

GROUP 15

INTAKE AND EXHAUST

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GENERAL INFORMATION

M1151000101041

The exhaust pipe is divided into three parts.

SERVICE SPECIFICATION

M1151000301584

ITEM		STANDARD VALUE	LIMIT
Intake charge pressure kPa (psi)		85 –159 (12.4 –23.0)	–
Turbocharger wastegate actuator pressure kPa (psi)		98 –102 (14.3 –14.7)	–
No. 1 Turbocharger wastegate solenoid terminal resistance [at 20° C (68° F)] Ω		29 –35	–
No. 2 Turbocharger wastegate solenoid terminal resistance [at 20° C (68° F)] Ω		29 –35	–
Exhaust manifold distortion of the installation surface mm (in)	Cylinder head assembly side	–	0.70 (0.028)
	Turbocharger assembly side	–	0.40 (0.016)

INTAKE AND EXHAUST DIAGNOSIS**INTRODUCTION**

M1151006900406

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

M1151007000398

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

M1151007100395

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.

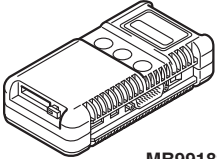

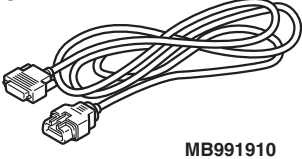
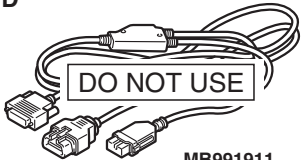
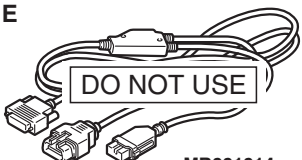
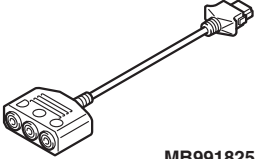
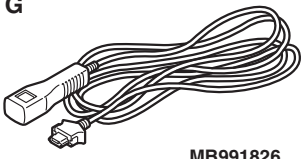
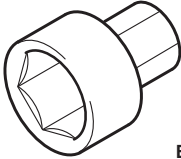
Q: Are the pipes and muffler damaged?

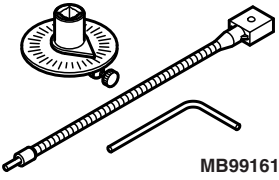
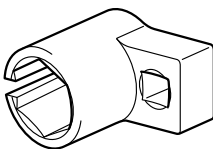
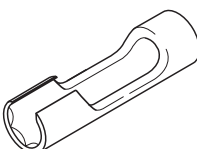
YES : Replace, then go to Step 1.

NO : There is no action to be taken.

SPECIAL TOOLS

M1151000601477

Tool	Tool number and name	Supersession	Application
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991914</p> <p>F</p>  <p>MB991825</p> <p>G</p>  <p>MB991826 MB991958</p>	<p>MB991958 Scan tool (M.U.T.-III sub assembly) A: MB991824 Vehicle communication interface (V.C.I.)</p> <p>B: MB991827 M.U.T.-III USB cable</p> <p>C: MB991910 M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>D: MB991911 M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>E: MB991914 M.U.T.-III main harness C (for Chrysler models only)</p> <p>F: MB991825 M.U.T.-III measurement adapter</p> <p>G: MB991826 M.U.T.-III trigger harness</p>	<p>MB991824-KIT</p> <p><i>NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.</i></p>	<p>Measurement of turbocharger supercharging pressure</p> <p>CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>
 <p>B992274</p>	<p>MB992274 Palm socket</p>	<p>–</p>	<p>Removal and installation of turbocharger compressor bracket</p>

Tool	Tool number and name	Supersession	Application
 MB991614	MB991614 Angle gauge	General service tool	Installation of turbocharger assembly coupling bolt and nut
 B991953	MB991953 Oxygen sensor wrench	MB991953-01	Removal and installation of heated oxygen sensor
	MB992188 Fuel injection pipe wrench	MB992188-01	Removal and installation of No.2 air temperature sensor

ON-VEHICLE SERVICE

INTAKE CHARGE PRESSURE CHECK

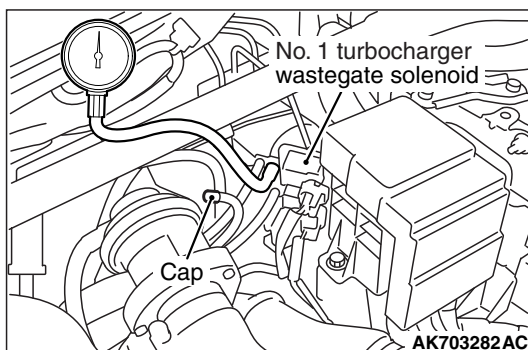
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Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

1. Removing the black hose from the No. 1 turbocharger wastegate solenoid or the brown connector, install the pressure gauge to this hose. Cap the nipple of solenoid after removing the black hose.



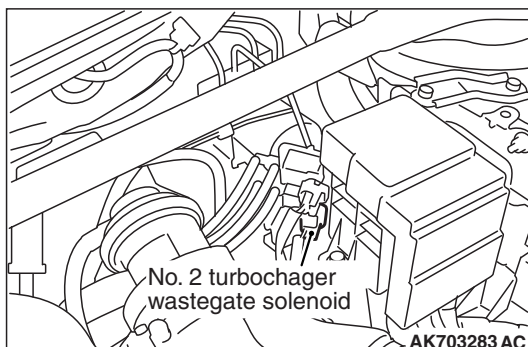
2. Disconnect the black connector of No. 2 turbocharger wastegate solenoid.

CAUTION

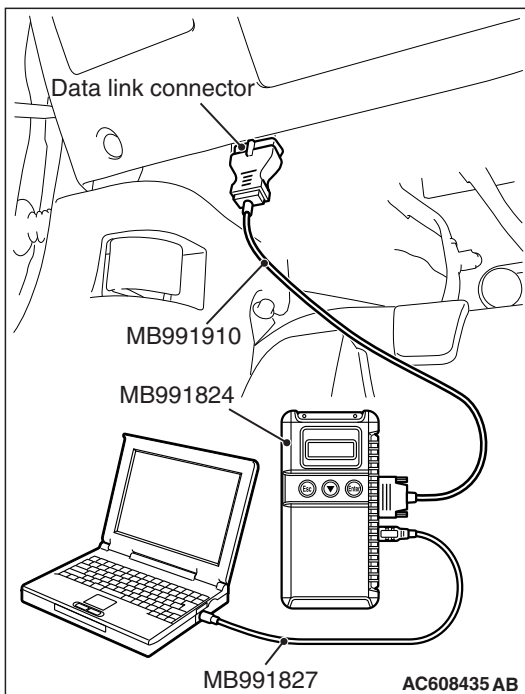
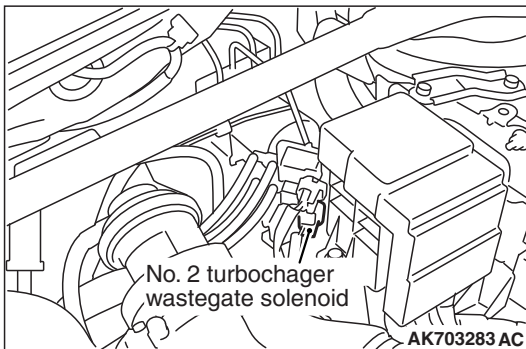
Two persons should be in the vehicle when the test is conducted; the person in the passenger seat should read the indications shown by the pressure meter.

3. When the engine speed reaches approximately 3,000 r/min or more with the throttle fully opened in the second gear, measure the intake charge pressure.

Standard value: 85 –159 kPa (12.4 –23.0 psi)



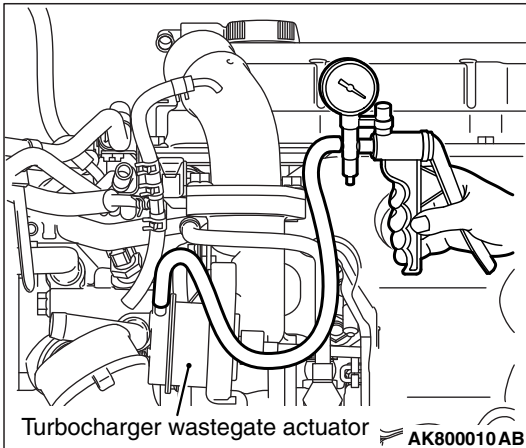
4. If the intake charge pressure is lower than the standard, check the following possible causes.
 - a. Turbocharger wastegate actuator malfunction
 - b. Turbocharger wastegate regulating valve malfunction
 - c. Intake charge pressure leakage
 - d. Turbocharger malfunction
 - e. Turbocharger bypass valve malfunction
5. If the intake charge pressure is higher than the standard, check on the following areas because the intake charge pressure control might be abnormal.
 - a. Turbocharger wastegate actuator malfunction
 - b. Turbocharger wastegate regulating valve malfunction
 - c. Rubber hose of turbocharger wastegate actuator disconnected or cracked
6. Connect the black connector of No. 2 turbocharger wastegate solenoid.



7. If the diagnostic trouble code is stored during the check, use scan tool MB991958 to eliminate the diagnosis code.

TURBOCHARGER WASTEGATE ACTUATOR CHECK

M1151001200491



1. Connect a hand vacuum pump (pressure-application type) to nipple.

⚠ CAUTION

In order to avoid damage to the diaphragm, do not apply a pressure of 117 kPa (17 psi) or higher.

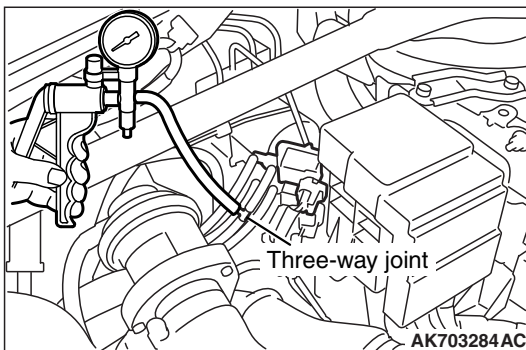
2. While gradually applying pressure, check the pressure that begins to activate (approximately 1 mm stroke) the turbocharger wastegate actuator rod.

Standard value: 98 –102 kPa (14.3 –14.7 psi)

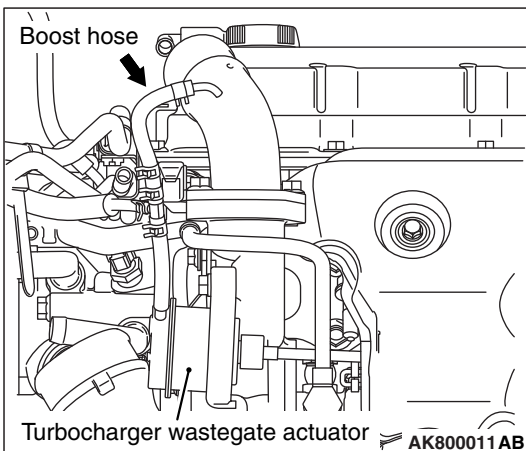
3. If there is a significant deviation from the standard value, check the actuator or the turbocharger wastegate regulating valve: replace if necessary.

INTAKE CHARGE PRESSURE CONTROL SYSTEM CHECK

M1151001100405



1. Removing the black hose from the No. 1 turbocharger wastegate solenoid or the brown connector, connect three-way joint between the hose and the solenoid.
2. Connect the pressurized type hand vacuum pump with the three-way joint.



3. Use the turbocharger wastegate actuator control boost nipple of air outlet fitting to remove the boost hose. Plug this nipple.

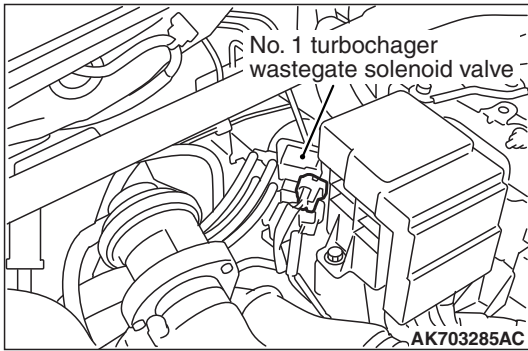
⚠ CAUTION

Do not apply the pressure of 117 kPa or more to prevent the diaphragm damage.

4. Blocking or releasing the boost hose end, apply the pressure. Check the pressurized state.

Engine state	Boost hose end	Normal state
Stopped: Ignition switch in "ON" position	Opened	Pressure leaks
	Closed	Pressure maintained
Rapid racing		Pressure leaks

5. Put the ignition switch in "LOCK" (OFF) position.



6. Disconnect the connector of No. 1 turbocharger wastegate solenoid or the brown connector.
7. Blocking or releasing the boost hose end, apply the pressure. Check the pressurized state. Plug the boost hose end while driving.

Engine state	Boost hose end	Normal state
Stopped: Ignition switch in "ON" position	Opened	Pressure leaks
	Closed	Pressure maintained
4,000 r/min after warming up engine		Pressure leaks

NOTE: Unless the pressurized state is normal, the turbocharger wastegate actuator, turbocharger wastegate solenoid or the hose might have a malfunction.

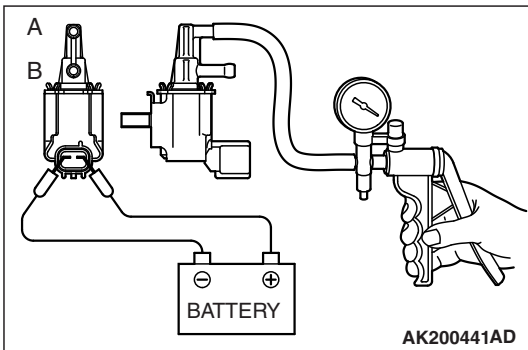
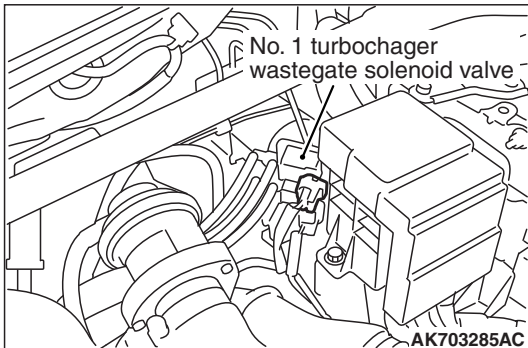
TURBOCHARGER WASTE GATE SOLENOID CHECK

M1151001300272

No.1 turbocharger wastegate solenoid or brown connector

A Operation check

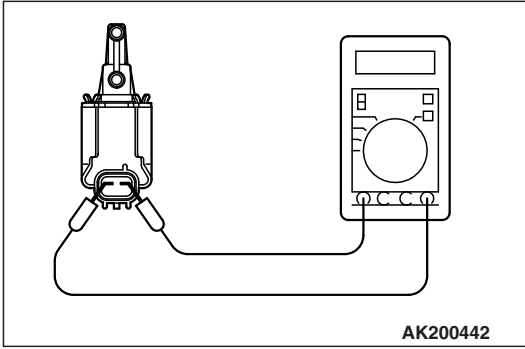
1. Install the hand vacuum pump to the nipple "A" of solenoid.
2. Use the jumper wire to connect the solenoid terminal with the battery terminal.
3. Disconnecting the jumper wire at the negative (-) battery side, apply the vacuum pressure. Check the airtightness.



Jumper wire	Nipple "B" state	Normal state
Connected	Opened	Negative pressure leaks
	Closed	Negative pressure maintained
Disconnected	Opened	Negative pressure maintained

B Check of coil resistance

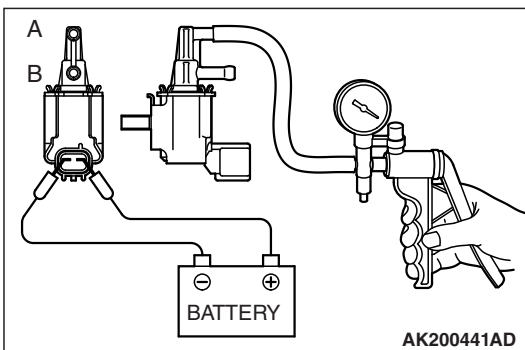
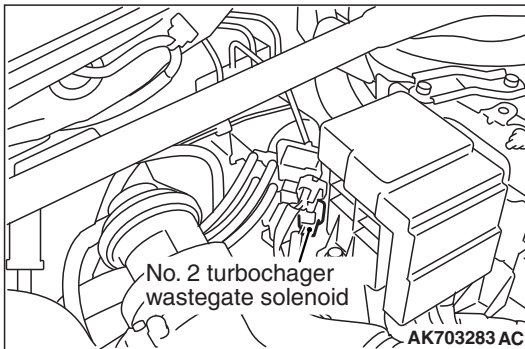
1. Measure the resistance between the solenoid terminals.
Standard value: 29 –35 Ω at 20° C (68° F)



NO.2 turbocharger wastegate solenoid or black connector

A Operation check

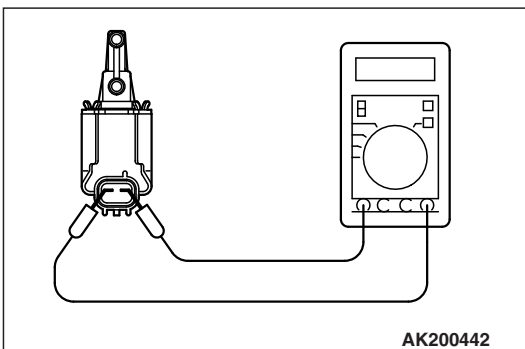
1. Install the hand vacuum pump to the nipple "A" of solenoid.
2. Use the jumper wire to connect the solenoid terminal with the battery terminal.
3. Disconnecting the jumper wire at the negative (-) battery side, apply the vacuum pressure. Check the airtightness.



Jumper wire	Nipple "B" state	Normal state
Connected	Opened	Negative pressure leaks
	Closed	Negative pressure maintained
Disconnected	Opened	Negative pressure maintained

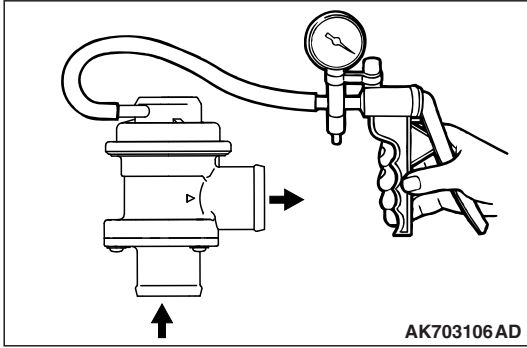
B Check of coil resistance

1. Measure the resistance between the solenoid terminals.
Standard value: 29 –35 Ω at 20° C (68° F)



TURBOCHARGER BYPASS VALVE CHECK

M1151001600303



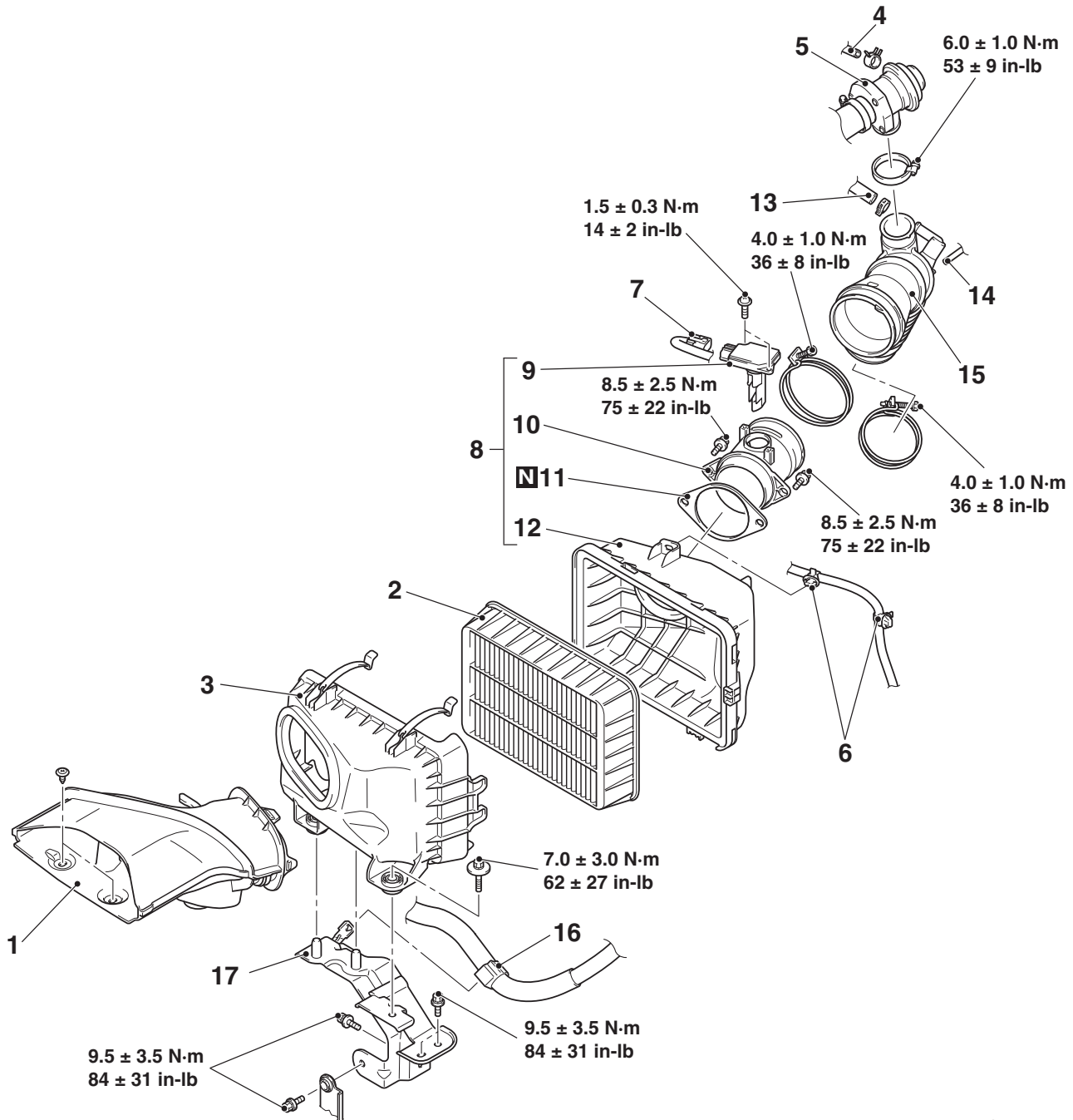
1. Remove the turbocharger bypass valve.
2. Connect the hand vacuum pump to the nipple of the turbocharger bypass valve.
3. Apply a negative pressure of approximately 50 kPa (14.8 in.Hg) and check that air tightness is maintained.
4. Also check operation of the valve.

Negative pressure	Valve operation
60.1 –76.1 kPa (17.8 –22.4 in.Hg)	Starts opening

AIR CLEANER

REMOVAL AND INSTALLATION

M1151002101951



AC710665 AB

Removal steps

1. Air cleaner intake duct
2. Air cleaner element
3. Air cleaner body
4. Air by-pass valve vacuum hose connection
5. Air by-pass valve connection
6. Harness clamp connection
7. Mass airflow sensor connector connection
8. Air cleaner cover assembly

>>A<<

Removal steps (Continued)

9. Mass airflow sensor
10. Air cleaner support
11. Gasket
12. Air cleaner cover
13. Breather hose connection
14. Vacuum hose connection
15. Air cleaner intake hose
16. Harness clamp connection
17. Air cleaner bracket

INSTALLATION SERVICE POINT

>>A<< MASS AIRFLOW SENSOR INSTALLATION

CAUTION

Do not over-tighten. If the mass air flow sensor installation screw is over-tightened, the air cleaner support thread may be damaged.

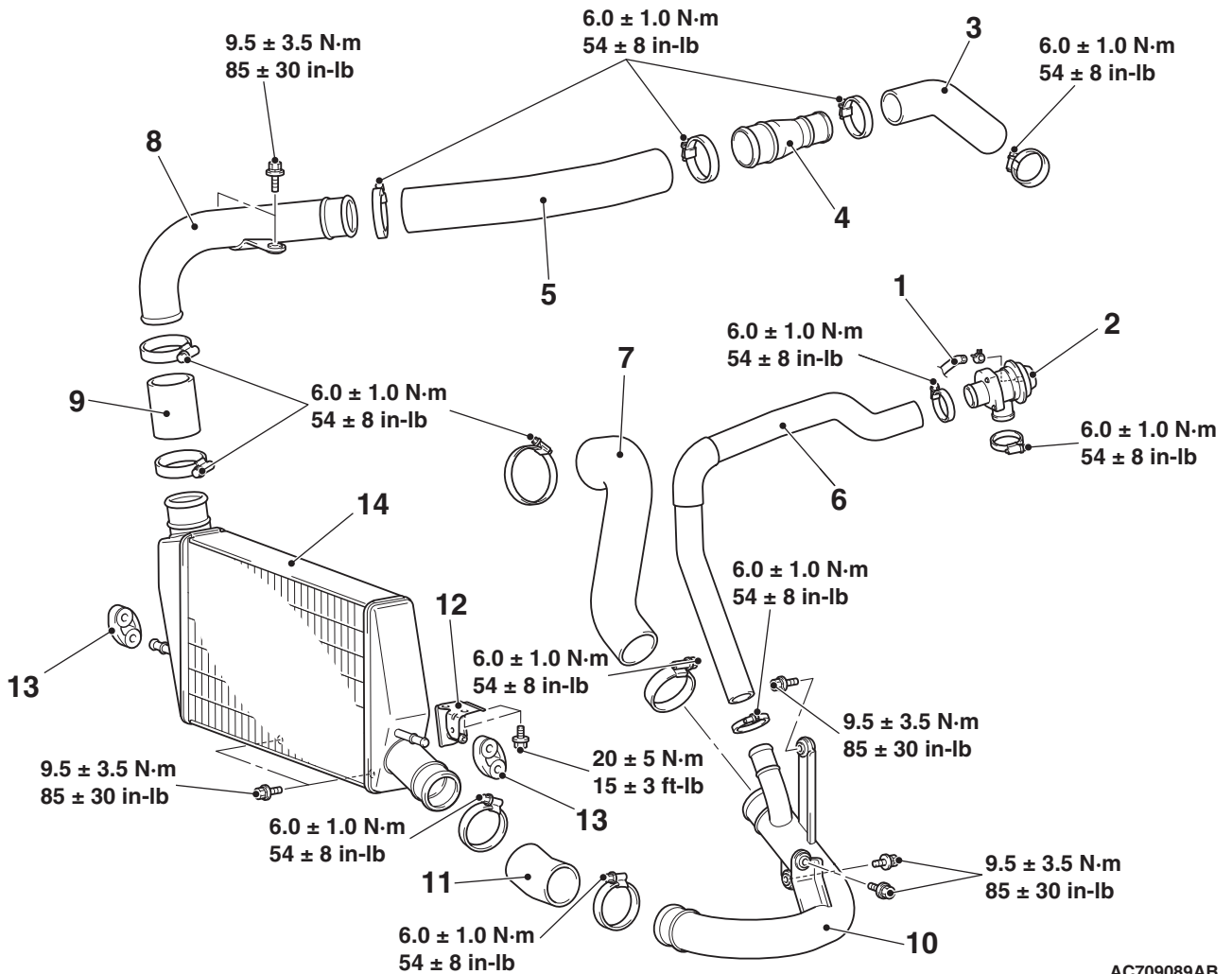
CHARGE AIR COOLER

REMOVAL AND INSTALLATION

M1151002401026

CAUTION

- Degrease the air hose and air pipe by isopropyl alcohol, parts cleaner (MZ100387) or equivalent.
- As for the parts cleaner, use the petroleum cleaner whose major component is aliphatic hydrocarbon.
- Working area should be airy and kept from flame.



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Removal steps

1. Turbocharger by-pass valve vacuum hose connection
2. Turbocharger by-pass valve

Removal steps (Continued)

- | | | |
|-------|-------|------------------------------------|
| <<A>> | >>A<< | 3. Charge air cooler intake hose A |
| <<A>> | >>A<< | 4. Charge air cooler intake pipe A |
| <<A>> | >>A<< | 5. Charge air cooler intake hose B |

Removal steps (Continued)

- Air cleaner body (Refer to P.15-11)
- <<A>> >>A<< 6. Turbocharger by-pass valve hose
- <<A>> >>A<< 7. Charge air cooler outlet hose E
 - Headlight support panel cover (Refer to GROUP 51, Front Bumper and Radiator Grille Assembly P.51-15)
- <<A>> >>A<< 8. Charge air cooler intake pipe B
- <<A>> >>A<< 9. Charge air cooler intake hose D

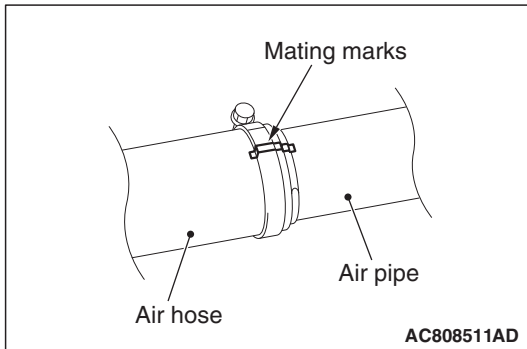
Removal steps (Continued)

- Front bumper and radiator grille assembly (Refer to GROUP 51, Front Bumper and Radiator Grille Assembly P.51-15)
- <<A>> >>A<< 10. Charge air cooler outlet pipe C
- <<A>> >>A<< 11. Charge air cooler outlet hose C
- <<A>> >>A<< 12. Charge air cooler hanger bracket (LH)
- <<A>> >>A<< 13. Charge air cooler hanger
- <<A>> >>A<< 14. Charge air cooler assembly

REMOVAL SERVICE POINT

<<A>> AIR HOSE/AIR PIPE REMOVAL

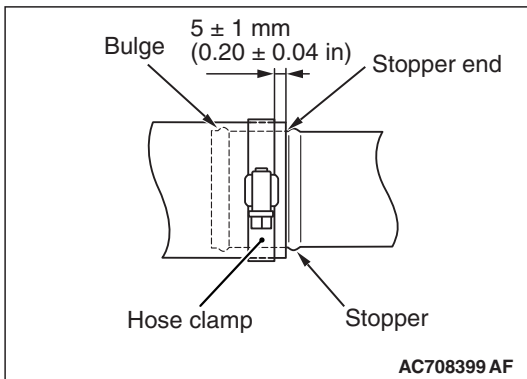
Put mating marks on the air hose, air pipe, and hose clamp, and remove them.



INSTALLATION SERVICE POINT

>>A<< AIR HOSE/AIR PIPE INSTALLATION

1. Insert hose to stopper end and not overlap with stopper.
2. Place the hose clamp as shown in the figure so that it does not overlap with the bulge and the stopper end. Then, set the hose clamp 5 ± 1 mm (0.20 ± 0.04 inch) away from the stopper.

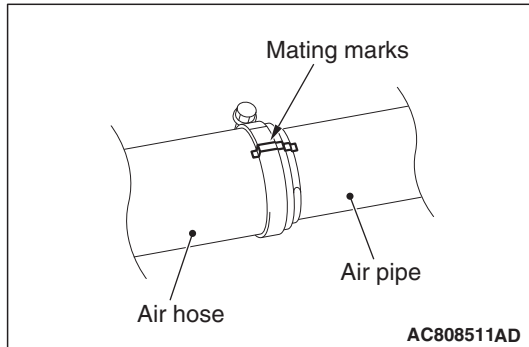


⚠ CAUTION

Do not use an electric screwdriver or air tool. Manually tighten the hose clamp.

3. Align the mating marks on the air hose, air pipe, and hose clamp. Then, tighten the hose clamp to the specified torque.

Tightening torque: 6.0 ± 1.0 N·m (54 ± 8 in-lb)



INTAKE MANIFOLD

REMOVAL AND INSTALLATION

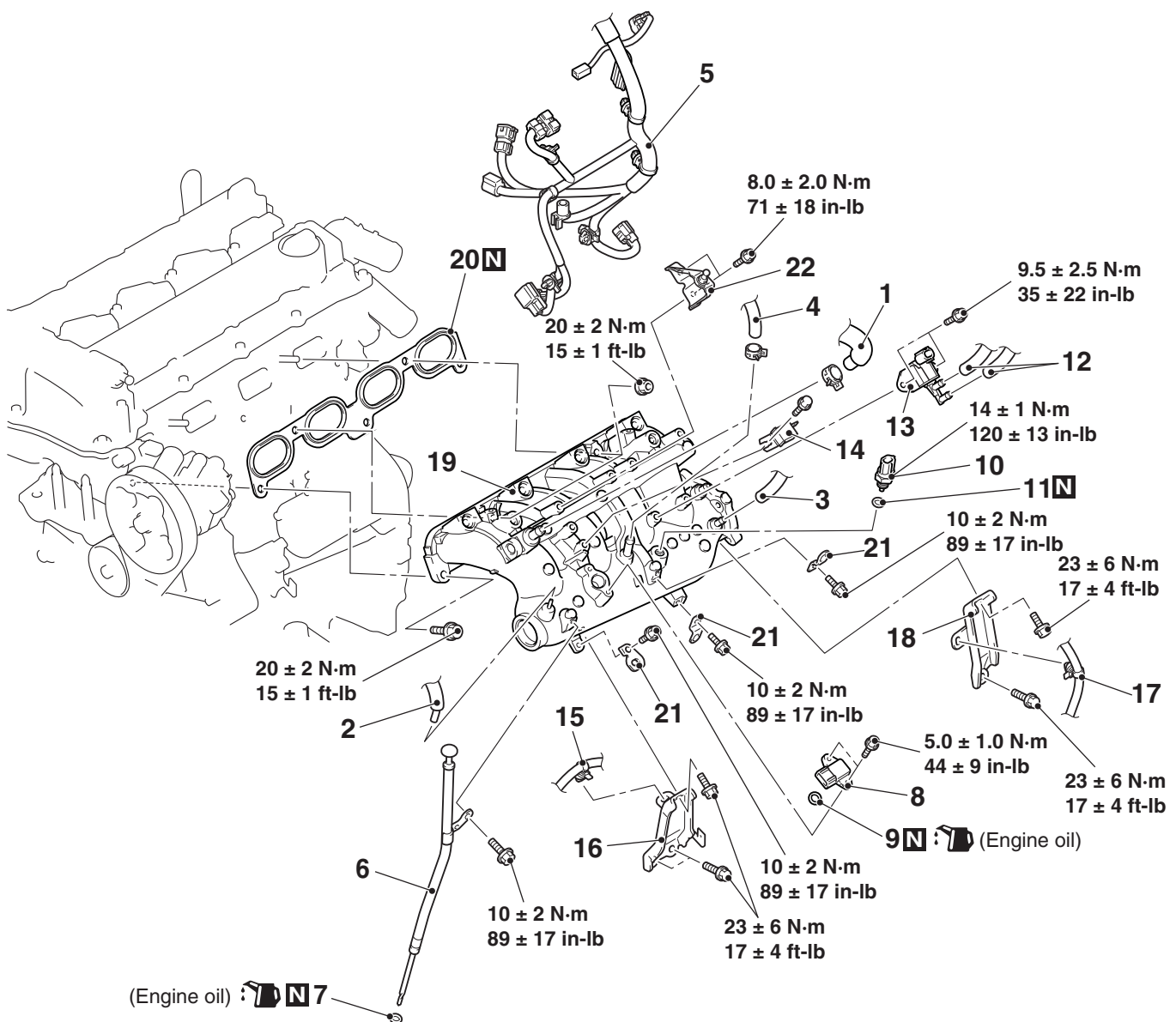
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Pre-removal operation

- Engine Upper Cover Removal (Refer to GROUP 16, Ignition System -Ignition Coil P.16-40).
- Air By-pass Valve, Air By-pass Hose, Charge Air Cooler Intake Hose B Removal (Refer to P.15-12).
- Air Cleaner Assembly Removal (Refer to P.15-11).
- Drive Belt Removal (Refer to GROUP 11A, Crankshaft Pulley P.11A-21).
- Throttle Body Removal (Refer to GROUP 13A, Throttle Body P.13A-886).
- Fuel Delivery Pipe and Fuel Injector Assembly Removal (Refer to GROUP 13A, Injector P.13A-882).

Post-installation operation

- Fuel Delivery Pipe and Fuel Injector Assembly Installation (Refer to GROUP 13A, Injector P.13A-882).
- Throttle Body Installation (Refer to GROUP 13A, Throttle Body P.13A-886).
- Air Cleaner Assembly Installation (Refer to P.15-11).
- Drive Belt Installation (Refer to GROUP 11A, Crankshaft Pulley P.11A-21).
- Air By-pass Valve, Air By-pass Hose, Charge Air Cooler Intake Hose B Installation (Refer to P.15-12).
- Engine Upper Cover Installation (Refer to GROUP 16, Ignition System -Ignition Coil P.16-40).



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Removal steps

Removal steps (Continued)

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Rocker cover PCV hose 2. Emission control equipment vacuum hose connection 3. Emission vacuum hose connection 4. Brake booster vacuum hose connection 5. Control wiring harness connection 6. Engine oil level gauge 7. O-ring >>B<< 8. Manifold absolute pressure sensor >>B<< 9. O-ring <<A>> >>A<< 10. No.2 Intake air temperature sensor | <ol style="list-style-type: none"> 11. Gasket 12. Vacuum hose connection 13. Purge control solenoid valve 14. Capacitor 15. Starter wiring harness clamp 16. Intake manifold stay (front) 17. Starter wiring harness clamp 18. Intake manifold stay (rear) 19. Intake manifold 20. Intake manifold gasket 21. Harness bracket 22. Engine upper cover bracket (front) |
|--|--|

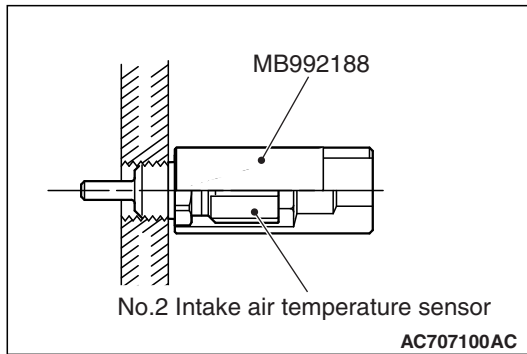
Required Special Tool:

- MB992188: Fuel Injection Pipe Wrench

REMOVAL SERVICE POINT

<<A>> NO.2 INTAKE AIR TEMPERATURE SENSOR REMOVAL

Use special tool MB992188 to remove the No.2 intake air temperature sensor.

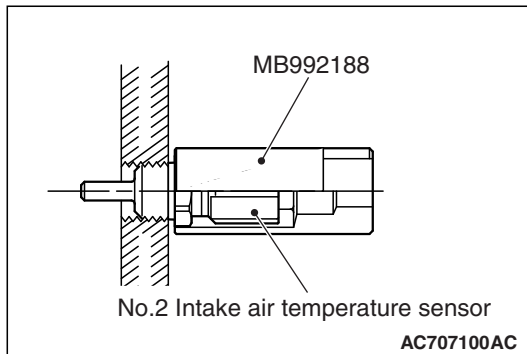


INSTALLATION SERVICE POINTS

>>A<< NO.2 INTAKE AIR TEMPERATURE SENSOR INSTALLATION

Tighten the No.2 intake air temperature sensor to the specified torque by using special tool MB992188.

Tightening torque: 14 ± 1 N·m (120 ± 13 in-lb)



>>B<< O-RING/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.
1. Apply a small amount of new engine oil to the O-ring.
 2. Install the manifold absolute pressure sensor to the intake manifold with care not to damage the O-ring.

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 AND TURBOCHARGER

REMOVAL AND INSTALLATION

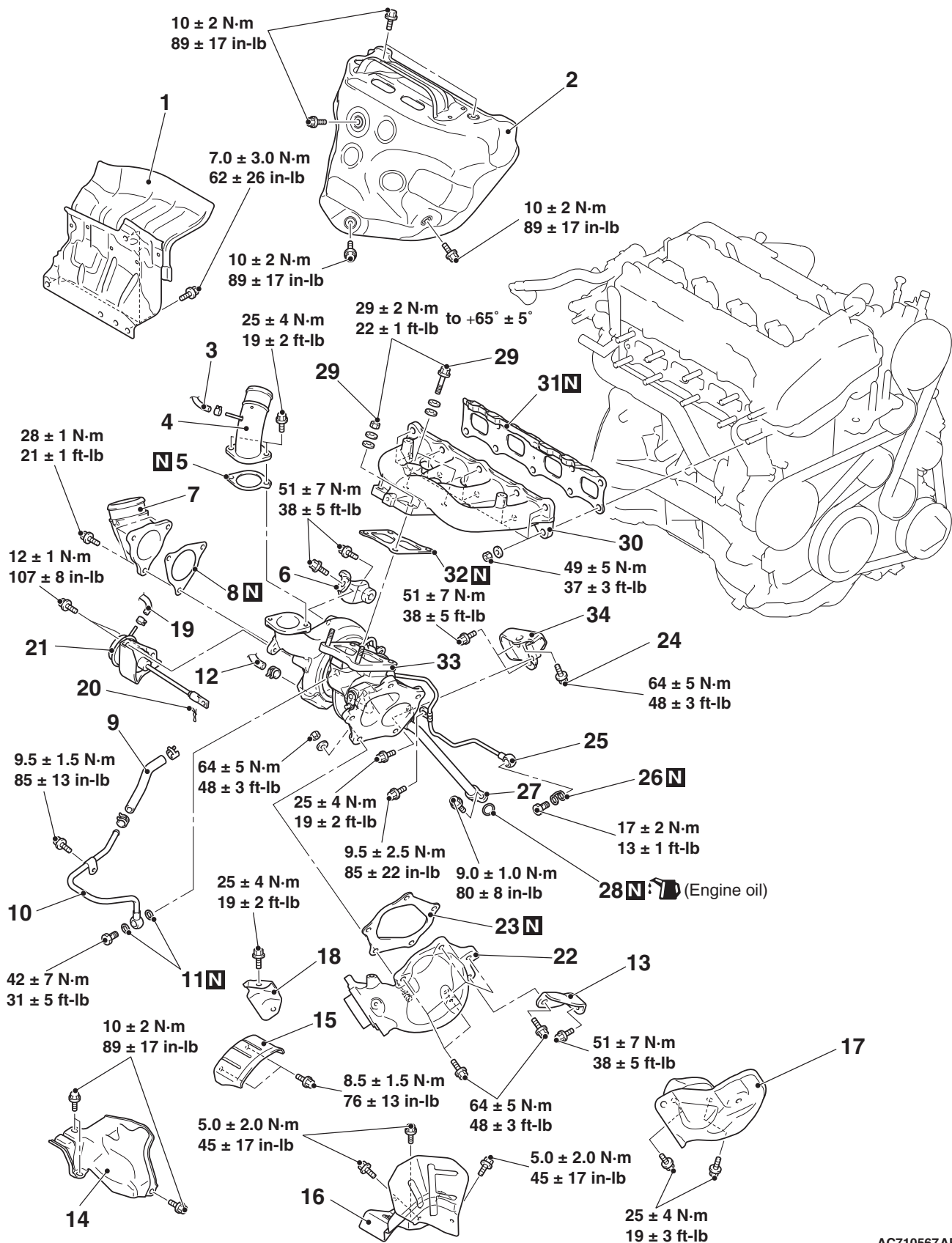
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Pre-removal operation

- Engine Room Under Cover Front A, B, Engine Room Under Cover Center and Engine Room Side Cover (RH) Removal (Refer to GROUP 51, Under Cover [P.51-15](#)).
- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service –Engine Coolant Replacement [P.14-17](#)).
- Engine Oil Draining (Refer to GROUP 12, On-vehicle Service –Engine Oil Replacement [P.12-4](#)).
- Engine Upper Cover Removal (Refer to GROUP 16, Ignition System –Ignition Coil [P.16-40](#)).
- Charge Air Cooler Intake Hose A and Charge Air Cooler Intake Pipe A Removal (Refer to [P.15-12](#)).
- Air Cleaner Assembly and Air Cleaner Intake Hose Removal (Refer to [P.15-11](#)).
- Front Exhaust Pipe Removal (Refer to [P.15-26](#)).
- Strut Tower Bar Removal (Refer to GROUP 42A, Strut Tower Bar [P.42A-14](#)).
- Cowl Top Panel Removal (Refer to GROUP 42A, Loose Panel [P.42A-14](#)).

Post-installation operation

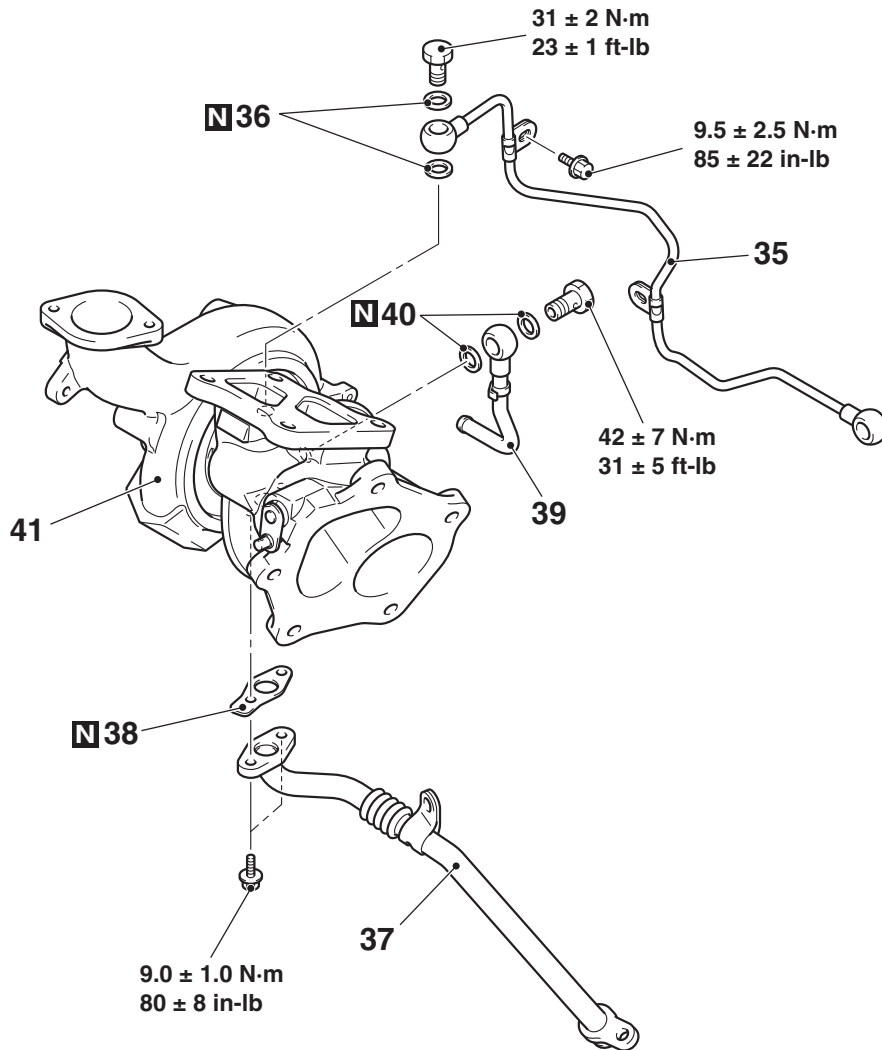
- Cowl Top Panel Installation (Refer to GROUP 42A, Loose Panel [P.42A-14](#)).
- Strut Tower Bar Installation (Refer to GROUP 42A, Strut Tower Bar [P.42A-14](#)).
- Front Exhaust Pipe Installation (Refer to [P.15-26](#)).
- Charge Air Cooler Intake Hose A and Charge Air Cooler Intake Pipe A Installation (Refer to [P.15-12](#)).
- Air Cleaner Assembly and Air Cleaner Intake Hose Installation (Refer to [P.15-11](#)).
- Engine Oil Refilling (Refer to GROUP 12, On-vehicle Service –Engine Oil Replacement [P.12-4](#)).
- Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service –Engine Coolant Replacement [P.14-17](#)).
- Engine Upper Cover Installation (Refer to GROUP 16, Ignition System –Ignition Coil [P.16-40](#)).
- Engine Room Under Cover Front A, B, Engine Room Under Cover Center and Engine Room Side Cover (RH) Installation (Refer to GROUP 51, Under Cover [P.51-15](#)).



- Removal steps**
1. Dash panel heat protector
 2. Exhaust manifold cover

- Removal steps (Continued)**
3. Emission vacuum control hose connection
 4. Turbocharger air outlet fitting

		Removal steps (Continued)		Removal steps (Continued)
		5. Turbocharger air outlet fitting gasket	>>C<<	24. Turbocharger bracket and turbocharger assembly coupling bolt
<<A>>	>>F<<	6. Turbocharger compressor bracket		25. Turbocharger oil feed tube connection
		7. Turbocharger air inlet fitting		26. Gasket
		8. Turbocharger air inlet fitting gasket		27. Turbocharger oil return tube connection
		9. Turbocharger water feed hose		28. O-ring
		10. Turbocharger water feed pipe		29. Exhaust manifold and turbocharger assembly coupling bolt and nut
		11. Gasket	>>D<<	30. Exhaust manifold
	>>E<<	12. Turbocharger water return hose		31. Exhaust manifold gasket
		13. Turbocharger exhaust outlet fitting bracket		32. Turbocharger gasket
		14. Transfer heat protector		33. Turbocharger assembly
		15. Drive shaft heat protector		• Transfer assembly (Refer to GROUP 22A, Transfer Assembly P.22A-126 <M/T>), (Refer to GROUP 22C, Transfer Assembly P.22C-410 <TC-SST>)
		16. Steering gear and linkage heat protector		34. Turbocharger bracket
		17. Turbocharger protector A		
		18. Turbocharger protector B		
		19. Emission vacuum control hose connection		
<>		20. Turbocharger pin	>>C<<	
		21. Waste gate actuator		
		22. Turbocharger exhaust outlet fitting		
		23. Turbocharger exhaust outlet fitting gasket		



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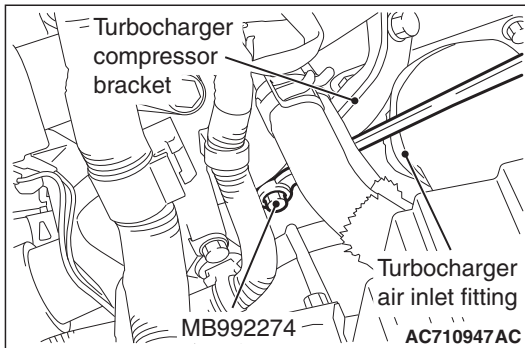
- <<C>>
- Removal steps**
- 35. Turbocharger oil feed tube
 - 36. Gasket
 - 37. Turbocharger oil return tube
- >>B<<
- 38. Turbocharger oil return tube gasket

- Removal steps (Continued)**
- 39. Turbocharger water return pipe
 - 40. Gasket
 - 41. Turbocharger
- >>A<<

Required Special Tools:

- MB992274: Palm Socket
- MB991614: Angle Gauge

REMOVAL SERVICE POINTS

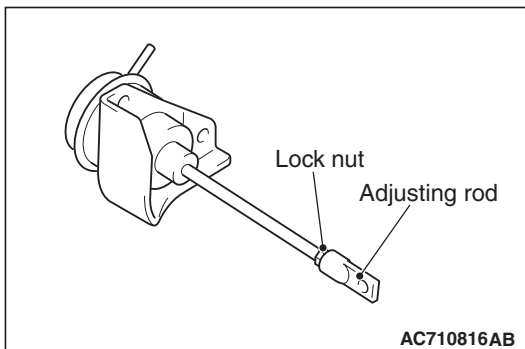
<<A>> TURBOCHARGER COMPRESSOR
BRACKET REMOVAL

Use special MB992274 to remove the turbocharger compressor bracket mounting bolt (cylinder block side).

<> WASTE GATE ACTUATOR REMOVAL

⚠ CAUTION

Never loosen the locking nuts and adjusting rod of the waste gate actuator.

<<C>> TURBOCHARGER OIL FEED TUBE
REMOVAL**⚠ CAUTION**

Take care not to allow foreign objects to get into the oil passage hole of the turbocharger assembly after the turbocharger oil feed tube is removed.

INSTALLATION SERVICE POINTS

>>A<< TURBOCHARGER INSTALLATION

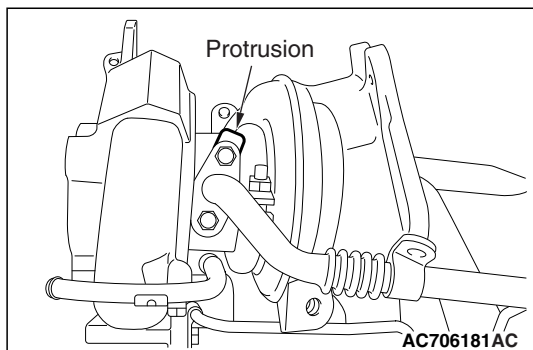
1. Clean the turbocharger oil feed tube, turbocharger water feed pipe and turbocharger water return pipe fitting, the inside of eye bolts, and individual pipe for clogs.

⚠ CAUTION

Take care not to allow foreign objects to get into the turbocharger.

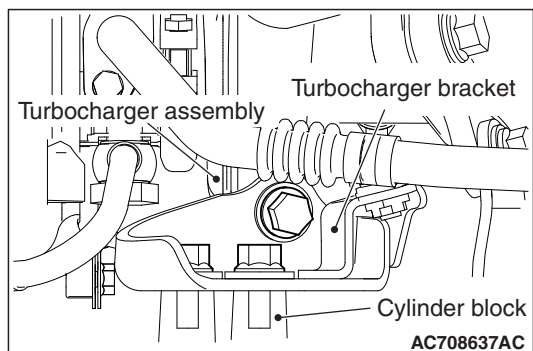
2. Clean or use compressed air to remove any carbon particles stuck to the oil passage of the turbocharger.
3. Refill new engine oil at the turbocharger oil feed tube fitting hole of the turbocharger.

>>B<< TURBOCHARGER OIL RETURN TUBE GASKET INSTALLATION



Install the gasket as its protrusion is in the direction shown. Install the gasket so that its protrusion faces in the direction shown in the illustration.

>>C<< TURBOCHARGER BRACKET/TURBOCHARGER BRACKET AND TURBOCHARGER ASSEMBLY COUPLING BOLT INSTALLATION



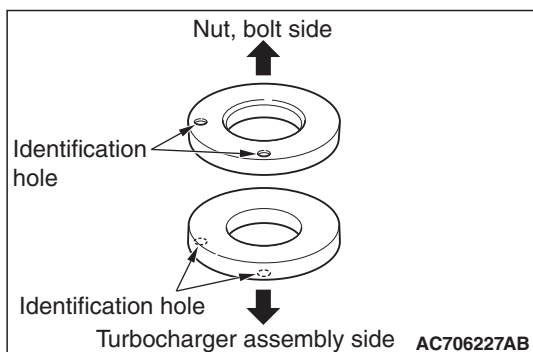
1. Check that the turbocharger bracket is in close contact with the turbocharger assembly and with the cylinder block, and then temporarily tighten the turbocharger bracket.
2. Tighten the bolt of the cylinder block side to the specified torque.

Tightening torque: $51 \pm 7 \text{ N} \cdot \text{m}$ ($38 \pm 5 \text{ ft} \cdot \text{lb}$)

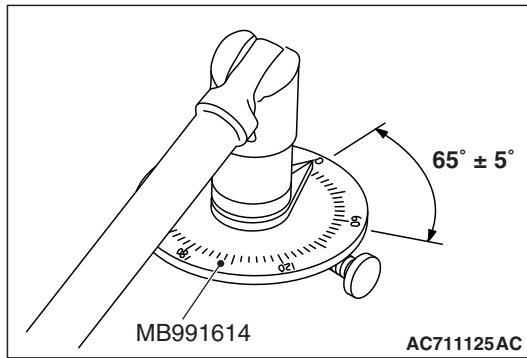
3. Tighten the turbocharger bracket and the turbocharger assembly coupling bolt to the specified torque.

Tightening torque: $64 \pm 5 \text{ N} \cdot \text{m}$ ($48 \pm 3 \text{ ft} \cdot \text{lb}$)

>>D<< EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY COUPLING BOLT AND NUT INSTALLATION

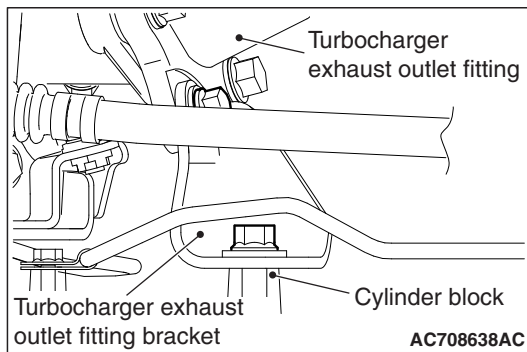


1. Tighten the bolts and nuts according to the procedure below.
 - (1) Install two washers with their identification holes facing outside as shown in the figure.
 - (2) Tighten the bolts and nuts to $29 \pm 2 \text{ N} \cdot \text{m}$ ($22 \pm 1 \text{ ft} \cdot \text{lb}$) in the order of number shown in the figure.



- (3) Use special tool MB991614 to tighten bolts and nuts 65 ± 5 degrees angle.

>>E<< TURBOCHARGER EXHAUST OUTLET FITTING BRACKET INSTALLATION



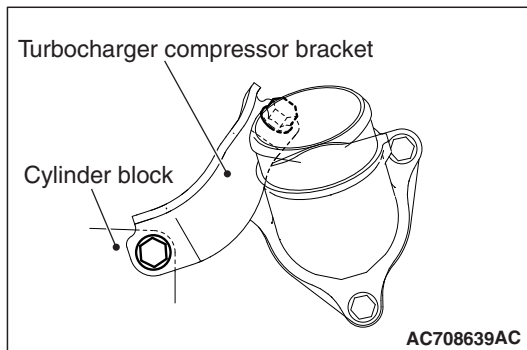
1. Check that the turbocharger exhaust outlet fitting bracket is in close contact with the turbocharger exhaust outlet fitting and with the cylinder block, and then temporarily tighten the turbocharger exhaust outlet fitting bracket.
2. Tighten the bolt of the cylinder block side to the specified torque.

Tightening torque: $51 \pm 7 \text{ N} \cdot \text{m}$ ($38 \pm 5 \text{ ft-lb}$)

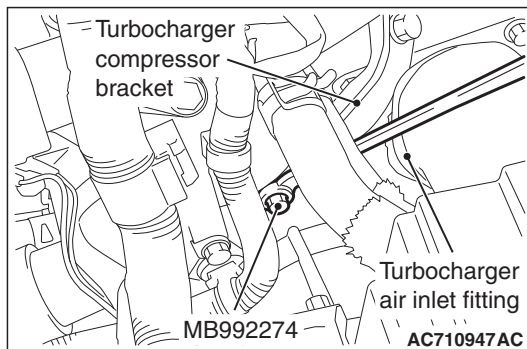
3. Tighten the bolt of the turbocharger exhaust outlet fitting bracket side to the specified torque.

Tightening torque: $64 \pm 5 \text{ N} \cdot \text{m}$ ($48 \pm 3 \text{ ft-lb}$)

>>F<< TURBOCHARGER COMPRESSOR BRACKET INSTALLATION



1. Check that the turbocharger compressor bracket is in close contact with the turbocharger assembly and with the cylinder block, and then temporarily tighten the turbocharger compressor bracket.



2. Use special tool MB992274 to tighten the turbocharger compressor bracket mounting bolt (cylinder block side) to the specified torque.

Tightening torque: $51 \pm 7 \text{ N} \cdot \text{m}$ ($38 \pm 5 \text{ ft-lb}$)

3. Tighten the bolt of the turbocharger assembly side to the specified torque.

Tightening torque: $51 \pm 7 \text{ N} \cdot \text{m}$ ($38 \pm 5 \text{ ft-lb}$)

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 and turbocharger installation surface. If it exceeds the limit value, replace it.

**Limit <Cylinder head assembly side>: 0.70 mm
(0.028 inch)**

**Limit <Turbocharger assembly side>: 0.40 mm (0.016
inch)**

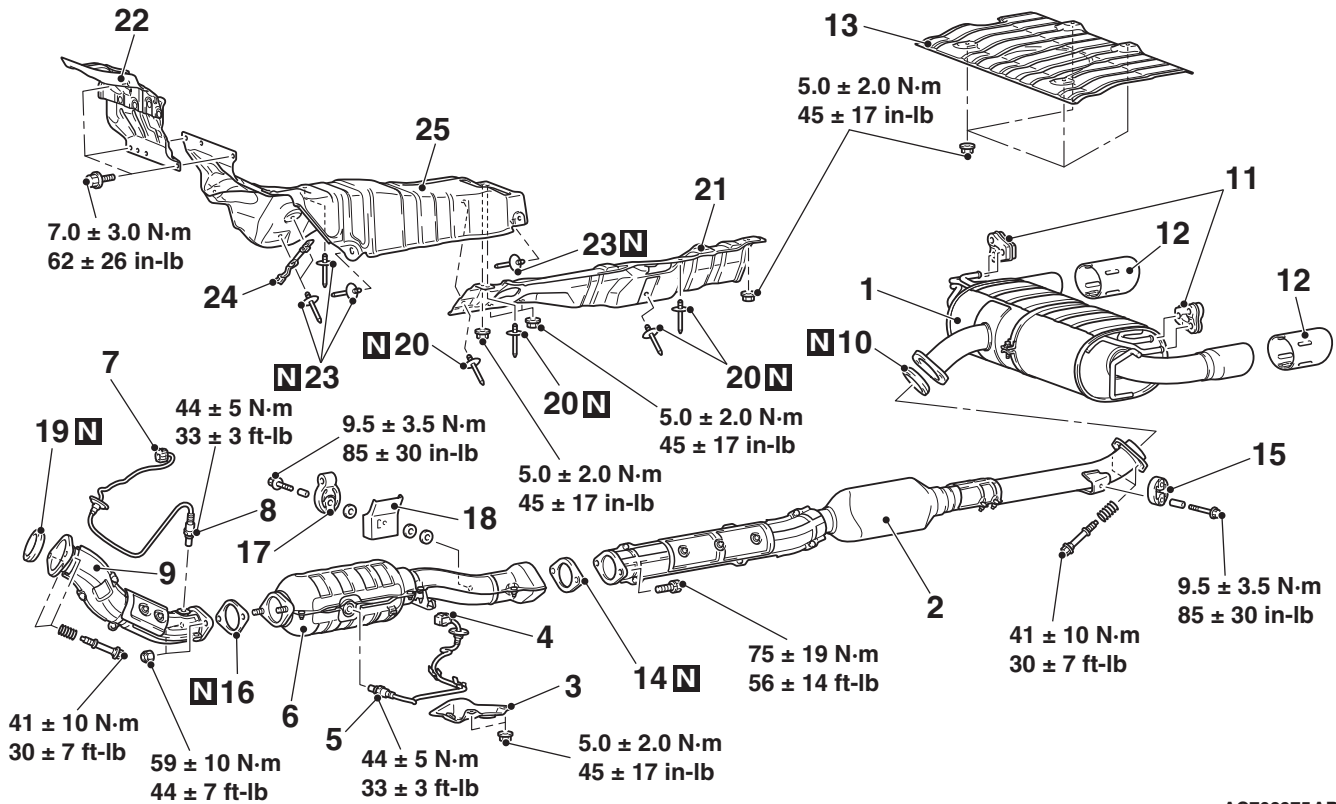
TURBOCHARGER ASSEMBLY CHECK

1. Visually check the turbine wheel and the compressor wheel for cracking or other damage.
2. Check whether the turbine wheel and the compressor wheel can be easily turned by hand.
3. Check for oil leakage from the turbocharger assembly.
4. Check whether or not the turbocharger waste gate regulating valve remains open. If any problem is found, replace the part after disassembly.

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
10. Seal ring
11. Exhaust muffler hanger
12. Exhaust tail pipe diffuser
13. Rear floor panel heat protector

Center exhaust pipe removal steps

2. Center exhaust pipe
10. Seal ring
14. Exhaust pipe gasket
15. Exhaust muffler hanger

Catalytic converter removal steps

3. Harness cover
4. Heated oxygen sensor (rear) connector

<<A>> >>B<<

5. Heated oxygen sensor (rear)
6. Catalytic converter
14. Exhaust pipe gasket
16. Exhaust pipe gasket
17. Exhaust muffler hanger
18. Exhaust muffler hanger protector

Front exhaust pipe removal steps

- Cowl side trim (Refer to GROUP 52A, Trims P.52A-12).
- Footrest
- Floor console side cover (Refer to GROUP 52A, Front Floor Console Assembly P.52A-10).
- Turn up the passenger side floor carpet.
- Front floor backbone brace (Refer to GROUP 42A, Loose Panel P.42A-198).

7. Heated oxygen sensor (front) connector

8. Heated oxygen sensor (front)
9. Front exhaust pipe
16. Exhaust pipe gasket
19. Seal ring

Front floor panel front heat protector and front floor panel rear heat protector removal steps

2. Center exhaust pipe
3. Harness cover

Front floor panel front heat protector and front floor panel rear heat protector removal steps (Continued)

4. Heated oxygen sensor (rear) connector
6. Catalytic converter
 - Cowl side trim (Refer to GROUP 52A, Trims [P.52A-12](#)).
 - Footrest
 - Floor console side cover (Refer to GROUP 52A, Front Floor Console Assembly [P.52A-10](#)).
 - Turn up the passenger side floor carpet. <> >>A<<
 - Front floor backbone brace (Refer to GROUP 42A, Loose Panel [P.42A-198](#)). <> >>A<<

Front floor panel front heat protector and front floor panel rear heat protector removal steps (Continued)

7. Heated oxygen sensor (front) connector
9. Front exhaust pipe
10. Seal ring
14. Exhaust pipe gasket
16. Exhaust pipe gasket
19. Seal ring
 - Propeller shaft assembly (Refer to GROUP 25, Propeller Shaft [P.25-7](#)).
20. Rivet
21. Front floor rear panel heat protector
22. Dash panel heat protector
23. Rivet
24. Heated oxygen sensor clip
25. Front floor front panel heat protector

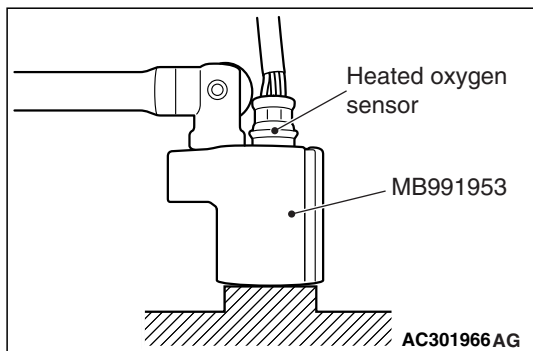
Required Special Tool:

- MB991953: Oxygen Sensor Wrench

REMOVAL SERVICE POINTS

<<A>> HEATED OXYGEN SENSOR REMOVAL

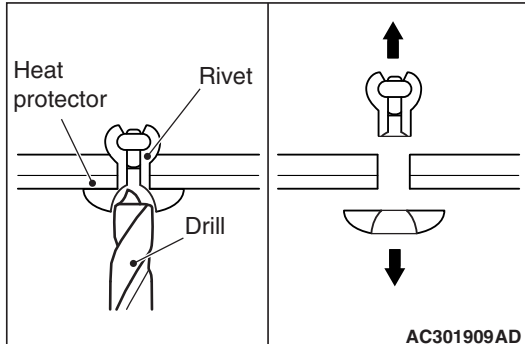
Use special tool MB991953 to remove the heated oxygen sensor.



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

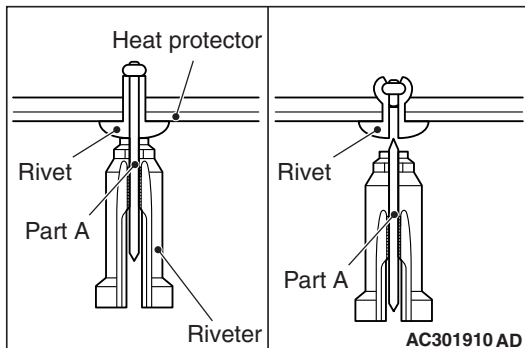
Be careful not to score the heat protector by drill.

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<< RIVET/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<< HEATED OXYGEN SENSOR INSTALLATION**

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

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

