

# INTAKE AND EXHAUST

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E15AA--

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## 15-2 INTAKE AND EXHAUST – Specifications/Service Adjustment Procedures

### SPECIFICATIONS

#### GENERAL SPECIFICATIONS

E15CA--

Items	Engine	
	4G92, 4G93, 4D68	4G13
Air cleaner		
Element	Unwoven cloth type	Unwoven cloth type
Exhaust system		
Front exhaust pipe	Dual type	Single type
Muffler	Expansion resonance type	Expansion resonance type
Coupling	Flat coupling	Flat coupling
Suspension system	Rubber hangers	Rubber hangers

#### SERVICE SPECIFICATIONS

E15CB--

Items	Standard value	Limit
Intake manifold and air intake plenum		
Distortion of the installation surface mm (in.)	0.15 (0.006) or less	0.2 (0.008)

### SERVICE ADJUSTMENT PROCEDURES

#### INTAKE MANIFOLD VACUUM INSPECTION

E15FBAB

Refer to GROUP 11 – Service Adjustment Procedures.

**AIR CLEANER <4G13>**

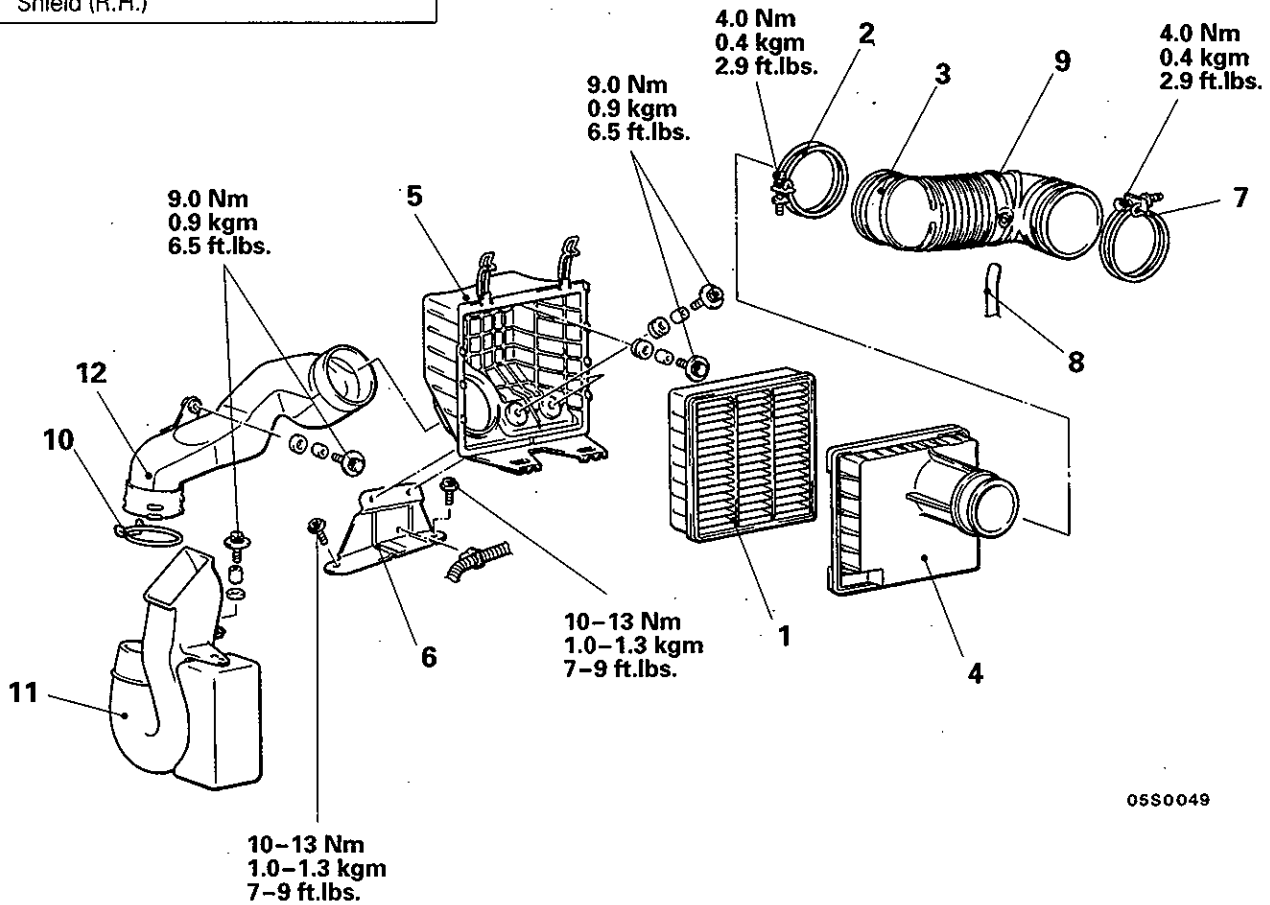
**REMOVAL AND INSTALLATION**

E150A-1

**Pre-removal and Post-installation Operation**

**<Air Duct A or B>**

- Removal and Installation of Battery, Battery Seat and Tray
- Removal and Installation of Splash Shield (R.H.)



05S0049

1. Air cleaner element

**Removal steps of air cleaner cover**

- ◆◆ 1. Air cleaner element
- ◆◆ 2. Hose clamp
- ◆◆ 3. Air intake hose connection
- ◆◆ 4. Air cleaner cover

**Removal steps of air cleaner body**

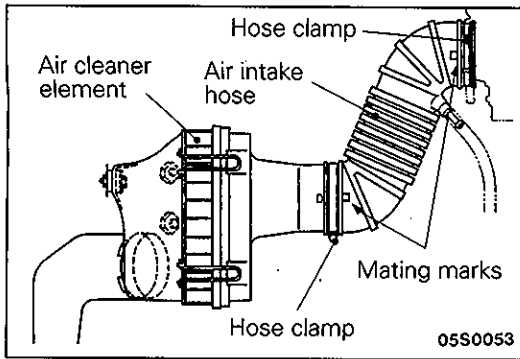
- 1. Air cleaner element
- 4. Air cleaner cover
- 5. Air cleaner body
- 6. Air cleaner bracket

**Removal steps of air intake hose**

- ◆◆ 2. Hose clamp
- ◆◆ 7. Hose clamp
- ◆◆ 8. PCV hose
- ◆◆ 9. Air intake hose

**Removal steps of air duct A and B**

- 1. Air cleaner element
- 4. Air cleaner cover
- 5. Air cleaner body
- 10. Hose clamp
- 11. Air duct A
- 12. Air duct B

**SERVICE POINTS OF INSTALLATION**

E150DAB

**9./7./2. INSTALLATION OF AIR INTAKE HOSE AND HOSE CLAMPS**

- (1) Install the air intake hose so that the "UP" mark is towards the top.
- (2) Install the hose clamp on the throttle body side so that the thread section of the hose clamp is horizontal.
- (3) Install the hose clamp on the air cleaner side so that the thread section of the hose clamp is vertical.

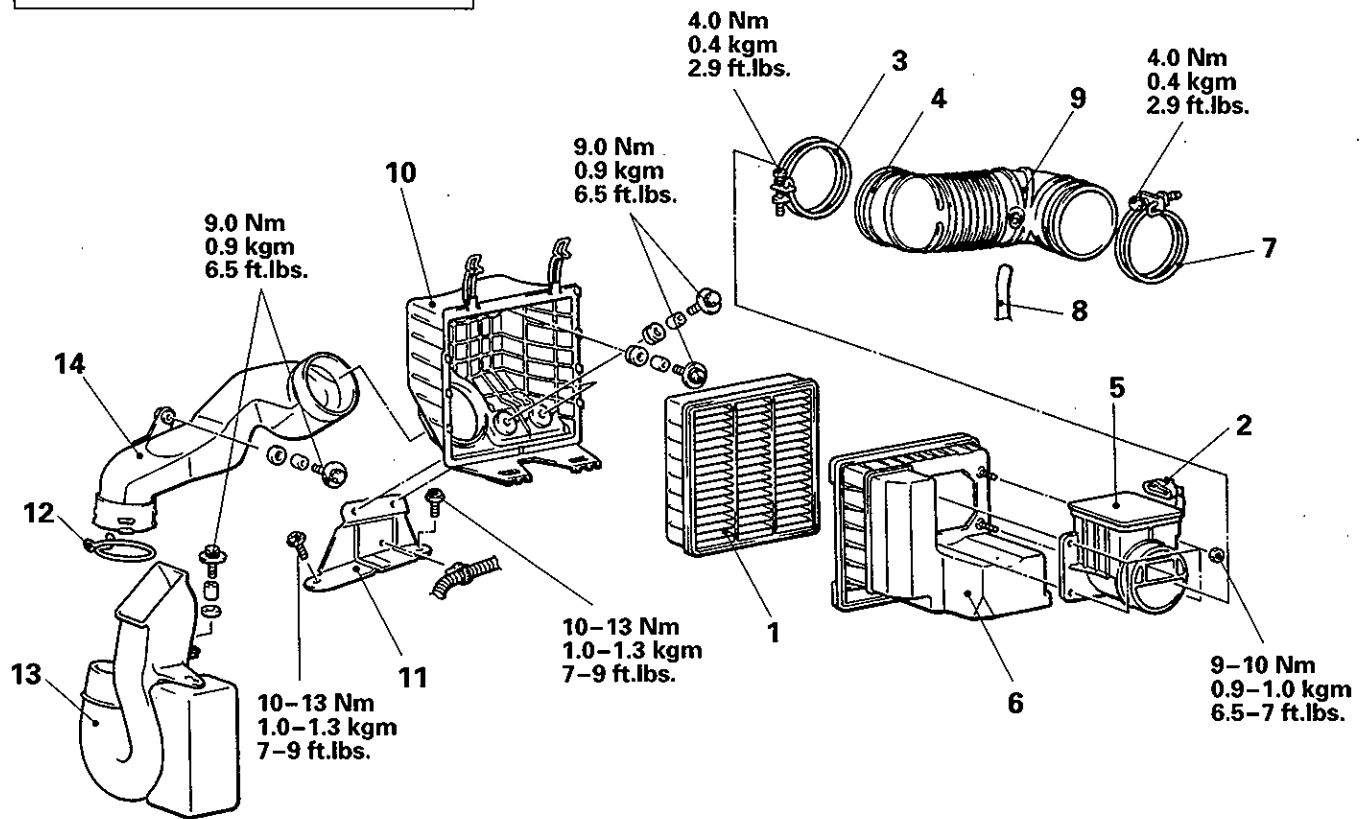
**AIR CLEANER <4G92, 4G93>**

E150A-2

**REMOVAL AND INSTALLATION**

**Pre-removal and Post-installation Operation**  
**<Air Duct A or B>**

- Removal and Installation of Battery, Battery Seat and Tray
- Removal and Installation of Splash Shield (R.H.)



05S0005

1. Air cleaner element

**Removal steps of air flow sensor**

- 2. Air flow sensor connector
- ◆◆ 3. Hose clamp
- 4. Air intake hose connection
- 5. Air flow sensor

**Removal steps of air cleaner cover**

- 1. Air cleaner element
- 5. Air flow sensor
- 6. Air cleaner cover

**Removal steps of air intake hose**

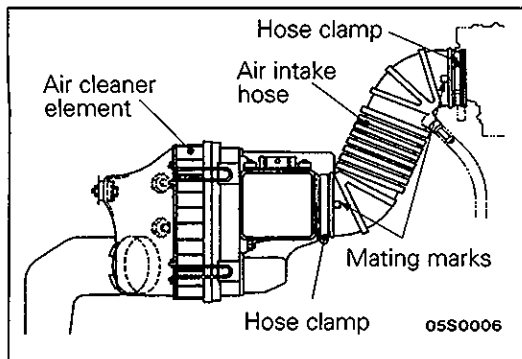
- ◆◆ 3. Hose clamp
- ◆◆ 7. Hose clamp
- ◆◆ 8. PCV hose
- ◆◆ 9. Air intake hose

**Removal steps of air cleaner body**

- 1. Air cleaner element
- 6. Air cleaner cover
- 10. Air cleaner body
- 11. Air cleaner bracket

**Removal steps of air duct A and B**

- 1. Air cleaner element
- 6. Air cleaner cover
- 10. Air cleaner body
- 12. Hose clamp
- 13. Air duct A
- 14. Air duct B

**SERVICE POINTS OF INSTALLATION**

E150DAB

**9./7./3. INSTALLATION OF AIR INTAKE HOSE AND HOSE CLAMPS**

- (1) Install the air intake hose so that the "UP" mark is towards the top.
- (2) Install the hose clamp on the throttle body side so that the thread section of the hose clamp is horizontal.
- (3) Install the hose clamp on the air cleaner side so that the thread section of the hose clamp is vertical.

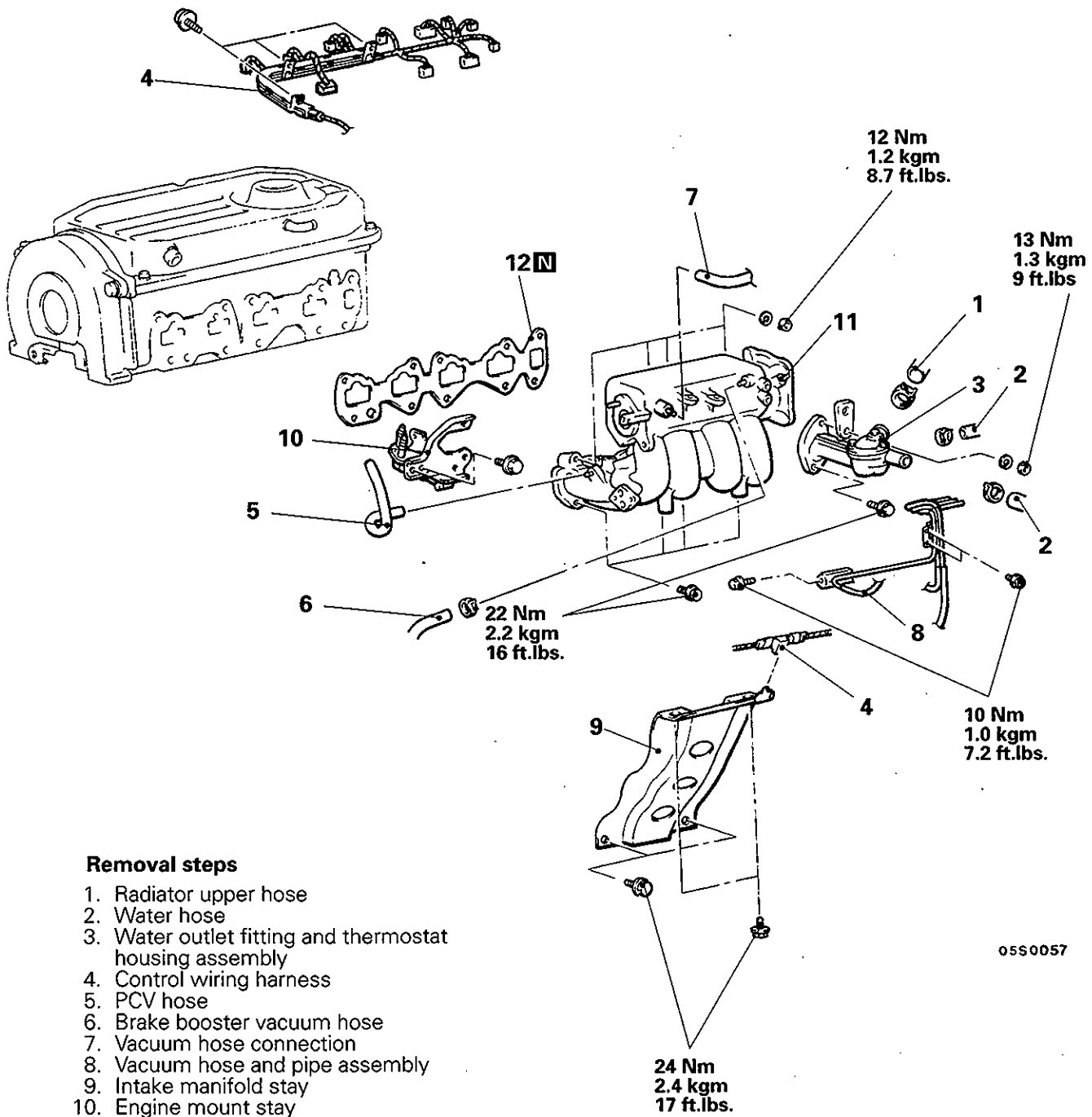
# INTAKE MANIFOLD <4G13>

## REMOVAL AND INSTALLATION

E15MA-1

**Pre-removal and Post-installation Operation**

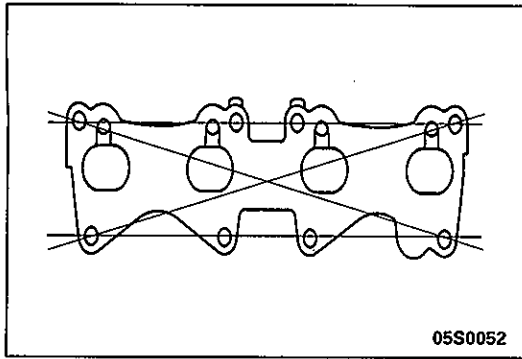
- Removal and Installation of Throttle Body  
(Refer to GROUP 13 – Throttle Body.)
- Removal and Installation of Injector  
(Refer to GROUP 13 – Injector.)



**Removal steps**

1. Radiator upper hose
2. Water hose
3. Water outlet fitting and thermostat housing assembly
4. Control wiring harness
5. PCV hose
6. Brake booster vacuum hose
7. Vacuum hose connection
8. Vacuum hose and pipe assembly
9. Intake manifold stay
10. Engine mount stay
11. Intake manifold
12. Intake manifold gasket

05S0057



## INSPECTION

E15M8BA3

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

### INTAKE MANIFOLD

1. Check for damage or cracking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and a thickness gage, check for distortion of the cylinder head installation surface.

**Standard value: 0.15 mm (0.006 in.) or less**

**Limit: 0.2 mm (0.008 in.)**



NOTES

**INTAKE MANIFOLD <4G92>**

**REMOVAL AND INSTALLATION**

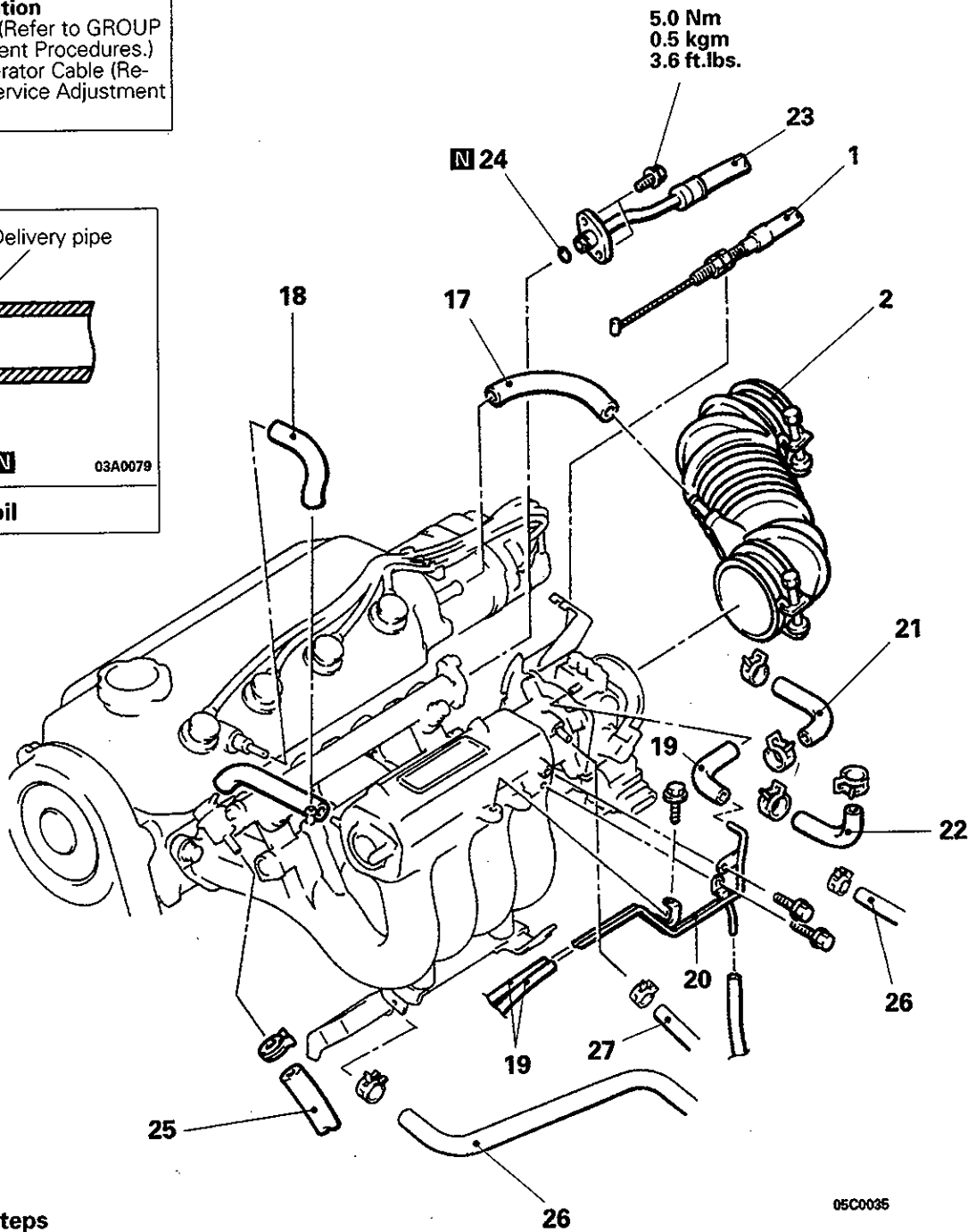
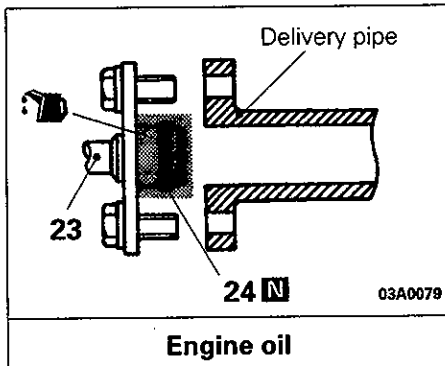
E15MA-2

**Pre-removal Operation**

- Releasing of Residual Fuel Pressure (Refer to GROUP 13 - Service Adjustment Procedures.)
- Draining of Coolant (Refer to GROUP 14 - Service Adjustment Procedures.)

**Post-installation Operation**

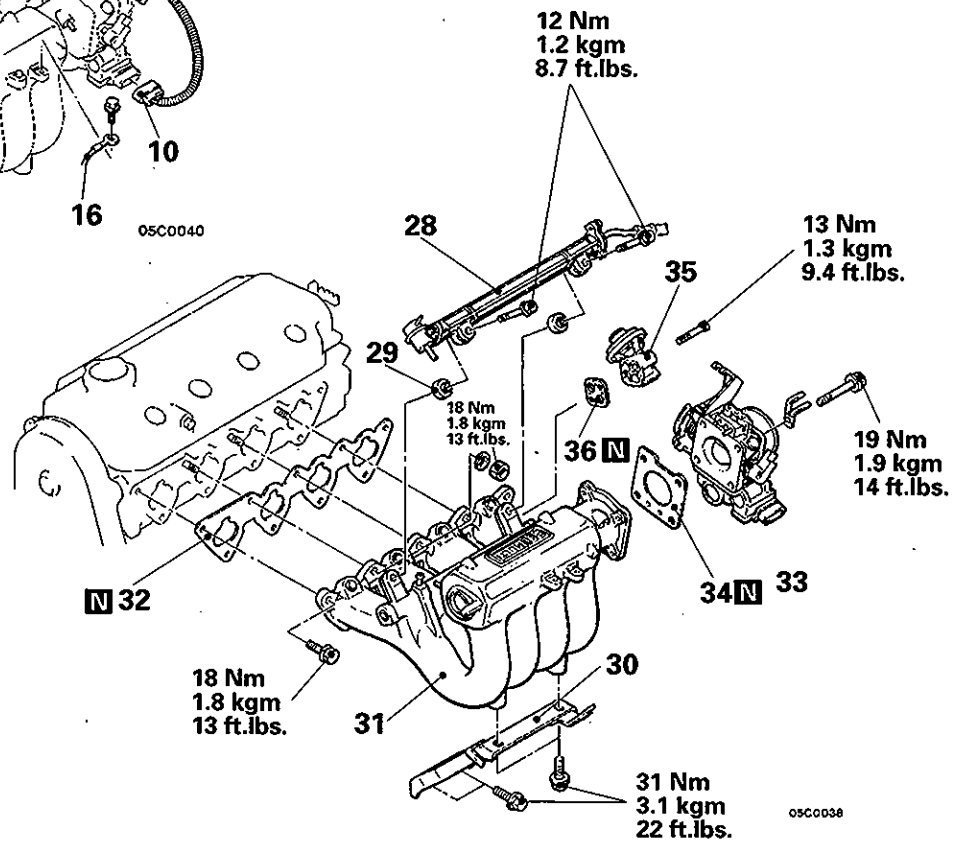
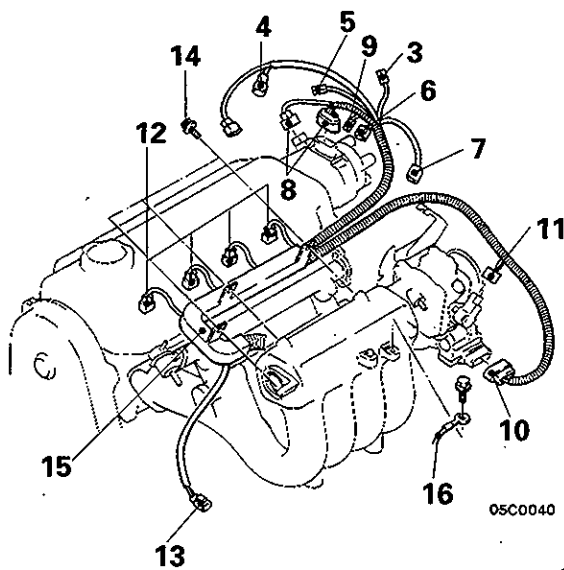
- Supplying of Coolant (Refer to GROUP 14 - Service Adjustment Procedures.)
- Adjustment of Accelerator Cable (Refer to GROUP 13 - Service Adjustment Procedures.)



**Removal steps**

1. Accelerator cable connection
2. Air intake hose

05C0035



- |   |   |   |
|---|---|---|
| 3. Engine coolant temperature switch (A/C) connector        |   | 22. Water hose connection (Throttle body → Water inlet fitting) |
| 4. Oxygen sensor connector                                  | ↔ | 23. High-pressure fuel hose connection                          |
| 5. Oil pressure switch connector                            |   | 24. O-ring  |
| 6. Water temperature gauge connector                        |   | 25. Fuel return hose connection                                 |
| 7. Engine coolant temperature sensor connector              |   | 26. Heater hose connection                                      |
| 8. Distributor connector                                    |   | 27. Brake booster vacuum hose connection                        |
| 9. Condenser connector                                      | ↔ | 28. Delivery pipe, injector and pressure regulator assembly     |
| 10. ISC connector   |   | 29. Insulator   |
| 11. TPS connector   |   | 30. Intake manifold stay  |
| 12. Injector connector                                      |   | 31. Intake manifold   |
| 13. Detonation sensor connector                             |   | 32. Intake manifold gasket                                      |
| 14. Engine coolant temperature switch (Engine control)      |   | 33. Throttle body   |
| 15. Control harness assembly                                |   | 34. Throttle body gasket  |
| 16. Earth wire  |   | 35. EGR valve   |
| 17. Breather hose connection                                |   | 36. EGR valve gasket  |
| 18. PCV hose connection                                     |   |   |
| 19. Vacuum hose connection                                  |   |   |
| 20. Vacuum pipe   |   |   |
| 21. Water hose connection (Thermostat case → Throttle body) |   |   |

**SERVICE POINTS OF REMOVAL**

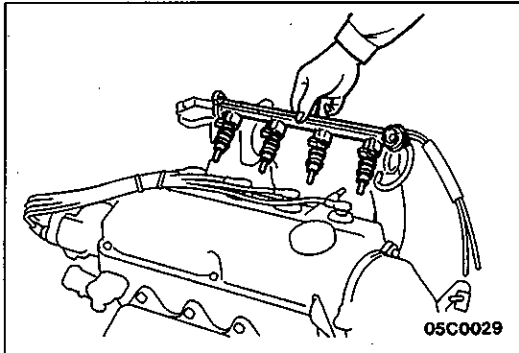
E15MBAD

**23. DISCONNECTION OF HIGH PRESSURE FUEL HOSE**

Relieve pressure in the fuel pipe line to prevent fuel outflow. (Refer to GROUP 13 – Service Adjustment Procedures.)

**Caution**

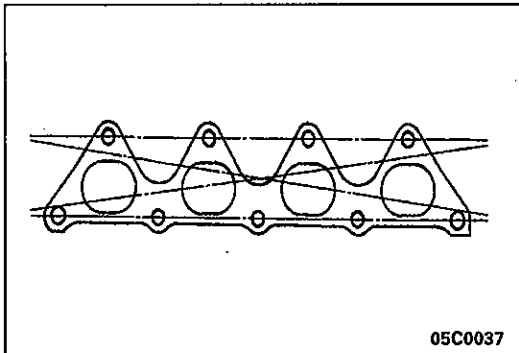
**Cover fuel pipe line with rag after relieving pressure as certain pressure may still remain.**

**28. REMOVAL OF DELIVERY PIPE, FUEL INJECTOR AND PRESSURE REGULATOR**

Remove delivery pipe with fuel injector and pressure regulator on.

**Caution**

**Do not drop injector when removing delivery pipe.**

**INSPECTION**

E15MBBA3

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

**INTAKE MANIFOLD**

1. Check for damage or cracking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and a thickness gage, check for distortion of the cylinder head installation surface.

**Standard value: 0.15 mm (0.006 in.) or less**

**Limit: 0.2 mm (0.008 in.)**

# INTAKE MANIFOLD <4G93>

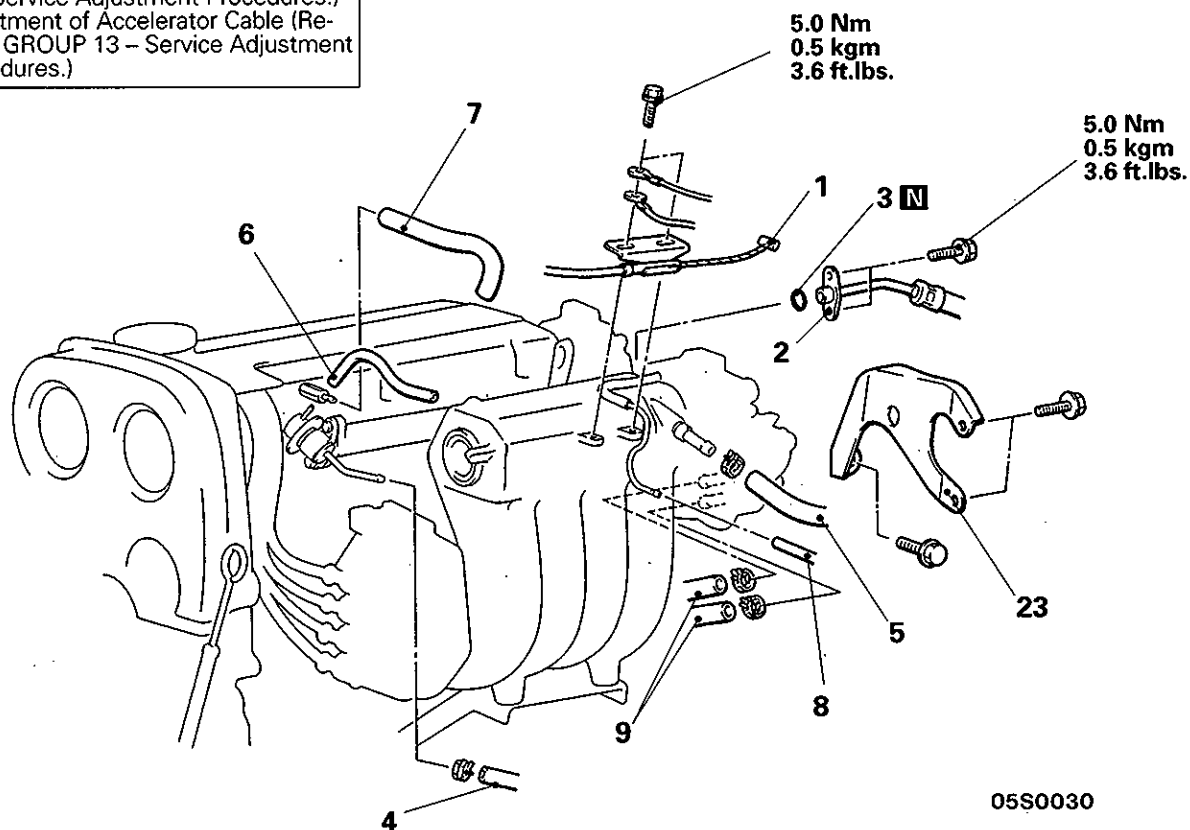
## REMOVAL AND INSTALLATION

### Pre-removal Operation

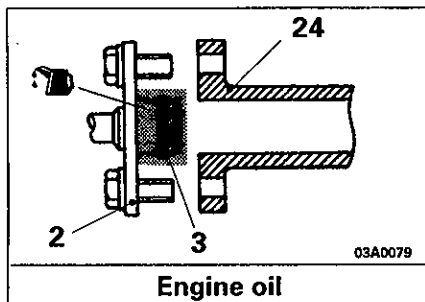
- Releasing of Residual Fuel Pressure (Refer to GROUP 13 - Service Adjustment Procedures.)
- Draining of Coolant (Refer to GROUP 14 - Service Adjustment Procedures.)
- Removal of Air Intake Duct (Refer to P.15-5.)

### Post-installation Operation

- Installation of Air Intake Duct (Refer to P.15-5.)
- Supplying of Coolant (Refer to GROUP 14 - Service Adjustment Procedures.)
- Adjustment of Accelerator Cable (Refer to GROUP 13 - Service Adjustment Procedures.)

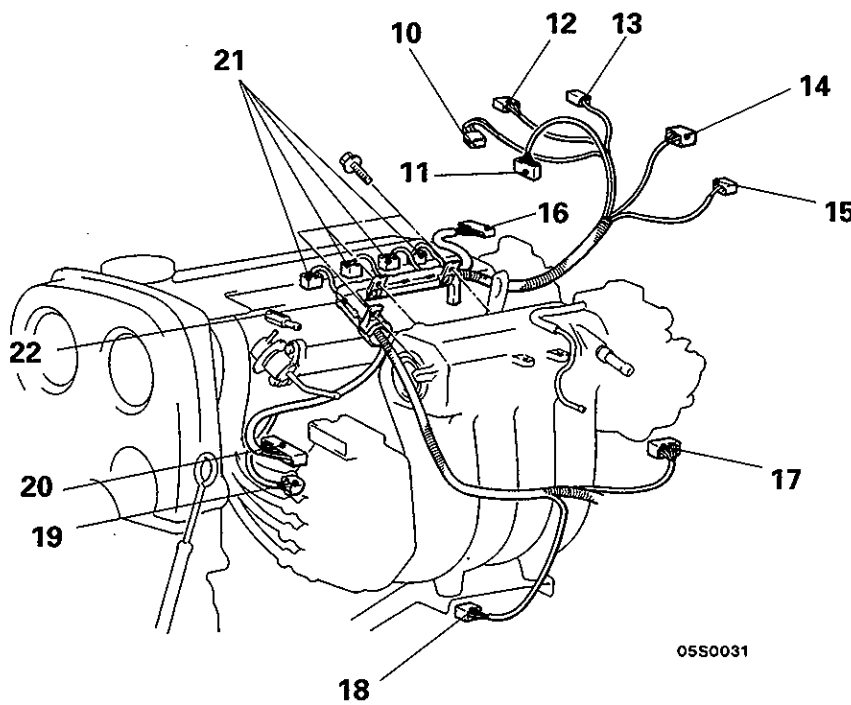


05S0030



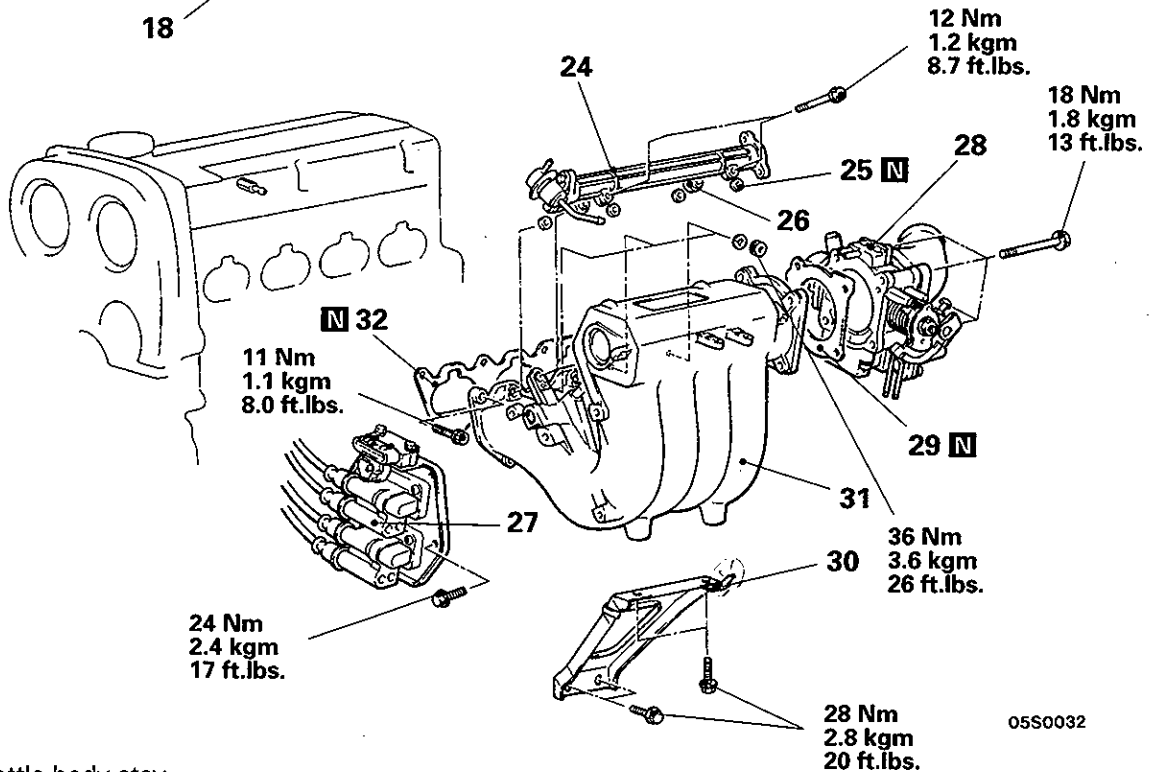
### Removal steps

1. Accelerator cable connection
2. High-pressure fuel hose connection
3. O-ring
4. Fuel return hose connection
5. Brake booster vacuum hose connection
6. Vacuum hose
7. PCV hose
8. Vacuum hose
9. Water hose



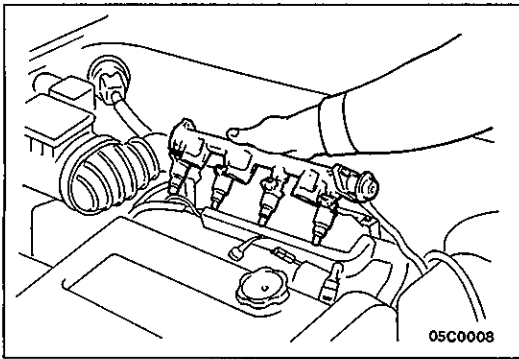
- 10. Water temperature switch (A/C) connector
- 11. Crank angle sensor connector
- 12. Oxygen sensor connector
- 13. Oil pressure switch connector
- 14. Water temperature sensor connector
- 15. Water temperature gauge connector
- 16. TPS connector
- 17. ISC connector
- 18. Detonation sensor connector
- 19. Power transistor connector
- 20. Ignition coil connector
- 21. Injector connector
- 22. Control wiring harness

05S0031



05S0032

- ◆◆ 23. Throttle body stay
- ◆◆ 24. Delivery pipe, injector and pressure regulator assembly
- 25. Insulator
- 26. Insulator
- 27. Ignition coil, power transistor and spark plug cable assembly
- ◆◆ 28. Throttle body
- ◆◆ 29. Gasket
- 30. Intake manifold stay
- 31. Intake manifold
- 32. Intake manifold gasket



**SERVICE POINTS OF REMOVAL**

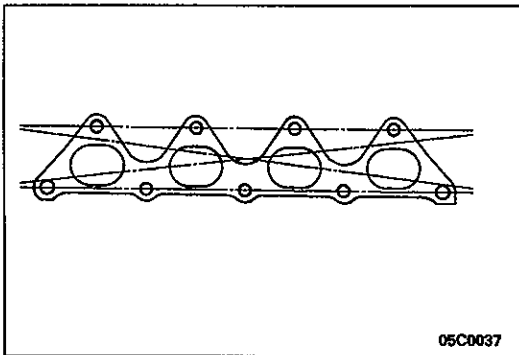
E15MBAD

**24. REMOVAL OF DELIVERY PIPE, FUEL INJECTOR AND PRESSURE REGULATOR**

Remove delivery pipe with fuel injector and pressure regulator on.

**Caution**

**Do not drop injector when removing delivery pipe.**



**INSPECTION**

E15MBA3

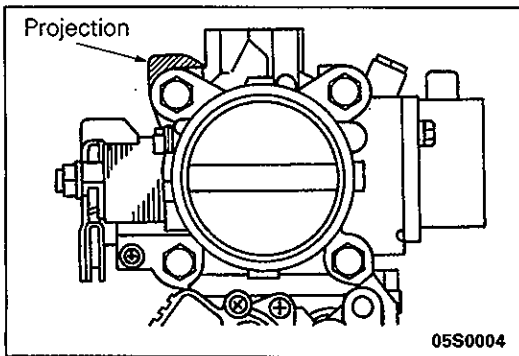
Check the following points; replace the part if a problem is found.

**INTAKE MANIFOLD**

1. Check for damage or cracking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and a thickness gage, check for distortion of the cylinder head installation surface.

**Standard value: 0.15 mm (0.006 in.) or less**

**Limit: 0.2 mm (0.008 in.)**

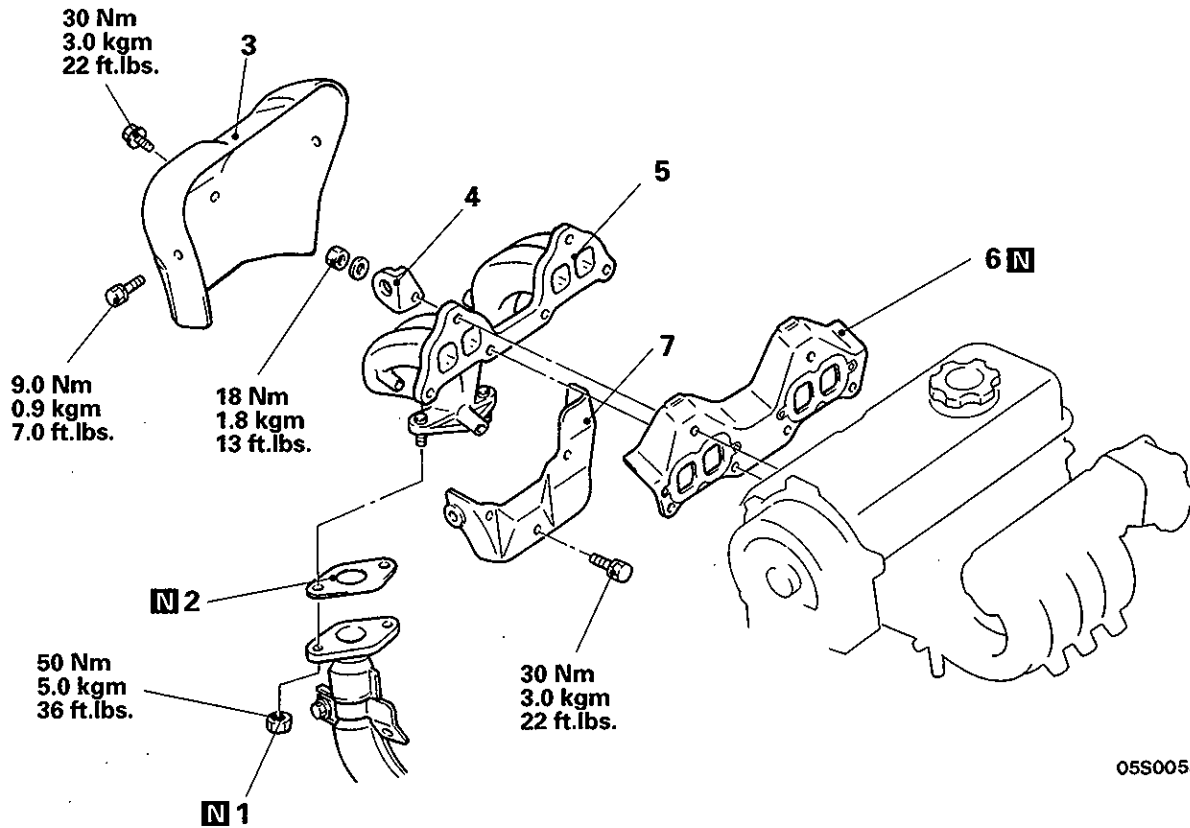


**SERVICE POINTS OF INSTALLATION**

E15MBAR

**29. INSTALLATION OF GASKET**

Install the gasket between the intake manifold and the throttle body with the gasket projection in the position shown in the illustration.

**EXHAUST MANIFOLD****REMOVAL AND INSTALLATION <4G13>**

05S0055

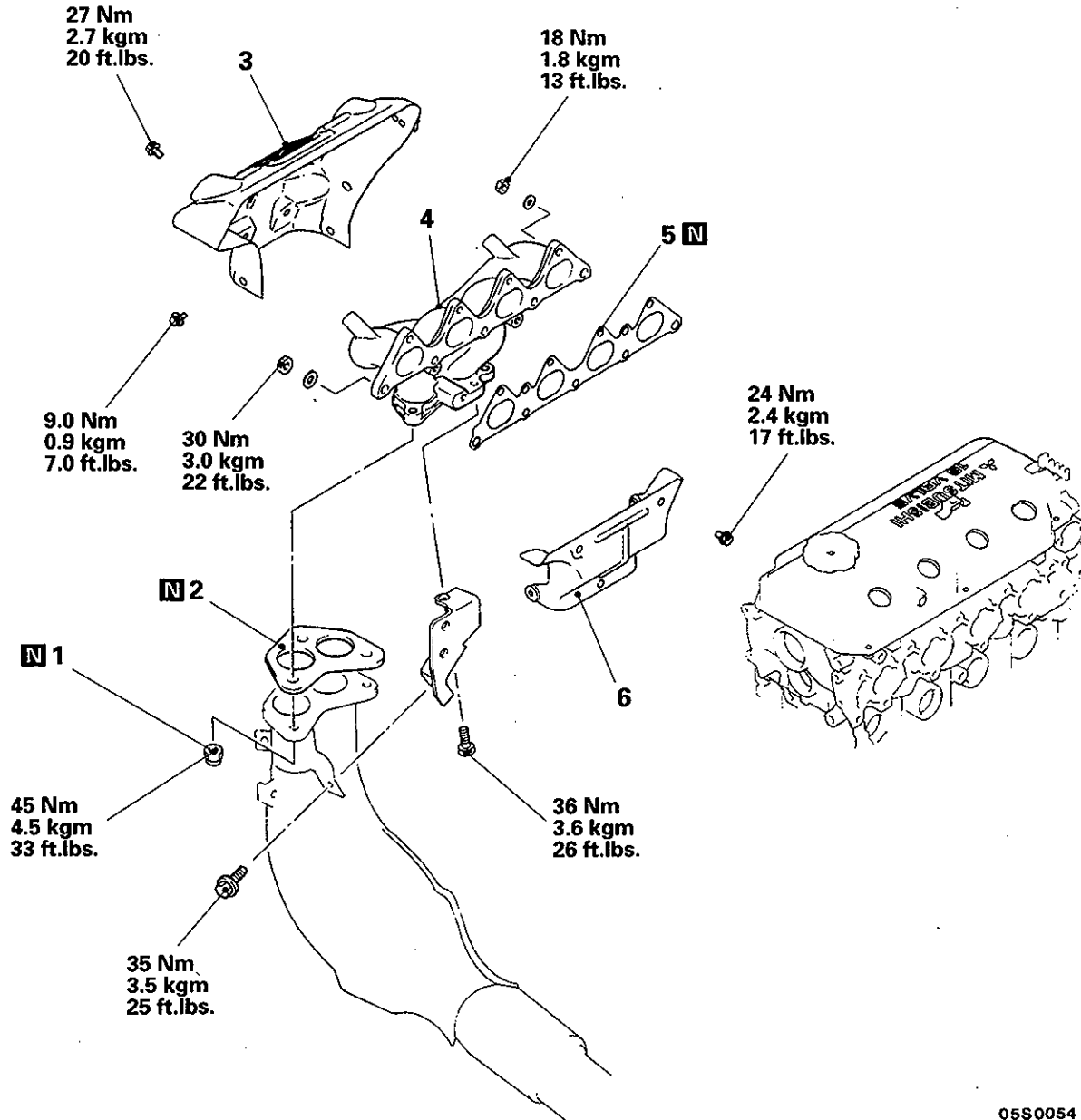
**Removal steps**

1. Self locking nut
2. Gasket
3. Exhaust manifold cover A
4. Engine hanger
5. Exhaust manifold
6. Exhaust manifold gasket
7. Exhaust manifold cover B



REMOVAL AND INSTALLATION <4G92>

E15NA-2



05S0054

**Removal steps**

1. Self locking nut
2. Gasket
3. Exhaust manifold cover A
4. Exhaust manifold
5. Exhaust manifold gasket
6. Exhaust manifold cover B

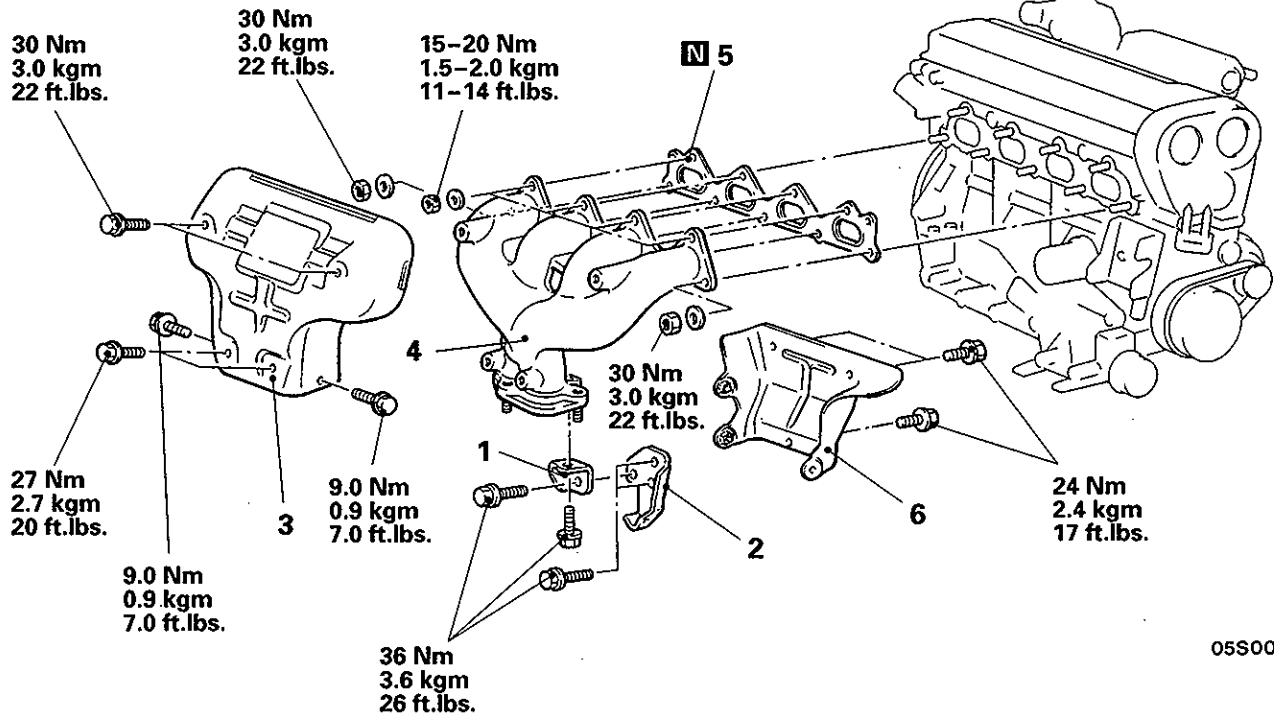
# 15-18 INTAKE AND EXHAUST – Exhaust Pipe and Main Muffler <2WD>

## REMOVAL AND INSTALLATION <4G93>

E15NA-3

### Pre-removal and Post-installation Operation

- Removal and Installation of Front Exhaust Pipe  
(Refer to P.15-19, 20)



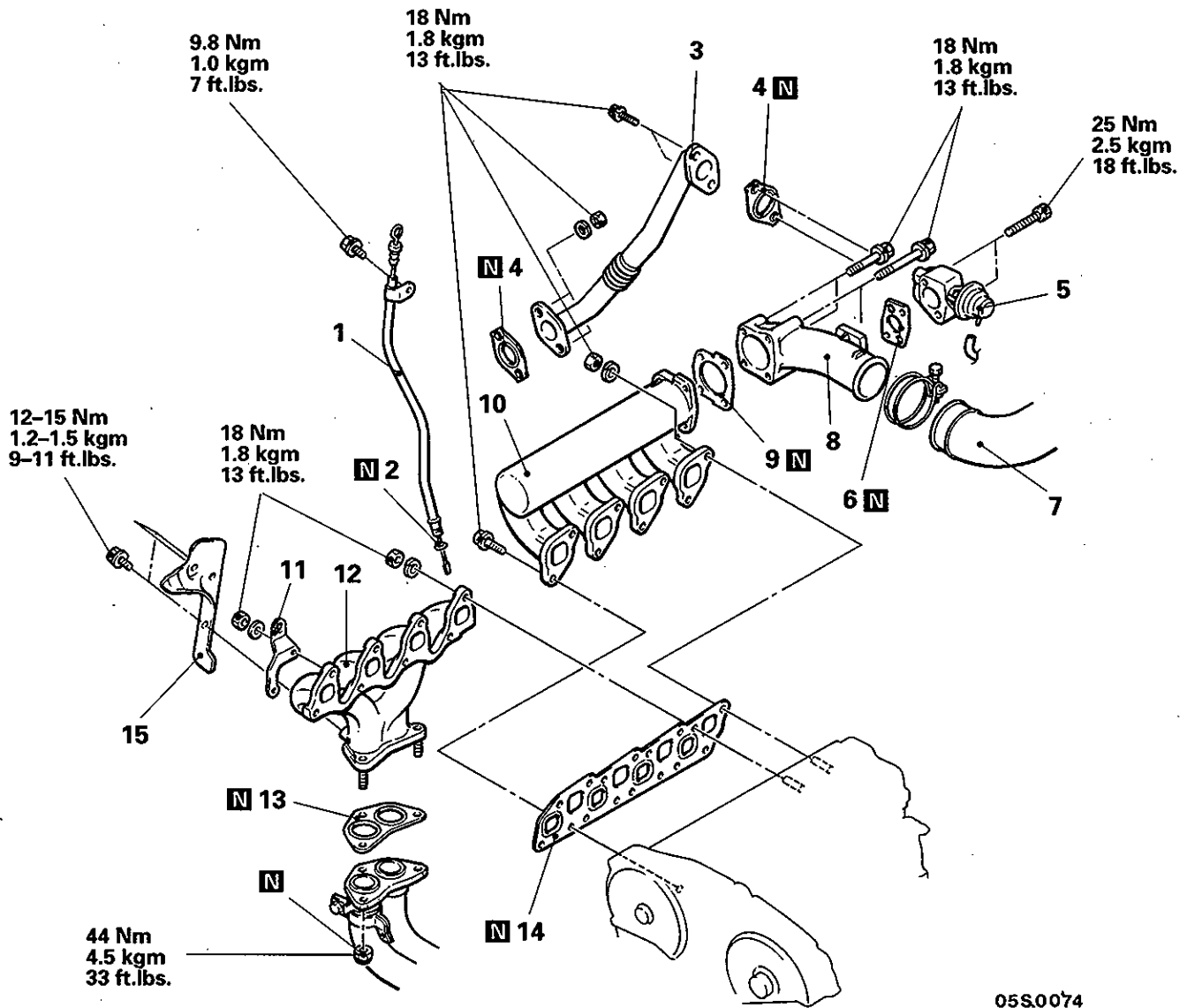
05S0056

### Removal steps

1. Self locking nut
2. Gasket
3. Exhaust manifold cover A
4. Exhaust manifold
5. Exhaust manifold gasket
6. Exhaust manifold cover B

**INTAKE MANIFOLD AND EXHAUST MANIFOLD <4D68>**

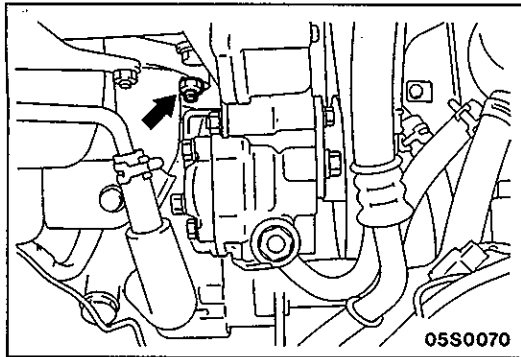
**REMOVAL AND INSTALLATION**



**Removal steps**

1. Oil level gauge guide assembly
  2. O-ring
  3. E.G.R. pipe
  4. E.G.R. pipe gasket
  5. E.G.R. valve
  6. E.G.R. valve gasket
  7. Air intake hose connection
  8. Air inlet fitting
  9. Air inlet fitting gasket
  10. Intake manifold
  11. Engine hanger
  12. Exhaust manifold
  13. Gasket
  14. Intake and exhaust manifold gasket
  15. Heat protector
- } <Vehicles equipped with E.G.R. valve>

## 15-18-2 INTAKE AND EXHAUST – Intake Manifold and Exhaust Manifold <4D68>



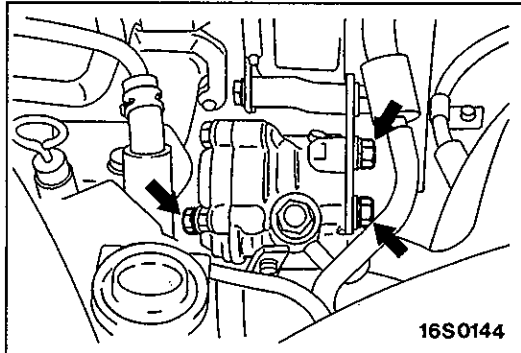
### SERVICE POINTS OF REMOVAL

E15UBAD

#### 12. REMOVAL OF EXHAUST MANIFOLD

Carry out the following procedure in order to remove the nut shown in the illustration.

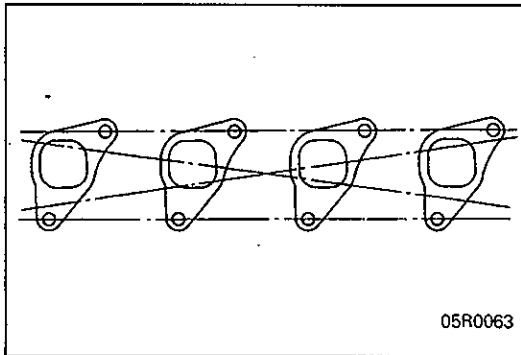
(1) Remove the drive belt of the power steering oil pump.



(2) Remove the power steering oil pump mounting bolts, and then remove the power steering oil pump from the oil pump bracket with the hose still attached.

#### NOTE

Use wire or similar in an appropriate position to support the power steering oil pump.



### INSPECTION

E15MBBA3

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

#### INTAKE MANIFOLD

1. Check for damage or cranking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and a thickness gage, check for distortion of the cylinder head installation surface.

**Standard value: 0.15 mm (0.0006 in.) or less**

**Limit: 0.2 mm (0.008 in.)**

**EXHAUST PIPE AND MAIN MUFFLER <2WD>**

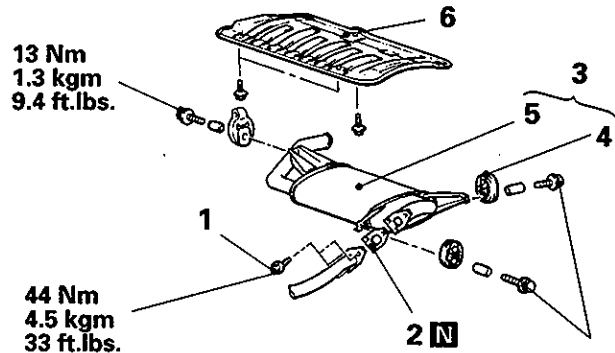
E15RA-1

**REMOVAL AND INSTALLATION <Hatchback>**

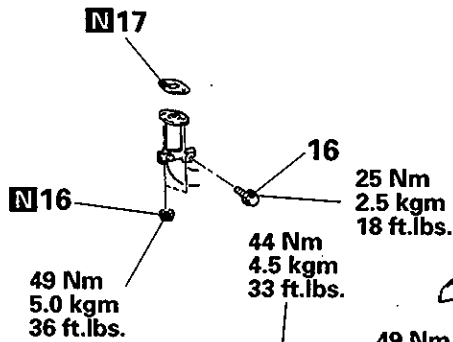
**Removal steps of main muffler and rear floor heat protector panel**

1. Bolt
2. Gasket
3. Main muffler assembly
4. Hanger
5. Main muffler
6. Rear floor heat protector panel

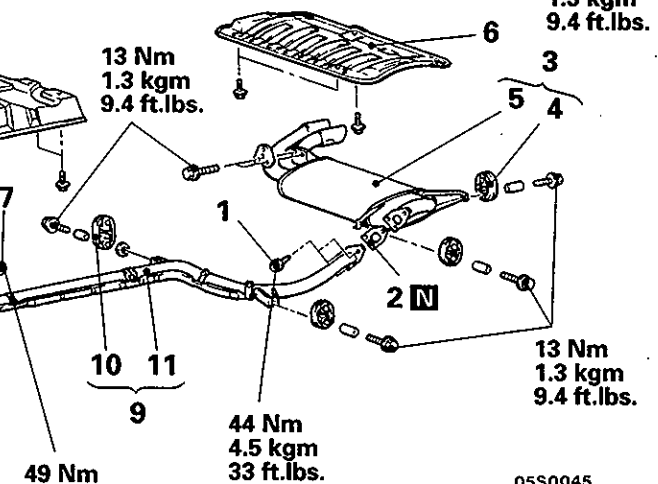
<4G13, 4G92>



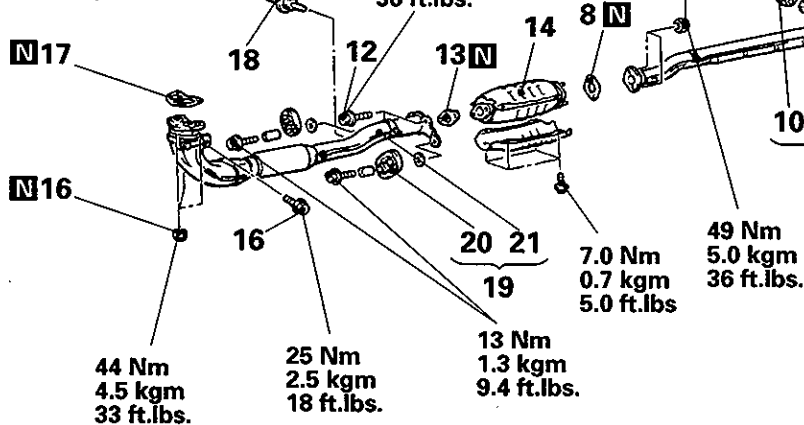
<4G13>



<4G93>



<4G92, 4G93>



05S0045

**Removal steps of center pipe, catalytic converter and front floor heat protector panel**

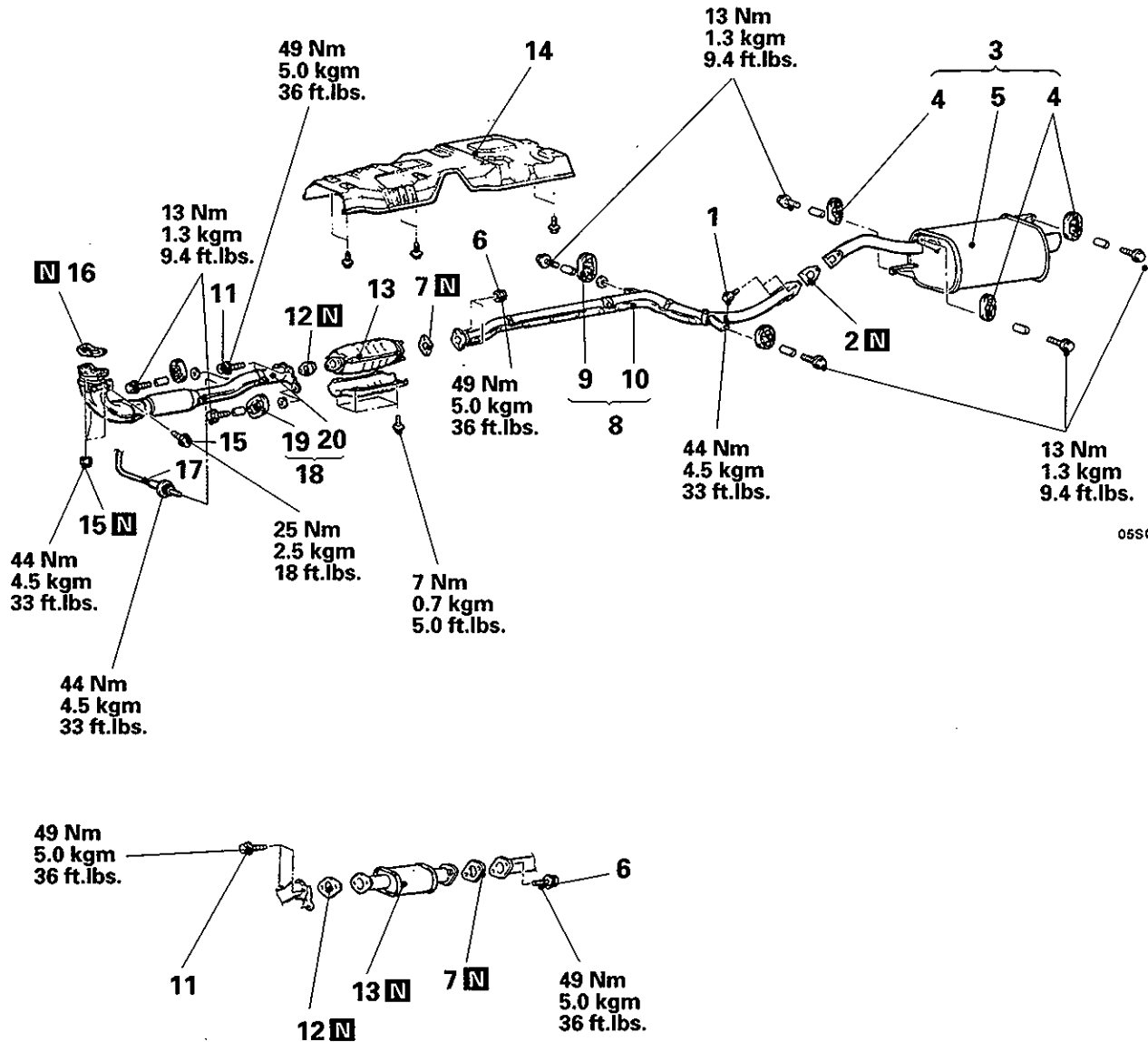
1. Bolt
2. Gasket
7. Self-locking nut
8. Gasket
9. Center pipe assembly
10. Hanger
11. Center pipe
12. Bolt
13. Gasket
14. Catalytic converter
15. Front floor heat protector panel

**Removal steps of front pipe**

12. Bolt
13. Gasket
16. Self-locking nut and bolt
17. Gasket
18. Oxygen sensor
19. Front pipe assembly
20. Hanger
21. Front pipe

# 15-19-1 INTAKE AND EXHAUST – Exhaust Pipe and Main Muffler <2WD>

## REMOVAL AND INSTALLATION <Sedan>



### Removal steps of main muffler

1. Bolt
2. Gasket
3. Main muffler assembly
4. Hanger
5. Main muffler

### Removal steps of front pipe

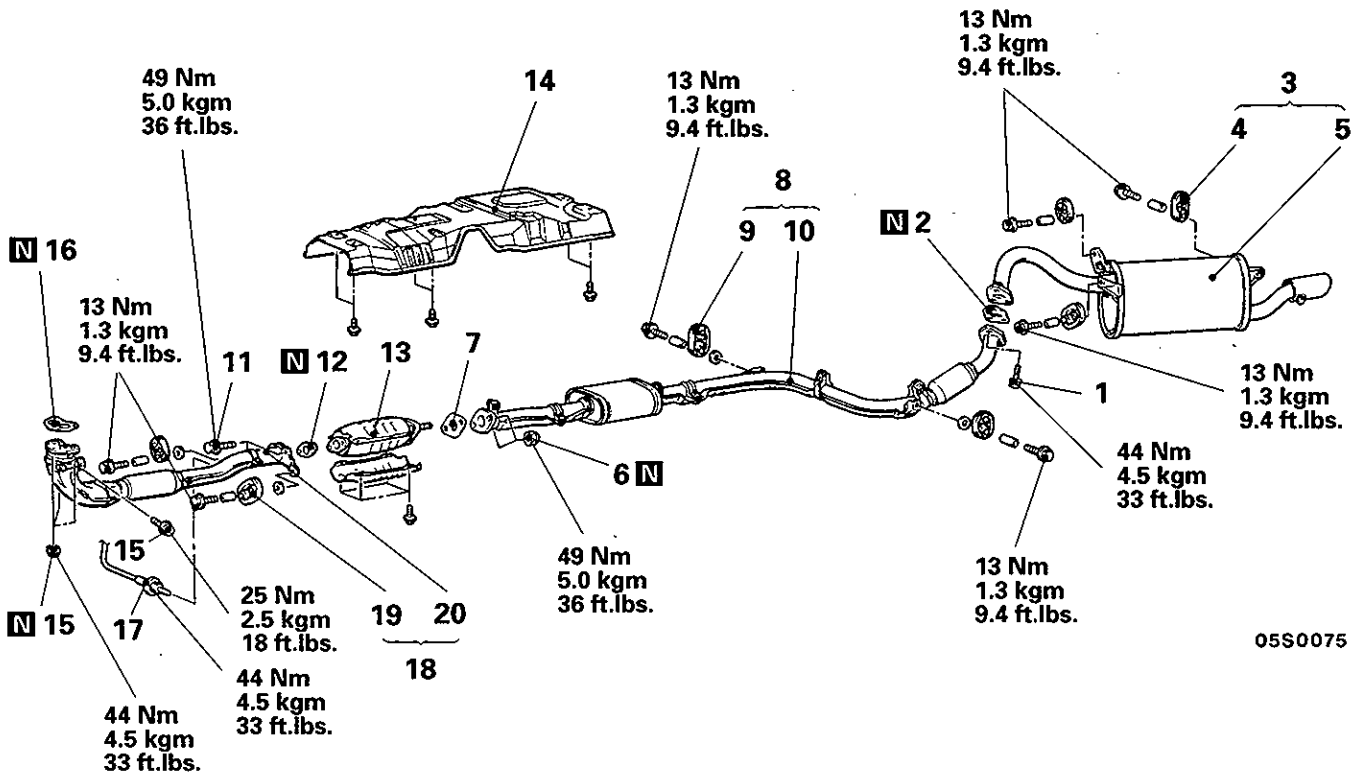
11. Bolt
12. Gasket
15. Self-locking nut and bolt
16. Gasket
17. Oxygen sensor <Petrol-powered vehicles>
18. Front pipe assembly
19. Hanger
20. Front pipe

### Removal steps of center pipe, pre-muffler, catalytic converter and front floor heat protector panel

1. Bolt
2. Gasket
6. Bolt <Diesel-powered vehicles> or self-locking nut <Petrol-powered vehicles>
7. Gasket
8. Center pipe assembly
9. Hanger
10. Center pipe
11. Bolt
12. Gasket
13. Pre-muffler or catalytic converter
14. Front floor heat protector panel

REMOVAL AND INSTALLATION <Wagon>

<Petrol-powered vehicles>



05S0075

**Removal steps of main muffler**

1. Bolt
2. Gasket
3. Main muffler assembly
4. Hanger
5. Main muffler

**Removal steps of front pipe**

11. Bolt
12. Gasket
15. Self-locking nut and bolt
16. Gasket
17. Oxygen sensor
18. Front pipe assembly
19. Hanger
20. Front pipe

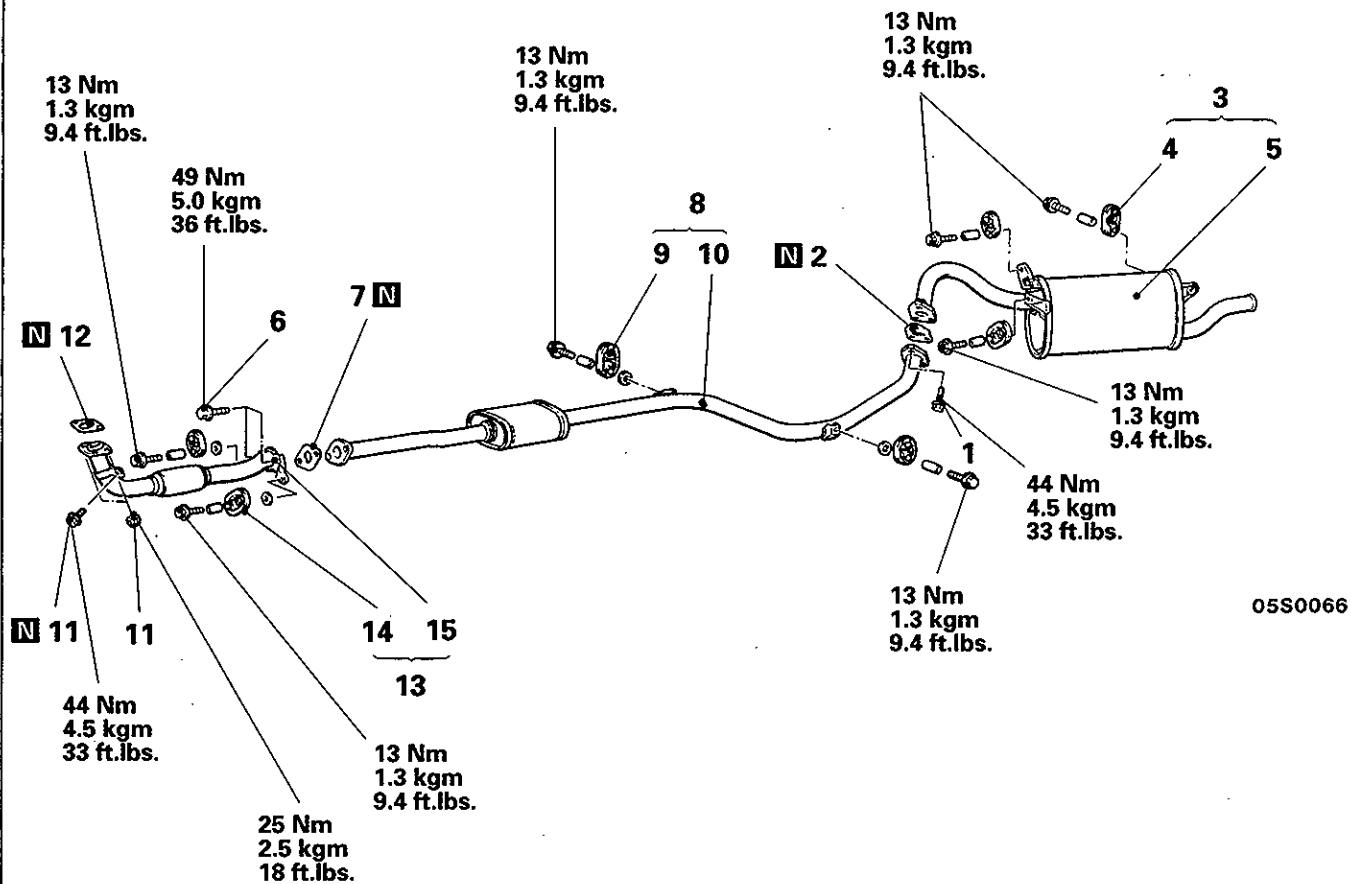
**Removal steps of center pipe, catalytic converter and front floor heat protector panel**

1. Bolt
2. Gasket
6. Self-locking nut
7. Gasket
8. Center pipe assembly
9. Hanger
10. Center pipe
11. Bolt
12. Gasket
13. Pre-muffler or catalytic converter
14. Front floor heat protector panel

# 15-19-3 INTAKE AND EXHAUST – Exhaust Pipe and Main Muffler <2WD>

## REMOVAL AND INSTALLATION <Wagon>

<Diesel-powered vehicles>



05S0066

### Removal steps of main muffler

1. Bolt
2. Gasket
3. Main muffler assembly
4. Hanger
5. Main muffler

### Removal steps of front pipe

6. Bolt
7. Gasket
11. Self-locking nut and bolt
12. Gasket
13. Front pipe assembly
14. Hanger
15. Front pipe

### Removal steps of center pipe

1. Bolt
2. Gasket
6. Bolt
7. Gasket
8. Center pipe assembly
9. Hanger
10. Center pipe

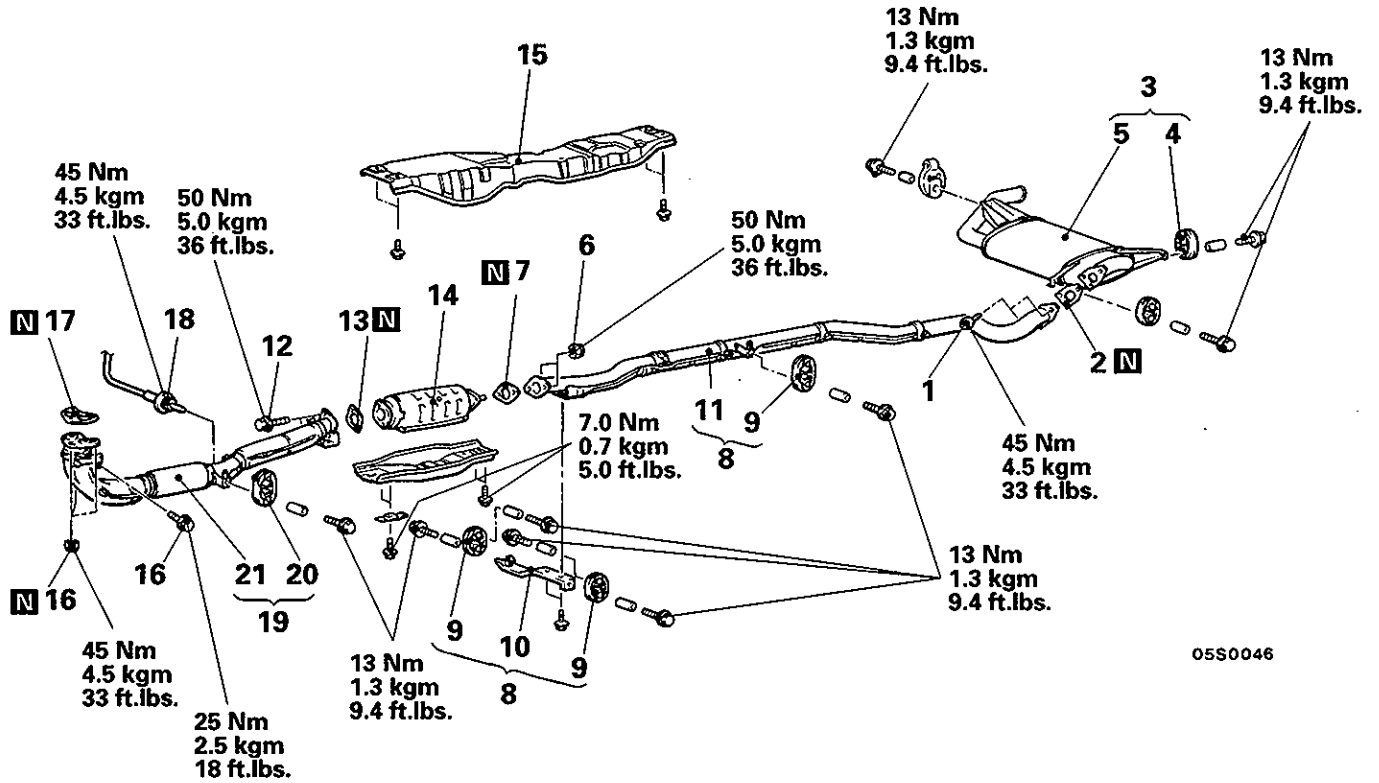


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NOTES

**EXHAUST PIPE AND MAIN MUFFLER <4WD>**

**REMOVAL AND INSTALLATION <Hatchback>**



05S0046

**Removal steps of main muffler**

1. Bolt
2. Gasket
3. Main muffler assembly
4. Hanger
5. Main muffler

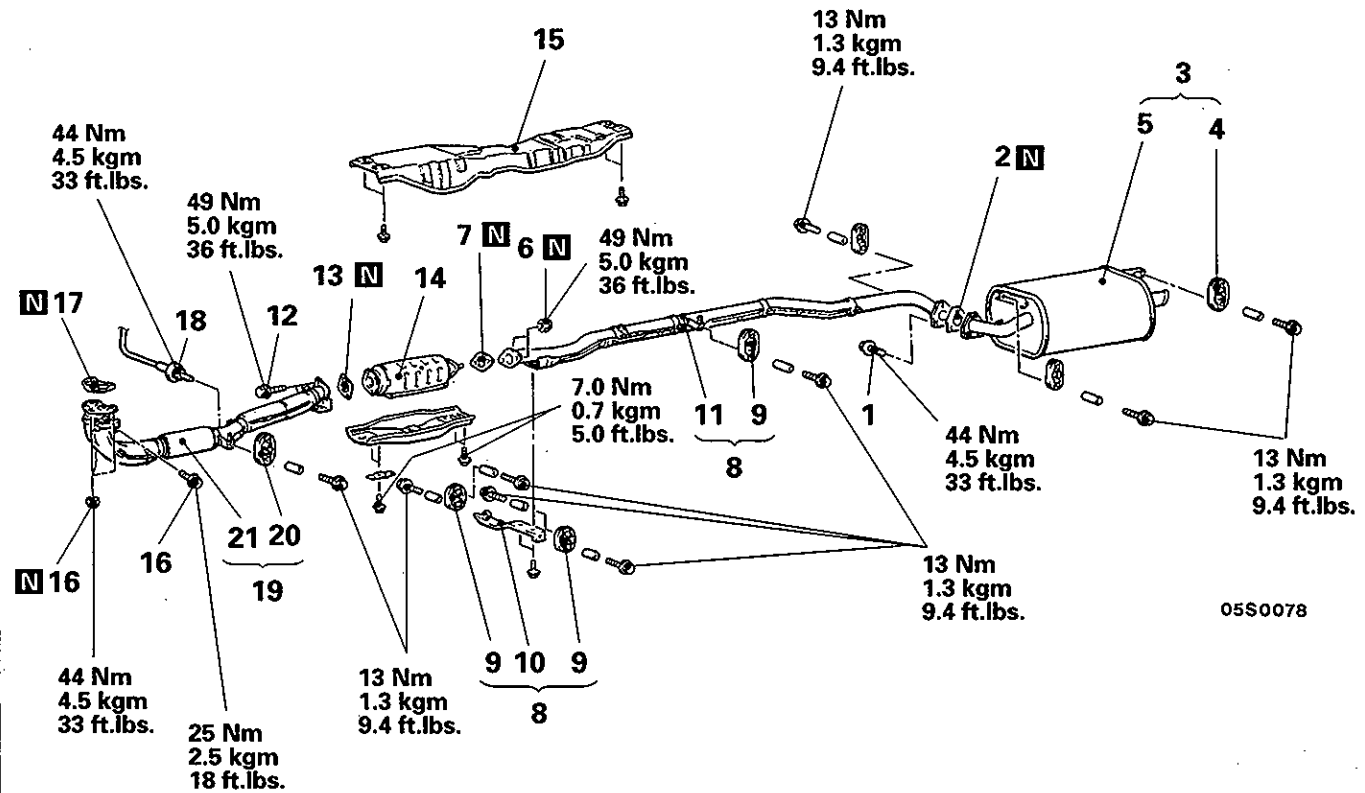
**Removal steps of front pipe**

12. Bolt
13. Gasket
16. Self-locking nut and bolt
17. Gasket
18. Oxygen sensor
19. Front pipe assembly
20. Hanger
21. Front pipe

**Removal steps of center pipe, catalytic converter and front floor heat protector panel**

1. Bolt
2. Gasket
6. Self-locking nut
7. Gasket
8. Center pipe assembly
9. Hanger
10. Hanger bracket
11. Center pipe
12. Bolt
13. Gasket
14. Catalytic converter
15. Front floor heat protector panel

REMOVAL AND INSTALLATION <Sedan>



**Removal steps of main muffler**

1. Bolt
2. Gasket
3. Main muffler assembly
4. Hanger
5. Main muffler

**Removal steps of front pipe**

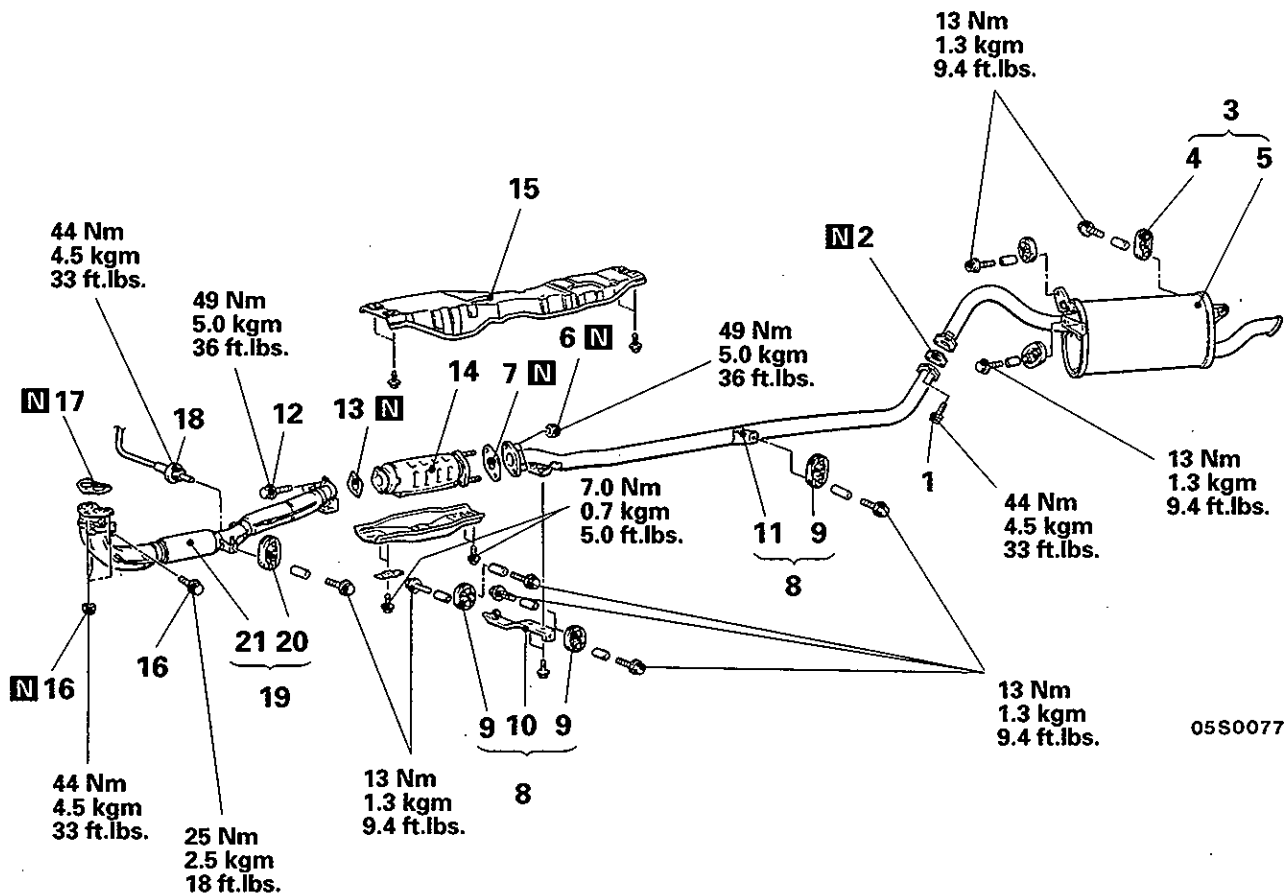
12. Bolt
13. Gasket
16. Self-locking nut and bolt
17. Gasket
18. Oxygen sensor
19. Front pipe assembly
20. Hanger
21. Front pipe

**Removal steps of center pipe, catalytic converter and front floor heat protector panel**

1. Bolt
2. Gasket
6. Self-locking nut
7. Gasket
8. Center pipe assembly
9. Hanger
10. Hanger bracket
11. Center pipe
12. Bolt
13. Gasket
14. Catalytic converter
15. Front floor heat protector panel

# 15-20-2 INTAKE AND EXHAUST – Exhaust Pipe and Main Muffler <4WD>

## REMOVAL AND INSTALLATION <Wagon>



### Removal steps of main muffler

1. Bolt
2. Gasket
3. Main muffler assembly
4. Hanger
5. Main muffler

### Removal steps of front pipe

12. Bolt
13. Gasket
16. Self-locking nut and bolt
17. Gasket
18. Oxygen sensor
19. Front pipe assembly
20. Hanger
21. Front pipe

### Removal steps of center pipe, catalytic converter and front floor heat protector panel

1. Bolt
2. Gasket
6. Self-locking nut
7. Gasket
8. Center pipe assembly
9. Hanger
10. Hanger bracket
11. Center pipe
12. Bolt
13. Gasket
14. Catalytic converter
15. Front floor heat protector panel