

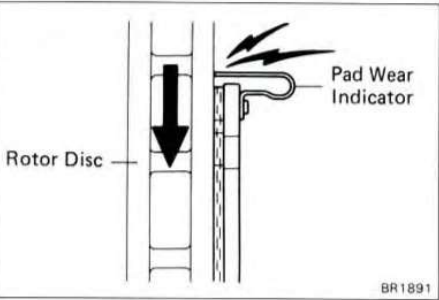
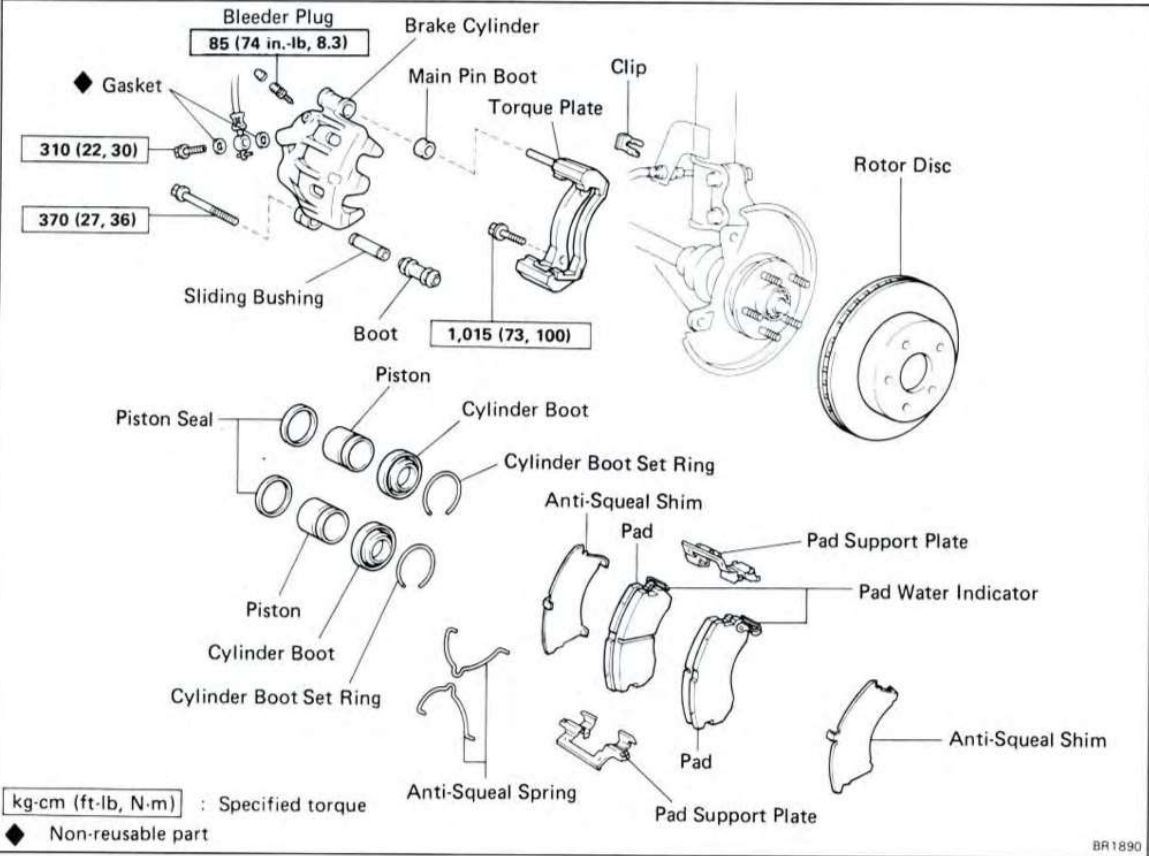
BRAKE SYSTEM

REFER TO 1988 CELICA REPAIR MANUAL (Pub. No. RM071U)

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

	Page
FRONT BRAKE	BR-2
REAR BRAKE	BR-10
ANTI-LOCK BRAKE SYSTEM (A.B.S.)	BR-12
Description	BR-12
Diagnosis System	BR-17
Troubleshooting	BR-21
Speed Sensor Diagnosis System	BR-27
Deceleration Sensor Operation	
Diagnosis System	BR-31
Brake Actuator	BR-33
Control Relays	BR-42
Front Speed Sensor	BR-43
Rear Speed Sensor	BR-45
Anti-lock Brake System Circuit	BR-47

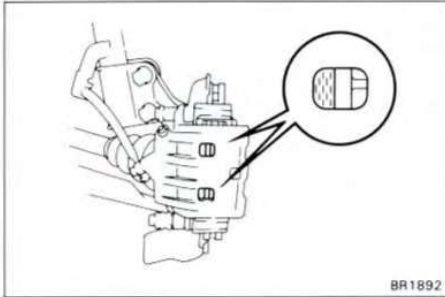
FRONT BRAKE
COMPONENTS



REPLACEMENT OF BRAKE PADS

NOTE: If a squealing noise occurs from the brakes while driving, check the pad wear indicator. If there are traces of the indicator contacting the rotor disc, the brake pad should be replaced.

1. REMOVE FRONT WHEEL

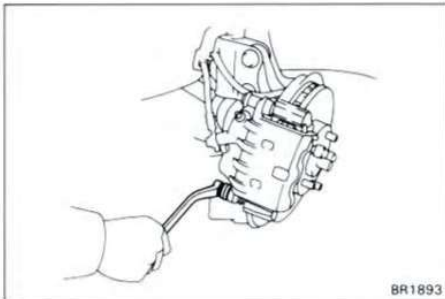
BRAKE SYSTEM — Front Brake**BR-3**

BR1892

2. INSPECT PAD LINING THICKNESS

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

Minimum thickness: 1.0 mm (0.039 in.)



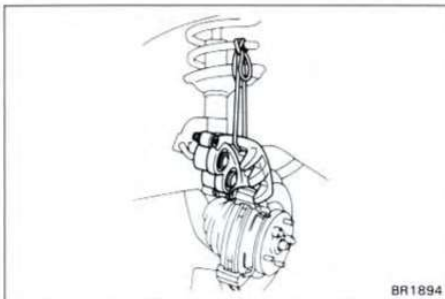
BR1893

3. REMOVE CYLINDER FROM TORQUE PLATE

(a) Remove the installation bolt.

(b) Lift up the brake cylinder and suspend it so the hose is not stretched.

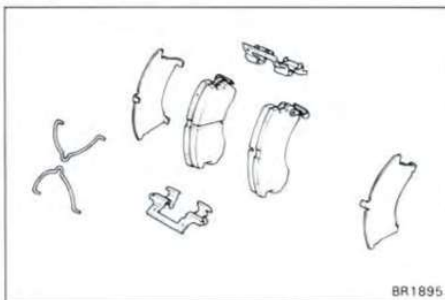
NOTE: Do not disconnect the brake hose.



BR1894

4. REMOVE FOLLOWING PARTS

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

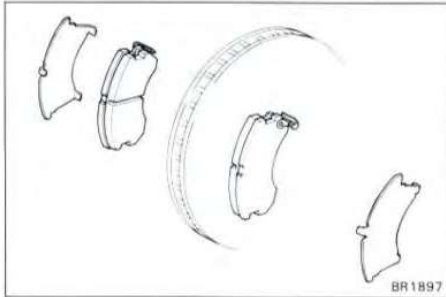


BR1895

5. CHECK ROTOR DISC THICKNESS
(See step 2 on page BR-7)**6. CHECK ROTOR DISC RUNOUT**
(See step 3 on page BR-7)**7. INSTALL PAD SUPPORT PLATES**

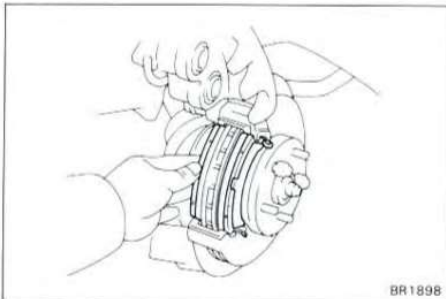
BR-4

BRAKE SYSTEM — Front Brake



8. INSTALL NEW PADS

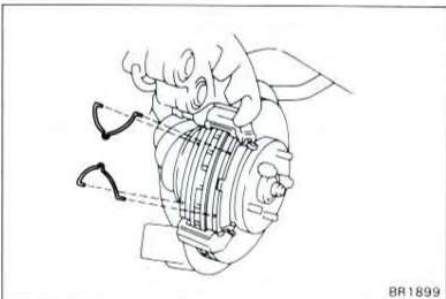
- (a) Install the anti-squeal shims to the pads.



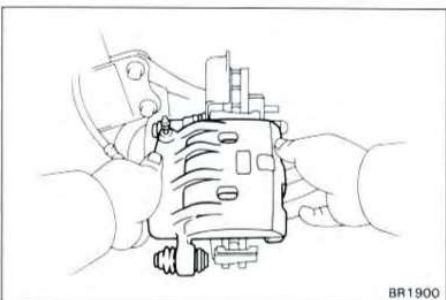
- (b) Install the pads onto each support plate.

NOTE: Install the pads so the wear indicator is at the top side.

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



- (c) Install the anti-squeal springs in position.



9. INSTALL CYLINDER

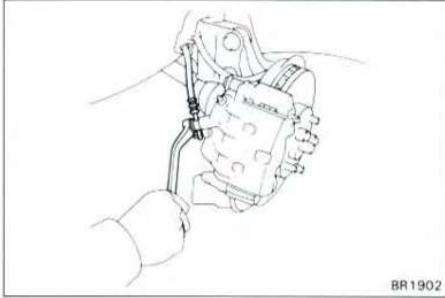
- (a) Draw out a small amount of brake fluid from the reservoir.

- (b) Press in piston with a hammer handle or an equivalent.

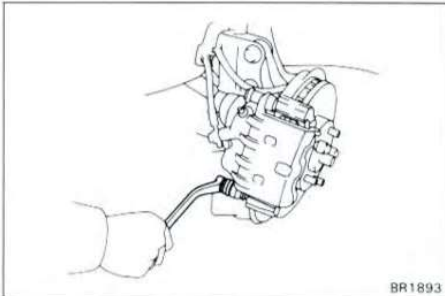
NOTE: Always change the pad on one wheel at a time as there is a possibility of the opposite piston flying out.

- (c) Insert the brake cylinder carefully so the boot is not wedged.

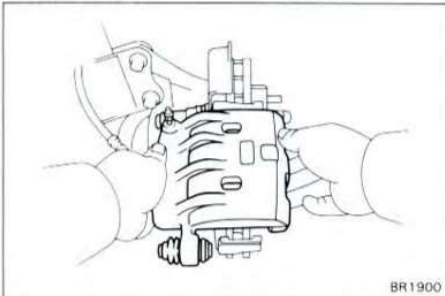
- (d) Install and torque the installation bolt.

BRAKE SYSTEM — Front Brake**BR-5****REMOVAL OF CYLINDER****(See page BR-2)****1. DISCONNECT BRAKE HOSE**

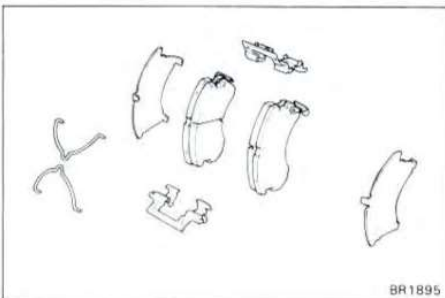
Remove the union bolt and disconnect the brake hose. Use a container to catch the brake fluid.

**2. REMOVE CYLINDER FROM TORQUE PLATE**

(a) Remove the installation bolt.

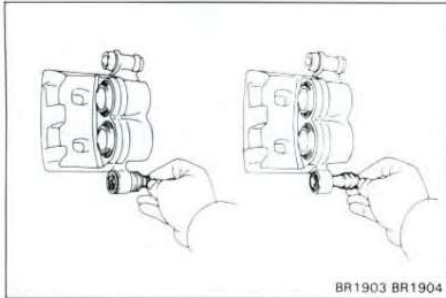


(b) Slide out the brake cylinder.

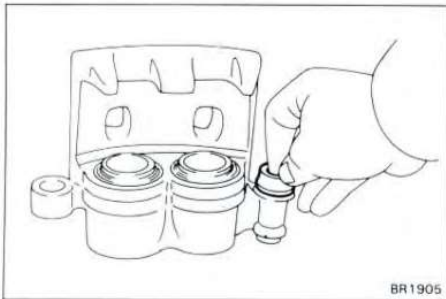
**3. REMOVE PADS****(See step 4 on page BR-3)**

BR-6

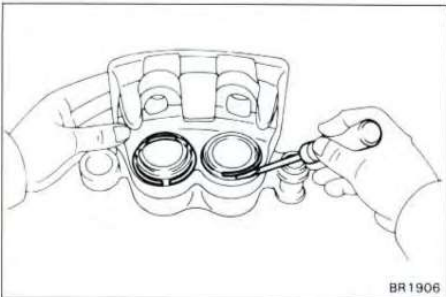
BRAKE SYSTEM — Front Brake

**DISASSEMBLY OF CYLINDER**

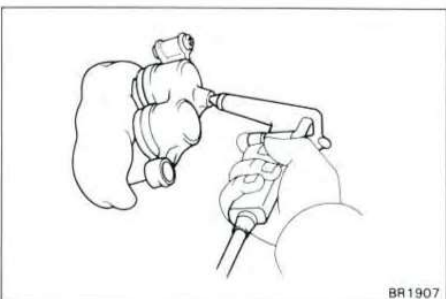
(See page BR-2)

1. REMOVE SLIDING BUSHING AND BOOT**2. REMOVE MAIN PIN BOOT**

Pull out the main pin boot.

**3. REMOVE CYLINDER BOOT SET RINGS AND CYLINDER BOOTS**

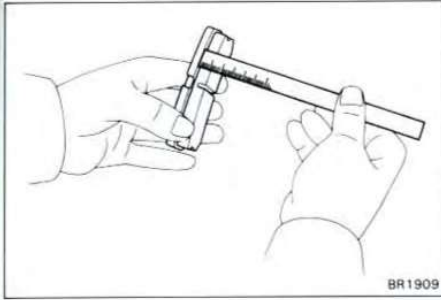
Using a screwdriver, remove the two cylinder boot set rings and remove the two cylinder boots from the brake cylinder.

**4. REMOVE PISTONS FROM CYLINDER**

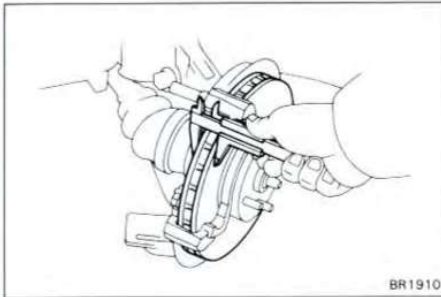
- (a) Put a piece of cloth or an equivalent as shown.
- (b) Use compressed air to remove the pistons from the cylinder.

WARNING: Do not place your fingers in front of the pistons when using compressed air.**5. REMOVE PISTON SEALS FROM CYLINDER**

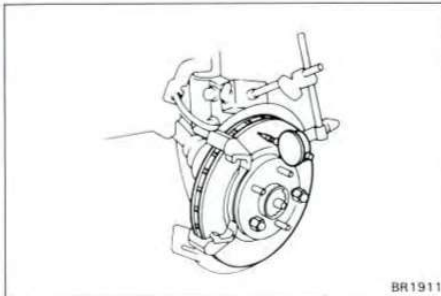
Using a screwdriver, remove the two piston seals from the

BRAKE SYSTEM — Front Brake**BR-7****INSPECTION OF FRONT BRAKE COMPONENTS****1. MEASURE PAD LINING THICKNESS****Standard thickness:** 10.0 mm (0.394 in.)**Minimum thickness:** 1.0 mm (0.039 in.)

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

**2. MEASURE ROTOR DISC THICKNESS****Standard thickness:** 25.0 mm (0.984 in.)**Minimum thickness:** 24.0 mm (0.945 in.)

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

**3. MEASURE ROTOR DISC RUNOUT**

NOTE: Before measuring the runout, confirm that the front hub bearing play is within specification. Measure the rotor disc runout at 10 mm (0.39 in.) from the outer edge of the rotor disc.

Maximum disc runout: 0.15 mm (0.0059 in.)

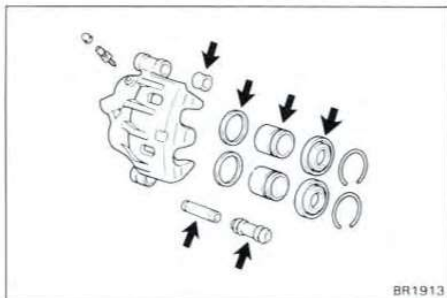
If the runout is greater than the maximum, inspect and adjust following the procedure listed below.

Then replace the disc if necessary.

- (a) Remove the torque plate from the knuckle.
- (b) Remove the hub nuts of the temporarily installed disc and pull off the rotor disc.
- (c) Check that the hub axial play is within specification, and replace the bearing if not within specification.
- (d) Install the rotor disc and measure the disc runout, then shift the rotor disc one fifth a turn and measure the disc runout. Similarly measure the runout at each position, and select the position where the runout is minimum.
- (e) In this position, if the runout is within specification, install the torque plate and torque the mounting bolts.

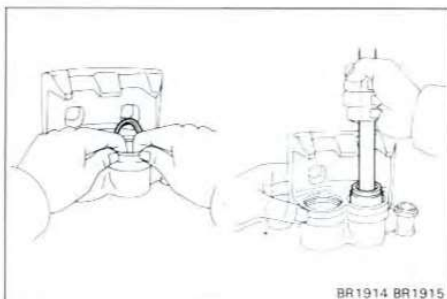
BR-8

BRAKE SYSTEM — Front Brake

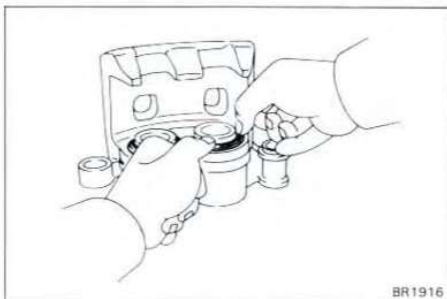
**ASSEMBLY OF CYLINDER**

(See page BR-2)

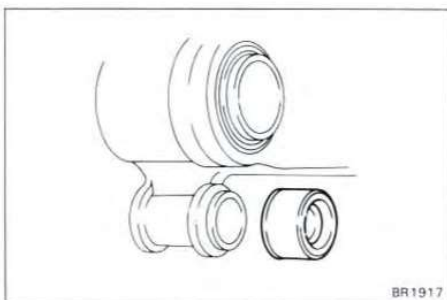
1. **APPLY LITHIUM SOAP BASE GLYCOL GREASE TO PARTS INDICATED WITH ARROWS**



2. **INSTALL PISTON SEALS AND PISTONS IN CYLINDER**
Install the two piston seals and two pistons into the brake cylinder.

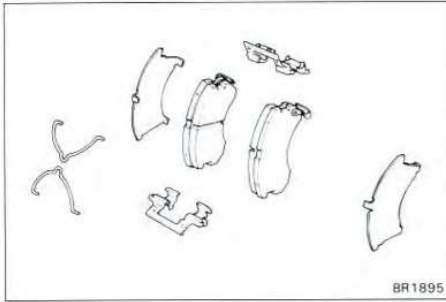


3. **INSTALL CYLINDER BOOTS AND SET RINGS IN CYLINDER**
Install the cylinder boots and set rings to each piston.



4. **INSTALL MAIN PIN BOOT**
Install the main pin boot in place.

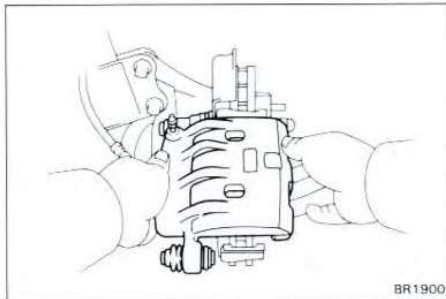
5. **INSTALL DUST BOOT AND SLIDING BUSHING**

BRAKE SYSTEM — Front Brake**BR-9****INSTALLATION OF CYLINDER**

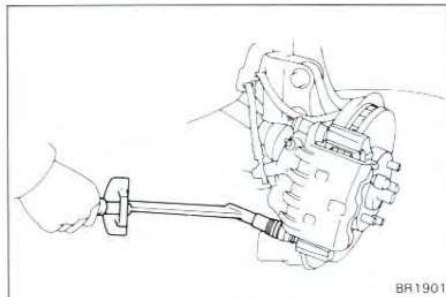
(See page BR-2)

1. INSTALL FOLLOWING PARTS

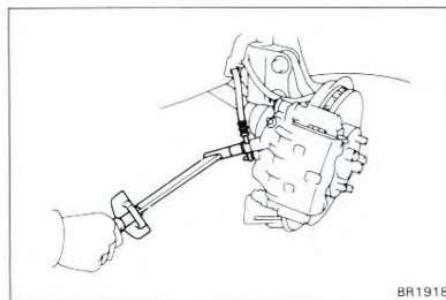
- (a) Two pad support plates
- (b) Two brake pads
- (c) Two anti-squeal shims
- (d) Two anti-squeal springs

**2. INSTALL CYLINDER**

- (a) Install the brake cylinder onto the main pin.
NOTE: Make sure that the boot end is installed into the groove of the main pin.
- (b) Install the brake cylinder over the brake pads.



- (c) Install the cylinder installation bolt and torque the bolt.
Torque: 370 kg-cm (27 ft-lb, 36 N·m)

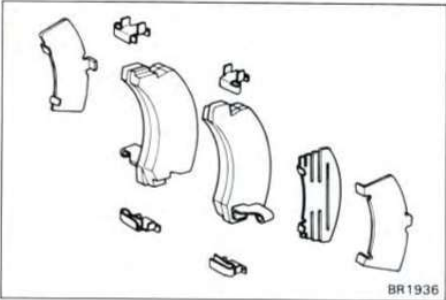
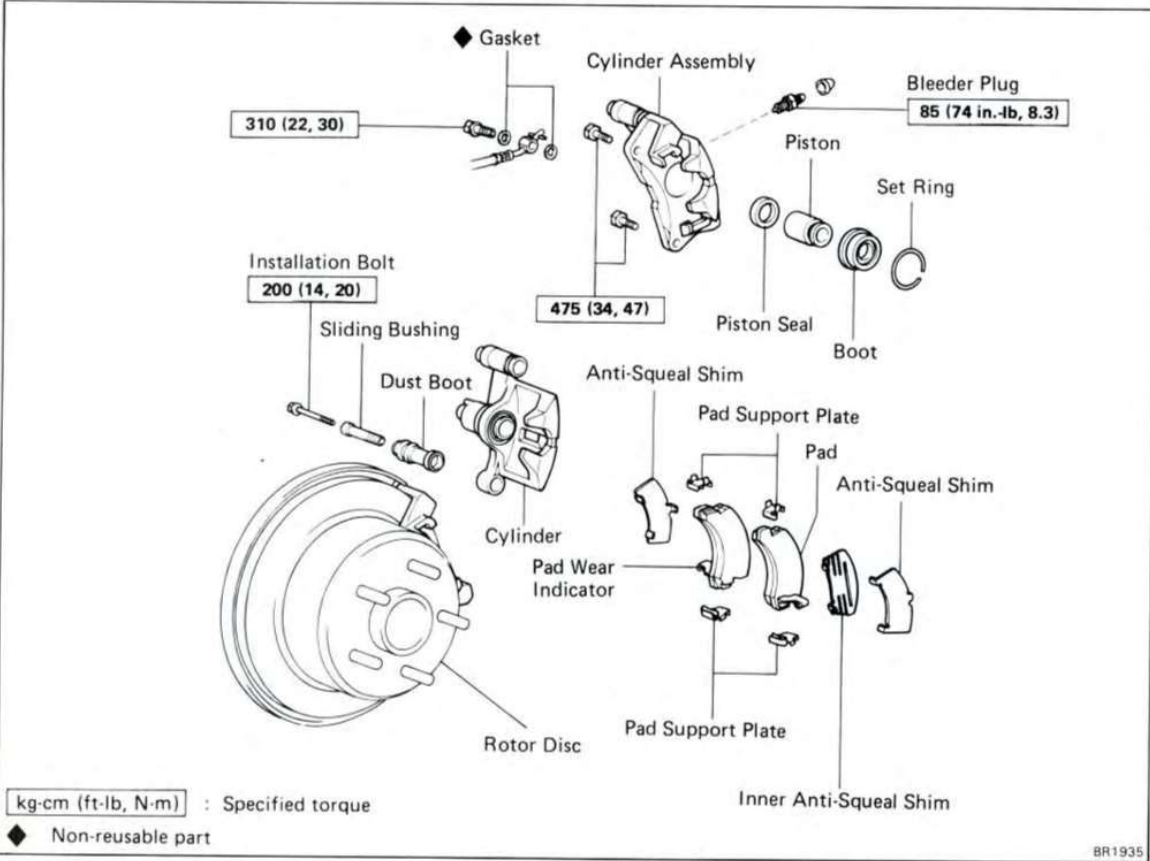
**3. CONNECT FLEXIBLE HOSE TO BRAKE CYLINDER**

Set the flexible hose and new gaskets in position and install the union bolt and torque it.

Torque: 310 kg-cm (22 ft-lb, 30 N·m)

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

REAR BRAKE
COMPONENTS

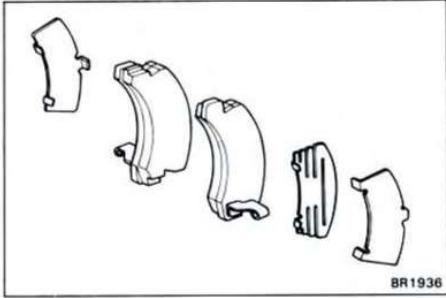


REMOVAL OF BRAKE PADS

REMOVE FOLLOWING PARTS

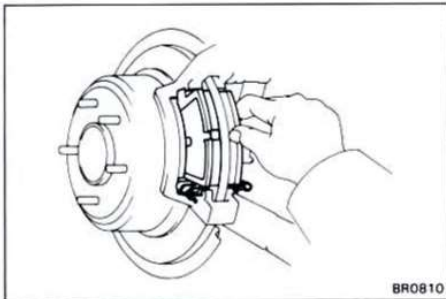
- (a) Two brake pads
- (b) Three anti-squeal shims
- (c) Four pad support plates

INSTALLATION OF BRAKE PADS

BRAKE SYSTEM — Rear Brake**BR-11****2. INSTALL PADS**

- (a) Install the three anti-squeal shims to the pads.

NOTE: Apply disc brake grease to the both side of the inner anti-squeal shim.



- (b) Install the two pads so the wear indicator plate is at the bottom side.

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

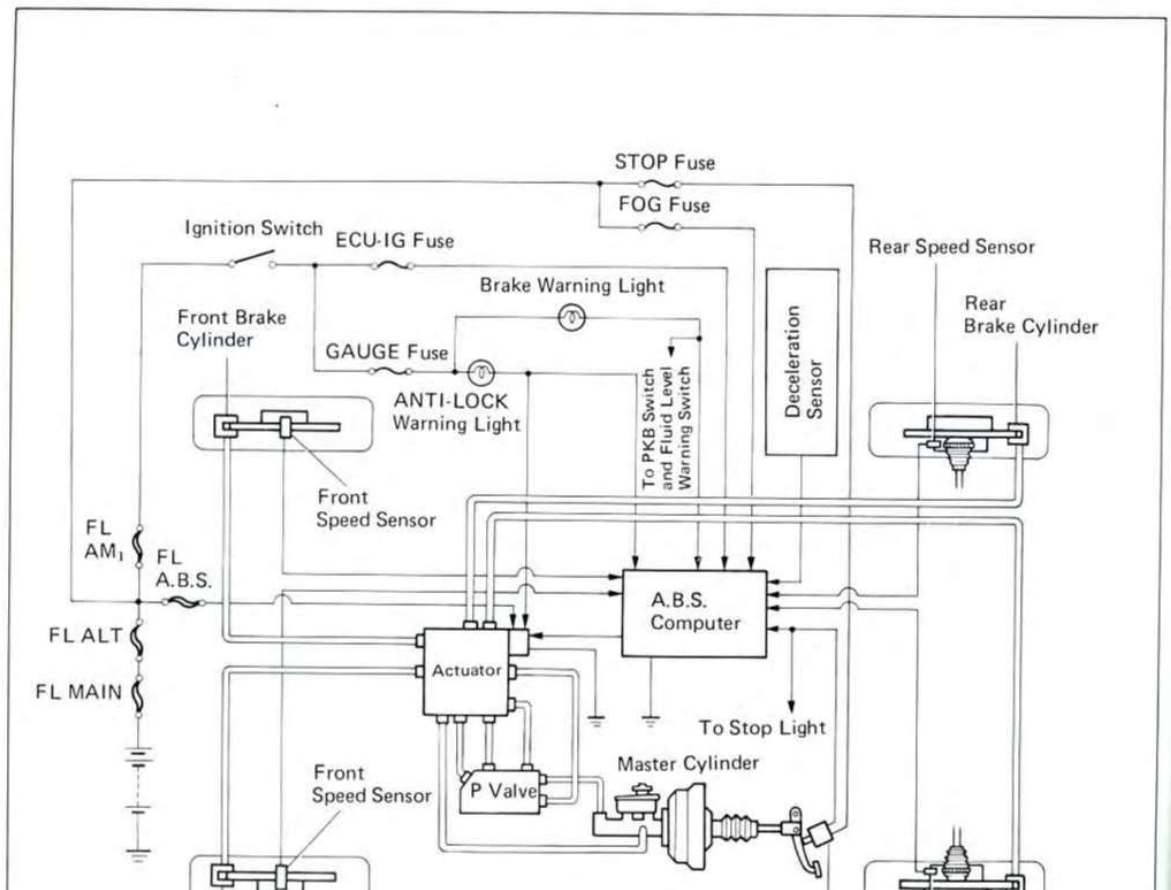
BR-12

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

ANTI-LOCK BRAKE SYSTEM (A.B.S.)

Description

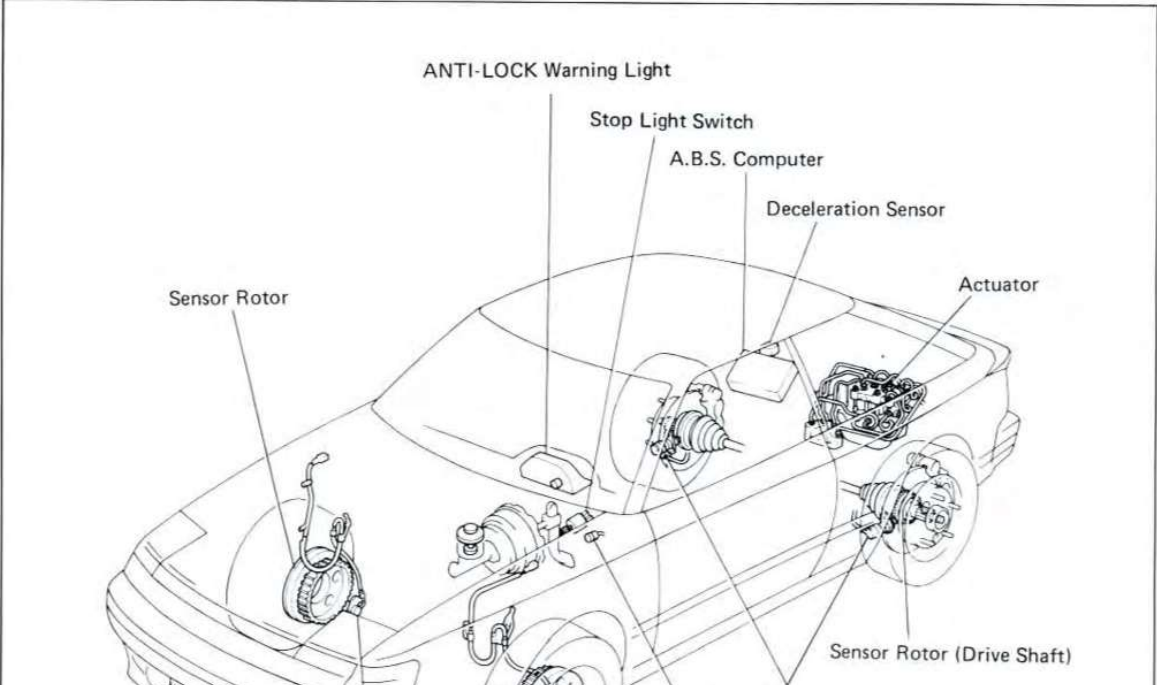
- The A.B.S. is a brake system which controls the wheel cylinder hydraulic pressure of all four wheels during sudden braking and braking on slippery road surfaces, preventing the wheels from locking. This A.B.S. provides the following benefits:
 - (1) Enables steering round an obstacle with a greater degree of certainty even when panic braking.
 - (2) Enables stopping in a panic brake without affecting stability and steerability, even on curves.
- The function of the A.B.S. is to maintain directional stability and vehicle steerability on most road conditions. However, the system cannot prevent the vehicle from skidding if the cornering speed limit is exceeded.
- The A.B.S. has a longitudinal deceleration sensor to match braking characteristics to the full-time four-wheel drive.
- In case a malfunction occurs, a diagnosis function and fail-safe system have been adopted for the A.B.S. to increase serviceability.



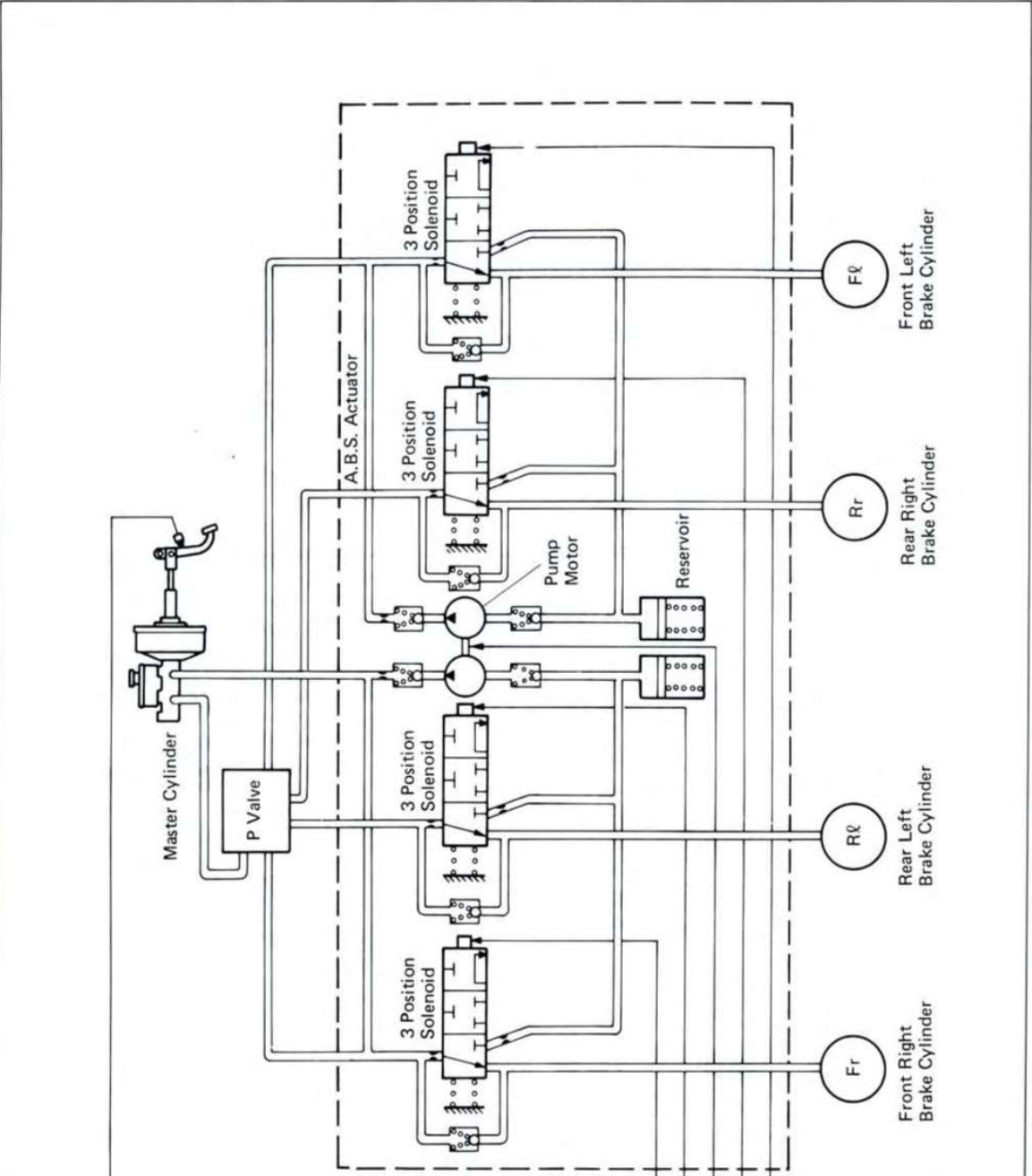
FUNCTION OF COMPONENTS

Component	Function
Front Speed Sensor	Detects the wheel speed of each of the left and right front wheels.
Rear Speed Sensor	Detects the wheel speed of each of the left and right rear wheels.
Deceleration Sensor	Detects the deceleration speed of the vehicle and sends a signal accordingly to the A.B.S. computer.
Stop Light Switch	Detects the brake signal and sends it to the computer.
ANTI-LOCK Warning Light	Lights up to alert the driver when trouble has occured in the Anti-lock Brake System.
Actuator	Controls the brake fluid pressure to each disc brake cylinder through signals from the computer.
Anti-lock Brake System Computer	From the wheel speed signals from each sensor, it calculates acceleration, deceleration and slip values and sends signals to the actuator to control brake fluid pressure.

LOCATION OF SYSTEM PARTS



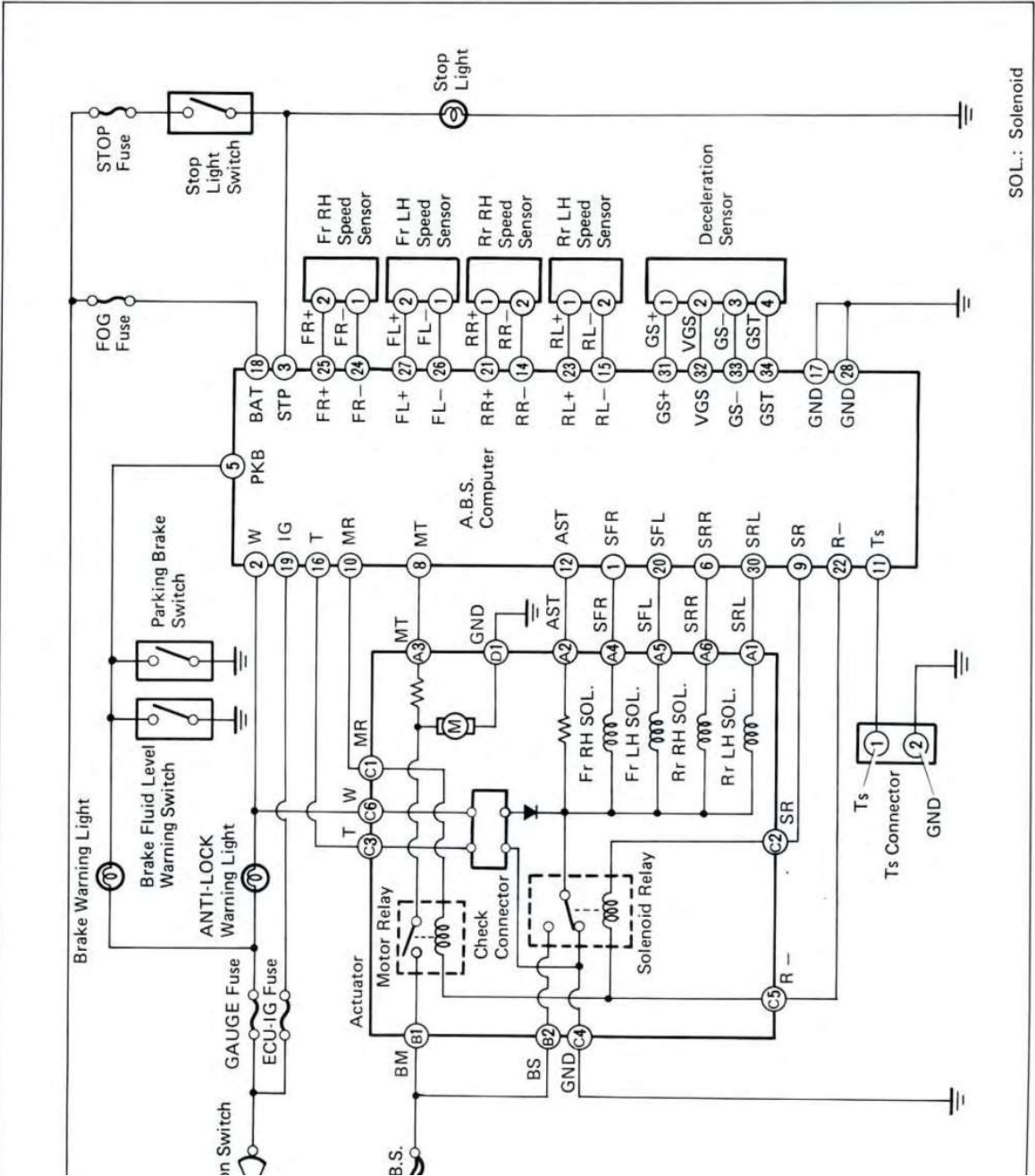
SYSTEM DIAGRAM



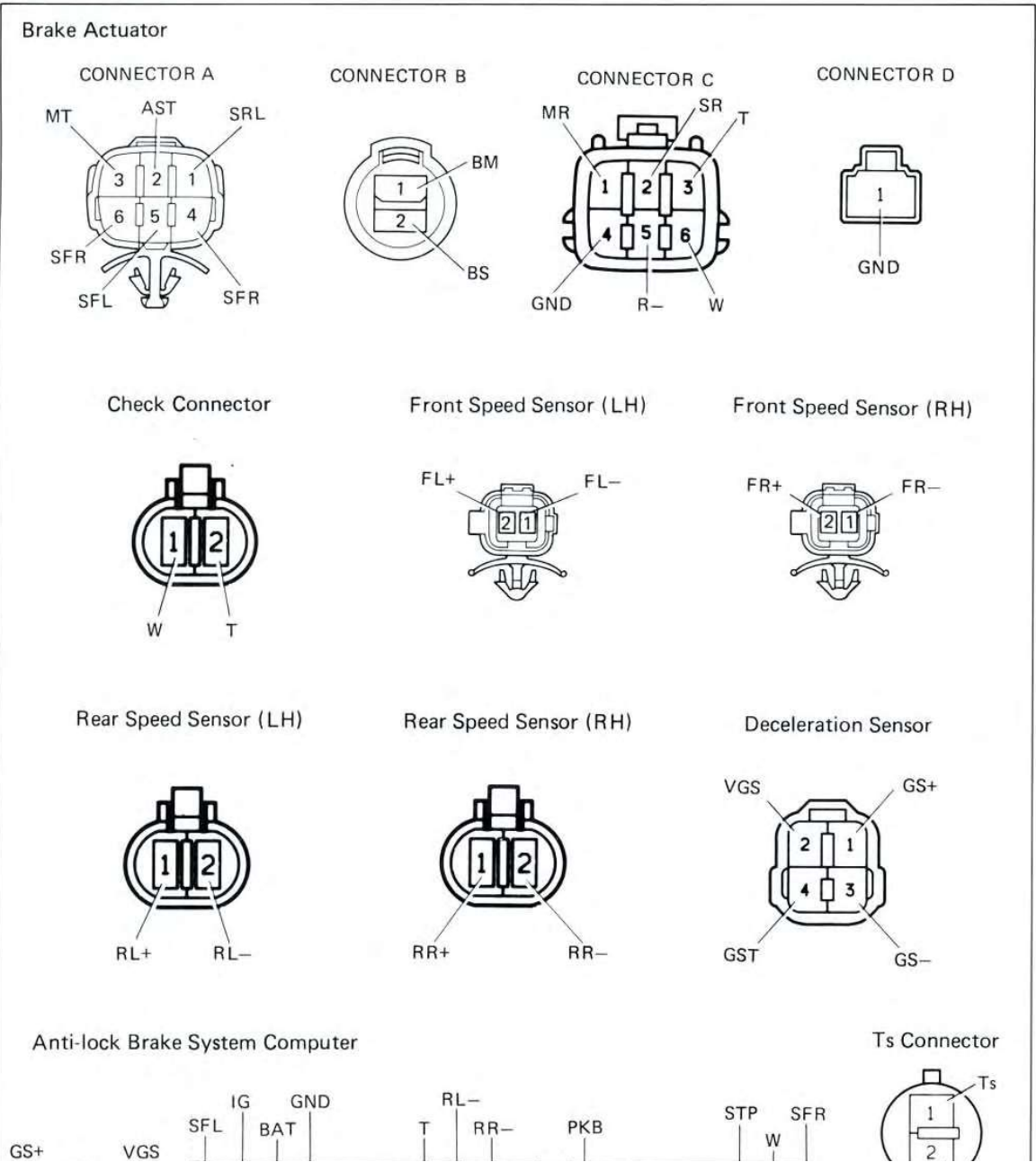
BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

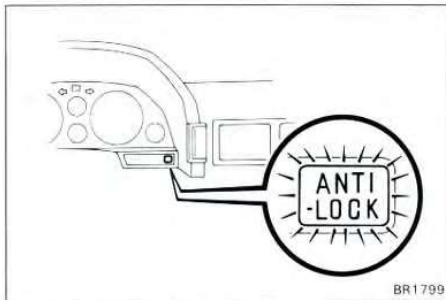
BR-15

WIRING DIAGRAM

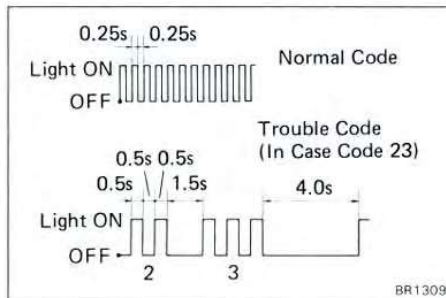


CONNECTORS



BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-17**

BR1799



BR1309

Diagnosis System**DESCRIPTION**

If a functional malfunction occurs, diagnosis system will identify the problem and computer stores the codes for the trouble items.

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

By turning on the ignition switch and disconnecting the check connector, the trouble can be identified by the number of blinks (diagnostic code) of the warning light.

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

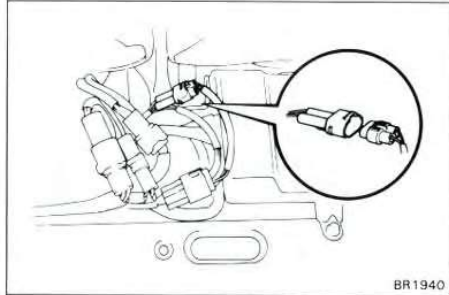
NOTE: The warning light does not show the diagnostic codes while the vehicle is running.

PRIMARY CHECK**CHECK ACTUATOR OPERATION NOISE**

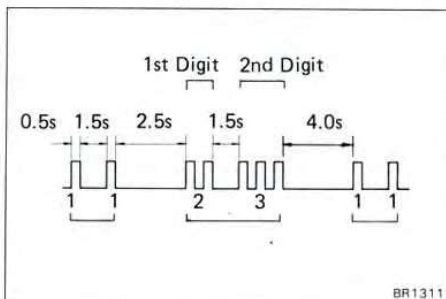
- (a) Start the engine and drive at a speed over 6 km/h (4 mph).
- (b) Check that the actuator operation noise is heard.

NOTE: A primary check is carried out once each time after the engine has been started and initial speed exceeds 6 km/h (4 mph). The respective functions, in order, of the 3 position solenoid and pump motor in the actuator are checked. However, if the brake pedal is depressed, the primary check is not carried out, but is started after the pedal has been released.

INSPECTION OF DIAGNOSIS SYSTEM

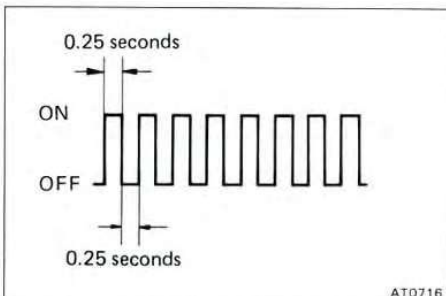
BR-18**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)****3. READ DIAGNOSTIC CODE**

- (a) Turn the ignition switch on.
- (b) Disconnect the check connector from the actuator.



- (c) In event of a malfunction, 4 seconds later the warning light will begin to blink. Read the number of blinks. (See DIAGNOSTIC CODE on page BR-19)

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



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

- (e) Repair the system.
- (f) After the malfunctioning components has been repaired, clear the diagnostic codes stored in the computer. (See page BR-20)

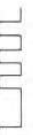
NOTE: If you disconnect the battery cable while repairing, all diagnostic codes in the computer will erased.

- (g) Connect the check connector.

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

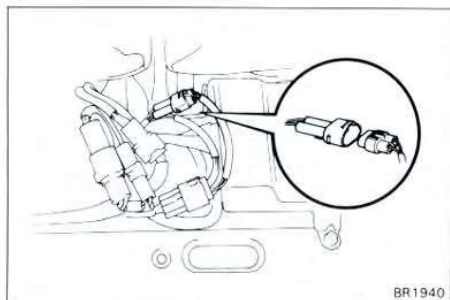
BR-19

DIAGNOSTIC CODE

Light Pattern	Diagnosis	Trouble Part
	Open circuit in solenoid relay circuit	• Actuator inside wire harness • Solenoid relay • Wire harness and connector of solenoid relay circuit
	Short circuit in solenoid relay circuit	
	Open circuit in pump motor relay circuit	• Actuator inside wire harness • Pump motor relay
	Short circuit in pump motor relay circuit	• Wire harness and connector of pump motor relay circuit
	Open or short circuit in 3 position solenoid of front right wheel	
	Open or short circuit in 3 position solenoid of front left wheel	• Actuator solenoid • Wire harness and connector of actuator solenoid circuit
	Open or short circuit in 3 position solenoid of rear right wheel	
	Open or short circuit in 3 position solenoid of rear left wheel	
	Front right wheel speed sensor signal malfunction	
	Front left wheel speed sensor signal malfunction	
	Rear right wheel speed sensor signal malfunction	• Speed sensor • Sensor rotor • Wire harness and connector of speed sensor
	Rear left wheel speed sensor signal malfunction	
	Open circuit in front left or rear right wheel speed sensor	
	Open circuit in front right or rear left wheel speed sensor	
	Low battery voltage (9.5 V or lower)	• Battery • Voltage regulator
	Abnormally high battery voltage (16.2 V or higher)	
	Malfunction in deceleration sensor	• Deceleration sensor • Deceleration sensor installation • Wire harness and connector of deceleration sensor
	Open or short circuit in deceleration sensor	
	Pump motor of actuator locked or open circuit in pump motor circuit in actuator	• Pump motor, relay and battery • Wire harness, connector and ground bolt or actuator pump motor circuit
	Malfunction in computer	• Computer

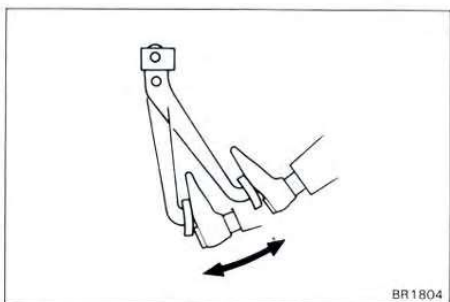
BR-20

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

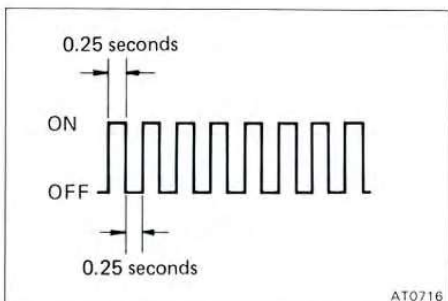
**CLEARING OF DIAGNOSTIC CODES****CLEAR DIAGNOSTIC CODES**

- (a) Turn the ignition switch on.
- (b) Disconnect the check connector from the actuator.

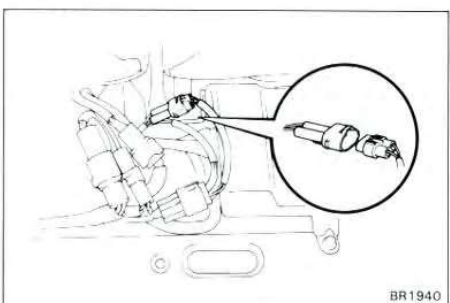
NOTE: Keep the vehicle stopped [vehicle speed 0 km/h (0 mph)].



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



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



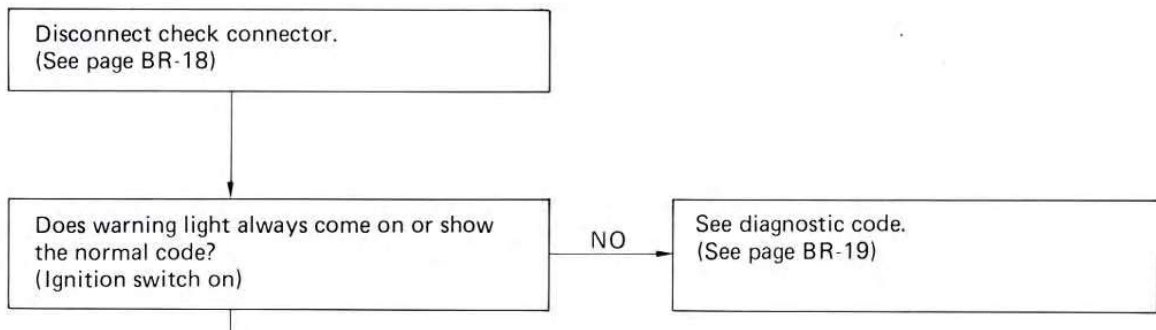
- (e) Connect the check connector.

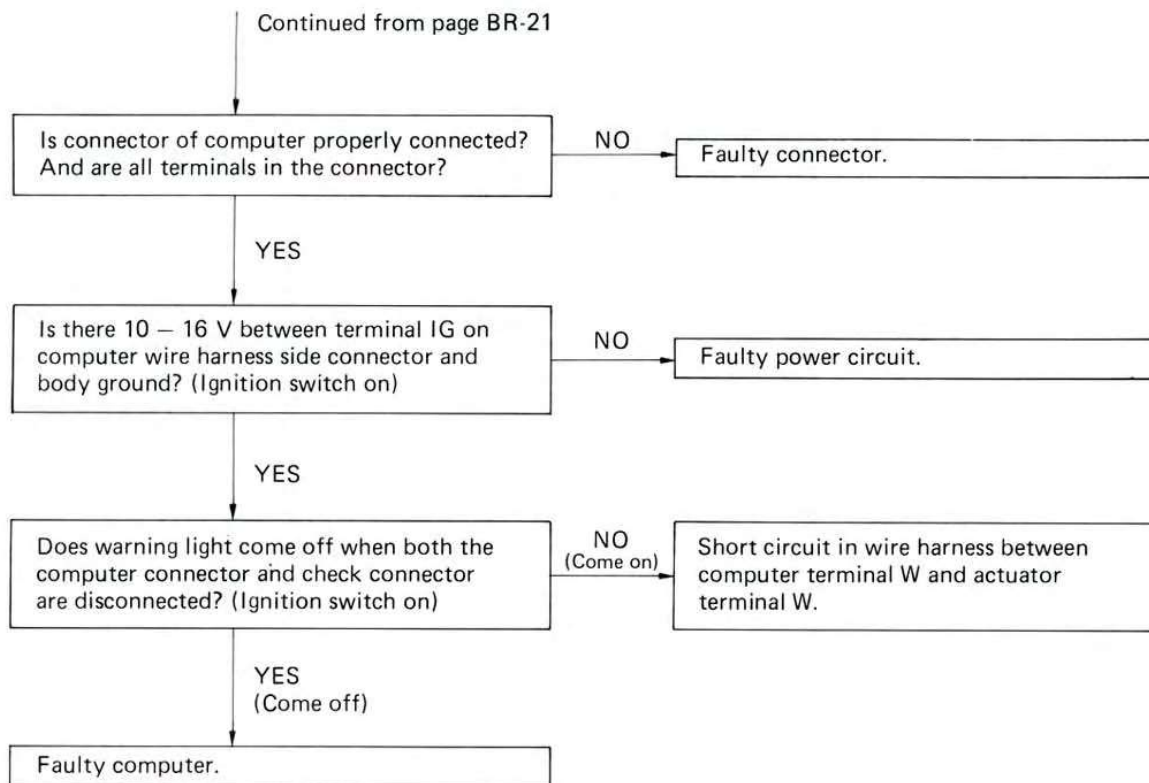
- (f) Check that the warning light goes off.

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-21****Troubleshooting**

Problem		No.
“ANTI-LOCK” warning light	Always comes on after ignition switch is turned on.	1
	Does not come on for 3 seconds after ignition switch on.	2
	Comes on and off.	3
	Comes on while running.	1
Brake working	Brakes pull.	4
	Braking inefficient.	4
	A.B.S. operates at ordinary braking.	4
	A.B.S. operates just before stopping at ordinary braking.	4
	Brake pedal pulsates abnormally while A.B.S. is operating.	4
	Skidding noise occurs while A.B.S. working. (A.B.S. works inefficiently)	5

1	“ANTI-LOCK” warning light comes on.
---	-------------------------------------



BR-22**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-23**

2

"ANTI-LOCK" warning light does not come on for 3 seconds after ignition switch on.

Disconnect check connector from actuator, and ground the terminal W of the wire harness side connector. (Ignition switch on)

Does warning light come on?

NO

Bulb burned out or open circuit in wire harness between warning light and actuator terminal W.

YES

Disconnect connectors from computer and actuator, and ground terminal W of computer wire harness side connector. (Ignition switch on)

Does warning light come on?

NO

Open circuit in wire harness between computer terminal W and warning light.

YES

With ignition switch off, disconnect actuator connectors, and check continuity between terminal W and AST on actuator side.

Reverse tester leads and check again. Is there one way continuity between terminals?

NO

Short circuit in actuator inside diode.

YES

NOTE: If the diode is short-circuited, a malfunction at computer terminal W will occur. When inspecting the terminal, connect the

BR-24**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**

3	"ANTI-LOCK" warning light comes on and off.
---	---

- Check connector is disconnected.
- Open circuit in wire harness between computer terminal T and actuator terminal T.
- Actuator terminal GND is improperly connected or open circuit in wire harness between actuator terminal GND and body ground.
- Short circuit in wire harness between computer terminal Ts and Ts connector.

4	• Brakes pull. • Braking inefficient. • A.B.S. operates at ordinary braking. • A.B.S. operates just before stopping at ordinary braking. • Brake pedal pulsates abnormally while A.B.S. working.
---	--

Disconnect check connector.
(See page BR-18)

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

NO

See diagnostic code.
(See page BR-19)

YES

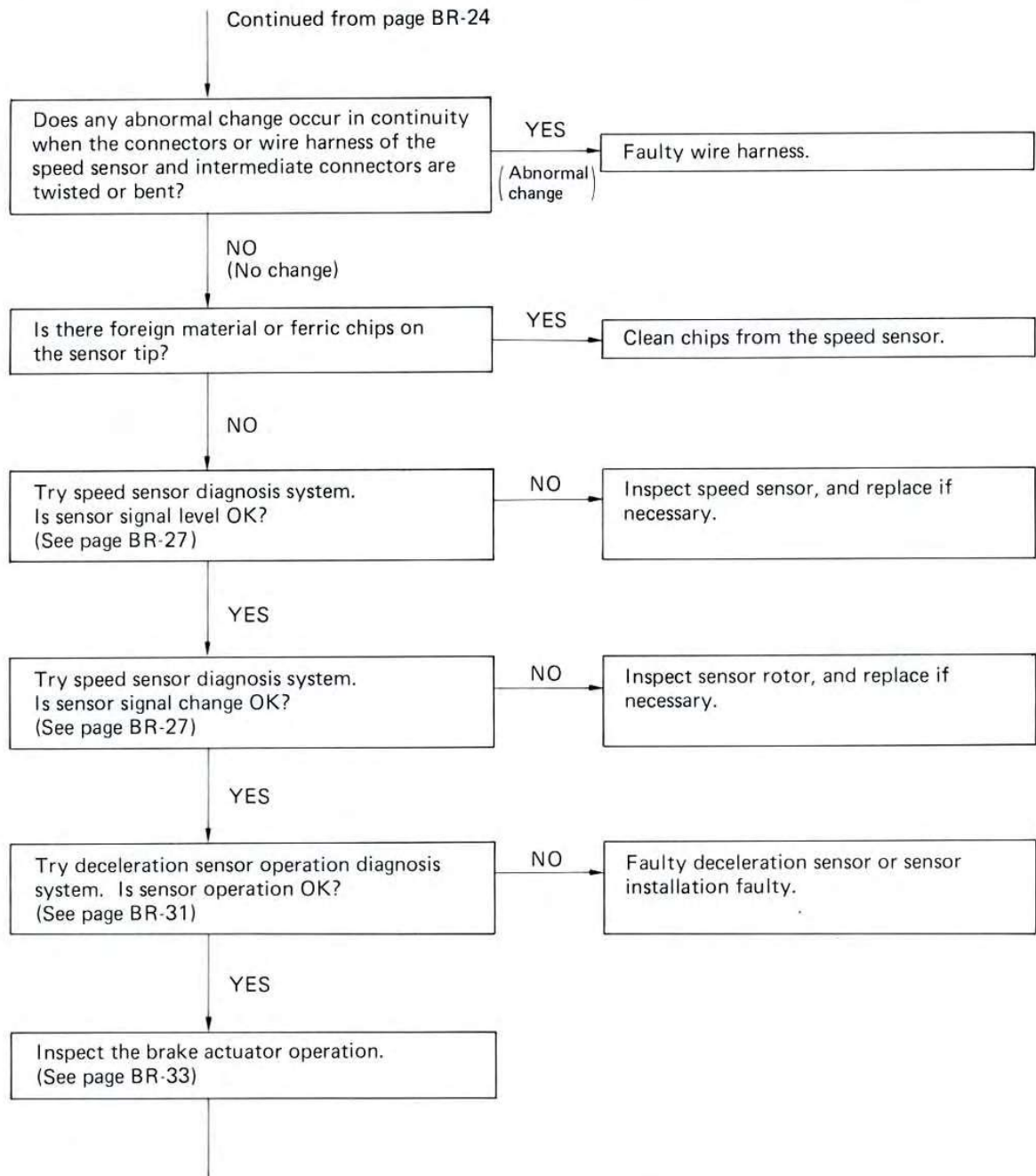
Are each speed sensors installed in place?
And are each installation bolts tightened
securely?

NO

Speed sensor installation faulty.

YES

Disconnect connector from computer, inspect
continuity between each speed sensor terminals
on wire harness side.
(See page BR-48)

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-25**

BR-26**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**

5 Anti-lock brake system works inefficiently.

Disconnect check connector.
(See page BR-18)

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

NO

See diagnostic code.
(See page BR-19)

YES

Is there battery voltage between computer
terminal STP and GND when depressing
brake pedal?

NO

Open circuit in stop light switch and
wire harness.

YES

Inspect actuator.
(See page BR-33)

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-27****Speed Sensor Diagnosis System****PRECAUTION**

While checking the speed sensor diagnosis system, A.B.S. does not work and brake system works as normal brake system.

INSPECTION OF DIAGNOSIS SYSTEM**1. INSPECT BATTERY VOLTAGE**

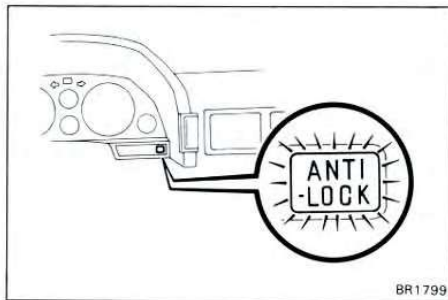
Inspect that the battery voltage is about 12 V.

2. CHECK THAT WARNING LIGHT TURNS ON

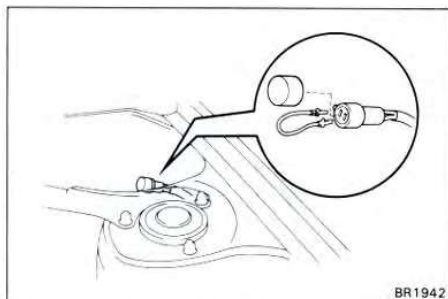
- Turn the ignition switch on.
- Check that the "ANTI-LOCK" warning light turns on for 3 seconds.

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

- Check that the "ANTI-LOCK" warning light turns off.
- Turn the ignition switch off.

**3. PERFORM FOLLOWING STEPS**

- Remove the rubber cap from the Ts connector located in back of the left side shock absorber protrusion in engine room.
- Short the terminals of Ts connector.



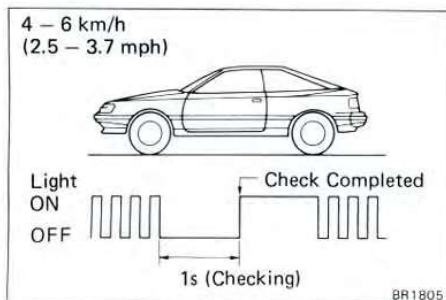
- Pull the parking brake lever up, and start the engine.

CAUTION: Do not depress the brake pedal.

- Check that the warning light blinks about 4 times.

BR-28

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)



4. INSPECT SENSOR SIGNAL LEVEL

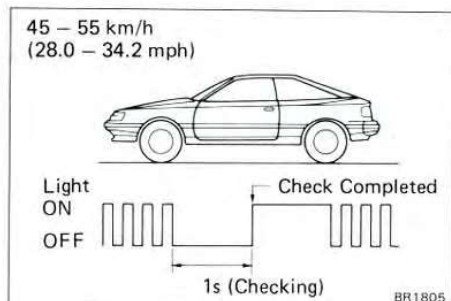
Drive the vehicle straight ahead at about 4 — 6 km/h (2.5 — 3.7 mph), and check that the warning light turns on after a 1 second pause.

If the warning light turns on without blinking when the vehicle speed is not within the specified speed range above, stop the vehicle and read the diagnostic code, and repair the malfunctioning parts.

(See step 6 on this page)

NOTE: If the warning light turns on while the vehicle speed is within specified speed range above, the check is completed. And when the vehicle speed exceeds 6 km/h (3.7 mph), the warning light will blink again. In this condition, speed sensors are OK.

CAUTION: While the warning light is off, do not give any shocks to computer such as acceleration, deceleration, braking, shift change, steering or shocks from the road condition.



5. INSPECT SENSOR SIGNAL CHANGE

Drive the vehicle straight ahead at about 45 — 55 km/h (28.0 — 34.2 mph), and check that the warning light turns on after a 1 second pause.

If the warning light turns on without blinking when the vehicle speed is not within the specified speed range above, stop the vehicle and read the diagnostic code, and repair the malfunctioning parts.

(See step 6 on this page)

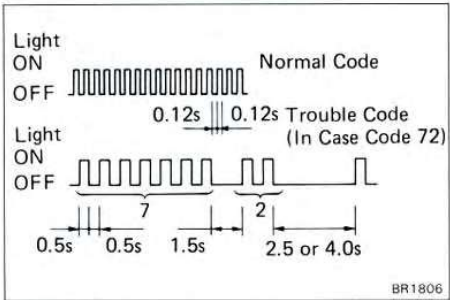
NOTE: If the warning light turns on while the vehicle speed is within specified speed range above, the check is completed. And when the vehicle speed is not within specified speed range, the warning light will blink again. In this condition, sensor rotors are OK.

CAUTION: While the warning light is off, do not give any shocks to computer such as acceleration, deceleration, braking, shift change, steering or shocks from the road condition.

6. READ DIAGNOSTIC CODE

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

BR-29



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

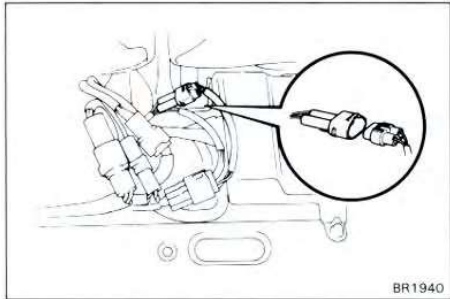
7. REPAIR MALFUNCTIONING PARTS

Repair or replace the malfunctioning parts.

8. PERFORM FOLLOWING STEPS

(a) Turn the ignition switch on.

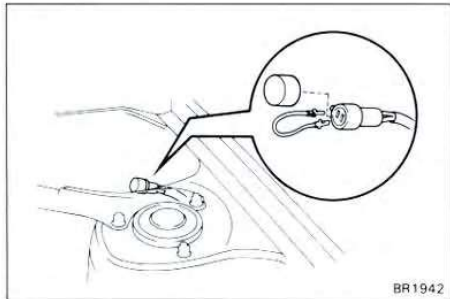
(b) Connect the check connector.



BR1940

(c) Remove the short pin or wire from the Ts connector and install the rubber cap to it.

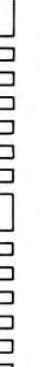
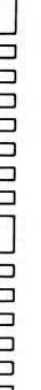
(d) Turn the ignition switch off.



BR1942

BR-30

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

Light Pattern	Diagnosis	Malfunctioning Part
	All speed sensors and sensor rotors are normal	
	Low voltage of front right speed sensor signal	• Front right speed sensor • Sensor installation
	Low voltage of front left speed sensor signal	• Front left speed sensor • Sensor installation
	Low voltage of rear right speed sensor signal	• Rear right speed sensor • Sensor installation
	Low voltage of rear left speed sensor signal	• Rear left speed sensor • Sensor installation
	Abnormal change of front right speed sensor signal	• Front right sensor rotor
	Abnormal change of front left speed sensor signal	• Front left sensor rotor
	Abnormal change of rear right speed sensor signal	• Rear right sensor rotor
	Abnormal change of rear left speed sensor signal	• Rear left sensor rotor

Deceleration Sensor Operation Diagnosis System

PRECAUTION

While checking the deceleration sensor diagnosis system, A.B.S. does not work and brake system works as normal brake system.

INSPECTION OF DIAGNOSIS SYSTEM

1. INSPECT BATTERY VOLTAGE

Inspect that the battery voltage is about 12 V.

2. CHECK THAT WARNING LIGHT TURNS ON

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

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

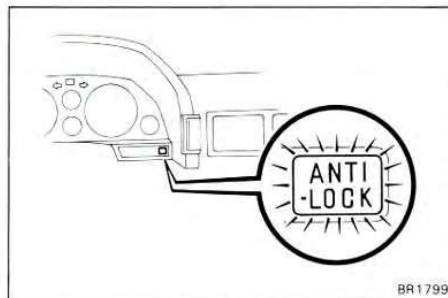
- Check that the "ANTI-LOCK" warning light turns off.
- Turn the ignition switch off.

3. PERFORM FOLLOWING STEPS

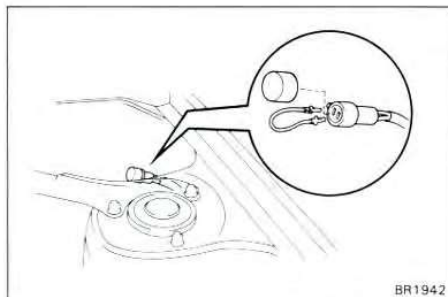
- Remove the rubber cap from the Ts connector located in back of the left side shock absorber protrusion in engine room.
- Short the terminals of Ts connector.
- Pull the parking brake lever up and depress the brake pedal, and start the engine.

- Check that the warning light blinks about 1 time every 1 second as shown.

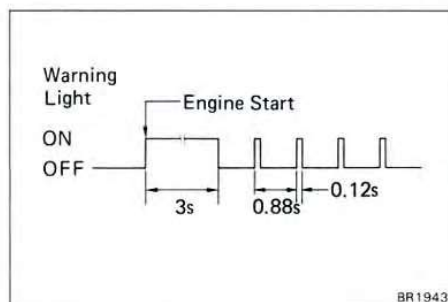
If the warning light does not blink, inspect the parking brake switch, stop light switch, Ts connector, deceleration sensor installation and computer.



BR1799

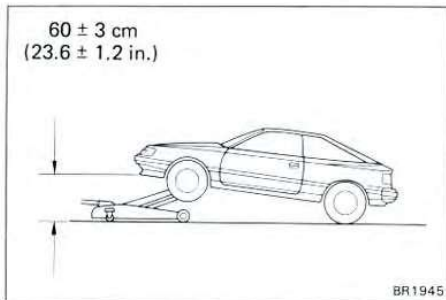


BR1942



BR1943

4. INSPECT SENSOR DETECTION POINT

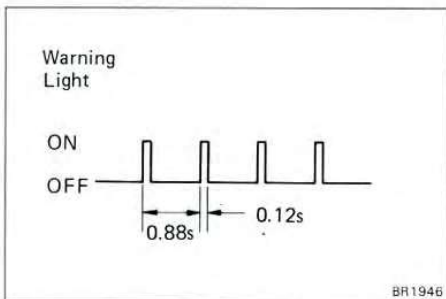
BR-32**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**

(d) Jack up the front side of the vehicle slowly as shown.
NOTE: When measuring the height, measure at the center of the lower body of the vehicle.

(e) Check that the warning light does not turn on.

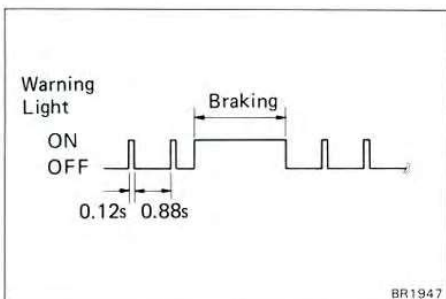
(f) Jack down the vehicle and check that the warning light blinking.

If the warning light turns on, inspect the deceleration sensor installation. And if the sensor installation is OK, replace the deceleration sensor.

**5. INSPECT SENSOR OPERATION**

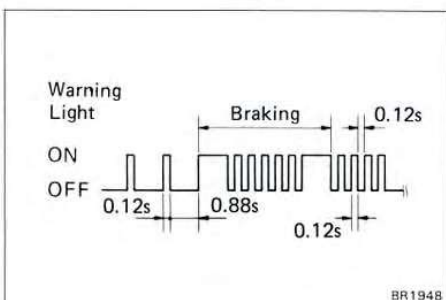
(a) Drive the vehicle straight ahead at about 10 km/h (6.2 mph) or more, lightly depress the brake pedal.

(b) Check that there is no change in the warning light light pattern.



(c) Drive the vehicle straight ahead at about 20 km/h (12.4 mph) or more, depress the brake pedal a little strong.

(d) Check that the warning light turns on while braking.



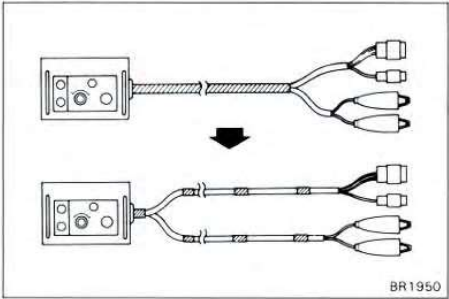
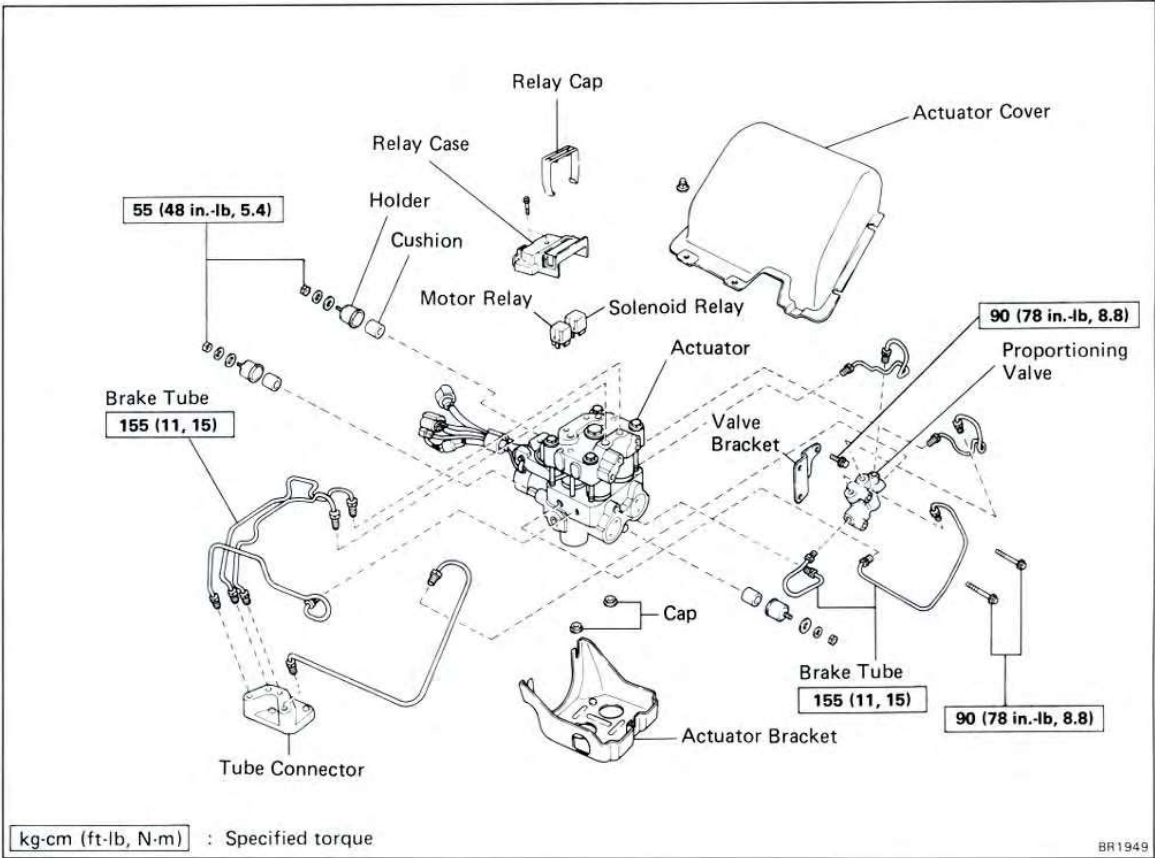
(e) Drive the vehicle straight ahead at about 20 km/h (12.4 mph) or more, depress the brake pedal strongly.

(f) Check that the warning light light pattern changes after braking as shown.

If the operation is not as specified, inspect the deceleration sensor installation. And if the sensor installation is OK, replace the deceleration sensor.

6. REMOVE SHORT PIN

Brake Actuator
COMPONENTS



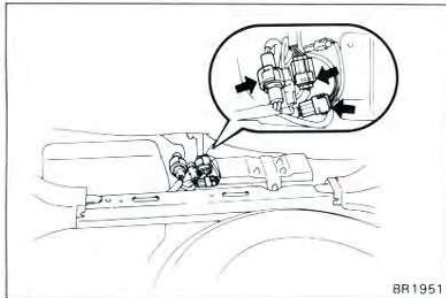
PREPARATION FOR INSPECTION

Before inspecting actuator, tear off the the vinyl tube which wrapped the wire harness of the actuator checker (SST). And then divide the clip mounted wire harnesses from the connector mounted wire harnesses, and wrap the tape at several points for each wire harness as shown.
SST 09990-00150

INSPECTION OF BRAKE ACTUATOR

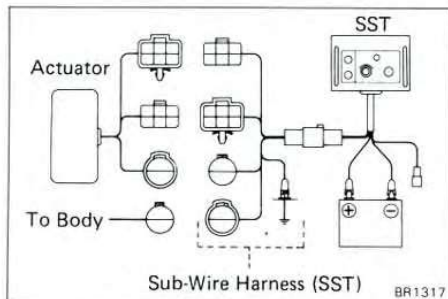
BR-34

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)



2. DISCONNECT CONNECTORS FROM ACTUATOR

- (a) Remove the three clips and turn over the luggage compartment mat.
- (b) Disconnect the three connectors from the actuator as shown.



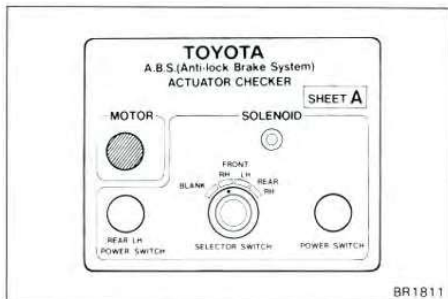
3. CONNECT ACTUATOR CHECKER (SST) TO ACTUATOR

- (a) Connect the actuator checker (SST) to the actuator and body side wire harness (SST) as shown.

SST 09990-00150

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

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

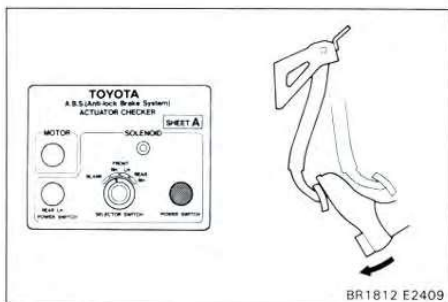


4. INSPECT BRAKE ACTUATOR OPERATION

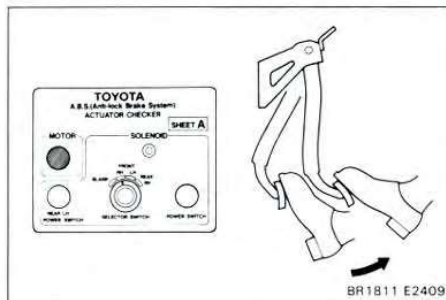
- (a) Start the engine, and run it at idle.
- (b) Turn the selector switch of the actuator checker to "FRONT RH" position.
- (c) Push and hold in the MOTOR switch for a few seconds.
- (d) Depress the brake pedal and hold it until the step (g) is completed.
- (e) Push the POWER SWITCH, and check that the brake pedal does not go down.

CAUTION: Do not keep the POWER SWITCH pushing more than 10 seconds.

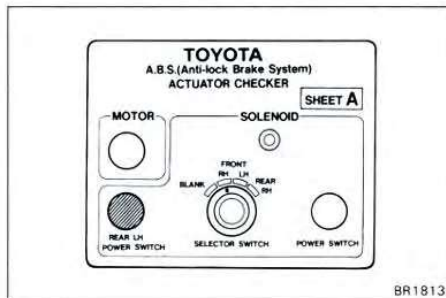
- (f) Release the switch, and check that the pedal goes down.



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

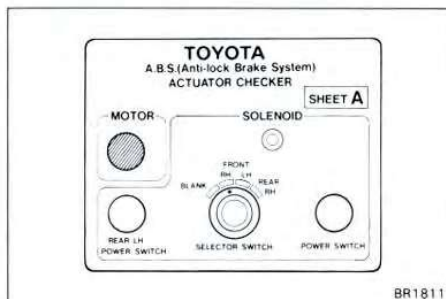
BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-35**

- (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.

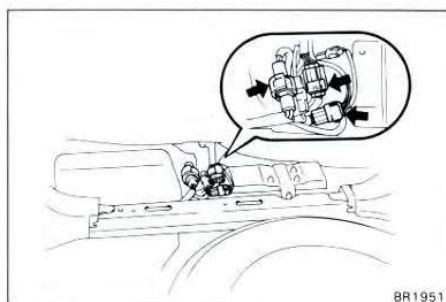
**5. INSPECT FOR OTHER WHEELS**

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

NOTE: When inspecting "REAR LH" position, push the REAR LH switch instead of the POWER SWITCH, and you can inspect anywhere the selector switch position is.

**6. PUSH SUB MOTOR SWITCH**

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

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

- (a) Remove the "SHEET A" (SST) and disconnect the actuator checker (SST) and sub-wire harness (SST) from the actuator.

SST 09990-00150 and 09990-00163

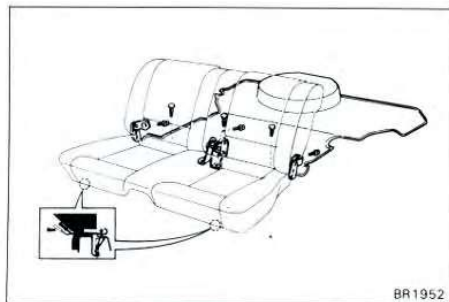
- (b) Connect the actuator connectors.
- (c) Clear the diagnostic codes.
(See page BR-20)

BR-36

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

REMOVAL OF BRAKE ACTUATOR**1. TAKE OUT FLUID WITH SYRINGE OR AN EQUIVALENT**

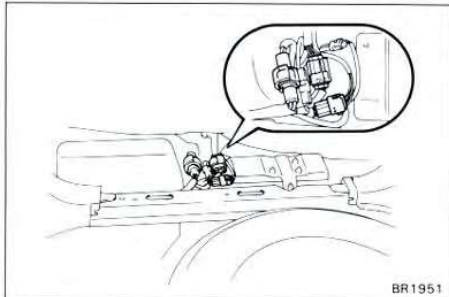
CAUTION: Do not let brake fluid remain on a painted surface. Wash off it immediately.



BR1952

2. REMOVE REAR SEAT CUSHION AND SEAT BACKS

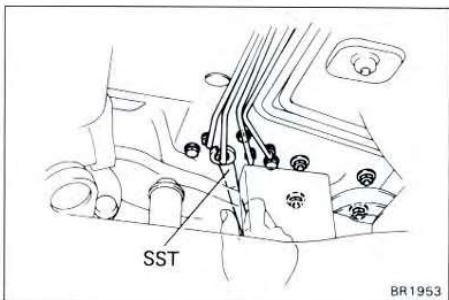
- (a) Remove the rear seat cushion.
- (b) Remove the three clips holding luggage compartment mat to the body.
- (c) Remove the six bolts and remove the seat backs with luggage compartment cover.



BR1951

3. DISCONNECT ACTUATOR CONNECTORS

Disconnect the four connectors from the actuator.



BR1953

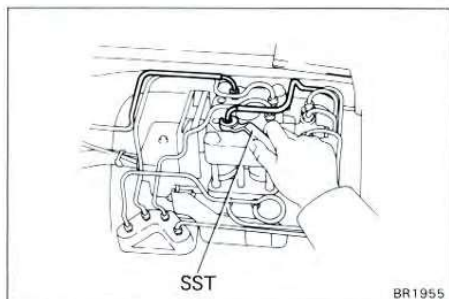
4. REMOVE ACTUATOR

- (a) Lift up the vehicle, and using SST, disconnect the four brake tubes from the tube connector.

SST 09751-36011

- (b) Remove the three bolts and four nuts.

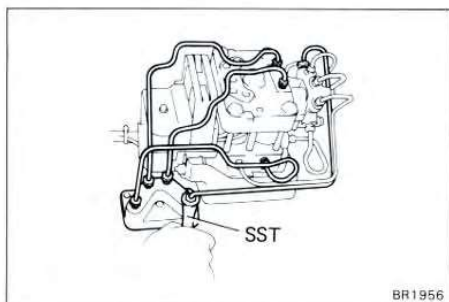
- (c) Remove the five nuts, remove the actuator cover and

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-37**

- (d) Using SST, disconnect the two brake tubes from the actuator as shown.

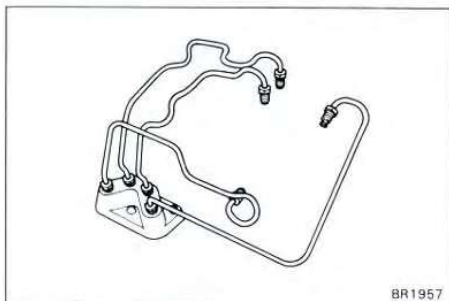
SST 09751-36011

- (e) Remove the actuator with bracket.

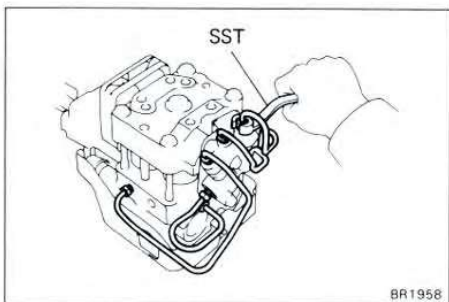
**5. REMOVE BRAKE TUBES**

- (a) Using SST, remove the four brake tubes connecting to the tube connector and remove the tube connector.

SST 09751-36011



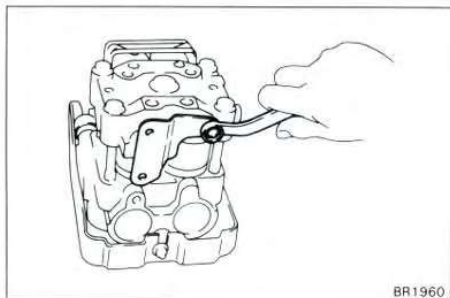
- (b) Temporarily install the removed tubes to the tube connector.



- (c) Using SST, remove the four brake tubes from the actuator.

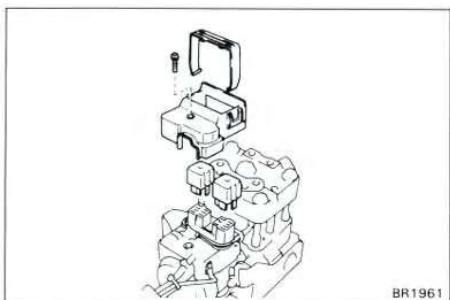
SST 09751-36011

6. REMOVE PROPORTIONING VALVE

BR-38**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**

BR1960

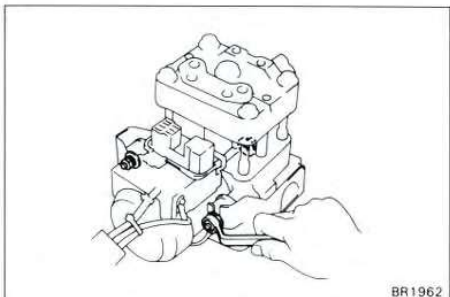
- (b) Remove the bolt and remove the valve bracket.



BR1961

7. REMOVE CONTROL RELAYS

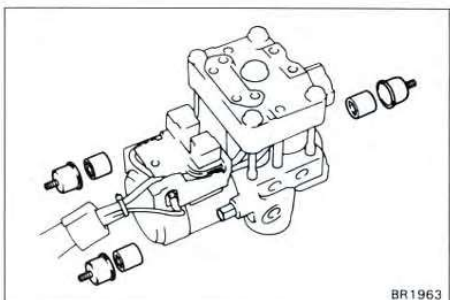
- (a) Remove the screw and remove the relay case with relay cap.
- (b) Remove the relay cap from the relay case.
- (c) Remove the two control relays from the actuator.



BR1962

8. REMOVE ACTUATOR BRACKET

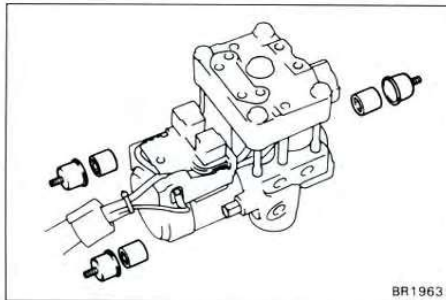
- (a) Remove the three nuts, wave washers and washers.
- (b) Remove the actuator from the actuator bracket.



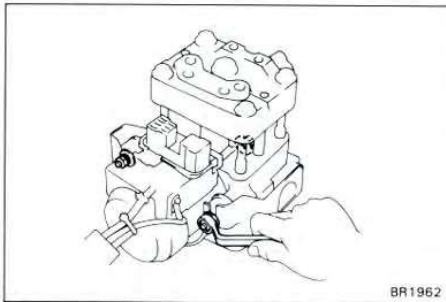
BR1963

9. REMOVE THREE HOLDERS AND CUSHIONS

Remove the three holders and cushions.

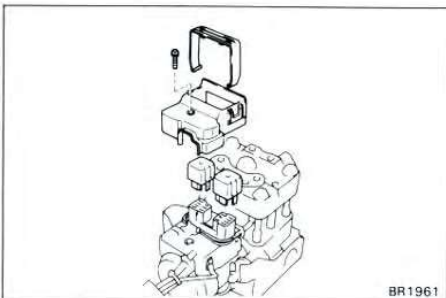
BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-39****INSTALLATION OF BRAKE ACTUATOR****1. INSTALL THREE CUSHIONS AND HOLDERS**

Install the three cushions to holders and install them to the actuator.

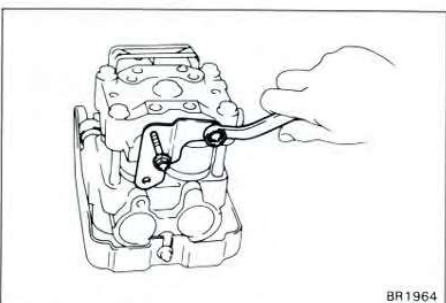
**2. INSTALL ACTUATOR BRACKET**

- (a) Install the actuator to the actuator bracket in place.
- (b) Install the washers, wave washers and nuts.
- (c) Tighten the three nuts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

**3. INSTALL CONTROL RELAYS**

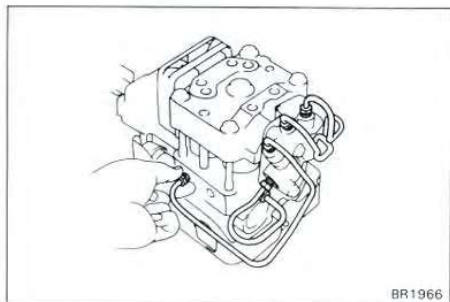
- (a) Install the two control relays in position.
- (b) Install the relay case and tighten the screw.
- (c) Install the relay cap onto the control relays.

**4. INSTALL PROPORTIONING VALVE**

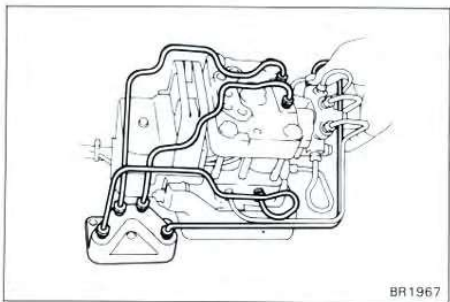
- (a) Using a proportioning valve installation bolt, install the valve bracket in place and tighten the bolt.

Torque: 90 kg-cm (78 in.-lb, 8.8 N·m)

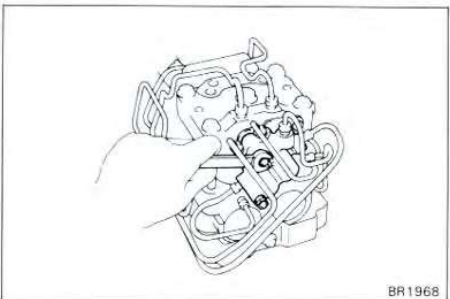
- (b) Remove the proportioning valve installation bolt.

BR-40**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)****5. INSTALL BRAKE TUBES**

- (a) Temporarily install the four brake tubes as shown.

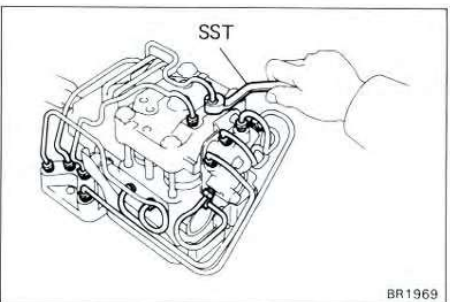


- (b) Remove the four brake tubes from the tube connector and temporarily install them to the actuator. And temporarily install the tube connector.



- (c) Tighten the two proportioning valve installation bolts.

Torque: 90 kg-cm (78 in.-lb, 8.8 N·m)

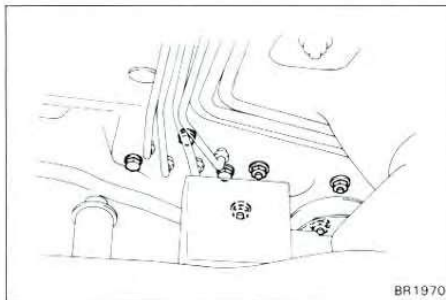


- (d) Using SST, tighten the eight brake tubes.

SST 09751-36011

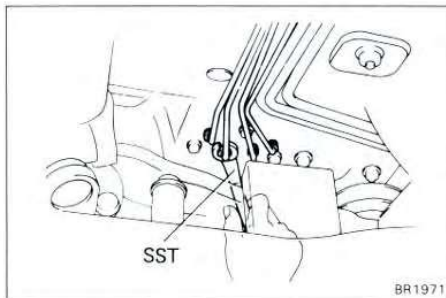
Torque: 155 kg-cm (11 ft-lb, 15 N·m)

6. INSTALL ACTUATOR

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-41**

- (c) Lift up the vehicle, install and tighten the three bolts and four nuts from the lower side of the vehicle.

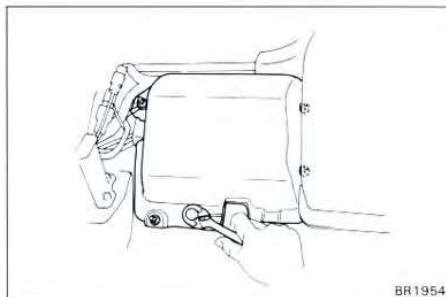
Torque: Bolt (Tube connector)
80 kg-cm (69 in.-lb, 7.8 N·m)
Nut (Actuator bracket)
130 kg-cm (9 ft-lb, 13 N·m)



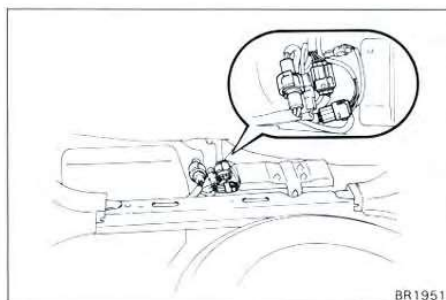
- (d) Using SST, connect the four brake tubes to the tube connector.

SST 09751-36011

Torque: 260 kg-cm (19 ft-lb, 25 N·m)



- (e) Install the actuator cover and rubber seat in place, and tighten the five nuts.

**7. CONNECT ACTUATOR CONNECTORS**

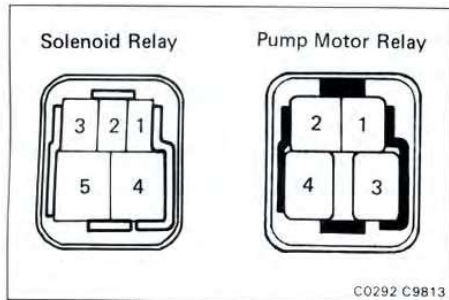
Connect the four connectors to the actuator.

8. INSTALL REAR SEAT BACKS AND SEAT CUSHION

- (a) Install the seat backs with the six bolts.

BR-42

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

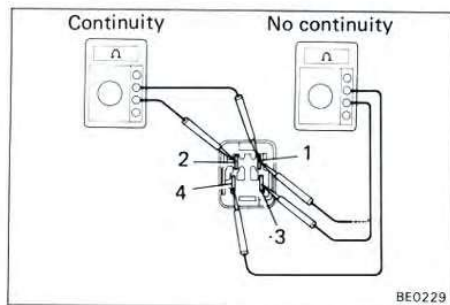


Control Relays

INSPECTION OF CONTROL RELAYS

1. REMOVE CONTROL RELAYS

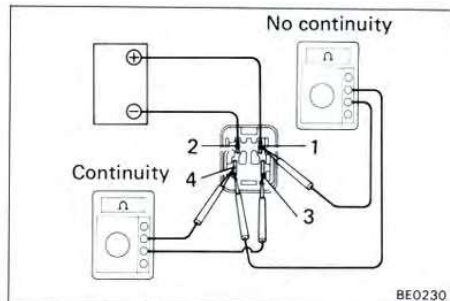
Remove the two control relays from the actuator.



2. INSPECT PUMP MOTOR RELAY CONTINUITY

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

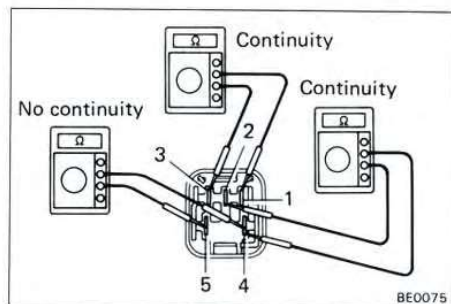
If continuity is not as specified, replace the relay.



3. INSPECT PUMP MOTOR RELAY OPERATION

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

If operation is not as specified, replace the relay.



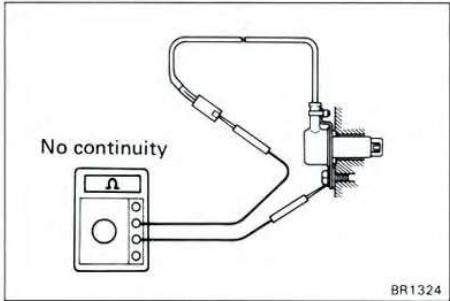
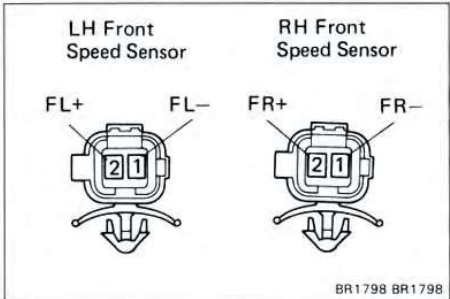
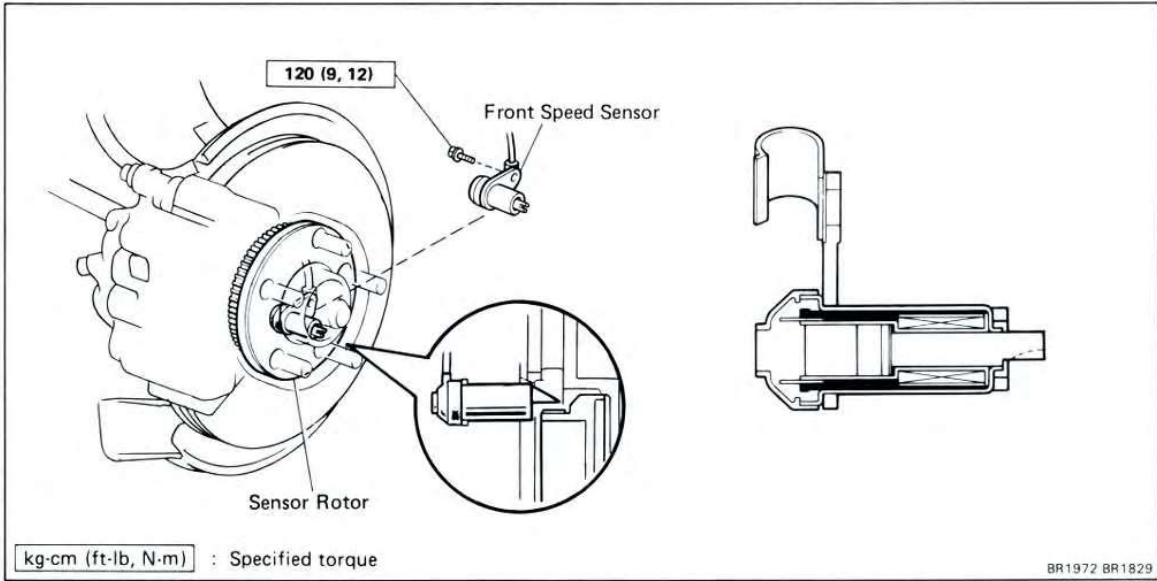
4. INSPECT SOLENOID RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.

5. INSPECT SOLENOID RELAY OPERATION

Front Speed Sensor



INSPECTION OF FRONT SPEED SENSOR

1. INSPECT SPEED SENSOR

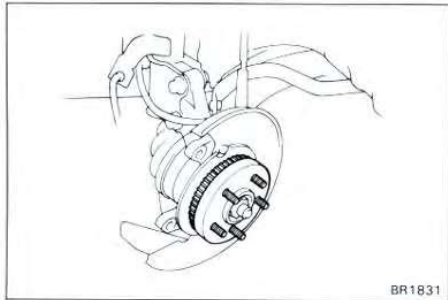
- (a) Remove the screw and bolt from the pipe clamp of the wire harness.
- (b) Disconnect the speed sensor connector.
- (c) Measure the resistance between terminals.

Resistance: 0.85 — 1.30 kΩ

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

- (d) Check that there is no continuity between each terminal and sensor body.
- If there is continuity, replace the sensor.
- (e) Connect the speed sensor connector.
- (f) Install the screw and bolt of the pipe clamp.

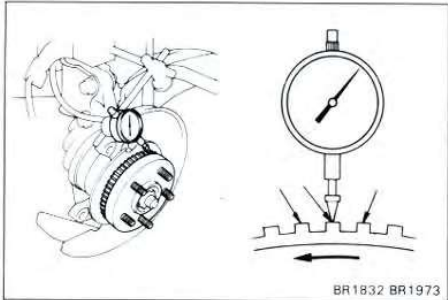
2. INSPECT SENSOR INSTALLATION

BR-44**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)****3. VISUALLY INSPECT SENSOR ROTOR SERRATIONS**

- Remove the two bolts and remove the torque plate with brake cylinder.
- Remove the rotor disc.
- Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.
- Install the rotor disc and brake cylinder assembly with two bolts.

Torque: 1,015 kg-cm (73 ft-lb, 100 N·m)

CAUTION: To prevent damage to the serrations, do not strike the axle hub.

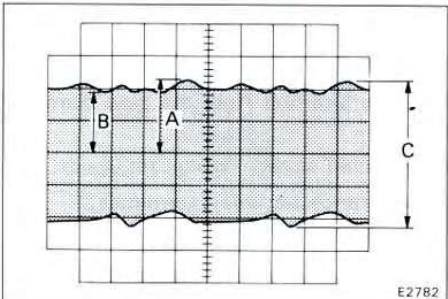
**4. INSPECT SENSOR ROTOR RUNOUT**

Measure the sensor rotor runout at 2 mm (0.08 in.) from the serration edge.

Maximum sensor rotor runout

(the runout fluctuation measured at the top of 3 consecutive serrations): 0.1 mm (0.004 in.)

If not as specified, replace the sensor rotor.

**INSPECTION OF FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS (REFERENCE)****INSPECT FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE**

- Connect an oscilloscope to the speed sensor connector.
- Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.
- Check that C is 0.5 V or more.

If not as specified, replace the speed sensor.

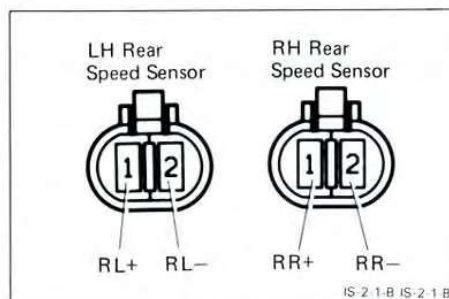
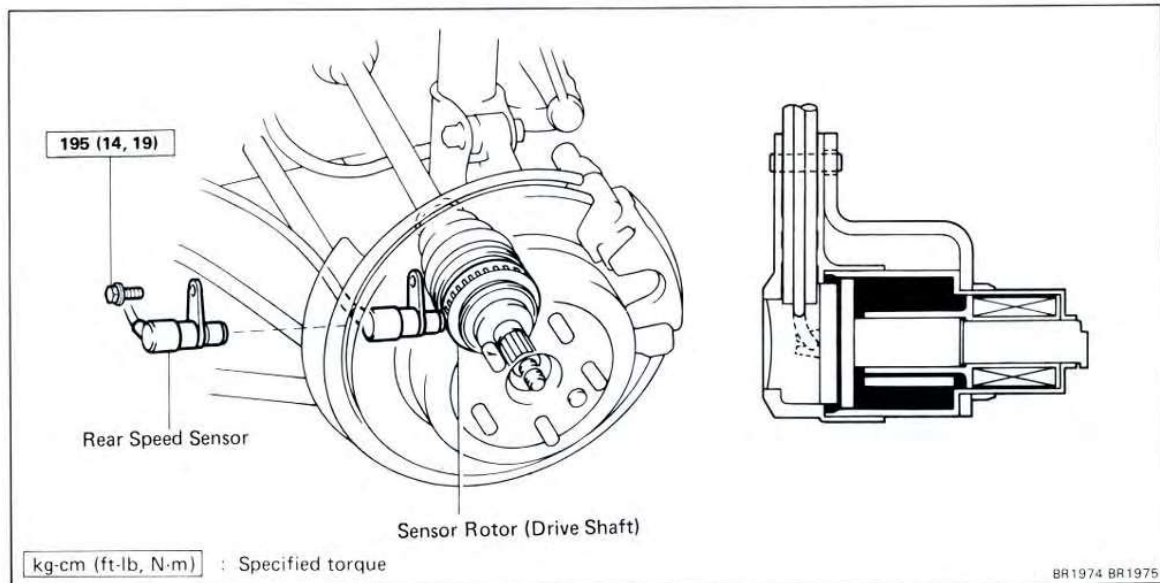
- Check that B is 70% or more of A.

If not as specified, replace the sensor rotor.

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)

BR-45

Rear Speed Sensor



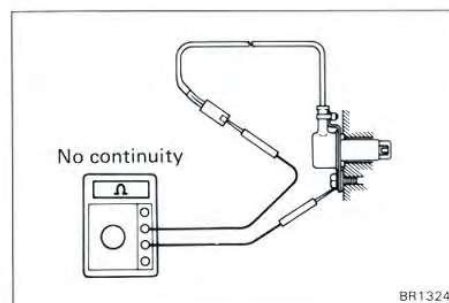
INSPECTION OF REAR SPEED SENSOR

1. INSPECT SPEED SENSOR

- Remove the rear seat cushion.
- Disconnect the speed sensor connector.
- Measure the resistance between terminals.

Resistance: 0.85 — 1.30 kΩ

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



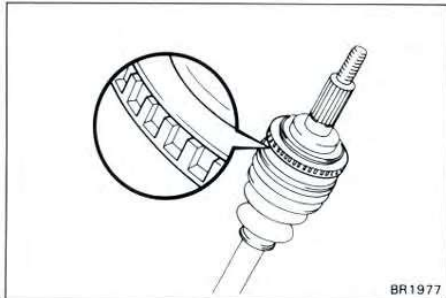
- Check that there is no continuity between each terminal and sensor body.

If there is continuity, replace the sensor.

- Connect the speed sensor connector.

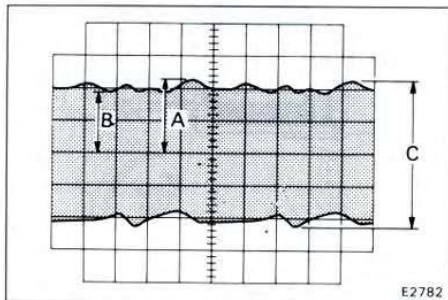
- Install the rear seat cushion.

2. INSPECT SENSOR INSTALLATION

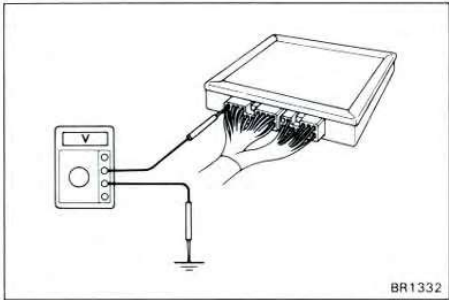
BR-46**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)****3. VISUALLY INSPECT SENSOR ROTOR SERRATIONS**

- (a) Remove the drive shaft.
(See page RA-14)
- (b) Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.
- (c) Install the drive shaft.
(See page RA-19)

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

**INSPECTION OF REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS (REFERENCE)****INSPECT REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE**

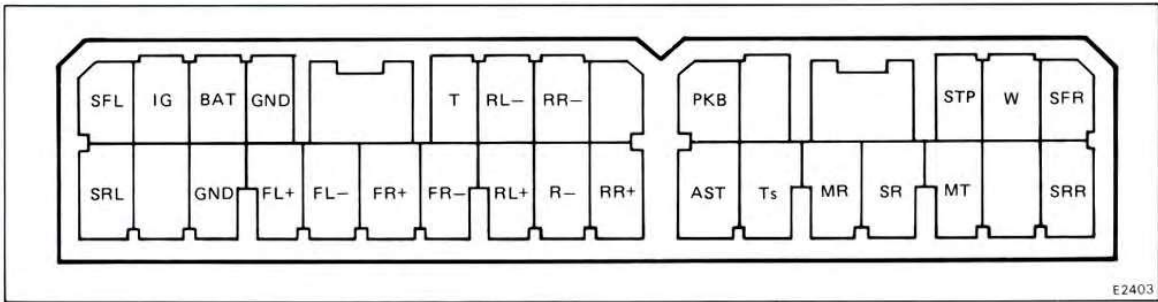
- (a) Connect an oscilloscope to the speed sensor connector.
- (b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.
- (c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.
- (d) Check that B is 60 % or more of A.
If not as specified, replace the rear axle hub.



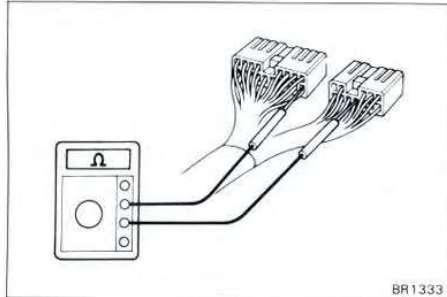
Anti-lock Brake System Circuit

INSPECTION OF SYSTEM CIRCUIT

1. INSPECT SYSTEM CIRCUIT WITH CONNECTOR CONNECTED
- (a) Pull out the A.B.S. computer.
(See page BR-49)
 - (b) Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal and body ground.

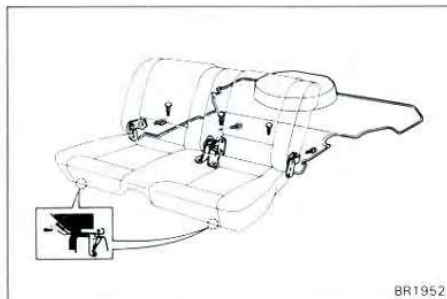
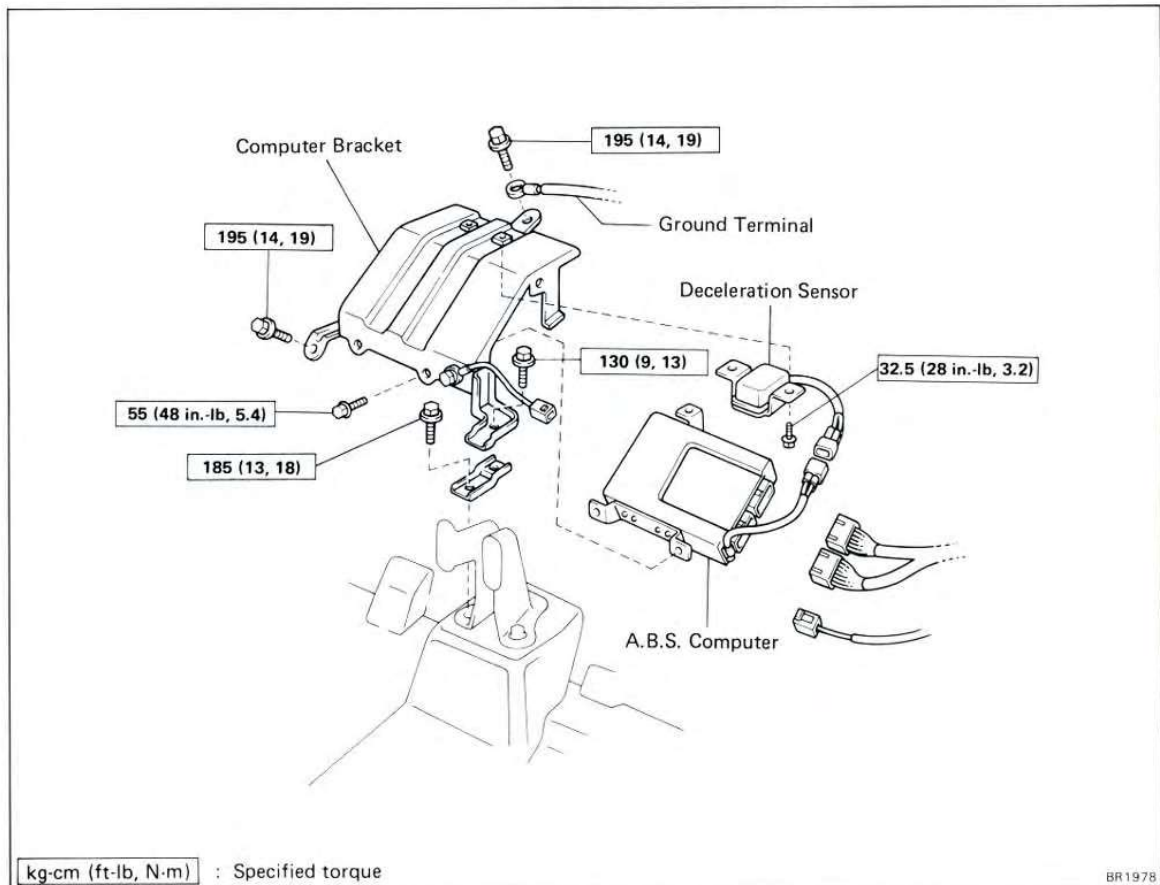


Tester Connection	Condition	Voltage	Trouble Part
SFL — Body ground	Ignition switch on	Battery voltage	Actuator, control relays
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
SFR — Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
SRL — Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
SRR — Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
AST — Body ground	Ignition switch on	Battery voltage	
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
W — Body ground	Ignition switch on	Battery voltage	"ANTI-LOCK" warning light bulb
	Ignition switch on and "ANTI-LOCK" warning light goes on	About 0 V	
T — Body ground	Check connector disconnected	Battery voltage	Check connector, computer
	Check connector connected	About 0 V	

BR-48**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)****2. INSPECT SYSTEM CIRCUIT WITH CONNECTOR DISCONNECTED**

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

Tester Connection	Check Item	Condition	Voltage or Resistance Value	Trouble Part
SFR — AST	Resistance	Ignition switch off	About 6 Ω	Actuator
STP — Body ground	Voltage	Ignition switch off and brake pedal depressed	Battery voltage	Stop light switch, stop light
	Continuity	Ignition switch off and brake pedal returned	Continuity	
PKB — Body ground	Voltage	Ignition switch on and PKB lever pulled	About 0 V	Parking brake switch, level warning switch
		Ignition switch on and PKB lever returned	Battery voltage	
SRR — AST	Resistance	Ignition switch off	About 6 Ω	Actuator
MT — Body ground	Continuity	Ignition switch off	Continuity	
SR — R ⊖	Resistance	Ignition switch off	65 — 100 Ω	
MR — R ⊖	Resistance	Ignition switch off	50 — 80 Ω	
Ts — Body ground	Continuity	—	No continuity	Ts connector, wiring harness
		Ts connector shorted	Continuity	
AST — Body ground	Resistance	Ignition switch off	About 5 Ω	Wiring harness
RR ⊖ — Body ground	Continuity	Ignition switch off	No continuity	Rear RH speed sensor
RL ⊖ — Body ground	Continuity	Ignition switch off	No continuity	Rear LH speed sensor
T — Body ground	Continuity	Ignition switch off	Continuity	Check connector, wiring harness
GND — Body ground	Continuity	Ignition switch off	Continuity	Wiring harness
BAT — Body ground	Voltage	—	Battery voltage	FOG fuse
IG — Body ground	Voltage	Ignition switch on	Battery voltage	ECU-IG fuse
SFL — AST	Resistance	Ignition switch off	About 6 Ω	Actuator
RR ⊕ — RR ⊖	Resistance	—	0.85 — 1.30 kΩ	Rear RH speed sensor
R ⊖ — Body ground	Continuity	Ignition switch off	No continuity	Wiring harness
RL ⊕ — RL ⊖	Resistance	—	0.85 — 1.30 kΩ	Rear LH speed sensor
FR ⊖ — Body ground	Continuity	—	No continuity	Front RH speed

BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)**BR-49****REMOVAL AND INSTALLATION OF A.B.S. COMPUTER AND DECELERATION SENSOR****1. REMOVE A.B.S. COMPUTER**

- (a) Remove the rear seat cushion.
(See page BR-36)
- (b) Remove the three bolts and ground terminal.
- (c) Disconnect the connectors and remove the three bolts and computer from the bracket.

2. REMOVE DECELERATION SENSOR

BR-50**BRAKE SYSTEM — Anti-lock Brake System (A.B.S.)****3. INSTALL DECELERATION SENSOR**

Install the deceleration sensor to the bracket with the two bolts.

Torque: 32.5 kg-cm (28 in.-lb, 3.2 N·m)

4. INSTALL A.B.S. COMPUTER

(a) Install the computer to the bracket with the three bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

(b) Connect the connectors and install the bracket and computer with the three bolts.

Torque: Front left 130 kg-cm (9 ft-lb, 13 N·m)

Front right 195 kg-cm (14 ft-lb, 19 N·m)

Rear 195 kg-cm (14 ft-lb, 19 N·m)

(c) Install the rear seat cushion.

