

BR-64

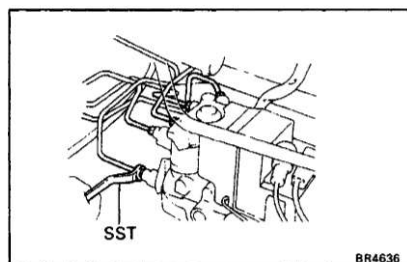
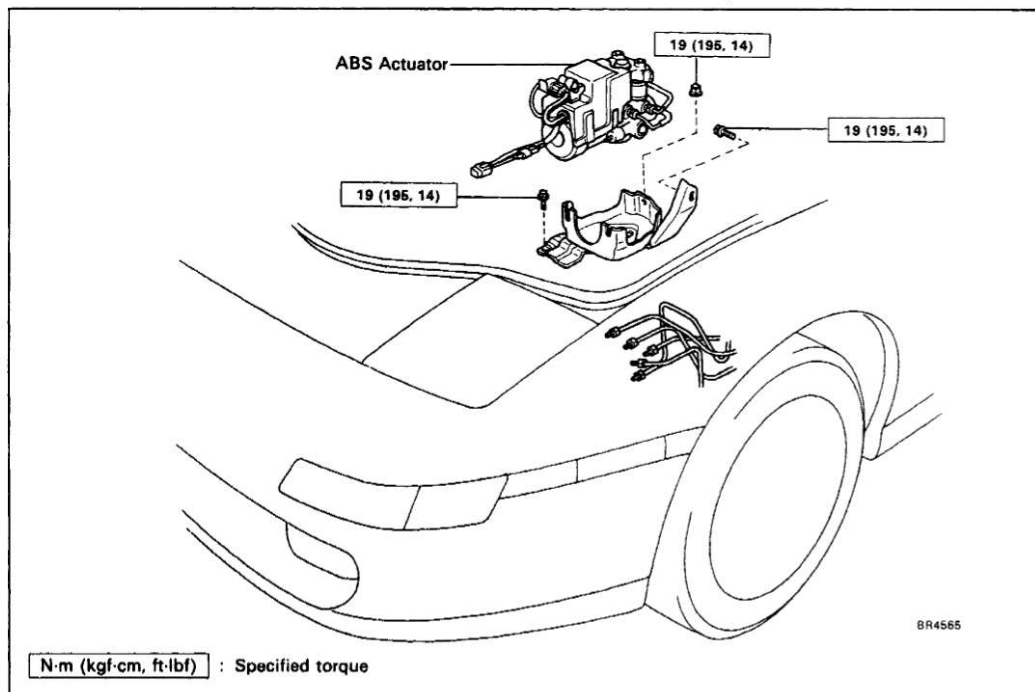
BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

ABS ACTUATOR

ABS ACTUATOR REMOVAL AND INSTALLATION

BR07F-01

Remove and install the parts as shown.



1. DISCONNECT AND CONNECT BRAKE TUBE

Using SST, disconnect and connect the brake tubes from/to the ABS actuator.

SST 09751 - 36011

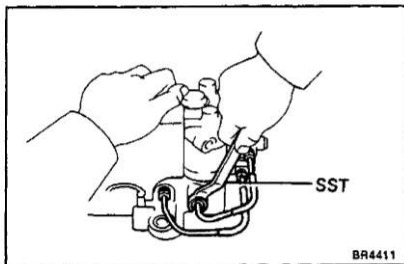
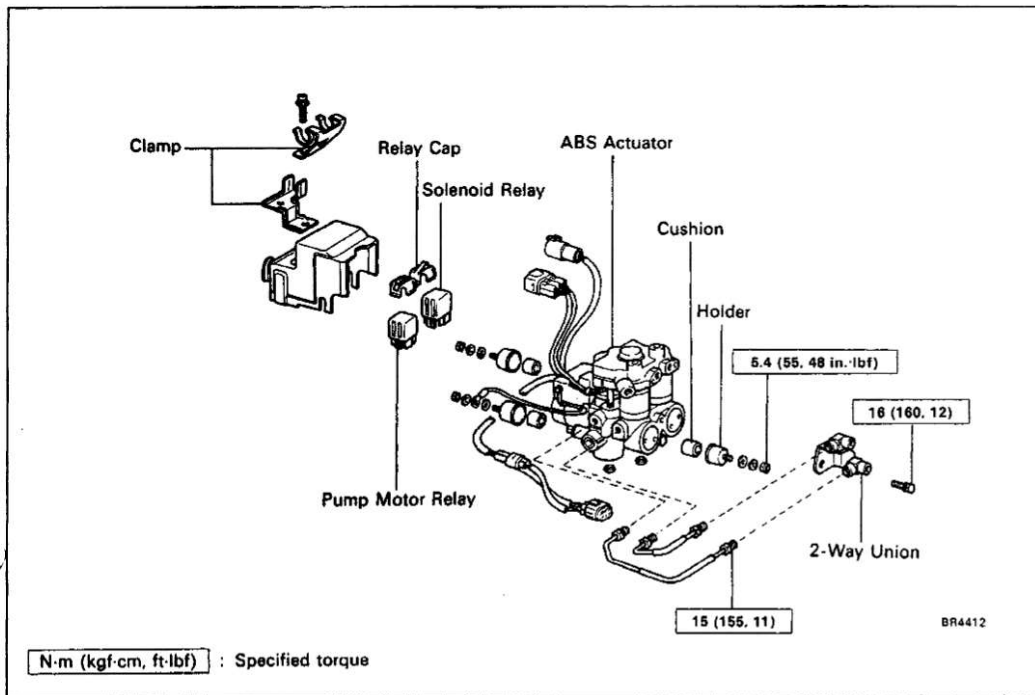
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

2. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page [BR-9](#))

ABS ACTUATOR DISASSEMBLY AND ASSEMBLY

Remove and install the parts as shown.



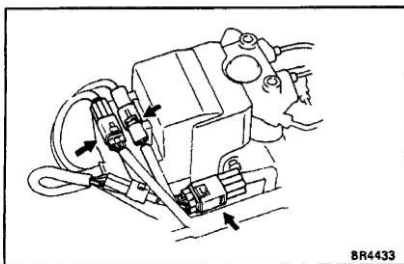
(MAIN POINT OF REMOVAL AND INSTALLATION)

1. DISCONNECT AND CONNECT BRAKE TUBE

Using SST, disconnect and connect the brake tubes from/to the ABS actuator.

SST 09751-3601 1

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)



ABS ACTUATOR OPERATION INSPECTION

1. INSPECTION BATTERY VOLTAGE

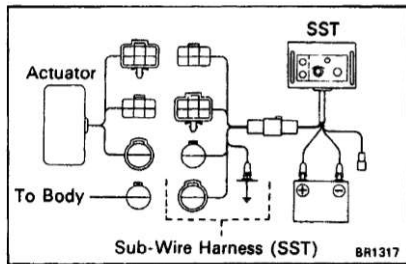
Battery voltage: 10-14.5 V

2. DISCONNECT CONNECTORS

Disconnect the three connectors from the actuator as shown.

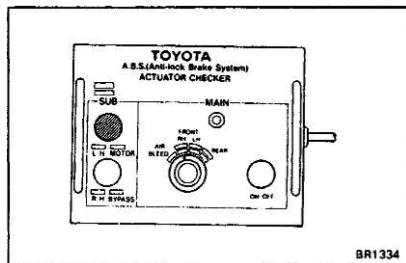
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BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)



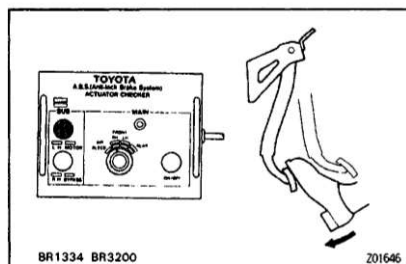
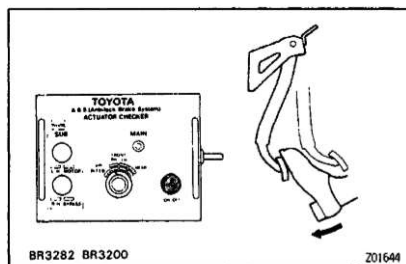
3. CONNECT ACTUATOR CHECKER (SST) TO ACTUATOR

- Connect the actuator checker (SST) to the actuator and body side wire harness through the sub-wire harness (SST) as shown.
SST 09990-00150
- Connect the red cable of the checker to the battery positive (+) terminal and black to the negative (-) terminal. Connect the black cable of the sub-wire harness to the battery negative (-) terminal or body-ground.



4. INSPECT BRAKE ACTUATOR OPERATION

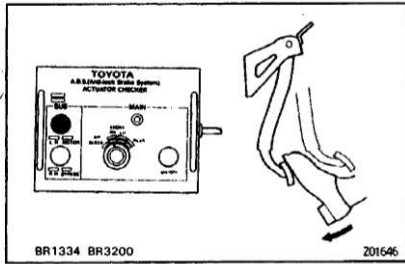
- Start the engine, and run it at idle.
 - Turn the MAIN selector switch of the actuator checker to "FRONT RH" position.
 - Push and hold in the SUB MOTOR switch for a few seconds.
 - Depress the brake pedal and hold it until step (g) is completed.
 - Push the MAIN push switch and check that the brake pedal does not go down.
- NOTICE: Do not keep the MAIN push switch pushing more than 10 seconds.**
- Release the switch, and check that the pedal goes down.



- Push and hold in the SUB MOTOR switch for a few seconds, and check that the pedal returns.
- Release the brake pedal.

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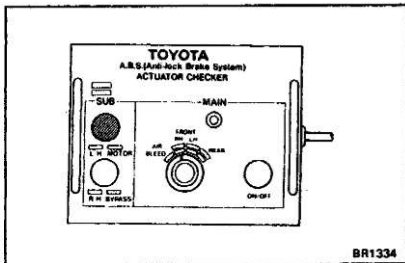
BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)



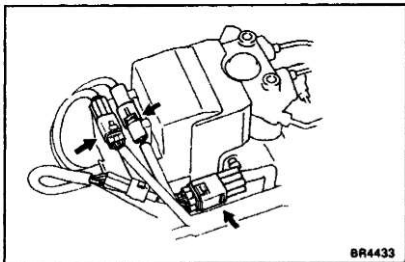
- (i) Push and hold in the SUB MOTOR switch for a few seconds.
- (j) Depress the brake pedal and hold it for about 15 seconds. As you hold the pedal down, push the SUB MOTOR switch for a few seconds. Check that the brake pedal not pulsate.

5. INSPECT FOR OTHER WHEELS

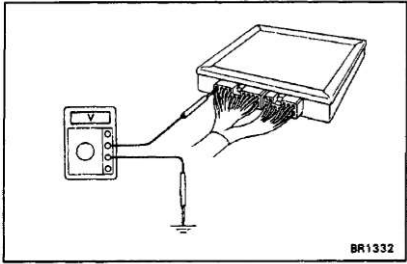
- (a) Turn the MAIN selector switch to "FRONT LH" position.
- (b) Repeating (c) to (j) of the step 4, check the actuator operation similarly.
- (c) Similarly, inspect "REAR" position.

**6. PUSH SUB MOTOR SWITCH**

Push and hold in the SUB MOTOR switch for a few seconds.

**7. DISCONNECT ACTUATOR CHECKER (SST) FROM ACTUATOR**

- (a) Disconnect the actuator (SST) and sub-wire harness (SST) from the actuator.
SST 09990-00150
- (b) Connect the actuator connectors.
- (c) Clear the diagnostic codes.
(See page [BR-55](#))



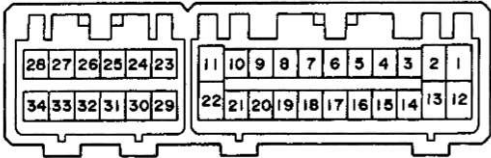
ANTI-LOCK BRAKE SYSTEM
CIRCUIT

BR079-01

SYSTEM CIRCUIT INSPECTION

1. INSPECT SYSTEM CIRCUIT WITH CONNECTOR
CONNECTED

- (a) Remove the ABS ECU.
- (b) Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal an body ground.



R02746

Tester Connection	Check Item	Condition	Specified Value	Trouble Part
IG	Voltage	IG switch on	Battery voltage	ECU-IG Fuse
R L-	Continuity	IG switch off	Continuity	ABS ECU
STP	Voltage	IG switch off and brake pedal depressed	Battery voltage	Stop light switch Stop light
	Continuity	IG switch off and brake pedal returned.	Continuity	
BAT	Voltage	IG switch off	Battery voltage	ECU + B Fuse
EX	Voltage	IG switch on	Battery voltage	ABS ECU, EFI ECU
RSS	Continuity	IG switch off	Continuity	ABS ECU
RR-	Continuity	IG switch off	Continuity	ABS ECU
WA	Voltage	IG switch on and "ABS" warning light goes on	About OV.	ABS ECU "ABS" warning light
		IG switch on and "ABS" warning light goes off	Battery voltage	
PK6	Voltage	IG switch on and PKB lever pulled	About OV	Parking brake switch Level warning switch
		IG switch on and PKB lever returned	Battery voltage	
SFR	Voltage	IG switch on and "ABS" warning light goes on	About OV	Actuator
		IG switch on and "A6S" warning light goes off	Battery voltage	
TS	Voltage	IG switch on and check connector Ts-E, not connected	Battery voltage	ABS ECU
		IG switch on and check connector Ts-E, connector	About OV	
FR-	Continuity	IG switch off	Continuity	ABS ECU
R-	Continuity	IG switch off	Continuity	
SR	Voltage	IG switch on and "ABS" warning light goes on	About OV	
		IG switch on and "A6S" warning light goes off	Battery voltage	
GND	Continuity	IG switch off	Continuity	Wiring harness
SFL	Voltage	IG switch on and "ABS" warning light goes on	About OV	Actuator
		IG switch on and "ABS" warning light goes off	Battery voltage	

V01021

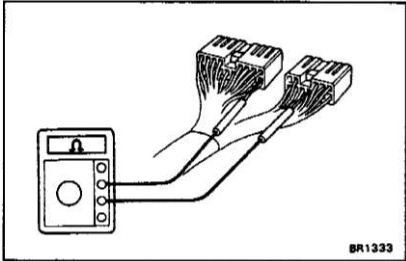
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BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

Tester Connection	Check Item	Condition	Specified Value	Trouble Part
TC	Voltage	IG switch on and check connector Tc-E, not connected	Battery voltage	ABS ECU
		IG switch on and check connector Tc-E, connected	About 0V	
AST	Voltage	IG switch on and "ABS" warning light goes on	About 0V	Actuator
		IG switch on and "ABS" warning light goes off	Battery voltage	
F L-	Continuity	IG switch off	Continuity	ABS ECU
FSS	Continuity	IG switch off	Continuity	
SRR	Voltage	IG switch on and "ABS" warning light goes on	About 0V	Actuator
		IG switch on and "ABS" warning light goes off	Battery voltage	

If the circuit is not as specified, check and repair or replace the trouble part shown in the table above.

V01022



2. INSPECT SYSTEM CIRCUIT WITH CONNECTOR DISCONNECTED

(a) Disconnect the connectors from the ECU, inspect at the wire harness side connector.

Tester Connection	Check Item	Specified Value	Trouble Part	Tester Connection	Check Item	Specified Value	Trouble Part
RR + ↔ RR-	Resistance	0.9 ~ 1.5 kΩ	Rear RH speed sensor	SFL ↔ AST	Resistance	About 6 Ω	Actuator
RL + ↔ RL-	Resistance	0.9 ~ 1.5 kΩ	Rear LH speed sensor	AST ↔ Body ground	Resistance	About 5 Ω	Actuator
SFR ↔ AST	Resistance	About 6 Ω	Actuator	FR + ↔ FR-	Resistance	0.8 ~ 1.5 Ω	Front R H speed sensor
MT ↔ Body ground	Resistance	About 5 Ω	Actuator	MR ↔ R-	Resistance	50 ~ 80 Ω	Control relay
FL + ↔ FL-	Resistance	0.8 ~ 1.5 kΩ	Front LH speed sensor	SRR ↔ AST	Resistance	About 6 Ω	Actuator
SR ↔ R-	Resistance	60 ~ 100 Ω	Control relay				

If the circuit is not as specified, check and repair or replace the trouble part shown in the table above.

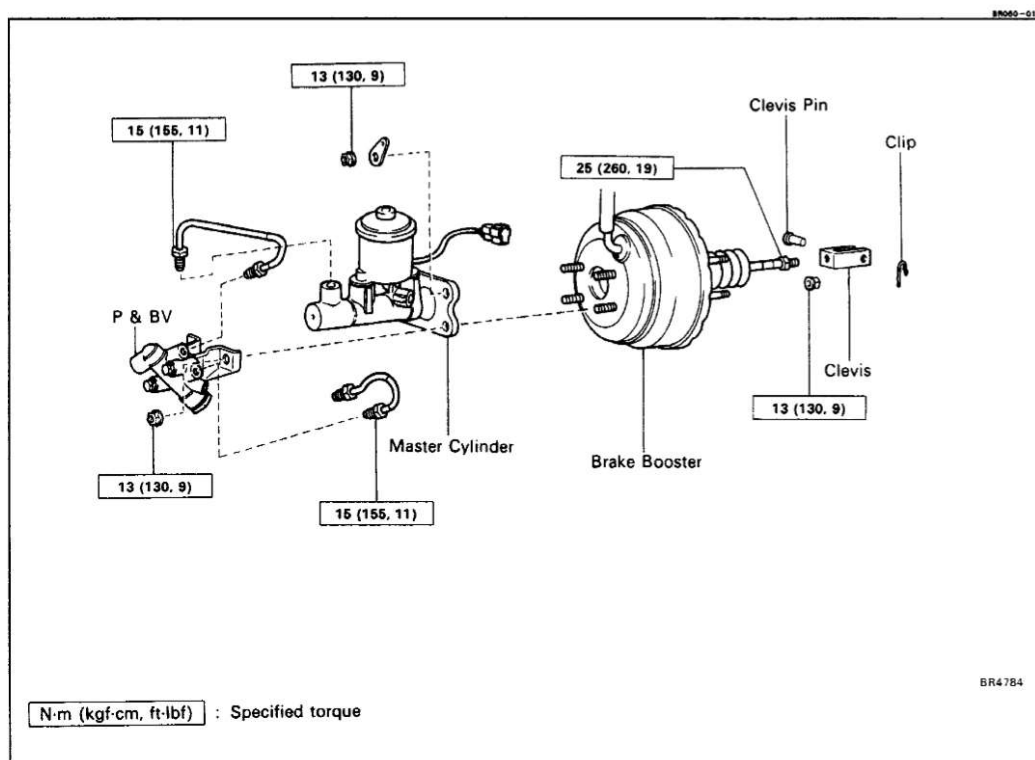
V01023

(b) Connect the connectors, and install the ECU in place.

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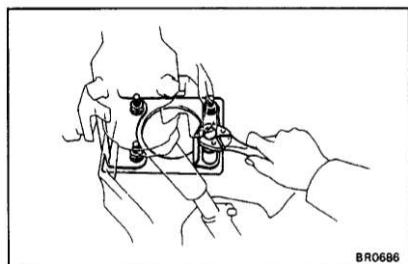
BRAKE - BRAKE BOOSTER

BRAKE BOOSTER



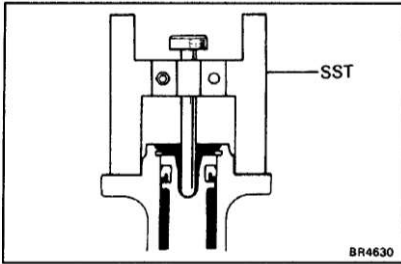
BRAKE BOOSTER REMOVAL

1. REMOVE MASTER CYLINDER
(See page [BR-11](#))
2. DISCONNECT VACUUM HOSE FROM BRAKE BOOSTER
3. REMOVE PEDAL RETURN SPRING
4. REMOVE CLIP AND CLEVIS PIN



5. REMOVE BRAKE BOOSTER

Remove the four nuts, and pull out the brake booster.

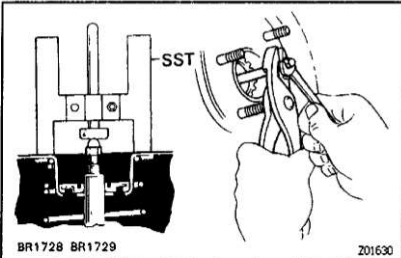


BRAKE BOOSTER INSTALLATION

BR061-01

1. ADJUST LENGTH OF BOOSTER PUSH ROD

- (a) Set the SST on the master cylinder, and lower the pin until its tip slightly touches the piston.
SST 09737-00010



- (b) Turn the SST upside down, and set it on the booster.
SST 09737-00010

- (c) Measure the clearance between the booster push rod and pin head (SST).

Clearance:

0 mm (0 in.)

- (d) Adjust the booster push rod length until the push rod lightly touches the pin head.

2. INSTALL VACUUM HOSE

3. INSTALL MASTER CYLINDER

(See page [BR-15](#))

4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page [BR-7](#))

5. CHECK FOR FLUID LEAKAGE

6. CHECK AND ADJUST BRAKE PEDAL

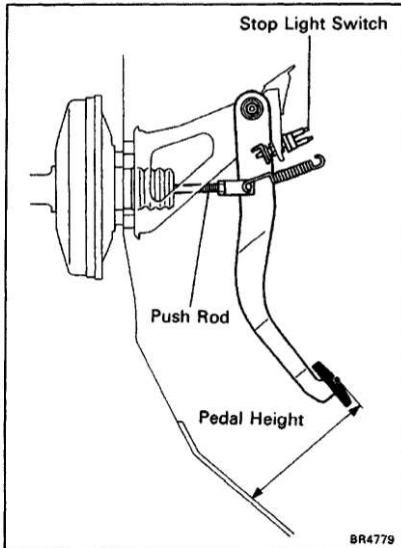
(See page [BR-7](#))

Check and adjust the brake pedal, then tighten the clevis lock nut.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

7. REFORM OPERATIONAL CHECK

(See page [BR-8](#))



CHECK AND ADJUSTMENT

BRAKE PEDAL CHECK AND ADJUSTMENT

1. CHECK THAT PEDAL HEIGHT IS CORRECT, AS SHOWN

Pedal height from asphalt sheet:

177–187 mm (6.968–7.362 in.)

If the pedal height is incorrect, adjust it.

2. IF NECESSARY, ADJUST PEDAL HEIGHT

- Disconnect the connector from the stop light switch.
- Loosen the stop light switch lock nut.
- Sufficiently loosen the stop light switch.
- Loosen the push rod lock nut.
- Adjust the pedal height by turning the pedal push rod.
- Return the stop light switch until it lightly contact the pedal stopper.
- Tighten the lock nut and connect the connector to the stop light switch.
- Check that the stop lights light when the brake pedal is depressed.
- After adjusting the pedal height, check and adjust the pedal freeplay.

3. CHECK THAT PEDAL FREEPLAY IS CORRECT, AS SHOWN

- Stop the engine depress the brake pedal several times until there is no more vacuum left in the booster.
- (Single booster)
Push in the pedal until the beginning of resistance is felt. Measure the distance, as shown.
(Tandem booster)
Push in the pedal until the beginning of the second resistance is felt. Measure the distance, as shown.

Pedal freeplay:

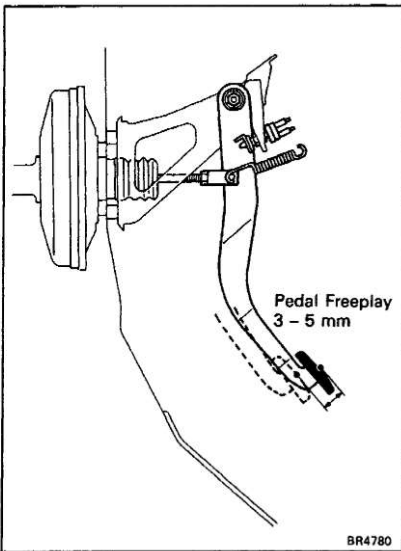
3–5 mm (0.12–0.20 in.)

(Tandem booster)

HINT: The freeplay to the first resistance is due to the play between the clevis and pin. And it is 1–3 mm (0.04–0.12 in.) on the pedal.

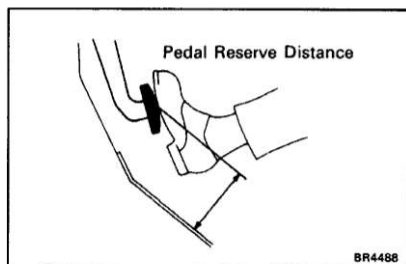
4. IF NECESSARY, ADJUST PEDAL FREEPLAY

- If incorrect, adjust the pedal freeplay by turning the pedal push rod.
- Start the engine and confirm that there is pedal freeplay.
- After adjusting the pedal freeplay, check the pedal height.



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BRAKE - CHECK AND ADJUSTMENT



5. CHECK THAT PEDAL RESERVE DISTANCE IS CORRECT, AS SHOWN

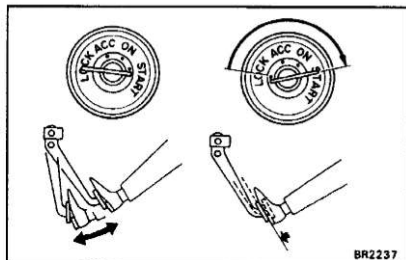
Release the parking brake.

With the engine running, depress the pedal and measure the pedal reserve distance, as shown.

Pedal reserve distance from asphalt sheet at 490 N (50 kgf, 110.2 lbf):

More than 117 mm (4.61 in.)

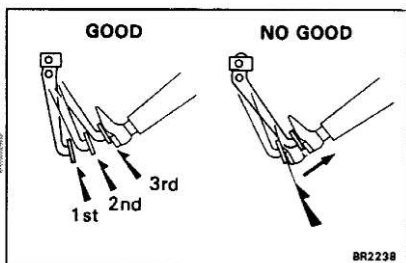
If the reserve distance is incorrect, troubleshoot the brake system.



BRAKE BOOSTER OPERATIONAL TEST

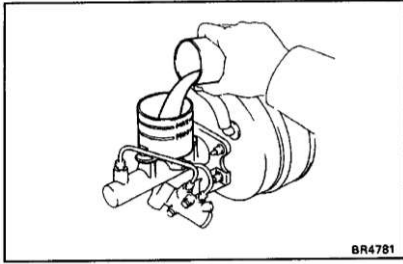
1. OPERATING CHECK

- 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

- Start the engine and stop it after one or two minutes. Depress the brake pedal several times slowly. If the pedal goes down the farthest the first time, but gradually rises after the second or third 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 thirty seconds, the booster is air tight.



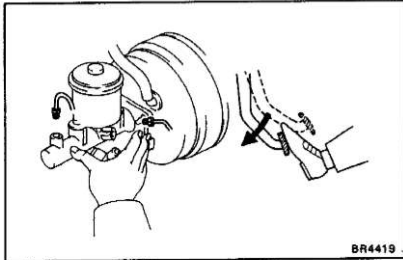
BRAKE SYSTEM BLEEDING

HINT: If any work is done on the brake system or if air in the brake lines is suspected, bleed the system of air.

NOTICE: Do not let brake fluid remain on a painted surface. Wash it off immediately.

1. FILL BRAKE RESERVOIR TANK WITH BRAKE FLUID

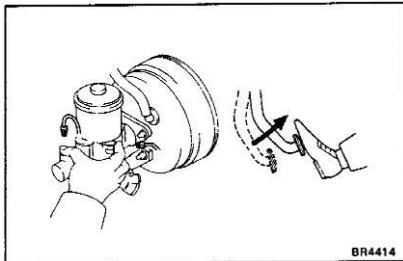
Fluid: SAEJ1703 or FMVSS No.116 DOT3



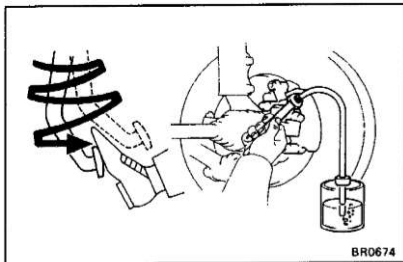
2. BLEED MASTER CYLINDER

HINT: If the master cylinder has been disassembled or if the reservoir tank becomes empty, bleed the air from the master cylinder.

- (a) Disconnect the brake tubes from the master cylinder.
- (b) Slowly depress the brake pedal and hold it.



- (c) Block off the outlet plug with your finger and release the brake pedal.
- (d) Repeat (b) and (c) three or four times.



3. BLEED BRAKE LINE

- (a) Connect the vinyl tube to the brake cylinder.
- (b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.
- (c) At the point when fluid stops coming out, tighten the bleeder plug, then release the brake pedal.
- (d) Repeat (b) and (c) until all the air in the fluid has been bled out.
- (e) Repeat the above procedure to bleed the out of the brake line for each wheel.

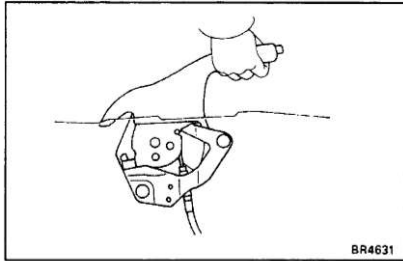
4. CHECK FLUID LEVEL IN RESERVOIR TANK

Check the fluid level and add fluid if necessary.

Fluid: SAEJ1703 or FMVSS No.116 DOT3

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BRAKE - CHECK AND ADJUSTMENT



PARKING BRAKE CHECK AND ADJUSTMENT

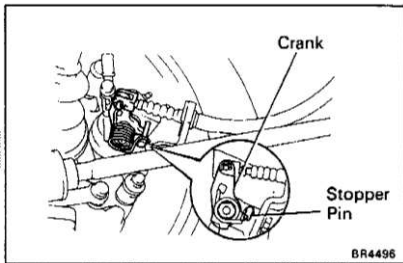
BR062-01

1. CHECK THAT PARKING BRAKE LEVER TRAVEL IS CORRECT

- Pull the parking brake lever all the way up and down for two or three times. Then return the parking brake lever.
- Depress the brake pedal for several times.
- Pull the parking brake lever all the way up, and count the notches of lever travel.

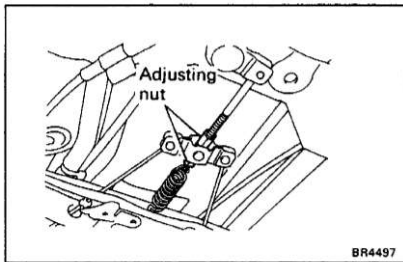
**Parking brake lever travel at 196 N (20 kgf, 44.1 lbf):
5-8 clicks**

If incorrect, adjust the parking brake.



2. IF NECESSARY, ADJUST PARKING BRAKE

- Pull the parking brake lever all the way up and down for two or three times. Then return the parking brake lever.
- Depress the brake pedal for several times.
- Remove the fuel tank protector.
- Loosen the adjusting nut and brake cable, and check that the parking brake crank touches stopper pin.



- Stretch the brake cable by turning the adjusting nut before the parking brake crank begin moving.
- Tighten the adjusting nuts.

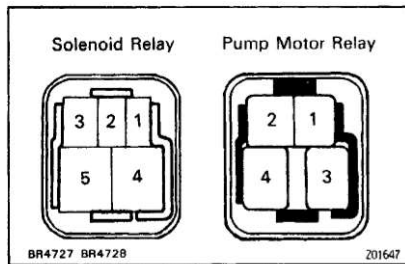
HINT: Tighten the adjusting nuts so the equalizer is horizontal to the ground.

Torque: 16 N-m (160 kgf-cm, 12 ft-lbf)

- Install the fuel tank protector.

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BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

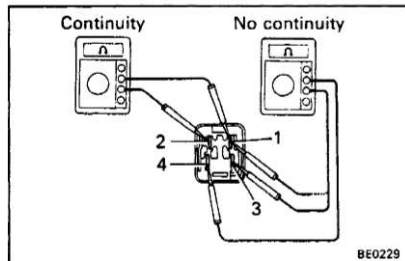


CONTROL RELAY

CONTROL RELAY INSPECTION

1. REMOVE CONTROL RELAYS

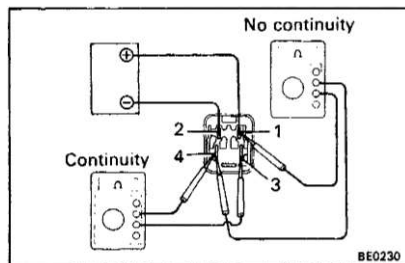
Remove the two control relays from the actuator.



2. INSPECT PUMP MOTOR RELAY CONTINUITY

- Check that there is continuity between terminals 1 and 2.
- Check that there is no continuity between terminals 3 and 4.
- Check that there is no continuity between terminals 1 and 4.

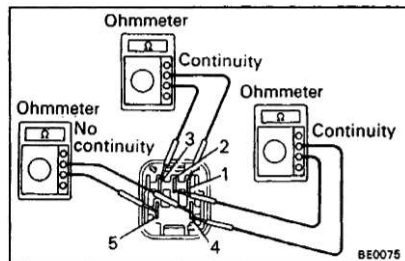
If continuity is not as specified, replace the relay.



3. INSPECT PUMP MOTOR RELAY OPERATION

- Apply battery voltage to terminals 1 and 2.
- Check that there is continuity between terminals 3 and 4.
- Check that there is no continuity between terminals 1 and 4.

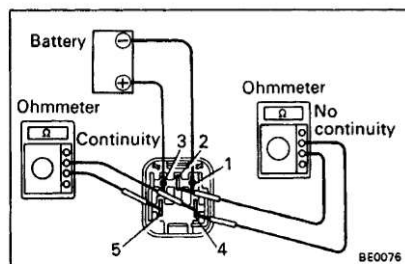
If operation is not as specified, replace the relay.



4. INSPECT SOLENOID RELAY CONTINUITY

- Check that there is continuity between terminals 1 and 3.
- Check that there is continuity between terminals 2 and 4.
- Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.



5. INSPECT SOLENOID RELAY OPERATION

- Apply battery voltage to terminals 1 and 3.
- Check that there is continuity between terminals 4 and 5.
- Check that there is no continuity between terminals 2 and 4.

If operation is not as specified, replace the relay.

6. INSTALL TWO CONTROL RELAYS

ANTI-LOCK BRAKE SYSTEM (ABS)

DESCRIPTION

The ABS is a brake system which controls the brake cylinder hydraulic pressure of all four wheels during sudden braking and braking on slippery road surfaces, preventing the wheels from locking.

This ABS provides the following benefits:

- (1) Enables steering round an obstacle with a greater degree of certainty even when panic braking.
- (2) Enables stopping in a panic brake while keeping the effect upon stability and steerability to a minimum, even on curves. . .

The function of the ABS is to help maintain directional stability and vehicle steerability on most road conditions. However, the system cannot prevent the vehicle from skidding if the cornering speed limit is exceeded.

In case a malfunction occurs, a diagnosis function and fail-safe system have been adopted for the ABS to increase serviceability.

B9072-01

COMPONENTS FUNCTION

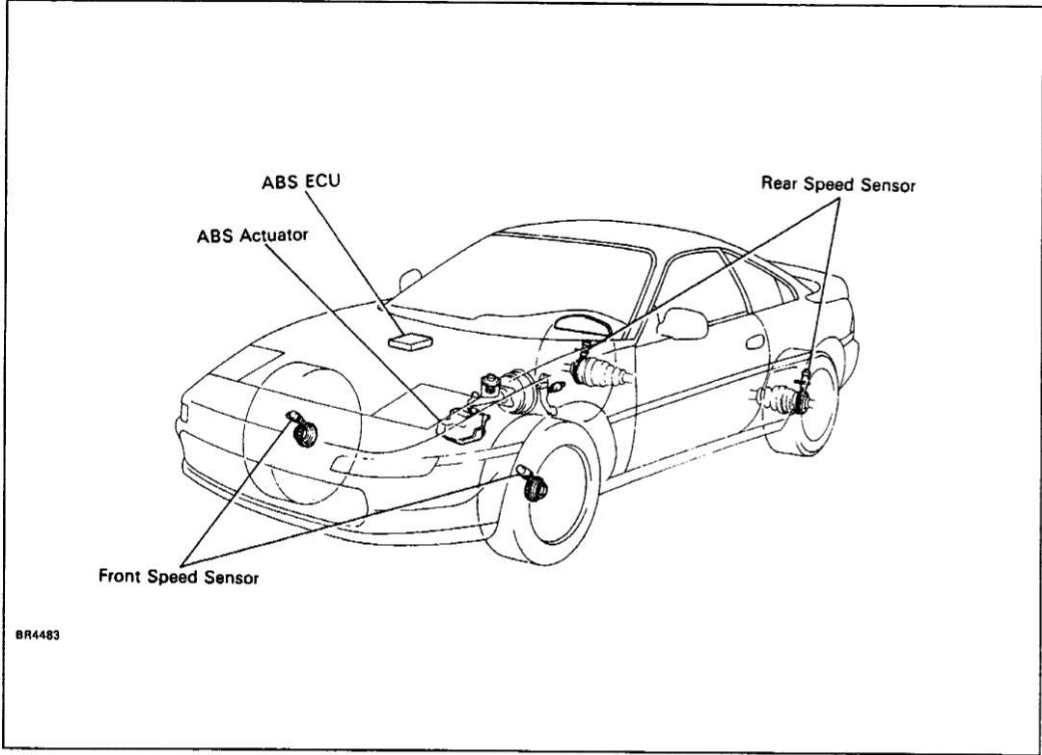
Component	Function
Front Speed Sensor	Detect the wheel speed of each of the left and right front wheels.
Rear Speed Sensor	Detect the wheel speed of each of the left and right rear wheels.
ABS Warning Lamp	Lights up to alert the driver when trouble has occurred in the Anti - Lock Brake System.
Actuator	Controls the brake fluid pressure to each disc brake cylinder through signals from the computer.
ABS ECU	From the wheel speed signals from each sensor, it calculates acceleration, deceleration and slip values and sends signals to the actuator to control brake fluid pressure.

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BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

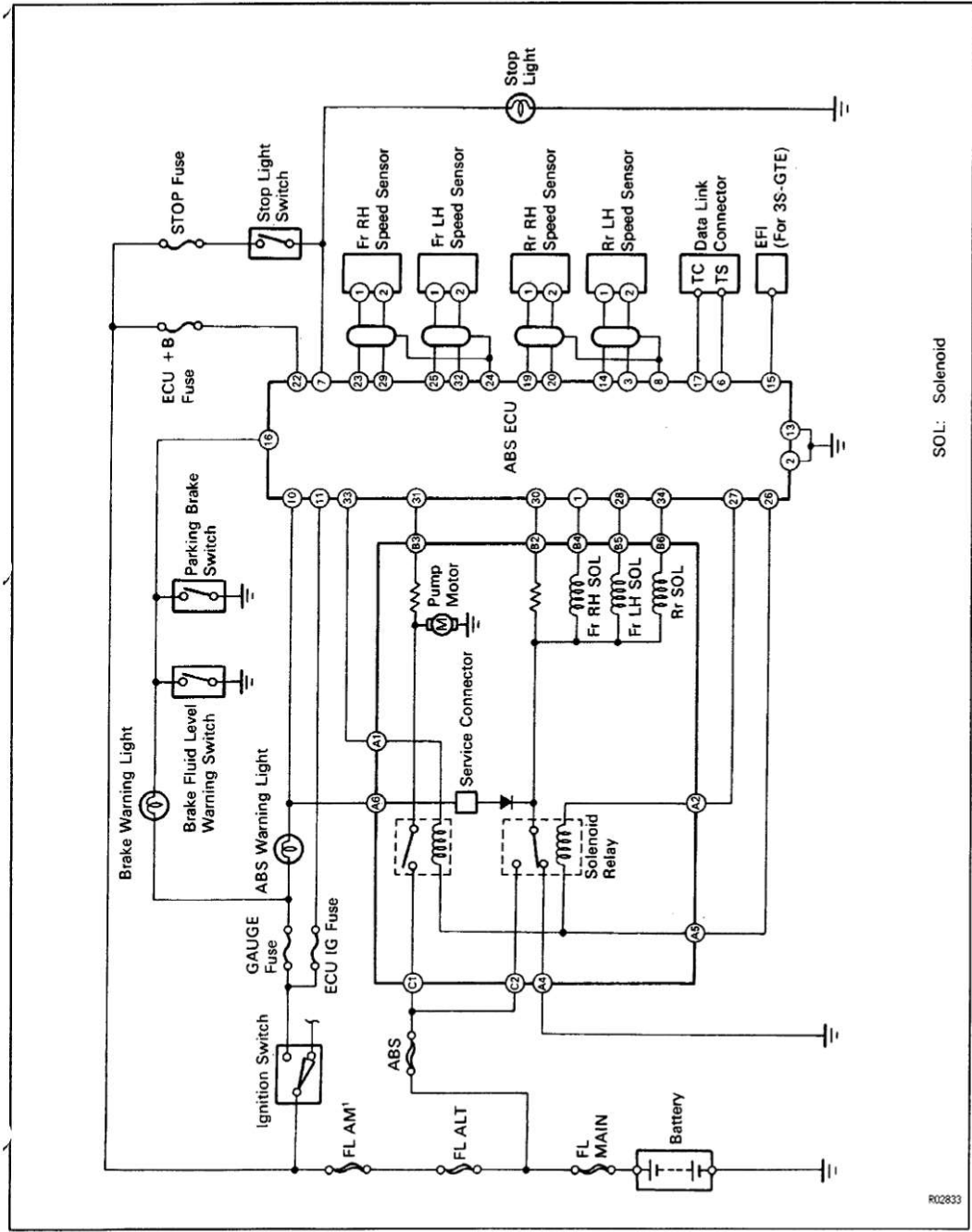
SYSTEM PARTS LOCATION

BR073-01



WIRING DIAGRAM

BR074-51

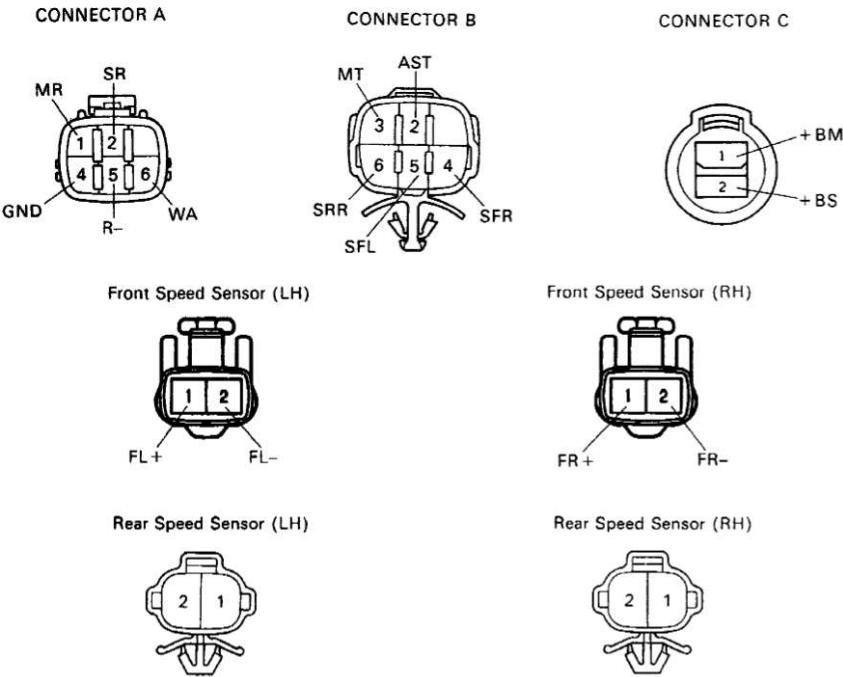


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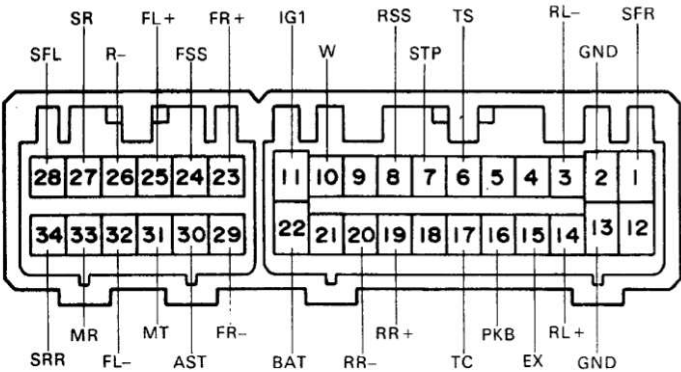
CONNECTORS

BR075-01

ABS Actuator



ABS ECU



BR4626 BR4626 ID-2-2
le-2-1-1 le-2-1-1
R01164 R01164
R02748

202602

BR-2

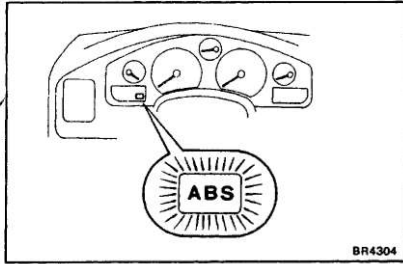
BRAKE - DESCRIPTION

GENERAL DESCRIPTION

- 1. 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 parts of the same part number or equivalent.
- 2. It is very important to keep parts and the area clean when repairing the brake system.

DESCRIPTION

The service brakes consist of a foot brake which changes rotational energy to thermal energy to stop the vehicle while it is being driven and a parking brake to keep the vehicle from moving while it is parked.



BR4304

DIAGNOSIS SYSTEM DESCRIPTION

BR076-01

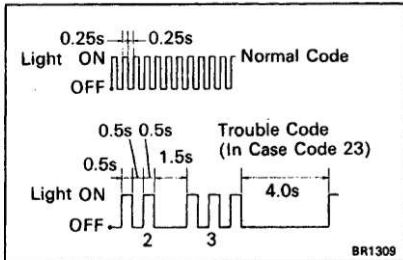
If a malfunction occurs, the system will identify the problem and the ECU will store the codes for the trouble items.

At the same time, the system informs the driver of a malfunction via the "ABS" warning light in the combination meter.

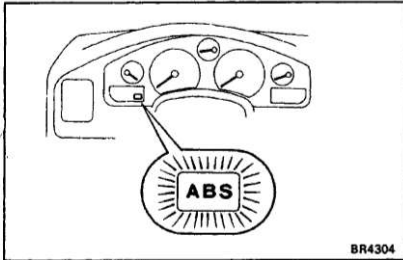
To identify the trouble by the number of blinks (diagnostic code) of the warning light turn on the ignition switch, disconnect the service connector, and use SST to connect Tc and E1 of the data link connector.

In the event of two codes, that having the smallest number (code) will be identified first.

HINT: The warning light does not show the diagnostic codes while the vehicle is running.



BR1309



BR4304

DIAGNOSIS SYSTEM INSPECTION

BR077-01

1. INSPECT BATTERY VOLTAGE

Inspect that the battery voltage is about 12 V.

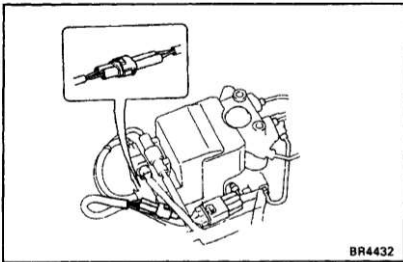
2. CHECK THAT WARNING LIGHT TURNS ON

- Turn the ignition switch on.
- Check that the "ABS" warning light turns on for 3 seconds.

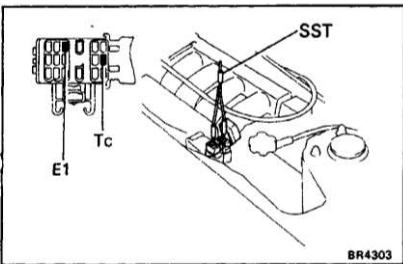
If not, inspect and repair or replace the fuse, bulb and wire harness.

3. REAR DIAGNOSTIC CODE

- Turn the ignition switch on.
- Disconnect the service connector.



BR4432

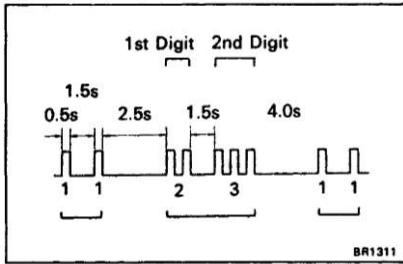


BR4303

- Using SST, connect terminals Tc and E1 of the data link connector.
SST 09843-18020

BR-54

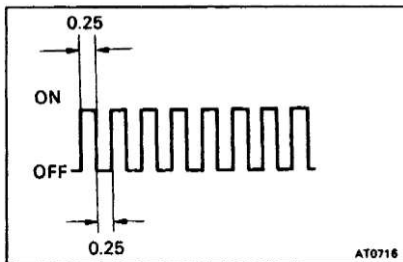
BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)



- (d) In event of a malfunction, 4 seconds later the warning light will begin to blink. Read the number of blinks.

(See DIAGNOSTIC CODE on page [BR-55](#))

HINT: The first number of blinks will equal the first digit of a two digit diagnostic code. After a 1.5 second pause, the 2nd number of blinks will equal the 2nd number of a two digit code. If there are two or more codes, there will be a 2.5 second pause between each, and indication will begin after 4.0 second pause from the smaller value and continue in order to larger.

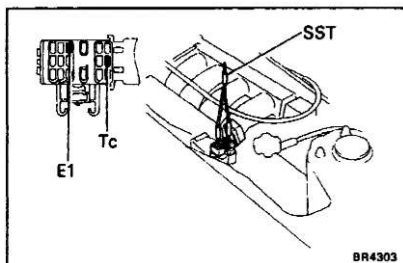


- (e) If the system is operating normally (no malfunction), the warning light will blink once every 0.5 seconds.

- (f) Repair the system.

- (g) After the malfunctioning components has been repaired, clear the diagnostic codes stored in the ECU. (See page [BR-55](#))

HINT: If you disconnect the battery cable while repairing, all diagnostic codes in the ECU will be erased.



- (h) Remove the SST from terminals Te and E1 of the data link connector.

SST 09843-18020

- (i) Connect the service connector.

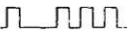
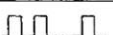
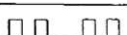
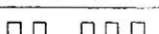
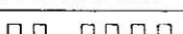
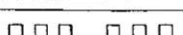
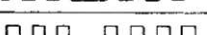
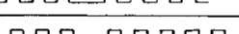
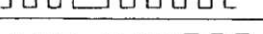
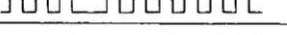
- (j) Turn the ignition switch on, and check that the "ABS" warning light goes off after the warning light goes on for 3 seconds.

DIAGNOSTIC CODE

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

BR-55

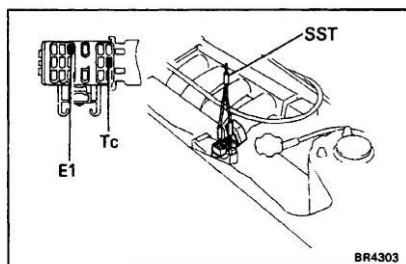
48/74-01

Code No.	Light Pattern	Diagnosis	Trouble Part
11		Open circuit in solenoid relay circuit	- Actuator inside wire harness - Control relay
12		Short circuit in solenoid relay circuit	Wire harness and connector of solenoid relay circuit
13		Open circuit in pump motor relay circuit	- Actuator inside wire harness - Control relay
14		Short circuit in pump motor relay circuit	Wire harness and connector of pump motor relay circuit
21		Open or short circuit in 3 position solenoid of front right wheel	- Actuator solenoid - Wire harness and connector of actuator solenoid circuit
22		Open or short circuit in 3 position solenoid of front left wheel	
23		Open or short circuit in 3 position solenoid of rear right wheel	
24		Open or short circuit 3 position solenoid of rear left wheel	
31		Front right wheel speed sensor signal malfunction	- Speed sensor - Sensor rotor - Wire harness and connector of speed sensor
32		Front left wheel speed sensor signal malfunction	
33		Rear right wheel speed sensor signal malfunction	
34		Rear left wheel speed sensor signal malfunction	
35		Open circuit in front left or rear right wheel speed sensor	
36		Open circuit in front right or rear left wheel speed sensor	
37		Wrong both rear axle hubs	Rear sensor rotors
41		Abnormal battery voltage (less than 9.5 V/more than 16.2 V)	- Battery - Voltage regulator
51		Pump motor of actuator locked or open circuit in pump motor circuit in actuator	- Pump motor, relay and battery - Wire harness, connector and ground bolt or actuator pump motor circuit
Always on		Malfunction in ECU	ECU

W00413

BR-56

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

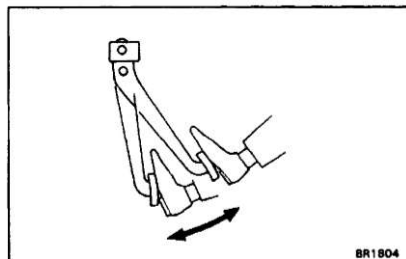


DIAGNOSTIC CODES CLEARING

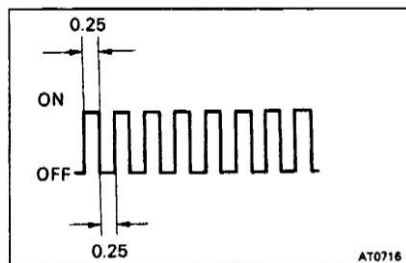
CLEAR DIAGNOSTIC CODES

- Turn the ignition switch on.
- Using SST, connect terminals Tc and E1 of the data link connector.
SST 09843-18020

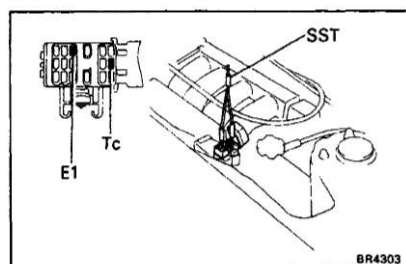
HINT: Keep the vehicle stopped vehicle speed 0 km/h (0 mph).



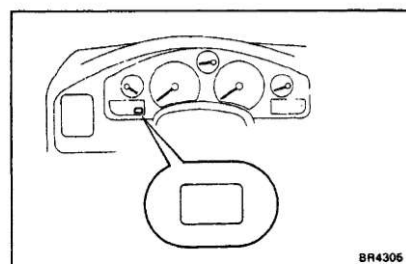
- Clear the diagnostic codes stored in ECU by depressing the brake pedal 8 or more times within 3 seconds.



- Check that the warning light shows the normal code.



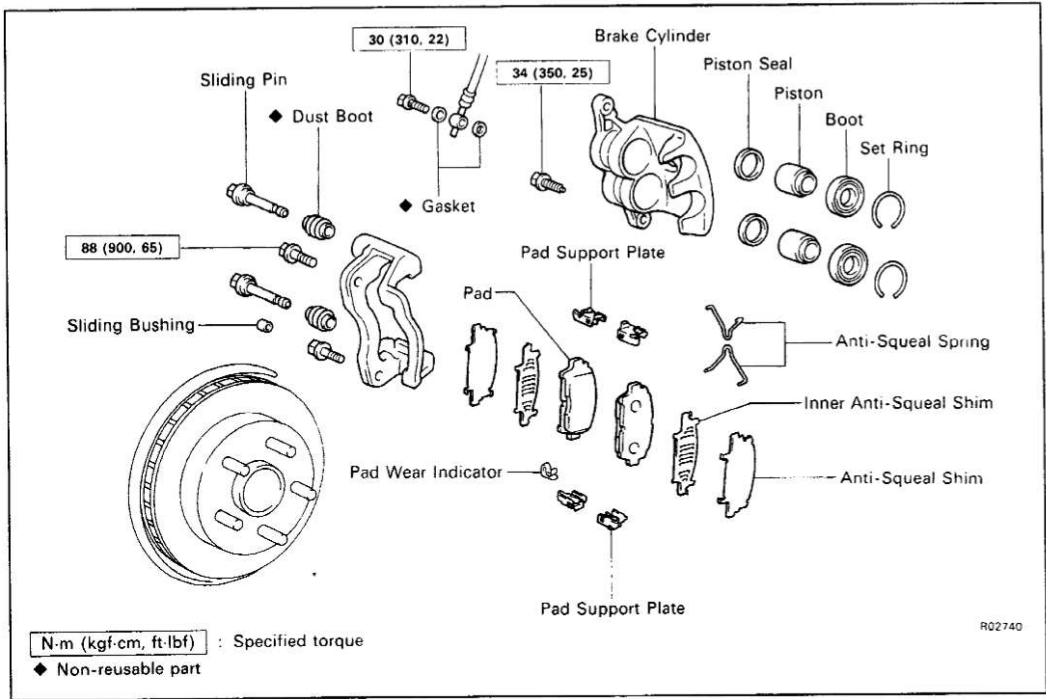
- Remove the SST from terminals Tc and E1 of the data link connector.
SST 09843-18020



- Check that the warning light goes off.

FRONT BRAKE
PE36T DISC (For 3S-GTE)
COMPONENTS

BR062-01

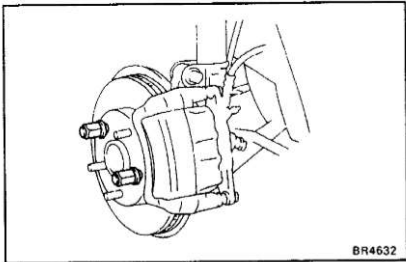


BR063-01

BRAKE PADS REPLACEMENT

1. REMOVE FRONT WHEEL

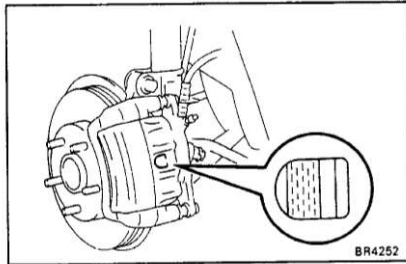
Remove the wheel and temporarily fasten the roto disc with hub nuts.

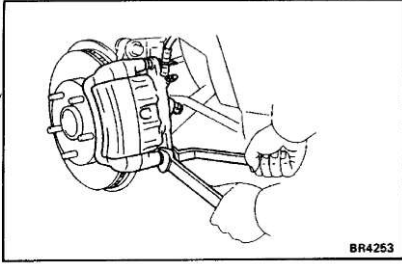


2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the cylinder inspection hole and replace the pads if it is not within specification.

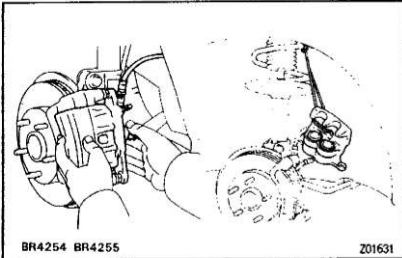
Minimum thickness:
1.0 mm (0.039 in.)





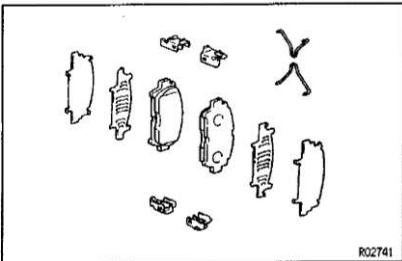
3. REMOVE CYLINDER FROM TORQUE PLATE

- (a) Hold the sliding pin and loosen the two installation bolts.
- (b) Remove the installation bolts.



- (c) Remove the brake cylinder and suspend it so the hose is not stretched.

HINT: Do not disconnect the brake hose.

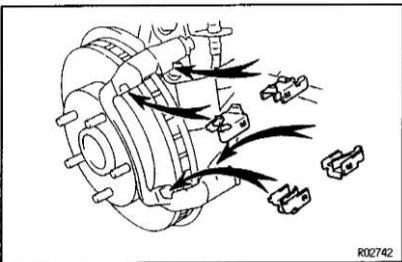


4. REMOVE FOLLOWING PARTS:

- (a) Two anti-squeal springs
- (b) Two brake pads
- (c) Four anti-squeal shims
- (d) Pad wear indicator plate
- (e) Two pad support plates

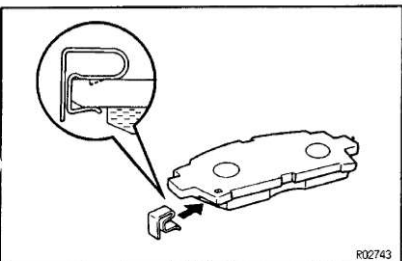
5. CHECK ROTOR DISC THICKNESS AND RUNOUT

(See page [BR-22](#))



6. INSTALL PAD SUPPORT PLATES

Install the two pad support plates.

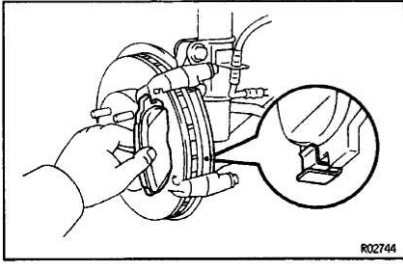


7. INSTALL NEW PADS

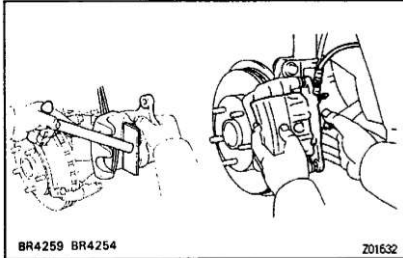
- (a) Install a pad wear indicator plate on the inside pad.
- (b) Apply disc brake grease to both sides of the two inner anti-squeal shims.
- (c) Install the two anti-squeal shims to the each pad.

BR-20

BRAKE - FRONT BRAKE

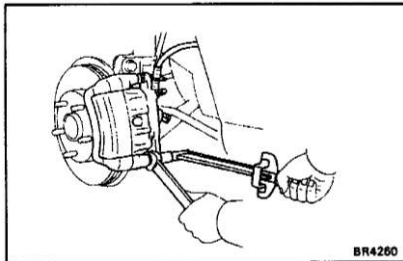


- (d) Install inside pad with the pad wear indicator plate facing downward.
- (e) Install outside pad.
- NOTICE:** There should be no oil grease adhering to the friction surfaces of the pads or the rotor disc.
- (f) Install the two anti-squeal springs.

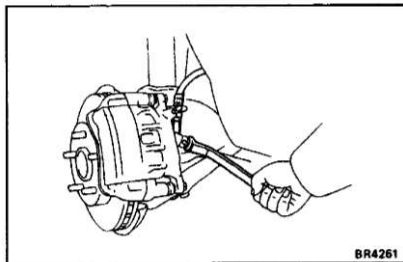
**8. INSTALL CYLINDER**

- (a) Draw out a small amount of brake fluid from the reservoir tank.
- (b) Place a wooden plate on the piston, and press in the piston with a hammer handle or similar implement.

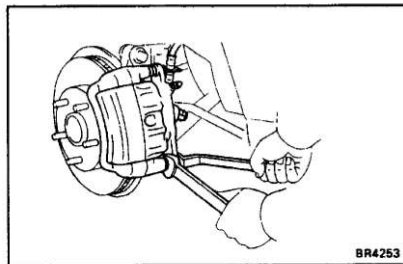
HINT: If the piston is difficult to punch in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.



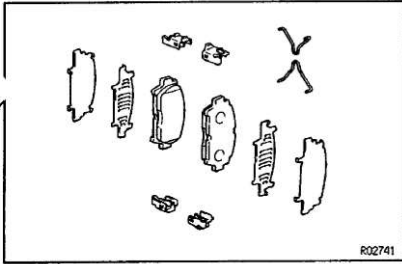
- (c) Temporarily install the cylinder on the torque plate with two installation bolts.
- (d) Hold the sliding pin and torque the installation bolts.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

9. INSTALL FRONT WHEEL**10. CHECK THAT FLUID LEVEL IS MAX LINE****CYLINDER REMOVAL****1. DISCONNECT FLEXIBLE HOSE**

- (a) Remove the union bolt and two gaskets from the brake cylinder, then disconnect the flexible hose from the brake cylinder.
- (b) Use a container to catch the brake fluid as it drains out.

**2. REMOVE CYLINDER FROM TORQUE PLATE**

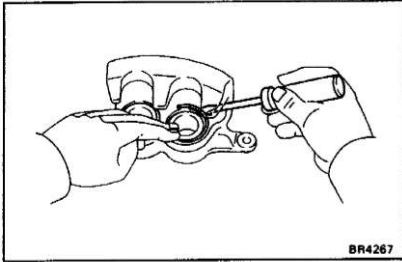
- (a) Hold the sliding pin and loosen the two installation bolts.
- (b) Remove the two installation bolts.
- (e) Remove the cylinder from the torque plate.



R02741

3. REMOVE FOLLOWING PARTS:

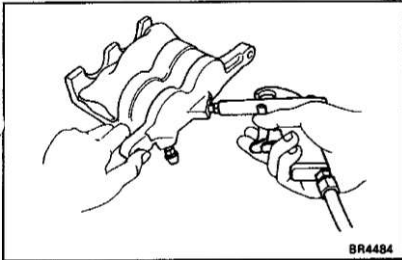
- (a) Two anti-squeal springs
- (b) Two brake pads
- (c) Four anti-squeal shims
- (d) Pad wear indicator
- (e) Two pad support plates



BR4267

CYLINDER DISASSEMBLY**1. REMOVE CYLINDER BOOT SET RINGS AND CYLINDER BOOTS**

Using a screwdriver, remove the cylinder boot set rings and cylinder boots from the cylinder.

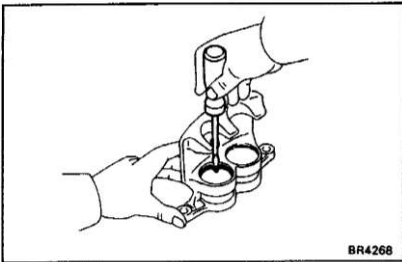


BR4484

2. REMOVE PISTONS

- (a) Place a piece of cloth or similar article between the pistons and the cylinder.
- (b) Use compressed air to remove the pistons from the cylinder.

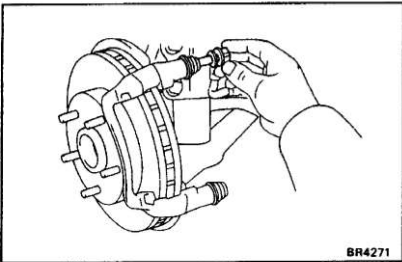
CAUTION: Do not place your fingers in front of the piston when using compressed air.



BR4268

3. REMOVE PISTON SEALS

Using a screwdriver, remove the piston seals from the cylinder.



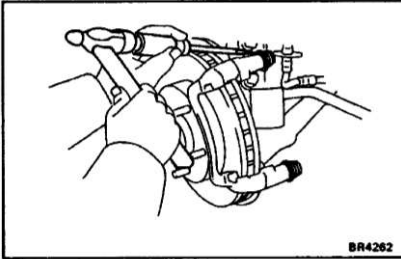
BR4271

4. REMOVE SLIDING PINS AND DUST BOOTS

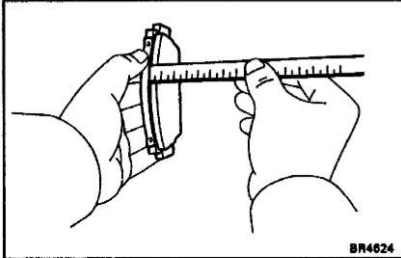
- (a) Remove the two sliding pins from the torque plate.

BR-22

BRAKE - FRONT BRAKE



- (b) Using a chisel and hammer, tap out the two dust boots.



FRONT BRAKE COMPONENTS INSPECTION

1. MEASURE PAD LINING THICKNESS

Standard thickness:
10.0 mm (0.39 in.)

Minimum thickness:
1.0 mm (0.039 in.)

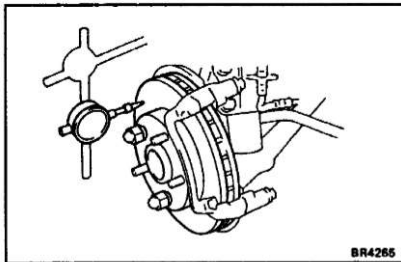
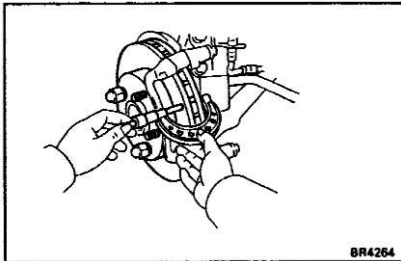
Replace the pad if the thickness is less than the minimum or if it shows sign of uneven wear.

2. MEASURE ROTOR DISC THICKNESS

Standard thickness:
30.0 mm (1.181 in.)

Minimum thickness:
28.0 mm (1.102 in.)

If the disc is scored or worn, or if thickness is less than minimum, repair or replace the disc.



3. MEASURE ROTOR DISC RUNOUT

HINT: Before measuring the runout, confirm that the front hub bearing play is within specification.

Measure the rotor disc runout at 10 mm (0.39 in.) from the outer edge of the disc.

Maximum disc runout:
0.07 mm (0.0028 in.)

If the runout is greater than the maximum, inspect and adjust if following the procedure below.

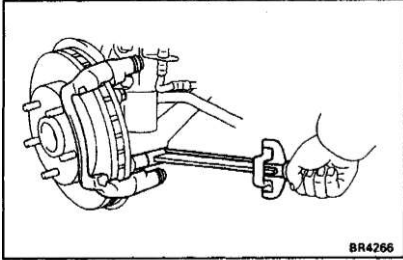
Then replace the disc if necessary.

- Remove the torque plate from the knuckle.
- Remove the hub nuts of the temporarily installed disc and pull off the rotor disc.
- Check that the hub axial play is within specification, and replace the bearing if not within specification. (See page [SA-12](#))

BRAKE - FRONT BRAKE

BR-23

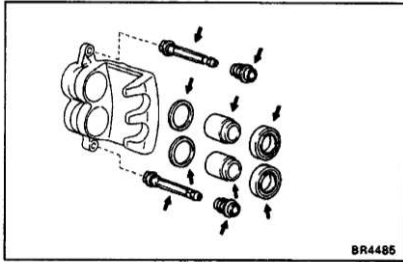
- (d) Install the rotor disc and measure the disc runout, then shift the rotor disc one fifth of a turn or one fourth of a turn, and measure the disc runout. Similarly measure the runout at each position, and select the position where the runout is minimum.



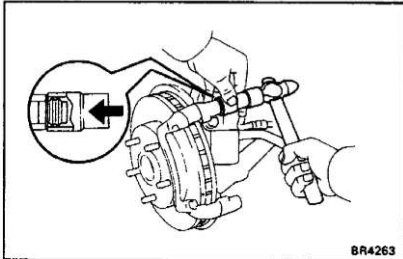
- (e). (n this position, if the runout is within specification, install the torque plate and torque the mounting bolts.
Torque: 88 N-m (900 kgf-cm, 65 ft-lbf)
- (f) If not within specification, replace the rotor disc, and repeat (d) and (e).

BR-24

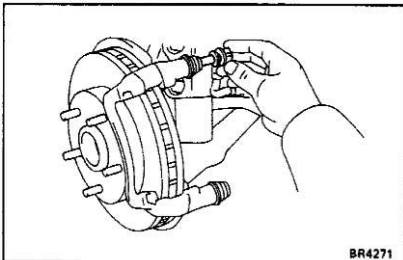
BRAKE - FRONT BRAKE

**CYLINDER ASSEMBLY**

BR087-01

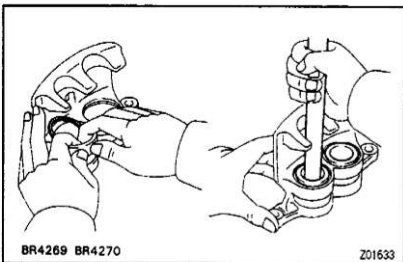
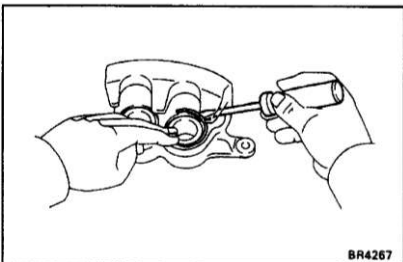
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS**2. INSTALL DUST BOOTS AND SLIDING PINS**

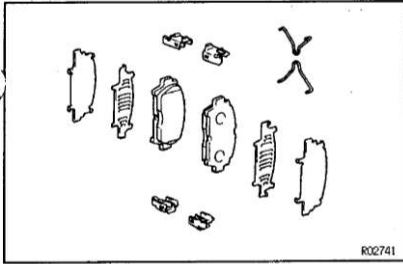
- (a) Using a 19 mm socket wrench and hammer, tap in two new dust boots into the torque plate.
- (b) Confirm that the metal plate portion of the dust boot fits snugly in the torque plate.



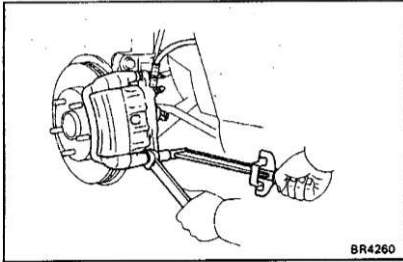
- (c) Insert two sliding pins into the torque plate.

NOTICE: Insert the sliding pin with sliding bushing into the bottom side.

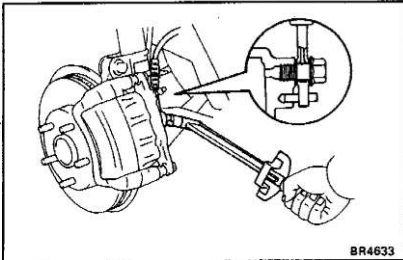
**3. INSTALL PISTON SEALS AND PISTONS IN CYLINDER****4. INSTALL CYLINDER BOOTS AND CYLINDER BOOT SET RINGS**

**CYLINDER INSTALLATION****1. INSTALL FOLLOWING PARTS:**

- (a) Two pad support plates
- (b) Pad wear indicator
- (c) Four anti-squeal shims
- (d) Two brake pads
- (e) Two anti-squeal springs

**2. INSTALL CYLINDER**

- (a) Temporarily install the cylinder on the torque plate with two installation bolts.
 - (b) Hold the sliding pin and torque the installation bolts.
- Torque: 34 N-m (350 kgf-cm, 25 ft-lbf)**

**3. CONNECT FLEXIBLE HOSE**

Install the flexible hose on the brake cylinder with two new gaskets.

Torque: 30 N-m (310 kgf-cm, 22 ft-lbf)

HINT: Install the flexible hose lock securely in the lock hole in the brake cylinder.

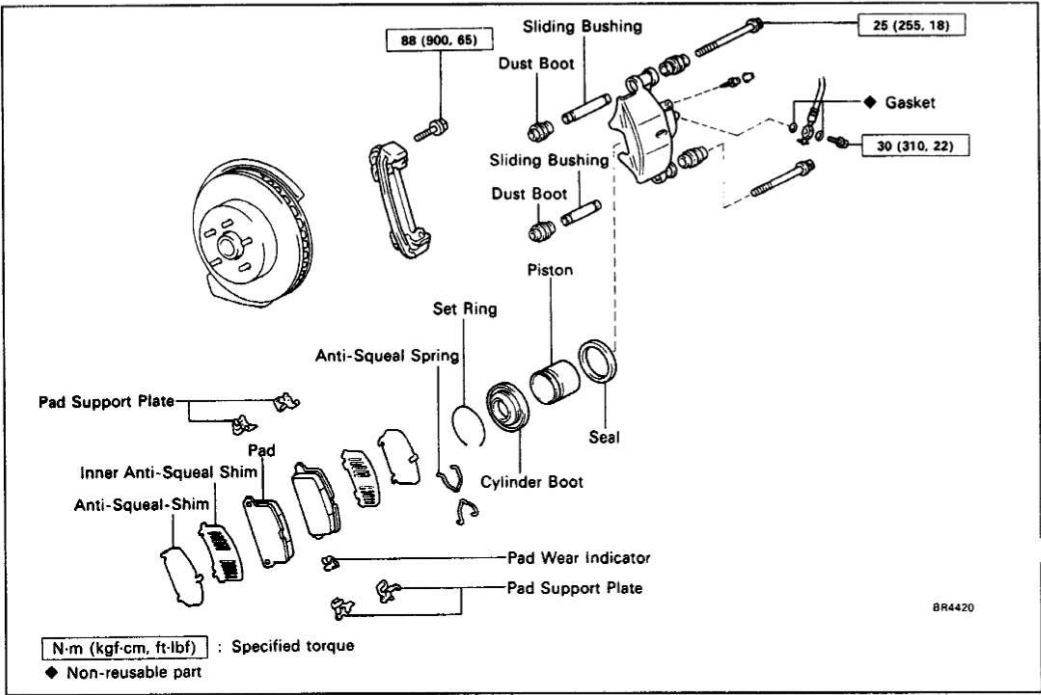
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page [BR-9](#))

5. CHECK FOR LEAKS

PD51 DISC (For 5S-FE)
COMPONENTS

BR088-01

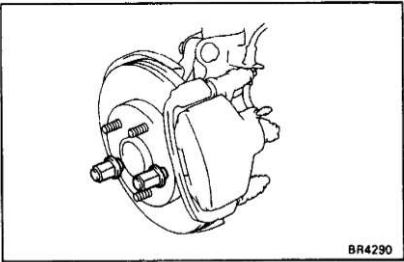


BR08A-01

BRAKE PADS REPLACEMENT

1. REMOVE FRONT WHEEL

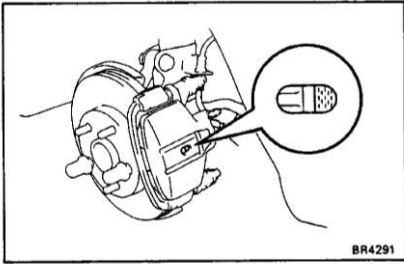
Remove the wheel and temporarily fasten the rotor disc with hub nuts.



2. INSPECT PAD LINING THICKNESS

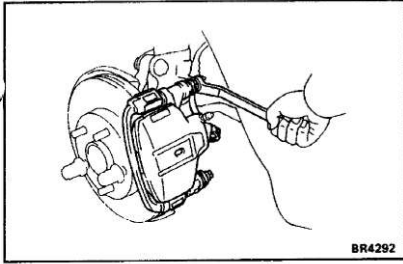
Check the pad thickness through the cylinder inspection hole and replace the pads if it is not within specification.

Minimum thickness:
1.0 mm (0.039 in.)

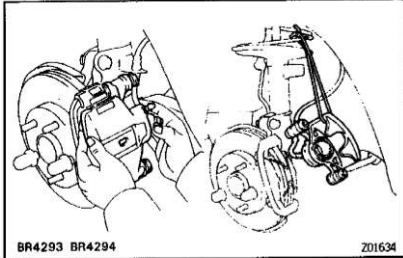


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BRAKE - FRONT BRAKE

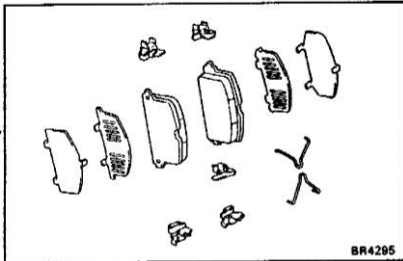
**3. REMOVE CYLINDER FROM TORQUE PLATE**

- (a) Remove two installation bolts from the torque plate.



- (b) Remove the brake cylinder and suspend it so the hose is not stretched.

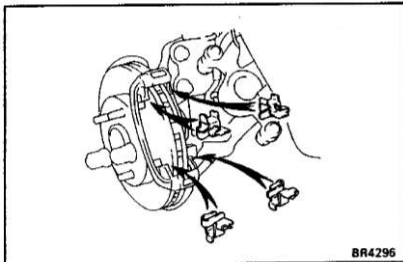
HINT: Do not disconnect the brake hose.

**4. REMOVE FOLLOWING PARTS:**

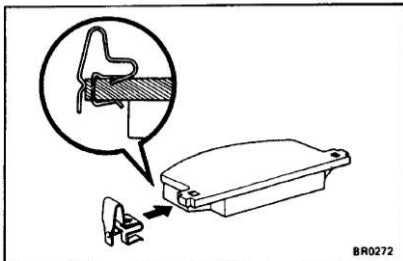
- (a) Two anti-squeal springs
- (b) Two brake pads
- (c) Four anti-squeal shims
- (d) Pad wear indicator plate
- (e) Four pad support plates

5. CHECK ROTOR DISC THICKNESS AND RUNOUT

(See page [BR-30](#))

**6. INSTALL PAD SUPPORT PLATES**

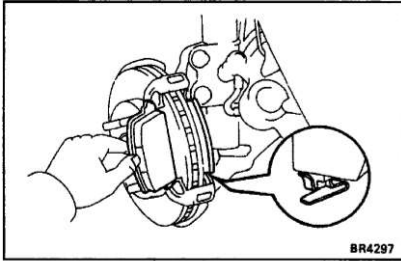
Install the pad support plates.

**7. INSTALL NEW PADS**

- (a) Install a pad wear indicator plate on the inside pad.
- (b) Apply disc brake grease to both sides of the two inner anti-squeal shims.
- (c) Install the two anti-squeal shims to the each pad.

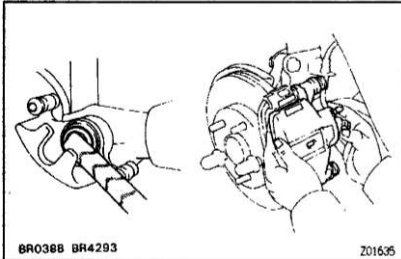
BR-28

BRAKE - FRONT BRAKE



BR4297

- (d) Install inside pad with the pad wear indicator plate facing downward.
- (e) Install outside pad.
- NOTICE:** There should be no oil or grease adhering to the friction surfaces of the pads or the rotor disc.
- (f) Install the two anti-squeal springs.



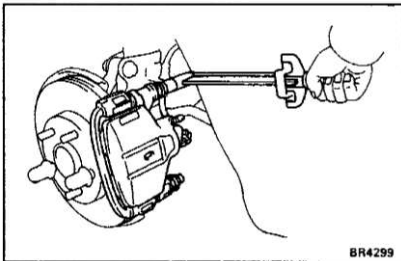
BR0388 BR4293

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8. INSTALL CYLINDER

- (a) Draw out a small amount of brake fluid from the reservoir tank.
- (b) Press in the piston with a hammer handle or an equivalent.

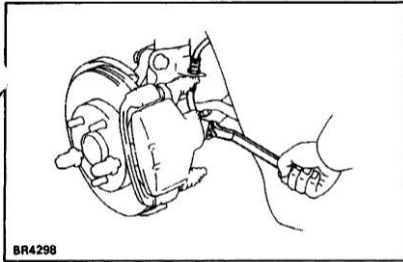
HINT: If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.



BR4299

- (c) Install the brake cylinder.
 - (d) Install and torque the two installation bolts.
- Torque: 25 N-m (255 kgf-cm, 18 ft-lbf)**

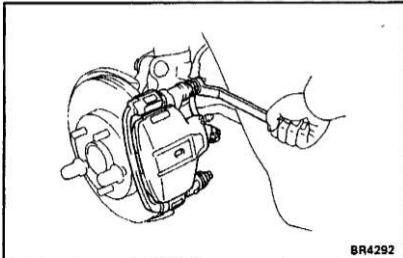
9. INSTALL FRONT WHEEL**10. CHECK THAT FLUID LEVEL IS MAX LINE**



CYLINDER REMOVAL

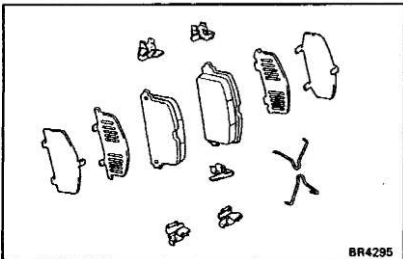
1. DISCONNECT FLEXIBLE HOSE

- Remove the union bolt and two gaskets from the brake cylinder, then disconnect the flexible hose from the brake cylinder.
- Use a container to catch the brake fluid as it drains out.



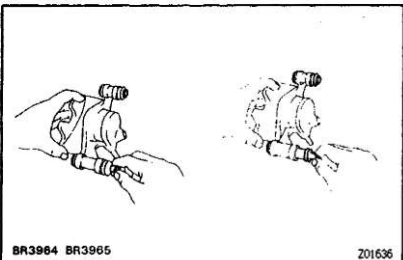
2. REMOVE CYLINDER FROM TORQUE PLATE

Remove the two installation bolts and cylinder.



3. REMOVE FOLLOWING PARTS:

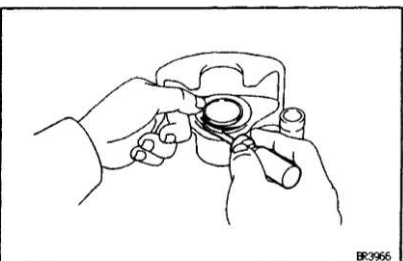
- Two anti-squeal springs
- Two brake pads
- Four anti-squeal shims
- Pad wear indicator
- Four pad support plates



CYLINDER DISASSEMBLY

1. REMOVE FOLLOWING PARTS:

- Two sliding bushings
- Four dust boots

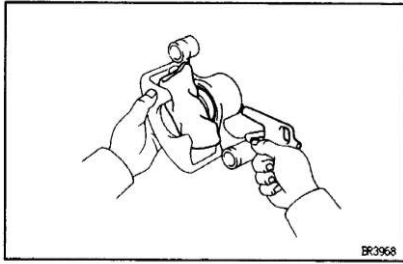


2. REMOVE CYLINDER BOOT SET RING AND CYLINDER BOOT

Using a screwdriver, remove the cylinder boot set ring and cylinder boot.

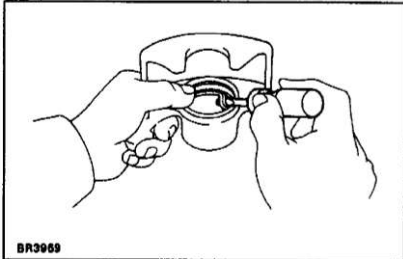
BR-30

BRAKE - FRONT BRAKE

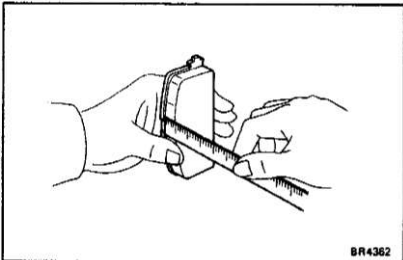
**3. REMOVE PISTON FROM CYLINDER**

- (a) Put a piece of cloth or an equivalent between the piston and the cylinder.
- (b) Use compressed air to remove the piston from the cylinder.

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

**4. REMOVE PISTON SEAL FROM BRAKE CYLINDER**

Using a screwdriver, remove the piston seal.

**FRONT BRAKE COMPONENTS INSPECTION****1. MEASURE PAD LINING THICKNESS**

Standard thickness:

10.0 mm (0.39 in.)

Minimum thickness:

1.0 mm (0.039 in.)

Replace the pad if the thickness is less than the minimum or if it shows sign of uneven wear.

2. MEASURE ROTOR DISC THICKNESS

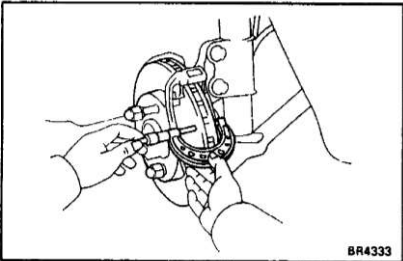
Standard thickness:

25.0 mm (0.984 in.)

Minimum thickness:

24.0 mm (0.945 in.)

If the disc is scored or worn, or if thickness is less than minimum, repair or replace the disc.

**3. MEASURE ROTOR DISC RUNOUT**

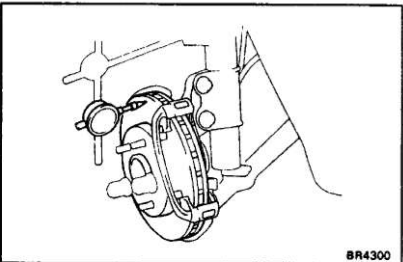
HINT: Before measuring the runout, confirm that the front hub bearing play is within specification.

Measure the rotor disc runout at 10 mm (0.39 in.) from the outer edge of the rotor disc.

Maximum disc runout:

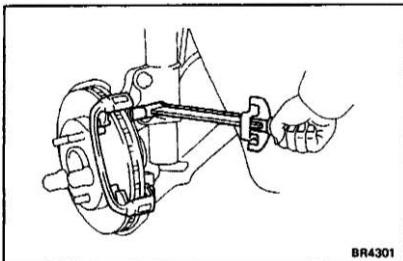
0.07 mm (0.0028 in.)

If the runout is greater than the maximum, inspect and adjust if following the procedure below.



Then replace the disc if necessary.

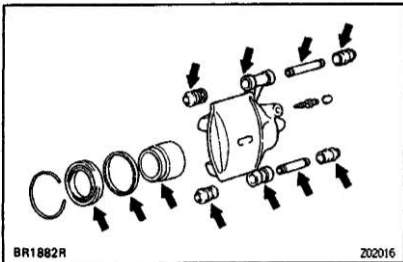
- (a) Remove the torque plate from the knuckle.
- (b) Remove the hub nuts the temporarily installed disc and pull off the rotor disc.
- (c) check that the hub axial play is within specification, and replace the bearing if not within specification. (See page [SA-12](#))
- (d) Install the rotor disc and measure the disc runout, then shift the rotor disc one fifth of a turn or one fourth of a turn, and measure the disc runout. Similarly measure the runout at each position, and select the position where the runout is minimum.



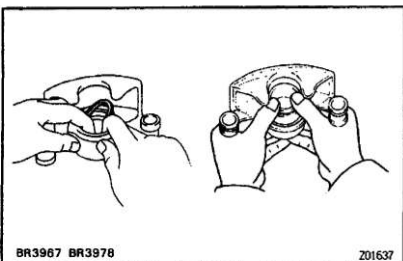
- (e) In this position, if the runout is within specification, install the torque plate and torque the mounting bolts.

Torque: 88 N-m (900 kgf-cm, 65 ft-lbf)

- (f) If not within specification, replace the rotor disc, and repeat (d) and (e).

**CYLINDER ASSEMBLY**

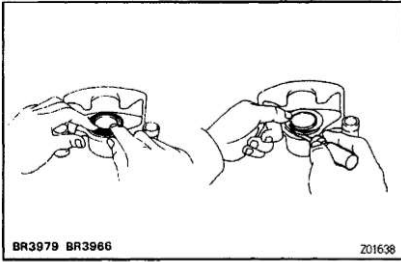
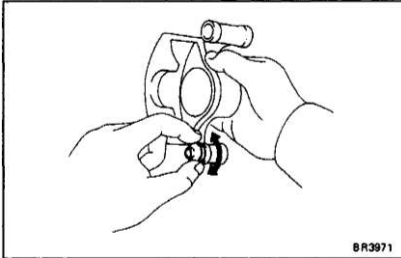
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



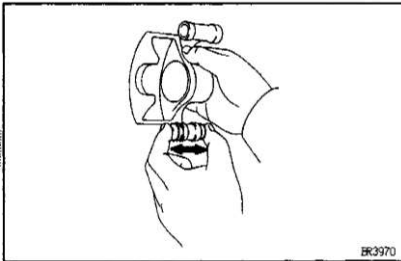
2. INSTALL PISTON SEAL AND PISTON IN CYLINDER

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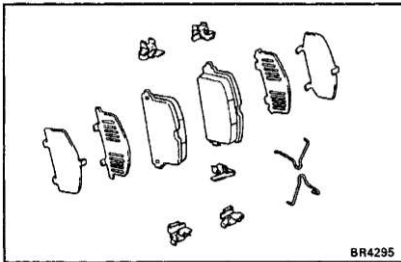
BRAKE - FRONT BRAKE

**3. INSTALL CYLINDER BOOT AND RING IN CYLINDER****4. INSTALL DUST BOOTS AND CYLINDER SLIDING BUSHINGS**

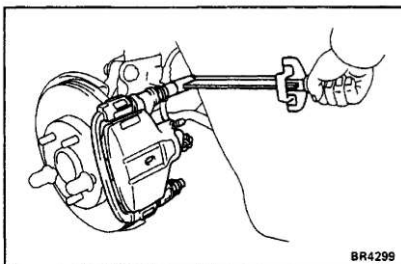
- (a) Install the dust boots into the brake cylinder.
- (b) Insure that the boots is secured firmly to the brake cylinder grooves.



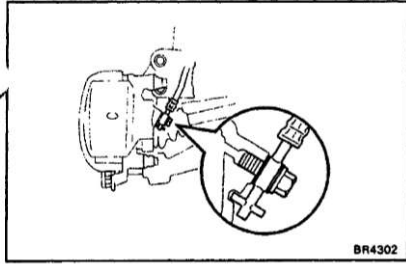
- (c) Install the bushing into the boots.
- (d) Insure that the boots is secured firmly to the bushing grooves.

**CYLINDER INSTALLATION****1. INSTALL FOLLOWING PARTS:**

- (a) Four pad support plates
- (b) Pad wear indicator
- (c) Four anti-squeal shims
- (d) Two brake pads
- (e) Two anti-squeal springs

**2. INSTALL CYLINDER**

- (a) Install the brake cylinder.
 - (b) Install and torque the two installation bolts.
- Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)**

**3. INSTALL FLEXIBLE HOSE**

Install the flexible hose on the brake cylinder with two new gaskets.

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

HINT: Insert the flexible hose lock securely in the lock hole in brake cylinder.

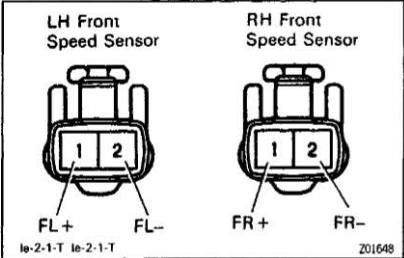
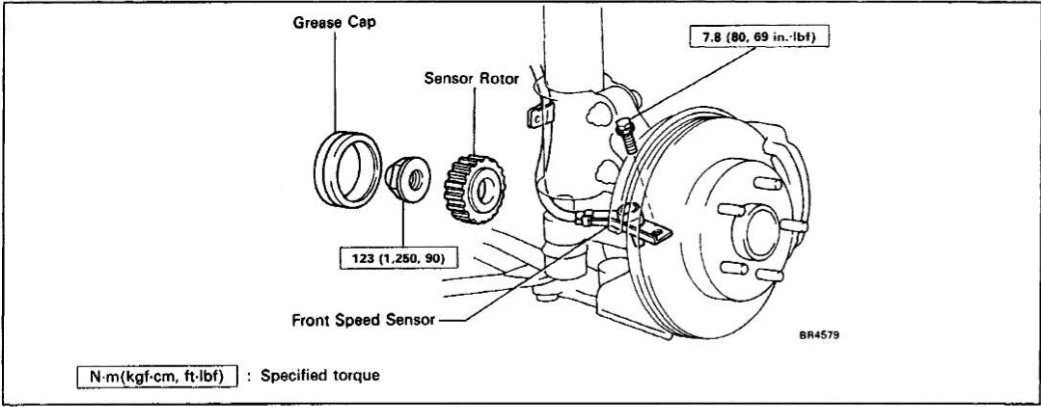
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page [BR-9](#))

5. CHECK FOR LEAKS

FRONT SPEED SENSOR
COMPONENTS

BR07X-01



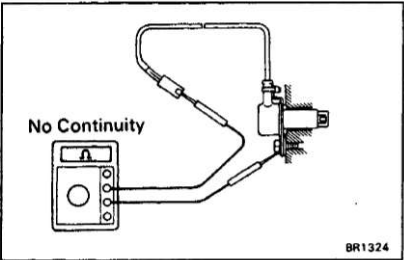
FRONT SPEED SENSOR INSPECTION

1. INSPECT SPEED SENSOR

- (a) Disconnect the speed sensor connector.
- (b) Measure the resistance between terminals.

Resistance: 0.9-1.5 kΩ

If resistance value is not as specified, replace the sensor.



- (c) Check that there is no continuity between each terminal and sensor body.
If there is continuity, replace the sensor.
- (d) Connect the speed sensor connector.

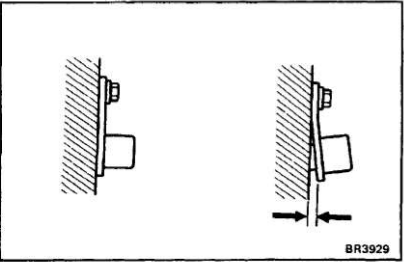
2. INSPECT SENSOR INSTALLATION

- (a) Check that the sensor installation bolt is tighten properly. If not, tighten the bolt.

Torque: 7.8 N·m (80 kgf·cm, 69 in.-lbf)

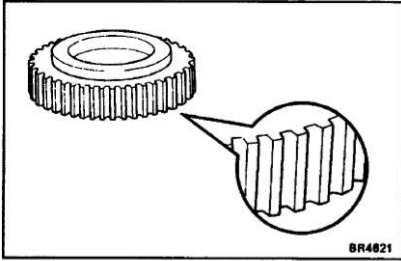
- (b) Check that there is no clearance between the sensor and rear axle carrier as shown.

If there is clearance, replace the sensor.



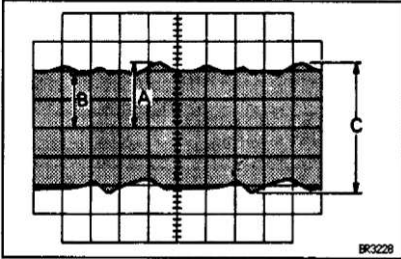
BR-70

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

**3. VISUALLY INSPECT SENSOR ROTOR SERRATIONS**

- (a) Remove the sensor rotor.
(See page [SA-14](#))
- (b) Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.
- (c) Install the sensor rotor.
(See page [SA-16](#))

NOTICE: To prevent damage to the serration:, do not strike the sensor rotor.



FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

INSPECT FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE

- (a) Connect an oscilloscope to the speed sensor connector.
- (b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.
- (c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.
- (d) Check that B is 5096 or more of A.
If not as specified, replace the sensor rotor.

BR-1

BRAKE

BRAKE SYSTEM

BR-2**BRAKE – GENERAL DESCRIPTION**

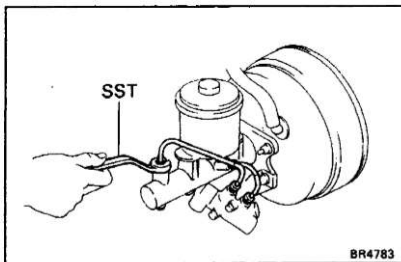
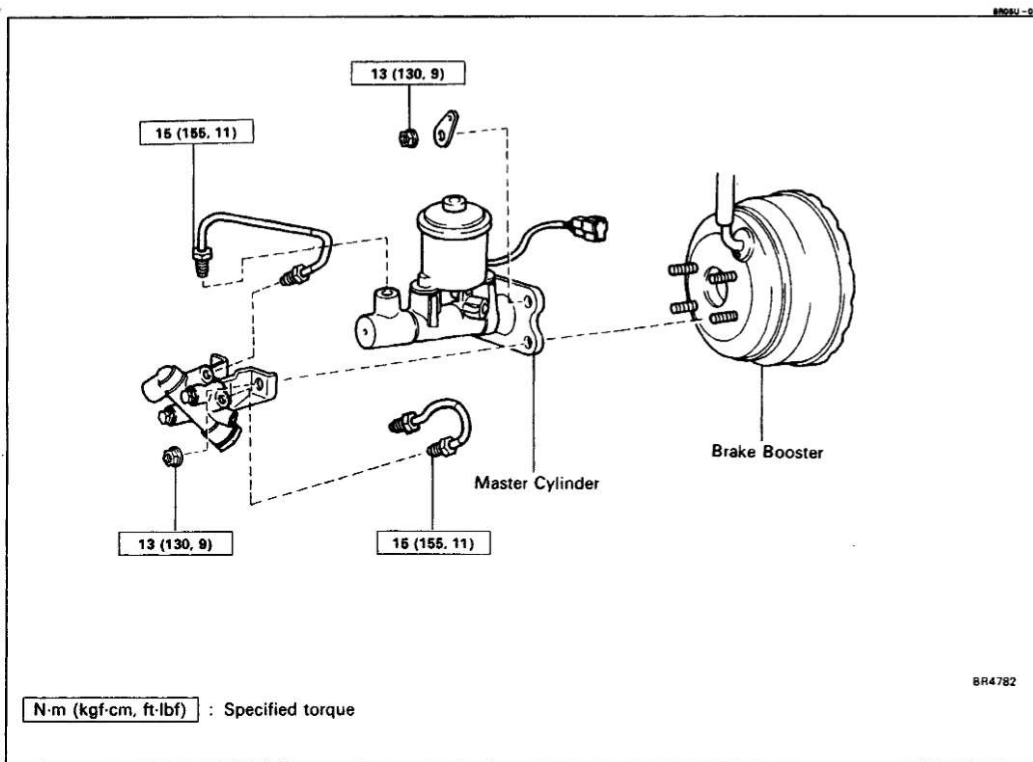
GENERAL DESCRIPTION

1. 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 parts of the same part number or equivalent.
2. It is very important to keep parts and the area clean when repairing the brake system.

DESCRIPTION

The service brakes consist of a foot brake which changes rotational energy to thermal energy to stop the vehicle while it is being driven and a parking brake to keep the vehicle from moving while it is parked.

MASTER CYLINDER



MASTER CYLINDER REMOVAL

1. DISCONNECT LEVEL WARNING SWITCH CONNECTOR

2. DRAW OUT FLUID WITH SYRINGE

NOTICE: Do not let brake fluid remain on a painted surface. Wash it off immediately.

3. DISCONNECT BRAKE TUBES

Using SST, disconnect the brake tubes from the master cylinder.

SST 09751 -3601 1

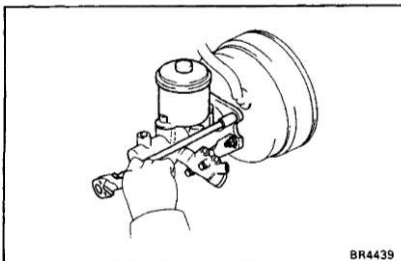
4. REMOVE MASTER CYLINDER

(a) Remove the four nuts.

(b) (w/ABS)

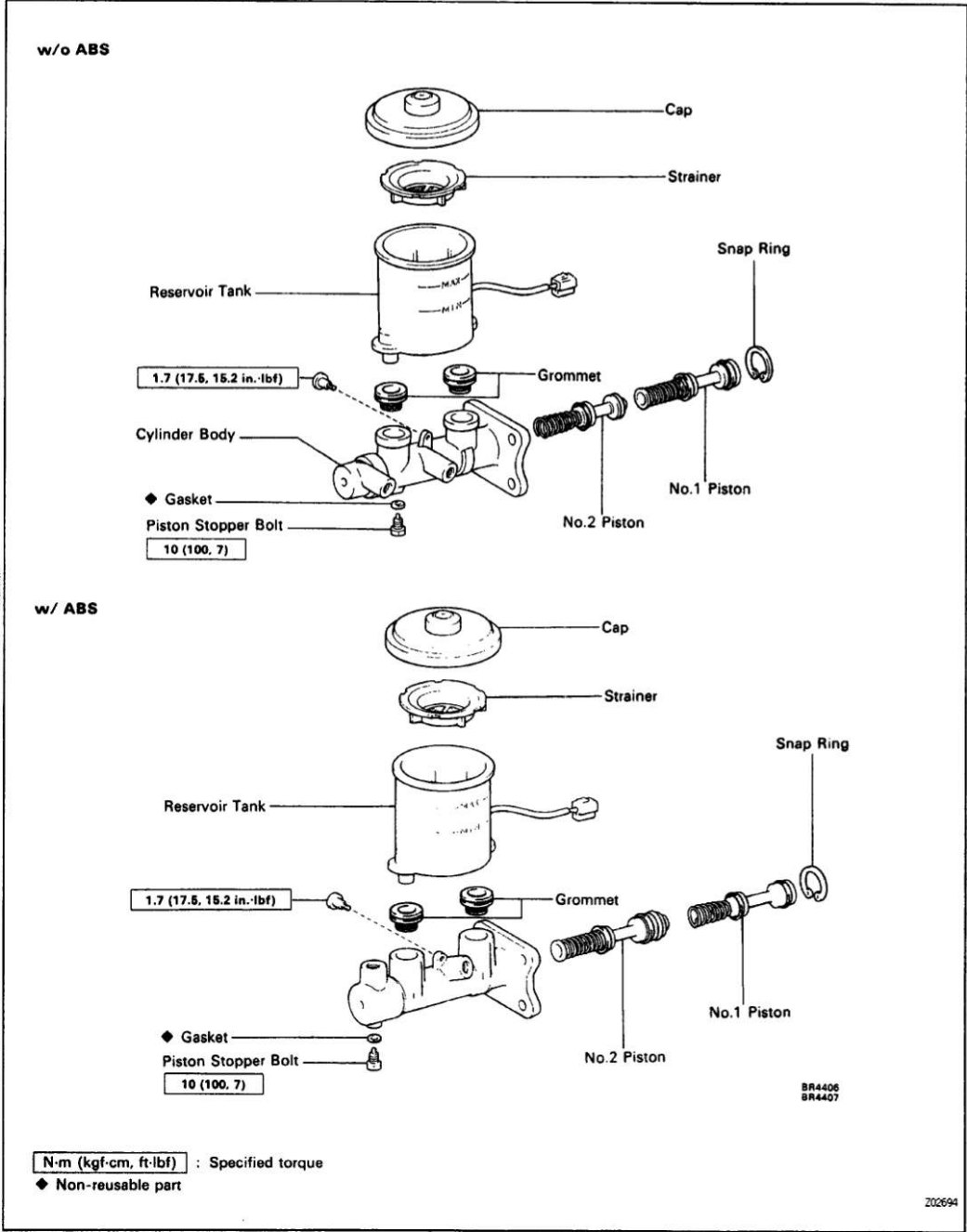
Remove the P valve with the P valve bracket.

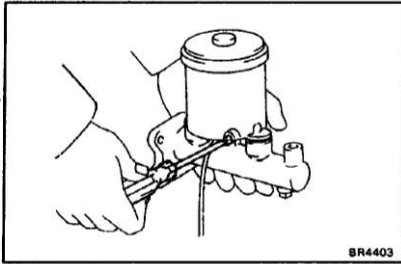
(c) Remove the master cylinder.



COMPONENTS

MOBY-01





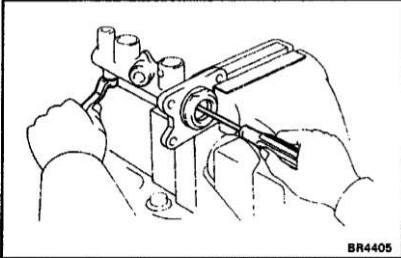
MASTER CYLINDER DISASSEMBLY^{BR05W-01}

1. REMOVE RESERVOIR TANK

- (a) Remove the set screw and pull out the reservoir tank.
- (b) Remove the cap and strainer from the reservoir tank.

2. REMOVE TWO GROMMETS

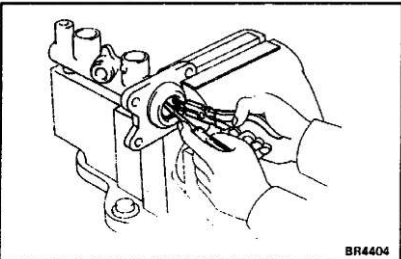
3. PLACE CYLINDER IN VISE



4. REMOVE PISTON STOPPER BOLT

Using a screwdriver, push the pistons in all the way and remove the piston stopper bolt and gasket.

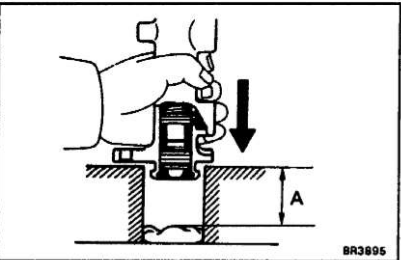
HINT: Tape the screwdriver tip before use.



5. REMOVE TWO PISTONS

- (a) push in the piston with a screwdriver and remove the snap ring with snap ring pliers.
- (b) Remove the No.1 piston and spring by hand, pulling straight out, not at an angle.

NOTICE: If pulled out at an angle, there is possibility that the cylinder bore could be damaged.



- (c) Place a rag and two wooden blocks on the work table and lightly tap the cylinder flange against the block edges until the piston drops out of the cylinder.

HINT: Make sure the distance (A) from the rag to the top of the blocks is at least 100 mm (3.94 in.).

MASTER CYLINDER COMPONENTS^{BR05X-01} INSPECTION

HINT: Clean the disassembled parts with compressed air.

1. INSPECT CYLINDER BORE FOR RUST OR SCORING

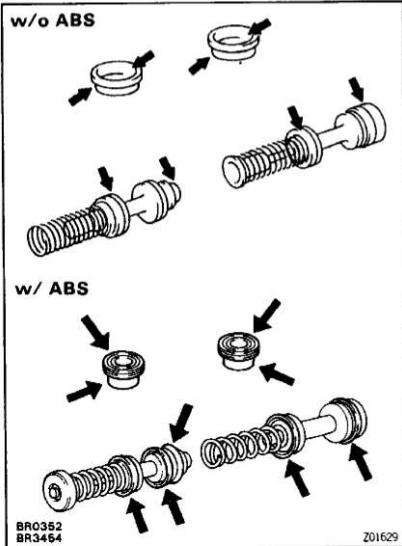
2. INSPECT CYLINDER FOR WEAR OR DAMAGE

If necessary, clean or replace the cylinder.

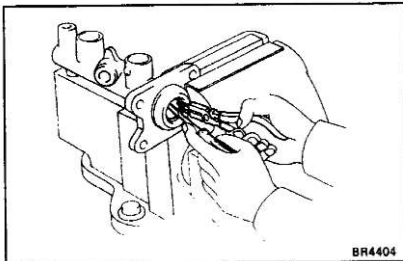
BR-14

BRAKE - MASTER CYLINDER

BROSY-01

**MASTER CYLINDER ASSEMBLY**

1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO RUBBER PARTS INDICATED BY ARROWS

**2. INSTALL TWO SPRINGS**

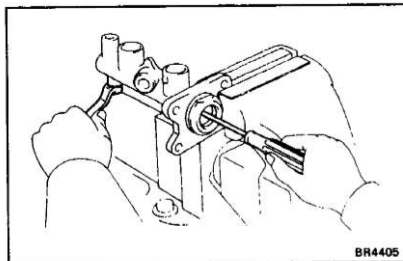
NOTICE: Be careful not to damage the rubber lips on the pistons.

- (a) Install the two piston straight in, not at an angle.

NOTICE: If inserted at angle, there is a possibility that the cylinder bore could be damaged.

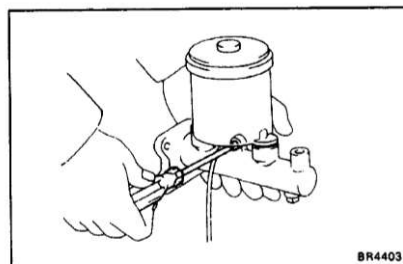
- (b) Push in the piston with a screwdriver and install the snap ring with snap ring pliers.

HINT: Tape the screwdriver tip before use.

**3. INSTALL PISTON STOPPER BOLT**

Using a screwdriver, push the piston in all the way and install the piston stopper bolt over the gasket. Torque the bolt.

Torque: 10 N-m (100 kgf-cm, 7 ft-lbf)

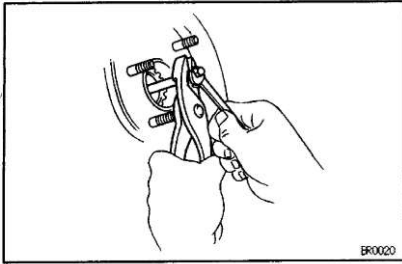
4. INSTALL TWO GROMMETS**5. INSTALL RESERVOIR TANK**

- (a) Install the cap and strainer to the reservoir tank.

- (b) Push the reservoir tank onto the cylinder.

- (c) Install the set screw while pushing on the reservoir tank.

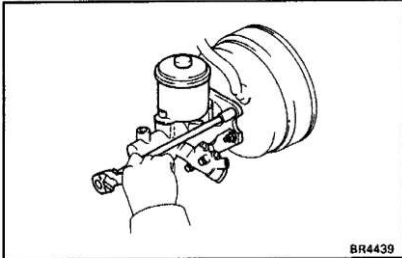
Torque: 1.7 N-m (17.5 kgf-cm, 15.2 ft-lbf)



MASTER CYLINDER INSTALLATION

1. ADJUST LENGTH OF BRAKE BOOSTER PUSH ROD BEFORE INSTALLING MASTER CYLINDER

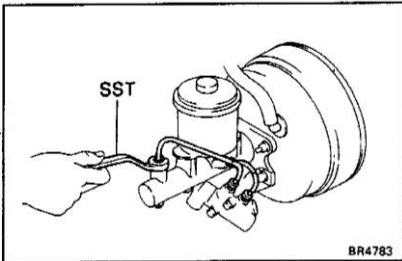
(See page [BR-17](#))



2. INSTALL MASTER CYLINDER

- (a) Install the master cylinder.
- (b) Install the P & BV with the P & BV bracket.
- (c) Install the four nuts and torque nuts.

Torque: 13 N-m (130 kgf-cm, 9 ft-lbf)



3. CONNECT TWO BRAKE TUBES

Using SST, connect the brake tubes to the master cylinder. Torque the union nuts.

SST 09751 - 36011

Torque: 15 N-m (155 kgf-cm, 11 ft-lbf)

4. CONNECT LEVEL WARNING SWITCH CONNECTOR

5. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page [BR-9](#))

6. CHECK FOR FLUID LEAKAGE

7. CHECK AND ADJUST BRAKE PEDAL

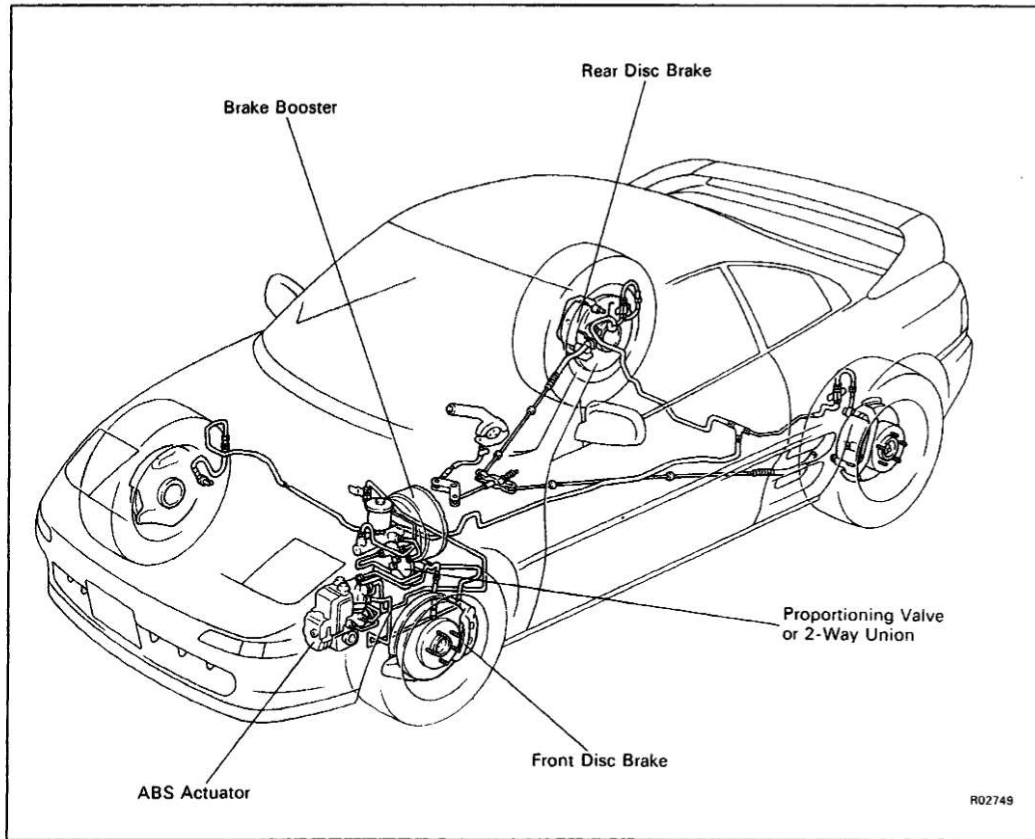
(See page [BR-7](#))

OPERATION

FOOT BRAKE

When the brake pedal is depressed, a vacuum builds up in the booster which amplifies the pedal force, pressing on the piston in the master cylinder. The piston raises the hydraulic pressure in the cylinder. This hydraulic pressure is then applied to each front brake cylinder and rear wheel cylinder (or rear brake cylinder), and acts to press the front brake pads and rear brake pads (or rear brake shoes) against the rotating rotor discs (or brake drums). The resulting friction converts the rotational energy to thermal energy, stopping the vehicle.

BRAKE-01



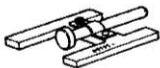
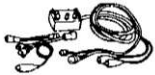
BR-4

BRAKE - PREPARATION

PREPARATION

SST (SPECIAL SERVICE TOOLS)

BROKS-01

	09023-00100 Union Nut Wrench 10 mm	
	09703-30010 Brake Shoe Return Spring Tool	
	09709-29017 LSPV Gauge Set	
	09737-00010 Brake Booster Push Rod Gauge	
	09751-36011 Brake Tube Union Nut 10 x 12 mm Wrench	
	09843-18020 Diagnosis Check Wire	
	09990-00150 ABS Actuator Checker and Sub-harness	
	09990-00163 ABS Actuator Checker Sheet "A"	
	09990-00200 ABS Actuator Checker Sub-harness "C"	
	09990-00210 ABS Actuator Checker Sub-harness "E"	

EQUIPMENT

BR08T-01

Torque wrench	
Micrometer	
Dial indicator	
Vernier calipers	

LUBRICANT

BR08U-01

Item	Capacity	Classification
Brake fluid	--	SAEJ 1703 or FMVSS No. 116 DOT 3

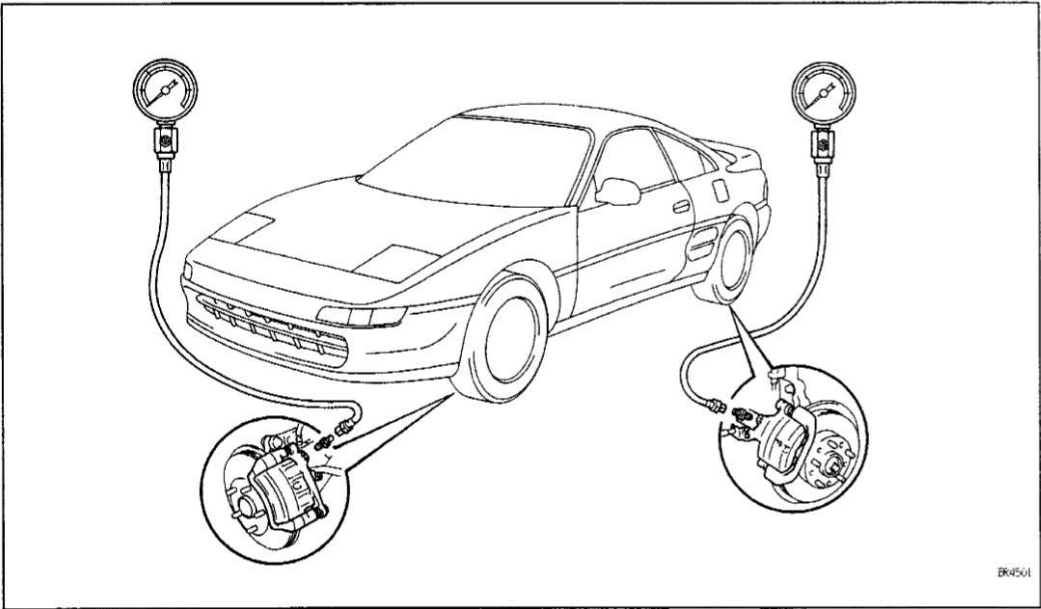
BR08U-01

PROPORTIONING AND BY-PASS VALVE (P & B VALVE)

BR070-01

FLUID PRESSURE INSPECTION

1. INSTALL LSPV GAUGE (SST) AND BLEED AIR
SST 09709-29017



BR4501

2. RAISE MASTER CYLINDER PRESSURE AND CHECK
REAR WHEEL CYLINDER PRESSURE

Specifications

	Master cylinder pressure	Rear wheel cylinder pressure
5S-FE	2,942 kPa (30 kgf/cm ² , 427 psi)	2,942 kPa (30 kgf/cm ² , 427 psi)
	7,845 kPa (80 kgf/cm ² , 1,138 psi)	5,884 kPa (60 kgf/cm ² , 853 psi)
3S-GTE	5,884 kPa (60 kgf/cm ² , 853 psi)	5,884 kPa (60 kgf/cm ² , 853 psi)
	9,807 kPa (100 kgf/cm ² , 1,422 psi)	8,238 kPa (84 kgf/cm ² , 1,195 psi)

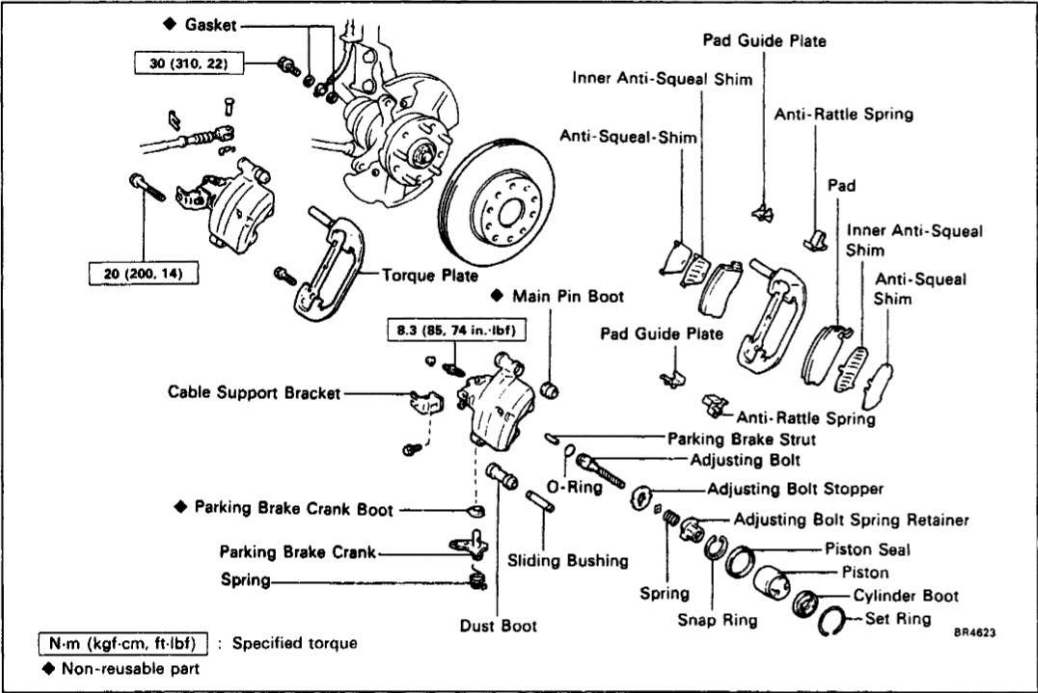
W01001

If the rear wheel cylinder pressure is incorrect, replace the P & B valve assembly.

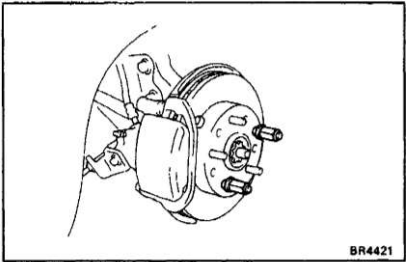
3. BLEED BRAKE SYSTEM
4. CHECK FOR FLUID LEAKAGE

REAR BRAKE
COMPONENTS

BR06G-01



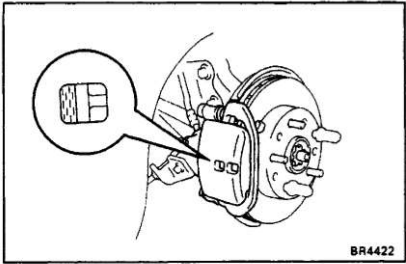
BR06H-01



BRAKE PADS REPLACEMENT

1. REMOVE REAR WHEEL

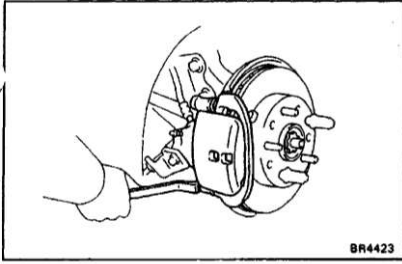
Remove the wheel and temporarily fasten the rotor disc with the hub nuts.



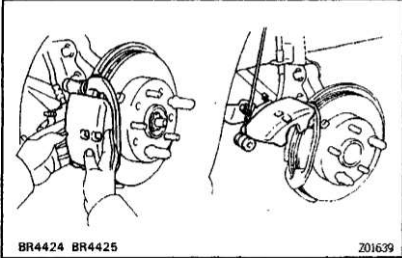
2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the cylinder inspection hole and replace the pads if it is not within specification.

Minimum thickness:
1.0 mm (0.039 in.)

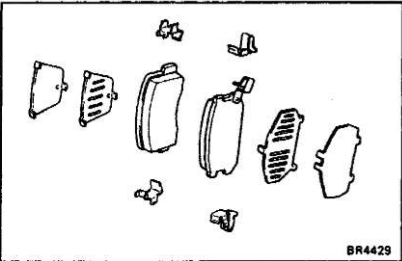
**3. LIFT UP CYLINDER**

- (a) Remove the installation bolt from the torque plate.

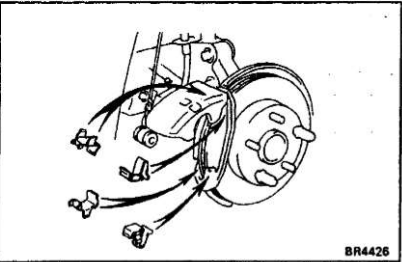


- (b) Lift up the brake cylinder and suspend the cylinder with string.

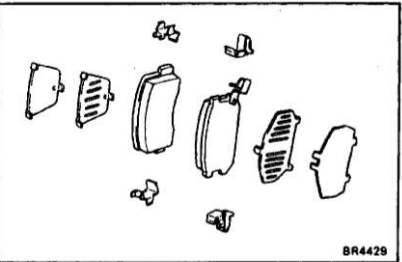
HINT: Do not disconnect the flexible hose from the brake cylinder.

**4. REMOVE FOLLOWING PARTS:**

- (a) Two brake pads
 (b) Four anti-squeal shims
 (c) Two anti-rattle springs
 (d) Two pad guide plates

5. CHECK ROTOR DISC THICKNESS AND RUNOUT
(See page [BR-41](#))**6. INSTALL PAD SUPPORT PLATES**

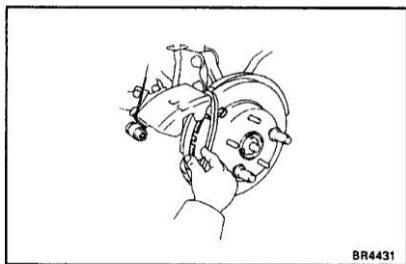
Install the four pad support plates.

**7. INSTALL NEW PADS**

- (a) Apply disc brake to both sides of the two inner anti-squeal shims.
 (b) Install the two anti-squeal shims to the each pad.

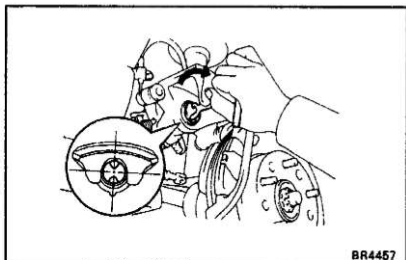
BR-36

BRAKE - REAR BRAKE



(c) Install the two pads.

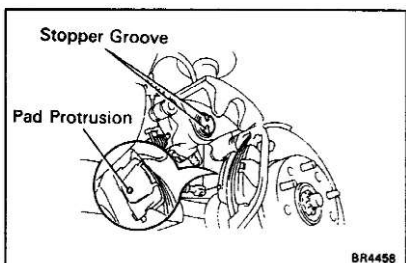
NOTICE: There should be no oil grease adhering to the friction surfaces of the pads or the rotor disc.



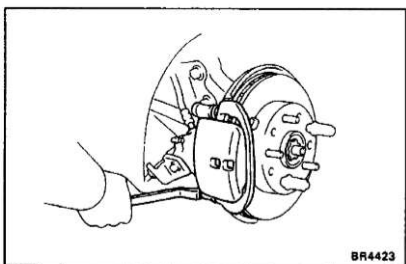
8. INSTALL CYLINDER

(a) Using SST, slowly turn piston clockwise until the piston turns freely, then align the cylinder protrusion and piston stopper groove.

SST 09719-14020 (09718-00020)



(b) Fit the pad protrusion into the piston stopper groove and install the cylinder.



(c) Install and torque the installation bolt.

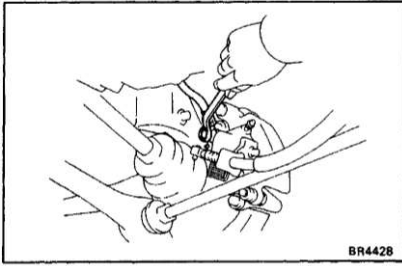
Torque: 20 N·m (200 kgf-cm, 14 ft-lbf)

9. INSTALL REAR WHEEL

10. CHECK THAT FLUID LEVEL IS MAX LINE

11. ADJUST PAD CLEARANCE

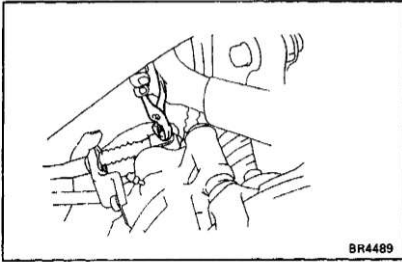
Depress the brake pedal for several times.



CYLINDER REMOVAL

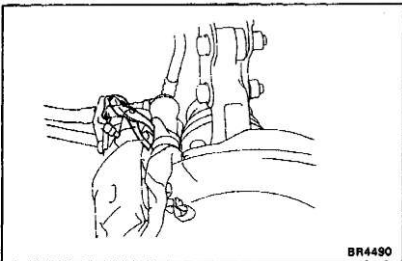
1. DISCONNECT FLEXIBLE HOSE

- (a) Remove the union bolt and two gaskets, and disconnect the flexible hose.
- (b) Use a container to catch the brake fluid.

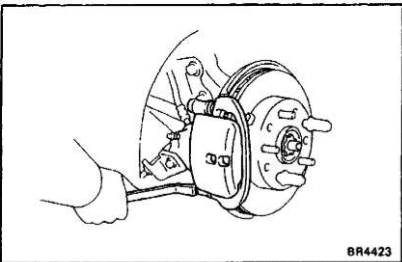


2. DISCONNECT PARKING BRAKE CABLE

- (a) Remove the pin clip.
- (b) Pull out the hole pin while pushing the parking brake crank.

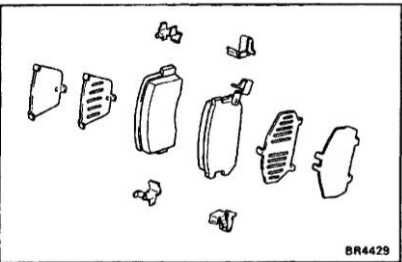


- (c) Remove the clip.
- (d) Remove the parking brake cable from the cable support bracket.



3. REMOVE CYLINDER

Remove the installation bolt, and remove the brake cylinder.



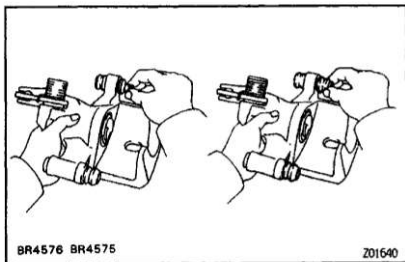
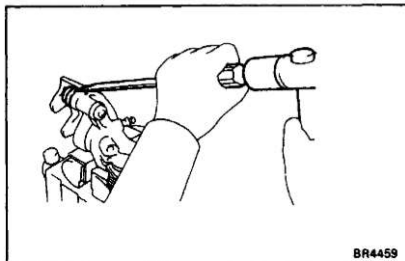
4. REMOVE FOLLOWING PARTS:

- (a) Two brake pads
- (b) Four anti-squeal shims
- (c) Two anti-squeal springs
- (d) Two pad guide plates

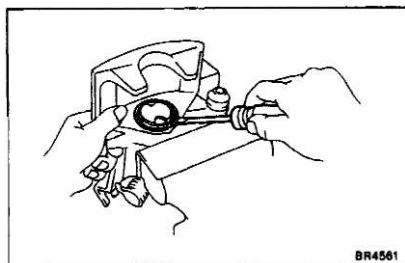
BR-38

BRAKE - REAR BRAKE

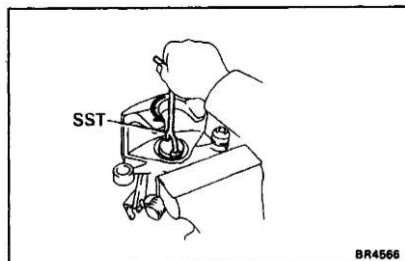
BRAKE - 01

**CYLINDER DISASSEMBLY****1. REMOVE DUST BOOT AND SLIDING BUSHING****2. REMOVE MAIN PIN BOOT**

Using a chisel and hammer, tap out the dust boots.

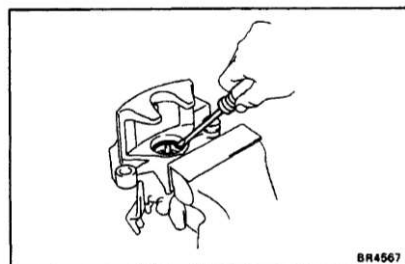
**3. REMOVE CYLINDER BOOT SET RING AND CYLINDER BOOT**

Using a screwdriver, remove the cylinder boot set ring and cylinder boot.

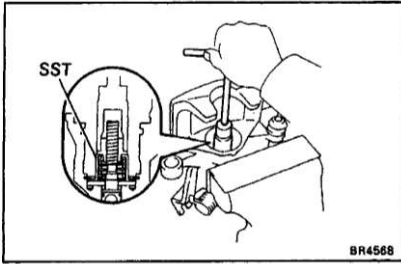
**4. REMOVE PISTON FROM CYLINDER**

Using SST, turn the piston counterclockwise and remove it.

SST 09719-14020

**5. REMOVE PISTON SEAL FROM CYLINDER**

Using a screwdriver, remove the piston seal.

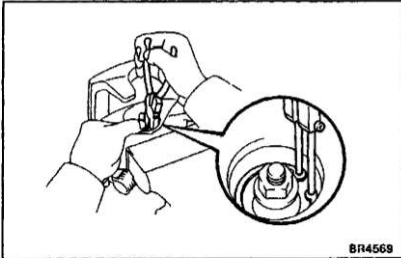
**6. REMOVE ADJUSTING BOLT**

- (a) Set SST onto the adjusting bolt, and lightly tighten it with a 14 mm socket.
SST 09 756 - 00010

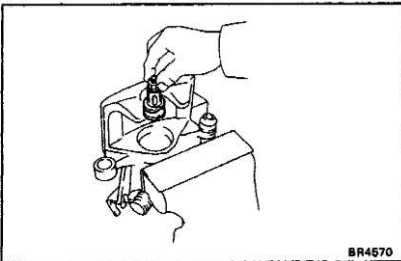
CAUTION:

- To insure safety, always use SST as there is a possibility of the spring flying out, causing injury or damaging to the interior surface of the cylinder.
- Be careful not to tighten the SST too tightly as this may damage the spring retainer.

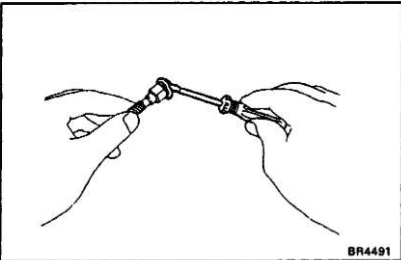
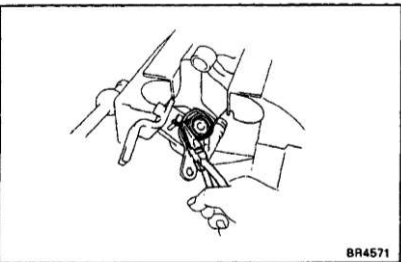
- (b) Using snap ring pliers, remove the snap ring from the cylinder.



- (c) Remove the parking brake strut, spring retainer, spring, spring plate and stopper together with the adjusting bolt from the cylinder.

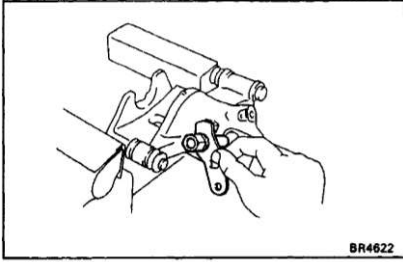
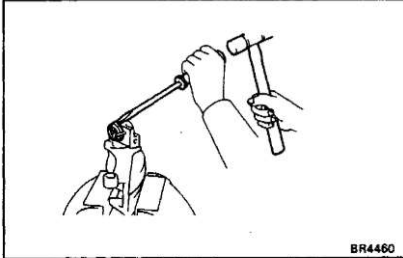
**7. DISASSEMBLE ADJUSTING BOLT**

- (a) Remove SST.
SST 09576 - 00010
- (b) Remove the spring retainer, spring, spring plate and stopper from the adjusting bolt.
- (c) Remove the O-ring from the adjusting bolt.

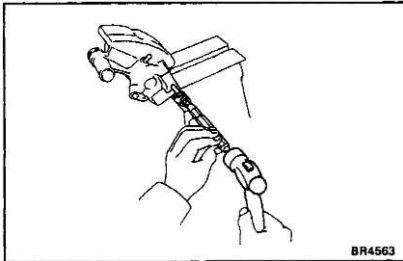
**8. REMOVE TORSION SPRING FROM PARKING BRAKE CRANK**

BR-40

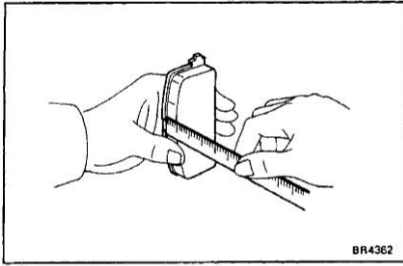
BRAKE - REAR BRAKE

**9. REMOVE PARKING BRAKE CRANK FROM CYLINDER****10. REMOVE PARKING BRAKE CRANK BOOT**

Using a chisel and hammer, tap out the parking brake crank boot.

11. REMOVE CABLE SUPPORT BRACKET**12. REMOVE STOPPER PIN**

Using a pin punch, tap out the pin.



REAR BRAKE COMPONENTS INSPECTION

1. MEASURE PAD LINING THICKNESS

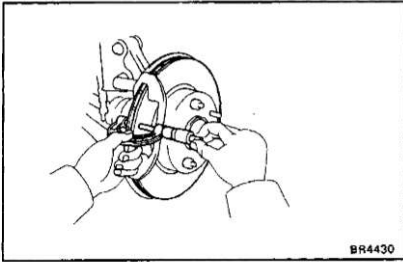
Standard thickness:

10.0 mm (0.394 in.)

Minimum thickness:

1.0 mm (0.039 in.)

Replace the pad if the thickness is less than the minimum or if it shows sign of uneven wear.



2. MEASURE ROTOR DISC THICKNESS

(3S-GTE Engine)

Standard thickness:

22.0 mm (0.866 in.)

Minimum thickness:

21.0 mm (0.827 in.)

(5S-FE Engine)

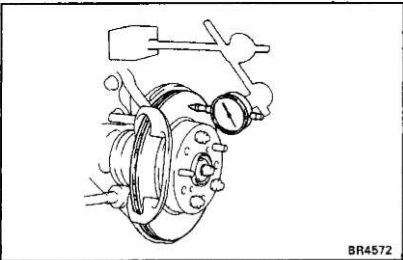
Standard thickness:

16.0 mm (0.630 in.)

Minimum thickness:

15.0 mm (0.591 in.)

If the disc is scored or worn, or if thickness is less than minimum, repair or replace the disc.



3. MEASURE ROTOR DISC RUNOUT

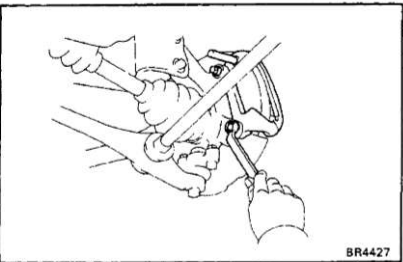
HINT: Before measuring the runout, confirm that the rear hub bearing play is within specification.

Measure the rotor disc runout at 10 mm (0.39 in.) from the outer edge of the rotor disc.

Maximum disc runout:

0.10 mm (0.0039 in.)

If the runout is greater than the maximum, replace the disc.



4. IF NECESSARY, REPLACE ROTOR DISC

- (a) Remove the disc brake cylinder mounting from the dust cover.
- (b) Remove the hub nuts and rotor disc.
- (c) Install a new rotor disc and temporarily fasten the disc with hub nuts.
- (d) Install the torque plate to the rear axle carrier.

Torque: 59 N-m (600 kgf-cm, 43 ft-lbf)

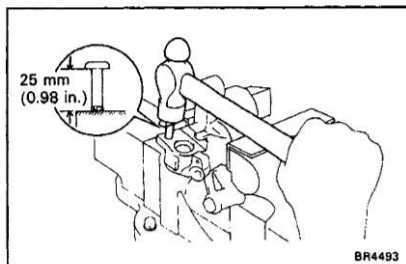
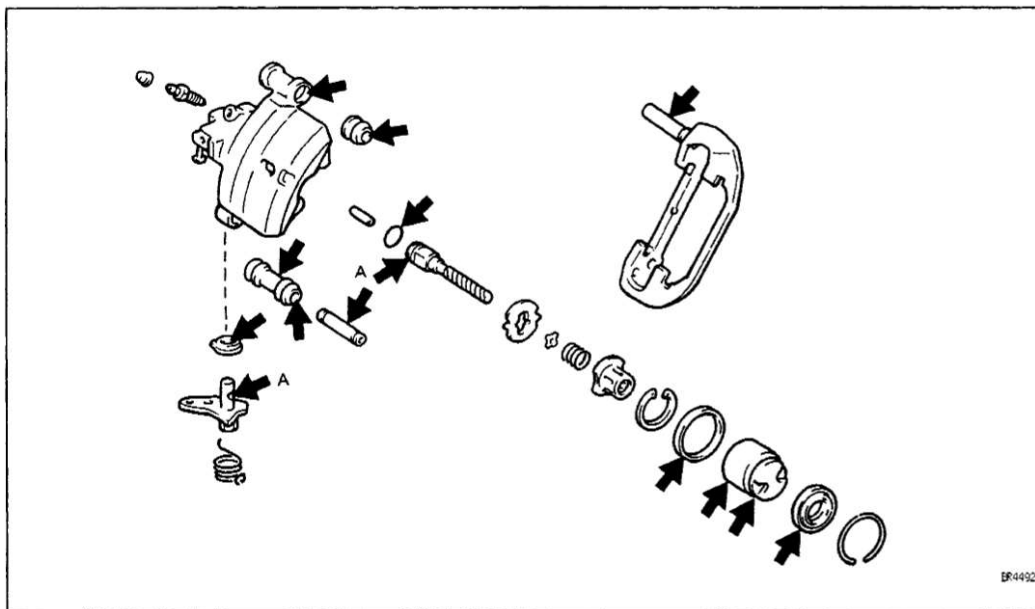
BR-42

BRAKE - REAR BRAKE

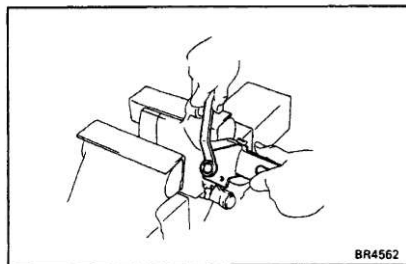
BR08M-01

CYLINDER ASSEMBLY**1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED BY ARROWS**

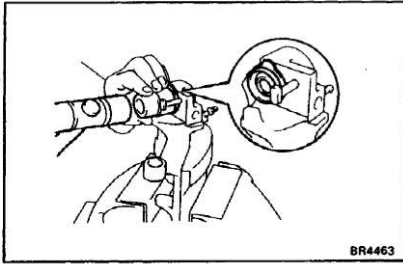
HINT: Pack the lithium soap base glycol grease into areas marked "A".

**2. INSTALL STOPPER PIN**

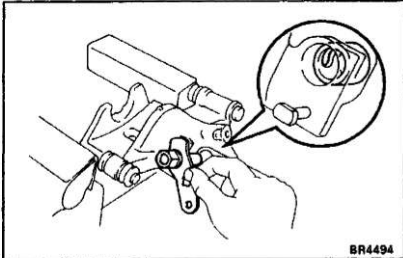
Tap in the pin to the brake cylinder until the stopper pin extends 25 mm (0.98 in.).

**3. INSTALL CABLE SUPPORT BRACKET**

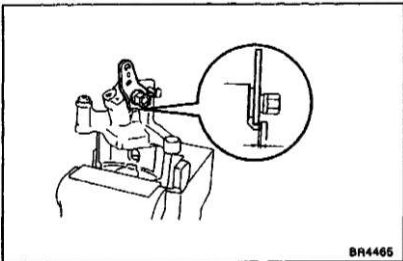
Torque: 47 N-m (475 kgf-cm, 34 ft-lbf)

**4. INSTALL PARKING BRAKE CRANK BOOT**

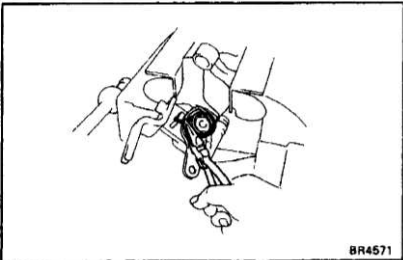
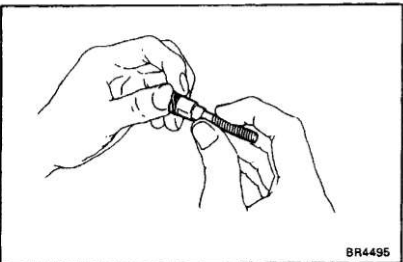
- (a) Using a 24 mm socket wrench and hammer, tap in new parking brake crank boot shown in the figure.
- (b) Confirm that the metal plate portion of the parking brake crank boot fits snugly in the cylinder.

**5. INSTALL PARKING BRAKE CRANK**

- (a) Check that the needle roller bearing is not covering the cylinder hole.
- (b) Install the parking brake crank in cylinder.

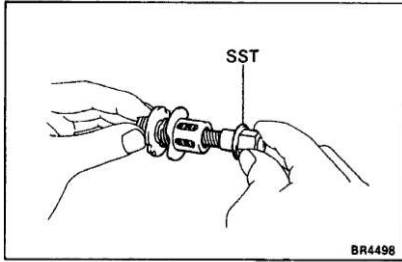


- (c) Check that there is clearance between the parking brake crank and cylinder.

**6. INSTALL TORSION SPRING****7. INSTALL O-RING TO ADJUSTING BOLT**

BR-44

BRAKE - REAR BRAKE

**8. INSTALL ADJUSTING BOLT SUB ASSEMBLY**

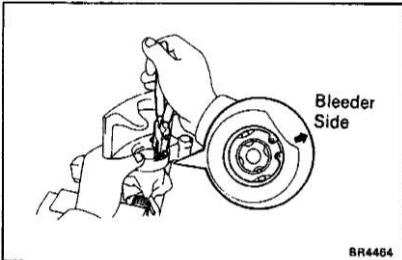
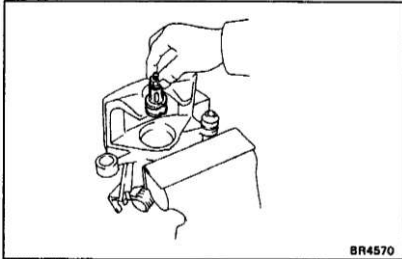
- (a) Assemble the parking brake stopper, spring plate, spring, spring retainer and parking brake strut to the adjusting bolt, and using SST, fully tighten them down by hand.

SST 09756 - 00010

HINT:

- Position the inscribed surface of the stopper upward.
- Align the notches of the spring retainer and stopper.

- (b) Install the adjusting bolt sub-assembly into the cylinder.

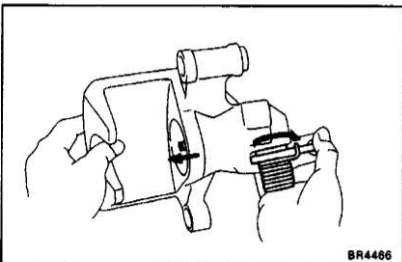


- (e) Using snap ring pliers, install the snap ring.

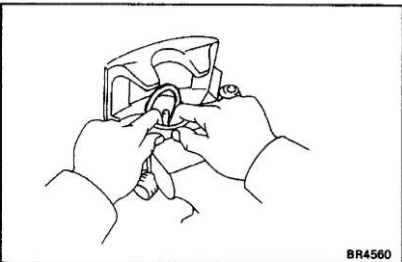
HINT: Face the snap ring opening toward the bleeder side.

- (d) Remove the SST.
SST 09756-00010

- (e) Firmly pull up the adjusting bolt by hand and insure that it does not move.

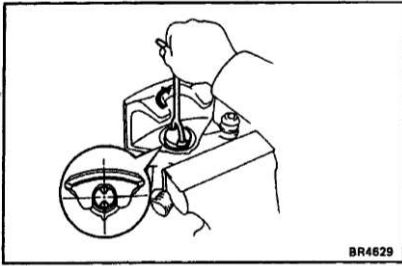
**9. OPERATIONAL CHECK**

Move the parking brake crank by hand and insure that the adjusting bolt moves smoothly.

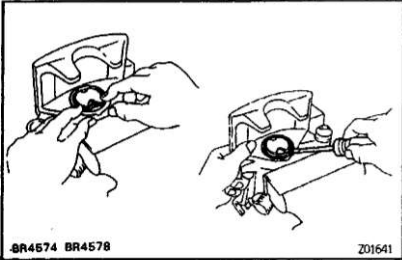
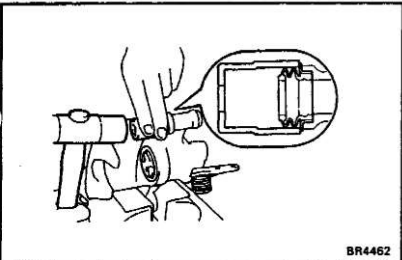
**10. INSTALL PISTON SEAL IN CYLINDER**

BRAKE - REAR BRAKE

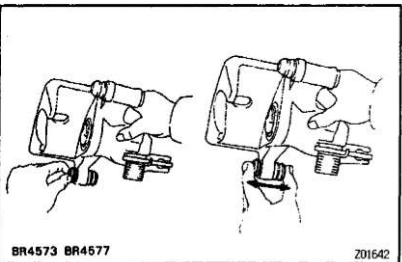
BR-45

**11. INSTALL PISTON IN CYLINDER**

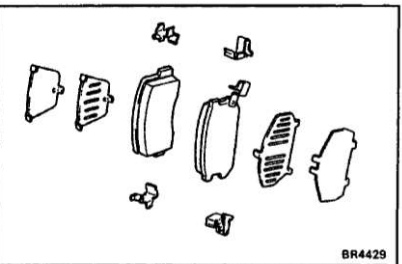
Using SST, slowly turn the piston clockwise until the piston turns freely, then align the cylinder protrusion and piston stopper groove.

**12. INSTALL CYLINDER BOOT AND SET RING IN CYLINDER****13. INSTALL MAIN PIN BOOT**

- (a) Using a 19 mm socket wrench and hammer, tap in new main pin boot into the cylinder.
- (b) Confirm that the metal plate portion of the main pin boot fits snugly in the cylinder.

**14. INSTALL DUST BOOT AND SLIDING BUSHING**

- (a) Install the dust boot.
- (b) Install the bushing into the boot, with the flange facing inside.

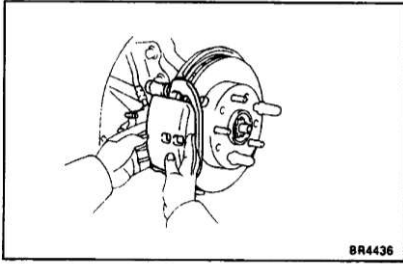
**CYLINDER INSTALLATION****1. INSTALL FOLLOWING PARTS:**

- (a) Two pad guide plats
- (b) Two anti-rattle springs
- (c) Four anti-squeal shims
- (d) Two brake pads

BROEN - 01

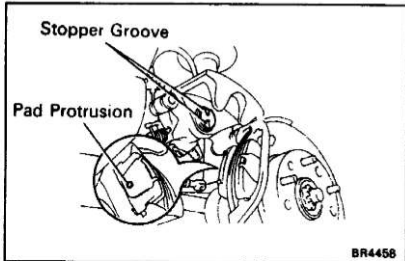
BR-46

BRAKE - REAR BRAKE

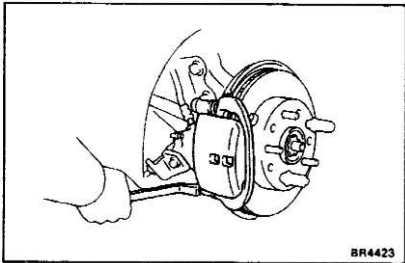
**2. INSTALL CYLINDER**

(a) Install the cylinder onto the main pin.

HINT: Make sure that the boot end is installed into the groove of the main pin.

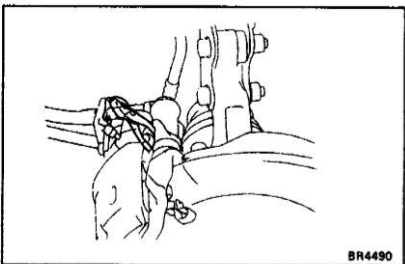


(b) Fit the pad protrusion into the piston stopper groove, and install the cylinder.

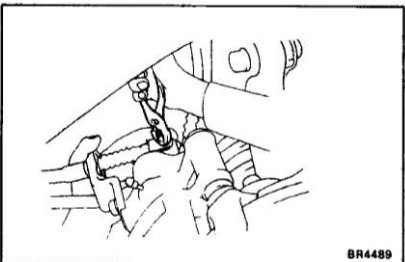


(c) Install the torque the installation bolt.

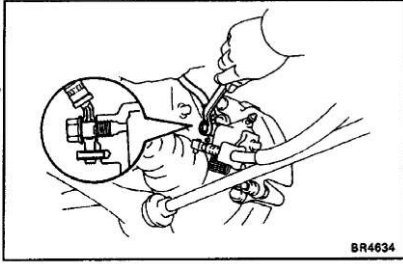
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

**3. CONNECT PARKING BRAKE CABLE**

(a) Install the parking brake cable to the cable support bracket and install the retainer.



(b) Install the hole pin while pushing the parking brake lever, and install the clip.

**4. CONNECT BRAKE HOSE**

Install the flexible hose on the brake cylinder with two new gaskets.

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

HINT: Insert the flexible hose lock securely in the lock hole in the brake cylinder.

5. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

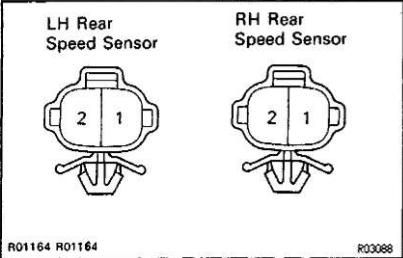
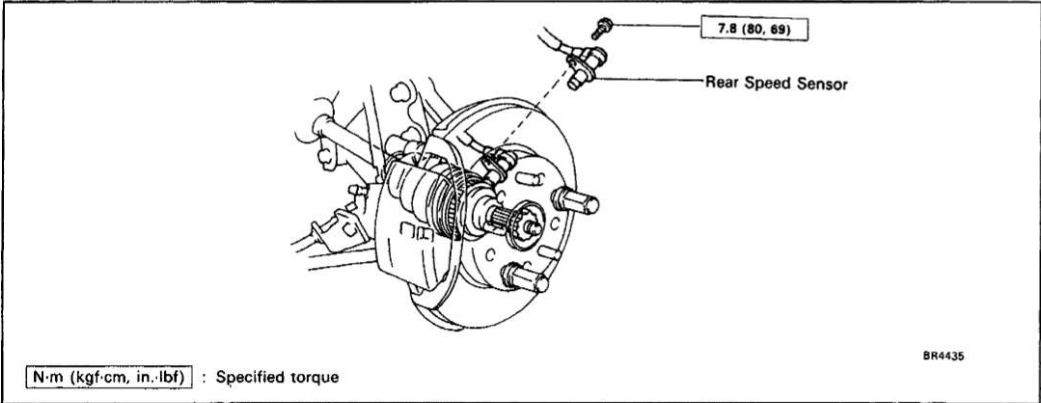
(See page [BR-9](#))

6. CHECK FOR FLUID LEAKAGE**7. ADJUST REAR BRAKE**

Depress the brake pedal several times and adjust the rear brake automatically.

REAR SPEED SENSOR
COMPONENTS

BR078-01

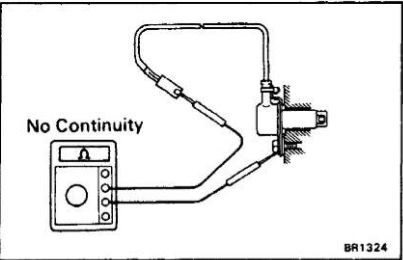


REAR SPEED SENSOR INSPECTION
1. INSPECT SPEED SENSOR

- (a) Disconnect the speed sensor connector.
- (b) Measure the resistance between terminals.

Resistance: 0.9-1.5 kΩ

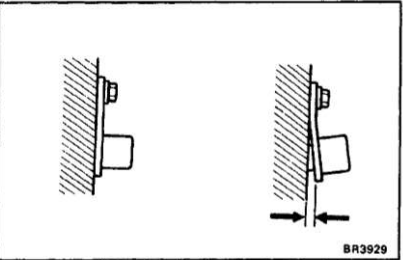
If resistance value is not as specified, replace the sensor.



- (c) Check that there is no continuity between each terminal and sensor body.
If there is continuity, replace the sensor.
- (d) Connect the speed sensor connector.

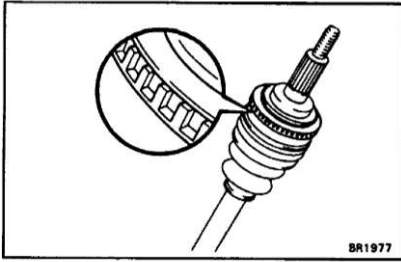
2. INSPECT SENSOR INSTALLATION

- (a) Check that the sensor installation bolt is tightened properly. If not, tighten the bolt.
Torque: 7.8 N-m (80 kgf-cm, 69 in.-lbf)
- (b) Check that there is no clearance between the sensor and rear axle carrier as shown.
If there is clearance, replace the sensor.



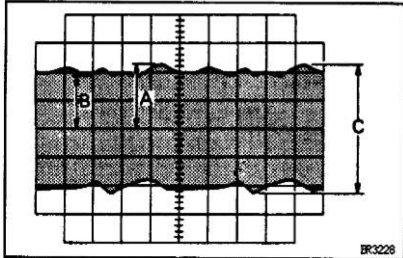
BR-72

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

**3. VISUALLY INSPECT SENSOR ROTOR SERRATIONS**

- (a) Remove the drive shaft.
(See page SA-55)
- (b) Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.
- (c) Install the drive shaft.
(See page SA-71)

NOTICE: To prevent damage to the serrations, do not strike the drive shaft.



REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

INSPECT REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE

- (a) Connect an oscilloscope to the speed sensor connector.
- (b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.
- (c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.
- (d) Check that B is 5096 or more of A.
If not as specified, replace the rear axle hub.

SERVICE SPECIFICATIONS

BR07A-01

SERVICE DATA

Brake pedal height (from asphalt sheet)		177 – 187 mm (6.968 – 7.362 in.)
Brake pedal freeplay		3 – 5 mm (0.12 – 0.20 in.)
Brake pedal reserve distance at 490 N (50 kgf, 110.2 lbf)		More than 117 mm (4.61 in.)
Brake booster push rod to piston clearance (W/SST)		0 mm (0 in.)
Front brake pad thickness	STD	10.0mm (0.39 in.)
Front brake pad thickness	Limit	1.0mm (0.039 in.)
Front brake disc thickness	STD	30.0mm (1.181 in.)
Front brake disc thickness	Limit	29.0 mm (1.142 in.)
Front brake disc thickness	STD	25.0mm (0.984 in.)
Front brake disc thickness	Limit	24.0 mm (0.945 in.)
Front brake disc thickness	Limit	0.07 mm (0.0028 in.)
Rear brake pad thickness	STD	10.0 mm (0.394 in.)
Rear brake pad thickness	Limit	1.0 mm (0.039 in.)
Rear brake disc thickness	STD	22.0 mm (0.866 in.)
Rear brake disc thickness	Limit	21.0 mm (0.828 in.)
Rear brake disc thickness	STD	16.0 mm (0.630 in.)
Rear brake disc thickness	Limit	15.0 mm (0.591 in.)
Rear brake disc runout	Limit	0.10 mm (0.0039 in.)
Parking brake lever travel at 196 N (20 kgf, 44.1 lbf)		5 – 8 clicks

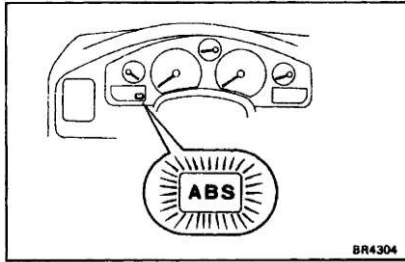
TORQUE SPECIFICATIONS

BR07B-01

Part tightened	N-m	kgf-cm	ft-lbf
Master cylinder x Piston stopper bolt	10	100	7
Master cylinder x Reservoir	1.7	17.5	15.2 in.-lbf
Master cylinder x Brake booster	13	130	9
Brake tube union nut	15	155	11
Brake booster clevis lock nut	25	260	19
Brake booster x Pedal bracket	13	130	9
Front disc brake cylinder installation bolt	34	350	25
Bleeder plug	8.3	85	74 in.-lbf
Front disc brake torque plate x Steering knuckle	88	900	65
Front disk brake cylinder x Flexible hose	30	310	22
Rear drum brake wheel cylinder x Backing plate	10	100	7
Parking brake cable bracket x Backing plate	7.8	80	69 in.-lbf
Rear disc brake cylinder installation bolt	20	200	14
Rear disc brake torque plate x Dust cover	59	600	43
Rear disc brake cylinder x Flexible hose	30	310	22
Rear disc brake torque plate x Rear axle carrier	47	475	45
Parking brake pedal bracket x Body	61	620	45
ABS actuator bracket x Body	19	195	14
Front speed sensor installation bolt	7.8	80	69 in.-lbf
Rear speed sensor installation bolt	7.8	80	69 in.-lbf

BR-62

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)



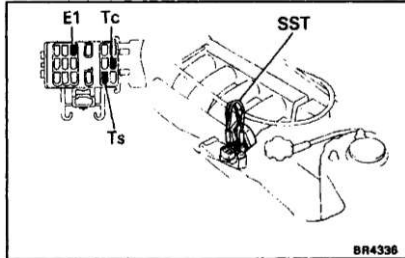
BR4304

SPEED SENSOR DIAGNOSIS SYSTEM

1. SPEED SENSOR SIGNAL CHECK

BAG70-01

(a) Turn the ignition switch to OFF.

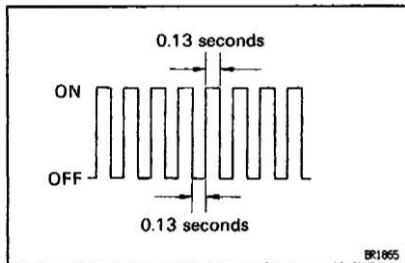


BR4336

(b) Using SST, connect terminals Ts and E1 of data link connector.

SST 09843-18020

(c) Start the engine.



BR1865

(d) Check that the ABS warning light blinks.

HINT: If the ABS warning light does not blink, inspect the ABS warning light circuit.

(e) Drive vehicle straight forward.

HINT: Drive vehicle faster than 80 km/h (50 mph) for several seconds.

(f) Stop the vehicle.

(g) Using SST, connect terminals Tc and E1 of data link connector.

SST 09843-18020

(h) Read the number of blinks of the ABS warning light.

HINT: See the list of diagnosis codes shown on the next page.

If every sensor is normal, a normal code is output. (A) cycle of 0.25 sec. on and 0.25 sec. OFF is repeated).

If two or more malfunctions are indicated at the same time, the lowest numbered code will be displayed first.

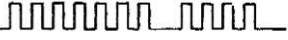
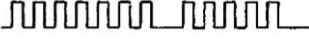
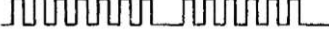
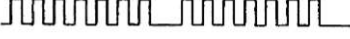
(i) After performing the check, disconnect terminals Ts and E1, Tc and E1 of data link connector, and ignition switch turned off.

DIAGNOSTIC CODE

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

BR-63

NOTE - 01

Code No.	Light Pattern	Diagnosis	Malfunctioning Part
	ON OFF 	All speed sensors and sensor rotors are normal	
71		Low voltage of front right speed sensor signal	• Front right speed sensor • Sensor installation
72		Low voltage of front left speed sensor signal	• Front left speed sensor • Sensor installation
73		Low voltage of rear right speed sensor signal	• Rear right speed sensor • Sensor installation
74		Low voltage of rear left speed sensor signal	• Rear left speed sensor • Sensor installation
75		Abnormal change of front right speed sensor signal	• Front right sensor rotor
76		Abnormal change of front left speed sensor signal	• Front left sensor rotor
77		Abnormal change of rear right speed sensor signal	• Rear right sensor rotor
78		Abnormal change of rear left speed sensor signal	• Rear left sensor rotor

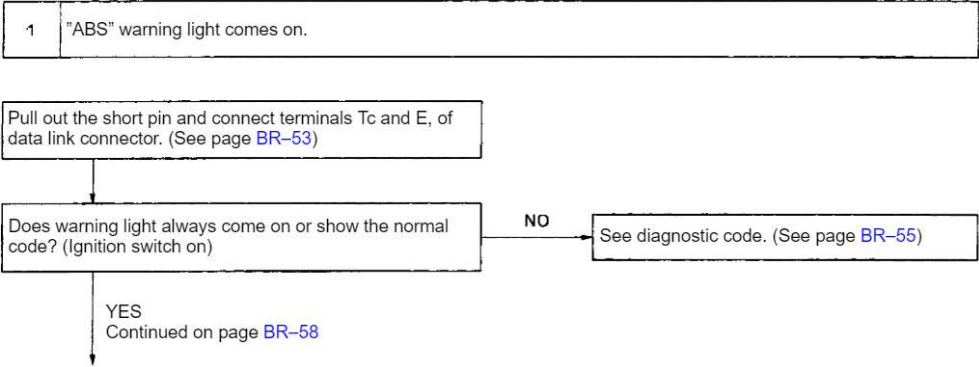
10-11-2000

TROUBLESHOOTING

BR07G-01

Problem		No.
"A6S" warning light	Always comes on after ignition switch is turned on.	1
	Does not come on for 3 seconds after ignition switch on.	2
	Comes on and off.	3
	Comes on while running.	1
Brake condition*	Brakes pull.	4
	Braking inefficient.	4
	ABS operates at ordinary braking.	4
	ABS operates just before stopping at ordinary braking.	4
	Brake pedal pulsates abnormally while ABS is operating.	4
	Skidding noise occurs while ABS operating. (ABS operates inefficiently)	5

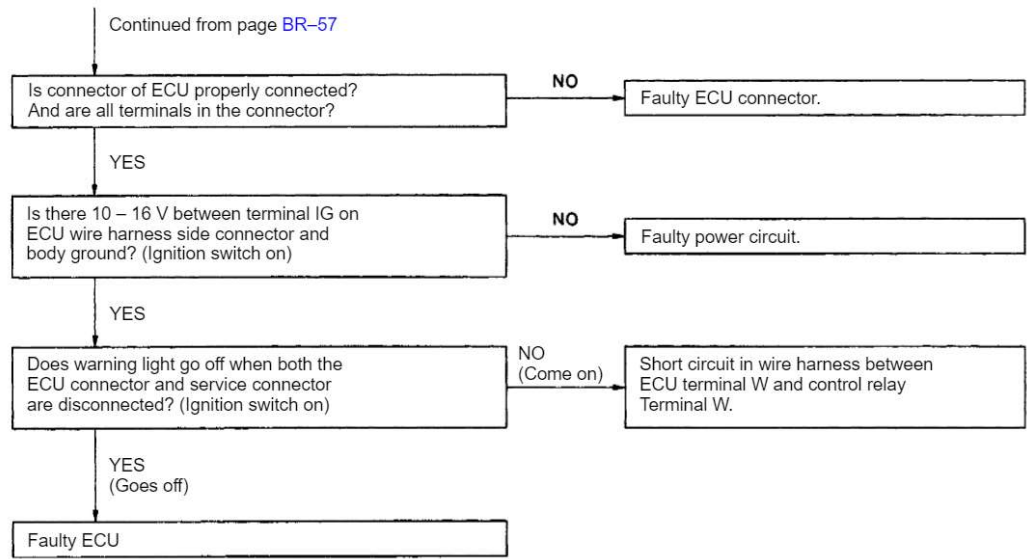
V00402



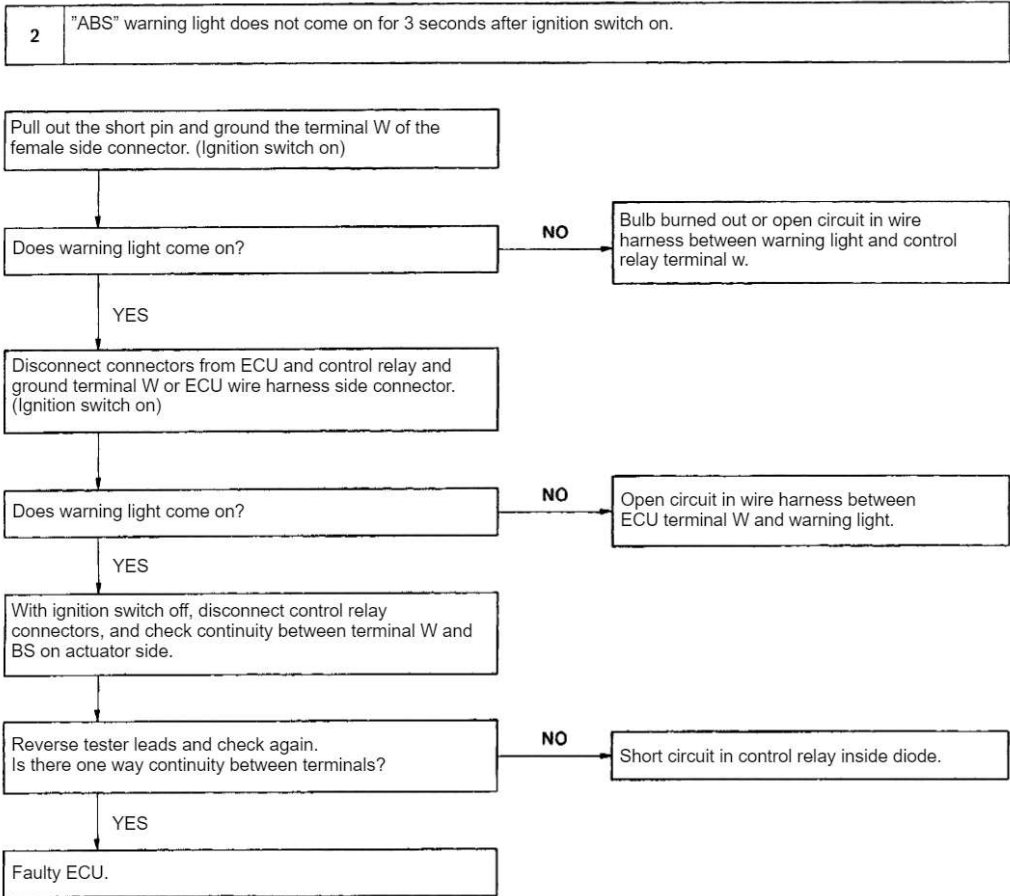
V00403

BR-58

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)



V00406



HINT: If the diode is short-circuited, a malfunction at ECU terminal W will occur. When inspecting the terminal, connect the ECU connector, and disconnect actuator connectors and data link connector. Then turn the ignition switch on, and check that the warning light goes on. If it does, the ECU terminal is OK.

V00407

BR-60

BRAKE - ANTI-LOCK BRAKE SYSTEM (ABS)

3 "ABS" warning light comes on and off.

- Check for short circuit in wire harness between terminal Tc and E₁ of check connector.

4

- Brakes pull.
- Braking inefficient.
- ABS operates at ordinary braking.
- 1 ABS operates just before stopping at ordinary braking.
- Brake pedal pulsates abnormally while ABS is operating.

Pull out the short pin and connect terminals Tc and E₁ of check connector. (See page BR-53)

Does warning light show the diagnostic normal code? (Ignition switch on)

NO

See diagnostic code. (See page BR-55)

YES

Are each speed sensors installed in place?
And are each installation bolts tightened securely?

NO

Speed sensor installation faulty.

YES

Try speed sensor diagnosis system. Is sensor signal level OK? (See page BR-62)

NO

Inspect speed sensor, and replace if necessary.

YES

Try speed sensor diagnosis system. Is sensor signal change OK? (See page BR-62)

NO

Inspect sensor rotor, and replace if necessary.

YES

Disconnect connector from ECU, inspect continuity between each speed sensor terminals on wire harness side. (See page BR-66)

Does any abnormal change occur in continuity when the connectors or wire harness of the speed sensor and intermediate connectors are twisted or bent?

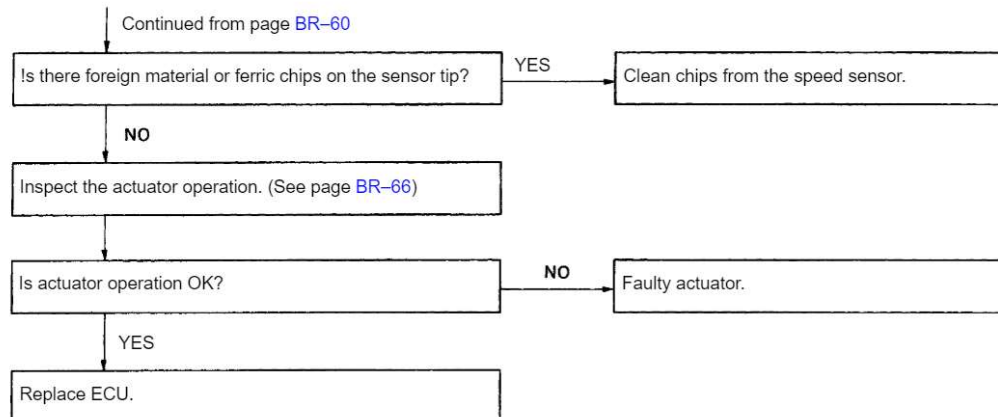
YES
(Abnormal change)

Faulty wire harness.

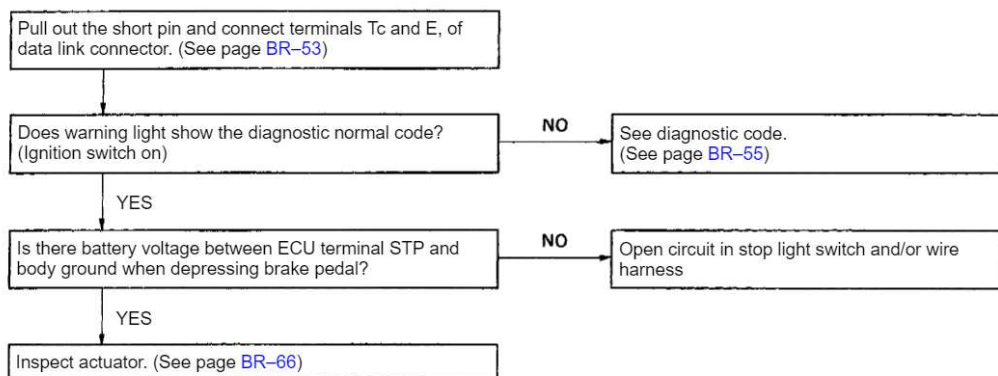
NO

(No change)
Continued on page BR-61

W00436



5 Anti-lock brake system operations inefficiently.



V00409

TROUBLESHOOTING

You will find the troubles easier using the table well shown below. In this table, each number shows the priority of causes in troubles. Check each part in order. If necessary, replace these parts.

See page										
Part Name (Trouble)										
	Brake system (Fluid leaks)									
	Brake system (Air in)									
	Brake pad or lining (Worn)									
	Piston seal (Worn or damaged)									
	Brake pedal (Freeplay minimal)									
	Master cylinder (Faulty)									
	Rear brake (Shoe clearance out of adjustment)									
	Parking brake (Lever travel out of adjustment)									
	Parking brake wire (Sticking)									
	Booster push rod (Out of adjustment)									
	Anchor or return spring (Faulty)									
	Pad or lining (Cracked or distorted)									
	Piston (Stuck)									
	Pad or lining (Oily)									
	Piston Frozen									
	Booster system (Vacuum leaks)									
	Pad support plate (Loose)									
	Installation bolt (Loose)									
	Sliding pin (Worn)									
	Rotor (Scored)									
	Pad or lining (Dirty)									
	Pad or lining (Hardened)									
	Anti-squeal shim (Damaged)									
	Hold-down spring (Damaged)									
Low pedal or spongy pedal	1	2	3	5	4	6				
Brake drag				1	11	4	2	3	9	8
Brake pull									5	1
Hard pedal but brake inefficient	1	2	3		5		9	4	6	10
Noise from brakes							8	1		

00000007