

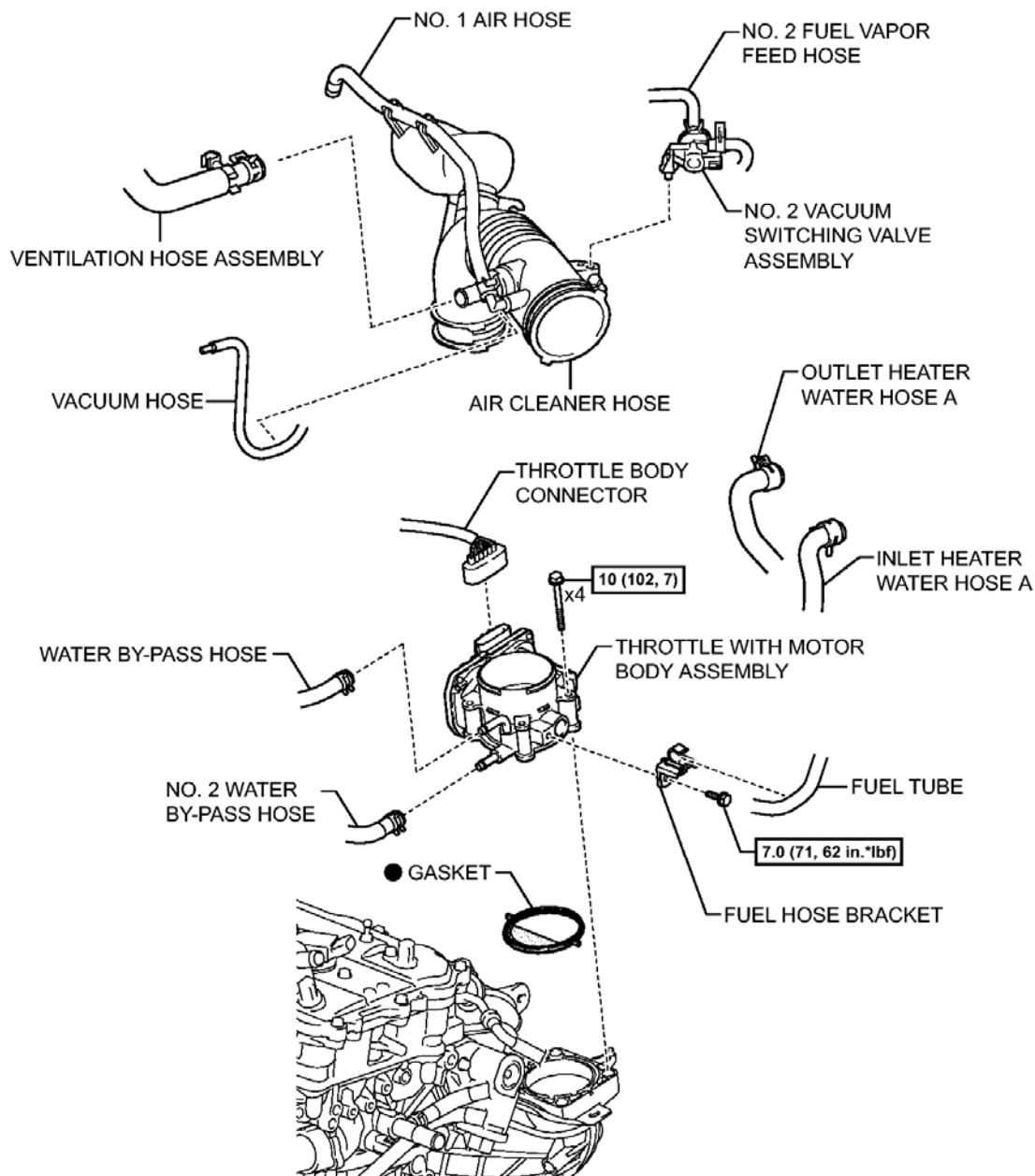
ENGINE

Exhaust System [1AR-FE] (Service Information) - Sienna

INTAKE MANIFOLD

COMPONENTS

ILLUSTRATION



[N*m (kgf*cm, ft.*lbf)]: Specified torque

● Non-reusable part

Fig. 1: Intake Manifold Replacement Components With Torque Specifications (1 of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE

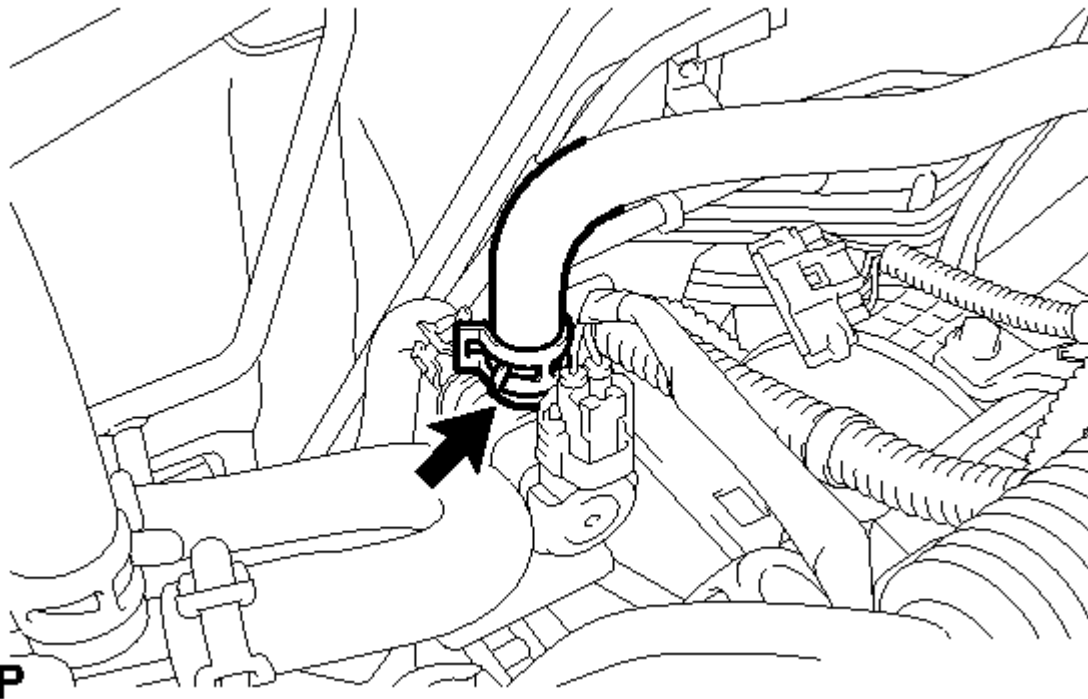
Refer to **PRECAUTION**

2. REMOVE AIR CLEANER ASSEMBLY

Refer to **REMOVAL**

3. REMOVE AIR CLEANER HOSE

- a. Loosen the clip and disconnect the No. 1 air hose.



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Fig. 3: Identifying No. 1 Air Hose & Clip

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

- b. Loosen the clip and disconnect the ventilation hose assembly.

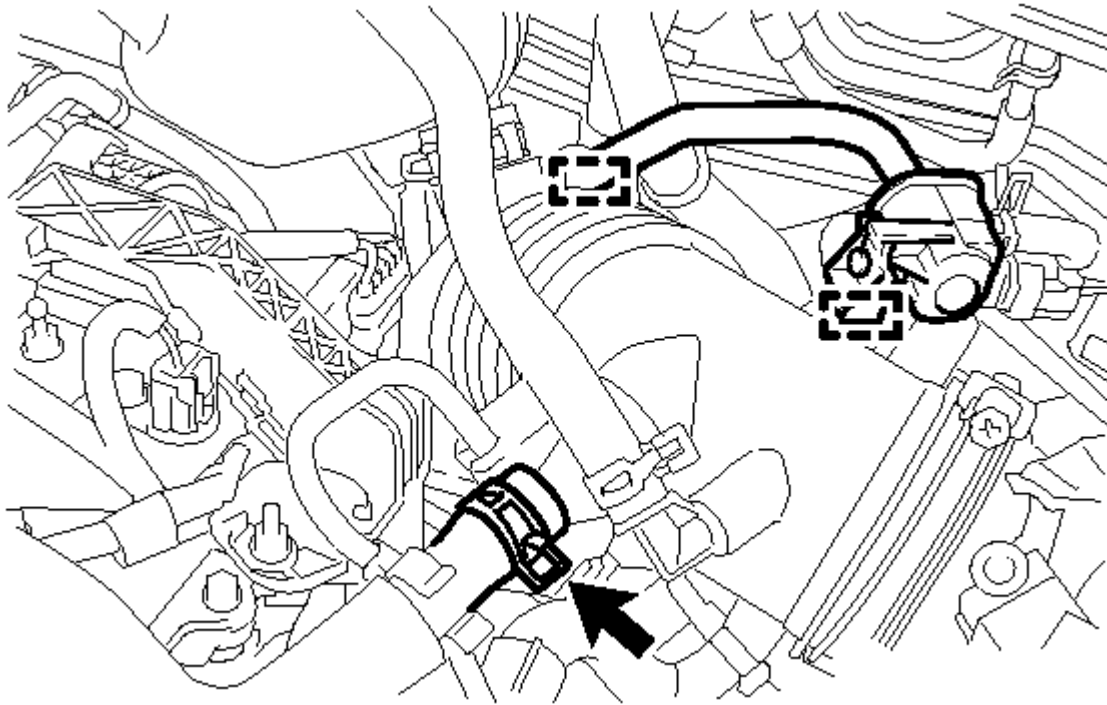


Fig. 4: Identifying No. 2 Fuel Vapor Feed Hose Clamp & No. 2 Vacuum Switching Valve Assembly

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

- c. Separate the No. 2 fuel vapor feed hose from the hose clamp.
- d. Separate the No. 2 vacuum switching valve assembly.
- e. Separate the vacuum hose from the hose clamp.

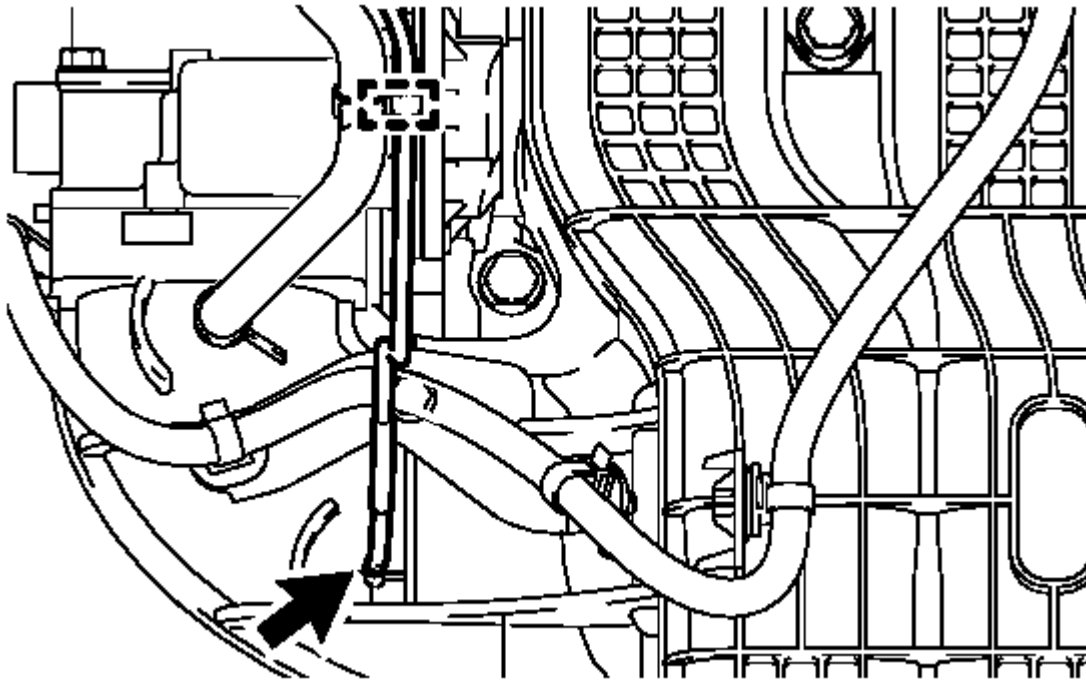


Fig. 5: Identifying Vacuum Hose & Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Disconnect the vacuum hose.
- g. Separate the vacuum hose from the 2 hose clamps.

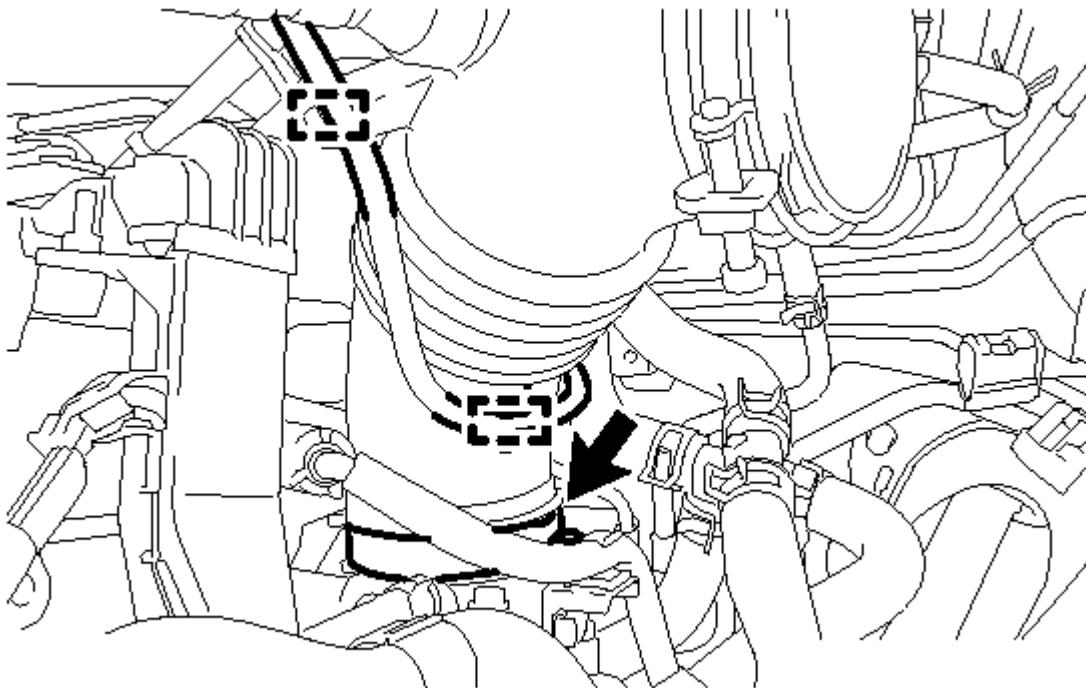


Fig. 6: Identifying Air Cleaner Hose & Clip

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

- h. Loosen the clip and remove the air cleaner hose.
- 4. **DISCONNECT WATER BY-PASS HOSE** . Refer to **REMOVAL - Step 9**
- 5. **DISCONNECT NO. 2 WATER BY-PASS HOSE** . Refer to **REMOVAL - Step 10**
- 6. **REMOVE THROTTLE WITH MOTOR BODY ASSEMBLY** . Refer to **REMOVAL - Step 11**
- 7. **DISCONNECT OUTLET HEATER WATER HOSE A**
 - a. Loosen the clip and disconnect the outlet heater water hose A.

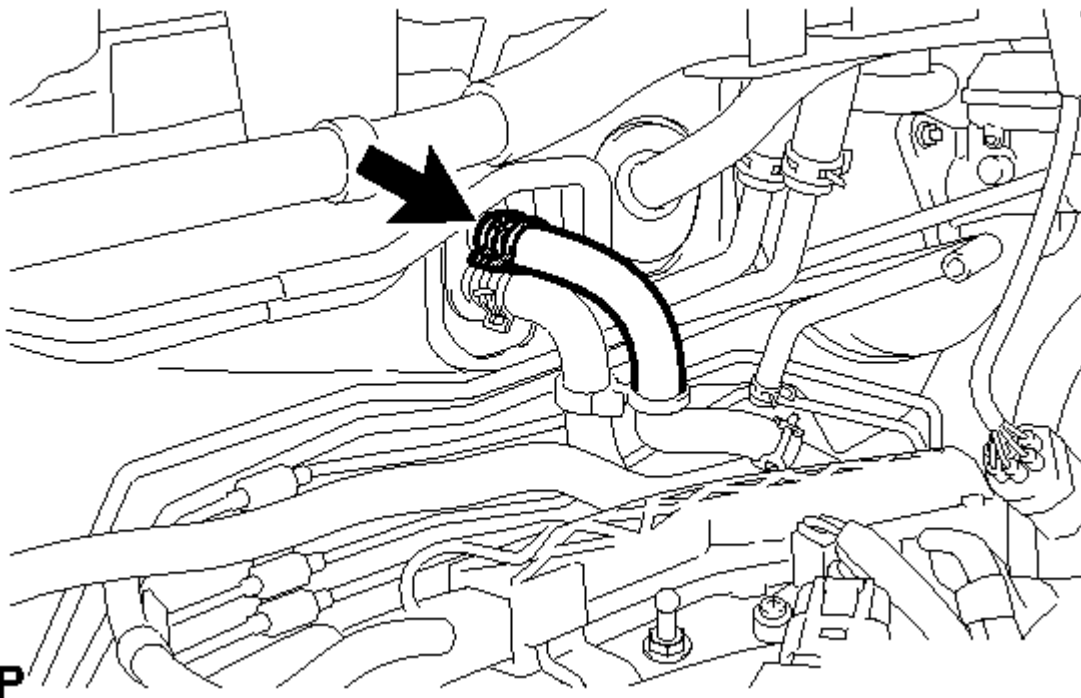


Fig. 7: Identifying Outlet Heater Water Hose A & Clip
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 8. **DISCONNECT INLET HEATER WATER HOSE A**
 - a. Loosen the clip and disconnect the inlet heater water hose A.

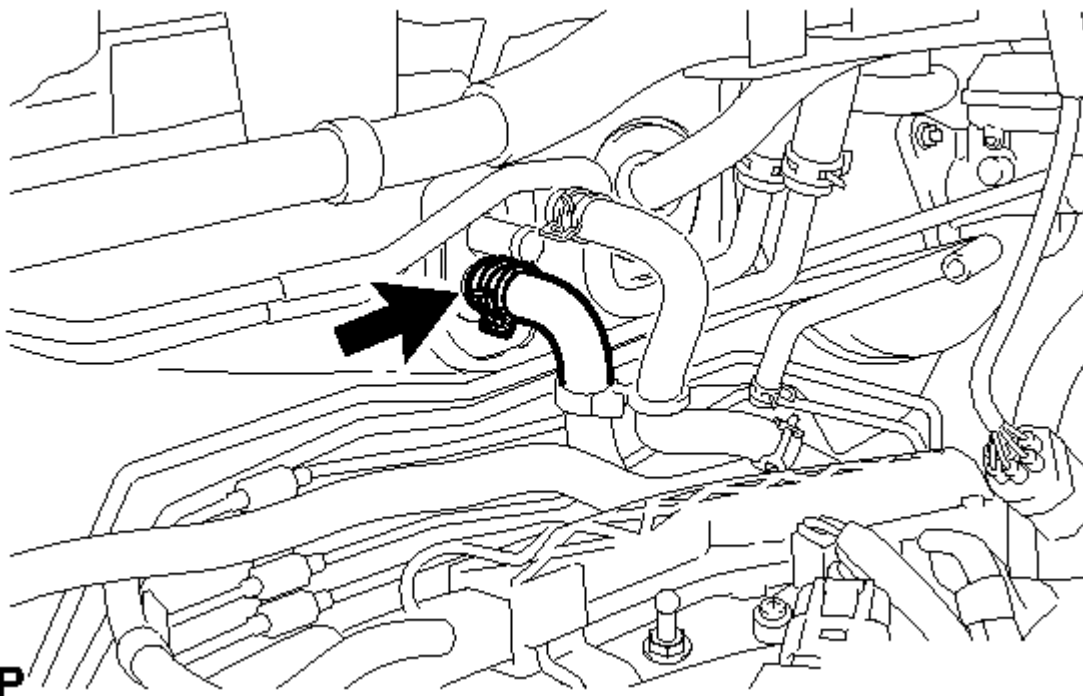


Fig. 8: Identifying Inlet Heater Water Hose A & Clip
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE VACUUM SWITCHING VALVE ASSEMBLY (for ACIS)
 - a. Disconnect the vacuum switching valve connector.

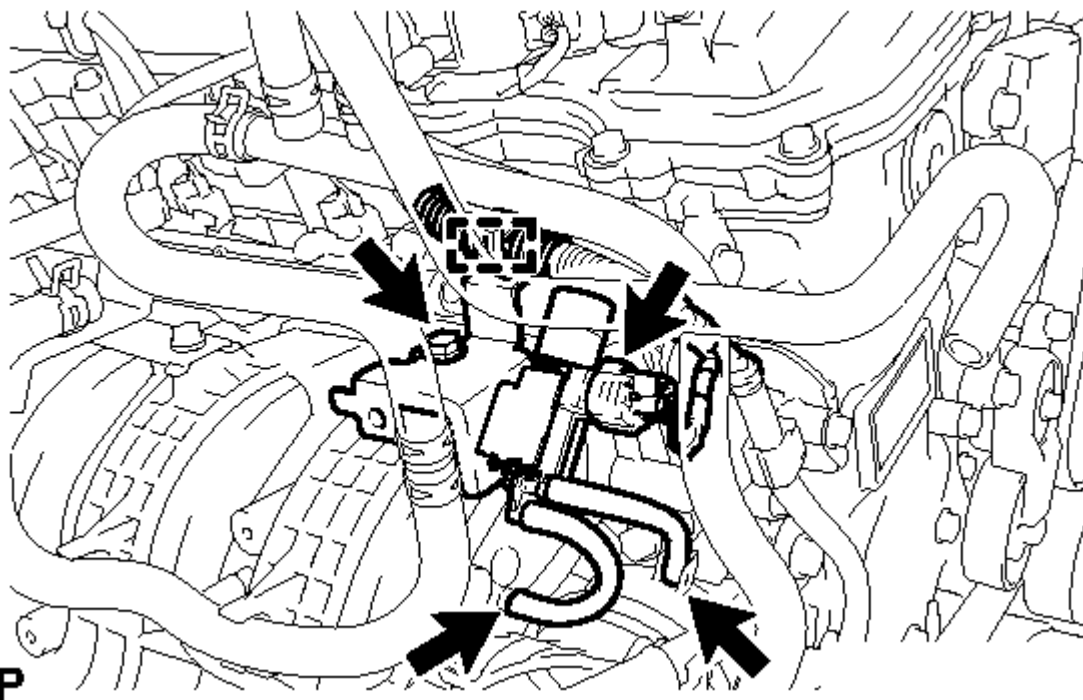


Fig. 9: Identifying Vacuum Switching Valve Connector, Wire Harness Clamp, Vacuum Hoses

& Fastener

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

- b. Disengage the wire harness clamp.
- c. Disconnect the 2 vacuum hoses.
- d. Remove the bolt and the vacuum switching valve assembly.

10. DISCONNECT NO. 2 VENTILATION HOSE

- a. Loosen the clip and disconnect the No. 2 ventilation hose.

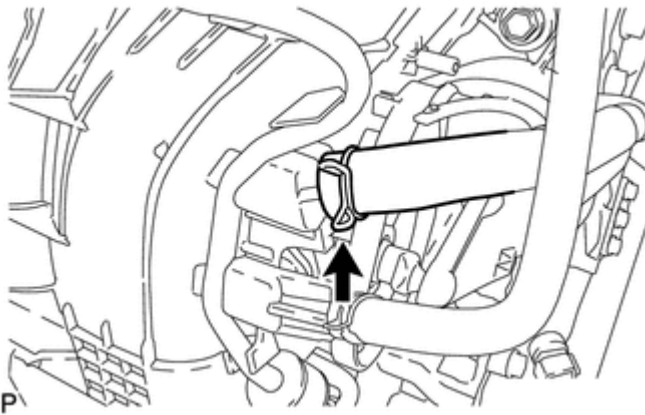


Fig. 10: Identifying No. 2 Ventilation Hose

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

11. DISCONNECT UNION TO CONNECTOR TUBE HOSE

- a. Loosen the clip and disconnect the union to connector tube hose.

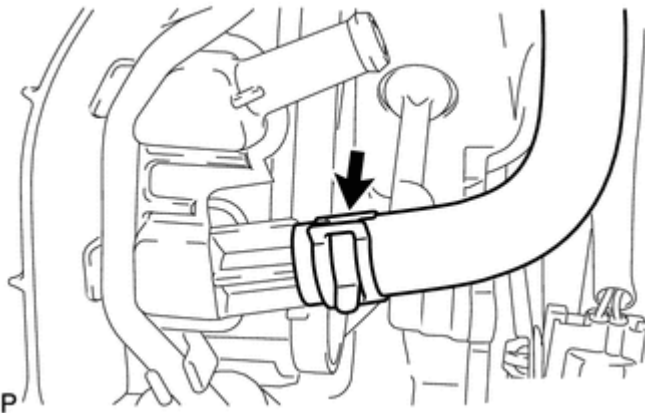


Fig. 11: Identifying Connector Tube Hose

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

12. REMOVE WIRE HARNESS CLAMP BRACKET

- a. Disconnect the sensor wire connector.

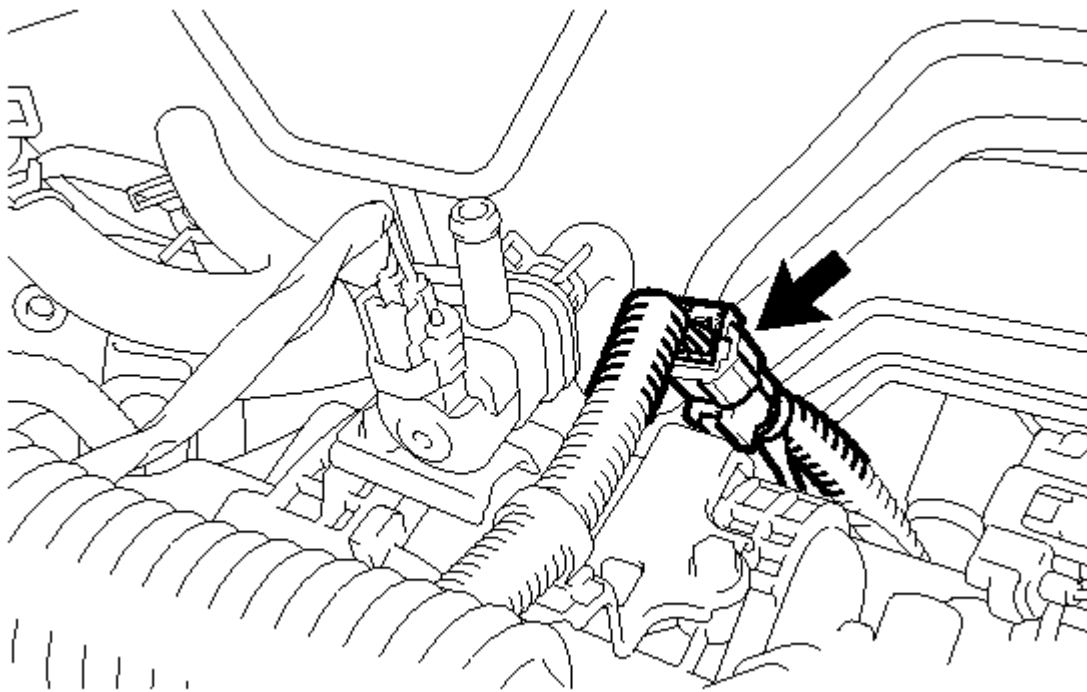


Fig. 12: Identifying Sensor Wire Harness Connector
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Apply battery voltage to the terminals of the connector to close the tumble control valves.

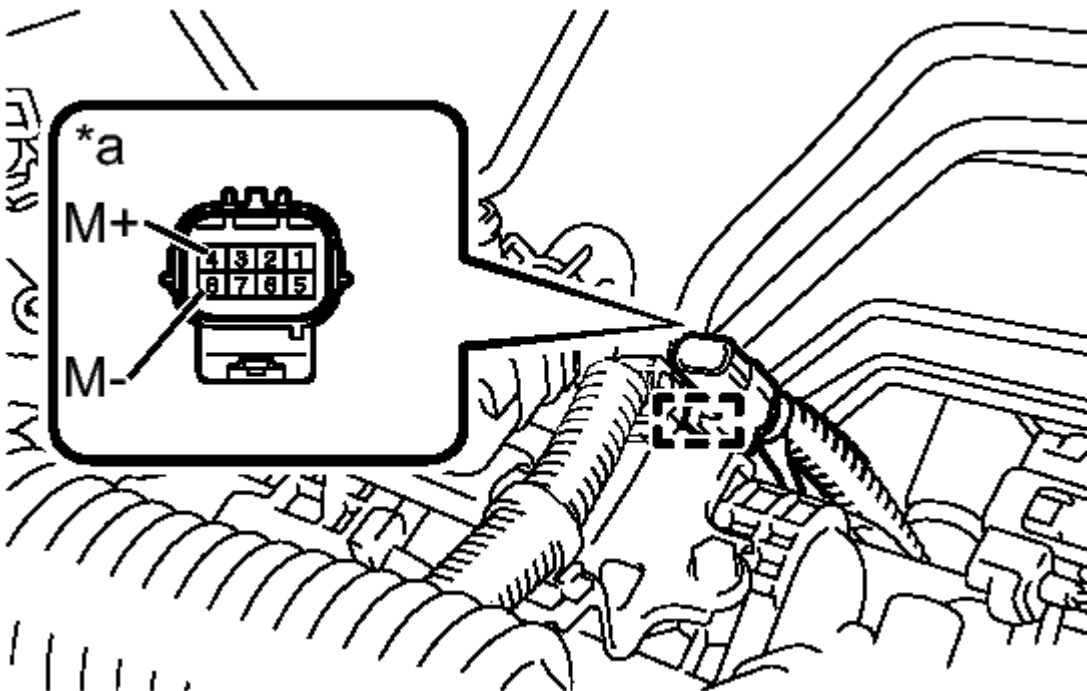


Fig. 13: Identifying Front View Of Sensor Wire Harness Connector
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

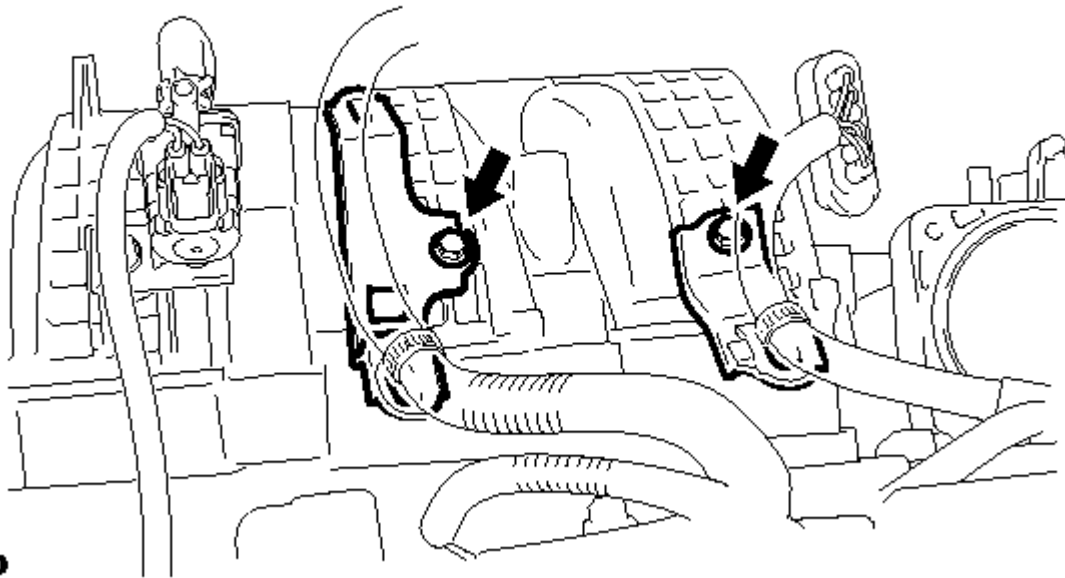
*a	Front view of wire harness connector (to Engine Wire)
----	--

OK

Measurement Condition	Specified Condition
Positive battery voltage applied to terminal 8 (M-) , and negative battery voltage applied to terminal 4 (M+)	Open --> Closed

NOTE:

- Confirm that the sound of the tumble control valves physically contacting the stopper can be heard.
 - If this procedure is not performed, the valves may be damaged when the intake manifold is removed.
 - Apply battery voltage for 1 to 3 seconds.
 - If battery voltage is applied for more than 3 seconds, the actuator may be damaged.
 - Do not allow the lead wires to contact the other terminals.
- c. Disengage the wire harness clamp.
- d. Remove the 2 bolts and the 2 wire harness clamp brackets.

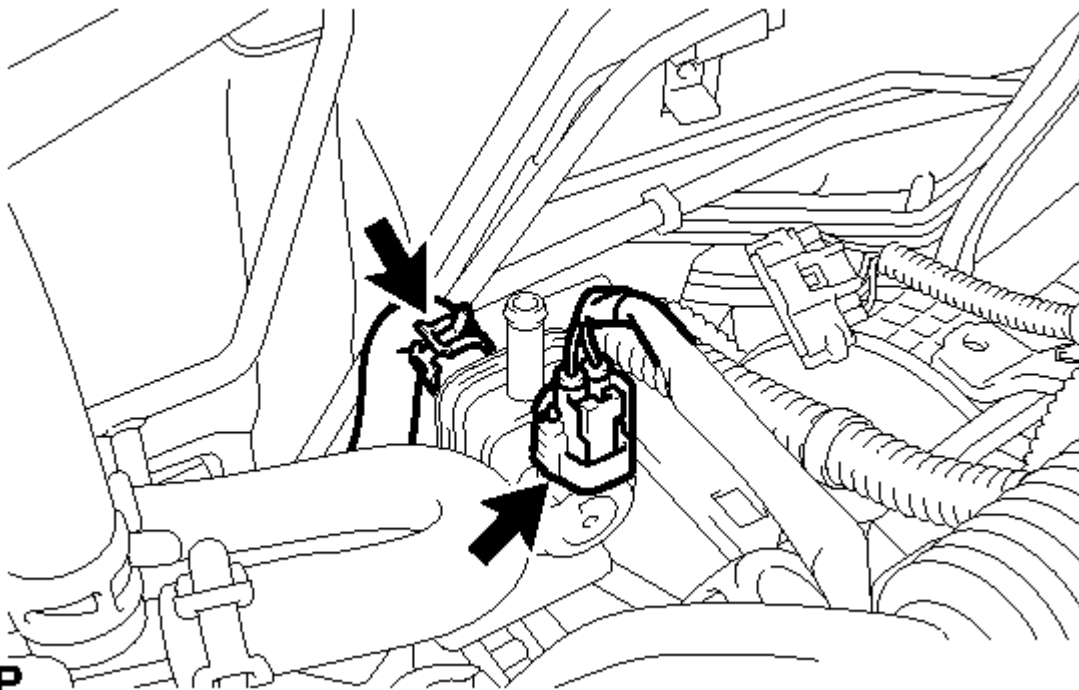


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Fig. 14: Identifying Wire Harness Clamp Brackets & Fasteners
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. REMOVE NO. 1 VACUUM SWITCHING VALVE ASSEMBLY

- a. Disconnect the No. 1 vacuum switching valve connector.



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Fig. 15: Identifying No. 1 Vacuum Switching Valve Assembly Connector & No. 2 Air Hose

Clip

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

- b. Loosen the clip and disconnect the No. 2 air hose.
- c. Remove the bolt and the No. 1 vacuum switching valve assembly.

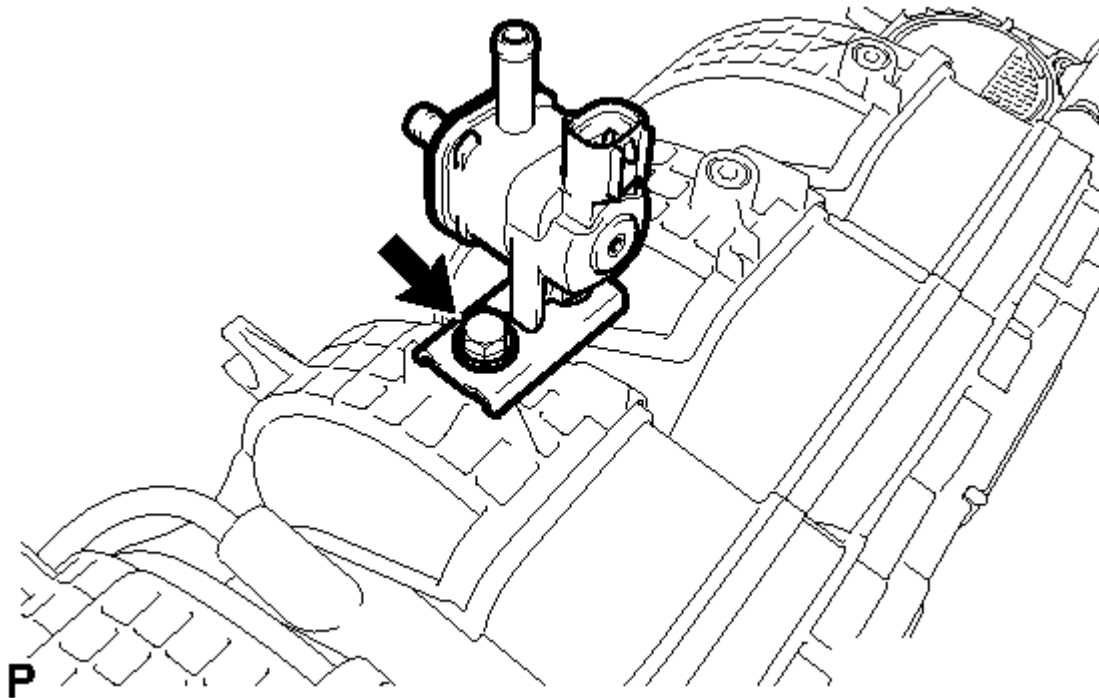


Fig. 16: Identifying No. 1 Vacuum Switching Valve Assembly & Fastener
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 14. **REMOVE EFI FUEL PIPE CLAMP** . Refer to **REMOVAL - Step 8**
- 15. **DISCONNECT FUEL TUBE SUB-ASSEMBLY**
 - a. Pinch the retainer to release it as shown in the illustration and disconnect the fuel tube. Refer to **PRECAUTION** .

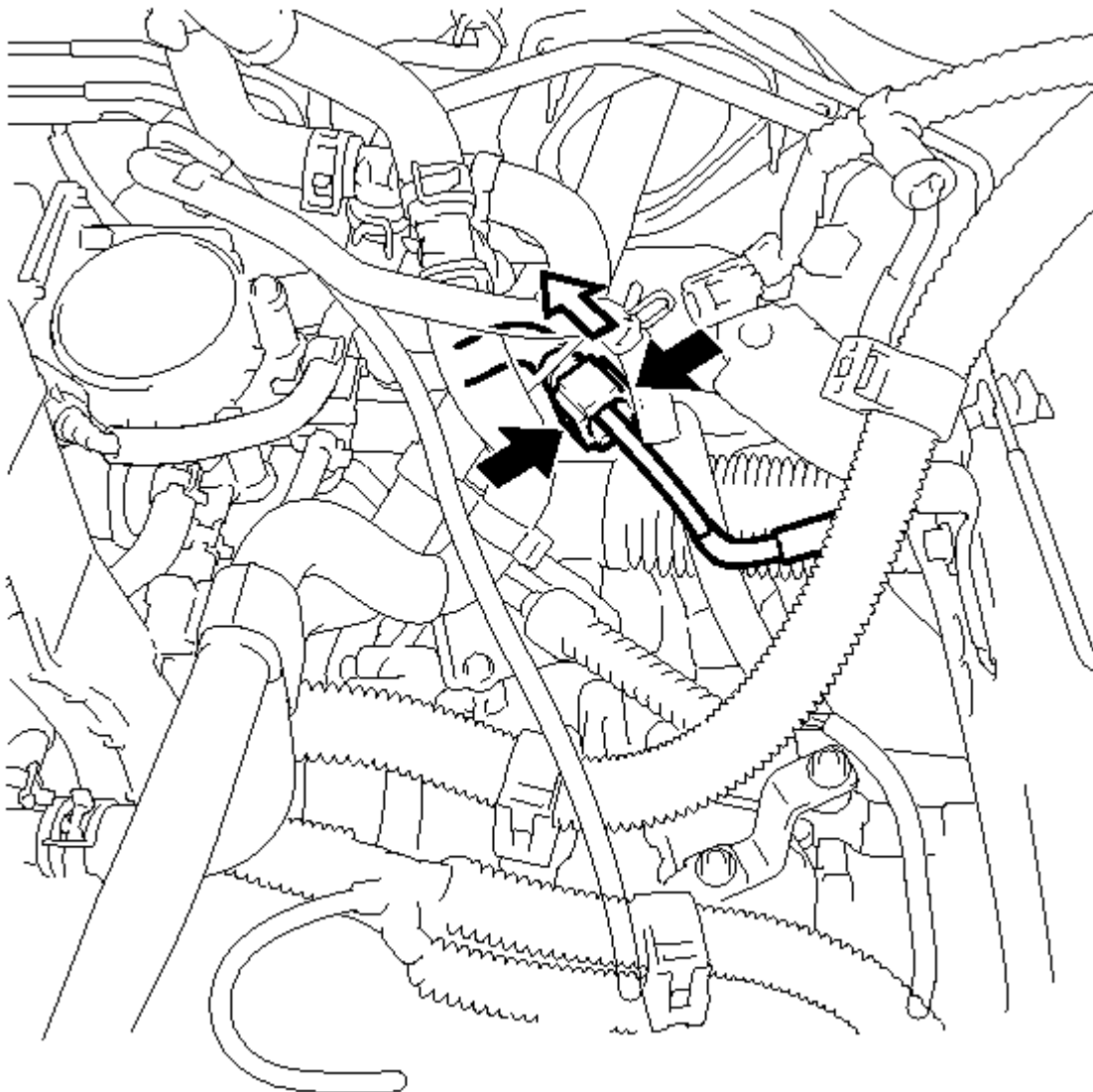


Fig. 17: Removing Fuel Tube Sub-Assembly Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

Pinch
Pull
Out

NOTE:

- Check for dirt or other foreign matter on the parts to be disconnected and clean them if necessary.
- The fuel tube connector seals with an O-ring. Ensure that there is no damage or foreign matter on the contact surface.
- If the connector and the pipe are stuck, push and pull on the connector to release them while pinching the retainer. Pull the connector out of the pipe carefully.

- Do not use any tools.
- Do not bend or twist the tubes.
- Protect the contact surface by covering it with a plastic bag.

16. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY

- a. Disconnect the 4 fuel injector connectors.

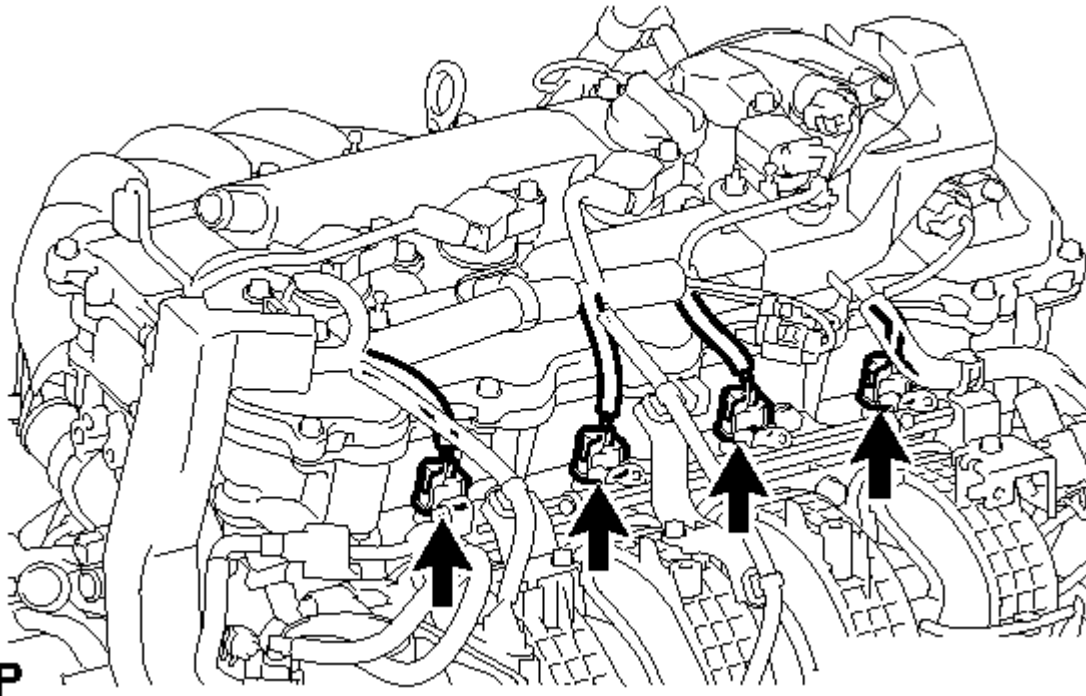


Fig. 18: Identifying Injector Connectors

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

- b. Remove the 2 bolts, and then remove the fuel delivery pipe together with the 4 fuel injectors.

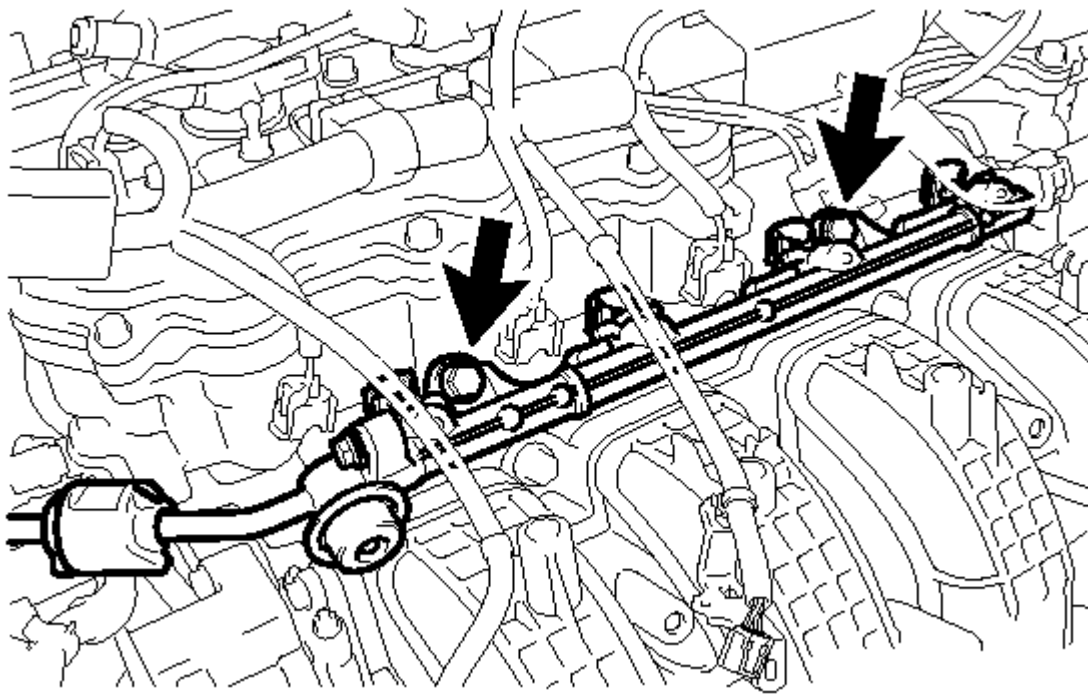


Fig. 19: Identifying Fuel Delivery Pipe Sub-Assembly Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be careful not to drop the fuel injectors when removing the fuel delivery pipe.

- c. Remove the 2 fuel delivery spacers from the cylinder head.

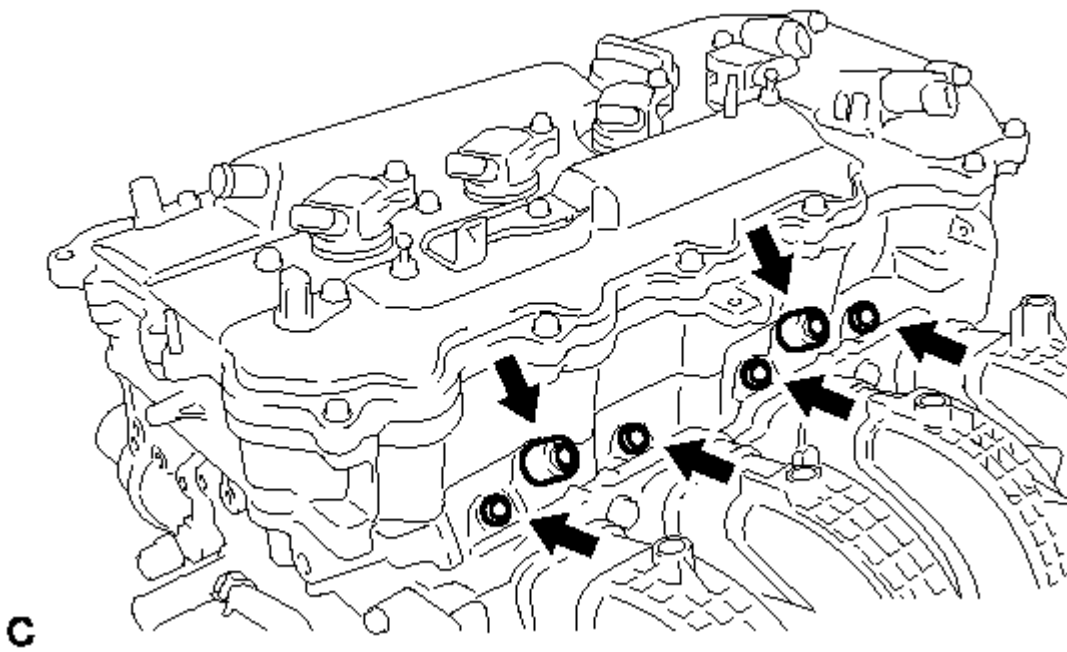


Fig. 20: Identifying Fuel Delivery Spacers And Injector Vibration Insulators
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Remove the 4 injector vibration insulators from the cylinder head.

17. REMOVE INTAKE MANIFOLD

- a. Disengage the 3 wire harness clamps and separate the wire harness.

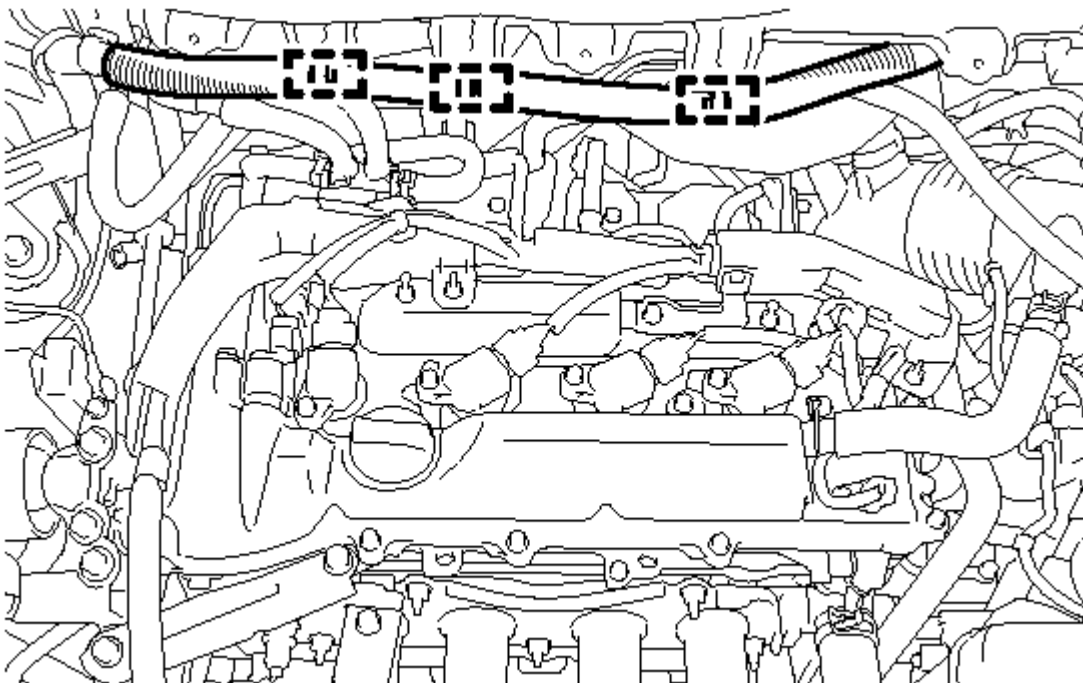
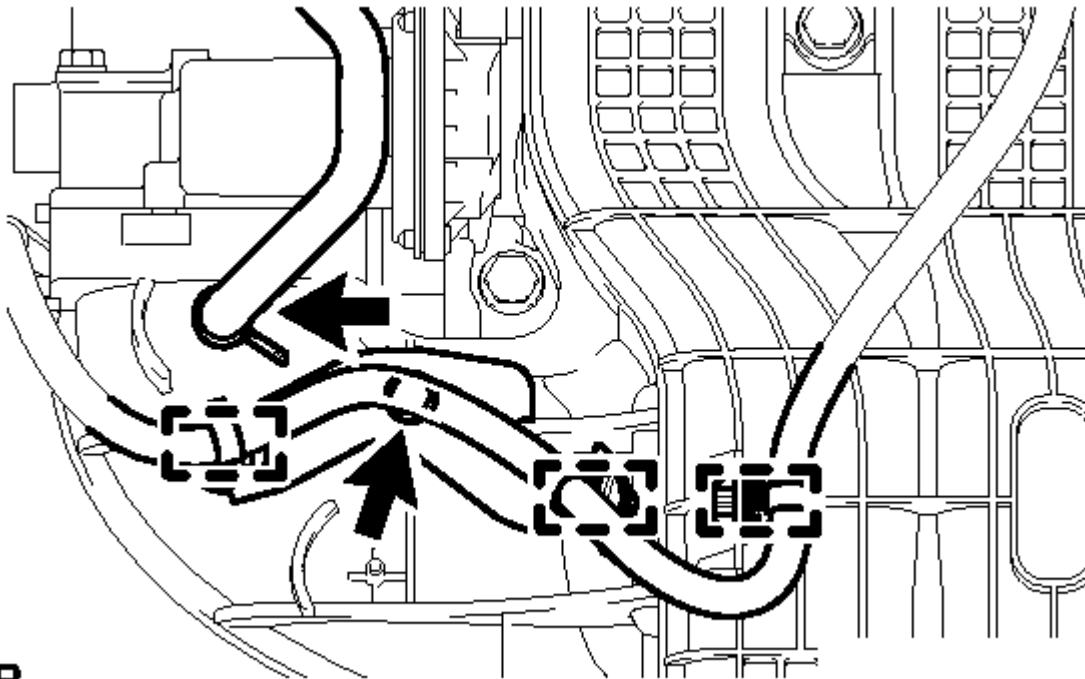


Fig. 21: Identifying Intake Manifold Wire Harness & Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

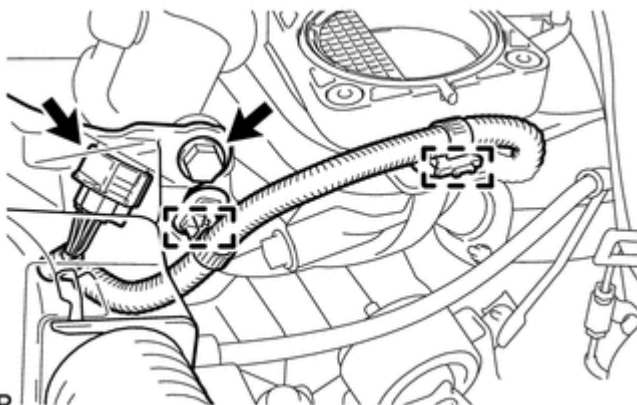
- b. Loosen the clip and disconnect the fuel vapor feed hose.



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Fig. 22: Identifying Wire Harness Clamps, Bracket & Fastener
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

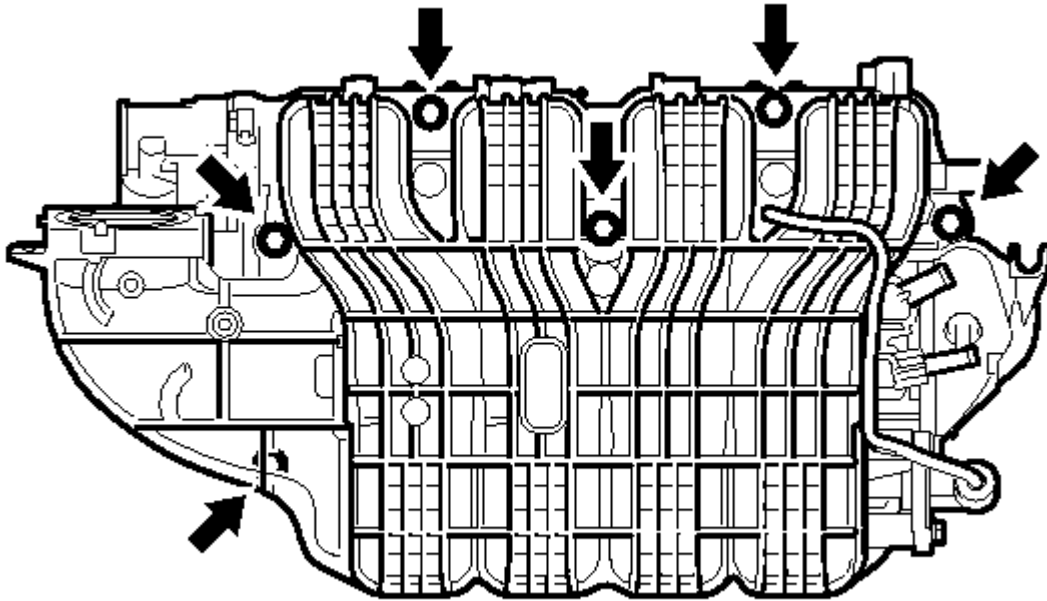
- c. Disengage the 3 wire harness clamps and separate the wire harness.
- d. Remove the bolt and the wire harness clamp bracket.
- e. Remove the bolt and disengage the 2 clamps.



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Fig. 23: Identifying Intake Air Control Valve Actuator Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Disconnect the intake air control valve actuator connector.
- g. Remove the 6 bolts and the intake manifold.



C

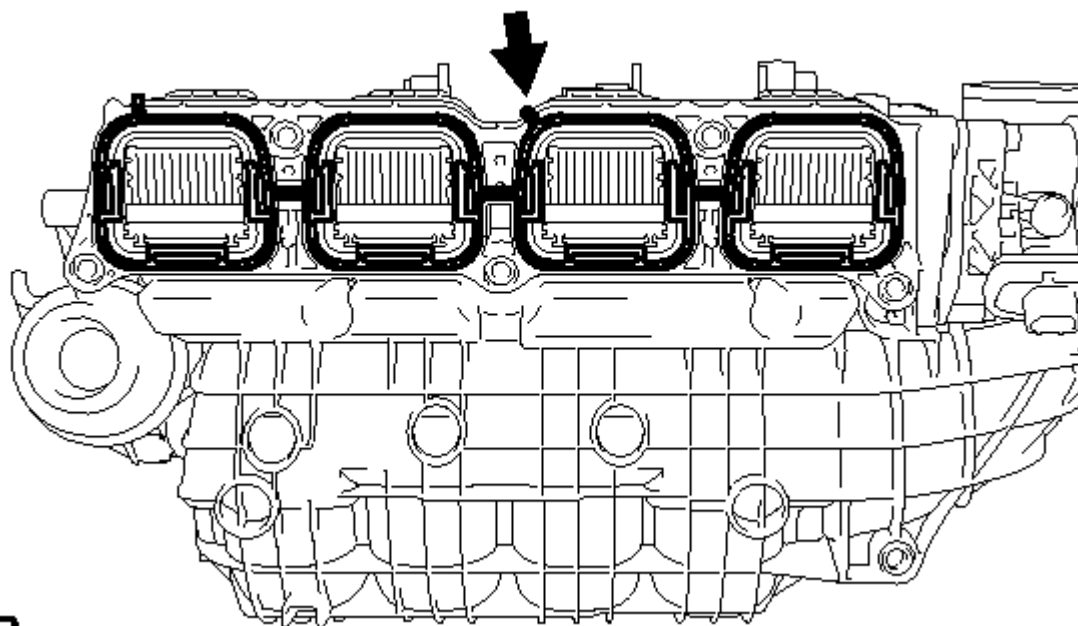
Fig. 24: Identifying Bolts And Intake Manifold

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

NOTE:

- The valves may be damaged if they are not closed before removing the intake manifold.
- When removing the intake manifold, be sure to remove the intake manifold slowly while confirming that the tumble control valves remain in the closed position.
- When the intake manifold has been removed, open the tumble control valves and keep them at a partially open position so that they do not protrude beyond the edge of the intake manifold.

- h. Remove the intake manifold gasket from the intake manifold.



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Fig. 25: Identifying Gasket And Intake Manifold

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

18. REMOVE NO. 1 CHECK VALVE

- a. Separate the vacuum hose from the 2 hose clamps.

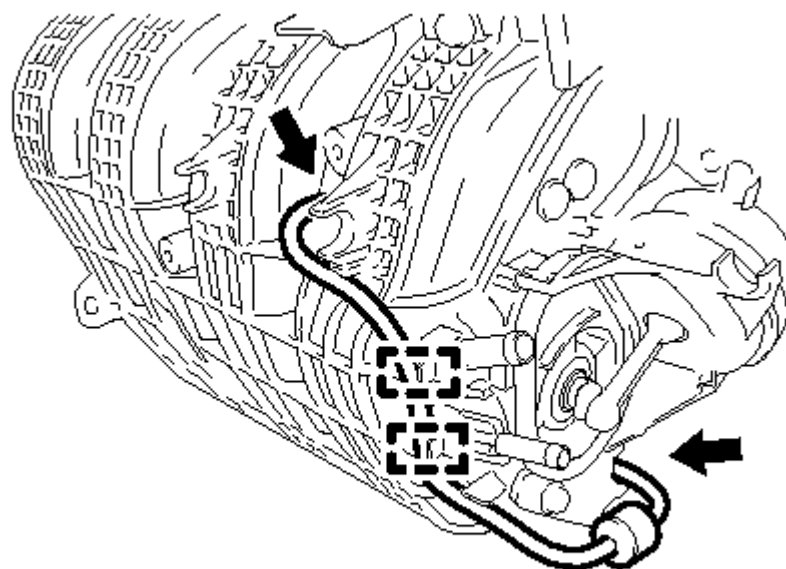


Fig. 26: Identifying No. 1 Check Valve Hose & Clamps

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

- b. Disconnect the 2 vacuum hoses and remove the No. 1 check valve.

19. REMOVE WIRE HARNESS CLAMP BRACKET

- a. Remove the bolt and the wire harness clamp bracket.

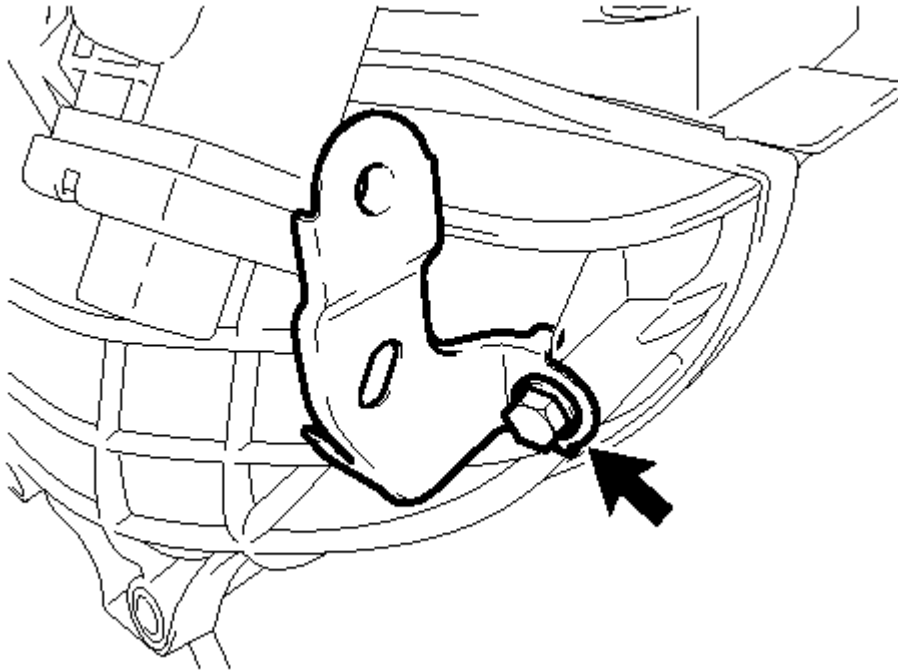
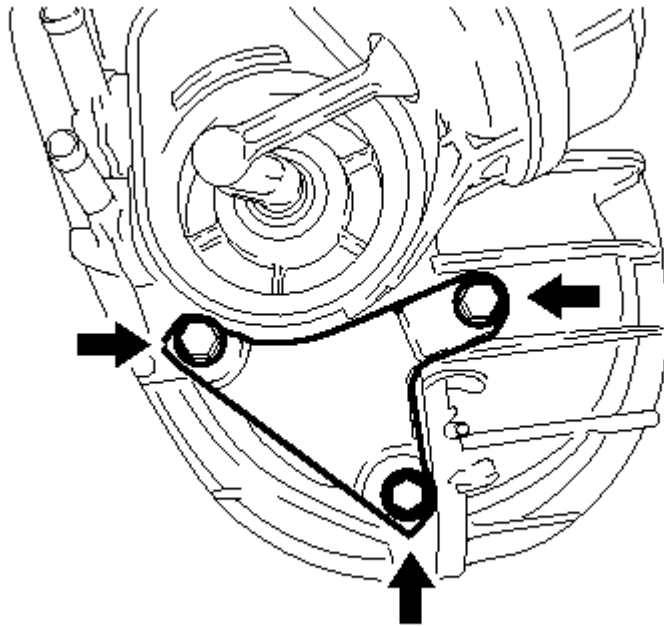


Fig. 27: Identifying Wire Harness Clamp Bracket & Fastener
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. REMOVE ENGINE MOUNTING DAMPER

- a. Remove the 3 bolts and the engine mounting damper.



C

Fig. 28: Identifying Engine Mounting Damper Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

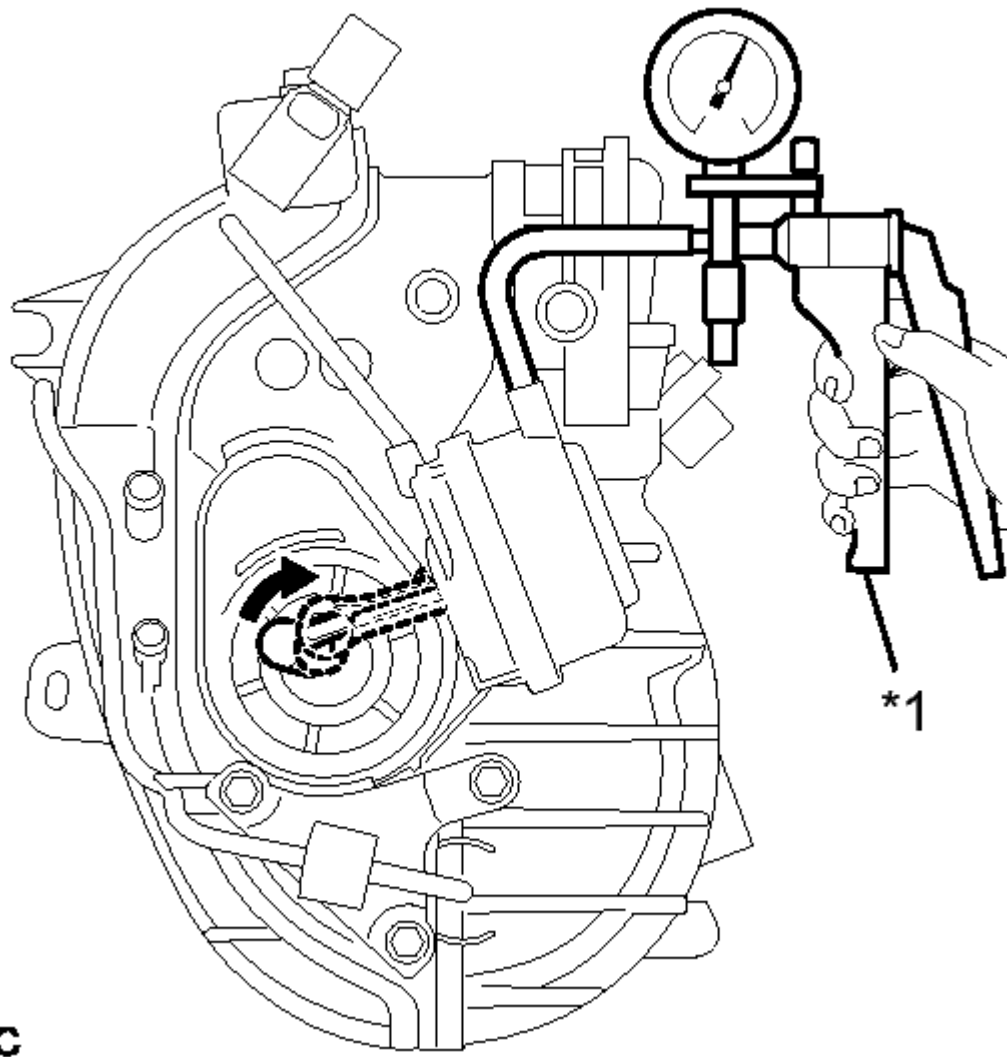
INSPECTION

INSPECTION

1. INSPECT INTAKE AIR CONTROL VALVE (for ACIS)

a. Inspect the diaphragm.

1. Using a vacuum pump, apply a vacuum of 60 kPa (450 mmHg, 17.7 in.Hg) or higher to the diaphragm chamber. Wait for 1 minute and check that the needle of the vacuum pump does not lower.



C
Fig. 29: Inspecting Intake Air Control Valve Using A Vacuum Pump (For ACIS)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Vacuum Pump
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If the result is not as specified, replace the intake manifold.

- b. After applying vacuum in the step above, check that the actuator rod operates.
2. **INSPECT VACUUM TANK AND NO. 1 CHECK VALVE**
 - a. Disconnect the vacuum hose from the No. 1 check valve.
 - b. Using a vacuum pump, apply vacuum to the check valve. Wait 1 minute and check that the needle of the vacuum pump does not lower.

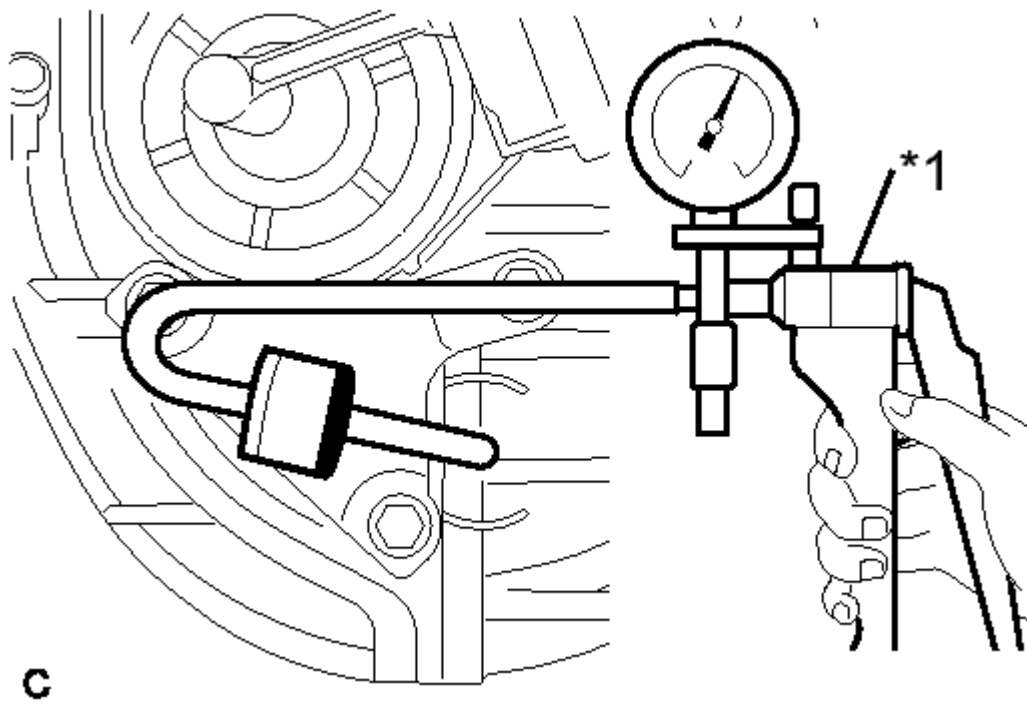


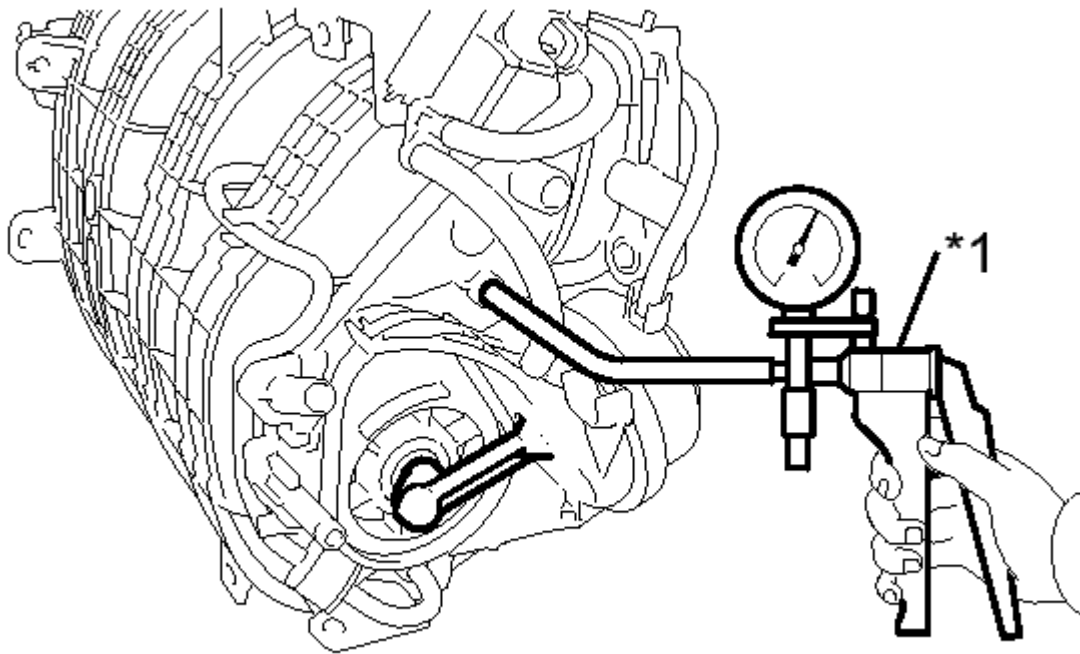
Fig. 30: Inspecting Vacuum Tank & No. 1 Check Valve Operation Using A Vacuum Pump
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Vacuum Pump
----	----------------

If the result is not as specified, replace the No. 1 check valve.

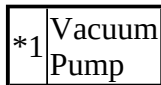
- c. Connect the vacuum hose to the No. 1 check valve.
- d. Using a vacuum pump, apply a vacuum of 60 kPa (450 mmHg, 17.7 in.Hg) or higher to the vacuum tank. Wait 1 minute and check that the needle of the vacuum pump does not lower.



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Fig. 31: Inspecting Vacuum Tank & No. 1 Check Valve Operation Using A Vacuum Pump
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION



If the result is not as specified, replace the intake manifold.

INSTALLATION

INSTALLATION

1. INSTALL ENGINE MOUNTING DAMPER

- a. Install the engine mounting damper to the intake manifold with the 3 bolts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

2. INSTALL WIRE HARNESS CLAMP BRACKET

- a. Install the wire harness clamp bracket to the intake manifold with the bolt.

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

3. INSTALL NO. 1 CHECK VALVE

- a. Connect the 2 vacuum hoses to the intake manifold.
- b. Check that the No. 1 check valve is installed as shown in the illustration.

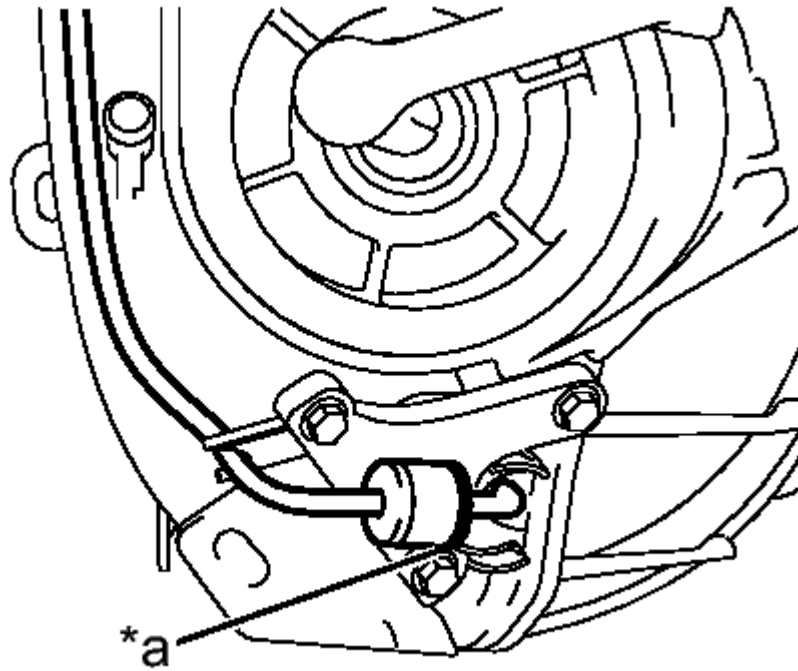


Fig. 32: Inspecting No. 1 Check Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a Black

- c. Install the vacuum hose to the 2 hose clamps.
4. **INSTALL INTAKE MANIFOLD**
- a. Close the tumble control valves. Refer to **ON-VEHICLE INSPECTION - Step 3** .

*a

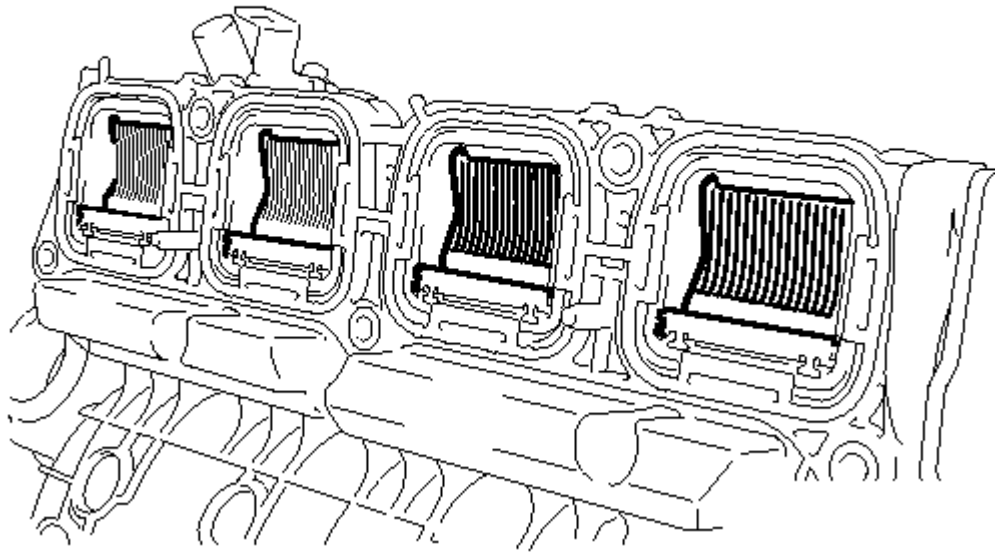


Fig. 33: Identifying Intake Manifold Valves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	Closed
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NOTE: The valves may be damaged if they are not closed before installing the intake manifold.

- b. Install a new gasket onto the intake manifold.
- c. Temporarily tighten the 6 bolts to the intake manifold.

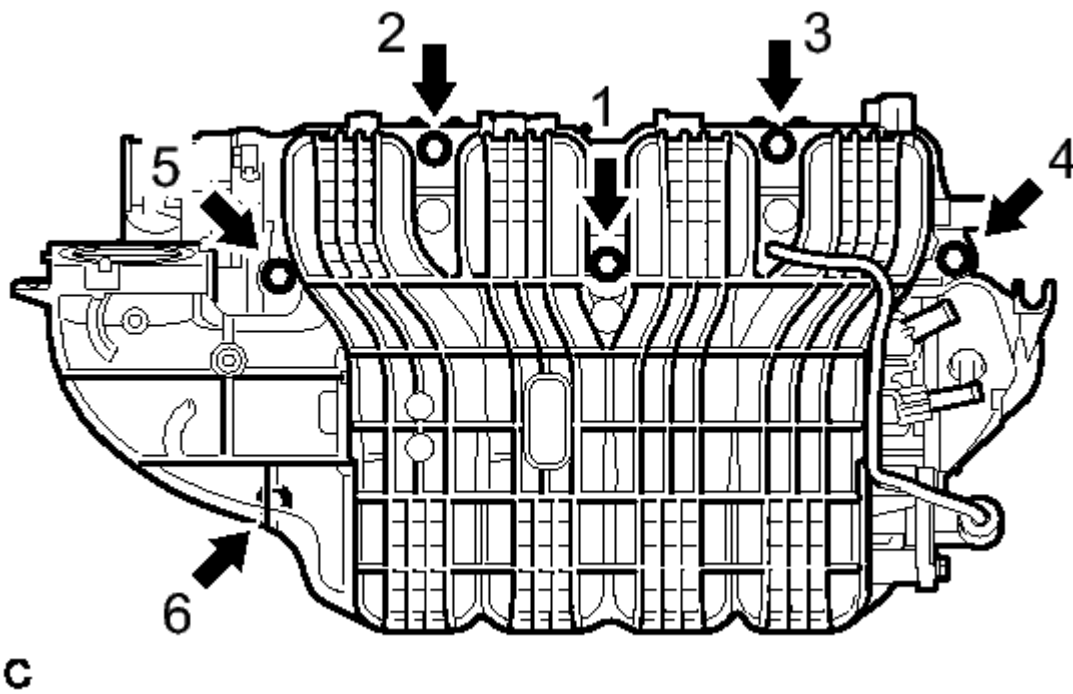


Fig. 34: Identifying Intake Manifold And Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Tighten the 6 bolts in the order shown in the illustration.

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

- e. Connect the intake air control valve actuator connector.
- f. Engage the 2 clamps to the intake manifold.
- g. Install the wire harness clamp bracket with the bolt.

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

- h. Install the wire harness clamp bracket with the bolt.

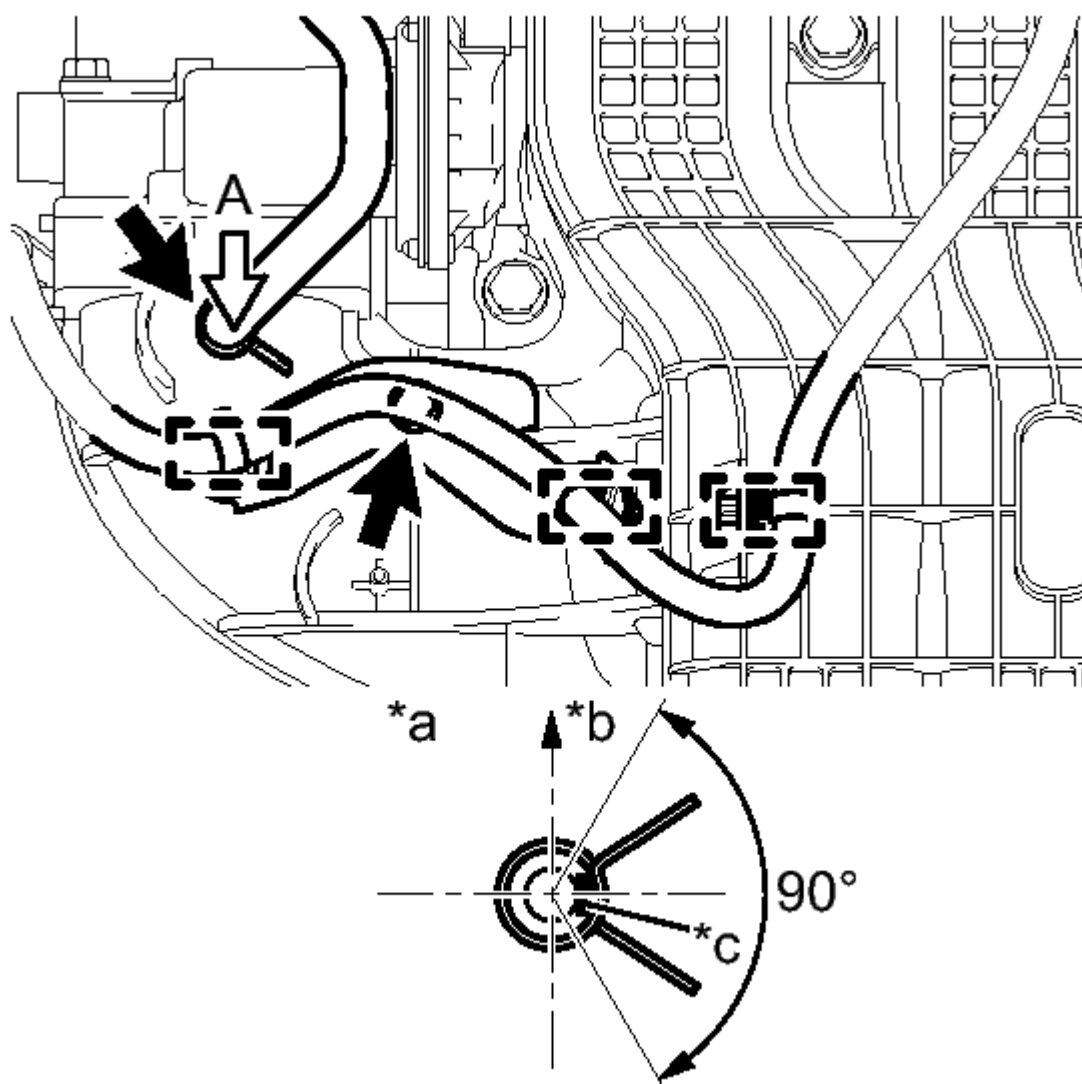


Fig. 35: Identifying Wire Harness Clamps, Bracket/Fastener & Fuel Vapor Hose
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

- i. Engage the 3 wire harness clamps.
- j. Connect the fuel vapor feed hose with the clip.

TEXT IN ILLUSTRATION

*a	View A
*b	Upper
*c	Paint Mark

HINT:

Connect the hose so that the direction of the hose clip is as indicated in the illustration.

- k. Engage the 3 wire harness clamps.

5. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY

- a. Install 4 new injector vibration insulators to the cylinder head.

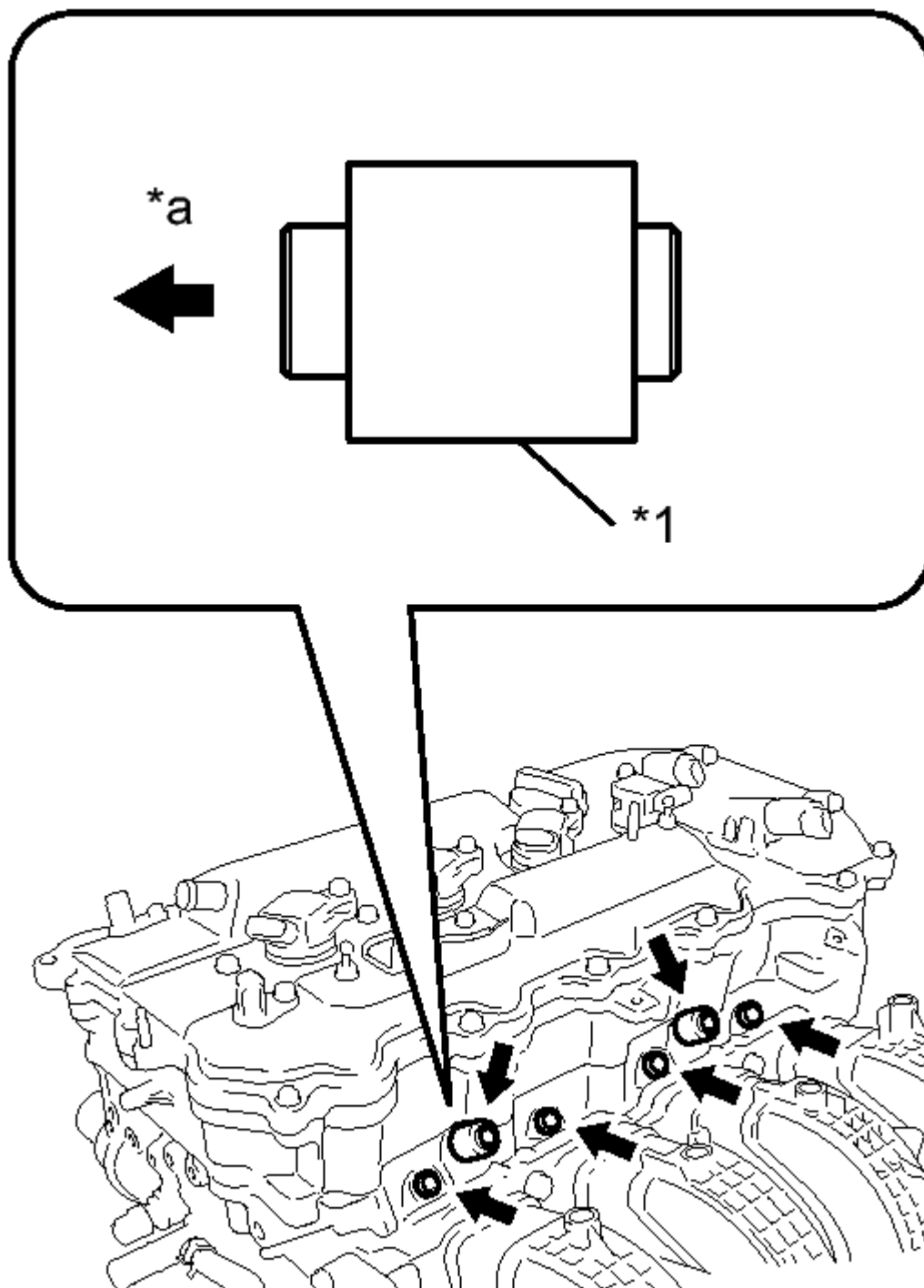


Fig. 36: Identifying Fuel Delivery Spacers & Injector Vibration Insulators At Cylinder Head
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

Fuel

*1	Delivery Spacer
*a	Cylinder Head Side

- b. Install the 2 fuel delivery spacers onto the cylinder head.

HINT:

Install the fuel delivery spacer so that the longer protrusion is on the cylinder head side.

- c. Install the fuel delivery pipe together with the 4 fuel injectors to the cylinder head, and then temporarily install the 2 bolts.

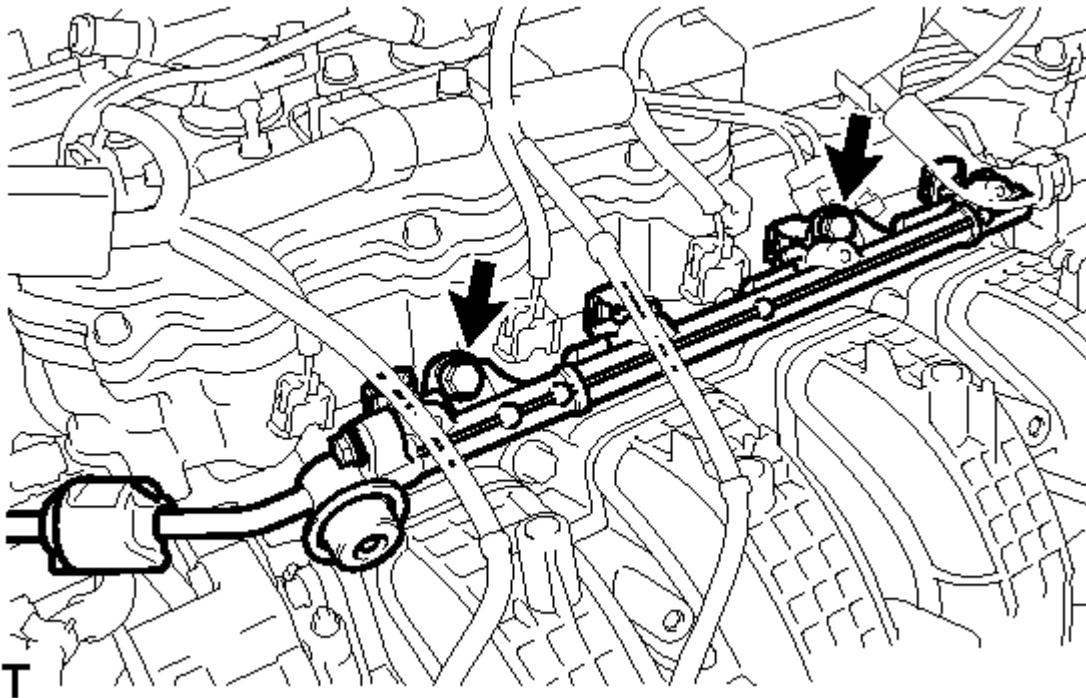


Fig. 37: Identifying Fuel Delivery Pipe Bolts

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

NOTE:

- Be careful not to drop the fuel injectors when installing the fuel delivery pipe.
- After installing the fuel injectors, check that they turn smoothly. If not, reinstall the injectors with new O-rings.

- d. Tighten the 2 bolts to the specified torque.

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

e. Connect the 4 fuel injector connectors.

6. CONNECT FUEL TUBE SUB-ASSEMBLY

a. Line up the pipe and connector and push them together until a "click" sound is heard. Refer to **PRECAUTION** .

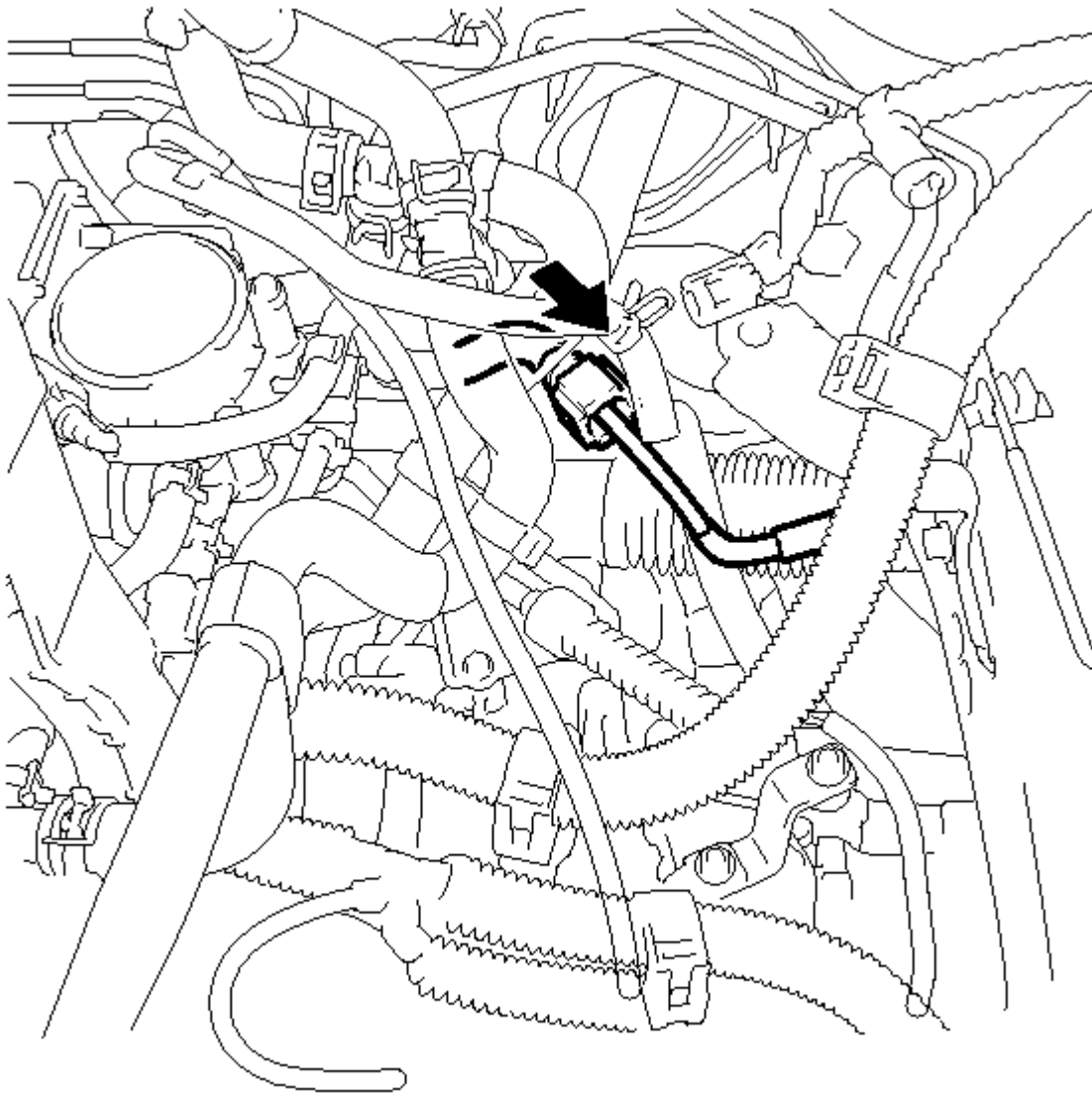


Fig. 38: Installing Fuel Tube Sub-Assembly

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

TEXT IN ILLUSTRATION

Push

NOTE:

- Check that there are no scratches or foreign objects on the connecting part.
- Check that the tube is inserted securely.

- Check that the tube is securely connected by pulling on it.

7. **INSTALL EFI FUEL PIPE CLAMP** . Refer to INSTALLATION - Step 7

8. **INSTALL NO. 1 VACUUM SWITCHING VALVE ASSEMBLY**

- Install the No. 1 vacuum switching valve assembly to the intake manifold with the bolt.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

- Connect the No. 2 air hose with the clip.

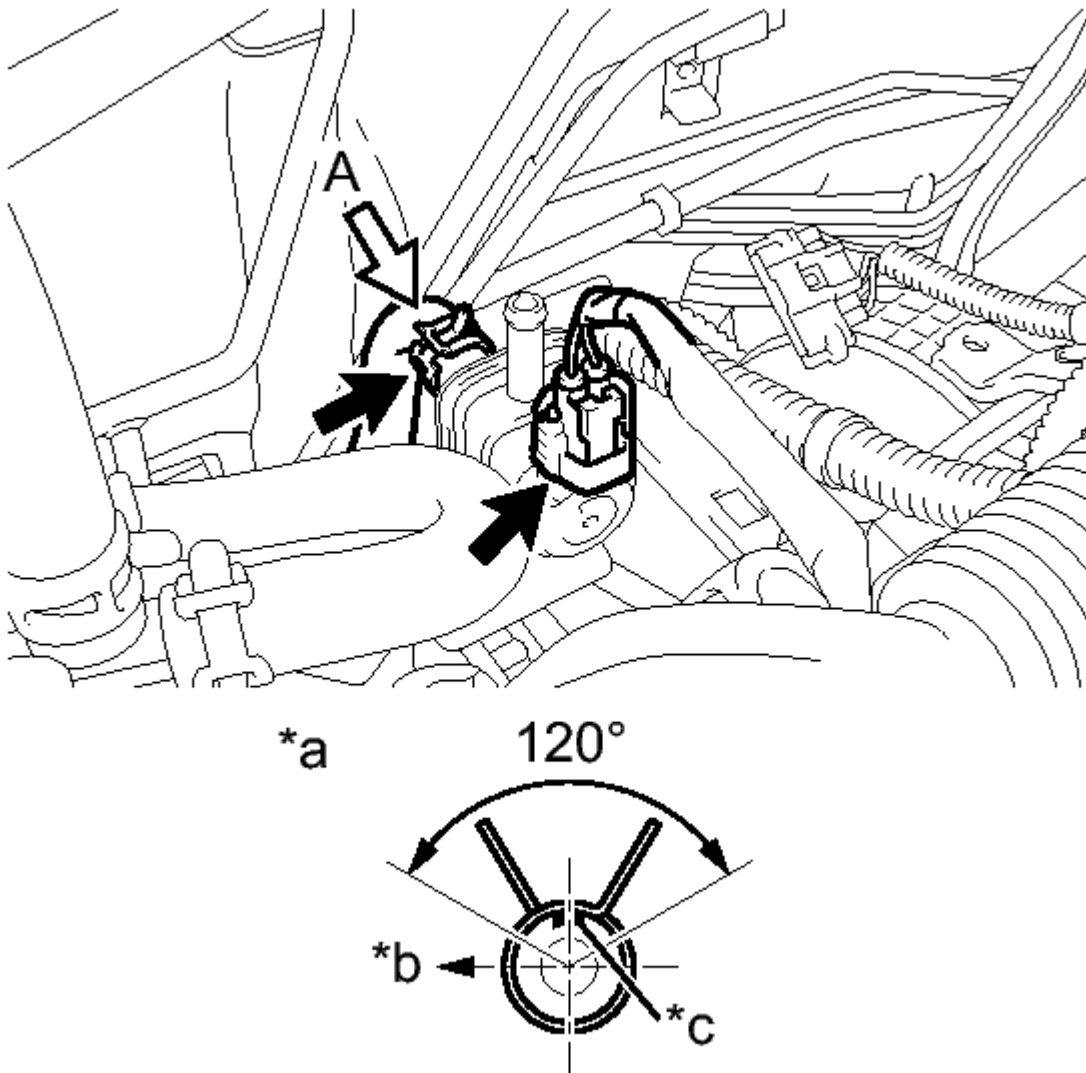


Fig. 39: Installing No. 1 Vacuum Switching Valve Assembly & No. 2 Air Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

View

*a	A
*b	LH
*c	Paint Mark

HINT:

Connect the hose so that the direction of the hose clip is as indicated in the illustration.

- c. Connect the No. 1 vacuum switching valve connector.

9. INSTALL WIRE HARNESS CLAMP BRACKET

- a. Install the 2 wire harness clamp brackets to the intake manifold with the 2 bolts.

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

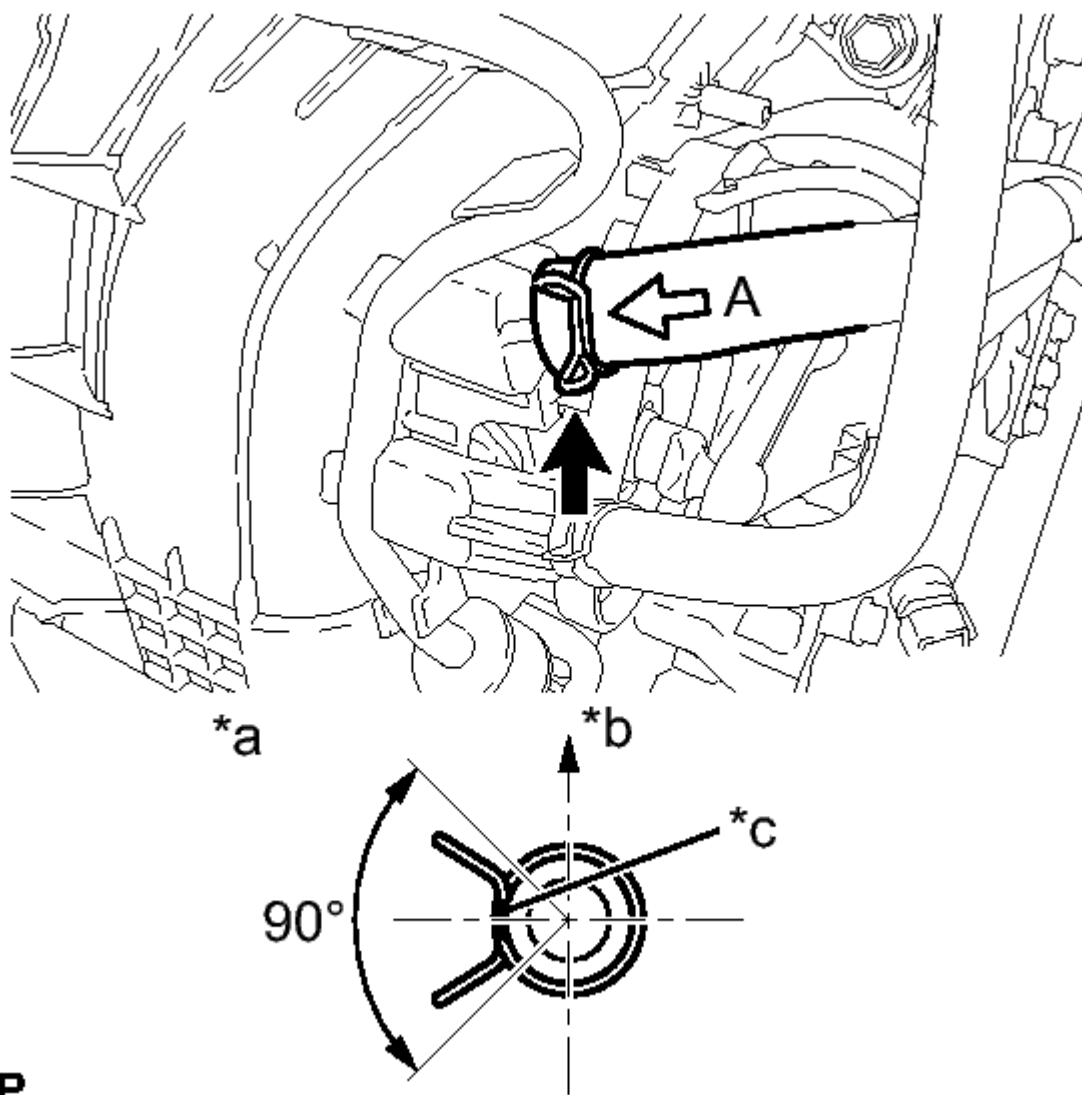
- b. Engage the wire harness clamp to the wire harness clamp bracket.
- c. Connect the sensor wire connector.

10. CONNECT UNION TO CONNECTOR TUBE HOSE

- a. Connect the union to connector tube hose to the intake manifold with the clip.

11. CONNECT NO. 2 VENTILATION HOSE

- a. Connect the No. 2 ventilation hose with the clip.



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Fig. 40: Installing No. 2 Ventilation Hose & Fastener
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	View A
*b	Upper
*c	Paint Mark

HINT:

Connect the hose so that the direction of the hose clip is as indicated in the illustration.

12. INSTALL VACUUM SWITCHING VALVE ASSEMBLY (for ACIS)

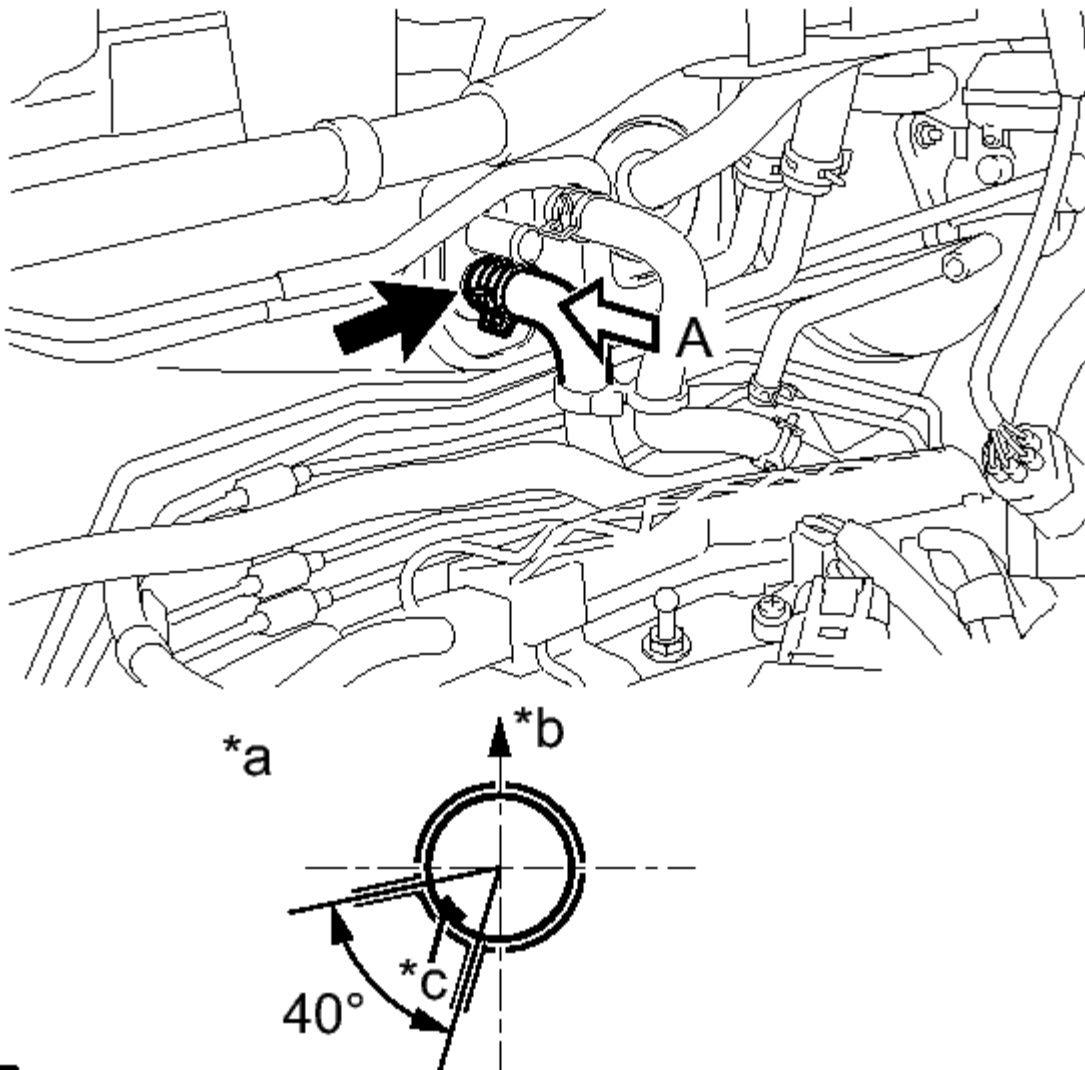
- a. Install the vacuum switching valve assembly to the intake manifold with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

- b. Connect the 2 vacuum hoses to the intake manifold.
- c. Engage the wire harness clamp to the vacuum switching valve assembly.
- d. Connect the vacuum switching valve connector.

13. INSTALL INLET HEATER WATER HOSE A

- a. Connect the inlet heater water hose A with the clip.



P

Fig. 41: Installing Inlet Heater Water Hose A & Fastener
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

View

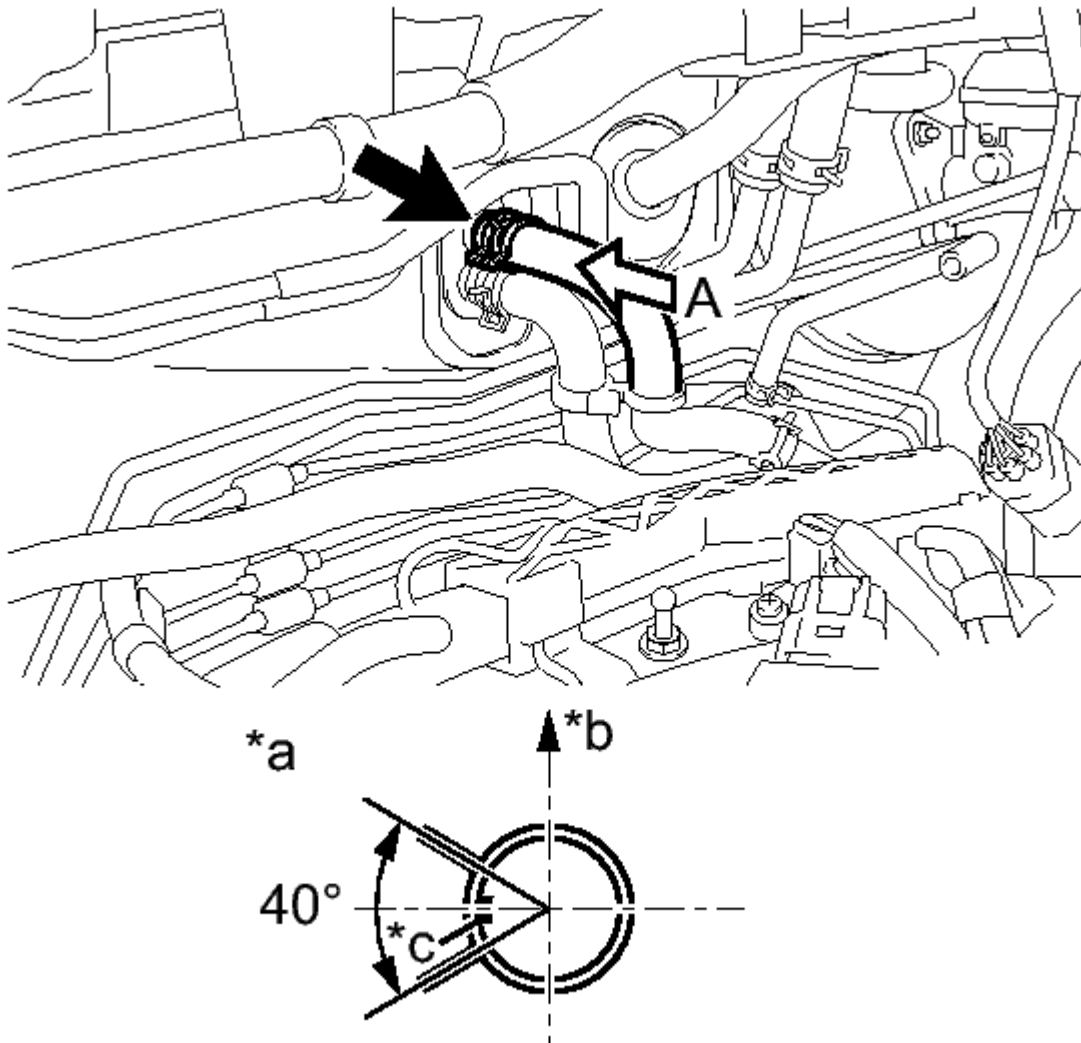
*a	A
*b	Upper
*c	Paint Mark

HINT:

Connect the hose so that the direction of the hose clip is as indicated in the illustration.

14. INSTALL OUTLET HEATER WATER HOSE A

- a. Connect the outlet heater water hose A with the clip.



P

Fig. 42: Installing Outlet Heater Water Hose A & Fastener
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

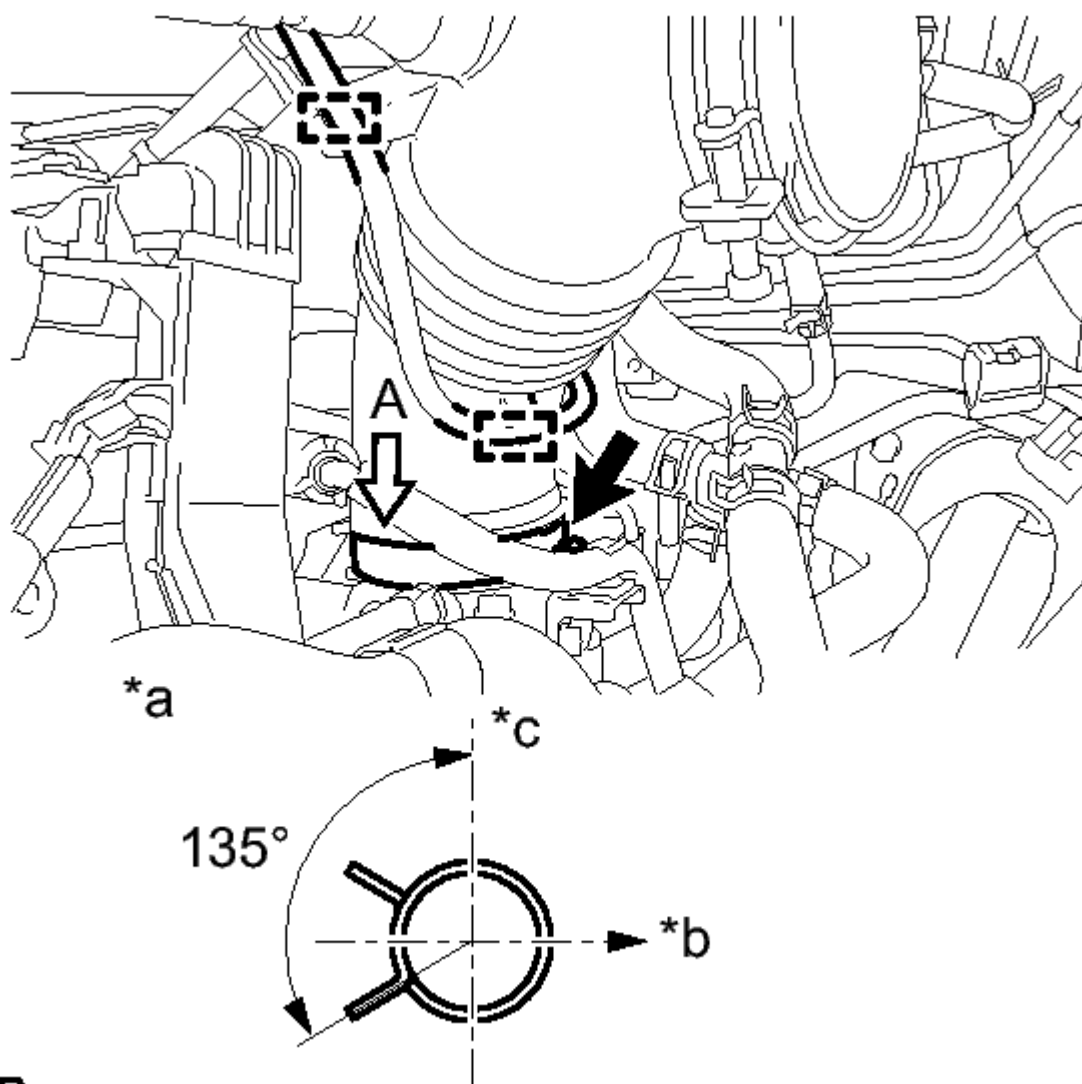
TEXT IN ILLUSTRATION

*a	View A
*b	Upper
*c	Paint Mark

HINT:

Connect the hose so that the direction of the hose clip is as indicated in the illustration.

15. **INSTALL THROTTLE WITH MOTOR BODY ASSEMBLY** . Refer to **INSTALLATION - Step 1**
16. **CONNECT NO. 2 WATER BY-PASS HOSE** . Refer to **INSTALLATION - Step 2**
17. **CONNECT WATER BY-PASS HOSE** . Refer to **INSTALLATION - Step 3**
18. **INSTALL AIR CLEANER HOSE**
 - a. Install the air cleaner hose with the clip.



P

Fig. 43: Installing Air Cleaner Hose & Fasteners
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

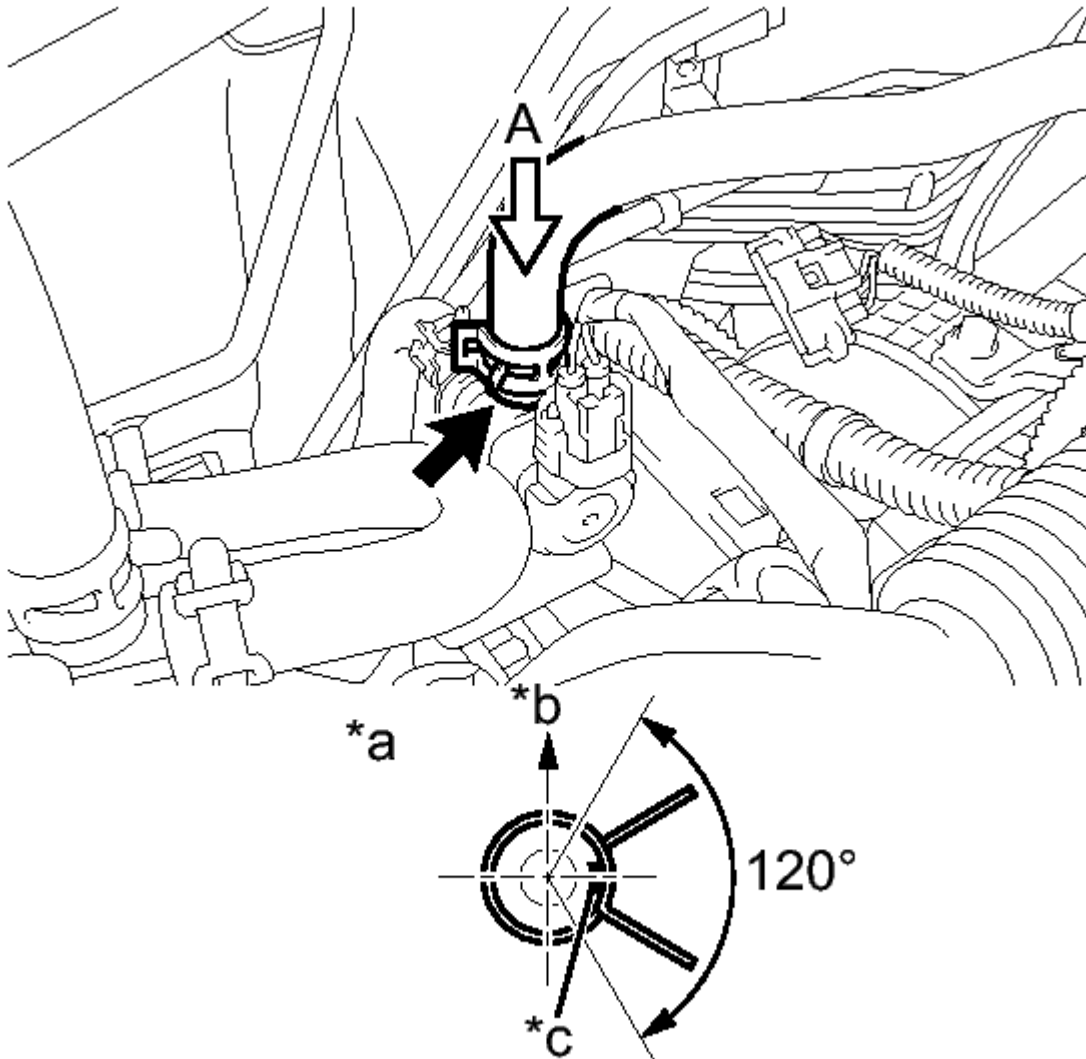
*a	View A
*b	Front of Vehicle
*c	LH

HINT:

Connect the hose so that the direction of the hose clip is as indicated in the illustration.

- b. Install the vacuum hose to the 2 hose clamps.

- c. Connect the vacuum hose.
- d. Install the vacuum hose to the hose clamp.
- e. Install the No. 2 vacuum switching valve assembly to the air cleaner hose.
- f. Install the No. 2 fuel vapor feed hose to the hose clamp.
- g. Connect the ventilation hose assembly to the air cleaner hose with the clip.
- h. Connect the No. 1 air hose with the clip.



P

Fig. 44: Installing No. 1 Air Hose & Fastener
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	View A
	Front

*b	of Vehicle
*c	Paint Mark

19. INSTALL AIR CLEANER ASSEMBLY

Refer to INSTALLATION

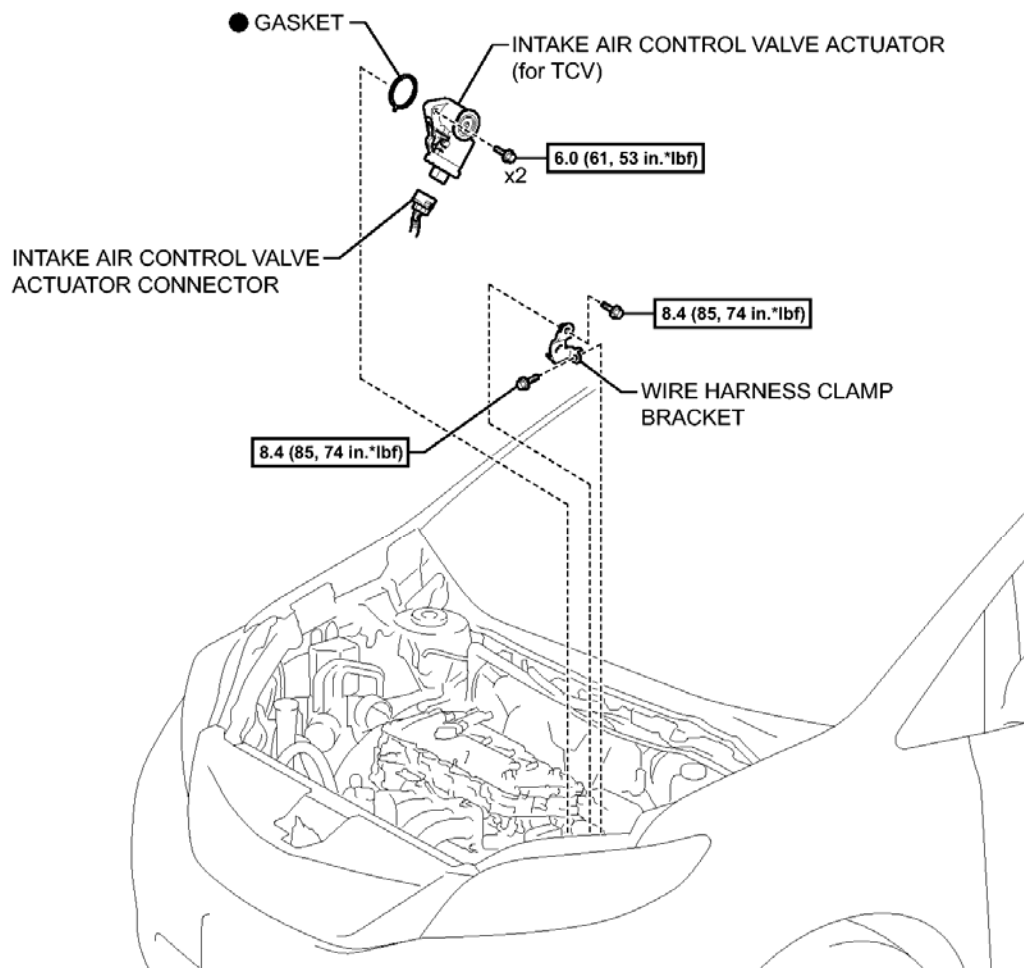
20. INSPECT FOR FUEL LEAK

Refer to ON-VEHICLE INSPECTION - Step 1

INTAKE AIR CONTROL VALVE ACTUATOR (FOR TCV)

COMPONENTS

ILLUSTRATION



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

P

Fig. 45: Intake Air Control Valve Actuator Replacement Components With Torque Specifications
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. REMOVE THROTTLE WITH MOTOR BODY ASSEMBLY

Refer to **REMOVAL**

2. REMOVE INTAKE AIR CONTROL VALVE ACTUATOR (for TCV)

- a. Remove the 2 bolts.

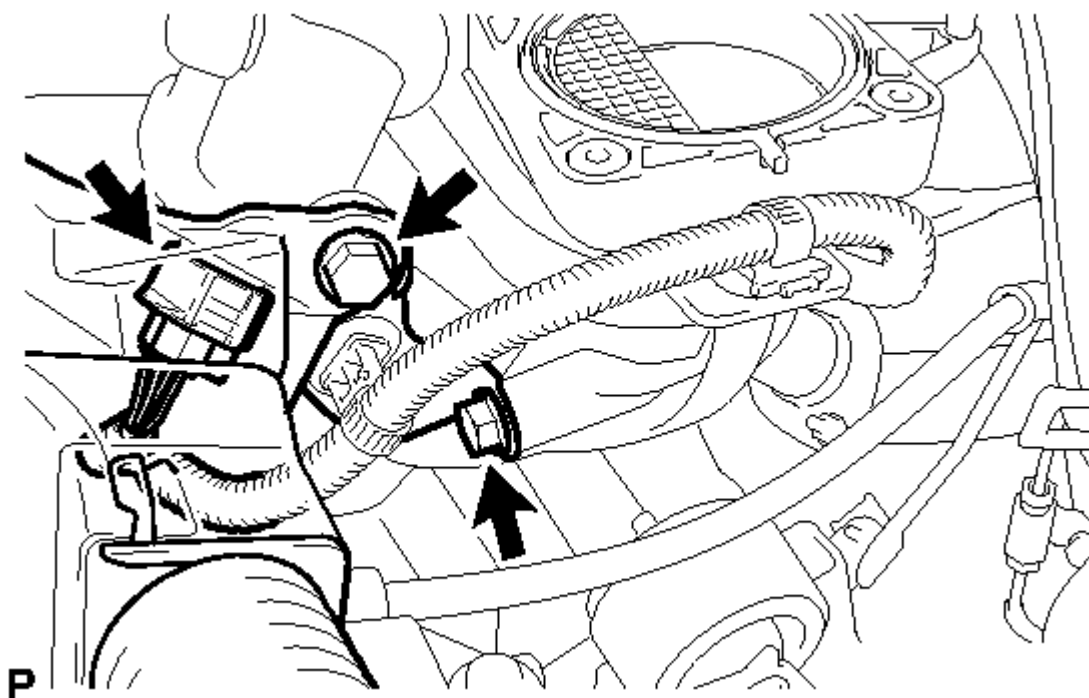


Fig. 46: Identifying Intake Air Control Valve Actuator Connector & Fasteners (For TCV)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Disconnect the intake air control valve actuator connector.
- c. Remove the 2 bolts and the intake air control valve actuator.

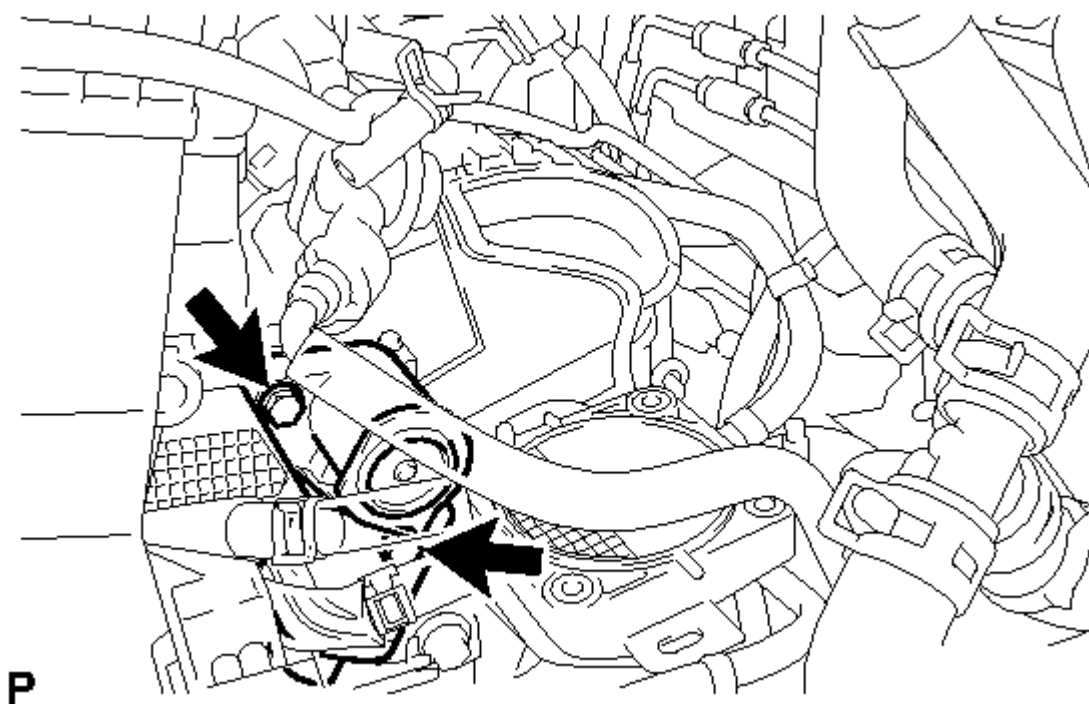


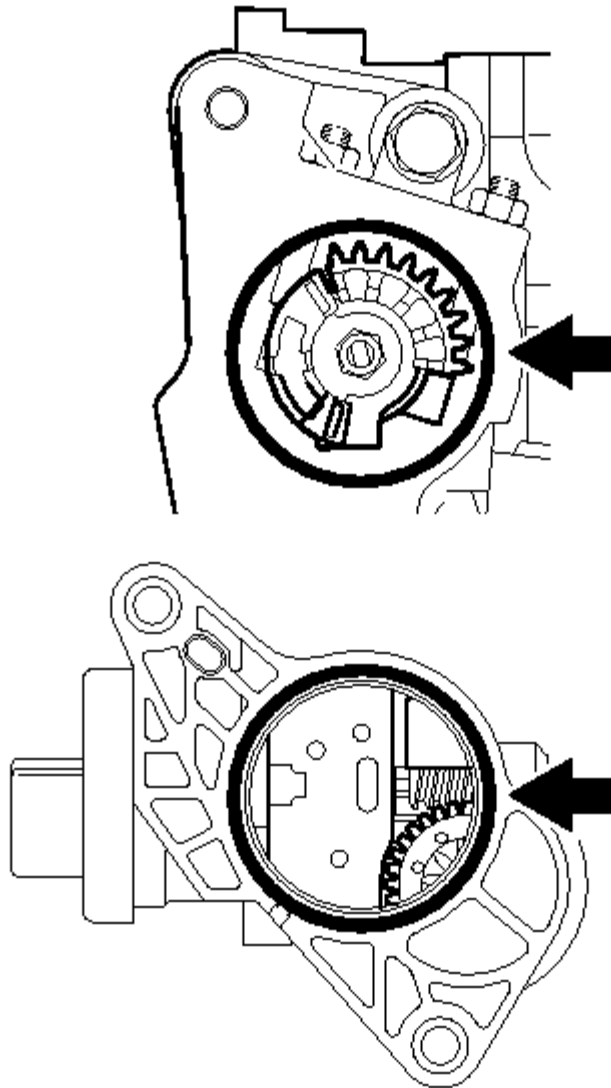
Fig. 47: Identifying Intake Air Control Valve Actuator & Fasteners (For TCV)

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

d. Remove the gasket from the intake manifold.

NOTE:

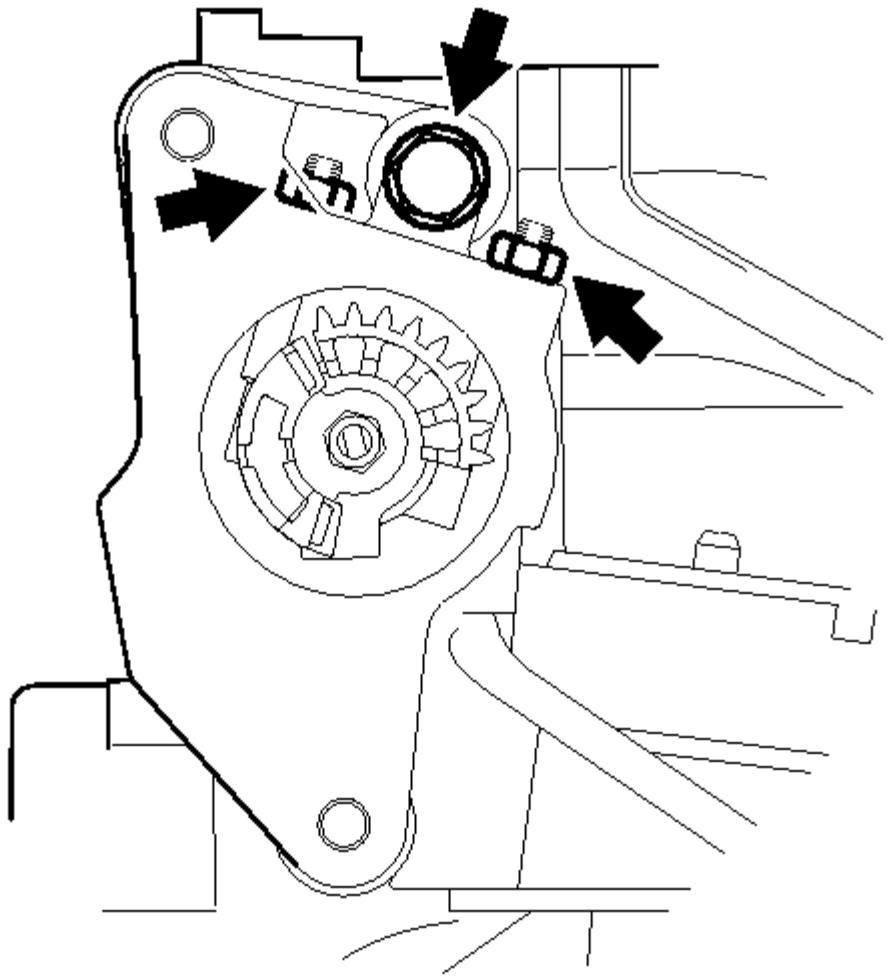
- Make sure that foreign matter, such as water, oil, sand and iron particle does not enter the gear chamber or actuator at the locations marked by the circles in the illustration.



P

Fig. 48: Identifying Intake Air Control Valve Actuator Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Do not loosen or remove the bolt and 2 nuts shown in the illustration.



P

Fig. 49: Identifying Fasteners To Not Loosen
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

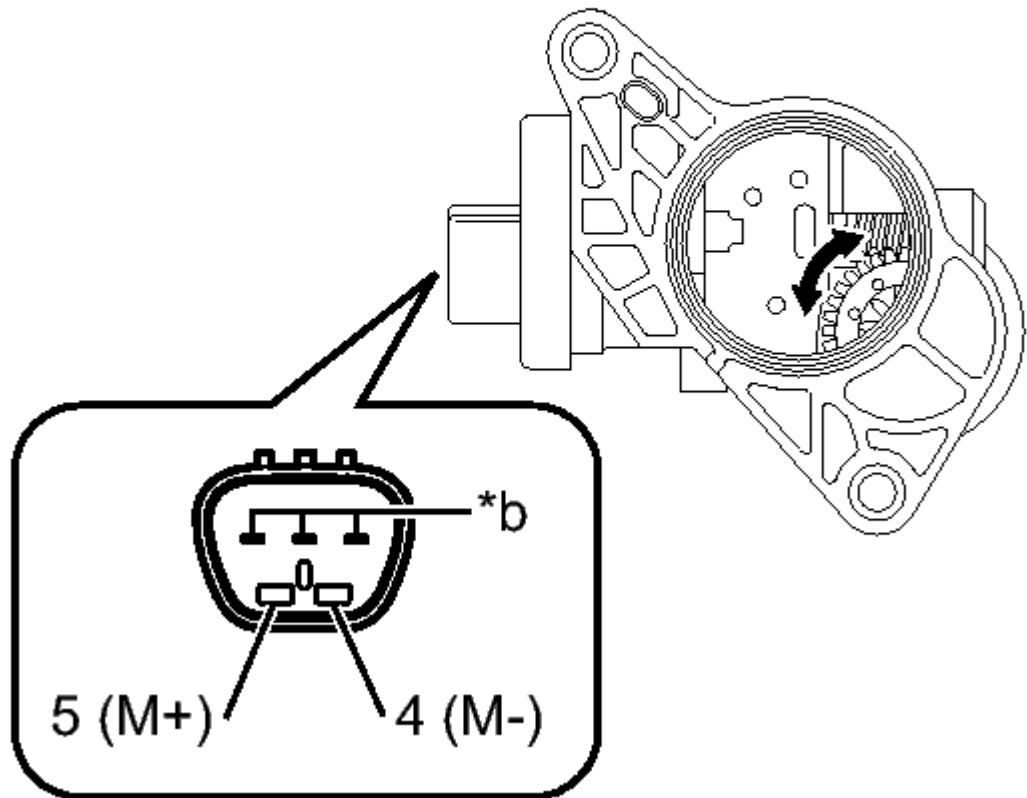
INSPECTION

INSPECTION

1. INSPECT INTAKE AIR CONTROL VALVE ACTUATOR (for TCV)

- a. Check the intake air control valve actuator operation.
 1. Check that the motor operates when the battery is connected to the terminals of the intake air control valve actuator.

*a



P

Fig. 50: Inspecting Intake Air Control Valve Actuator Operation (For TCV)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	Component without harness connected (Intake Air Control Valve Actuator)
*b	Sensor Terminals

NOTE: If the positive and negative battery leads contact the terminals

for the sensor, the actuator may be damaged.

OK

Measurement Condition	Specified Condition
Positive battery voltage applied to terminal 4 (M-), and negative battery voltage applied to terminal 5 (M+)	Motor rotates clockwise
Positive battery voltage applied to terminal 5 (M+), and negative battery voltage applied to terminal 4 (M-)	Motor rotates counterclockwise

If the result is not as specified, replace the intake air control valve actuator.

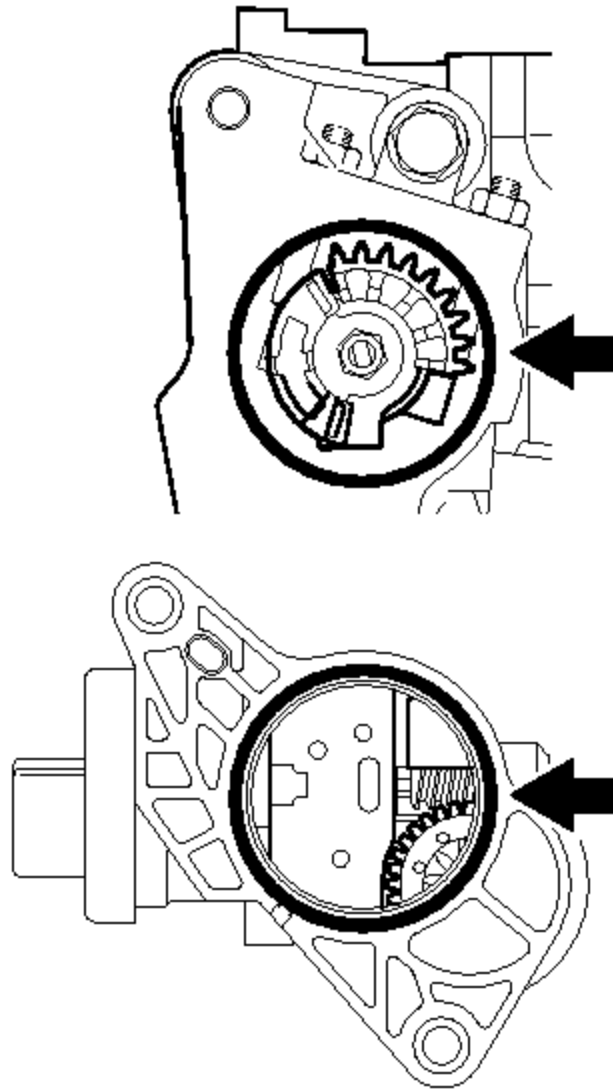
INSTALLATION

INSTALLATION

1. INSTALL INTAKE AIR CONTROL VALVE ACTUATOR (for TCV)

NOTE:

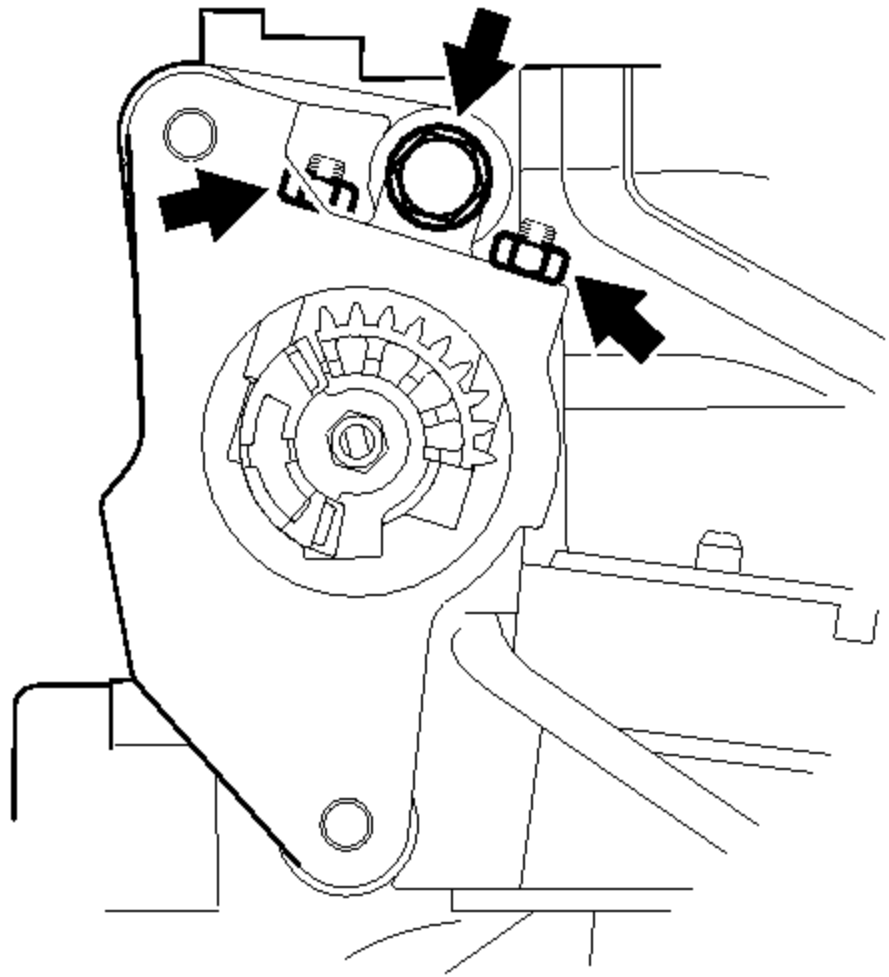
- Make sure that foreign matter, such as water, oil, sand and iron particles, does not enter the gear chamber or actuator at the locations marked by the circles in the illustration.



P

Fig. 51: Identifying Intake Air Control Valve Actuator Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Do not loosen or remove the bolt and 2 nuts shown in the illustration.

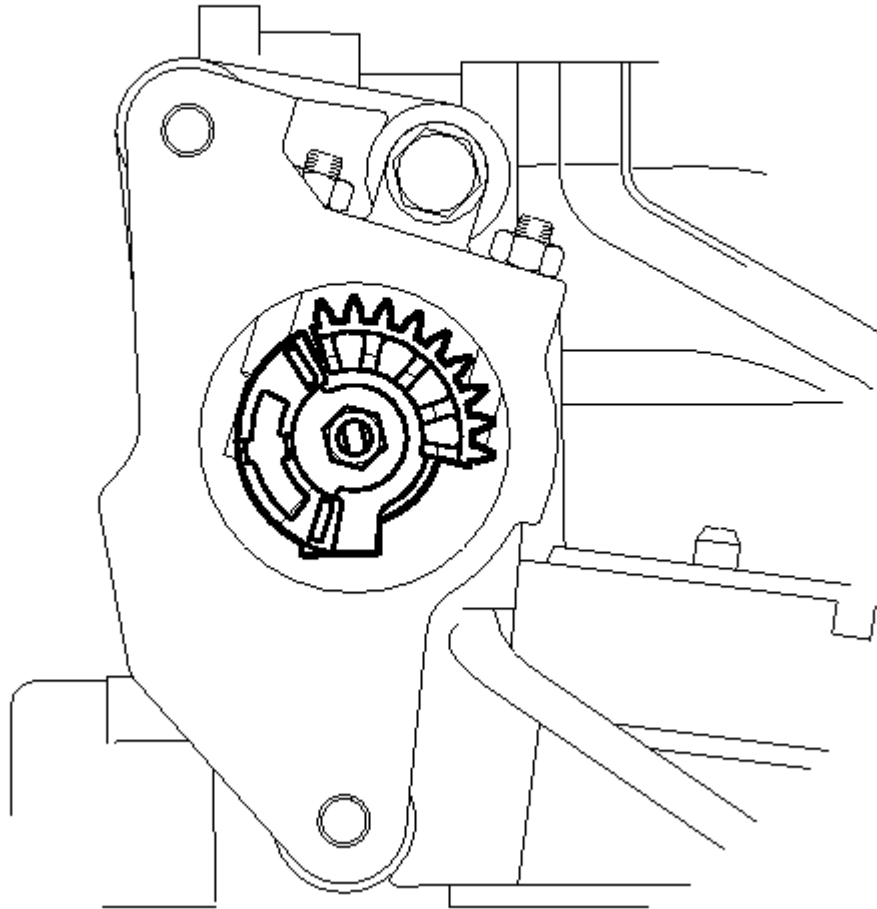


P

Fig. 52: Identifying Fasteners To Not Loosen
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Check that the gear of each tumble control valve is in the position shown in the illustration.

***a**



P

Fig. 53: Checking Tumble Control Valve Gear Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

***a** Closed

HINT:

Turn the gear clockwise until it contacts the stopper.

- b. Install a new gasket onto the intake air control valve actuator.
- c. Install the intake air control valve actuator to the intake manifold with the 2 bolts.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

NOTE:

- If excessive force is applied to the gear in the direction of rotation when installing the actuator, the valves and actuator may be damaged.
- After installing the actuator, make sure the ends of the valves are not protruding from the surface where the intake manifold is installed. If the valves are protruding, remove and reinstall the actuator.

- d. Connect the intake air control valve actuator connector.
- e. Install the wire harness clamp bracket to the intake manifold with the 2 bolts.

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

2. INSTALL THROTTLE WITH MOTOR BODY ASSEMBLY

Refer to **INSTALLATION**

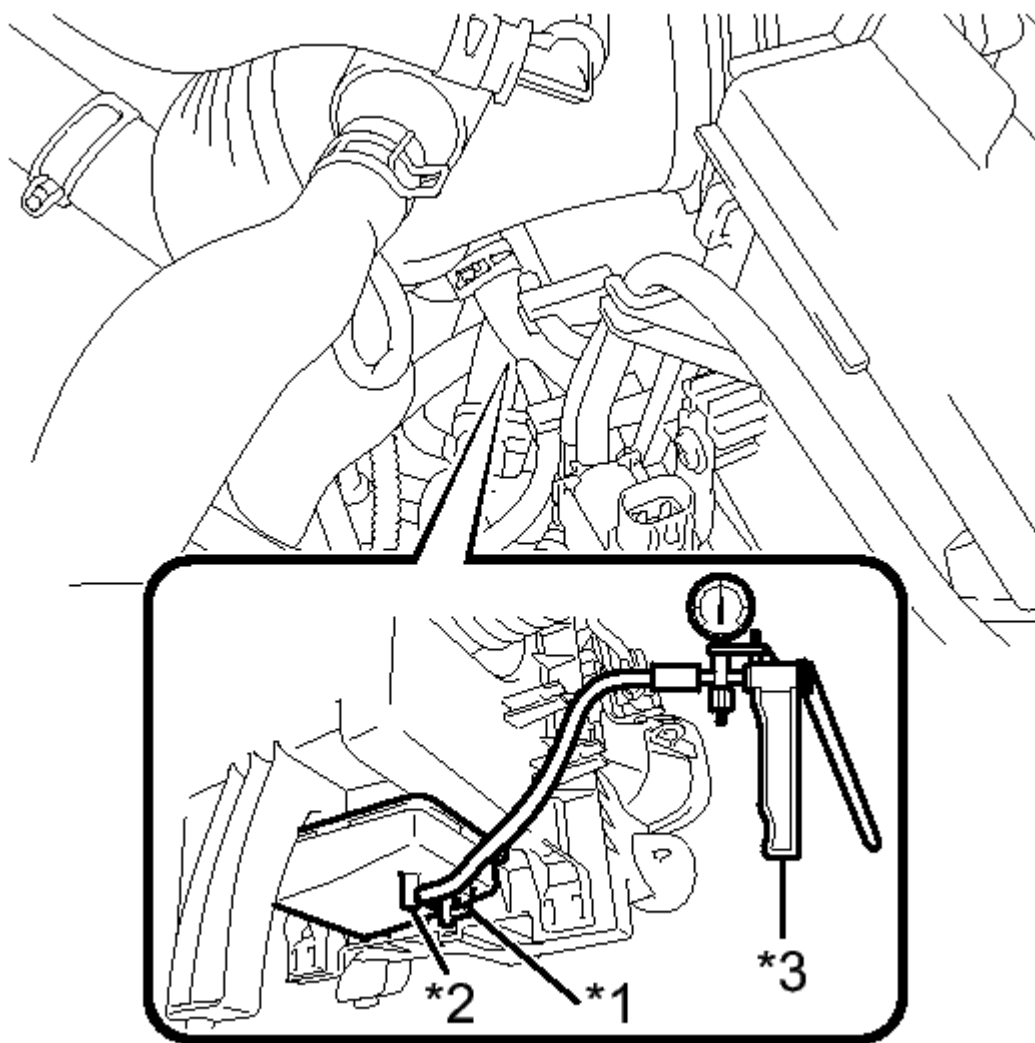
VACUUM TANK

ON-VEHICLE INSPECTION

ON-VEHICLE INSPECTION

1. INSPECT VACUUM TANK

- a. Check that air flows from port B to port A.
- b. Using a vacuum pump, apply 60 kPa (450 mmHg, 17.7 in. Hg) of vacuum to port B. Check that there is no change in vacuum after one minute.



P

Fig. 54: Inspecting Vacuum Tank Air Flow Operation Using A Vacuum Pump
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Port A
*2	Port B
*3	Vacuum Pump

If the result is not as specified, replace the air cleaner case sub-assembly.

VACUUM SWITCHING VALVE (FOR ACIS)

COMPONENTS

ILLUSTRATION

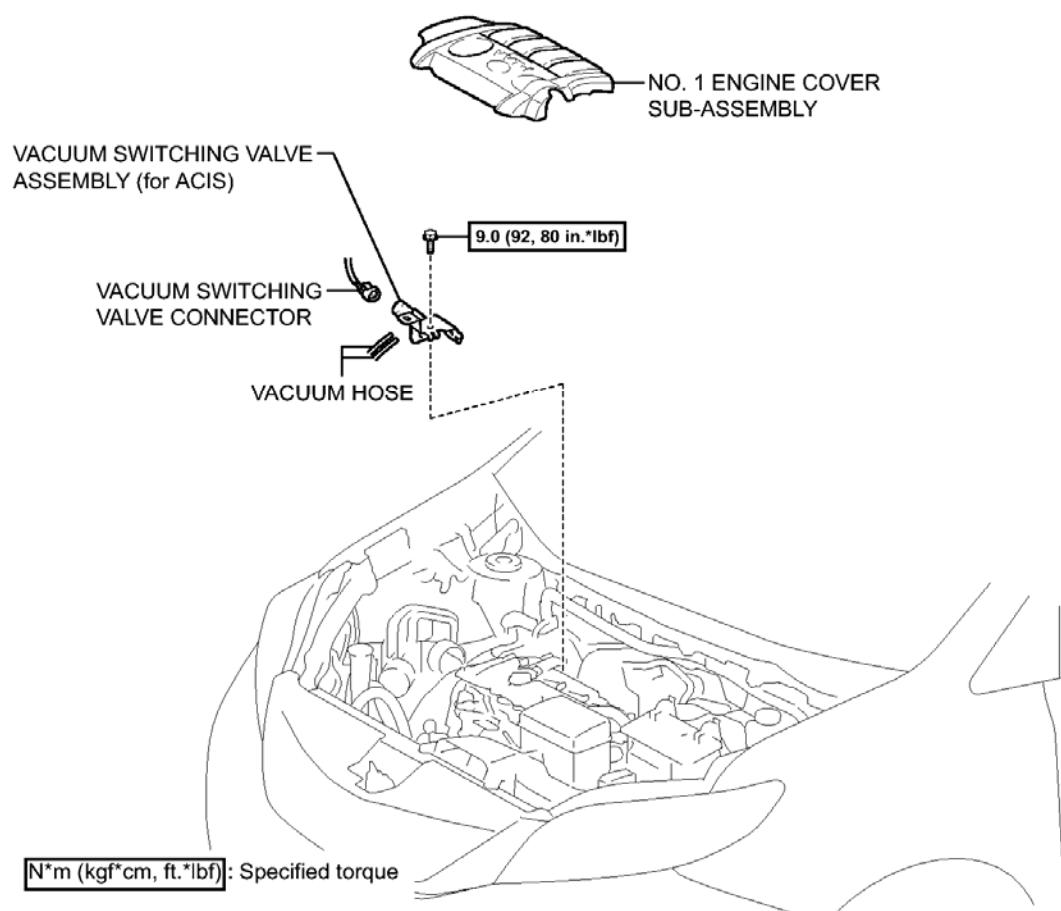


Fig. 55: Vacuum Switching Valve Replacement Components With Torque Specifications (For ACIS)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY** . Refer to **REMOVAL - Step 21**
2. **REMOVE VACUUM SWITCHING VALVE ASSEMBLY (for ACIS)**
 - a. Disconnect the vacuum switching valve connector.

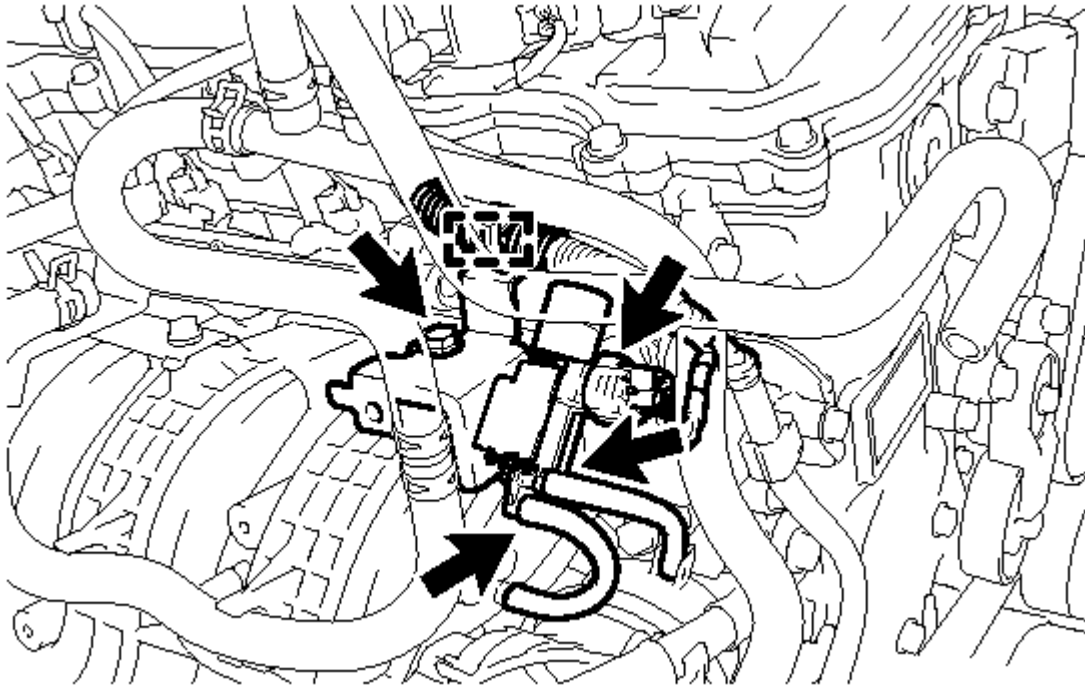


Fig. 56: Identifying Vacuum Switching Valve Assembly, Vacuum Hoses, Wire Harness Clamp & Fasteners

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

- b. Disengage the wire harness clamp.
- c. Disconnect the 2 vacuum hoses.
- d. Remove the bolt and the vacuum switching valve assembly.

INSPECTION

INSPECTION

1. **INSPECT VACUUM SWITCHING VALVE ASSEMBLY (for ACIS)**
 - a. Measure the resistance according to the value(s) in the table below.

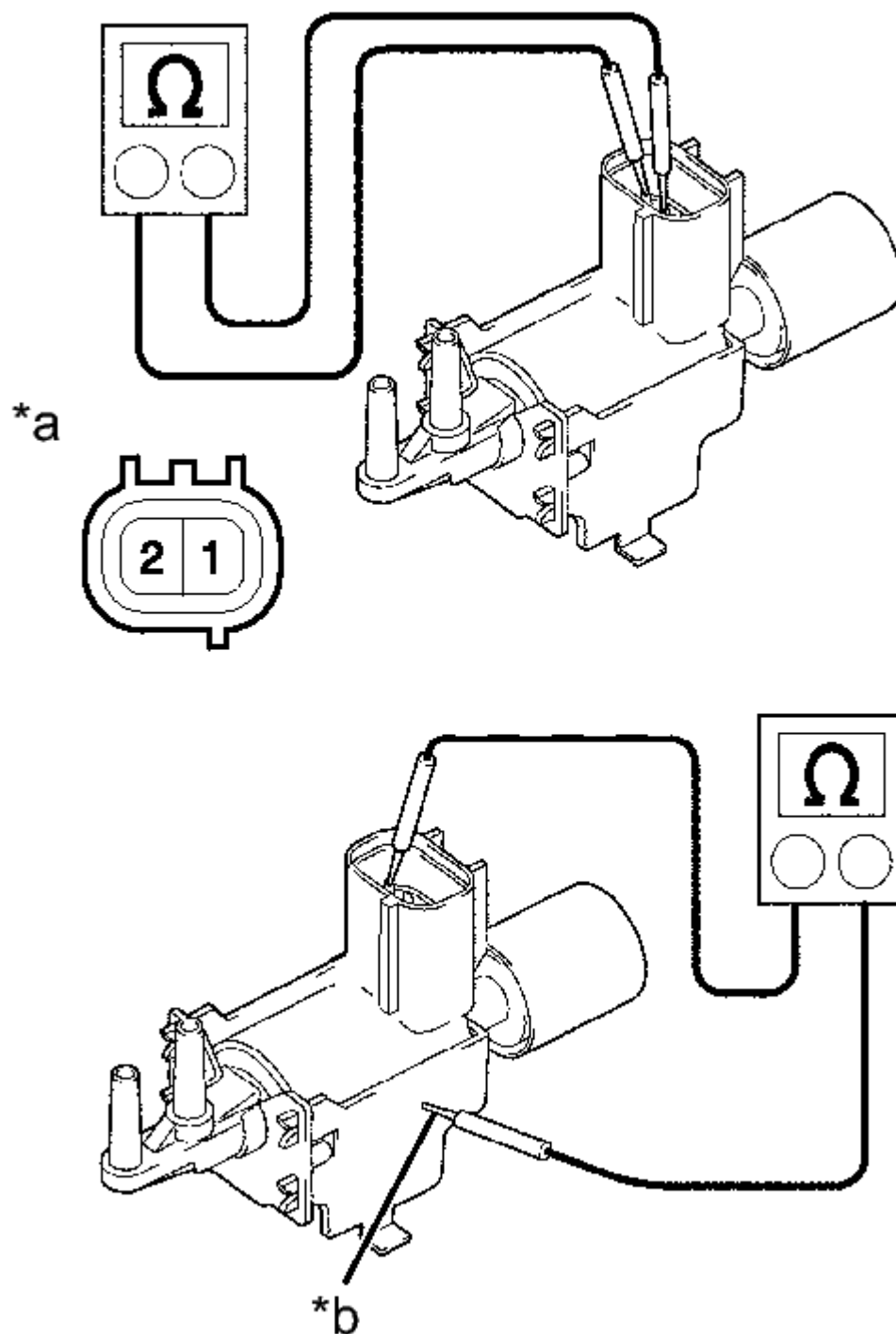


Fig. 57: Measuring Vacuum Switching Valve Resistance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

Component

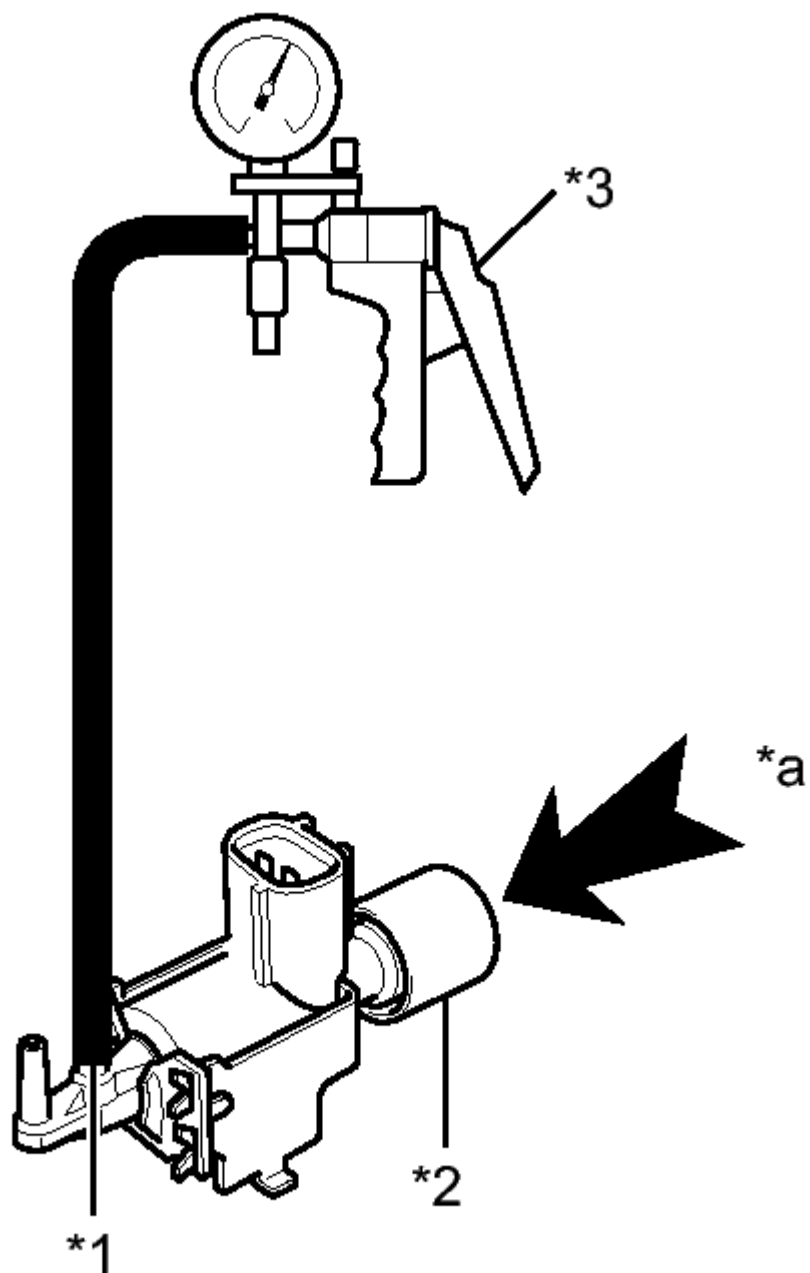
*a	without harness connected (Vacuum Switching Valve Assembly)
*b	Body Ground

Standard Resistance

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68° F)	37 to 44 ohms
1 - Body ground	Always	1 Mohms or higher
2 - Body ground		

If the result is not as specified, replace the vacuum switching valve assembly.

- b. Check the vacuum switching valve operation.
 1. Using a vacuum pump, when vacuum is applied to port E, check that air is sucked into the filter.



C

Fig. 58: Checking Vacuum Switching Valve Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Port E
----	--------

*2	Filter
*3	Vacuum Pump
*a	Air

If the result is not as specified, replace the vacuum switching valve assembly.

2. Apply battery voltage across the terminals. When vacuum is applied to port F, check that air is sucked into port E.

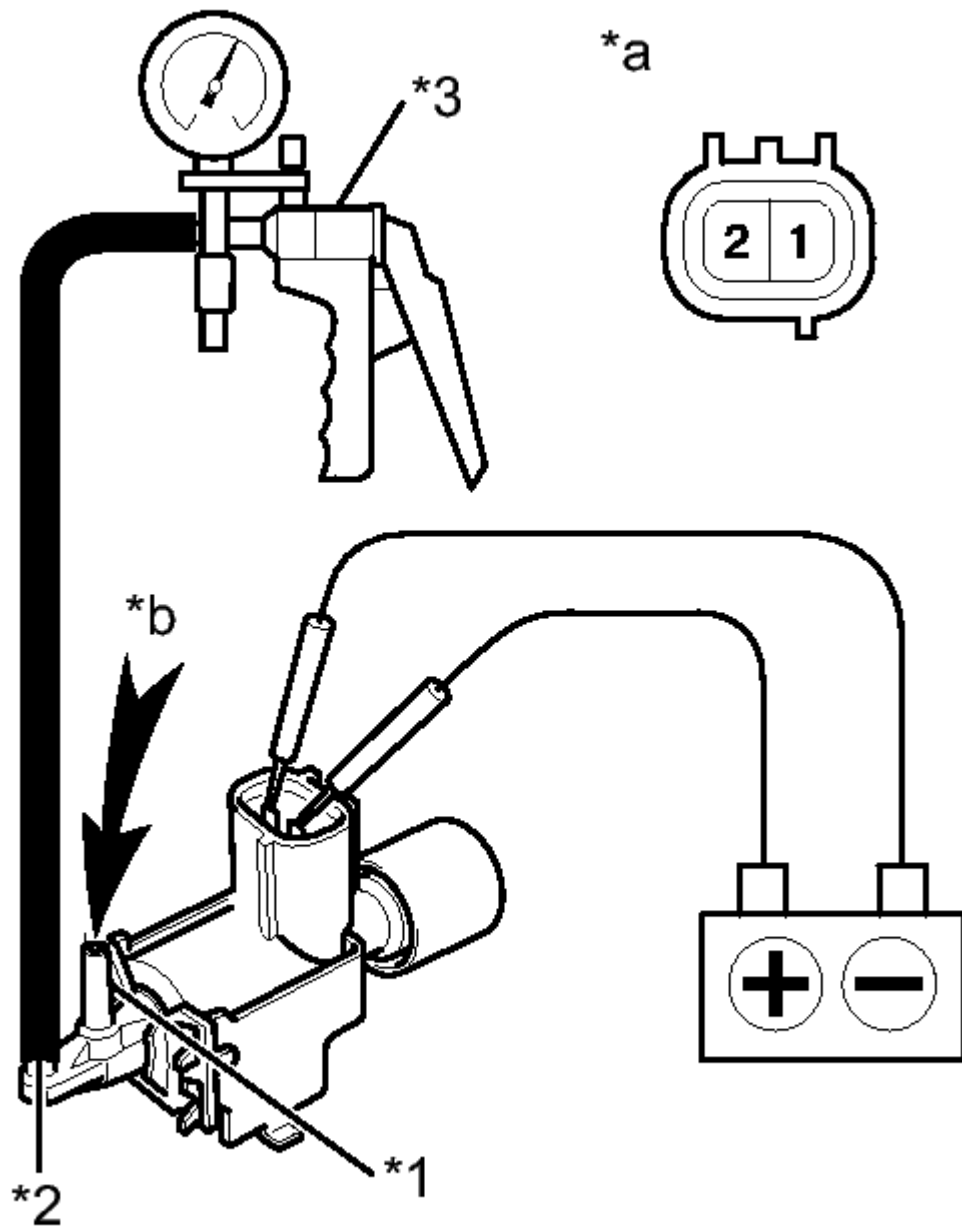


Fig. 59: Inspecting Vacuum Switching Valve Air Flow With Battery Voltage Applied
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Port E
----	--------

*2	Port F
*3	Vacuum Pump
*a	Component without harness connected (Vacuum Switching Valve Assembly)
*b	Air

If the result is not as specified, replace the vacuum switching valve assembly.

INSTALLATION

INSTALLATION

1. INSTALL VACUUM SWITCHING VALVE ASSEMBLY (for ACIS)

- Install the vacuum switching valve assembly to the intake manifold with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

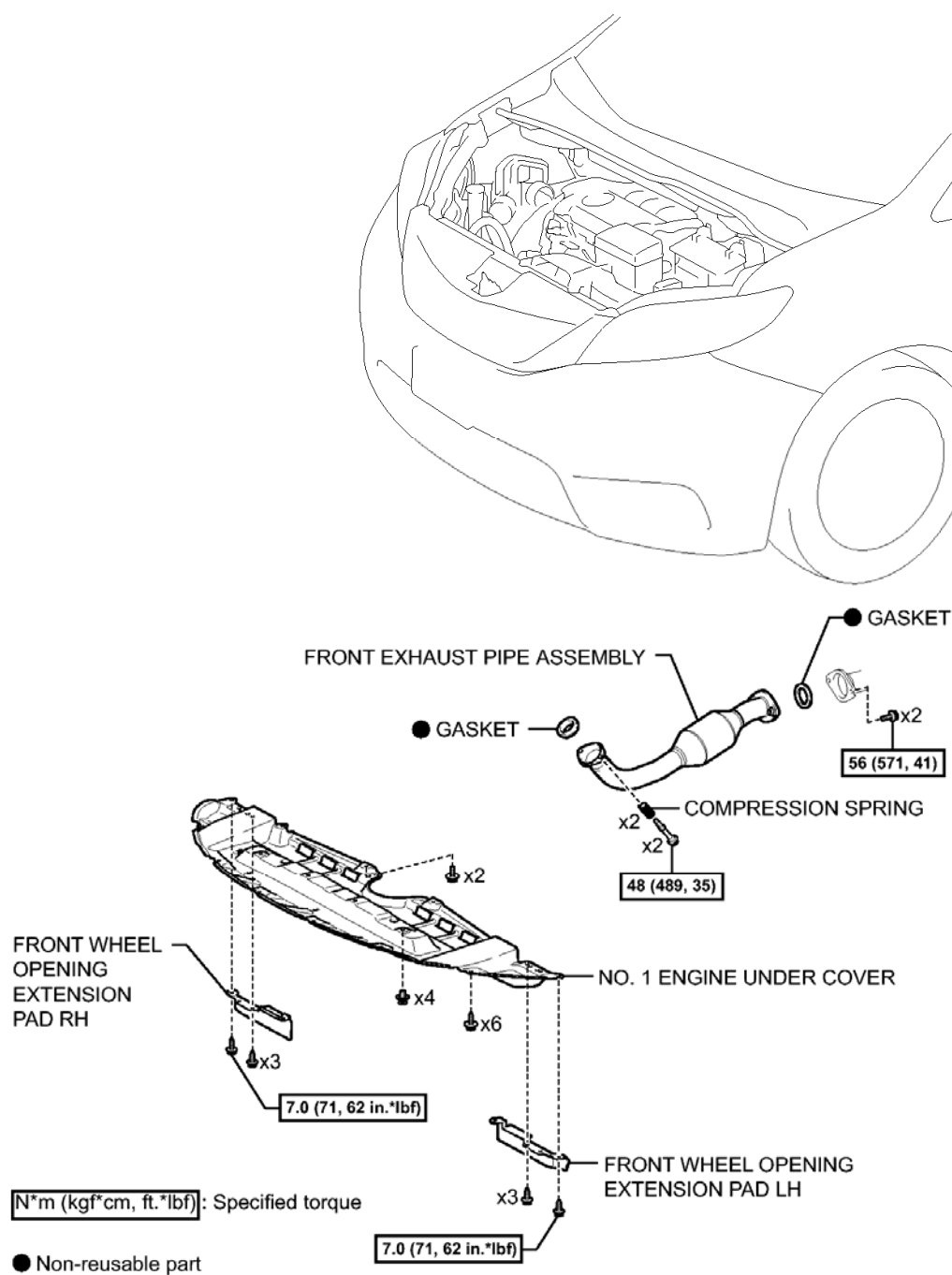
- Connect the 2 vacuum hoses to the vacuum switching valve assembly.
- Engage the wire harness clamp to the vacuum switching valve assembly.
- Connect the vacuum switching valve connector.

2. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY . Refer to INSTALLATION - Step 75

EXHAUST MANIFOLD

COMPONENTS

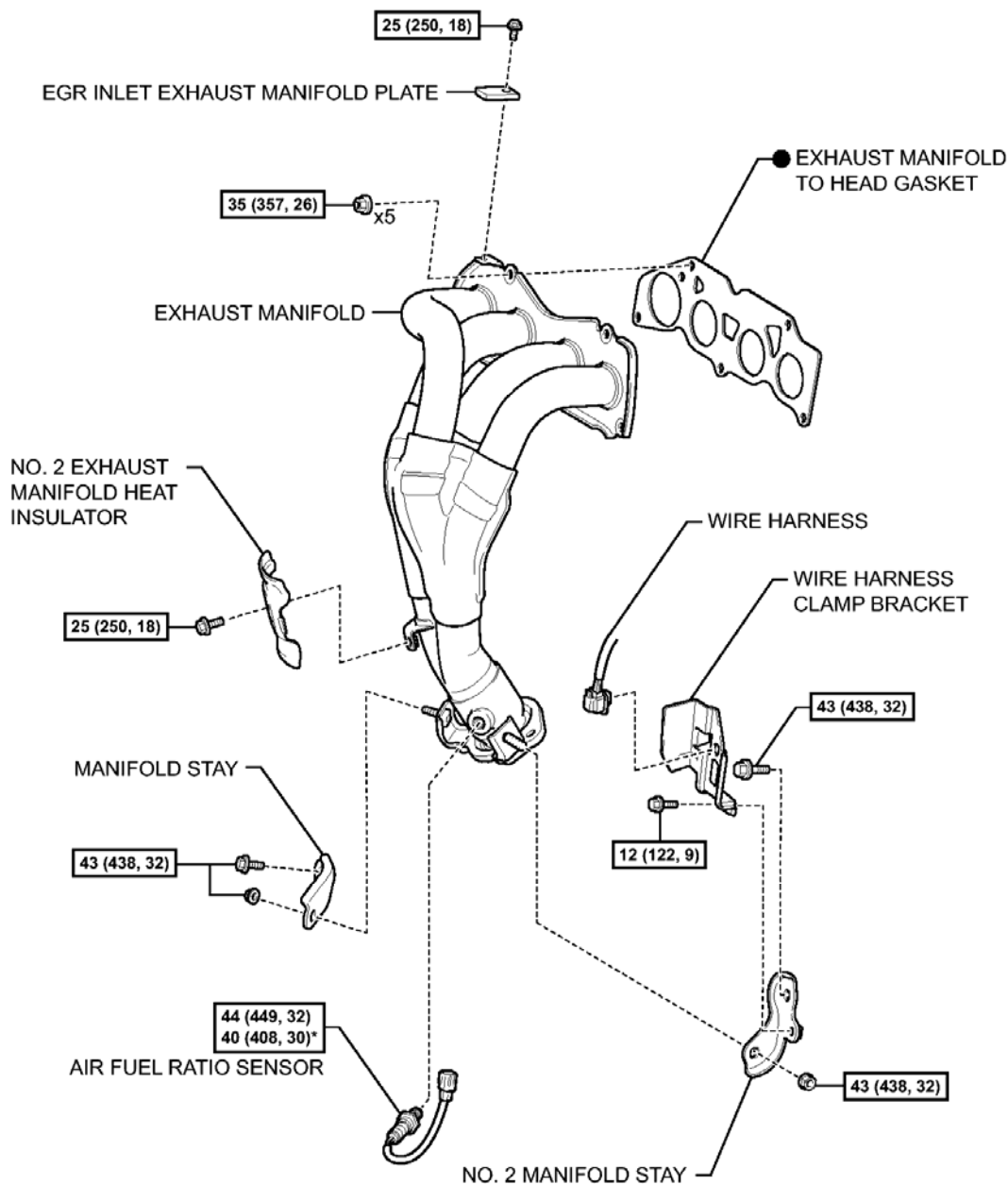
ILLUSTRATION



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Fig. 60: Exhaust Manifold Replacement Components With Torque Specifications (1 of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



N*m (kgf*cm, ft.*lbf): Specified torque

* For use with SST

● Non-reusable part

P

Fig. 61: Exhaust Manifold Replacement Components With Torque Specifications (2 of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. REMOVE NO. 1 ENGINE UNDER COVER

- a. Remove the 8 screws, front wheel opening extension pad RH and front wheel opening extension pad LH.

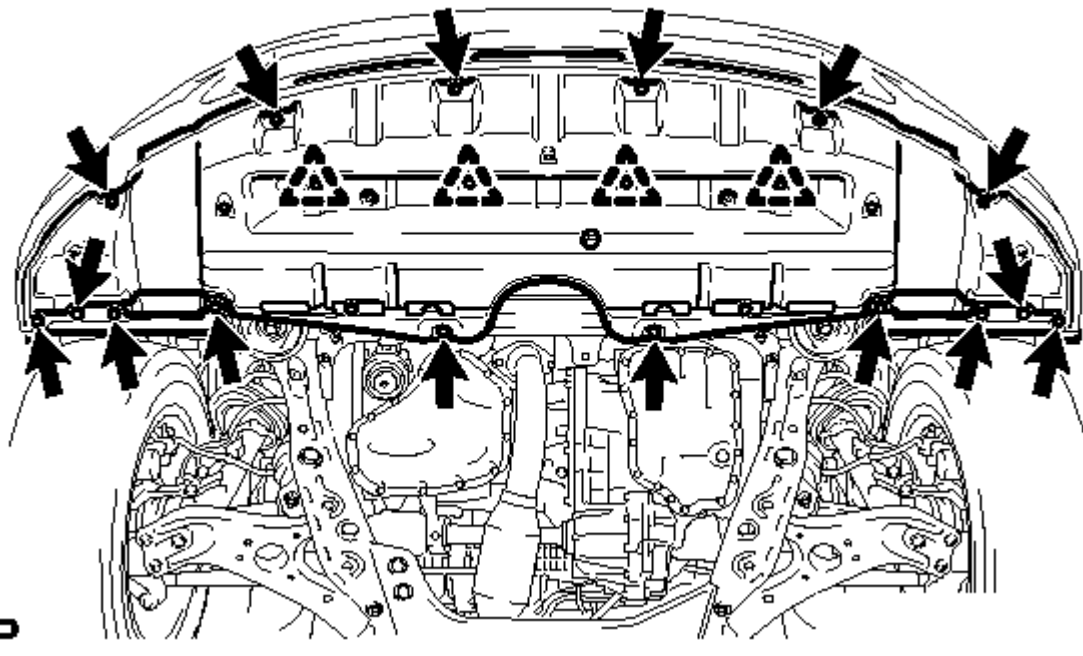
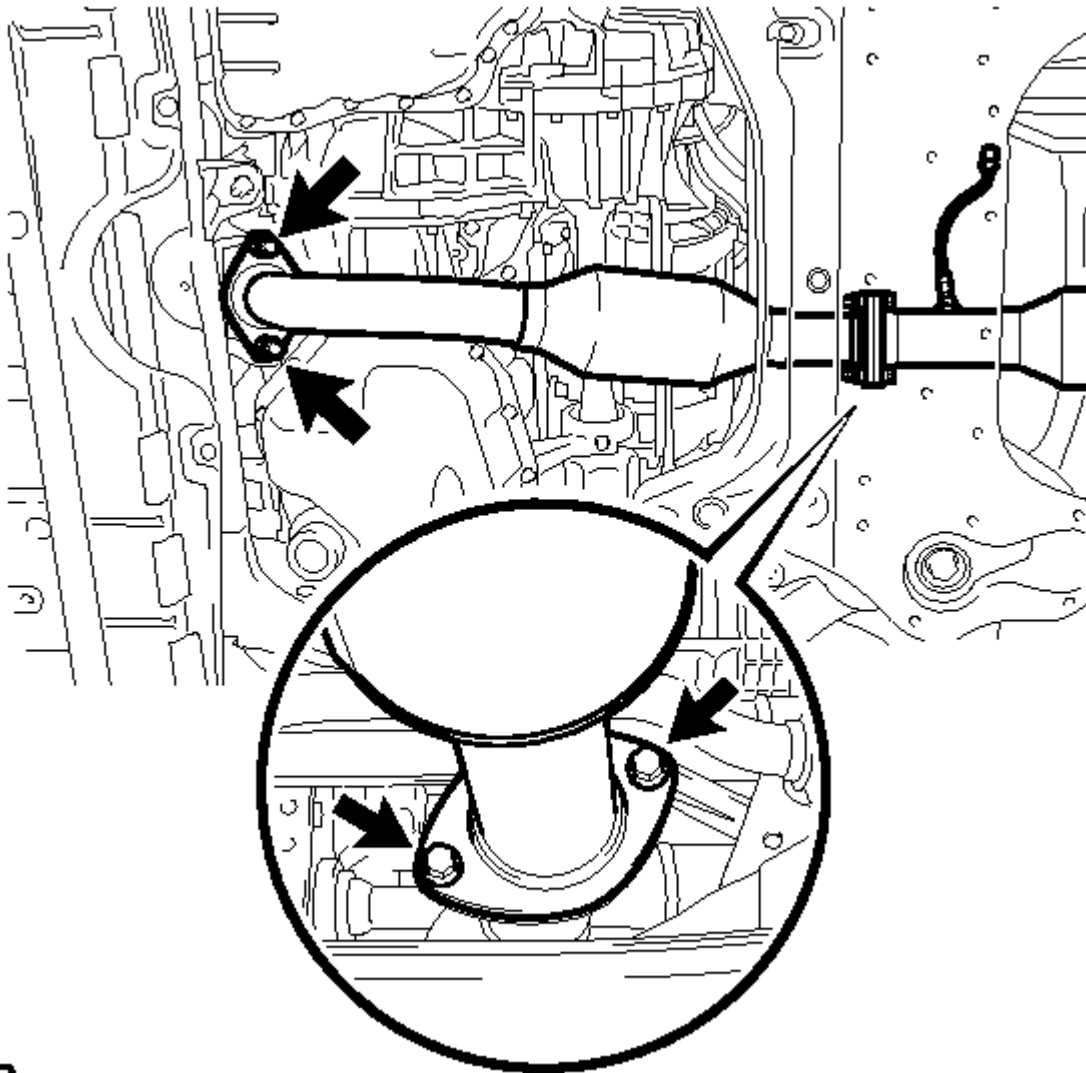


Fig. 62: Identifying No. 1 Engine Under Cover Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 2 bolts, 6 screws, 4 clips and No. 1 engine under cover.

2. REMOVE FRONT EXHAUST PIPE ASSEMBLY

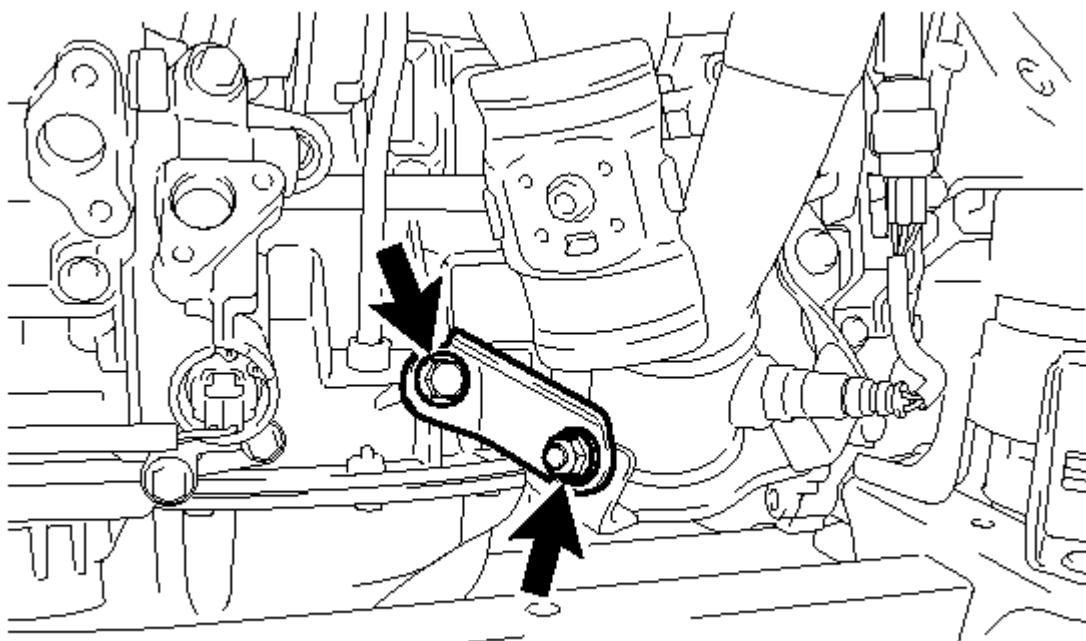
- a. Remove the 4 bolts, 2 compression springs and front exhaust pipe assembly.



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Fig. 63: Identifying Front Exhaust Pipe Assembly Compression Springs & Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 2 gaskets from the front exhaust pipe assembly and exhaust manifold.
- 3. **REMOVE MANIFOLD STAY**
 - a. Remove the bolt, nut and manifold stay.



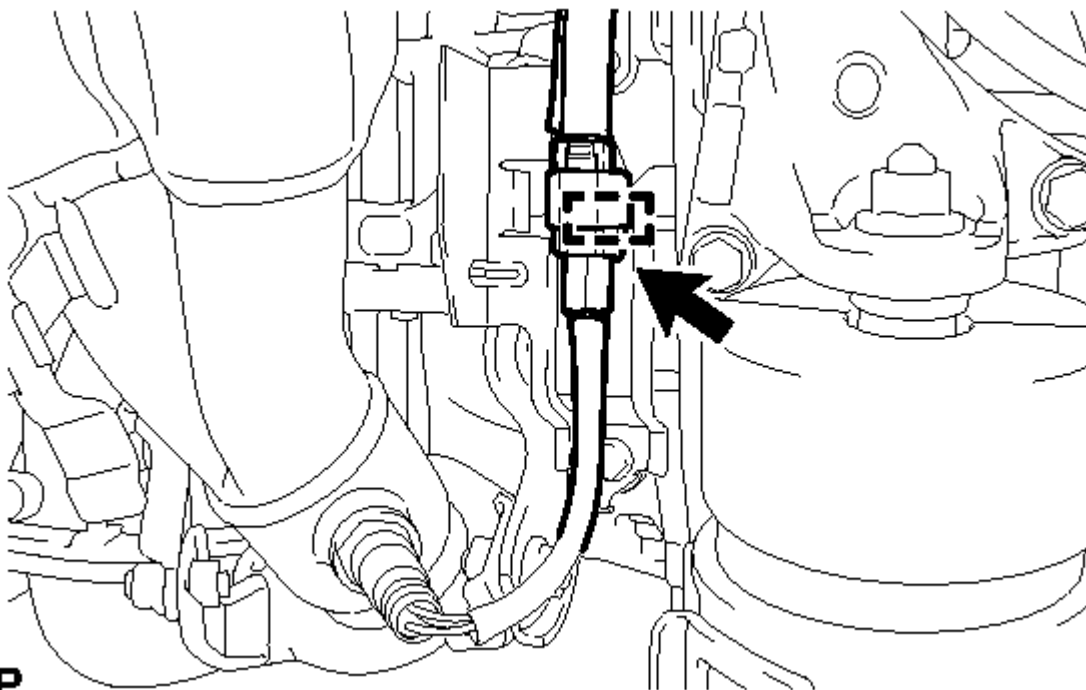
P

Fig. 64: Identifying Manifold Stay Fasteners

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

4. REMOVE NO. 2 MANIFOLD STAY

- a. Disconnect the connector and disengage the harness clamp.

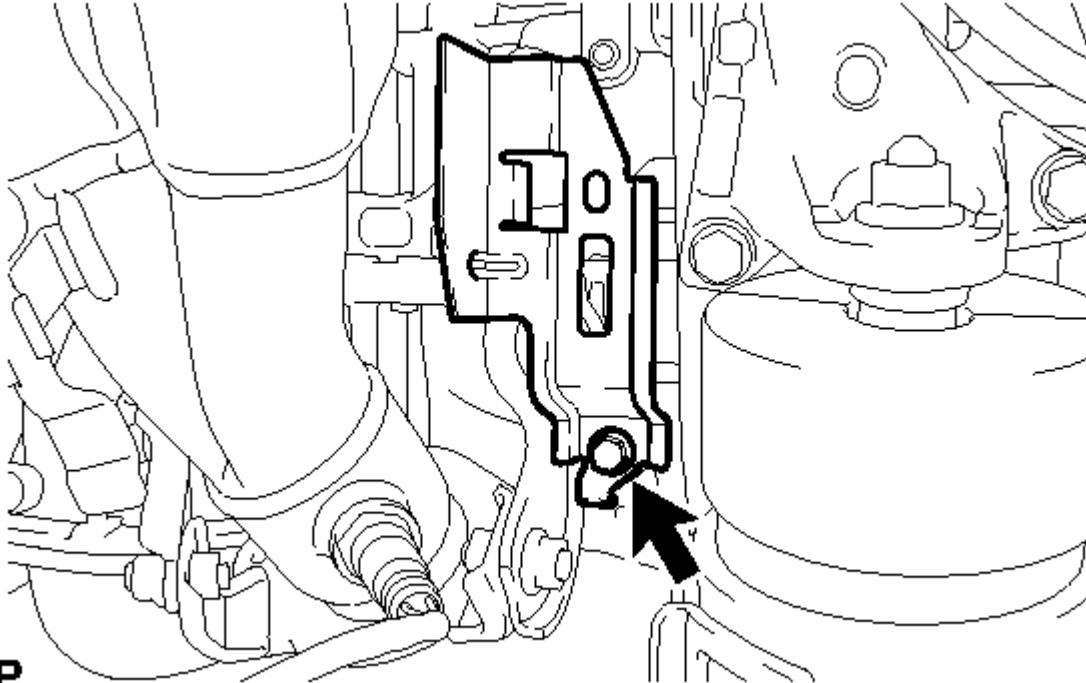


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Fig. 65: Identifying No. 2 Manifold Stay Wire Harness & Clamp

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

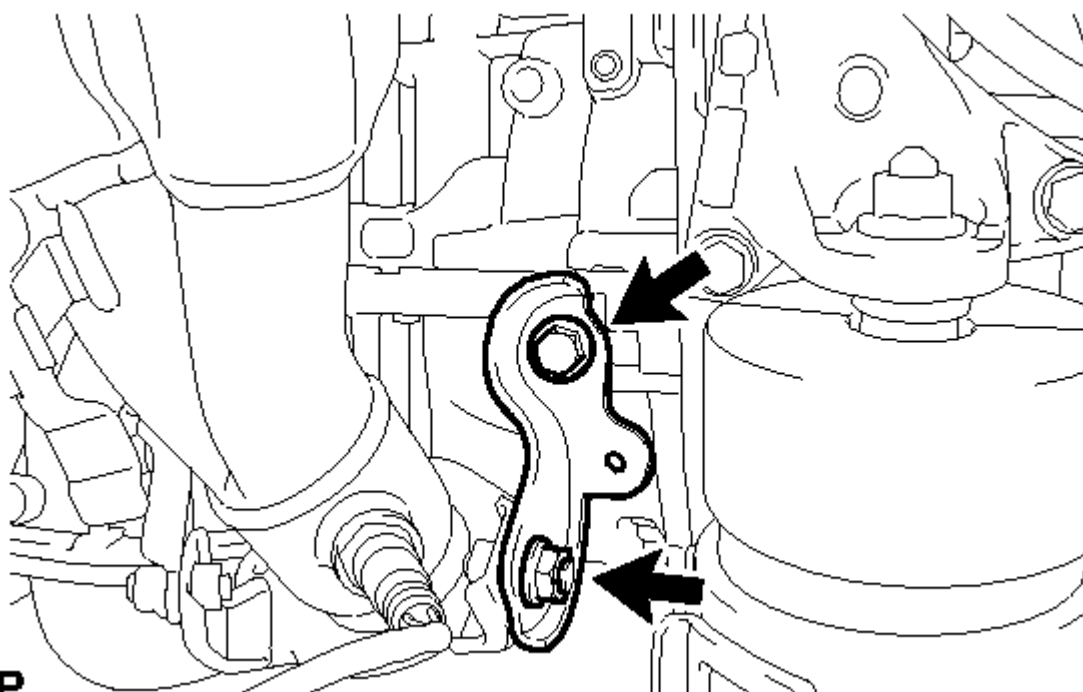
- b. Remove the bolt and wire harness clamp bracket.



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Fig. 66: Identifying No. 2 Manifold Wire Harness Clamp Bracket & Fastener
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

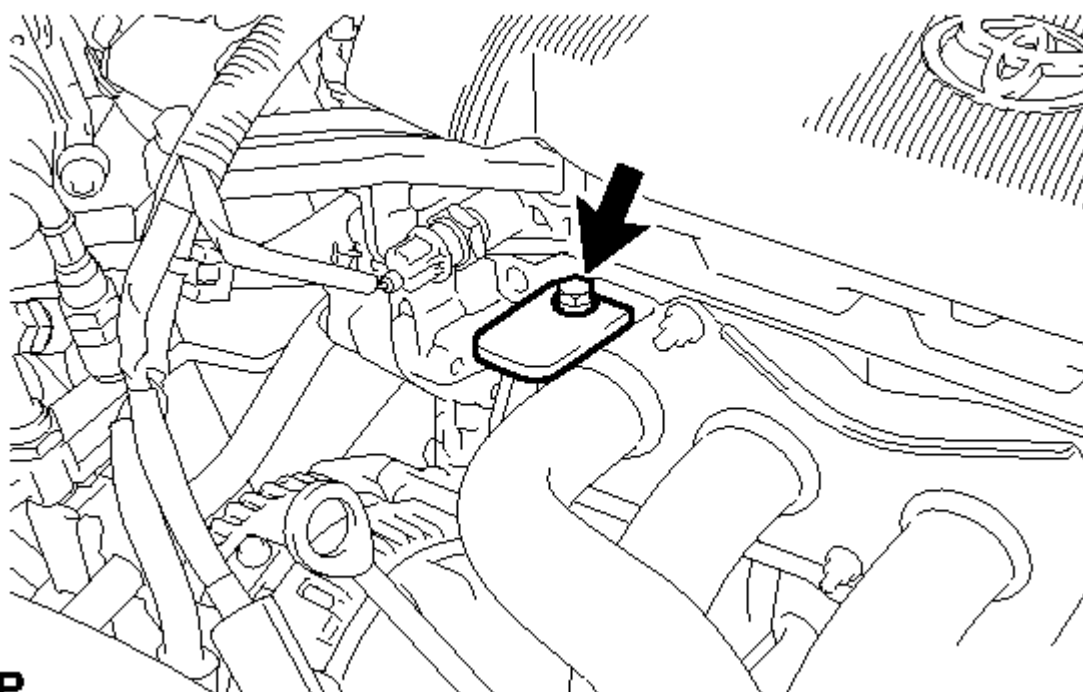


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Fig. 67: Identifying No. 2 Manifold Stay Fasteners
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. REMOVE EGR INLET EXHAUST MANIFOLD PLATE

- a. Remove the bolt and EGR inlet exhaust manifold plate.



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Fig. 68: Identifying EGR Inlet Exhaust Manifold Plate & Fastener

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

6. REMOVE EXHAUST MANIFOLD

- a. Remove the 5 nuts and exhaust manifold.

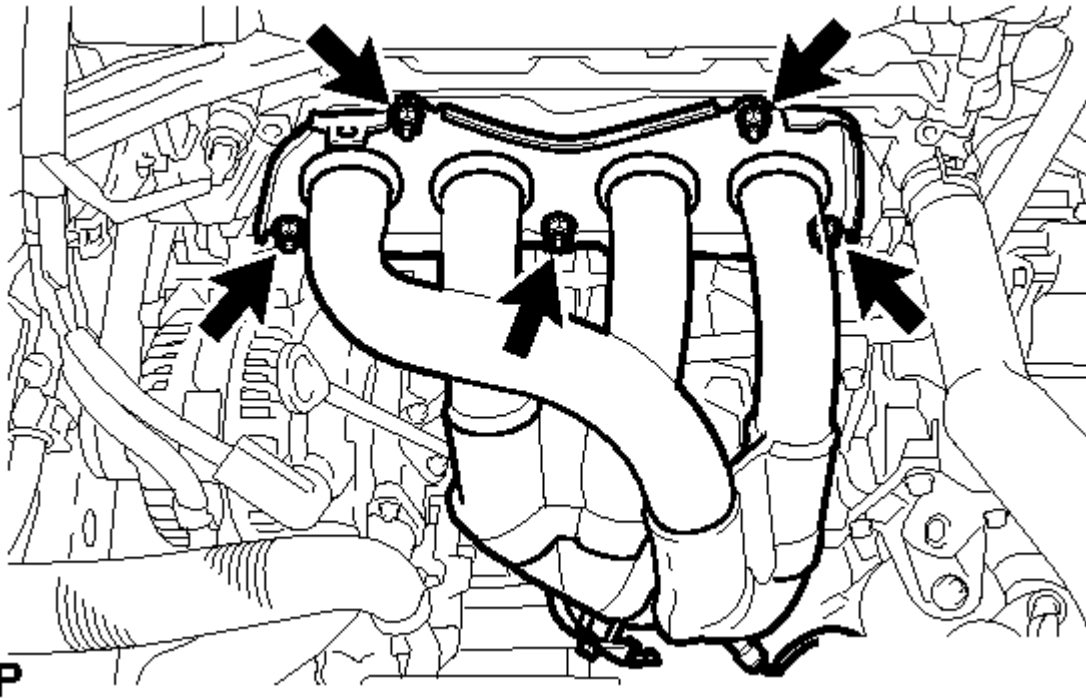
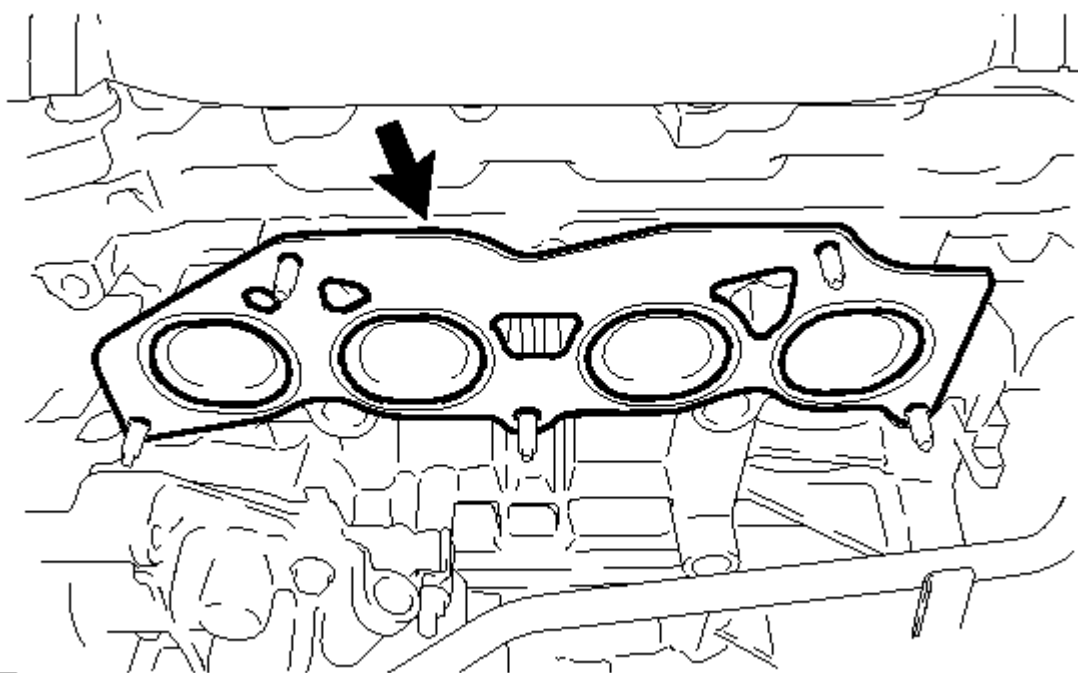


Fig. 69: Identifying Exhaust Manifold & Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE EXHAUST MANIFOLD TO HEAD GASKET

- a. Remove the exhaust manifold to head gasket.

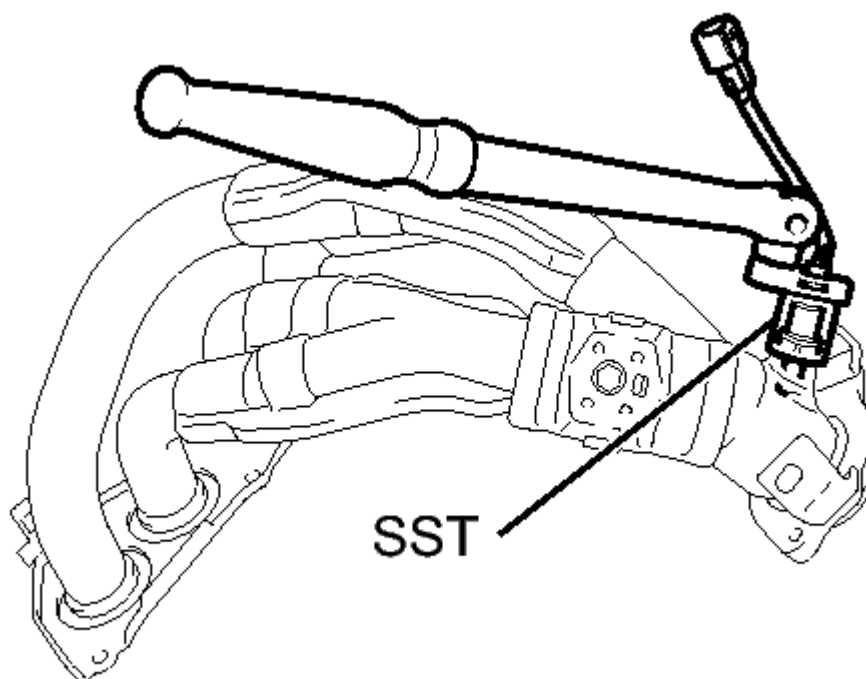


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Fig. 70: Identifying Exhaust Manifold To Head Gasket
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. REMOVE AIR FUEL RATIO SENSOR

- a. Using SST, remove the air fuel ratio sensor from the exhaust manifold.



P

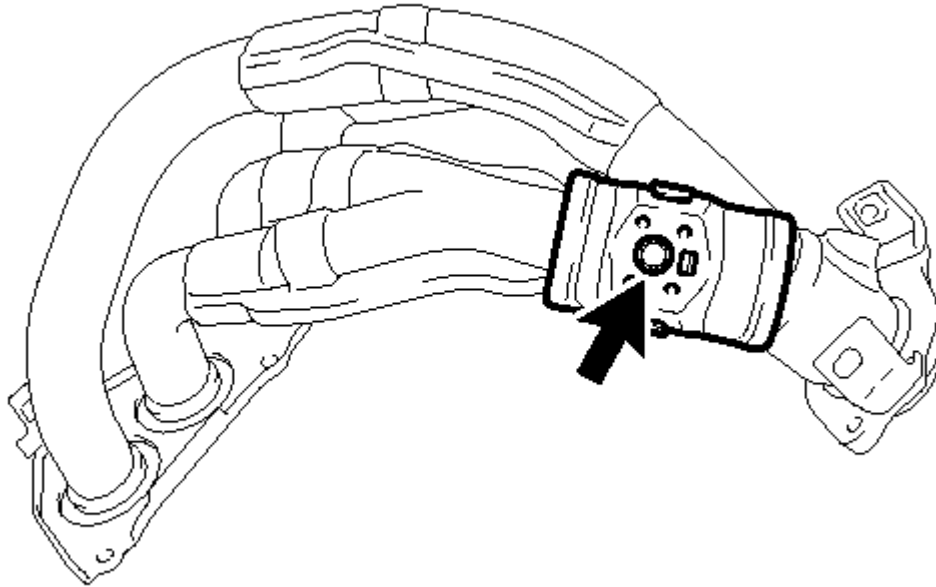
Fig. 71: Removing Air Fuel Ratio Sensor At Exhaust Manifold Using SST

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

- SST: 09224-00010

9. REMOVE NO. 2 EXHAUST MANIFOLD HEAT INSULATOR

- Remove the bolt and No. 2 exhaust manifold heat insulator.



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Fig. 72: Identifying No. 2 Exhaust Manifold Heat Insulator & Fastener
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

INSTALLATION

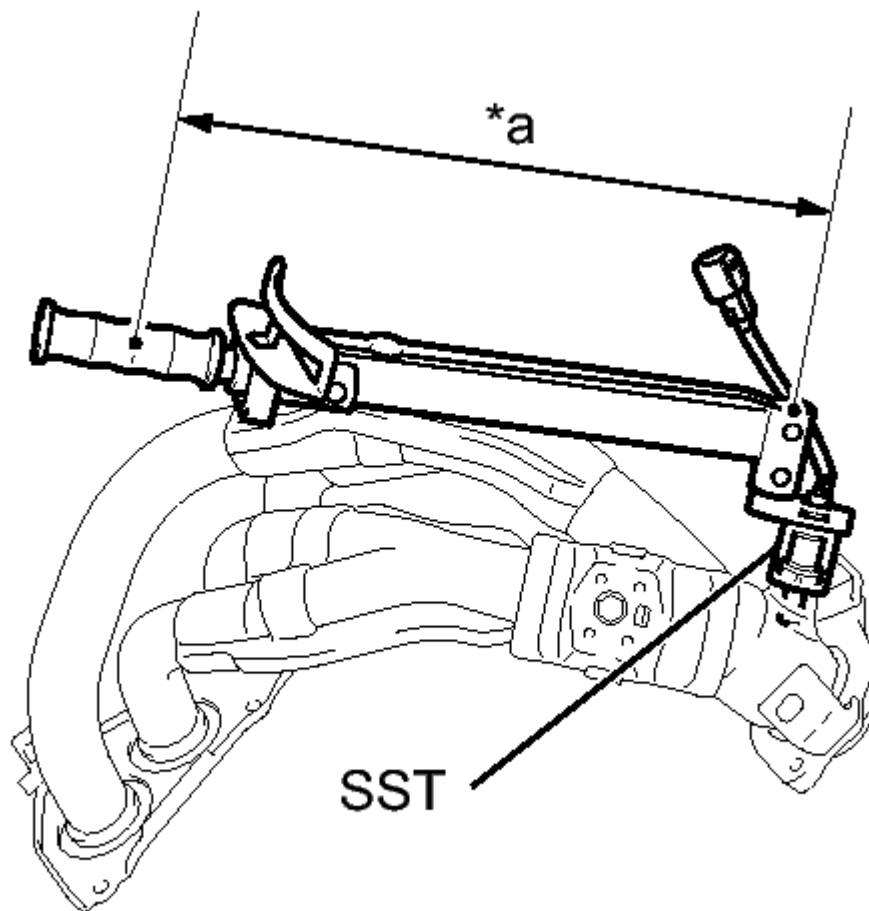
1. INSTALL NO. 2 EXHAUST MANIFOLD HEAT INSULATOR

- Install the No. 2 exhaust manifold heat insulator with the bolt.

Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

2. INSTALL AIR FUEL RATIO SENSOR

- Using SST, install the air fuel ratio sensor to the exhaust manifold.



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Fig. 73: Installing Air Fuel Ratio Sensor At Exhaust Manifold Using SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	Fulcrum Length
----	-------------------

- SST: 09224-00010

without SST

Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)

with SST

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

HINT:

- The "with SST" torque value is effective when using SST with a fulcrum length of 30 mm (1.18 in.).
- The "with SST" torque value is effective when using a torque wrench with a fulcrum length of 300 mm (11.81 in.). Refer to **PRECAUTION**.
- The "with SST" torque value is effective when SST is parallel to the torque wrench.

3. INSTALL EXHAUST MANIFOLD TO HEAD GASKET

- a. Install a new exhaust manifold to head gasket.

4. INSTALL EXHAUST MANIFOLD

- a. Temporarily install the exhaust manifold with the 5 nuts.

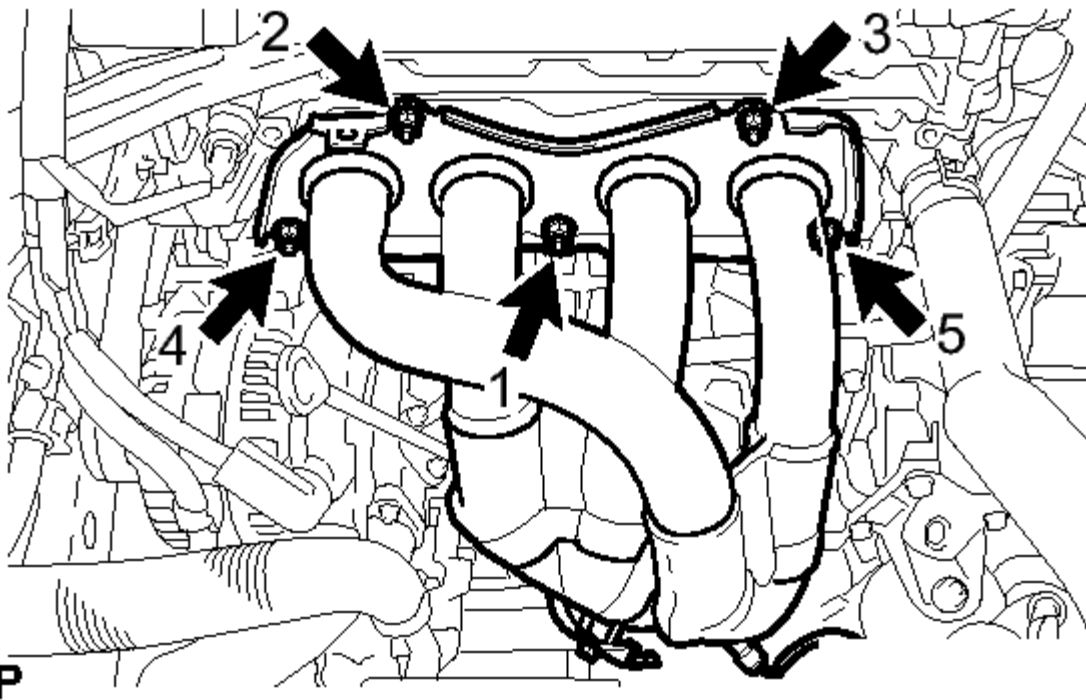


Fig. 74: Installing Exhaust Manifold Fasteners With Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Tighten the 5 nuts in the order shown in the illustration.

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

5. INSTALL EGR INLET EXHAUST MANIFOLD PLATE

- a. Install the EGR inlet exhaust manifold plate with the bolt.

Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

6. INSTALL NO. 2 MANIFOLD STAY

- a. Install the No. 2 manifold stay with the bolt and nut.

Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

- b. Install the wire harness clamp bracket with the bolt.

Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

- c. Engage the harness clamp and connect the connector.

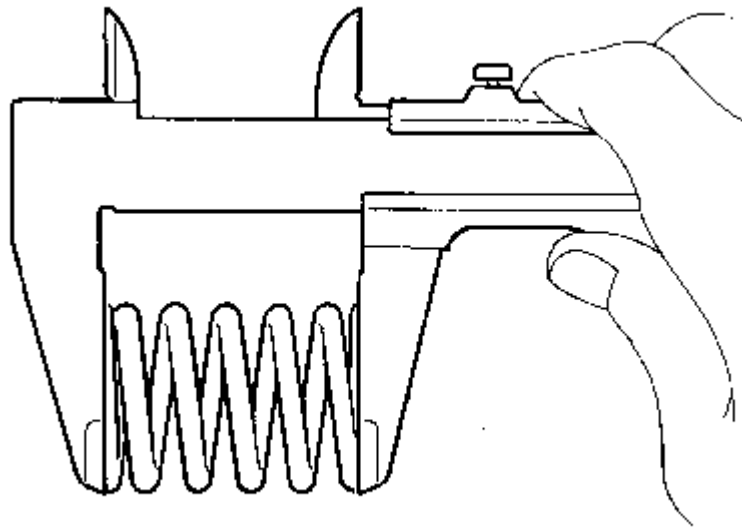
7. INSTALL MANIFOLD STAY

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

Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

8. INSTALL FRONT EXHAUST PIPE ASSEMBLY

- a. Using a vernier caliper, measure the free length of the compression springs.



A77857

Fig. 75: Measuring Free Length Of Compression Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Minimum length

41.7 mm (1.642 in.)

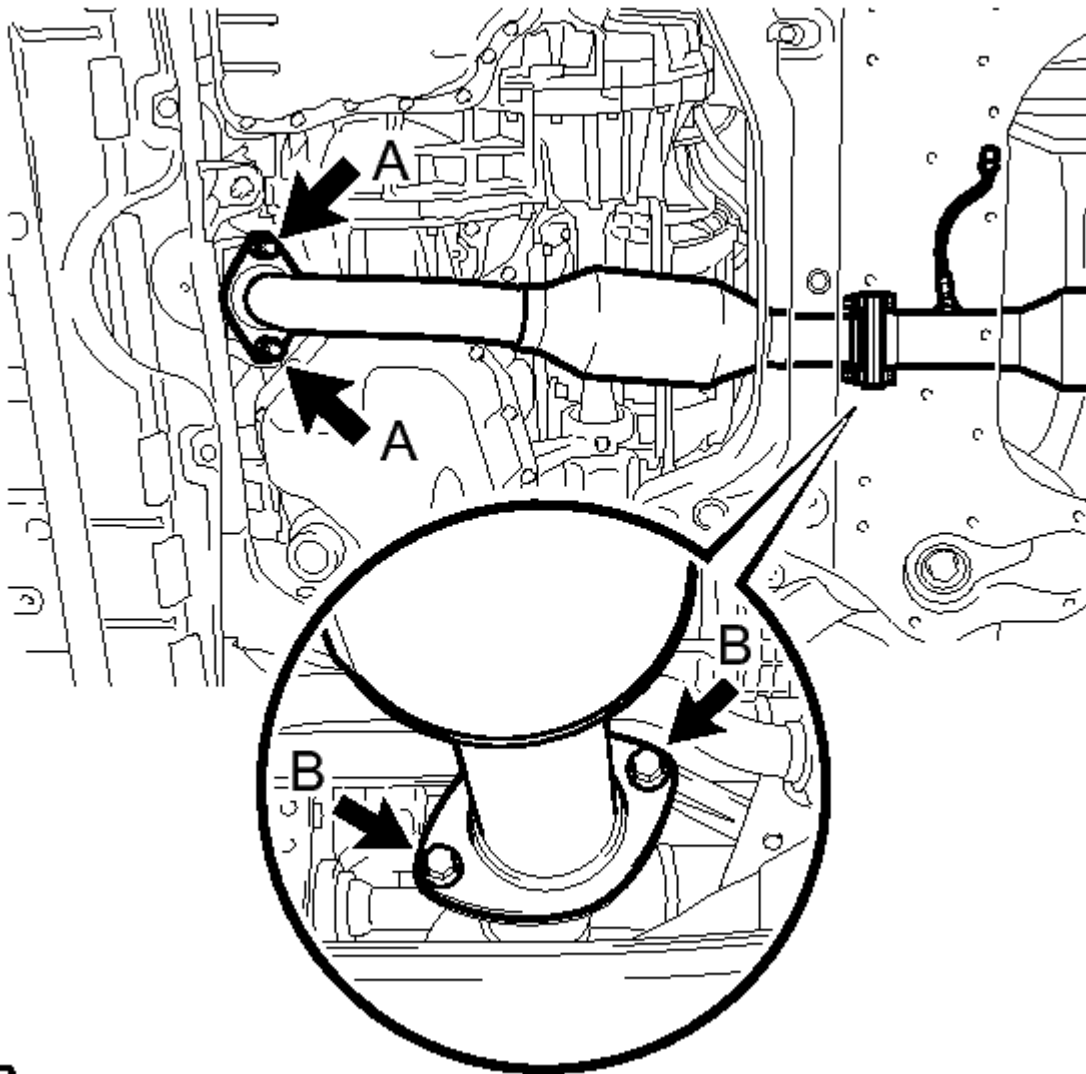
If the length is not as specified, replace the compression spring.

- b. Fully push a new gasket to the exhaust manifold.

NOTE:

- Install the gasket in the correct direction.
- Do not reuse the gasket.
- Do not damage the gasket by dropping it, etc.
- Do not damage the outer surface of the gasket.

- c. Install a new gasket onto the front exhaust pipe assembly.
- d. Install the front exhaust pipe with the 2 compression springs and 4 bolts.



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Fig. 76: Installing Front Exhaust Pipe Compression Springs & Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Bolt A

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

Bolt B

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

9. INSPECT FOR EXHAUST GAS LEAK

10. INSTALL NO. 1 ENGINE UNDER COVER

- a. Install the No. 1 engine under cover with the 2 bolts, 6 screws and 4 clips.

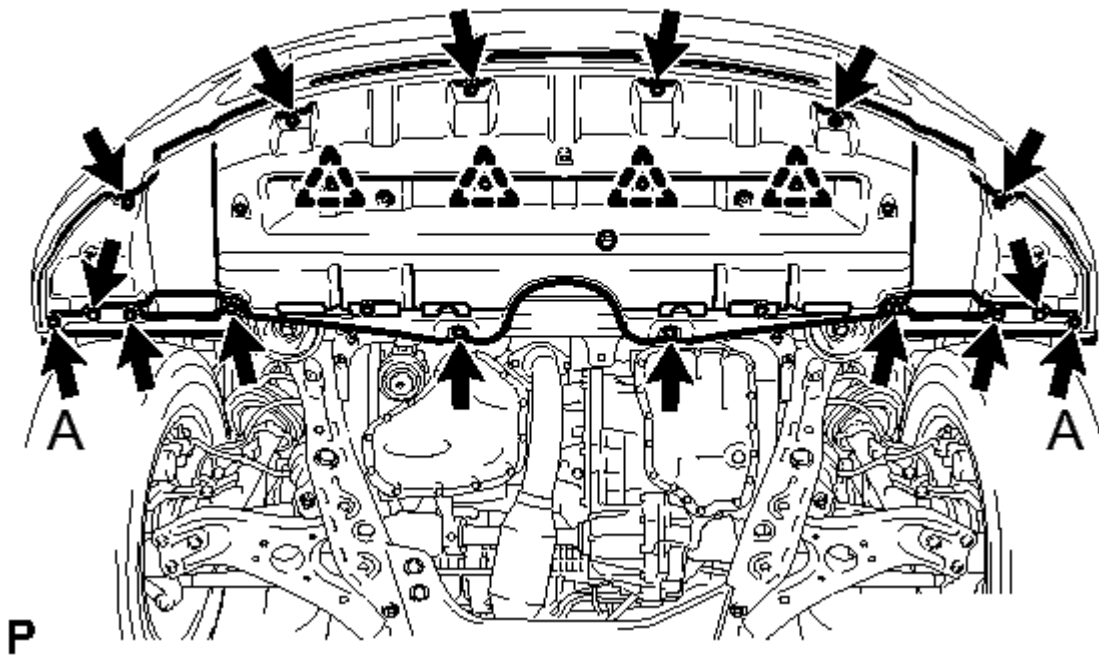


Fig. 77: Installing No. 1 Engine Under Cover Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the front wheel opening extension pad RH and front wheel opening extension pad LH with the 8 screws.

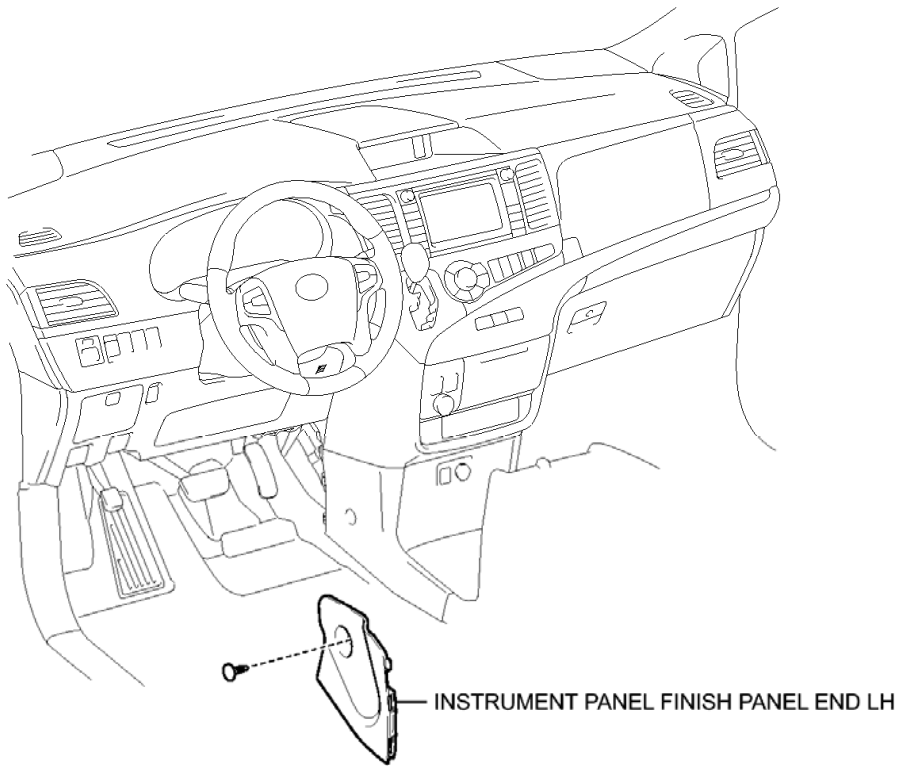
Screw A

Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)

EXHAUST PIPE

COMPONENTS

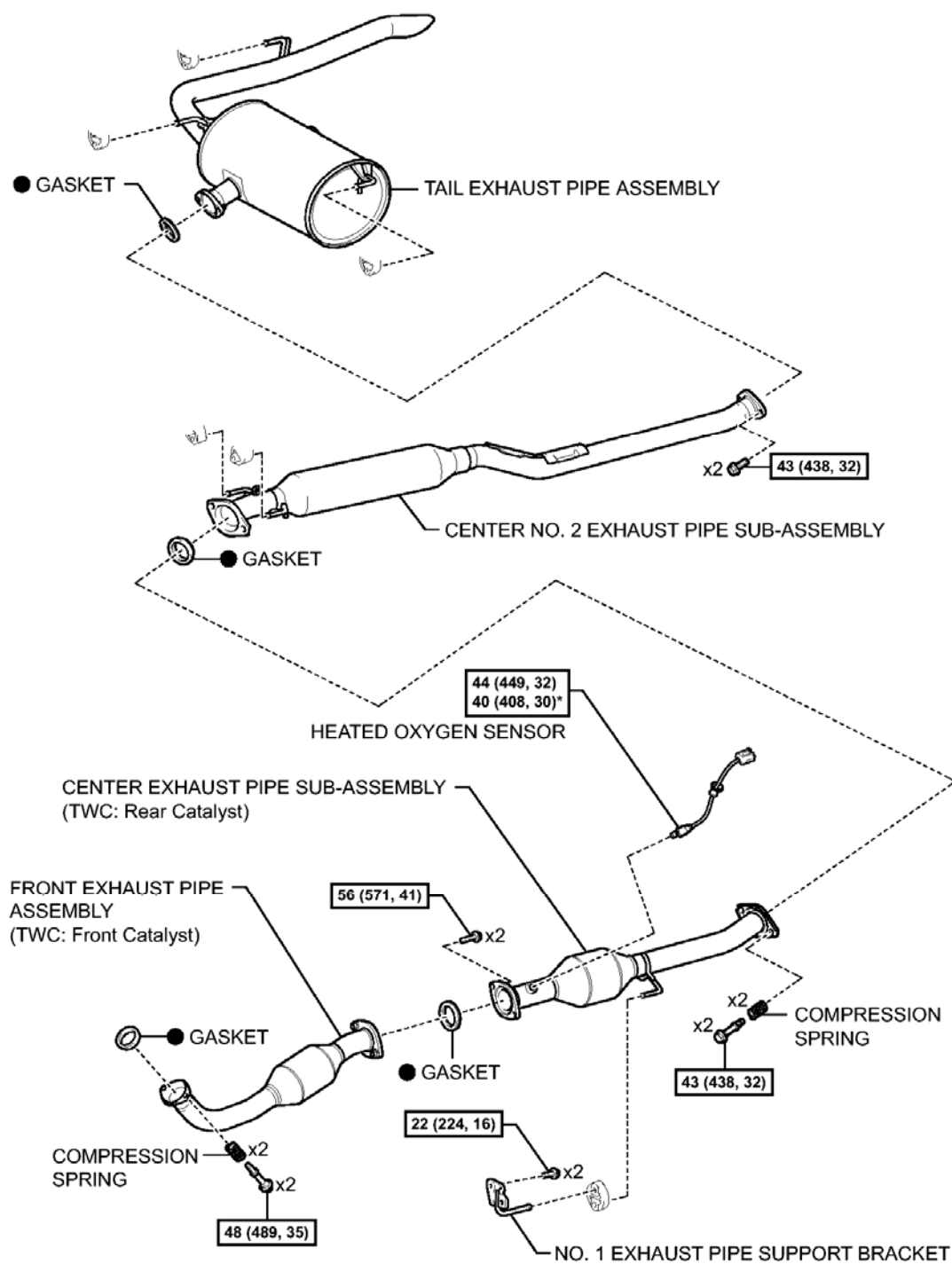
ILLUSTRATION



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Fig. 78: Exhaust Pipe Replacement Components (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



N*m (kgf*cm, ft.*lbf): Specified torque

* For use with SST

● Non-reusable part

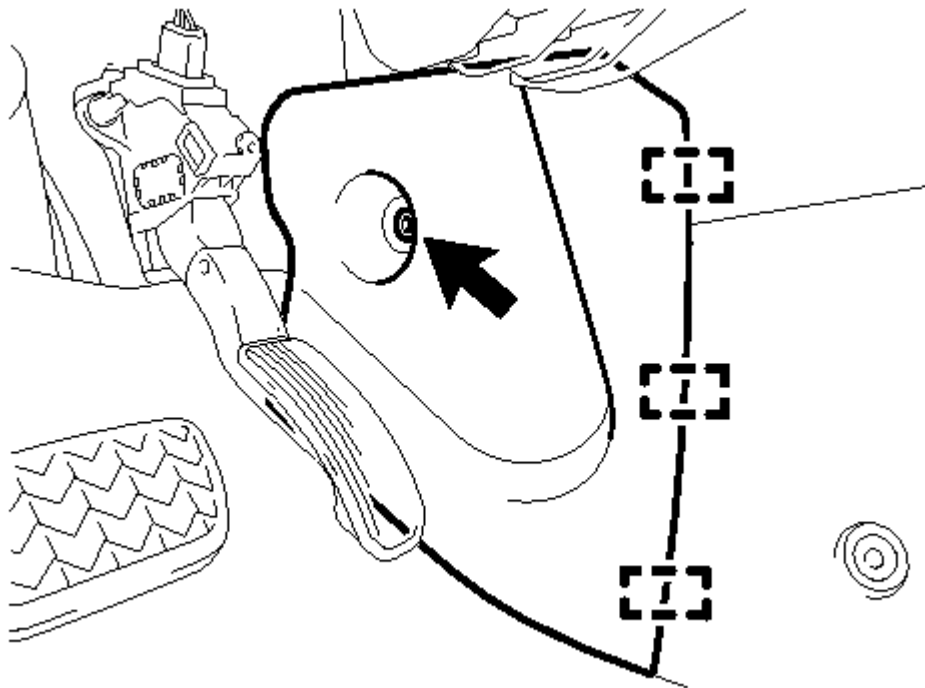
Fig. 79: Exhaust Pipe Replacement Components With Torque Specifications (2 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. REMOVE INSTRUMENT PANEL FINISH PANEL END LH

- a. Using a clip remover, remove the clip.



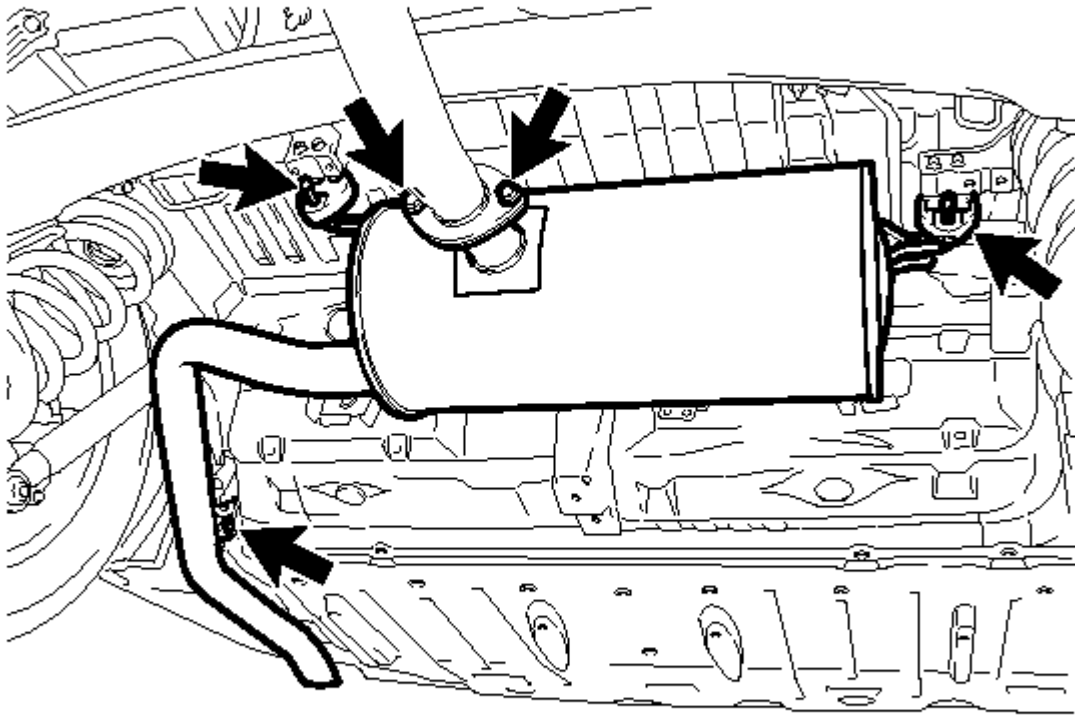
P

Fig. 80: Identifying Instrument Panel Finish Panel End LH Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Disengage the 3 guides and remove the instrument panel finish panel end LH.

2. REMOVE TAIL EXHAUST PIPE ASSEMBLY

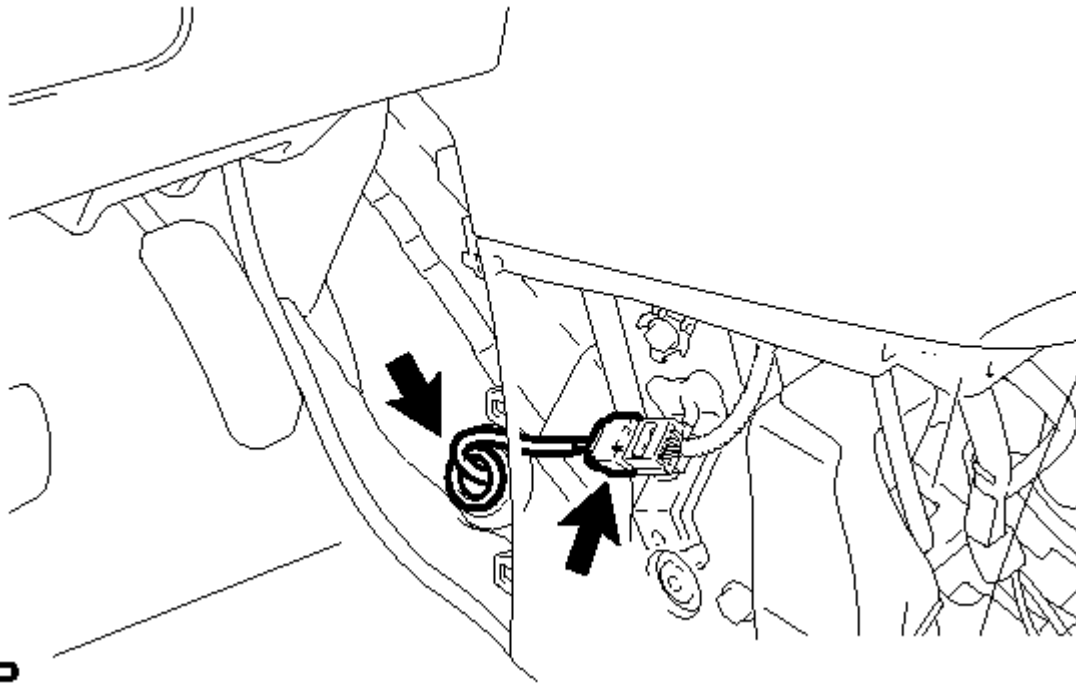
- a. Remove the 2 bolts.



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Fig. 81: Identifying Tail Exhaust Pipe Assembly, Supports & Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

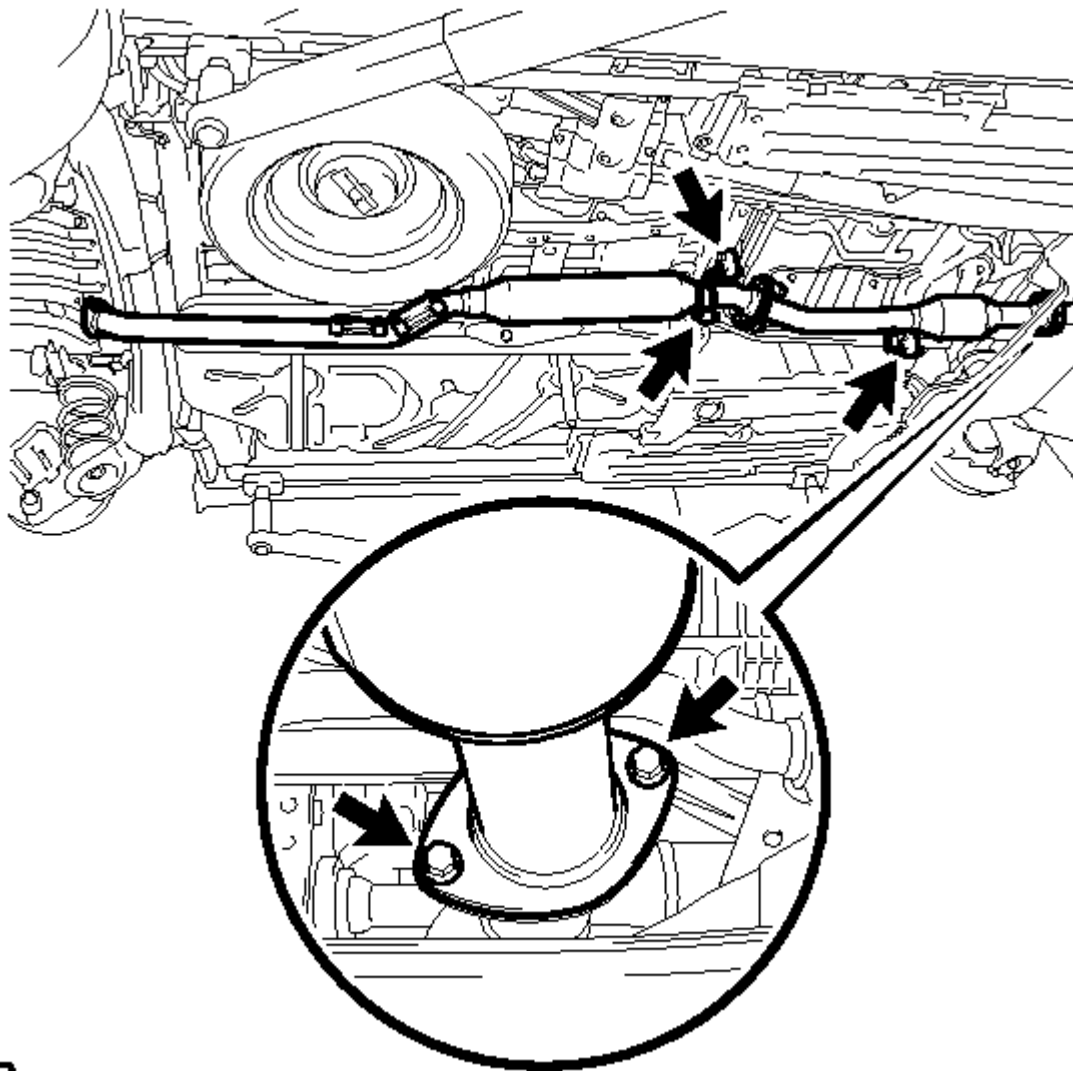
- b. Disconnect the 3 exhaust pipe supports and remove the tail exhaust pipe assembly.
 - c. Remove the gasket from the center exhaust pipe assembly.
- 3. REMOVE CENTER EXHAUST PIPE ASSEMBLY**
- a. Disconnect the heated oxygen sensor connector and pass the grommet through the floor.



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Fig. 82: Identifying Center Exhaust Pipe Assembly Heated Oxygen Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

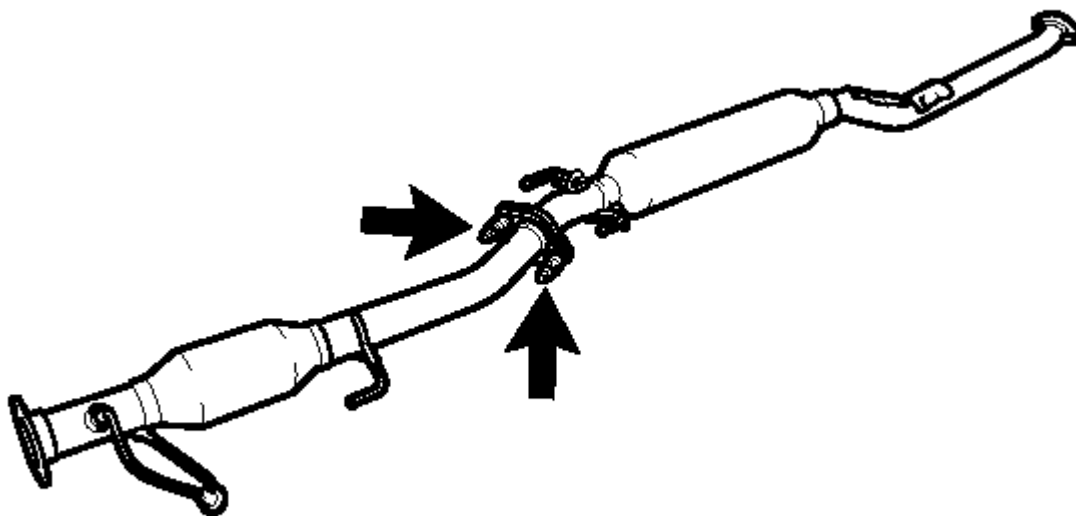
- b. Remove the 2 bolts.



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Fig. 83: Identifying Center Exhaust Pipe Assembly, Supports & Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

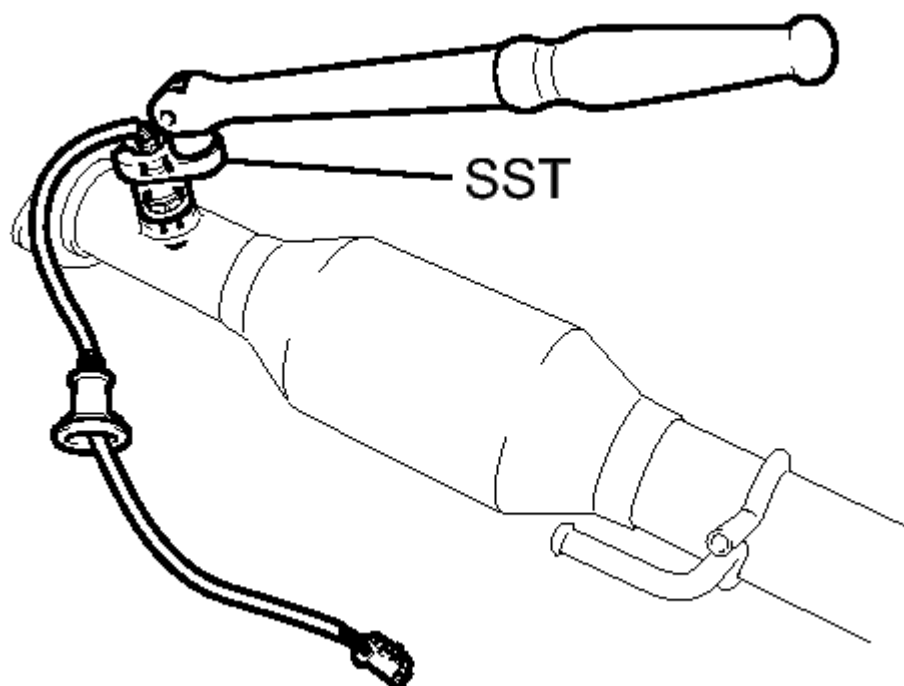
- c. Disconnect the 3 exhaust pipe supports and remove the center exhaust pipe assembly.
- d. Remove the gasket from the front exhaust pipe assembly.
- e. Remove the 2 bolts and 2 compression springs.



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Fig. 84: Identifying Center Exhaust Pipe Assembly Compression Springs & Fasteners
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Remove the gasket from the center exhaust pipe sub-assembly.
- 4. **REMOVE HEATED OXYGEN SENSOR**
 - a. Using SST, remove the heated oxygen sensor from the center exhaust pipe sub-assembly.



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Fig. 85: Removing Heated Oxygen Sensor Using SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- SST: 09224-00010

5. REMOVE FRONT EXHAUST PIPE ASSEMBLY

- Remove the 2 bolts, 2 compression springs and front exhaust pipe assembly.

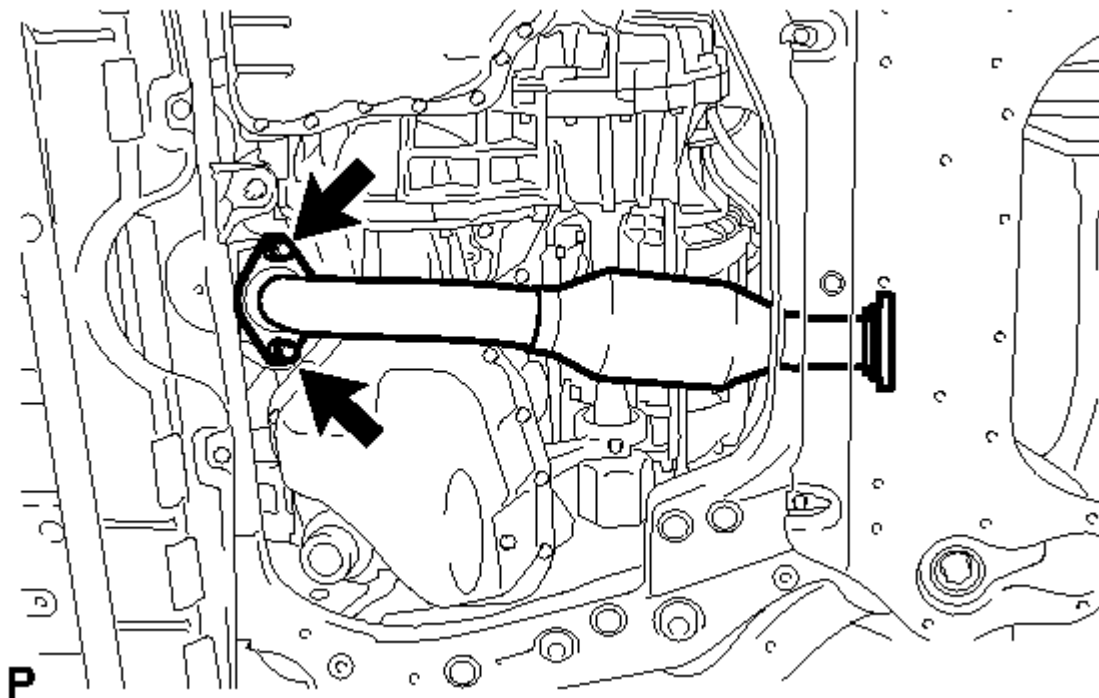


Fig. 86: Identifying Front Exhaust Pipe Assembly, Compression Springs & Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Remove the gasket from the exhaust manifold.

6. REMOVE NO. 1 EXHAUST PIPE SUPPORT BRACKET

- Remove the 2 bolts and No. 1 exhaust pipe support bracket.

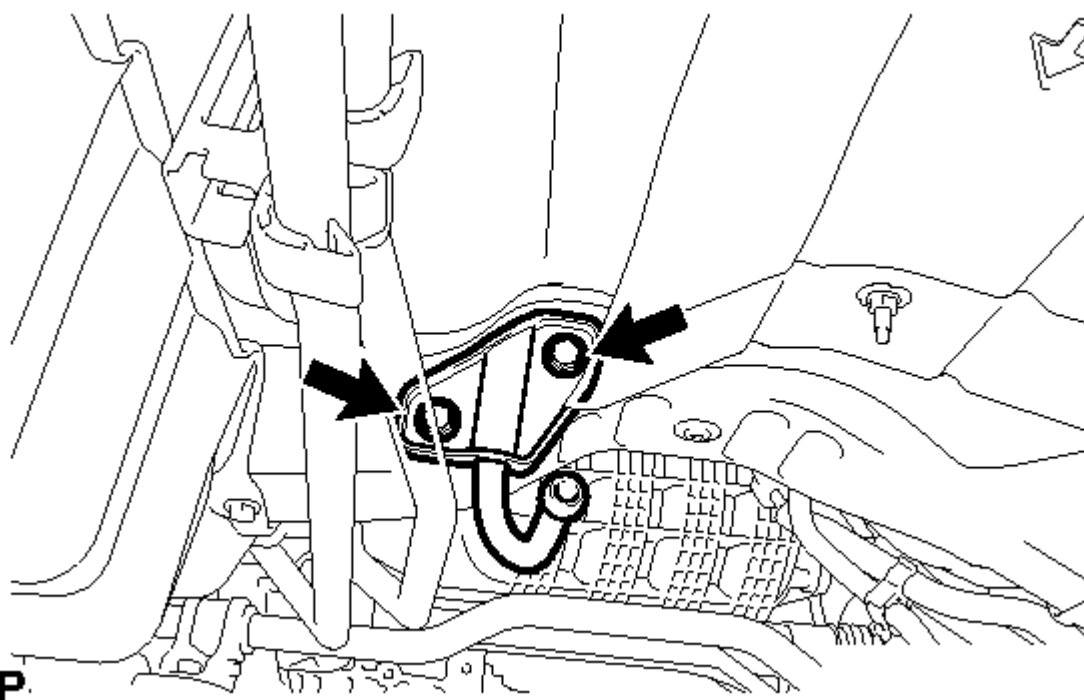


Fig. 87: Identifying No. 1 Exhaust Pipe Support Bracket & Fasteners
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

INSTALLATION

1. INSTALL NO. 1 EXHAUST PIPE SUPPORT BRACKET

- a. Install the No. 1 exhaust pipe support bracket with 2 bolts.

Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)

2. INSTALL FRONT EXHAUST PIPE ASSEMBLY

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

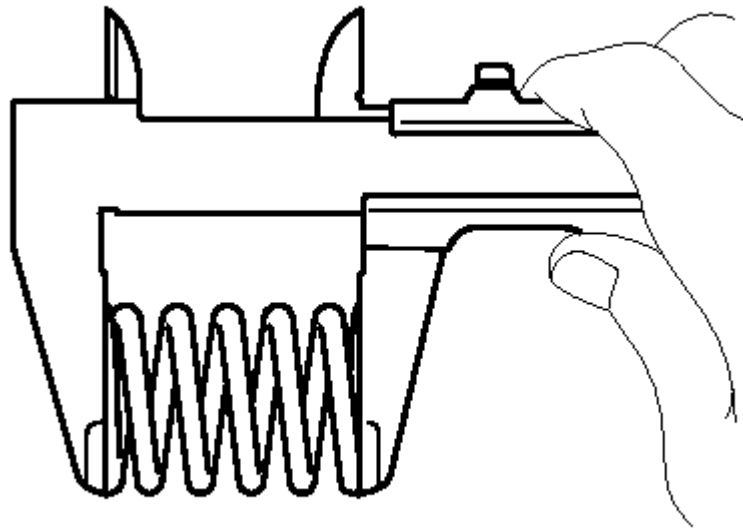


Fig. 88: Measuring Free Length Of Compression Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Minimum Length

41.7 mm (1.642 in.)

If the length is not as specified, replace the compression spring.

- b. Fully push a new gasket onto the exhaust manifold.

NOTE:

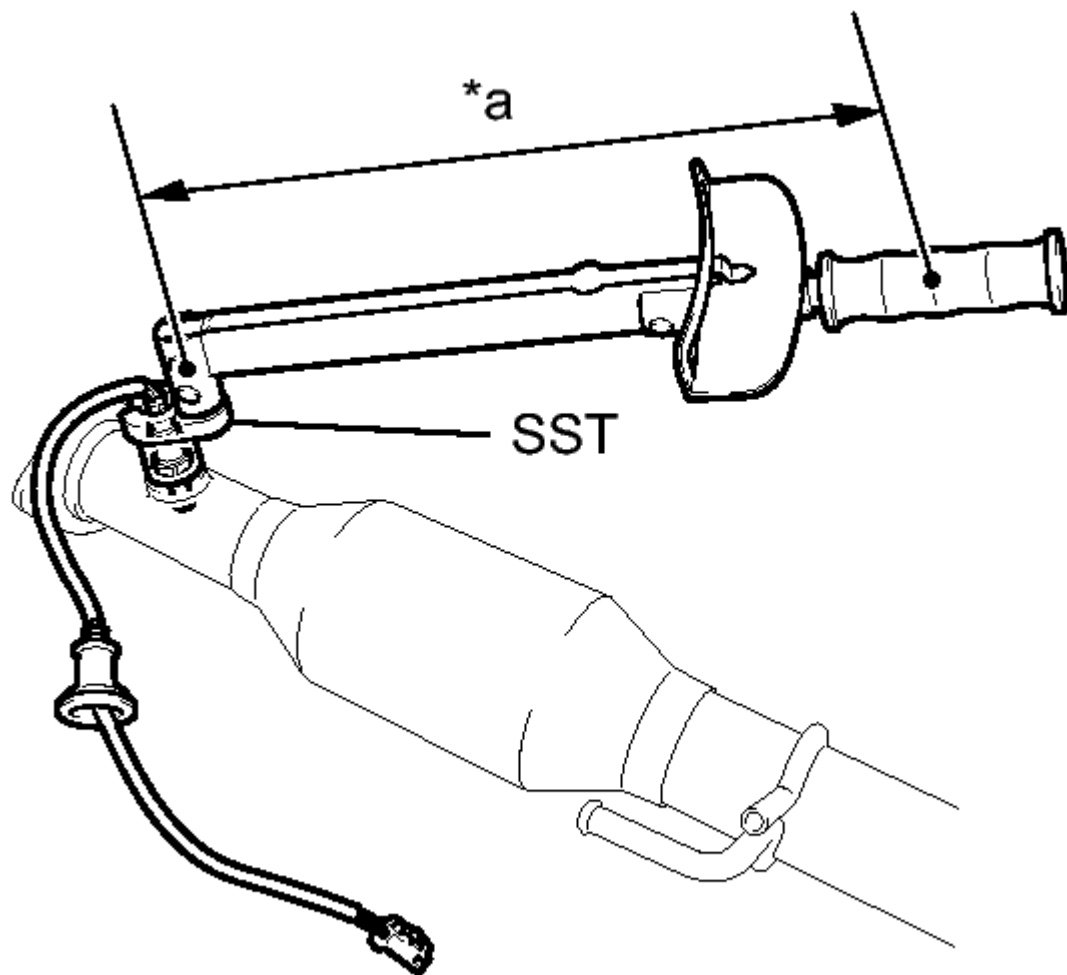
- Install the gasket in the correct direction.
- Do not reuse the gasket.
- Do not damage the gasket by dropping it, etc.
- Do not damage the outer surface of the gasket.

- c. Install the front exhaust pipe assembly with the 2 bolts and 2 compression springs.

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

3. INSTALL HEATED OXYGEN SENSOR

- a. Using SST, install the heated oxygen sensor to the front exhaust pipe assembly.



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Fig. 89: Installing Heated Oxygen Sensor Using SST
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	Fulcrum
	Length

- SST: 09224-00010

without SST

Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)

with SST

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

HINT:

- The "with SST" torque value is effective when using SST with a fulcrum length of 30 mm (1.18 in.).
- The "with SST" torque value is effective when using a torque wrench with a fulcrum length of 300 mm (11.81 in.). Refer to **PRECAUTION** .
- The "with SST" torque value is effective when SST is parallel to the torque wrench.

4. INSTALL CENTER EXHAUST PIPE ASSEMBLY

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

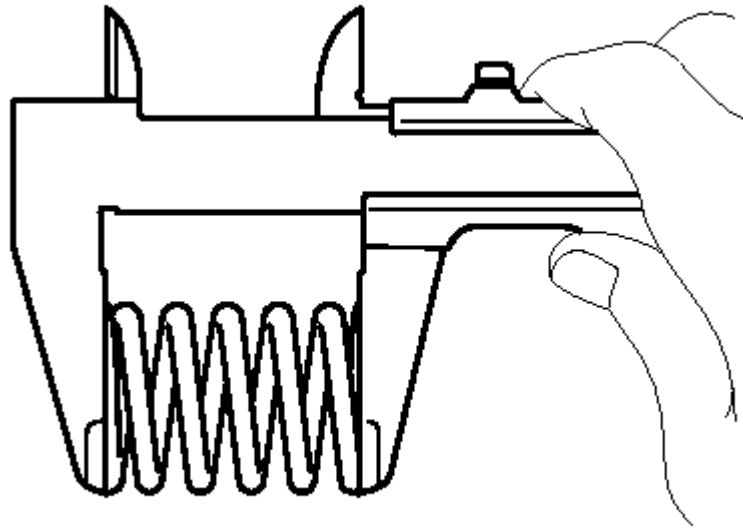


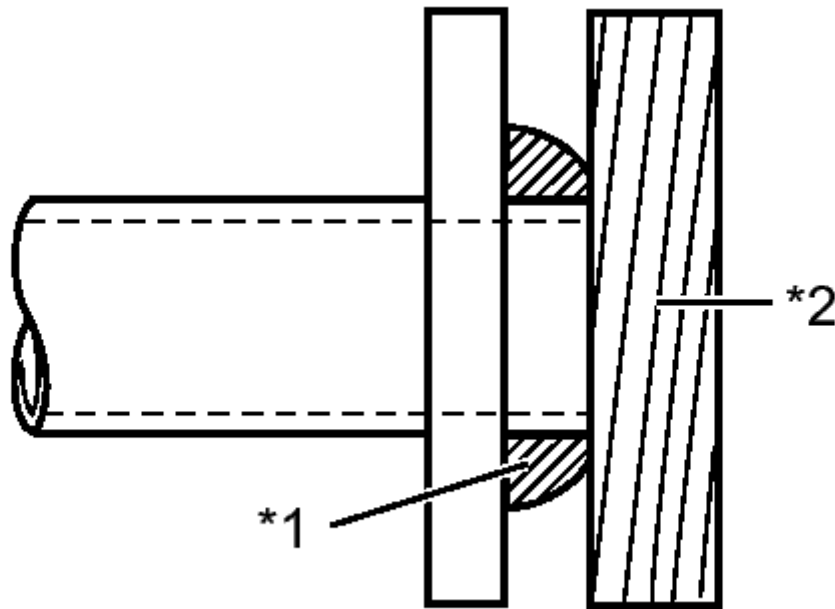
Fig. 90: Measuring Free Length Of Compression Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Minimum Length

39.15 mm (1.5413 in.)

If the length is not as specified, replace the compression spring.

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



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Fig. 91: Identifying Wooden Block & Gasket
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Gasket
*2	Wooden Block

NOTE:

- Install the gasket in the correct direction.
- Do not reuse the gasket.
- Do not damage the gasket by dropping it, etc.
- Do not damage the outer surface of the gasket.
- Do not push in the gasket with the exhaust pipe when connecting it.

- c. Install the center exhaust pipe sub-assembly to the center No. 2 exhaust pipe sub-assembly with the 2 compression springs and 2 bolts.

Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

- d. Install a new gasket to the front exhaust pipe assembly.
 e. Hang the center exhaust pipe assembly with the 3 exhaust pipe supports.
 f. Install the 2 bolts.

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

- g. Pull the oxygen sensor harness through the floor, install the grommet in the floor, and connect the oxygen sensor connector.

5. INSTALL TAIL EXHAUST PIPE ASSEMBLY

- a. Install a new gasket to the center exhaust pipe assembly.
- b. Hang the tail exhaust pipe assembly with the 3 exhaust pipe supports.
- c. Install 2 bolts.

Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

6. INSTALL INSTRUMENT PANEL FINISH PANEL END LH

- a. Engage the 3 guides and install the instrument panel finish panel end LH.
- b. Install the clip.

7. INSPECT FOR EXHAUST GAS LEAK