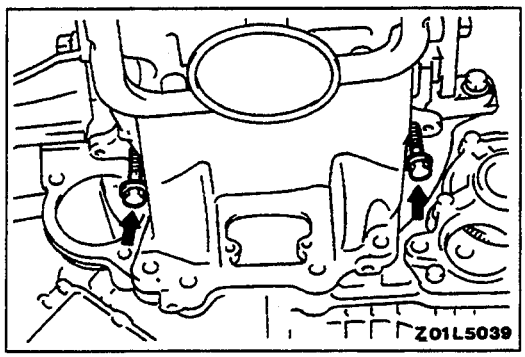


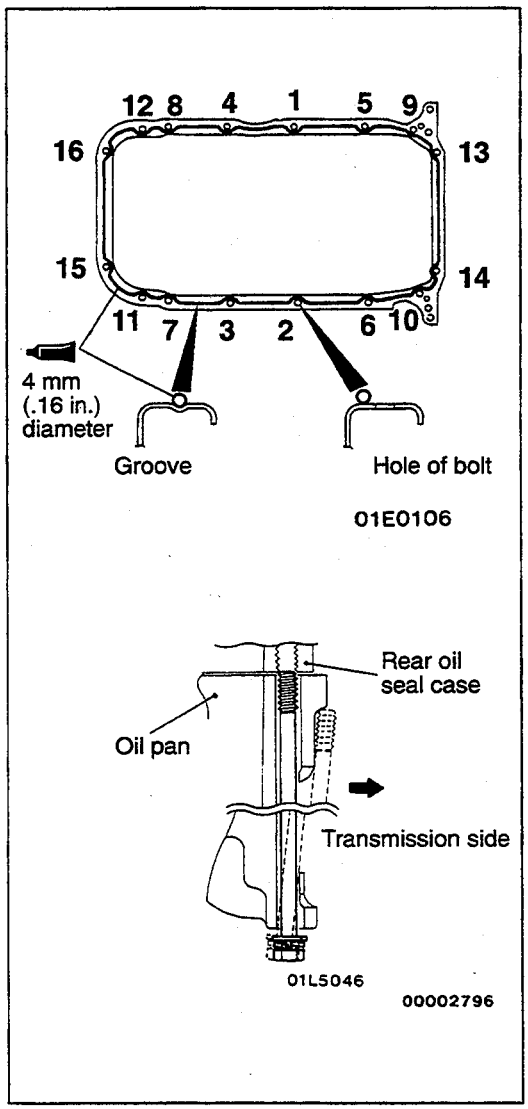

## REMOVAL SERVICE POINT

### ◀A▶ OIL PAN, UPPER REMOVAL

Install a bolt [diameter × length: 10 × 38 mm (.39 × 1.50 in.)] to link the oil pan, upper with the transaxle in the hole of the oil pan, upper as shown in the illustration, and then tighten the bolt to remove the oil pan, upper.

## INSPECTION

- Check the oil pan for cracks.
- Check the sealant-coated surface of the oil pan for damage and deformation.




## INSTALLATION SERVICE POINT

### ▶A◀ OIL PAN, UPPER INSTALLATION

(1) Remove the sealant from the oil pan and cylinder block mating surfaces.
(2) Degrease the sealant-coated surface and the engine mating surface.
(3) Apply specified sealant around the gasket surface of the oil pan as shown in the illustration.

**Specified sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent**

NOTE
The sealant should be applied in a continuous bead approximately 4 mm (.16 in.) in diameter.

(4) Install the oil pan to the cylinder block within 30 minutes after applying the sealant.
(5) Tighten the oil pan mounting bolts in the order shown in the illustration at left.

**Caution**
**The bolt holes for bolts 13 and 14 in the illustration are cut away on the transmission side, so be careful not to insert these bolts at an angle.**

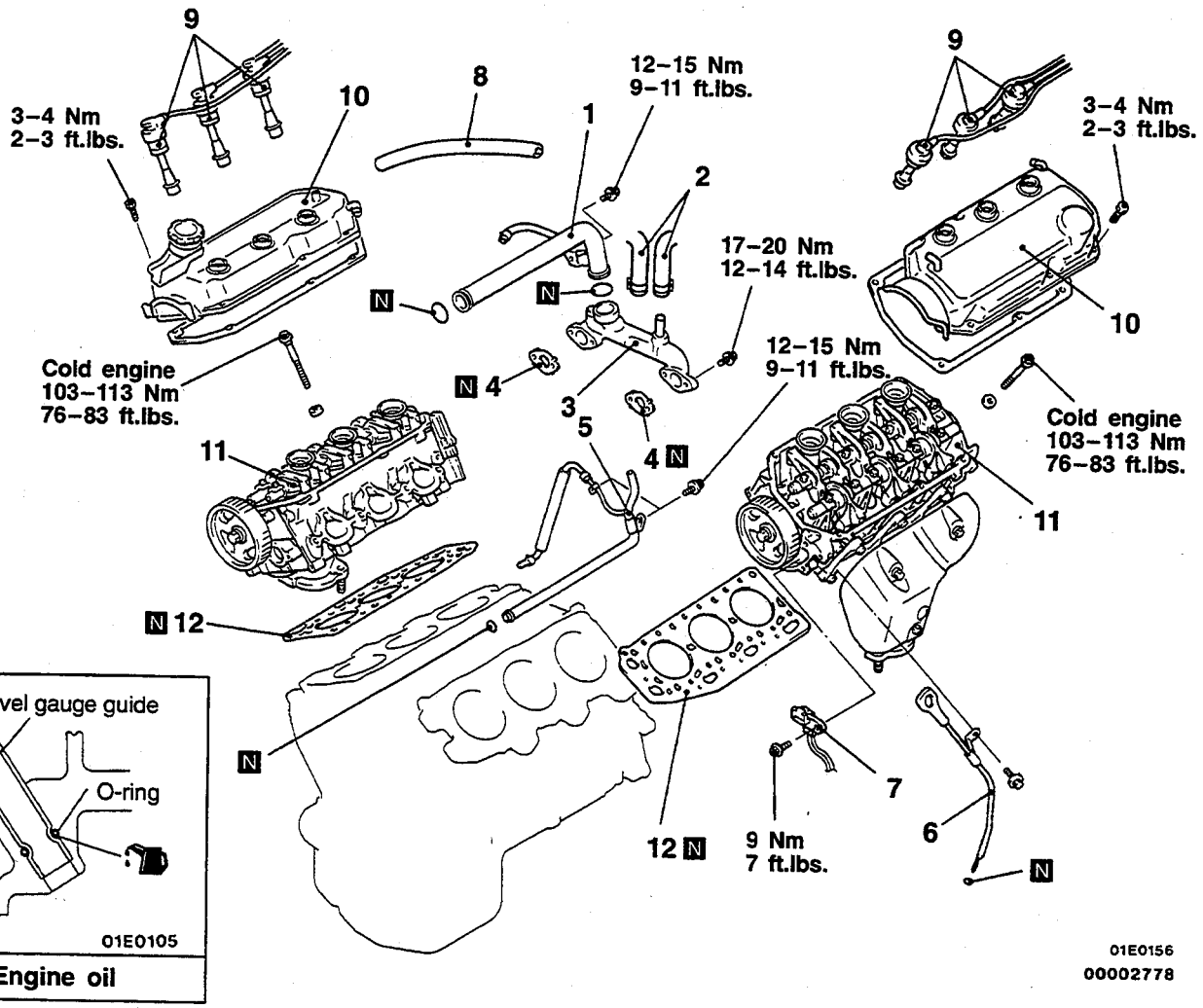
**TSB Revision**

# CYLINDER HEAD GASKET

110005703

## REMOVAL AND INSTALLATION

**Pre-removal and Post-installation Operation**
- Engine Coolant Draining and Supplying (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal and Installation of Timing Belt (Refer to P.11A-58.)
- Removal and Installation of intake Manifold (Refer to GROUP 15 – Intake Manifold.)







Engine oil

**Removal steps**

▶C◀ 1. Water outlet pipe
2. Heater hose
▶D◀ 3. Water passage
▶D◀ 4. Gasket
▶C◀ 5. Water pipe and hose assembly
6. Oil level gage guide <Only left bank is removed>
7. Camshaft position sensor <Only left bank is removed>
8. Ventilation hose
9. Spark plug cable
10. Rocker cover
◀A▶ ▶B◀ 11. Cylinder head assembly
▶A◀ 12. Cylinder head gasket

TSB Revision

## SERVICE SPECIFICATIONS

110005766

| Items | | Specifications |
|---|---|---|
| Basic ignition timing | | 5°±2° BTDC at curb idle <SOHC-12 valve engine><br>5°±3° BTDC at curb idle <DOHC, SOHC-24 valve engine> |
| Curb idle speed rpm | | 700±100 |
| Idle speed when air conditioning ON rpm | | 900 in neutral |
| Basic idle speed rpm | | 700±50 |
| Throttle position sensor adjusting voltage mV | | 400–1,000 |
| Throttle position sensor resistance kΩ | | 3.5–6.5 |
| Idle air control motor coil resistance Ω | | 28–33 [at 20°C (68 °F)] |
| Intake air temperature sensor resistance kΩ | | 2.7 [at 20°C (68 °F)] |
| Engine coolant temperature sensor resistance kΩ | 20°C (68 °F) | 2.4 |
| | 80°C (176 °F) | 0.3 |
| Heated oxygen sensor output voltage V | | 0.6–1.0 |
| Fuel pressure kPa (psi) | Vacuum hose disconnection | 330–350 (47–50) at curb idle |
| | Vacuum hose connection | Approx. 270 (38) at curb idle |
| Injector coil resistance Ω | | 13–16 [at 20°C (68 °F)] |
| Evaporative emission purge solenoid coil resistance Ω | | 36–44 [at 20°C (68 °F)] |
| EGR solenoid coil resistance Ω | | 36–44 [at 20°C (68 °F)] |
| Variable induction control solenoid coil resistance Ω | | 36–44 [at 20°C (68 °F)] |

## SEALANT

110005767

| Items | Specified sealant |
|---|---|
| Engine coolant temperature sensor threaded portion | 3M Nut Locking Part No. 4171 or equivalent |

## SPECIAL TOOLS

110005768

| Tool | Tool Number and tool name | Supersession | Application |
|---|---|---|---|
|  | MB991341 Scan Tool (Multi-Use Tester <MUT>) | MB991341C | Up to 1993 models<br>• Reading of diagnostic trouble codes<br>• Multiport fuel injection (MFI) system inspection |
|  | ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.) | | |

**TSB Revision**

## READING OF DIAGNOSTIC TROUBLE CODES

110005775

### Precautions for Operation

(1) When battery positive voltage is low, no detection of failure is possible. Be sure to check the battery for voltage and other conditions before starting the test.
(2) Diagnostic items are erased if the battery or the engine control module connector is disconnected. Do not disconnect the battery before the diagnostic result is completely read.
(3) Be sure to connect or disconnect the scan tool with the ignition switch turned off. If the scan tool is disconnected while the ignition switch is at the ON position, an ABS diagnostic trouble code may be stored and the ABS warning lamp may thus illuminate.

**WHEN USING THE SCAN TOOL [MULTI-USE TESTER (MUT) <Up to 1993 model> OR SCAN TOOL (MUT-II) <All model>]**

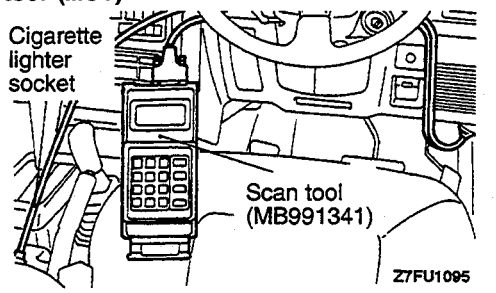
**Caution**
**Connection and disconnection of the scan tool should always be made with the ignition switch in the OFF position.**

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

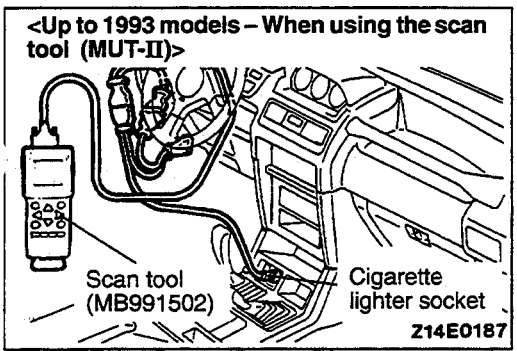
NOTE
When connecting the scan tool to vehicles built before 1993, use the adaptor harness which is supplied as an accessory to the scan tool sub-assembly.

(2) Turn the ignition switch to ON.
(3) Take a reading of the diagnostic output.
(4) Repair the problem location while referring to the diagnostic chart.
(5) After turning the ignition switch once to OFF, turn it back to ON.
(6) Erase the diagnostic trouble code.
(7) Check again that the condition is normal.

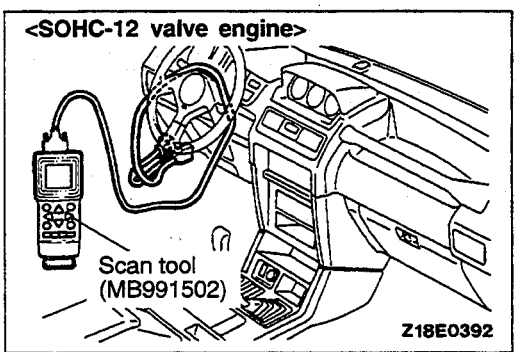
<Up to 1993 models – When using the scan tool (MUT)>



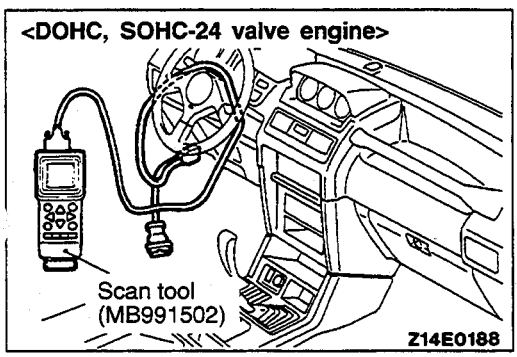

<Up to 1993 models – When using the scan tool (MUT-II)>




<SOHC-12 valve engine>




<DOHC, SOHC-24 valve engine>

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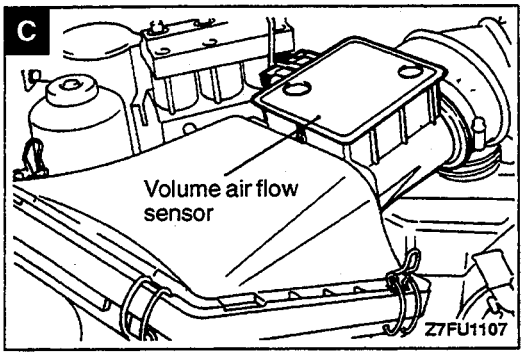
C

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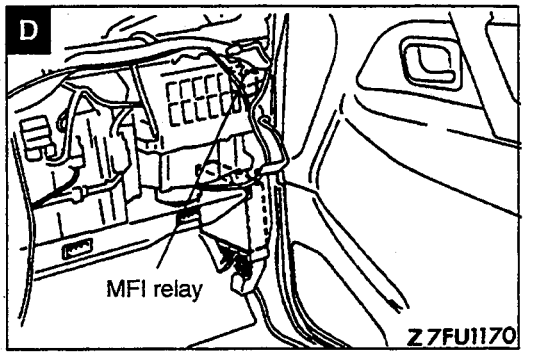


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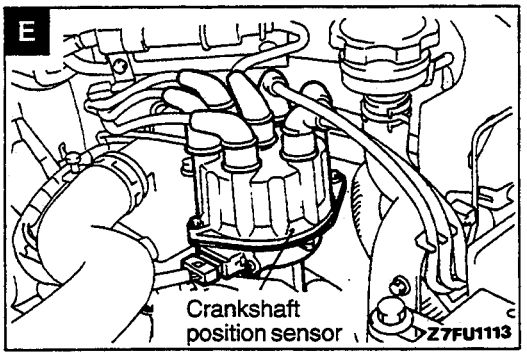


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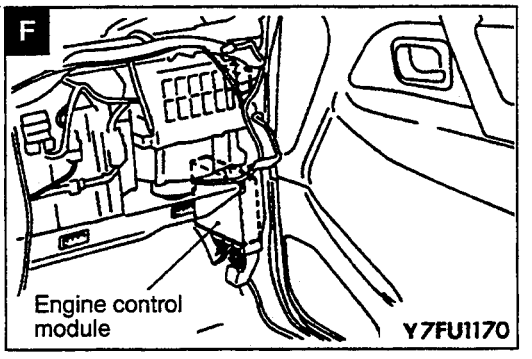


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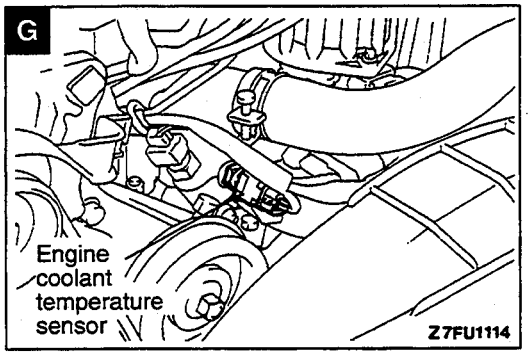


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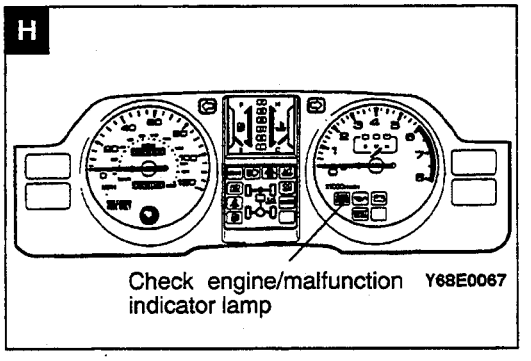


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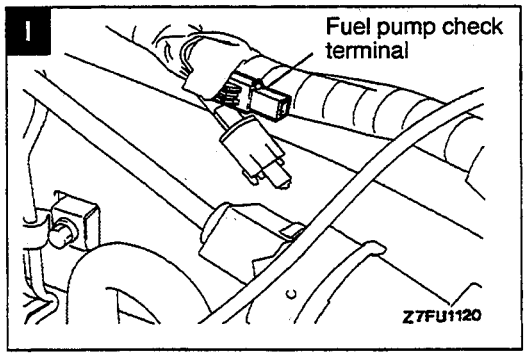


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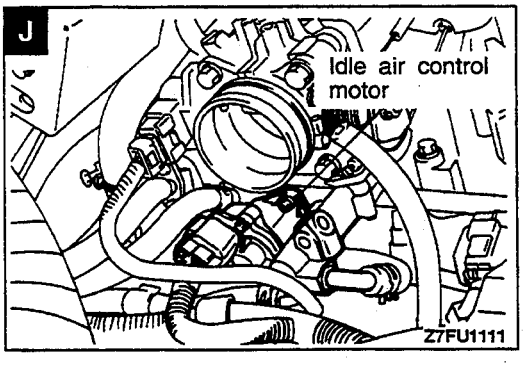


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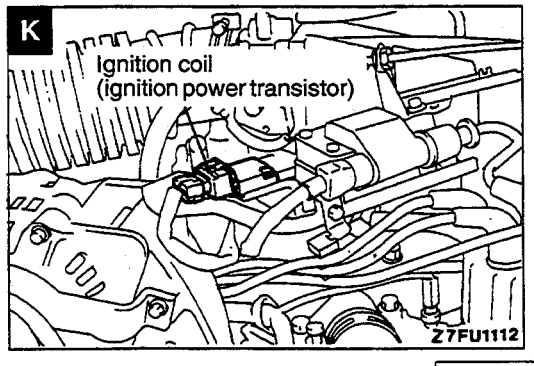


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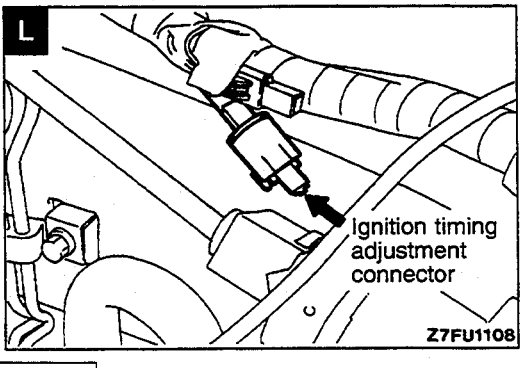
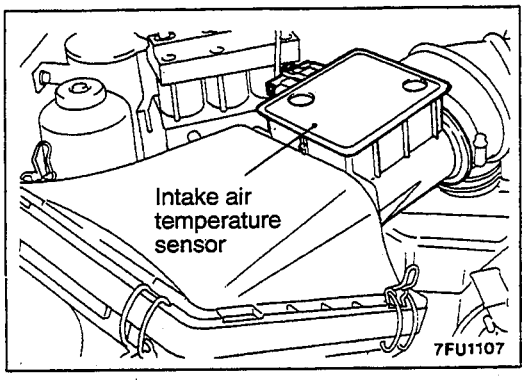
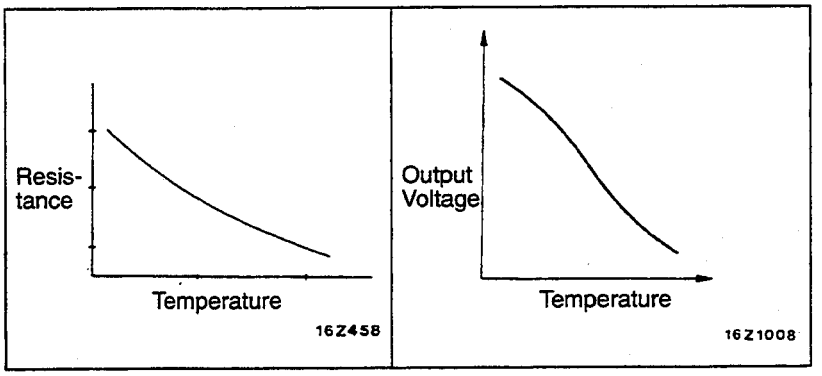


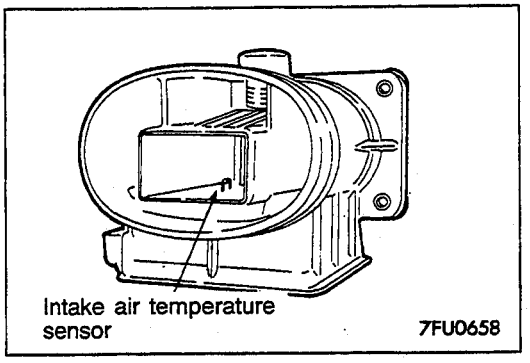

TSB Revision

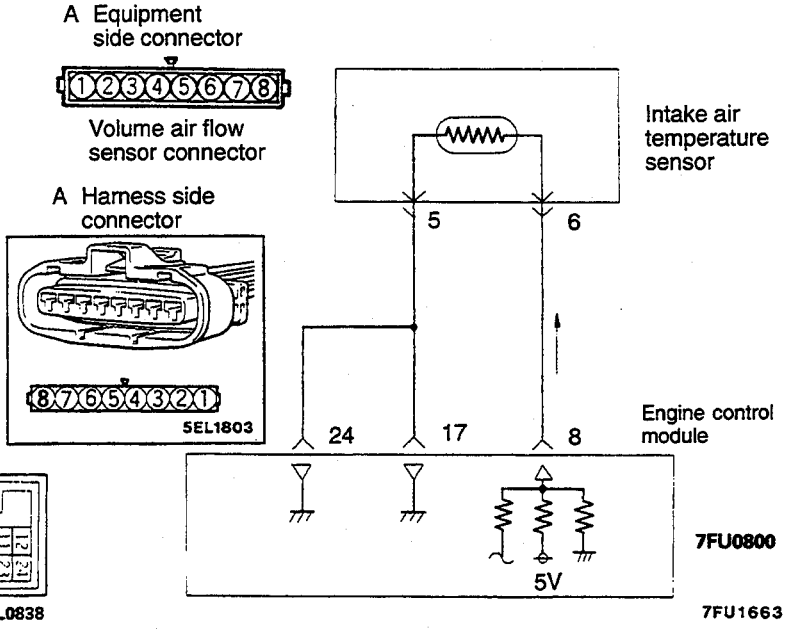
## INTAKE AIR TEMPERATURE SENSOR

110005788

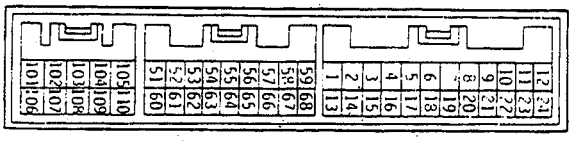



Engine control module connector




### OPERATION

- The intake air temperature sensor functions to convert the temperature of the air drawn into the engine to a voltage, and to input that voltage as a signal to the engine control module. The engine control module, based upon those signals, then corrects the amount to fuel injection, etc.
- The 5 V power supply within the engine control module is supplied, by way of the resistance within the unit, to the intake air temperature sensor, it passes through the intake air temperature sensor, which is a type of resistor, and is grounded as the engine control module. Note that the resistance of the intake air temperature sensor decreases when the temperature of the intake air increases.
- The intake air temperature sensor terminal voltage becomes higher when the resistance of the intake air temperature sensor increases, and becomes lower when the resistance decreases. Consequently, the intake air temperature sensor terminal voltage varies in accordance with the temperature of the intake air, becoming lower when the temperature of the intake air increases.

### TROUBLESHOOTING HINTS

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

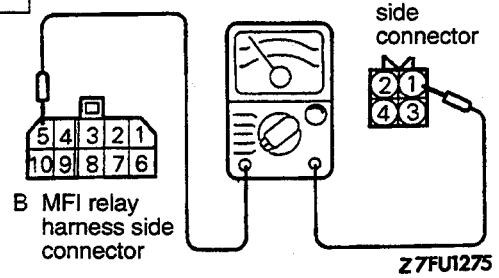
## INSPECTION

### Using Scan tool

| Function | Item No. | Data display | Check conditions | Engine condition rpm | Standard value mV |
|---|---|---|---|---|---|
| Data reading | 11 | Sensor detection voltage | • Engine: Warmed up (Make the mixture lean by engine speed reduction, and rich by racing.) | When sudden deceleration from 4,000 | 200 or lower |
| | | | | When engine is suddenly raced | 600–1,000 |
| | | | • 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 | Idling (700 rpm) | Changes repeatdly between 400 mV or lower and 600–1,000 mV |
| | | | | 2,000 | |

## HARNESS INSPECTION

**1**



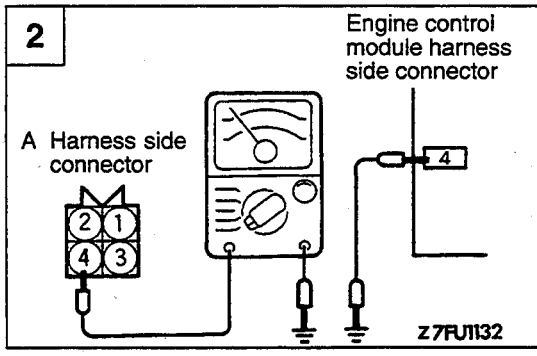

Check for continuity between the heated oxygen sensor and the MFI relay.
- MFI relay connector: Disconnected
- Heated oxygen sensor connector: Disconnected

NOTE
- Touch the ohmmeter probes to both ends of the harness.

OK → 2

NG → Repair the harness. (A1–B5)

**2**

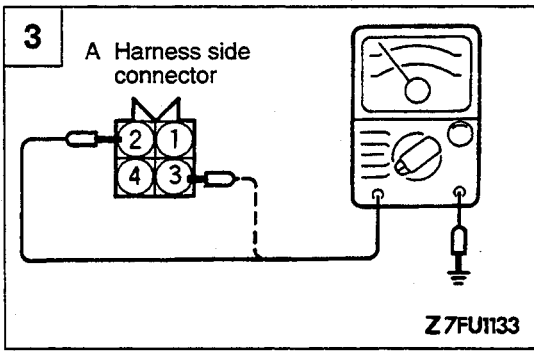



Check for an open circuit or a short-circuit to ground between the heated oxygen sensor and the engine control module.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NG → Repair the harness. (A4–4)

**3**



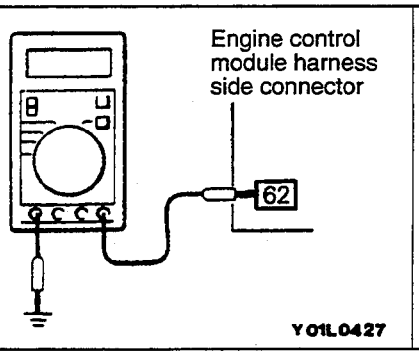

Check for continuity in the ground circuit.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → STOP

NG → Repair the harnesses. (A2–17) (A2–24) (A3 – Ground)

## HARNESS INSPECTION

**1**



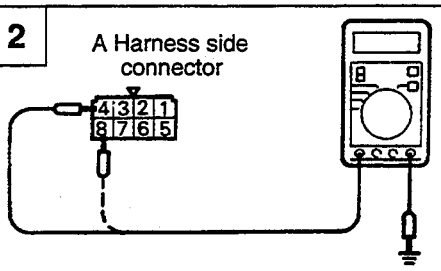

Measure the ignition switch-IG terminal input voltage.
- Engine control module connector: Disconnected

| Ignition switch | Voltage (V) |
|---|---|
| OFF | 0–1 |
| ON | B+ |

OK → 2

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

**2**



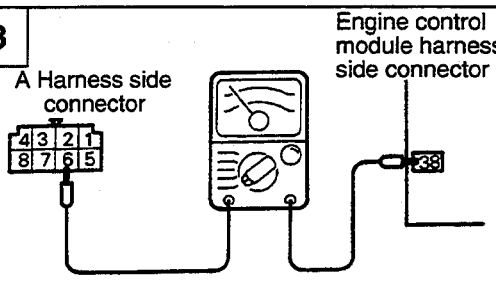

Measure the power supply voltage of the MFI relay.
- Ignition switch: OFF
- MFI relay connector: Disconnected

| Voltage (V) |
|---|
| B+ |

OK → 3

NG → Repair the harness. (A10–Battery)

**3**

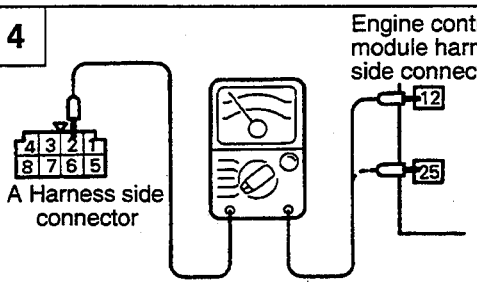



Check for an open circuit or a short-circuit to ground between the MFI relay and the engine control module.
- Engine control module connector: Disconnected
- MFI relay connector: Disconnected

OK → 4

NG → Repair the harnesses. (A8–63) (A8–66)

**4**

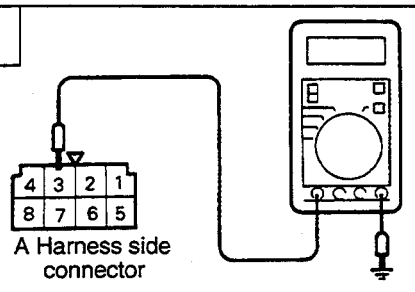



Check for an open circuit or a short-circuit to ground between the MFI relay and the engine control module.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 5

NG → Repair the harnesses. (A4–102) (A4–107)

**5**




Measure the power supply voltage of the actuator.
- MFI relay connector: Connected
- Engine control module connector: Connected

| Engine | Voltage (V) |
|---|---|
| Cranking | 8 or higher |
| Racing | B+ |

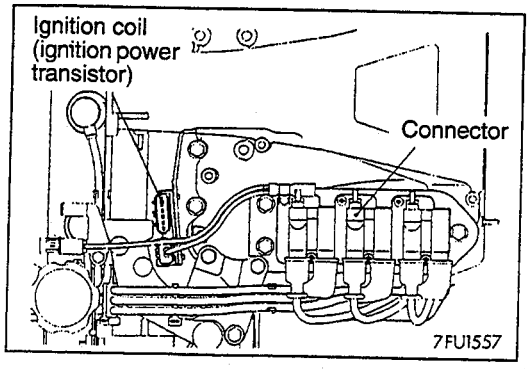
OK → STOP

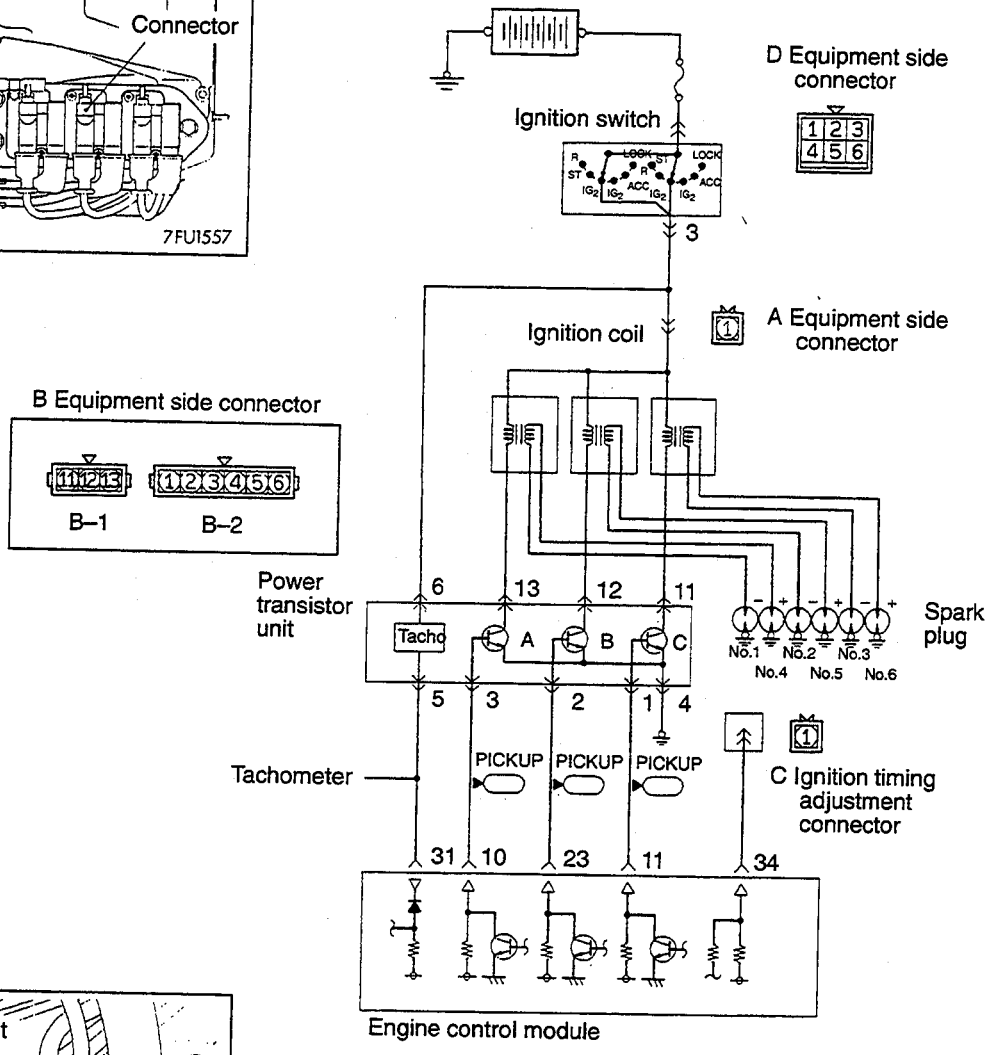
NG → MFI relay or engine control module is defective.

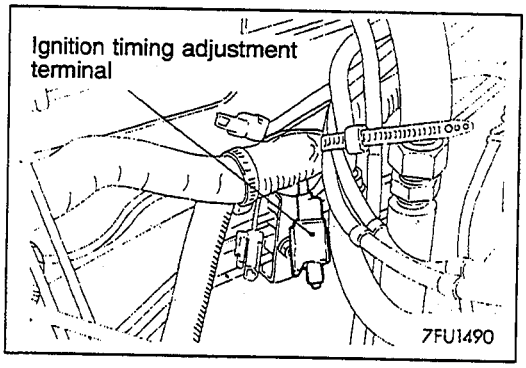
**TSB Revision**

## IGNITION COIL AND IGNITION POWER TRANSISTOR <SOHC>

110005834



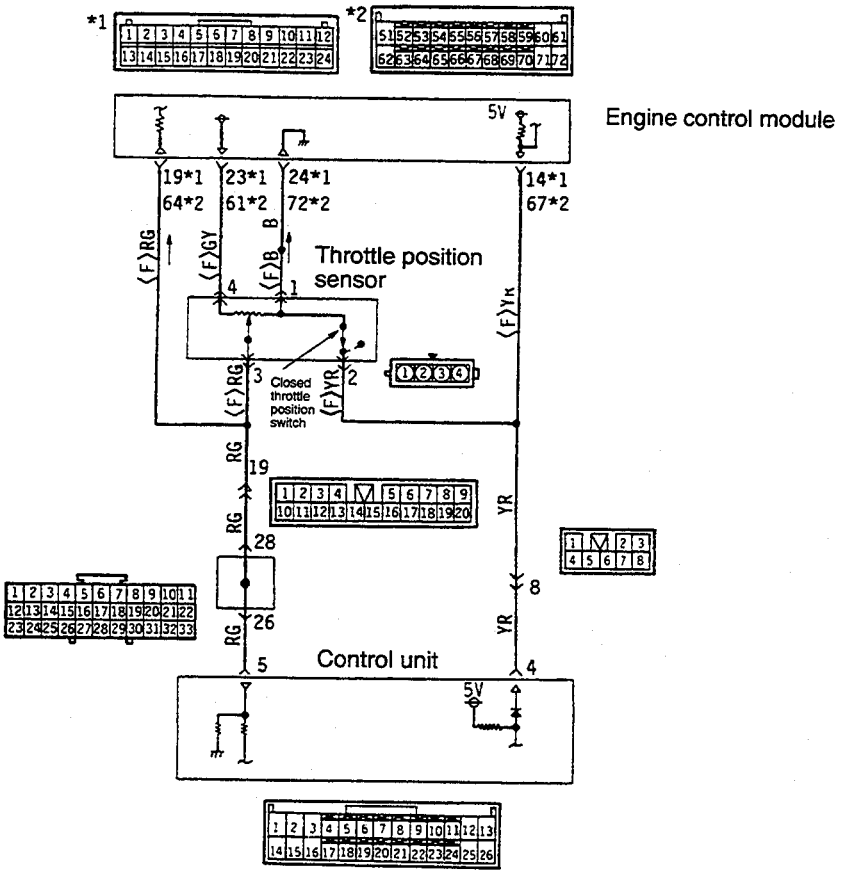




### OPERATION

- When the ignition power transistor unit A is turned on by the signal from the engine control module, primary current flows to the ignition coil A. When the ignition power transistor unit A is turned off, the primary current is shut off and a high voltage is induced in the secondary coil A, causing the ignition plugs of No. 1 and No. 4 cylinders to spark. When the ignition power transistor unit B is turned off, the ignition plugs of No. 2 and No. 5 cylinder spark. In addition, when the ignition power transistor unit C is turned off, the ignition plugs of No. 3 and No. 6 cylinders spark.
- When the engine control module turns off the transistor in the unit, the battery positive voltage in the unit is applied to the ignition power transistor unit to turn it on. When the engine control module turns on the transistor in the unit, the ignition power transistor unit is turned off.

**TSB Revision**

## 11. THROTTLE POSITION SENSOR AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECK




Remarks
*1: 3.0L ENGINE – 12 VALVE
*2: 3.0L ENGINE – 24 VALVE and 3.5L ENGINE

03E0144

### Description of operation

The throttle position sensor and closed throttle position switch are mounted in the throttle body and are sensors in the MFI system.
The throttle position sensor converts the opening position of the throttle valve to a voltage value, and inputs it to the control unit. The control unit compares this signals with the vehicle speed signal and changes the amount of actuator control accordingly. The closed throttle position switch turns ON and OFF depending on the voltage value from the throttle position sensor to compensate for fluctuations or deviations in the voltage.

### Diagnosis – No.17 (automatically canceled)

### ECU terminal voltage

| Terminal No. | Signal | Conditions | Terminal Voltage |
|---|---|---|---|
| 4 | Closed throttle position switch | When accelerator pedal is depressed | 4.5–5.5 V |
| | | When accelerator pedal is released | 0 V |
| 5 | Throttle position sensor | When accelerator pedal is fully depressed | 4.0–5.5 V |
| | | When accelerator pedal is released | 0.5–0.7 V |

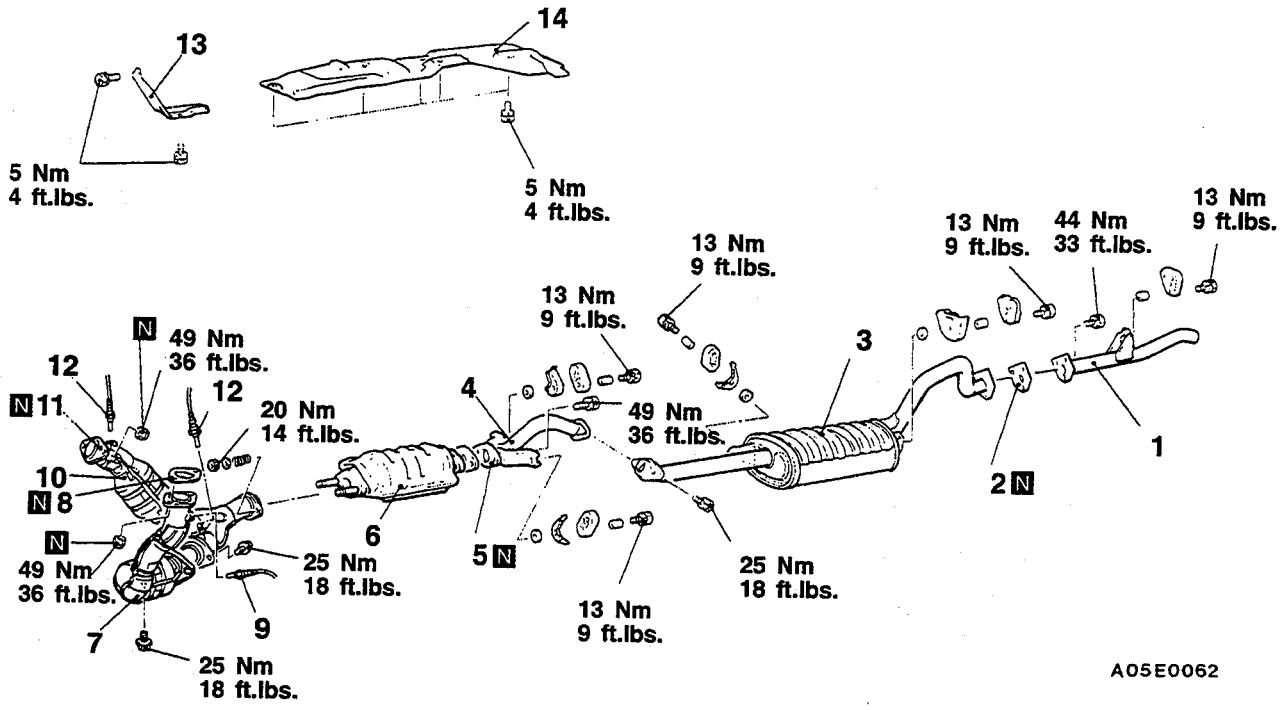
**TSB Revision**

# EXHAUST PIPE, MUFFLER AND CATALYTIC CONVERTER <3.0L-24VALVE engine For CALIFORNIA>

110005587

## REMOVAL AND INSTALLATION

**Pre-removal and Post-installation Operation**
- Under Cover Removal and Installation




**Removal steps**

1. Tail pipe
2. Gasket
3. Main muffler
4. Center exhaust pipe
5. Gasket
6. Catalytic converter
7. Left bank warm up three-way catalytic converter
8. Gasket
9. Heated oxygen sensor
10. Right bank warm up three-way catalytic converter
11. Gasket
12. Heated oxygen sensor
13. Heat protector
14. Front panel heat protector

## INSPECTION

- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers and rubber suspenders for deterioration or damage.
- Check for gas leakage from mufflers and pipes.

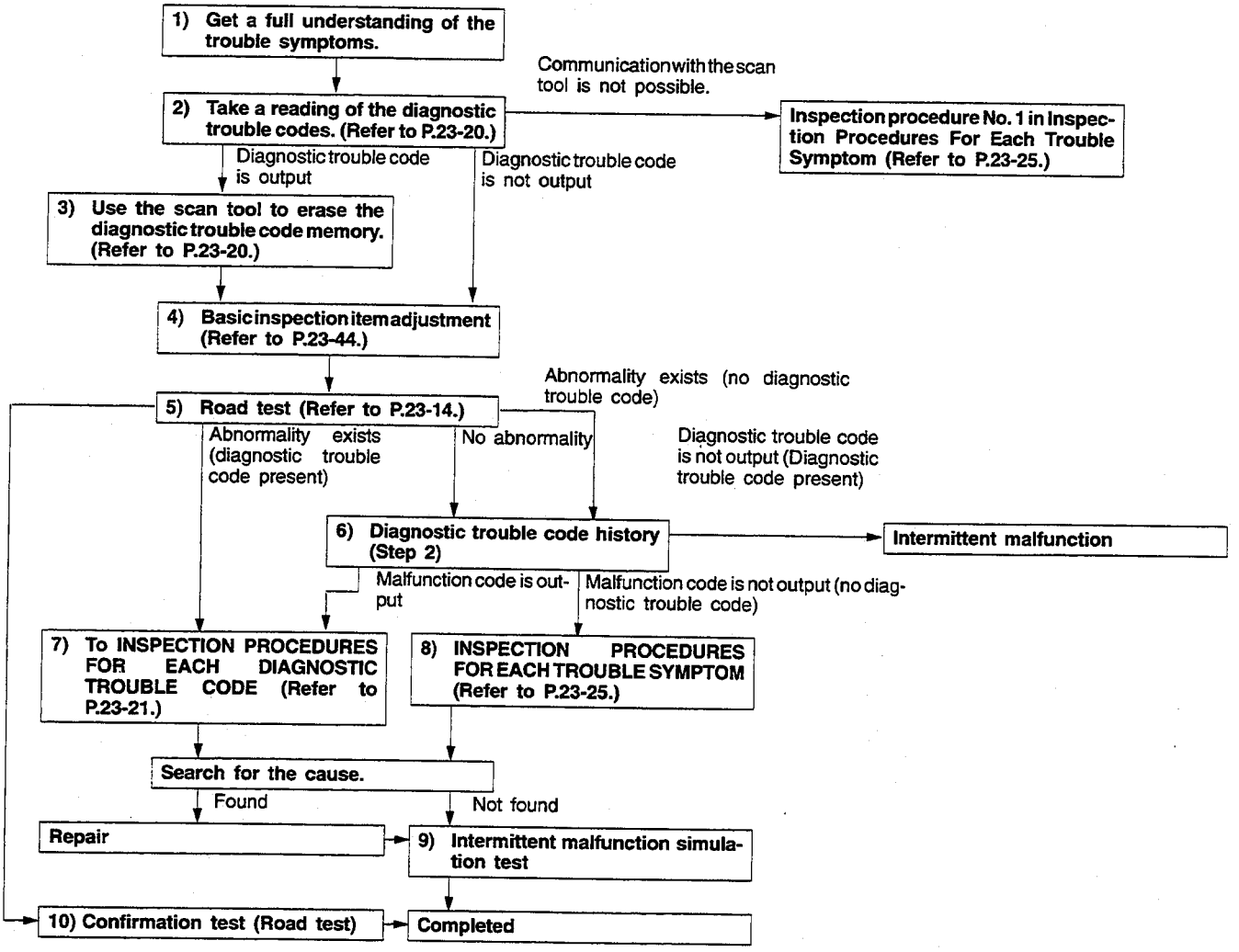
**TSB Revision**

# TROUBLESHOOTING <V4AW3>

110005399

## STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

Malfunctions of the 4 A/T system can be caused by malfunctions or incorrect adjustments of the electronic control system, hydraulic control system or A/T system or a combination of these.
Carry out troubleshooting by the following procedure in order to make effective diagnoses.




1) Get a full understanding of the conditions under which the trouble symptoms that the customer is complaining about occur, including frequency of occurrence.
2) Use the scan tool to read and make a note of the diagnostic trouble codes (including fail-safe codes). (Refer to P.23-20.)
3) Erase the diagnostic trouble codes in order to carry out a road test. (Refer to P.23-20.)
4) Carry out adjustment of the basic inspection items (ATF, TPS, park/neutral position switch, throttle cable, etc.). (Refer to P.23-44.)
5) Carry out a road test. (Refer to P.23-14.)
   Be sure to check that the basic inspection items and all diagnostic trouble codes and conditions of reoccurrence are covered during this test.
6) Check that the diagnostic trouble codes which were read before the road test (in step (2) above) are present.
7) Determine the probable cause from the Inspection Procedures For Each Diagnostic Trouble Code. (Refer to P.23-21.)
8) Determine the probable cause from the Inspection Procedures For Each Trouble Symptom. (Refer to P.23-25.)
9) Carry out a intermittent malfunction simulation test. (Refer to GENERAL – How To Use This Manual.)10) After repairs are completed, carry out a road test to check that the malfunction has been repaired.

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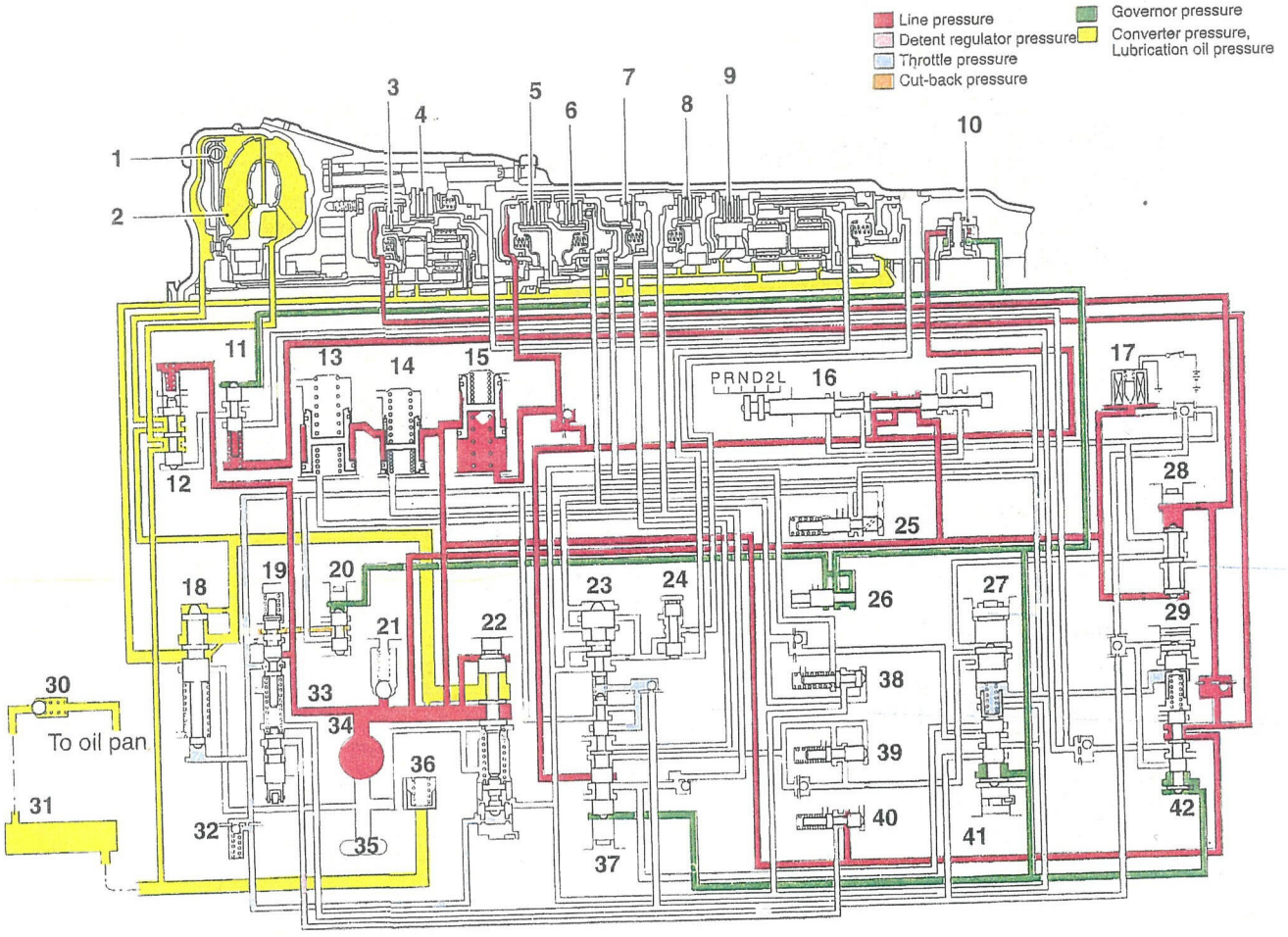
## D–1 (DRIVE 1ST)




1. Lockup clutch
2. Torque converter
3. Overdrive clutch
4. Overdrive brake
5. Forward clutch
6. Direct clutch
7. Brake No. 1
8. Brake No. 2
9. Brake No. 3
10. Governor
11. Lockup signal valve
12. Lockup relay valve
13. Accumulator B2
14. Accumulator C2
15. Accumulator C1
16. Manual valve
17. OD solenoid valve
18. Secondary regulator valve
19. Throttle valve
20. Cut back valve
21. Pressure relief valve
22. Primary regulator valve
23. Low coast shift valve
24. Plug
25. Low coast modulator valve
26. Plug
27. Intermediate shift valve
28. D–2 down timing valve
29. Third coast shift valve
30. Oil cooler return ball
31. Oil cooler
32. Damping check ball
33. Down-shift plug
34. Oil pump
35. Strainer
36. Oil cooler by-pass valve
37. 1–2 shift valve
38. Reverse clutch sequence valve
39. Intermediate modulator valve
40. Detent regulator valve
41. 2–3 shift valve
42. 3–4 shift valve

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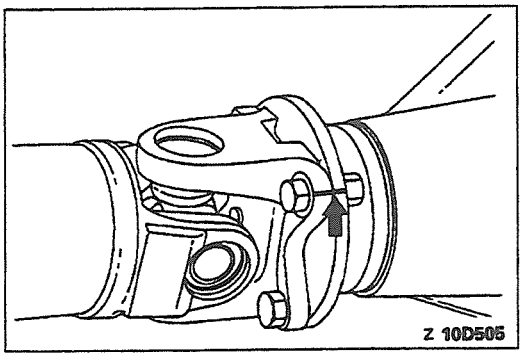
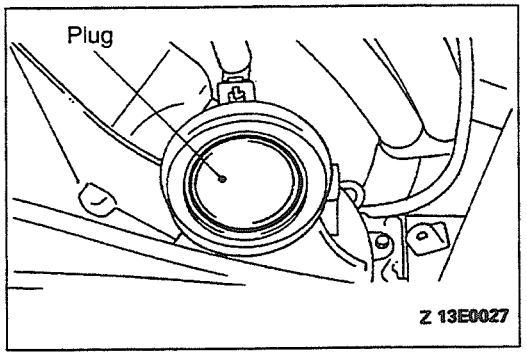



## REMOVAL SERVICE POINTS

**◀A▶ REAR PROPELLER SHAFT/FRONT PROPELLER SHAFT REMOVAL**

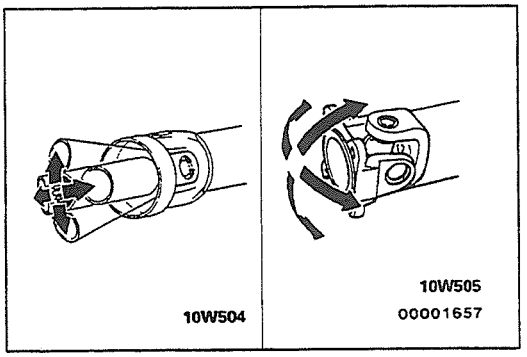
(1) Make mating marks on the flange yoke and the differential companion flange.




(2) Use the plug as a cover so that no foreign material gets into the transmission or transfer.

## INSPECTION

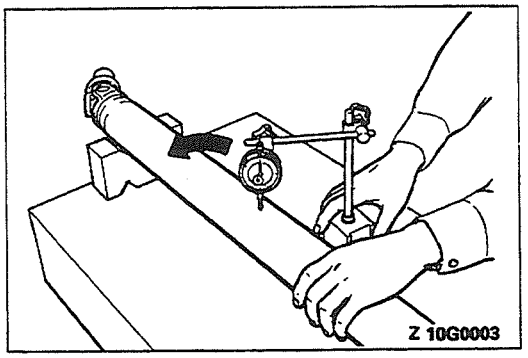
- Check the universal joints for smooth operation in all directions.
- Check the sleeve yoke and flange yoke for wear, damage or cracks.
- Check the propeller shaft yokes for wear, damage or cracks.
- Check the propeller shaft for bends, twisting or damage.




**PROPELLER SHAFT RUNOUT**

Measure the propeller shaft runout with a dial indicator.

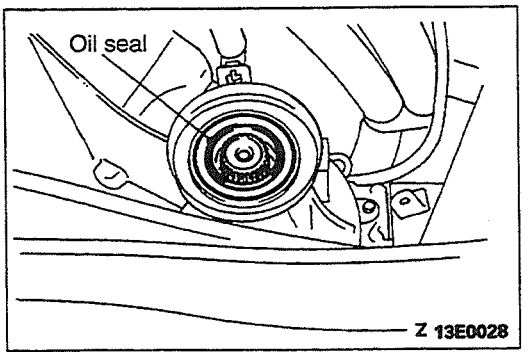
**Limit: 0.6 mm (.024 in.)**




## INSTALLATION SERVICE POINTS

**▶A◀ FRONT PROPELLER SHAFT/REAR PROPELLER SHAFT INSTALLATION**

(1) **Caution**
**Be careful not to damage the oil seal lip of the transmission and transfer.**

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# REAR WIPER AND WASHER

## REMOVAL AND INSTALLATION

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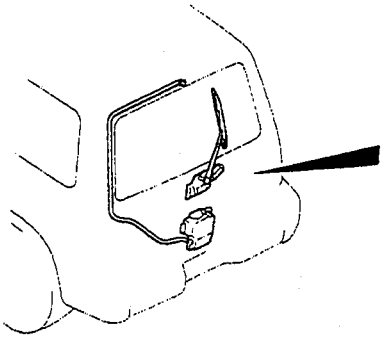

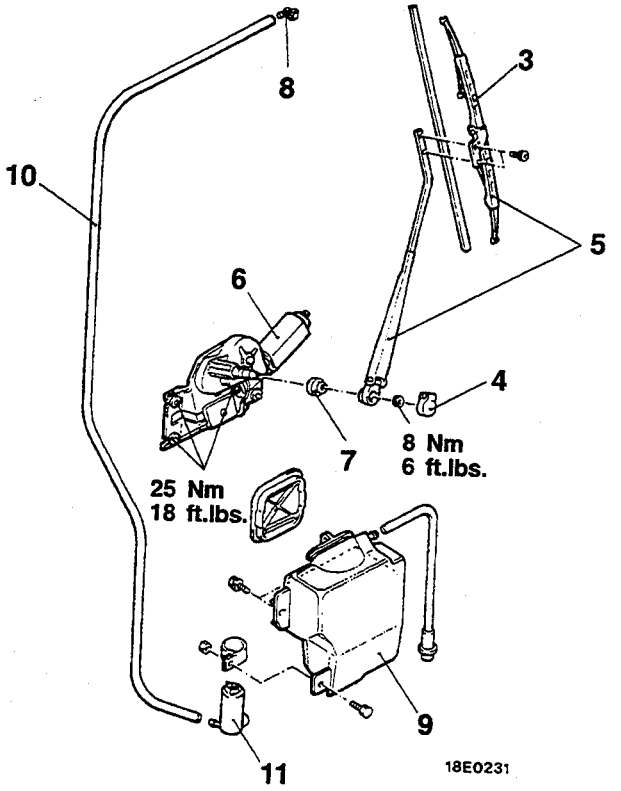


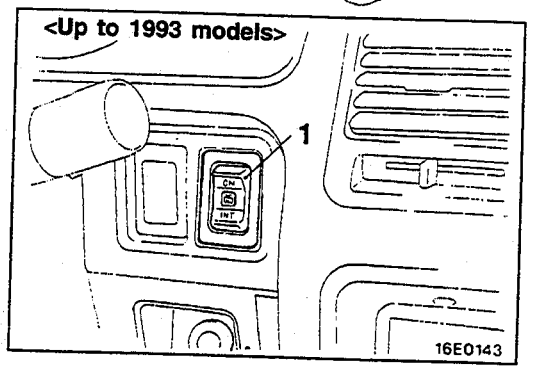


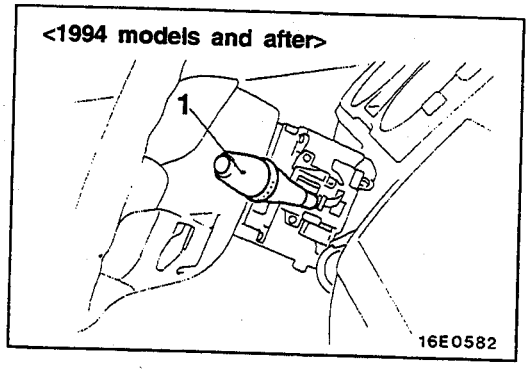


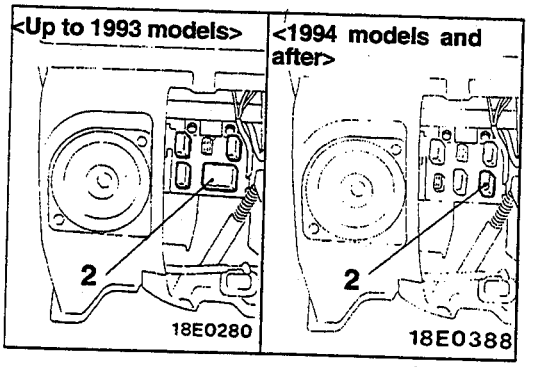


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1. Rear wiper and washer switch (Refer to P.51-18.) <1994 models and after>
3. Wiper blade
8. Washer nozzle

**Rear intermittent wiper relay removal steps**

- Instrument under cover (Refer to GROUP 52A–Instrument Panel.)

2. Rear intermittent wiper relay

**Wiper motor removal steps**

4. Cover

▶B◀ 5. Wiper arm and blade assembly

- Back door trim (Refer to GROUP 42–Back Door Trim and Waterproof Film.)

6. Wiper motor and bracket assembly

▶A◀ 7. Grommet

**Washer tank and motor removal steps**

- Back door trim (Refer to GROUP 42–Back Door Trim and Waterproof Film.)

9. Washer tank assembly
- Washer fluid draining

10. Washer tube
11. Washer motor

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