BRAKE SYSTEM

GENERAL DESCRIPTION

1. **Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts of the same part number or equivalent.**
2. **It is very important to keep parts and the area clean when repairing the brake system.**
3. **If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section**.

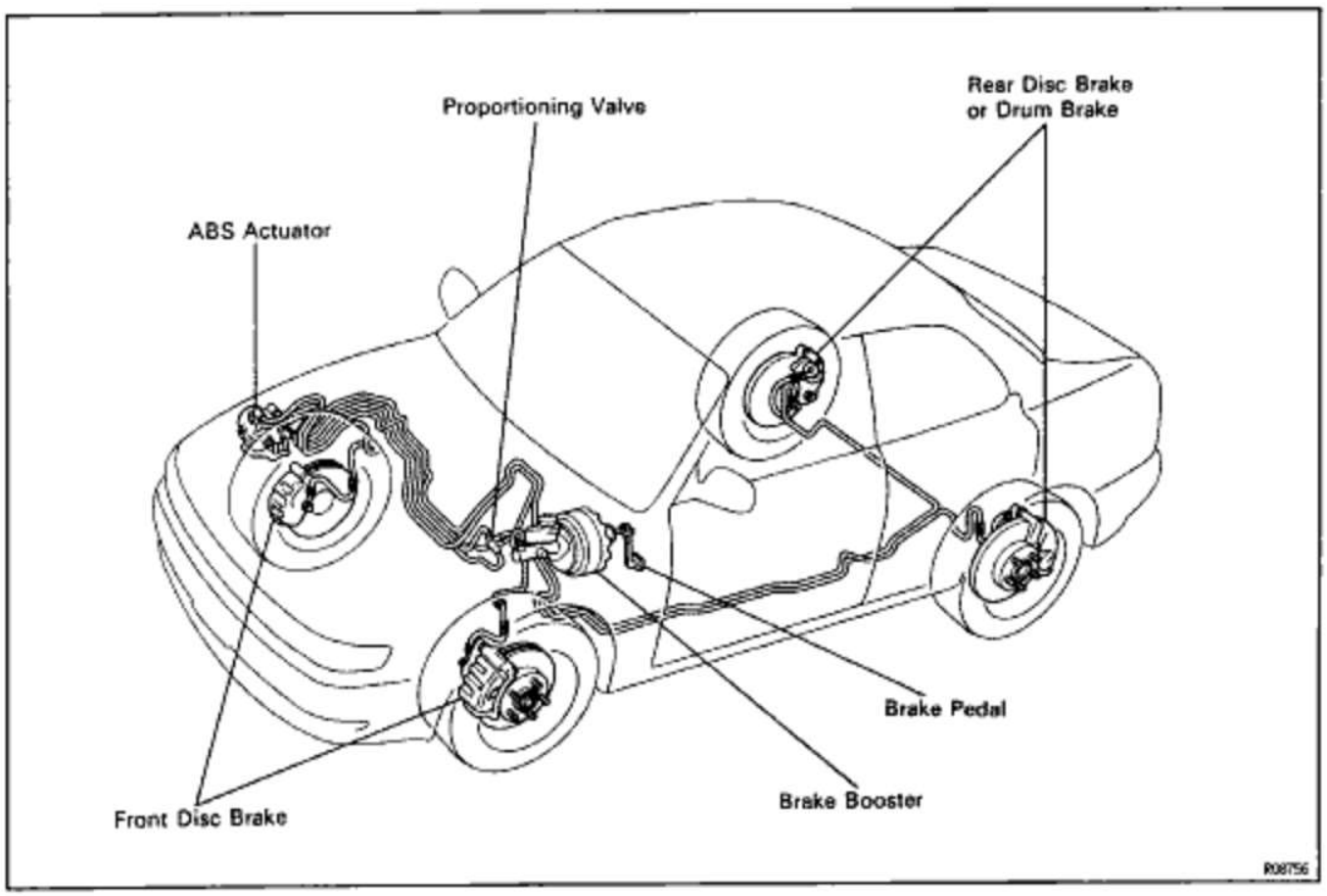
DESCRIPTION

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

OPERATION

FOOT BRAKE

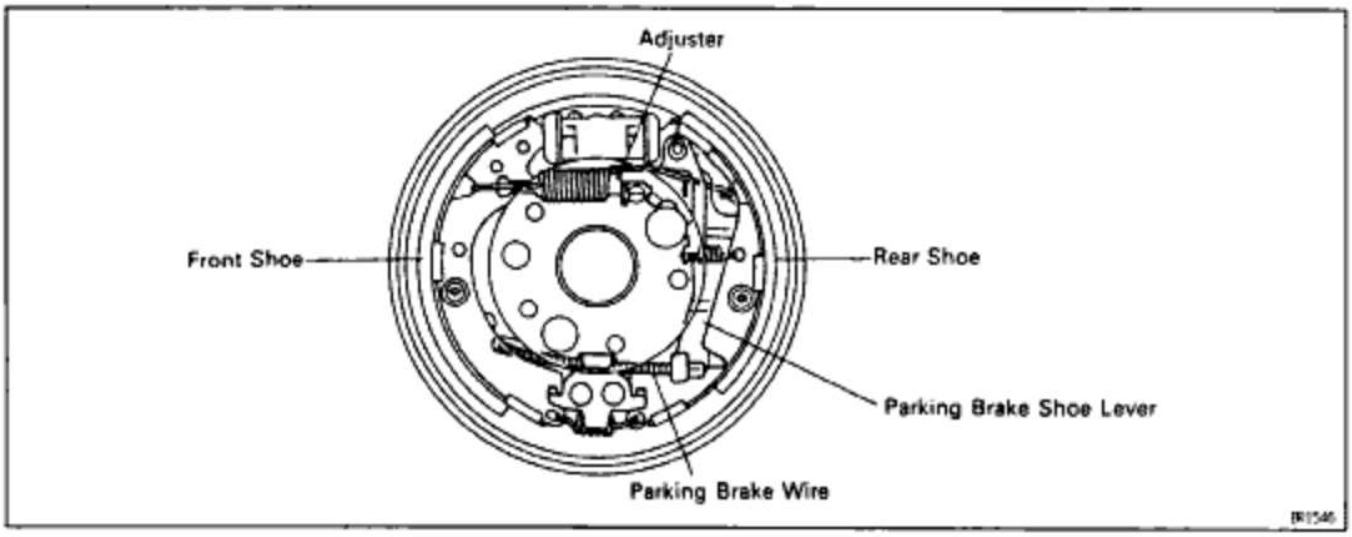
when the brake pedal is depressed, a vacuum builds up in the booster which amplifies the pedal force, pressing on the piston in the master cylinder. The piston movement raises the hydraulic pressure in the cylinder. This hydraulic pressure is then applied to each front caliper and rear wheel cylinder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



PARKING BRAKE

Rear Drum Brake:

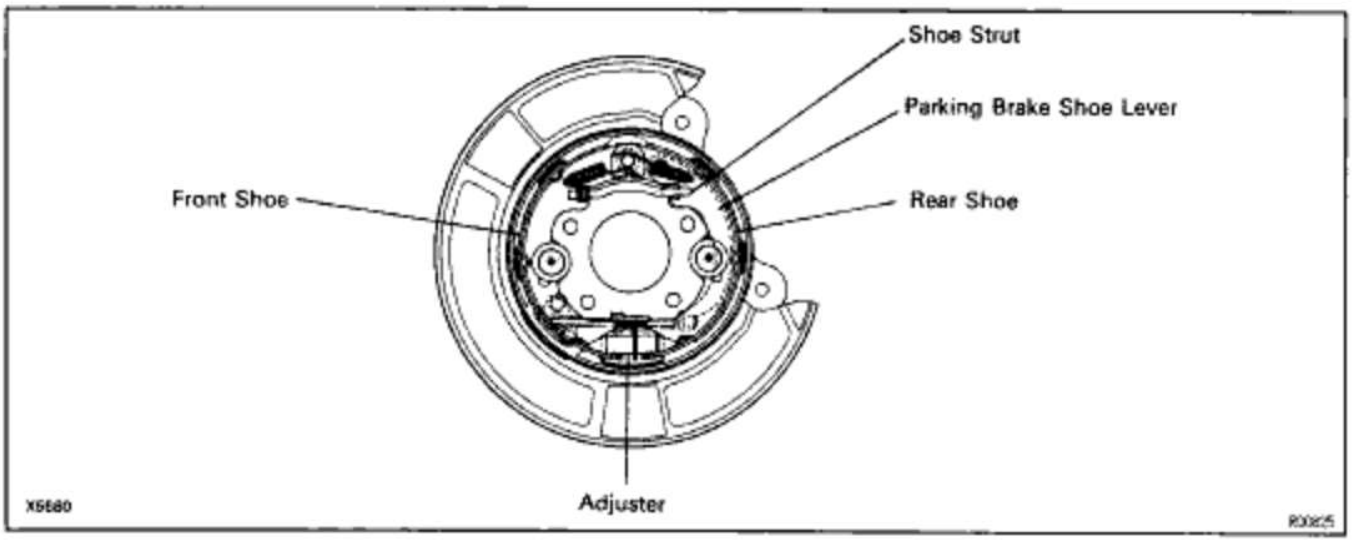
When the parking brake lever is pulled, the parking brake shoe lever is pulled via the parking brake wire. This causes the adjuster to push the front shoe, which expands and is pressed against the brake drum. If the parking brake lever continues to be pulled, the contact point of the parking brake shoe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



PARKING BRAKE

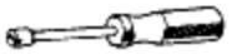
Rear Disc Brake:

When the parking brake lever is pulled or pedal is depressed, 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 disc. If the parking brake lever or pedal continues to be pulled or depressed, 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 disc being locked by the front shoe and rear shoe.



PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09023–00100 Union Nut Wrench 10 mm	
	09703–30010 Brake Shoe Return Spring Tool	
	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 A6S Actuator Checker and Sub–harness	TMC made vehicle (NIPPONDENSO ABS)
	09990–00163 ABS Actuator Checker Sheet 'A'	TMC made vehicle (NIPPONDENSO ABS)
	09990–00200 ABS Actuator Checker Sub–harness "C"	TMC made vehicle (NIPPONDENSO ABS)
	09990–00210 ABS Actuator Checker Sub–harness "E"	TMC made vehicle (NIPPONDENSO ABS)

RECOMMENDED TOOLS

	09082–00050 TOYOTA Electrical Tester Set	
	09905–00013 Snap Ring Pliers	

EQUIPMENT

Torque wrench	
Micrometer	Brake disc
Dial indicator	Brake disc
Vernier calipers	Brake drum and disc

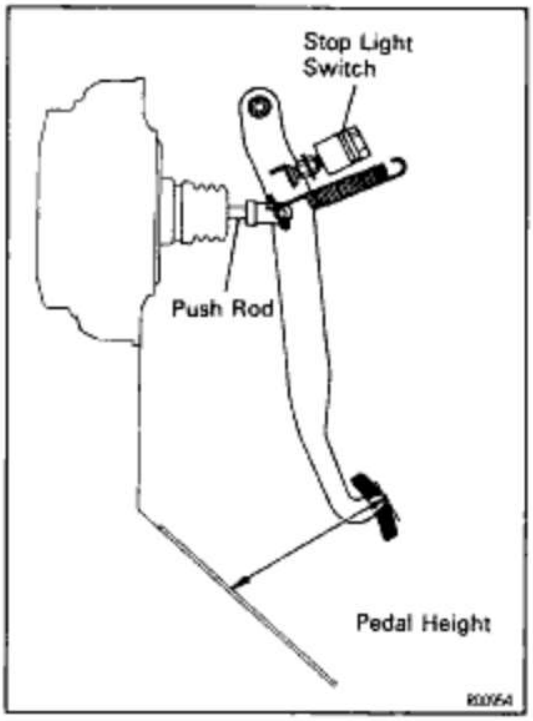
LUBRICANT

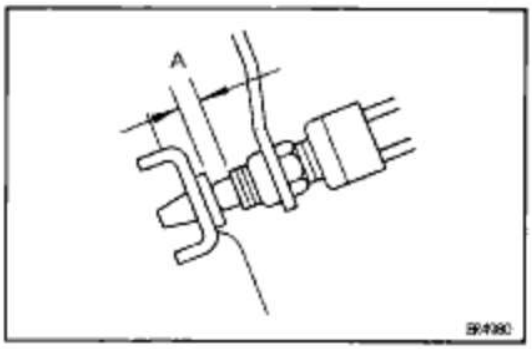
Item	Capacity	Classification
Brake fluid	–	SAE J 1703 or FMVSS No. 116 DOT3

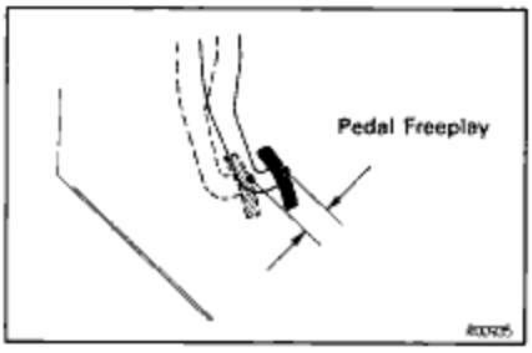
TROUBLESHOOTING

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

See page	-	-	BR–21,29,37,44	BR–21,29,44	BR–8	BR–12	BR–37,44	BR–10,11	-	BR–17	BR–37	BR–21,29,37,44	BR–21,29,37,44	BR–21,29,37,44	BR–21,29,37,44	BR–9	BR–21,29,44	BR–21,29,37,44	BR21, 29, 44	BR–21,29,44	BR–21,29,37,44	BR–21,29,37,44	BR–21,29,44	BR–37
Part Name (Trouble)	Brake system (Fluid leaks)	Brake system (Air in)	Brake pad or lining (Worn)	Piston seal (Worn or damaged)	Brake pedal (Freeplay minimal)	Master cylinder (Faulty)	Rear brake (Shoe clearance out of adjustment)	Parking brake (Lever or pedal travel out of adjustment)	Parking brake wire (Sticking)	Booster push rod (Out of adjustment)	Anchor or return spring (Faulty)	Pad or lining (Cracked or distorted)	Piston (Stuck)	Pad or lining (oily)	Piston (Frozen)	Booster system (Vacuum leaks)	Pad support plate (Loose)	Installation bolt (Loose)	Sliding pin (Worn)	Rotor (Scored)	Pad or lining (Dirty)	Pad or lining (Hardened)	Anti–squeal shim (Damaged)	Hold–down spring (Damaged)
Low pedal or spongy pedal	1	2		3		5	4			6														
Brake drag					1	11	4	2	3	9	8	5	6		7	10								
Brake pull												5	1	2	3					4				
Hard pedal but brake inefficient	1	2	3				5			9		4		6		10				8		7		
Noise from brakes											8	1					4	2	5	3	6	7	9	10







CHECK AND ADJUSTMENT

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 fn.)

If the pedal height is incorrect, adjust it.

2. IF NECESSARY, ADJUST PEDAL HEIGHT

(a) Disconnect the connector from the stop light switch.

(b) Loosen the stop light switch lock nut and remove the stop light switch.

(c) Loosen the push rod lock nut.

(d) Adjust the pedal height by turning the pedal push rod.

(e) Tighten the push rod lock nut.

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

(f) Install the stop light switch and turn it until it lightly contacts the pedal stopper.

(g) Turn the stop light switch back one turn.

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

Clearance:

0.5–2.4 mm (0.02–0.09 in.)

(i) Tighten the stop light switch lock nut.

(j) Connect the connector to the stop light switch.

(k) Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

(l) After adjusting the pedal height, check that pedal freeplay.

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

3. CHECK THAT PEDAL FREEPLAY IS CORRECT

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

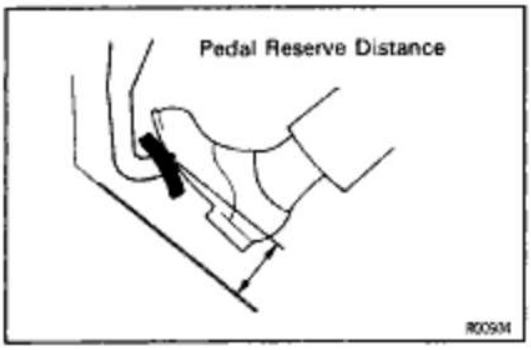
(b) Push in the pedal by hand until the beginning of the resistance is felt, then measure the distance.

Pedal freeplay:

1–6 mm (0.04–0.24 in.)

HINT: The freeplay to the 1st 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.

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



4. CHECK THAT PEDAL RESERVE DISTANCE IS COR–RECT

Release the parking brake.

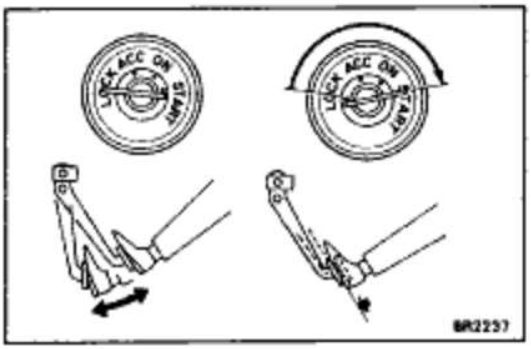
With the engine running, depress the pedal and meas–ure the pedal reserve distance.

Pedal reserve distance from asphalt sheet 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.

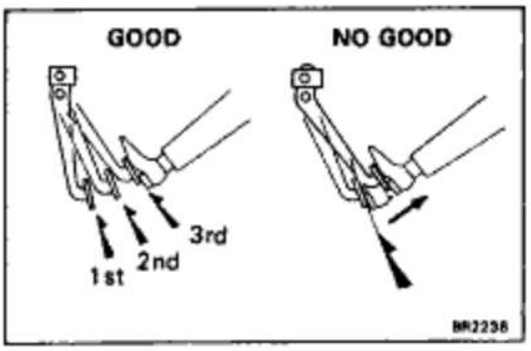
BRAKE BOOSTER OPERATIONAL TEST



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.

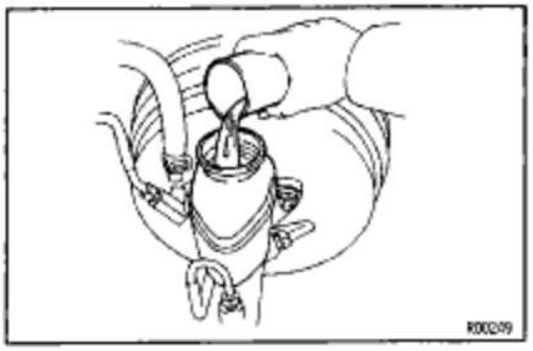


2. AIR TIGHTNESS CHECK

(a) Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly. If the pedal goes down farthest the 1 st time, but gradually rises after the 2nd or 3rd 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 reverse travel after holding the pedal for 30 seconds, the booster is air tight.

BRAKE SYSTEM BLEEDING

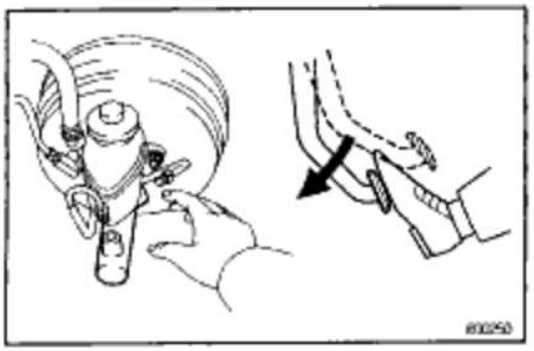


HINT: If any work is done on the brake system or if air in the brake lines is suspected, bleed the system of air.

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

1. FILL BRAKE RESERVOIR WITH BRAKE FLUID

Fluid: SAE J1703 or FMVSS No. 116 DOT3

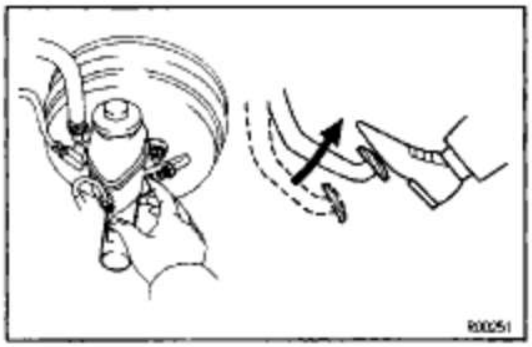


2. BLEED MASTER CYLINDER

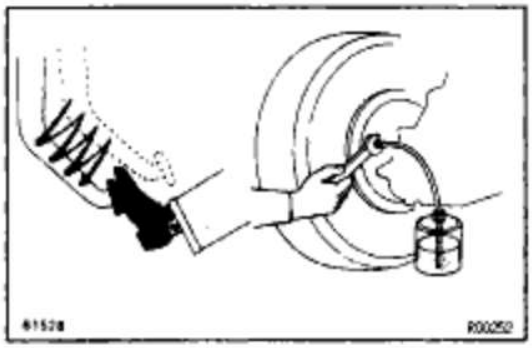
HINT: If the master cylinder has been disassembled or if the reservoir becomes empty, bleed the air from the master cylinder.

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

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

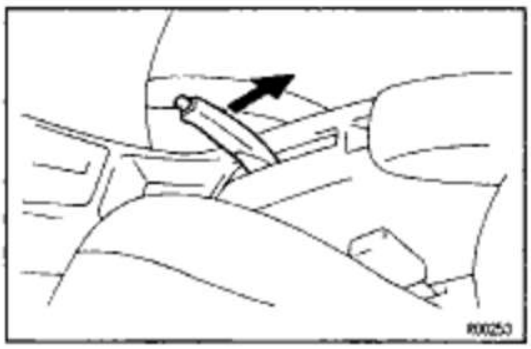


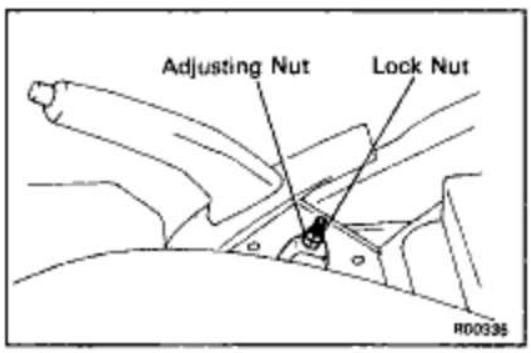
(c) Block off the outer holes with your fingers, and release the brake pedal.
(d) Repeat (b) and (c) 3 or 4 times.



3. BLEED BRAKE LINE
(a) Connect the vinyl tube to the brake caliper.
(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.

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



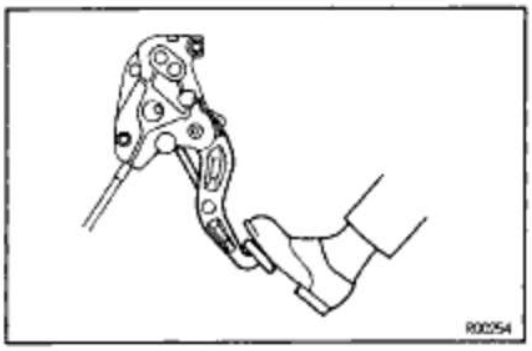


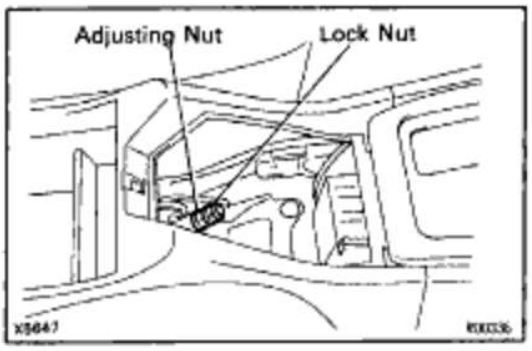
LEVER TYPE PARKING BRAKE CHECK AND ADJUSTMENT

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 lbf): 5–8 clicks
If incorrect, adjust the parking brake.

2. IF NECESSARY, ADJUST PARKING BRAKE LEVER TRAVEL
HINT: Before adjusting the parking brake, make sure that the rear brake shoe clearance has been adjusted.
For shoe clearance adjustment, see step 9 on page BR–43 or step 8 on page BR–58.
(a) Remove the rear console box.
(b) Loosen the lock nut and turn the adjusting nut until the lever travel is correct.

(c) Tighten the lock nut.
Torque: 5.4 N–m (55 kgf–cm. 48 in.¿lbf)
(d) Install the rear console box.





PEDAL TYPE PARKING BRAKE CHECK AND ADJUSTMENT

1. CHECK THAT PARKING BRAKE PEDAL TRAVEL IS CORRECT

Slowly depress the parking brake pedal all the way, and count the number of clicks.

Parking brake pedal travel at 294 N (30 kgf,66 lbf): 3–6 clicks

If incorrect, adjust the parking brake.

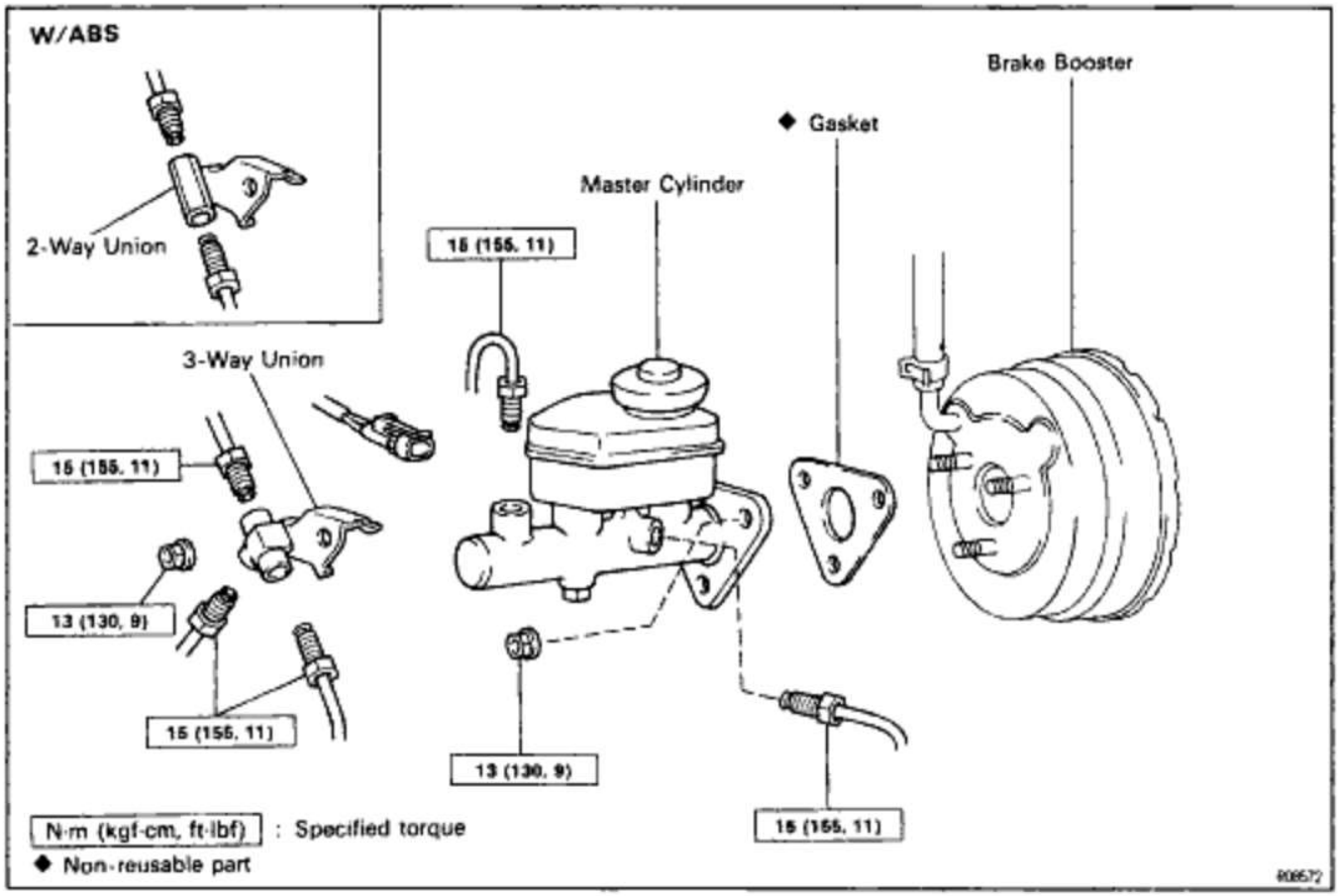
2. IF NECESSARY, ADJUST PARKING BRAKE PEDAL TRAVEL

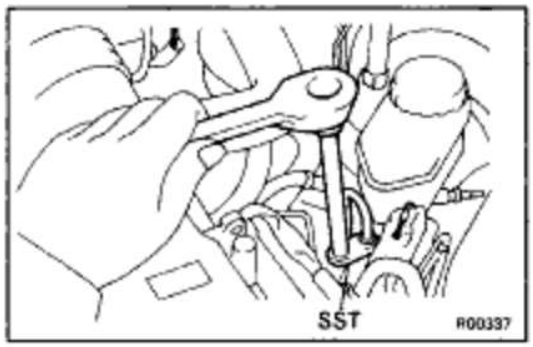
HINT: Before adjusting the parking brake, make sure that the rear brake shoe clearance has been adjusted. For shoe clearance adjustment, see step 8 on page BR –58.

(a) Remove the hole cover.
(b) Loosen the lock nut and turn the adjusting nut until the lever travel is correct.
(c) Tighten the lock nut.
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)
(d) Install the hole cover.

MASTER CYLINDER

MASTER CYLINDER REMOVAL





1. DISCONNECT LEVEL WARNING SWITCH CONNEC – TOR

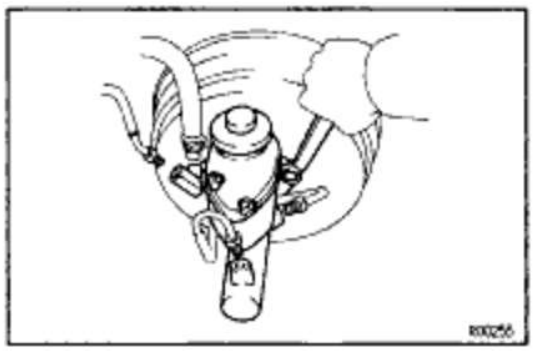
2. TAKE OUT FLUID WITH SYRINGE

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

3. DISCONNECT BRAKE LINES

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

SST 09023–00100

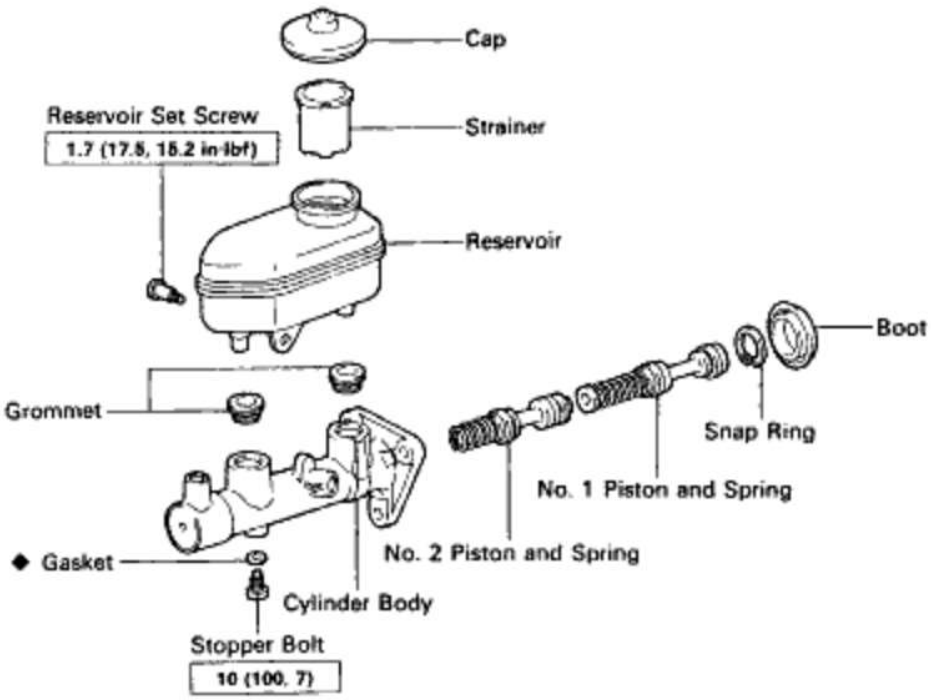


4. REMOVE MASTER CYLINDER

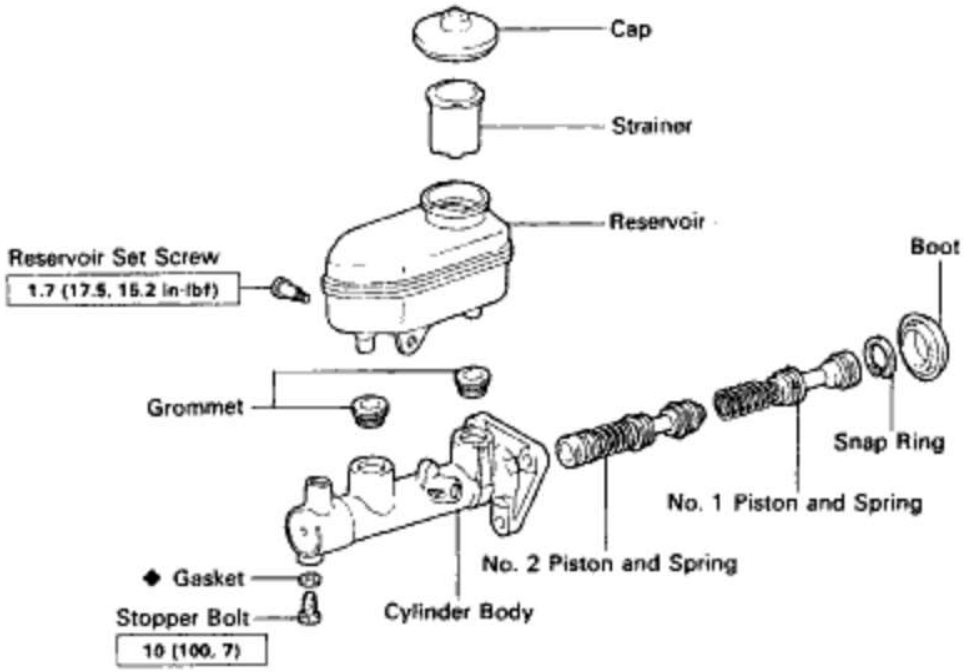
Remove the mounting nuts and pull out the master cylinder and gasket.

COMPONENTS

w/o ABS

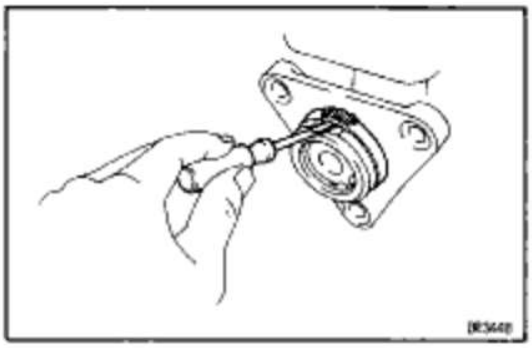


w/ABS



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

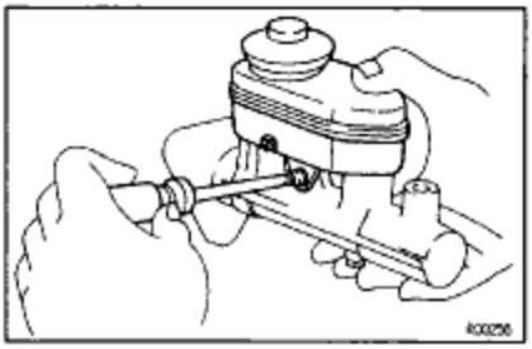
R00678
R00679
R00453



MASTER CYLINDER DISASSEMBLY

1. REMOVE MASTER CYLINDER BOOT

Using a screwdriver, remove the master cylinder boot.



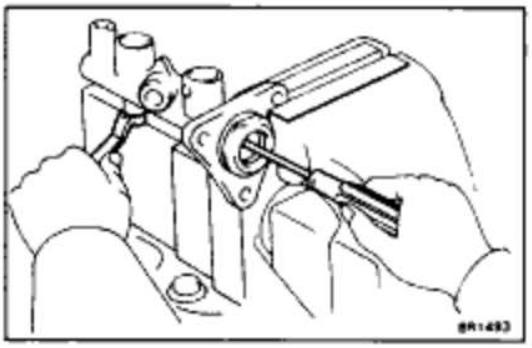
2. REMOVE RESERVOIR

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

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

3. REMOVE 2 GROMMETS

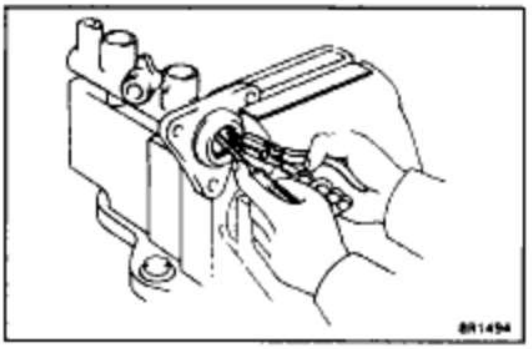
4. PLACE CYLINDER IN VISE



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.

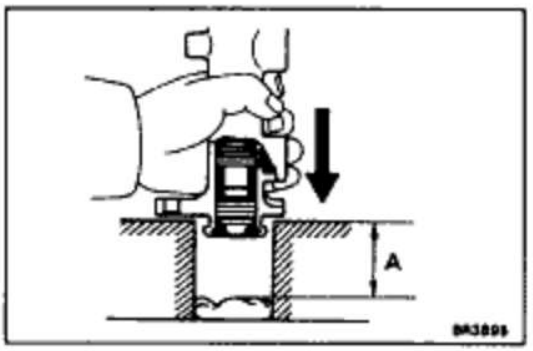


6. REMOVE 2 PISTONS AND SPRINGS

(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 a possibility that the cylinder bore could be damaged.



(c) Place a rag and 2 wooden blocks on the work table and lightly tap the cylinder flange against the blocks 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 INSPECTION

HINT: Clean the disassembled parts with compressed air.

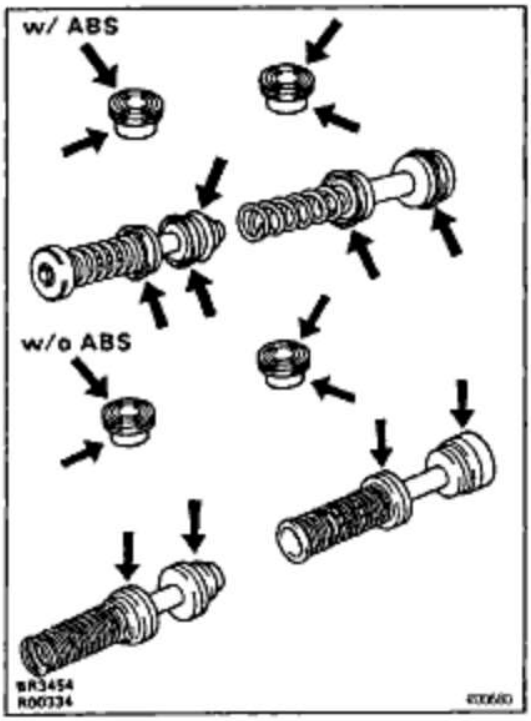
1. INSPECT CYLINDER BORE FOR RUST OR SCORING

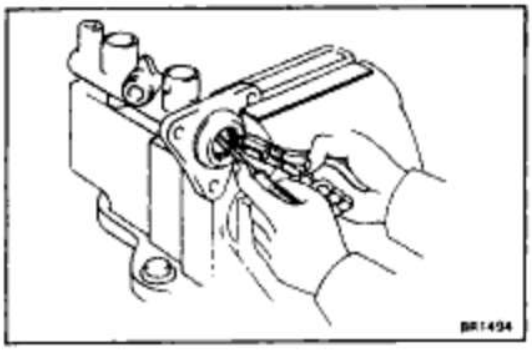
2. INSPECT CYLINDER FOR WEAR OR DAMAGE

If necessary, clean or replace the cylinder.

MASTER CYLINDER ASSEMBLY

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





2. INSTALL 2 SPRINGS AND PISTONS

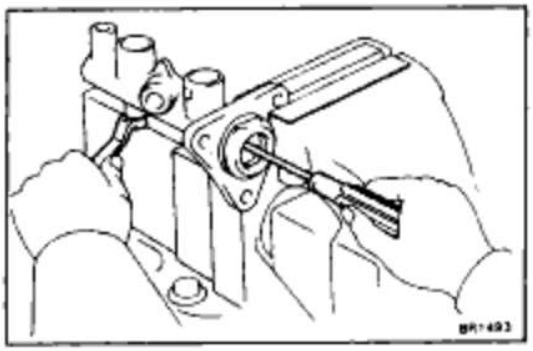
NOTICE: Be careful not to damage the rubber lips on the pistons.

(a) Install the 2 springs and pistons straight in, not at an angle.

NOTICE: If install at an angle, there is a possibility of damaging the cylinder bore.

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

HINT: Tape the screwdriver tip before use.

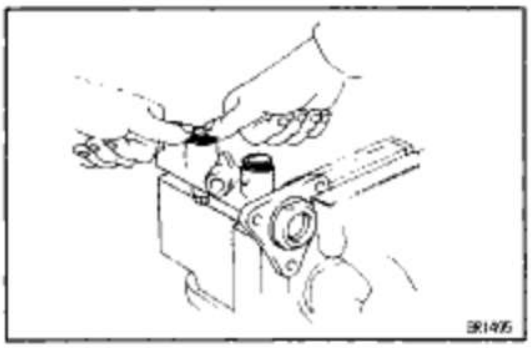


3. INSTALL PISTON STOPPER BOLT

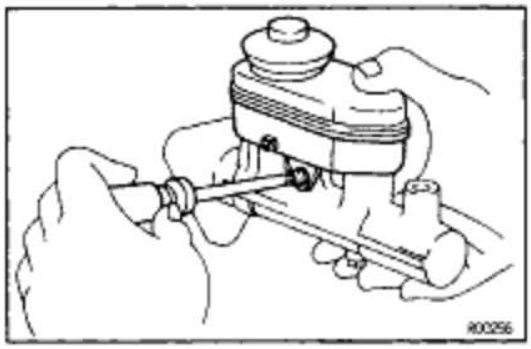
Using a screwdriver, push the piston in all the way and install the piston stopper bolt over a new gasket.

Torque the bolt.

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

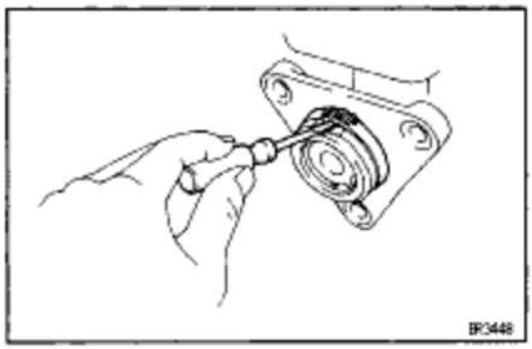


4. INSTALL 2 GROMMETS



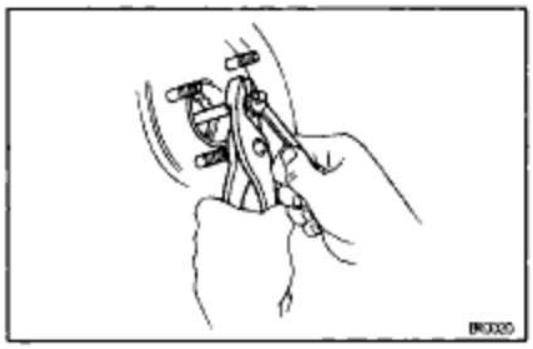
5. INSTALL RESERVOIR

(a) Install the strainer and cap to the reservoir.
(b) Push the reservoir onto the cylinder.
(c) Install the set screw while pushing on the reservoir.
Torque: 1.7 N–m (17.5 kgf–cm, 15.2 in.–lbf)



6. INSTALL MASTER CYLINDER BOOT

Facing the UP mark on the master cylinder boot upwards, install the cylinder boot to the master cylinder.



MASTER CYLINDER INSTALLATION

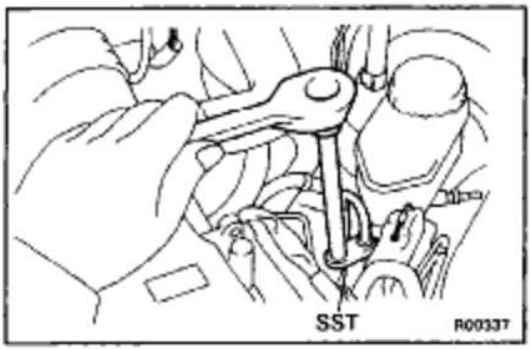
1. ADJUST LENGTH OF BRAKE BOOSTER PUSH ROD BEFORE INSTALLING MASTER CYLINDER

(See page BR–19)



2. INSTALL MASTER CYLINDER

Install the master cylinder and a new gasket on the brake booster with 3 nuts.
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)



3. CONNECT 2 BRAKE LINES

Using SST, connect the brake lines 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 page BR–9)

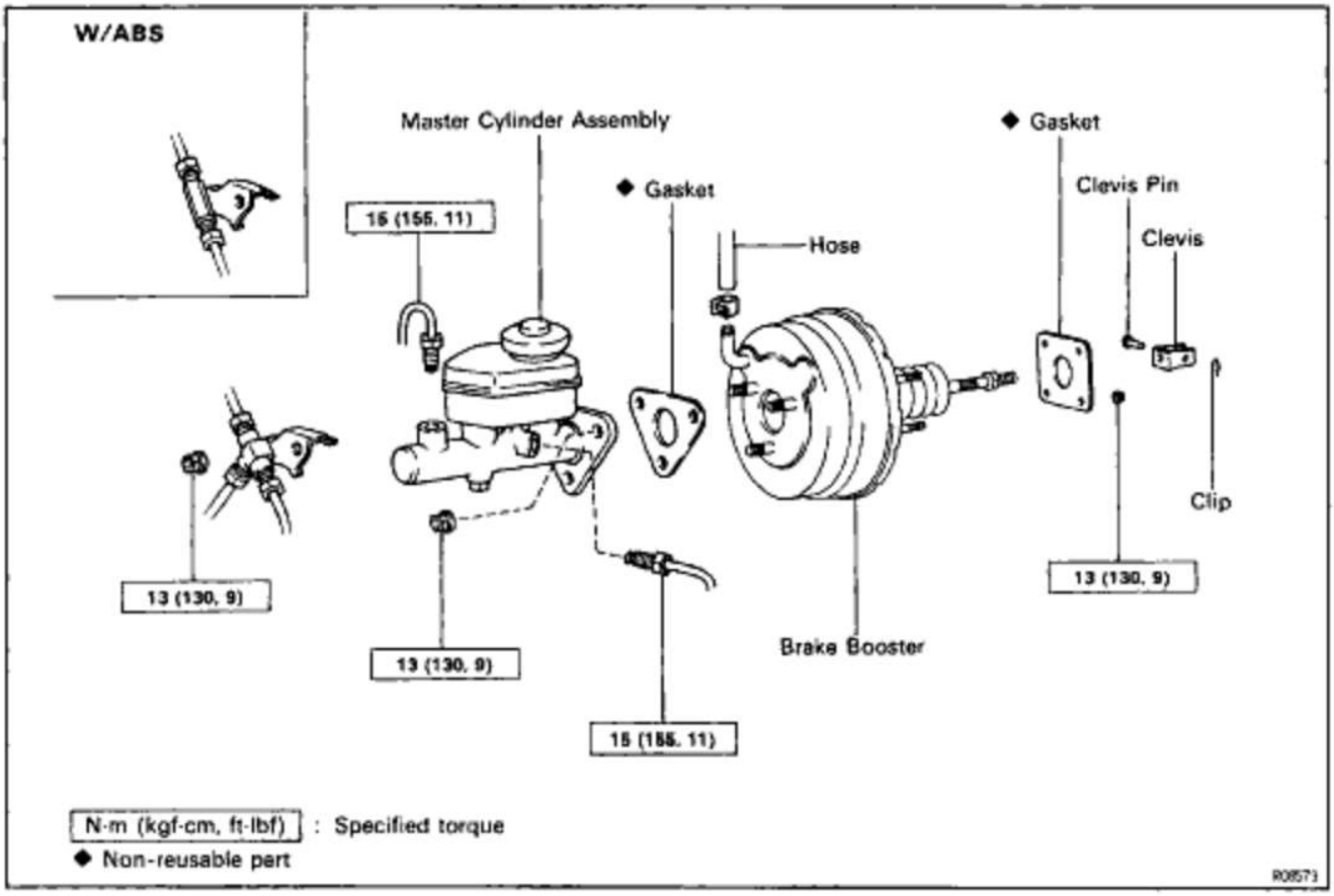
6. CHECK FOR LEAKS

7. CHECK AND ADJUST BRAKE PEDAL

(See page BR–8)

BRAKE BOOSTER

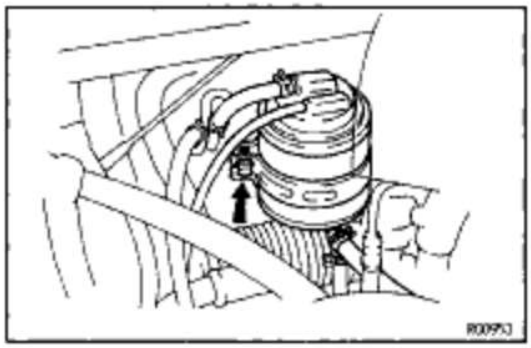
BRAKE BOOSTER REMOVAL





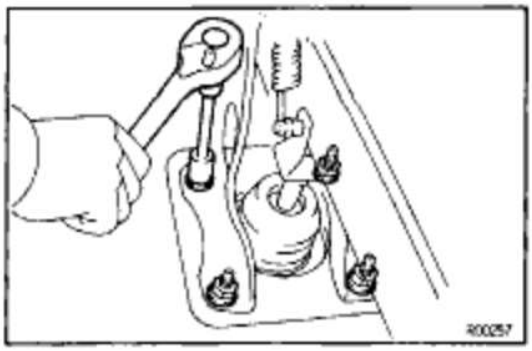
1. REMOVE MASTER CYLINDER

(See page BR–12)



2. PUSH DOWN CHARCOAL CANISTER

Loosen the clamp screw and push the charcoal canis–ter down slightly.



3. DISCONNECT VACUUM HOSE FROM BRAKE BOO–STER

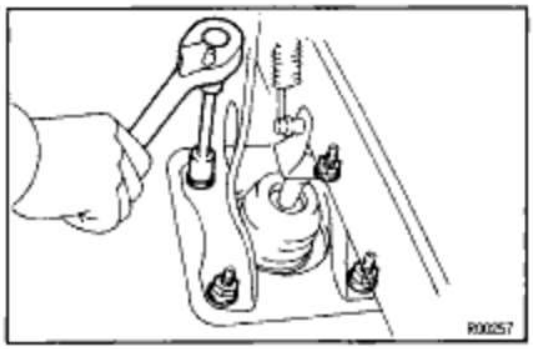
4. REMOVE PEDAL RETURN SPRING

5. REMOVE CLIP AND CLEVIS PIN

6. REMOVE BRAKE BOOSTER, GASKET AND CLEVIS

(a) Remove the 4 nuts and clevis.

(b) Pull out the brake booster and gasket.



BRAKE BOOSTER INSTALLATION

1. INSTALL BRAKE BOOSTER

(a) Install the booster and a new gasket.

(b) Install the clevis to the operating rod.

(c) Install and torque the booster installation nuts.

Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)

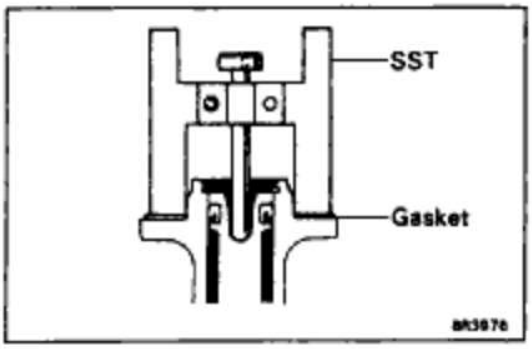
(d) Install the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin.

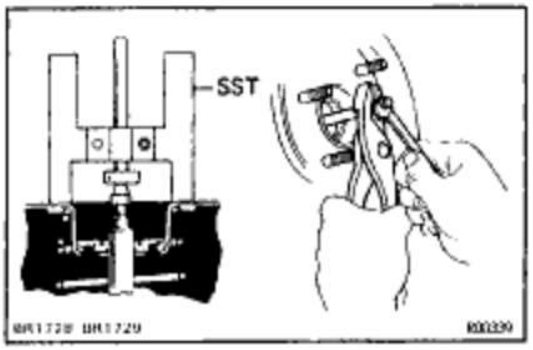
(e) Install the pedal return spring.

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.





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

(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 slightly touches the pin head.

3. INSTALL CHARCOAL CANISTER TO ORIGINAL PO–SITION

4. INSTALL MASTER CYLINDER

5. CONNECT VACUUM HOSE TO BRAKE BOOSTER

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

(See page BR–9)

7. CHECK FOR LEAKS

8. CHECK AND ADJUST BRAKE PEDAL

(See page BR–8)

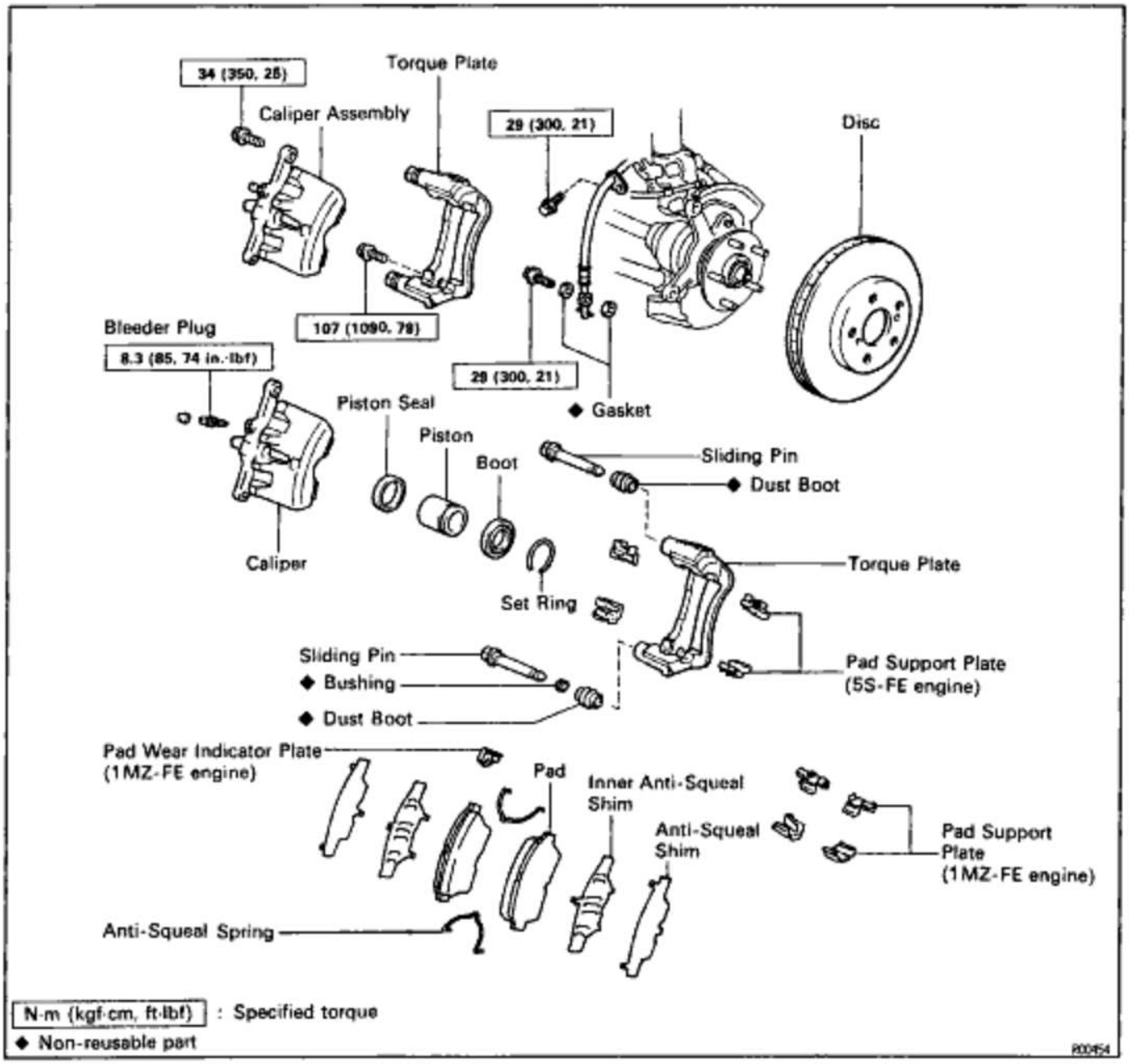
Check and adjust the brake pedal, then tighten the clevis lock nut.

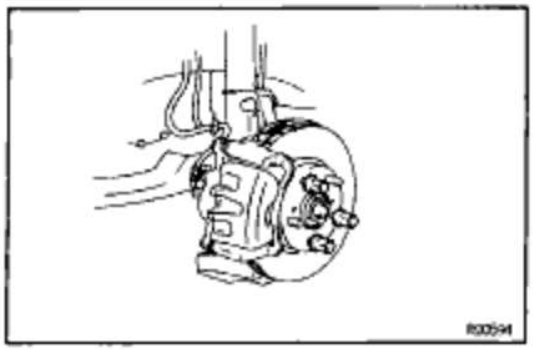
Torque: 25 N–m (260 kgf–cm, 19 ft–lbf)

9. PERFORM OPERATIONAL CHECK

(See page BR–9)

FRONT BRAKE
(Single–Piston Type)
COMPONENTS

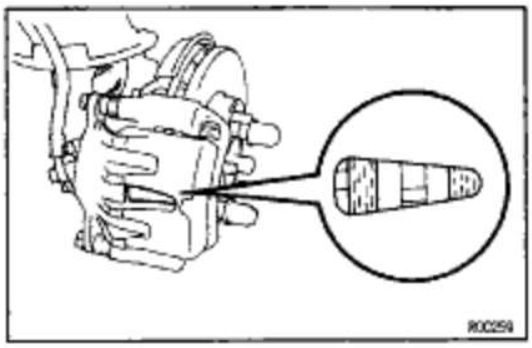




BRAKE PADS REPLACEMENT

1. REMOVE FRONT WHEEL

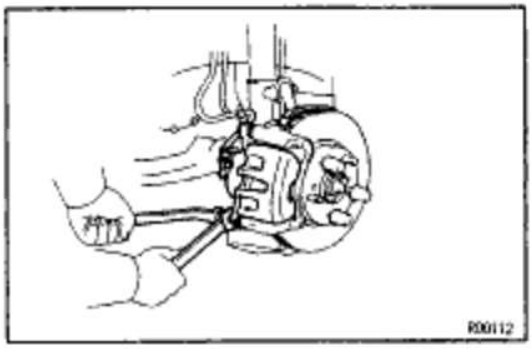
Remove the wheel and temporarily fasten the disc with hub nuts.



2. INSPECT PAD LINING THICKNESS

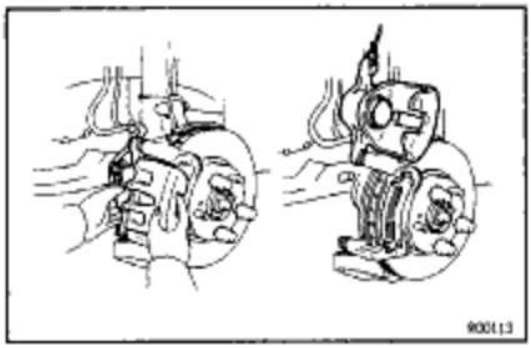
Check the pad thickness through the caliper inspec–tion hole and replace the pads if it is not within the specification.

Minimum thickness:
1.0 mm (0.039 in.)



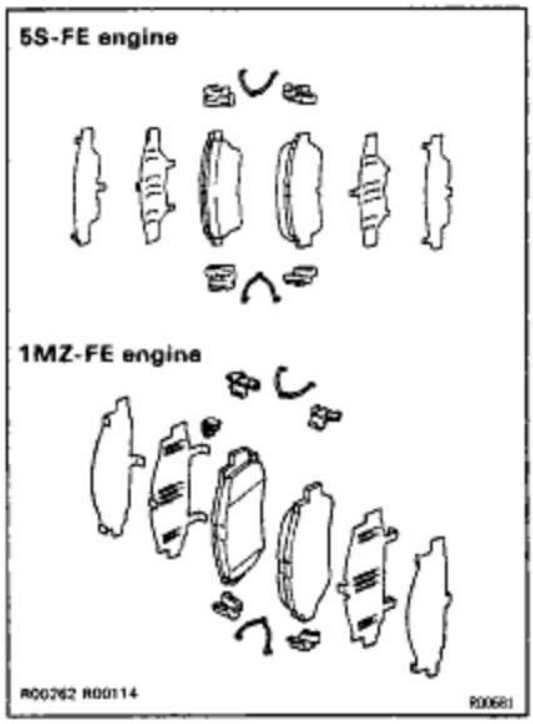
3. LIFT UP CALIPER

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



(c) Lift up the caliper and suspend the caliper with string.

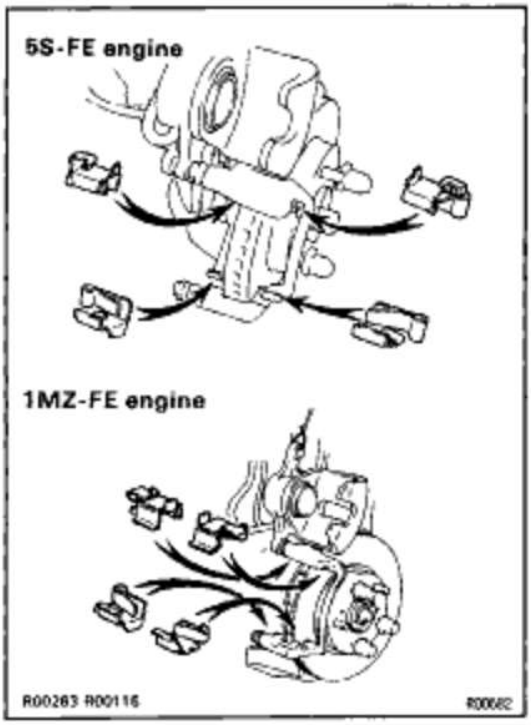
HINT: Do not disconnect the flexible hose from the caliper.



4. REMOVE FOLLOWING PARTS:

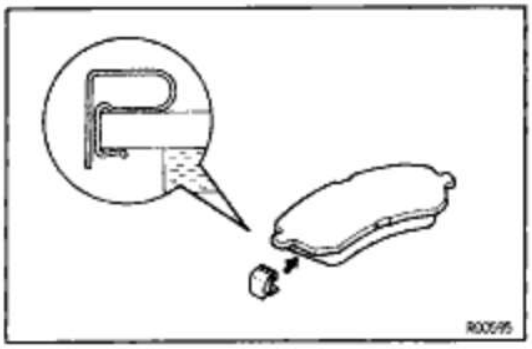
(a) 2 anti–squeal springs
(b) 2 brake pads
(c) 4 anti–squeal shims
(d) 1 MZ–FE engine:
Pad wear indicator
(e) 4 pad support plates

5. CHECK DISC THICKNESS AND RUNOUT
(See page BR–26)



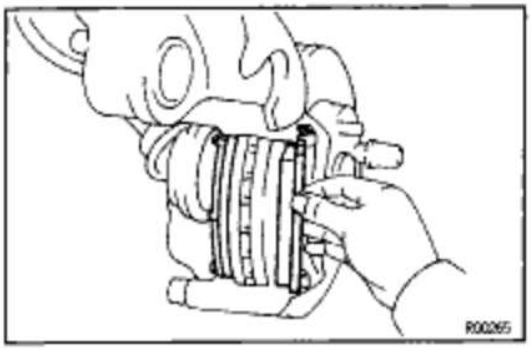
6. INSTALL PAD SUPPORT PLATES

Install the 4 pad support plates.



7. INSTALL NEW PADS

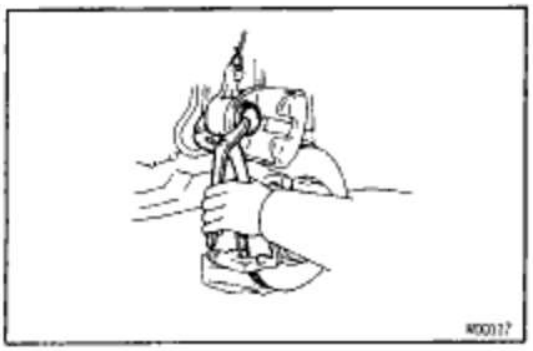
(a) 1 MZ–FE engine:
Install a pad wear indicator plate on the inside pad.
(b) Apply disc brake grease to both sides of the inner anti –squeal shim.
(c) Install the 2 anti–squeal shims on each pad.



(d) install inside pad with the pad wear indicator plate facing upward.
(e) Install outside pad.

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

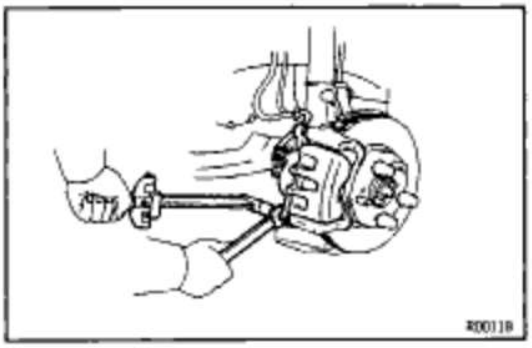
(f) Install the 2 anti–squeal springs.



8. INSTALL CALIPER

(a) Draw out a small amount of brake fluid from the reservoir.
(b) Press in the piston with water pump pliers or similar implement.

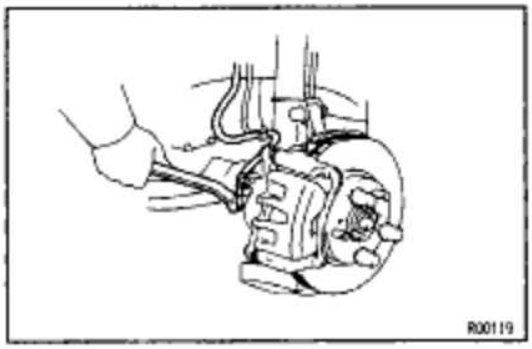
HINT: If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.



(c) Install the caliper.
(d) Hold the sliding pin and torque the installation bolt.
Torque: 34 N–m (350 kgf–cm, 25 ft–lbf)

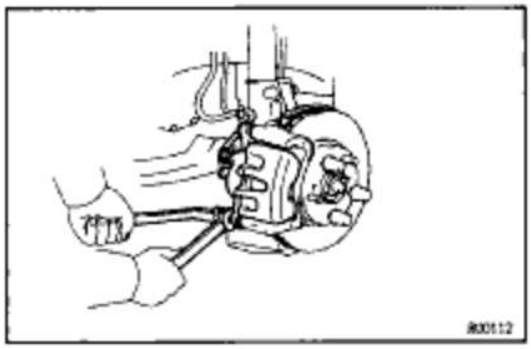
9. INSTALL FRONT WHEEL

10. CHECK THAT FLUID LEVEL IS AT MAX LINE

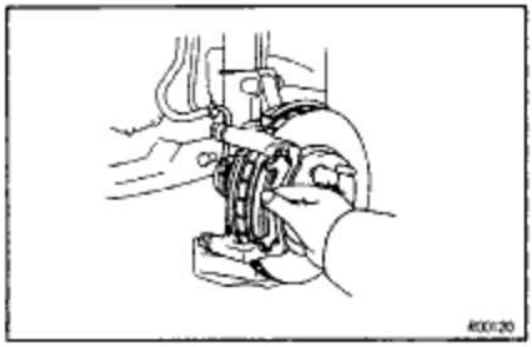


CALIPER REMOVAL

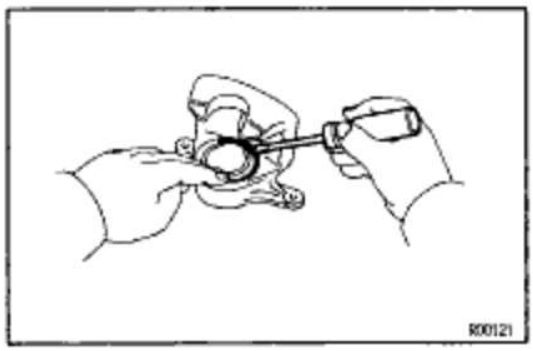
1. DISCONNECT FLEXIBLE HOSE
(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.
(b) Use a container to catch the brake fluid as it drains out.



2. REMOVE CALIPER
(a) Hold the sliding pin and loosen the 2 installation bolts.
(b) Remove the 2 installation bolts.
(c) Remove the caliper from the torque plate.



3. REMOVE 2 BRAKE PADS
Remove the inside and outside pads.



CALIPER DISASSEMBLY

1. REMOVE CYLINDER BOOT SET RING AND CYLIN–DER BOOT
Using a screwdriver, remove the cylinder boot set ring and cylinder boot from the caliper.

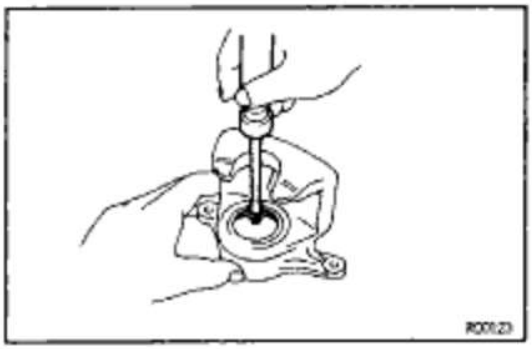


2. REMOVE PISTON

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

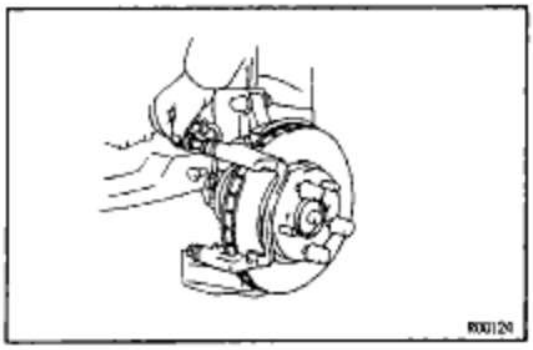
(b) Use compressed air to remove the piston from the cylinder.

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



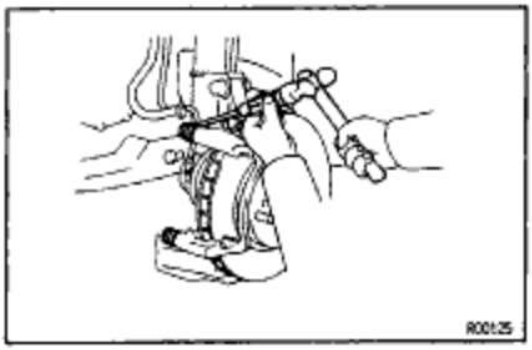
3. REMOVE PISTON SEAL

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

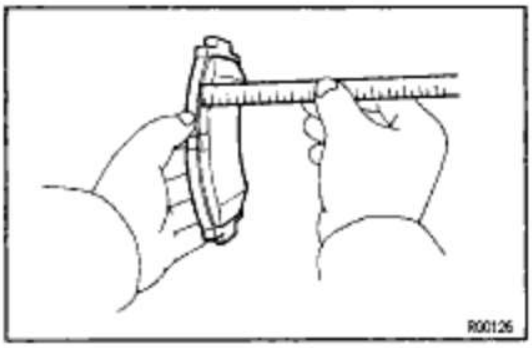


4. REMOVE SLIDING PINS AND DUST BOOTS

(a) Remove the 2 sliding pins from the torque plate.



(b) Using a screwdriver and hammer, tap out the 2 dust boots.



FRONT BRAKE COMPONENTS INSPECTION AND REPAIR

1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness:

5S–FE engine

12.0 mm (0.472 In.)

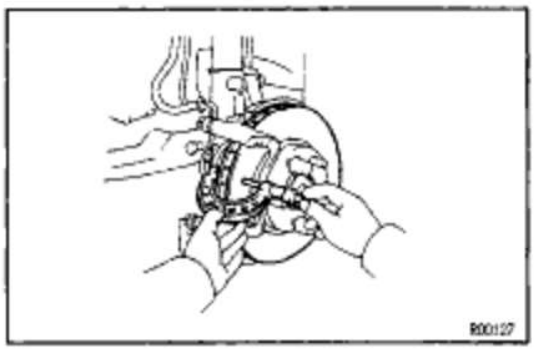
1 MZ–FE engine

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 mini–mum thickness or less, or if the pad has excessively uneven wear.



2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

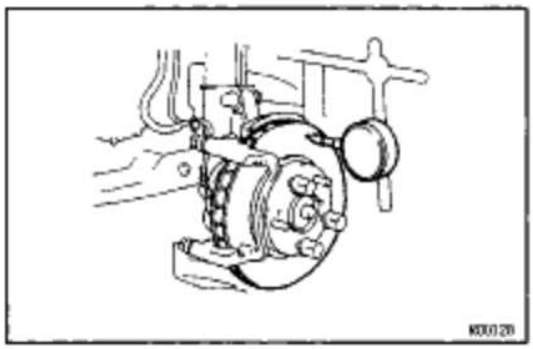
Standard thickness:

28.0 mm (1.102 in.)

Minimum thickness:

26.0 mm (1.024 in.)

Replace the disc if the disc's thickness is at the mini–mum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.



3. MEASURE DISC RUNOUT

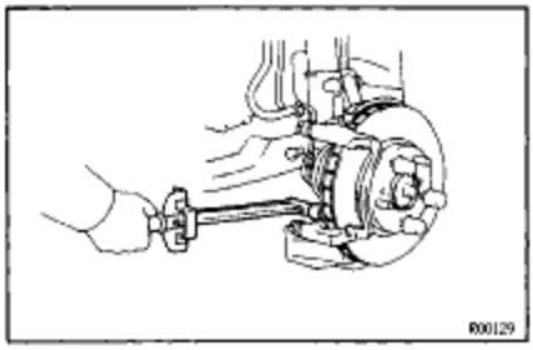
Measure disc runout 10 mm (0.39 in.) from the outer edge of the disc.

Maximum disc runout:

0.05 mm (0.0020 in.)

If runout is greater than maximum, attempt to adjust to below this maximum figure.

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



4. IF NECESSARY, ADJUST DISC RUNOUT

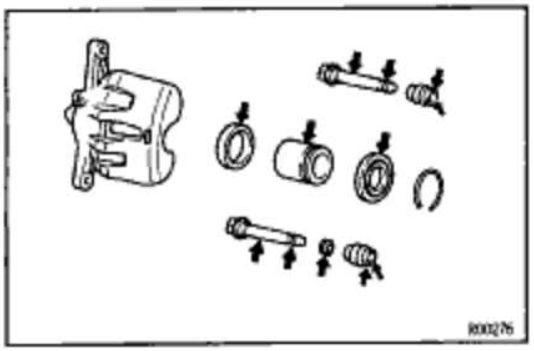
(a) Remove the torque plate from the knuckle.

(b) Remove the hub nuts and the disc. Reinstall the disc 1/5 of a turn round from its original position on the hub. Install and torque the hub nuts.

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

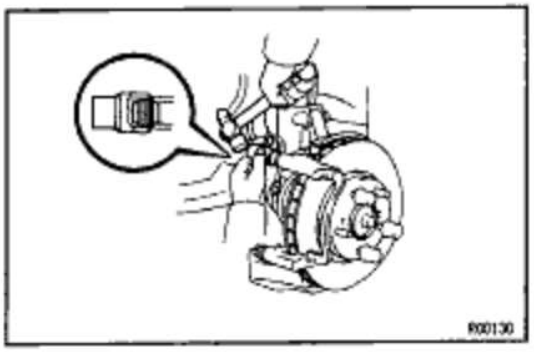
Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.
(d) If the minimum runout recorded in (b) and (c) is less than 0.05 mm (0.0020in.), install the disc in that position.
(e) If the minimum runout recorded in (b) and (c) is greater than 0.05 mm (0.0020 in.), replace the disc and repeat step 3.
(f) Install the torque plate and torque the mounting bolts.
Torque: 107 N–m (1,090 kgf–cm, 79 ft–lbf)

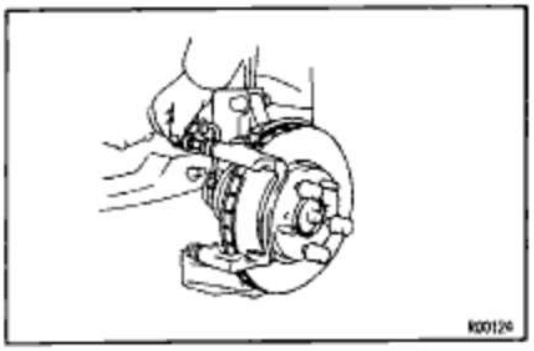


CALIPER ASSEMBLY

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

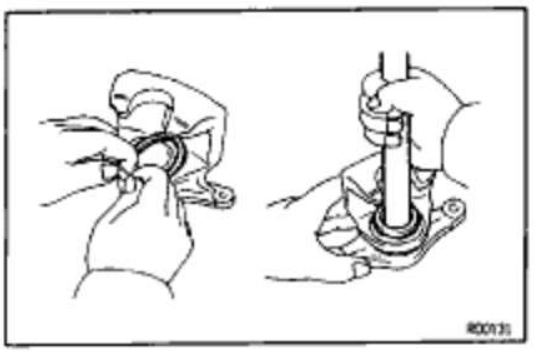


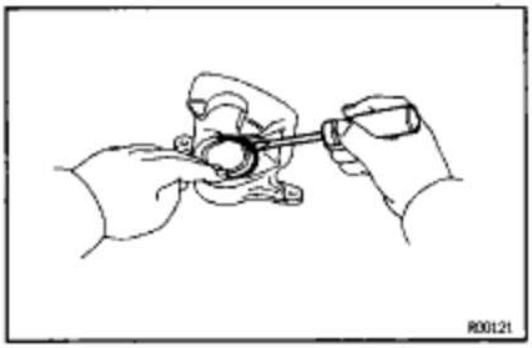
2. INSTALL DUST BOOTS AND SLIDING PINS
(a) Using a 19 mm socket wrench and hammer, tap in 2 new dust boots into the torque plate.
(b) Confirm that the metal plate portion of the dust boot fits snugly in the torque plate.



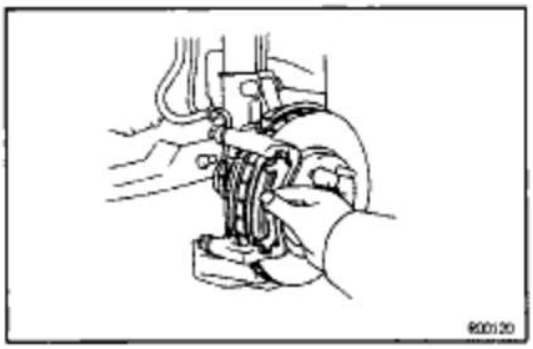
(c). Insert 2 sliding pins into the torque plate.
NOTICE: Insert the sliding pin with sliding bushing into the bottom side.

3. INSTALL PISTON SEAL AND PISTON IN CYLINDER





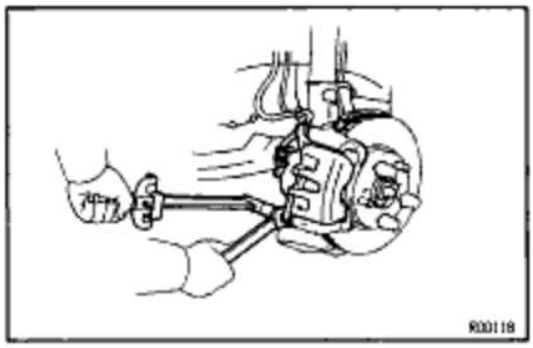
4. INSTALL CYLINDER BOOT AND CYLINDER BOOT SET RING



CALIPER INSTALLATION

1. INSTALL 2 BRAKE PADS

Install the inside and outside pads.

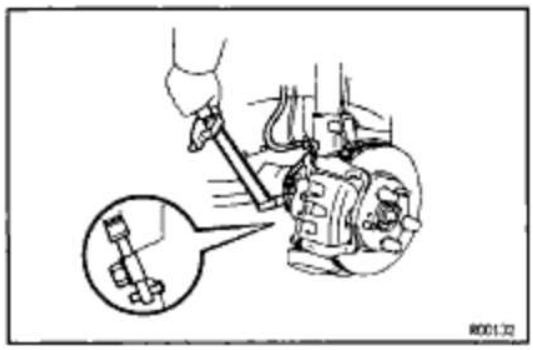


2. INSTALL CALIPER

(a) Temporarily install the caliper on the torque plate with the 2 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 caliper with 2 new gaskets.

Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)

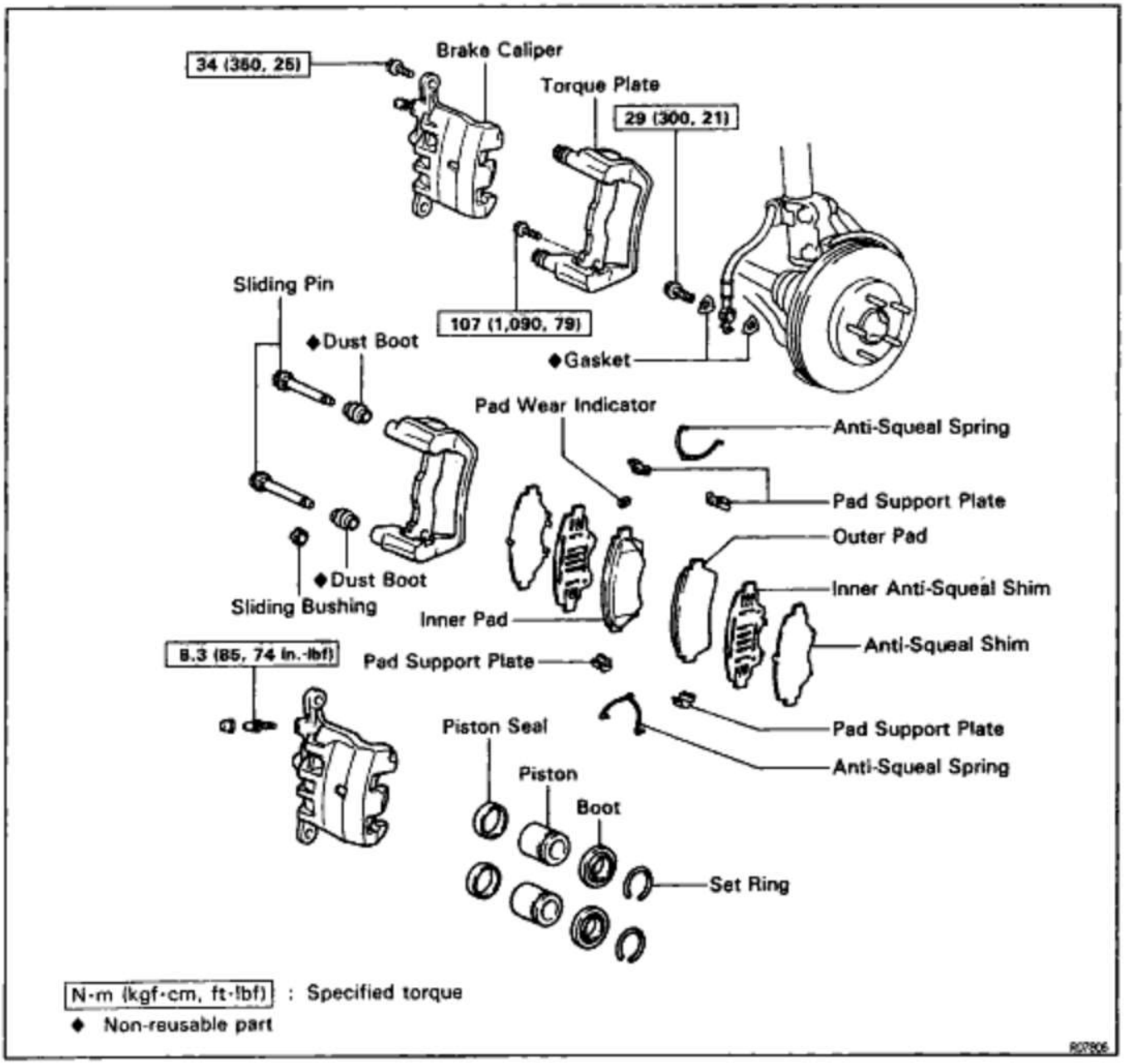
HINT: Install the flexible hose lock securely in the lock hole in the caliper.

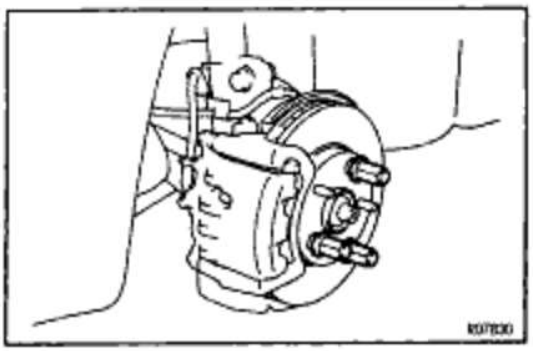
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page BR–9)

5. CHECK FOR LEAKS

FRONT BRAKE (2–Piston Type) COMPONENTS

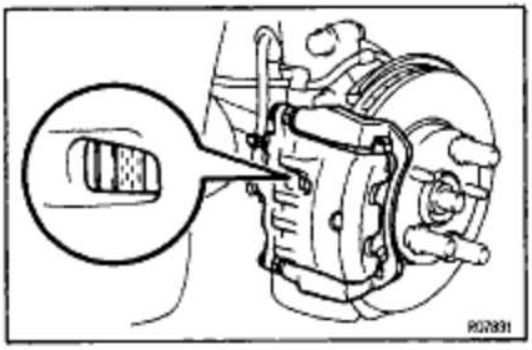




BRAKE PADS REPLACEMENT

1. REMOVE FRONT WHEEL

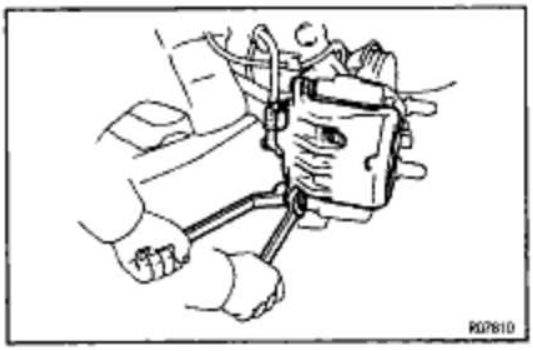
Remove the wheel and temporarily fasten the disc with the hub nuts.



2. INSPECT PAD LINING THICKNESS

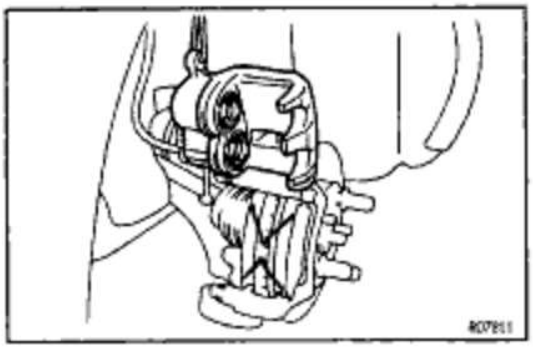
Check the pad thickness through the caliper inspection hole and replace the pads if it is not within the specification.

Minimum thickness:
1.0 mm (0.039 in.)



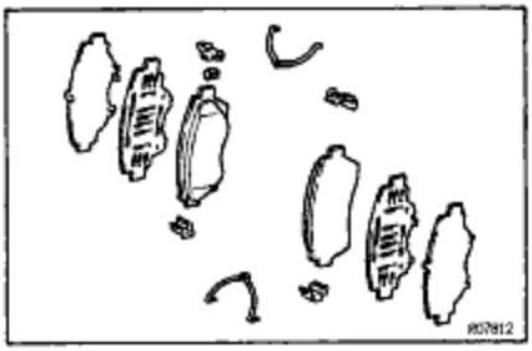
3. LIFT UP CALIPER

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



(c) Lift up and suspend the caliper.

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

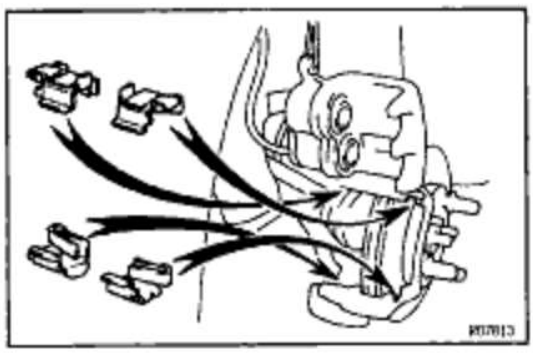


4. REMOVE FOLLOWING PARTS:

(a) 2 anti–squeal springs
(b) 2 brake pads
(c) 4 anti–squeal shims
(d) 4 pad support plates
(e) Pad wear indicator

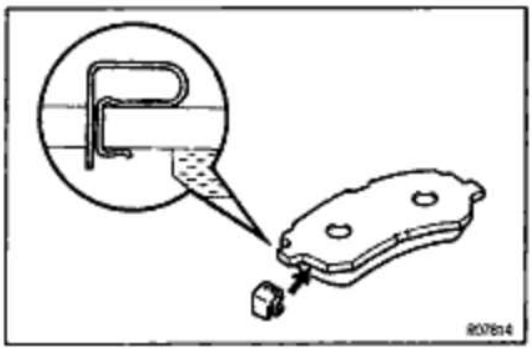
5. CHECK DISC THICKNESS AND RUNOUT

(See page BR–33)



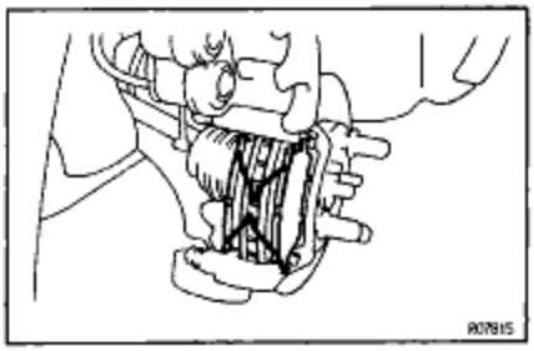
6. INSTALL PAD SUPPORT PLATES

Install the 4 pad support plates.



7. INSTALL NEW PADS

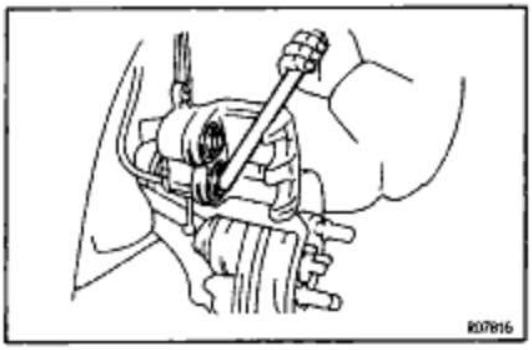
(a) Install the pad wear indicator plate on the pad.
(b) Apply disc brake grease to both sides of the inner anti–squeal shim.
(c) Install the 2 anti–squeal shims on each pad.



(d) Install the inner pad with the pad wear indicator plates facing upward.
(e) Install the outer pad.

NOTICE: There should be no oil or grease adhering to the friction surface's of the pads or the disc.

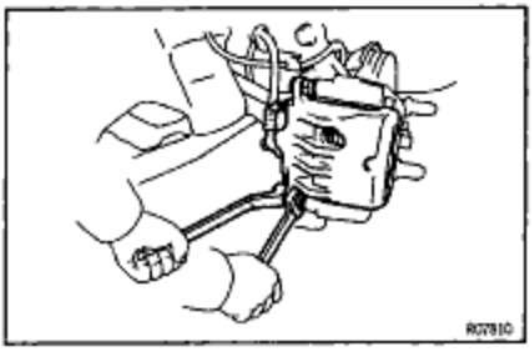
(f) Install the 2 anti–squeal springs.



8. INSTALL CALIPER

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

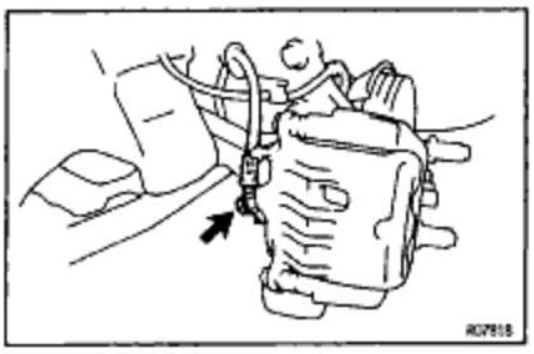


(c) Install the caliper.
(d) Hold the sliding pin and torque the installation bolt.

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

9. INSTALL FRONT WHEEL

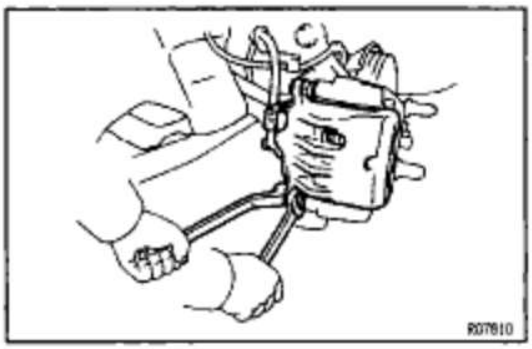
10. CHECK THAT FLUID LEVEL IS AT MAX LINE



CALIPER REMOVAL

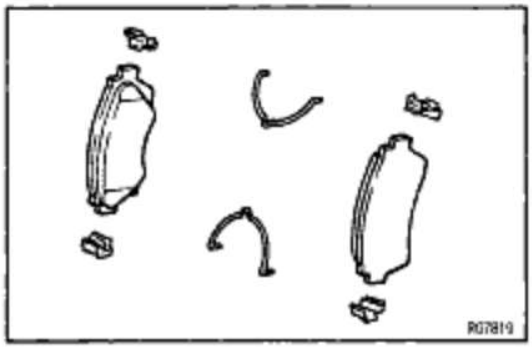
1. DISCONNECT FLEXIBLE HOSE

(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.
(b) Use a container to catch the brake fluid as it drains out.



2. REMOVE CALIPER

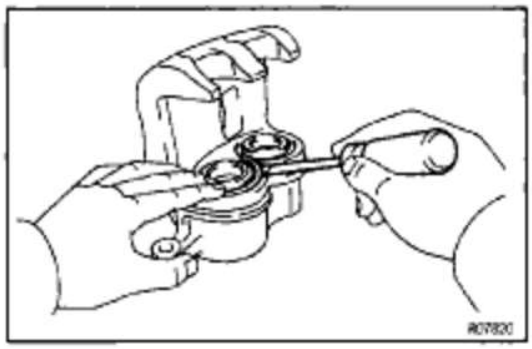
(a) Hold the sliding pin and loosen the 2 installation bolts.
(b) Remove the 2 installation bolts.
(c) Remove the caliper from the torque plate.



3. REMOVE FOLLOWING PARTS:

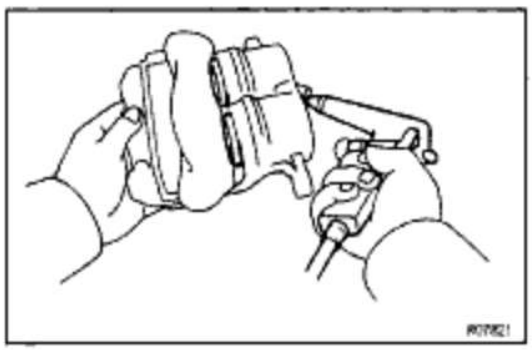
(a) 2 anti–squeal springs
(b) 2 brake pads with anti–squeal shims
(c) 4 pad support plates

CALIPER DISASSEMBLY



1. REMOVE CYLINDER BOOT SET RINGS AND CYLIN–DER BOOTS

Using a screwdriver, remove the 2 cylinder boot set rings and cylinder boots from the caliper.



2. REMOVE PISTONS

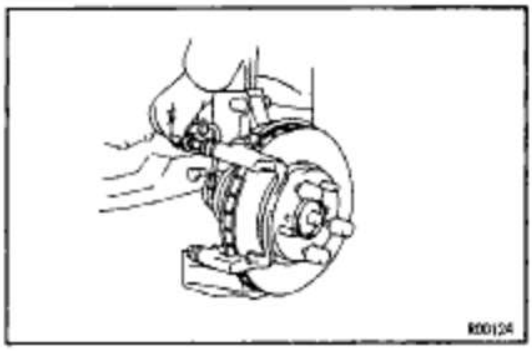
(a) Place a piece of cloth or similar article between the piston and caliper.
(b) Use compressed air to remove the pistons from the cylinder.

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



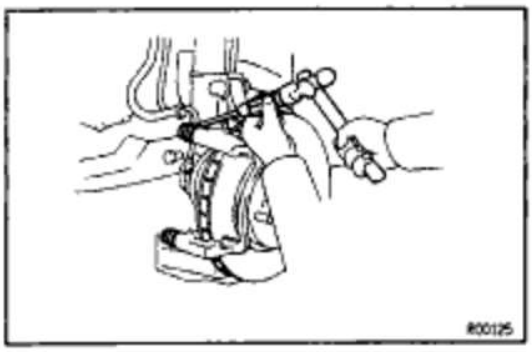
3. REMOVE PISTON SEALS

Using a screwdriver, remove the 2 piston seals from the cylinder.

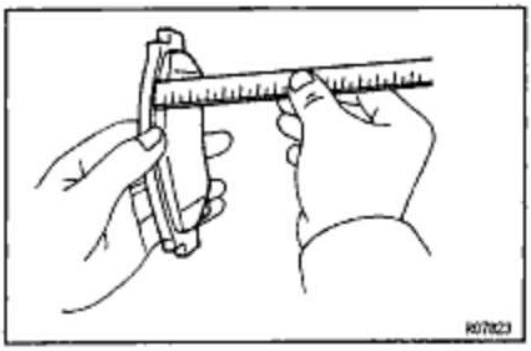


4. REMOVE SLIDING PINS AND DUST BOOTS

(a) Remove the 2 sliding pins from the torque plate.



(b) Using a screwdriver and hammer, tap out the 2 dust boots.



FRONT BRAKE COMPONENTS INSPECTION AND REPAIR

1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

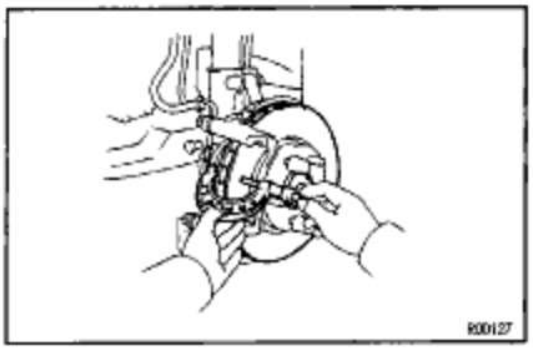
Standard thickness:

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 excessively uneven wear.



2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

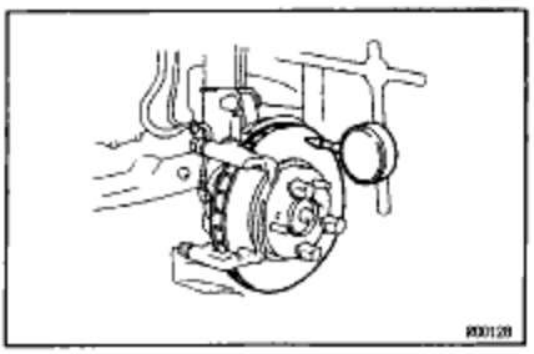
Standard thickness:

28 mm (1.102 in.)

Minimum thickness:

26 mm (1.024 in.)

Replace the disc if the disc's thickness is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.



3. MEASURE DISC RUNOUT

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

Maximum disc runout:

0.05 mm (0.0020 in.)

If runout is greater than maximum, attempt to adjust to below this maximum figure.

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

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the torque plate from the knuckle.

(b) Remove the hub nuts and the disc. Reinstall the disc 1/5 of a turn round from its original position on the hub. Install and torque the hub nuts.

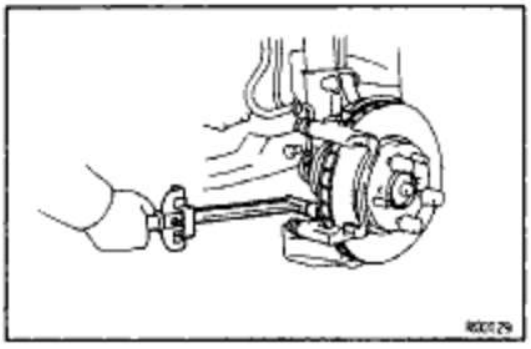
Torque: 103 N–m (1,050¿¿f¿cm, 76 ft–lbf)

Remeasure the disc runout. Make a note of the runout and disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.

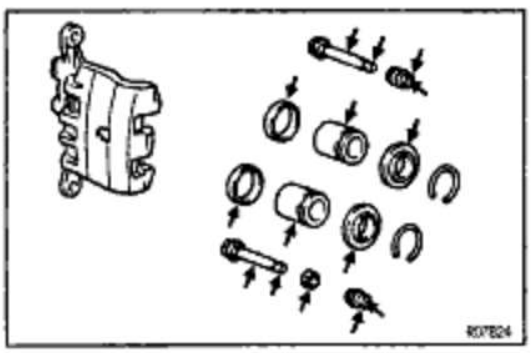
(d) If the minimum runout recorded in (b) and (c) is less than 0.05 mm (0.0020 in.), install the disc in that position.

(e) If the minimum runout recorded in (b) and (c) is greater than 0.05 mm (0.0020 in.), replace the disc and repeat step 3.



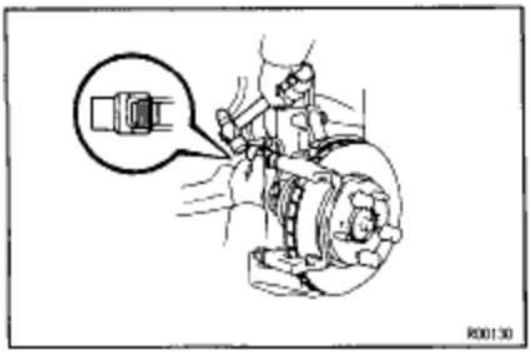
(f) Install the torque plate and torque the mounting bolts.

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



CALIPER ASSEMBLY

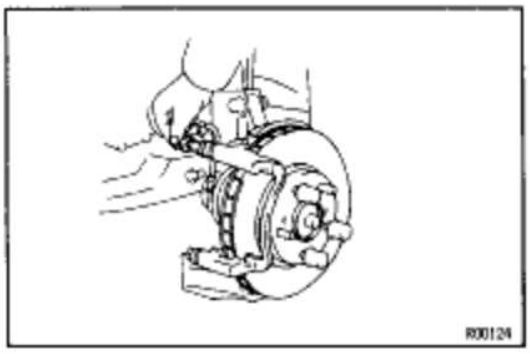
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



2. INSTALL DUST BOOTS AND SLIDING PINS

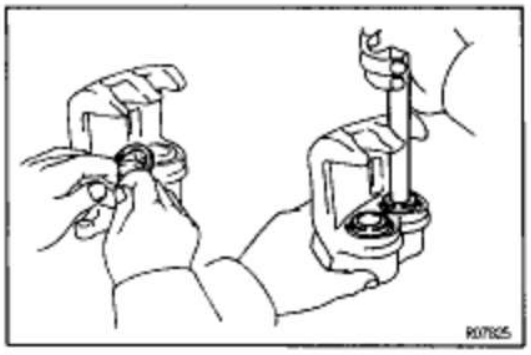
(a) Using a 19 mm socket and a hammer, tap in 2 new dust boots into the torque plate.

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

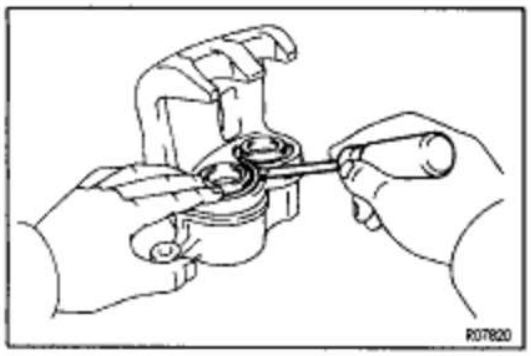


(c) Insert 2 sliding pins into the torque plate.

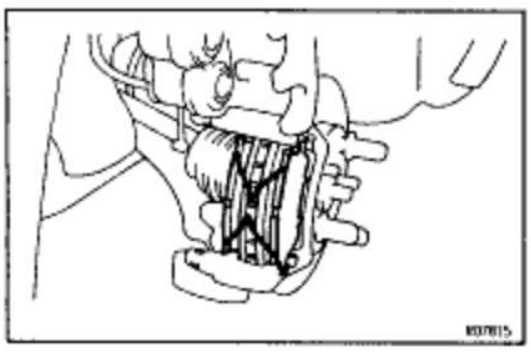
NOTICE: Insert the sliding pin with sliding bushing into the bottom side



3. INSTALL PISTON SEALS AND PISTONS IN CYLIN – DER



4. INSTALL CYLINDER BOOTS AND CYLINDER BOOT SET RINGS



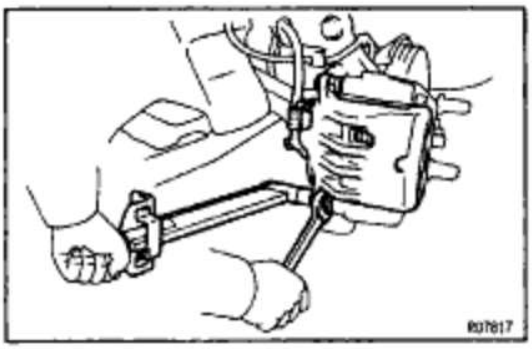
CALIPER INSTALLATION

1. INSTALL FOLLOWING PARTS:

(a) 4 pad support plates

(b) 2 brake pads with anti–squeal shims

(c) 2 anti–squeal springs

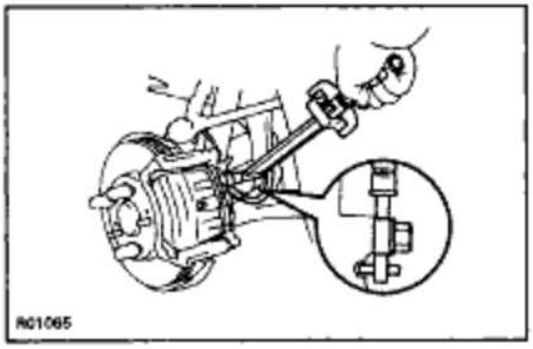


2. INSTALL CALIPER

(a) Temporarily install the caliper on the torque plate with the 2 installation bolts.

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

Torque: 34 N–m (350 kgf–cm, 26 ft–lbf)



3. CONNECT FLEXIBLE HOSE

Install the flexible hose on the brake caliper with 2 new gaskets.

Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)

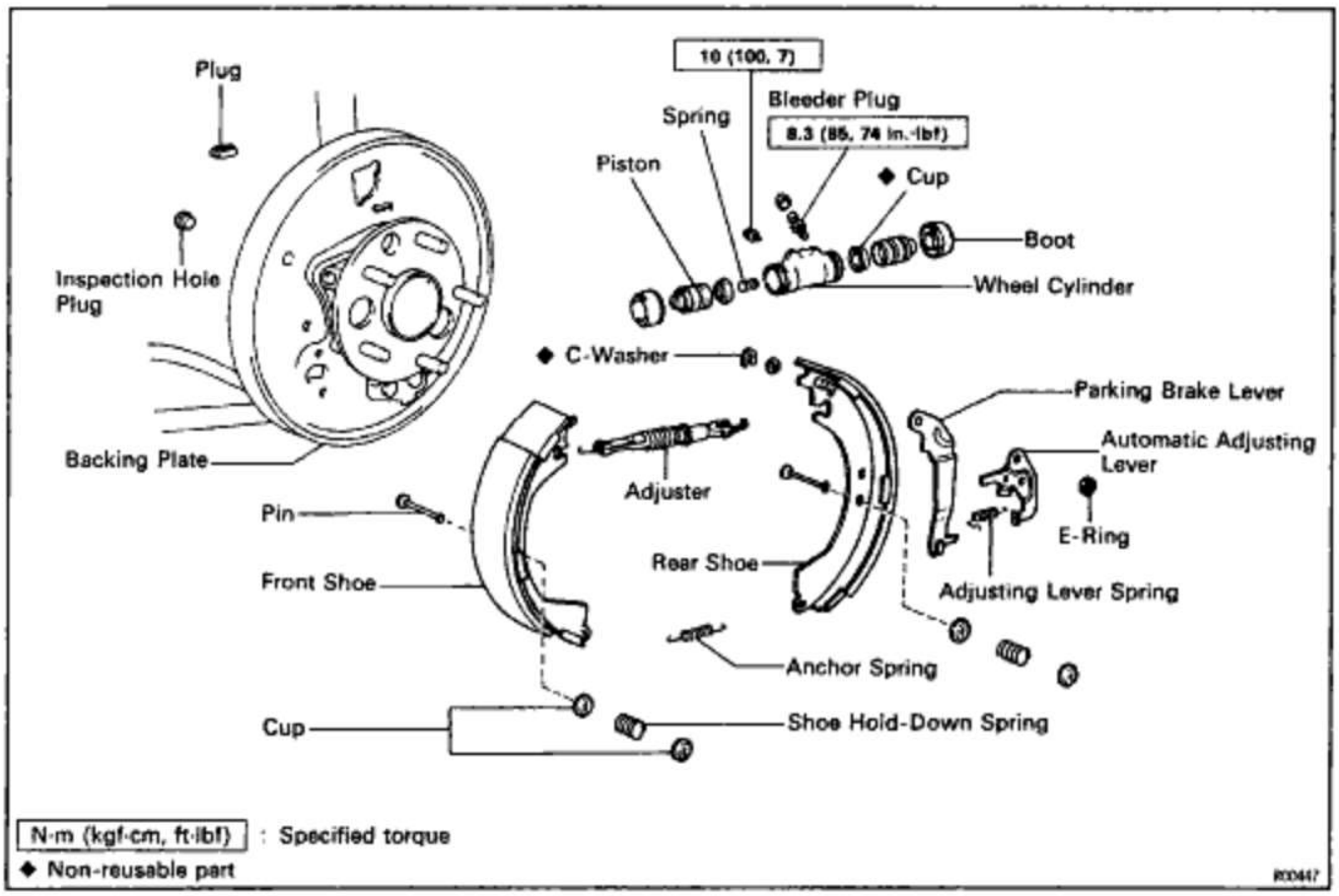
HINT: Insert the flexible hose lock securely in the lock hole in the brake caliper.

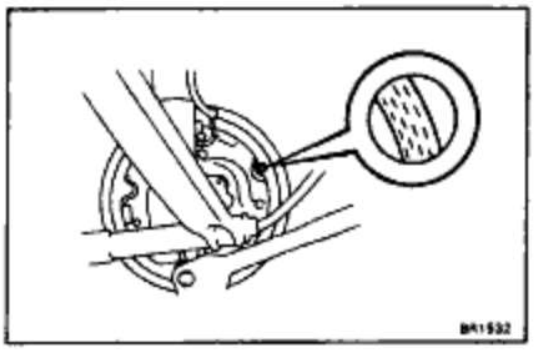
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page BR–9)

5. CHECK FOR LEAKS

REAR BRAKE (Drum Brake) COMPONENTS





REAR DRUM BRAKE REMOVAL

1. INSPECT SHOE LINING THICKNESS

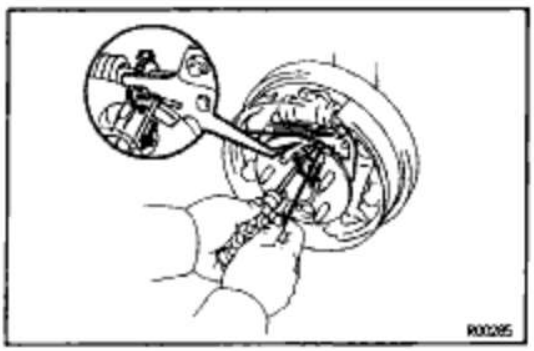
Remove the inspection hole plug, and check the shoe lining thickness through the hole.

If less than minimum, replace the shoes.

Minimum thickness:

1.0 mm (0.039 in.)

2. REMOVE REAR WHEEL

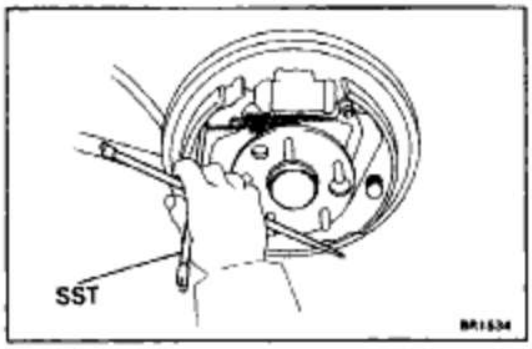


3. REMOVE BRAKE DRUM

HINT: If the brake drum cannot be removed easily, perform the following steps.

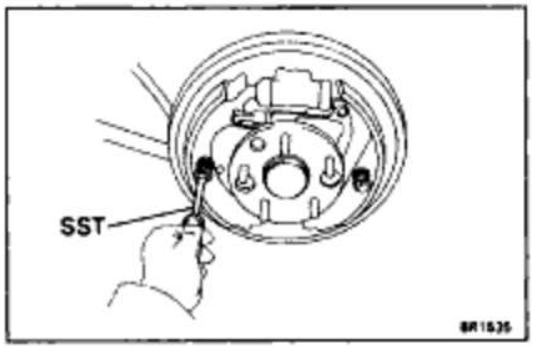
(a) Insert a bent wire or an equivalent through the hole in the brake drum, and hold the automatic adjusting lever away from the adjuster.

(b) Using a screwdriver, reduce the brake shoe adjustment by turning the adjuster.



4. REMOVE FRONT SHOE

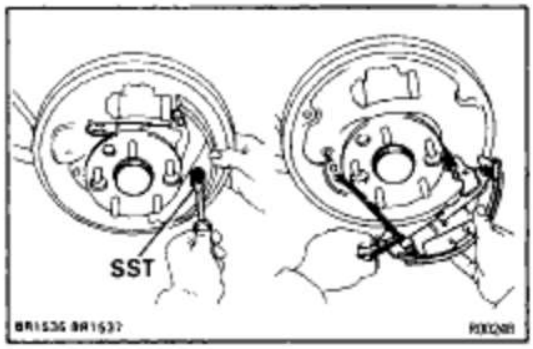
(a) Using SST, disconnect the return spring.
SST 09703–30010



(b) Using SST, remove the shoe hold–down spring, cups and pin.
SST 09718–00010

(c) Disconnect the anchor spring from the front shoe and remove the front shoe.

(d) Remove the anchor spring from the rear shoe.



5. REMOVE REAR SHOE

(a) Using SST, remove the shoe hold–down spring, cups and pin.
SST 09718–00010

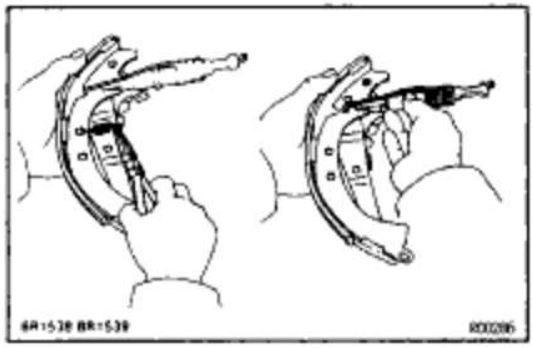
(b) Using a screwdriver, disconnect the parking brake cable from the anchor plate.

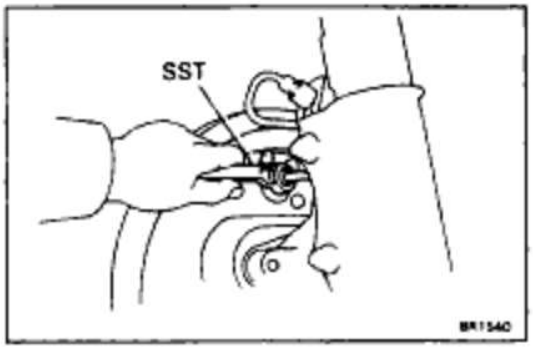
(c) Using pliers, disconnect the parking brake cable from the lever and remove the rear shoe together with the adjuster.

6. REMOVE ADJUSTER FROM REAR SHOE

(a) Remove the adjusting lever spring.

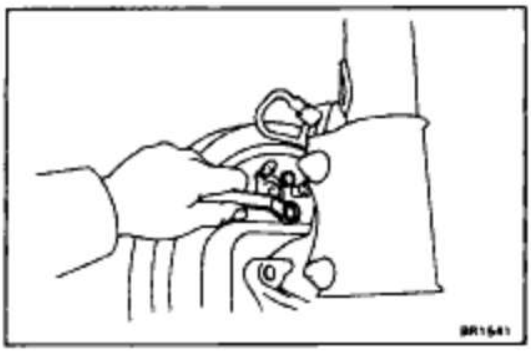
(b) Remove the adjuster together with the return spring.





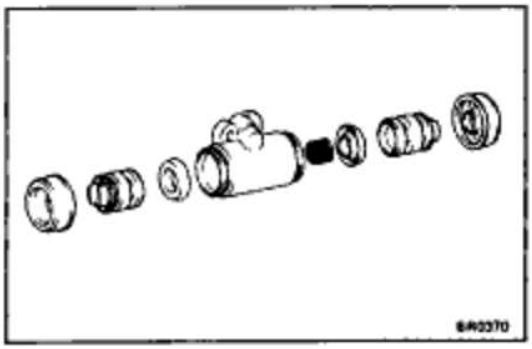
7. DISCONNECT BRAKE LINE FROM WHEEL CYLINDER

Using SST, disconnect the brake line. Use a container to catch the brake fluid.
SST 09751–36011



8. REMOVE WHEEL CYLINDER

Remove the 2 bolts and the wheel cylinder.



9. IF NECESSARY, DISASSEMBLE WHEEL CYLINDER

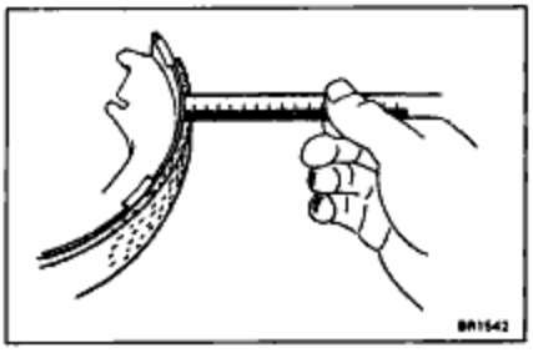
Remove the following parts from the wheel cylinder.

- 2 boots
- 2 pistons
- 2 piston cups
- Spring

REAR DRUM BRAKE COMPONENTS INSPECTION AND REPAIR

1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



2. MEASURE BRAKE SHOE LINING THICKNESS

Standard thickness:

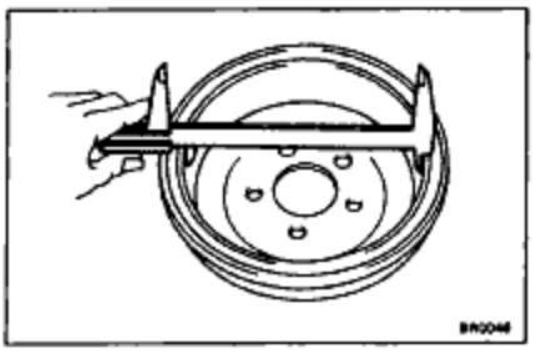
5.0 mm (0.197 in.)

Minimum thickness:

1.0 mm (0.039 in.)

If the shoe lining is less than minimum or shows signs of uneven wear, replace the brake shoes.

HINT: If any of the brake shoes have to be replaced, replace all of the rear shoes in order to maintain even braking.



3. MEASURE BRAKE DRUM INSIDE DIAMETER

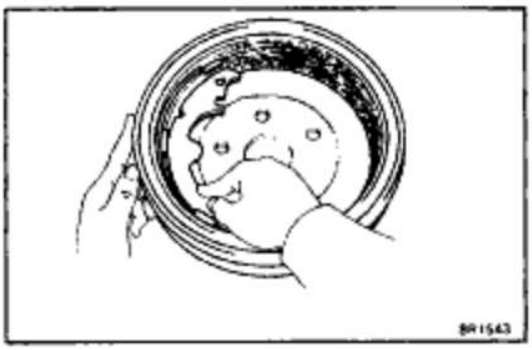
Standard inside diameter:

228.6 mm (9.000 in.)

Maximum inside diameter:

230.6 mm (9.079 in.)

If the drum is scored or worn, the brake drum may be lathed to the maximum inside diameter.

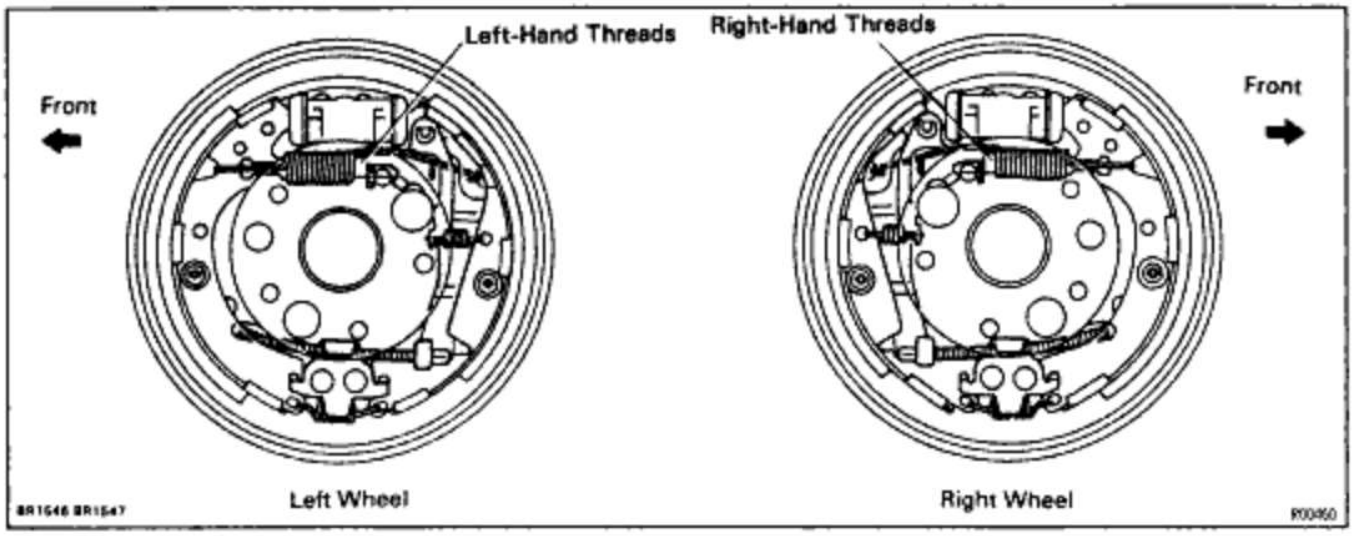


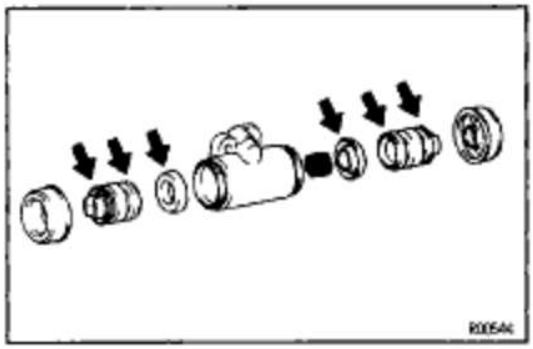
4. INSPECT REAR BRAKE LINING AND DRUM FOR PROPER CONTACT

If the contact between the brake lining and drum is improper, repair the lining with a brake shoe grinder, or replace the brake shoe assembly.

REAR DRUM BRAKE INSTALLATION

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





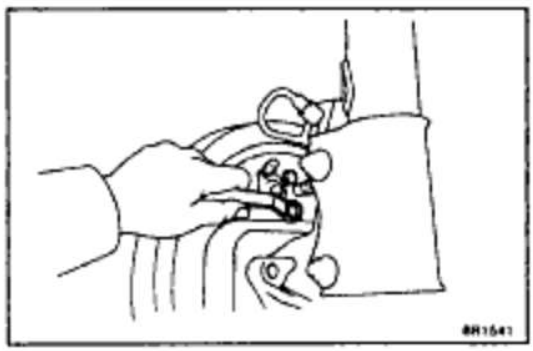
1. ASSEMBLE WHEEL CYLINDER

(a) Apply lithium soap base glycol grease to the cups and pistons as shown.

(b) Assemble the wheel cylinder.

HINT: Install in proper direction only.

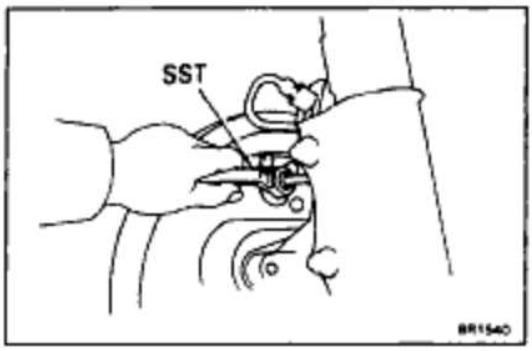
- Spring
- 2 cups
- 2 pistons
- 2 boots



2. INSTALL WHEEL CYLINDER

Install the wheel cylinder on the backing plate with the 2 bolts.

Torque: 10 N–m (100 kgf–cm, 7 ft–lbf)

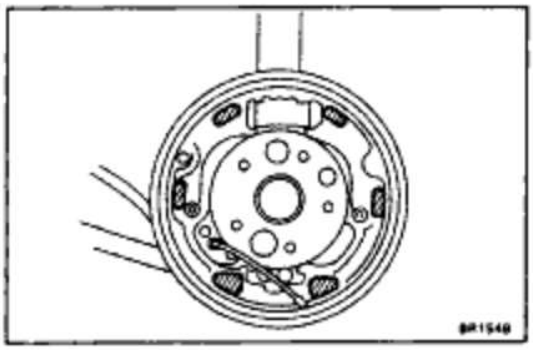


3. CONNECT BRAKE LINE TO WHEEL CYLINDER

Using SST, connect the brake line.

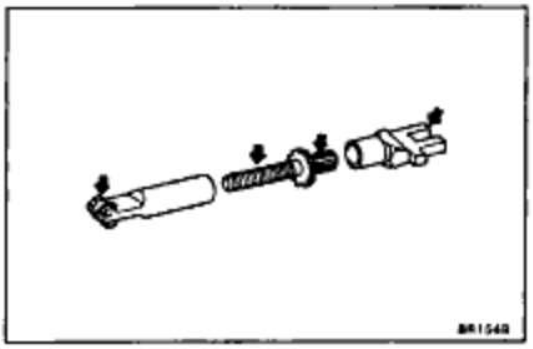
SST 09751–36011

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

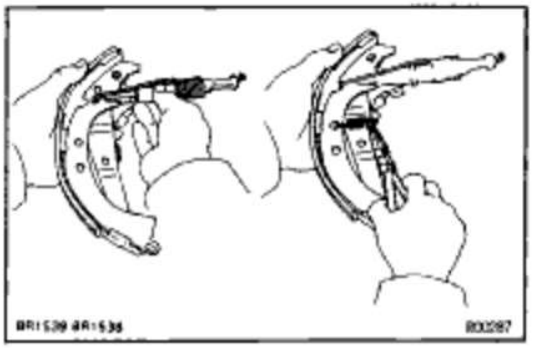


4. APPLY HIGH TEMPERATURE GREASE TO BACK – ING PLATE AND ADJUSTER

(a) Apply high temperature grease to the brake shoe contact surfaces.

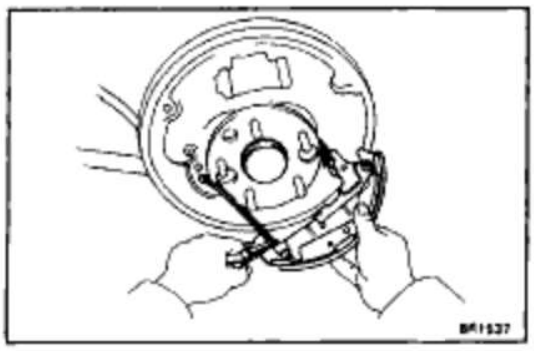


(b) Apply high temperature grease to the adjuster bolt threads and ends.



5. INSTALL ADJUSTER ONTO REAR SHOE

Set the adjuster and return spring and install the adjusting lever spring.

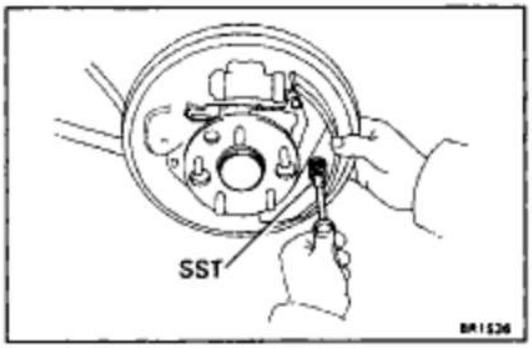


6. INSTALL REAR SHOE

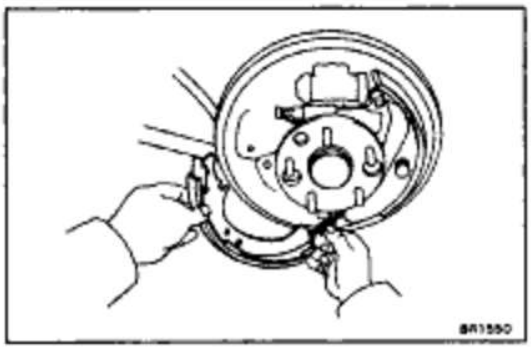
(a) Using pliers, connect the parking brake cable to the lever.

(b) Pass the parking brake cable through the notch in the anchor plate.

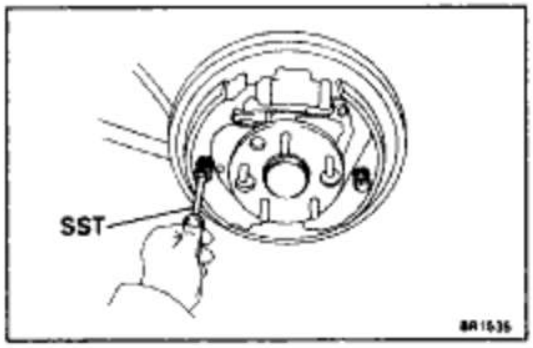
(c) Set the rear shoe in place with the end of the shoe inserted in the wheel cylinder and the other end in the anchor plate.



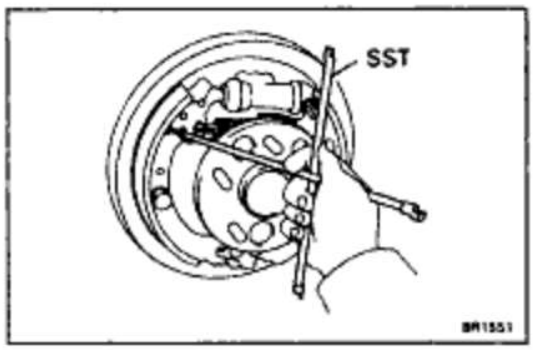
(d) Using SST, install the shoe hold–down spring, cups and pin.
SST 09718–00010
NOTICE: Do not allow oil or grease to get on the rubbing face.



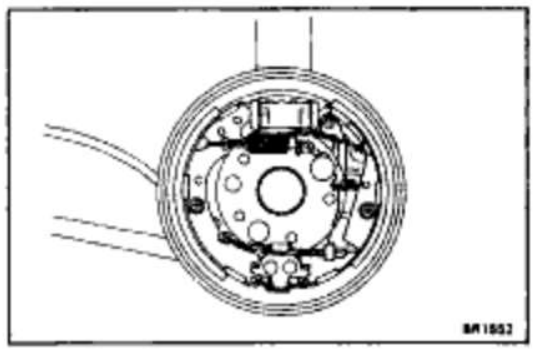
7. INSTALL FRONT SHOE
(a) Install the anchor spring between the front and rear shoes.
(b) Set the front shoe in place with the end of the shoe inserted in the wheel cylinder and the adjuster in place.



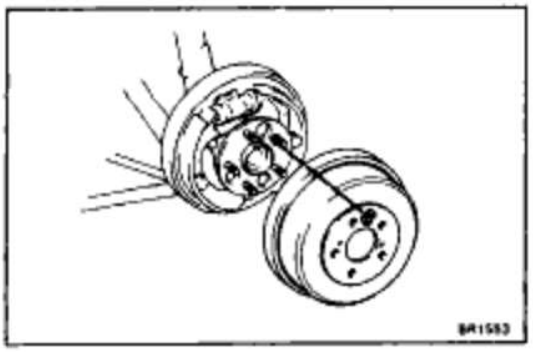
(c) Using SST, install the shoe hold–down spring, cups and pin.
SST 09 718–00010
NOTICE: Do not allow oil or grease to get on the rubbing face.



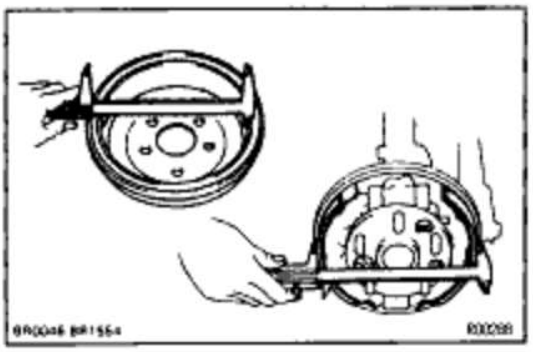
(d) Using SST, connect the return spring.
SST 09703–30010



8. CHECK OPERATION OF AUTOMATIC ADJUSTING MECHANISM
(a) Move the parking brake lever of the rear shoe back and forth. Check that the adjuster turns.
If the adjuster does not turn, check for incorrect installation of the rear brakes.
(b) Adjust the adjuster length to the shortest possible amount.



(c) Align the adjusting hole on the brake drum and largest hole on the axle carrier, install the brake drum.
(d) Pull the parking brake lever all the way up until a clicking sound can no longer be heard.



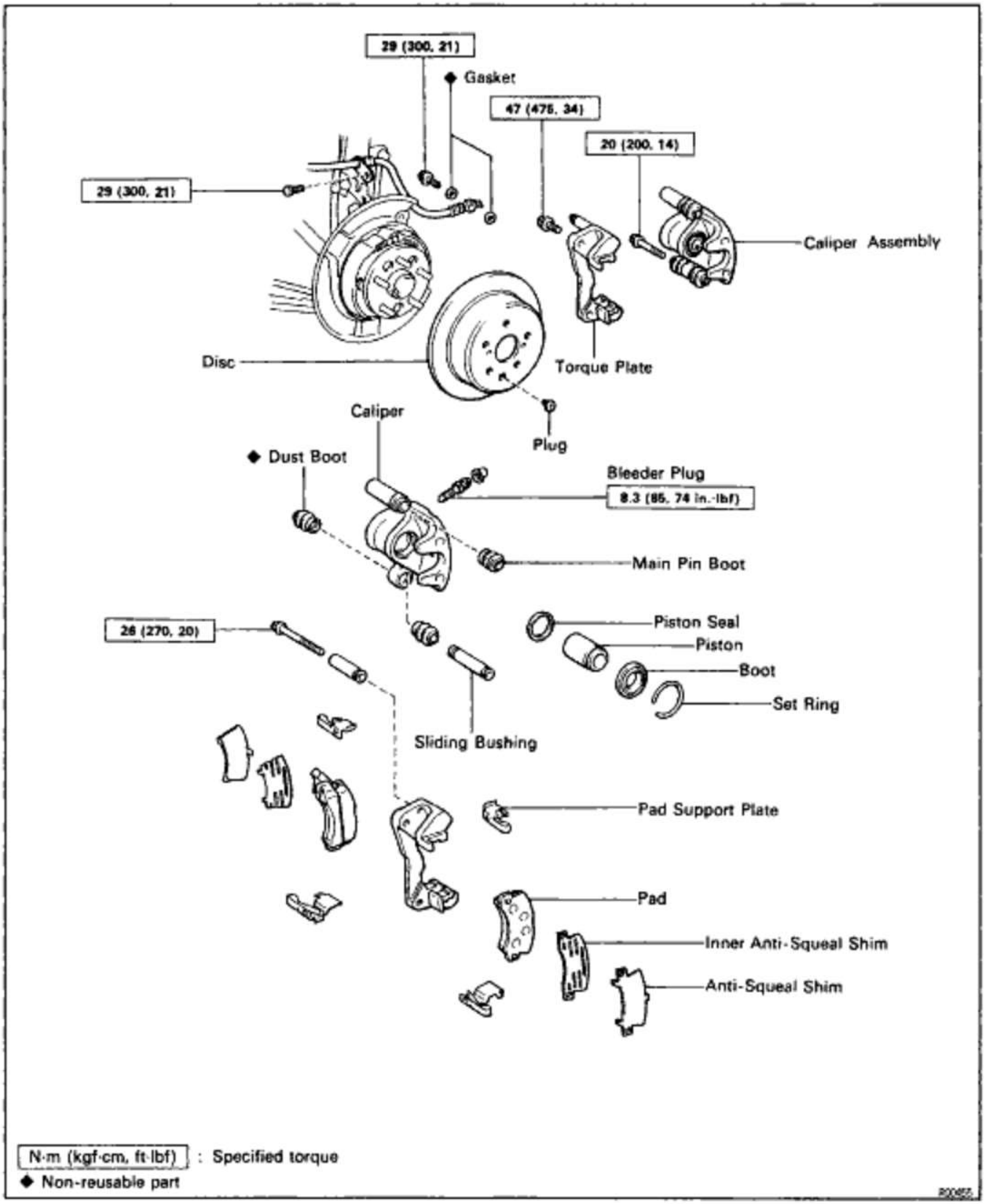
9. CHECK CLEARANCE BETWEEN BRAKE SHOES AND DRUM

(a) Remove the brake drum.
(b) Measure the brake drum inside diameter and diameter of the brake shoes. Check that the difference between the diameters is the correct shoe clearance.
Shoe clearance:
0.6 mm (0.024 in.)

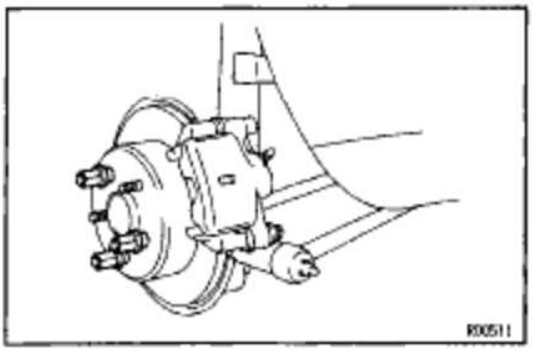
If incorrect, check the parking brake system.

10. INSTALL BRAKE DRUM
11. INSTALL REAR WHEEL
12. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM
(See page BR–9)
13. CHECK FOR LEAKS

REAR BRAKE (Disc Brake) COMPONENTS

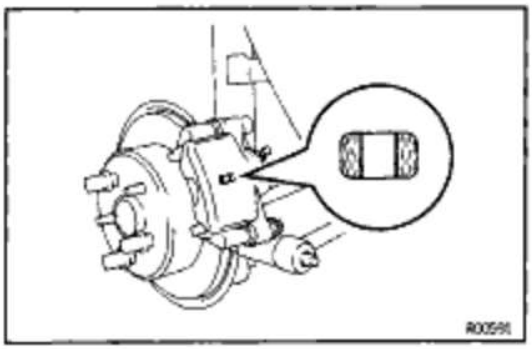


BRAKE PADS REPLACEMENT



1. REMOVE REAR WHEEL

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

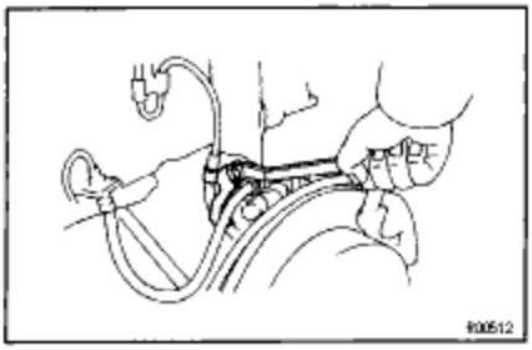


2. INSPECT PAD LINING THICKNESS

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

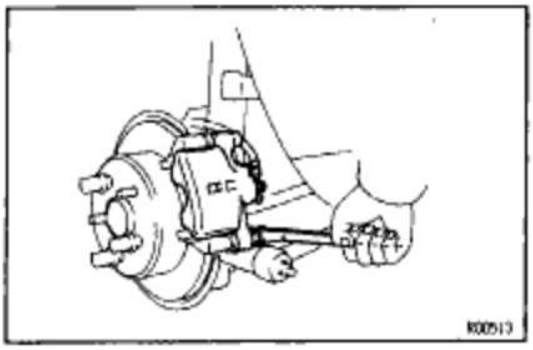
Minimum thickness:

1.0 mm (0.039 in.)

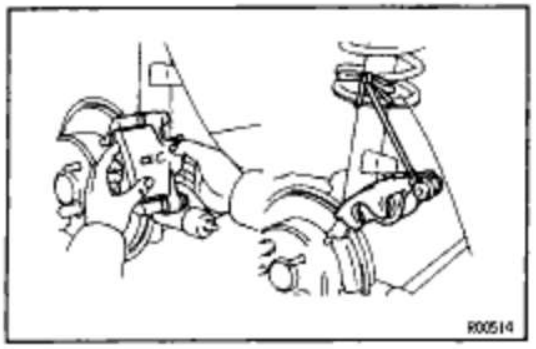


3. LIFT UP CALIPER

(a) Remove the flexible hose bracket.

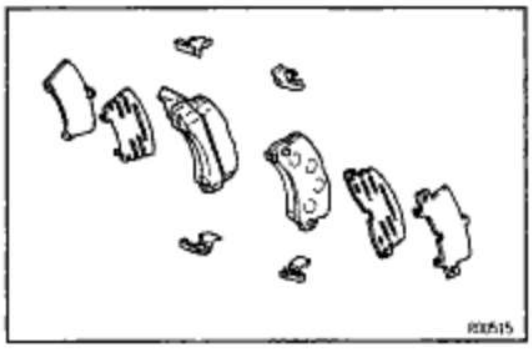


(b) Remove the installation bolt from the torque plate.



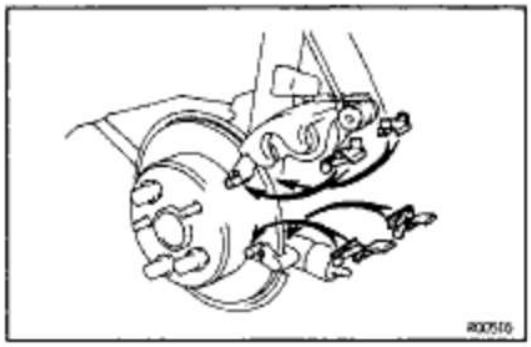
(c) Lift up the caliper and suspend the caliper with string.

HINT: Do not disconnect the flexible hose from the caliper.

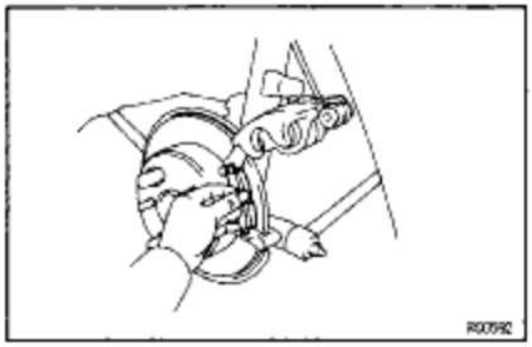


4. REMOVE FOLLOWING PARTS:
(a) 2 brake pads
(b) 4 anti–squeal shims
(c) 4 pad support plates

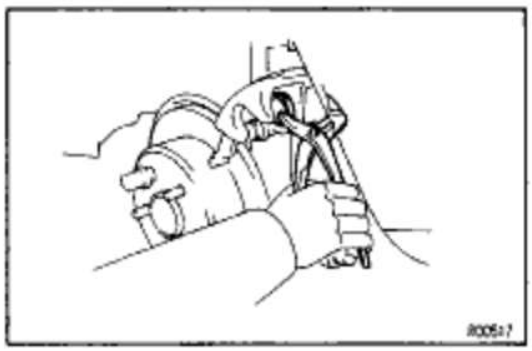
5. CHECK DISC THICKNESS AND RUNOUT
(See page BR–50**)**



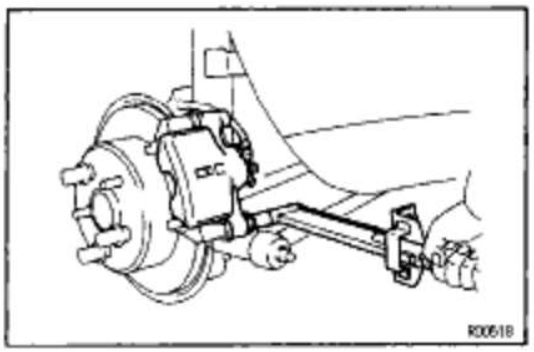
6. INSTALL PAD SUPPORT PLATES
Install the 4 pad support plates.



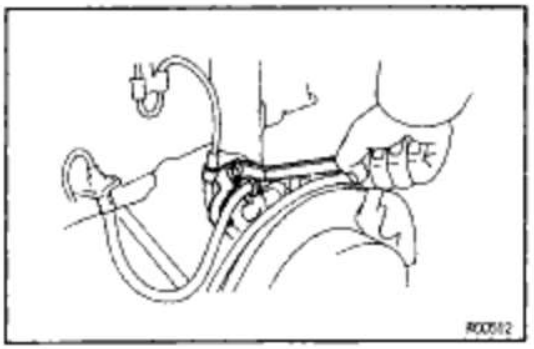
7. INSTALL NEW PADS
(a) Apply disc brake grease to both side of the inner anti –squeal shims.
(b) Install the 2 anti–squeal shims on each pad.
(c) Install 2 pads with the pad wear indicator plates facing up ward.
NOTICE: There should be no oil or grease adhering to the friction surfaces of the pads or the disc.



6. INSTALL CALIPER
(a) Draw out a small amount of brake fluid from the reservoir.
(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.

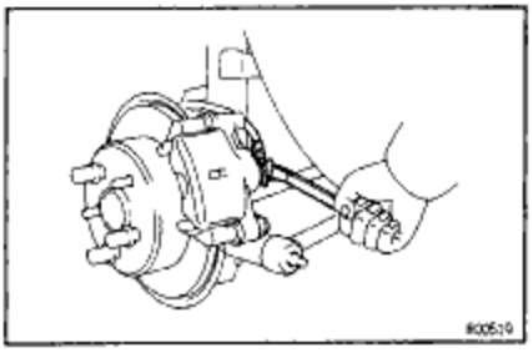


(c) Install the caliper and torque the installation bolt.
Torque: 20 N–m (200 kgf–cm, 14 ft–lbf)



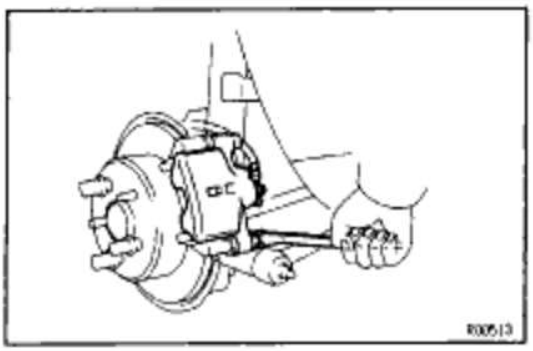
(d) Install the flexible hose bracket.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

9. INSTALL REAR WHEEL
14. CHECK THAT FLUID LEVEL IS AT MAX LINE

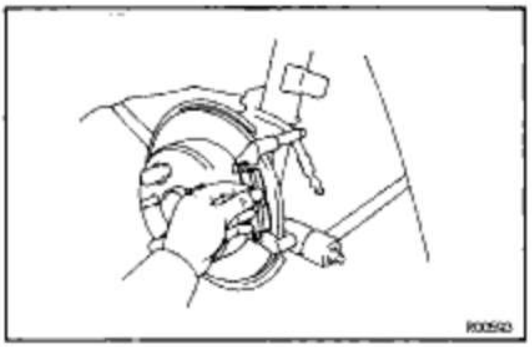


CALIPER REMOVAL

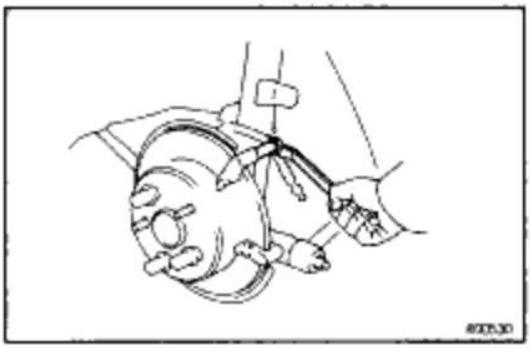
1. DISCONNECT FLEXIBLE HOSE
(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.
(b) Use a container to catch the brake fluid as it drains out.



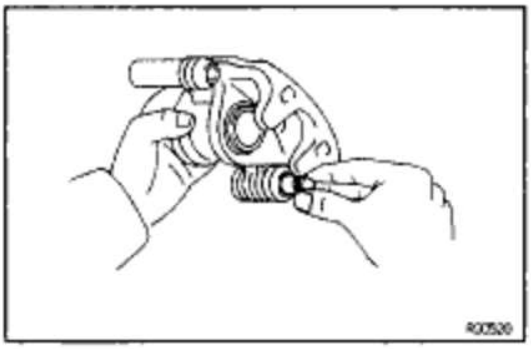
2. REMOVE CALIPER
(a) Remove the installation bolt.
(b) Remove the caliper from the torque plate.



3. REMOVE 2 PADS
Remove the inside and outside pads.

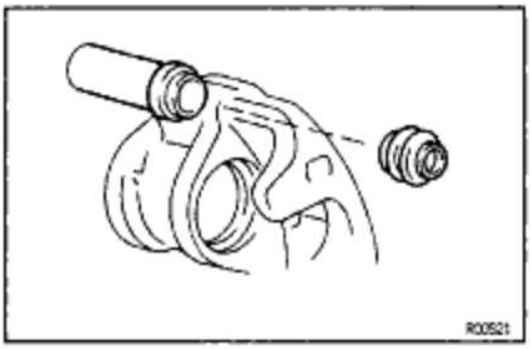


4. REMOVE MAIN PIN
Loosen the. main pin installation bolt and remove the main pin.

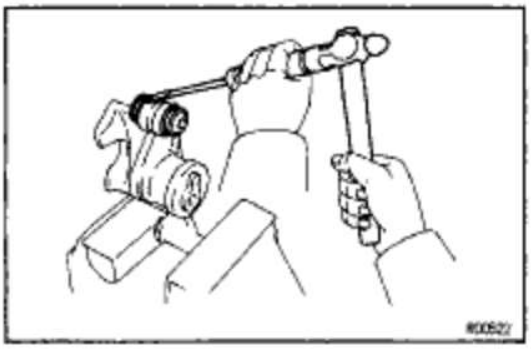


CALIPER DISASSEMBLY

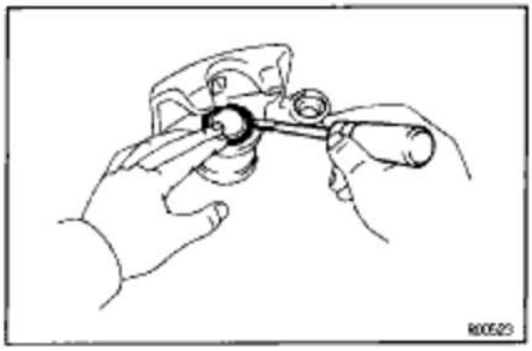
1. REMOVE SLIDING BUSHING
Pull out the sliding bushing.



2. REMOVE MAIN PIN BOOT
Pull out the main pin boot.

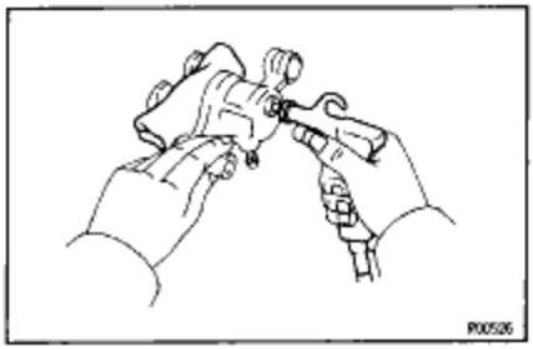


3. REMOVE DUST BOOTS
(a) Place the caliper in vise.
(b) Using a screwdriver and hammer, tap out the 2 dust boots.



4. REMOVE CYLINDER BOOT SET RING AND CYLIN– DER BOOT

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

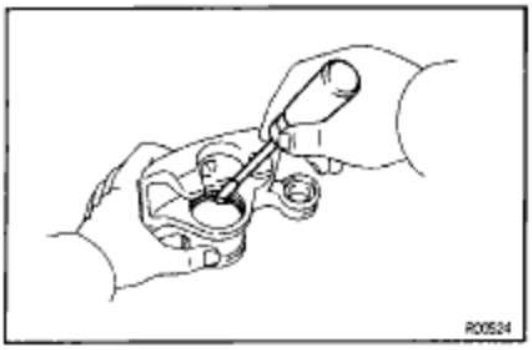


5. REMOVE PISTON

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

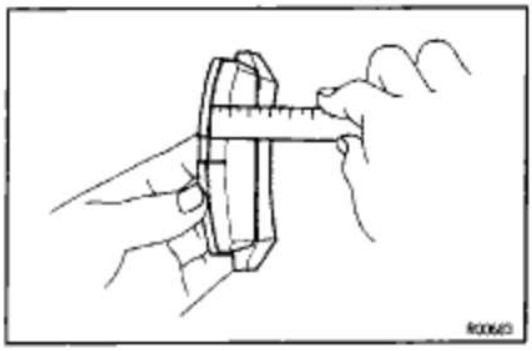
(b) Use compressed air to remove the piston from the cylinder.

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 DISC BRAKE COMPONENTS INSPECTION AND REPAIR

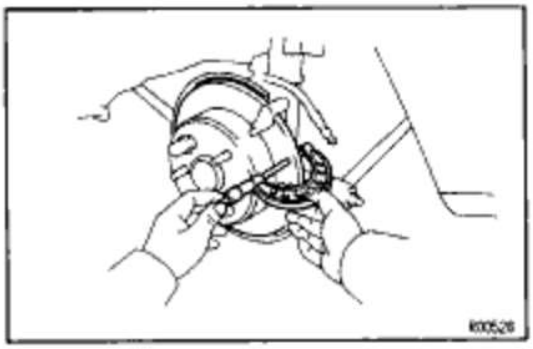
1. MEASURE PAD LINING THICKNESS

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 mini– mum thickness or less, or if the pad has excessively uneven wear.



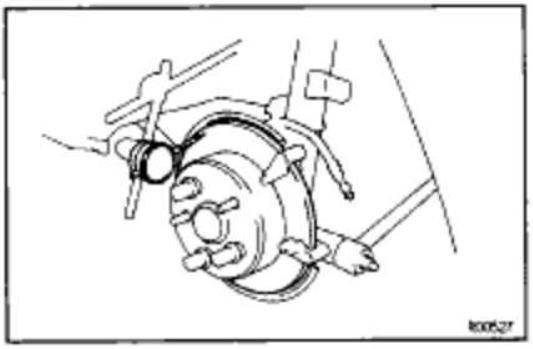
2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

Standard thickness:
10.0 mm (0.394 in.)

Minimum thickness:
9.0 mm (0.354 in.)

Replace the disc if the disc's thickness is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.



3. MEASURE DISC RUNOUT

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

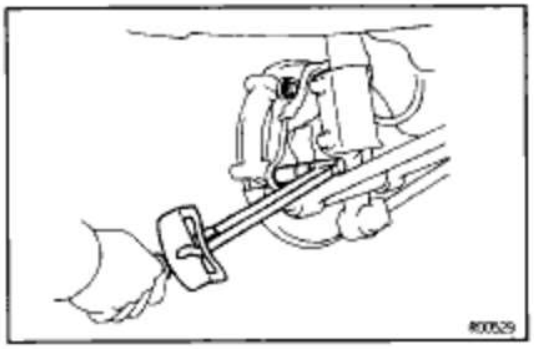
Maximum disc runout:
0.15 mm (0.0059 in.)

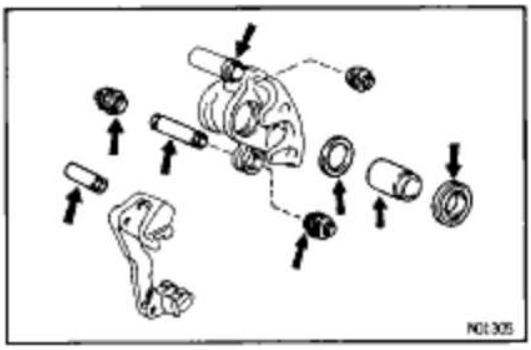
If the runout is greater than the maximum, replace the disc.

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

4. IF NECESSARY, REPLACE DISC

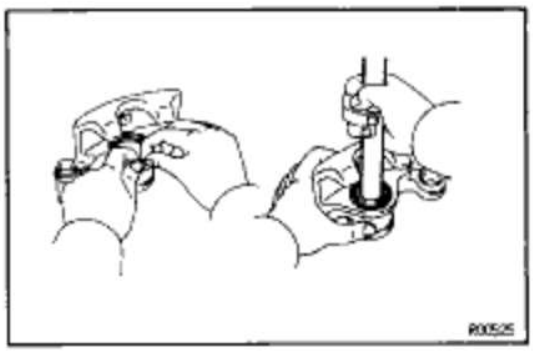
(a) Remove the torque plate.
(b) Remove the hub nuts of the temporarily installed disc and pull off the disc.
(c) Install a new disc and loosely install the hub nuts.
(d) Install the torque plate and tighten the mounting bolts.
Torque: 47 N–m (475 kgf–cm, 34 ft–lbf)



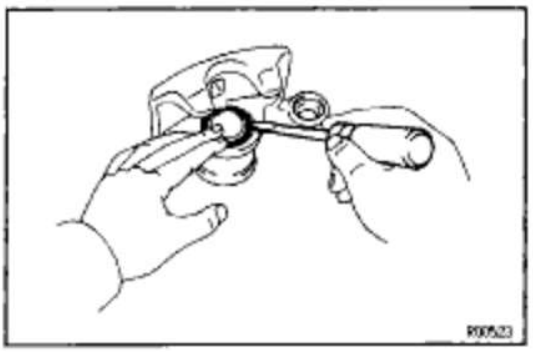


CALIPER ASSEMBLY

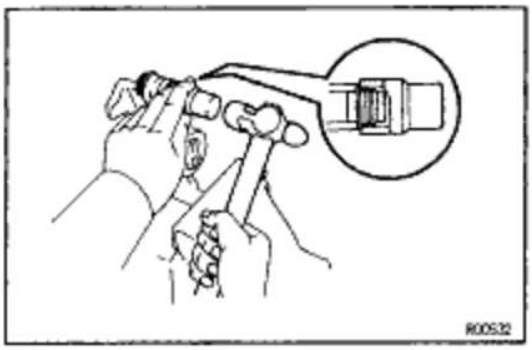
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



2. INSTALL PISTON SEAL AND PISTON IN CYLINDER

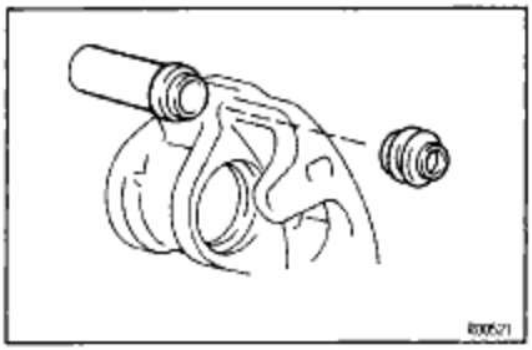


3. INSTALL CYLINDER BOOT AND SET RING IN CYL–INDER

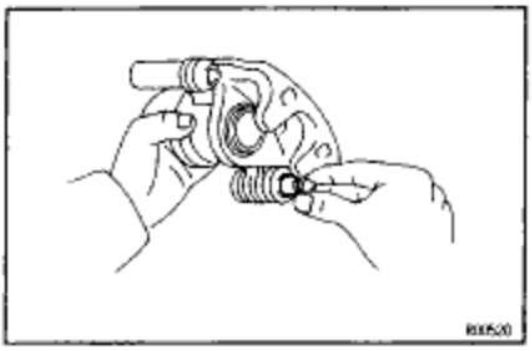


4. INSTALL DUST BOOTS

(a) Place the caliper in vise.
(b) Using a 19 mm socket wrench and hammer, tap in 2 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



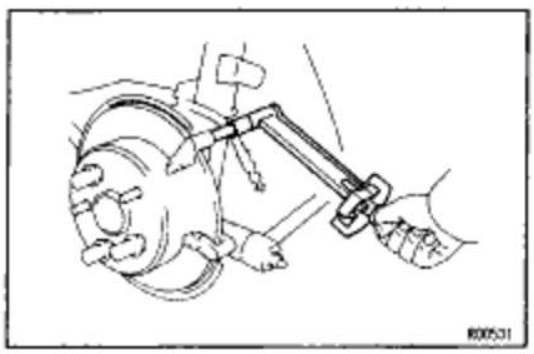
6. INSTALL SLIDING BUSHING

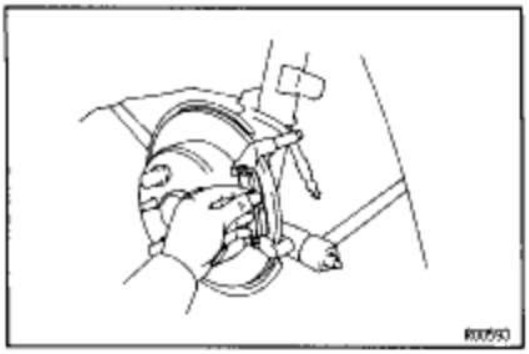
CALIPER INSTALLATION

1. INSTALL MAIN PIN

Install the main pin and torque the main pin installa–tion bolt.

Torque: 26 N–m (270 kgf–cm. 20 ft–lbf)

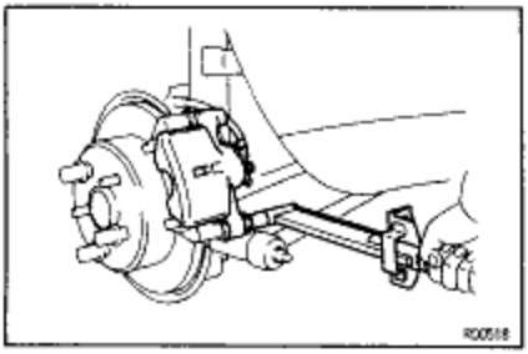




2. INSTALL 2 PADS

Install 2 pads with the pad wear indicator plate facing upward.

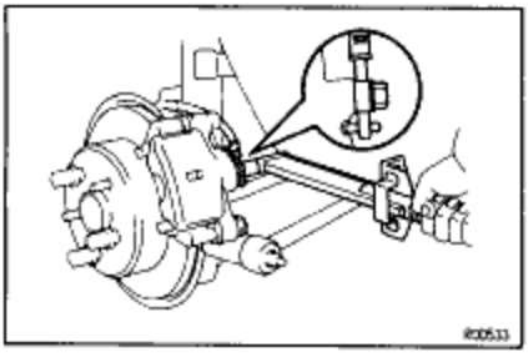
NOTICE: There should be no oil or grease adhering to the friction surfaces of the pads or the disc.



3. INSTALL CALIPER

Install the caliper and torque the installation bolt.

Torque: 20 N–m (200 k9f¿cm, 14 ft–lbf)



4. CONNECT FLEXIBLE HOSE

Install the flexible hose on the caliper with 2 new gaskets.

Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)

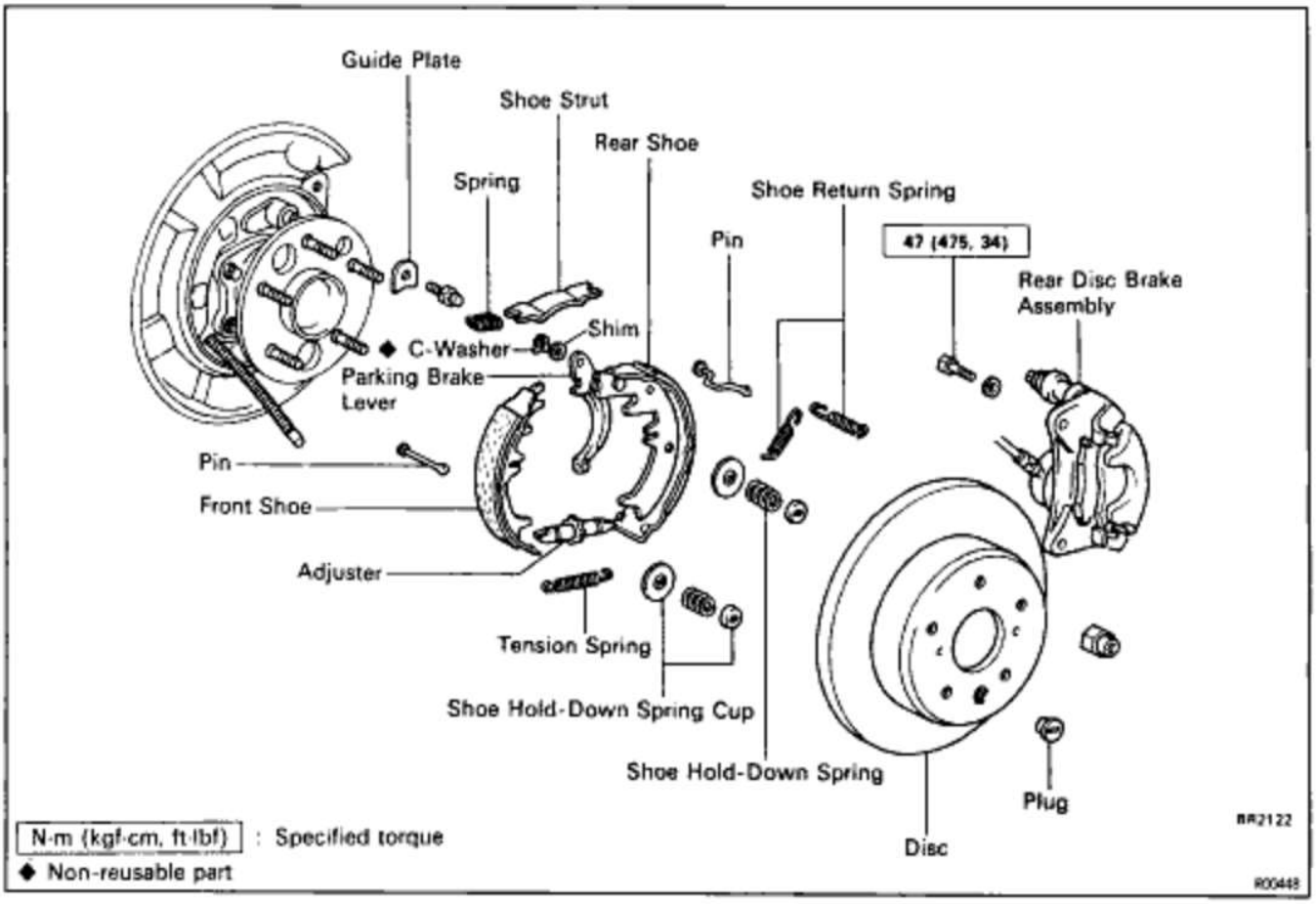
HINT: Insert the flexible hose lock securely in the lock hole in the caliper.

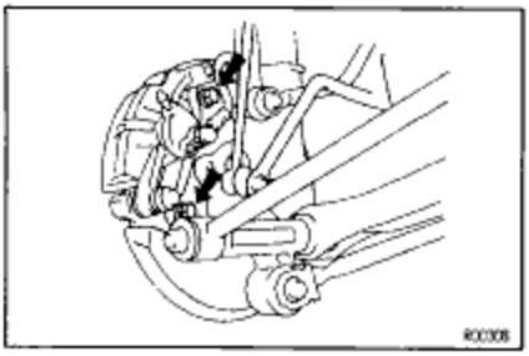
5. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page BR–9)

6. CHECK FOR LEAKS

REAR BRAKE (Parking Brake for Rear Disc Brake) COMPONENTS





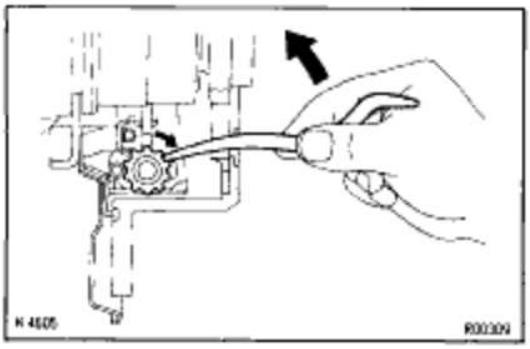
PARKING BRAKE DISASSEMBLY

1. REMOVE REAR WHEEL

2. REMOVE REAR DISC BRAKE ASSEMBLY

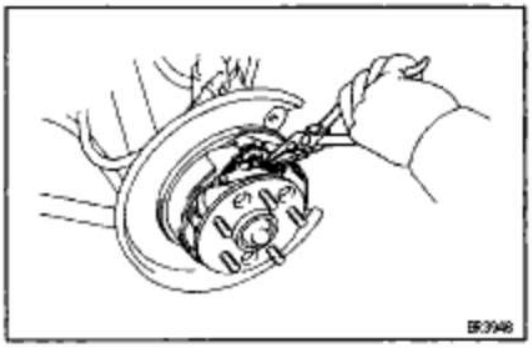
(a) Remove the 2 mounting bolts and remove the disc brake assembly.

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



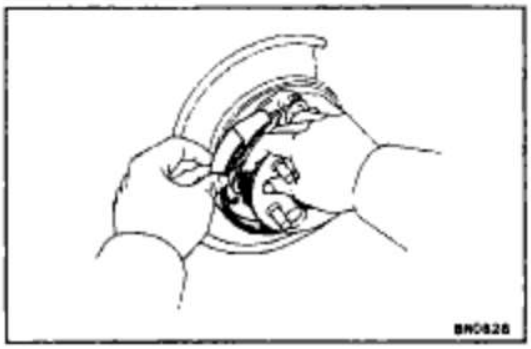
3. REMOVE DISC

HINT: If the disc cannot be removed easily, turn the shoe adjuster



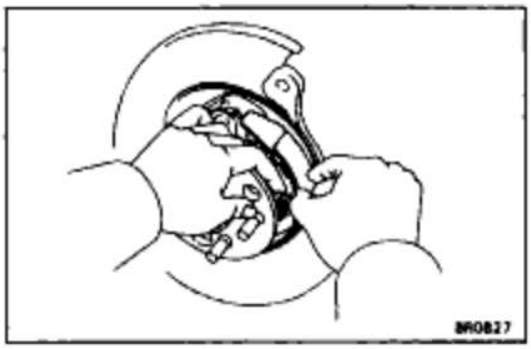
4. REMOVE SHOE RETURN SPRINGS

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



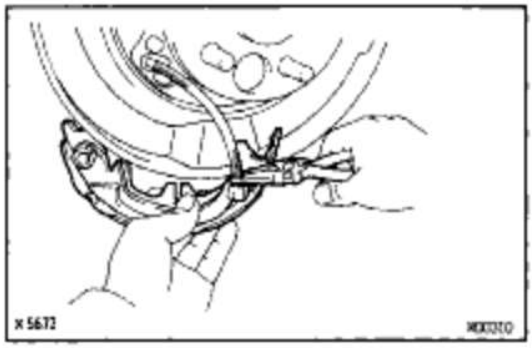
5. REMOVE FRONT SHOE, ADJUSTER AND TENSION SPRING

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



6. REMOVE REAR SHOE

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

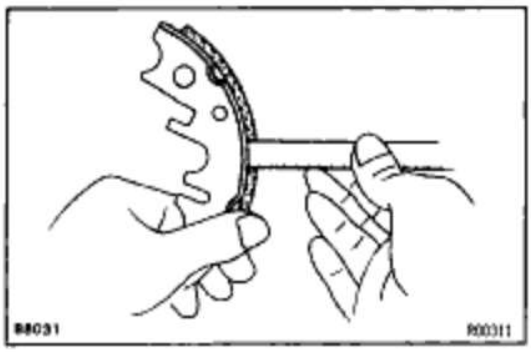


(c) Using needle–nose pliers, disconnect the parking brake cable from the parking brake shoe lever.
(d) Remove the shoe hold–down spring cups, springs and pins.

PARKING BRAKE COMPONENTS INSPECTION AND REPAIR

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.

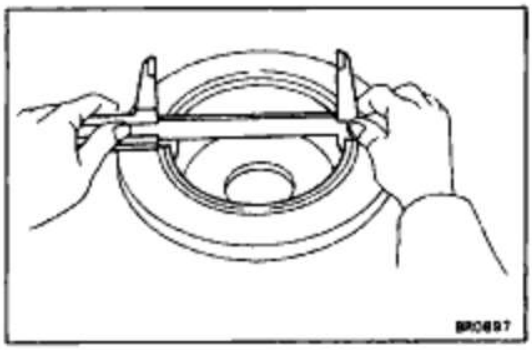
Standard thickness:

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 excessively uneven wear, replace the brake shoe.



3. MEASURE DISC INSIDE DIAMETER

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

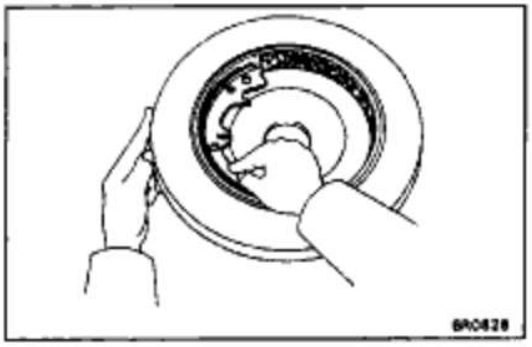
Standard inside diameter:

170 mm (6.69 in.)

Maximum inside diameter:

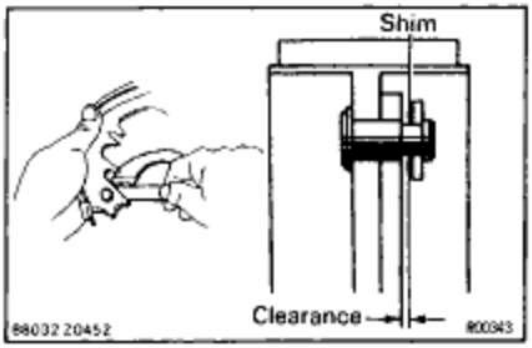
171 mm (6.73 in.)

Replace the disc if the inside diameter is at the maxi–mum value or more. Replace the disc or grind it with a lathe if the disc is badly scored or worn unevenly.



4. INSPECT PARKING BRAKE LINING AND DISC FOR PROPER CONTACT

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



5. MEASURE CLEARANCE BETWEEN PARKING BRAKE SHOE AND LEVER

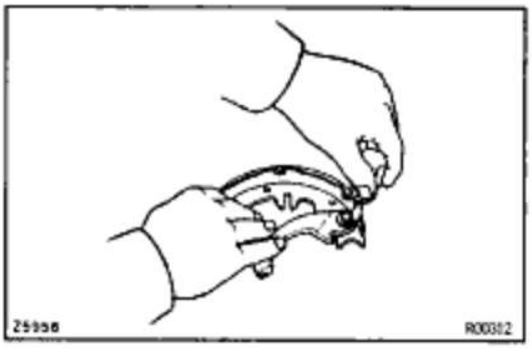
Using a feeler gauge, measure the clearance.

Standard clearance:

Less than 0.35 mm (0.0138 in.)

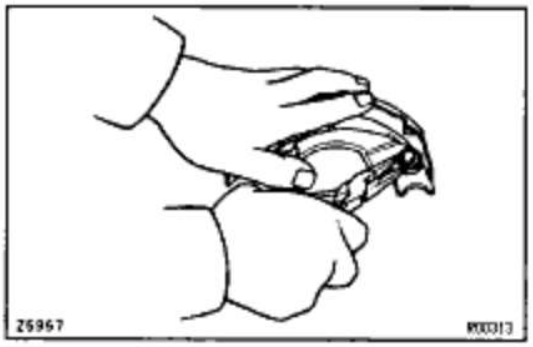
If the clearance is not within the specification, replace the shim with one of the correct size.

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



6. IF NECESSARY, REPLACE SHIM

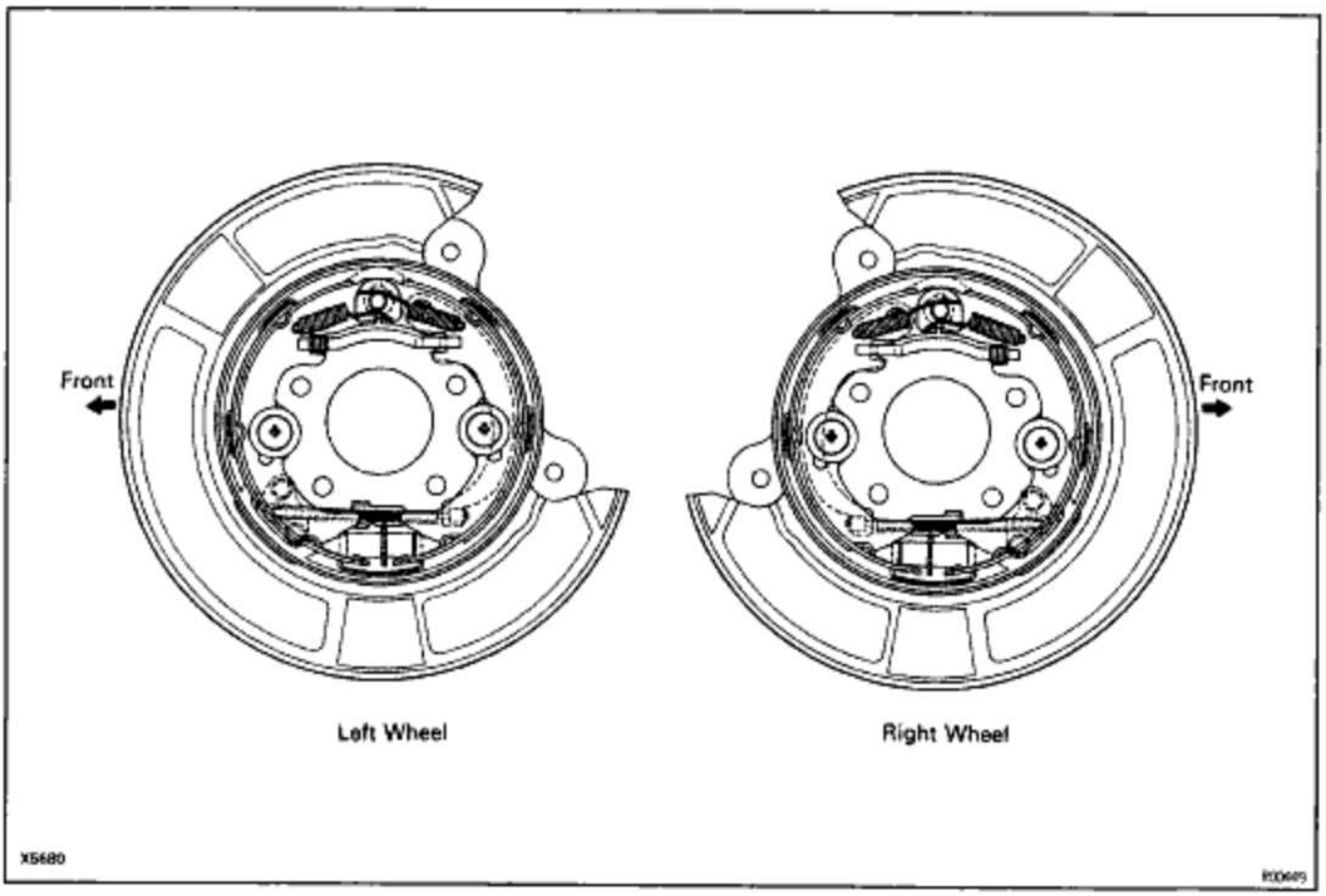
(a) Remove the parking brake lever, and install the cor–rect size shim.

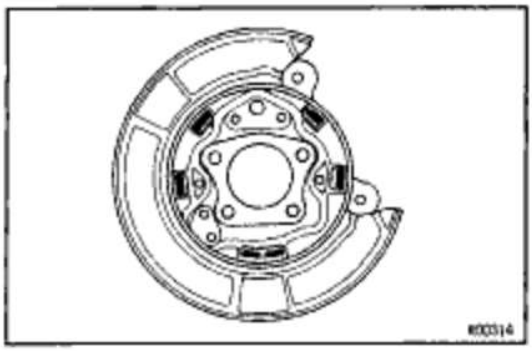


(b) Install the parking brake lever with a new C–washer.
(c) Remeasure the clearance.

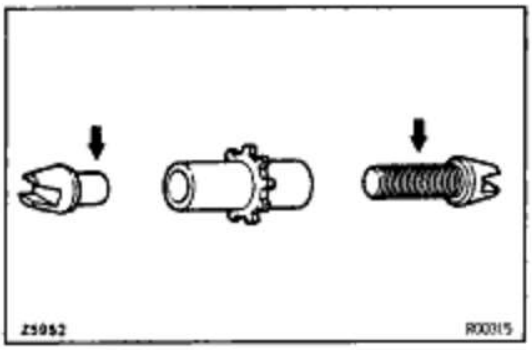
PARKING BRAKE ASSEMBLY

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

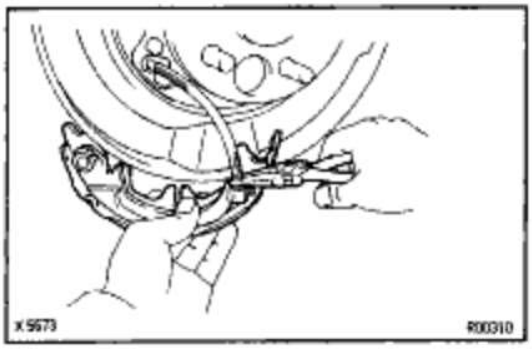




1. APPLY HIGH TEMPERATURE GREASE ON BACK–ING PLATE

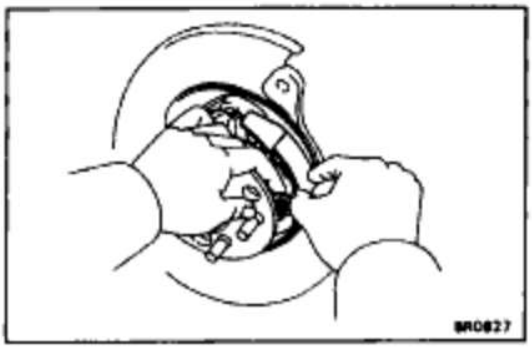


2. APPLY HIGH TEMPERATURE GREASE TO ADJUSTER



3. CONNECT PARKING BRAKE CABLE TO PARKING BRAKE LEVER

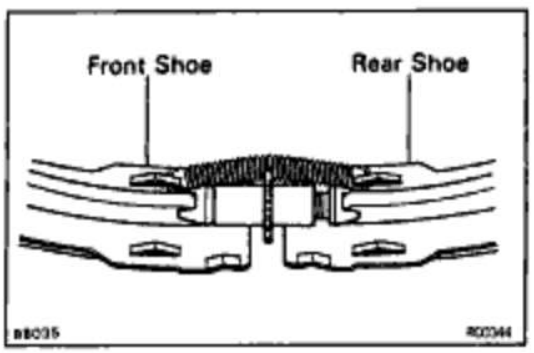
(a) Install the shoe hold–down springs, cups and pins.
(b) Using needle–nose pliers, connect the parking brake cable to the parking brake lever.



4. INSTALL REAR SHOE

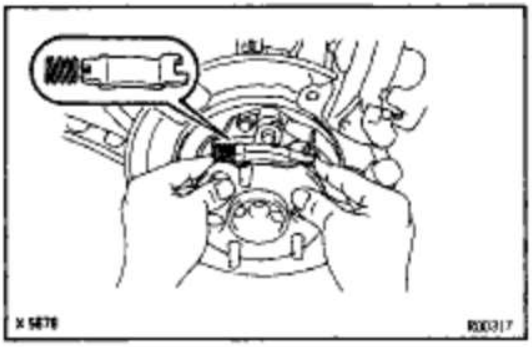
Slide in the rear shoe between the shoe hold–down spring cup and the backing plate.

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

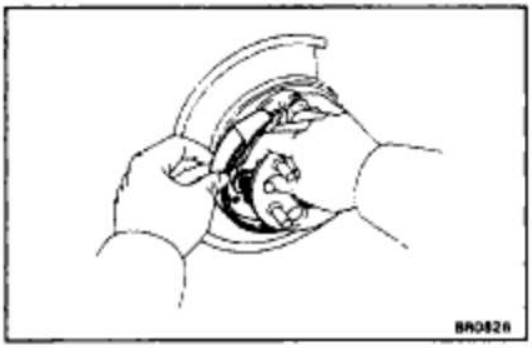


5. INSTALL TENSION SPRING, FRONT SHOE, AD–JUSTER AND STRUT

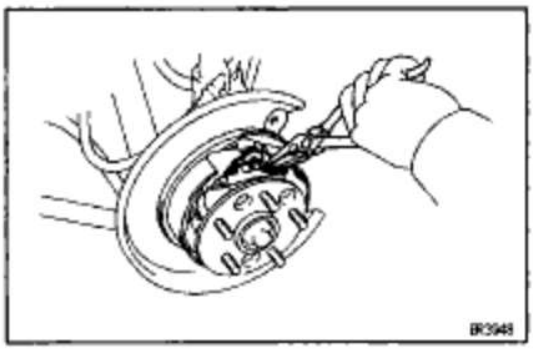
(a) Install the tension spring to the rear shoe.
(b) Install the front shoe to the tension spring.
(c) Install the adjuster between the front and rear shoes.



(d) Install the shoe strut with the spring.

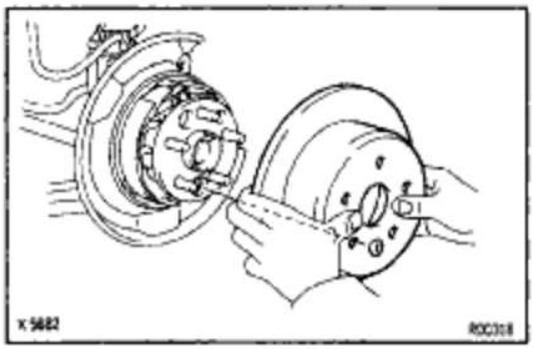


(e) Slide in the front shoe between the shoe hold–down spring cup and the backing plate.



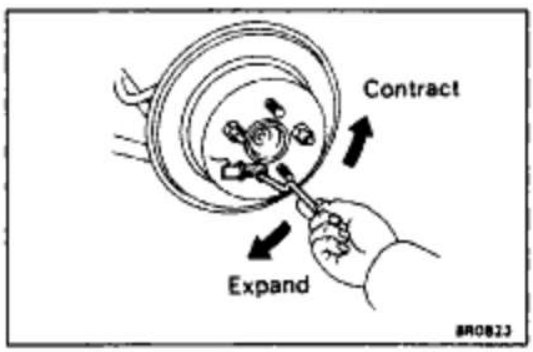
6. INSTALL SHOE RETURN SPRINGS

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



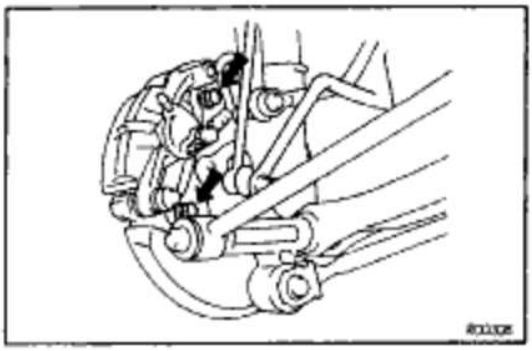
7. INSTALL DISC

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



8. 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 disc locks.
(d) Return the adjuster 8 notches.
(e) install the hole plug.



9. INSTALL DISC BRAKE ASSEMBLY

Install the disc brake assembly and torque the 2 mot nting bolts.

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

10. INSTALL REAR WHEEL

11. SETTLING PARKING BRAKE SHOES AND DISC

(a) LEVER TYPE:

With the parking brake release button pushed in, pull the lever with 98 N (10 kgf, 22 lbf) of force.

(b) PEDAL TYPE:

Depress the parking brake pedal with 147 N (15 kgf, 33 lbf).

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

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

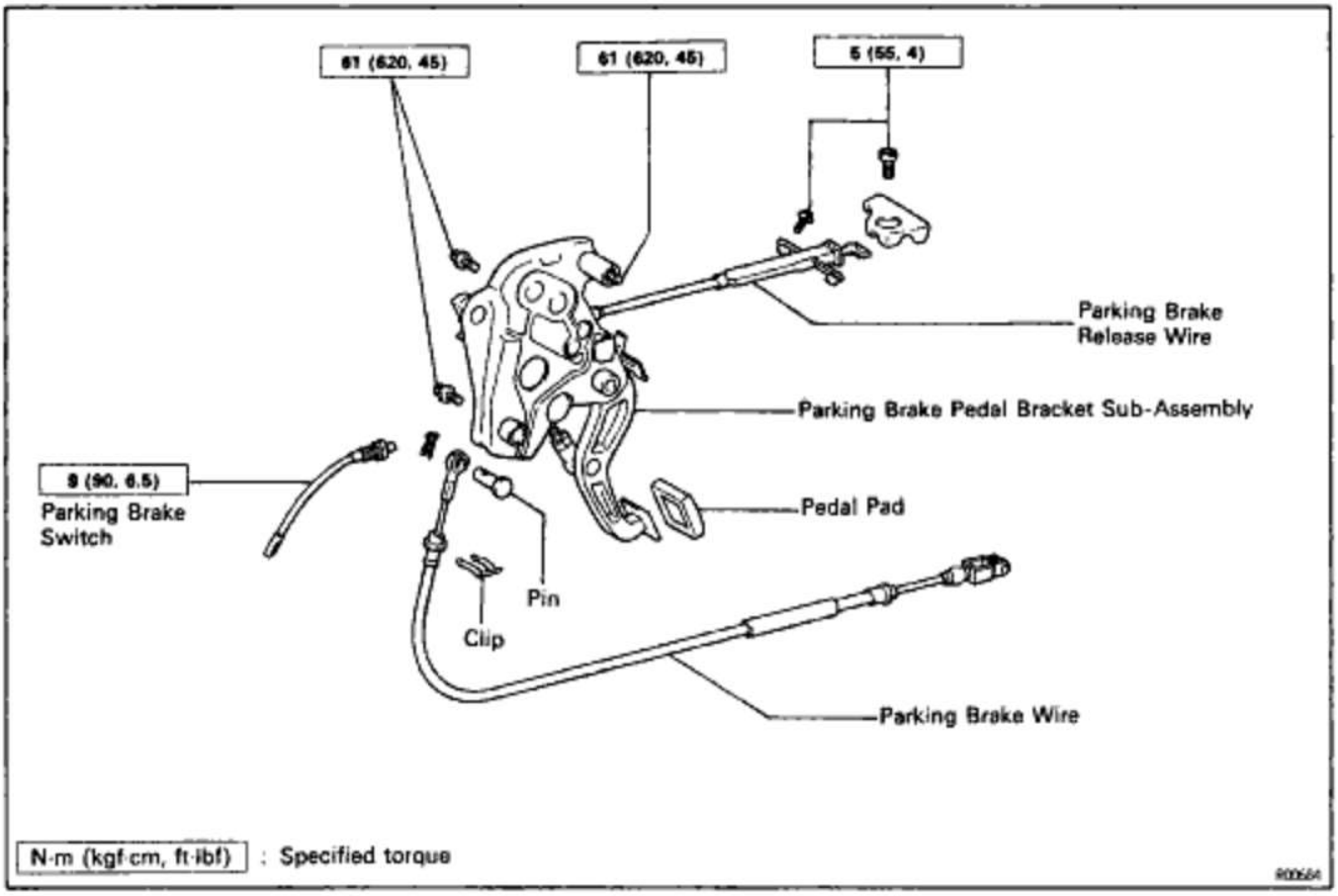
(e) Repeat this procedure 2 or 3 times.

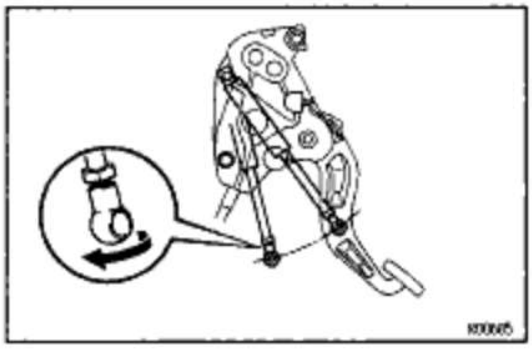
12. RECHECK AND ADJUST PARKING BRAKE LEVER/ PEDAL TRAVEL

PARKING BRAKE

PARKING BRAKE PEDAL DISASSEMBLY AND ASSEMBLY

Remove and install the parts as shown.





MAIN POINT OF PEDAL INSTALLATION

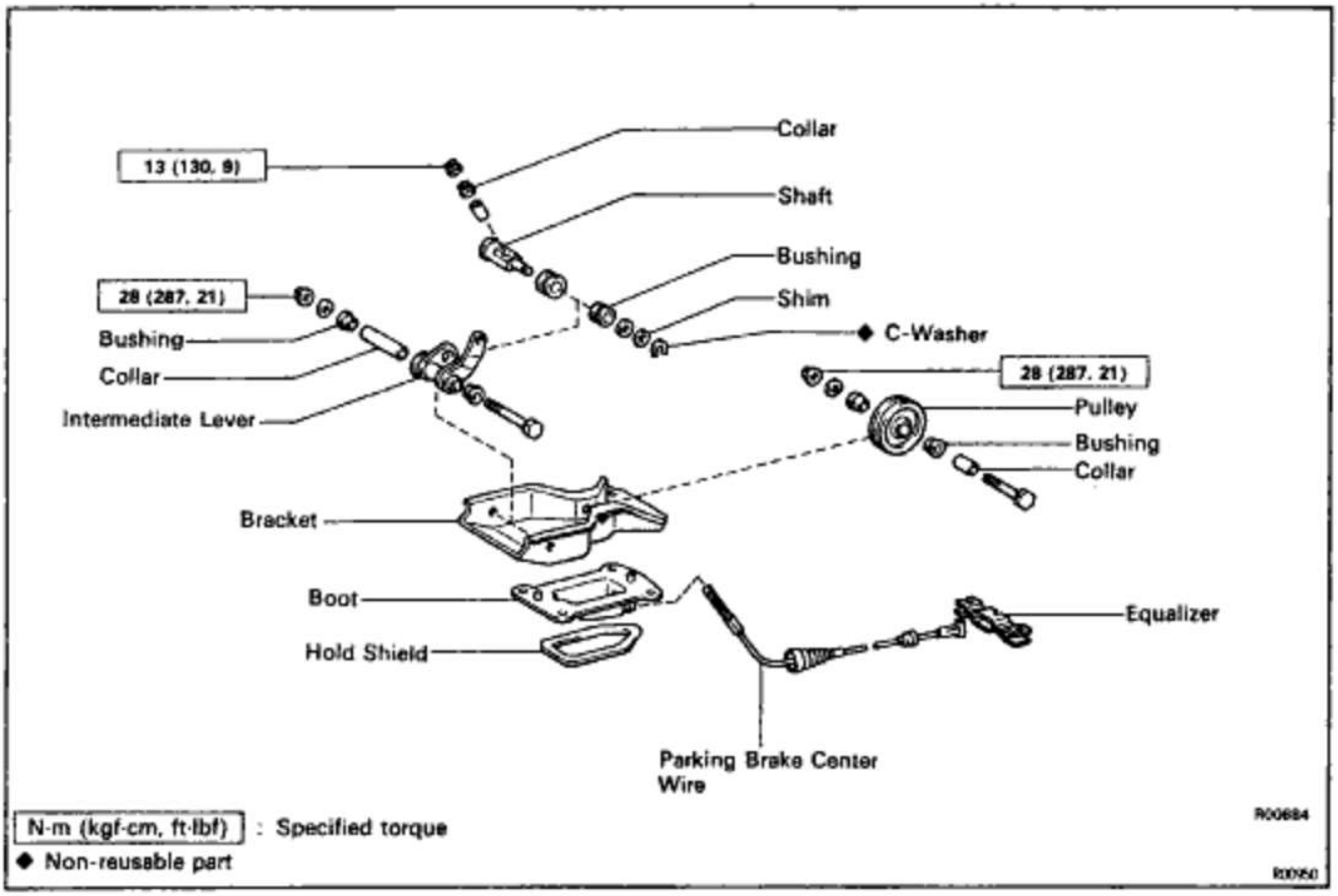
INSTALL SHOCK ABSORBER

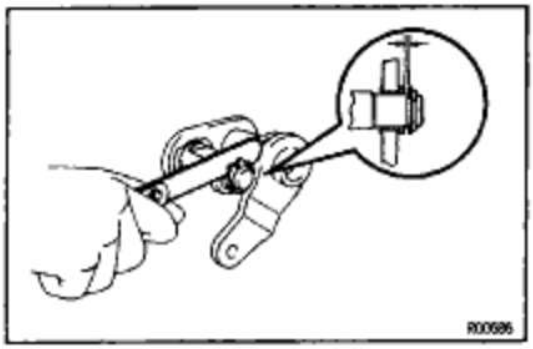
(a) Loosen the union lock nut.
(b) Install the shock absorber to the pin on the pedal bracket side, then extend the piston rod fully.
(c) Return the pedal until it hits the cushion.
(d) Make adjustments so that the shock absorber's union and the pin on the pedal side are aligned, then turn the union 1 turn counterclockwise.
(e) Install the shock absorber to the pedal and tighten the lock nut.

Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)

PARKING BRAKE INTERMEDIATE LEVER DISASSEMBLY AND ASSEMBLY

Remove and install the parts as shown.





MAIN POINT OF INTERMEDIATE LEVER INSTALLATION

MEASURE CLEARANCE BETWEEN INTERMEDIATE LEVER SHAFT AND LEVER

Using a feeler gauge, measure the clearance.

Standard clearance:

0.09–0.5 mm (0.004–0.02 in.)

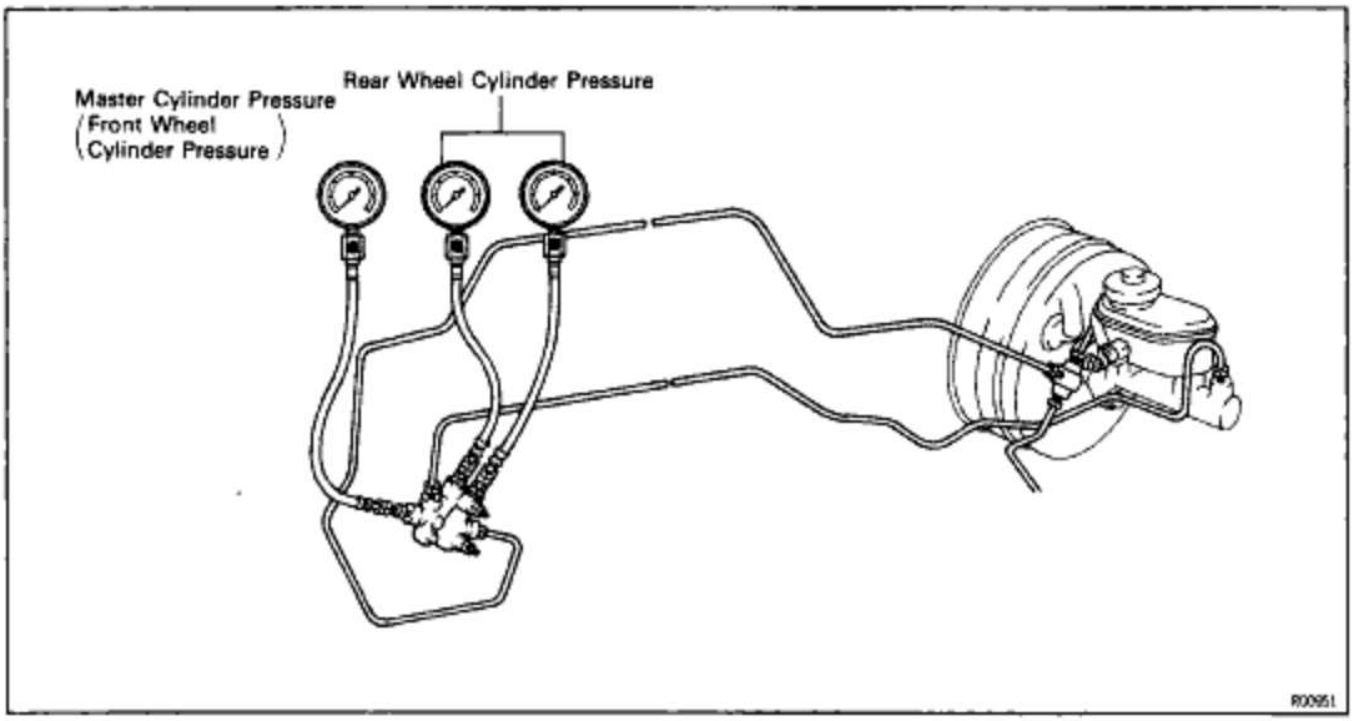
If the clearance is not within the specification, replace the shim with one of the correct size.

Shim Thickness	Shim Thickness
0.3 mm (0.012 in.)	1.2 mm (0.047 in.)
0.6 mm (0.024 in.)	1.5 mm (0.059 in.)
0.9 mm (0.035 in.)	1.8 mm (0.071 in.)

PROPORTIONING VALVE (P VALVE)

P VALVE INSPECTION

1. CONNECT FLUID PRESSURE GAUGE TO P VALVE



2. BLEED AIR FROM FLUID 'PRESSURE GAUGE

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

Master cylinder fluid pressure	Rear brake cylinder fluid pressure
5S–FE w/o ABS:	
2,452 kPa (25 kgf/cm^2 , 356 psi)	2,452 kPa (25 kgf/cm^2 , 356 psi)
7,845 kPa (80 kgf/cm^2 , 1,138 psi)	4,452 kPa (45.4 kgf/cm^2 , 648 psi)
1 MZ–FE w/o A6S:	
2,942 kPa–(30 kgf/cm^2 , 427 psi)	2,942 kPa (30 kgf/cm^2 , 427 psi)
7,845 kPa (80 kgf/cm^2 , 1,138 psi)	4,756 kPa (48.5 kgf/cm^2 , 690 psi)
5S–FE w/ABS, 1 MZ–FE w/ABS:	
3,432 kPa (35 kgf/cm^2 , 498 psi)	3,432 kPa (35 kgf/cm^2 , 498 psi)
7,845 kPa (80 kgf/cm^2 , 1,138 psi)	5,070 kPa (51.7 kgf/crn2 , 735 psi)

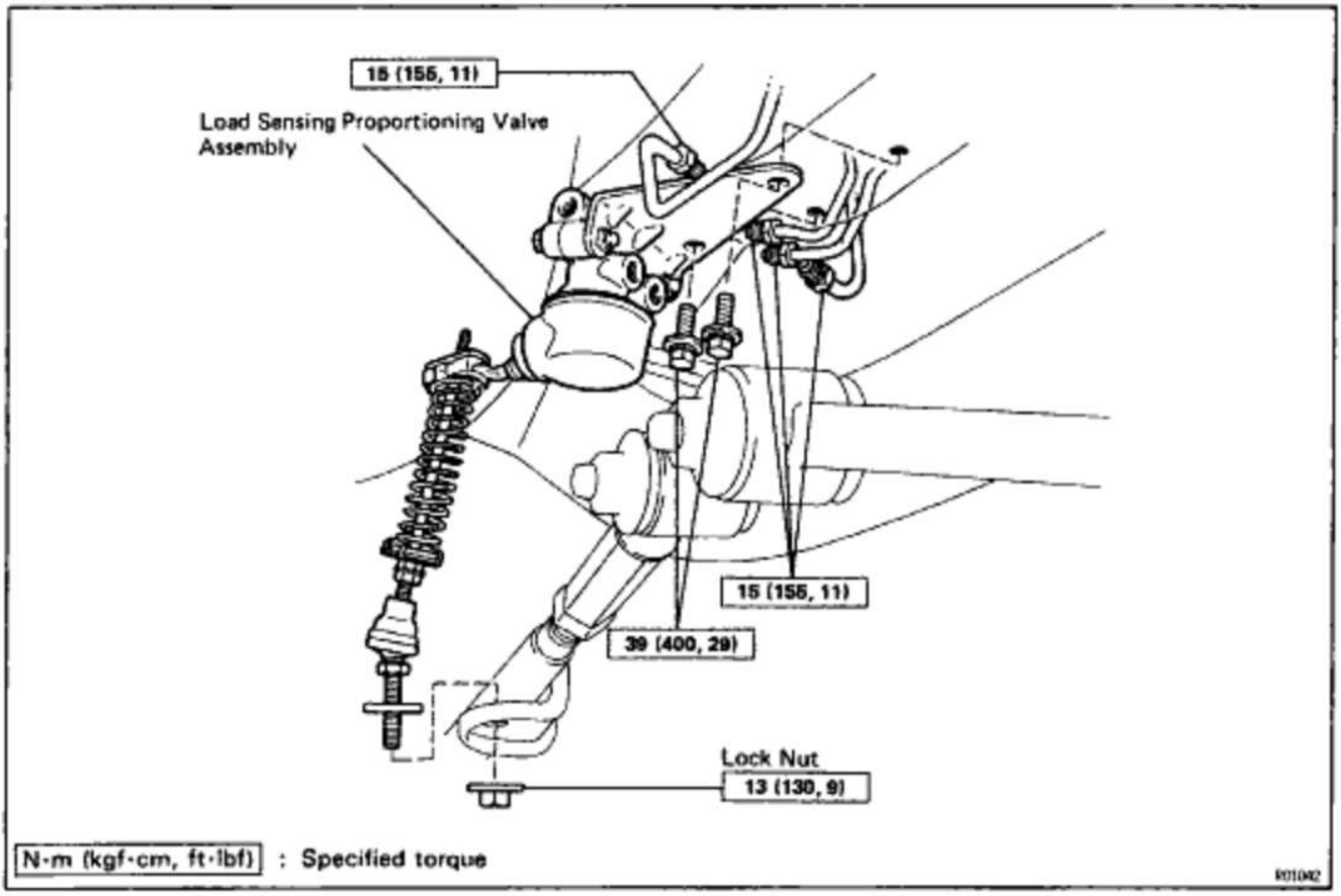
If the rear brake cylinder pressure is incorrect, replace the P valve assembly.

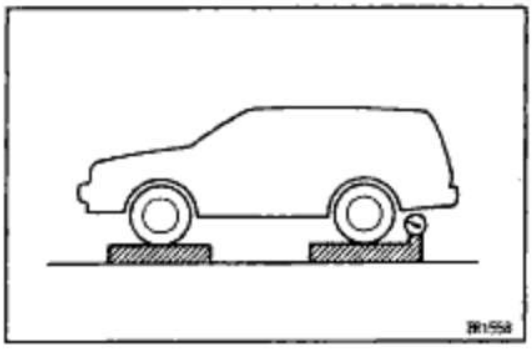
4. BLEED BRAKE SYSTEM

5. CHECK FOR LEAKS

LOAD SENSING PROPORTIONING VALVE (LSPV)

COMPONENTS

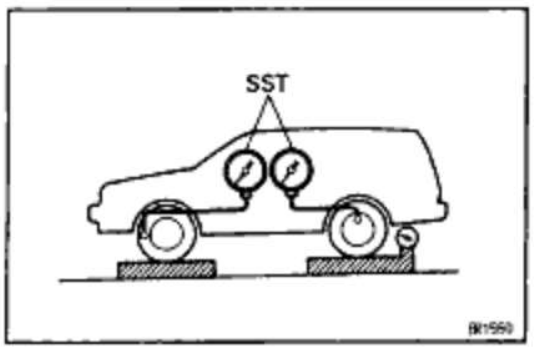




FLUID PRESSURE INSPECTION

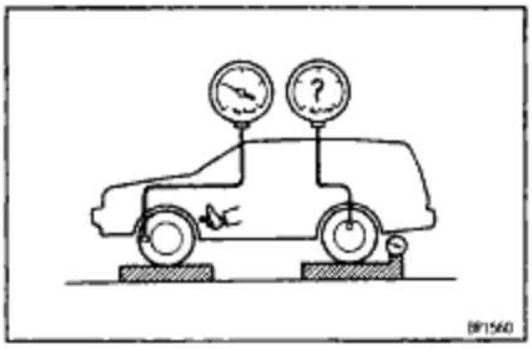
1. SET REAR AXLE LOAD

(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 FLUID PRESSURE TO FOL–LOWING SPECIFICATION AND CHECK REAR BRAKE FLUID PRESSURE

Rear brake fluid pressure:

5S–FE All, 1 MZ–FE w/ABS

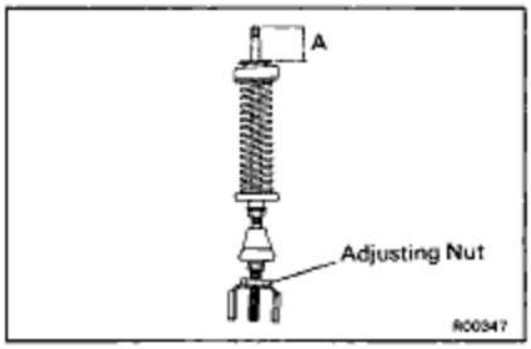
Front brake fluid pressure kPa (kgf/cm^2 , psi)	Rear brake fluid pressure kPa (kgf/cm^2 , psi)
9,807 (100, 1,422)	6,139–7,120 (62.6–72.6, 890–1,033)

1 MZ–FE w/o A6S

Front brake fluid pressure kPa (kgf/cm^2 , psi)	Rear brake fluid pressure kPa (kgf/cm^2 , psi)
12,747 (130 , 1,849)	8,865–9,846 (90.4–100.4,1,286–1,428)

HINT:

- Depress the brake pedal while the engine is run–ning.
- The brake pedal should not be depressed twice and/or returned while setting to the specified pressure. Read the value of rear pressure 2 sec–onds after adjusting to the specified fluid pres–sure.



4. IF NECESSARY, ADJUST FLUID PRESSURE

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

Initial set length:

26.0 mm (1.02 in.)

(b) Check the rear brake fluid pressure.

(c) If not within the specification, adjust the fluid pres–sure by changing the shaft length.

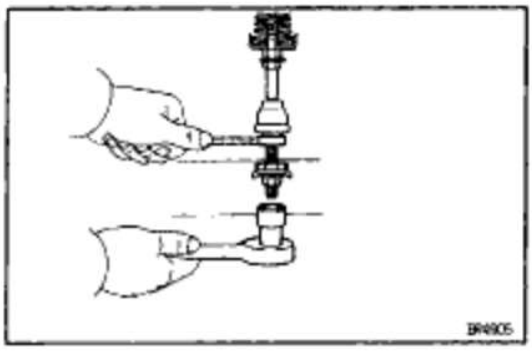
Low pressure–Lengthen A

High pressure–Shorten A

HINT:–For every full turn of the adjusting nut, the fluid pressure will change as follows:

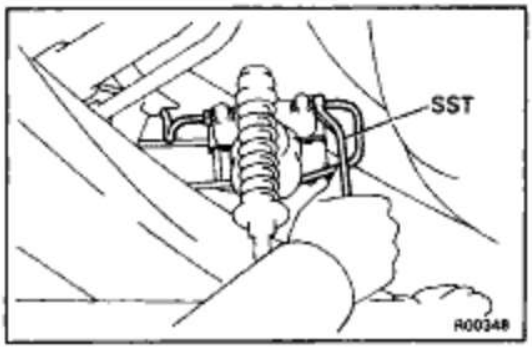
Fluid Pressure changed kPa (kgf/cm^2, psi)

5S–FE All, 1 MZ–FE w/ABS	294 (3.0, 42.7)
1 MZ–FE w/o ABS	422 (4.3, 61.2)

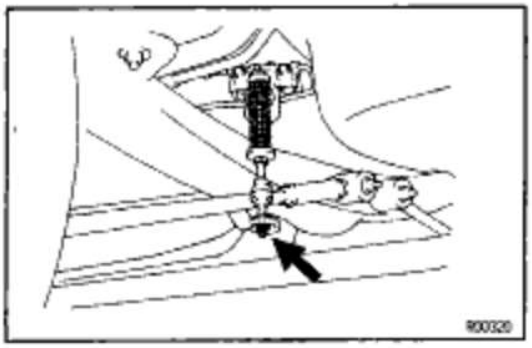


(d) Torque the lock nut.
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)
If it cannot be adjusted, replace the valve body.

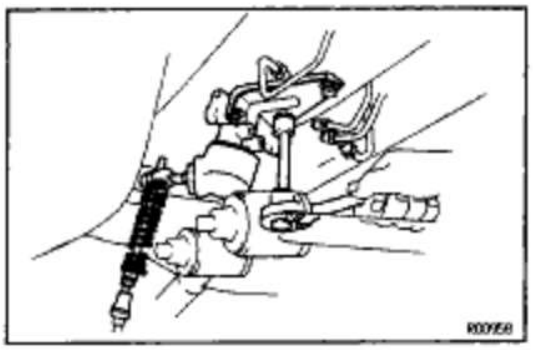
LSPV REMOVAL



1. DISCONNECT BRAKE LINES
Using SST, disconnect the brake lines from the valve body.
SST 09751–36011



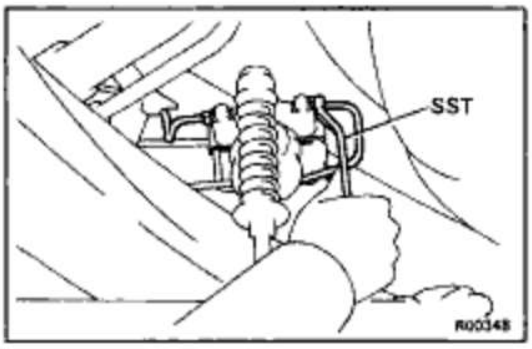
2. REMOVE LSPV ASSEMBLY
(a) Remove the lock nut and disconnect the adjusting bolt from the rear suspension arm.



(b) Remove the 2 mounting bolts and remove the LSPV assembly.

LSPV INSTALLATION

1. INSTALL LSPV ASSEMBLY
(a) Install the valve assembly with the 2 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 to the rear suspension arm with the lock nut.



2. CONNECT BRAKE LINES

Using SST, connect the brake lines.

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 page BR–9)

4. CHECK FOR LEAKS

5. CHECK AND ADJUST FLUID PRESSURE

(See page BR–63)

6. REMOVE LSPV GAUGE (SST) AND BLEED BRAKE SYSTEM

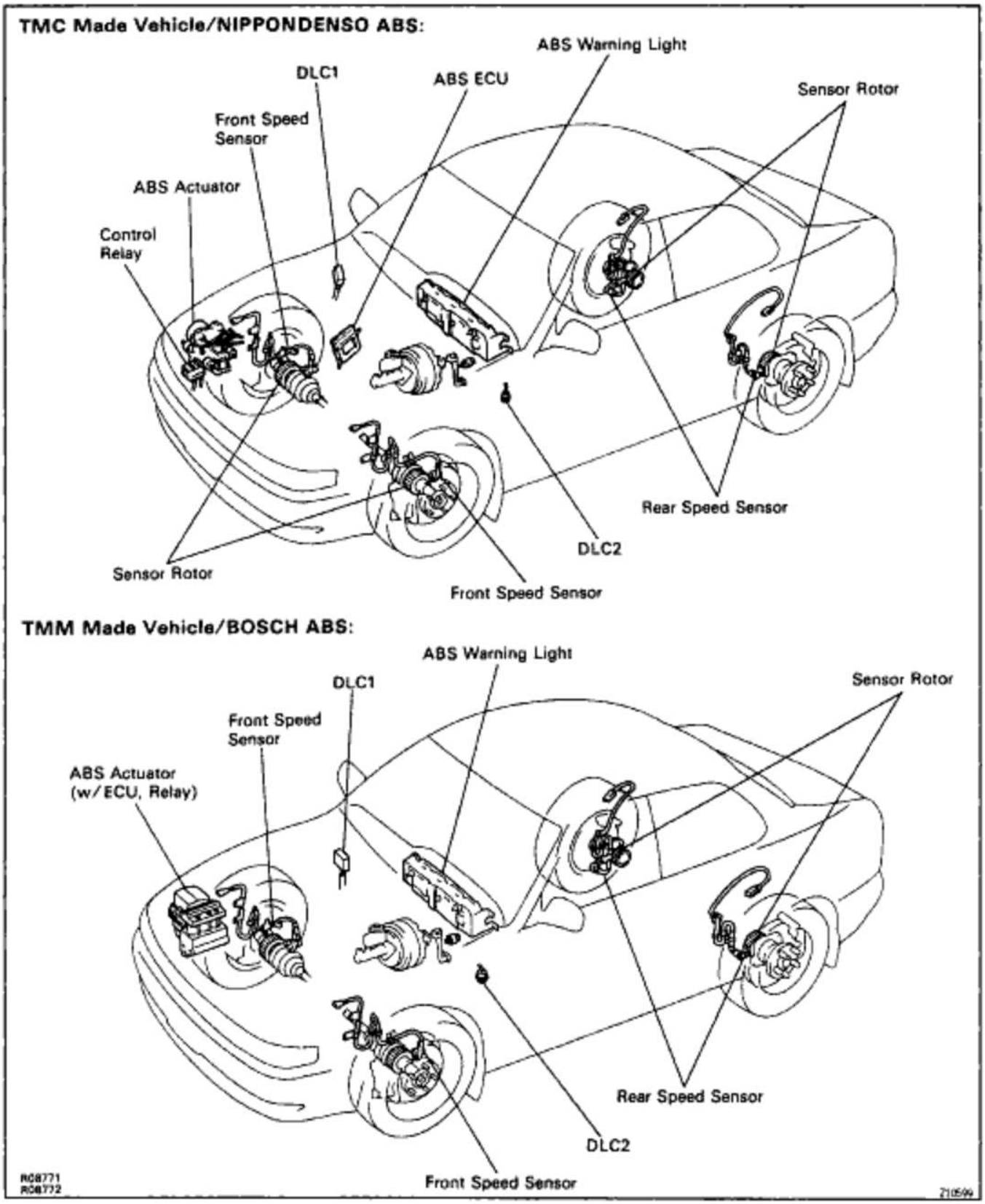
7. CHECK FOR LEAKS

ANTI–LOCK BRAKE SYSTEM (ABS)

DESCRIPTION

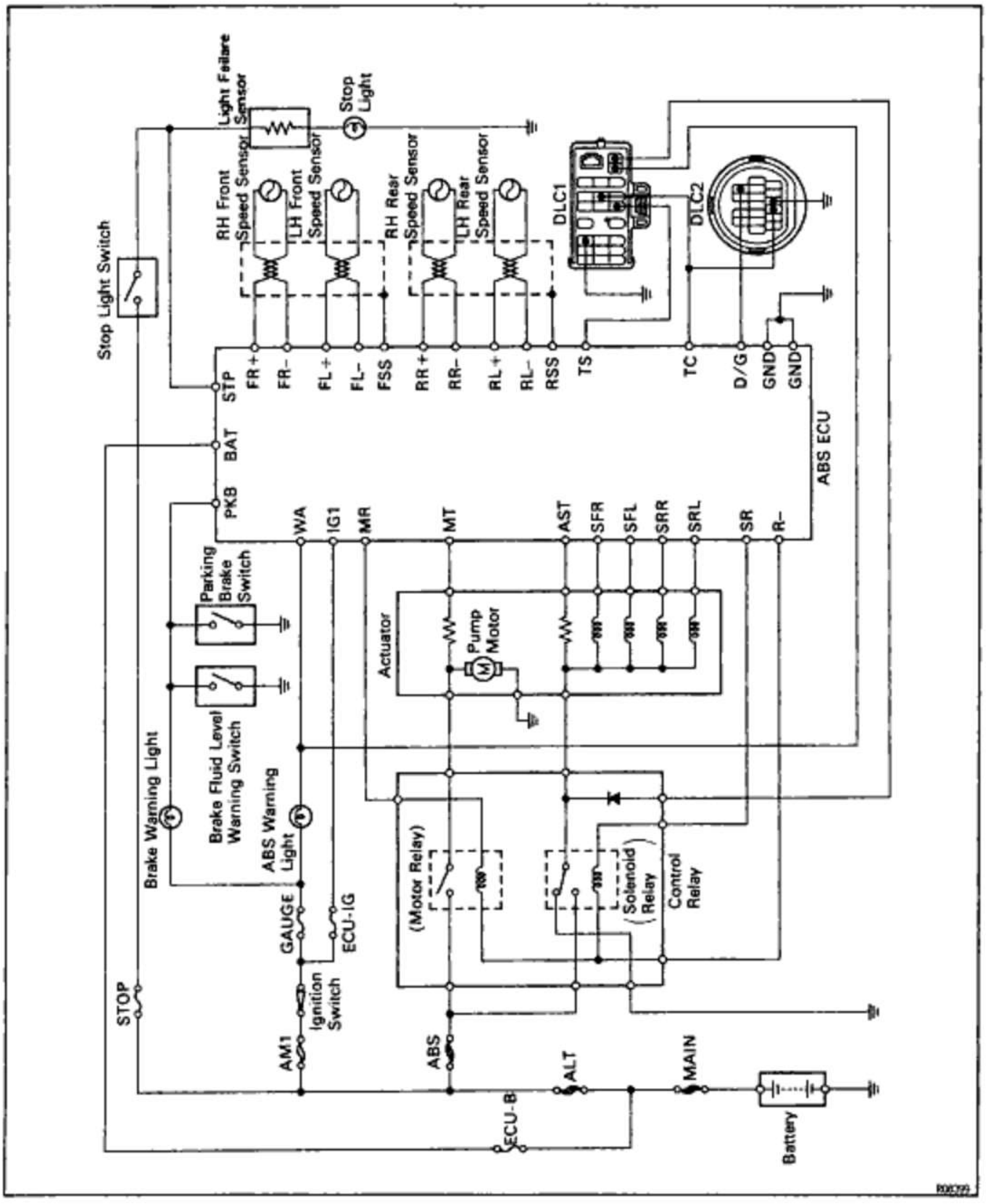
- ABS controls the brake cylinder hydraulic pressure to all 4 wheels during sudden braking and braking on slippery road surfaces, preventing the wheels from locking. ABS provides the following benefits:
  (1) Steering round an obstacle with a greater degree of certainty even when panic braking.
  (2) Stopping during panic braking while keeping the effect up on stability and steerability to a minimum, even on curves.
- In case a malfunction occurs, a diagnosis function and fail–safe system have been adopted for the ABS.
- An ABS actuator manufactured by BOSCH is used on the Camry produced by TMM (Toyota Motor Manufacturing U.S.A., Inc.).

SYSTEM PARTS LOCATION



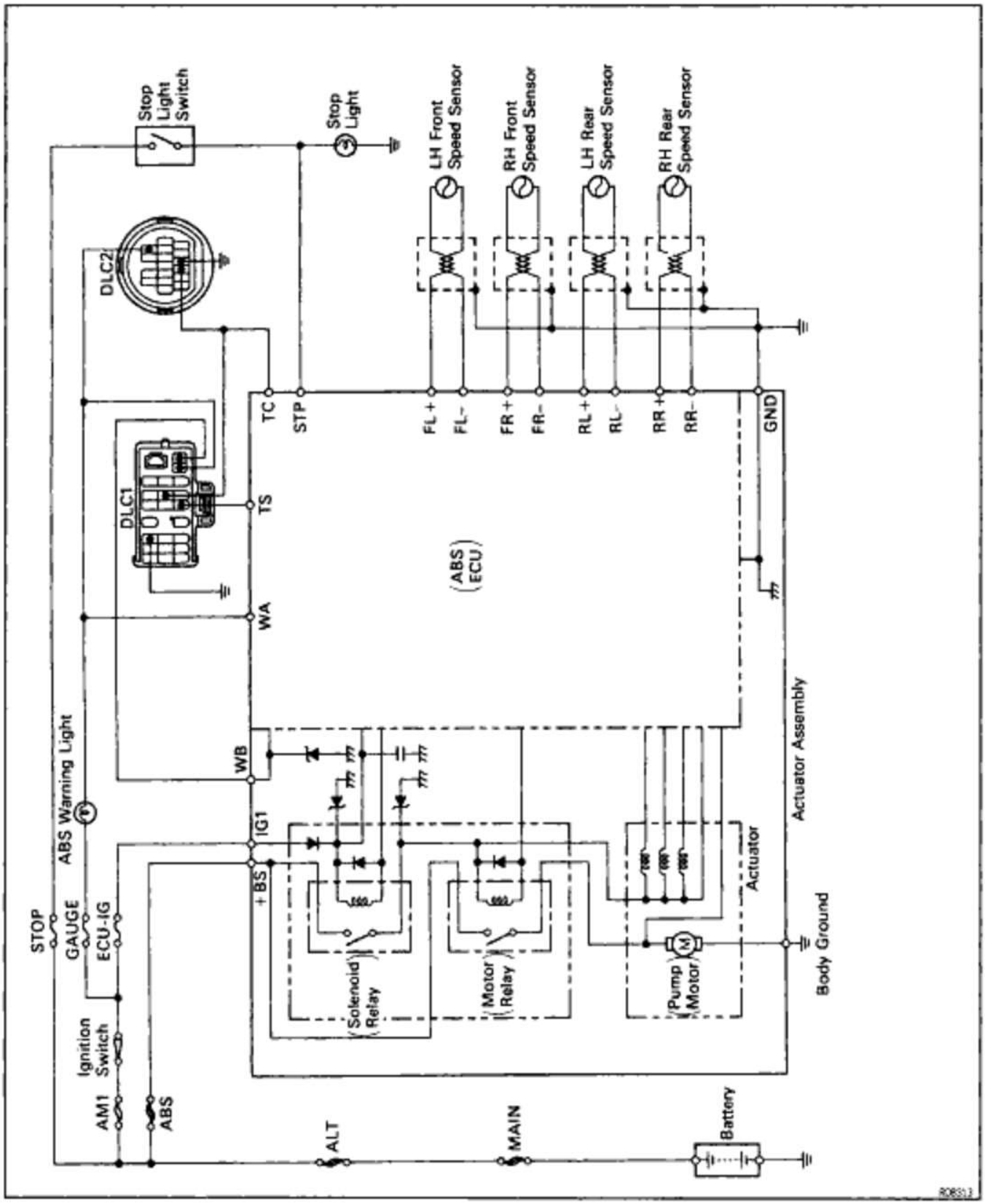
WIRING DIAGRAM

TMC Made Vehicle/NIPPONDENSO ABS:



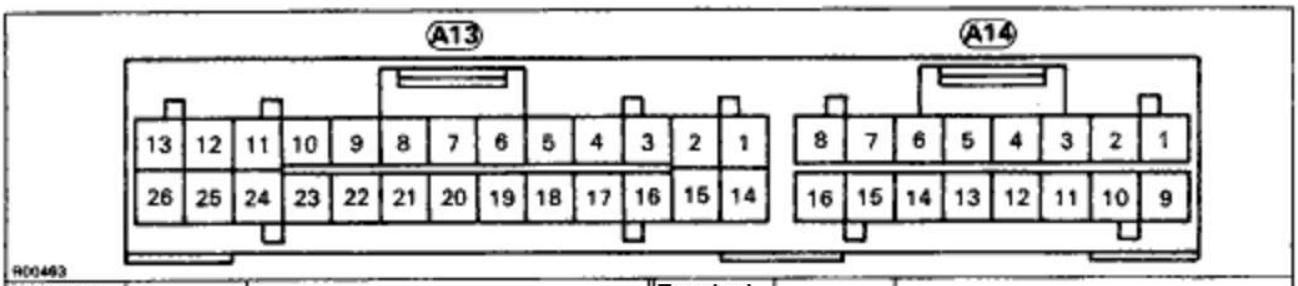
WIRING DIAGRAM

TMM Made Vehicle/BOSCH ABS:



ECU TERMINALS

TMC Made Vehicle/NIPPONDENSO ABS:

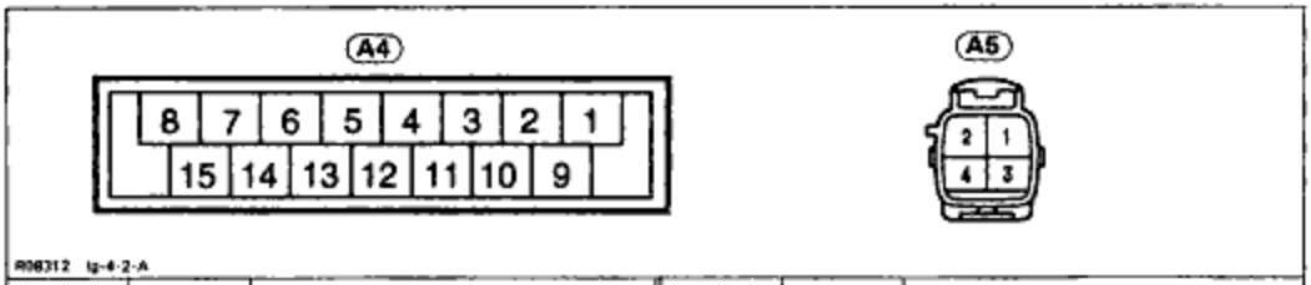


Terminal No.	Symbol	Connection	Terminal No.	Symbol	Connection
A13- 1	SFR	Right front solenoid	A14- 1	RL–	Left rear speed sensor
2	GND	Ground	2	–	–
3	FR–	Right front speed sensor	3	–	–
4	–	–	4	D/G	DLC2
5	TC	DLC1, DLC2	5	–	–
6	MT	ABS control (motor) relay monitor	6	STP	Stop light switch
7	–	–	7	RSS	Sealed wiring harness
8	–	–	8	RR+	Right rear speed sensor
9	FL+	Left front speed sensor	9	RL+	Left rear speed sensor
10	FSS	Sealed wiring harness	10	–	–
11	SR	ABS control (solenoid) relay	11	–	–
12	IG1	Ignition switch	12	–	–
13	SFL	Left front solenoid	13	WA	ABS warning light
14	SRL	Left rear solenoid	14	PKB	Parking brake switch
15	GND	Ground	15	TS	DLC1
16	FR+	Right front speed sensor	16	RR-	Right rear speed sensor
17	–	–			
18	AST	A8S control (solenoid) relay monitor			
19	–	–			
20	–	–			
21	–	–			
22	FL–	Left front speed sensor			
23	MR	ABS control (motor) relay			
24	R–	Relay ground			
25	BAT	Battery			
26	SRR	Right rear solenoid			

V04536

ECU TERMINALS

TMM Made Vehicle/BOSCH ABS:



Terminal No.	Symbol	Connection	Terminal No.	Symbol	Connection
A4- 1	WA	A6S warning fight	A5-1	+BS	Battery
2	RL–	Left rear speed sensor	2	IG1	Ignition switch
3	–	–	3	WB	DLC1
4	RL+	Left rear speed sensor	4	GND	Ground
5	FR–	Right front speed sensor			
6	RR+	Right rear speed sensor			
7	FL–	Left front speed sen-			
8	–	sor –			
9	STP	Stop light switch			
10	–	–			
11	FR+	Right front speed sensor			
12	TC	DLC1, DLC2			
13	FL+	Left front speed sensor			
14	RR–	Right rear speed sensor			
15	TS	DLC1			

V04537

ECU TERMINALS STANDARD VALUE

TMC Made Vehicle/NIPPONDENSO ABS:

Symbols (Terminals No.)	STD Voltage (V)	Condition
BAT (A13-25) – GND (A13-2, 15)	10 – 14	Always
IG1 (A13-12) – GND (A13-2, 15)	10 – 14	IG switch ON
SR (A13-11) – R– (A13-24)	8.4 – 14	IG switch ON, ABS warning light OFF
MR (A13-23) – R– (A13-24)	Below 1.0	IG switch ON
SFR (A13-1) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
SFL (A13-13) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
SRR (A13-26) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
AST (A13-18) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
WA (A14-13) – GND (A13-2, 15)	Below 2.0	IG switch ON, AIRS warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
PKB (A14-14) – GND (A13-2, 15)	Below 1.5	IG switch ON, PKB switch ON, Fluid in M/C reservoir above MIN level
	10 – 14	IG switch ON, PKB switch OFF, Fluid in M/C reservoir above MIN level
STP (A14-6) – GND (A13-2, 15)	Below 1.5	Stop light switch OFF
	8 – 14	Stop light switch ON
D/G (A14-4) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
TC (A13-5) – GND (A13-2, 15)	10 – 14	!G switch ON
TS (A14-15) – GND (A13-2, 15)	10 – 14	IG switch ON
FR+ (A13-16) – FR– (A13-3)	AC generation	IG switch ON Slowly turn right front wheel
FL+ (A13-9) – FL– (A13-22)	AC generation	IG switch ON Slowly turn left front wheel
RR+ (A14-8) – RR– (A14-16)	AC generation	IG switch ON Slowly turn right rear wheel
RL+ (A14-9) – RL– (A14-1)	AC generation	IG switch ON Slowly turn left rear wheel

V04538

ECU TERMINALS STANDARD VALUE

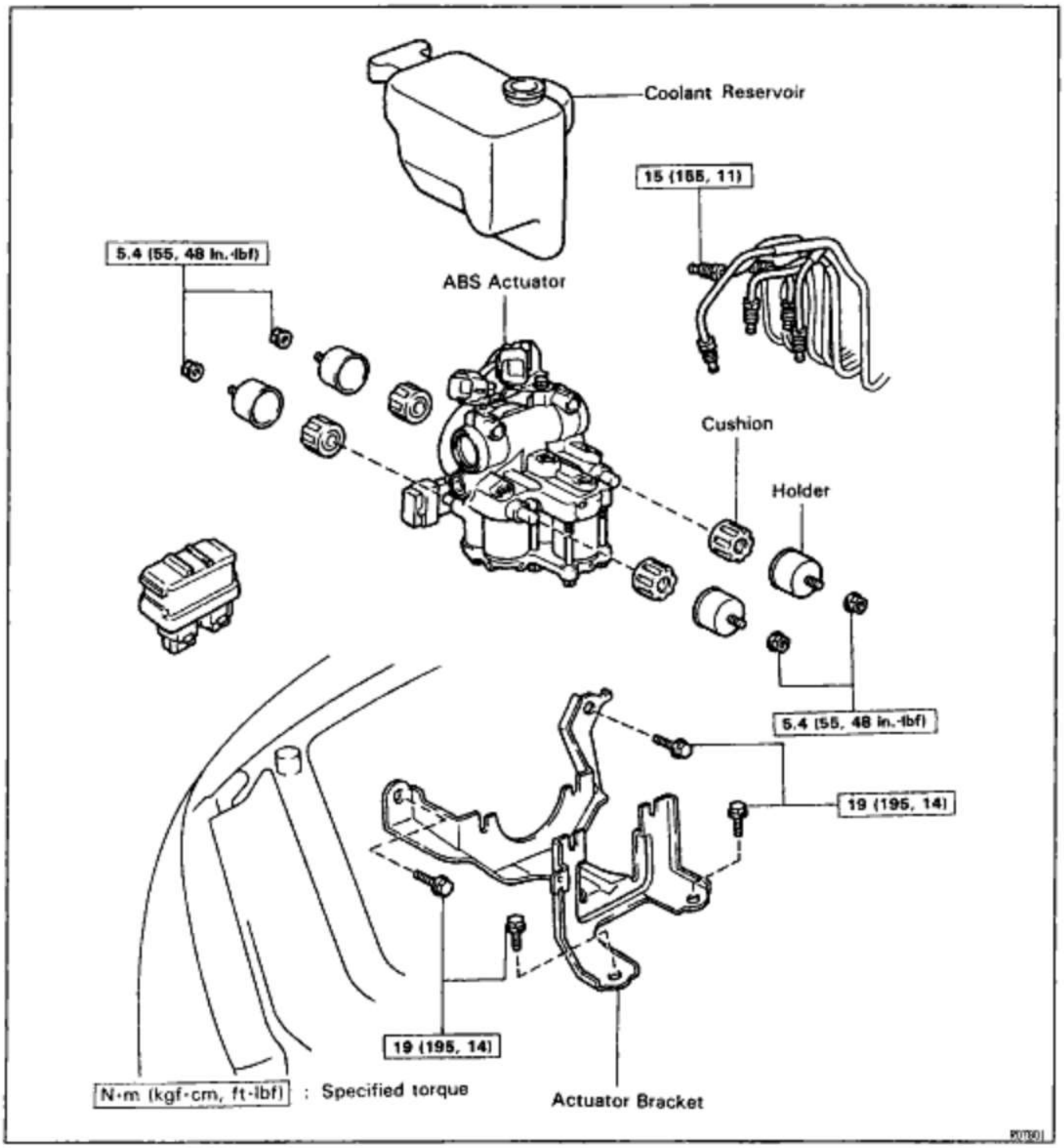
TMM Made Vehicle/BOSCH ABS:

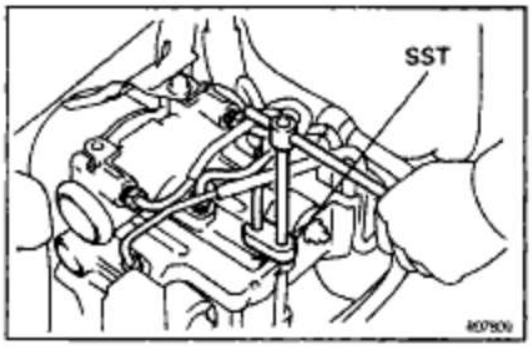
Symbols (Terminals No.)	STD Voltage (V)	Condition
+BS (A5-1) – GND (A5-4)	10 – 14	Always
IG1 (A5-2) – GND (A5-4)	10 – 14	IG switch ON
WA (A4-1) – GND (A5-4)	Below 2.6	IG switch ON, A6S warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
WB (A5-3) – GND (A5-4)	Below 2.6	IG switch ON, ABS warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
STP (A4-9) – GND (A5-4)	Below 1.5	Stop light switch OFF
	5 – 14	Stop light switch ON
Tc (A4-12) – GND (A5-4)	5.7 – 8.1	IG switch ON
Ts (A4-15) – GND (A5-4)	5.7 – 8.1	I G switch 0 N
FR+ (A4-11) – FR– (A4-5)	AC generation	IG switch ON, slowly turn right front wheel
FL+ (A4-13) – FL– (A4-7)	AC generation	IG switch ON, slowly turn left front wheel
RR+ (A4-6) – RR– (A4-14)	AC generation	IG switch ON, slowly turn right rear wheel
RL+ (A4-4) – RL– (A4-2)	AC generation	IG switch ON, slowly turn left rear wheel

ABS ACTUATOR (TMC Made Vehicle NIPPONDENSO ABS)

ABS ACTUATOR REMOVAL AND INSTALLATION

Remove and install the parts as shown.





MAIN POINTS OF REMOVAL AND INSTALLATION

1. DISCONNECT AND CONNECT BRAKE LINE

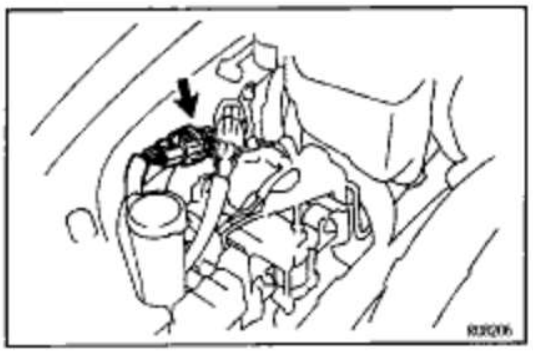
Using SST, disconnect and connect the brake lines from/to the ABS actuator.

SST 09023–00100

Torque: 15 N–m (155 kgf–cm. 11 ft–lbf)

2. BLEED BRAKE SYSTEM

(See page BR–9)



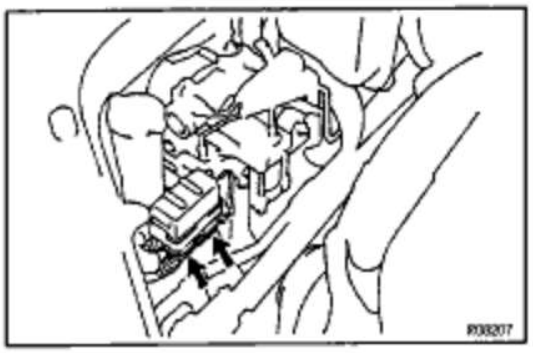
ABS ACTUATOR INSPECTION

1. INSPECT BATTERY POSITIVE VOLTAGE

Battery positive voltage:
10–14.5 V

2. DISCONNECT CONNECTORS

(a) Disconnect the connector from the actuator.

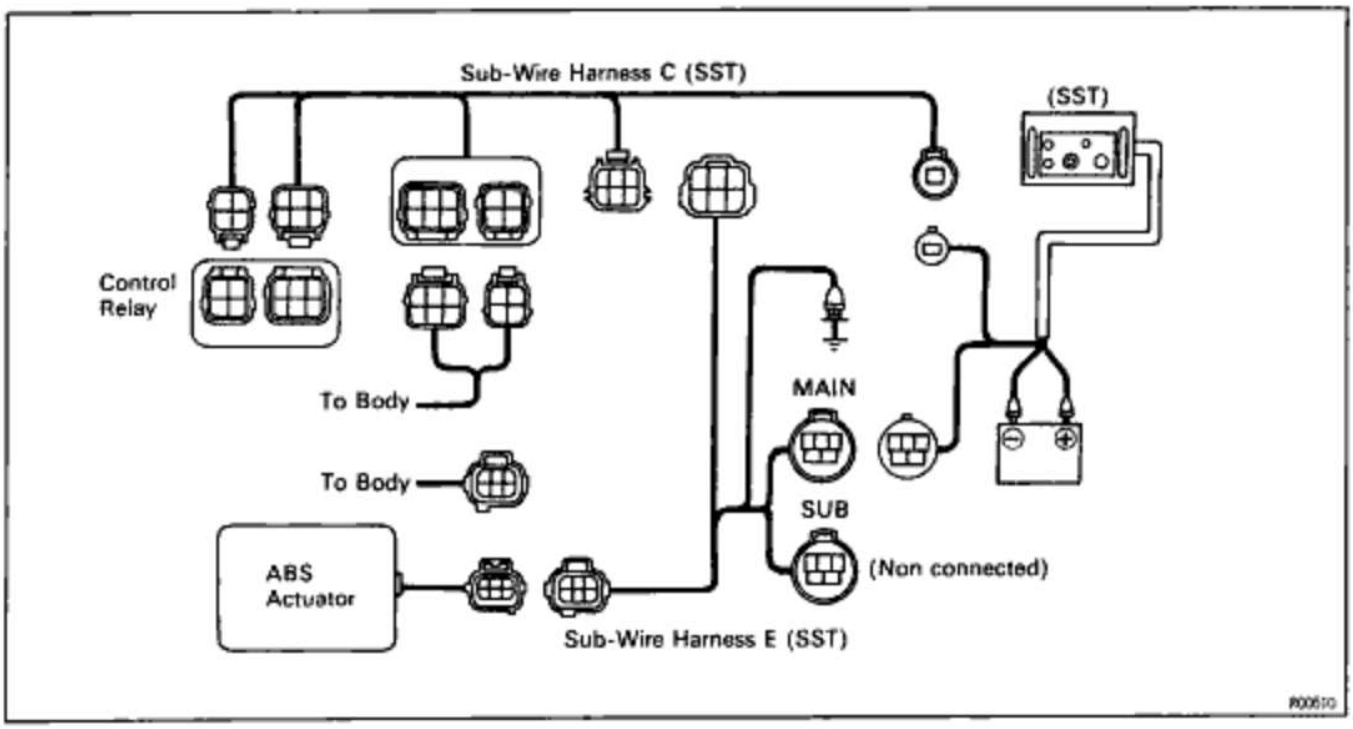


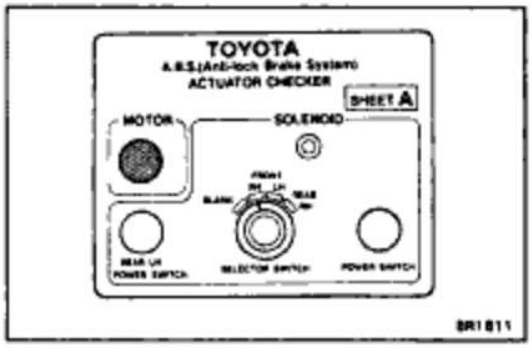
(b) Disconnect the 2 connectors from the control relay.

3. CONNECT ACTUATOR CHECKER (SST) TO ACTUA–TOR

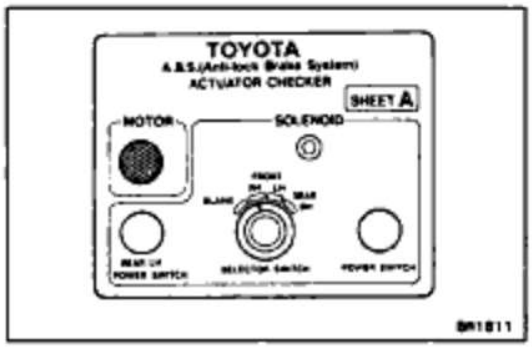
(a) Connect the actuator checker (SST) to the actuator, control relay and body side wire harness through the sub–wire harness C and E (SST) as shown.
SST 09990–00150, 09990–00200, 09990–00210

(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.



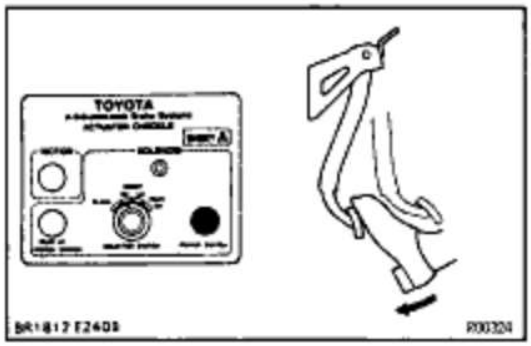


(c) Place the "SHEET A" (SST) on the actuator checker.
SST 09990–00163

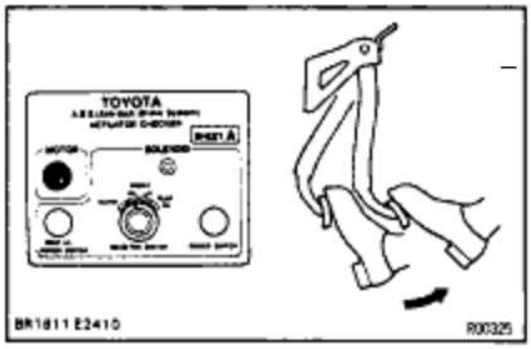


4. INSPECT BRAKE ACTUATOR OPERATION

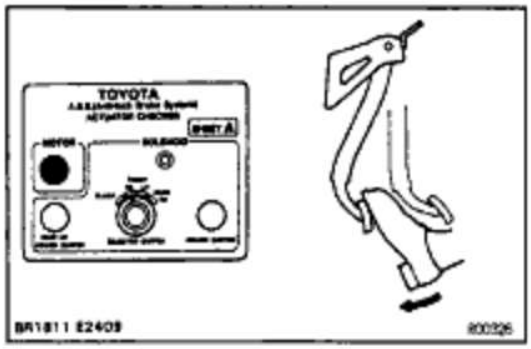
(a) Start the engine, and run it at idle.
(b) Turn the selector switch of the actuator checker to "FRONT RH" position.
(c) Push and hold in the MOTOR switch for a few seconds.
(d) Depress the brake pedal and hold it until step (g) is completed.



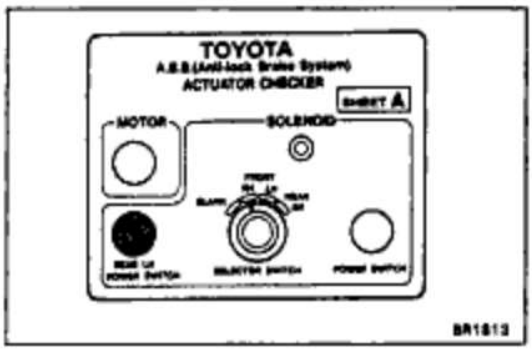
(e) Push the POWER SWITCH, and check that the brake pedal does not go down.
NOTICE: Do not keep the POWER SWITCH pushed down for more than 10 seconds.
(f) Release the switch, and check that the pedal goes down.



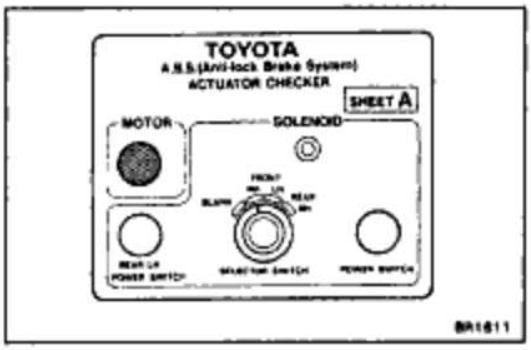
(g) Push and hold in the MOTOR switch for a few seconds, and check that the pedal returns.
(h) Release the brake pedal.



(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.
(k) Release the brake pedal.



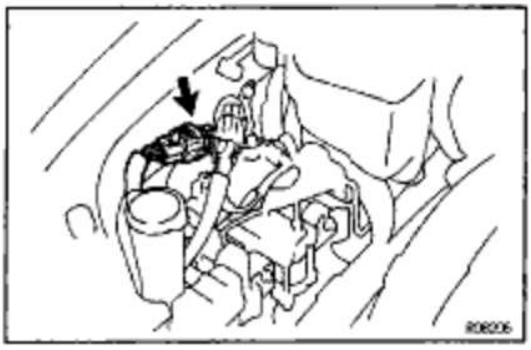
(l) Turn the selector switch to "FRONT LH" position.
(m) Repeat (c) to 6), checking the actuator operation similarly.
(n) Similarly, inspect "REAR RH" and "REAR LH" position.
HINT: When inspecting "REAR LH" position, push the REAR LH switch instead of the POWER SWITCH, and you can inspect in any selector switch position.



(o) Push and hold in the MOTOR switch for a few seconds.
(p) Stop the engine.

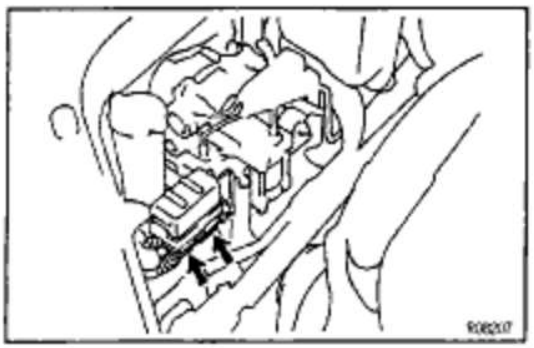
5. DISCONNECT ACTUATOR CHECKER (SST) FROM ACTUATOR

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 , 09990–00163



6. CONNECT CONNECTORS

(a) Connect the 2 connectors to the control relay.



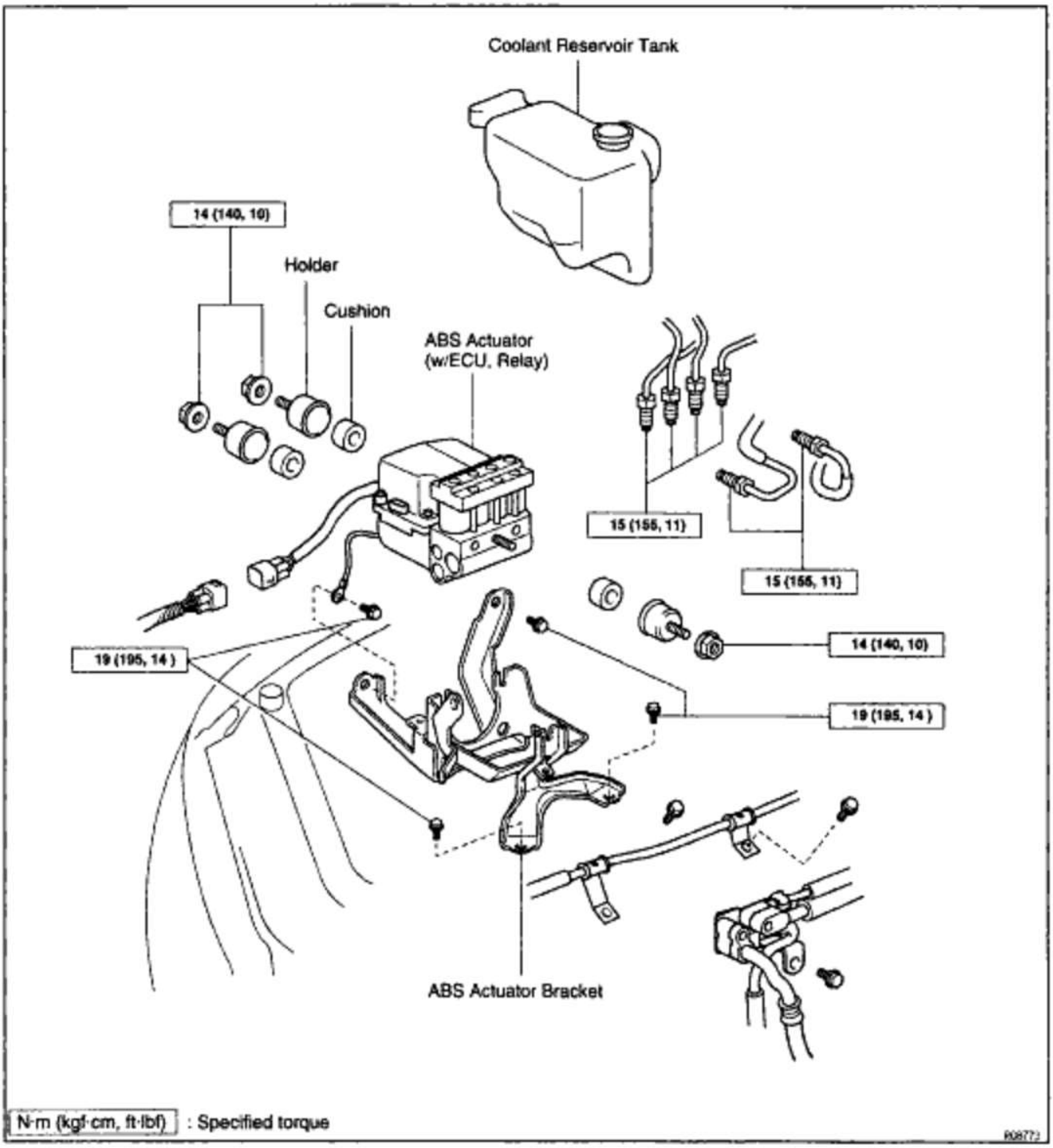
(b) Connect the connector to the actuator.

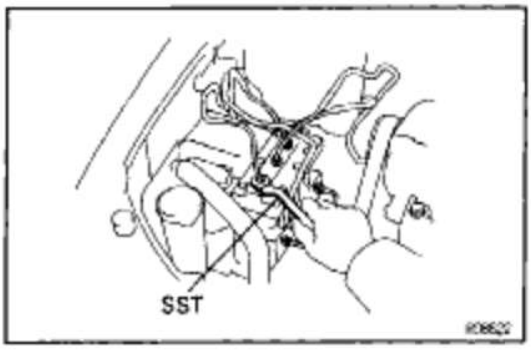
7. CLEAR DIAGNOSTIC TROUBLE CODES
(See page BR–94**)**

ABS ACTUATOR (TMM Made Vehicle BOSCH ABS)

ABS ACTUATOR REMOVAL AND INSTALLATION

Remove and install the parts as shown.





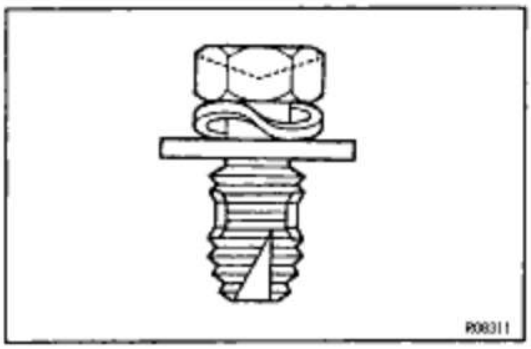
MAIN POINTS OF REMOVAL AND INSTALLATION

1. DISCONNECT AND CONNECT BRAKE LINE

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

SST 09751–36011

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



2. INSTALL ABS ACTUATOR

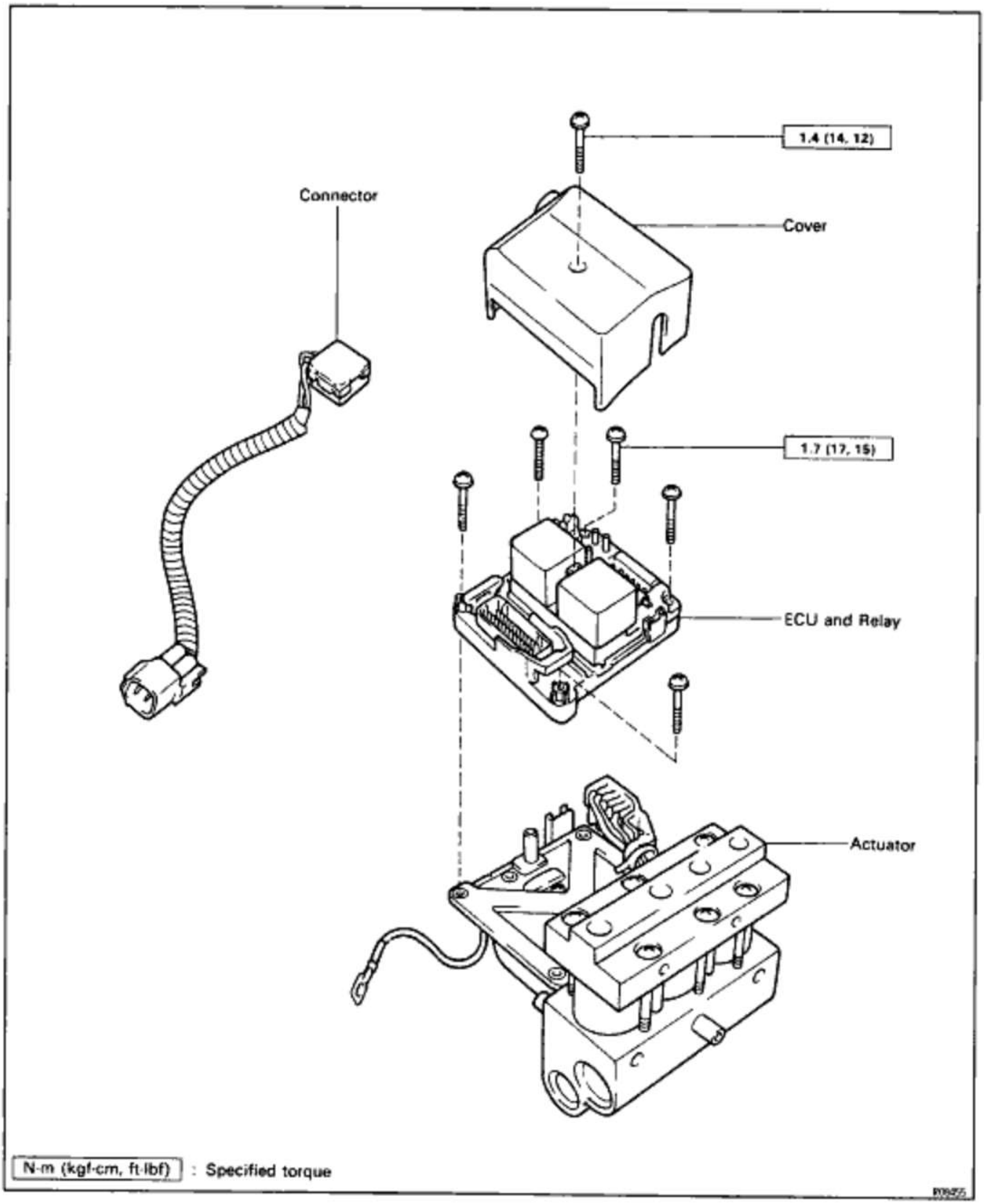
NOTICE: Use the bolts which have a notch to securely ground the actuator ground wire.

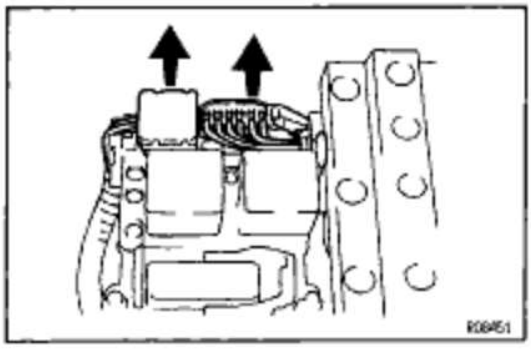
3. BLEED BRAKE SYSTEM

(See page BR–9)

ABS ACTUATOR DISASSEMBLY AND ASSEMBLY

Remove and install the parts as shown.





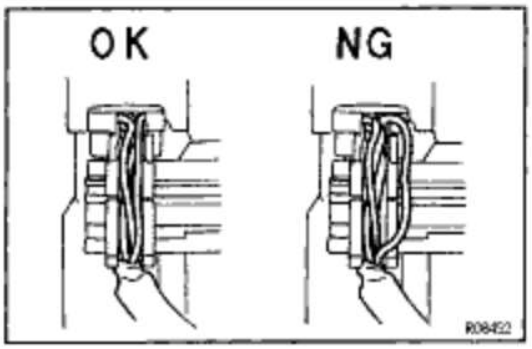
MAIN POINTS OF DISASSEMBLY AND ASSEMBLY

1. REMOVE AND INSTALL COVER

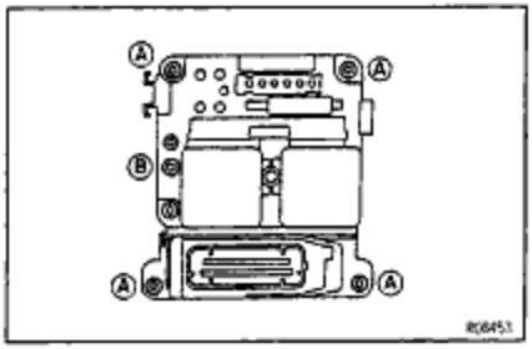
Using a T15 torx wrench, loosen and tighten the screw.

Torque: 1.4 N–m(14 kgf–cm, 12 in.lbf)

2. DISCONNECT AND CONNECT 4–PIN AND 6–PIN CONNECTORS



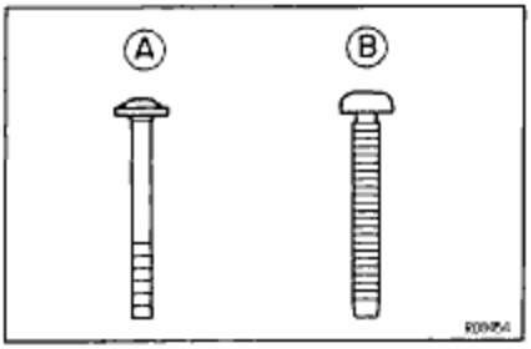
NOTICE: When installing, place the 4–pin connector's cables into the cable guide.



3. REMOVE AND INSTALL ECU

Using T15 and T20 torx wrenches, loosen and tighten the 5 screws.

Torque: 1.7 N–m(17 kgf–cm, 15 in.–lbf)



NOTICE: There are 2 kinds of screw, so install a correct screw into each hole.

4. PERFORM TEST DRIVE

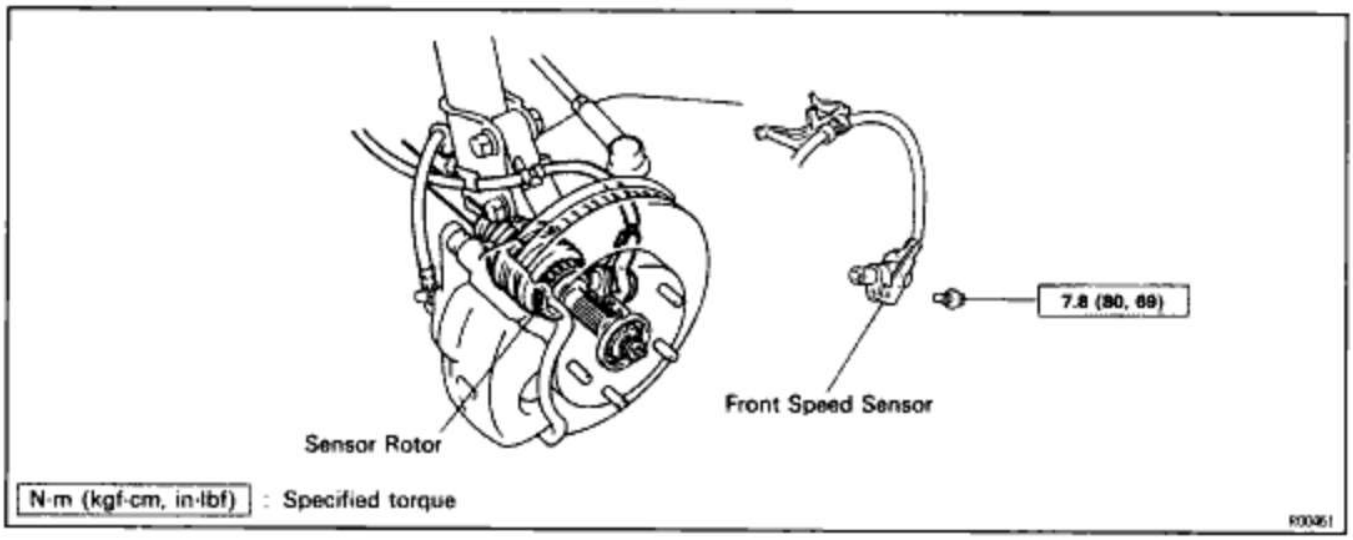
(a) Drive for at least 20 seconds at 30 Km/h (119 mph).

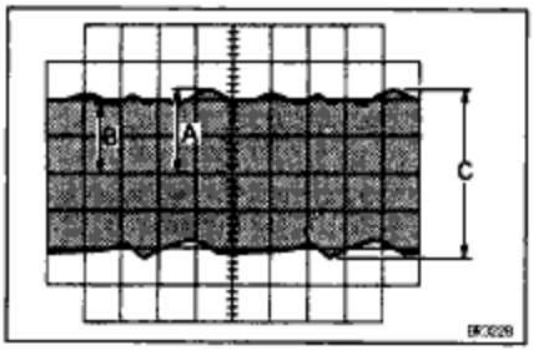
(b) The ABS warning light may not light.

If the ABS warning light lights, read the diagnostic trouble code.

FRONT SPEED SENSOR

COMPONENTS

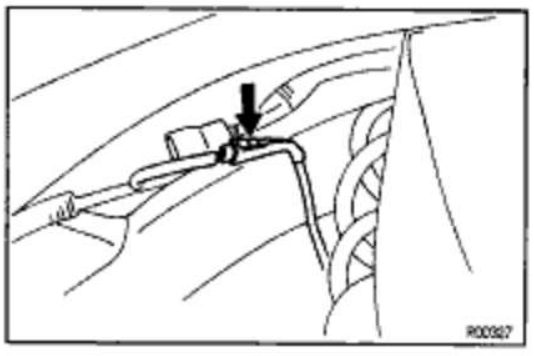




FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

INSPECT FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLO–SCOPE

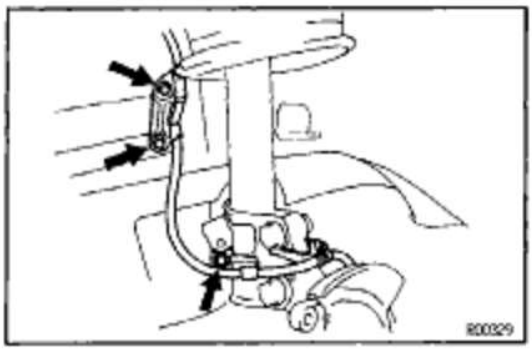
(a) Connect an oscilloscope to the speed sensor connec–tor.
(b) Run the vehicle at 20 km/h (112.4 mph), and inspect speed sensor output wave.
(c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.
(d) Check that B is 30% or more of A.
If not as specified, replace the drive shaft.



FRONT SPEED SENSOR REMOVAL

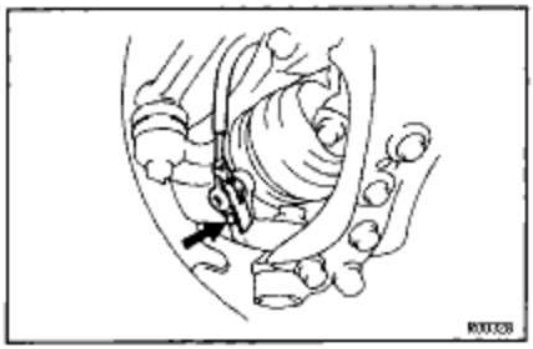
1. DISCONNECT SPEED SENSOR CONNECTOR

(a) Remove the fender shield.
(b) Disconnect the speed sensor connector.



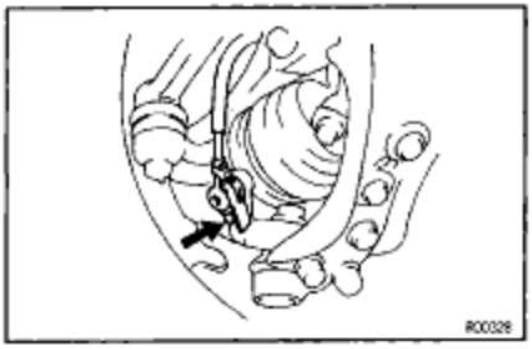
2. REMOVE SPEED SENSOR

(a) Remove the 3 clamp bolts holding the sensor harness to the body and shock absorber_



(b) Remove the speed sensor from the steering knuckle.

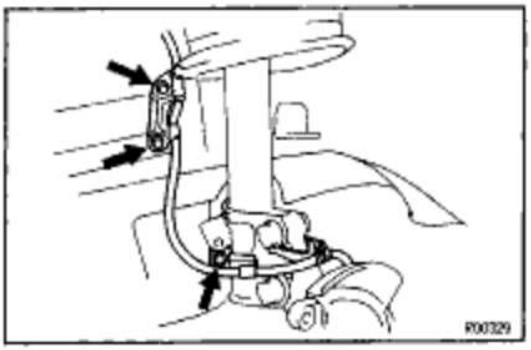
FRONT SPEED SENSOR INSTALLATION



1. INSTALL SPEED SENSOR

Install the speed sensor to the steering knuckle.

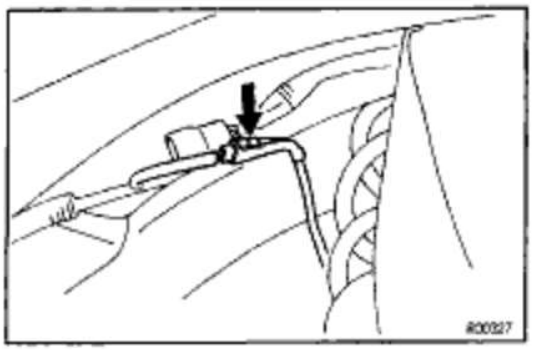
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)



2. CONNECT SPEED SENSOR CONNECTOR

(a) Install the sensor harness.

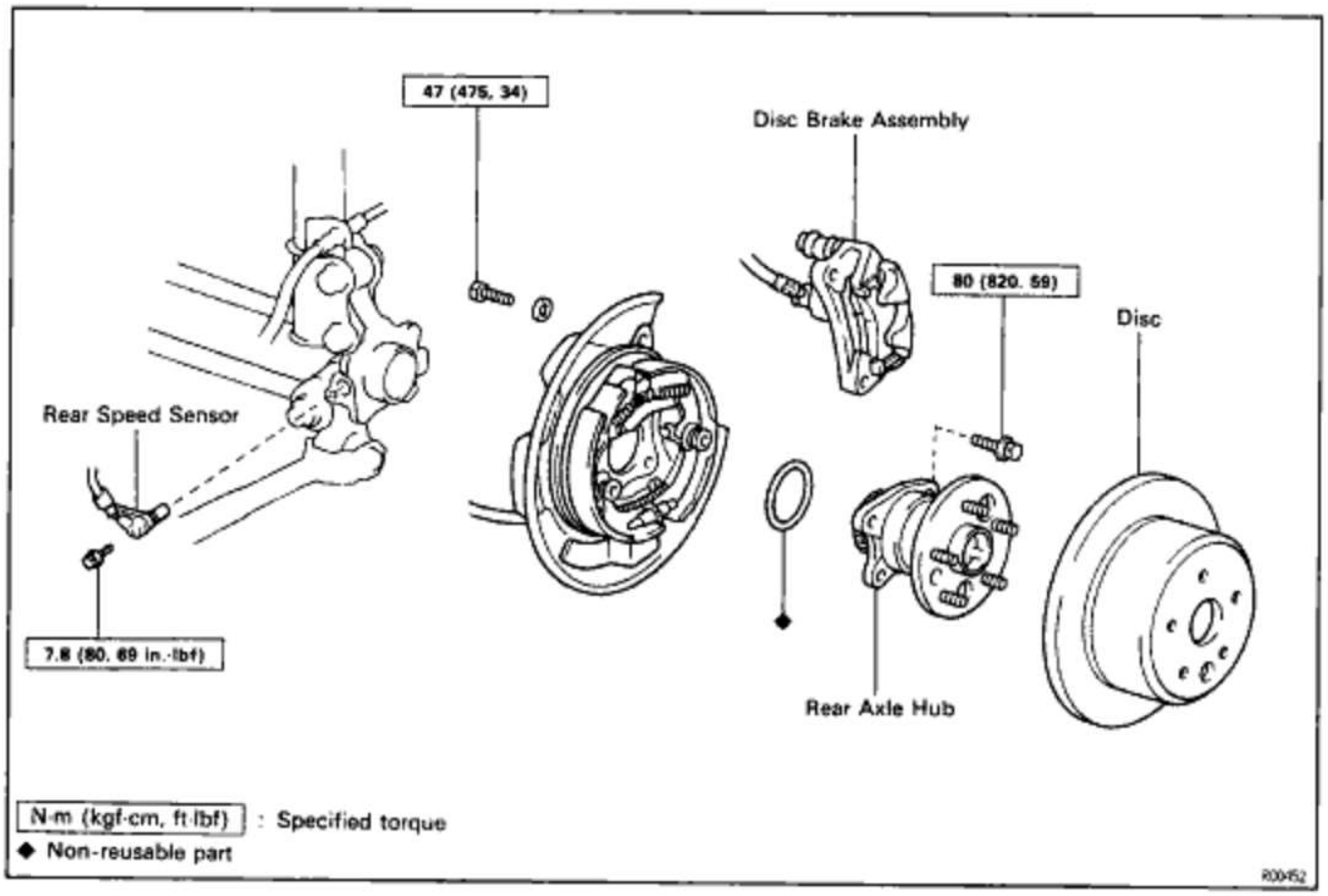
Torque: 5.4 N–m (55 kgf–cm. 48 in.–lbf)

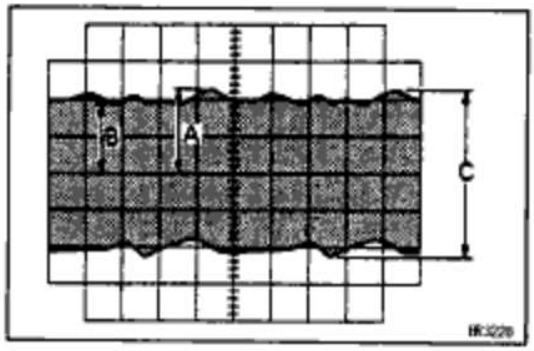


(b) Connect the speed sensor connector.

REAR SPEED SENSOR

COMPONENTS

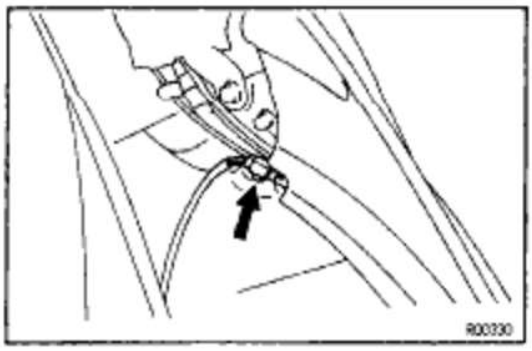




REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

INSPECT REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLO–SCOPE

(a) Connect an oscilloscope to the speed sensor connec–tor.
(b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.
(c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.
(d) Check that B is 40 96 or more of A.
If not as specified, replace the rear axle hub.

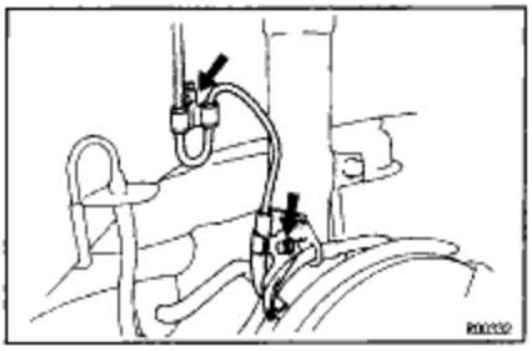


REAR SPEED SENSOR REMOVAL

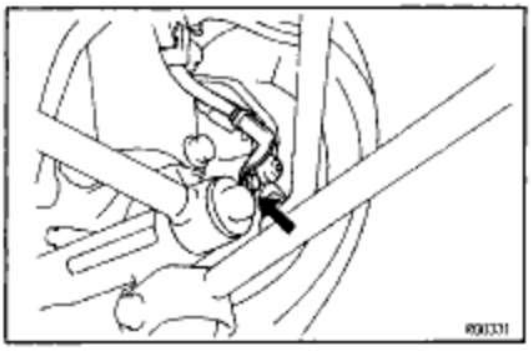
1. DISCONNECT SPEED SENSOR CONNECTOR

(a) Remove the seat cushion and side seatback.

(b) Disconnect the speed sensor connector, and pull out the sensor wire harness with the grommet.

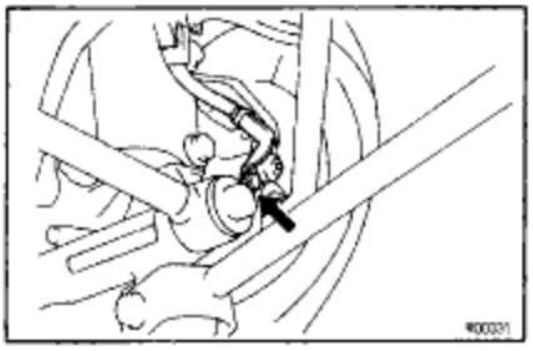


(c) Remove the 2 clamp bolts holding the sensor wire harness to the body and shock absorber.



2. REMOVE SPEED SENSOR

Remove the speed sensor from the axle carrier.

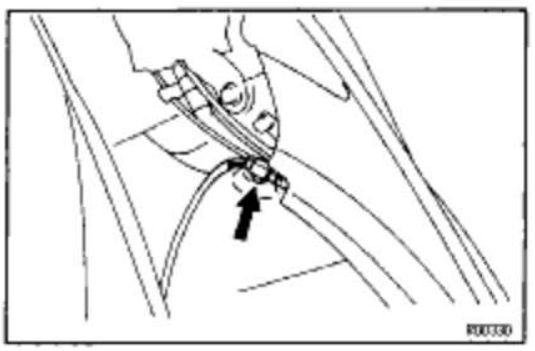


REAR SPEED SENSOR INSTALLATION

1. INSTALL SPEED SENSOR

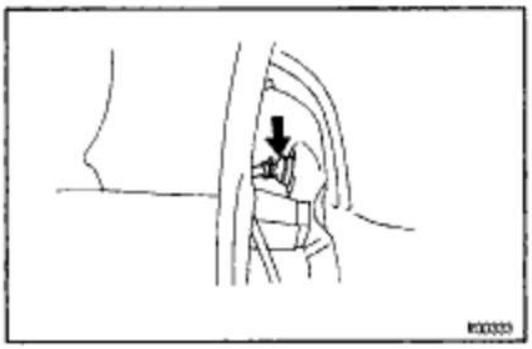
Install the speed sensor to the axle carrier.

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

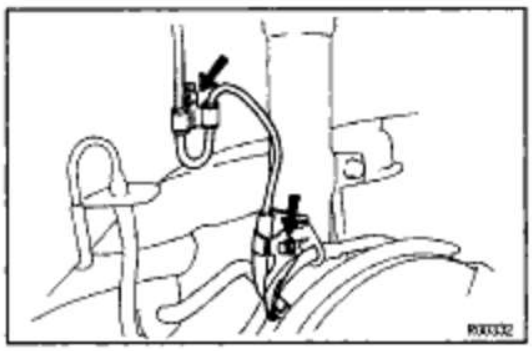


2. CONNECT SPEED SENSOR CONNECTOR

(a) Pass the sensor harness through the body panel hole, and connect the connector.



(b) install the grommet securely.



(c) Install the sensor harness.
Torque: 5.4 N–m (55 kgf–cm, 48 in.–lbf)

–MEMO–

TROUBLESHOOTING (TMC Made Vehicle NIPPONDENSO ABS)

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 recur, simulate the problem by initially 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 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

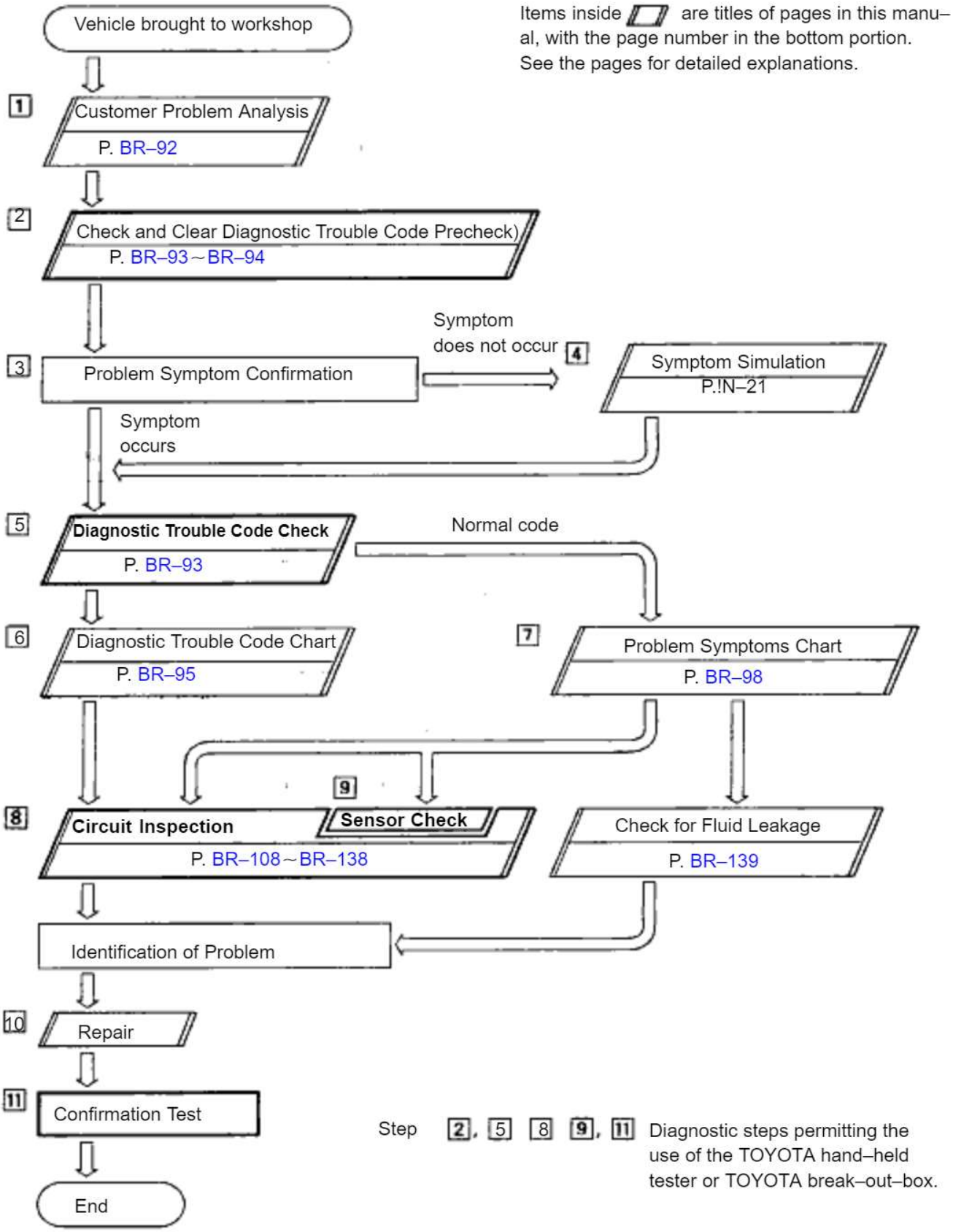
Use the ABS warning light to check if each of the signals from the speed sensors are being input correctly to the ECU. Instructions for this check are given in the circuit inspection.

(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 to make sure the entire ABS system is operating correctly.


Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.
Vehicle brought to workshop
1
Customer Problem Analysis
P. BR–92
2
Check and Clear Diagnostic Trouble Code Precheck)
P. BR–93 ~ BR–94
3
Problem Symptom Confirmation
Symptom does not occur
4
Symptom Simulation
P.!N–21
Symptom occurs
5
Diagnostic Trouble Code Check
P. BR–93
Normal code
6
Diagnostic Trouble Code Chart
P. BR–95
7
Problem Symptoms Chart
P. BR–98
9
8
Circuit Inspection
Sensor Check
P. BR–108 ~ BR–138
Check for Fluid Leakage
P. BR–139
Identification of Problem
10
Repair
11
Confirmation Test
End
Step 2, 5, 8, 9, 11 Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

CUSTOMER PROBLEM ANALYSIS CHECK SHEET

ABS Check Sheet

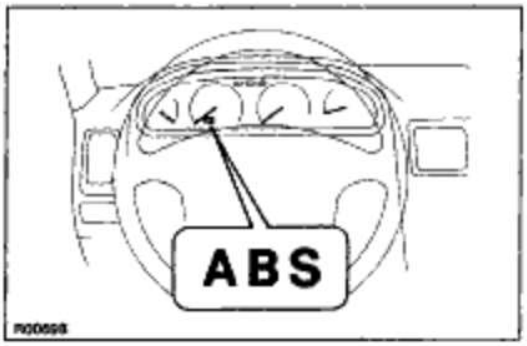
Inspector's Name :

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

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

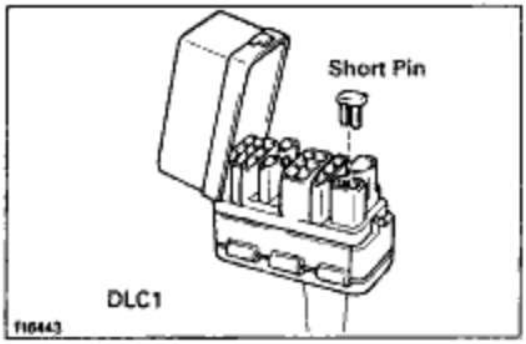
Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

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



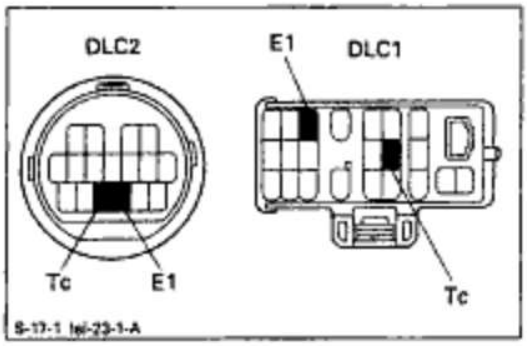
DIAGNOSIS SYSTEM INDICATOR CHECK

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 for the ABS warning light circuit (See page BR–130).



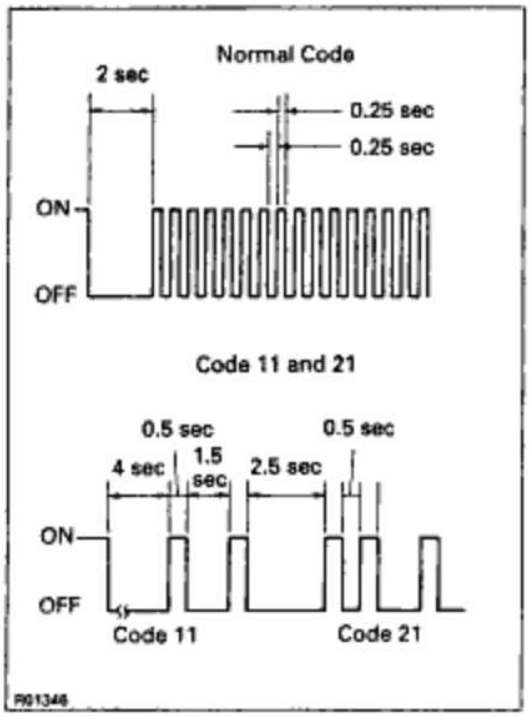
DIAGNOSTIC TROUBLE CODE CHECK

1. Disconnect the Short Pin from DLC1.



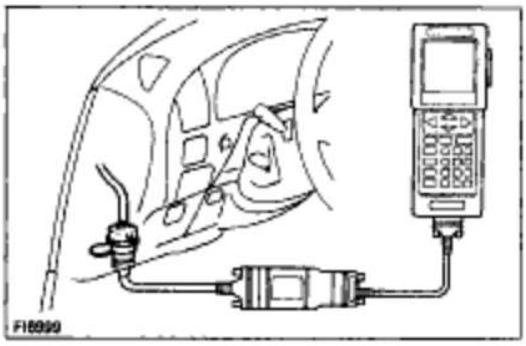
2. Using SST, connect terminals Tc and E1 of DLC2 or DLC1.
   SST 09843–18020
3. Turn the ignition switch to ON.
4. Read the diagnostic trouble code from the ABS warning light on the combination meter.

HINT: If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page BR–134 or BR–130).



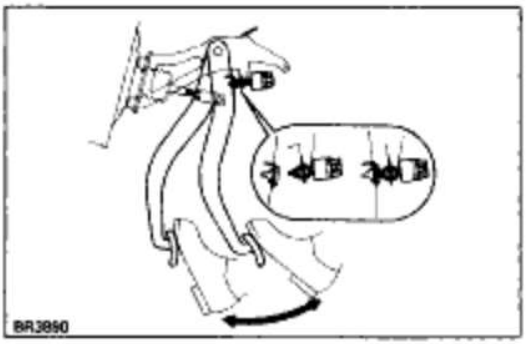
As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

5. Codes are explained in the code table on page BR–95.
6. After completing the check, disconnect terminals Tc and E1, and turn off the display.
   If 2 or more malfunctions are indicated at the same time, the–lowest numbered diagnostic trouble code will be displayed first. .



DIAGNOSTIC TROUBLE CODE CHECK USING TOYOTA HAND–HELD TESTER

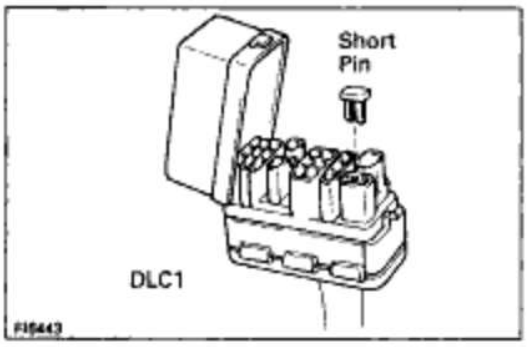
1. Hook up the Toyota hand–held tester to the DLC2.
2. Read the diagnostic trouble codes by following the prompts on the tester screen.
   Please refer to the Toyota hand–held tester operator's manual for further details.

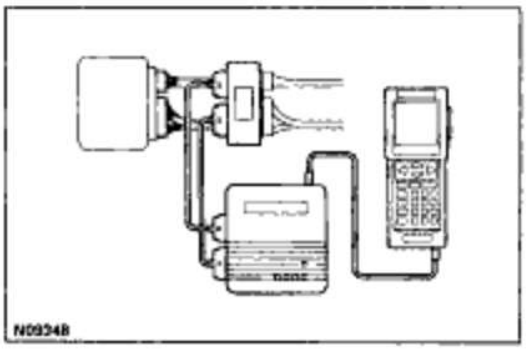


DIAGNOSTIC TROUBLE CODE CLEARANCE

1. Using SST, connect terminals Tc and E1 of DLC2 or DLC1 and remove the short pin from DLC1.
   SST 09843–18020
2. IG switch ON.
3. Clear the diagnostic trouble codes stored in ECU by de–pressing 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 DLC2 or DLC1.
6. Connect the Short Pin to DLC1

HINT: Cancellation can also be done by removing the ECU–13 fuse, but in this case, other memory systems will also be cancelled out.





ECU TERMINAL VALUES MEASUREMENT USING TOYOTA BREAK–OUT–BOX AND TOYOTA HAND–HELD TESTER

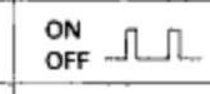
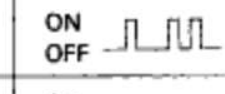
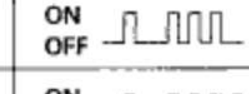
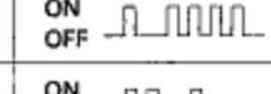
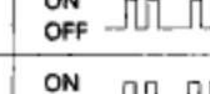
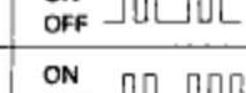
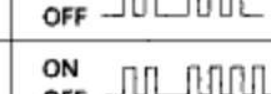
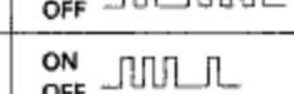
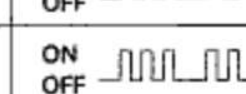
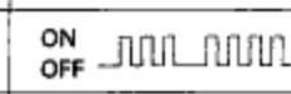
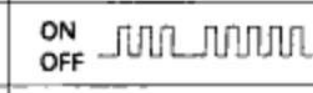
1. Hook up the Toyota break–out–box and Toyota hand–held tester to the vehicle.
2. Read the ECU input/output values by following the prompts on the tester screen.

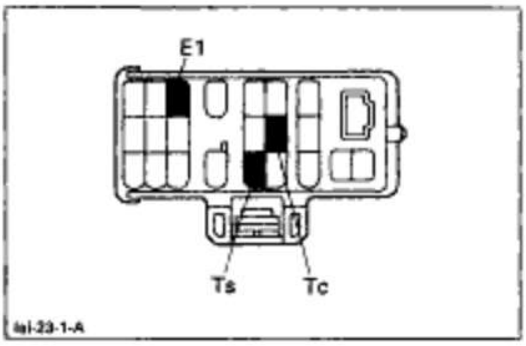
HINT: Toyota hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.
Please refer to the Toyota hand–held tester/Toyota break–out–box operator's manual for further details.

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the diagnostic trouble code check, check the circuit listed for that code.

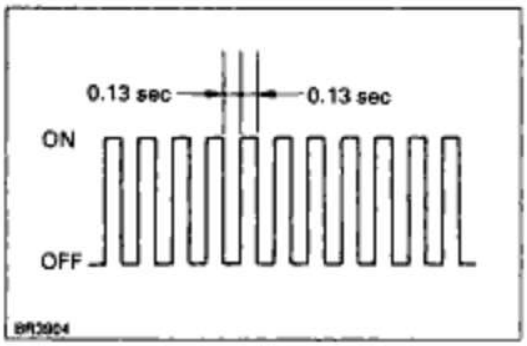
HINT: Using SST 09843–18020, connect the terminals Tc and E1, and remove the short pin.

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



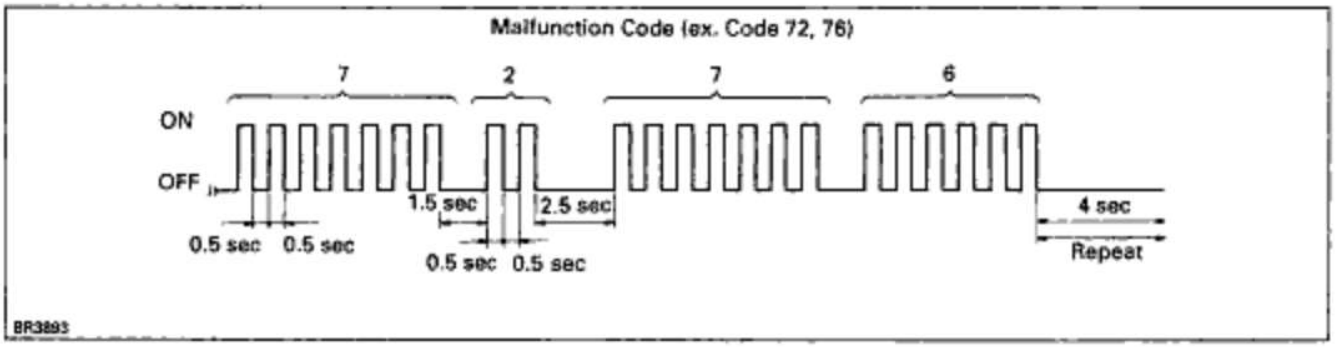
SPEED SENSOR SIGNAL CHECK

1. Turn the ignition switch to OFF.
2. Using SST, connect terminals Ts and E1 of DLC1.
   SST 09843–18020
3. Start the engine.

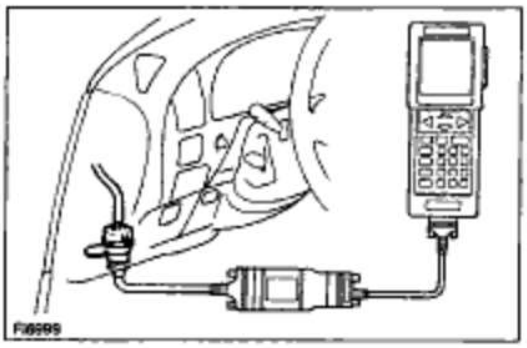


4. Check that the ABS warning light blinks
   HINT: If the ABS. warning light does not blink, inspect the ABS warning light circuit (See page BR–130).
5. Drive vehicle straight forward.
   HINT: Drive vehicle faster than 45 km/h (28 mph) for several seconds.
6. Stop the vehicle.
7. Using SST, connect terminals Tc and E1 of DLC1.
   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 2 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 DLC1, and ignition switch turned off.



DIAGNOSTIC TROUBLE CODE CHECK

USING TOYOTA HAND–HELD TESTER

1. Perform steps 1.–6. on the previous page.
2. Hook up the Toyota hand–held tester to the DLC2.
3. Read the diagnostic trouble codes by following the prompts on the tester screen.

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

Diagnostic Trouble Code of Speed Sensor Check Function

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

PROBLEM SYMPTOMS CHART

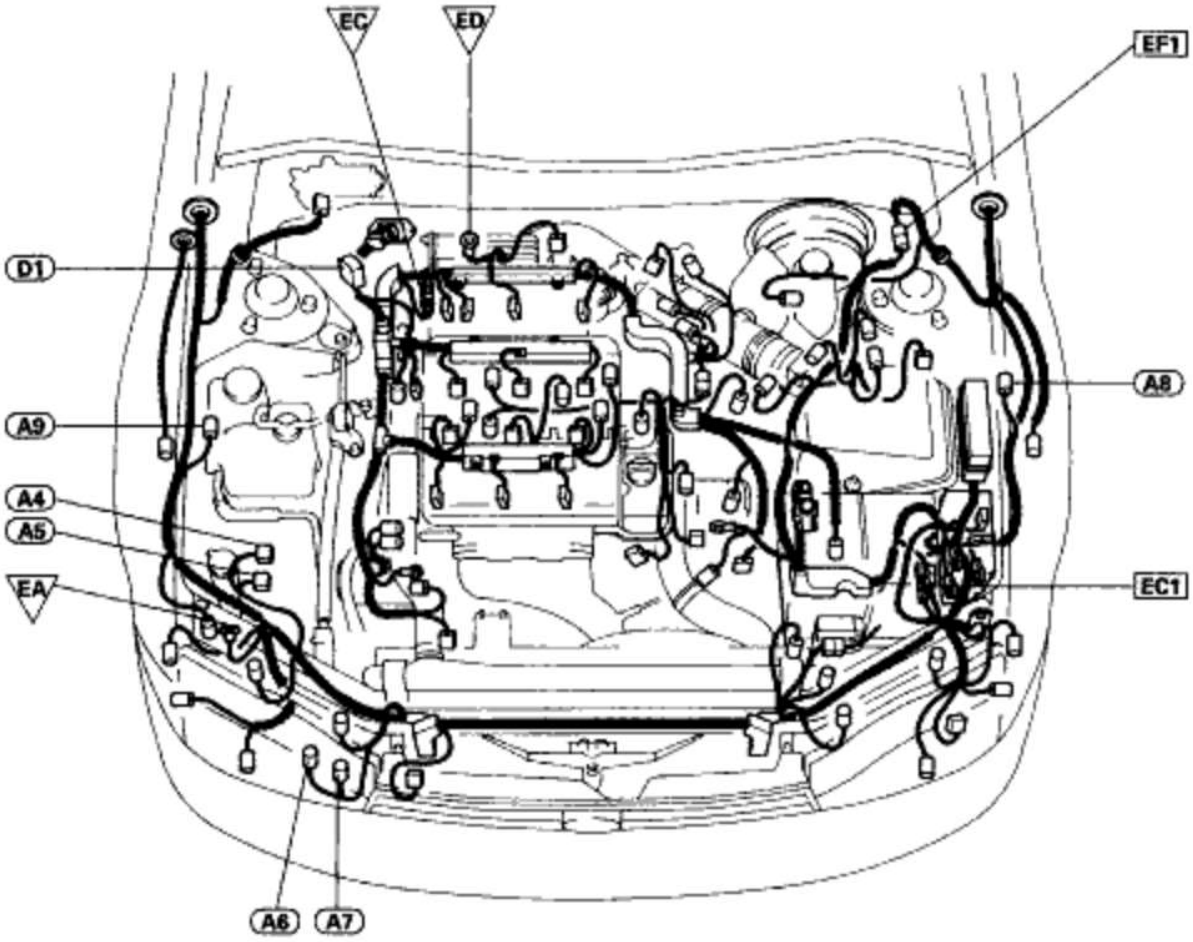
If a normal code is displayed during the diagnostic trouble code check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptoms	Inspection Circuit	See page
A6S does not operate.	Only when 1.–4. are all normal and the problem is still occurring, replace the ABS ECU. 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–139).	BR–93 BR–123 BR–119 BR–77
A6S does not operate efficiently.	Only when 1.–4. are all normal and the problem is still occurring, replace the ABS ECU. 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–139).	BR–93 BR–119 BR–128 BR–77
ABS warning light abnormal.	1. ABS warning light circuit. 2. ABS ECU.	BR–130
Diagnostic trouble code check cannot be performed.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit. 2. Tc terminal circuit.	BR–130 BR–134
Speed sensor signal check cannot be performed.	1. Ts terminal circuit. 2. ABS ECU.	BR–137

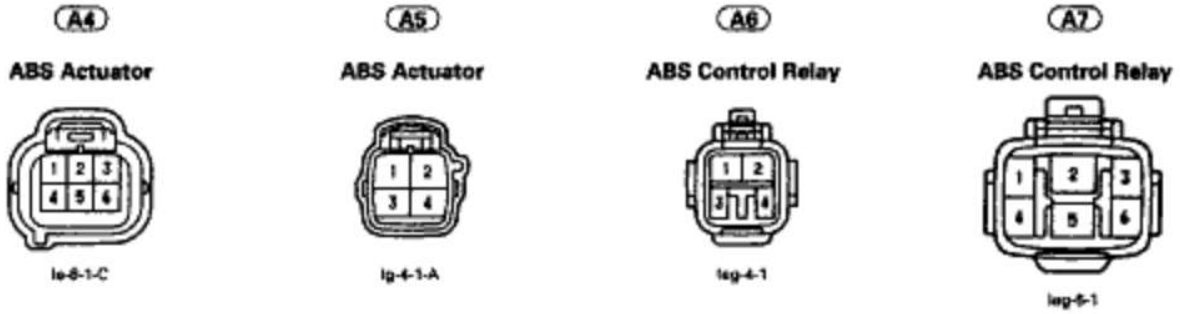
LOCATION OF CONNECTORS

Location of Connectors in Engine Compartment

1MZ–FE Engine:



N09612



A8 A9

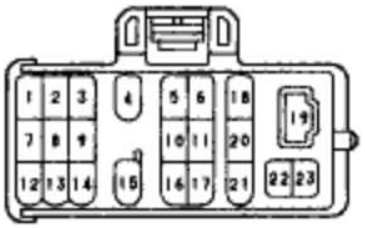
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



le-2-1-Y

D1

DLC1



lsi-23-1

EC1



lef-8-1



lef-8-2

EF1



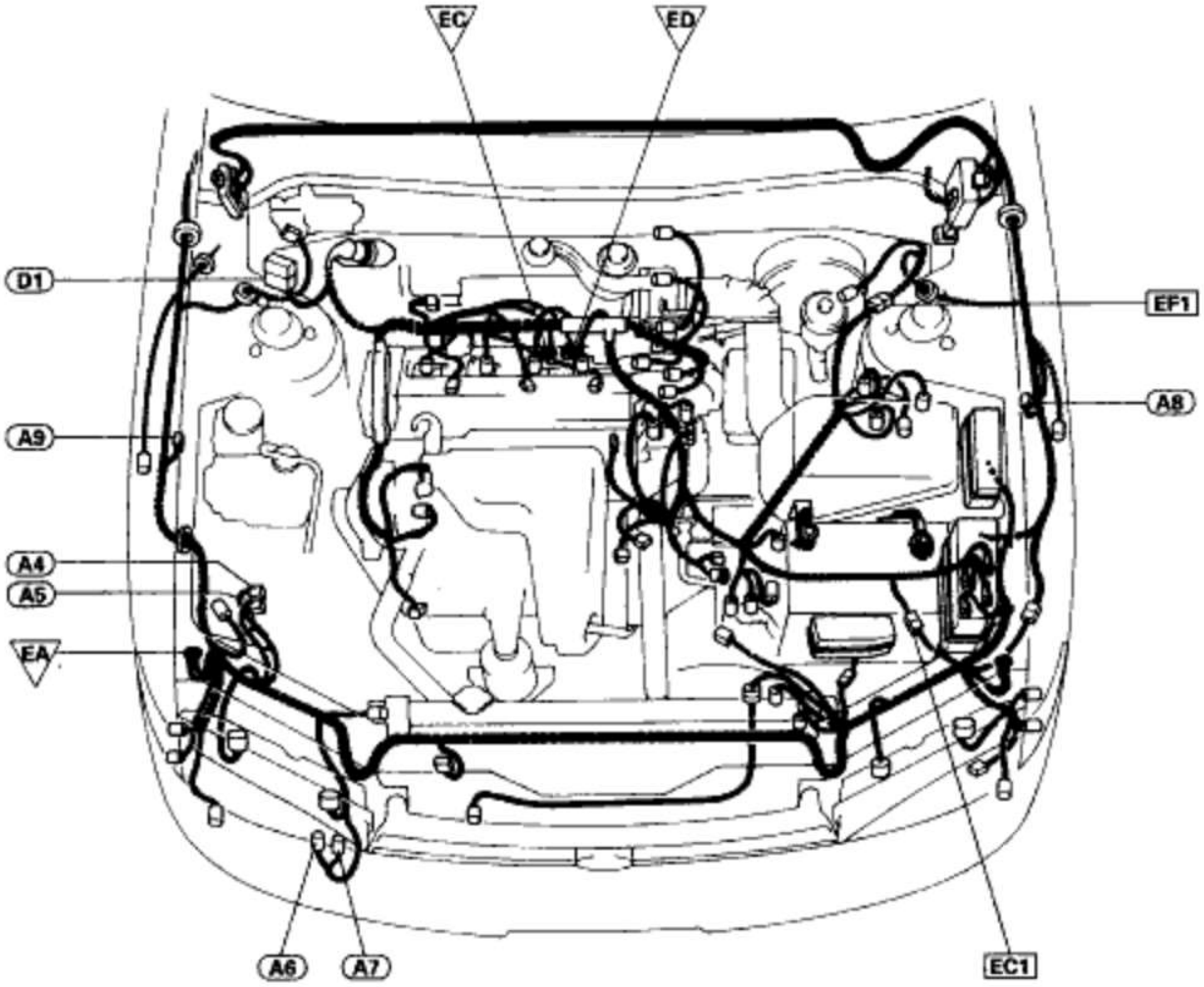
lfg-4-1



lfg-4-2

Location of Connectors in Engine Compartment

5S–FE Engine:











A8 A9

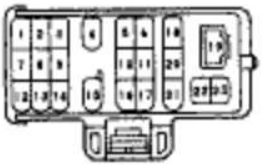
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



le-2-1-T

D1

DLC1



lei-23-1-A

EC1



lef-8-1



lef-8-2

EF1

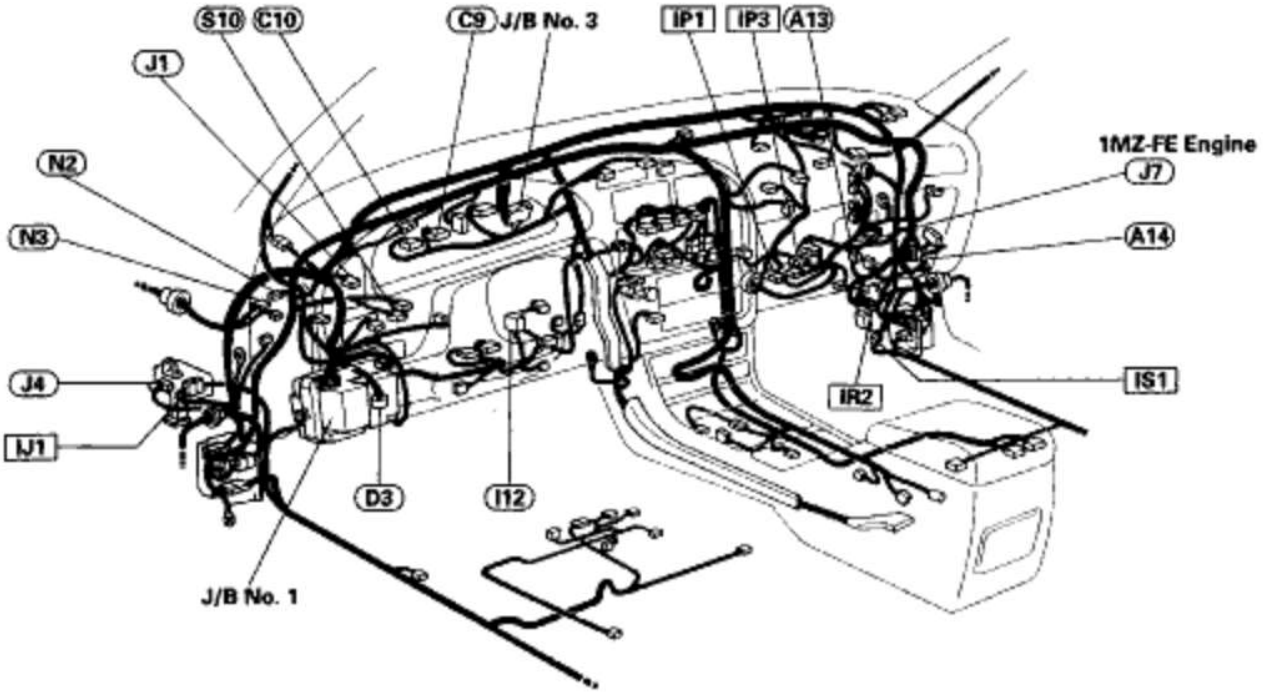


lfg-4-1



lfg-4-2

Location of Connectors in Instrument Panel



N09614

A13

ABS ECU



mn-26-1

A14

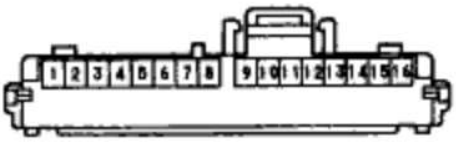
ABS ECU



n-16-1-A

C9

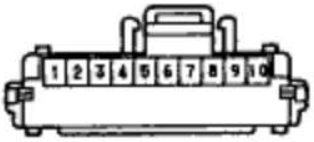
ABS Warning Light



j-16-1

C10

ABS Warning Light



j-10-1

D3

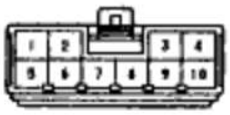
DLC2



S-17-1

I12

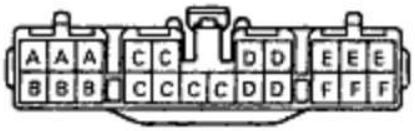
Ignition Switch



g-10-1-B

J1

Junction Connector



e-22-1-A

J3

Junction Connector



e-14-1-A

J7 1MZ-FE

Junction Connector



e-12-1

N2

Noise Filter



g-2-2

N3

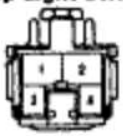
Noise Filter



g-2-1

S10

Stop Light Switch

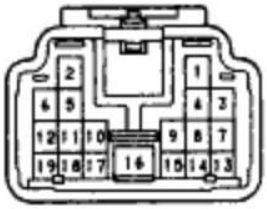


eg-4-1

IJ1

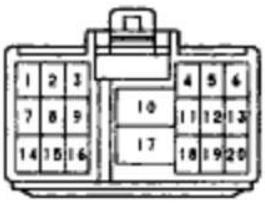


eg-19-1

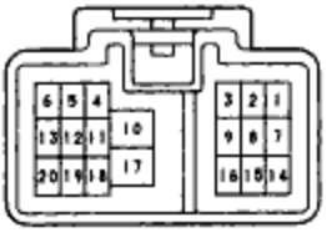


eg-19-2

IP1



e-20-1-B



e-20-2-B

IP3



e6-19-1



ef-19-2

IR2



e-8-1



e-8-2

IS1

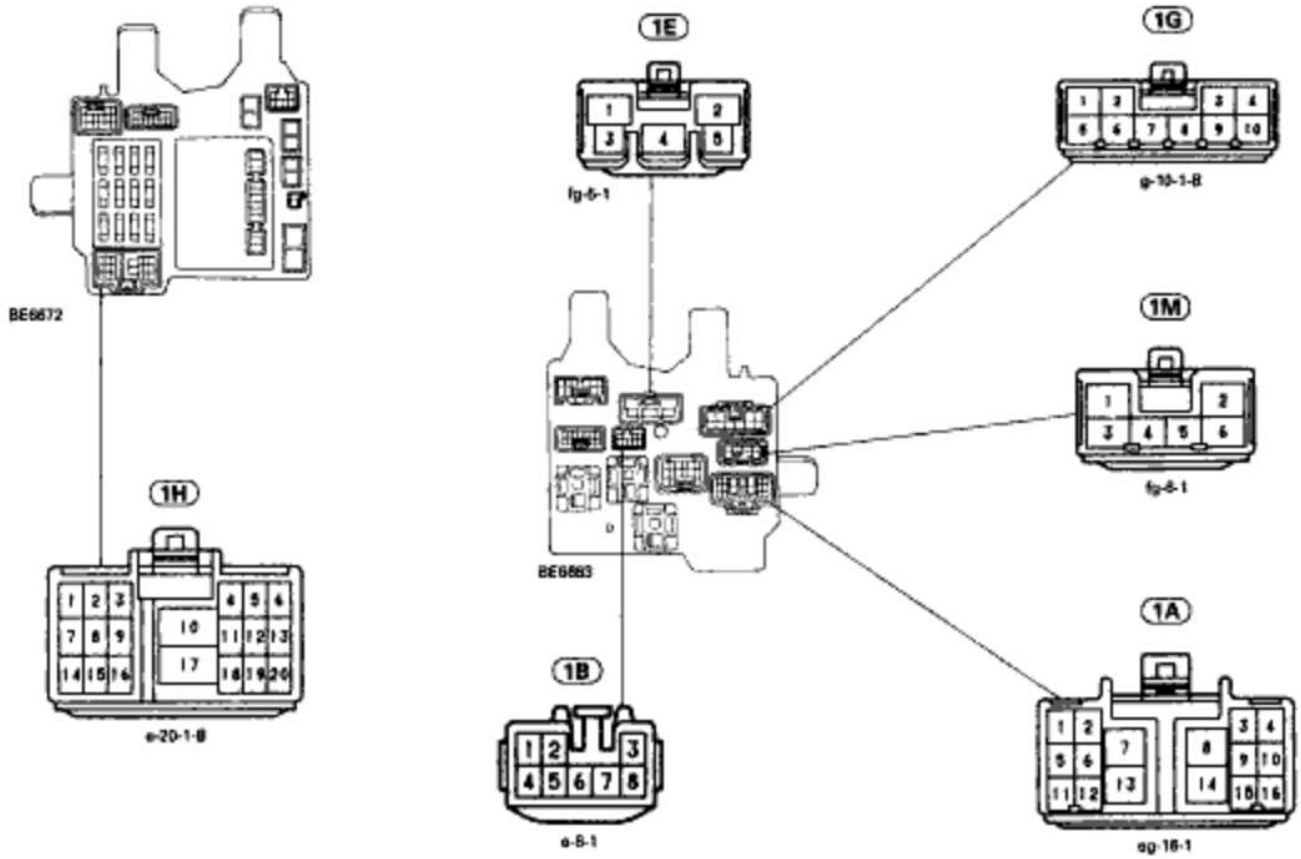


e-6-1

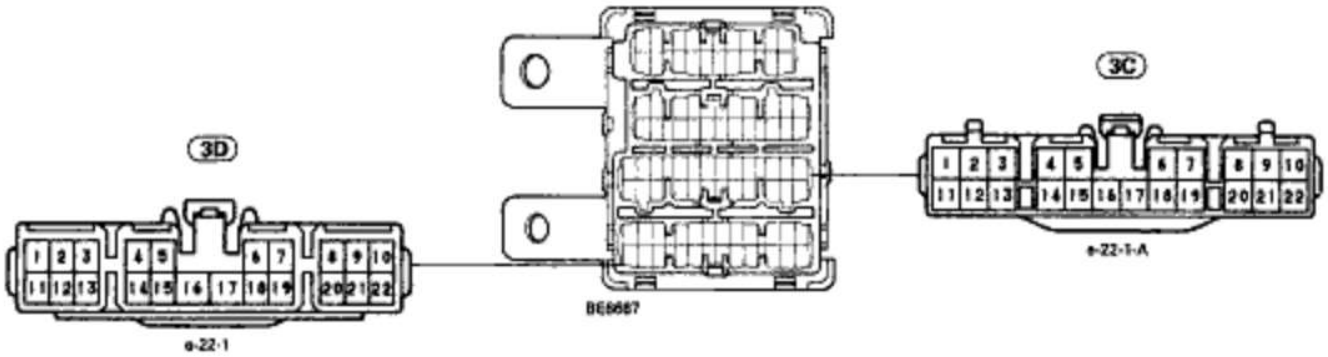


e-8-2

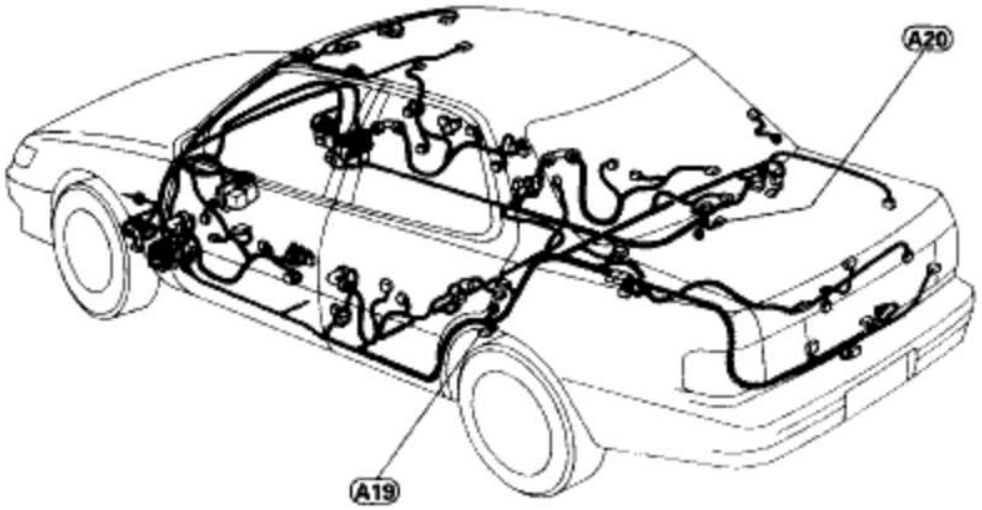
J/B No. 1


1E
fg-6-1
1G
g-10-1-B
1M
fg-6-1
1H
e-20-1-B
1B
e-8-1
1A
eg-16-1
BE6672
BE6683

J/B No. 3


3C
e-22-1-A
3D
e-22-1
BE5667

Location of Connectors in Body



N09615

A19 A20

ABS Speed Sensor Left Rear
ABS Speed Sensor Right Rear



e-2-2-L

CIRCUIT INSPECTION

DTC 11,12 ABS Control (Solenoid) Relay Circuit

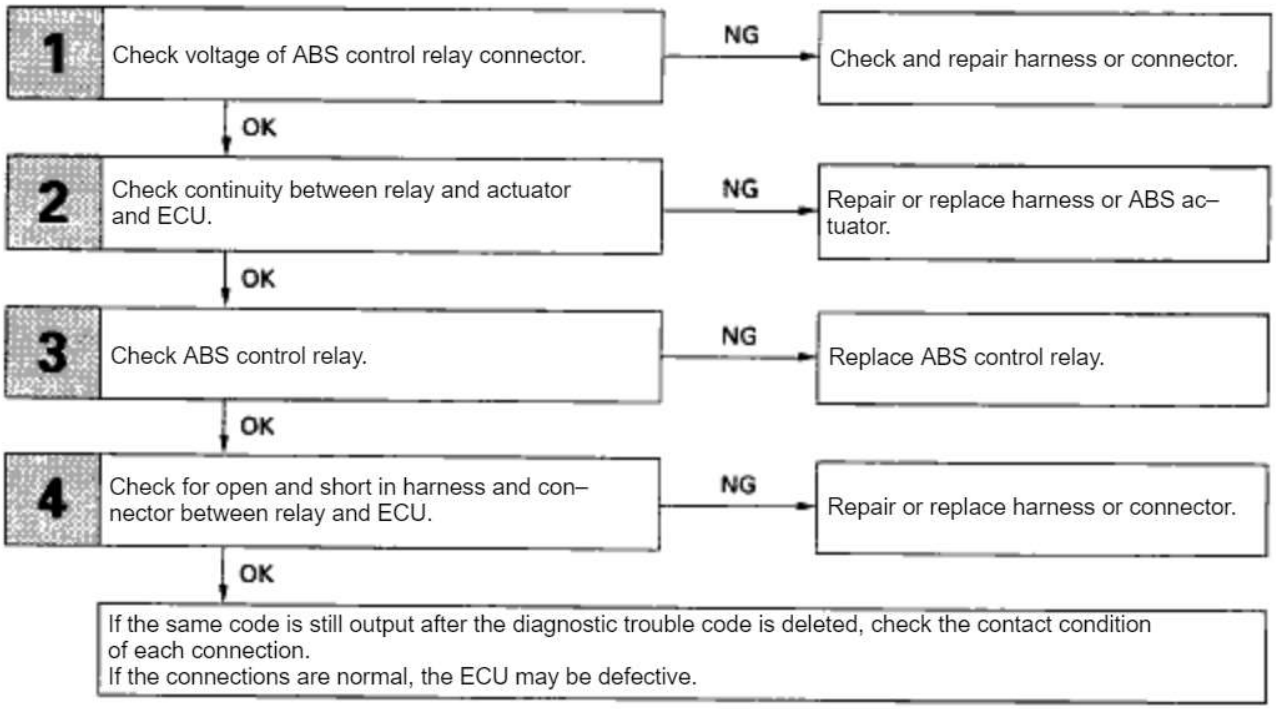
CIRCUIT DESCRIPTION

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.

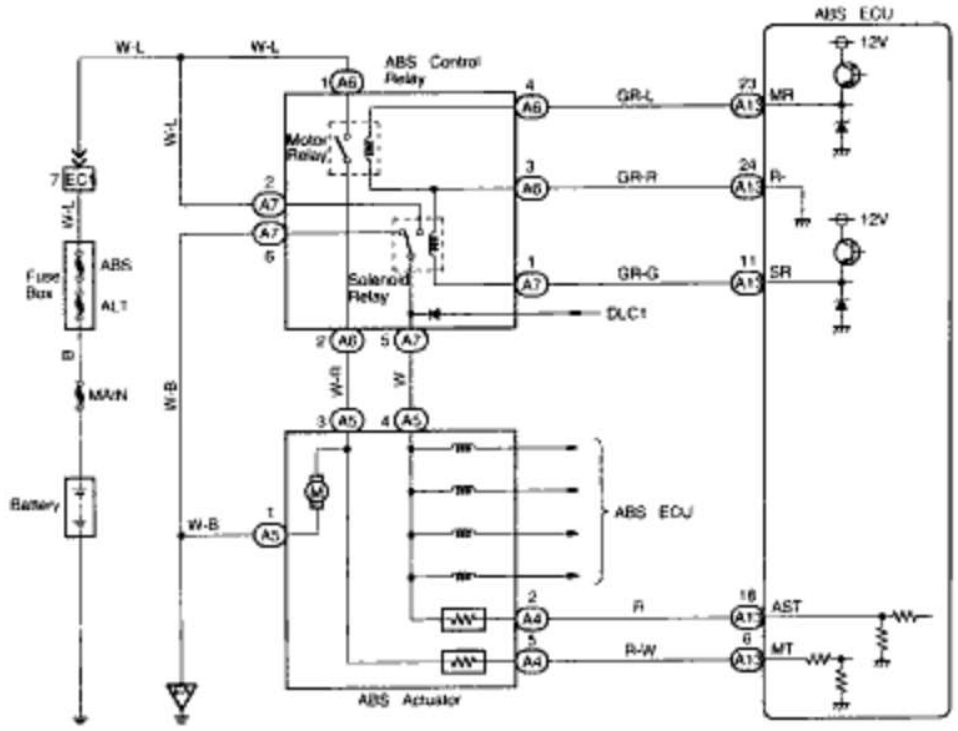
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
11	Conditions (1) and (2) continue for 0.2 sec. or more: (1) ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage (2) ABS control (solenoid) relay monitor terminal (AST) voltage: 0 V	• ABS control (solenoid) relay. • 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 terminal (SR) voltage: 0 V (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



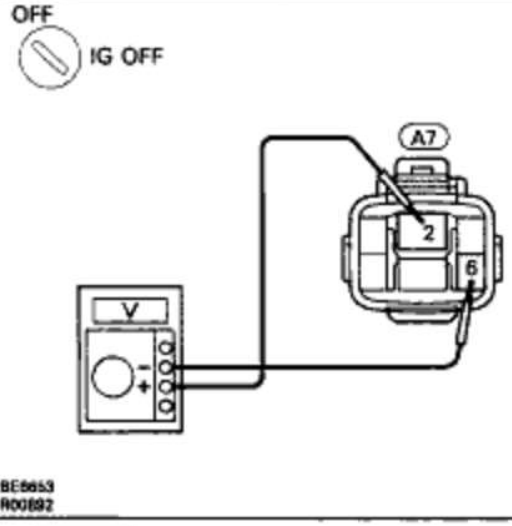
WIRING DIAGRAM



R08715

INSPECTION PROCEDURE

1 Check voltage between terminals (A7) 2 and (A7) 6 of ABS control relay connector.



P Disconnect the ABS control relay connector.

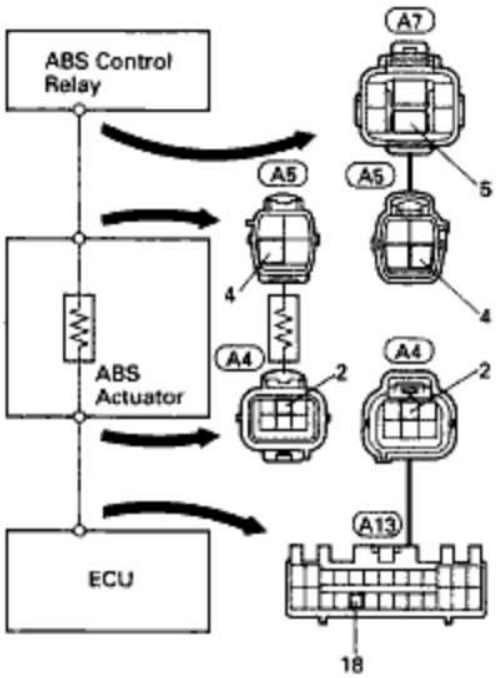
C Measure voltage between terminals (A72) and (A76) of ABS control relay harness side connector.

OK **Voltage: 10–14 V**

OK

NG → Check and repair harness or connector.

2 Check continuity between terminals (A7) 5 and (A5) 4, (A5) 4 and (A4) 2, (A4) 2 and (A13) 18.



P Disconnect the 2 connectors from ABS actuator.

C Check continuity between terminals (A7) 5 and (A5)4, (A5)4 and (A4)2, (A4)2 and (A13)18.

OK **Continuity**

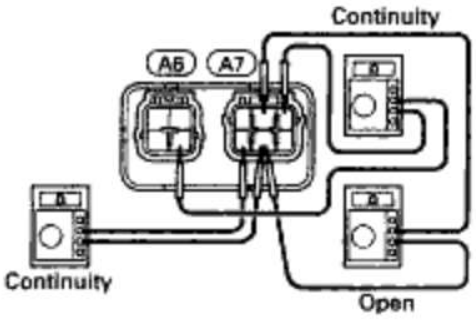
HINT: There is a resistance of 4–6Ω between terminals (A5) 4 and (A4) 2.

OK

NG → Repair or replace harness or ABS actuator.

3 Check ABS control relay.

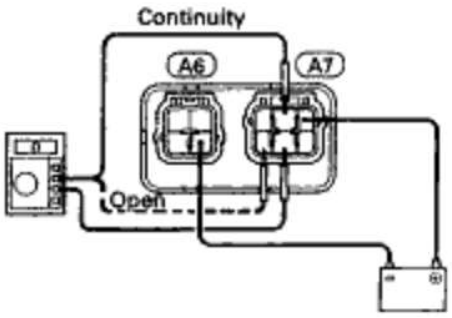
C Check continuity between each terminal of ABS control relay.



OK

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

C
1. Apply battery positive voltage between terminals (A7) 1 and (A6) 3.
2. Check continuity between each terminal of ABS control relay.



R02889
R03695

OK

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

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–28).

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 13,14 ABS Control (Motor) Relay Circuit

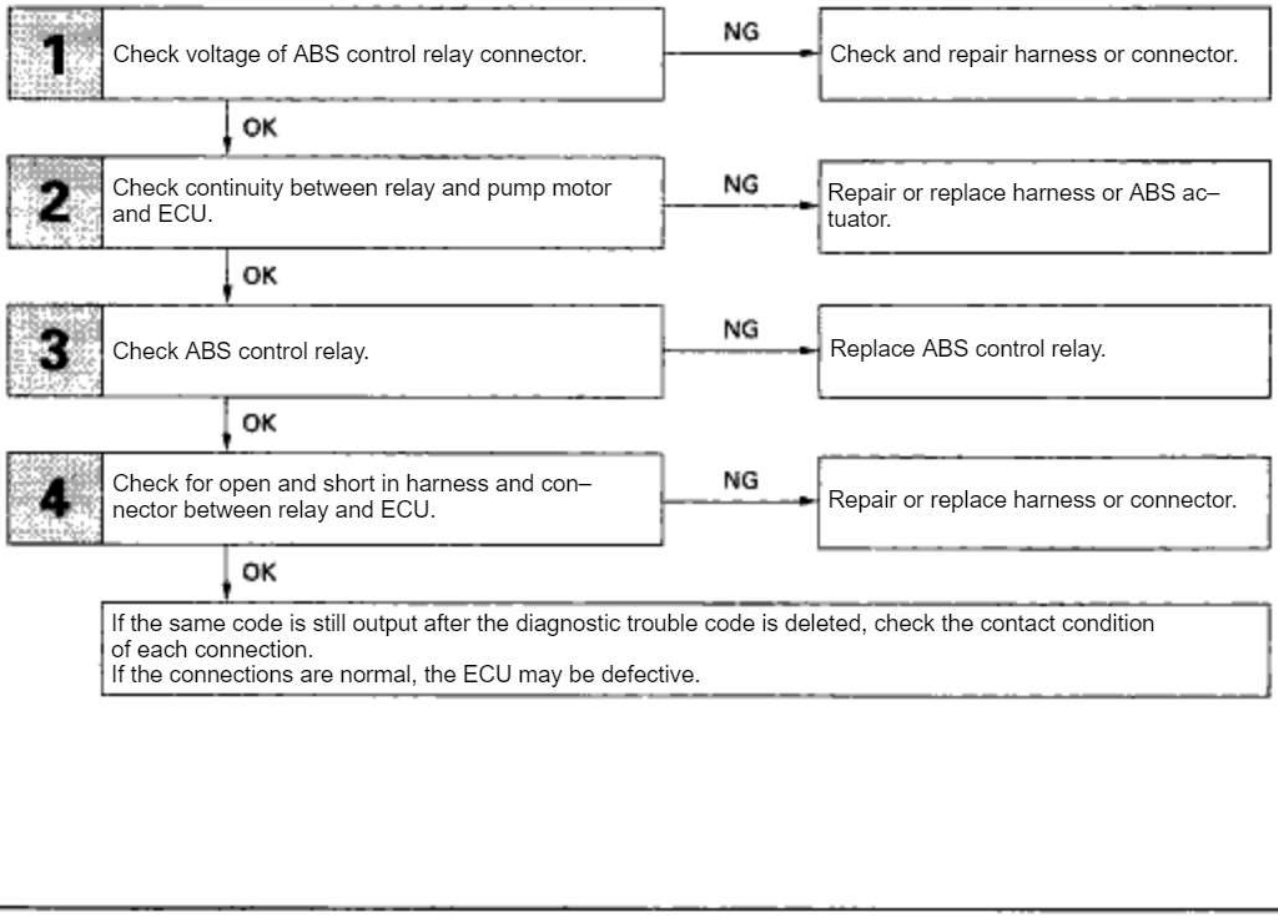
CIRCUIT DESCRIPTION

The ABS control (motor) relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the control (motor) relay ON and operates the ABS pump motor.

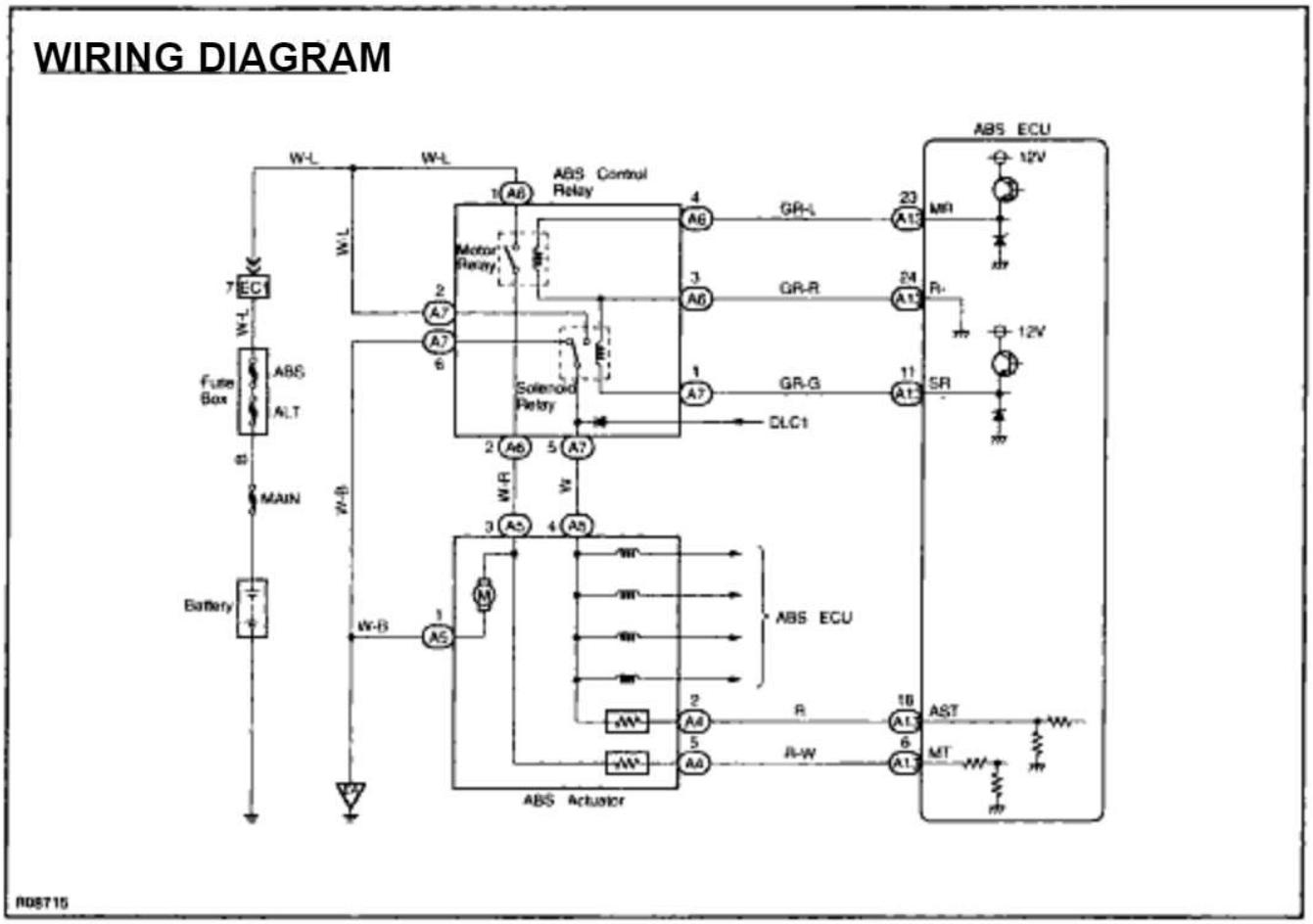
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
13	Conditions (1) and (2) continued for 0.2 sec. or more: (1) ABS control (motor) relay terminal (MR) voltage: Battery positive voltage (2) ABS control (motor) relay monitor terminal (MT) voltage: 0 V	• ABS control (motor) relay. • Open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

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

DIAGNOSTIC CHART

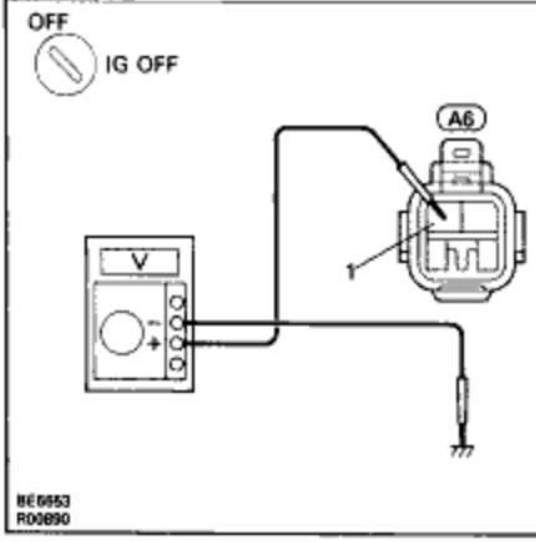


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminals (A6) 1 of ABS control relay and body ground.**



P Disconnect the ABS control relay connector.

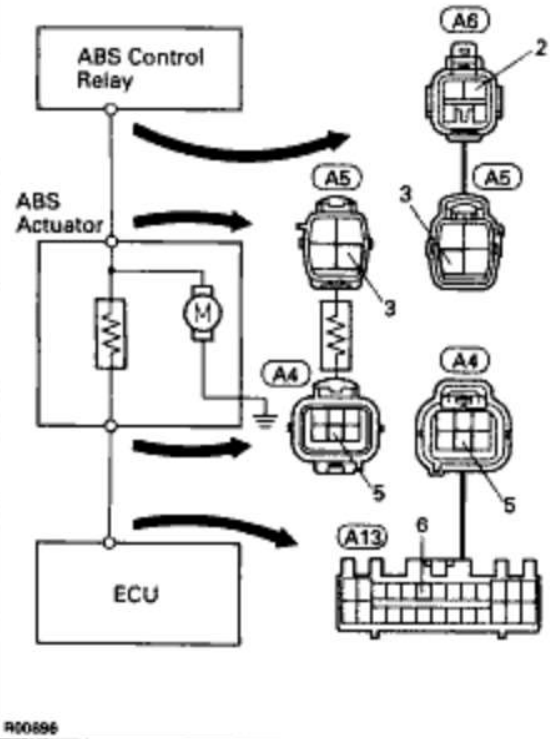
C Measure voltage between terminals A6 1 of ABS control relay harness side connector and body ground.

OK **Voltage: 10–14 V**

OK

NG Check and repair harness or connector.

2 **Check continuity between terminals (A6) 2 and (A5) 3, (A5) 3 and (A4) 5, (A4) 5 and (A13) 6.**



P Disconnect the 2 connectors from ABS actuator.

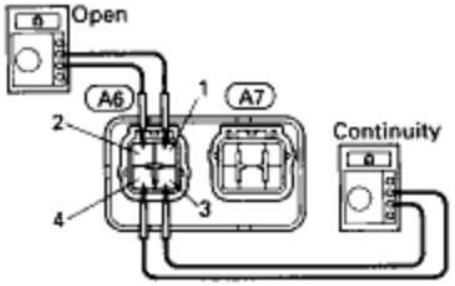
C Check continuity between terminals A6 2 and A5 3, A5 3 and A4 5, A4 5 and A13 6.
Continuity

OK HINT: There is a resistance of 4–6Ω between terminals A5 3 and A4 5.

OK

NG Repair or replace harness or ABS actuator.

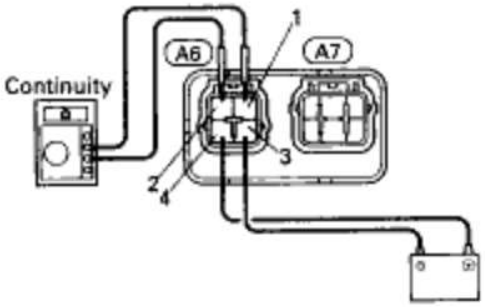
3 **Check ABS control relay.**



C Check continuity between each terminal of ABS control relay.

OK

Terminals A6 3 and A6 4	Continuity (Reference value 62Ω)
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.

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–28).**

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 braking force.

DTC 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 terminal (SR) voltage: Battery positive voltage (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.	• ABS actuator. • Open or short in SFR circuit. • ECU.
22	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage (2) Voltage of ABS ECU terminal AST: Battery positive voltage (3) When power transistor of ECU is ON, voltage of terminal SFL is 0 V or battery positive voltage.	• ABS actuator. • Open or short in SFL circuit. • ECU.
23	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage (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.	• ABS actuator. • Open or short in SRR circuit. • ECU.
24	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage (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.	• ABS actuator. • Open or short in SRL circuit. • 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.

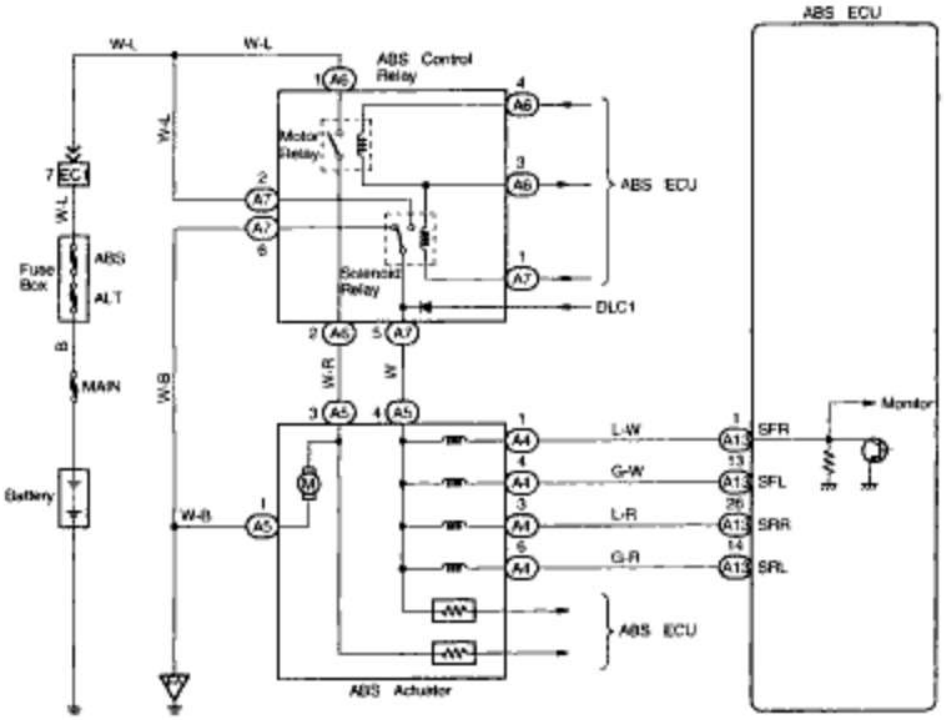
DIAGNOSTIC CHART

1 Check ABS actuator solenoid.
- NG → Replace ABS actuator.
- OK ↓

2 Check for open and short in harness and connector between ECU and actuator.
- NG → Repair or replace harness or connector.
- OK ↓

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.

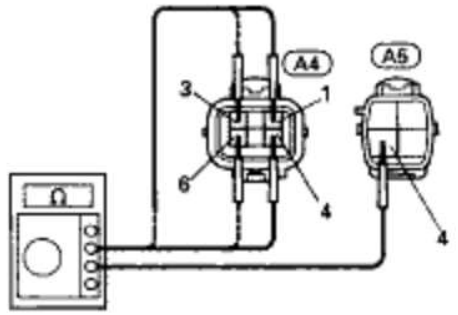
WIRING DIAGRAM



R08716

INSPECTION PROCEDURE

1 **Check ABS actuator solenoid.**



P Disconnect the 2 connectors from ABS actuator.

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

OK **Continuity**
HINT: Resistance of each solenoid coil is 1.2Ω.

OK

NG → Replace ABS actuator.

2 **Check for open and short in harness and connector between ABS ECU and actuator (See page IN–28).**

OK

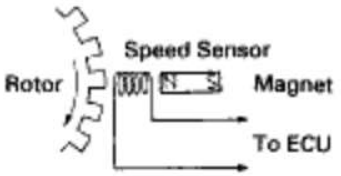
NG → Repair or replace harness or connector.

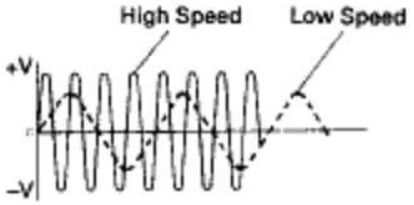
If the same code is still output after the diagnostic trouble code is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

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 to control the ABS system. The front and rear rotors each 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 direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.





BR3583
BR3582

DTC 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 speed sensor signal occurs at least 7 times in the time be–tween 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	Speed sensor signal is not input for about 1 sec. while the left front and right rear speed sensor signals are being checked with the IG switch ON.	• Open in left front or right rear speed sensor circuit. • ECU.
36	Speed sensor signal is not input for about 1 sec. while the right front and left rear speed sensor signals are being checked with the IG switch ON.	• Open in right front or left rear speed sensor circuit. • ECU.

HINT: DTC No. 31 is for the right front speed sensor.
DTC No. 32 is for the left front speed sensor.
DTC No. 33 is for the right rear speed sensor
DTC No. 34 is for the left rear speed sensor.

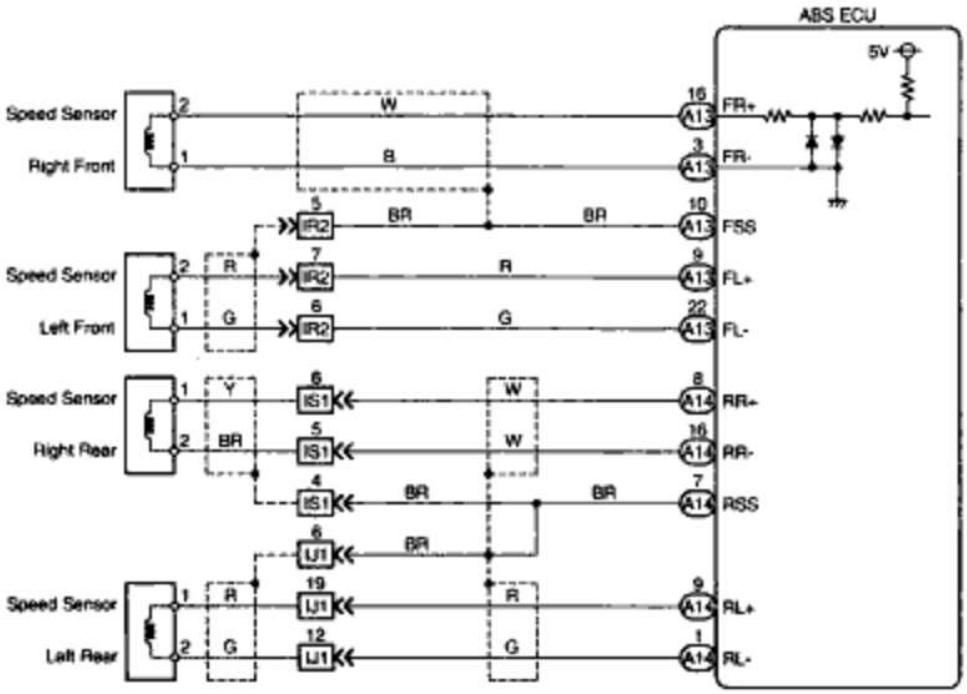
Fail safe function: If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

DIAGNOSTIC CHART

1. Check speed sensor.
   - NG → Replace speed sensor.
   - OK ↓
2. Check for open and short in harness and connector between each speed sensor and ECU.
   - NG → Repair or replace harness or connector.
   - OK ↓
3. Check sensor rotor and sensor installation.
   - NG → Replace speed sensor or rotor.
   - OK ↓

Check and replace ABS ECU.

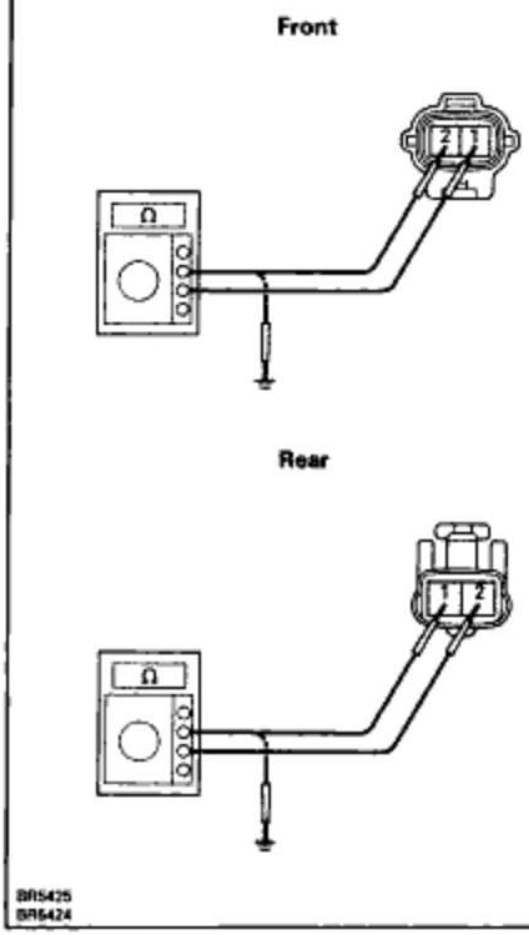
WIRING DIAGRAM



R08717

INSPECTION PROCEDURE

1 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.
Resistance: 0.6–1.8 kΩ

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

C **Resistance: 1 MΩ or higher**

OK

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.
Resistance: 0.9–1.3 kΩ

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

C **Resistance: 1 MΩ or higher**

OK

OK

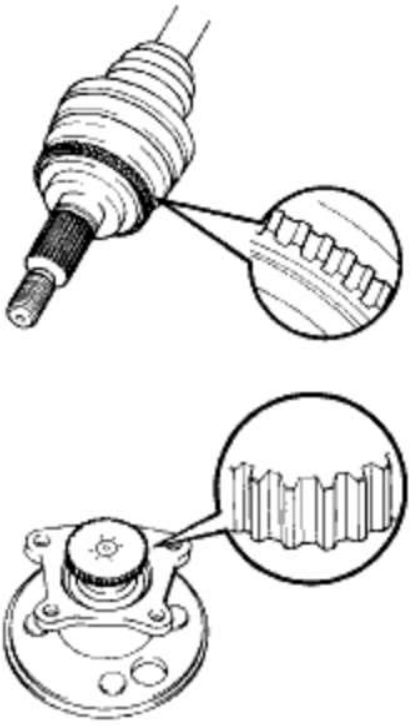
NG → Replace speed sensor.

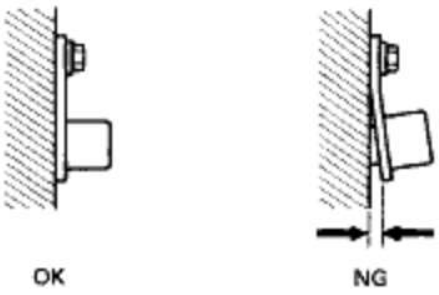
2 Check for open and short in harness and connector between each speed sensor and ECU (See page IN–28).

OK

NG → Repair or replace harness or connector.

3 Check sensor rotor and sensor installation.





R00948
R00947
BR2795

Front

P Remove front drive shaft (See SA section).

C Check sensor–rotor serrations.

OK **No scratches or missing teeth.**

C Check the front speed sensor installation

OK **The installation bolt is tightened properly.**

Rear

P Remove the axle hub (See 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

Check and replace ABS ECU.

NG **Replace speed speed or rotor.**

DTC 41 IG Power Source Circuit

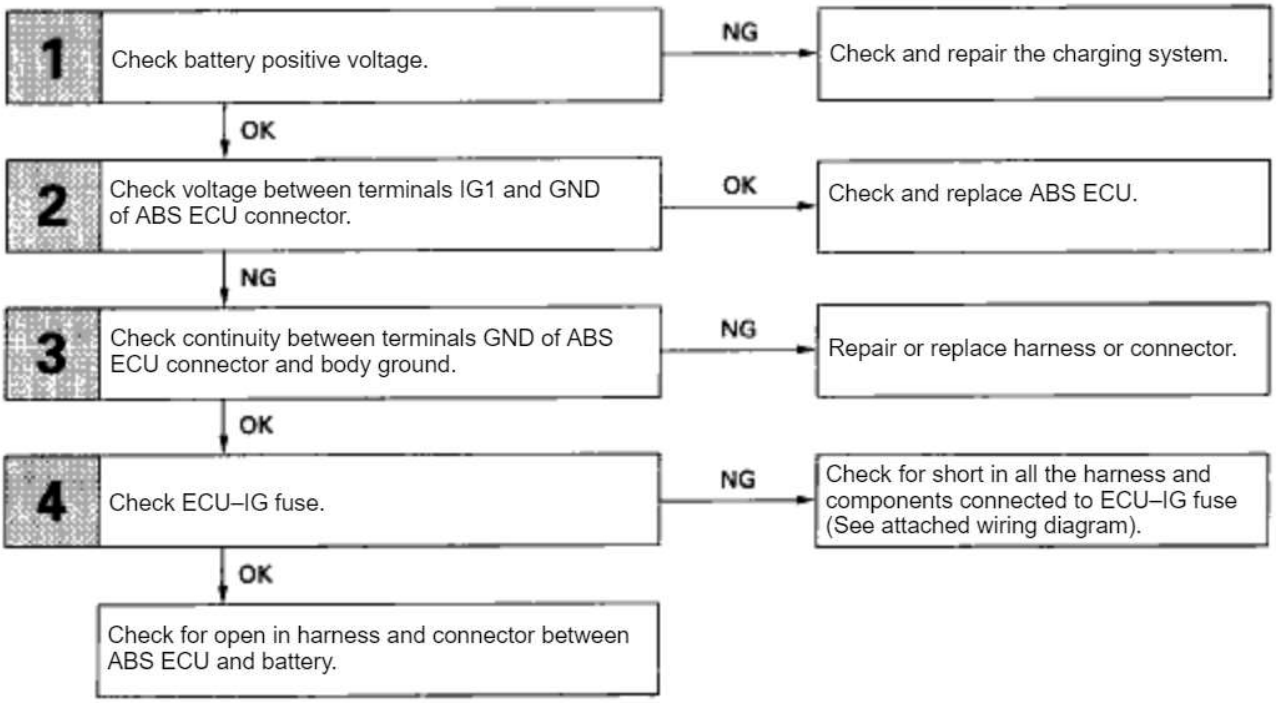
CIRCUIT DESCRIPTION

This is the power source for the ECU, hence the CPU and the actuators.

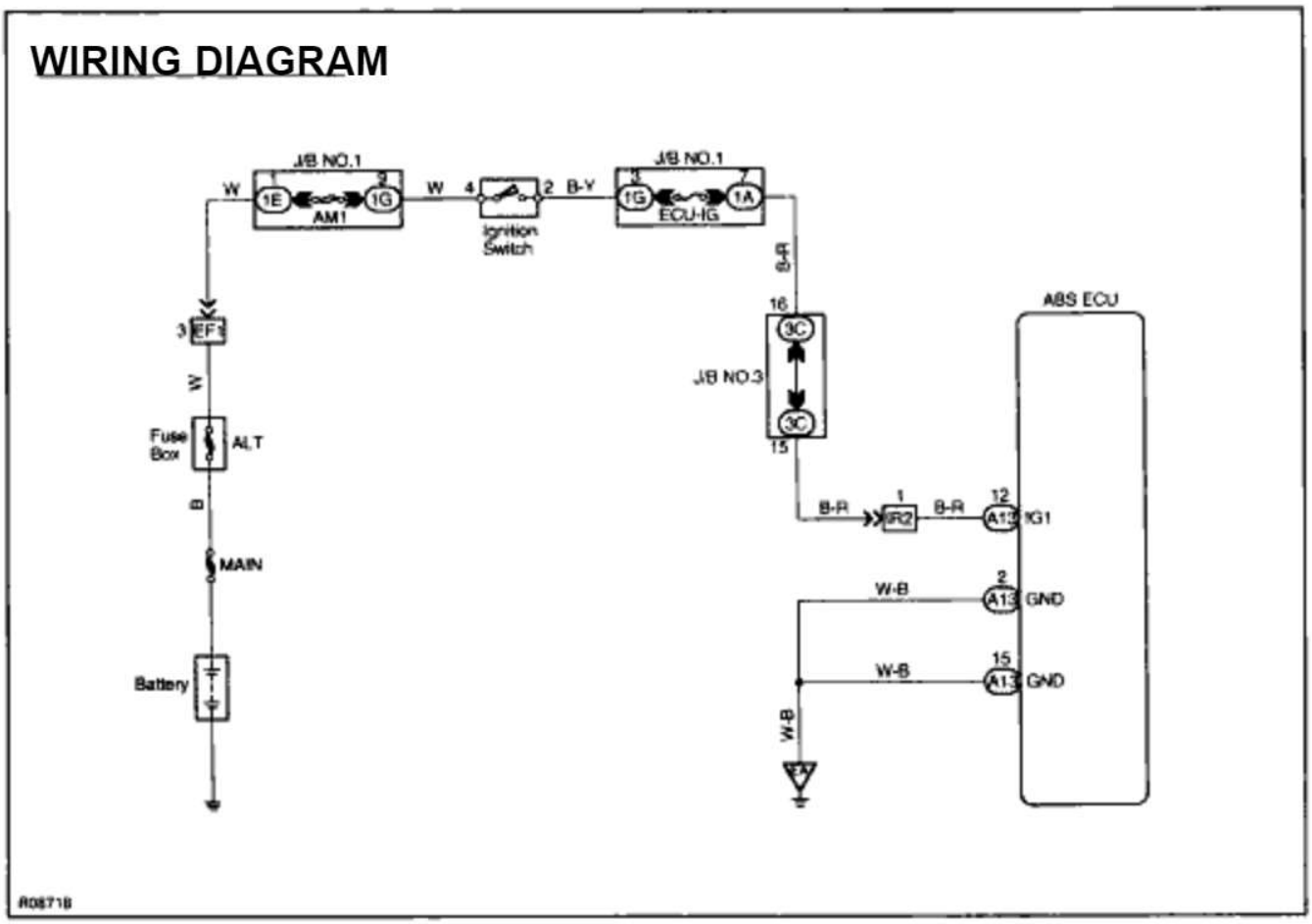
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
41	Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG1 remains at more than 17 V or below 9.5 V for more than 10 sec.	• Battery. • IC regulator. • Open or short in power source circuit. • ECU.

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

DIAGNOSTIC CHART



WIRING DIAGRAM



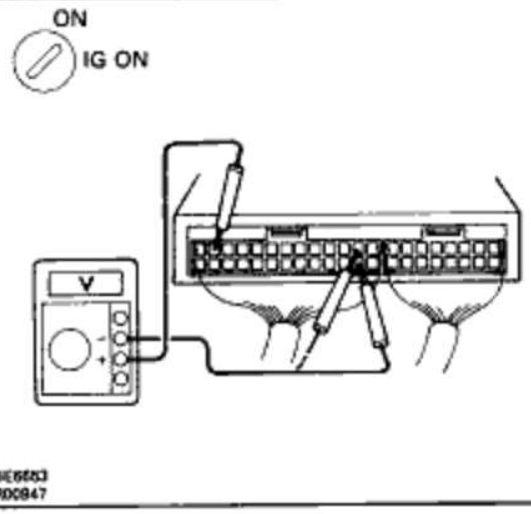
INSPECTION PROCEDURE

1 Check battery positive voltage.

OK Voltage: 10–14V

OK → NG: Check and repair the charging system,

2 Check voltage between terminals IG1 and GND of ABS ECU connector.



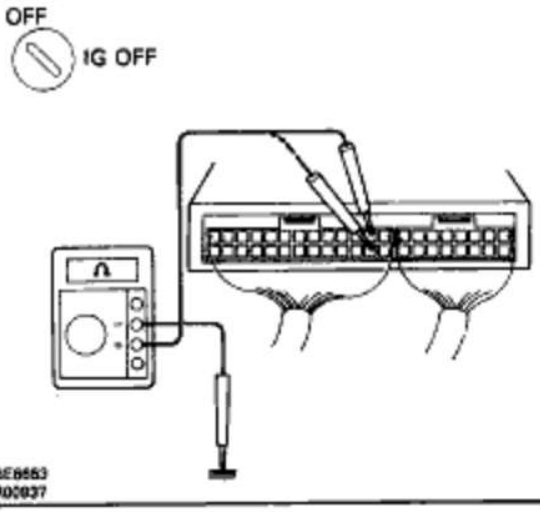
P Remove ABS ECU with connectors still connected.

C 1. Turn ignition switch ON.
2. Measure voltage between terminals IG1 and GND of ABS ECU connector.

OK Voltage: 10–14 V

OK → NG: Check and replace ABS ECU.

3 Check continuity between terminals GND of ABS ECU connector and body ground.

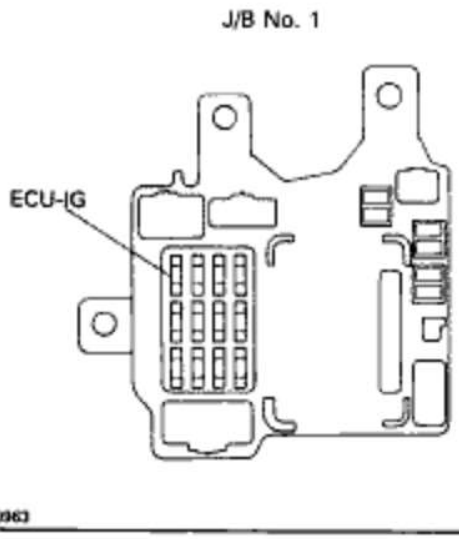


C Measure resistance between terminals GND of ABS ECU connector and body ground.

OK Resistance: 1Ω or less

OK → NG: Repair or replace harness or connector.

4 Check ECU–IG fuse.



P Remove ECU–IG fuse from J/6 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 (See page IN–28).

DTC 51 ABS Pump Motor Lock

CIRCUIT DESCRIPTION

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

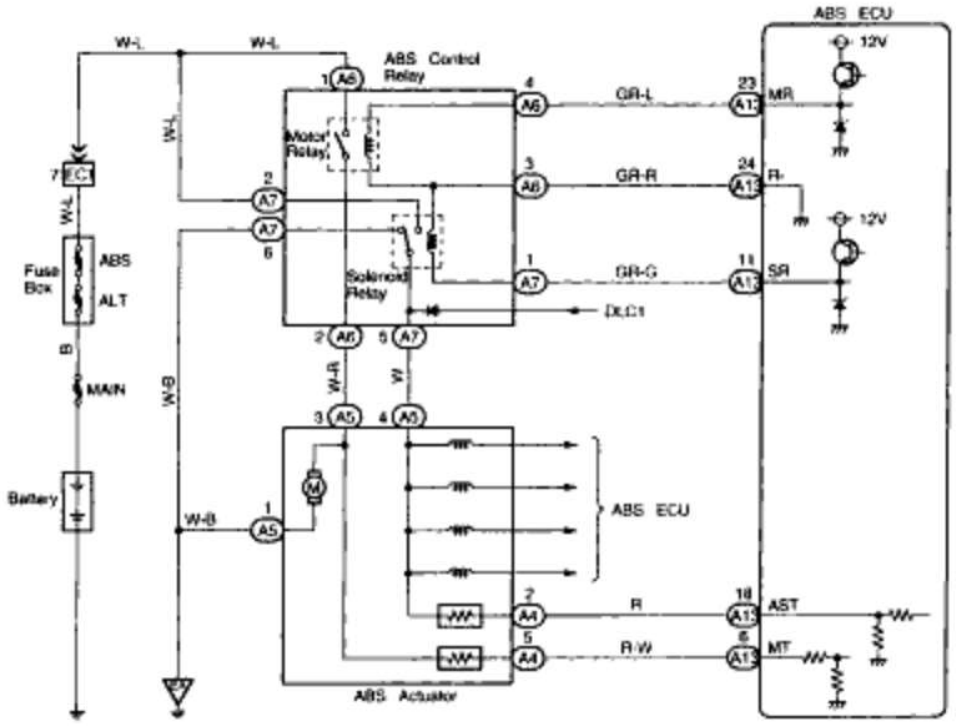
Fail safe function: If trouble occurs in the ABS pump motor, the ECU cuts off current to the control (solenoid) relay and prohibits ABS control.

DIAGNOSTIC CHART

See inspection of ABS actuator (See page BR–77).

WIRING DIAGRAM

(Reference)



Stop Light Switch Circuit

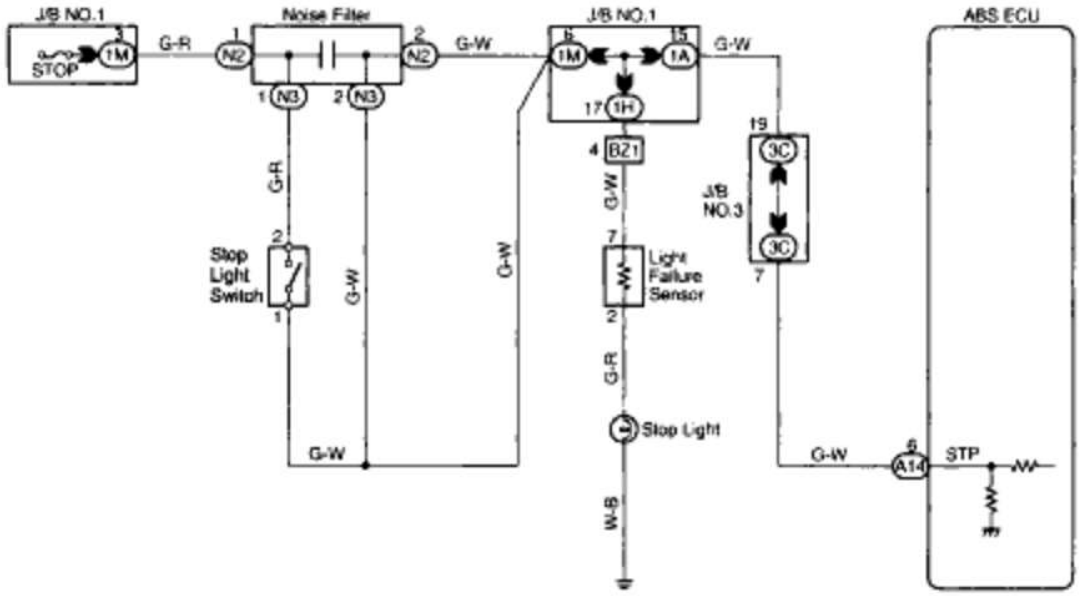
CIRCUIT DESCRIPTION

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

DIAGNOSTIC CHART

1	Check operation of stop light.	NG	Repair stop light circuit (See page BE–65).
OK ↓			
2	Check voltage of terminal STP.	OK	Proceed to next circuit inspection shown on problem symptoms chart (See page BR–98).
NG ↓			
3	Check for open in harness and connector between ABS ECU and stop light switch (See page IN–27).	NG	Repair or replace harness or connector.
OK ↓			
Check and replace ABS ECU.			

WIRING DIAGRAM



INSPECTION PROCEDURE

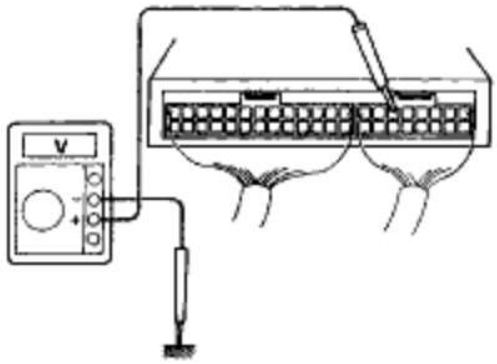
1 Check operation of stop light.

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 STP of ABS ECU and body ground when brake pedal is de–pressed.

OK **Voltage: 8–14 V**

NG

OK → Proceed to next circuit inspection shown on problem symptoms chart (See page BR–98).

3 Check for open in harness and connector between ABS ECU and stop light switch (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

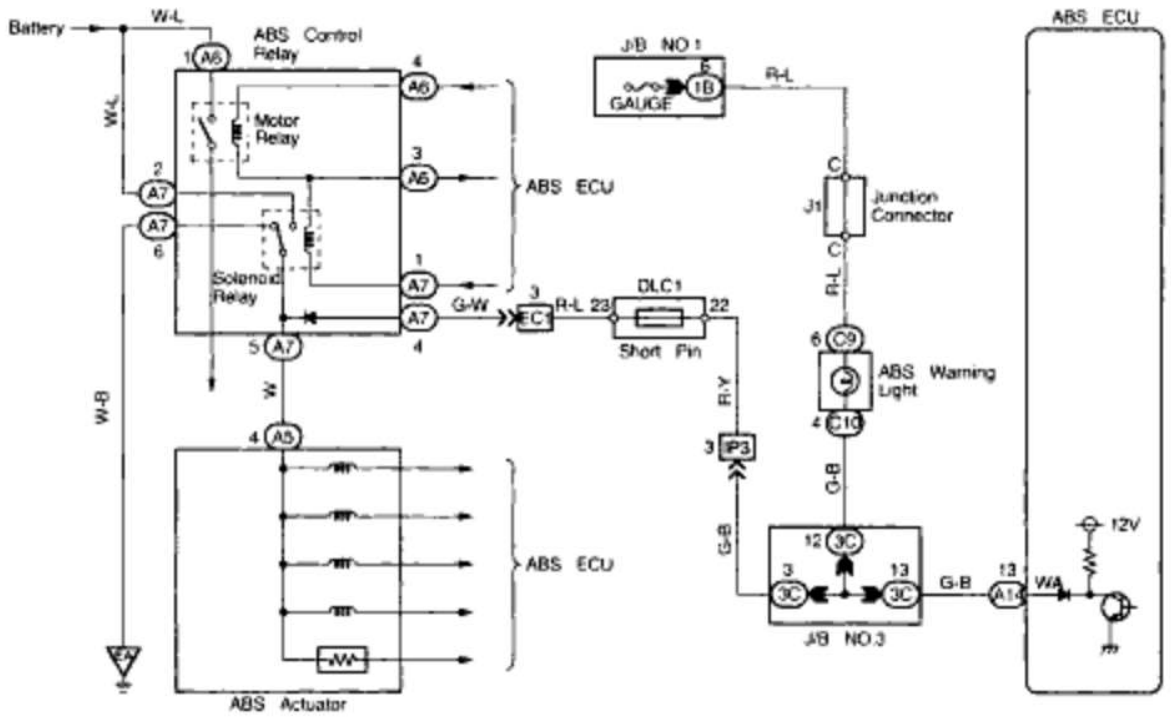
If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a diagnostic trouble code in memory.
After removing the short pin of the DLC1, connect terminals Tc and E1 of the DLC1 or DLC2 to make the ABS warning light to blink and output the diagnostic trouble code.

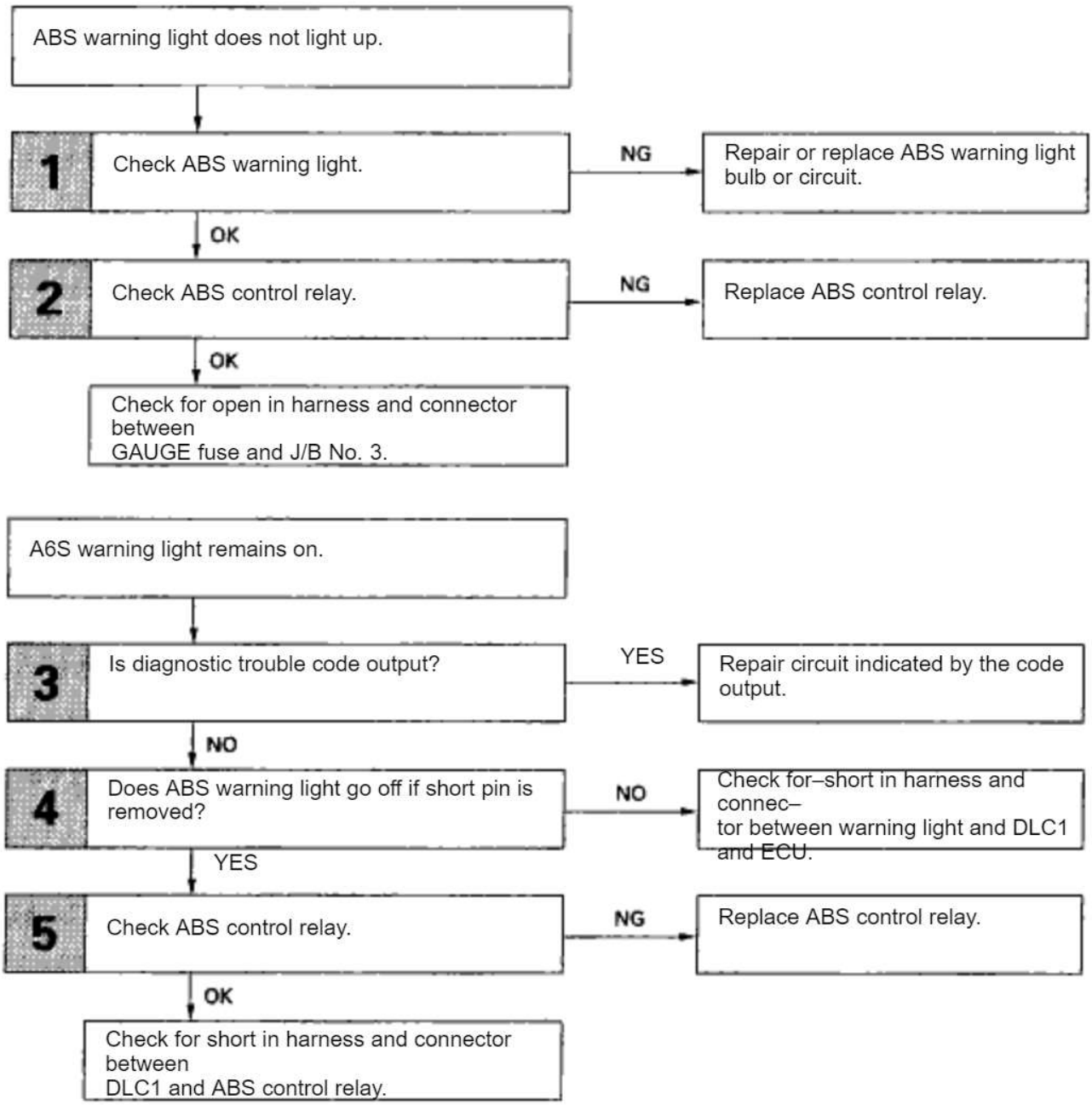
DIAGNOSTIC CHART

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

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

WIRING DIAGRAM




ABS warning light does not light up.
1
Check 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
Check for open in harness and connector between GAUGE fuse and J/B No. 3.
A6S 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 connec–tor between warning light and DLC1 and ECU.
YES
5
Check ABS control relay.
NG
Replace ABS control relay.
OK
Check for short in harness and connector between DLC1 and ABS control relay.

INSPECTION PROCEDURE

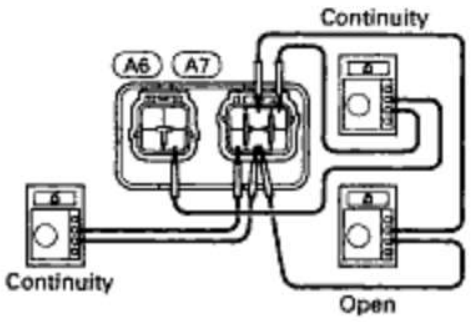
1 Check ABS warning light.

See Combination Meter Troubleshooting on page BE–1 18.

OK

NG → Replace bulb or combination meter assembly.

2 Check ABS control relay.

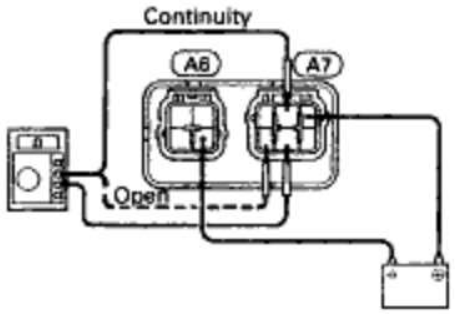


P Disconnect the connectors from control relay.

C Check continuity between each terminal of ABS control relay.

OK

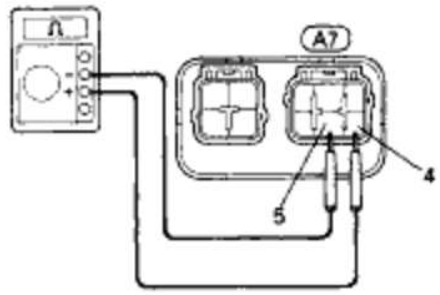
Terminals (A7) 1 and (A6) 3	Continuity (Reference value 80Ω)
Terminals (A7) 5 and (A7) 6	Continuity
Terminals (A7) 2 and (A7) 5	Open



C
1. Apply battery positive voltage between terminals (A7) 1 and (A6) 3.
2. Check continuity between each terminal of ABS control relay.

OK

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



R00689
R00695
R00940

C Connect the ⊕ test lead to terminal 4 of (A7) and the ⊖ lead to terminal 5 of (A7). Check continuity between the terminals.

OK Continuity

If there is no continuity, connect the ⊖ test lead to terminal 4 of (A7) and the ⊕ lead to terminal 5 of (A7). Recheck continuity between terminals.

OK

NG → Replace ABS control relay.

Check for open in harness and connector between DLC1 and A6S control relay and body ground (See page IN–27).

3 Is diagnostic trouble code output?

Perform diagnostic trouble code check on page BR–93.

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 DLC1 and ECU (See page IN–28).

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

OK

NG → Replace ABS control relay.

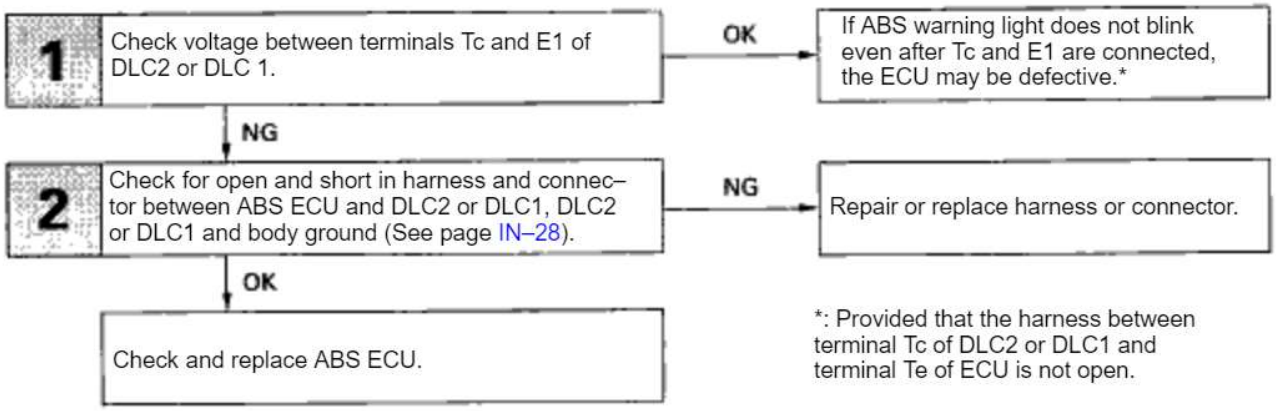
Check for short in harness and connector between DLC1 and ABS control relay (See page IN–28)

Tc Terminal Circuit

CIRCUIT DESCRIPTION

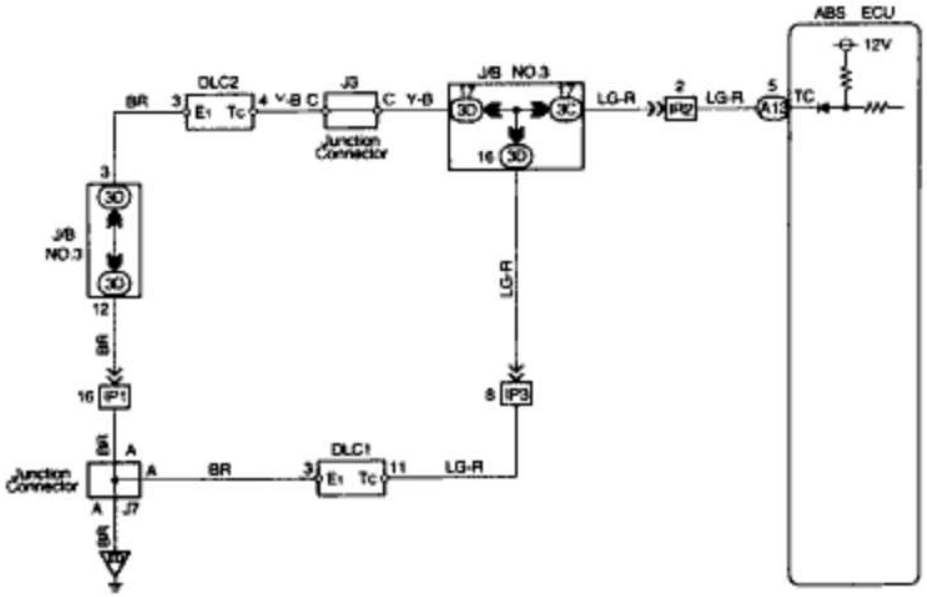
Connecting terminals Te and E1 of the DLC1 or the DLC2 causes the ECU to display the diagnostic trouble code by flasing the ABS warning light.

DIAGNOSTIC CHART

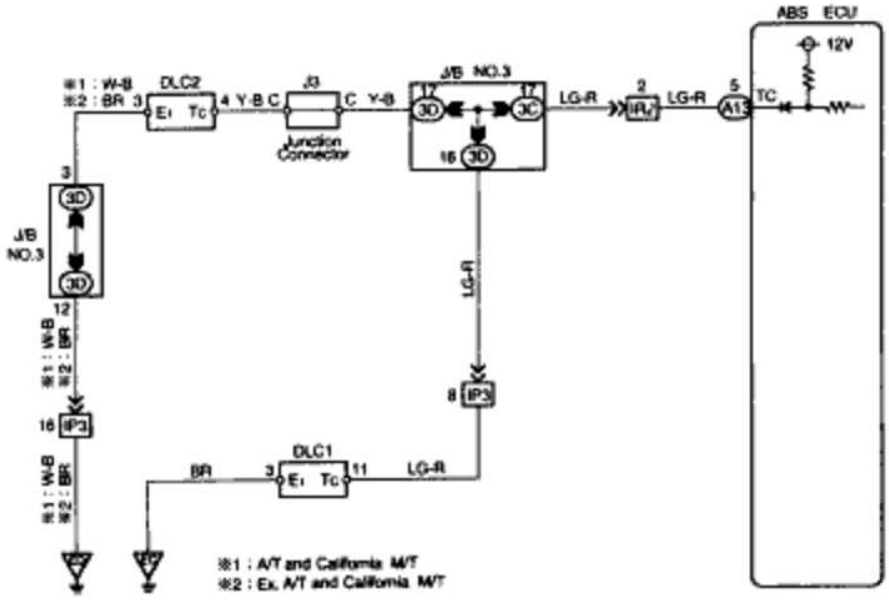


WIRING DIAGRAM

1 MZ–FE:



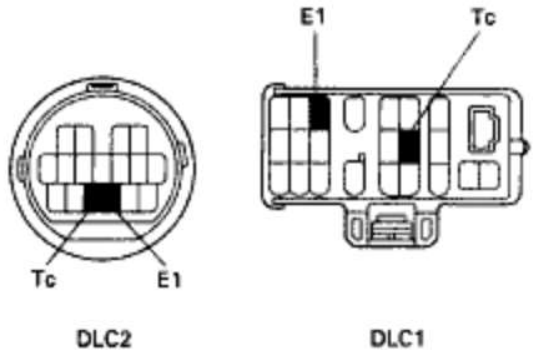
5S–FE:



R08721
R08722

INSPECTION PROCEDURE

1 Check voltage between terminals Te and E1 of DLC2 or DLC1.



C 1. Turn ignition switch ON.
2. Measure voltage between terminals Tc and E1 of DLC2 or DLC1.

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 DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

Ts Terminal Circuit

CIRCUIT DESCRIPTION

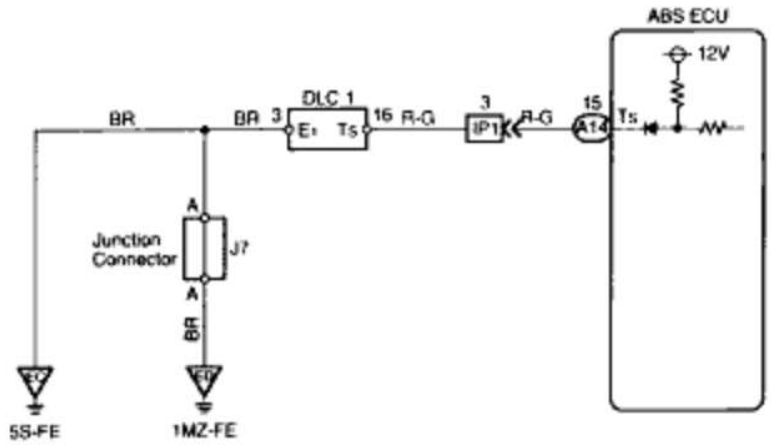
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the diagnostic trouble code check.
Connecting terminals Ts and E1 of the DLC1 in the engine compartment starts the check.

DIAGNOSTIC CHART

1. Check voltage between terminals Ts and E1 of DLC 1.
   - OK → If ABS warning light does not blink even after Ts and E 1 are connected, the ECU may be defective.
   - NG ↓
2. Check for open and short in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–28).
   - NG → Repair or replace harness or connector.
   - OK ↓

Check and replace ABS ECU.

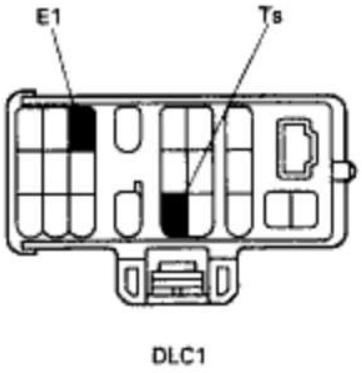
WIRING DIAGRAM



R08723

INSPECTION PROCEDURE

1 Check voltage between terminals and E1 of DLC1.



C
1. Turn ignition switch ON.
2. Measure voltage between terminals Ts and E1 of DLC 1.

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 DLC1, DLC1 and body ground (See page IN–28).

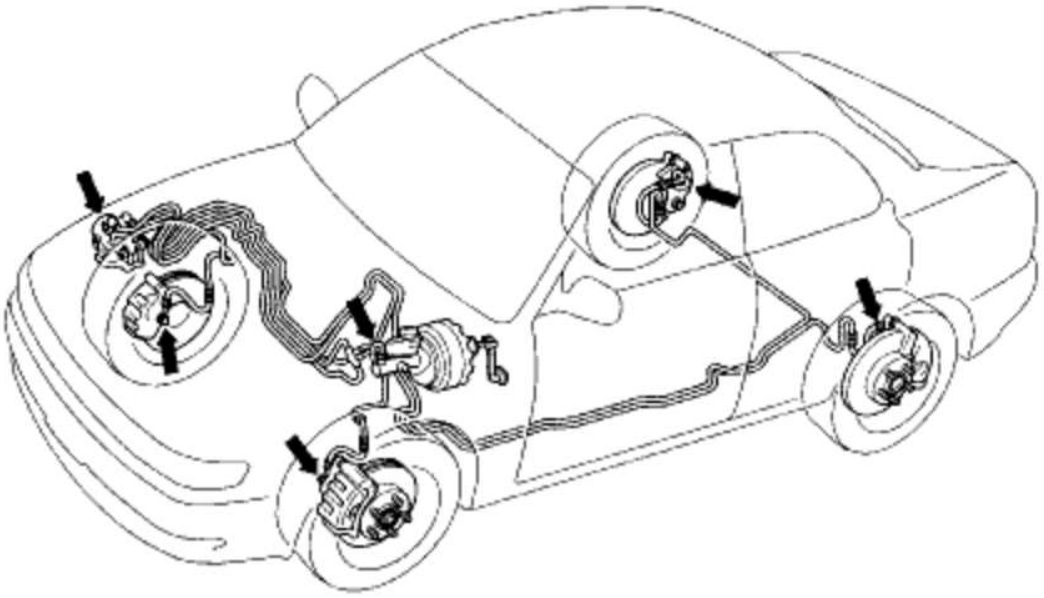
OK

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.



TROUBLESHOOTING (TMM Made Vehicle BOSCH ABS)

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 malfunc–tion 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 recur, simulate the problem by initially 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 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 con–nectars, 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.

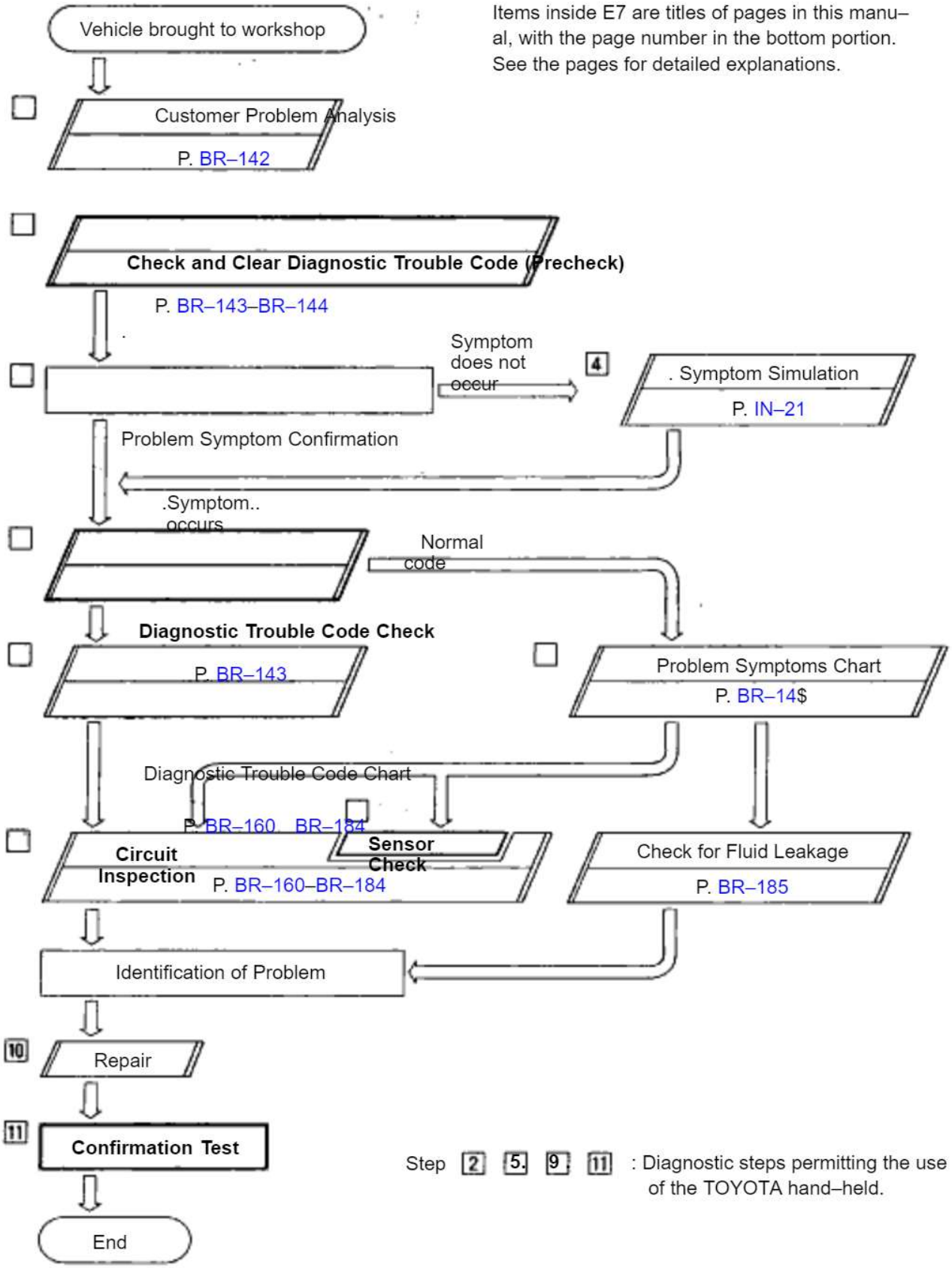
(10) REPAIRS

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 to make sure the entire ABS system is operating correctly.

Items inside E7 are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.



Step 2 5 9 11 : Diagnostic steps permitting the use of the TOYOTA hand–held.

CUSTOMER PROBLEM ANALYSIS CHECK SHEET

ABS Check Sheet

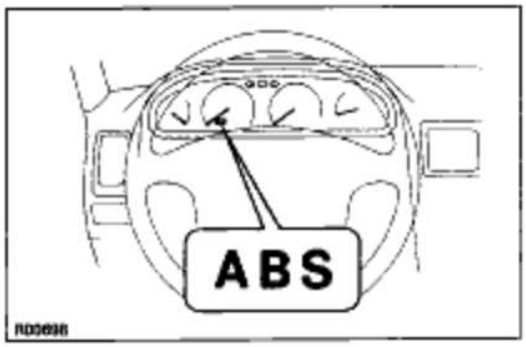
Inspector's Name :

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

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

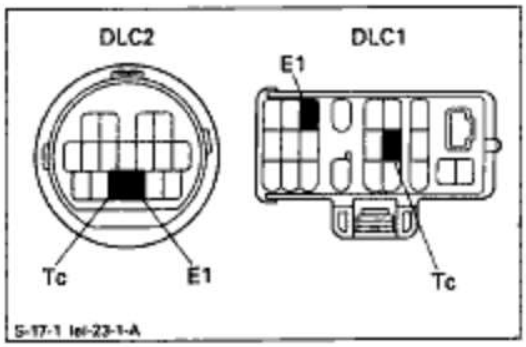
Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

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



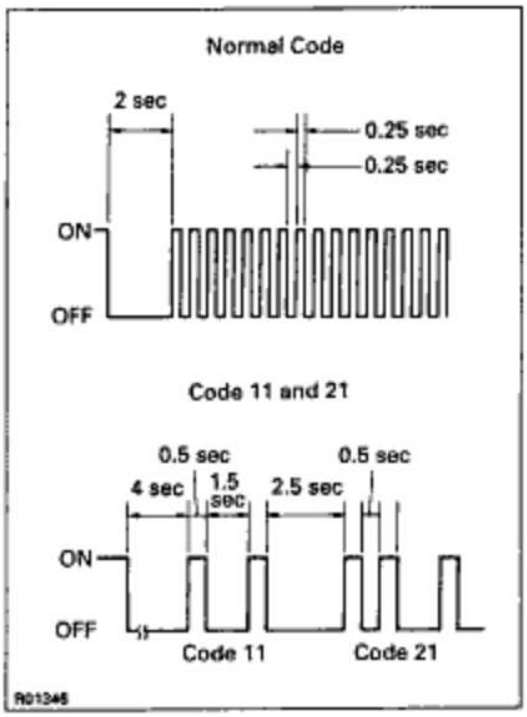
DIAGNOSIS SYSTEM
INDICATOR CHECK

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 for the ABS warning light circuit (See page BR–177).



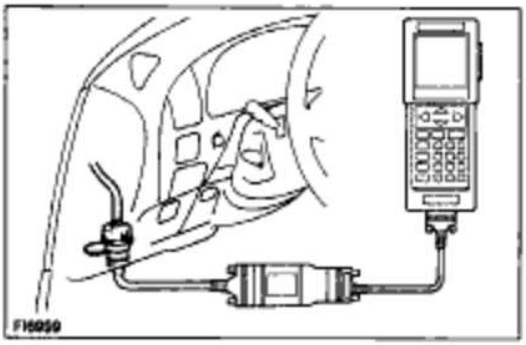
DIAGNOSTIC TROUBLE CODE CHECK

1. Using SST, connect terminals Tc and E1 of DLC2 or DLC1.
   SST 09843–18020
2. Turn the ignition switch to ON.
3. Read the diagnostic trouble code from the ABS warning light on the combination meter.
   HINT: If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page BR–180 or BR–177y.



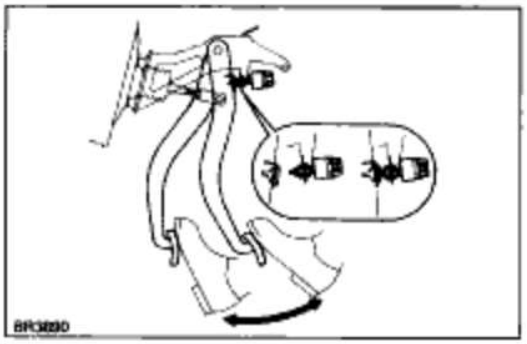
As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

4. Codes are explained in the code table on page BR–145.
5. After completing the check, disconnect terminals Tc and E1, and turn off the display.
   If 2 or more malfunctions are indicated at the same time, the lowest numbered diagnostic trouble code will be displayed first.



DIAGNOSTIC TROUBLE CODE CHECK USING TOYOTA HAND–HELD TESTER

1. Hook up the Toyota hand–held tester to the DLC2.
2. Read the diagnostic trouble codes by following the prompts on the tester screen.
   Please refer to the Toyota hand–held tester operator's manual for further details.



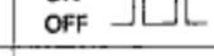
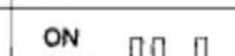
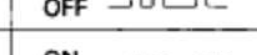
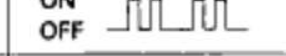
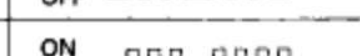
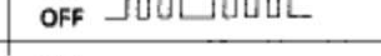
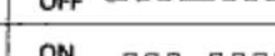
DIAGNOSTIC TROUBLE CODE CLEARANCE

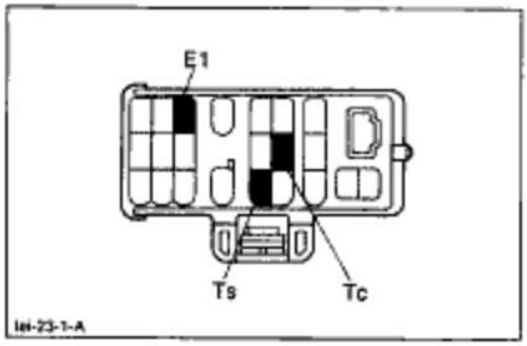
1. Using SST, connect terminals Tc and E1 of DLC2 or DLC1.
   SST 09843–18020
2. IG switch ON.
3. Clear the diagnostic trouble codes stored in ECU by de–pressing the brake pedal 8 or more times within 3 seconds.
4. Check that the warning light shows the normal code.
5. Remove the SST from the terminals of DLC2 or DLC1.

HINT: Cancellation cannot be done by removing the battery cable or ECU–13 fuse.

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the diagnostic trouble code check, check the circuit listed for that code.

Code	ABS Warning Light Blinking Pattern	Diagnosis
11		Open or short circuit in ABS solenoid relay circuit
13		Open or short circuit in ABS motor relay circuit
21		Open or short circuit in 3–position solenoid circuit for right front wheel
22		Open or short circuit in 3–position solenoid circuit for left front wheel
23		Open or short circuit in 3–position solenoid circuit for rear wheels
31		Right front wheel speed sensor signal malfunction
32		Left front wheel speed sensor signal malfunction
33		Right rear wheel speed sensor signal malfunction
34		Left rear wheel speed sensor signal malfunction
35		Open circuit in right front speed sensor circuit
36		Open circuit in left front speed sensor circuit
37		Faulty rear speed sensor rotor
38		Open circuit in right rear speed sensor circuit
39		Open circuit in left rear speed sensor circuit
41		Low battery positive voltage
51		Pump motor is locked Open in pump motor circuit in actuator
62		Malfunction in ECU

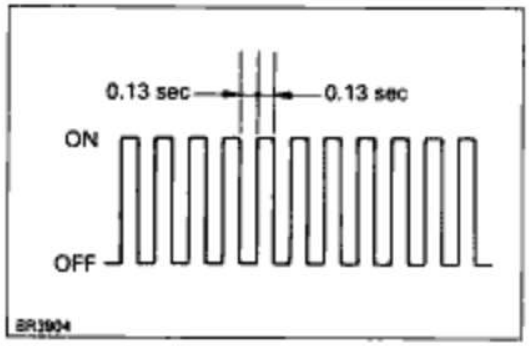


SPEED SENSOR SIGNAL CHECK

1. When the ignition switch is turned ON, check that the ABS warning light goes on for 3 seconds.
2. Turn the ignition switch to OFF.
3. Using SST, connect terminals Ts and El of DLC1.

SST 09843–18020

4. Start the engine.



5. 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–177j.

6. Drive vehicle straight forward.

HINT:

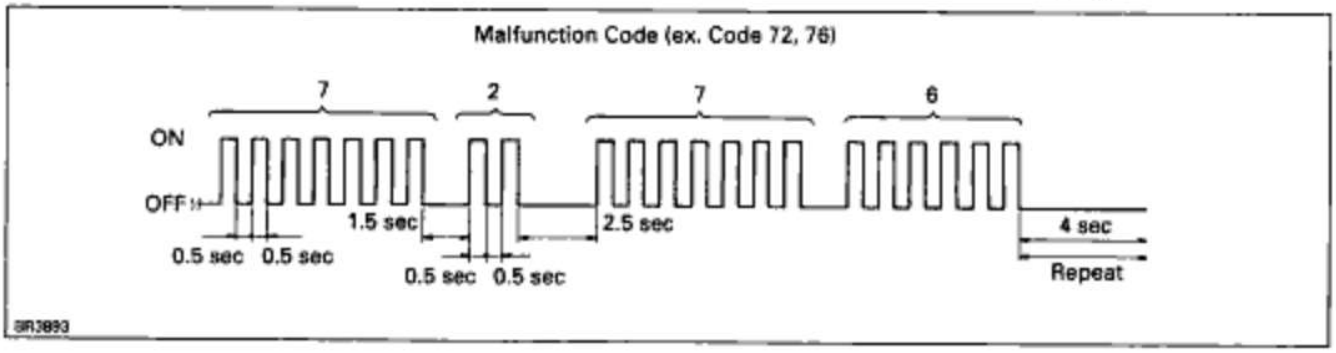
- Drive vehicle at 45–55 km/h (28–34 mph) for several seconds.
- If the brake is applied during the check, the check routine must be started again.

7. Stop the vehicle.
8. Turn the ignition switch to OFF.
9. Disconnect terminals Ts and E1, and connect Te and E1.
10. Turn the ignition switch to ON.
11. Read the number of blinks of the ABS warning light.

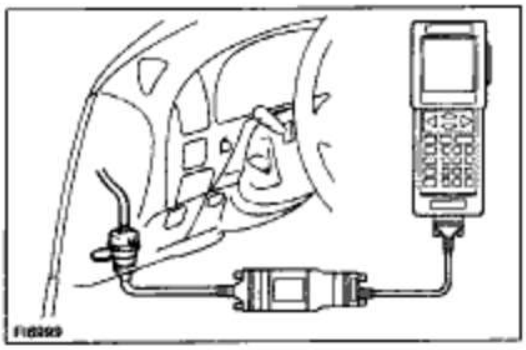
HINT: See the list of diagnostic trouble codes shown on the next page.

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



12. After performing the check, disconnect terminals Tc and E1 of DLC1, and ignition switch turned off.



DIAGNOSTIC TROUBLE CODE CHECK USING TOYOTA HAND–HELD TESTER

1. Perform steps 1. 7. on the previous page.
2. Hook up the Toyota hand–held tester to the DLC2.
3. Read the diagnostic trouble codes by following the prompts on the tester screen.
   Please refer to the Toyota hand–held tester operator's manual for further details.

Diagnostic Trouble Code of Speed Sensor Check Function

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

PROBLEM SYMPTOMS CHART

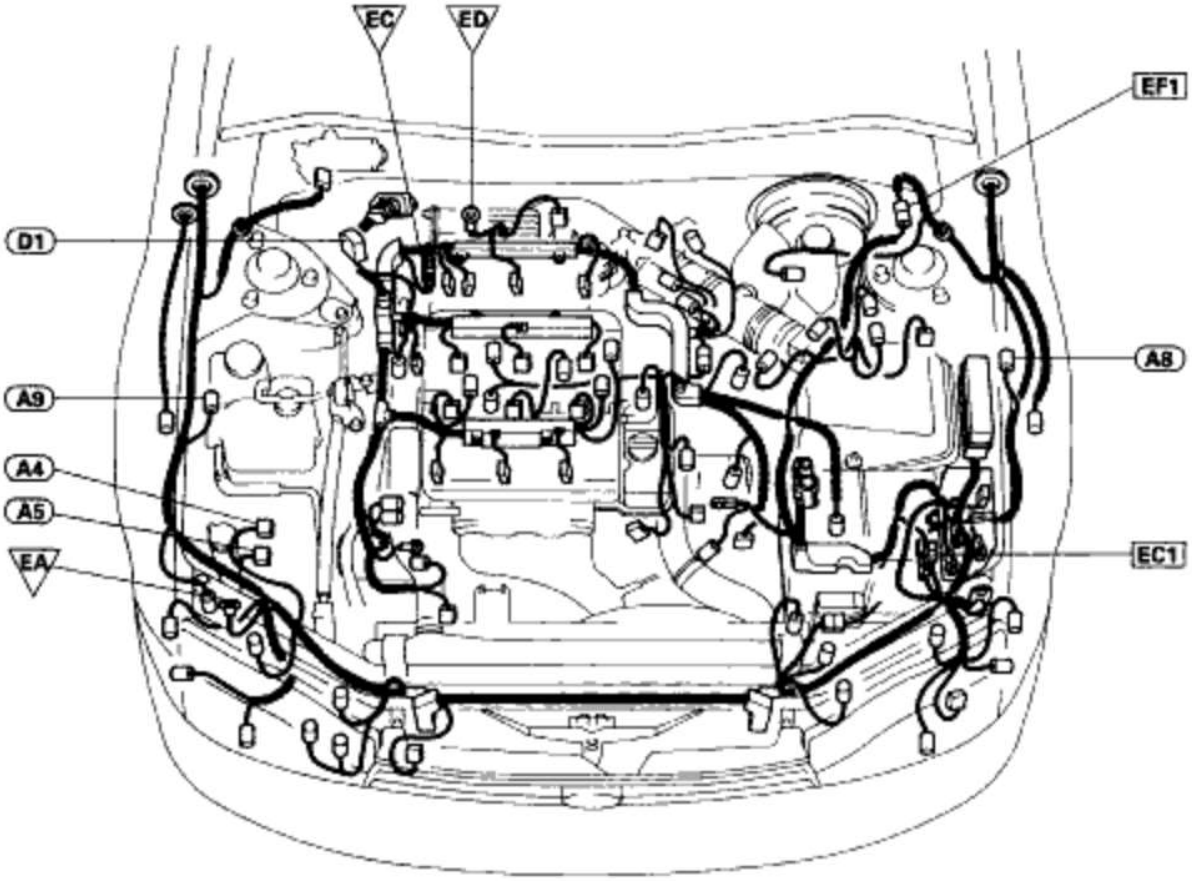
If a normal code is displayed during the diagnostic trouble code check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptoms	Inspection Circuit	See page
ABS does not operate.	Only when 1. 4. are all normal and the problem is still occurring, replace the ABS ECU. 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 hydraulic circuit for leakage.	BR–143 BR–170 BR–166 BR–185
ABS does not operate efficiently.	Only when 1. 4. are all normal and the problem is still occurring, replace the ABS ECU. 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 hydraulic circuit for leakage.	BR–143 BR–166 BR–175 BR–185
ABS warning light abnormal.	1. ABS warning light circuit. 2. ABS ECU.	BR–177
Diagnostic trouble code check cannot be performed.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit. 2. Tc terminal circuit.	BR–177 BR–180
Speed sensor signal check cannot be performed.	1. Ts terminal circuit. 2. ABS ECU.	BR–183

LOCATION OF CONNECTORS

Location of Connectors in Engine Compartment

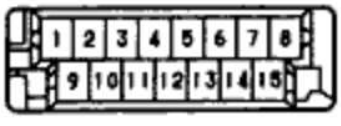
1M2–FE Engine:



N09612

A4

ABS Actuator



R08574

A5

ABS Actuator



Ig-4-1-A

A8 A9

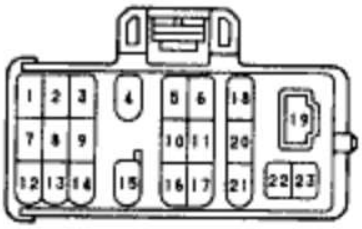
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



ls-2-1-T

D1

DLC1



lei-23-1

EC1



lef-8-1



lef-8-2

EF1



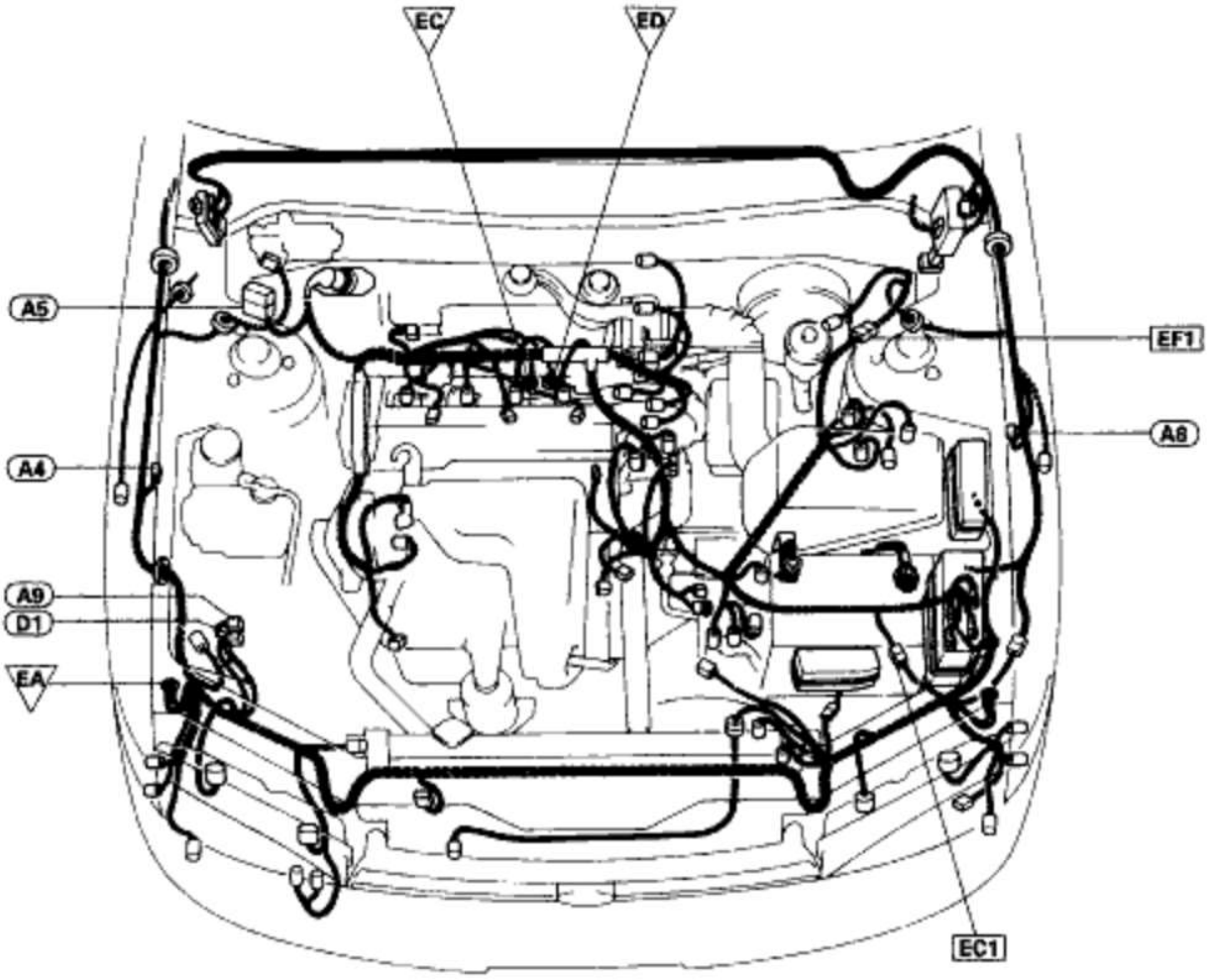
lfg-4-1



lfg-4-2

Location of Connectors in Engine Compartment

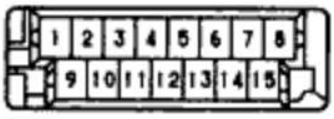
5S–FE Engine:



N09613

A4

ABS Actuator



R08674

A5

ABS Actuator



lg-4-1-A

A8 A9

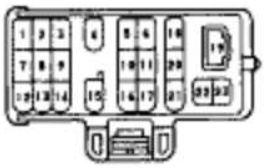
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



le-2-1-T

D1

DLC1



lei-23-1-A

EC1



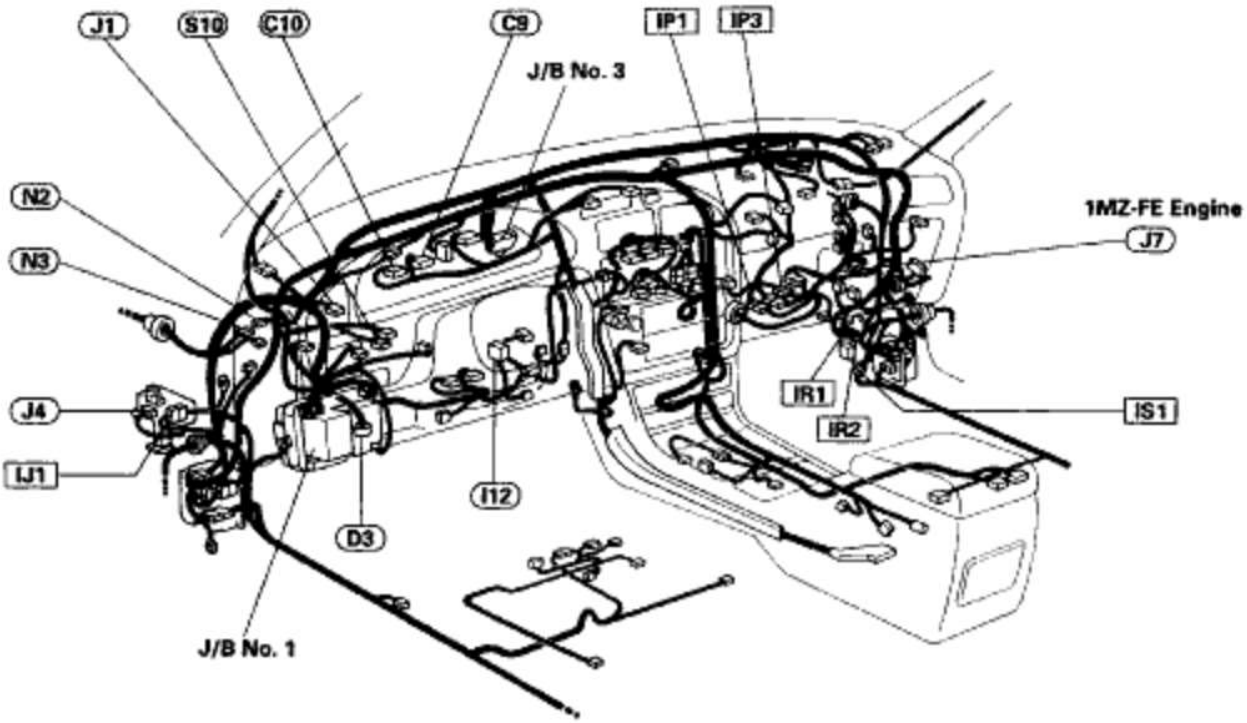
lef-8-1 lef-8-2

EF1



lfg-4-1 lfg-4-2

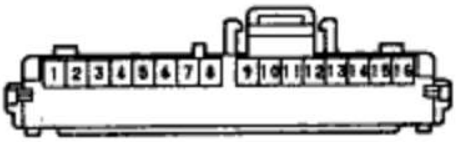
Location of Connectors in instrument Panel



N08614

C9

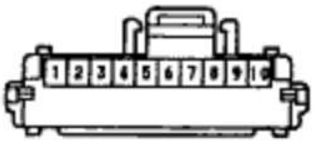
ABS Warning Light



j-16-1

C10

ABS Warning Light



j-10-1

D3

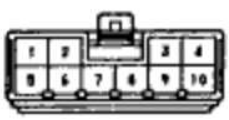
DLC2



S-17-1

I12

Ignition Switch



g-10-1-B

J1

Junction Connector



e-22-1-A

J3

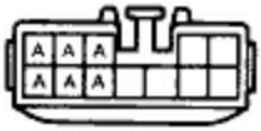
Junction Connector



e-14-1-A

J7 1MZ-FE

Junction Connector



e-12-1

J7

Noise Filter



e-2-2

N3

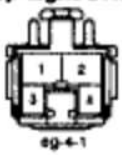
Noise Filter



e-2-1

S10

Stop Light Switch

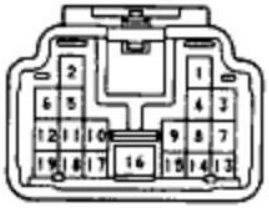


eg-4-1

IJ1



eg-19-1

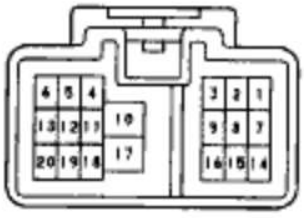


eg-19-2

IP1



e-20-1-B



e-20-2-B

IP3

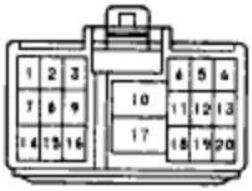


ef-19-1

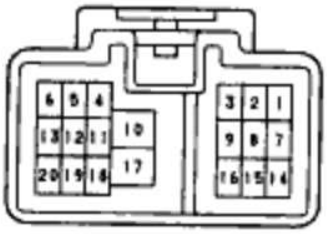


ef-19-2

IR1



e-20-1-B



e-20-2-B

IR2



e-8-1



e-8-2

IS1

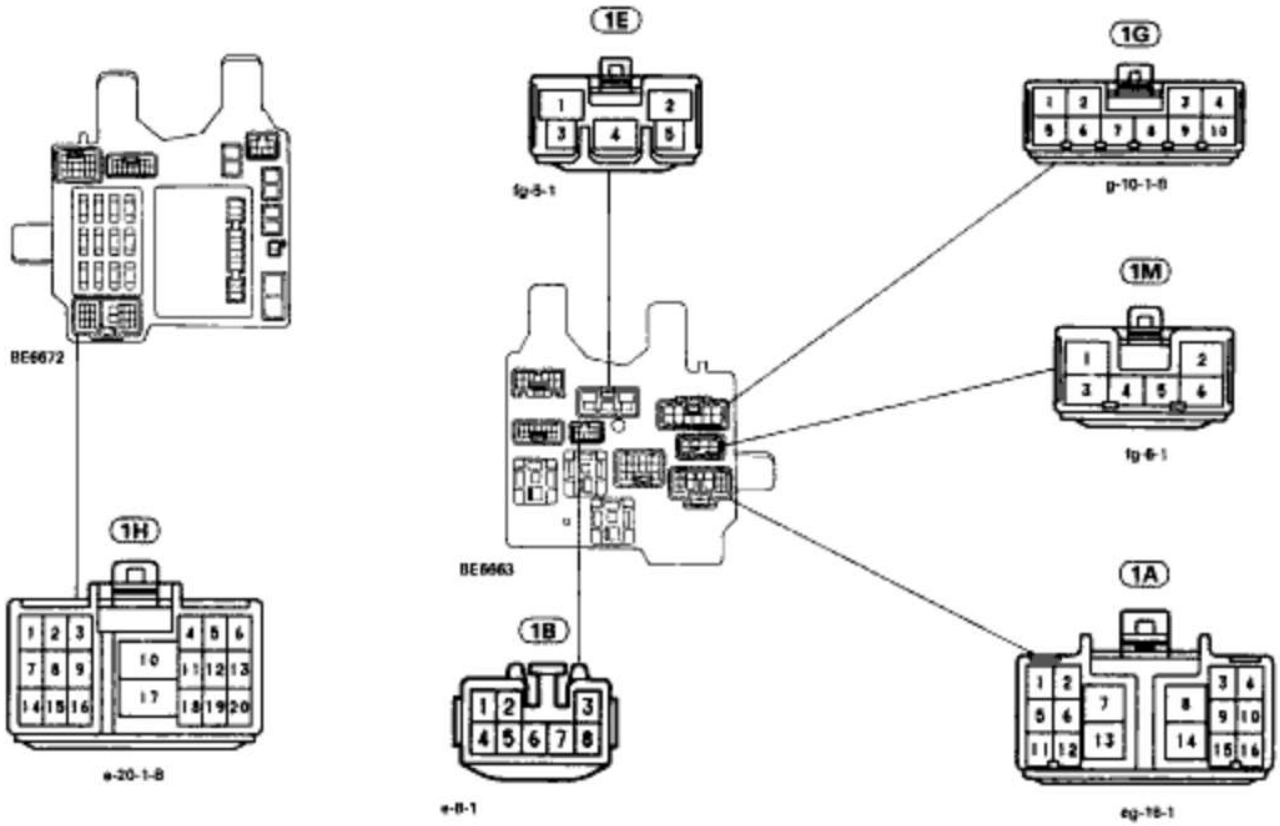


e-6-1

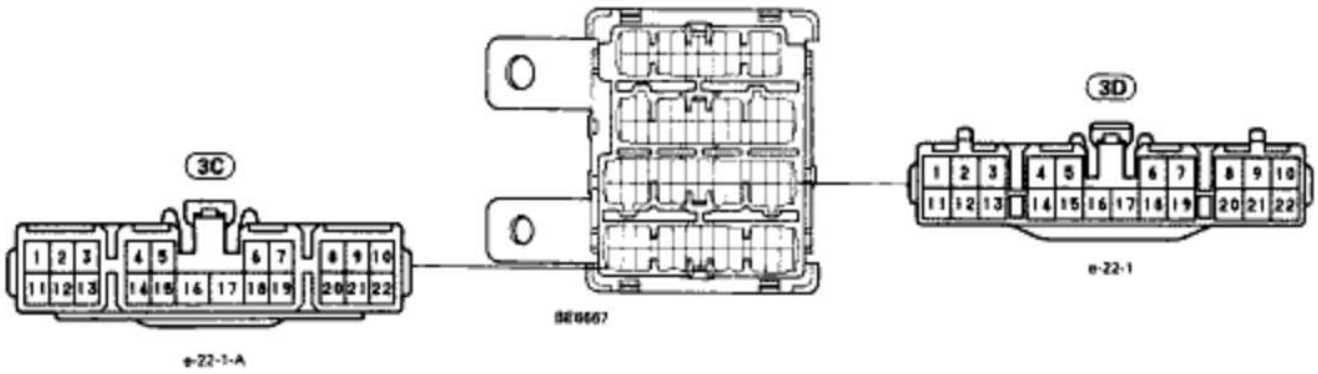


e-6-2

J/B No. 1

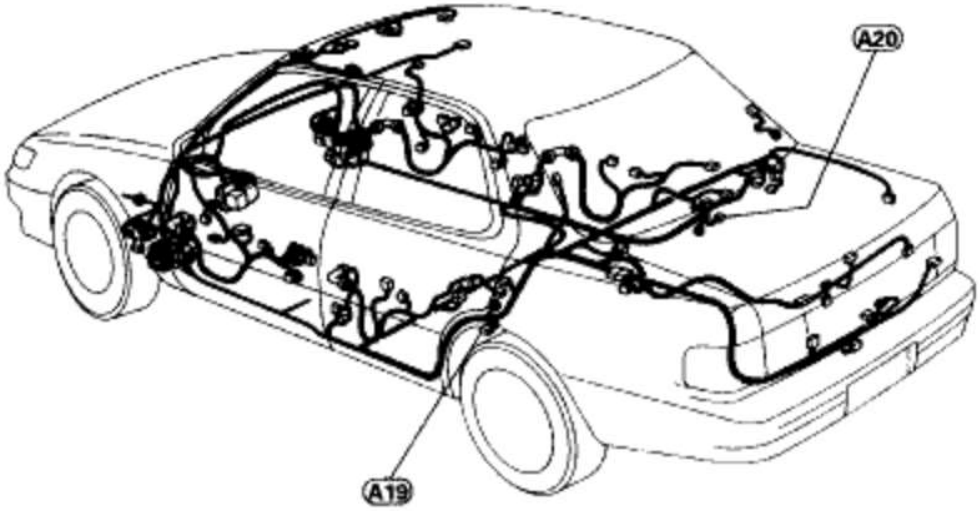

1E
1G
1M
1H
1B
1A
BE6672
BE6663
e-20-1-B
e-8-1
eg-16-1

J/B No. 3


3C
3D
BE6667
e-22-1-A
e-22-1

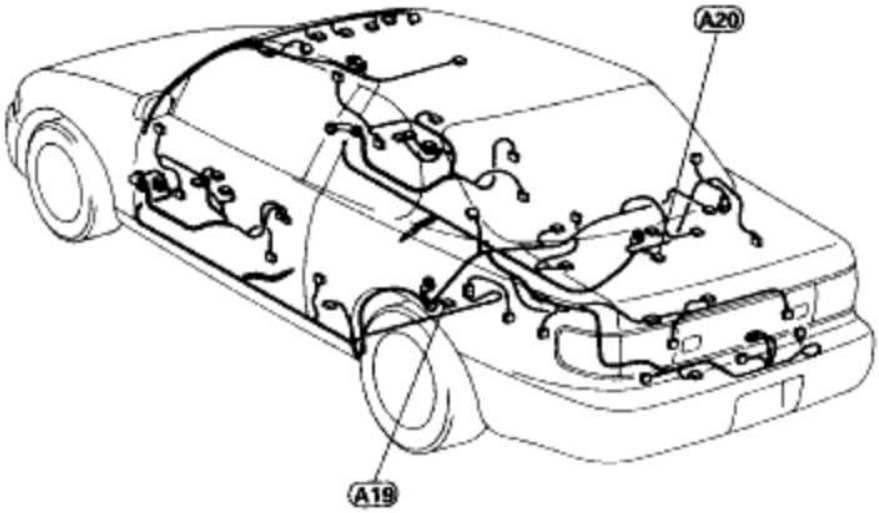
Location of Connectors in Body

Sedan:



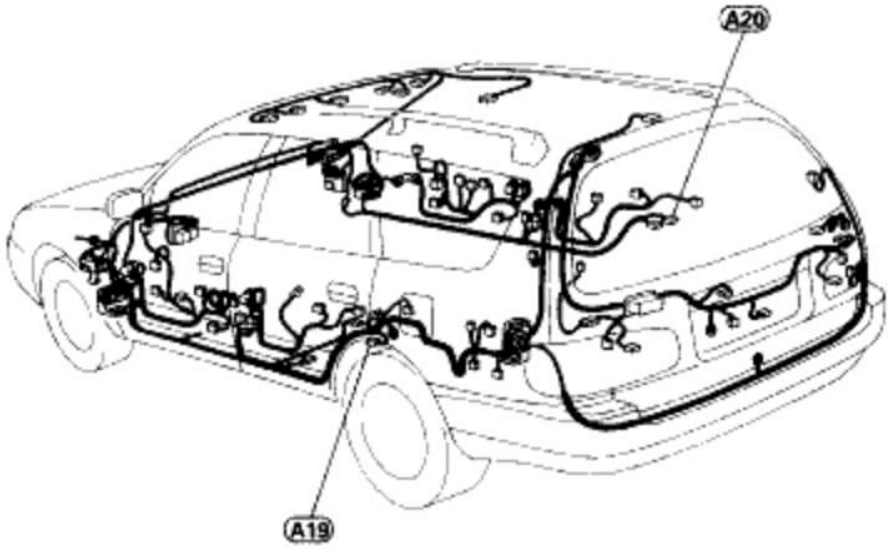
N09615

Coupe:



N09703

Wagon:



N098704

A19 A20

ABS Speed Sensor Left Rear
ABS Speed Sensor Right Rear



e-2-2-L

–MEMO–

CIRCUIT INSPECTION

DTC 11,13 ABS Solenoid and Motor Relay Circuit

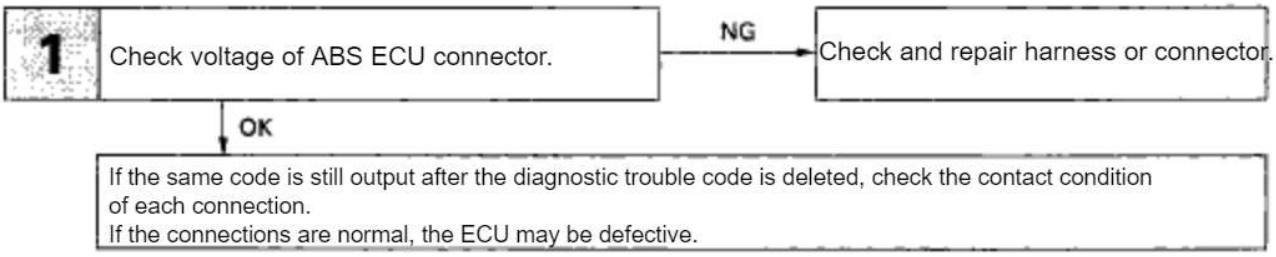
CIRCUIT DESCRIPTION

The solenoid relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on. The motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
11	(1) 5V is applied to the solenoid voltage monitor terminal (AST) for 30 sec. or more, with the IG switch ON and the warning light on. (2) 5V is applied to the solenoid voltage monitor terminal (AST) for 0.02 sec. or more, after the warning light goes off.	• Open or short in ABS solenoid relay circuit. • ECU.
13	(1) The motor voltage monitor terminal (MT) is ON for 5 sec. or more, with the motor relay operation signal OFF. (2) The motor voltage monitor terminal (MT) is OFF for 0.04 sec. with the motor relay operation signal ON.	• Pump motor. • Open in ABS motor relay circuit. • ECU.

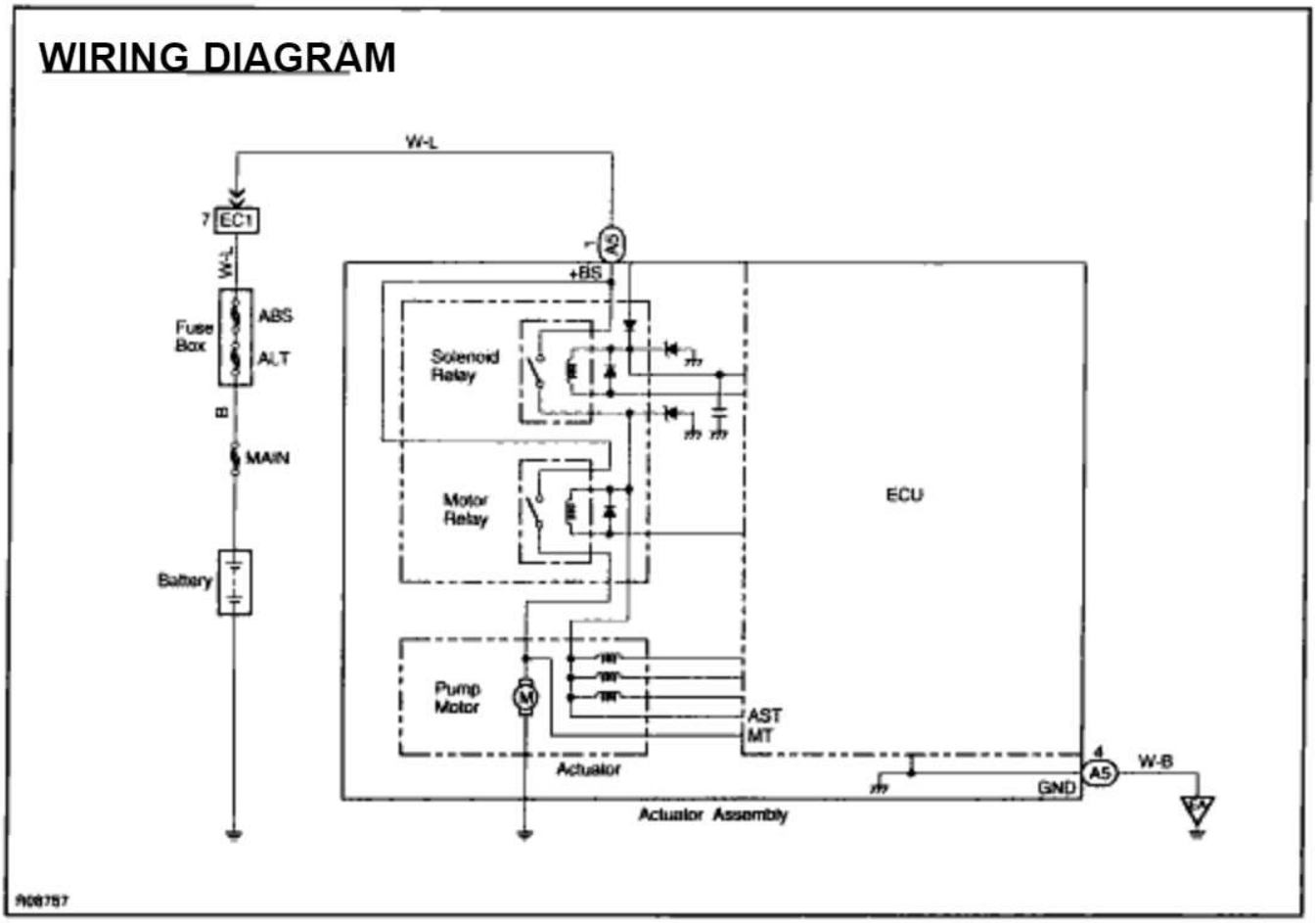
Fail safe function: If trouble occurs in the control (solenoid) relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

DIAGNOSTIC CHART



HINT: When DTC13 is output, check that the pump motor ground wire is installed correctly.

WIRING DIAGRAM

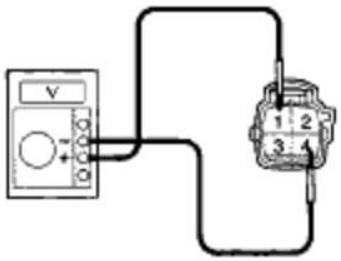


INSPECTION PROCEDURE

1 **Check voltage between terminals connector. (A5) 1 and (A5) 4 of ABS ECU**

OFF

IG OFF



R09545

P Disconnect the ABS ECU connector.

C Measure voltage between terminals (A5) 1 and (A5) 4 of ABS ECU harness side connector.

OK **Voltage: 10–14 V**

OK

NG **Check and repair 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.

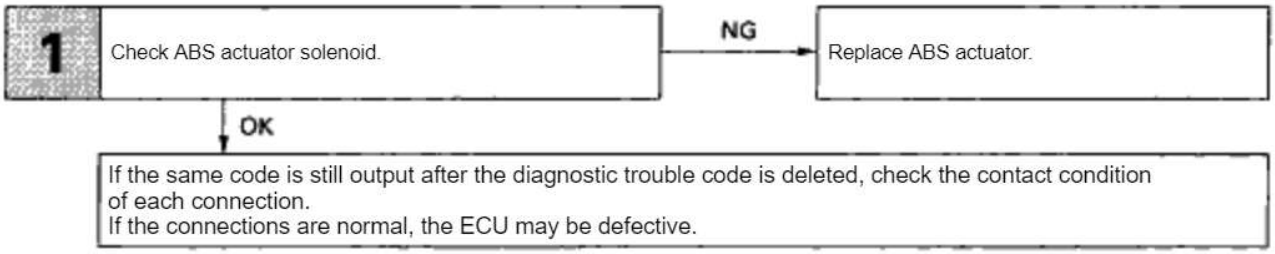
DTC 21, 22, 23 ABS Actuator Solenoid Circuit

CIRCUIT DESCRIPTION

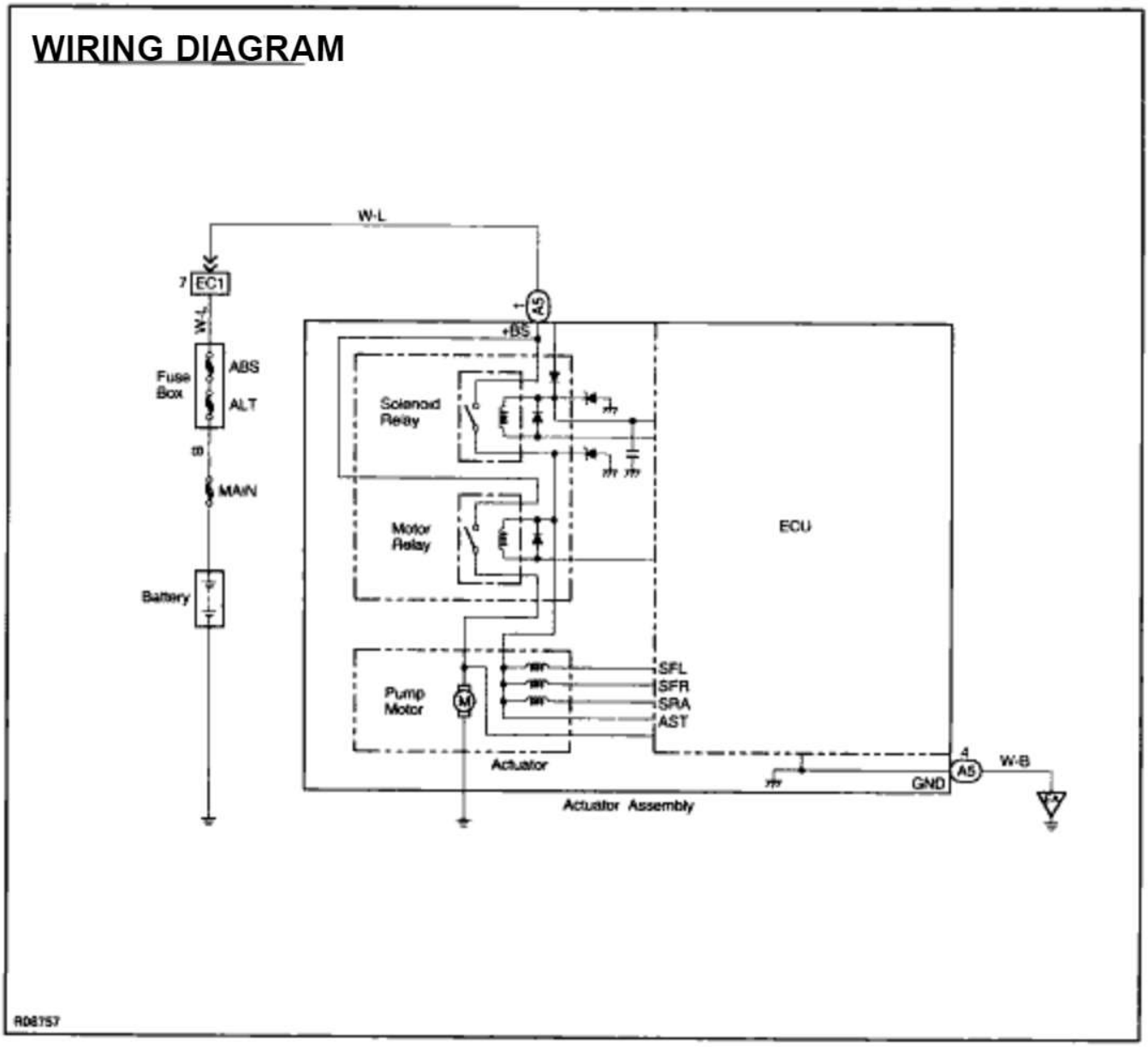
This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders, thus controlling the braking force.

DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
21	(1) OV is applied to terminal SFR for 0.035 sec. while battery voltage is applied to the sole–noid voltage monitor terminal (AST) and the ECM power transistor is OFF. (2) Battery voltage is applied to terminal SFR for 0.035 sec. while battery voltage is applied to the solenoid voltage monitor terminal (AST) and the ECM power transistor is ON.	• ABS actuator (solenoid valve). • Open or short in right front solenoid circuit. • ECU.
22	(1) OV is applied to terminal SFL for 0.035 sec. while battery voltage is applied to the sole–noid voltage monitor terminal (AST)and the ECM power transistor is OFF. (2) Battery voltage is applied to terminal SFL for 0.035 sec. while battery voltage is applied to the solenoid voltage monitor terminal (AST) and the ECM power–transistor is ON.	• ABS actuator (solenoid valve). • Open or short in left front solenoid circuit. • ECU.
23	(1) OV is applied to terminal SRA for 0.035 sec. while battery voltage is applied to the sole–noid voltage monitor terminal (AST) and the ECM power transistor is OFF. (2) Battery voltage is applied to terminal SRA for 0.035 sec. while battery voltage is applied to the solenoid voltage monitor terminal (AST) and the ECM power transistor is ON.	• ABS actuator (solenoid valve). • Open or short in rear solenoid circuit. • ECU.

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

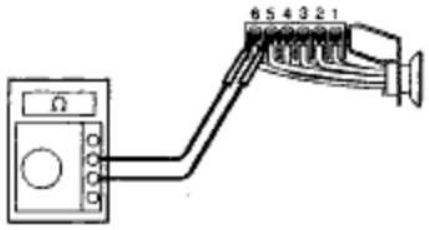


WIRING DIAGRAM



INSPECTION PROCEDURE

1 Check ABS actuator solenoid.



P Remove the ABS ECU cover and disconnect 6–pin connector.

C Check continuity between terminals 1 and 2, 3 and 4, 5 and6.

OK **Continuity**
HINT: Resistance of each solenoid coil is 1.1) .

OK

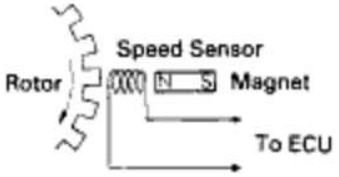
NG Replace ABS actuator.

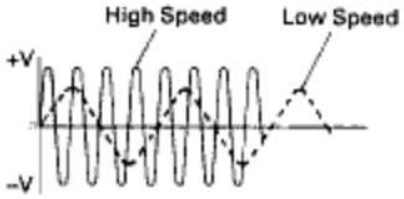
If the same code is still output after the diagnostic trouble code is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DTC 31,32,33,34,35, 36, 38, 39 Speed Sensor Circuit

CIRCUIT DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS system. The front and rear rotors each 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 direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.





BR3683
BR3562

DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
31,32, 33,34	(1) No pulse is input when the vehicle speed reaches 12 km/h (7 mph). (2) No pulse is input when the vehicle speed reaches 20 km/h (12 mph). (3) When the vehicle speed is 10 km/h (7 mph) or above, a pulse is not input for at least 20 sec.	• Right front, left front, right rear and left rear speed sensor. • Open in each speed sensor circuit. • Sensor installation • Sensor rotor • ECU.
35,36, 38,39	The hardware detects a constant open is each sensor circuit.	• Right front, left front, right rear and left rear speed sensor. • Open in each speed sensor circuit. • ECU.

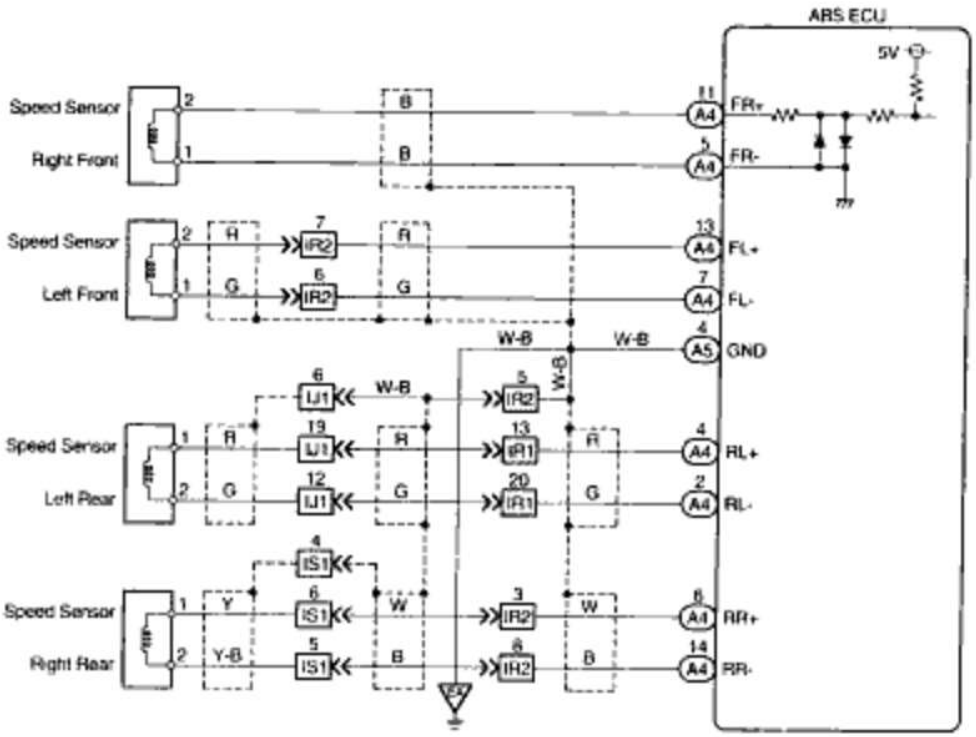
HINT: DTC Nos. 31 and 35 are for the right front speed sensor.
DTC Nos. 32 and 36 are for the left front speed sensor.
DTC Nos. 33 and 38 are for the right rear speed sensor
DTC Nos. 34 and 39 are for the left rear speed sensor.
Fail safe function: If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

DIAGNOSTIC CHART

1. Check speed sensor.
   - NG → Replace speed sensor.
   - OK ↓
2. Check for open and short in harness and connector between each speed sensor and ECU.
   - NG → Repair or replace harness or connector.
   - OK ↓
3. Check sensor rotor and sensor installation.
   - NG → Replace speed sensor or rotor.
   - OK ↓

Check and replace ABS ECU.

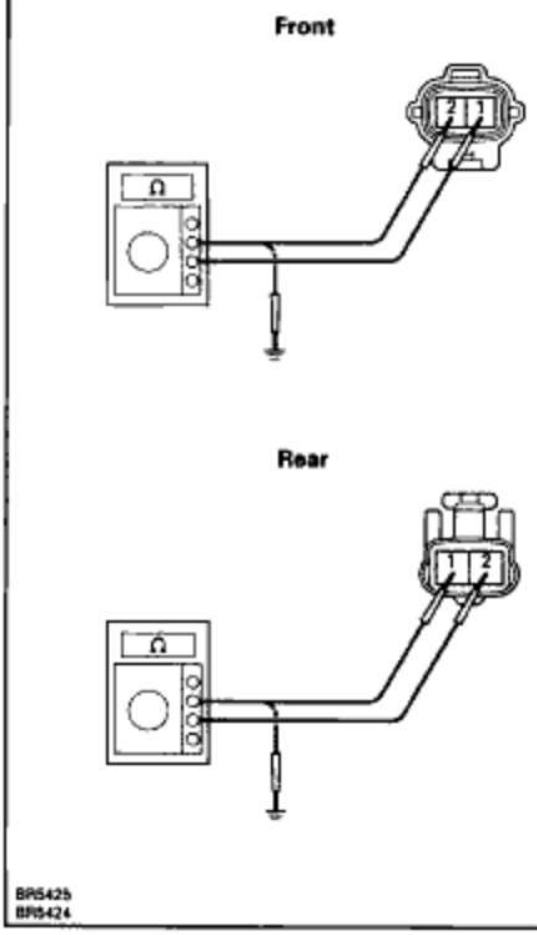
WIRING DIAGRAM



R08758

INSPECTION PROCEDURE

1 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: 0.6–1.8 kΩ**

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

OK **Resistance: 1 MO 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: 0.6–1.8 tcΩ**

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

OK **Resistance: 1 MΩ or higher**

OK

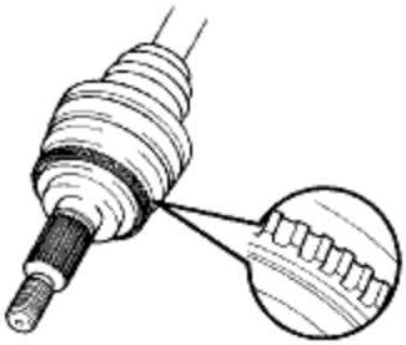
NG **Replace speed sensor.**

2 Check for open and short in harness and connector between each speed sensor and ECU (See page IN–28).

OK

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

3 Check sensor rotor and sensor installation.



Front

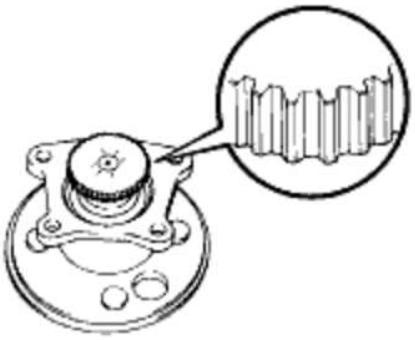
P Remove front drive shaft (See SA section).
Check sensor rotor serrations.

C

OK **No scratches or missing teeth.**

C Check the front speed sensor installation

OK **The installation bolt is tightened properly.**

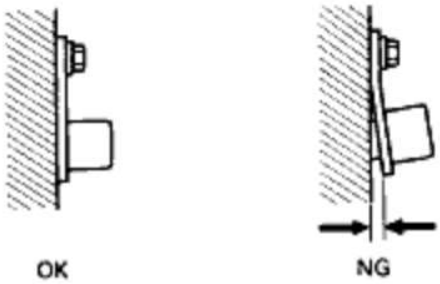


Rear

P Remove the axle hub (See SA section).

C Check the sensor rotor serrations.

OK **No scratches or missing teeth.**



R00948
R00947
BR3795

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 speed or rotor.**

Check and replace ABS ECU.

DTC 41 +BS Power Source Circuit

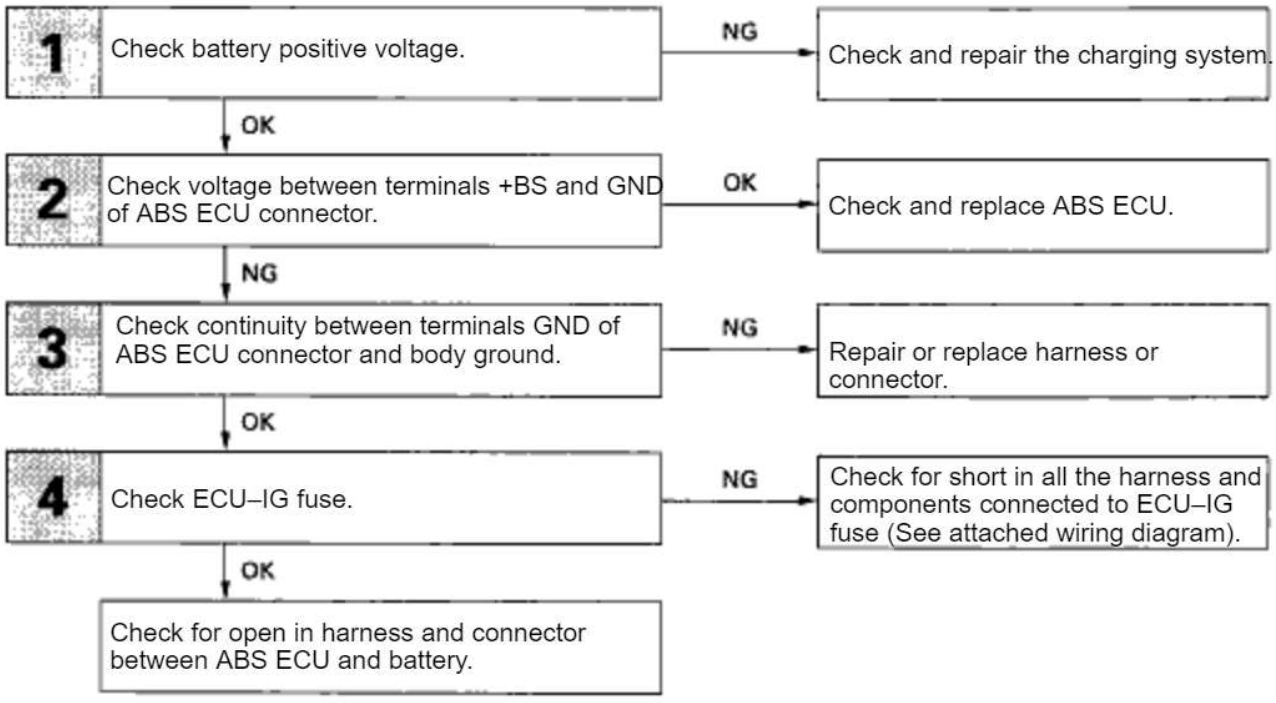
CIRCUIT DESCRIPTION

This is the power source for the ECU, hence the CPU, and the actuators.

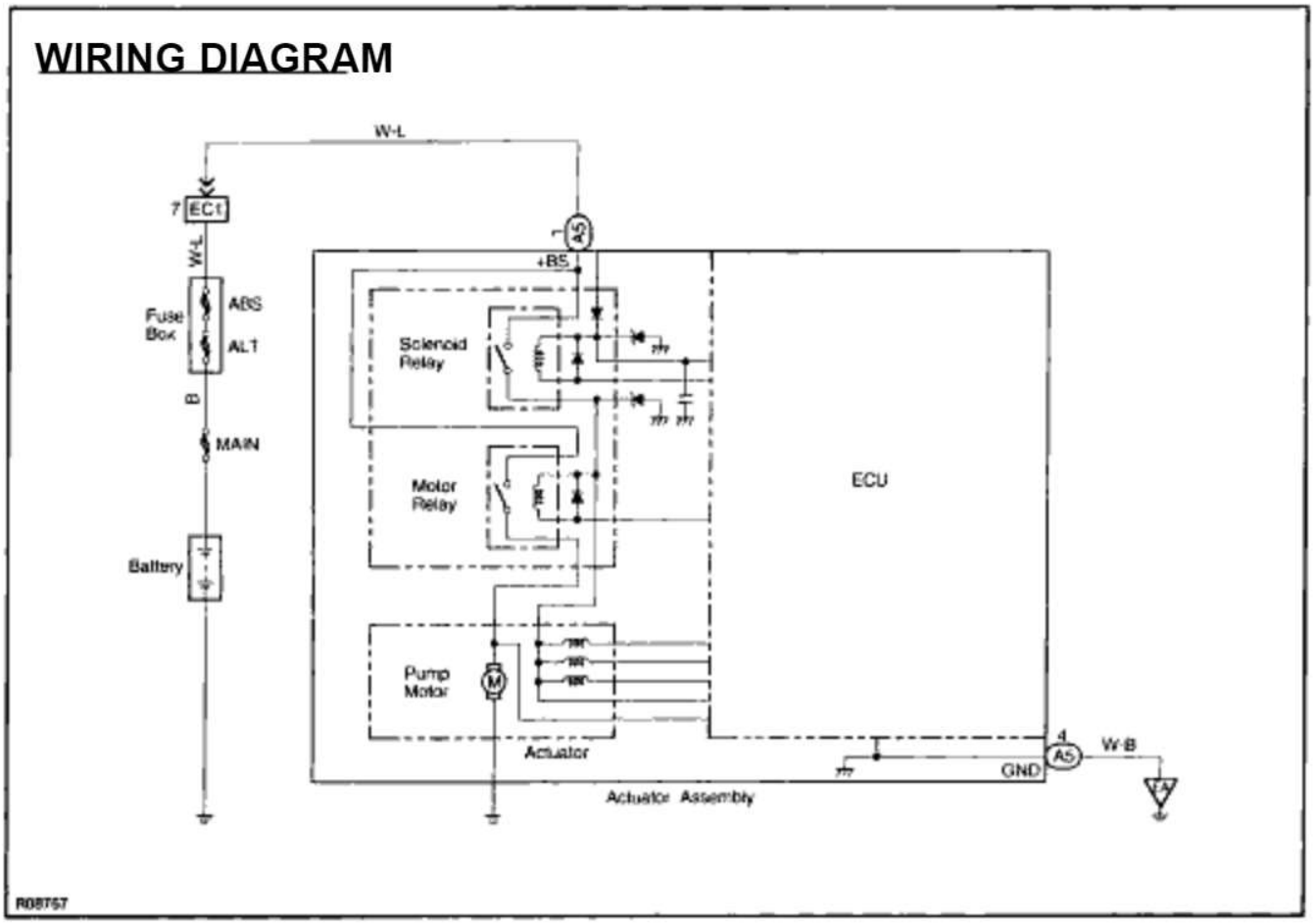
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
41	(1) Voltage of 5V or more, or 9.4V or less, is applied for at least 60 sec. to terminal +BS before the ABS primary check and ABS operation. (2) Voltage of 5V or more, or 9.4V or less, is applied to terminal +BS for 0.2 sec. or more, after the ABS primary check and before ABS operation. (3) During ABS operation, voltage of 5V or more, or 8.8V or less, is applied to terminal +BS for 0.2 sec. or more.	• Battery. • IC regulator. • Open or short in power source circuit. • ECU.

Fail safe function: If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.
If the voltage applied to terminal +BS becomes 9.9V or less, the warning light goes off and ABS control becomes possible.

DIAGNOSTIC CHART



WIRING DIAGRAM



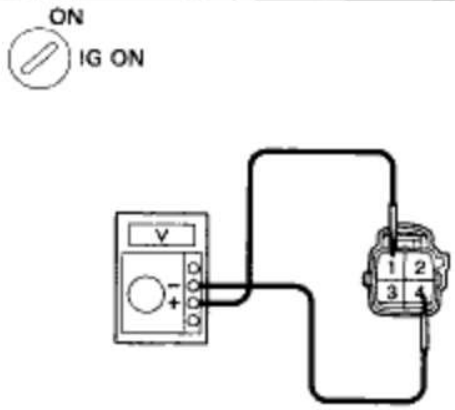
INSPECTION PROCEDURE

1 Check battery positive voltage.

OK Voltage: 10–14 V

OK → NG: Check and repair the charging system.

2 Check voltage between terminals +BS and GND of ABS ECU connector.



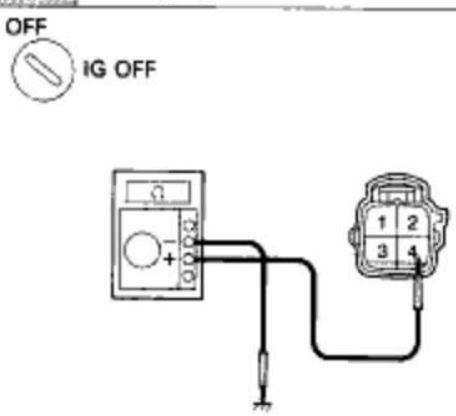
P Disconnect ABS ECU connector.

C
1. Turn ignition switch ON.
2. Measure voltage between terminals IG1 and GND of ABS ECU connector.

OK Voltage: 10–14 V

OK → NG: Check and replace ABS ECU.

3 Check continuity between terminal GND of ABS ECU connector and body ground.

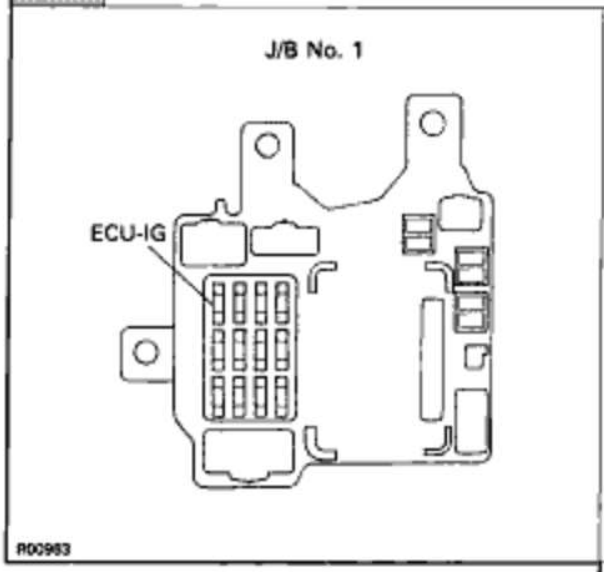


C Measure resistance between terminal GND of ABS ECU connector and body ground.

OK Resistance: 1Ω or less

OK → NG: Repair or replace harness or connector.

4 Check ECU–IG fuse.



P Remove ECU–IG fuse from J/B No. 1.

C Check continuity of ECU–IG fuse.

OK **Continuity**

NG → **Check for short in. a1l the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK →

Check for open in harness and connector between ABS ECU and battery (See page IN–28).

DTC 51 ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC 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 current to the solenoid relay and prohibits ABS control.

DIAGNOSTIC CHART

Check that the pump motor ground wire is installed correctly.
If it is OK, replace the ABS actuator assembly.

Stop Light Switch Circuit

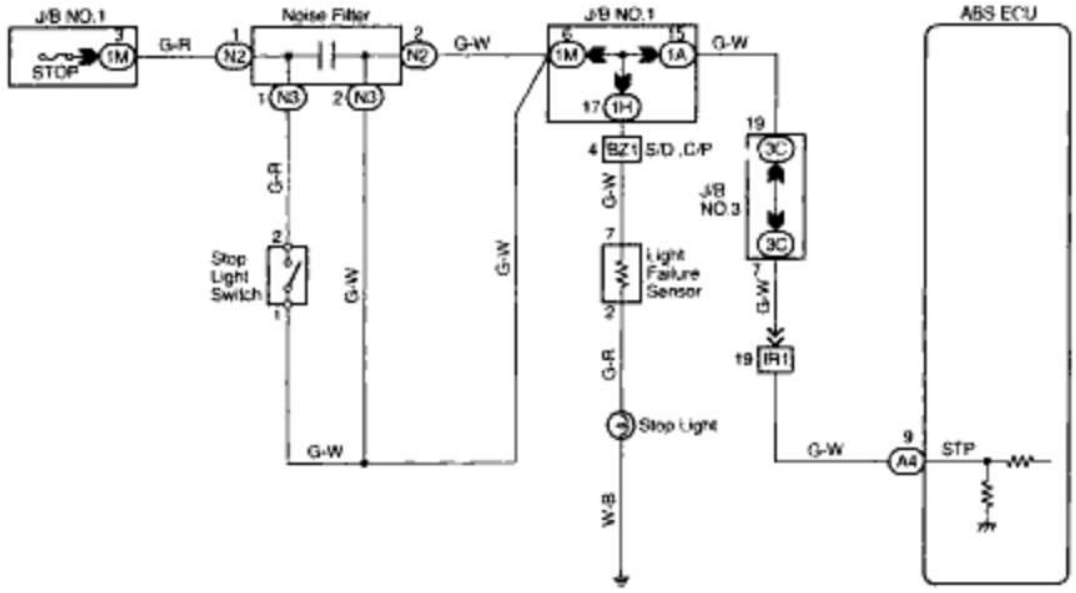
CIRCUIT DESCRIPTION

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

DIAGNOSTIC CHART

1	Check operation of stop light.	NG	Repair stop light circuit (See page BE–65).
	OK		
2	Check voltage of terminal STP.	OK	Proceed to next circuit inspection shown on problem symptoms chart (See page BR–148y.
	NG		
3	Check for open in harness and connector between ABS ECU and stop light switch (See page IN–27).	NG	Repair–or replace harness or connector.
	OK		
	Check and replace ABS ECU.		

WIRING DIAGRAM



R08760

INSPECTION PROCEDURE

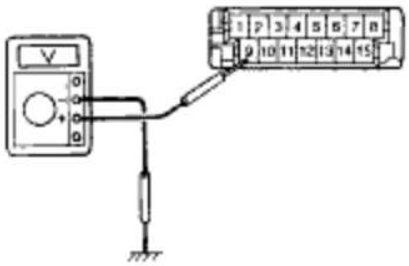
1 Check operation of stop light.

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 connector and body ground.



F088793

P Disconnect ABS ECU connector.

C Measure voltage between terminal STP and body ground.

OK Voltage: 8–14 V

NG

OK → Proceed to next circuit inspection shown on problem symptoms chart (See page BR–148).

3 Check for open in harness and connector between ABS ECU and stop light switch (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

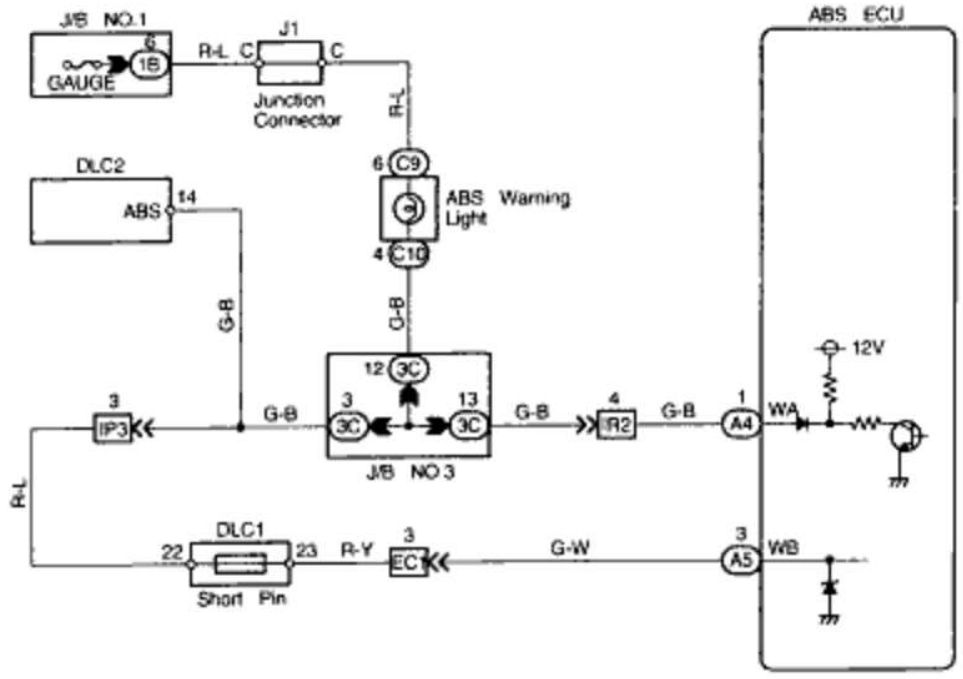
If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a diagnostic trouble code in memory.
Connect terminals Tc and E1 of the DLC1 or DLC2 to make the ABS warning light to blink and output the diagnostic trouble code.

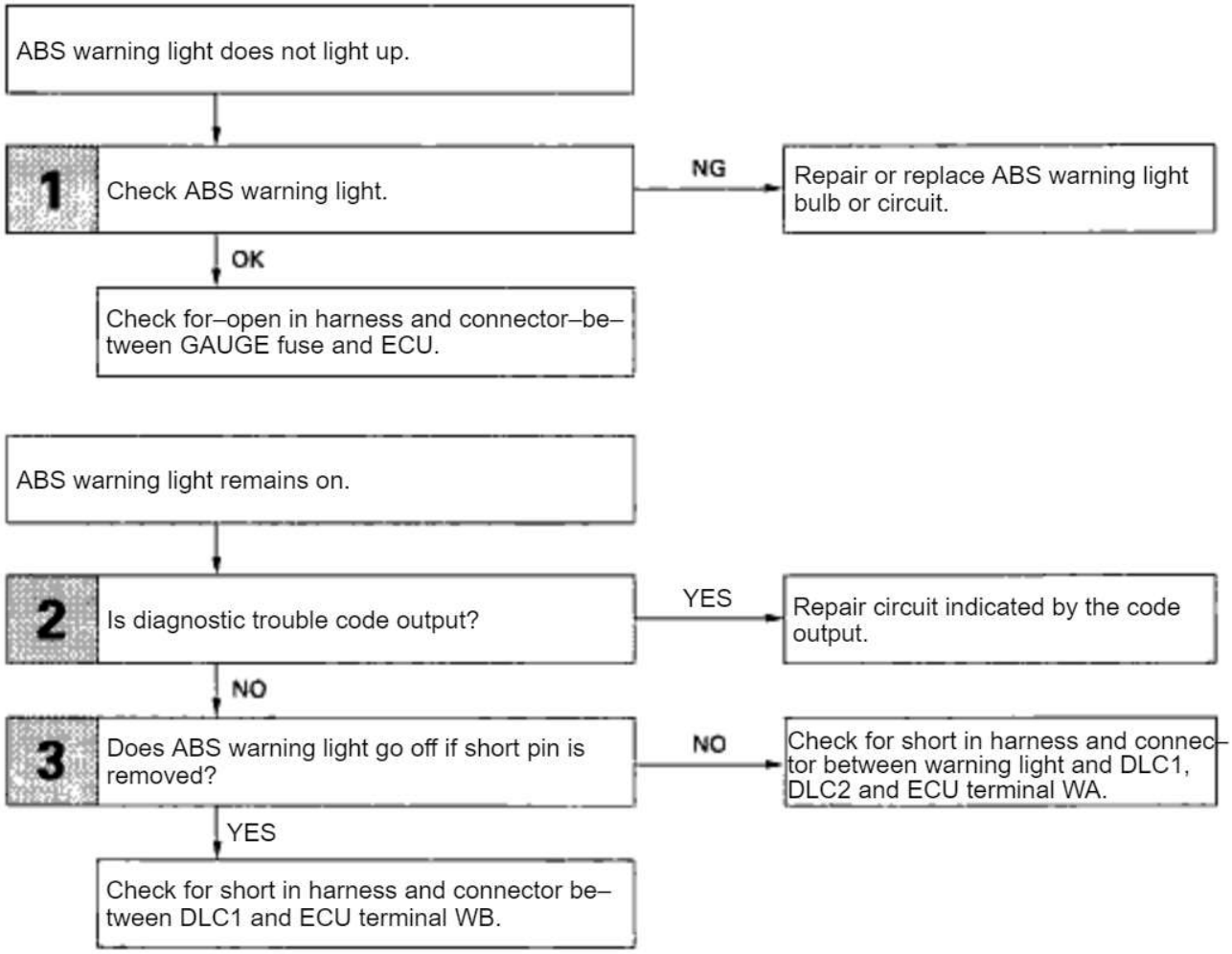
DIAGNOSTIC CHART

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 2

WIRING DIAGRAM




ABS warning light does not light up.
1
Check ABS warning light.
NG
Repair or replace ABS warning light bulb or circuit.
OK
Check for–open in harness and connector–between GAUGE fuse and ECU.
ABS warning light remains on.
2
Is diagnostic trouble code output?
YES
Repair circuit indicated by the code output.
NO
3
Does ABS warning light go off if short pin is removed?
NO
Check for short in harness and connector between warning light and DLC1, DLC2 and ECU terminal WA.
YES
Check for short in harness and connector between DLC1 and ECU terminal WB.

INSPECTION PROCEDURE

1 Check ABS warning light.

See Combination Meter–Troubleshooting on page BE–1 18.

OK

NG → Replace bulb or combination meter assembly.

Check for open in harness and connector between GAUGE fuse and ECU (See page IN–27).

2 Is diagnostic trouble code output?

Perform diagnostic trouble code check on page BR–143.

NO

YES → Repair circuit indicated by the code output.

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

YES

NO → Check for short in harness and connector between warning light and DLC1, DLC2 and ECU terminal WA (See page IN–28).

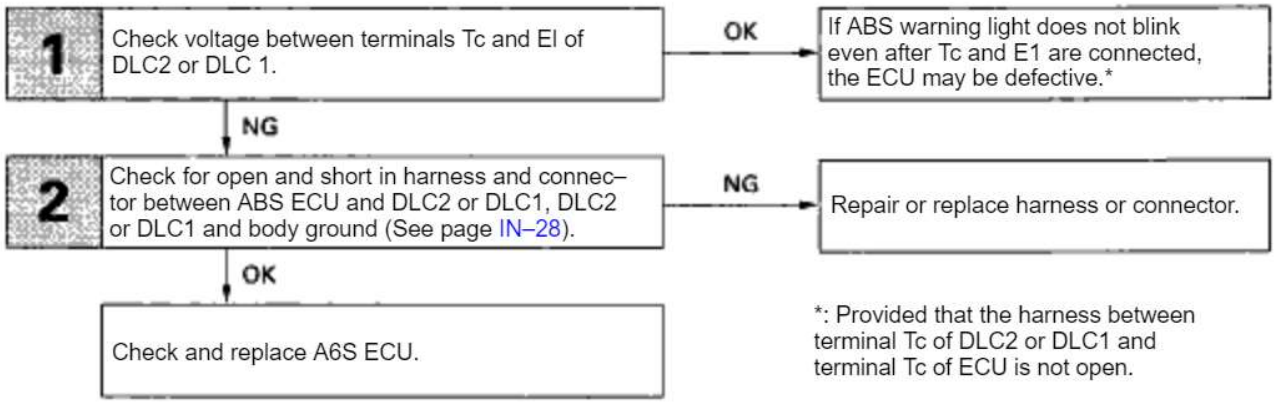
Check for short in harness and connector between DLC1 and ECU terminal WB (See page IN–27).

Terminal Circuit

CIRCUIT DESCRIPTION

Connecting terminals Te and E1 of the DLC1 or the DLC2 causes the ECU to display the diagnostic trouble code by flasing the ABS warning light.

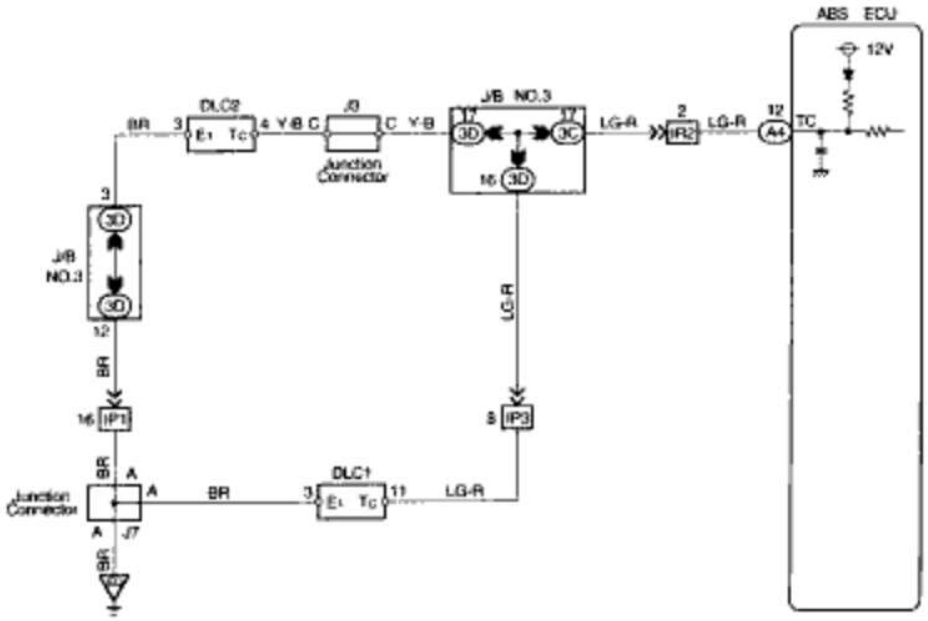
DIAGNOSTIC CHART



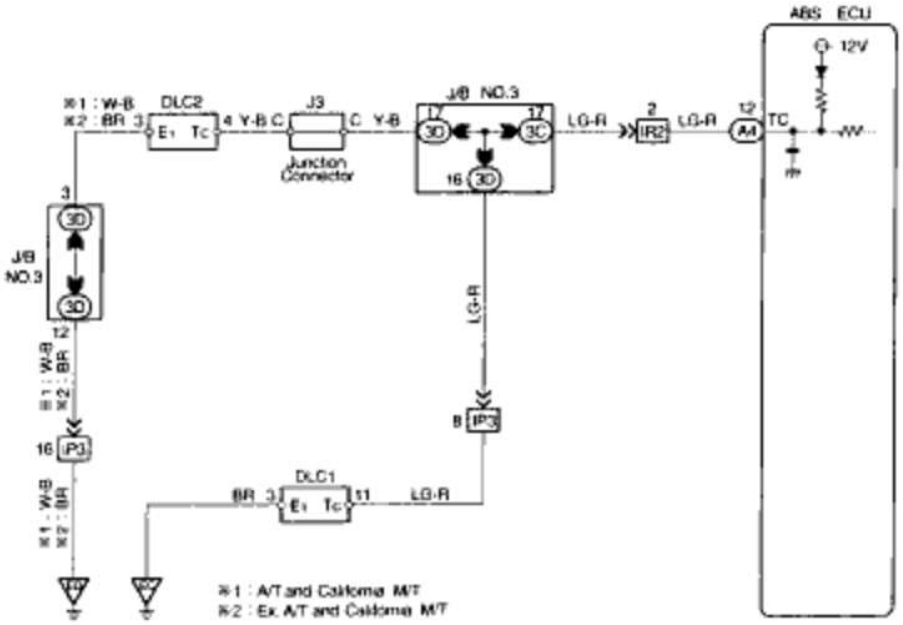
*: Provided that the harness between terminal Tc of DLC2 or DLC1 and terminal Tc of ECU is not open.

WIRING DIAGRAM

1 M^–FE:



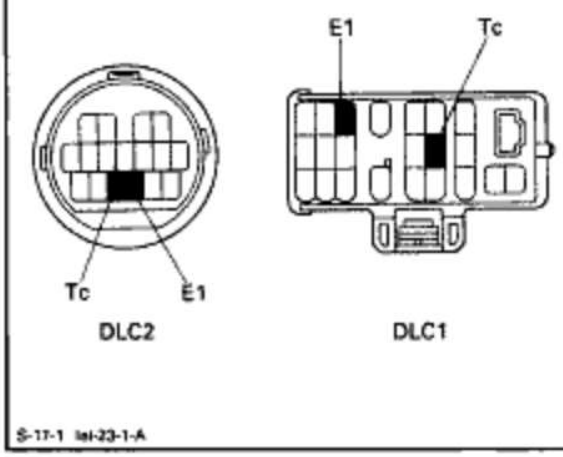
5S–FE:



R08762
R08763

INSPECTION PROCEDURE

1 Check voltage between terminals Te and E1 of DLC2 or DLC1.



C
1. Turn ignition switch ON.
2. Measure voltage between terminals Tc and E1 of DLC2 or DLC1.

OK
Voltage: 10–14 V

NG

OK → If ABS warning light does not blink even after Tc and E 1 are connected, the ECU may be defective.

2 Check for open and short in harness and connector between ABS ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

Ts Terminal Circuit

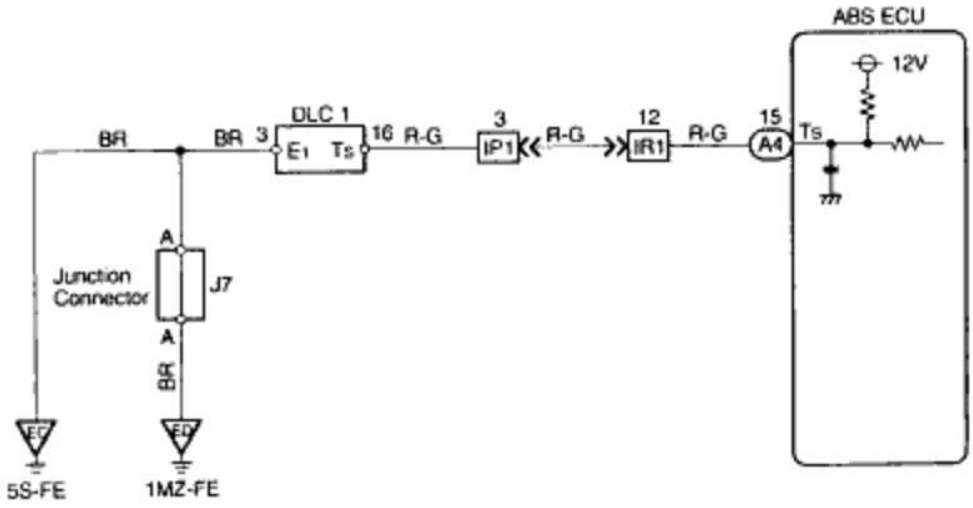
CIRCUIT DESCRIPTION

The sensor check circuit detects abnormalities in the speed sensor signal which can not be detected with the diagnostic trouble code check.
Connecting terminals Ts and E1 of the DLC1 in the engine compartment starts the check.

DIAGNOSTIC CHART

1	Check voltage between terminals Ts and E1 of DLC1.	OK	If ABS warning light does not blink even after Ts and E1 are connected, the ECU may be defective.
NG			
2	Check for open and short in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–28).	NG	Repair or replace harness or connector.
OK			
Check and replace ABS ECU.			

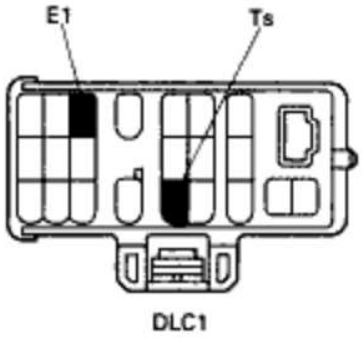
WIRING DIAGRAM



R06784

INSPECTION PROCEDURE

1 Check voltage between terminals¿¿and E1 of DLC1.



C
1. Turn ignition switch ON.
2. Measure voltage between terminals Ts and E1 of DLC 1.

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 DLC1, DLC1 and body ground (See page IN–28).

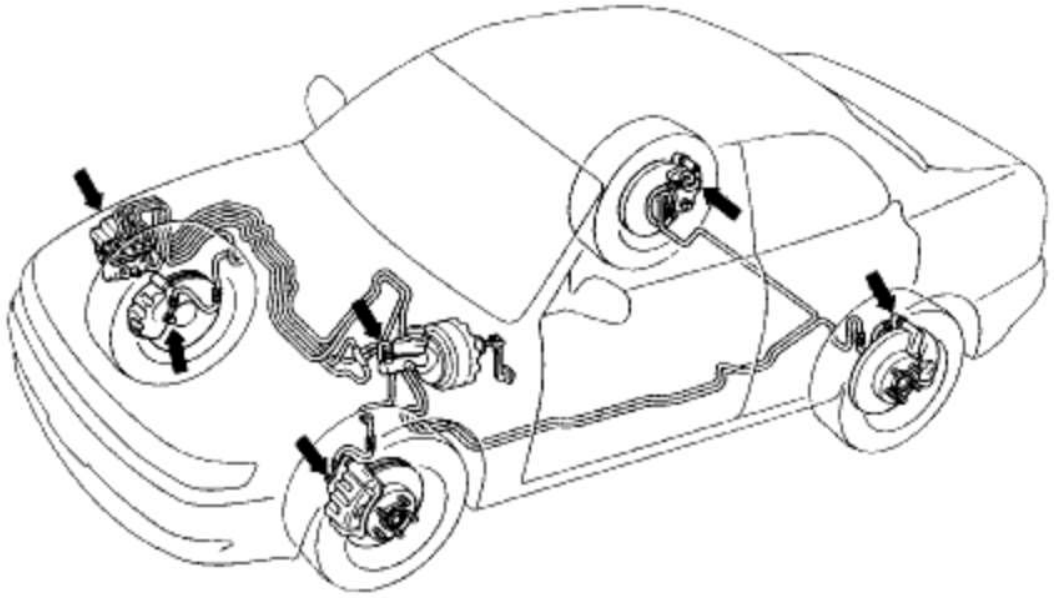
OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

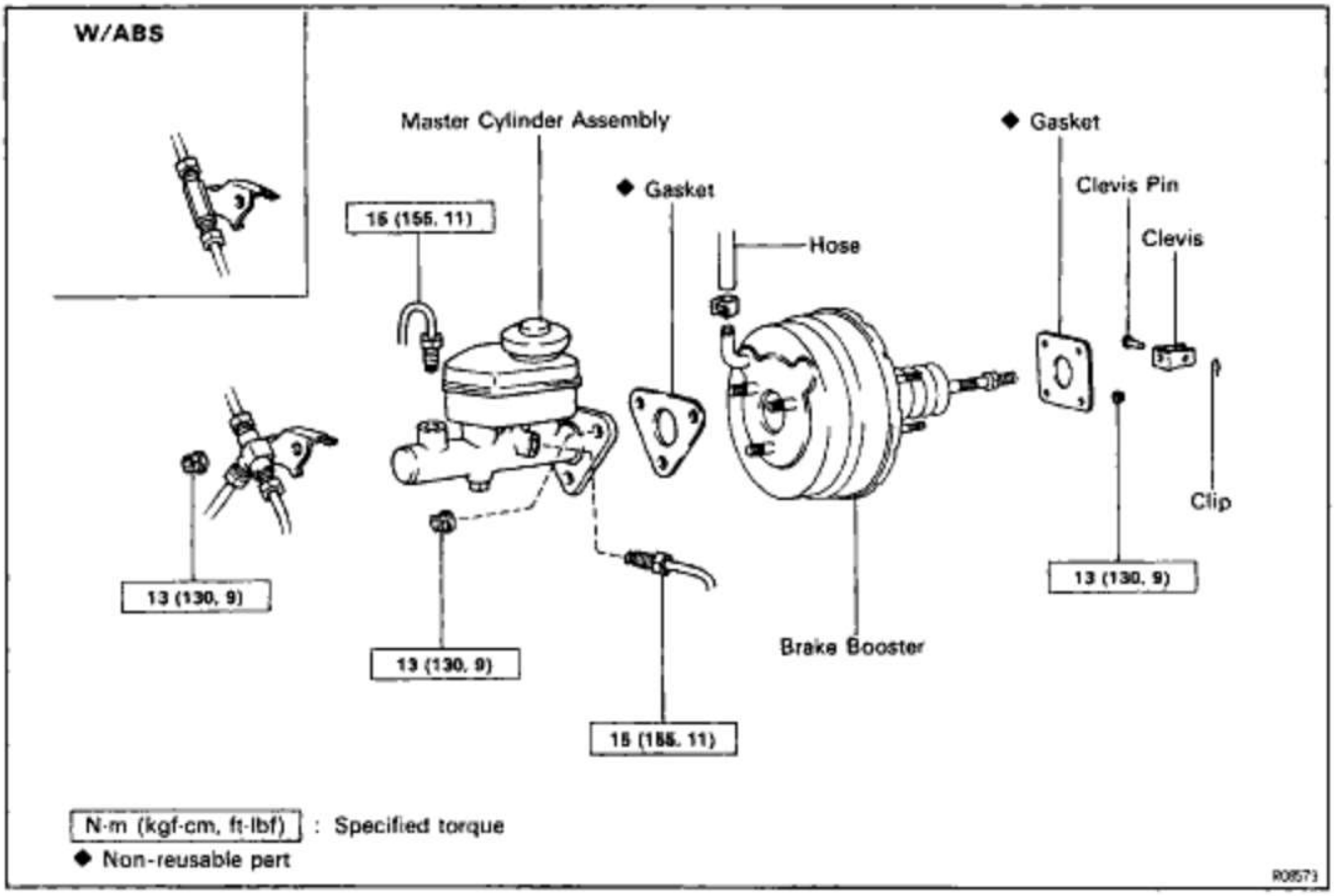
Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



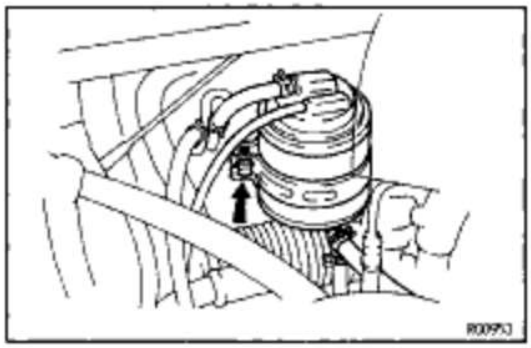
BRAKE BOOSTER

BRAKE BOOSTER REMOVAL

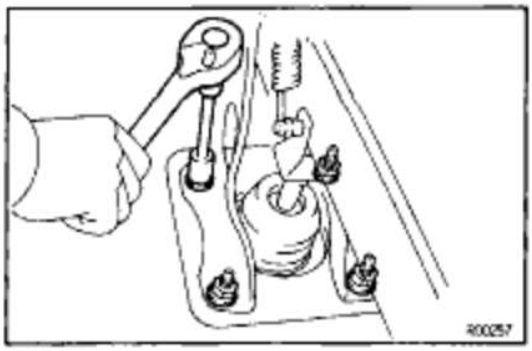




1. REMOVE MASTER CYLINDER
(See page BR–12)



2. PUSH DOWN CHARCOAL CANISTER
Loosen the clamp screw and push the charcoal canis–ter down slightly.



3. DISCONNECT VACUUM HOSE FROM BRAKE BOO – STER

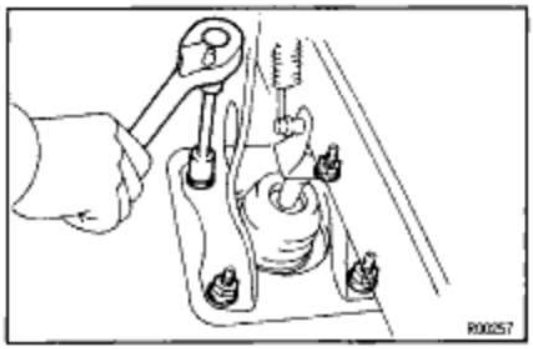
4. REMOVE PEDAL RETURN SPRING

5. REMOVE CLIP AND CLEVIS PIN

6. REMOVE BRAKE BOOSTER, GASKET AND CLEVIS

(a) Remove the 4 nuts and clevis.

(b) Pull out the brake booster and gasket.



BRAKE BOOSTER INSTALLATION

1. INSTALL BRAKE BOOSTER

(a) Install the booster and a new gasket.

(b) Install the clevis to the operating rod.

(c) Install and torque the booster installation nuts.

Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)

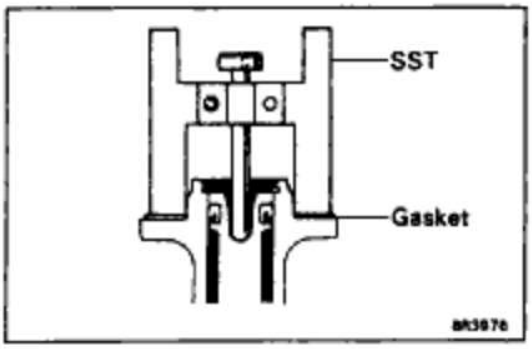
(d) Install the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin.

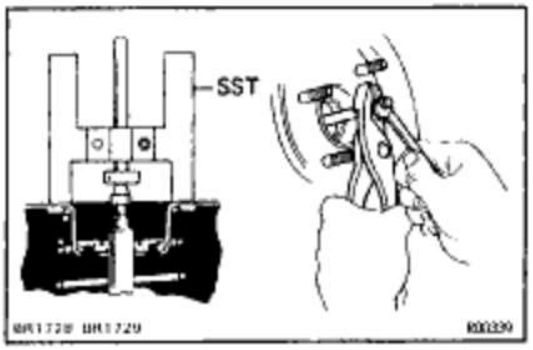
(e) Install the pedal return spring.

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.





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

(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 slightly touches the pin head.

3. INSTALL CHARCOAL CANISTER TO ORIGINAL PO– SITION

4. INSTALL MASTER CYLINDER

5. CONNECT VACUUM HOSE TO BRAKE BOOSTER

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

(See page BR–9)

7. CHECK FOR LEAKS

8. CHECK AND ADJUST BRAKE PEDAL

(See page BR–8)

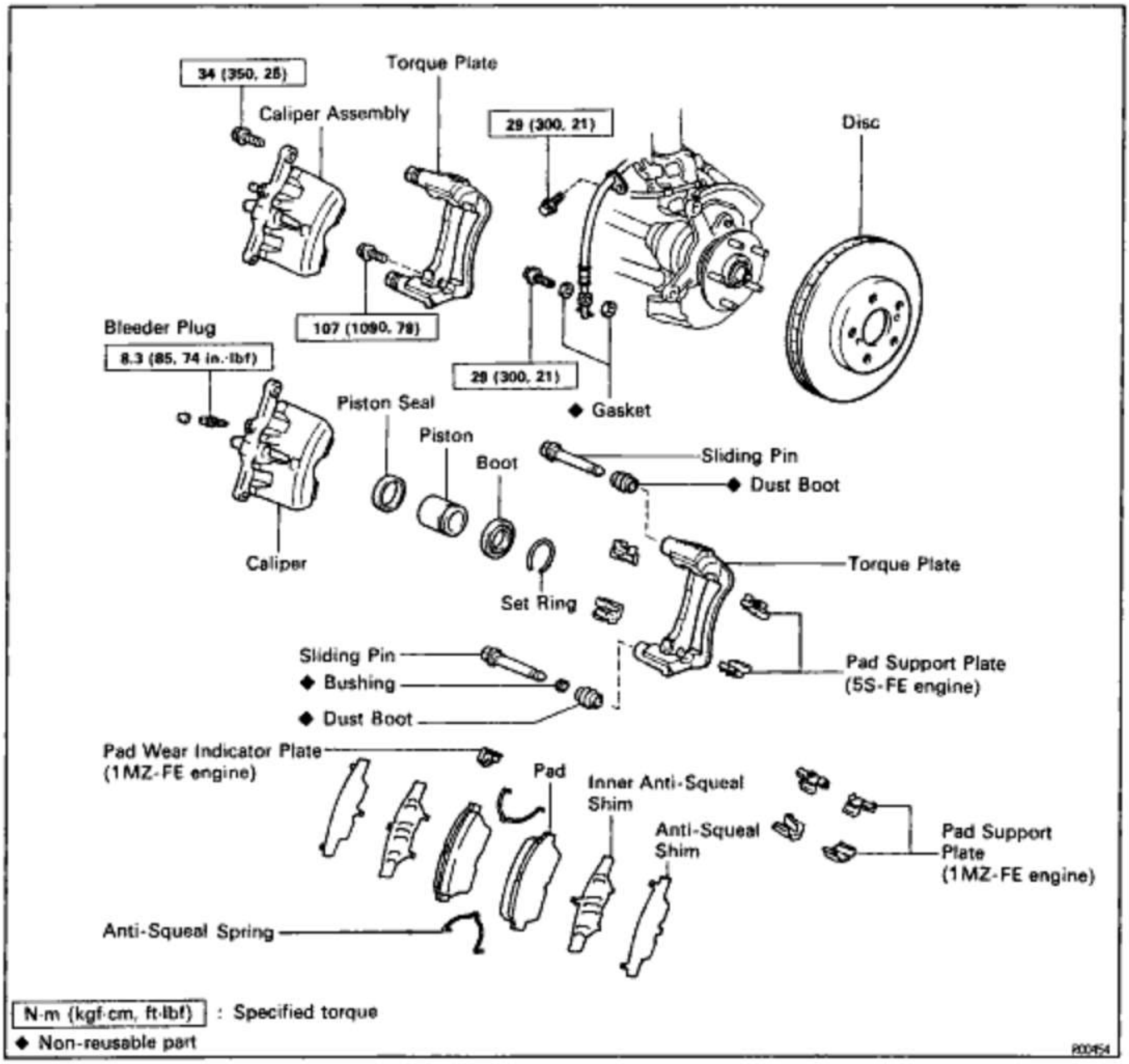
Check and adjust the brake pedal, then tighten the clevis lock nut.

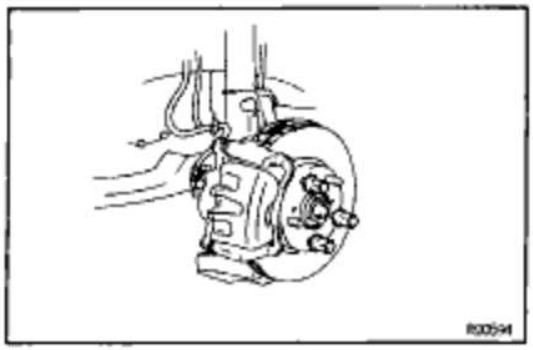
Torque: 25 N–m (260 kgf–cm, 19 ft–lbf)

9. PERFORM OPERATIONAL CHECK

(See page BR–9)

FRONT BRAKE
(Single–Piston Type)
COMPONENTS

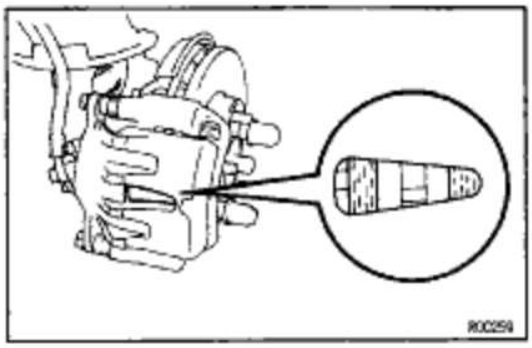




BRAKE PADS REPLACEMENT

1. REMOVE FRONT WHEEL

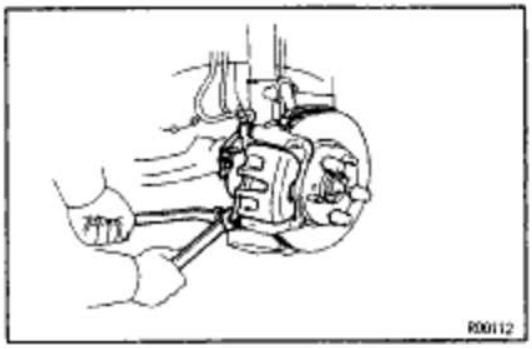
Remove the wheel and temporarily fasten the disc with hub nuts.



2. INSPECT PAD LINING THICKNESS

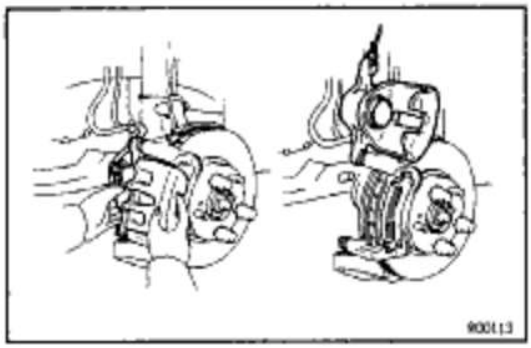
Check the pad thickness through the caliper inspection hole and replace the pads if it is not within the specification.

Minimum thickness:
1.0 mm (0.039 in.)



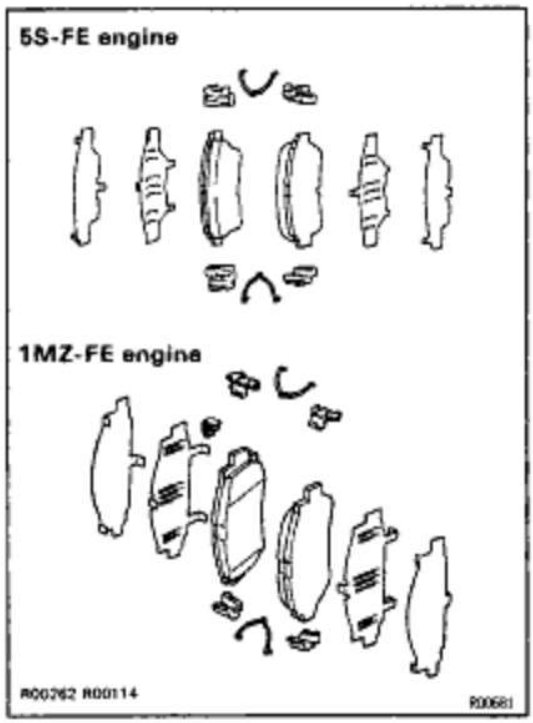
3. LIFT UP CALIPER

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



(c) Lift up the caliper and suspend the caliper with string.

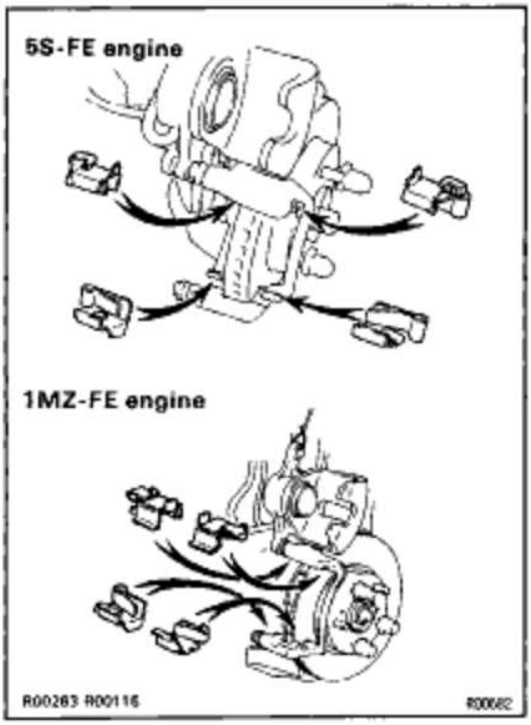
HINT: Do not disconnect the flexible hose from the caliper.



4. REMOVE FOLLOWING PARTS:

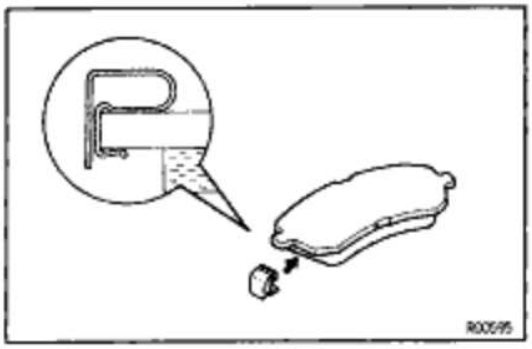
(a) 2 anti–squeal springs
(b) 2 brake pads
(c) 4 anti–squeal shims
(d) 1 MZ–FE engine:
Pad wear indicator
(e) 4 pad support plates

5. CHECK DISC THICKNESS AND RUNOUT
(See page BR–26)



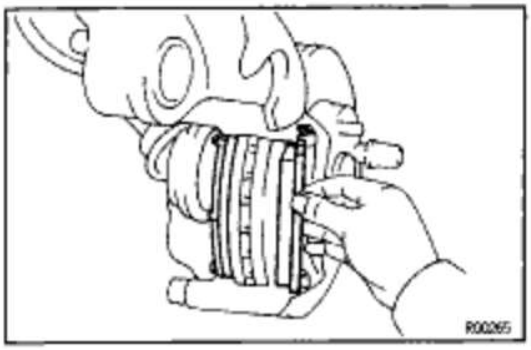
6. INSTALL PAD SUPPORT PLATES

Install the 4 pad support plates.



7. INSTALL NEW PADS

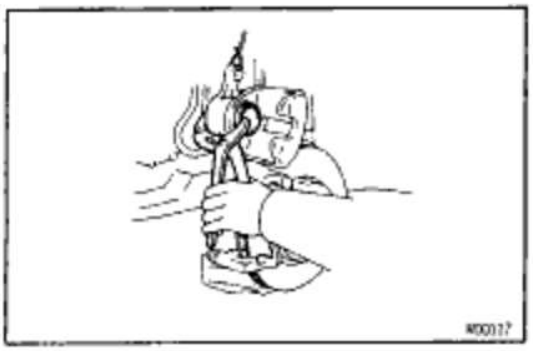
(a) 1 MZ–FE engine:
Install a pad wear indicator plate on the inside pad.
(b) Apply disc brake grease to both sides of the inner anti –squeal shim.
(c) Install the 2 anti–squeal shims on each pad.



(d) install inside pad with the pad wear indicator plate facing upward.
(e) Install outside pad.

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

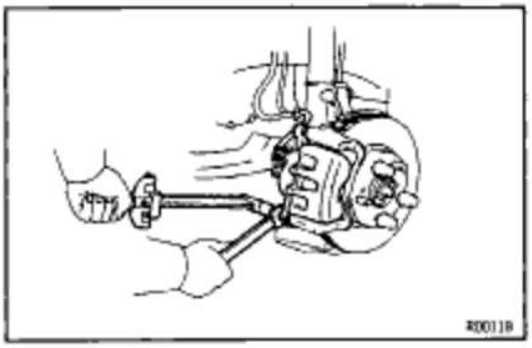
(f) Install the 2 anti–squeal springs.



8. INSTALL CALIPER

(a) Draw out a small amount of brake fluid from the reservoir.
(b) Press in the piston with water pump pliers or similar implement.

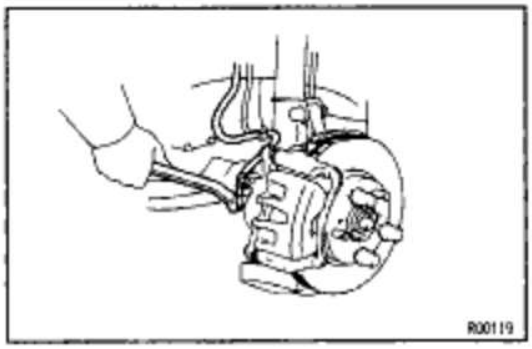
HINT: If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.



(c) Install the caliper.
(d) Hold the sliding pin and torque the installation bolt.
Torque: 34 N–m (350 kgf–cm, 25 ft–lbf)

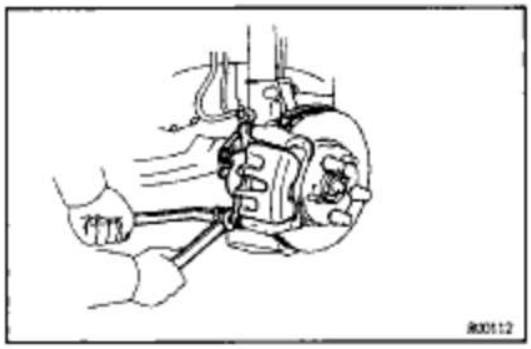
9. INSTALL FRONT WHEEL

10. CHECK THAT FLUID LEVEL IS AT MAX LINE

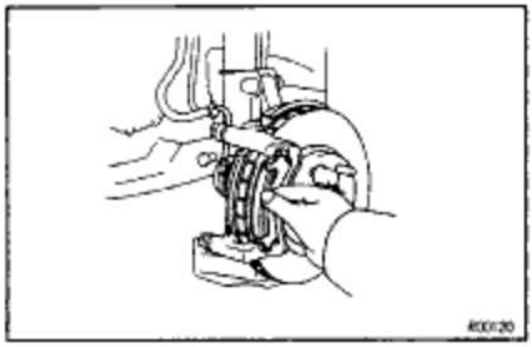


CALIPER REMOVAL

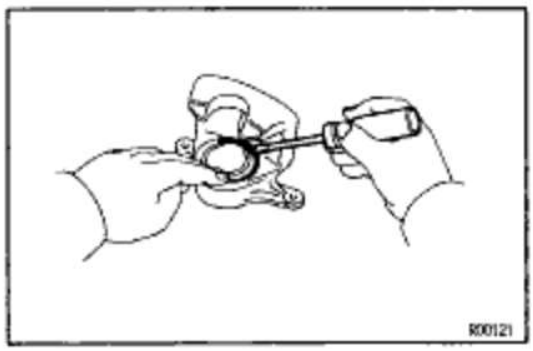
1. DISCONNECT FLEXIBLE HOSE
(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.
(b) Use a container to catch the brake fluid as it drains out.



2. REMOVE CALIPER
(a) Hold the sliding pin and loosen the 2 installation bolts.
(b) Remove the 2 installation bolts.
(c) Remove the caliper from the torque plate.



3. REMOVE 2 BRAKE PADS
Remove the inside and outside pads.



CALIPER DISASSEMBLY

1. REMOVE CYLINDER BOOT SET RING AND CYLIN–DER BOOT
Using a screwdriver, remove the cylinder boot set ring and cylinder boot from the caliper.

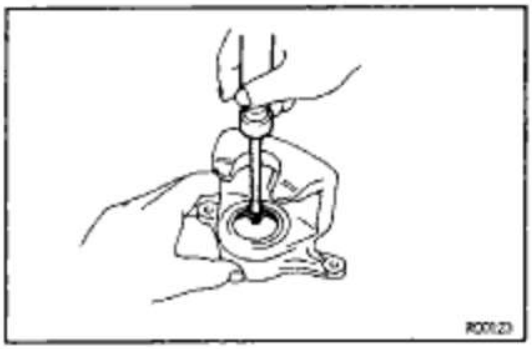


2. REMOVE PISTON

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

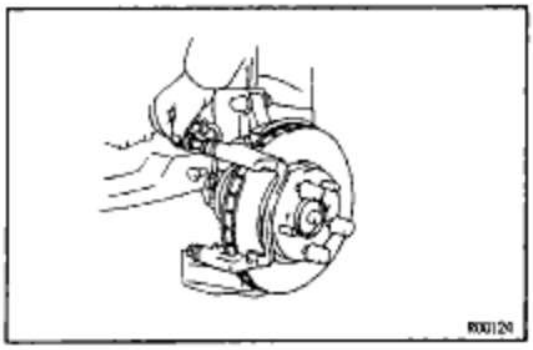
(b) Use compressed air to remove the piston from the cylinder.

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



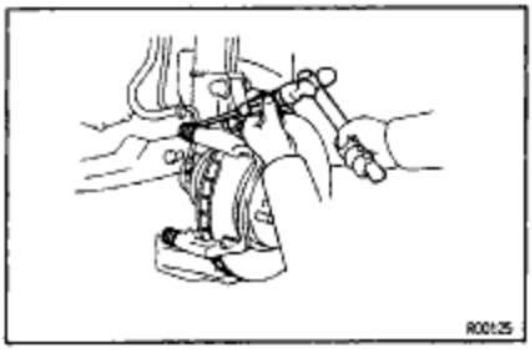
3. REMOVE PISTON SEAL

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

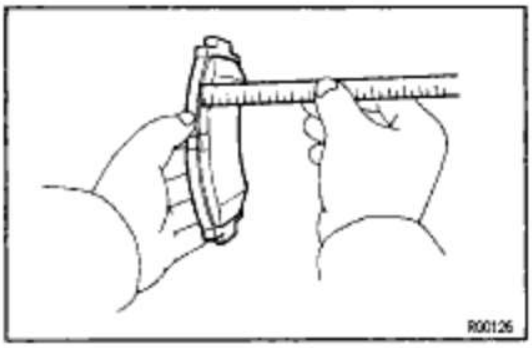


4. REMOVE SLIDING PINS AND DUST BOOTS

(a) Remove the 2 sliding pins from the torque plate.



(b) Using a screwdriver and hammer, tap out the 2 dust boots.



FRONT BRAKE COMPONENTS INSPECTION AND REPAIR

1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness:

5S–FE engine

12.0 mm (0.472 In.)

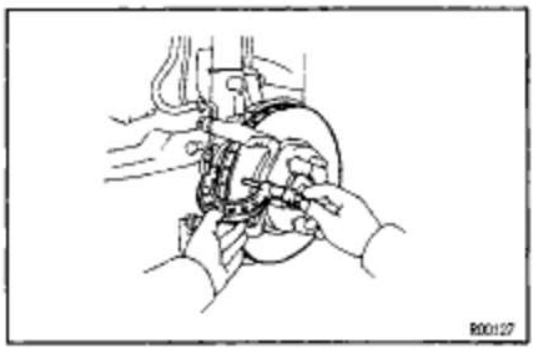
1 MZ–FE engine

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 mini–mum thickness or less, or if the pad has excessively uneven wear.



2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

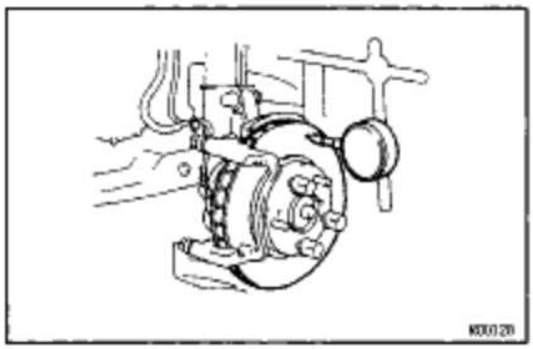
Standard thickness:

28.0 mm (1.102 in.)

Minimum thickness:

26.0 mm (1.024 in.)

Replace the disc if the disc's thickness is at the mini–mum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.



3. MEASURE DISC RUNOUT

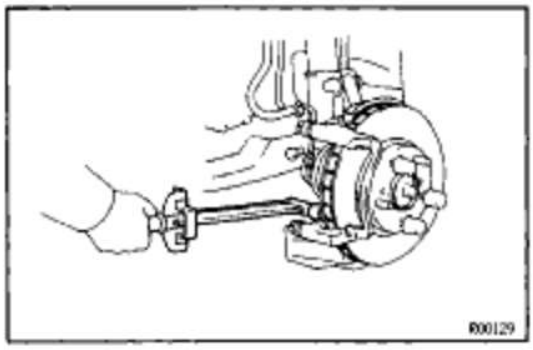
Measure disc runout 10 mm (0.39 in.) from the outer edge of the disc.

Maximum disc runout:

0.05 mm (0.0020 in.)

If runout is greater than maximum, attempt to adjust to below this maximum figure.

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



4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the torque plate from the knuckle.

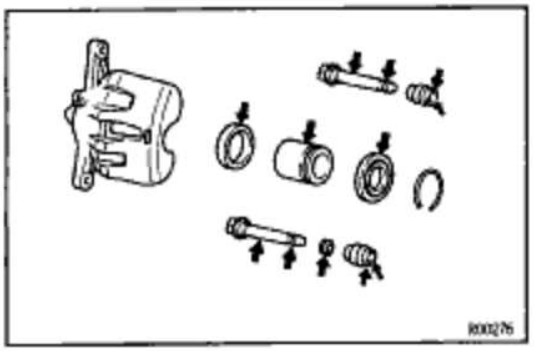
(b) Remove the hub nuts and the disc. Reinstall the disc 1/5 of a turn round from its original position on the hub. Install and torque the hub nuts.

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

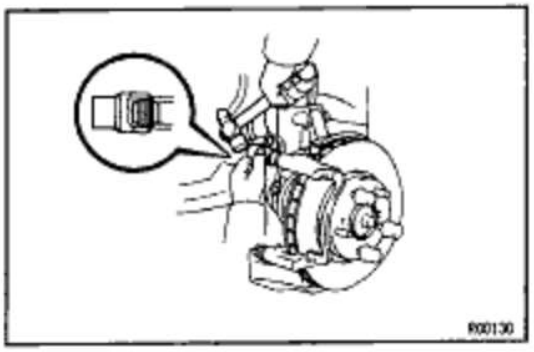
Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.
(d) If the minimum runout recorded in (b) and (c) is less than 0.05 mm (0.0020in.), install the disc in that position.
(e) If the minimum runout recorded in (b) and (c) is greater than 0.05 mm (0.0020 in.), replace the disc and repeat step 3.
(f) Install the torque plate and torque the mounting bolts.
Torque: 107 N–m (1,090 kgf–cm, 79 ft–lbf)

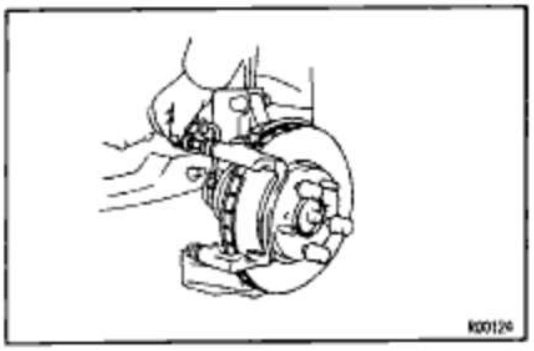
CALIPER ASSEMBLY



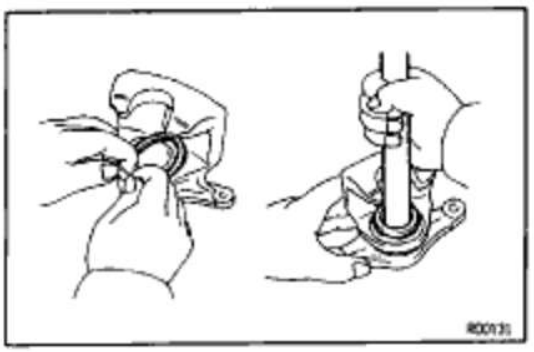
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



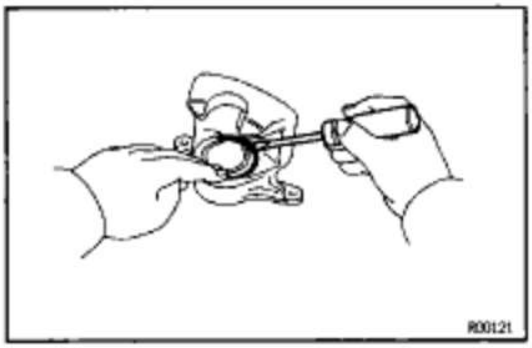
2. INSTALL DUST BOOTS AND SLIDING PINS
(a) Using a 19 mm socket wrench and hammer, tap in 2 new dust boots into the torque plate.
(b) Confirm that the metal plate portion of the dust boot fits snugly in the torque plate.



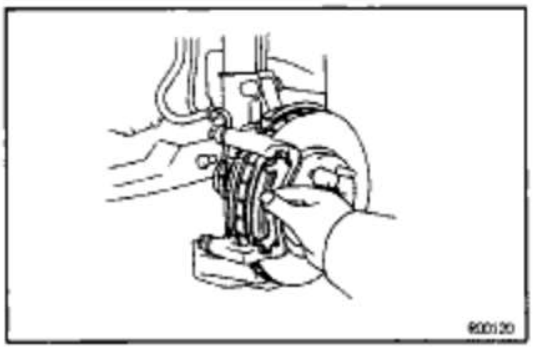
(c). Insert 2 sliding pins into the torque plate.
NOTICE: Insert the sliding pin with sliding bushing into the bottom side.



3. INSTALL PISTON SEAL AND PISTON IN CYLINDER



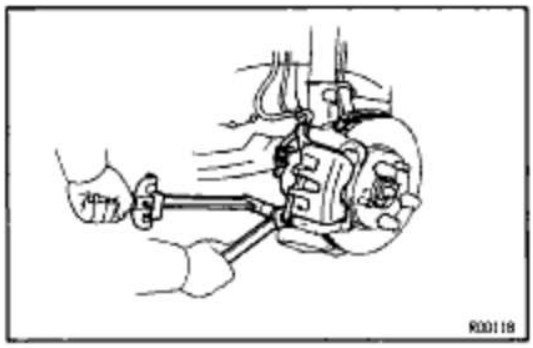
4. INSTALL CYLINDER BOOT AND CYLINDER BOOT SET RING



CALIPER INSTALLATION

1. INSTALL 2 BRAKE PADS

Install the inside and outside pads.

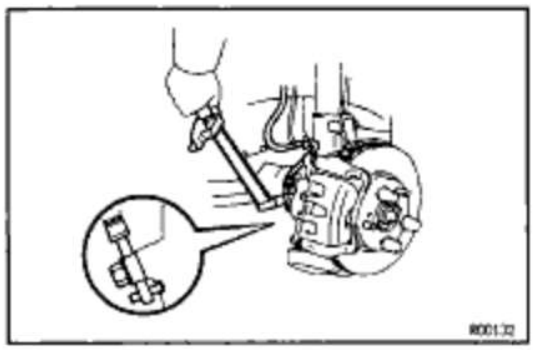


2. INSTALL CALIPER

(a) Temporarily install the caliper on the torque plate with the 2 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 caliper with 2 new gaskets.

Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)

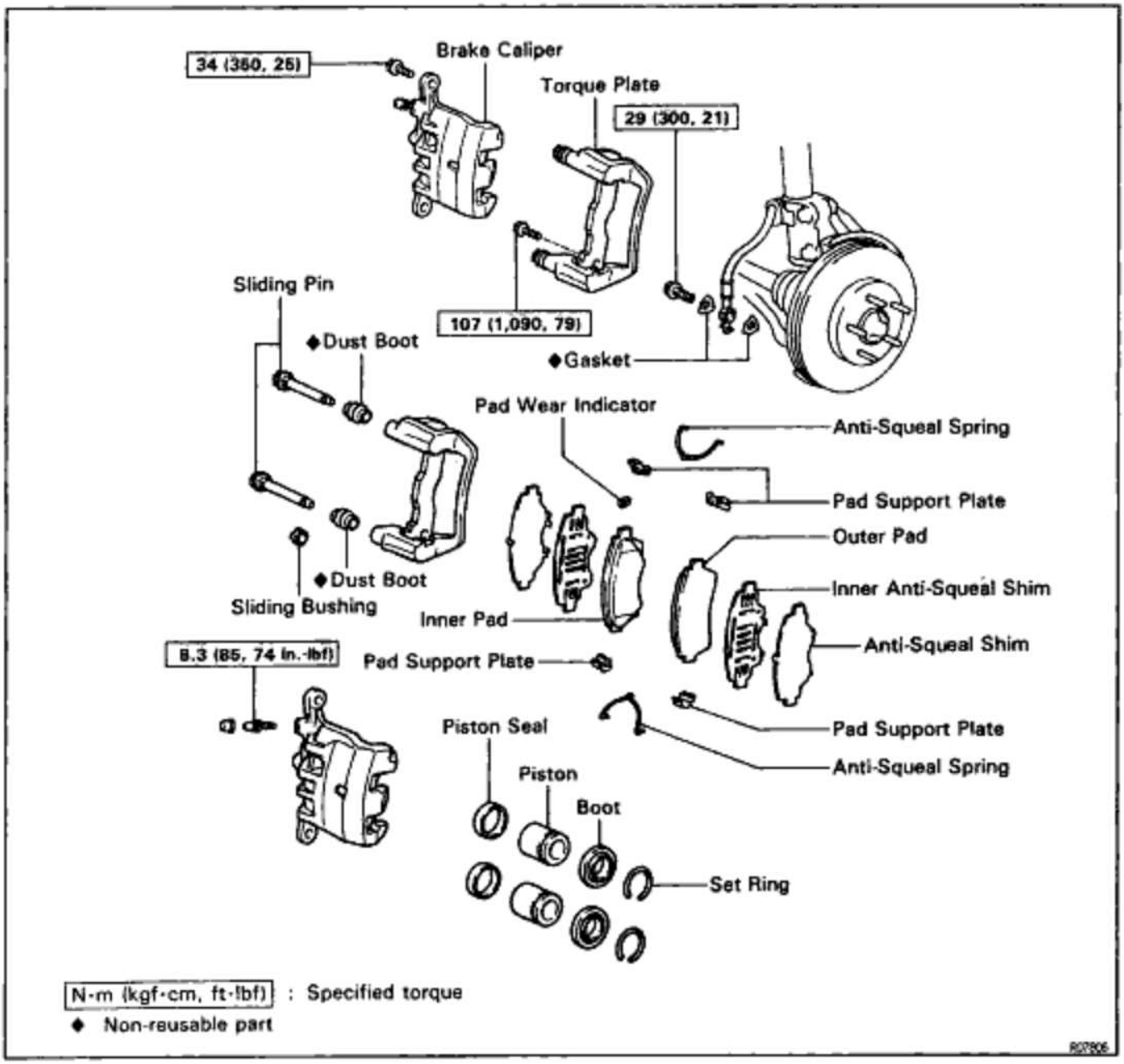
HINT: Install the flexible hose lock securely in the lock hole in the caliper.

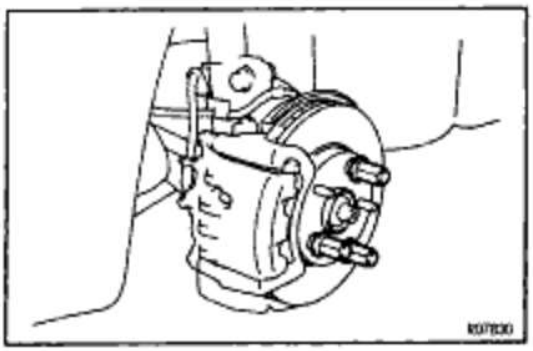
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page BR–9)

5. CHECK FOR LEAKS

FRONT BRAKE (2–Piston Type) COMPONENTS

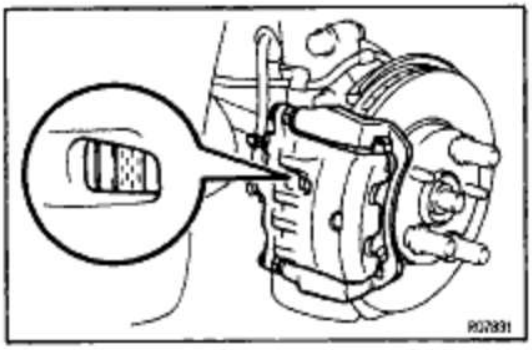




BRAKE PADS REPLACEMENT

1. REMOVE FRONT WHEEL

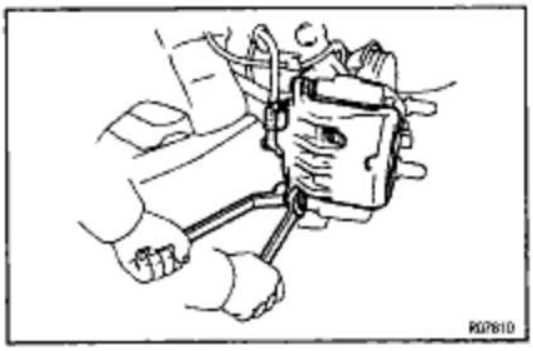
Remove the wheel and temporarily fasten the disc with the hub nuts.



2. INSPECT PAD LINING THICKNESS

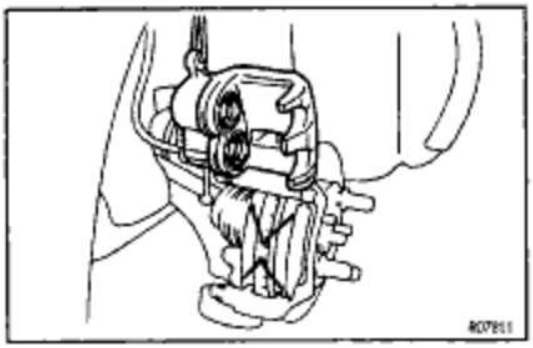
Check the pad thickness through the caliper inspection hole and replace the pads if it is not within the specification.

Minimum thickness:
1.0 mm (0.039 in.)



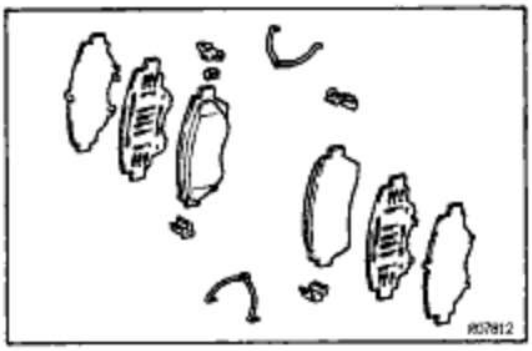
3. LIFT UP CALIPER

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



(c) Lift up and suspend the caliper.

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

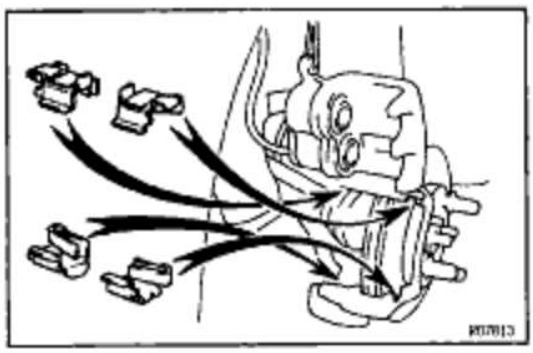


4. REMOVE FOLLOWING PARTS:

(a) 2 anti–squeal springs
(b) 2 brake pads
(c) 4 anti–squeal shims
(d) 4 pad support plates
(e) Pad wear indicator

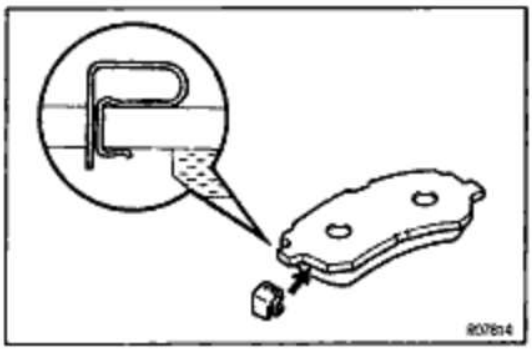
5. CHECK DISC THICKNESS AND RUNOUT

(See page BR–33)



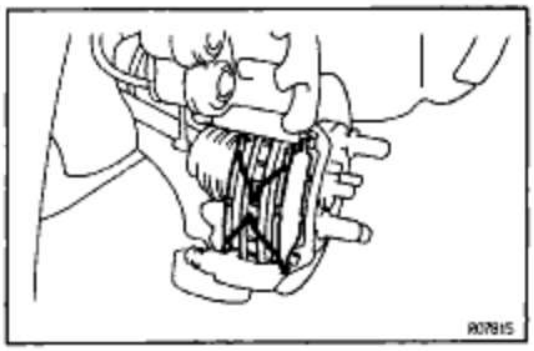
6. INSTALL PAD SUPPORT PLATES

Install the 4 pad support plates.



7. INSTALL NEW PADS

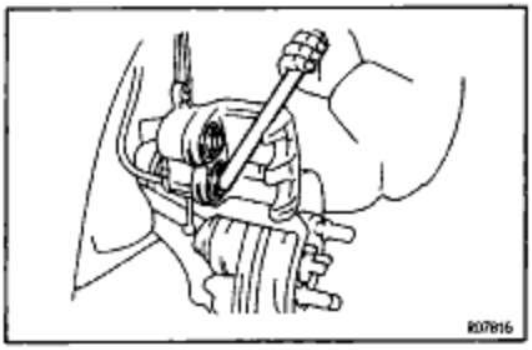
(a) Install the pad wear indicator plate on the pad.
(b) Apply disc brake grease to both sides of the inner anti–squeal shim.
(c) Install the 2 anti–squeal shims on each pad.



(d) Install the inner pad with the pad wear indicator plates facing upward.
(e) Install the outer pad.

NOTICE: There should be no oil or grease adhering to the friction surface's of the pads or the disc.

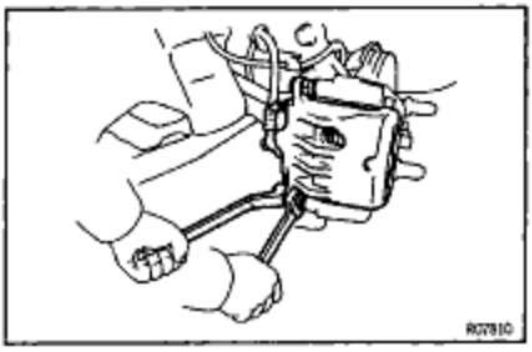
(f) Install the 2 anti–squeal springs.



8. INSTALL CALIPER

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

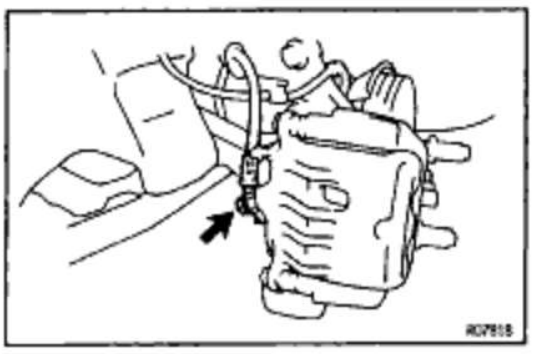


(c) Install the caliper.
(d) Hold the sliding pin and torque the installation bolt.

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

9. INSTALL FRONT WHEEL

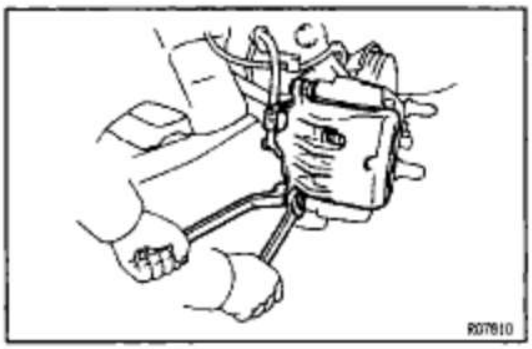
10. CHECK THAT FLUID LEVEL IS AT MAX LINE



CALIPER REMOVAL

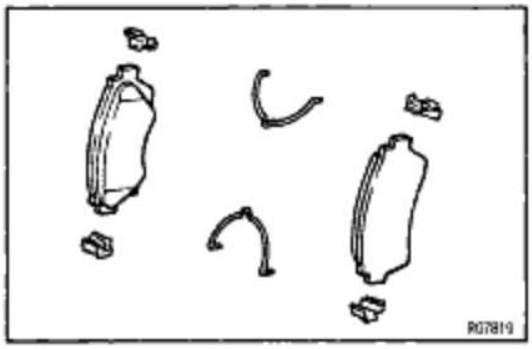
1. DISCONNECT FLEXIBLE HOSE

(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.
(b) Use a container to catch the brake fluid as it drains out.



2. REMOVE CALIPER

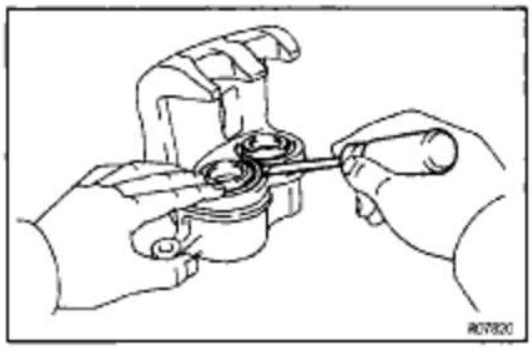
(a) Hold the sliding pin and loosen the 2 installation bolts.
(b) Remove the 2 installation bolts.
(c) Remove the caliper from the torque plate.



3. REMOVE FOLLOWING PARTS:

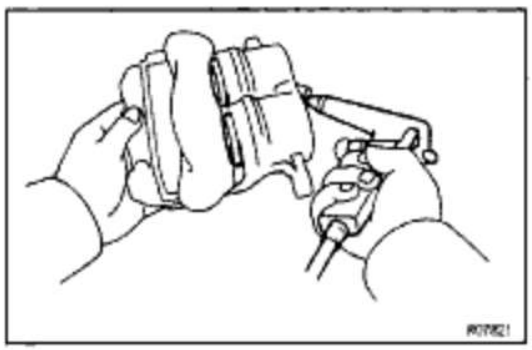
(a) 2 anti–squeal springs
(b) 2 brake pads with anti–squeal shims
(c) 4 pad support plates

CALIPER DISASSEMBLY



1. REMOVE CYLINDER BOOT SET RINGS AND CYLIN–DER BOOTS

Using a screwdriver, remove the 2 cylinder boot set rings and cylinder boots from the caliper.



2. REMOVE PISTONS

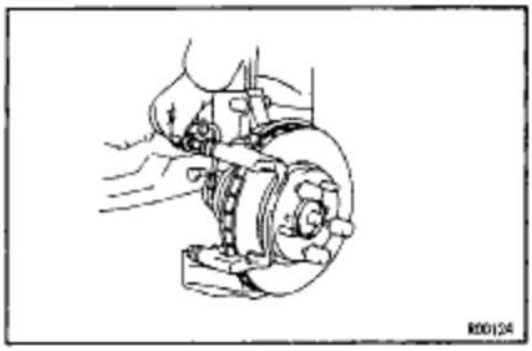
(a) Place a piece of cloth or similar article between the piston and caliper.
(b) Use compressed air to remove the pistons from the cylinder.

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



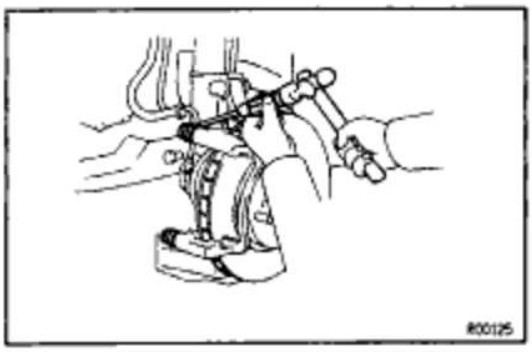
3. REMOVE PISTON SEALS

Using a screwdriver, remove the 2 piston seals from the cylinder.

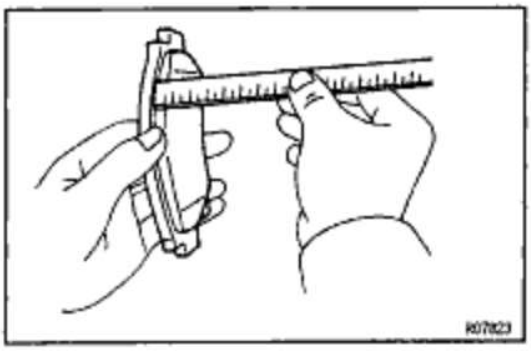


4. REMOVE SLIDING PINS AND DUST BOOTS

(a) Remove the 2 sliding pins from the torque plate.



(b) Using a screwdriver and hammer, tap out the 2 dust boots.



FRONT BRAKE COMPONENTS INSPECTION AND REPAIR

1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

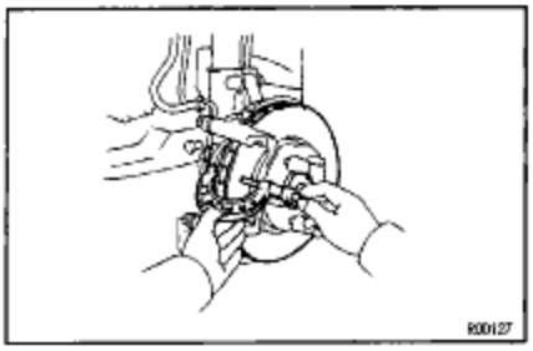
Standard thickness:

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 excessively uneven wear.



2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

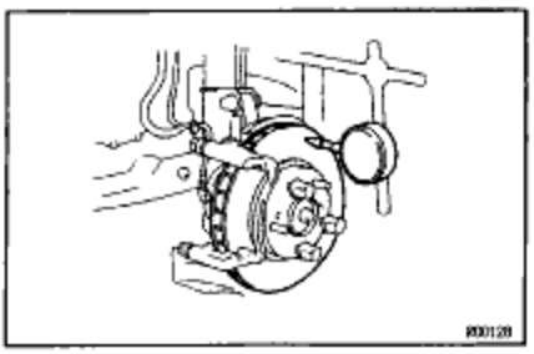
Standard thickness:

28 mm (1.102 in.)

Minimum thickness:

26 mm (1.024 in.)

Replace the disc if the disc's thickness is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.



3. MEASURE DISC RUNOUT

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

Maximum disc runout:

0.05 mm (0.0020 in.)

If runout is greater than maximum, attempt to adjust to below this maximum figure.

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

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the torque plate from the knuckle.

(b) Remove the hub nuts and the disc. Reinstall the disc 1/5 of a turn round from its original position on the hub. Install and torque the hub nuts.

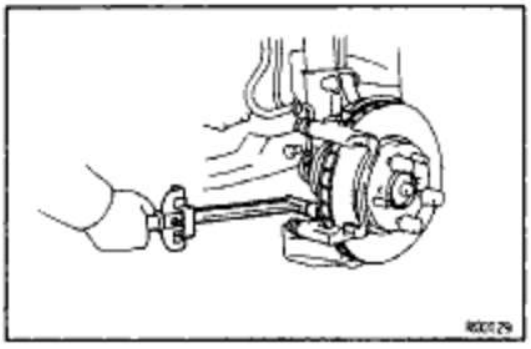
Torque: 103 N–m (1,050¿¿f¿cm, 76 ft–lbf)

Remeasure the disc runout. Make a note of the runout and disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.

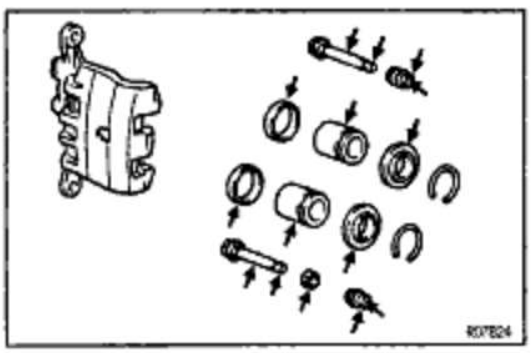
(d) If the minimum runout recorded in (b) and (c) is less than 0.05 mm (0.0020 in.), install the disc in that position.

(e) If the minimum runout recorded in (b) and (c) is greater than 0.05 mm (0.0020 in.), replace the disc and repeat step 3.



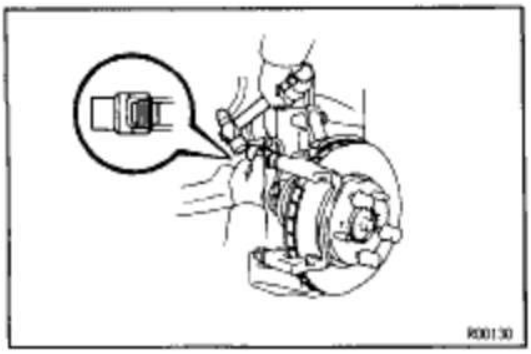
(f) Install the torque plate and torque the mounting bolts.

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



CALIPER ASSEMBLY

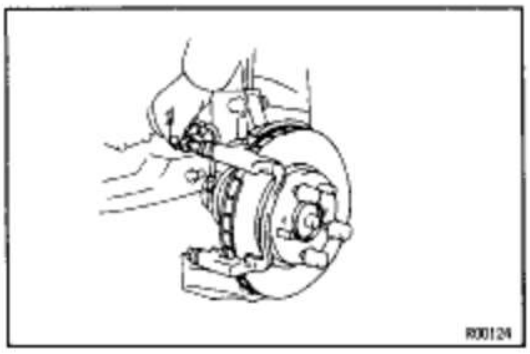
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



2. INSTALL DUST BOOTS AND SLIDING PINS

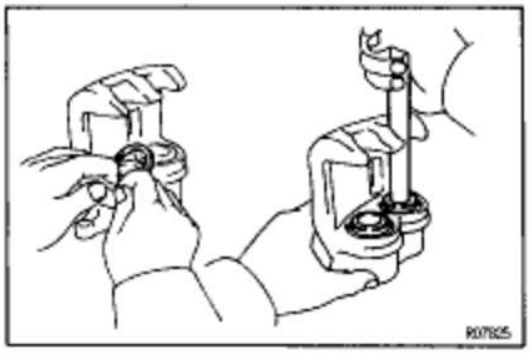
(a) Using a 19 mm socket and a hammer, tap in 2 new dust boots into the torque plate.

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

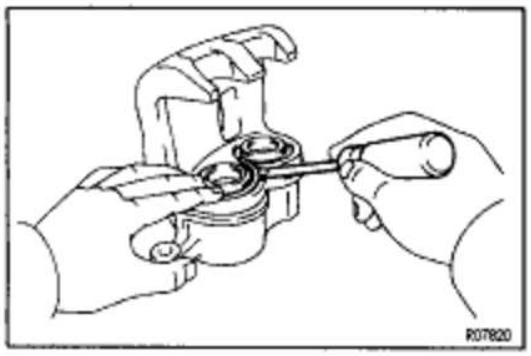


(c) Insert 2 sliding pins into the torque plate.

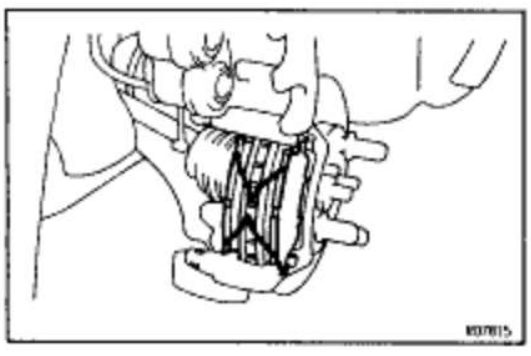
NOTICE: Insert the sliding pin with sliding bushing into the bottom side



3. INSTALL PISTON SEALS AND PISTONS IN CYLIN – DER



4. INSTALL CYLINDER BOOTS AND CYLINDER BOOT SET RINGS



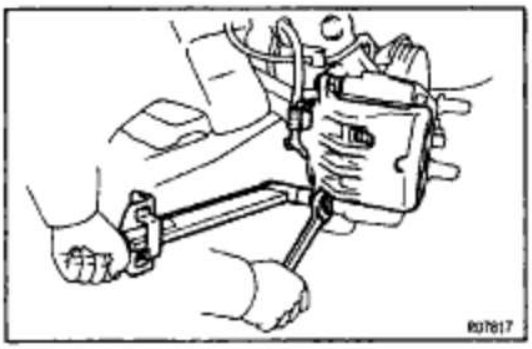
CALIPER INSTALLATION

1. INSTALL FOLLOWING PARTS:

(a) 4 pad support plates

(b) 2 brake pads with anti–squeal shims

(c) 2 anti–squeal springs

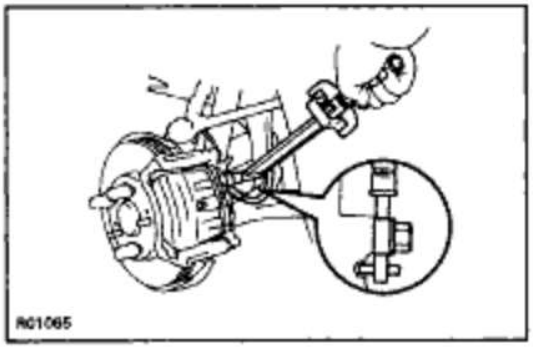


2. INSTALL CALIPER

(a) Temporarily install the caliper on the torque plate with the 2 installation bolts.

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

Torque: 34 N–m (350 kgf–cm, 26 ft–lbf)



3. CONNECT FLEXIBLE HOSE

Install the flexible hose on the brake caliper with 2 new gaskets.

Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)

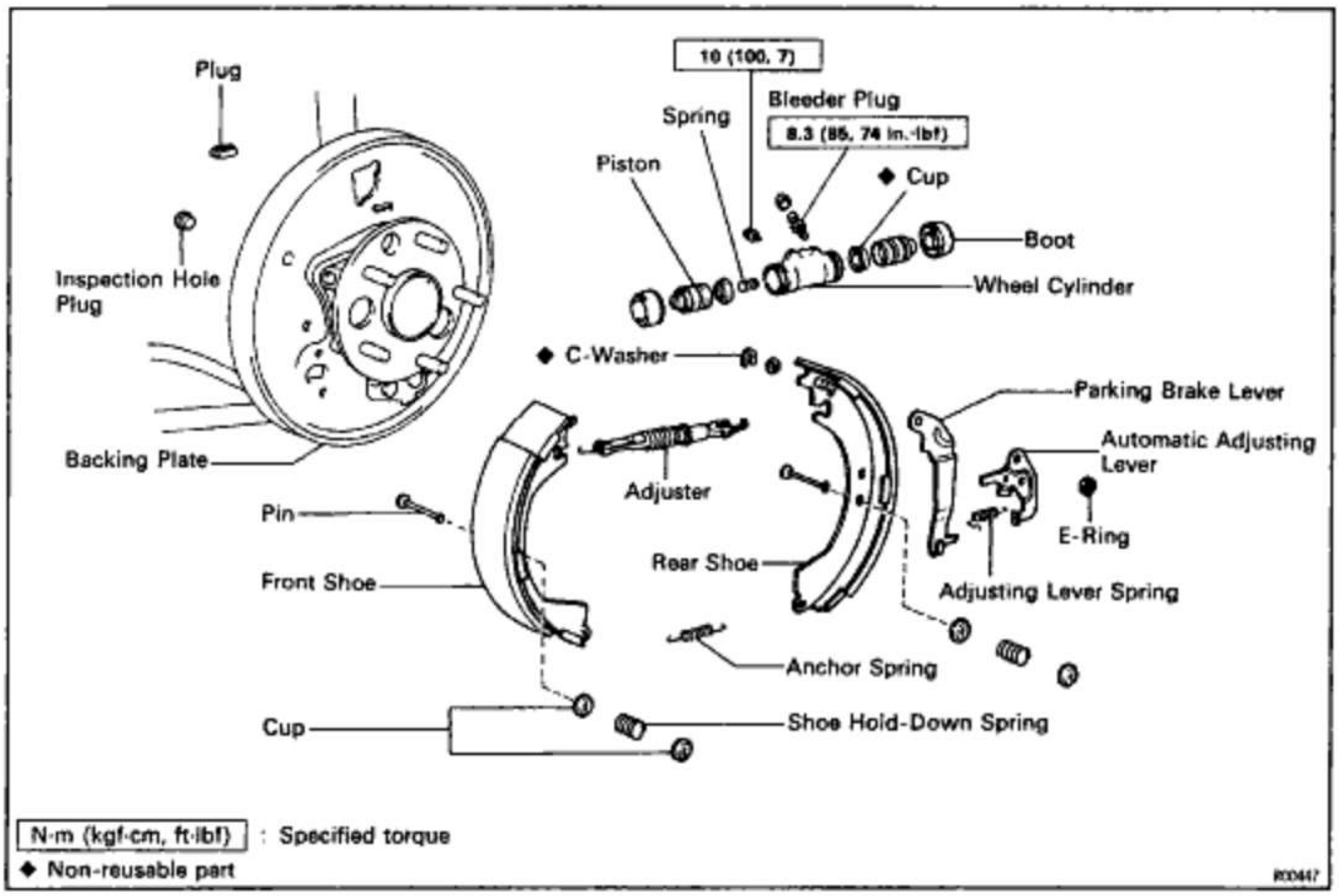
HINT: Insert the flexible hose lock securely in the lock hole in the brake caliper.

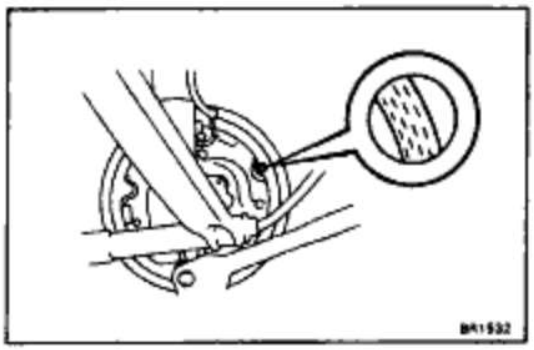
4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page BR–9)

5. CHECK FOR LEAKS

REAR BRAKE (Drum Brake) COMPONENTS





REAR DRUM BRAKE REMOVAL

1. INSPECT SHOE LINING THICKNESS

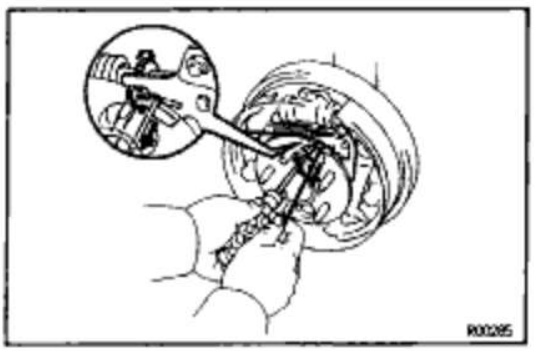
Remove the inspection hole plug, and check the shoe lining thickness through the hole.

If less than minimum, replace the shoes.

Minimum thickness:

1.0 mm (0.039 in.)

2. REMOVE REAR WHEEL

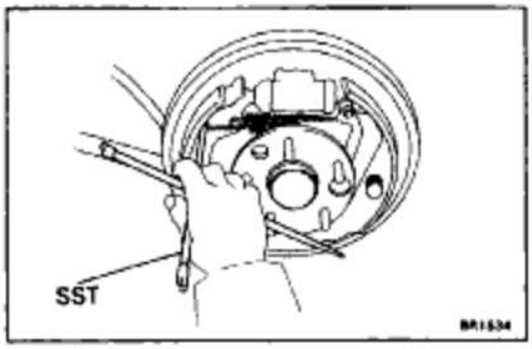


3. REMOVE BRAKE DRUM

HINT: If the brake drum cannot be removed easily, perform the following steps.

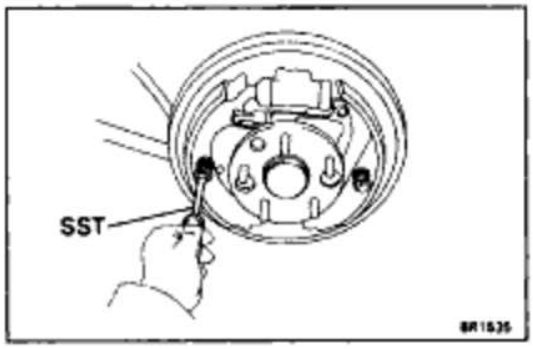
(a) Insert a bent wire or an equivalent through the hole in the brake drum, and hold the automatic adjusting lever away from the adjuster.

(b) Using a screwdriver, reduce the brake shoe adjustment by turning the adjuster.



4. REMOVE FRONT SHOE

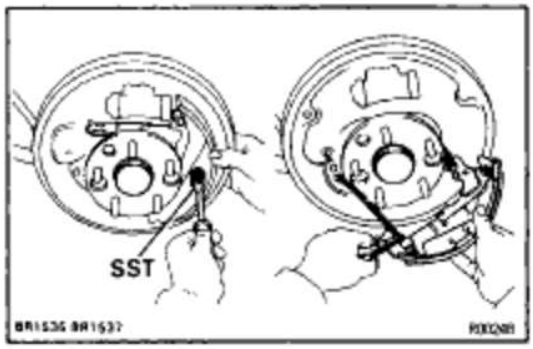
(a) Using SST, disconnect the return spring.
SST 09703–30010



(b) Using SST, remove the shoe hold–down spring, cups and pin.
SST 09718–00010

(c) Disconnect the anchor spring from the front shoe and remove the front shoe.

(d) Remove the anchor spring from the rear shoe.



5. REMOVE REAR SHOE

(a) Using SST, remove the shoe hold–down spring, cups and pin.
SST 09718–00010

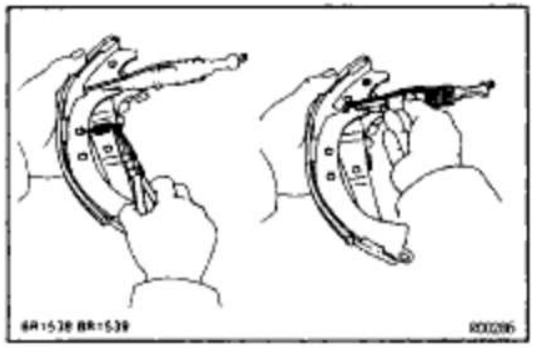
(b) Using a screwdriver, disconnect the parking brake cable from the anchor plate.

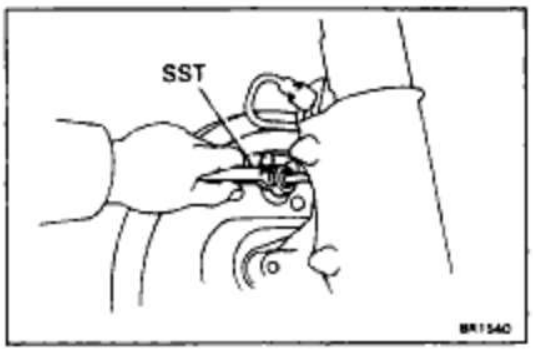
(c) Using pliers, disconnect the parking brake cable from the lever and remove the rear shoe together with the adjuster.

6. REMOVE ADJUSTER FROM REAR SHOE

(a) Remove the adjusting lever spring.

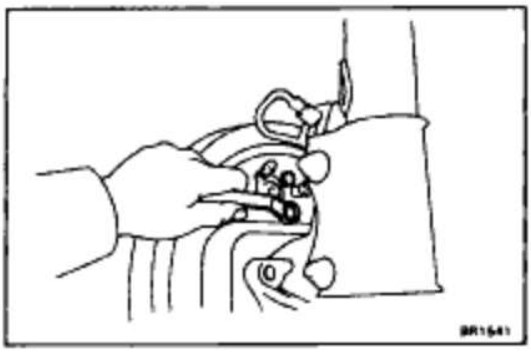
(b) Remove the adjuster together with the return spring.





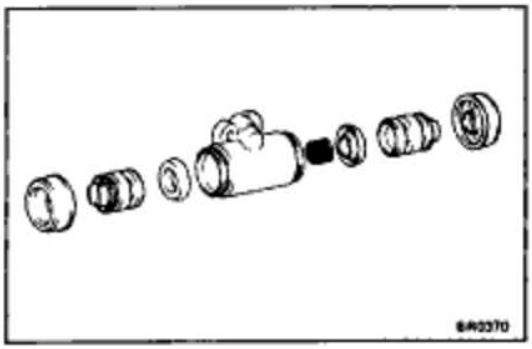
7. DISCONNECT BRAKE LINE FROM WHEEL CYLIN – DER

Using SST, disconnect the brake line. Use a container to catch the brake fluid.
SST 09751–36011



8. REMOVE WHEEL CYLINDER

Remove the 2 bolts and the wheel cylinder.



9. IF NECESSARY, DISASSEMBLE WHEEL CYLINDER

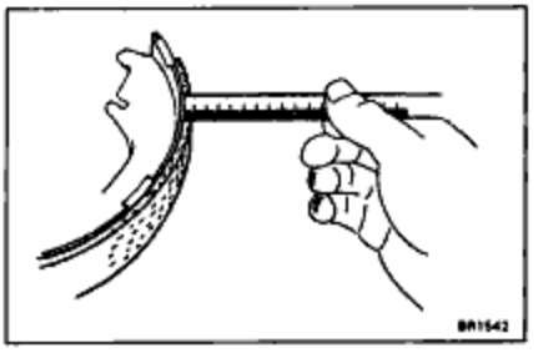
Remove the following parts from the wheel cylinder.

- 2 boots
- 2 pistons
- 2 piston cups
- Spring

REAR DRUM BRAKE COMPONENTS INSPECTION AND REPAIR

1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



2. MEASURE BRAKE SHOE LINING THICKNESS

Standard thickness:

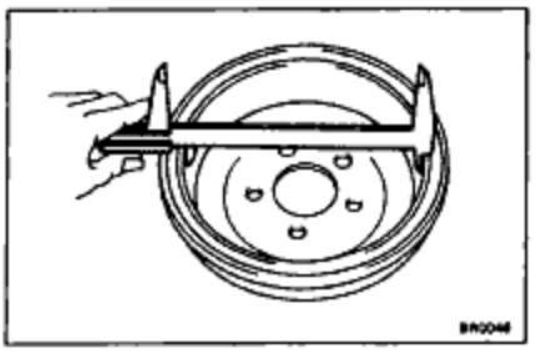
5.0 mm (0.197 in.)

Minimum thickness:

1.0 mm (0.039 in.)

If the shoe lining is less than minimum or shows signs of uneven wear, replace the brake shoes.

HINT: If any of the brake shoes have to be replaced, replace all of the rear shoes in order to maintain even braking.



3. MEASURE BRAKE DRUM INSIDE DIAMETER

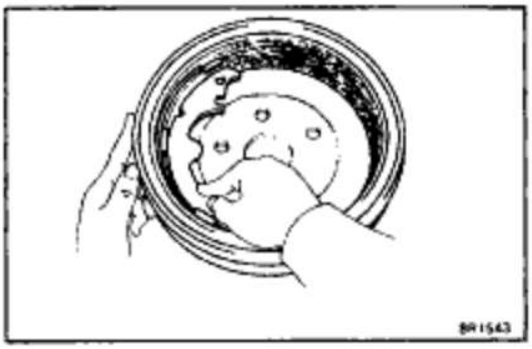
Standard inside diameter:

228.6 mm (9.000 in.)

Maximum inside diameter:

230.6 mm (9.079 in.)

If the drum is scored or worn, the brake drum may be lathed to the maximum inside diameter.

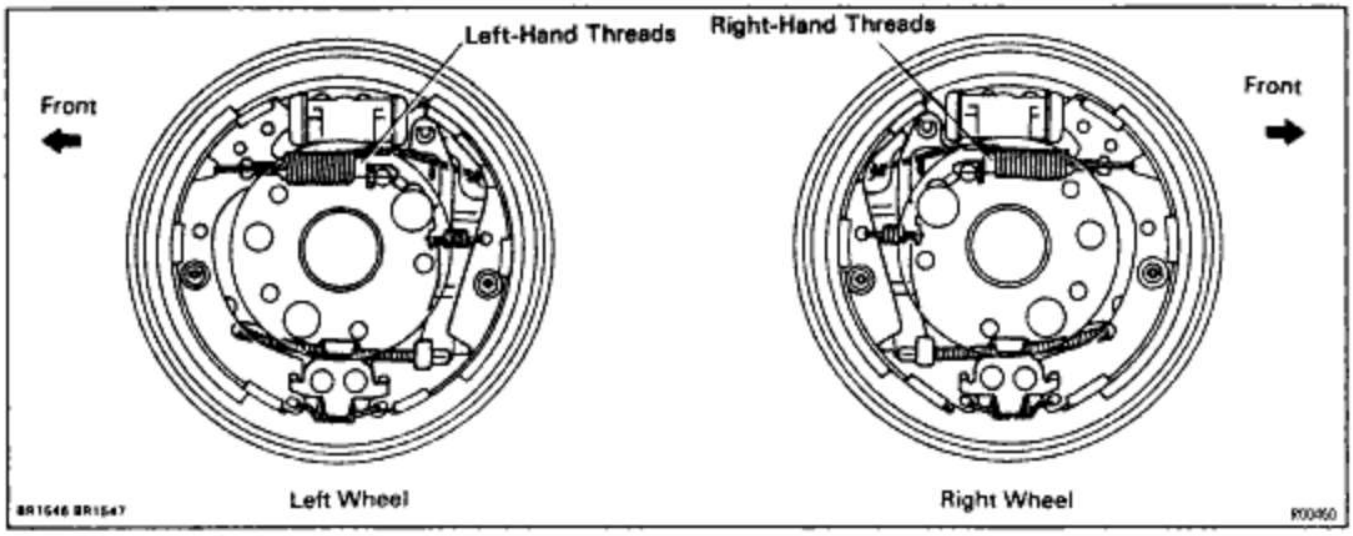


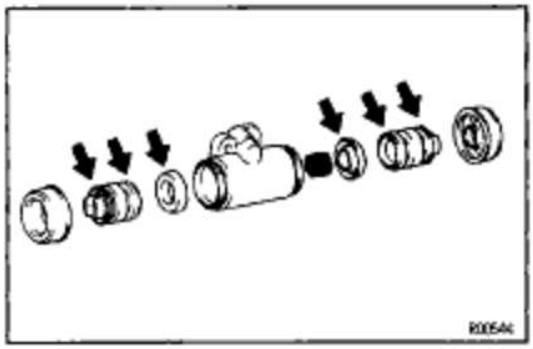
4. INSPECT REAR BRAKE LINING AND DRUM FOR PROPER CONTACT

If the contact between the brake lining and drum is improper, repair the lining with a brake shoe grinder, or replace the brake shoe assembly.

REAR DRUM BRAKE INSTALLATION

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





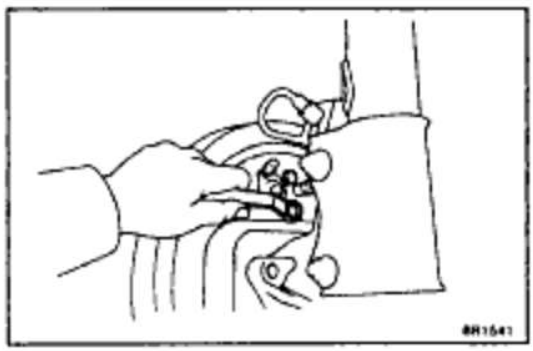
1. ASSEMBLE WHEEL CYLINDER

(a) Apply lithium soap base glycol grease to the cups and pistons as shown.

(b) Assemble the wheel cylinder.

HINT: Install in proper direction only.

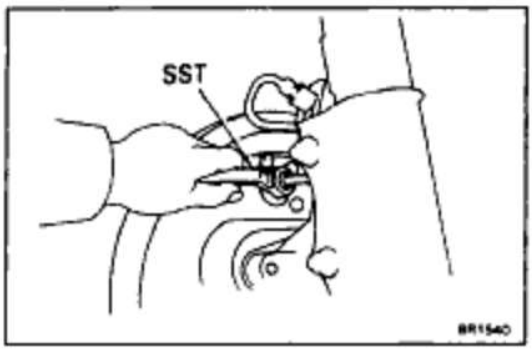
- Spring
- 2 cups
- 2 pistons
- 2 boots



2. INSTALL WHEEL CYLINDER

Install the wheel cylinder on the backing plate with the 2 bolts.

Torque: 10 N–m (100 kgf–cm, 7 ft–lbf)

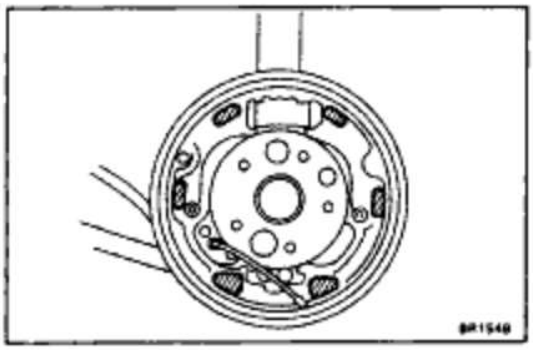


3. CONNECT BRAKE LINE TO WHEEL CYLINDER

Using SST, connect the brake line.

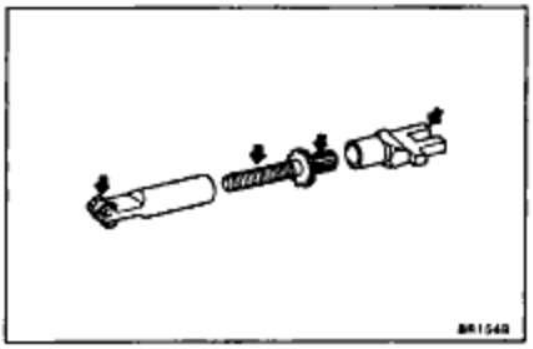
SST 09751–36011

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

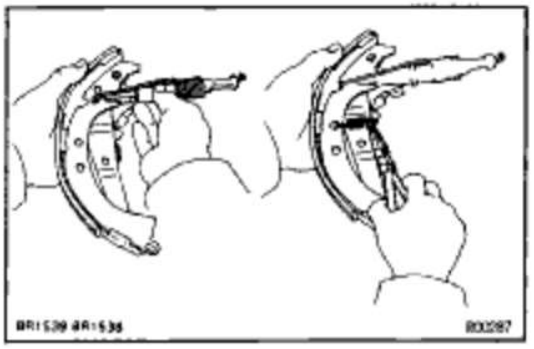


4. APPLY HIGH TEMPERATURE GREASE TO BACK – ING PLATE AND ADJUSTER

(a) Apply high temperature grease to the brake shoe contact surfaces.

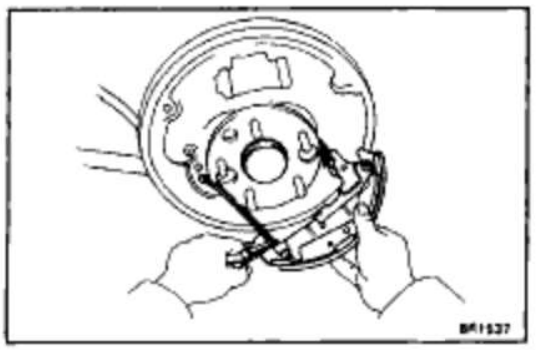


(b) Apply high temperature grease to the adjuster bolt threads and ends.



5. INSTALL ADJUSTER ONTO REAR SHOE

Set the adjuster and return spring and install the adjusting lever spring.

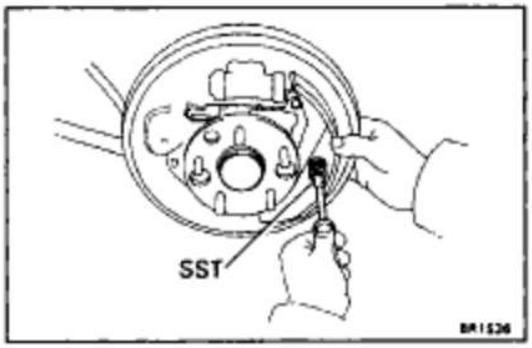


6. INSTALL REAR SHOE

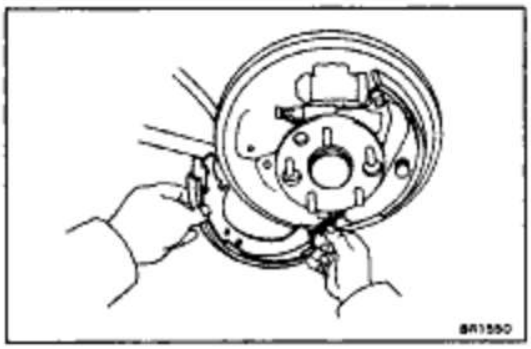
(a) Using pliers, connect the parking brake cable to the lever.

(b) Pass the parking brake cable through the notch in the anchor plate.

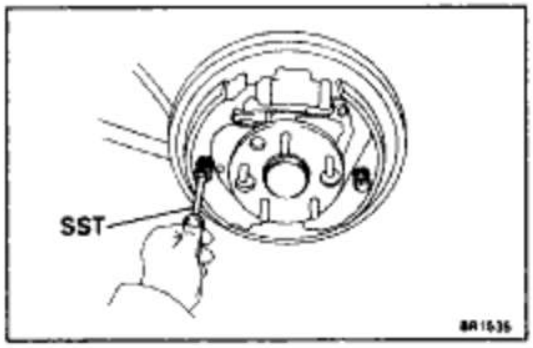
(c) Set the rear shoe in place with the end of the shoe inserted in the wheel cylinder and the other end in the anchor plate.



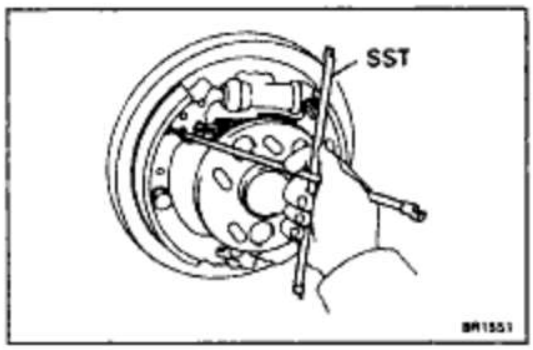
(d) Using SST, install the shoe hold–down spring, cups and pin.
SST 09718–00010
NOTICE: Do not allow oil or grease to get on the rubbing face.



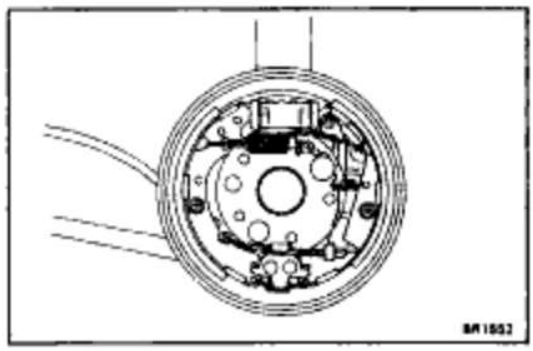
7. INSTALL FRONT SHOE
(a) Install the anchor spring between the front and rear shoes.
(b) Set the front shoe in place with the end of the shoe inserted in the wheel cylinder and the adjuster in place.



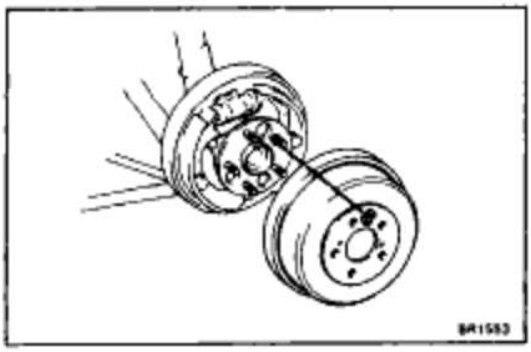
(c) Using SST, install the shoe hold–down spring, cups and pin.
SST 09 718–00010
NOTICE: Do not allow oil or grease to get on the rubbing face.



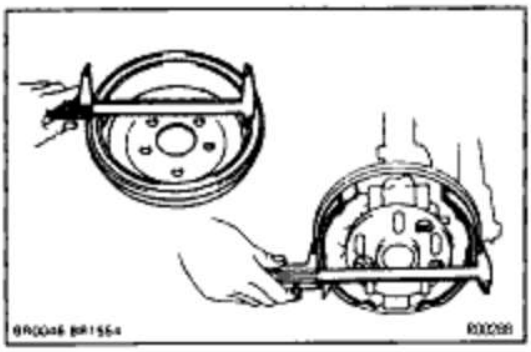
(d) Using SST, connect the return spring.
SST 09703–30010



8. CHECK OPERATION OF AUTOMATIC ADJUSTING MECHANISM
(a) Move the parking brake lever of the rear shoe back and forth. Check that the adjuster turns.
If the adjuster does not turn, check for incorrect installation of the rear brakes.
(b) Adjust the adjuster length to the shortest possible amount.



(c) Align the adjusting hole on the brake drum and largest hole on the axle carrier, install the brake drum.
(d) Pull the parking brake lever all the way up until a clicking sound can no longer be heard.



9. CHECK CLEARANCE BETWEEN BRAKE SHOES AND DRUM

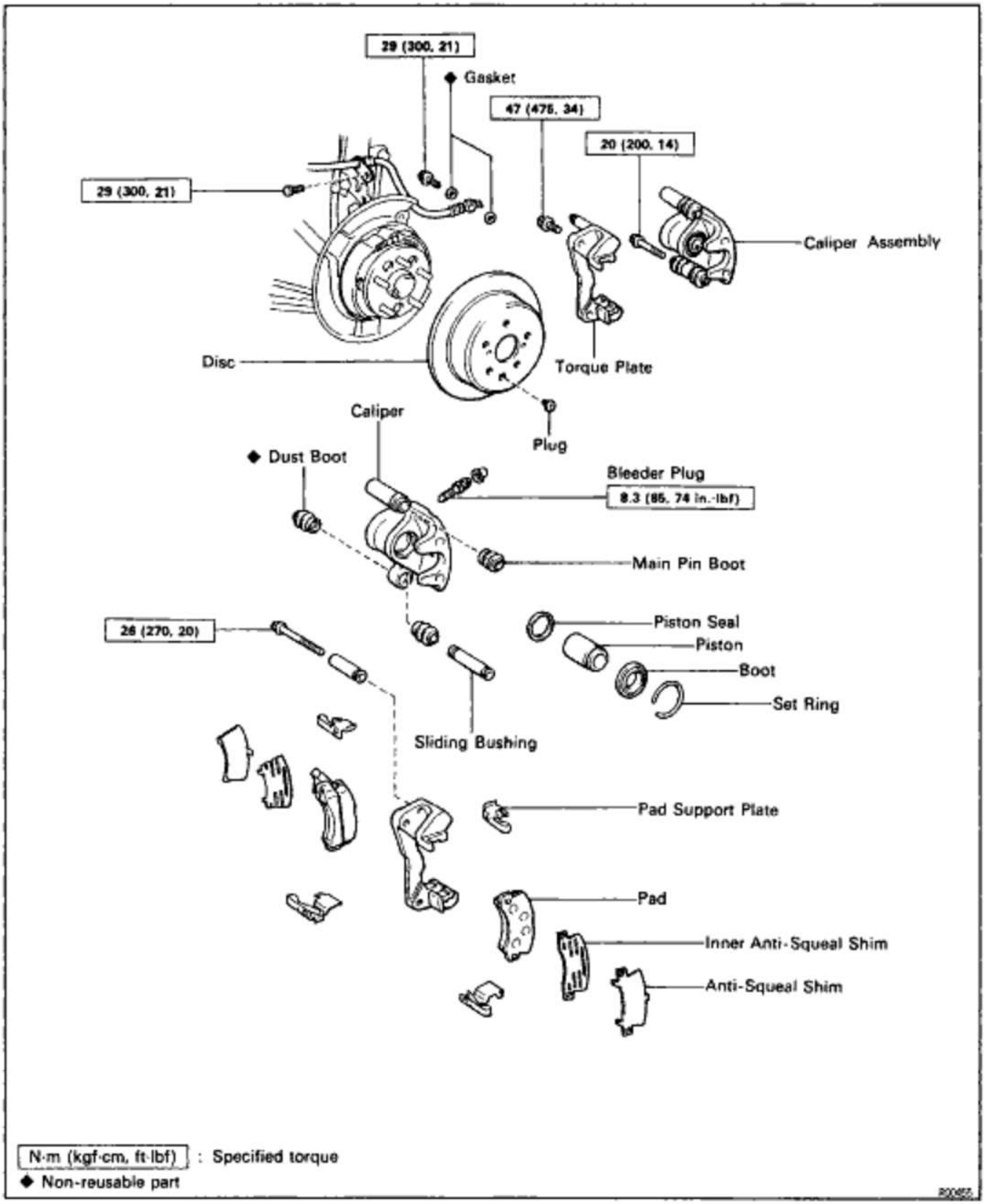
(a) Remove the brake drum.
(b) Measure the brake drum inside diameter and diameter of the brake shoes. Check that the difference between the diameters is the correct shoe clearance.

Shoe clearance:
0.6 mm (0.024 in.)

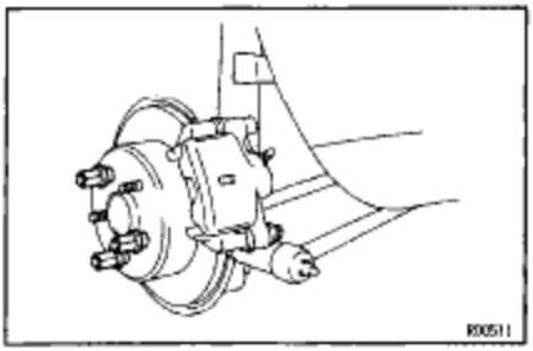
If incorrect, check the parking brake system.

10. INSTALL BRAKE DRUM
11. INSTALL REAR WHEEL
12. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM
(See page BR–9)
13. CHECK FOR LEAKS

REAR BRAKE (Disc Brake) COMPONENTS

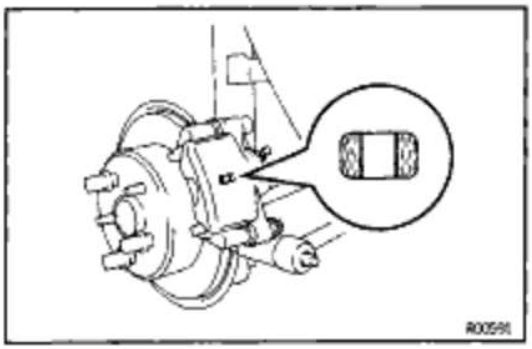


BRAKE PADS REPLACEMENT



1. REMOVE REAR WHEEL

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

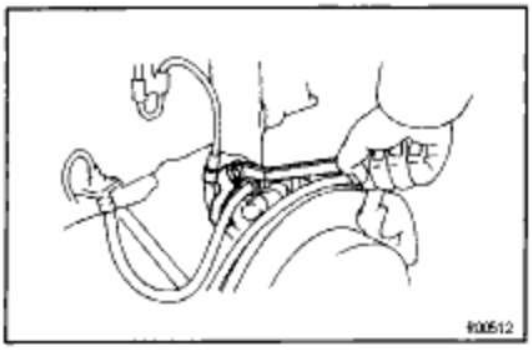


2. INSPECT PAD LINING THICKNESS

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

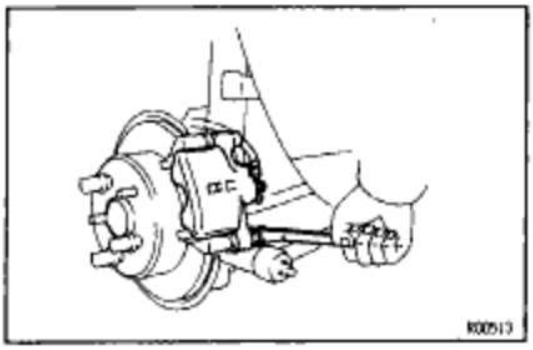
Minimum thickness:

1.0 mm (0.039 in.)

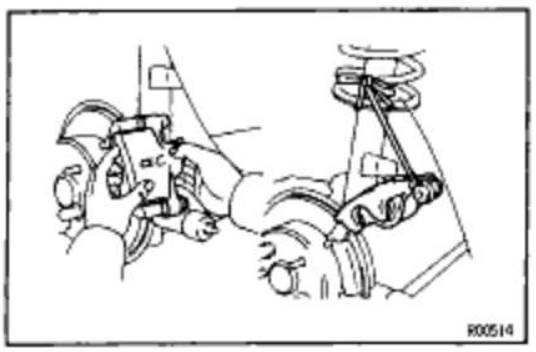


3. LIFT UP CALIPER

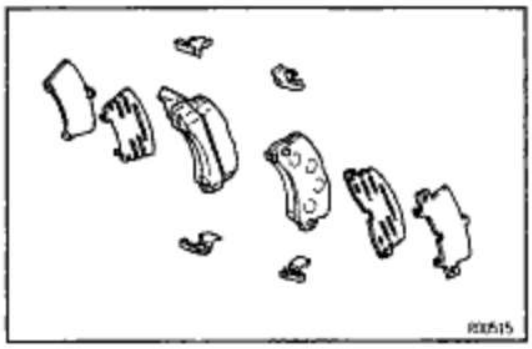
(a) Remove the flexible hose bracket.



(b) Remove the installation bolt from the torque plate.

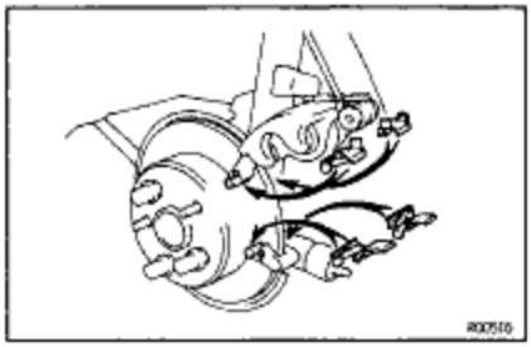


(c) Lift up the caliper and suspend the caliper with string.
HINT: Do not disconnect the flexible hose from the caliper.

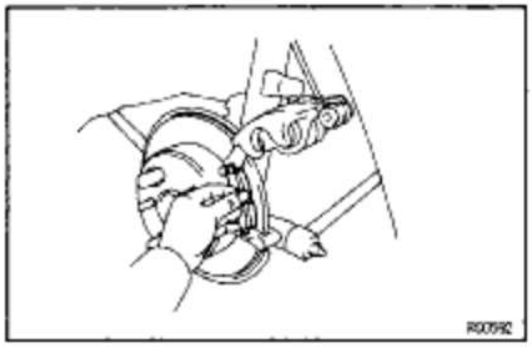


4. REMOVE FOLLOWING PARTS:
(a) 2 brake pads
(b) 4 anti–squeal shims
(c) 4 pad support plates

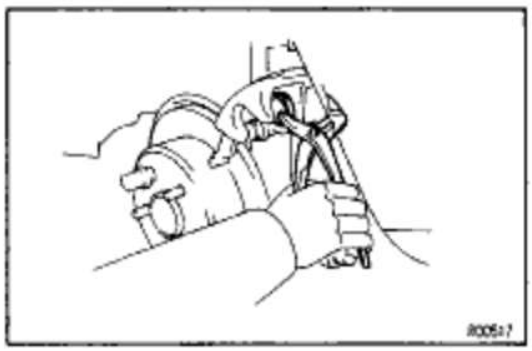
5. CHECK DISC THICKNESS AND RUNOUT
(See page BR–50**)**



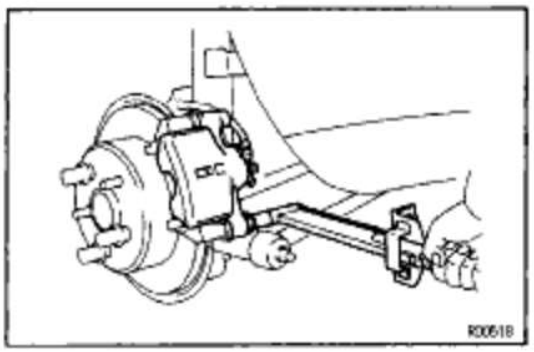
6. INSTALL PAD SUPPORT PLATES
Install the 4 pad support plates.



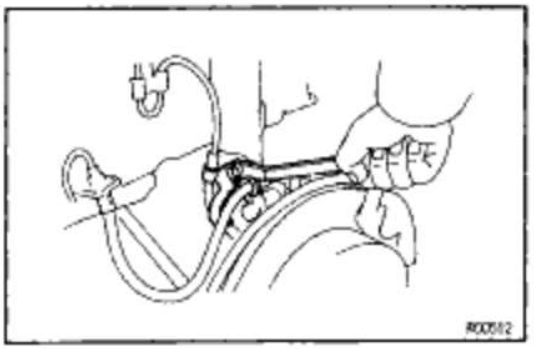
7. INSTALL NEW PADS
(a) Apply disc brake grease to both side of the inner anti –squeal shims.
(b) Install the 2 anti–squeal shims on each pad.
(c) Install 2 pads with the pad wear indicator plates facing up ward.
NOTICE: There should be no oil or grease adhering to the friction surfaces of the pads or the disc.



6. INSTALL CALIPER
(a) Draw out a small amount of brake fluid from the reservoir.
(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.

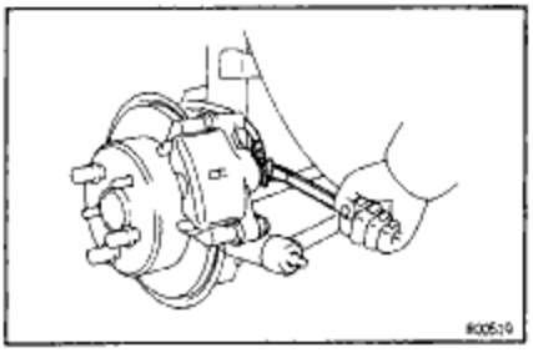


(c) Install the caliper and torque the installation bolt.
Torque: 20 N–m (200 kgf–cm, 14 ft–lbf)



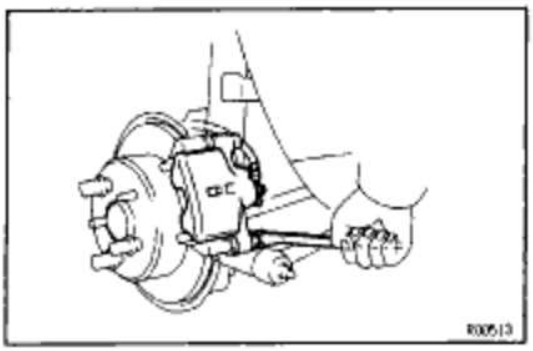
(d) Install the flexible hose bracket.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

9. INSTALL REAR WHEEL
14. CHECK THAT FLUID LEVEL IS AT MAX LINE

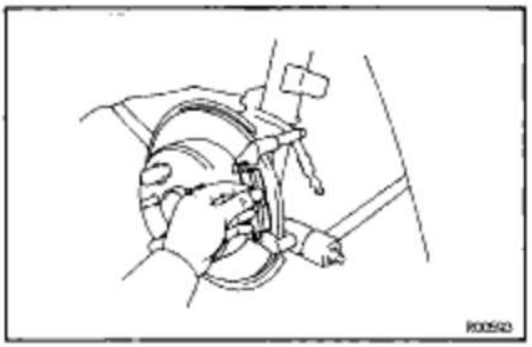


CALIPER REMOVAL

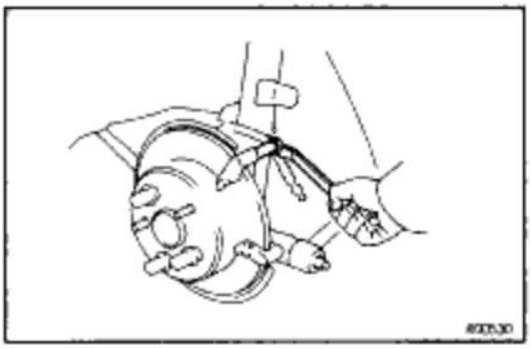
1. DISCONNECT FLEXIBLE HOSE
(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.
(b) Use a container to catch the brake fluid as it drains out.



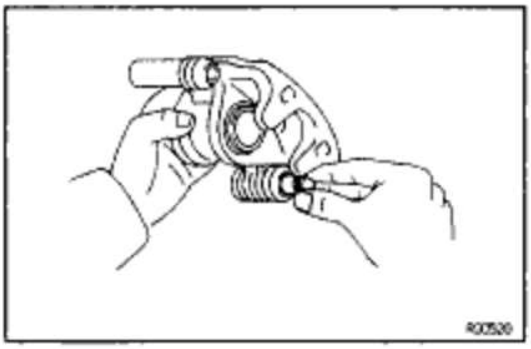
2. REMOVE CALIPER
(a) Remove the installation bolt.
(b) Remove the caliper from the torque plate.



3. REMOVE 2 PADS
Remove the inside and outside pads.

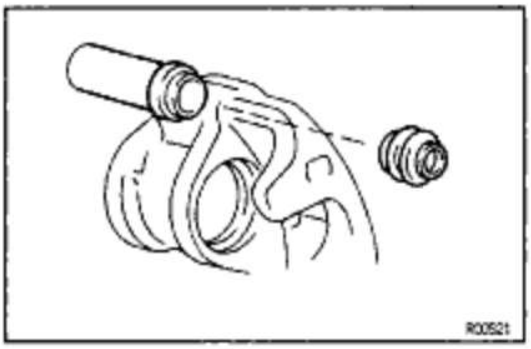


4. REMOVE MAIN PIN
Loosen the. main pin installation bolt and remove the main pin.

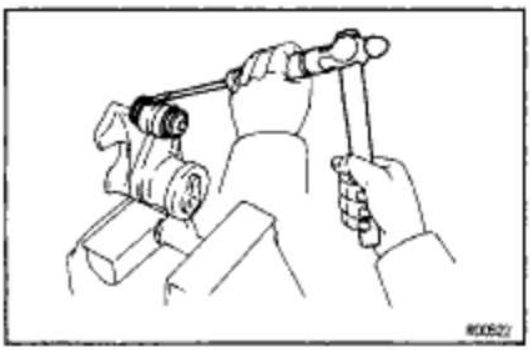


CALIPER DISASSEMBLY

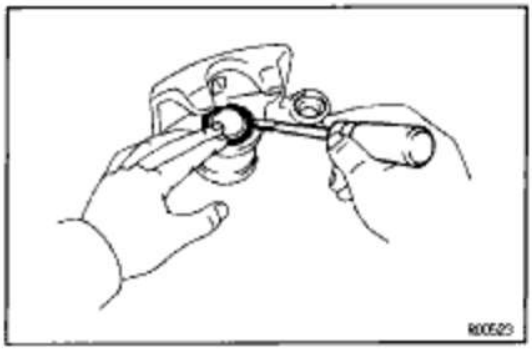
1. REMOVE SLIDING BUSHING
Pull out the sliding bushing.



2. REMOVE MAIN PIN BOOT
Pull out the main pin boot.

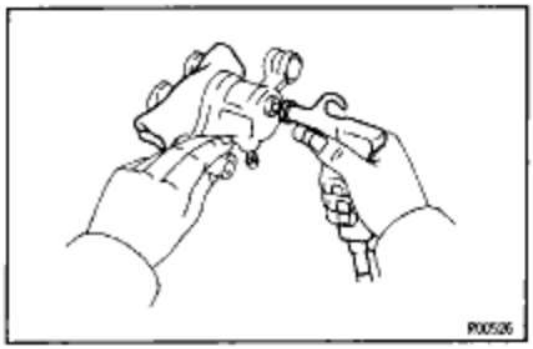


3. REMOVE DUST BOOTS
(a) Place the caliper in vise.
(b) Using a screwdriver and hammer, tap out the 2 dust boots.



4. REMOVE CYLINDER BOOT SET RING AND CYLIN– DER BOOT

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

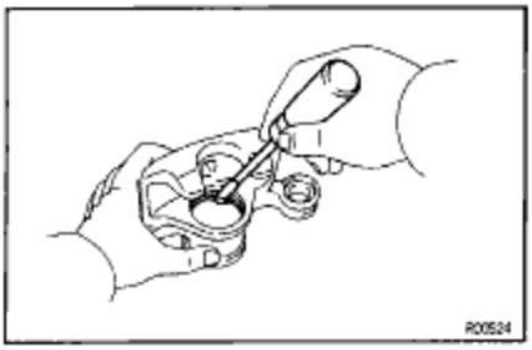


5. REMOVE PISTON

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

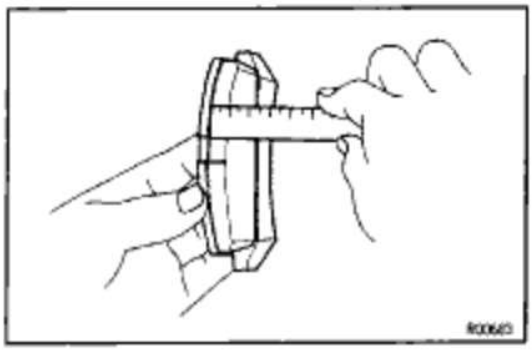
(b) Use compressed air to remove the piston from the cylinder.

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 DISC BRAKE COMPONENTS INSPECTION AND REPAIR

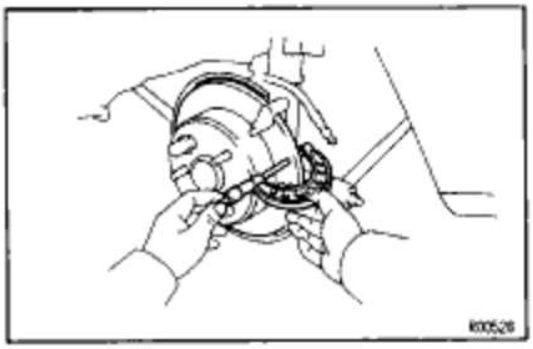
1. MEASURE PAD LINING THICKNESS

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 mini– mum thickness or less, or if the pad has excessively uneven wear.



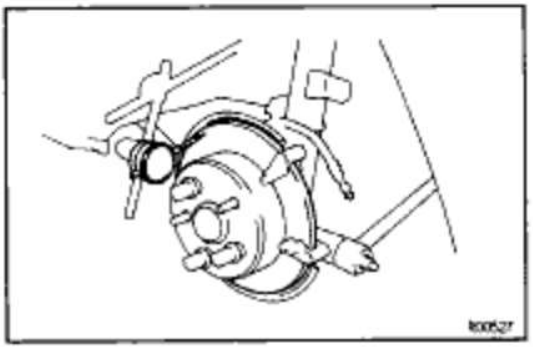
2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

Standard thickness:
10.0 mm (0.394 in.)

Minimum thickness:
9.0 mm (0.354 in.)

Replace the disc if the disc's thickness is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.



3. MEASURE DISC RUNOUT

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

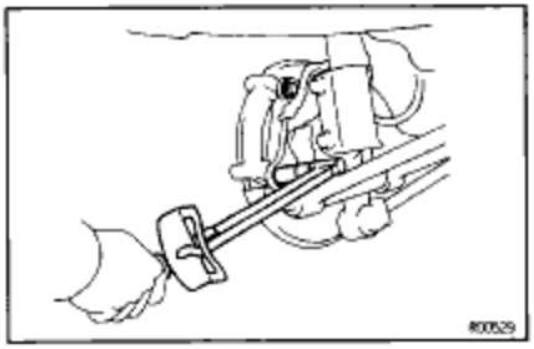
Maximum disc runout:
0.15 mm (0.0059 in.)

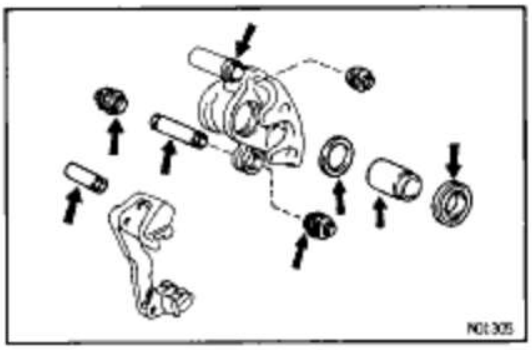
If the runout is greater than the maximum, replace the disc.

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

4. IF NECESSARY, REPLACE DISC

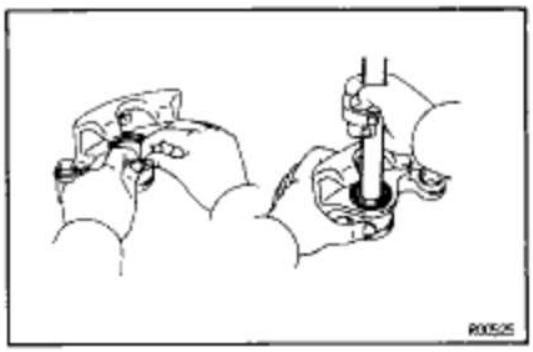
(a) Remove the torque plate.
(b) Remove the hub nuts of the temporarily installed disc and pull off the disc.
(c) Install a new disc and loosely install the hub nuts.
(d) Install the torque plate and tighten the mounting bolts.
Torque: 47 N–m (475 kgf–cm, 34 ft–lbf)



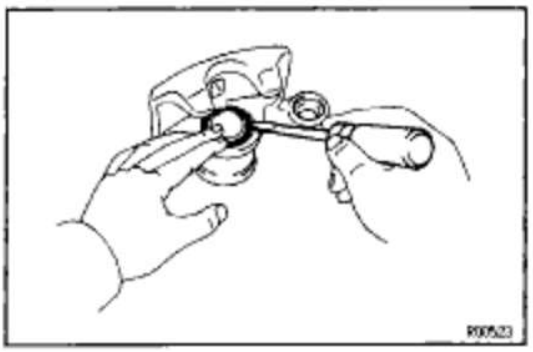


CALIPER ASSEMBLY

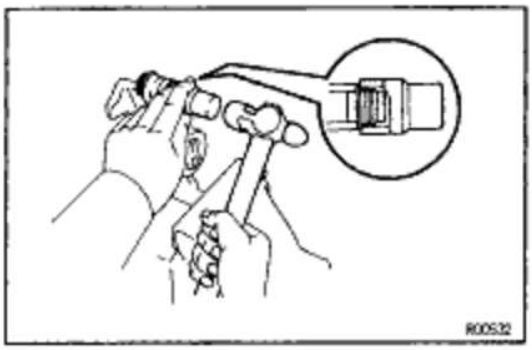
1. APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS



2. INSTALL PISTON SEAL AND PISTON IN CYLINDER

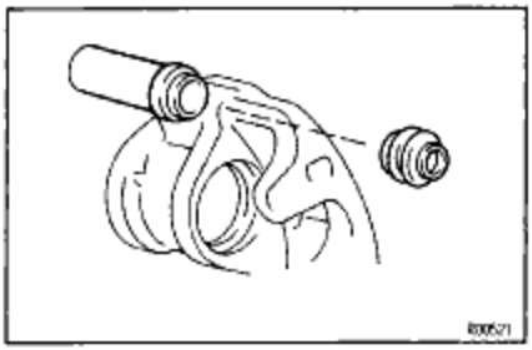


3. INSTALL CYLINDER BOOT AND SET RING IN CYL–INDER

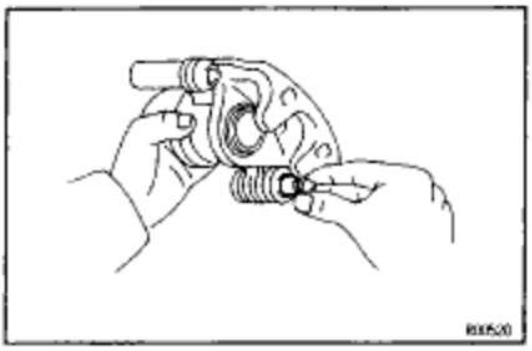


4. INSTALL DUST BOOTS

(a) Place the caliper in vise.
(b) Using a 19 mm socket wrench and hammer, tap in 2 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



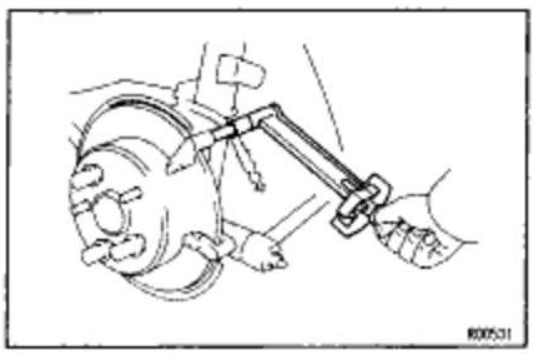
6. INSTALL SLIDING BUSHING

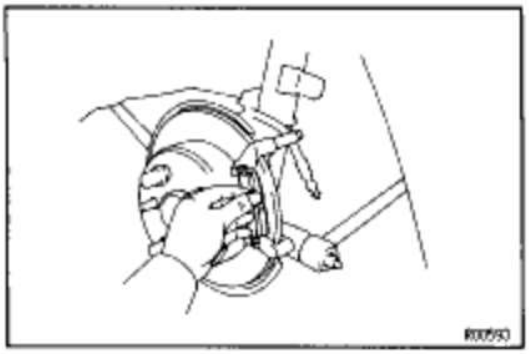
CALIPER INSTALLATION

1. INSTALL MAIN PIN

Install the main pin and torque the main pin installa–tion bolt.

Torque: 26 N–m (270 kgf–cm. 20 ft–lbf)

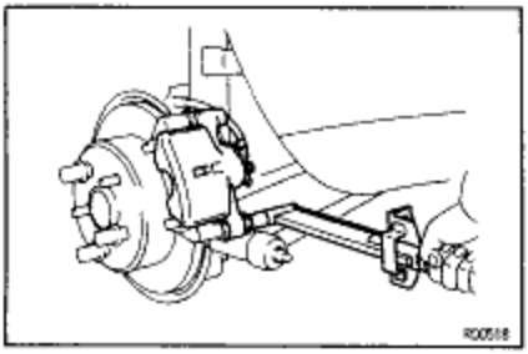




2. INSTALL 2 PADS

Install 2 pads with the pad wear indicator plate facing upward.

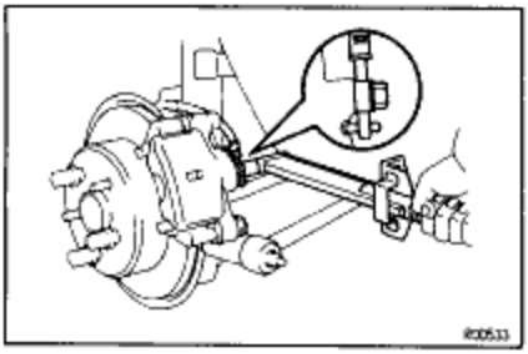
NOTICE: There should be no oil or grease adhering to the friction surfaces of the pads or the disc.



3. INSTALL CALIPER

Install the caliper and torque the installation bolt.

Torque: 20 N–m (200 k9f¿cm, 14 ft–lbf)



4. CONNECT FLEXIBLE HOSE

Install the flexible hose on the caliper with 2 new gaskets.

Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)

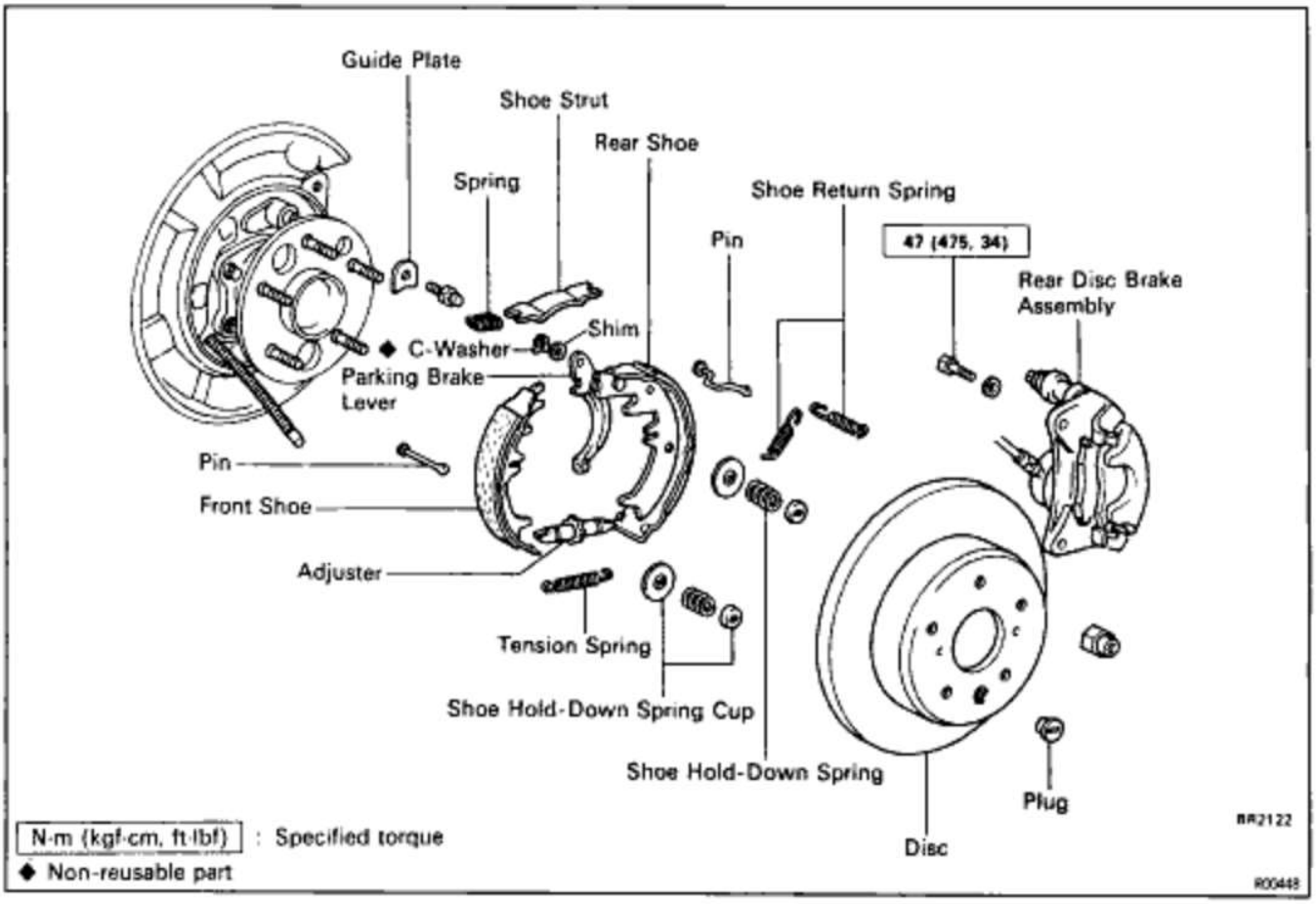
HINT: Insert the flexible hose lock securely in the lock hole in the caliper.

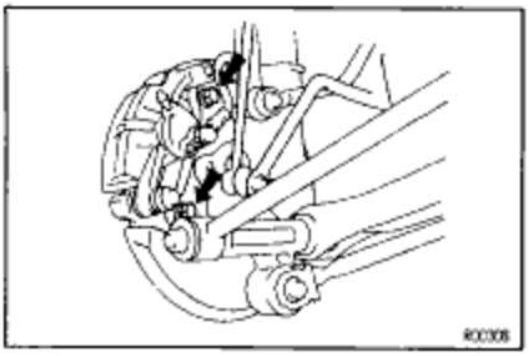
5. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM

(See page BR–9)

6. CHECK FOR LEAKS

REAR BRAKE (Parking Brake for Rear Disc Brake) COMPONENTS





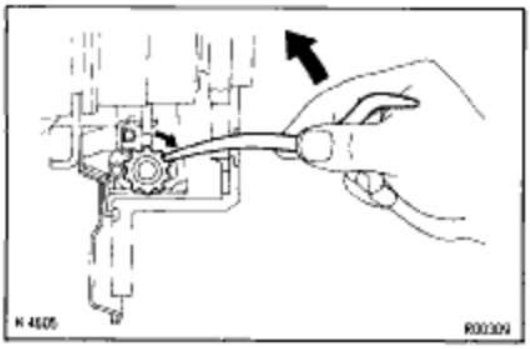
PARKING BRAKE DISASSEMBLY

1. REMOVE REAR WHEEL

2. REMOVE REAR DISC BRAKE ASSEMBLY

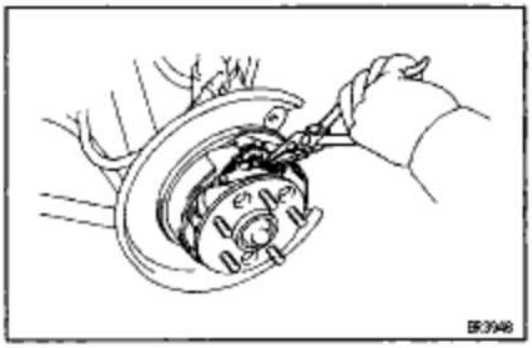
(a) Remove the 2 mounting bolts and remove the disc brake assembly.

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



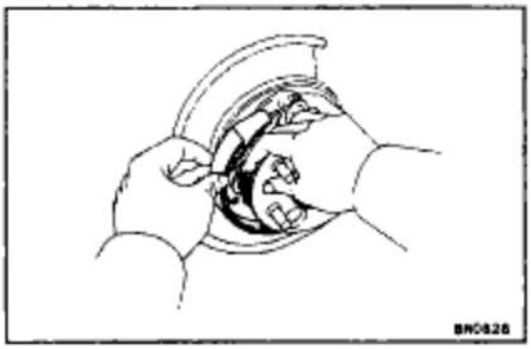
3. REMOVE DISC

HINT: If the disc cannot be removed easily, turn the shoe adjuster



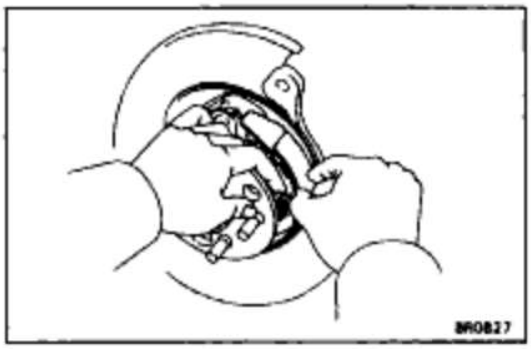
4. REMOVE SHOE RETURN SPRINGS

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



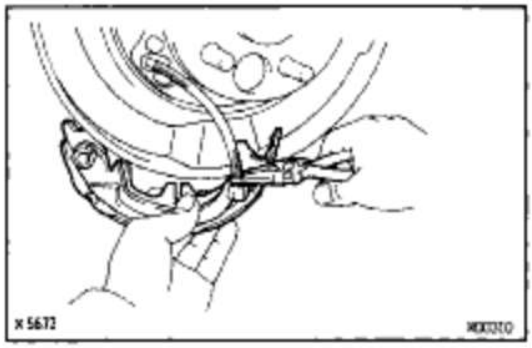
5. REMOVE FRONT SHOE, ADJUSTER AND TENSION SPRING

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



6. REMOVE REAR SHOE

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

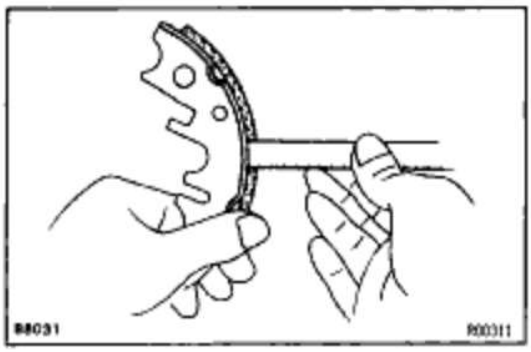


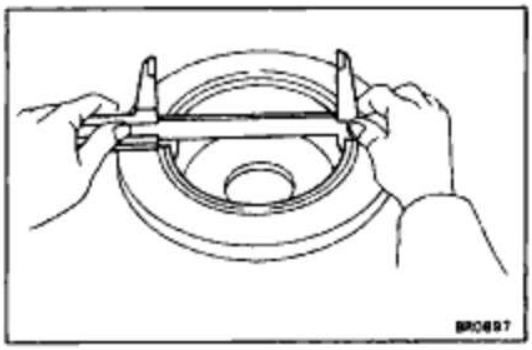
(c) Using needle–nose pliers, disconnect the parking brake cable from the parking brake shoe lever.
(d) Remove the shoe hold–down spring cups, springs and pins.

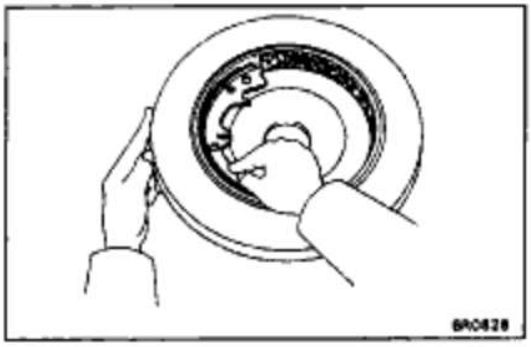
PARKING BRAKE COMPONENTS INSPECTION AND REPAIR

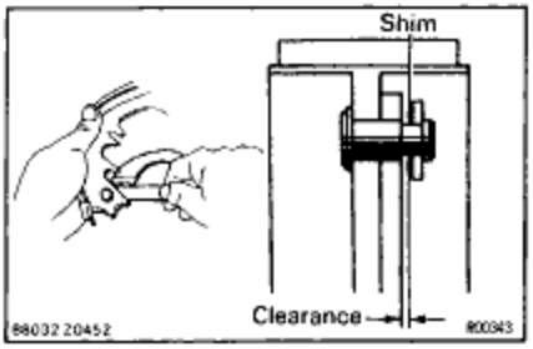
1. INSPECT DISASSEMBLED PARTS

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 excessively uneven wear, replace the brake shoe.

3. MEASURE DISC INSIDE DIAMETER

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

Standard inside diameter:

170 mm (6.69 in.)

Maximum inside diameter:

171 mm (6.73 in.)

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

4. INSPECT PARKING BRAKE LINING AND DISC FOR PROPER CONTACT

Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit. If the contact between the 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

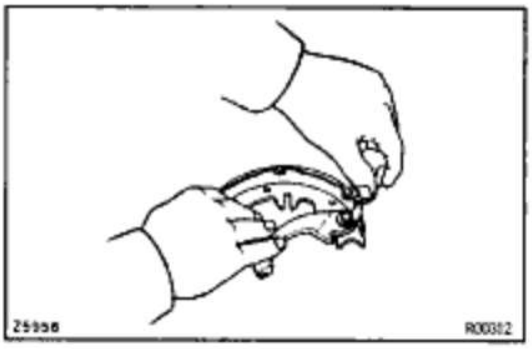
Using a feeler gauge, measure the clearance.

Standard clearance:

Less than 0.35 mm (0.0138 in.)

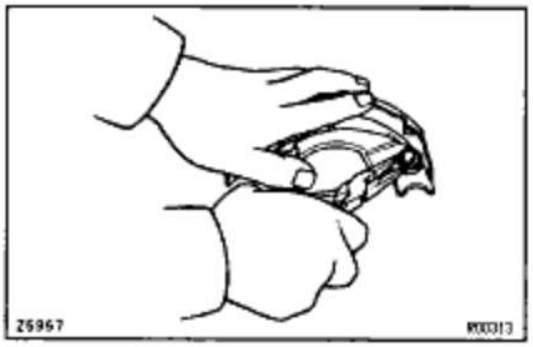
If the clearance is not within the specification, replace the shim with one of the correct size.

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



6. IF NECESSARY, REPLACE SHIM

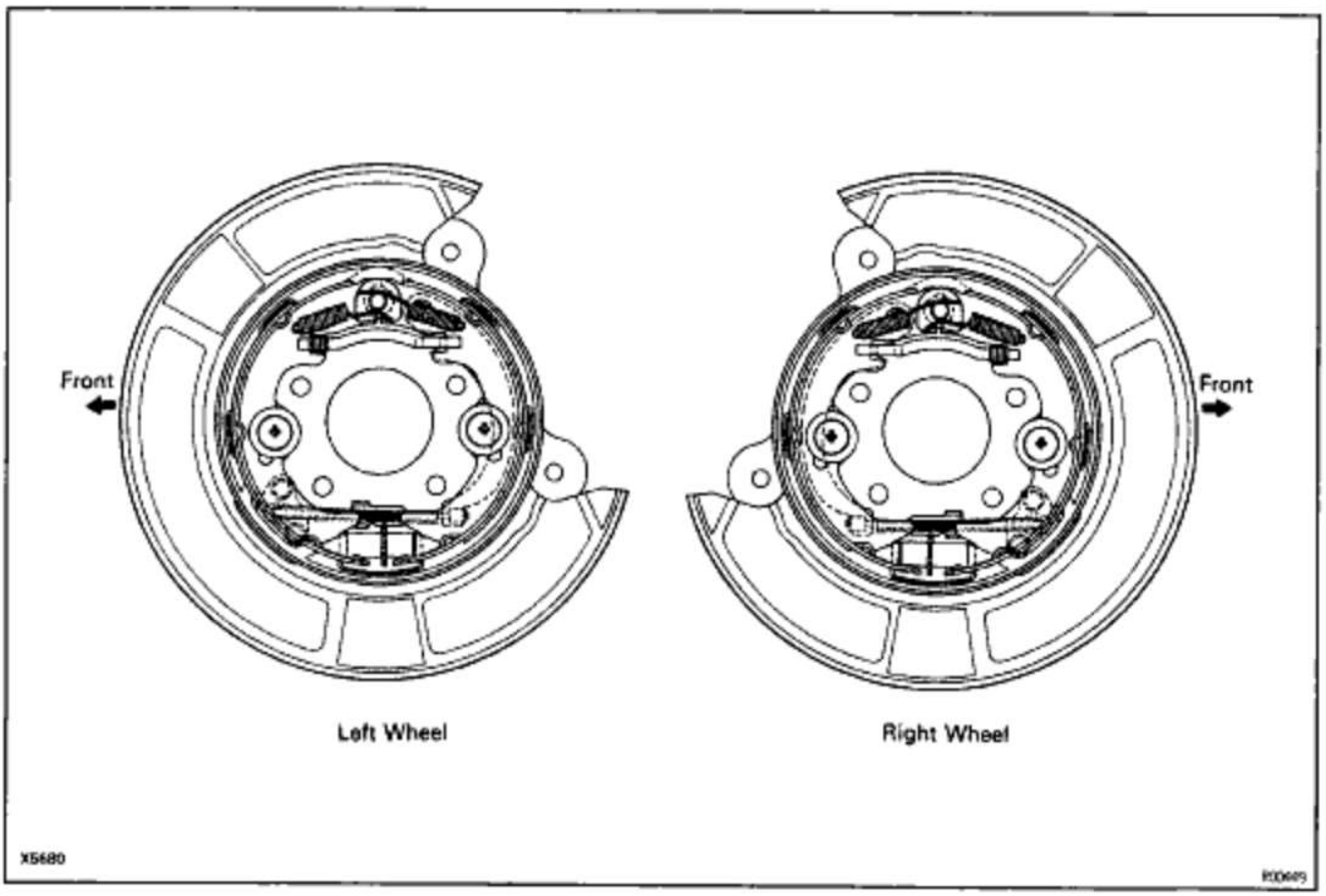
(a) Remove the parking brake lever, and install the cor–rect size shim.

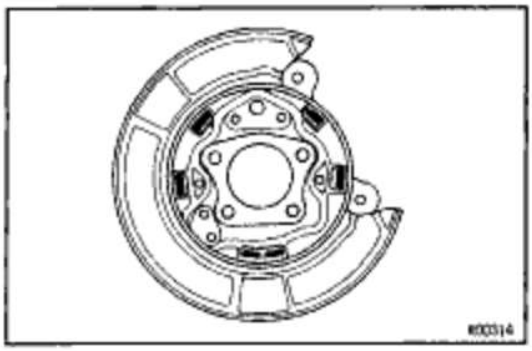


(b) Install the parking brake lever with a new C–washer.
(c) Remeasure the clearance.

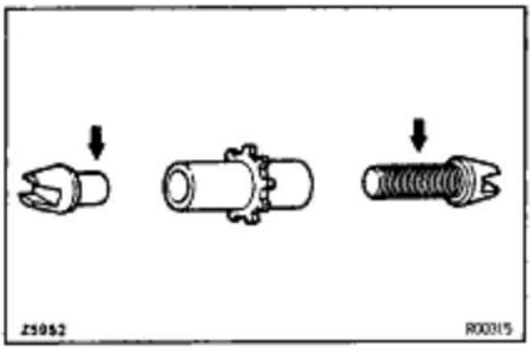
PARKING BRAKE ASSEMBLY

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

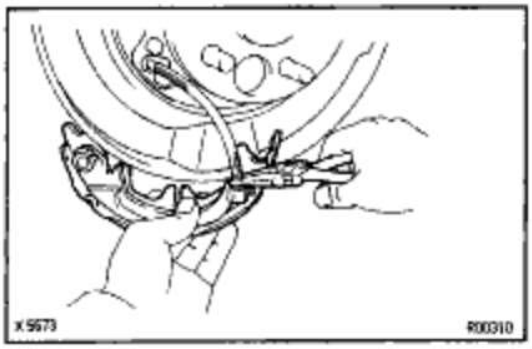




1. APPLY HIGH TEMPERATURE GREASE ON BACK – ING PLATE

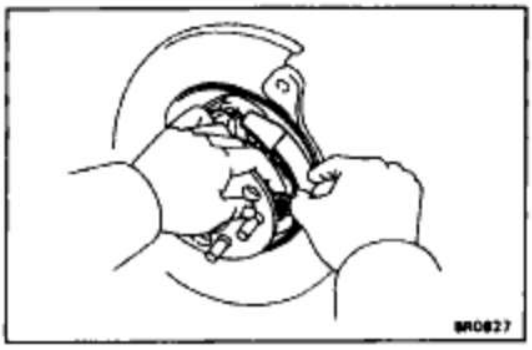


2. APPLY HIGH TEMPERATURE GREASE TO ADJUSTER



3. CONNECT PARKING BRAKE CABLE TO PARKING BRAKE LEVER

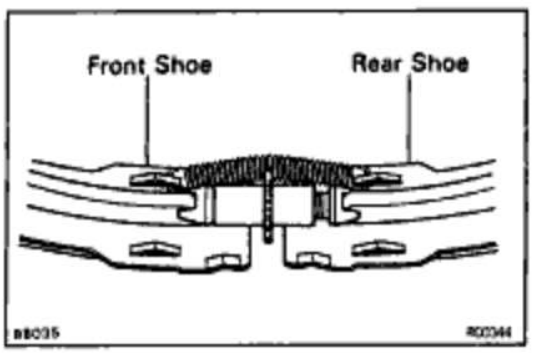
(a) Install the shoe hold–down springs, cups and pins.
(b) Using needle–nose pliers, connect the parking brake cable to the parking brake lever.



4. INSTALL REAR SHOE

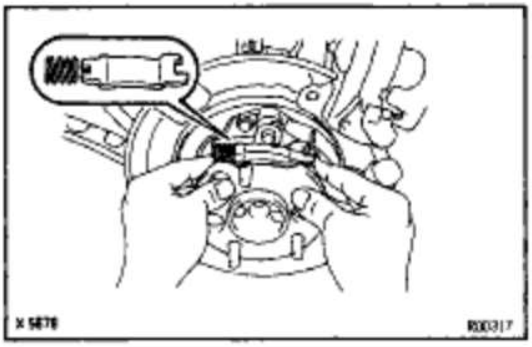
Slide in the rear shoe between the shoe hold–down spring cup and the backing plate.

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

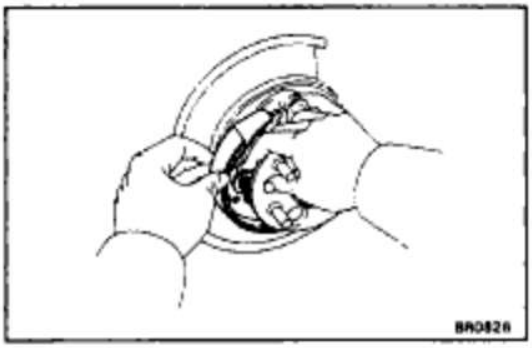


5. INSTALL TENSION SPRING, FRONT SHOE, AD–JUSTER AND STRUT

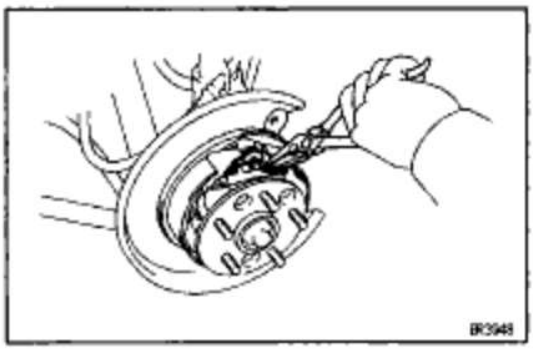
(a) Install the tension spring to the rear shoe.
(b) Install the front shoe to the tension spring.
(c) Install the adjuster between the front and rear shoes.



(d) Install the shoe strut with the spring.

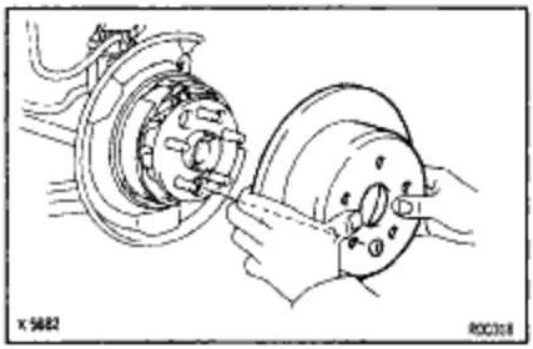


(e) Slide in the front shoe between the shoe hold–down spring cup and the backing plate.



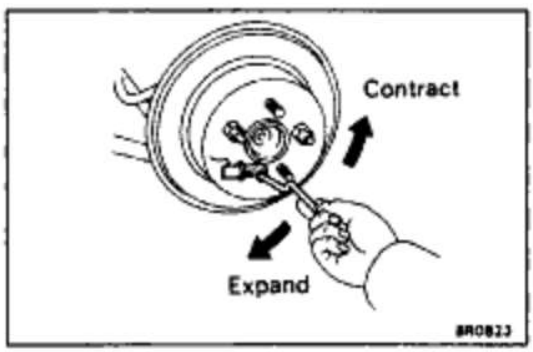
6. INSTALL SHOE RETURN SPRINGS

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



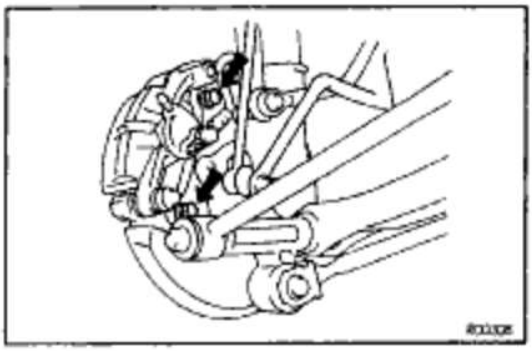
7. INSTALL DISC

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



8. 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 disc locks.
(d) Return the adjuster 8 notches.
(e) install the hole plug.



9. INSTALL DISC BRAKE ASSEMBLY

Install the disc brake assembly and torque the 2 mot nting bolts.

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

10. INSTALL REAR WHEEL

11. SETTLING PARKING BRAKE SHOES AND DISC

(a) LEVER TYPE:

With the parking brake release button pushed in, pull the lever with 98 N (10 kgf, 22 lbf) of force.

(b) PEDAL TYPE:

Depress the parking brake pedal with 147 N (15 kgf, 33 lbf).

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

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

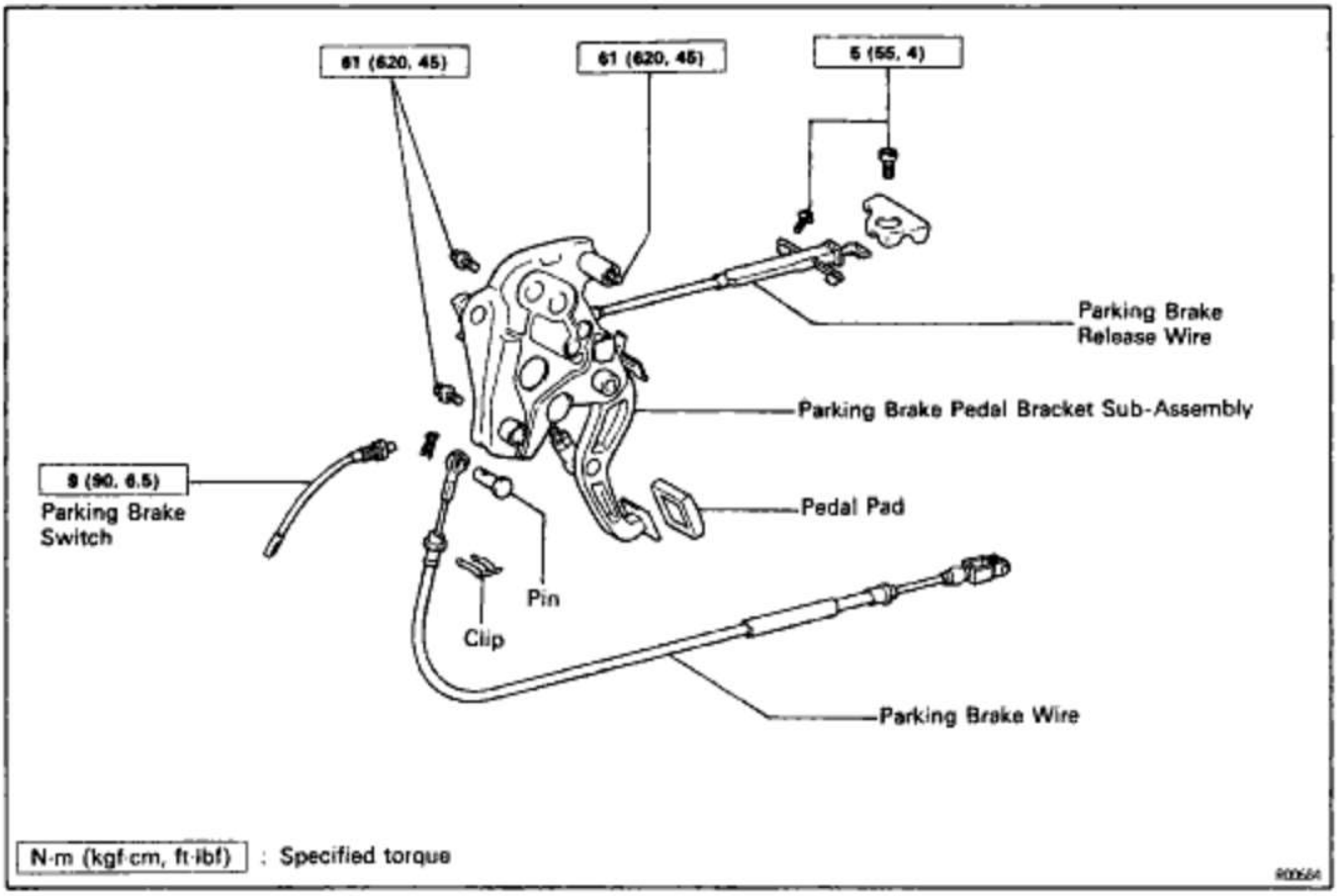
(e) Repeat this procedure 2 or 3 times.

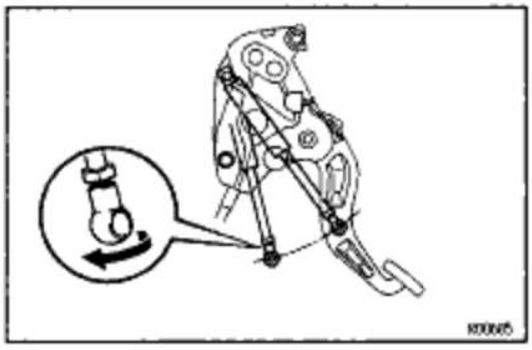
12. RECHECK AND ADJUST PARKING BRAKE LEVER/ PEDAL TRAVEL

PARKING BRAKE

PARKING BRAKE PEDAL DISASSEMBLY AND ASSEMBLY

Remove and install the parts as shown.





MAIN POINT OF PEDAL INSTALLATION

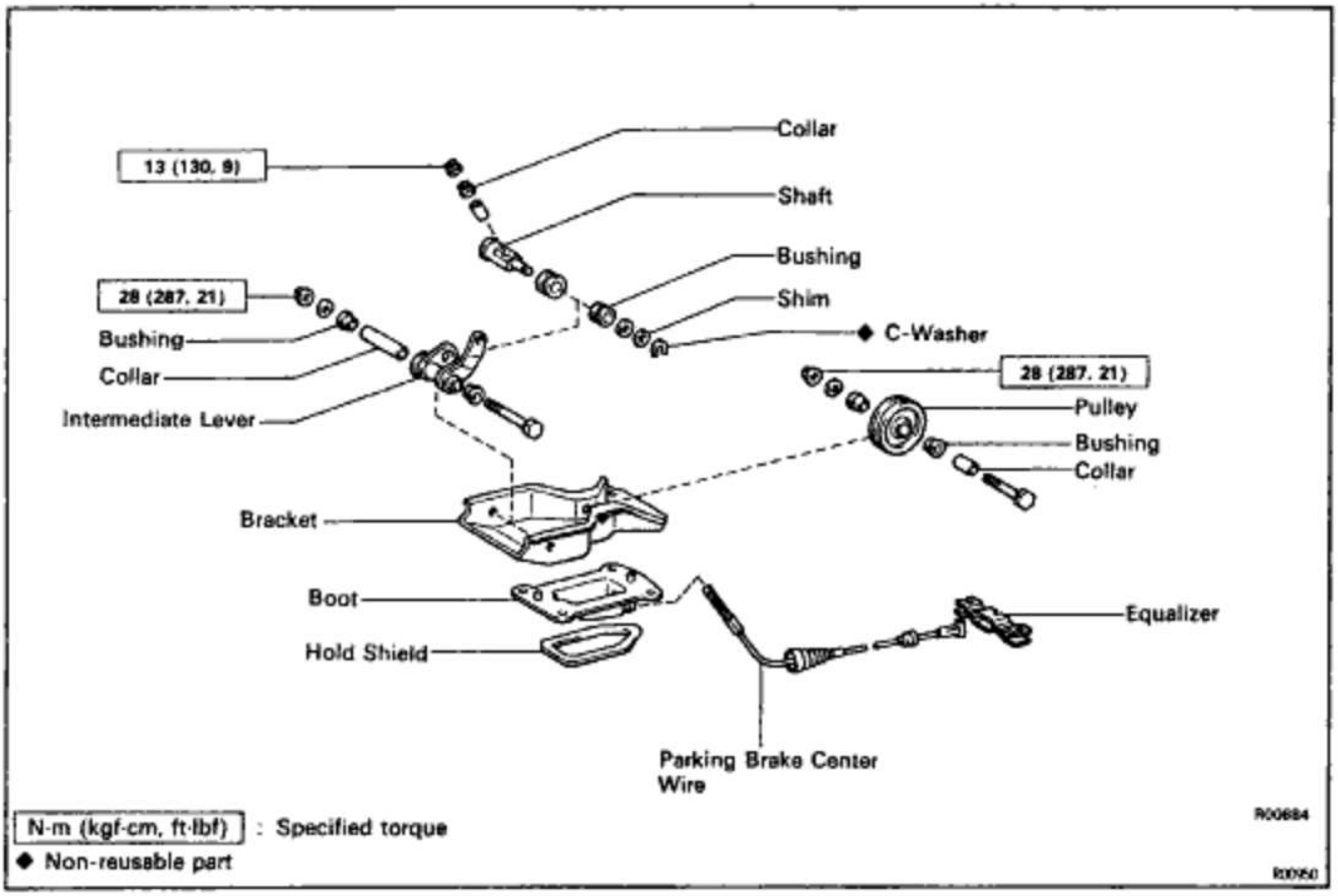
INSTALL SHOCK ABSORBER

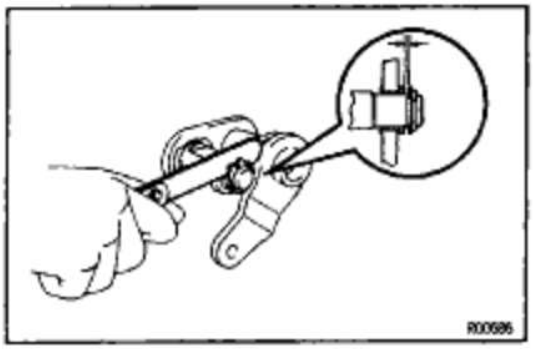
(a) Loosen the union lock nut.
(b) Install the shock absorber to the pin on the pedal bracket side, then extend the piston rod fully.
(c) Return the pedal until it hits the cushion.
(d) Make adjustments so that the shock absorber's union and the pin on the pedal side are aligned, then turn the union 1 turn counterclockwise.
(e) Install the shock absorber to the pedal and tighten the lock nut.

Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)

PARKING BRAKE INTERMEDIATE LEVER DISASSEMBLY AND ASSEMBLY

Remove and install the parts as shown.





MAIN POINT OF INTERMEDIATE LEVER INSTALLATION

MEASURE CLEARANCE BETWEEN INTERMEDIATE LEVER SHAFT AND LEVER

Using a feeler gauge, measure the clearance.

Standard clearance:

0.09–0.5 mm (0.004–0.02 in.)

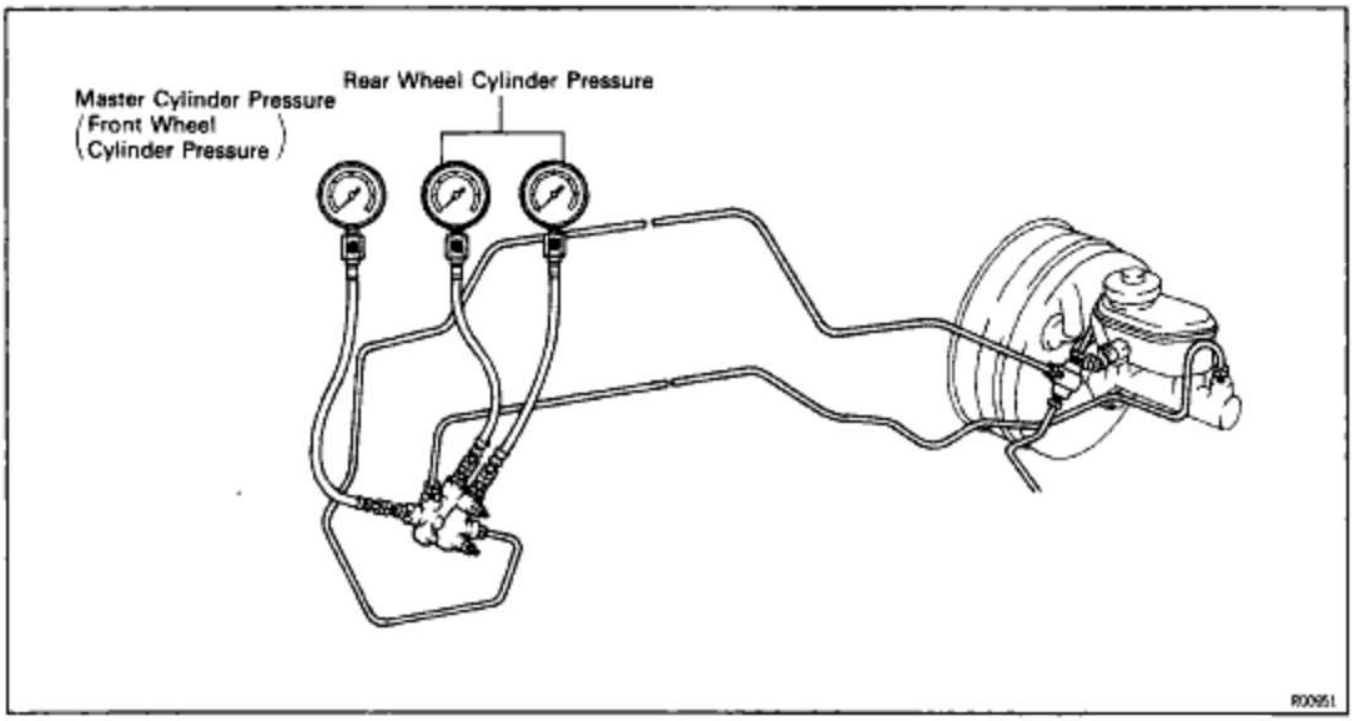
If the clearance is not within the specification, replace the shim with one of the correct size.

Shim Thickness	Shim Thickness
0.3 mm (0.012 in.)	1.2 mm (0.047 in.)
0.6 mm (0.024 in.)	1.5 mm (0.059 in.)
0.9 mm (0.035 in.)	1.8 mm (0.071 in.)

PROPORTIONING VALVE (P VALVE)

P VALVE INSPECTION

1. CONNECT FLUID PRESSURE GAUGE TO P VALVE



2. BLEED AIR FROM FLUID 'PRESSURE GAUGE

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

Master cylinder fluid pressure	Rear brake cylinder fluid pressure
5S–FE w/o ABS:	
2,452 kPa (25 kgf/cm^2 , 356 psi)	2,452 kPa (25 kgf/cm^2 , 356 psi)
7,845 kPa (80 kgf/cm^2 , 1,138 psi)	4,452 kPa (45.4 kgf/cm^2 , 648 psi)
1 MZ–FE w/o A6S:	
2,942 kPa–(30 kgf/cm^2 , 427 psi)	2,942 kPa (30 kgf/cm^2 , 427 psi)
7,845 kPa (80 kgf/cm^2 , 1,138 psi)	4,756 kPa (48.5 kgf/cm^2 , 690 psi)
5S–FE w/ABS, 1 MZ–FE w/ABS:	
3,432 kPa (35 kgf/cm^2 , 498 psi)	3,432 kPa (35 kgf/cm^2 , 498 psi)
7,845 kPa (80 kgf/cm^2 , 1,138 psi)	5,070 kPa (51.7 kgf/crn2 , 735 psi)

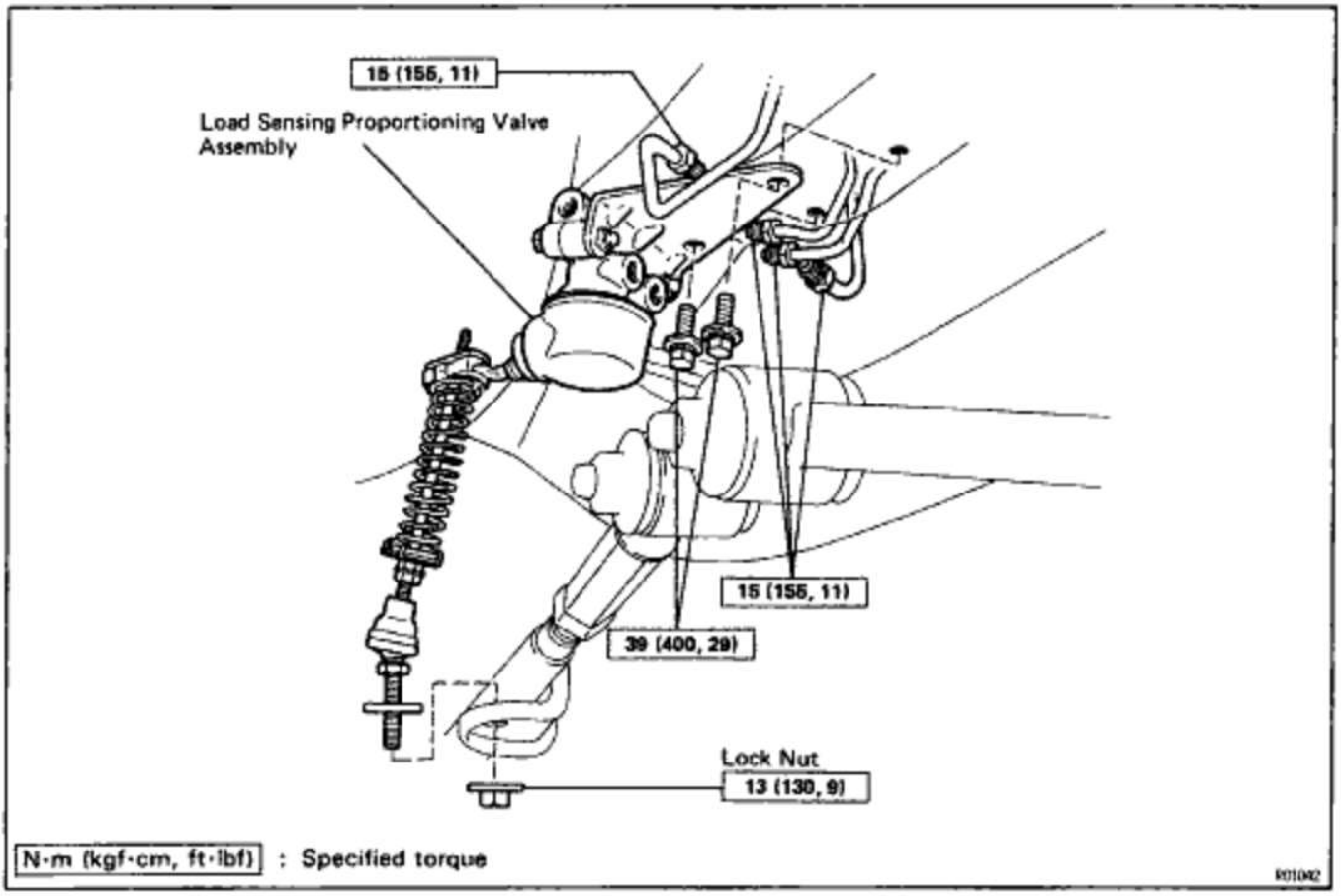
If the rear brake cylinder pressure is incorrect, replace the P valve assembly.

4. BLEED BRAKE SYSTEM

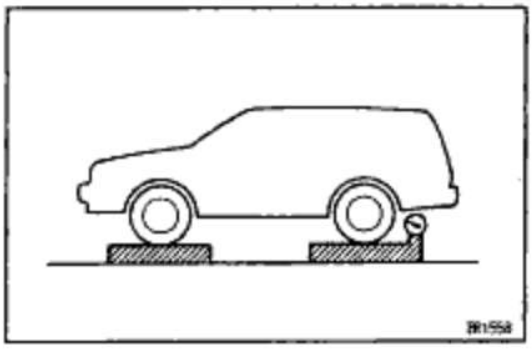
5. CHECK FOR LEAKS

LOAD SENSING PROPORTIONING VALVE (LSPV)

COMPONENTS



FLUID PRESSURE INSPECTION



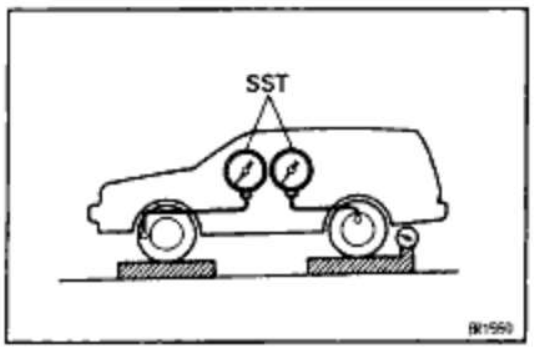
1. SET REAR AXLE LOAD

(a) Set the vehicle to its curb weight.

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

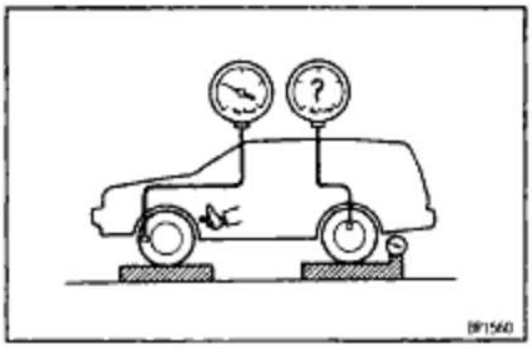
(c) Set the rear axle load.

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 FLUID PRESSURE TO FOL–LOWING SPECIFICATION AND CHECK REAR BRAKE FLUID PRESSURE

Rear brake fluid pressure:

5S–FE All, 1 MZ–FE w/ABS

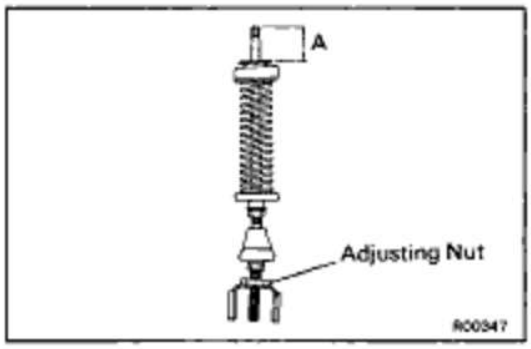
Front brake fluid pressure kPa (kgf/cm^2 , psi)	Rear brake fluid pressure kPa (kgf/cm^2 , psi)
9,807 (100, 1,422)	6,139–7,120 (62.6–72.6, 890–1,033)

1 MZ–FE w/o A6S

Front brake fluid pressure kPa (kgf/cm^2 , psi)	Rear brake fluid pressure kPa (kgf/cm^2 , psi)
12,747 (130 , 1,849)	8,865–9,846 (90.4–100.4,1,286–1,428)

HINT:

- Depress the brake pedal while the engine is run–ning.
- The brake pedal should not be depressed twice and/or returned while setting to the specified pressure. Read the value of rear pressure 2 sec–onds after adjusting to the specified fluid pres–sure.



4. IF NECESSARY, ADJUST FLUID PRESSURE

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

Initial set length:

26.0 mm (1.02 in.)

(b) Check the rear brake fluid pressure.

(c) If not within the specification, adjust the fluid pres–sure by changing the shaft length.

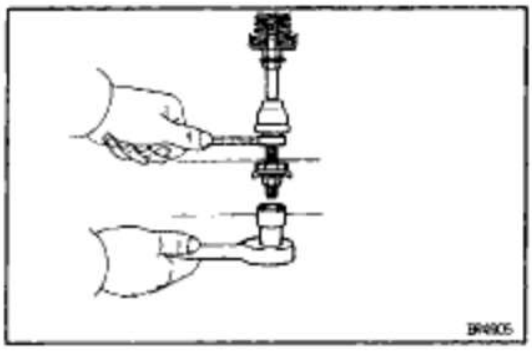
Low pressure–Lengthen A

High pressure–Shorten A

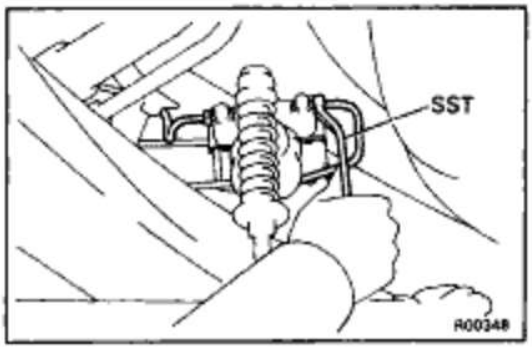
HINT:–For every full turn of the adjusting nut, the fluid pressure will change as follows:

Fluid Pressure changed kPa (kgf/cm^2, psi)

5S–FE All, 1 MZ–FE w/ABS	294 (3.0, 42.7)
1 MZ–FE w/o ABS	422 (4.3, 61.2)



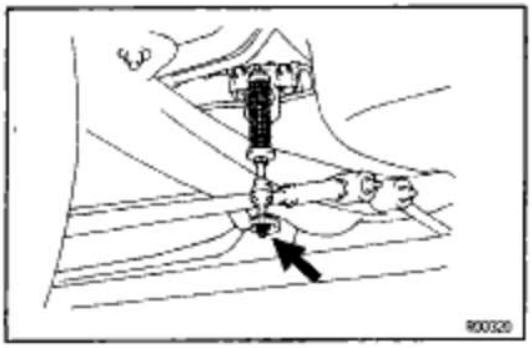
(d) Torque the lock nut.
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)
If it cannot be adjusted, replace the valve body.



LSPV REMOVAL

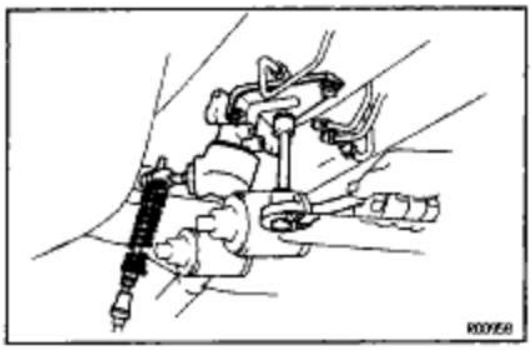
1. DISCONNECT BRAKE LINES

Using SST, disconnect the brake lines 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.

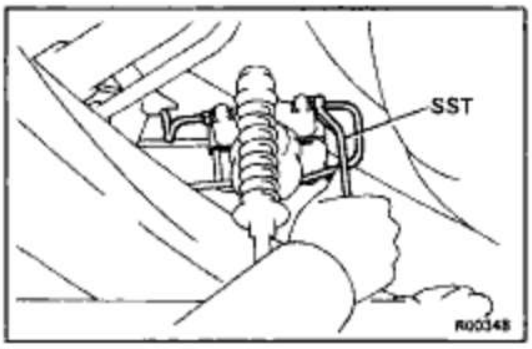


(b) Remove the 2 mounting bolts and remove the LSPV assembly.

LSPV INSTALLATION

1. INSTALL LSPV ASSEMBLY

(a) Install the valve assembly with the 2 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 to the rear suspension arm with the lock nut.



2. CONNECT BRAKE LINES

Using SST, connect the brake lines.

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 page BR–9)

4. CHECK FOR LEAKS

5. CHECK AND ADJUST FLUID PRESSURE

(See page BR–63)

6. REMOVE LSPV GAUGE (SST) AND BLEED BRAKE SYSTEM

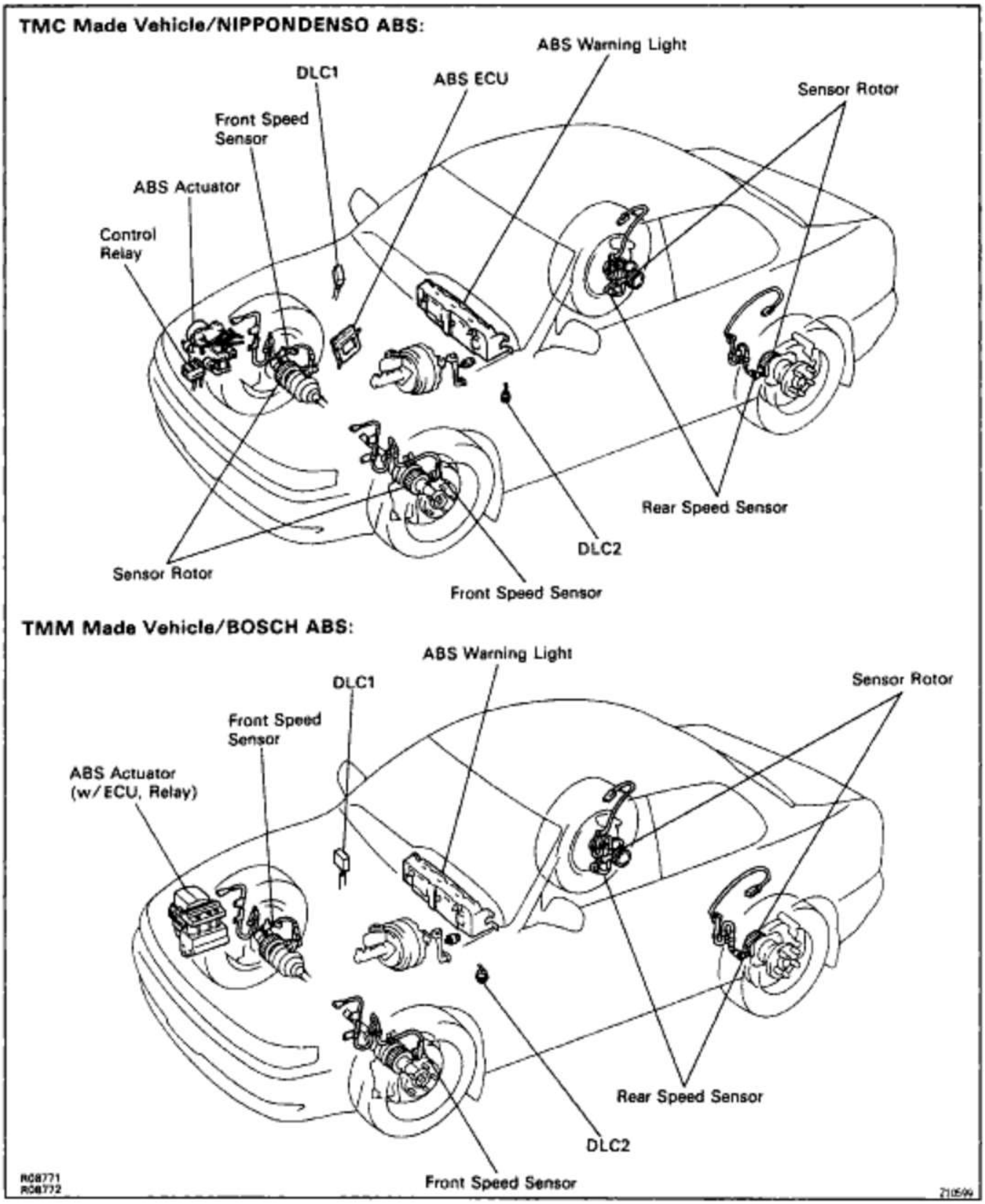
7. CHECK FOR LEAKS

ANTI–LOCK BRAKE SYSTEM (ABS)

DESCRIPTION

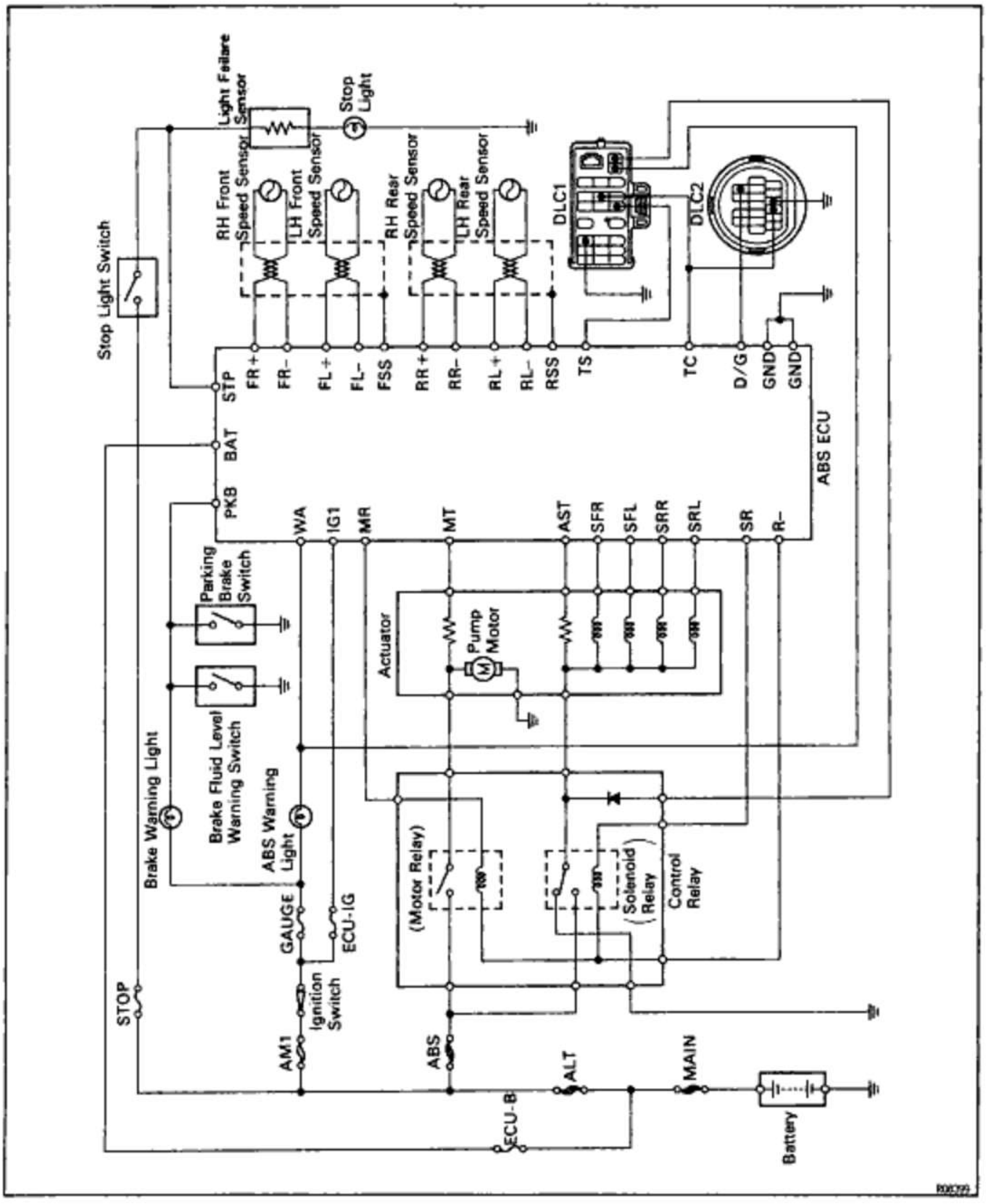
- ABS controls the brake cylinder hydraulic pressure to all 4 wheels during sudden braking and braking on slippery road surfaces, preventing the wheels from locking. ABS provides the following benefits:
  (1) Steering round an obstacle with a greater degree of certainty even when panic braking.
  (2) Stopping during panic braking while keeping the effect up on stability and steerability to a minimum, even on curves.
- In case a malfunction occurs, a diagnosis function and fail–safe system have been adopted for the ABS.
- An ABS actuator manufactured by BOSCH is used on the Camry produced by TMM (Toyota Motor Manufacturing U.S.A., Inc.).

SYSTEM PARTS LOCATION



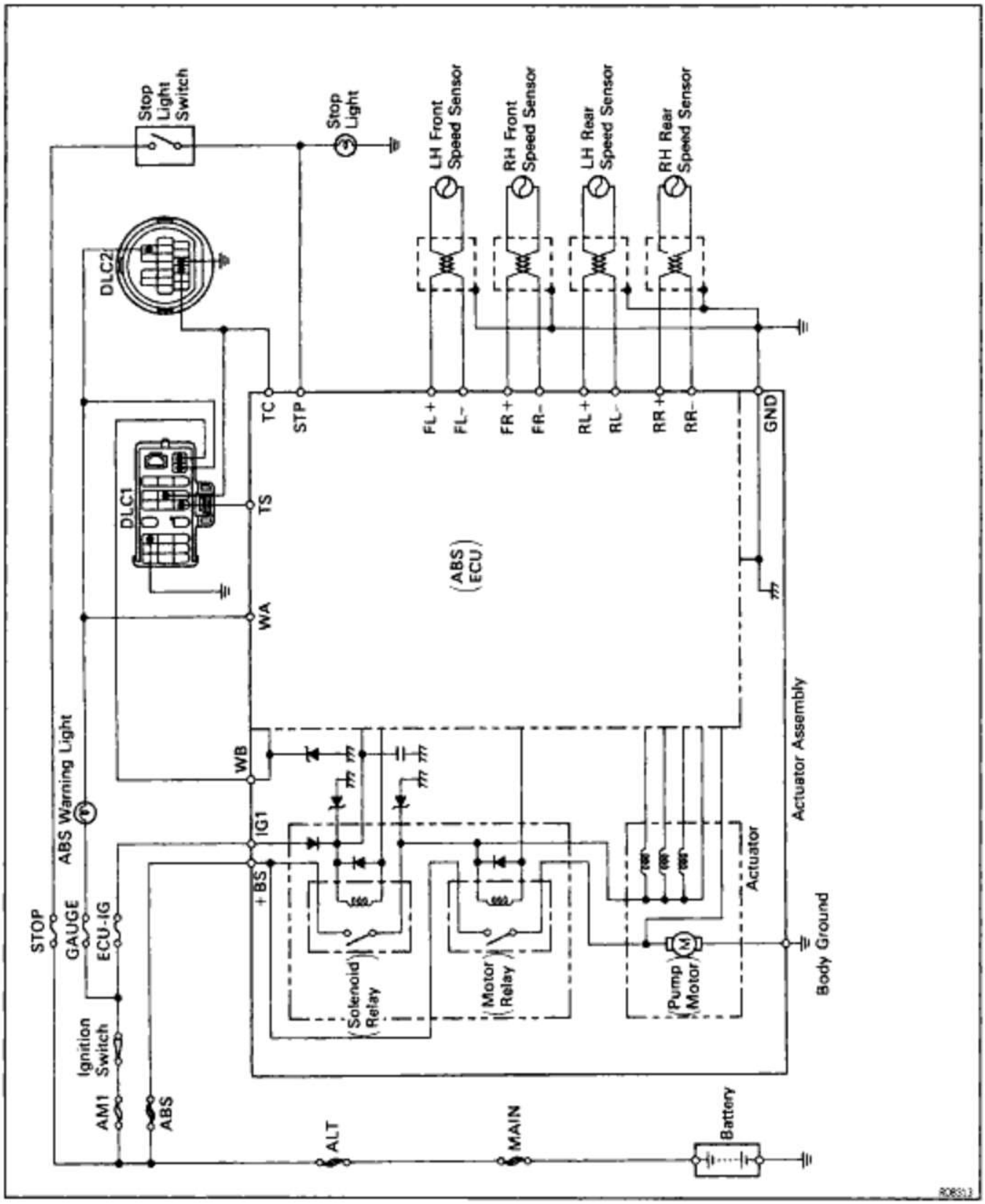
WIRING DIAGRAM

TMC Made Vehicle/NIPPONDENSO ABS:



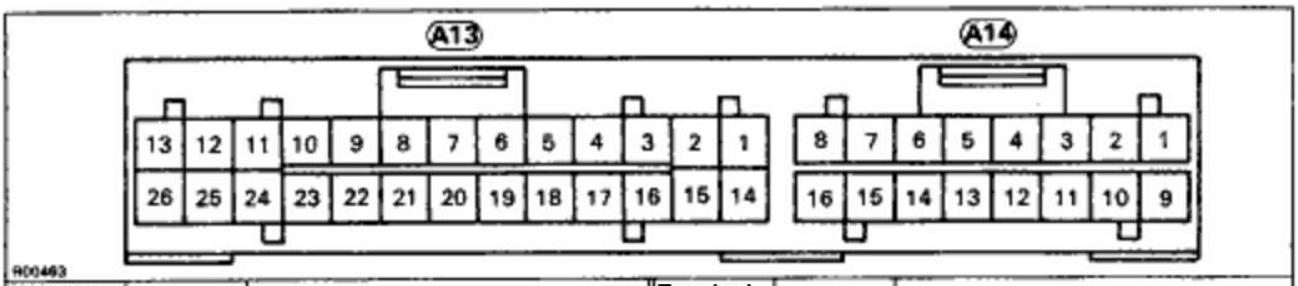
WIRING DIAGRAM

TMM Made Vehicle/BOSCH ABS:



ECU TERMINALS

TMC Made Vehicle/NIPPONDENSO ABS:

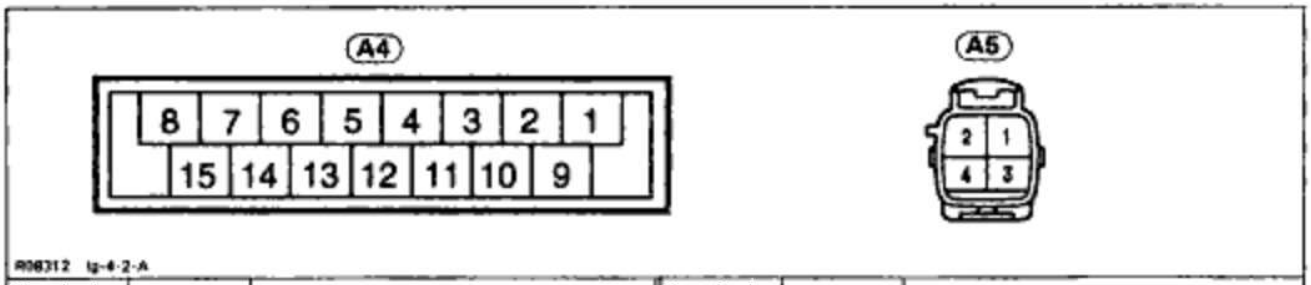


Terminal No.	Symbol	Connection	Terminal No.	Symbol	Connection
A13- 1	SFR	Right front solenoid	A14- 1	RL–	Left rear speed sensor
2	GND	Ground	2	–	–
3	FR–	Right front speed sensor	3	–	–
4	–	–	4	D/G	DLC2
5	TC	DLC1, DLC2	5	–	–
6	MT	ABS control (motor) relay monitor	6	STP	Stop light switch
7	–	–	7	RSS	Sealed wiring harness
8	–	–	8	RR+	Right rear speed sensor
9	FL+	Left front speed sensor	9	RL+	Left rear speed sensor
10	FSS	Sealed wiring harness	10	–	–
11	SR	ABS control (solenoid) relay	11	–	–
12	IG1	Ignition switch	12	–	–
13	SFL	Left front solenoid	13	WA	ABS warning light
14	SRL	Left rear solenoid	14	PKB	Parking brake switch
15	GND	Ground	15	TS	DLC1
16	FR+	Right front speed sensor	16	RR-	Right rear speed sensor
17	–	–			
18	AST	A8S control (solenoid) relay monitor			
19	–	–			
20	–	–			
21	–	–			
22	FL–	Left front speed sensor			
23	MR	ABS control (motor) relay			
24	R–	Relay ground			
25	BAT	Battery			
26	SRR	Right rear solenoid			

V04536

ECU TERMINALS

TMM Made Vehicle/BOSCH ABS:



Terminal No.	Symbol	Connection	Terminal No.	Symbol	Connection
A4- 1	WA	A6S warning fight	A5-1	+BS	Battery
2	RL–	Left rear speed sensor	2	IG1	Ignition switch
3	–	–	3	WB	DLC1
4	RL+	Left rear speed sensor	4	GND	Ground
5	FR–	Right front speed sensor			
6	RR+	Right rear speed sensor			
7	FL–	Left front speed sen-			
8	–	sor –			
9	STP	Stop light switch			
10	–	–			
11	FR+	Right front speed sensor			
12	TC	DLC1, DLC2			
13	FL+	Left front speed sensor			
14	RR–	Right rear speed sensor			
15	TS	DLC1			

V04537

ECU TERMINALS STANDARD VALUE

TMC Made Vehicle/NIPPONDENSO ABS:

Symbols (Terminals No.)	STD Voltage (V)	Condition
BAT (A13-25) – GND (A13-2, 15)	10 – 14	Always
IG1 (A13-12) – GND (A13-2, 15)	10 – 14	IG switch ON
SR (A13-11) – R– (A13-24)	8.4 – 14	IG switch ON, ABS warning light OFF
MR (A13-23) – R– (A13-24)	Below 1.0	IG switch ON
SFR (A13-1) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
SFL (A13-13) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
SRR (A13-26) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
AST (A13-18) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
WA (A14-13) – GND (A13-2, 15)	Below 2.0	IG switch ON, AIRS warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
PKB (A14-14) – GND (A13-2, 15)	Below 1.5	IG switch ON, PKB switch ON, Fluid in M/C reservoir above MIN level
	10 – 14	IG switch ON, PKB switch OFF, Fluid in M/C reservoir above MIN level
STP (A14-6) – GND (A13-2, 15)	Below 1.5	Stop light switch OFF
	8 – 14	Stop light switch ON
D/G (A14-4) – GND (A13-2, 15)	10 – 14	IG switch ON, ABS warning light OFF
TC (A13-5) – GND (A13-2, 15)	10 – 14	!G switch ON
TS (A14-15) – GND (A13-2, 15)	10 – 14	IG switch ON
FR+ (A13-16) – FR– (A13-3)	AC generation	IG switch ON Slowly turn right front wheel
FL+ (A13-9) – FL– (A13-22)	AC generation	IG switch ON Slowly turn left front wheel
RR+ (A14-8) – RR– (A14-16)	AC generation	IG switch ON Slowly turn right rear wheel
RL+ (A14-9) – RL– (A14-1)	AC generation	IG switch ON Slowly turn left rear wheel

V04538

ECU TERMINALS STANDARD VALUE

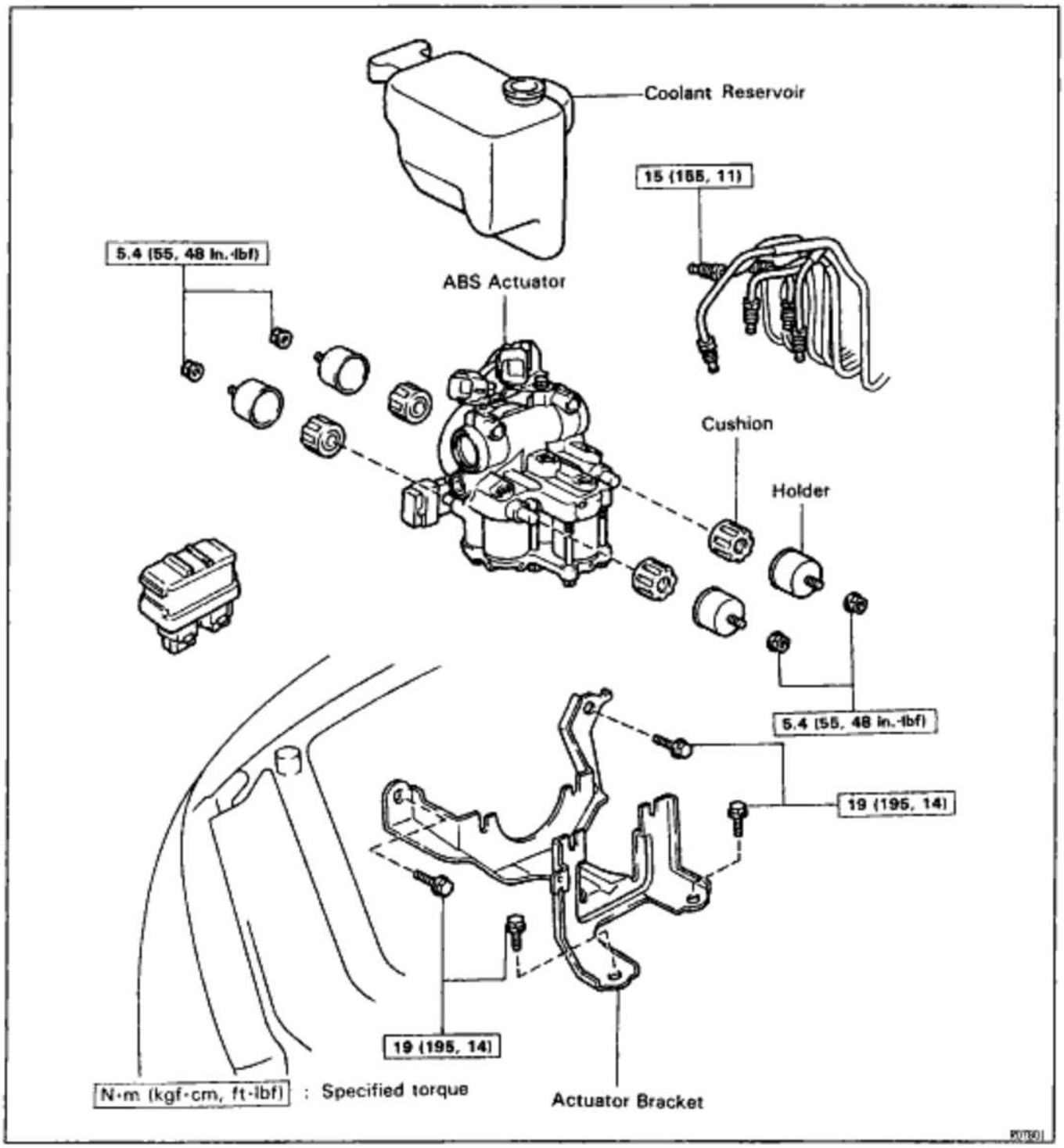
TMM Made Vehicle/BOSCH ABS:

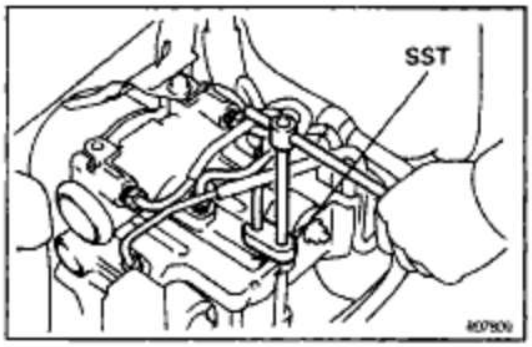
Symbols (Terminals No.)	STD Voltage (V)	Condition
+BS (A5-1) – GND (A5-4)	10 – 14	Always
IG1 (A5-2) – GND (A5-4)	10 – 14	IG switch ON
WA (A4-1) – GND (A5-4)	Below 2.6	IG switch ON, A6S warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
WB (A5-3) – GND (A5-4)	Below 2.6	IG switch ON, ABS warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
STP (A4-9) – GND (A5-4)	Below 1.5	Stop light switch OFF
	5 – 14	Stop light switch ON
Tc (A4-12) – GND (A5-4)	5.7 – 8.1	IG switch ON
Ts (A4-15) – GND (A5-4)	5.7 – 8.1	I G switch 0 N
FR+ (A4-11) – FR– (A4-5)	AC generation	IG switch ON, slowly turn right front wheel
FL+ (A4-13) – FL– (A4-7)	AC generation	IG switch ON, slowly turn left front wheel
RR+ (A4-6) – RR– (A4-14)	AC generation	IG switch ON, slowly turn right rear wheel
RL+ (A4-4) – RL– (A4-2)	AC generation	IG switch ON, slowly turn left rear wheel

ABS ACTUATOR (TMC Made Vehicle NIPPONDENSO ABS)

ABS ACTUATOR REMOVAL AND INSTALLATION

Remove and install the parts as shown.





MAIN POINTS OF REMOVAL AND INSTALLATION

1. DISCONNECT AND CONNECT BRAKE LINE

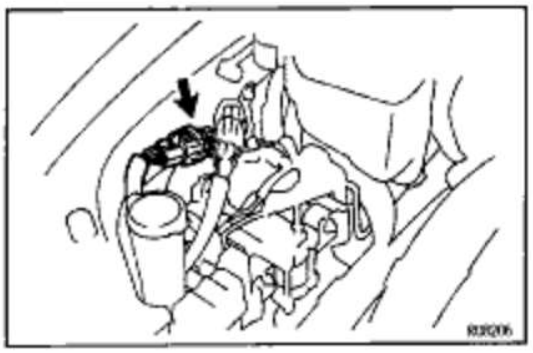
Using SST, disconnect and connect the brake lines from/to the ABS actuator.

SST 09023–00100

Torque: 15 N–m (155 kgf–cm. 11 ft–lbf)

2. BLEED BRAKE SYSTEM

(See page BR–9)



ABS ACTUATOR INSPECTION

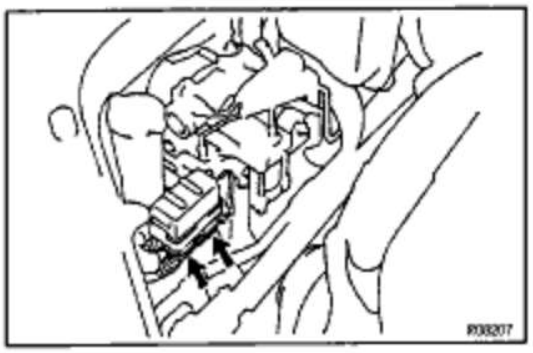
1. INSPECT BATTERY POSITIVE VOLTAGE

Battery positive voltage:

10–14.5 V

2. DISCONNECT CONNECTORS

(a) Disconnect the connector from the actuator.



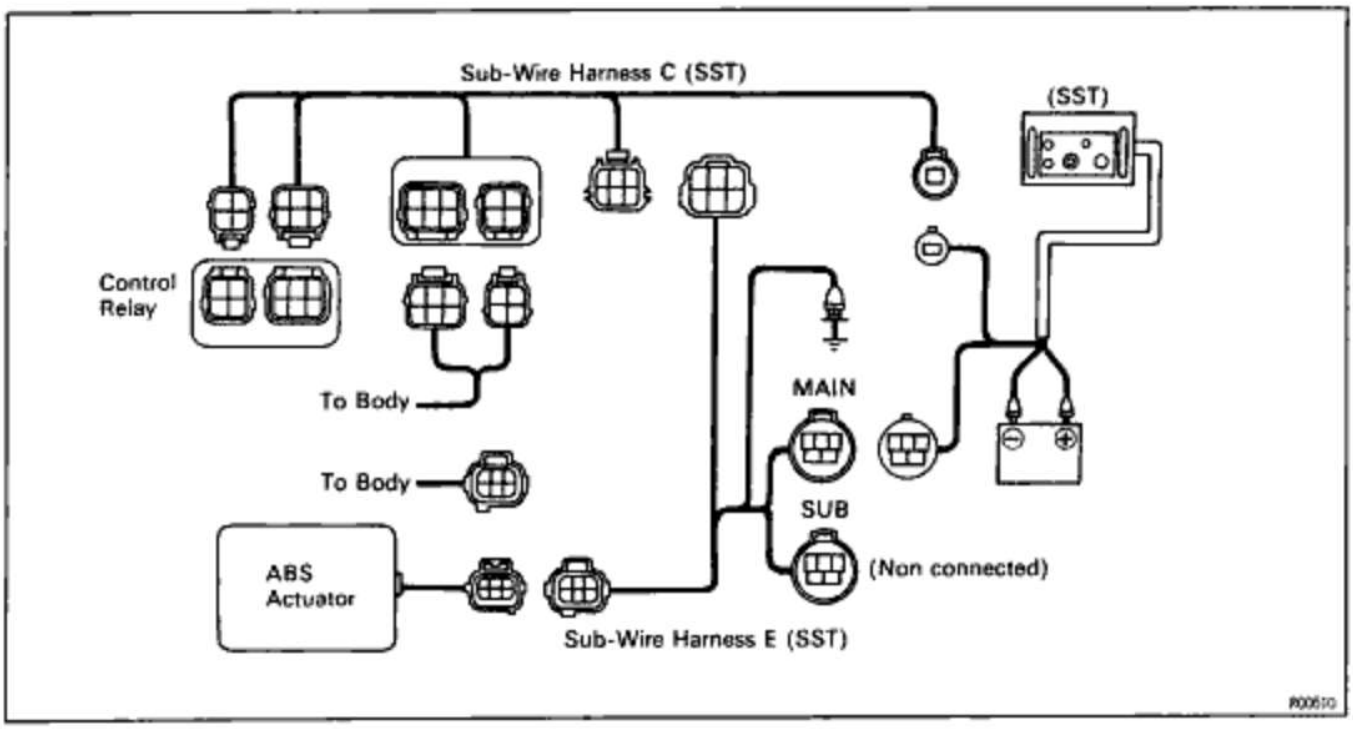
(b) Disconnect the 2 connectors from the control relay.

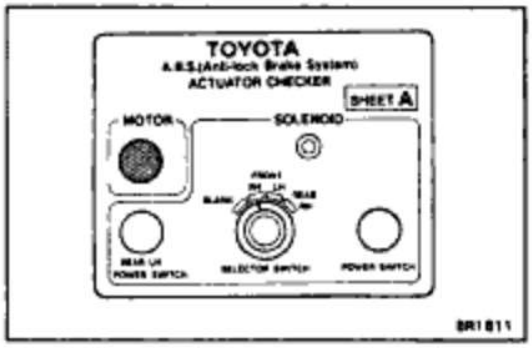
3. CONNECT ACTUATOR CHECKER (SST) TO ACTUA – TOR

(a) Connect the actuator checker (SST) to the actuator, control relay and body side wire harness through the sub–wire harness C and E (SST) as shown.

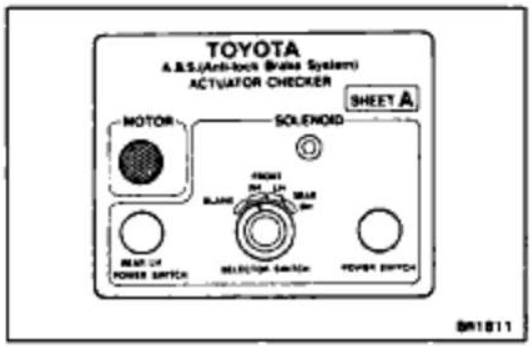
SST 09990–00150, 09990–00200, 09990–00210

(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.



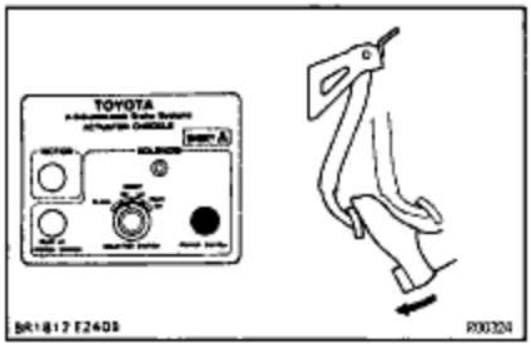


(c) Place the "SHEET A" (SST) on the actuator checker.
SST 09990–00163

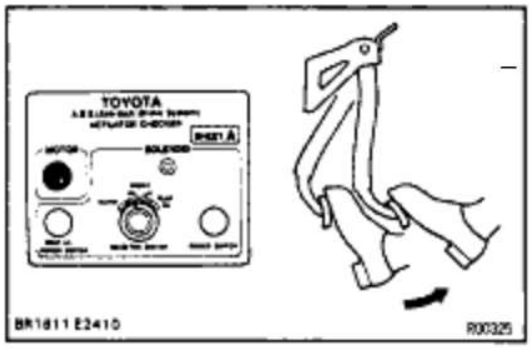


4. INSPECT BRAKE ACTUATOR OPERATION

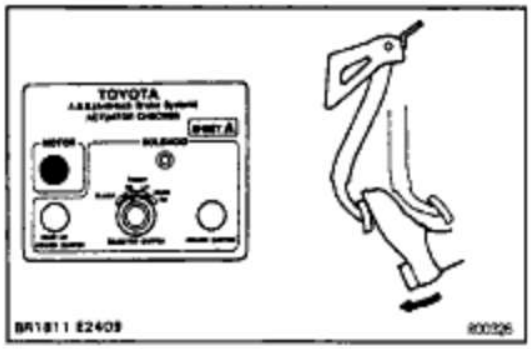
(a) Start the engine, and run it at idle.
(b) Turn the selector switch of the actuator checker to "FRONT RH" position.
(c) Push and hold in the MOTOR switch for a few seconds.
(d) Depress the brake pedal and hold it until step (g) is completed.



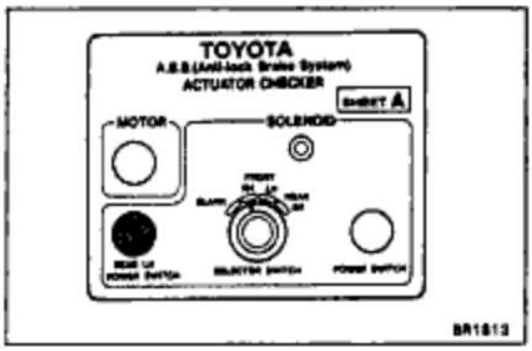
(e) Push the POWER SWITCH, and check that the brake pedal does not go down.
NOTICE: Do not keep the POWER SWITCH pushed down for more than 10 seconds.
(f) Release the switch, and check that the pedal goes down.



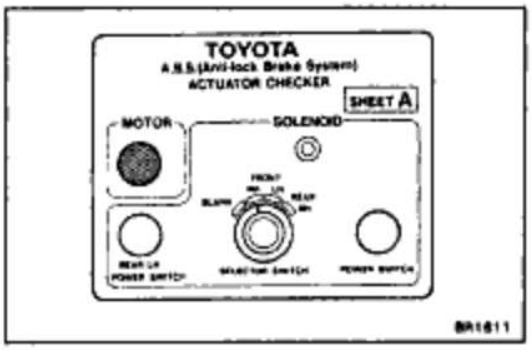
(g) Push and hold in the MOTOR switch for a few seconds, and check that the pedal returns.
(h) Release the brake pedal.



(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.
(k) Release the brake pedal.



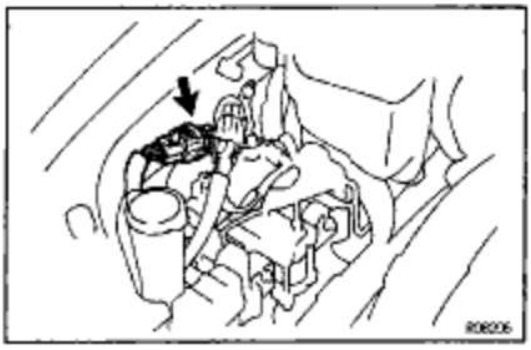
(l) Turn the selector switch to "FRONT LH" position.
(m) Repeat (c) to 6), checking the actuator operation similarly.
(n) Similarly, inspect "REAR RH" and "REAR LH" position.
HINT: When inspecting "REAR LH" position, push the REAR LH switch instead of the POWER SWITCH, and you can inspect in any selector switch position.



(o) Push and hold in the MOTOR switch for a few seconds.
(p) Stop the engine.

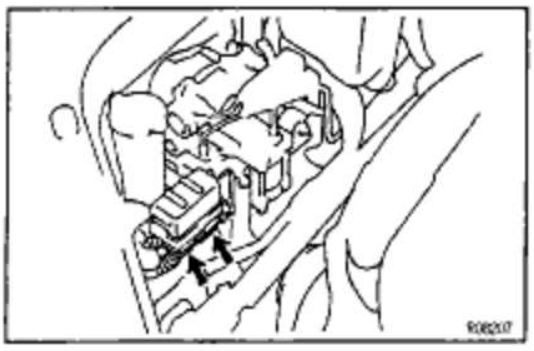
5. DISCONNECT ACTUATOR CHECKER (SST) FROM ACTUATOR

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 , 09990–00163



6. CONNECT CONNECTORS

(a) Connect the 2 connectors to the control relay.



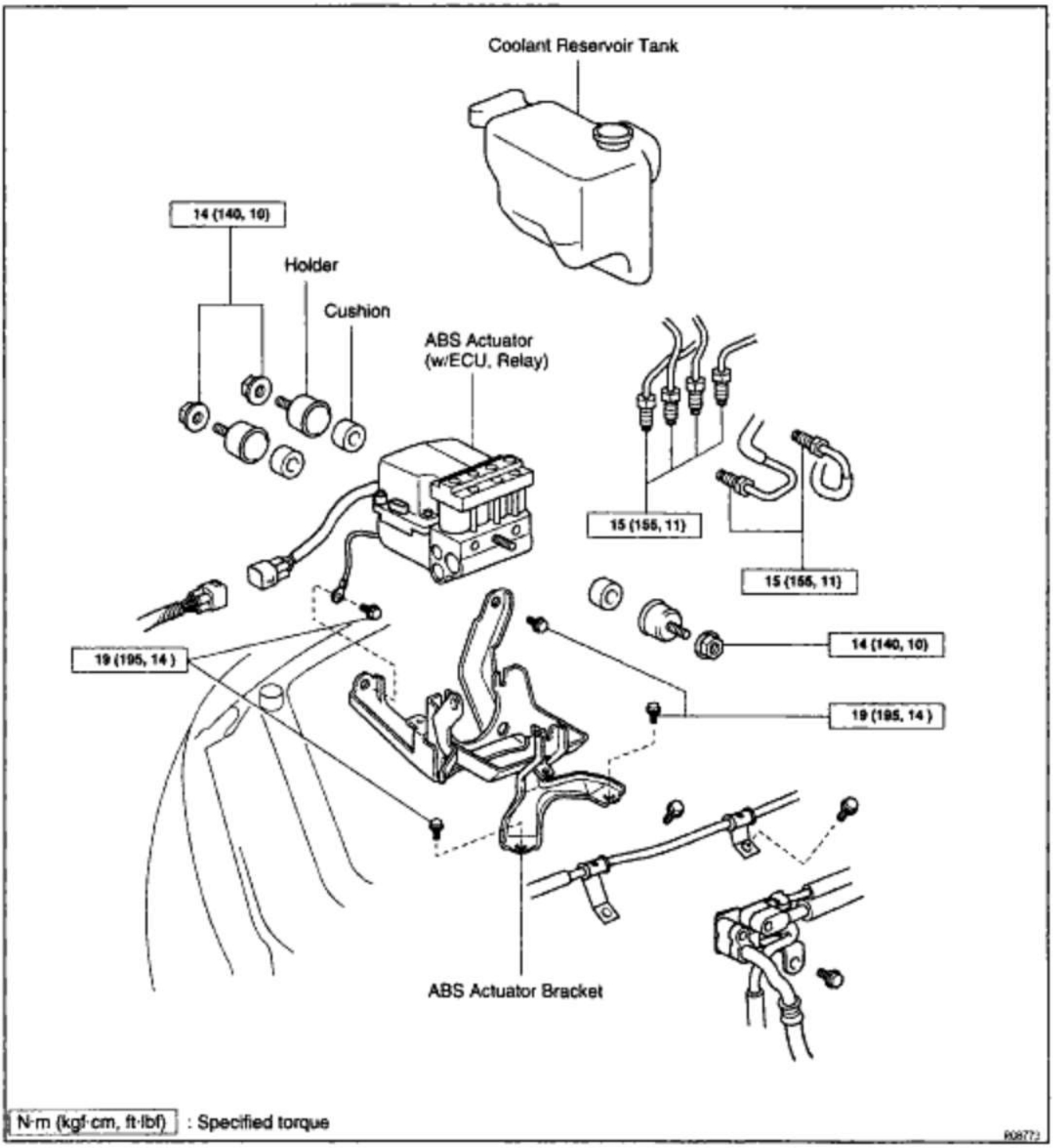
(b) Connect the connector to the actuator.

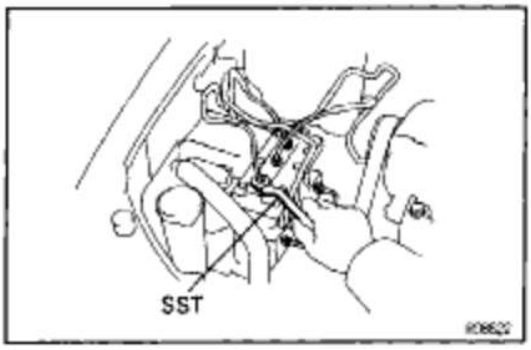
7. CLEAR DIAGNOSTIC TROUBLE CODES
(See page BR–94**)**

ABS ACTUATOR (TMM Made Vehicle BOSCH ABS)

ABS ACTUATOR REMOVAL AND INSTALLATION

Remove and install the parts as shown.





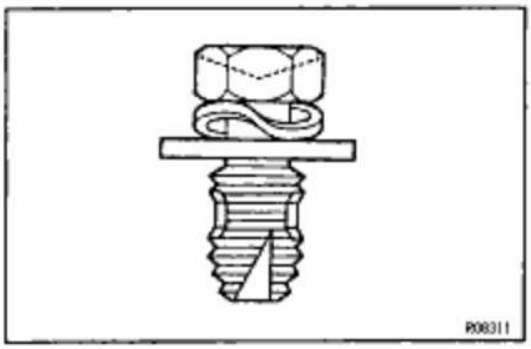
MAIN POINTS OF REMOVAL AND INSTALLATION

1. DISCONNECT AND CONNECT BRAKE LINE

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

SST 09751–36011

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



2. INSTALL ABS ACTUATOR

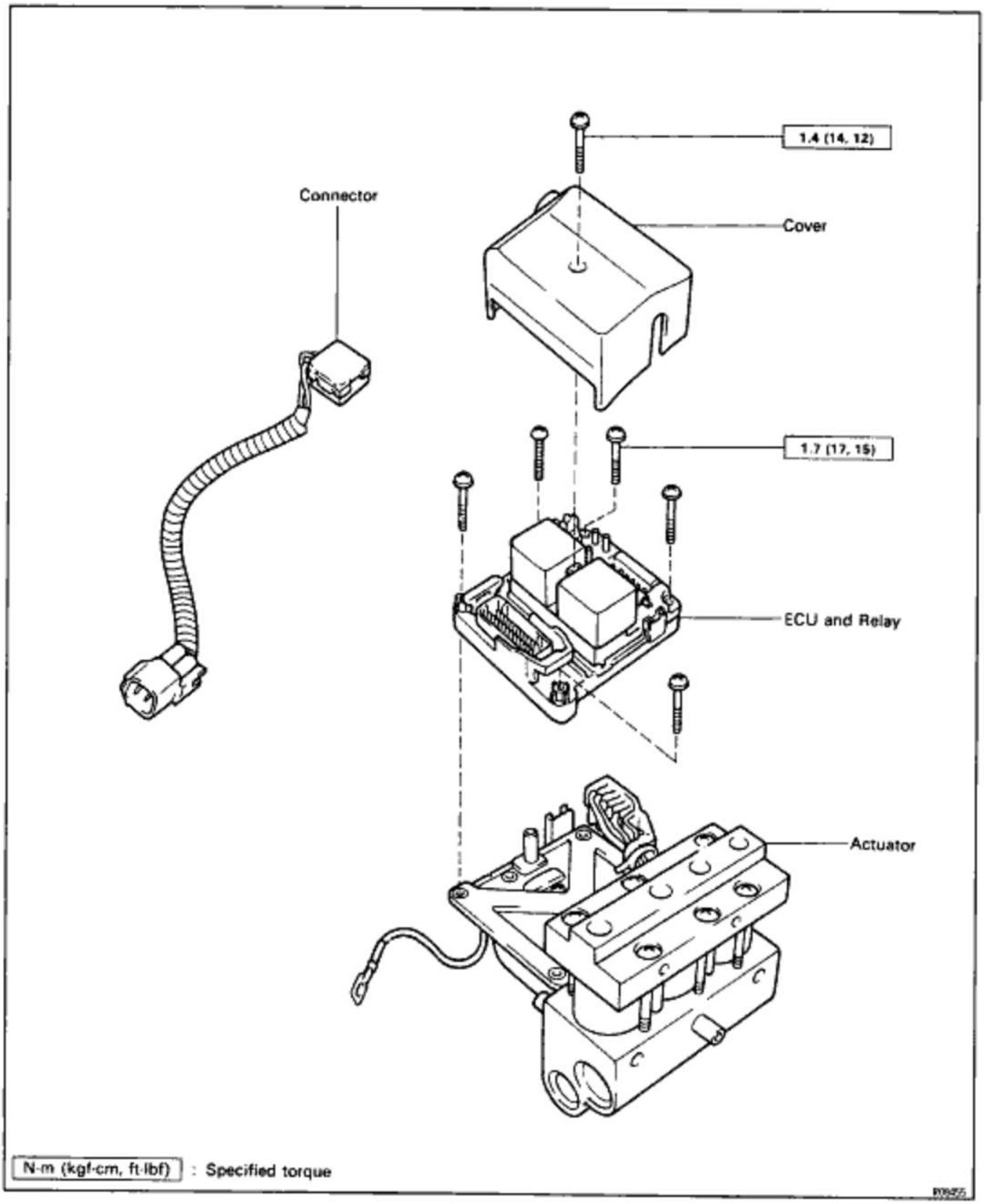
NOTICE: Use the bolts which have a notch to securely ground the actuator ground wire.

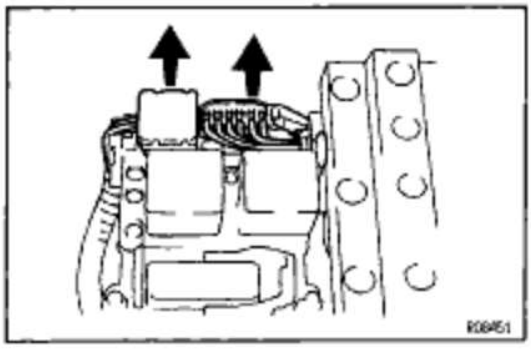
3. BLEED BRAKE SYSTEM

(See page BR–9)

ABS ACTUATOR DISASSEMBLY AND ASSEMBLY

Remove and install the parts as shown.





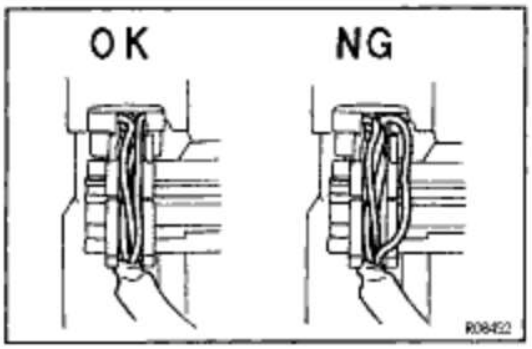
MAIN POINTS OF DISASSEMBLY AND ASSEMBLY

1. REMOVE AND INSTALL COVER

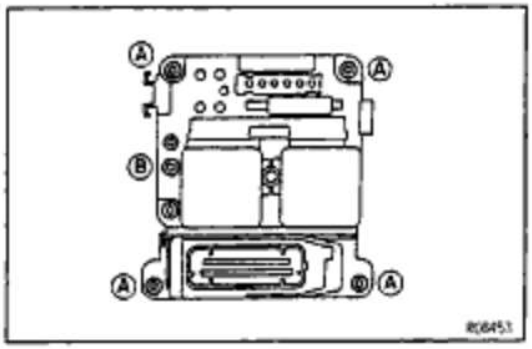
Using a T15 torx wrench, loosen and tighten the screw.

Torque: 1.4 N–m(14 kgf–cm, 12 in.lbf)

2. DISCONNECT AND CONNECT 4–PIN AND 6–PIN CONNECTORS



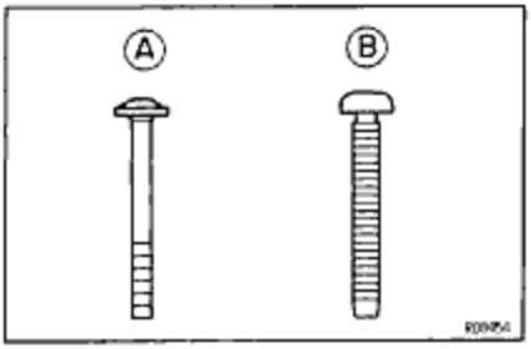
NOTICE: When installing, place the 4–pin connector's cables into the cable guide.



3. REMOVE AND INSTALL ECU

Using T15 and T20 torx wrenches, loosen and tighten the 5 screws.

Torque: 1.7 N–m(17 kgf–cm, 15 in.–lbf)



NOTICE: There are 2 kinds of screw, so install a correct screw into each hole.

4. PERFORM TEST DRIVE

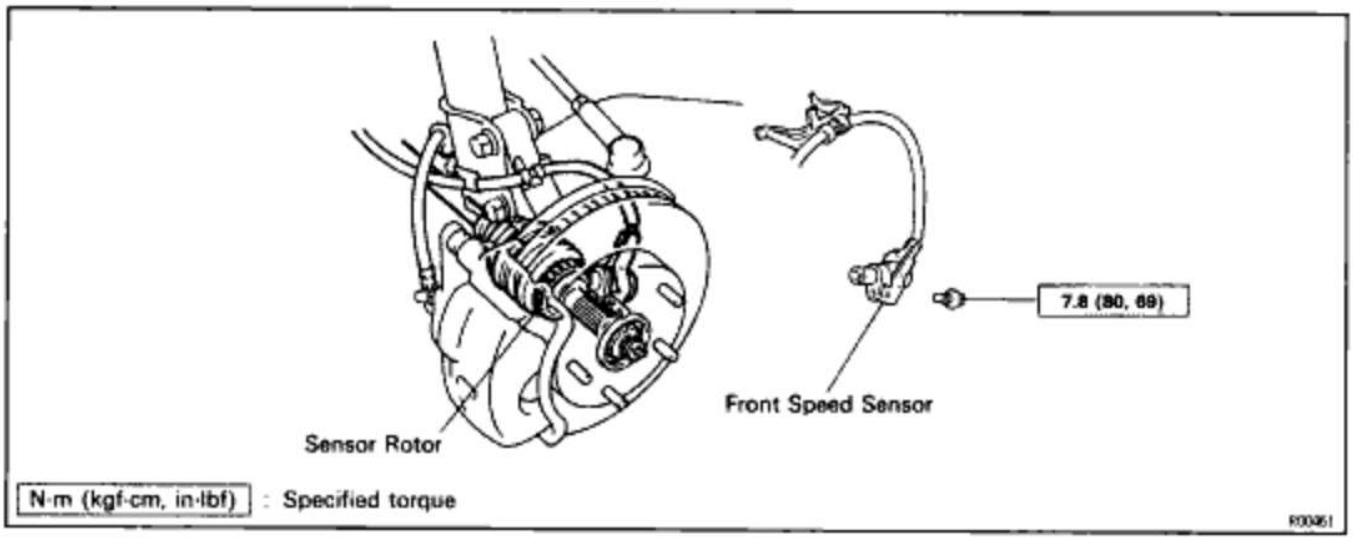
(a) Drive for at least 20 seconds at 30 Km/h (119 mph).

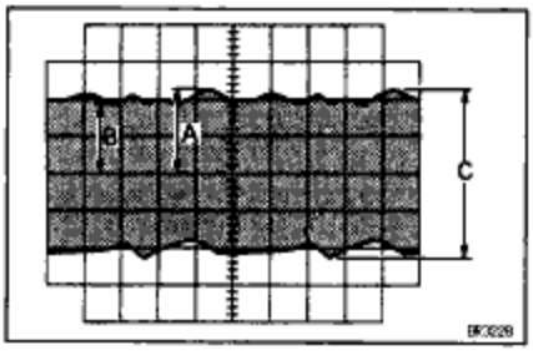
(b) The ABS warning light may not light.

If the ABS warning light lights, read the diagnostic trouble code.

FRONT SPEED SENSOR

COMPONENTS

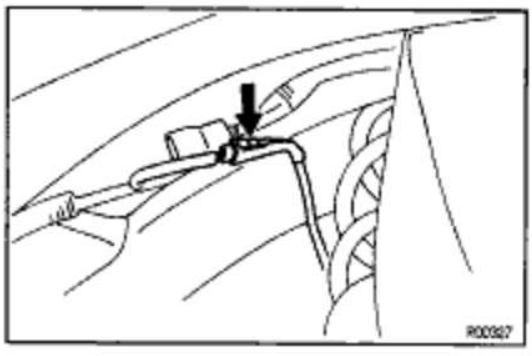




FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

INSPECT FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLO–SCOPE

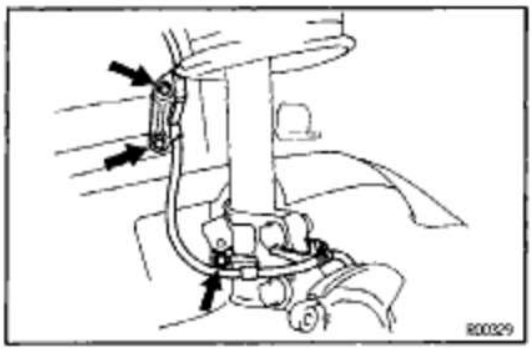
(a) Connect an oscilloscope to the speed sensor connec–tor.
(b) Run the vehicle at 20 km/h (112.4 mph), and inspect speed sensor output wave.
(c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.
(d) Check that B is 30% or more of A.
If not as specified, replace the drive shaft.



FRONT SPEED SENSOR REMOVAL

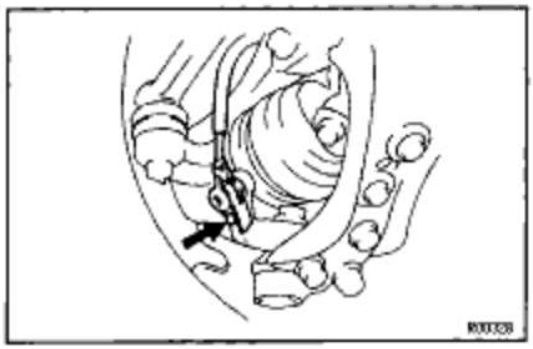
1. DISCONNECT SPEED SENSOR CONNECTOR

(a) Remove the fender shield.
(b) Disconnect the speed sensor connector.



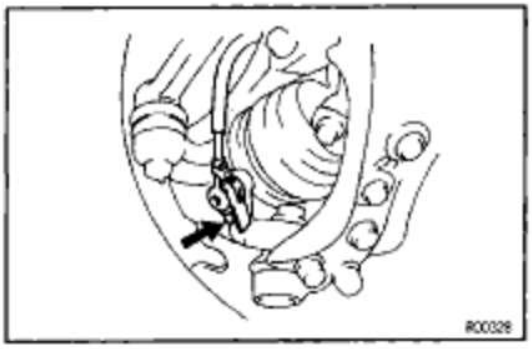
2. REMOVE SPEED SENSOR

(a) Remove the 3 clamp bolts holding the sensor harness to the body and shock absorber_



(b) Remove the speed sensor from the steering knuckle.

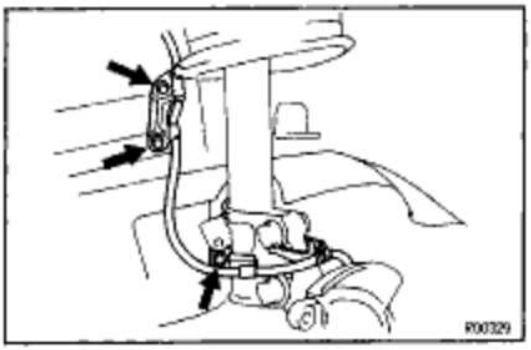
FRONT SPEED SENSOR INSTALLATION



1. INSTALL SPEED SENSOR

Install the speed sensor to the steering knuckle.

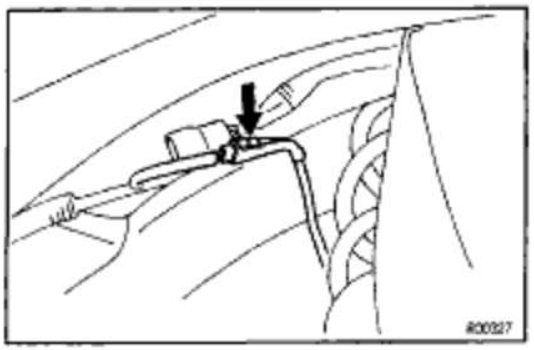
Torque: 7.8 N–m (80 kgf–cm, 69 MAW)



2. CONNECT SPEED SENSOR CONNECTOR

(a) Install the sensor harness.

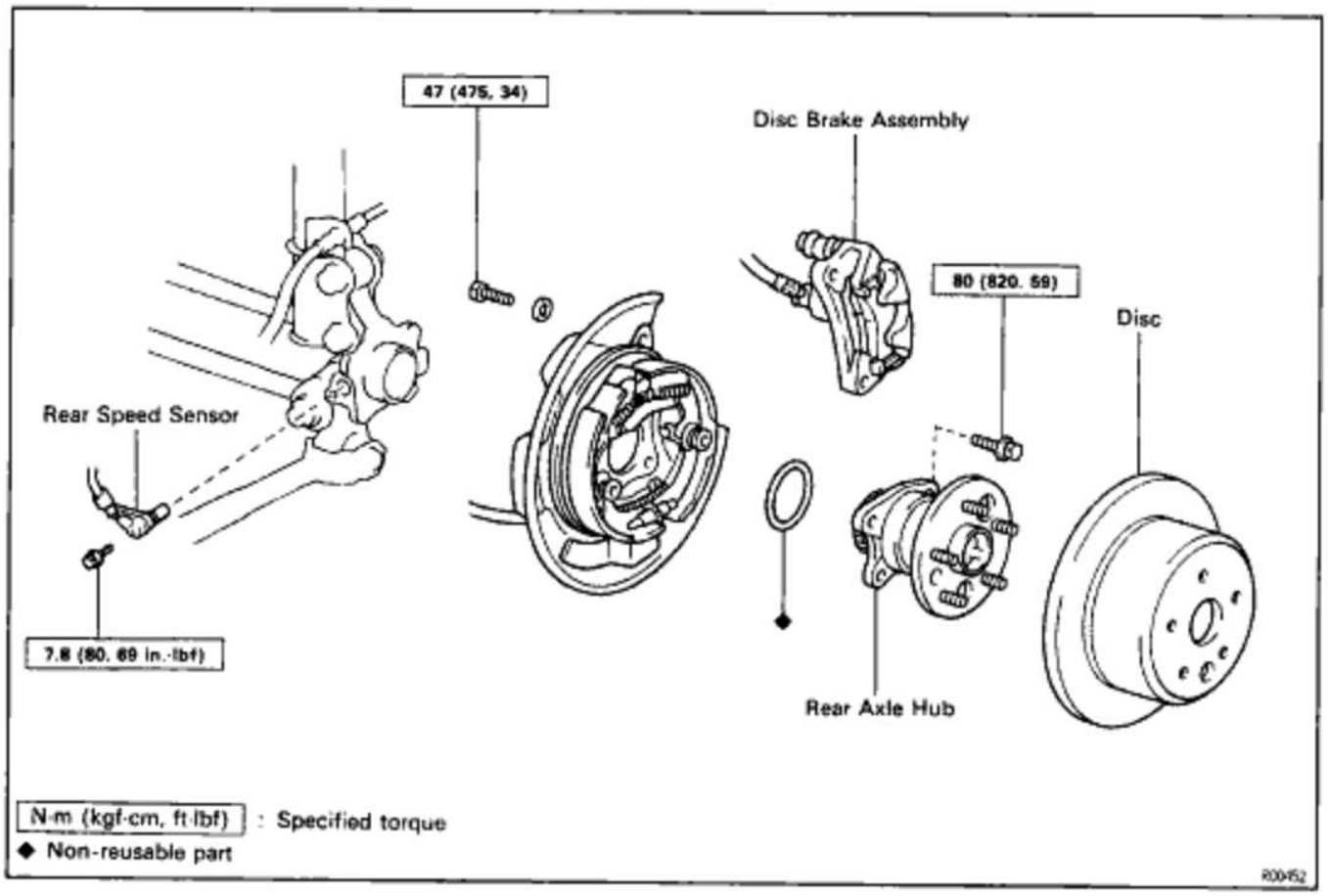
Torque: 5.4 N–m (55 kgf–cm. 48 in.–lbf)

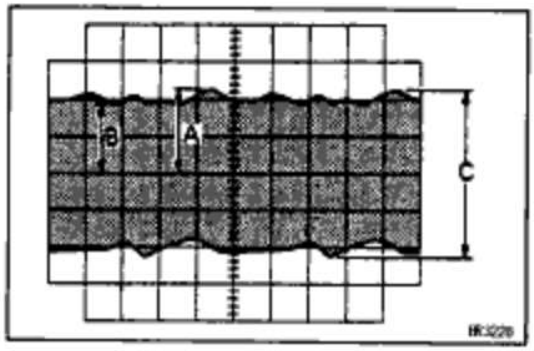


(b) Connect the speed sensor connector.

REAR SPEED SENSOR

COMPONENTS

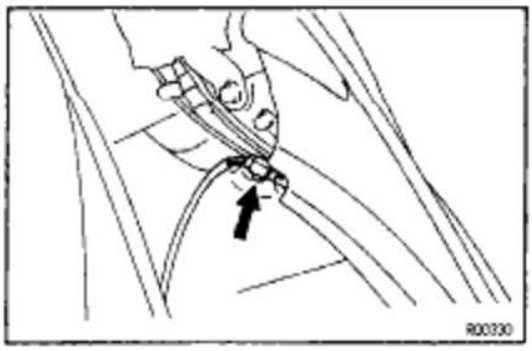




REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

INSPECT REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLO–SCOPE

(a) Connect an oscilloscope to the speed sensor connec–tor.
(b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.
(c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.
(d) Check that B is 40 96 or more of A.
If not as specified, replace the rear axle hub.

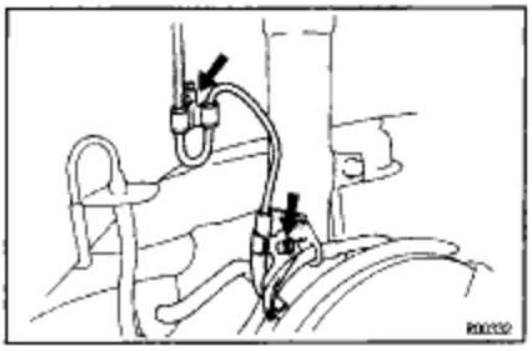


REAR SPEED SENSOR REMOVAL

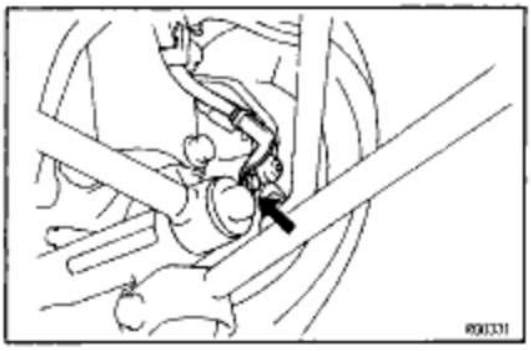
1. DISCONNECT SPEED SENSOR CONNECTOR

(a) Remove the seat cushion and side seatback.

(b) Disconnect the speed sensor connector, and pull out the sensor wire harness with the grommet.

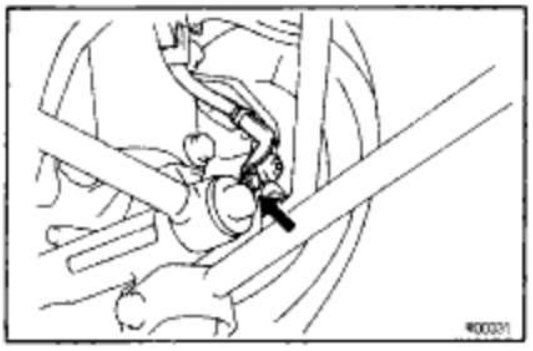


(c) Remove the 2 clamp bolts holding the sensor wire harness to the body and shock absorber.



2. REMOVE SPEED SENSOR

Remove the speed sensor from the axle carrier.

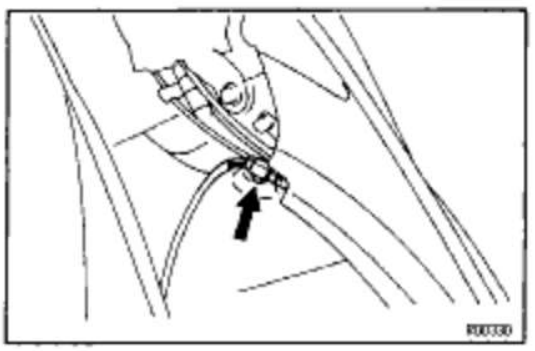


REAR SPEED SENSOR INSTALLATION

1. INSTALL SPEED SENSOR

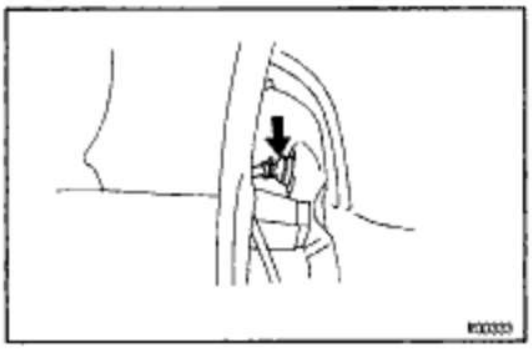
Install the speed sensor to the axle carrier.

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

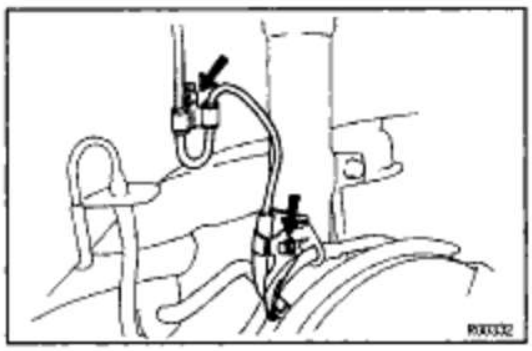


2. CONNECT SPEED SENSOR CONNECTOR

(a) Pass the sensor harness through the body panel hole, and connect the connector.



(b) install the grommet securely.



(c) Install the sensor harness.
Torque: 5.4 N–m (55 kgf–cm, 48 in.–lbf)

–MEMO–

TROUBLESHOOTING (TMC Made Vehicle NIPPONDENSO ABS)

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 recur, simulate the problem by initially 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 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

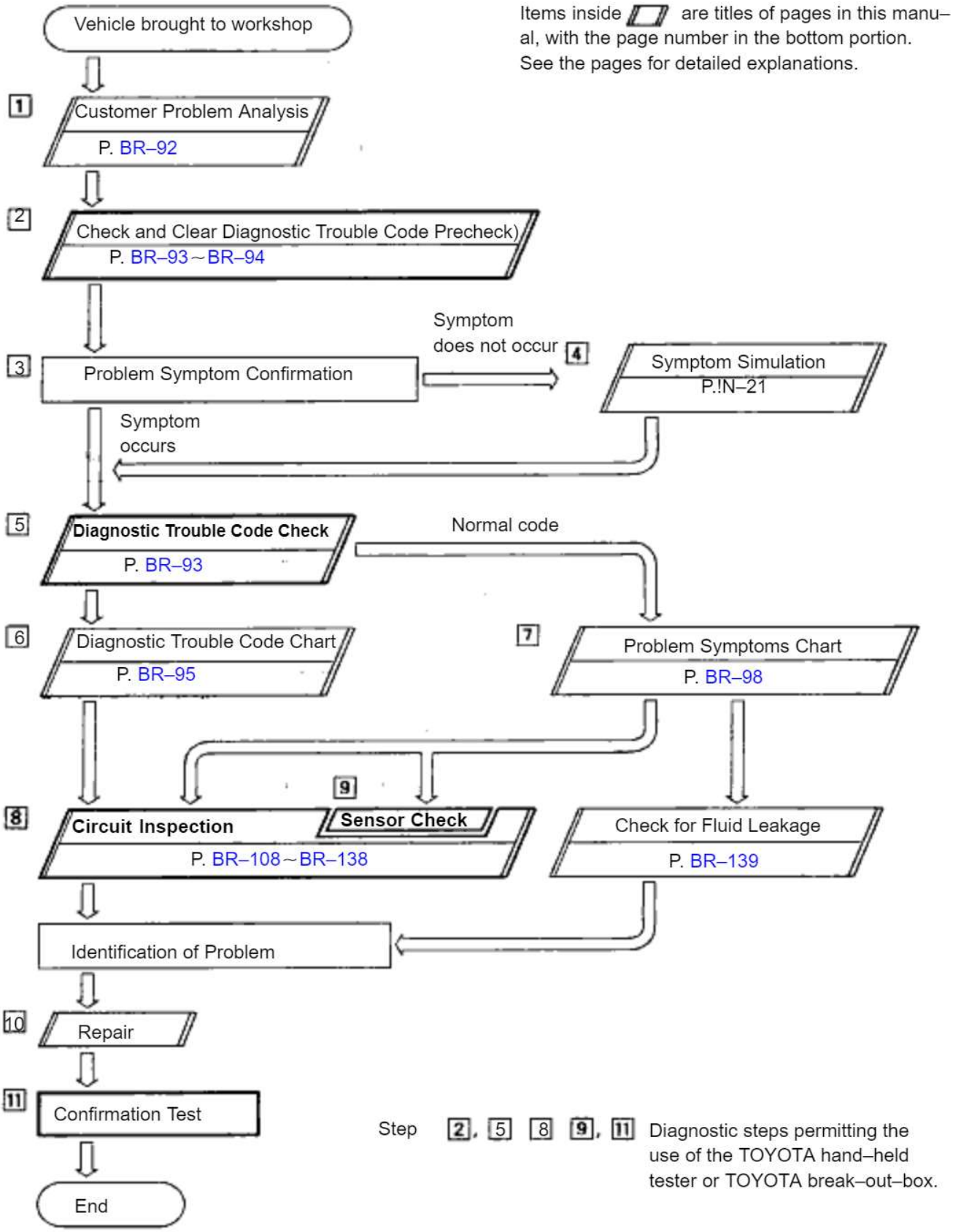
Use the ABS warning light to check if each of the signals from the speed sensors are being input correctly to the ECU. Instructions for this check are given in the circuit inspection.

(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 to make sure the entire ABS system is operating correctly.



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

Step 2, 5, 8, 9, 11 Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

CUSTOMER PROBLEM ANALYSIS CHECK SHEET

ABS Check Sheet

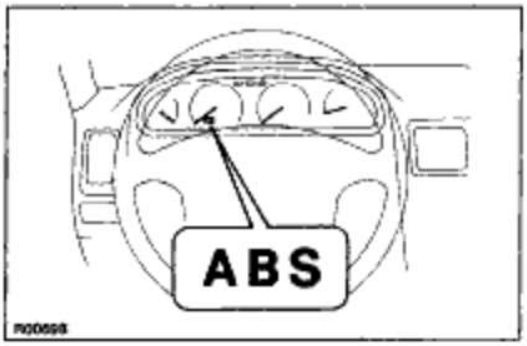
Inspector's Name :

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

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

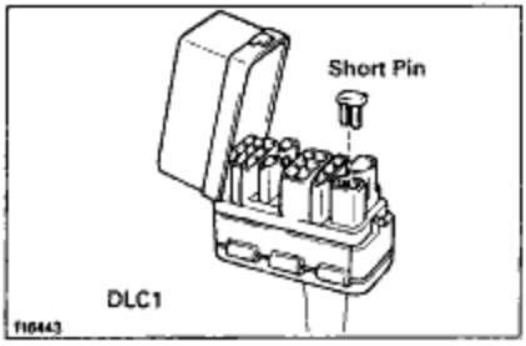
Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

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



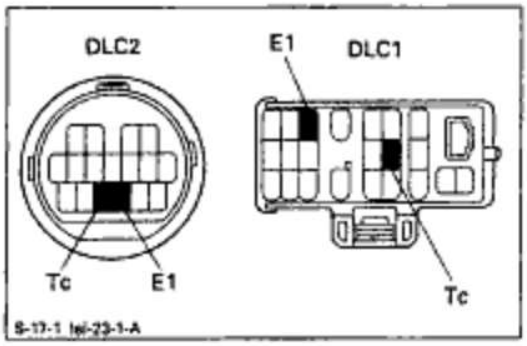
DIAGNOSIS SYSTEM INDICATOR CHECK

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 for the ABS warning light circuit (See page BR–130).



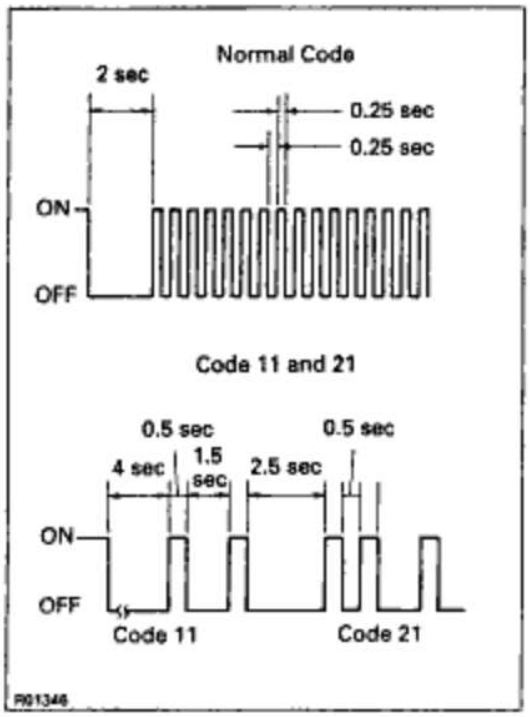
DIAGNOSTIC TROUBLE CODE CHECK

1. Disconnect the Short Pin from DLC1.



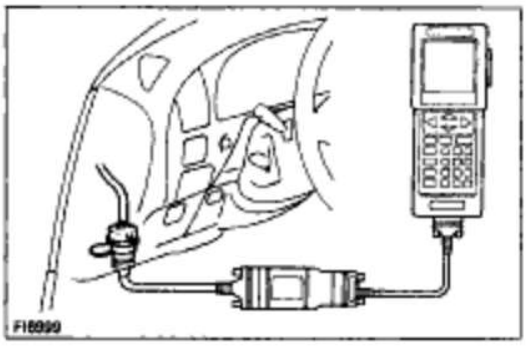
2. Using SST, connect terminals Tc and E1 of DLC2 or DLC1.
   SST 09843–18020
3. Turn the ignition switch to ON.
4. Read the diagnostic trouble code from the ABS warning light on the combination meter.

HINT: If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page BR–134 or BR–130).



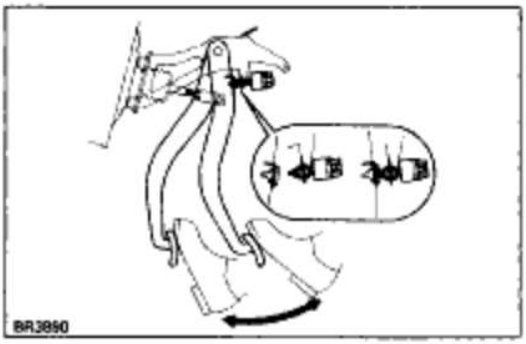
As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

5. Codes are explained in the code table on page BR–95.
6. After completing the check, disconnect terminals Tc and E1, and turn off the display.
   If 2 or more malfunctions are indicated at the same time, the–lowest numbered diagnostic trouble code will be displayed first. .



DIAGNOSTIC TROUBLE CODE CHECK USING TOYOTA HAND–HELD TESTER

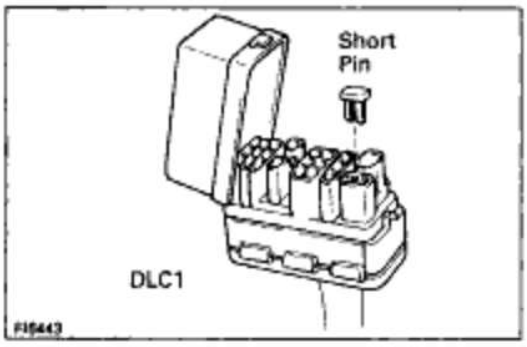
1. Hook up the Toyota hand–held tester to the DLC2.
2. Read the diagnostic trouble codes by following the prompts on the tester screen.
   Please refer to the Toyota hand–held tester operator's manual for further details.

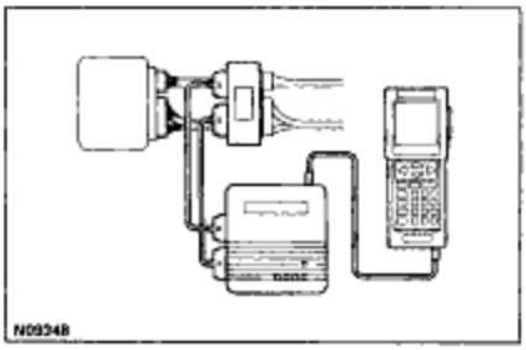


DIAGNOSTIC TROUBLE CODE CLEARANCE

1. Using SST, connect terminals Tc and E1 of DLC2 or DLC1 and remove the short pin from DLC1.
   SST 09843–18020
2. IG switch ON.
3. Clear the diagnostic trouble codes stored in ECU by de–pressing 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 DLC2 or DLC1.
6. Connect the Short Pin to DLC1

HINT: Cancellation can also be done by removing the ECU–13 fuse, but in this case, other memory systems will also be cancelled out.





ECU TERMINAL VALUES MEASUREMENT USING TOYOTA BREAK–OUT–BOX AND TOYOTA HAND–HELD TESTER

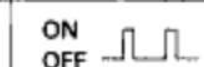
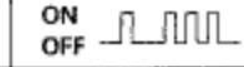
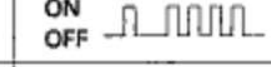
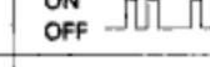
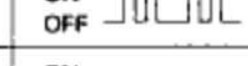
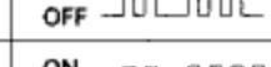
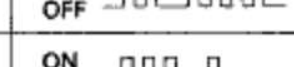
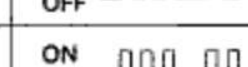
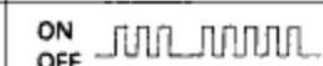
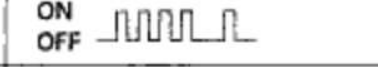
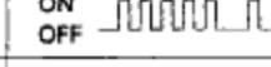
1. Hook up the Toyota break–out–box and Toyota hand–held tester to the vehicle.
2. Read the ECU input/output values by following the prompts on the tester screen.

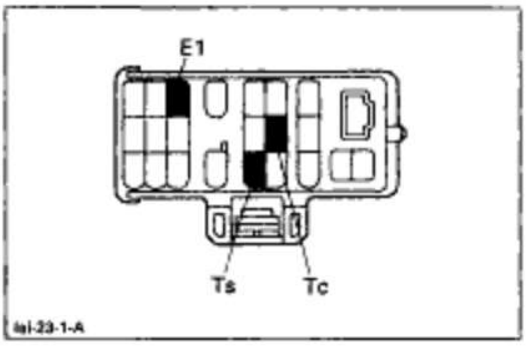
HINT: Toyota hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.
Please refer to the Toyota hand–held tester/Toyota break–out–box operator's manual for further details.

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the diagnostic trouble code check, check the circuit listed for that code.

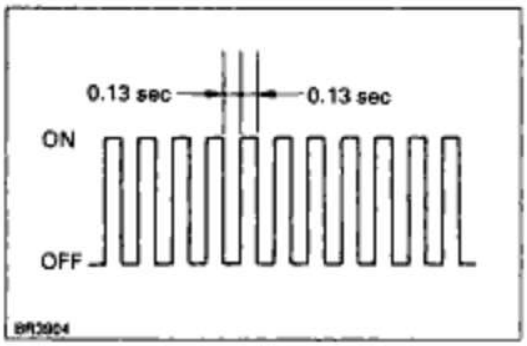
HINT: Using SST 09843–18020, connect the terminals Tc and E1, and remove the short pin.

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



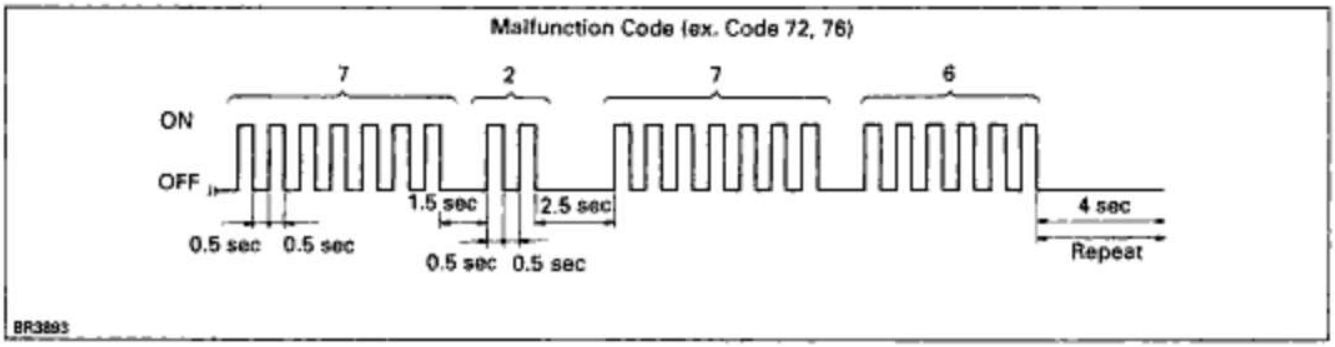
SPEED SENSOR SIGNAL CHECK

1. Turn the ignition switch to OFF.
2. Using SST, connect terminals Ts and E1 of DLC1.
   SST 09843–18020
3. Start the engine.

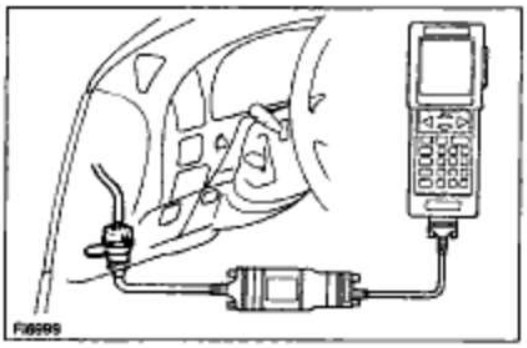


4. Check that the ABS warning light blinks
   HINT: If the ABS. warning light does not blink, inspect the ABS warning light circuit (See page BR–130).
5. Drive vehicle straight forward.
   HINT: Drive vehicle faster than 45 km/h (28 mph) for several seconds.
6. Stop the vehicle.
7. Using SST, connect terminals Tc and E1 of DLC1.
   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 2 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 DLC1, and ignition switch turned off.



DIAGNOSTIC TROUBLE CODE CHECK

USING TOYOTA HAND–HELD TESTER

1. Perform steps 1.–6. on the previous page.
2. Hook up the Toyota hand–held tester to the DLC2.
3. Read the diagnostic trouble codes by following the prompts on the tester screen.

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

Diagnostic Trouble Code of Speed Sensor Check Function

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

PROBLEM SYMPTOMS CHART

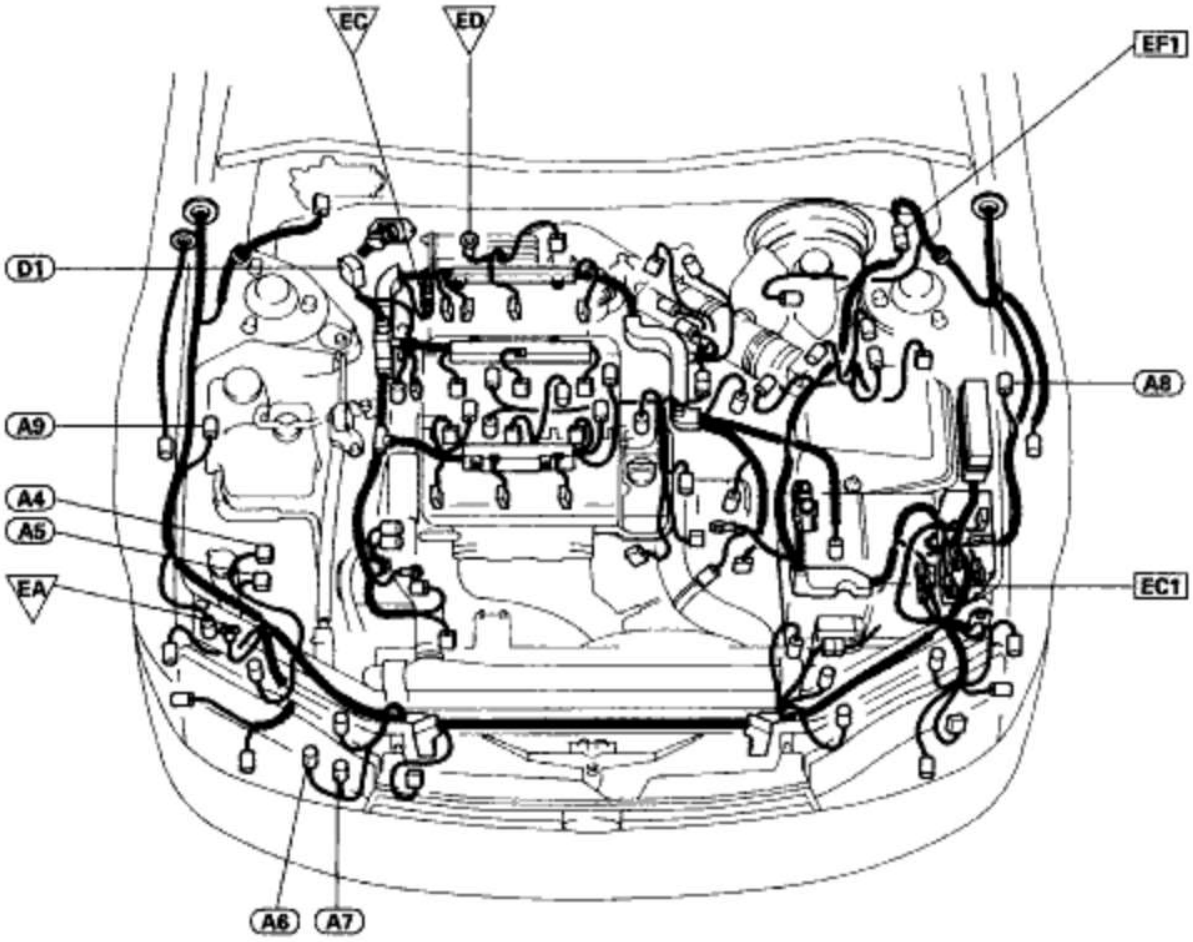
If a normal code is displayed during the diagnostic trouble code check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptoms	Inspection Circuit	See page
A6S does not operate.	Only when 1.–4. are all normal and the problem is still occurring, replace the ABS ECU. 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–139).	BR–93 BR–123 BR–119 BR–77
A6S does not operate efficiently.	Only when 1.–4. are all normal and the problem is still occurring, replace the ABS ECU. 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–139).	BR–93 BR–119 BR–128 BR–77
ABS warning light abnormal.	1. ABS warning light circuit. 2. ABS ECU.	BR–130
Diagnostic trouble code check cannot be performed.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit. 2. Tc terminal circuit.	BR–130 BR–134
Speed sensor signal check cannot be performed.	1. Ts terminal circuit. 2. ABS ECU.	BR–137

LOCATION OF CONNECTORS

Location of Connectors in Engine Compartment

1MZ–FE Engine:



N09612

A4

ABS Actuator



le-6-1-C

A5

ABS Actuator



lg-4-1-A

A6

ABS Control Relay



leg-4-1

A7

ABS Control Relay



leg-5-1

A8 A9

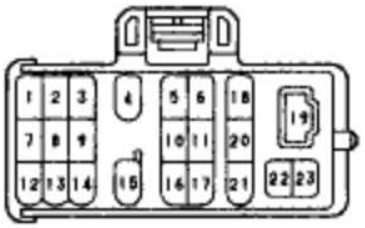
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



le-2-1-1

D1

DLC1



lsi-23-1

EC1



lef-8-1



lef-8-2

EF1



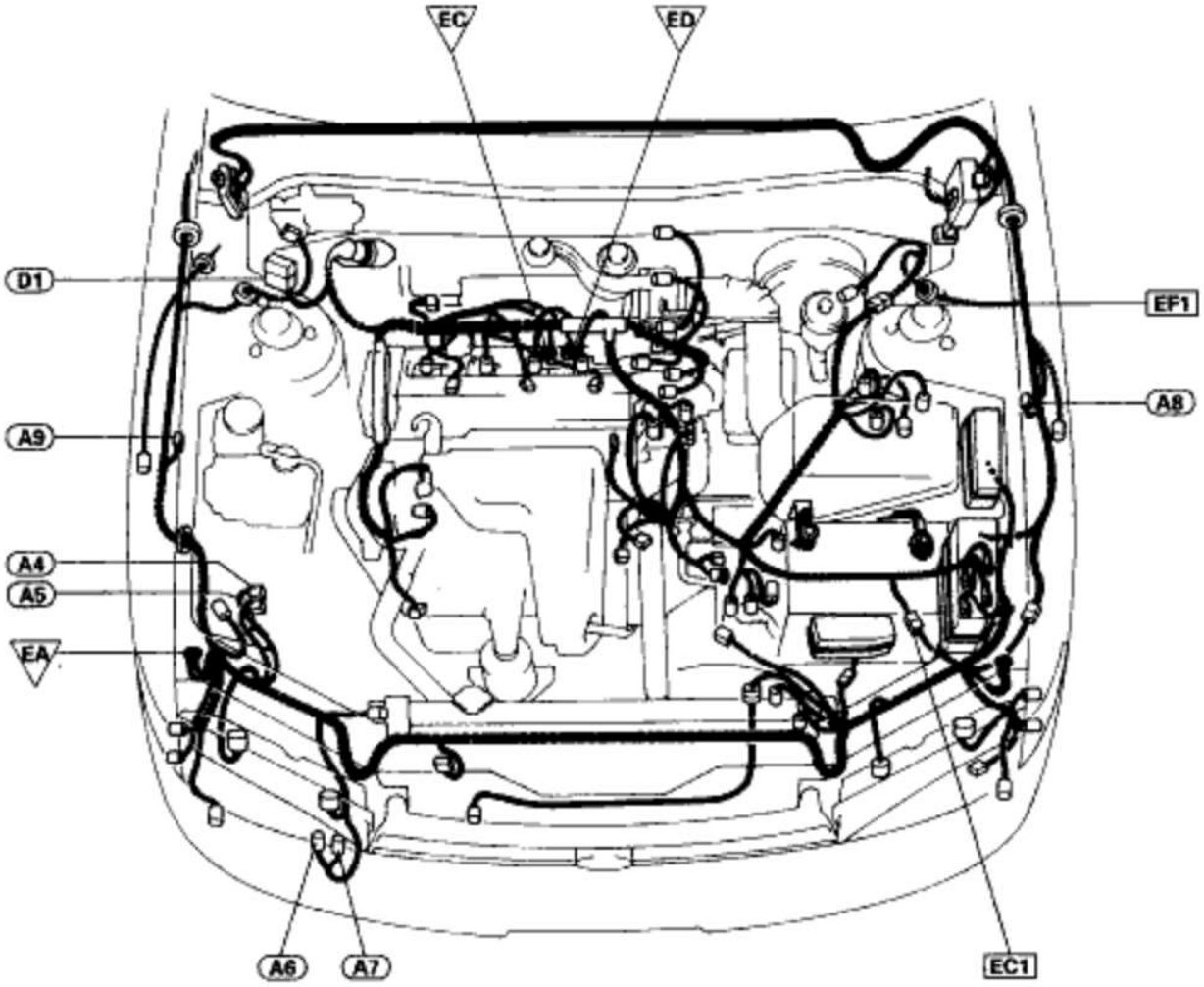
lfg-4-1



lfg-4-2

Location of Connectors in Engine Compartment

5S–FE Engine:











(A8) (A9)

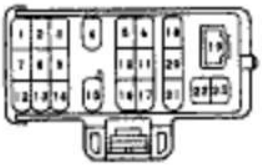
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



le-2-1-T

(D1)

DLC1



lei-23-1-A

(EC1)



lef-8-1



lef-8-2

(EF1)

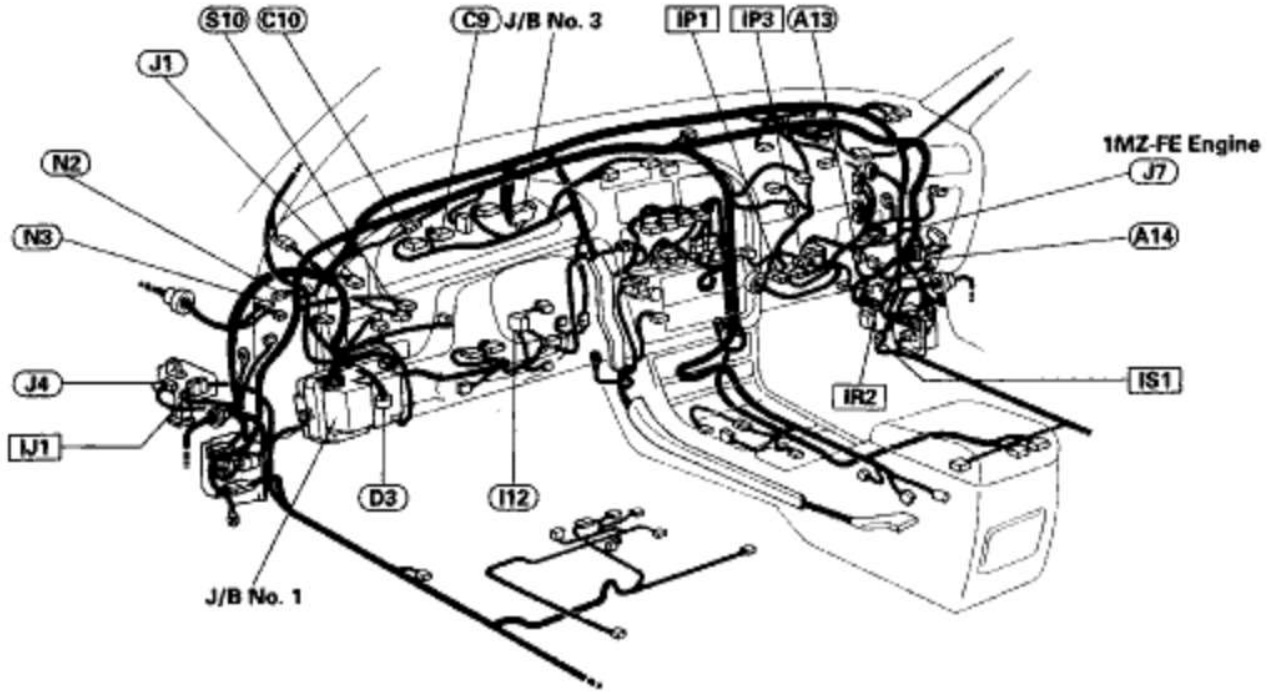


lfg-4-1



lfg-4-2

Location of Connectors in Instrument Panel



N09614

A13

ABS ECU



mn-26-1

A14

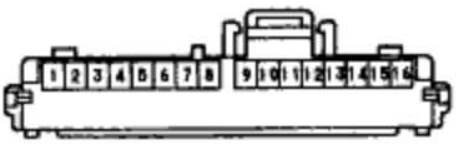
ABS ECU



n-16-1-A

C9

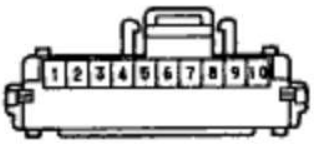
ABS Warning Light



j-16-1

C10

ABS Warning Light



j-10-1

D3

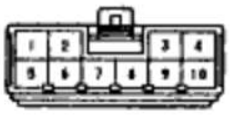
DLC2



S-17-1

I12

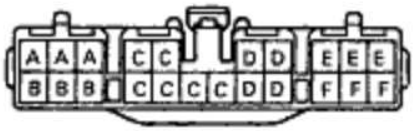
Ignition Switch



g-10-1-B

J1

Junction Connector



e-22-1-A

J3

Junction Connector



e-14-1-A

J7 1MZ-FE

Junction Connector



e-12-1

N2

Noise Filter



g-2-2

N3

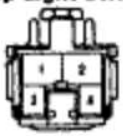
Noise Filter



g-2-1

S10

Stop Light Switch

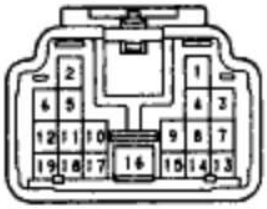


eg-4-1

IJ1



eg-19-1

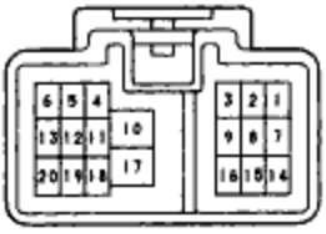


eg-19-2

IP1



e-20-1-B



e-20-2-B

IP3



e6-19-1



ef-19-2

IR2



e-8-1



e-8-2

IS1

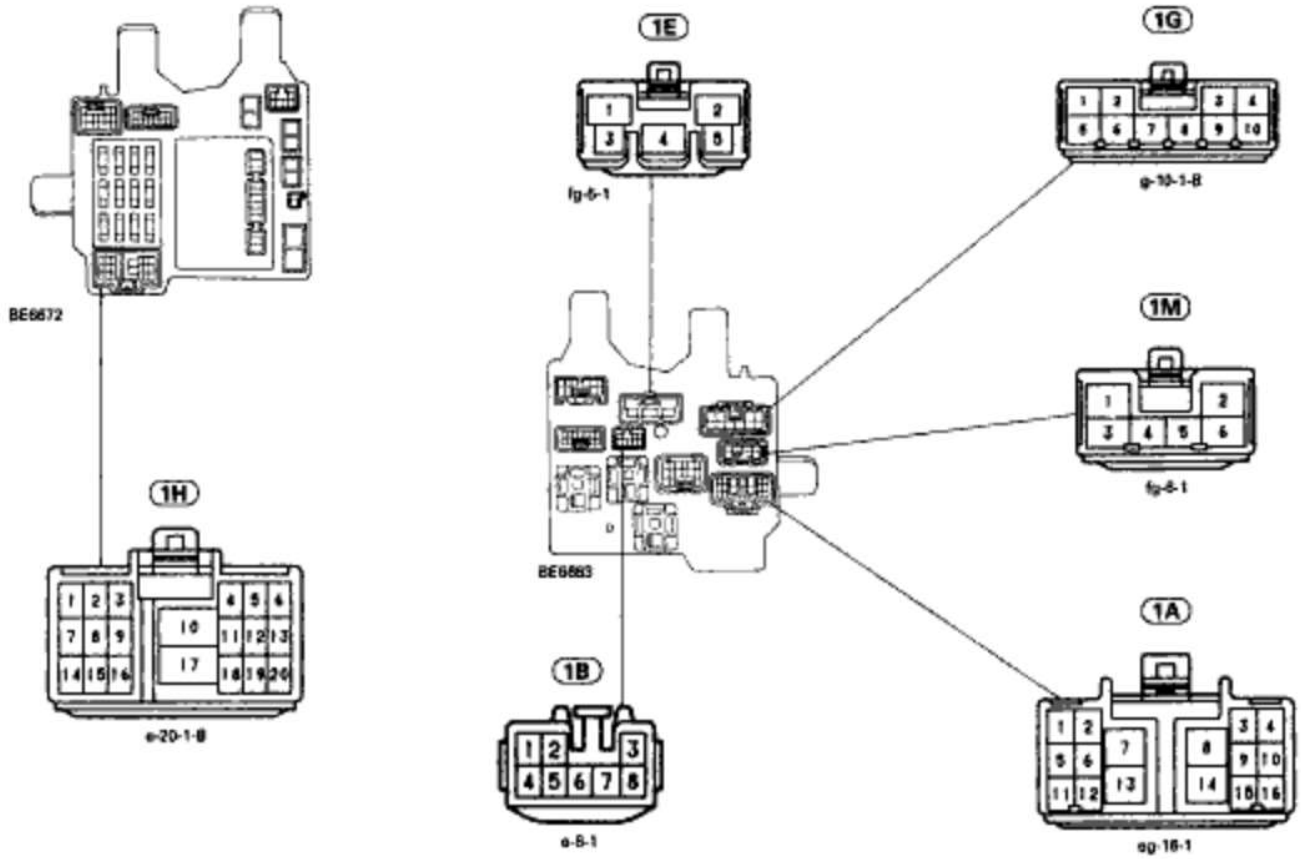


e-6-1

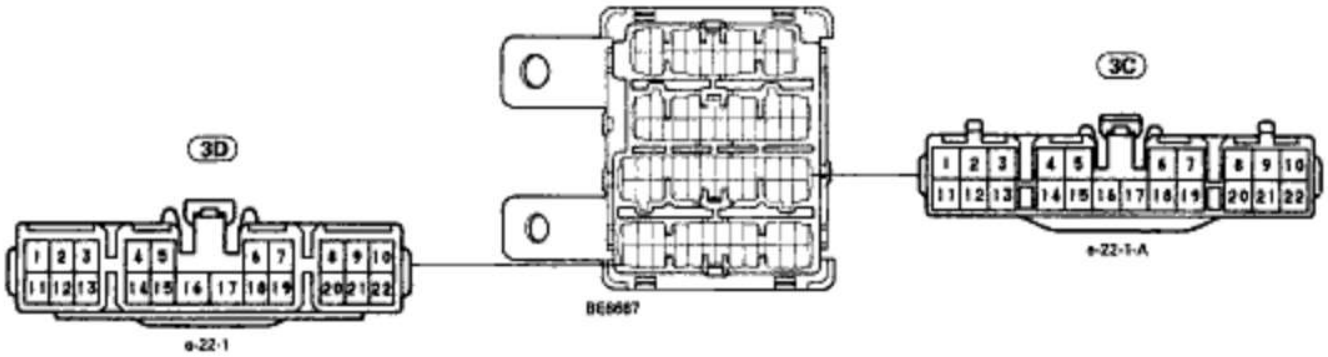


e-8-2

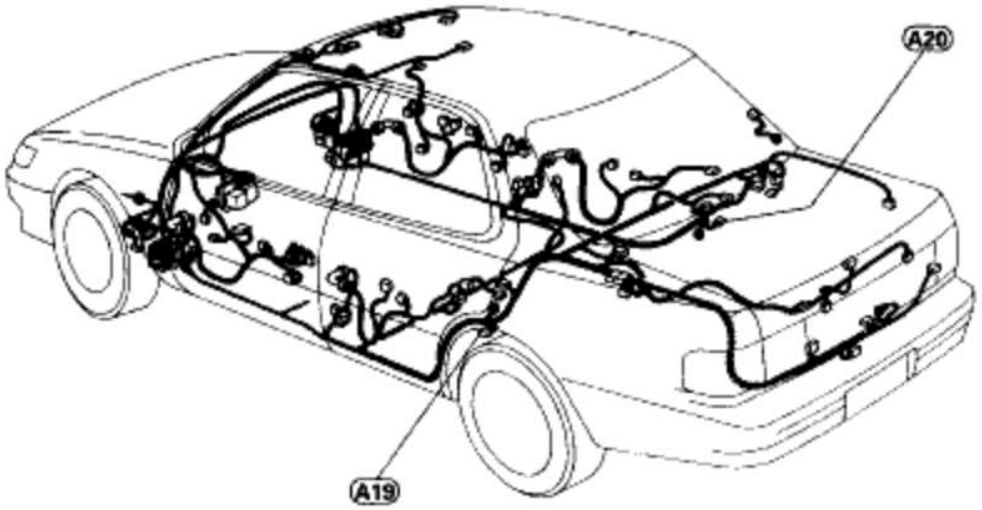
J/B No. 1


1E
1G
1M
1H
1B
1A
BE6672
BE6683
e-20-1-B
e-8-1
eg-16-1

J/B No. 3


3D
3C
BE5667
e-22-1
e-22-1-A

Location of Connectors in Body



N09615

A19 A20

ABS Speed Sensor Left Rear
ABS Speed Sensor Right Rear



e-2-2-L

CIRCUIT INSPECTION

DTC 11,12 ABS Control (Solenoid) Relay Circuit

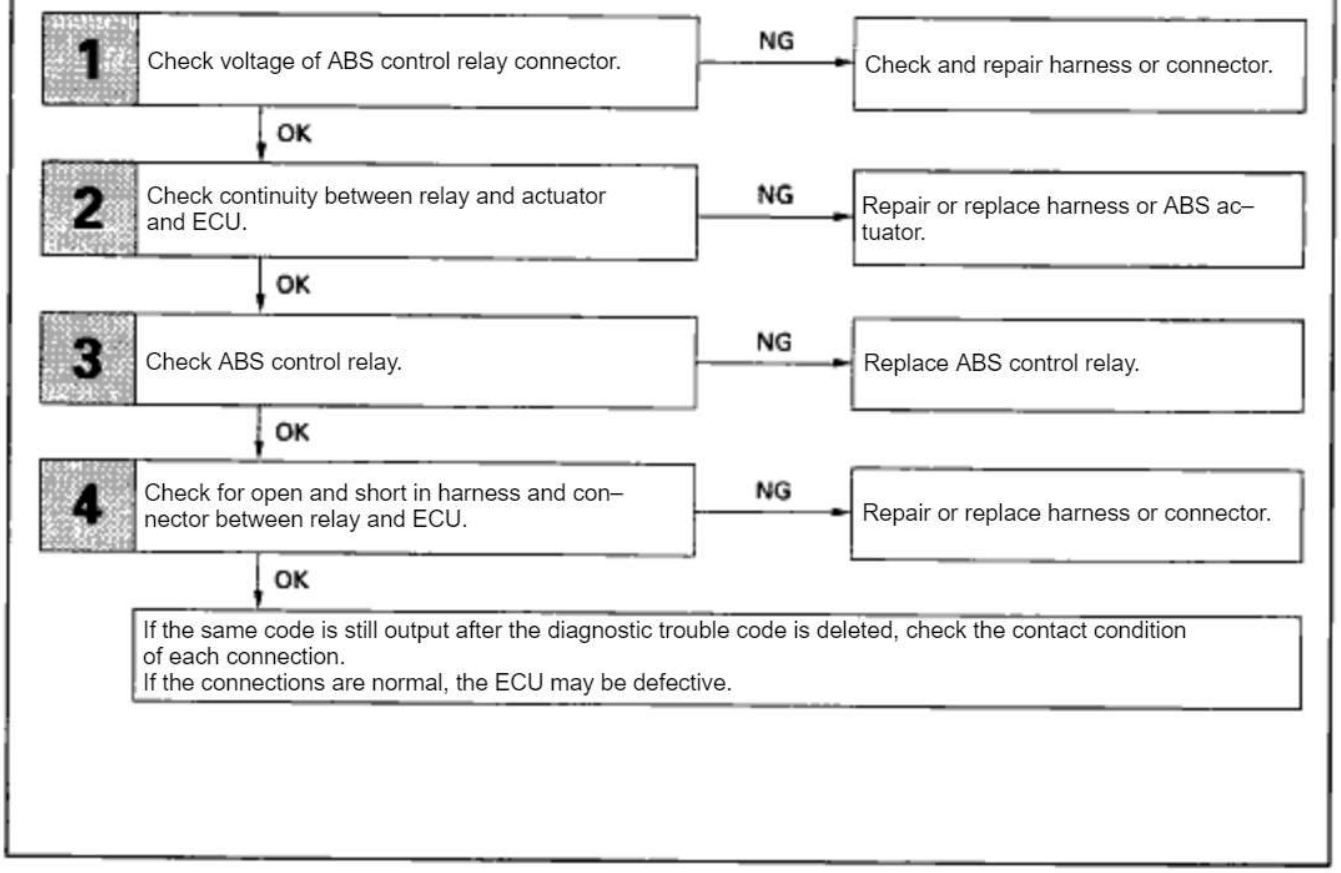
CIRCUIT DESCRIPTION

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.

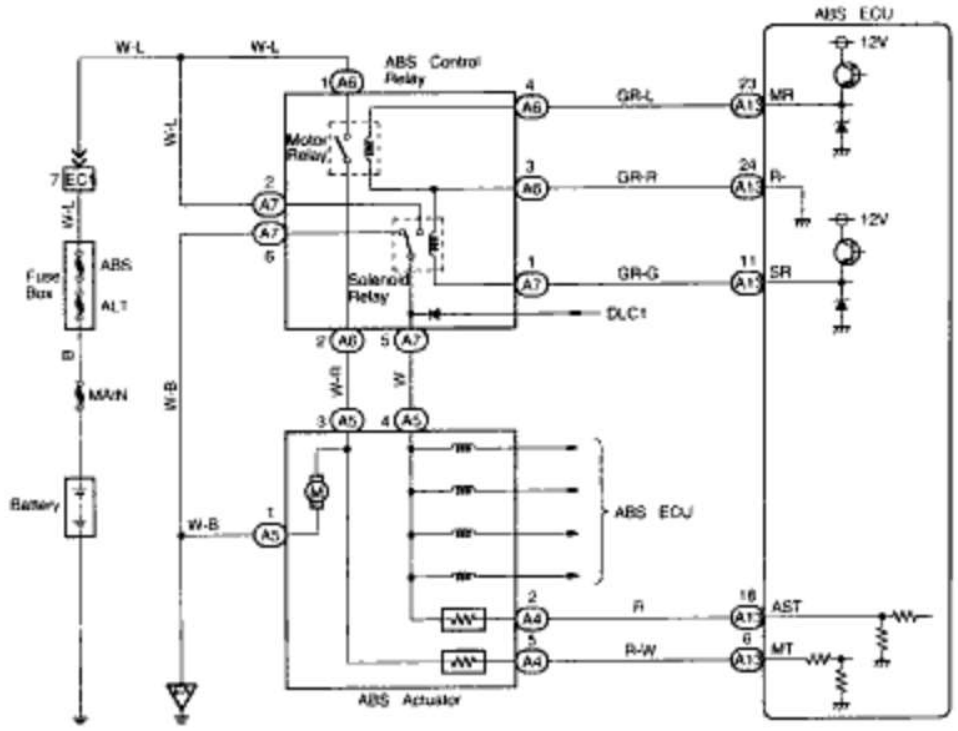
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
11	Conditions (1) and (2) continue for 0.2 sec. or more: (1) ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage (2) ABS control (solenoid) relay monitor terminal (AST) voltage: 0 V	• ABS control (solenoid) relay. • 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 terminal (SR) voltage: 0 V (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

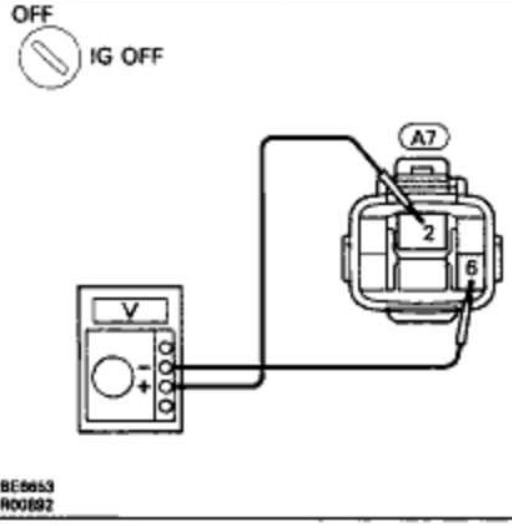


WIRING DIAGRAM



INSPECTION PROCEDURE

1 Check voltage between terminals (A7) 2 and (A7) 6 of ABS control relay connector.



P Disconnect the ABS control relay connector.

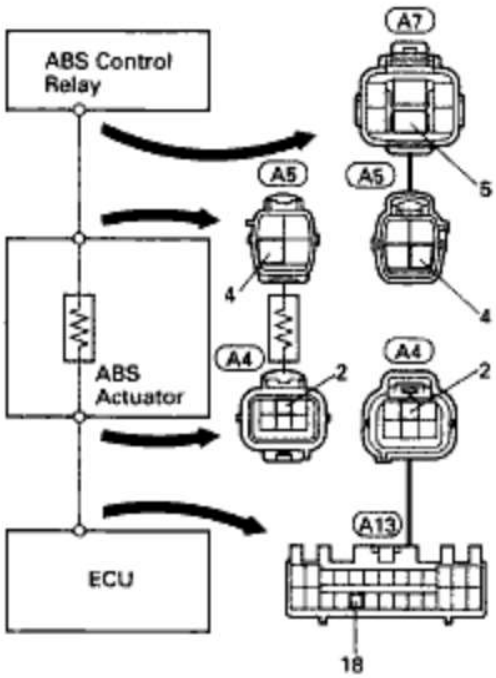
C Measure voltage between terminals (A72) and (A76) of ABS control relay harness side connector.

OK **Voltage: 10–14 V**

OK

NG → Check and repair harness or connector.

2 Check continuity between terminals (A7) 5 and (A5) 4, (A5) 4 and (A4) 2, (A4) 2 and (A13) 18.



P Disconnect the 2 connectors from ABS actuator.

C Check continuity between terminals (A7) 5 and (A5) 4, (A5) 4 and (A4) 2, (A4) 2 and (A13) 18.

OK **Continuity**

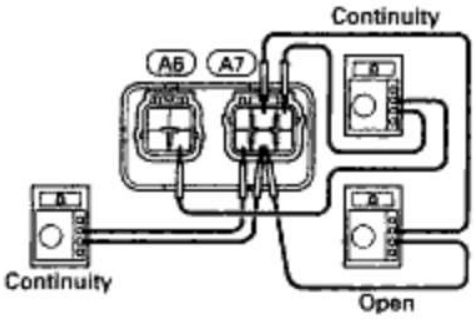
HINT: There is a resistance of 4–6Ω between terminals (A5) 4 and (A4) 2.

OK

NG → Repair or replace harness or ABS actuator.

3 Check ABS control relay.

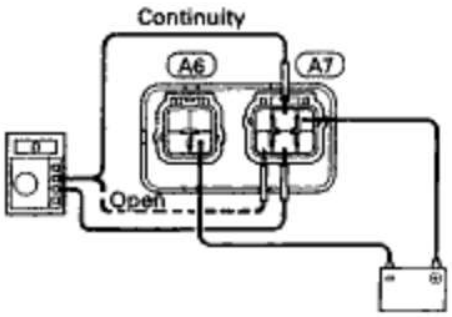
C Check continuity between each terminal of ABS control relay.



OK

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

C
1. Apply battery positive voltage between terminals (A7) 1 and (A6) 3.
2. Check continuity between each terminal of ABS control relay.



OK

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

R02889
R03935

OK

NG Replace ABS control relay.

4 Check for open and short in harness and connector between ABS control relay a ABS ECU (See page IN–28).

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 13,14 ABS Control (Motor) Relay Circuit

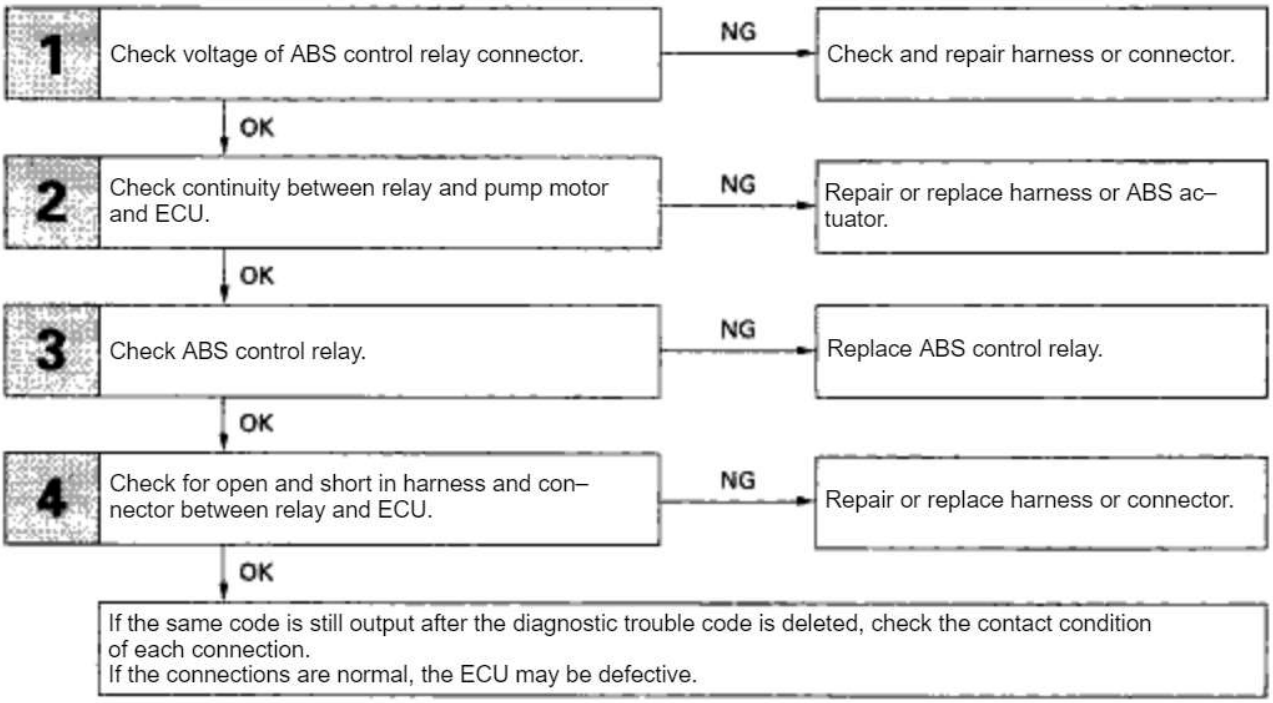
CIRCUIT DESCRIPTION

The ABS control (motor) relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the control (motor) relay ON and operates the ABS pump motor.

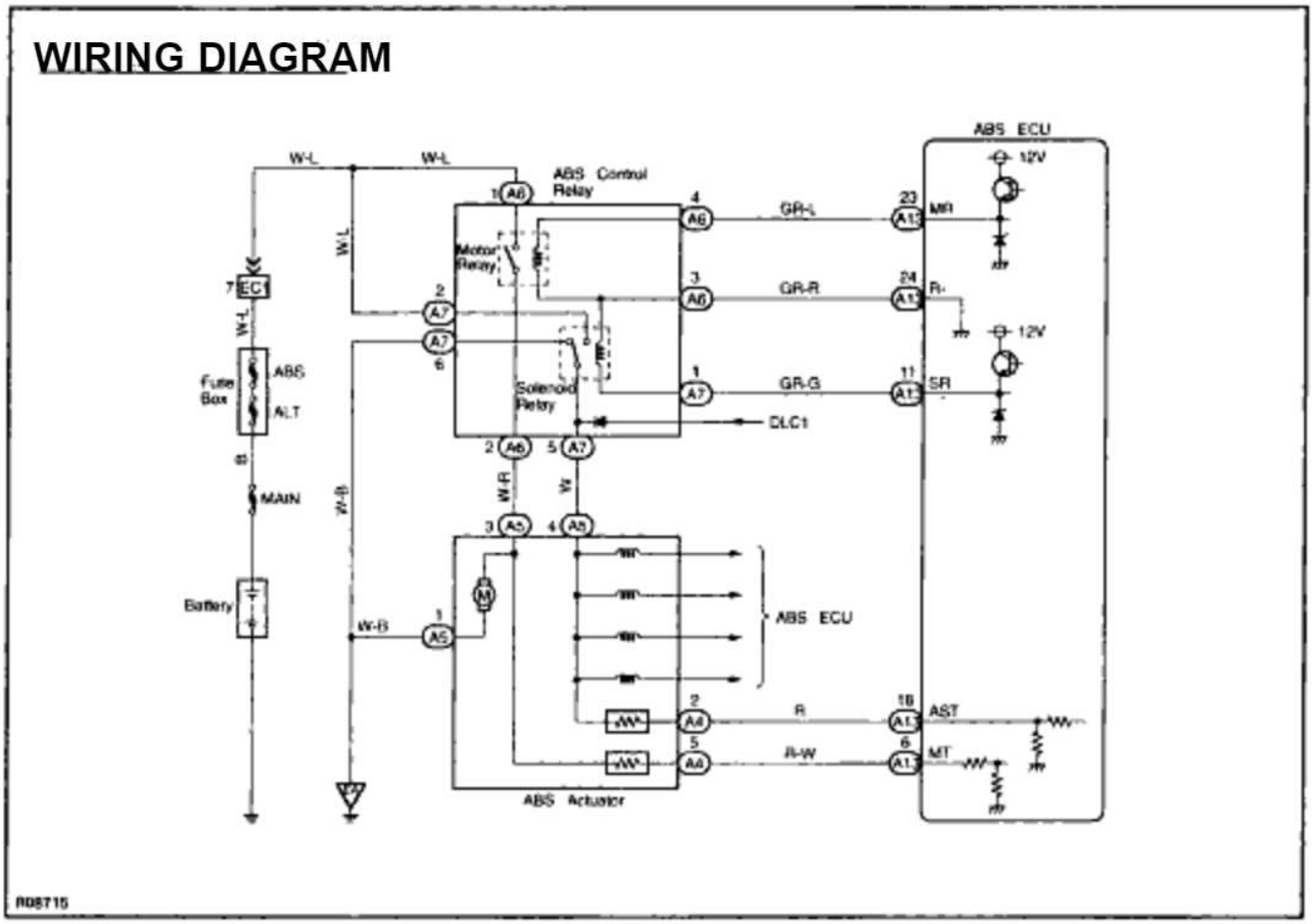
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
13	Conditions (1) and (2) continued for 0.2 sec. or more: (1) ABS control (motor) relay terminal (MR) voltage: Battery positive voltage (2) ABS control (motor) relay monitor terminal (MT) voltage: 0 V	• ABS control (motor) relay. • Open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

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

DIAGNOSTIC CHART

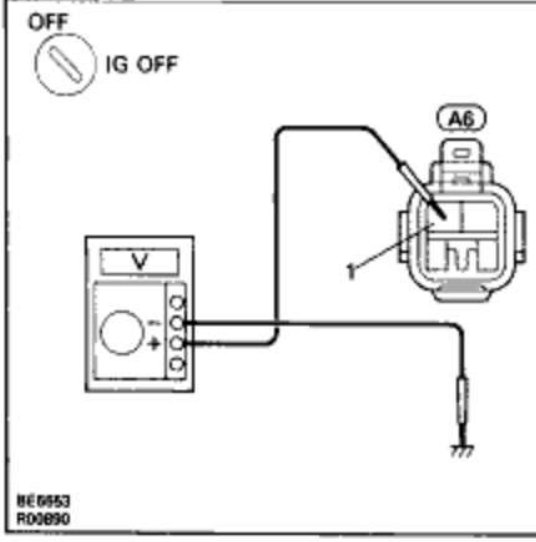


WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminals A6 1 of ABS control relay and body ground.**



P Disconnect the ABS control relay connector.

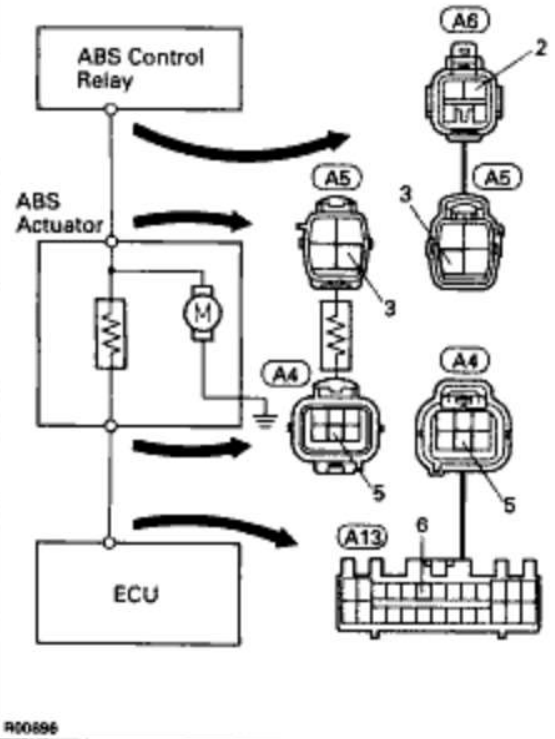
C Measure voltage between terminals A6 1 of ABS control relay harness side connector and body ground.

OK **Voltage: 10–14 V**

OK

NG Check and repair harness or connector.

2 **Check continuity between terminals A6 2 and A5 3, A5 3 and A4 5, A4 5 and A13 6.**



P Disconnect the 2 connectors from ABS actuator.

C Check continuity between terminals A6 2 and A5 3, A5 3 and A4 5, A4 5 and A13 6.

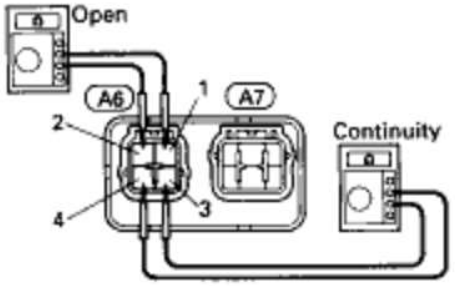
OK **Continuity**

HINT: There is a resistance of 4–6Ω between terminals A5 3 and A4 5.

OK

NG Repair or replace harness or ABS actuator.

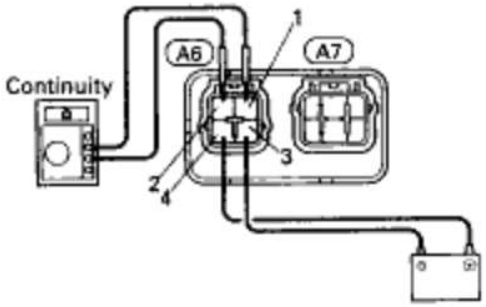
3 **Check ABS control relay.**



C Check continuity between each terminal of ABS control relay.

OK

Terminals A6 3 and A6 4	Continuity (Reference value 62Ω)
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.

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–28).**

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

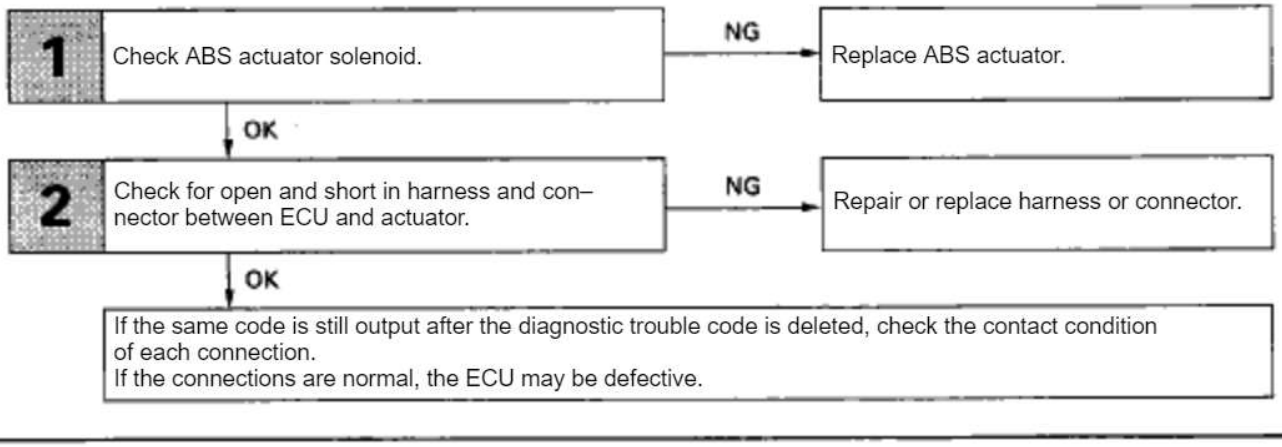
CIRCUIT DESCRIPTION

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

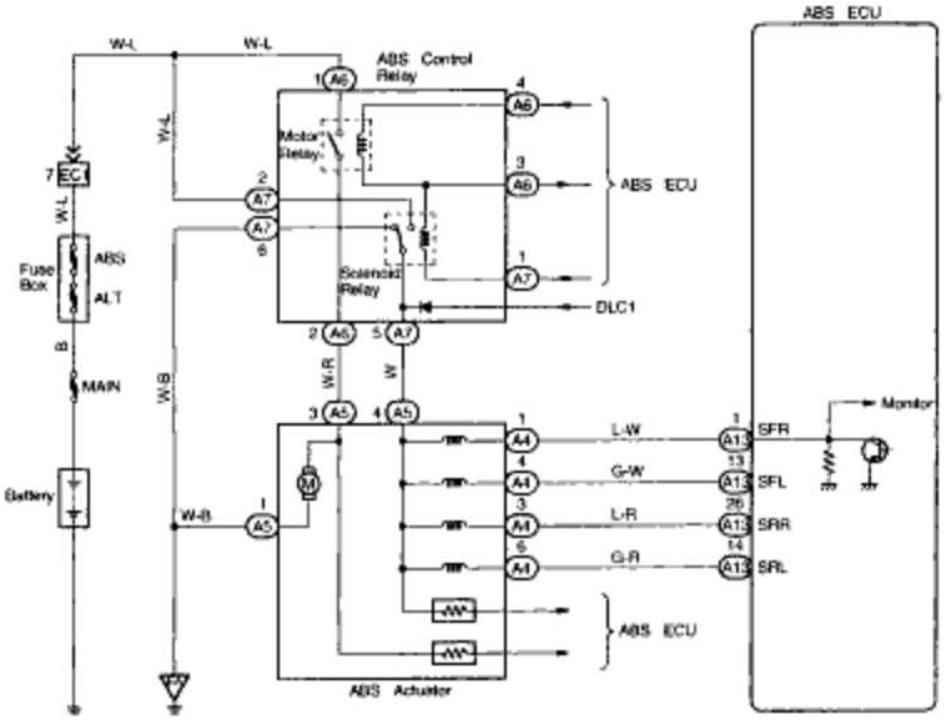
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
21	Conditions (1) through (3) continue for 0.05 sec. or more: (1) ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage (2) Voltage of ABS ECU terminal AST: Battery positive voltage (3) When power transistor of ECU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



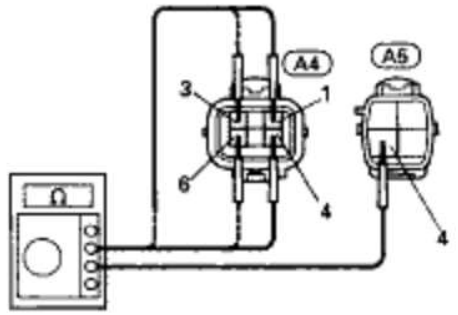
WIRING DIAGRAM



R08716

INSPECTION PROCEDURE

1 **Check ABS actuator solenoid.**



P Disconnect the 2 connectors from ABS actuator.

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

OK **Continuity**
HINT: Resistance of each solenoid coil is 1.2Ω.

OK

NG → **Replace ABS actuator.**

2 **Check for open and short in harness and connector between ABS ECU and actuator (See page IN–28).**

OK

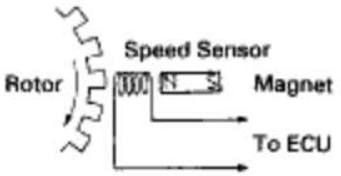
NG → **Repair or replace harness or connector.**

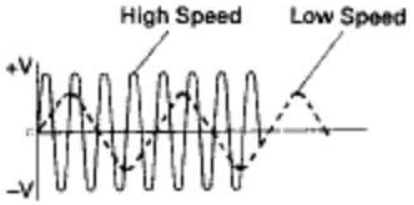
If the same code is still output after the diagnostic trouble code is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

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 to control the ABS system. The front and rear rotors each 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 direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.





BR3583
BR3582

DTC 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 speed sensor signal occurs at least 7 times in the time be–tween 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	Speed sensor signal is not input for about 1 sec. while the left front and right rear speed sensor signals are being checked with the IG switch ON.	• Open in left front or right rear speed sensor circuit. • ECU.
36	Speed sensor signal is not input for about 1 sec. while the right front and left rear speed sensor signals are being checked with the IG switch ON.	• Open in right front or left rear speed sensor circuit. • ECU.

HINT: DTC No. 31 is for the right front speed sensor.
DTC No. 32 is for the left front speed sensor.
DTC No. 33 is for the right rear speed sensor
DTC No. 34 is for the left rear speed sensor.

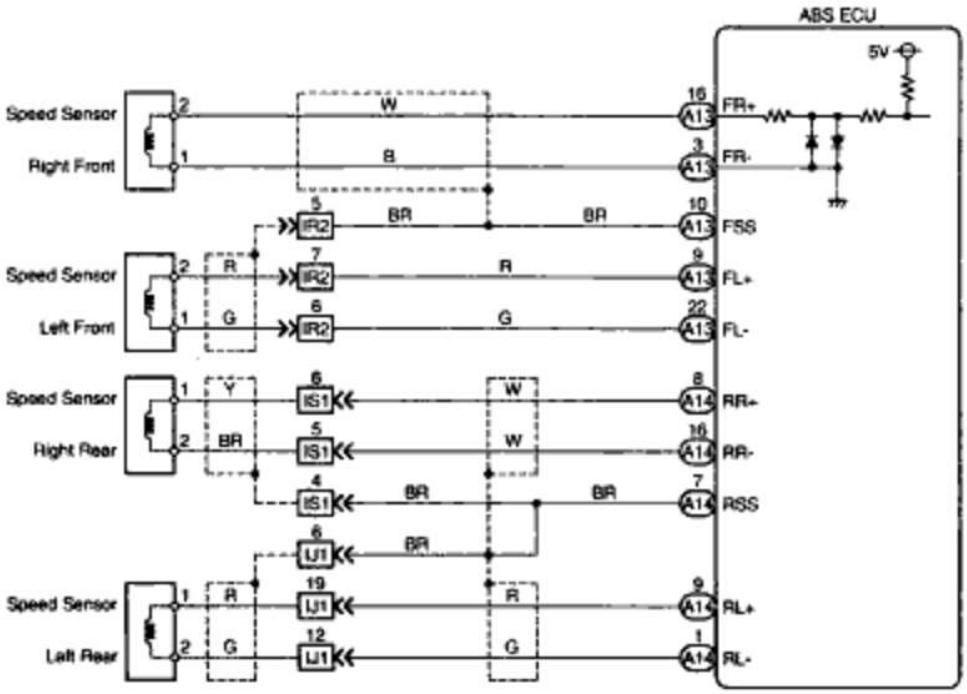
Fail safe function: If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

DIAGNOSTIC CHART

1. Check speed sensor.
   - NG → Replace speed sensor.
   - OK ↓
2. Check for open and short in harness and connector between each speed sensor and ECU.
   - NG → Repair or replace harness or connector.
   - OK ↓
3. Check sensor rotor and sensor installation.
   - NG → Replace speed sensor or rotor.
   - OK ↓

Check and replace ABS ECU.

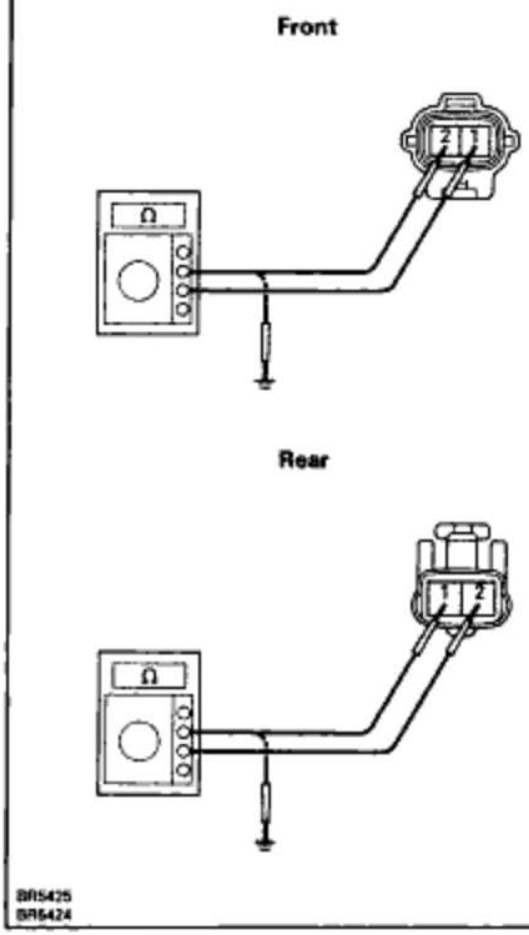
WIRING DIAGRAM



R08717

INSPECTION PROCEDURE

1 **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.
Resistance: 0.6–1.8 kΩ

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

C **Resistance: 1 MΩ or higher**

OK

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.
Resistance: 0.9–1.3 kΩ

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

C **Resistance: 1 MΩ or higher**

OK

OK

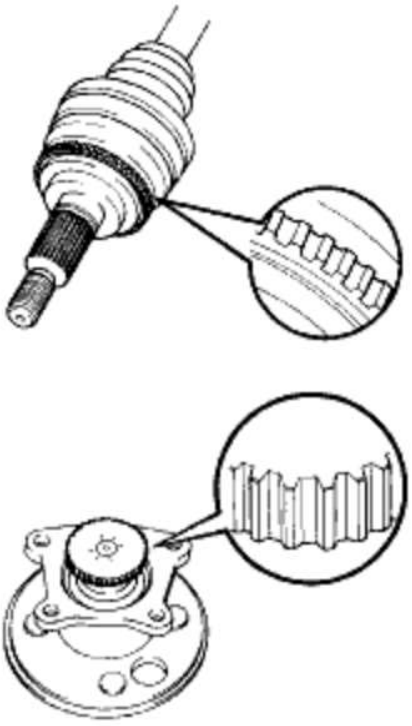
NG **Replace speed sensor.**

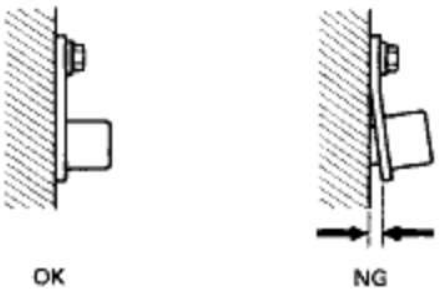
2 **Check for open and short in harness and connector between each speed sensor and ECU (See page IN–28).**

OK

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

3 Check sensor rotor and sensor installation.





R00948
R00947
BR2795

Front

P Remove front drive shaft (See SA section).

C Check sensor–rotor serrations.

OK **No scratches or missing teeth.**

C Check the front speed sensor installation

OK **The installation bolt is tightened properly.**

Rear

P Remove the axle hub (See 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

Check and replace ABS ECU.

NG **Replace speed speed or rotor.**

DTC 41 IG Power Source Circuit

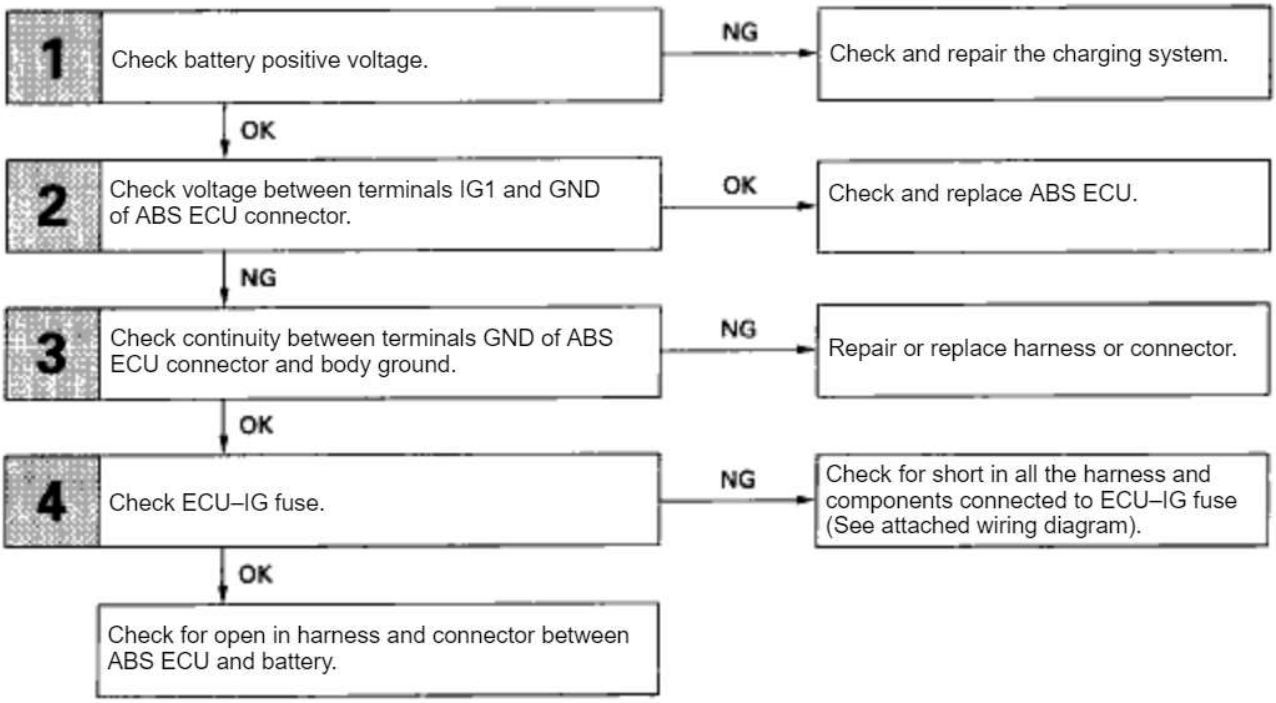
CIRCUIT DESCRIPTION

This is the power source for the ECU, hence the CPU and the actuators.

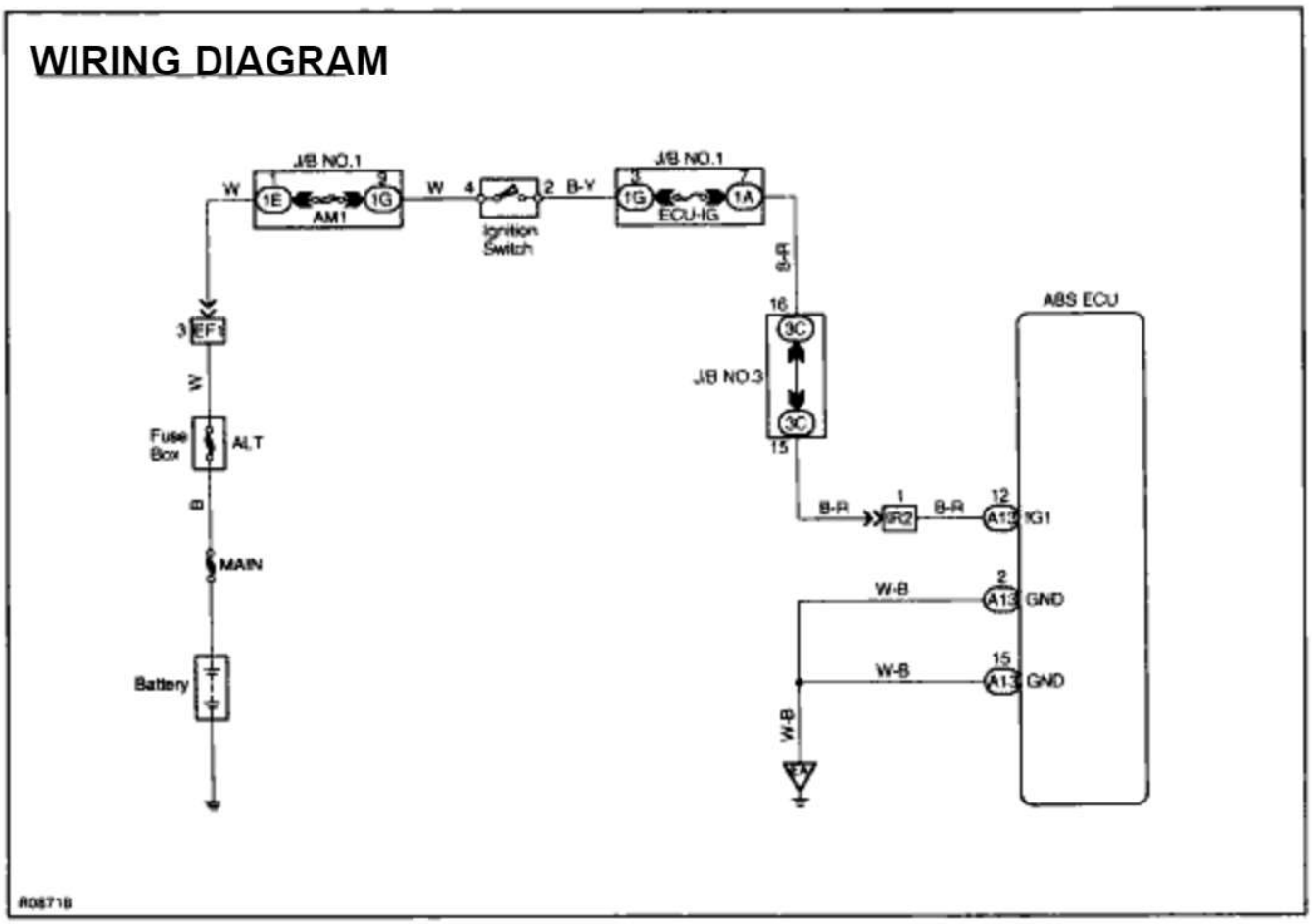
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
41	Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG1 remains at more than 17 V or below 9.5 V for more than 10 sec.	• Battery. • IC regulator. • Open or short in power source circuit. • ECU.

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

DIAGNOSTIC CHART



WIRING DIAGRAM



INSPECTION PROCEDURE

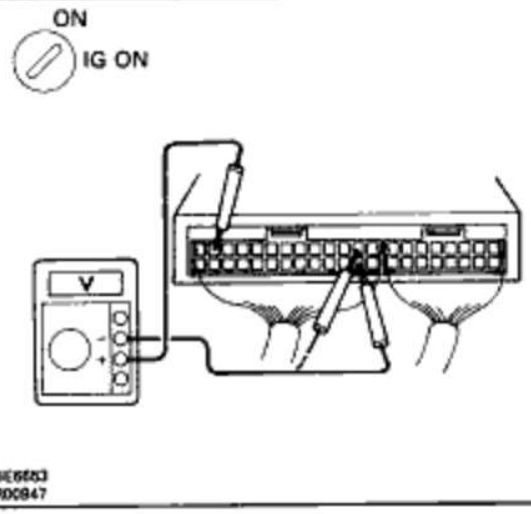
1 **Check battery positive voltage.**

OK **Voltage: 10 – 14 V**

NG → **Check and repair the charging system.**

OK

2 **Check voltage between terminals IG1 and GND of ABS ECU connector.**



P Remove ABS ECU with connectors still connected.

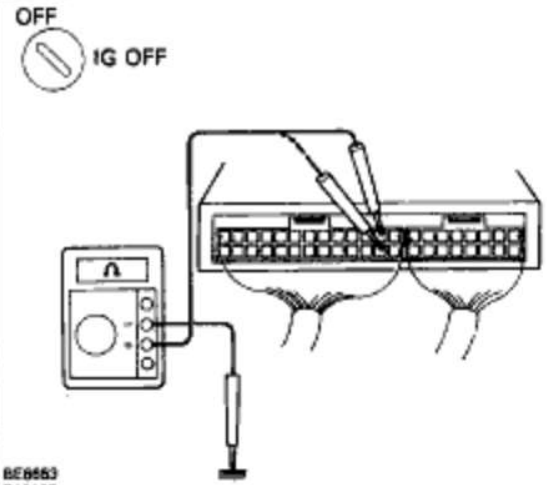
C 1. Turn ignition switch ON.
2. Measure voltage between terminals IG1 and G N D of ABS ECU connector.

OK **Voltage: 10–14 V**

NG → **Check and replace ABS ECU.**

OK

3 **Check continuity between terminals GND of ABS ECU connector and body ground.**



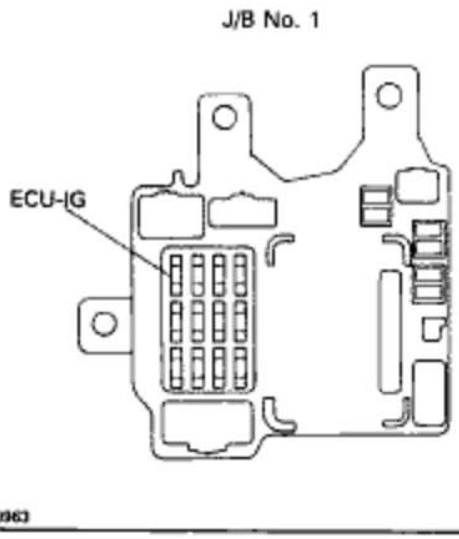
C Measure resistance between terminals GND of ABS ECU connector and body ground.

OK **Resistance: 1Ω or less**

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

OK

4 Check ECU–IG fuse.



P Remove ECU–IG fuse from J/6 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 (See page IN–28).

DTC 51 ABS Pump Motor Lock

CIRCUIT DESCRIPTION

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

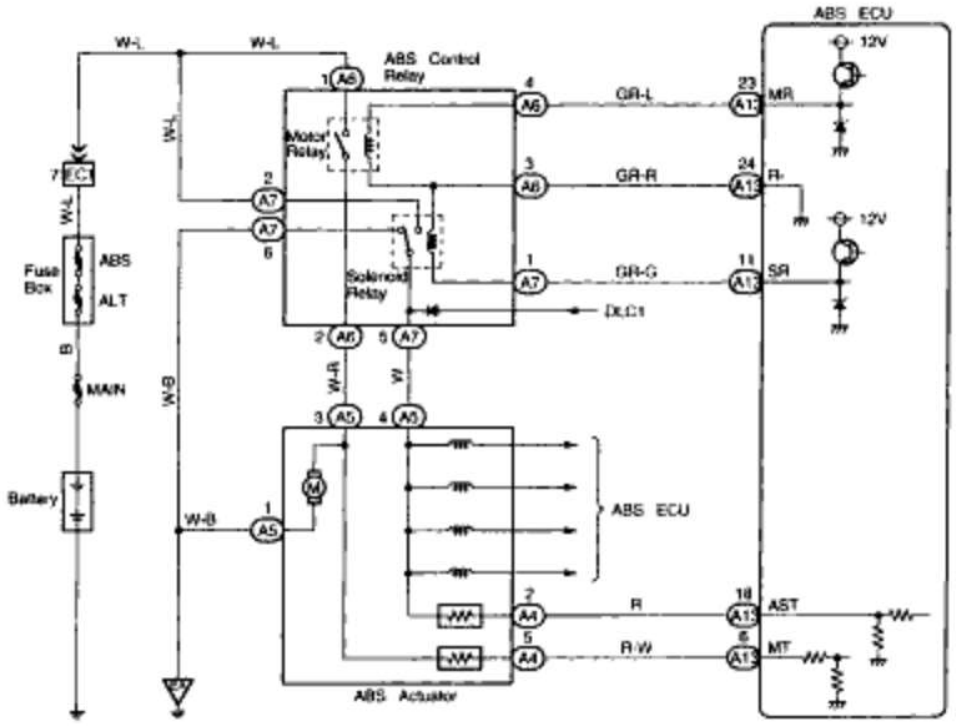
Fail safe function: If trouble occurs in the ABS pump motor, the ECU cuts off current to the control (solenoid) relay and prohibits ABS control.

DIAGNOSTIC CHART

See inspection of ABS actuator (See page BR–77).

WIRING DIAGRAM

(Reference)



RS5715

Stop Light Switch Circuit

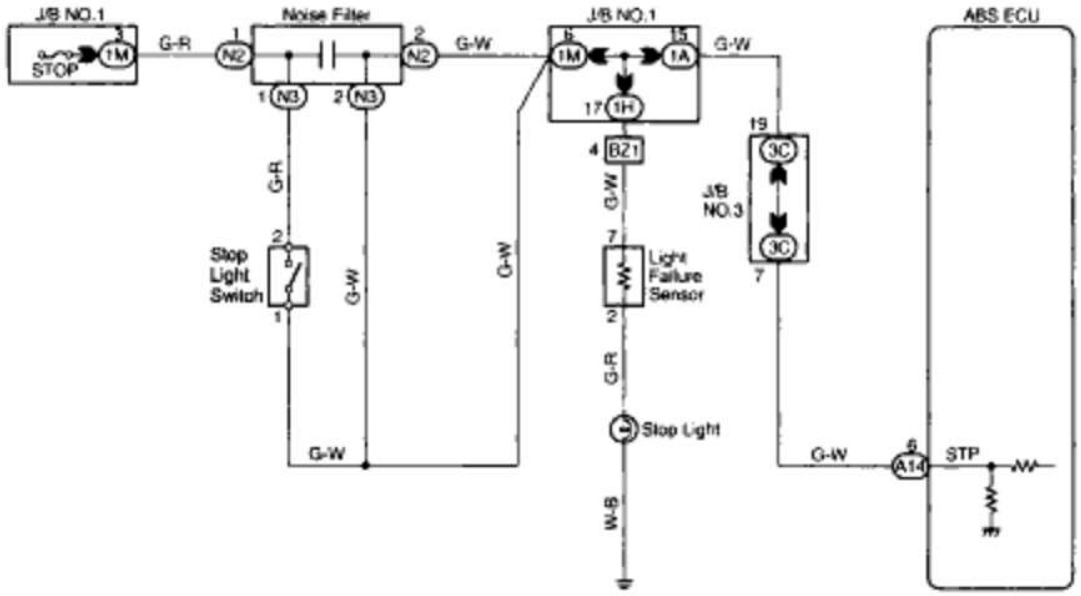
CIRCUIT DESCRIPTION

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

DIAGNOSTIC CHART

1	Check operation of stop light.	NG	Repair stop light circuit (See page BE–65).
OK ↓			
2	Check voltage of terminal STP.	OK	Proceed to next circuit inspection shown on problem symptoms chart (See page BR–98).
NG ↓			
3	Check for open in harness and connector between ABS ECU and stop light switch (See page IN–27).	NG	Repair or replace harness or connector.
OK ↓			
Check and replace ABS ECU.			

WIRING DIAGRAM



INSPECTION PROCEDURE

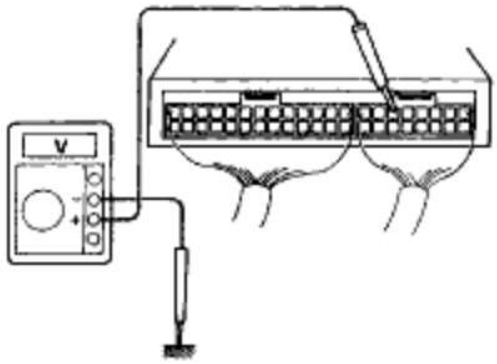
1 Check operation of stop light.

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 STP of ABS ECU and body ground when brake pedal is de–pressed.

OK **Voltage: 8–14 V**

NG

OK → Proceed to next circuit inspection shown on problem symptoms chart (See page BR–98).

3 Check for open in harness and connector between ABS ECU and stop light switch (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

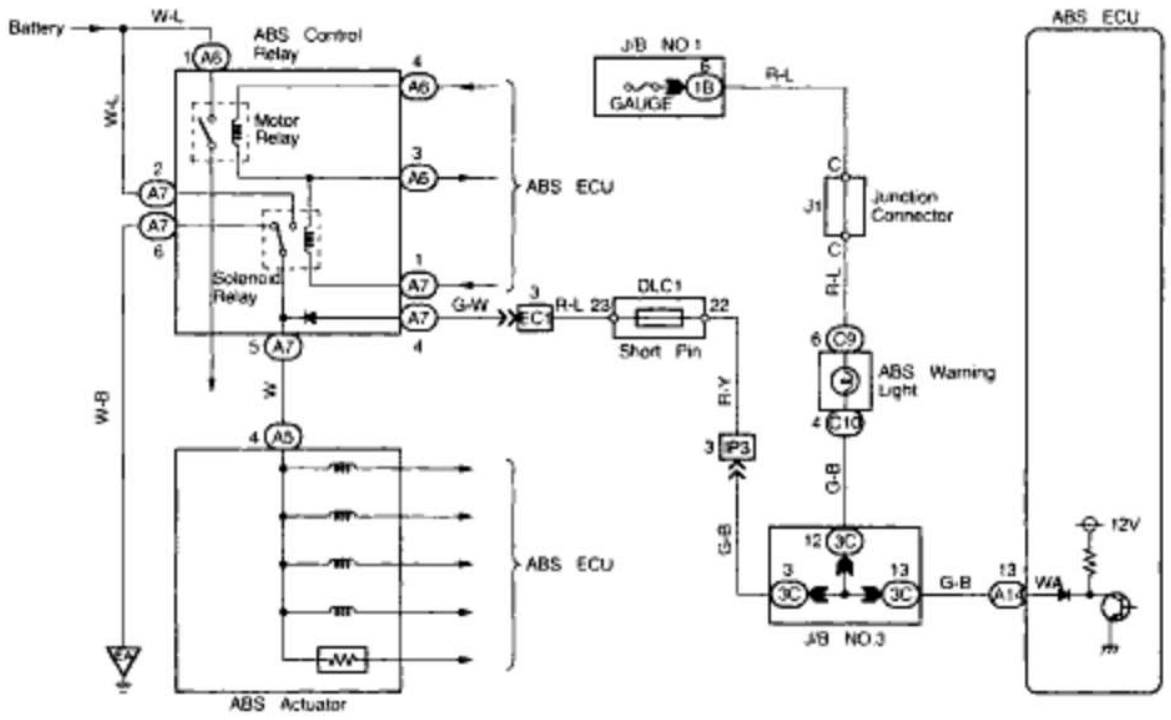
If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a diagnostic trouble code in memory.
After removing the short pin of the DLC1, connect terminals Tc and E1 of the DLC1 or DLC2 to make the ABS warning light to blink and output the diagnostic trouble code.

DIAGNOSTIC CHART

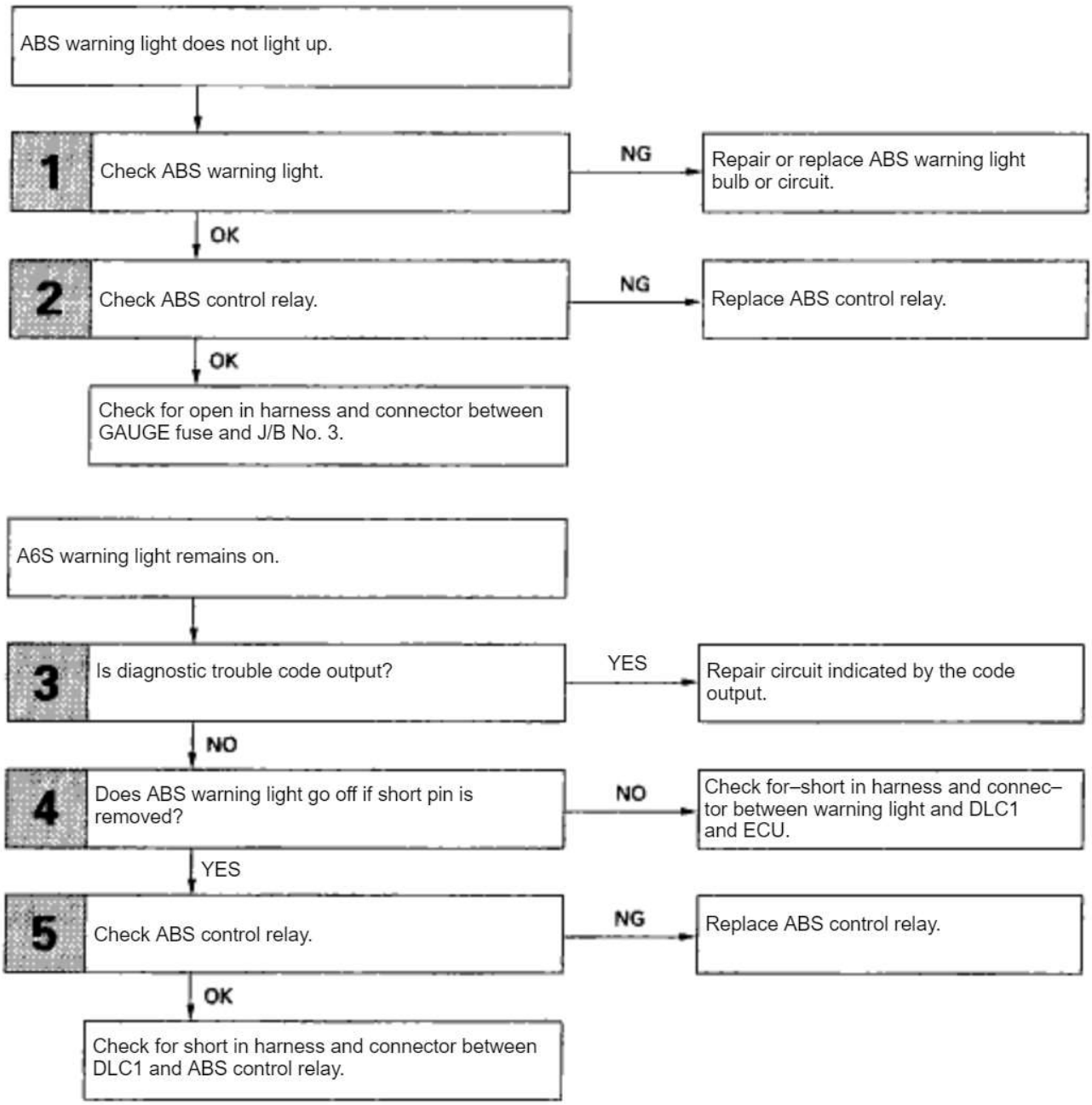
Perform troubleshooting in accordance with the chart below for each trouble symptom.

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

WIRING DIAGRAM



R08720


ABS warning light does not light up.
1
Check 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
Check for open in harness and connector between GAUGE fuse and J/B No. 3.
A6S 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 connec–tor between warning light and DLC1 and ECU.
YES
5
Check ABS control relay.
NG
Replace ABS control relay.
OK
Check for short in harness and connector between DLC1 and ABS control relay.

INSPECTION PROCEDURE

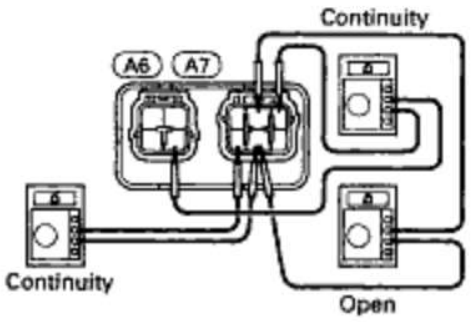
1 Check ABS warning light.

See Combination Meter Troubleshooting on page BE–1 18.

OK

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

2 Check ABS control relay.

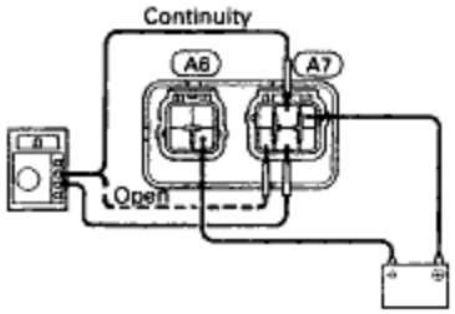


P Disconnect the connectors from control relay.

C Check continuity between each terminal of ABS control relay.

OK

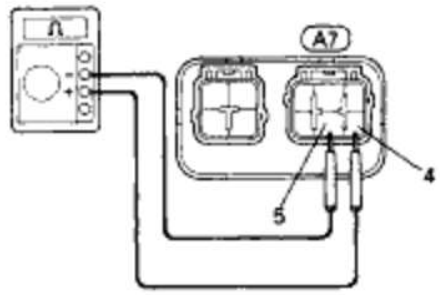
Terminals (A7) 1 and (A6) 3	Continuity (Reference value 80Ω)
Terminals (A7) 5 and (A7) 6	Continuity
Terminals (A7) 2 and (A7) 5	Open



C
1. Apply battery positive voltage between terminals (A7) 1 and (A6) 3.
2. Check continuity between each terminal of ABS control relay.

OK

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



R00689
R00695
R00940

C Connect the ⊕ test lead to terminal 4 of (A7) and the ⊖ lead to terminal 5 of (A7). Check continuity between the terminals.

OK Continuity

If there is no continuity, connect the ⊖ test lead to terminal 4 of (A7) and the ⊕ lead to terminal 5 of (A7). Recheck continuity between terminals.

OK

NG → **Replace ABS control relay.**

Check for open in harness and connector between DLC1 and A6S control relay and body ground (See page IN–27).

3 Is diagnostic trouble code output?

Perform diagnostic trouble code check on page BR–93.

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 DLC1 and ECU (See page IN–28).

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

OK

NG → Replace ABS control relay.

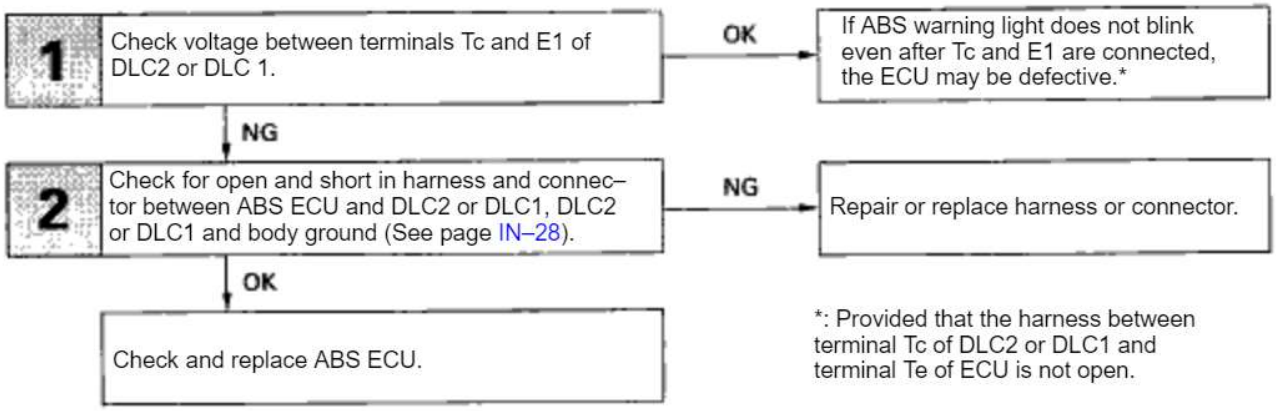
Check for short in harness and connector between DLC1 and ABS control relay (See page IN–28).

Tc Terminal Circuit

CIRCUIT DESCRIPTION

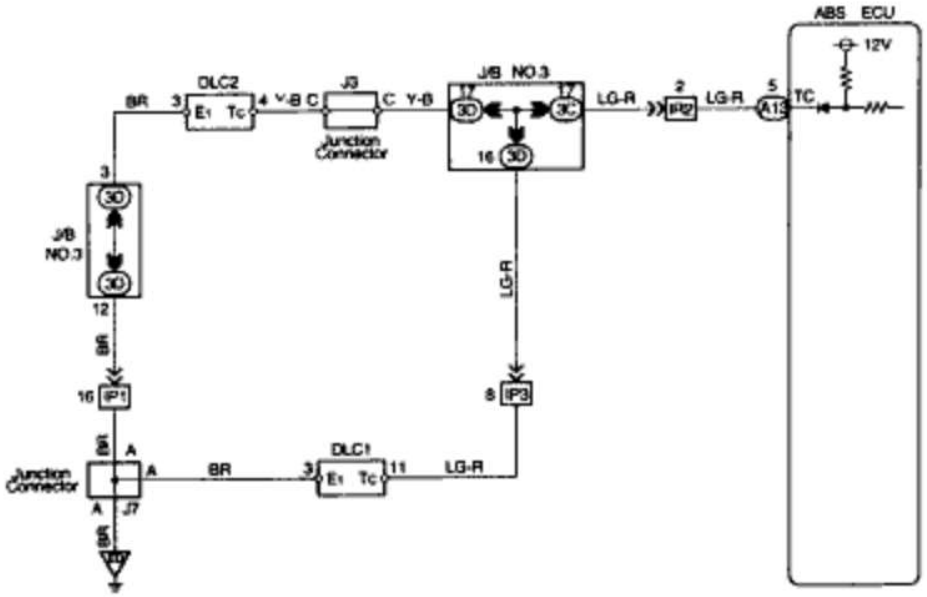
Connecting terminals Te and E1 of the DLC1 or the DLC2 causes the ECU to display the diagnostic trouble code by flasing the ABS warning light.

DIAGNOSTIC CHART

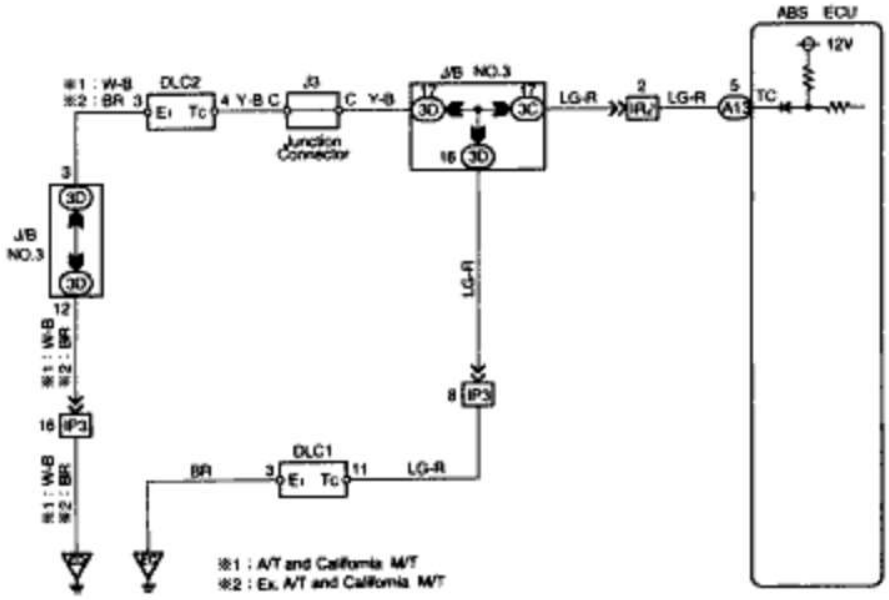


WIRING DIAGRAM

1 MZ–FE:



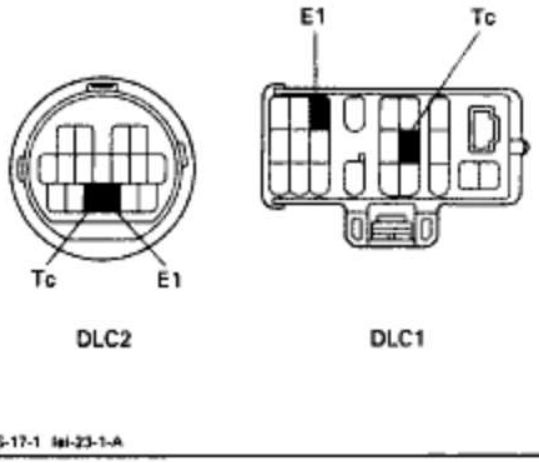
5S–FE:



R08721
R08722

INSPECTION PROCEDURE

1 Check voltage between terminals Te and E1 of DLC2 or DLC1.



C 1. Turn ignition switch ON.
2. Measure voltage between terminals Tc and E1 of DLC2 or DLC1.

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 DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

Ts Terminal Circuit

CIRCUIT DESCRIPTION

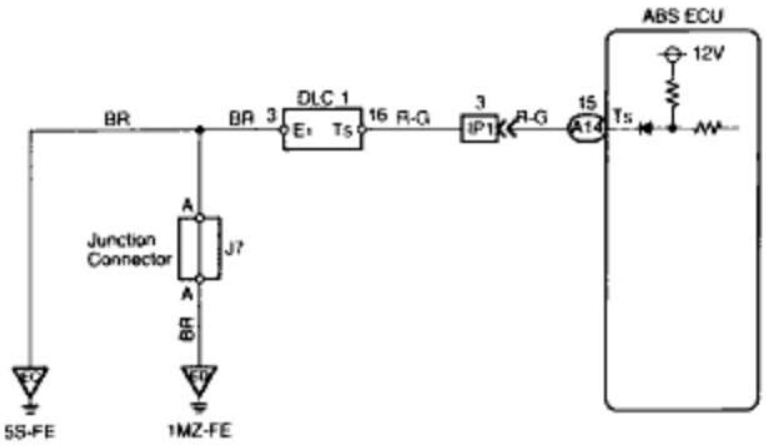
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the diagnostic trouble code check.
Connecting terminals Ts and E1 of the DLC1 in the engine compartment starts the check.

DIAGNOSTIC CHART

1. Check voltage between terminals Ts and E1 of DLC 1.
   - OK → If ABS warning light does not blink even after Ts and E 1 are connected, the ECU may be defective.
   - NG ↓
2. Check for open and short in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–28).
   - NG → Repair or replace harness or connector.
   - OK ↓

Check and replace ABS ECU.

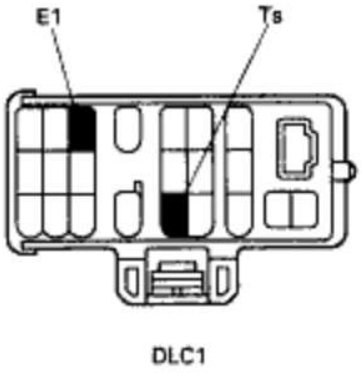
WIRING DIAGRAM



R08723

INSPECTION PROCEDURE

1 Check voltage between terminals and E1 of DLC1.



C
1. Turn ignition switch ON.
2. Measure voltage between terminals Ts and E1 of DLC 1.

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 DLC1, DLC1 and body ground (See page IN–28).

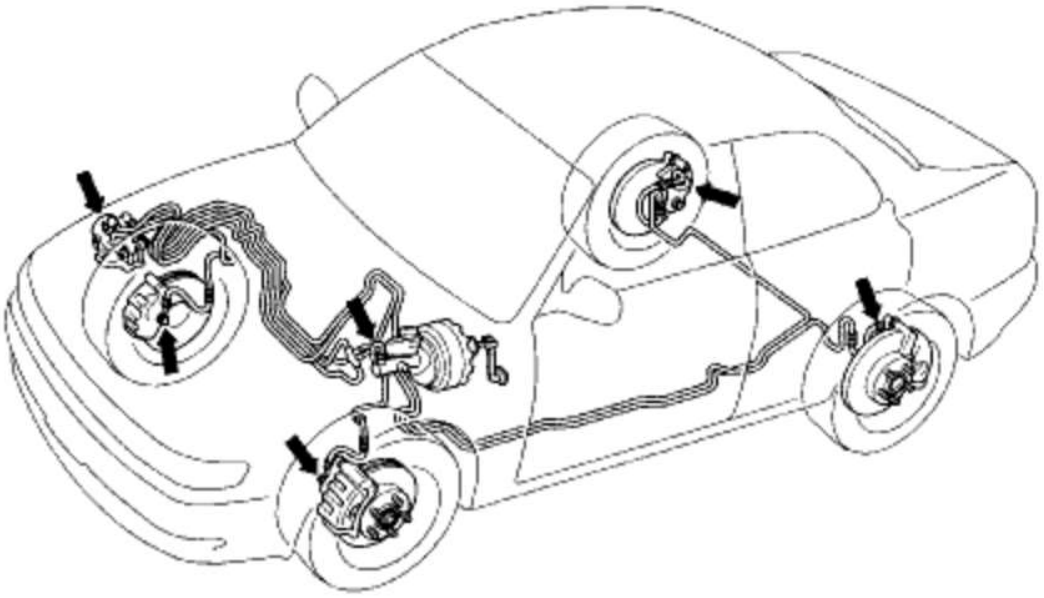
OK

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.



TROUBLESHOOTING (TMM Made Vehicle BOSCH ABS)

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 malfunc–tion 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 recur, simulate the problem by initially 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 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 con–nectars, or the ECU.

(9) SENSOR CHECK

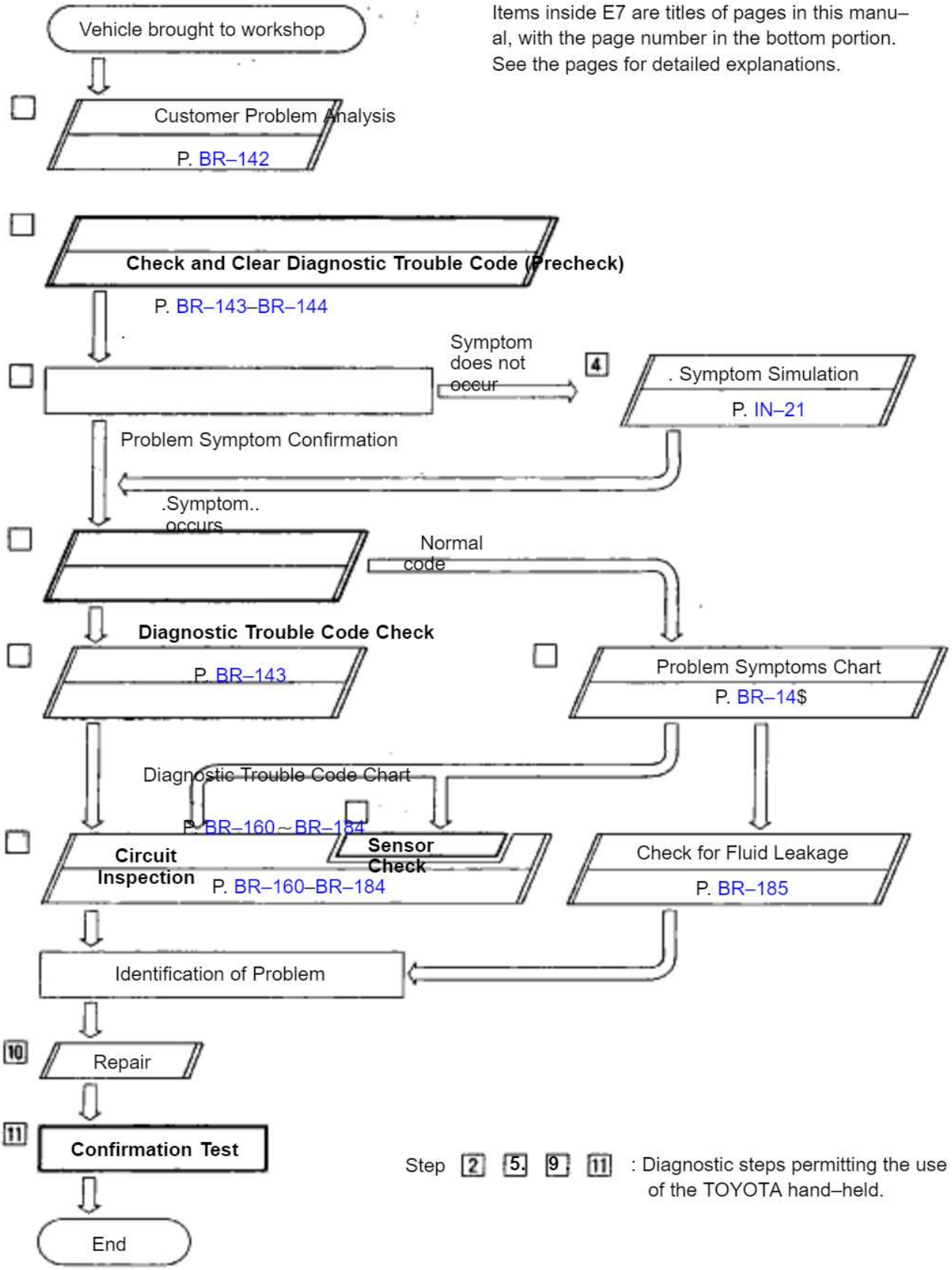
Use the ABS warning light to check if each of the signals from the speed sensors are being input correctly to the ECU. Instructions for this check are given in the circuit inspection.

(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 to make sure the entire ABS system is operating correctly.



Items inside E7 are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2 5 9 11 : Diagnostic steps permitting the use of the TOYOTA hand–held.

CUSTOMER PROBLEM ANALYSIS CHECK SHEET

ABS Check Sheet

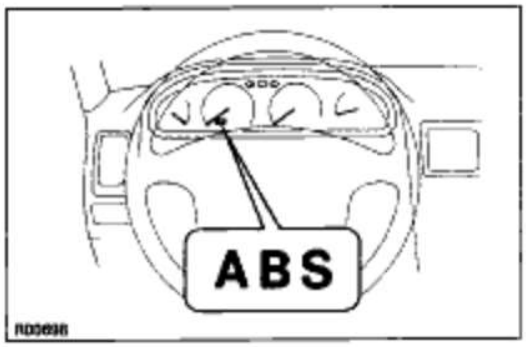
Inspector's Name :

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

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

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

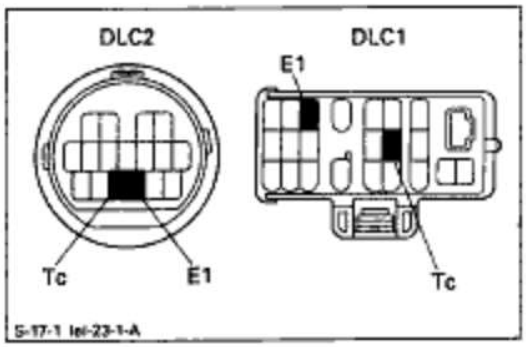


DIAGNOSIS SYSTEM

INDICATOR CHECK

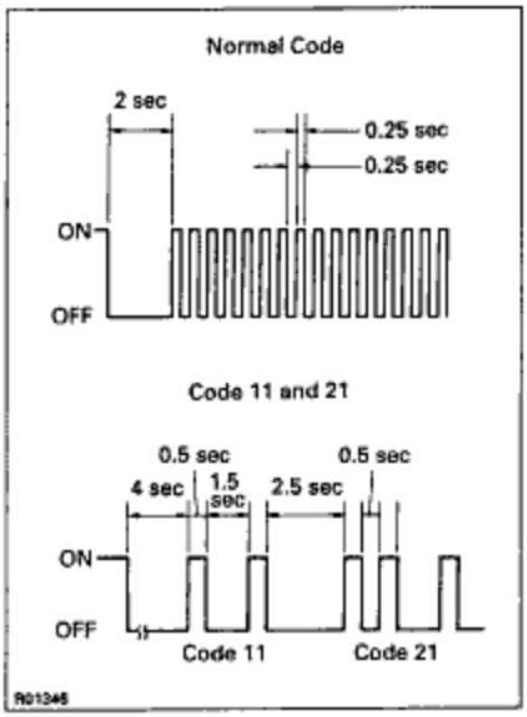
When the ignition switch is turned ON, check that the ABS warning light goes on for 3 seconds.

HINT: If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit (See page BR–177).



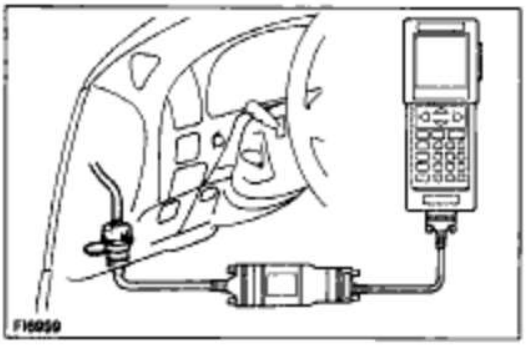
DIAGNOSTIC TROUBLE CODE CHECK

1. Using SST, connect terminals Tc and E1 of DLC2 or DLC1.
   SST 09843–18020
2. Turn the ignition switch to ON.
3. Read the diagnostic trouble code from the ABS warning light on the combination meter.
   HINT: If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page BR–180 or BR–177y.



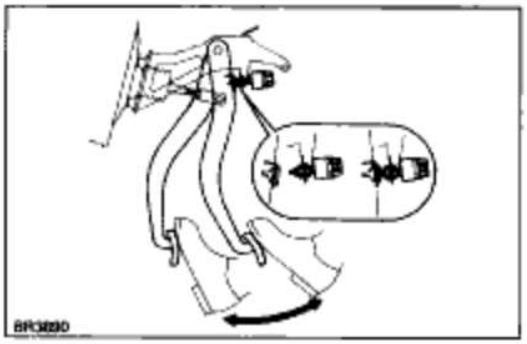
As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

4. Codes are explained in the code table on page BR–145.
5. After completing the check, disconnect terminals Tc and E1, and turn off the display.
   If 2 or more malfunctions are indicated at the same time, the lowest numbered diagnostic trouble code will be displayed first.



DIAGNOSTIC TROUBLE CODE CHECK USING TOYOTA HAND–HELD TESTER

1. Hook up the Toyota hand–held tester to the DLC2.
2. Read the diagnostic trouble codes by following the prompts on the tester screen.
   Please refer to the Toyota hand–held tester operator's manual for further details.



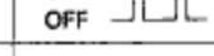
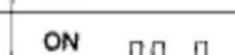
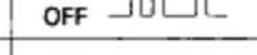
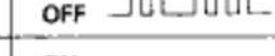
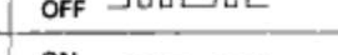
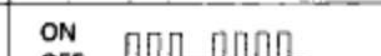
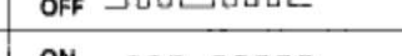
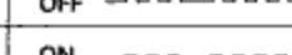
DIAGNOSTIC TROUBLE CODE CLEARANCE

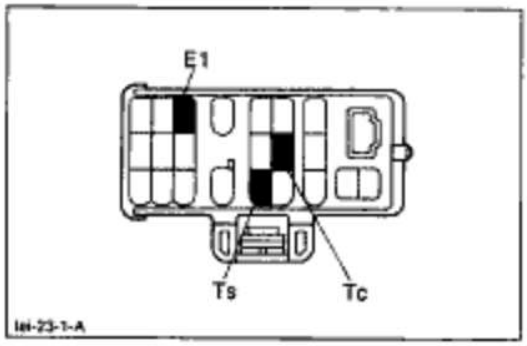
1. Using SST, connect terminals Tc and E1 of DLC2 or DLC1.
   SST 09843–18020
2. IG switch ON.
3. Clear the diagnostic trouble codes stored in ECU by de–pressing the brake pedal 8 or more times within 3 seconds.
4. Check that the warning light shows the normal code.
5. Remove the SST from the terminals of DLC2 or DLC1.

HINT: Cancellation cannot be done by removing the battery cable or ECU–13 fuse.

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the diagnostic trouble code check, check the circuit listed for that code.

Code	ABS Warning Light Blinking Pattern	Diagnosis
11		Open or short circuit in ABS solenoid relay circuit
13		Open or short circuit in ABS motor relay circuit
21		Open or short circuit in 3–position solenoid circuit for right front wheel
22		Open or short circuit in 3–position solenoid circuit for left front wheel
23		Open or short circuit in 3–position solenoid circuit for rear wheels
31		Right front wheel speed sensor signal malfunction
32		Left front wheel speed sensor signal malfunction
33		Right rear wheel speed sensor signal malfunction
34		Left rear wheel speed sensor signal malfunction
35		Open circuit in right front speed sensor circuit
36		Open circuit in left front speed sensor circuit
37		Faulty rear speed sensor rotor
38		Open circuit in right rear speed sensor circuit
39		Open circuit in left rear speed sensor circuit
41		Low battery positive voltage
51		Pump motor is locked Open in pump motor circuit in actuator
62		Malfunction in ECU

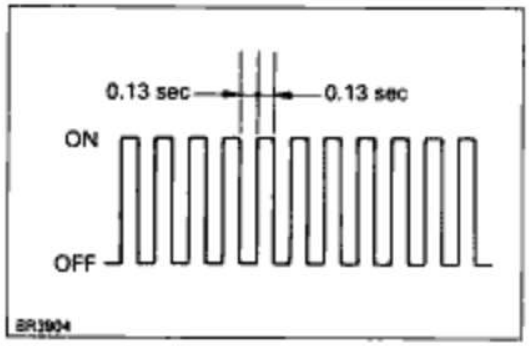


SPEED SENSOR SIGNAL CHECK

1. When the ignition switch is turned ON, check that the ABS warning light goes on for 3 seconds.
2. Turn the ignition switch to OFF.
3. Using SST, connect terminals Ts and El of DLC1.

SST 09843–18020

4. Start the engine.



5. 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–177j.

6. Drive vehicle straight forward.

HINT:

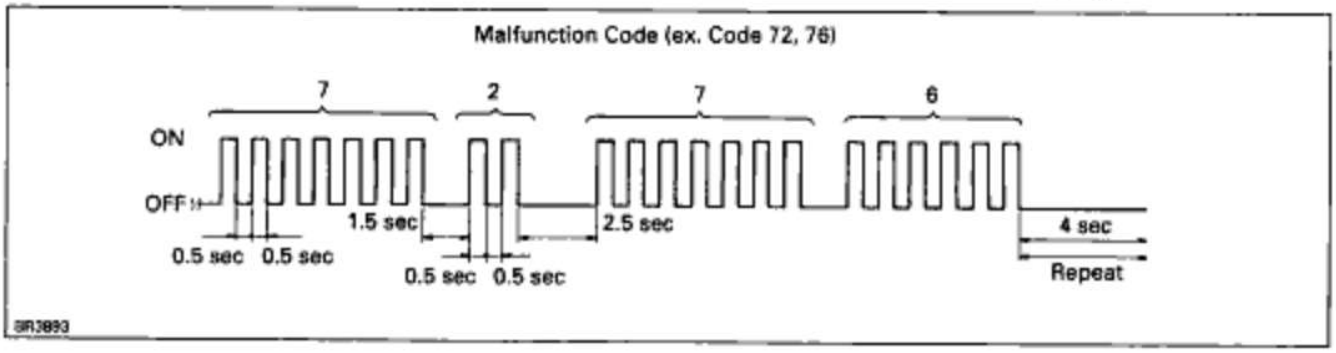
- Drive vehicle at 45–55 km/h (28–34 mph) for several seconds.
- If the brake is applied during the check, the check routine must be started again.

7. Stop the vehicle.
8. Turn the ignition switch to OFF.
9. Disconnect terminals Ts and E1, and connect Te and E1.
10. Turn the ignition switch to ON.
11. Read the number of blinks of the ABS warning light.

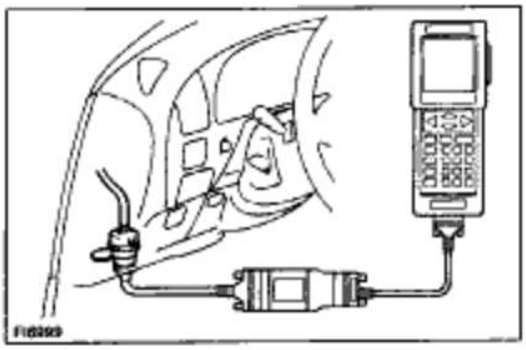
HINT: See the list of diagnostic trouble codes shown on the next page.

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



12. After performing the check, disconnect terminals Tc and E1 of DLC1, and ignition switch turned off.



DIAGNOSTIC TROUBLE CODE CHECK USING TOYOTA HAND–HELD TESTER

1. Perform steps 1. ~ 7. on the previous page.
2. Hook up the Toyota hand–held tester to the DLC2.
3. Read the diagnostic trouble codes by following the prompts on the tester screen.
   Please refer to the Toyota hand–held tester operator's manual for further details.

Diagnostic Trouble Code of Speed Sensor Check Function

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

PROBLEM SYMPTOMS CHART

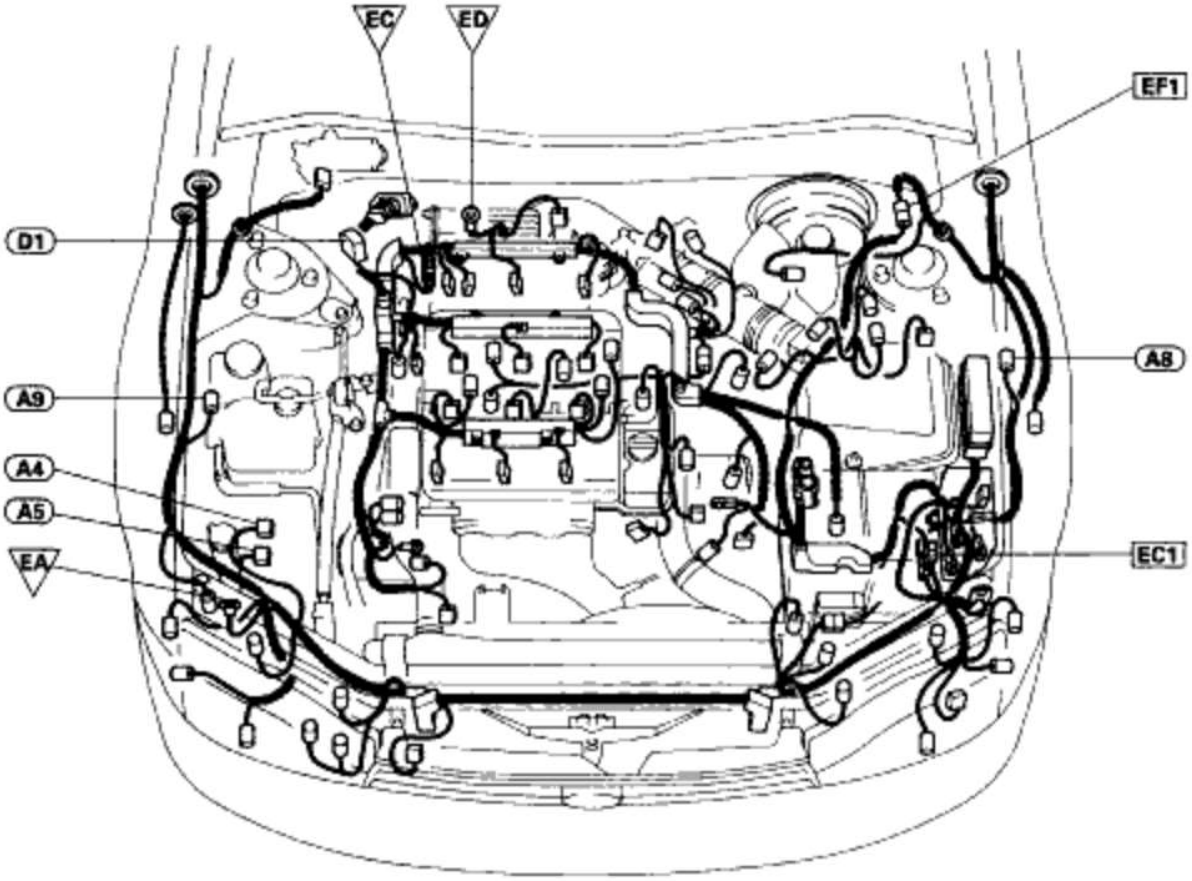
If a normal code is displayed during the diagnostic trouble code check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptoms	Inspection Circuit	See page
ABS does not operate.	Only when 1. ~ 4. are all normal and the problem is still occurring, replace the ABS ECU. 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 hydraulic circuit for leakage.	BR–143 BR–170 BR–166 BR–185
ABS does not operate efficiently.	Only when 1.~ 4. are all normal and the problem is still occurring, replace the ABS ECU. 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 hydraulic circuit for leakage.	BR–143 BR–166 BR–175 BR–185
ABS warning light abnormal.	1. ABS warning light circuit. 2. ABS ECU.	BR–177
Diagnostic trouble code check cannot be performed.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit. 2. Tc terminal circuit.	BR–177 BR–180
Speed sensor signal check cannot be performed.	1. Ts terminal circuit. 2. ABS ECU.	BR–183

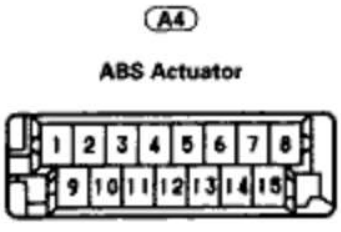
LOCATION OF CONNECTORS

Location of Connectors in Engine Compartment

1M2–FE Engine:



N09612



R08574



Ig-4-1-A

A8 A9

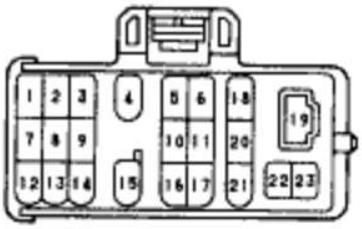
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



ls-2-1-T

D1

DLC1



lei-23-1

EC1



lef-8-1



lef-8-2

EF1



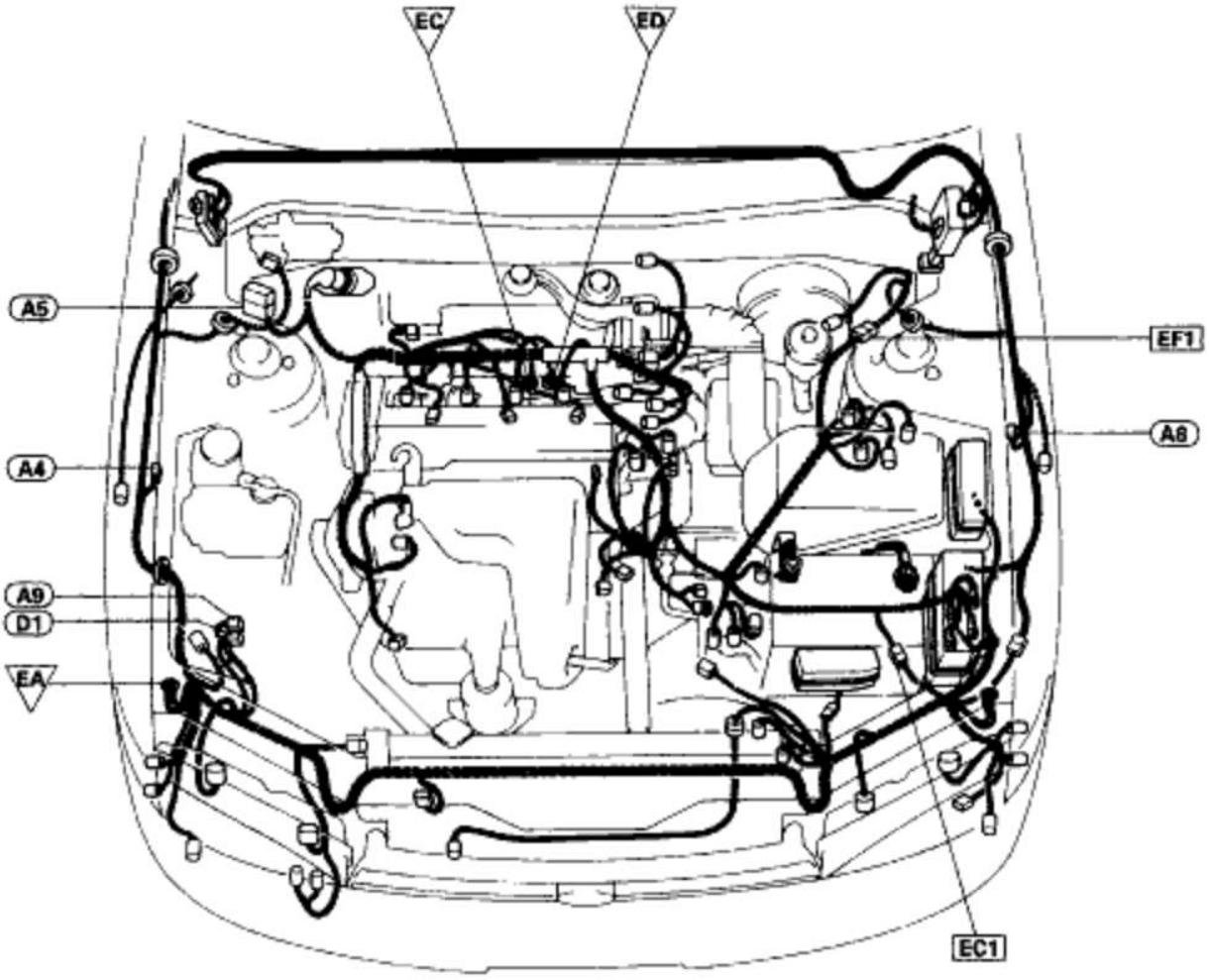
lfg-4-1



lfg-4-2

Location of Connectors in Engine Compartment

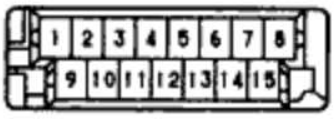
5S–FE Engine:



N09613

A4

ABS Actuator



R08674

A5

ABS Actuator



lg-4-1-A

A8 A9

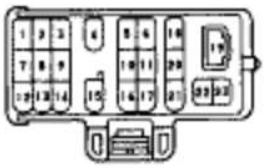
ABS Speed Sensor Left Front
ABS Speed Sensor Right Front



le-2-1-T

D1

DLC1



lei-23-1-A

EC1



lef-8-1



lef-8-2

EF1

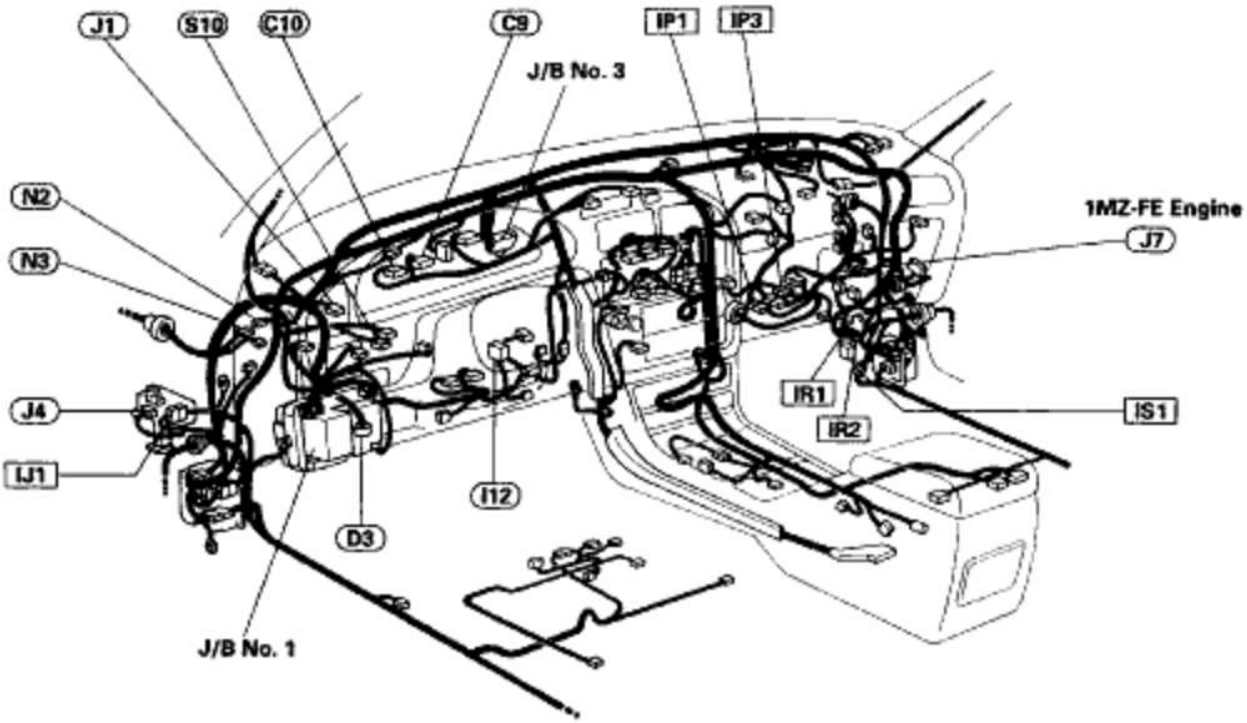


lfg-4-1



lfg-4-2

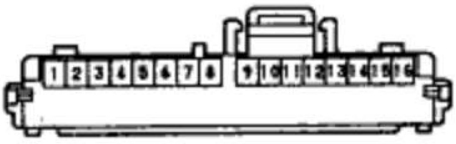
Location of Connectors in instrument Panel



N08614

C9

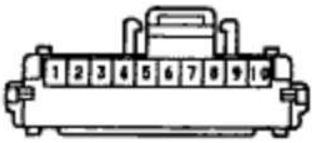
ABS Warning Light



j-16-1

C10

ABS Warning Light



j-10-1

D3

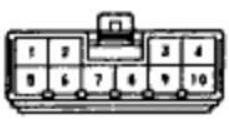
DLC2



S-17-1

I12

Ignition Switch



g-10-1-B

J1

Junction Connector



e-22-1-A

J3

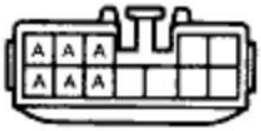
Junction Connector



e-14-1-A

J7 1MZ-FE

Junction Connector



e-12-1

J7

Noise Filter



e-2-2

N3

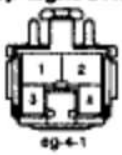
Noise Filter



e-2-1

S10

Stop Light Switch

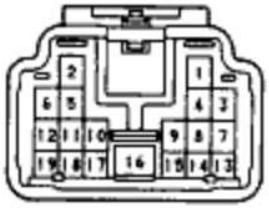


eg-4-1

IJ1



eg-19-1

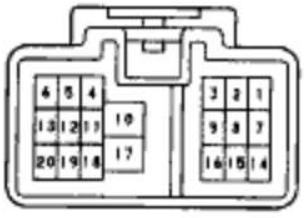


eg-19-2

IP1



e-20-1-B



e-20-2-B

IP3

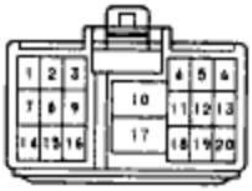


ef-19-1

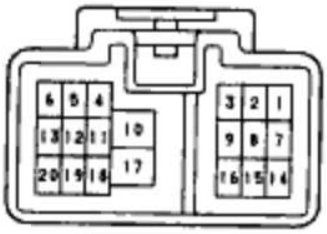


ef-19-2

IR1



e-20-1-B



e-20-2-B

IR2



e-8-1



e-8-2

IS1

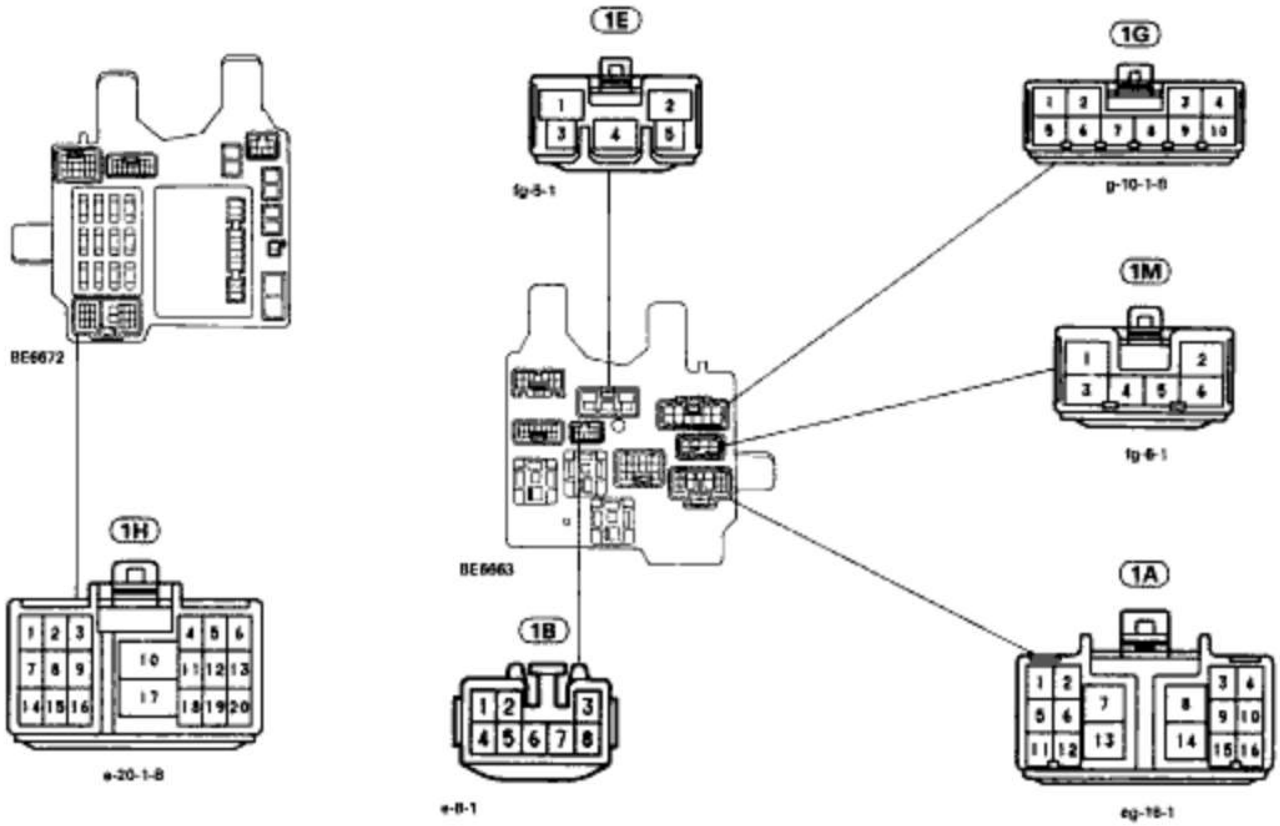


e-6-1

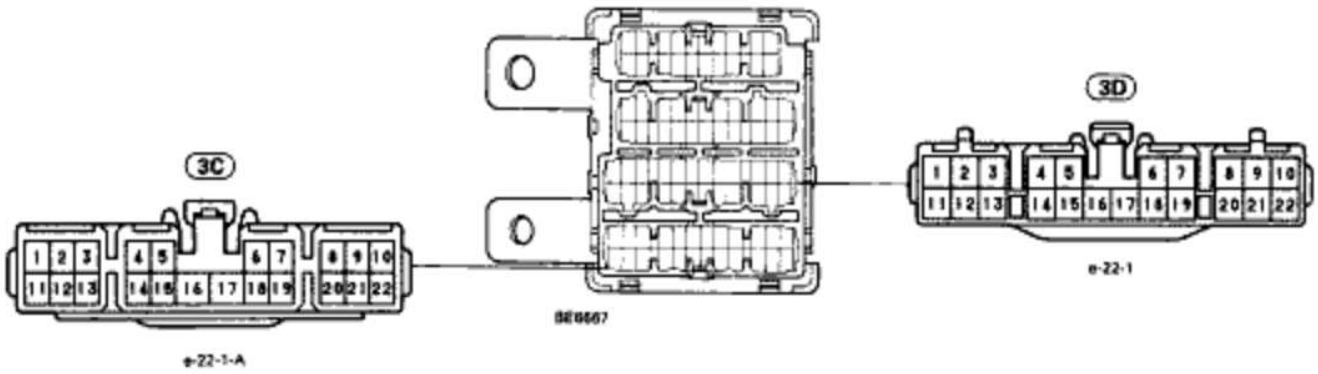


e-6-2

J/B No. 1

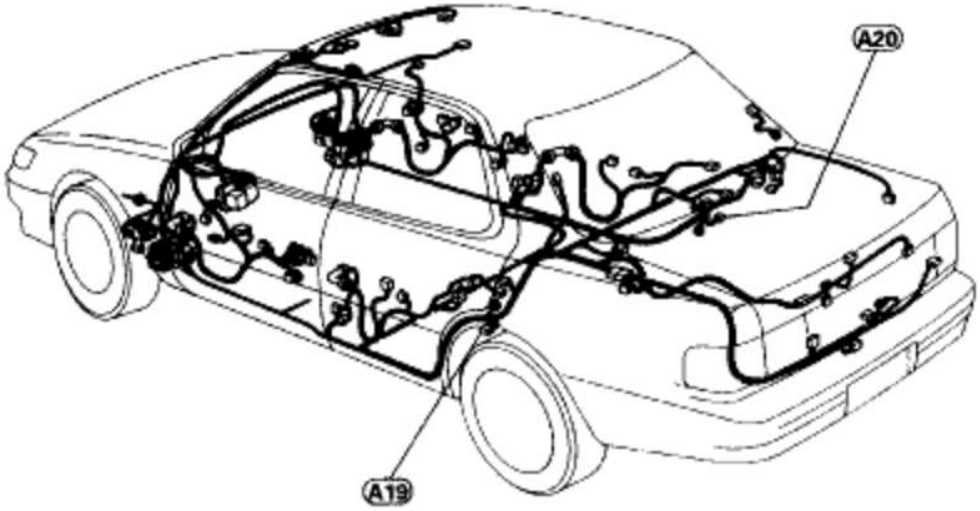

1E
1G
1M
1H
1B
1A
BE6672
BE6663
e-20-1-B
e-8-1
eg-16-1

J/B No. 3


3C
3D
BE6667
e-22-1-A
e-22-1

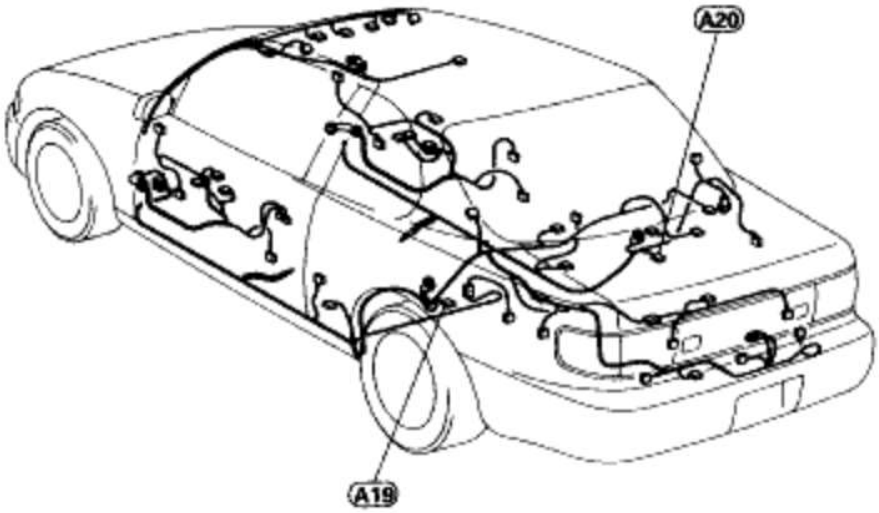
Location of Connectors in Body

Sedan:



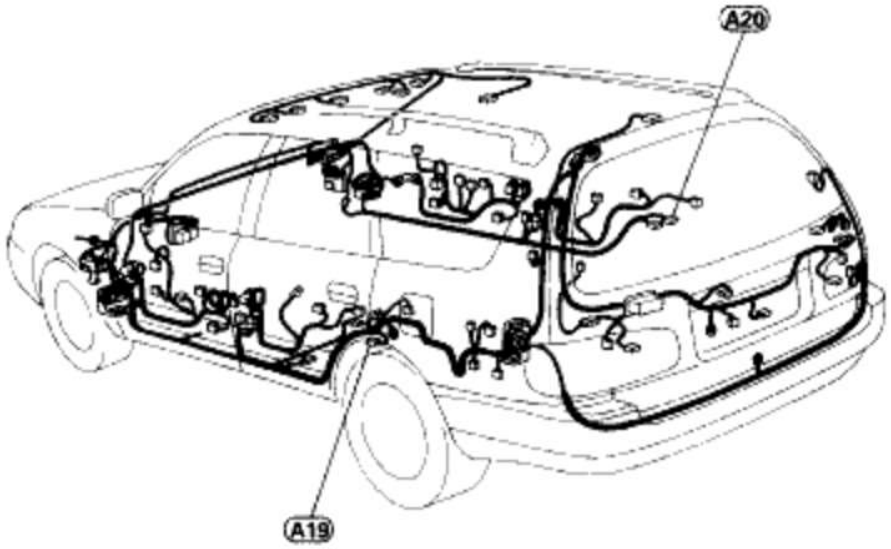
N09615

Coupe:



N09703

Wagon:



N098704

A19 A20

ABS Speed Sensor Left Rear
ABS Speed Sensor Right Rear



e-2-2-L

–MEMO–

CIRCUIT INSPECTION

DTC 11,13 ABS Solenoid and Motor Relay Circuit

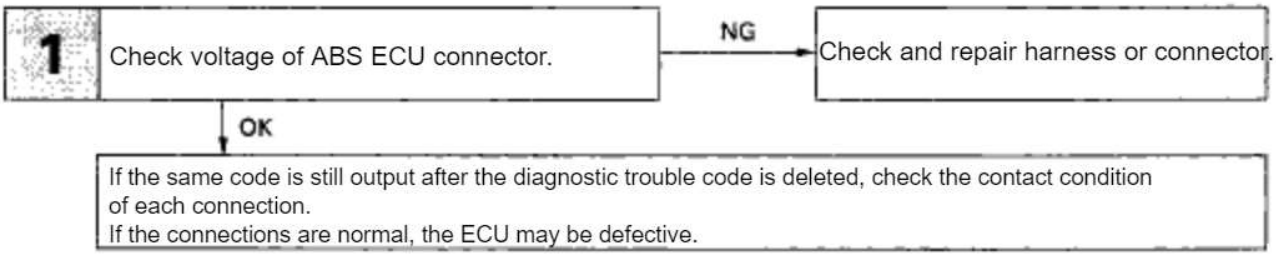
CIRCUIT DESCRIPTION

The solenoid relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on. The motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
11	(1) 5V is applied to the solenoid voltage monitor terminal (AST) for 30 sec. or more, with the IG switch ON and the warning light on. (2) 5V is applied to the solenoid voltage monitor terminal (AST) for 0.02 sec. or more, after the warning light goes off.	• Open or short in ABS solenoid relay circuit. • ECU.
13	(1) The motor voltage monitor terminal (MT) is ON for 5 sec. or more, with the motor relay operation signal OFF. (2) The motor voltage monitor terminal (MT) is OFF for 0.04 sec. with the motor relay operation signal ON.	• Pump motor. • Open in ABS motor relay circuit. • ECU.

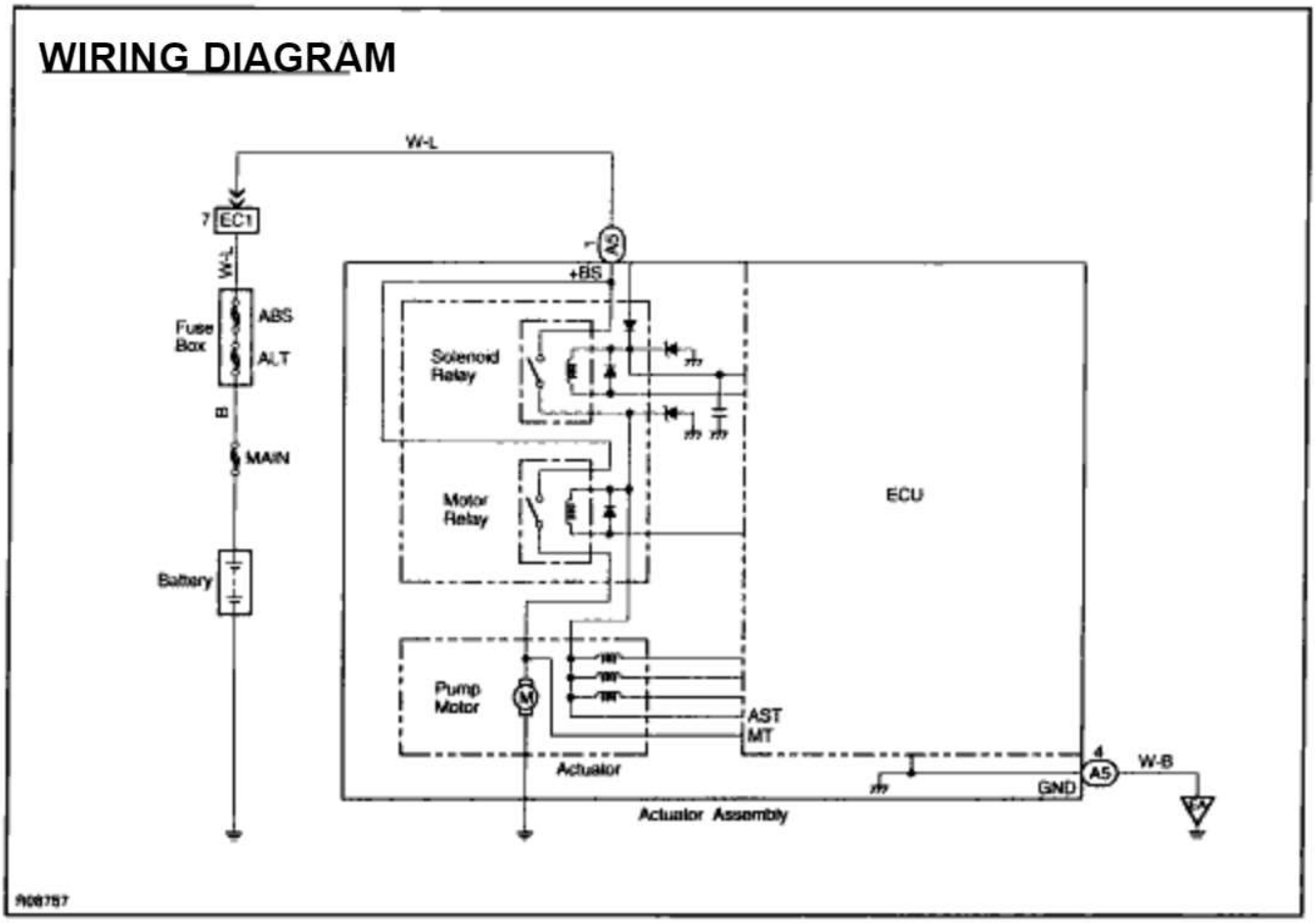
Fail safe function: If trouble occurs in the control (solenoid) relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

DIAGNOSTIC CHART



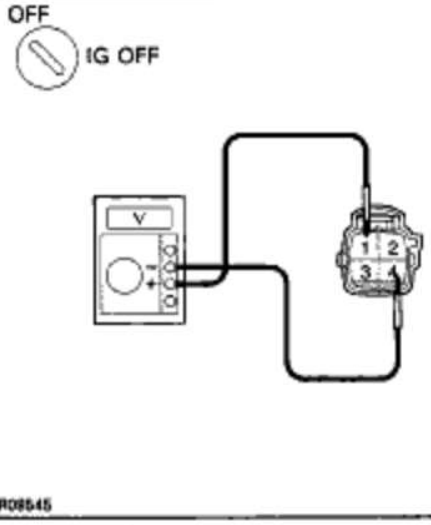
HINT: When DTC13 is output, check that the pump motor ground wire is installed correctly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 **Check voltage between terminals connector. (A5) 1 and (A5) 4 of ABS ECU**



P Disconnect the ABS ECU connector.

C Measure voltage between terminals (A5) 1 and (A5) 4 of ABS ECU harness side connector.

OK **Voltage: 10–14 V**

OK

NG → **Check and repair 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.

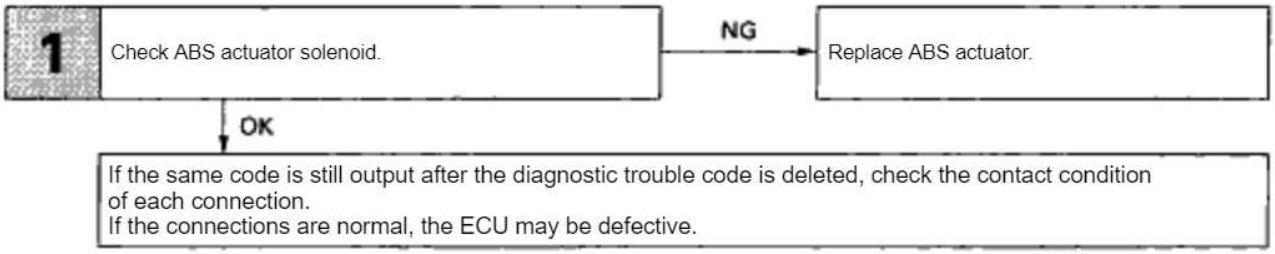
DTC 21, 22, 23 ABS Actuator Solenoid Circuit

CIRCUIT DESCRIPTION

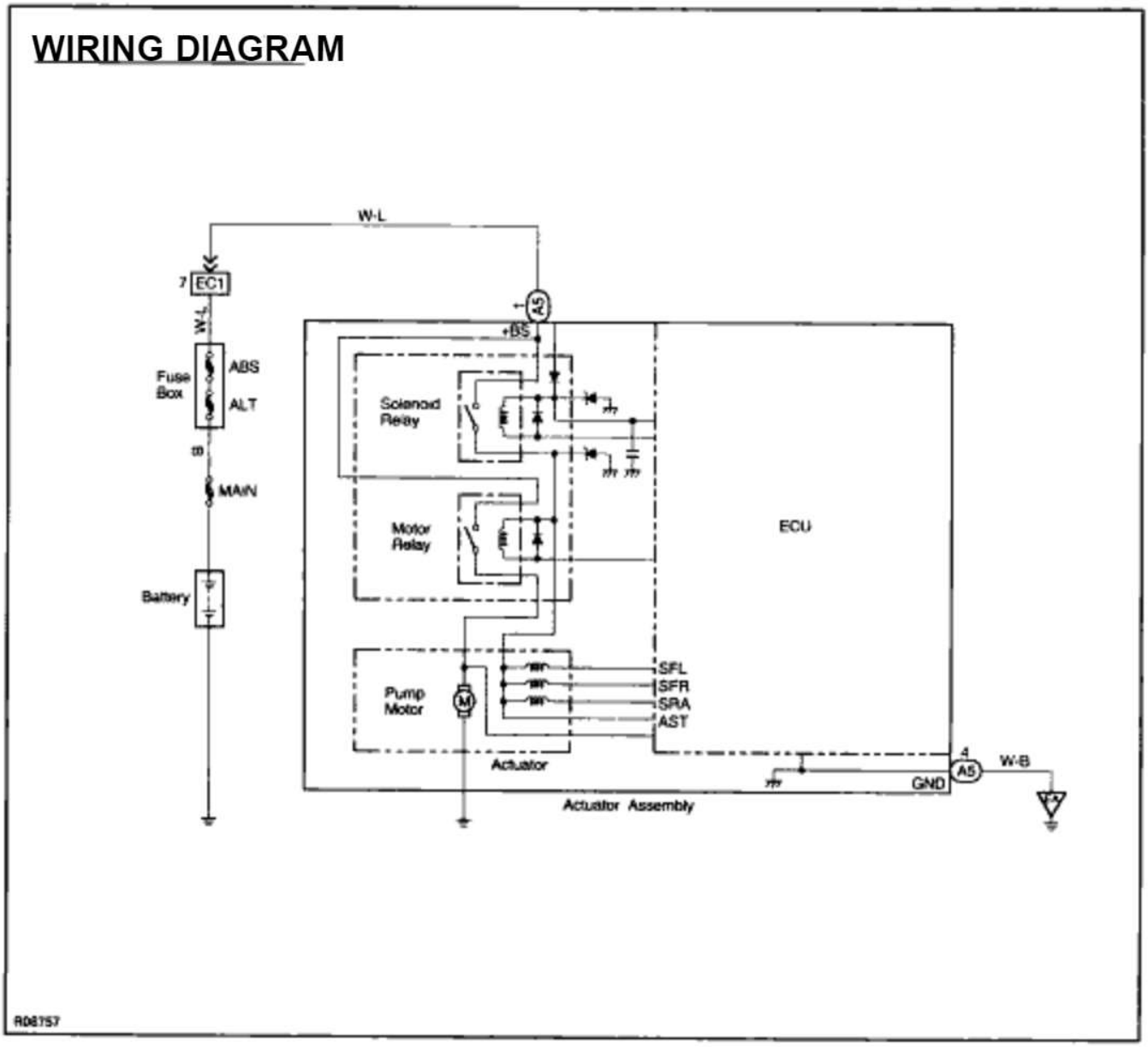
This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders, thus controlling the braking force.

DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
21	(1) OV is applied to terminal SFR for 0.035 sec. while battery voltage is applied to the sole–noid voltage monitor terminal (AST) and the ECM power transistor is OFF. (2) Battery voltage is applied to terminal SFR for 0.035 sec. while battery voltage is applied to the solenoid voltage monitor terminal (AST) and the ECM power transistor is ON.	• ABS actuator (solenoid valve). • Open or short in right front solenoid circuit. • ECU.
22	(1) OV is applied to terminal SFL for 0.035 sec. while battery voltage is applied to the sole–noid voltage monitor terminal (AST)and the ECM power transistor is OFF. (2) Battery voltage is applied to terminal SFL for 0.035 sec. while battery voltage is applied to the solenoid voltage monitor terminal (AST) and the ECM power–transistor is ON.	• ABS actuator (solenoid valve). • Open or short in left front solenoid circuit. • ECU.
23	(1) OV is applied to terminal SRA for 0.035 sec. while battery voltage is applied to the sole–noid voltage monitor terminal (AST) and the ECM power transistor is OFF. (2) Battery voltage is applied to terminal SRA for 0.035 sec. while battery voltage is applied to the solenoid voltage monitor terminal (AST) and the ECM power transistor is ON.	• ABS actuator (solenoid valve). • Open or short in rear solenoid circuit. • ECU.

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

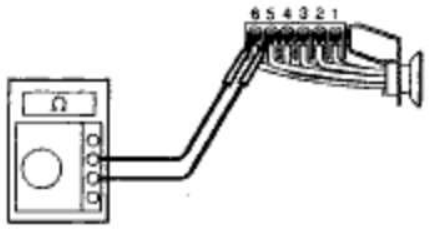


WIRING DIAGRAM



INSPECTION PROCEDURE

1 Check ABS actuator solenoid.



P Remove the ABS ECU cover and disconnect 6–pin connector.

C Check continuity between terminals 1 and 2, 3 and 4, 5 and6.

OK **Continuity**
HINT: Resistance of each solenoid coil is 1.1Ω.

OK

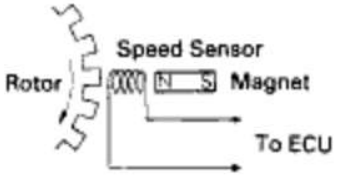
NG Replace ABS actuator.

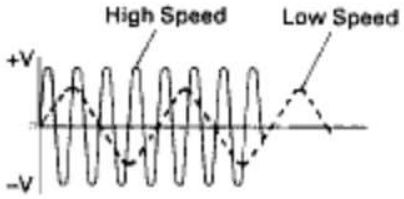
If the same code is still output after the diagnostic trouble code is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DTC 31,32,33,34,35, 36, 38, 39 Speed Sensor Circuit

CIRCUIT DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS system. The front and rear rotors each 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 direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.





BR3683
BR3562

DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
31,32, 33,34	(1) No pulse is input when the vehicle speed reaches 12 km/h (7 mph). (2) No pulse is input when the vehicle speed reaches 20 km/h (12 mph). (3) When the vehicle speed is 10 km/h (7 mph) or above, a pulse is not input for at least 20 sec.	• Right front, left front, right rear and left rear speed sensor. • Open in each speed sensor circuit. • Sensor installation • Sensor rotor • ECU.
35,36, 38,39	The hardware detects a constant open is each sensor circuit.	• Right front, left front, right rear and left rear speed sensor. • Open in each speed sensor circuit. • ECU.

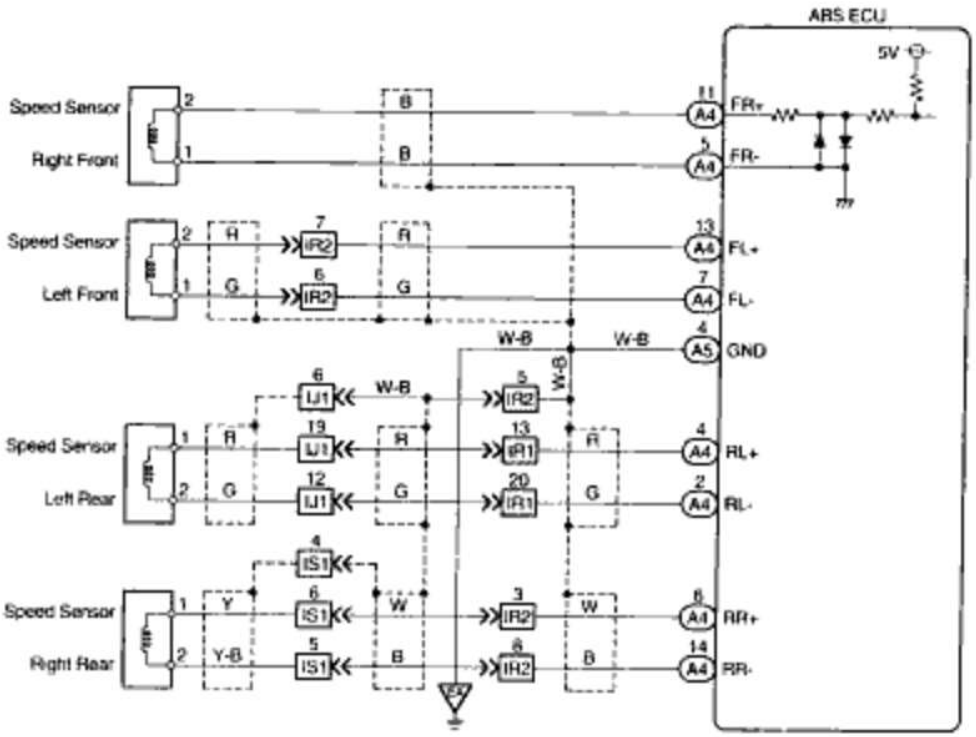
HINT: DTC Nos. 31 and 35 are for the right front speed sensor.
DTC Nos. 32 and 36 are for the left front speed sensor.
DTC Nos. 33 and 38 are for the right rear speed sensor
DTC Nos. 34 and 39 are for the left rear speed sensor.
Fail safe function: If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

DIAGNOSTIC CHART

1. Check speed sensor.
   - NG → Replace speed sensor.
   - OK ↓
2. Check for open and short in harness and connector between each speed sensor and ECU.
   - NG → Repair or replace harness or connector.
   - OK ↓
3. Check sensor rotor and sensor installation.
   - NG → Replace speed sensor or rotor.
   - OK ↓

Check and replace ABS ECU.

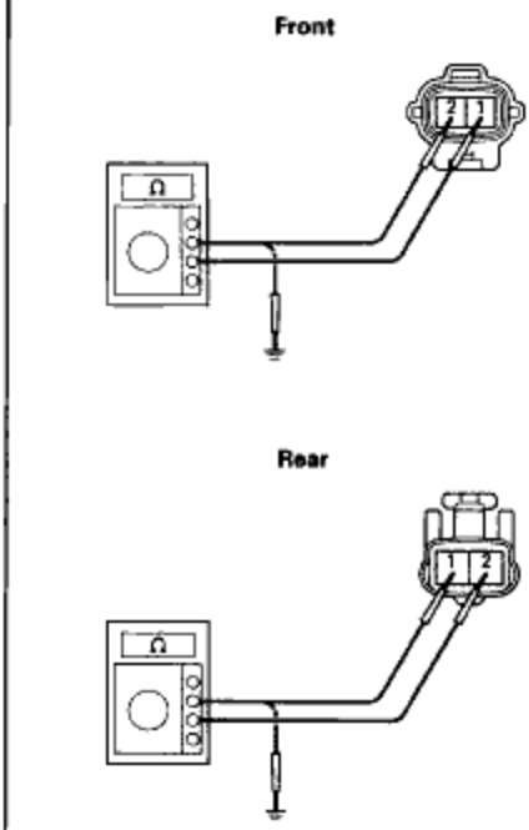
WIRING DIAGRAM



R08758

INSPECTION PROCEDURE

1 **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: 0.6–1.8 kΩ**

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

OK **Resistance: 1 MO 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: 0.6–1.8 tcΩ**

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

OK **Resistance: 1 MΩ or higher**

OK

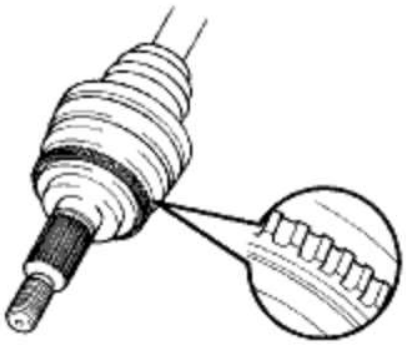
NG **Replace speed sensor.**

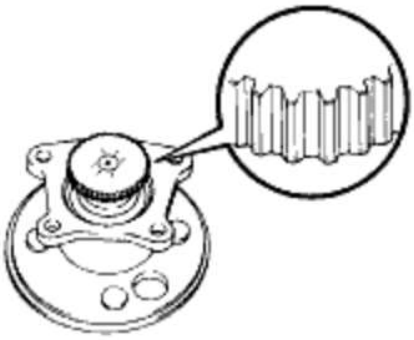
2 **Check for open and short in harness and connector between each speed sensor and ECU (See page IN–28).**

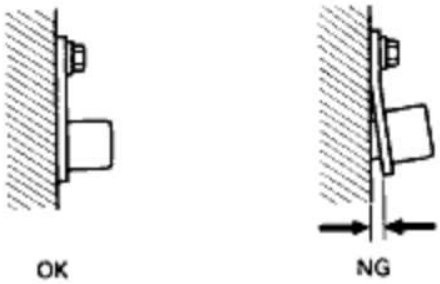
OK

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

3 Check sensor rotor and sensor installation.







R00948
R00947
BR3795

Front

P Remove front drive shaft (See SA section).
Check sensor rotor serrations.

C

OK **No scratches or missing teeth.**

C Check the front speed sensor installation

OK **The installation bolt is tightened properly.**

Rear

P Remove the axle hub (See 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 speed or rotor.

Check and replace ABS ECU.

DTC 41 +BS Power Source Circuit

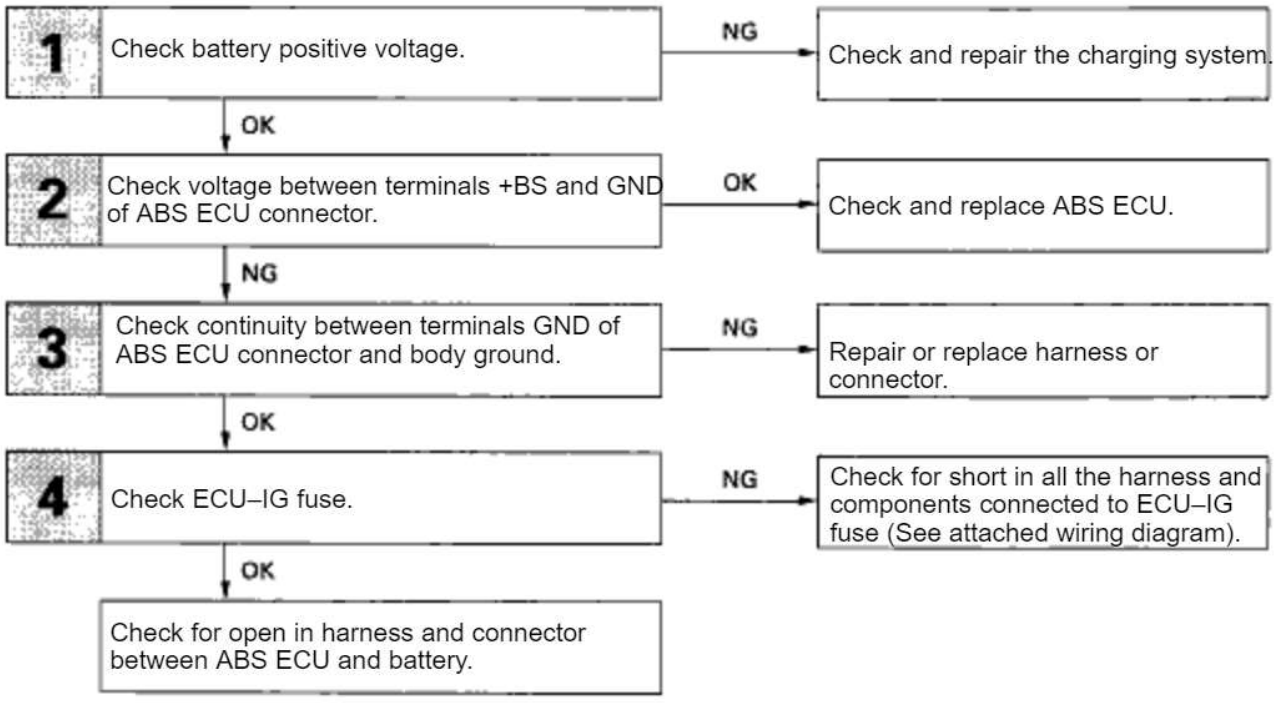
CIRCUIT DESCRIPTION

This is the power source for the ECU, hence the CPU, and the actuators.

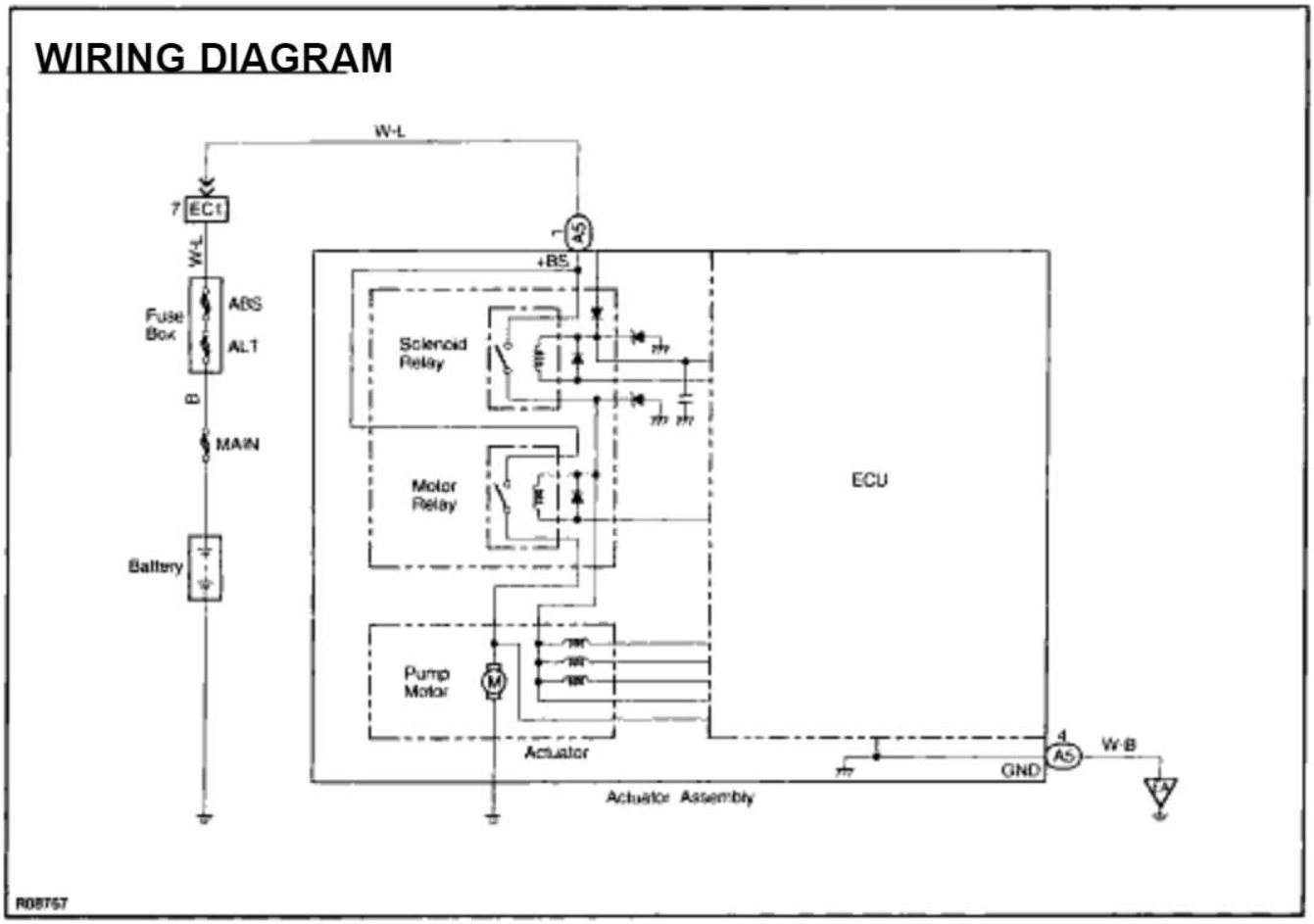
DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble area
41	(1) Voltage of 5V or more, or 9.4V or less, is applied for at least 60 sec. to terminal +BS before the ABS primary check and ABS operation. (2) Voltage of 5V or more, or 9.4V or less, is applied to terminal +BS for 0.2 sec. or more, after the ABS primary check and before ABS operation. (3) During ABS operation, voltage of 5V or more, or 8.8V or less, is applied to terminal +BS for 0.2 sec. or more.	• Battery. • IC regulator. • Open or short in power source circuit. • ECU.

Fail safe function: If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.
If the voltage applied to terminal +BS becomes 9.9V or less, the warning light goes off and ABS control becomes possible.

DIAGNOSTIC CHART



WIRING DIAGRAM



INSPECTION PROCEDURE

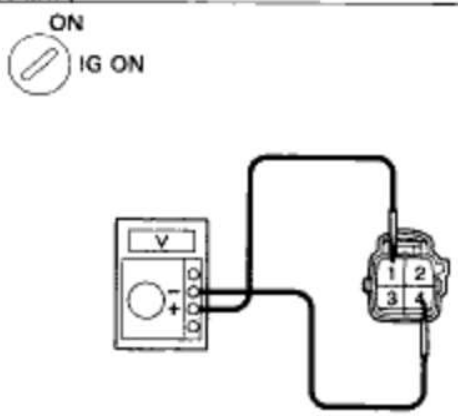
1 Check battery positive voltage.

OK Voltage: 10–14 V

OK

NG Check and repair the charging system.

2 Check voltage between terminals +BS and GND of ABS ECU connector.



P Disconnect ABS ECU connector.

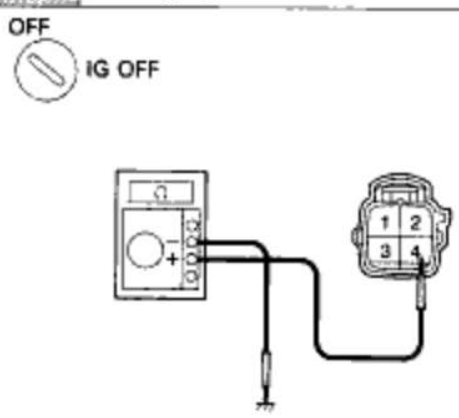
C
1. Turn ignition switch ON.
2. Measure voltage between terminals IG1 and GND of ABS ECU connector.

OK Voltage: 10–14 V

OK

NG Check and replace ABS ECU.

3 Check continuity between terminal GND of ABS ECU connector and body ground.



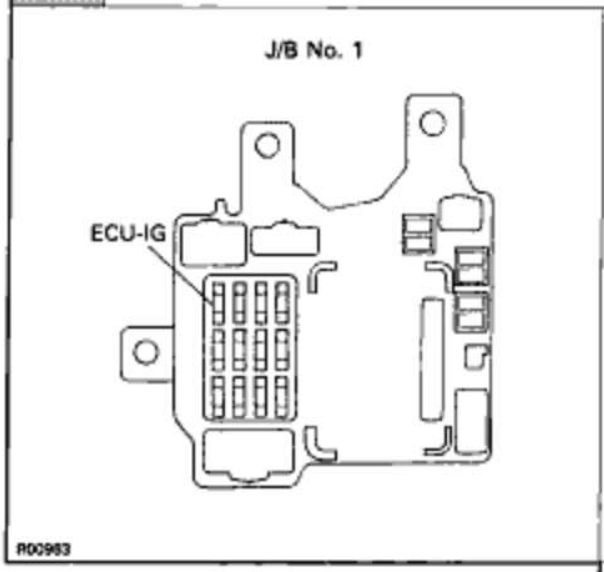
C Measure resistance between terminal GND of ABS ECU connector and body ground.

OK Resistance: 1Ω or less

OK

NG Repair or replace harness or connector.

4 Check ECU–IG fuse.



P Remove ECU–IG fuse from J/B No. 1.

C Check continuity of ECU–IG fuse.

OK **Continuity**

NG → **Check for short in. a1l the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK →

Check for open in harness and connector between ABS ECU and battery (See page IN–28).

DTC 51 ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC 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 current to the solenoid relay and prohibits ABS control.

DIAGNOSTIC CHART

Check that the pump motor ground wire is installed correctly.
If it is OK, replace the ABS actuator assembly.

Stop Light Switch Circuit

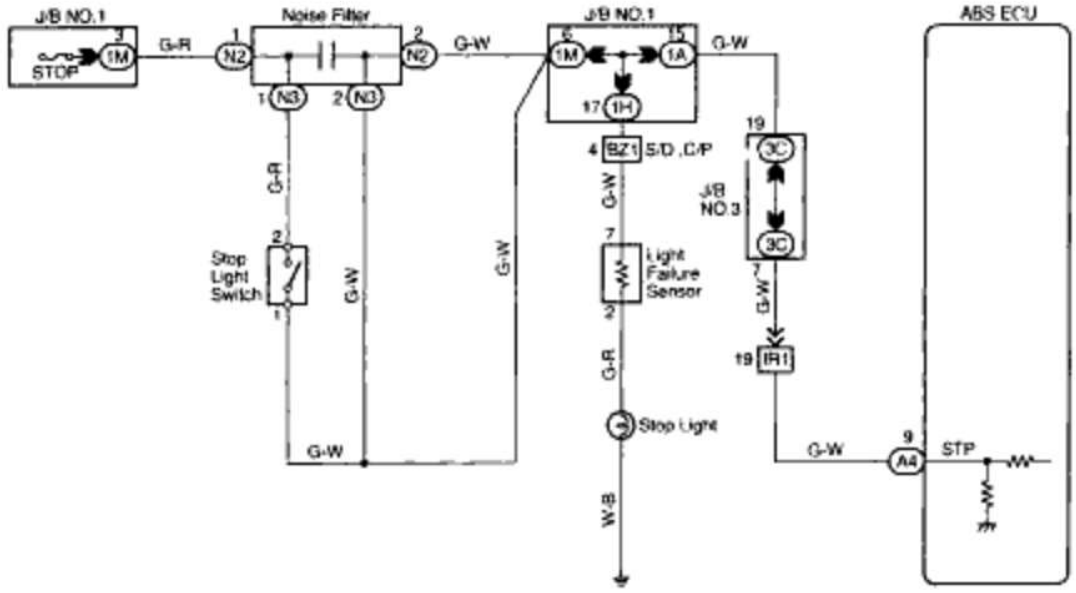
CIRCUIT DESCRIPTION

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

DIAGNOSTIC CHART

1	Check operation of stop light.	NG	Repair stop light circuit (See page BE–65).
	OK		
2	Check voltage of terminal STP.	OK	Proceed to next circuit inspection shown on problem symptoms chart (See page BR–148y.
	NG		
3	Check for open in harness and connector between ABS ECU and stop light switch (See page IN–27).	NG	Repair–or replace harness or connector.
	OK		
	Check and replace ABS ECU.		

WIRING DIAGRAM



R08760

INSPECTION PROCEDURE

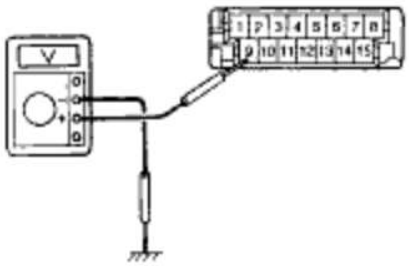
1 Check operation of stop light.

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 connector and body ground.



P Disconnect ABS ECU connector.

C Measure voltage between terminal STP and body ground.

OK Voltage: 8–14 V

NG

OK → Proceed to next circuit inspection shown on problem symptoms chart (See page BR–148).

3 Check for open in harness and connector between ABS ECU and stop light switch (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

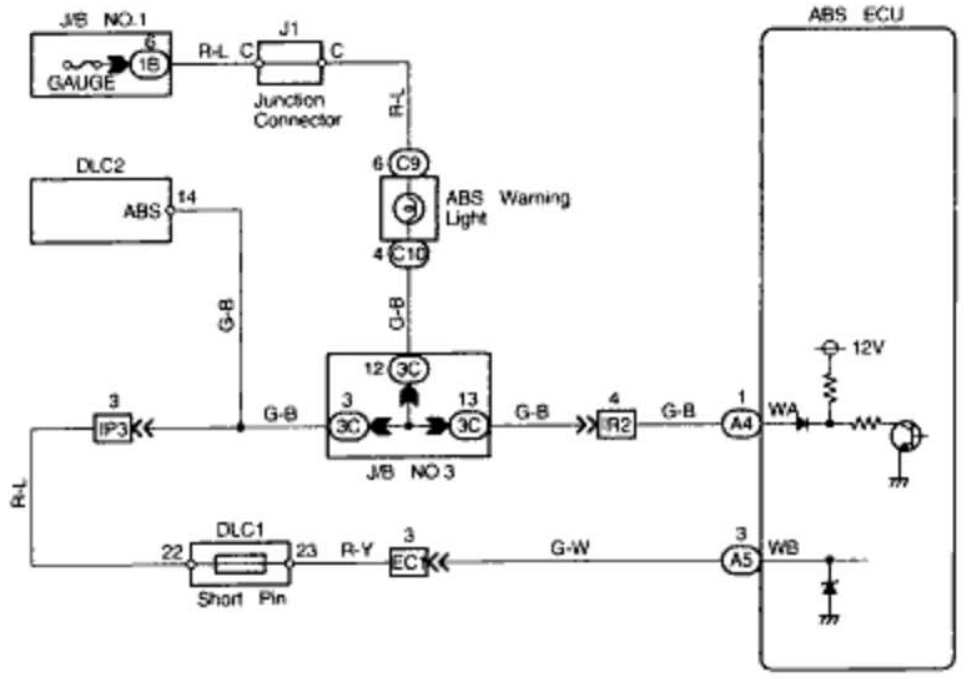
If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a diagnostic trouble code in memory.
Connect terminals Tc and E1 of the DLC1 or DLC2 to make the ABS warning light to blink and output the diagnostic trouble code.

DIAGNOSTIC CHART

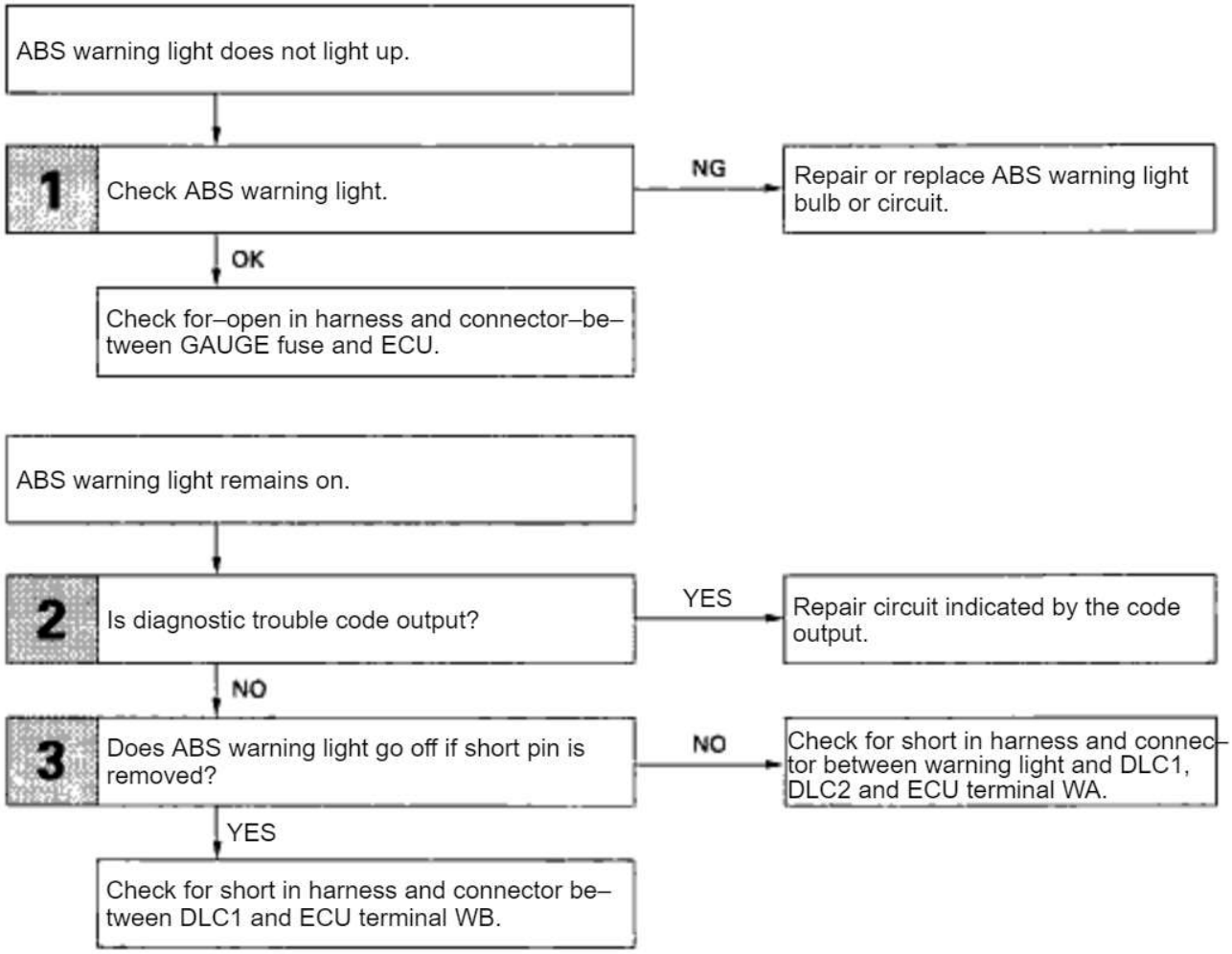
Perform troubleshooting in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 2

WIRING DIAGRAM



R08761


ABS warning light does not light up.
1
Check ABS warning light.
NG
Repair or replace ABS warning light bulb or circuit.
OK
Check for–open in harness and connector–between GAUGE fuse and ECU.
ABS warning light remains on.
2
Is diagnostic trouble code output?
YES
Repair circuit indicated by the code output.
NO
3
Does ABS warning light go off if short pin is removed?
NO
Check for short in harness and connector between warning light and DLC1, DLC2 and ECU terminal WA.
YES
Check for short in harness and connector between DLC1 and ECU terminal WB.

INSPECTION PROCEDURE

1 Check ABS warning light.

See Combination Meter–Troubleshooting on page BE–1 18.

OK

NG → Replace bulb or combination meter assembly.

Check for open in harness and connector between GAUGE fuse and ECU (See page IN–27).

2 Is diagnostic trouble code output?

Perform diagnostic trouble code check on page BR–143.

NO

YES → Repair circuit indicated by the code output.

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

YES

NO → Check for short in harness and connector between warning light and DLC1, DLC2 and ECU terminal WA (See page IN–28).

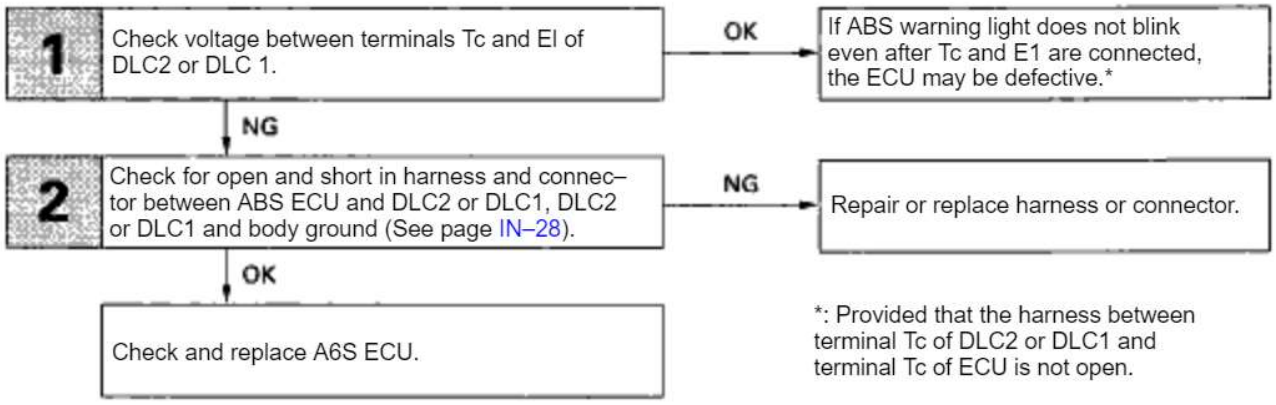
Check for short in harness and connector between DLC1 and ECU terminal WB (See page IN–27).

Terminal Circuit

CIRCUIT DESCRIPTION

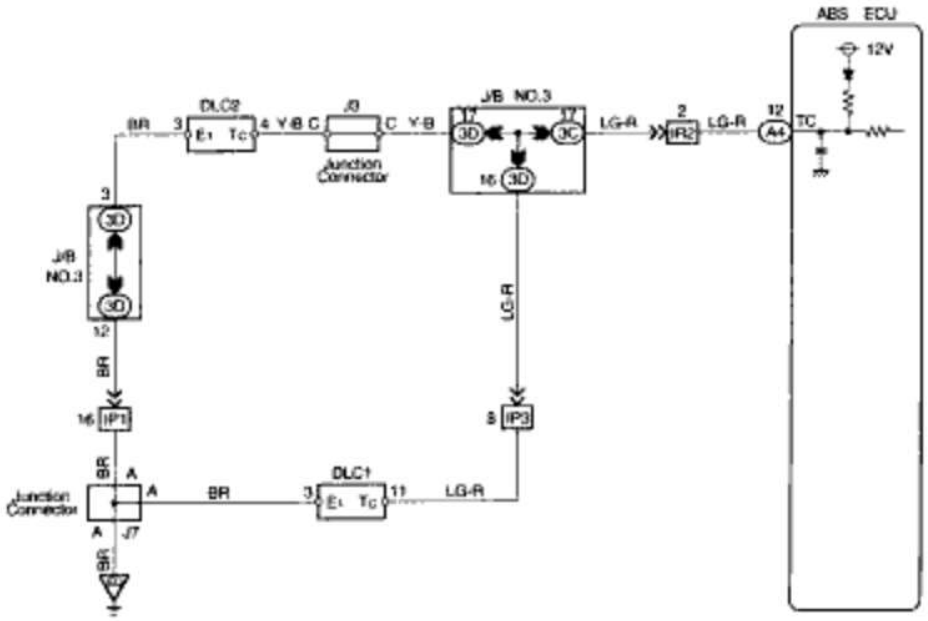
Connecting terminals Te and E1 of the DLC1 or the DLC2 causes the ECU to display the diagnostic trouble code by flasing the ABS warning light.

DIAGNOSTIC CHART

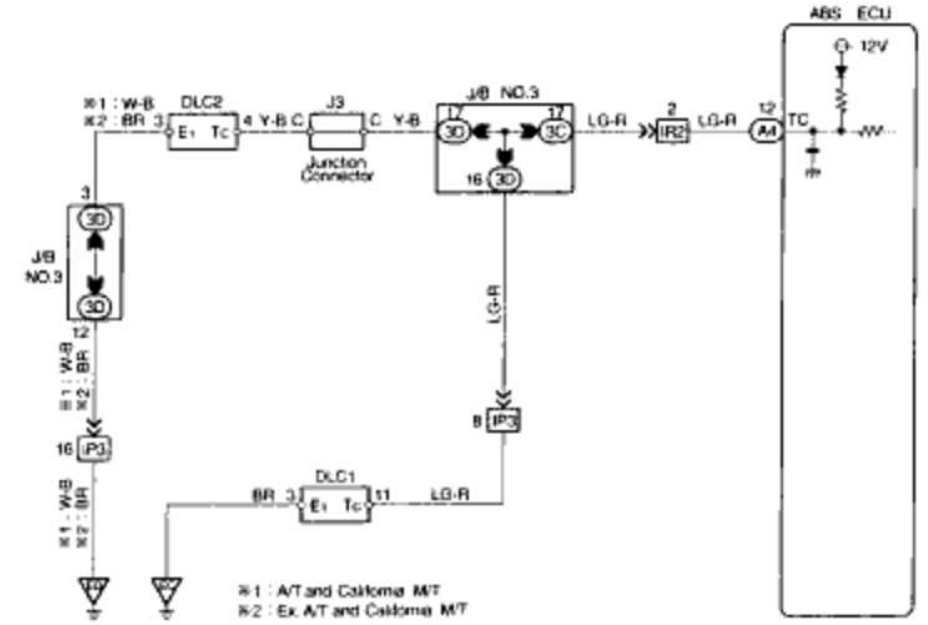


WIRING DIAGRAM

1 M^–FE:



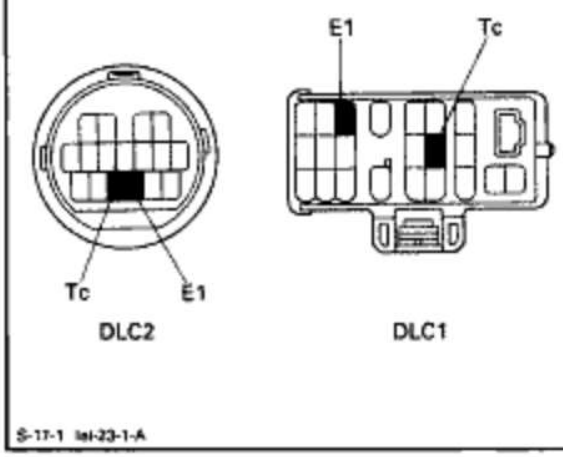
5S–FE:



R08762
R08763

INSPECTION PROCEDURE

1 Check voltage between terminals Te and E1 of DLC2 or DLC1.



C
1. Turn ignition switch ON.
2. Measure voltage between terminals Tc and E1 of DLC2 or DLC1.

OK
Voltage: 10–14 V

NG

OK → If ABS warning light does not blink even after Tc and E 1 are connected, the ECU may be defective.

2 Check for open and short in harness and connector between ABS ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–28).

OK

NG → Repair or replace harness or connector.

Check and replace ABS ECU.

Ts Terminal Circuit

CIRCUIT DESCRIPTION

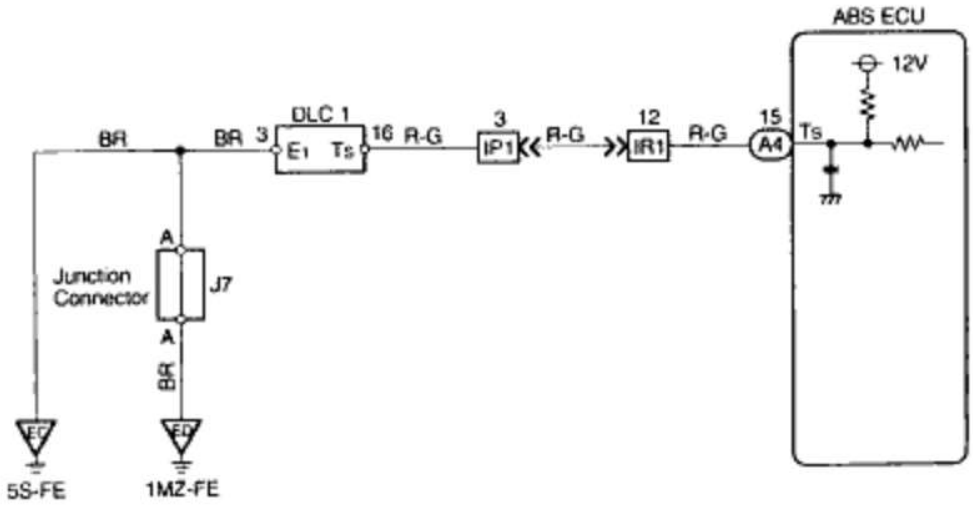
The sensor check circuit detects abnormalities in the speed sensor signal which can not be detected with the diagnostic trouble code check.
Connecting terminals Ts and E1 of the DLC1 in the engine compartment starts the check.

DIAGNOSTIC CHART

1. Check voltage between terminals Ts and E1 of DLC1.
   - OK → If ABS warning light does not blink even after Ts and E1 are connected, the ECU may be defective.
   - NG ↓
2. Check for open and short in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–28).
   - NG → Repair or replace harness or connector.
   - OK ↓

Check and replace ABS ECU.

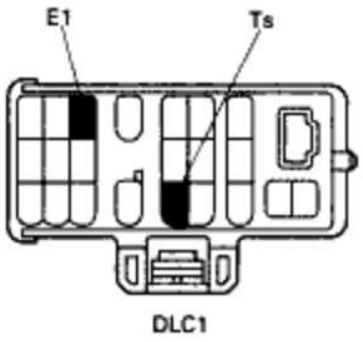
WIRING DIAGRAM



R06764

INSPECTION PROCEDURE

1 Check voltage between terminals¿¿and E1 of DLC1.



C
1. Turn ignition switch ON.
2. Measure voltage between terminals Ts and E1 of DLC 1.

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 DLC1, DLC1 and body ground (See page IN–28).

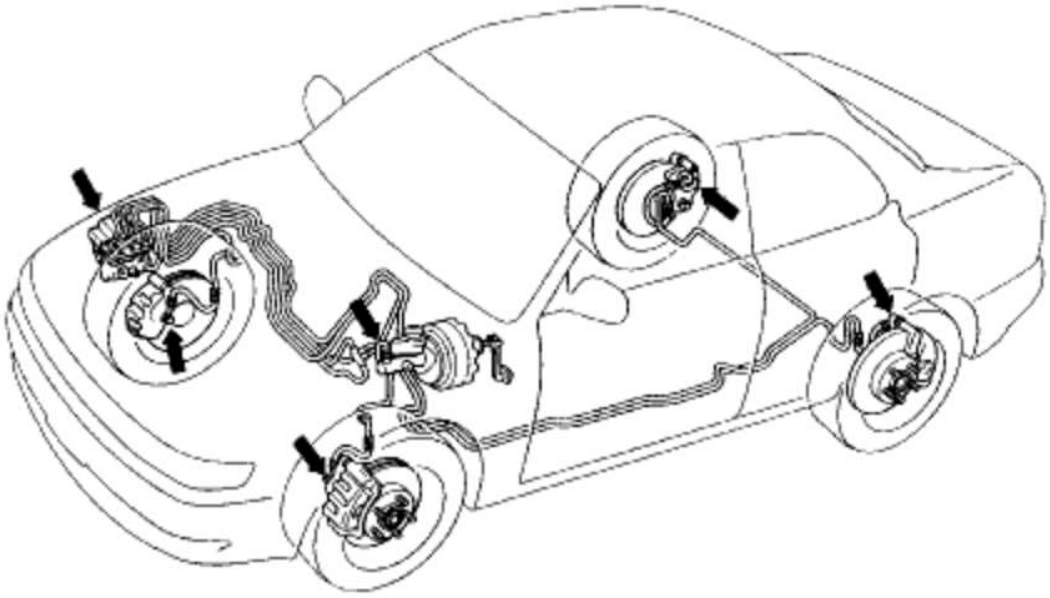
OK

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.



SERVICE SPECIFICATIONS

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 490 N (50 kgf, 110.2 lbf)		More than 70 mm (2.76 in.)
Brake booster push rod to piston clearance (w/SST)		0 mm (0 in.)
Front brake pad thickness (5S–FE engine)	STD	12.0 mm (0.472 in.)
Front brake pad thickness (5S–FE engine)	Limit	1.0 mm (0.039 in.)
Front brake pad thickness (1 MZ–FE engine)	STD	11.0 mm (0.433 in.)
Front brake pad thickness (1 MZ–FE engine)	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 (1.024 in.)
Front brake disc runout	Limit	0.05 mm (0.0020 in.)
Rear brake drum inside diameter	STD	228.6 mm (9.000 in.)
Rear brake drum inside diameter	Limit	230.6 mm (9.079 in.)
Rear brake shoe lining thickness	STD	5.0 mm (0.197 in.)
Rear brake shoe lining thickness	Limit	1.0 mm (0.039 in.)
Rear brake drum to shoe clearance		0.6 mm (0.024 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 inside diameter	STD	170 mm (6.69 in.)
Rear brake disc inside diameter	Limit	171 mm (6.73 in.)
Parking brake lining thickness for rear disc brake	STD	2.0 mm (0.079 in.)
Parking brake lining thickness for rear disc brake	Limit	1.0 mm (0.039 in.)
Parking brake lever travel at 196 N (20 kgf, 44 lbf)		5 – 8 clicks
Parking brake pedal travel at 294 N (30 kgf, 66 lbf)		3 – 6 clicks
Parking brake clearance between rear shoe and lever		Less than 0.35 mm (0.0138 in.)
Parking brake adjusting shim thickness for rear disc brake		0.3 mm (0.012 in.) 0.6 mm (0.024 in.) 0.9 mm (0.035 in.)