BRAKE SYSTEM

GENERAL DESCRIPTION

BR03E–01

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

BR03F–01

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.

GENERAL DESCRIPTION

BR03E–01

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2. **It is very important to keep parts and the area clean when repairing the brake system.**

DESCRIPTION

BR03F–01

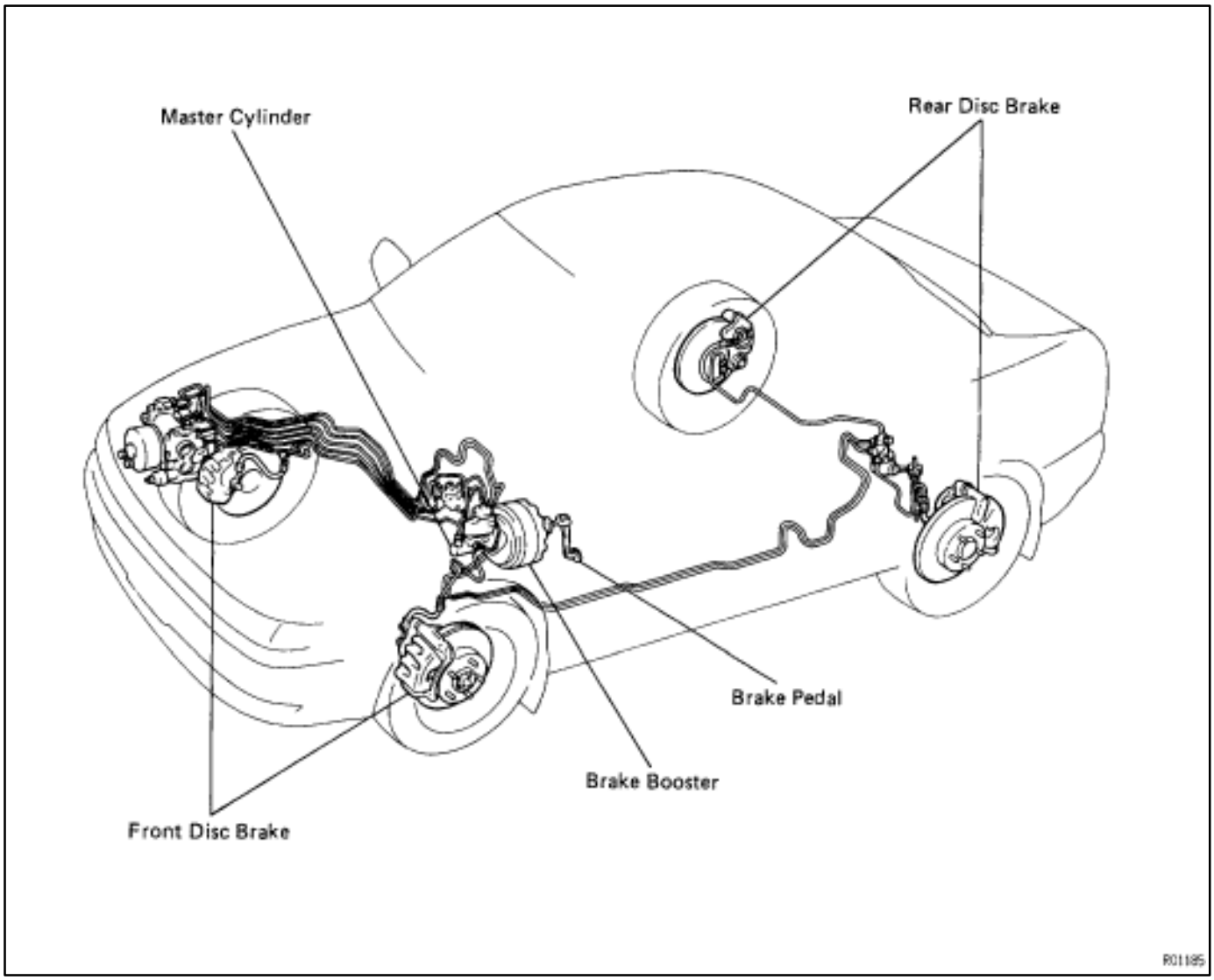
The service brakes consist of a foot brake which changes rotational energy to thermal energy to stop the vehicle while it is being driven and a parking brake to keep the vehicle from moving while it is parked.

OPERATION

BR03G–01

FOOT BRAKE

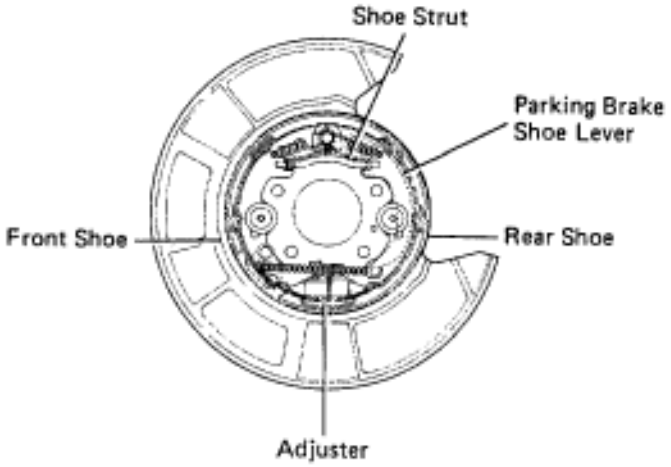
When the brake pedal is depressed, a vacuum builds up in the booster which amplifies the pedal force, pressing on the piston in the master cylinder. The piston raises the hydraulic pressure in the cylinder. This hydraulic pressure is then applied to each respective brake cylinder, and acts to press the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



PARKING BRAKE

BR03H–01

When the parking brake lever is pulled up, the parking brake shoe lever is pulled via the parking brake wire. This causes the shoe strut to push the front shoe, which expands and is pressed against the rotor disc. If the parking brake lever continues to be pulled up, the contact point of the parking brake shoe lever and shoe strut then becomes the fulcrum so that the parking brake shoe lever causes the rear shoe to expand. This results in the rotor disc being locked by the front shoe and rear shoe.



V00422

PREPARATION

BR03J–01

SST(SPECIAL SERVICE TOOLS)

	09023–00100	Union Nut Wrench 10 mm	
	09709–29017	LSPV Gauge Set	
	09718–00010	Shoe Hold Down Spring Driver	
	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 (Anti–lock Brake System) 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

BR03K–01

Torque wrench	
Micrometer	Brake disc rotor
Dial indicator	Brake disc rotor
Vernier calipers	Brake disc rotor
Voltmeter	
Ohmmeter	

LUBRICANT

BR03L–01

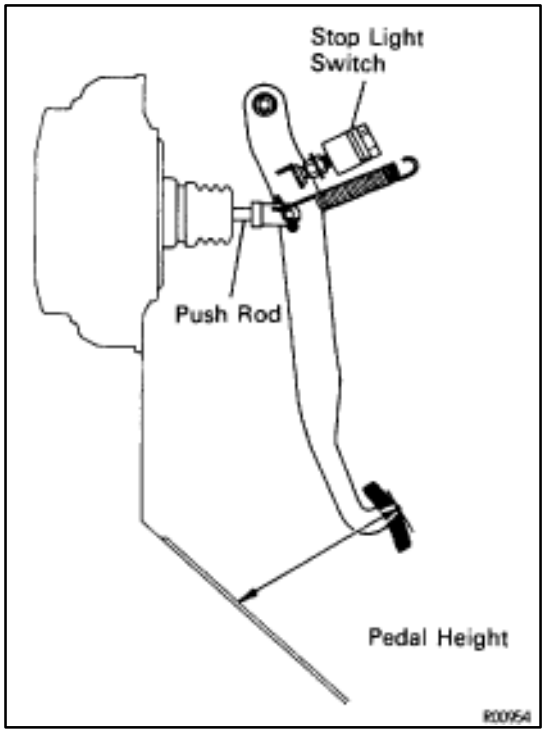
Item	Capacity	Classification
Brake fluid	–	SAEJ1703 or FMVSS No. 116, DOT 3

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.

BR03M–01

See page	–	–	BR–19, 27	BR–19, 27	BR–8	BR–12	BR–41	BR–11	–	BR–18	BR–36	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–19, 27	BR–36
Part Name / Trouble	Brake system (Fluid leaks)	Brake system (Air in)	Brake pads (Worn)	Piston seals (Worn or damaged)	Brake pedal (Freeplay minimal)	Master cylinder (Faulty)	Parking brake (Shoe clearance out of adjustment)	Parking brake (Lever travel out of adjustment)	Parking brake wire (Sticking)	Booster push rod (Out of adjustment)	Tension or return spring (Faulty)	Pad (Cracked or distorted)	Piston (Stuck)	Pad (Oily)	Piston (Frozen)	Booster system (Vacuum leaks)	Pad support plate (Loose)	Installation bolt (Loose)	Sliding pin (Worn)	Rotor (Scored)	Pad (Dirty)	Pad (Hardened)	Anti-squeal shim (Damaged)	Hold-down spring (Damaged)
Low pedal or spongy pedal	1	2		3		4				5														
Brake drag					1	11	4	2	3	9	8	5	6		7	10								
Brake pull												5	1	2	3					4				
Hard pedal but brake inefficient	1	2	3							8		4		5		9				7		6		
Noise from brakes											8	1					4	2	5	3	6	7	9	10



CHECK AND ADJUSTMENT

BR03N–02

BRAKE PEDAL CHECK AND ADJUSTMENT

1. CHECK THAT PEDAL HEIGHT IS CORRECT

Pedal height from asphalt sheet:

147.5–157.5 mm (5.81–6.20 in.)

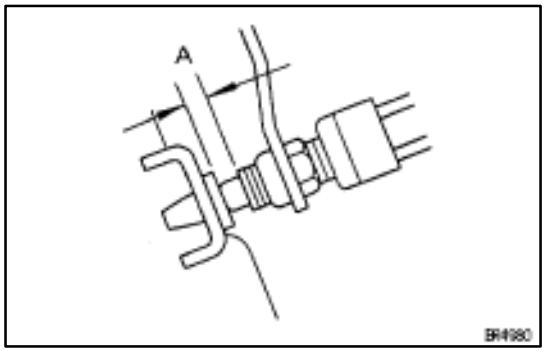
If the pedal height is incorrect, adjust it.

2. IF NECESSARY, ADJUST PEDAL HEIGHT

(a) Remove the under cover.
(b) Remove the lower pad and air duct.
(c) Disconnect the connector from the stop light switch.
(d) Loosen the stop light switch lock nut and remove the stop light switch.
(e) Loosen the push rod lock nut.
(f) Adjust the pedal height by turning the pedal push rod.
(g) Tighten the push rod lock nut.

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

(h) Install the stop light switch and turn it until it lightly contacts the pedal stopper.
(i) Return the stop light switch one turn.



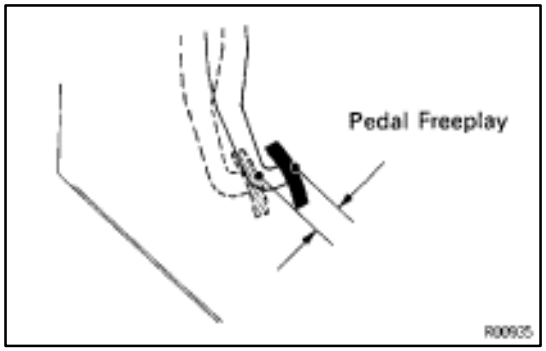
(j) Check that the clearance (A) between stop light switch and pedal.

Clearance:

0.5–2.4 mm (0.02–0.09 in.)

(k) Tighten the stop light switch lock nut.
(l) Connect the connector to the stop light switch.
(m) Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.
(n) After adjusting the pedal height, check the pedal freeplay.

HINT: If clearance (A) between the stop light switch and the brake pedal stopper has been adjusted correctly, the pedal freeplay will meet the specifications.



3. CHECK THAT PEDAL FREEPLAY IS CORRECT, AS SHOWN

(a) Stop the engine and depress the brake pedal several times until there is no more vacuum left in the booster.

(b) Push in the pedal by hand until the beginning of the second point of resistance is felt, then measure the distance as shown.

Pedal freeplay:

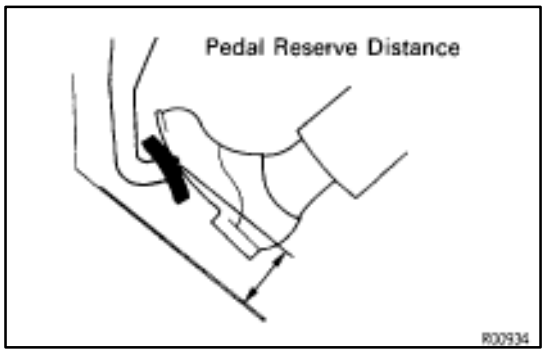
1–6 mm (0.04–0.24 in.)

If incorrect, check the stop light switch clearance. And if the clearance is OK, then troubleshoot the brake system.

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

(c) Install the air duct and lower pad.

(d) Install the under cover.



4. 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.

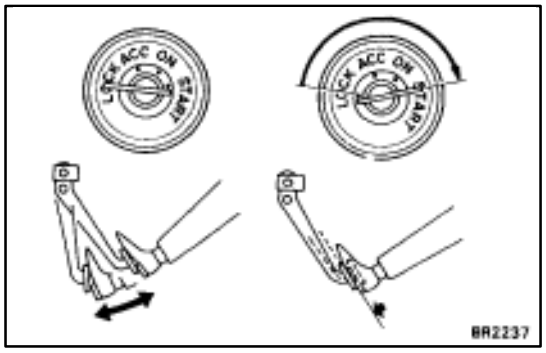
Pedal reserve distance at 490 N (50 kgf, 110.2 lbf):

More than 70 mm (2.76 in.)

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

BRAKE BOOSTER OPERATIONAL TEST

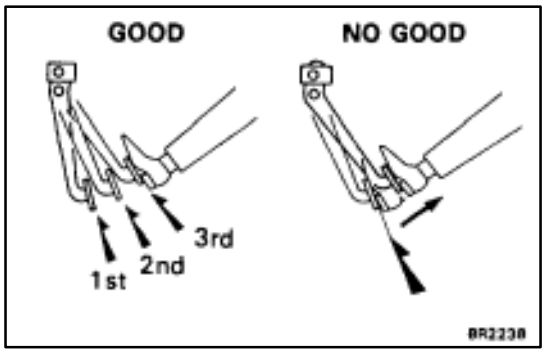
BR03P–01



1. OPERATING CHECK

(a) Depress the brake pedal several times with the engine off and check that there is no change in the pedal reserve distance.

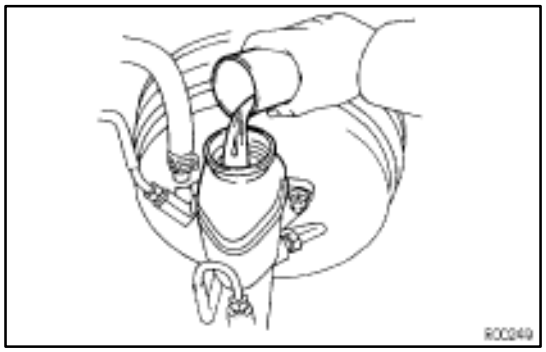
(b) Depress the brake pedal and start the engine. If the pedal goes down slightly, operation is normal.



2. AIR TIGHTNESS

(a) 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.

(b) 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

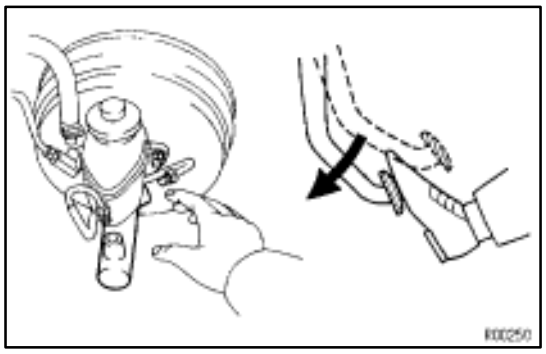
BR03Q–01

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 painted surfaces. Wash it off immediately.

1. FILL RESERVOIR TANK WITH BRAKE FLUID

Fluid: SAE J1703 or FMVSS NO. 116DOT3

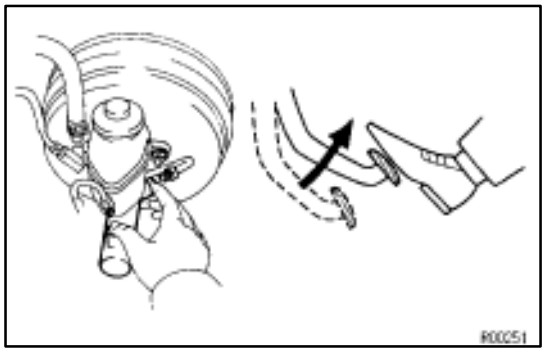


2. BLEED MASTER CYLINDER

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

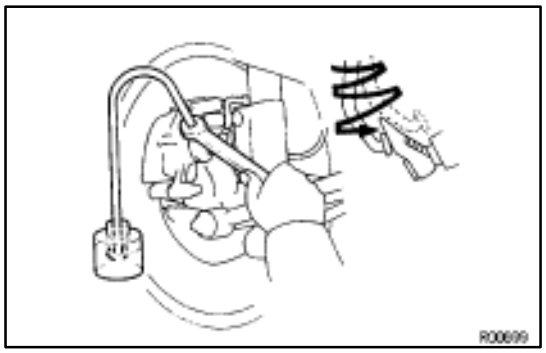
(a) Disconnect the brake tubes from the master cylinder.

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



(c) Block off the outer holes with your fingers, 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.

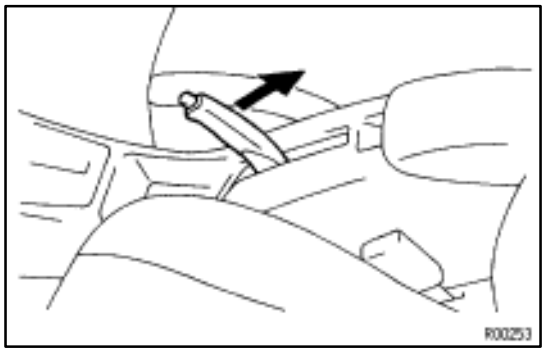
(b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.

(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 air out of the brake line for each wheel.
Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)

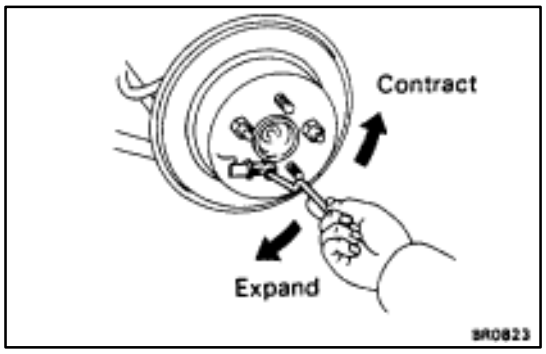
4. CHECK FLUID LEVEL IN RESERVOIR TANK
Check the fluid level and add fluid if necessary.
Fluid: SAE J1703 or FMVSS NO.116DOT3



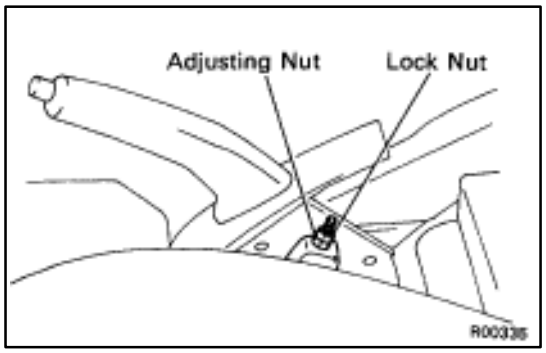
PARKING BRAKE CHECK AND ADJUSTMENT

BR03R–01

1. CHECK THAT PARKING BRAKE LEVER TRAVEL IS CORRECT
Pull the parking brake lever all the way up, and count the number of clicks.
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 LEVER TRAVEL
(a) Remove the rear wheel.
(b) Temporarily install the hub nuts.
(c) Remove the hole plug.
(d) Turn the adjuster and expand the shoes until the rotor disc locks.
(e) Return the adjuster eight notches.
(f) Install the hole plug and hub nuts.
(g) Install the rear wheel.
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

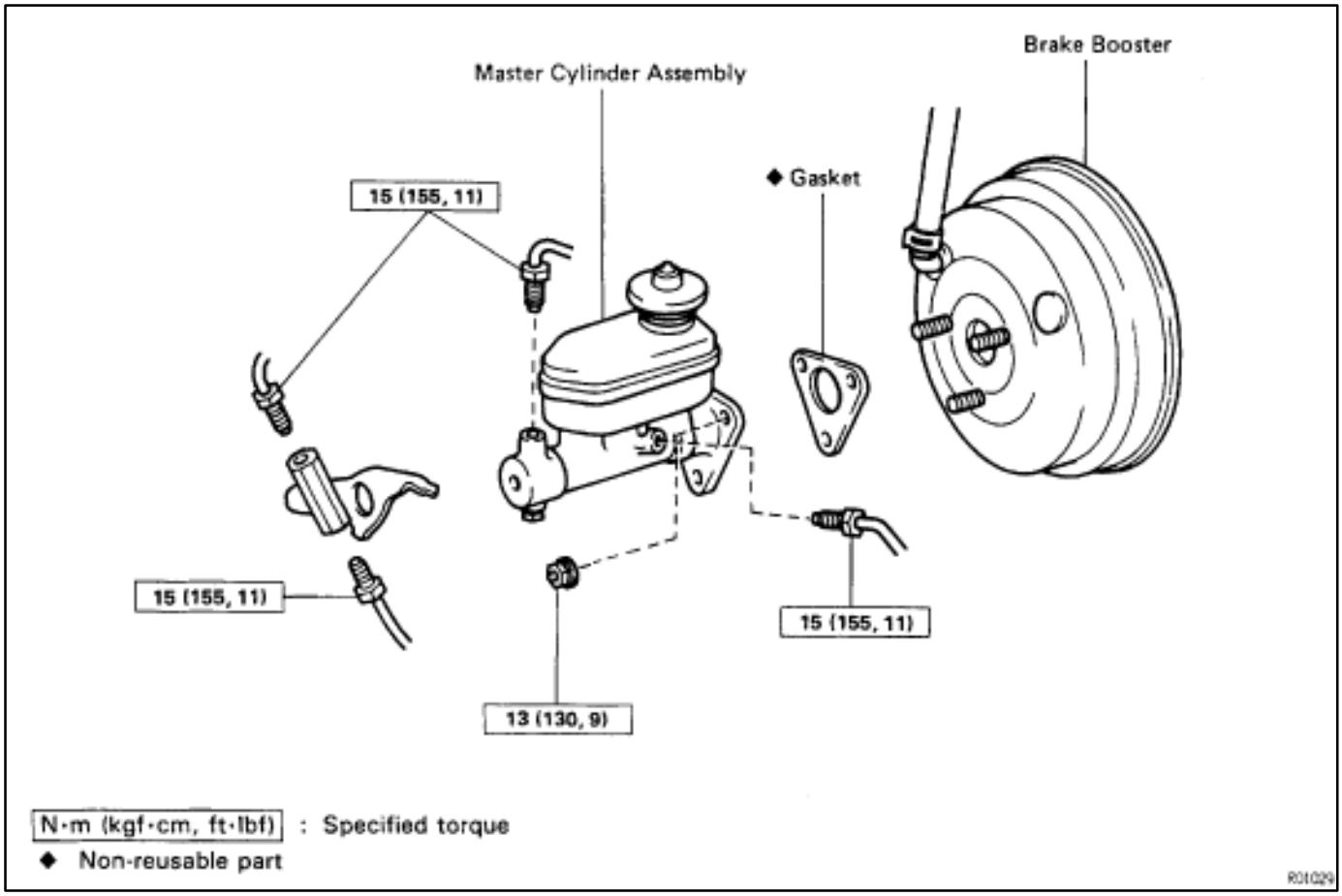


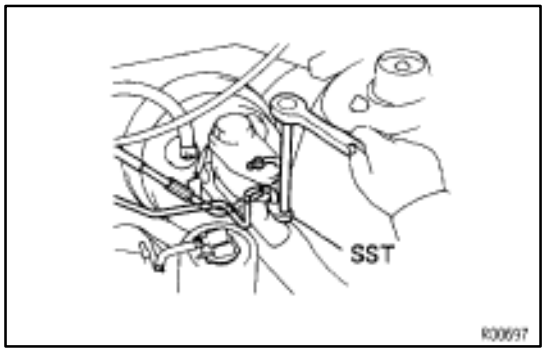
(h) Remove the rear console box.
(i) Loosen the lock nut and turn the adjusting nut until the lever travel is correct.
(j) Tighten the lock nut.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)
(k) Install the rear console box.

MASTER CYLINDER

BR03S–01

MASTER CYLINDER REMOVAL





1. DISCONNECT LEVEL WARNING SWITCH CONNECTOR

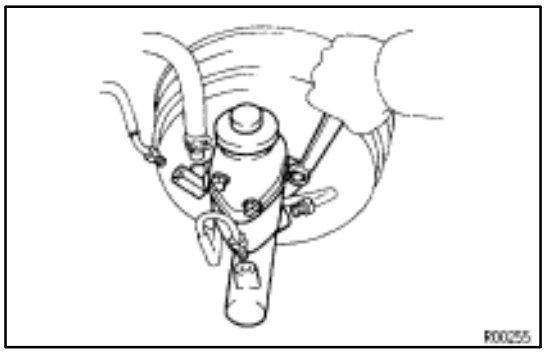
2. TAKE OUT FLUID WITH SYRINGE

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 09023–00100

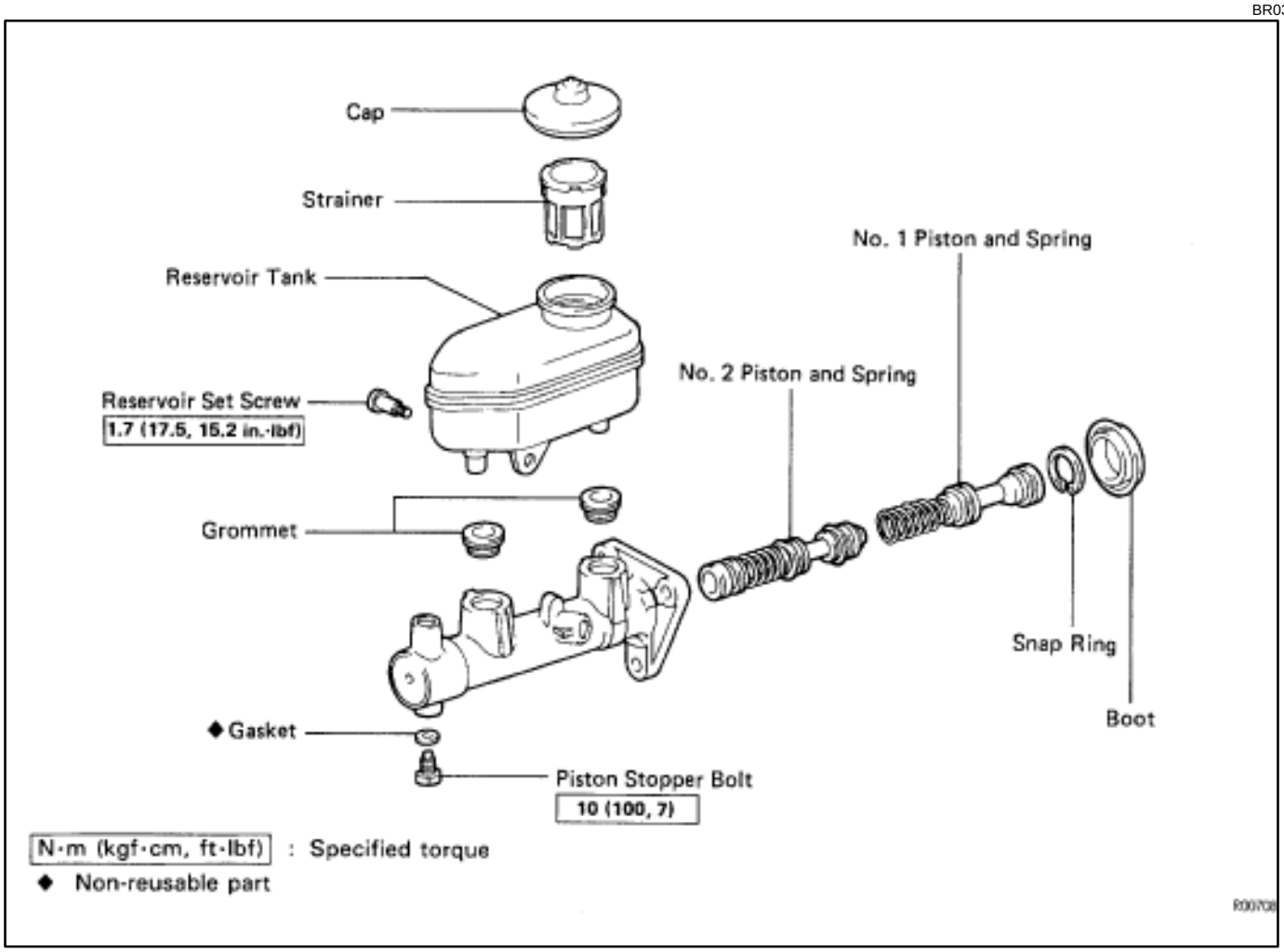


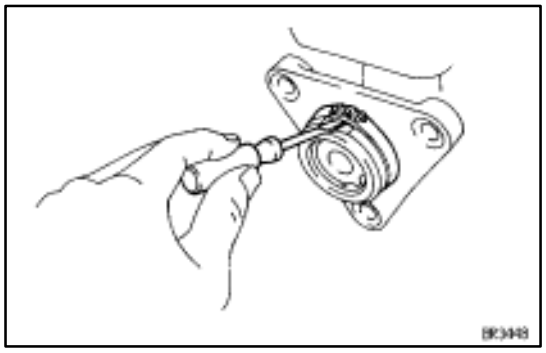
4. REMOVE MASTER CYLINDER

Remove the mounting nuts and pull out the master cylinder and gasket.

COMPONENTS

BR03T–01



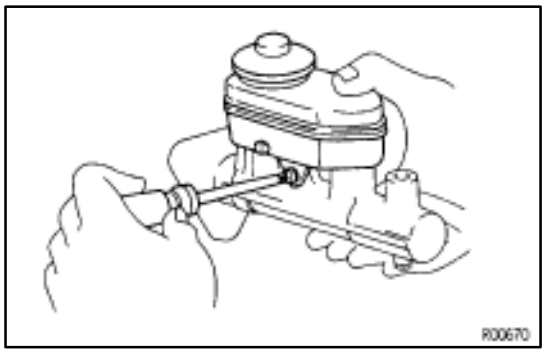


MASTER CYLINDER DISASSEMBLY

BR03U–01

1. REMOVE MASTER CYLINDER BOOT

Using a screwdriver, remove the master cylinder boot.



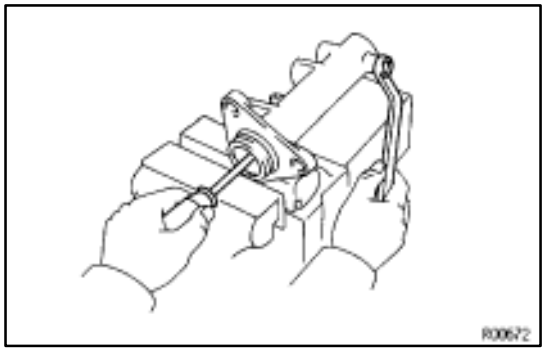
2. REMOVE RESERVOIR TANK

(a) Remove the set screw and pull out the reservoir tank.

(b) Remove the cap and strainer from the reservoir tank.

3. REMOVE TWO GROMMETS

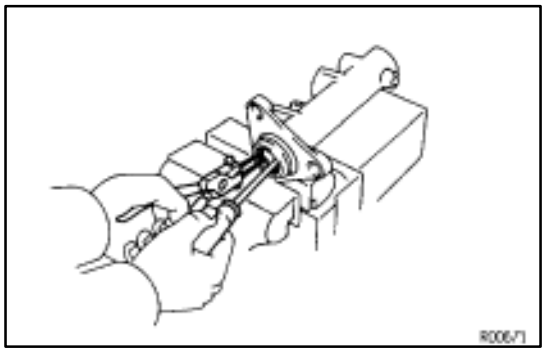
4. PLACE CYLINDER IN VISE



5. 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.

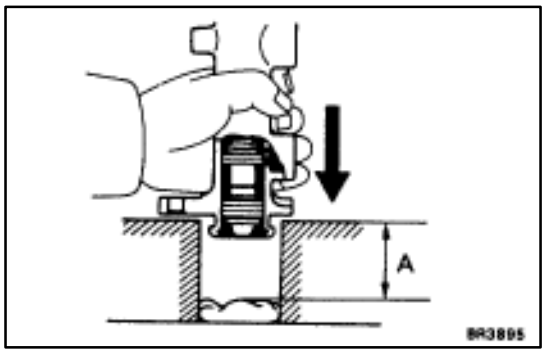


6. REMOVE TWO PISTONS

(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 INSPECTION

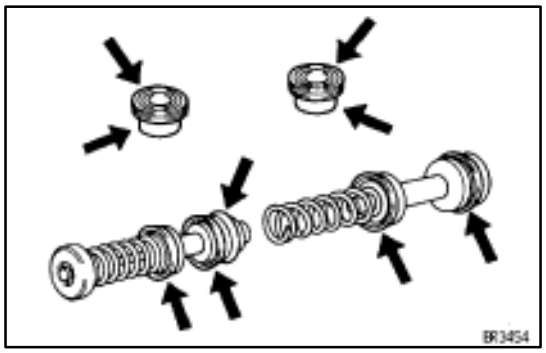
BR03V–01

HINT: Clean the disassembled parts with compressed air.

1. INSPECT CYLINDER BORE FOR RUST OR SCORING

2. INSPECT CYLINDER FOR WEAR OR DAMAGE

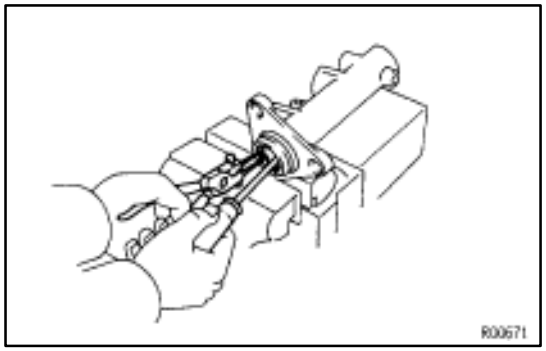
If necessary, clean or replace the cylinder.



MASTER CYLINDER ASSEMBLY

BR03W–01

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



2. INSTALL TWO PISTONS

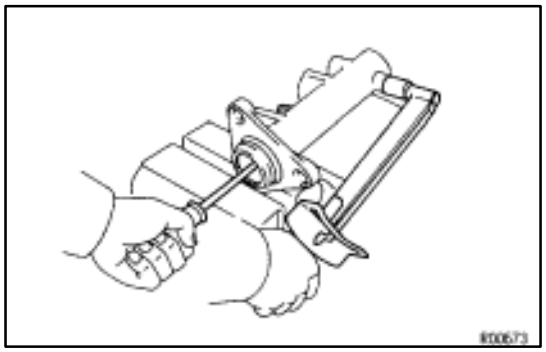
NOTICE: Be careful not to damage the rubber lips on the pistons.

(a) Insert the two pistons straight in, no at an angle.

NOTICE: If inserted at an 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.

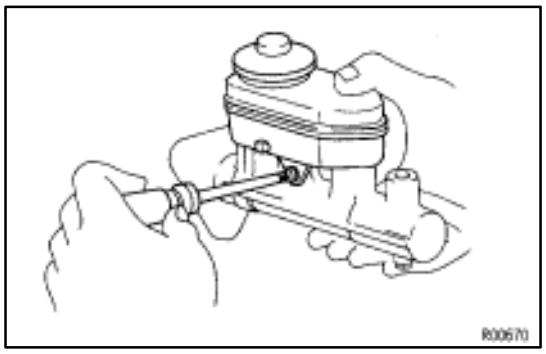


3. INSTALL PISTON STOPPER BOLT

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



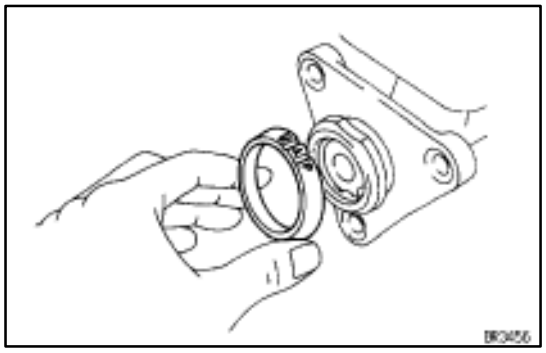
5. INSTALL RESERVOIR TANK

(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 in.·lbf)

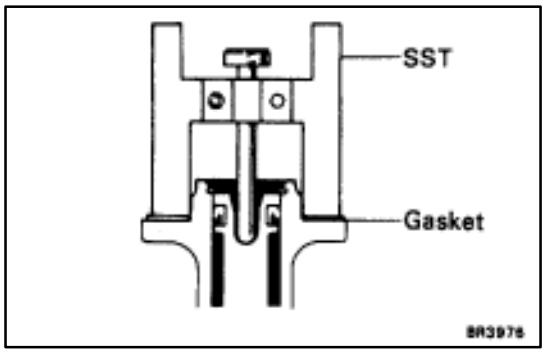


6. INSTALL MASTER CYLINDER BOOT

With the UP mark on the master cylinder boot facing upwards, install the cylinder boot on the master cylinder.

MASTER CYLINDER INSTALLATION

BR03X–01

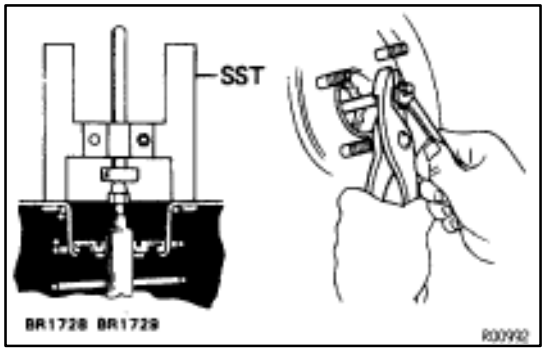


1. ADJUST LENGTH OF BOOSTER PUSH ROD

(a) Install the gasket on the master cylinder.

(b) Set the SST on the gasket, and lower the pin until its tip slightly touches the piston.

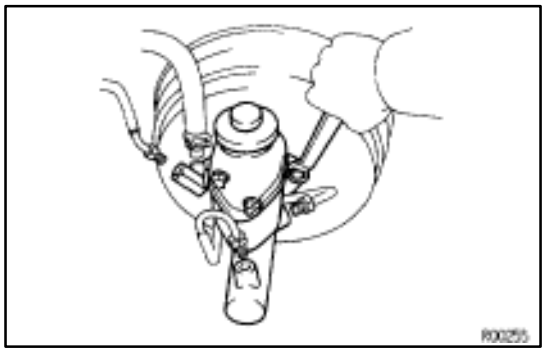
SST 09737–00010



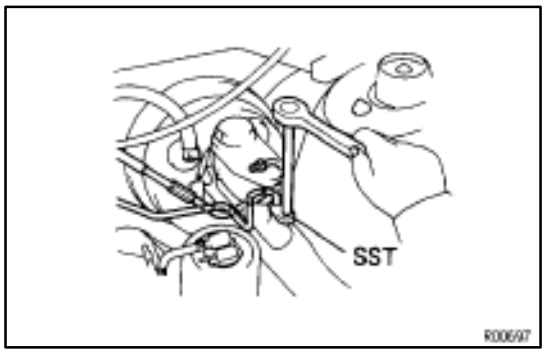
(c) Turn the SST upside down, and set it on the booster.
SST 09737–00010

(d) Measure the clearance between the booster push rod and pin head (SST).
Clearance:
0 mm (0 in.)

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



2. INSTALL MASTER CYLINDER
Install the master cylinder and gasket on the brake booster with three 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 09023–00100
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 brake system bleeding)

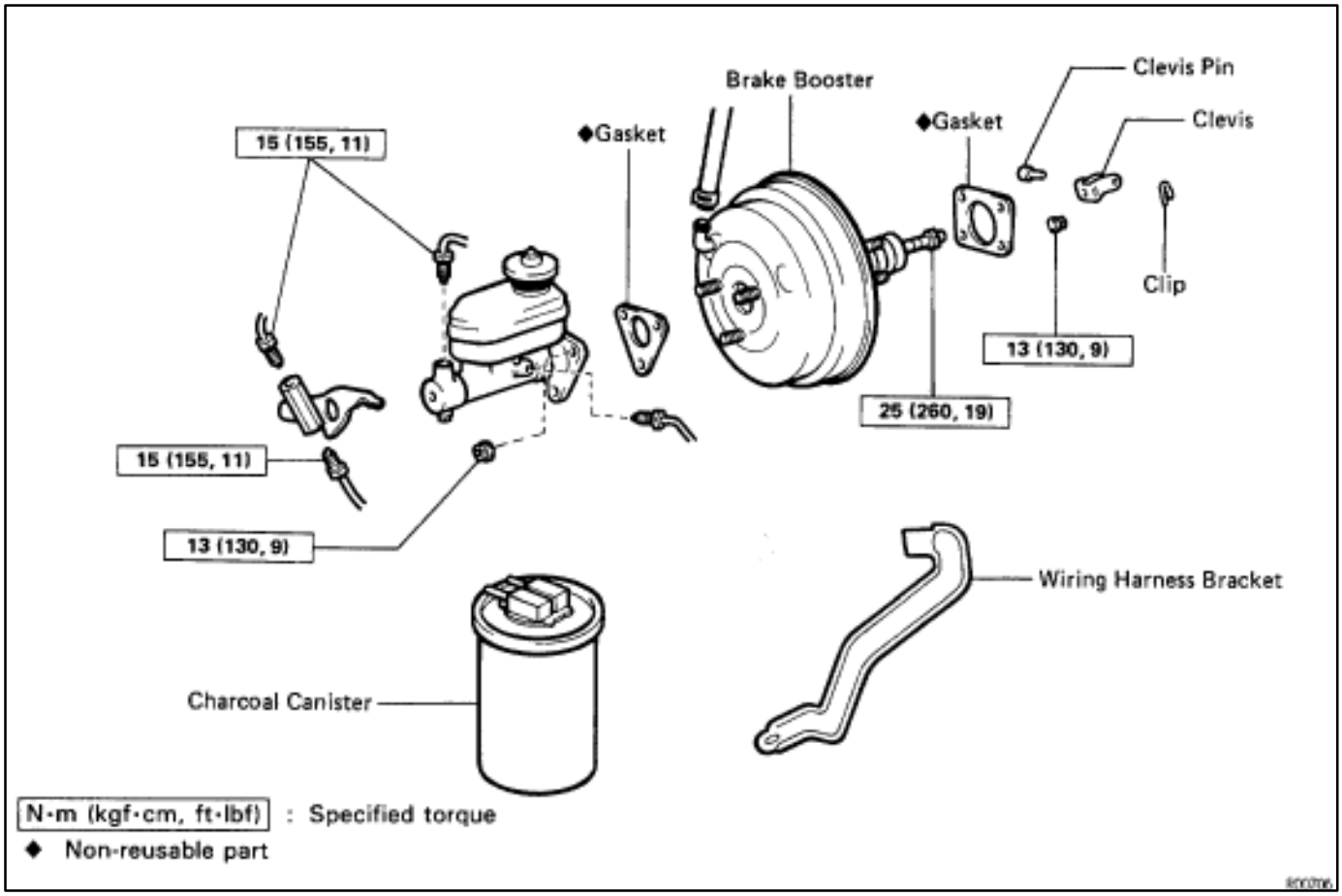
6. CHECK FOR FLUID LEAKAGE

7. CHECK AND ADJUST BRAKE PEDAL
(See brake pedal check and adjustment)

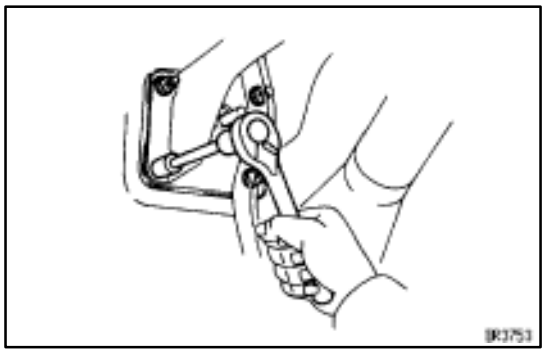
BRAKE BOOSTER

BR03Y–01

BRAKE BOOSTER REMOVAL



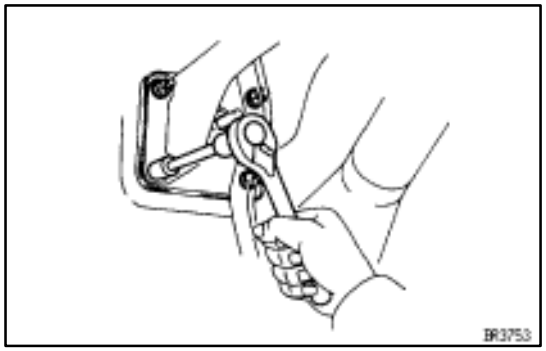
1. **REMOVE MASTER CYLINDER**
2. **REMOVE CHARCOAL CANISTER**
3. **REMOVE WIRING HARNESS BRACKET**
4. **DISCONNECT VACUUM HOSE FROM BRAKE BOOSTER**
5. **REMOVE PEDAL RETURN SPRING**
6. **REMOVE CLIP AND CLEVIS PIN**



7. **REMOVE BRAKE BOOSTER**

(a) Remove the four booster installation nuts.

(b) Pull out the brake booster and gasket.



BRAKE BOOSTER INSTALLATION

BR03Z–01

1. INSTALL BRAKE BOOSTER

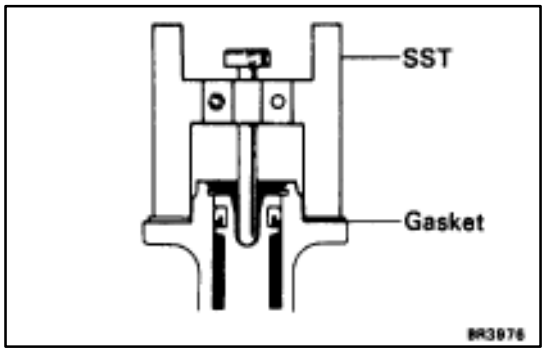
(a) Install the clevis to the operating rod.

(b) Install the booster and gasket.

(c) Install and torque the booster installation nuts.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(d) Insert the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin.

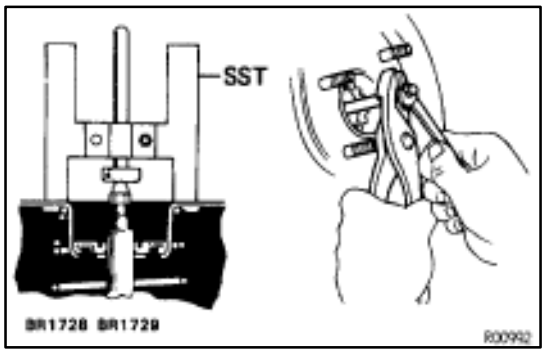
(e) Install the pedal return spring.



2. ADJUST LENGTH OF BOOSTER PUSH ROD

(a) Install the gasket on the master cylinder.

(b) Set the SST on the gasket, and lower the pin until its tip slightly touches the piston.
SST 09737–00010



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

(d) Measure the clearance between the booster push rod and pin head (SST).
Clearance:
0 mm (0 in.)

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

3. INSTALL WIRING HARNESS BRACKET

4. INSTALL CHARCOAL CANISTER

5. INSTALL MASTER CYLINDER

6. CONNECT VACUUM HOSE TO BRAKE BOOSTER

7. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM
(See brake system bleeding)

8. CHECK FOR FLUID LEAKAGE

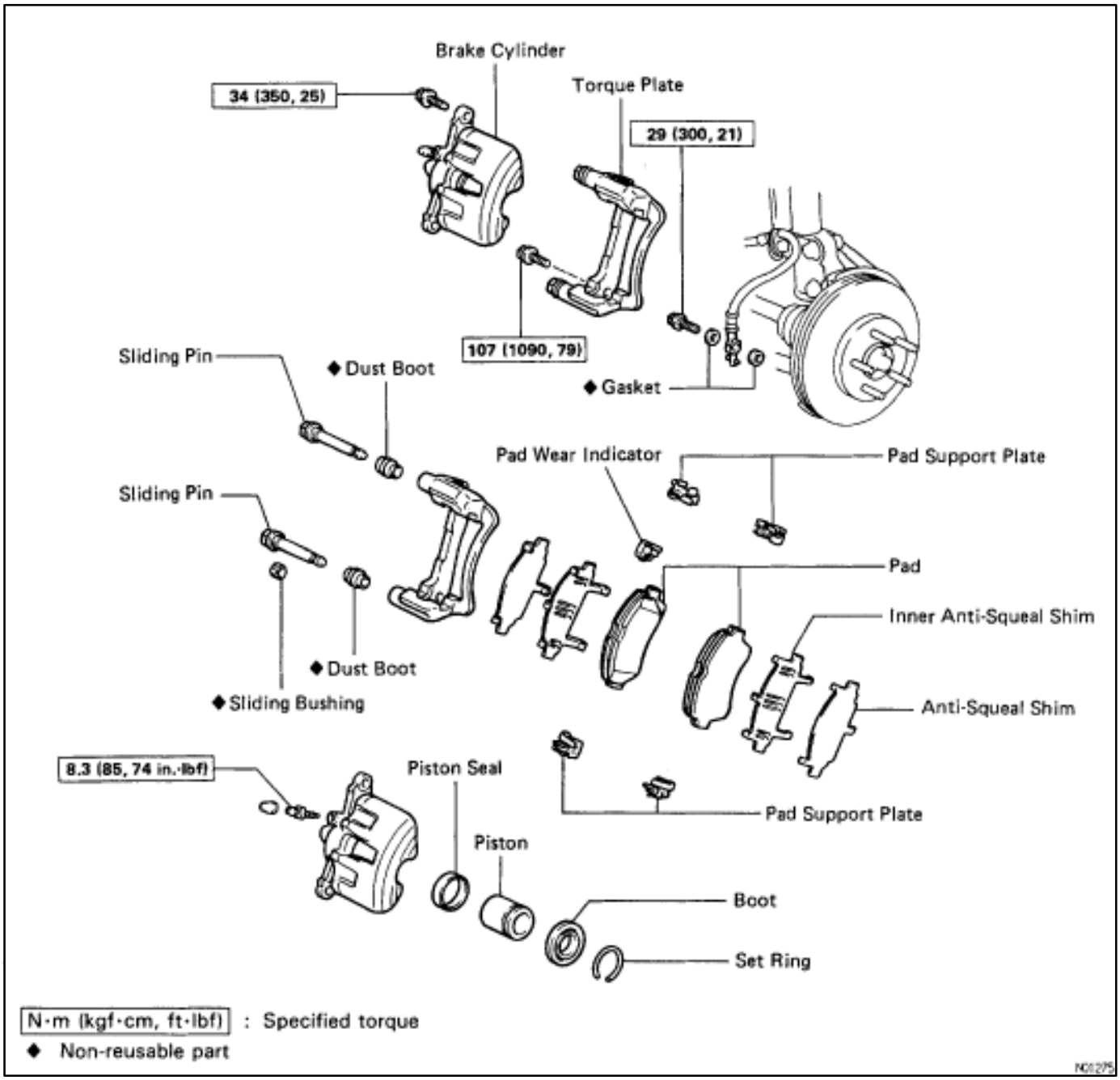
9. CHECK AND ADJUST BRAKE PEDAL
(See brake pedal check and adjustment)

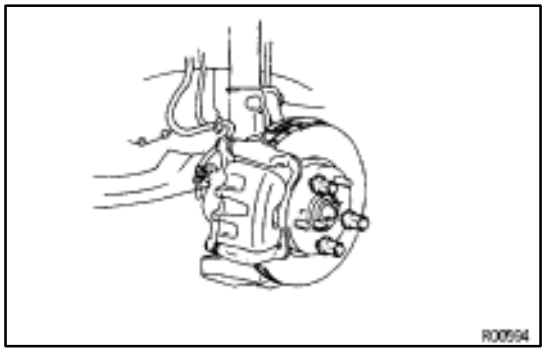
10. PERFORM OPERATIONAL CHECK
(See brake booster operational test)

FRONT BRAKE

BR040–01

COMPONENTS



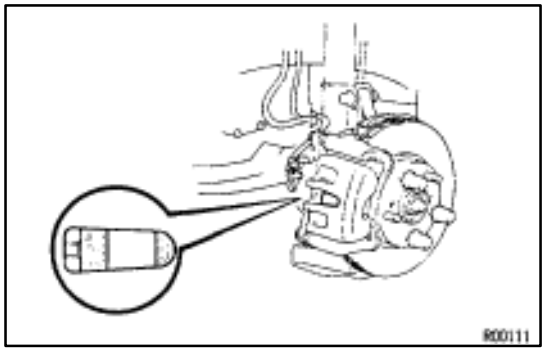


BRAKE PADS REPLACEMENT

BR041–01

1. REMOVE FRONT WHEEL

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

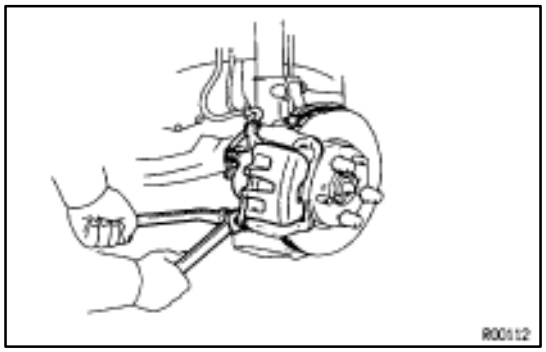


2. INSPECT PAD LINING THICKNESS

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

Minimum thickness:

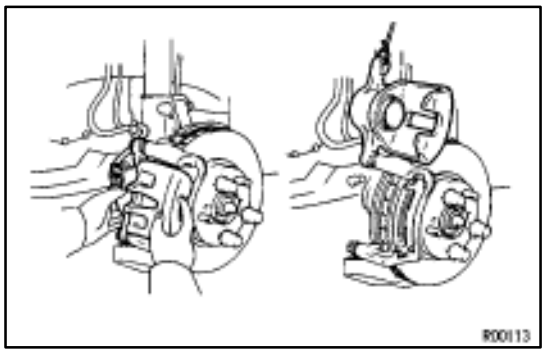
1.0 mm (0.039 in.)



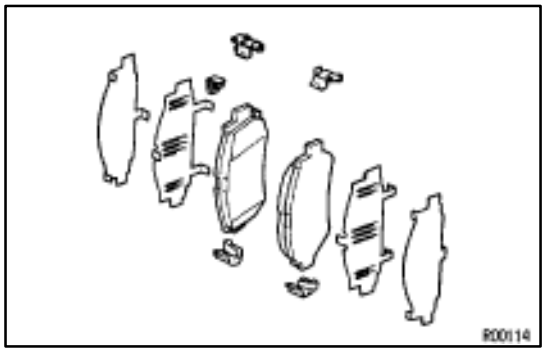
3. LIFT UP CYLINDER

(a) Hold the sliding pin on the bottom and loosen the installation bolt.

(b) Remove the installation bolt.



(c) 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:

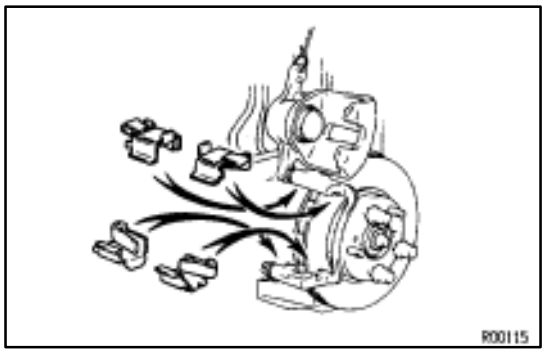
(a) Two brake pads

(b) Four anti–squeal shims

(c) Four pad support plates

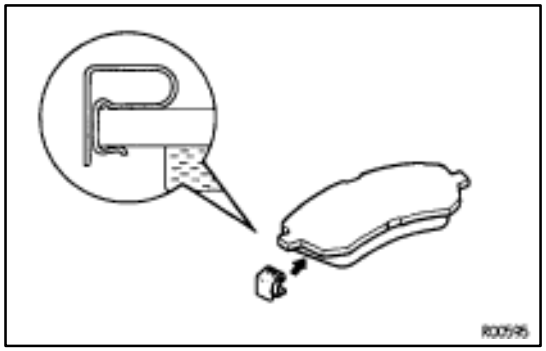
(d) Pad wear indicator

5. CHECK ROTOR DISC THICKNESS AND RUNOUT
(See front brake components inspection and repair)



6. INSTALL PAD SUPPORT PLATES

Install the four pad support plates.

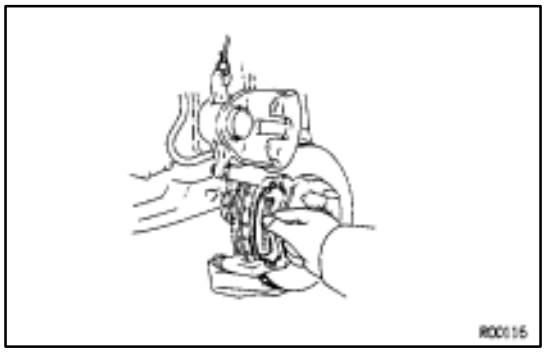


7. INSTALL NEW PADS

(a) Install the pad wear indicator plate on the pad.

(b) Apply disc brake grease to both sides of the inner anti–squeal shim.

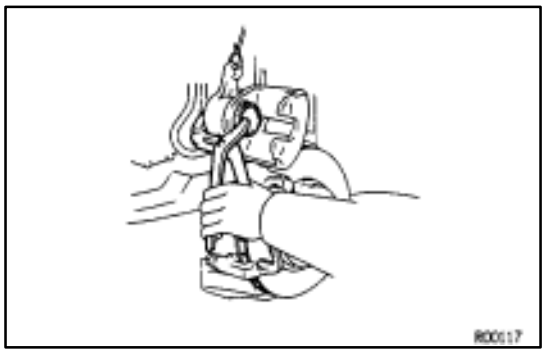
(c) Install the two anti–squeal shims on each pad.



(d) Install two pads with the pad wear indicator plates facing upward.

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

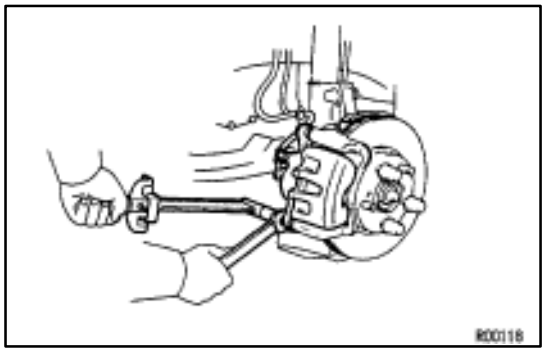
8. INSTALL CYLINDER



(a) Draw out a small amount of brake fluid from the reservoir tank.

(b) Press in the piston with water pump pliers or similar implement.

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



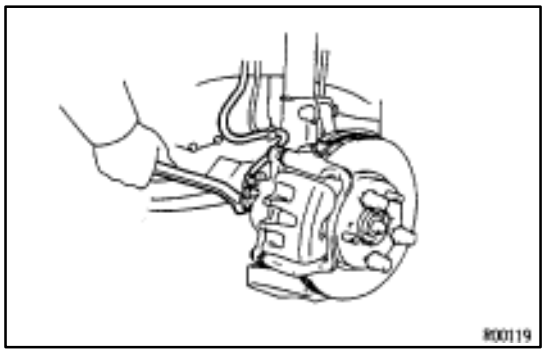
(c) Install the cylinder.

(d) Hold the sliding pin and torque the installation bolt.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

9. INSTALL FRONT WHEEL

10. CHECK THAT FLUID LEVEL IS AT MAX LINE



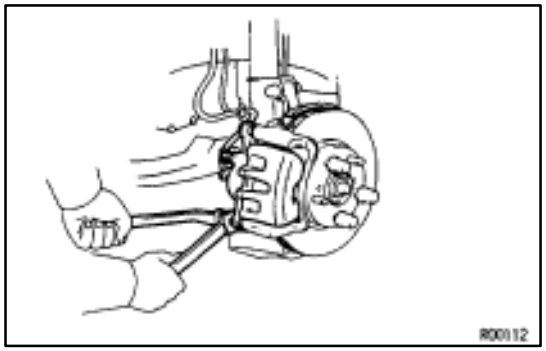
CYLINDER REMOVAL

BR042–01

1. DISCONNECT FLEXIBLE HOSE

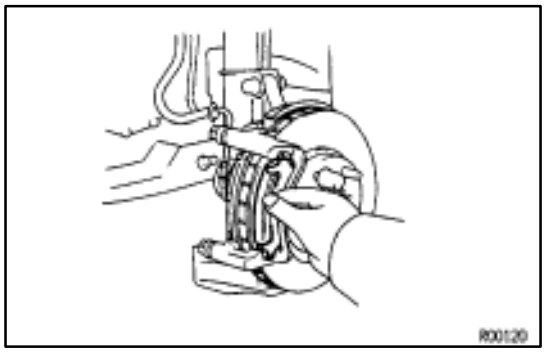
(a) Remove the union bolt and two gaskets from the brake cylinder, then disconnect the flexible hose from the brake cylinder.

(b) Use a container to catch the brake fluid as it drains out.



2. REMOVE CYLINDER

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

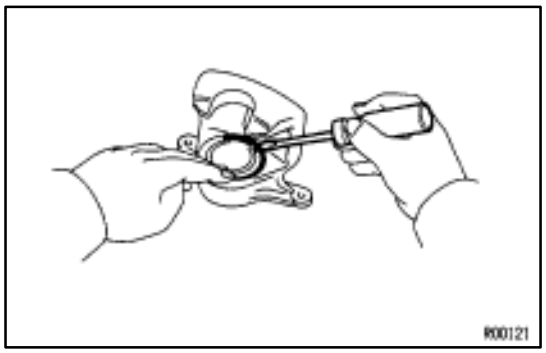


3. REMOVE TWO BRAKE PADS

Remove the inside and outside pads.

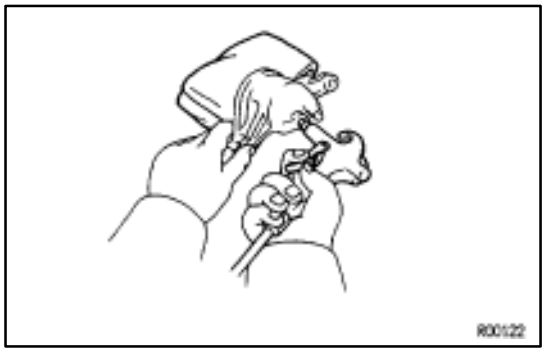
CYLINDER DISASSEMBLY

BR043–01



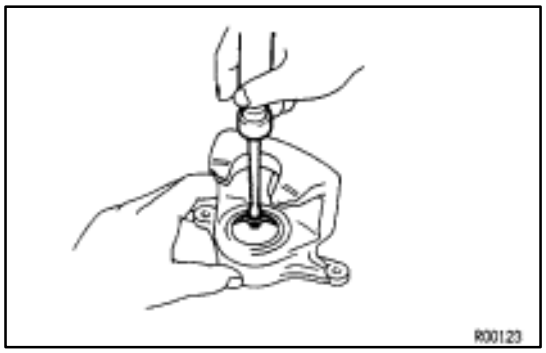
1. REMOVE CYLINDER BOOT SET RINGS AND CYLINDER BOOT

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



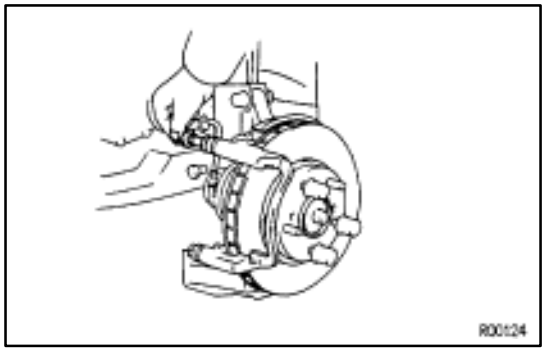
2. REMOVE PISTON

(a) Place a piece of cloth or similar article 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.



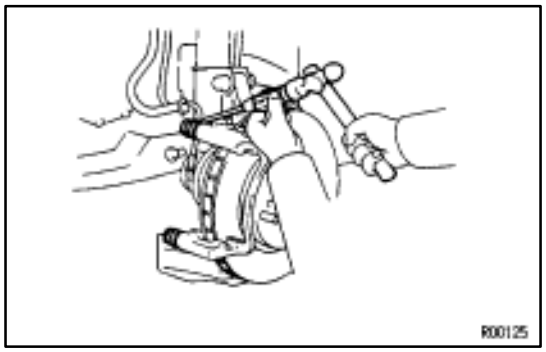
3. REMOVE PISTON SEAL

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



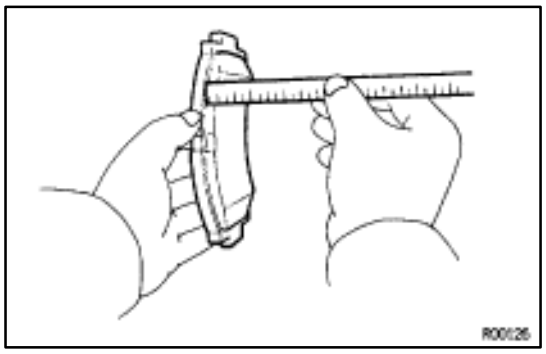
4. REMOVE SLIDING PINS AND DUST BOOTS

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



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

BR044–01



FRONT BRAKE COMPONENTS INSPECTION AND REPAIR

1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

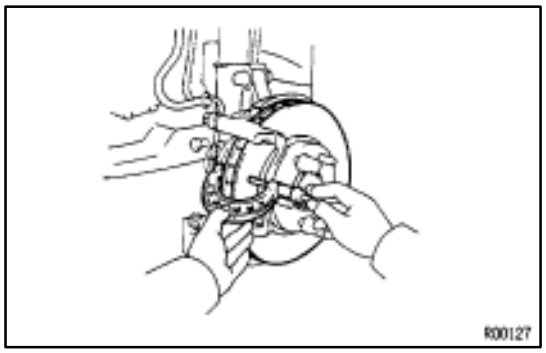
Standard thickness:

11.0 mm (0.433 in.)

Minimum thickness:

1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum thickness or less, or if the pad has severely uneven wear.



2. MEASURE ROTOR DISC THICKNESS

Using a micrometer, measure the rotor disc thickness.

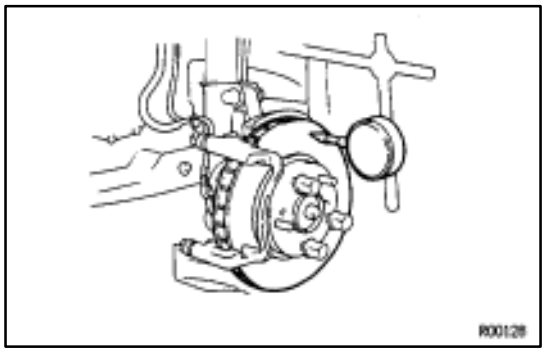
Standard thickness:

28 mm (1.102 in.)

Minimum thickness:

26 mm (1.024 in.)

Replace the rotor disc if the thickness of the rotor disc is at the minimum thickness or less. Replace the rotor disc or grind it on a lathe if it is scored or is worn unevenly.



3. MEASURE ROTOR DISC RUNOUT

Using a dial indicator, measure the rotor disc runout at a position 10 mm (0.39 in.) from the outside edge.

Maximum disc runout:

0.05 mm (0.0020 in.)

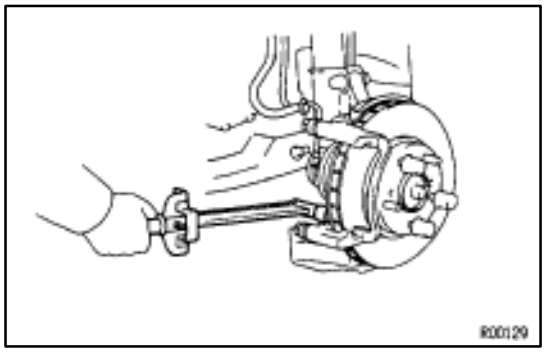
If the rotor disc's runout is at the maximum value or greater, check the bearing play in the axial direction and check the axle hub runout (See SA section). If the bearing play and axle hub runout are not abnormal, adjust the rotor disc runout.

4. IF NECESSARY, ADJUST ROTOR DISC RUNOUT

(a) Remove the torque plate from the knuckle.

(b) Remove the hub nuts of the temporarily installed disc and pull off the rotor disc.

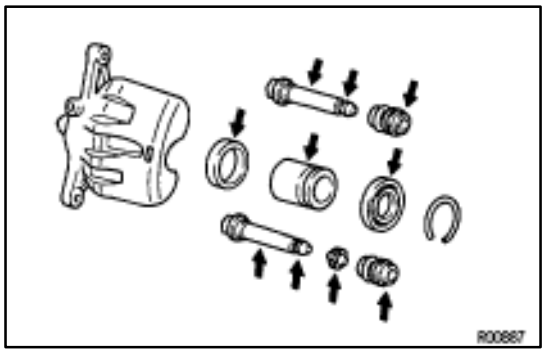
(c) Install the rotor disc and measure the disc runout, then shift the rotor disc one fifth of a turn and measure the disc runout. Similarly measure the runout at each position, and select the position where the runout is minimum.



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

Torque: 107 N·m (1,090 kgf·cm, 79 ft·lbf)

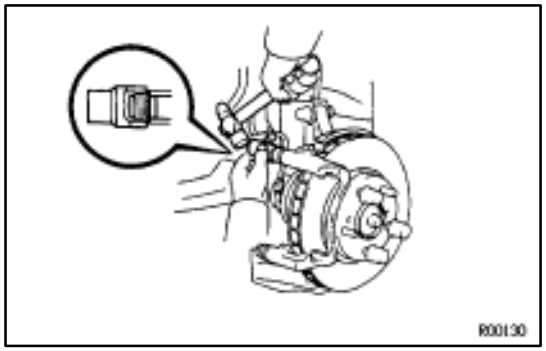
(e) If not within specification, replace the rotor disc, and repeat (c) and (d).



CYLINDER ASSEMBLY

BR045–01

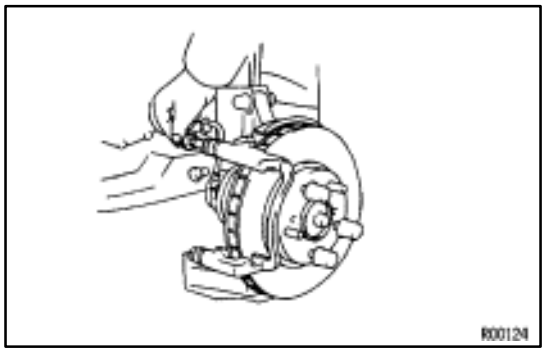
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



2. INSTALL DUST BOOTS AND SLIDING PINS

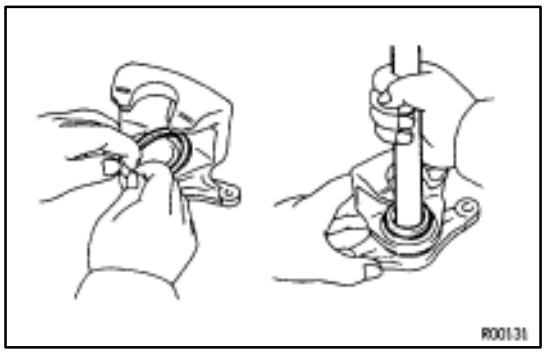
(a) Using a 19 mm socket wrench and hammer, tap in two new dust boots into the torque plate.

(b) Confirm that the metal plate portion of the dust boot fits snugly in the torque plate.

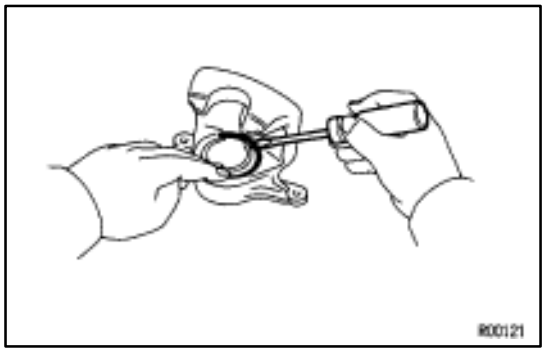


(c) Insert two sliding pins into the torque plate.
NOTICE: Insert the sliding pin with sliding bushing into the bottom side.

3. INSTALL PISTON SEAL AND PISTON IN CYLINDER



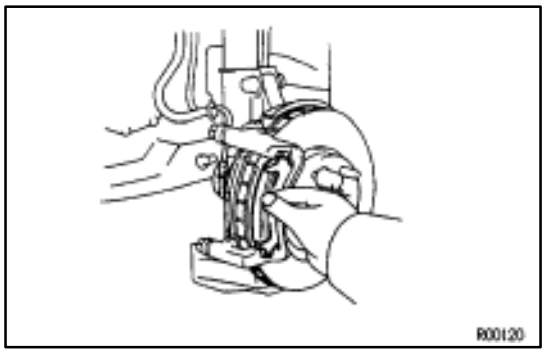
4. INSTALL CYLINDER BOOT AND CYLINDER BOOT SET RING

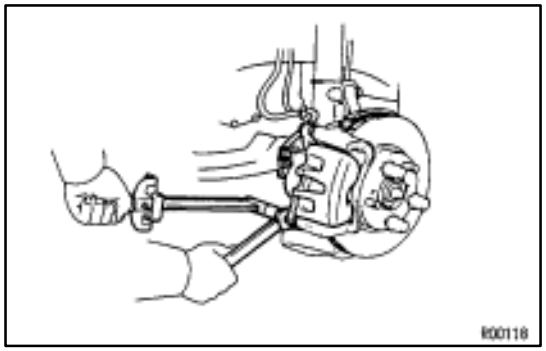


CYLINDER INSTALLATION

BR046–01

1. INSTALL TWO BRAKE PADS
Install the inside and outside pads.

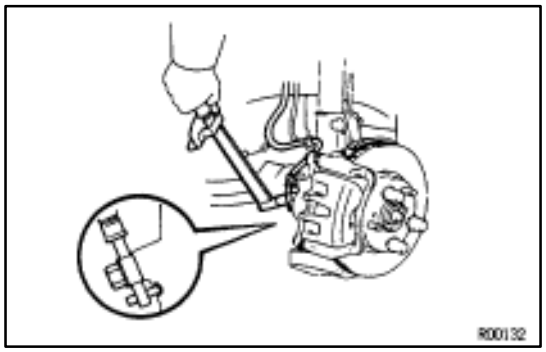




2. INSTALL CYLINDER

(a) Temporarily install the cylinder on the torque plate with two installation bolts.

(b) Hold the sliding pin and torque the installation bolt.
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: 27 N·m (300 kgf·cm, 21 ft·lbf)

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

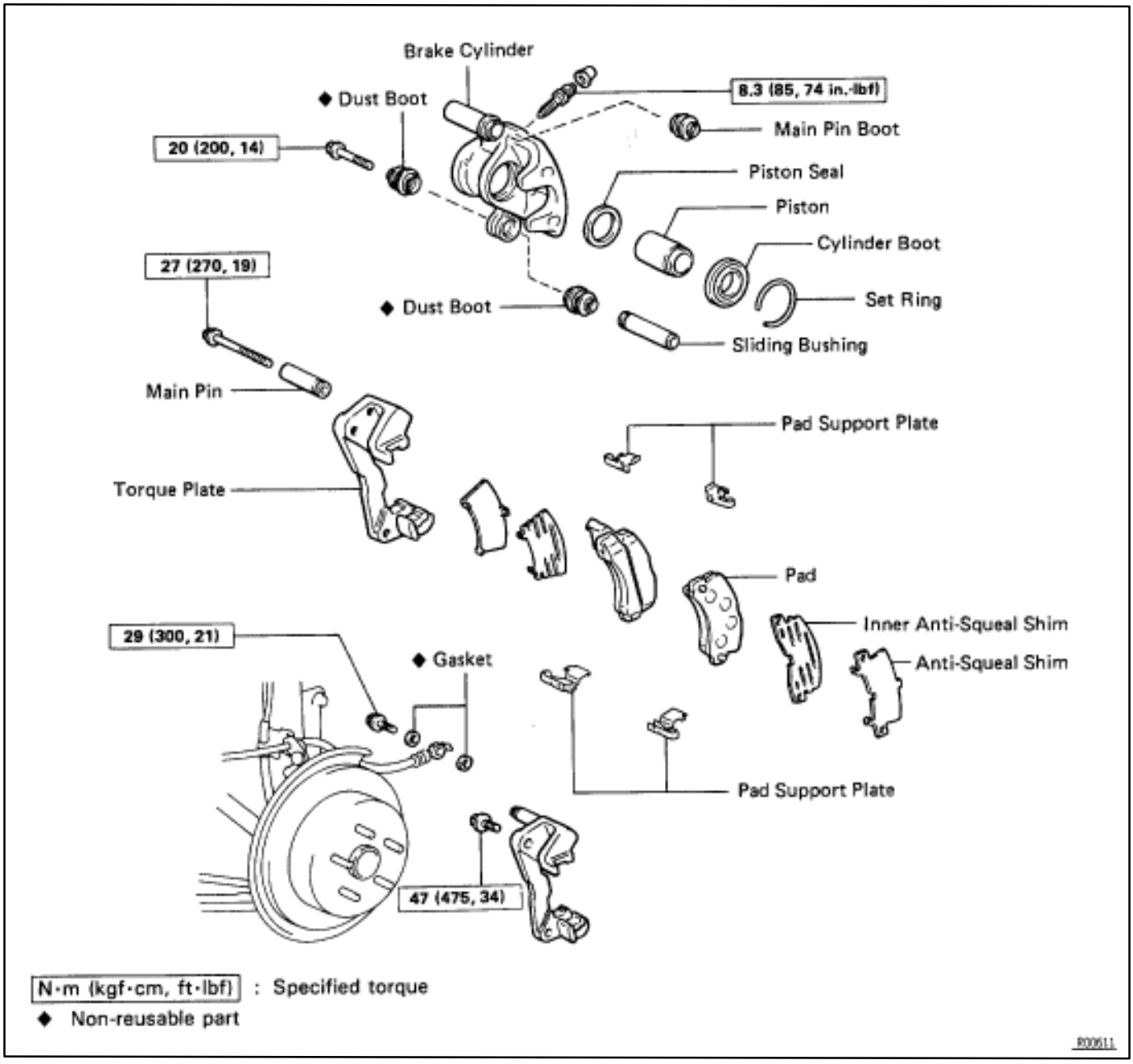
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM
(See brake system bleeding)

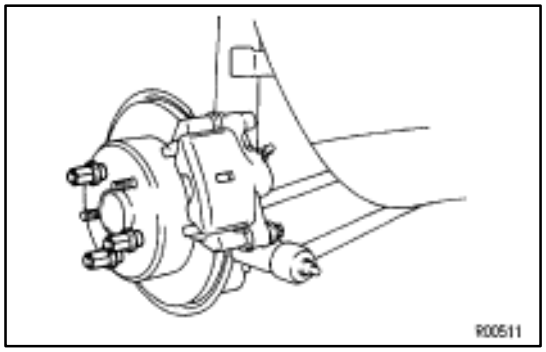
5. CHECK FOR LEAKS

REAR BRAKE (DISC BRAKE)

BR047–01

COMPONENTS



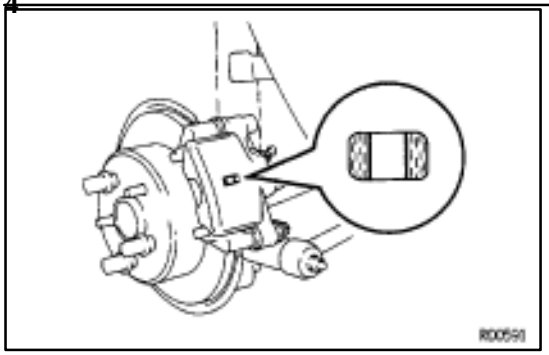


BRAKE PADS REPLACEMENT

BR048–01

1. REMOVE REAR WHEEL

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

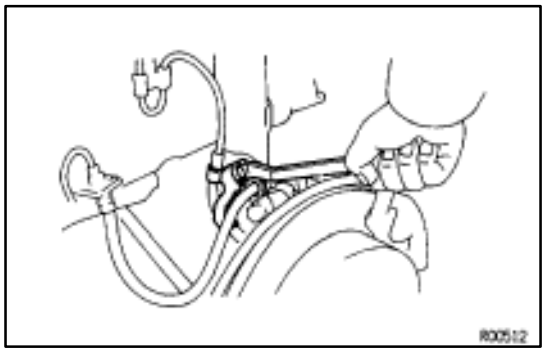


2. INSPECT PAD LINING THICKNESS

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

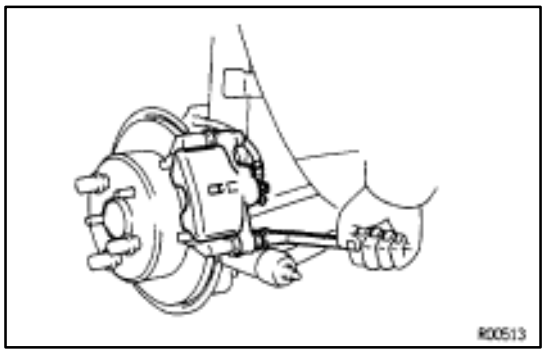
Minimum thickness:

1.0 mm (0.039 in.)

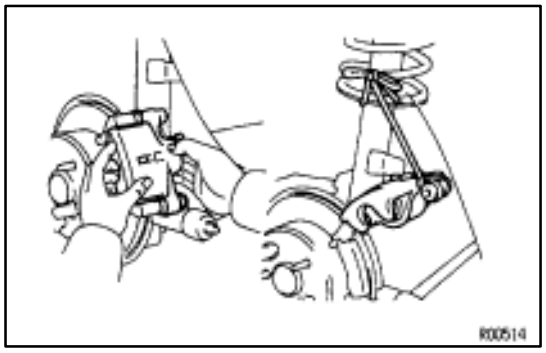


3. LIFT UP CYLINDER

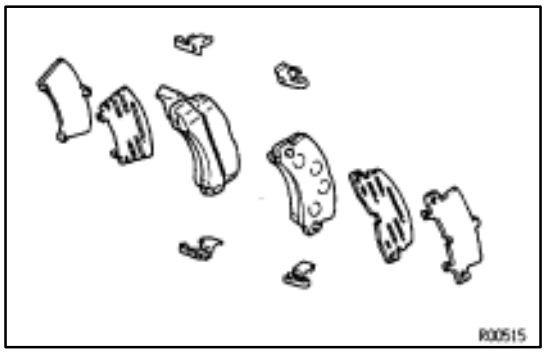
(a) Remove the flexible hose bracket.



(b) Remove the installation bolt.



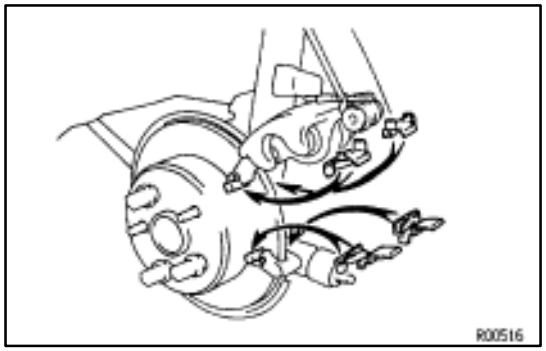
(c) Lift up the brake cylinder and suspend the cylinder with string.
HINT: Do not disconnect the flexible hose from the brake cylinder.



4. REMOVE FOLLOWING PARTS:

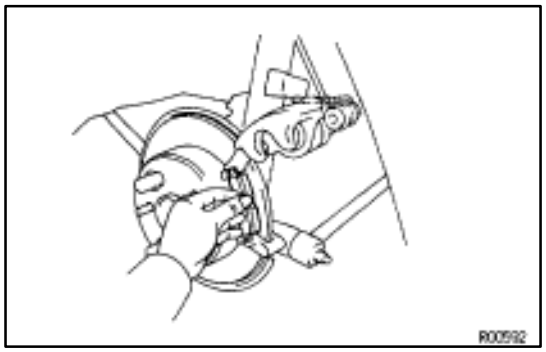
(a) Two brake pads
(b) Four anti–squeal shims
(c) Four pad support plates

5. CHECK ROTOR DISC THICKNESS AND RUNOUT
(See rear brake components inspection and repair)



6. INSTALL PAD SUPPORT PLATES

Install the four pad support plates.



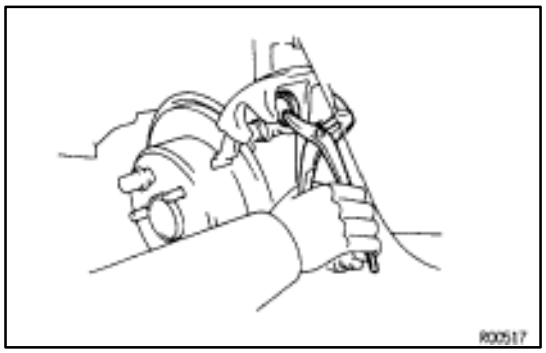
7. INSTALL NEW PADS

(a) Apply disc brake grease to both sides of the inner anti–squeal shims.

(b) Install the two anti–squeal shims on each pad.

(c) Install two pads with the pad wear indicator plates facing upward.

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

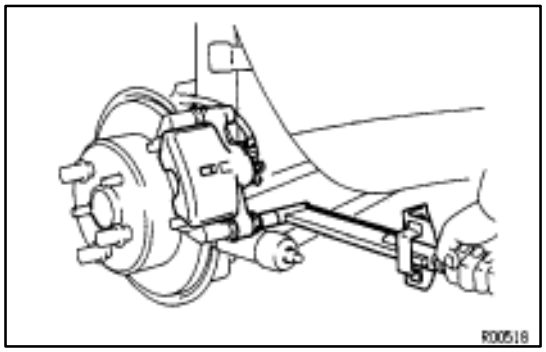


8. INSTALL CYLINDER

(a) Draw out a small amount of brake fluid from the reservoir tank.

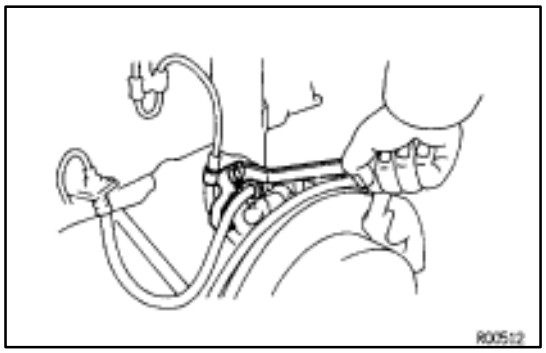
(b) Press in the piston with water pump pliers or similar implement.

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



(c) Install the brake cylinder and torque the installation bolt.

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

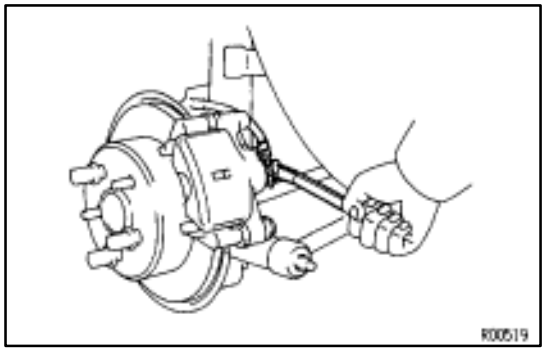


(d) Install the flexible hose bracket.

Torque: 29 N·m (300 kgf·cm, 29 ft·lbf)

9. INSTALL REAR WHEEL

10. CHECK THAT FLUID LEVEL IS AT MAX LINE



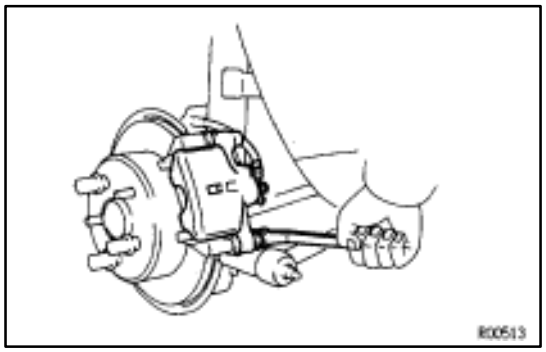
CYLINDER REMOVAL

BR049–01

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.

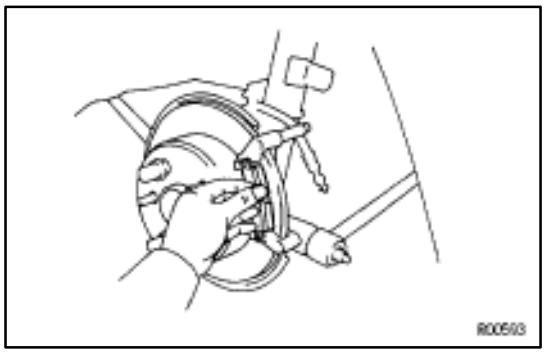
(b) Use a container to catch the brake fluid as it drains out.



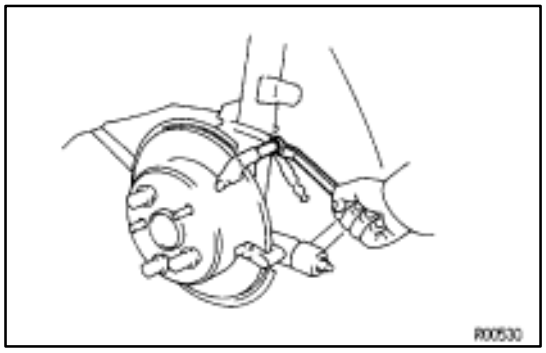
2. REMOVE CYLINDER

(a) Remove the installation bolt.

(b) Remove the cylinder from the torque plate.

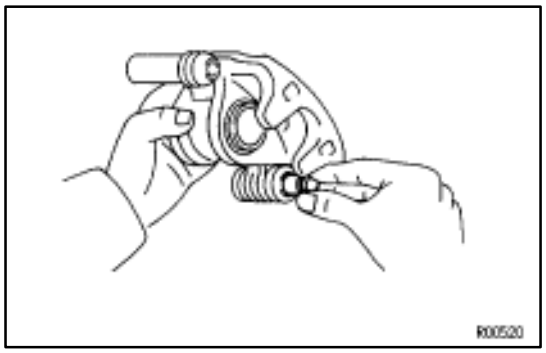


3. REMOVE TWO PADS



4. REMOVE MAIN PIN

Loosen the main pin installation bolt and remove the main pin.

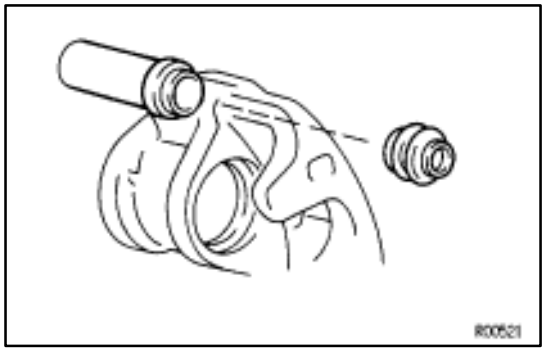


CYLINDER DISASSEMBLY

BR04A–01

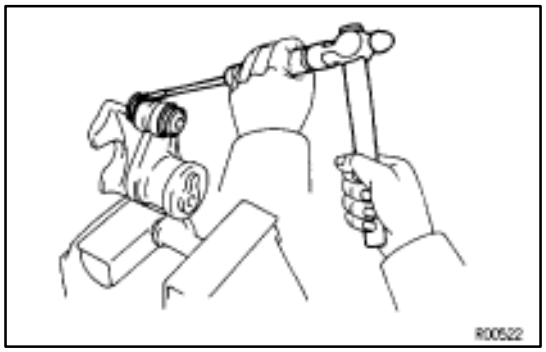
1. REMOVE SLIDING BUSHING

Pull out the sliding bushing.



2. REMOVE MAIN PIN BOOT

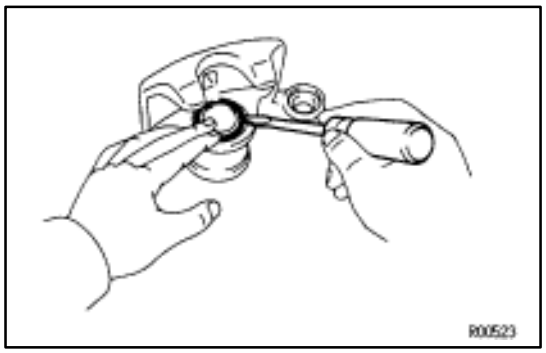
Pull out the main pin boot.



3. REMOVE DUST BOOTS

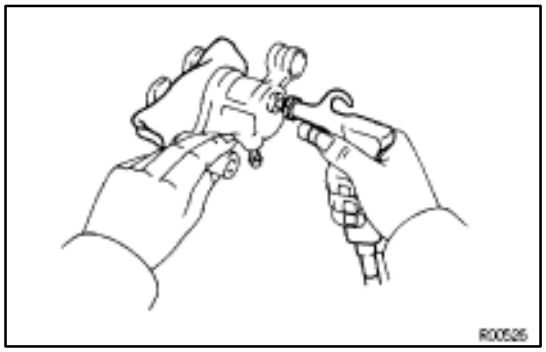
(a) Place the cylinder in vise.

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



4. REMOVE CYLINDER BOOT SET RING AND CYLINDER BOOT

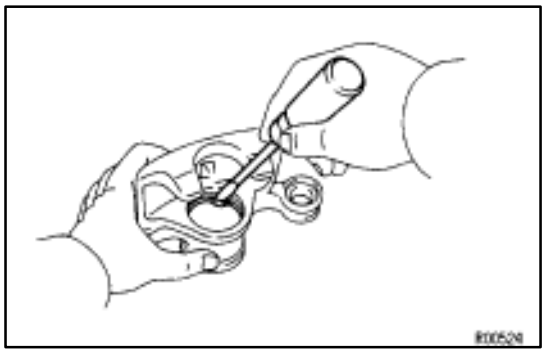
Using a screwdriver, remove the cylinder boot set ring and cylinder boot from the cylinder.



5. REMOVE PISTON

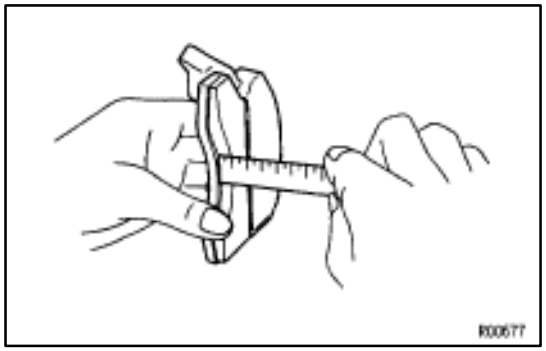
(a) Place a piece of cloth or similar article between the piston and the cylinder.

(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.



6. REMOVE PISTON SEAL

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



REAR BRAKE COMPONENTS INSPECTION AND REPAIR

BR04B–01

1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

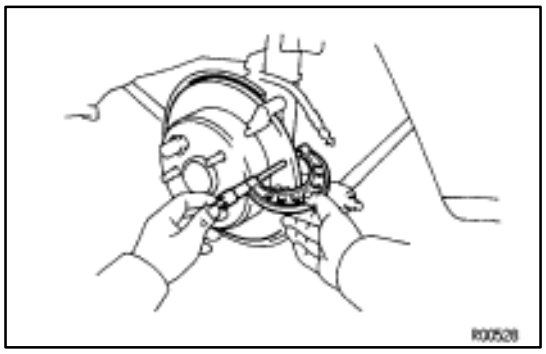
Standard thickness:

10.0 mm (0.394 in.)

Minimum thickness:

1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum thickness or less, or if the pad has severely uneven wear.



2. MEASURE ROTOR DISC THICKNESS

Using a micrometer, measure the rotor disc thickness.

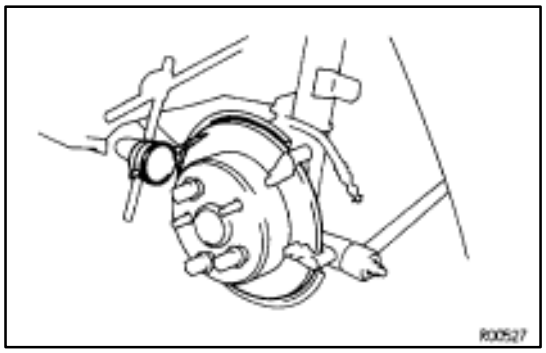
Standard thickness:

10.0 mm (0.394 in.)

Minimum thickness:

9.0 mm (0.354 in.)

Replace the rotor disc if the thickness of the rotor disc is at the minimum thickness or less. Replace the rotor disc or grind it on a lathe if it is scored or is worn unevenly.



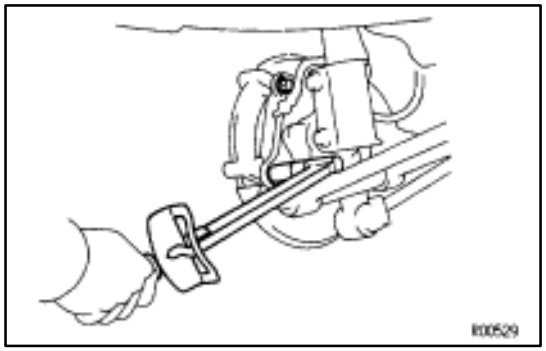
3. MEASURE ROTOR DISC RUNOUT

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

Maximum disc runout:

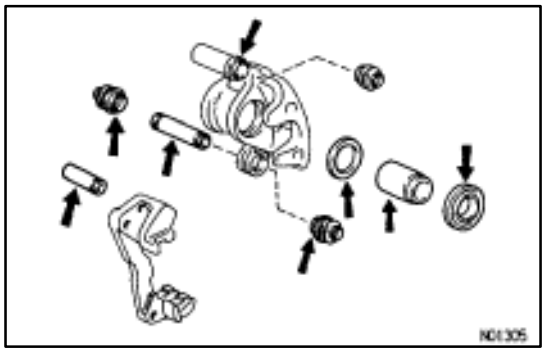
0.15 mm (0.0059 in.)

If the runout is greater than the maximum, replace the disc. HINT: Before measuring the runout, confirm that the hub bearing play is within specification.



4. IF NECESSARY, REPLACE ROTOR DISC

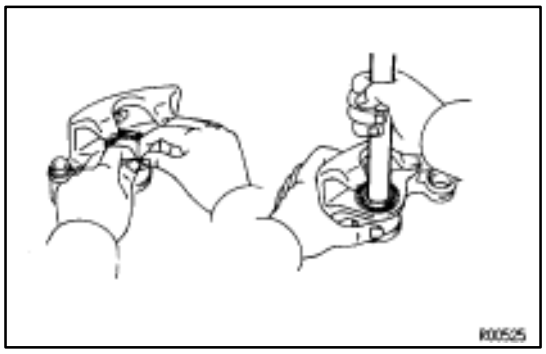
(a) Remove the torque plate.
(b) Remove the hub nuts of the temporarily installed disc and pull off the rotor disc.
(c) Install a new rotor disc and loosely install the hub nuts.
(d) Install the torque plate and tighten the mounting bolt.
Torque: 47 N·m (475 kgf·cm, 34 ft·lbf)



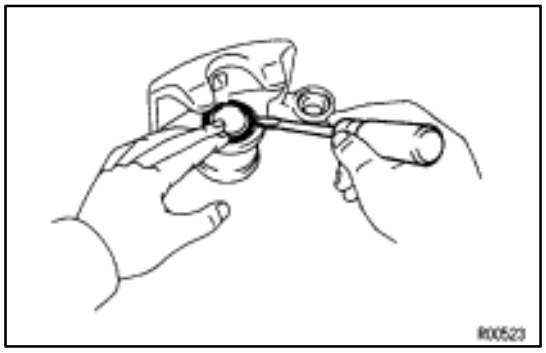
CYLINDER ASSEMBLY

BR04C–01

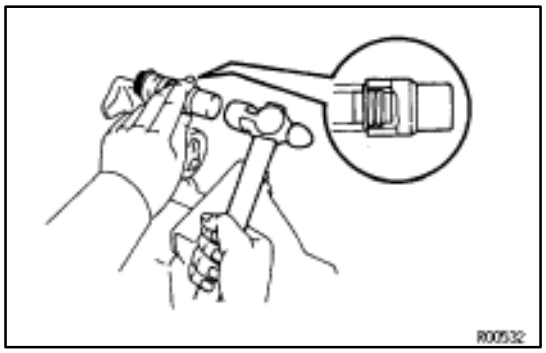
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



2. INSTALL PISTON SEAL AND PISTON IN CYLINDER

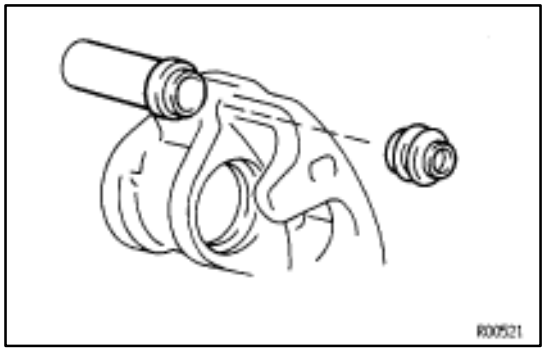


3. INSTALL CYLINDER BOOT AND SET RING IN CYLINDER

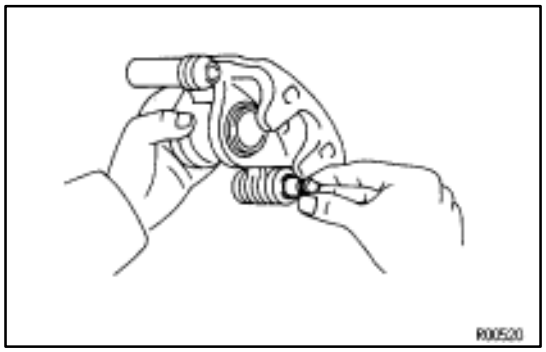


4. INSTALL DUST BOOTS

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



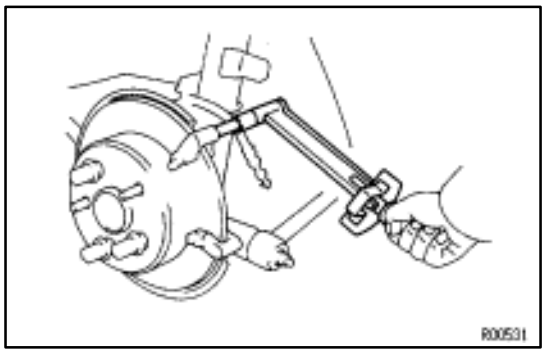
5. INSTALL MAIN PIN BOOT



6. INSTALL SLIDING BUSHING

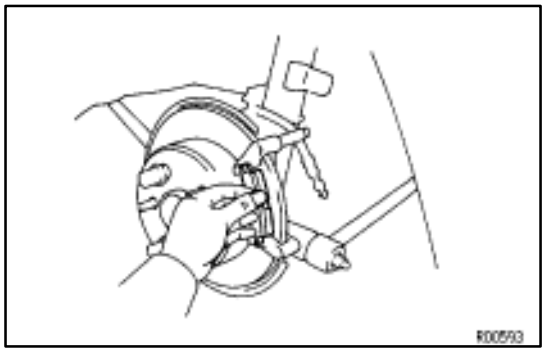
CYLINDER INSTALLATION

BR04D–01



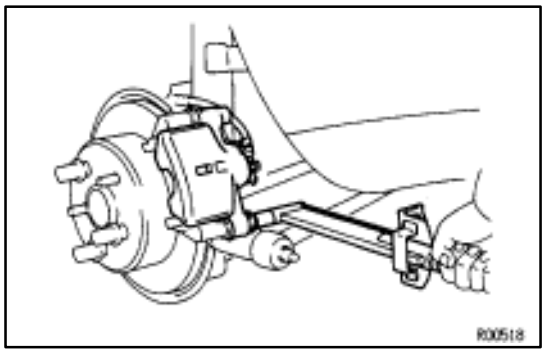
1. INSTALL MAIN PIN

Install the main pin and torque the main pin installation bolt.
Torque: 27 N·m (270 kgf·cm, 19 ft·lbf)



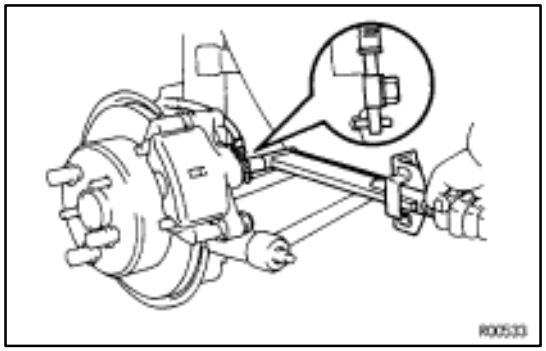
2. INSTALL TWO PADS

Install two pads with the pad wear indicator plate facing upward.
NOTICE: There should be no oil or grease adhering to the friction surfaces of the pads or the rotor disc.



3. INSTALL CYLINDER

Install the brake cylinder and torque the installation bolt.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

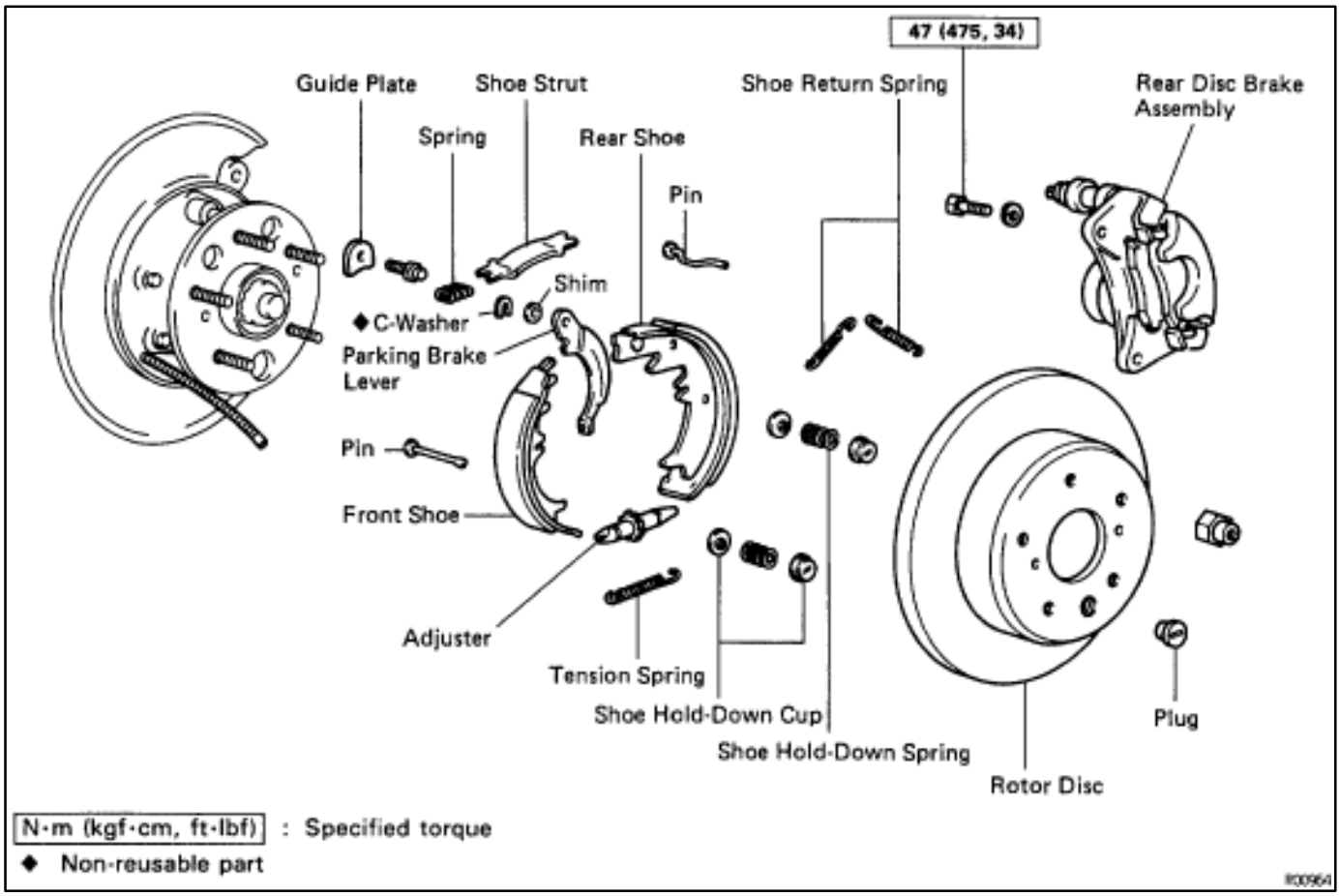


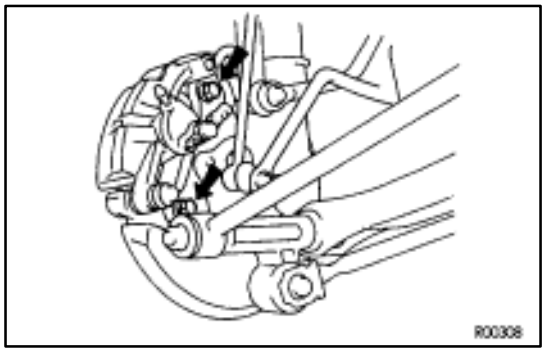
4. **CONNECT FLEXIBLE HOSE**
   Install the flexible hose on the brake cylinder with two new gaskets.
   Torque: 29 N·m (300 kgf·cm, 14 ft·lbf)
   HINT: Insert the flexible hose lock securely in the lock hole in the brake cylinder.
5. **FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM**
   (See brake system bleeding)
6. **CHECK FOR LEAKS**

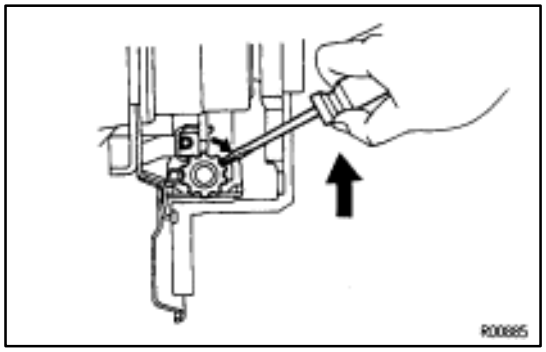
REAR BRAKE (PARKING BRAKE)

BR04E–01

COMPONENTS







PARKING BRAKE DISASSEMBLY

BR04F–01

1. REMOVE REAR WHEEL

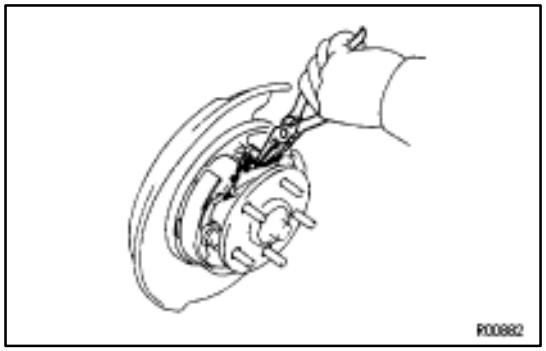
2. REMOVE REAR DISC BRAKE ASSEMBLY

(a) Remove the two mounting bolts and remove the disc brake assembly.

(b) Suspend the disc brake so the hose is not stretched.

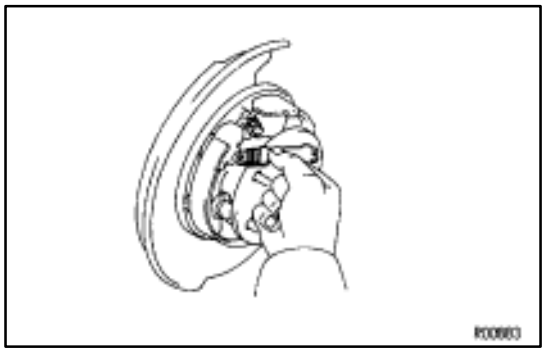
3. REMOVE ROTOR DISC

HINT: If the rotor disc cannot be removed easily, return the shoe adjuster until the wheel turns freely.

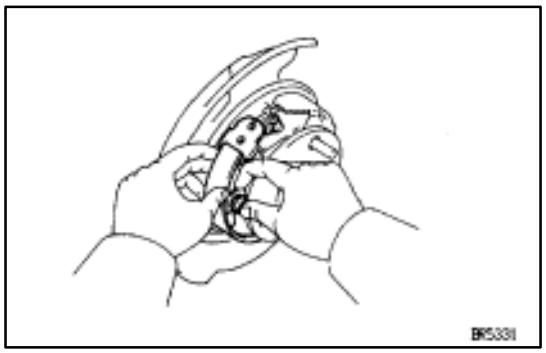


4. REMOVE SHOE RETURN SPRINGS

Using needle–nose pliers, remove the two shoe return springs.

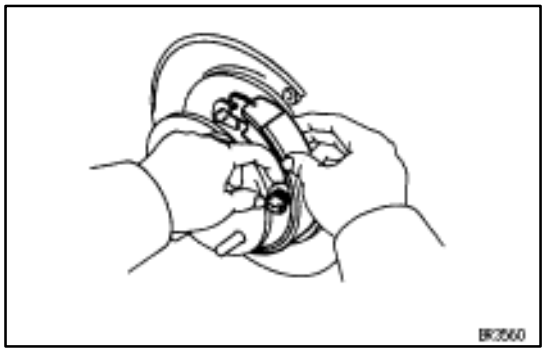


5. REMOVE SHOE STRUT WITH SPRING



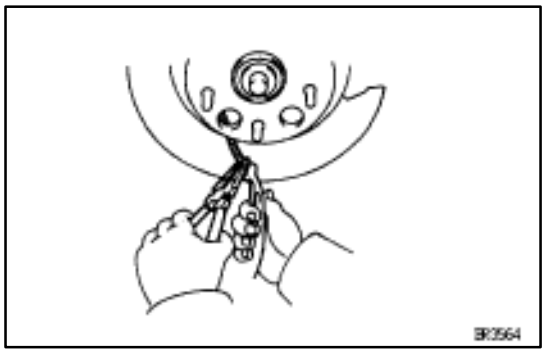
6. REMOVE FRONT SHOE ADJUSTER AND TENSION SPRING

(a) Slide out the front shoe and remove the shoe adjuster.
(b) Disconnect the tension spring and remove the front shoe.



7. REMOVE REAR SHOE

(a) Slide out the rear shoe.
(b) Remove the tension spring from the rear shoe.



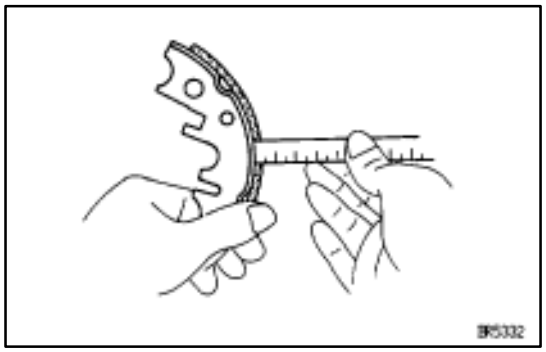
(c) Disconnect the parking brake cable from the parking brake shoe lever.
(d) Remove the shoe hold–down spring cups, springs and pins.

PARKING BRAKE COMPONENTS INSPECTION AND REPAIR

BR04G–01

1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



2. MEASURE BRAKE SHOE LINING THICKNESS

Using a scale, measure the thickness of the shoe lining.

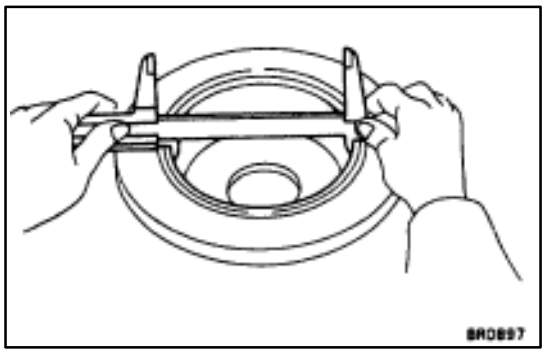
Standard thickness:

2.0 mm (0.079 in.)

Minimum thickness:

1.0 mm (0.039 in.)

If the lining thickness is at the minimum thickness or less, or if there is extremely uneven wear, replace the brake shoe.



3. MEASURE BRAKE DISC INSIDE DIAMETER

Using a vernier caliper, measure the inside diameter of the rotor disc.

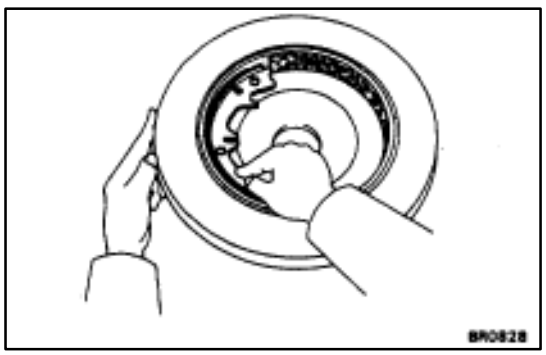
Standard inside diameter:

170 mm (6.69 in.)

Minimum inside diameter:

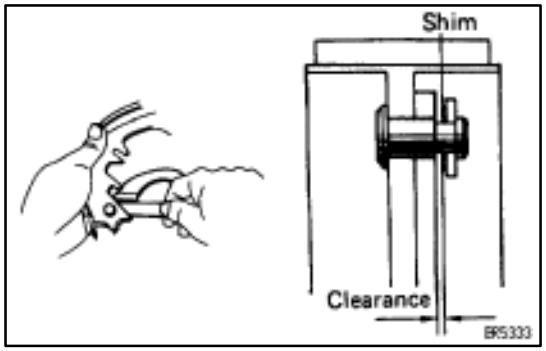
171 mm (6.73 in.)

Replace the rotor disc if the inside diameter is at the maximum value or more. Replace the rotor disc or grind it with a lathe if the rotor disc is scored or is worn unevenly.



4. INSPECT PARKING BRAKE LINING AND DISC FOR PROPER CONTACT

Apply chalk to the inside surface of the rotor, then grind down the brake shoe lining to fit. If the contact between the rotor disc and the brake shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe assembly.



5. MEASURE CLEARANCE BETWEEN PARKING BRAKE SHOE AND LEVER

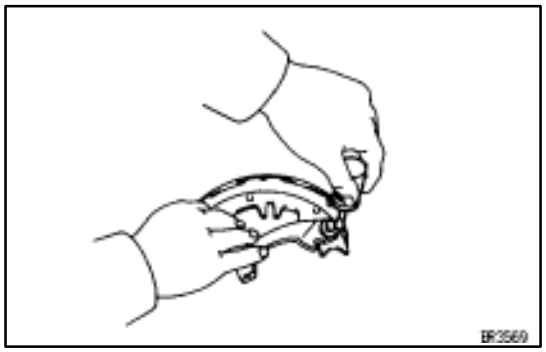
Using a feeler gauge, measure the clearance.

Standard clearance:

Less than 0.35 mm (0.0138 in.)

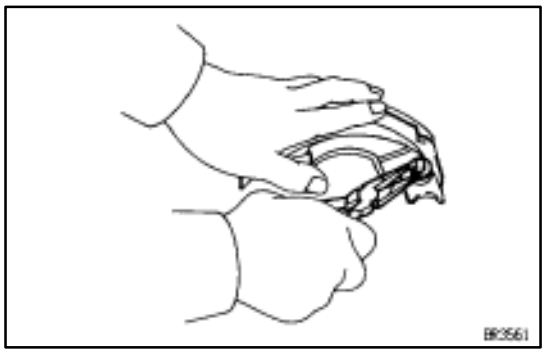
If the clearance is not within the specification, replace the shim with one of the correct size.

Thickness	mm(in.)	Thickness	mm(in.)
0.3	(0.012)	0.9	(0.035)
0.6	(0.024)		



6. IF NECESSARY, REPLACE SHIM

(a) Remove the parking brake shoe lever, and install the correct size shim.



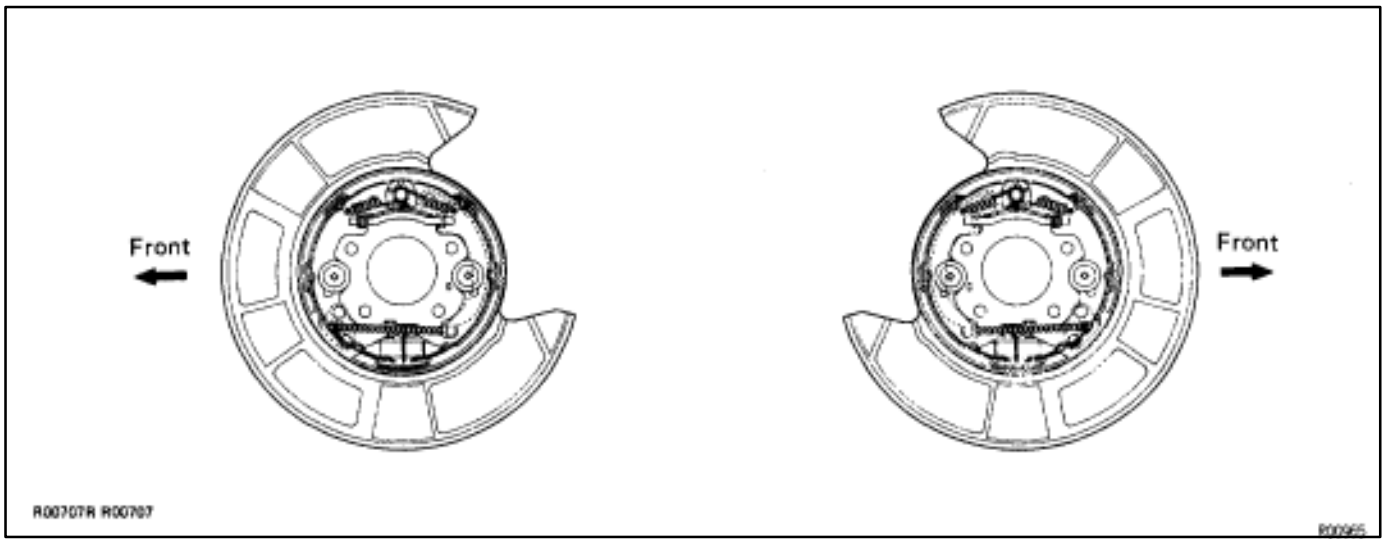
(b) Install the parking brake shoe lever with a new C–washer.

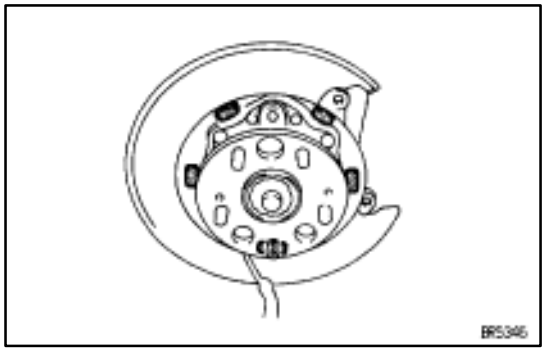
(c) Remeasure the clearance.

PARKING BRAKE ASSEMBLY

BR04H–01

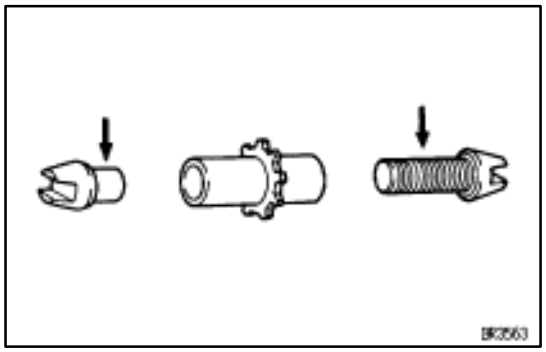
HINT: Assemble the parts in the correct direction as shown.



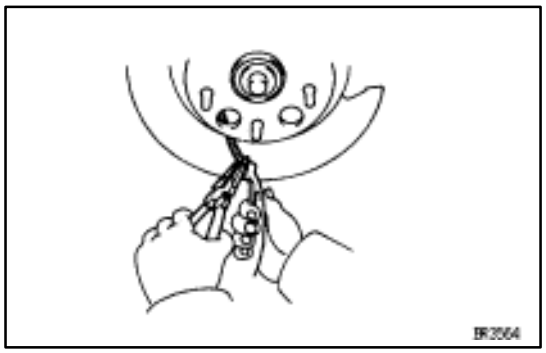


1. APPLY HIGH TEMPERATURE GREASE ON BACKING PLATE AS SHOWN

Apply high temperature grease to the sliding surfaces of the shoe.

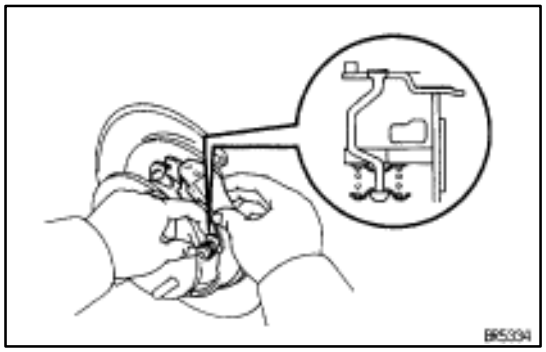


2. APPLY HIGH TEMPERATURE GREASE TO ADJUSTER AS SHOWN



3. CONNECT PARKING BRAKE CABLE TO PARKING BRAKE LEVER

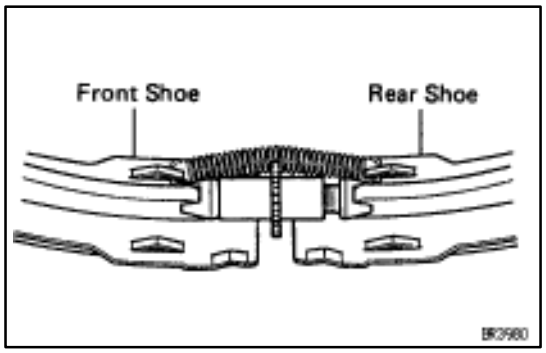
(a) Install the shoe hold–down springs, cups and pins.
(b) Connect the parking brake cable to the parking brake shoe lever of the rear shoe.



4. INSTALL REAR SHOE

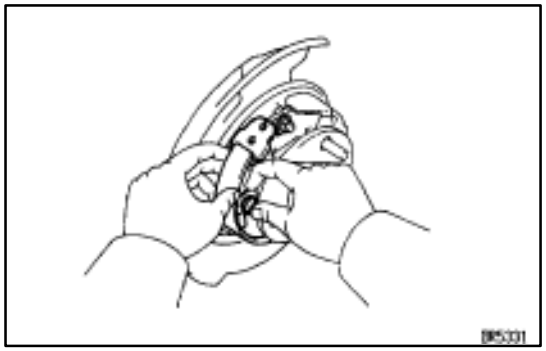
Slide in the rear shoe between the shoe hold–down spring cup and the backing plate.

NOTICE: Do not allow oil or grease to get on the rubbing face.



5. INSTALL TENSION SPRING, FRONT SHOE AND ADJUSTER

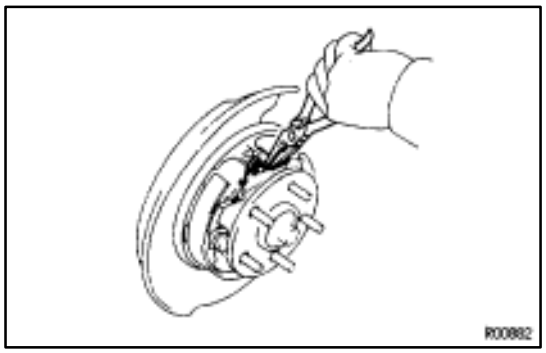
(a) Install the tension spring on the rear shoe.
(b) Install the front shoe on the tension spring.
(c) Install the adjuster between the front and rear shoes.



(d) Slide in the front shoe between the shoe hold–down spring cup and the backing plate.

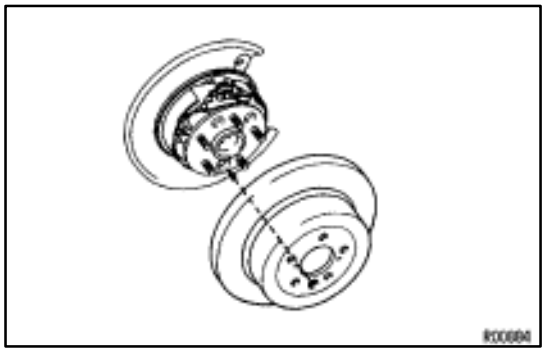
6. INSTALL STRUT WITH SPRING

Install the strut with the spring forward.



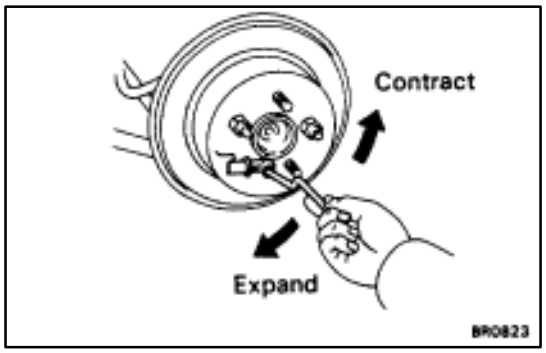
7. INSTALL SHOE RETURN SPRINGS

Using needle–nose pliers, install the shoe return springs.



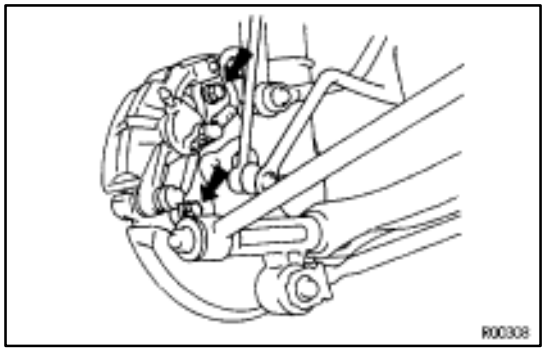
8. INSTALL ROTOR DISC

(a) Before installing, polish the disc and shoe surfaces with sandpaper.
(b) Align the hole on the rear axle shaft flange and service hole on the disc.



9. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Temporarily install the hub nuts.
(b) Remove the hole plug.
(c) Turn the adjuster and expand the shoes until the rotor disc locks.
(d) Return the adjuster eight notches.
(e) Install the hole plug.



10. INSTALL REAR DISC BRAKE ASSEMBLY

Install the disc brake assembly and torque the two mounting bolts.

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

11. INSTALL REAR WHEEL

12. SETTLING PARKING BRAKE SHOES AND DISC

(a) Drive the vehicle at about 50 km/h (31 mph) on a safe, level and dry road.

(b) With the parking brake release button pushed in, pull on the lever with 98 N (10 kgf, 19.8 lbf) of force.

(c) Drive the vehicle for about 400 meters (0.25 mile) in this condition.

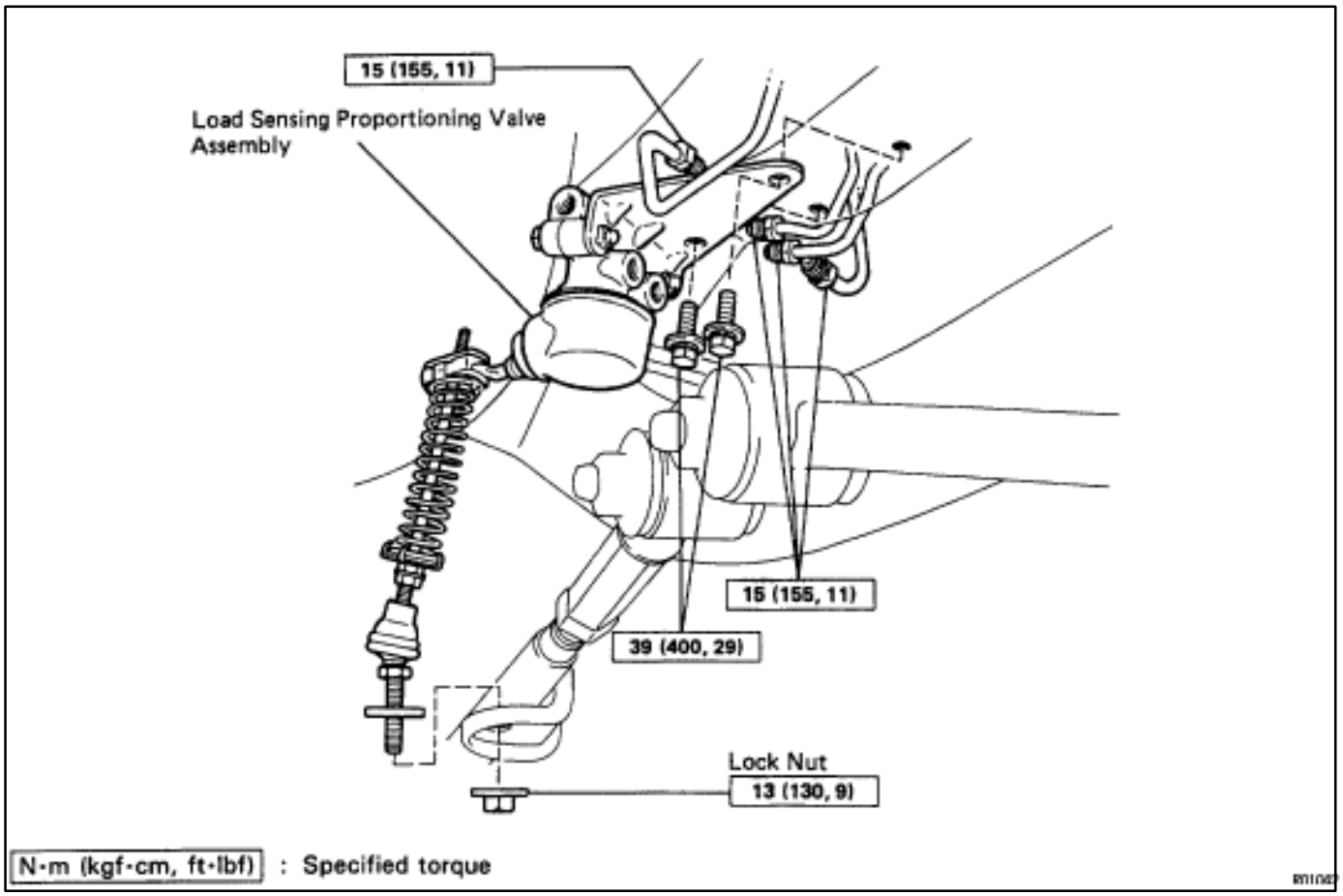
(d) Repeat this procedure two or three times.

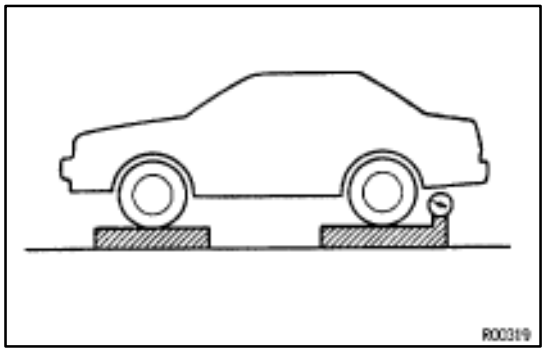
13. CHECK AND ADJUST PARKING BRAKE LEVER TRAVEL (See parking brake check and adjustment)

LOAD SENSING PROPORTIONING VALVE (LSPV)

BR04J–01

COMPONENTS





FLUID PRESSURE CHECK AND ADJUSTMENT

BR04K–01

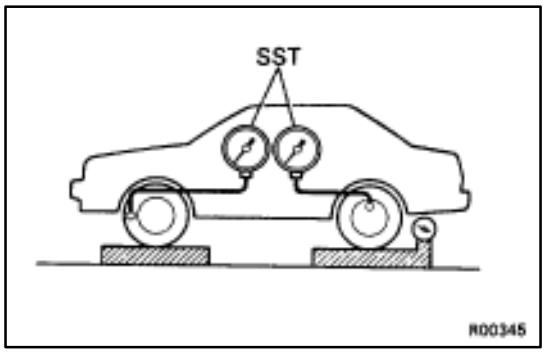
1. SET REAR AXLE LOAD

(a) Set the vehicle to its curb weight.

(b) Measure the rear axle load and note the value.

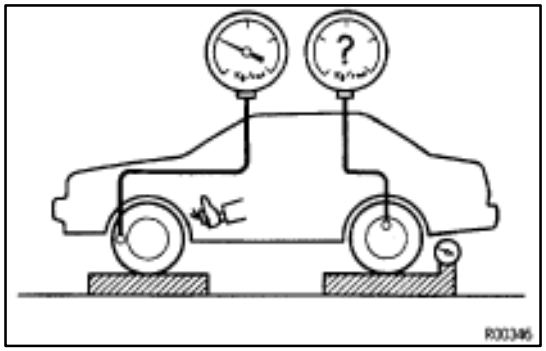
(c) Set the rear axle load.

Rear axle load: Rear axle curb weight + 31 kg (68 lb)



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

SST 09709–29017

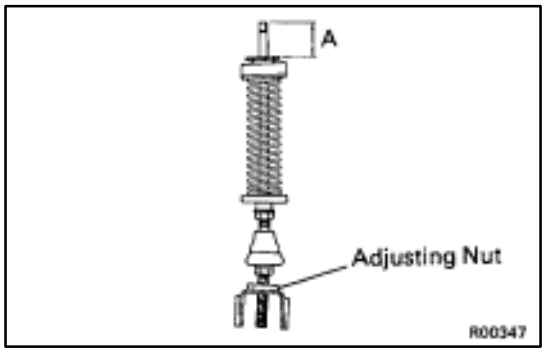


3. RAISE FRONT BRAKE PRESSURE TO 1,787 kpa (110 kgf/cm^2, 1,565 psi) CHECK REAR BRAKE PRESSURE

Brake pressure:

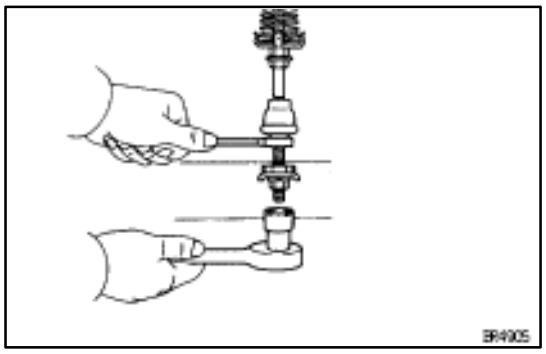
6,227–7,208 kpa (63.5–73.5 kgf/cm^2, 903–1,045 psi)

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



4. IF NECESSARY, ADJUST FLUID PRESSURE

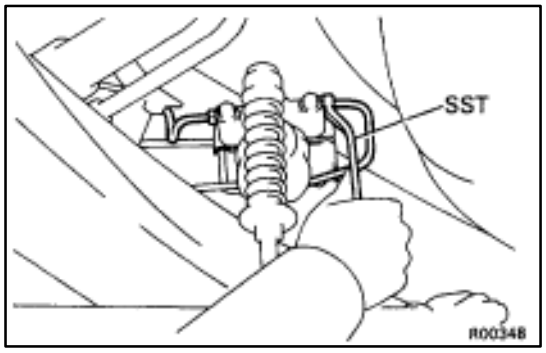
(a) Adjust the fluid pressure by changing the shaft length.
Low pressure–Lengthen A
High pressure–Shorten A
HINT: The fluid pressure is adjusted 245 kpa (2.5 kgf/cm^2, 36 psi) per each turn of the adjusting nut.



(b) Torque the lock nut.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)
If it cannot be adjusted, replace the valve assembly.

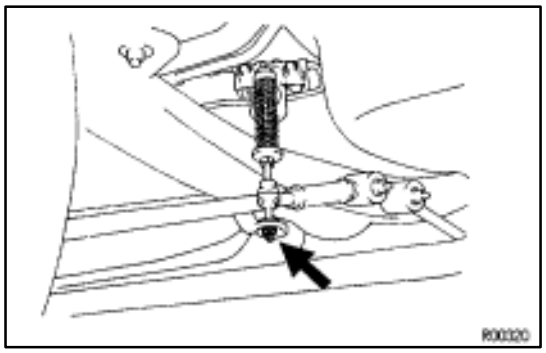
LSPV REMOVAL

BR04L–01



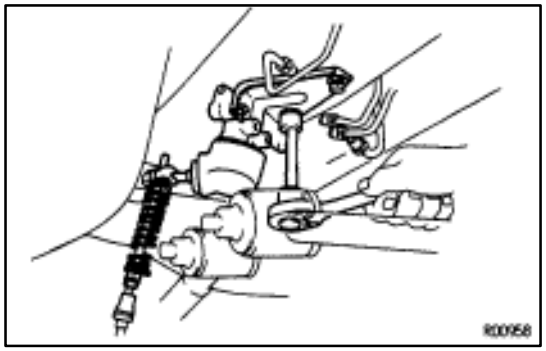
1. DISCONNECT BRAKE TUBES

Using SST, disconnect the brake tubes from the valve body.
SST 09751–36011

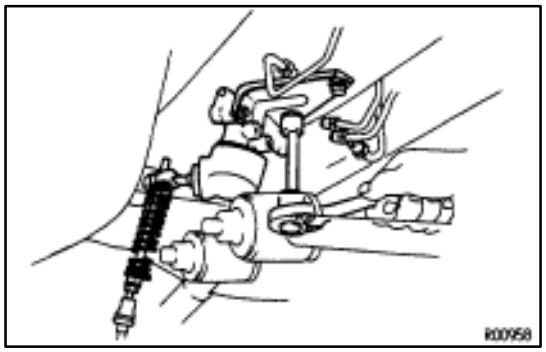


2. REMOVE LSPV ASSEMBLY

(a) Remove the lock nut and disconnect the adjusting bolt from the rear suspension arm.



(b) Remove the two mounting bolts and remove the LSPV assembly.



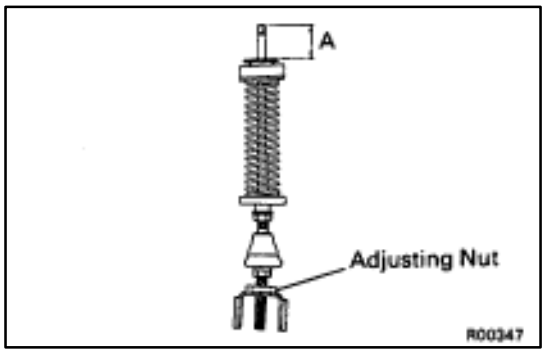
LSPV INSTALLATION

BR04M–01

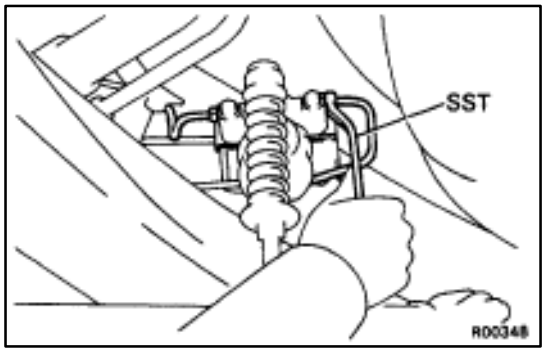
1. INSTALL LSPV ASSEMBLY

(a) Install the valve assembly with the two mounting bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Install the adjusting nut to the adjusting bolt and then install the adjusting bolt lock bolt to the rear suspension arm with the adjusting bolt lock nut.



(c) Set the shaft length A to initial set length and temporarily tighten the adjusting bolt lock nut.
Initial set length:
27.5 mm (1.08 in.)



2. CONNECT BRAKE TUBES
Using SST, connect the brake tubes.
SST 09751–36011
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

3. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM
(See brake system bleeding)

4. CHECK FOR FLUID LEAKAGE

5. CHECK AND ADJUST FLUID PRESSURE

6. REMOVE SST AND BLEED BRAKE SYSTEM
SST 09709–29017

7. CHECK FOR FLUID LEAKAGE

–MEMO–

ANTI–LOCK BRAKE SYSTEM (ABS)

ANTI–LOCK BRAKE SYSTEM (ABS)

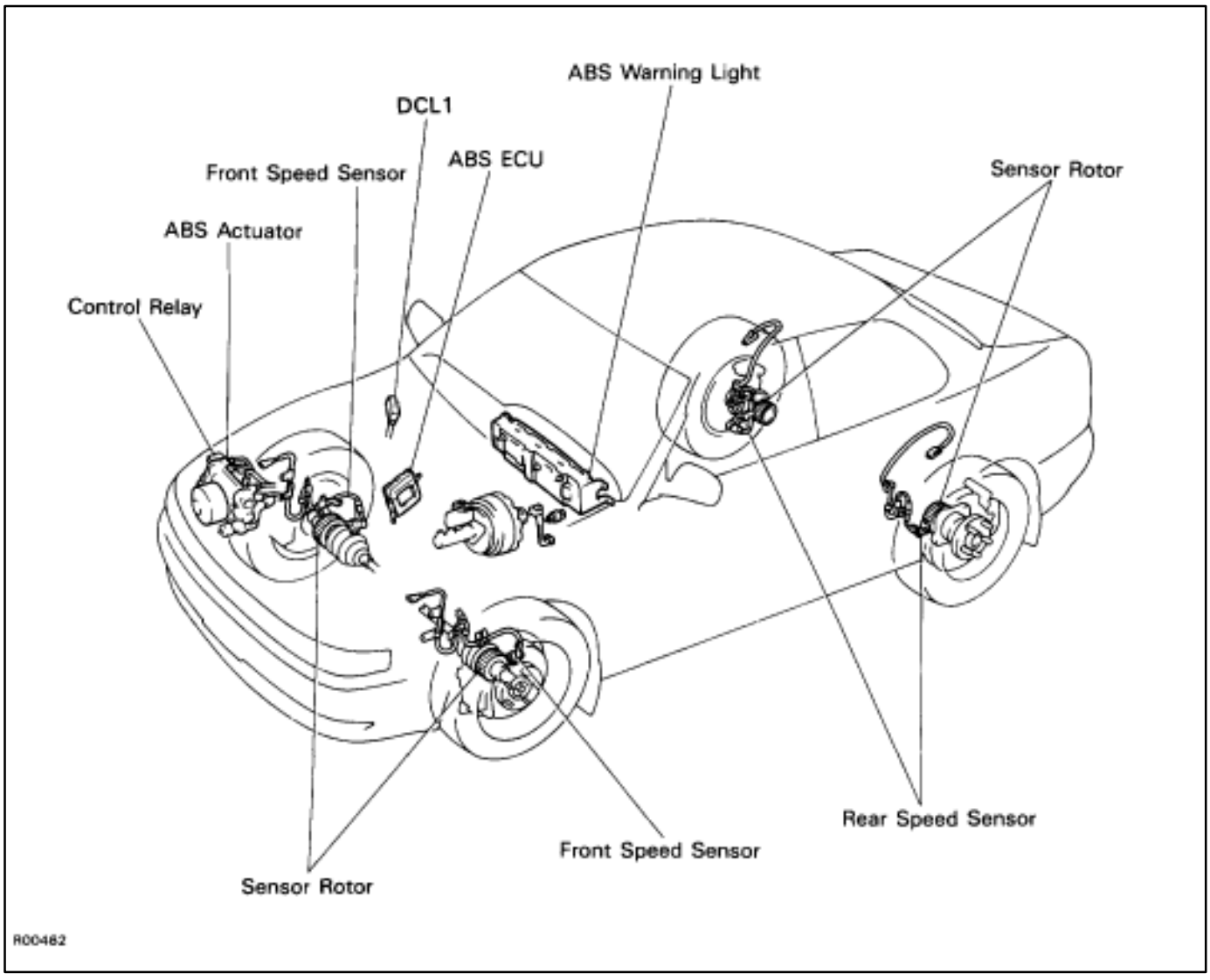
Description

1 The ABS is a brake system which controls the wheel 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.

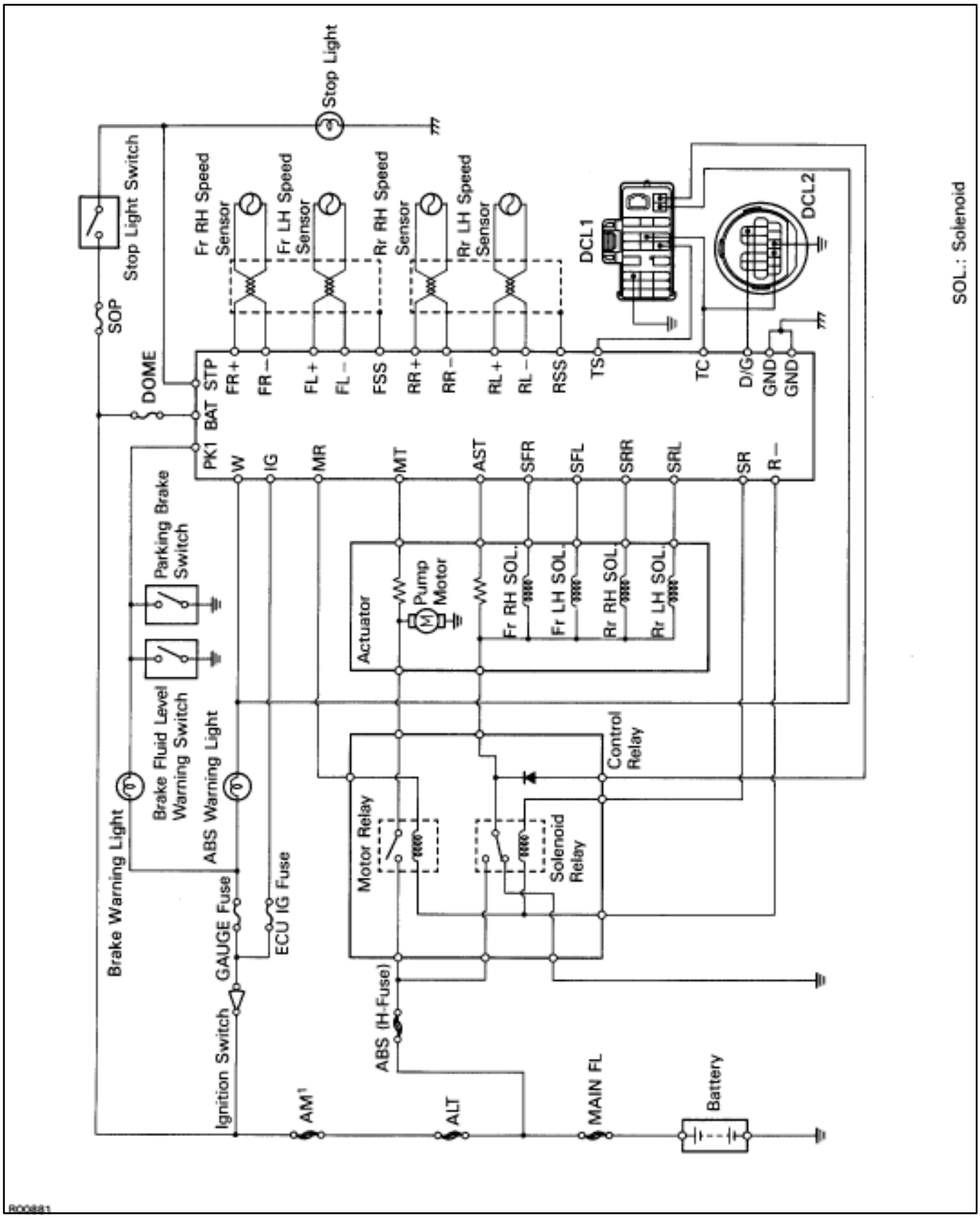
1 The function of the ABS is to help maintain directional stability and vehicle steerability on most road conditions. However, the system cannot prevent the vehicle from skidding if the cornering speed limit is exceeded.

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

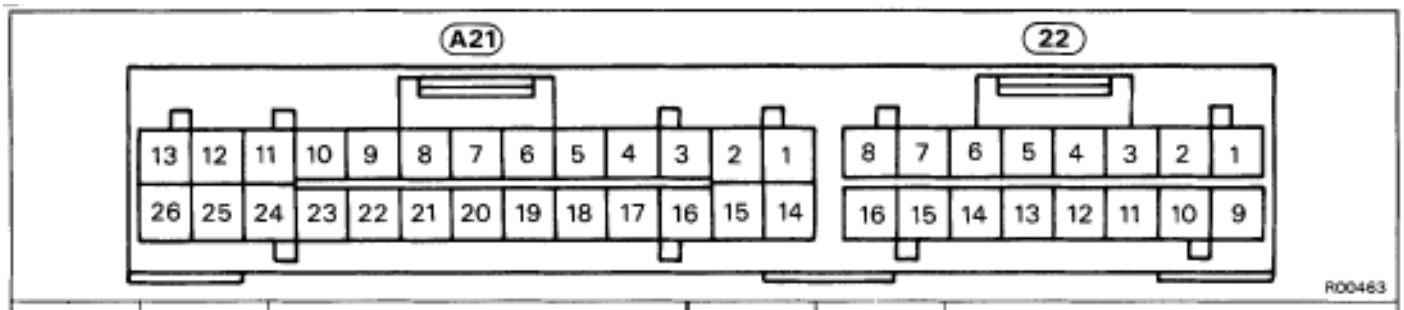
LOCATION OF SYSTEM PARTS



WIRING DIAGRAM



TERMINALS OF ECM (w/o TRAC)



Terminal No.	Symbol	Connection	Terminal No.	Symbol	Connection
A21-1	SFR	Front right solenoid	A22-1	RL–	Rear left sensor
2	GND	Ground	2	–	–
3	FR–	Front right speed sensor	3	–	–
4	–	–	4	DG	DCL2
5	Tc	DCL2	5	–	–
6	MT	ABS motor relay monitor	6	STP	Stop light switch
7	–	–	7	RSS	Sealed wiring harness
8	–	–	8	RR+	Rear right speed sensor
9	FL+	Front left speed sensor	9	RL+	Rear left speed sensor
10	FSS	Sealed wiring harness	10	–	–
11	SR	ABS control (solenoid) relay	11	–	–
12	IG	Ignition switch	12	–	–
13	SFL	Front left solenoid	13	W	ABS warning light
14	SRL	Rear left solenoid	14	PKB	Parking brake switch
15	GND	Ground	15	TS	DCL1
16	FR+	Front speed sensor	16	RR–	Rear right speed sensor
17	–	–			
18	AST	ABS control (solenoid) relay monitor			
19	–	–			
20	–	–			
21	–	–			
22	FL–	Rear left speed sensor			
23	MR	ABS control (motor) relay			
24	R–	Relay			
25	BAT	Battery ground			
26	SRR	Rear solenoid			

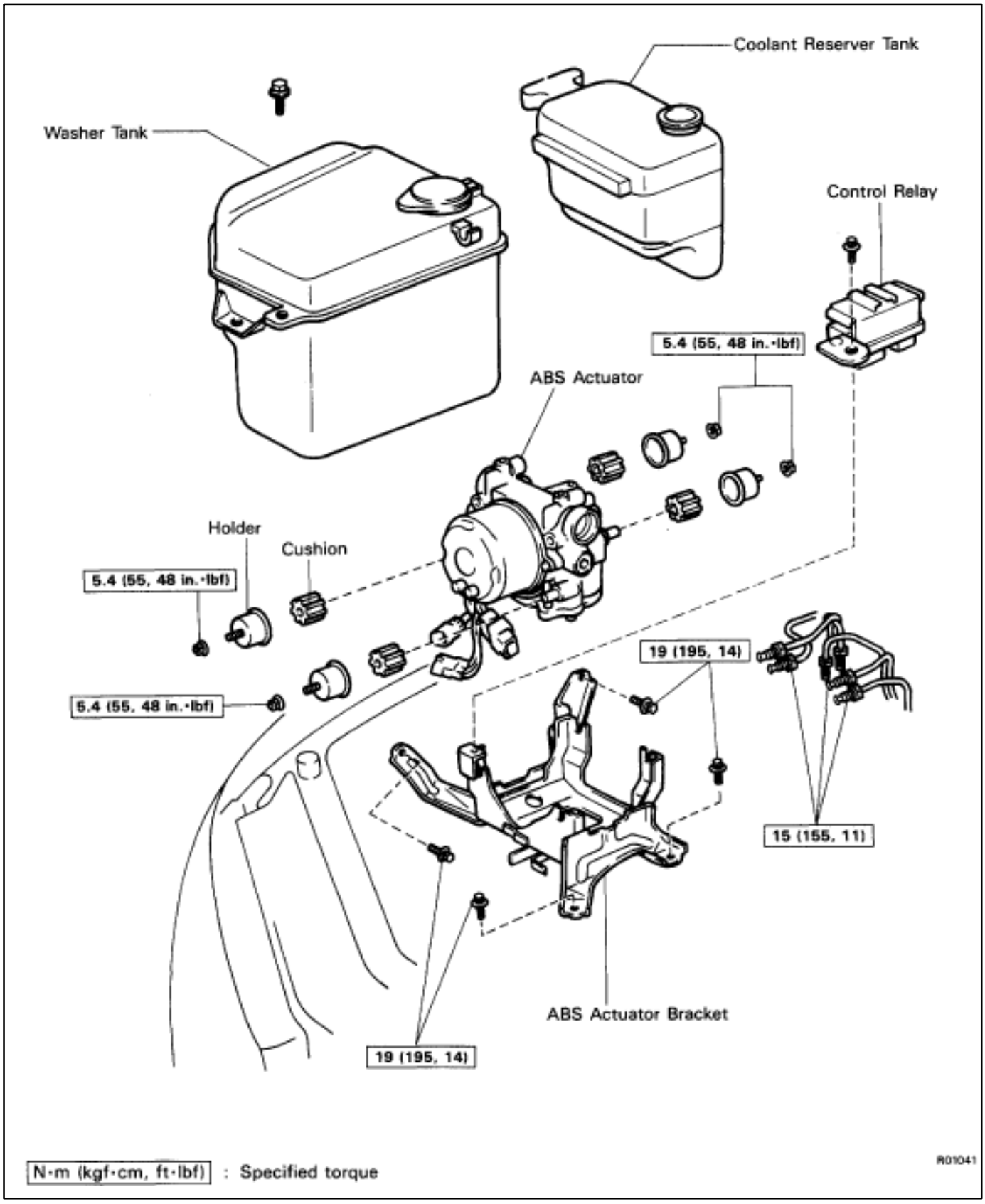
STANDARD VALUE OF ECM TERMINALS

Symbols (Terminals No.)	STD Voltage (V)	Condition
BAT (A21-25) – GND (A21-$\frac{2}{15}$)	10 – 14	Always
IG (A21-12) – GND (A21-$\frac{2}{15}$)	10 – 14	IG switch ON
SR (A21-11) – R– (A21-24)	10 – 14	IG switch ON, ABS warning light OFF
MR (A21-23) – R– (A21-24)	Below 1.0	IG switch ON
SFR (A21-1) – GND (A21-$\frac{5}{15}$)	10 – 14	IG switch ON, ABS warning light OFF
SFL (A21-13) – GND (A21-$\frac{2}{15}$)	10 – 14	IG switch ON, ABS warning light OFF
SRR (A21-26) – GND (A21-$\frac{2}{15}$)	10 – 14	IG switch ON, ABS warning light OFF
AST (A21-18) – GND (A21-$\frac{2}{15}$)	10 – 14	IG switch ON, ABS warning light OFF
W (A22-13) – GND (A21-$\frac{2}{15}$)	Below 1.0	IG switch ON, ABS warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
PKB (A22-14) – GND (A21-$\frac{2}{15}$)	Below 1.0	IG switch ON, PKB switch ON
	10 – 14	IG switch ON, PKB switch OFF
STP (A22-6) – GND (A21-$\frac{2}{15}$)	Below 1.0	Stop light switch OFF
	10 – 14	Stop light switch ON
DG (A22-4) – GND (A21-$\frac{2}{15}$)	10 – 14	IG switch ON, ABS warning light OFF
Tc (A21-5) – GND (A21-$\frac{2}{15}$)	10 – 14	IG switch ON
Ts (A22-15) – GND (A21-$\frac{2}{15}$)	10 – 14	IG switch ON
FR+ (A21-16) – FR– (A21-3)	AC generation	IG switch ON Slowly turn right front wheel
FL+ (A21-9) – FL– (A21-22)	AC generation	IG switch ON Slowly turn left front wheel
RR+ (A22-8) – RR– (A22-16)	AC generation	IG switch ON Slowly turn right rear wheel
RL+ (A22-9) – RL– (A22-1)	AC generation	IG switch ON Slowly turn left rear wheel

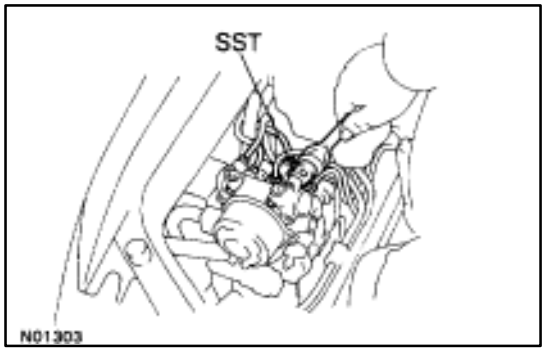
ABS Actuator

ABS ACTUATOR REMOVAL AND INSTALLATION

Remove and install the parts as shown.



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



(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 09023–00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lb)

2. BLEED BRAKE SYSTEM

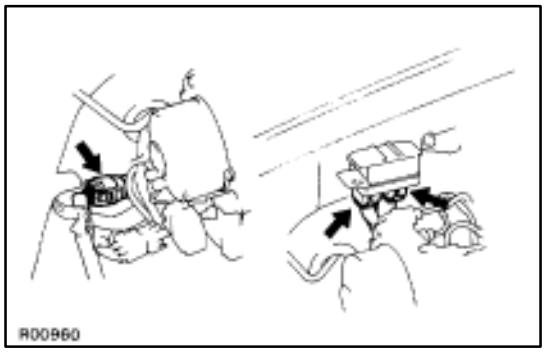
(See brake system bleeding)

ABS ACTUATOR OPERATION INSPECTION

1. INSPECT BATTERY VOLTAGE

Battery positive voltage: 10–14 V

2. REMOVE WASHER TANK



3. DISCONNECT CONNECTORS

(a) Disconnect the connector from the actuator.

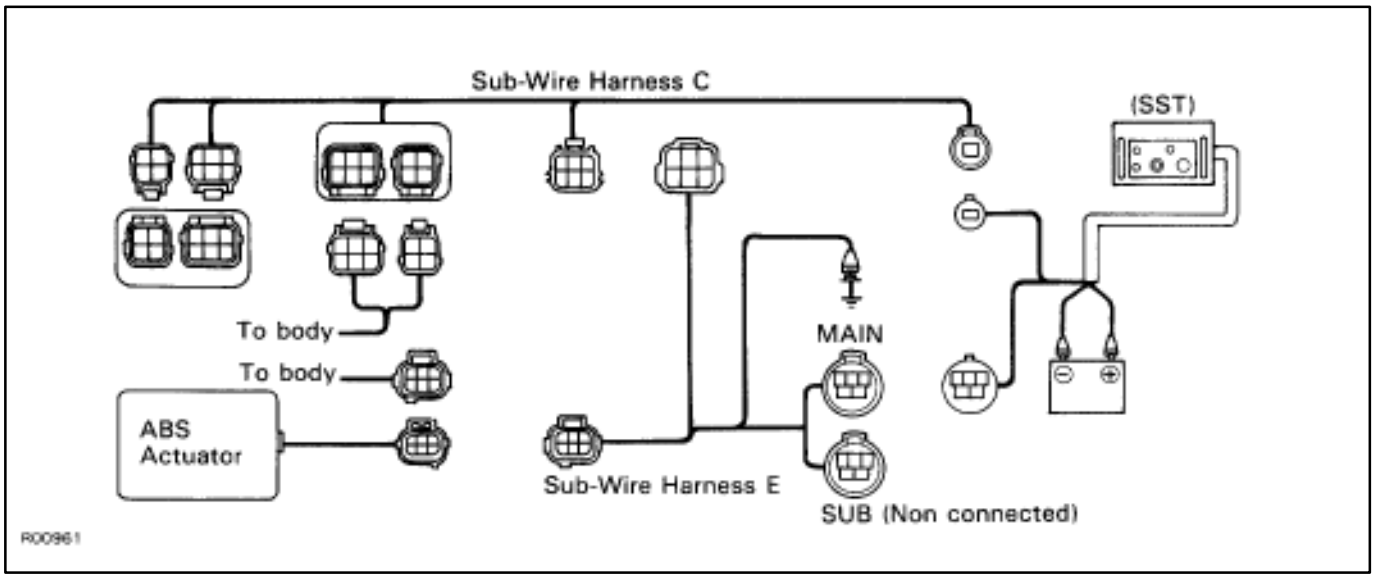
(b) Remove control relay and disconnect the connectors from the control relay.

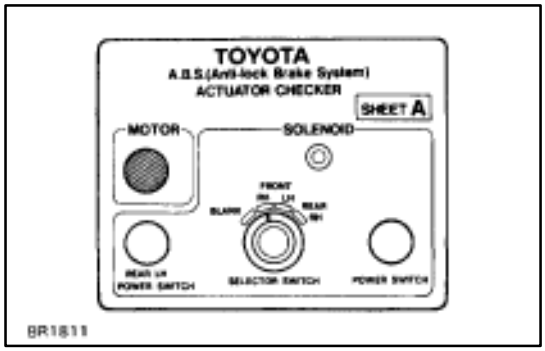
4. CONNECT ACTUATOR CHECKER (SST) TO ACTUATOR

(a) Connect the actuator checker (SST) to the actuator, control relay and body side wire harness through the sub–wire harness (SST) as shown.
SST 09990–00150, 09990–00200 and 09990–00210

(b) Connect the red cable of the checker to the battery positive (+) terminal and black cable to the negative (–) terminal. Connect the black cable of the sub–wire harness to the battery negative (–) terminal or body ground.

(c) Place the “SHEET A” (SST) on the actuator checker.
SST 09990–00163





BR1811

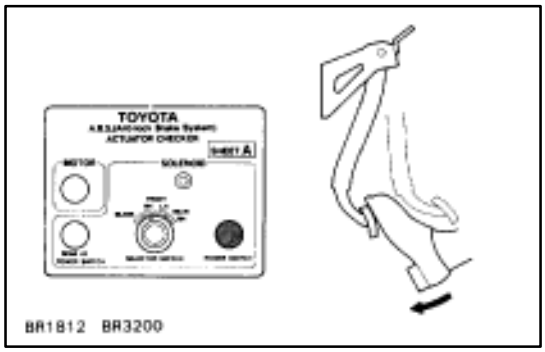
5. INSPECT BRAKE ACTUATOR OPERATION

(a) Start the engine, and run it at idle.

(b) Turn the selector switch of the actuator checker to “FRONT RH” position.

(c) Push and hold in the MOTOR switch for a few seconds.

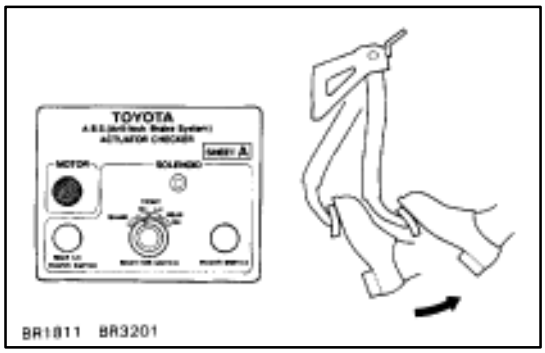
(d) Depress the brake pedal and hold it until the step (g) is completed.



BR1812 BR3200

(e) Push the POWER SWITCH, and check that the brake pedal does not go down.
NOTICE: Do not keep the POWER SWITCH pushing more than 10 seconds.

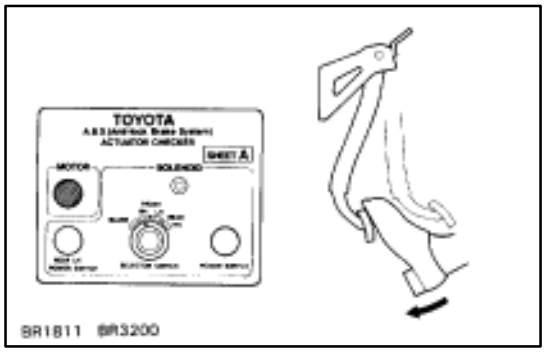
(f) Release the switch, and check that the pedal go down.



BR1811 BR3201

(g) Push and hold in the MOTOR switch for a few seconds, and check that the pedal returns.

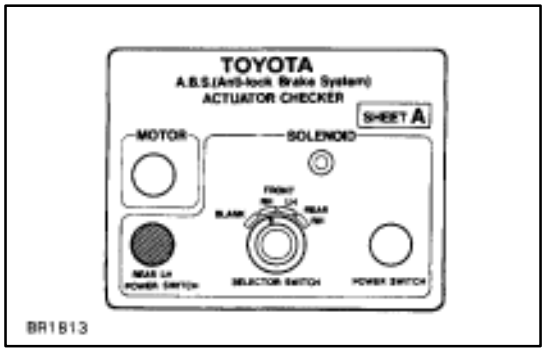
(h) Release the brake pedal.



BR1811 BR3200

(i) Push and hold in the 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 MOTOR switch for a few seconds. Check that the brake pedal does not pulsate.



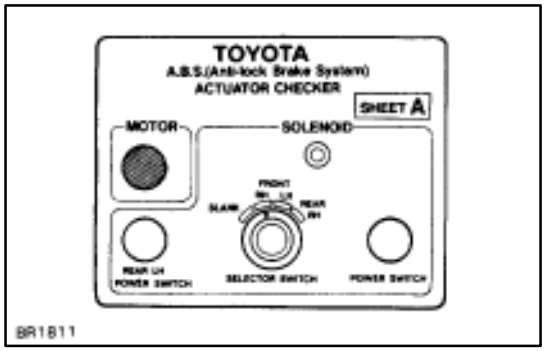
BR1813

6. INSPECT FOR OTHER WHEELS

(a) Turn the selector switch to “FRONT LH” position.

(b) Repeating (c) to (j) of the step 5, check the actuator operation similarly.

(c) Similarly, inspect “REAR RH” and “REAR LH” position.
HINT: When inspecting “REAR LH” position, push the REAR LH switch instead of the POWER SWITCH, and you can inspect in any selector switch position.



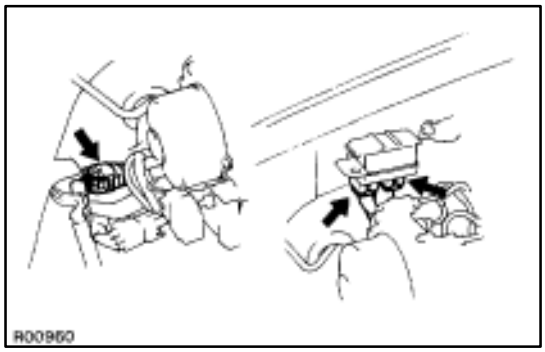
7. PUSH MOTOR SWITCH

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

8. DISCONNECT ACTUATOR CHECKER (SST) FROM ACTUATOR

Remove the “SHEET A” (SST) and disconnect the actuator checker (SST) and sub–wire harness (SST) from the actuator, control relay and body side wire harness.

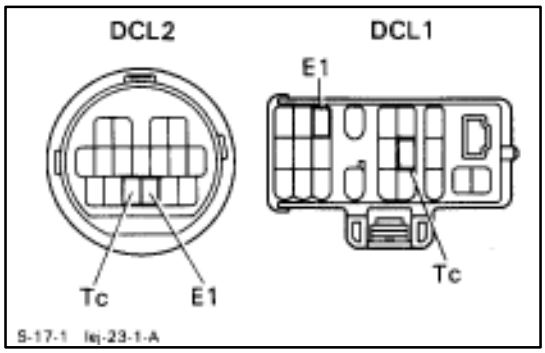
SST 09990–00150, 09990–00200, 09990–00210 and 09990–00163



9. CONNECT ACTUATOR CONNECTORS

Connect the three connectors to actuator and control relay.

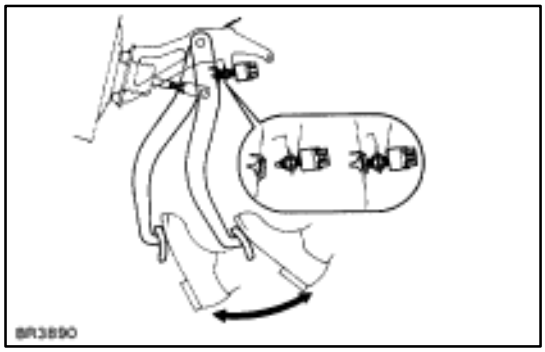
10. INSTALL CONTROL RELAY



11. CLEAR DIAGNOSTIC TROUBLE CODES

(a) Using SST, connect terminals Tc and E1 of DCL2 or DCL1.
SST 09843–18020

(b) IG switch ON.



(c) Clear the diagnostic trouble codes stored in ECU by depressing the brake pedal 8 or more times within 3 seconds.

(d) Check that the warning light shows the normal code.

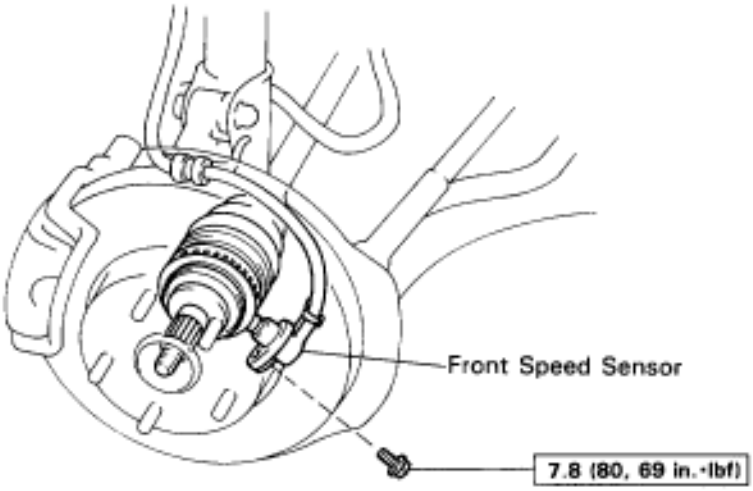
(e) Remove the SST from the terminals of DCL2 or DCL1.

Speed Sensor

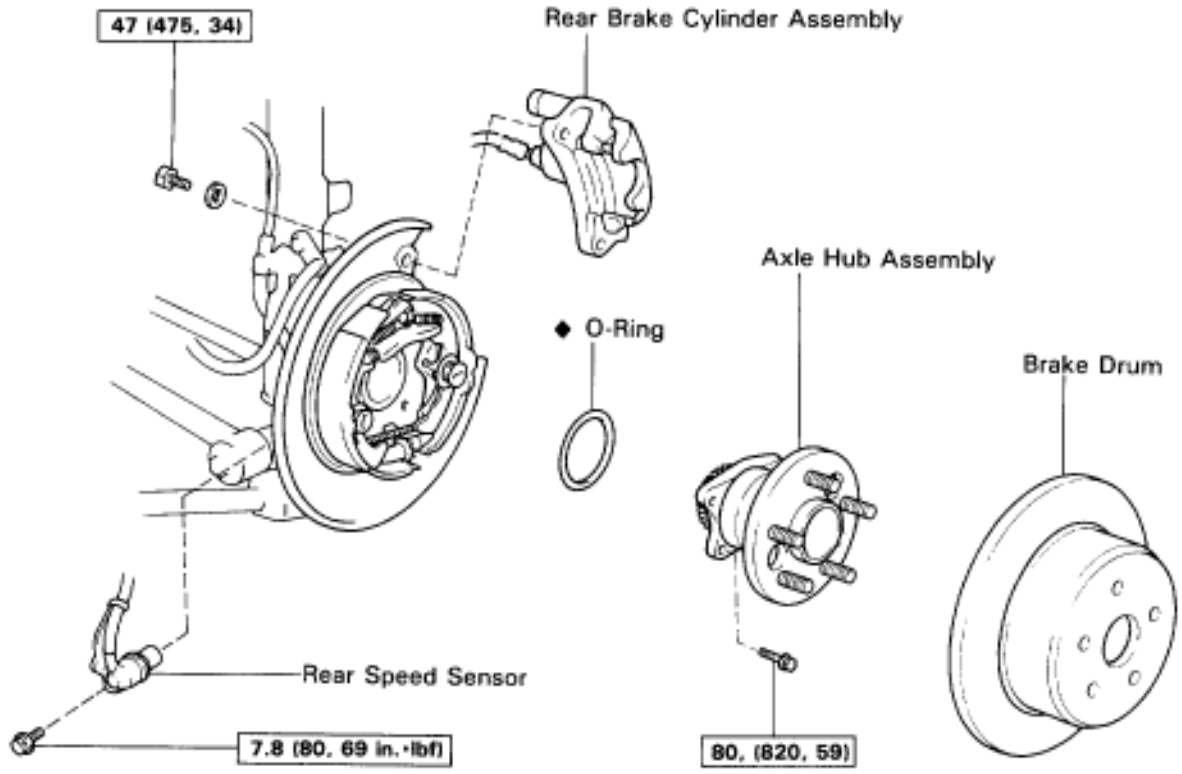
SPEED SENSOR REMOVAL AND INSTALLATION

Remove and install the parts as shown.

Front



Rear



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

◆ Non-reusable part

N01276
N01277

Troubleshooting
HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the following pages.

1 CUSTOMER PROBLEM ANALYSIS

Using the customer problem analysis check sheet for reference, ask the customer in as much detail as possible about the problem.

2 CHECK AND CLEAR THE DIAGNOSTIC TROUBLE CODES (PRECHECK)

If the ABS warning light lights up, and the ABS does not operate, the ECU stores diagnostic trouble codes corresponding to the problem in memory.

Before confirming the trouble, first check the diagnostic trouble codes to see if there are any malfunction codes stored in memory. When there are malfunction codes, make a note of them, then clear them and proceed to "3 Problem Symptom Confirmation".

3 PROBLEM SYMPTOM CONFIRMATION, 4 SYMPTOM SIMULATION

Confirm the problem symptoms. If the problem does not reoccur, be sure to simulate the problem by mainly checking the circuits indicated by the diagnostic trouble code in step 2, using "Problem simulation method".

5 DIAGNOSTIC TROUBLE CODE CHECK

Check the diagnostic trouble codes.

If a malfunction code is output, proceed to "6 Diagnostic Trouble Code Chart". If the normal code is output, proceed to "7 Problem Symptoms Chart".

Be sure to proceed to "6 Diagnostic trouble Code Chart" after the steps 2 and 3 are completed.

If troubleshooting is attempted only by following the malfunction code stored in the memory, errors could be made in the diagnosis.

6 DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is confirmed in the diagnostic trouble code check, proceed to the inspection procedure indicated by the matrix chart for each diagnostic trouble code.

7 PROBLEM SYMPTOMS CHART

If the normal code is confirmed in the diagnostic trouble code check, perform inspection in accordance with the inspection order in the problem symptoms chart.

8 CIRCUIT INSPECTION

Proceed with diagnosis of each circuit in accordance with the inspection order confirmed in 6 and 7. Determine whether the cause of the problem is in the sensor, actuators, wire harness and connectors, or the ECU.

9 SENSOR CHECK

Use the ABS warning light to check if each of the signals from the speed sensors are being input correctly to the ECU. Instructions for this check are given in the circuit inspection.

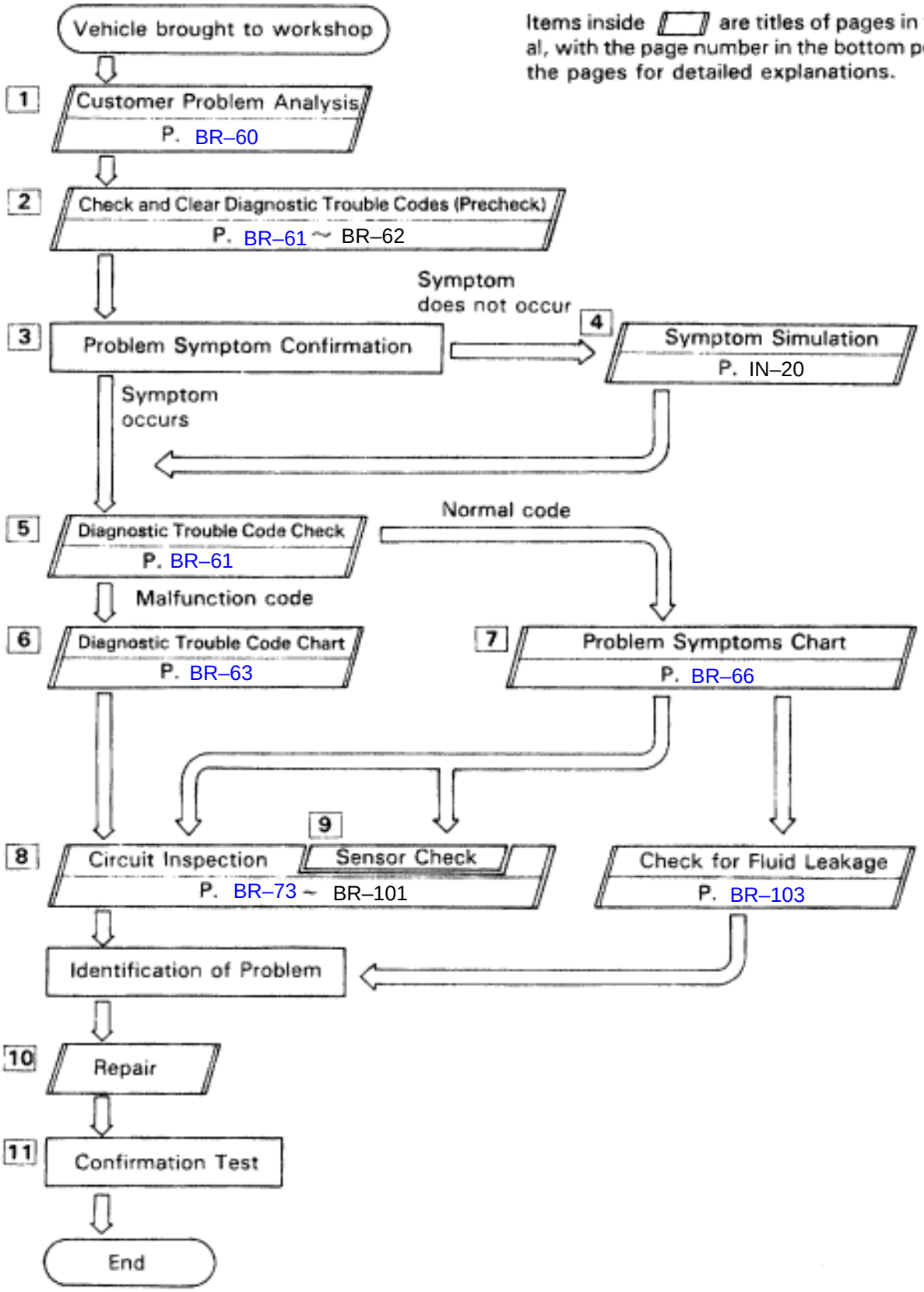
10 REPAIRS

After the cause of the problem is located, perform repairs by following the inspection and replacement procedures in this manual.

[11] CONFIRMATION TEST

After completing repairs, confirm not only that the malfunction is eliminated, but also conduct a test drive, etc., to make sure the entire ABS system is operating correctly. (In vehicles with the TRC system, also check the TRC system.)

Items inside ▭ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.



CUSTOMER PROBLEM ANALYSIS CHECK SHEET

ABS Check Sheet

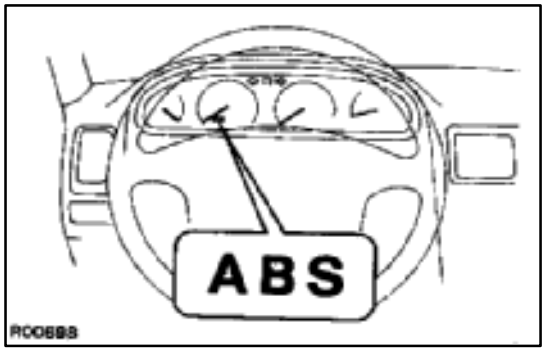
Inspector's Name :

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km Mile

Condition of Problem Occurrence	Date of Problem Occurrence	/ /
	How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	ABS Warning Light Abnormal	☐ Remain ON ☐ Does not Light UP

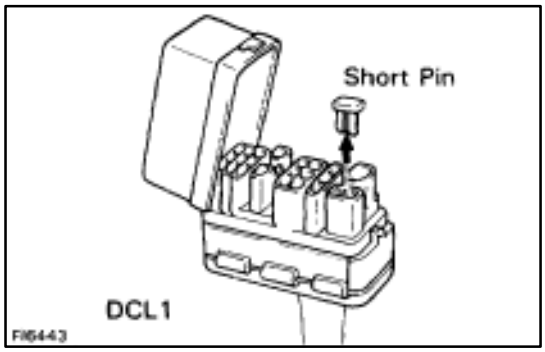
Diagnostic Trouble Code Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)



DIAGNOSIS SYSTEM
INDICATOR CHECK

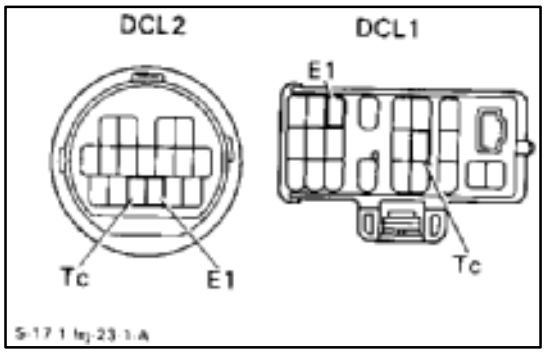
When the ignition switch is turned on, check that the ABS warning light goes on for 3 seconds.

HINT: If the indicator check result is not normal, proceed to troubleshooting (see BE–118) for the combination meter section.

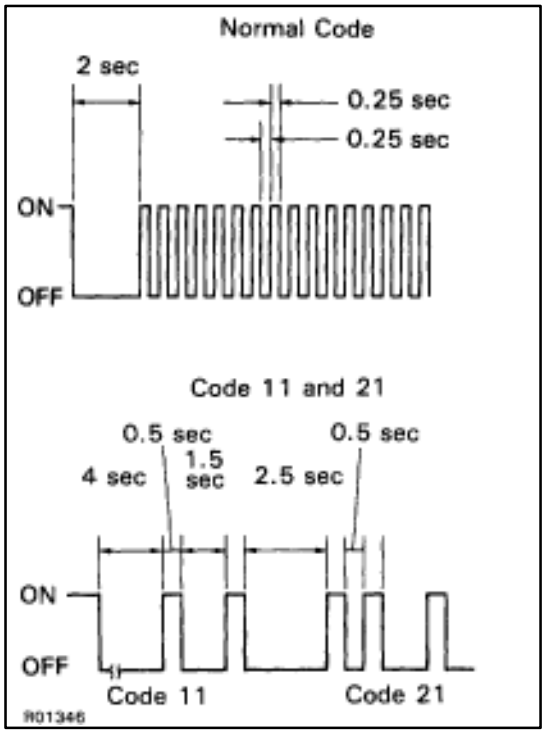


DIAGNOSTIC TROUBLE CODE CHECK

1. Turn the ignition switch to ON.
2. Disconnect the Short Pin from DCL1.

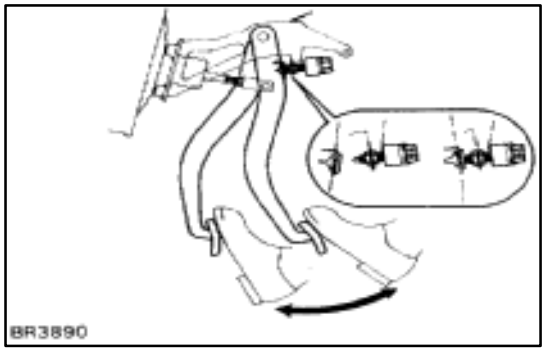


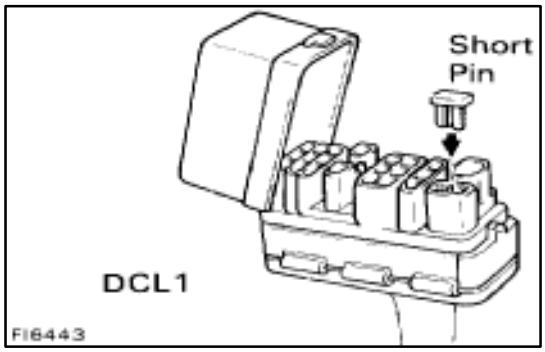
3. Using SST, connect terminals Tc and E1 of DCL2 or DCL1.
   SST 09843–18020
4. Read the diagnostic trouble code from the ABS warning light on the combination meter.
   HINT: If no code appears, inspect the diagnostic circuit (see page BR–98).



As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

5. Codes are explained in the code table on page BR–63.
6. After completing the check, disconnect terminals Tc and E1, and turn off the display.
   If two or more malfunctions are indicated at the same time, the lowest numbered diagnostic trouble code will be displayed first.



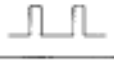
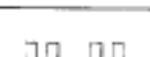
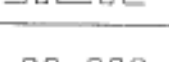
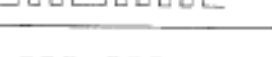
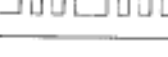


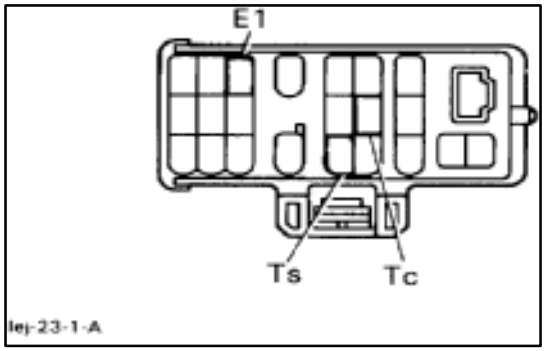
DIAGNOSTIC TROUBLE CODE CLEARANCE

1. Using SST, connect terminals Tc and E1 of DCL2 or DCL1.
   SST 09843–18020
2. IG switch ON.
3. Clear the diagnostic trouble codes stored in ECU by depressing the brake pedal 8 or more times within 3 seconds.
4. Check that the warning light shows the normal code.
5. Remove the SST from the terminals of DCL2 or DCL1.
6. Connect the Short Pin to DCL1.

DIAGNOSTIC TROUBLE CODE CHART

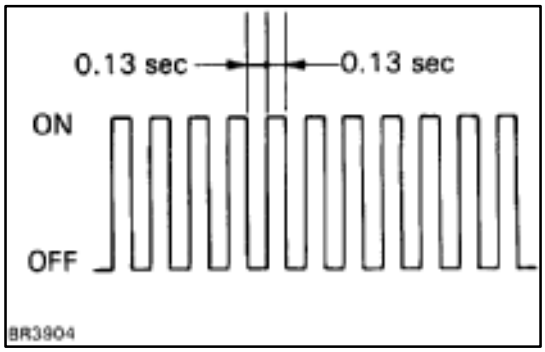
If a malfunction code is displayed during the diagnostic trouble code check, check the circuit listed for that code, in the table below and proceed to the page given.

Code	ABS Warning Light Blinking Pattern	Diagnosis
11	ON / OFF  BE3931	Open circuit in ABS control (solenoid) relay circuit
12	ON / OFF  BE3931	Short circuit in ABS control (solenoid) relay circuit
13	ON / OFF  BE3931	Open circuit in ABS control (pump motor) relay circuit
14	ON / OFF  BE3931	Short circuit in ABS control (pump motor) relay circuit
21	ON / OFF  BE3932	Open or short circuit in 3-position solenoid circuit for front right wheel
22	ON / OFF  BE3932	Open or short circuit in 3-position solenoid circuit for front left wheel
23	ON / OFF  BE3932	Open or short circuit in 3-position solenoid circuit for rear right wheel
24	ON / OFF  BE3932	Open or short circuit in 3-position solenoid circuit for rear t left wheel
31	ON / OFF  BE3933	Front right wheel speed sensor signal malfunction
32	ON / OFF  BE3933	Front left wheel speed sensor signal malfunction
33	ON / OFF  BE3933	Rear right wheel speed sensor signal malfunction
34	ON / OFF  BE3933	Rear left wheel speed sensor signal malfunction
35	ON / OFF  BE3933	Open circuit in front left or rear right speed sensor circuit
36	ON / OFF  BE3933	Open circuit in front right or rear left speed sensor circuit
37	ON / OFF  BE3933	Faulty rear speed sensor rotor
41	ON / OFF  BE3934	Low battery positive voltage or abnormally high battery positive voltage
51	ON / OFF  BE3935	Pump motor is locked Open in pump motor ground
Always ON	ON / OFF 	Malfunction in ECU

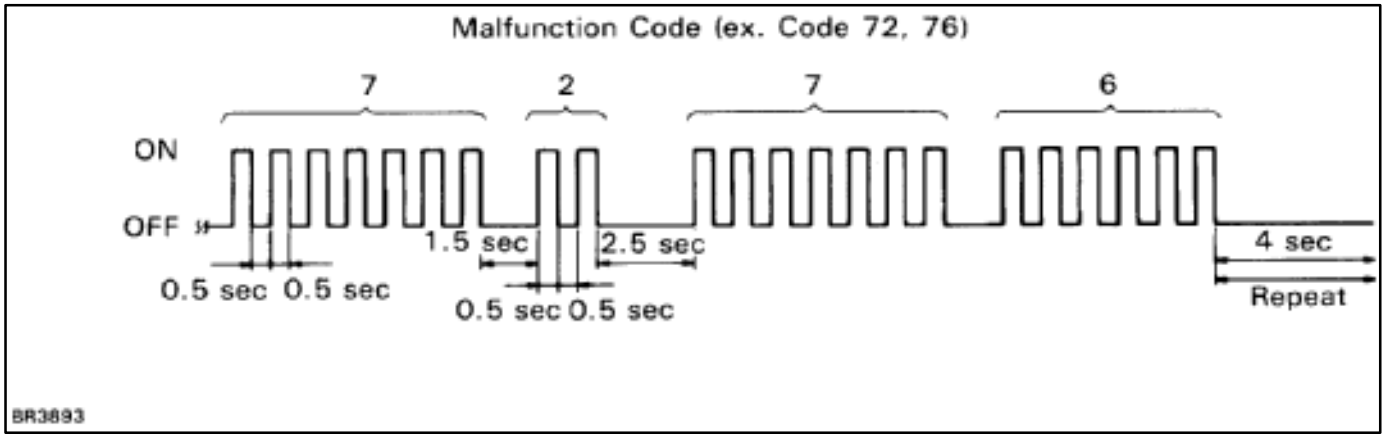


SPEED SENSOR SIGNAL CHECK

1. Turn the ignition switch to OFF.
2. Using SST, connect terminals Ts and E1 of DCL1.
   SST 09843–18020
3. Start the engine.



4. Check that the ABS warning light blinks.
   HINT: If the ABS warning light does not blink, inspect the ABS warning light circuit (see page BR–95).
5. Drive vehicle straight forward.
   HINT: Drive vehicle faster than 80 km/h (50 mph) for several seconds.
6. Stop the vehicle.
7. Using SST, connect terminals Tc and E1 of DCL1.
   SST 09843–18020
8. Read the number of blinks of the ABS warning light.
   HINT: See the list of diagnostic trouble 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.



9. After performing the check, disconnect terminals Ts and E1, Tc and E1 of DCL1, and ignition switch turned off.

Diagnostic Trouble Code of Speed Sensor Check Function

Code No.	Diagnosis	Trouble Area
71	Low output voltage of front right speed sensor	□ Front right speed sensor □ Sensor installation
72	Low output voltage of front left speed sensor	□ Front left speed sensor □ Sensor installation
73	Low output voltage of rear right speed sensor	□ Rear right speed sensor □ Sensor installation
74	Low output voltage of rear left speed sensor	□ Rear left speed sensor □ Sensor installation
75	Abnormal change in output voltage of front right speed sensor.	□ Front right speed sensor rotor
76	Abnormal change in output voltage of front left speed sensor	□ Front left speed sensor rotor
77	Abnormal change in output voltage of rear right speed sensor	□ Rear right speed sensor rotor
78	Abnormal change in output voltage of rear left speed sensor	□ Rear left speed sensor rotor

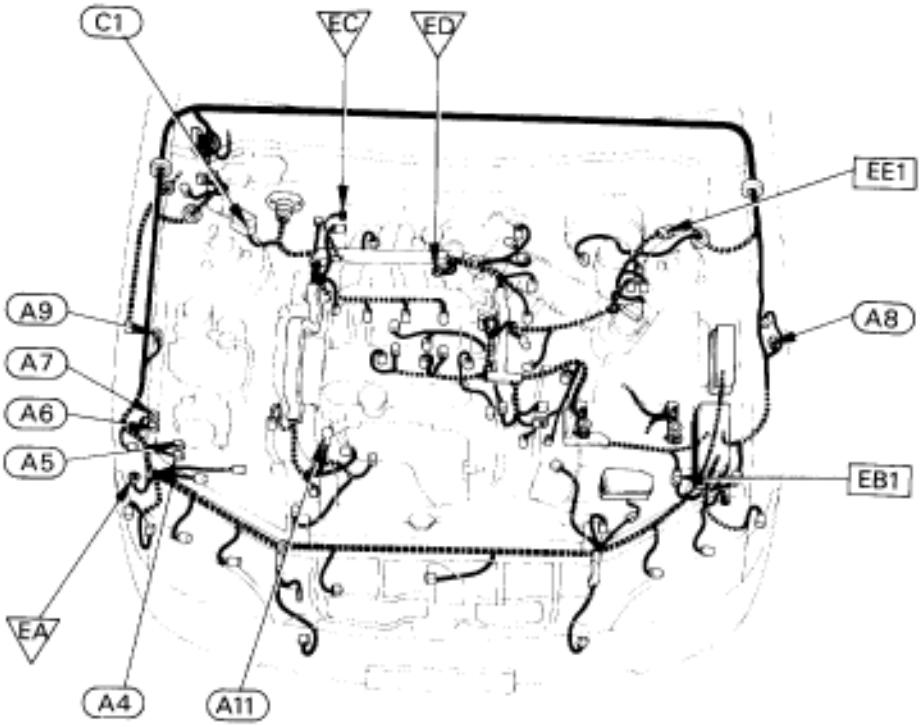
PROBLEM SYMPTOMS CHART

If a normal code is displayed during the diagnostic trouble code check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the page for troubleshooting.

Symptoms	Inspection Circuit	See page
ABS does not operate.	1. Check the diagnostic trouble code, reconfirming that the normal code is output. 2. IG Power Source Circuit 3. Speed sensor circuit. 4. Check the ABS actuator with a checker. If abnormal, check the hydraulic circuit for leakage (see page BR–103). If 1.~4. are all normal and the problem is still occurring, replace the ABS ECU.	BR–61 BR–88 BR–84 BR–54
ABS does not operate efficiently.	1. Check the diagnostic trouble code, reconfirming that the normal code is output. 2. Speed sensor circuit. 3. Stop light switch circuit. 4. Check the ABS actuator with a checker. If abnormal, check the hydraulic circuit for leakage (see page BR–103). If 1.~4. are all normal and the problem is still occurring, replace the ABS ECU.	BR–61 BR–88 BR–93 BR–54
ABS warning light abnormal.	1. ABS warning light circuit. 2. ABS ECU.	BR–95
Diagnostic trouble code check cannot be performed.	1. ABS warning light circuit. 2. Tc terminal circuit. 3. ABS ECU.	BR–95 BR–99
Speed sensor signal check cannot be performed	1. Ts terminal circuit. 2. ABS ECU.	BR–101

LOCATION OF CONNECTORS

Location of Connectors in Engine Compartment



BE6660

A4

ABS Actuator

Ie-6-1-C

A5

ABS Actuator

Ig-4-1-A

A6

ABS Relay
(Motor Relay and
Solenoid Relay)

Ieg-4-1

A7

ABS Relay
(Motor Relay and
Solenoid Relay)

Ieg-6-1

A8

ABS Speed Sensor
Front Left

Ie-2-1-T

A9

ABS Speed Sensor
Front Left

Ie-2-1-T

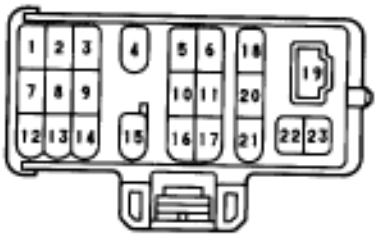
A11

Generator

X-142

C1

DCL1



Ieg-23-1-A

EB1

Ref. B-1

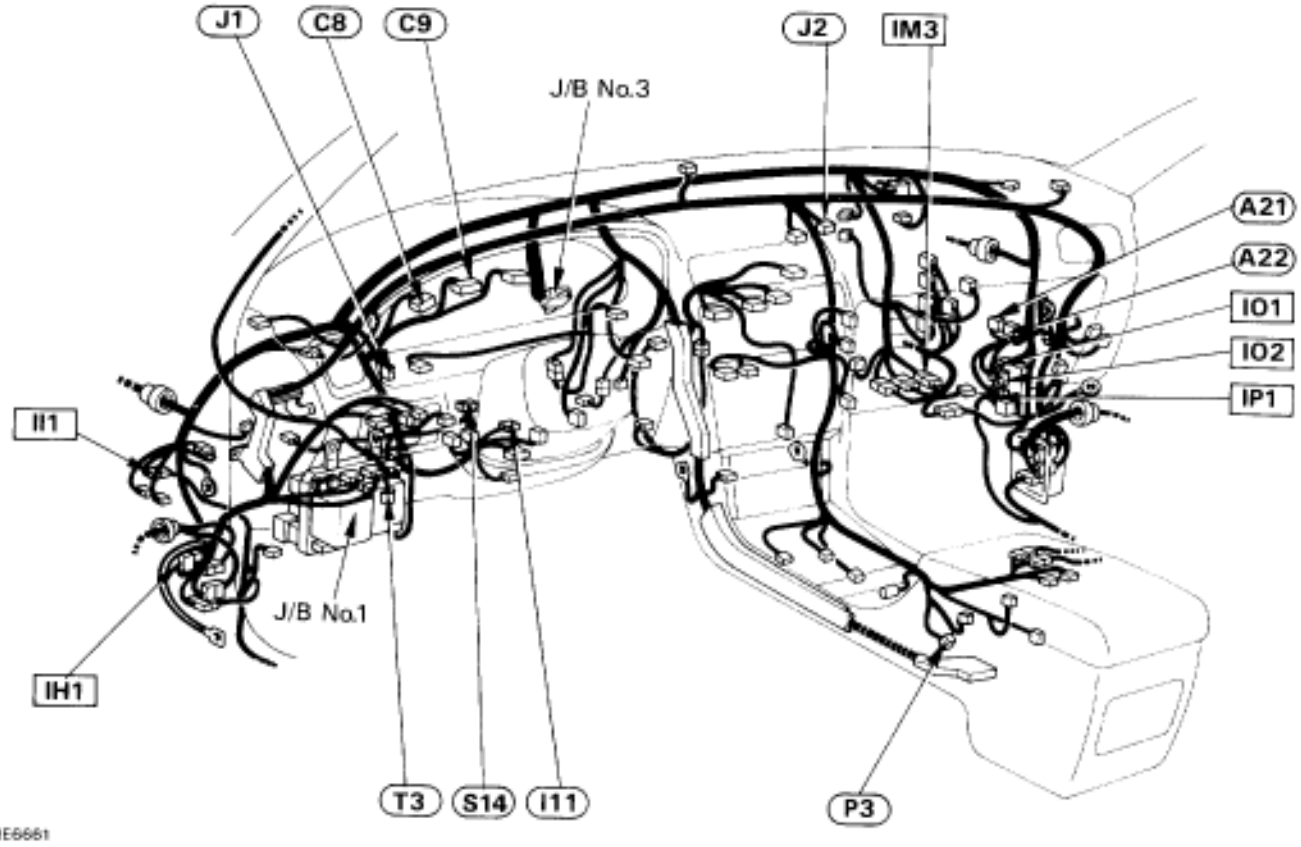
Ref. B-2

EE1

Fig. 4-1

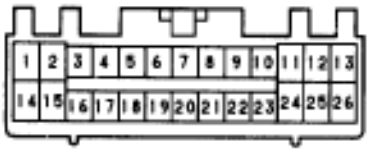
Fig. 4-2

Location of Connectors in Instrument Panel



A21

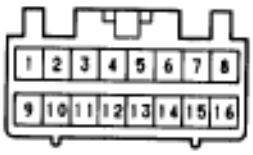
ABS ECU



Vd-26-1

A22

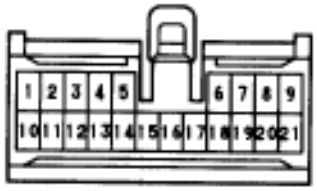
ABS ECU



Vd-16-1

C8

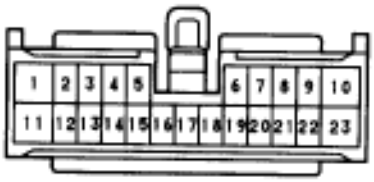
ABS Warning Light



h-21-1

C9

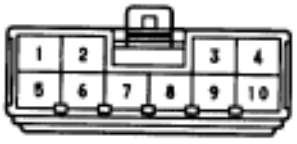
ABS Warning Light



eh-23-1

I11

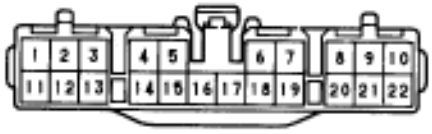
Ignition switch



g-10-1-B

J1

Junction Connector



e-22-1-A

J2

Junction Connector

e-14-1-A

P3

Parking Brake Switch

e-1-1

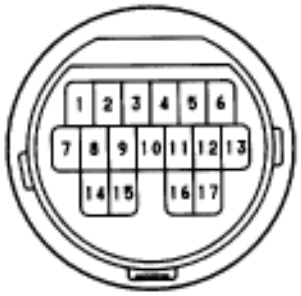
S14

Stop Light Switch

eg-4-1

T3

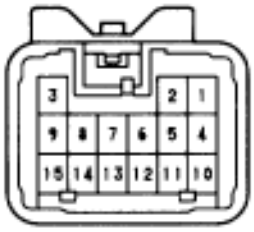
DCL2



5-17-1

IH1

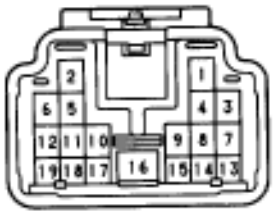
e-15-1



e-15-2

II1

eg-19-1



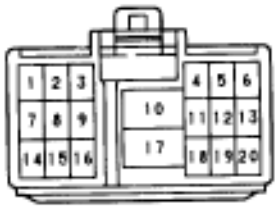
eg-19-2

IM3

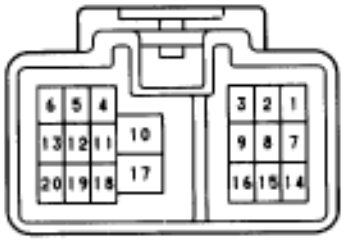
ef-19-1

ef-19-2

IO1



e-20-1-B



e-20-2-B

IO2

e-8-1

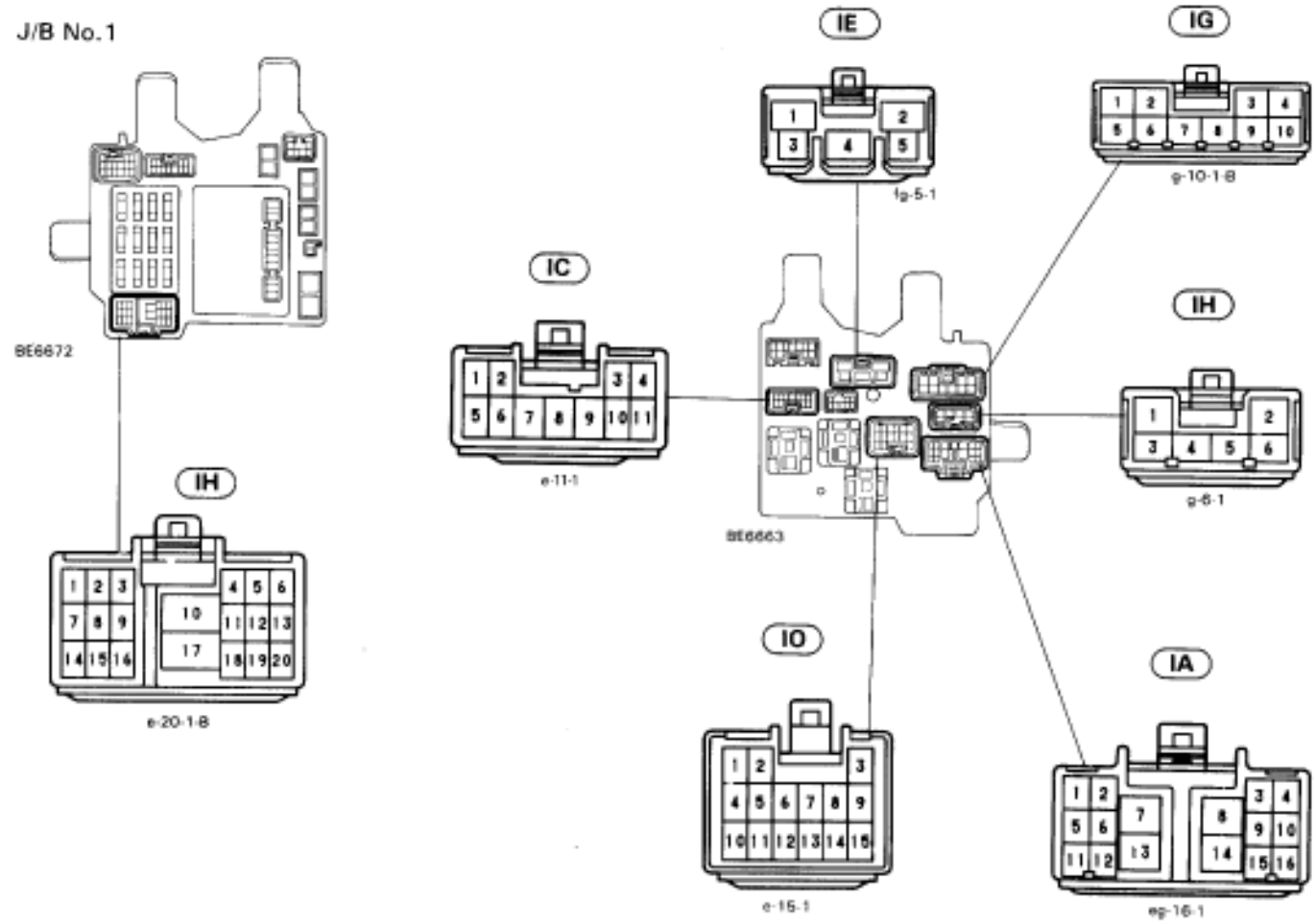
e-8-2

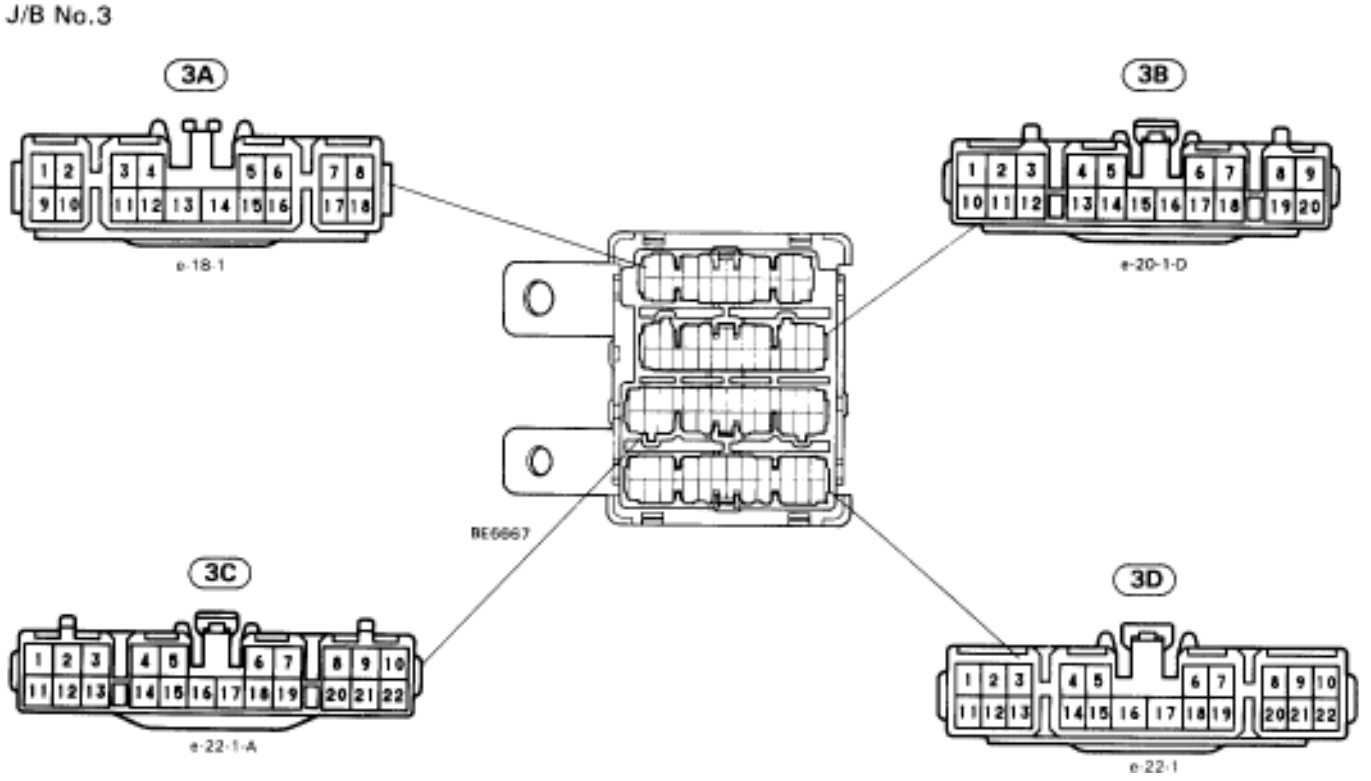
IP1

e-6-1

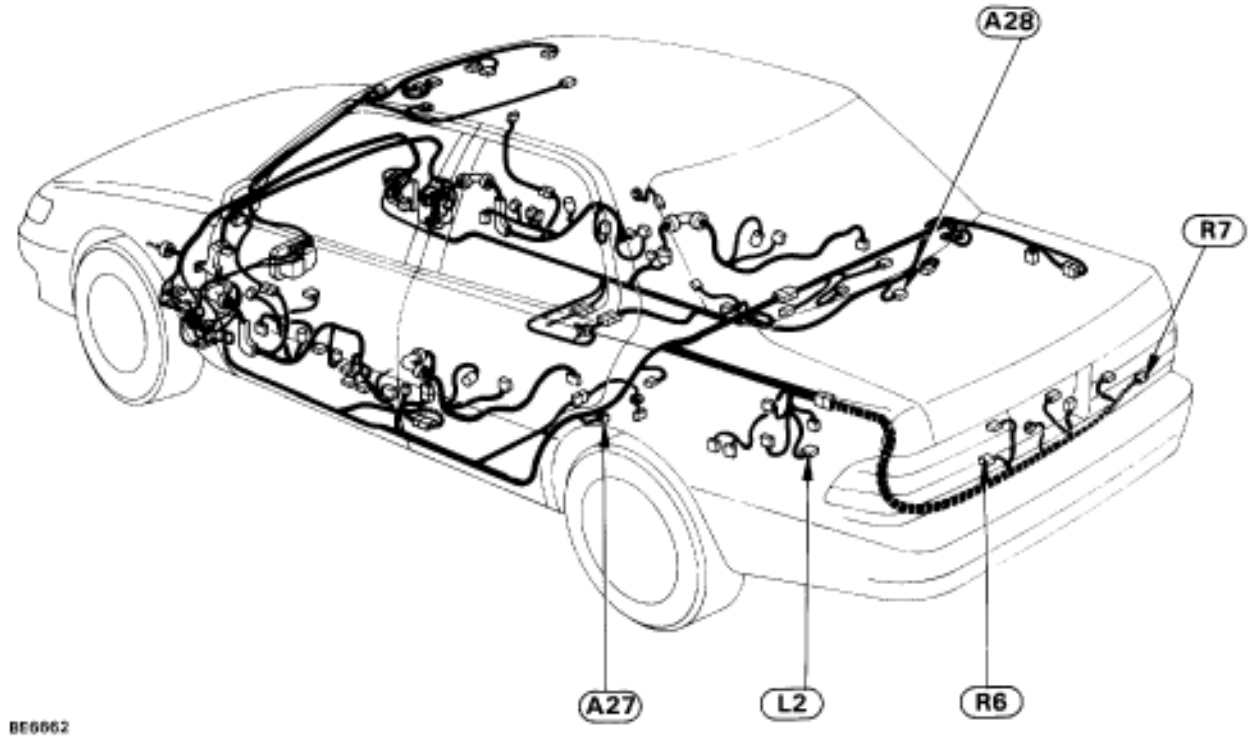
e-6-2

Location of Connectors in Instrument Panel





Location of Connectors in Body



A27
ABS Speed Sensor Rear Left

e-2-2-L

A28
ABS Speed Sensor Rear Right

e-2-2-L

L2
Light Failure Sensor

e-12-1

R6 R7
Stop Light

e-6-2

CIRCUIT INSPECTION

DTC	11, 12	ABS Control (Solenoid) Relay Circuit

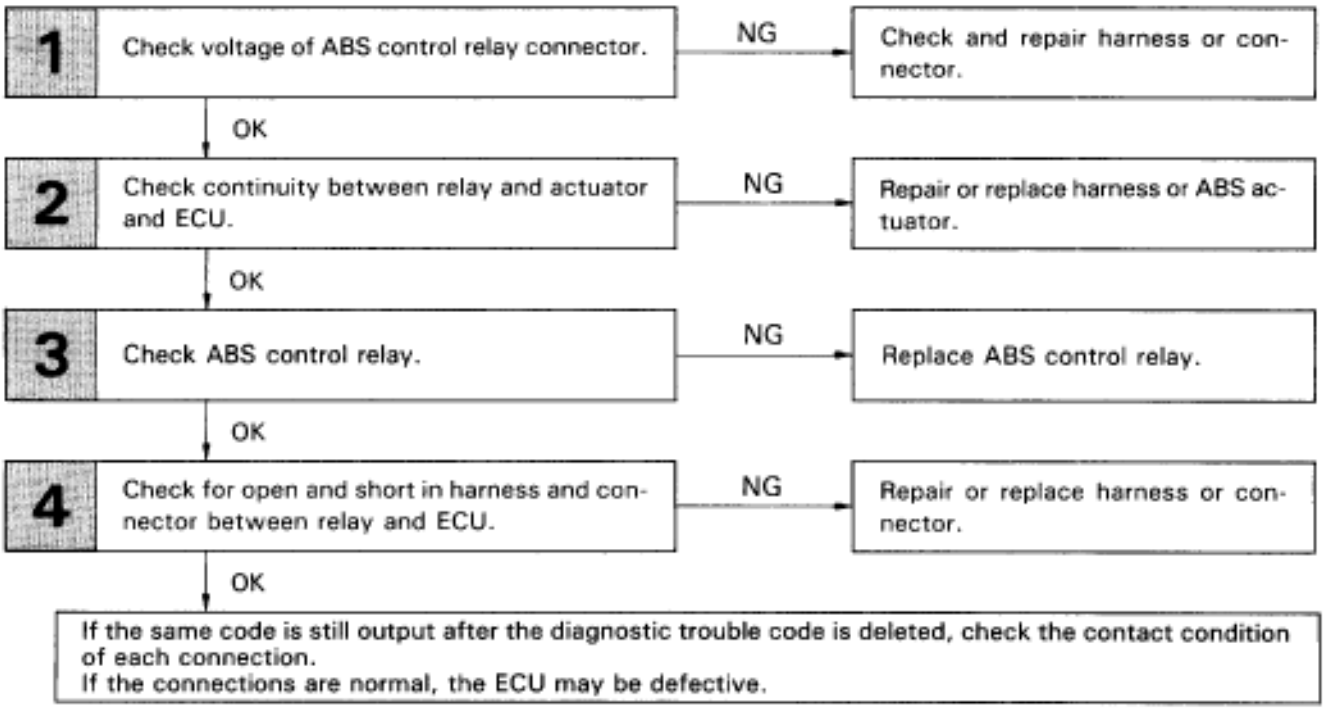
— CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned on, if the initial check is OK, the relay goes on.

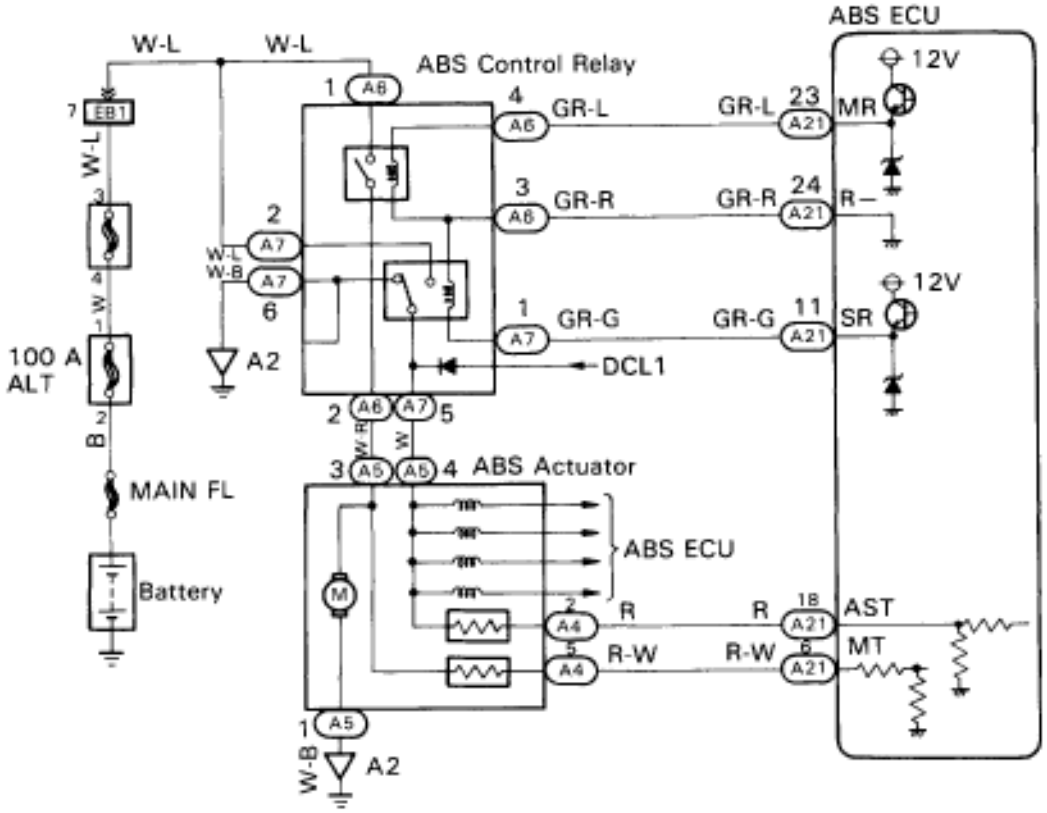
Code No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
11	Conditions (1) and (2) continue for 0.2 sec. or more: (1) ABS control (solenoid) relay: ON (2) ABS control (solenoid) relay monitor terminal (AST) voltage: 0	ABS control (solenoid) relay. Open or short in ABS control (solenoid) relay circuit. ECU
12	Conditions (1) and (2) continue for 0.2 sec. or more: (1) ABS control (solenoid) relay: OFF (2) ABS control (solenoid) relay monitor terminal (AST) voltage: Battery positive voltage.	ABS control (solenoid) relay. B+ short in ABS control (solenoid) relay circuit ECU

Fail safe function: If trouble occurs in the control (solenoid) relay circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

— DIAGNOSTIC CHART

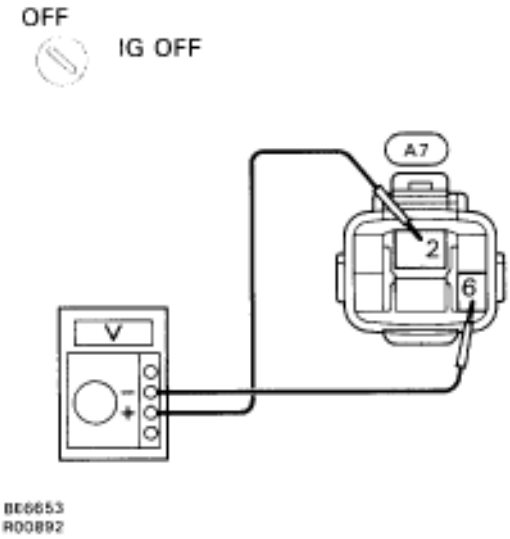


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminals 2 and 6 of ABS control relay.**



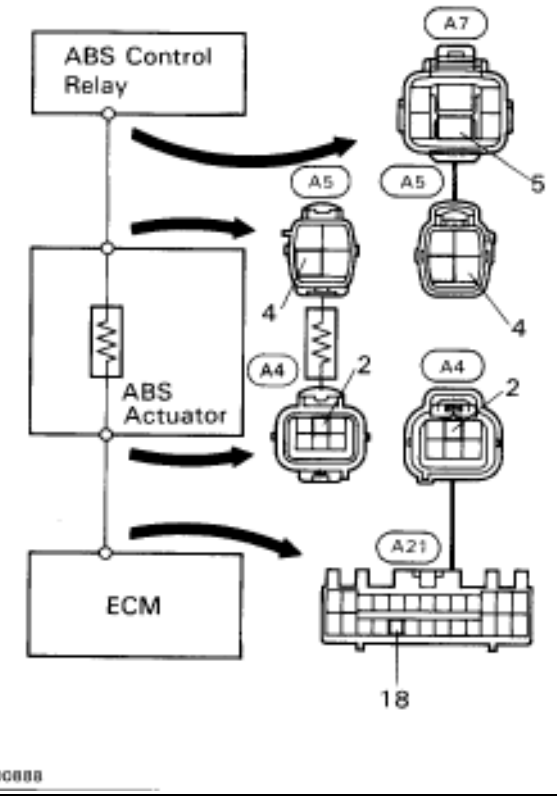
P 1. Remove the washer tank and control relay.
2. Disconnect the ABS control relay connector.

C Measure voltage between terminals 2 and 6 of ABS control relay harness side connector.

OK **Voltage: 10 – 14 V**

OK → **NG** → **Check and repair harness or connector.**

2 **Check continuity between terminal 5 and 4, 4 and 2, 2 and 18**



P Disconnect the two connectors from ABS actuator.

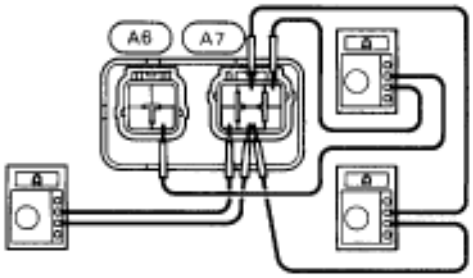
C Check continuity terminal 5 and 4, 4 and 2, 2 and 18.

OK **Continuity**

Hint There is a resistance of 4 ~ 6 Ω between terminals 4 and 2.

OK → **NG** → **Repair or replace harness or ABS actuator**

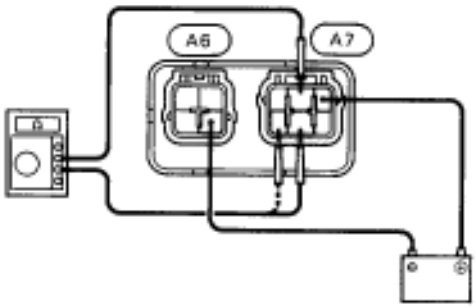
3 **Check ABS control relay.**



C Check continuity between each terminal of ABS control relay shown below.

OK

Terminals (A7) 1 and (A6) 3	Continuity (Reference value 80 Ω)
Terminals (A7) 5 and (A7) 6	Continuity
Terminals (A7) 2 and (A7) 5	Open



C
1. Apply battery positive voltage between terminals ( ) 1 and ( ) 3.
2. Check continuity between each terminal of ABS control relay shown below.

OK

Terminals (A7) 5 and (A7) 6	Open
Terminals (A7) 2 and (A7) 5	Continuity

R00889
R00895

OK → **NG** → **Replace ABS control relay.**

4 **Check for open and short in harness and connector between ABS control relay and ABS ECU (See page IN–27).**

OK → **NG** → **Repair or replace harness or connector.**

If the same code is still output after the diagnostic trouble code is detected, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DTC 13, 14 ABS Control (Motor) Relay Circuit

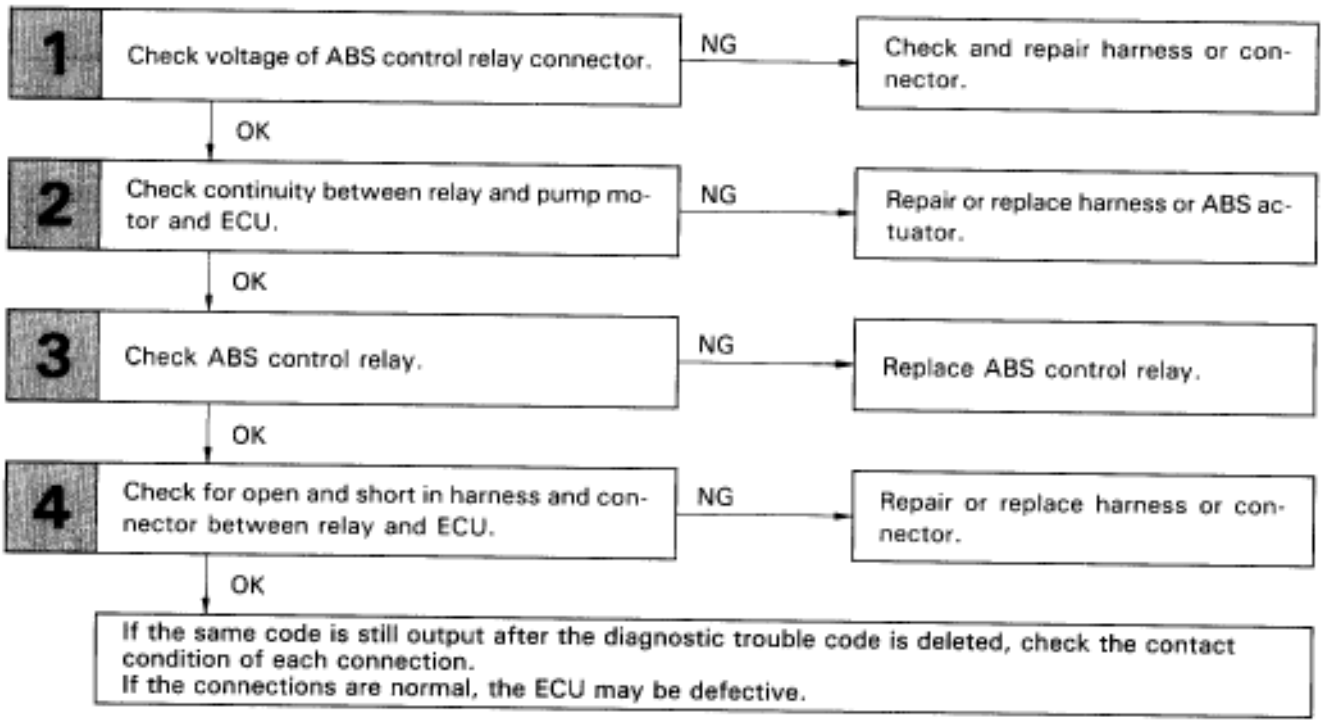
CIRCUIT DESCRIPTION

The ABS control (motor) relay supplies power to the ABS pump motor. If the accumulator pressure drops, the ECU switches the control (motor) relay ON and operates the ABS pump motor.

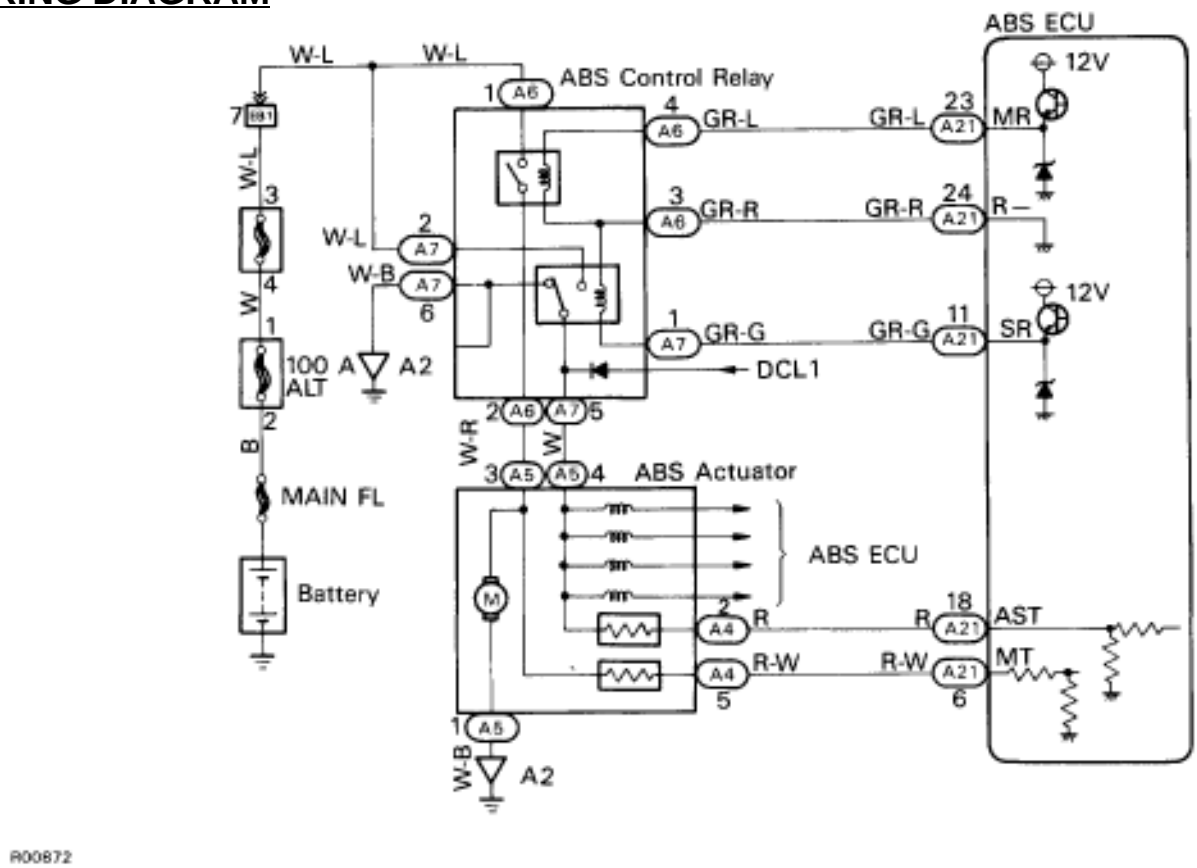
Code No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
13	Conditions (1) and (2) continued for 0.2 sec. or more: (1) ABS control (motor) relay: ON (2) ABS control (motor) relay monitor terminal (MT) voltage: 0 V	○1 ABS control (motor) relay. ○2 Open or short in ABS control (motor) relay circuit. ○3 ECU.
14	Conditions (1) and (2) continued for 4 sec. or more: (1) ABS control (motor) relay: OFF (2) ABS control (motor) relay monitor terminal (MT) voltage: Battery positive voltage.	○1 ABS monitor relay. ○2 B+ short in ABS control (motor) relay circuit. ○3 ECU.

Fail safe function: If trouble occurs in the control (motor) relay circuit, the ECU cuts off the current to the ABS control (motor) relay and prohibits ABS control.

DIAGNOSTIC CHART

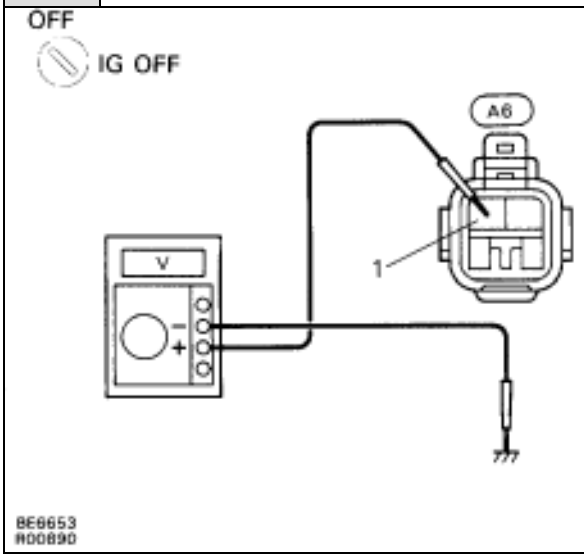


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminals 1 of ABS control relay and body ground.**



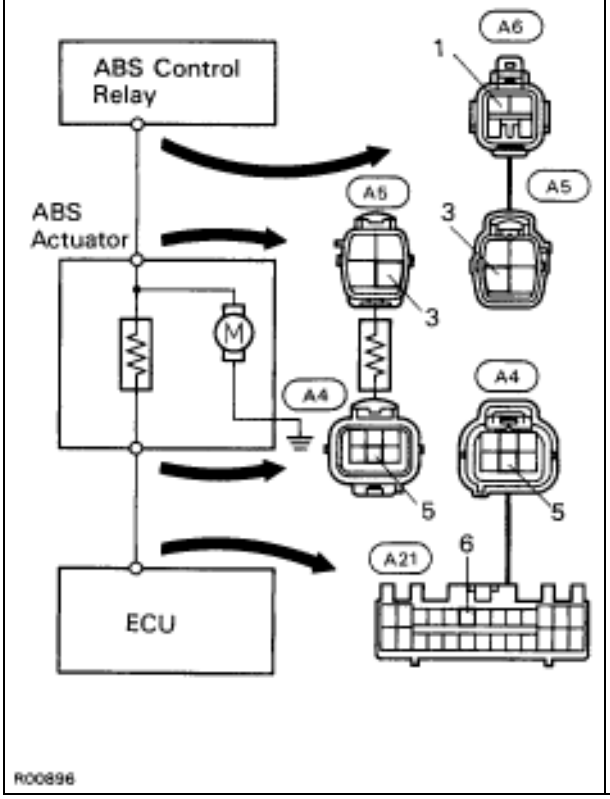
P 1. Remove the washer tank and control relay.
2. Disconnect the ABS control relay connector.

C Measure voltage between terminals 1 of ABS control relay harness side connector and body ground.

OK **Voltage: 10 – 14 V**

OK → **NG** → **Check and repair harness or connector.**

2 **Check continuity between terminal 1 and 3, 3 and 5, 5 and 6.**



P Disconnect the two connectors from ABS actuator.

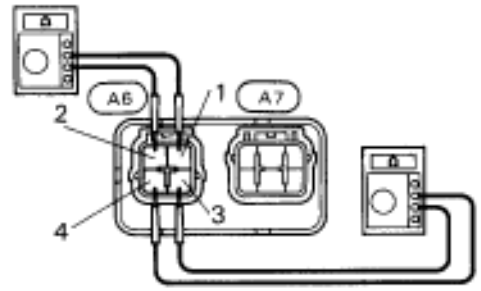
C Check continuity terminal 1 and 3, 3 and 5, 5 and 6.

OK **Continuity**

Hint There is a resistance of 4 ~ 6 Ω between terminals 3 and 5.

OK → **NG** → **Repair or replace harness or ABS actuator.**

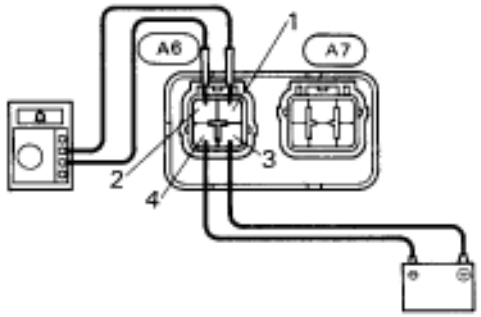
3 **Check ABS control relay**



C Check continuity between each terminal of ABS control relay shown below.

OK

Terminals (A6) 3 and (A6) 4	Continuity (Reference value 62 Ω)
Terminals (A6) 1 and (A6) 2	Open



C
1. Apply battery positive voltage between terminals (A6) 3 and (A6) 4.
2. Check continuity between each terminal of ABS control relay shown below.

OK

Terminals (A6) 1 and (A6) 2	Continuity

R00894
R00893

OK → **NG** → **Replace ABS control relay**

4 **Check for open and short in harness and connector between ABS control relay and ABS ECU (See page IN–27)**

OK → **NG** → **Repair or replace harness or connector.**

If the same code is still output after the diagnostic trouble code is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DTC	21, 22, 23, 24	ABS Actuator Solenoid Circuit

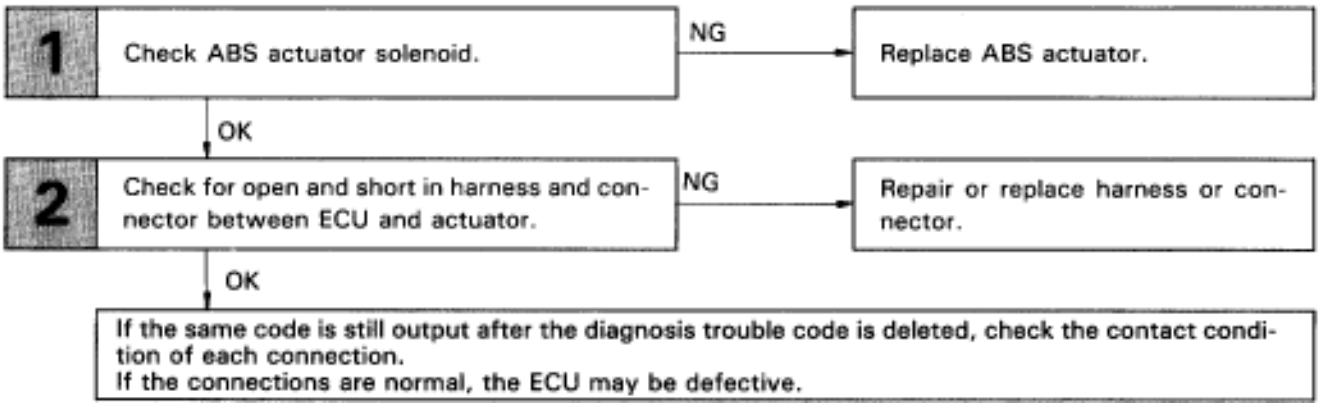
CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders, thus controlling the turning of the wheels.

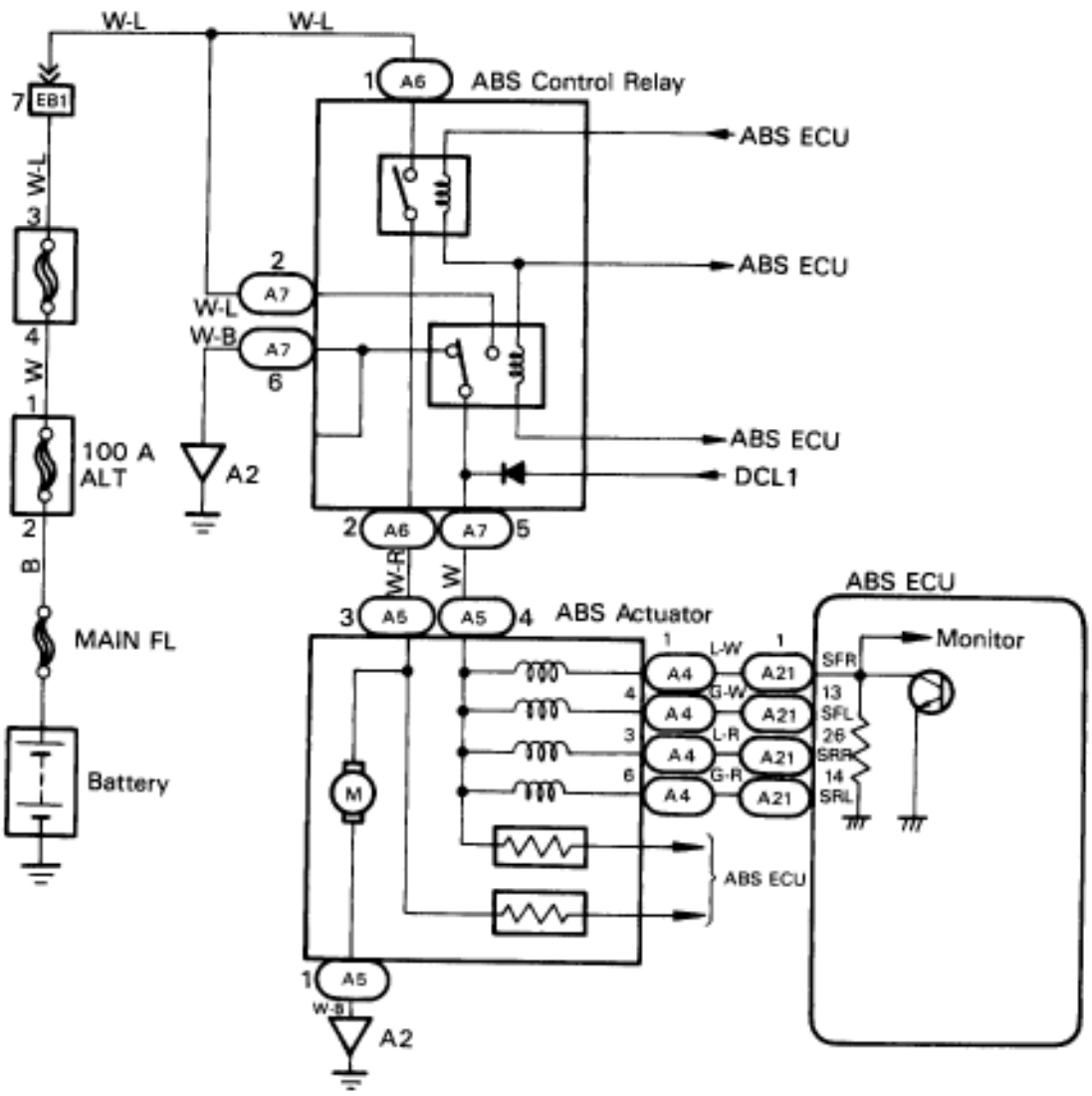
Code No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
21	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay: ON (2) Voltage of ABS ECU terminal AST: Battery positive voltage. (3) When power transistor of ECU is ON, voltage of terminal SFR is 0 V or battery positive voltage.	□A ABS actuator. □B Open or short in SFR circuit. □C ECU.
22	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay: ON (2) Voltage of ABS ECU terminal AST: Battery positive voltage. (3) When power transistor of ECU is ON, voltage of terminal SFLR is 0 V or battery positive voltage.	□A ABS actuator. □B Open or short in SFL circuit. □C ECU.
23	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay: ON (2) Voltage of ABS ECU terminal AST: Battery positive voltage. (3) When power transistor of ECU is ON, voltage of terminal SRR is 0 V or battery positive voltage.	□A ABS actuator. □B Open or short in SRR circuit. □C ECU.
24	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay: ON (2) Voltage of ABS ECU terminal AST: Battery positive voltage. (3) When power transistor of ECU is ON, voltage of terminal SRL is 0 V or battery positive voltage.	□A ABS actuator. □B Open or short in SRL circuit. □C ECU.

Fail safe function: If trouble occurs in the actuator solenoid circuit, the ECU cuts off current to the control (solenoid) relay and prohibits ABS control.

DIAGNOSTIC CHART



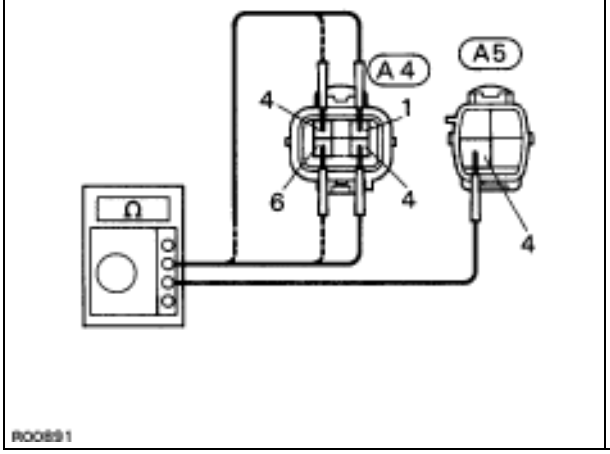
WIRING DIAGRAM



R00874

INSPECTION PROCEDURE

1 **Check ABS actuator solenoid.**



P
1. Remove the washer tank.
2. Disconnect the two connectors from ABS actuator.

C Check continuity between terminal (A4) 4 and (A5) 1, 3, 4, 6 of ABS actuator connector.

OK **Continuity**

Hint Resistance of each solenoid coil is 1.2 Ω.

OK → **NG** → **Replace ABS actuator.**

2 **Check for open and short in harness and connector between ABS ECU and actuator (See page IN–27).**

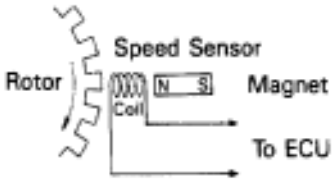
OK → **NG** → **Repair or replace harness or connector.**

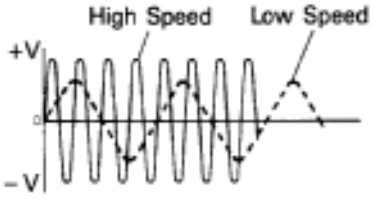
If the same code is still output after the diagnostic trouble code is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DTC	31, 32, 33, 34, 35, 36	Speed Sensor Circuit

— CIRCUIT DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the ECU. These signals are used for control of both the ABS and system. The front rotor and rear rotor have 48 serrations. When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage.
Since the frequency of this AC voltage changes in proportion to the speed of the rotors (wheels), the frequency is used by the ECU to detect the speed of each wheel.





8R3583
8R3582

Code No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
31, 32 33, 34	Detection of any of conditions (1) through (3): (1) At vehicle speed of 10 km/h (6 mph) or more, pulses are not input for 5 sec. (2) Momentary interruption of the vehicle speed sensor signal occurs at least 7 times in the time between switching the ignition switch ON and switching it OFF. (3) Abnormal fluctuation of speed sensor signals with the vehicle speed 20 km/h (12 mph) or more.	□ Right front, left front, right rear and left rear speed sensor. □ Open or short in each speed sensor circuit. □ ECU
35	Vehicle speed sensor signal is not input for about 1 sec. while the left front and right rear vehicle speed sensor signals are being checked when the IG switch is turned ON.	□ Open in left front, right rear speed sensor circuit. □ ECU.
36	Vehicle speed sensor signal is not input for about 1 sec. while the right front and left rear vehicle speed sensor signals are being checked with the IG switch ON.	□ Open in right front, left rear speed sensor circuit. □ ECU.

HINT: DTC 31 is for the right front wheel speed sensor.
DTC 32 is for the left front wheel speed sensor.
DTC 33 is for the right rear wheel speed sensor.
DTC 34 is for the left rear wheel speed sensor.

Fail safe function: If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

DIAGNOSTIC CHART

1 Speed sensor check (See page BR–64).
- OK → When DTC 31 – 36 are displayed, check and replace ABS ECM.
- NG →

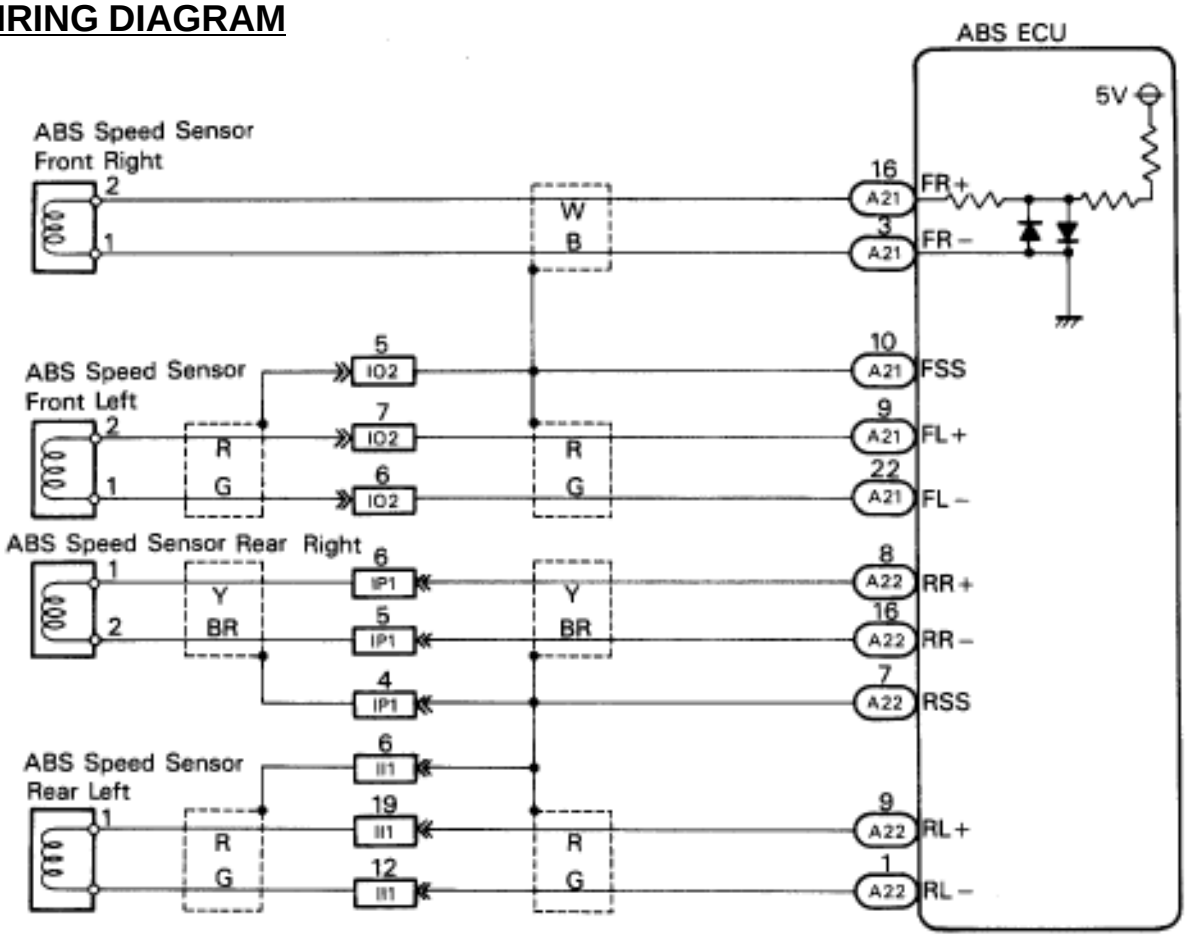
2 Check speed sensor.
- NG → Replace speed sensor.
- OK →

3 Check for open and short in harness and connector between each speed sensor and ECU.
- NG → Repair or replace harness or connector.
- OK →

4 Check sensor rotor and sensor installation.
- NG → Replace speed sensor or rotor.
- OK →

Check and replace ABS ECU.

WIRING DIAGRAM



R00879

INSPECTION PROCEDURE

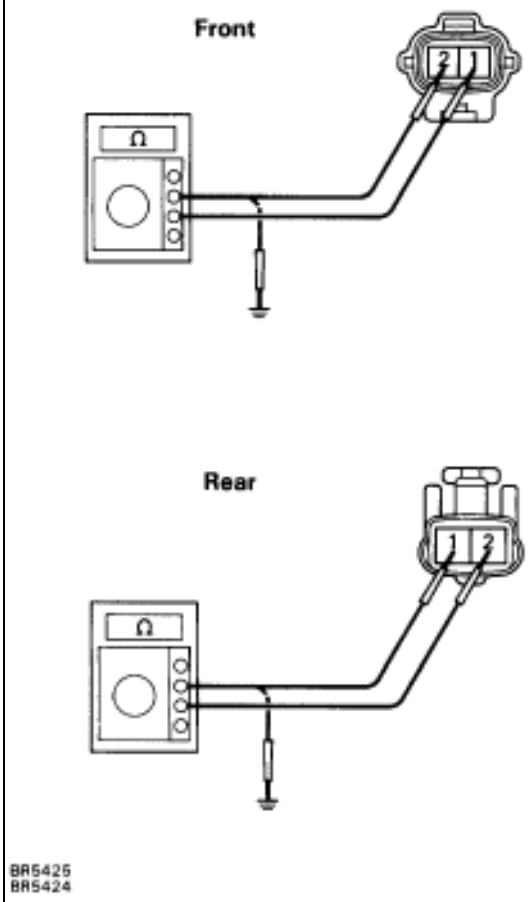
1 **Speed sensor check.**

P See speed sensor check on page BR–64.

NG

OK **When diag. Code 31 – 36 are displayed, check and replace ABS ECU.**

2 **Check speed sensor.**



Front

P
1. Remove front fender liner.
2. Disconnect speed sensor connector.

C Measure resistance between terminals 1 and 2 of speed sensor connector.

OK **Resistance: 0.9 – 1.3 k Ω**

C Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK **Resistance: 1 MΩ or higher**

Rear

P
1. Remove the seat cushion and side seat back.
2. Disconnect speed sensor connector.

C Measure resistance between terminals 1 and 2 of speed sensor connector.

OK **Resistance: 0.9 – 1.3 k Ω**

C Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK **Resistance: 1 MΩ of higher**

OK

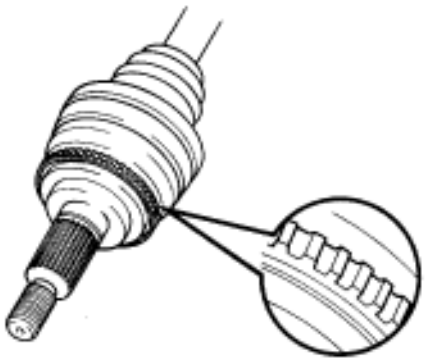
NG **Replace speed sensor**

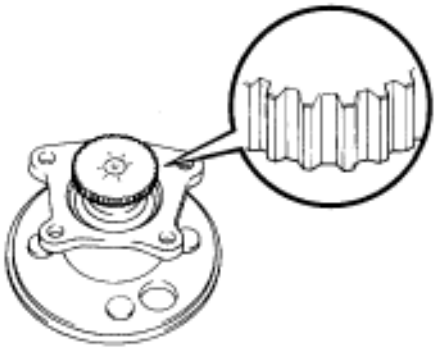
3 **Check for open and short in harness and connector between each speed sensor and ECU (See page IN–27).**

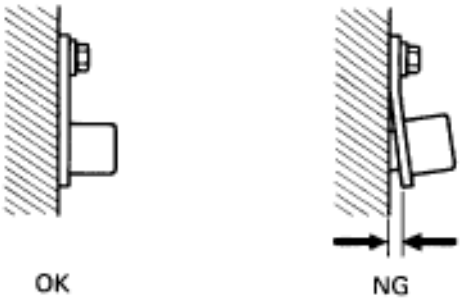
OK

NG **Repair or replace harness or connector.**

4 **Check sensor rotor and sensor installation.**







R00948
R00947
BR3795

Front

P Remove front speed sensor. (See SA section)

C Check sensor rotor serrations.

OK **No scratches or missing teeth.**

C Check the front speed sensor installation.

OK **The installation bolts are tightened properly**

Rear

P Remove the drive shaft. (See the SA section)

C Check the sensor rotor serrations.

OK **No scratches or missing teeth.**

C Check the speed sensor installation.

OK **The installation bolt is tightened properly and there is no clearance between the sensor and rear axle carrier.**

OK

NG **Replace speed sensor or rotor.**

Check and replace ABS ECU.

CIRCUIT INSPECTION

DTC	41	IG Power Source Circuit

CIRCUIT DESCRIPTION

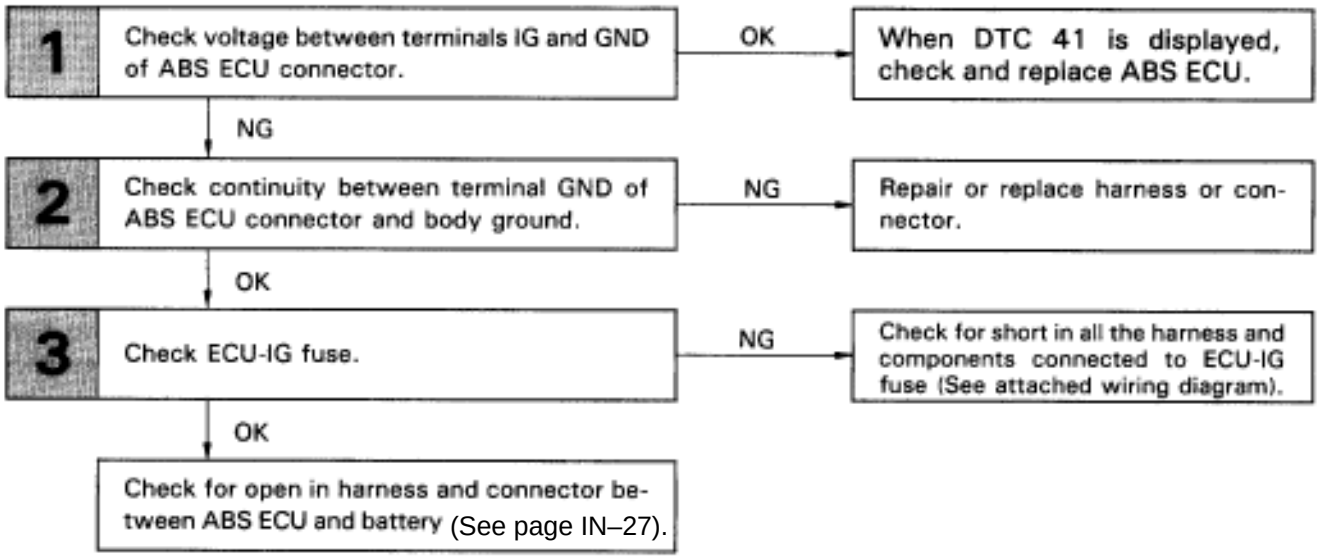
This is the power source for the ECU and becomes power source for the CPU and actuators.

Code No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
41	Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG remains at more than 17 V or below 9.5 V for more than 10 sec.	1. Battery 2. IC regulator 3. Open or short in power source circuit. 4. ECU

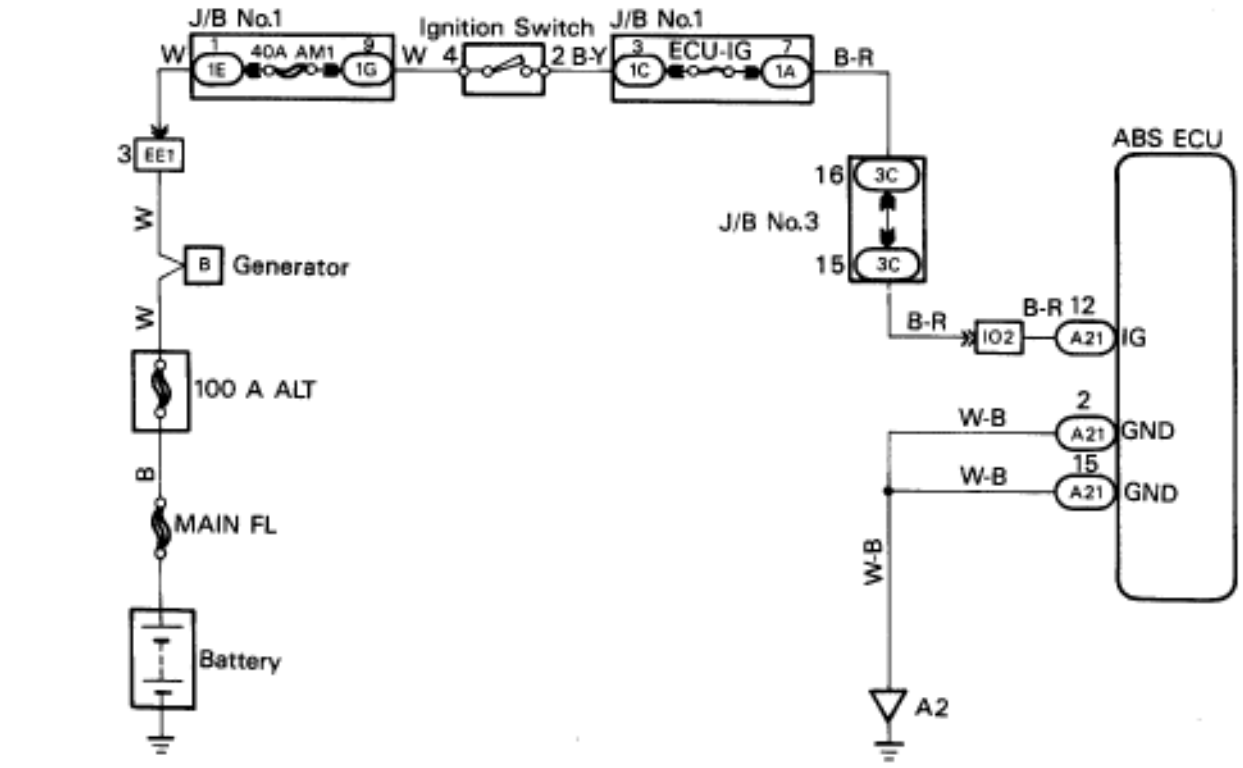
Fail safe function: If trouble occurs in the power source circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

DIAGNOSTIC CHART

First check battery positive voltage. If the voltage is not between 10 V and 14 V, check and repair the charging system.

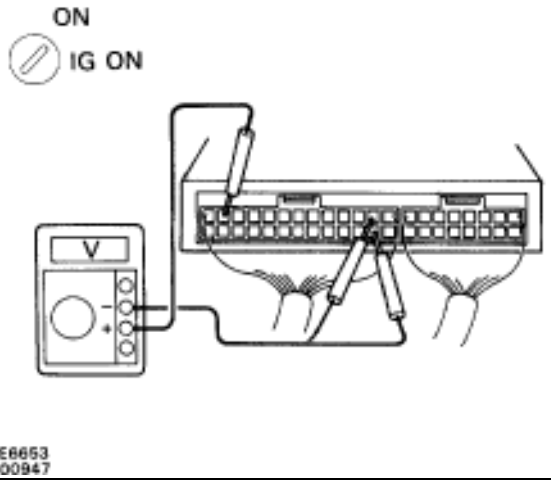


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminals IG and GND of ABS ECU connector.**



P Remove ABS ECU with connectors still connected.

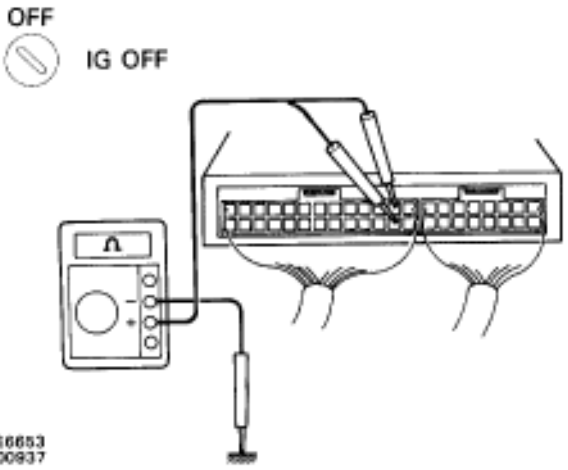
C
1. Turn ignition switch on,
2. Measure voltage between terminals IG and GND of ABS connector.

OK **Voltage: 10 – 14 V**

NG

OK **When diag. code 41 is displayed, check and replace ABS ECU.**

2 **Check continuity between terminal GND of ECU connector and body ground.**



C Measure resistance between terminal GND of ABS connector and body ground.

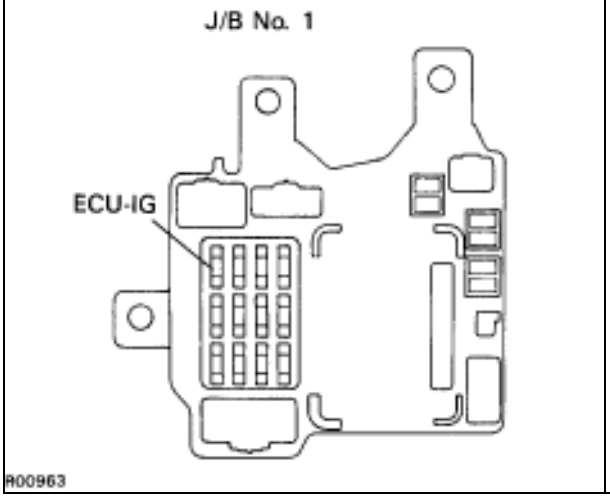
OK **Resistance: 1 Ω or less.**

OK

NG **Repair or replace harness or connector.**

Go to step 1.

3	Check ECU–IG fuse.



P Remove ECU–IG fuse from J/B No. 1.

C Check continuity of ECU–IG fuse.

OK **Continuity**

OK

NG **Check for short in all the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

Check for open in harness and connector between ABS ECU and battery.

DTC 51 ABS Pump Motor Lock

CIRCUIT DESCRIPTION

Code No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
51	Pump motor is not operating normally during initial check.	ABS pump motor.

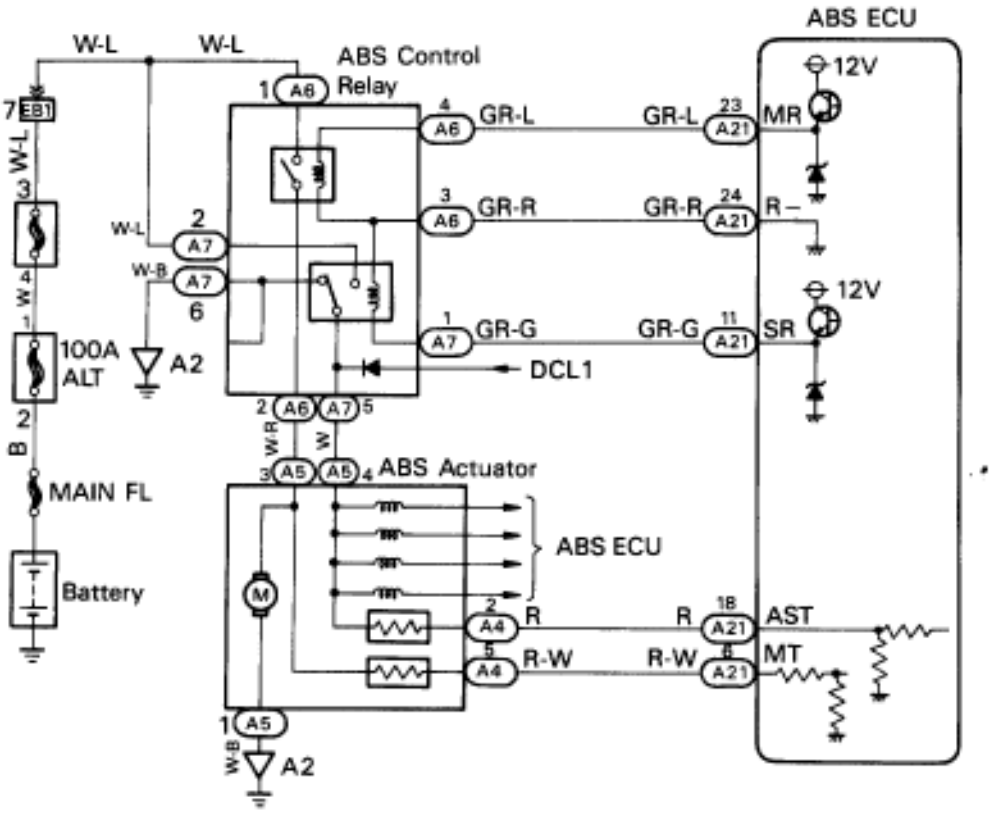
Fail safe function: If trouble occurs in the ABS pump motor, the ECU cuts off the current to the control (motor) relay and prohibits ABS control.

DIAGNOSTIC CHART

See inspection of ABS pump motor (See page BR–54).

WIRING DIAGRAM

(Reference)

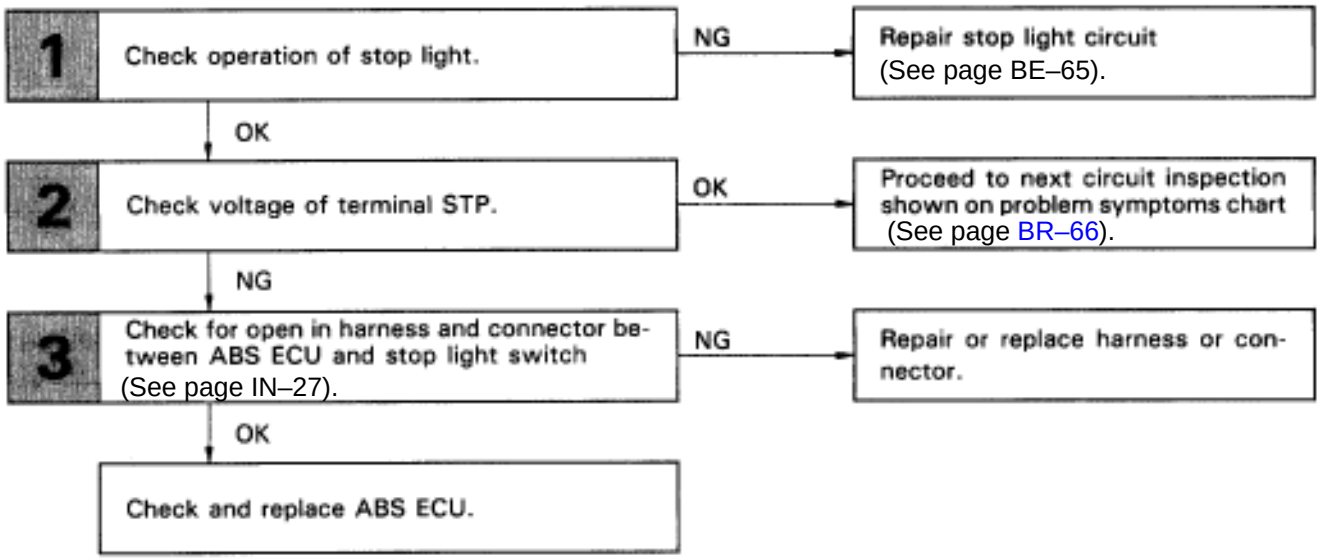


Stop Light Switch Circuit

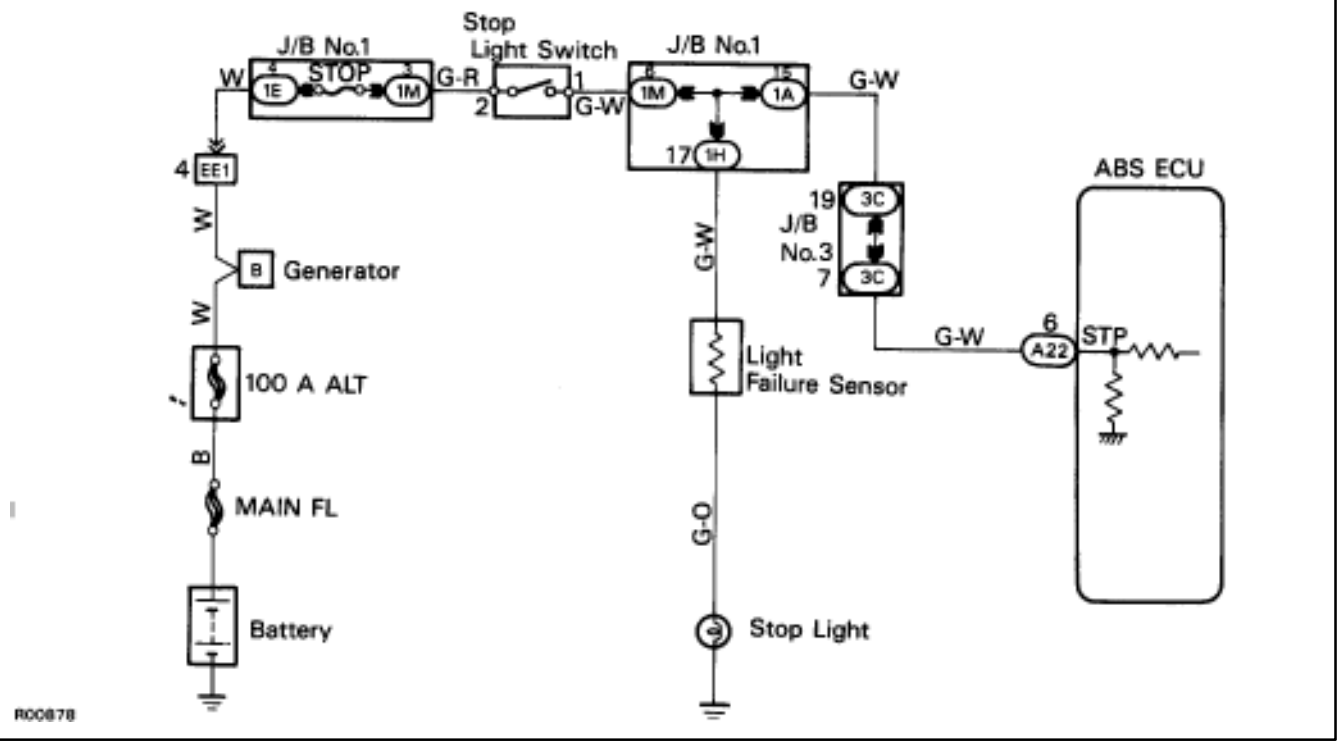
CIRCUIT DESCRIPTION

This stop light switch senses whether the brake pedal is depressed or released, and send the signal to the ECU.

DIAGNOSTIC CHART



WIRING DIAGRAM



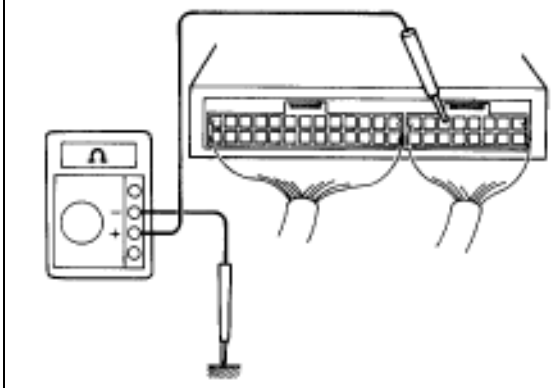
INSPECTION PROCEDURE

1	Check operation of stop light.
C	Check that stop light lights up when brake pedal is depressed and turns off when brake pedal is released.

OK

NG → **Repair stop light circuit (See page BE–65).**

2	Check voltage between terminal STP of ABS ECU and body ground.



P Remove ABS ECU with connectors still connected.

C Measure voltage between terminal.

OK **Voltage: 10 – 14 V**

NG

OK → **Proceed to next circuit inspection shown on problem symptoms chart (See page BR–66).**

3	Check for open in harness and connector between ABS ECU and stop light switch (See page IN–27).

OK

NG → **Repair or replace harness or connector.**

Check and replace ABS ECU.

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

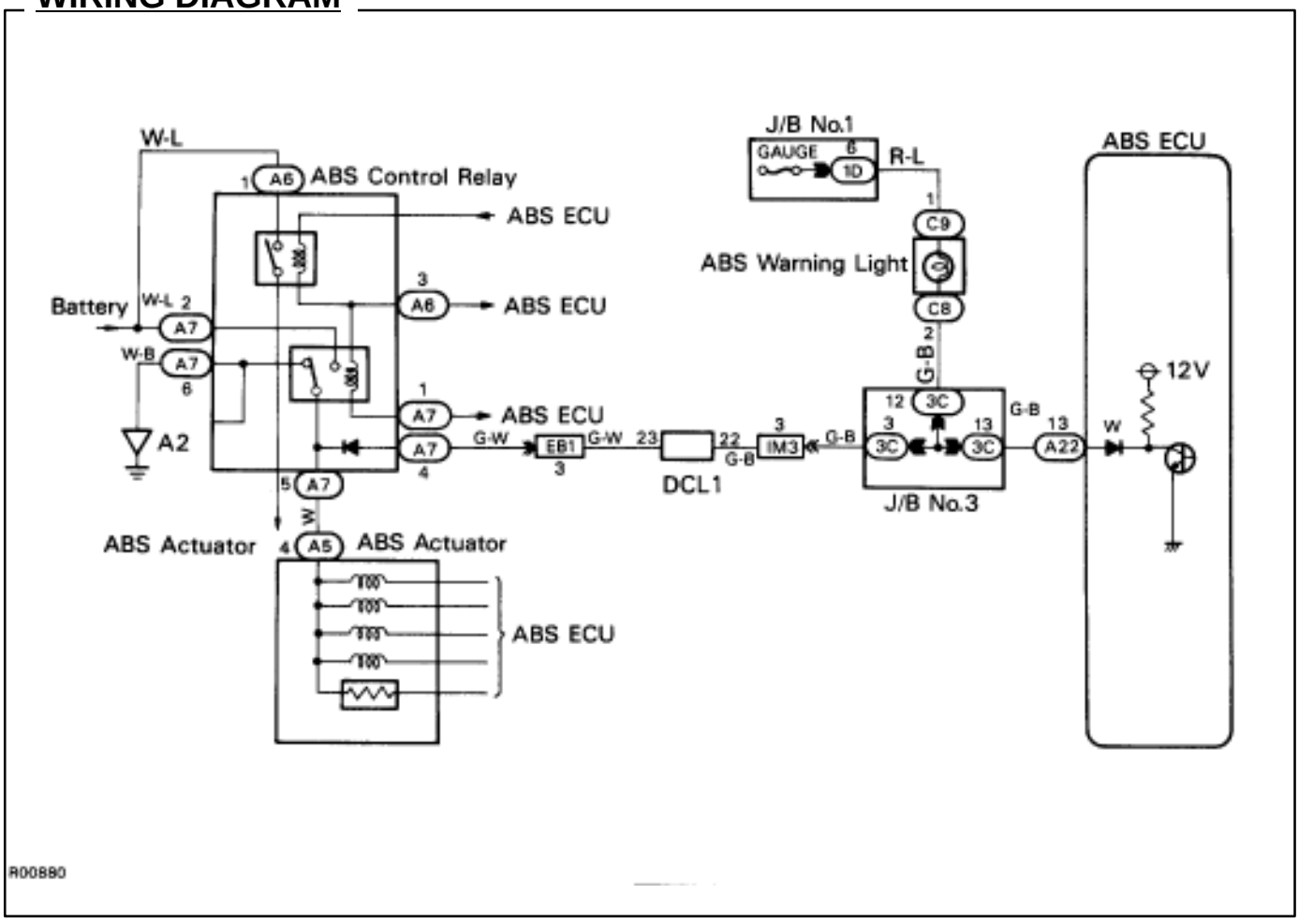
If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a diagnostic trouble code in memory.
After removing the short pin of the DCL1, connect a DCL1 or connect between Tc and E1 of the DCL2 to cause the ABS warning light to blink and output the diagnostic trouble code is output.

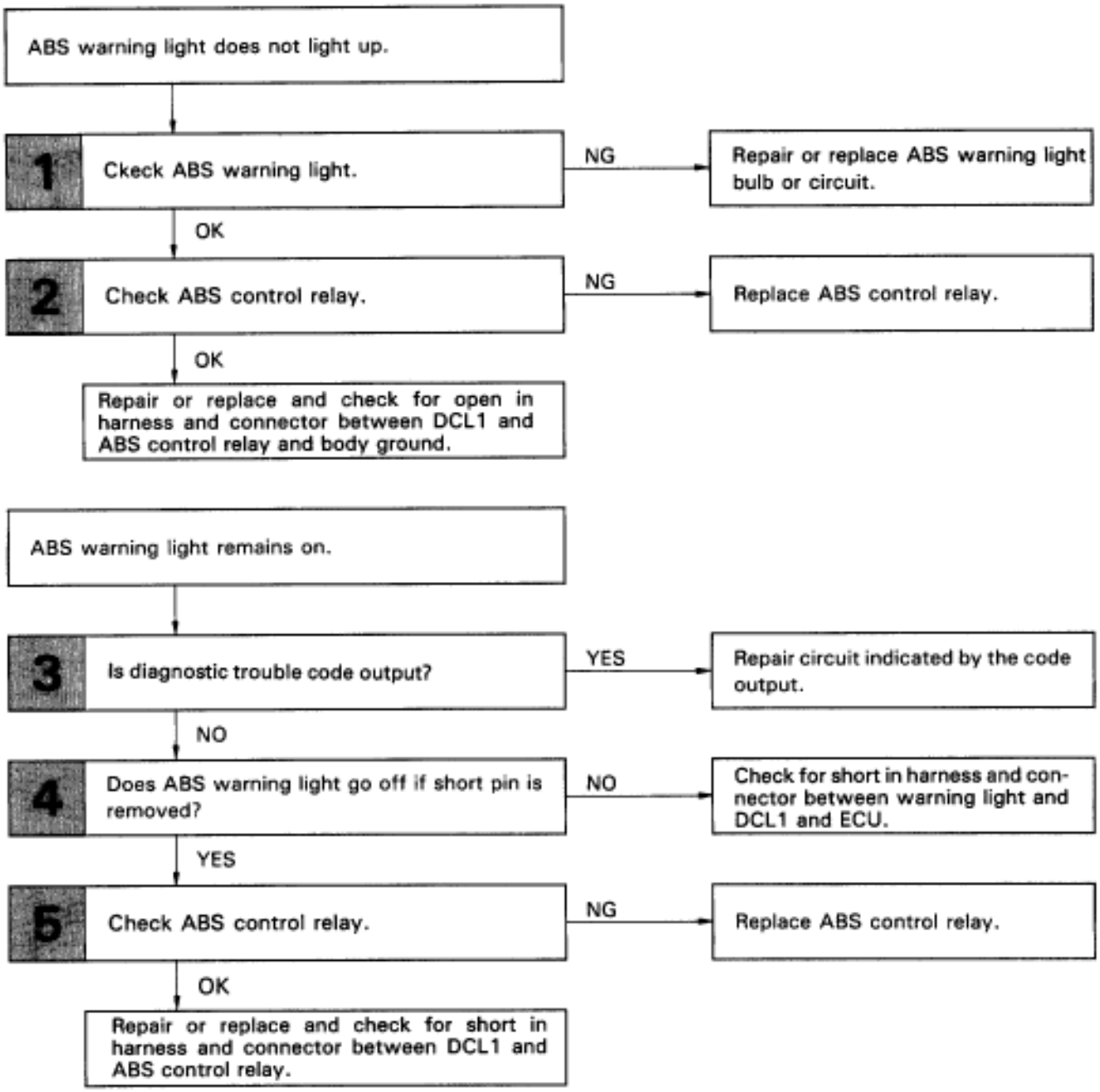
DIAGNOSTIC CHART

Perform troubleshooting in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 3

WIRING DIAGRAM




ABS warning light does not light up.
1
Ckeck ABS warning light.
NG
Repair or replace ABS warning light bulb or circuit.
OK
2
Check ABS control relay.
NG
Replace ABS control relay.
OK
Repair or replace and check for open in harness and connector between DCL1 and ABS control relay and body ground.
ABS warning light remains on.
3
Is diagnostic trouble code output?
YES
Repair circuit indicated by the code output.
NO
4
Does ABS warning light go off if short pin is removed?
NO
Check for short in harness and connector between warning light and DCL1 and ECU.
YES
5
Check ABS control relay.
NG
Replace ABS control relay.
OK
Repair or replace and check for short in harness and connector between DCL1 and ABS control relay.

INSPECTION PROCEDURE

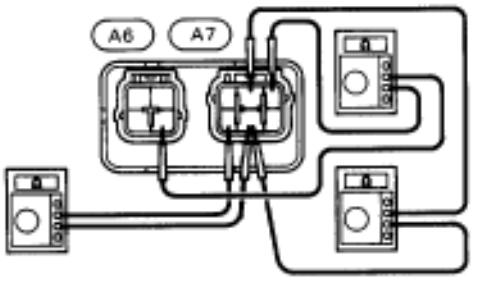
1 **Check ABS warning light.**

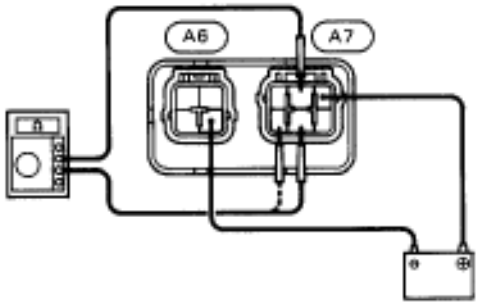
See Combination Meter Troubleshooting on page BE–118.

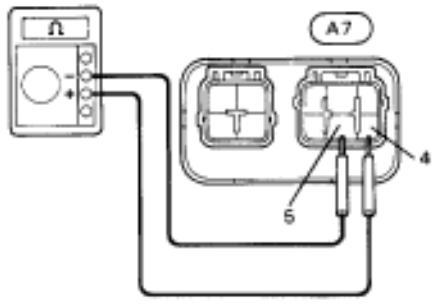
OK

NG **Replace bulb or combination meter assembly.**

2 **Check ABS (control) relay.**







R00889
R00895
R00940

P
1. Remove the washer tank and control relay.
2. Disconnect the connectors from control relay.

C Check continuity between each terminal of ABS control relay shown below.

OK

Terminals (A7) 1 and (A6) 3	Continuity (Reference value 80 Ω)
Terminals (A7) 5 and (A7) 6	Continuity
Terminals (A7) 2 and (A7) 5	Open

C
1. Apply battery positive voltage between terminals ( ) 1 and ( ) 3.
2. Check continuity between each terminal of ABS control relay shown below.

OK

Terminals (A7) 5 and (A7) 6	Open
Terminals (A7) 2 and (A7) 5	Continuity

C Connect the ⊕ test lead to terminal 4 of ( ) and the ⊖ lead to terminal 5 of ( ). Check continuity between the terminals.

OK **Continuity**

If there is no continuity, connect the ⊖ test lead to terminal 4 of ( ) and the ⊕ lead to terminal 5 of ( ). Recheck continuity between terminals.

OK

NG **Replace ABS control relay.**

Repair or replace and check for open in harness and connector between DCL1 and ABS control relay and body ground (See page IN–27).

3	Is diagnostic trouble code output?
Perform diagnostic trouble code check on page BR–61.	

NO

YES → **Repair circuit indicated by the code output.**

4	Does ABS warning light go off if short pin is removed?

YES

NO → **Check for short in harness and connector between warning light and DCL1 and ECU. (see page IN–27).**

5	Check ABS control relay (See step No. 2).

OK

NG → **Replace ABS control relay.**

Repair or replace and check for short in harness and connector between DCL1 and ABS control relay (See page IN–27).

Tc Terminal Circuit

CIRCUIT DESCRIPTION

Connecting between terminals Tc and E1 of the DCL1 or the DCL2 causes the ECU to display the diagnostic trouble code by flashing the ABS warning light.

DIAGNOSTIC CHART

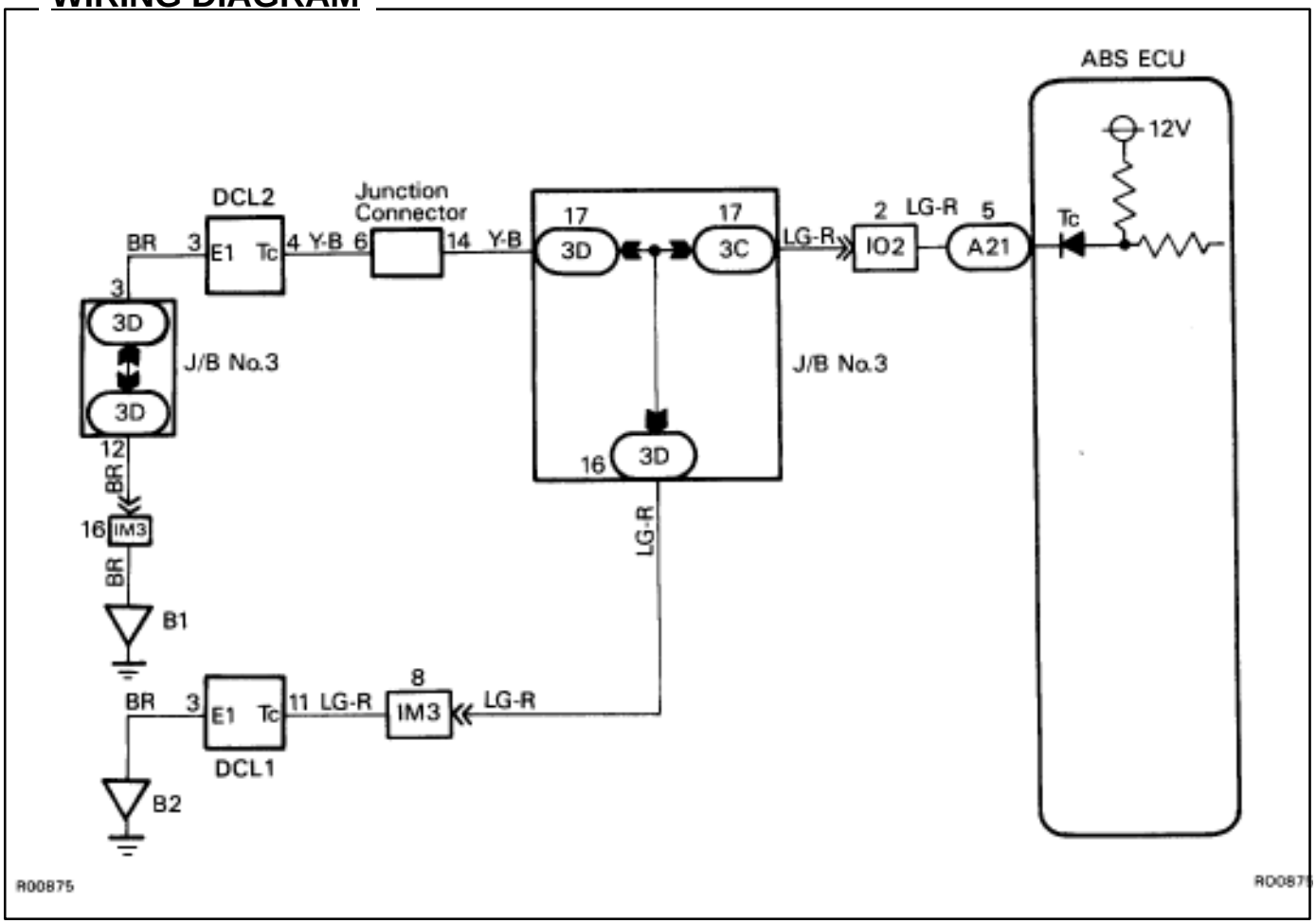
1 Check voltage between terminals Tc and E1 of DCL2 or DCL1.
- OK → If ABS warning light does not blink even after Tc and E1 are connected, the ECU may be defective.*
- NG →

2 Check for open and short in harness and connector between ABS ECM and DCL2 or DCL1, DCL2 or DCL1 and body ground (See page IN–27).
- NG → Repair or replace harness or connector.
- OK →

Check and replace ABS ECU.

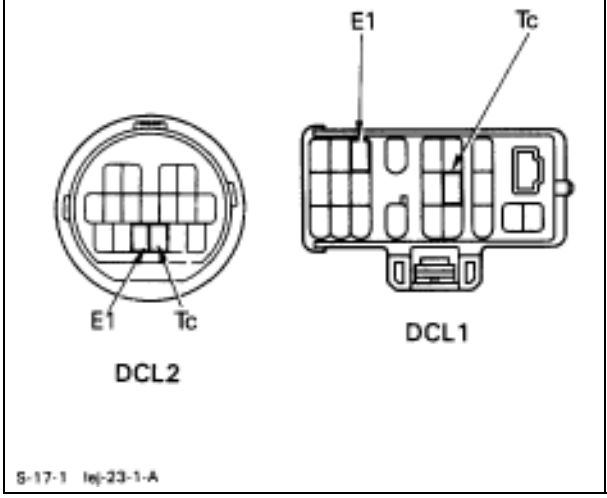
*: Provided that the harness between terminal Tc of DCL2 or DCL1 and terminal Tc of ECU is not open.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminals Tc and E1 of DCL2 or DCL1.**



C
1. Turn ignition switch ON.
2. Measure voltage between terminals Tc and E1 of DCL2 or DCL1.

OK **Voltage: 10 – 14 V**

NG

OK **If ABS warning light does not blink even after Tc and E1 are connected, the ECU may be defective.**

2 **Check for open and short in harness and connector between ABS ECU and DCL2 or DCL1, DCL2 or DCL1 and body ground (See page IN–27).**

OK

NG **Repair or replace harness or connector.**

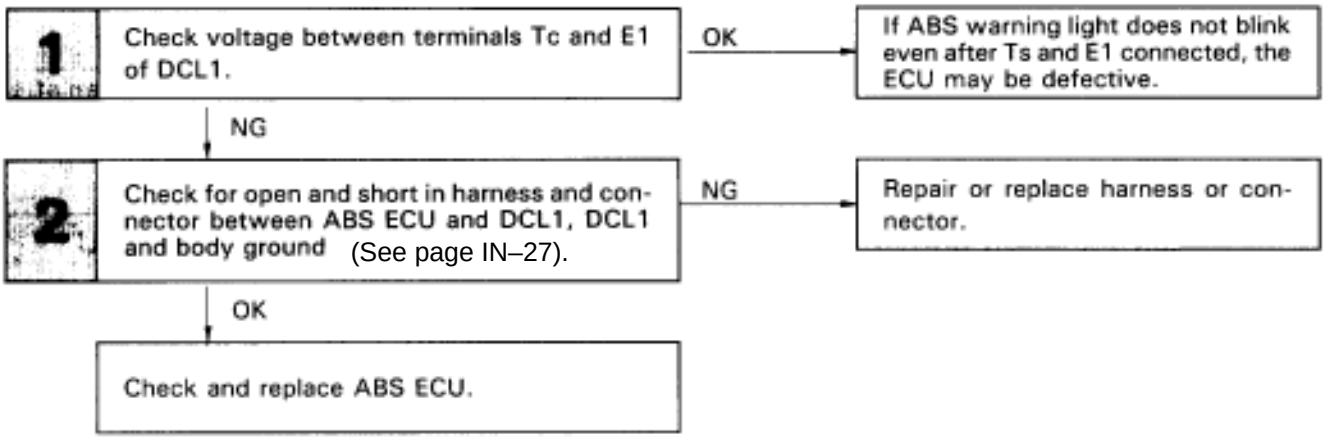
Check and replace ABS ECU.

Ts Terminal Circuit

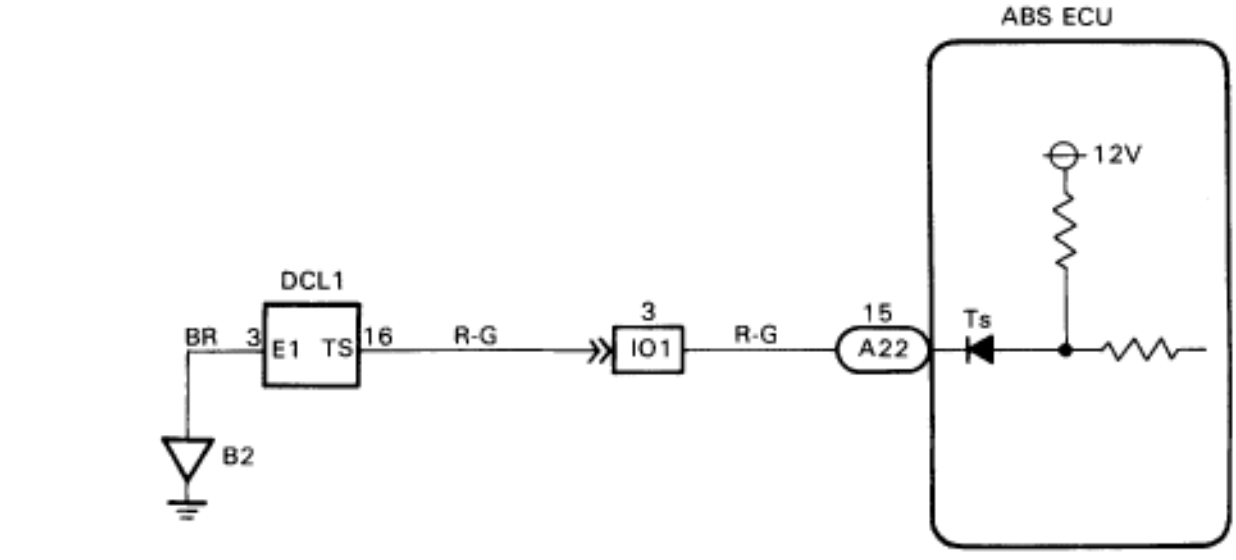
CIRCUIT DESCRIPTION

The sensor check circuit detects abnormalities in the speed sensor signal which can not be detected with the diagnostic trouble code check.
Connecting terminals Tc and E1 of the DCL1 in the engine compartment starts the check.

DIAGNOSTIC CHART

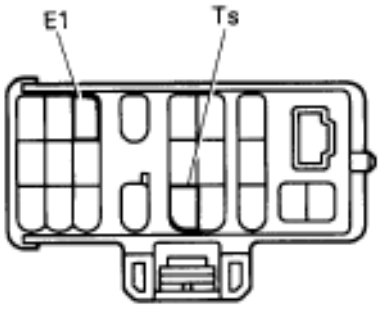


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminal Ts and E1 of DCL1.**



DCL1

Inj-23-1-A

C
1. Turn ignition switch ON.
2. Measure voltage between terminal Ts and E1 of DCL1.

OK **Voltage: 10 – 14 V**

NG

OK **If ABS warning light does not blink even after Ts and E1 are connected, the ECU may be defective.**

2 **Check for open and short in harness and connector between ABS ECU and DCL1, DCL1 and body ground (See page IN–27).**

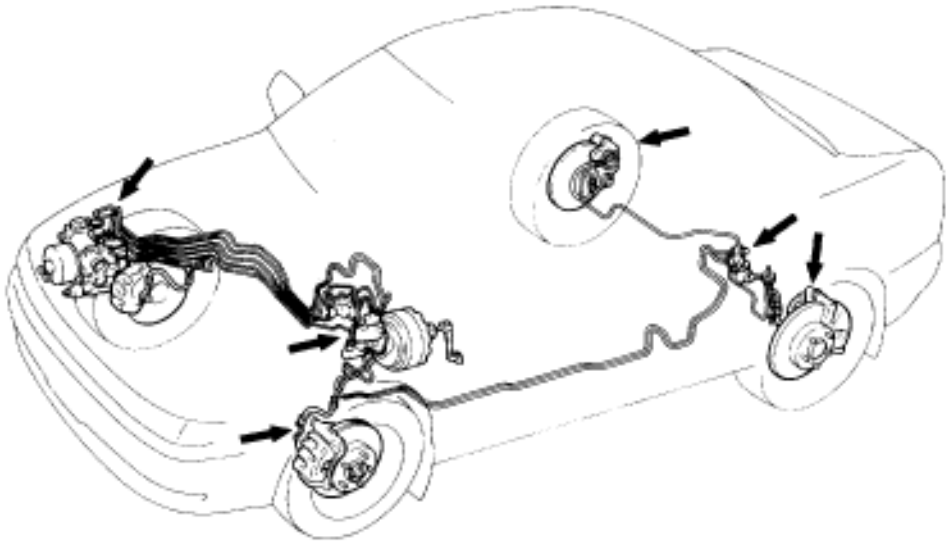
OK

NG **Repair or replace harness or connector.**

Check and replace ABS ECU.

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



R01329

SERVICE SPECIFICATIONS

BR04N–01

SERVICE DATA

Brake pedal height (from asphalt sheet)		147.5–157.5 mm (5.81–6.20 in.)
Brake pedal freeplay		1–6 mm (0.04–0.24 in.)
Brake pedal reserve distance at 490N (50kgf,110.2lbf)		More than 70 mm (2.76 in.)
Brake booster push rod to piston clearance	(w/SST)	0 mm (0 in.)
Front brake pad thickness	STD	11.0 mm (0.433 in.)
Front brake pad thickness	Limit	1.0 mm (0.039 in.)
Front brake disc thickness	STD	28.0 mm (1.102 in.)
Front brake disc thickness	Limit	26.0 mm (1.063 in.)
Front brake disc runout	Limit	0.05 mm (0.0020 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	10.0 mm (0.394 in.)
Rear brake disc thickness	Limit	9.0 mm (0.354 in.)
Rear brake disc runout	Limit	0.15 mm (0.0059 in.)
Rear brake disc inner diameter	STD	170 mm (6.69 in.)
Rear brake disc inner diameter	Limit	171 mm (6.73 in.)
Parking brake lining thickness	STD	2.0 mm (0.079 in.)
Parking brake lining thickness	Limit	1.0 mm (0.039 in.)
Parking brake lever travel at 196 N (20 kgf, 44.1 lbf)		5–8 clicks
Parking brake clearance between rear shoe and lever		Less than 0.35 mm (0.0138 in.)
Parking brake adjusting shim thickness		0.3mm (0.012 in.) 0.6 mm (0.024 in.) 0.9 mm (0.035 in.)

TORUE SPECIFICATIIONS

BR04P–01

Part tightened	N·m	kgf·cm	ft·lbf
Master cylinder X Reservoir tank	1.7	17.5	15.2 in.·lbf
Piston stopper bolt X Master cylinder	10	100	7
Master cylinder X Brake booster	13	130	9
Brake blister X Clevis lock nut	25	260	19
Brake booster X pedal bracket	13	130	9
Front disc brake torque plate X Steering knuckle	107	1,090	79
Front disc brake cylinder installation bolt	34	350	25
Front disc brake cylinder X Flexible hose union bolt	29	300	21
Brake tube union nut	15	155	11
Bleeder plug	8.3	85	74 in.·lbf
Rear disc brake torque plate X Axle carrier	47	475	34
Rear disc brake cylinder installation bolt	20	200	14
Rear disc brake cylinder main pin installation bolt	27	270	19
Rear disc brake X Flexible hose	29	300	21
LSPV X Body	39	400	29
LSPV adjusting bolt lock nut X Suspension arm	13	130	9
ABS actuator X Actuator bracket	5.4	55	48 in.·lbf
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