

GROUP 15

**INTAKE AND
EXHAUST**

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GENERAL DESCRIPTION

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The exhaust pipe is divided into three parts.

SERVICE SPECIFICATION

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| Item | Limit |
|-----------------------------------------------------------------|--------------|
| Exhaust manifold distortion of the installation surface mm (in) | 0.70 (0.028) |

INTAKE AND EXHAUST DIAGNOSIS**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.15-3 |
| 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.

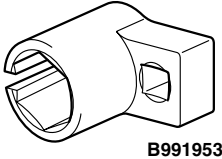
Q: Are the pipes and muffler damaged?

YES : Replace, then go to Step 1.

NO : There is no action to be taken.

SPECIAL TOOL

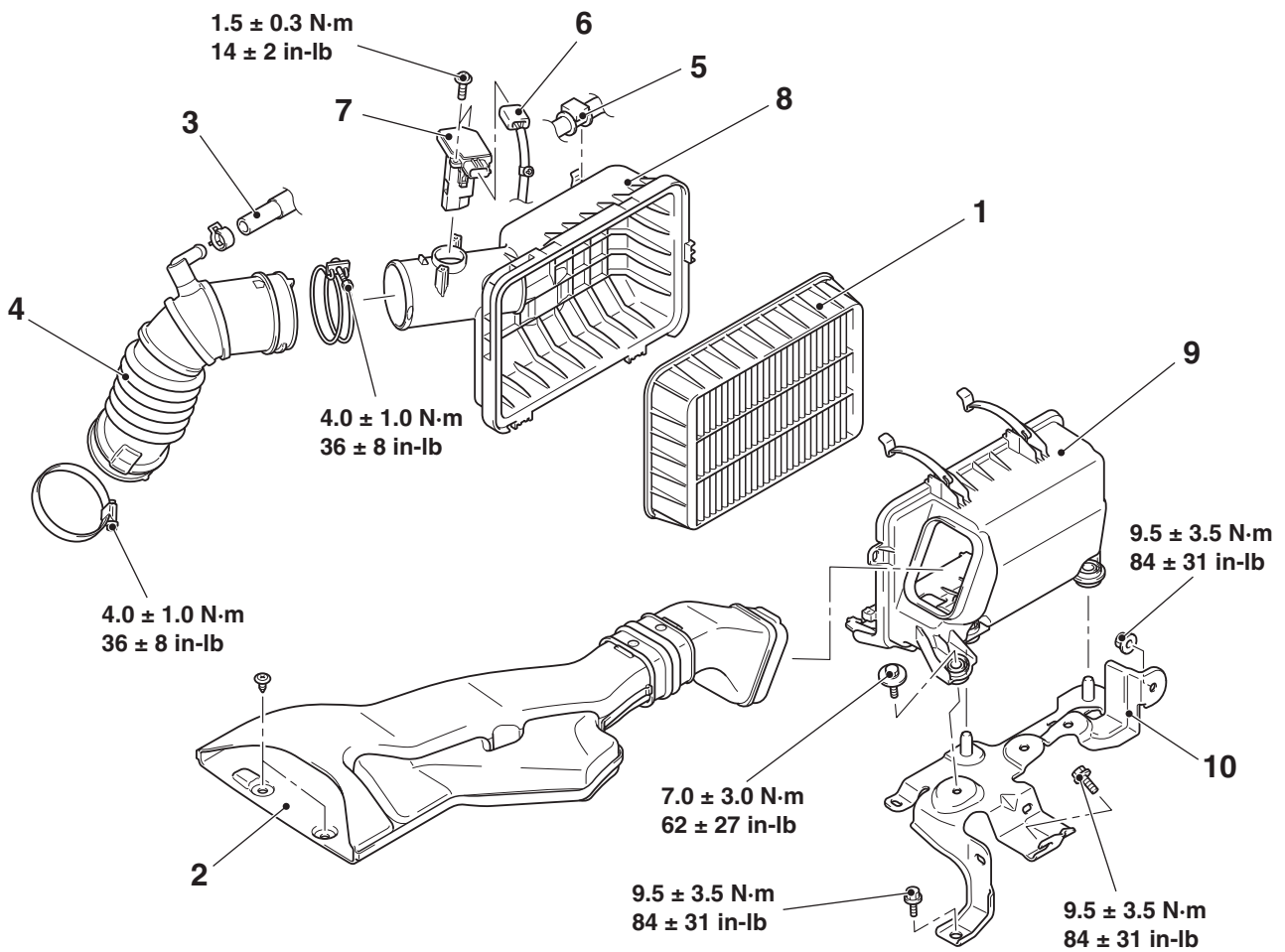
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| Tool | Tool number and name | Supersession | Application |
|--------------------------------------------------------------------------------------------------|----------------------------------|--------------|--------------------------------------------------|
|  <p>B991953</p> | MB991953 Oxygen sensor wrench | MB991953-01 | Removal and installation of heated oxygen sensor |

AIR CLEANER

REMOVAL AND INSTALLATION

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Removal steps

1. Air cleaner element
2. Air cleaner intake duct
3. Breather hose connection
4. Air cleaner intake hose
5. Vacuum hose connection
6. Mass airflow sensor connector
7. Mass airflow sensor

Removal steps (Continued)

8. Air cleaner cover
9. Air cleaner body
 - Engine control module (Refer to GROUP 13A –Engine Control Module (ECM) P.13A-952).
 - Battery and battery tray
10. Air cleaner bracket

INTAKE MANIFOLD

REMOVAL AND INSTALLATION

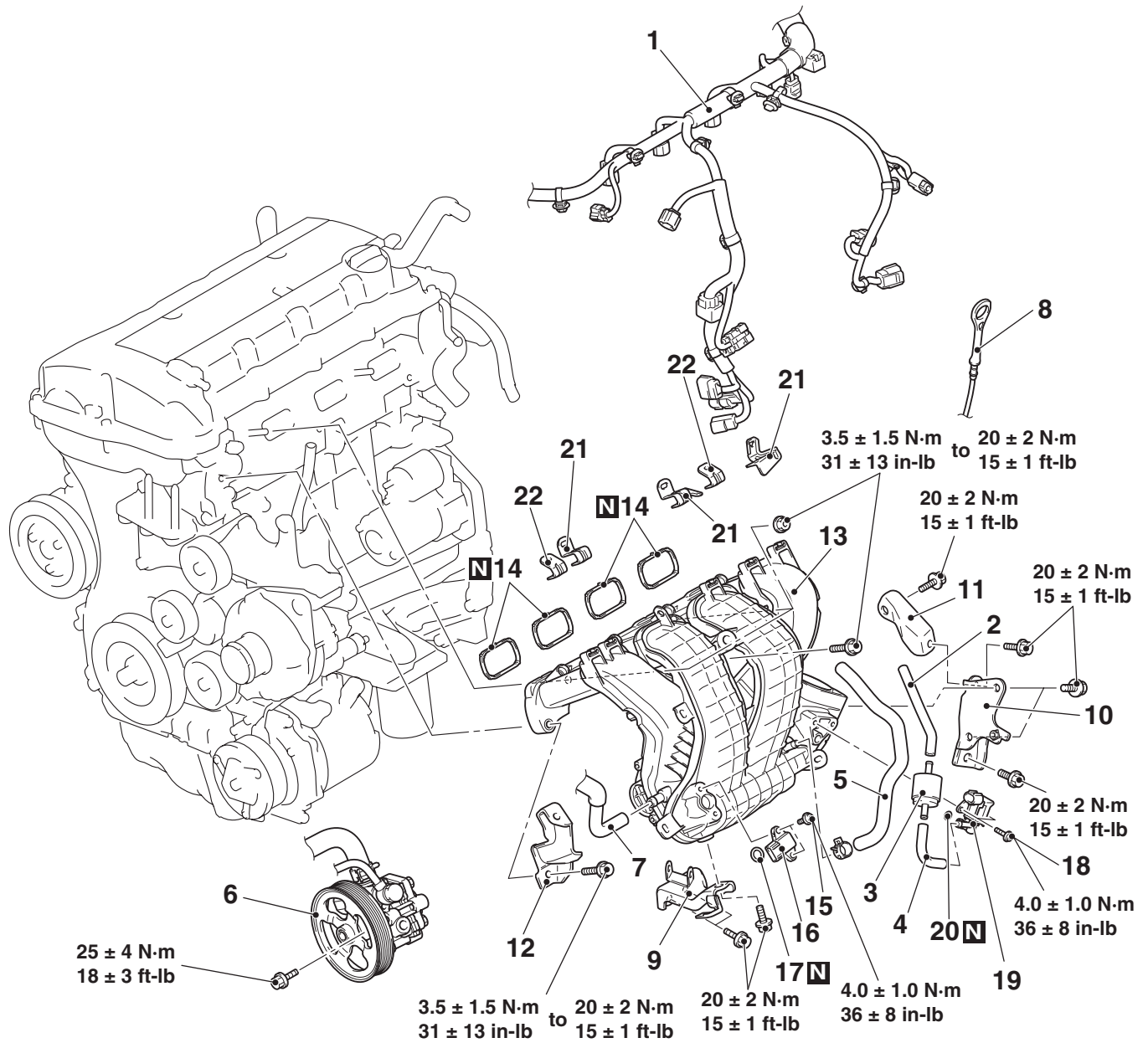
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Pre-removal operation

- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement [P.14-13](#)).
- Engine Upper Cover Removal (Refer to GROUP 11A – Camshaft [P.11A-22](#)).
- Drive Belt Removal (Refer to GROUP 11A –Crankshaft Pulley [P.11A-19](#)).
- Air Cleaner Assembly and Air Cleaner Intake Hose Removal (Refer to [P.15-4](#)).
- Throttle Body Removal (Refer to GROUP 13A –Throttle Body [P.13A-950](#)).
- Fuel Injector Removal (Refer to GROUP 13A –Injector [P.13A-945](#)).
- EGR Valve and EGR Valve Stay Removal (Refer to GROUP 17 –EGR Valve [P.17-85](#)). <Vehicles for California>

Post-installation operation

- EGR Valve and EGR Valve Stay Installation (Refer to GROUP 17 –EGR Valve [P.17-85](#)). <Vehicles for California>
- Fuel Injector Installation (Refer to GROUP 13A –Injector [P.13A-945](#)).
- Throttle Body Installation (Refer to GROUP 13A –Throttle Body [P.13A-950](#)).
- Air Cleaner Assembly and Air Cleaner Intake Hose Installation (Refer to [P.15-4](#)).
- Drive Belt Installation (Refer to GROUP 11A –Crankshaft Pulley [P.11A-19](#)).
- Engine Upper Cover Installation (Refer to GROUP 11A – Camshaft [P.11A-22](#)).
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement [P.14-13](#)).



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Removal steps

1. Control wiring harness connection
2. Emission vacuum hose
3. Emission vacuum control chamber
4. Emission vacuum hose
5. Brake booster vacuum hose
6. Power steering oil pump assembly
7. Rocker cover PCV hose
8. Engine oil level gauge
9. Intake manifold stay
10. Intake manifold stay B <except for California>
11. Intake manifold stay C <except for California>

Removal steps (Continued)

- >>C<< 12. Injector protector front
- >>C<< 13. Intake manifold
- >>A<< 14. Intake manifold gasket
- >>B<< 15. Screw
- >>A<< 16. Manifold absolute pressure sensor
- >>A<< 17. O-ring
- >>A<< 18. Screw
- >>A<< 19. Purge control solenoid valve
- >>A<< 20. O-ring
- >>A<< 21. Intake manifold harness bracket
- >>A<< 22. Engine cover bracket

<<A>>

REMOVAL SERVICE POINT

<<A>> POWER STEERING OIL PUMP ASSEMBLY REMOVAL

1. With the hose installed, remove the power steering oil pump assembly from the bracket.
2. Tie the removed power steering oil pump assembly with a string at a position where it will not interfere with the removal and installation of the intake manifold.

INSTALLATION SERVICE POINTS

>>A<< SCREW INSTALLATION

 **CAUTION**

Do not over-tighten. As the self-forming-type screw is used, the excessive torque can damage the intake manifold threads.

>>B<< MANIFOLD ABSOLUTE PRESSURE SENSOR INSTALLATION

 **CAUTION**

- Install the manifold absolute pressure sensor, taking care that no shock is applied to it.
- Do not use a manifold absolute pressure sensor that has been dropped.

**>>C<< INTAKE MANIFOLD/INJECTOR
PROTECTOR FRONT INSTALLATION**

Install the intake manifold and the injector protector front, and tighten mounting bolts and nuts temporarily.

NOTE: The tightening of the fuel rail assembly, the intake manifold and the injector protector front has the specified order. Temporarily tighten the intake manifold and injector protector front mounting bolts and nuts (Refer to GROUP 13A –Injector P. 13A-945).

INSPECTION

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INTAKE MANIFOLD CHECK

1. Check the intake manifold for damage and cracks, and replace it if necessary.
2. Check the vacuum outlet port for clogging, and clean it if necessary.

EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

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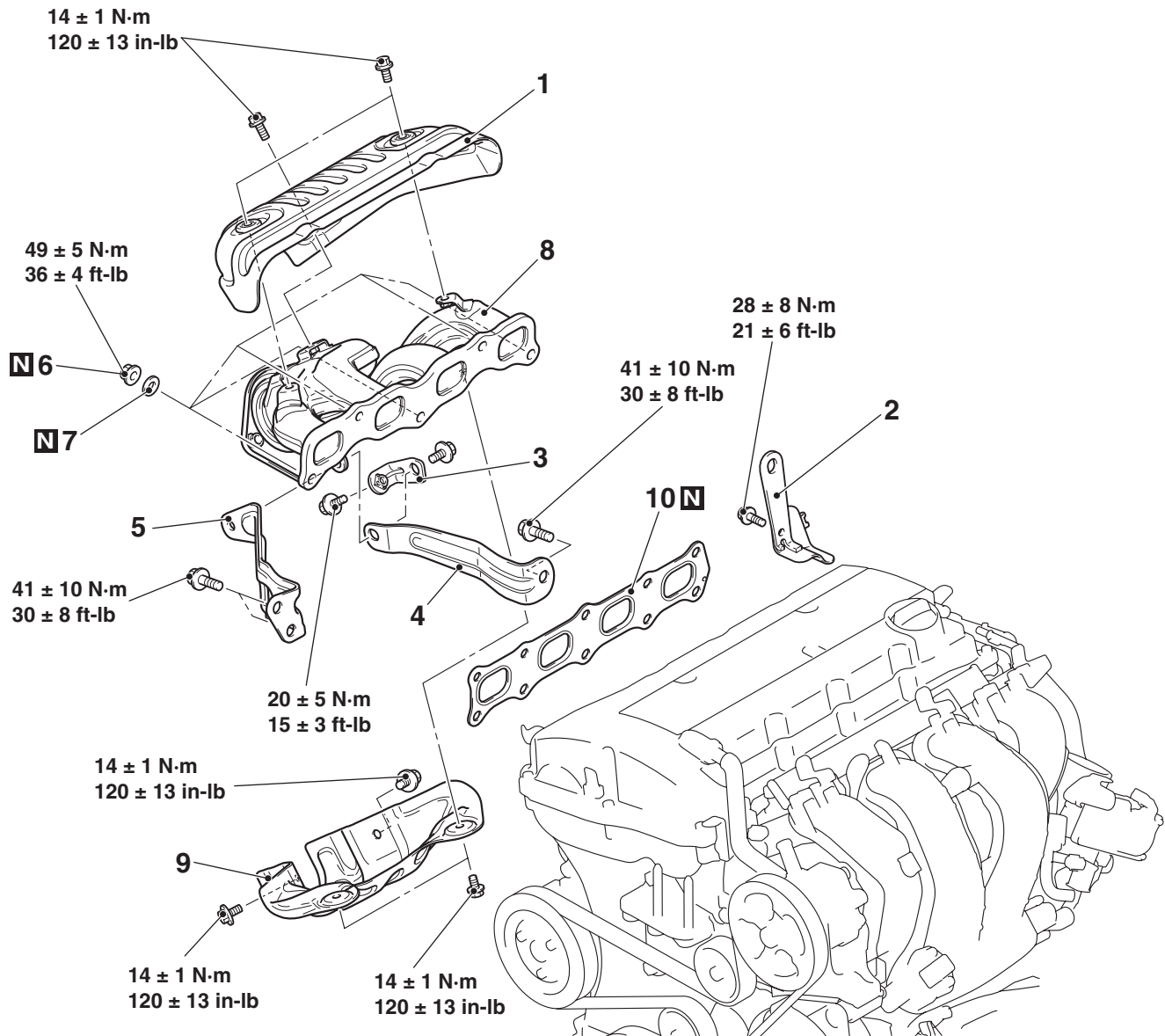
Pre-removal operation

- Front Exhaust Pipe Removal (Refer to P.15-12).
- Strut Tower Bar Removal (Refer to GROUP 42A –Strut Tower Bar P.42A-11).

Post-installation operation

- Strut Tower Bar Installation (Refer to GROUP 42A –Strut Tower Bar P.42A-11).
- Front Exhaust Pipe Installation (Refer to P.15-12).

<Except for CALIFORNIA>



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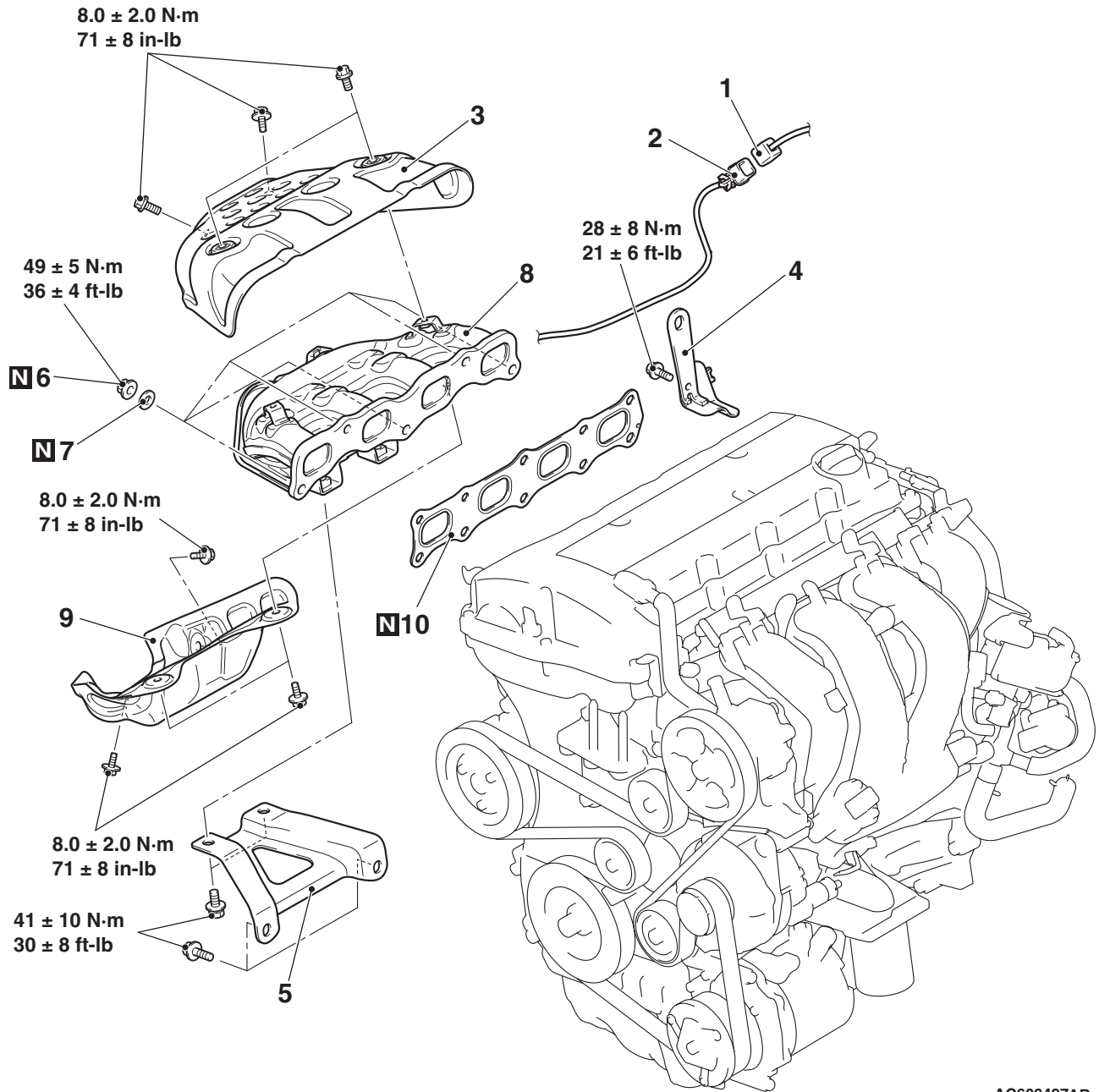
Removal steps

1. Exhaust manifold cover (upper)
2. Engine hanger
3. Exhaust manifold bracket D
4. Exhaust manifold bracket B
5. Exhaust manifold bracket A

Removal steps (Continued)

- | | | |
|-------|-------|-----------------------------------|
| <<A>> | >>A<< | 6. Exhaust manifold nut |
| <<A>> | >>A<< | 7. Exhaust manifold washer |
| <<A>> | >>A<< | 8. Exhaust manifold |
| <<A>> | >>A<< | 9. Exhaust manifold cover (lower) |
| | | 10. Exhaust manifold gasket |

<Vehicles for CALIFORNIA>



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Removal steps

1. Heated oxygen sensor (front) connector
2. Heated oxygen sensor (front)
3. Exhaust manifold cover (upper)
4. Engine hanger
5. Exhaust manifold bracket

Removal steps (Continued)

- | | | |
|-------|-------|-----------------------------------|
| <<A>> | >>A<< | 6. Exhaust manifold nut |
| <<A>> | >>A<< | 7. Exhaust manifold washer |
| <<A>> | >>A<< | 8. Exhaust manifold |
| <<A>> | >>A<< | 9. Exhaust manifold cover (lower) |
| | | 10. Exhaust manifold gasket |

REMOVAL SERVICE POINT

<<A>> EXHAUST MANIFOLD NUT/EXHAUST MANIFOLD WASHER/EXHAUST MANI- FOLD/EXHAUST MANIFOLD COVER REMOVAL

1. Remove the mounting bolts of the exhaust manifold cover (upper) and move them to the position where they will not interfere with the loosening of the exhaust manifold nut.
2. Loosen the exhaust manifold nut, and remove the exhaust manifold nut and the exhaust manifold washer.
3. Remove the exhaust manifold and the exhaust manifold cover (lower) as a set.

INSTALLATION SERVICE POINT

>>A<< EXHAUST MANIFOLD COVER/EXHAUST MANIFOLD/EXHAUST MANIFOLD WASHER/EXHAUST MANIFOLD NUT INSTALLA- TION

1. Install the exhaust manifold cover (lower) to the exhaust manifold (with mounting bolts removed), install the exhaust manifold and the exhaust manifold cover (upper) to the engine as a set.
2. Install the new exhaust manifold nut and exhaust manifold washer, and tighten the exhaust manifold nut to the specified torque.

Tightening torque: 49 ± 5 N· m (36 ± 4 ft-lb)

3. Install the exhaust manifold cover (upper) to the exhaust manifold, and tighten the exhaust manifold cover (upper) to the specified torque.

Tightening torque:

14 ± 1 N· m (120 ± 13 in-lb) <except for California>

8.0 ± 2.0 N· m (71 ± 18 in-lb) <vehicles for California>

INSPECTION

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EXHAUST MANIFOLD CHECK

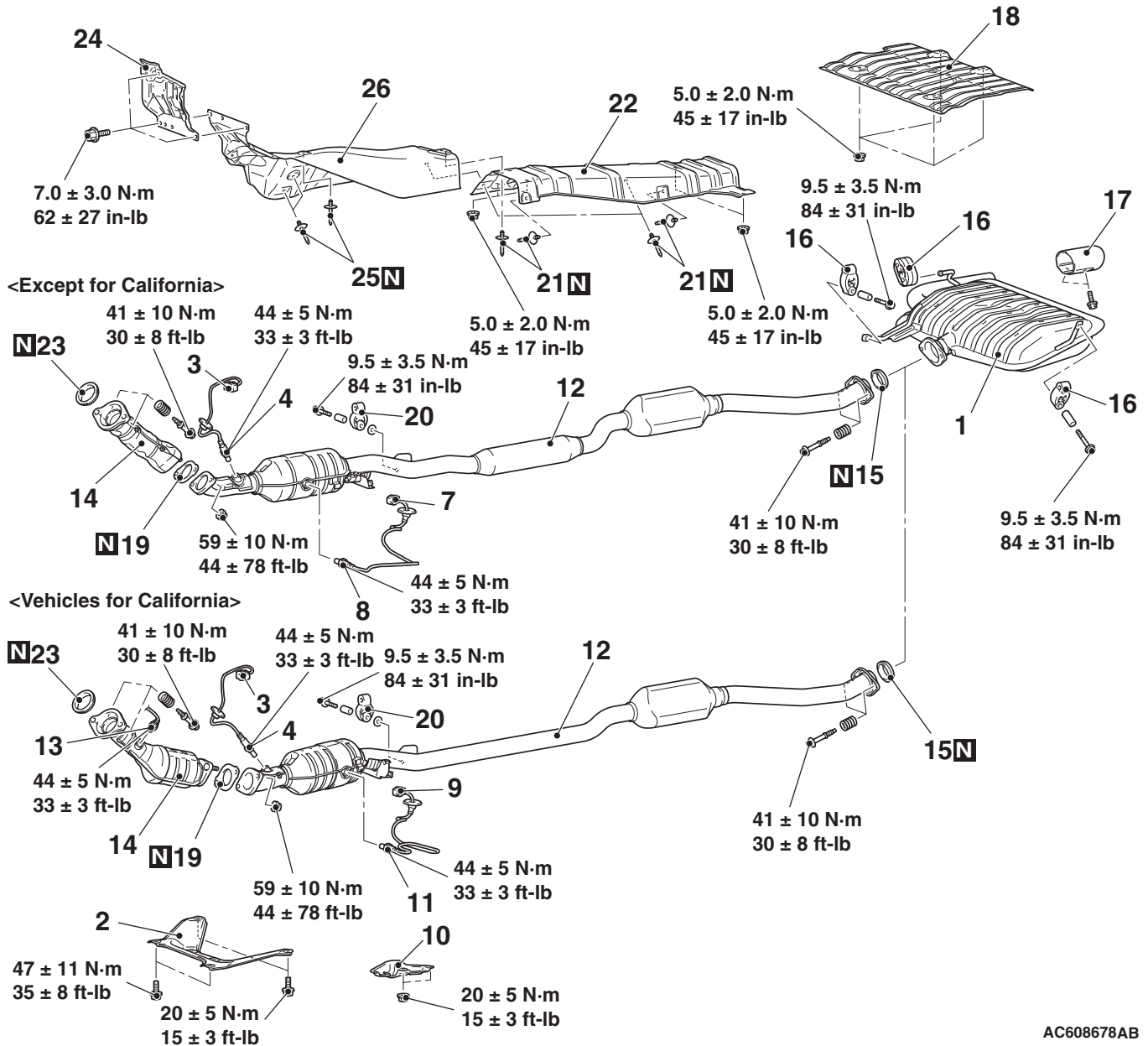
1. Check the exhaust manifold for damage and cracks, and replace it if necessary.
2. Using a straight edge and a thickness gauge, check for distortion of the cylinder head installation surface. If it exceeds the limit value, replace it.

Limit: 0.70 mm (0.028 inch)

EXHAUST PIPE AND MAIN MUFFLER

REMOVAL AND INSTALLATION

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- Exhaust main muffler and rear floor panel heat protector removal steps**
1. Exhaust main muffler
 15. Exhaust pipe gasket
 16. Exhaust muffler hanger
 17. Exhaust tail pipe diffuser
 18. Rear floor panel heat protector
- Center exhaust pipe and front floor panel rear heat protector removal steps**
2. Backbone brace
 - Footrest

<<A>> >>B<<

- Center exhaust pipe and front floor panel rear heat protector removal steps (Continued)**
- Lower side cover (Refer to GROUP 52A –Front Floor Console Assembly P.52A-8).
 - Turn up the passenger side floor carpet.
3. Heated oxygen sensor (front) connector <except for California>
 4. Heated oxygen sensor (front) <except for California>

Center exhaust pipe and front floor panel rear heat protector removal steps (Continued)

- | | | | |
|-------|-------|-----|-----------------------------------------------------------------|
| | | 5. | Heated oxygen sensor (rear) connector <vehicles for California> |
| <<A>> | >>B<< | 6. | Heated oxygen sensor (rear) <vehicles for California> |
| | | 7. | Heated oxygen sensor (rear) connector <except for California> |
| <<A>> | >>B<< | 8. | Heated oxygen sensor (rear) <except for California> |
| | | 9. | Heated oxygen sensor (3rd) connector <vehicles for California> |
| | | 10. | Harness cover <vehicles for California> |
| <<A>> | >>B<< | 11. | Heated oxygen sensor (3rd) <vehicles for California> |
| | | 12. | Center exhaust pipe |
| | | 19. | Exhaust pipe gasket |
| | | 20. | Exhaust muffler hanger |
| <> | >>A<< | 21. | Rivet |
| <> | >>A<< | 22. | Front floor rear panel heat protector |

Front exhaust pipe and front floor panel front heat protector removal steps

- | | | | |
|-------|-------|-----|--------------------------------------------------------|
| <<A>> | >>B<< | 13. | Heated oxygen sensor (front) <vehicles for California> |
| | | 14. | Front exhaust pipe |
| | | 19. | Exhaust pipe gasket |
| | | 23. | Seal ring |
| | | 24. | Dash panel heat protector |
| <> | >>A<< | 25. | Rivet |
| <> | >>A<< | 26. | Front floor front panel heat protector |

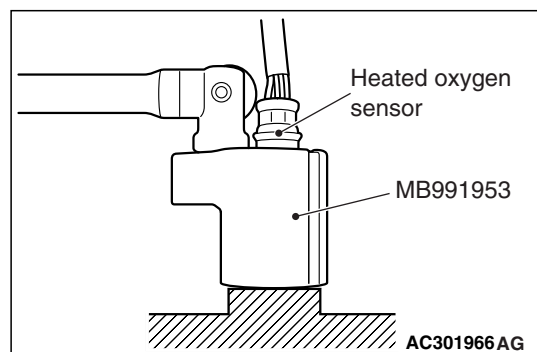
Required Special Tool:

- MB991953: Oxygen Sensor Wrench

REMOVAL SERVICE POINTS

<<A>> OXYGEN SENSOR REMOVAL

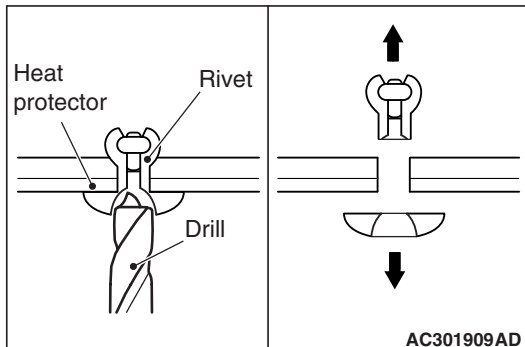
Remove the connection and clamp of oxygen sensor connector, and then use special tool MB991953 to remove the oxygen sensor.



<> RIVET/FRONT FLOOR REAR PANEL HEAT PROTECTOR/FRONT FLOOR FRONT PANEL HEAT PROTECTOR REMOVAL**⚠ CAUTION**

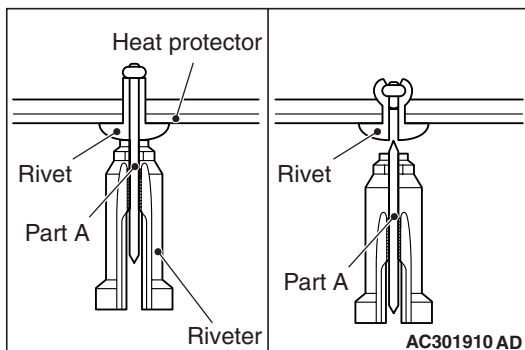
Be careful not to score the heat protector by drill.

1. Use a 6.0 / diameter / mm drill to make a hole in the flange of rivet as shown.
2. Break the rivet, and remove the rivet and heat protector.

**INSTALLATION SERVICE POINTS****>>A<< FRONT FLOOR FRONT PANEL HEAT PROTECTOR/FRONT FLOOR REAR PANEL HEAT PROTECTOR/RIVET INSTALLATION**

Use a riveter to tighten the rivet by the following procedure.

1. Insert part A of rivet into the riveter, and insert the rivet into the assembling area.
2. Operate the tool's handle while pushing the flange surface of rivet by riveter. Part A of rivet is cut and the rivet is tightened.

**>>B<< OXYGEN SENSOR INSTALLATION**

1. Tighten the oxygen sensor to the specified torque by using special tool MB991953.

Tightening torque: 44 ± 5 N·m (33 ± 3 ft-lb)

2. Connect the oxygen sensor connector and install the connector bracket.

