# GROUP 15

# INTAKE AND EXHAUST

## CONTENTS

# GENERAL DESCRIPTION

M1151000100639

The exhaust pipe is divided into four parts.

# INTAKE AND EXHAUST DIAGNOSIS

## INTRODUCTION

M1151006900343

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

M1151007000343

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

M1151007100340

| 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.**

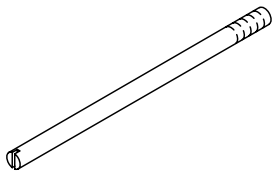
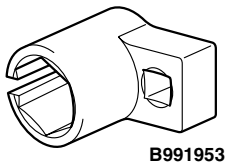
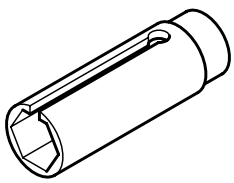
**Q: Are any heat protectors loose or damaged?**
**YES :** Tighten or replace, then go to Step 1.
**NO :** Go to Step 6.

**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

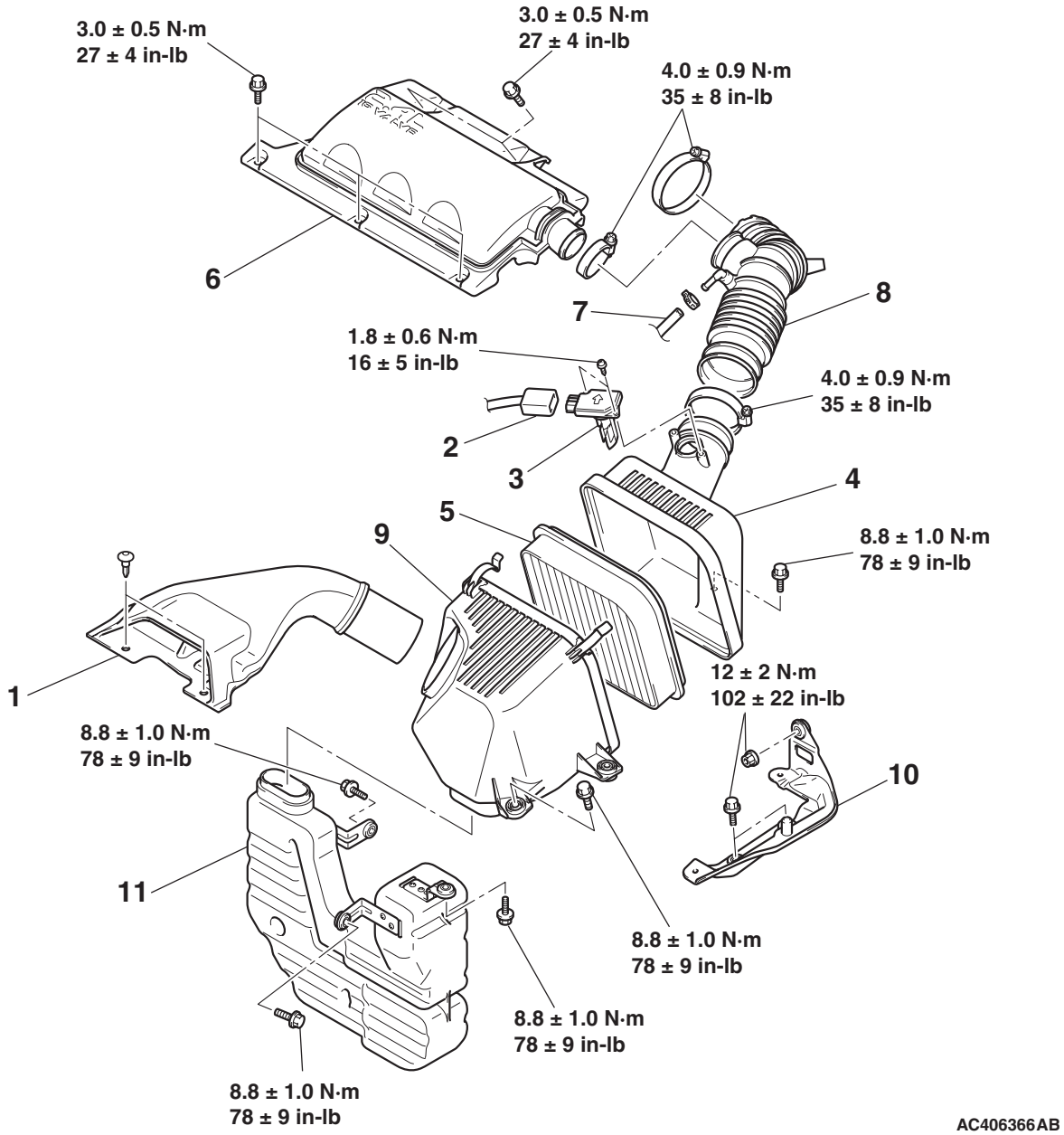
M1151000600571

| TOOL | TOOL NUMBER AND NAME | SUPERSESSION | APPLICATION |
|---|---|---|---|
|  | MD998412<br>Guide | MD998412 | Installation of intake manifold plenum |
|  <br>B991953 | 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>

M1151002100925

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**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-1214].

9. AIR CLEANER BODY
10. AIR CLEANER BRACKET

- UNDER COVER (LH) (REFER TO GROUP 51, UNDER COVER P.51-8).

11. AIR CLEANER RESONATOR

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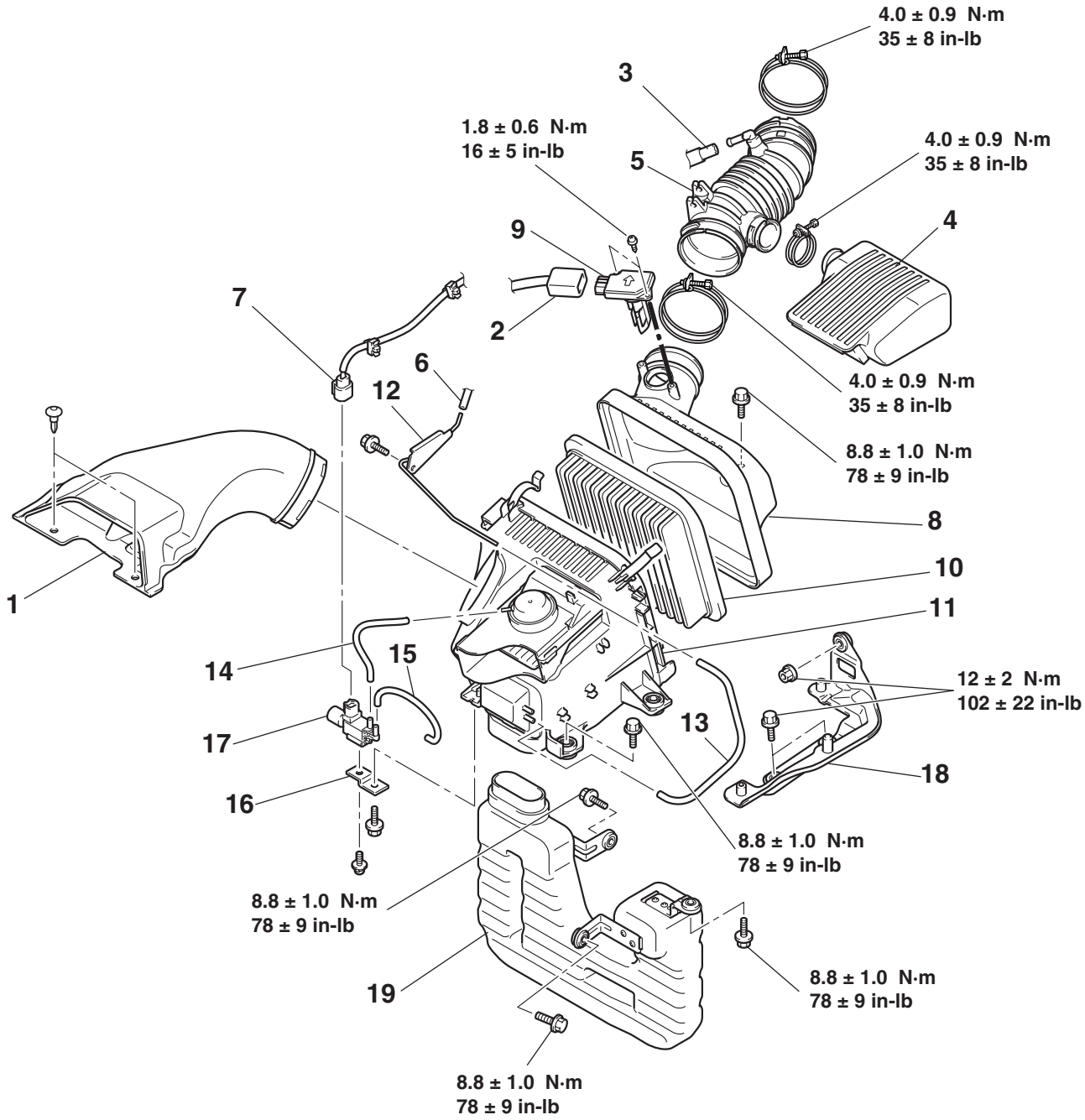
## REMOVAL AND INSTALLATION <3.8L ENGINE>

M1151002100862

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**REMOVAL STEPS**

1. AIR CLEANER INTAKE DUCT
2. MASS AIRFLOW SENSOR CONNECTOR
3. BREATHER HOSE CONNECTION
4. AIR CLEANER RESONATOR
5. AIR CLEANER TO THROTTLE BODY DUCT
6. VACUUM HOSE CONNECTION
7. VARIABLE INTAKE AIR CONTROL SOLENOID VALVE CONNECTOR

**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-1295].

8. AIR CLEANER COVER
9. MASS AIRFLOW SENSOR
10. AIR CLEANER ELEMENT
11. AIR CLEANER BODY
12. VACUUM PIPE
13. VACUUM HOSE

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**REMOVAL STEPS (Continued)**

14. VACUUM HOSE
15. VACUUM HOSE
16. SOLENOID VALVE STAY
17. VARIABLE INTAKE AIR CONTROL SOLENOID VALVE
18. AIR CLEANER BRACKET
- 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-420).

19. AIR CLEANER RESONATOR

## INSPECTION

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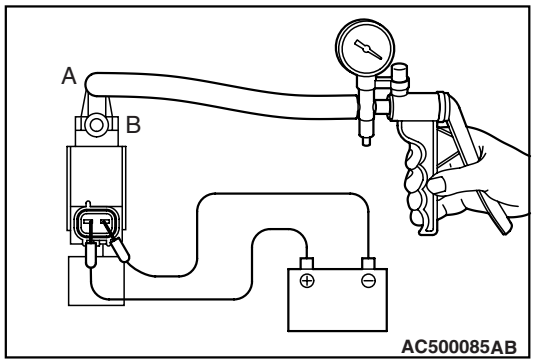
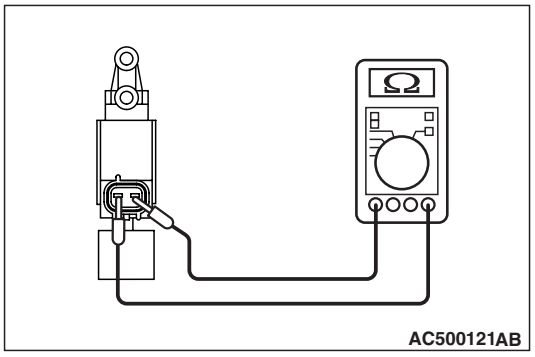
### VARIABLE INTAKE AIR CONTROL SOLENOID CHECK




1. Connect a hand vacuum pump to nipple (A) of the solenoid.
2. Check air tightness by applying a vacuum with voltage applied directly from the battery to the variable intake air control solenoid and without applying voltage.

| BATTERY VOLTAGE | NORMAL CONDITION |
|---|---|
| Applied | Vacuum maintained |
| Not applied | Vacuum leaks |




3. Measure the resistance between the terminals of the solenoid.

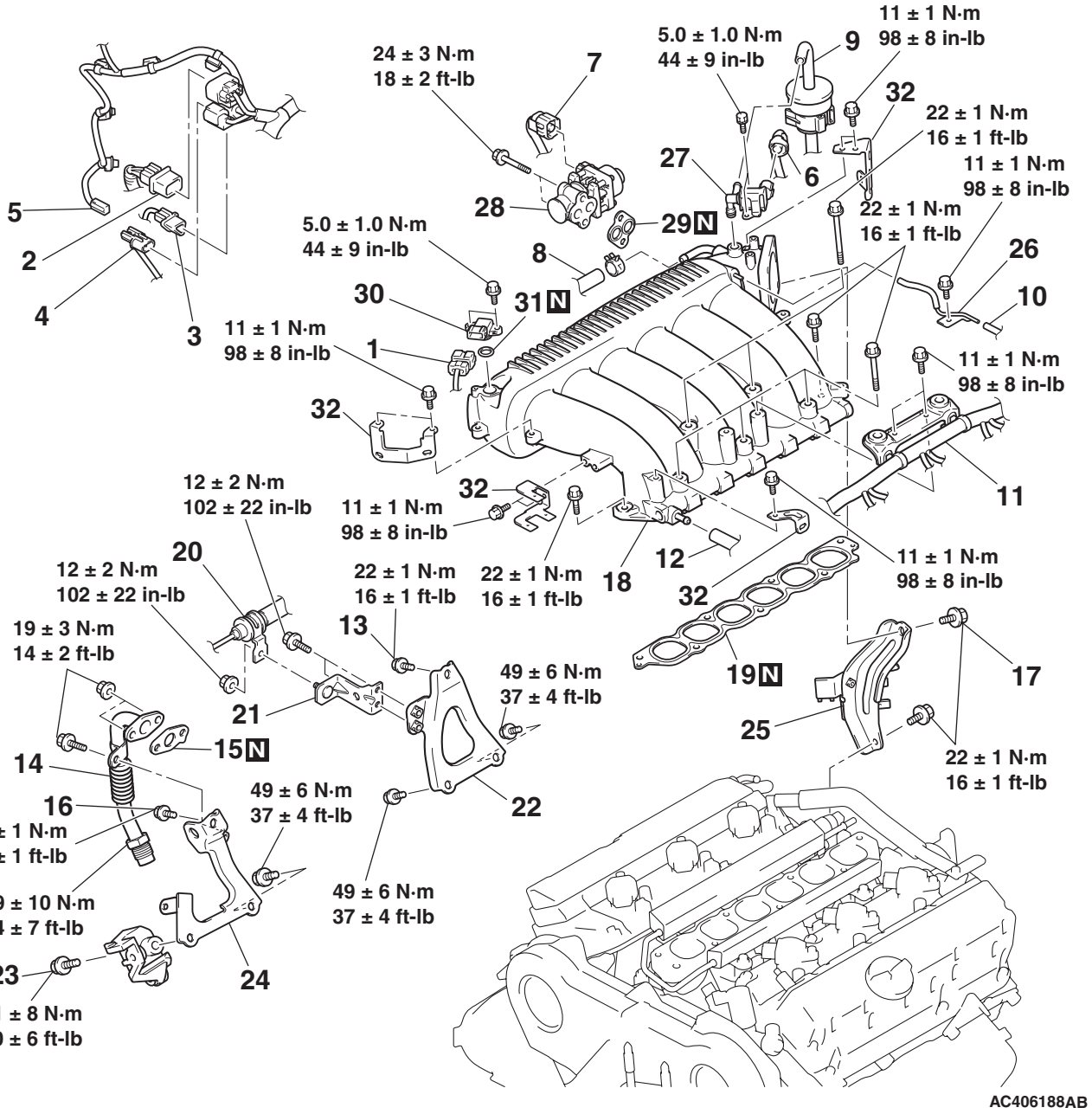
**Standard value: 29 – 35 Ω [at 20° C (68° F)]**

# INTAKE MANIFOLD PLENUM

## REMOVAL AND INSTALLATION <3.8L ENGINE>

M1151002700228

| Pre-removal Operation | Post-installation Operation |
|---|---|
| • Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-22).<br>• Strut Tower Bar Removal (Refer to GROUP 42, Strut Tower Bar P.42-12).<br>• Air Cleaner Cover and Air Cleaner to Throttle Body Duct Removal (Refer to P.15-5).<br>• Throttle Body Removal (Refer to GROUP 13B, Throttle Body P.13B-1293). | • Throttle Body Installation (Refer to GROUP 13B, Throttle Body P.13B-1293).<br>• Air Cleaner Cover and Air Cleaner to Throttle Body Duct Installation (Refer to P.15-5).<br>• Strut Tower Bar Installation (Refer to GROUP 42, Strut Tower Bar P.42-12).<br>• Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-22). |

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**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. VACUUM HOSE CONNECTION
11. CONTROL WIRING HARNESS AND ENGINE COVER BRACKET ASSEMBLY
12. PCV HOSE CONNECTION
13. INTAKE MANIFOLD PLENUM STAY (REAR) CONNECTING BOLT
14. EGR PIPE
15. EGR PIPE GASKET
16. INTAKE MANIFOLD PLENUM STAY (FRONT) CONNECTING BOLT
17. THROTTLE BODY STAY CONNECTING BOLT

**REMOVAL STEPS (Continued)**

>>**B**<<
18. INTAKE MANIFOLD PLENUM
19. INTAKE MANIFOLD PLENUM GASKET
20. POWER STEERING PRESSURE HOSE CLAMP
21. POWER STEERING PRESSURE HOSE CLAMP BRACKET
22. 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.37-57).

23. POWER STEERING OIL PUMP BRACKET CONNECTING BOLT
24. INTAKE MANIFOLD PLENUM STAY (FRONT)
25. THROTTLE BODY STAY
26. VACUUM PIPE AND HOSE ASSEMBLY
27. EVAPORATIVE EMISSION PURGE SOLENOID
28. EXHAUST GAS RECIRCULATION VALVE

>>**A**<<
29. EXHAUST GAS RECIRCULATION VALVE GASKET
30. MANIFOLD ABSOLUTE PRESSURE SENSOR
31. O-RING
32. HARNESS BRACKET

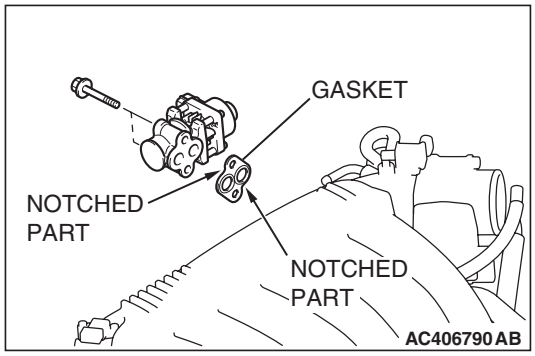
**Required Special Tool:**

- MD998412: Guide

## INSTALLATION SERVICE POINTS

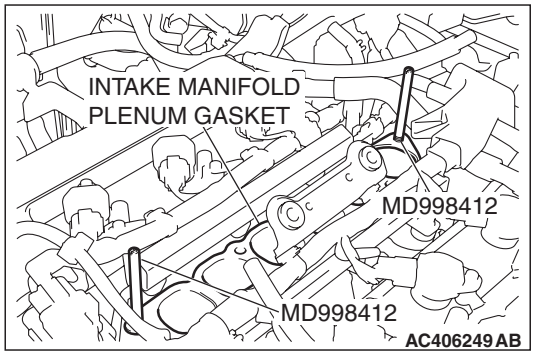
### >>A<< EXHAUST GAS RECIRCULATION VALVE GASKET INSTALLATION

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.

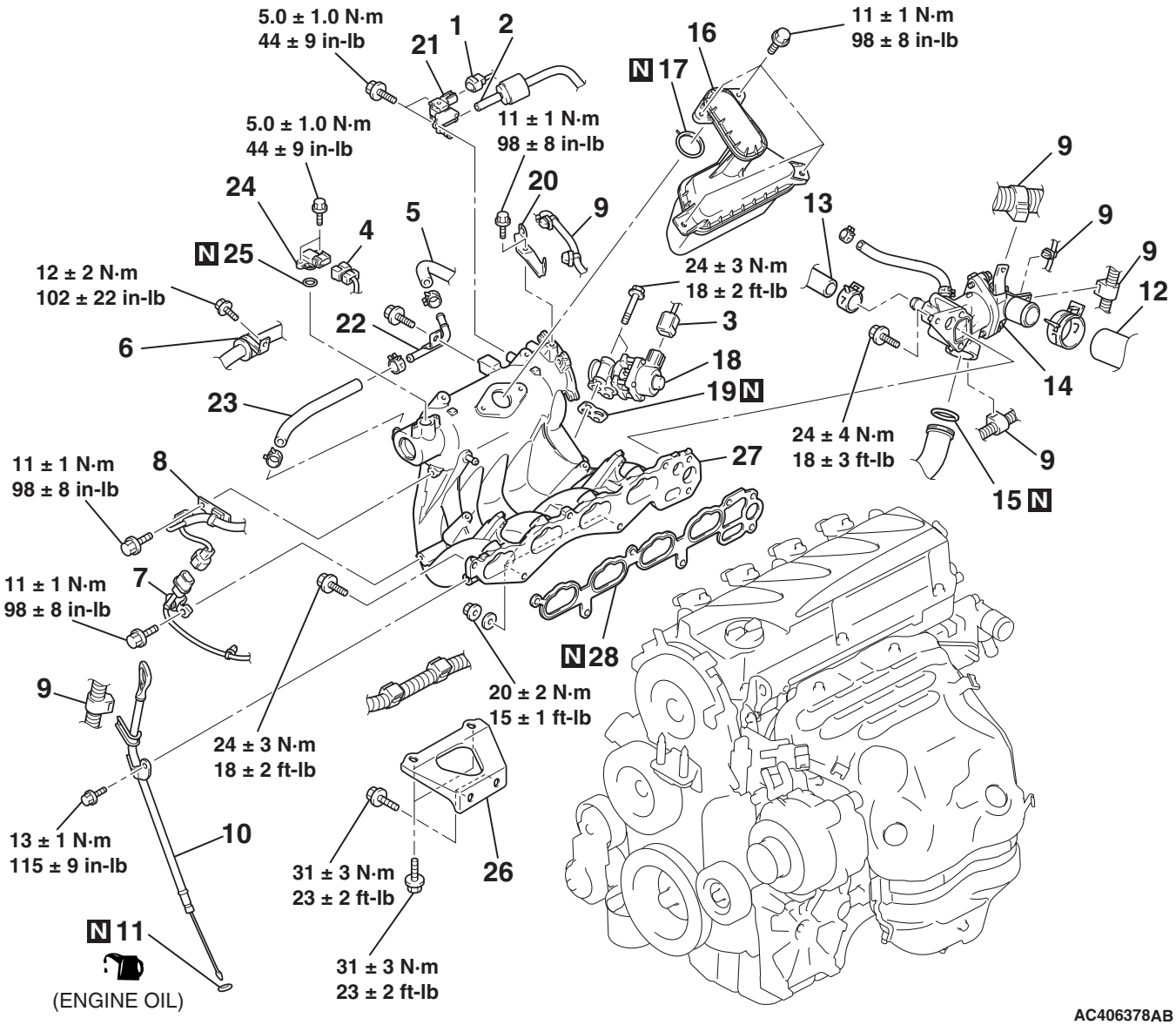


# INTAKE MANIFOLD

## REMOVAL AND INSTALLATION <2.4L ENGINE>

M1151003001388

| Pre-removal Operation | Post-installation Operation |
|---|---|
| • Fuel Line Pressure Reduction [Refer to GROUP 13A, On-vehicle Service –Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) P.13A-1200].<br>• Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service –Engine Coolant Replacement P.14-22).<br>• Air Cleaner Cover and Air Intake Hose Removal (Refer to P.15-5).<br>• Throttle Body Removal (Refer to GROUP 13A, Throttle Body P.13A-1212).<br>• Delivery Pipe and Injector Assembly Removal (Refer to GROUP 13A, Injector P.13A-1209). | • Delivery Pipe and Injector Assembly Installation (Refer to GROUP 13A, Injector P.13A-1209).<br>• Throttle Body Installation (Refer to GROUP 13A, Throttle Body P.13A-1212).<br>• Air Cleaner Cover and Air Intake Hose Installation (Refer to P.15-5).<br>• 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. 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

13. HEATER WATER HOSE CONNECTION

**REMOVAL STEPS (Continued)**

**>>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

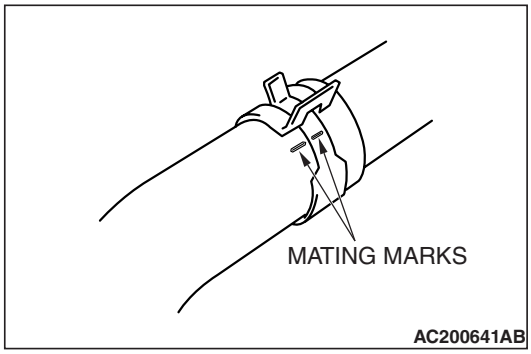
**>>A<<** 23. BRAKE BOOSTER VACUUM HOSE

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

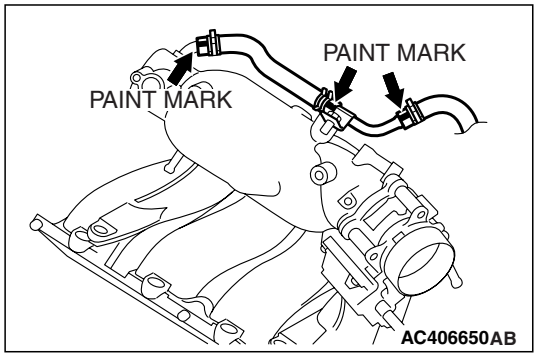
Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.



## INSTALLATION SERVICE POINTS

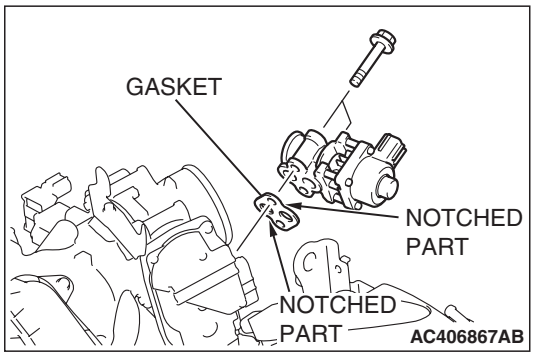
### >>A<< BRAKE BOOSTER VACUUM HOSE CONNECTION

Insert vacuum hose with its paint mark facing upward.




### >>B<< EXHAUST GAS RECIRCULATION VALVE GASKET INSTALLATION

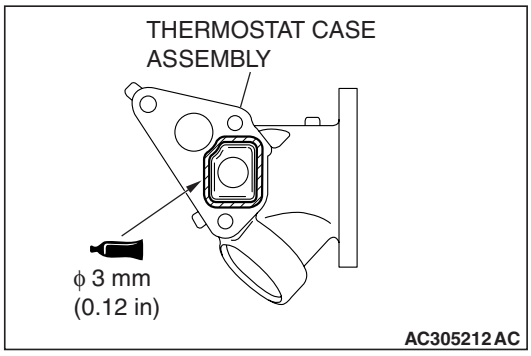
Install the exhaust gas recirculation valve gasket as shown in the illustration.

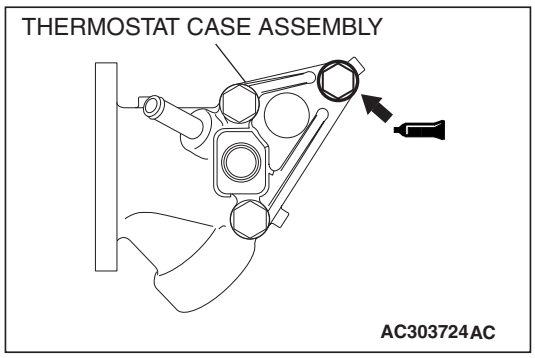



### >>C<< THERMOSTAT CASE ASSEMBLY INSTALLATION

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**



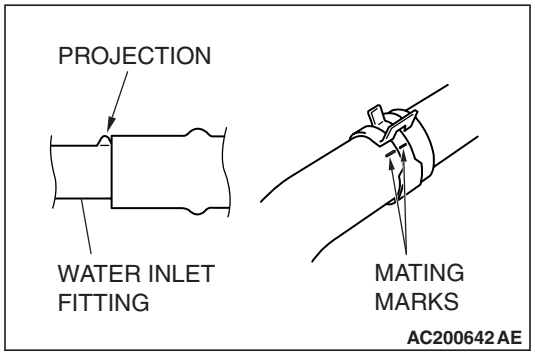



3. Apply sealant to the thread of the thermostat case assembly bolts as shown.

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

4. With the sealant still wet (within 15 minutes after the sealant is applied), install the thermostat case assembly. Do not apply the sealant in an area more than the required.

## >>D<< RADIATOR LOWER HOSE CONNECTION

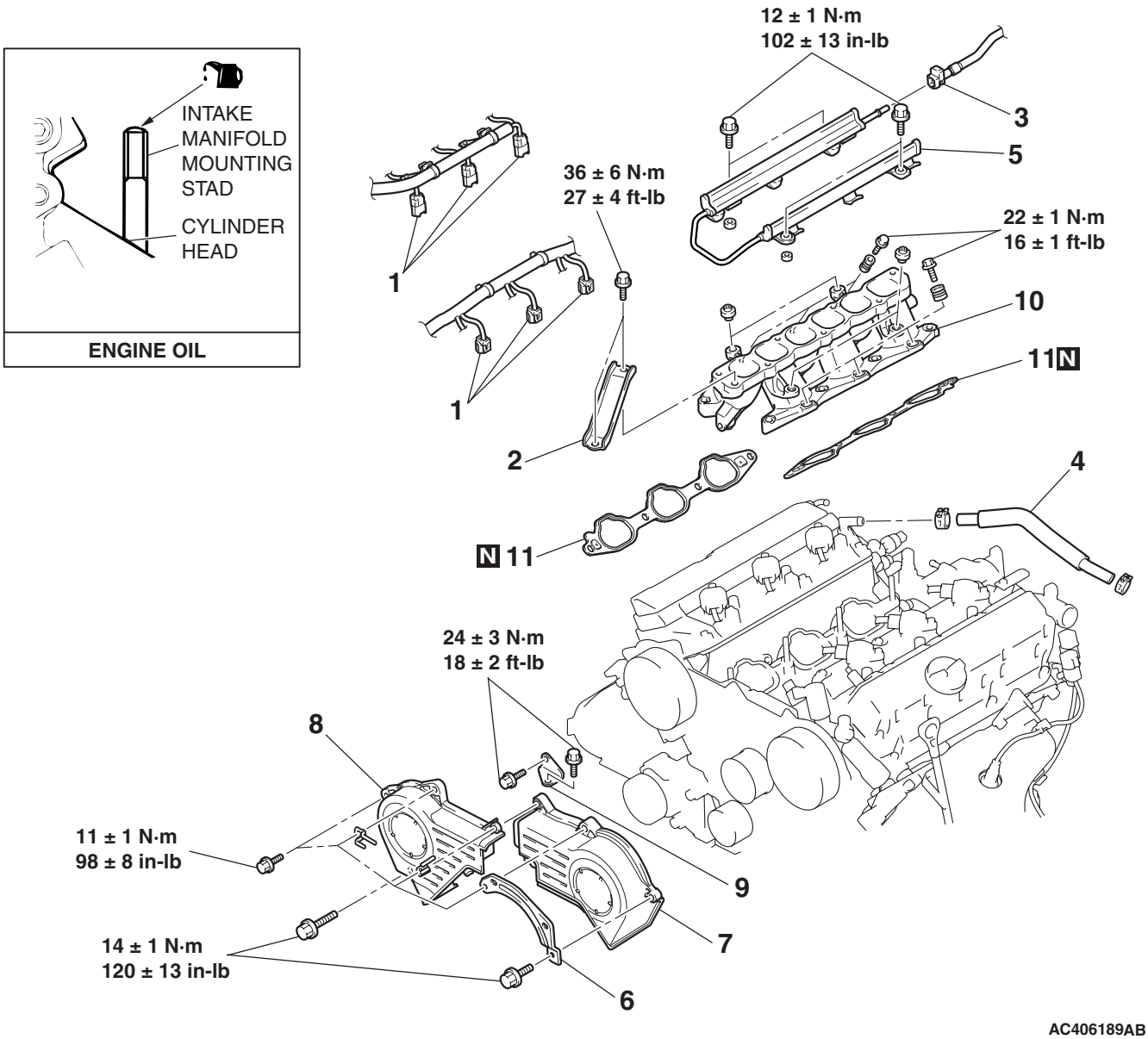



1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

## REMOVAL AND INSTALLATION <3.8L ENGINE>

M1151003001430

| Pre-removal Operation | Post-installation Operation |
|---|---|
| • Fuel Discharge Prevention [Refer to GROUP 13B, On-vehicle Service –Fuel Pump Relay Disconnection (How to Reduce Pressurized Fuel Lines) P.13B-1283].<br>• Intake Manifold Plenum Removal (Refer to P.15-7). | • Intake Manifold Plenum Installation (Refer to P.15-7).<br>• Fuel Leakage Inspection |

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**REMOVAL STEPS**

1. INJECTOR CONNECTOR
2. ENGINE MOUNTING STAY
<<A>> >>C<< 3. FUEL HIGH-PRESSURE HOSE CONNECTION
4. PCV HOSE CONNECTION
<<B>> 5. FUEL RAIL AND INJECTOR
6. HARNESS BRACKET

**REMOVAL STEPS (Continued)**

7. TIMING BELT FRONT UPPER COVER, LEFT
8. TIMING BELT FRONT UPPER COVER, RIGHT
9. WATER PUMP BRACKET
>>B<< 10. INTAKE MANIFOLD
>>A<< 11. INTAKE MANIFOLD GASKET

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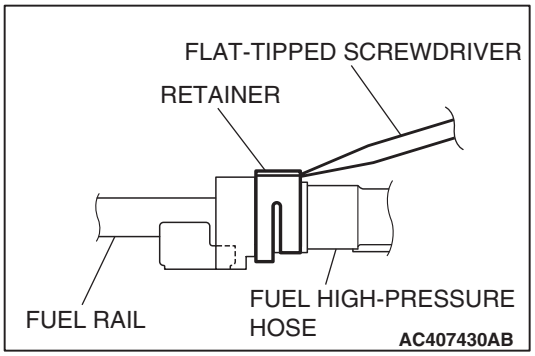
## REMOVAL SERVICE POINTS

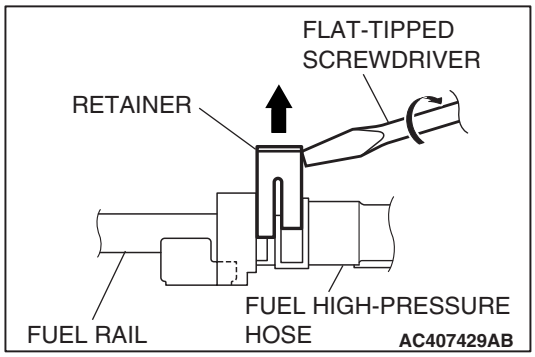
### <<A>> FUEL HIGH-PRESSURE HOSE DISCONNECTION

**⚠ CAUTION**
**Do not kink the fuel high-pressure hose as it is made of plastic and will become damage.**

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° to the arrowed direction, and lift the retainer to unlock and disconnect the fuel high-pressure hose.




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

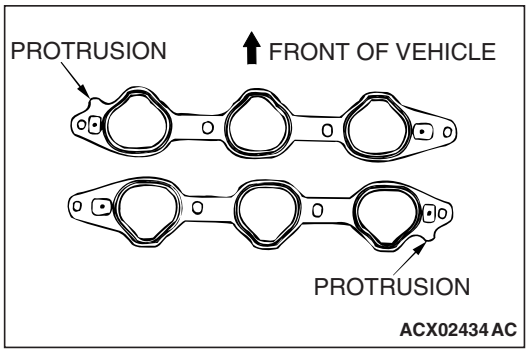
**⚠ CAUTION**
**Care must be taken when removing the fuel rail not to drop the injector.**

Remove the fuel rail with the injectors attached to it.

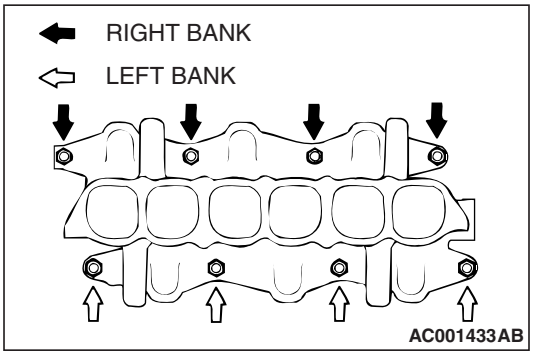
## INSTALLATION SERVICE POINTS

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

Install the gasket with the protrusions in the position illustrated.



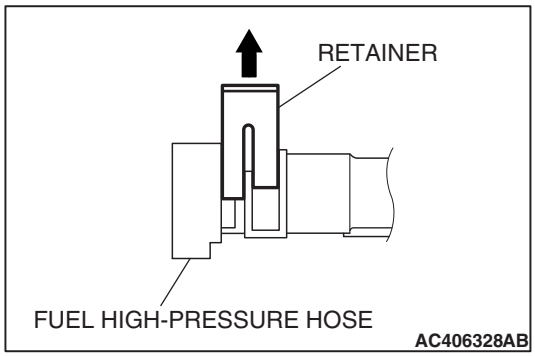
## >>B<< INTAKE MANIFOLD INSTALLATION



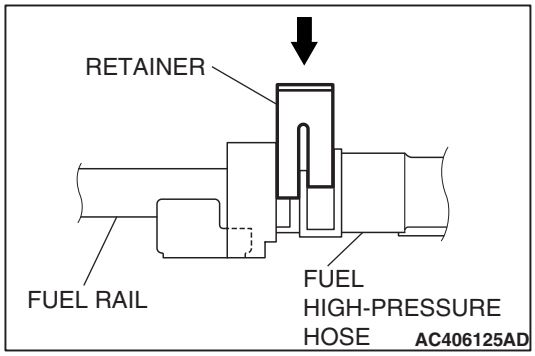

1. Coat the intake manifold mounting studs with engine oil.
2. Tighten the intake manifold mounting nuts by the following procedure.

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

## >>C<< 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

M1151003100791

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

### Intake Manifold Check

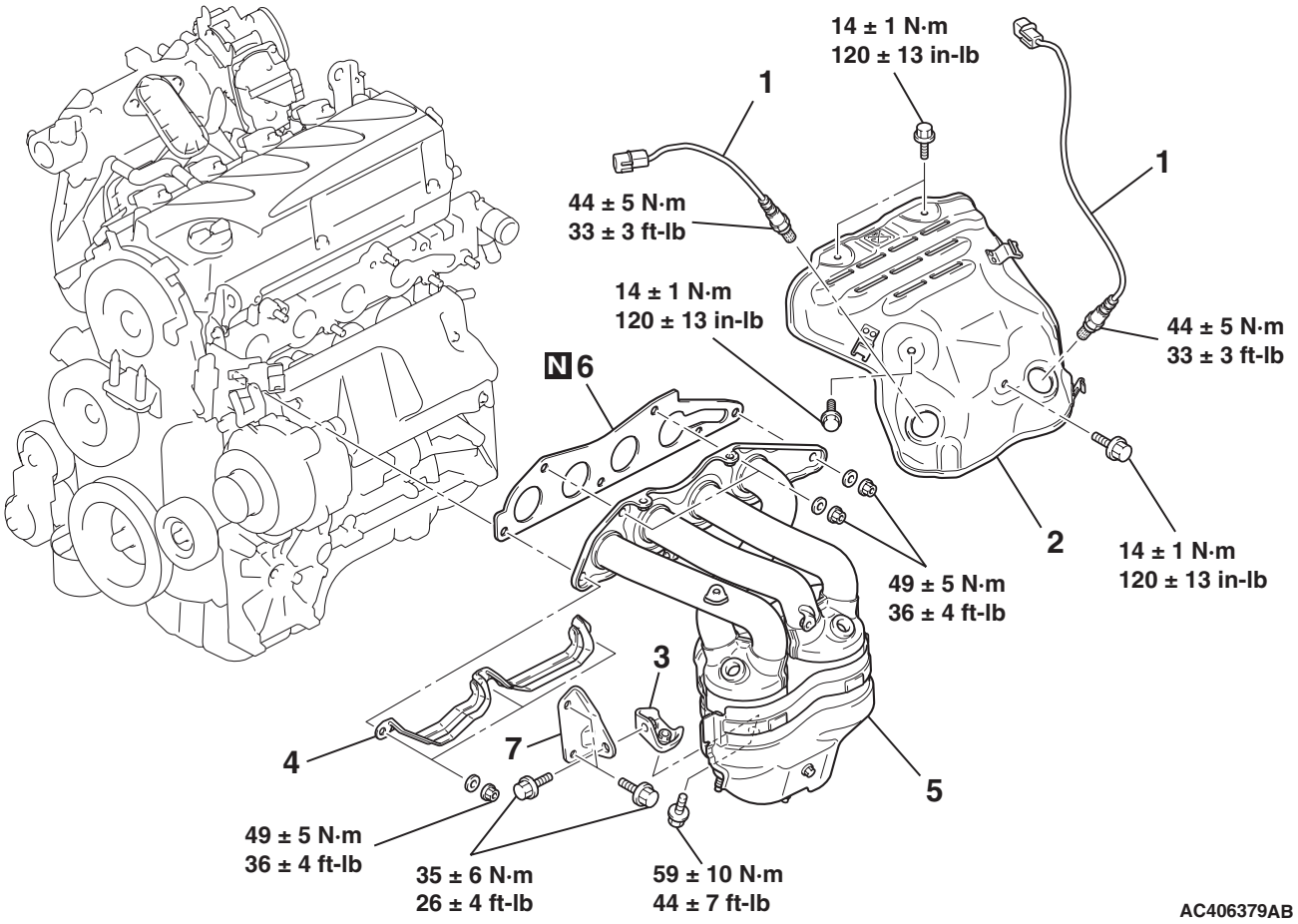
1. Check for damage or cracking of any part.
2. Clogging of the negative pressure (vacuum) outlet port, or clogging of the exhaust gas recirculation passages.
3. Using a straight edge and feeler gauge, check for distortion of the cylinder head installation surface.

**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




**REMOVAL STEPS**

<<**A**>> >>**A**<< 1. HEATED OXYGEN SENSOR
2. EXHAUST MANIFOLD COVER
- FRONT NO.1 EXHAUST PIPE (REFER TO P.15-23).

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

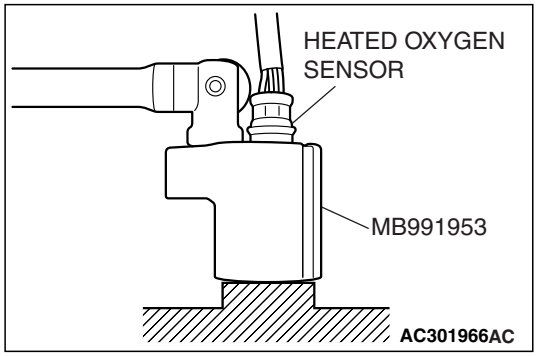
**Required Special Tool:**

- MB991953: Oxygen Sensor Wrench

**TSB Revision**

## REMOVAL SERVICE POINT

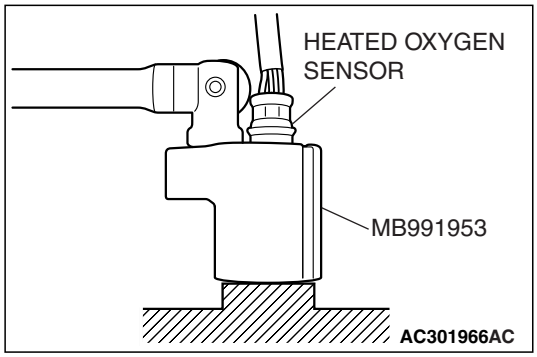
### <<A>> HEATED OXYGEN SENSOR REMOVAL




Use special tool MB991953 to remove the heated oxygen sensor.

## INSTALLATION SERVICE POINT

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



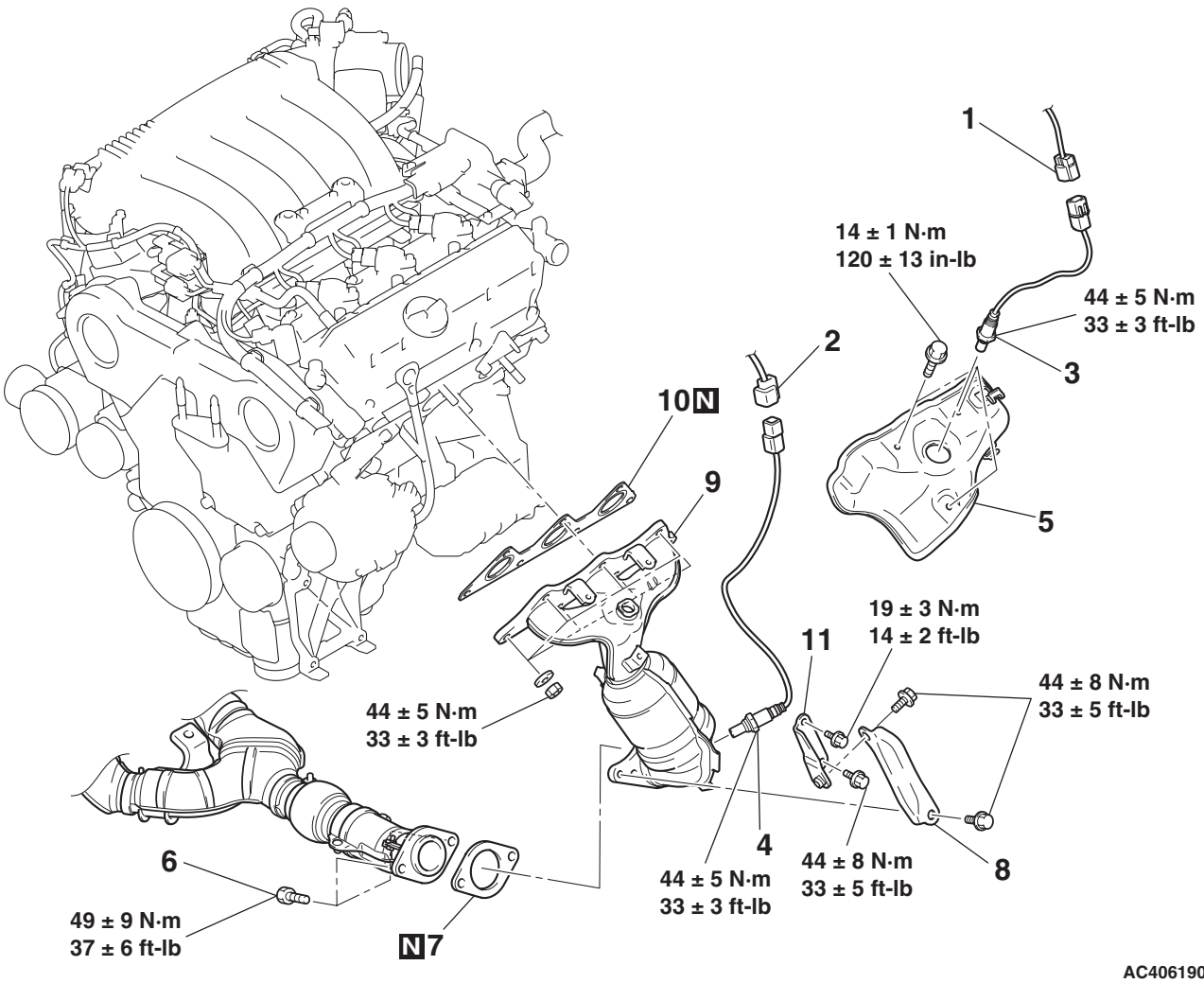

Use special tool MB991953 to install the heated oxygen sensor.

## REMOVAL AND INSTALLATION <3.8L ENGINE>

M1151003301196

## <LEFT BANK>

| Pre-removal Operation | Post-installation Operation |
|---|---|
| • Under Cover Removal (Refer to GROUP 51, Under Cover P.51-8).<br>• Air Cleaner Intake Duct Removal (Refer to P.15-5). | • Air Cleaner Intake Duct Installation (Refer to P.15-5).<br>• 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

<<A>> >>B<< 3. LEFT BANK HEATED OXYGEN SENSOR (FRONT)

<<B>> >>A<< 4. LEFT BANK HEATED OXYGEN SENSOR (REAR)

5. HEAT PROTECTOR

**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

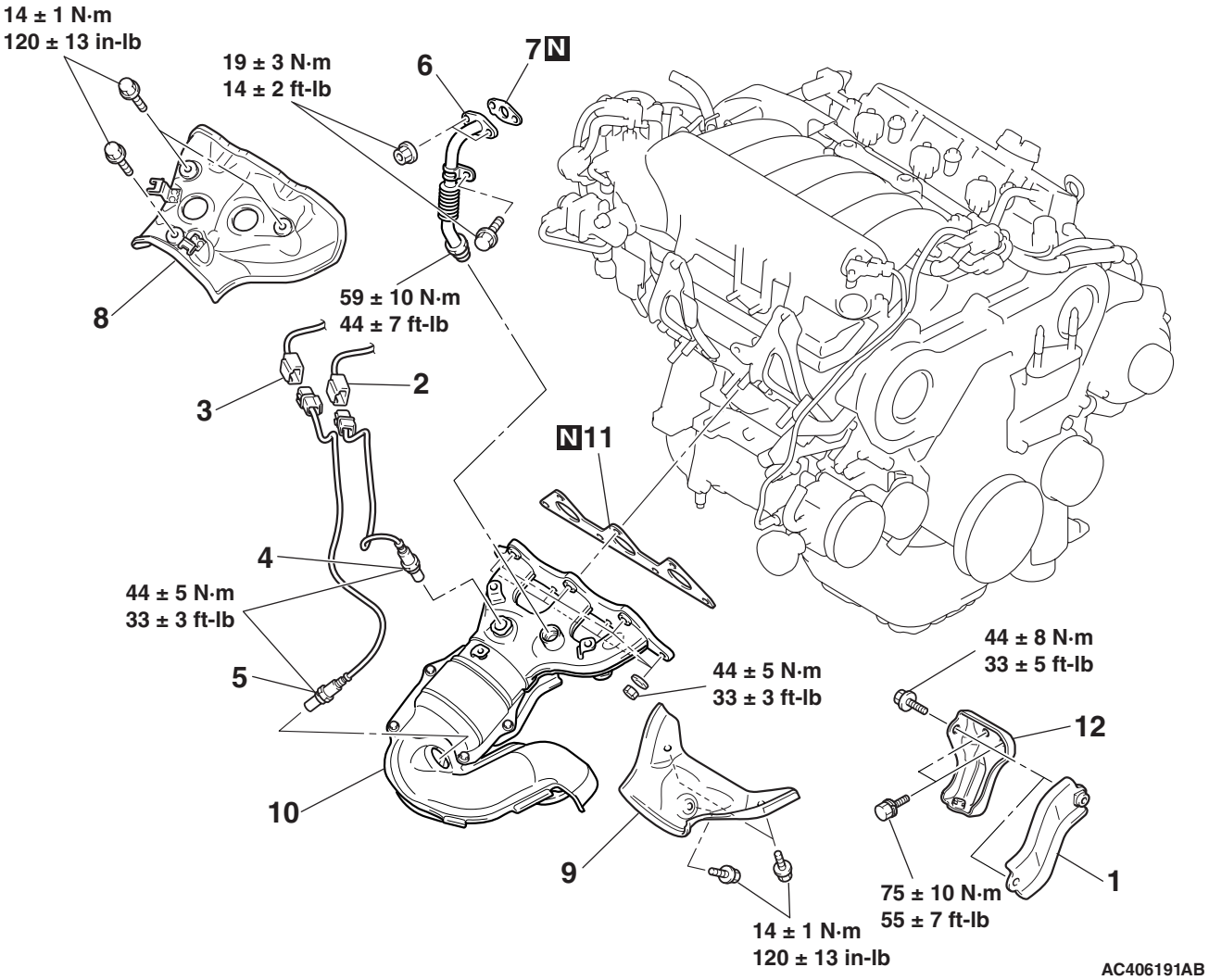
**Required Special Tools:**

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

**TSB Revision**

## <RIGHT BANK>

| Pre-removal Operation | Post-installation Operation |
|---|---|
| • Air Cleaner Cover and Air Cleaner Air Intake Duct Removal (Refer to P.15-5).<br>• Battery Removal<br>• Under Cover Removal (Refer to GROUP 51, Under Cover P.51-8).<br>• Front Exhaust Pipe, Center Exhaust Pipe Removal (Refer to P.15-24).<br>• Strut Tower Bar Removal (Refer to GROUP 42, Strut Tower Bar P.42-12).<br>• Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service –Engine Coolant Replacement P.14-22). | • Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service –Engine Coolant Replacement P.14-22).<br>• Strut Tower Bar Installation (Refer to GROUP 42, Strut Tower Bar P.42-12).<br>• Front Exhaust Pipe, Center Exhaust Pipe Installation (Refer to P.15-24).<br>• Under Cover Installation (Refer to GROUP 51, Under Cover P.51-8).<br>• Battery Installation<br>• Air Cleaner Cover and Air Cleaner Air Intake Duct Installation (Refer to P.15-5). |




**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.15-24).

**REMOVAL STEPS (Continued)**
- FRONT UNDER FLOOR HEAT PROTECTOR (REFER TO P.15-24).

1. EXHAUST MANIFOLD STAY, RIGHT B
2. RIGHT BANK HEATED OXYGEN SENSOR (FRONT) CONNECTOR
3. RIGHT BANK HEATED OXYGEN SENSOR (REAR) CONNECTOR

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**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

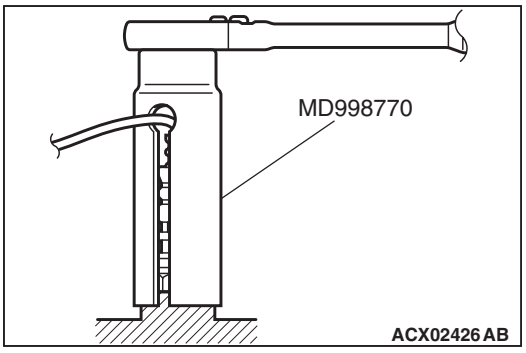
**Required Special Tools:**

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

## REMOVAL SERVICE POINTS

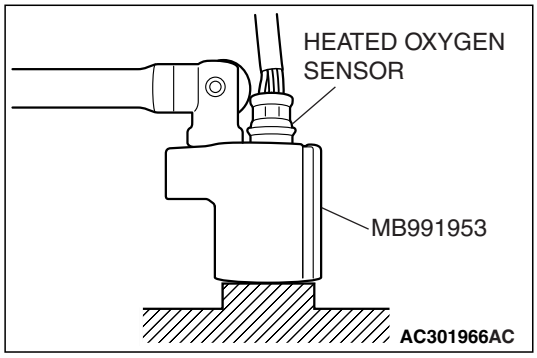
### <<A>> LEFT BANK HEATED OXYGEN SENSOR (FRONT)/RIGHT BANK HEATED OXYGEN SENSOR (FRONT) REMOVAL

Use special tool MD998770 to remove the heated oxygen sensor.



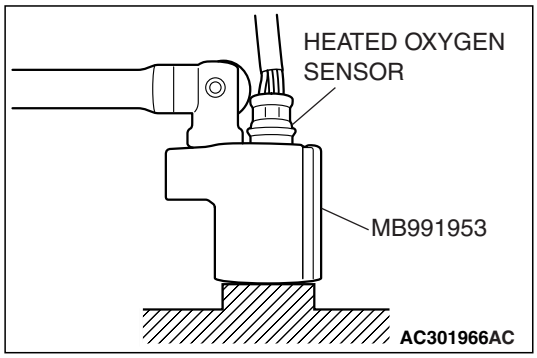

### <<B>> LEFT BANK HEATED OXYGEN SENSOR (REAR)/RIGHT BANK HEATED OXYGEN SENSOR (REAR) REMOVAL

Use special tool MB991953 to remove the heated oxygen sensor.



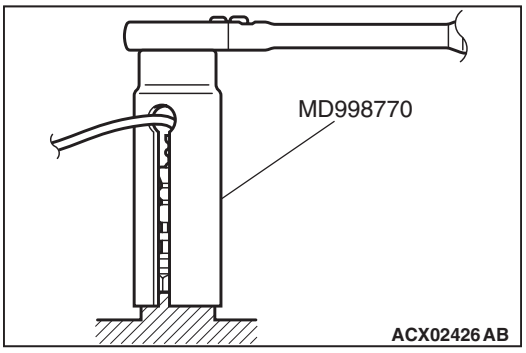
## INSTALLATION SERVICE POINTS

### >>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

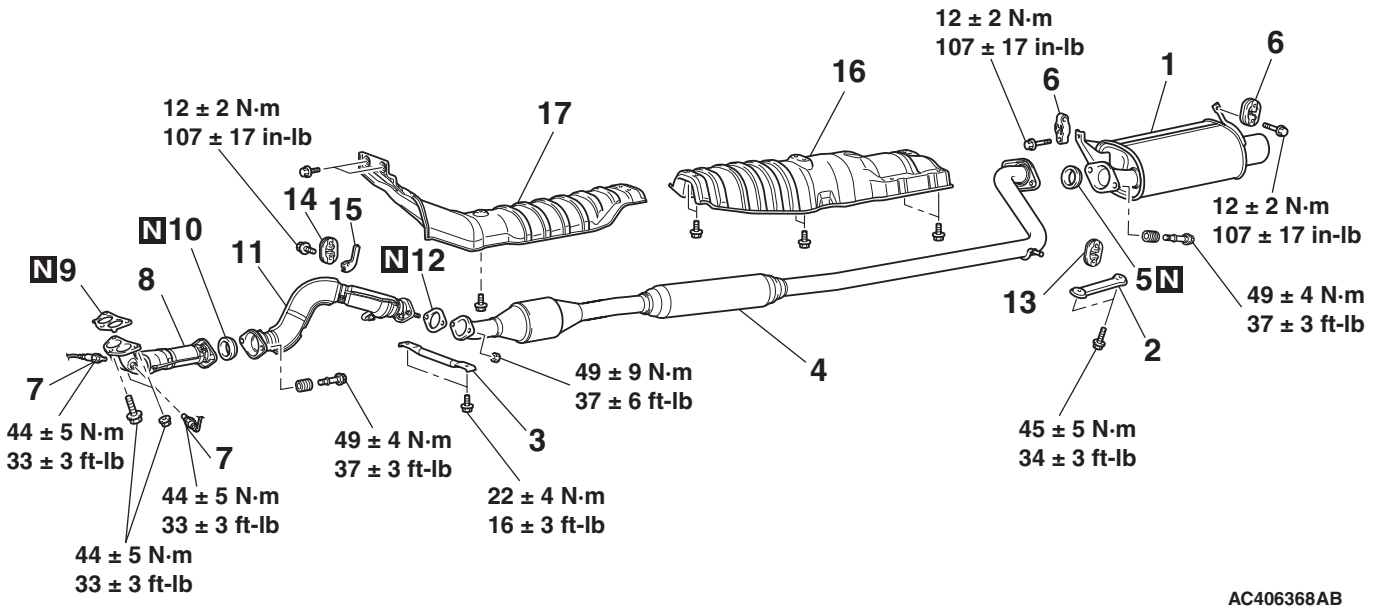
1. Check for damage or cracking of any part.
2. Using a straight edge and a feeler gauge, check for distortion of the cylinder head installation surface.

   **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>

M1151008700787

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**MAIN MUFFLER REMOVAL STEPS**
1. MAIN MUFFLER
5. SEAL RING
6. HANGER

**CENTER EXHAUST PIPE REMOVAL STEPS**
2. CROSSMEMBER STAY
3. FRONT FLOOR BACKBONE BRACE
4. CENTER EXHAUST PIPE
5. SEAL RING
12. GASKET
13. HANGER

**<<A>> >>A<<**

**FRONT EXHAUST PIPE REMOVAL STEPS**
7. HEATED OXYGEN SENSOR
8. FRONT NO.1 EXHAUST PIPE
9. GASKET
10. SEAL RING
11. FRONT NO.2 EXHAUST PIPE
12. GASKET
14. HANGER
15. PROTECTOR
16. CENTER UNDER FLOOR HEAT PROTECTOR
17. FRONT UNDER FLOOR HEAT PROTECTOR

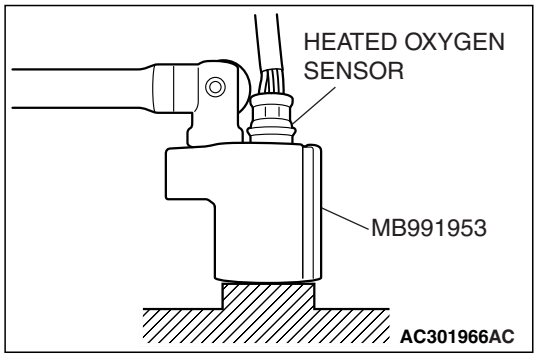
**Required Special Tool:**

- MB991953: Oxygen Sensor Wrench

### REMOVAL SERVICE POINT

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

Use special tool MB991953 to remove the heated oxygen sensor.



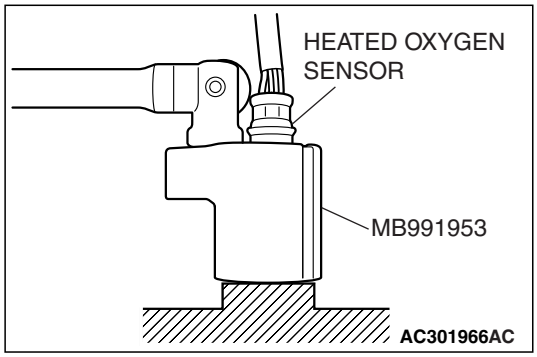

AC301966AC

TSB Revision

## INSTALLATION SERVICE POINT

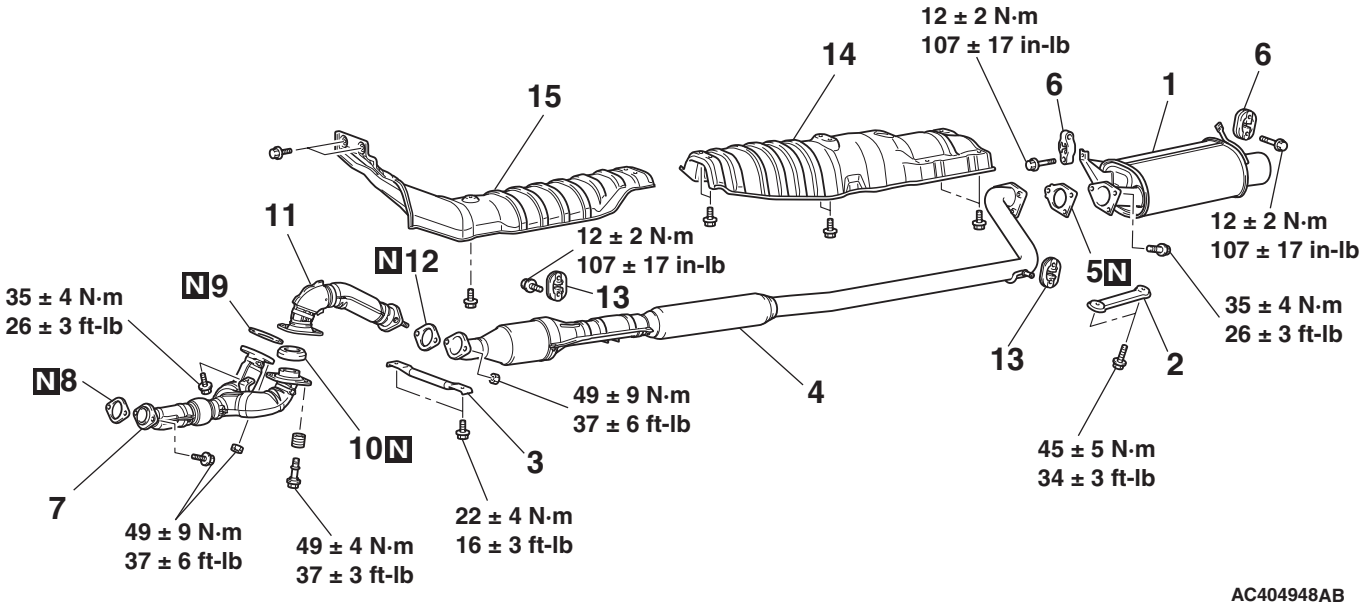
### >>A<< HEATED OXYGEN SENSOR INSTALLATION

Use special tool MB991953 to install the heated oxygen sensor.




## REMOVAL AND INSTALLATION <3.8L ENGINE>

M1151008700806




**MAIN MUFFLER REMOVAL STEPS**

1. MAIN MUFFLER
5. GASKET
6. HANGER

**CENTER EXHAUST PIPE REMOVAL STEPS**

2. CROSSMEMBER STAY
3. FRONT FLOOR BACKBONE BRACE
4. CENTER EXHAUST PIPE
5. GASKET
12. GASKET
13. HANGER

**FRONT EXHAUST PIPE REMOVAL STEPS**

7. FRONT NO.1 EXHAUST PIPE
8. GASKET
9. GASKET
10. SEAL RING
11. FRONT NO.2 EXHAUST PIPE
12. GASKET
14. CENTER UNDER FLOOR HEAT PROTECTOR
15. FRONT UNDER FLOOR HEAT PROTECTOR

# SPECIFICATIONS

## FASTENER TIGHTENING SPECIFICATIONS

M1151006800539

| ITEM | | SPECIFICATION |
|---|---|---|
| **Air cleaner <2.4L ENGINE>** | | |
| 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 bolt | | 1.8 ±0.6 N· m (16 ±5 in-lb) |
| **Air cleaner <3.8L ENGINE>** | | |
| 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 bolt | | 1.8 ±0.6 N· m (16 ±5 in-lb) |
| **Exhaust manifold <2.4L ENGINE>** | | |
| 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) |
| **Exhaust manifold <Left bank> <3.8L ENGINE>** | | |
| 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) |
| **Exhaust manifold <Right bank> <3.8L ENGINE>** | | |
| 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) |

| ITEM | | SPECIFICATION |
|---|---|---|
| **Exhaust pipe and main muffler <2.4L ENGINE>** | | |
| Center exhaust pipe nut | | 49 ±9 N· m (37 ±6 ft-lb) |
| Crossmember stay bolt | | 45 ±5 N· m (34 ±3 ft-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 ±3 ft-lb) |
| Hanger bolt | | 12 ±2 N· m (107 ±17 in-lb) |
| Heated oxygen sensor | | 44 ±5 N· m (33 ±3 ft-lb) |
| Main muffler bolt | | 49 ±4 N· m (37 ±3 ft-lb) |
| **Exhaust pipe and main muffler <3.8L ENGINE>** | | |
| Center exhaust pipe nut | | 49 ±9 N· m (37 ±6 ft-lb) |
| Crossmember stay bolt | | 45 ±5 N· m (34 ±3 ft-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 ±3 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 | | 12 ±2 N· m (107 ±17 in-lb) |
| Main muffler bolt | | 35 ±4 N· m (26 ±3 ft-lb) |
| **Intake manifold <2.4L ENGINE>** | | |
| 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) |
| **Intake manifold <3.8L ENGINE>** | | |
| Engine mounting stay bolt | | 36 ±6 N· m (27 ±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) |
| 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) |

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| ITEM | | SPECIFICATION |
|---|---|---|
| **Intake manifold plenum <3.8L ENGINE>** | | |
| 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) |
| Vacuum pipe bolt | | 11 ±1 N· m (98 ±8 in-lb) |

## SERVICE SPECIFICATION

M1151000300666

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

## 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 |

**NOTES**