

GROUP 15

INTAKE AND EXHAUST

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SERVICE SPECIFICATIONS

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Item	Standard value	Limit
Intake manifold distortion of the installation surface mm (in)	0.15 (0.006) or less	0.20 (0.008)
Exhaust manifold distortion of the installation surface mm (in)	–	0.54 (0.021)

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.15-2
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 or seal ring for cracks, damage.

Q: Is the gasket or seal ring damaged?

YES : Replace the gasket or seal ring (Refer to [P.15-8](#) or [P.15-10](#)). Then go to Step 4.

NO : Go to Step 3.

STEP 3. Check for loosening in each coupling section.

Q: Is there any loosening in any section?

YES : Tighten the loosening section (Refer to [P.15-8](#) or [P.15-10](#)). Then go to Step 4.

NO : There is no action to be taken.

STEP 4. 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 : Return to Step 2.

NO : The procedure is complete.

Inspection Procedure 2: Abnormal Noise

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 abnormal noise.

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 the muffler (Refer to [P.15-10](#)). Then go to Step 7 .

NO : Go to Step 3.

STEP 3. Check the hanger for cracks.

Q: Is the hanger cracked?

YES : Replace the hanger (Refer to [P.15-10](#)). Then go to Step 7.

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 the pipes or muffler. Then go to Step 7.

NO : Go to Step 5.

STEP 5. Check the heat protectors.

Q: Are any heat protectors loose or damaged?

YES : Tighten or replace the heat protector (Refer to [P.15-10](#)). Then go to Step 7.

NO : Go to Step 6.

STEP 6. Check the pipes and muffler for damage.

Q: Are the pipes and muffler damaged?

YES : Replace the muffler (Refer to [P.15-10](#)). Then go to Step 7 .

NO : There is no action to be taken.

STEP 7. 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 abnormal noise.

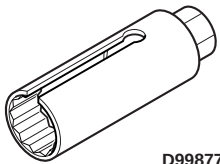
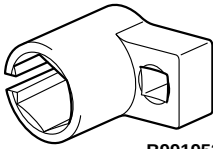
Q: Is any abnormal noise generated?

YES : Return to Step 2.

NO : The procedure is complete.

SPECIAL TOOL

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Tool	Tool number and name	Supersession	Application
 D998770	MD998770 Oxygen sensor wrench	MD998770-01 or General service tool	Removal and installation of linear air-fuel ratio sensor
 B991953	MB991953 Oxygen sensor wrench	MB991953-01	Removal and installation of heated oxygen sensor (rear)

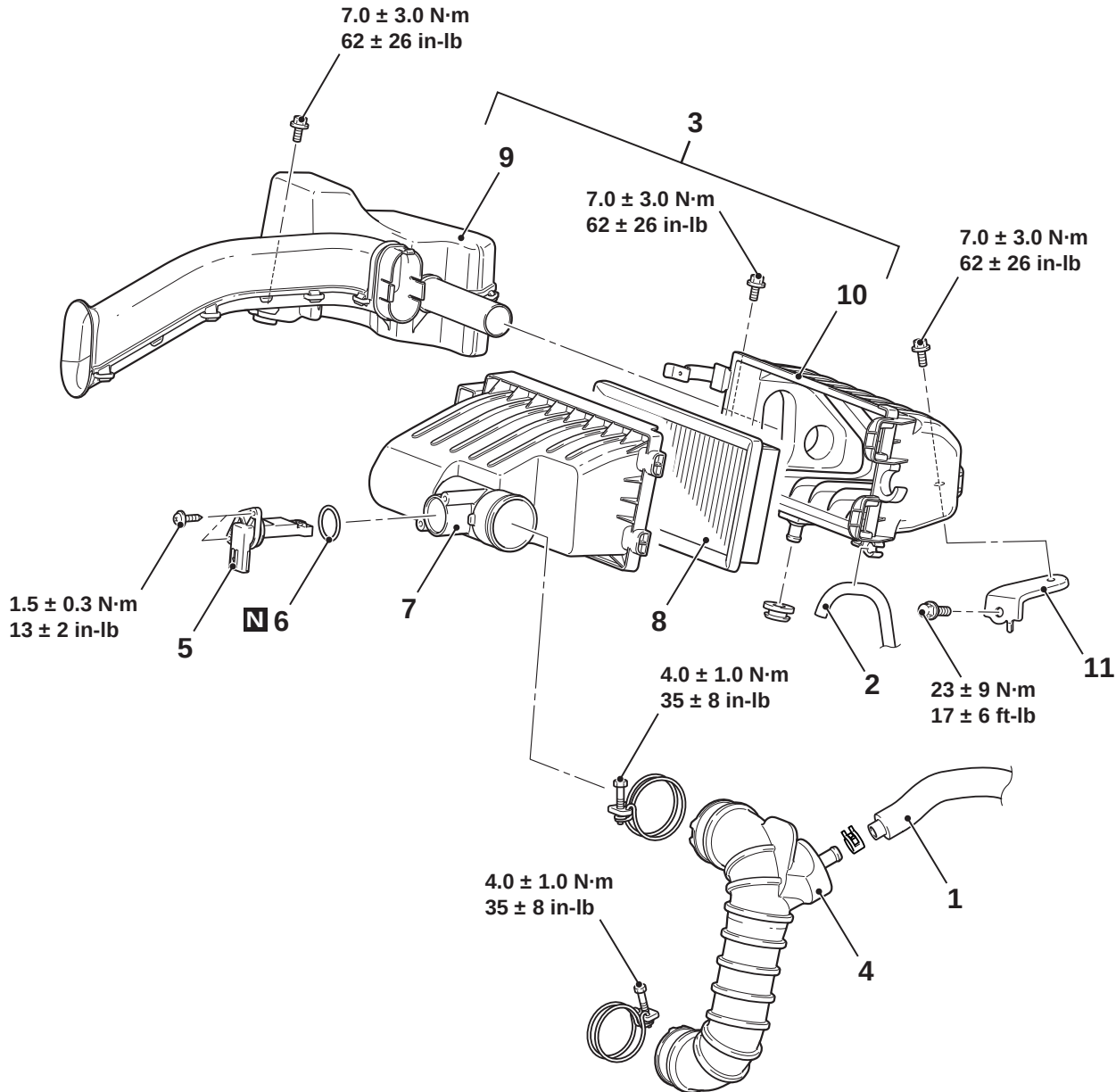
AIR CLEANER

REMOVAL AND INSTALLATION

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⚠ CAUTION

- When removing or installing the mass airflow sensor, be careful not to apply impact to the sensor.
- Do not reuse the mass airflow sensor that has been dropped.



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Air cleaner element removal

8. Air cleaner element

Removal steps

1. Breather hose connection
2. Breather hose connection <CVT>
3. Air cleaner assembly
4. Air intake hose
>>A<< 5. Mass airflow sensor

Removal steps (Continued)

6. O-ring
7. Air cleaner cover
8. Air cleaner element
9. Air duct
10. Air cleaner body assembly
11. Air cleaner bracket

INSTALLATION SERVICE POINT

>>A<< MASS AIRFLOW SENSOR INSTALLATION

1. Install the mass airflow sensor to the air cleaner cover with care not to damage the O-ring.

⚠ CAUTION

Do not over-tighten. If the mounting screw is over-tightened, the air cleaner cover can be damaged.

2. Tighten the mounting screws to the specified torque.

Tightening torque: 1.5 ± 0.3 N·m (13 ± 2 in-lb)

INTAKE MANIFOLD

REMOVAL AND INSTALLTION

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⚠ CAUTION

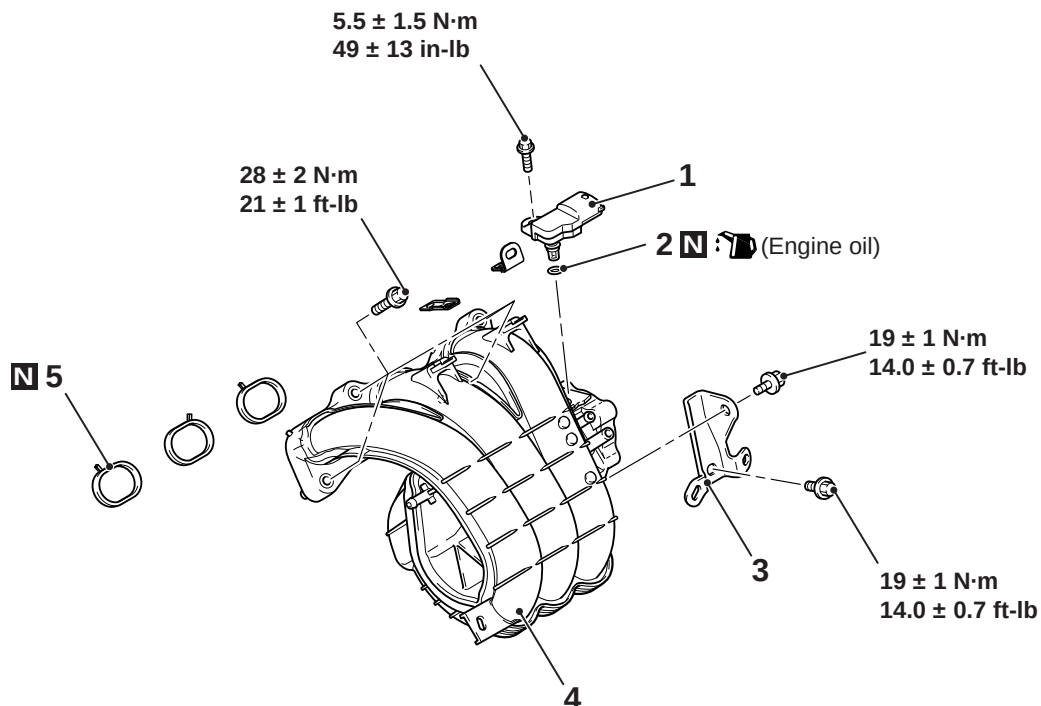
- When removing or installing the manifold absolute pressure sensor, be careful not to apply impact to the sensor.
- Do not reuse the manifold absolute pressure sensor that has been dropped.

Pre-removal Operation

- Throttle Body Assembly Removal (Refer to GROUP 13A – Throttle Body Assembly [P.13A-655](#)).
- Fuel Rail and Fuel Injector Assembly Removal (Refer to GROUP 13A – Injector [P.13A-651](#)).

Post-installation Operation

- Fuel Rail and Fuel Injector Assembly Installation (Refer to GROUP 13A – Injector [P.13A-651](#)).
- Throttle Body Assembly Installation (Refer to GROUP 13A – Throttle Body Assembly [P.13A-655](#)).



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Removal steps

- Brake booster vacuum hose connection (Refer to GROUP 35A – Master Cylinder Assembly and Brake Booster Assembly [P.35A-28](#)).
- Purge hose connection (Refer to GROUP 11B – Fuel and Emission Parts [P.11B-13](#)).

Removal steps (Continued)

1. Manifold absolute pressure sensor
2. O-ring
3. Intake manifold stay
4. Intake manifold
5. Intake manifold gasket

INSTALLATION SERVICE POINTS

>>A<< GASKET INSTALLATION

Securely insert the gasket in the groove of the intake manifold without causing any torsion or damage to the gasket.

>>B<<INTAKE MANIFOLD/INTAKE MANIFOLD STAY INSTALLATION

1. Install the intake manifold and intake manifold stay temporarily tighten the mounting bolts.

CAUTION

Check that the sealing surfaces of the intake manifold and intake manifold stay contact securely after temporary tightening.

2. Tighten the intake manifold and intake manifold stay bolts to the specified torque.

Tightening torque:

Intake manifold: 28 ± 2 N·m (21 ± 1 ft-lb)

Intake manifold stay: 19 ± 1 N·m (14.0 ± 0.7 ft-lb)

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

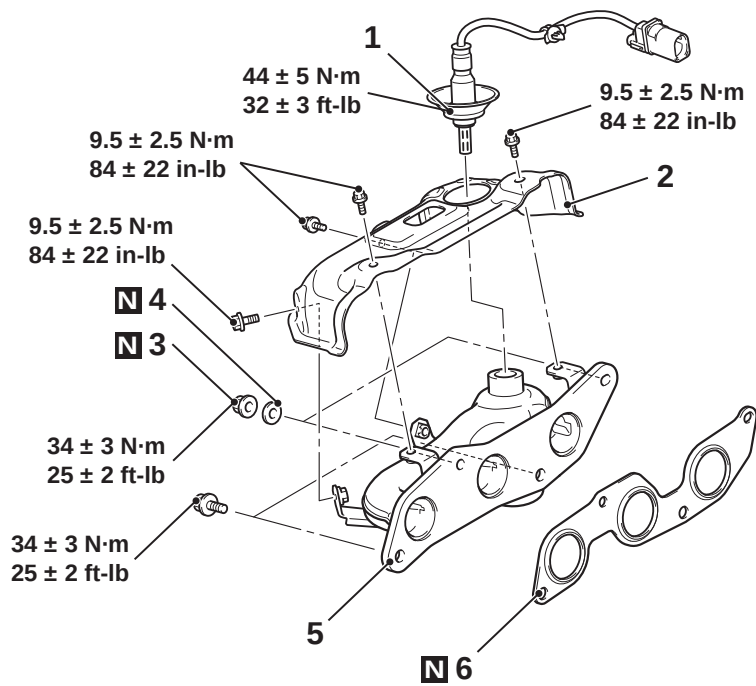
Limit: 0.20 mm (0.008 inch)

EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

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Pre-removal Operation - Air Cleaner Assembly Removal (Refer to P.15-5). - Catalytic Converter Removal (Refer to P.15-10).	Post-installation Operation - Catalytic Converter Installation (Refer to P.15-10). - Air Cleaner Assembly Installation (Refer to P.15-5).
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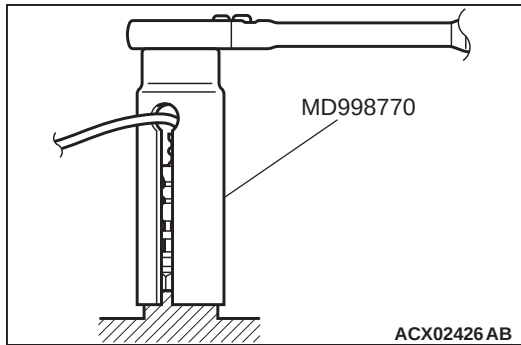
- <<A>> >>A<<
- Removal steps**
1. Linear air-fuel ratio sensor
 2. Exhaust manifold cover
 3. Nut

- Removal steps (Continued)**
4. Washer
 5. Exhaust manifold
 6. Exhaust manifold gasket

REMOVAL SERVICE POINT

<<A>> LINEAR AIR-FUEL RATIO SENSOR
REMOVAL

1. Remove the linear air-fuel ratio sensor connector connection and harness clip.



2. Use special tool oxygen sensor wrench (MD998770) to remove the linear air-fuel ratio sensor.

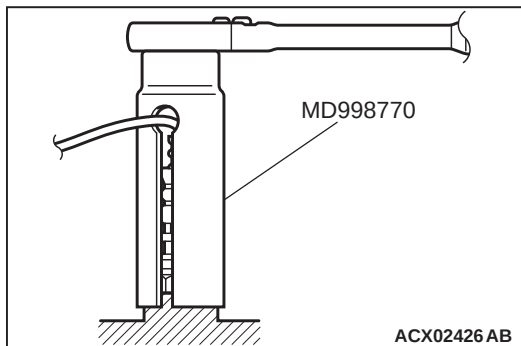
INSTALLATION SERVICE POINT

>>A<< LINEAR AIR-FUEL RATIO SENSOR INSTALLATION

1. In the same manner as removal, use special tool oxygen sensor wrench (MD998770) to tighten the linear air-fuel ratio sensor to the specified torque.

Tightening torque: 44 ± 5 N·m (32 ± 3 ft-lb)

2. Install the linear air-fuel ratio sensor connector connection and harness clip.



INSPECTION

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

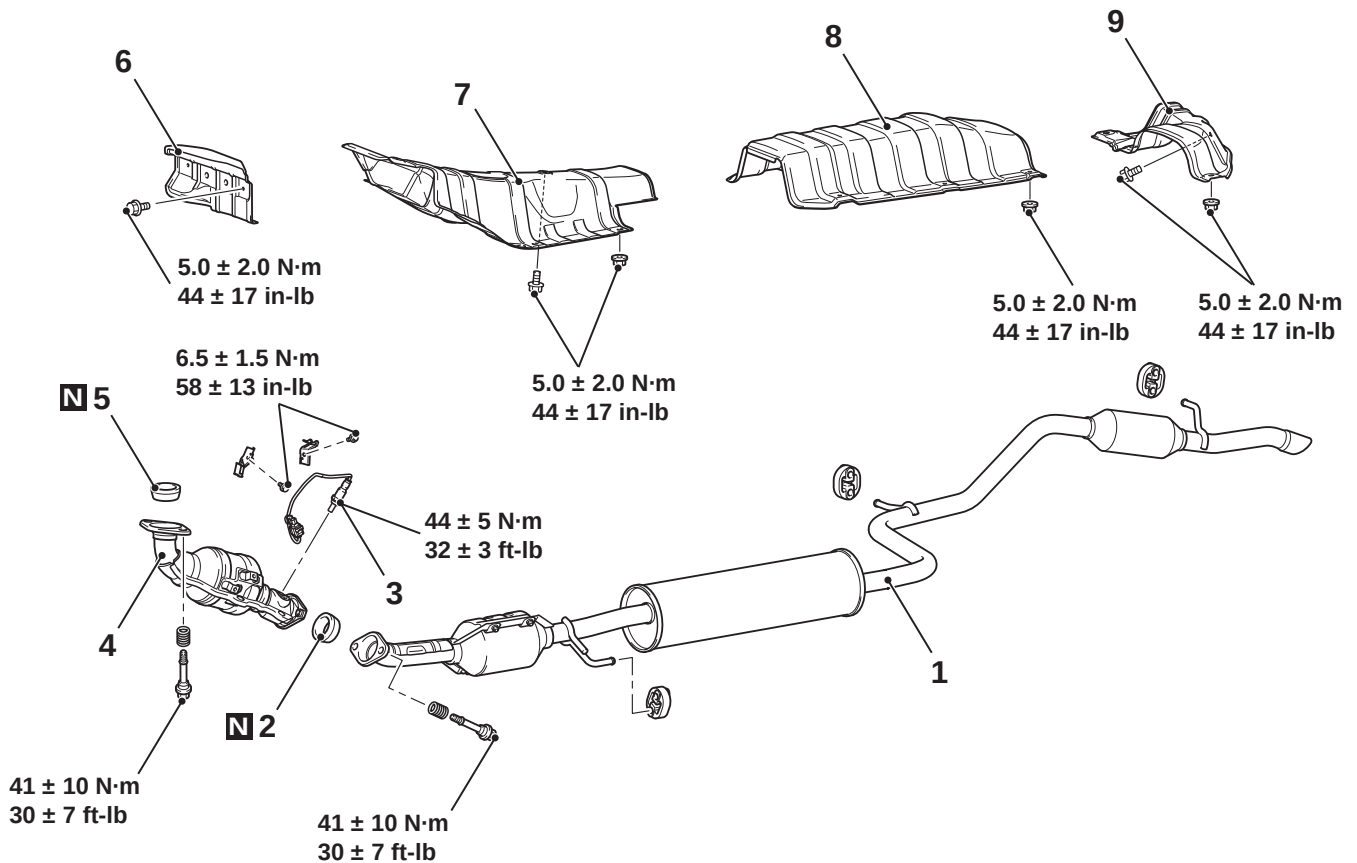
EXHAUST MANIFOLD CHECK

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.

Limit: 0.54 mm (0.021 inch)

EXHAUST PIPE AND MAIN MUFFLER**REMOVAL AND INSTALLATION**

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Removal steps

- <<A>> >>A<<
1. Main muffler
 2. Seal ring
 3. Heated oxygen sensor (rear)
 4. Catalytic converter
 5. Seal ring
 6. Heat protector panel dash upper
 - Gearshift cable and select cable assembly (Refer to GROUP 22A – Transaxle Control [P.22A-8](#)) <M/T>.

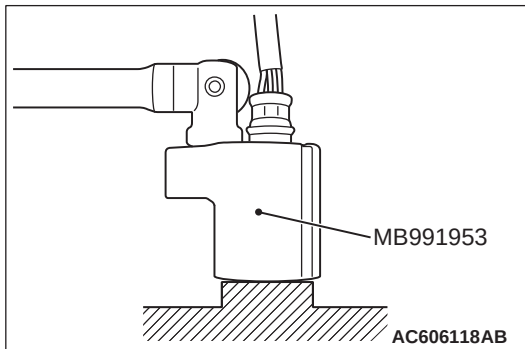
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Removal steps (Continued)

- Transaxle control cable (Refer to GROUP 23A – Transaxle Control [P.23A-134](#)) <CVT>.
- 7. Heat protector panel front floor front
- 8. Heat protector panel front floor rear
- Engine room under cover side RH connection (Refer to GROUP 51 – Under Cover [P.51-15](#)).
- 9. Heat protector panel rear

REMOVAL SERVICE POINTS**<<A>> OXYGEN SENSOR REMOVAL**

1. Remove the oxygen sensor connector connection and harness clamp.



2. Use special tool oxygen sensor wrench (MB991953) to remove the oxygen sensor.

<> ENGINE ROOM UNDER COVER SIDE RH DISCONNECTION

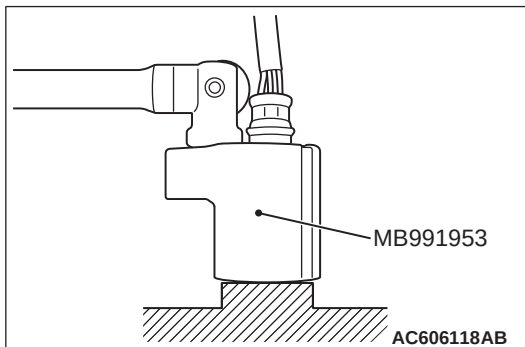
Remove the nuts, bolts and clips at the right side of the engine compartment undercover in order to allow sufficient clearance to remove and install the heat protector panel rear.

INSTALLATION SERVICE POINT

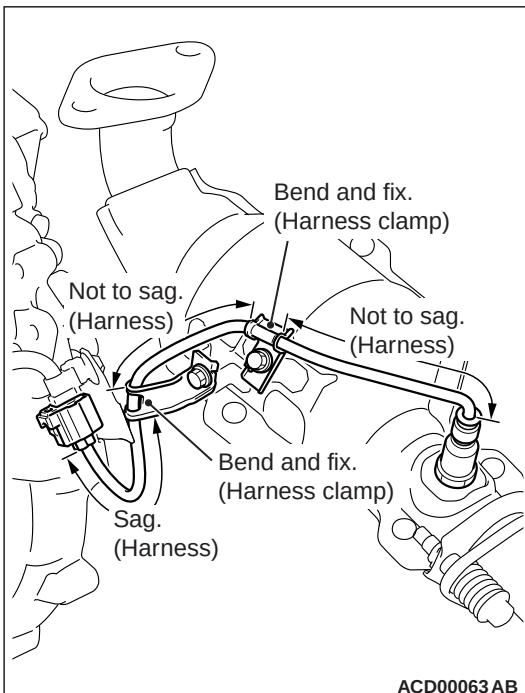
>>A<< OXYGEN SENSOR INSTALLATION

1. In the same manner as removal, use special tool oxygen sensor wrench (MB991953) to tighten the oxygen sensor to the specified torque.

Tightening torque: 44 ± 5 N·m (32 ± 3 ft-lb)



2. Install the oxygen sensor connector connection and harness clamp.



NOTES