
INTAKE AND EXHAUST

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GENERAL**OUTLINE OF CHANGES**

- The service procedures have been established due to the adoption of the intake manifold made of resin for the 4G93-GDI engine and the change of the exhaust pipe.
- The service procedures have been established due to the adoption of the exhaust manifold incorporated with the catalytic converter for the 4G92-MPI engine.
- The following service procedures have been added to correspond to the addition of the F9Q engine.
 1. On-vehicle Service
 2. Removal and installation of the intercooler
 3. Removal and installation of the intake manifold
 4. Removal and installation of the exhaust manifold
 5. Removal and installation of the turbocharger
 6. Removal and installation of the exhaust pipe and main muffler

SERVICE SPECIFICATION

Items	Standard value
Turbocharger waster gate solenoid coil resistance Ω (at 25°C)	15.5 - 17.5

SPECIAL TOOL

Tool	Number	Name	Use
	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor

ON-VEHICLE SERVICE <F9Q>**WASTE GATE ACTUATOR/VARIABLE NOZZLE
TURBINE CONTROL ACTUATOR**

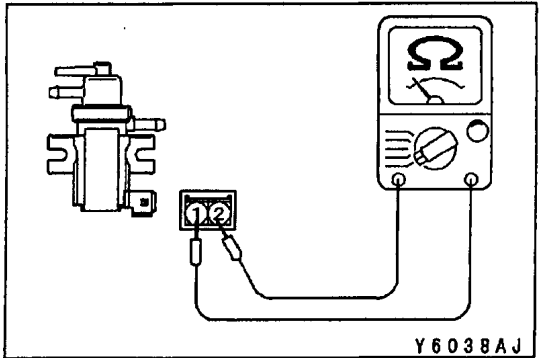
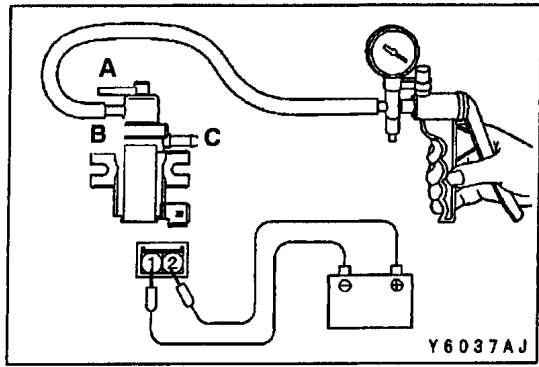
1. Disconnect the vacuum hose from the actuator nipple.
2. Connect a hand vacuum pump to the nipple.
3. The rod should move smoothly when vacuum is applied gradually.

TURBOCHARGER WASTE GATE SOLENOID CHECK

NOTE

When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose from the solenoid.
2. Disconnect the solenoid connector.
3. Connect a hand vacuum pump to the nipple (B) of the solenoid (refer to the illustration at left).
4. Check the air-tightness by applying a vacuum with voltage applied directly from the battery to the solenoid and without applying voltage.



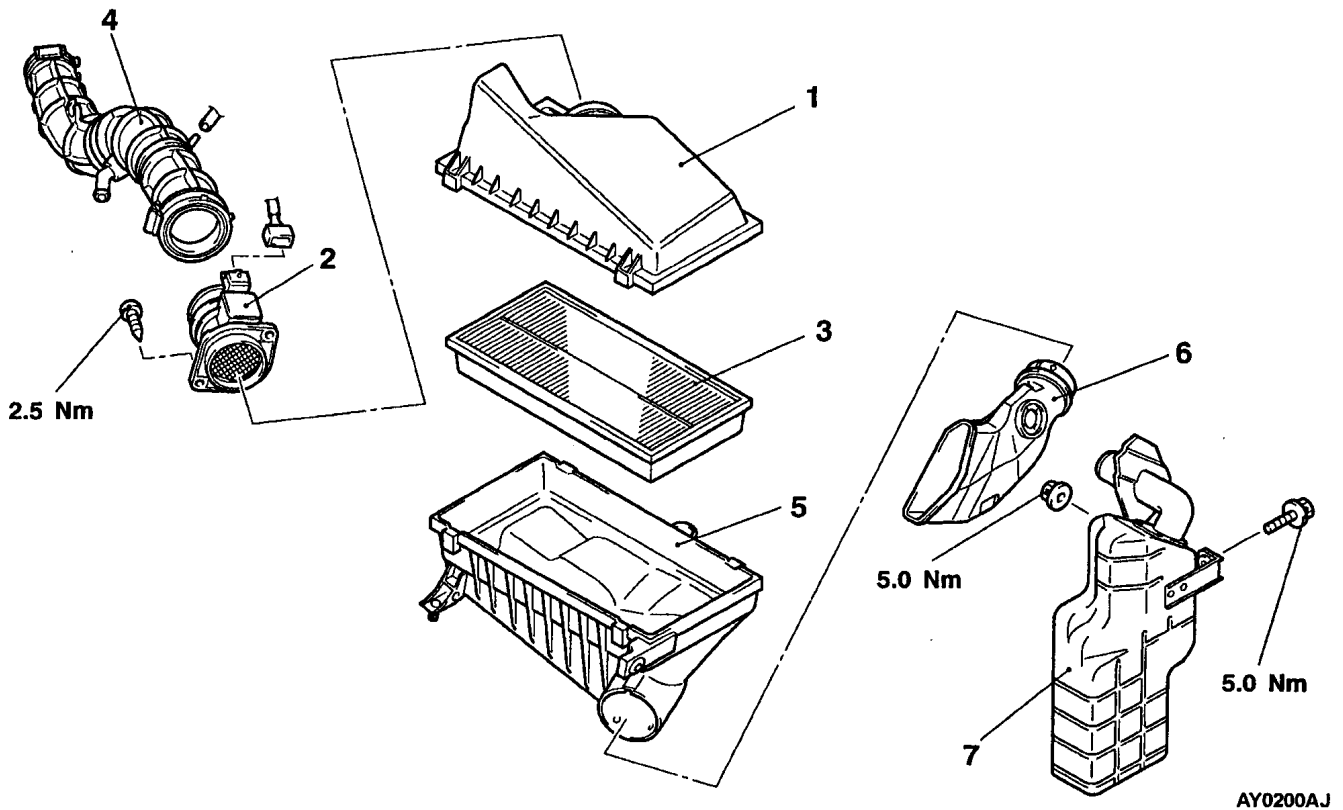
Battery voltage	Nipple A condition	Normal condition
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained
Not applied	Open	Vacuum leaks

5. Measure the resistance between the terminals.

Standard value: 15.5 – 17.5 Ω (at 25°C)

AIR CLEANER <F9Q>

REMOVAL AND INSTALLATION

**Removal steps**

1. Air cleaner cover
2. Air flow sensor assembly
3. Air cleaner element
4. Air intake hose
- Battery

5. Air cleaner body
6. Air duct
- Splash shield
7. Resonator

INSTALLATION SERVICE POINT**▶A◀ AIR FLOW SENSOR ASSEMBLY INSTALLATION**

Make sure that the mesh of the air flow sensor assembly is not contaminated with dirt, then install the air flow sensor.

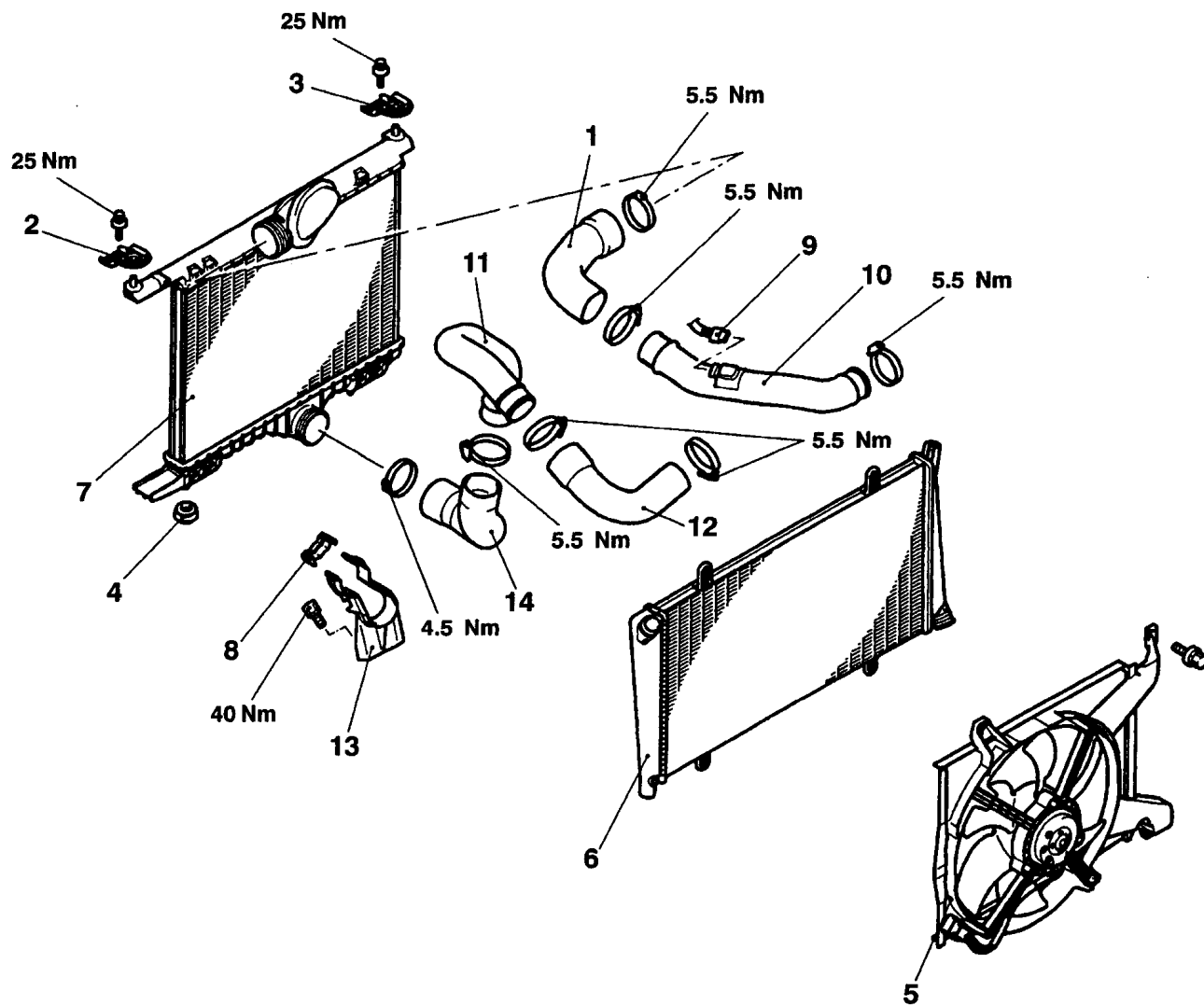
Caution

If the sensor mesh remains contaminated, the air flow sensor could not sense air flow volume exactly.

INTERCOOLER <F9Q>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
 Radiator Fan Motor, Radiator and Intercooler assembly
 Removal and Installation
 (Refer to GROUP 14 - RADIATOR <F9Q>.)



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Removal steps

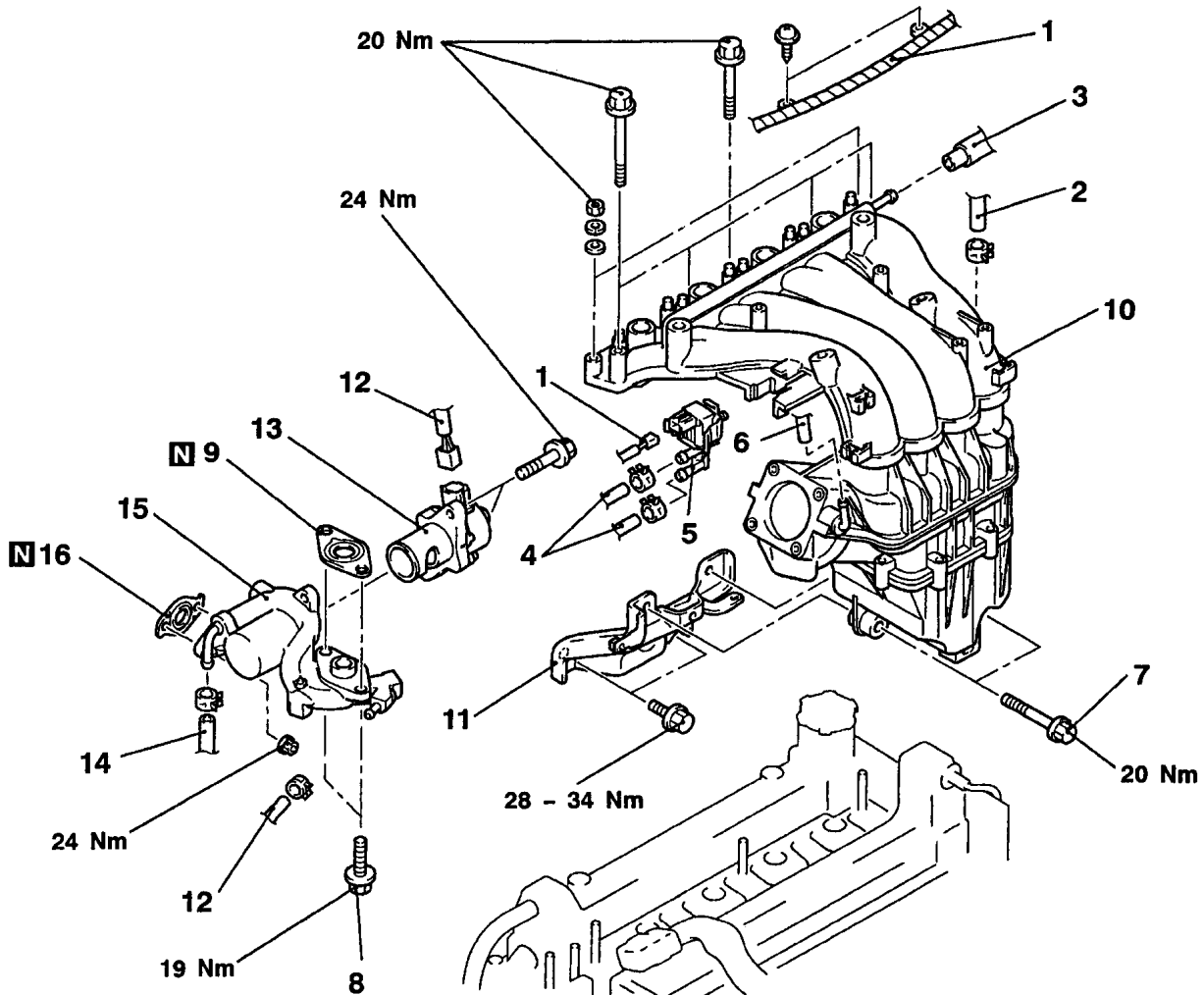
- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Air hose 2. Upper insulator (L.H.) 3. Upper insulator (R.H.) 4. Insulator 5. Radiator fan motor assembly 6. Radiator assembly 7. Intercooler assembly | <ul style="list-style-type: none"> 8. Clip 9. Boost sensor connector 10. Air pipe 11. Air pipe 12. Air hose 13. Hose bracket 14. Air hose |
|--|--|

INTAKE MANIFOLD <4G93-GDI>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation
- Throttle Body Removal and Installation (Refer to GROUP 13J.)
- Fuel Injector Removal and Installation (Refer to GROUP 13J.)
- Ignition Coil Removal and Installation (Refer to GROUP 16.)



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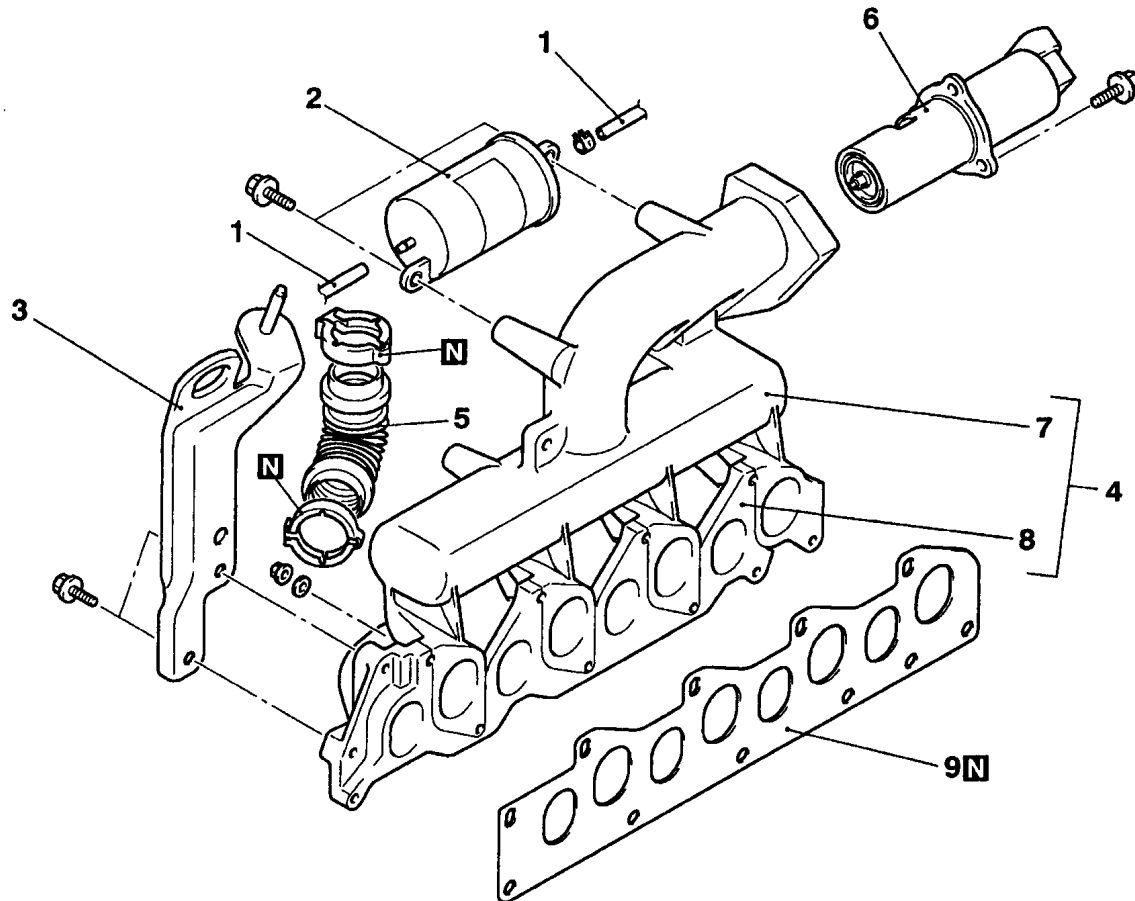
Removal steps

1. Control wiring harness, connector
2. Brake booster vacuum hose connection
3. PCV hose connection
4. Vacuum hoses connection
5. Purge control solenoid valve
6. Purge hose connection
7. Intake manifold to intake manifold stay connecting bolt
8. Intake manifold to EGR valve support connecting bolt
9. EGR valve support gasket
 - Injector driver
10. Intake manifold assembly
11. Intake manifold stay
12. EGR valve connector
13. EGR valve
14. Water hose connection
15. EGR valve support
16. EGR valve support gasket

INTAKE MANIFOLD AND EXHAUST MANIFOLD <F9Q>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
 Turbocharger Assembly Removal and Installation
 (Refer to P.15-9.)

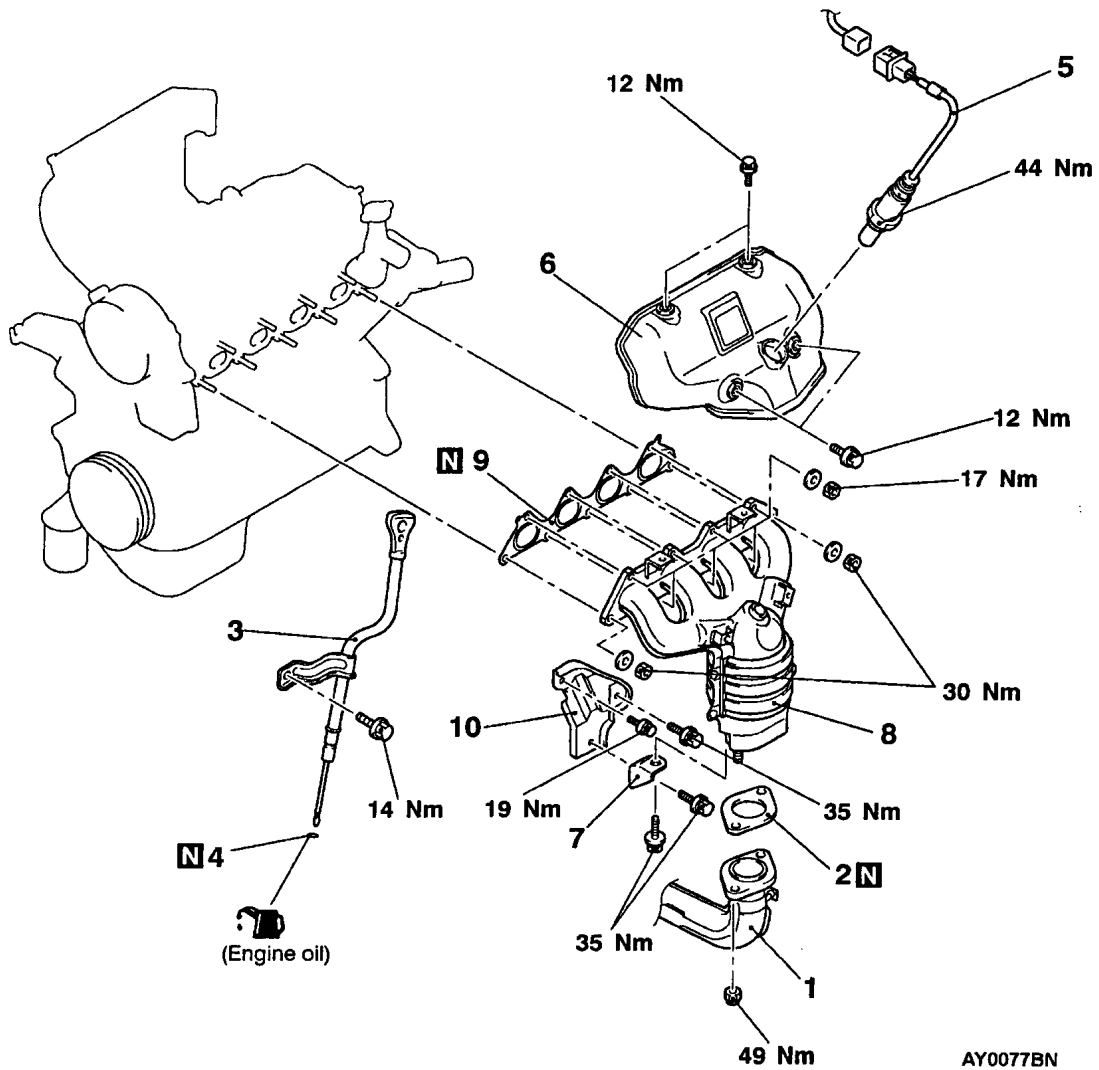


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Removal steps

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Vacuum hose connection 2. Vacuum tank assembly 3. Engine hanger 4. Intake and exhaust manifold assembly | <ol style="list-style-type: none"> 5. EGR pipe 6. EGR valve assembly 7. Intake manifold 8. Exhaust manifold 9. Intake and exhaust manifold gasket |
|---|--|

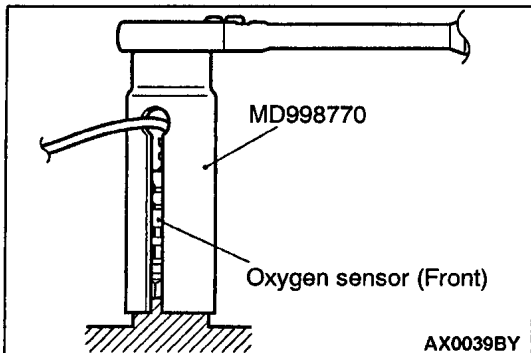
EXHAUST MANIFOLD <4G92-MPI>



Removal steps

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Front exhaust pipe connection 2. Gasket 3. Engine oil level gauge assembly 4. O-ring | <ol style="list-style-type: none"> 6. Exhaust manifold cover 7. Exhaust manifold bracket B 8. Exhaust manifold 9. Exhaust manifold gasket 10. Exhaust manifold bracket A |
|--|---|

◀A▶ ▶A◀



REMOVAL SERVICE POINT

◀A▶ OXYGEN SENSOR (FRONT) REMOVAL

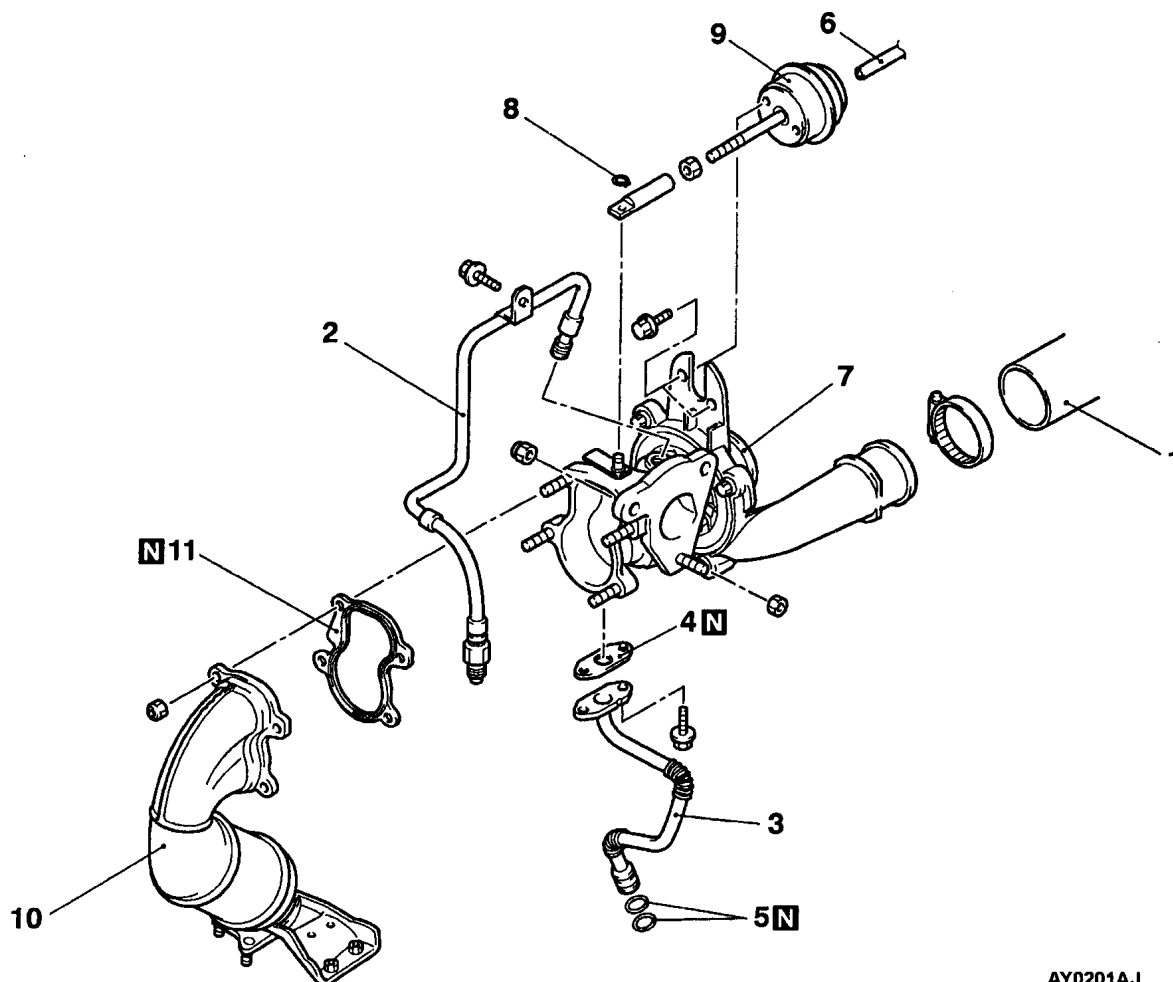
INSTALLATION SERVICE POINT

▶A◀ OXYGEN SENSOR (FRONT) INSTALLATION

TURBOCHARGER <F9Q>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
 Air Intake Hose Removal and Installation
 (Refer to P.15-4.)



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Removal steps

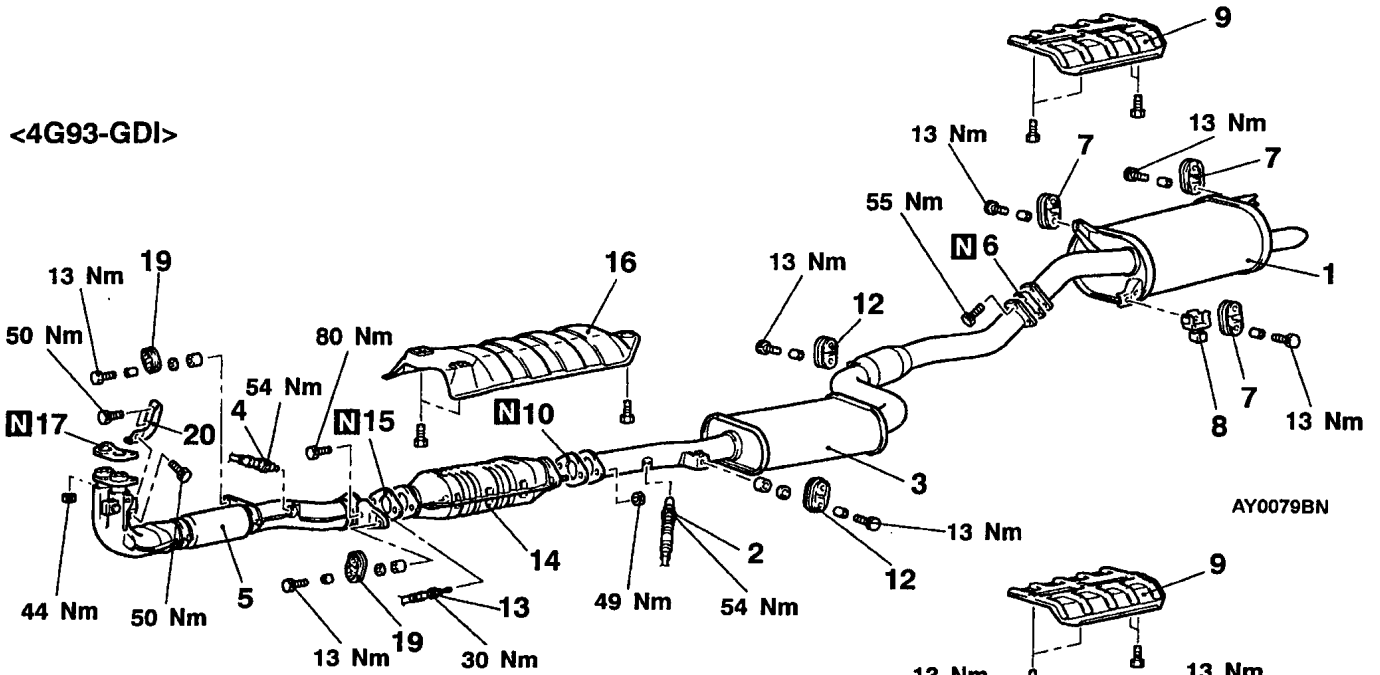
1. Air hose connection
2. Oil pipe assembly
3. Oil return pipe assembly
4. Oil return pipe gasket
5. O-ring
6. Vacuum hose connection

7. Turbocharger assembly
8. Circlip
9. Waste gate assembly
10. Catalytic converter
11. Gasket

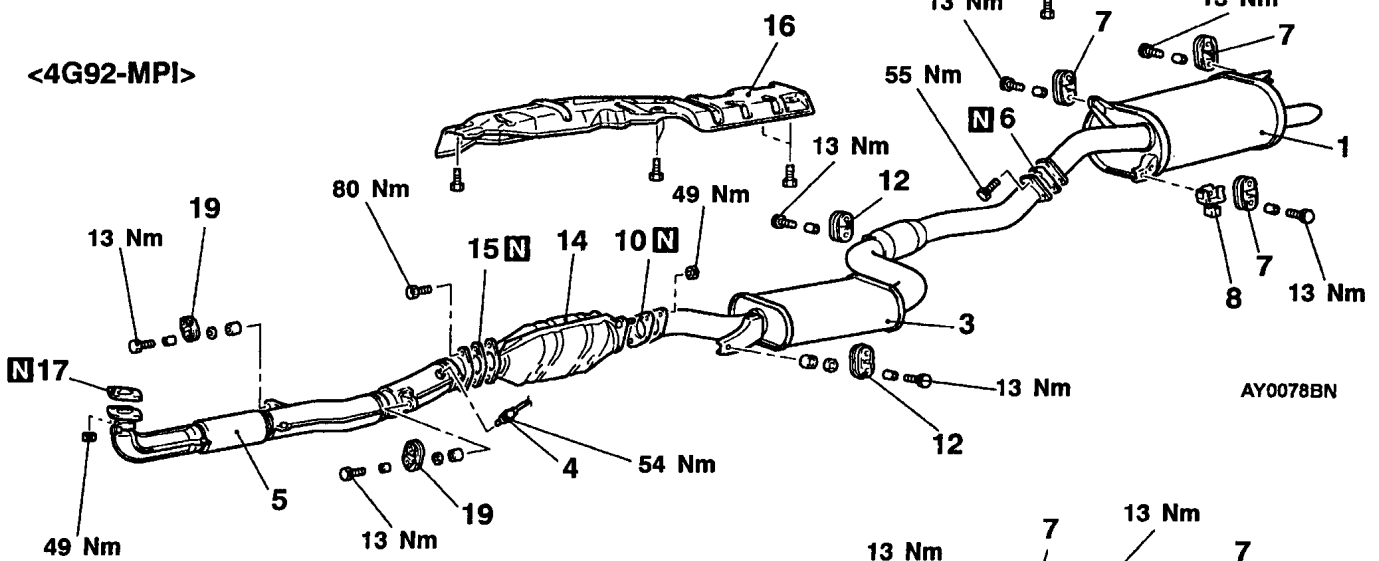
EXHAUST PIPE AND MAIN MUFFLER

REMOVAL AND INSTALLATION

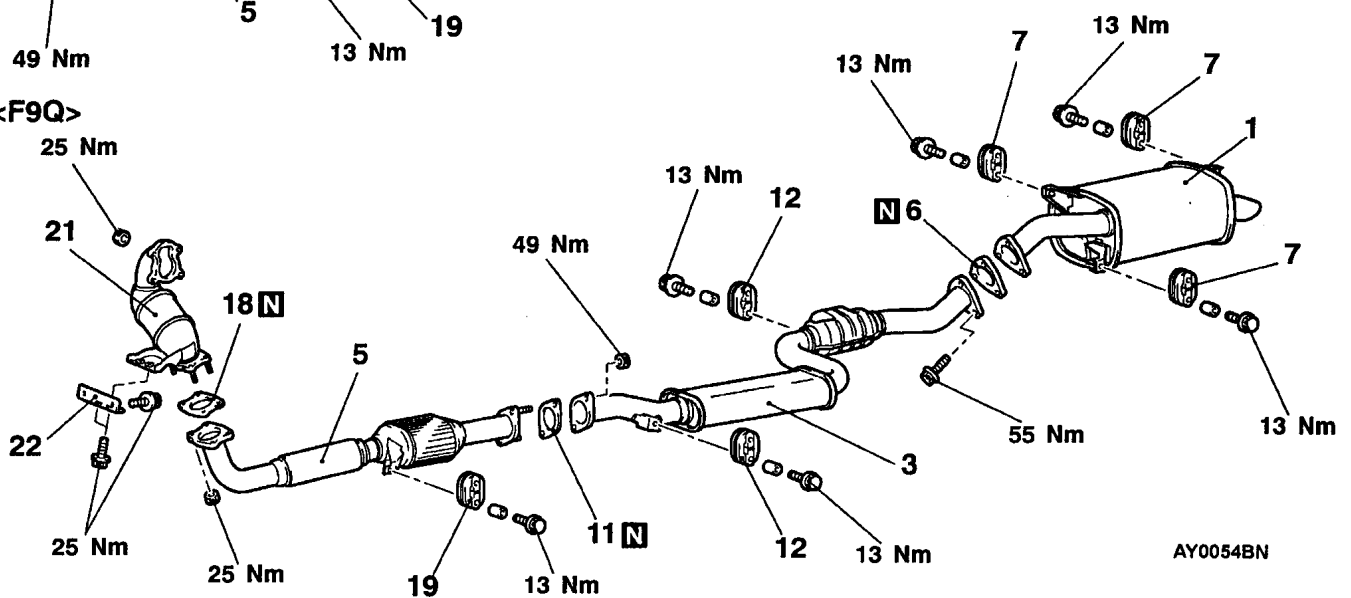
<4G93-GDI>



<4G92-MPI>



<F9Q>



Main muffler removal steps

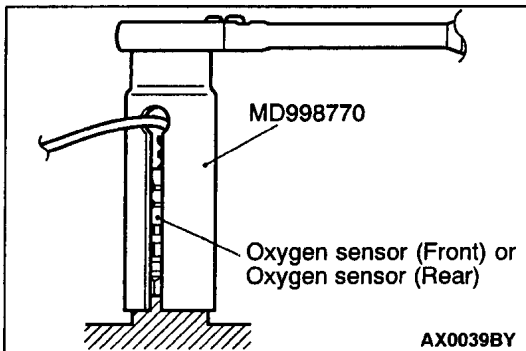
1. Main muffler
6. Gasket
7. Hanger
8. Dynamic damper
<4G93-GDI, 4G13-MPI>
9. Rear floor heat protector
<4G93-GDI, 4G13-MPI>

Center exhaust pipe removal steps

- ◀A▶ ▶A◀
2. Oxygen sensor (rear) <4G93-GDI>
 3. Center exhaust pipe
 6. Gasket
 10. Gasket <4G93-GDI, 4G13-MPI>
 11. Gasket <F9Q>
 12. Hanger
 13. Catalyst temperature sensor
<4G93-GDI-M/T>
 14. Catalytic converter
<4G93-GDI, 4G13-MPI>
 15. Gasket <4G93-GDI, 4G13-MPI>
 16. Front floor heat protector
<4G93-GDI, 4G13-MPI>

Front exhaust pipe removal steps

- ◀A▶ ▶A◀
4. Oxygen sensor (front) <4G93-GDI>
or oxygen sensor (rear) <4G92-MPI>
 5. Front exhaust pipe
 11. Gasket <F9Q>
 15. Gasket <4G93-GDI, 4G13-MPI>
 17. Gasket <4G93-GDI, 4G13-MPI>
 18. Gasket <F9Q>
 19. Hanger
 20. Front exhaust pipe bracket
<4G93-GDI>
 21. Catalytic converter <F9Q>
 22. Bracket <F9Q>



REMOVAL SERVICE POINT

◀A▶ OXYGEN SENSOR (REAR)/OXYGEN SENSOR (FRONT) REMOVAL

INSTALLATION SERVICE POINT

▶A◀ OXYGEN SENSOR (FRONT)/OXYGEN SENSOR (REAR) INSTALLATION