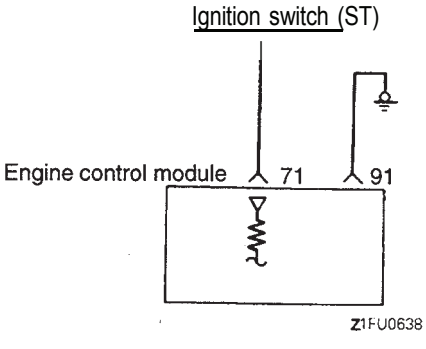
OK → 3

NG → Repair the harness. (A1 – Ground)

3	A Harness side connector Z6AF0064	Measure the impressed voltage. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → STOP OK → Repair the harness. (A2–89)

IGNITION SWITCH-ST <M/T>





OPERATION

Refer to P.13A-112.

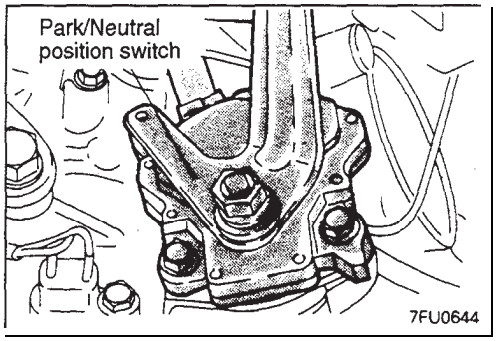
INSPECTION

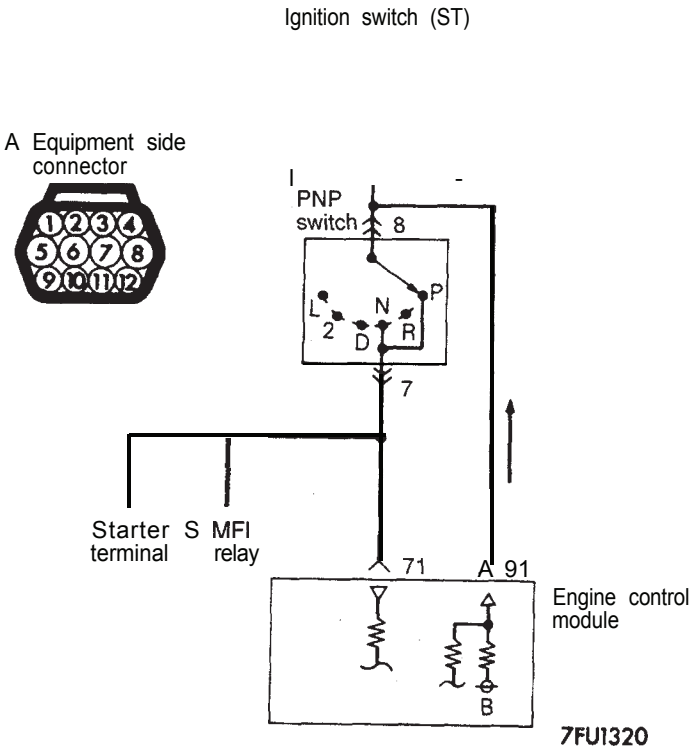
Refer to P.13A-112.

HARNESS INSPECTION

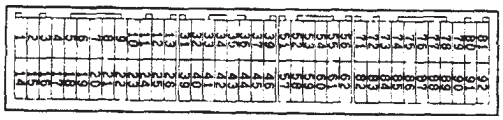
1	Engine control module harness side connector 71 Z6FU1258	Measure the input voltage to the engine control module • Engine control module connector. Disconnected • Ignition switch: START **8 V or more**	OK → 2 OK → Repair the harness. (71 – Ignition switch)
2	Engine control module harness side connector 91 Z6FU1259	Check for continuity of the ground circuit. • Engine control module connector: Disconnected	OK → STOP OK → Repair the harness. (91 – Ground)

IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH) <A/T>





Engine control module connector



Z9FU0393 7FU1630

OPERATION

Refer to P.13A-113.

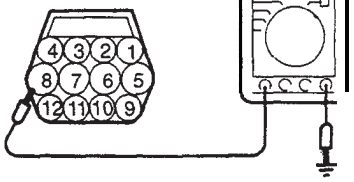
TROUBLESHOOTING HINTS

Refer to P.13A-113.

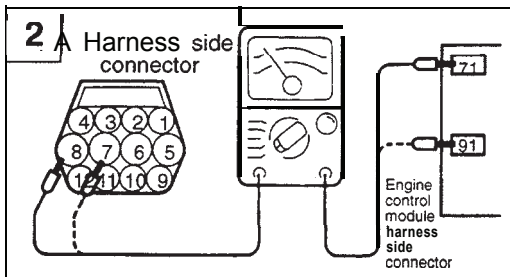
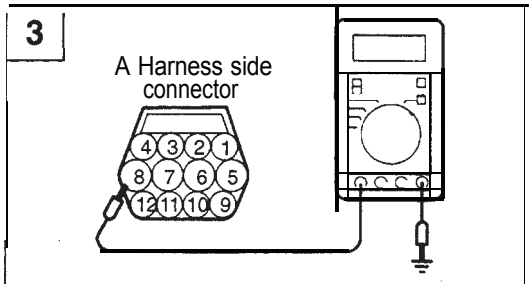
INSPECTION

Refer to P.13A-114.

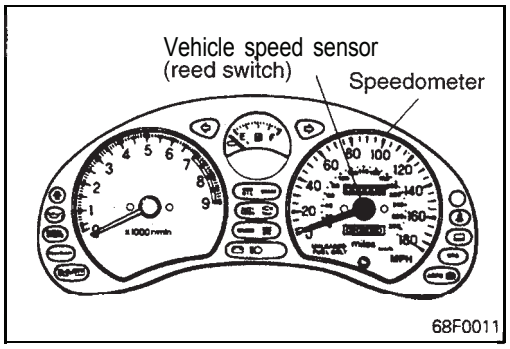
HARNESS INSPECTION

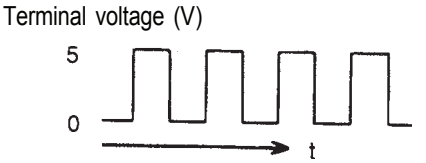
1	A Harness side connector  Z9FU0268	Measure the power supply voltage. • Engine control module connector: Disconnected • PNP switch connector: Disconnected • Ignition switch: START **Battery voltage**	OK → 2 ~~OK~~ → Check the power supply circuit.

TSB Revision

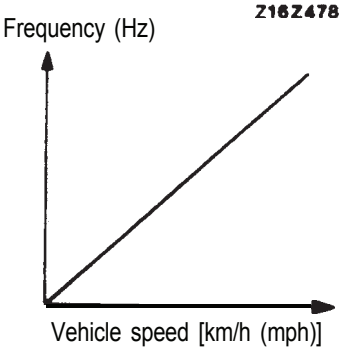
2  Z9FU0269	Check for continuity between the PNP switch and enaine control module. • Engine control module connector: Disconnected • PNP switch connector: Disconnected NOTE Insert the probes of the circuit tester into both ends of the harness.	OK →	3
		NOK →	Repair the harness. (A8–91) (A7–71)
3  Z9FU0268	Measure the impressed voltage to the PNP switch. • Engine control module connector: Connected • PNP switch connector: Disconnected • Ignition switch: ON **Bakery voltage**	OK →	STOP
		NOK →	Replace the engine control module.

VEHICLE SPEED SENSOR (Mechanical Speedometer Type)

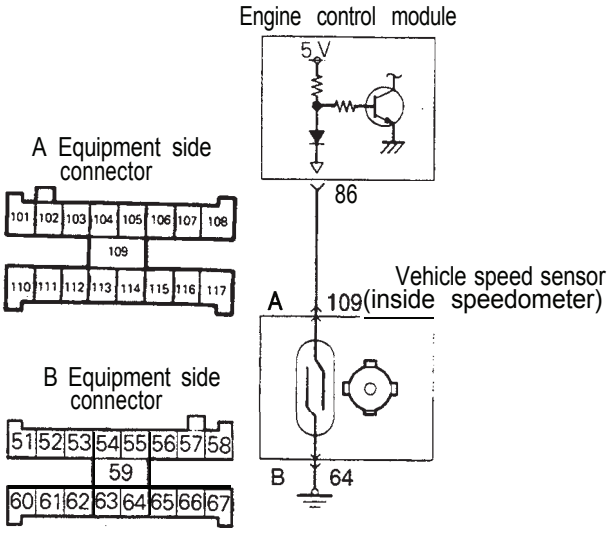




Z16Z478

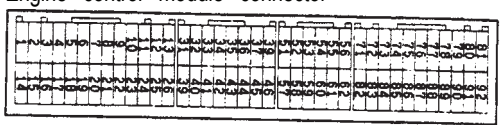


Z16Z451



Z7FU1435

Engine control module connector



Z9FU0393

7FU1631

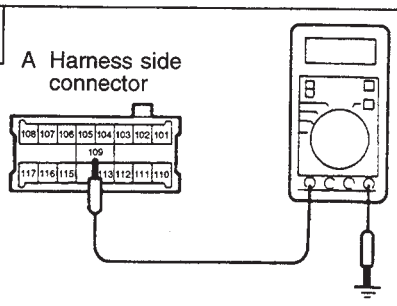
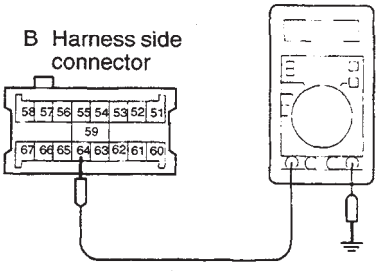
OPERATION

Refer to P.13A-117.

TROUBLESHOOTING HINTS

Refer to P.13A-117.

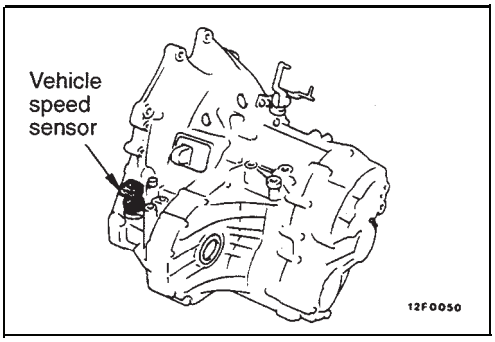
HARNESS INSPECTION

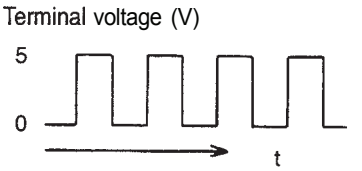
1	A Harness side connector  Z6FU1265	Measure the power supply voltage of the vehicle speed sensor. • Connector. Disconnected • Ignition switch: ON **4.5–4.9 V**	OK → 2 OK → Repair the harness. (A109–86)
2	B Harness side connector  Z7FU1438	Check for continuity of the ground circuit • Connector: Disconnected	OK → STOP OK → Repair the harness. (B64 – Ground)

SENSOR INSPECTION

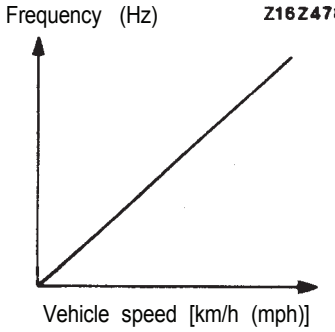
Refer to GROUP 54 – Meters and Gauges.

VEHICLE SPEED SENSOR (Electrical Speedometer Type)

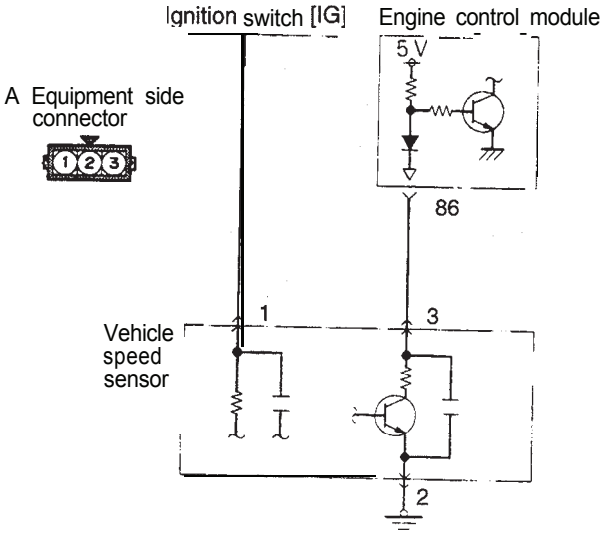




Z16Z478

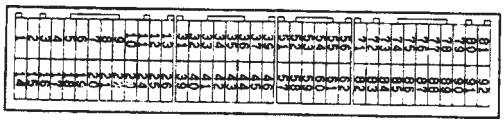


Z16Z451



Z7FU1434

Engine control module connector



Z9FU0393

7FU1632

OPERATION

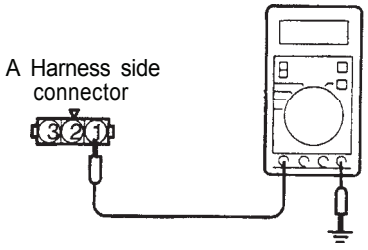
Refer to P.13A-119.

TROUBLESHOOTING HINTS

Refer to P.13A-117.

HARNESS INSPECTION

1



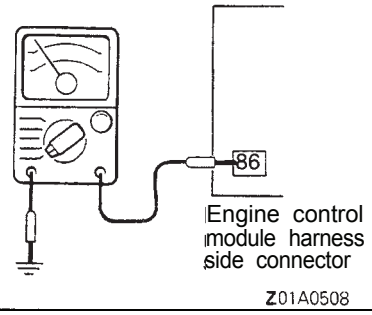
Measure line voltage applied to vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

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

2



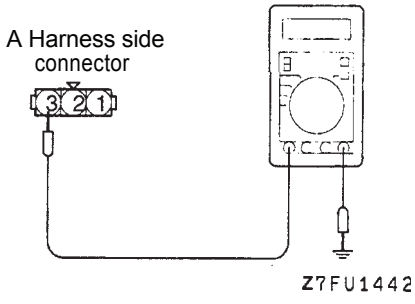
Check the vehicle speed sensor output circuit for continuity.
- Engine control module connector: Disconnected
- Ignition switch: ON
- Move the vehicle

Continuity

OK → STOP

NG → 3

3



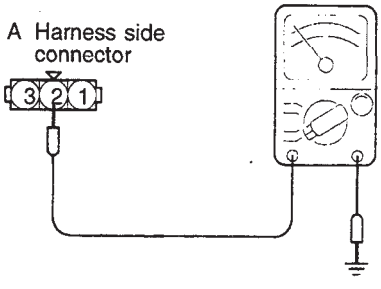
Measure the power supply voltage of the vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

4.5-4.9 v

OK → 4

NG → Repair the harness. (A3–86)

4



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

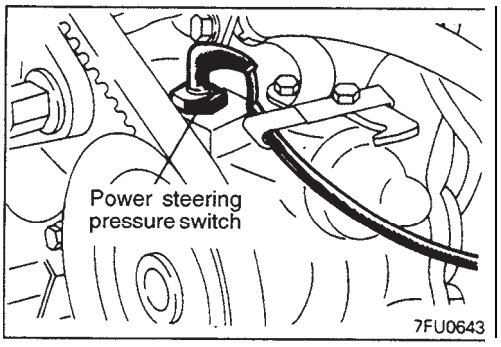
OK → STOP

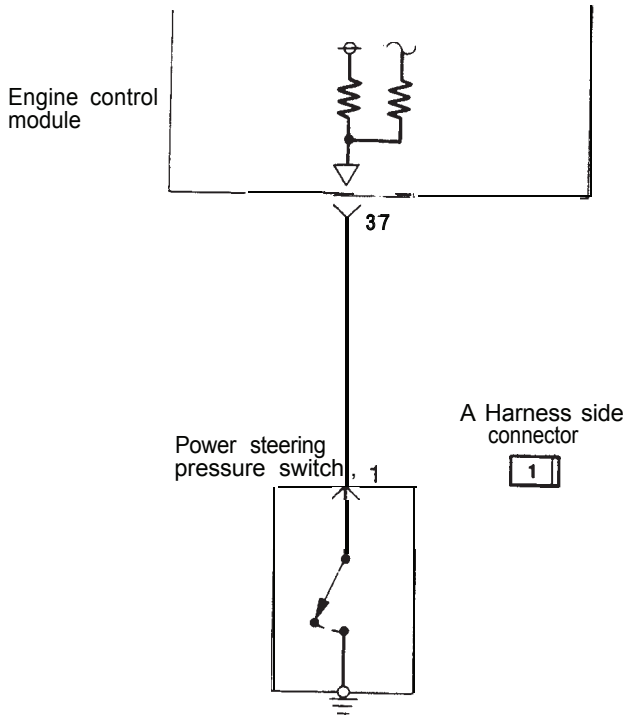
NG → Repair the harness. (A2 – Ground)

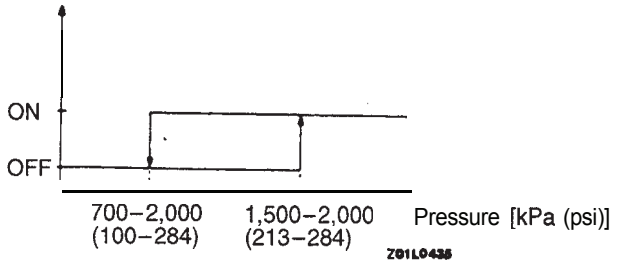
SENSOR INSPECTION

Refer to GROUP 54 – Meters and gauges.

POWER STEERING PRESSURE SWITCH







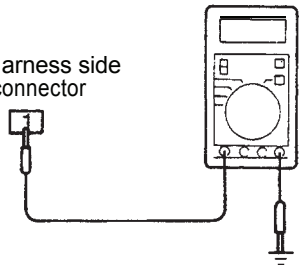
OPERATION

Refer to P.13A-121.

INSPECTION

Refer to P.13A-122.

HARNESS INSPECTION

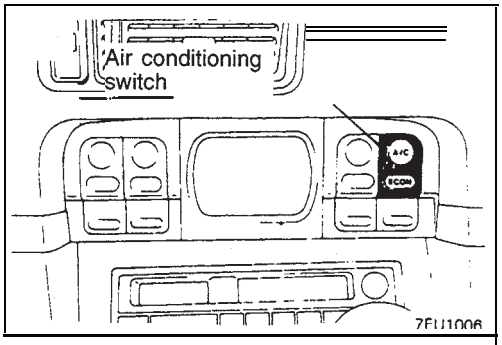
1 	Measure the power supply voltage. • Connector Disconnected • Ignition switch: ON **Battery voltage**	OK →	STOP
		NG →	Repair the harness. (AI -37)

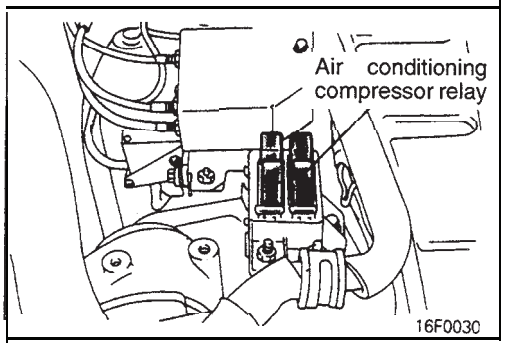
SENSOR INSPECTION

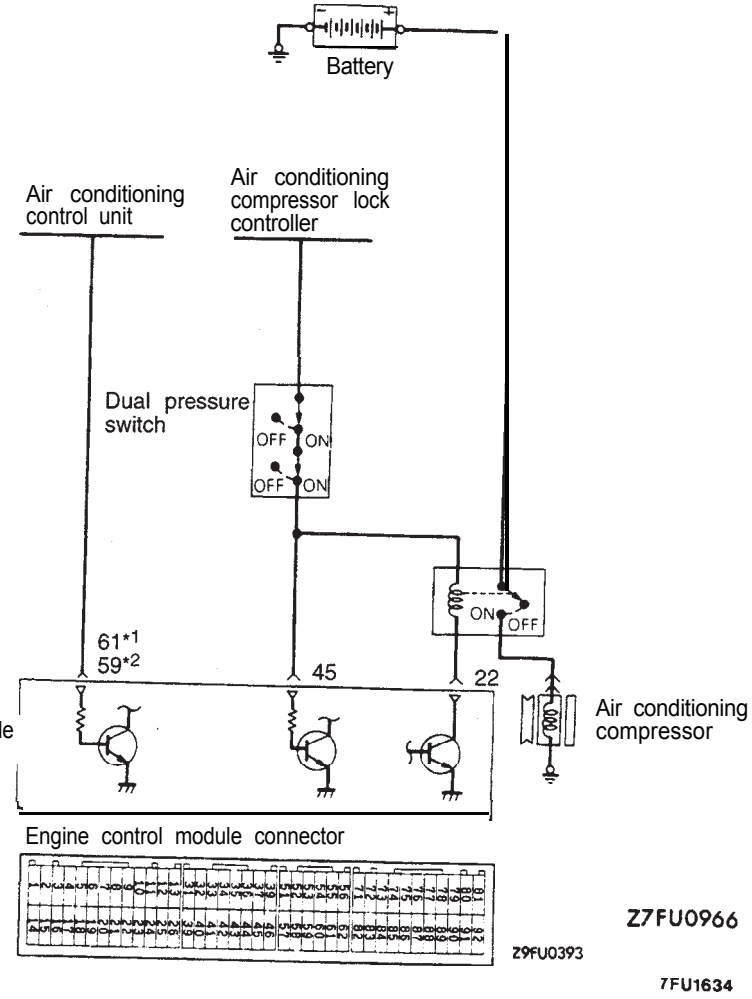
Refer to GROUP 37A – On-vehicle Service.

TSB Revision

AIR CONDITIONING SWITCH AND COMPRESSOR CLUTCH RELAY







NOTE
*1: Non Turbo
*2: Turbo

OPERATION

Refer to P.13A-123.

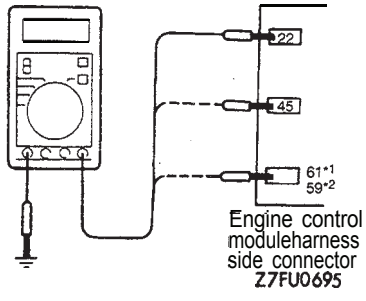
TROUBLESHOOTING HINTS

Refer to P.13A-123.

INSPECTION

Refer to P.13A-123.

HARNESS INSPECTION

1		Measure the power supply voltage of the conditioning circuit. • Air conditioning switch: ON • Engine control module connector: Disconnected • Ignition switch: ON • Dual air conditioning switch: ON **Battery voltage**	OK OK 7	STOP Check the air conditioning circuit.

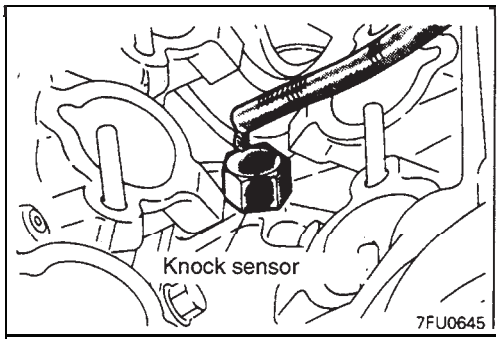
NOTE
*1: Non Turbo
*2: Turbo

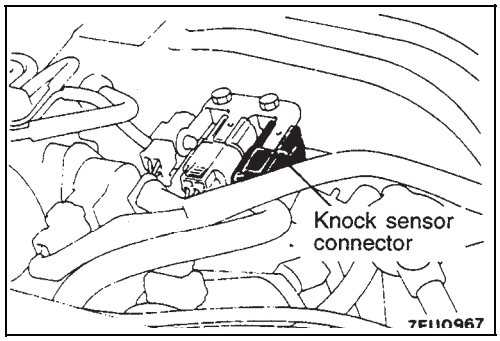
TSB Revision

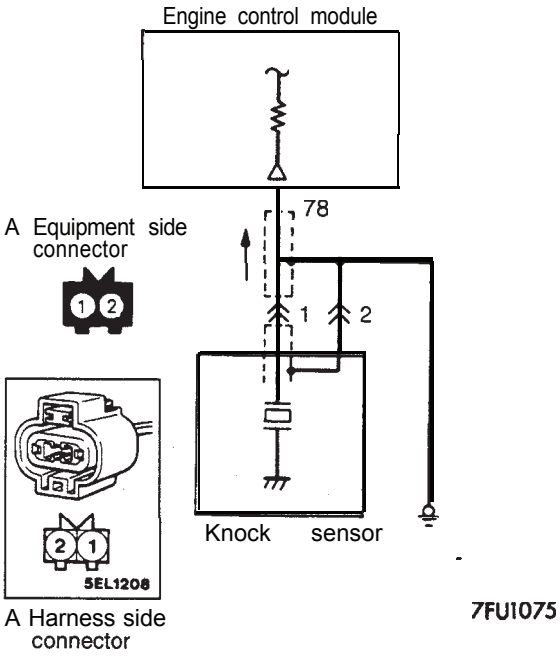
AIR CONDITIONING INSPECTION

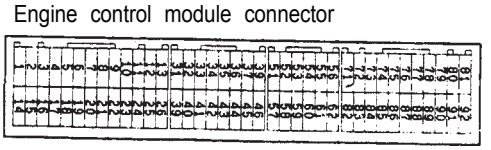
Refer to GROUP 55 – On-vehicle Service.

KNOCK SENSOR









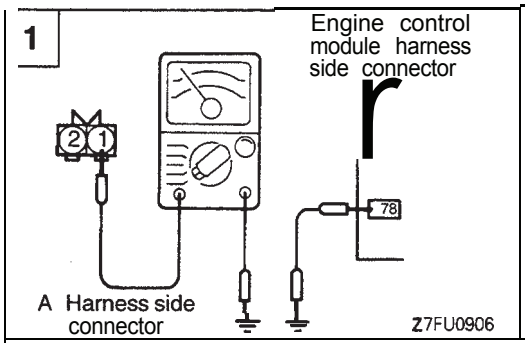
OPERATION

Refer to P.13A-125.

TROUBLESHOOTING HINTS

Refer to P.13A-125.

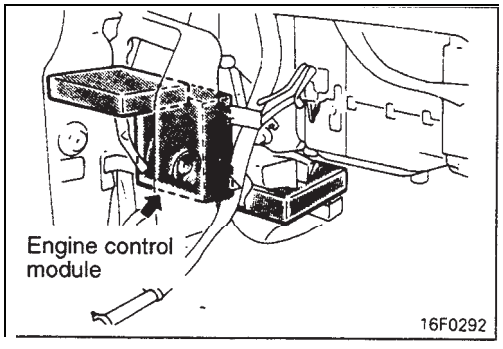
HARNESS INSPECTION

1 	Check for an open-circuit or a short-circuit to ground, between the engine control module and knock sensor. • Knock sensor connector: Disconnected • Engine control module connector: Disconnected	OK → 2 NG → Repair the harness. (AI -78)

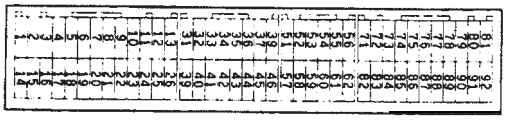
TSB Revision

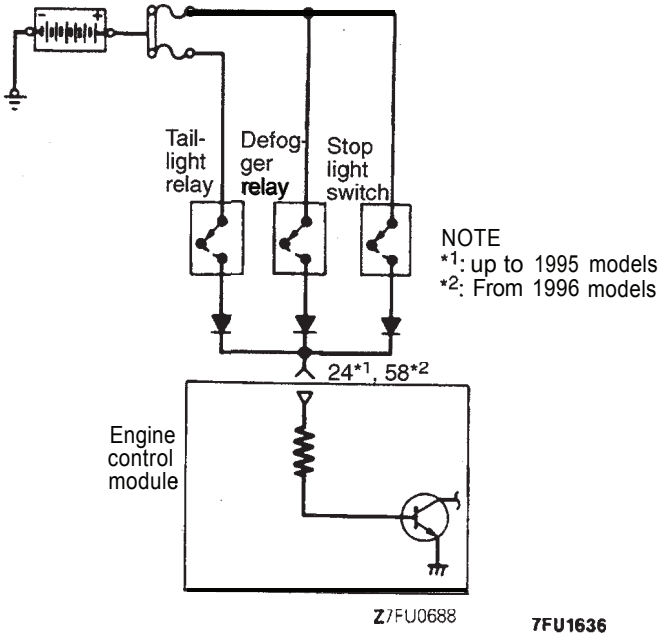
2		
A Harness side connector Z6FU1302	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP OK → Repair the harness. (A2 – Ground)

ELECTRICAL LOAD SWITCH



Engine control module connector





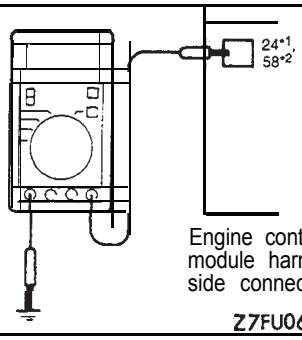
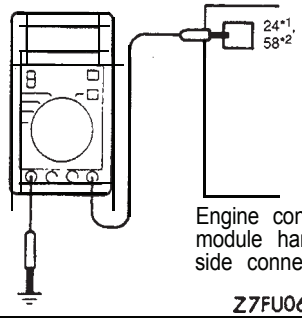
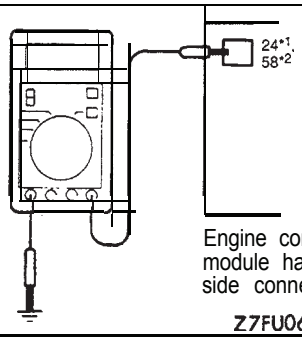
OPERATION

Refer to P.13A-127.

INSPECTION

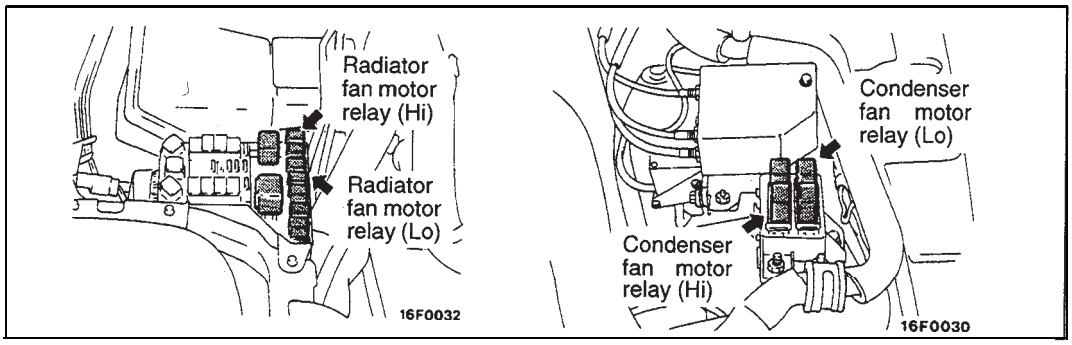
Refer to P.13A-127.

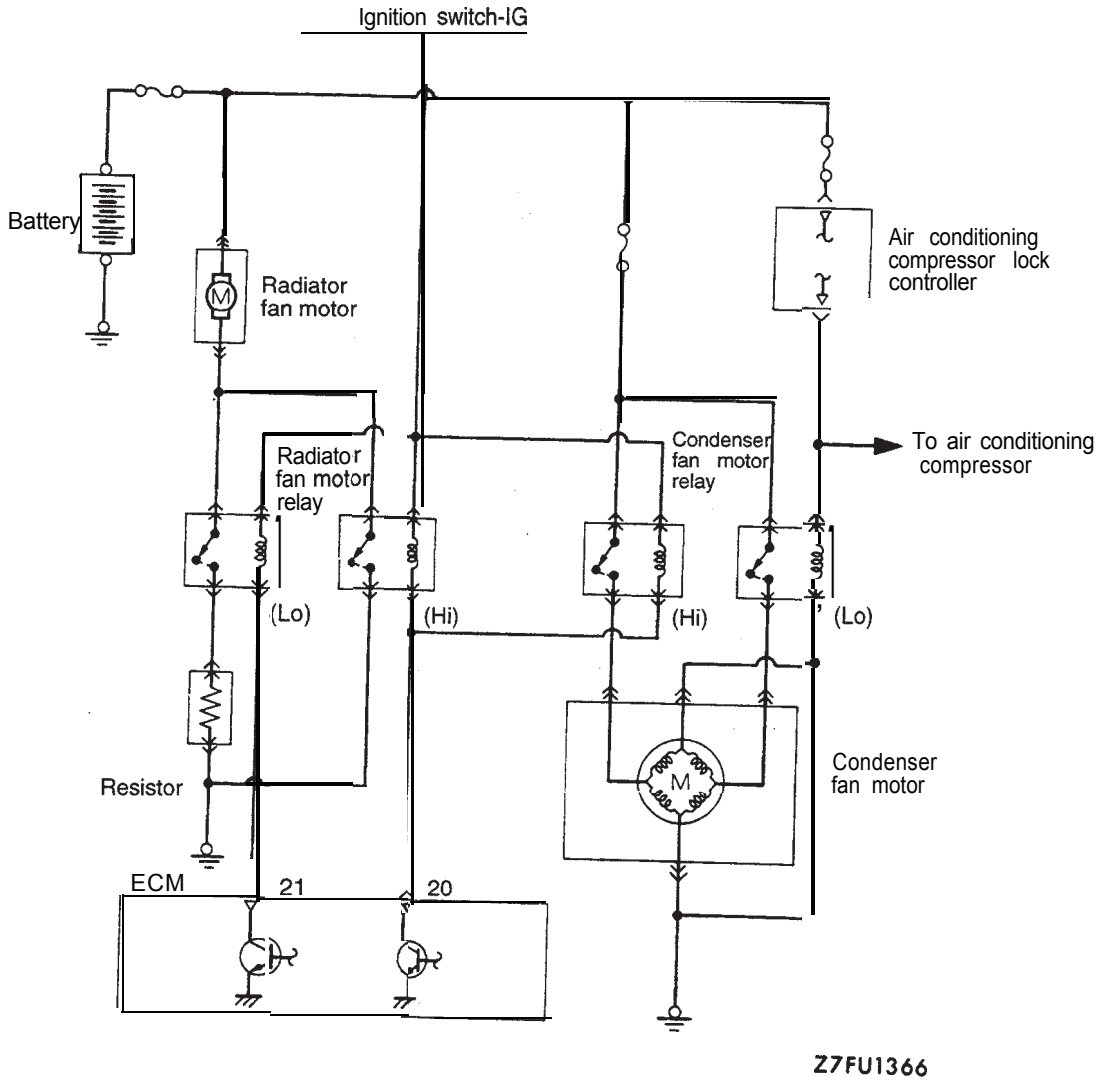
HARNESS INSPECTION

1		Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Lighting switch: ON (Tail light relay ON) **Battery voltage**	OK → 2 NG → Check circuit related to tail light relay
2		Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Defogger switch: ON (Defogger relay ON) **Battery voltage**	OK → 3 NG → Check circuit related to defogger relay
3		Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Brake pedal: Depressed (Stop light switch ON) **Battery voltage**	OK → STOP NG → Check circuit related to stoplight relay

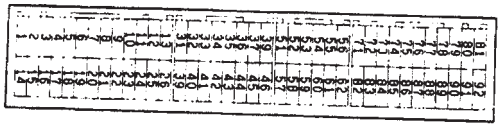
NOTE
*1: Up to 1995 models
*2: From 1996 models

FAN MOTOR RELAY (RADIATOR, AIR CONDITIONING CONDENSER)





Engine control module connector



Z9FU0393

7FU1637

TSB Revision

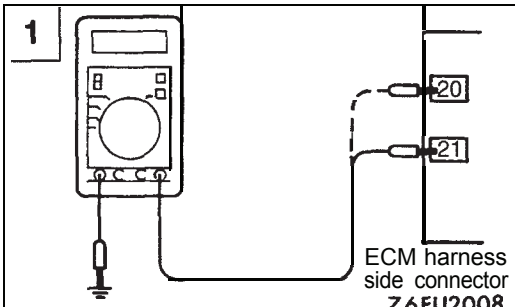
OPERATION

Refer to P.13A-130.

INSPECTION

Refer to P.13A-130.

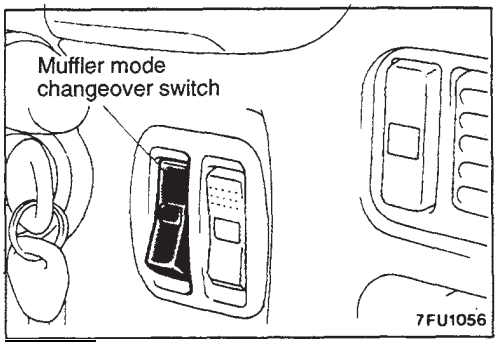
HARNESS INSPECTION

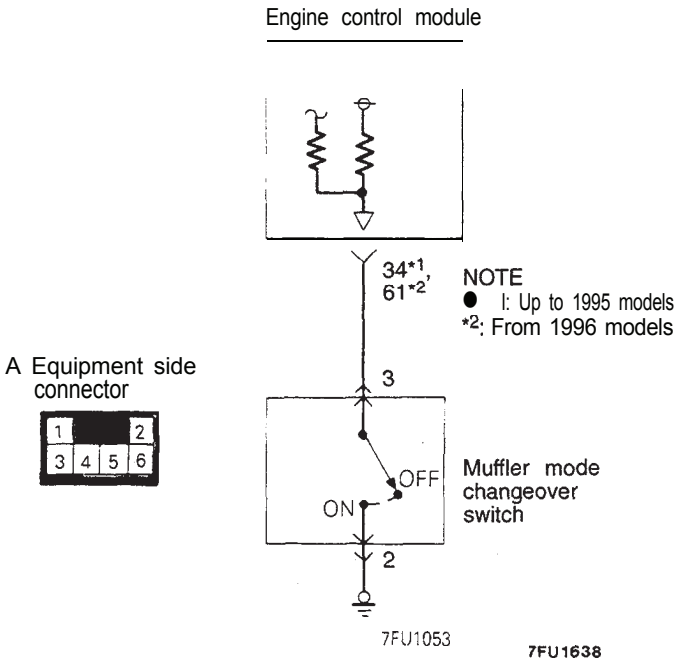
1 	Measure input voltage applied to ECM. • ECM connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → STOP NG → Check the fan motor relay circuit.	

FAN MOTOR RELAY INSPECTION

Refer to Radiator Check in GROUP 14 and Power Relay Check in GROUP 55.

MUFFLER MODE CHANGEOVER SWITCH <Turbo>





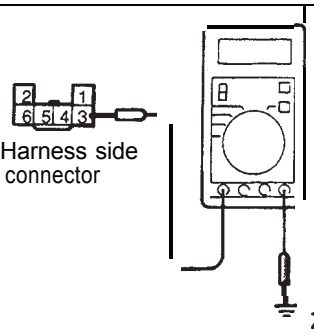
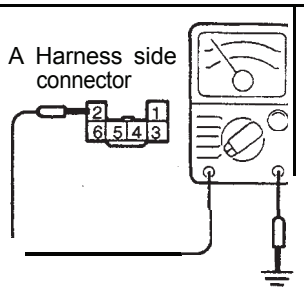
OPERATION

Refer to P.13A-131.

INSPECTION

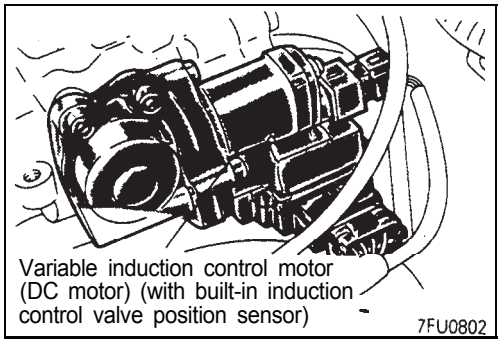
Refer to P.13A-131.

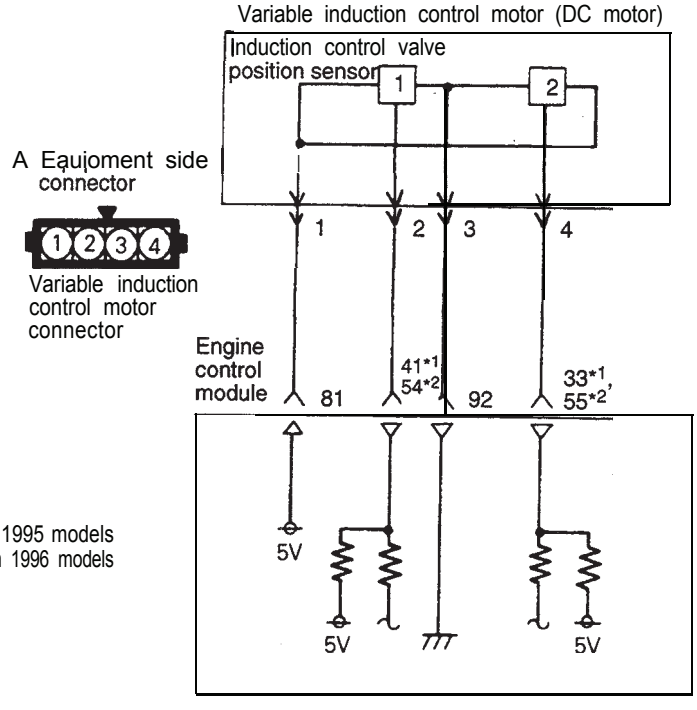
HARNESS INSPECTION

1 	Measure the power supply voltage. • Connector: Disconnected • ignition switch: ON **Battery voltage**	OK →	2
		NG →	Repair the harness. (A3–34*1, 61*2)
2 	Checkforcontinuity of the ground circuit. • Connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (A2 – Ground)

NOTE
*1: Up to 1995 models
*2: From 1996 models

INDUCTION CONTROL VALVE POSITION SENSOR <Non Turbo>





NOTE
• 1: Up to 1995 models
• 2: From 1996 models

Z7FU0968
7FU1639

OPERATION

Refer to P.13A-133.

INSPCTION

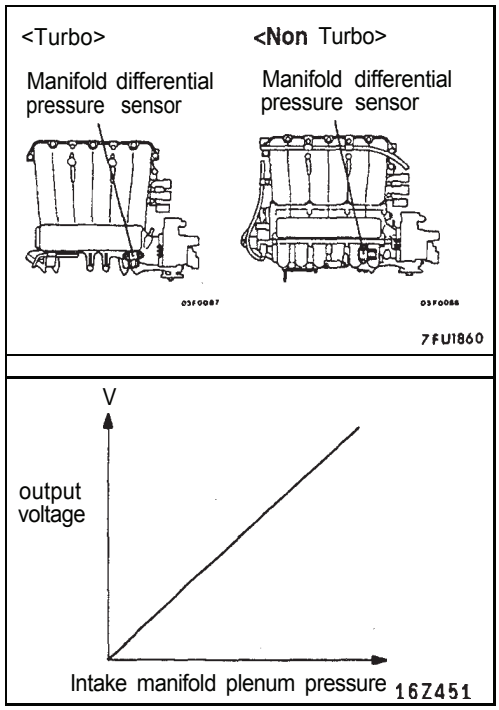
Refer to P.13A-133.

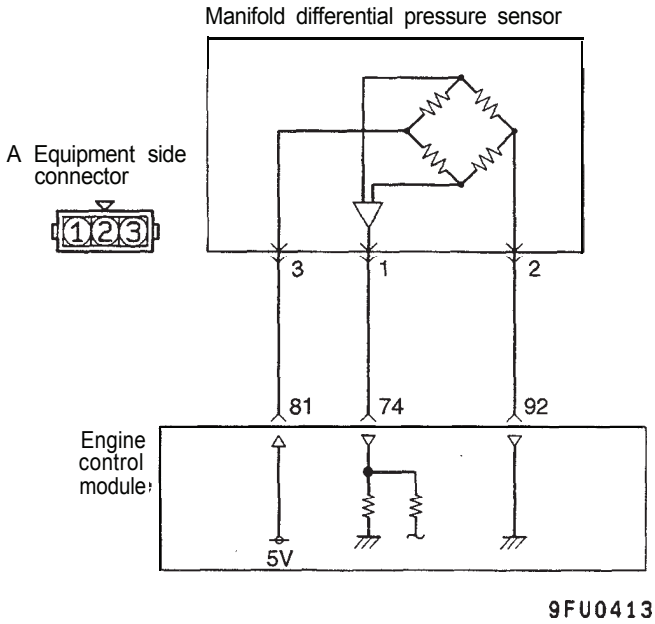
HARNESS INSPECTION

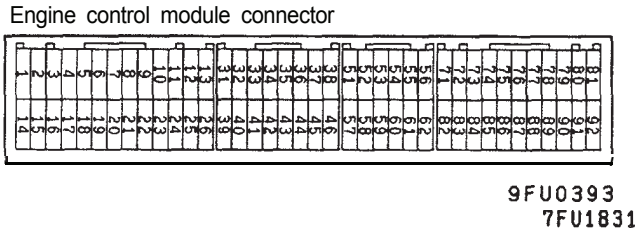
1	A Harness side connector Z6FU1241	Measure the power supply voltage of the air intake control valve position sensor. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → 2 NG → Repair the harness. (A1–81)
2	A Harness side connector Z7FU0824	Check for continuity of the ground circuit. • Connector: Disconnected	OK → 3 NG → Repair the harness. (A3–92)
3	A Harness side connector Z7FU0825	Measure the terminal voltage. • Connector: Disconnected • Ignition switch: ON	OK → STOP NG → Repair the harness. (A2–41*1, 54*2) (A4–33*1, 55*2)

NOTE
*1: Up to 1995 models
*2: From 1996 models

MANIFOLD DIFFERENTIAL PRESSURE (MDP) SENSOR







OPERATION

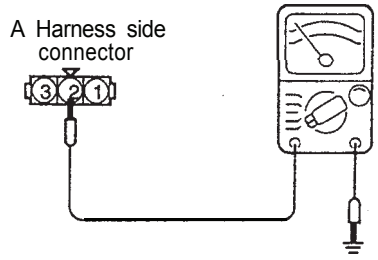
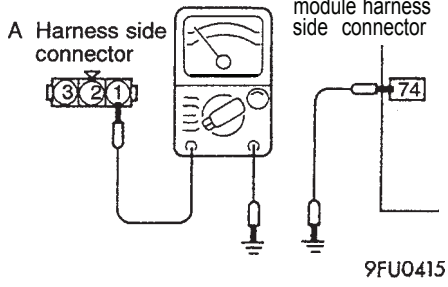
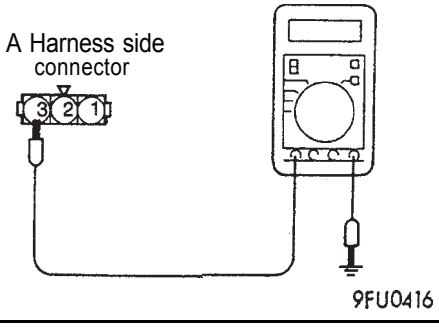
- Manifold differential pressure switch converts the intake manifold plenum pressure to the voltage and inputs to the engine control module. Engine control module confirms the operation of EGR system from this signal and, if there is any error in the EGR system, memorizes the diagnostic trouble code.
- 5 V of power is supplied to the manifold differential pressure sensor from the engine control module, and the sensor circuit ground is located in the engine control module.
- The manifold differential pressure sensor output voltage is proportioned to the intake manifold plenum pressure and sent to the engine control module.

INSPECTION

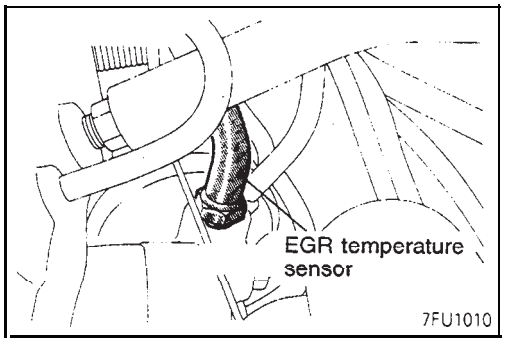
Using Scan Tool

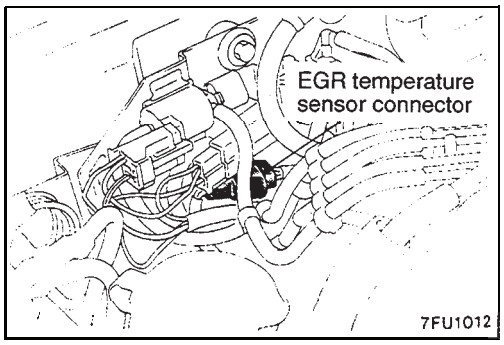
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	95	intake manifold plenum pressure	Engine: Warm-up	Idling	25.5-38.9 kPa <Non Turbo> 29.0-42.4 kPa <Turbo>

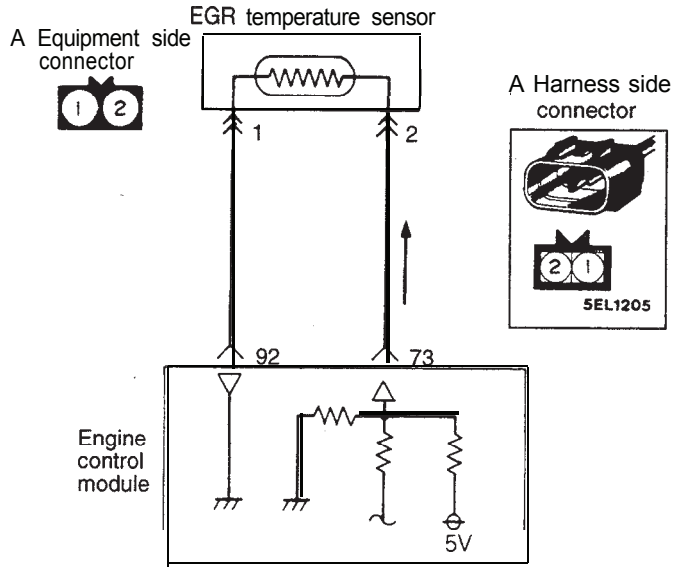
HARNESS INSPECTION

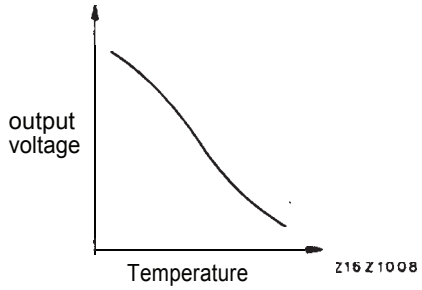
1 	Check for continuity of the ground circuit. • Manifold differential pressure sensor connector: Disconnected	OK →	2
		NG →	Repair the harness. (A2 – 92)
2 	Check for open-circuit, or short-circuit to ground between the engine control module and the manifold differential pressure sensor. • Manifold differential pressure sensor connector: Disconnected • Engine control module connector: Disconnected	OK →	3
		NG →	Repair the harness. (A3 – 74)
3 	Measure the impressed voltage to the manifold differential pressure sensor. • Manifold differential pressure sensor connector: Disconnected • Engine control module connector: Connected • Ignition switch: ON **Voltage: 4.8-5.2 V**	OK →	STOP
		NG →	Repair the engine control module.

EGR TEMPERATURE SENSOR <California Up to 1995 models, Federal – Turbo Up to 1995 models>









7FU1640

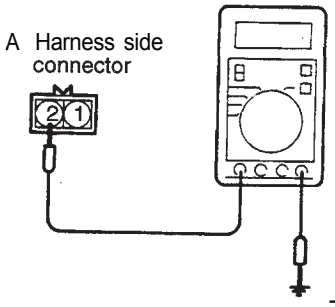
OPERATION

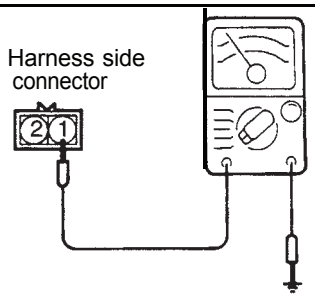
Refer to P.13A-135.

INSPECTION

Refer to P.13A-136.

HARNESS INSPECTION

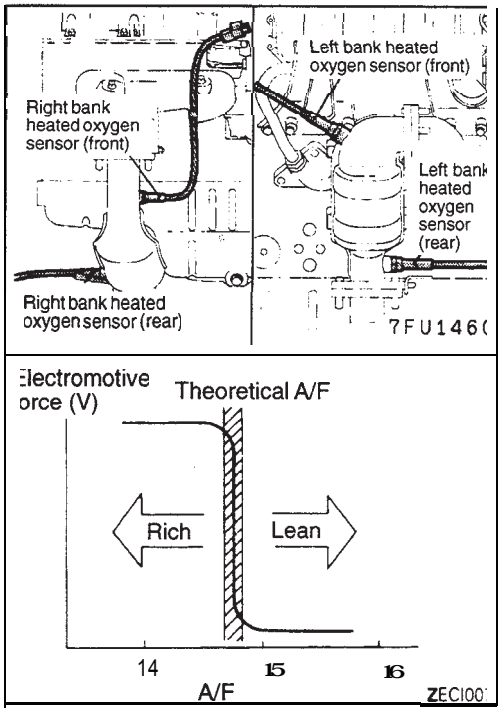
1 	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **4.3–4.7 V**	OK →	2
		NG →	Repair the harness. (A2–73)

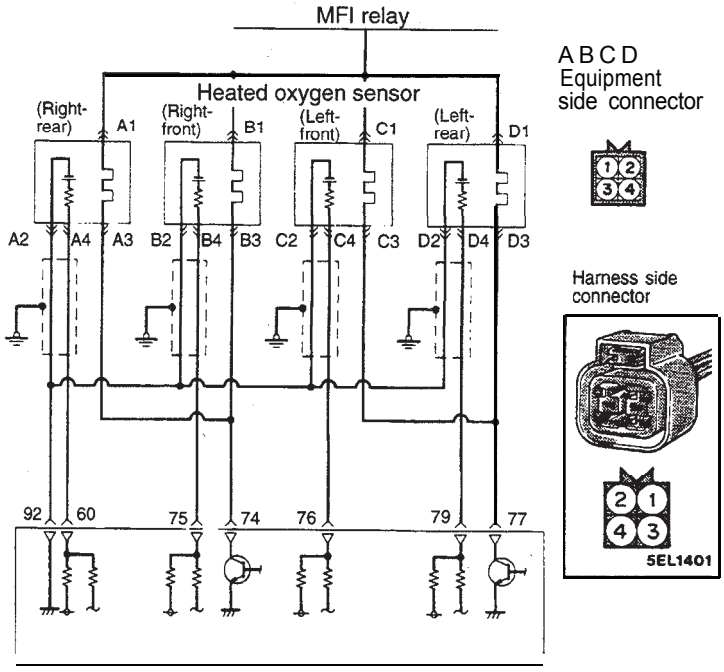
2 	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (AI -92)

SENSOR INSPECTION

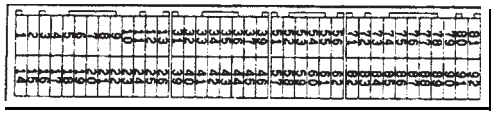
Refer to GROUP 17 – Exhaust Gas Recirculation (EGR) System.

HEATED OXYGEN SENSOR <California – Non Turbo Up to 1995 models>





Engine control module connector



Z9FU0393 7FU1641

TSB Revision

OPERATION

Refer to P.13A-137.

TROUBLESHOOTING

Refer to P.13A-138.

INSPECTION

Using Scan Tool

<Heated Oxygen Sensor (front)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	11 39	Sensor detection voltage	Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and a so check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↔ 600– 1,000 mV (changes)
				2,000 rpm	

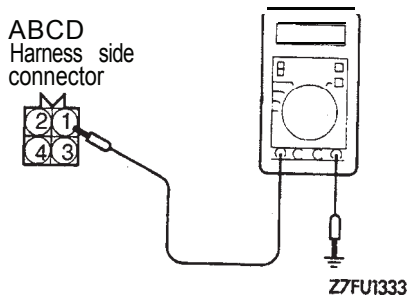
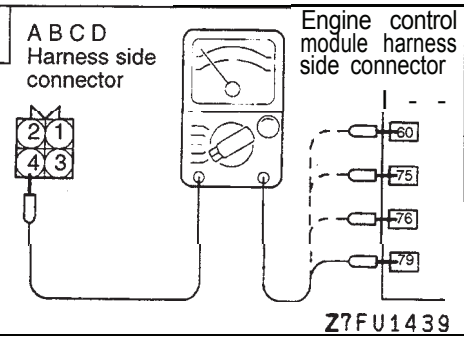
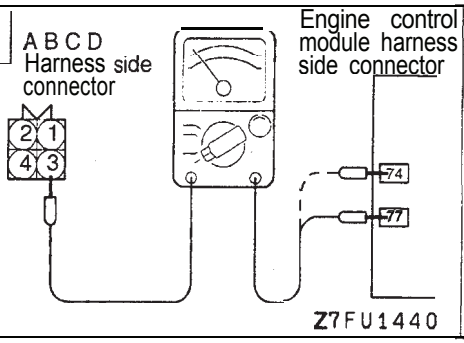
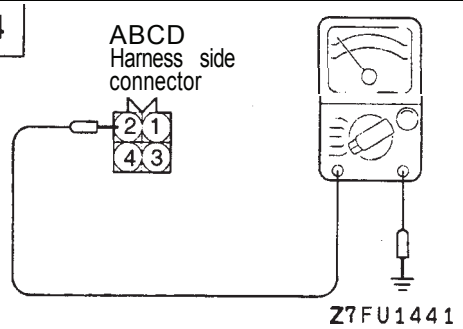
<Heated Oxygen Sensor (rear)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear <M/T> L range <A/T> • Drive with wide open throttle	3,500 rpm	600–1,000 mV

<Heated Oxygen Sensor (front, rear)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	48	Heater condition	Engine: Warm-up	750 rpm (Idle)	ON
				5,000 rpm	OFF

HARNESS INSPECTION

1		Measure the power supply voltage of the heated oxygen sensor. • Connector: Disconnected • Ignition switch ON **Battery voltage**	OK → 2 NG → Repair the harness. (A1, B1, C1, D1 – MFI relay)
2		Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK → 3 NG → Repair the harness. (A4–60) (B4–75) (C4–76) (D4–79)
3		Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor. • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK → 4 NG → Repair the harness. (A3, B3–74) (C3, D3–77)
4		Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (A2, B2, C2, D2–92)

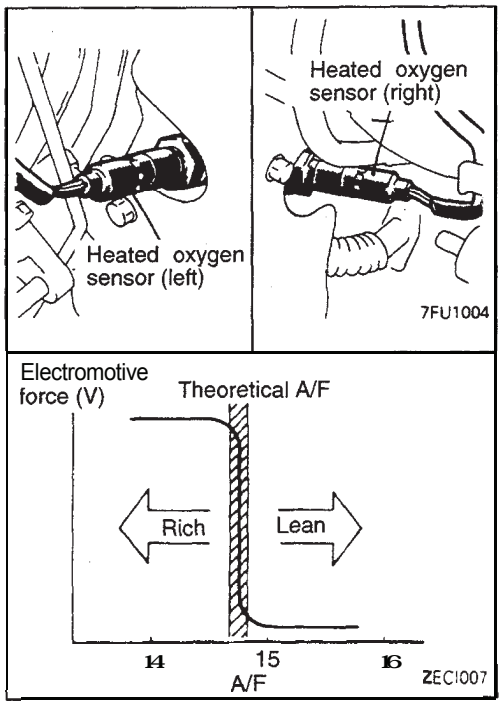
SENSOR INSPECTION

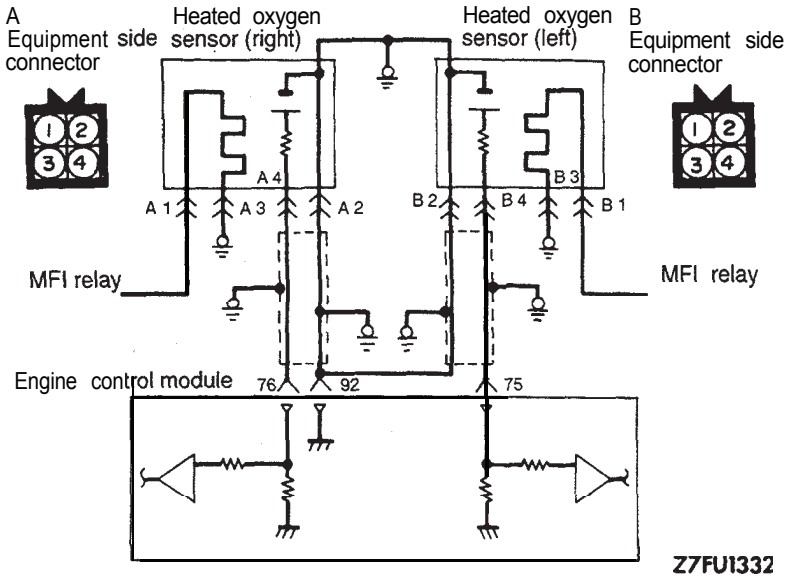
Refer to P.13A-143.

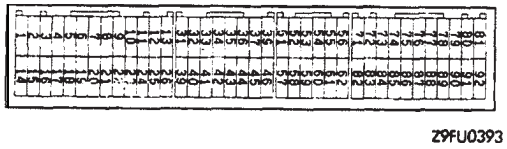
INSTALLATION

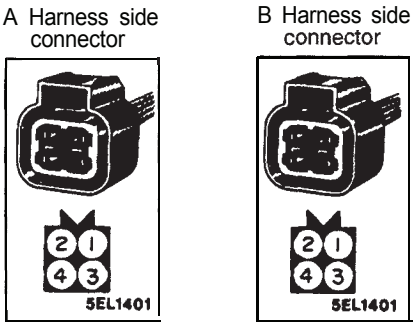
Refer to P.13A-143.

HEATED OXYGEN SENSOR <Federal – Turbo Up to 1995 models>









OPERATION

Refer to P.13A-137.

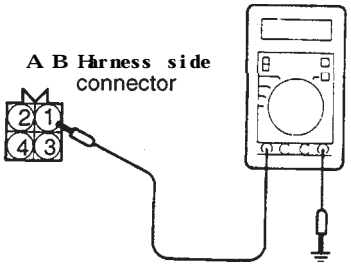
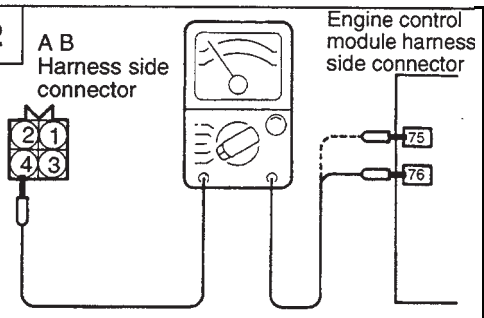
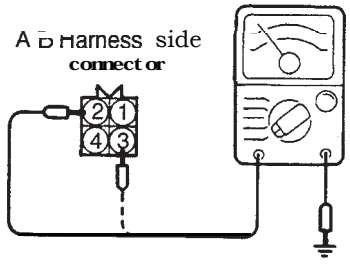
TROUBLESHOOTING

Refer to P.13A-138.

INSPECTION

Refer to P.13A-141.

HARNESS INSPECTION

1 	Measure the power supply voltage of the heated oxygen sensor. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK →	2
		NG →	Repair the harness. (A1, B1 – MFI relay)
2 	Check for an open-circuit, or a short-circuit to ground, between the enginecontrol module and the heated oxygen sensor. • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK →	3
		NG →	Repair the harness. (A4–76) (B4–75)
3 	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (A2, B2–92) (A3, B3 – Ground)

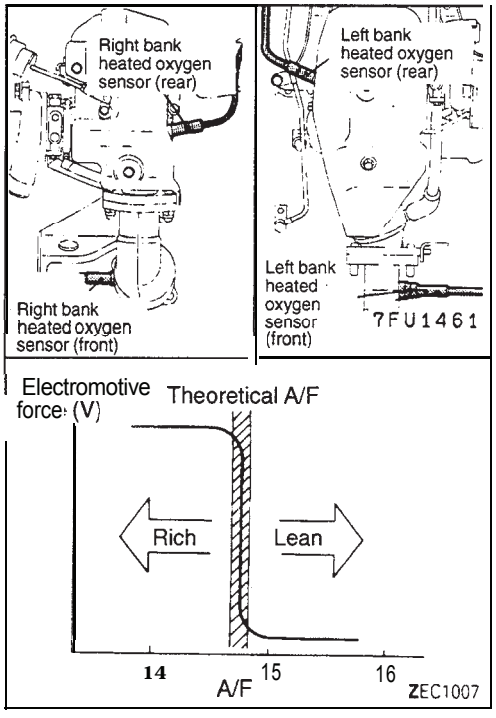
SENSOR INSPECTION

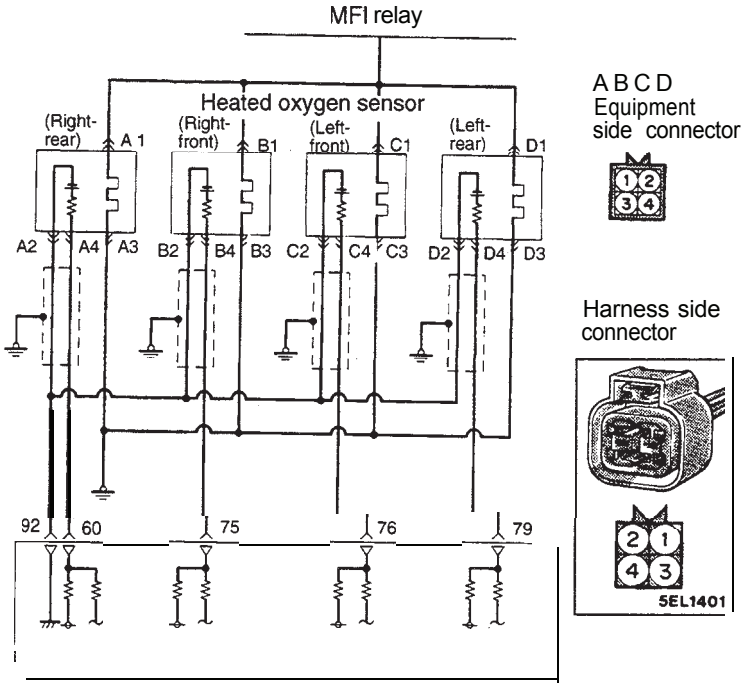
Refer to P.13A-143.

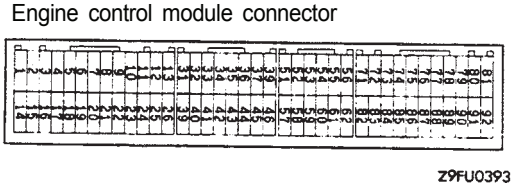
INSTALLATION

Refer to P.13A-143.

HEATED OXYGEN SENSOR <California – Turbo Up to 1995 models>







OPERATION

Refer to P.13A-137.

TROUBLESHOOTING

Refer to P.13A-138.

INSPECTION

Using Scan Tool

<Heated Oxygen Sensor (front)>

Function	item No.	Data display	Check condition	Engine state	Standard value
Data reading	11 39	Sensor detection voltage	Engine Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600–1,000 mV
			Engine Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↔ 600–1,000 mV (changes)
				2,000 rpm	

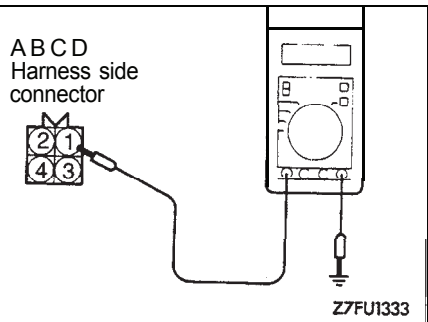
TSB Revision

<Heated Oxygen Sensor (rear)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear • Drive with wide open throttle	3,500 rpm	600– 1,000 mV

HARNESS INSPECTION

1



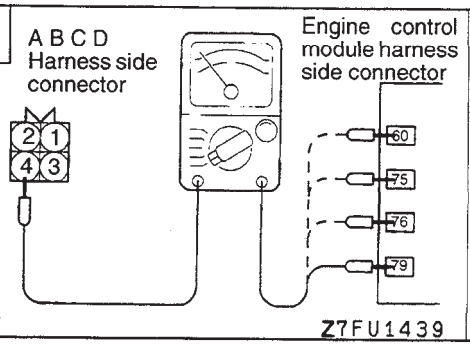
Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A1, B1, CI, D1 – MFI relay)

2

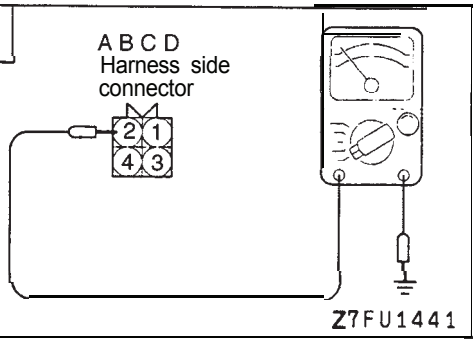


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NG → Repair the harness. (A4–60) (B4–75) (C4–76) (D4–79)

3



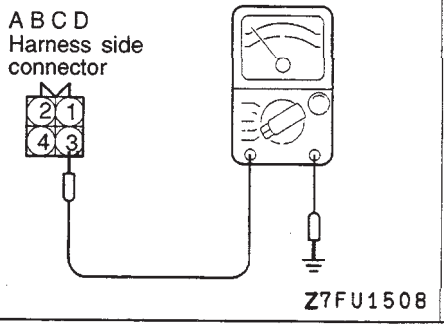
Check for continuity of the ground circuit
- Connector: Disconnected

OK → 4

3

NG → Repair the harness (A2, B2, C2, D2–92)

4



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

OK → STOP

NG → Repair the harness. (A3, B3, C3, D3 – Ground)

TSB Revision

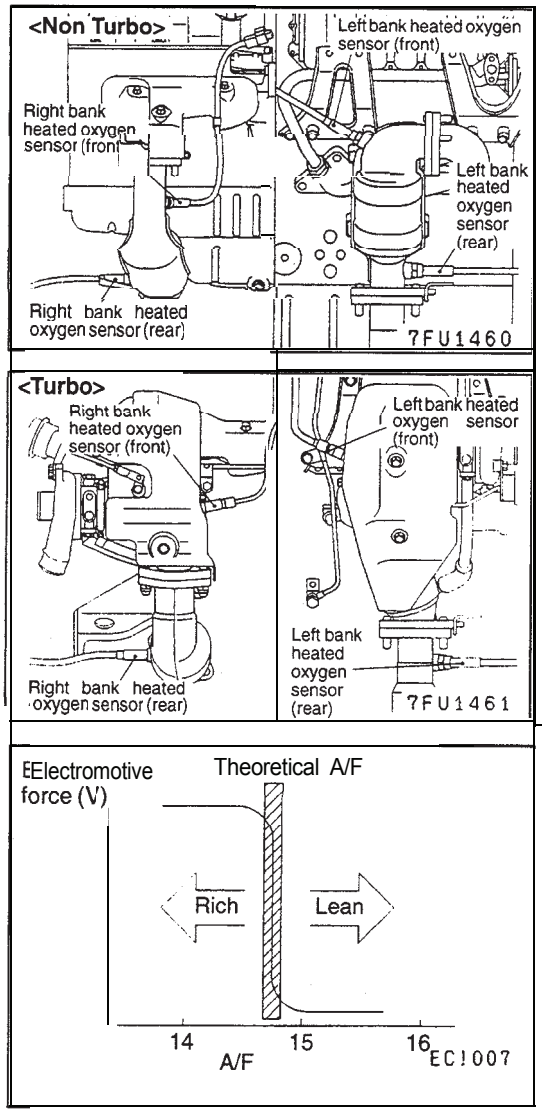
SENSOR INSPECTION

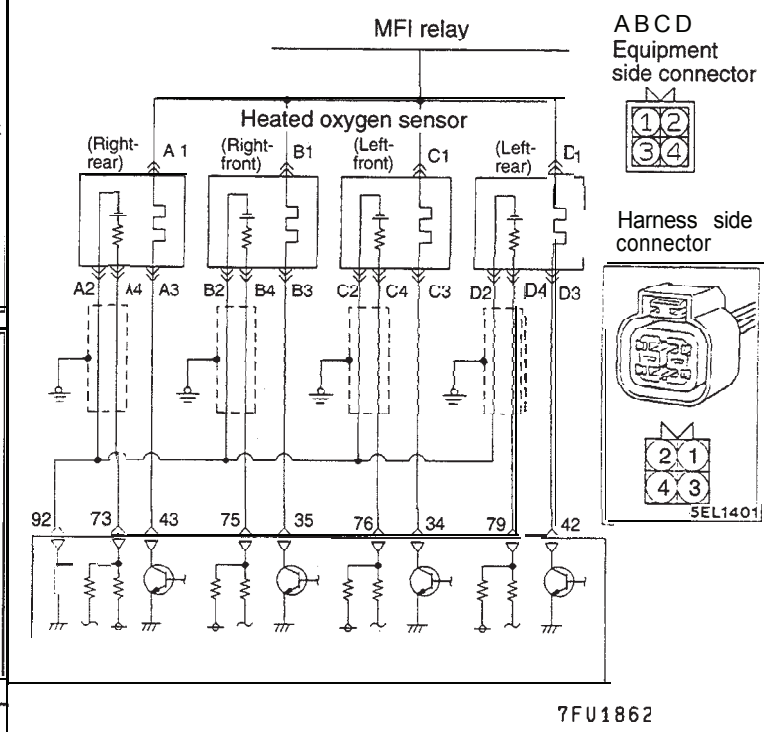
Refer to P.13A-143.

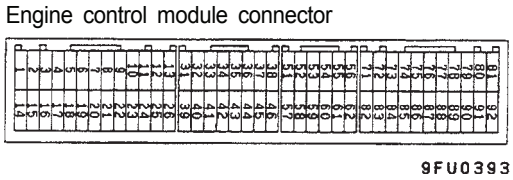
INSTALLATION

Refer to P.13A-143.

HEATED OXYGEN SENSOR <From 1996 models>







OPERATION

- The heated oxygen sensor senses the oxygen concentration in exhaust gas, converts it into a voltage and inputs it to the engine control module.
- The heated oxygen sensor outputs about 1 V when the air-fuel ratio is richer than the theoretical ratio and outputs about 0 V when the ratio is leaner (higher oxygen concentration in exhaust gas).
- The engine control module controls the fuel injection ratio based on this signal so that the air-fuel ratio may be kept at the theoretical ratio.
- The battery voltage is supplied to the heated oxygen sensor through the MFI relay. Therefore, the sensor element is heated by the heater so that the heated oxygen sensor remains responsive even when the exhaust temperature is low.

TROUBLESHOOTING HINTS

Hint 1: Poor cleaning of exhaust gas will result if the heated oxygen sensor fails.
Hint 2: If the heated oxygen sensor checked good but the sensor output voltage is out of specification, troubles of parts related to air-fuel raito control system are suspected.

[Examples]
(1) Faulty injector
(2) Air leaking into the intake manifold through gasket gap, etc.
(3) Faulty volume air flow sensor, intake air temperature sensor, barometric pressure sensor, engine coolant temperature sensor

INSPECTION

Using Scan Tool

<Heated oxygen sensor (front)>

Function	item No.	Data display	Check condition	Engine state	Standard value
Data reading	11 39	Sensor detection voltage	Engine Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↔ 600– 1,000 mV (changes)
				2,500 rpm	

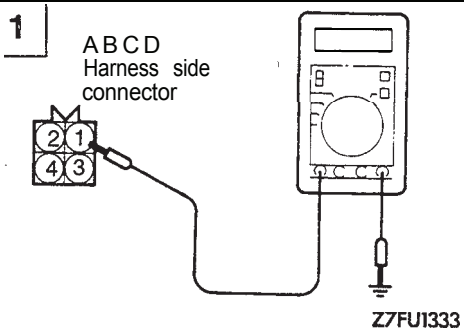
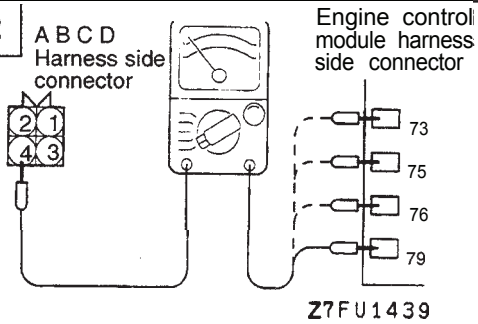
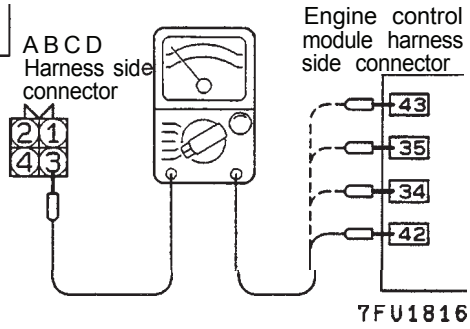
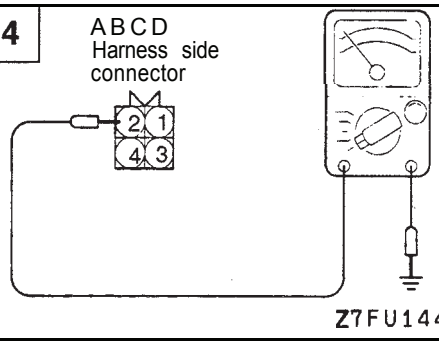
<Heated oxygen sensor (rear)>

Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear <M/T>, L range <A/T> • Drive with wide open throttle	3,500 rpm	600– 1,000 mV

<Heated oxygen sensor (front, rear)>

Function	Item No.	Data display	Check condition	Engine condition	Normal indication
Data reading	48	Heater condition	Engine: Warm-up	750 rpm (Idle)	ON
				5,000 rpm	OFF

HARNESS INSPECTION

1 	Measure the power supply voltage of be heated oxygen' sensor. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK →	2
		NG →	Repair the harness. (A1, B1, C1, D I – MFI relay)
2 	Check for an open-circuit, or a short-circuit to ground, between the engine control moduleand the heated oxygen sensor • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK →	3
		NG →	Repair the harness. (A4–73) (B4–75) (C4–76) (D4–79)
3 	Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor. • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK →	4
		NG →	Repair the harness. (A3–43) (B3–35) (C3–34) (D3–42)
4 	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (A2, B2, C2, D2–92)

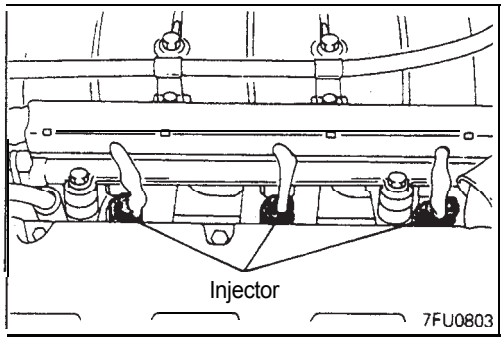
SENSOR INSPECTION

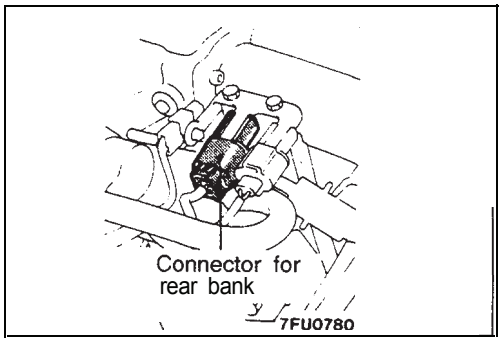
Refer to P.13A-143.

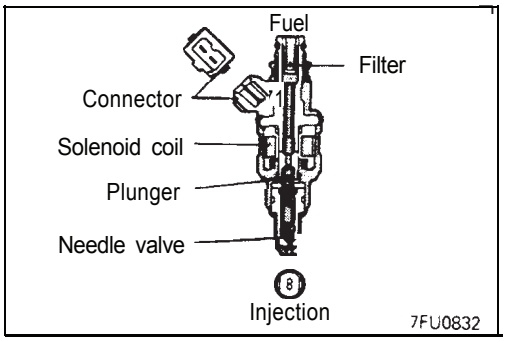
INSTALLATION

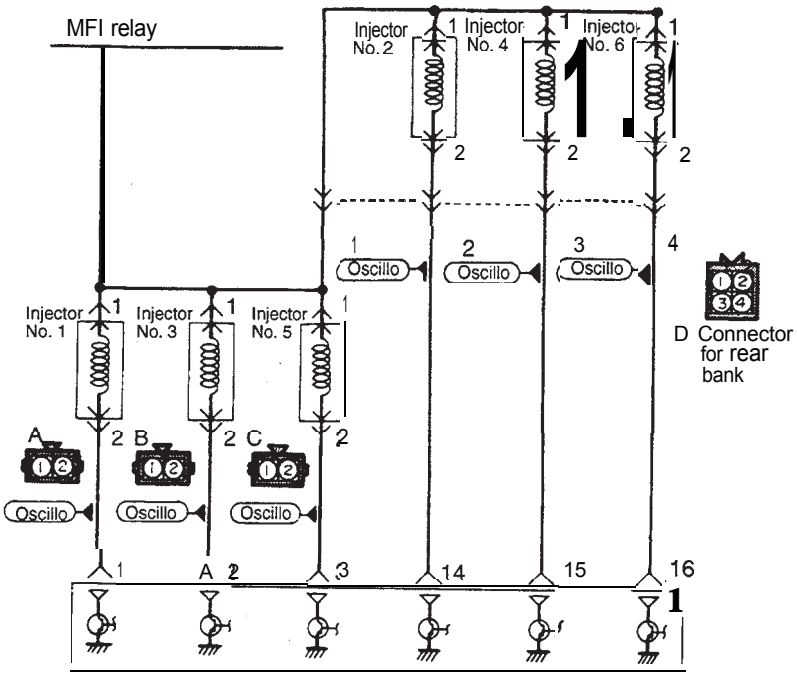
Refer to P.13A-143.

INJECTORS <Non Turbo>

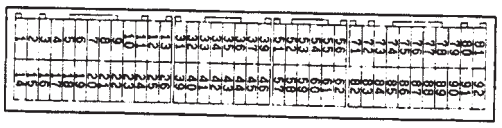








Engine control module connector



Z9FU0393

7FU1644

OPERATION

Refer to P.13A-144.

TROUBLESHOOTING HINTS

Refer to P.13A-145.

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41	Drive time*1	Engine: Cranking	0°C (32°F)*2	12.9–19.3 ms
				20°C (68°F)	36.1–54.1 ms
				80°C (176°F)	8.2-i 2.4 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41	Drive time*3	• Engine coolant temperature 80 to 95°C (176 to 203°F) • Lights, electric cooling fan, accessory units: All OFF • Transaxle Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	2.3-3.5 ms <Up to 1995 models> 2.5-3.7 ms <From 1996 models>
				2,500 rpm	2.0-3.2 ms <Up to 1995 models> 2.2-3.4 ms <From 1996 models
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
*3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may about 10% longer.
*4: From 1996 models

<Long-term fuel trim>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	81	Specified range	Engine: after warming-up	Idling	–12.5–12.5%

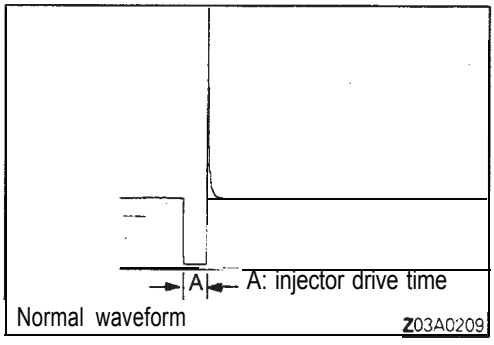
<Short-term fuel trim>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	82	Specified range	Engine: afterwarming-up (during closed-loop control)	No load 2,500 rpm	–17–17%

<Fuel control condition>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	86	Control condition	Engine: after warming-up	2,000 rpm	Closed loop
				Racing	Open loop

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		



Normal waveform

Using Oscilloscope

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

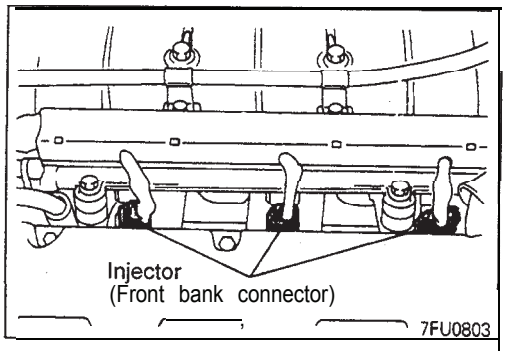
HARNESS INSPECTION

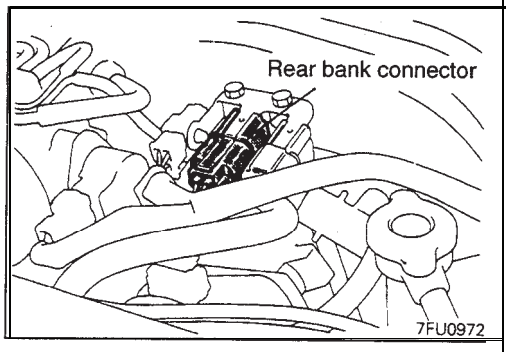
Refer to P.13A-146.

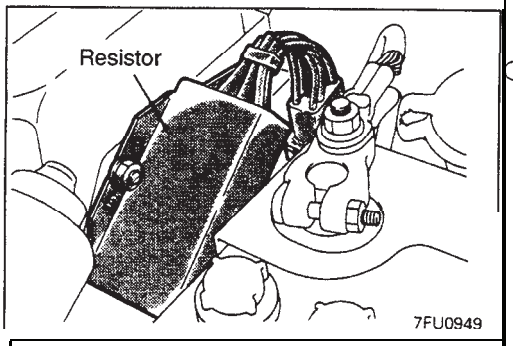
ACTUATOR INSPECTION

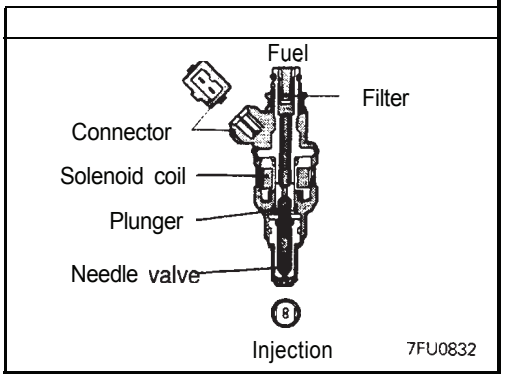
Refer to P.13A-147.

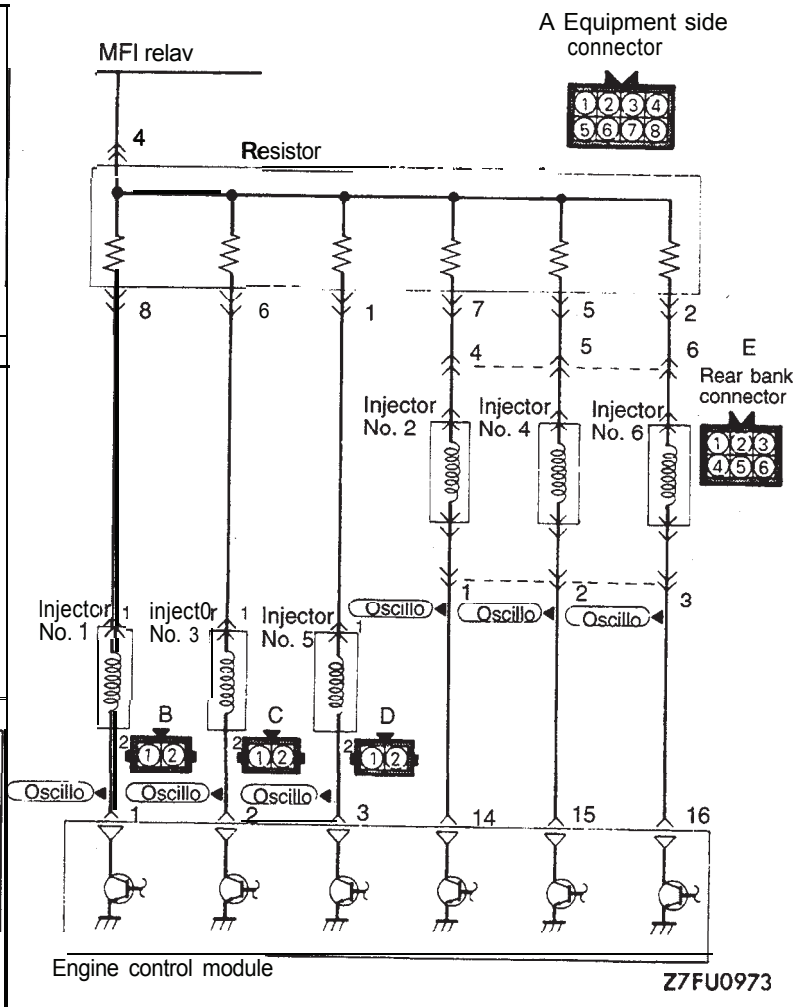
INJECTORS <Turbo>

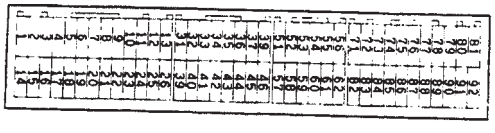












7FU1645

OPERATION

Refer to P.13A-144.

TROUBLESHOOTING HINTS

Refer to P.13A-145.

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*1	Engine: Cranking	0°C (32°F)*2	8.4-I 2.6 ms
				20°C (68°F)	23.3-34.9 ms
				80°C (176°F)	5.4-8.2 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*3	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lamps, electric cooling fan, accessory units: All OFF • Transaxle: Neutral • Steering wheel: Neutral	700 rpm (Idle)	1.6-2.8 ms <Up to 1995 models> 1.7-2.9 ms <From 1996 models>
				2,500 rpm	1.4-2.6 ms <Up to 1995 models> 1.5-2.7 ms <From 1996 models
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
*3: When the vehicle is new within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.
*4: From 1996 models

<Long-term fuel trim>*4

Function	item No.	Data display	Check condition	Engine state	Standard value
Data reading	81	Specified range	Engine: after warming-up	Idling	–12.5–12.5%

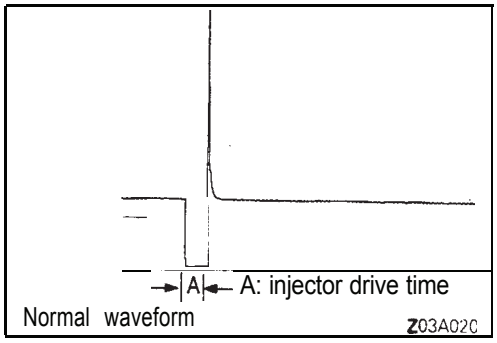
<Short-term fuel trim>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	82	Specified range	Engine: afterwarming-up (during closed-loop control)	No load 2,500 rpm	–17–17%

<Fuel control condition>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	86	Control condition	Engine: after warming-up	2,000 rpm	Closed loop
				Racing	Open loop

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		



Normal waveform

Using Oscilloscope

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

HARNESS INSPECTION

Refer to P.13A-150.

ACTUATOR INSPECTION

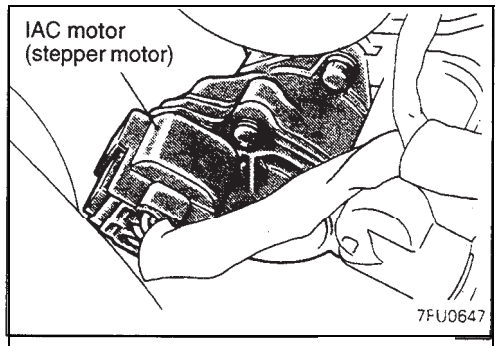
INJECTORS

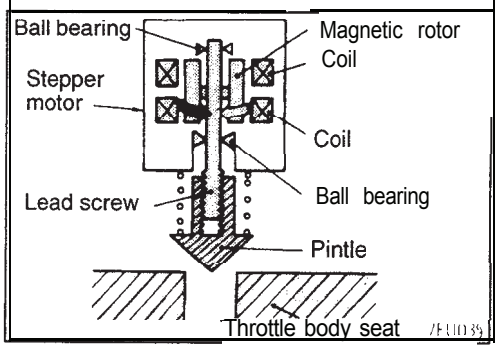
Refer to P.13A-151.

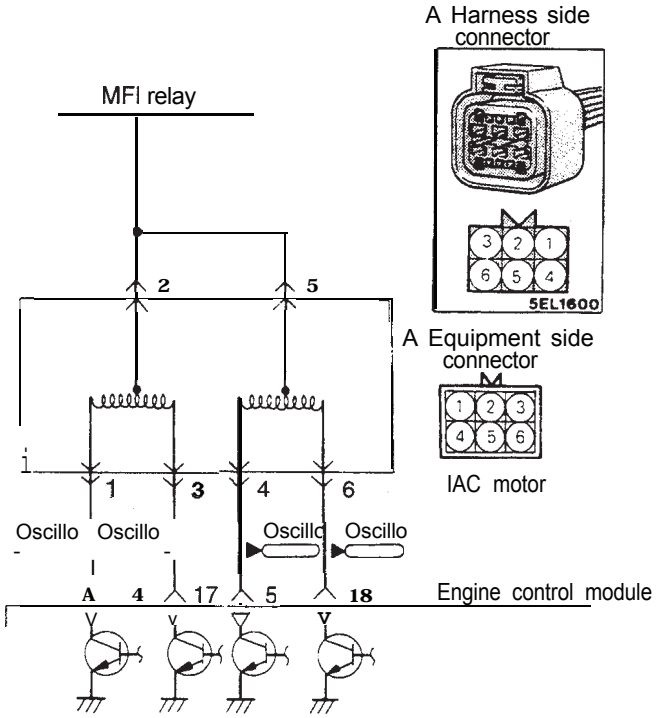
RESISTOR

Refer to P.13A-152.

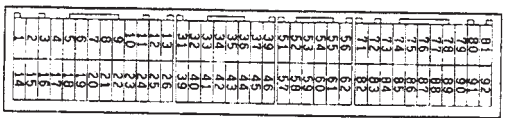
IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)







Engine control module connector



Z9FU0393

7FU1646

OPERATION

Refer to P.13A-153.

TROUBLESHOOTING HINTS

Refer to P.13A-153.

INSPECTION

Refer to P.13A-154.

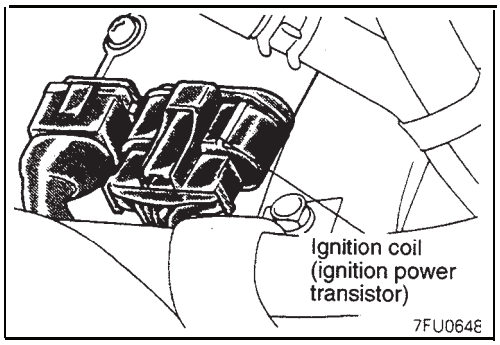
HARNESS INSPECTION

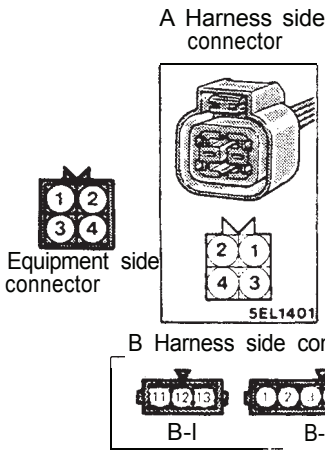
Refer to P.13A-155.

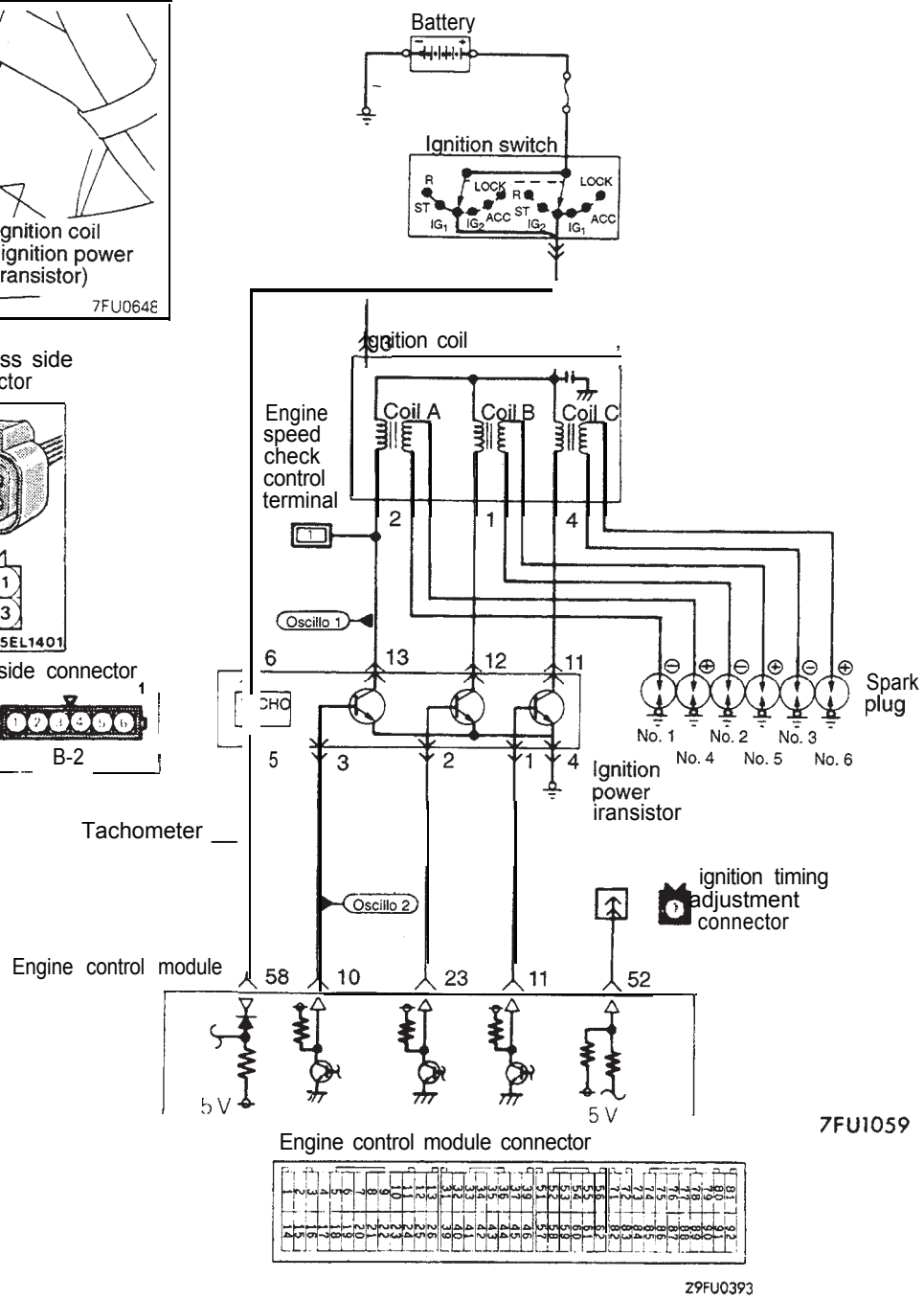
ACTUATOR INSPECTION

Refer to P.13A-155.

IGNITION COIL AND IGNITION POWER TRANSISTOR







OPERATION

Refer to P.13A-158.

TSB Revision

INSPECTION

Using Scan Tool

<Spark Advance>

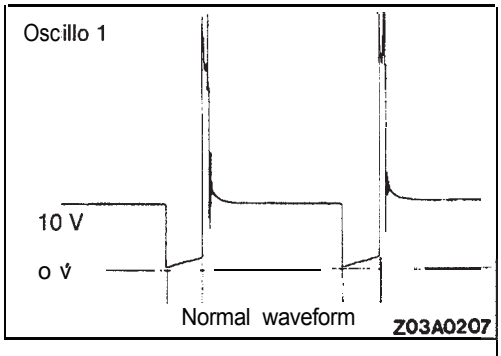
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warming up • Timing light: Set (set timing light to check actual ignition timing)	700 rpm (Idle)	7-23" BTDC
				2,000 rpm <Up to 1995 models>	30–50° BTDC <Non Turbo> 23-43" BTDC <Turbo>
				2,500 rpm <From 1996 models>	32–52° BTDC <Non Turbo> 25-45" BTDC <Turbo>

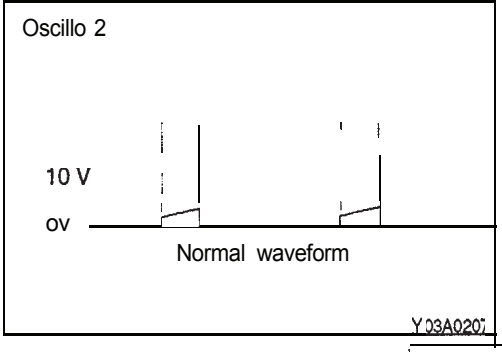
<Ignition Timing Adjustment Mode>

Function	Item No.	Data display	Check condition	Terminal condition	Standard value
Data list	36	Continuity present or not present between ignition timing adjustment terminal and ground	• Engine: Idling	Ignition timing adjustment terminal is grounded	ON
				Ignition timing adjustment terminal is disconnected from ground	OFF

<Standard Ignition Timing>

Function	Item No.	Drive	Check condition	Normal condition
Actuator test	17	Set to ignition timing adjustment mode	• Engine: idling • Timing light: set	5" BTDC





Using Oscilloscope

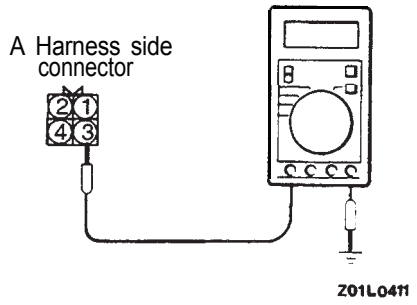
1. Primary signal of ignition coil
   (1) Run the engine at an idle speed.
   (2) Connect the probe to oscilloscope pick-up point 1 as shown in the circuit diagram, and check the primary signal of the ignition coil.

2. Control signal of ignition power transistor

   Connect the probe to oscilloscope pick-up point 2 as shown in the circuit diagram, and check the control signal of the ignition power transistor.

HARNESS INSPECTION

1



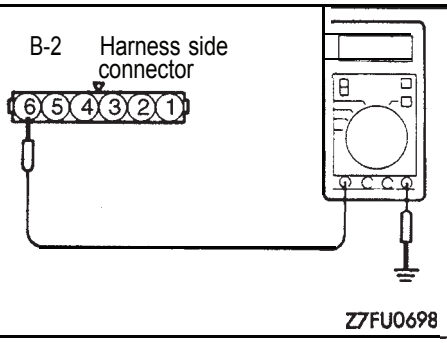
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A3 – Ignition switch)

2



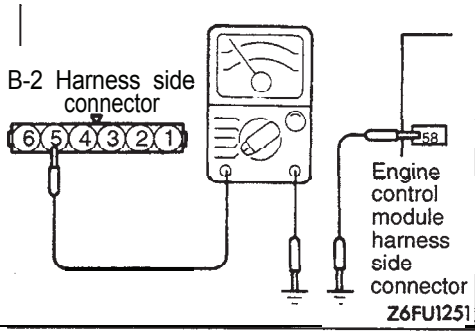
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 3

NG → Repair the harness. (B6 – Ignition switch)

3

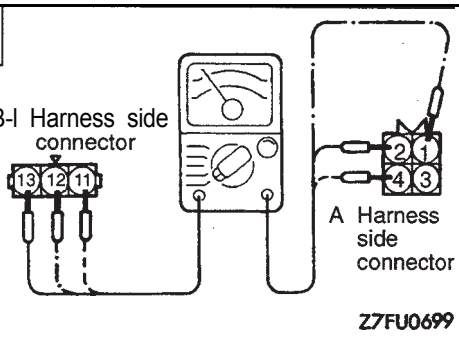


Check for an open-circuit, or a short-circuit to ground between the engine control unit and the ignition power transistor.
- Engine control module connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → 4

NG → Repair the harness. (B5–58)

4

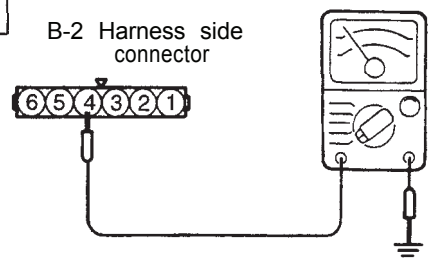
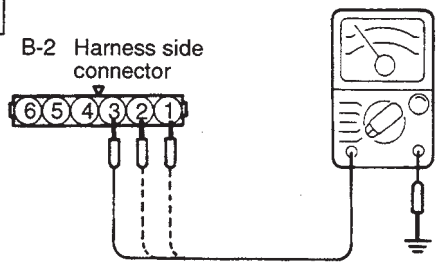
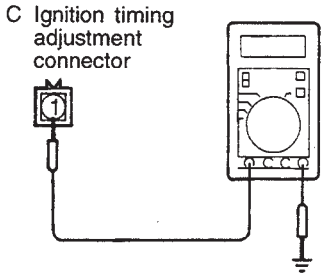


Check for an open-circuit, or a short-circuit to ground between the ignition power transistor and the ignition coil.
- Ignition coil connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → 5

NG → Repair the harness. (A2–B13) (A1–B12) (A4–B11)

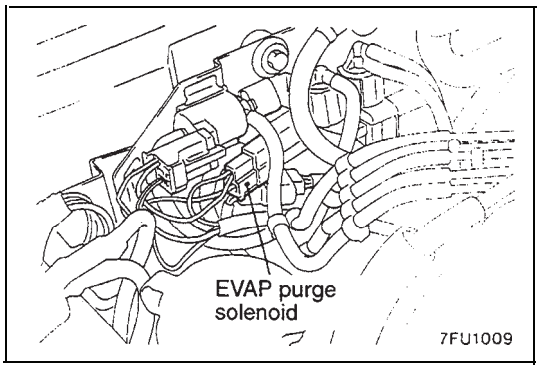
TSB Revision

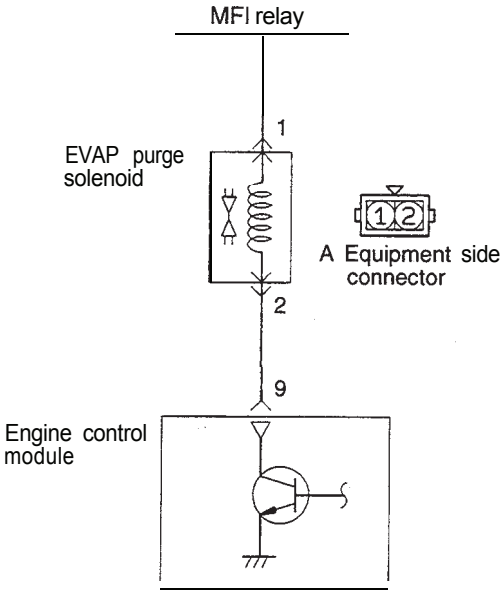
5 	Check for continuity of the ground circuit. ● Connector: Disconnected	OK →	6
		OK →	Repair the harness. (B4 – Ground)
6 	Measure the voltage of the control signal circuit of the ignition power transistor. ● Connector: Disconnected ● Ignition switch: START 0.5-4.0 v	OK →	7
		OK →	Repair the harness. (B3–10) (B2–23) (B1–11)
7 	Measure the voltage of the ignition timing adjustment terminal. ● Ignition switch: ON **4.0–5.2 V**	OK →	STOP
		OK →	Repair the harness. (C1–52)

ACTUATOR INSPECTION

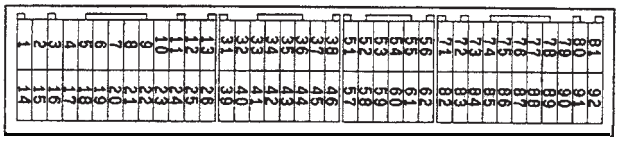
Refer to GROUP 16 – ignition System.

EVAPORATIVE EMISSION PURGE SOLENOID





Engine control module connector



7FU1850

OPERATION

Refer to P.13A-162.

INSPECTION

Refer to P.13A-162.

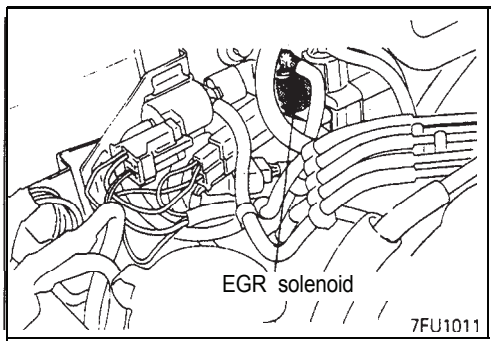
HARNESS INSPECTION

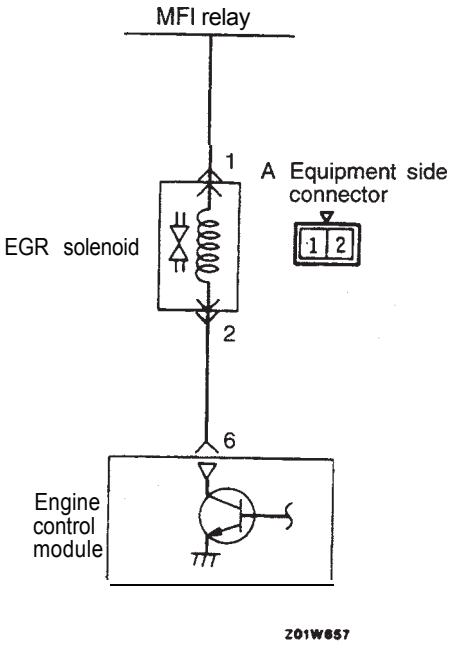
Refer to P.13A-163.

ACTUATOR INSPECTION

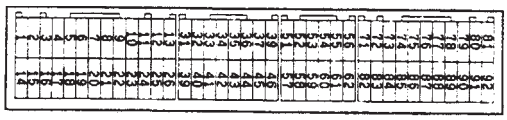
Refer to GROUP 17 – Evaporative Emission Control System.

EGR SOLENOID





Engine control module connector



OPERATION

Refer to P.13A-164.

TROUBLESHOOTING HINT

Refer to P.13A-164.

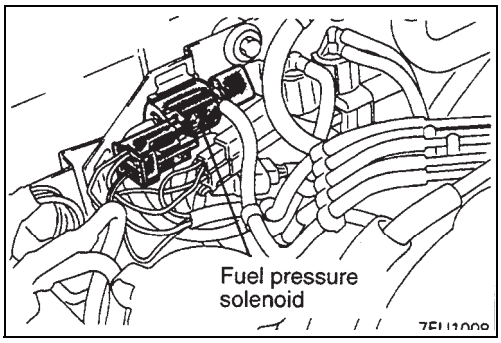
INSPECTION

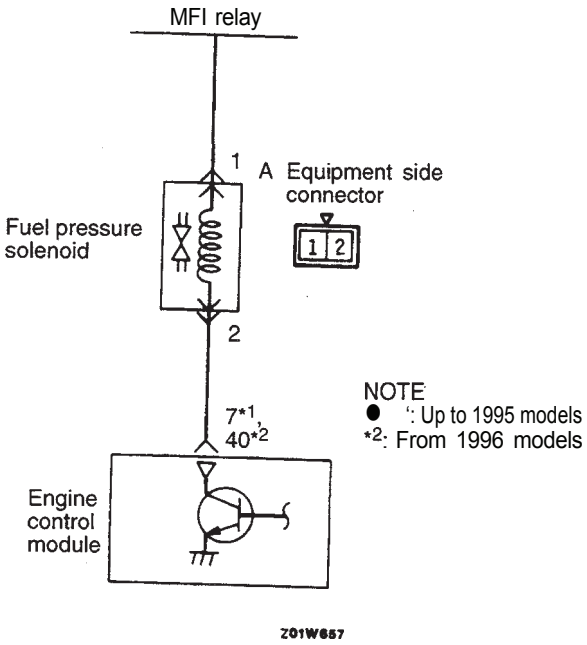
Refer to P.13A-165.

HARNESS INSPECTION

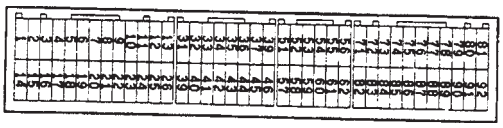
Refer to P.13A-165.

FUEL PRESSURE SOLENOID <Turbo>





Engine control module connector



OPERATION

Refer to P.13A-166.

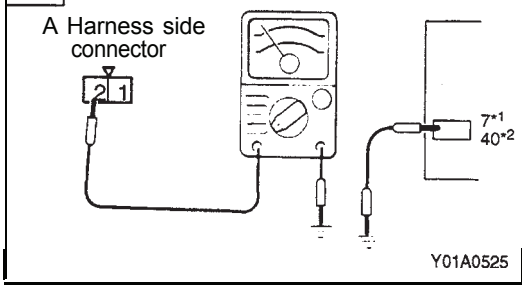
INSPECTION

Refer to P.13A-167.

HARNESS INSPECTION

1 A Harness side connector 2 1 Z01A0524	Measure the power supply voltage • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 ~~OK~~ → Repair the harness. (AI – MFI relay)

TSB Revision

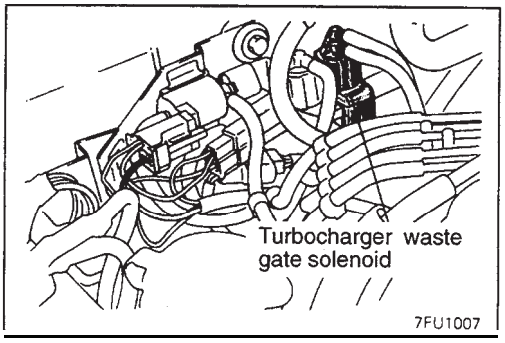
2 	Check for an open-circuit, or a short-circuit to ground, between the fuel pressure solenoid and the engine control module. • Engine control module connector: Disconnected • Fuel pressure solenoid connector: Disconnected	OK →	A STOP
		OK →	Repair the harness. (A2–7*1, 40*2)

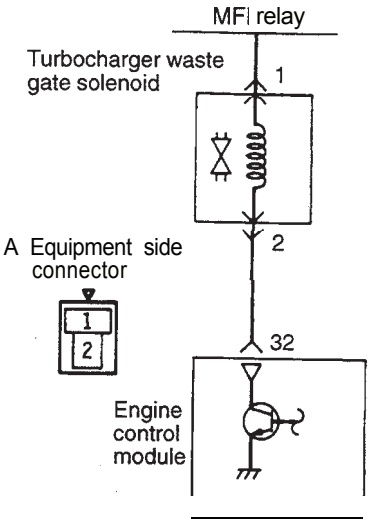
NOTE
*1: Up to 1995 models
*2: From 1996 models

ACTUATOR INSPECTION

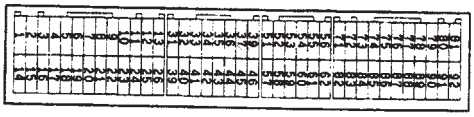
Refer to P.13A-168.

TURBOCHARGER WASTE GATE SOLENOID <Turbo>





Engine control module connector



Z9FU0393

7FU1651

TSB Revision

OPERATION

Refer to P.13A-169.

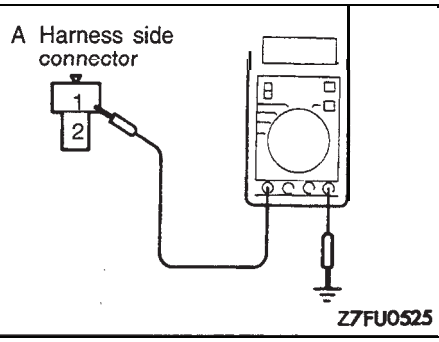
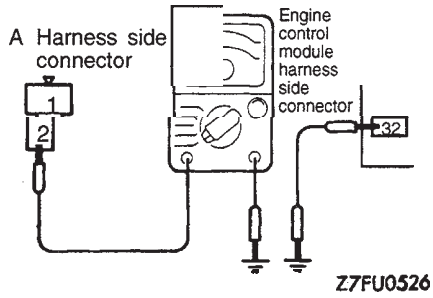
TROUBLESHOOTING HINTS

Refer to P.13A-169.

INSPECTION

Refer to P.13A-170.

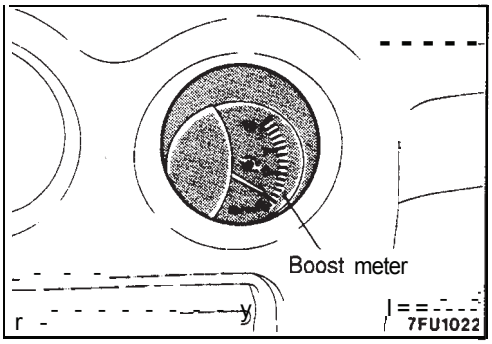
HARNESS INSPECTION

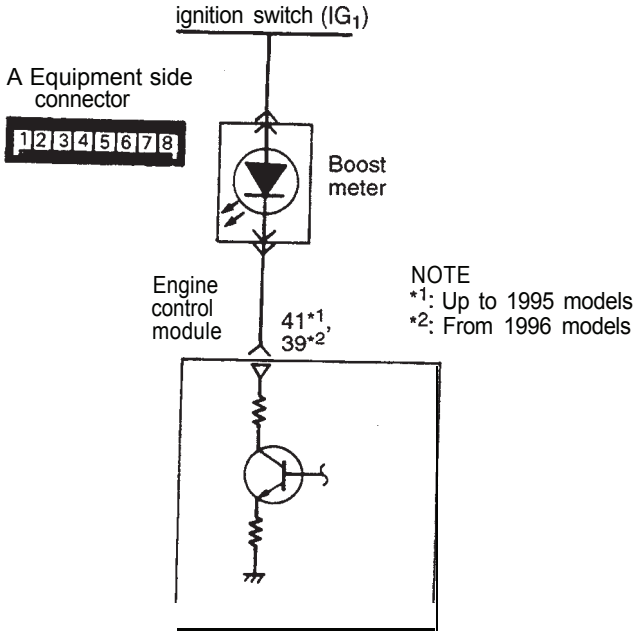
1		Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NG → Repair the harness. (A1 – MFI relay)
2		Check for an open-circuit, or a short-circuit to ground, between the turbocharger waste gate solenoid and the engine control module. • Turbocharger waste gate solenoid connector: Disconnected • Engine control module connector: Disconnected	OK → A STOP NG → Repair the harness. (A2–32)

ACTUATOR INSPECTION

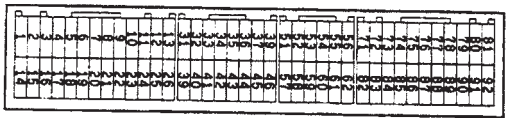
Refer to GROUP 15.

BOOST METER <Turbo>



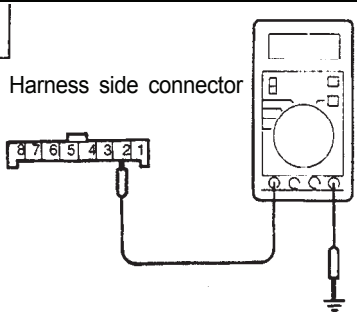


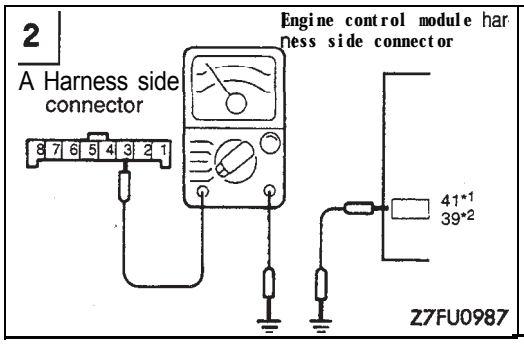
Engine control module connector



7FU1652

HARNESS INSPECTION

1 	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → **2** NG → Repair the harness. (A2 – Ignition coil [IG])

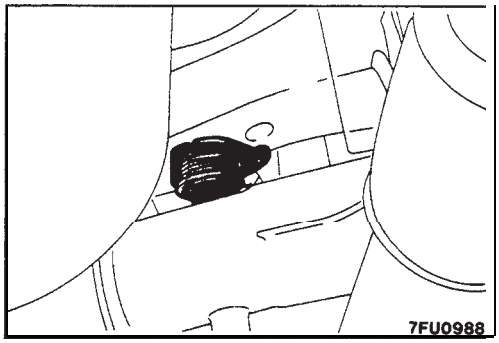
2  	Check for an open-circuit or a short-circuit to ground, between the engine control module and the boost meter. • Boost meter connector: Disconnected • Engine control module connector: Disconnected	OK → STOP NG → Repair the harness. (A3–41*1, 39*2)

NOTE
*1: Up to 1995 models
*2: From 1996 models

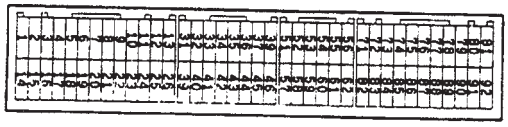
ACTUATOR INSPECTION

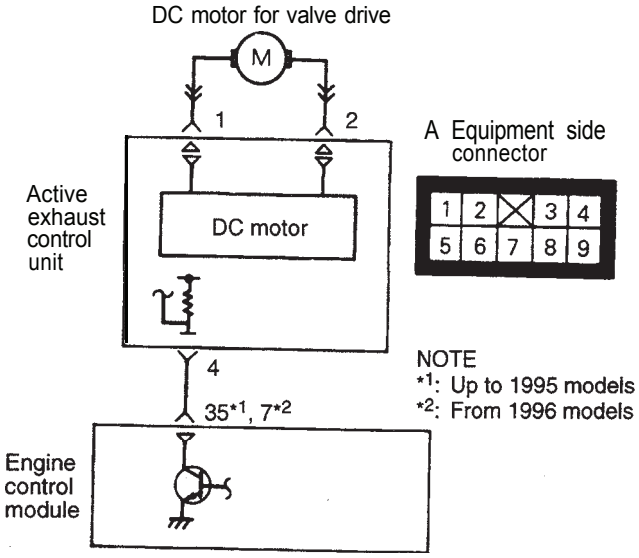
Refer to GROUP 54.

ACTIVE EXHAUST CONTROL UNIT <Turbo>



Engine control module connector





7FU1653

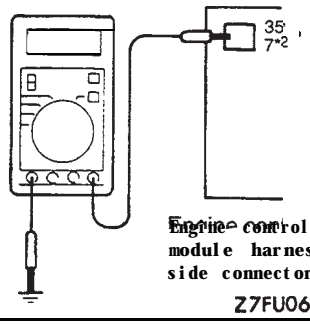
TSB Revision

OPERATION

Refer to P.13A-173.

HARNESS INSPECTION

1	Measure the input voltage of engine control module. ● Engine control module connector: Disconnected ● Ignition switch: ON **Battery voltage**	@ -	- A OK → Repair the harness. (A4–35*1, 7*2)

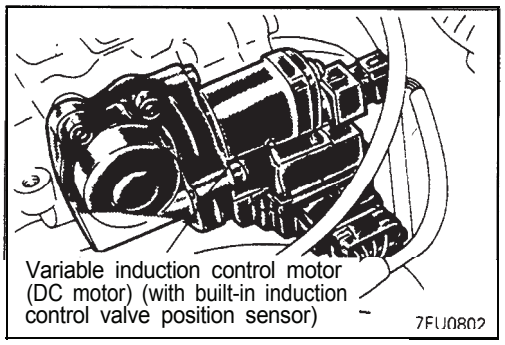


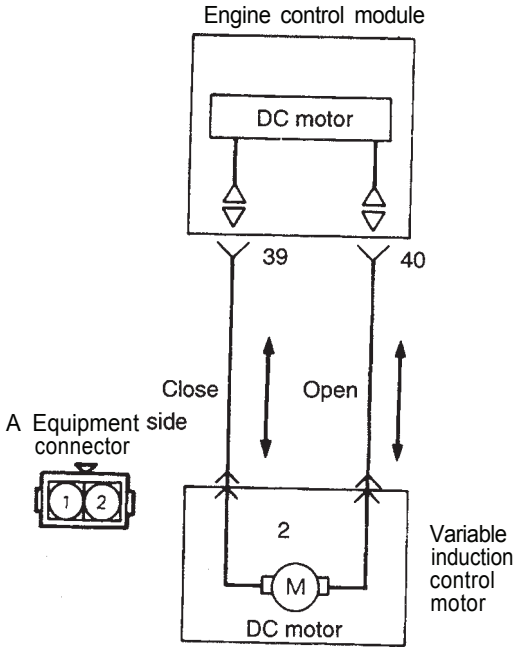
NOTE
*1: Up to 1995 models
*2: From 1996 models

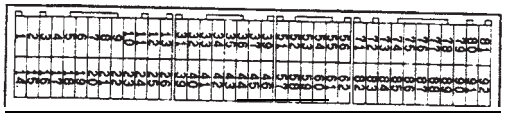
ACTUATOR INSPECTION

Refer to GROUP 15.

VARIABLE INDUCTION CONTROL MOTOR (DC MOTOR) <Non Turbo>







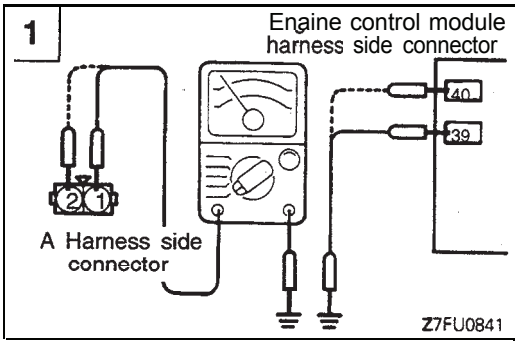
OPERATION

Refer to P.13A-174.

INSPECTION

Refer to P.13A-174.

HARNESS INSPECTION

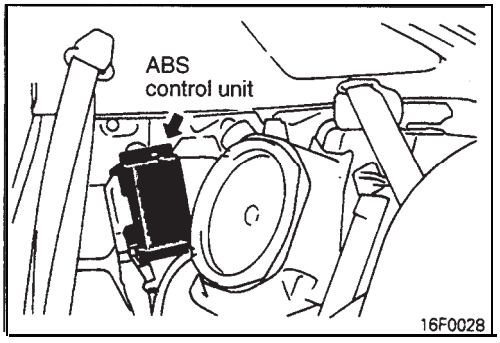
1 	Check for an open-circuit or a short-circuit to ground, between the engine control module and the variable induction control motor connector. • Variable induction control motor connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (A1–39) (A2–40)

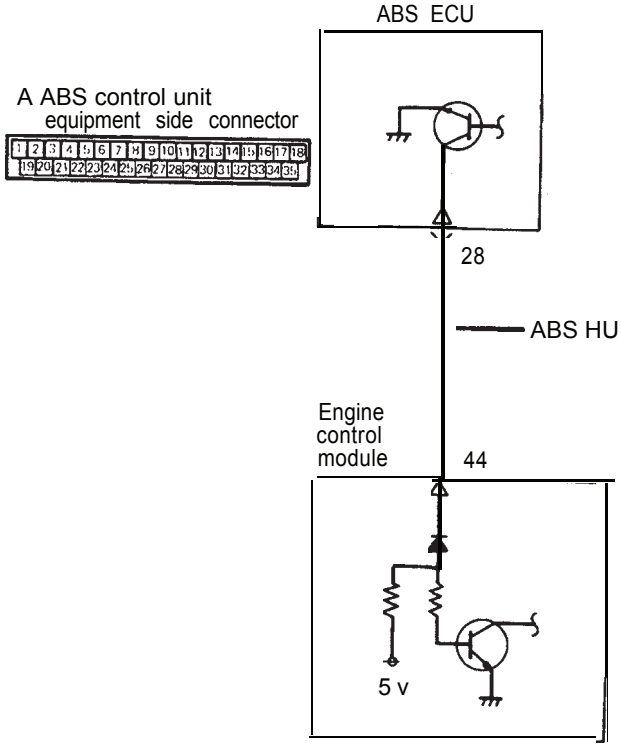
ACTUATOR INSPECTION

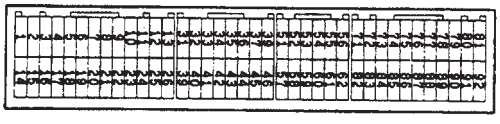
Refer to GROUP **15.**

TSB Revision

ANTI-LOCK BRAKING SIGNAL <Turbo>





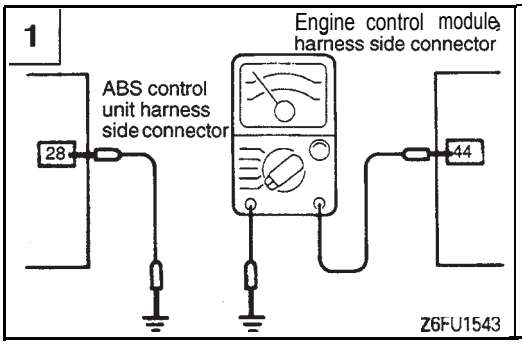


7FU1655

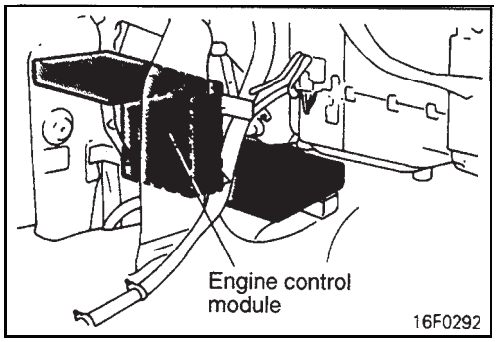
OPERATION

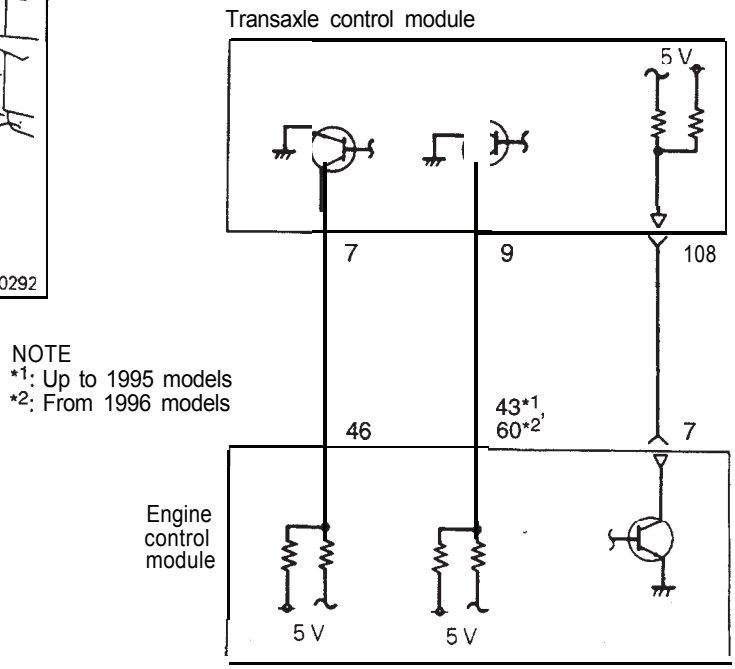
Refer to P.13A-176.

HARNESS INSPECTION

1 	Check for an open-circuit or a short-circuit to ground, between the ABS control unit and the engine control module. • ABS control unit connector: Disconnected • Engine control module connector: Disconnected	@ - - A OK →	Repair the harness. (A28–44)

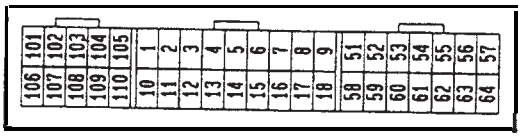
ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <A/T>





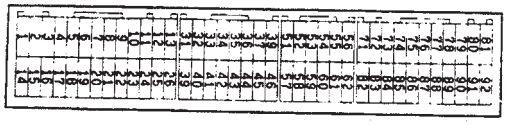
Z7FU0843

A Transaxle control module connector



Z7FU0903

Engine control module connector



Z9FU0393

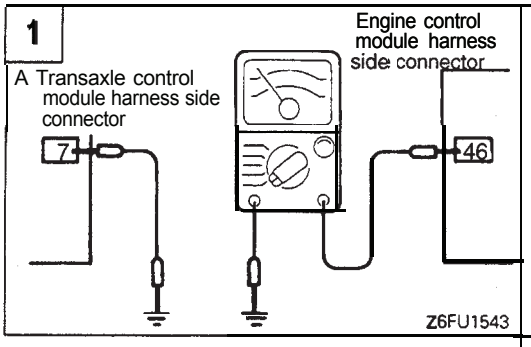
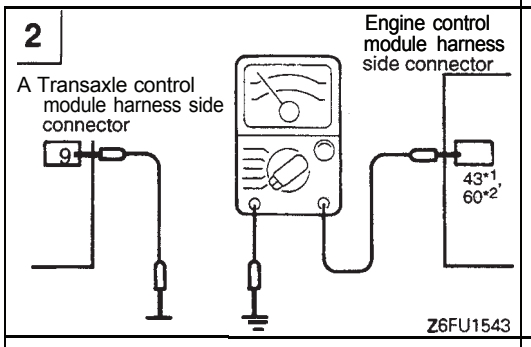
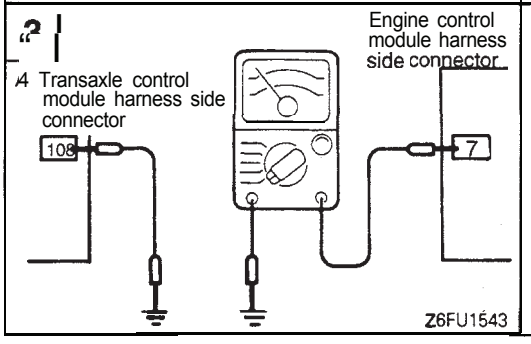
7FU1656

OPERATION

Refer to P.13A-177

TSB Revision

HARNESS INSPECTION

1 	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	2
		NG →	Repair the harness. (A7–46)
2 	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	3
		NG →	Repair the harness. (A9–43*1, 60*2)
3 	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (AI 08-7)

NOTE
*1: Up to 1995 models
● 2: From 1996 models

RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

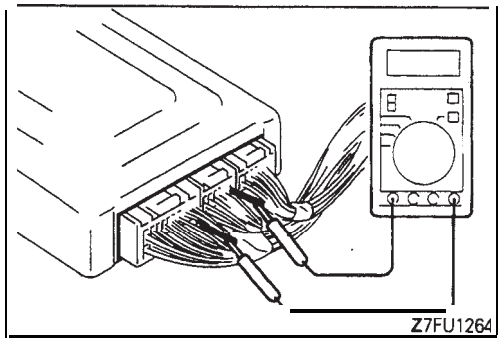
Refer to P.13A-179.

FUEL PUMP OPERATION CHECK

Refer to P.13A-179.

FUEL PRESSURE TEST

Refer to P.13A-180.



ENGINE CONTROL MODULE (ECM) TERMINAL VOLTAGE INSPECTION

(1) Connect a very thin wire probe (such as a paper clip) to the probe of the voltmeter.
(2) Insert the very thin probe from the wire side into contact with each of the terminals of the ECM connector and check the voltage, while referring to the check chart.

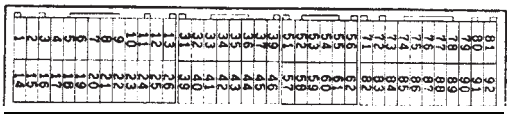
NOTE
1. Measure a voltage with the ECM connector connected.
2. Measure the voltage between each terminal and the No. 26 terminal (ground terminal).
3. Withdraw the ECM for easier access to the connector terminals.
4. The inspection need not be performed in the order of the chart.

Caution
Short-circuiting the positive (+) probe between a connector terminal and ground could cause damage to the vehicle wiring, sensors or ECM, or all of them. Use care to prevent it!

(3) If the voltmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
(4) After repair or replacement, recheck with the voltmeter to confirm that the problem has cleared completely.

TERMINAL VOLTAGE CHECK CHART

Engine Control Module Connector Terminal Configuration



Z9FU0393

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
80	Back-up power supply	Ignition switch: OFF	B+	–
12	power supply	Ignition switch: ON	B+	–
25				
82	Ignition switch: IG	Ignition switch: ON	B+	–
38	MFI relay (power supply)	Ignition switch: OFF	B+	–
		Ignition switch: ON	0–3 V	
8	MFI relay (fuel pump)	Ignition switch: ON	B+	–
		Engine: Idle	0–3 V	
81	Sensor impressed voltage	Ignition switch: ON	4.5–5.5 V	–

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
90	Volume air flow sensor	Engine: Idle		2.2-3.2 V	–
		Engine: 2,000 rpm			
19	Volume air flow sensor reset signal	Engine: Idle		o-1 v	–
		Engine: 3,000 rpm		6-9 V	
72	Intake air temperature sensor	ignition switch: ON	When intake temperature is 0°C (32°F)	3.2-3.8 V	–
			When intake temperature is 20°C (68°F)	2.3-2.9 V	
			When intake temperature is 40°C (104°F)	1.5-2.1 V	–
			When intake temperature is 80°C (176°F)	0- 10 V	
85	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m (0 ft.)	3.7-4.3 V	–
			When altitude is 1,200 m (3,937 ft.)	3.2-3.8 V	
83	Water temperature sensor	Ignition switch: ON	When water temperature is 0°C (32°F)	3.2-3.8 V	–
			When water temperature is 20°C (68°F)	2.3-2.9 V	
			When water temperature is 40°C (104°F)	1.3–1.9 V	–
			When water temperature is 80°C (176°F)	0.3-0.9 V	
84	Throttle position sensor	Ignition-switch: Kept in ON state for more than 15 seconds	Idle	0.3–1.0 v	–
			Wide open throttle	4.5-5.5 v	
87	Closed throttle position switch	Ignition switch: ON	Throttle valve placed in idle position	O-I V	–
			Throttle valve placed in slightly opened position	4 V or more	
88	Camshaft position sensor	Engine: Cranked		0.2-3.0 V	–
		Engine: Idle			
89	Crankshaft position sensor	Engine: Cranked		0.2-3.0 V	–
		Engine: Idle			
71	Ignition Switch – ST	Engine: Cranked		8 V or more	M/T
91	Park/Neutral position switch	Ignition switch: ON	Selector lever set to P or N	o-3 v	A/T
			Selector lever set to D, 2, L or R	8-14 V	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
86	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5 V (Changes repeated)	–
37	Power steering pressure switch	Engine: Idle, warm	Steering wheel placed in neutral (straight ahead) position	B+	
			Steering wheel turned half a turn	O-3 V	
45	Air conditioning switch 1	Engine: Idle	Air conditioning switch set to OFF	O-3 V	
			Air conditioning switch set to ON (Air conditioning compressor in driven state)	B+	
59 <Turbo, Non-Turbo up to 1995 models> 61 <Non-Turbo From 1996 models>	Air conditioning switch 2	Engine: Idle	Air conditioning switch set to OFF	O-3 V	
			• Air conditioning switch set to ON • Indoor set temperature brought closer to atmospheric temperature	B+	
22	Air conditioning relay	• Engine: Idle • Air conditioning switch: OFF → ON (Air compressor in driven state)		B+ or 6 V or more for a moment → O-3 V	–
21	Fan motor relay (Lo)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	–
		Radiator fan operating at low speeds [Coolant temperature: 95–105°C (203-221 °F)]		o-3 v	
20	Fan motor relay (Hi)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	
		Radiator fan operating at high speeds [Coolant temperature: above 105°C (221 °F)]		o-3 v	
24 <Up to 1995 models> 58 <From 1996 models>	Electric load switch	Engine: Running at idle	Lighting switch set to OFF	o-3 v	
			Lighting switch set to ON	B+	
75 76	Heated oxygen sensor(front)	Engine: Warm, 2,000 rpm (Check using a digital type voltmeter.)		0 ↔ 0.8 V (Changes repeatedly)	–

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
60 <Up to 1995 models> 73, 79 <From 1996 models>	Heated oxygen sensor (rear)	• Transaxle: 2nd gear <M/T>, L range <A/T> • Drive with wide open throttle • Engine 3,500 rpm or more	0.6–1.0 V	<California, Federal - from 1996 models>
1	No. 1 injector	Engine: Running at idle after warmup, and accelerated abruptly by depressing accelerator pedal	Falls temporarily a little from 11-14 V.	–
14	No. 2 injector			
2	No. 3 injector			
15	No. 4 injector			
3	No. 5 injector			
16	No. 6 injector			
4	Stepper motor coil <AI>	Engine: Warm Check immediately after hot restart.	B+ ↔ 0–3 V (Changed repeated)	–
17	Stepper motor coil <A2>			
5	Stepper motor coil <B1>			
18	Stepper motor coil <B2>			
10	Ignition power transistor unit A	Engine speed: 3,000 rpm	0.3-3 v	–
23	Ignition power transistor unit B			
11	Ignition power transistor unit C			
9	Evaporative emission purge solenoid	Ignition switch: ON	B+	
		Engine: Warm, 3,000 rpm	o-3 v	
7 cup to 1995 models> 40 <From 1996 models>	Fuel pressure solenoid	Ignition switch: ON	B+	Turbo
		Engine: From cranking to idling (within approx. 2 minutes)	O-3 V → B+	
32	Turbocharger waste gate solenoid	Ignition switch: ON	B+	Turbo
		Engine: Idle (when the premium gasoline is used)	O-3 V	
41 <Up to 1995 models> 39 <From 1996 models>	Turbo meter	Ignition switch: ON	4-13 v	Turbo
		Engine: Depress the accelerator pedal abruptly while the engine is idling	Falls temporarily from B+	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
31	Fuel pump relay 2	Engine: Depress the accelerator pedal abruptly while the engine is idling		Rises temporarily from 0–3 V	Turbo
58 <Up to 1995 models> 51 <From 1996 models>	Engine ignition signal	Engine: 3,000 rpm		0.3–3 V	–
35 <Up to 1995 models> 7 <From 1996 models>	Valve opened or closed indication signal	Muffler mode change-over switch: ON	Engine: Idle	0–3 V	Turbo
			Engine: 4,500 rpm	B+	
34 <Up to 1995 models> 61 <From 1996 models>	Muffler mode change-over switch	Ignition switch: ON	Changeover switch set to ON (TOUR)	O-3 V	Turbo
			Changeover switch set to OFF (SPORT)	B+	
52	Ignition timing adjustment terminal	Ignition switch: ON	Ignition timing adjustment terminal connected to ground	O-I V	–
			Ignition timing adjustment terminal disconnected from ground	4.0-5.5 V	
36	Check engine/malfunction indicator lamp	Ignition switch: OFF → ON		0–3 V → 9-13 v (Several seconds later)	–
6	EGR solenoid	Ignition switch: ON		B+	<up to 1995: California – Non Turbo, Turbo> <From 1996: All models>
		Engine: Idle Suddenly depress the accelerator pedal		Falls temporarily from B+.	
73 <Up to 1995 models>	EGR temperature sensor	Ignition switch: ON	When sensor temperature is 50°C (122°F)	3.6-4.4 V	California, Federal – Turbo
			When sensor temperature is 100°C (212°F)	2.2-3.0 V	
74, 77 <Up to 1995 models> 34, 35, 42, 43 <From 1996 models>	Oxygen sensor heater	Engine: Idle, warm		o-3 v	<Up to 1995: California – Non Turbo> <From 1996: All models>
		Engine: 5,000 rpm		B+	

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Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
41 <Up to 1995 models> 54 <From 1996 models>	Induction control valve position sensor No. 1	Ignition switch: ON	O-l V or 4.5-5.5 v	Non Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm	O-l V or 4.5-5.5 v → 1.5–4 v (for a moment)	
33 <Up to 1995 models> 55 <From 1996 models>	Induction control valve position sensor No. 2	Ignition switch: ON	O-l V or 4.5-5.5 v	Non-Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm	O-l V or 4.5-5.5 v → 1.5-4 v (for a moment)	
40	Induction control valve (Opened)	Engine: Slowly accelerated from idling speed to 5,000 rpm	O-l V → 4 V or more (for a moment)	Non Turbo
39	Induction control valve (Closed)	Engine: Slowly decelerated from 5,000 rpm to idling speed		
44	Anti-lock braking signal	Engine: Idle	B+	Turbo
		• When vehicle is put in motion for the first time after the ignition switch was placed in ON position • Vehicle speed: 0 → 10 km/h (0 → 0.6 mph)	B+ → O-3 V (for a moment)	
46	Total control "Reduce torque" request signal 1	Engine: Idle	4.5-5.5 v	A/T
		Engine: Running at idle after warmup and changing speeds	O-l V	
43 <Up to 1995 models> 60 <From 1996 models>	Total control "Reduce torque" request signal 2	Engine: Idle	o-1 v	A/T
		Engine: Running at idle after warmup and changing speeds	l-5.5 V	
7	Total control "Reduce torque" execution signal	Engine: Running at idle with coolant temperature at 50°C (122°F) or lower	O-l V	A/T
		Engine: idle, warm	1–4 V	
74	Manifold differential pressure senosr	Engine: Idle	0.8-2.4 V	A/T
		• Engine: Idle • Suddenly depress the accelerator pedal.	Voltage rises temporarily from 0.8-2.4 V	