

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

2009 BRAKES**Brake - Highlander****BRAKE SYSTEM****PRECAUTION****1. TROUBLESHOOTING PRECAUTION****NOTE:**

- Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with those having the same part number or equivalent.
- It is very important to keep parts and the area clean when repairing the brake system.
- If the vehicle is equipped with a mobile communication system, refer to the precautions in the INTRODUCTION article.
- Care must be taken when using magnets as they could affect the performance of the speed sensors.
- Since the brake lines are classified as critical safety related parts, be sure to disassemble and inspect the components if a brake fluid leak is found. If any abnormality is found, replace the component with a new one.
- When removing brake components, cover the brake tube connections to prevent foreign matter such as dust or dirt from entering the tubes.
- Do not damage or deform the brake tubes when removing or installing them.
- When installing a grommet to the body, ensure that the brake tube passes through the center of the grommet.
- When installing a brake tube or flexible hose, ensure that they are free from twists or bends.
- If the cap of a flexible hose does not match the groove on the bracket, twist the hose slightly to insert it.
- Flexible hoses must be free from absorber oil, grease, etc.
- When installing a brake tube to a plastic clamp, ensure that the brake tube is not loose or pinched.
- Do not reuse any clips or plastic clamps removed from a flexible hose.
- After installing a brake tube and flexible hose, ensure that they do not interfere with any other components.
- Do not allow brake fluid to adhere to any painted surface such as the

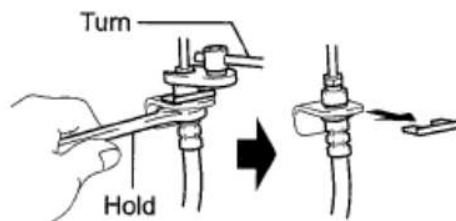
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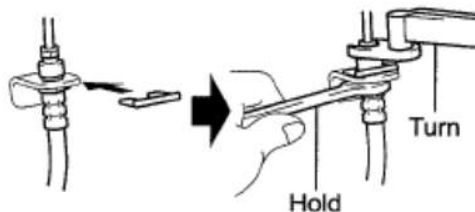
vehicle body. If brake fluid leaks onto any painted surface, immediately wash it off.

- When disconnecting and connecting a flexible hose and brake tube:
 - a. Hold the flexible hose with a wrench and disconnect the brake tube with a union nut wrench without deforming the tube.
 - b. Remove the clip.
 - c. Install a new clip.
 - d. Connect the brake tube with a union nut wrench without deforming the tube.

Disconnecting:



Connecting:



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Fig. 1: Disconnecting And Connecting Flexible Hose And Brake Line

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

- When connecting a brake tube and way:
 - a. Support the way to prevent deformation of the brake tube and connect the brake tube to the way with a union nut wrench.
 - b. Support the way to prevent deformation of the brake tube and install the bolt to secure the way to the body.

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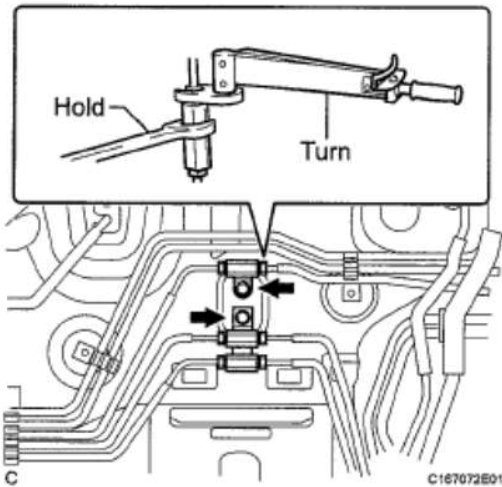


Fig. 2: Connecting Brake Tube Using Union Nut Wrench
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this article .

IGNITION SWITCH POSITION

Expression	Switch Type	
	Ignition Switch (position)	Engine Switch (condition)
Ignition Switch off	LOCK	Off
Ignition Switch on (IG)	ON	On (IG)
Ignition Switch on (ACC)	ACC	On (ACC)
Engine Start	START	Start

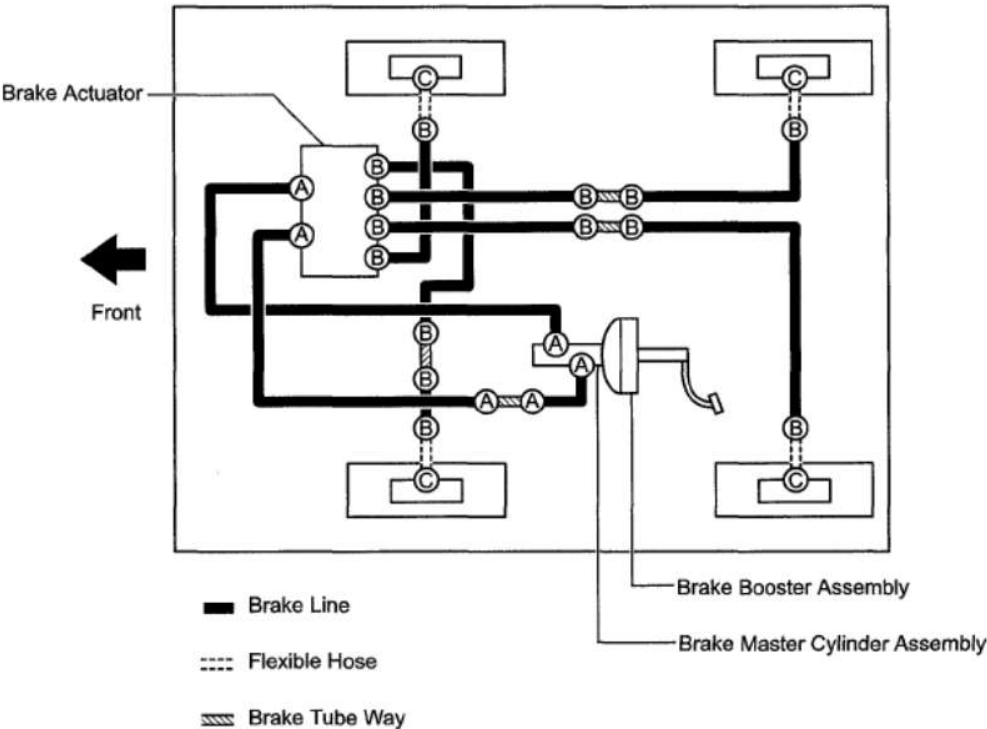
SYSTEM DIAGRAM

HINT:

See the layout drawing to confirm the locations and tightening torque of flexible hoses and brake lines.

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- Ⓐ Union Nut

20 N*m (204 kgf*cm, 15 ft.*lbf)

18 N*m (184 kgf*cm, 13 ft.*lbf)*
- Ⓑ Union Nut

15 N*m (155 kgf*cm, 11 ft.*lbf)

14 N*m (143 kgf*cm, 10 ft.*lbf)*
- Ⓒ Union Bolt

29 N*m (296 kgf*cm, 21 ft.*lbf)

* For use with union nut wrench

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Fig. 3: Brake System Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Brake System

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Symptom	Suspected Area	Refer to
Low or spongy pedal	Fluid leaks in brake system	-
	Air in brake system	<u>BRAKE FLUID</u>
	Piston seals (Worn or damaged) (Front)	<u>FRONT BRAKE</u>
	Piston seals (Worn or damaged) (Rear)	<u>REAR BRAKE</u>
	Master cylinder (Faulty)	<u>BRAKE MASTER CYLINDER</u>
	Booster push rod (Adjustment necessary)	<u>BRAKE MASTER CYLINDER</u>
Brake drag	Brake pedal free play (Insufficient)	<u>BRAKE PEDAL</u>
	Parking brake pedal travel (Out of adjustment)	<u>PARKING BRAKE SYSTEM</u>
	Parking brake cable (Sticking)	<u>REMOVAL</u>
	Parking brake shoe clearance (Out of adjustment)	<u>PARKING BRAKE SYSTEM</u>
	Pad (Cracked or distorted) (Front)	<u>FRONT BRAKE</u>
	Pad (Cracked or distorted) (Rear)	<u>REAR BRAKE</u>
	Piston (Stuck) (Front)	<u>FRONT BRAKE</u>
	Piston (Stuck) (Rear)	<u>REAR BRAKE</u>
	Piston (Seized) (Front)	<u>FRONT BRAKE</u>
	Piston (Seized) (Rear)	<u>REAR BRAKE</u>
	Vacuum leaks in booster system	<u>BRAKE BOOSTER</u>
	Master cylinder (Faulty)	<u>BRAKE MASTER CYLINDER</u>
	Booster push rod (Adjustment necessary)	<u>BRAKE MASTER CYLINDER</u>
Brake pull	Piston (Stuck) (Front)	<u>FRONT BRAKE</u>
	Piston (Stuck) (Rear)	<u>REAR BRAKE</u>
	Pad (Oily) (Front)	<u>FRONT BRAKE</u>
	Pad (Oily) (Rear)	<u>REAR BRAKE</u>
	Piston (Seized) (Front)	<u>FRONT BRAKE</u>
	Piston (Seized) (Rear)	<u>REAR BRAKE</u>
	Disc (Scored) (Front)	<u>FRONT BRAKE</u>
	Disc (Scored) (Rear)	<u>REAR BRAKE</u>
	Pad (Cracked or distorted) (Front)	<u>FRONT BRAKE</u>
	Pad (Cracked or distorted) (Rear)	<u>REAR BRAKE</u>
	Fluid leaks in brake system	-
	Air in brake system	<u>BRAKE FLUID</u>
	Pad (Worn) (Front)	<u>FRONT BRAKE</u>
	Pad (Worn) (Rear)	<u>REAR BRAKE</u>
	Pad (Cracked or distorted) (Front)	<u>FRONT BRAKE</u>

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Hard pedal but inefficient braking	Pad (Cracked or distorted) (Rear)	<u>REAR BRAKE</u>
	Pad (Oily) (Front)	<u>FRONT BRAKE</u>
	Pad (Oily) (Rear)	<u>REAR BRAKE</u>
	Pad (Glazed) (Front)	<u>FRONT BRAKE</u>
	Pad (Glazed) (Rear)	<u>REAR BRAKE</u>
	Disc (Scored) (Front)	<u>FRONT BRAKE</u>
	Disc (Scored) (Rear)	<u>REAR BRAKE</u>
	Vacuum leaks in booster system	<u>BRAKE BOOSTER</u>
	Ejector tube	<u>EJECTOR TUBE (FOR 1AR-FE)</u>
	No. 1 vacuum switching valve assembly	<u>VACUUM SWITCHING VALVE (FOR 1AR-FE)</u>
Noise from brakes	Pad (Cracked or distorted) (Front)	<u>FRONT BRAKE</u>
	Pad (Cracked or distorted) (Rear)	<u>REAR BRAKE</u>
	Cylinder mounting bolt (Loose) (Front)	<u>FRONT BRAKE</u>
	Cylinder mounting bolt (Loose) (Rear)	<u>REAR BRAKE</u>
	Disc (Scored) (Front)	<u>FRONT BRAKE</u>
	Disc (Scored) (Rear)	<u>REAR BRAKE</u>
	Pad support plate (Loose) (Front)	<u>FRONT BRAKE</u>
	Pad support plate (Loose) (Rear)	<u>REAR BRAKE</u>
	Sliding pin (Worn) (Front)	<u>FRONT BRAKE</u>
	Sliding pin (Worn) (Rear)	<u>REAR BRAKE</u>
	Pad (Dirty) (Front)	<u>FRONT BRAKE</u>
	Pad (Dirty) (Rear)	<u>REAR BRAKE</u>
	Pad (Glazed) (Front)	<u>FRONT BRAKE</u>
	Pad (Glazed) (Rear)	<u>REAR BRAKE</u>
	Anti-squeal shim (Damaged) (Front)	<u>FRONT BRAKE</u>
	Anti-squeal shim (Damaged) (Rear)	<u>REAR BRAKE</u>

BRAKE FLUID**ON-VEHICLE INSPECTION****1. INSPECT FLUID LEVEL**

- a. Check the fluid level.

If brake fluid level is lower than the MIN line, check for leaks and inspect the disc brake pads. If necessary, refill the reservoir with brake fluid to the MAX line after repair or replacement.

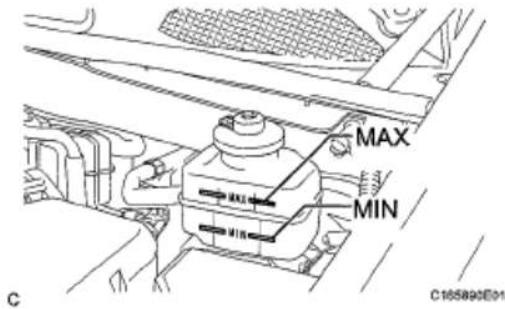
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Fig. 4: Identifying Fluid Levels

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

Brake Fluid:

SAE J1703 or FMVSS No. 116 DOT 3

REPLACEMENT

HINT:

If any work is performed on the brake system or if air in the brake lines is suspected, bleed the brake system.

NOTE:

- Move the shift lever to the P position and apply the parking brake before bleeding the brakes.
- Add brake fluid to keep the level between the MIN and MAX lines of the reservoir while bleeding the brakes.
- If brake fluid leaks onto any painted surface, immediately wash it off.

1. FILL BRAKE FLUID RESERVOIR

- a. Fill the reservoir with brake fluid.

Brake Fluid:

SAE J1703 or FMVSS No. 116 DOT 3

NOTE:

Make sure that there is sufficient brake fluid in the reservoir.

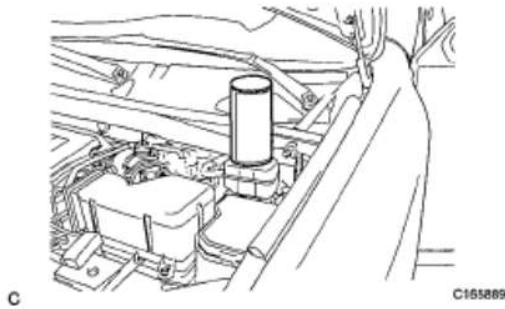
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Fig. 5: Locating Master Cylinder Reservoir Filler Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. BLEED BRAKE MASTER CYLINDER**NOTE:**

- If the master cylinder is reinstalled or if the reservoir becomes empty, bleed the master cylinder.
- To prevent brake fluid from adhering, cover the painted surfaces with a shop rag or a piece of cloth.

- a. Using a union nut wrench (12 mm), disconnect the 2 brake lines from the master cylinder.



Fig. 6: Locating Brake Master Cylinder Assembly Brake Tubes
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Slowly depress the brake pedal and hold it (*1).

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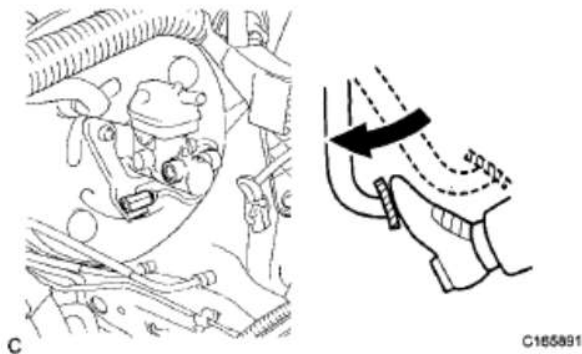


Fig. 7: Depressing Brake Pedal

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

- c. Cover the 2 outer holes with fingers, and release the brake pedal (*2).
- d. Repeat (*1) and (*2) 3 or 4 times.



Fig. 8: Depressing Brake Pedal

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

- e. Using a union nut wrench (12 mm), connect the 2 brake lines to the master cylinder.

Torque: without union nut wrench

20 N*m (204 kgf*cm, 15 ft.*lbf)

with union nut wrench

18 N*m (184 kgf*cm, 13 ft.*lbf)

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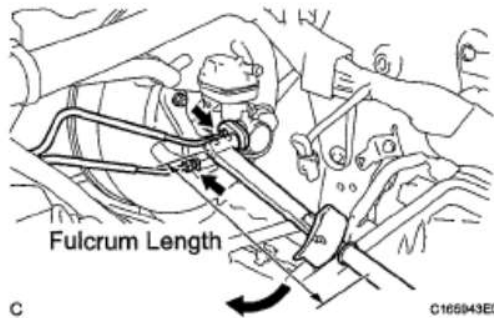


Fig. 9: Locating Brake Master Cylinder Assembly Brake Tubes
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when the union nut wrench is parallel to the torque wrench.

3. BLEED BRAKE LINE

NOTE:

- Bleed the brake line of the wheel farthest from the master cylinder first.
 - Add brake fluid to keep the level between the MIN and MAX lines of the reservoir while bleeding the brakes.
- Connect a vinyl tube to the bleeder plug.
 - Depress the brake pedal several times, and then loosen the bleeder plug with the pedal depressed (*3).

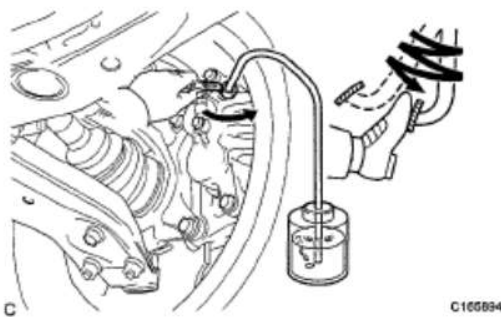


Fig. 10: Connecting Vinyl Tube To Bleeder Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- When fluid stops coming out, tighten the bleeder plug, and then release the brake pedal (*4).
- Repeat (*3) and (*4) until all the air in the fluid is completely bled out.
- Tighten the bleeder plug completely.

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Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

- f. Repeat the above procedure for each wheel to bleed the brake line.

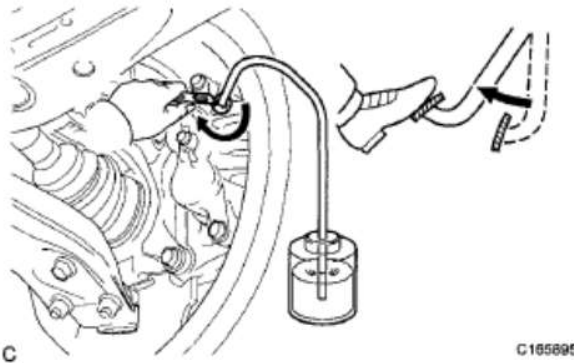


Fig. 11: Tightening Bleeder Plug

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

4. BLEED BRAKE ACTUATOR

NOTE: After bleeding the brake system, if the specified height or feel of the brake pedal cannot be obtained, bleed the brake actuator assembly with Techstream by following the procedure below.

- Depress the brake pedal more than 20 times with the ignition switch off.
- Connect Techstream to the DLC3, and then turn the ignition switch on (IG).

NOTE: Do not start the engine.

- Turn Techstream on and select "AIR BLEEDING" on the screen.

NOTE:

- Refer to the Techstream operator's manual for further details.
- Bleed the air by following the steps displayed on Techstream.

- Bleed the air according to "Step 1: Increase Line" on the Techstream display.

NOTE:

- Make sure that the master cylinder reservoir tank does not run out of brake fluid.
- Add brake fluid to keep the level between the MIN and MAX lines of the reservoir while bleeding the brakes.

- Connect a vinyl tube to either one of the bleeder plugs.
- Depress the brake pedal several times, and then loosen the bleeder plug connected to the vinyl tube with the pedal depressed (*5).

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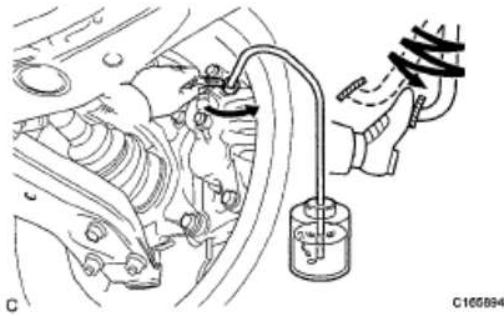


Fig. 12: Connecting Vinyl Tube To Bleeder Plug

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

3. When fluid stops coming out, tighten the bleeder plug, and then release the brake pedal
4. Repeat (*5) and (*6) until all the air in the fluid is completely bled out.
5. Tighten the bleeder plug completely.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

6. Repeat the above procedure for the rest of the wheels to bleed the brake lines.

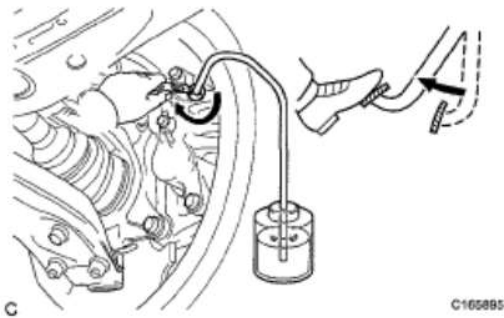


Fig. 13: Tightening Bleeder Plug

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

- e. Bleed the suction line according to "Step 2: Inhalation Line" on the Techstream display.

NOTE:

- Bleed the suction line by following the steps displayed on Techstream.
- Add brake fluid to keep the level between the MIN and MAX lines of the reservoir while bleeding the brakes.

1. Connect a vinyl tube to the bleeder plug at the right front wheel or the right rear wheel and loosen the bleeder plug.
2. Operate the brake actuator assembly to bleed the air using Techstream (*7).

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NOTE:

- During this step, be sure to release the brake pedal.
- The actuator operation stops automatically in 4 seconds.

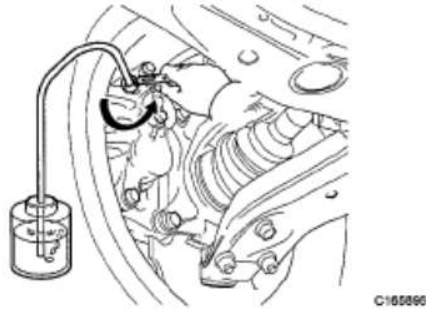


Fig. 14: Connecting Vinyl Tube To Bleeder Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Check that the actuator operation has stopped by referring to the Techstream display, and tighten the bleeder plug (*8).
4. Repeat (*7) and (*8) until all the air in the fluid is completely bled out.
5. Tighten the bleeder plug completely.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

6. For the rest of the wheels, bleed the air in the same way as stated in the above procedure.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

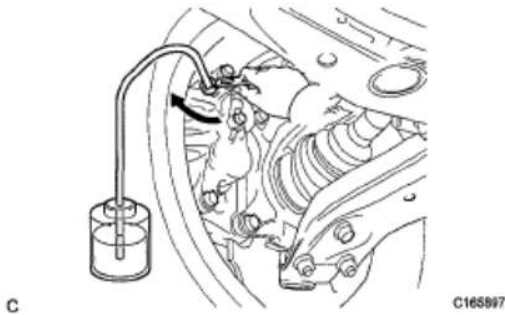


Fig. 15: Tightening Bleeder Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Bleed the pressure reduction line according to "Step 3: Decrease Line" on the Techstream display.

NOTE:

- Bleed the pressure reduction line by following the steps displayed on Techstream.
- Add brake fluid to keep the level between the MIN and MAX lines

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of the reservoir while bleeding the brakes.

1. Connect a vinyl tube to either one of the bleeder plugs.
2. Loosen the bleeder plug (*9).
3. While keeping the brake pedal fully depressed, operate the brake actuator assembly using Techstream.

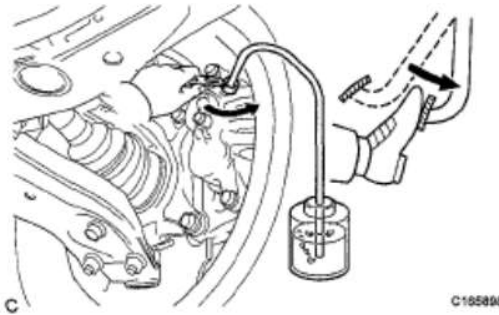


Fig. 16: Depressing Brake Actuator Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- The actuator operation stops automatically in 4 seconds. When performing this procedure continuously, an interval of at least 20 seconds is required.
 - After the operation is completed, the brake pedal goes down slightly. This is a normal phenomenon when the solenoid opens.
 - During this procedure, the pedal seems heavy, but completely depress it so that the brake fluid comes out from the bleeder plug.
 - Be sure to keep the brake pedal depressed. Never depress and release the pedal repeatedly.
4. Tighten the bleeder plug, and then release the brake pedal (*10).
 5. Repeat steps (*9) to (*10) until all the air in the fluid is completely bled out.
 6. Tighten the bleeder plug completely.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

7. Repeat the above procedures for the rest of the brakes to bleed the brake lines.

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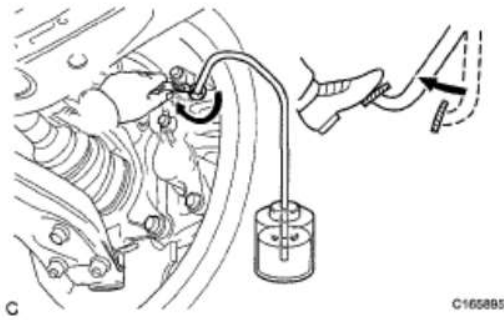


Fig. 17: Tightening Bleeder Plug

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

- g. Bleed the brake lines again according to "Step 4: Increase Line" on the Techstream display.

NOTE:

- Bleed the air by following the steps displayed on Techstream.
- Add brake fluid to keep the level between the MIN and MAX lines of the reservoir while bleeding the brakes.

1. Connect a vinyl tube to either one of the bleeder plugs.
2. Depress the brake pedal several times, and then loosen the bleeder plug connected to the vinyl tube with the pedal depressed (*11).

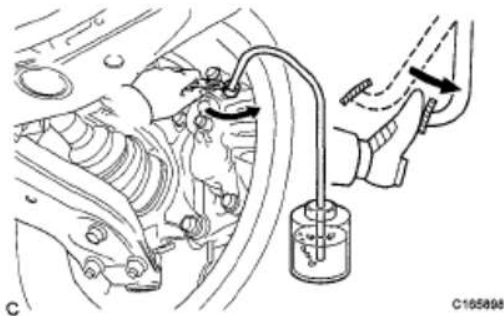


Fig. 18: Depressing Brake Actuator Assembly

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

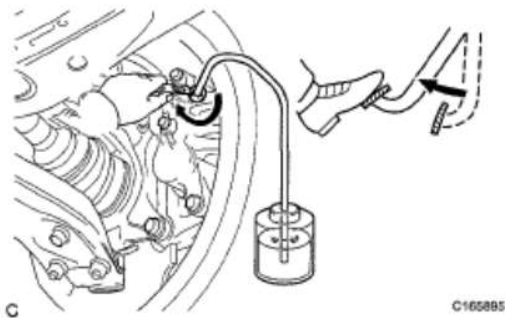
3. When fluid stops coming out, tighten the bleeder plug, and then release the brake pedal
4. Repeat (*11) and (*12) until all the air in the fluid is completely bled out.
5. Tighten the bleeder plug completely.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

6. Repeat the above procedures for each brake to bleed the brake lines.

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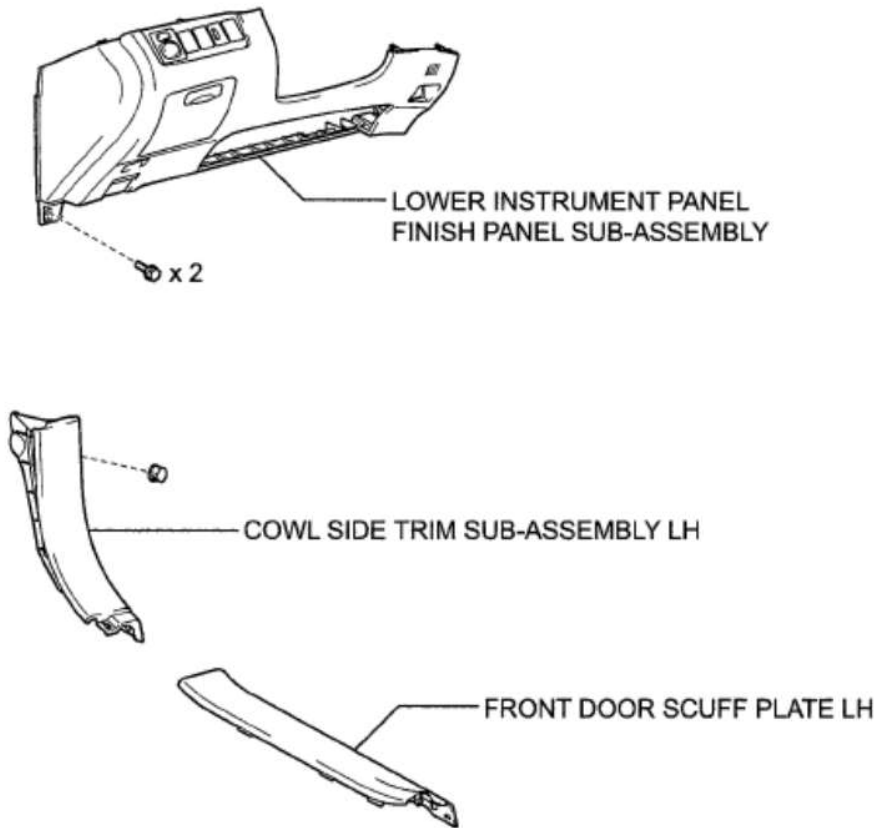
**Fig. 19: Tightening Bleeder Plug****Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.**

- h. Finish "AIR BLEEDING" on Techstream, and then turn off Techstream.
 - i. Disconnect Techstream from the DLC3.
 - j. Turn the ignition switch off.
5. **INSPECT FLUID LEVEL** (See **ON-VEHICLE INSPECTION**)
6. **INSPECT FOR BRAKE FLUID LEAK**

BRAKE PEDAL**COMPONENTS**

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Fig. 20: Identifying Brake Pedal Components With Torque Specification (1 Of 2)
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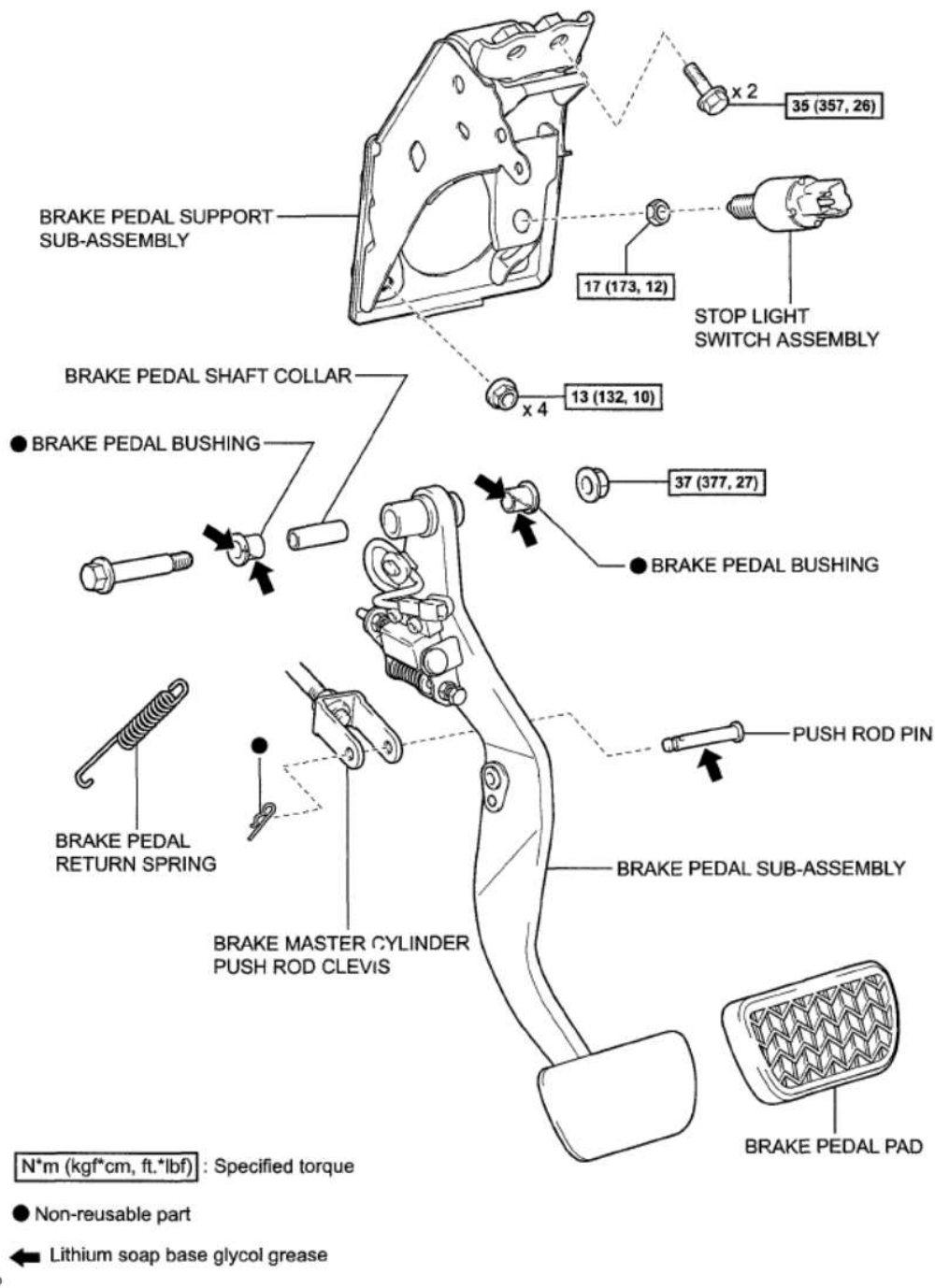


Fig. 21: Identifying Brake Pedal Components With Torque Specification (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE LH (See REMOVAL)
2. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See REMOVAL)

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3. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System) (See REMOVAL)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System) (See REMOVAL)**
5. **REMOVE BRAKE PEDAL RETURN SPRING**
 - a. Remove the brake pedal return spring from the push rod pin and instrument panel reinforcement.
6. **REMOVE STOP LIGHT SWITCH ASSEMBLY (See INSPECTION)**
7. **SEPARATE BRAKE MASTER CYLINDER PUSH ROD CLEVIS**
 - a. Remove the clip and push rod pin, and separate the brake master cylinder push rod clevis from the brake pedal sub-assembly.

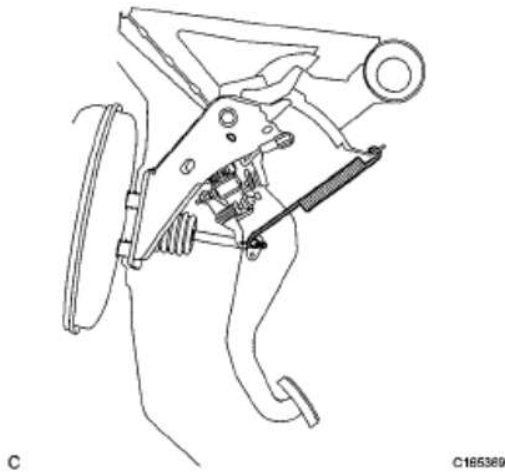


Fig. 22: Identifying Brake Pedal Return Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **REMOVE BRAKE PEDAL SUPPORT SUB-ASSEMBLY**
 - a. Disconnect the brake pedal load sensing switch connector and disengage the clamp.

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Fig. 23: Locating Brake Pedal Load Sensing Switch Connector And Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 2 bolts and separate the brake pedal support sub-assembly from the instrument panel reinforcement.



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Fig. 24: Locating Brake Pedal Support Sub-Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 4 nuts and brake pedal support sub-assembly from the body.

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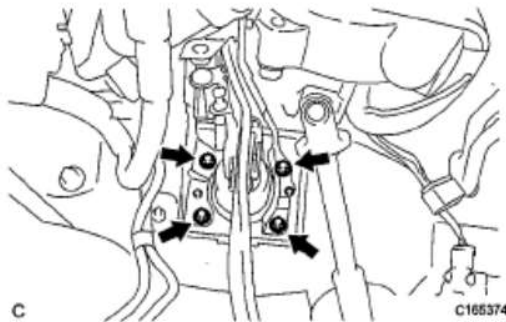


Fig. 25: Locating Brake Pedal Support Sub-Assembly Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. REMOVE BRAKE PEDAL SUB-ASSEMBLY

- a. Disengage the 2 clamps.



Fig. 26: Identifying Brake Pedal Sub-Assembly Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the bolt, nut and brake pedal sub-assembly from the brake pedal support sub-assembly.

2. REMOVE BRAKE PEDAL SHAFT COLLAR

- a. Remove the brake pedal shaft collar from the brake pedal sub-assembly.

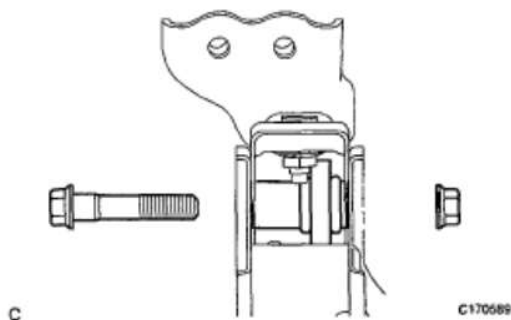


Fig. 27: Identifying Brake Pedal Sub-Assembly Bolt

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

3. REMOVE BRAKE PEDAL BUSHING

- a. Remove the 2 brake pedal bushings from the brake pedal sub-assembly.

4. REMOVE BRAKE PEDAL PAD

- a. Remove the brake pedal pad from the brake pedal sub-assembly.

ADJUSTMENT**1. INSPECT AND ADJUST BRAKE PEDAL HEIGHT**

- a. Check the brake pedal height.
 1. Turn back the carpet.
 2. Measure the shortest distance between the brake pedal surface and tibia pad.

Pedal height from tibia pad:

148.8 to 158.8 mm (5.858 to 6.252 in.)

- b. Adjust the brake pedal height.
 1. Disconnect the stop light switch connector.
 2. Remove the stop light switch assembly.
 3. Loosen the push rod clevis lock nut.
 4. Adjust the brake pedal height by turning the push rod.
 5. Tighten the push rod clevis lock nut.

Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

6. Install and adjust the stop light switch (See **INSTALLATION**).

NOTE: Do not depress the brake pedal.

7. Connect the stop light switch connector.

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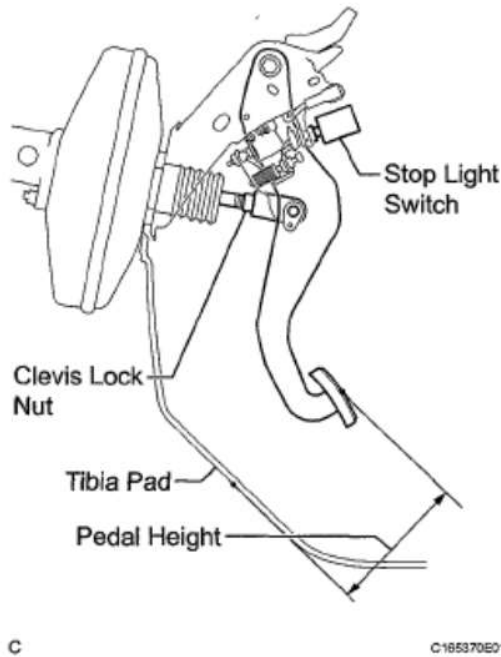


Fig. 28: Adjusting Brake Pedal Height
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSPECT BRAKE PEDAL FREE PLAY

- Stop the engine. Depress the pedal several times until no vacuum is left in the brake booster. Release the brake pedal.
- Depress the pedal until a slight resistance is felt. Measure the distance as shown in the illustration.

Pedal free play:

1.0 to 6.0 mm (0.039 to 0.236 in.)

If the pedal free play is not as specified, check the stop light switch clearance (See **INSTALLATION**). If the pedal free play is as specified, proceed to the "3 INSPECT BRAKE PEDAL RESERVE DISTANCE" procedure.

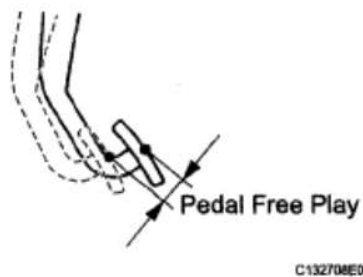


Fig. 29: Inspecting Pedal Free Play
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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3. INSPECT BRAKE PEDAL RESERVE DISTANCE

HINT:

Measure the distance at the same point used for the brake pedal height inspection.

- a. Release the parking brake lever.
- b. With the engine running, depress the brake pedal and measure the pedal reserve distance as shown in the illustration.

Pedal reserve distance from the tibia pad at 500 N (51 kgf, 112 lbf):

84.4 mm (3.32 in.)

If the distance is not as specified, troubleshoot the brake system (See **PROBLEM SYMPTOMS TABLE**).

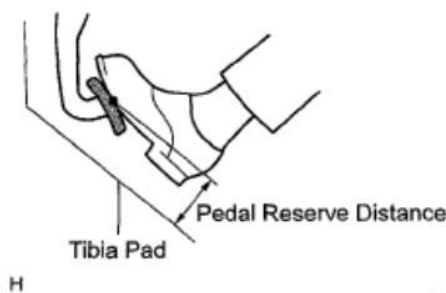


Fig. 30: Inspecting Brake Pedal Reserve Distance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY

1. INSTALL BRAKE PEDAL PAD

- a. Install the brake pedal pad.

2. INSTALL BRAKE PEDAL BUSHING

- a. Apply lithium soap base glycol grease to 2 new brake pedal bushings.
- b. Install the 2 brake pedal bushings to the brake pedal sub-assembly.

3. INSTALL BRAKE PEDAL SHAFT COLLAR

- a. Install the brake pedal shaft collar to the brake pedal sub-assembly.

4. INSTALL BRAKE PEDAL SUB-ASSEMBLY

- a. Install the brake pedal sub-assembly to the brake pedal support sub-assembly with the bolt and nut as shown in the illustration.

Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

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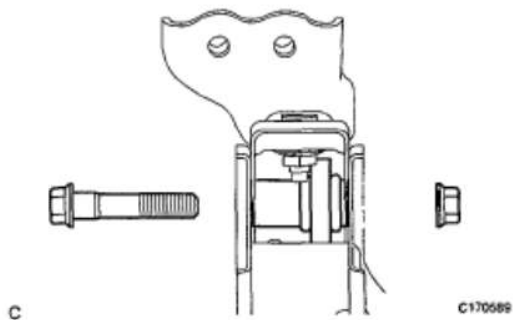


Fig. 31: Identifying Brake Pedal Sub-Assembly Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Engage the 2 clamps.



Fig. 32: Identifying Brake Pedal Sub-Assembly Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL BRAKE PEDAL SUPPORT SUB-ASSEMBLY

- a. Install the brake pedal support sub-assembly with the 4 nuts.

Torque: 13 N*m (132 kgf*cm, 10 ft.*lbf)

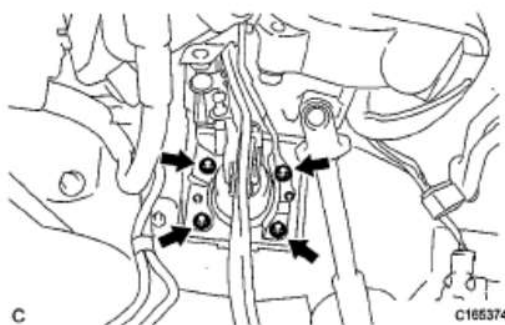


Fig. 33: Locating Brake Pedal Support Sub-Assembly Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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- b. Install the brake pedal support sub-assembly to the instrument panel reinforcement with the 2 bolts.

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

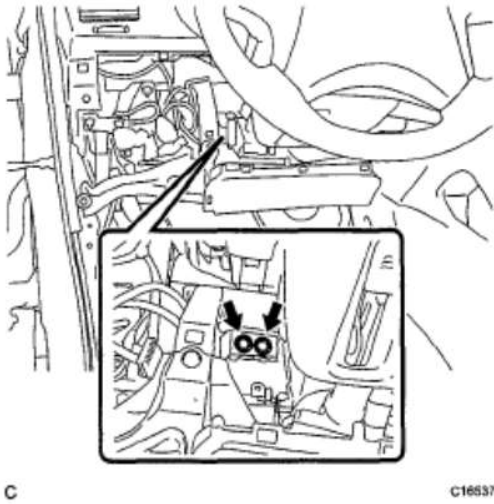


Fig. 34: Locating Brake Pedal Support Sub-Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the brake pedal load sensing switch connector and engage the clamp.

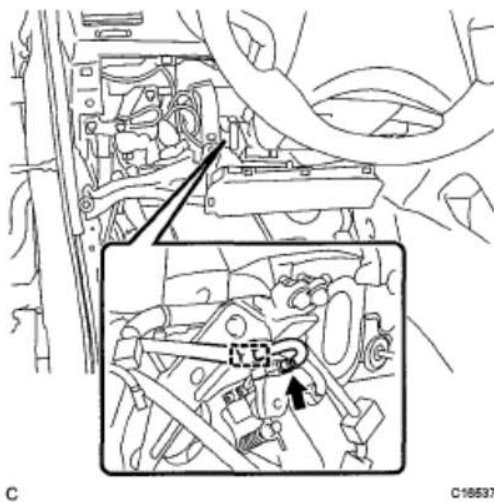


Fig. 35: Locating Brake Pedal Load Sensing Switch Connector And Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. CONNECT BRAKE MASTER CYLINDER PUSH ROD CLEVIS

- Apply lithium soap base glycol grease to the push rod pin.
- Connect the brake master cylinder push rod clevis to the brake pedal with the push rod pin, and install a new clip as shown in the illustration.

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Fig. 36: Applying Lithium Soap Base Glycol Grease To Push Rod Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL BRAKE PEDAL RETURN SPRING

- a. Install the brake pedal return spring between the instrument panel reinforcement and brake master cylinder push rod clevis.

4. INSTALL STOP LIGHT SWITCH ASSEMBLY (See INSTALLATION)

5. INSPECT AND ADJUST BRAKE PEDAL HEIGHT (See ADJUSTMENT)

6. INSPECT BRAKE PEDAL FREE PLAY (See ADJUSTMENT)

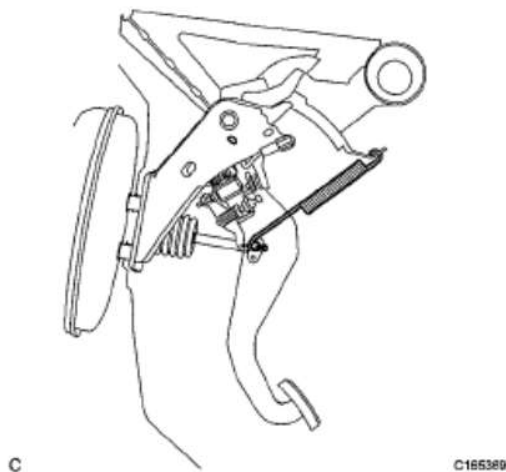


Fig. 37: Identifying Brake Pedal Return Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSPECT BRAKE PEDAL RESERVE DISTANCE (See ADJUSTMENT)

8. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System) (See INSTALLATION)

9. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System) (See INSTALLATION)

10. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See INSTALLATION)

11. INSTALL FRONT DOOR SCUFF PLATE LH (See INSTALLATION)

BRAKE MASTER CYLINDER

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COMPONENTS

for 1AR-FE:

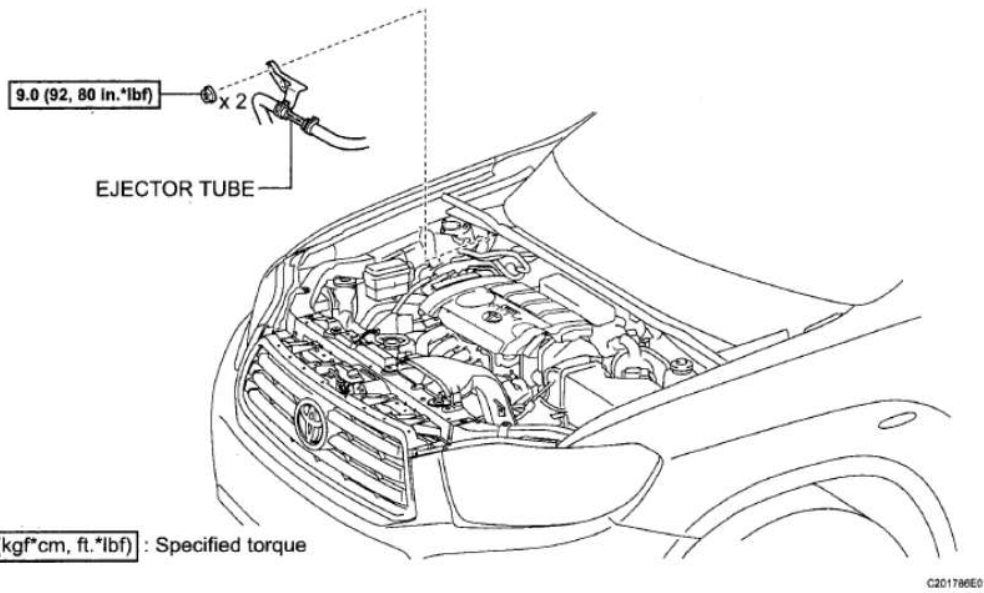
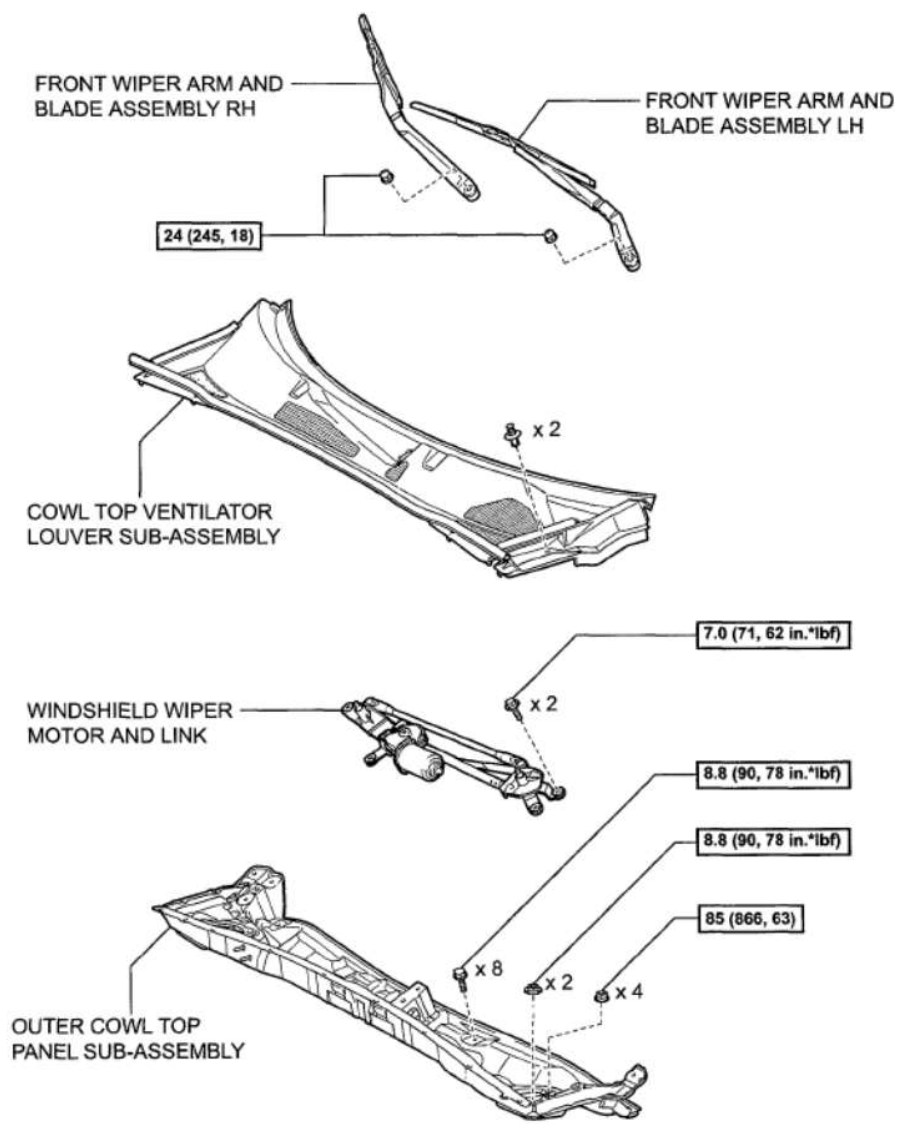


Fig. 38: Identifying Brake Master Cylinder Components With Torque Specification (1 Of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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Fig. 39: Identifying Brake Master Cylinder Components With Torque Specification (2 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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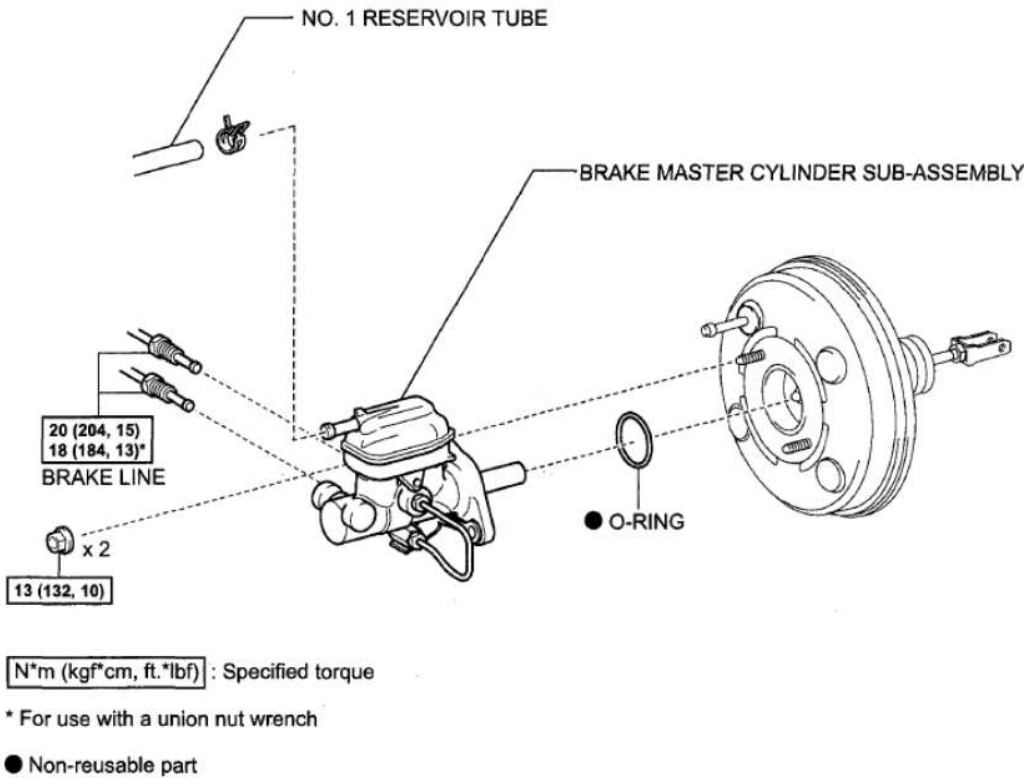
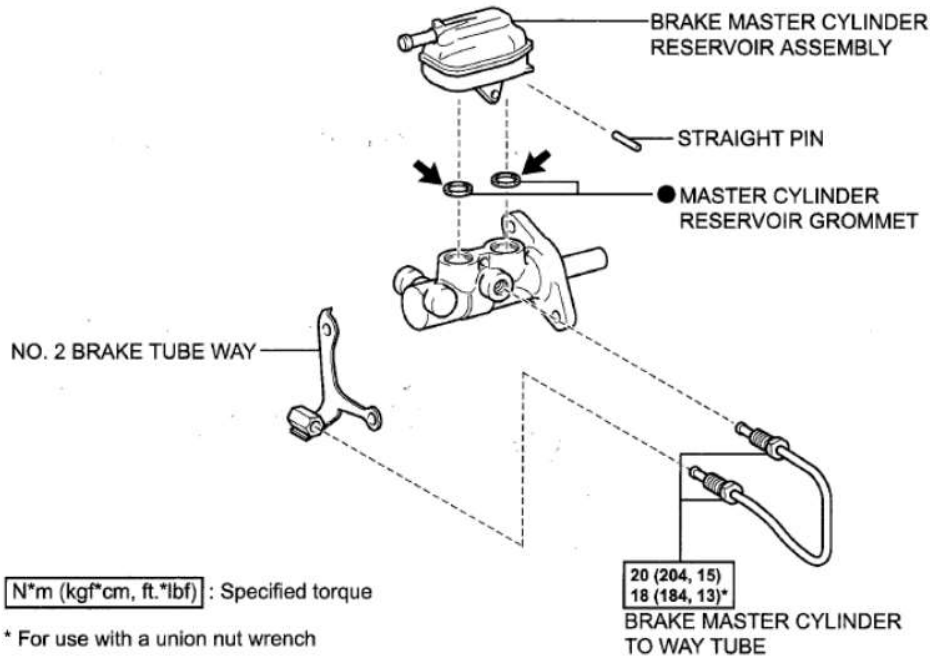


Fig. 40: Identifying Brake Master Cylinder Components With Torque Specification (3 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Fig. 41: Identifying Brake Master Cylinder Components With Torque Specification (4 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

NOTE: Release the vacuum from the booster by depressing the brake pedal several times. Then remove the brake master cylinder sub-assembly from the brake booster assembly.

1. **SEPARATE EJECTOR TUBE (for 1AR-FE)**
 - a. Remove the 2 nuts and separate the ejector tube.
2. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See [REMOVAL](#))
3. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See [REMOVAL](#))
4. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See [REMOVAL](#))

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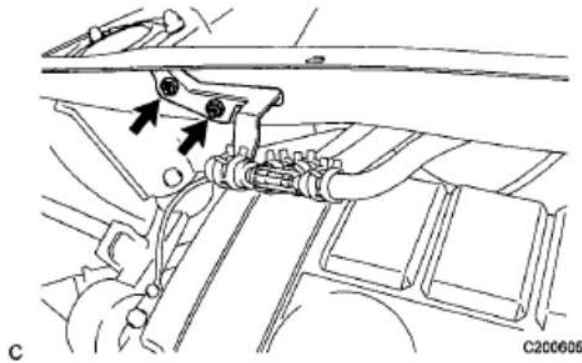


Fig. 42: Locating Ejector Tube Nuts

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

5. **REMOVE WINDSHIELD WIPER MOTOR AND LINK** (See REMOVAL)
6. **REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY** (See REMOVAL)
7. **DRAIN BRAKE FLUID**
8. **DISCONNECT NO. 1 RESERVOIR TUBE**
 - a. Slide the clip and disconnect the No. 1 reservoir tube from the brake master reservoir assembly.
9. **DISCONNECT BRAKE LINE**
 - a. Using a union nut wrench (12 mm), disconnect the 2 brake lines from the brake master cylinder sub-assembly.



Fig. 43: Locating Brake Master Cylinder Assembly Brake Tubes

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

10. **REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY**
 - a. Remove the 2 nuts and brake master cylinder sub-assembly.
 - b. Remove the O-ring from the brake master cylinder sub-assembly.

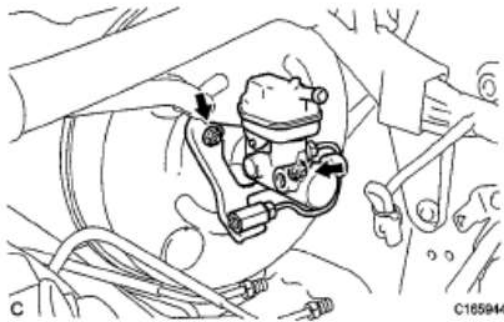
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Fig. 44: Identifying Brake Master Cylinder Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- The master cylinder requires careful handling. Do not allow the master cylinder to receive any impact, such as from being dropped. Do not reuse a master cylinder that has been dropped.
- Do not strike or pinch the master cylinder piston, and do not cause any damage to the master cylinder piston by any other means.
- When installing the master cylinder to the brake booster, or when removing the master cylinder from the brake booster, make sure that the master cylinder is kept horizontal or its tip faces downward (the piston faces upward) to prevent the master cylinder piston from falling out.
- Do not allow any foreign objects to contaminate the master cylinder piston. If a foreign object gets on the piston, remove it by using a shop rag or a piece of cloth and then apply an even layer of lithium soap base glycol grease around the circumference (sliding part) of the piston.
- Do not use any other type of grease or fluid.

DISASSEMBLY**1. REMOVE BRAKE MASTER CYLINDER TO WAY TUBE**

- a. Mount the brake master cylinder sub-assembly in a vise.

NOTE:

Place aluminum plates on the vise to prevent damage to the brake master cylinder sub-assembly.

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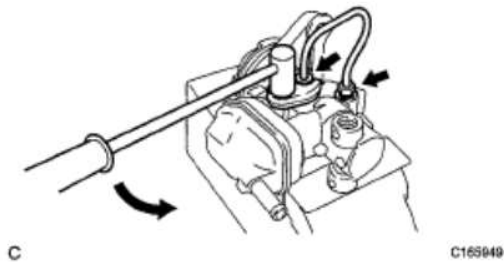


Fig. 45: Mounting Brake Master Cylinder Sub-Assembly In Vise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a union nut wrench (12 mm), remove the brake master cylinder to way tube from the No. 2 brake tube way and brake master cylinder body.

2. REMOVE NO. 2 BRAKE TUBE WAY

- a. Remove the No. 2 brake tube way from the brake master cylinder body.

3. REMOVE BRAKE MASTER CYLINDER RESERVOIR ASSEMBLY

- a. Mount the brake master cylinder sub-assembly in a vise.

NOTE: Place aluminum plates on the vise to prevent damage to the brake master cylinder sub-assembly.

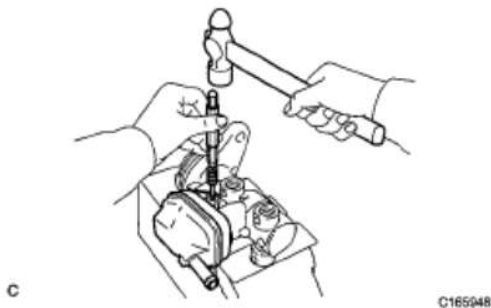


Fig. 46: Tapping Straight Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a pin punch and a hammer, tap out the straight pin, and remove the brake master cylinder reservoir assembly.

4. REMOVE MASTER CYLINDER RESERVOIR GROMMET

- a. Remove the 2 master cylinder reservoir grommets from the brake master cylinder reservoir assembly.

INSPECTION

1. INSPECT AND ADJUST BRAKE BOOSTER PUSH ROD

NOTE: Make an adjustment with no vacuum in the brake booster assembly.

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(Depress the brake pedal several times with the engine stopped.)

HINT:

- Adjustment of the brake booster push rod is required when the brake master cylinder sub-assembly is replaced with a new one.
 - Adjustment is not necessary when the removed brake master cylinder sub-assembly is reused and the brake booster assembly is replaced with a new one.
- a. Apply chalk to the tip of the accessory tool.

HINT:

An accessory tool is enclosed with a new brake master cylinder sub-assembly.

- b. Place the accessory tool on the brake booster assembly.
- c. Measure the clearance between the brake booster push rod and accessory tool.

Standard clearance:

0 mm (0 in.)

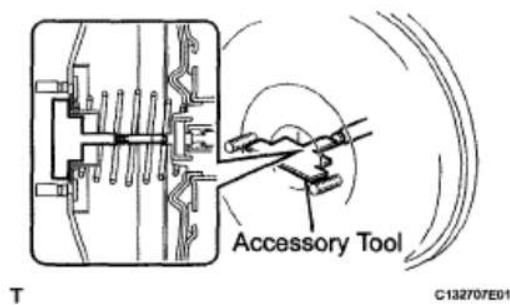


Fig. 47: Placing Accessory Tool On Brake Booster Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

Adjust the clearance in the following cases:

- If there is a clearance between the accessory tool and the shell of the brake booster (floating accessory tool), the push rod is protruding too far.
 - If the chalk does not stick on the tip of the brake booster push rod, the push rod protrusion is insufficient.
- d. If the clearance is not as specified, adjust the push rod length by holding the rod using SST and turning the tip of the rod using a socket driver (7 mm).

SST 09737-00020

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HINT:

Check the push rod clearance again after adjustment.

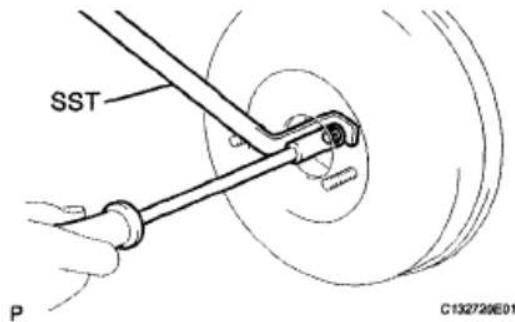


Fig. 48: [Turning Tip Rod Using Socket Driver]
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY

1. INSTALL MASTER CYLINDER RESERVOIR GROMMET

- Apply lithium soap base glycol grease to 2 new master cylinder reservoir grommets.
- Install the 2 master cylinder reservoir grommets to the brake master cylinder reservoir assembly.

2. INSTALL BRAKE MASTER CYLINDER RESERVOIR ASSEMBLY

- Install the brake master cylinder reservoir assembly to the master cylinder body.
- Mount the brake master cylinder sub-assembly in a vise.

NOTE: Place aluminum plates on the vise to prevent damage to the brake master cylinder sub-assembly.

- Using a pin punch and a hammer, tap in the straight pin.

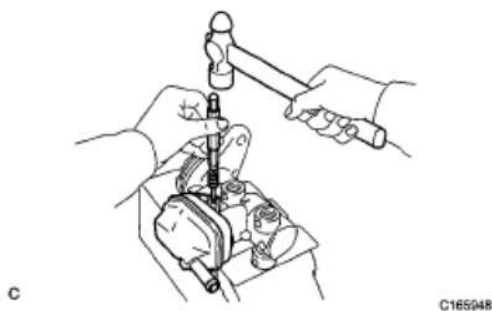


Fig. 49: Tapping Straight Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL NO. 2 BRAKE TUBE WAY

- Install the No. 2 brake tube way to the brake master cylinder body.

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4. INSTALL BRAKE MASTER CYLINDER TO WAY TUBE

- Secure the No. 2 brake tube way to the brake master cylinder body with the 2 bolts, 2 nuts and 4 washers as shown in the illustration.

Torque: 13 N*m (132 kgf*cm, 10 ft.*lbf)

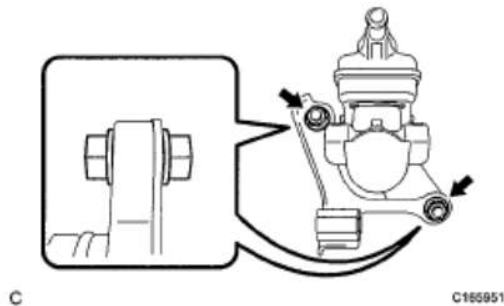


Fig. 50: Locating Brake Master Cylinder Body With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Mount the brake master cylinder sub-assembly in a vise.

NOTE: Place aluminum plates on the vise to prevent damage to the brake master cylinder sub-assembly.

- Using a union nut wrench (12 mm), install the brake master cylinder to way tube to the brake master cylinder body and No. 2 brake tube way.

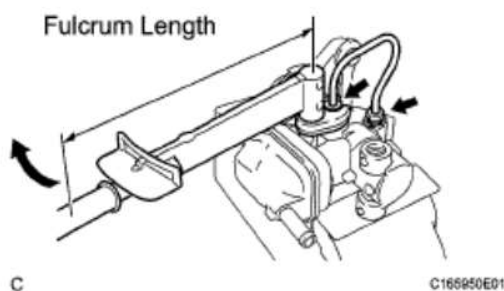


Fig. 51: Identifying Torque Wrench With Fulcrum Length
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: without union nut wrench

20 N*m (204 kgf*cm, 15 ft.*lbf)

with union nut wrench

18 N*m (184 kgf*cm, 13 ft.*lbf)

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NOTE:

- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when the union nut wrench is parallel to the torque wrench.

d. Remove the 2 bolts, 2 nuts and 4 washers.

INSTALLATION

1. **INSPECT AND ADJUST BRAKE BOOSTER PUSH ROD** (See INSPECTION)
2. **INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY**
 - a. Install a new O-ring to the brake master cylinder sub-assembly.
 - b. Install the brake master cylinder sub-assembly to the brake booster assembly with the 2 nuts.

Torque: 13 N*m (132 kgf*cm, 10 ft.*lbf)

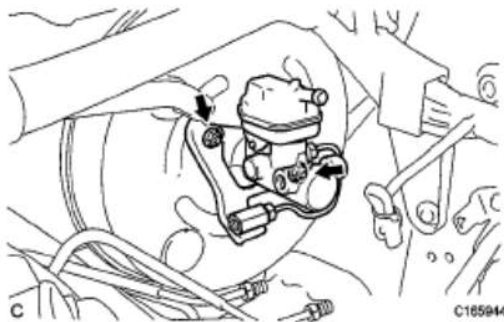


Fig. 52: Identifying Brake Master Cylinder Sub-Assembly

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

NOTE:

- The master cylinder requires careful handling. Do not allow the master cylinder to receive any impact, such as from being dropped. Do not reuse a master cylinder that has been dropped.
- Do not strike or pinch the master cylinder piston, and do not cause any damage to the master cylinder piston by any other means.
- When installing the master cylinder to the brake booster, or when removing the master cylinder from the brake booster, make sure that the master cylinder is kept horizontal or its tip faces downward (the piston faces upward) to prevent the master cylinder piston from falling out.
- Do not allow any foreign objects to contaminate the master cylinder piston. If a foreign object gets on the piston, remove it by using a shop rag or a piece of cloth and then apply an even layer of lithium soap based glycol grease around the circumference (sliding part) of the piston.

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- Do not use any other type of grease or fluid.

3. CONNECT BRAKE LINE

- Using a union nut wrench (12 mm), connect the 2 brake lines to the brake master cylinder sub-assembly.

Torque: without union nut wrench

20 N*m (204 kgf*cm, 15 ft.*lbf)

with union nut wrench

18 N*m (184 kgf*cm, 13 ft.*lbf)

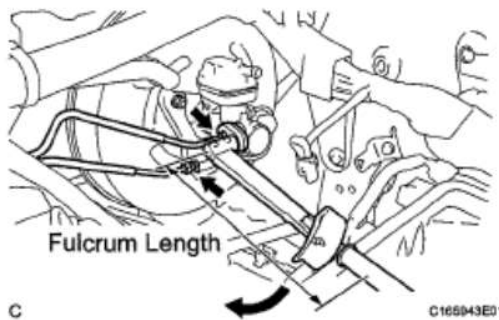


Fig. 53: Locating Brake Master Cylinder Assembly Brake Tubes

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

NOTE:

- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when the union nut wrench is parallel to the torque wrench.

4. CONNECT NO. 1 RESERVOIR TUBE

- Connect the No. 1 reservoir tube to the brake master cylinder reservoir assembly.

5. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY (See INSTALLATION)

6. INSTALL WINDSHIELD WIPER MOTOR AND LINK (See INSTALLATION)

7. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See INSTALLATION)

8. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See INSTALLATION)

9. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See INSTALLATION)

10. INSTALL EJECTOR TUBE (for 1AR-FE)

- Install the ejector tube with the 2 nuts.

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

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11. **FILL BRAKE FLUID RESERVOIR** (See ON-VEHICLE INSPECTION)
12. **BLEED BRAKE MASTER CYLINDER** (See ON-VEHICLE INSPECTION)
13. **BLEED BRAKE LINE** (See REPLACEMENT)
14. **BLEED BRAKE ACTUATOR** (See REPLACEMENT)
15. **INSPECT FOR BRAKE FLUID LEAK**
16. **INSPECT FLUID LEVEL** (See ON-VEHICLE INSPECTION)

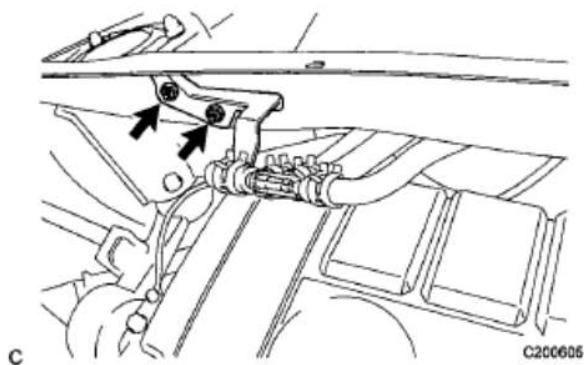


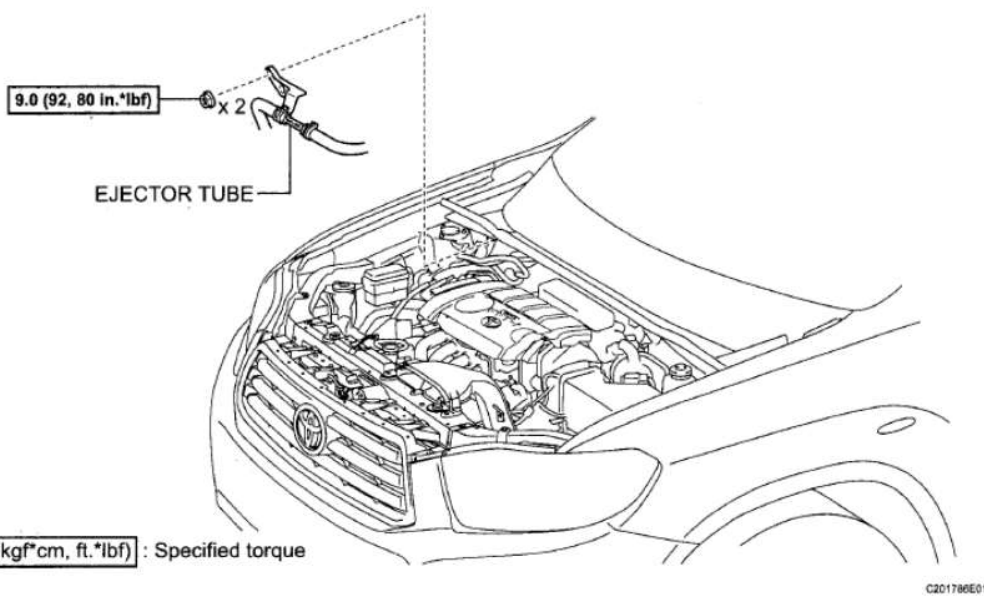
Fig. 54: Locating Ejector Tube Nuts

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

BRAKE BOOSTER

COMPONENTS

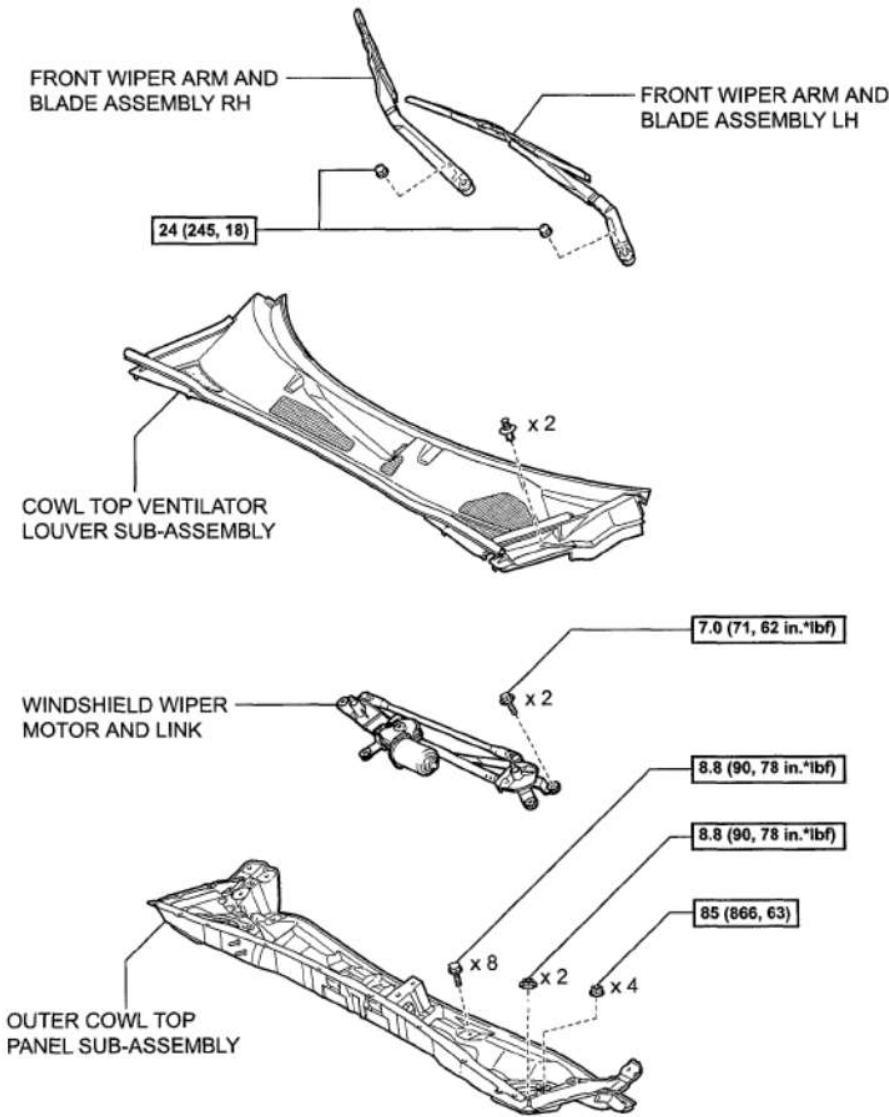
for 1AR-FE:



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Fig. 55: Identifying Brake Booster Components With Torque Specification (1 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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

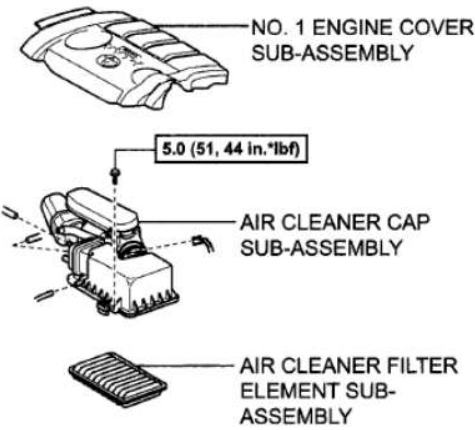
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Fig. 56: Identifying Brake Booster Components With Torque Specification (2 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

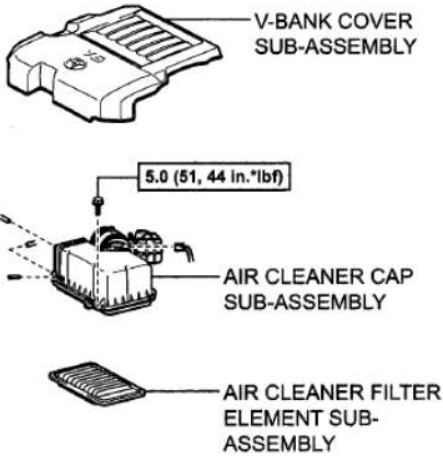
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for 1AR-FE:

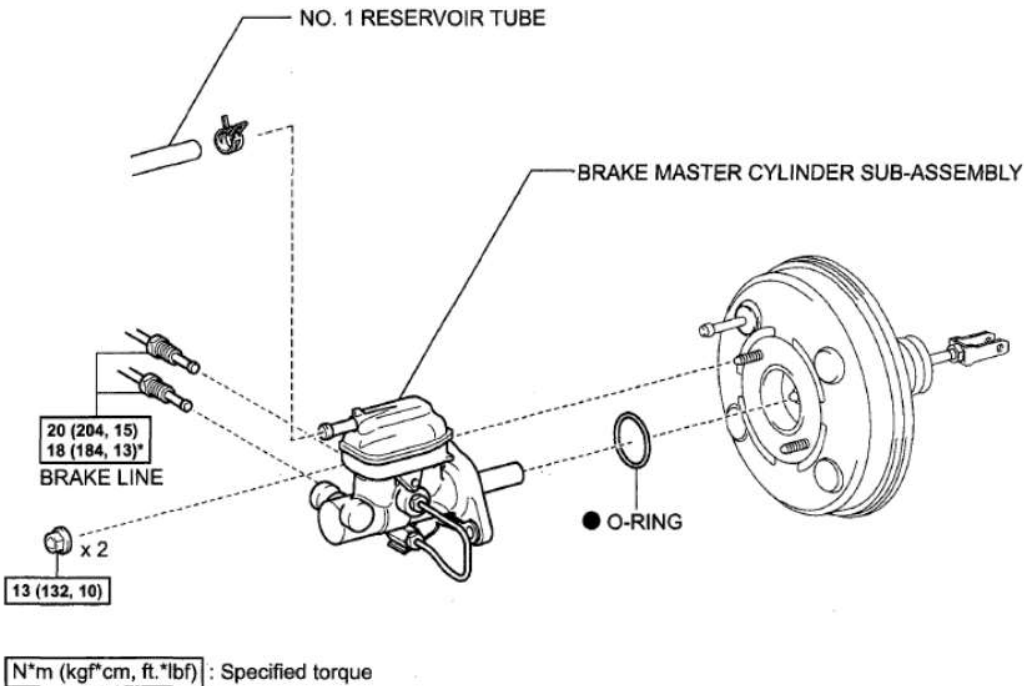


for 2GR-FE:



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

Fig. 57: Identifying Brake Booster Components With Torque Specification (3 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



* For use with a union nut wrench

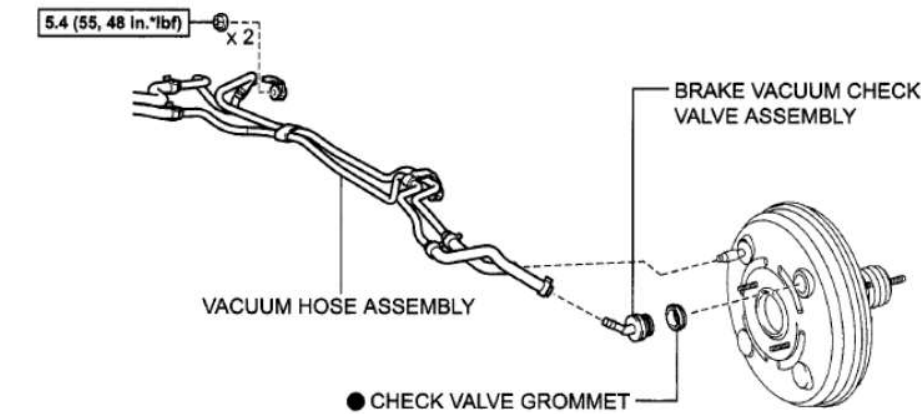
● Non-reusable part

Fig. 58: Identifying Brake Booster Components With Torque Specification (4 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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for 1AR-FE:



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

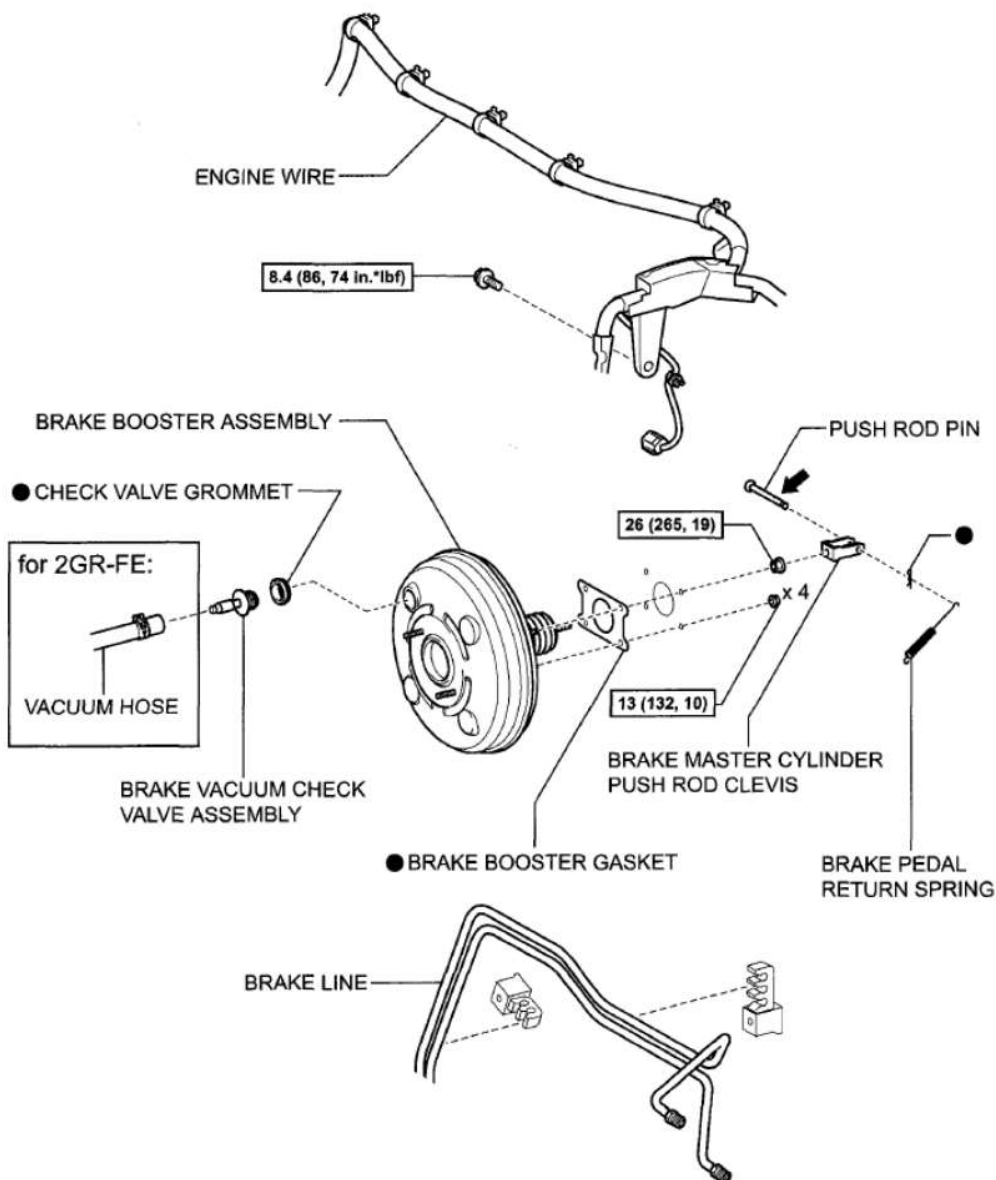
● Non-reusable part

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Fig. 59: Identifying Brake Booster Components With Torque Specification (5 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

● Non-reusable part

← Lithium soap base glycol grease

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Fig. 60: Identifying Brake Booster Components With Torque Specification (6 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

1. INSPECT BRAKE BOOSTER ASSEMBLY

- Airtightness check

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1. Start the engine and stop it after 1 or 2 minutes. Slowly depress the brake pedal several times.

HINT:

If the pedal can be depressed to the floor the first time, but on the 2nd and 3rd times cannot be depressed as far, the booster is airtight.

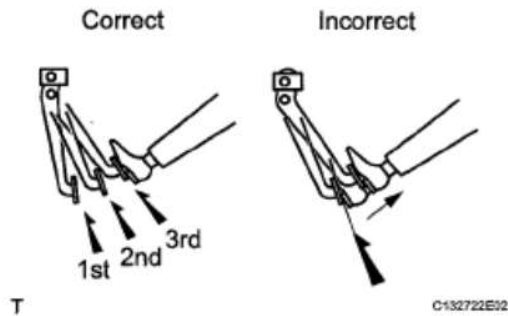


Fig. 61: Identifying Brake Pedal Correct And Incorrect Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Depress the brake pedal while the engine is running, and stop the engine with the brake pedal depressed.

HINT:

If there is no change in the pedal reserve distance while holding the pedal for 30 seconds, the booster is airtight.

b. Operation check

1. Depress the brake pedal several times with the ignition switch off and check that there is no change in the pedal reserve distance when the pedal is depressed.

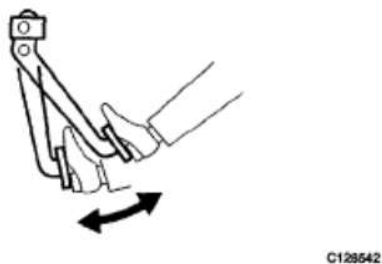


Fig. 62: Checking Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

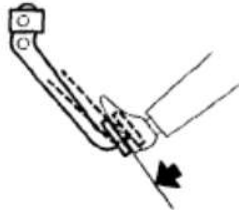
2. Depress and hold down the pedal, and start the engine.

HINT:

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If the pedal goes down slightly, operation is normal.



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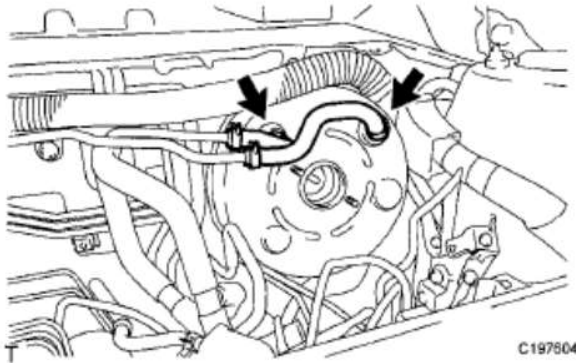
Fig. 63: Holding Down Pedal

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

REMOVAL

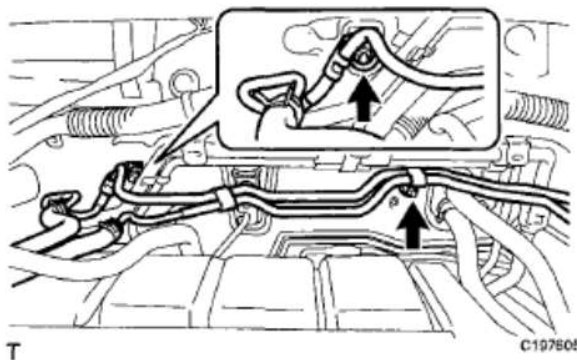
NOTE: Release the vacuum from the booster by depressing the brake pedal several times. Then remove the brake master cylinder sub-assembly from the brake booster assembly.

1. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (for 1AR-FE) (See REMOVAL)
2. REMOVE V-BANK COVER SUB-ASSEMBLY (for 2GR-FE) (See REMOVAL)
3. SEPARATE EJECTOR TUBE (for 1AR-FE) (See REMOVAL)
4. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See REMOVAL)
5. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See REMOVAL)
6. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See REMOVAL)
7. REMOVE WINDSHIELD WIPER MOTOR AND LINK (See REMOVAL)
8. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY (See REMOVAL)
9. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (for 1AR-FE) (See REMOVAL)
10. REMOVE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY (for 1AR-FE) (See REMOVAL)
11. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (for 2GR-FE) (See REMOVAL)
12. REMOVE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY (for 2GR-FE) (See REMOVAL)
13. DRAIN BRAKE FLUID
14. DISCONNECT NO. 1 RESERVOIR TUBE (See REMOVAL)
15. DISCONNECT BRAKE LINE (See REMOVAL)
16. REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY (See REMOVAL)
17. SEPARATE VACUUM HOSE ASSEMBLY (for 1AR-FE)
 - a. Slide the 2 clips and disconnect the 2 vacuum hoses.

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander****Fig. 64: Locating Vacuum Hoses**

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

- b. Remove the 2 nuts and separate the vacuum hose assembly.

**Fig. 65: Locating Vacuum Hoses Nuts**

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

18. DISCONNECT VACUUM HOSE (for 2GR-FE)

- a. Slide the clip and disconnect the vacuum hose.

19. REMOVE BRAKE VACUUM CHECK VALVE ASSEMBLY

- a. for 1AR-FE:
 1. Remove the 2 vacuum check valve assemblies from the brake booster assembly.
- b. for 2GR-FE:
 1. Remove the vacuum check valve assembly from the brake booster assembly.

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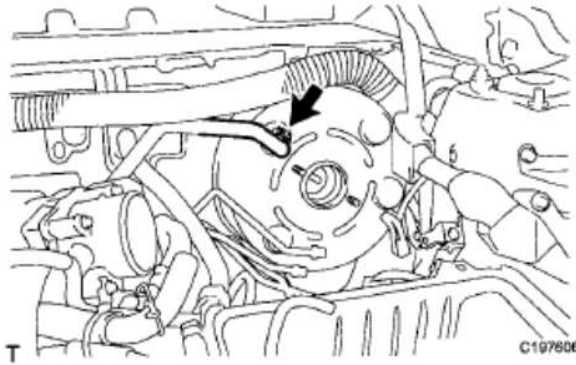


Fig. 66: Locating Vacuum Hose Clip

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

20. REMOVE CHECK VALVE GROMMET

a. for 1AR-FE:

1. Remove the 2 check valve grommets from the brake booster assembly.

b. for 2GR-FE:

1. Remove the check valve grommet from the brake booster assembly.

21. REMOVE BRAKE PEDAL RETURN SPRING (See REMOVAL)

22. SEPARATE BRAKE MASTER CYLINDER PUSH ROD CLEVIS (See REMOVAL)

23. REMOVE BRAKE MASTER CYLINDER PUSH ROD CLEVIS

- a. Remove the 4 nuts and push out the brake booster assembly.

NOTE: Do not damage the brake lines.

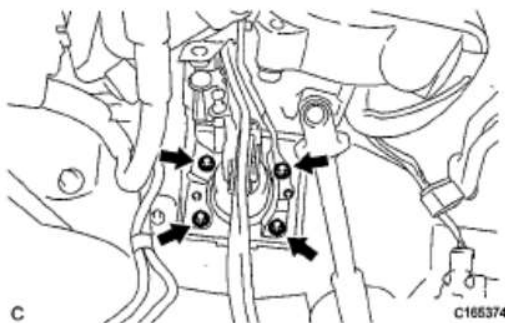


Fig. 67: Locating Brake Booster Assembly Nuts

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

- b. Loosen the lock nut, and remove the brake master cylinder push rod clevis and lock nut from the brake booster assembly.

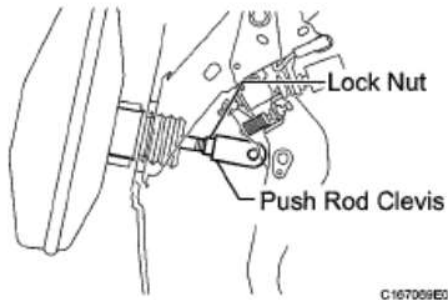
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Fig. 68: Identifying Push Rod Clevis And Lock Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

24. SEPARATE ENGINE WIRE

- a. Disengage the 9 clamps.
- b. Remove the bolt and separate the engine wire from the body.



Fig. 69: Identifying Engine Wire Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. SEPARATE ENGINE WIRE (w/Security Horn)

- a. Disengage the 9 clamps, and disconnect the alarm horn connector.
- b. Remove the bolt and separate the engine wire from the body.

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Fig. 70: Identifying Engine Wire Clamps

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

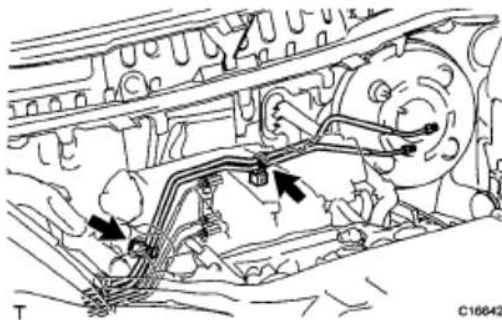
26. REMOVE BRAKE BOOSTER ASSEMBLY

- a. Disengage the 2 clamps and separate the 2 brake lines from the body.

NOTE: Be careful not to damage the brake lines or clamps. If any parts are damaged, replace them with new ones.

- b. Remove the brake booster assembly from the body.

NOTE: Do not damage the brake lines.



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Fig. 71: Locating Brake Lines Clamps

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

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27. REMOVE BRAKE BOOSTER GASKET

- Remove the brake booster gasket from the brake booster assembly.

INSPECTION

1. INSPECT BRAKE VACUUM CHECK VALVE ASSEMBLY

- Check that there is ventilation from the booster to the engine, and no ventilation from the engine to the booster. If the results are not as specified, replace the brake vacuum check valve assembly.

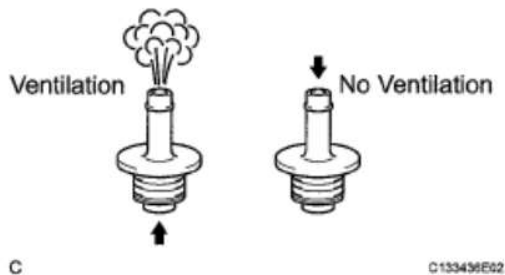


Fig. 72: Checking Ventilation From Booster To Engine
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL BRAKE BOOSTER GASKET

- Install a new brake booster gasket to the brake booster assembly.

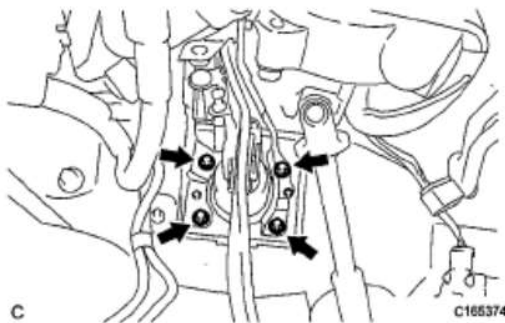
2. INSTALL BRAKE BOOSTER ASSEMBLY

- Install the brake booster assembly to the body and temporarily tighten the 4 nuts.

NOTE: Do not damage the brake lines.

HINT:

Fully tighten the 4 nuts after installing the brake master cylinder push rod clevis and push rod clevis lock nut.



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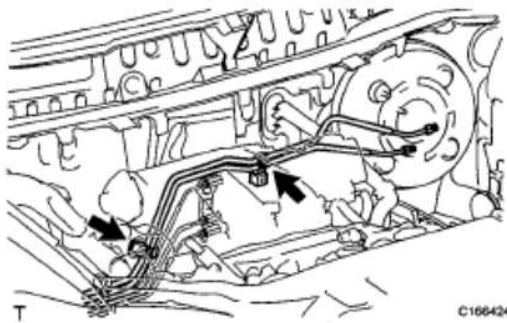
2009 BRAKES Brake - Highlander

Fig. 73: Locating Brake Booster Assembly Nuts

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

- b. Engage the 2 clamps and install the 2 brake lines to the body.

NOTE: Be careful not to damage the brake lines or clamps. If any parts are damaged, replace them with new ones.

**Fig. 74: Locating Brake Lines Clamps**

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

3. INSTALL ENGINE WIRE

- a. Engage the 9 clamps.
- b. Install the engine wire to the body with the bolt.

Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

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Fig. 75: Identifying Engine Wire Clamps**Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.****4. INSTALL ENGINE WIRE (w/Security Horn)**

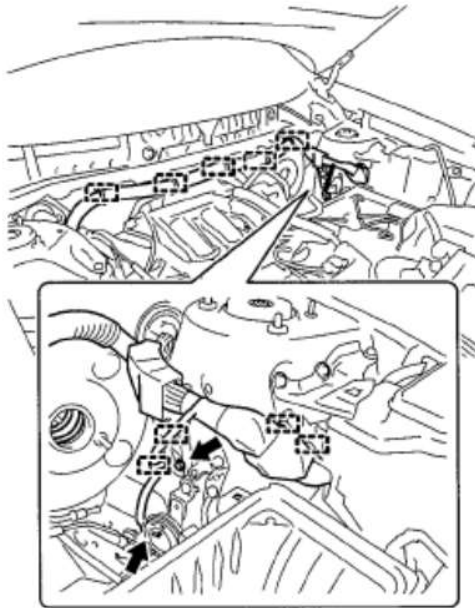
- a. Engage the 9 clamps.
- b. Connect the alarm horn connector and install the engine wire to the body with the bolt.

Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)**5. INSTALL CHECK VALVE GROMMET**

- a. for 1AR-FE:
 1. Install 2 new check valve grommets to the brake booster assembly.
- b. for 2GR-FE:
 1. Install a new check valve grommet to the brake booster assembly.

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Fig. 76: Identifying Engine Wire Clamps

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

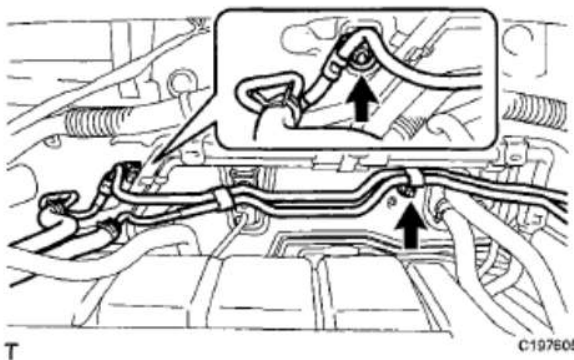
6. INSTALL BRAKE VACUUM CHECK VALVE ASSEMBLY

- a. for 1AR-FE:
 1. Install the 2 brake vacuum check valve assemblies to the brake booster assembly.
- b. for 2GR-FE:
 1. Install the brake vacuum check valve assembly to the brake booster assembly.

7. INSTALL VACUUM HOSE ASSEMBLY (for 1AR-FE)

- a. Install the vacuum hose assembly with the 2 nuts.

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



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Fig. 77: Locating Vacuum Hoses Nuts

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

- b. Connect the vacuum hoses to the vacuum check valve assemblies and slide the 2 clips.

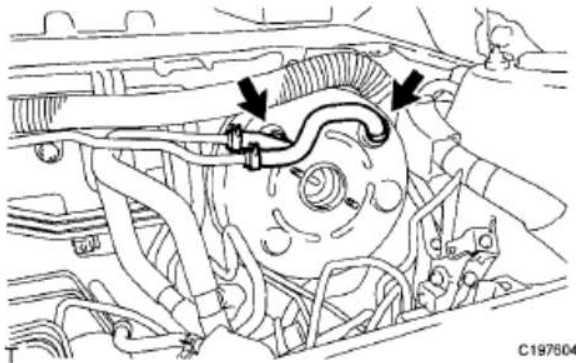


Fig. 78: Connecting Vacuum Hoses To Vacuum Check Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. CONNECT VACUUM HOSE (for 2GR-FE)

- a. Connect the vacuum hose to the vacuum check valve assembly and slide the clip.

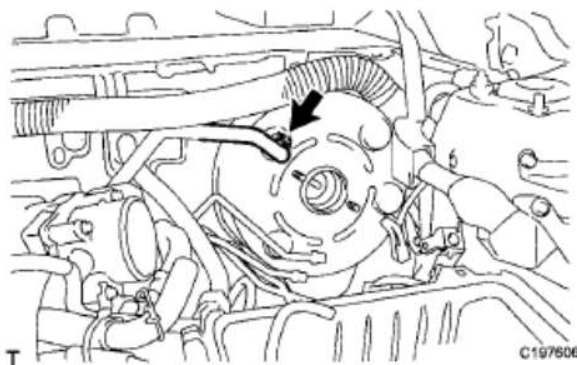


Fig. 79: Locating Vacuum Hose Clip
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSTALL BRAKE MASTER CYLINDER PUSH ROD CLEVIS

- a. Install the push rod clevis lock nut and brake master cylinder push rod clevis to the brake booster assembly, and temporarily tighten the push rod clevis lock nut.

NOTE: Do not damage the brake lines.

HINT:

Fully tighten the lock nut after adjusting the brake pedal height.

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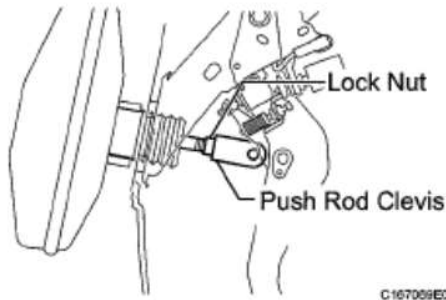


Fig. 80: Identifying Push Rod Clevis And Lock Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Fully tighten the 4 nuts to install the brake booster assembly to the body.

Torque: 13 N*m (132 kgf*cm, 10 ft.*lbf)

10. **CONNECT BRAKE MASTER CYLINDER PUSH ROD CLEVIS** (See INSTALLATION)
11. **INSTALL BRAKE PEDAL RETURN SPRING** (See INSTALLATION)

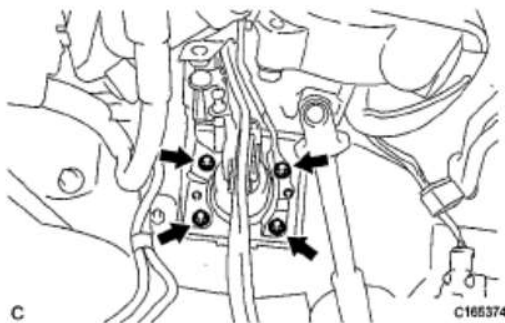


Fig. 81: Locating Brake Booster Assembly Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. **INSPECT AND ADJUST BRAKE PEDAL HEIGHT** (See ADJUSTMENT)
13. **INSPECT BRAKE PEDAL FREE PLAY** (See ADJUSTMENT)
14. **INSPECT BRAKE PEDAL RESERVE DISTANCE** (See ADJUSTMENT)
15. **INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY** (See REASSEMBLY)
16. **CONNECT BRAKE LINE** (See INSTALLATION)
17. **CONNECT NO. 1 RESERVOIR TUBE** (See INSTALLATION)
18. **INSTALL AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY (for 1AR-FE)** (See INSTALLATION)
19. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (for 1AR-FE)** (See INSTALLATION)
20. **INSTALL AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY (for 2GR-FE)** (See INSTALLATION)
21. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (for 2GR-FE)** (See INSTALLATION)

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22. **INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY** (See INSTALLATION)
23. **INSTALL WINDSHIELD WIPER MOTOR AND LINK** (See INSTALLATION)
24. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See INSTALLATION)
25. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See INSTALLATION)
26. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See INSTALLATION)
27. **INSTALL EJECTOR TUBE** (for 1AR-FE) (See INSTALLATION)
28. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY** (for 1AR-FE) (See INSTALLATION)
29. **INSTALL V-BANK COVER SUB-ASSEMBLY** (for 2GR-FE) (See INSTALLATION)
30. **FILL BRAKE FLUID RESERVOIR** (See REPLACEMENT)
31. **BLEED BRAKE MASTER CYLINDER** (See REPLACEMENT)
32. **BLEED BRAKE LINE** (See REPLACEMENT)
33. **BLEED BRAKE ACTUATOR** (See REPLACEMENT)
34. **INSPECT FOR BRAKE FLUID LEAK**
35. **INSPECT FLUID LEVEL** (See ON-VEHICLE INSPECTION)

EJECTOR TUBE (FOR 1 AR-FE)

COMPONENTS

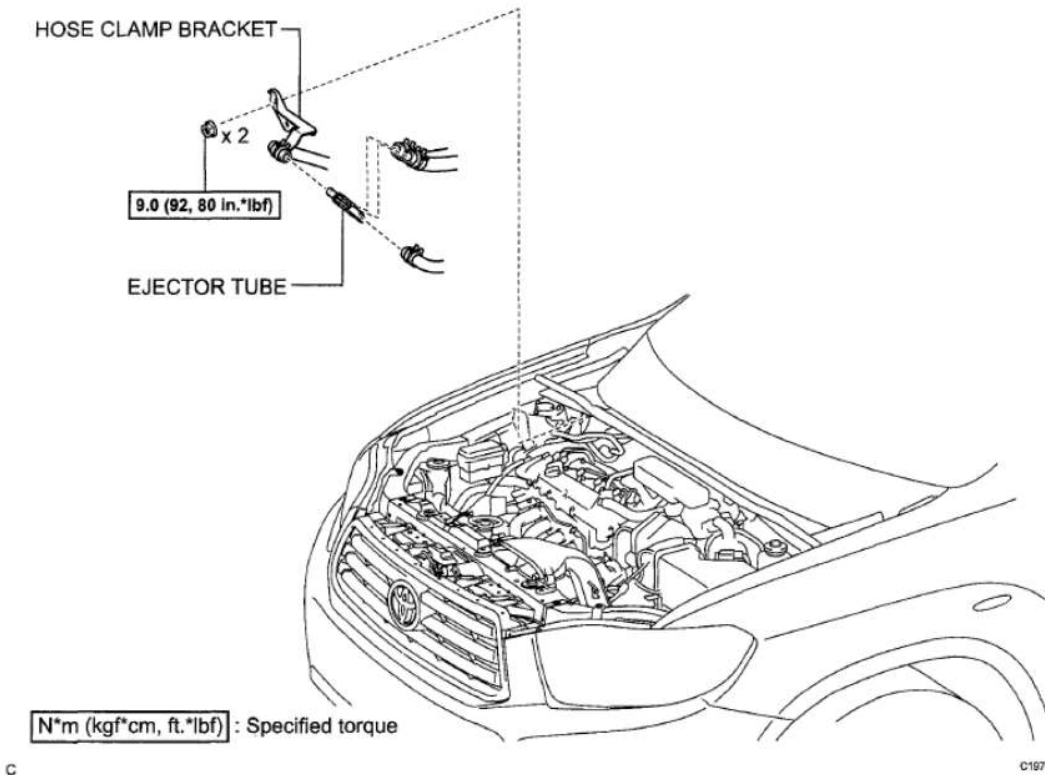
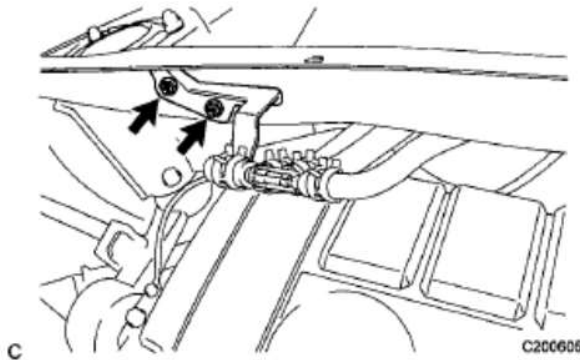


Fig. 82: Identifying Ejector Tube (1 AR-FE) Components With Torque Specification
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander****REMOVAL****1. REMOVE EJECTOR TUBE**

- a. Remove the 2 nuts and separate the hose clamp bracket from the outer cowl top panel sub-assembly.

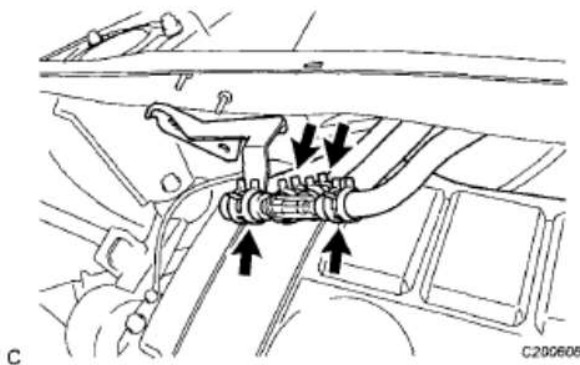
**Fig. 83: Locating Ejector Tube Nuts**

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

- b. Disconnect the 4 vacuum hoses to remove the ejector tube.

INSPECTION**1. INSPECT EJECTOR TUBE**

- a. Inspect that the ejector tube has no deformation or cracks.

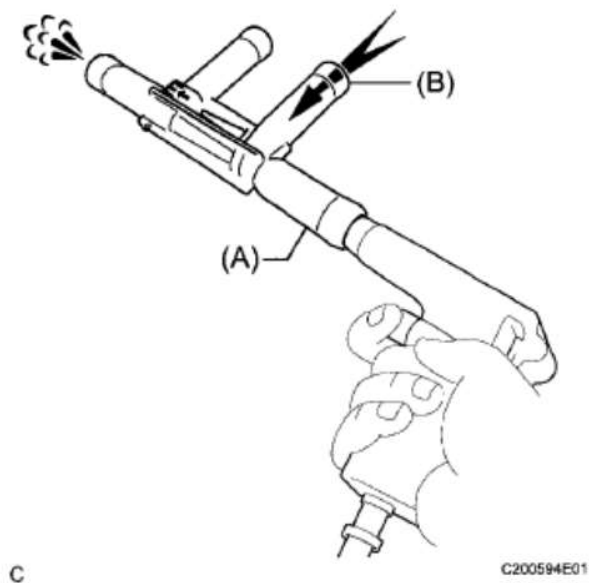
**Fig. 84: Locating Ejector Tube**

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

- b. Check that suction occurs at the port (B) when applying compressed air into the port (A). If any of the defects is found, replace the ejector tube with a new one.

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**Fig. 85: Checking Suction Occurs Port**

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

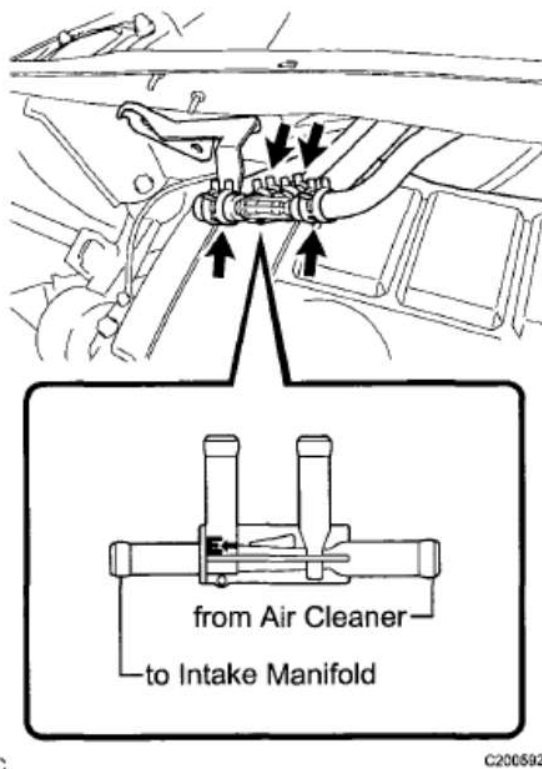
INSTALLATION**1. INSTALL EJECTOR TUBE**

- a. Connect the 4 vacuum hoses to the ejector tube to install it.

NOTE: Install the ejector tube in the correct direction.

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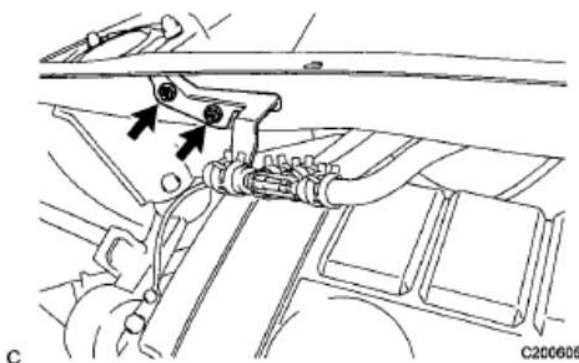
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Fig. 86: Connecting Vacuum Hoses To Ejector Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the hose clamp bracket to the outer cowl top panel sub-assembly with the 2 nuts.

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



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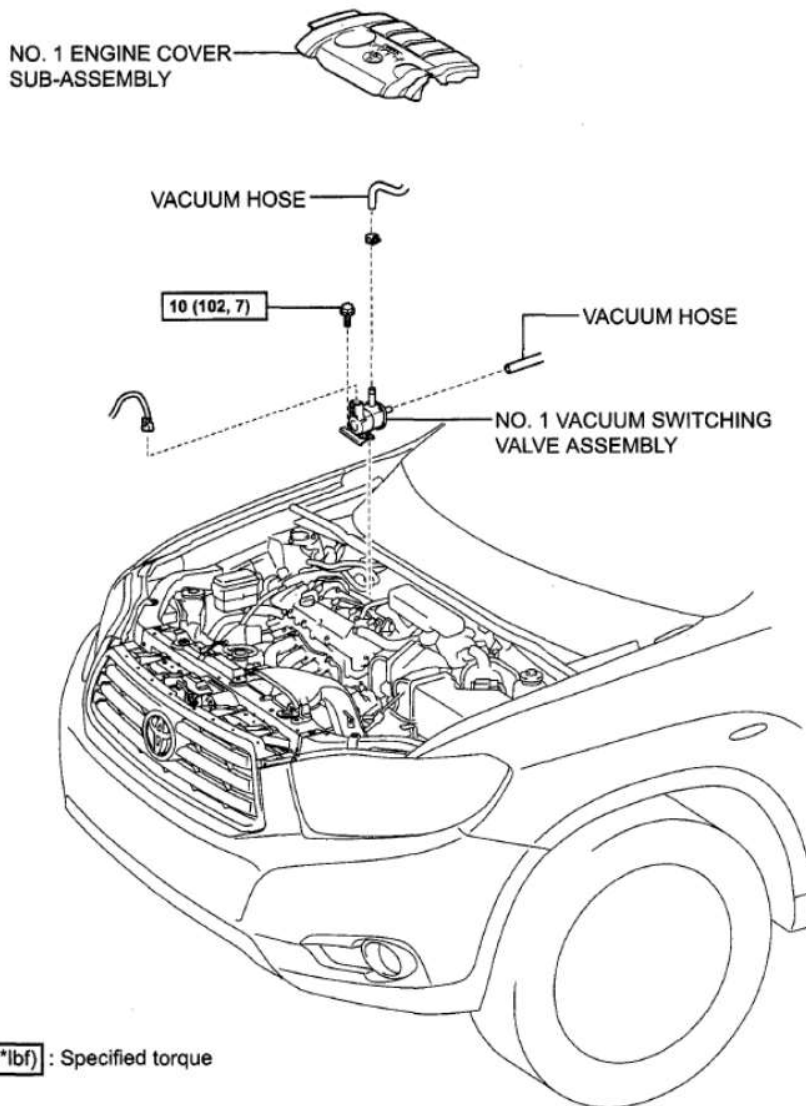
Fig. 87: Locating Ejector Tube Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

VACUUM SWITCHING VALVE (FOR 1AR-FE)

COMPONENTS

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Fig. 88: Identifying Vacuum Switching Valve (1AR-FE) Components With Torque Specification
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

1. INSPECT NO. 1 VACUUM SWITCHING VALVE ASSEMBLY

- Remove the No. 1 engine cover sub-assembly.
- Disconnect the hose (connected to the air cleaner) from the No. 1 vacuum switching valve assembly.
- Move the shift lever to P and apply the parking brake.
- Connect the Techstream to the DLC3, and then turn the ignition switch on (IG).
- Enter the following menus: Powertrain/Engine/Active Test/Activate the Brake Ejector VSV.
- Start the engine.

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- g. Using the Techstream, turn off the No. 1 vacuum switching valve assembly (Brake Ejector VSV: CLOSE).

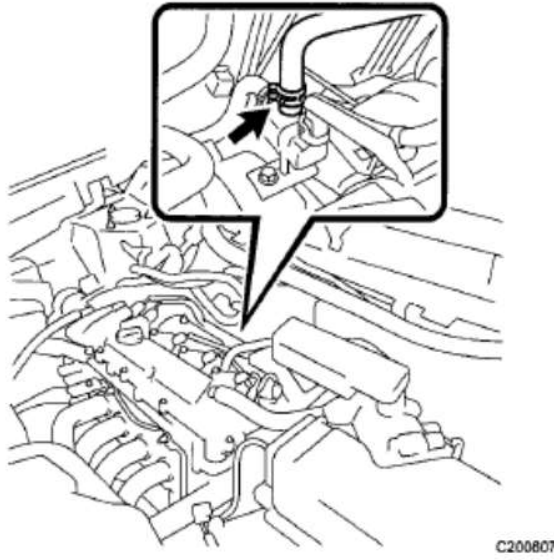


Fig. 89: Locating Hose Clamp

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

- h. Use your finger to confirm that the No. 1 vacuum switching valve assembly has no suction.
- i. Using the Techstream, turn on the No. 1 vacuum switching valve assembly (Brake Ejector VSV: OPEN).
- j. Use your finger to confirm that the No. 1 vacuum switching valve assembly has suction.

REMOVAL

1. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY** (See **REMOVAL**)
2. **REMOVE NO. 1 VACUUM SWITCHING VALVE ASSEMBLY**
 - a. Slide the 2 clips and disconnect the 2 vacuum hoses and connector.
 - b. Remove the bolt and No. 1 vacuum switching valve assembly.

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Fig. 90: Locating No. 1 Vacuum Switching Valve With Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. INSPECT NO. 1 VACUUM SWITCHING VALVE ASSEMBLY

- a. Check the No. 1 vacuum switching valve assembly for an open circuit.
 - 1. Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard Resistance

STANDARD RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
1 - 2	at 20°C (68°F)	23 to 26 ohms
1 - Body ground 2 - Body ground	-	10 Mohms or higher

If the result is not as specified, replace the No. 1 vacuum switching valve assembly.

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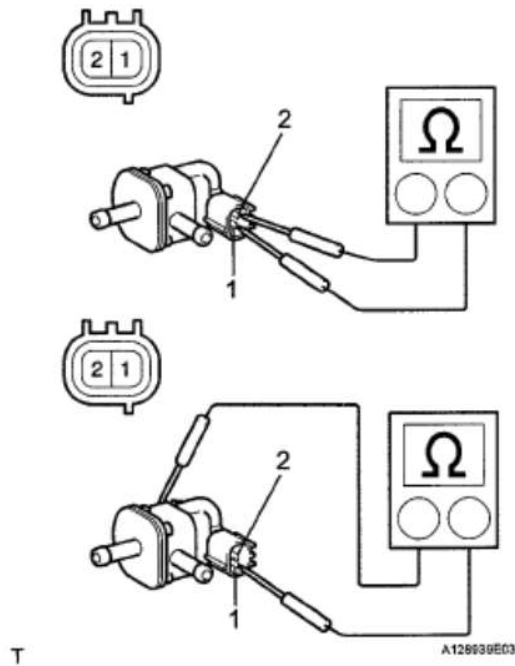


Fig. 91: Checking No. 1 Vacuum Switching Valve Assembly For An Open Circuit
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check the operation of the No. 1 vacuum switching valve assembly.
 1. Check that air does not flow from port E to port F as shown in the illustration.

If the result is not as specified, replace the No. 1 vacuum switching valve assembly.

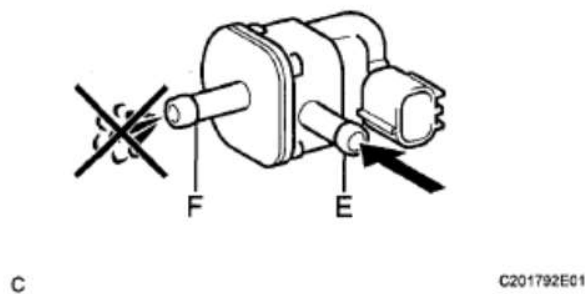


Fig. 92: Checking Air Does Not Flow From Port E To Port F
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Apply battery positive voltage across the terminals.
3. Check that air flows from port E to port F as shown in the illustration.

If the result is not as specified, replace the No. 1 vacuum switching valve assembly.

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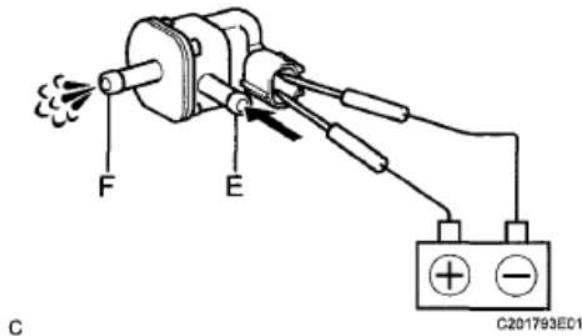


Fig. 93: Applying Battery Positive Voltage Across Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL NO. 1 VACUUM SWITCHING VALVE ASSEMBLY

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

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

- Connect the connector and 2 vacuum hoses, and slide the 2 clips.

2. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See INSTALLATION)



Fig. 94: Locating No. 1 Vacuum Switching Valve With Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FRONT BRAKE

COMPONENTS

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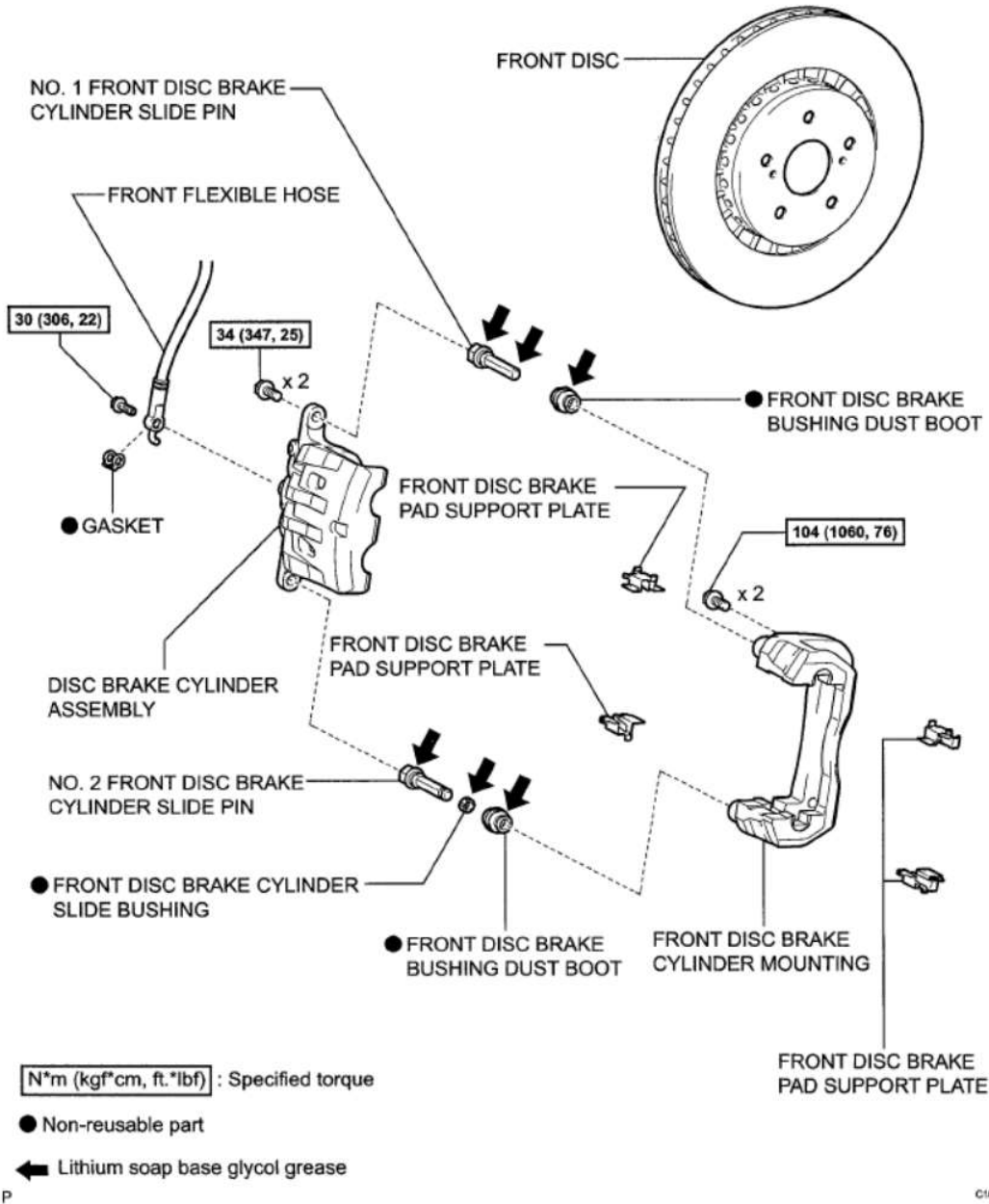


Fig. 95: Identifying Front Brake Components With Torque Specification (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

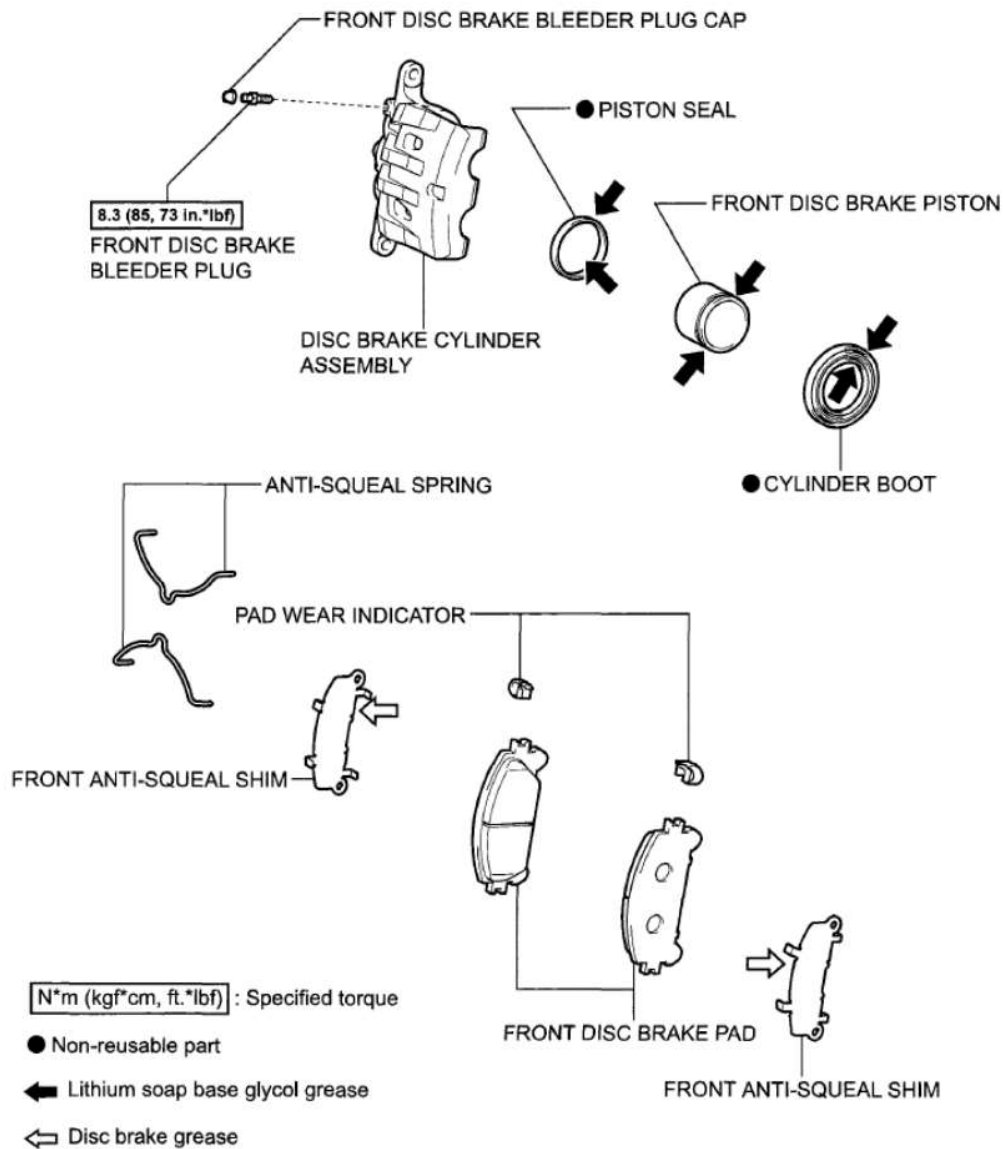


Fig. 96: Identifying Front Brake Components With Torque Specification (2 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

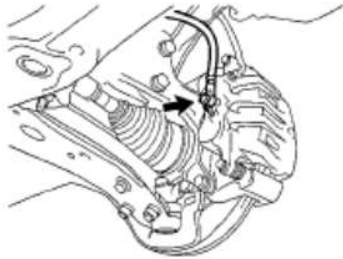
1. **REMOVE FRONT WHEEL**
2. **DRAIN BRAKE FLUID**

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander**

NOTE: If brake fluid leaks onto any painted surface of the vehicle, wash off and remove it completely.

3. DISCONNECT FRONT FLEXIBLE HOSE

- a. Remove the bolt and gasket, and disconnect the front flexible hose from the disc brake cylinder assembly.



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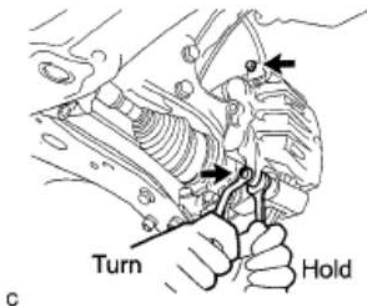
Fig. 97: Locating Front Flexible Hose

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

4. REMOVE DISC BRAKE CYLINDER ASSEMBLY

- a. Hold the front disc brake cylinder slide pins and remove the 2 bolts and disc brake cylinder assembly.

NOTE: Remove the disc brake cylinder assembly while holding both of the brake pads because of the anti-squeal springs may fall off the brake pads.



C

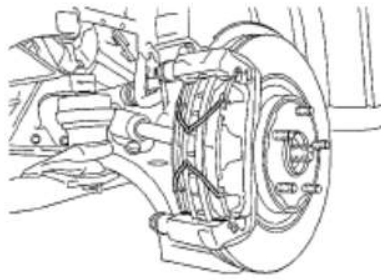
C165871E01

Fig. 98: Holding Front Disc Brake Cylinder Slide Pins

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

DISASSEMBLY**1. REMOVE FRONT DISC BRAKE PAD**

- a. Remove the 2 anti-squeal springs.

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander**

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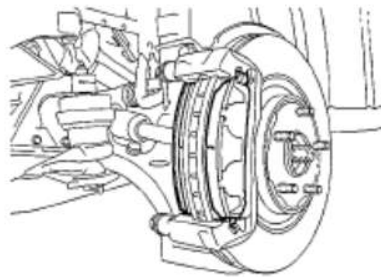
Fig. 99: Identifying Anti-Squeal Springs

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

- b. Remove the 2 brake pads from the front disc brake cylinder mounting.

2. REMOVE FRONT ANTI-SQUEAL SHIM

- a. Remove the 2 anti-squeal shims and the 2 pad wear indicators from the pads.



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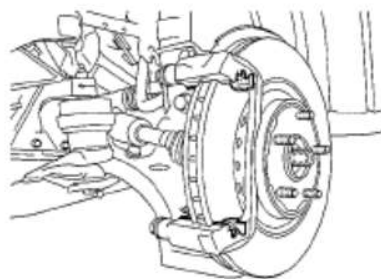
Fig. 100: Identifying Anti-Squeal Shims

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

3. REMOVE FRONT DISC BRAKE PAD SUPPORT PLATE

- a. Remove the 4 front disc brake pad support plates from the front disc brake cylinder mounting.

NOTE: Each front disc brake pad support plate has a different shape. Be sure to put an identification mark on each front disc brake pad support plate so that they can be reinstalled to their original position.



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2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander**

Fig. 101: Identifying Front Disc Brake Pad Support Plates
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REMOVE NO. 1 FRONT DISC BRAKE CYLINDER SLIDE PIN

- a. Remove the No. 1 front disc brake cylinder slide pin from the front disc brake cylinder mounting.

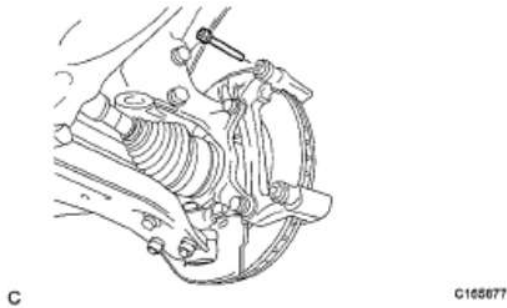


Fig. 102: Identifying No. 1 Front Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. REMOVE NO. 2 FRONT DISC BRAKE CYLINDER SLIDE PIN

- a. Remove the No. 2 front disc brake cylinder slide pin from the front disc brake cylinder mounting.

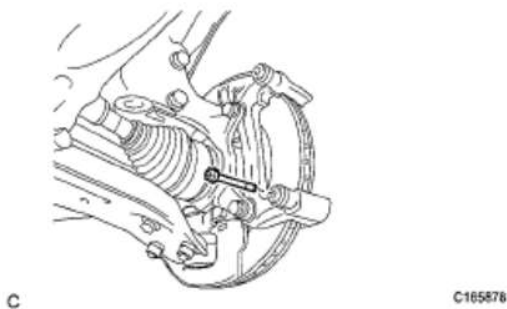


Fig. 103: Identifying No. 2 Front Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE FRONT DISC BRAKE CYLINDER SLIDE BUSHING

- a. Using a screwdriver, remove the front disc brake cylinder slide bushing from the No. 2 front disc brake cylinder slide pin.

NOTE: Do not damage the No. 2 front disc brake cylinder slide pin.

HINT:

Tape the screwdriver tip before use.

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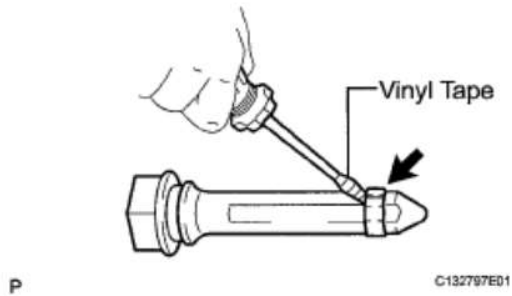


Fig. 104: Removing Front Disc Brake Cylinder Slide Bushing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE FRONT DISC BRAKE BUSHING DUST BOOT

- Remove the 2 front disc brake bushing dust boots from the front disc brake cylinder mounting.

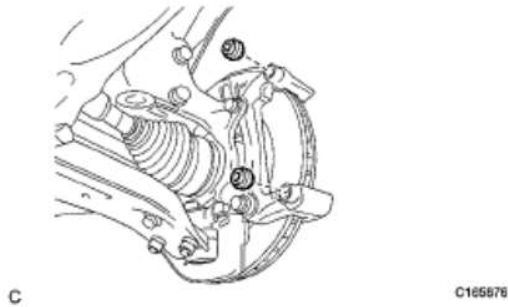


Fig. 105: Identifying Front Disc Brake Bushing Dust Boots
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. REMOVE FRONT DISC BRAKE CYLINDER MOUNTING

- Remove the 2 bolts and front disc brake cylinder mounting from the steering knuckle.

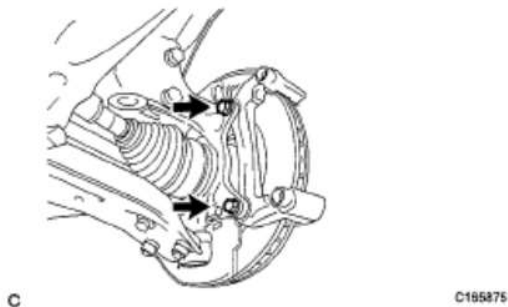


Fig. 106: Locating Front Disc Brake Cylinder Mounting Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE FRONT DISC BRAKE PISTON

- Place a shop rag or a piece of cloth between the disc brake pistons and the disc brake cylinder assembly.

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- b. Using compressed air, remove one of the disc brake pistons from the disc brake cylinder assembly.

CAUTION: Do not place your fingers in front of the front disc brake piston when using compressed air.

NOTE: Do not allow any brake fluid to spatter.

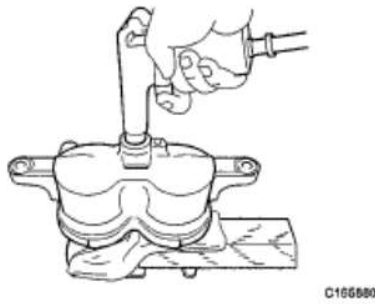


Fig. 107: Removing Front Disc Brake Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. REMOVE CYLINDER BOOT

- a. Using a screwdriver, remove the 2 cylinder boots.

NOTE: Be careful not to damage the front disc brake cylinder.

HINT:

Tape the screwdriver tip before use.

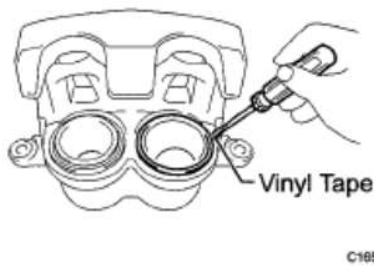


Fig. 108: Removing Cylinder Boots
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. REMOVE PISTON SEAL

- a. Using a screwdriver, remove the 2 piston seals from the disc brake cylinder assembly.

NOTE: Be careful not to damage the inner cylinder or cylinder groove.

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HINT:

Tape the screwdriver tip before use.



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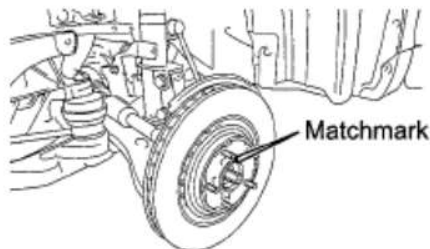
Fig. 109: Removing Piston Seal

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

12. **REMOVE FRONT DISC BRAKE BLEEDER PLUG CAP**
13. **REMOVE FRONT DISC BRAKE BLEEDER PLUG**
14. **REMOVE FRONT DISC**
 - a. Remove the front disc.

HINT:

Put matchmarks on the disc and the axle hub.



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Fig. 110: Identifying Matchmarks On Disc And Axle Hub

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

INSPECTION

1. **INSPECT PAD LINING THICKNESS**
 - a. Using a ruler, measure the pad lining thickness.

Standard thickness:

12.0 mm (0.472 in.)

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Minimum thickness:

1.0 mm (0.039 in.)

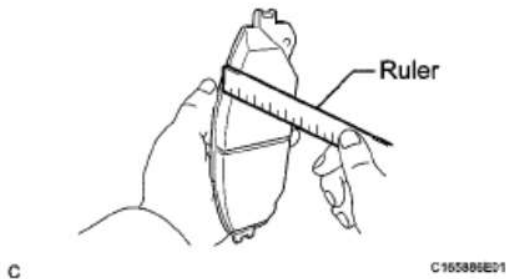


Fig. 111: Measuring Pad Lining Thickness

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

If the pad lining thickness is less than the minimum, replace the brake pads.

HINT:

Be sure to check wear of the front disc after replacing the brake pads with new ones.

2. INSPECT DISC THICKNESS

- a. Using a micrometer, measure the disc thickness.

Standard thickness:

28.0 mm (1.102 in.)

Minimum thickness:

25.0 mm (0.983 in.)

If the disc thickness is less than the minimum, replace the front disc.

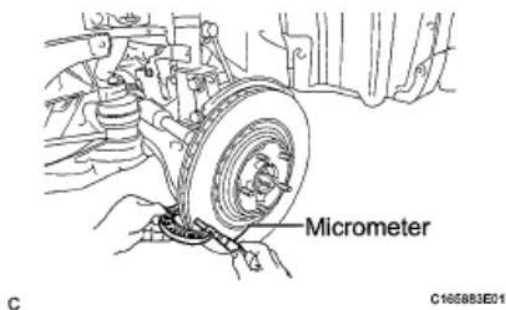


Fig. 112: Measuring Disc Thickness

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

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander****3. INSPECT BRAKE CYLINDER AND PISTON**

- a. Check the cylinder bore and piston for rust or scoring. If necessary, replace the disc brake cylinder assembly and piston.

4. INSPECT FRONT DISC BRAKE PAD SUPPORT PLATE

- a. Inspect the front disc brake pad support plate. If necessary, replace the front brake pad support plate.

HINT:

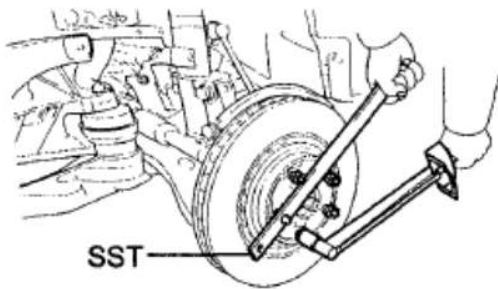
Make sure that the pad support plate has sufficient rebound, no deformation, cracks or wear, and that all rust and dirt are cleaned off.

5. INSPECT DISC RUNOUT

- a. Using SST to hold the disc, tighten the disc with the 5 hub nuts.

SST 09330-00021

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

**c**

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Fig. 113: Tightening Disc With Hub Nuts

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

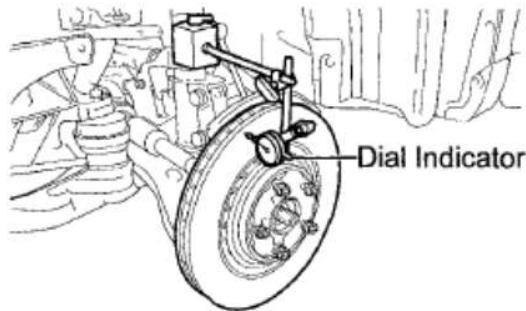
- b. Using a dial indicator, measure the disc runout 10 mm (0.394 in.) away from the outer edge of the front disc.

Maximum disc runout:

0.05 mm (0.0020 in.)

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2009 BRAKES Brake - Highlander



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Fig. 114: Measuring Disc Runout

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

NOTE:

- Keep the magnet of the dial indicator away from the axle hub and speed sensor.
- Install the dial indicator to the shock absorber.

HINT:

If the runout exceeds the maximum value, change the installation position of the disc on the front axle hub to minimize runout. If the runout exceeds the maximum even after the installation position is changed, check the bearing play in the axial direction and the axle hub runout (See **ON-VEHICLE INSPECTION**). If the bearing play and the axle hub runout are normal and if the disc thickness is not within the specified range, grind the disc. If the disc thickness is less than the minimum, replace the disc.

- c. Remove the 5 hub nuts and the front disc.

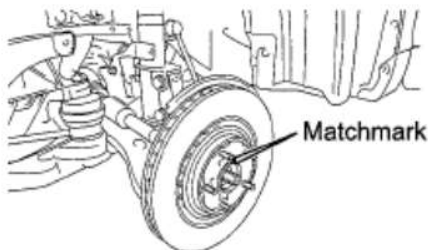
REASSEMBLY

1. INSTALL FRONT DISC

- a. Align the matchmarks and install the front disc.

NOTE:

When replacing the disc with a new one, select the installation position where the front disc has minimal runout.



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Fig. 115: Identifying Matchmarks On Disc And Axle Hub

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

2. TEMPORARILY TIGHTEN FRONT DISC BRAKE BLEEDER PLUG

- a. Temporarily tighten the front disc brake bleeder plug to the disc brake cylinder sub-assembly.

3. INSTALL FRONT DISC BRAKE BLEEDER PLUG CAP

- a. Install the bleeder plug cap to the front disc brake bleeder plug.

4. INSTALL PISTON SEAL

- a. Apply a light layer of lithium soap base glycol grease to the entire circumference of a new piston seal.
- b. Install the piston seal to the disc brake cylinder assembly.

NOTE: Securely install the piston seal into the groove of the disc brake cylinder.



Lithium soap base glycol grease

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Fig. 116: Applying Light Layer Of Lithium Soap Base Glycol Grease To Entire Circumference Of Piston Seal

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

5. INSTALL FRONT DISC BRAKE PISTON

- a. Apply a light layer of lithium soap base glycol grease to the entire circumference of a new cylinder boot.
- b. Install the cylinder boot to the front disc brake piston.
- c. Apply a light layer of lithium soap base glycol grease to the contact surfaces of the front disc brake piston, and install the front disc brake piston to the disc brake cylinder assembly.

NOTE: Do not install the front disc brake piston forcibly in the disc brake cylinder assembly.

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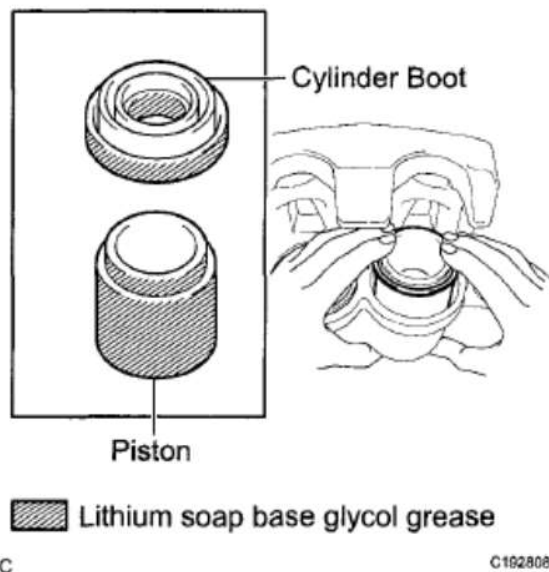


Fig. 117: Applying Light Layer Of Lithium Soap Base Glycol Grease To Entire Circumference Of Cylinder Boot

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

6. INSTALL CYLINDER BOOT

- a. Install the cylinder boot to the front disc brake cylinder assembly as shown in the illustration.

NOTE:

- Securely install the cylinder boot into the groove of the cylinder and piston.
- Do not damage the cylinder boot.

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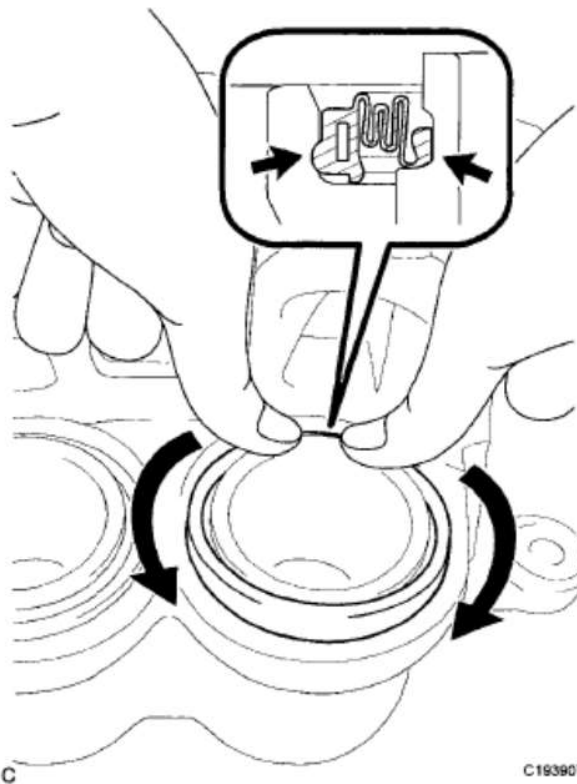


Fig. 118: Installing Cylinder Boot To Front Disc Brake Cylinder Assembly

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

7. INSTALL FRONT DISC BRAKE CYLINDER MOUNTING

- Install the front disc brake cylinder mounting to the steering knuckle with the 2 bolts.

Torque: 104 N*m (1060 kgf*cm, 76 ft.*lbf)

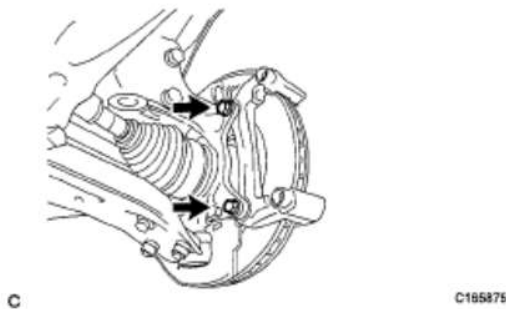


Fig. 119: Locating Front Disc Brake Cylinder Mounting Bolts

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

8. INSTALL FRONT DISC BRAKE BUSHING DUST BOOT

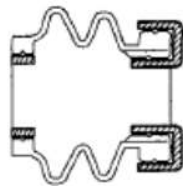
2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

- a. Apply a light layer of lithium soap base glycol grease to the contact and inner surfaces of 2 new front disc brake bushing dust boots.

HINT:

Apply at least 0.3 g (0.01 oz.) of lithium soap base glycol grease to each front disc brake bushing dust boot.



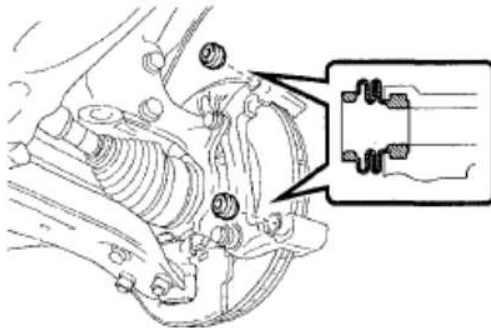
 Lithium soap base glycol grease

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Fig. 120: Identifying Grease Applying Area To Front Disc Brake Bushing Dust Boots
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the 2 front disc brake bushing dust boots to the front disc brake cylinder mounting.



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Fig. 121: Identifying Front Disc Brake Bushing Dust Boots
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSTALL FRONT DISC BRAKE CYLINDER SLIDE BUSHING

- a. Apply a light layer of lithium soap base glycol grease to the contact surface of the No. 2 front disc brake cylinder slide pin.
- b. Install a new front disc brake cylinder slide bushing to the No. 2 front disc brake cylinder slide pin.

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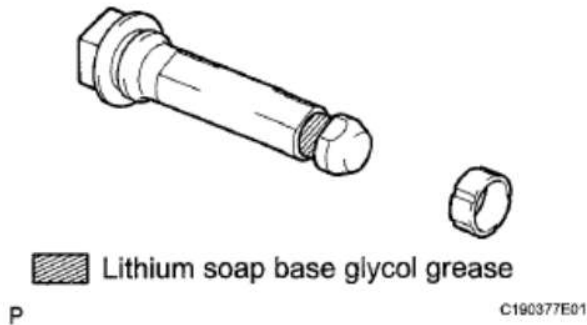


Fig. 122: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. INSTALL NO. 1 FRONT DISC BRAKE CYLINDER SLIDE PIN

- Apply a light layer of lithium soap base glycol grease to the sliding part and the seal surface of the No. 1 front disc brake cylinder slide pin.



Fig. 123: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Install the No. 1 front disc brake cylinder slide pin to the front disc brake cylinder mounting.

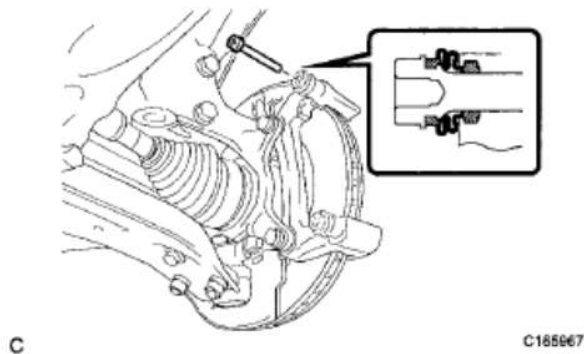


Fig. 124: Identifying No. 1 Front Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. INSTALL NO. 2 FRONT DISC BRAKE CYLINDER SLIDE PIN

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- a. Apply a light layer of lithium soap base glycol grease to the sliding part and the seal surface of the No. 2 front disc brake cylinder slide pin.



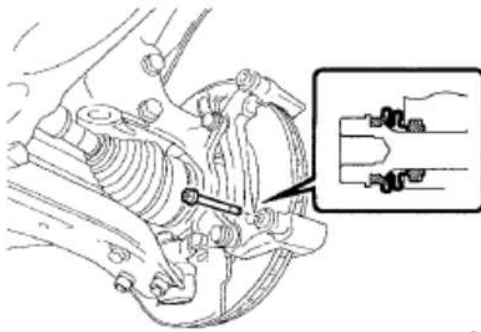
 Lithium soap base glycol grease

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Fig. 125: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the No. 2 front disc brake cylinder slide pin to the front disc brake cylinder mounting.



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Fig. 126: Identifying No. 2 Front Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

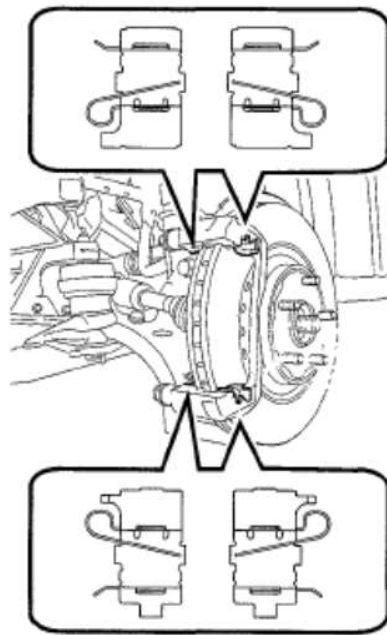
12. INSTALL FRONT DISC BRAKE PAD SUPPORT PLATE

- a. Install the 4 front disc brake pad support plates to the front disc brake cylinder mounting as shown in the illustration.

NOTE: Be sure to install each front disc brake pad support plate to the correct position and direction.

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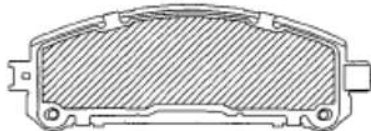
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Fig. 127: Identifying Front Disc Brake Pad Support Plates Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. INSTALL FRONT ANTI-SQUEAL SHIM

- a. Apply disc brake grease to the inside of the 2 front anti-squeal shims as shown in the illustration.



 Area for disc brake grease application

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Fig. 128: Identifying Disc Brake Grease Application Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- When replacing worn pads, the front anti-squeal shims must be replaced together with the pads.
- Install the shims in the correct positions and directions.
- Apply disc brake grease to the area that contacts the front anti-squeal shim.
- Disc brake grease can come out slightly from the area where the front anti-squeal shim is installed.
- Make sure that disc brake grease is not applied onto the lining

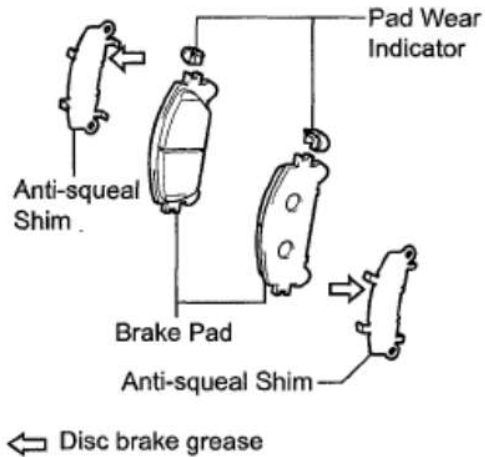
2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

surface.

- b. Install the 2 front anti-squeal shims and the 2 pad wear indicators to the pads.

NOTE: Install the pad wear indicators in the correct positions and directions.

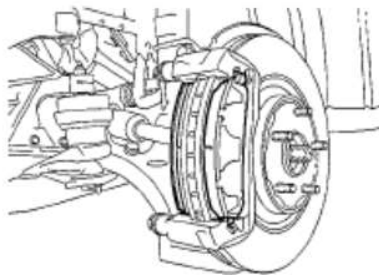


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Fig. 129: Identifying Front Anti-Squeal Shims And Pad Wear Indicators
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSTALL FRONT DISC BRAKE PAD

- a. Install the 2 brake pads with the front anti-squeal shims to the front disc brake cylinder mounting.



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Fig. 130: Identifying Anti-Squeal Shims
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the 2 anti-squeal springs to the front disc brake pads.

NOTE:

- When replacing the front brake pads with new ones, make sure to replace the anti-squeal springs at the same time.
- Be sure to install the anti-squeal springs into the front disc brake pad installation holes as far as they will go.

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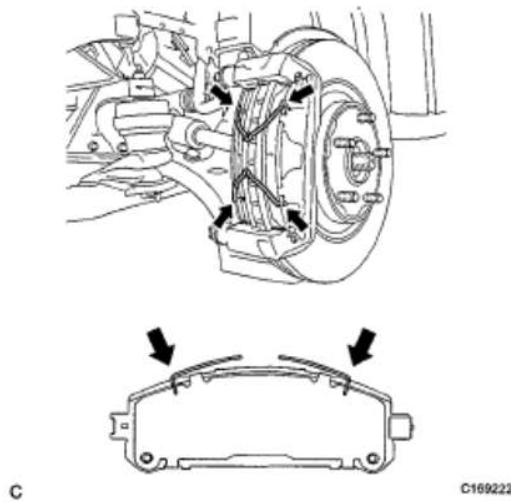


Fig. 131: Locating Anti-Squeal Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL DISC BRAKE CYLINDER ASSEMBLY

- Hold the front disc brake cylinder slide pins and install the disc brake cylinder assembly with the 2 bolts.

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

NOTE: Be sure that the anti-squeal springs are installed to the front disc brake pads.

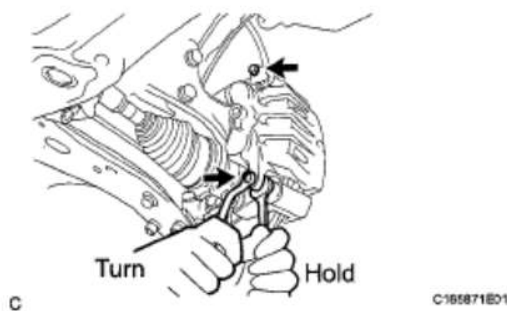


Fig. 132: Holding Front Disc Brake Cylinder Slide Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. CONNECT FRONT FLEXIBLE HOSE

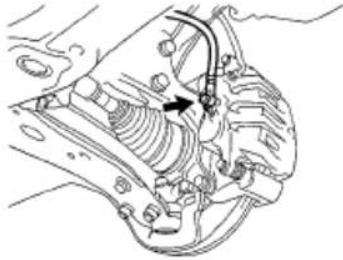
- Connect the front flexible hose with the union bolt and a new gasket to the disc brake cylinder assembly.

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Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

NOTE: Install the front flexible hose lock securely in the lock hole in the disc brake cylinder assembly.



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Fig. 133: Locating Front Flexible Hose

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

3. **FILL BRAKE FLUID RESERVOIR** (See REPLACEMENT)
4. **BLEED BRAKE LINE** (See REPLACEMENT)
5. **BLEED BRAKE ACTUATOR** (See REPLACEMENT)
6. **INSPECT FLUID LEVEL** (See ON-VEHICLE INSPECTION)
7. **INSPECT FOR BRAKE FLUID LEAK**
8. **INSTALL FRONT WHEEL**

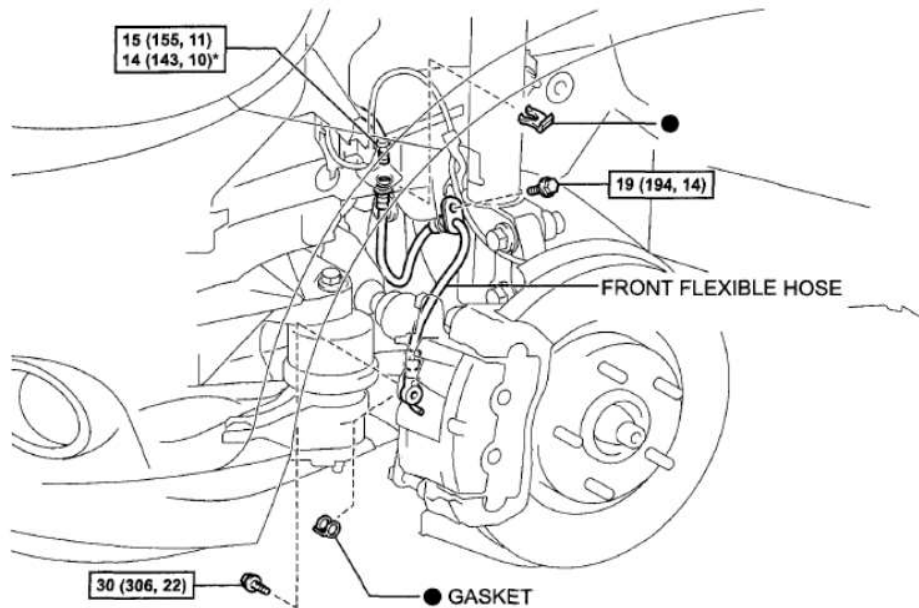
Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

FRONT BRAKE FLEXIBLE HOSE

COMPONENTS

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2009 BRAKES Brake - Highlander



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

* For use with union nut wrench

● Non-reusable part

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Fig. 134: Identifying Front Brake Flexible Hose Components With Torque Specification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

NOTE: If both the RH side hose and LH side hose are disconnected at the same time, be sure to place identification marks indicating the position on each side.

HINT:

- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

1. DRAIN BRAKE FLUID

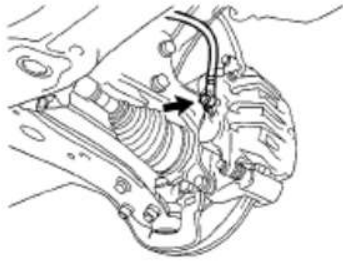
2. REMOVE FRONT WHEEL

3. REMOVE FRONT FLEXIBLE HOSE

- Remove the union bolt and gasket, and separate the front flexible hose.

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander



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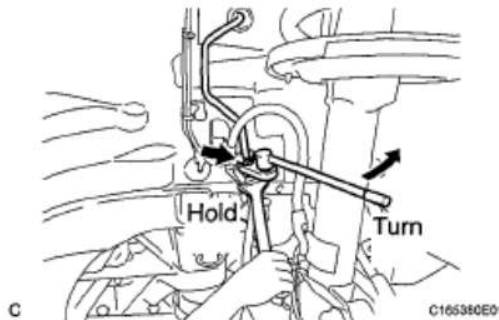
Fig. 135: Locating Front Flexible Hose

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

- b. Using a union nut wrench (10 mm), disconnect the brake line from the front flexible hose while holding the front flexible hose with a wrench.

NOTE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake lines.



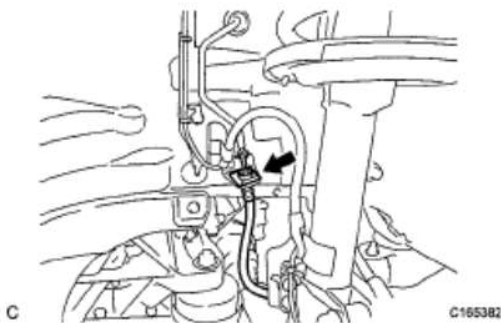
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Fig. 136: Disconnecting Brake Line From Front Flexible Hose

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

- c. Remove the clip.



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Fig. 137: Locating Flexible Hose Clip

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander**

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

- d. Remove the bolt and front flexible hose from the absorber bracket.

INSTALLATION**NOTE:**

- Because the left and right hoses are not interchangeable, verify the part number when installing the flexible hoses.
- If the hoses are to be reused, connect them after checking the identification marks placed when each hose was disconnected.

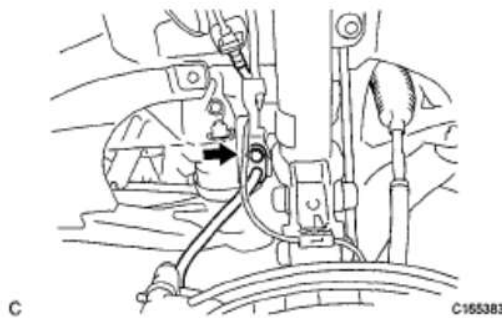


Fig. 138: Locating Front Flexible Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. INSTALL FRONT FLEXIBLE HOSE

- a. Connect the front flexible hose to the disc brake cylinder assembly with the union bolt and a new gasket.

Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

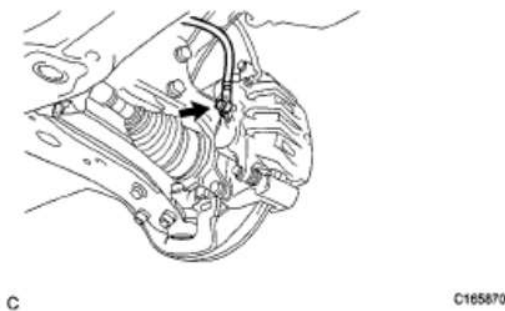


Fig. 139: Locating Front Flexible Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the front flexible hose with a new clip.

NOTE: Install the clip as far as it will go.

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

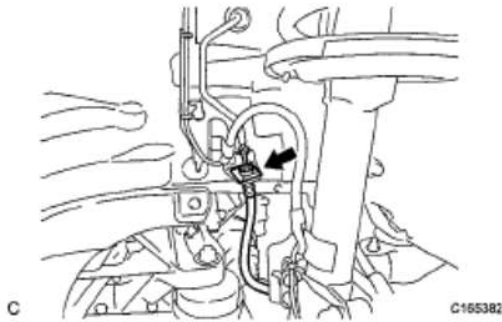


Fig. 140: Locating Flexible Hose Clip

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

- c. Using a union nut wrench (10 mm), connect the brake line to the front flexible hose while holding the front flexible hose with a wrench.

Torque: without union nut wrench

15 N*m (155 kgf*cm, 11 ft.*lbf)

with union nut wrench

14 N*m (143 kgf*cm, 10 ft.*lbf)

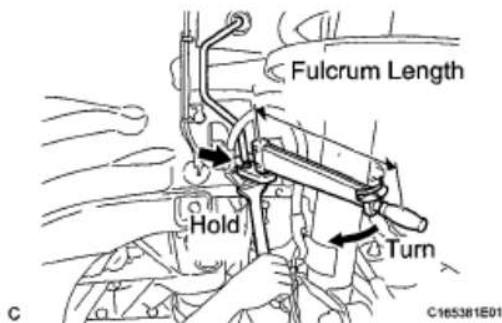


Fig. 141: Identifying Torque Wrench With Fulcrum Length

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

NOTE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake line.
- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when the union nut wrench is parallel to the torque wrench.

- d. Install the front flexible hose to the absorber bracket with the bolt.

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

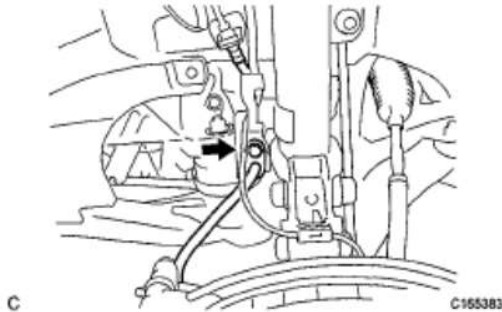


Fig. 142: Locating Front Flexible Hose

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

2. **FILL BRAKE FLUID RESERVOIR** (See ON-VEHICLE INSPECTION)
3. **BLEED BRAKE LINE** (See REPLACEMENT)
4. **BLEED BRAKE ACTUATOR** (See REPLACEMENT)
5. **INSPECT FOR BRAKE FLUID LEAK**
6. **INSPECT FLUID LEVEL** (See ON-VEHICLE INSPECTION)
7. **INSTALL FRONT WHEEL**

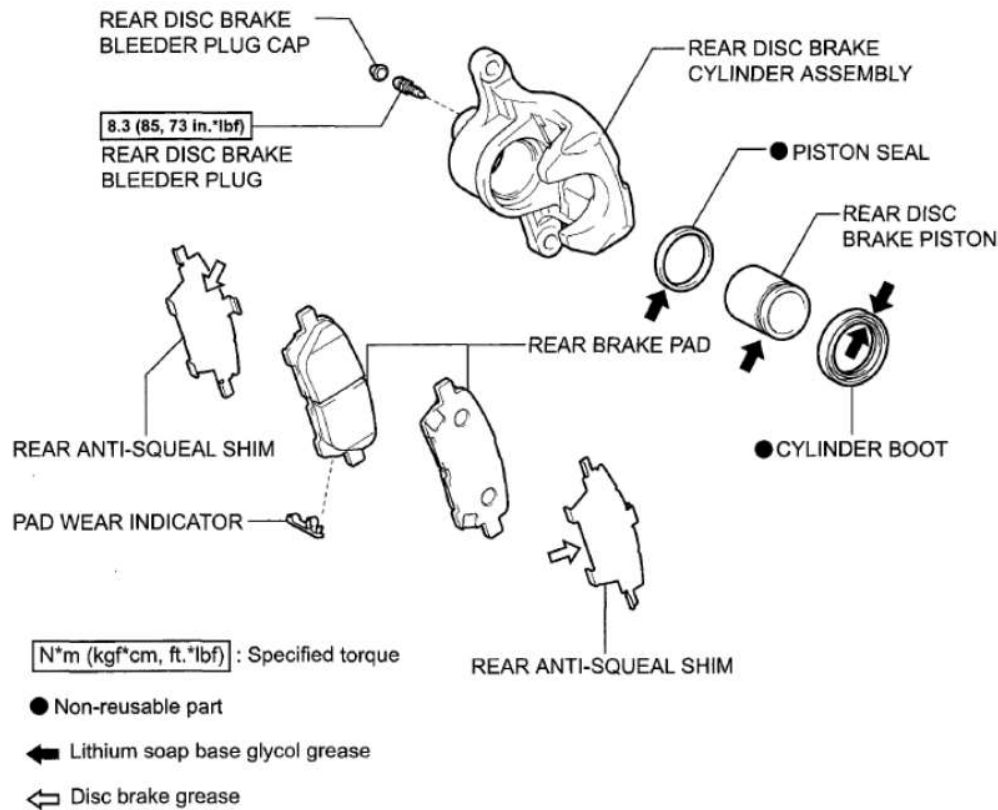
Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

REAR BRAKE

COMPONENTS

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander



C193303E01

Fig. 144: Identifying Rear Brake Components With Torque Specification (2 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE REAR WHEEL
2. DRAIN BRAKE FLUID

NOTE: If brake fluid leaks onto any painted surface, wash off and remove it completely.

3. DISCONNECT REAR FLEXIBLE HOSE

- a. Remove the union bolt and gasket, and disconnect the rear flexible hose from the rear disc brake cylinder assembly.

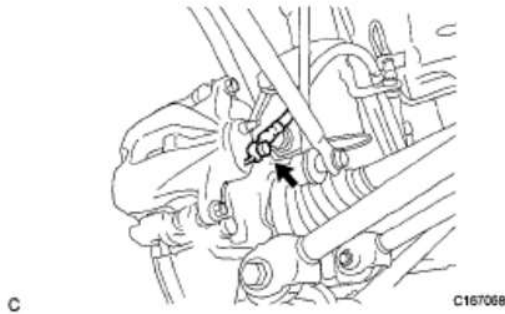
2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander**

Fig. 145: Locating Rear Flexible Hose Union Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REMOVE REAR DISC BRAKE CYLINDER ASSEMBLY

- a. Hold the 2 rear disc brake cylinder slide pins, and remove the 2 bolts and rear disc brake cylinder assembly.

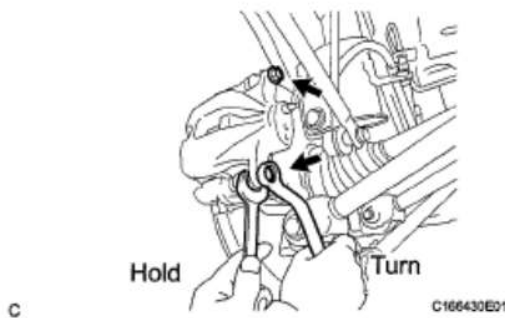


Fig. 146: Holding Rear Disc Brake Cylinder Slide Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY**1. REMOVE REAR BRAKE PAD**

- a. Remove the 2 brake pads with the rear anti-squeal shims from the rear disc brake cylinder mounting.

2. REMOVE REAR ANTI-SQUEAL SHIM

- a. Remove the 2 rear anti-squeal shims and the pad wear indicator from the inner pad.

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2009 BRAKES Brake - Highlander

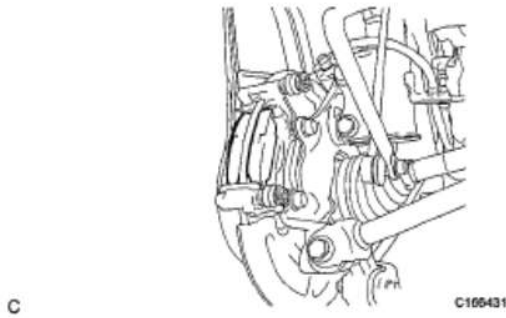


Fig. 147: Identifying Rear Brake Pad

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

3. REMOVE NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

- a. Remove the No. 1 rear disc brake pad support plate from the rear disc brake cylinder mounting.

NOTE: The No. 1 rear disc brake pad support plate and the No. 2 rear disc brake pad support plate have different shape. Be sure to put an identification mark on each rear disc brake pad support plate so that they can be reinstalled to their original position.

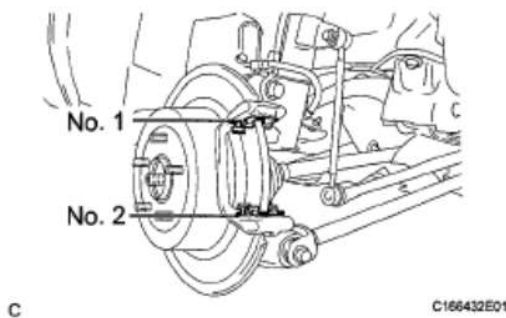


Fig. 148: Identifying No. 1 And 2 Rear Disc Brake Pad Support Plate

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

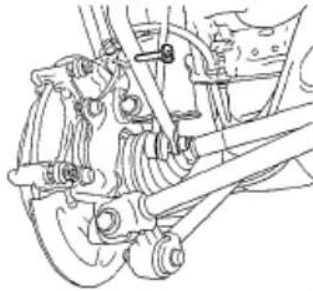
4. REMOVE NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

- a. Remove the No. 2 rear disc brake pad support plate from the rear disc brake cylinder mounting.

NOTE: The No. 1 rear disc brake pad support plate and the No. 2 rear disc brake pad support plate have different shape. Be sure to put an identification mark on each rear disc brake pad support plate so that they can be reinstalled to their original position.

5. REMOVE NO. 1 REAR DISC BRAKE CYLINDER SLIDE PIN

- a. Remove the No. 1 rear disc brake cylinder slide pin from the rear disc brake cylinder mounting.

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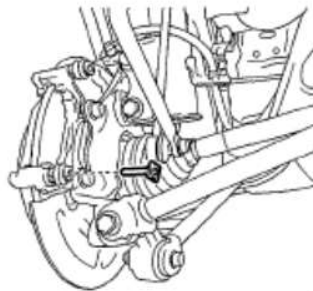
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Fig. 149: Identifying No. 1 Rear Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE NO. 2 REAR DISC BRAKE CYLINDER SLIDE PIN

- a. Remove the No. 2 rear disc brake cylinder slide pin from the rear disc brake cylinder mounting.



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Fig. 150: Identifying No. 2 Rear Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE REAR DISC BRAKE CYLINDER SLIDE BUSHING

- a. Using a screwdriver, remove the rear disc brake cylinder slide bushing from the No. 2 rear disc brake cylinder slide pin.

NOTE: Do not damage the No. 2 rear disc brake cylinder slide pin.

HINT:

Tape the screwdriver tip before use.

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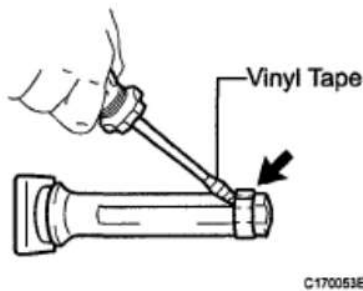


Fig. 151: Removing Rear Disc Brake Cylinder Slide Bushing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. REMOVE REAR DISC BRAKE BUSHING DUST BOOT

- a. Remove the 2 rear disc brake bushing dust boots from the rear disc brake cylinder mounting.

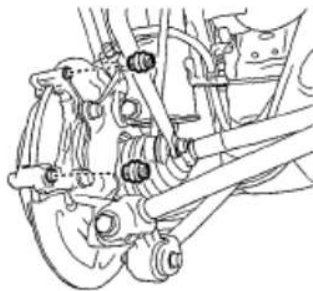


Fig. 152: Identifying Rear Disc Brake Bushing Dust Boots
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE REAR DISC BRAKE CYLINDER MOUNTING

- a. Remove the 2 bolts and the rear disc brake cylinder mounting from the rear axle.

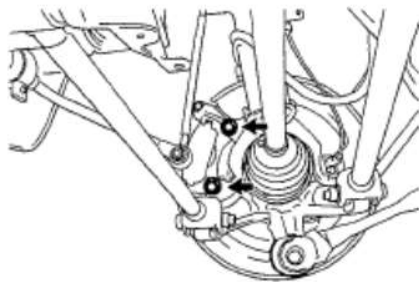


Fig. 153: Locating Rear Disc Brake Cylinder Mounting Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. REMOVE REAR DISC BRAKE PISTON

- a. Place a shop rag or a piece of cloth between the rear disc brake piston and disc brake cylinder

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assembly.

- b. Apply compressed air to remove the rear disc brake piston from the rear disc brake cylinder assembly.

CAUTION: Do not place your fingers in front of the rear disc brake piston when using compressed air.

NOTE: Do not allow any brake fluid to spatter.



Fig. 154: Removing Rear Disc Brake Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. REMOVE CYLINDER BOOT

- a. Using a screwdriver, remove the cylinder boot.

NOTE: Be careful not to damage the rear disc brake cylinder assembly.

HINT:

Tape the screwdriver tip before use.

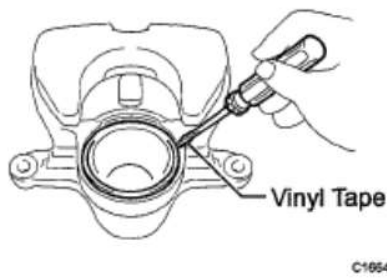


Fig. 155: Removing Cylinder Boot
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. REMOVE PISTON SEAL

- a. Using a screwdriver, remove the piston seal from the rear disc brake cylinder assembly.

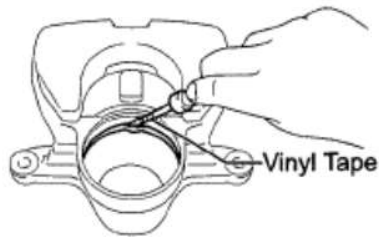
2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

NOTE: Be careful not to damage the inner cylinder or cylinder groove.

HINT:

Tape the screwdriver tip before use.



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Fig. 156: Removing Piston Seal

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

13. REMOVE REAR DISC BRAKE BLEEDER PLUG CAP

- a. Remove the bleeder plug cap from the rear disc brake bleeder plug.

14. REMOVE REAR DISC BRAKE BLEEDER PLUG

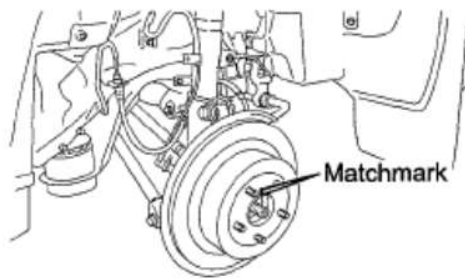
- a. Remove the rear disc brake bleeder plug from the rear disc brake cylinder assembly.

15. REMOVE PARKING BRAKE SHOE ADJUSTING HOLE PLUG

- a. Remove the parking brake shoe adjusting hole plug.

16. REMOVE REAR DISC

- a. Put matchmarks on the rear disc and the axle hub.



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Fig. 157: Identifying Matchmarks On Rear Disc And Axle Hub

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

- b. Release the parking brake and remove the rear disc.

HINT:

If the disc cannot be removed easily, turn and press firmly the shoe adjuster until the wheel comes

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free.

INSPECTION

1. INSPECT BRAKE CYLINDER AND PISTON

- a. Inspect the cylinder bore and the piston for rust or scoring. If necessary, replace the rear disc brake cylinder assembly and piston.

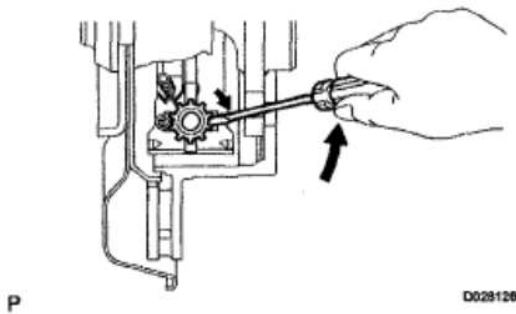


Fig. 158: Releasing Parking Brake

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

2. INSPECT PAD LINING THICKNESS

- a. Using a ruler, measure the pad lining thickness.

Standard thickness:

10.0 mm (0.394 in.)

Minimum thickness:

1.0 mm (0.039 in.)

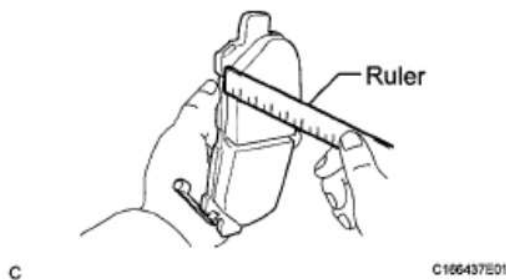


Fig. 159: Measuring Pad Lining Thickness

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

If the pad lining thickness is less than the minimum, replace the brake pads.

HINT:

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander**

Be sure to check wear of the rear disc after replacing the brake pads with new ones.

3. INSPECT NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

- a. Inspect the No. 1 rear disc brake pad support plate. If necessary, replace the No. 1 rear disc brake pad support plate.

HINT:

Make sure that it has sufficient rebound, and has no deformation, cracks or wear, and all rust and dirt are cleaned off.

4. INSPECT NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

HINT:

Inspect the No. 2 rear disc brake pad support plate using the same procedure with the No. 1 rear disc brake pad support plate. If necessary, replace the No. 2 rear disc brake pad support plate.

5. INSPECT DISC THICKNESS

- a. Using a micrometer, measure the disc thickness.

Standard thickness:

10.0 mm (0.390 in.)

Minimum thickness:

8.5 mm (0.334 in.)

If the disc thickness is less than the minimum, replace the rear disc.

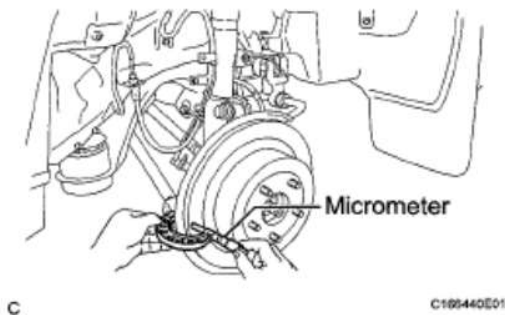


Fig. 160: Measuring Disc Thickness

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

6. INSPECT DISC RUNOUT

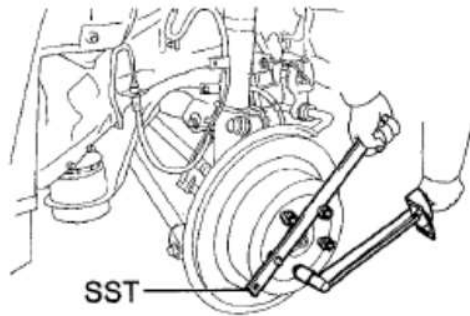
- a. Using SST to hold the rear disc, tighten the rear disc with the 5 nuts.

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

SST 09330-00021

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)



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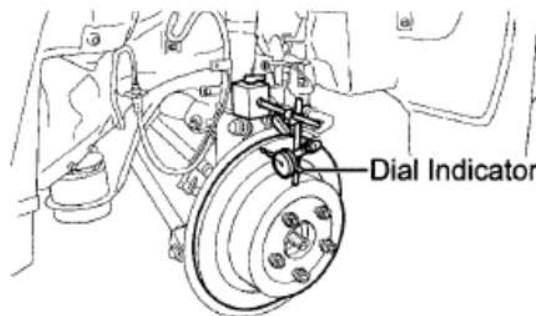
Fig. 161: Tightening Rear Disc With Nuts

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

- b. Using a dial indicator, measure the disc runout 10 mm (0.394 in.) away from the outer edge of the rear disc.

Maximum disc runout:

0.15 mm (0.0059 in.)



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Fig. 162: Measuring Disc Runout

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

NOTE:

- Keep the magnet of the dial indicator away from the axle hub and speed sensor.
- Install the dial indicator to the shock absorber.

HINT:

If the runout exceeds the maximum value, change the installation position of the disc on the rear

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

axle hub to minimize runout. If the runout exceeds the maximum even after the installation position is changed, check the bearing play in the axial direction and the axle hub runout (for 2WD: See **ON-VEHICLE INSPECTION**, for 4WD: See **ON-VEHICLE INSPECTION**). If the bearing play and the axle hub runout are normal and if the disc thickness is not within the specified range, grind the disc. If the disc thickness is less than the minimum, replace the disc.

- c. Remove the 5 hub nuts and the rear disc.

REASSEMBLY

1. INSTALL REAR DISC

- a. Align the matchmarks and install the rear disc.

NOTE: When replacing the rear disc with a new one, select the installation position where the rear disc has minimal runout.

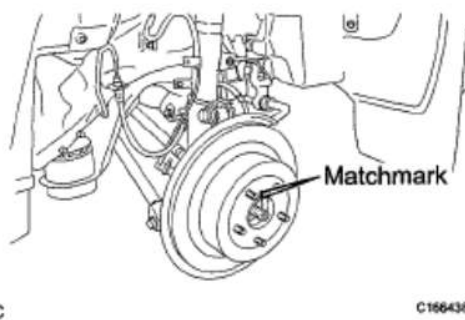


Fig. 163: Identifying Matchmarks On Rear Disc And Axle Hub
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL PARKING BRAKE SHOE ADJUSTING HOLE PLUG

- a. Install the parking brake shoe adjusting hole plug.

3. INSTALL REAR DISC BRAKE BLEEDER PLUG

- a. Temporarily tighten the rear disc brake bleeder plug to the rear disc brake cylinder assembly.

HINT:

The bleeder plug will be tightened to a torque specification in the "Bleed Brake Line" procedure.

4. INSTALL REAR DISC BRAKE BLEEDER PLUG CAP

- a. Install the rear disc brake bleeder plug cap to the rear disc brake bleeder plug.

5. INSTALL PISTON SEAL

- a. Apply a light layer of lithium soap base glycol grease to the entire circumference of a new piston seal.
- b. Install the piston seal to the rear disc brake cylinder assembly.

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

NOTE: Securely install the piston seal into the groove of the disc brake cylinder.



 Lithium soap base glycol grease

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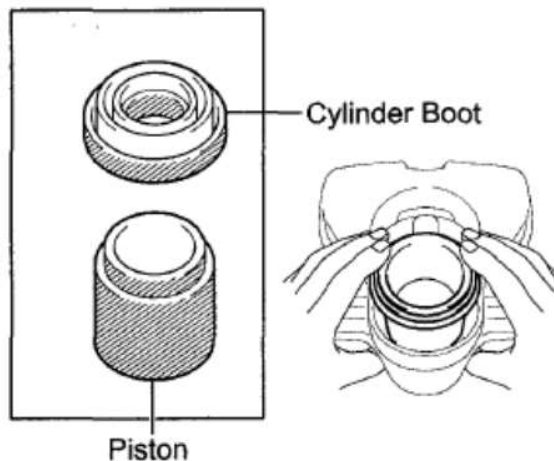
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Fig. 164: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSTALL REAR DISC BRAKE PISTON

- Apply a light layer of lithium soap base glycol grease to the entire circumference of a new cylinder boot.
- Install the cylinder boot to the rear disc brake piston.
- Apply a light layer of lithium soap base glycol grease to the contact surface of the rear disc brake piston, and install it to the rear disc brake cylinder assembly.

NOTE: Do not install the rear disc piston forcibly in the rear disc brake cylinder assembly.



 Lithium soap base glycol grease

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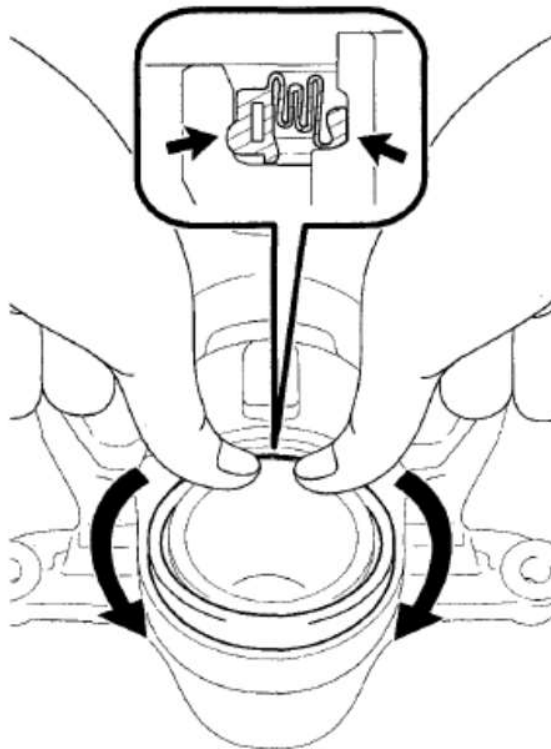
Fig. 165: Applying Light Layer Of Lithium Soap Base Glycol Grease To Entire Circumference Of Cylinder Boot
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander****7. INSTALL CYLINDER BOOT**

- a. Install the cylinder boot to the rear disc brake cylinder assembly as shown in the illustration.

NOTE:

- Securely install the cylinder boot into the groove of the cylinder and piston.
- Do not damage the cylinder boot.



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Fig. 166: Installing Cylinder Boot To Rear Disc Brake Cylinder Assembly

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

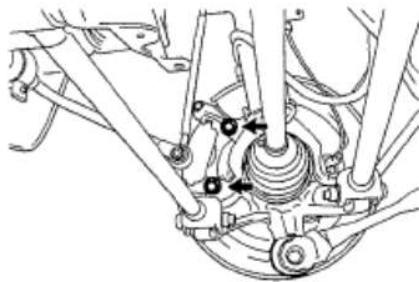
8. INSTALL REAR DISC BRAKE CYLINDER MOUNTING

- a. Install the rear disc brake cylinder mounting to the rear axle with the 2 bolts.

Torque: 78 N*m (795 kgf*cm, 57 ft.*lbf)

2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander



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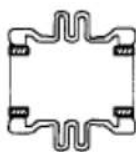
Fig. 167: Locating Rear Disc Brake Cylinder Mounting Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSTALL REAR DISC BRAKE BUSHING DUST BOOT

- a. Apply a light layer of lithium soap base glycol grease to the seal surfaces of 2 new rear disc brake bushing dust boots.

HINT:

Apply at least 0.3 g (0.01 oz.) of lithium soap base glycol grease to each rear disc brake bushing dust boot.



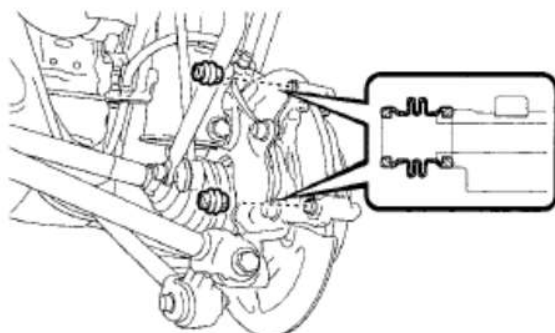
 Lithium soap base glycol grease

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Fig. 168: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the 2 rear disc brake bushing dust boots to the rear disc brake cylinder mounting.



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2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

Fig. 169: Identifying Rear Disc Brake Bushing Dust Boots
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. INSTALL REAR DISC BRAKE CYLINDER SLIDE BUSHING

- a. Apply a light layer of lithium soap base glycol grease to the contact surface of the No. 2 rear disc brake cylinder slide pin.
- b. Install a new rear disc brake cylinder slide bushing to the No. 2 rear disc brake cylinder slide pin.



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Fig. 170: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. INSTALL NO. 2 REAR DISC BRAKE CYLINDER SLIDE PIN

- a. Apply a light layer of lithium soap base glycol grease to the sliding part and the seal surface of the No. 2 rear disc brake cylinder slide pin.



 Lithium soap base glycol grease

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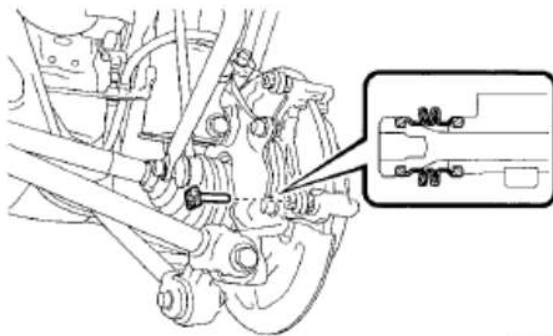
C192812E01

Fig. 171: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the No. 2 rear disc brake cylinder slide pin to the rear disc brake cylinder mounting.

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Fig. 172: Identifying No. 2 Rear Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. INSTALL NO. 1 REAR DISC BRAKE CYLINDER SLIDE PIN

- a. Apply a light layer of lithium soap base glycol grease to the sliding part and the seal surface of the No. 1 rear disc brake cylinder slide pin.



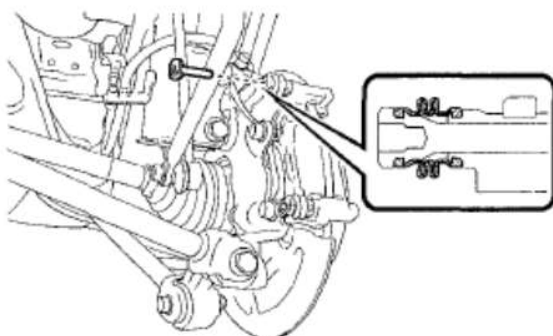
 Lithium soap base glycol grease

C

C192813E01

Fig. 173: Identifying Lithium Soap Base Glycol Grease Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the No. 1 rear disc brake cylinder slide pin to the rear disc brake cylinder mounting.



C

C167075

Fig. 174: Identifying No. 1 Rear Disc Brake Cylinder Slide Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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13. INSTALL NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

- a. Install the No. 1 rear disc brake pad support plate to the rear disc brake cylinder mounting.

NOTE: Be sure to install the No. 1 rear disc brake pad support plate to the correct position and direction.

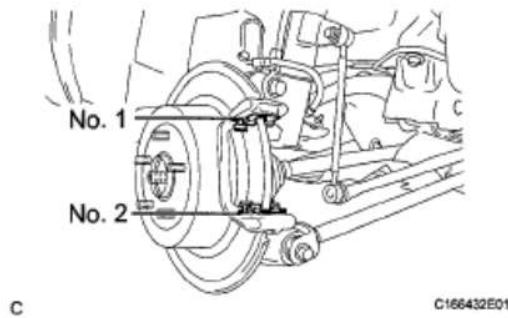


Fig. 175: Identifying No. 1 And 2 Rear Disc Brake Pad Support Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSTALL NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

- a. Install the No. 2 rear disc brake pad support plate to the rear disc brake cylinder mounting.

NOTE: Be sure to install the No. 2 rear disc brake pad support plate to the correct position and direction.

15. INSTALL REAR ANTI-SQUEAL SHIM

- a. Apply disc brake grease to the inside of the 2 rear anti-squeal shims as shown in the illustration.

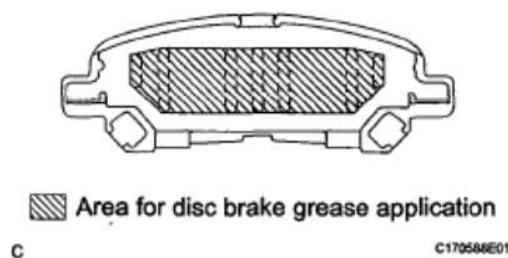


Fig. 176: Applying Disc Brake Grease To Inside Of Rear Anti-Squeal Shims
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- When replacing worn pads, the rear anti-squeal shims must be replaced together with the pads.
- Install the shims in the correct positions and directions.
- Apply disc brake grease to the area that contacts the rear anti-squeal shim.

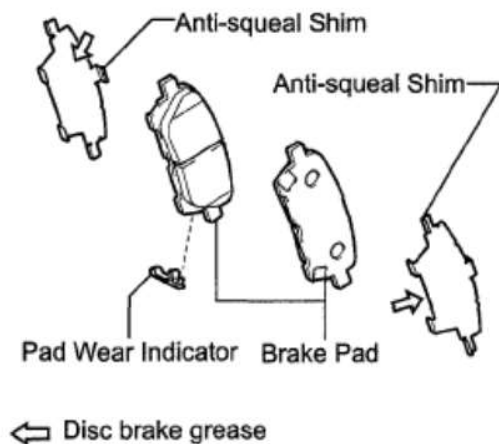
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- Disc brake grease can come out slightly from the area where the rear anti-squeal shim is installed.
- Make sure that disc brake grease is not applied onto the lining surface.

- Install the rear anti-squeal shims to each of the 2 rear brake pads.
- Install the pad wear indicator to the inside rear brake pad.

NOTE: Install the pad wear indicator and rear anti-squeal shims in the correct positions and directions.

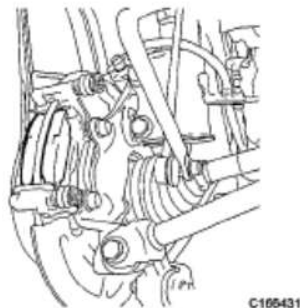


C170586E01

Fig. 177: Installing Rear Anti-Squeal Shims To Each Of Rear Brake Pads
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. INSTALL REAR BRAKE PAD

- Install the 2 rear brake pads with the rear anti-squeal shims to the rear disc brake cylinder mounting.



C

C105431

Fig. 178: Identifying Rear Brake Pad
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander****INSTALLATION****1. INSTALL REAR DISC BRAKE CYLINDER ASSEMBLY**

- a. Install the rear disc brake cylinder assembly to the rear disc brake cylinder mounting with the 2 bolts.

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

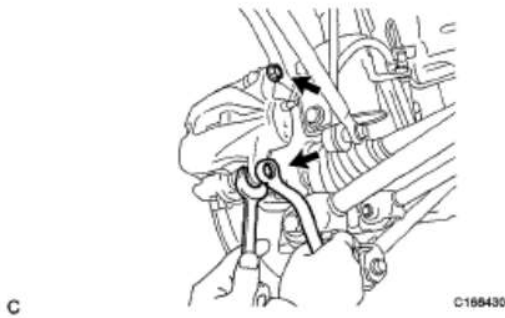


Fig. 179: Installing Rear Disc Brake Cylinder Assembly To Rear Disc Brake Cylinder Mounting With Bolts

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

2. CONNECT REAR FLEXIBLE HOSE

- a. Connect the rear flexible hose to the rear disc brake cylinder assembly with the union bolt and a new gasket.

Torque: 33 N*m (336 kgf*cm, 24 ft.*lbf)

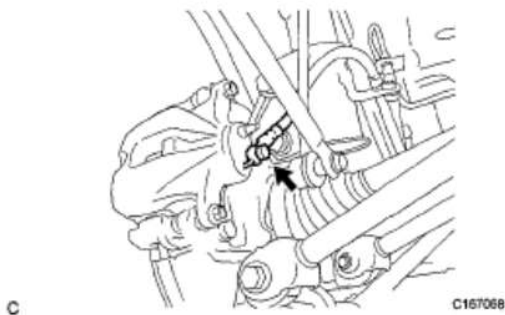


Fig. 180: Locating Rear Flexible Hose Union Bolt

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

3. **FILL BRAKE FLUID RESERVOIR** (See ON-VEHICLE INSPECTION)
4. **BLEED BRAKE LINE** (See REPLACEMENT)
5. **BLEED BRAKE ACTUATOR** (See REPLACEMENT)
6. **INSPECT FLUID LEVEL** (See ON-VEHICLE INSPECTION)
7. **INSPECT FOR BRAKE FLUID LEAK**

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8. **ADJUST PARKING BRAKE SHOE CLEARANCE AND PARKING BRAKE PEDAL TRAVEL**
(See **PARKING BRAKE SYSTEM**)
9. **INSTALL REAR WHEEL**

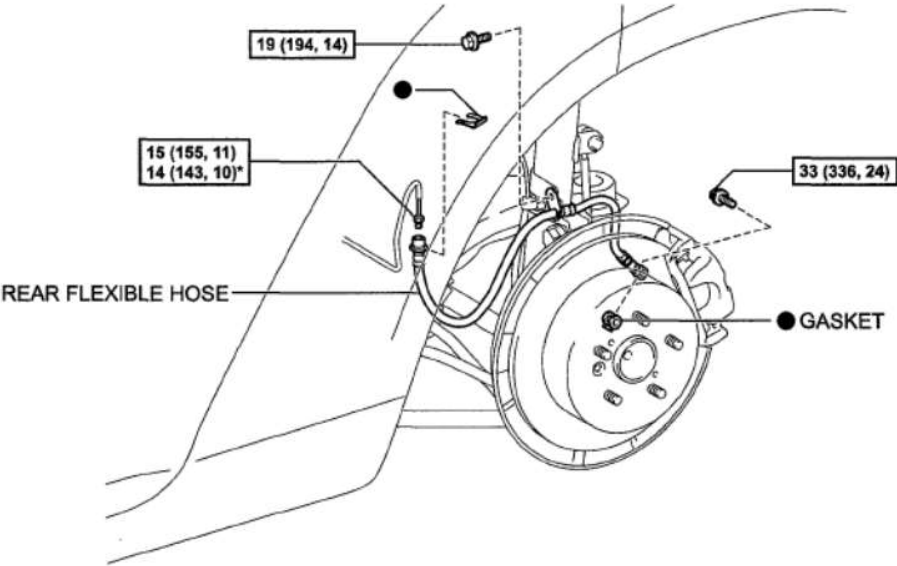
Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

REAR BRAKE FLEXIBLE HOSE**COMPONENTS**

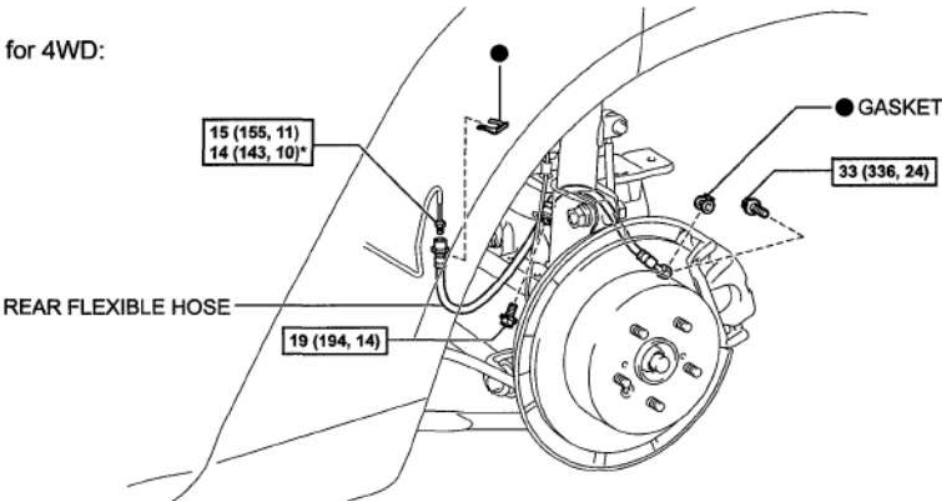
2009 Toyota Highlander Limited

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for 2WD:



for 4WD:



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

* For use with union nut wrench

● Non-reusable part

T C166062E01

Fig. 181: Identifying Rear Brake Flexible Hose Components With Torque Specification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

NOTE: If both the RH side hose and LH side hose are disconnected at the same time, be sure to place identification marks indicating the position on each side.

HINT:

2009 Toyota Highlander Limited**2009 BRAKES Brake - Highlander**

- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

1. DRAIN BRAKE FLUID**2. REMOVE REAR WHEEL****3. REMOVE REAR FLEXIBLE HOSE**

- a. Remove the union bolt and gasket, and separate the rear flexible hose.

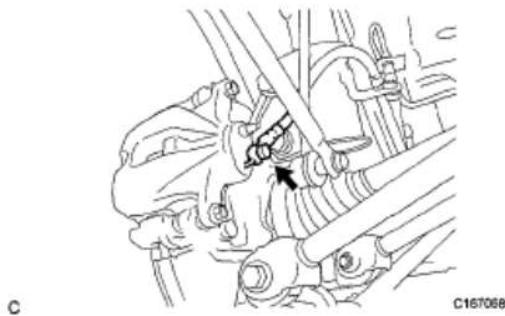


Fig. 182: Locating Rear Flexible Hose Union Bolt

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

- b. Using a union nut wrench (10 mm), disconnect the brake line while holding the rear flexible hose with a wrench.

NOTE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake line.

- c. Remove the clip.

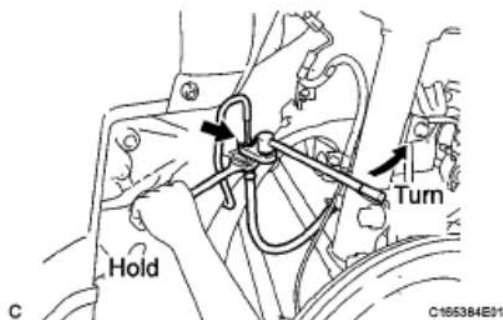


Fig. 183: Disconnecting Brake Line

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

- d. Remove the bolt and rear flexible hose from the absorber bracket.

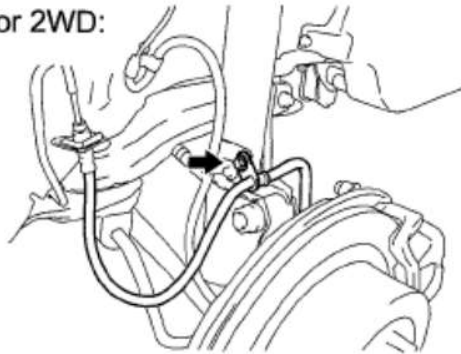
2009 Toyota Highlander Limited

2009 BRAKES Brake - Highlander

INSTALLATION**NOTE:**

- Because the left and right hoses are not interchangeable, verify the part number when installing the flexible hoses.
- If the hoses are to be reused, connect them after checking the identification marks placed when each hose was disconnected.

for 2WD:



for 4WD:

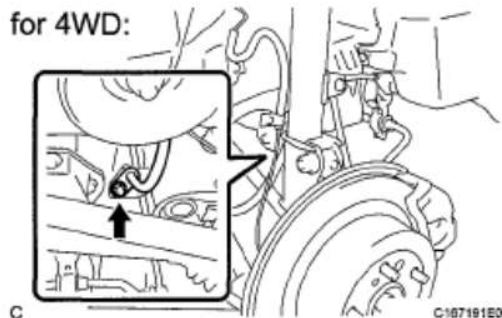


Fig. 184: Locating Rear Flexible Hose Absorber Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. INSTALL REAR FLEXIBLE HOSE

- a. Connect the rear flexible hose to the disc brake cylinder assembly with the union bolt and a new gasket.

Torque: 33 N*m (336 kgf*cm, 24 ft.*lbf)

- b. Install the rear flexible hose to the bracket with a new clip.

NOTE: Install the clip as far as it will go.

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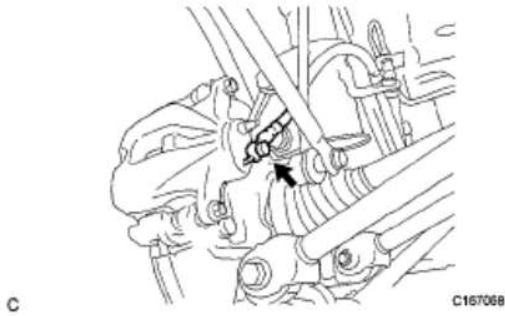


Fig. 185: Locating Rear Flexible Hose Union Bolt

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

- c. Using a union nut wrench (10 mm), connect the brake line to the front brake flexible hose while holding the flexible hose with a wrench.

Torque: without union nut wrench

15 N*m (155 kgf*cm, 11 ft.*lbf)

with union nut wrench

14 N*m (143 kgf*cm, 10 ft.*lbf)

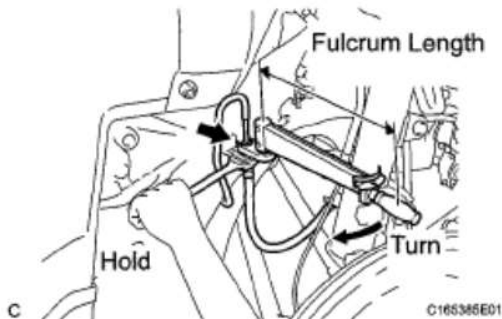


Fig. 186: Connecting Brake Line To Front Brake Flexible Hose

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

NOTE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake line.
- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when the union nut wrench is parallel to the torque wrench.

- d. Install the rear flexible hose to the absorber bracket with the bolt.

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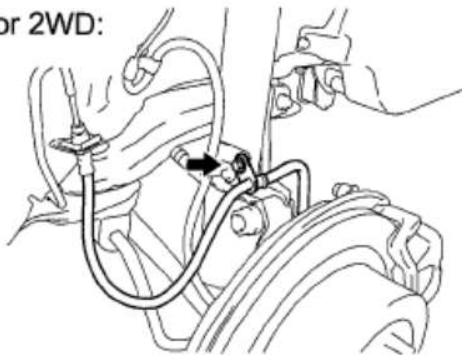
2009 BRAKES Brake - Highlander

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

2. **FILL BRAKE FLUID RESERVOIR** (See ON-VEHICLE INSPECTION)
3. **BLEED BRAKE LINE** (See REPLACEMENT)
4. **BLEED BRAKE ACTUATOR** (See REPLACEMENT)
5. **INSPECT FOR BRAKE FLUID LEAK**
6. **INSPECT FLUID LEVEL** (See ON-VEHICLE INSPECTION)
7. **INSTALL REAR WHEEL**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

for 2WD:



for 4WD:

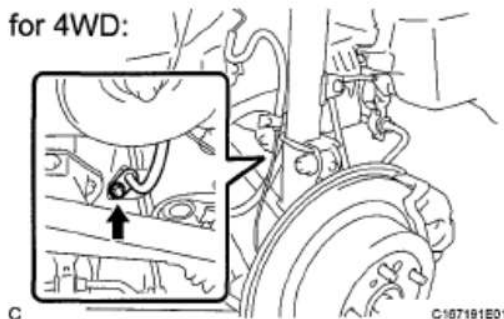


Fig. 187: Locating Rear Flexible Hose Absorber Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.