

## GROUP 15

# INTAKE AND EXHAUST

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## GENERAL DESCRIPTION

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The exhaust pipe is divided into four parts.

## INTAKE AND EXHAUST DIAGNOSIS

### SERVICE SPECIFICATION

M1151000301432

| ITEM  | STANDARD VALUE       | LIMIT        |
|---|----------------------|--------------|
| Manifold distortion of the installation surface mm (in) | 0.15 (0.006) or less | 0.20 (0.008) |

### INTRODUCTION

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Intake leaks usually create driveability issues that are not obviously related to the intake system. Exhaust leaks or abnormal noise is caused by cracks, gaskets and fittings, or by exhaust pipe or muffler damage due to impacts during travel. The exhaust leaks from these sections and causes the exhaust noise to increase. There may be cases when the system contacts the body and vibration noise is generated.

### TROUBLESHOOTING STRATEGY

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Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find an intake or exhaust system fault.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

### SYMPTOM CHART

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| SYMPTOM         | INSPECTION PROCEDURE | REFERENCE PAGE |
|-----------------|----------------------|----------------|
| Exhaust Leakage | 1                    | P.15-2         |
| Abnormal Noise  | 2                    | P.15-3         |

### SYMPTOM PROCEDURES

#### INSPECTION PROCEDURE 1: Exhaust Leakage

#### DIAGNOSIS

**STEP 1. Start the engine. Have an assistant stay in the driver's seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.**

**Q: Is the exhaust leaking?**

**YES :** Go to Step 2.

**NO :** The procedure is complete.

**STEP 2. Check the gasket for cracks, damage.**

**Q: Is the gasket damaged?**

**YES :** Replace the gasket, then go to Step 1.

**NO :** Go to Step 3.

**STEP 3. Check for loosening in each coupling section.**

**Q: Is there any loosening in any section?**

**YES :** Tighten, then go to Step 1.

**NO :** There is no action to be taken.

**INSPECTION PROCEDURE 2: Abnormal Noise**

**DIAGNOSIS**

**STEP 1. Start the engine. Have an assistant stay in the drivers seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.**

**Q: Is any abnormal noise generated?**  
**YES :** Go to Step 2.  
**NO :** The procedure is complete.

**STEP 2. Check for missing parts in the muffler. Tap the muffler lightly to check for loose baffles, etc.**

**Q: Are there any missing parts in the muffler?**  
**YES :** Replace, then go to Step 1.  
**NO :** Go to Step 3.

**STEP 3. Check the hanger for cracks.**

**Q: Is the hanger cracked?**  
**YES :** Replace, then go to Step 1.  
**NO :** Go to Step 4.

**STEP 4. Check for interference of the pipes and muffler with the body.**

**Q: Are the pipes and muffler interfering with the body?**  
**YES :** Repair, then go to Step 1.  
**NO :** Go to Step 5.

**STEP 5. Check the heat protectors.**

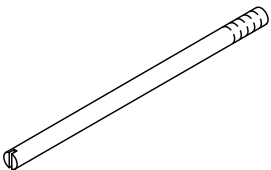
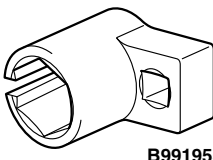
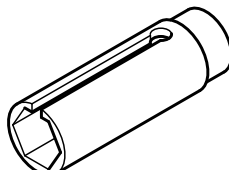
**Q: Are any heat protectors loose or damaged?**  
**YES :** Tighten or replace, then go to Step 1.  
**NO :** Go to Step 6.

**STEP 6. Check the pipes and muffler for damage.**

**Q: Are the pipes and muffler damaged?**  
**YES :** Replace, then go to Step 1.  
**NO :** There is no action to be taken.

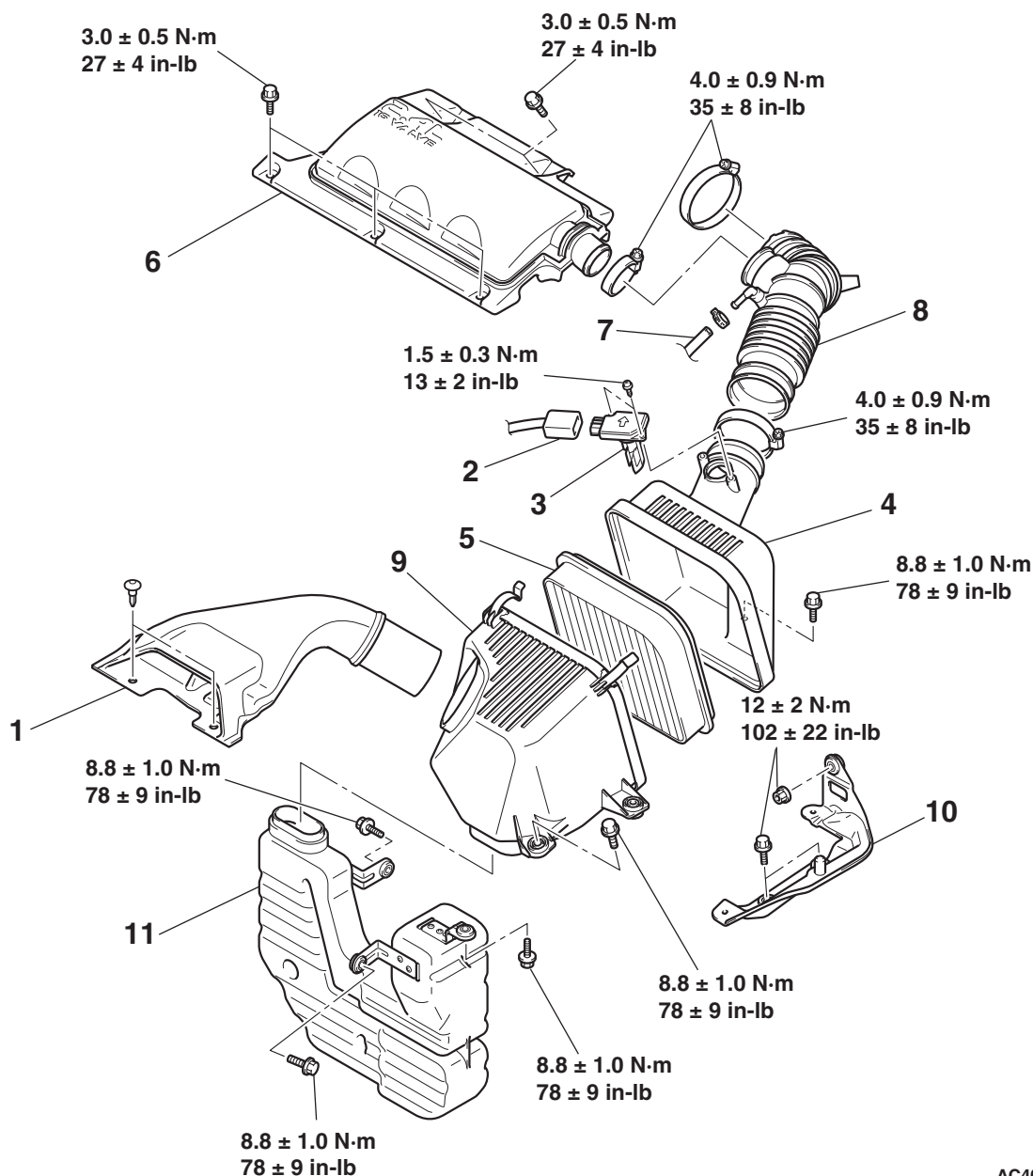
**SPECIAL TOOLS**

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| TOOL  | TOOL NUMBER AND NAME             | SUPERSESSION                        | APPLICATION                                      |
|---|----------------------------------|-------------------------------------|--|
|  | MD998412<br>Guide                | MD998412                            | Installation of intake manifold plenum           |
|  | MB991953<br>Oxygen sensor wrench | -                                   | Removal and installation of heated oxygen sensor |
|  | MD998770<br>Oxygen sensor wrench | MD998770-01 or General service tool | Removal and installation of heated oxygen sensor |

**AIR CLEANER****REMOVAL AND INSTALLATION <2.4L ENGINE>**

M1151002102794



AC406366AD

**REMOVAL STEPS**

1. AIR CLEANER INTAKE DUCT
2. MASS AIRFLOW SENSOR CONNECTOR
3. MASS AIRFLOW SENSOR
4. AIR CLEANER COVER
5. AIR CLEANER ELEMENT
6. AIR CLEANER RESONATOR
7. BREATHER HOSE CONNECTION
8. AIR CLEANER TO THROTTLE BODY DUCT

**REMOVAL STEPS (Continued)**

- ECM <M/T> OR PCM <A/T> [REFER TO GROUP 13A, ENGINE CONTROL MODULE (ECM) AND POWERTRAIN CONTROL MODULE (PCM) [P.13A-1247](#)].
- 9. AIR CLEANER BODY
- 10. AIR CLEANER BRACKET
  - UNDER COVER (LH) (REFER TO GROUP 51, UNDER COVER [P.51-8](#)).
- 11. AIR CLEANER RESONATOR

## M1151002102802



## REMOVAL STEPS (Continued)

- ECM <M/T> OR PCM <A/T>  
[REFER TO GROUP 13B, ENGINE  
CONTROL MODULE (ECM) AND  
POWERTRAIN CONTROL  
MODULE (PCM) [P.13B-1291](#)].
6. AIR CLEANER COVER
  7. MASS AIRFLOW SENSOR
  8. AIR CLEANER ELEMENT
  9. AIR CLEANER BODY
  10. AIR CLEANER BRACKET

**REMOVAL STEPS (Continued)**

- UNDER COVER (LH) (REFER TO GROUP 51, UNDER COVER [P.51-8](#)).
  - TRANSMISSION FLUID COOLER LINE TUBE ASSEMBLY AND TRANSMISSION FLUID COOLER LINE HOSE ASSEMBLY B CONNECTION <A/T> (REFER TO GROUP 23A, TRANSMISSION FLUID COOLER [P.23A-429](#)).
11. AIR CLEANER RESONATOR

## REMOVAL AND INSTALLATION <3.8L ENGINE>

## Pre-removal Operation

- ## Post-installation Operation

- 
- (ENGINE OIL)
- 11 ± 1 N·m  
98 ± 8 in-lb
- 24 ± 3 N·m  
18 ± 2 ft-lb
- 5.0 ± 1.0 N·m  
44 ± 9 in-lb
- 11 ± 1 N·m  
98 ± 8 in-lb
- 22 ± 1 N·m  
16 ± 1 ft-lb
- 5.0 ± 1.0 N·m  
44 ± 9 in-lb
- 12 ± 2 N·m  
102 ± 22 in-lb
- 19 ± 3 N·m  
14 ± 2 ft-lb
- 22 ± 1 N·m  
16 ± 1 ft-lb
- 49 ± 6 N·m  
37 ± 4 ft-lb
- 22 ± 1 N·m  
16 ± 1 ft-lb
- 11 ± 1 N·m  
98 ± 8 in-lb
- 22 ± 1 N·m  
16 ± 1 ft-lb
- 11 ± 1 N·m  
98 ± 8 in-lb
- 11 ± 1 N·m  
98 ± 8 in-lb
- 22 ± 1 N·m  
16 ± 1 ft-lb
- 41 ± 8 N·m  
30 ± 6 ft-lb
- 59 ± 10 N·m  
44 ± 7 ft-lb
- 22 ± 1 N·m  
16 ± 1 ft-lb
- 49 ± 6 N·m  
37 ± 4 ft-lb
- 49 ± 6 N·m  
37 ± 4 ft-lb

## TSB Revision

**REMOVAL STEPS**

1. MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR
2. CONTROL WIRING HARNESS AND INJECTOR WIRING HARNESS COMBINATION CONNECTOR
3. CRANKSHAFT POSITION SENSOR CONNECTOR
4. KNOCK SENSOR CONNECTOR
5. POWER STEERING PRESSURE SWITCH CONNECTOR
6. EVAPORATIVE EMISSION PURGE SOLENOID CONNECTOR
7. EXHAUST GAS RECIRCULATION VALVE CONNECTOR
8. BRAKE BOOSTER VACUUM HOSE CONNECTION
9. EVAPORATIVE EMISSION PURGE HOSE CONNECTION
10. CONTROL WIRING HARNESS AND ENGINE COVER BRACKET ASSEMBLY
11. PCV HOSE CONNECTION
12. INTAKE MANIFOLD PLENUM STAY (REAR) CONNECTING BOLT
13. EGR PIPE
14. EGR PIPE GASKET
15. INTAKE MANIFOLD PLENUM STAY (FRONT) CONNECTING BOLT
16. THROTTLE BODY STAY CONNECTING BOLT

&gt;&gt;B&lt;&lt;

**REMOVAL STEPS (Continued)**

17. INTAKE MANIFOLD PLENUM
18. INTAKE MANIFOLD PLENUM GASKET
19. POWER STEERING PRESSURE HOSE CLAMP
20. POWER STEERING PRESSURE HOSE CLAMP BRACKET
21. INTAKE MANIFOLD PLENUM STAY (REAR)
  - STEERING GEAR AND LINKAGE PROTECTOR (REFER TO GROUP 37, STEERING GEAR BOX AND LINKAGE [P.37-34](#)).
  - POWER STEERING OIL PUMP (REFER TO GROUP 37, POWER STEERING OIL PUMP ASSEMBLY [P.37-56](#)).
22. POWER STEERING OIL PUMP BRACKET CONNECTING BOLT
23. INTAKE MANIFOLD PLENUM STAY (FRONT)
24. THROTTLE BODY STAY
25. EVAPORATIVE EMISSION PURGE SOLENOID
26. EXHAUST GAS RECIRCULATION VALVE
27. EXHAUST GAS RECIRCULATION VALVE GASKET
28. MANIFOLD ABSOLUTE PRESSURE SENSOR
29. O-RING
30. HARNESS BRACKET
31. CAP

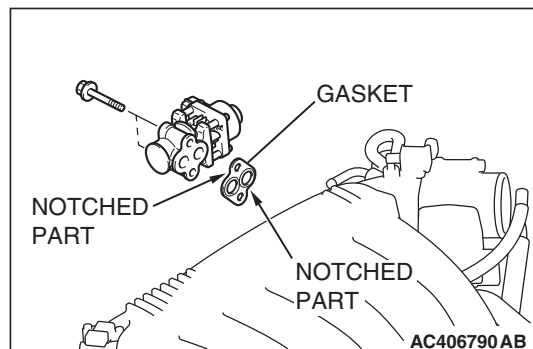
&gt;&gt;A&lt;&lt;

**Required Special Tool:**

- MD998412: Guide

**INSTALLATION SERVICE POINTS****>>A<< EXHAUST GAS RECIRCULATION VALVE GASKET INSTALLATION**

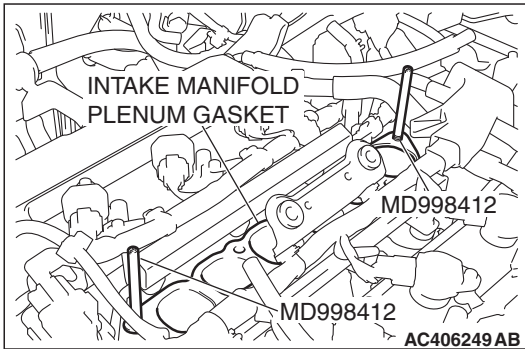
Install the exhaust gas recirculation valve gasket as shown in the illustration.





## >>B<< INTAKE MANIFOLD PLENUM INSTALLATION

Use special tool MD998412 to install the intake manifold plenum.



## INTAKE MANIFOLD

## REMOVAL AND INSTALLATION &lt;2.4L ENGINE&gt;

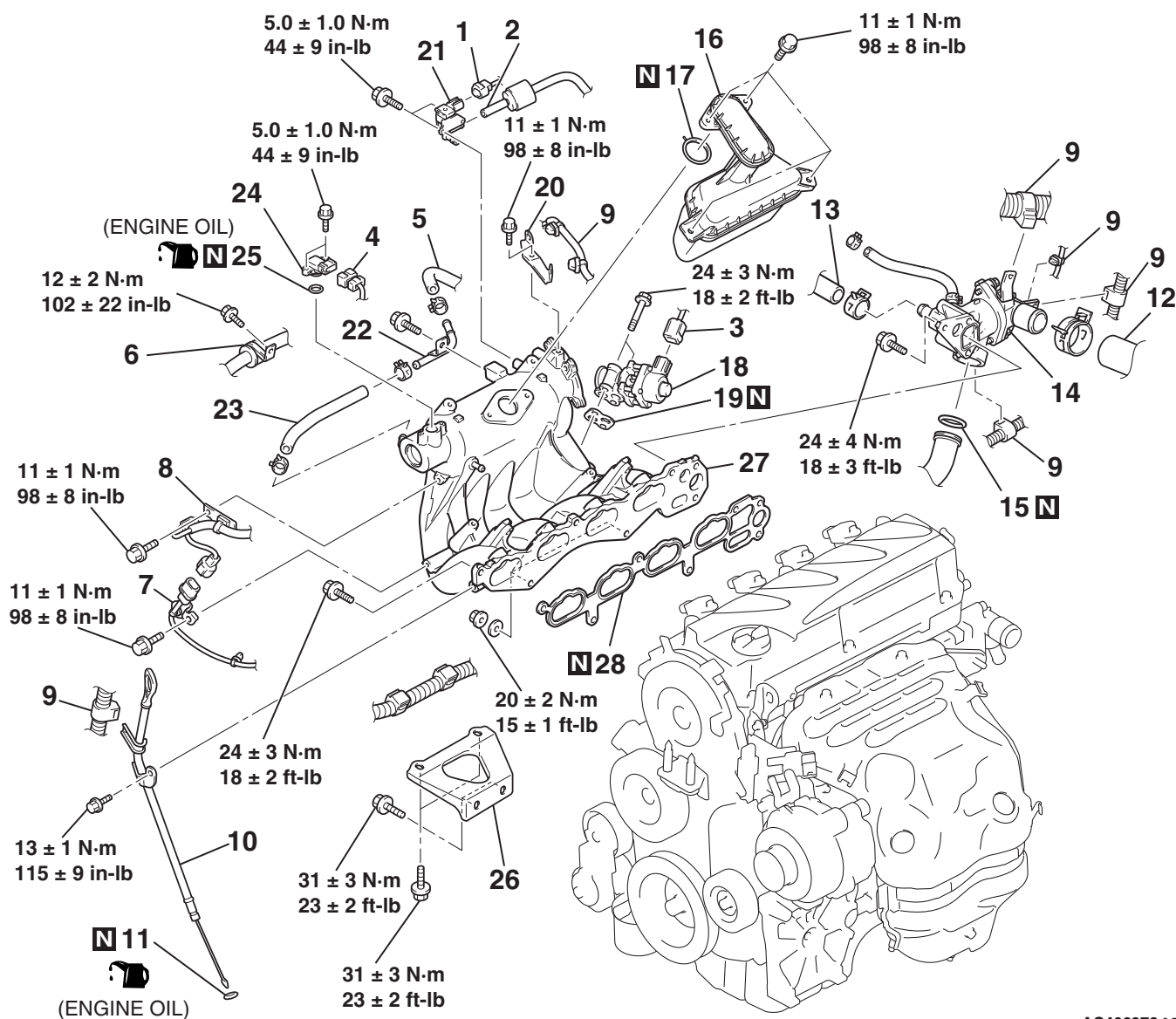
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## Pre-removal Operation

- Fuel Line Pressure Reduction [Refer to GROUP 13A, On-vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) [P.13A-1232](#)].
- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement [P.14-22](#)).
- Air Cleaner Cover and Air Cleaner to Throttle Body Duct Removal (Refer to [P.15-4](#)).
- Throttle Body Removal (Refer to GROUP 13A, Throttle Body [P.13A-1245](#)).
- Fuel Rail and Fuel Injector Assembly Removal (Refer to GROUP 13A, Injector [P.13A-1242](#)).

## Post-installation Operation

- Fuel Rail and Fuel Injector Assembly Installation (Refer to GROUP 13A, Injector [P.13A-1242](#)).
- Throttle Body Installation (Refer to GROUP 13A, Throttle Body [P.13A-1245](#)).
- Air Cleaner Cover and Air Cleaner to Throttle Body Duct Installation (Refer to [P.15-4](#)).
- Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement [P.14-22](#)).



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**REMOVAL STEPS**

1. EVAPORATIVE EMISSION PURGE SOLENOID VALVE CONNECTOR
2. EVAPORATIVE EMISSION PURGE HOSE CONNECTION
3. EXHAUST GAS RECIRCULATION VALVE CONNECTOR
4. MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR
- >>A<< 5. BRAKE BOOSTER VACUUM HOSE CONNECTION
6. POWER STEERING PRESSURE HOSE CLAMP
7. KNOCK SENSOR CONNECTOR BRACKET
8. HARNESS CRAMP BRACKET
9. HARNESS CRAMP
10. ENGINE OIL DIPSTICK AND DIPSTICK GUIDE
11. O-RING
- <<A>> >>D<< 12. RADIATOR LOWER HOSE CONNECTION

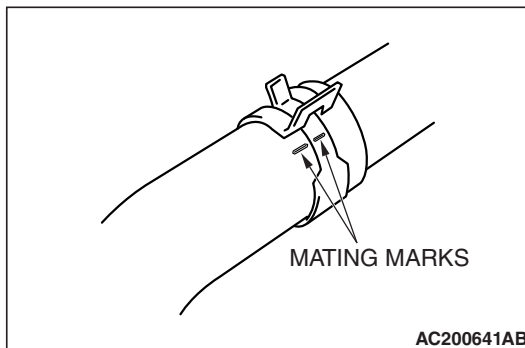
**REMOVAL STEPS (Continued)**

13. HEATER WATER HOSE CONNECTION
- >>C<< 14. THERMOSTAT CASE ASSEMBLY
15. O-RING
16. RESONATOR
17. GASKET
18. EXHAUST GAS RECIRCULATION VALVE
- >>B<< 19. EXHAUST GAS RECIRCULATION VALVE GASKET
20. HARNESS CLAMP BRACKET
21. EVAPORATIVE EMISSION PURGE SOLENOID VALVE
22. BRAKE BOOSTER VACUUM PIPE
- >>A<< 23. BRAKE BOOSTER VACUUM HOSE
24. MANIFOLD ABSOLUTE PRESSURE SENSOR
25. O-RING
26. INTAKE MANIFOLD STAY
27. INTAKE MANIFOLD
28. INTAKE MANIFOLD GASKET

**REMOVAL SERVICE POINT**

**<<A>> RADIATOR LOWER HOSE DISCONNECTION**

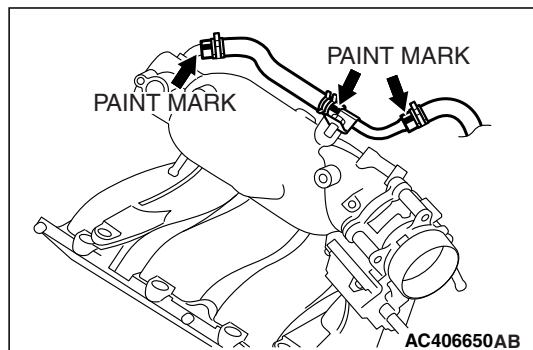
Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.



## INSTALLATION SERVICE POINTS

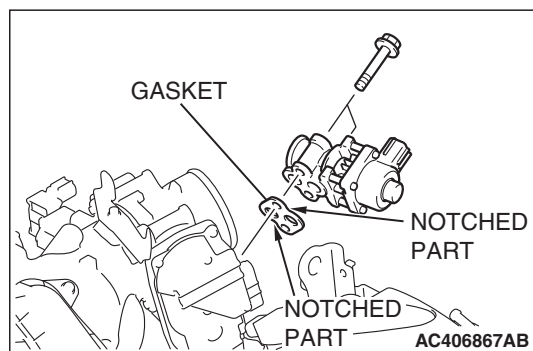
## &gt;&gt;A&lt;&lt; BRAKE BOOSTER VACUUM HOSE CONNECTION

Insert vacuum hose with its paint mark facing upward.



## &gt;&gt;B&lt;&lt; EXHAUST GAS RECIRCULATION VALVE GASKET INSTALLATION

Install the exhaust gas recirculation valve gasket as shown in the illustration.

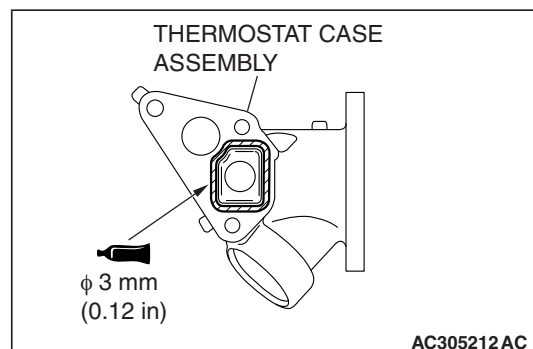


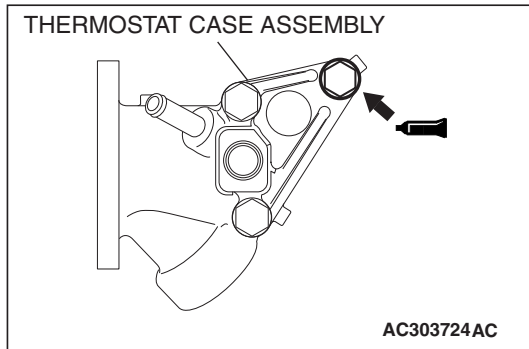
## &gt;&gt;C&lt;&lt; THERMOSTAT CASE ASSEMBLY INSTALLATION

1. Use a gasket scraper or wire brush to completely eliminate all gasket material on the gasket mounting surface.
2. Apply a bead of the sealant to the cylinder head mating surface of the thermostat case assembly as shown.

**Specified Sealant: 3M™ AAD Part No.8672, 3M™ AAD part No.8679/8678 or equivalent**

*NOTE: Install the thermostat case assembly immediately after applying sealant.*





3. Apply sealant to the thread of the thermostat case assembly bolt as shown.

**Specified Sealant: 3M™ AAD Part No.8730, 8731 or equivalent**

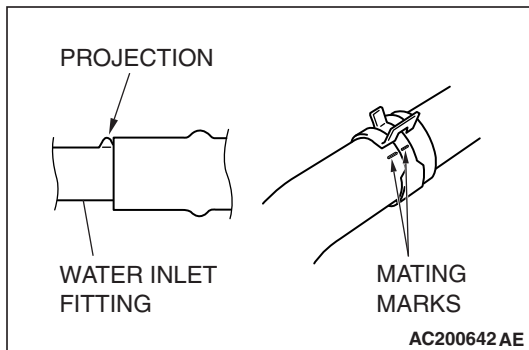
**⚠ CAUTION**

**After installing the parts, wait at least one hour. Never start the engine or let engine oil or water touch the sealant application area during that time.**

4. With the sealant still wet, install the thermostat case assembly. Do not apply the sealant in an area more than the required.

**>>D<< RADIATOR LOWER HOSE CONNECTION**

1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.



## REMOVAL AND INSTALLATION &lt;3.8L ENGINE&gt;

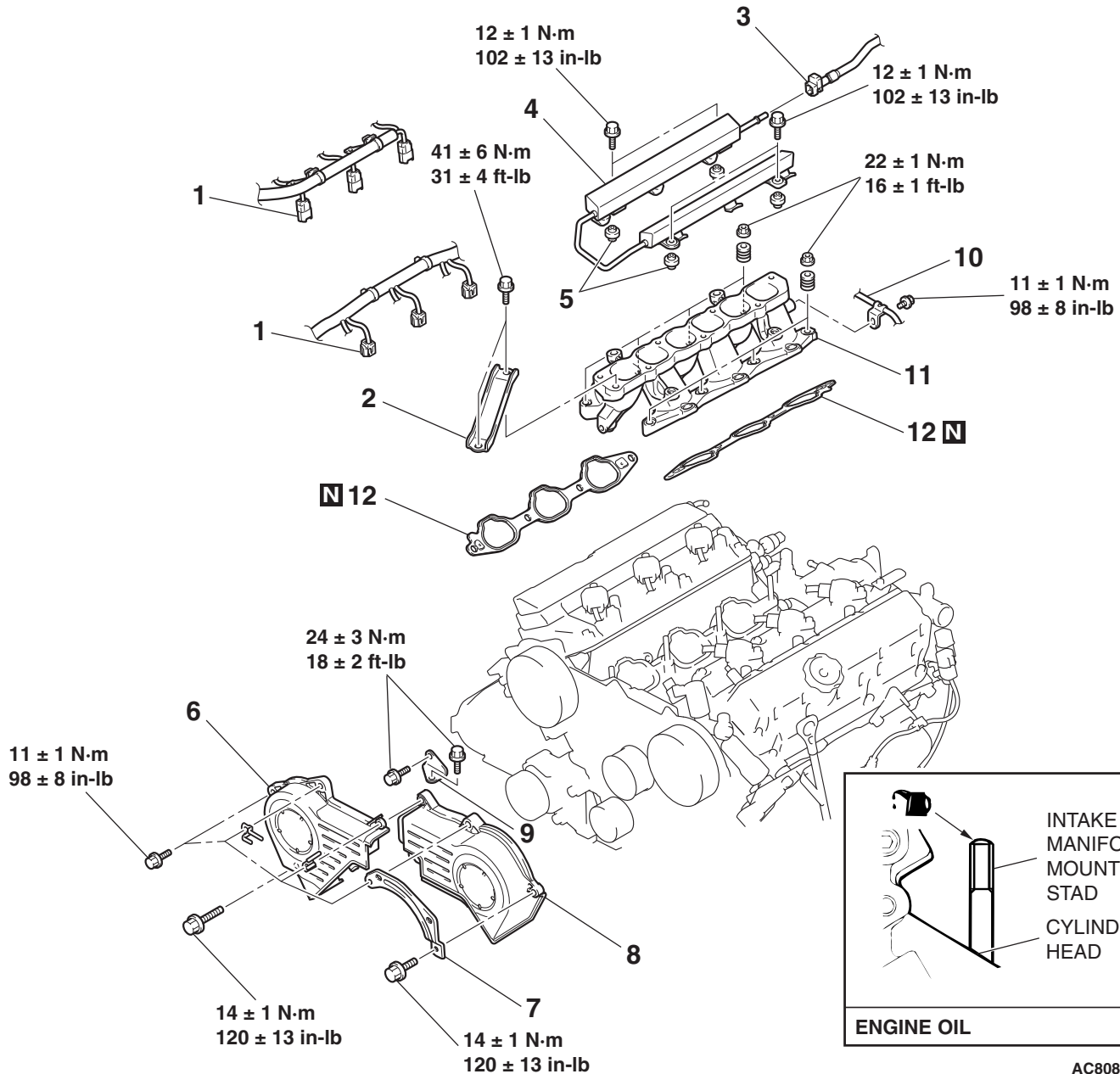
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**Pre-removal Operation**

- Fuel Discharge Prevention [Refer to GROUP 13B, On-vehicle Service – Fuel Pump Relay Disconnection (How to Reduce Pressurized Fuel Lines) [P.13B-1278](#)].
- Intake Manifold Plenum Removal (Refer to [P.15-7](#)).

**Post-installation Operation**

- Intake Manifold Plenum Installation (Refer to [P.15-7](#)).
- Fuel Leakage Inspection



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**REMOVAL STEPS**

- <<A>> >>D<<
- <<B>> >>C<<
- INJECTOR CONNECTOR
  - ENGINE MOUNTING STAY
  - FUEL HIGH-PRESSURE HOSE CONNECTION
  - FUEL RAIL AND FUEL INJECTOR ASSEMBLY
  - INSULATOR
  - TIMING BELT FRONT UPPER COVER, RIGHT

**REMOVAL STEPS (Continued)**

- >>B<<
- >>A<<
- HARNESS BRACKET
  - TIMING BELT FRONT UPPER COVER, LEFT
  - WATER PUMP BRACKET
  - OIL FEEDER CONTROL VALVE PIPE CONNECTION
  - INTAKE MANIFOLD
  - INTAKE MANIFOLD GASKET

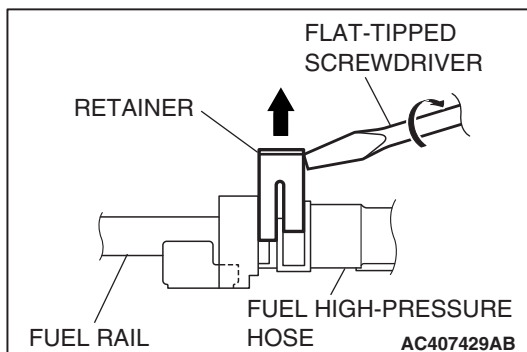
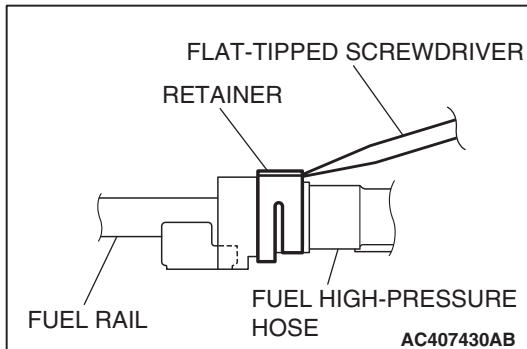
## REMOVAL SERVICE POINTS

### <<A>> FUEL HIGH-PRESSURE HOSE DISCONNECTION

#### ⚠ CAUTION

Do not kink the fuel high-pressure hose as it is made of plastic and will become damaged.

1. Insert a flat-tipped screwdriver [width 6 mm (0.24 inch), thickness 1 mm (0.04 inch)] to the retainer.
2. Turn the flat-tipped screwdriver approximately 90 degrees to the arrowed direction, and lift the retainer to unlock and disconnect the fuel high-pressure hose.



### <<B>> FUEL RAIL AND FUEL INJECTOR ASSEMBLY REMOVAL

#### ⚠ CAUTION

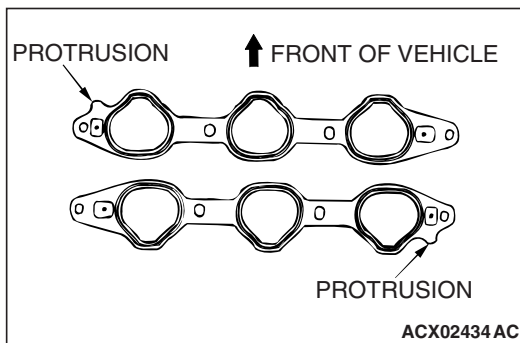
Care must be taken when removing the fuel rail not to drop the injector.

Remove the fuel rail with the injectors attached to it.

## INSTALLATION SERVICE POINTS

### >>A<< INTAKE MANIFOLD GASKET INSTALLATION

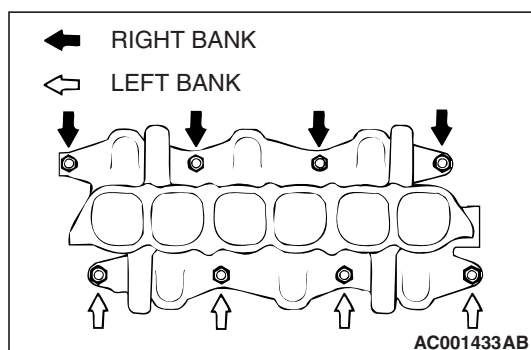
Install the gasket with the protrusions in the position illustrated.



## &gt;&gt;B&lt;&lt; INTAKE MANIFOLD INSTALLATION

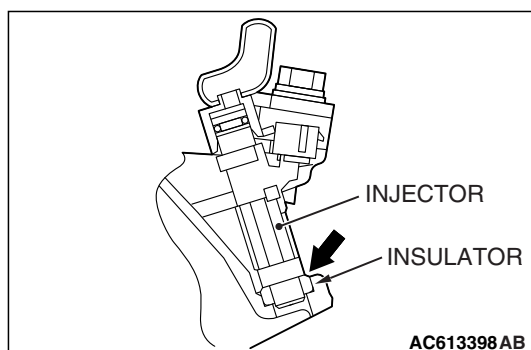
1. Coat the intake manifold mounting studs with engine oil.
2. Tighten the intake manifold mounting nuts by the following procedure.

| ORDER | MOUNTING NUTS   | TIGHTENING TORQUE                      |
|-------|-----------------|--|
| 1st   | Right-bank nuts | $6.5 \pm 1.5$ N·m ( $58 \pm 13$ in-lb) |
| 2nd   | Left-bank nuts  | $22 \pm 1$ N·m ( $16 \pm 1$ ft-lb)     |
| 3rd   | Right-bank nuts | $22 \pm 1$ N·m ( $16 \pm 1$ ft-lb)     |
| 4th   | Left-bank nuts  | $22 \pm 1$ N·m ( $16 \pm 1$ ft-lb)     |
| 5th   | Right-bank nuts | $22 \pm 1$ N·m ( $16 \pm 1$ ft-lb)     |

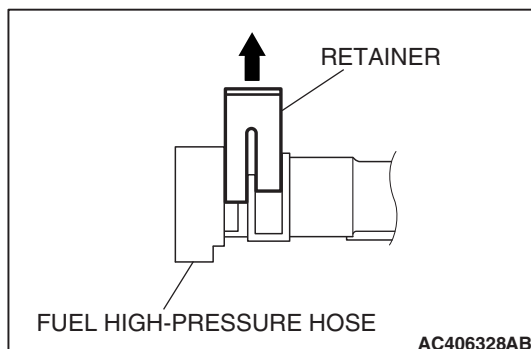
>>C<< FUEL RAIL AND FUEL INJECTOR  
ASSEMBLY INSTALLATION**⚠ CAUTION**

Securely bring the insulator into contact with the injector to prevent air leak from the insulator area.

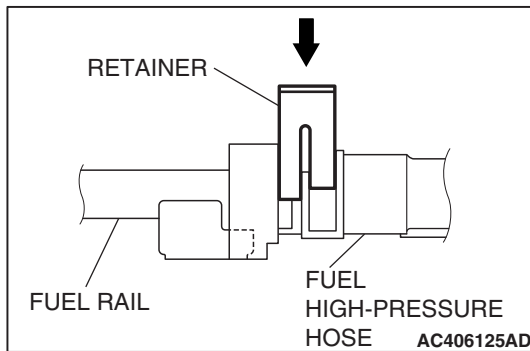
Be sure that there is no clearance between the insulator area and the injector, and install them to the intake manifold.

>>D<< FUEL HIGH-PRESSURE HOSE  
CONNECTION

1. Pull up the lock of fuel high-pressure hose to unlock before installing.







2. Install the fuel high-pressure hose to the fuel rail securely and push the lock of fuel high-pressure hose downward and lock thoroughly.
3. After installing, slightly pull the fuel high-pressure hose and ensure that there is no disengaged fuel high-pressure hose. Also confirm that there is approximately 1 mm (0.04 inch) play at this time.

## INSPECTION

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Check the following points; replace the part if a problem is found.

### Intake Manifold Check

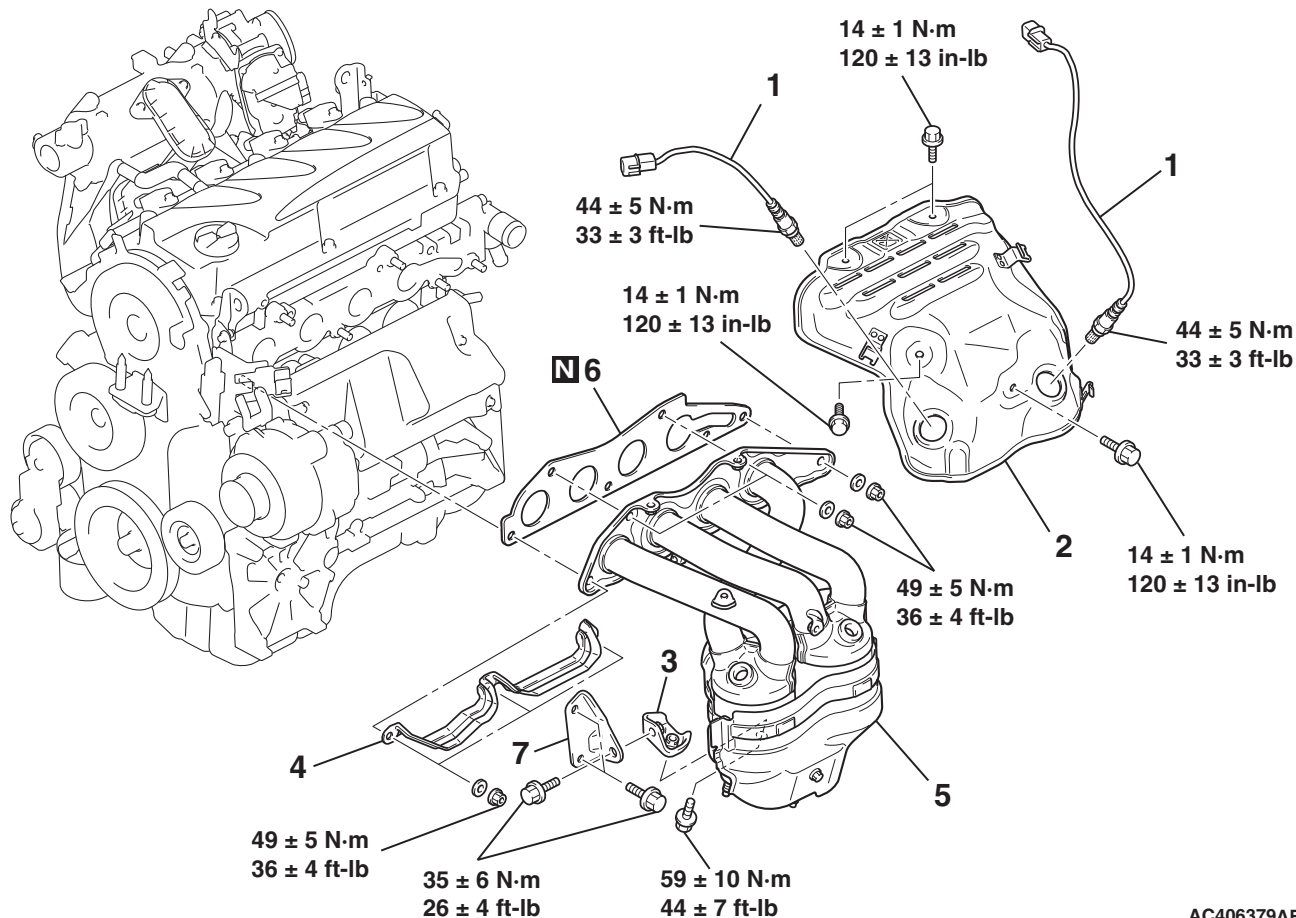
1. Check for damage or cracking of any part.
2. Clogging of the negative pressure (vacuum) outlet port, or clogging of the exhaust gas recirculation passages.
3. Using a straight edge and feeler gauge, check for distortion of the cylinder head installation surface.

**Standard value: 0.15 mm (0.006 inch) or less**

**Limit: 0.20 mm (0.008 inch)**

**EXHAUST MANIFOLD****REMOVAL AND INSTALLATION <2.4L ENGINE>**

M1151003301163



AC406379AB

**REMOVAL STEPS**

- <<A>> >>A<<
1. HEATED OXYGEN SENSOR
  2. EXHAUST MANIFOLD COVER
    - FRONT NO.1 EXHAUST PIPE (REFER TO [P.15-24](#)).
  3. EXHAUST MANIFOLD BRACKET B

**REMOVAL STEPS (Continued)**

4. LOWER HEAT PROTECTOR <A/T>
5. EXHAUST MANIFOLD
6. EXHAUST MANIFOLD GASKET
7. EXHAUST MANIFOLD BRACKET A

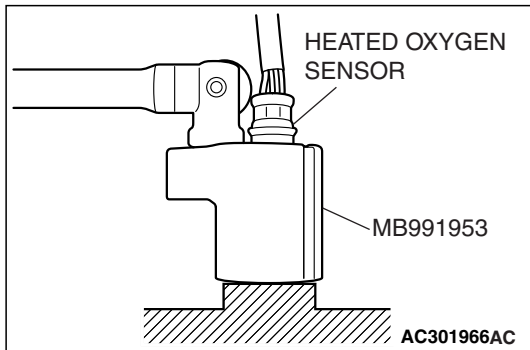
**Required Special Tool:**

- MB991953: Oxygen Sensor Wrench

## REMOVAL SERVICE POINT

### <<A>> HEATED OXYGEN SENSOR REMOVAL

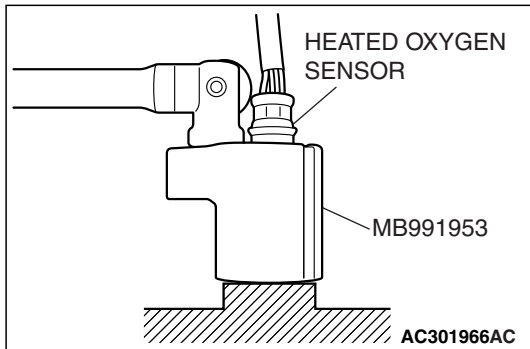
Use special tool MB991953 to remove the heated oxygen sensor.



## INSTALLATION SERVICE POINT

### >>A<< HEATED OXYGEN SENSOR INSTALLATION

Use special tool MB991953 to install the heated oxygen sensor.



## REMOVAL AND INSTALLATION &lt;3.8L ENGINE&gt;

M1151003301196

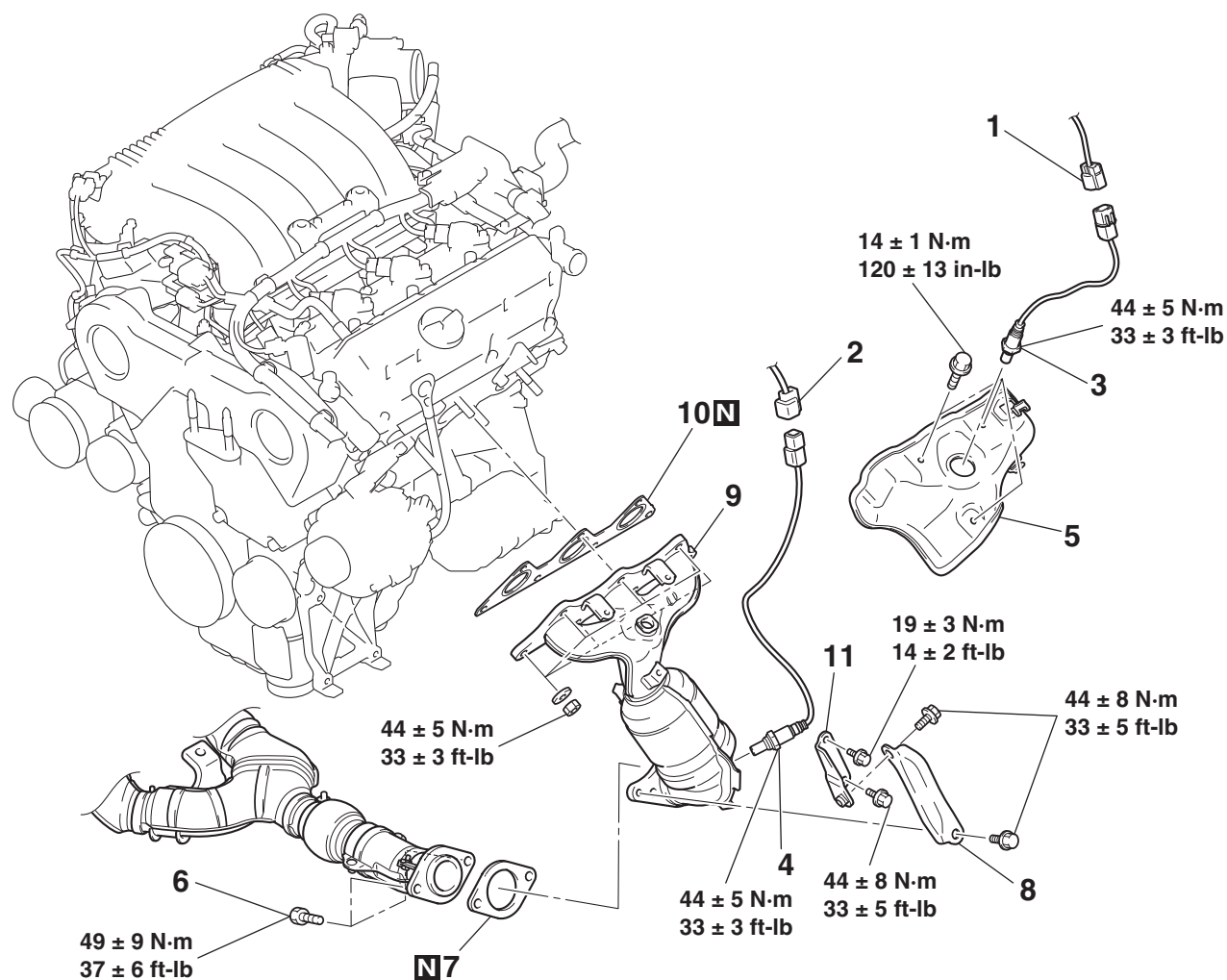
## &lt;LEFT BANK&gt;

**Pre-removal Operation**

- Under Cover Removal (Refer to GROUP 51, Under Cover P.51-8).
- Air Cleaner Intake Duct Removal (Refer to P.15-5).

**Post-installation Operation**

- Air Cleaner Intake Duct Installation (Refer to P.15-5).
- Under Cover Installation (Refer to GROUP 51, Under Cover P.51-8).



AC406190AB

**REMOVAL STEPS**

1. LEFT BANK HEATED OXYGEN SENSOR (FRONT) CONNECTOR
  2. LEFT BANK HEATED OXYGEN SENSOR (REAR) CONNECTOR
  3. LEFT BANK HEATED OXYGEN SENSOR (FRONT)
  4. LEFT BANK HEATED OXYGEN SENSOR (REAR)
  5. HEAT PROTECTOR
- <<A>> >>B<<  
<<B>> >>A<<

**REMOVAL STEPS (Continued)**

6. FRONT EXHAUST PIPE CONNECTING BOLTS
7. FRONT EXHAUST PIPE GASKET
8. EXHAUST MANIFOLD STAY, LEFT B
9. EXHAUST MANIFOLD
10. EXHAUST MANIFOLD GASKET
11. EXHAUST MANIFOLD STAY, LEFT A

**Required Special Tools:**

- MB991953: Oxygen Sensor Wrench
- MD998770: Oxygen Sensor Wrench

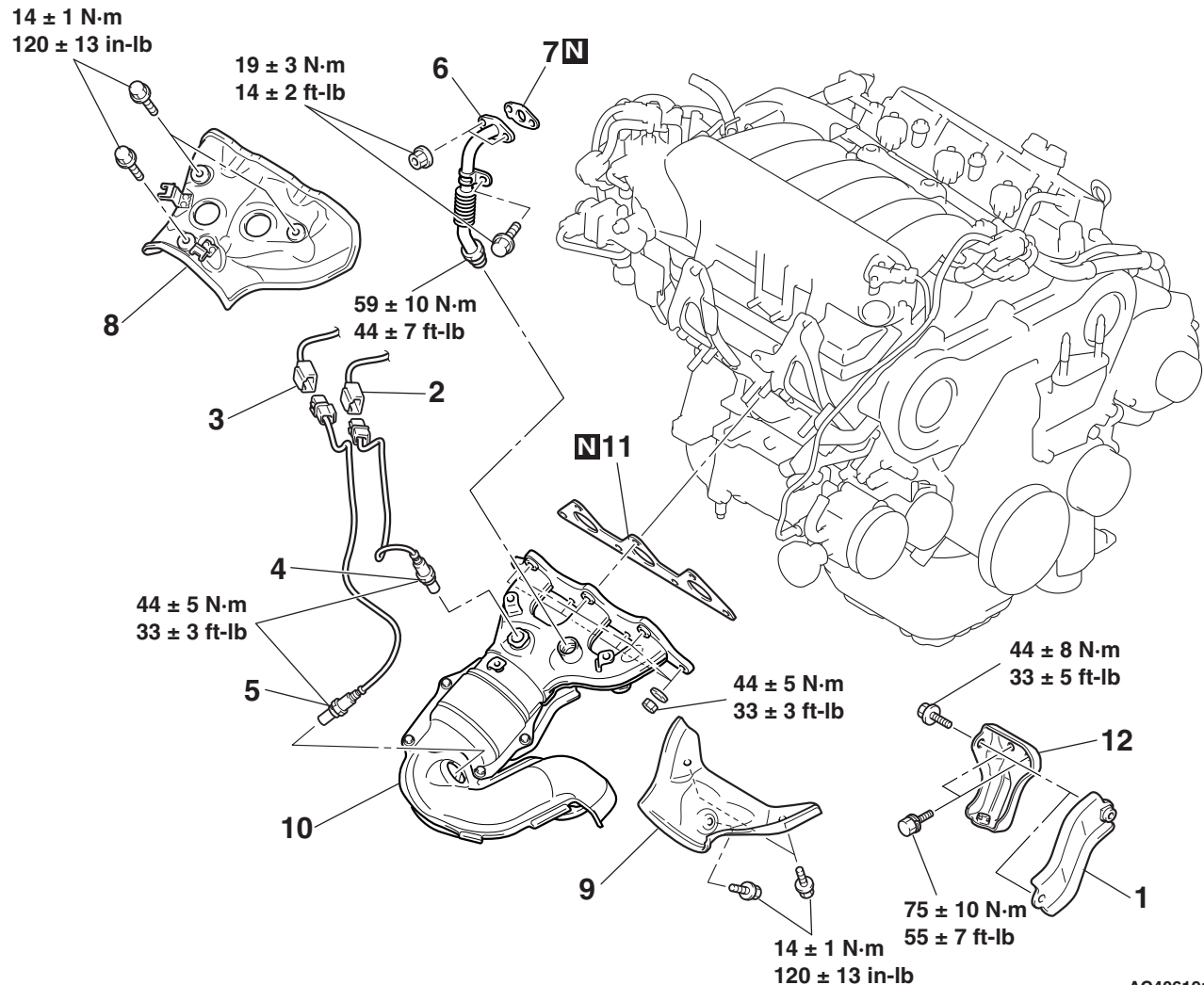
<RIGHT BANK>

**Pre-removal Operation**

- Air Cleaner Cover and Air Cleaner Air Intake Duct Removal (Refer to P.15-5).
- Battery Removal
- Under Cover Removal (Refer to GROUP 51, Under Cover P.51-8).
- Front Exhaust Pipe, Center Exhaust Pipe Removal (Refer to P.15-26).
- Strut Tower Bar Removal (Refer to GROUP 42, Strut Tower Bar P.42-14).
- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-22).

**Post-installation Operation**

- Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-22).
- Strut Tower Bar Installation (Refer to GROUP 42, Strut Tower Bar P.42-14).
- Front Exhaust Pipe, Center Exhaust Pipe Installation (Refer to P.15-26).
- Under Cover Installation (Refer to GROUP 51, Under Cover P.51-8).
- Battery Installation
- Air Cleaner Cover and Air Cleaner Air Intake Duct Installation (Refer to P.15-5).



AC406191AB

**REMOVAL STEPS**

- STEERING GEAR AND LINKAGE PROTECTOR (REFER TO GROUP 37, POWER STEERING GEAR BOX AND LINKAGE P.37-34).
- CENTER UNDER FLOOR HEAT PROTECTOR (REFER TO P.15-26).

**REMOVAL STEPS (Continued)**

- FRONT UNDER FLOOR HEAT PROTECTOR (REFER TO P.15-26).
- 1. EXHAUST MANIFOLD STAY, RIGHT B
- 2. RIGHT BANK HEATED OXYGEN SENSOR (FRONT) CONNECTOR
- 3. RIGHT BANK HEATED OXYGEN SENSOR (REAR) CONNECTOR

**REMOVAL STEPS (Continued)**

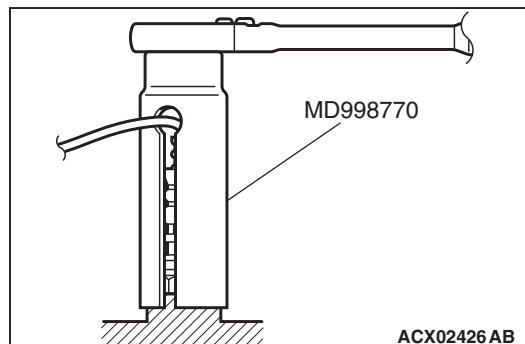
- <<A>> >>B<< 4. RIGHT BANK HEATED OXYGEN SENSOR (FRONT)
- <<B>> >>A<< 5. RIGHT BANK HEATED OXYGEN SENSOR (REAR)
6. EGR PIPE
7. EGR PIPE GASKET
8. UPPER HEAT PROTECTOR
9. LOWER HEAT PROTECTOR
10. EXHAUST MANIFOLD
11. EXHAUST MANIFOLD GASKET
12. EXHAUST MANIFOLD STAY, RIGHT A

**Required Special Tools:**

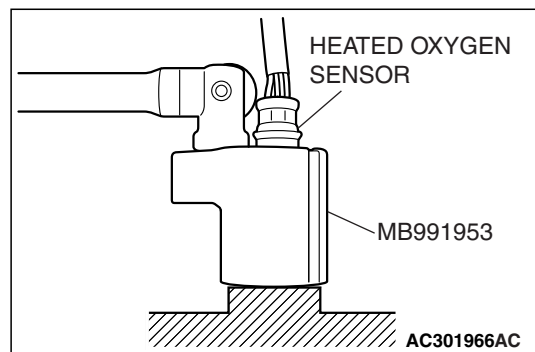
- MB991953: Oxygen Sensor Wrench
- MD998770: Oxygen Sensor Wrench

**REMOVAL SERVICE POINTS****<<A>> LEFT BANK HEATED OXYGEN SENSOR (FRONT)/RIGHT BANK HEATED OXYGEN SENSOR (FRONT) REMOVAL**

Use special tool MD998770 to remove the heated oxygen sensor.

**<<B>> LEFT BANK HEATED OXYGEN SENSOR (REAR)/RIGHT BANK HEATED OXYGEN SENSOR (REAR) REMOVAL**

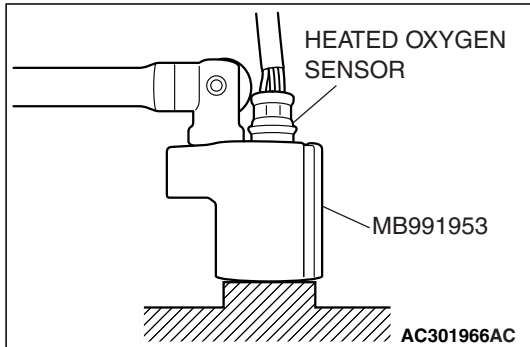
Use special tool MB991953 to remove the heated oxygen sensor.



## INSTALLATION SERVICE POINTS

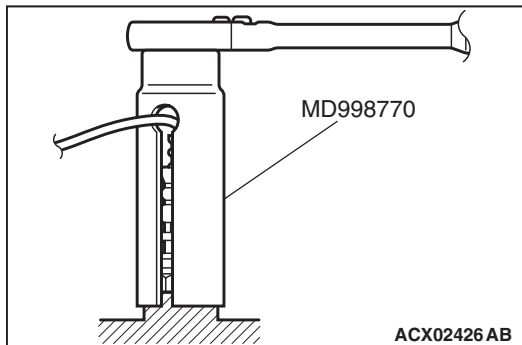
### >>A<< RIGHT BANK HEATED OXYGEN SENSOR (REAR)/LEFT BANK HEATED OXYGEN SENSOR (REAR) INSTALLATION

Use special tool MB991953 to install the heated oxygen sensor.



### >>B<< RIGHT BANK HEATED OXYGEN SENSOR (FRONT)/LEFT BANK HEATED OXYGEN SENSOR (FRONT) INSTALLATION

Use special tool MD998770 to install the heated oxygen sensor.



## INSPECTION

M1151003400725

Check the following points; replace the part if a problem is found.

### Exhaust Manifold Check

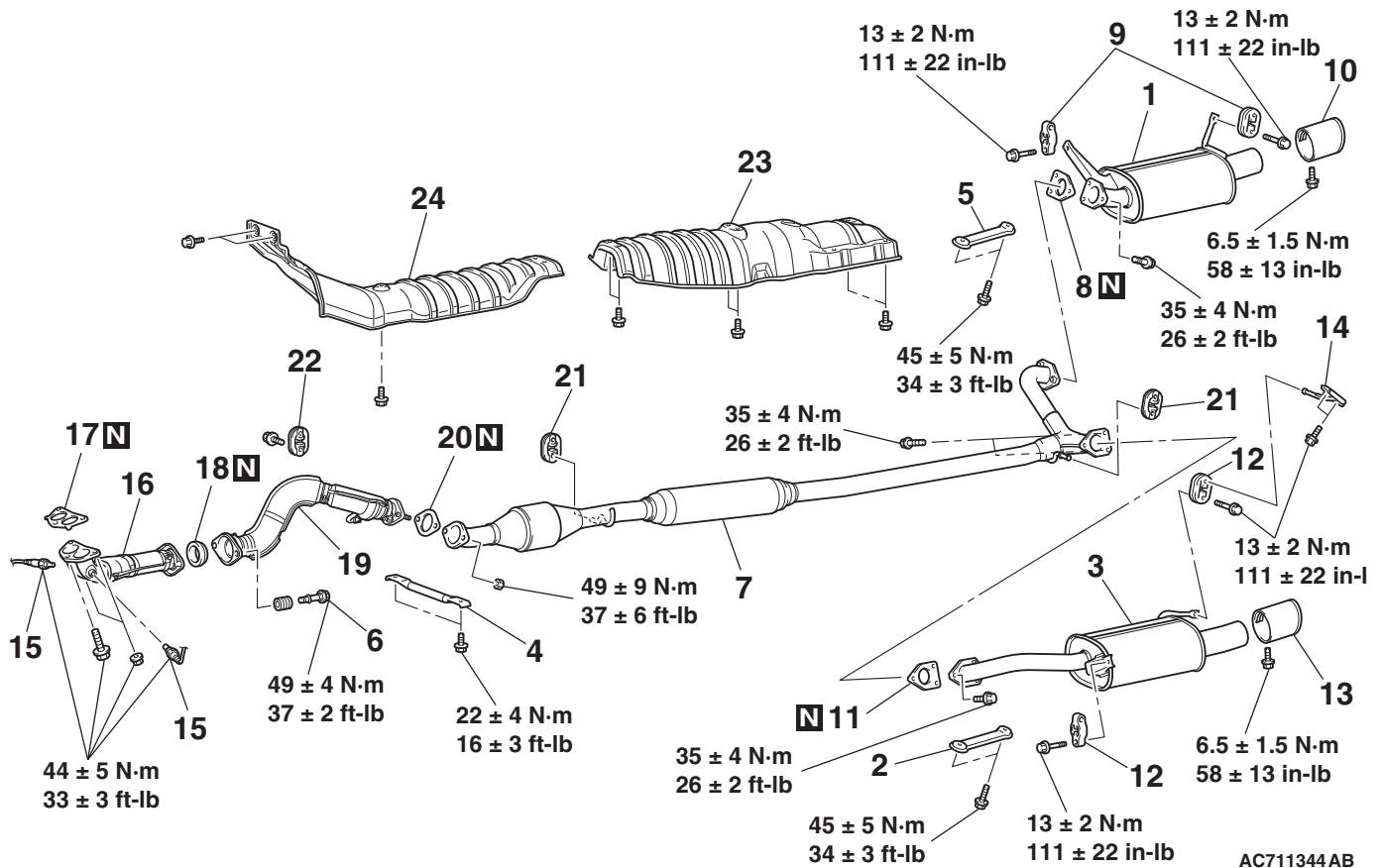
1. Check for damage or cracking of any part.
2. Using a straight edge and a feeler gauge, check for distortion of the cylinder head installation surface.

**Standard value: 0.15 mm (0.006 inch) or less**

**Limit: 0.20 mm (0.008 inch)**

**EXHAUST PIPE AND MAIN MUFFLER****REMOVAL AND INSTALLATION <2.4L ENGINE>**

M1151008702493



AC711344AB

**MAIN MUFFLER REMOVAL  
STEPS <RH>**

1. MAIN MUFFLER
8. GASKET
9. HANGER
10. EXHAUST TAIL PIPE DIFFUSER

**MAIN MUFFLER REMOVAL  
STEPS <LH>**

2. CROSSMEMBER STAY
3. MAIN MUFFLER
11. GASKET
12. HANGER
13. EXHAUST TAIL PIPE DIFFUSER
14. BRACKET

**CENTER EXHAUST PIPE  
REMOVAL STEPS**

4. FRONT FLOOR BACKBONE  
BRACE
5. CROSSMEMBER STAY
6. FRONT NO.2 EXHAUST PIPE  
BOLT

&lt;&lt;A&gt;&gt; &gt;&gt;A&lt;&lt;

**CENTER EXHAUST PIPE  
REMOVAL STEPS (Continued)**

7. CENTER EXHAUST PIPE
8. GASKET
11. GASKET
20. GASKET
21. HANGER
23. CENTER UNDER FLOOR HEAT  
PROTECTOR
24. FRONT UNDER FLOOR HEAT  
PROTECTOR

**FRONT EXHAUST PIPE  
REMOVAL STEPS**

15. HEATED OXYGEN SENSOR
16. FRONT NO.1 EXHAUST PIPE
17. GASKET
18. SEAL RING
19. FRONT NO.2 EXHAUST PIPE
20. GASKET
22. HANGER

**Required Special Tool:**

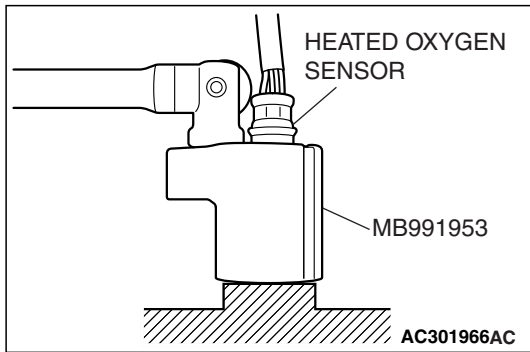
- MB991953: Oxygen Sensor Wrench



## REMOVAL SERVICE POINT

### <<A>> HEATED OXYGEN SENSOR REMOVAL

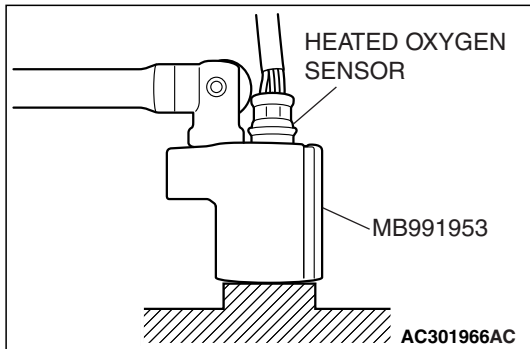
Use special tool MB991953 to remove the heated oxygen sensor.



## INSTALLATION SERVICE POINT

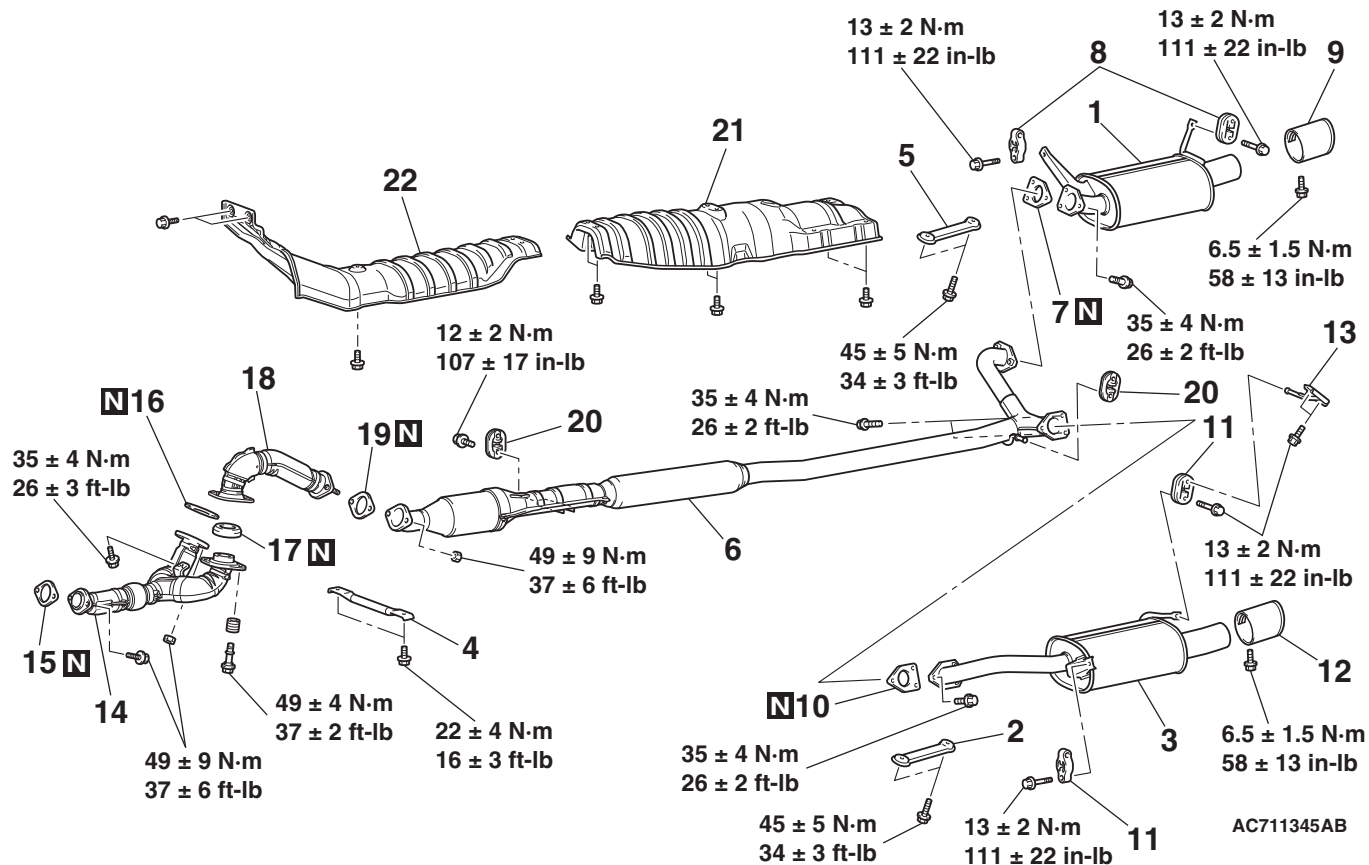
### >>A<< HEATED OXYGEN SENSOR INSTALLATION

Use special tool MB991953 to install the heated oxygen sensor.



## REMOVAL AND INSTALLATION &lt;3.8L ENGINE&gt;

M1151008702266

**MAIN MUFFLER REMOVAL  
STEPS <RH>**

1. MAIN MUFFLER
7. GASKET
8. HANGER
9. EXHAUST TAIL PIPE DIFFUSER

**MAIN MUFFLER REMOVAL  
STEPS <LH>**

2. CROSSMEMBER STAY
3. MAIN MUFFLER
10. GASKET
11. HANGER
12. EXHAUST TAIL PIPE DIFFUSER
13. BRACKET

**CENTER EXHAUST PIPE  
REMOVAL STEPS**

4. FRONT FLOOR BACKBONE  
BRACE
5. CROSSMEMBER STAY

**CENTER EXHAUST PIPE  
REMOVAL STEPS (Continued)**

6. CENTER EXHAUST PIPE
7. GASKET
10. GASKET
19. GASKET
20. HANGER
21. CENTER UNDER FLOOR HEAT  
PROTECTOR
22. FRONT UNDER FLOOR HEAT  
PROTECTOR

**FRONT EXHAUST PIPE  
REMOVAL STEPS**

14. FRONT NO.1 EXHAUST PIPE
15. GASKET
16. GASKET
17. SEAL RING
18. FRONT NO.2 EXHAUST PIPE
19. GASKET

# SPECIFICATIONS

## FASTENER TIGHTENING SPECIFICATIONS

M1151006800711

| ITEM   |     | SPECIFICATION                |
|--|-----|------------------------------|
| <b>Air cleaner &lt;2.4L ENGINE&gt;</b>                         |     |                              |
| Air cleaner air intake hose clamp bolt                         |     | 4.0 ± 0.9 N·m (35 ± 8 in-lb) |
| Air cleaner bolt   |     | 8.8 ± 1.0 N·m (78 ± 9 in-lb) |
| Air cleaner bracket bolt and nut                               |     | 12 ± 2 N·m (102 ± 22 in-lb)  |
| Air cleaner resonator bolt                                     |     | 8.8 ± 1.0 N·m (78 ± 9 in-lb) |
| Air cleaner resonator to engine bolt                           |     | 3.0 ± 0.5 N·m (27 ± 4 in-lb) |
| Mass airflow sensor screw                                      |     | 1.5 ± 0.3 N·m (13 ± 2 in-lb) |
| <b>Air cleaner &lt;3.8L ENGINE&gt;</b>                         |     |                              |
| Air cleaner air intake hose clamp bolt                         |     | 4.0 ± 0.9 N·m (35 ± 8 in-lb) |
| Air cleaner bolt   |     | 8.8 ± 1.0 N·m (78 ± 9 in-lb) |
| Air cleaner bracket bolt and nut                               |     | 12 ± 2 N·m (102 ± 22 in-lb)  |
| Air cleaner resonator bolt                                     |     | 8.8 ± 1.0 N·m (78 ± 9 in-lb) |
| Mass airflow sensor screw                                      |     | 1.5 ± 0.3 N·m (13 ± 2 in-lb) |
| <b>Exhaust manifold &lt;2.4L ENGINE&gt;</b>                    |     |                              |
| Exhaust manifold bracket A bolt                                |     | 35 ± 6 N·m (26 ± 4 ft-lb)    |
| Exhaust manifold bracket B bolt                                |     | 59 ± 10 N·m (44 ± 7 ft-lb)   |
| Exhaust manifold cover bolt                                    |     | 14 ± 1 N·m (120 ± 13 in-lb)  |
| Exhaust manifold nut   |     | 49 ± 5 N·m (36 ± 4 ft-lb)    |
| Heated oxygen sensor   |     | 44 ± 5 N·m (33 ± 3 ft-lb)    |
| <b>Exhaust manifold &lt;Left bank&gt; &lt;3.8L ENGINE&gt;</b>  |     |                              |
| Exhaust manifold nut   |     | 44 ± 5 N·m (33 ± 3 ft-lb)    |
| Exhaust manifold stay, left bolt                               | M8  | 19 ± 3 N·m (14 ± 2 ft-lb)    |
|  | M10 | 44 ± 8 N·m (33 ± 5 ft-lb)    |
| Front exhaust pipe bolt  |     | 49 ± 9 N·m (37 ± 6 ft-lb)    |
| Heat protector bolt  |     | 14 ± 1 N·m (120 ± 13 in-lb)  |
| Heated oxygen sensor   |     | 44 ± 5 N·m (33 ± 3 ft-lb)    |
| <b>Exhaust manifold &lt;Right bank&gt; &lt;3.8L ENGINE&gt;</b> |     |                              |
| EGR pipe   |     | 59 ± 10 N·m (44 ± 7 ft-lb)   |
| EGR pipe clamp bolt  |     | 19 ± 3 N·m (14 ± 2 ft-lb)    |
| EGR pipe connecting nut  |     | 19 ± 3 N·m (14 ± 2 ft-lb)    |
| Exhaust manifold nut   |     | 44 ± 5 N·m (33 ± 3 ft-lb)    |
| Exhaust manifold stay, right A bolt                            |     | 75 ± 10 N·m (55 ± 7 ft-lb)   |
| Exhaust manifold stay, right B bolt                            |     | 44 ± 8 N·m (33 ± 5 ft-lb)    |
| Heat protector bolt  |     | 14 ± 1 N·m (120 ± 13 in-lb)  |
| Heated oxygen sensor   |     | 44 ± 5 N·m (33 ± 3 ft-lb)    |
| <b>Exhaust pipe and main muffler &lt;2.4L ENGINE&gt;</b>       |     |                              |
| Center exhaust pipe nut  |     | 49 ± 9 N·m (37 ± 6 ft-lb)    |

| ITEM   | SPECIFICATION                 |
|--|-------------------------------|
| Crossmember stay bolt                                      | 45 ± 5 N·m (34 ± 3 ft-lb)     |
| Exhaust tail pipe diffuser bolt                            | 6.5 ± 1.5 N·m (58 ± 13 in-lb) |
| Front floor backbone brace bolt                            | 22 ± 4 N·m (16 ± 3 ft-lb)     |
| Front no.1 exhaust pipe bolt and nut                       | 44 ± 5 N·m (33 ± 3 ft-lb)     |
| Front no.2 exhaust pipe bolt                               | 49 ± 4 N·m (37 ± 2 ft-lb)     |
| Hanger bolt <Vehicles With Dual Muffler>                   | 13 ± 2 N·m (111 ± 22 in-lb)   |
| Hanger bolt <Vehicles With Single Muffler>                 | 12 ± 2 N·m (107 ± 17 in-lb)   |
| Heated oxygen sensor                                       | 44 ± 5 N·m (33 ± 3 ft-lb)     |
| Main muffler bolt <Vehicles With Dual Muffler>             | 35 ± 4 N·m (26 ± 2 ft-lb)     |
| Main muffler bolt <Vehicles With Single Muffler>           | 49 ± 4 N·m (37 ± 2 ft-lb)     |
| <b>Exhaust pipe and main muffler &lt;3.8L ENGINE&gt;</b>   |                               |
| Center exhaust pipe nut                                    | 49 ± 9 N·m (37 ± 6 ft-lb)     |
| Crossmember stay bolt                                      | 45 ± 5 N·m (34 ± 3 ft-lb)     |
| Exhaust tail pipe diffuser bolt                            | 6.5 ± 1.5 N·m (58 ± 13 in-lb) |
| Front floor backbone brace bolt                            | 22 ± 4 N·m (16 ± 3 ft-lb)     |
| Front no.1 exhaust pipe bolt                               | 35 ± 4 N·m (26 ± 3 ft-lb)     |
| Front no.1 exhaust pipe to front no.2 exhaust pipe bolt    | 49 ± 4 N·m (37 ± 2 ft-lb)     |
| Front no.1 exhaust pipe to left bank exhaust manifold bolt | 49 ± 9 N·m (37 ± 6 ft-lb)     |
| Front no.1 exhaust pipe to right bank exhaust manifold nut | 49 ± 9 N·m (37 ± 6 ft-lb)     |
| Hanger bolt (Center exhaust pipe)                          | 12 ± 2 N·m (107 ± 17 in-lb)   |
| Hanger bolt (Main muffler)                                 | 13 ± 2 N·m (111 ± 22 in-lb)   |
| Main muffler bolt  | 35 ± 4 N·m (26 ± 2 ft-lb)     |
| <b>Intake manifold &lt;2.4L ENGINE&gt;</b>                 |                               |
| Engine oil dipstick guide bolt                             | 13 ± 1 N·m (115 ± 9 in-lb)    |
| Evaporative emission purge solenoid valve bolt             | 5.0 ± 1.0 N·m (44 ± 9 in-lb)  |
| Exhaust gas recirculation valve bolt                       | 24 ± 3 N·m (18 ± 2 ft-lb)     |
| Harness clamp bracket bolt                                 | 11 ± 1 N·m (98 ± 8 in-lb)     |
| Intake manifold bolt                                       | 24 ± 3 N·m (18 ± 2 ft-lb)     |
| Intake manifold nut  | 20 ± 2 N·m (15 ± 1 ft-lb)     |
| Intake manifold stay bolt                                  | 31 ± 3 N·m (23 ± 2 ft-lb)     |
| Knock sensor connector bracket bolt                        | 11 ± 1 N·m (98 ± 8 in-lb)     |
| Manifold absolute pressure sensor bolt                     | 5.0 ± 1.0 N·m (44 ± 9 in-lb)  |
| Pressure hose clamp bolt                                   | 12 ± 2 N·m (102 ± 22 in-lb)   |
| Resonator bolt   | 11 ± 1 N·m (98 ± 8 in-lb)     |
| Thermostat case assembly bolt                              | 24 ± 4 N·m (18 ± 3 ft-lb)     |
| <b>Intake manifold &lt;3.8L ENGINE&gt;</b>                 |                               |
| Engine mounting stay bolt                                  | 41 ± 6 N·m (31 ± 4 ft-lb)     |
| Fuel rail and injector bolt                                | 12 ± 1 N·m (102 ± 13 in-lb)   |
| Intake manifold bolt                                       | 22 ± 1 N·m (16 ± 1 ft-lb)     |
| Oil feeder control valve pipe bolt                         | 11 ± 1 N·m (98 ± 8 in-lb)     |

| ITEM  |     | SPECIFICATION                |
|---|-----|------------------------------|
| Timing belt front upper cover bolt                | M6  | 11 ± 1 N·m (98 ± 8 in-lb)    |
|   | M8  | 14 ± 1 N·m (120 ± 13 in-lb)  |
| Water pump bracket bolt                           |     | 24 ± 3 N·m (18 ± 2 ft-lb)    |
| <b>Intake manifold plenum &lt;3.8L ENGINE&gt;</b> |     |                              |
| EGR pipe  |     | 59 ± 10 N·m (44 ± 7 ft-lb)   |
| EGR pipe clamp bolt                               |     | 19 ± 3 N·m (14 ± 2 ft-lb)    |
| EGR pipe connection nut                           |     | 19 ± 3 N·m (14 ± 2 ft-lb)    |
| Evaporative emission purge solenoid bolt          |     | 5.0 ± 1.0 N·m (44 ± 9 in-lb) |
| Engine cover bracket bolt                         |     | 11 ± 1 N·m (98 ± 8 in-lb)    |
| Exhaust gas recirculation valve bolt              |     | 24 ± 3 N·m (18 ± 2 ft-lb)    |
| Harness bracket bolt                              |     | 11 ± 1 N·m (98 ± 8 in-lb)    |
| Intake manifold plenum bolt                       |     | 22 ± 1 N·m (16 ± 1 ft-lb)    |
| Intake manifold plenum stay bolt                  | M8  | 22 ± 1 N·m (16 ± 1 ft-lb)    |
|   | M10 | 49 ± 6 N·m (37 ± 4 ft-lb)    |
| Manifold absolute pressure sensor bolt            |     | 5.0 ± 1.0 N·m (44 ± 9 in-lb) |
| Power steering oil pump bracket connecting bolt   |     | 41 ± 8 N·m (30 ± 6 ft-lb)    |
| Power steering pressure hose clamp bracket bolt   |     | 12 ± 2 N·m (102 ± 22 in-lb)  |
| Power steering pressure hose clamp nut            |     | 12 ± 2 N·m (102 ± 22 in-lb)  |
| Throttle body stay bolt                           |     | 22 ± 1 N·m (16 ± 1 ft-lb)    |

## SEALANTS

M1151000500273

| ITEM                          | SPECIFIED SEALANT   |
|-------------------------------|---|
| Thermostat case assembly      | 3M™ AAD Part No.8672, 3M™ AAD Part No.8679/8678 or equivalent |
| Thermostat case assembly bolt | 3M™ AAD Part No. 8730, 8731 or equivalent                     |

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## NOTES