

2009 Toyota Highlander Limited

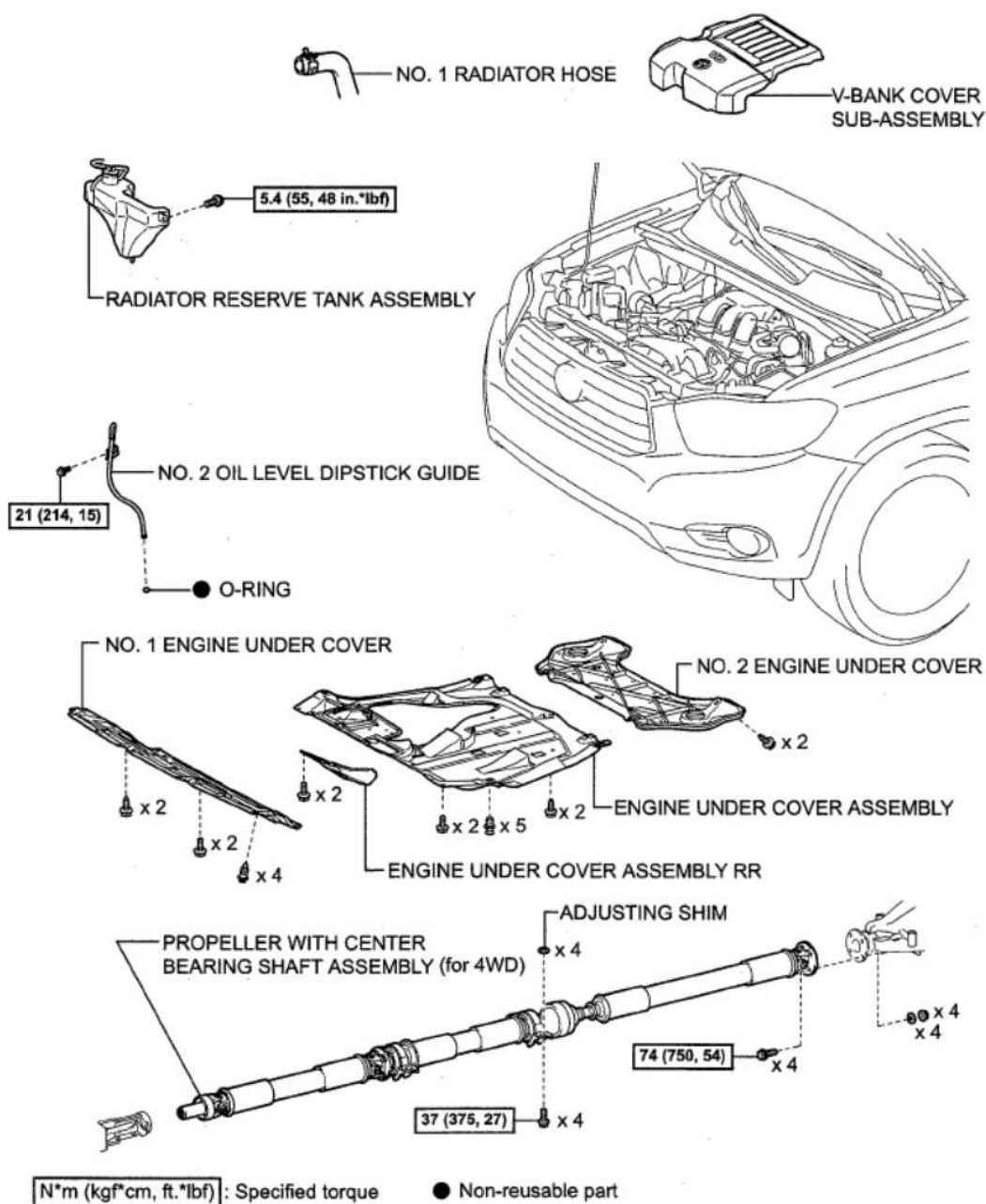
2009 ENGINE Exhaust (2GR-FE) - Highlander

2009 ENGINE

Exhaust (2GR-FE) - Highlander

EXHAUST MANIFOLD

COMPONENTS



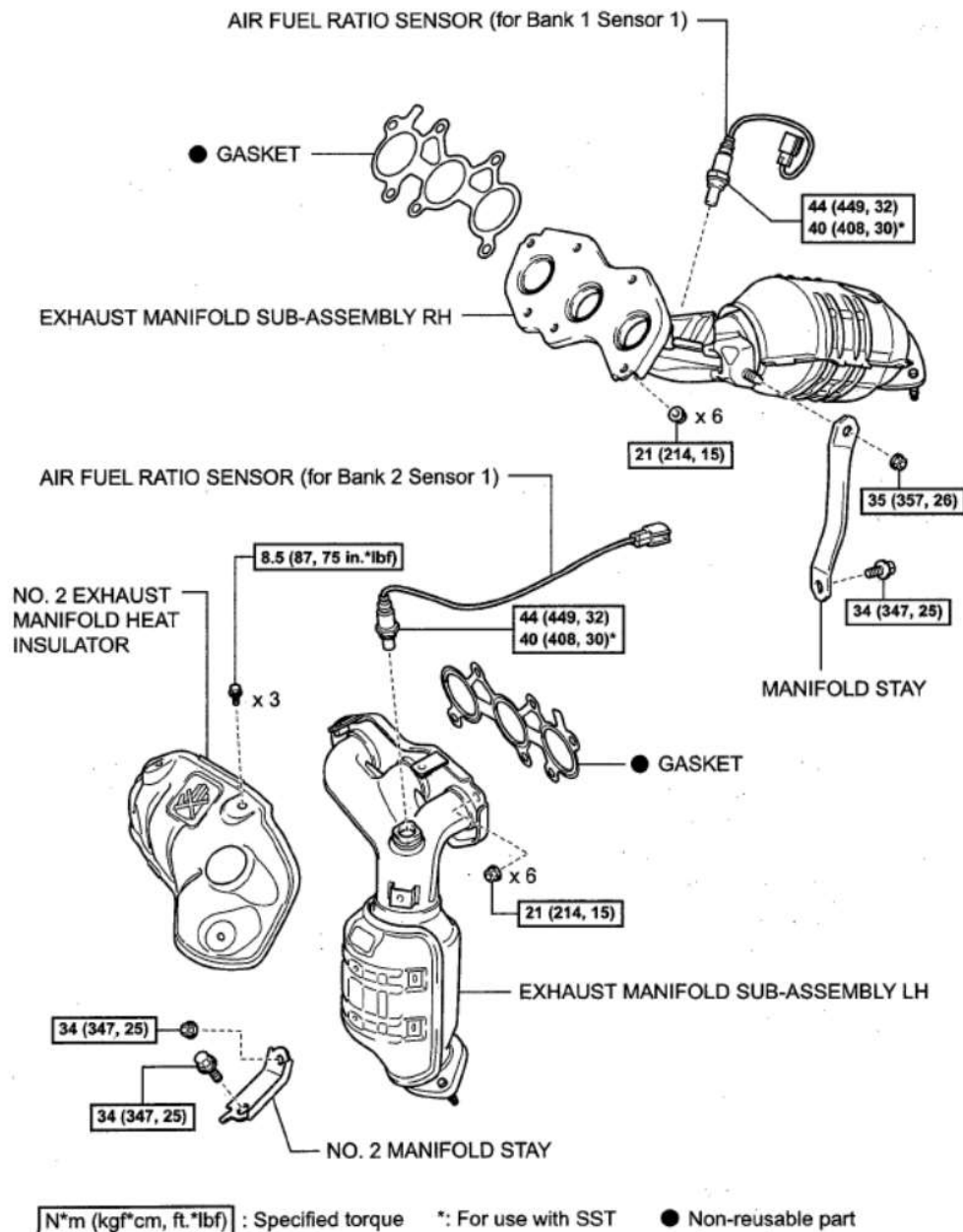
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Fig. 1: Identifying Exhaust Manifold Components And Torque Specifications (1 Of 3)

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

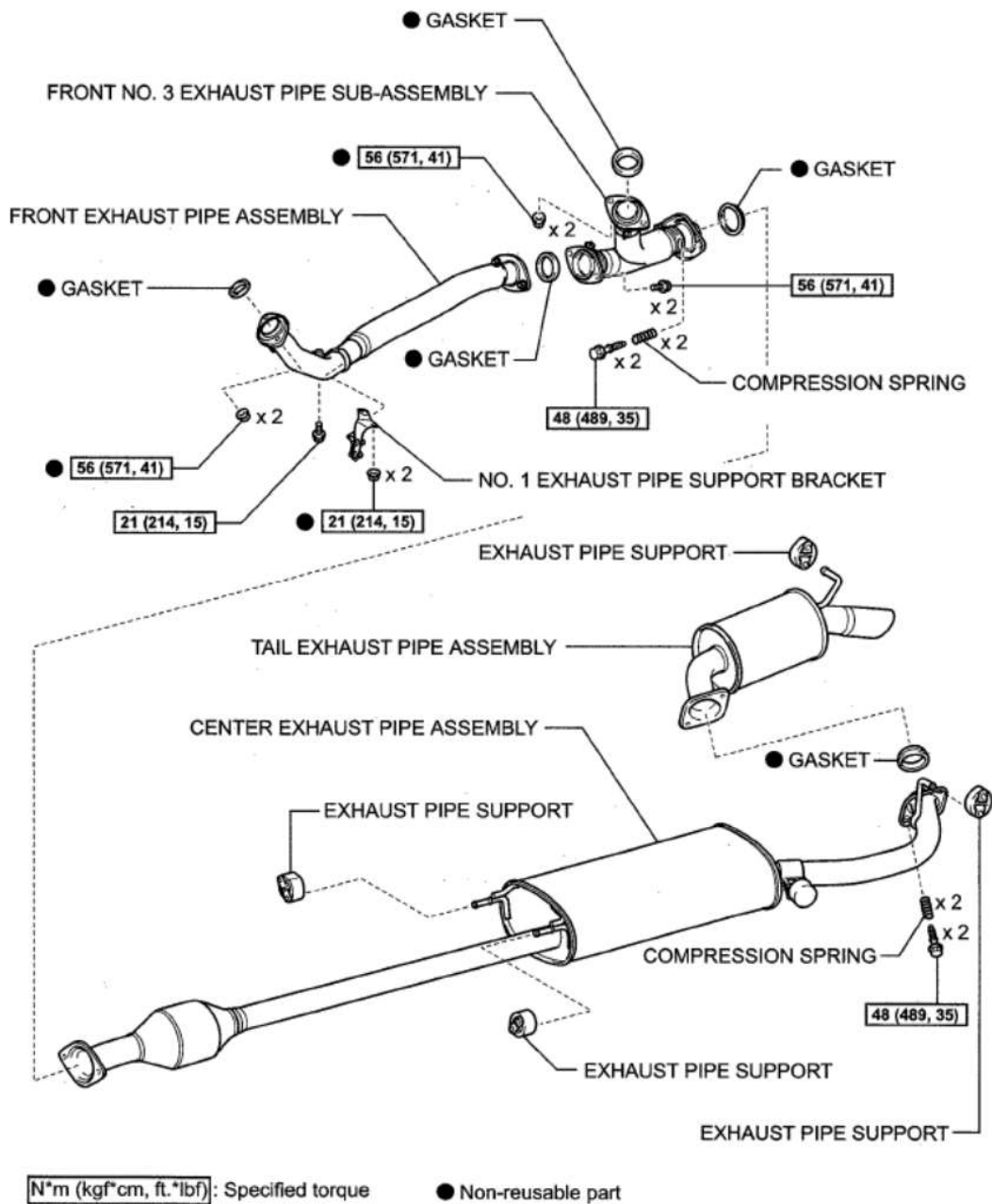


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Fig. 2: Identifying Exhaust Manifold Components And Torque Specifications (2 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Fig. 3: Identifying Exhaust Manifold Components And Torque Specifications (3 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE FRONT WHEEL RH**
2. **REMOVE V-BANK COVER SUB-ASSEMBLY** (See **REMOVAL**)
3. **REMOVE ENGINE UNDER COVER ASSEMBLY** (See **REMOVAL**)
4. **REMOVE NO. 1 ENGINE UNDER COVER** (See **REMOVAL**)

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5. **REMOVE NO. 2 ENGINE UNDER COVER** (See REMOVAL)
6. **DRAIN ENGINE COOLANT** (See COOLANT)
7. **DISCONNECT NO. 1 RADIATOR HOSE** (See REMOVAL)
8. **REMOVE RADIATOR RESERVE TANK ASSEMBLY**
 - a. Disconnect the hose [A].
 - b. Remove the 2 bolts [B] and radiator reserve tank assembly.
9. **REMOVE NO. 2 OIL LEVEL DIPSTICK GUIDE** (See REMOVAL)
10. **REMOVE AIR FUEL RATIO SENSOR (for Bank 2 Sensor 1)** (See REMOVAL)

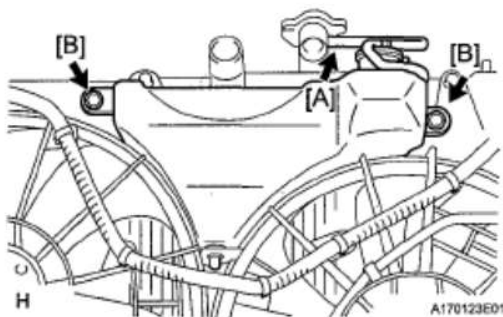


Fig. 4: Locating Bolts And Radiator Reserve Tank Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **REMOVE NO. 2 EXHAUST MANIFOLD HEAT INSULATOR**
 - a. Remove the 3 bolts and No. 2 exhaust manifold heat insulator.
12. **REMOVE PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY (for 4WD)** (See REMOVAL)
13. **REMOVE TAIL EXHAUST PIPE ASSEMBLY** (See REMOVAL)

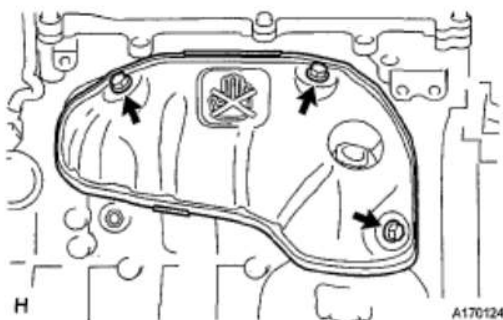


Fig. 5: Locating Bolts And No. 2 Exhaust Manifold Heat Insulator
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **REMOVE CENTER EXHAUST PIPE ASSEMBLY** (See REMOVAL)
15. **REMOVE FRONT NO. 3 EXHAUST PIPE SUB-ASSEMBLY** (See REMOVAL)
16. **REMOVE FRONT EXHAUST PIPE ASSEMBLY** (See REMOVAL)

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17. REMOVE NO. 2 MANIFOLD STAY

- a. Remove the bolt, nut and No. 2 manifold stay.

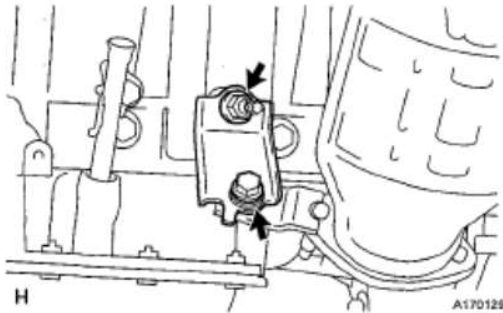


Fig. 6: Locating Bolt, Nut And No. 2 Manifold Stay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY LH

- a. Remove the 6 nuts and exhaust manifold sub-assembly LH.
- b. Remove the gasket.

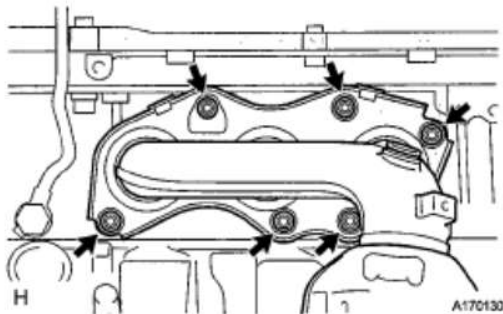
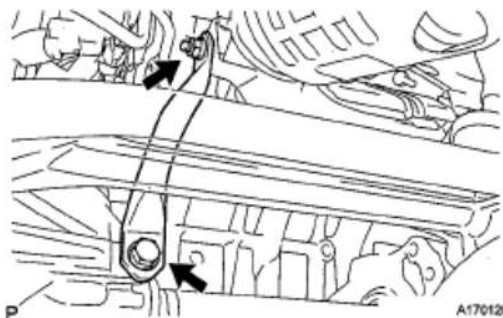


Fig. 7: Locating Nuts And Exhaust Manifold Sub-Assembly LH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. REMOVE MANIFOLD STAY

- a. Remove the bolt, nut and manifold stay.



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Fig. 8: Locating Bolt, Nut And Manifold Stay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH

- a. Disconnect the air fuel ratio sensor (for bank 1 sensor 1) connector and remove the clamp.

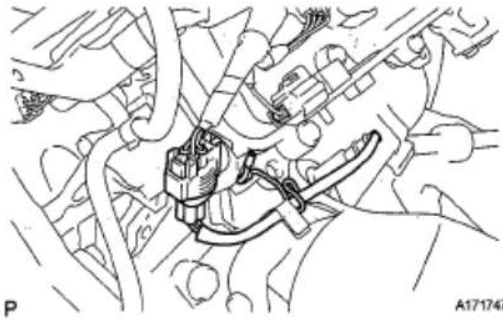


Fig. 9: Identifying Air Fuel Ratio Sensor Connector And Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 6 nuts and exhaust manifold sub-assembly RH.
- c. Remove the gasket.

21. REMOVE AIR FUEL RATIO SENSOR (for Bank 1 Sensor 1) (See REMOVAL)

INSTALLATION

1. INSTALL AIR FUEL RATIO SENSOR (for Bank 1 Sensor 1) (See INSPECTION)
2. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY RH

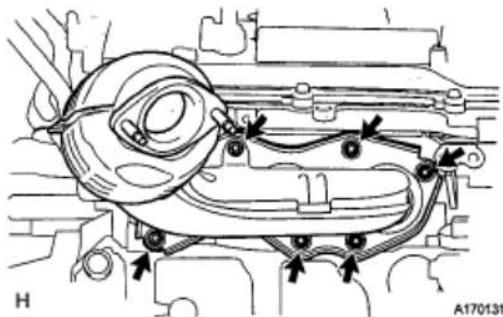


Fig. 10: Locating Nuts And Exhaust Manifold Sub-Assembly RH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Install a new gasket.
- b. Install the exhaust manifold sub-assembly RH by tightening the 6 nuts in the order shown in the illustration.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

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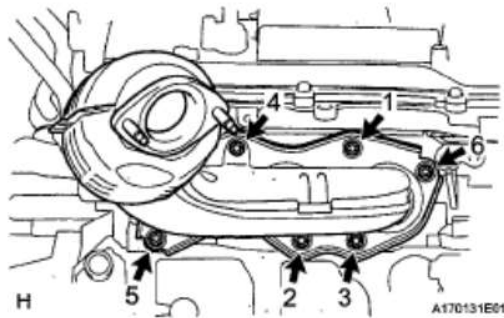


Fig. 11: Locating Nuts And Exhaust Manifold Sub-Assembly RH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the air fuel ratio sensor (for bank 1 sensor 1) connector and install the clamp.

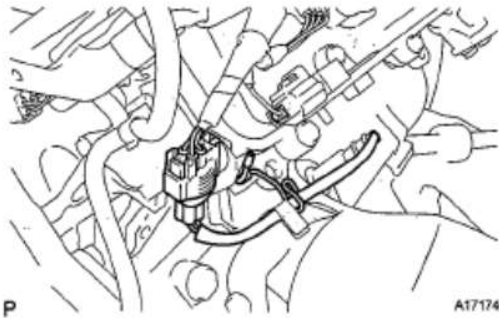


Fig. 12: Identifying Air Fuel Ratio Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL MANIFOLD STAY

- a. Install the manifold stay with the bolt and nut.

Torque: Bolt

34 N*m (347 kgf*cm, 25 ft.*lbf)

Nut

35 N*m (357 kgf*cm, 26 ft.*lbf)

4. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY LH

- a. Install a new gasket.

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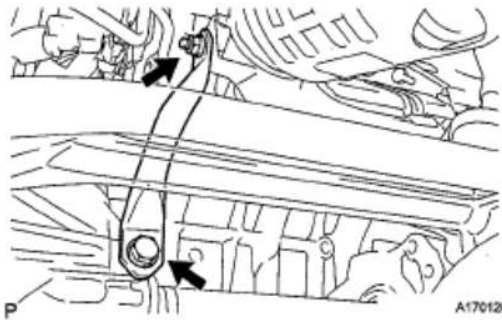


Fig. 13: Locating Bolt, Nut And Manifold Stay

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the exhaust manifold sub-assembly LH by tightening the 6 nuts in the order shown in the illustration.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

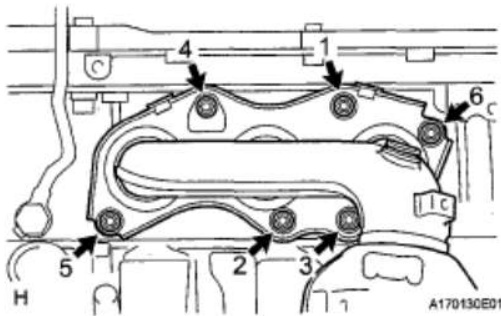


Fig. 14: Locating Exhaust Manifold Sub-Assembly LH And Nuts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL NO. 2 MANIFOLD STAY

- a. Install the No. 2 manifold stay by tightening the bolt and nut in the order shown in the illustration.

Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)

6. INSTALL FRONT EXHAUST PIPE ASSEMBLY (See INSTALLATION)

7. INSTALL FRONT NO. 3 EXHAUST PIPE SUB-ASSEMBLY (See INSTALLATION)

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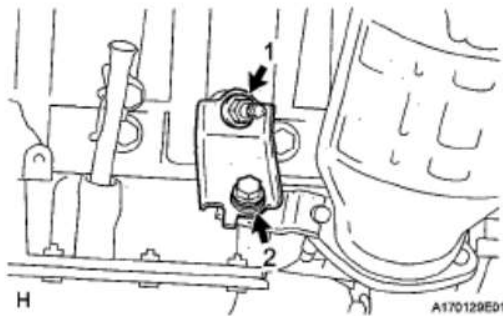


Fig. 15: Locating No. 2 Manifold Stay And Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSTALL CENTER EXHAUST PIPE ASSEMBLY** (See INSTALLATION)
9. **INSTALL TAIL EXHAUST PIPE ASSEMBLY** (See INSTALLATION)
10. **TEMPORARILY TIGHTEN PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY** (for 4WD) (See INSTALLATION)
11. **FULLY TIGHTEN PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY** (for 4WD) (See INSTALLATION)
12. **INSTALL NO. 2 EXHAUST MANIFOLD HEAT INSULATOR**
 - a. Install the No. 2 exhaust manifold heat insulator by tightening the 3 bolts in the order shown in the illustration.

Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)

13. **INSTALL AIR FUEL RATIO SENSOR** (for Bank 2 Sensor 1) (See INSTALLATION)
14. **INSTALL NO. 2 OIL LEVEL DIPSTICK GUIDE** (See INSTALLATION)

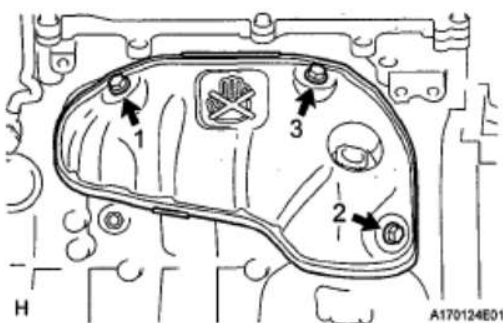


Fig. 16: Locating No. 2 Exhaust Manifold Heat Insulator And Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. **INSTALL RADIATOR RESERVE TANK ASSEMBLY**
 - a. Install the radiator reserve tank assembly with the 2 bolts [A].

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

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b. Connect the hose [B].

16. **CONNECT NO. 1 RADIATOR HOSE** (See INSTALLATION)
17. **ADD ENGINE COOLANT** (See REPLACEMENT)
18. **INSPECT FOR COOLANT LEAK** (See COOLING SYSTEM)

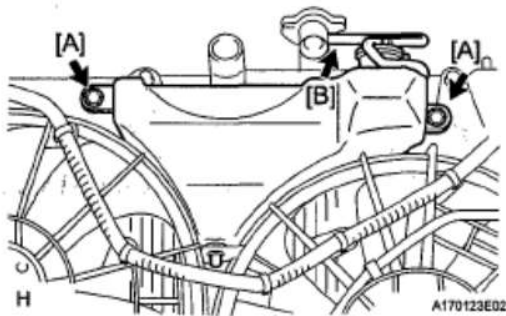


Fig. 17: Locating Radiator Reserve Tank Assembly And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **INSPECT FOR EXHAUST GAS LEAK**

If exhaust gas is leaking, repair the leak. Replace damaged or worn parts as necessary.

20. **INSPECT AND ADJUST TRANSFER OIL (for 4WD)**

(See TRANSFER OIL)

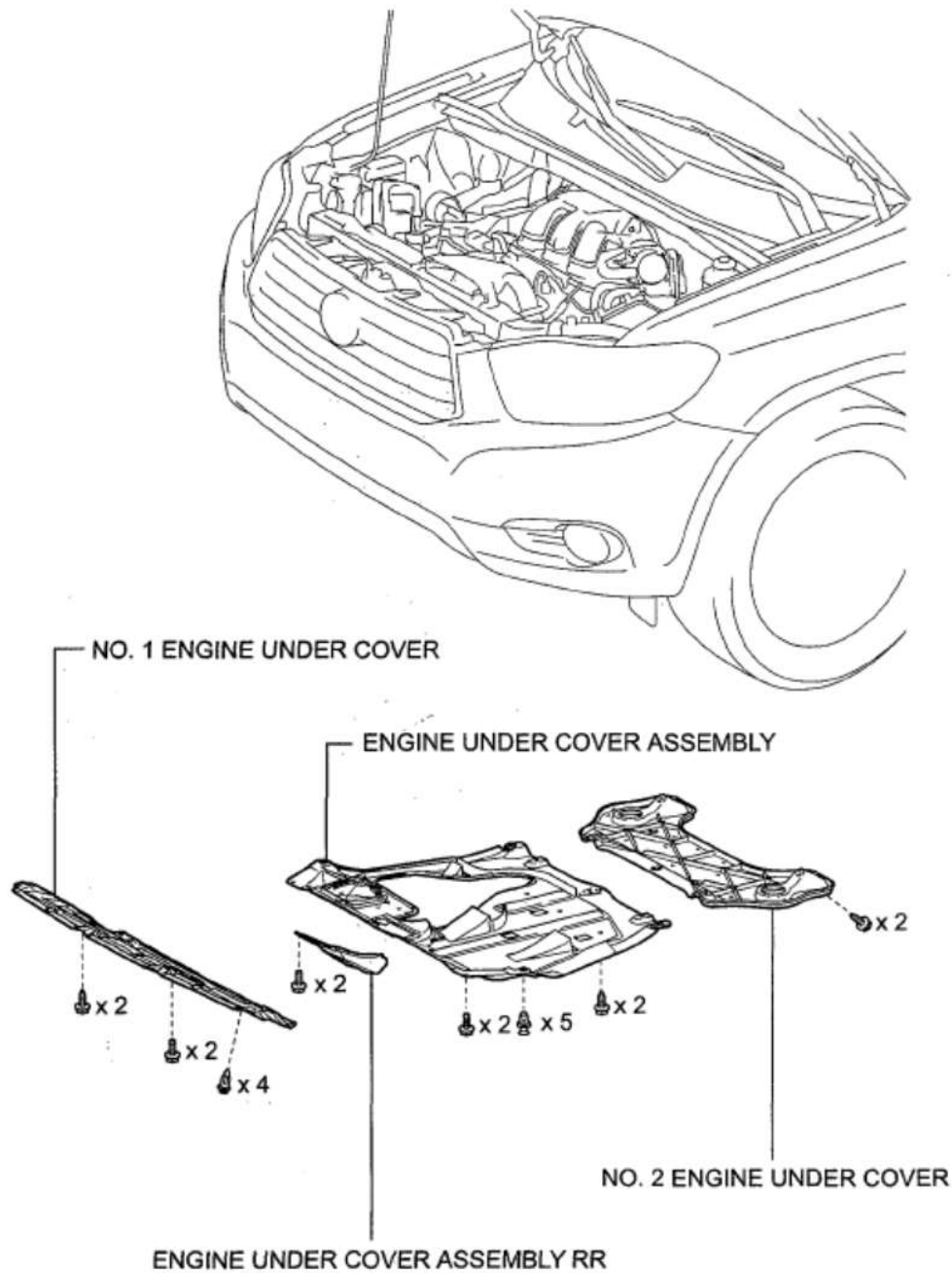
21. **INSTALL NO. 2 ENGINE UNDER COVER** (See INSTALLATION)
22. **INSTALL NO. 1 ENGINE UNDER COVER** (See INSTALLATION)
23. **INSTALL ENGINE UNDER COVER ASSEMBLY** (See INSTALLATION)
24. **REMOVE V-BANK COVER SUB-ASSEMBLY** (See INSTALLATION)
25. **INSTALL FRONT WHEEL RH**

EXHAUST PIPE

COMPONENTS

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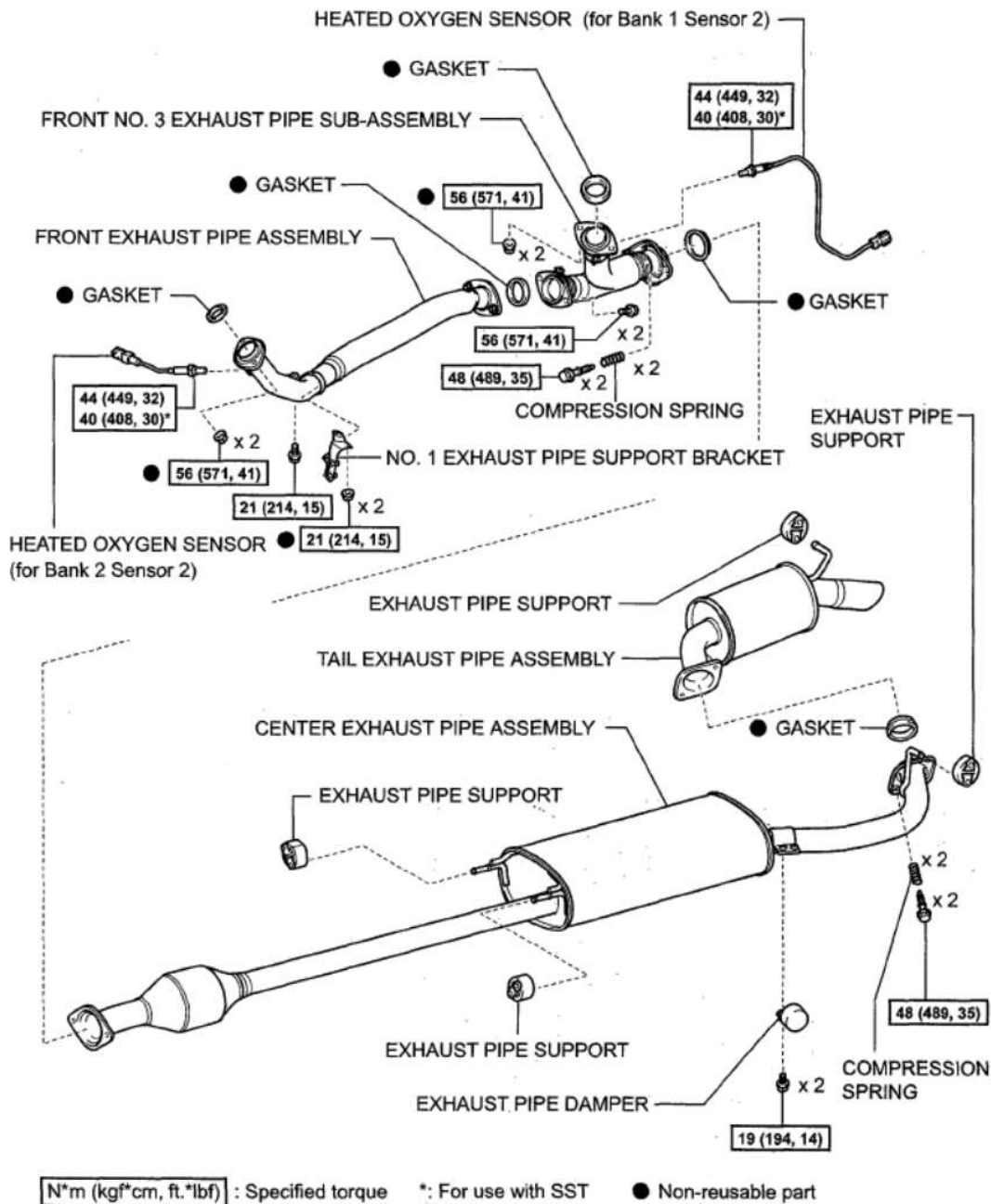


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Fig. 18: Identifying Exhaust Pipe Components And Torque Specifications (1 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Fig. 19: Identifying Exhaust Pipe Components And Torque Specifications (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE ENGINE UNDER COVER ASSEMBLY (See **REMOVAL**)
2. REMOVE NO. 1 ENGINE UNDER COVER (See **REMOVAL**)
3. REMOVE NO. 2 ENGINE UNDER COVER (See **REMOVAL**)

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4. REMOVE TAIL EXHAUST PIPE ASSEMBLY

- a. Remove the 2 bolts and 2 compression springs.
- b. Disconnect the exhaust pipe support and remove the tail exhaust pipe assembly.
- c. Remove the gasket from the center exhaust pipe assembly.

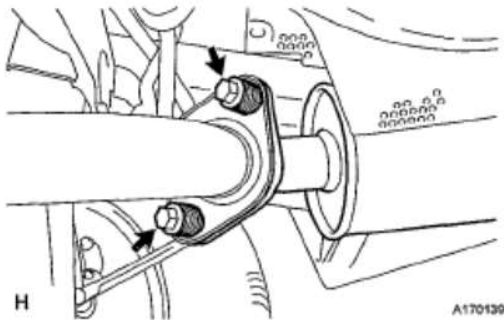


Fig. 20: Locating Bolts And Compression Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. REMOVE EXHAUST PIPE DAMPER

- a. Remove the 2 bolts and exhaust pipe damper.



Fig. 21: Locating Bolts And Exhaust Pipe Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE CENTER EXHAUST PIPE ASSEMBLY

- a. Remove the 2 bolts and 2 compression springs.
- b. Disconnect the 3 exhaust pipe supports and remove the center exhaust pipe assembly.
- c. Remove the gasket from the No. 3 exhaust pipe sub-assembly.

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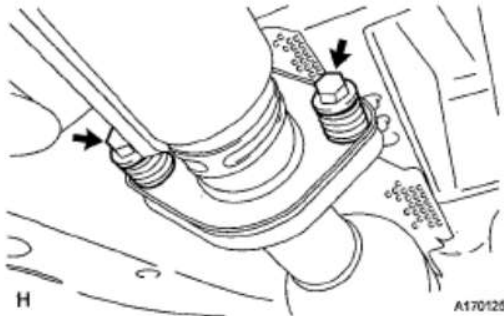


Fig. 22: Locating Bolts And Compression Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE FRONT NO. 3 EXHAUST PIPE SUB-ASSEMBLY

- a. Remove the 3 clamps and disconnect the heated oxygen sensor (for bank 1 sensor 2) connector.

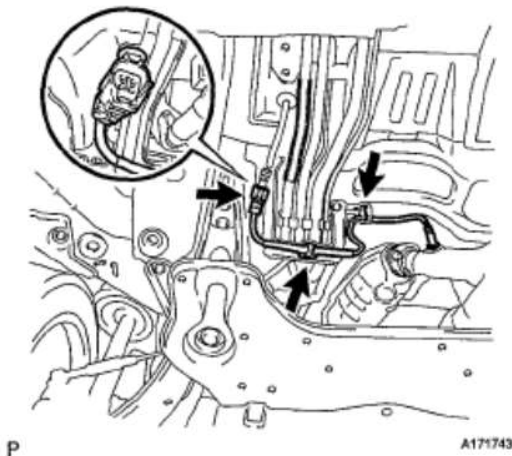
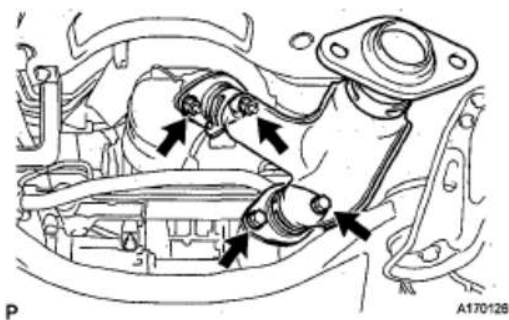


Fig. 23: Locating Clamps And Heated Oxygen Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 2 bolts, 2 nuts and front No. 3 exhaust pipe sub-assembly.
- c. Remove the 2 gaskets from the front No. 3 exhaust pipe sub-assembly.

8. REMOVE HEATED OXYGEN SENSOR (for Bank 1 Sensor 2) (See REMOVAL)



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Fig. 24: Locating Bolts, Nuts And Front No. 3 Exhaust Pipe Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE FRONT EXHAUST PIPE ASSEMBLY

- a. Disconnect the heated oxygen sensor (for bank 2 sensor 2) connector.

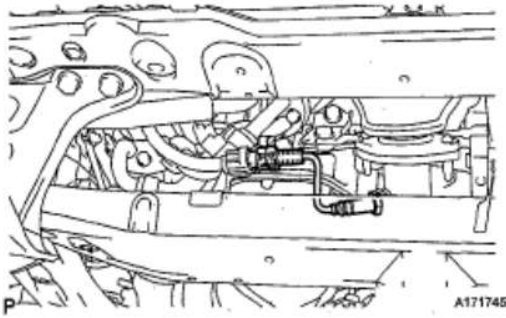


Fig. 25: Identifying Heated Oxygen Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Loosen the bolt.
- c. Remove the 2 nuts and front exhaust pipe assembly.
- d. Remove the gasket from the front exhaust pipe assembly.

10. REMOVE HEATED OXYGEN SENSOR (for Bank 2 Sensor 2) (See REMOVAL)

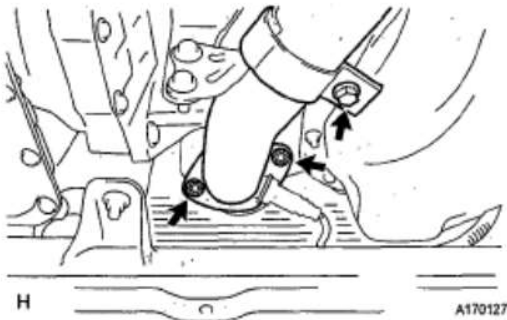


Fig. 26: Locating Nuts And Front Exhaust Pipe Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL HEATED OXYGEN SENSOR (for Bank 2 Sensor 2) (See INSPECTION)**
2. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
 - a. Install a new gasket to the front exhaust pipe assembly.
 - b. Install the front exhaust pipe assembly with 2 new nuts.

Torque: 56 N*m (571 kgf*cm, 41 ft.*lbf)

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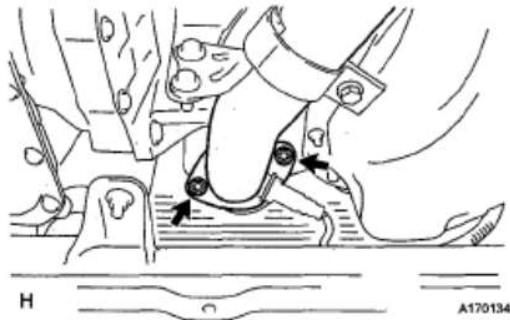


Fig. 27: Locating Nuts And Front Exhaust Pipe Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Connect the heated oxygen sensor (for bank 2 sensor 2) connector.

3. INSTALL HEATED OXYGEN SENSOR (for Bank 1 Sensor 2) (See INSPECTION)

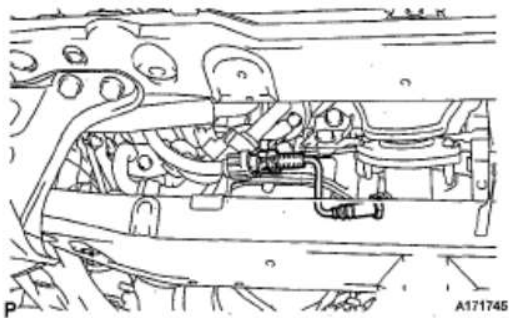


Fig. 28: Identifying Heated Oxygen Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL FRONT NO. 3 EXHAUST PIPE SUB-ASSEMBLY

- Install 2 new gaskets to the front No. 3 exhaust pipe sub-assembly.
- Install the front No. 3 exhaust pipe sub-assembly with 2 new nuts and the 2 bolts.

Torque: 56 N*m (571 kgf*cm, 41 ft.*lbf)

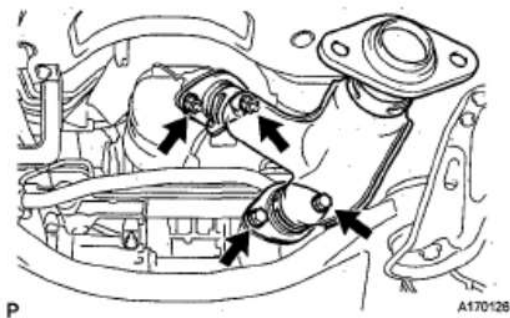


Fig. 29: Locating Bolts, Nuts And Front No. 3 Exhaust Pipe Sub-Assembly

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Install the 3 clamps and connect the heated oxygen sensor (for bank 1 sensor 2) connector.

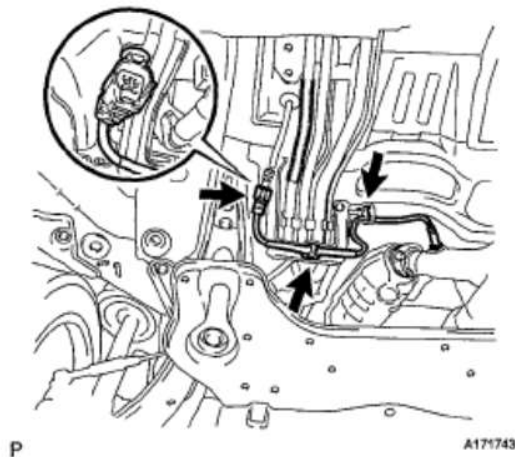


Fig. 30: Locating Clamps And Heated Oxygen Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Tighten the front exhaust pipe assembly bolt.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

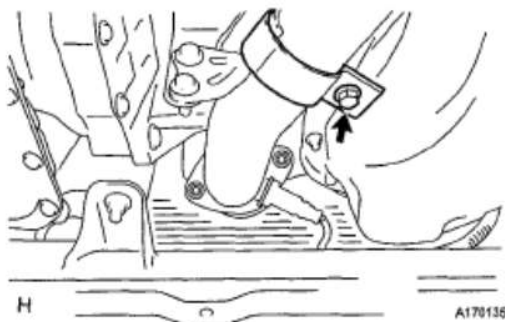


Fig. 31: Locating Front Exhaust Pipe Assembly Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL CENTER EXHAUST PIPE ASSEMBLY

- a. Using vernier calipers, measure the free length of the compression spring.

COMPRESSION SPRING SPECIFICATIONS

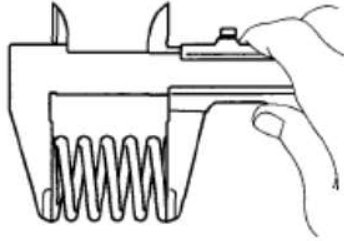
Minimum	41.5 mm (1.63 in.)
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HINT:

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If the length is less than the minimum, replace the compression spring.



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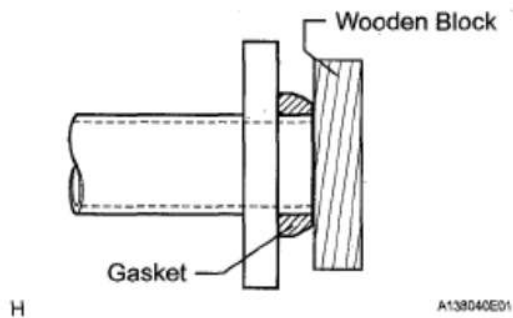
Fig. 32: Measuring Free Length Of Compression Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a plastic-faced hammer and wooden block, tap in a new gasket until its surface is flush with the front No. 3 exhaust pipe sub-assembly.

NOTE:

- Tap in the gasket in the correct direction.
- Do not reuse the removed gasket.
- Do not push in the gasket while installing the center exhaust pipe assembly.

- c. Connect the 3 exhaust pipe supports, and install the center exhaust pipe assembly.



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Fig. 33: Identifying Wooden Block And Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Install the 2 compression springs and 2 bolts.

Torque: 48 N*m (489 kgf*cm, 35 ft.*lbf)

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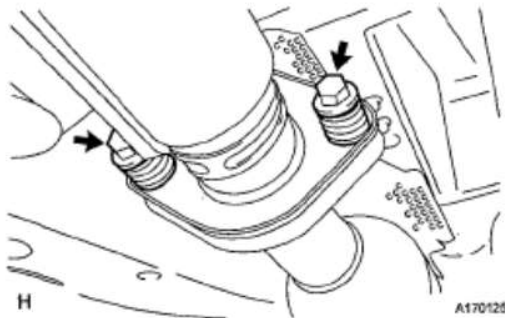


Fig. 34: Locating Compression Springs And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSTALL EXHAUST PIPE DAMPER

- Install the exhaust pipe damper with the 2 bolts.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



Fig. 35: Locating Bolts And Exhaust Pipe Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL TAIL EXHAUST PIPE ASSEMBLY

- Using vernier calipers, measure the free length of the compression spring.

COMPRESSION SPRING SPECIFICATIONS

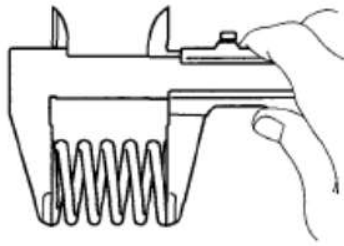
Minimum	40.5 mm (1.59 in.)
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HINT:

If the length is less than the minimum, replace the compression spring.

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Fig. 36: Measuring Free Length Of Compression Spring

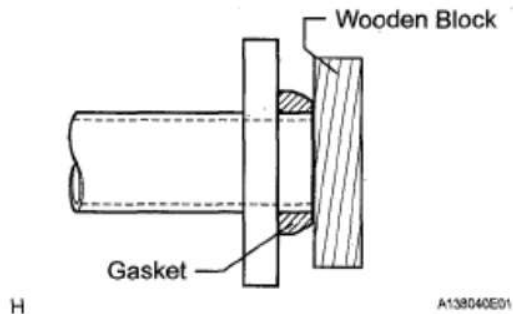
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a plastic-faced hammer and wooden block, tap in a new gasket until its surface is flush with the center exhaust pipe assembly.

NOTE:

- Tap in the gasket in the correct direction.
- Do not reuse the removed gasket.
- Do not push in the gasket while installing the tail exhaust pipe assembly.

- c. Connect the exhaust pipe support, and install the tail exhaust pipe assembly.



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Fig. 37: Identifying Wooden Block And Gasket

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Install the 2 compression springs and 2 bolts.

Torque: 48 N*m (489 kgf*cm, 35 ft.*lbf)

8. INSPECT FOR EXHAUST GAS LEAK

If exhaust gas is leaking, repair the leak. Replace damaged or worn parts as necessary.

9. **INSTALL NO. 2 ENGINE UNDER COVER** (See **INSTALLATION**)
10. **INSTALL NO. 1 ENGINE UNDER COVER** (See **INSTALLATION**)
11. **INSTALL ENGINE UNDER COVER ASSEMBLY** (See **INSTALLATION**)

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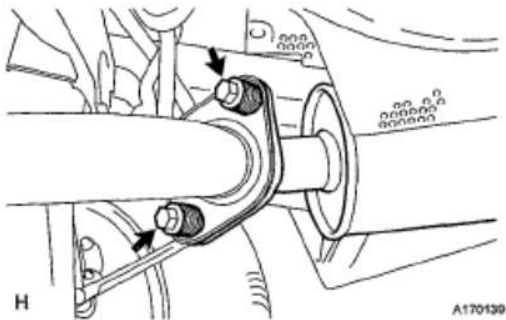


Fig. 38: Locating Compression Springs And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.