

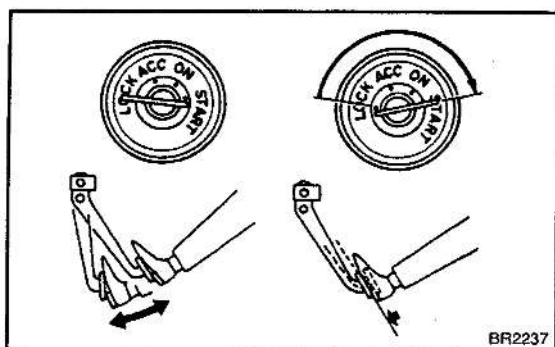
BRAKE

BRAKE BOOSTER ASSEMBLY (1ND-TV) ..	BR-1
VACUUM PUMP	BR-10
LOAD SENSING PROPORTIONING VALVE (LSPV)	BR-19
ABS ACTUATOR (1ND-TV)	BR-21
FRONT SPEED SENSOR	BR-26

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.



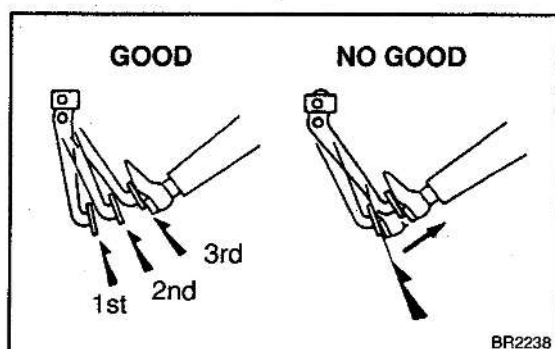
BRAKE BOOSTER ASSEMBLY (1ND-TV)

BR1RL-01

ON-VEHICLE INSPECTION

1. OPERATING CHECK

- Depress the brake pedal several times with the engine off and check that there is no change in the pedal reserve distance.
- Depress the brake pedal and start the engine. If the pedal goes down slightly, operation is normal.

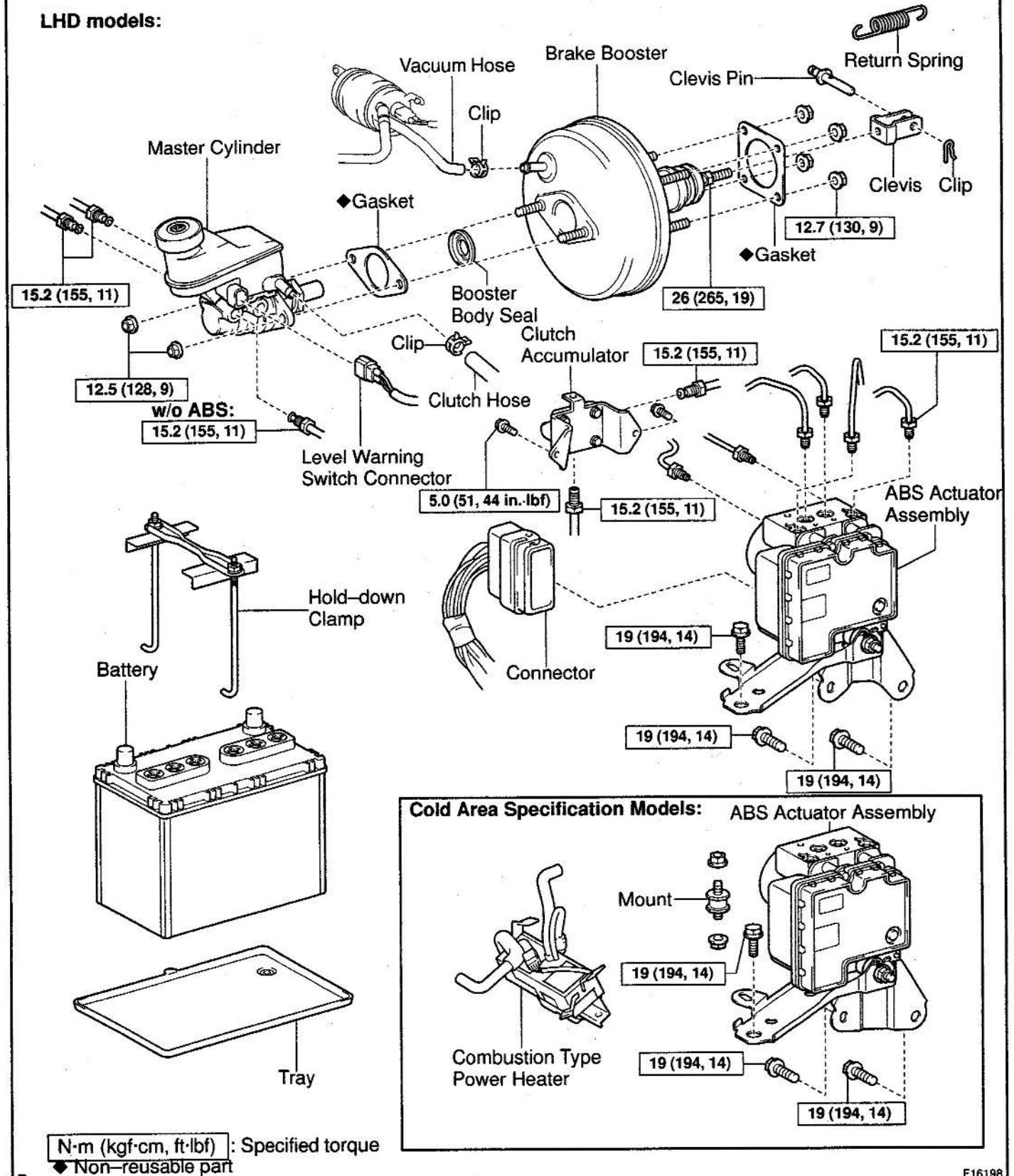


2. AIR TIGHTNESS CHECK

- Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly. If the pedal goes down farthest the 1st time, but gradually rises after the 2nd or 3rd time, the booster is air tight.
- Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed. If there is no change in the pedal reserve travel after holding the pedal for 30 seconds, the booster is air tight.

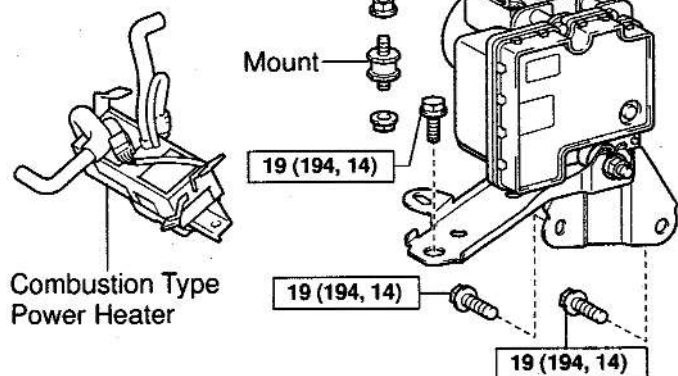
COMPONENTS

LHD models:



Cold Area Specification Models:

ABS Actuator Assembly

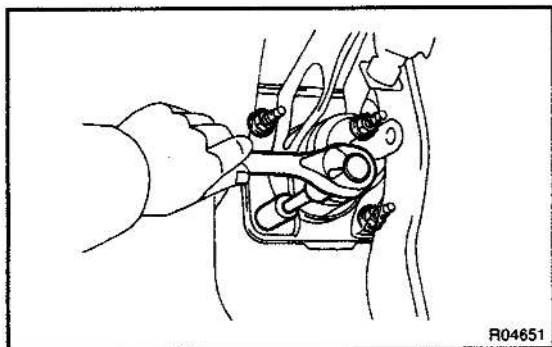


N

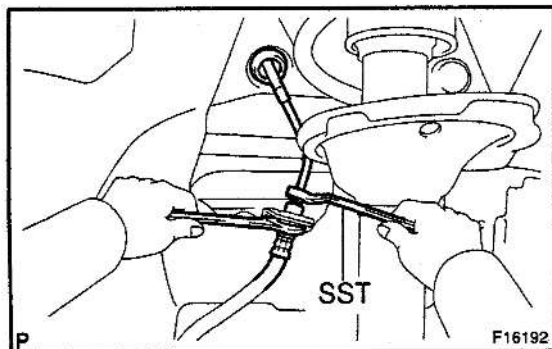
REMOVAL

1. **REMOVE MASTER CYLINDER** (See Pub. No. RM685E on page BR-11, BR-15)
2. **LHD:**
REMOVE BRAKE BOOSTER
 - (a) Cold Area Specification models:
Remove the combustion type power heater (See page AC-15).
 - (b) Remove the ABS actuator assembly (See page BR-24).
 - (c) Disconnect the vacuum hose from the brake booster.
 - (d) Remove the booster body seal from the brake booster.

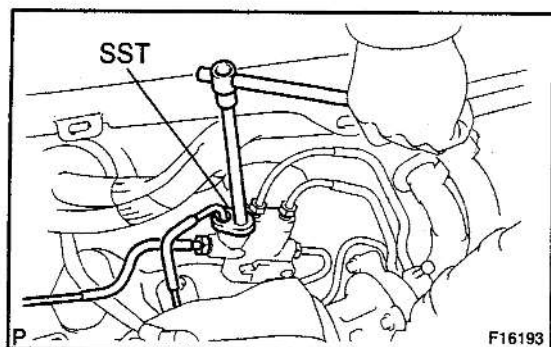
BR



- (e) Remove the brake booster.
 - (1) Remove the return spring.
 - (2) Remove the clip and clevis pin.
 - (3) Remove the 4 installation nuts and clevis.
 - (4) Pull out the brake booster and remove the gasket.
3. **RHD:**
REMOVE BRAKE BOOSTER
 - (a) Remove 2 bolts and the vacuum tank assembly.
 - (b) Remove the wiper arm assembly (See Pub. No. RM685E on page BO-41).
 - (c) Remove the cowl top ventilator louver assembly (See Pub. No. RM685E on page BO-41).
 - (d) Remove the wiper motor assembly (See Pub. No. RM685E on page BO-41).
 - (e) Remove the outer front cowl top panel (See Pub. No. RM685E on page BO-41).
 - (f) Remove the 2 bolts of PS vane pump, and move PS vane pump aside (See page SR-15).

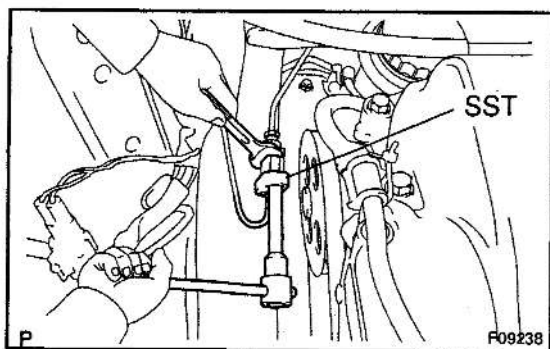


- (g) Remove the brake line.
 - (1) Using a SST and spanner, disconnect the brake line from the flexible hose.
- SST 09751-36011



- (2) w/o ABS:
Using a SST, remove the 2 brake lines from the 3-way.

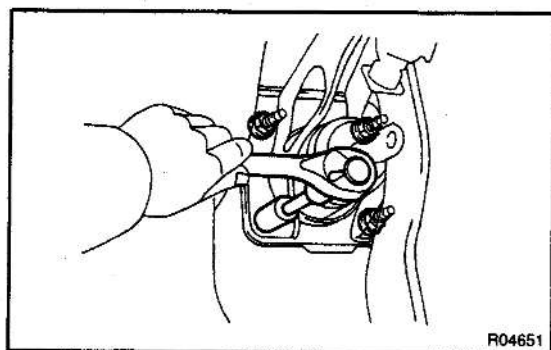
SST 09023-00100



- (3) w/ ABS:
Using a SST and spanner, remove the brake line.

SST 09023-00100

- (h) Remove the clutch master cylinder (See Pub. No. RM685E on page CL-5).
(i) Disconnect the vacuum hose from the brake booster.



- (j) Remove the brake booster.
(1) Remove the return spring.
(2) Remove the clip and clevis pin.
(3) Remove the 4 installation nuts and clevis
(4) Pull out the brake booster and remove the gasket.

INSTALLATION

1. LHD:

INSTALL BRAKE BOOSTER

(a) Install the brake booster.

- (1) Install the booster and a new gasket.
- (2) Install and torque the 4 installation nuts.

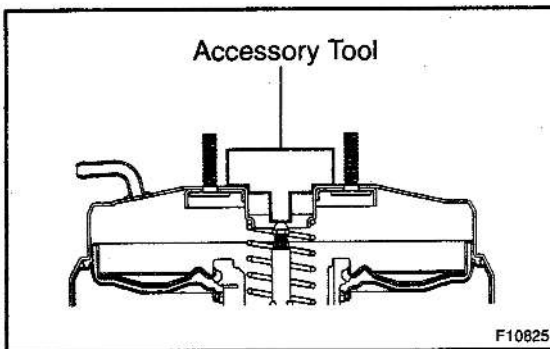
Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

- (3) Install the clevis, and torque the lock nut.

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

- (4) Insert the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin and install the return spring.

BR



- ##### (b) When replacing the brake master cylinder only: Adjust the length of brake booster push rod.

- (1) Apply chalk to the tip of an accessory tool.

HINT:

An accessory tool is enclosed with new master cylinder.

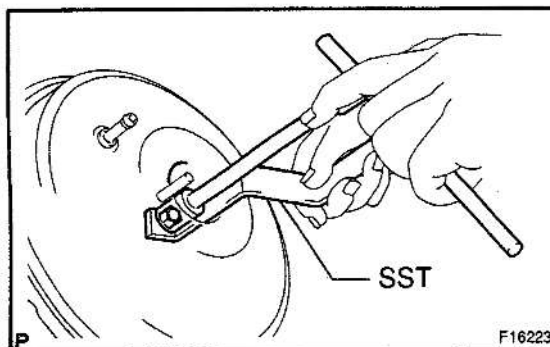
- (2) Place the accessory tool to the brake booster.
- (3) Measure the clearance between the brake booster push rod and accessory tool.

Clearance: 0 mm (0 in.)

HINT:

Adjust the clearance in following cases:

- If there is a clearance between the accessory tool and the shell of the booster (floating accessory tool), the clearance is small.
- If the chalk does not stick on the tip of the push rod, the clearance is large.



- (4) If the clearance is out of the specified range, fix the push rod using SST and adjust the length of the protruding adjusting bolt.

SST 09737-00020

HINT:

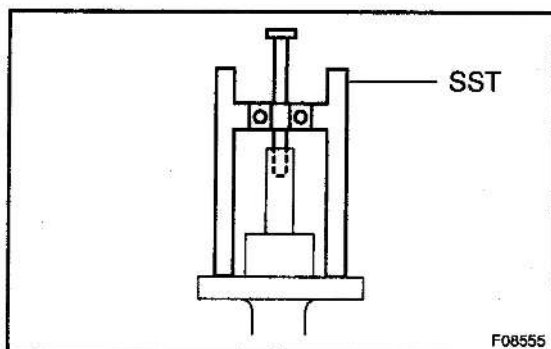
When adjusting the push rod, depress the brake pedal sufficiently so that the push rod sticks out.

- (c) Connect the vacuum hose to the brake booster.
- (d) Install the ABS actuator assembly (See page BR-25).
- (e) Cold Area specification models:
Install the combustion type power heater (See page AC-24).

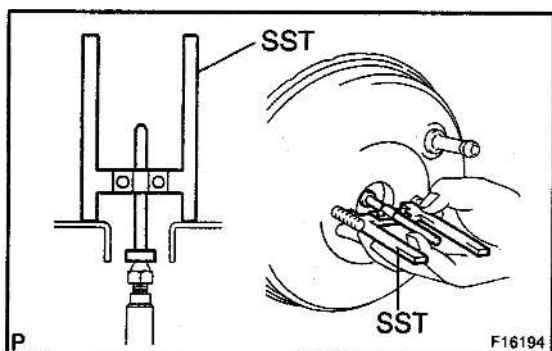
2. RHD:

INSTALL BRAKE BOOSTER

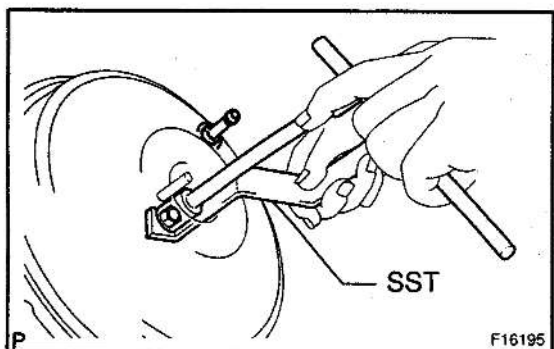
- (a) Install the brake booster.
 - (1) Install the booster and a new gasket.
 - (2) Install and torque the 4 installation nuts.
Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)
 - (3) Install the clevis, and torque the lock nut.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)
 - (4) Insert the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin and install the return spring.



- (b) Adjust the length of brake booster push rod.
 - (1) Set the SST on the master cylinder, and lower the pin until its tip slightly touches the piston.
SST 09737-00012



- (2) Turn the SST upside down, and set it on the booster.
SST 09737-00012
- (3) Measure the clearance between the brake booster push rod and pin head.
Clearance: 0 mm (0 in.)

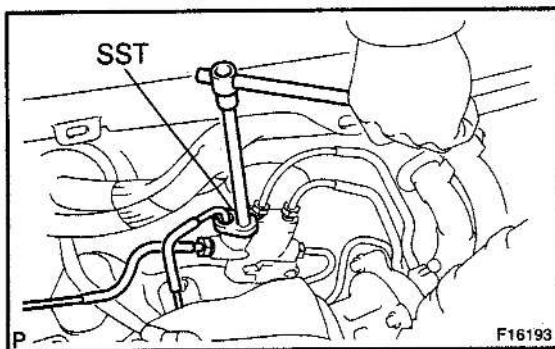


- (4) If the clearance is out of the specified range, fix the push rod using SST and adjust the length of the protruding adjusting bolt.
SST 09737-00020

HINT:

When adjusting the push rod, depress the brake pedal sufficiently so that the push rod sticks out.

- (c) Connect the vacuum hose to the brake booster.
- (d) Install the clutch master cylinder (See Pub. No. RM685E on page CL-8).



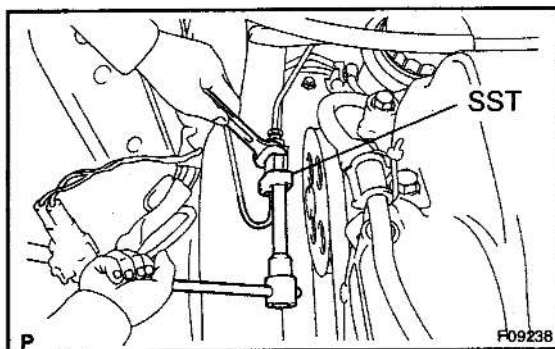
(e) Install the brake line.

(1) w/o ABS:

Using a SST, connect the 2 brake lines to the 3-way.

SST 09023-00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

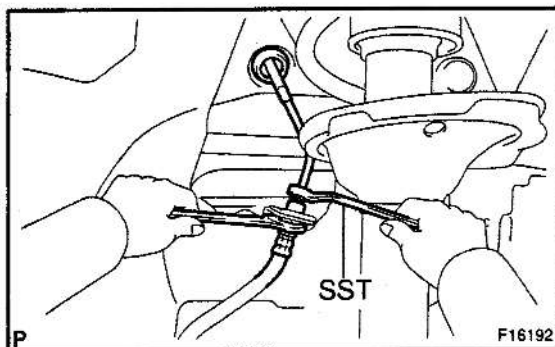


(2) w/ ABS:

Using a SST and spanner, connect the brake line.

SST 09023-00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)



(3) Using a SST and spanner, install the brake line to the flexible hose.

SST 09751-36011

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

(f) Install the PS vane pump (See page SR-23).

(g) Install the outer front cowl top panel (See Pub. No. RM685E on page BO-44).

(h) Install the wiper motor assembly (See Pub. No. RM685E on page BO-44).

(i) Install the cowl top ventilator louver assembly (See Pub. No. RM685E on page BO-44).

(j) Install the wiper arm assembly (See Pub. No. RM685E on page BO-44).

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

(k) Install the vacuum tank assembly.

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

3. INSTALL MASTER CYLINDER (See Pub. No. RM685E on page BR-12, BR-20)

(a) LHD:

Install the 2 nuts and brake master cylinder.

HINT:

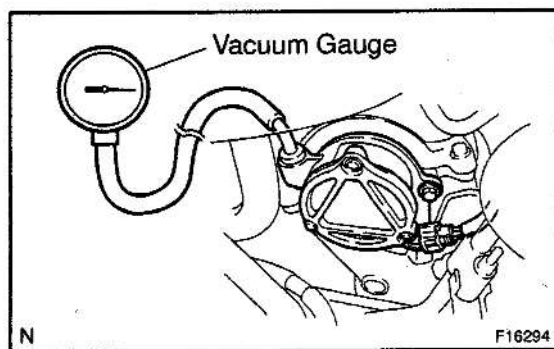
When installing the master cylinder, insert the booster body seal into the master cylinder piston, and install the master cylinder to the brake booster.

(b) RHD:

Install the 2 nuts and brake master cylinder.

4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See Pub. No. RM685E on page BR-4)

5. RHD:
BLEED CLUTCH SYSTEM
6. CHECK FOR LEAKS
7. CHECK AND ADJUST BRAKE PEDAL (See Pub. No. RM685E on page BR-6)
8. RHD:
CHECK AND ADJUST CLUTCH PEDAL (See page CL-1)
9. PERFORM OPERATIONAL CHECK (See page BR-1)



BR1RP-01

VACUUM PUMP ON-VEHICLE INSPECTION

OPERATIONING CHECK

- (a) Disconnect the vacuum hose and connect the vacuum gauge to the vacuum pump.
- (b) Start the engine.
- (c) Measure the vacuum with the engine at idle.

Vacuum at standard (sea-level) atmospheric pressure (1,013 mbar) when 2 minutes or more has elapsed after engine is started:

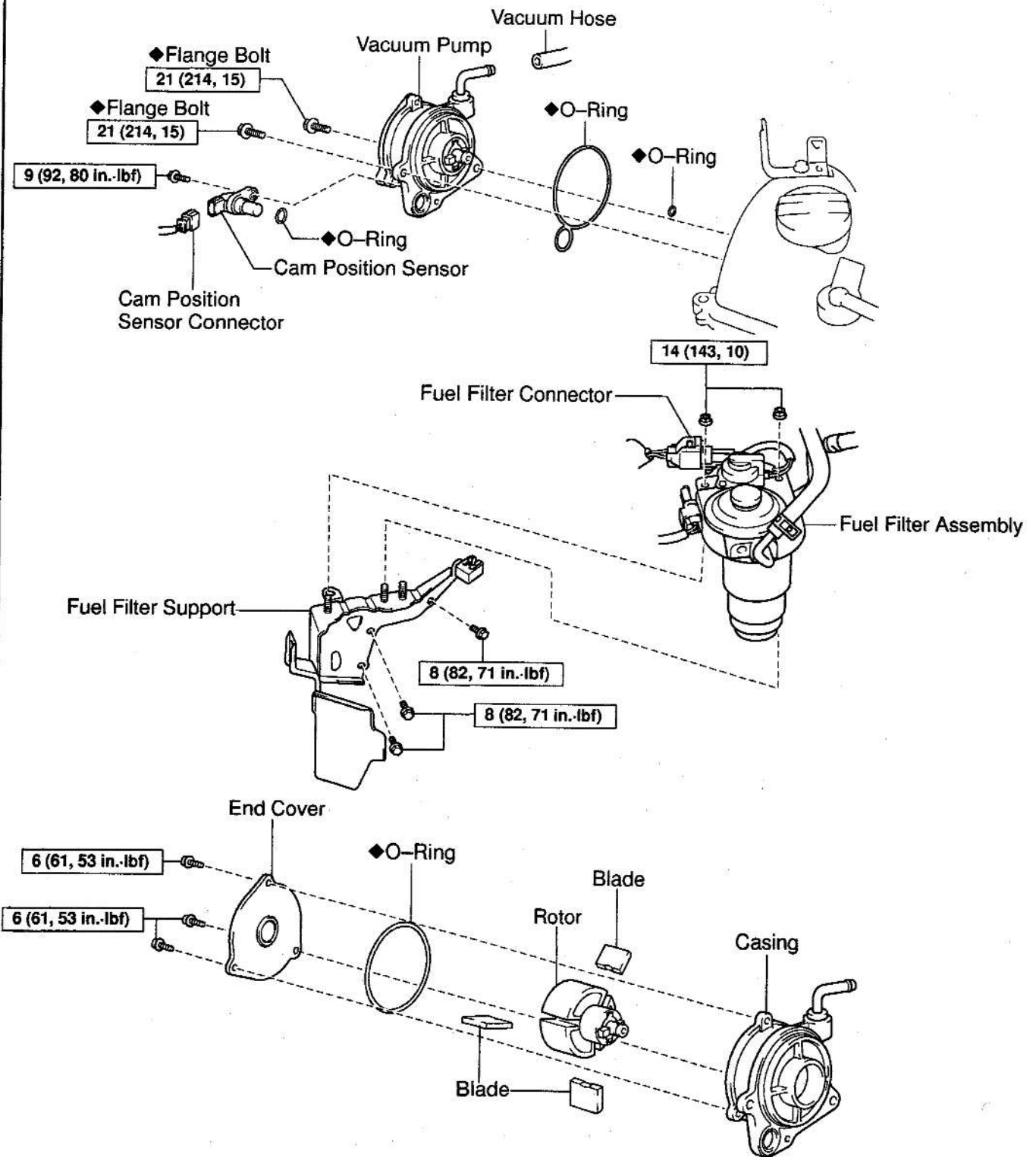
More than 86 kpa (650 mmHg)

If necessary, replace the vacuum pump assembly.

HINT:

For maintenance (every 200,000 km (124,000 miles) or 10 years), make sure to inspect the rotor, blades, casing and end cover even if the vacuum is more than 86 kpa (650 mmHg).

COMPONENTS

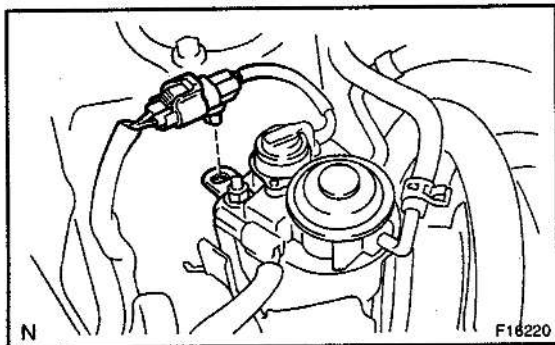


N·m(kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

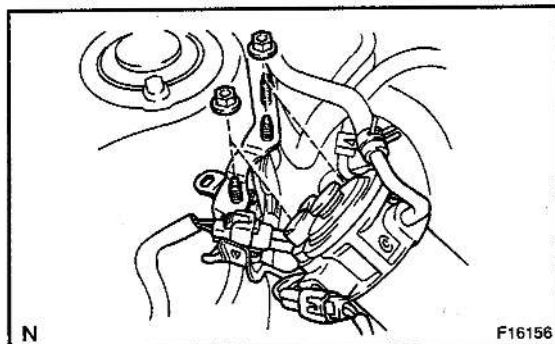
N

F16300

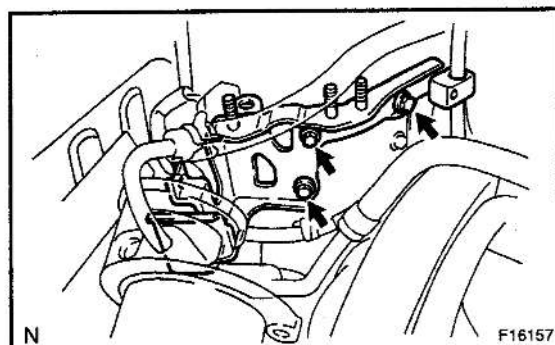


REMOVAL

1. **DISCONNECT FUEL FILTER CONNECTOR FROM BRACKET**

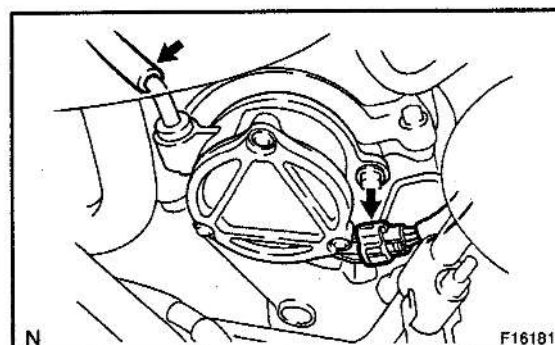


2. **REMOVE FUEL FILTER ASSEMBLY**
 - (a) Remove the 2 nuts.
 - (b) Raise the fuel filter assembly and slide it.

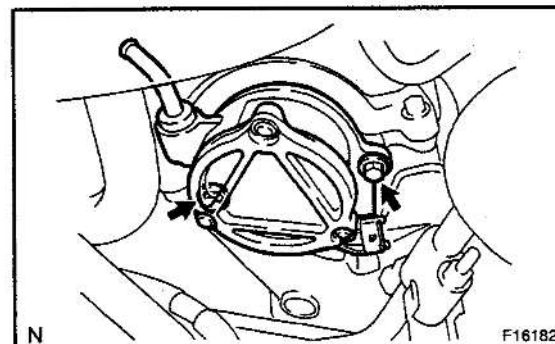


3. **REMOVE FUEL FILTER SUPPORT**

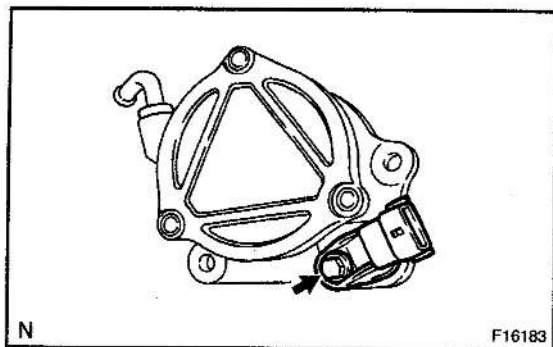
Remove the 3 bolts and fuel filter support.



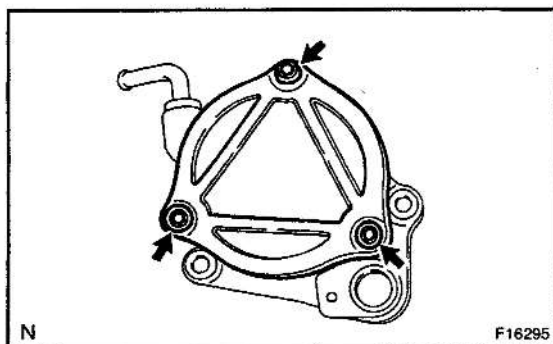
4. **REMOVE VACUUM PUMP ASSEMBLY**
 - (a) Disconnect the vacuum hose and cam position sensor connector.



- (b) Remove the 2 bolts and vacuum pump.
 - (c) Remove the 2 O-rings from the vacuum pump.

**5. REMOVE CAM POSITION SENSOR**

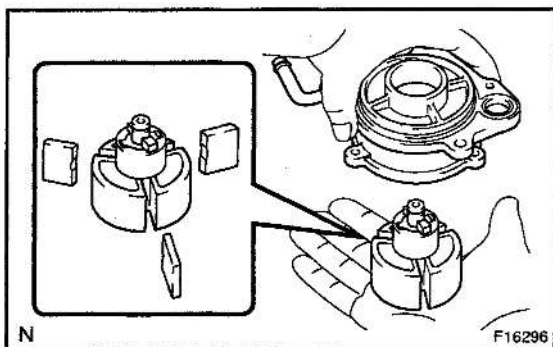
Remove a bolt, cam position sensor and O-ring from the vacuum pump.



DISASSEMBLY

1. REMOVE END COVER

- Using a hexagon wrench (4 mm), remove the 3 screws and end cover.
- Using a screw driver, remove the O-ring from the casing.



2. REMOVE ROTOR AND 3 BLADES

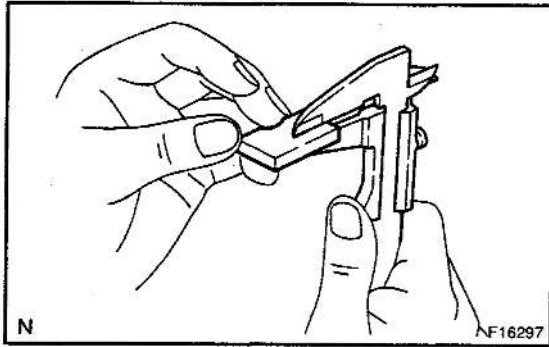
NOTICE:

Be careful not to drop the blades.

INSPECTION

1. INSPECT ROTOR

Inspect the rotor for wear or damage.
If necessary, replace the vacuum pump.



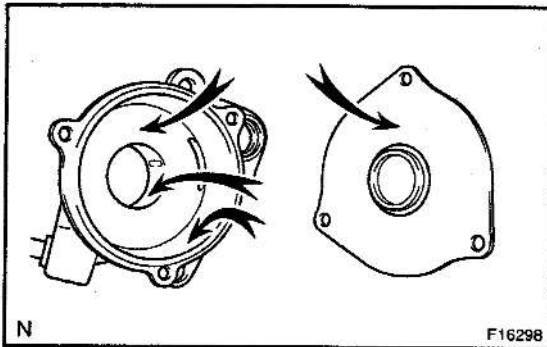
2. INSPECT BLADE

- (a) Inspect the blades for wear or damage.
- (b) Using vernier calipers, measure the most thin point of the blades.

Standard thickness: 4.9 mm (0.193 in.)

Minimum thickness: 4.5 mm (0.177 in.)

If necessary, replace the blade.



3. INSPECT CASING AND END COVER

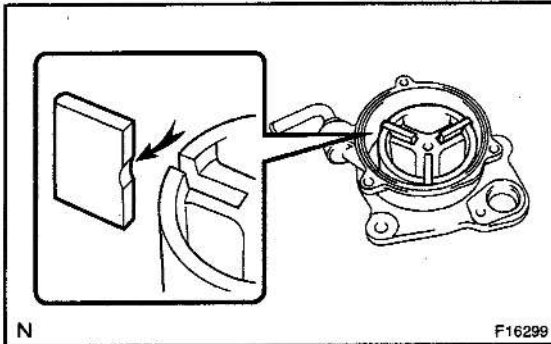
- (a) Inspect the inside surface on the casing of for scoring.
- (b) Inspect the under side surface on the end cover of for scoring.

If necessary, replace the vacuum pump assembly.

REASSEMBLY

1. INSTALL ROTOR

Coat the rotor with engine oil, and install into the casing.

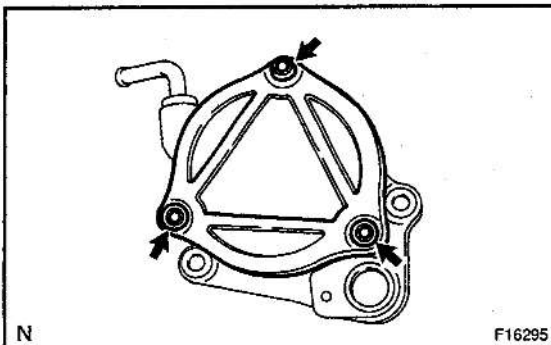


2. INSTALL 3 BLADES

Coat the 3 blades with engine oil, and install into the rotor.

HINT:

When installing the blade to the rotor, insert it with the hollow side facing inside.



3. INSTALL END COVER

- (a) Coat the new O-ring with engine oil, and place them to the casing.
- (b) Install the end cover to the casing.
- (c) Using a hexagon wrench (4 mm), install and torque the 3 screws to the casing.

Torque: 6 N·m (61 kgf·cm, 53 in.-lbf)

INSTALLATION

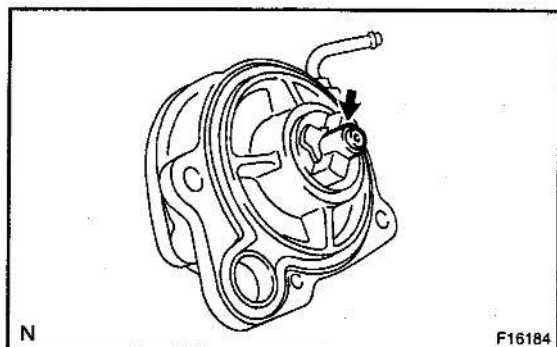
1. INSTALL CAM POSITION SENSOR

- (a) Install a new O-ring to the cam position sensor.
- (b) Install the cam position sensor to the vacuum pump.

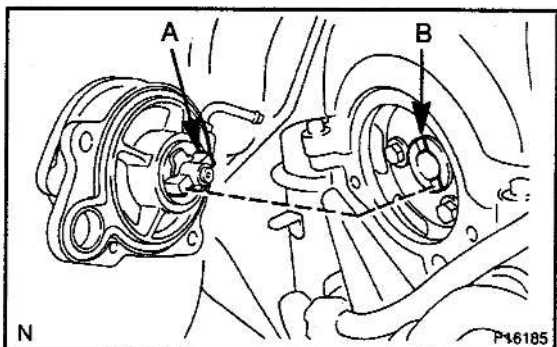
Torque: 9 N·m (92 kgf·cm, 80 in.-lbf)

2. INSTALL VACUUM PUMP ASSEMBLY

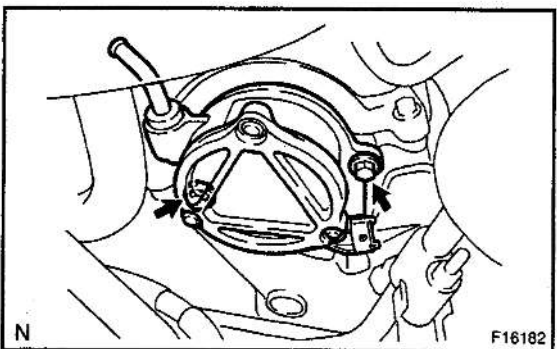
- (a) Coat the 2 new O-rings with engine oil, and place them to the vacuum pump assembly.



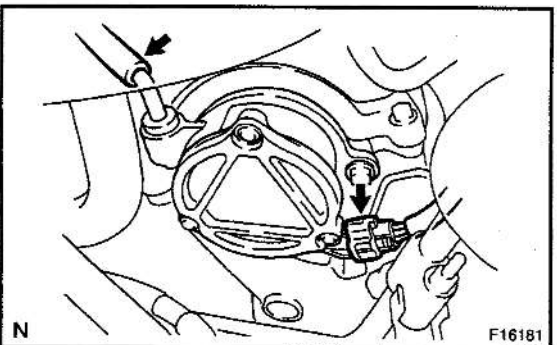
- (b) Apply engine oil to the oil pipe at the tip of vacuum pump assembly.



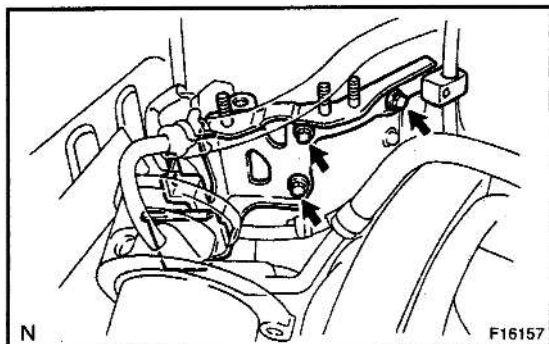
- (c) Install the vacuum pump assembly so that the coupling teeth "A" at the side of vacuum pump assembly and the tip groove of camshaft "B" can engage.



- (d) Install and torque the 2 new flange bolts.
Torque: 21 N·m (214 kgf·cm, 15 ft-lbf)

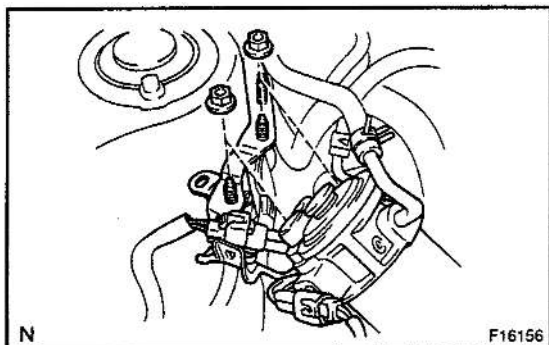


- (e) Connect vacuum hose and cam position sensor connector.

**3. INSTALL FUEL FILTER SUPPORT**

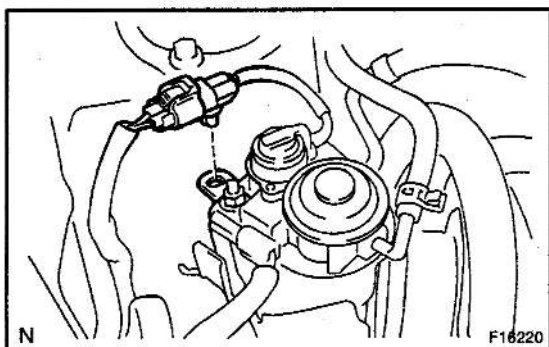
Install the fuel filter support and 3 bolts.

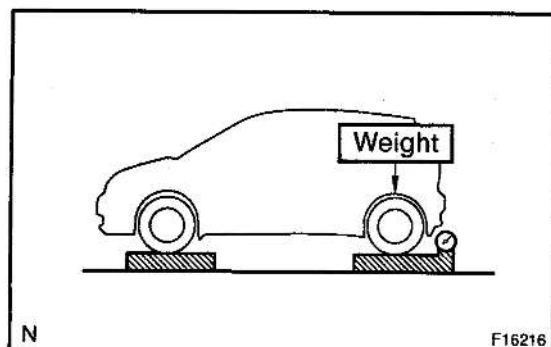
Torque: 8 N·m (82 kgf·cm, 71 in.-lbf)

**4. INSTALL FUEL FILTER ASSEMBLY**

Install the fuel filter assembly and 2 nuts.

Torque: 14 N·m (143 kgf·cm, 10 ft.-lbf)

**5. CONNECT FUEL FILTER CONNECTOR TO BRACKET**



LOAD SENSING PROPORTIONING VALVE (LSPV)

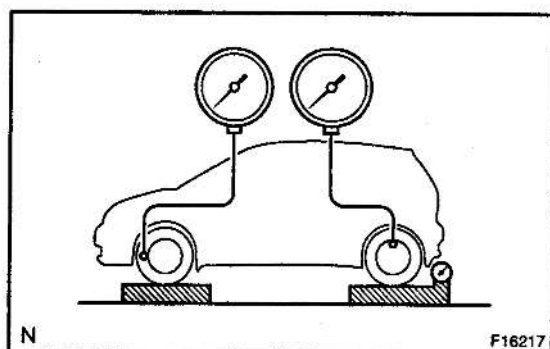
ON-VEHICLE INSPECTION

BR186-02

1. **SET REAR AXLE LOAD**
 - (a) Set the vehicle to its curb weight.
 - (b) Measure the rear axle load and note the value.
 - (c) Set the rear axle load.

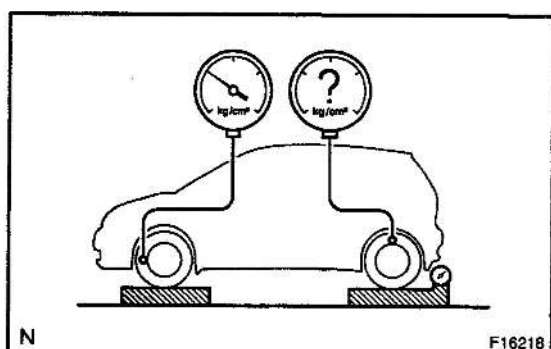
Rear axle load:

Rear axle curb weight + 41 kgf (90 lb)



2. **INSTALL LSPV GAUGE (SST) AND BLEED BRAKE SYSTEM**

SST 09709-29018



3. **RAISE FRONT BRAKE FLUID PRESSURE TO 9,800 kpa (100 kgf/cm², 1,421 psi) AND CHECK REAR BRAKE FLUID PRESSURE**

Rear brake pressure:

3700 ± 600 kpa (38 ± 6 kgf/cm², 537 ± 87 psi)

HINT:

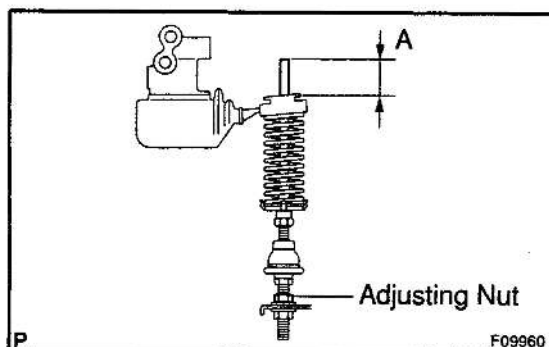
The brake pedal should not be depressed twice and/or returned while setting to the specified pressure. Read the value of rear pressure after holding the specified fluid pressure for 2 seconds after adjusting the specified fluid pressure.

4. **IF NECESSARY, ADJUST FLUID PRESSURE**

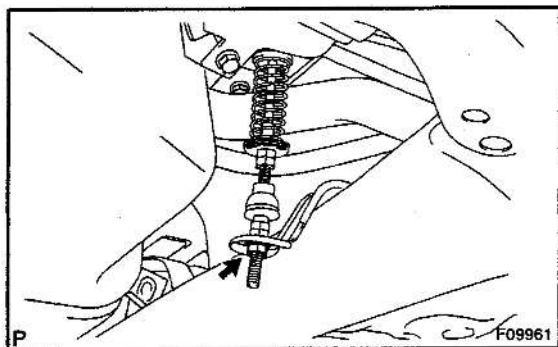
- (a) Set the shaft length A to initial set length and tighten the adjusting bolt lock nut.

Initial set length: 9.7 mm (0.381 in.)

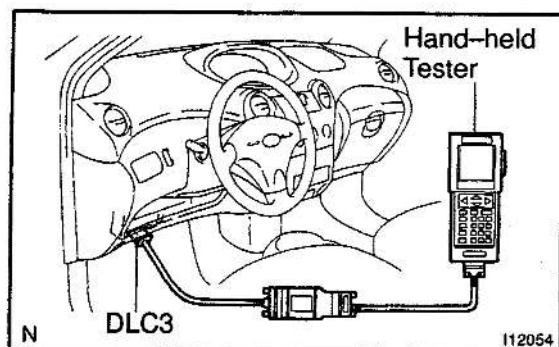
- (b) Check the rear brake pressure.



- (c) If the pressure is not within the specification, adjust the fluid pressure by changing the shaft length.
To increase rear brake pressure – Shorten A
To decrease rear brake pressure – Lengthen A



- (d) Torque the lock nut.
Torque: 12.5 N·m (127 kgf·cm, 9 ft·lbf)
If it cannot be adjusted, replace the valve body.



ABS ACTUATOR (1ND-TV) ON-VEHICLE INSPECTION

BR1RW-01

1. CONNECT HAND-HELD TESTER

- Connect the hand-held tester to the DLC3.
- Start the engine and run it at idle.
- Select the ACTIVE TEST mode on the hand-held tester.

HINT:

Please refer to the hand-held tester operator's manual for further details.

2. INSPECT ABS ACTUATOR MOTOR OPERATION

- Check that the operation sound of the ABS actuator motor can be heard when the motor relay is turned ON by the hand-held tester.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If the operation sound can not be heard, replace the ABS actuator because the motor operation is in failure.

- Turn the motor relay OFF.

3. INSPECT RIGHT FRONT WHEEL SOLENOID

- Depress the brake pedal and hold it for about 15 seconds, and check that the brake pedal does not go down further.

If the brake pedal goes down, replace the ABS actuator because the sealing condition of the reduction solenoid valve is abnormal.

- Check that the brake pedal does not pulsate when the motor relay is turned ON by the hand-held tester.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If there is a pulsation in the brake pedal, replace the ABS actuator because the sealing condition of the reduction solenoid valve is abnormal.

- Turn the motor relay to OFF.
- Depress the brake pedal and hold it until the step (g) is completed.

- (e) Check that the brake pedal does is fully depressed when the SFRH and SFRR solenoids are turned ON by the hand-held tester.

NOTICE:

Do not keep solenoid ON for more than 2 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If the brake pedal goes down, replace the ABS actuator because the holding solenoid valve operation is abnormal.

HINT:

To prevent the solenoids from damaging, the hand-held tester turns OFF automatically 2 secs. after it has been turned ON.

- (f) Check that the brake pedal can be depressed down further when the solenoids are turned OFF.

If the brake pedal does not go down, replace the ABS actuator because the reduction solenoid valve operation is abnormal.

- (g) Check that the brake pedal returns when the motor relay is turned ON by the hand-held tester.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If the brake pedal does not return, replace the ABS actuator because the motor operation is in failure.

- (h) Turn the motor relay to OFF and release the brake pedal.

4. INSPECT OTHER WHEEL SOLENOIDS OPERATION

Check the solenoids of the other wheels with the same inspection procedure as the right front wheel solenoids.

HINT:

Left front wheel: SFLH and SFLR

Right rear wheel: SRRH and SRRR

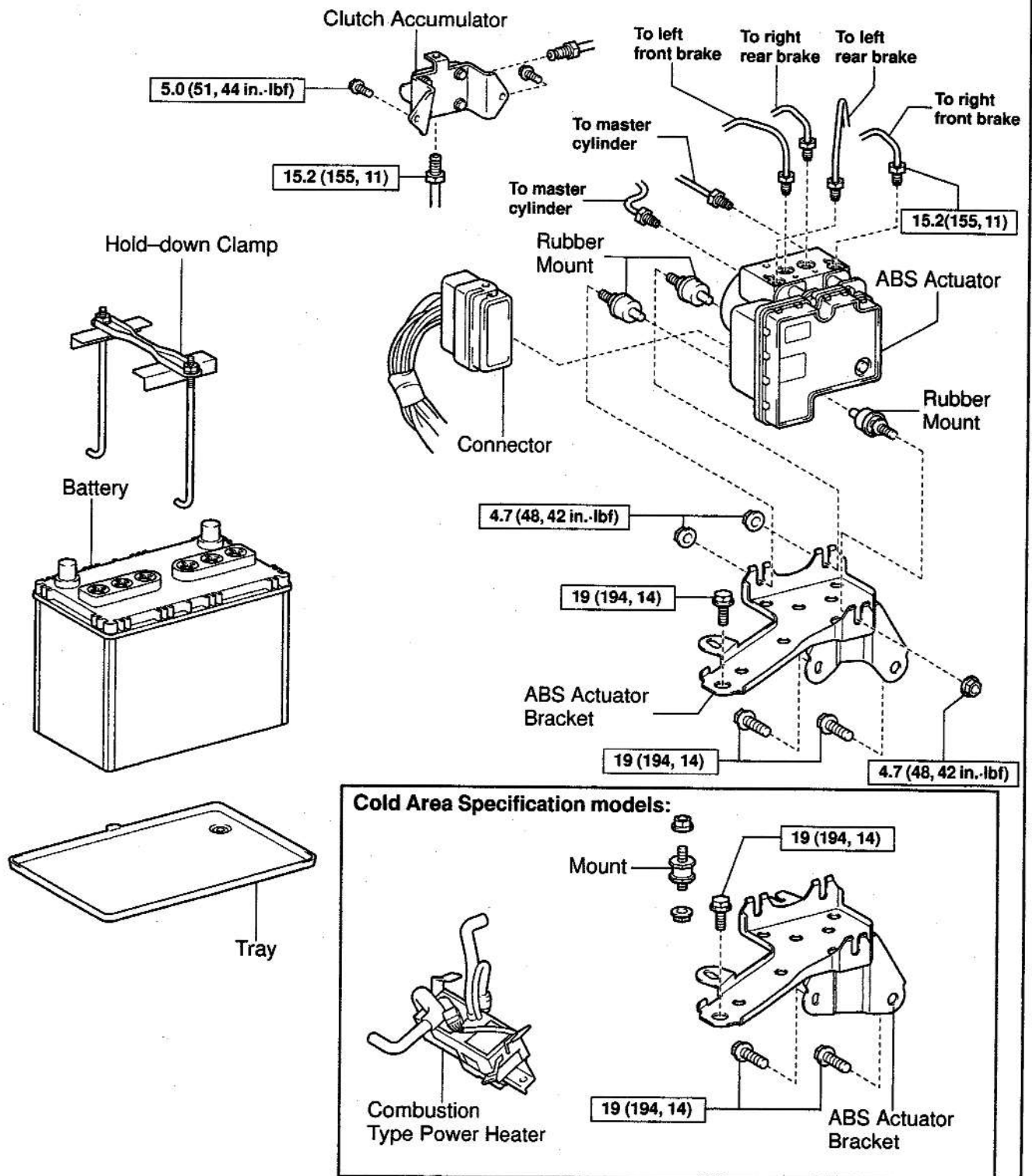
Left rear wheel: SRLH and SRLR

NOTICE:

Never depress the brake pedal under the condition that the reduction solenoid alone is turned ON as ABS ECU is reset.

5. CLEAR DTC (See page DI-2)

COMPONENTS



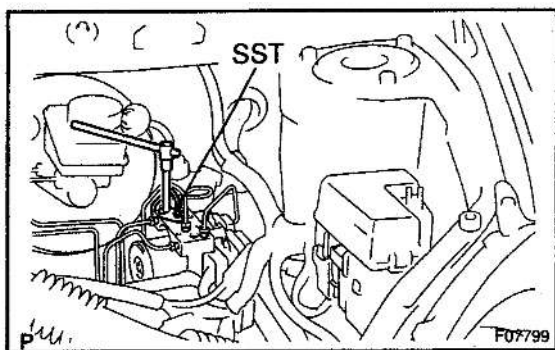
N·m (kgf·cm, ft·lbf) : Specified torque

REMOVAL

1. REMOVE BATTERY ASSEMBLY

Remove the hold-down clamp, then remove the battery and tray from the engine room.

2. REMOVE CLUTCH ACCUMULATOR (See page CL-9)



3. DISCONNECT BRAKE LINE

Using a SST, disconnect the 6 brake lines from the ABS actuator assembly.

SST 09023-00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

HINT:

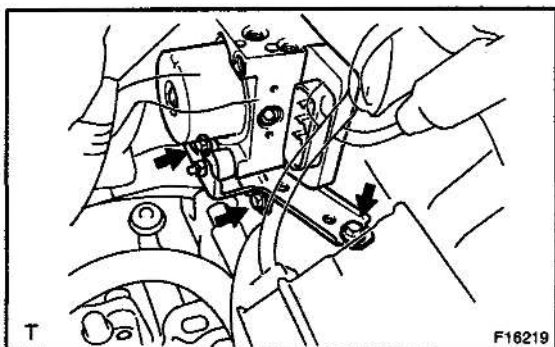
- When disconnecting the brake lines, use tags or make a memo to identify the place to reconnect.
- At the time of installation, connect each brake line to the correct position (See page BR-23).

4. DISCONNECT CONNECTOR FROM ABS ACTUATOR ASSEMBLY

5. REMOVE ABS ACTUATOR ASSEMBLY

(a) LHD Cold Area Specification models:

Remove the 2 nuts and mount from the ABS actuator bracket and combustion type power heater (See page AC-15).



(b) Remove the 3 bolts and ABS actuator assembly.

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

6. REMOVE ABS ACTUATOR

(a) Remove the 3 nuts and ABS actuator from the bracket.

Torque: 4.7 N·m (48 kgf·cm, 42 in·lbf)

(b) Remove the 3 rubber mounts from the ABS actuator.

INSTALLATION

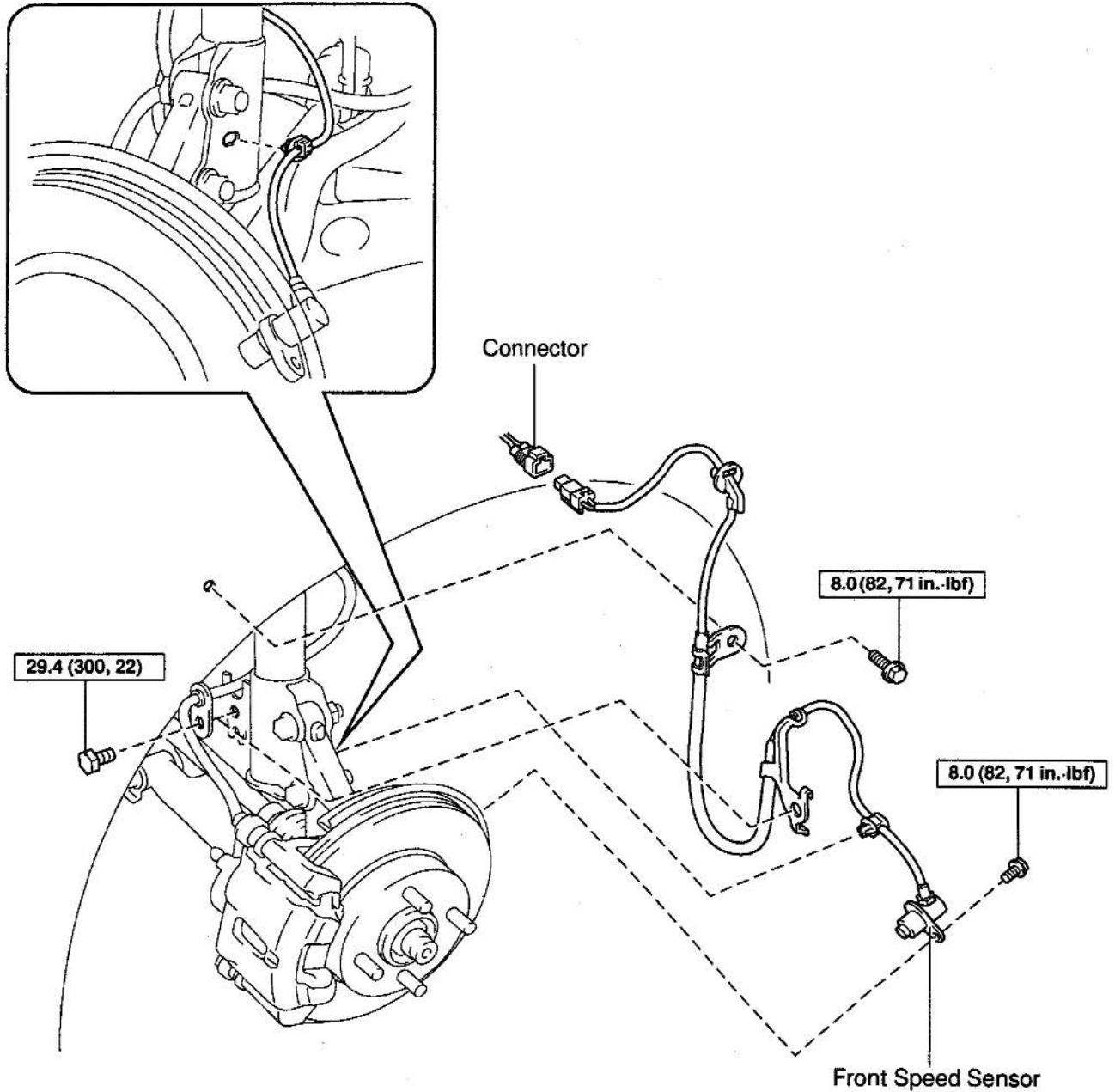
Installation is in the reverse order of removal (See page BR-24).

HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See Pub. No. RM685E on page BR-4).
- Check for leaks.

FRONT SPEED SENSOR COMPONENTS

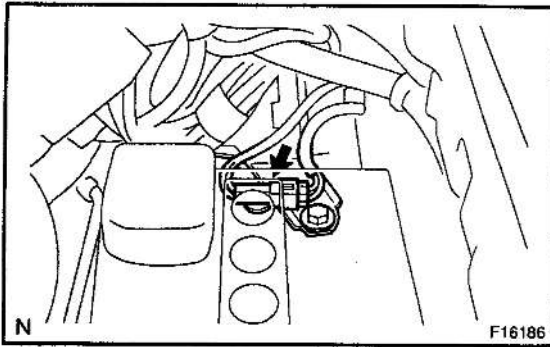
BR150-01



N

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

F16151



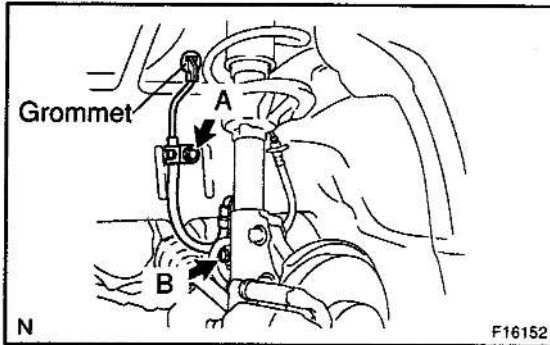
REMOVAL

1. DISCONNECT SPEED SENSOR CONNECTOR

Disconnect the speed sensor connector.

2. REMOVE FRONT WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



3. REMOVE SPEED SENSOR

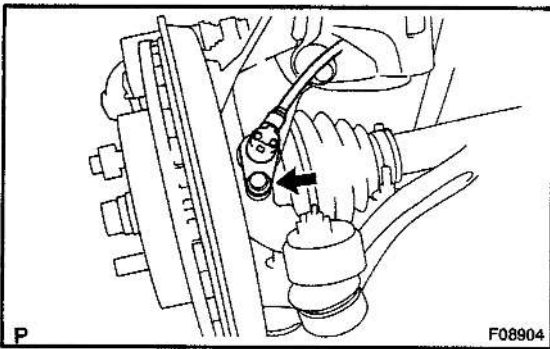
- (a) Remove the grommet and the 2 clamp bolts from the body and shock absorber.

Torque:

Bolt: A 8.0 N·m (82 kgf·cm, 71 in·lbf)

Bolt: B 29.4 N·m (300 kgf·cm, 22 ft·lbf)

- (b) Using a clip remover, remove the clip from the absorber bracket.



- (c) Remove the bolt and speed sensor from the steering knuckle.

Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)

INSTALLATION

Installation is in the reverse order of removal (See page BR-27).

HINT:

After installation, check the speed sensor signal (See page DI-2).