

AXIOM

BRAKES

CONTENTS

Brake Control System	5A-1
Anti-lock Brake System	5B-1
Power-assisted Brake System	5C-1
Parking Brakes (4x4 Model)	5D1-1
Parking Brakes (4x2 Model)	5D2-1

Brake Control System

CONTENTS

Service Precaution	5A-2	Chart A-3, TA-3 The Wheels Are Locked .	5A-32
General Description	5A-3	Chart A-4 Brake Pedal Feed Is Abnormal .	5A-32
Functional Description	5A-4	Chart A-5, TA-5 Braking Sound	
System Components	5A-10	(From EHCUC) Is Heard While Not Braking	5A-33
Electronic Hydraulic Control Unit (EHCUC) .	5A-10	Diagnostic Trouble Codes	5A-34
ABS Warning Light	5A-10	Diagnosis By "ABS" Warning Light	
Wheel Speed Sensor	5A-10	Illumination Pattern	5A-36
G-Sensor	5A-10	Diagnostic Trouble Codes (DTCs)	5A-37
Normal and Anti-lock Braking	5A-10	Chart B-1 With the key in the ON position	
Brake Pedal Travel	5A-10	(Before starting the engine). Warning light	
Acronyms and Abbreviations	5A-11	(W/L) is not activated.	5A-39
General Diagnosis	5A-11	Chart B-2 CPU Error (DTC 14 (Flash out) /	
General Information	5A-11	C0271, C0272, C0273, C0284 (Serial	
ABS Service Precautions	5A-11	communications))	5A-39
Computer System Service Precautions ...	5A-11	Chart B-3 Low or High Ignition Voltage	
General Service Precautions	5A-11	(DTC 15 (Flash out) / C0277, 0278 (Serial	
Note on Intermittents	5A-11	communications))	5A-40
Test Driving ABS Complaint Vehicles	5A-12	Chart B-4 Excessive Dump Time (DTC 17	
"ABS" Warning Light	5A-12	(Flash out) / C0269 (Serial	
Normal Operation	5A-12	communications))	5A-40
Tech 2 Scan Tool	5A-13	Chart B-5 Excessive Isolation Time	
DATA LIST	5A-16	(DTC 18 (Flash out) / C0274	
ACTUATOR TEST	5A-17	(Serial communications))	5A-40
Tech 2 Service Bleed	5A-21	Chart B-6 G-Sensor Output Failure	
Basic Diagnostic Flow Chart	5A-22	(DTC 21 (Flash out) / C0276	
Basic Inspection Procedure	5A-23	(Serial communications))	5A-41
EHCUC Connector Pin-out Checks	5A-24	Chart B-7 Brake Switch Failure	
Circuit Diagram	5A-25	(DTC 22 (Flash out) / C0281	
Connector List	5A-28	(Serial communications))	5A-41
Part Location	5A-29	Chart B-8 2WD Controller in 4WD Vehicle	
Symptom Diagnosis	5A-30	Controller (DTC 13 (Flash out) / C0285	
Chart A-1 ABS Works Frequently But		(Serial communications)), 4WD State Input	
Vehicle Does Not Decelerate	5A-30	Signal Failure (DTC 24 (Flash out) / C0282	
Chart TA-1 ABS Works Frequently But		(Serial communications))	5A-42
Vehicle Does Not Decelerate		Chart B-9 Pump Motor Failure	
(Use TECH 2)	5A-31	(DTC 32 (Flash out) / C0267, C0268	
Chart A-2 Uneven Braking Occurs While		(Serial communications))	5A-42
ABS Works	5A-31	Chart B-10 EHCUC Valve Relay Failure	
Chart TA-2 Uneven Braking Occurs While		(DTC 35 (Flash out) / C0265, C0266	
ABS Works (Use TECH 2)	5A-31	(Serial communications))	5A-43
		Chart B-11 FL Isolation Solenoid Coil Failure	
		(DTC 41 (Flash out) / C0245, C0247	
		(Serial communications))	5A-43
		Chart B-12 FL Dump Solenoid Coil Failure	
		(DTC 42 (Flash out) / C0246, C0248	
		(Serial communications))	5A-43

5A-2 BRAKE CONTROL SYSTEM

Chart B-13 FR Isolation Solenoid Coil Failure (DTC 43 (Flash out) / C0241, C0243 (Serial communications))	5A-44	Chart B-21 FR Speed Sensor Missing Signal (DTC 62 (Flash out) / C0222, C0223 (Serial communications))	5A-49
Chart B-14 FR Dump Solenoid Coil Failure (DTC 44(Flash out) / C0242, C0244 (Serial communications))	5A-44	Chart B-22 Rear Speed Sensor Missing Signal (DTC 63 (Flash out) / C0236, C0237 (Serial communications))	5A-50
Chart B-15 Rear Isolation Solenoid Coil Failure (DTC 45 (Flash out) / C0251, C0253 (Serial communications))	5A-44	Chart B-23 Simultaneous Drop-out of Front Speed Sensor Signal (DTC 64 (Flash out) / C0229 (Serial communications))	5A-51
Chart B-16 Rear Dump Solenoid Coil Failure (DTC 46 (Flash out) / C0252, C0254 (Serial communications))	5A-45	Chart B-24 Wheel Speed Input Abnormality (DTC 65 (Flash out) / C0238 (Serial communications))	5A-52
Chart B-17 FL Speed Sensor Open or Shorted (DTC 51 (Flash out) / C0225 (Serial communications))	5A-45	Unit Inspection Procedure	5A-53
Chart B-18 FR Speed Sensor Open or Shorted (DTC 52 (Flash out) / C0221 (Serial communications))	5A-46	Chart C-1-1 FL Sensor Output Inspection Procedure	5A-53
Chart B-19 Rear Speed Sensor Open or Shorted (DTC 53 (Flash out) / C0235 (Serial communications))	5A-47	Chart C-1-2 FR Sensor Output Inspection Procedure	5A-54
Chart B-20 FL Speed Sensor Missing Signal (DTC 61 (Flash out) / C0226, C0227 (Serial communications))	5A-48	Chart C-1-3 Rear Sensor Output Inspection Procedure	5A-54
		Chart TC-1 Sensor Output Inspection Procedure	5A-55
		Special Tools	5A-56

Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

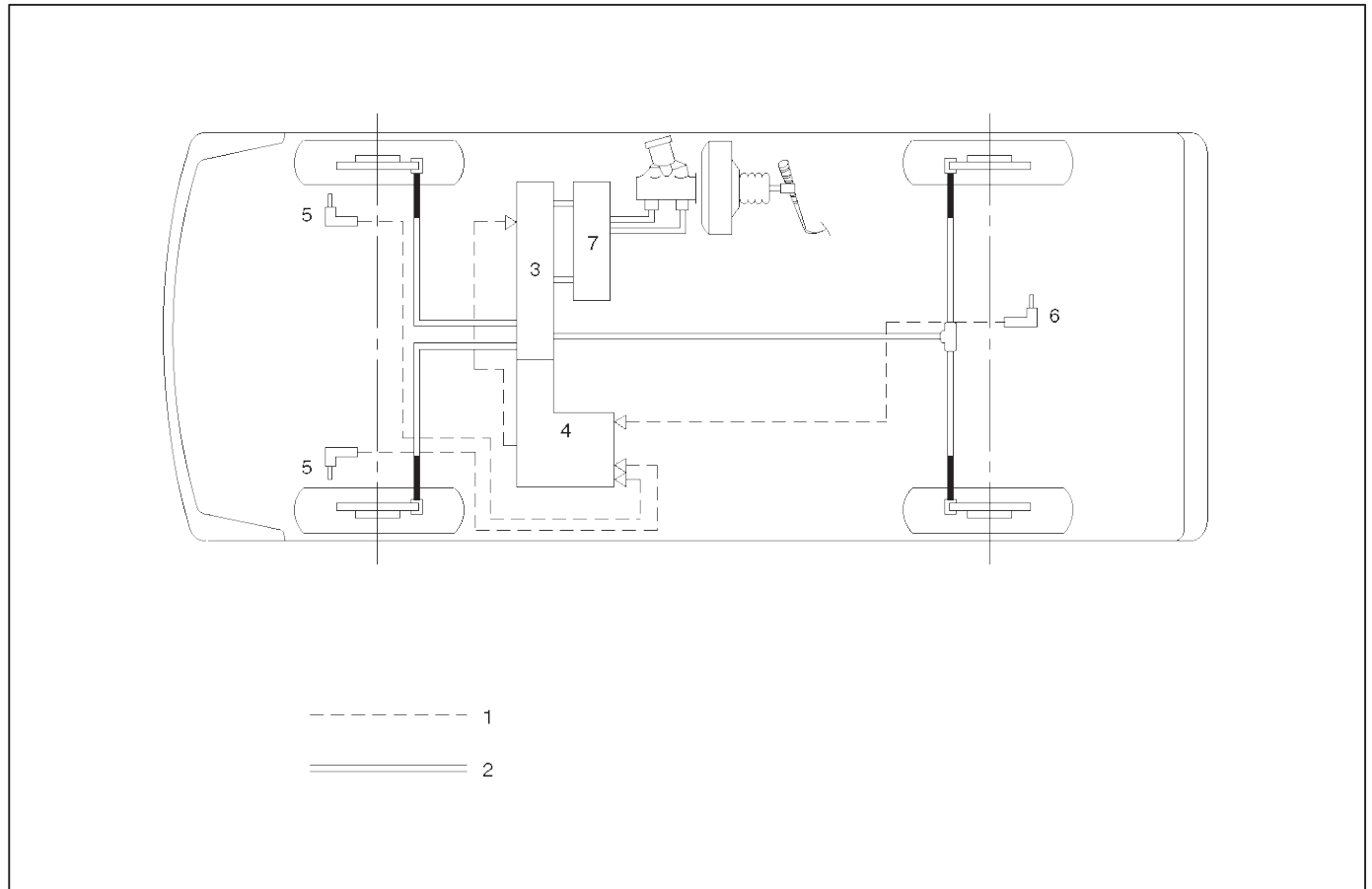
CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description

The Anti-lock Brake System (ABS) works on all four wheels. A combination of wheel speed sensor and Electronic Hydraulic Control Unit (EHCU) can determine when a wheel is about to stop turning and adjust brake pressure to maintain best braking.

This system helps the driver maintain greater control of the vehicle under heavy braking conditions.

NOTE: The Electronic Hydraulic Control Unit (EHCU) comprises the Hydraulic Unit (H/U) and the coil Integrated Module.



C05RW004

Legend

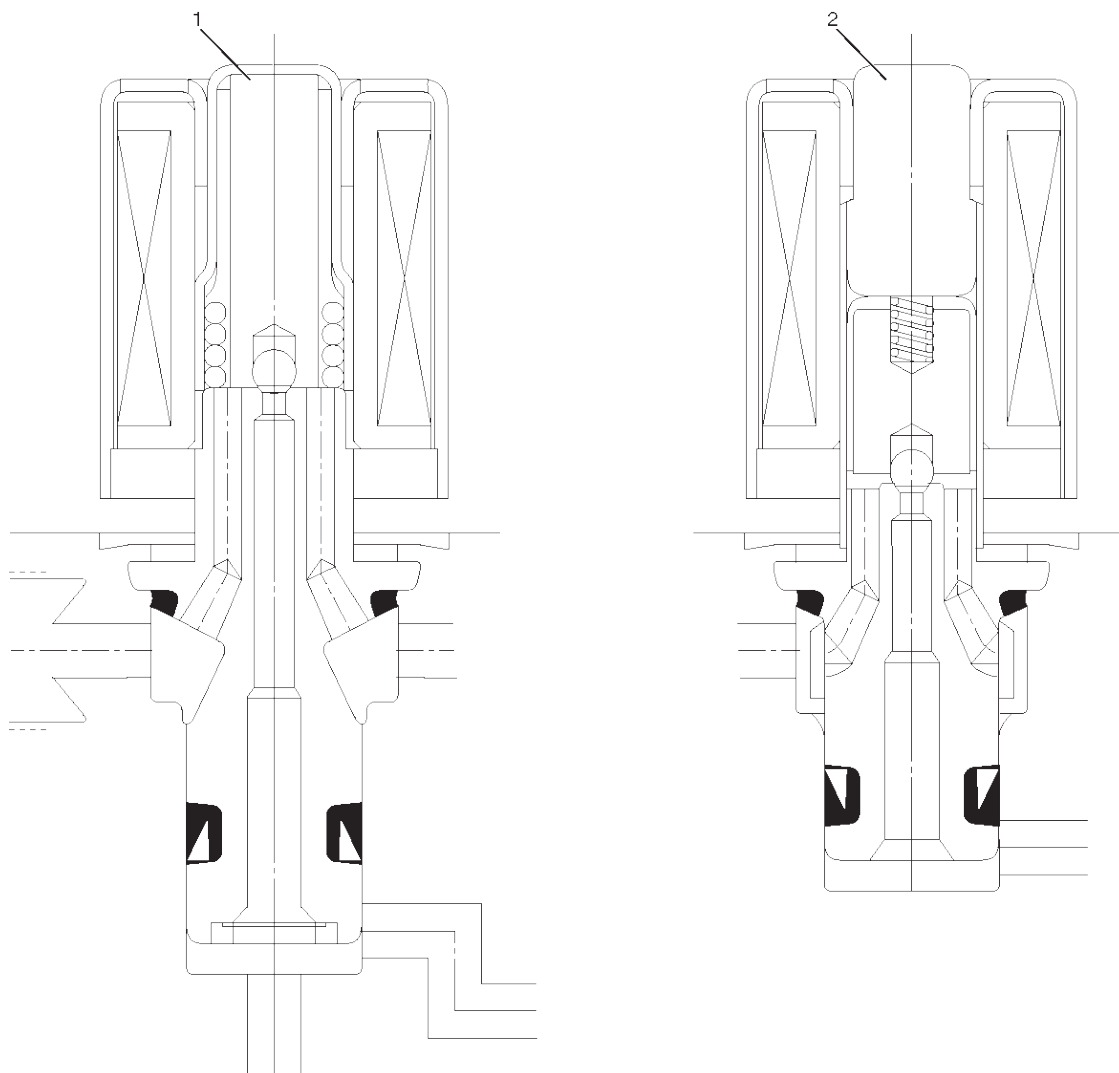
- | | |
|--------------------------|--|
| (1) Electronic Line | (4) Coil Integrated Module |
| (2) Hydraulic Line | (5) Front Wheel Speed Sensor |
| (3) Hydraulic Unit (H/U) | (6) Rear Wheel Speed Sensor |
| | (7) Proportioning and Bypass (P&B) Valve |

5A-4 BRAKE CONTROL SYSTEM

Functional Description

Hydraulic Unit (H/U)

Solenoid Valve



C05RW012

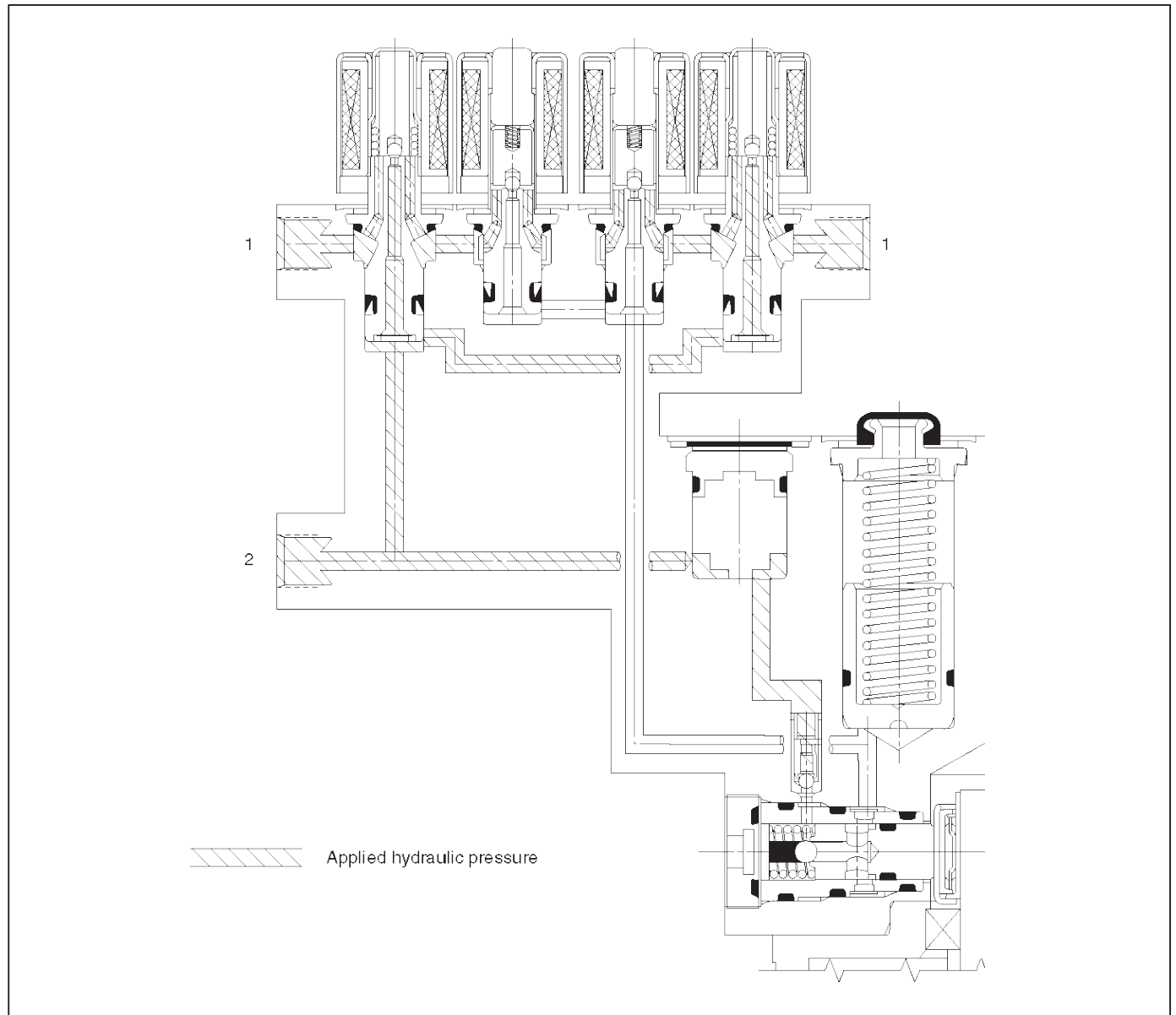
Legend

- (1) Isolation Valve
- (2) Dump valve

Normal Braking

During normal (non anti-lock) braking, the solenoid valves has current flow. The dump valve is closed and the isolation valve is opened due to spring force.

Brake fluid travels through the centre of the isolation valve (normally open) around the dump valve (normally closed) then to the brake pistons.



C05RW010

Legend

- (1) Brake
- (2) Master Cylinder

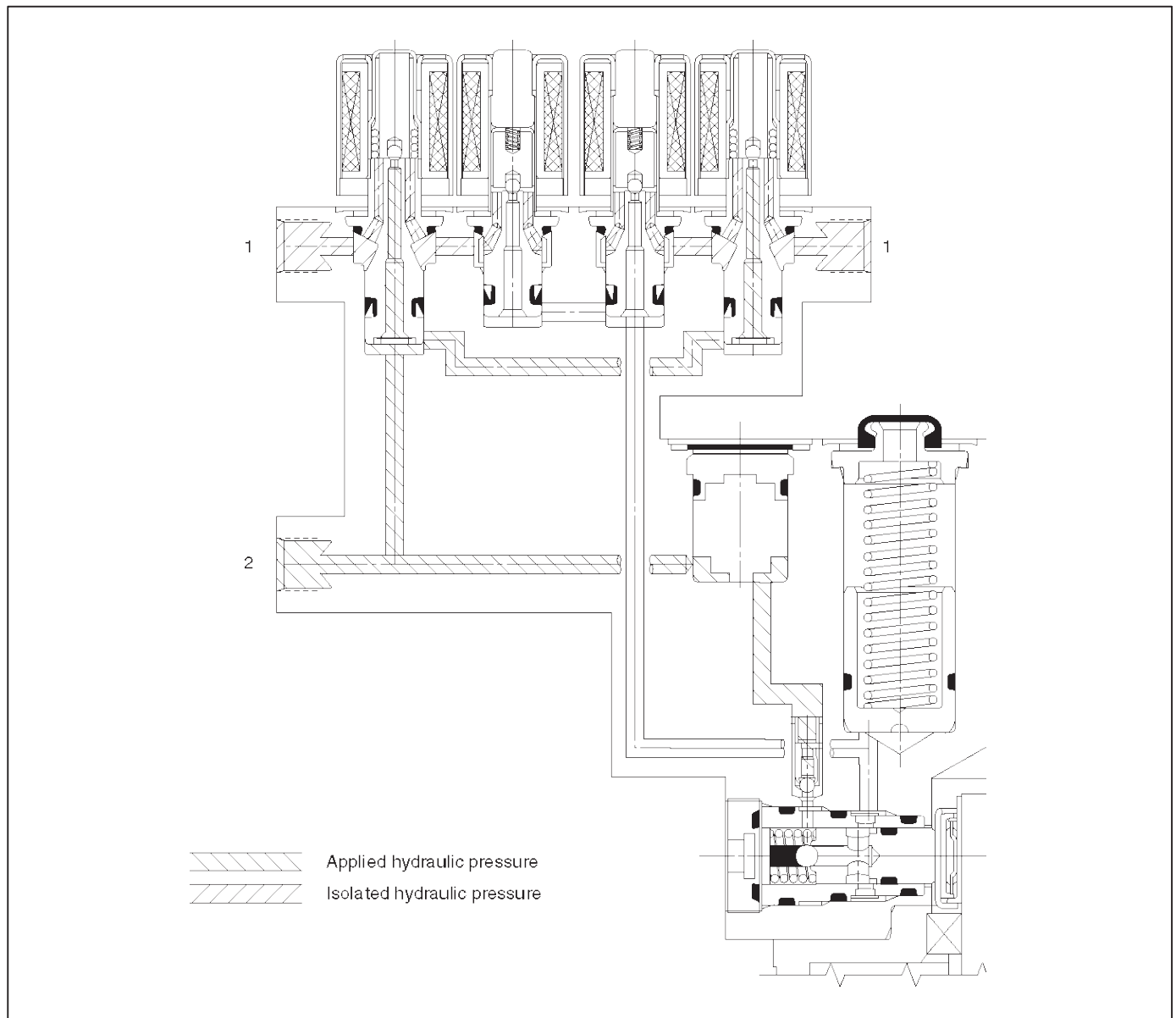
5A-6 BRAKE CONTROL SYSTEM

Pressure Isolation (Pressure Maintain)

The electro-hydraulic control unit is activated when the brakes are applied.

If the information from the wheel speed sensors indicates excessive wheel deceleration (imminent lockup), the first step in the anti-lock sequence is to isolate the brake pressure being applied by the brake pedal.

The microprocessor in the coil integrated module sends a voltage to the coil to energize and close the isolation valve. This prevents any additional fluid pressure applied by the brake pedal from reaching the wheel. With the isolation valves closed, unnecessary increase in the brake pressure is prevented.



C05RW011

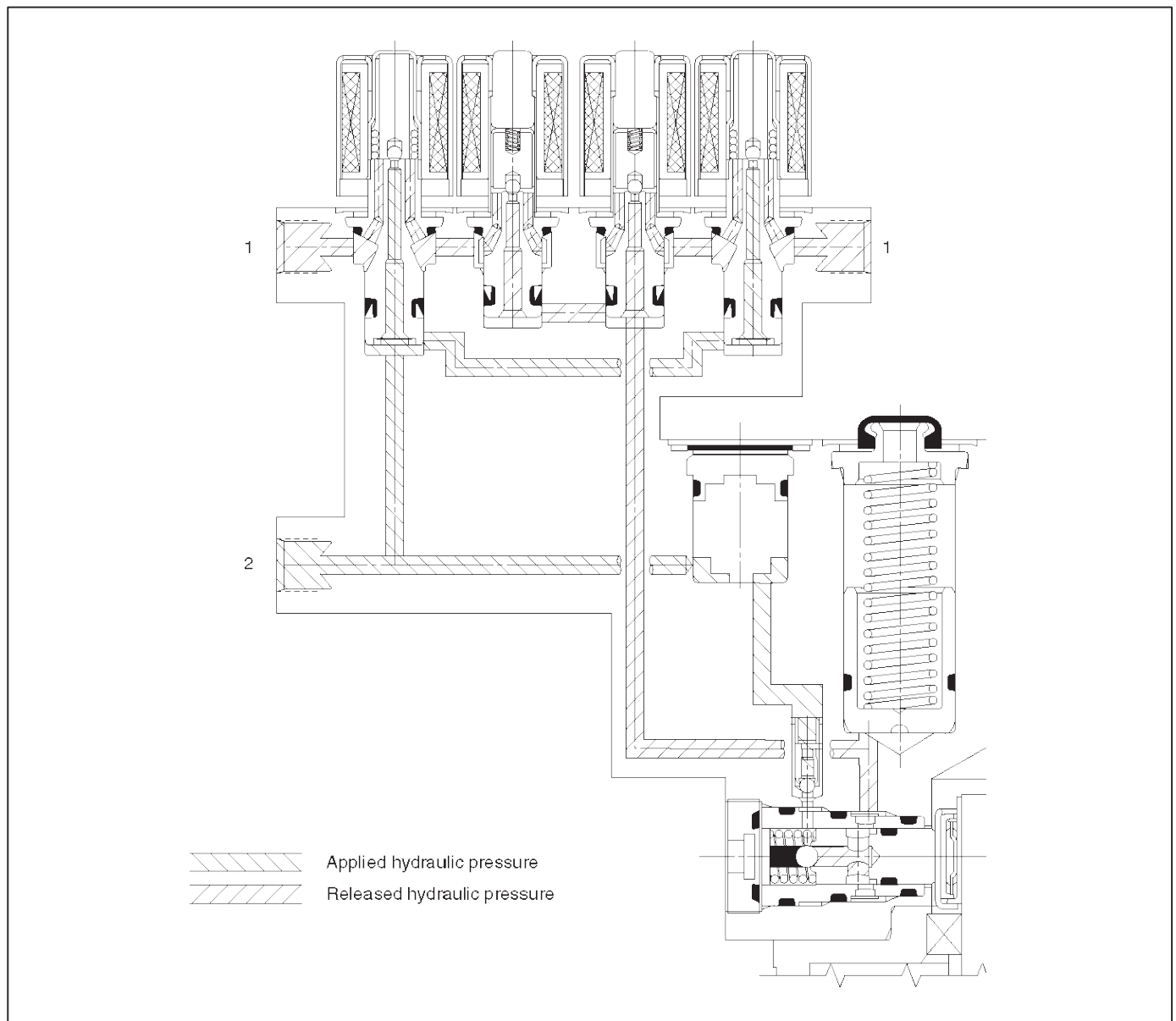
Legend

- (1) Brake
- (2) Master Cylinder

Pressure Reduction

Once the brake pressure is isolated, it must be reduced to allow the wheels to unlock. This is accomplished by dumping a portion of the brake fluid pressure into a low pressure accumulator.

The microprocessor activates the normally closed dump valve to open, allowing fluid from the wheels to be dumped into the accumulator. This is done with very short activation pulses opening and closing the dump valve passageway. Brake pressure is reduced at the wheel and allows the wheel to begin rotating again. The fluid from the brake piston is stored in the accumulator against spring pressure and a portion of this fluid also primes the pump. The dump valves are operated independently to control the deceleration of the wheel.



C05RW009

Legend

- (1) Brake
- (2) Master Cylinder

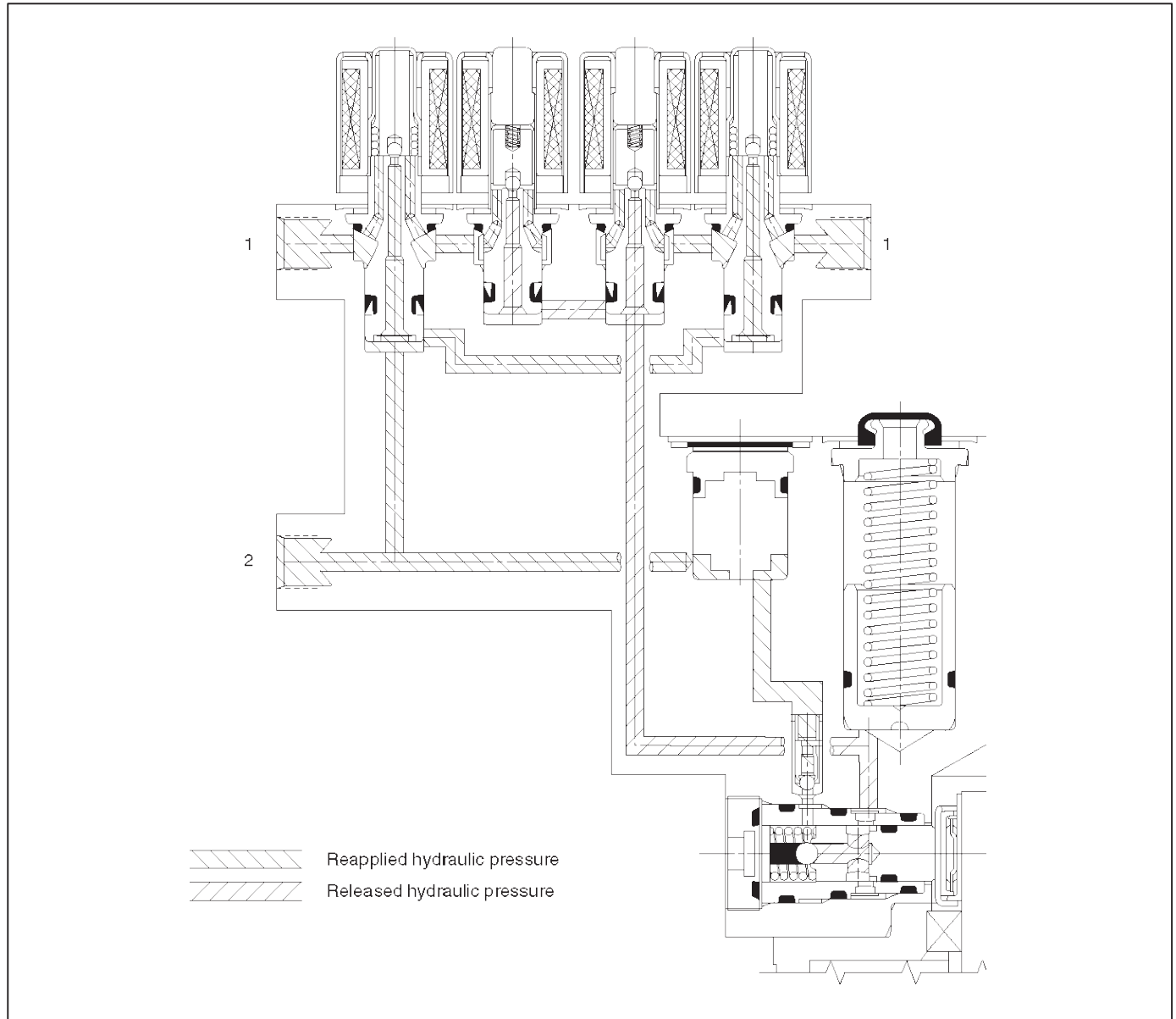
5A-8 BRAKE CONTROL SYSTEM

Pressure Increase (Re-apply)

The re-apply sequence is initiated to achieve optimum braking. The isolation valve is momentarily opened to allow master cylinder and pump pressure to reach the brakes. This controlled pressure rise continues until the wheel is at optimum brake output or until the brake pressure is brought up to the master cylinder output pressure.

If more pressure is required, more fluid is drawn from the master cylinder and applied to the brakes. The driver may feel slight pedal pulsations, or pedal drop, this is normal and expected.

As fluid is re-applied to the brakes, the wheel speed will reduce. If the wheels approach imminent lockup again, the module will isolate, dump and re-apply again. This cycle occurs in millisecond intervals, allowing several cycles to occur each second. It is a much faster and more controlled way of “pumping the pedal”.



C05RW014

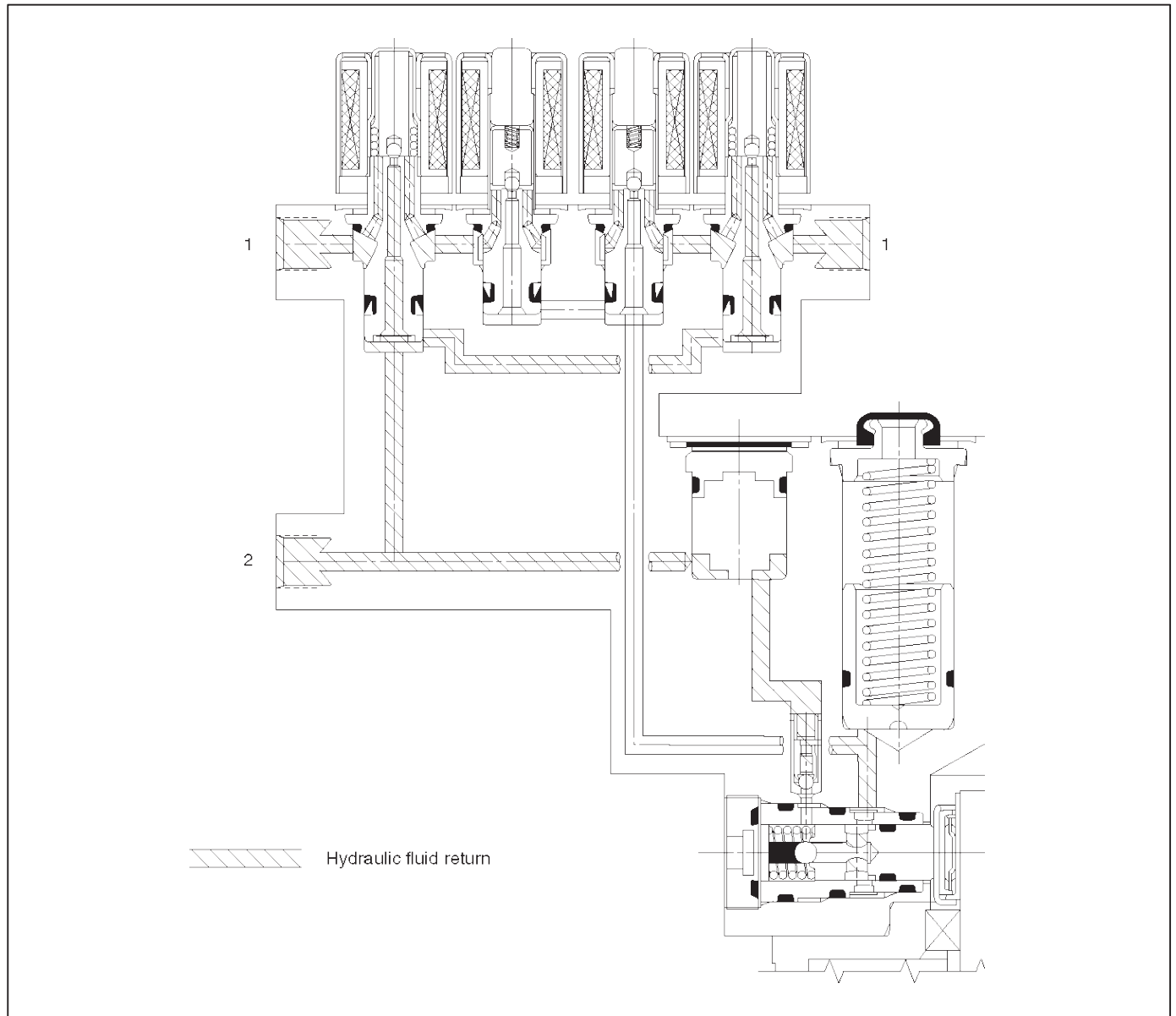
Legend

- (1) Brake
- (2) Master Cylinder

Brake Release

At the end of the anti-lock stop, when the brake pedal is released, the pump will remain running for a short time to help drain any fluid from the accumulators. As this fluid returns into the system, the spring forces the piston back to its original position.

The isolation valve opens and fluid may return to the master cylinder. Conventional braking is then resumed.



C05RW013

Legend

- (1) Brake
- (2) Master Cylinder

System Components

Electronic Hydraulic Control Unit (EHC), three Wheel Speed Sensors, Warning Light, and G-sensor.

Electronic Hydraulic Control Unit (EHC)

The EHC consists of ABS control circuits, fault detector, and a fail-safe. The signal received from each sensor activates the hydraulic unit accordingly and cancels the ABS to return to normal braking if a malfunction occurs in the ABS system.

The EHC has a self-diagnosing function which can indicate faulty circuits during diagnosis.

The EHC is mounted on the engine compartment rear right side. It consists of a Motor, Plunger Pump, Solenoid Valves.

Solenoid Valves: Reduces or holds the caliper fluid pressure for each front disc brake or both rear disc brakes according to the signal sent from the EHC.

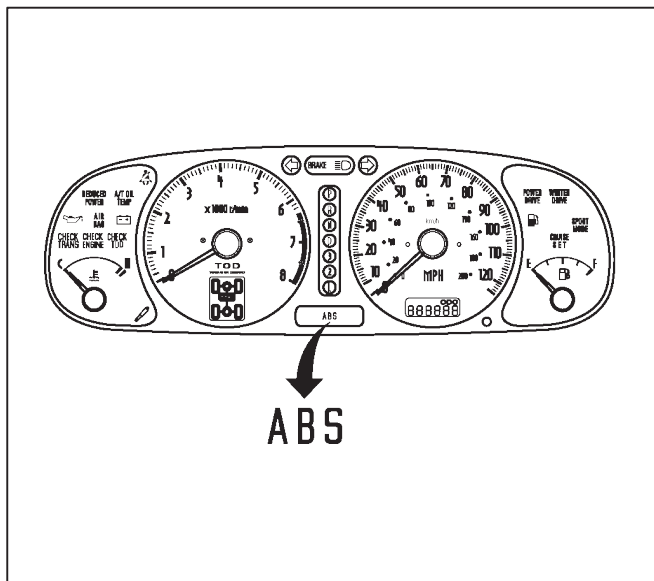
Reservoir: Temporarily holds the brake fluid that returns from the front and rear disc brake caliper so that pressure of front disc brake caliper can be reduced smoothly.

Plunger Pump: Feeds the brake fluid held in the reservoir to the master cylinder.

Motor: Drives the pump according to the signal from EHC.

Check Valve: Controls the brake fluid flow.

ABS Warning Light



Vehicles equipped with the Anti-lock Brake System have an amber "ABS" warning light in the instrument panel. The "ABS" warning light will illuminate if a malfunction in the Anti-lock Brake System is detected by the Electronic Hydraulic Control Unit (EHC). In case of an electronic malfunction, the EHC will turn "ON" the "ABS" warning light and disable the Anti-lock braking function. The "ABS" light will turn "ON" for approximately three seconds after the ignition switch is turned to the "ON" position.

If the "ABS" light stays "ON" after the ignition switch is turned to the "ON" position, or comes "ON" and stays "ON" while driving, the Anti-lock Brake System should be inspected for a malfunction according to the diagnosis procedure.

Wheel Speed Sensor

It consists of a sensor and a rotor. The sensor is attached to the knuckle on the front wheels and to the rear axle case on the rear differential.

The front sensor rotor is attached to the each brake rotor by bolts.

The rear rotor is press-fit in the differential case.

The magnetic flux generated from electrodes magnetized by a magnet in the sensor varies due to rotation of the rotor, and the electromagnetic induction generates alternating voltage in the coil. This voltage draws a "sine curve" with the frequency proportional to rotor speed and it allows detection of wheel speed.

G-Sensor

The G-sensor installed inside the EHC detects the vehicle deceleration speed and sends a signal to the EHC. In 4WD operation, all four wheels may be decelerated in almost the same phase, since all wheels are connected mechanically.

This tendency is noticeable particularly on roads with low friction coefficient, and the ABS control is adversely affected.

The G-sensor judges whether the friction coefficient of road surface is low or high, and changes the EHC's operating system to ensure ABS control.

Normal and Anti-lock Braking

Under normal driving conditions, the Anti-lock Brake System functions the same as a standard power assisted brake system. However, with the detection of wheel lock-up, a slight bump or kick-back will be felt in the brake pedal. This pedal "bump" will be followed by a series of short pedal pulsations which occurs in rapid succession. The brake pedal pulsation will continue until there is no longer a need for the anti-lock function or until the vehicle is stopped. A slight ticking or popping noise may be heard during brake applications when the Anti-lock features is being used.

When the Anti-lock feature is being used, the brake pedal may rise even as the brakes are being applied. This is also normal. Maintaining a constant force on the pedal will provide the shortest stopping distance.

Brake Pedal Travel

Vehicles equipped with the Anti-lock Brake System may be stopped by applying normal force to the brake pedal. Although there is no need to push the pedal beyond the point where it stops or holds the vehicle, by applying more force the pedal will continue to travel toward the floor. This extra brake pedal travel is normal.

Acronyms and Abbreviations

Several acronyms and abbreviations are commonly used throughout this section:

ABS

Anti-lock Brake System

CIM

Coil Integrated Module

CKT

Circuit

DLC

Data Link Connector

EHCUC

Electronic Hydraulic Control Unit

FL

Front Left

FR

Front Right

GEN

Generator

H/U

Hydraulic Unit

MV

Millivolts

RR

Rear

RPS

Revolution per Second

VDC

DC Volts

VAC

AC Volts

W/L

Warning Light

WSS

Wheel Speed Sensor

General Diagnosis

General Information

ABS troubles can be classified into two types, those which can be detected by the ABS warning light and those which can be detected as a vehicle abnormality by the driver.

In either case, locate the fault in accordance with the "BASIC DIAGNOSTIC FLOWCHART" and repair.

Please refer to *Section 5C* for the diagnosis of mechanical troubles such as brake noise, brake judder (brake pedal or vehicle vibration felt when braking), uneven braking, and parking brake trouble.

ABS Service Precautions

Required Tools and Items:

- Box Wrench
- Brake Fluid
- Special Tool

Some diagnosis procedures in this section require the installation of a special tool.

J-39200 High Impedance Multimeter

When circuit measurements are requested, use a circuit tester with high impedance.

Computer System Service Precautions

The Anti-lock Brake System interfaces directly with the Electronic Hydraulic Control Unit (EHCUC) which is a control computer that is similar in some regards to the Powertrain Control Module. These modules are designed to withstand normal current draws associated with vehicle operation. However, care must be taken to avoid overloading any of the EHCUC circuits. In testing for opens or shorts, do not ground or apply voltage to any of the circuits unless instructed to do so by the appropriate diagnostic procedure. These circuits should only be tested with a high impedance multimeter (J-39200) or special tools as described in this section. Power should never be removed or applied to any control module with the ignition in the "ON" position.

Before removing or connecting battery cables, fuses or connectors, always turn the ignition switch to the "OFF" position.

General Service Precautions

The following are general precautions which should be observed when servicing and diagnosing the Anti-lock Brake System and/or other vehicle systems. Failure to observe these precautions may result in Anti-lock Brake System damage.

- If welding work is to be performed on the vehicle using an electric arc welder, the EHCUC and valve block connectors should be disconnected before the welding operation begins.
- The EHCUC and valve block connectors should never be connected or disconnected with the ignition "ON".
- If only the rear wheels are rotated using jacks or drum tester, the system will diagnose a speed sensor malfunction and the "ABS" warning light will illuminate. But actually no trouble exists. After inspection stop the engine once and re-start it, then make sure that the "ABS" warning light does not illuminate.

If the battery has been discharged

The engine may stall if the battery has been completely discharged and the engine is started via jumper cables. This is because the Anti-lock Brake System (ABS) requires a large quantity of electricity. In this case, wait until the battery is recharged, or set the ABS to a non-operative state by removing the fuse for the ABS (50A). After the battery has been recharged, stop the engine and install the ABS fuse. Start the engine again, and confirm that the ABS warning light does not light.

Note on Intermittents

As with virtually any electronic system, it is difficult to identify an intermittent failure. In such a case duplicating the system malfunction during a test drive or a good description of vehicle behavior from the customer may be helpful in locating a "most likely" failed component or

5A-12 BRAKE CONTROL SYSTEM

circuit. The symptom diagnosis chart may also be useful in isolating the failure. Most intermittent problems are caused by faulty electrical connections or wiring. When an intermittent failure is encountered, check suspected circuits for damage:

- Suspected harness damage.
- Poor mating of connector halves or terminals not fully seated in the connector body (backed out).
- Improperly formed or damaged terminals.

Test Driving ABS Complaint Vehicles

In case of an intermittent ABS lamp illumination, see "Diagnosis by ABS Warning Light illumination Pattern" or go to 5A-37. In some cases, the vehicle may need to be test driven by following the test procedure below.

1. Start the engine and make sure that the "ABS" W/L goes OFF. If the W/L remains ON, it means that the Diagnostic Trouble Code (DTC) is stored. Therefore, read the code and locate the fault.

NOTE: The DTC cannot be cleared if the vehicle speed does not exceed 12 km/h (8 mph) at DTC, even though the repair operation is completed.

2. Start the vehicle and accelerate to about 30 km/h (19 mph) or more.
3. Slowly brake and stop the vehicle completely.
4. Then restart the vehicle and accelerate to about 40 km/h (25 mph) or more.
5. Brake at a time so as to actuate the ABS and stop the vehicle.
6. Be cautious of abnormality during the test. If the W/L is actuated while driving, read the DTC and locate the fault.
7. If the abnormality is not reproduced by the test, make best efforts to reproduce the situation reported by the customer.
8. If the abnormality has been detected, repair in accordance with the "SYMPTOM DIAGNOSIS".

NOTE:

- Be sure to give a test drive on a wide, even road with a small traffic.
- If an abnormality is detected, be sure to suspend the test and start trouble diagnosis at once.

"ABS" Warning Light

When ABS trouble occurs to actuate "ABS" warning light, the trouble code corresponding to the trouble is stored in the EHCUC. Only ordinary brake is available with ABS being unactuated. Even when "ABS" warning light is actuated, if the starter switch is set ON after setting it OFF once, the EHCUC checks up on the entire system and, if there is no abnormality, judges ABS to work currently and the warning light is lit normally even though the trouble code is stored.

NOTE: Illumination of the "ABS" warning light indicates that anti-lock braking is no longer available. Power assisted braking without anti-lock control is still available.

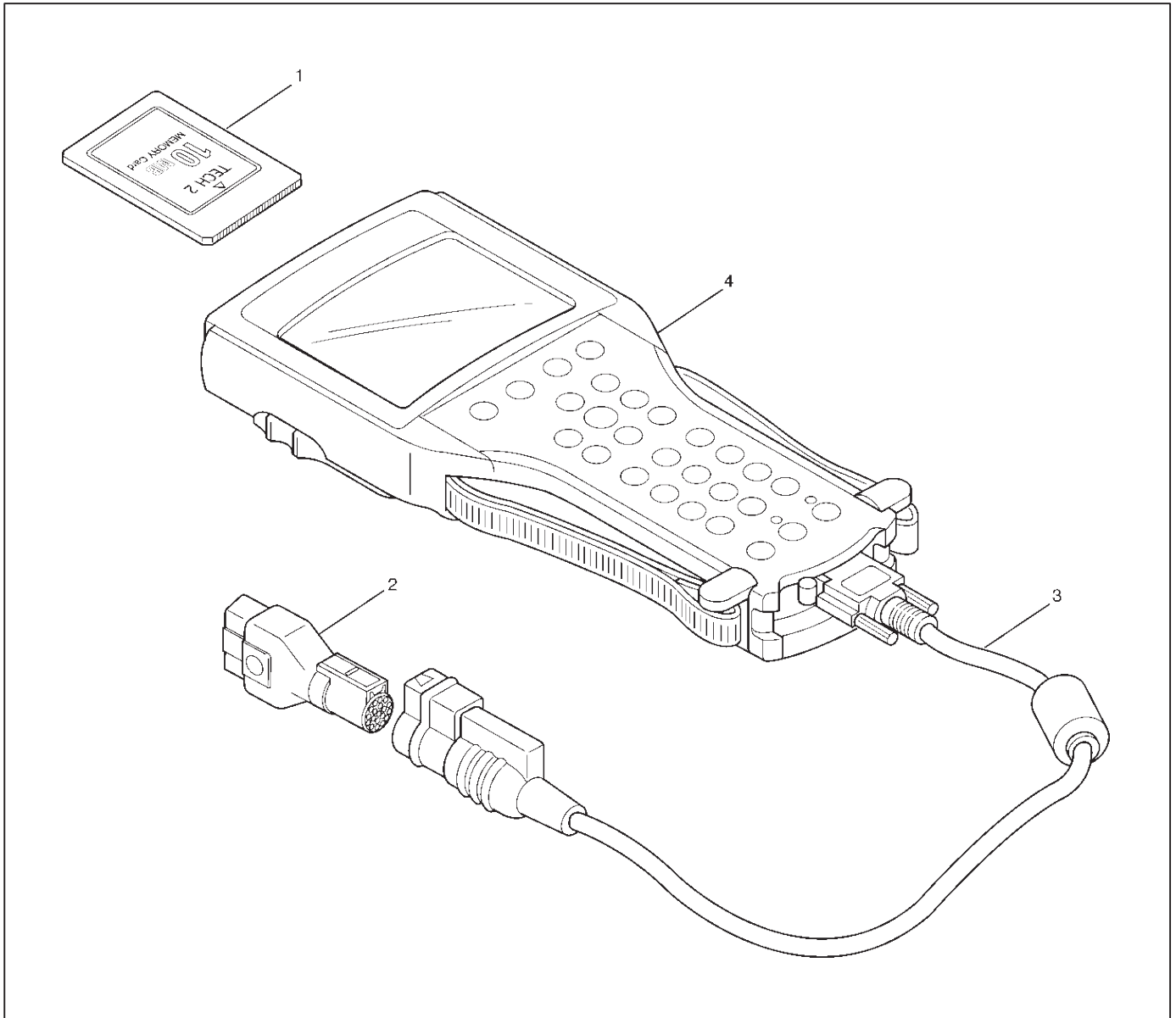
Normal Operation

"ABS" Warning Light

When the ignition is first moved from "OFF" to "RUN", the amber "ABS" warning light will turn "ON". The "ABS" warning light will turn "ON" during engine starting and will usually stay "ON" for approximately three seconds after the ignition switch is returned to the "ON" position. The warning light should remain "OFF" at all other times.

Tech 2 Scan Tool

From 98 MY, Isuzu dealer service departments are recommended to use Tech 2. Please refer to Tech 2 scan tool user guide.



901RW257

Legend

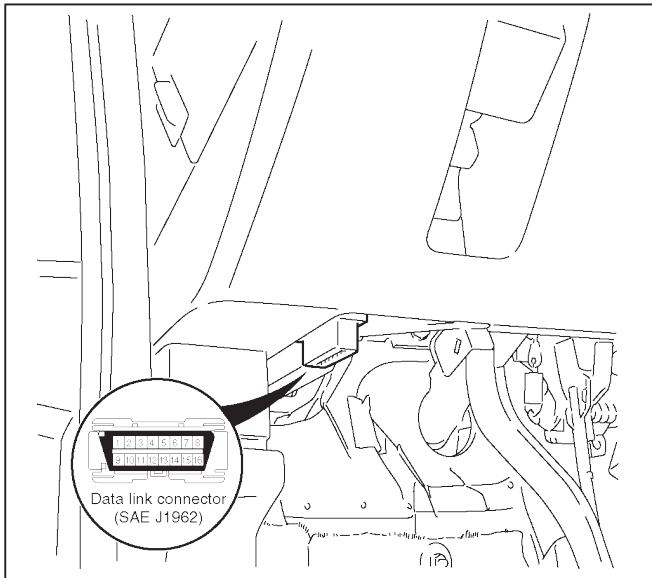
- (1) PCMCIA Card
- (2) SAE 16/19 Adaptor

- (3) DLC Cable
- (4) Tech-2

5A-14 BRAKE CONTROL SYSTEM

Getting Started

- Before operating the Isuzu PCMCIA card with the Tech 2, the following steps must be performed:
 - The Isuzu 98 System PCMCIA card (1) inserts into the Tech 2 (4).
 - Connect the SAE 16/19 adapter (2) to the DLC cable (3).
 - Connect the DLC cable to the Tech 2 (4).
 - Make sure the vehicle ignition is off.
 - Connect the Tech 2 SAE 16/19 adapter to the vehicle DLC.

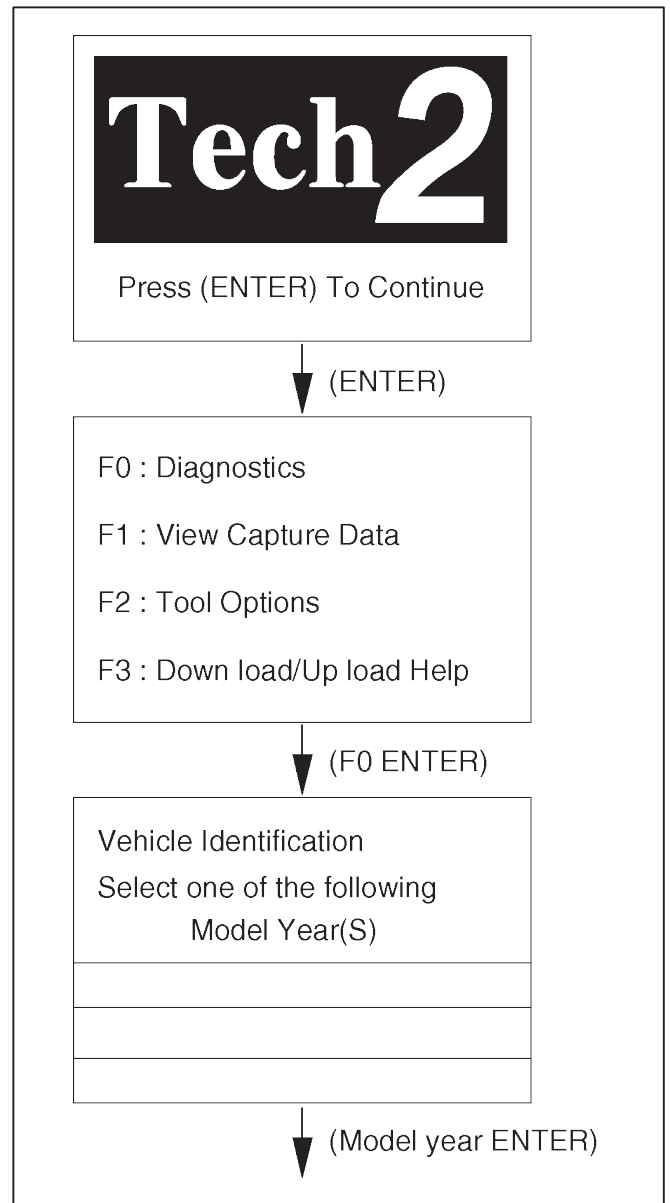


- The vehicle ignition turns on.
- Power up the Tech 2.
- Verify the Tech 2 power up display.

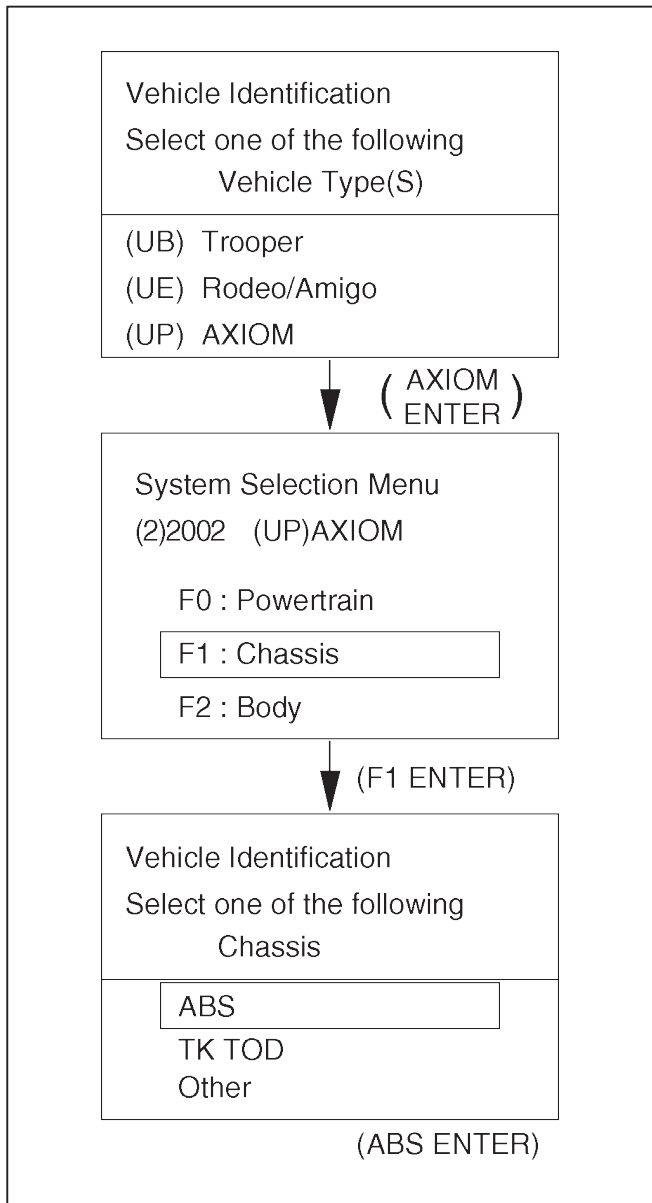


Operating Procedure

The power up screen is displayed when you power up the tester with the Isuzu systems PCMCIA card. Follow the operating procedure below.



060R100102



5A-16 BRAKE CONTROL SYSTEM

DATA LIST

The data displayed by DATA LIST are as follows:

Display	Content	OK/NG Criteria for Data
Front Left Wheel Speed Front Right Wheel Speed Rear Wheel Speeds	km/h (MPH)	● Start the vehicle and make sure of linear change in each wheel speed. ● Turn each wheel by hand and make sure that each speed data change.
Warning Lamp	ON/OFF	● To be OFF usually
ABS State	ON/OFF	● To be OFF usually
ABS Relay	Active/Inactive	● To be Active usually
4 Wheel Drive	Active/Inactive	● 2WD: Inactive ● 4WD: Active
Brake Switch	Active/Inactive	● Inactive (Released) ● Active (Pressed)
Brake Fluid Level	Normal or not	● To be Normal usually
Return Pump	Active/Inactive	● To be Inactive usually
DRP (Dynamic Rear Proportioning)	Active/Inactive	● To be Inactive usually
Rear Dump Valve Commanded	Active/Inactive	● To be Inactive usually
Rear Dump Valve Feedback		
Rear Isolation Valve Commanded		
Rear Isolation Valve Feedback		
FL Dump Valve Commanded	Active/Inactive	● To be Inactive usually
FL Dump Valve Feedback		
FL Isolation Valve Commanded		
FL Isolation Valve Feedback		
FR Dump Valve Commanded	Active/Inactive	● To be Inactive usually
FR Dump Valve Feedback		
FR Isolation Valve Commanded		
FR Isolation Valve Feedback		
G-Sensor	Voltage	● 2.50V when vehicle is stopped
Battery Voltage	Voltage	● Between 10-16.9V

ACTUATOR TEST

This mode is used to exercise the ABS actuators and make sure they operate normally. Prior to the test, pay attention to the cautions below. (When checking the solenoid valve system, be sure to jack up the vehicle.)

CAUTION:

- Before testing, be sure that the brakes work normally.
- Make sure that the battery is fully charged. Conduct the test by two persons (A TECH 2 operator and a vehicle checker).
- Be sure to start ACTUATOR TEST with the engine stopped.
- Before testing, make sure that electrical trouble, if any, has been completely repaired. Conducting tests of ABS solenoid with electrical circuit problem remaining uncorrected could damage the control unit.

Application Menu
F0: Diagnostic Trouble Codes
F1: Data Display
F2: Snapshot
F3: Actuator Test
F4: Miscellaneous Tests

Select "F3: Actuator Test" by function key from Application Menu, and push enter key.

Application Menu
F0: Return Pump Relay Test
F1: Front Left Solenoid Valve Test
F2: Front Right Solenoid Valve Test
F3: Rear Left Solenoid Valve Test
F4: Rear Left Solenoid Valve Test

Return Pump Relay Test:
Select "F0: Return Pump Relay Test" and push enter key.

Return Pump Relay Test	
(2) 2002 (UP) AXIOM	
Electronic System: ABS	
Front Left Wheel Speed	0 km/h
Front Right Wheel Speed	0 km/h
Rear Wheel Speeds	0 km/h
Warning Lamp	Off
ABS State	Off
ABS Relay	Active
4 Wheel Drive	Inactive
Return Pump	Inactive
Quit	On Off

Using soft key, check the return pump function.

5A-18 BRAKE CONTROL SYSTEM

Application Menu

F0: Return Pump Relay Test

F1: Front Left Solenoid Valve Test

F2: Front Right Solenoid Valve Test

F3: Rear Left Solenoid Valve Test

F4: Rear Right Solenoid Valve Test

Solenoid Valve Test:
Select required Solenoid Valve Test and
push the enter key.

Front Left Solenoid Valve Test

(2) 2002 (UP) AXIOM

Electronic System: ABS

Before Running this Test
See Checking Procedure !

Confirm

Push the soft key under "Confirm" box.

Release brake pedal.

Front Left Solenoid Valve Test

(2) 2002 (UP) AXIOM

Electronic System: ABS

Normal Function

Brake Switch | Inactive

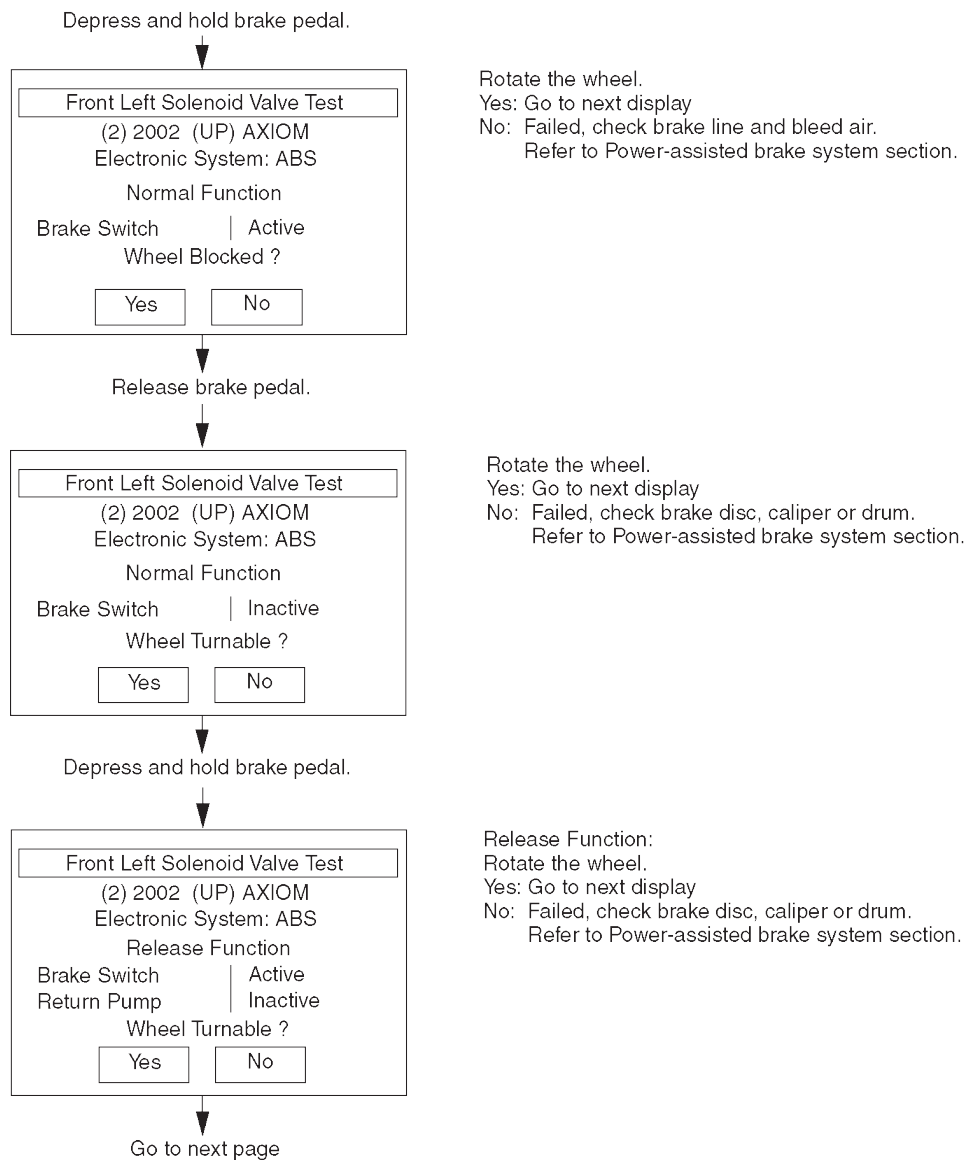
Wheel Turnable ?

Yes

No

Normal Function:
Rotate the wheel.
Yes: Go to next display
No: Failed, check hydraulic brake system.
Refer to Power-assisted brake system section.

Go to next page



Depress and hold brake pedal.

Front Left Solenoid Valve Test

(2) 2002 (UP) AXIOM

Electronic System: ABS

Normal Function

Brake Switch | Active

Wheel Blocked?

Yes

No

Reapply Function:
Rotate the wheel.
Yes: Go to next display
No: Failed, check brake line and bleed air.
Refer to Power-assisted brake system section.

Front Left Solenoid Valve Test

(2) 2002 (UP) AXIOM

Electronic System: ABS

Test passed successfully !

Confirm

Test completed.
To return Application Menu, push the soft key
under "Confirm" box.

Tech 2 Service Bleed

Application Menu
F0: Diagnostic Trouble Codes
F1: Data Display
F2: Snapshot
F3: Actuator Test
F4: Miscellaneous Tests

Select "F4: Miscellaneous Tests" by function key from Application Menu, and push enter key.
NOTE: Apply parking brake firmly while servicing.
When operate EHCU by using Tech 2, start the engine.

Application Menu
F0: Brake Bleed

Push enter key.

Brake Bleed
(2) 2002 (UP) AXIOM
Electronic System: ABS
1st Time
Perfome Manual Bleed Procedure Until Fluid Flows With No Air Present.
Continue

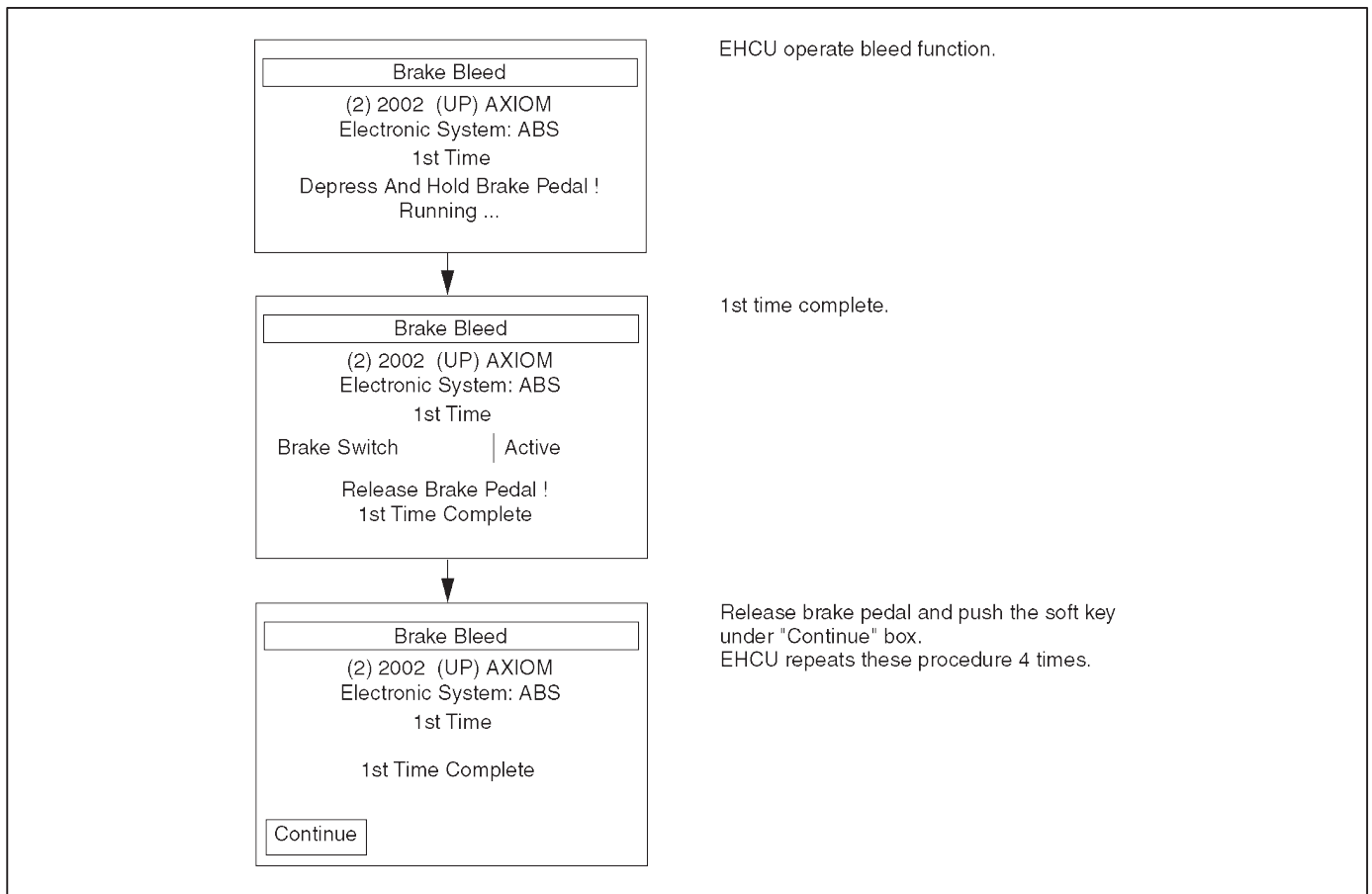
Push the soft key under "Continue" box.

Depress and hold brake pedal.

Brake Bleed
(2) 2002 (UP) AXIOM
Electronic System: ABS
1st Time
Depress And Hold Brake Pedal !
Activate
Yes No

To start brake bleed, push the soft key under "Yes" box.

5A-22 BRAKE CONTROL SYSTEM



F05R200006

Basic Diagnostic Flow Chart

Step	Action	Yes	No
1	1. Verify complaint with the customer. 2. Questioning to customer. 3. Basic inspection (Refer to <i>Basic inspection procedure</i>) Using TECH 2?	Go to Step 2	Go to Step 4
2	Verify DTC through: "F0: Diagnostic Trouble Codes." Is the DTC stored in the EHCUC?	Clear code and check for repeatability. Go to Step 3	Go to Step 5
3	1. Repair of faulty part. 2. Clear DTC. 3. Inspection of "ABS" W/L Illumination pattern with ignition SW "ON". 4. Test drive. Does trouble repeat?	Repeat the diagnosis if the symptom or DTC appears again Go to Step 1	Go to Step 5
4	Verify DTC through: "F0: Diagnostic Trouble Codes." Is the DTC stored in the EHCUC?	Clear code and check for repeatability Go to Step 3	Trouble diagnosis based on symptom (Refer to <i>Symptom Diagnosis</i>) Go to Step 3
5	1. Reconnect all components. Ensure that all component are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Finished	Go to Step 5

Basic Inspection Procedure

1. Basic Inspection of Service Brake

Step	Action	Yes	No
1	Is the fluid level normal?	Go to <i>Step 2</i>	Replenish with fluid Go to <i>Step 2</i>
2	Does fluid leak?	Repair Go to <i>Step 3</i>	Go to <i>Step 3</i>
3	Is the booster functioning properly?	Go to <i>Step 4</i>	Repair Go to <i>Step 4</i>
4	Is the pad and rotor within specs?	Go to <i>Step 5</i>	Repair Go to <i>Step 5</i>
5	Reconnect all components. Ensure all component are properly mounted. Was this step finished?	Finished	Go to <i>Step 5</i>

2. Ground Inspection

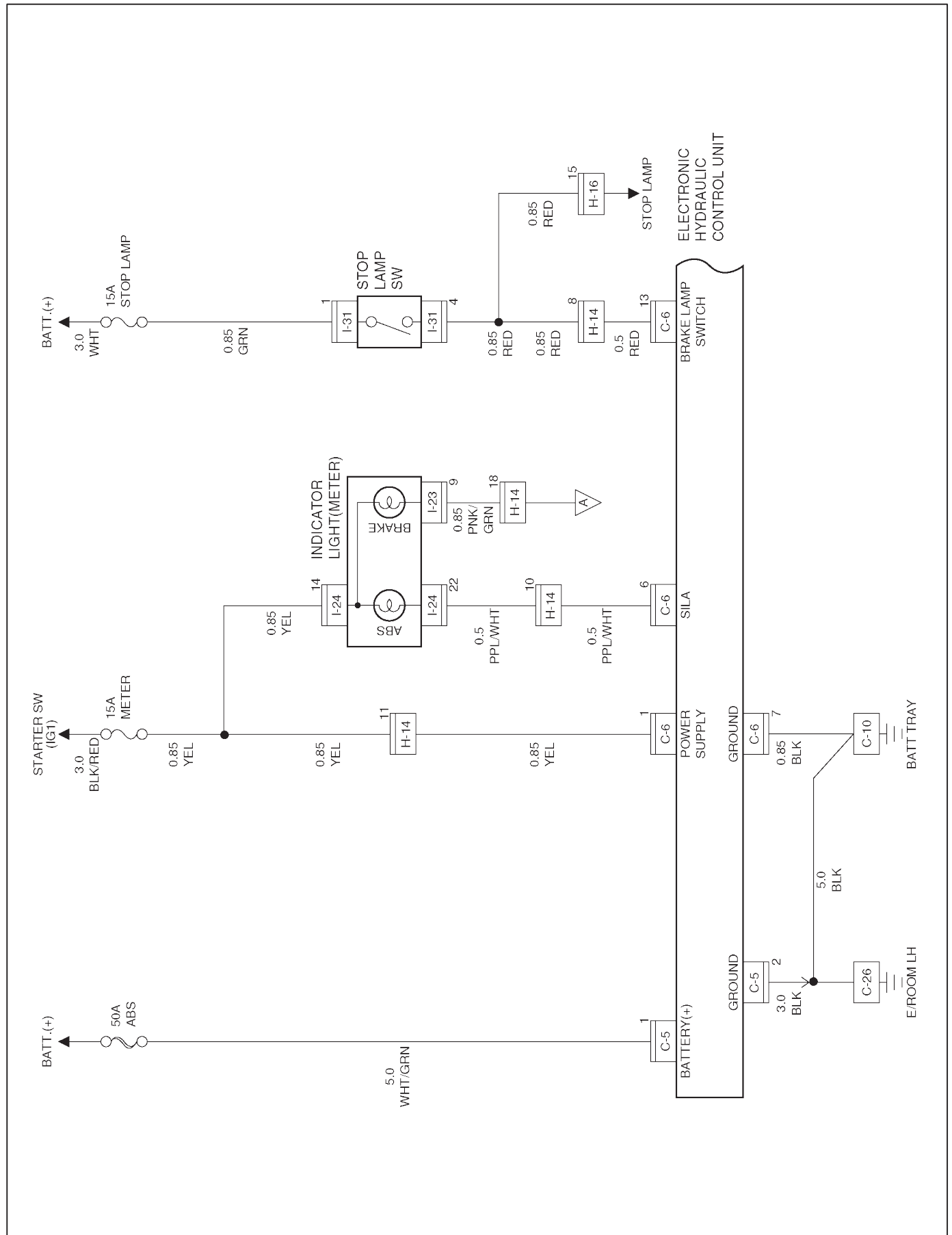
Step	Action	Yes	No
1	Is there good contact with the ABS ground points?	Go to <i>Step 2</i>	Repair Go to <i>Step 2</i>
2	Reconnect all components. Ensure that all component are properly mounted.	Finished	Go to <i>Step 2</i>

EHCUC Connector Pin-out Checks

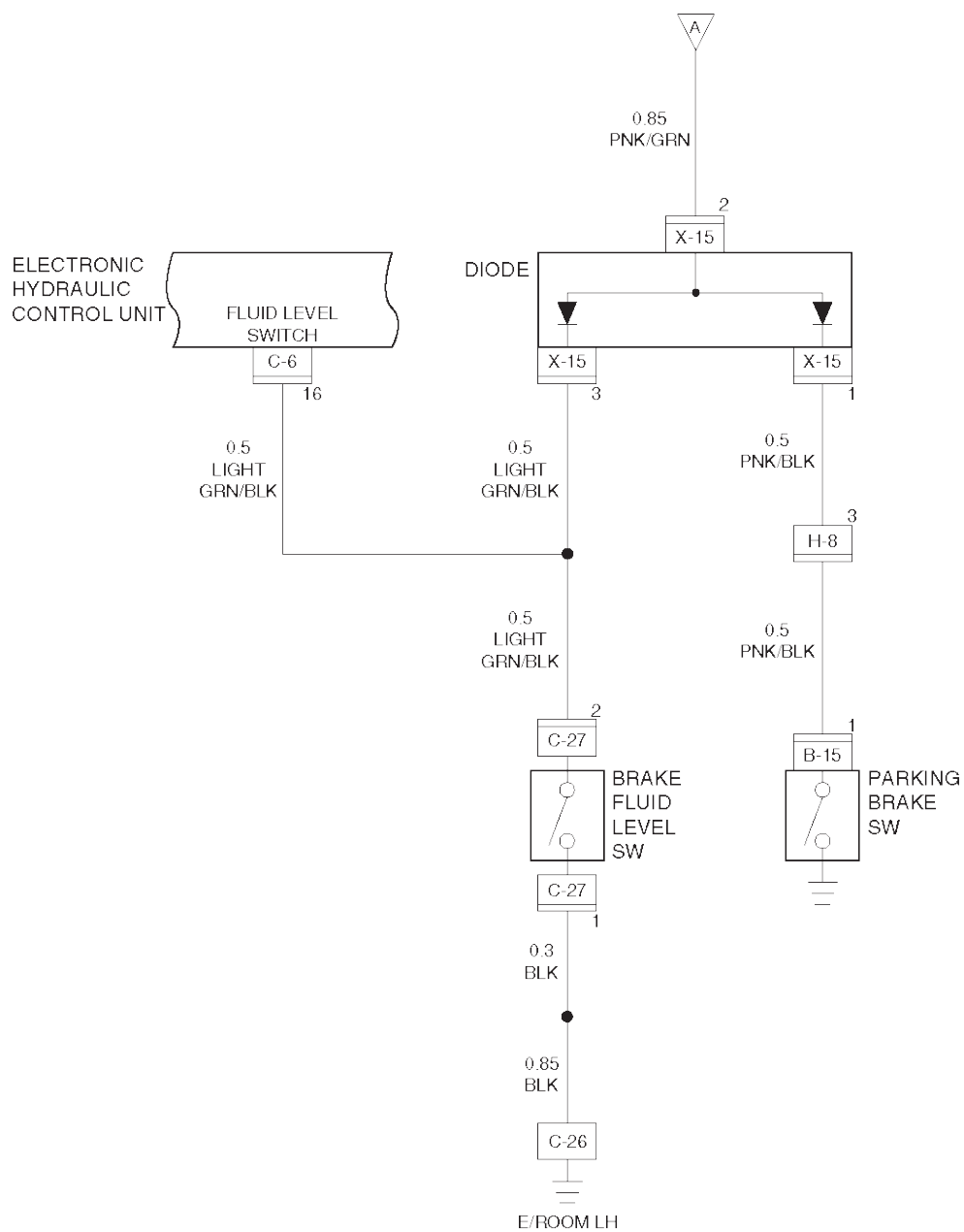
- Disconnect Electronic Hydraulic Control Module.
- Perform checks with high impedance digital multimeter J-39200 or equivalent.

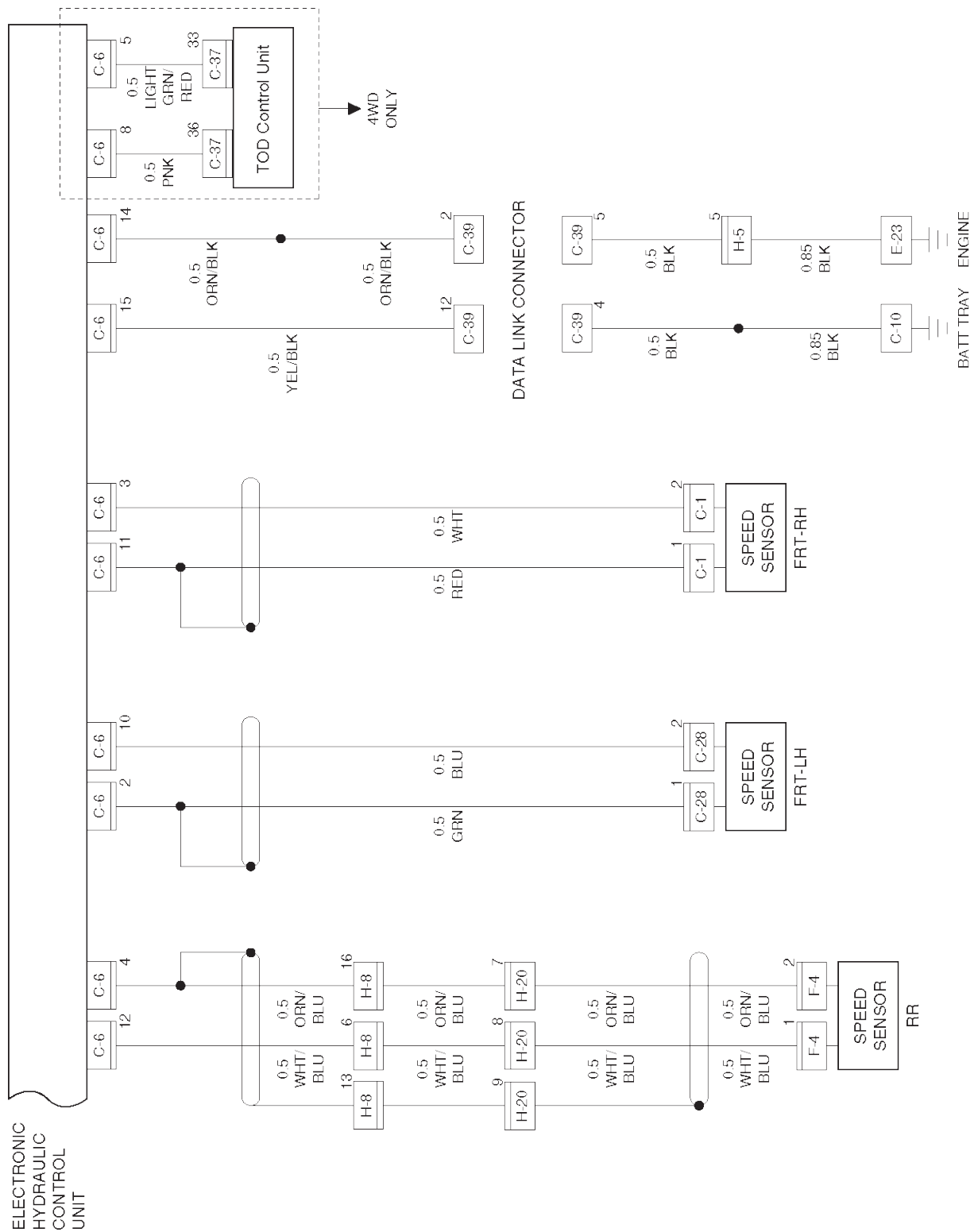
No.	Circuit to be Tested	Ignition Switch Position	Multimeter Scale/Range	Measure between Pin Number	Nominal Value	Note
1	Power supply	OFF	20DCV	1 (C-5) 2 (C-5)	11.5V to 14.5V	
2	Ignition enable	OFF	20DCV	1 (C-6) 7 (C-6)	0V to 0.1V	
		ON	20DCV	1 (C-6) 7 (C-6)	11.5V to 14.5V	
3	Stoplamp switch	OFF	20DCV	13 (C-6) 7 (C-6)	10.5V to 14.5V	Press brake pedal
4	Ground connection	OFF	200 Ω	7 (C-6) Ground	Less than 2 Ω	
		OFF	1 Ω	2 (C-5) Ground	Less than 0.2 Ω	
5	FL speed sensor	OFF	2k Ω	2 (C-6) 10 (C-6)	2.0k Ω to 2.8k Ω	Internal Resistance
		OFF	200k Ω	2 (C-6) 7 (C-6)	more than 100k Ω	Insulation Resistance
		OFF	200mACV	2 (C-6) 10 (C-6)	more than 200mV	Turn wheel at 1RPS
6	FR speed sensor	OFF	2k Ω	3 (C-6) 11 (C-6)	2.0k Ω to 2.8k Ω	Internal Resistance
		OFF	200k Ω	3 (C-6) 7 (C-6)	more than 100k Ω	Insulation Resistance
		OFF	200mACV	3 (C-6) 11 (C-6)	more than 200mV	Turn wheel at 1RPS
7	RR speed sensor	OFF	2k Ω	4 (C-6) 12 (C-6)	1.2k Ω to 2.0k Ω	Internal Resistance
		OFF	200k Ω	4 (C-6) 7 (C-6)	more than 100k Ω	Insulation Resistance
		OFF	200mACV	4 (C-6) 12 (C-6)	more than 200mV	Turn wheel at 1RPS

Circuit Diagram



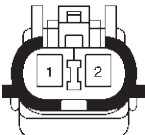
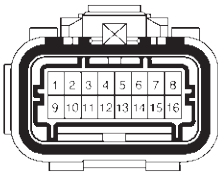
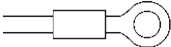
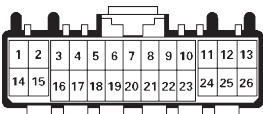
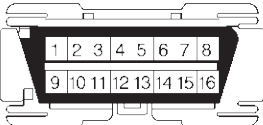
5A-26 BRAKE CONTROL SYSTEM

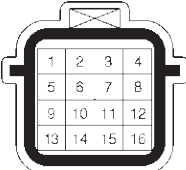
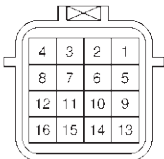
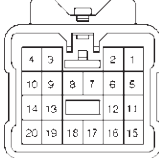
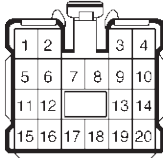
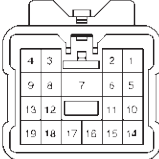
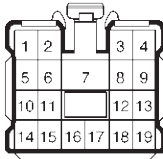
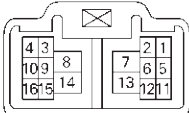
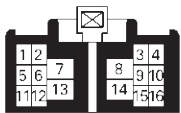
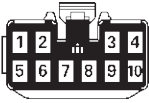
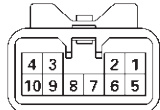
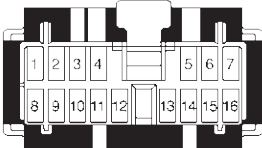
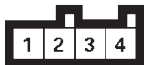




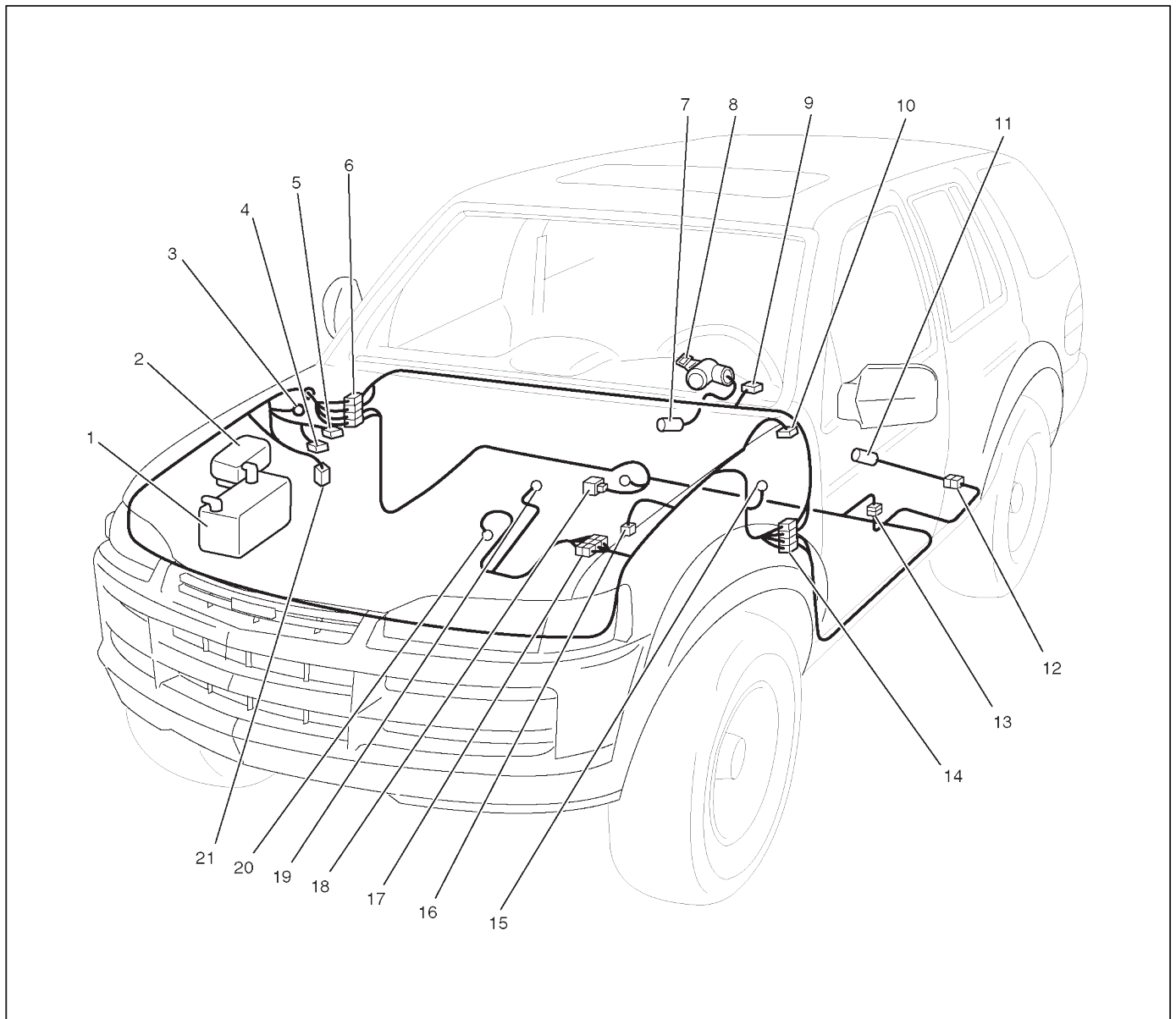
5A-28 BRAKE CONTROL SYSTEM

Connector List

No.	Connector face
B-15	
C-1 C-28	
C-5	
C-6	
C-10 C-16 E-23	
C-27	
C-37	
C-39	
F-4	

No.	Connector face
H-5	 
H-8	 
H-14	 
H-16	 
H-20	 
I-18	
I-23	
I-24	
X-15	

Part Location



810R200002

Legend

- | | |
|----------------------|-----------|
| (1) Battery | (9) I-24 |
| (2) Fuse & Relay Box | (10) C-39 |
| (3) C-16 | (11) F-4 |
| (4) C-5 | (15) C-10 |
| (5) C-6 | (16) C-28 |
| (6) H-8, 14 | (17) H-5 |
| (7) I-18 | (19) E-23 |
| (8) Starter Switch | (21) C-1 |

Symptom Diagnosis

The symptoms that cannot be indicated by warning light can be divided in the following five categories:

1. ABS works frequently but vehicle does not decelerate.
2. Uneven braking occurs while ABS works.
3. The wheels lock during braking.
4. Brake pedal feel is abnormal.
5. Braking sound (from EHCUC) is heard while not braking.

These are all attributed to problems which cannot be detected by EHCUC self-diagnosis. Use the customer complaint and test to determine which symptom is present. Then follow the appropriate flow chart listed below.

No.	Symptom	Diagnostic Flow Charts	
		Without TECH 2	With TECH 2
1	ABS works frequently but vehicle does not decelerate.	Chart A-1	Chart TA-1
2	Uneven braking occurs while ABS works.	Chart A-2	Chart TA-2
3	The wheels are locked.	Chart A-3	Chart TA-3
4	Brake pedal feel is abnormal.	Chart A-4	—
5	Braking sound (from EHCUC) is heard while not braking.	Chart A-5	Chart TA-5

Chart A-1 ABS Works Frequently But Vehicle Does Not Decelerate

Step	Action	Yes	No
1	Is braking force distribution normal between front and rear of vehicle?	Go to Step 2	Repair brake parts. Go to Step 7
2	Are axle parts installed normally?	Go to Step 3	Repair axle parts. Go to Step 7
3	Is there play in each or any wheel speed sensor?	Repair wheel speed sensor. Go to Step 7	Go to Step 4
4	Is there damage, or powdered iron sticking to each or any wheel speed sensor/sensor ring?	Replace or repair sensor or sensor ring. Go to Step 7	Go to Step 5
5	Is the output of each wheel speed sensor normal? (Refer to <i>Chart C-1 or TC-1</i>)	Go to Step 6	Replace wheel speed sensor or repair harness. Go to Step 7
6	Is the input of TOD control unit normal?	Go to Step 7	Replace TOD control unit or repair harness. Go to Step 7
7	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to Step 7

Chart TA-1 ABS Works Frequently But Vehicle Does Not Decelerate (Use TECH 2)

Step	Action	Yes	No
1	1. Connect TECH 2. 2. Make sure of the output conditions of each sensor. Is the output of each sensor normal?	Go to <i>Step 2</i>	Replace wheel speed sensor. Go to <i>Step 3</i>
2	Return to Chart A-1. Was the Chart A-1 finished?	Go to <i>Step 3</i>	Go to <i>Step 2</i>
3	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

Chart A-2 Uneven Braking Occurs While ABS Works

Step	Action	Yes	No
1	Is there play in each or any sensor?	Repair. Go to <i>Step 5</i>	Go to <i>Step 2</i>
2	Damage or powdered iron sticking to each or any sensor/sensor ring?	Repair. Go to <i>Step 5</i>	Go to <i>Step 3</i>
3	Is the output of each sensor normal? (Refer to <i>Chart C-1 or TC-1</i>)	Go to <i>Step 4</i>	Replace sensor or repair harness. Go to <i>Step 5</i>
4	Is brake pipe connecting order correct?	Replace H/U. Go to <i>Step 5</i>	Reconnect brake pipe correctly. Go to <i>Step 5</i>
5	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 5</i>

Chart TA-2 Uneven Braking Occurs While ABS Works (Use TECH 2)

Step	Action	Yes	No
1	1. Connect TECH 2. 2. Make sure of the output conditions of each sensor. Is the output of each sensor normal?	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	Check piping by TECH 2 ACTUATOR TEST Is the piping normal?	Replace EHC. U. Go to <i>Step 4</i>	Repair the pipe. Go to <i>Step 4</i>
3	Repair and check the wheel speed sensor (Refer to <i>Chart B-20 to B-23 , C-1 or TC-1</i>). Was the each chart finished?	Go to <i>Step 4</i>	Go to <i>Step 3</i>
4	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 4</i>

5A-32 BRAKE CONTROL SYSTEM**Chart A-3, TA-3 The Wheels Are Locked**

Step	Action	Yes	No
1	Is ABS working?	Go to <i>Step 2</i>	Go to <i>Step 4</i>
2	Is vehicle speed under 10 km/h (6mph)?	Go to <i>Step 3</i>	Normal.
3	Is sensor output normal? (Chart C-1 or TC-1)	Go to <i>Step 4</i>	Replace sensor or repair harness. Go to <i>Step 6</i>
4	Is front TOD control unit normal?	Go to <i>Step 5</i>	Replace TOD control unit or repair harness. Go to <i>Step 6</i>
5	Is hydraulic unit grounded properly?	Replace EHCUC. Go to <i>Step 6</i>	Repair. Go to <i>Step 6</i>
6	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 6</i>

Chart A-4 Brake Pedal Feed Is Abnormal

Step	Action	Yes	No
1	Is the stop light actuated when the brake pedal is depressed?	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	1. Turn the ignition switch off. 2. Disconnected EHCUC connector. Is the check voltage EHCUC connector terminals 13 to 7 when brake pedal is depressed than battery voltage?	Go to <i>Step 4</i>	Harness NG between brake SW and EHCUC. Go to <i>Step 6</i>
3	Is stop light fuse normal?	Go to <i>Step 5</i>	Replace stop light fuse. Go to <i>Step 6</i>
4	Is the check continuity between EHCUC connector terminals, 7 to body grounded?	Go to <i>Step 6</i>	Repair body grounded harness. Go to <i>Step 6</i>
5	Is brake SW normal?	Repair stop light harness. Go to <i>Step 6</i>	Replace brake SW. Go to <i>Step 6</i>
6	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 6</i>

Chart A-5, TA-5 Braking Sound (From EHCU) Is Heard While Not Braking

Step	Action	Yes	No
1	Is this the first vehicle start after engine start?	Normal. (It is self checking sound.)	Go to <i>Step 2</i>
2	Is vehicle speed under 10 km/h (6 mph)?	Normal. (It is self checking sound.)	Go to <i>Step 3</i>
3	Check for the following condition: • At the time of shift down or clutch operation. • At the time of low road friction drive (ice or snow road) or rough road drive. • At the time of high-speed turn. • At the time of passing curb. • At the time of operating electrical equipment switches. • At the time of racing the engine (over 5000 rpm). Did it occur under any one condition above?	ABS may sometimes be actuated even when brake pedal is not applied.	Go to <i>Step 4</i>
4	Is there play in each or any sensor/wheel speed sensor rings?	Repair. Go to <i>Step 7</i>	Go to <i>Step 5</i>
5	Damage or powdered iron sticking to each or any sensor/wheel speed sensor ring?	Repair. Go to <i>Step 7</i>	Go to <i>Step 6</i>
6	Is each sensor output normal? (Refer to <i>Chart C-1</i> or <i>TC-1</i>).	Check harness/connector for suspected disconnection If no disconnection is found, replace Coil integrated module. Go to <i>Step 7</i>	Repair. Go to <i>Step 7</i>
7	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 7</i>

5A-34 BRAKE CONTROL SYSTEM**Diagnostic Trouble Codes**

Choose and trace an appropriate flowchart by the numbers listed below to find fault and repair.

Code		Diagnosis	Item	Chart No.
Flash out	Serial Communications			
12	—	—	—	—
13	C0285	2 WD Controller in 4WD Vehicle Controller	Wiring	B-8
14	C0271	RAM read/write error	Coil Integrated Module	B-2
	C0272	ROM checksum error		
	C0270	ALU function error		
	C0273	Inoperative isolation item		
	C0284	Loop time overrun		
15	C0277	Low ignition voltage	Wiring	B-3
	C0278	High ignition voltage		
17	C0269	Excessive dump time	Coil Integrated Module	B-4
18	C0274	Excessive isolation time		B-5
21	C0276	G-Sensor Failure		B-6
22	C0281	Brake switch Failure		B-7
24	C0282	Open or shorted 4×4 input signal (4WD only)	Wiring	B-8
32	C0267	Open motor circuit or shorted ECU output	Motor	B-9
	C0268	Stalled motor or open ECU output		
35	C0265	Open relay circuit	Relay	B-10
	C0266	Shorted relay circuit		
41	C0245	FL Open isolation solenoid or shorted ECU output	Solenoid	B-11
	C0247	FL Shorted isolation solenoid or open ECU output		
42	C0246	FL Open dump solenoid or shorted ECU output		B-12
	C0248	FL Shorted dump solenoid or open ECU output		
43	C0241	FR Open isolation solenoid or shorted ECU output		B-13
	C0243	FR Shorted isolation solenoid or open ECU output		
44	C0242	FR Open dump solenoid or shorted ECU output		B-14
	C0244	FR Shorted dump solenoid or open ECU output		
45	C0251	Rear Open isolation solenoid or shorted ECU output		B-15
	C0253	Rear Shorted isolation solenoid or open ECU output		
46	C0252	Rear Open dump solenoid or shorted ECU output		B-16
	C0254	Rear Shorted dump solenoid or open ECU output		

Code		Diagnosis	Item	Chart No.
Flash out	Serial Communications			
51	C0225	FL Open or shorted sensor	Sensor or Wiring	B-17
52	C0221	FR Open or shorted sensor		B-18
53	C0235	Rear Open or shorted sensor		B-19
61	C0226	FL Missing sensor signal		B-20
	C0227	FL Sensor signal dropout		
62	C0222	FR Missing sensor signal		B-21
	C0223	FR Sensor signal dropout		
63	C0236	Rear Missing sensor signal		B-22
	C0237	Rear Sensor signal dropout		
64	C0229	Simultaneous dropout of front sensor signal		B-23
65	C0238	Wheel speed error	Vehicle or Sensor	B-24
—	C0286	Shorted indicator lamp	Wiring	—

Diagnosis By “ABS” Warning Light Illumination Pattern

In the event that there is abnormality in the “ABS” warning light illumination pattern while the key is in the ON position or if the warning light is actuated while driving, refer to the flow chart below for the correct diagnostic procedure.

No.	Condition	“ABS” Warning Light Illumination Pattern	Diagnostic
1	Warning light is actuated normally	Warning light ON OFF Starter SW ON OFF Still not lit during driving	Normal
2	Warning light is not lit	Warning light ON OFF Starter SW ON OFF	Warning light lighting circuit trouble→Go to Chart B-1
3	Warning light remains ON	Warning light ON OFF Starter SW ON OFF	Diagnostic trouble codes are stored. Display diagnostic trouble codes and diagnose on a code basis according to the flow charts.
4	Warning light is actuated while driving	Warning light ON OFF Starter SW ON OFF During driving	Diagnostic trouble codes are stored. Display diagnostic trouble codes and diagnose on a code basis according to the flow charts.
5	Warning light goes at 12 km/h (8 mph) or higher (After repairing the faulty part)	Warning light ON OFF Starter SW ON OFF Speed 0 kph 12 km/h (8 mph)	Even after repairing the faulty part the warning light (W/L) dose not go out if vehicle is at a stop. Turn the ignition switch to the ON position and drive the vehicle at 12 km/h (8 mph) or higher to make sure that the warning light goes out.

Diagnostic Trouble Codes (DTCs)

When the warning light in the meter remains ON, the EHCU stores the fault identification and disables the ABS.

How to display and erase DTCs:

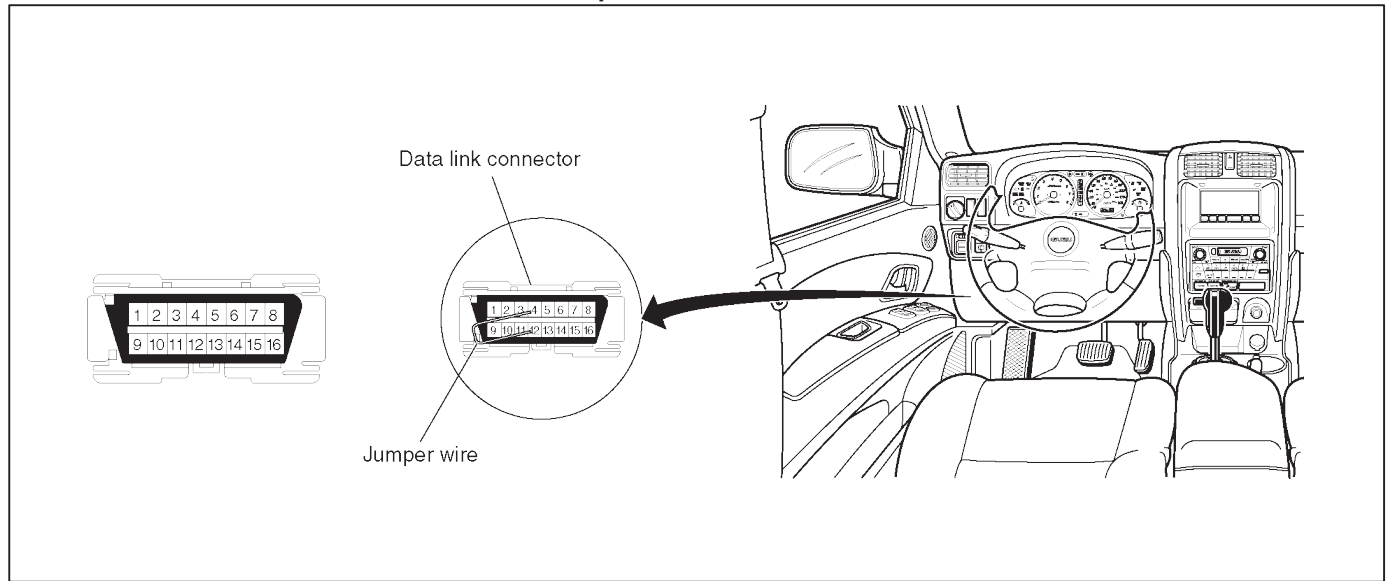
NOTE:

- DTCs can be displayed also by TECH 2. Use "Diagnostic Trouble Codes" mode.

1. How to start DTC display:

- Confirm that the vehicle has come to a complete stop (with the wheels standing still) and that the brake pedal is not depressed. (Unless these two condition are satisfied, DTC display cannot be started.)
- With IGN OFF, connect #12 terminal with #4 terminal or #5 terminal (GND) . Then turn IGN ON.

The DLC is located behind the driver side kick panel



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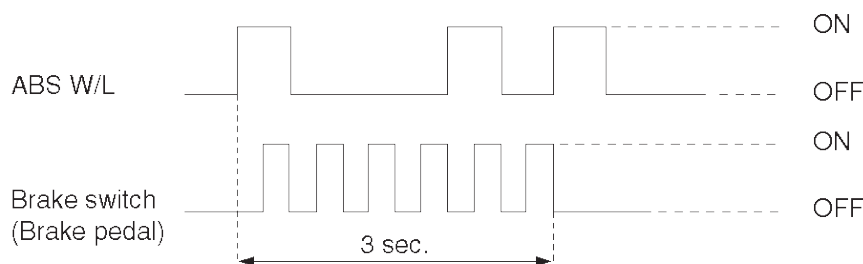
- Keep #12 terminal connected with #4 terminal or #5 terminal (GND) during DTC display. (If #12 terminal is separated from #4 terminal or #5 terminal (GND) during display, display will stop.)

2. DTC display:

- DTC is displayed by blinking warning light.
- Double-digit display.
- First, normal DTC 12 is displayed three times and then any other DTCs are displayed three times. (If no other DTCs have been stored, the display of DTC 12 will be repeated.)

3. How to erase code:

- Conduct brake switch ON/OFF operation 6 or more times within 3 seconds of self-diagnosis startup.
- The code cannot be erased if more than 3 seconds have passed since self-diagnosis startup, or if self-diagnosis has started with brake switched on (brake pedaled).



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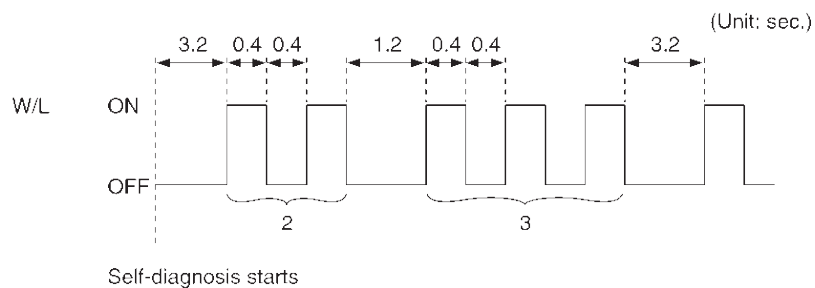
5A-38 BRAKE CONTROL SYSTEM

4. Notes

- If the following should occur during Diagnostic Trouble Code (DTC) display, the display will be discontinued. After initial check, the status that is under the control of ABS will be returned :
 - The vehicle starts (The wheels turn) or the brake pedal is depressed.
- Up to 3 different codes can be stored.
- If the ABS should turn OFF due to an intermittent defect, the system will be restored at the next key cycle, if the initial check finds no abnormality (when IGN is switched from OFF to ON).

5. An example of DTC display

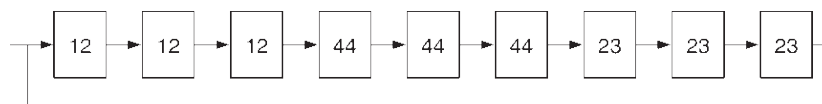
<Display of DTC 23>



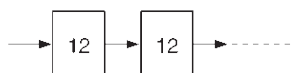
B05R100001

After displaying DTC 12 three times, one DTC after another is displayed, starting with the most recent one. (However, display is discontinued after about 5 minutes.)

<In case where there are two or more DTCs: 44 & 23>



<In case no DTC has been stored>



B05R100002

The DTC 12 is displayed repeatedly. (display is discontinued after about 5 minutes after)

Chart B-1 With the key in the ON position (Before starting the engine). Warning light (W/L) is not activated.

Step	Action	Yes	No
1	Is W/L fuse disconnected?	Replace fuse. Go to <i>Step 5</i>	Go to <i>Step 2</i>
2	Is W/L burnt out?	Replace W/L bulb. Go to <i>Step 5</i>	Go to <i>Step 3</i>
3	1. Turn the key off. 2. Disconnect coil integrated module connector (C-6). 3. Turn the key ON. Is the check voltage between coil integrated module connector (C-6) terminals 6 and 7 the battery voltage?	Go to <i>Step 4</i>	Repair harness and connector. Go to <i>Step 5</i>
4	Is there the continuity between coil integrated module connector (C-6) terminals, 1 and 7 and body ground.	Check harness for suspected disconnection No fault found: Replace EHCUC. Go to <i>Step 5</i>	Repair harness and connector. Go to <i>Step 5</i>
5	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 5</i>

Chart B-2 CPU Error (DTC 14 (Flash out) / C0271, C0272, C0273, C0284 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Inspect coil integrated module ground. Is there the continuity between the coil integrated module connector terminals, 2 (C-5) and 7 (C-6) and body ground?	Go to <i>Step 2</i>	Repair the body ground harness. Go to <i>Step 3</i>
2	1. Turn the key off, connect the coil integrated module connector. 2. Erase the trouble code. 3. Turn Ignition off, then on, to perform system self-check. 4. If warning light remains on, display trouble codes once again. Is the trouble code the DTC 14 (Flash out) / C0271, C0272, C0273, C0284 (Serial communications)?	Replace EHCUC. Go to <i>Step 3</i>	Inspect in accordance with the DTC displayed.
3	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

5A-40 BRAKE CONTROL SYSTEM**Chart B-3 Low or High Ignition Voltage (DTC 15 (Flash out) / C0277, 0278 (Serial communications))**

Step	Action	Yes	No
1	Is the battery voltage normal? (Battery capacity check)	Go to <i>Step 2</i>	Charge or replace battery. Go to <i>Step 2</i>
2	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Turn the key on. Is the voltage between coil integrated module connector (C-6) terminals 1 and 7, higher than 10V?	Check harness connector for suspected disconnection Fault found: Repair, and perform system self-check No fault found: replace EHCU. Go to <i>Step 3</i>	Repair harness or connector. Go to <i>Step 3</i>
3	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

Chart B-4 Excessive Dump Time (DTC 17 (Flash out) / C0269 (Serial communications))

Step	Action	Yes	No
1	Check for anything causing extended ABS activation, such as locked brakes or an erratic speed sensor signal. Was a problem found?	Repair or Replace	Go to <i>Step 2</i>
2	1. The key turned off. 2. Replace EHCU. 3. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 2</i>

Chart B-5 Excessive Isolation Time (DTC 18 (Flash out) / C0274 (Serial communications))

Step	Action	Yes	No
1	Check for anything causing extended ABS activation, such as locked brakes or an erratic speed sensor signal. Was a problem found?	Repair or Replace	Go to <i>Step 2</i>
2	1. The key turned off. 2. Replace EHCU. 3. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 2</i>

Chart B-6 G-Sensor Output Failure (DTC 21 (Flash out) / C0276 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Replace EHCUC. 3. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 1</i>

Chart B-7 Brake Switch Failure (DTC 22 (Flash out) / C0281 (Serial communications))

Step	Action	Yes	No
1	Is the stop light actuated when the brake pedal is depressed?	Go to <i>Step 2</i>	Go to <i>Step 4</i>
2	1. Turn the key off. 2. Disconnected coil integrated module connector. Is the check voltage between coil integrated module connector (C-6) terminals 13 to 7 when brake pedal is depressed the battery voltage?	Go to <i>Step 3</i>	Harness between brake SW and coil integrated module is faulty. Go to <i>Step 6</i>
3	Is the check that pins C-5 connector 2, and C-6 connector 7 have good ground?	Check harness / connector for disconnection Fault found: Repair, and perform system self-check. No fault found: replace EHCUC. Go to <i>Step 6</i>	Repair. Go to <i>Step 6</i>
4	Is stop light fuse normal?	Go to <i>Step 5</i>	Replace. Go to <i>Step 6</i>
5	Is brake SW normal?	Abnormal harness in stop light circuit. Repair the harness. Go to <i>Step 6</i>	Replace. Go to <i>Step 6</i>
6	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 6</i>

5A-42 BRAKE CONTROL SYSTEM**Chart B-8 2WD Controller in 4WD Vehicle Controller (DTC 13 (Flash out) / C0285 (Serial communications)), 4WD State Input Signal Failure (DTC 24 (Flash out) / C0282 (Serial communications))**

Step	Action	Yes	No
1	Remove coil integrated module connector. Is the coil integrated module connector (C-6) terminal 8 line normally?	Go to <i>Step 2</i>	Repair. Go to <i>Step 3</i>
2	Is the TOD control unit normally?	Replace EHCUC. Go to <i>Step 3</i>	Replace TOD control unit. Go to <i>Step 3</i>
3	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

Chart B-9 Pump Motor Failure (DTC 32 (Flash out) / C0267, C0268 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the voltage between terminal 1 of the coil integrated module connector (C-5) and body ground. Is the voltage equal to the battery voltage?	Go to <i>Step 2</i>	Repair fuse/harness between battery and coil integrated module connector (C-5) terminal 1. Go to <i>Step 5</i>
2	Is the harness from the hydraulic unit connected to the coil integrated module connector?	Go to <i>Step 3</i>	Connect to the connector. Go to <i>Step 3</i>
3	Is the hydraulic unit harness in good condition?	Go to <i>Step 4</i>	Replace EHCUC. Go to <i>Step 5</i>
4	Is the resistance of hydraulic unit connector terminals 1 and 2 between 0.2 and 1.0 ohms?	Replace EHCUC. Go to <i>Step 5</i>	Replace EHCUC. Go to <i>Step 5</i>
5	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 5</i>

Chart B-10 EHCUC Valve Relay Failure (DTC 35 (Flash out) / C0265, C0266 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the voltage between terminal 1 of the coil integrated module connector (C-5) and body ground. Is the voltage equal to the battery voltage?	Replace EHCUC. Go to <i>Step 2</i>	Repair fuse and harness between coil integrated module connector (C-5) terminal 1 and battery. Go to <i>Step 2</i>
2	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 2</i>

Chart B-11 FL Isolation Solenoid Coil Failure (DTC 41 (Flash out) / C0245, C0247 (Serial communications))

Step	Action	Yes	No
1	Was the "EHCUC Connector Pin-out Checks" performed?	Go to <i>Step 2</i>	Go to "EHCUC Connector Pin-out Checks."
2	1. Turn the key switch to off. 2. Disconnect the 2-way EHCUC connector (C-5) from the EHCUC. 3. Inspect the connector for damage or corrosion. Is the connector free from damage or corrosion?	Go to <i>Step 3</i>	Repair the connector. Repeat the "Basic Diagnostic Flow Chart."
3	1. Replace the Coil Integrated Module. 2. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

Chart B-12 FL Dump Solenoid Coil Failure (DTC 42 (Flash out) / C0246, C0248 (Serial communications))

Step	Action	Yes	No
1	Was the "EHCUC Connector Pin-out Checks" performed?	Go to <i>Step 2</i>	Go to "EHCUC Connector Pin-out Checks."
2	1. Turn the key switch to off. 2. Disconnect the 2-way EHCUC connector (C-5) from the EHCUC. 3. Inspect the connector for damage or corrosion. Is the connector free from damage or corrosion?	Go to <i>Step 3</i>	Repair the connector. Repeat the "Basic Diagnostic Flow Chart."
3	1. Replace the Coil Integrated Module. 2. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

5A-44 BRAKE CONTROL SYSTEM**Chart B-13 FR Isolation Solenoid Coil Failure (DTC 43 (Flash out) / C0241, C0243 (Serial communications))**

Step	Action	Yes	No
1	Was the "EHCU Connector Pin-out Checks" performed?	Go to Step 2	Go to "EHCU Connector Pin-out Checks."
2	1. Turn the key switch to off. 2. Disconnect the 2-way EHCU connector (C-5) from the EHCU. 3. Inspect the connector for damage or corrosion. Is the connector free from damage or corrosion?	Go to Step 3	Repair the connector. Repeat the "Basic Diagnostic Flow Chart."
3	1. Replace the Coil Integrated Module. 2. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to Step 3

Chart B-14 FR Dump Solenoid Coil Failure (DTC 44(Flash out) / C0242, C0244 (Serial communications))

Step	Action	Yes	No
1	Was the "EHCU Connector Pin-out Checks" performed?	Go to Step 2	Go to "EHCU Connector Pin-out Checks."
2	1. Turn the key switch to off. 2. Disconnect the 2-way EHCU connector (C-5) from the EHCU. 3. Inspect the connector for damage or corrosion. Is the connector free from damage or corrosion?	Go to Step 3	Repair the connector. Repeat the "Basic Diagnostic Flow Chart."
3	1. Replace the Coil Integrated Module. 2. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to Step 3

Chart B-15 Rear Isolation Solenoid Coil Failure (DTC 45 (Flash out) / C0251, C0253 (Serial communications))

Step	Action	Yes	No
1	Was the "EHCU Connector Pin-out Checks" performed?	Go to Step 2	Go to "EHCU Connector Pin-out Checks."
2	1. Turn the key switch to off. 2. Disconnect the 2-way EHCU connector (C-5) from the EHCU. 3. Inspect the connector for damage or corrosion. Is the connector free from damage or corrosion?	Go to Step 3	Repair the connector. Repeat the "Basic Diagnostic Flow Chart."
3	1. Replace the Coil Integrated Module. 2. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to Step 3

Chart B-16 Rear Dump Solenoid Coil Failure (DTC 46 (Flash out) / C0252, C0254 (Serial communications))

Step	Action	Yes	No
1	Was the "EHCU Connector Pin-out Checks" performed?	Go to Step 2	Go to "EHCU Connector Pin-out Checks."
2	1. Turn the key switch to off. 2. Disconnect the 2-way EHCU connector (C-5) from the EHCU. 3. Inspect the connector for damage or corrosion. Is the connector free from damage or corrosion?	Go to Step 3	Repair the connector. Repeat the "Basic Diagnostic Flow Chart."
3	1. Replace the Coil Integrated Module. 2. Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to Step 3

Chart B-17 FL Speed Sensor Open or Shorted (DTC 51 (Flash out) / C0225 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the resistance between coil integrated module connector (C-6) terminals 2 and 10. Is the resistance between 2.0k and 2.8k ohms?	Check for faults in harness between speed sensor and coil integrated module. Fault found: Repair, and perform system self-check. No fault found: Replace coil integrated module. Go to Step 3	Go to Step 2
2	Measure the FL speed sensor resistance at the sensor connector. Is the resistance between 2.0k and 2.8k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to Step 3	Replace sensor. Go to Step 3
3	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to Step 3

5A-46 BRAKE CONTROL SYSTEM

Chart B-18 FR Speed Sensor Open or Shorted (DTC 52 (Flash out) / C0221 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the resistance between coil integrated module connector (C-6) terminals 3 and 11. Is the resistance between 2.0k and 2.8k ohms?	Check for faults in harness between speed sensor and coil integrated module. Fault found: Repair, and perform system self-check. No fault found: Replace coil integrated module. Go to <i>Step 3</i>	Go to <i>Step 2</i>
2	Measure the FR speed sensor resistance at the sensor connector. Is the resistance between 2.0k and 2.8k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to <i>Step 3</i>	Replace sensor. Go to <i>Step 3</i>
3	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

Chart B-19 Rear Speed Sensor Open or Shorted (DTC 53 (Flash out) / C0235 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the resistance between coil integrated module connector (C-6) terminals 4 and 12. Is the resistance between 1.0k and 1.7k ohms?	Check for faults in harness between speed sensor and coil integrated module. Fault found: Repair, and perform system self-check. No fault found: Replace EHCUC. Go to <i>Step 3</i>	Go to <i>Step 2</i>
2	Measure the Rear speed sensor resistance at the sensor connector. Is the resistance between 1.0k and 1.7k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to <i>Step 3</i>	Replace sensor. Go to <i>Step 3</i>
3	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

5A-48 BRAKE CONTROL SYSTEM
Chart B-20 FL Speed Sensor Missing Signal (DTC 61 (Flash out) / C0226, C0227 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the FL speed sensor resistance between coil integrated module connector (C-6) terminals 2 and 10. Is the resistance between 2.0k and 2.8k ohms?	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	Is there play sensor/sensor rotor?	Repair. Go to <i>Step 6</i>	Go to <i>Step 4</i>
3	Measure the FL speed sensor resistance at the sensor connector. Is the resistance between 2.0k and 2.8k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to <i>Step 6</i>	Replace sensor. Go to <i>Step 6</i>
4	Damage and powdered iron sticking to sensor/sensor ring?	Repair. Go to <i>Step 6</i>	Go to <i>Step 5</i>
5	Is sensor output normal? (Chart C-1-1 or TC-1)	Check for faults in harness between speed sensor and coil integrated module. Fault found: repair, and perform system self-check. No fault found: replace EHC. Go to <i>Step 6</i>	Replace sensor. Go to <i>Step 6</i>
6	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 6</i>

NOTE: Even after repairing the faulty part the warning light (W/L) does not go out if the vehicle is at a stop. Turn the ignition switch to the ON position and drive the vehicle at 12 km/h (8 mph) or higher to make sure that the warning light goes out.

Chart B-21 FR Speed Sensor Missing Signal (DTC 62 (Flash out) / C0222, C0223 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the FR speed sensor resistance between coil integrated module connector (C-6) terminals 3 and 11. Is the resistance between 2.0k and 2.8k ohms?	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	Is there play sensor/sensor rotor?	Repair. Go to <i>Step 6</i>	Go to <i>Step 4</i>
3	Measure the FR speed sensor resistance at the sensor connector. Is the resistance between 2.0k and 2.8k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to <i>Step 6</i>	Replace sensor. Go to <i>Step 6</i>
4	Damage and powered iron sticking to sensor/sensor ring?	Repair. Go to <i>Step 6</i>	Go to <i>Step 5</i>
5	Is sensor output normal? (Chart C-1-2 or TC-1)	Check for faults in harness between speed sensor and coil integrated module. Fault found: repair, and perform system self-check. No fault found: replace EHC. Go to <i>Step 6</i>	Replace sensor. Go to <i>Step 6</i>
6	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 6</i>

NOTE: Even after repairing the faulty part the warning light (W/L) does not go out if the vehicle is at a stop. Turn the ignition switch to the ON position and drive the vehicle at 12 km/h (8 mph) or higher to make sure that the warning light goes out.

5A-50 BRAKE CONTROL SYSTEM

Chart B-22 Rear Speed Sensor Missing Signal (DTC 63 (Flash out) / C0236, C0237 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the Rear speed sensor resistance between coil integrated module connector (C-6) terminals 4 and 12. Is the resistance between 1.0k and 1.7k ohms?	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	Is there play sensor/sensor rotor?	Repair. Go to <i>Step 6</i>	Go to <i>Step 4</i>
3	Measure the rear speed sensor resistance at the sensor connector. Is the resistance between 1.0k and 1.7k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to <i>Step 6</i>	Replace sensor. Go to <i>Step 6</i>
4	Damage and powered iron sticking to sensor/sensor ring?	Repair. Go to <i>Step 6</i>	Go to <i>Step 5</i>
5	Is sensor output normal? (Chart C-1-3 or TC-1)	Check for faults in harness between speed sensor and coil integrated module. Fault found: repair, and perform system self-check. No fault found: replace EHC. Go to <i>Step 6</i>	Replace sensor. Go to <i>Step 6</i>
6	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 6</i>

NOTE: Even after repairing the faulty part the warning light (W/L) does not go out if the vehicle is at a stop. Turn the ignition switch to the ON position and drive the vehicle at 12 km/h (8 mph) or higher to make sure that the warning light goes out.

Chart B-23 Simultaneous Drop-out of Front Speed Sensor Signal (DTC 64 (Flash out) / C0229 (Serial communications))

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Measure the FL speed sensor resistance between coil integrated module connector (C-6) terminals 2 and 10. Is the resistance between 2.0k and 2.8k ohms?	Go to Step 2	Go to Step 3
2	Measure the FR speed sensor resistance between coil integrated module connector (C-6) terminals 3 and 11. Is the resistance between 2.0k and 2.8 k ohms?	Go to Step 5	Go to Step 4
3	Measure the FL speed sensor resistance at the sensor connector. Is the resistance between 2.0k and 2.8k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to Step 2	Replace sensor. Go to Step 2
4	Measure the FR speed sensor resistance at the sensor connector. Is the resistance between 2.0k and 2.8k ohms?	Repair harness abnormality between sensors and coil integrated module. Go to Step 5	Replace sensor. Go to Step 5
5	Damage and powdered iron sticking to sensor/sensor ring?	Repair. Go to Step 6	Go to Step 6
6	Is there play sensor/sensor rotor?	Repair. Go to Step 7	Go to Step 7
7	Is sensor output normal? (Chart C-1-1&C-1-2 or TC-1)	Check for faults in harness between speed sensor and coil integrated module. Fault found: repair, and perform system self-check. No fault found: replace EHC. Go to Step 8	Replace sensor. Go to Step 8
8	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat "Basic diagnostic flow chart"	Go to Step 8

NOTE: Even after repairing the faulty part the warning light (W/L) does not go out if the vehicle is at a stop. Turn the ignition switch to the ON position and drive the vehicle at 12 km/h (8 mph) or higher to make sure that the warning light goes out.

5A-52 BRAKE CONTROL SYSTEM**Chart B-24 Wheel Speed Input Abnormality (DTC 65 (Flash out) / C0238 (Serial communications))**

Step	Action	Yes	No
1	Using TECH 2?	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	1. Connect TECH 2. 2. Select Snap shot manual trigger. 3. With wheel speed data displayed, run the vehicle when speed has arrived at 30 km/h (18 mph). 4. Check speed data on each wheel (refer to the criterion given below). * 1 Is the abnormal sensor condition found?	Replace. Go to <i>Step 8</i>	Go to <i>Step 3</i> All the sensors should follow the following flowchart (without using TECH 2).
3	Is there play in sensor/sensor ring?	Repair. Go to <i>Step 8</i>	Go to <i>Step 4</i>
4	Is there powdered iron sticking to sensor/sensor ring?	Repair. Go to <i>Step 8</i>	Go to <i>Step 5</i>
5	Is there a broken tooth or indentation in sensor ring?	Replace sensor ring. Go to <i>Step 8</i>	Go to <i>Step 6</i>
6	Is there play in wheel bearing?	Adjust or repair. Go to <i>Step 8</i>	Go to <i>Step 7</i>
7	Is the check wiring between sensor and coil integrated module normal?	Replace EHCU. Go to <i>Step 8</i>	Repair, and perform system self-check. Go to <i>Step 8</i>
8	1. Reconnect all components, ensure all components are properly mounted. 2. Clear diagnostic trouble code. Was this step finished?	Repeat 'Basic diagnostic flow chart'	Go to <i>Step 8</i>

Sensor Signal Abnormality Criteria using TECH 2

1. While driving, the speed of one or two wheels is 25% or more higher or lower than that of the other wheels.
2. The speed of one or two wheels is 10 km/h (6 mph) or more higher or lower than that of the other wheels.
3. During steady driving, wheel speed changes abruptly.

*1 The vehicle must run on a level paved road.

NOTE: Even after repairing the faulty part the warning light (W/L) does not go out if the vehicle is at a stop.

Turn the ignition switch to the ON position and drive the vehicle at 12 km/h (8 mph) or higher to make sure that the warning light goes out.

It is important to verify that the correct tires are installed on vehicle.

Unit Inspection Procedure

This section describes the following inspection procedures referred to during *Symptom Diagnosis* and *Diagnosis By "ABS" Warning Light Illumination Pattern*

	without TECH 2	with TECH 2
Sensor Output Inspection	Chart C-1-1 to C-1-3	Chart TC-1

Chart C-1-1 FL Sensor Output Inspection Procedure

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Jack up the vehicle with all four wheels off the ground. Measure the AC voltage between coil integrated module connector terminals while turning FL wheel at a speed of 1 RPS: Is the voltage between coil integrated module connector (C-6) terminals 2 and 10 less than 200 mV?	Go to <i>Step 2</i>	OK. Go to <i>Step 3</i>
2	1. Disconnect the wheel speed sensor. 2. Measure resistance between the wheel speed sensor connector terminals 1 and 2. Is the check between connector (C-28) terminals 1 and 2 within 2.0k - 2.8k ohms?	Connector is faulty, or open or short circuit of harness between wheel speed sensor connector and coil integrated module. Inspect and correct the connector or harness. Go to <i>Step 3</i>	Wheel speed sensor is faulty. Replace the wheel speed sensor. Go to <i>Step 3</i>
3	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

Chart C-1-2 FR Sensor Output Inspection Procedure

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Jack up the vehicle with all four wheels off the ground. Measure the AC voltage between coil integrated module connector terminals while turning FR wheel at a speed of 1 RPS: Is the voltage between coil integrated module connector (C-6) terminals 3 and 11 less than 200 mV?	Go to <i>Step 2</i>	OK. Go to <i>Step 3</i>
2	1. Disconnect the wheel speed sensor. 2. Measure resistance between the wheel speed sensor connector terminals 1 and 2. Is the check between connector (C-1) terminals 1 and 2 within 2.0k - 2.8k ohms?	Connector is faulty, or open or short circuit of harness between wheel speed sensor connector and coil integrated module. Inspect and correct the connector or harness. Go to <i>Step 3</i>	Wheel speed sensor is faulty. Replace the wheel speed sensor. Go to <i>Step 3</i>
3	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

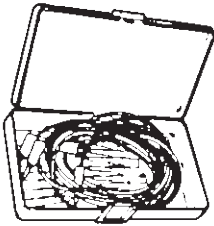
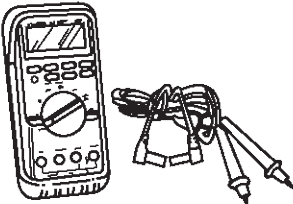
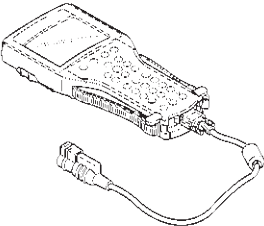
Chart C-1-3 Rear Sensor Output Inspection Procedure

Step	Action	Yes	No
1	1. Turn the key off. 2. Disconnect coil integrated module connector. 3. Jack up the vehicle with all four wheels off the ground measure the AC voltage between coil integrated module connector terminals while turning Rear wheel at a speed of 1 RPS: Is the check between coil integrated module connector (C-6) terminals 4 and 12 than under 200 mV?	Go to <i>Step 2</i>	OK. Go to <i>Step 3</i>
2	1. Disconnect the wheel speed sensor. 2. Measure resistance between the wheel speed sensor connector terminals 1 and 2. Is the check between connector (F-4) terminals 1 and 2 within 1.0k - 1.7k ohms?	Connector is faulty, or open or short circuit of harness between wheel speed sensor connector and coil integrated module. Inspect and correct the connector or harness. Go to <i>Step 3</i>	Wheel speed sensor is faulty. Replace the wheel speed sensor. Go to <i>Step 3</i>
3	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 3</i>

Chart TC-1 Sensor Output Inspection Procedure

Step	Action	Yes	No
1	1. Connect TECH 2. 2. Check the wheel speed of each sensor by Data List. Is the vehicle speed normal?	Go to <i>Step 6</i>	Go to <i>Step 2</i>
2	Check the sensor harness for suspected disconnection (check while shaking harness/connector). Is the sensor harness connection normal?	Replace speed sensor. Go to <i>Step 4</i>	Repair. Go to <i>Step 3</i>
3	Check the wheel speed of each sensor by Data List. Is the vehicle speed normal?	Go to <i>Step 6</i>	Go to <i>Step 4</i>
4	Check the sensor rotor. Is the sensor rotor normal?	Replace speed sensor. Go to <i>Step 5</i>	Replace sensor rotor. Go to <i>Step 5</i>
5	Check the harness between coil integrated module and speed sensor. Is the harness connection normal?	Go to <i>Step 6</i>	Repair harness or connector between coil integrated module and speed sensor. Go to <i>Step 6</i>
6	Reconnect all components, ensure all components are properly mounted. Was this step finished?	Repeat the "Basic diagnostic flow chart"	Go to <i>Step 6</i>

Special Tools

ILLUSTRATION	TOOL NO. TOOL NAME
 901RW074	J-35616 Connector test adapter kit
 901RS153	J-39200 High impedance multimeter
	7000086-ISU Tech 2 Set (1) PCMCIA Card (2) SAE 16/19 Adapter (3) DLC Cable (4) Tech 2

AXIOM

BRAKES

ANTI-LOCK BRAKE SYSTEM

CONTENTS

Service Precaution	5B-1	Front Wheel Speed Sensor and Associated	
Electronic Hydraulic Control Unit	5B-2	Parts	5B-4
Electronic Hydraulic Control Unit and		Removal	5B-4
Associated Parts	5B-2	Inspection and Repair	5B-4
Removal	5B-2	Installation	5B-4
Disassembled View	5B-3	Rear Wheel Speed Sensor	5B-5
Disassembly	5B-3	Removal	5B-5
Reassembly	5B-3	Inspection and Repair	5B-5
Installation	5B-3	Installation	5B-5
Front Wheel Speed Sensor	5B-4		

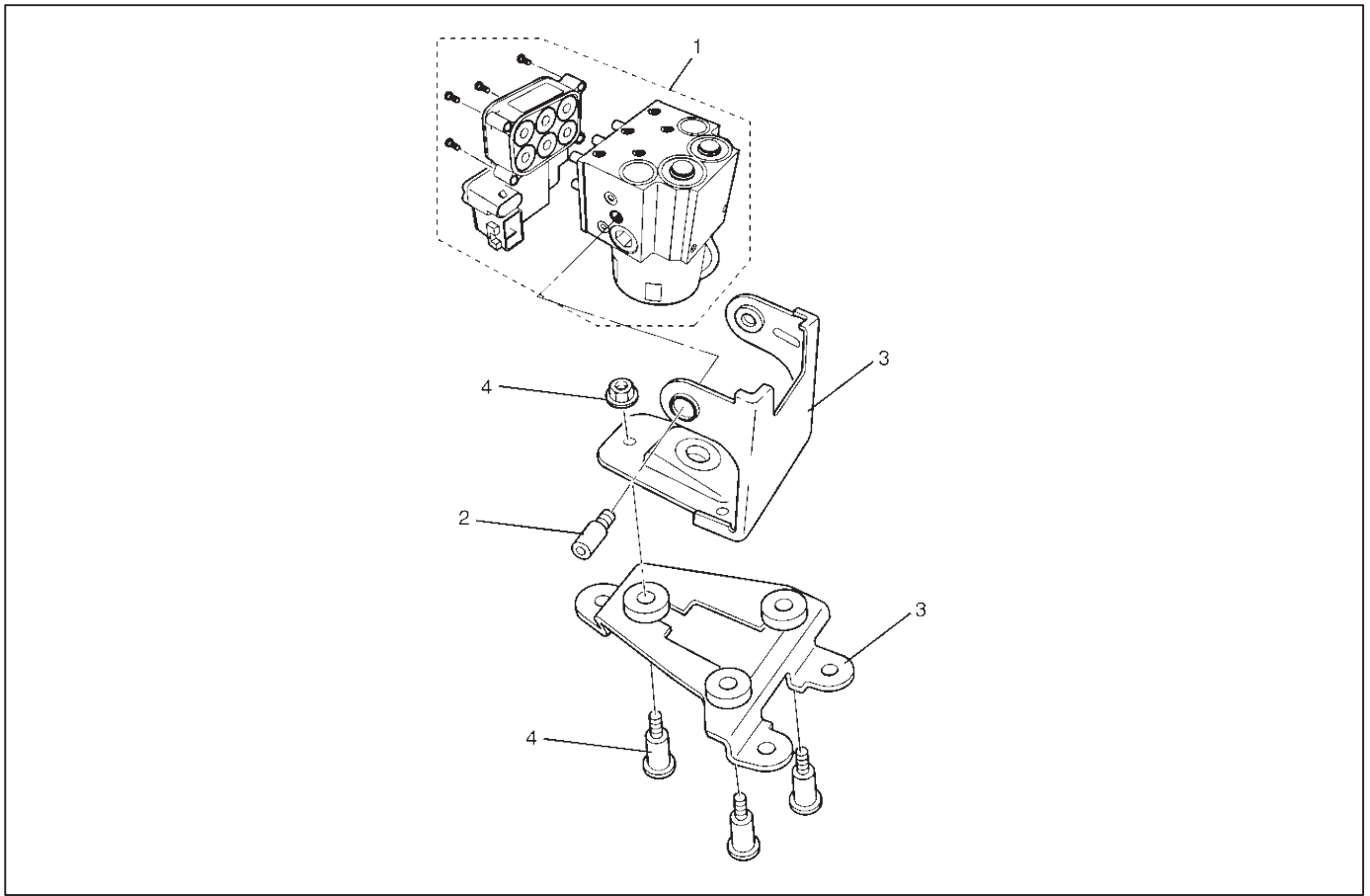
Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

Electronic Hydraulic Control Unit

Electronic Hydraulic Control Unit and Associated Parts



350R100003

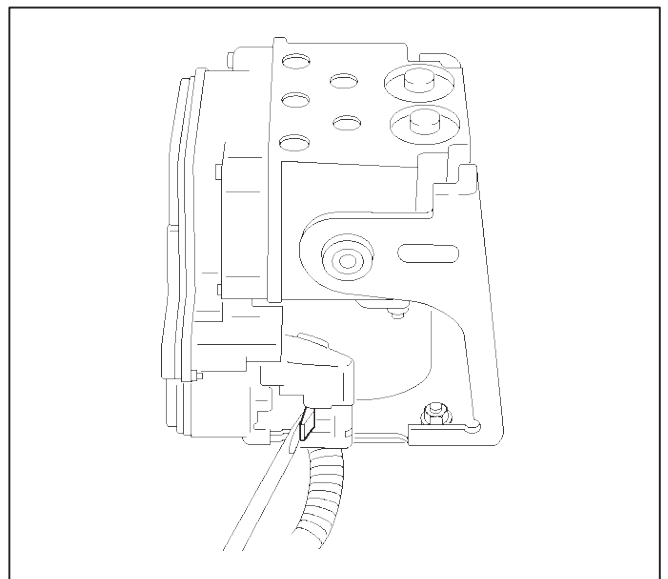
Legend

- (1) EHC
- (2) Bolt

- (3) Bracket
- (4) Bolt and Nut

Removal

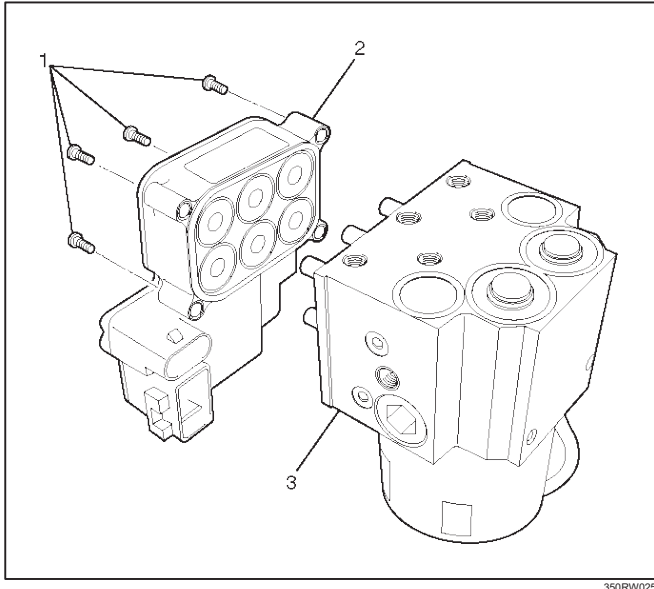
1. Remove brake pipes.
 - After disconnecting brake pipe, cap or tape the openings of the brake pipe to prevent the entry of foreign matter.
2. Remove three bracket fixing bolts.
3. Disconnect red clip from harness connector.



350RW018

4. Remove harness connector.
5. Remove EHCU ASM.
6. Remove EHCU.

Disassembled View



Legend

- (1) Fixing Bolts
- (2) Coil Integrated Module
- (3) Hydraulic Unit (H/U)

Installation

To install, follow the removal steps in the reverse order, noting the following points:

Torque

Hydraulic unit fixing nuts : 22 N·m (16 lb ft)

Ground cable : 14 N·m (10 lb ft)

Brake pipe (joint bolts) : 16 N·m (12 lb ft)

- After installing the hydraulic unit, bleed brakes completely. See Section 5A "Hydraulic Brakes".

Disassembly

1. Remove fixing bolts from EHCU.
2. Remove coil integrated module from hydraulic unit.

Reassembly

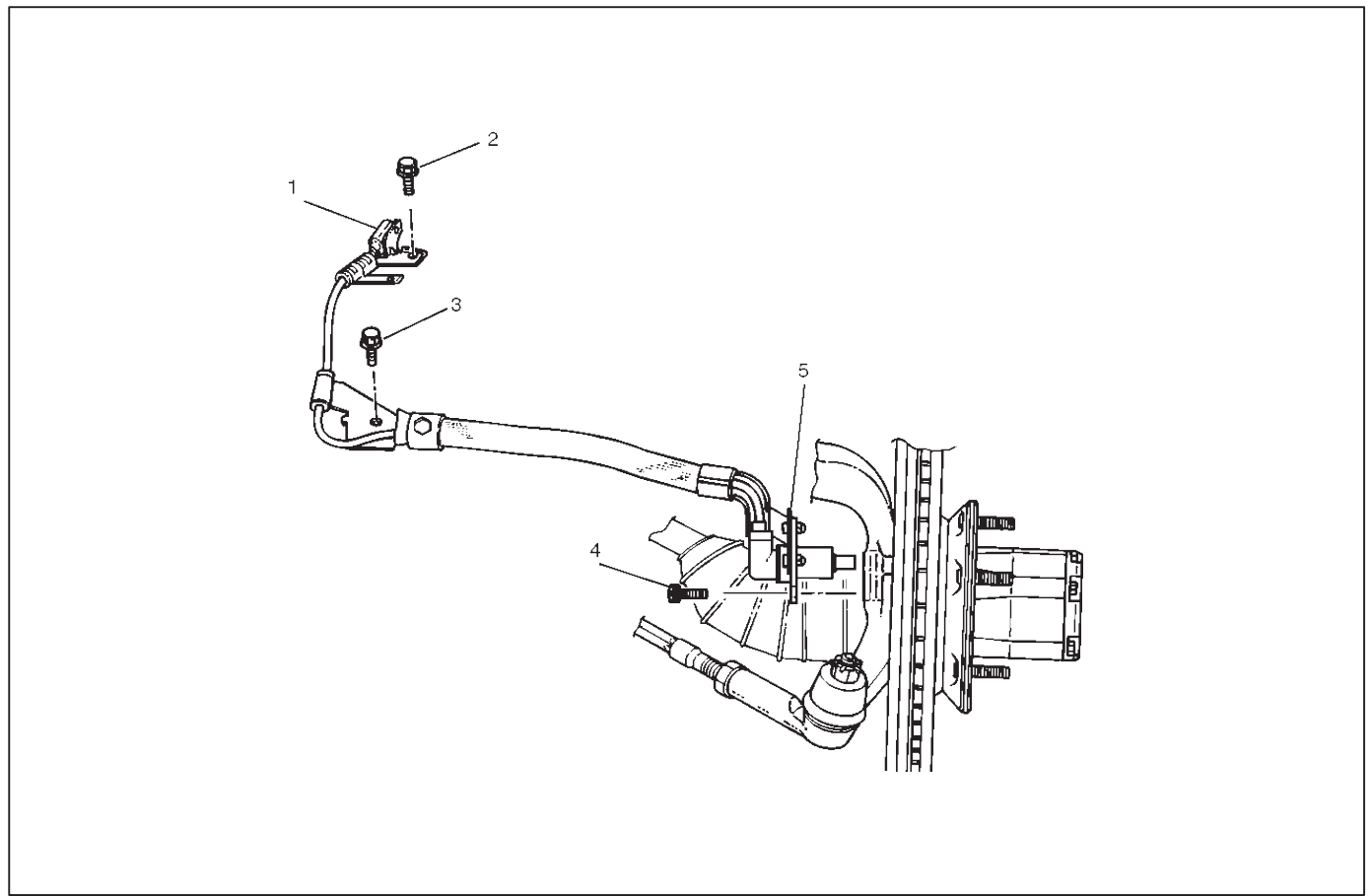
To reassembly, follow the disassembly steps in the reverse order, noting the following points:

Torque

Fixing bolts: 4.4 N·m (39 lb in)

Front Wheel Speed Sensor

Front Wheel Speed Sensor and Associated Parts



350RS033

Legend

- | | |
|---|--|
| (1) Speed Sensor Connector | (3) Sensor Cable Fixing Bolt (Lower side) |
| (2) Sensor Cable Fixing Bolt (Upper side) | (4) Sensor Cable Fixing Bolt (Sensor side) |
| | (5) Speed Sensor |

Removal

1. Remove speed sensor connector.
2. Remove sensor cable fixing bolt (Upper side).
3. Remove sensor cable fixing bolt (Lower side).
4. Remove the speed sensor cable fixing bolt.
5. Remove speed sensor.

Inspection and Repair

1. Check the speed sensor pole piece for presence of foreign materials; remove any dirt, etc.
2. Check the pole piece for damage; replace speed sensor if necessary.
3. Check the speed sensor cable for short or open circuit, and replace with a new one if necessary.
To check for cable short or open, bend or stretch the cable while checking for continuity.
4. Check the sensor ring for damage including tooth chipping, and if damaged, replace the sensor ring assembly. Refer to removal of the sensor ring in Section 4C "Front hub and disc".

Installation

1. Install speed sensor and take care not to hit the speed sensor pole piece during installation.
2. Install speed sensor fixing bolt and tighten the fixing bolt to the specified torque.

Torque: 11 N·m (95 lb in)

3. Install speed sensor cable fixing bolt (Lower side) and tighten the fixing bolt to the specified torque.

Torque : 24 N·m (17 lb ft)

4. Install speed sensor cable fixing bolt (Upper side) and tighten the fixing bolt to the specified torque.

Torque : 6 N·m (52 lb in)

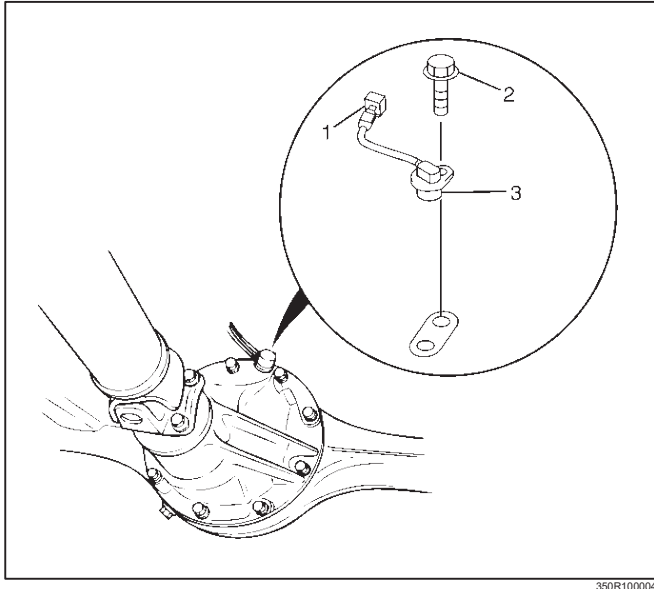
NOTE: Confirm that a white line marked on the cable is not twisted when connecting the speed sensor cable.

5. Install speed sensor connector.

Rear Wheel Speed Sensor

Removal

1. Disconnect harness connector (1).
2. Remove sensor fixing bolt (2) .
3. Remove speed sensor (3).

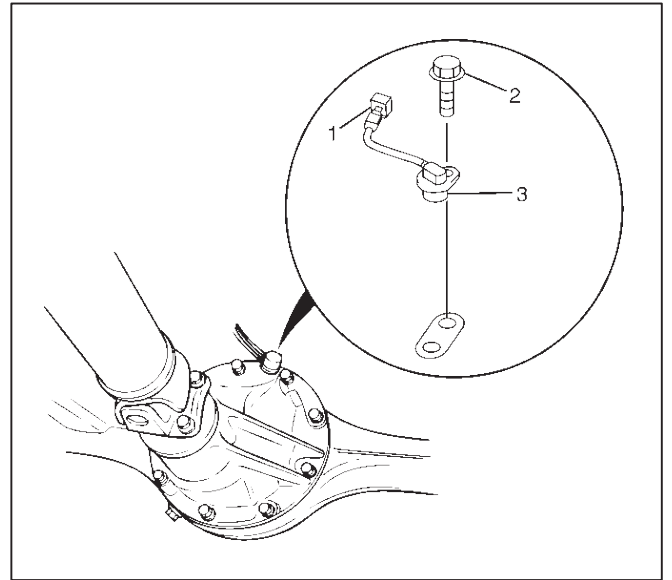


Installation

1. Install speed sensor (3).
2. Tighten the sensor fixing bolt (2) to the specified torque.

Torque : 24 N·m (17 lb ft)

3. Connect harness connector (1).



Inspection and Repair

1. Check speed sensor pole piece for presence of foreign materials; remove any dirt, etc.
2. Check the pole piece for damage, and replace speed sensor if necessary.
3. Check speed sensor cable for short or open, and replace with a new one if necessary. To check for cable short or open, bend or stretch the cable while checking for continuity.
4. Check the sensor ring for damage including tooth chipping, and if damaged, replace the axle shaft assembly. Refer to removal of the sensor ring in Section 4A2 "Differential (Rear)".

AXIOM (Vehicles Produced Before July/31/2001)

BRAKES

POWER-ASSISTED BRAKE SYSTEM

CONTENTS

Service Precaution	5C-2	Removal	5C-21
General Description	5C-2	Installation	5C-21
Diagnosis	5C-6	Master Cylinder Assembly	5C-22
General Diagnosis	5C-7	Master Cylinder Assembly and Associated Parts	5C-22
Hydraulic Brakes	5C-10	Removal	5C-22
Filling Master Cylinder Reservoir	5C-10	Inspection and Repair	5C-22
Deterioration of Brake Fluid	5C-10	Installation	5C-23
Leakage of Brake Fluid	5C-10	Main Data and Specifications	5C-24
Bleeding Brake Hydraulic System	5C-10	Special Tools	5C-24
Flushing Brake Hydraulic System	5C-11	Vacuum Booster Assembly	5C-25
Brake Pipes and Hoses	5C-11	Vacuum Booster Assembly and Associated Parts	5C-25
Brake Hose Inspection	5C-11	Removal	5C-25
Front Caliper Brake Hose	5C-12	Inspection and Repair	5C-26
Front Caliper Brake Hose and Associated Parts	5C-12	Installation	5C-26
Removal	5C-12	Exterior Components	5C-28
Installation	5C-12	Exterior Components and Associated Parts	5C-28
Rear Axle Brake Hose	5C-13	Removal	5C-28
Rear Axle Brake Hose and Associated Parts	5C-13	Inspection and Repair	5C-29
Removal	5C-13	Installation	5C-29
Installation	5C-13	Vacuum Booster Overhaul	5C-29
Brake Pipe	5C-14	Vacuum Booster	5C-29
Removal	5C-14	Main Data and Specifications	5C-30
Installation	5C-14	Special Tools	5C-31
P & B (Proportioning and Bypass) Valve	5C-15	Front Disc Brake Pads	5C-32
P & B (Proportioning and Bypass) Valve Sectional View	5C-15	Front Disc Brake Pads Inspection	5C-32
Removal	5C-15	Front Disc Brake Pads and Associated Parts	5C-32
Installation	5C-15	Removal	5C-33
Main Data and Specifications	5C-16	Installation	5C-33
Brake Pedal	5C-17	Front Disc Brake Rotor	5C-35
Checking Pedal Height	5C-17	Inspection	5C-35
Checking Pedal Travel	5C-17	Replacing Brake Rotors	5C-35
Brake Pedal and Associated Parts	5C-18	Refinishing Brake Rotors	5C-35
Removal	5C-18	Front Disc Brake Caliper Assembly	5C-36
Installation	5C-18	Front Disc Brake Caliper Assembly and Associated Parts	5C-36
Stoplight Switch	5C-19	Removal	5C-37
Parts Location	5C-19	Installation	5C-37
Removal	5C-19	Front Disc Brake Caliper	5C-39
Installation	5C-19	Front Disc Brake Caliper Disassembled View	5C-39
Main Data and Specifications	5C-20	Disassembly	5C-39
Fluid Reservoir Tank	5C-21		
Fluid Reservoir Tank and Associated Parts	5C-21		

5C-2 POWER-ASSISTED BRAKE SYSTEM

Inspection and Repair	5C-40	Disassembly	5C-51
Reassembly	5C-40	Inspection and Repair	5C-51
Main Data and Specifications	5C-42	Reassembly	5C-51
Rear Disc Brake Pads (4×4 Model)	5C-43	Main Data and Specifications (4×4 Model)	5C-53
Brake Pads Inspection	5C-43	Brake Lining	5C-54
Brake Pads and Associated Parts	5C-43	Brake Lining and Associated Parts	5C-54
Removal	5C-44	Removal	5C-54
Installation	5C-44	Brake Lining Inspection	5C-55
Rear Disc Brake Rotor (4×4 Model)	5C-46	Installation	5C-55
Inspection	5C-46	Drum Brake Adjustment (4×2 Model)	5C-56
Replacing Brake Rotors	5C-46	Servicing The Brake Drum	5C-56
Refinishing Brake Rotors	5C-46	Wheel Cylinder Assembly (4×2 Model)	5C-57
Rear Drum (In Disc) Inside Diameter Check	5C-47	Wheel Cylinder Assembly and Associated Parts	5C-57
Rear Disc Brake Caliper Assembly (4×4 Model)	5C-48	Removal	5C-57
Rear Disc Brake Caliper Assembly and Associated Parts	5C-48	Installation	5C-57
Removal	5C-48	Disassembled View	5C-58
Installation	5C-49	Disassembly	5C-58
Rear Disc Brake Caliper (4×4 Model)	5C-50	Inspection and Repair	5C-58
Rear Disc Brake Caliper Disassembled View	5C-50	Reassembly	5C-58
		Main Data and Specifications	5C-60

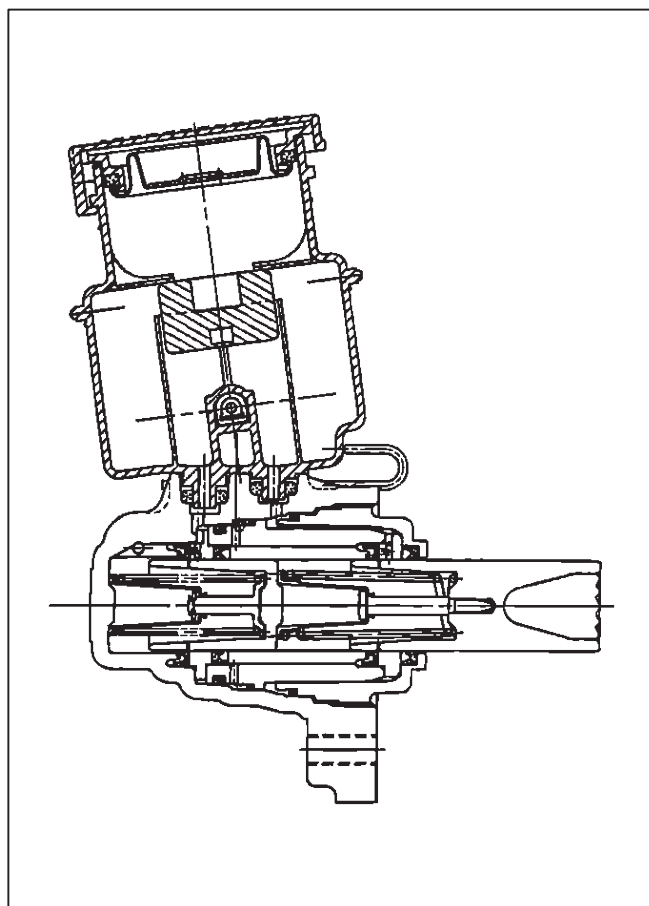
Service Precaution

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General Description

Master Cylinder Assembly



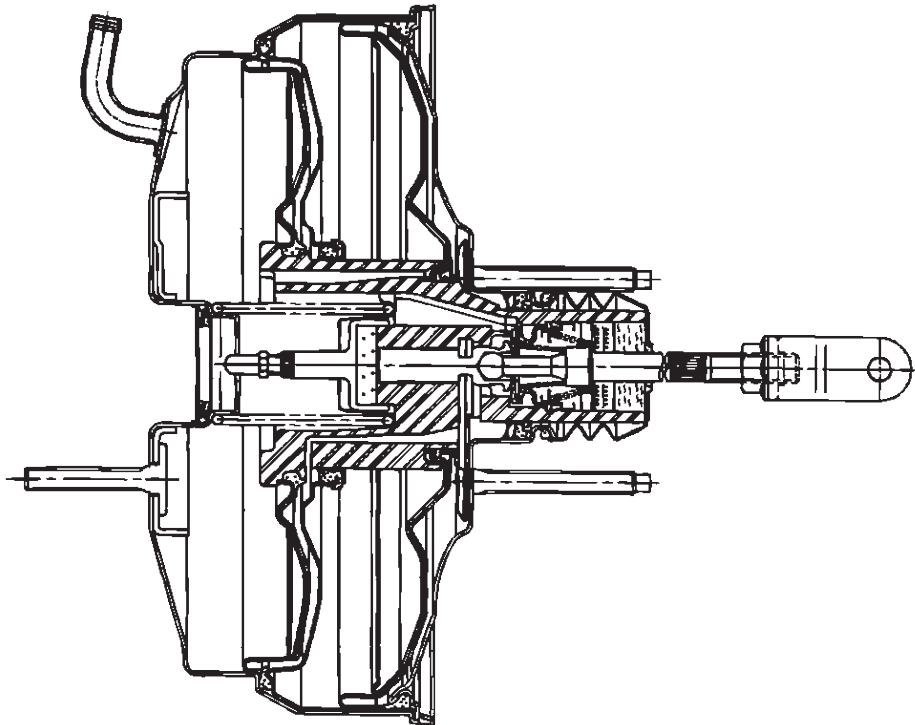
330RS001

The master cylinder contains two pistons that supply the hydraulic pressure for a dual-circuit braking system. The primary piston provides the fluid pressure to the front brakes, while the secondary piston provides the fluid pressure to the rear brakes. If the pressure is lost from either system, the remaining system will function to stop the vehicle.

CAUTION:

1. The master cylinder is not repairable. If found defective, it must be replaced as a complete assembly.
2. If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system. (Refer to *Bleeding Brake Hydraulic System* in this section.)
3. The torque values specified are for dry, unlubricated fasteners.
4. Perform service operations on a clean bench free from all mineral oil materials.

Brake Booster



This booster is a tandem vacuum unit with a diaphragm effective diameter 205mm (8.072 in) + 230mm (9.056 in). In normal operating mode, with the service brakes in the released position, the tandem vacuum booster operates with vacuum on both sides of its diaphragms. When the brakes are applied, air at atmospheric pressure is admitted to both sides of the diaphragm to provide the power assist. When the service brake is released, the atmospheric air is shut off from both sides of the diaphragm. The air is then drawn from the booster through the vacuum check valve to the vacuum source.

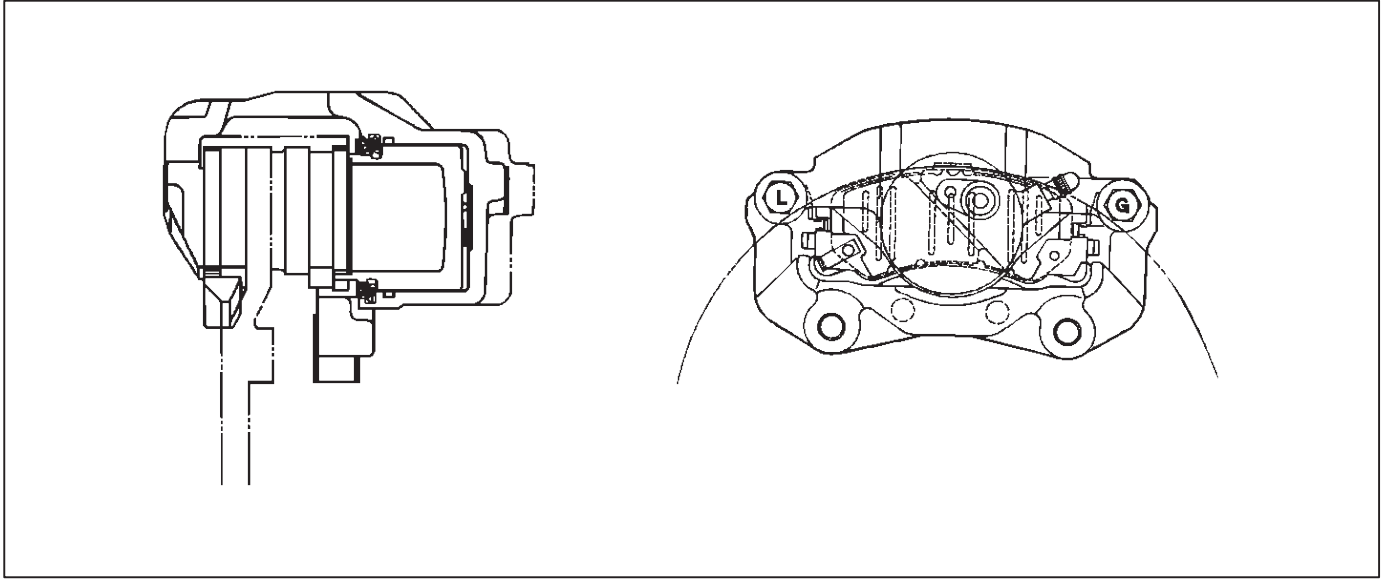
CAUTION:

1. If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.
2. The torque values specified are for dry, unlubricated fasteners.
3. The vacuum booster is not repairable and must be replaced as complete assembly.

5C-4 POWER-ASSISTED BRAKE SYSTEM

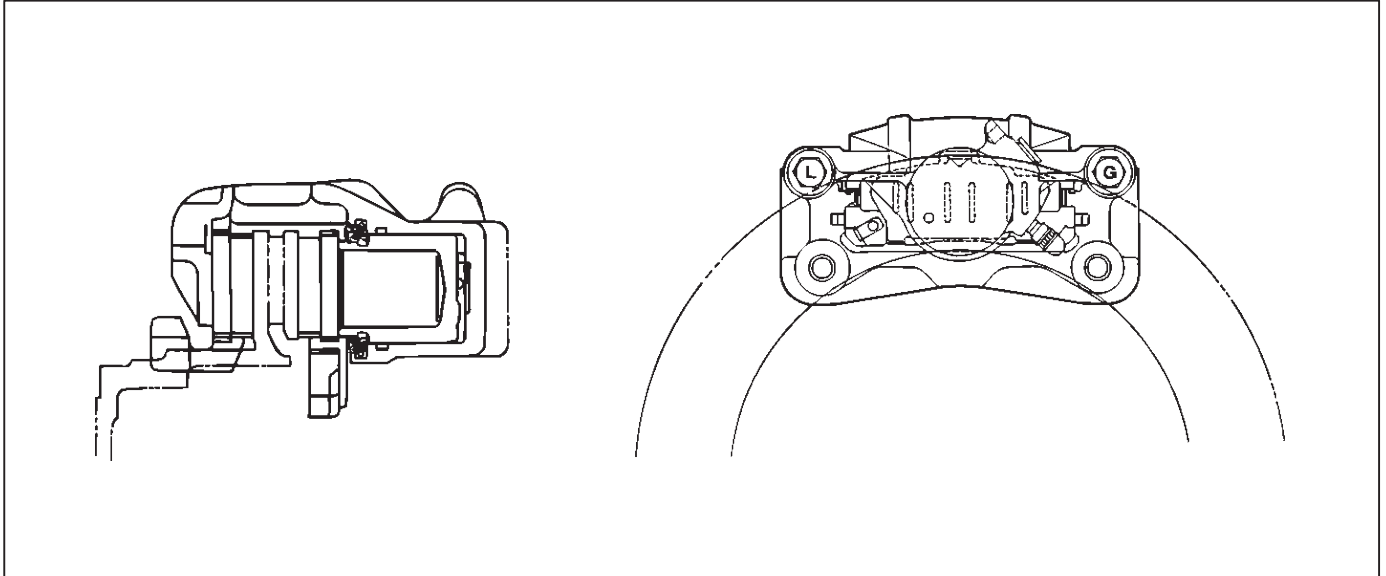
Disc Brake

Front Disc Brake



A05RW001

Rear Disc Brake (4×4 Model)



A05RW002

The disc brake assembly consists of a caliper, piston, rotor, pad assembly and support bracket. The caliper assembly has a single bore and is mounted to the support bracket with two mounting bolts. The support bracket allows the caliper to move laterally against the rotor. The caliper is a one-piece casting with the inboard side containing the piston bore. A square cut rubber seal is located in a groove in the piston bore which provides the hydraulic seal between the piston and the cylinder wall.

NOTE:

1. Replace all components included in repair kits used to service this caliper.
2. Lubricate rubber parts with clean brake fluid to ease assembly.

3. If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.

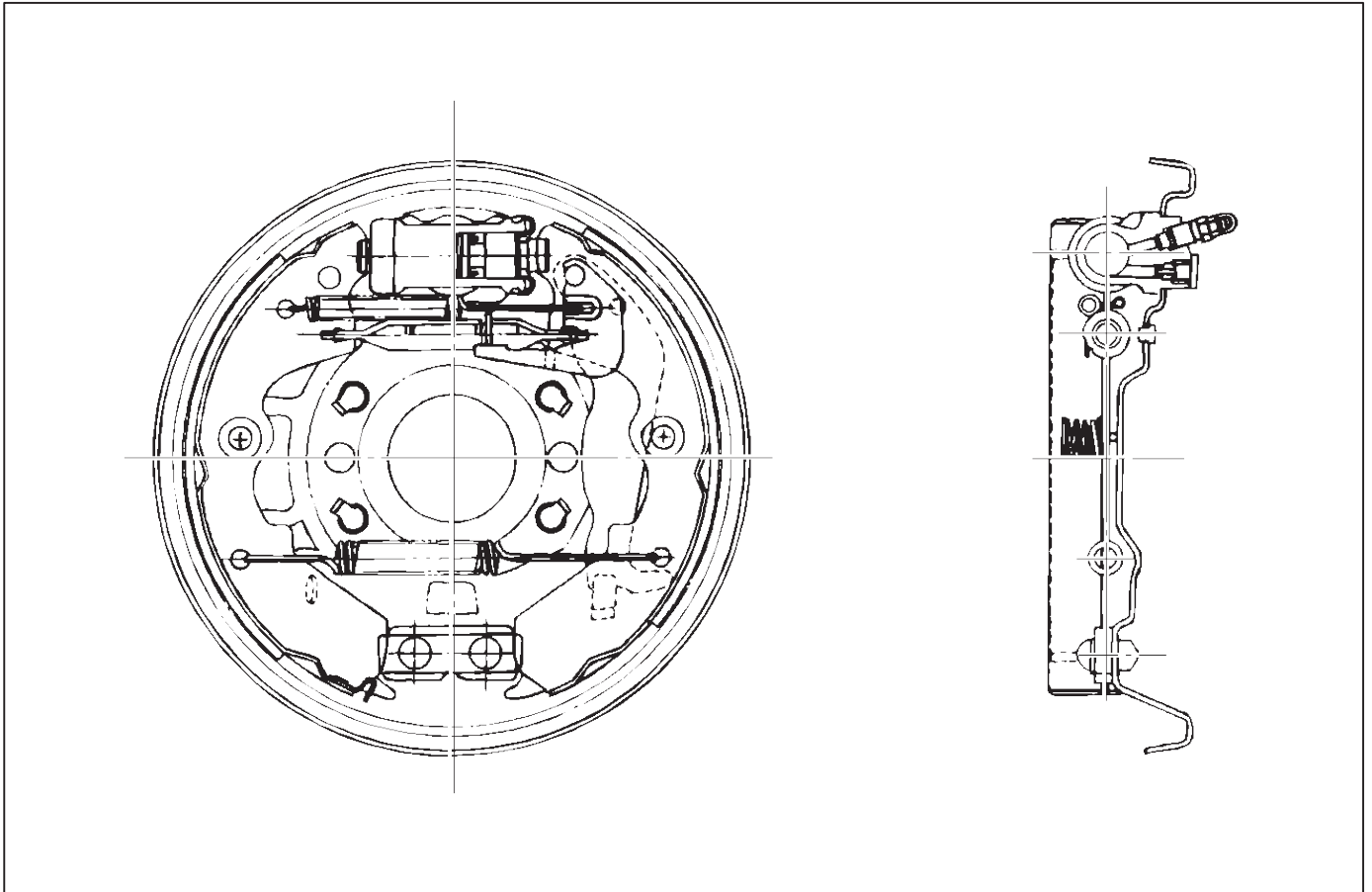
4. Replace pads in axle sets only.

5. The torque values specified are for dry, unlubricated fasteners.

6. Perform the service operation on a clean bench free from all mineral oil materials.

Operation

Hydraulic pressure, created by applying the brake pedal, is converted by the caliper to a stopping force. This force creates a clamping action of the piston pressing towards the rotors (outward) and the caliper slides inward toward the vehicle. This clamping action forces the linings against the rotor, creating friction to stop the vehicle.

Leading/Trailing Drum Brakes (4×2 Model)

A05RS003

This drum brake assembly is a leading/trailing shoe design. Both brake shoes are held against the wheel cylinder pistons by the upper return spring and to the fixed anchor plate by the lower return spring. When the brakes are applied, the wheel cylinder pistons expand pushing both shoes out contact the drum.

With forward wheel rotation, the forward brake shoe will wrap into the drum and becomes self-energized.

With reverse wheel rotation, the rear brake shoe is self-energized. Force from the brake shoes is transferred to the anchor plate through the braking plate to the axle flange. Adjustment is automatic and occurs on any service brake application. Also, with leading/trailing brakes, it is normal for the front shoe to wear at a faster rate than the rear shoe.

Diagnosis

Road Testing The Brakes

Brake Test

Brakes should be tested on a dry, clean, reasonably smooth and level roadway. A true test of brake performance cannot be made if the roadway is wet, greasy or covered with loose dirt where all tires do not grip the road equally. Testing will also be adversely affected if the roadway is crowned so as to throw the weight of the vehicle toward wheels on one side or if the roadway is so rough that wheels tend to bounce. Test the brakes at different vehicle speeds with both light and heavy pedal pressure; however, avoid locking the wheels and sliding the tires. Braking without locking the tires will stop the vehicle in less distance than braking to a skid (which has no brake efficiency). More tire to road friction is present while braking without locking the tires than braking to a skid.

The standard brake system is designed and balanced to avoid locking the wheels except at very high deceleration levels.

It is designed this way because the shortest stopping distance and best control is achieved without brake lock-up.

Because of high deceleration capability, a firmer pedal may be felt at higher deceleration levels.

External Conditions That Affect Brake Performance

1. **Tires:** Tires having unequal contact and grip on the road will cause unequal braking. Tires must be equally inflated, identical in size, and the thread pattern of right and left tires must be approximately equal.
2. **Vehicle Loading:** A heavily loaded vehicle requires more braking effort.
3. **Wheel Alignment:** Misalignment of the wheels, particularly in regard to excessive camber and caster, will cause the brakes to pull to one side.

Brake Fluid Leaks

With engine running at idle and the transmission in "Neutral", depress the brake pedal and hold a constant foot pressure on the pedal. If pedal gradually falls away with the constant pressure, the hydraulic system may be leaking.

Check the master cylinder fluid level. While a slight drop in the reservoir level will result from normal lining wear, an abnormally low level in reservoir indicates a leak in the system. The hydraulic system may be leaking internally as well as externally. Refer to *Master Cylinder Inspection*. Also, the system may appear to pass this test but still have slight leakage. If fluid level is normal, check the vacuum booster push rod length. If an incorrect length push rod is found, adjust or replace the push rod. Check the brake pedal travel and the parking brake adjustment. When checking the fluid level, the master cylinder fluid level may be lower than the "MAX" mark if the front and rear linings are worn. This is normal.

Warning Light Operation

When the ignition switch is in the START position, the "BRAKE" warning light should turn on and go off when the ignition switch returns to the ON position.

The following conditions will activate the "BRAKE" light:

1. **Parking brake applied.** The light should be on whenever the parking brake is applied and the ignition switch is on.
2. **Low fluid level.** A low fluid level in the master cylinder will turn the "BRAKE" light on.
3. **During engine cranking** the "BRAKE" light should remain on. This notifies the driver that the warning circuit is operating properly.

General Diagnosis

Condition	Possible cause	Correction
Brake Pull	Tire inflation pressure is unequal.	Adjust
	Front wheel alignment is incorrect.	Adjust
	Unmatched tires on same axle.	Tires with approx. the same amount of tread should be used on the same axle.
	Restricted brake pipes or hoses.	Check for soft hoses and damaged lines. Replace with new hoses and new double-walled steel brake piping.
	Water or oil on the brake pads.	Clean or replace.
	Brake pads hardened.	Replace
	Brake pads worn excessively.	Replace
	Brake rotor worn or scored.	Grind or replace.
	Disc brake caliper malfunctioning.	Clean or replace.
	Front hub bearing preload incorrect.	Adjust or replace.
	Loose suspension parts.	Check all suspension mountings.
	Loose calipers.	Check and tighten the bolts to specifications.
Brake Roughness or Chatter (Pulsates)	Excessive lateral runout.	Check per instructions. If not within specifications, replace or machine the rotor.
	Parallelism not within specifications.	Check per instructions. If not within specifications, replace or machine the rotor.
	Wheel bearings not adjusted.	Adjust wheel bearings to correct specifications
	Pad reversed (steel against iron).	Replace the brake pad and machine rotor to within specifications.
Excessive Pedal Effort	Malfunctioning vacuum booster.	Check the vacuum booster operation and repair, if necessary.
	Partial system failure.	Check the front and rear brake system for failure and repair. Also, check the brake warning light. If a failed system is found, the light should indicate failure.
	Excessively worn pad.	Check and replace pads in sets.
	Piston in caliper stuck or sluggish.	Remove caliper and rebuild.
	Fading brakes due to incorrect pad.	Remove and replace with original equipment pad or equivalent.
	Vacuum leak to vacuum booster.	Check for ruptured or loose hose.
	Check the direction of check valve within vacuum hose.	Correct vacuum hose direction.
	Grease on the brake pads.	Replace or clean.

5C-8 POWER-ASSISTED BRAKE SYSTEM

Condition	Possible cause	Correction
Excessive Brake Pedal Travel	Air in hydraulic circuit.	Bleed the hydraulic circuit.
	Level of brake fluid in the reservoir too low.	Replenish brake fluid reservoir to specified level and bleed hydraulic circuit as necessary.
	Master cylinder push rod clearance excessive.	Adjust
	Leakage in hydraulic system.	Correct or replace defective parts.
Brake Drag	Master cylinder pistons not returning correctly.	Adjust the stop light switch and vacuum booster push rod. If necessary, rebuild.
	Restricted brake pipes or hoses.	Check for soft hoses or damaged pipes, and replace with new hoses and new double-walled steel brake piping.
	Parking brake maladjusted.	Adjust
	Parking brake lining clearance insufficient.	Adjust
	Brake pedal free play insufficient.	Adjust the brake pedal height or power cylinder operating rod.
	Piston in the master cylinder sticking.	Replace
	Piston in the disc brake caliper sticking.	Replace piston seals.
	Brake pads sticking in caliper.	Clean
	Return spring weakened.	Replace
	Parking brake binding.	Overhaul the parking brakes and correct.
	Front hub bearing preload incorrect.	Adjust or replace.
	Parking brake shoes not returning.	Correct or replace the brake back plate and brake shoe as necessary.
	Obstructions in hydraulic circuit.	Clean
	Rotor warped excessively.	Grind or replace.
	Rear brake drum distorted.	Grind or replace.
	Parking cable sticking.	Grind or replace.
Grabbing or Uneven Braking Action (All conditions listed under "Pulls")	Malfunctioning vacuum booster.	Check operation and correct as necessary.
	Binding brake pedal mechanism.	Check and lubricate, if necessary.
	Corroded caliper assembly.	Clean and lubricate.
Brake Noisy	Brake pads are worn.	Replace
	Brake pads are hardened.	Replace
	Brake pads are in poor contact with rotor.	Correct
	Brake disc(s) warped, worn or damaged.	Grind or replace.
	Disc brake anti-squeak shims fatigued.	Replace
	Front hub bearings are loose or preload is incorrect.	Adjust or replace.
	Brake disc is rusted.	Grind or replace.

Condition	Possible cause	Correction
Poor Brake Action	Master cylinder faulty.	Correct or replace.
	Vacuum booster faulty.	Correct or replace.
	Level of brake fluid in reservoir too low.	Replenish and bleed.
	Air in hydraulic circuit.	Bleed
	Disc brake caliper faulty.	Clean or replace.
	Water or oil on brake pads.	Clean or replace.
	Brake pads in poor contact with the rotor.	Correct
	Brake pads worn.	Replace
	Brake disc rusted.	Grind or replace.
	Check valve in vacuum hose faulty.	Correct or replace.

Hydraulic Brakes

Filling Master Cylinder Reservoir

CAUTION: Use only specified brake fluid. Do not use any fluid which contains a petroleum base. Do not use a container which has been used for petroleum based fluids or a container which is wet with water. Petroleum based fluid will cause swelling and distortion of rubber parts in the hydraulic brake system. Water mixed with brake fluid lowers the fluid boiling point. Keep all fluid containers capped to prevent contamination.

Always fill the master cylinder reservoir when the engine is cold.

Never allow the brake fluid to come in contact with the painted surfaces.

The master cylinder reservoir must be kept properly filled to ensure adequate reserve and to prevent air and moisture from entering the hydraulic system. However, because of expansion due to heat absorbed from the brakes and the engine, the reservoir must not be overfilled. The brake fluid reservoir is on the master cylinder, which is located under the hood on the left side of the cowl. Thoroughly clean reservoir cap before removal to avoid getting dirt into reservoir. Remove the diaphragm. Add fluid as required to bring level to the "MAX" mark on the reservoir tank. Use "DOT 3" Hydraulic Brake Fluid. If the fluid cap diaphragm is stretched, return it to the original position before installing.

Deterioration of Brake Fluid

Using any other brake fluid than specified or brake fluid with mineral oil or water mixed in will drop the boiling point of brake fluid. It may, in turn, result in vapor lock or deteriorated rubber parts of the hydraulic system. Be sure to change the brake fluid at specified intervals.

If the rubber parts are deteriorated, remove all the system parts and clean them with alcohol. Prior to reassembly, dry the cleaned parts with air to remove the alcohol. Replace all the hoses and rubber parts of the system.

Leakage of Brake Fluid

With engine idling, set shift lever in the neutral position and continue to depress brake pedal at a constant pedal application force.

Should the pedal stroke become deeper gradually, leakage from the hydraulic pressure system is possible. Perform visual inspection for any signs of leakage.

Bleeding Brake Hydraulic System

A bleeding operation is necessary to remove air from the hydraulic brake system whenever air is introduced into the hydraulic system. It may be necessary to bleed the hydraulic system at all four brakes if air has been introduced through a low fluid level or by disconnecting brake pipes at the master cylinder. If a brake pipe is disconnected at one wheel, only that wheel cylinder/caliper needs to be bled. If the pipes are

disconnected at any fitting located between the master cylinder and brakes, then the brake system served by the disconnected pipe must be bled.

1. For 4-Wheel Antilock Brake System (ABS) equipped vehicle, be sure to remove the ABS main fuse 60A located at the relay and fuse box before bleeding air. If you attempt to bleed air without removing the main fuse, air cannot be let out thoroughly, and this may cause damage to the hydraulic unit. After bleeding air, be sure to replace the ABS main fuse back to its original position.

2. Set the parking brake completely, then start the engine.

NOTE: The vacuum booster will be damaged if the bleeding operation is performed with the engine off.

3. Remove the master cylinder reservoir cap.

4. Fill the master cylinder reservoir with brake fluid. Keep the reservoir at least half full during the air bleeding operation

5. Always use new brake fluid for replenishment.

6. When replenishing the brake fluid reservoir, carefully pour in the brake fluid to prevent air bubbles from entering the brake system.

When the master cylinder is replaced or overhauled, first bleed the air from the master cylinder, then from each wheel cylinder and caliper following the procedures described below.

Bleeding the Master Cylinder

7. Disconnect the rear wheel brake pipe (1) from the master cylinder.

Check the fluid level and replenish as necessary. If replenished, leave the system for at least one minute.

8. Depress the brake pedal slowly once and hold it depressed.

9. Completely seal the delivery port of the master cylinder with your finger, where the pipe was disconnected then release the brake pedal slowly.

10. Release your finger from the delivery port when the brake pedal returns completely.

11. Repeat steps 8 through 10 until the brake fluid comes out of the delivery port during step 8.

NOTE: Do not allow the fluid level in the reservoir to go below the half-way mark.

12. Reconnect the brake pipe (1) to the master cylinder and tighten the pipe.

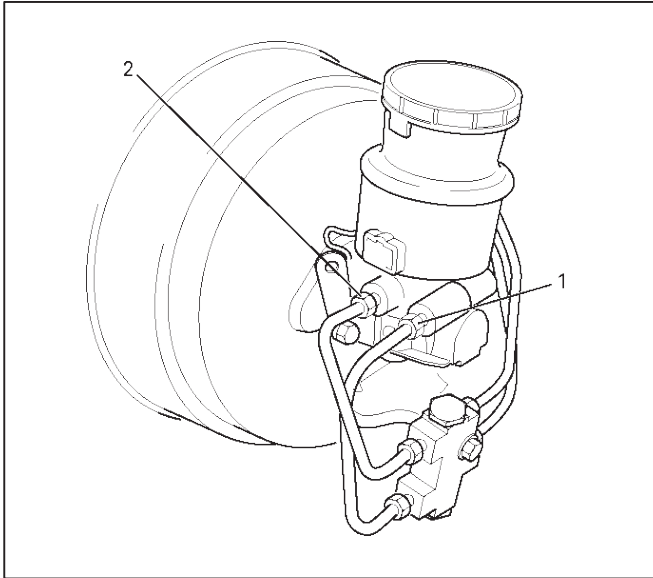
13. Depress the brake pedal slowly once and hold it depressed.

14. Loosen the rear wheel brake pipe (1) at the master cylinder.

15. Retighten the brake pipe, then release the brake pedal slowly.

16. Repeat steps 13 through 15 until no air comes out of the port when the brake pipe is loosened

NOTE: Be very careful not to allow the brake fluid to come in contact with painted surfaces.



17. Bleed the air from the front wheel brake pipe connection (2) by repeating steps 7 through 16.

Bleeding the Caliper

18. Bleed the air from each wheel in the order listed below:

- Right rear caliper or wheel cylinder
- Left rear caliper or wheel cylinder
- Right front caliper
- Left front caliper

Conduct air bleeding from the wheels in the above order. If no brake fluid comes out, it suggests that air is mixed in the master cylinder. In this case, bleed air from the master cylinder in accordance with steps 7 through 17, and then bleed air from the caliper or wheel cylinder.

19. Place the proper size box end wrench over the bleeder screw.
20. Cover the bleeder screw with a transparent tube, and submerge the free end of the transparent tube in a transparent container containing brake fluid.
21. Pump the brake pedal slowly three (3) times (once/sec), then hold it depressed.
22. Loosen the bleeder screw until fluid flows through the tube.
23. Retighten the bleeder screw.
24. Release the brake pedal slowly.
25. Repeat steps 21 through 24 until the air is completely removed.
- It may be necessary to repeat the bleeding procedure 10 or more times for front wheels and 15 or more times for rear wheels.
26. Go to the next wheel in the sequence after each wheel is bled.
- Be sure to monitor reservoir fluid level.

27. Depress the brake pedal to check if you feel "sponginess" after the air has been removed from all wheel cylinders and calipers.
- If the pedal feels "spongy", the entire bleeding procedure must be repeated.

28. After the bleeding operation is completed on the each individual wheel, check the level of the brake fluid in the reservoir and replenish up to the "MAX" level as necessary.

29. Attach the reservoir cap.

If the diaphragm inside the cap is deformed, reform it and install.

30. Stop the engine.

Flushing Brake Hydraulic System

It is recommended that the entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in the hydraulic system. Approximately one quart of fluid is required to flush the hydraulic system. The system must be flushed if there is any doubt as to the grade of fluid in the system or if fluid has been used which contains the slightest trace of mineral oil. All rubber parts that have been subjected to a contaminated fluid must be replaced.

Brake Pipes and Hoses

The hydraulic brake system components are interconnected by special steel piping and flexible hoses. Flexible hoses are used between the frame and the front calipers, the frame and rear axle case and the rear axle and the rear calipers.

When the hydraulic pipes have been disconnected for any reason, the brake system must be bled after reconnecting the pipe. Refer to *Bleeding the Brake Hydraulic System* in this section.

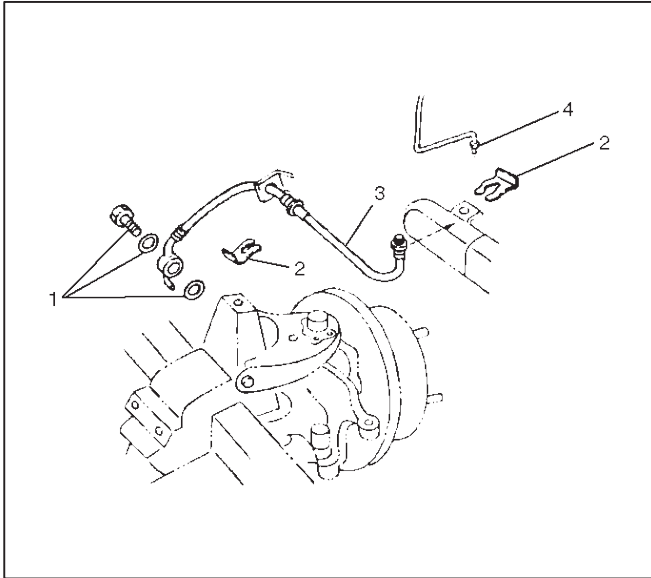
Brake Hose Inspection

The brake hose should be inspected at least twice a year. The brake hose assembly should be checked for road hazard, cracks and chafing of the outer cover, and for leaks and blisters. Inspect for proper routing and mounting of the hose. A brake hose that rubs on suspension components will wear and eventually fail. A light and mirror may be needed for an adequate inspection. If any of the above conditions are observed on the brake hose, adjust or replace the hose as necessary.

CAUTION: Never allow brake components such as calipers to hang from the brake hoses, as damage to the hoses may occur.

Front Caliper Brake Hose

Front Caliper Brake Hose and Associated Parts



352RV001

Legend

- (1) Bolt and Gasket
- (2) Clip
- (3) Hose
- (4) Brake Pipe

Removal

1. Raise the vehicle and support it with suitable safety stands.
2. Remove the wheel and tire assembly.
3. Clean dirt, grease, and other foreign material off the hose fittings at both ends.
4. Disconnect brake pipe.
5. Remove clip.
6. Remove bolt and gasket.
7. Remove hose.

Installation

To install, follow the removal steps in the reverse order, noting the following points.

1. Tighten the brake pipes to the specified torque

Torque: 19 N·m (14 lb ft)

2. Tighten the bolt to the specified torque.

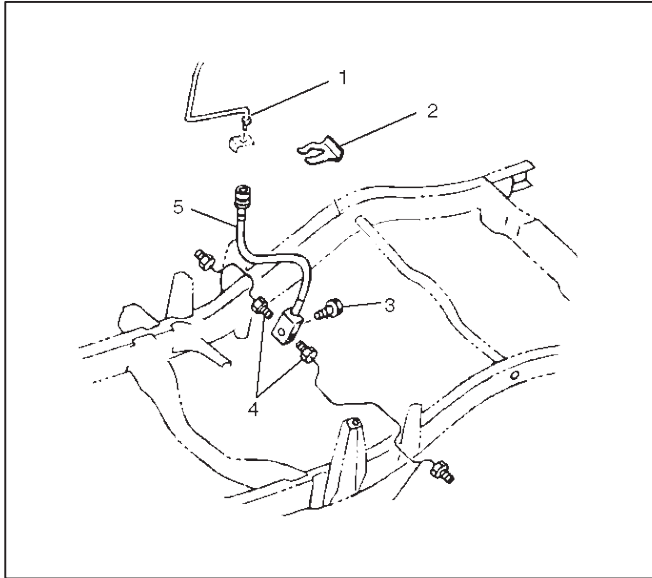
Torque: 35 N·m (26 lb ft)

NOTE: Always use new gaskets and be sure to put the hooked edge of the flexible hose end into the anti-rotation cavity.

After installing the brake hoses, bleed the brakes as described in this section.

Rear Axle Brake Hose

Rear Axle Brake Hose and Associated Parts



352RW002

Legend

- (1) Brake Pipe
- (2) Clip
- (3) Bolt
- (4) Brake Pipe
- (5) Hose

Installation

To install, follow the removal steps in the reverse order, noting the following points.

1. Tighten the brake pipes to the specified torque

Torque: 19 N·m (14 lb ft)

2. Tighten the bolt to the specified torque.

Torque: 15 N·m (11 lb ft)

After installing the brake hoses, bleed the brakes as described in this section.

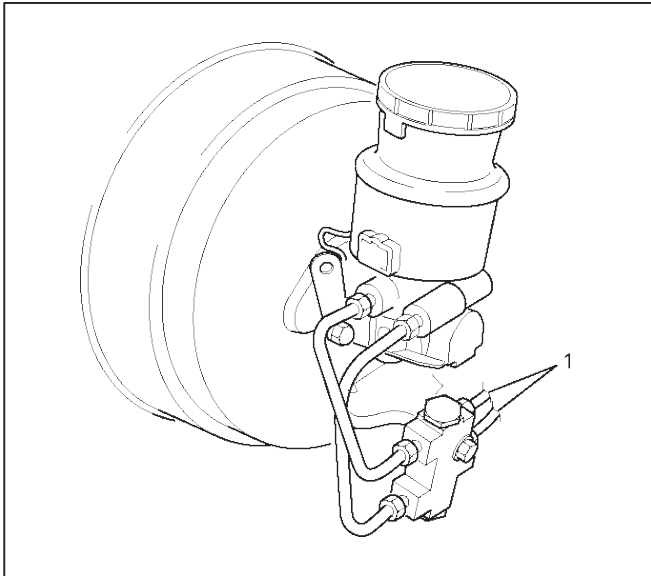
Removal

1. Raise the vehicle and support it with suitable safety stands.
2. Remove wheel and tire assembly.
3. Clean dirt, grease, and other foreign material off the hose fittings at both ends.
4. Disconnect brake pipe.
5. Remove clip.
6. Remove brake pipe.
7. Remove bolt.
8. Remove hose.

Brake Pipe

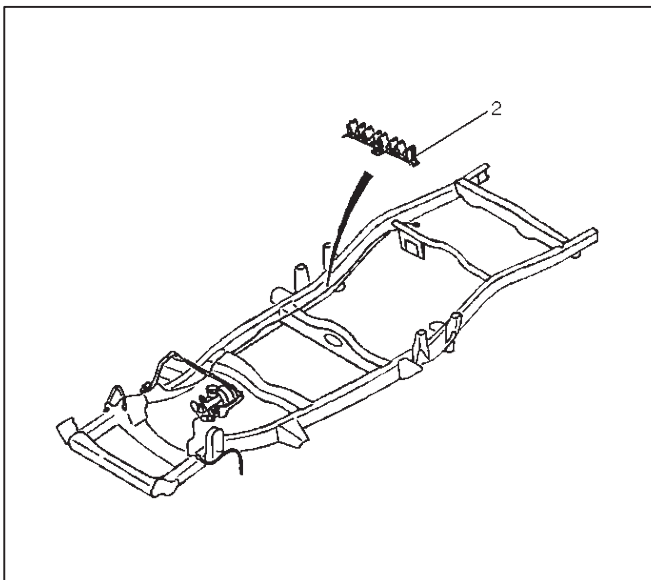
Removal

1. Raise the vehicle and support it with suitable safety stands.
2. Remove wheel and tire assembly as necessary.
3. Clean dirt, grease, and other foreign material off the pipe fittings at both ends.
4. Remove brake pipe (1).



330RW011

5. Remove plastic clip (2).



330RW002

Installation

To install, follow the removal steps in the reverse order, noting the following points.

1. Tighten the brake pipes to the specified torque.

Master cylinder and Proportioning and Bypass valve sides

Torque: 15 N·m (11 lb ft)

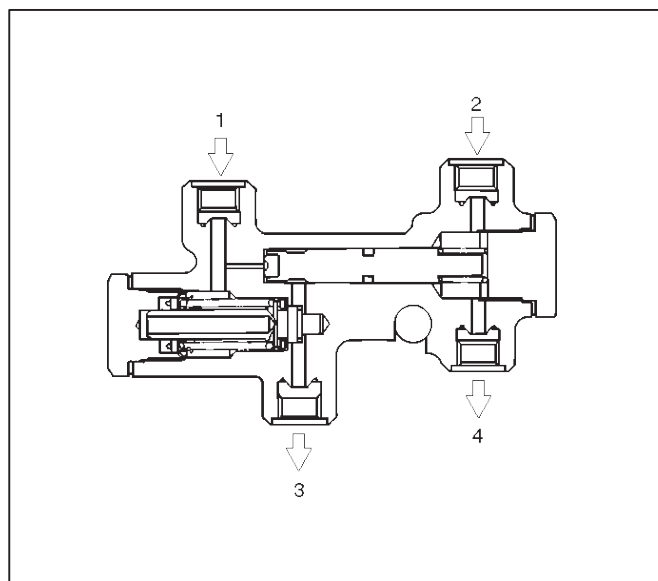
Others

Torque: 16 N·m (12 lb ft)

After installing the brake pipes, bleed the brakes as described in this section.

P & B (Proportioning and Bypass) Valve

P & B (Proportioning and Bypass) Valve Sectional View



350RW014

Legend

- (1) Master Cylinder (Secondary)
- (2) Master Cylinder (Primary)
- (3) Rear Brake
- (4) Front Brake

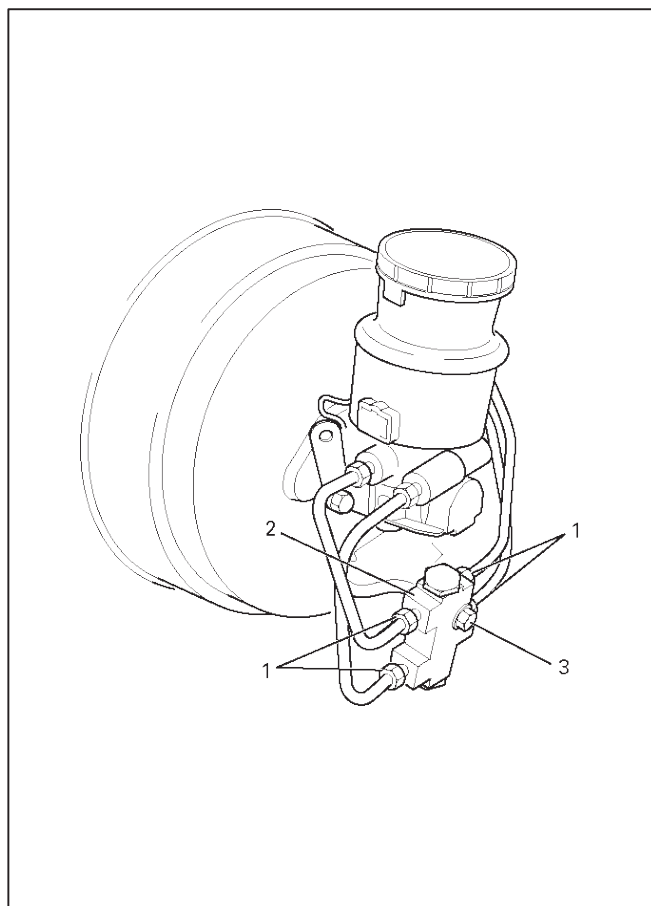
The P&B valve contains two sections, each serving a different function.

The proportioning section of the P&B valve proportions outlet pressure to the rear brakes after a predetermined rear input pressure has been reached. This is done to prevent rear wheel lock up on the vehicles with light rear wheel loads. The valve has a by-pass feature which assures full system pressure to the rear brakes in the event of front brake system malfunction. Also full front pressure is retained in the event of rear brake malfunction.

The P&B valve is not repairable and must be replaced as complete assembly.

Removal

1. The P&B valve is not repairable and must be replaced as a complete assembly. Care must be taken to prevent brake fluid from contacting any painted surface.
2. Remove hydraulic pipes (1) and plug the pipes (1) to prevent the loss of fluid or the entrance of dirt.
3. Remove bolt (3).
4. Remove P&B valve (2).



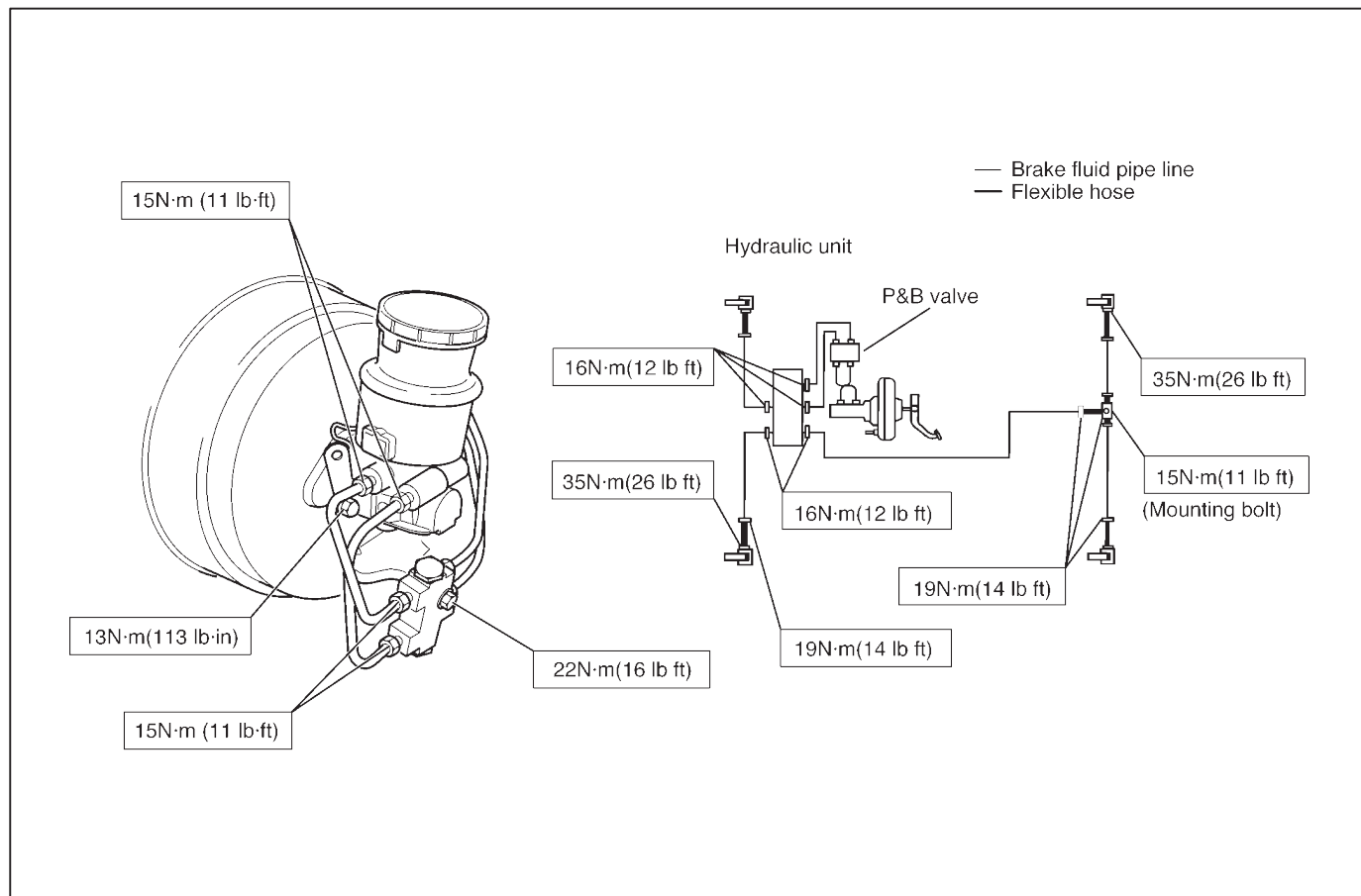
350RW026

Installation

1. Install P&B valve (2).
2. Install bolt (3) and tighten the bolt to the specified torque.
Torque: 22 N·m (16 lb ft)
3. Install hydraulic pipes (1) and tighten the bolt to the specified torque.
Torque: 15 N·m (11 lb ft)
4. After installing the brake pipes, bleed the brakes as refer to *Bleeding Brake Hydraulic System* in this section.

Main Data and Specifications

Torque Specifications

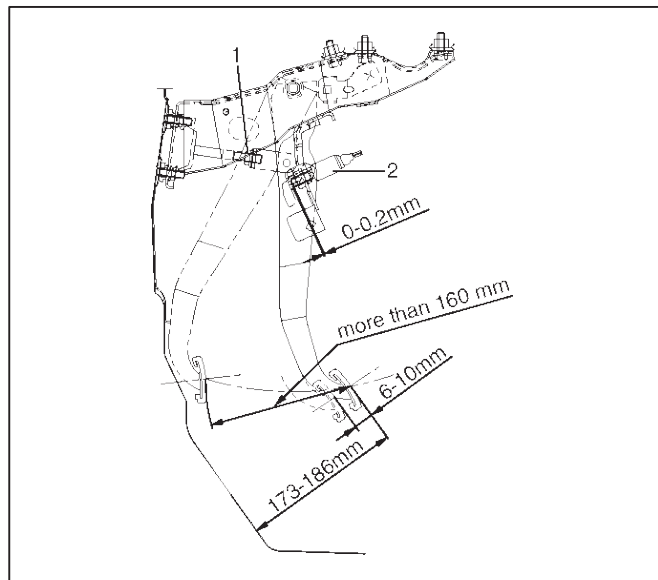


Brake Pedal

Checking Pedal Height

The push rod serves as the brake pedal stopper when the pedal is fully released. Brake pedal height adjustment should be performed as follows:

Adjust Brake Pedal



1. Measure the brake pedal height after making sure the pedal is fully returned by the pedal return spring. Pedal height must be measured after starting the engine and receiving it several times.

Pedal Free Play: 6-10 mm (0.23-0.39 in)

Pedal Free Play: 173-185 mm (6.81-7.28 in)

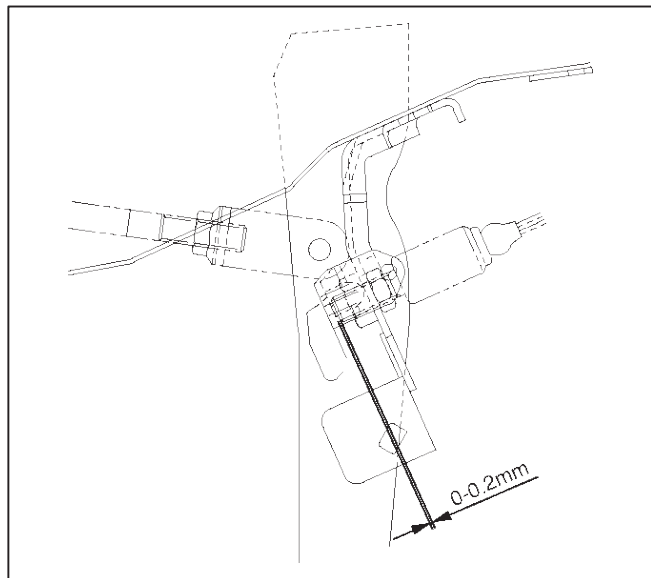
NOTE: Pedal free play must be measured after turning off the engine and stepping on the brake pedal firmly five times or more.

2. If the measured value is not within the above range, adjust the brake pedal as follows:
 - a. Disconnect the stoplight switch connector.
 - b. Loosen the stoplight switch lock nut.
 - c. Rotate the stoplight switch so that it moves away from the brake pedal.
 - d. Loosen the lock nut (1) on the push rod.
 - e. Adjust the brake pedal to the specified height by rotating the push rod in the appropriate direction.
 - f. Tighten the lock nut to the specified torque.

Torque: 20 N·m (15 lb ft)

- g. Adjust the stoplight switch (2) to the specified clearance (between the switch housing and the brake pedal) by rotating the switch housing.

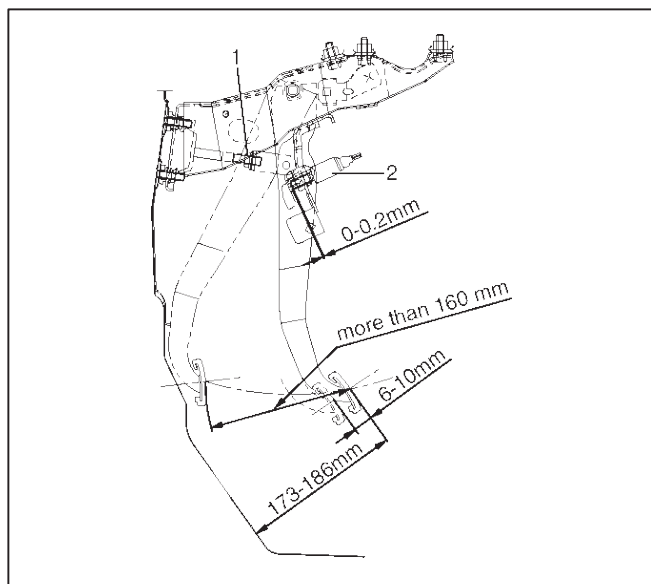
Clearance: 0.5–1.0 mm (0.02–0.04 in)



NOTE: While adjusting the stoplight switch, make sure that the threaded part of the stoplight switch does not push the brake pedal.

- h. Tighten the stoplight switch lock nut.
- i. Connect the stoplight switch connector.

Checking Pedal Travel

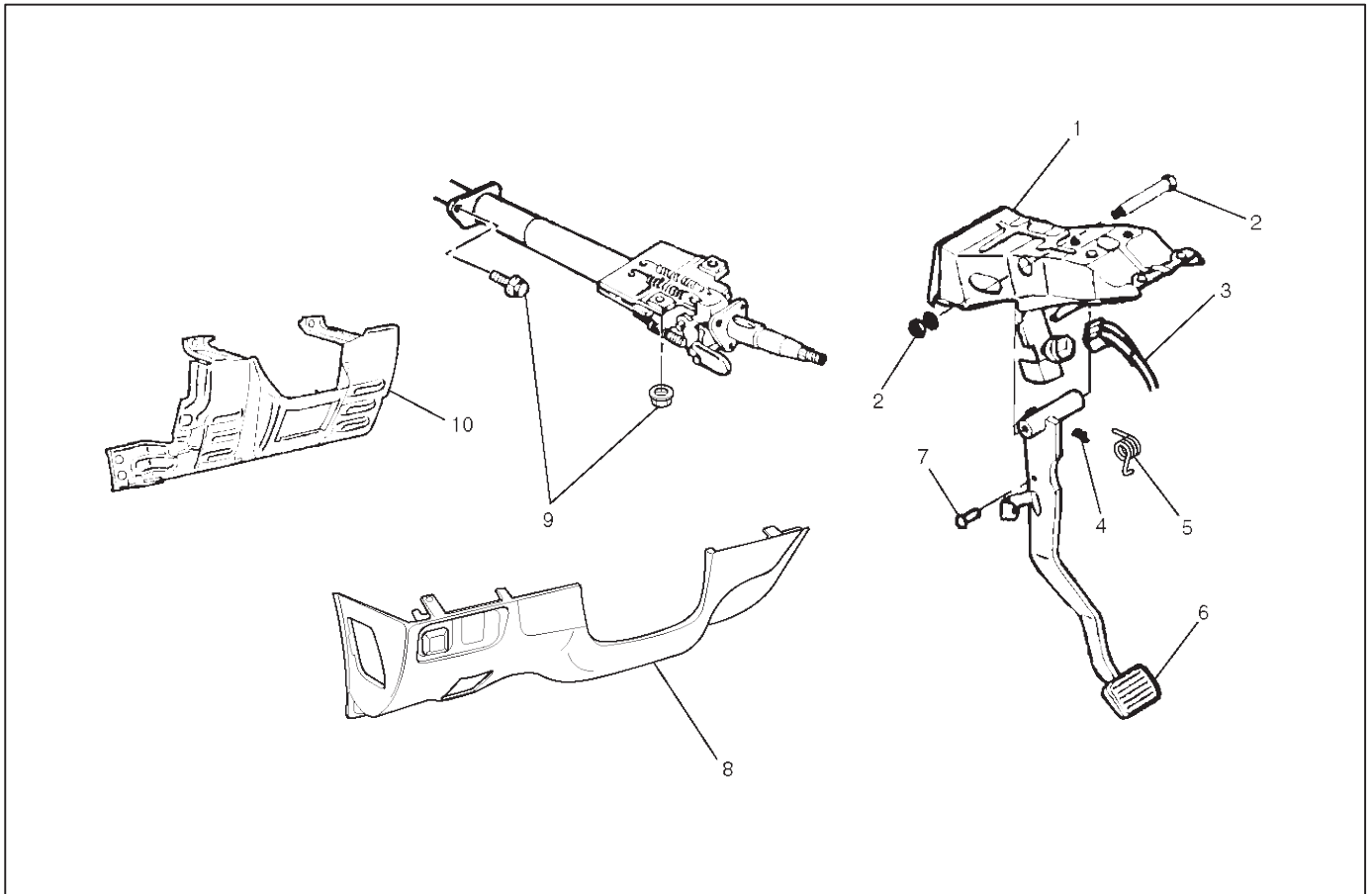


1. Pedal height must be measured after starting the engine and revving it several times to apply vacuum to the vacuum booster fully.

NOTE: Pedal height must be 95 mm (3.7 in) or more when about 50 kg (110.25 lb) of stepping force is applied.

2. If the measured value is lower than the above range, air may still be present in the hydraulic system. Perform the bleeding procedure.

Brake Pedal and Associated Parts



310RY00006

Legend

- | | |
|----------------------------------|--------------------------|
| (1) Brake Pedal Bracket Assembly | (6) Pedal Assembly |
| (2) Fulcrum Pin and Nut | (7) Push Rod Pin |
| (3) Connector | (8) Lower Cover |
| (4) Snap Pin | (9) Bolts and Nut |
| (5) Return Spring | (10) Driver Knee Bolster |

Removal

1. Disconnect the battery “-” terminal cable, and wait at least 5 minutes.
2. Disconnect the yellow 3 way SRS connector located under the steering column.
3. Remove the engine hood opening lever.
4. Remove lower cover (8).
5. Remove driver knee bolster (10).
6. Disconnect the stop light switch connector (3). Disconnect the anti-theft control module connector. Refer to *Body and Accessories* section in this Manual.
7. Remove snap pin (4) and push rod pin (7).
8. Remove the steering column shaft fixing bolt and nut (9) on the steering wheel side, and lower the steering column shaft.
9. Remove the brake pedal bracket assembly (1).
10. Remove return spring (5).
11. Remove fulcrum pin and nut (2).

12. Remove pedal assembly (6).

Installation

1. Apply grease to the entire circumference of the fulcrum pin.
2. Install pedal assembly (6) and fulcrum pin and nut (2). Tighten the nut (2) to the specified torque.
Torque: 35 N·m (26 lb ft)
3. Install the brake pedal bracket assembly (1). Tighten the bolts and nuts soecified torque.
Torque: 15 N·m (11 lb ft)
4. Install return spring (5).
5. Adjust pedal free travel.
Refer to *Brake Pedal Adjustment* in this section.
6. Tighten the steering column fixing bolt (9) (dash panel) to the specified torque.
Torque: 20 N·m (14 lb ft)

7. Tighten the steering column fixing nut (9) (Cross Beam) to the specified torque.

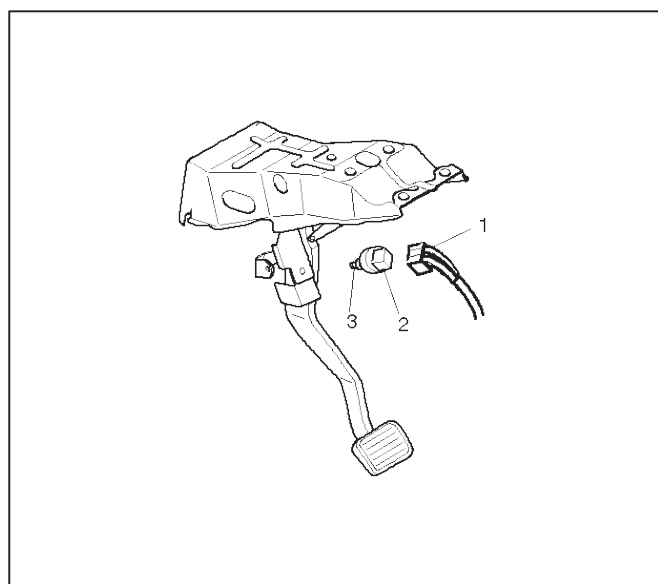
Torque: 17 N·m (12 lb ft)

8. Apply grease to the entire circumference of the Push rod pin (7).
9. Install push rod pin (7).
10. Install snap pin (4).
11. Connect the anti-theft control module connector.
Refer to *Body and Accessories* section in this manual.

12. Connect the stop light switch connector (3).
13. Install driver knee bolster (10) and lower cover (8).
14. Install the engine hood opening lever.
15. Connect the yellow 3 way SRS connector located under the steering column.
16. Connect the battery “-” terminal cable.

Stoplight Switch

Parts Location



Legend

- (1) Connector
- (2) Switch
- (3) Lock Nut

Removal

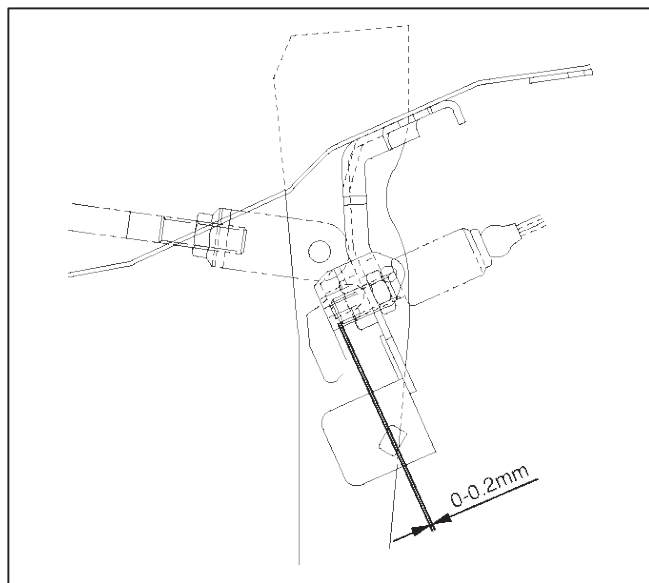
1. Disconnect connector (1).
2. Remove lock nut (3).
3. Remove switch (2).

Installation

1. Adjust the stop light switch to the specified clearance (between switch housing and brake pedal) by rotating the switch housing.

Clearance : 0-0.2 mm (0-0.08 in)

NOTE: Do not attempt to force the push rod into position during the stop light switch installation and adjustment procedure.



2. Connect connector (1).
3. Install lock nut (3).

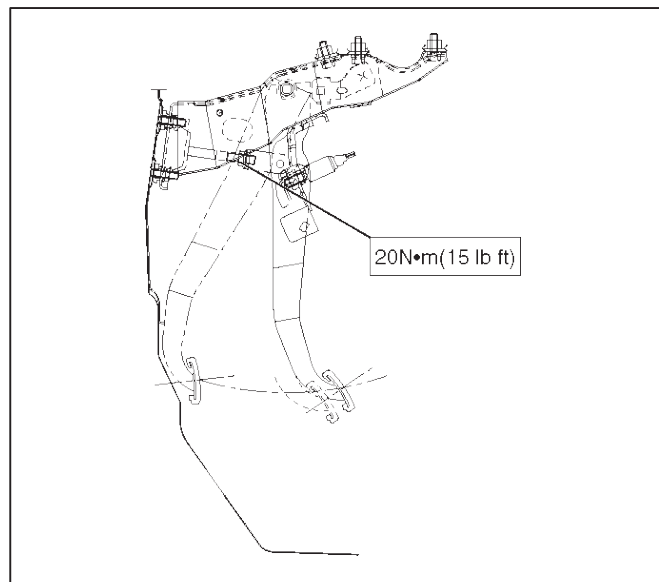
5C-20 POWER-ASSISTED BRAKE SYSTEM

Main Data and Specifications

General Specifications

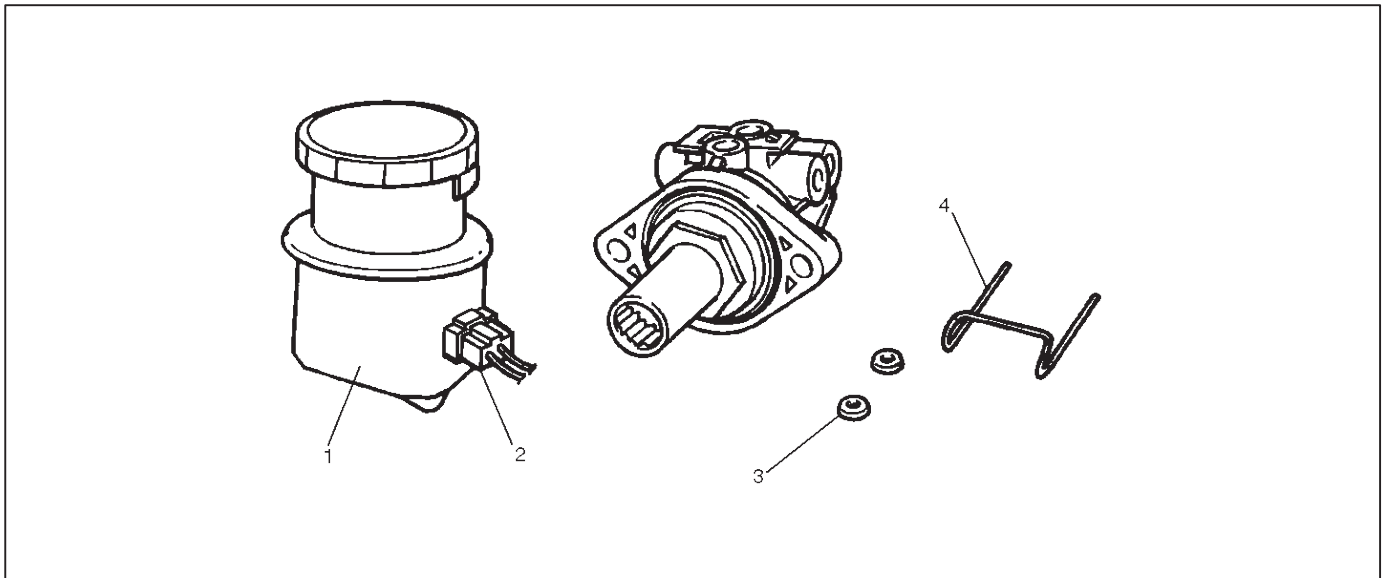
Pedal free play	6–10 mm (0.23 –0.39 in)
Pedal Height	173–185 mm (6.81–7.28 in)

Torque Specifications



Fluid Reservoir Tank

Fluid Reservoir Tank and Associated Parts



330RW003

Legend

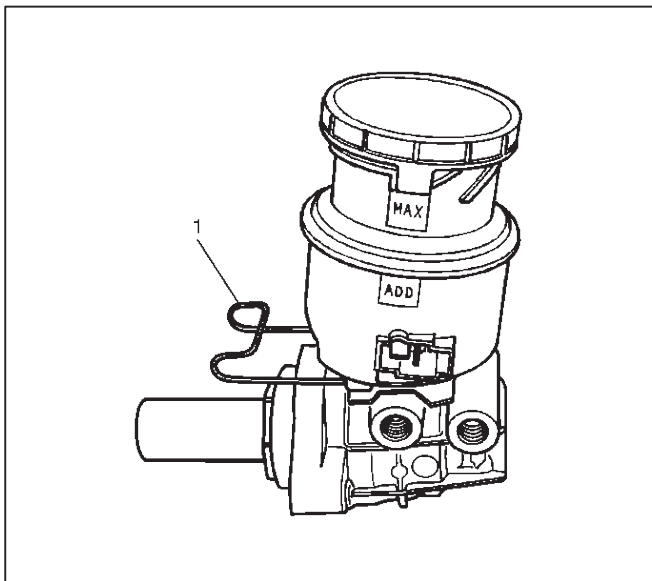
- (1) Fluid Reservoir
- (2) Electrical Connector

- (3) O-ring
- (4) Retainer

Removal

NOTE: Before removing the fluid reservoir, remove the brake fluid from the fluid reservoir.

1. Disconnect electrical connector.
2. Remove retainer (1).



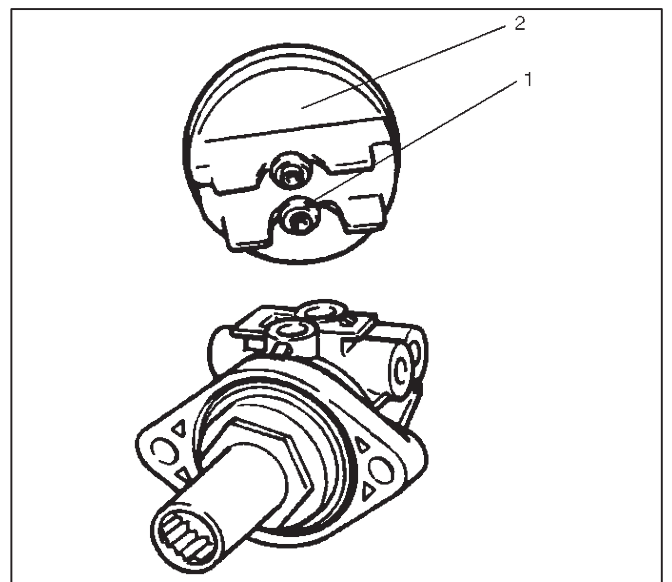
330RW004

3. Remove fluid reservoir and the fluid level sensor built into the fluid reservoir. The fluid level sensor cannot be removed for servicing.
4. Remove O-ring.

Installation

To install, follow the removal steps in the reverse order, noting the following points:

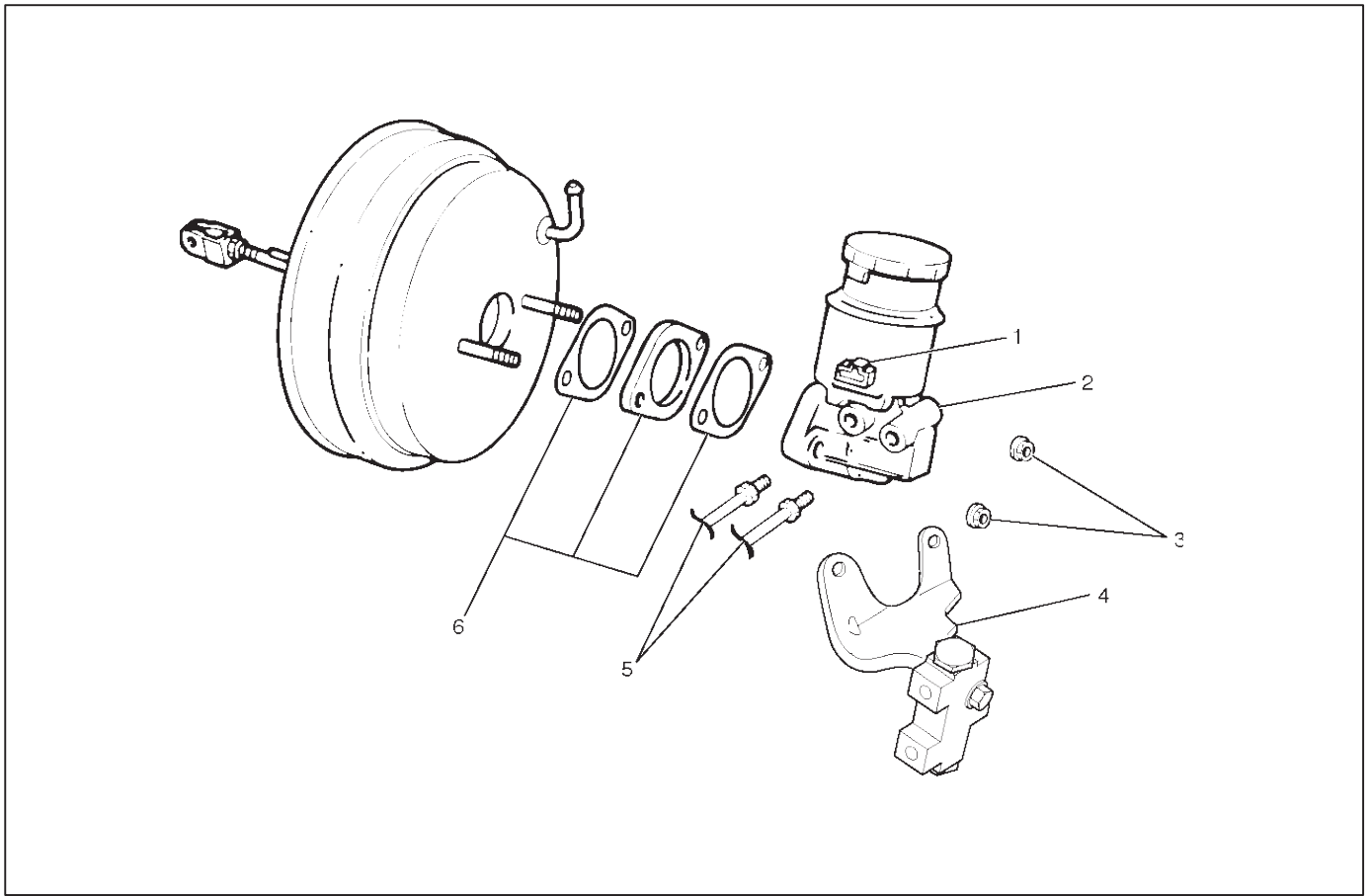
1. O-ring (1) must be set onto the fluid reservoir (2), before installing fluid reservoir.



330RW005

Master Cylinder Assembly

Master Cylinder Assembly and Associated Parts



330RW010

Legend

- | | |
|--------------------------|---------------------------|
| (1) Electrical Connector | (4) P&B Valve and Bracket |
| (2) Master Cylinder | (5) Brake Pipes |
| (3) 2 attaching Nuts | (6) Spacer and 2 gaskets |

Removal

CAUTION: When removing the master cylinder from the vacuum booster, be sure to get rid of the internal negative pressure of the vacuum booster (by, for instance, disconnecting the vacuum hose) in advance.

If any negative pressure remains in the vacuum booster, the piston may possibly come out when the master cylinder is being removed, letting the brake fluid run out.

While removing the master cylinder, further, do not hold the piston as it can be easily pulled out.

Outside surface of the piston is the surface on which seals are to slide. Care should be taken to keep the surface free of cuts and dents.

1. Disconnect electrical connector.
2. Remove brake pipes and after disconnecting the brake pipe, cap or tape the openings of the brake pipe to prevent the entry of foreign matter.
3. Remove 2 attaching nuts.
4. Remove P&B valve and bracket.

5. Remove master cylinder.

6. Remove spacer and the 2 gaskets.

Inspection and Repair

Master Cylinder

The master cylinder is not repairable and must be replaced as a complete assembly if found defective.

Inspection

Excessive brake pedal travel, malfunction or dragging brake suggests that the master cylinder is defective. In such cases perform the following visual check:

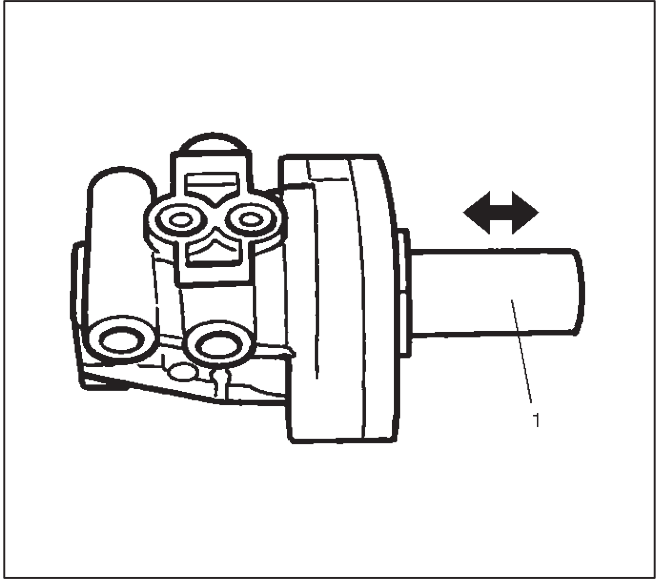
Visual Check

Make parts replacement as required if wear, distortion, nicks, cuts, corrosion, or other abnormal conditions are found through the following parts inspection:

- Master cylinder body
- Fluid reservoir
- O-ring

Functional Inspection of Master Cylinder Piston

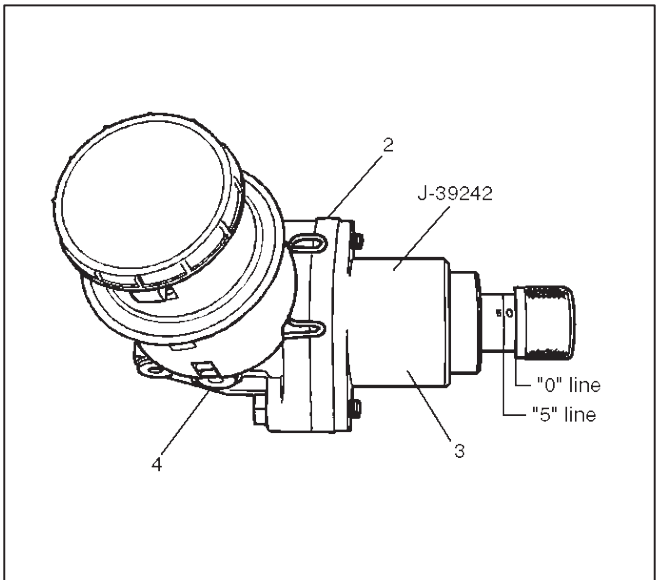
Push the primary piston (1) with your fingers to check that it travels smoothly. If the motion is questionable, replace the master cylinder as a complete assembly.



330RW007

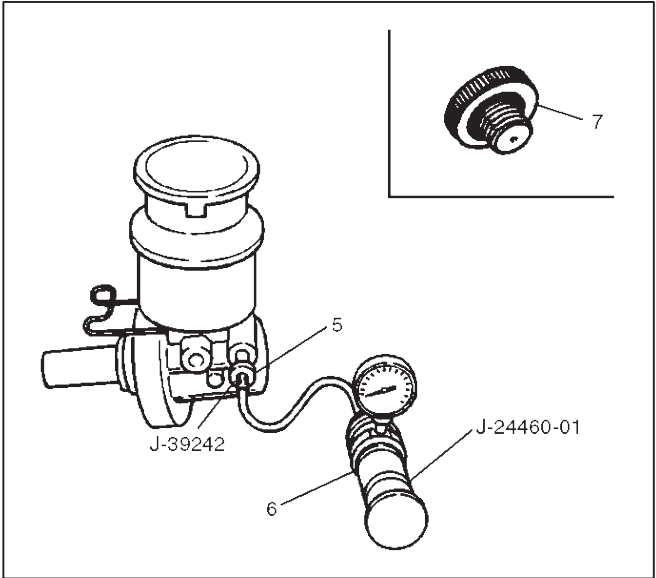
Functional Inspection of Master Cylinder

Inspect the master cylinder for functionality described below. Replace if necessary. Install the primary piston holder (3) J-39242 (including the master cylinder attachment (5) and master cylinder plug (7)) onto the master cylinder (4). Make sure the spacer (2) (2 bolts) with its adjusting bolt is screwed in up to the "0" line



330RW008

Connect the master cylinder attachment (5) J-39242 with the end of the radiator cap tester (6) J-24460-01, and apply air pressure with the cap tester. Make sure there is no rise in pressure while adjusting the bolt to the "5" line. There should be a pressure increase of 0.5 kg/cm² or more.



330RW009

NOTE: When checking the front (or primary) side, be sure to mount the master cylinder plug in the rear (or secondary) port.

	"0" Line	"5" Line
Apply air pressure to the front and rear ports	No pressure rise.	Pressure increase of 0.5 kg/cm ² or more
Remarks	Checks port into the atmospheric pressure chamber	Checks air tightness of the pressure chamber

NOTE:

1. Do not use an air compressor, as the air from the compressor is mixed with compressor oil.
2. When installing the master cylinder onto the vacuum booster, always adjust the vacuum booster push rod. (Refer to *Vacuum Booster* in this section).
3. After the master cylinder is installed onto the vehicle, check for leakage, pedal travel and pedal free play.

Installation

1. Install spacer and the 2 gaskets.
2. Install master cylinder.
When replacing the master cylinder or vacuum booster or both, always measure the vacuum booster push rod protrusion and adjust it as necessary (Refer to *Vacuum Booster* in section).
3. Install P&B valve and bracket.
4. Install 2 attaching nuts and tighten the attaching nuts to the specified torque.

Torque: 13 N·m (113 lb in)

5C-24 POWER-ASSISTED BRAKE SYSTEM

5. Install brake pipes and tighten the brake pipe to the specified torque.

Master cylinder and P&B valve sides

Torque: 15 N·m (11 lb ft)

Others

Torque: 16 N·m (12 lb ft)

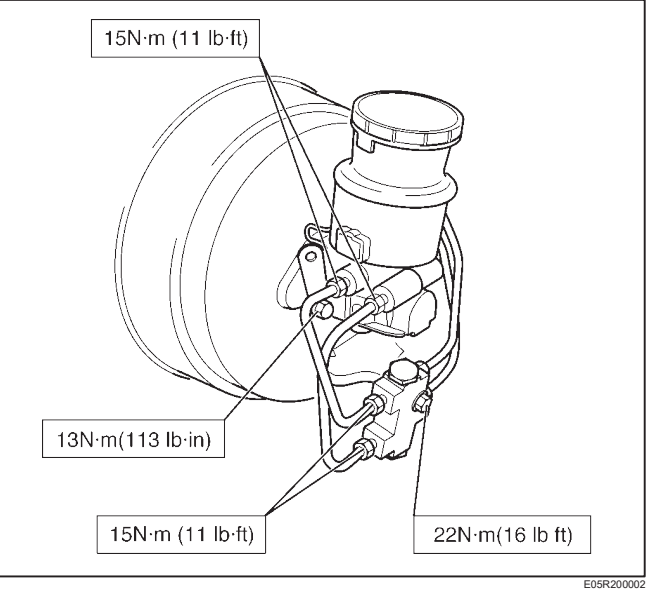
6. Connect electrical connector.

Main Data and Specifications

General Specifications

Type	Dual-circuit
Piston bore diameter	25.4 mm (1.000 in)

Torque Specifications

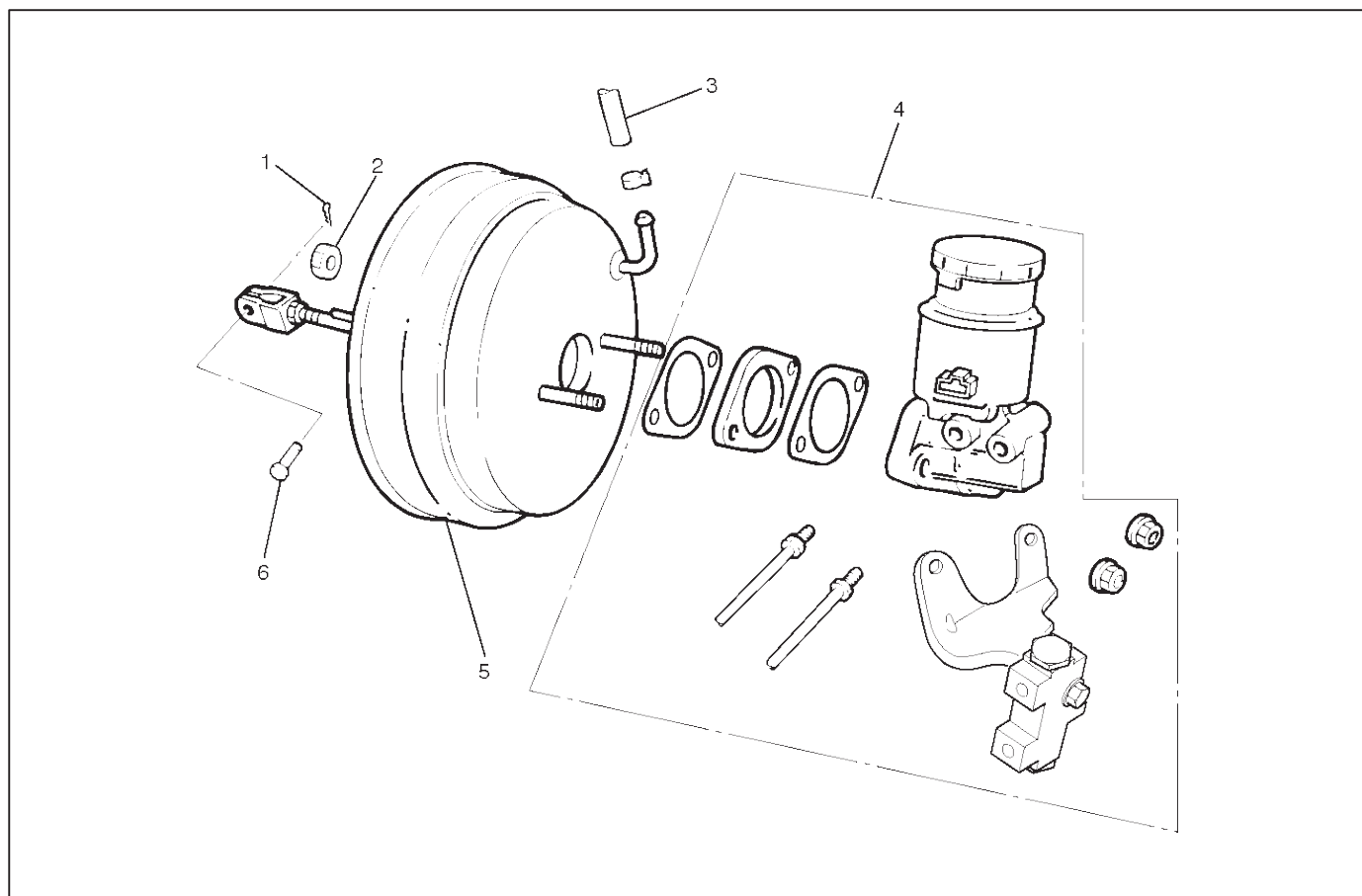


Special Tools

ILLUSTRATION	TOOL NO. TOOL NAME
 901RS200	J-39242 Primary Piston Holder (including master cylinder attachment and master cylinder plug)
 901RS201	J-24460-01 Radiator Cap Tester

Vacuum Booster Assembly

Vacuum Booster Assembly and Associated Parts



331RW005

Legend

- | | |
|-------------------------------|---------------------|
| (1) Pin | (4) Master Cylinder |
| (2) Vacuum Booster Fixing Nut | (5) Vacuum Booster |
| (3) Vacuum Hose | (6) Snap Pin |

Removal

1. Before removing the vacuum booster assembly, disconnect and remove the brake pipes.
2. Remove master cylinder, refer to *Master Cylinder Removal* in this section.

CAUTION: When removing the master cylinder from the vacuum booster, be sure to get rid of the internal negative pressure of the vacuum booster (by, for instance, disconnecting the vacuum hose) in advance.

If any negative pressure remains in the vacuum booster, the piston may possibly come out when the master cylinder is being removed, letting the brake fluid run out.

Do not hold the piston while removing the master cylinder, the piston can be easily pulled out.

Outside surface of the piston is the surface on which seals are to slide. Care should be taken to keep the surface free of cuts and dents.

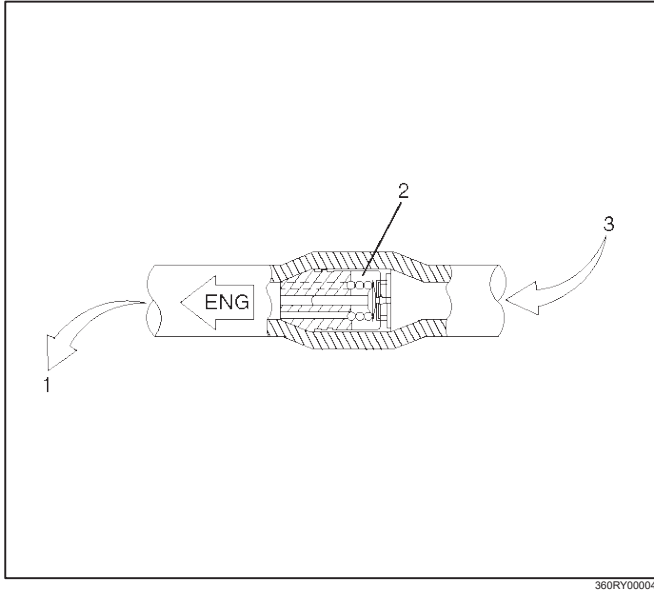
3. Remove vacuum hose.

4. Disconnect the yoke clevis from the brake pedal.
5. Remove vacuum booster fixing nut.
6. Remove vacuum booster.

Inspection and Repair

Vacuum Hose (The built in check valve)

1. Inspect the check valve (2), which is installed inside the vacuum hose.
2. Air should pass freely from the vacuum booster (3) to the engine (1).
3. Air should not pass from the engine (1) to the vacuum booster (3). If it does, the check valve is inoperative and the vacuum hose built in the check valve must be replaced.

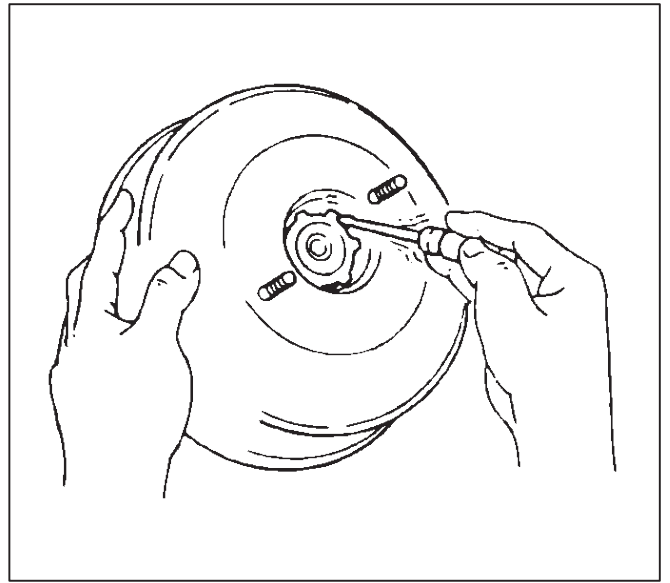


Installation

1. Perform vacuum booster and vacuum booster push rod adjustment.

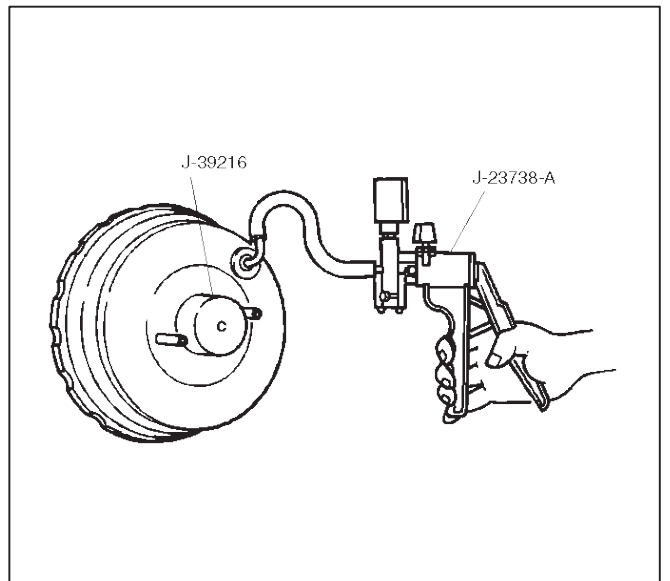
NOTE: When replacing either the master cylinder or vacuum booster, be sure to measure push rod, and adjust if required.

2. Remove retainer from vacuum booster front shell using a small screwdriver. Then gently draw plate and seal assembly out of the shell inside.



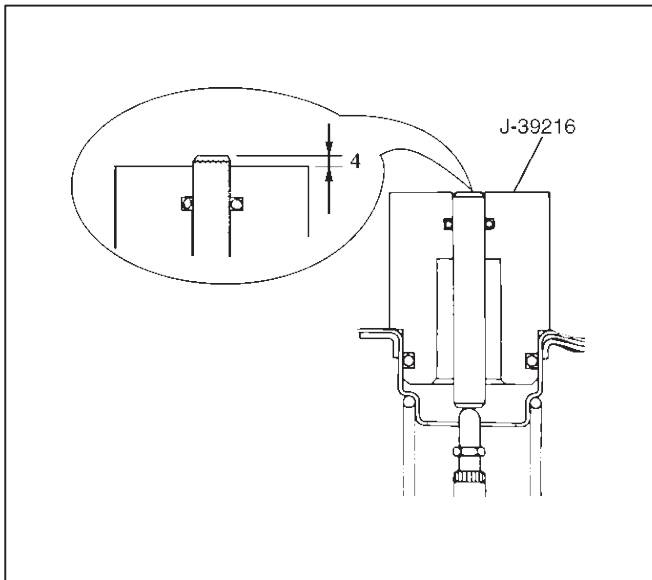
3. Set push rod gauge J-39216 on vacuum booster, and apply negative pressure by means of vacuum pump J-23738-A so that the pressure in the vacuum booster becomes 500 mm Hg.

NOTE: Be sure to apply NEGATIVE pressure after installing a push rod gauge on the vacuum booster.



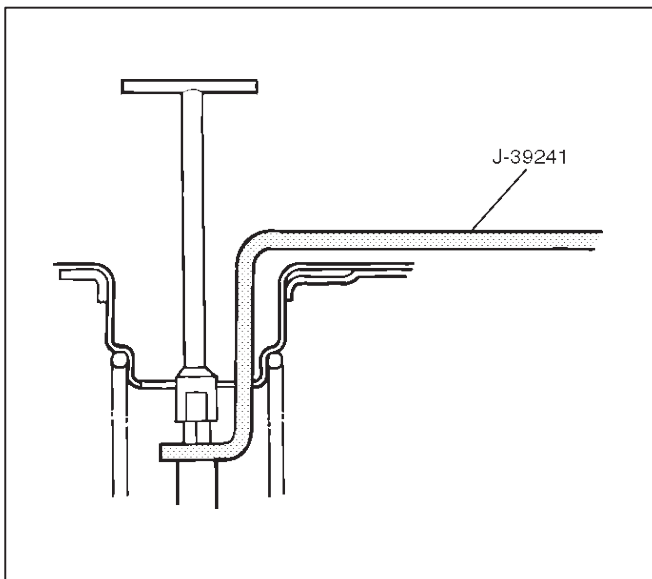
4. Measure dimension (4).

**Dimension (4) (Standard): -0.1 – 0.1 mm
(-0.0039 – 0.0039 in)**



331RW002

5. If dimension (4) is out of the standard range, adjust push rod using the Push Rod Support J-39241.



331RW003

6. Mount plate and seal assembly in vacuum booster front shell. Then install the retainer.

7. Install vacuum booster fixing nut and tighten the specified torque.

Torque: 15 N·m (11 lb ft)

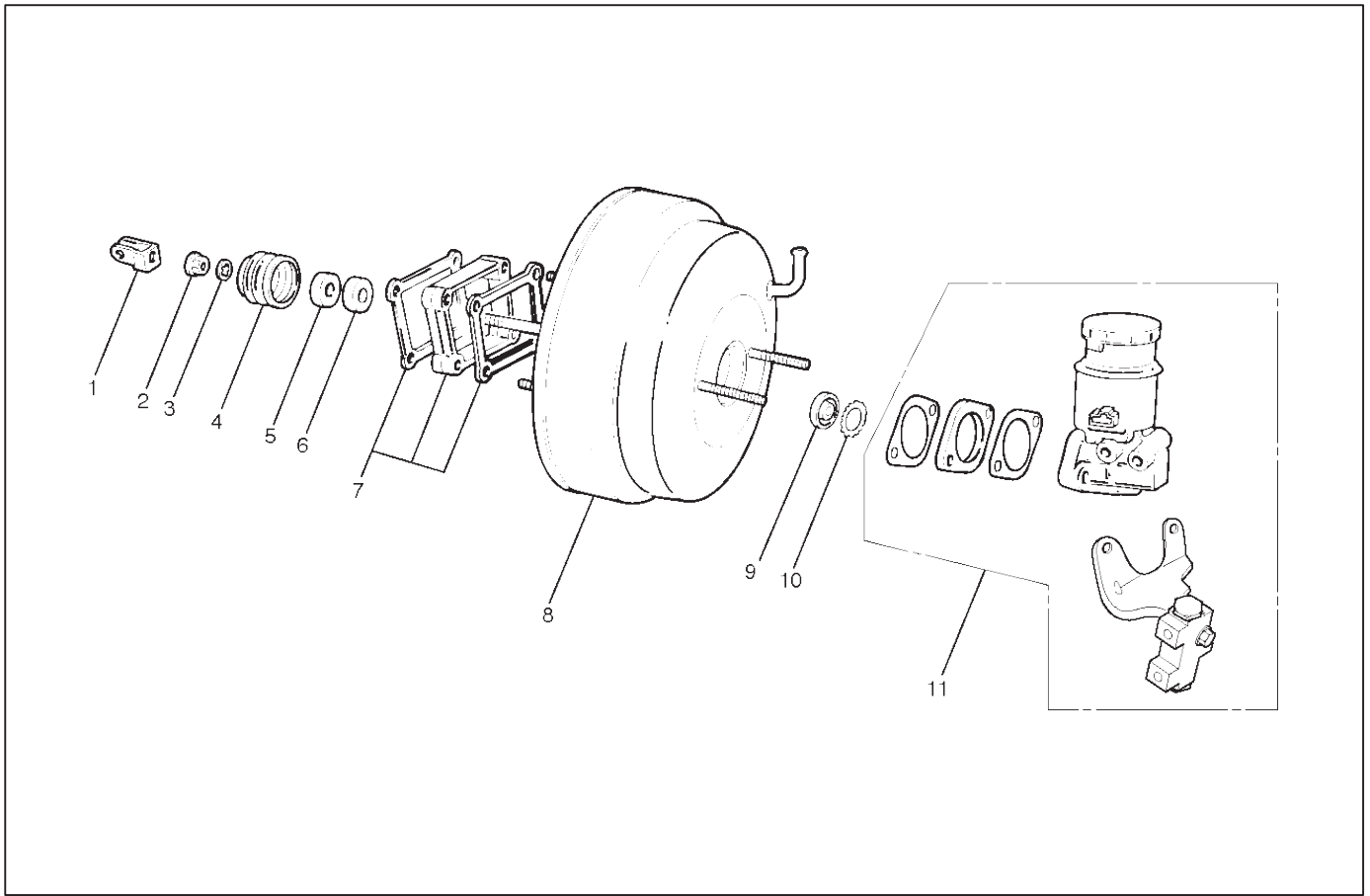
8. Install yoke clevis.

9. Connect vacuum hose and make sure that the arrow on the hose points in the direction of the engine.

10. Install master cylinder, refer to *Master Cylinder Installation* in this section.

Exterior Components

Exterior Components and Associated Parts



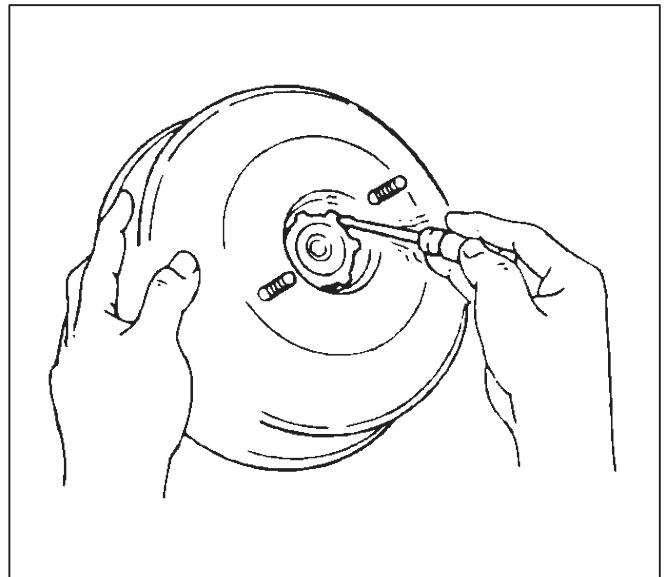
331RW006

Legend

- | | |
|----------------------|------------------------------|
| (1) Yoke Clevis | (6) Filter |
| (2) Lock Nut | (7) 2 Gaskets and Spacer |
| (3) Retaining Clip | (8) Vacuum Booster |
| (4) Valve Body Guard | (9) Retainer |
| (5) Silencer | (10) Plate and Seal Assembly |
| | (11) Master Cylinder |

Removal

1. Remove master cylinder. Refer to *Master Cylinder* in this section.
2. Remove vacuum booster. Refer to *Vacuum Booster* in this section.
3. Remove yoke clevis.
4. Remove lock nut.
5. Remove retaining clip.
6. Remove valve body guard.
7. Remove silencer.
8. Remove filter.
9. Remove 2 gaskets and spacer.
10. Remove retainer, using a small screwdriver to pry out the retainer. Gently pull out the plate and seal assembly from the shell.



331RS003

Inspection and Repair

Visual Check

Make necessary parts replacement if cuts, nicks, excessive wear, or other abnormal conditions are found through inspection. Check the following parts:

- Yoke clevis
- Valve body guard
- Silencer
- Filter plate and seal assembly

Installation

1. Install plate and seal assembly.
2. Install retainer.

3. Install 2 gaskets and spacer.
4. Install filter.
5. Install silencer.
6. Install valve body guard.
7. Install retainer.
8. Install lock nut and yoke clevis and tighten to the specified torque.

Torque: 20 N·m (15 lb ft)

9. Install vacuum booster, refer to *Vacuum Booster* in this section.
10. Install master cylinder, refer to *Master Cylinder* in this section and after installation, perform brake pedal check and adjustment. Refer to *Brake Pedal* in this section.

Vacuum Booster Overhaul

Vacuum Booster

The vacuum booster cannot be disassembled for repair. Replace a defective vacuum booster with a new one.

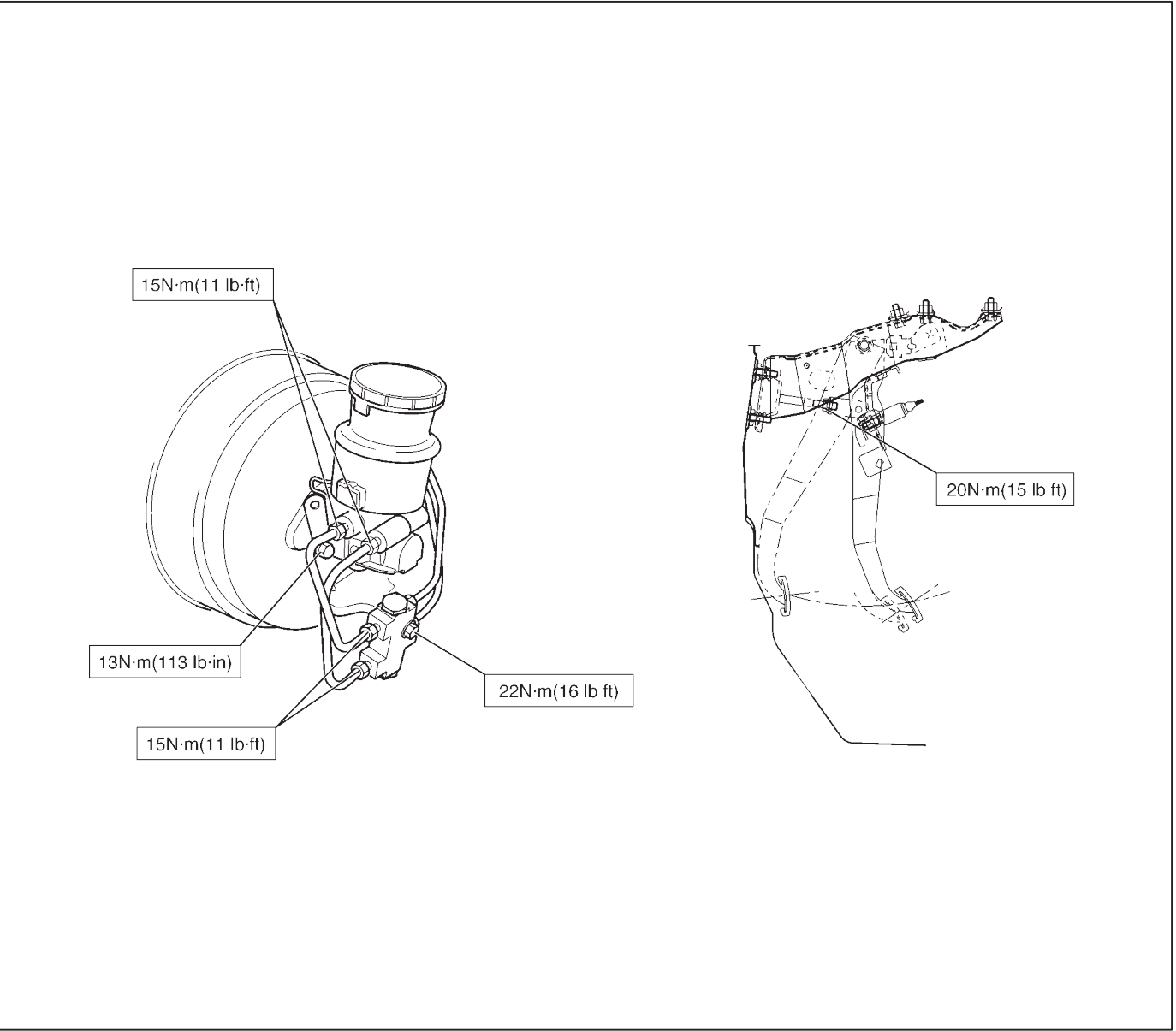
5C-30 POWER-ASSISTED BRAKE SYSTEM

Main Data and Specifications

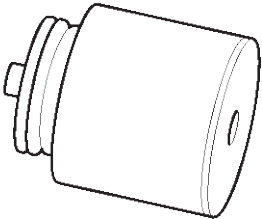
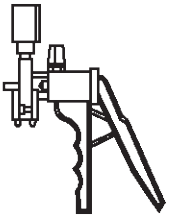
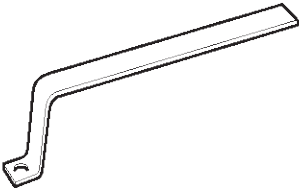
General Specifications

Vacuum booster diaphragm diameter (Front)	205 mm (8.07 in)
Vacuum booster diaphragm diameter (Rear)	230 mm (9.06 in)
Push rod stroke	More than 32.0 mm (1.26 in)
Plunger diameter	10.25 mm (0.40 in)
Push rod diameter	27.4 mm (1.08 in)

Torque Specifications



Special Tools

ILLUSTRATION	TOOL NO. TOOL NAME
 901RS202	J-39216 Push Rod Gauge
 901RS203	J-23738-A Vacuum Pump
 901RS204	J-39241 Push Rod Support

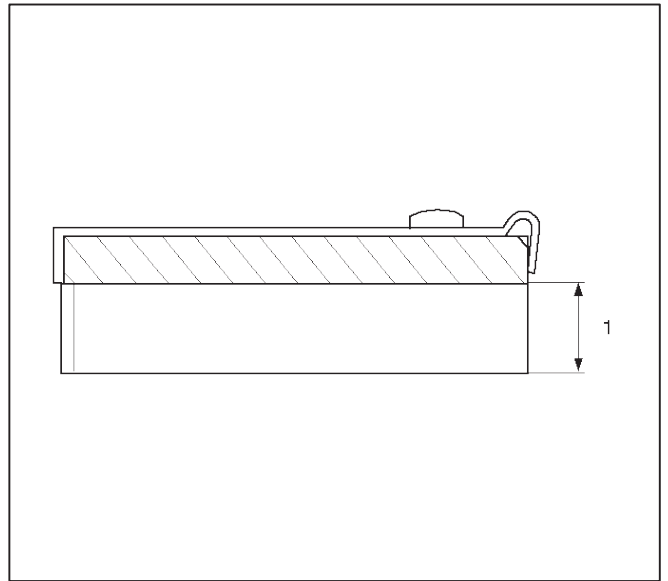
Front Disc Brake Pads

Front Disc Brake Pads Inspection

Check the outer pad by looking at each caliper from above. Check the thickness on the inner pad by looking down through the inspection hole on the top of the caliper. Whenever the pad is worn to about the thickness of the pad base, the pad should be removed for further measurements. The pad should be replaced anytime the pad thickness (1) is worn to within 1.00 mm (0.039 in) of the pad itself.

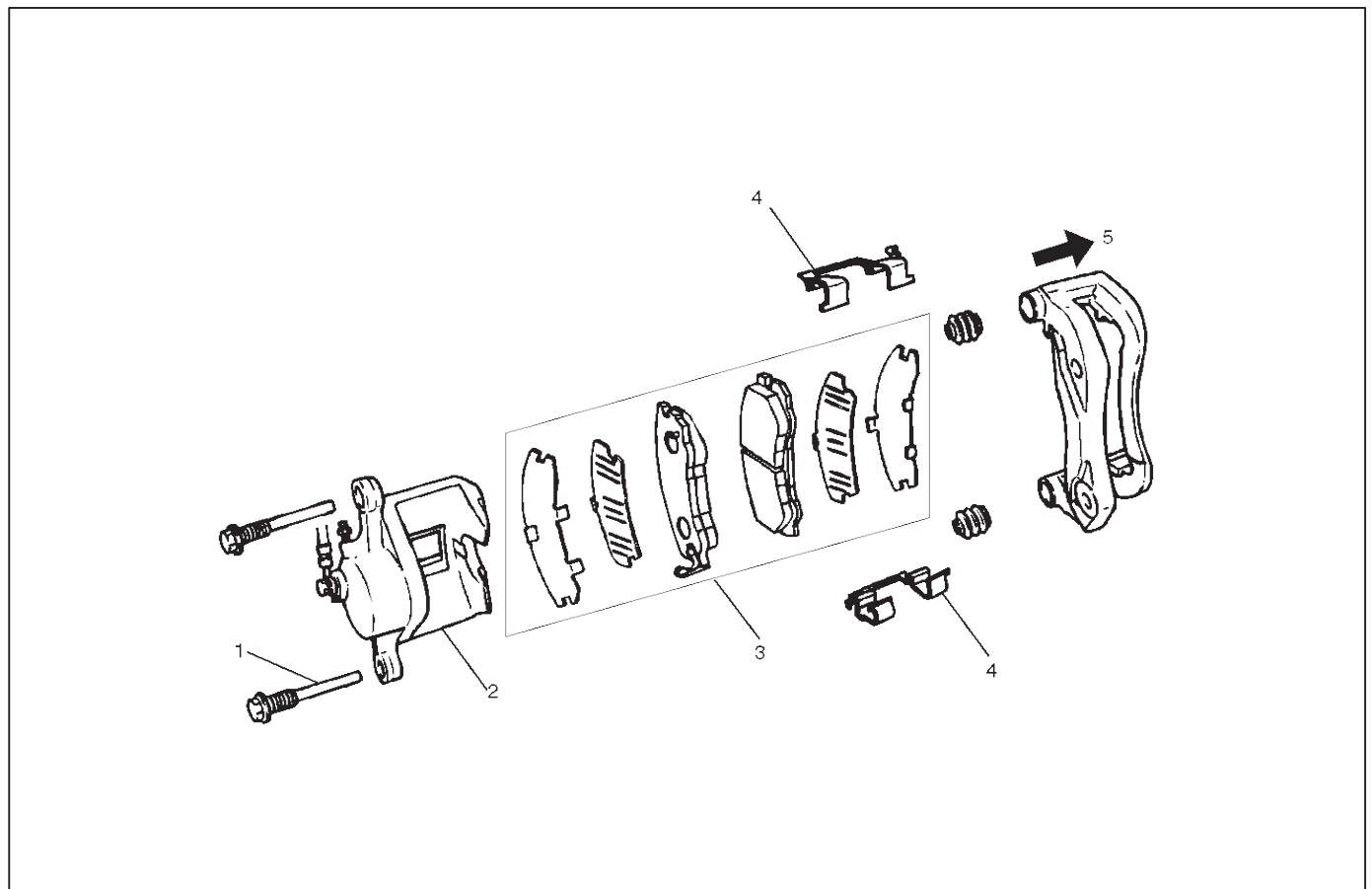
Wear indicators are installed on disc brake pads, disc brake pads need replacement when the wear indicator is heard.

Minimum limit (1): 1.0 mm (0.039 in)



302RS002

Front Disc Brake Pads and Associated Parts



302RW003

Legend

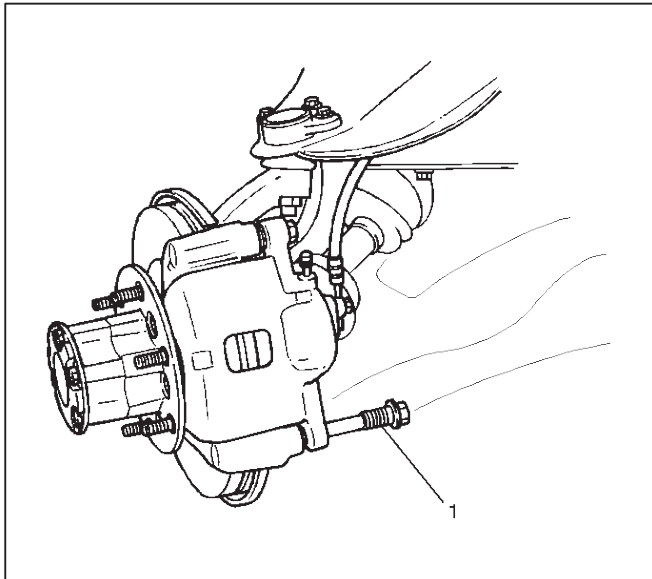
- (1) Lock Bolt
- (2) Caliper Assembly

- (3) Pad Assembly
- (4) Clip
- (5) Outer Side

Removal

NOTE: If a squealing noise occurs from the front brake while driving, check the pad wear indicator plate. If the indicator plate contacts the rotor, the disc pad assembly should be replaced.

- Draw out two-thirds of the brake fluid from the reservoir.
 - Raise the vehicle and support it with suitable safety stands.
1. Remove wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
 2. Remove lock bolt (1).

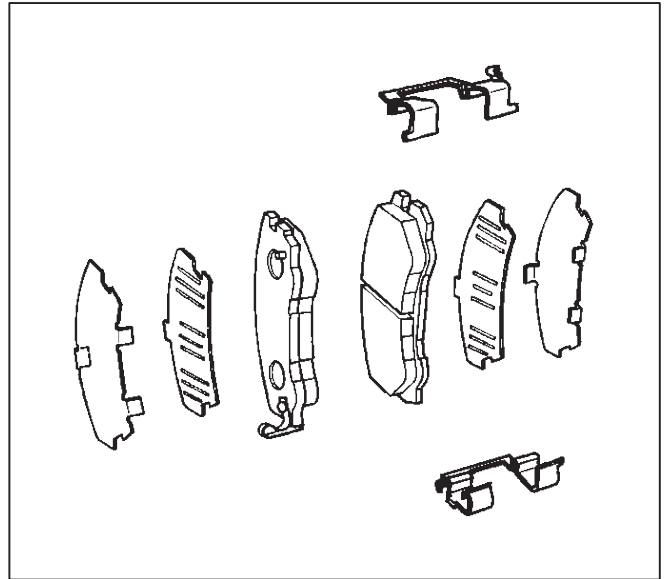


302RW004

3. Rotate caliper assembly and support the caliper assembly so that the brake hose is not stretched or damaged.
4. Remove pad assembly with shim.
5. Remove Clip.

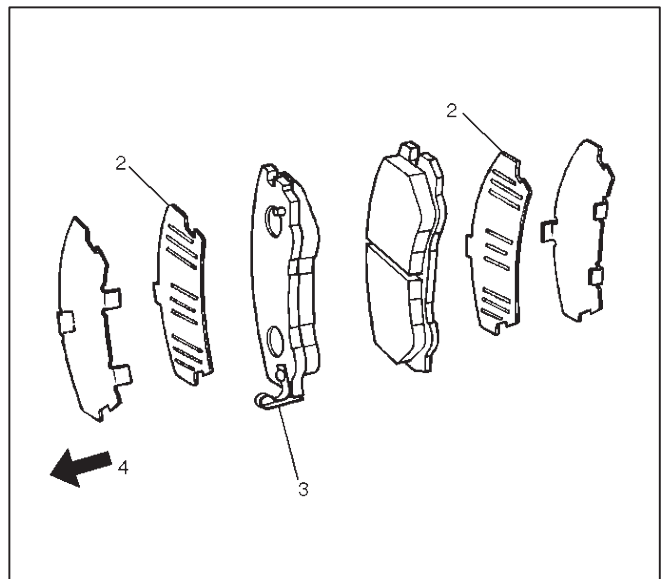
Installation

1. Install clip.



302RS005

2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims (2). Wipe off extruded grease after installing. Install pad assembly with shim.

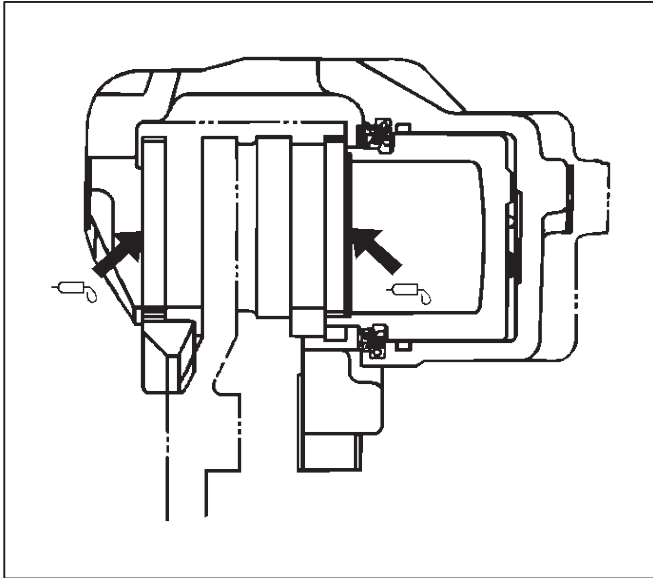


302RW005

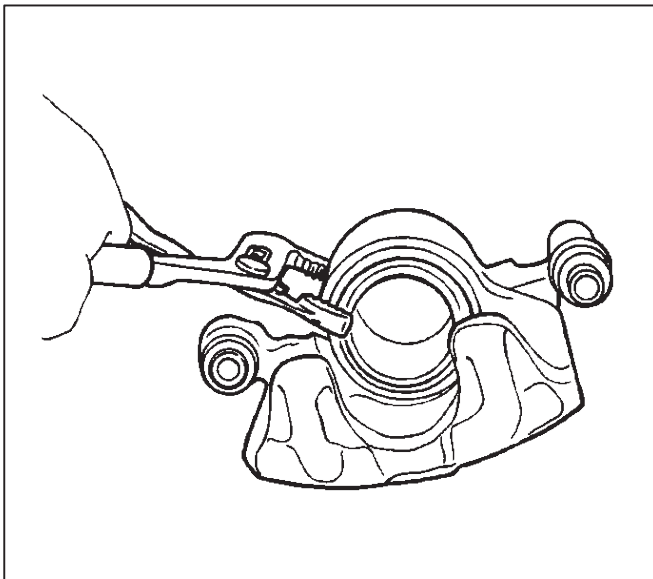
Legend

- (2) Inner Shim
- (3) Wear Indicator
- (4) Inner Side

5C-34 POWER-ASSISTED BRAKE SYSTEM

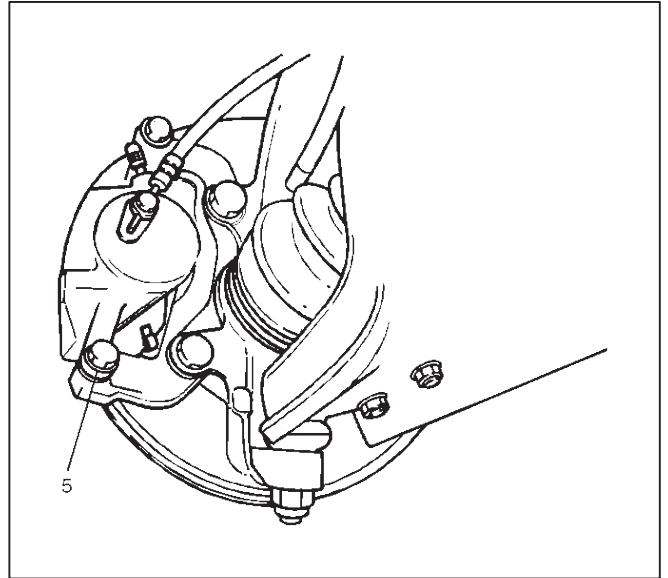


3. Carefully use adjustable pliers to bottom the piston into the caliper bore. Do not pull or twist the flexible hose or damage will occur.
Install caliper assembly.
Set caliper assembly in place.



4. Install lock bolt (5) and tighten the bolt to the specified torque.

Torque: 74 N·m (54 lb ft)



5. Install wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
6. Pump the brake pedal several times to make sure that the pedal is firm. Check the brake fluid level in the reservoir after pumping the brakes.

Front Disc Brake Rotor

Inspection

In the manufacturing of the brake rotor, all the tolerances regarding surface finish, parallelism and lateral runout are held very closely. Maintaining these tolerances provides the surface necessary to assure smooth brake operation.

Lateral Runout

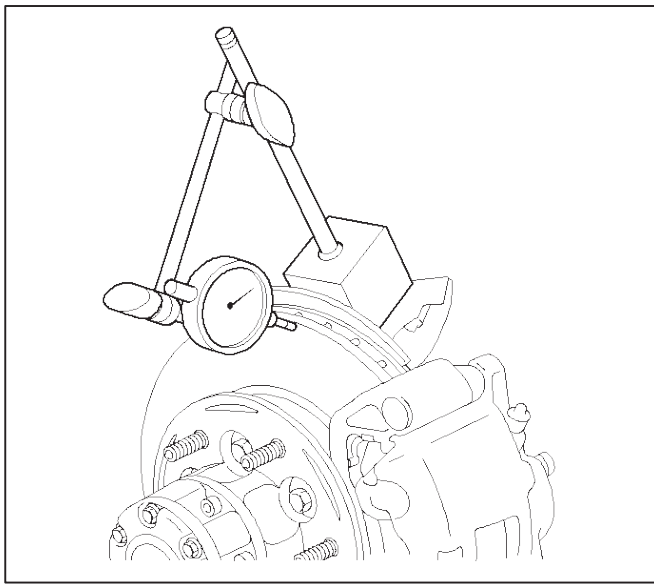
Lateral runout is the movement of the rotor from side to side as it rotates on the spindle. This could also be referred to as "rotor wobble".

This movement causes the piston to be knocked back into its bore. This results in additional pedal travel and a vibration during braking.

Checking Lateral Runout

1. Adjust the wheel bearing correctly, refer to *Differential* in Section 4A1.
2. Attach the dial indicator accordingly so that the stem contacts the rotor surface to approximately 29mm (1.14 in) from the rotor edge.
3. Rotate the rotor one complete turn and inspect for signs of lateral runout. Lateral runout should not exceed 0.13 mm (0.005 in).

Maximum runout: 0.13 mm (0.005 in)



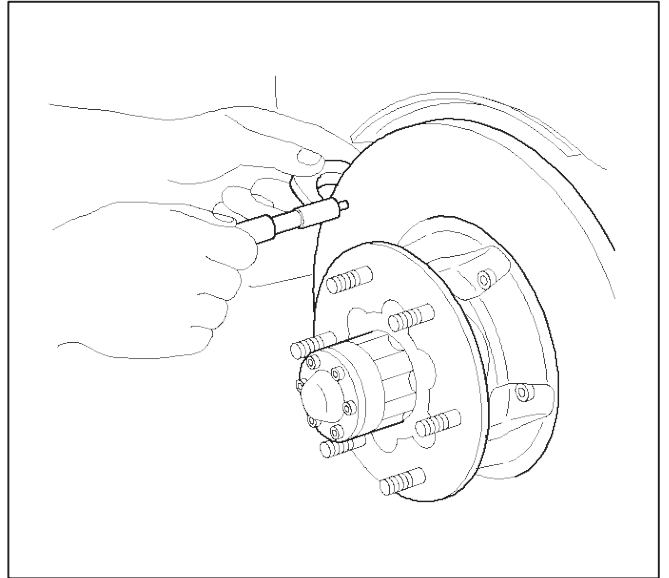
411RS019

Parallelism

Parallelism is the measurement of thickness of the rotor at four or more points around the circumference of the rotor. All measurement must be made at 29 mm (1.14 in) from the edge of the rotor.

The rotor thickness must not vary more than 0.010 mm (0.0004 in) from point to point.

Maximum runout: 0.010 mm (0.0004 in)



411RS018

Replacing Brake Rotors

When installing new brake rotors, do not refinish the surfaces. These parts are at the correct level of surface finish.

Refinishing Brake Rotors

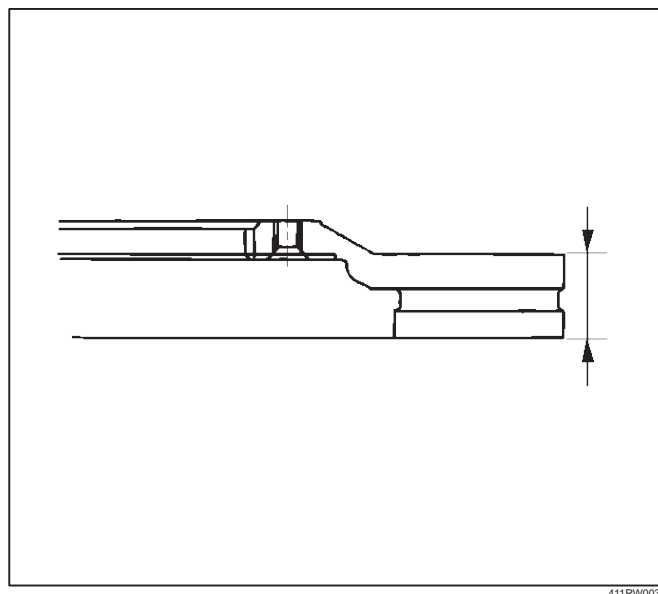
Accurate control of the rotor tolerances is necessary for proper performance of the disc brakes. Machining of the rotor should be done only with precision equipment. All brake rotors have a minimum thickness dimension cast into them. This dimension is the minimum wear dimension and not a refinish dimension. The minimum wear dimension is 24.60 mm (0.969 in). The minimum refinish dimension is 24.97 mm (0.983 in).

When refinishing rotors, always use sharp cutting tools or bits. Dull or worn tools leave a poor surface finish which will affect initial braking performance. Vibration dampening attachments should always be used when refinishing braking surfaces. These attachments eliminate tool chatter and will result in better surface finish.

After refinishing, replace any rotor that does not meet the minimum thickness of 24.97 mm (0.983 in). Do not use a brake rotor that exceeds the manufacturers specifications.

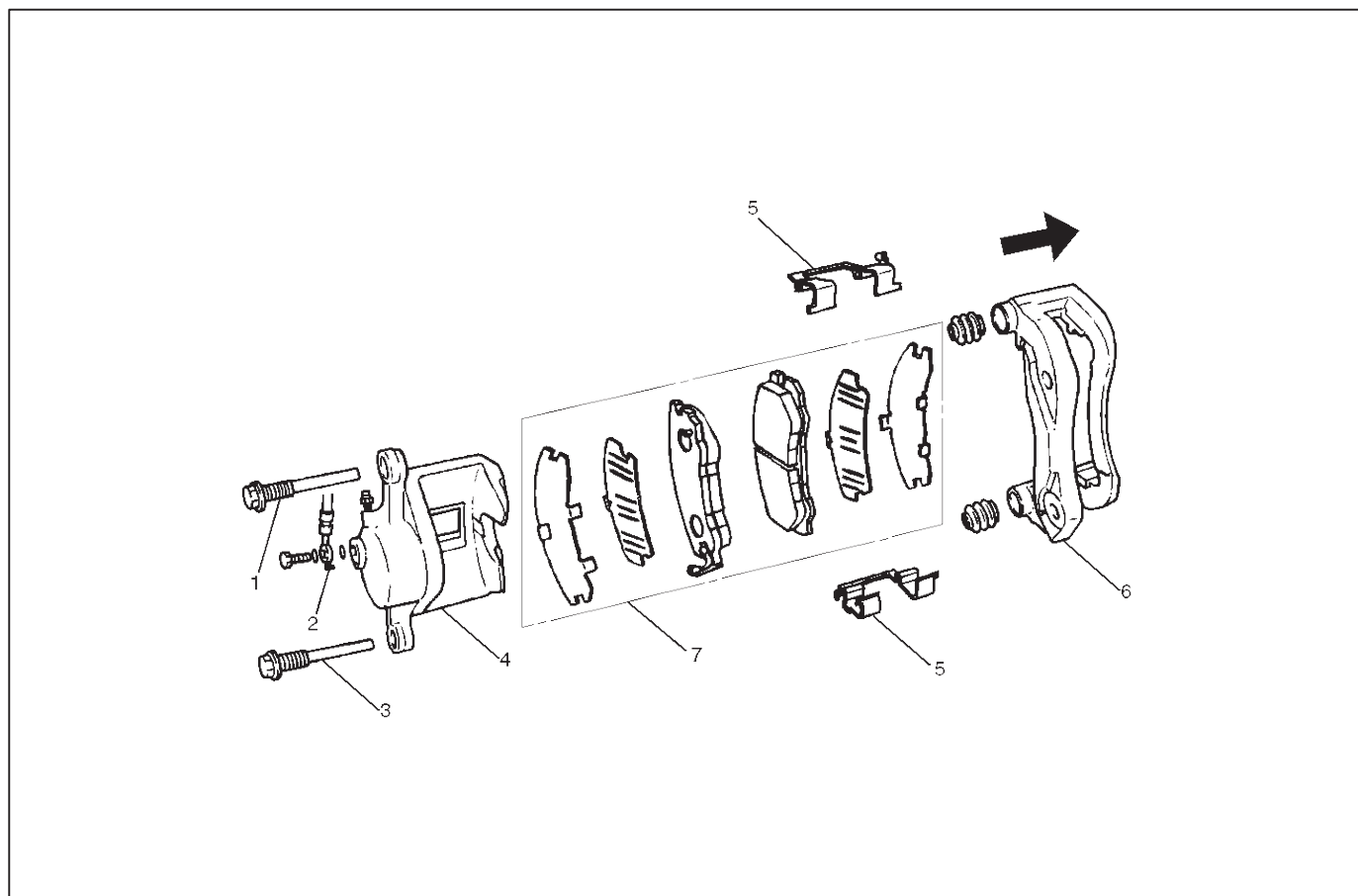
Minimum wear dimension: 24.60 mm (0.969 in)

Refinish dimension: 24.97 mm (0.983 in)



Front Disc Brake Caliper Assembly

Front Disc Brake Caliper Assembly and Associated Parts



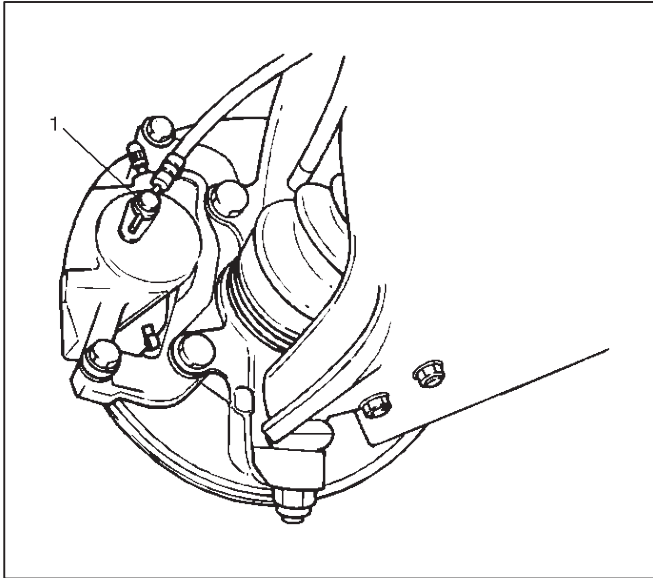
Legend

- (1) Guide Bolt
- (2) Brake Flexible Hose
- (3) Lock Bolt

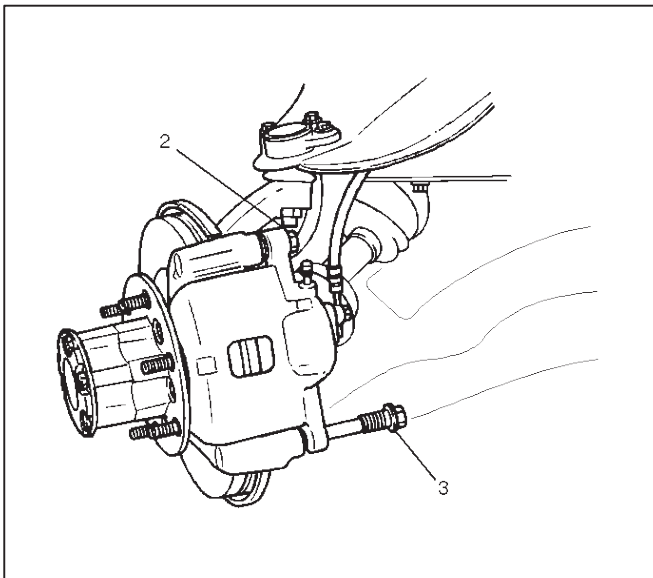
- (4) Caliper Assembly
- (5) Clip
- (6) Support Bracket with Pad Assembly
- (7) Pad Assembly

Removal

1. Raise the vehicle and support with suitable safety stands.
2. Concerning wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
3. Remove the bolt and gaskets, then disconnect the flexible hose from the caliper and after disconnecting the flexible hose (1), cap or tape the openings to prevent entry of foreign material.



4. Since the brake fluid flows out from the connecting coupler, place a drain pan under the vehicle.
5. Remove guide bolt (2).
6. Remove lock bolt (3).

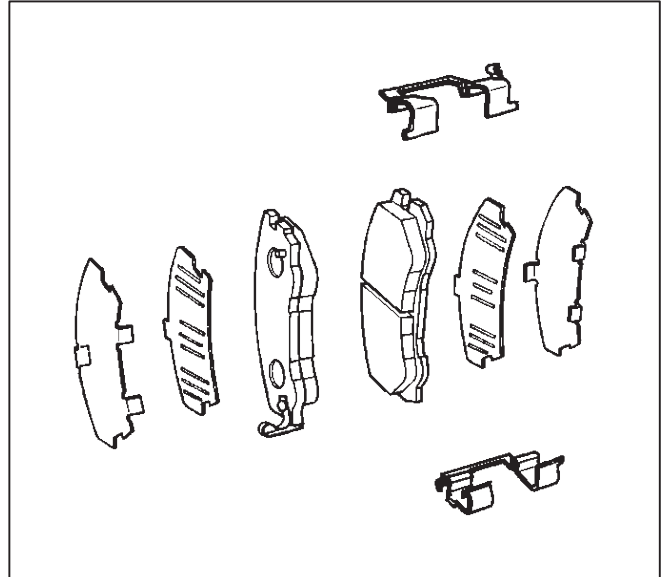


7. Remove caliper assembly.
8. Remove support bracket with pad assembly and take care not to damage the flexible brake hose when removing the support bracket.

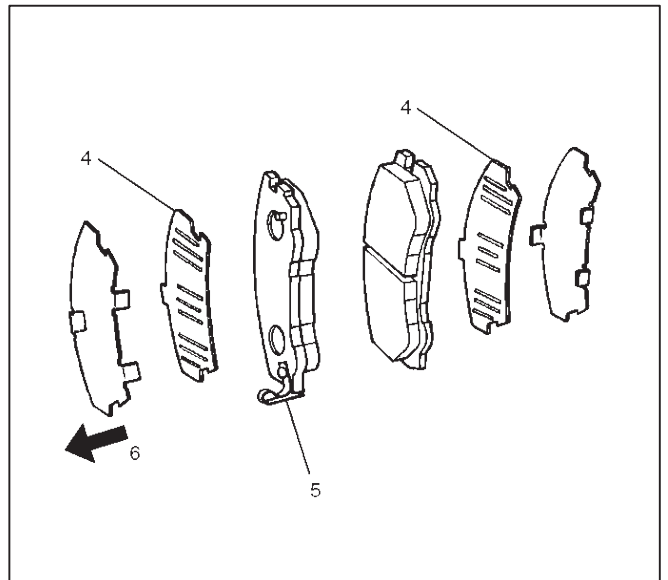
9. Remove pad assembly with shim and mark the lining locations if they are to be reinstalled.
10. Remove clip.

Installation

1. Install clip.



2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims (4). Wipe off extruded grease after installing. Install pad assembly with shim.



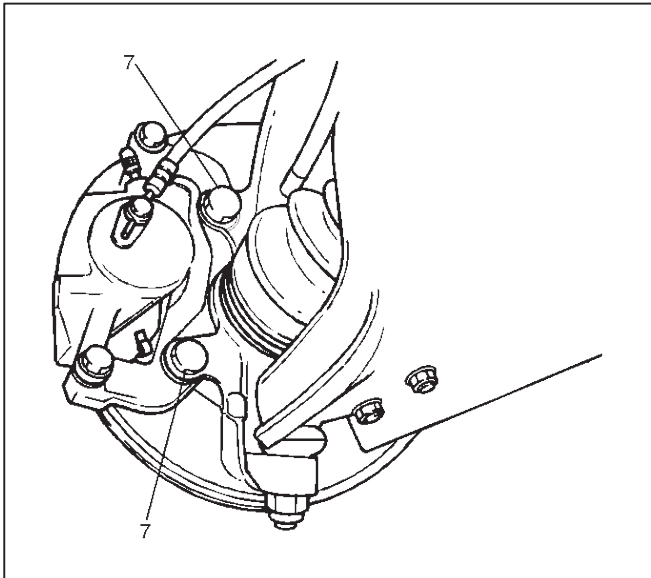
Legend

- (4) Inner Shim
- (5) Wear Indicator
- (6) Inner Side

5C-38 POWER-ASSISTED BRAKE SYSTEM

3. Install support bracket and tighten the bolt (7) to the specified torque.

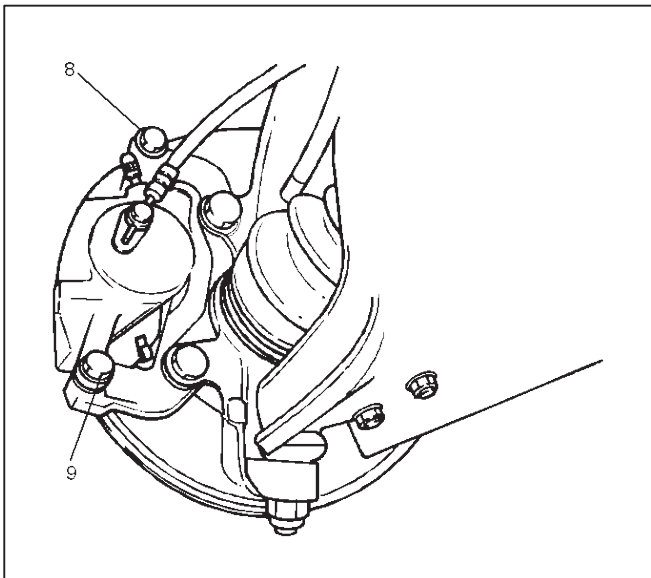
Torque: 155 N·m (115 lb ft)



302RW012

4. Install caliper assembly.
5. Install lock bolt (9) and guide bolt (8) and tighten the bolt to the specified torque.

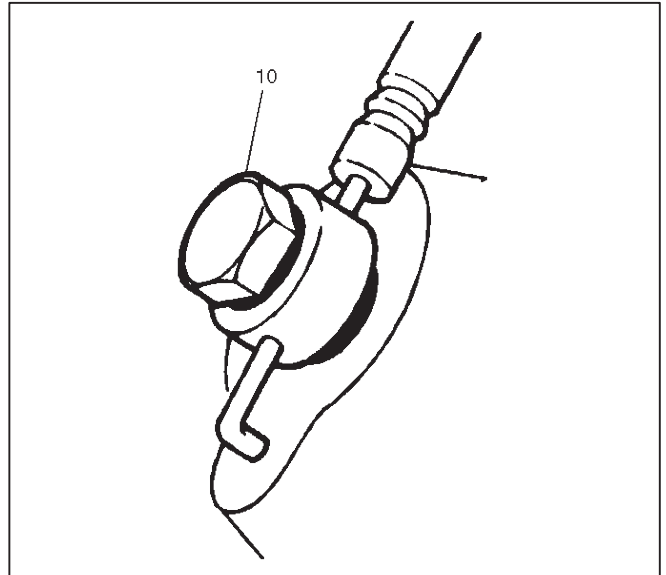
Torque: 74 N·m (54 lb ft)



302RW013

6. Install brake flexible hose, always use new gaskets and be sure to put the hooked edge of the flexible hose end into the anti-rotation cavity then tighten the I-bolt (10) to the specified torque.

Torque: 35 N·m (26 lb ft)

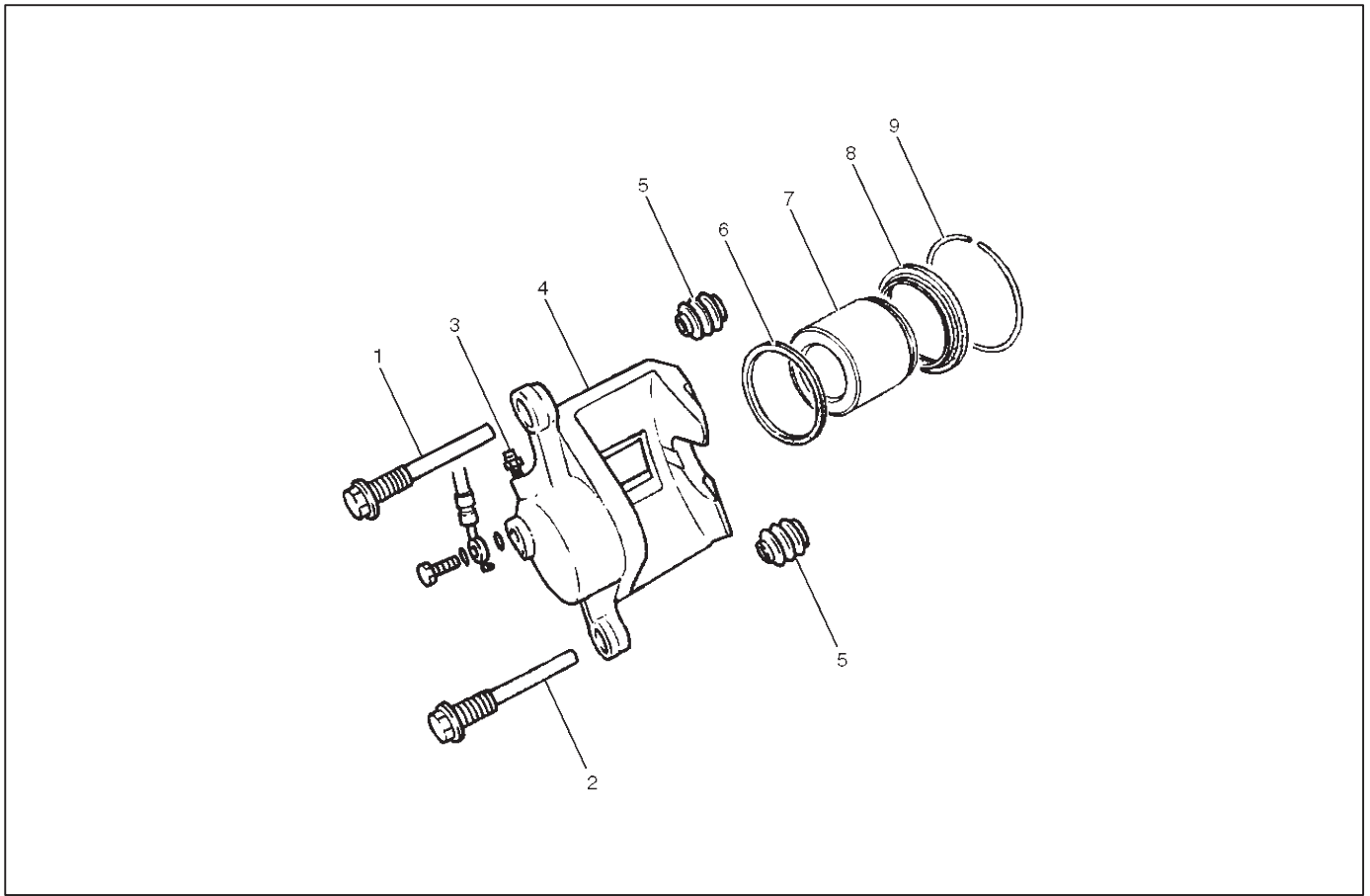


302RW014

7. Install wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
8. Bleed brakes. Refer to *Hydraulic Brakes* in this section.

Front Disc Brake Caliper

Front Disc Brake Caliper Disassembled View



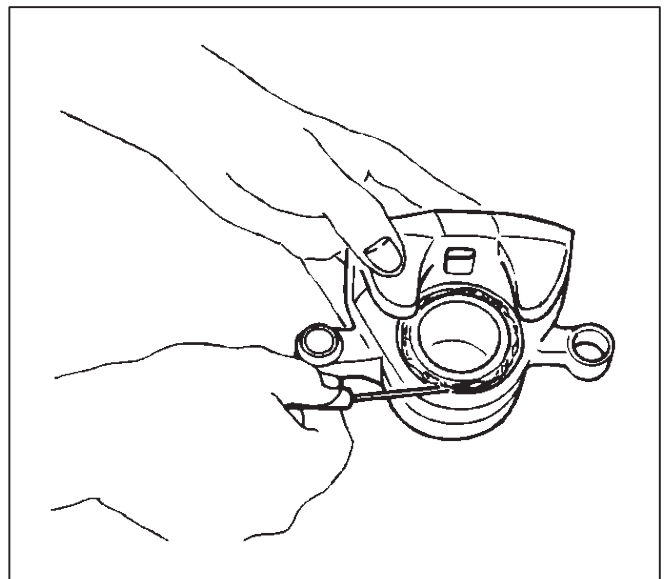
302RW015

Legend

- | | |
|----------------------|---|
| (1) Guide Bolt | (5) Dust Boot: Guide Bolt and Lock Bolt |
| (2) Lock Bolt | (6) Piston Seal |
| (3) Bleeder with Cap | (7) Piston |
| (4) Caliper Body | (8) Dust Boot: Piston |
| | (9) Dust Boot Ring |

Disassembly

1. Remove guide bolt.
2. Remove lock bolt.
3. Remove dust boot: guide bolt and lock bolt.
4. Remove dust boot ring, using a small screwdriver.



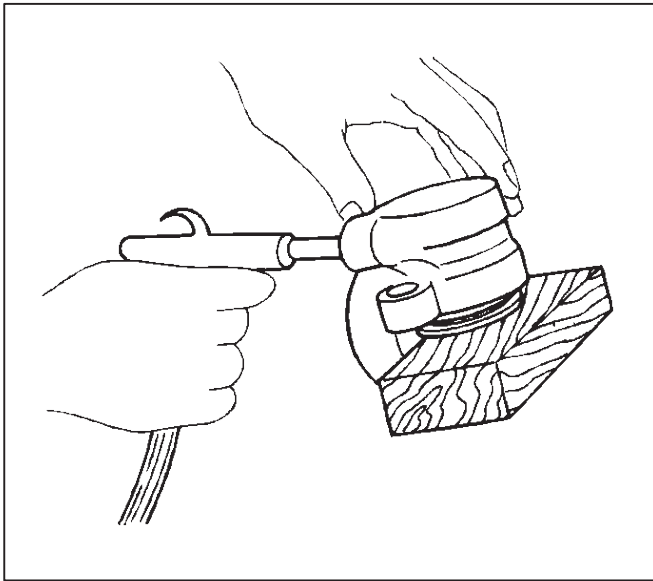
302RS016

5C-40 POWER-ASSISTED BRAKE SYSTEM

5. Insert a block of wood into the caliper and force out the piston by blowing compressed air into the caliper at the flexible hose attachment. This procedure must be done prior to removal of the dust boot. Remove piston.

WARNING: DO NOT PLACE YOUR FINGERS IN FRONT OF THE PISTON IN AN ATTEMPT TO CATCH OR PROTECT IT WHEN APPLYING COMPRESSED AIR. THIS COULD RESULT IN PERSONAL INJURY.

CAUTION: Use just enough air to ease the piston out of the bore. If the piston is blown out, it may be damaged.



6. Remove dust boot: piston.
7. Remove piston seal.
8. Remove bleeder with cap.
9. Remove caliper body.

Inspection and Repair

Make necessary parts replacement, if wear, damage, corrosion or any other abnormal conditions are found through inspection.

Check the following parts:

- Rotor
- Cylinder body
- Cylinder bore
- Piston
- Guide bolt, lock bolt
- Support bracket

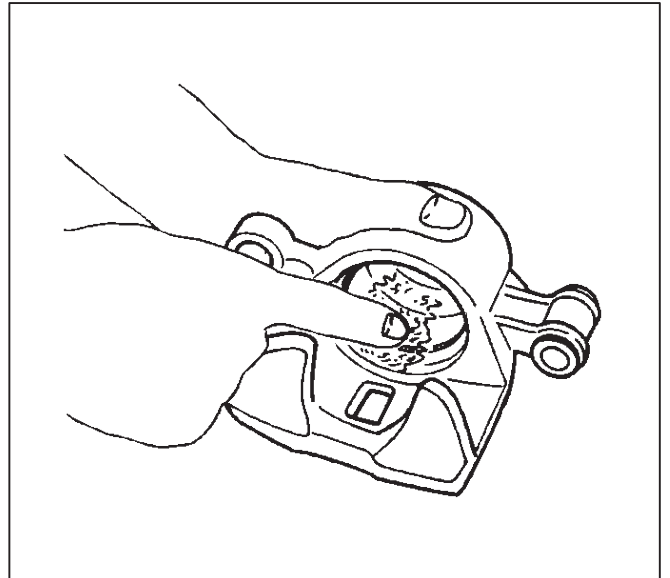
NOTE: The piston seal, boot ring and dust boot are to be replaced each time the caliper is overhauled. Discard these used rubber parts and replace them with new ones.

Reassembly

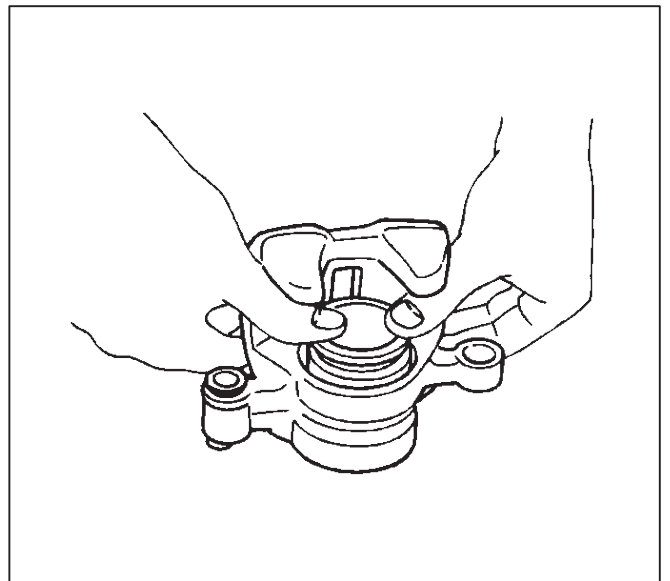
1. Install caliper body.
2. Install bleeder with cap and tighten the cap to the specified torque.

Torque: 8 N·m (69 lb in)

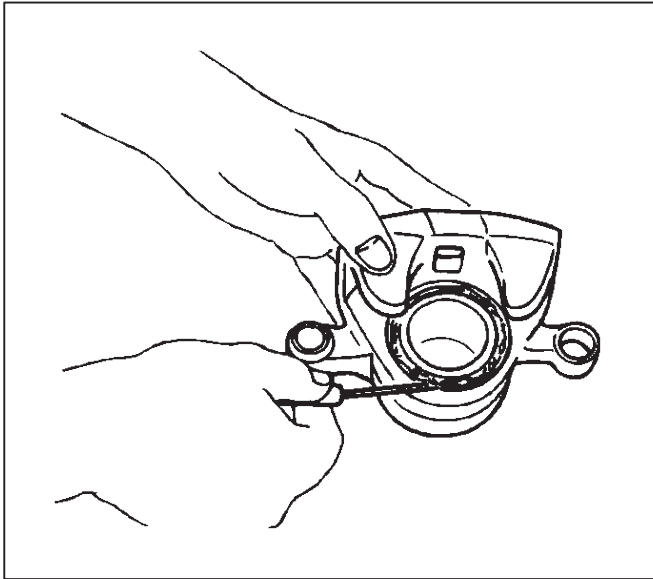
3. Apply special rubber grease to the piston seal and cylinder wall, then insert the piston seal into the cylinder. The special rubber grease is included in the repair kit.



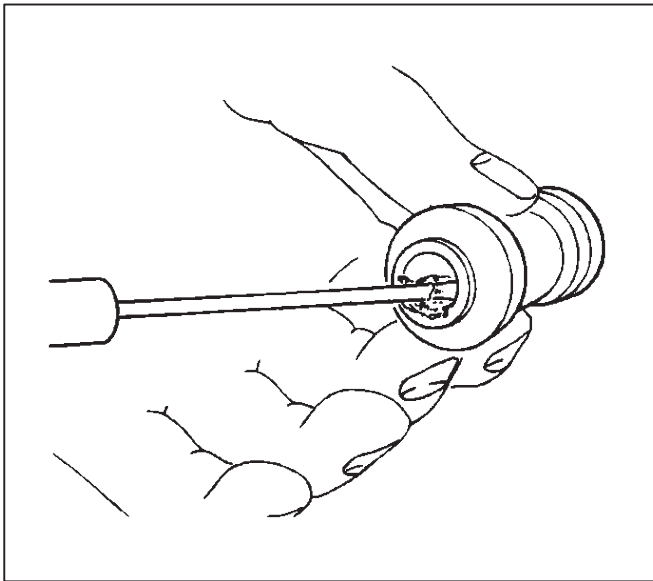
4. When inserting the piston into the cylinder, use finger pressure only and do not use a mallet or other impact tool, since damage to the cylinder wall or piston seal can result. Install piston.



5. Apply special grease (approximately 1 g) to the piston and attach the dust boot to the piston and caliper. Insert the dust boot ring into the dust boot.



6. Install guide bolt and lock bolt dust boot.
7. Install the dust boot on the support bracket after applying special grease (approximately 1 g) onto the dust boot inner surface. Apply special grease onto the lock bolt and guide bolt setting hole of the support bracket.



8. Install lock bolt and guide bolt and tighten the bolt to the specified torque.

Torque: 74 N·m (54 lb ft)

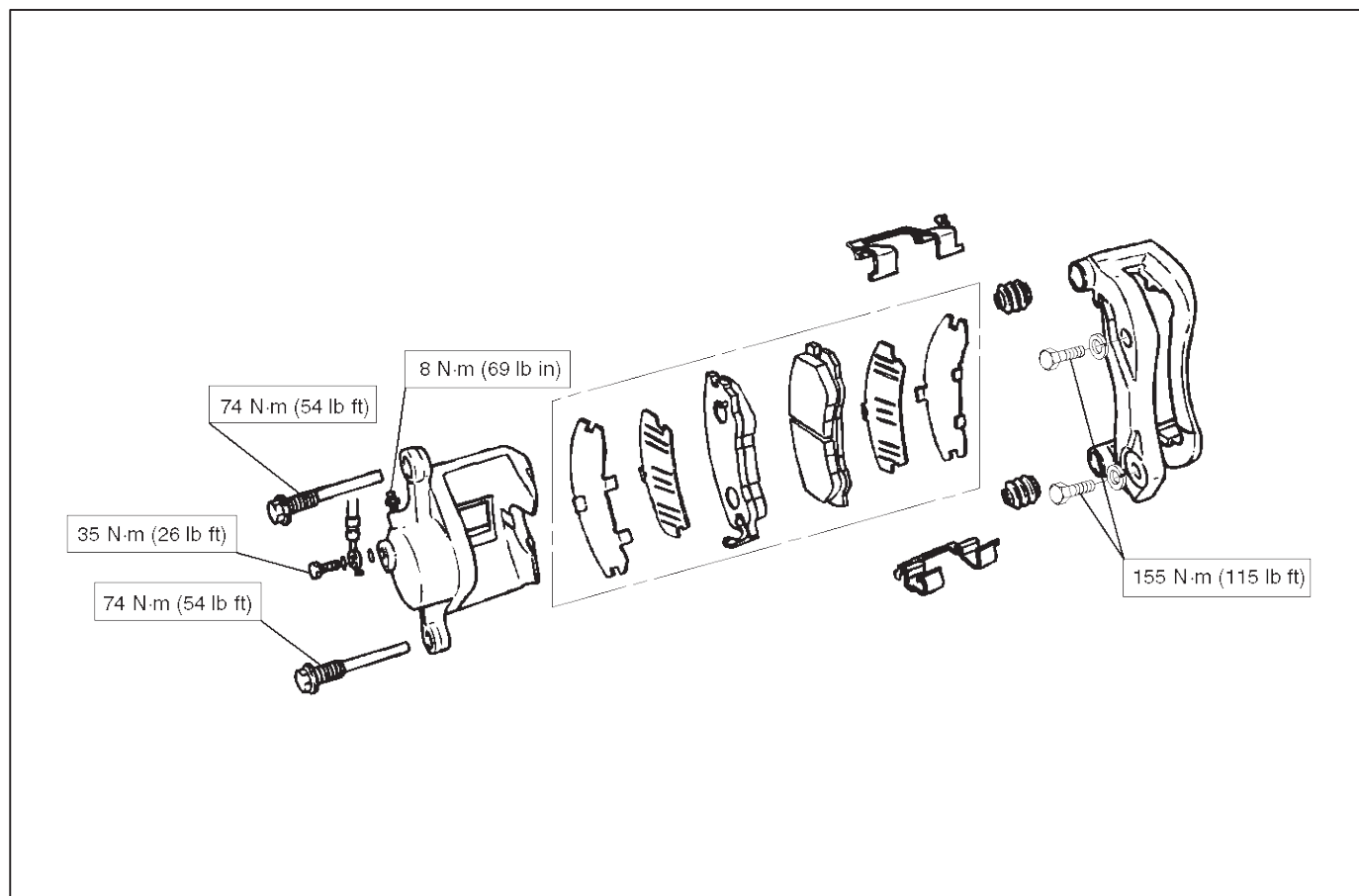
5C-42 POWER-ASSISTED BRAKE SYSTEM

Main Data and Specifications

General Specifications

Type	Floating, pin slide
Pad dimension	55 cm ² (8.52 in ²)
Adjusting method	Self-adjusting
Piston diameter	60.33 mm (2.38 in)
Disc type	Ventilated
Disc thickness	26 mm (1.02 in)
Disc effective diameter	222 mm (8.74 in)

Torque Specifications



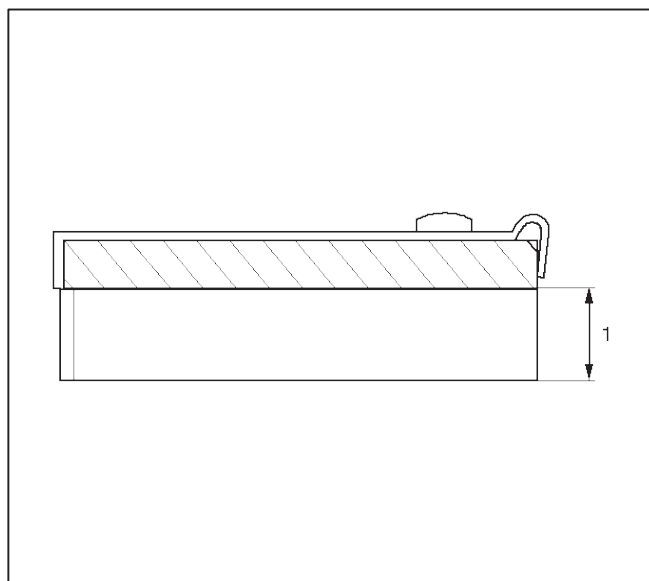
Rear Disc Brake Pads (4×4 Model)

Brake Pads Inspection

Check the outer pads by looking at each caliper from above. Check the thickness on the inner pad by looking down through the inspection hole in the top of the caliper. Whenever the pad is worn to about the thickness of the pad base, the pad should be removed for further measurements. The pad should be replaced anytime the pad thickness (1) is worn to within 1.0 mm (0.039 in) of the pad itself.

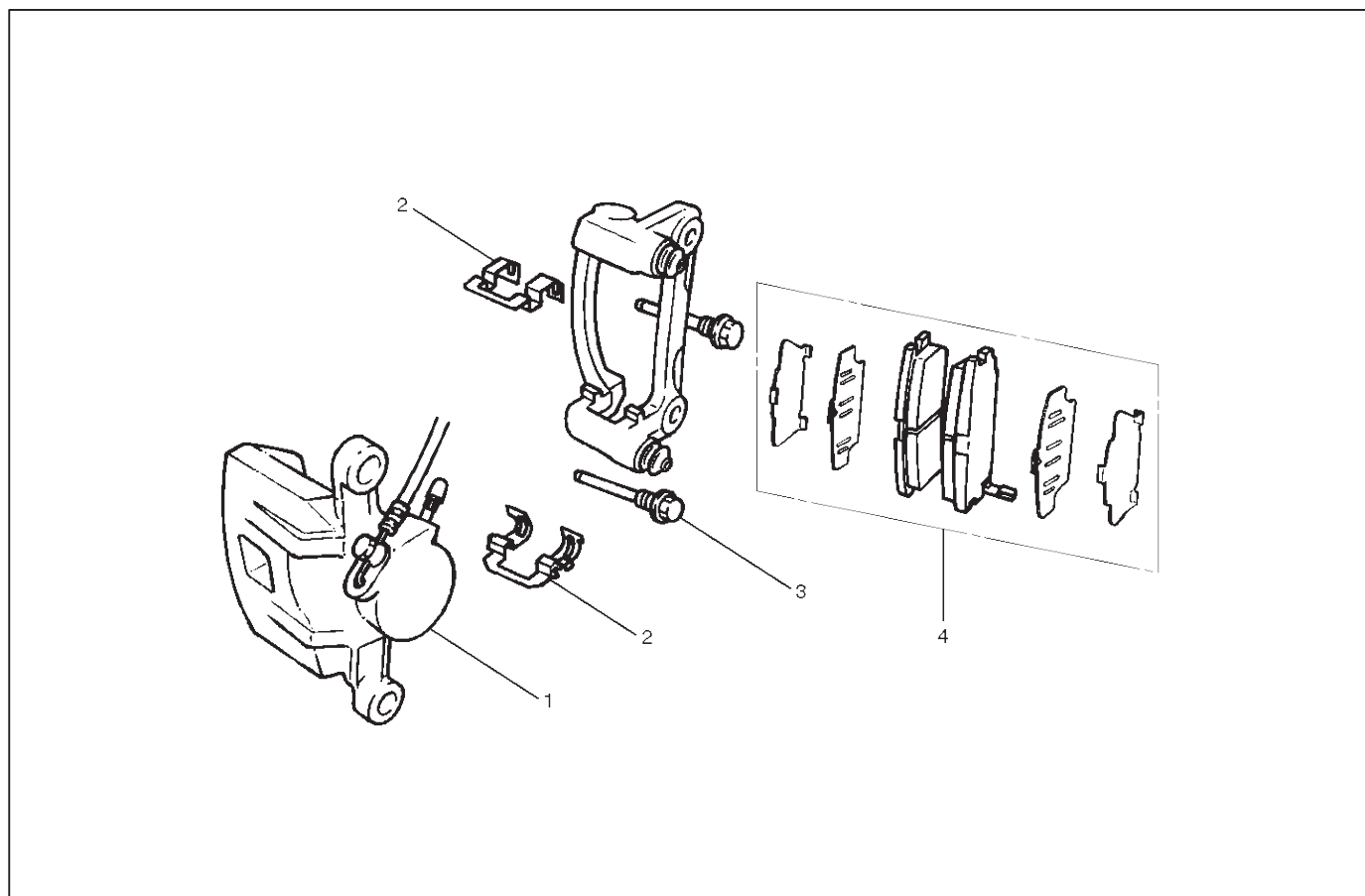
Wear indicators are installed on disc brake pads, disc brake pads need replacement when the wear indicator is heard.

Minimum limit (1): 1.0 mm (0.039 in)



302RW016

Brake Pads and Associated Parts



306RW001

Legend

- (1) Caliper Assembly
- (2) Clip

- (3) Lock Bolt
- (4) Pad Assembly

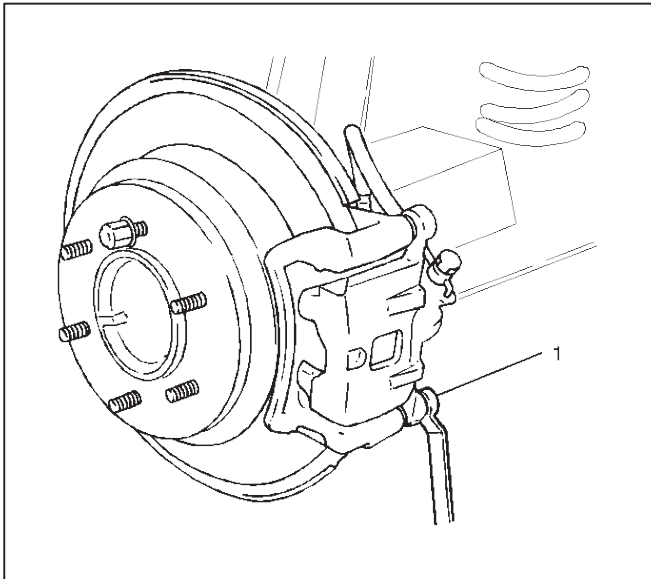
Removal

NOTE: If a squealing noise occurs from the rear brake while driving, check the pad wear indicator plate. If the indicator plate contacts the rotor, the disc pad assembly should be replaced.

- Draw out two-thirds of the brake fluid from the reservoir.
- Raise the vehicle and support it with suitable safety stands.

1. Remove wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.

2. Remove lock bolt (1)



306RW002

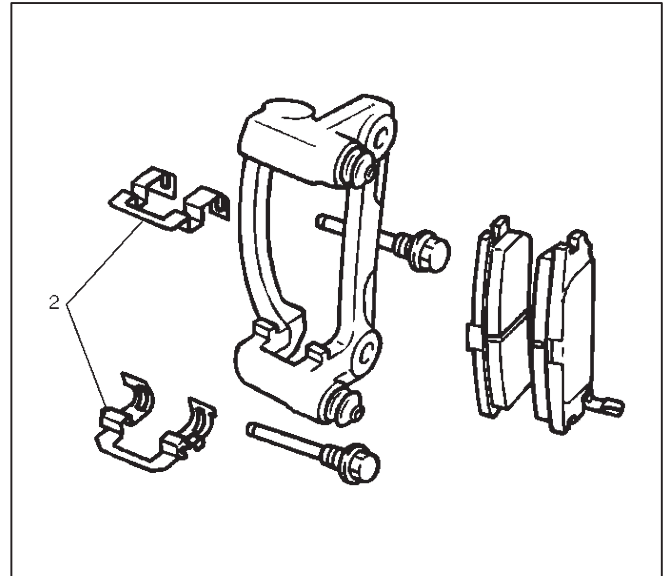
3. Rotate caliper assembly and support the caliper assembly so that the brake hose is not stretched or damaged.

4. Remove pad assembly with shim.

5. Remove clip.

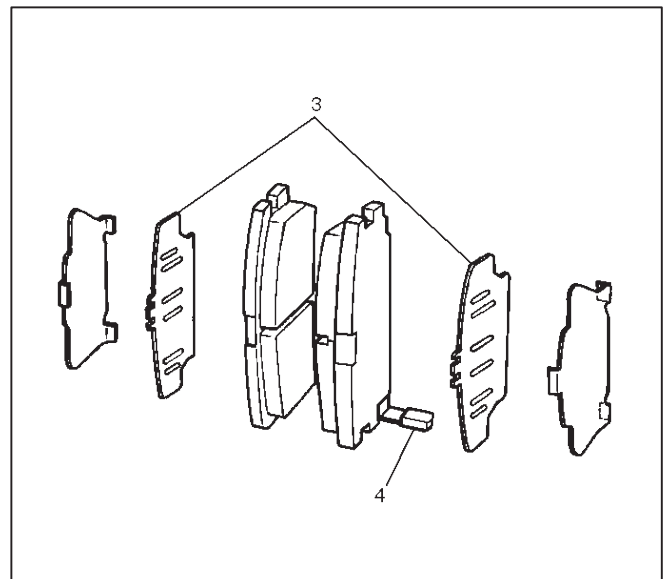
Installation

1. Install clip (2).



306RW003

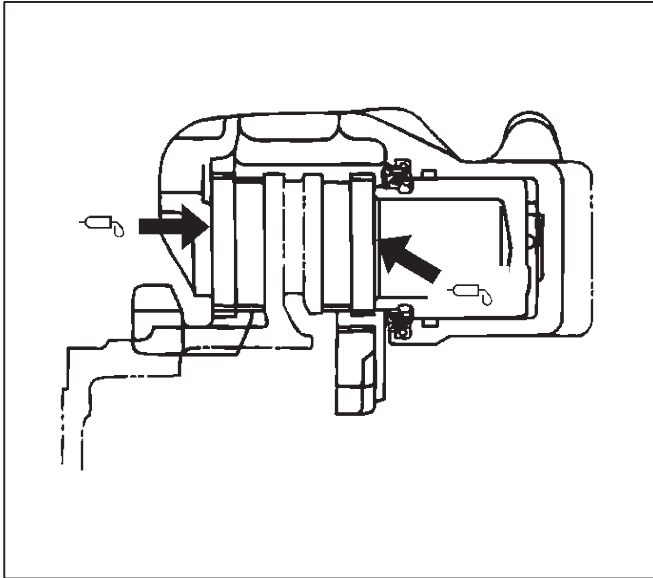
2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims. Wipe off extruded grease after installing. Install pad assembly with shim.



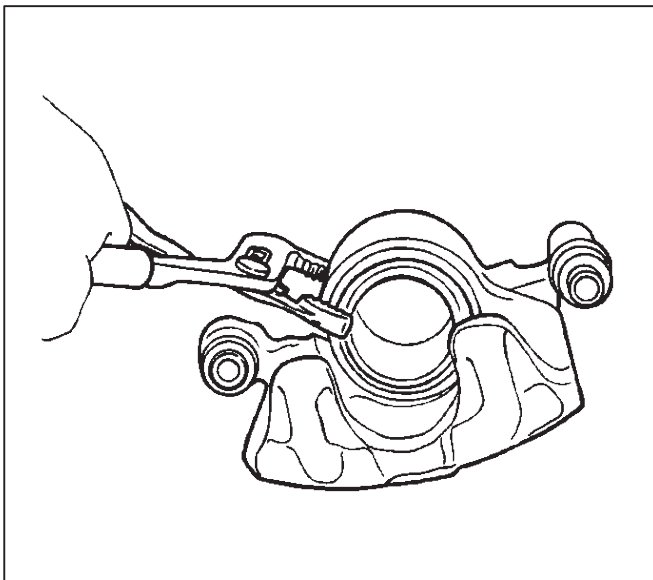
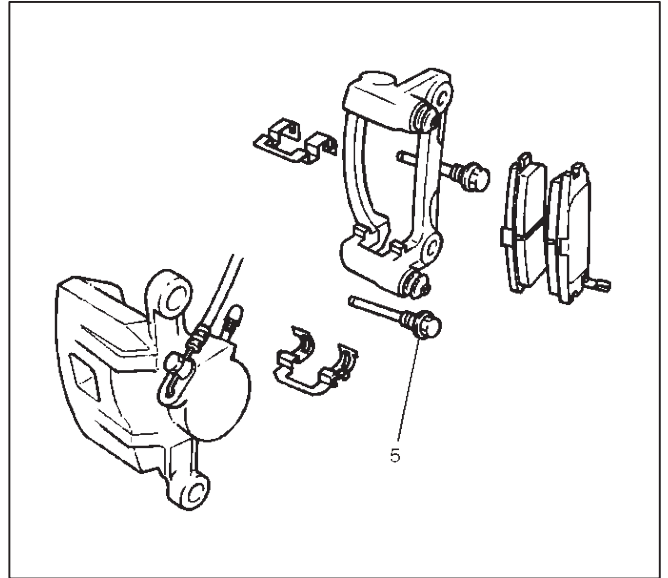
306RW004

Legend

- (3) Inner Shim
- (4) Wear Indicator



3. Carefully use adjustable pliers to bottom the piston into the caliper bore. Do not pull or twist the flex hose or damage will occur.



4. Install lock bolt (5) and tighten the bolt to the specified torque.

Torque: 44 N·m (32 lb ft)

5. Install wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
6. Pump the brake pedal several times to make sure that the pedal is firm. Check the brake fluid level in the reservoir after pumping the brakes.

Rear Disc Brake Rotor (4×4 Model)

Inspection

In the manufacturing of the brake rotor, all the tolerances regarding surface finish, parallelism and lateral runout are held very closely. Maintaining these tolerances provides the surface necessary to assure smooth brake operation.

Lateral Runout

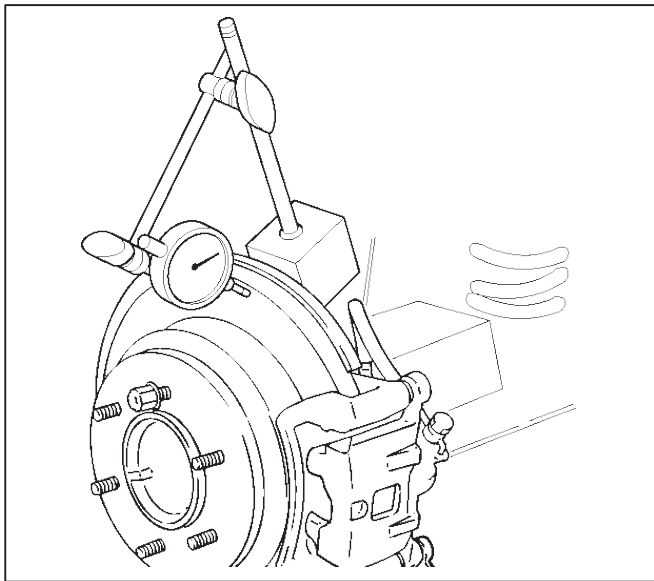
Lateral runout is the movement of the rotor from side to side as it rotates on the spindle. This could also be referred to as "rotor wobble".

This movement causes the piston to be knocked back into its bore. This results in additional pedal travel and a vibration during braking.

Checking Lateral Runout

1. Adjust the wheel bearing correctly, refer to *Differential* in Section 4A1.
 2. Attach the dial indicator accordingly so that the stem contacts the rotor surface to approximately 29mm (1.14 in) from the rotor edge.
 3. Rotate the rotor one complete turn and inspect for signs of lateral runout. Lateral runout should not exceed 0.13 mm (0.005 in).
1. The lateral runout should not exceed 0.13 mm (0.005 in)

Maximum runout: 0.13 mm (0.005 in)



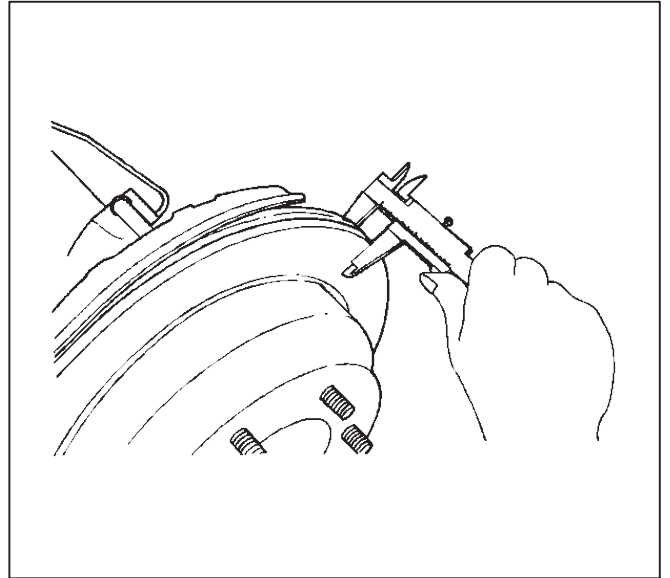
306RY00013

Parallelism

Parallelism is the measurement of thickness of the rotor at four or more points around the circumference of the rotor. All measurement must be made at 22 mm (0.87 in) from the edge of the rotor.

The rotor thickness must not vary more than 0.010 mm (0.0004 in) from point to point.

Maximum parallelism: 0.010 mm (0.0004 in)



420RS013

Replacing Brake Rotors

When installing new brake rotors, do not refinish the surfaces. These parts are at the correct level of surface finish.

Refinishing Brake Rotors

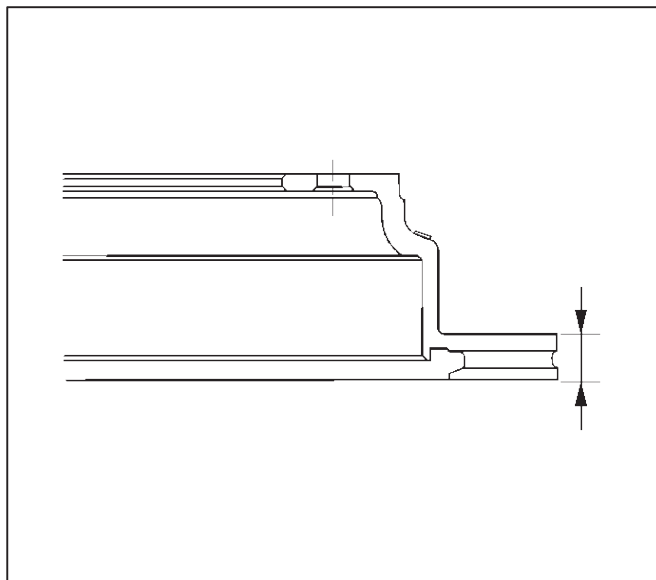
Accurate control of the rotor tolerances is necessary for proper performance of the disc brakes. Machining of the rotor should be done only with precision equipment. All brake rotors have a minimum thickness dimension cast into them. This dimension is the minimum wear dimension and not a refinish dimension. The minimum wear dimension is 16.6 mm (0.654 in). The minimum refinish dimension is 16.97 mm (0.668 in).

When refinishing rotors, always use sharp cutting tools or bits. Dull or worn tools leave a poor surface finish which will affect initial braking performance. Vibration dampening attachments should always be used when refinishing braking surfaces. These attachments eliminate tool chatter and will result in better surface finish.

After refinishing, replace any rotor that does not meet the minimum thickness of 16.97 mm (0.668 in). Do not use a brake rotor that exceeds the manufacturers specifications.

Minimum wear dimension: 16.6 mm (0.654 in)

Refinish dimension: 16.97 mm (0.668 in)



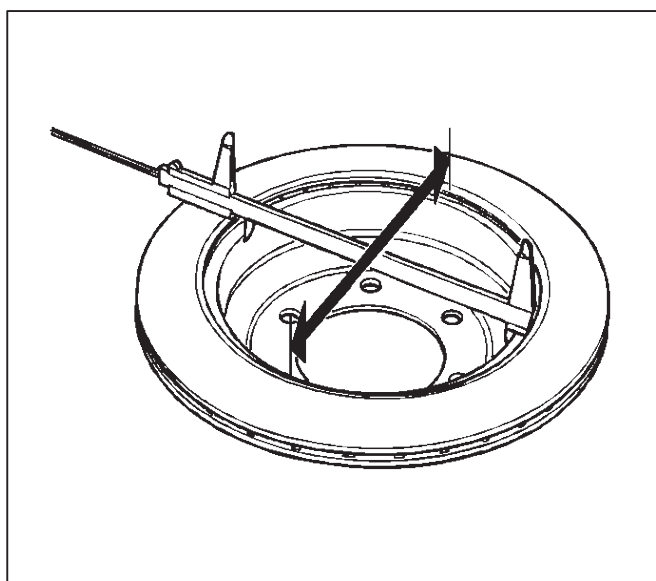
Rear Drum (In Disc) Inside Diameter Check

Check the rear drum inside diameter by measuring at more than two portions as shown in the illustration.

If the inside diameter is greater than the limit, replace the rear rotor.

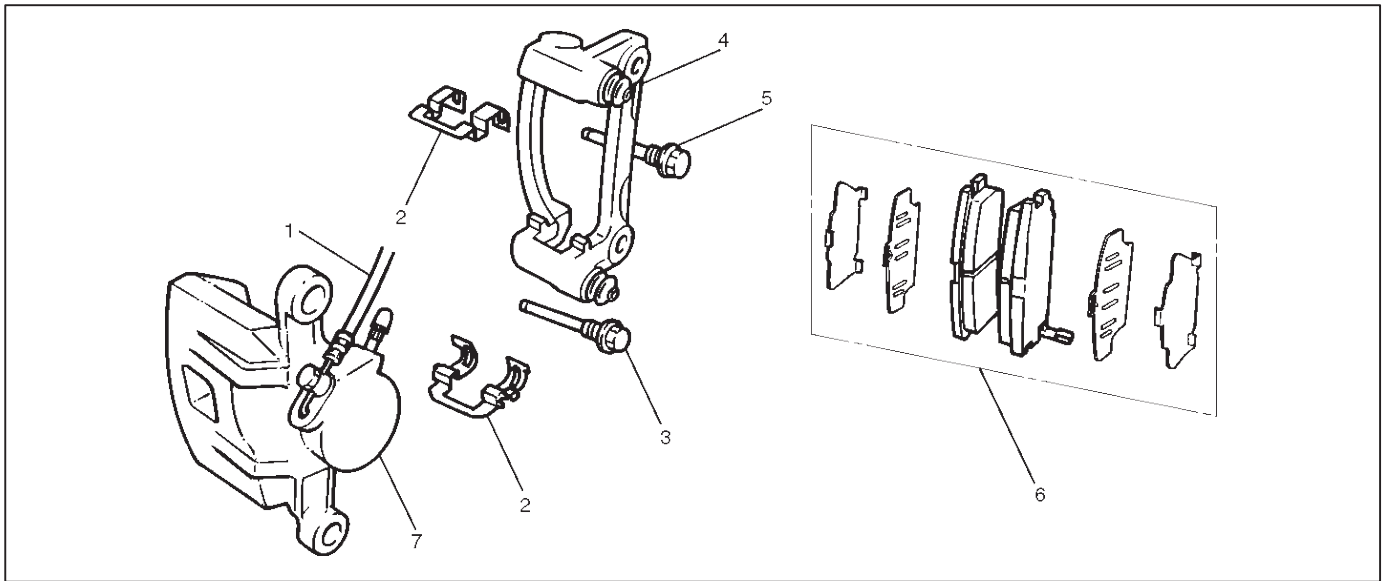
Standard: 210.0 mm (8.27 in)

Limit: 211.4 mm (8.32 in)



Rear Disc Brake Caliper Assembly (4×4 Model)

Rear Disc Brake Caliper Assembly and Associated Parts



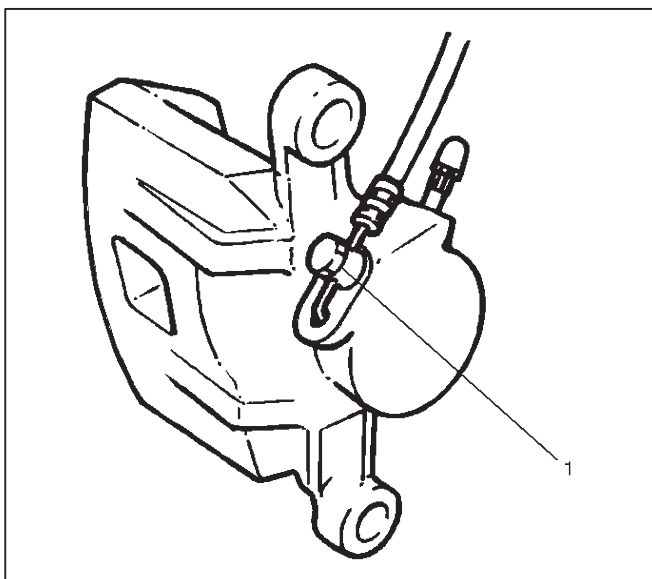
306RW007

Legend

- | | |
|-------------------------|----------------------------|
| (1) Brake Flexible Hose | (4) Support Bracket |
| (2) Clip | (5) Guide Bolt |
| (3) Lock Bolt | (6) Pad Assembly with Shim |
| | (7) Caliper Assembly |

Removal

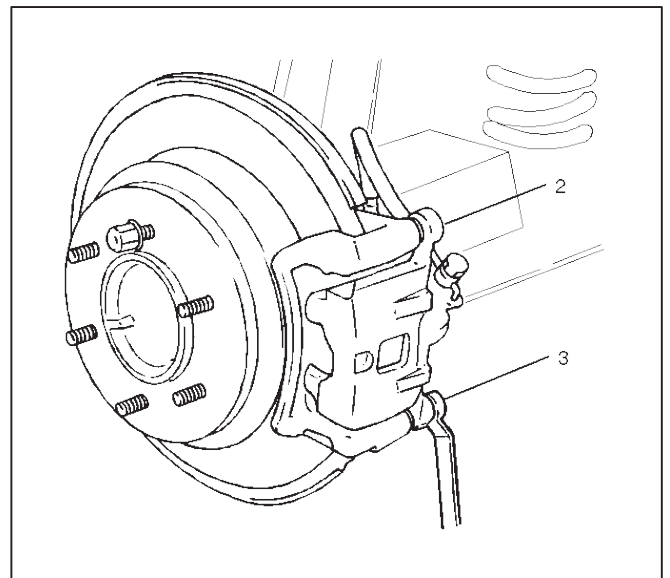
1. Raise the vehicle and support with suitable safety stands.
2. Remove wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
3. Remove the bolt and gaskets, then disconnect the flexible hose from the caliper and after disconnecting the flexible hose (1), cap or tape the openings to prevent entry of foreign material.



306RW008

4. Since the brake fluid flows out from the connecting coupler, place a drain pan under the vehicle.

5. Remove lock bolt (3).
6. Remove guide bolt (2).

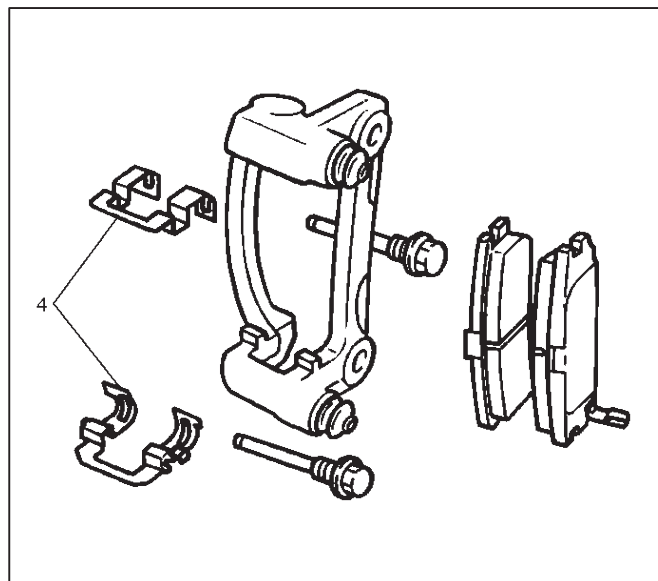


306RW009

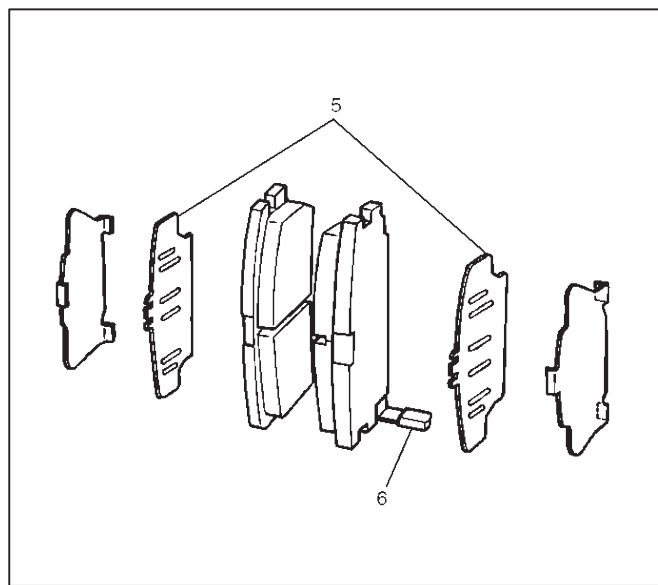
7. Remove caliper assembly.
8. Remove support bracket with pad assembly and take care not to damage the flexible brake hose when removing the support bracket.
9. Remove pad assembly with shim and mark the lining locations if they are to be reinstalled.
10. Remove clip.

Installation

1. Install clip (4).



2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims (5). Wipe off extruded grease after installing. Install pad assembly with shim.

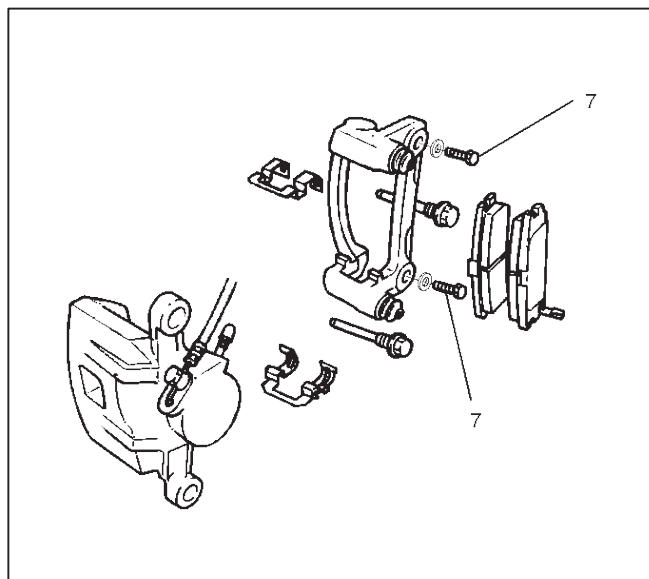


Legend

- (5) Inner Shim
(6) Wear indicator

3. Install support bracket and tighten the bolt (7) to the specified torque.

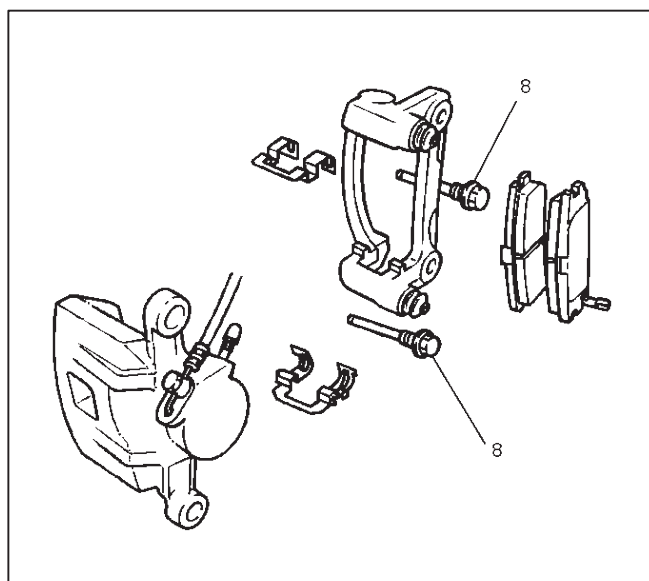
Torque: 103 N·m (76 lb ft)



4. Install caliper assembly.

5. Install lock bolt and guide bolt (8) and tighten the bolt to the specified torque.

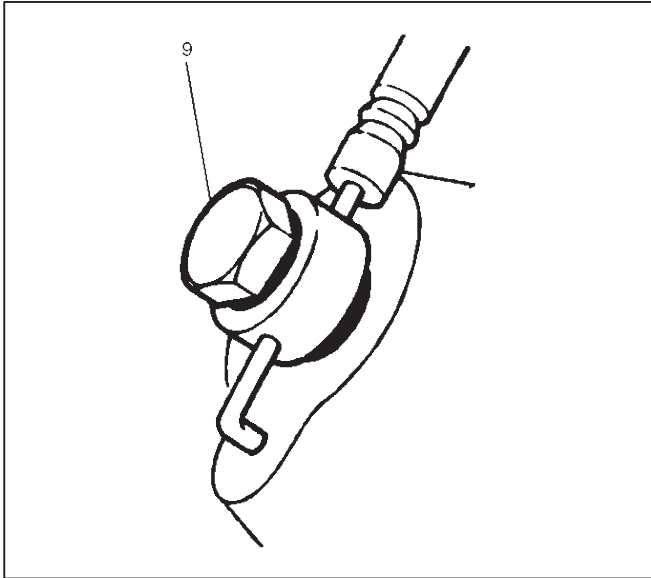
Torque: 44 N·m (32 lb ft)



6. Install brake flexible hose, always use new gaskets and be sure to put the hooked edge of the flexible hose end into the anti-rotation cavity then tighten the eye-bolt (9) to the specified torque.

Torque: 35 N·m (26 lb ft)

5C-50 POWER-ASSISTED BRAKE SYSTEM



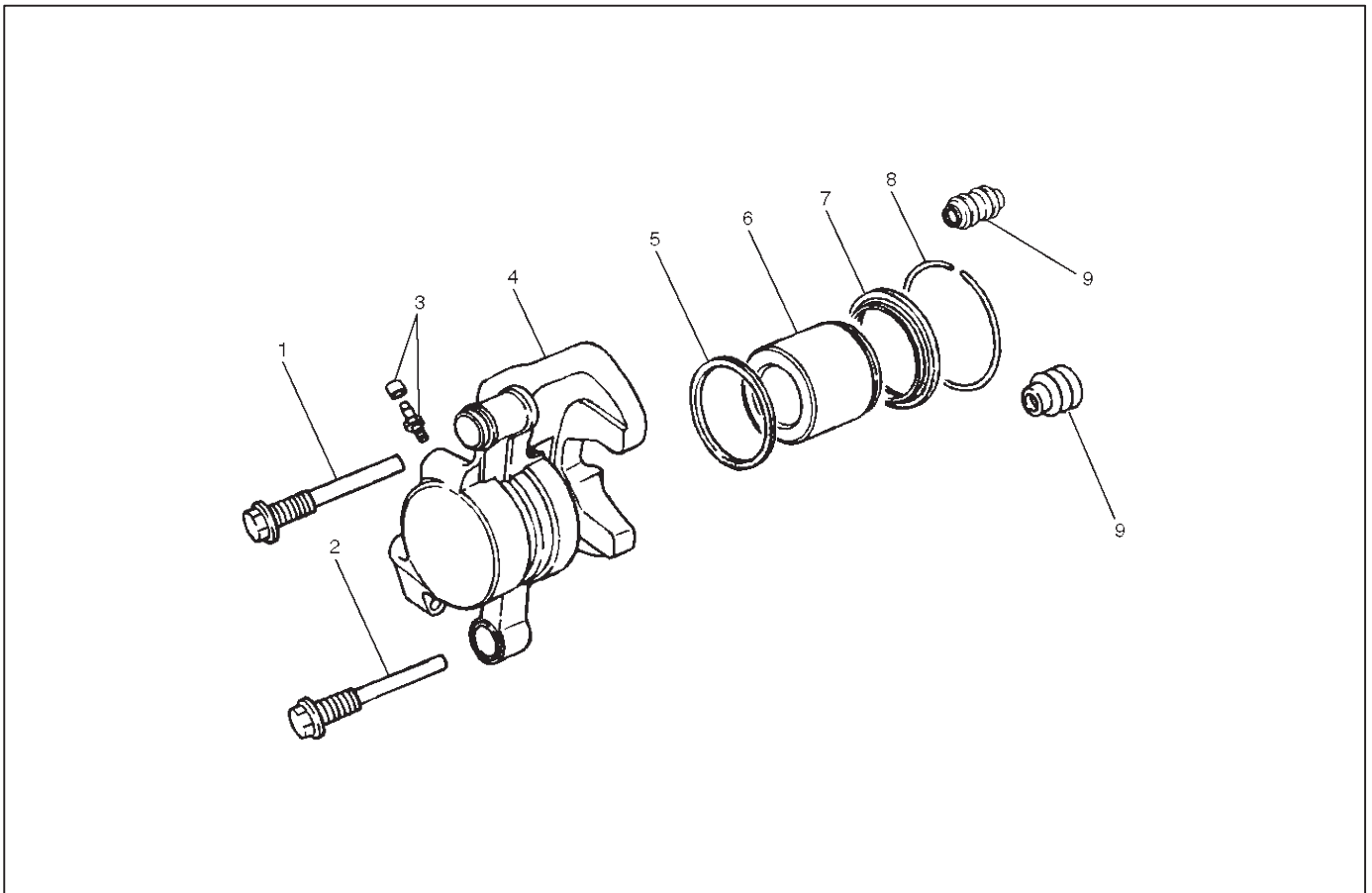
302RW017

7. Install the wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.

8. Bleed brakes. Refer to *Hydraulic Brakes* in this section.

Rear Disc Brake Caliper (4×4 Model)

Rear Disc Brake Caliper Disassembled View



306RW014

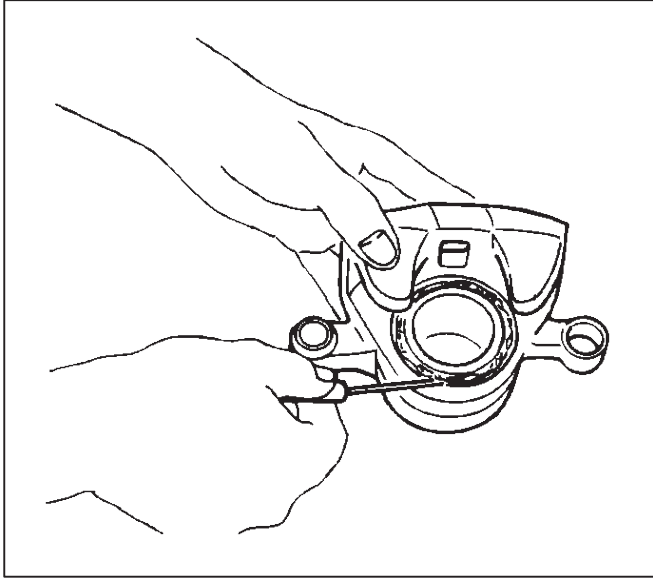
Legend

- (1) Guide Bolt
- (2) Lock Bolt
- (3) Bleeder with Cap
- (4) Caliper Body

- (5) Piston Seal
- (6) Piston
- (7) Dust Boot: Piston
- (8) Dust Boot Ring
- (9) Dust Boot: Guide Bolt and Lock Bolt

Disassembly

1. Remove guide bolt.
2. Remove lock bolt.
3. Remove dust boot; guide bolt and lock bolt.
4. Remove dust boot ring, using a small screwdriver.

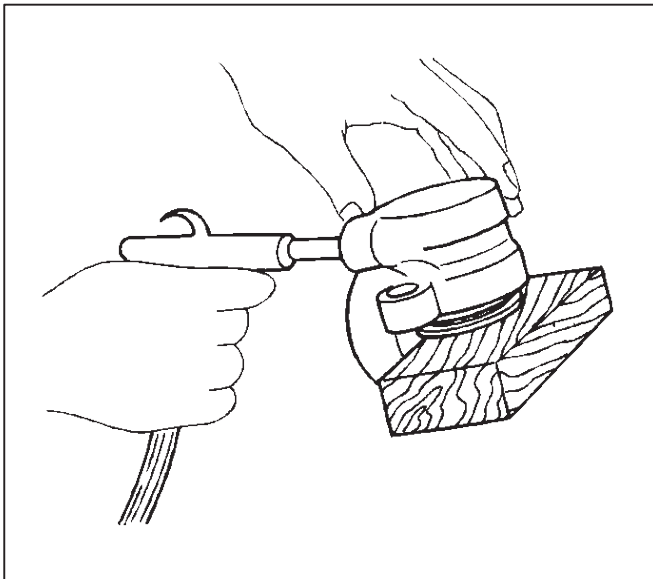


302RS016

5. Insert a block of wood into the caliper and force out the piston by blowing compressed air into the caliper at the flexible hose attachment. This procedure must be done prior to removal of the dust boot. Remove piston.

WARNING: DO NOT PLACE YOUR FINGERS IN FRONT OF THE PISTON IN AN ATTEMPT TO CATCH OR PROTECT IT WHEN APPLYING COMPRESSED AIR. THIS COULD RESULT IN PERSONAL INJURY.

CAUTION: Use just enough air to ease the piston out of the bore. If the piston is blown out, it may be damaged.



302RS017

6. Remove dust boot: piston.
7. Remove piston seal.
8. Remove bleeder with cap.
9. Remove caliper body.

Inspection and Repair

Make necessary parts replacement, if wear, damage, corrosion or any other abnormal conditions are found through inspection.

Check the following parts:

- Rotor
- Cylinder body
- Cylinder bore
- Piston
- Guide bolt, lock bolt
- Support bracket

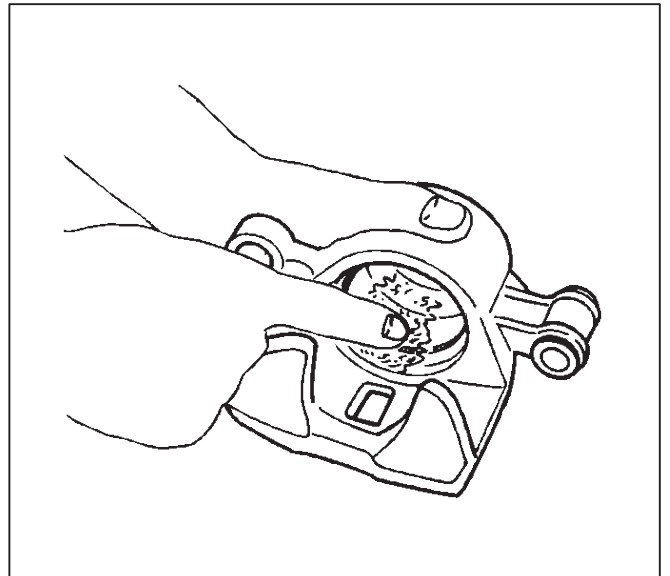
NOTE: The piston dust seal and dust boot are to be replaced each time the caliper is overhauled. Discard these used rubber parts and replace with new ones.

Reassembly

1. Install caliper body.
2. Install bleeder with cap and tighten the cap to the specified torque.

Torque: 8 N·m (69 lb ft)

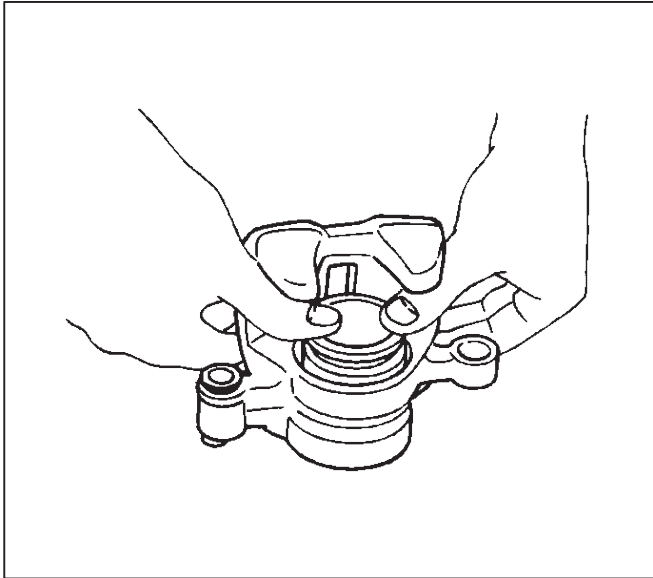
3. Install piston seal and apply special rubber grease to the piston seal and cylinder wall, then insert the piston seal into the cylinder. The special rubber grease is included in the repair kit.



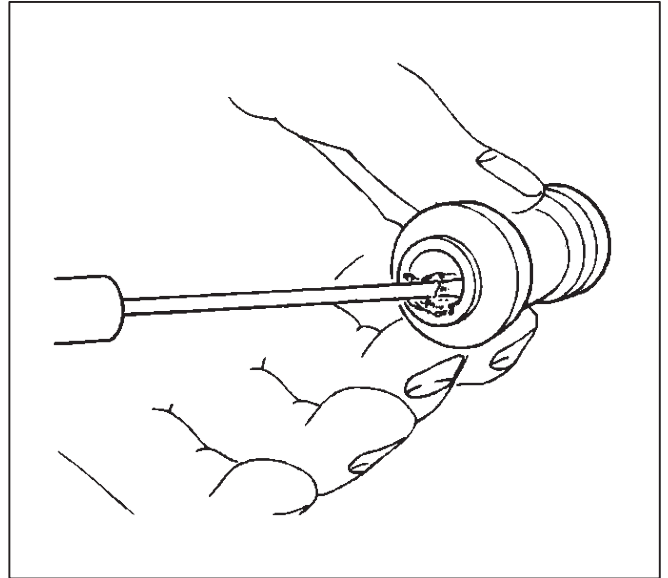
302RS018

4. When inserting the piston into the cylinder, use finger pressure only and do not use a mallet or other impact tool, since damage to the cylinder wall or piston seal can result. Install piston.

5C-52 POWER-ASSISTED BRAKE SYSTEM

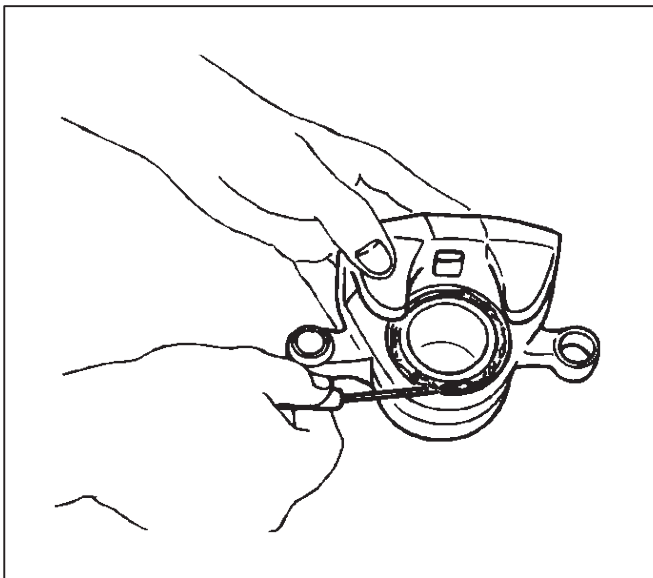


5. Apply special grease (approximately 1g) to the piston and attach the dust boot to the piston and caliper. Insert the dust boot ring into the dust boot.



8. Install lock bolt and guide bolt and tighten the bolt to the specified torque.

Torque: 44 N·m (32 lb ft)



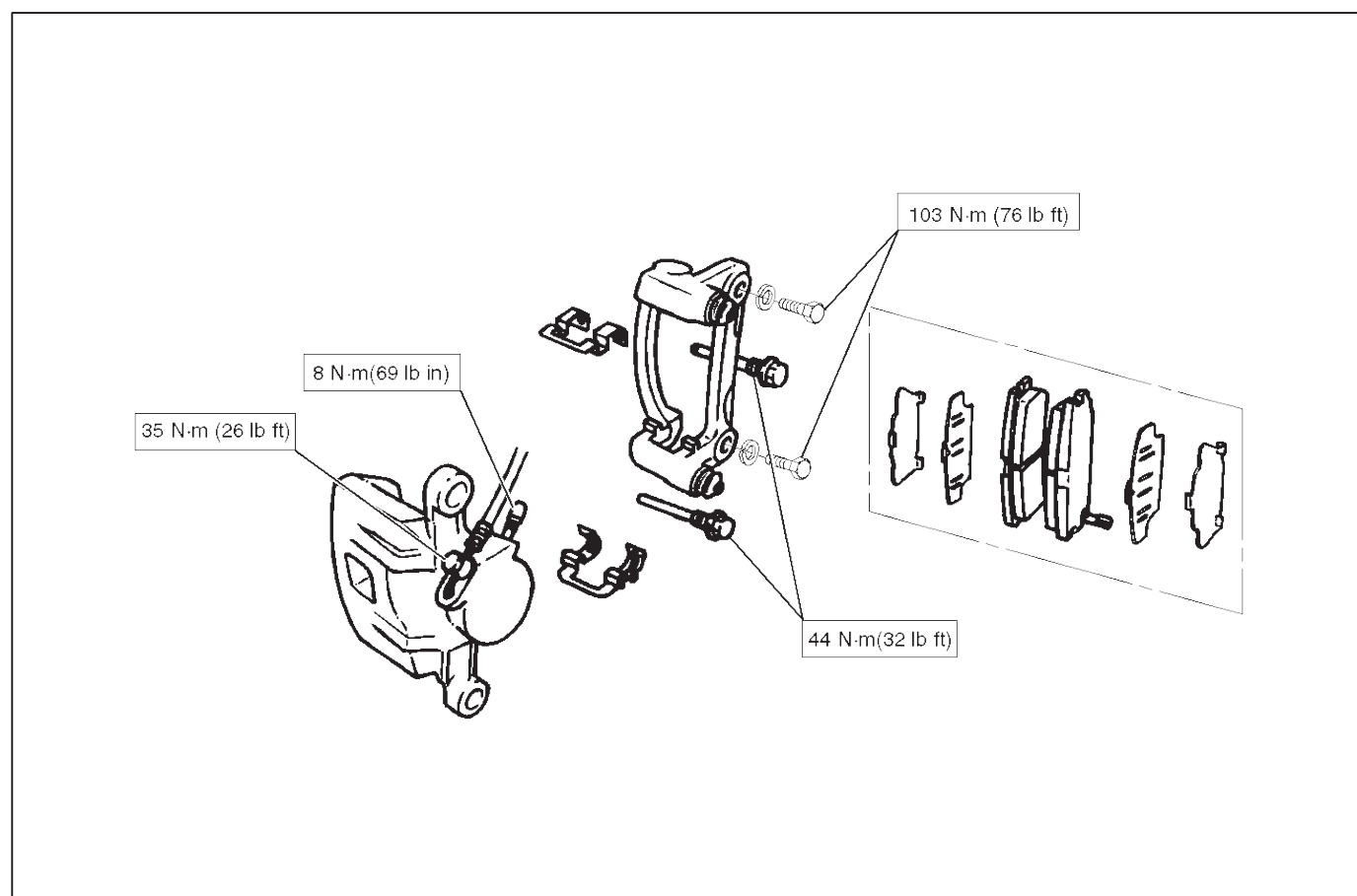
6. Install guide bolt and lock bolt dust boot.
7. Install the dust boot on the support bracket after applying special grease (Approx. 1g) onto the dust boot inner surface. Also apply special grease onto the lock bolt and guide bolt setting hole of the support bracket.

Main Data and Specifications (4×4 Model)

General Specifications

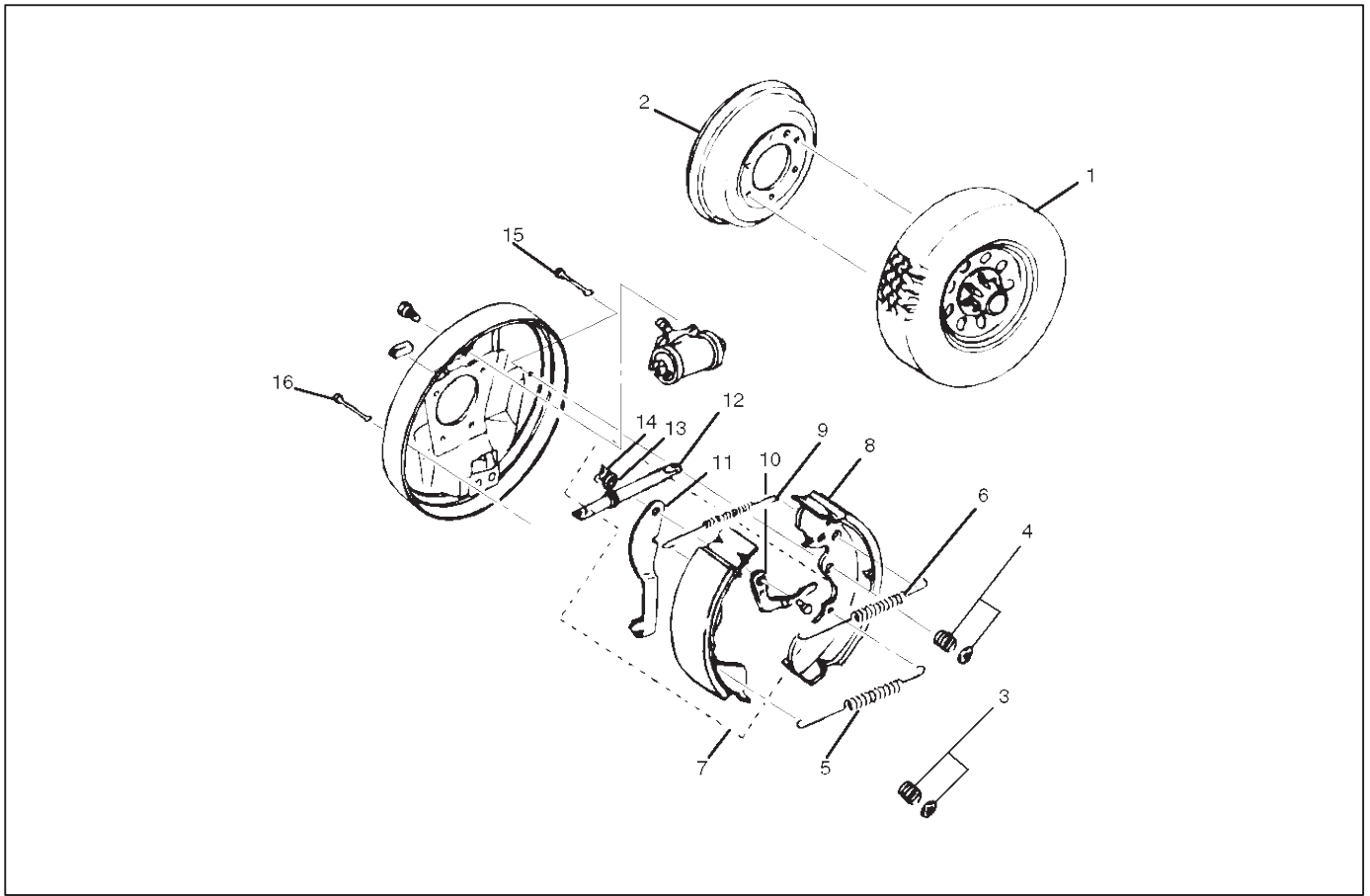
Type	Floating, pin slide
Pad dimension	33 cm ² (5.11 in ²)
Adjusting method	Self-adjusting
Piston diameter	41.3 mm (1.63 in)
Disc type	Ventilated
Disc thickness	18 mm (0.71 in)
Disc effective diameter	269.2 mm (10.60 in)

Torque Specifications



Brake Lining

Brake Lining and Associated Parts



305RW001

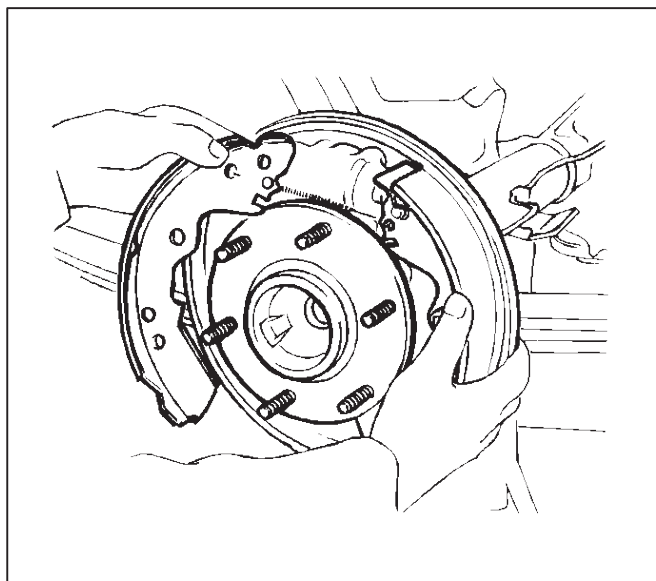
Legend

- | | |
|--|---------------------------------|
| (1) Wheel and Tire Assembly | (9) Upper (inner) Return Spring |
| (2) Drum | (10) Auto Adjuster Lever |
| (3) Hold-down Spring and Cup | (11) Parking Brake Lever |
| (4) Hold-down Spring and Cups | (12) Adjuster Assembly |
| (5) Lower Return Spring | (13) Wave Washer |
| (6) Upper (other) Return Spring | (14) Retainer |
| (7) Trailing Shoe Assembly with Parking Brake Lever | (15) Hold-down Pin |
| (8) Leading Shoe Assembly with Upper (inner) Return Spring | (16) Hold-down Pin |

Removal

1. Raise the vehicle and support with suitable safety stands.
2. Remove wheel and tire assembly (1).
 - Refer to "Wheel and Tires" in *Wheel and Tire System* section.
3. Remove Drum (2).
 - If difficulty is encountered in removing the drum:
 - Mark the position of the drum to the axle.
 - Make sure the parking brake is released.
 - Use a rubber mallet to tap gently on the outer rim of the drum and/or around the inner drum. Be careful to avoid damaging the drum.
4. Remove upper (other) return spring (6) and auto adjuster lever.
5. Remove lower return spring (5).
6. Remove hold-down spring and cups (4) and hold-down pin (15).
7. Remove adjuster assembly (12).
8. Remove leading shoe assembly (8) with upper (inner) return spring (9).

NOTE: Do not over stretch the return spring.



305RS003

9. Remove upper (inner) return spring (9).
10. Remove hold-down spring and cup (3) and hold-down pin (16).
11. Remove Trailing shoe assembly (7) with parking brake lever (16).
12. Remove parking brake cable from parking brake lever (11).
13. Remove retainer (14), wave washer (13), and parking brake lever (11).

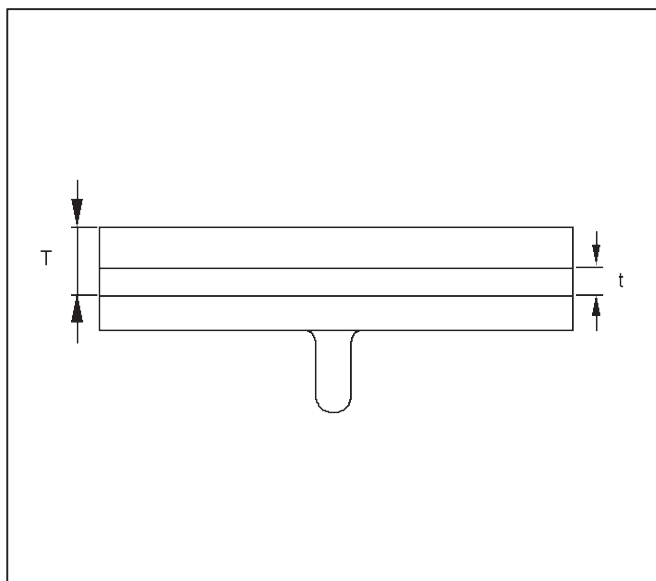
Brake Lining Inspection

Check the shoe assemblies for wear by removing brake drum.

Replace the shoe assemblies, if lining thickness is less than 1.0 mm (0.039 in).

The shoe assemblies have a wear indicator that makes a noise when the linings wear to a degree where replacement is required.

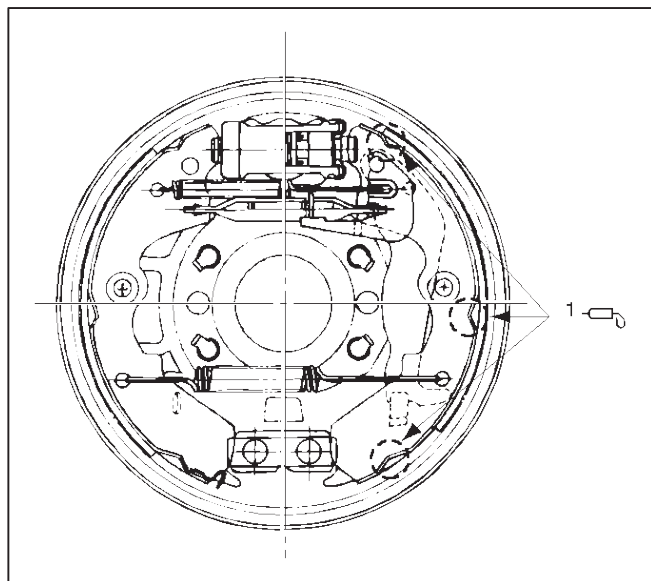
Minimum limit: 1.0 mm (0.039 in)



305RS001

Installation

1. Apply grease lightly to back place A.



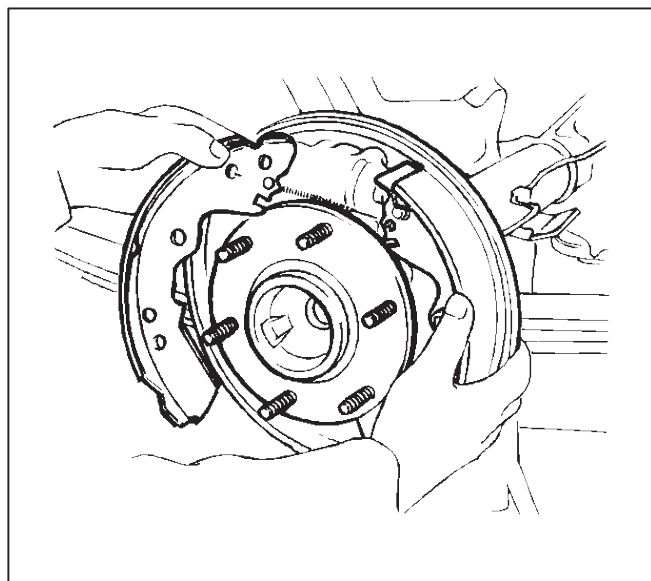
305RW002

Legend

- (1) Place A (3 portions for each side)

2. Install parking brake lever (11), wave washer (13), and retainer (14).
3. Install trailing shoe assembly (7) with parking brake lever (16).
4. Install the parking brake cable to parking brake lever (11).
5. Install hold-down pin (16) and hold-down spring and cup (3).
6. Install upper (inner) return spring (9).
7. Install leading shoe assembly (8) with upper (inner) return spring (9).

NOTE: Do not over stretch the return spring.



305RS003

8. Install adjuster assembly (12).
9. Install hold-down pin (15) and hold-down spring and cups (4).

10. Install lower return spring (5).
 - Use brake spring tool.
11. Install auto adjuster lever (10).
12. Install upper (outer) return spring (6).
 - Use brake spring tool.
13. Install brake drum (2).
 - Adjust the brakes, refer to *Drum Brake Adjustment* in this section.
14. Install wheel and tire assembly (1).
 - Refer to "Wheels and Tires " in *wheel and Tire System* section.

Drum Brake Adjustment (4×2 Model)

NOTE: All brakes are self-adjusting. Brakes are adjusted by repeated stepping on the brake pedal. (After stepping on the pedal and releasing it, the rear auto adjuster, in the rear brake, produces a clicking sound.

The same operation should be repeated until the sound disappears.)

Take the following steps after overhauling the rear brake assembly.

1. Move the parking brake handle to its fully released position.
2. Parking cable must be loosened sufficiently. (Loosen the adjust nut and the lock nut.)
3. Repeat stepping on the brake pedal firmly, and releasing it until the clicking sound can no longer be heard.
If the difference between the brake drum inside diameter and diameter of the brake shoes is adjusted to be 0,5 mm, the number of times for depressing the brake pedal can be reduced.

4. Remove the drum. Measure the brake drum inside diameter and diameter of the brake shoes.

Shoe clearance: 0.25-0.4 mm (0.0098-0.0157 in)

If incorrect, check the brake auto-adjusting system.

5. Rotate the adjust nut until all slack disappears from the cable. Set the adjust nut.
6. Applying about 30 kg (66 lb) of force, pull the parking brake handle to its fully set position three or four times.
7. If the parking brake is properly adjusted, the travel between the fully disengaged position and the fully engaged position will be between 9 and 11 notches. If the traveling range is not within these limits, again repeat steps 1 through 5.

After adjusting has been done, check to see if the rear wheel rotates smoothly without drag when turned by hand.

Servicing The Brake Drum

Whenever the brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves and out-of-round.

Cracked, Scored or Grooved Drum

A cracked drum is unsafe and must be replaced.

Do not attempt to weld a cracked drum.

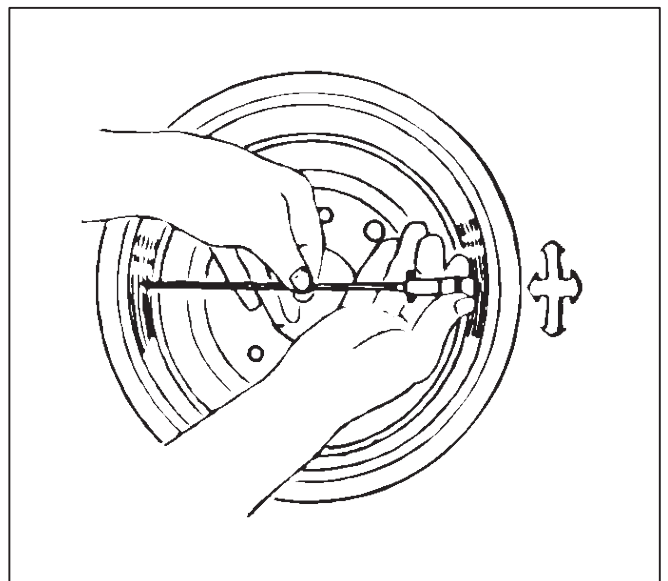
Smooth any slight scores. Heavy or extensive scoring will cause excessive brake lining wear, and it will probably be necessary to machine the drum braking surface.

If the brake linings are slightly worn and the drum is grooved, the drum should be polished with fine emery cloth but should not be machined. At this stage, eliminating all the grooves in the drum and smoothing the ridges on the lining would require the removal of too much metal and lining. If left alone, the grooves and ridges match and satisfactory service can be obtained. If brake linings are to be replaced, a grooved drum should be machined. Using a grooved drum with new linings will create inefficient braking performance and cause the linings to wear quicker.

Out-Of-Round Drum

An out-of-round drum makes accurate brake shoe adjustment impossible and is likely to cause excessive wear to other parts of the brake mechanism due to its eccentric action. An out-of-round drum can also cause severe and irregular tire tread wear as well as a pulsing brake pedal. When the braking surface of a brake drum exceeds the specification limit of 0.15 mm (0.006 in) in out-of-round, the drum should be machined to true up the braking surface. Out-of-round can be accurately measured with an inside micrometer fitted with proper extension rods. When measuring a drum for out-of-round and wear, take measurements at the open and closed edges of machines surfaces and at right angles to each other.

Maximum out-of-round: 0.15 mm (0.006 in)



Machining The Drum

If a drum is to be machined, only enough metal should be removed to obtain a true, smooth braking surface. If a drum does not clean-up when machined to a maximum diameter, it must be replaced. Removal of more metal will

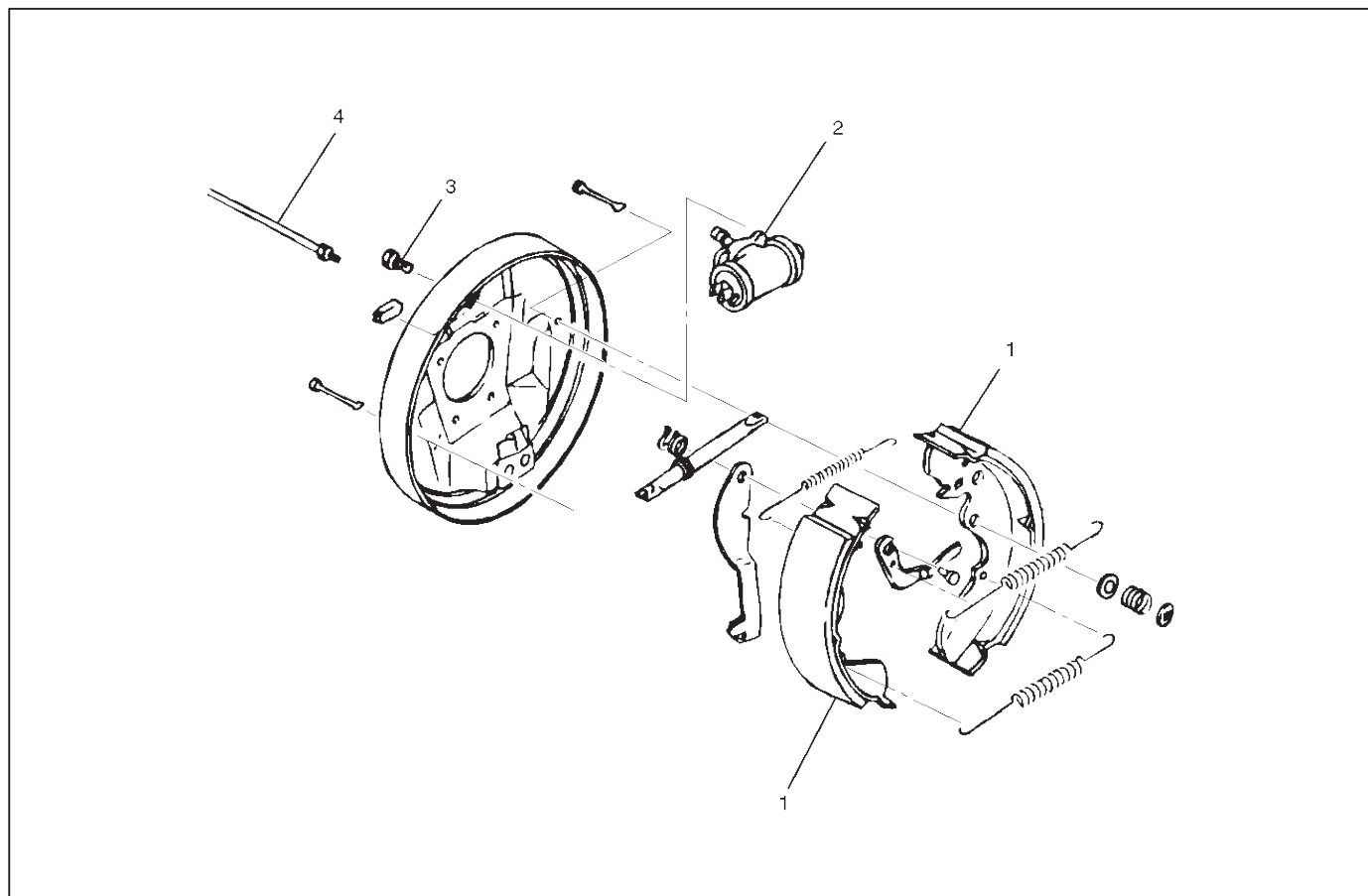
affect dissipation of heat and may cause distortion of the drum.

After refinishing, replace any drum that exceeds a maximum inside diameter of 296.5 mm (11.673 in). Do not use a brake drum that is not within the specification.

Maximum inside diameter: 296.5 mm (11.673 in)

Wheel Cylinder Assembly (4×2 Model)

Wheel Cylinder Assembly and Associated Parts



305RW003

Legend

- (1) Brake Linings
- (2) Wheel Cylinder

- (3) Bolts
- (4) Brake Pipe

Removal

1. Remove brake linings (1).
 - Refer to *Brake Lining and Associated Parts* in this section.
2. Remove brake pipe (4).
 - Plug the opening in the line to prevent fluid loss and contamination.
3. Remove bolts (3) and wheel cylinder (2).

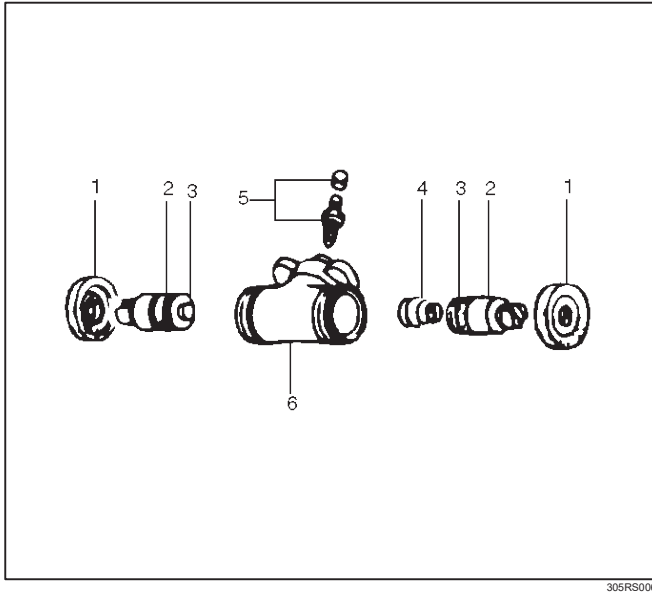
Installation

1. Install wheel cylinder (2) and tighten bolts (3) to the specified torque.

Torque: 10 N·m (8 lb ft)
2. Install brake pipe (4) and tighten the nut to the specified torque.

Torque: 16 N·m (12 lb ft)
3. Install brake linings (1).
 - Refer to *Brake Lining Replacement* in this section.
 - Bleed brake system. Refer to *Hydraulic Brake* in this section.

Disassembled View



305RS006

Legend

- (1) Boot
- (2) Piston Assembly
- (3) Piston Cup
- (4) Return Spring
- (5) Bleeder
- (6) Wheel Cylinder

Disassembly

1. Remove boot (1) and piston assembly (2).
2. Remove piston cup (3) from piston assembly (2).
3. Remove return spring (4) and bleeder (5) from wheel cylinder (6).

Inspection and Repair

1. Make necessary parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.

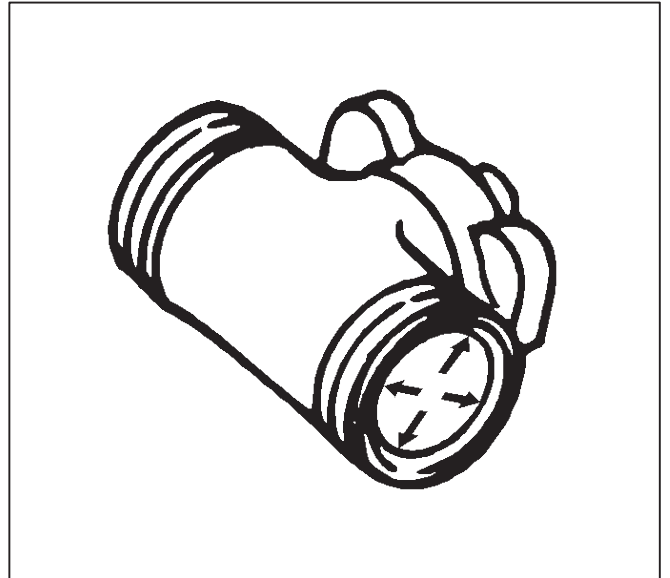
Check the following parts;

- Wheel cylinder body
- Cylinder bore
- Piston
- Return spring
- Bleeder

NOTE: Replace the piston cups and boots each time the wheel cylinder is overhauled. Discard these used rubber parts and replace with new ones.

Reassembly

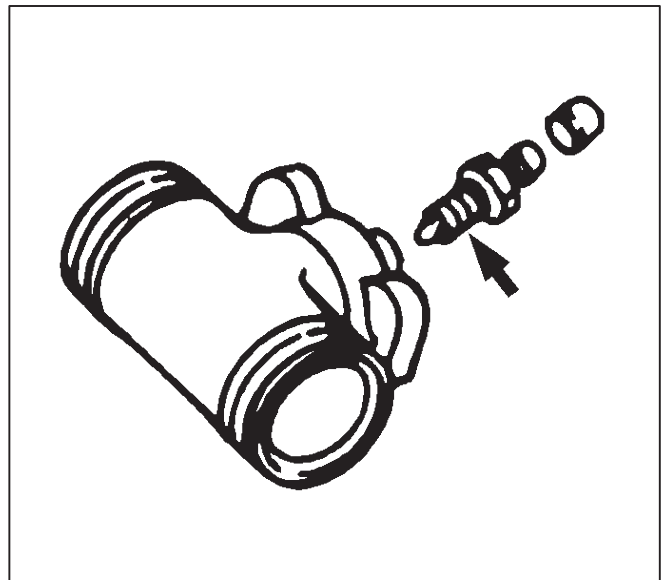
1. Lubricate the cylinder bore with clean rubber grease.



305RS007

2. Install bleeder (5) to wheel cylinder (6).

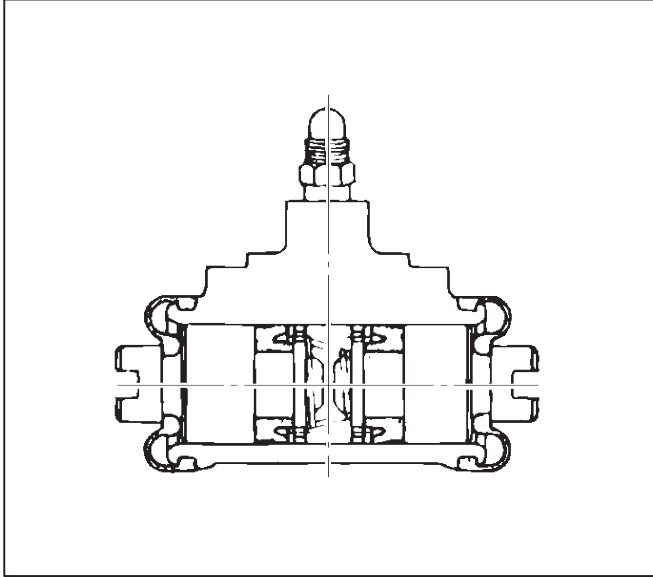
Torque: 10 N·m (8 lb ft)



305RS008

3. Install new piston cups (3) on each piston so that the flared end of the cups are turned to the inboard side of the pistons.

Attach the return spring (4) and the boot (1) to the piston.



4. Apply DELCO silicone lube No. 5459912 (or equivalent) to the piston and the inner face of the boots.
5. Install piston assembly (2) to wheel cylinder (6).

Main Data and Specifications

Rear drum brake	
Type	Leading-trailing, non-servo
Drum inside diameter	295 mm (11.6 in)
Wheel cylinder diameter	22.22 mm (7/8 in)

16 N·m (12 lb ft)

10 N·m (8 lb ft)

This diagram illustrates the assembly of a rear wheel and its suspension components. The wheel is shown with a hub and a brake disc. The suspension components, including the brake caliper, brake pads, and brake disc, are shown in an exploded view. The diagram includes torque specifications for the wheel nuts (16 N·m (12 lb ft)) and the brake disc (10 N·m (8 lb ft)).

E05RW010

AXIOM (Vehicles Produced After Aug./1/2001)

POWER-ASSISTED BRAKE SYSTEM

CONTENTS

Service Precaution	5C-62	Master Cylinder Assembly	5C-82
General Description	5C-62	Master Cylinder Assembly Desassembled View	5C-82
Diagnosis	5C-66	Desassembly	5C-82
General Diagnosis	5C-67	Inspection	5C-82
Hydraulic Brakes	5C-70	Reassembly	5C-83
Filling Master Cylinder Reservoir	5C-70	Installation	5C-83
Deterioration of Brake Fluid	5C-70	Main Data and Specifications	5C-84
Leakage of Brake Fluid	5C-70	Vacuum Booster Assembly	5C-85
Bleeding Brake Hydraulic System	5C-70	Vacuum Booster Assembly and Associated Parts	5C-85
Flushing Brake Hydraulic System	5C-71	Removal	5C-85
Brake Pipes and Hoses	5C-71	Inspection and Repair	5C-86
Brake Hose Inspection	5C-71	Exterior Components	5C-87
Front Caliper Brake Hose	5C-72	Exterior Components and Associated Parts	5C-87
Front Caliper Brake Hose and Associated Parts	5C-72	Removal	5C-87
Removal	5C-72	Inspection and Repair	5C-88
Installation	5C-72	Installation	5C-88
Rear Axle Brake Hose	5C-73	Vacuum Booster Overhaul	5C-88
Rear Axle Brake Hose and Associated Parts	5C-73	Vacuum Booster	5C-88
Removal	5C-73	Main Data and Specifications	5C-89
Installation	5C-73	Front Disc Brake Pads	5C-90
Brake Pipe	5C-74	Front Disc Brake Pads Inspection	5C-90
Removal	5C-74	Front Disc Brake Pads and Associated Parts	5C-90
Installation	5C-74	Removal	5C-91
P & B (Proportioning and Bypass) Valve	5C-75	Installation	5C-91
Removal	5C-75	Front Disc Brake Rotor	5C-93
Installation	5C-75	Inspection	5C-93
Main Data and Specifications	5C-76	Replacing Brake Rotors	5C-93
Brake Pedal	5C-77	Refinishing Brake Rotors	5C-93
Checking Pedal Height	5C-77	Front Disc Brake Caliper Assembly	5C-95
Checking Pedal Travel	5C-77	Front Disc Brake Caliper Assembly and Associated Parts	5C-95
Brake Pedal and Associated Parts	5C-78	Removal	5C-95
Removal	5C-78	Installation	5C-96
Installation	5C-78	Front Disc Brake Caliper	5C-98
Stoplight Switch	5C-79	Front Disc Brake Caliper Disassembled View	5C-98
Parts Location	5C-79	Disassembly	5C-98
Removal	5C-79	Inspection and Repair	5C-99
Installation	5C-79	Reassembly	5C-99
Main Data and Specifications	5C-80	Main Data and Specifications	5C-100
Master Cylinder Assembly	5C-81	Rear Disc Brake Pads (4×4 Model)	5C-101
Master Cylinder Assembly and Associated Parts	5C-81		
Removal	5C-81		
Inspection	5C-81		

5C-62 POWER-ASSISTED BRAKE SYSTEM

Brake Pads Inspection	5C-101	Reassembly	5C-109
Brake Pads and Associated Parts	5C-101	Main Data and Specifications	
Removal	5C-102	(4×4 Model)	5C-111
Installation	5C-102	Brake Lining	5C-112
Rear Disc Brake Rotor (4×4 Model)	5C-104	Brake Lining and Associated Parts	5C-112
Inspection	5C-104	Removal	5C-112
Replacing Brake Rotors	5C-104	Brake Lining Inspection	5C-113
Refinishing Brake Rotors	5C-104	Installation	5C-113
Rear Drum (In Disc) Inside Diameter		Drum Brake Adjustment (4×2 Model)	5C-114
Check	5C-105	Servicing The Brake Drum	5C-114
Rear Disc Brake Caliper Assembly		Wheel Cylinder Assembly (4×2 Model)	5C-115
(4×4 Model)	5C-106	Wheel Cylinder Assembly and Associated	
Rear Disc Brake Caliper Assembly and		Parts	5C-115
Associated Parts	5C-106	Removal	5C-115
Removal	5C-106	Installation	5C-115
Installation	5C-107	Disassembled View	5C-116
Rear Disc Brake Caliper (4×4 Model)	5C-108	Disassembly	5C-116
Rear Disc Brake Caliper Disassembled		Inspection and Repair	5C-116
View	5C-108	Reassembly	5C-116
Disassembly	5C-109	Main Data and Specifications	5C-118
Inspection and Repair	5C-109		

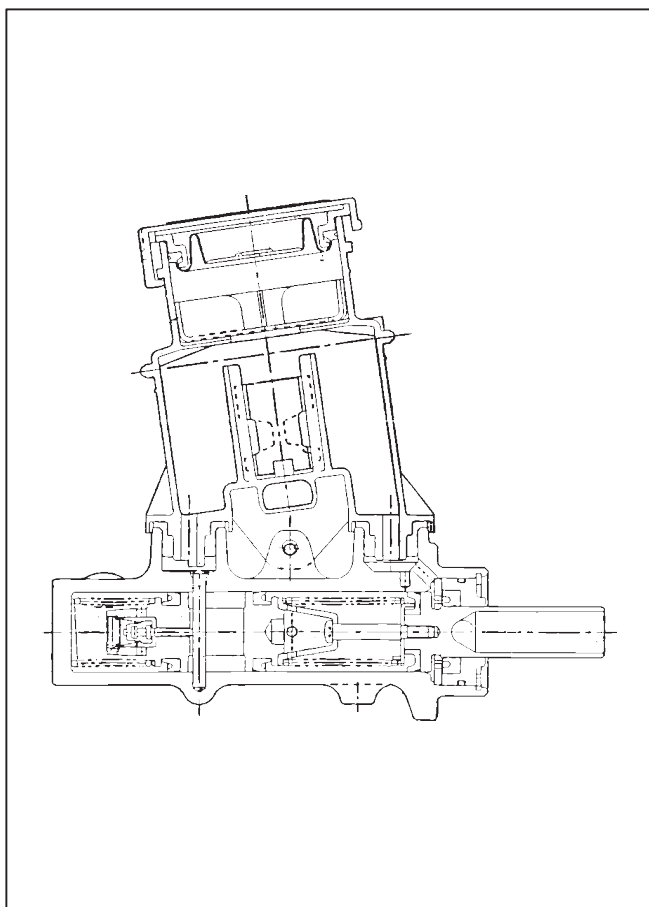
Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE *SRS COMPONENT AND WIRING LOCATION VIEW* IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE *SRS SERVICE INFORMATION*. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description

Master Cylinder Assembly



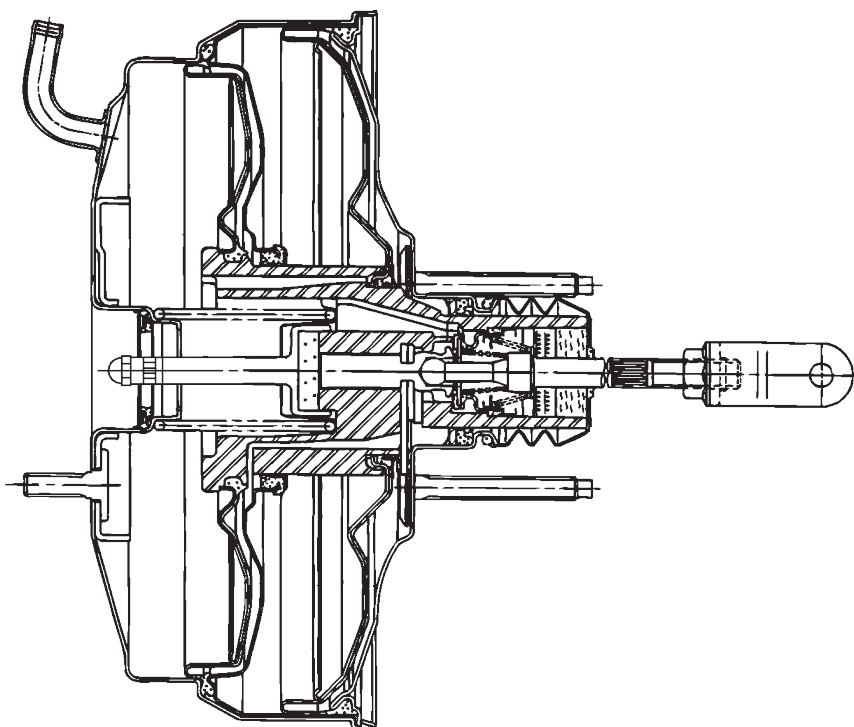
330R200002

The master cylinder contains two pistons that supply the hydraulic pressure for a dual-circuit braking system. The primary piston provides the fluid pressure to the front brakes, while the secondary piston provides the fluid pressure to the rear brakes. If the pressure is lost from either system, the remaining system will function to stop the vehicle.

CAUTION:

1. If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system. (Refer to *Bleeding Brake Hydraulic System* in this section.)
2. The torque values specified are for dry, unlubricated fasteners.
3. Perform service operations on a clean bench free from all mineral oil materials.

Brake Booster



331R200001

This booster is a tandem vacuum unit with a diaphragm effective diameter 205mm + 230mm (8.07in + 9.06in). In normal operating mode, with the service brakes in the released position, the tandem vacuum booster operates with vacuum on both sides of its diaphragms. When the brakes are applied, air at atmospheric pressure is admitted to both sides of the diaphragm to provide the power assist. When the service brake is released, the atmospheric air is shut off from both sides of the diaphragm. The air is then drawn from the booster through the vacuum check valve to the vacuum source.

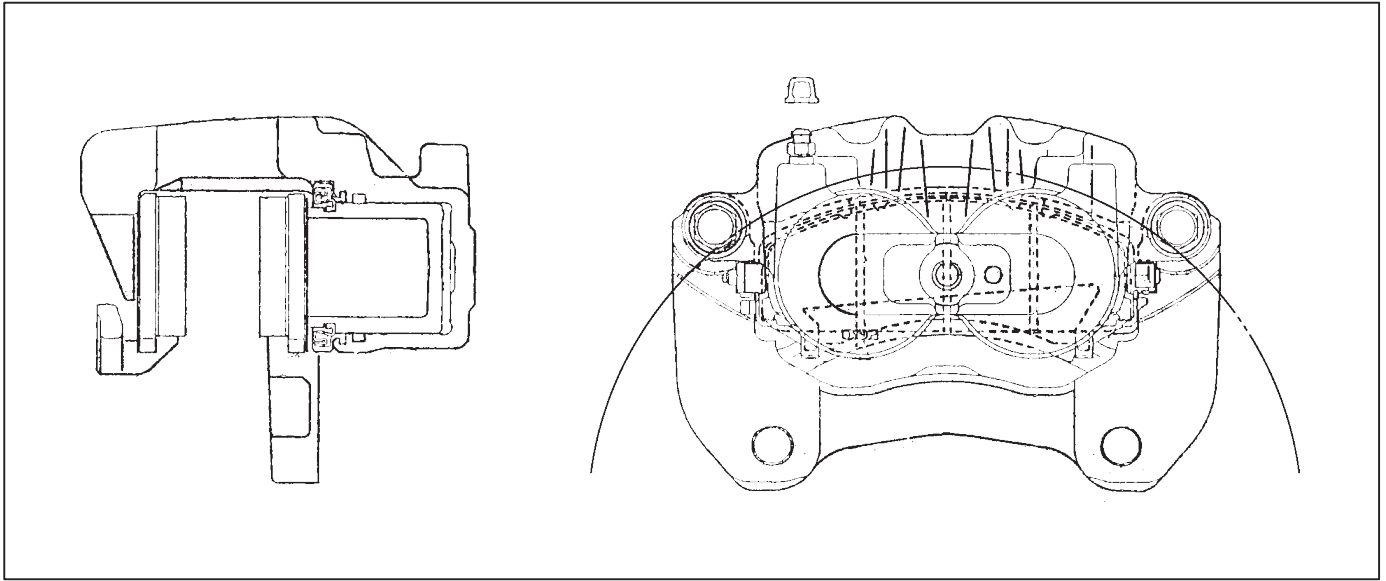
CAUTION:

1. If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.
2. The torque values specified are for dry, unlubricated fasteners.
3. The vacuum booster is not repairable and must be replaced as complete assembly.

5C-64 POWER-ASSISTED BRAKE SYSTEM

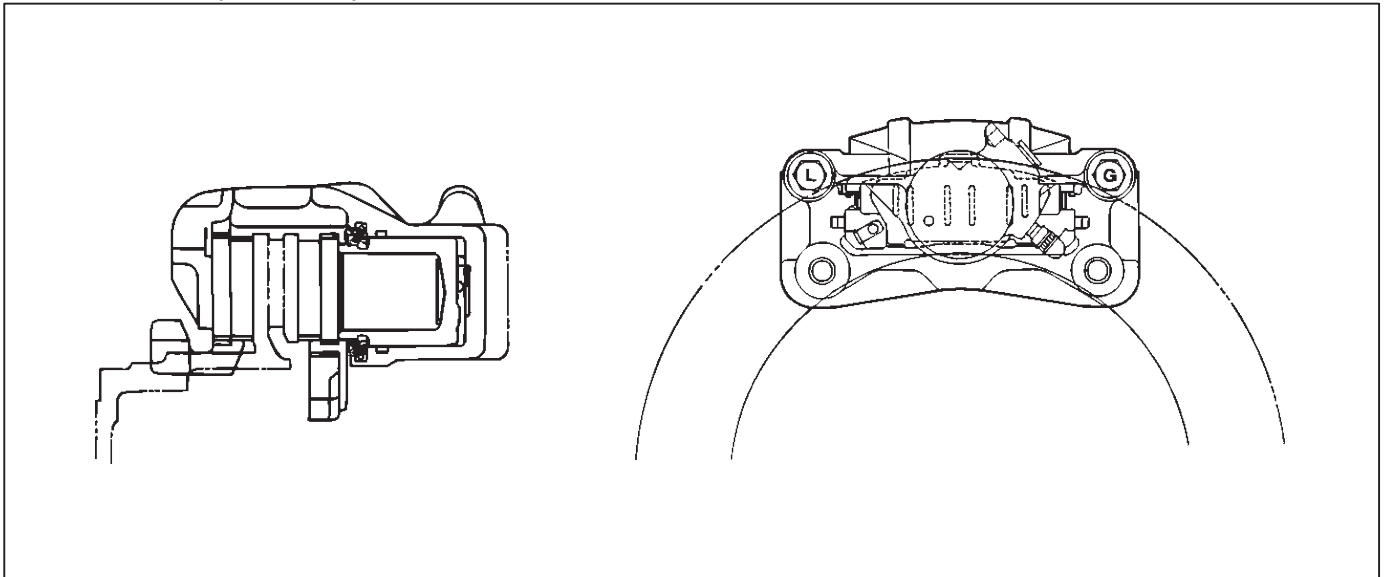
Disc Brake

Front Disc Brake



A05R200001

Rear Disc Brake (4×4 Model)



A05RW002

The disc brake assembly consists of a caliper, piston, rotor, pad assembly and support bracket. The caliper assembly has a front dual bore, rear single bore and is mounted to the support bracket with two mounting bolts. The support bracket allows the caliper to move laterally against the rotor. The caliper is a one-piece casting with the inboard side containing the piston bore. A square cut rubber seal is located in a groove in the piston bore which provides the hydraulic seal between the piston and the cylinder wall.

NOTE:

1. Replace all components included in repair kits used to service this caliper.
2. Lubricate rubber parts with clean brake fluid to ease assembly.

3. If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.

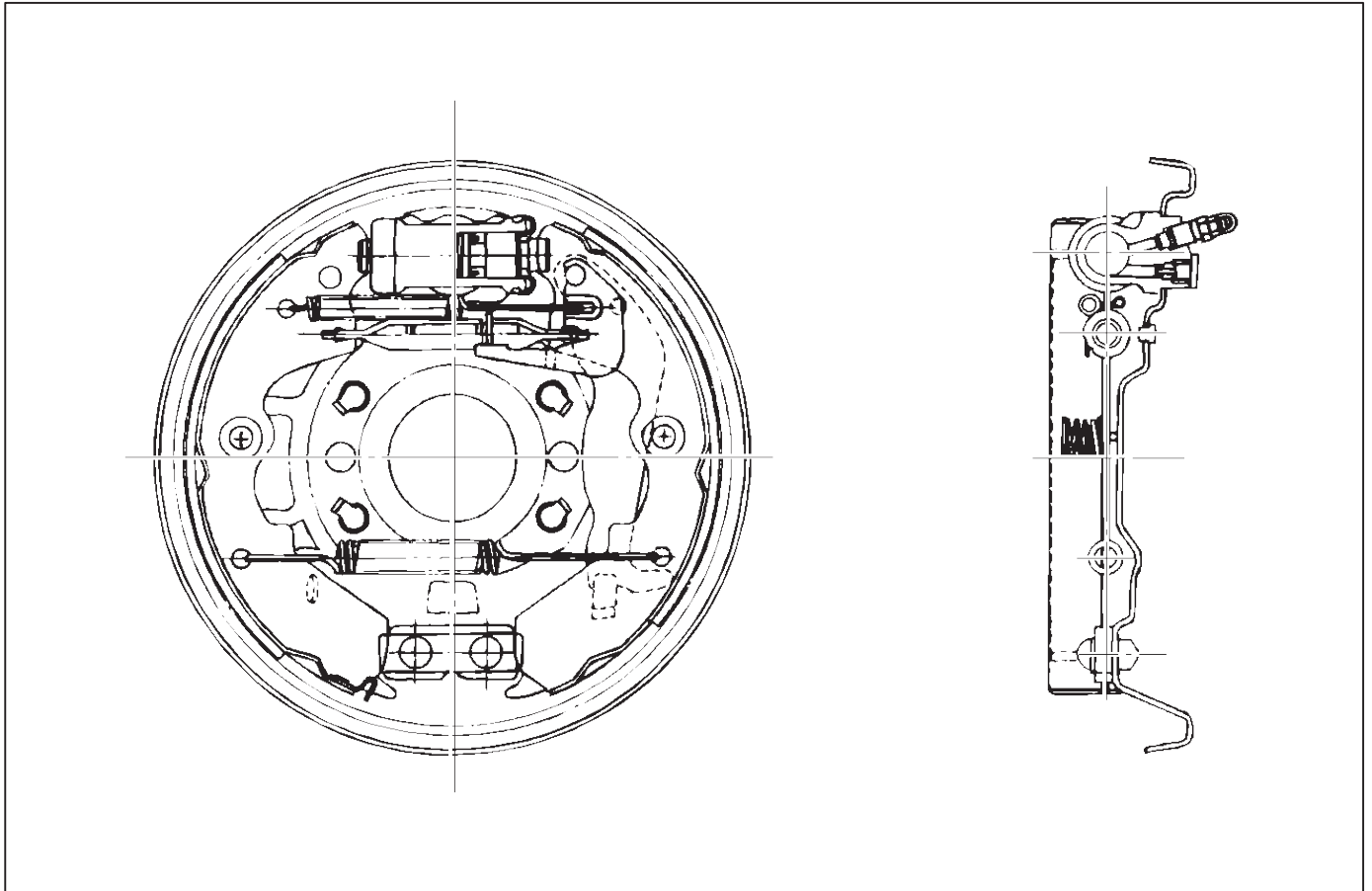
4. Replace pads in axle sets only.

5. The torque values specified are for dry, unlubricated fasteners.

6. Perform the service operation on a clean bench free from all mineral oil materials.

Operation

Hydraulic pressure, created by applying the brake pedal, is converted by the caliper to a stopping force. This force creates a clamping action of the piston pressing towards the rotors (outward) and the caliper slides inward toward the vehicle. This clamping action forces the linings against the rotor, creating friction to stop the vehicle.

Leading/Trailing Drum Brakes (4×2 Model)

A05RS003

This drum brake assembly is a leading/trailing shoe design. Both brake shoes are held against the wheel cylinder pistons by the upper return spring and to the fixed anchor plate by the lower return spring. When the brakes are applied, the wheel cylinder pistons expand pushing both shoes out contacting the drum.

With forward wheel rotation, the forward brake shoe will wrap into the drum and becomes self-energized.

With reverse wheel rotation, the rear brake shoe is self-energized. Force from the brake shoes is transferred to the anchor plate through the braking plate to the axle flange. Adjustment is automatic and occurs on any service brake application. Also, with leading/trailing brakes, it is normal for the front shoe to wear at a faster rate than the rear shoe.

Diagnosis

Road Testing The Brakes

Brake Test

Brakes should be tested on a dry, clean, reasonably smooth and level roadway. A true test of brake performance cannot be made if the roadway is wet, greasy or covered with loose dirt where all tires do not grip the road equally. Testing will also be adversely affected if the roadway is crowned so as to throw the weight of the vehicle toward wheels on one side or if the roadway is so rough that wheels tend to bounce. Test the brakes at different vehicle speeds with both light and heavy pedal pressure; however, avoid locking the wheels and sliding the tires. Braking without locking the tires will stop the vehicle in less distance than braking to a skid (which has no brake efficiency). More tire to road friction is present while braking without locking the tires than braking to a skid.

The standard brake system is designed and balanced to avoid locking the wheels except at very high deceleration levels.

It is designed this way because the shortest stopping distance and best control is achieved without brake lock-up.

Because of high deceleration capability, a firmer pedal may be felt at higher deceleration levels.

External Conditions That Affect Brake Performance

1. **Tires:** Tires having unequal contact and grip on the road will cause unequal braking. Tires must be equally inflated, identical in size, and the thread pattern of right and left tires must be approximately equal.
2. **Vehicle Loading:** A heavily loaded vehicle requires more braking effort.
3. **Wheel Alignment:** Misalignment of the wheels, particularly in regard to excessive camber and caster, will cause the brakes to pull to one side.

Brake Fluid Leaks

With engine running at idle and the transmission in "Neutral", depress the brake pedal and hold a constant foot pressure on the pedal. If pedal gradually falls away with the constant pressure, the hydraulic system may be leaking.

Check the master cylinder fluid level. While a slight drop in the reservoir level will result from normal lining wear, an abnormally low level in reservoir indicates a leak in the system. The hydraulic system may be leaking internally as well as externally. Refer to *Master Cylinder Inspection*. Also, the system may appear to pass this test but still have slight leakage. If fluid level is normal, check the vacuum booster push rod length. If an incorrect length push rod is found, adjust or replace the push rod. Check the brake pedal travel and the parking brake adjustment. When checking the fluid level, the master cylinder fluid level may be lower than the "MAX" mark if the front and rear linings are worn. This is normal.

Warning Light Operation

When the ignition switch is in the START position, the "BRAKE" warning light should turn on and go off when the ignition switch returns to the ON position.

The following conditions will activate the "BRAKE" light:

1. **Parking brake applied.** The light should be on whenever the parking brake is applied and the ignition switch is on.
2. **Low fluid level.** A low fluid level in the master cylinder will turn the "BRAKE" light on.
3. **During engine cranking** the "BRAKE" light should remain on. This notifies the driver that the warning circuit is operating properly.

General Diagnosis

Condition	Possible cause	Correction
Brake Pull	Tire inflation pressure is unequal.	Adjust
	Front wheel alignment is incorrect.	Adjust
	Unmatched tires on same axle.	Tires with approx. the same amount of tread should be used on the same axle.
	Restricted brake pipes or hoses.	Check for soft hoses and damaged lines. Replace with new hoses and new double walled steel brake piping.
	Water or oil on the brake pads.	Clean or replace.
	Brake pads hardened.	Replace
	Brake pads worn excessively.	Replace
	Brake rotor worn or scored.	Grind or replace.
	Disc brake caliper malfunctioning.	Clean or replace.
	Front hub bearing preload incorrect.	Adjust or replace.
	Loose suspension parts.	Check all suspension mountings.
	Loose calipers.	Check and tighten the bolts to specifications.
Brake Roughness or Chatter (Pulsates)	Excessive lateral runout.	Check per instructions. If not within specifications, replace or machine the rotor.
	Parallelism not within specifications.	Check per instructions. If not within specifications, replace or machine the rotor.
	Pad reversed (steel against iron).	Replace the brake pad and machine rotor to within specifications.
Excessive Pedal Effort	Malfunctioning vacuum booster.	Check the vacuum booster operation and repair, if necessary.
	Partial system failure.	Check the front and rear brake system for failure and repair. Also, check the brake warning light. If a failed system is found, the light should indicate failure.
	Excessively worn pad.	Check and replace pads in sets.
	Piston in caliper stuck or sluggish.	Remove caliper and rebuild.
	Fading brakes due to incorrect pad.	Remove and replace with original equipment pad or equivalent.
	Vacuum leak to vacuum booster.	Check for ruptured or loose hose.
	Check the direction of check valve within vacuum hose.	Correct vacuum hose direction.
	Grease on the brake pads.	Replace or clean.
Excessive Brake Pedal Travel	Air in hydraulic circuit.	Bleed the hydraulic circuit.
	Level of brake fluid in the reservoir too low.	Replenish brake fluid reservoir to specified level and bleed hydraulic circuit as necessary.
	Master cylinder push rod clearance excessive.	Adjust
	Leakage in hydraulic system.	Correct or replace defective parts.

5C-68 POWER-ASSISTED BRAKE SYSTEM

Condition	Possible cause	Correction
Brake Drag	Master cylinder pistons not returning correctly.	Adjust the stop light switch and vacuum booster push rod. If necessary, rebuild.
	Restricted brake pipes or hoses.	Check for soft hoses or damaged pipes, and replace with new hoses and new double-walled steel brake piping.
	Parking brake maladjusted.	Adjust
	Parking brake lining clearance insufficient.	Adjust
	Brake pedal free play insufficient.	Adjust the brake pedal height or power cylinder operating rod.
	Piston in the master cylinder sticking.	Replace
	Piston in the disc brake caliper sticking.	Replace piston seals.
	Brake pads sticking in caliper.	Clean
	Return spring weakened.	Replace
	Parking brake binding.	Overhaul the parking brakes and correct.
	Front hub bearing preload incorrect.	Adjust or replace.
	Parking brake shoes not returning.	Correct or replace the brake back plate and brake shoe as necessary.
	Obstructions in hydraulic circuit.	Clean
	Rotor warped excessively.	Grind or replace.
	Rear brake drum distorted.	Grind or replace.
	Parking cable sticking.	Grind or replace.
Grabbing or Uneven Braking Action (All conditions listed under "Pulls")	Malfunctioning vacuum booster.	Check operation and correct as necessary.
	Binding brake pedal mechanism.	Check and lubricate, if necessary.
	Corroded caliper assembly.	Clean and lubricate.
Brake Noisy	Brake pads are worn.	Replace
	Brake pads are hardened.	Replace
	Brake pads are in poor contact with rotor.	Correct
	Brake disc(s) warped, worn or damaged.	Grind or replace.
	Disc brake anti-squeak shims fatigued.	Replace
	Front hub bearings are loose or preload is incorrect.	Adjust or replace.
	Brake disc is rusted.	Grind or replace.

Condition	Possible cause	Correction
Poor Brake Action	Master cylinder faulty.	Correct or replace.
	Vacuum booster faulty.	Correct or replace.
	Level of brake fluid in reservoir too low.	Replenish and bleed.
	Air in hydraulic circuit.	Bleed
	Disc brake caliper faulty.	Clean or replace.
	Water or oil on brake pads.	Clean or replace.
	Brake pads in poor contact with the rotor.	Correct
	Brake pads worn.	Replace
	Brake disc rusted.	Grind or replace.
	Check valve in vacuum hose faulty.	Correct or replace.

Hydraulic Brakes

Filling Master Cylinder Reservoir

CAUTION: Use only specified brake fluid. Do not use any fluid which contains a petroleum base. Do not use a container which has been used for petroleum based fluids or a container which is wet with water. Petroleum based fluid will cause swelling and distortion of rubber parts in the hydraulic brake system. Water mixed with brake fluid lowers the fluid boiling point. Keep all fluid containers capped to prevent contamination.

Always fill the master cylinder reservoir when the engine is cold.

Never allow the brake fluid to come in contact with the painted surfaces.

The master cylinder reservoir must be kept properly filled to ensure adequate reserve and to prevent air and moisture from entering the hydraulic system. However, because of expansion due to heat absorbed from the brakes and the engine, the reservoir must not be overfilled. The brake fluid reservoir is on the master cylinder, which is located under the hood on the left side of the cowl. Thoroughly clean reservoir cap before removal to avoid getting dirt into reservoir. Remove the diaphragm. Add fluid as required to bring level to the "MAX" mark on the reservoir tank. Use "DOT 3" Hydraulic Brake Fluid. If the fluid cap diaphragm is stretched, return it to the original position before installing.

Deterioration of Brake Fluid

Using any other brake fluid than specified or brake fluid with mineral oil or water mixed in will drop the boiling point of brake fluid. It may, in turn, result in vapor lock or deteriorated rubber parts of the hydraulic system. Be sure to change the brake fluid at specified intervals.

If the rubber parts are deteriorated, remove all the system parts and clean them with alcohol. Prior to reassembly, dry the cleaned parts with air to remove the alcohol. Replace all the hoses and rubber parts of the system.

Leakage of Brake Fluid

With engine idling, set shift lever in the neutral position and continue to depress brake pedal at a constant pedal application force.

Should the pedal stroke become deeper gradually, leakage from the hydraulic pressure system is possible. Perform visual inspection for any signs of leakage.

Bleeding Brake Hydraulic System

A bleeding operation is necessary to remove air from the hydraulic brake system whenever air is introduced into the hydraulic system. It may be necessary to bleed the hydraulic system at all four brakes if air has been introduced through a low fluid level or by disconnecting brake pipes at the master cylinder. If a brake pipe is disconnected at one wheel, only that wheel cylinder/caliper needs to be bled. If the pipes are disconnected at any fitting located between the master cylinder and brakes, then the brake system served by the disconnected pipe must be bled.

1. For 4-Wheel Antilock Brake System (ABS) equipped vehicle, be sure to remove the ABS main fuse 60A located at the relay and fuse box before bleeding air. If you attempt to bleed air without removing the main fuse, air cannot be let out thoroughly, and this may cause damage to the hydraulic unit. After bleeding air, be sure to replace the ABS main fuse back to its original position.
2. Set the parking brake completely, then start the engine.

NOTE: The vacuum booster will be damaged if the bleeding operation is performed with the engine off.

3. Remove the master cylinder reservoir cap.
4. Fill the master cylinder reservoir with brake fluid. Keep the reservoir at least half full during the air bleeding operation
5. Always use new brake fluid for replenishment.
6. When replenishing the brake fluid reservoir, carefully pour in the brake fluid to prevent air bubbles from entering the brake system.
When the master cylinder is replaced or overhauled, first bleed the air from the master cylinder, then from each wheel cylinder and caliper following the procedures described below.

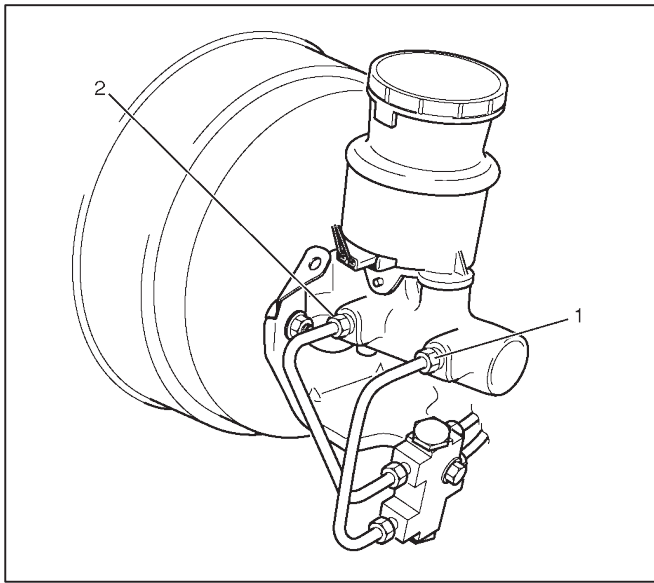
Bleeding the Master Cylinder

7. Disconnect the rear wheel brake pipe (1) from the master cylinder.
Check the fluid level and replenish as necessary. If replenished, leave the system for at least one minute.
8. Depress the brake pedal slowly once and hold it depressed.
9. Completely seal the delivery port of the master cylinder with your finger, where the pipe was disconnected then release the brake pedal slowly.
10. Release your finger from the delivery port when the brake pedal returns completely.
11. Repeat steps 8 through 10 until the brake fluid comes out of the delivery port during step 8.

NOTE: Do not allow the fluid level in the reservoir to go below the half-way mark.

12. Reconnect the brake pipe (1) to the master cylinder and tighten the pipe.
13. Depress the brake pedal slowly once and hold it depressed.
14. Loosen the rear wheel brake pipe (1) at the master cylinder.
15. Retighten the brake pipe, then release the brake pedal slowly.
16. Repeat steps 13 through 15 until no air comes out of the port when the brake pipe is loosened

NOTE: Be very careful not to allow the brake fluid to come in contact with painted surfaces.



17. Bleed the air from the front wheel brake pipe connection (2) by repeating steps 7 through 16.

Bleeding the Caliper

18. Bleed the air from each wheel in the order listed below:

- Right rear caliper or wheel cylinder
- Left rear caliper or wheel cylinder
- Right front caliper
- Left front caliper

Conduct air bleeding from the wheels in the above order. If no brake fluid comes out, it suggests that air is mixed in the master cylinder. In this case, bleed air from the master cylinder in accordance with steps 7 through 17, and then bleed air from the caliper or wheel cylinder.

19. Place the proper size box end wrench over the bleeder screw.
20. Cover the bleeder screw with a transparent tube, and submerge the free end of the transparent tube in a transparent container containing brake fluid.
21. Pump the brake pedal slowly three (3) times (once/sec), then hold it depressed.
22. Loosen the bleeder screw until fluid flows through the tube.
23. Retighten the bleeder screw.

24. Release the brake pedal slowly.
25. Repeat steps 21 through 24 until the air is completely removed.
It may be necessary to repeat the bleeding procedure 10 or more times for front wheels and 15 or more times for rear wheels.
26. Go to the next wheel in the sequence after each wheel is bled.
Be sure to monitor reservoir fluid level.
27. Depress the brake pedal to check if you feel "sponginess" after the air has been removed from all wheel cylinders and calipers.
If the pedal feels "spongy", the entire bleeding procedure must be repeated.
28. After the bleeding operation is completed on the each individual wheel, check the level of the brake fluid in the reservoir and replenish up to the "MAX" level as necessary.
29. Attach the reservoir cap.
If the diaphragm inside the cap is deformed, reform it and install.
30. Stop the engine.

Flushing Brake Hydraulic System

It is recommended that the entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in the hydraulic system. Approximately one quart of fluid is required to flush the hydraulic system. The system must be flushed if there is any doubt as to the grade of fluid in the system or if fluid has been used which contains the slightest trace of mineral oil. All rubber parts that have been subjected to a contaminated fluid must be replaced.

Brake Pipes and Hoses

The hydraulic brake system components are interconnected by special steel piping and flexible hoses. Flexible hoses are used between the frame and the front calipers, the frame and rear axle case and the rear axle and the rear calipers.

When the hydraulic pipes have been disconnected for any reason, the brake system must be bled after reconnecting the pipe. Refer to *Bleeding the Brake Hydraulic System* in this section.

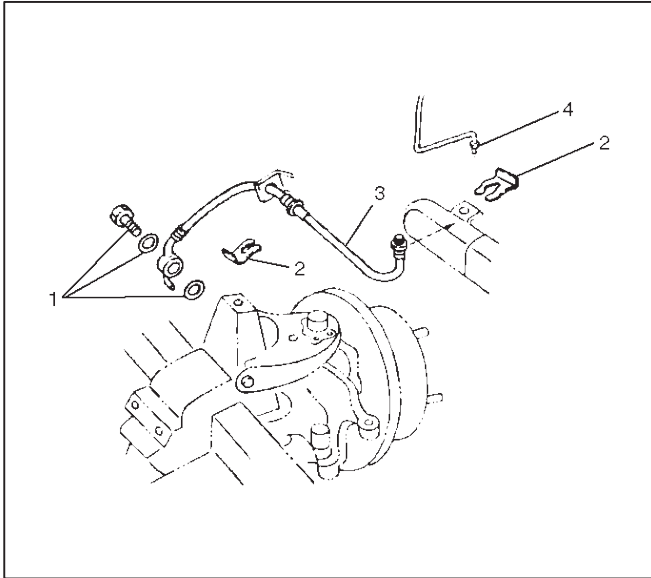
Brake Hose Inspection

The brake hose should be inspected at least twice a year. The brake hose assembly should be checked for road hazard, cracks and chafing of the outer cover, and for leaks and blisters. Inspect for proper routing and mounting of the hose. A brake hose that rubs on suspension components will wear and eventually fail. A light and mirror may be needed for an adequate inspection. If any of the above conditions are observed on the brake hose, adjust or replace the hose as necessary.

CAUTION: Never allow brake components such as calipers to hang from the brake hoses, as damage to the hoses may occur.

Front Caliper Brake Hose

Front Caliper Brake Hose and Associated Parts



352RV001

Legend

- (1) Bolt and Gasket
- (2) Clip
- (3) Hose
- (4) Brake Pipe

Removal

1. Raise the vehicle and support it with suitable safety stands.
2. Remove the wheel and tire assembly.
3. Clean dirt, grease, and other foreign material off the hose fittings at both ends.
4. Disconnect brake pipe.
5. Remove clip.
6. Remove bolt and gasket.
7. Remove hose.

Installation

To install, follow the removal steps in the reverse order, noting the following points.

1. Tighten the brake pipes to the specified torque

Torque: 16 N·m (12 lb ft)

2. Tighten the bolt to the specified torque.

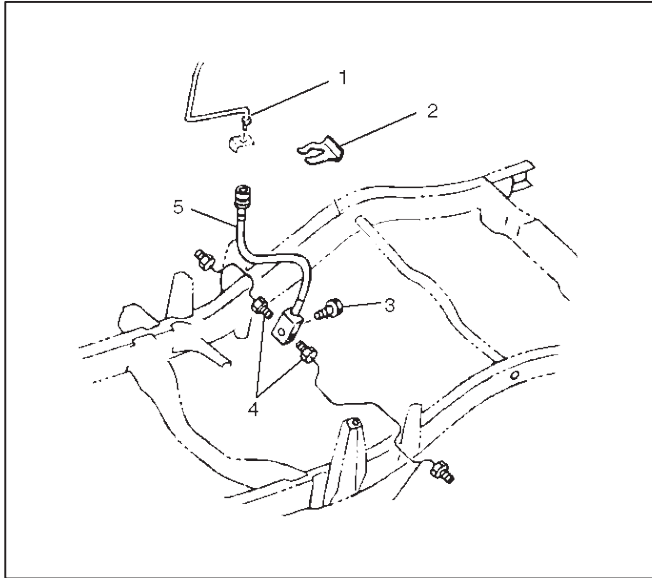
Torque: 35 N·m (26 lb ft)

NOTE: Always use new gaskets and be sure to put the hooked edge of the flexible hose end into the anti-rotation cavity.

After installing the brake hoses, bleed the brakes as described in this section.

Rear Axle Brake Hose

Rear Axle Brake Hose and Associated Parts



352RW002

Legend

- (1) Brake Pipe
- (2) Clip
- (3) Bolt
- (4) Brake Pipe
- (5) Hose

Installation

To install, follow the removal steps in the reverse order, noting the following points.

1. Tighten the brake pipes to the specified torque

Torque: 16 N·m (12 lb ft)

2. Tighten the bolt to the specified torque.

Torque: 15 N·m (11 lb ft)

After installing the brake hoses, bleed the brakes as described in this section.

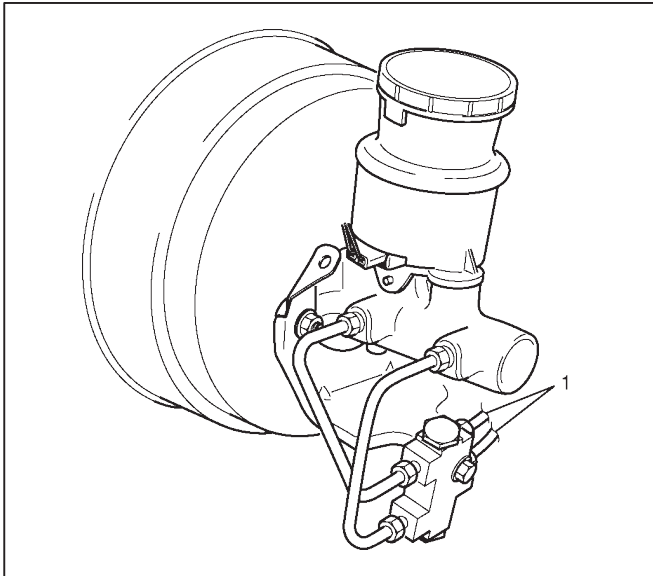
Removal

1. Raise the vehicle and support it with suitable safety stands.
2. Remove wheel and tire assembly.
3. Clean dirt, grease, and other foreign material off the hose fittings at both ends.
4. Disconnect brake pipe.
5. Remove clip.
6. Remove brake pipe.
7. Remove bolt.
8. Remove hose.

Brake Pipe

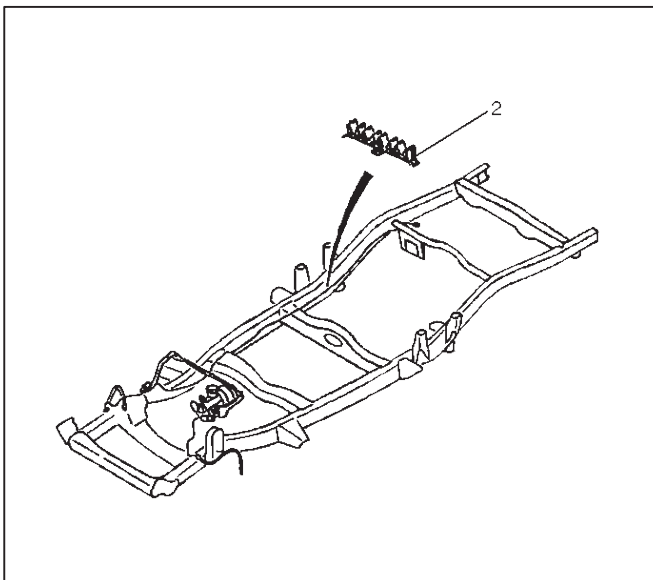
Removal

1. Raise the vehicle and support it with suitable safety stands.
2. Remove wheel and tire assembly as necessary.
3. Clean dirt, grease, and other foreign material off the pipe fittings at both ends.
4. Remove brake pipe (1).



330R200003

5. Remove plastic clip (2).



330RW002

Installation

To install, follow the removal steps in the reverse order, noting the following points.

1. Tighten the brake pipes to the specified torque.

Master cylinder and P&B valve sides

Torque: 12 N·m (104 lb in)

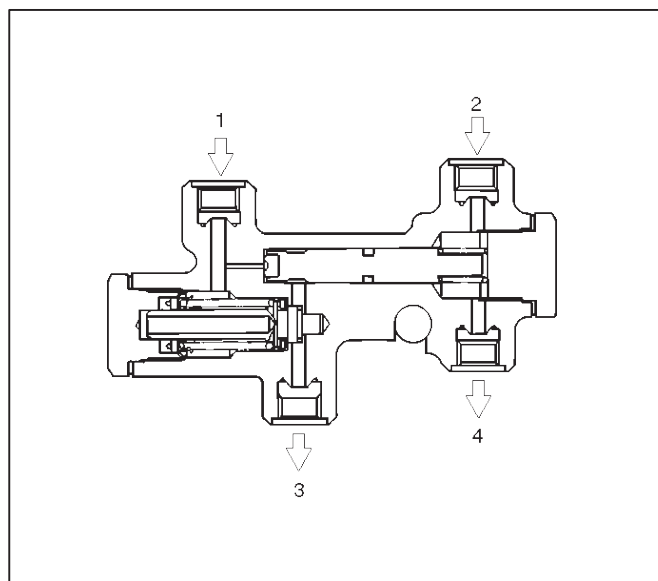
Others

Torque: 16 N·m (12 lb ft)

After installing the brake pipes, bleed the brakes as described in this section.

P & B (Proportioning and Bypass) Valve

P & B (Proportioning and Bypass) Valve Sectional View



350RW014

Legend

- (1) Master Cylinder (Secondary)
- (2) Master Cylinder (Primary)
- (3) Rear Brake
- (4) Front Brake

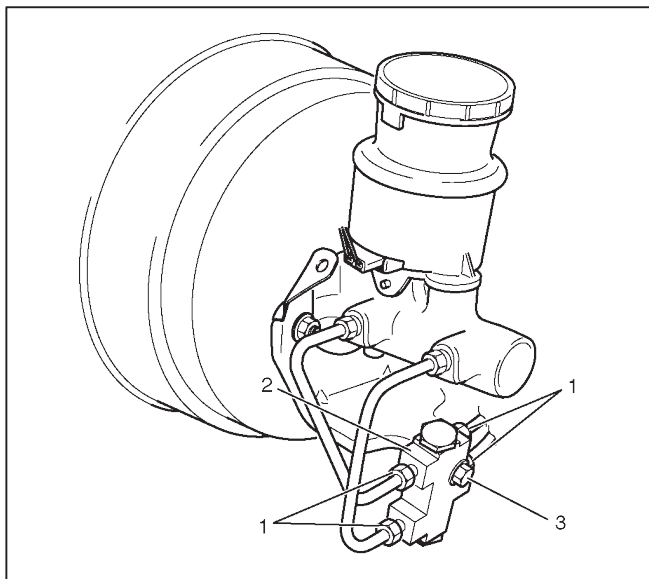
The P&B valve contains two sections, each serving a different function.

The proportioning section of the P&B valve proportions outlet pressure to the rear brakes after a predetermined rear input pressure has been reached. This is done to prevent rear wheel lock up on the vehicles with light rear wheel loads. The valve has a by-pass feature which assures full system pressure to the rear brakes in the event of front brake system malfunction. Also full front pressure is retained in the event of rear brake malfunction.

The P&B valve is not repairable and must be replaced as complete assembly.

Removal

1. The P&B valve is not repairable and must be replaced as a complete assembly. Care must be taken to prevent brake fluid from contacting any painted surface.
2. Remove hydraulic pipes (1) and plug the pipes (1) to prevent the loss of fluid or the entrance of dirt.
3. Remove bolt (3).
4. Remove P&B valve (2).



350R200003

Installation

1. Install P&B valve (2).
2. Install bolt (3) and tighten the bolt to the specified torque.

Torque: 22 N·m (16 lb ft)

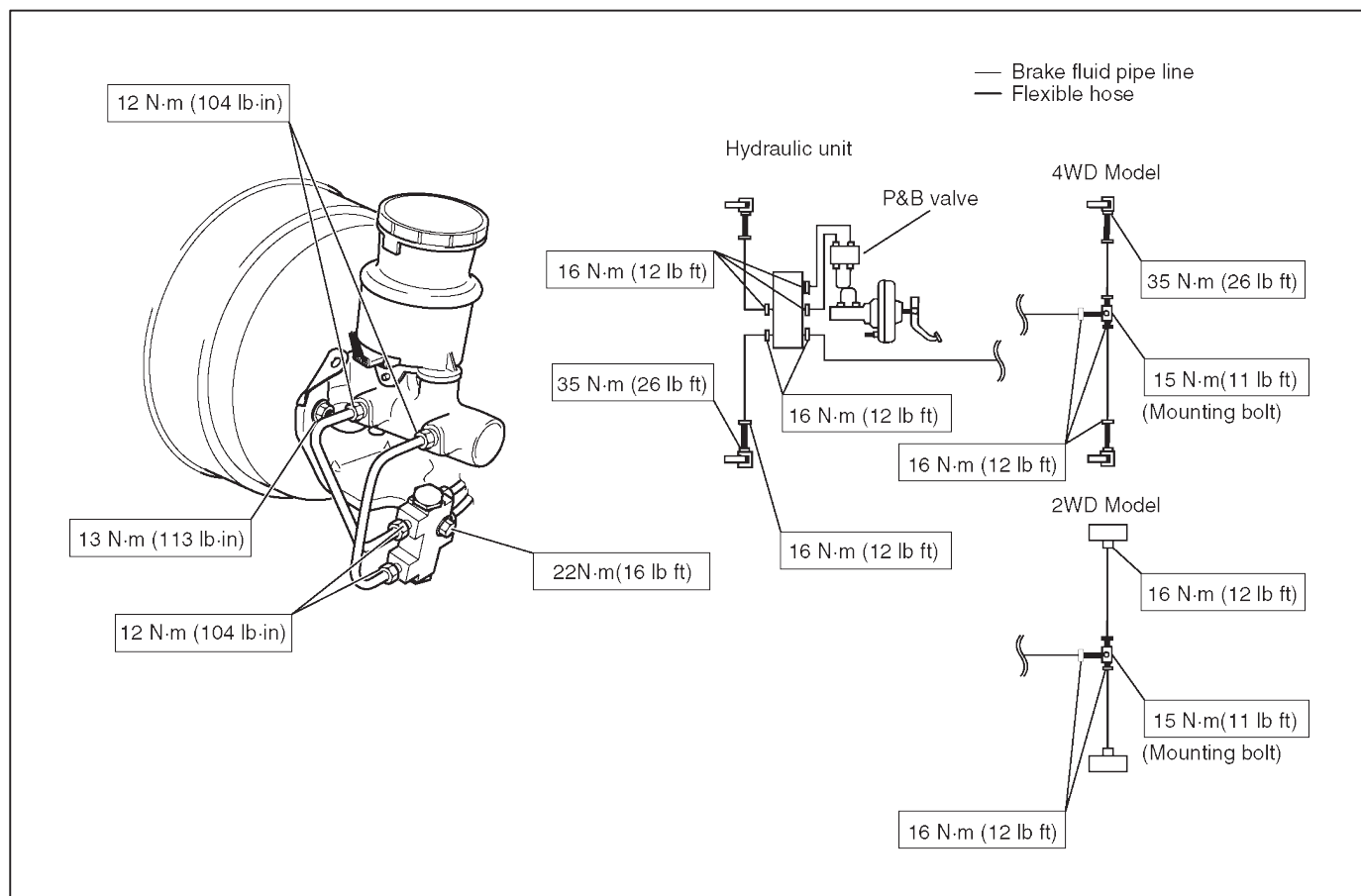
3. Install hydraulic pipes (1) and tighten the bolt to the specified torque.

Torque: 12 N·m (104 lb in)

4. After installing the brake pipes, bleed the brakes as described in *Bleeding Brake Hydraulic System* in this section.

Main Data and Specifications

Torque Specifications

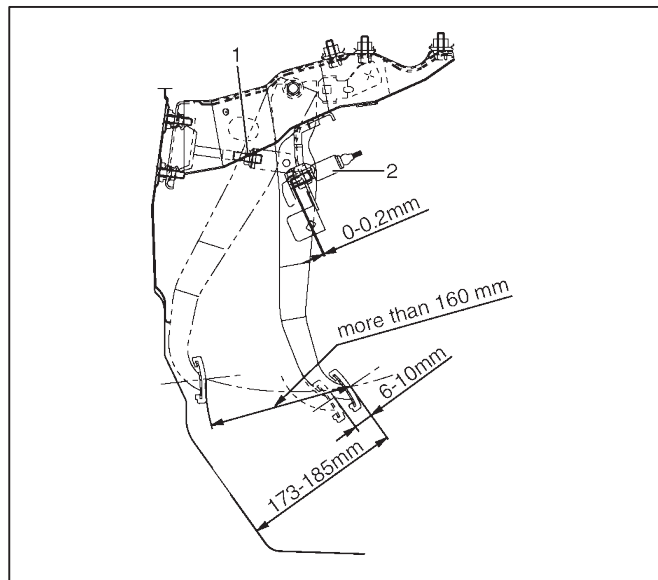


Brake Pedal

Checking Pedal Height

The push rod serves as the brake pedal stopper when the pedal is fully released. Brake pedal height adjustment should be performed as follows:

Adjust Brake Pedal



1. Measure the brake pedal height after making sure the pedal is fully returned by the pedal return spring. Pedal height must be measured after starting the engine and stepping on it several times.

Pedal Free Play: 6-10 mm (0.23-0.39 in)

Pedal Height: 173-185 mm (6.81-7.28 in)

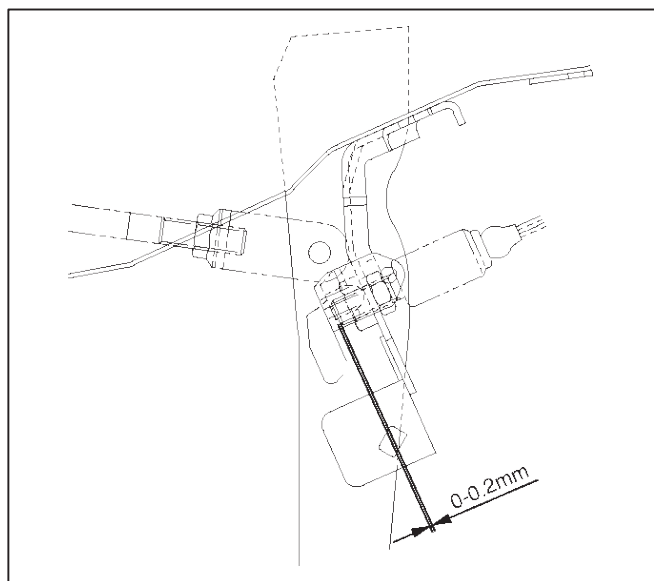
NOTE: Pedal free play must be measured after turning off the engine and stepping on the brake pedal firmly five times or more.

2. If the measured value is not within the above range, adjust the brake pedal as follows:
 - a. Disconnect the stoplight switch connector.
 - b. Loosen the stoplight switch lock nut.
 - c. Rotate the stoplight switch so that it moves away from the brake pedal.
 - d. Loosen the lock nut (1) on the push rod.
 - e. Adjust the brake pedal to the specified height by rotating the push rod in the appropriate direction.
 - f. Tighten the lock nut to the specified torque.

Torque: 20 N·m (15 lb ft)

- g. Adjust the stoplight switch (2) to the specified clearance (between the switch housing and the brake pedal) by rotating the switch housing.

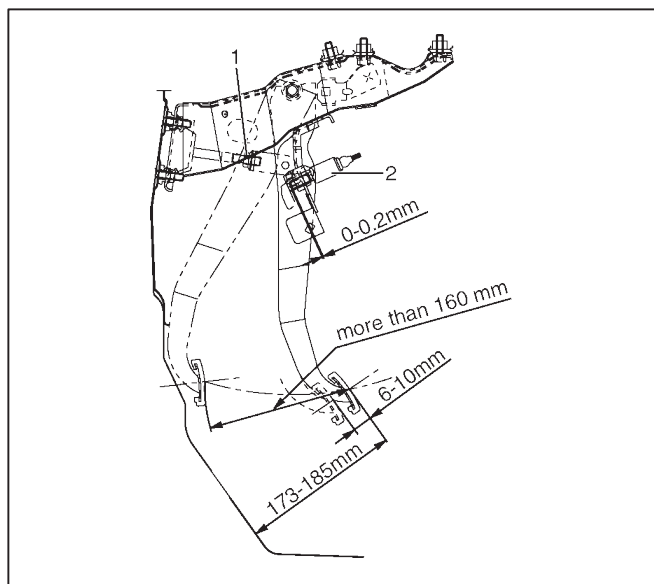
Clearance: 0.5–1.0 mm (0.02–0.04 in)



NOTE: While adjusting the stoplight switch, make sure that the threaded part of the stoplight switch does not push the brake pedal.

- h. Tighten the stoplight switch lock nut.
- i. Connect the stoplight switch connector.

Checking Pedal Travel

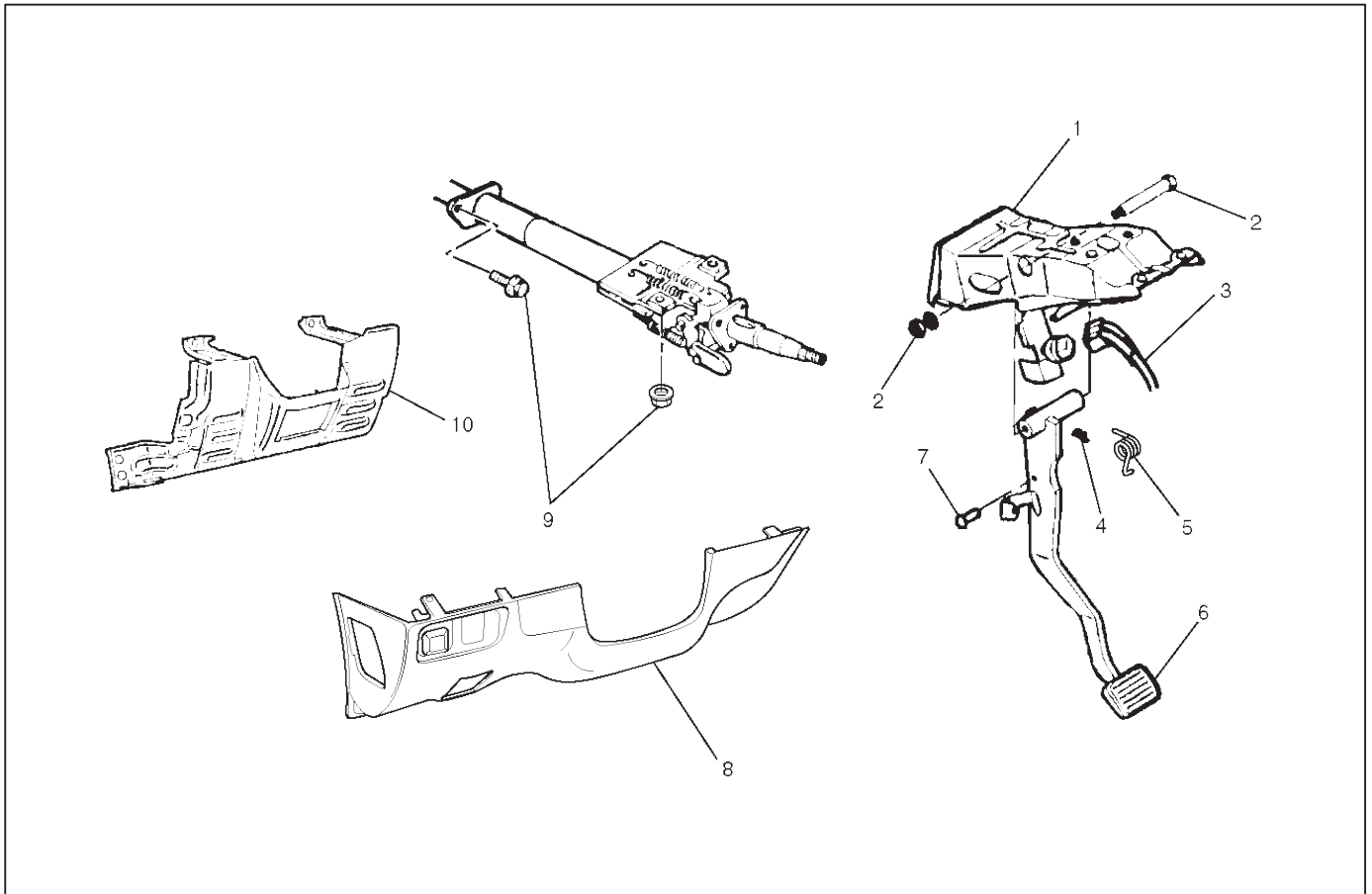


1. Pedal height must be measured after starting the engine and revving it several times to apply vacuum to the vacuum booster fully.

NOTE: Pedal height must be 95 mm (3.7 in) or more when about 50 kg (110.25 lb) of stepping force is applied.

2. If the measured value is lower than the above range, air may still be present in the hydraulic system. Perform the bleeding procedure.

Brake Pedal and Associated Parts



310RY00006

Legend

- | | |
|----------------------------------|--------------------------|
| (1) Brake Pedal Bracket Assembly | (6) Pedal Assembly |
| (2) Fulcrum Pin and Nut | (7) Push Rod Pin |
| (3) Connector | (8) Lower Cover |
| (4) Snap Pin | (9) Bolts and Nut |
| (5) Return Spring | (10) Driver Knee Bolster |

Removal

1. Disconnect the battery “-” terminal cable, and wait at least 5 minutes.
2. Disconnect the yellow 3 way SRS connector located under the steering column.
3. Remove the engine hood opening lever.
4. Remove lower cover (8).
5. Remove driver knee bolster (10).
6. Disconnect the stop light switch connector (3). Disconnect the anti-theft control module connector. Refer to *Body and Accessories* section.
7. Remove snap pin (4) and push rod pin (7).
8. Remove the steering column shaft fixing bolt and nut (9) on the steering wheel side, and lower the steering column shaft.
9. Remove the brake pedal bracket assembly (1).
10. Remove return spring (5).
11. Remove fulcrum pin and nut (2).

12. Remove pedal assembly (6).

Installation

1. Apply grease to the entire circumference of the fulcrum pin.
2. Install pedal assembly (6) and fulcrum pin and nut (2). Tighten the nut (2) to the specified torque.

Torque: 35 N·m (26 lb ft)

3. Install the brake pedal bracket assembly (1). Tighten the bolts and nuts soecified torque.

Torque: 15 N·m (11 lb ft)

4. Install return spring (5).
5. Adjust pedal free travel. Refer to *Brake Pedal Adjustment* in this section.

6. Tighten the steering column fixing bolt (9) (dash panel) to the specified torque.

Torque: 20 N·m (14 lb ft)

7. Tighten the steering column fixing nut (9) (Cross Beam) to the specified torque.

Torque: 17 N·m (12 lb ft)

8. Apply grease to the entire circumference of the Push rod pin (7).

9. Install push rod pin (7).

10. Install snap pin (4).

11. Connect the anti-theft control module connector.
Refer to *Body and Accessories* section.

12. Connect the stop light switch connector (3).

13. Install driver knee bolster (10) and lower cover (8).

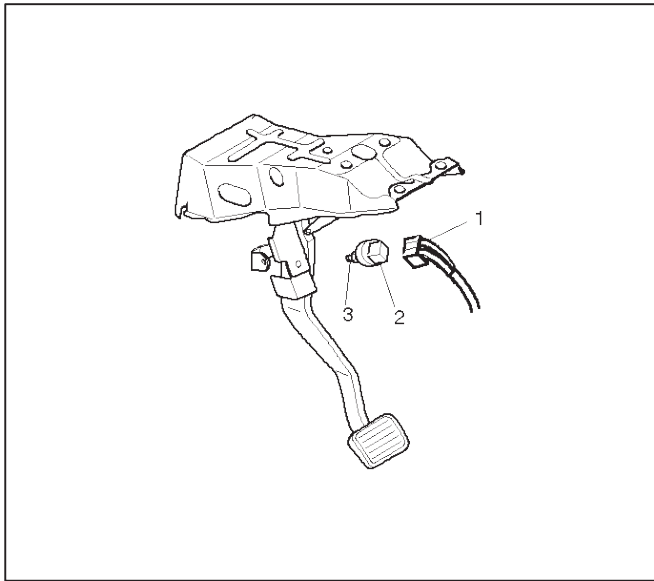
14. Install the engine hood opening lever.

15. Connect the yellow 3 way SRS connector located under the steering column.

16. Connect the battery “-” terminal cable.

Stoplight Switch

Parts Location



Legend

- (1) Connector
- (2) Switch
- (3) Lock Nut

Removal

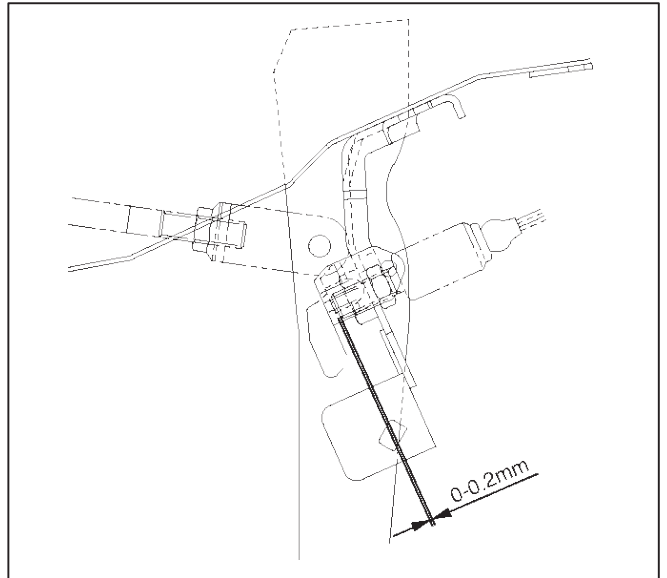
1. Disconnect connector (1)
2. Remove lock nut (3).
3. Remove switch (2).

Installation

1. Adjust the stop light switch to the specified clearance (between switch housing and brake pedal) by rotating the switch housing.

Clearance : 0-0.2 mm (0-0.08 in)

NOTE: Do not attempt to force the push rod into position during the stop light switch installation and adjustment procedure.



2. Connect connector (1).
3. Install lock nut (3).

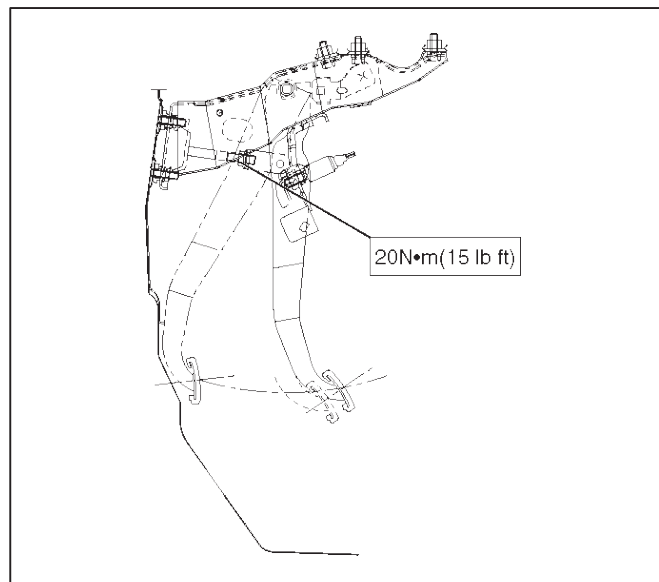
5C-80 POWER-ASSISTED BRAKE SYSTEM

Main Data and Specifications

General Specifications

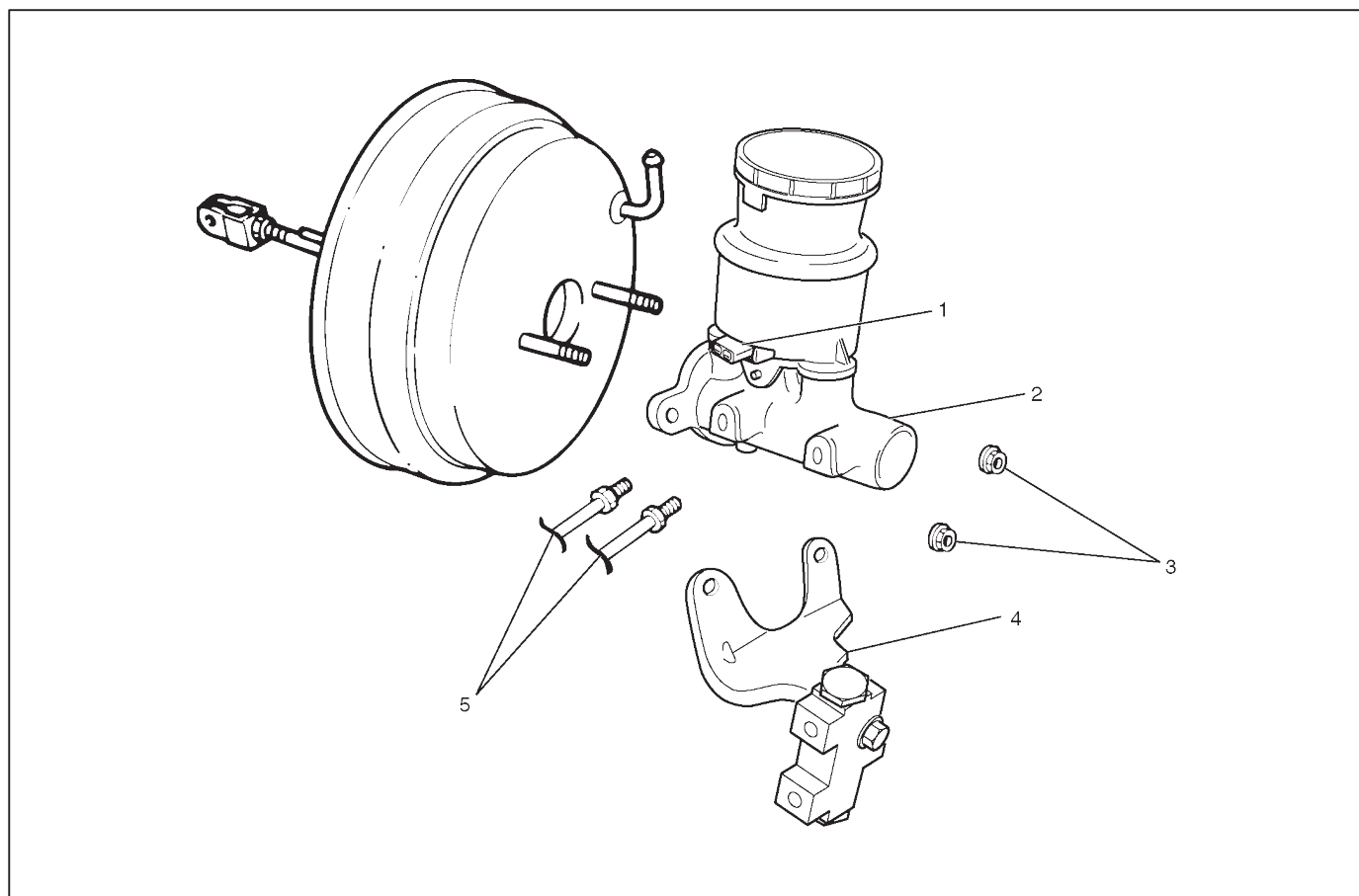
Pedal free play	6–10 mm (0.23 –0.39 in)
Pedal Height	173–185 mm (6.81–7.28 in)

Torque Specifications



Master Cylinder Assembly

Master Cylinder Assembly and Associated Parts



330R200006

Legend

- | | |
|--------------------------|---------------------------|
| (1) Electrical Connector | (3) 2 attaching Nuts |
| (2) Master Cylinder | (4) P&B Valve and Bracket |
| | (5) Brake Pipes |

Removal

CAUTION: When removing the master cylinder from the vacuum booster, be sure to get rid of the internal negative pressure of the vacuum booster (by disconnecting the vacuum hose) in advance.

If any negative pressure remains in the vacuum booster, the piston may possibly come out when the master cylinder is being removed, letting the brake fluid run out.

While removing the master cylinder, do not hold the piston as it can be easily pulled out.

Outside surface of the piston is the surface on which seals are to slide. Care should be taken to keep the surface free of cuts and dents.

1. Disconnect electrical connector.
2. Remove brake pipes and after disconnecting the brake pipe, cap or tape the openings of the brake pipe to prevent the entry of foreign matter.
3. Remove 2 attaching nuts.
4. Remove P&B valve and bracket.
5. Remove master cylinder.

Inspection

Excessive brake pedal travel, malfunction or dragging brake suggests that the master cylinder is defective. In such cases perform the following visual check:

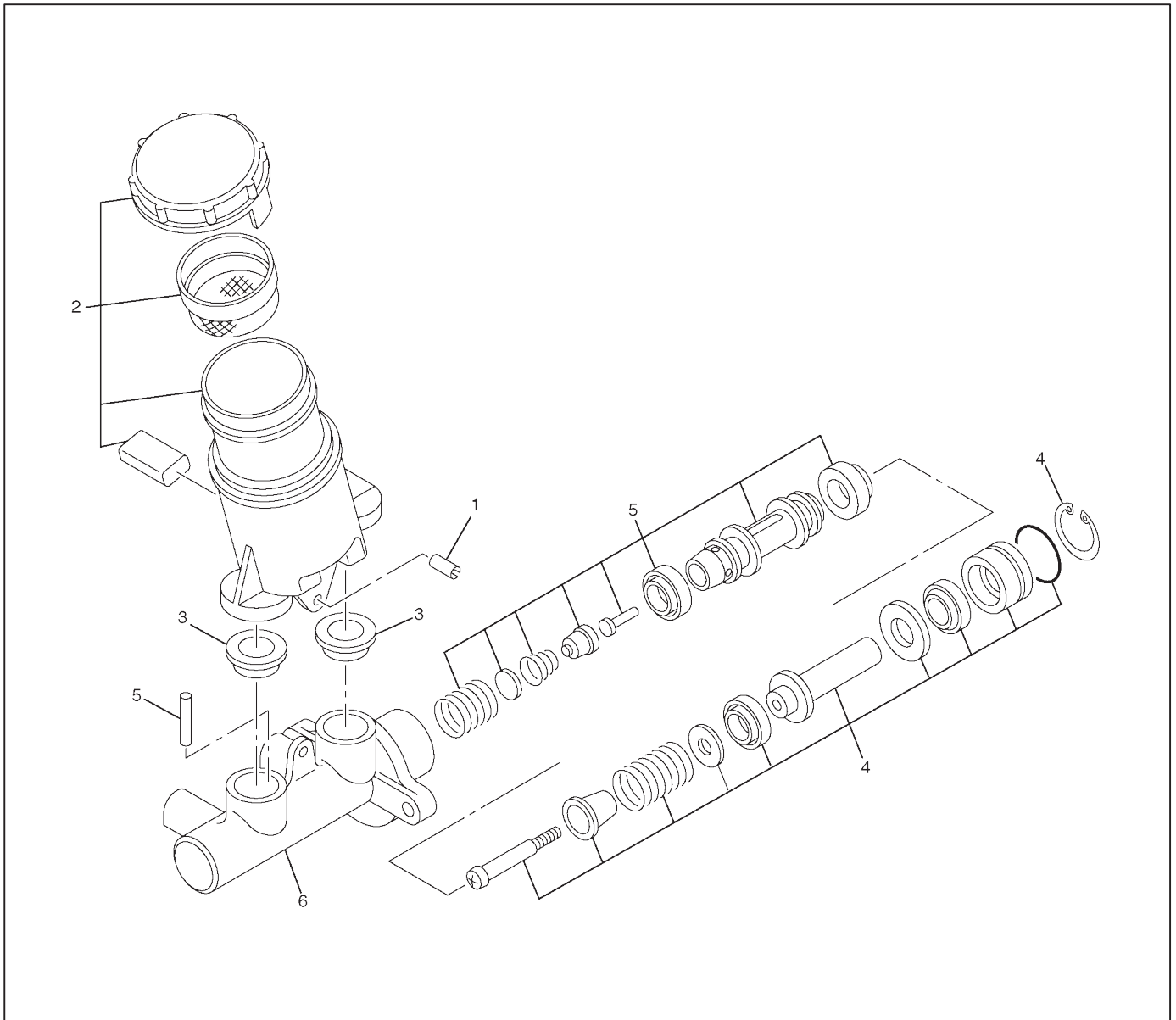
Visual Check

Make parts replacement as required if wear, distortion, nicks, cuts, corrosion, or other abnormal conditions are found through the following parts inspection:

- Master cylinder body
- Fluid reservoir
- O-ring

Master Cylinder Assembly

Master Cylinder Assembly Desassembled View



330R200005

Legend

- | | |
|---------------------------------------|-------------------------------|
| (1) Spring Pin | (4) Primary Piston Assembly |
| (2) Reserve Tank and Reserve Tank Cap | (5) Secondary Piston Assembly |
| (3) O-ring | (6) Cylinder Body |

Desassembly

1. Remove the spring pin.
2. Remove the reserve tank and the reserve tank cap. The brake fluid level switch is built-in to the reserve tank and cannot be removed.
3. Remove the O-ring.
4. Remove the snap ring.
5. Remove the primary piston assembly.
6. Invert the cylinder body and push on the secondary piston until the pin falls free.

7. Remove the secondary piston assembly.
8. Remove the cylinder body.

Inspection

Excessive brake pedal travel, malfunction or dragging brake suggests that the master cylinder is defective. In such cases perform the following visual check:

Visual Check

Make parts replacement as required if wear, distortion, nicks, cuts, corrosion, or other abnormal conditions are found through the following parts inspection:

- Master cylinder body
- Fluid reservoir
- O-ring
- Wash each part in brake fluid before beginning the inspection procedure.
- Check the inside surfaces of the master cylinder for abrasion, corrosion, and other damage. Replace the cylinder if necessary.
- Check the return port for clogging. Clean the port with a wire and compressed air if necessary.
- Check the piston and piston cup for abrasion, damage, and wear. Replace the piston assembly if any of these conditions exist.
- Check the return spring. Replace the spring if it is weak.
- Check the snap ring. Replace the snap ring if it is stretched or weak.

Reassembly

1. Wash each master cylinder internal part in brake fluid before beginning installation.
2. Install the cylinder body.
3. Press the secondary piston assembly into the cylinder body and hold it. Thread the pin through the long hole of the piston to secure the piston assembly.
4. Install the primary piston assembly.
5. Install the snap ring.
6. Install the O-ring
7. Install the reserve tank and the reserve tank cap.
8. Install the spring pin.

Installation

1. Install master cylinder.

When replacing the master cylinder or vacuum booster or both, always measure the vacuum booster push rod protrusion and adjust it as necessary (Refer to *Vacuum Booster* in section).

2. Install P&B valve and bracket.
3. Install 2 attaching nuts and tighten the attaching nuts to the specified torque.

Torque: 13 N·m (113 lb in)

4. Install brake pipes and tighten the brake pipe to the specified torque.

Master cylinder and P&B valve sides

Torque: 12 N·m (104 lb in)

Others

Torque: 16 N·m (12 lb in)

5. Connect electrical connector.

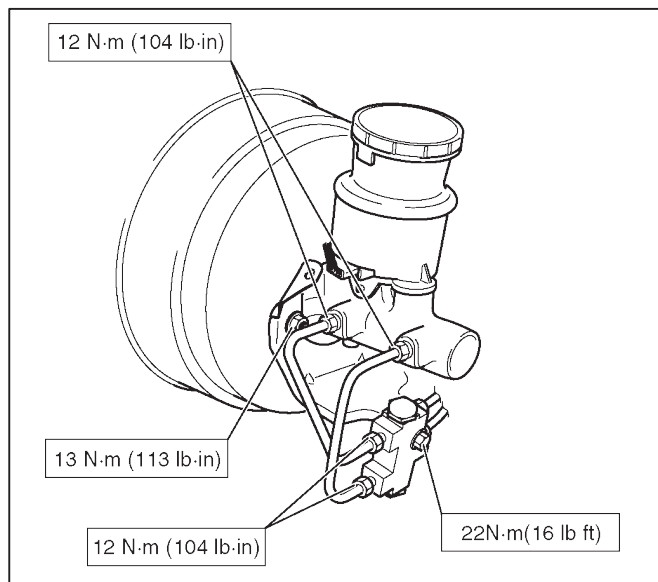
5C-84 POWER-ASSISTED BRAKE SYSTEM

Main Data and Specifications

General Specifications

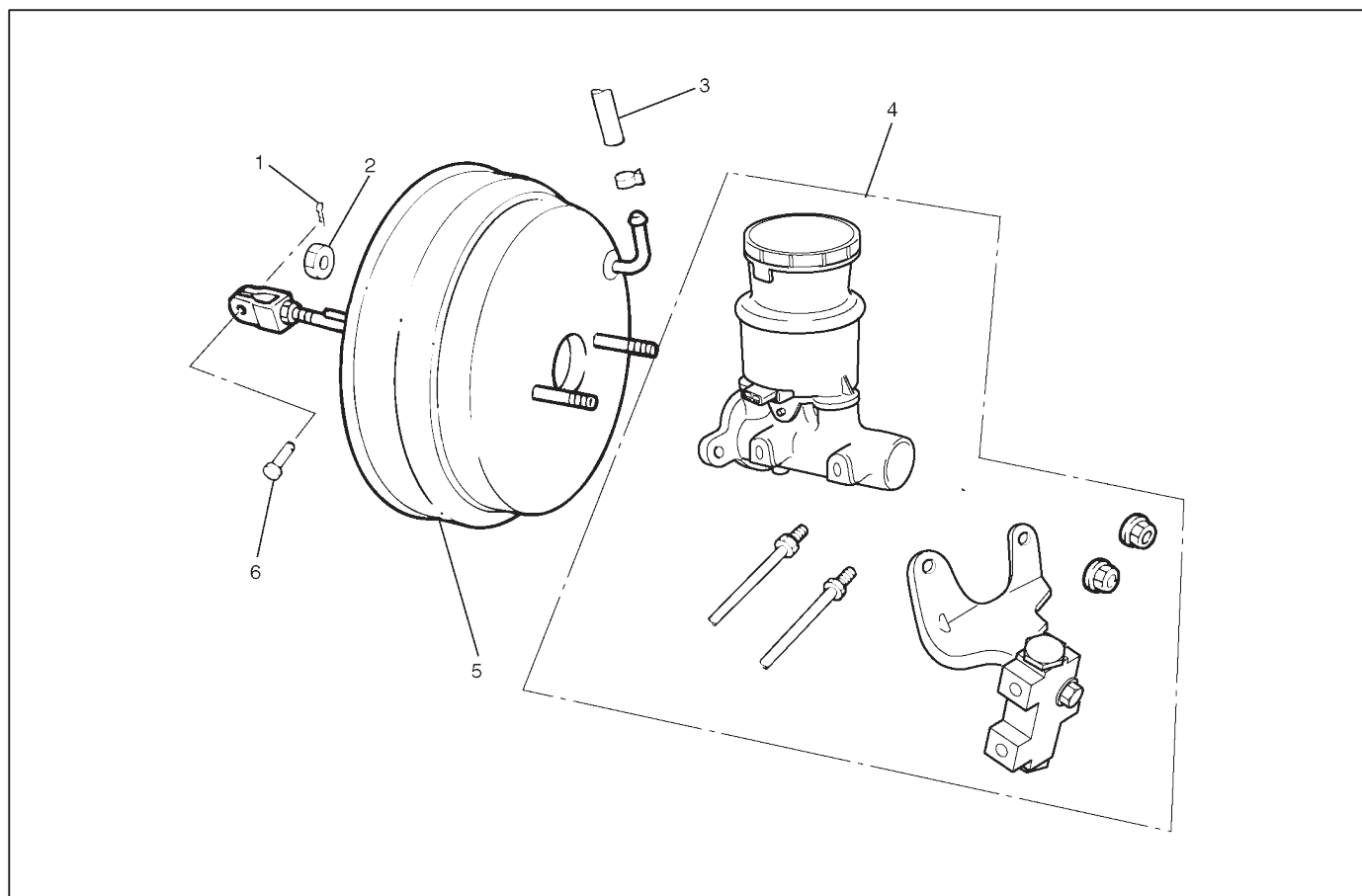
Type	Dual-circuit
Piston bore diameter	25.4 mm (1.000 in)

Torque Specifications



Vacuum Booster Assembly

Vacuum Booster Assembly and Associated Parts



331R200004

Legend

- | | |
|-------------------------------|---------------------|
| (1) Snap Pin | (4) Master Cylinder |
| (2) Vacuum Booster Fixing Nut | (5) Vacuum Booster |
| (3) Vacuum Hose | (6) Pin |

Removal

1. Before removing the vacuum booster assembly, disconnect and remove the brake pipes.
2. Remove master cylinder, refer to *Master Cylinder Removal* in this section.

CAUTION: When removing the master cylinder from the vacuum booster, be sure to get rid of the internal negative pressure of the vacuum booster (by, disconnecting the vacuum hose) in advance.

If any negative pressure remains in the vacuum booster, the piston may possibly come out when the master cylinder is being removed, letting the brake fluid run out.

Do not hold the piston while removing the master cylinder, the piston can be easily pulled out.

Outside surface of the piston is the surface on which seals are to slide. Care should be taken to keep the surface free of cuts and dents.

3. Remove vacuum hose.
4. Disconnect the yoke clevis from the brake pedal.

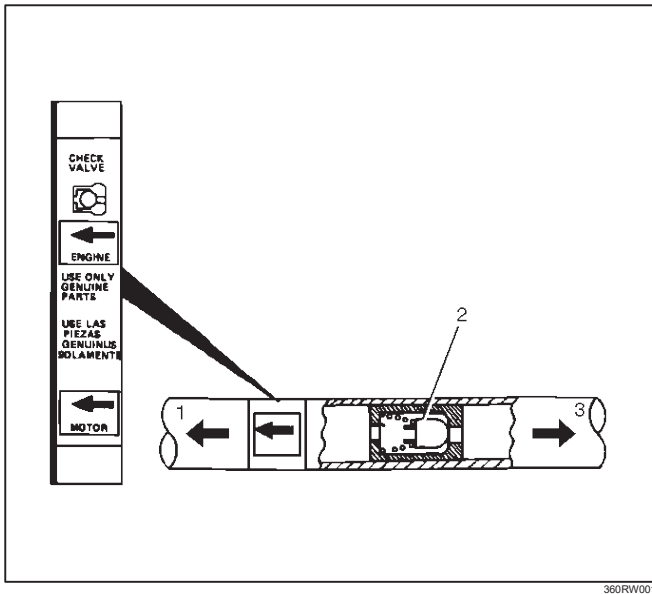
5. Remove vacuum booster fixing nut.
6. Remove vacuum booster.

Inspection and Repair

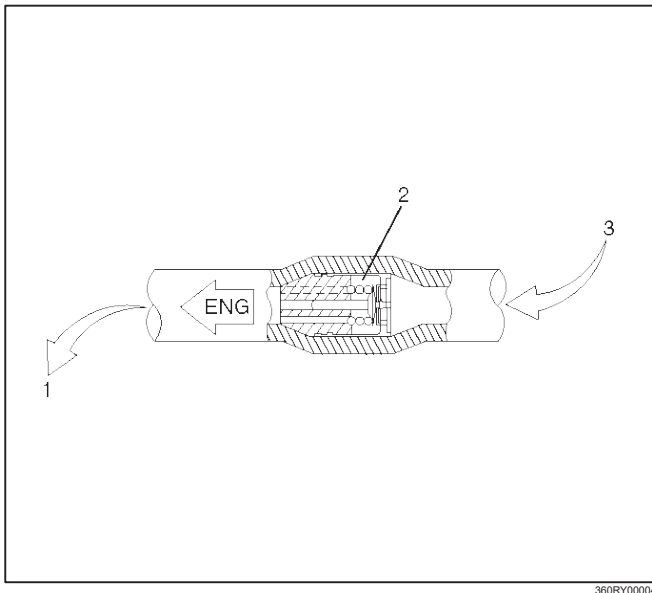
Vacuum Hose (The built in check valve)

1. Inspect the check valve (2), which is installed inside the vacuum hose.
2. Air should pass freely from the vacuum booster (3) to the engine (1).
3. Air should not pass from the engine (1) to the vacuum booster (3). If it does, the check valve is inoperative and the vacuum hose built in the check valve must be replaced.

HEC ENGINE

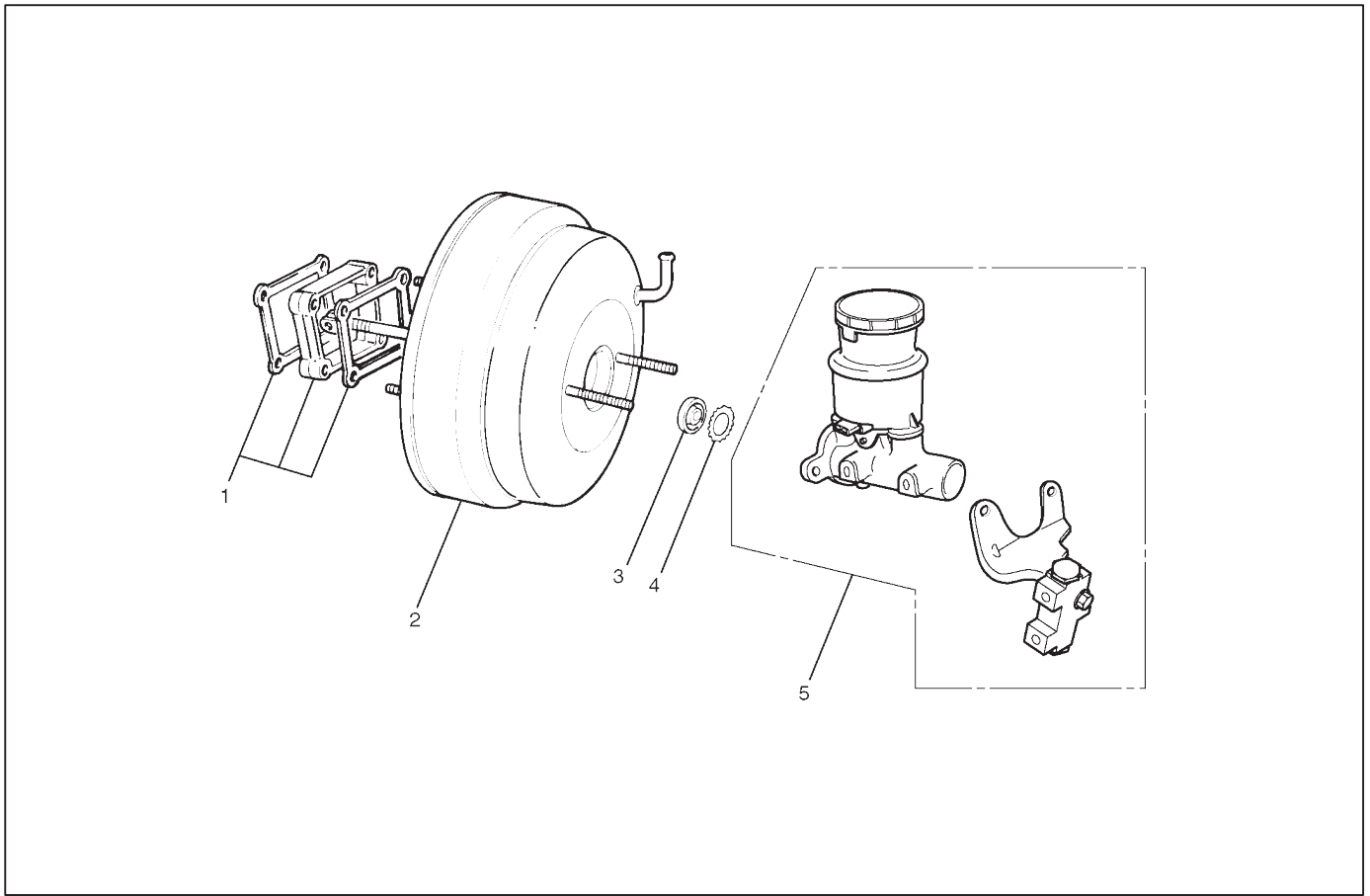


6VD1 ENGINE



Exterior Components

Exterior Components and Associated Parts



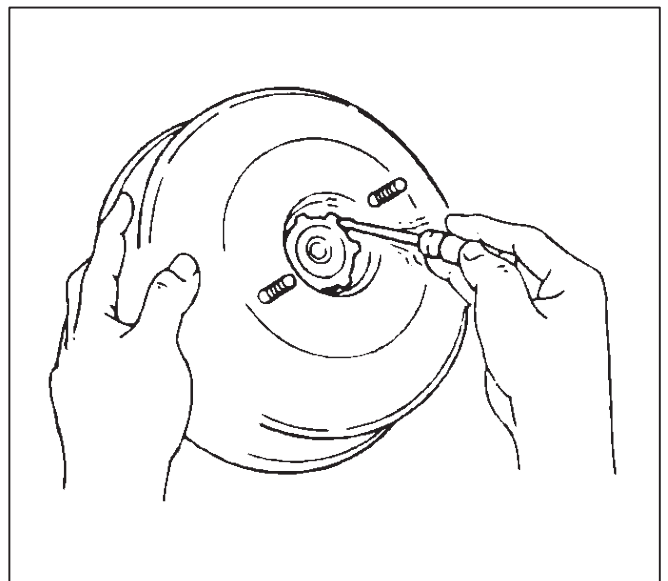
331R200006

Legend

- | | |
|--------------------------|-----------------------------|
| (1) 2 Gaskets and Spacer | (3) Plate and Seal Assembly |
| (2) Vacuum Booster | (4) Retainer |
| | (5) Master Cylinder |

Removal

1. Remove master cylinder. Refer to *Master Cylinder* in this section.
2. Remove vacuum booster. Refer to *Vacuum Booster* in this section.
3. Remove 2 gaskets and spacer.
4. Remove retainer, plate and seal assembly.



331RS003

Inspection and Repair

Visual Check

Make necessary parts replacement if cuts, nicks, excessive wear, or other abnormal conditions are found through inspection.

NOTE: The parts listed below must be replaced with new ones whenever the master cylinder is removed.

1. Plate and seal assembly
2. Retainer

Installation

1. Install plate and seal assembly.
2. Install retainer.
3. Install vacuum booster, refer to *Vacuum Booster* in this section.
4. Install master cylinder, refer to *Master Cylinder* in this section and after installation, perform brake pedal check and adjustment. Refer to *Brake Pedal* in this section.

Vacuum Booster Overhaul

Vacuum Booster

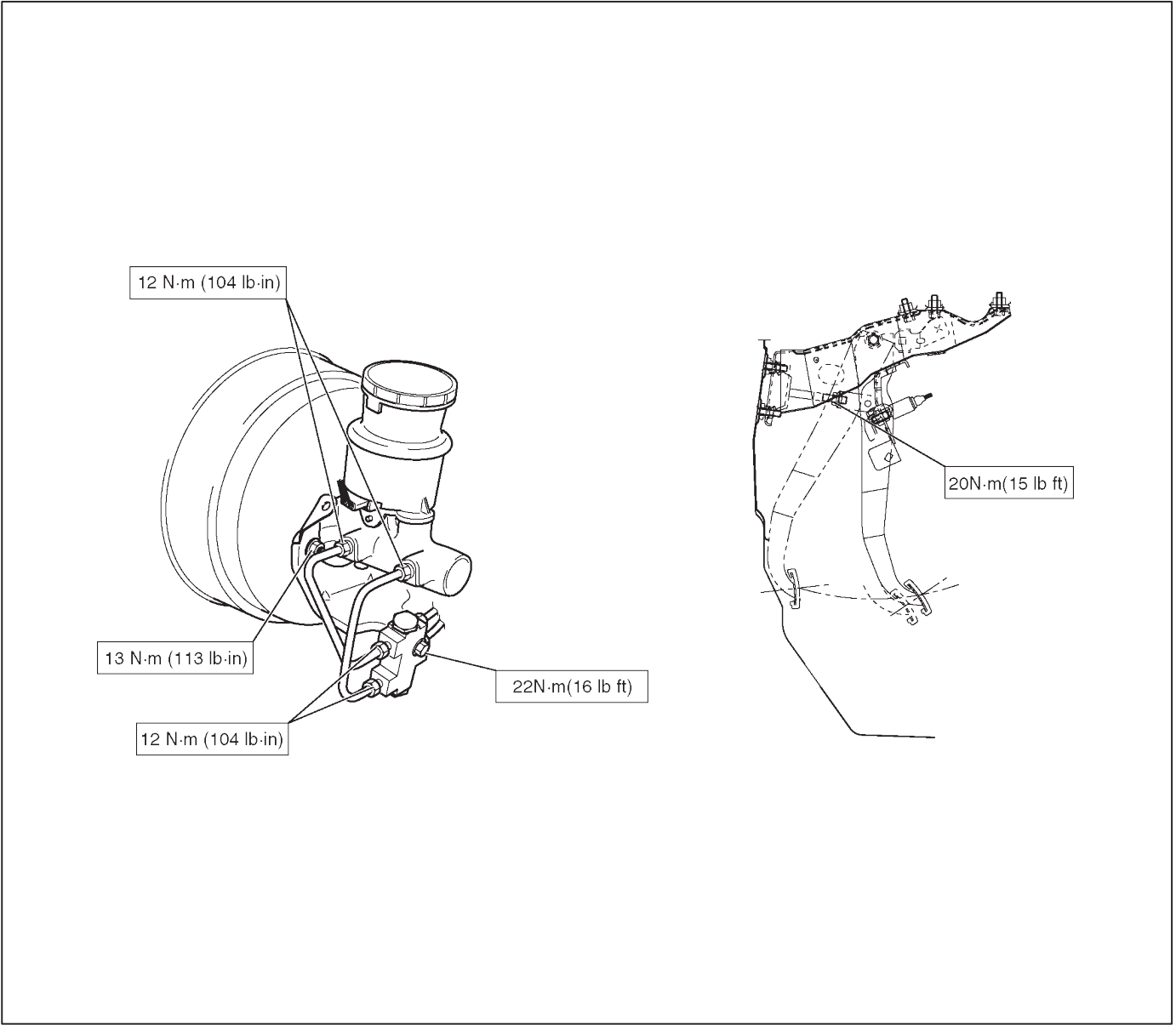
The vacuum booster cannot be disassembled for repair. Replace a defective vacuum booster with a new one.

Main Data and Specifications

General Specifications

Vacuum booster diaphragm diameter (Front)	205 mm (8.07 in)
Vacuum booster diaphragm diameter (Rear)	230 mm (9.06 in)
Push rod stroke	More than 32.0 mm (1.26 in)
Plunger diameter	10.25 mm (0.40 in)
Push rod diameter	27.4 mm (1.08 in)

Torque Specifications



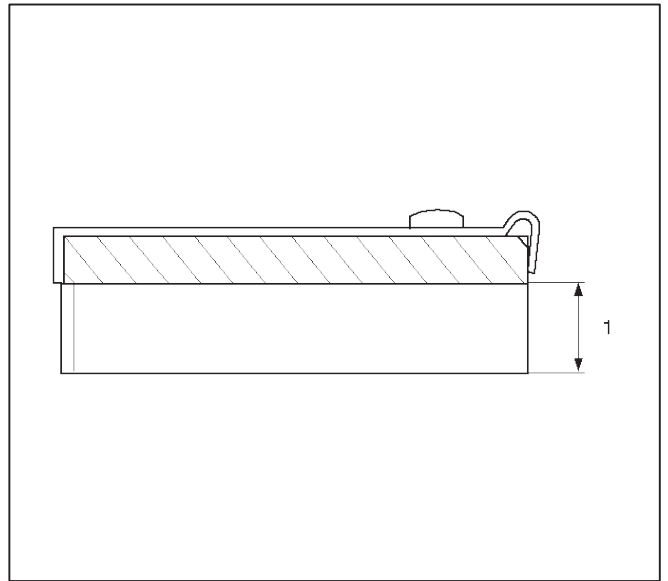
Front Disc Brake Pads

Front Disc Brake Pads Inspection

Check the outer pad by looking at each caliper from above. Check the thickness on the inner pad by looking down through the inspection hole in the top of the caliper. Whenever the pad is worn to about the thickness of the pad base, the pad should be removed for further measurements. The pad should be replaced anytime the pad thickness (1) is worn to within 1.00 mm (0.039 in) of the pad itself.

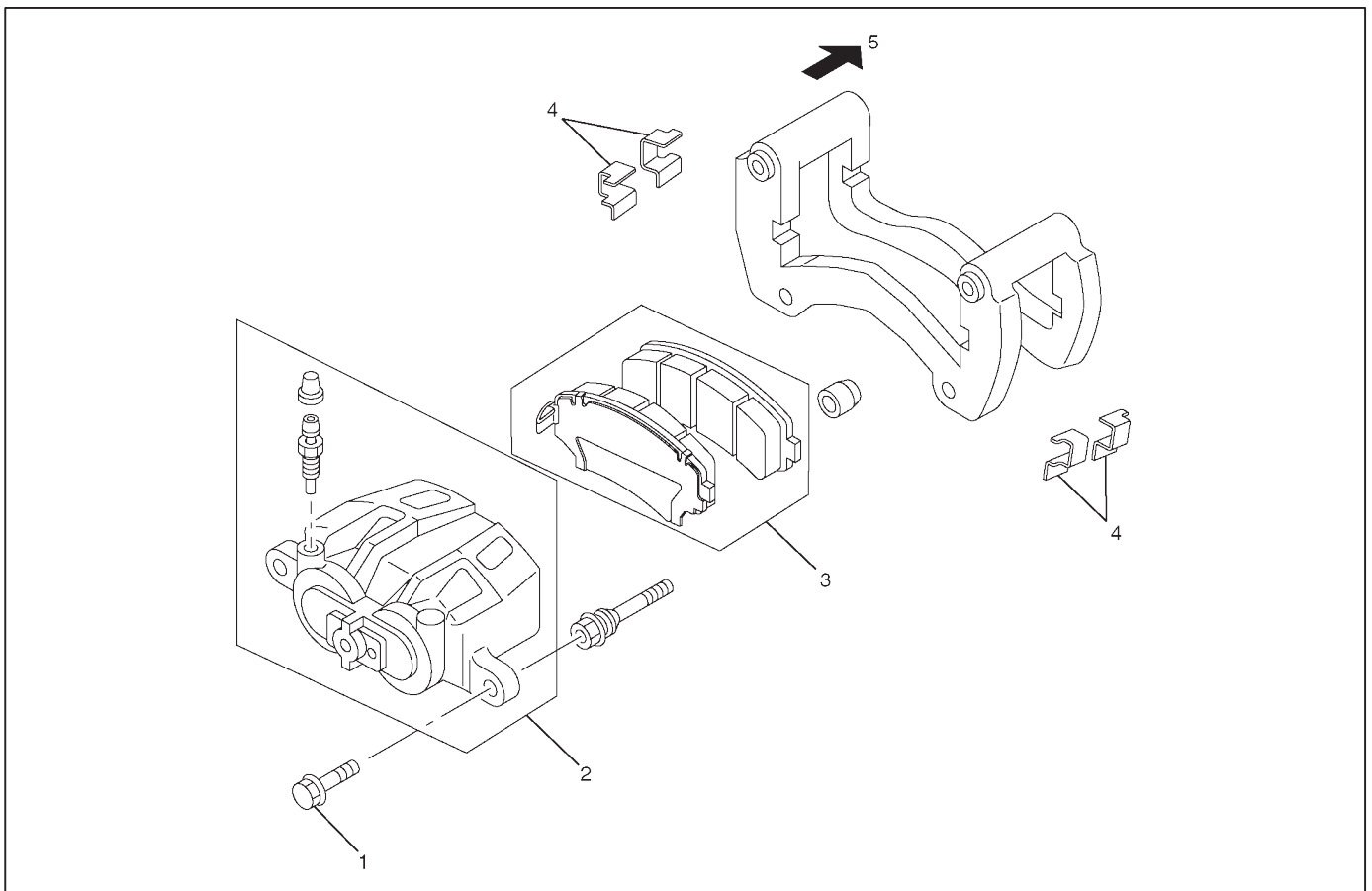
Wear indicators are installed on disc brake pads, disc brake pads need replacement when the wear indicator is heard.

Minimum limit (1): 1.0 mm (0.039 in)



302RS002

Front Disc Brake Pads and Associated Parts



302R200026

Legend

- (1) Pin Bolt
- (2) Caliper Assembly

- (3) Pad Assembly
- (4) Clip
- (5) Outer Side

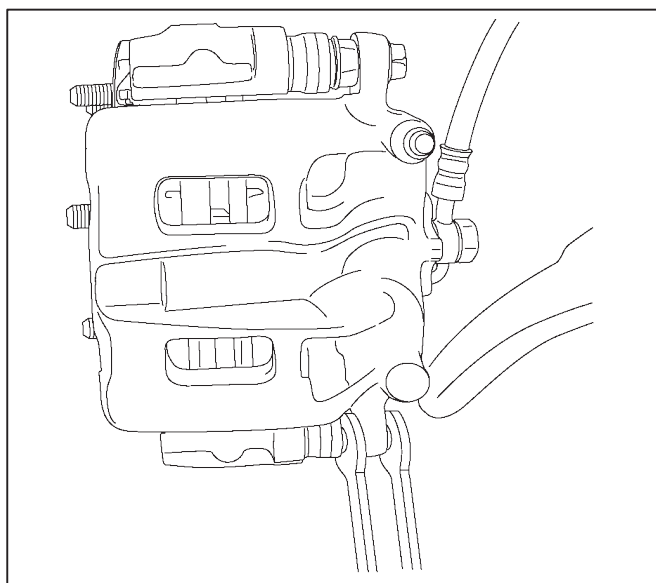
Removal

NOTE: If a squealing noise occurs from the front brake while driving, check the pad wear indicator plate. If the indicator plate contacts the rotor, the disc pad assembly should be replaced.

- Draw out two-thirds of the brake fluid from the reservoir.
- Raise the vehicle and support it with suitable safety stands.

1. Remove wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.

2. Remove pin bolt (1).



302R200028

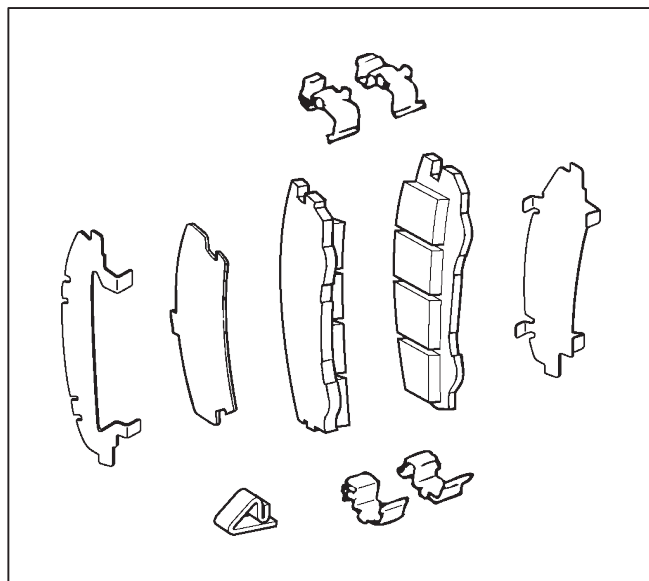
3. Rotate caliper assembly and support the caliper assembly so that the brake hose is not stretched or damaged.

4. Remove pad assembly with shim.

5. Remove Clip.

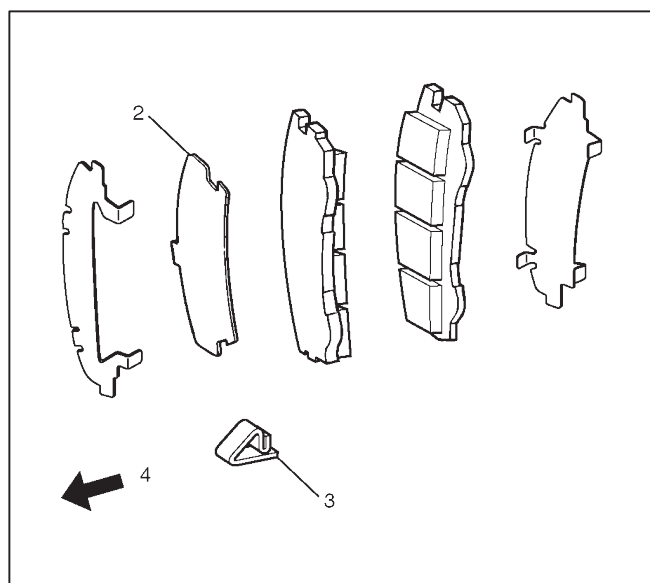
Installation

1. Install clip.



302R200023

2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims (2). Wipe off extruded grease after installing. Install pad assembly with shim.



302R200024

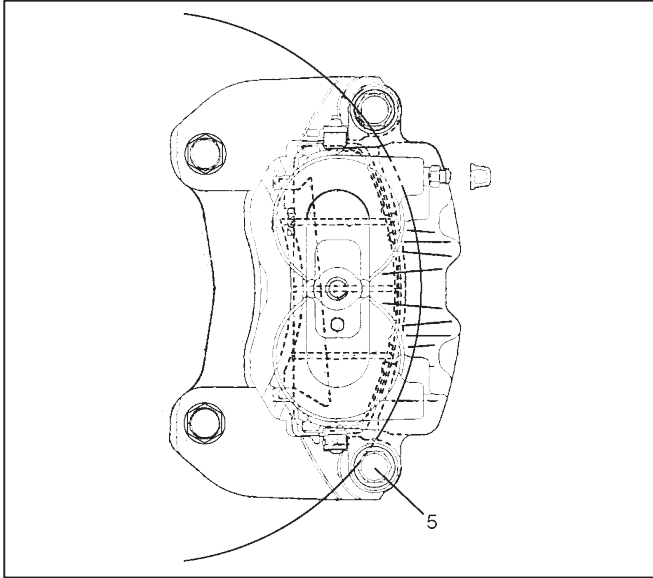
Legend

- (2) Inner Shim
- (3) Wear Indicator
- (4) Inner Side

5C-92 POWER-ASSISTED BRAKE SYSTEM

3. Carefully use adjustable pliers to bottom the piston into the caliper bore. Do not pull or twist the flexible hose or damage will occur.
Install caliper assembly.
Set caliper assembly in place.
4. Install lock bolt (5) and tighten the bolt to the specified torque.

Torque: 45 N·m (33 lb ft)



302R200008

5. Install wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
6. Pump the brake pedal several times to make sure that the pedal is firm. Check the brake fluid level in the reservoir after pumping the brakes.

Front Disc Brake Rotor

Inspection

In the manufacturing of the brake rotor, all the tolerances regarding surface finish, parallelism and lateral runout are held very closely. Maintaining these tolerances provides the surface necessary to assure smooth brake operation.

Lateral Runout

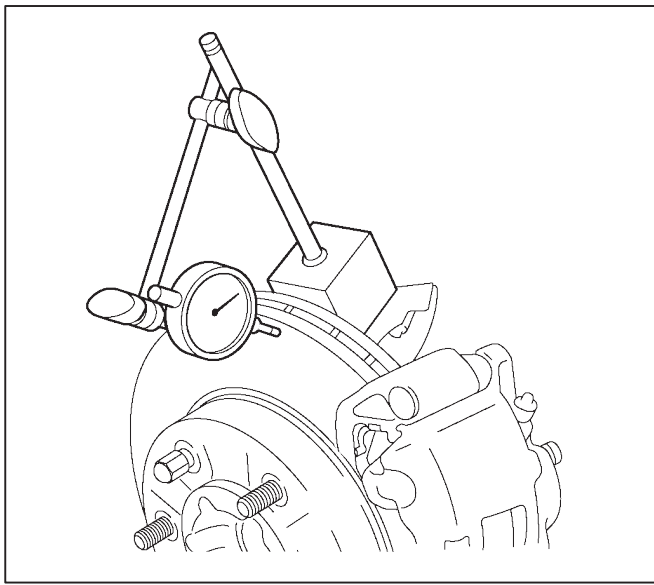
Lateral runout is the movement of the rotor from side to side as it rotates on the spindle. This could also be referred to as "rotor wobble".

This movement causes the piston to be knocked back into its bore. This results in additional pedal travel and a vibration during braking.

Checking Lateral Runout

1. Adjust the wheel bearing correctly, refer to *Differential* in Section 4A.
2. Attach the dial indicator accordingly so that the stem contacts the rotor surface to approximately 29mm (1.14 in) from the rotor edge.
3. Rotate the rotor one complete turn and inspect for signs of lateral runout. Lateral runout should not exceed 0.13 mm (0.005 in).

Maximum runout: 0.13 mm (0.005 in)



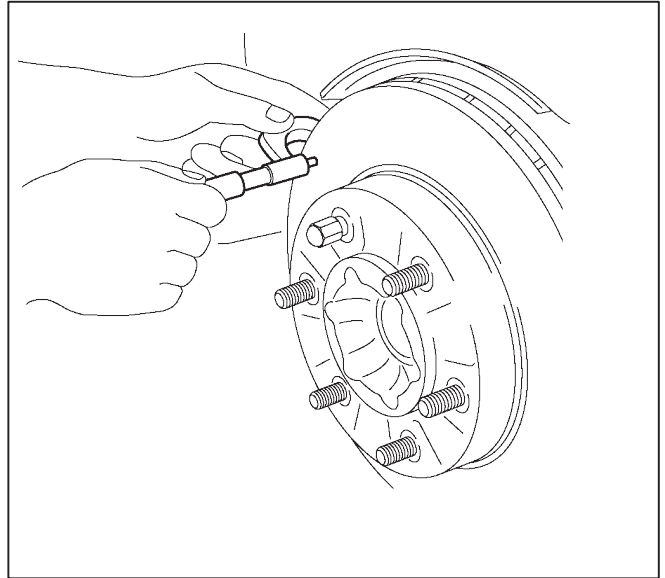
411R200008

Parallelism

Parallelism is the measurement of thickness of the rotor at four or more points around the circumference of the rotor. All measurement must be made at 29 mm (1.14 in) from the edge of the rotor.

The rotor thickness must not vary more than 0.010 mm (0.0004 in) from point to point.

Maximum runout: 0.010 mm (0.0004 in)



411R200007

Replacing Brake Rotors

When installing new brake rotors, do not refinish the surfaces. These parts are at the correct level of surface finish.

Refinishing Brake Rotors

Accurate control of the rotor tolerances is necessary for proper performance of the disc brakes. Machining of the rotor should be done only with precision equipment. All brake rotors have a minimum thickness dimension cast into them. This dimension is the minimum wear dimension and not a refinish dimension. The minimum wear dimension is 24.60 mm (0.969 in). The minimum refinish dimension is 26.00 mm (1.024 in).

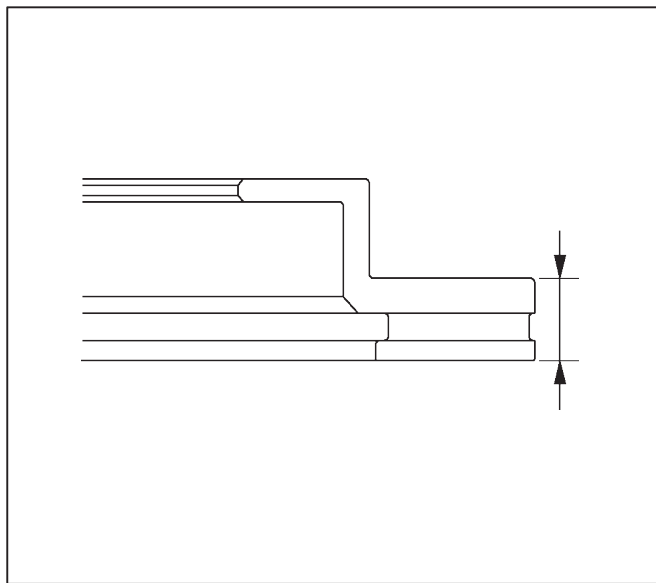
When refinishing rotors, always use sharp cutting tools or bits. Dull or worn tools leave a poor surface finish which will affect initial braking performance. Vibration dampening attachments should always be used when refinishing braking surfaces. These attachments eliminate tool chatter and will result in better surface finish.

After refinishing, replace any rotor that does not meet the minimum thickness of 26.00 mm (1.024 in). Do not use a brake rotor that exceeds the manufacturers specifications.

5C-94 POWER-ASSISTED BRAKE SYSTEM

Minimum wear dimension: 24.60 mm (1.024 in)

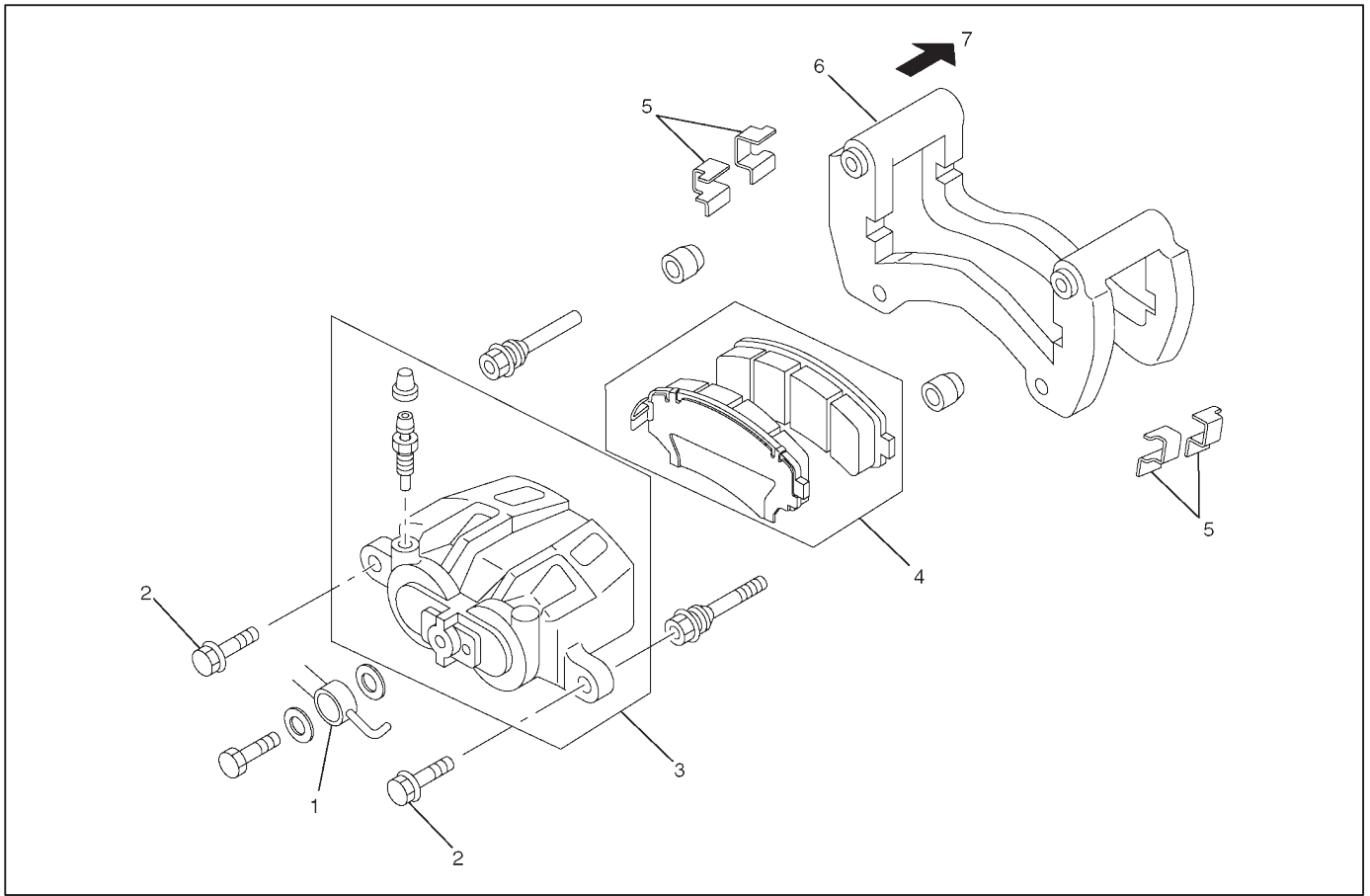
Refinish dimension: 26.00 mm (1.024 in)



411R20009

Front Disc Brake Caliper Assembly

Front Disc Brake Caliper Assembly and Associated Parts



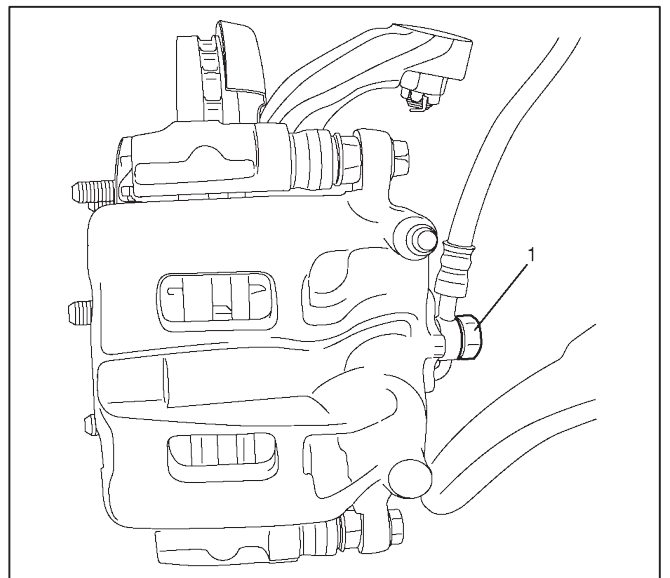
302R200027

Legend

- | | |
|-------------------------|---------------------------------------|
| (1) Brake Flexible Hose | (4) Pad Assembly |
| (2) Pin Bolt | (5) Clip |
| (3) Caliper Assembly | (6) Support Bracket with Pad Assembly |
| | (7) Outer Side |

Removal

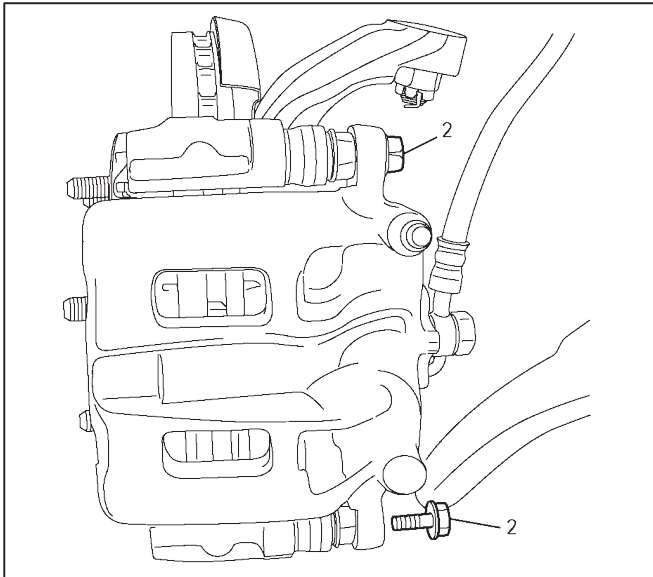
1. Raise the vehicle and support with suitable safety stands.
2. Remove wheel and tire assembly, refer to *Wheels and Tires System* in Section 3E.
3. Remove the bolt and gaskets, then disconnect the flexible hose from the caliper and after disconnecting the flexible hose (1), cap or tape the openings to prevent entry of foreign material.



302R200007

5C-96 POWER-ASSISTED BRAKE SYSTEM

4. Since the brake fluid flows out from the connecting coupler, place a drain pan under the vehicle.
5. Remove pin bolt (2).

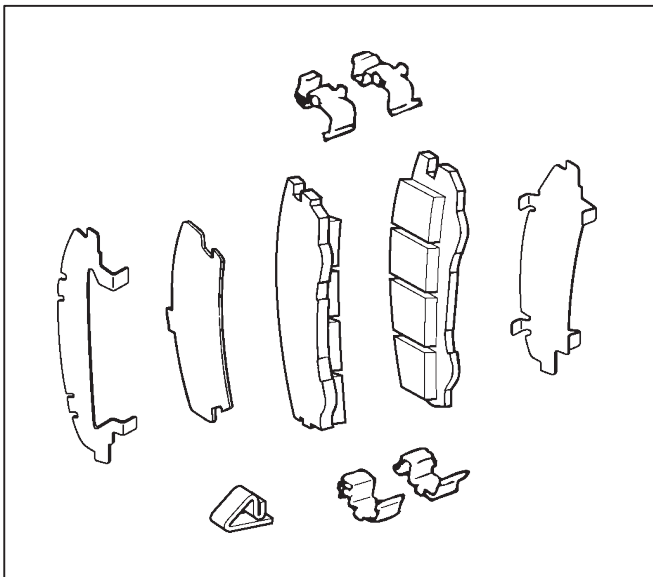


302R200020

6. Remove caliper assembly.
7. Remove support bracket with pad assembly and take care not to damage the flexible brake hose when removing the support bracket.
8. Remove pad assembly with shim and mark the lining locations if they are to be reinstalled.
9. Remove clip.

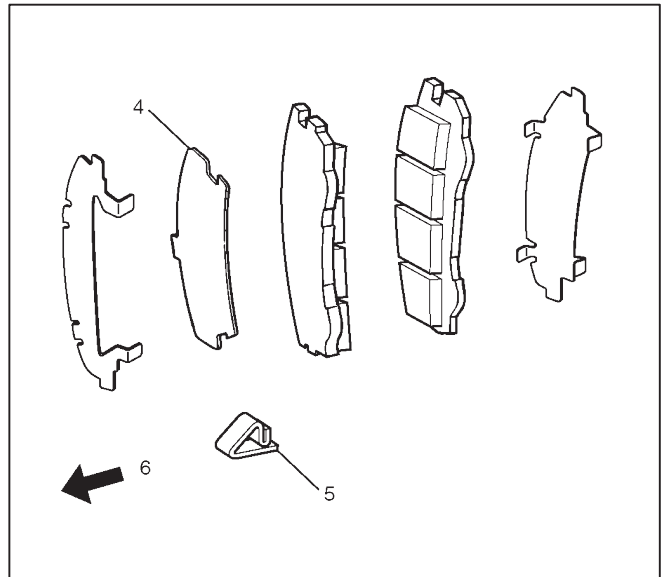
Installation

1. Install clip.



302R200023

2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims (4). Wipe off extruded grease after installing. Install pad assembly with shim.



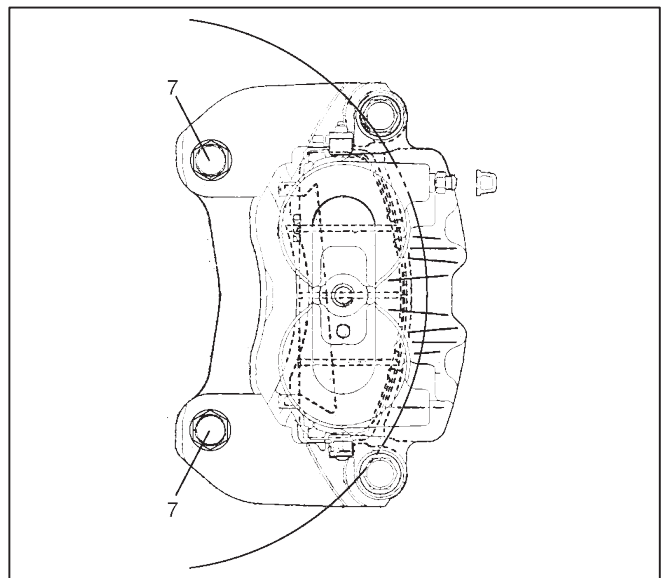
302R200025

Legend

- (4) Inner Shim
- (5) Wear Indicator
- (6) Inner Side

3. Install support bracket and tighten the bolt (7) to the specified torque.

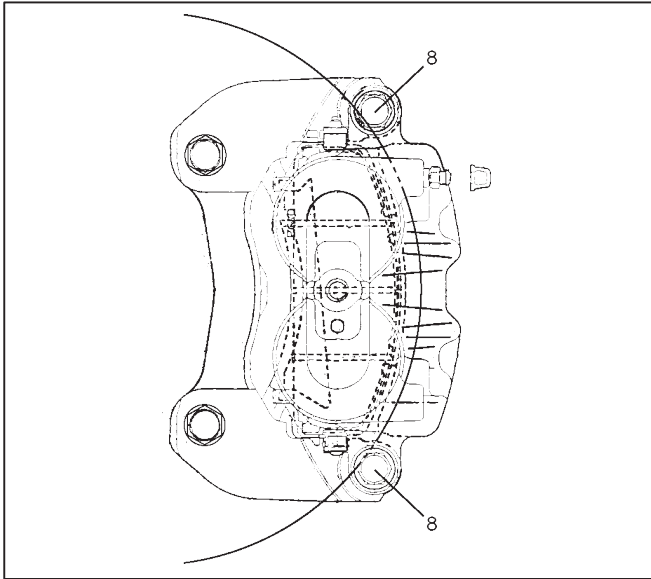
Torque: 155 N·m (115 lb ft)



302R200009

4. Install caliper assembly.
5. Install pin bolt (8) and tighten the bolt to the specified torque.

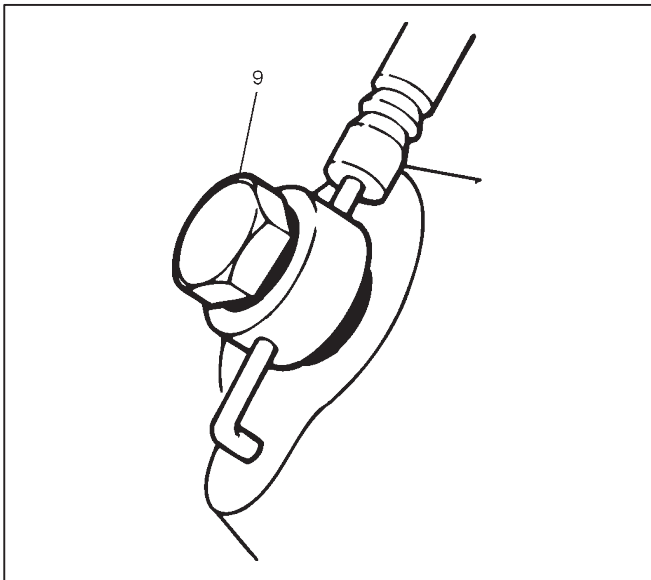
Torque: 45 N·m (33 lb ft)



302R200010

6. Install brake flexible hose, always use new gaskets and be sure to put the hooked edge of the flexible hose end into the anti-rotation cavity then tighten the I-bolt (9) to the specified torque.

Torque: 35 N·m (26 lb ft)

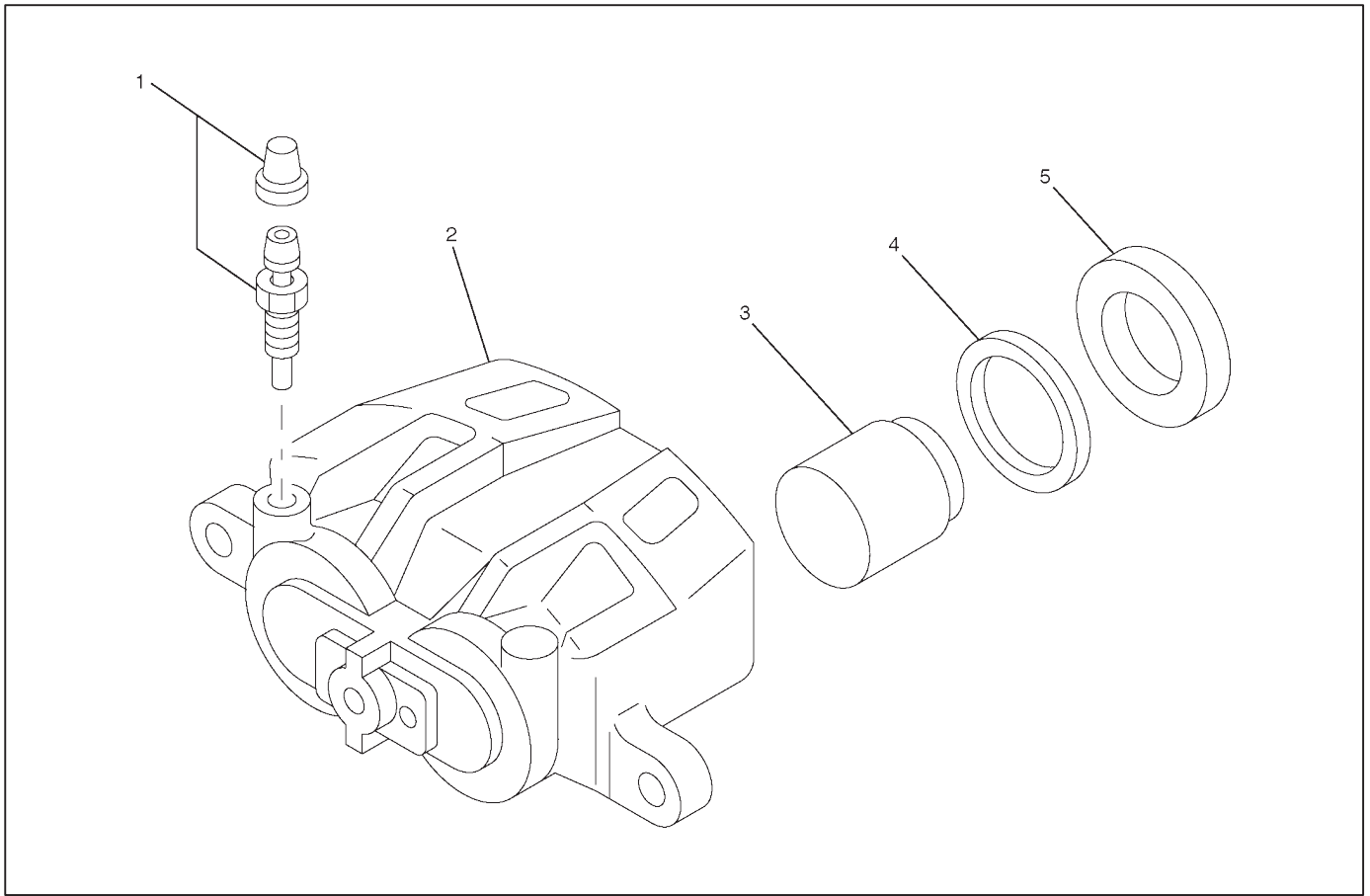


302R200021

7. Install wheel and tire assembly, referring to *Wheels and Tires System* in Section 3E.
8. Bleed brakes. Refer to *Hydraulic Brakes* in this section.

Front Disc Brake Caliper

Front Disc Brake Caliper Disassembled View



302R200018

Legend

- (1) Bleeder with Cap
- (2) Caliper Body

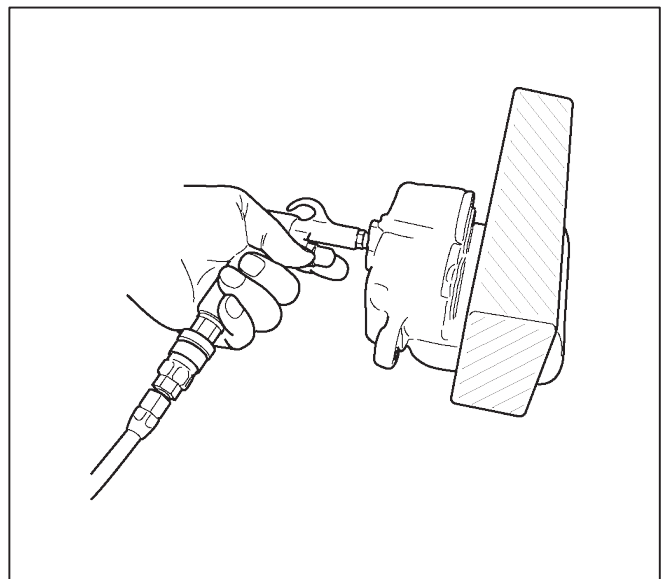
- (3) Piston
- (4) Piston Seal
- (5) Dust Boot: Piston

Disassembly

1. Insert a block of wood into the caliper and force out the piston by blowing compressed air into the caliper at the flexible hose attachment. This procedure must be done prior to removal of the dust boot.
Remove piston.

WARNING: DO NOT PLACE YOUR FINGERS IN FRONT OF THE PISTON IN AN ATTEMPT TO CATCH OR PROTECT IT WHEN APPLYING COMPRESSED AIR. THIS COULD RESULT IN PERSONAL INJURY.

CAUTION: Use just enough air to ease the piston out of the bore. If the piston is blown out, it may be damaged.



302R200012

2. Remove dust boot: piston.
3. Remove piston seal.
4. Remove bleeder with cap.
5. Remove caliper body.

Inspection and Repair

Make necessary parts replacement, if wear, damage, corrosion or any other abnormal conditions are found through inspection.

Check the following parts:

- Rotor
- Cylinder body
- Cylinder bore
- Piston
- Guide pin, lock pin
- Support bracket

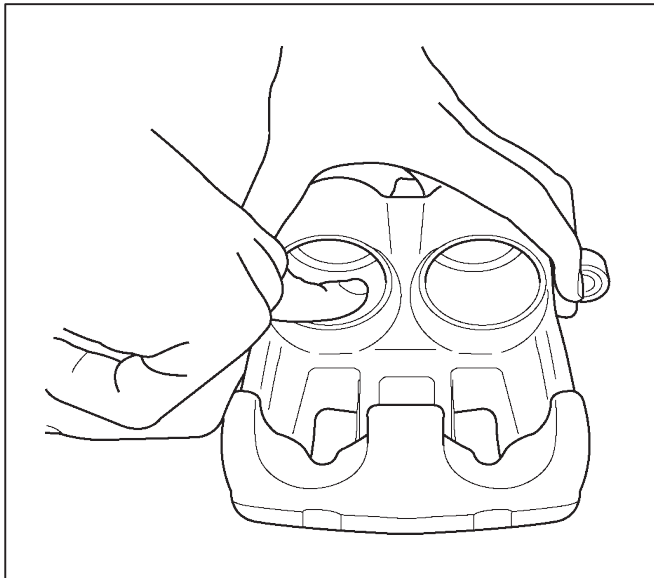
NOTE: The piston seal, boot ring and dust boot are to be replaced each time the caliper is overhauled. Discard these used rubber parts and replace them with new ones.

Reassembly

1. Install caliper body.
2. Install bleeder with cap and tighten the cap to the specified torque.

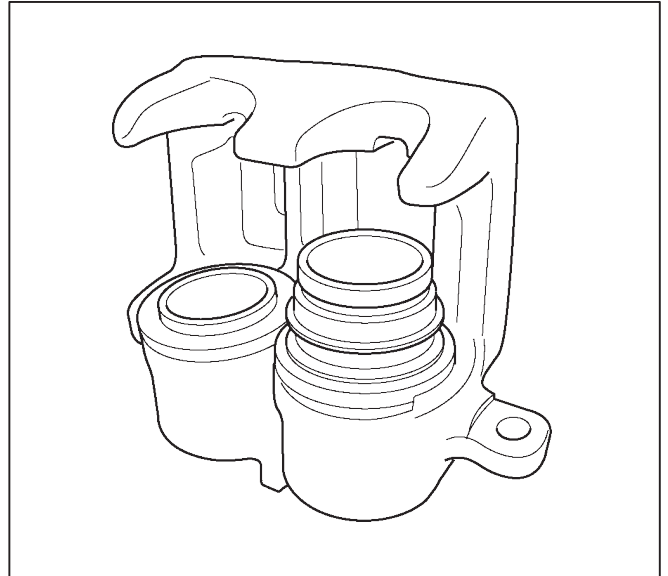
Torque: 8 N·m (69 lb in)

3. Apply special rubber grease to the piston seal and cylinder wall, then insert the piston seal into the cylinder. The special rubber grease is included in the repair kit.



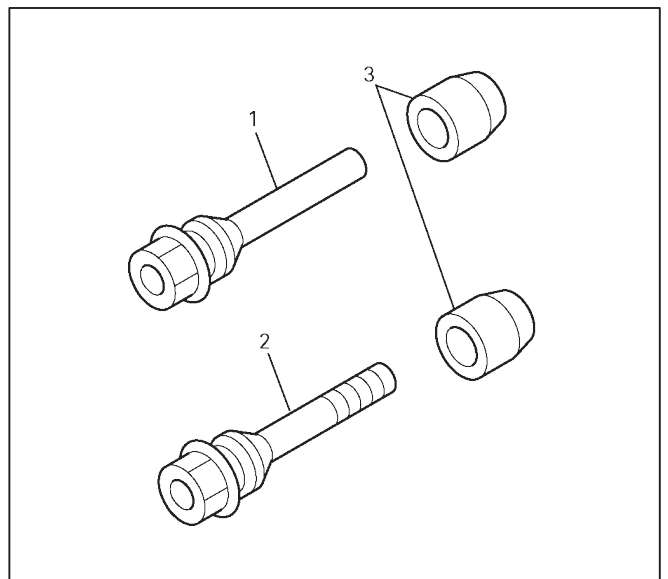
302R200013

4. When inserting the piston into the cylinder, use finger pressure only and do not use a mallet or other impact tool, since damage to the cylinder wall or piston seal can result.
Install piston.



302R200015

5. Apply special grease (approximately 1 g) to the piston and attach the dust boot to the piston and caliper. Insert the dust boot ring into the dust boot.
6. Install guide bolt and lock bolt dust boot.
7. Install the dust boot on the support bracket after applying special grease (approximately 1 g) onto the dust boot inner surface. Apply special grease onto the lock pin and guide pin setting hole of the support bracket.



302R200022

Legend

- (1) Guide Pin
- (2) Lock Pin
- (3) Pin Boot

8. Install pin bolt and tighten the bolt to the specified torque.

Torque: 45 N·m (33 lb ft)

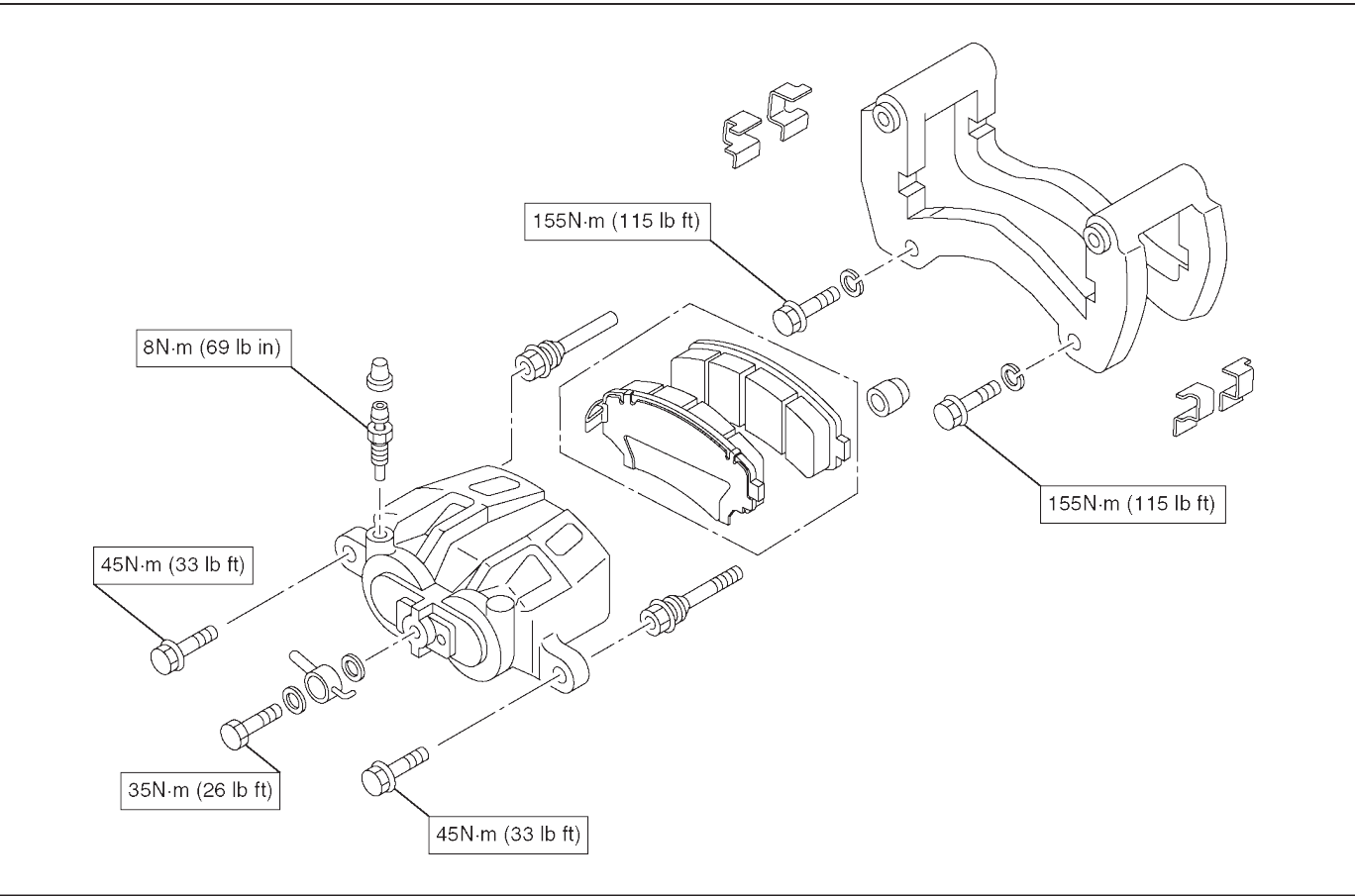
5C-100POWER-ASSISTED BRAKE SYSTEM

Main Data and Specifications

General Specifications

Type	Floating, pin slide
Pad dimension	48.7 cm ² (7.55 in ²)
Adjusting method	Self-adjusting
Piston diameter	45.4 mm (1.79 in) ×2
Disc type	Ventilated
Disc thickness	26 mm (1.02 in)
Disc effective diameter	242 mm (9.53 in)

Torque Specifications



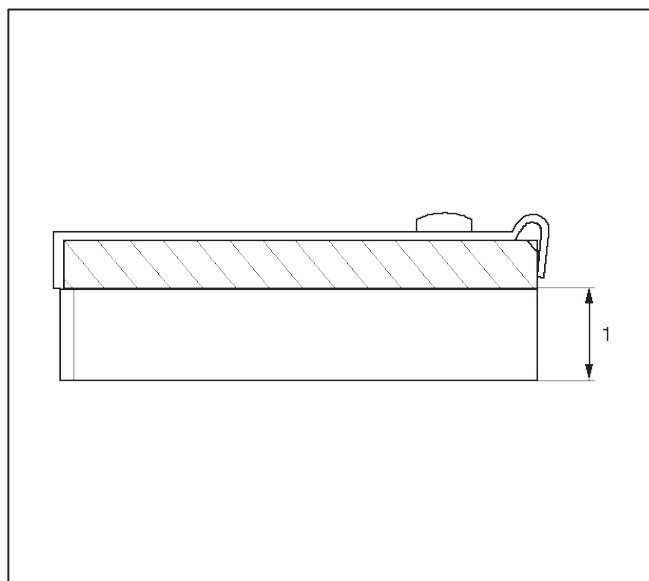
Rear Disc Brake Pads (4×4 Model)

Brake Pads Inspection

Check the outer pads by looking at each caliper from above. Check the thickness on the inner pad by looking down through the inspection hole in the top of the caliper. Whenever the pad is worn to about the thickness of the pad base, the pad should be removed for further measurements. The pad should be replaced anytime the pad thickness (1) is worn to within 1.0 mm (0.039 in) of the pad itself.

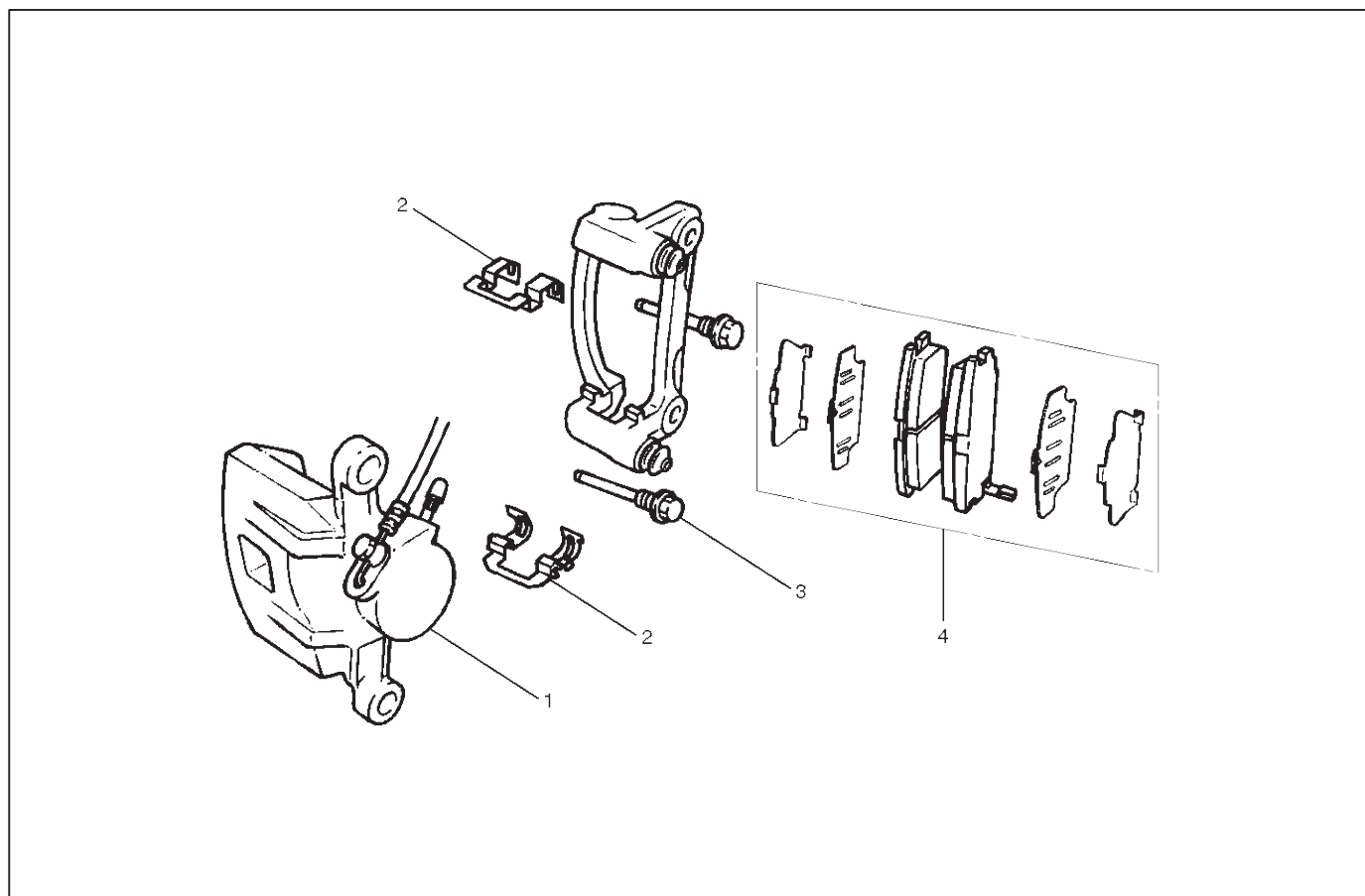
Wear indicators are installed on disc brake pads, disc brake pads need replacement when the wear indicator is heard.

Minimum limit (1): 1.0 mm (0.039 in)



302RW016

Brake Pads and Associated Parts



306RW001

Legend

- (1) Caliper Assembly
- (2) Clip

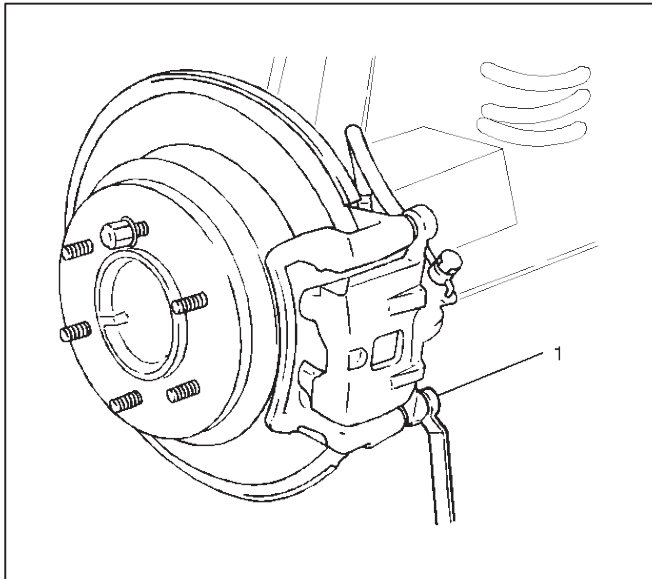
- (3) Lock Bolt
- (4) Pad Assembly

5C-102POWER-ASSISTED BRAKE SYSTEM

Removal

NOTE: If a squealing noise occurs from the rear brake while driving, check the pad wear indicator plate. If the indicator plate contacts the rotor, the disc pad assembly should be replaced.

- Draw out two-thirds of the brake fluid from the reservoir.
 - Raise the vehicle and support it with suitable safety stands.
1. Remove wheel and tire assembly, referring to *Wheels and Tires System* in Section 3E.
 2. Remove lock bolt (1)

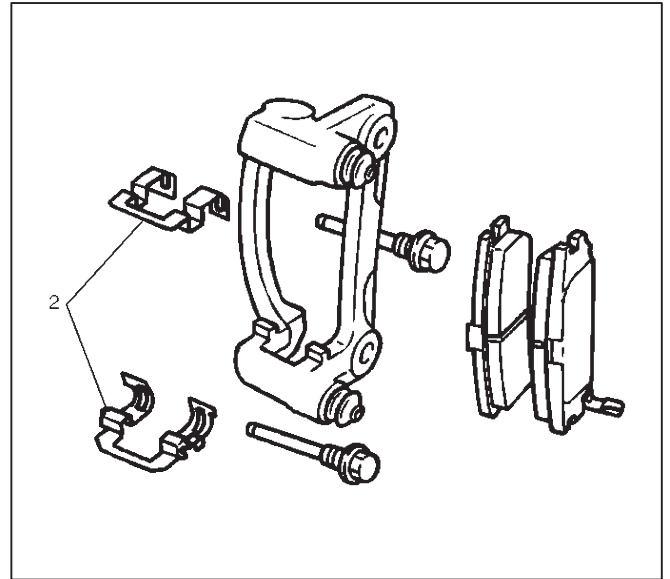


306RW002

3. Rotate caliper assembly and support the caliper assembly so that the brake hose is not stretched or damaged.
4. Remove pad assembly with shim.
5. Remove clip.

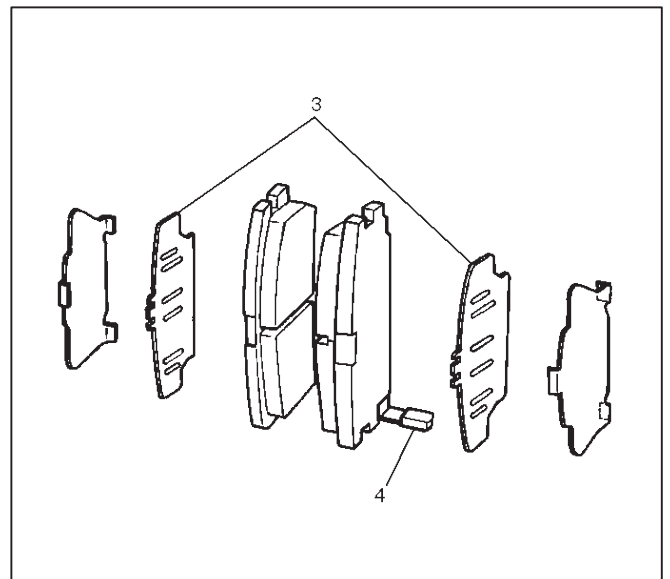
Installation

1. Install clip (2).



306RW003

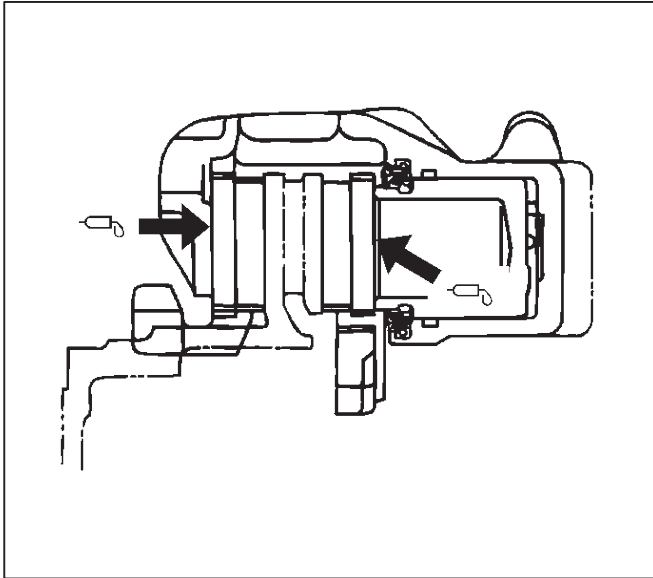
2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims. Wipe off extruded grease after installing. Install pad assembly with shim.



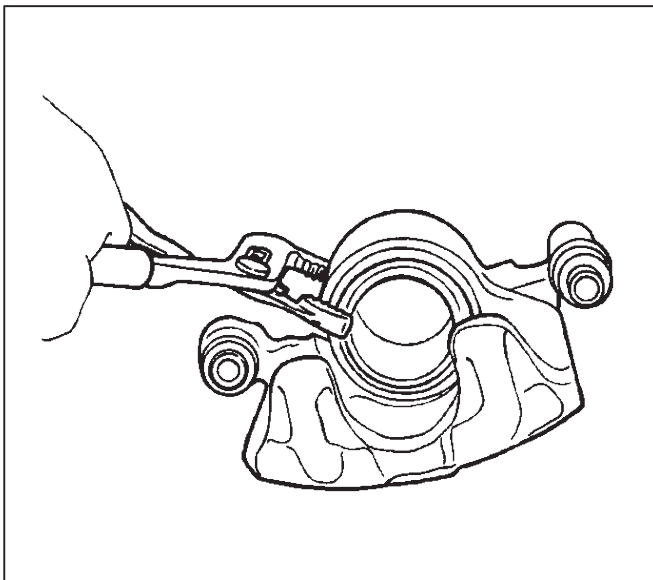
306RW004

Legend

- (3) Inner Shim
- (4) Wear Indicator

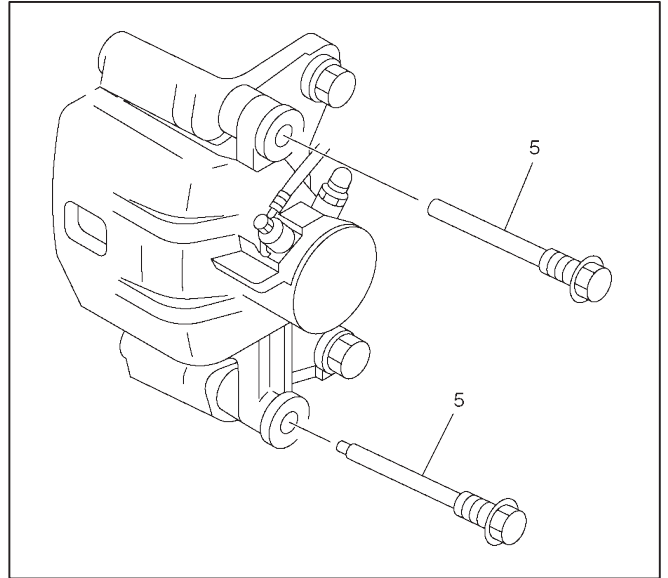


3. Carefully use adjustable pliers to bottom the piston into the caliper bore. Do not pull or twist the flex hose or damage will occur.



4. Install lock bolt (5) and tighten the bolt to the specified torque.

Torque: 44 N·m (32 lb ft)



5. Install wheel and tire assembly, referring to *Wheels and Tires System* in Section 3E.
6. Pump the brake pedal several times to make sure that the pedal is firm. Check the brake fluid level in the reservoir after pumping the brakes.

Rear Disc Brake Rotor (4×4 Model)

Inspection

In the manufacturing of the brake rotor, all the tolerances regarding surface finish, parallelism and lateral runout are held very closely. Maintaining these tolerances provides the surface necessary to assure smooth brake operation.

Lateral Runout

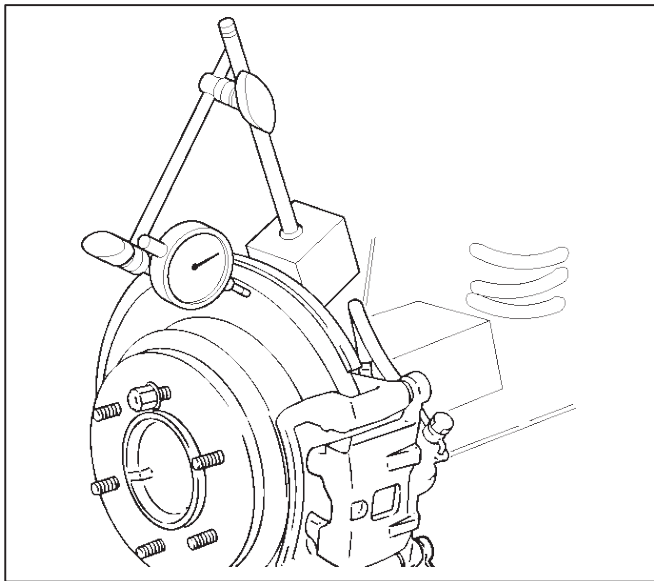
Lateral runout is the movement of the rotor from side to side as it rotates on the spindle. This could also be referred to as "rotor wobble".

This movement causes the piston to be knocked back into its bore. This results in additional pedal travel and a vibration during braking.

Checking Lateral Runout

1. Adjust the wheel bearing correctly, referring to *Differential* in Section 4A.
 2. Attach the dial indicator accordingly so that the stem contacts the rotor surface to approximately 29mm (1.14 in) from the rotor edge.
 3. Rotate the rotor one complete turn and inspect for signs of lateral runout. Lateral runout should not exceed 0.13 mm (0.005 in).
1. The lateral runout should not exceed 0.13 mm (0.005 in)

Maximum runout: 0.13 mm (0.005 in)



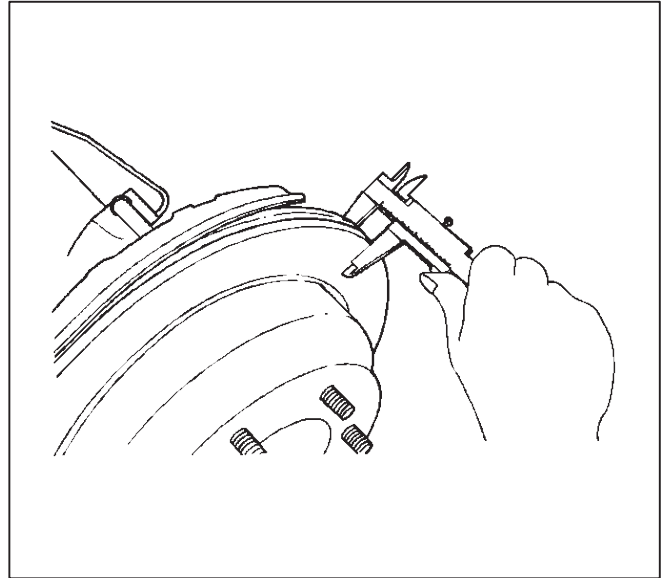
306RY00013

Parallelism

Parallelism is the measurement of thickness of the rotor at four or more points around the circumference of the rotor. All measurement must be made at 22 mm (0.87 in) from the edge of the rotor.

The rotor thickness must not vary more than 0.010 mm (0.0004 in) from point to point.

Maximum parallelism: 0.010 mm (0.0004 in)



420RS013

Replacing Brake Rotors

When installing new brake rotors, do not refinish the surfaces. These parts are at the correct level of surface finish.

Refinishing Brake Rotors

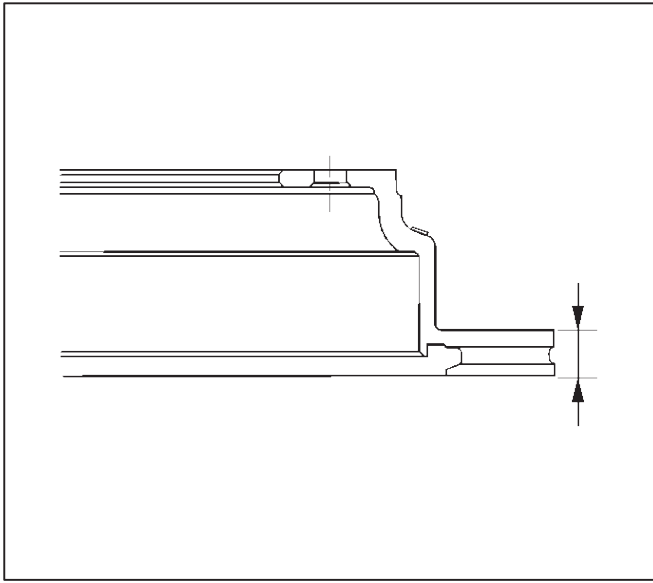
Accurate control of the rotor tolerances is necessary for proper performance of the disc brakes. Machining of the rotor should be done only with precision equipment. All brake rotors have a minimum thickness dimension cast into them. This dimension is the minimum wear dimension and not a refinish dimension. The minimum wear dimension is 16.6 mm (0.654 in). The minimum refinish dimension is 16.97 mm (0.668 in).

When refinishing rotors, always use sharp cutting tools or bits. Dull or worn tools leave a poor surface finish which will affect initial braking performance. Vibration dampening attachments should always be used when refinishing braking surfaces. These attachments eliminate tool chatter and will result in better surface finish.

After refinishing, replace any rotor that does not meet the minimum thickness of 16.97 mm (0.668 in). Do not use a brake rotor that exceeds the manufacturers specifications.

Minimum wear dimension: 16.6 mm (0.654 in)

Refinish dimension: 16.97 mm (0.668 in)



420RW002

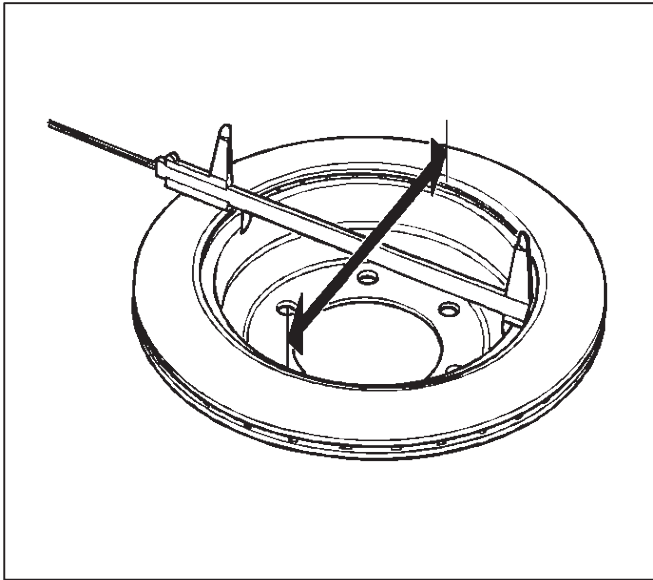
Rear Drum (In Disc) Inside Diameter Check

Check the rear drum inside diameter by measuring at more than two portions as shown in the illustration.

If the inside diameter is greater than the limit, replace the rear rotor.

Standard: 210.0 mm (8.27 in)

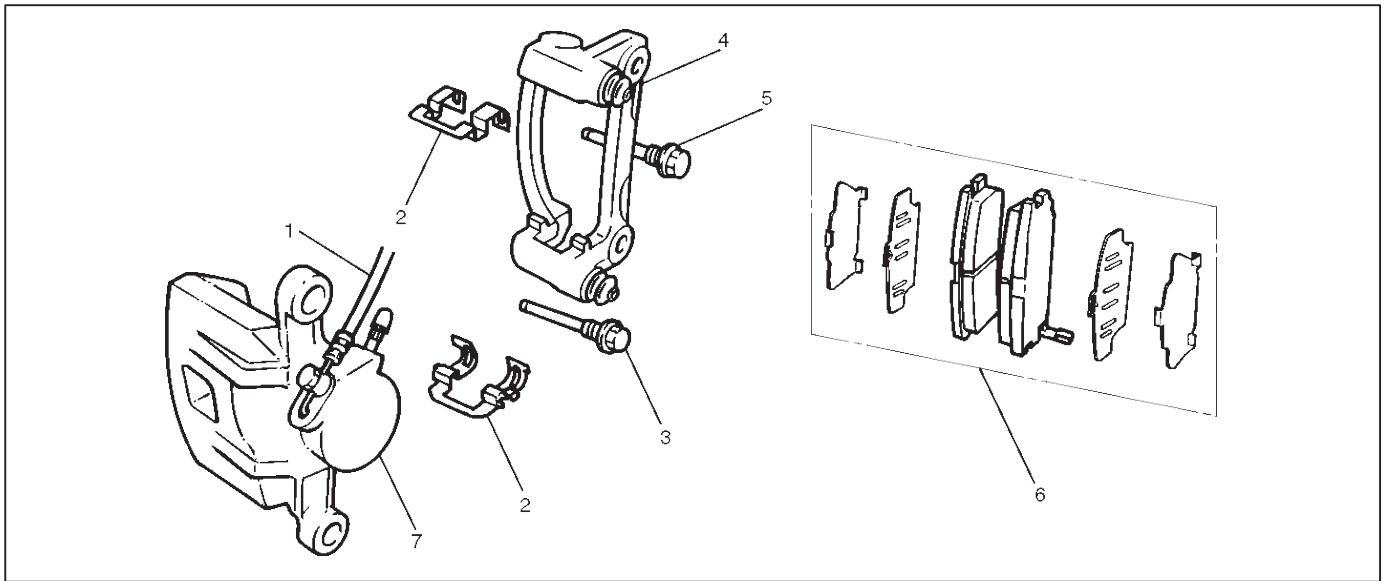
Limit: 211.4 mm (8.32 in)



420RS035

Rear Disc Brake Caliper Assembly (4×4 Model)

Rear Disc Brake Caliper Assembly and Associated Parts



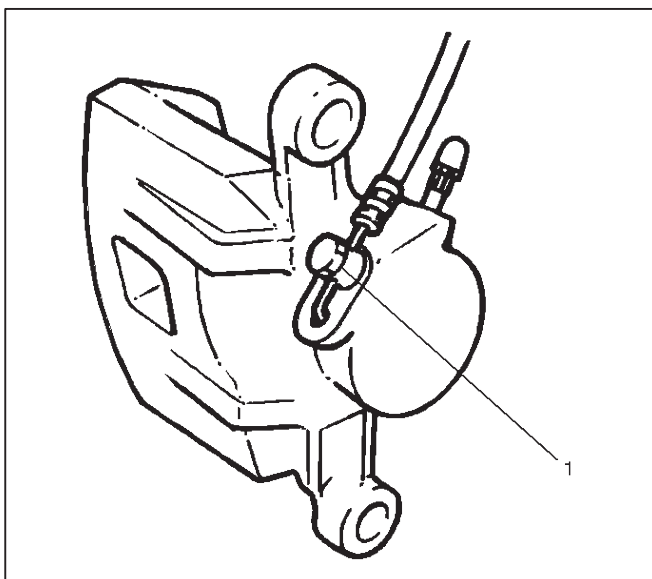
306RW007

Legend

- | | |
|-------------------------|----------------------------|
| (1) Brake Flexible Hose | (4) Support Bracket |
| (2) Clip | (5) Guide Bolt |
| (3) Lock Bolt | (6) Pad Assembly with Shim |
| | (7) Caliper Assembly |

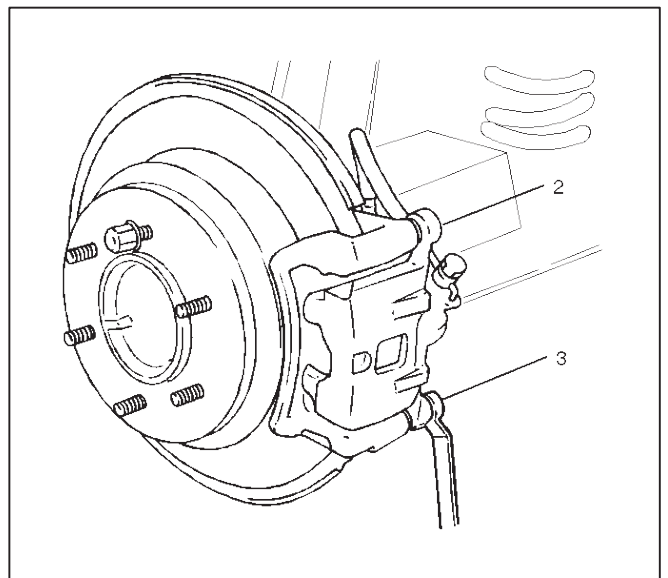
Removal

1. Raise the vehicle and support with suitable safety stands.
2. Remove wheel and tire assembly, referring to *Wheels and Tires System* in Section 3E.
3. Remove the bolt and gaskets, then disconnect the flexible hose from the caliper and after disconnecting the flexible hose (1), cap or tape the openings to prevent entry of foreign material.



306RW008

4. Since the brake fluid flows out from the connecting coupler, place a drain pan under the vehicle.
5. Remove lock bolt (3).
6. Remove guide bolt (2).



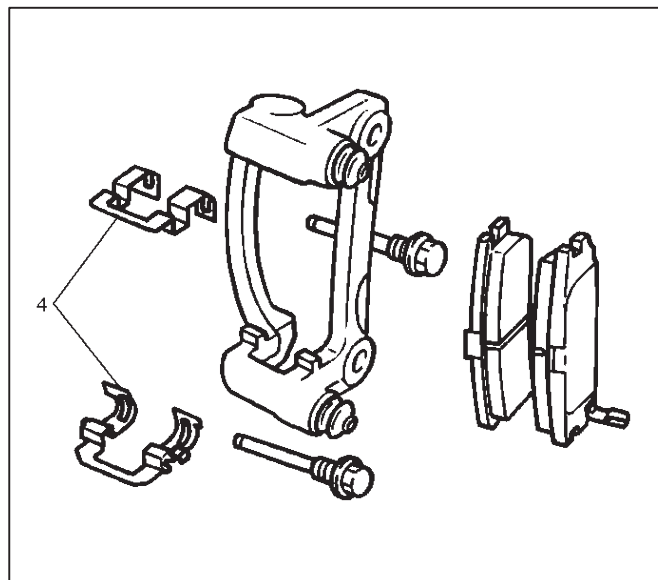
306RW009

7. Remove caliper assembly.
8. Remove support bracket with pad assembly and take care not to damage the flexible brake hose when removing the support bracket.
9. Remove pad assembly with shim and mark the lining locations if they are to be reinstalled.

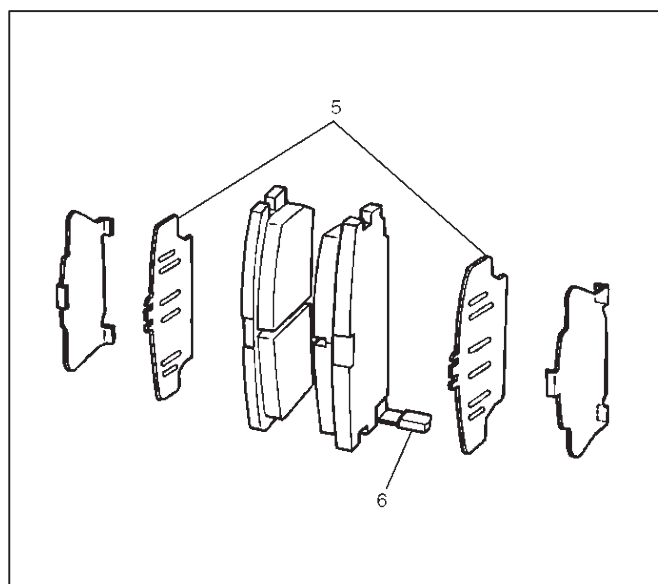
10. Remove clip.

Installation

1. Install clip (4).



2. Apply special grease (approximately 0.2 g) to both contacting surfaces of the inner shims (5). Wipe off extruded grease after installing. Install pad assembly with shim.

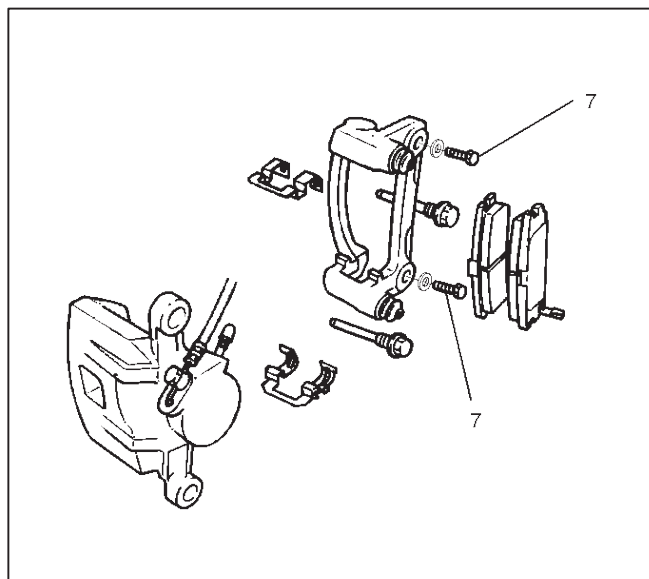


Legend

- (5) Inner Shim
- (6) Wear indicator

3. Install support bracket and tighten the bolt (7) to the specified torque.

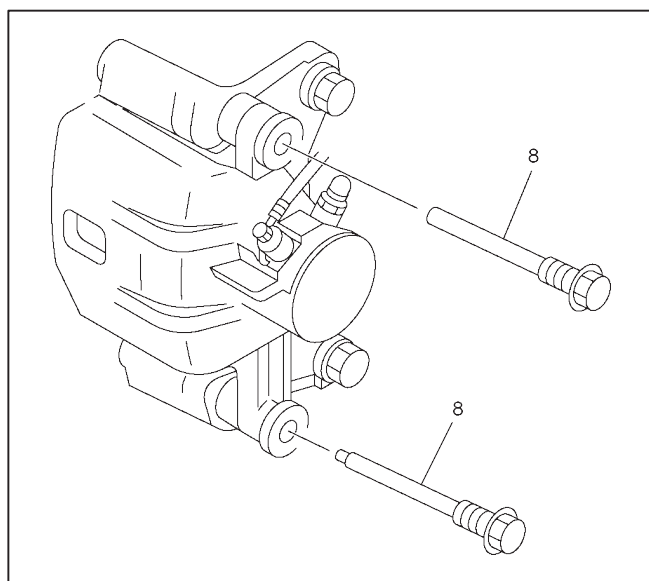
Torque: 103 N·m (76 lb ft)



4. Install caliper assembly.

5. Install lock bolt and guide bolt (8) and tighten the bolt to the specified torque.

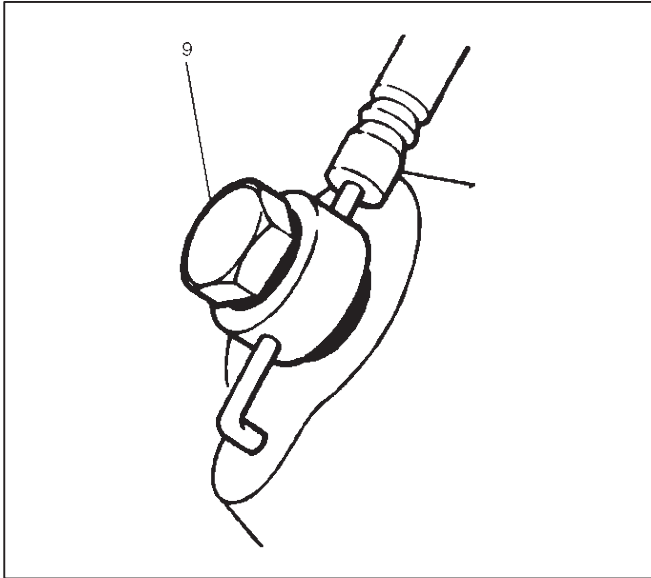
Torque: 44 N·m (32 lb ft)



6. Install brake flexible hose, always use new gaskets and be sure to put the hooked edge of the flexible hose end into the anti-rotation cavity then tighten the eye-bolt (9) to the specified torque.

Torque: 35 N·m (26 lb ft)

5C-108POWER-ASSISTED BRAKE SYSTEM



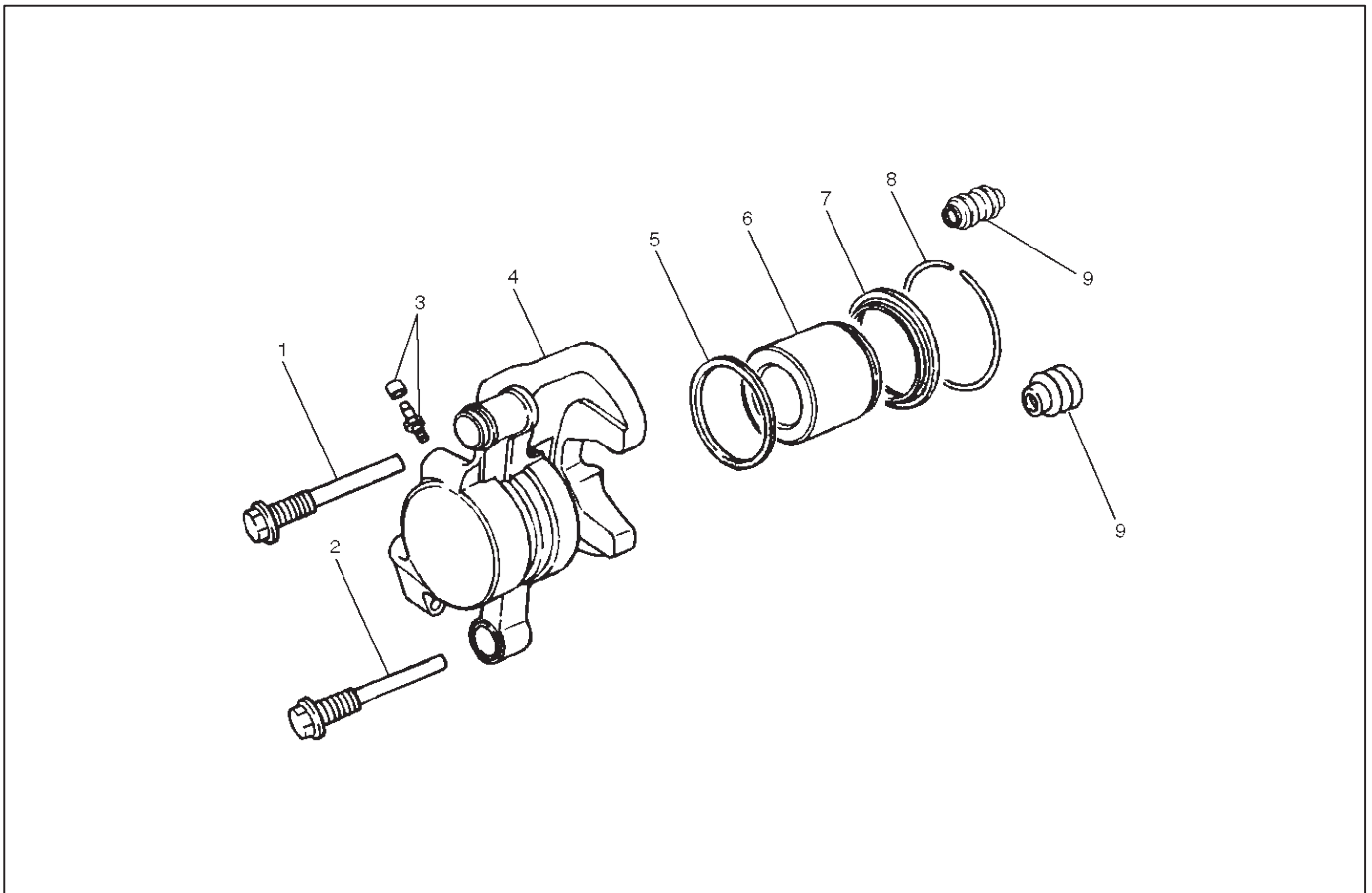
302RW017

7. Install the wheel and tire assembly, referring to *Wheels and Tires System* in Section 3E.

8. Bleed brakes. Refer to *Hydraulic Brakes* in this section.

Rear Disc Brake Caliper (4×4 Model)

Rear Disc Brake Caliper Disassembled View



306RW014

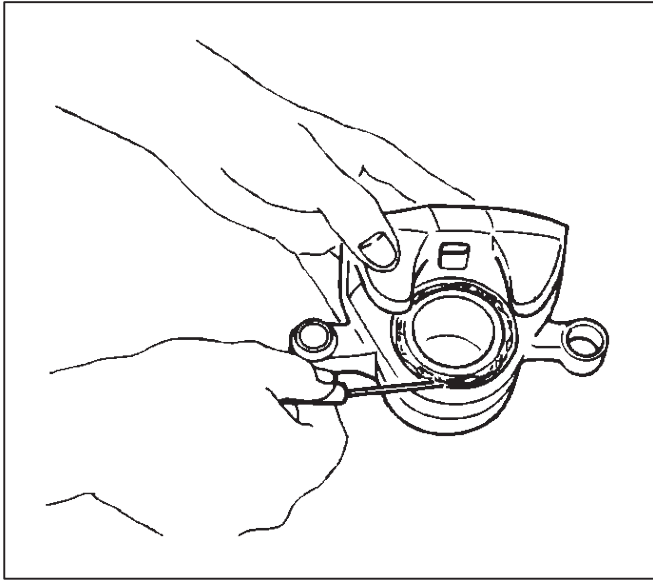
Legend

- (1) Guide Bolt
- (2) Lock Bolt
- (3) Bleeder with Cap
- (4) Caliper Body

- (5) Piston Seal
- (6) Piston
- (7) Dust Boot: Piston
- (8) Dust Boot Ring
- (9) Dust Boot: Guide Bolt and Lock Bolt

Disassembly

1. Remove guide bolt.
2. Remove lock bolt.
3. Remove dust boot; guide bolt and lock bolt.
4. Remove dust boot ring, using a small screwdriver.

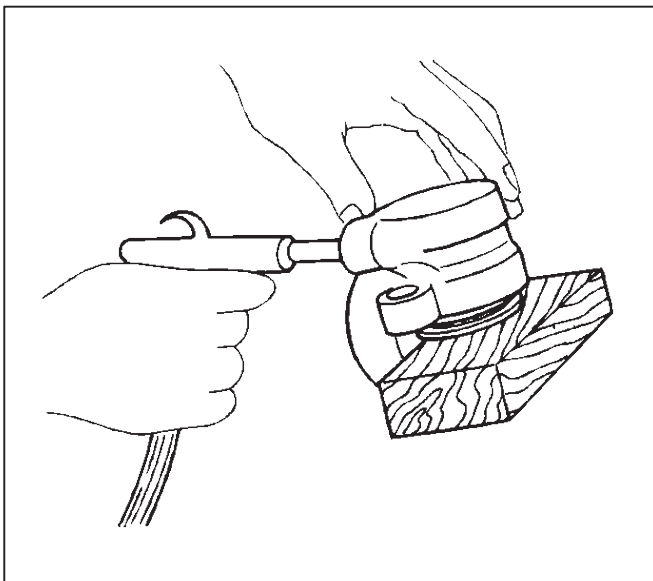


302RS016

5. Insert a block of wood into the caliper and force out the piston by blowing compressed air into the caliper at the flexible hose attachment. This procedure must be done prior to removal of the dust boot. Remove piston.

WARNING: DO NOT PLACE YOUR FINGERS IN FRONT OF THE PISTON IN AN ATTEMPT TO CATCH OR PROTECT IT WHEN APPLYING COMPRESSED AIR. THIS COULD RESULT IN PERSONAL INJURY.

CAUTION: Use just enough air to ease the piston out of the bore. If the piston is blown out, it may be damaged.



302RS017

6. Remove dust boot: piston.
7. Remove piston seal.
8. Remove bleeder with cap.
9. Remove caliper body.

Inspection and Repair

Make necessary parts replacement, if wear, damage, corrosion or any other abnormal conditions are found through inspection.

Check the following parts:

- Rotor
- Cylinder body
- Cylinder bore
- Piston
- Guide bolt, lock bolt
- Support bracket

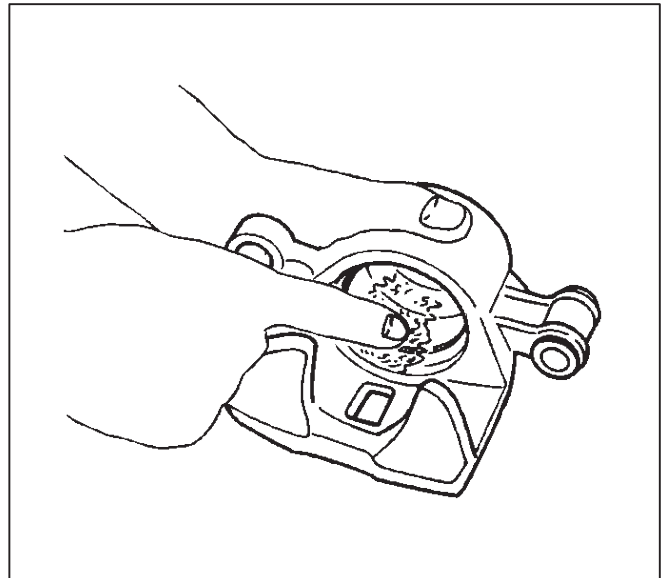
NOTE: The piston dust seal and dust boot are to be replaced each time the caliper is overhauled. Discard these used rubber parts and replace with new ones.

Reassembly

1. Install caliper body.
2. Install bleeder with cap and tighten the cap to the specified torque.

Torque: 8 N·m (69 lb ft)

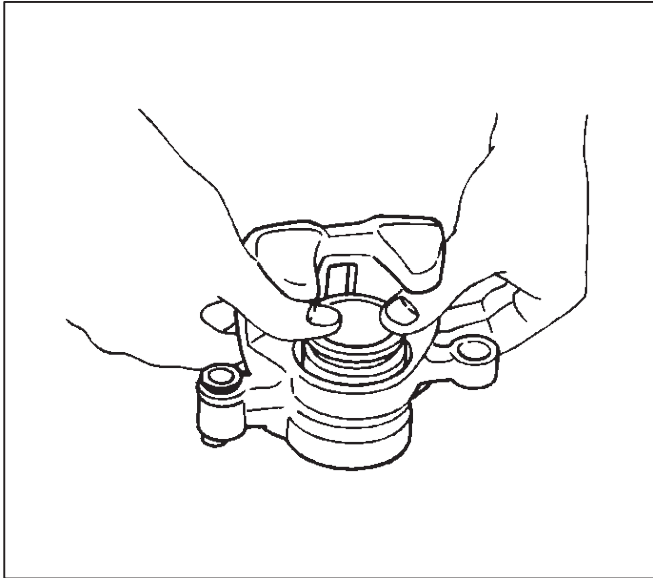
3. Install piston seal and apply special rubber grease to the piston seal and cylinder wall, then insert the piston seal into the cylinder. The special rubber grease is included in the repair kit.



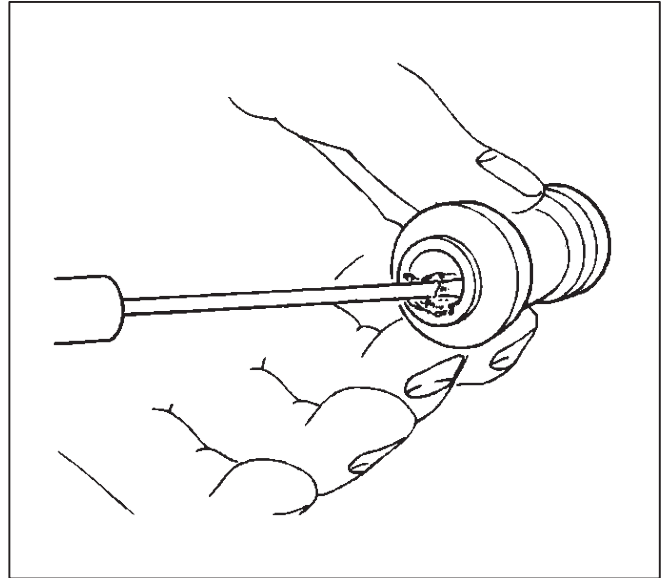
302RS018

4. When inserting the piston into the cylinder, use finger pressure only and do not use a mallet or other impact tool, since damage to the cylinder wall or piston seal can result. Install piston.

5C-110 POWER-ASSISTED BRAKE SYSTEM

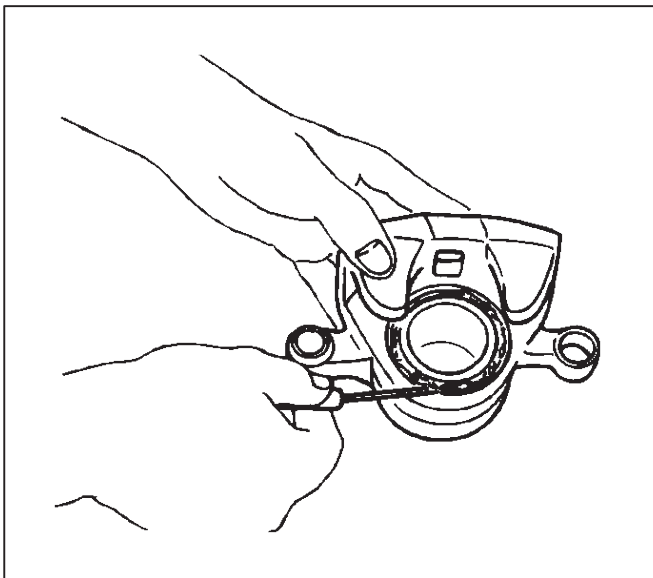


5. Apply special grease (approximately 1g) to the piston and attach the dust boot to the piston and caliper. Insert the dust boot ring into the dust boot.



8. Install lock bolt and guide bolt and tighten the bolt to the specified torque.

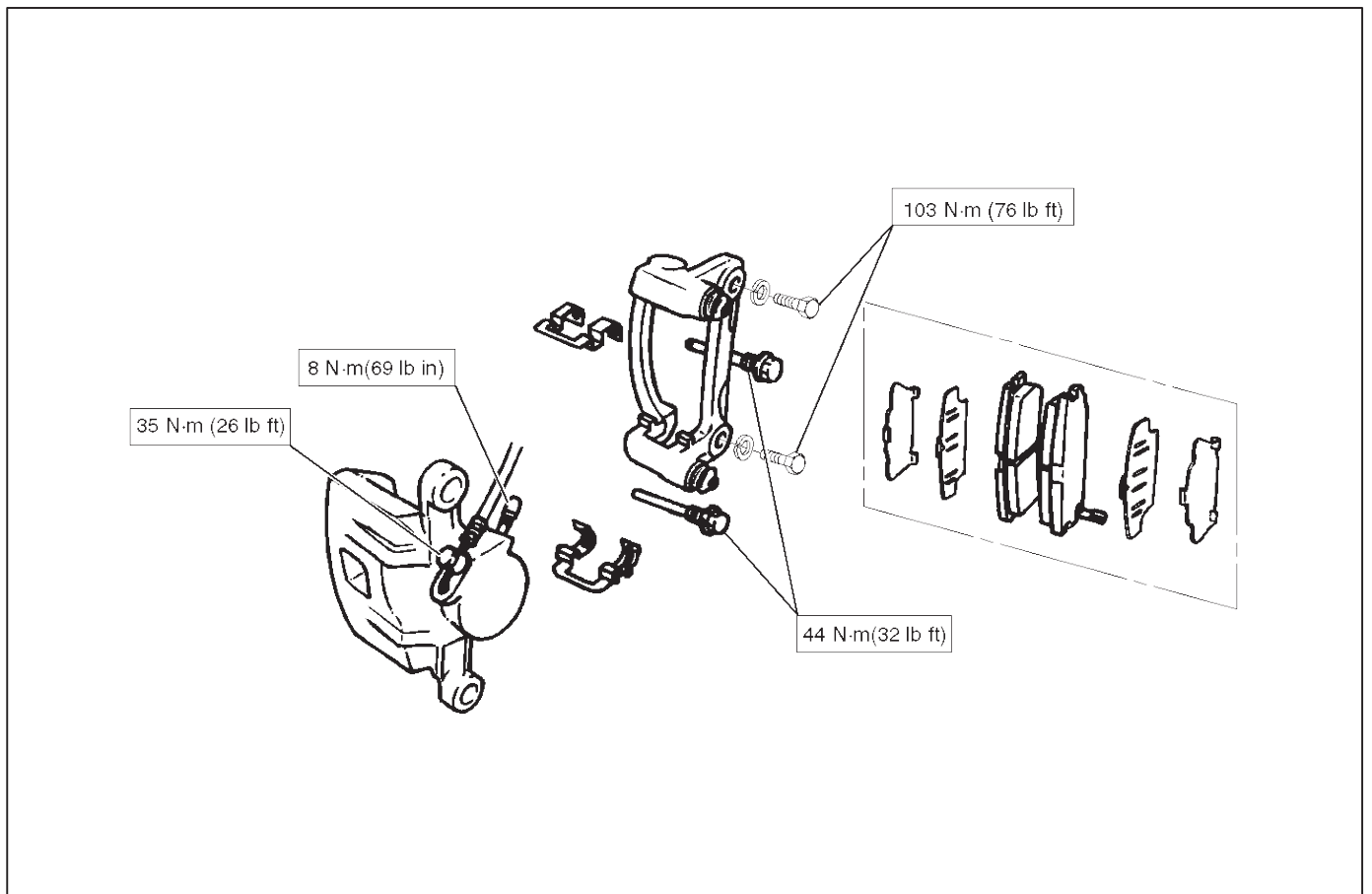
Torque: 44 N·m (32 lb ft)



6. Install guide bolt and lock bolt dust boot.
7. Install the dust boot on the support bracket after applying special grease (Approx. 1g) onto the dust boot inner surface. Also apply special grease onto the lock bolt and guide bolt setting hole of the support bracket.

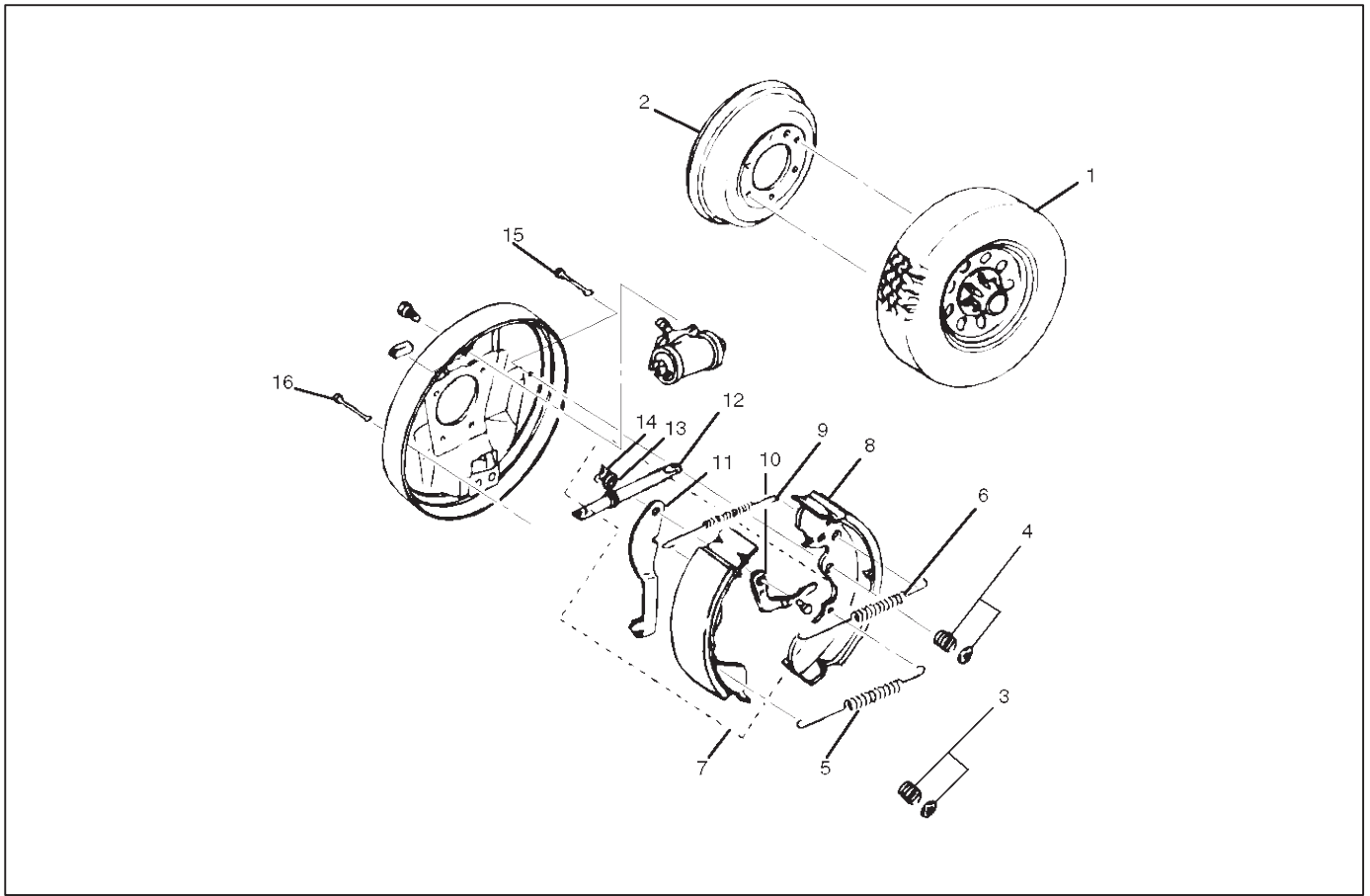
Main Data and Specifications (4×4 Model)**General Specifications**

Type	Floating, pin slide
Pad dimension	33 cm ² (5.11 in ²)
Adjusting method	Self-adjusting
Piston diameter	41.3 mm (1.63 in)
Disc type	Ventilated
Disc thickness	18 mm (0.71 in)
Disc effective diameter	269.2 mm (10.60 in)

Torque Specifications

Brake Lining

Brake Lining and Associated Parts



305RW001

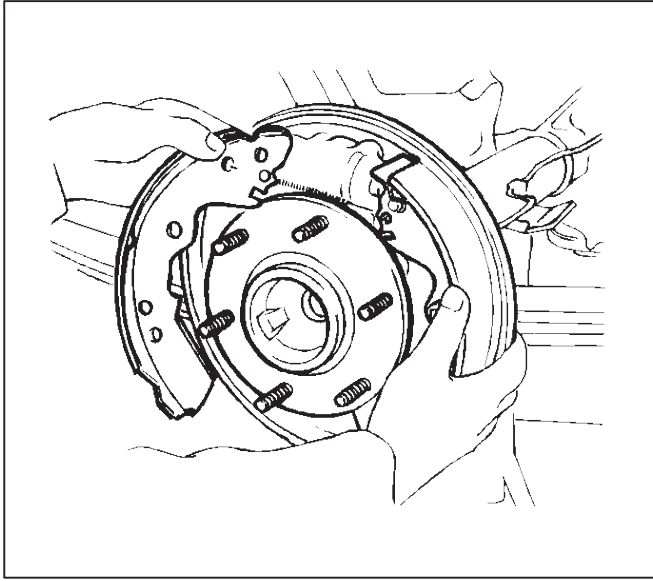
Legend

- | | |
|--|---------------------------------|
| (1) Wheel and Tire Assembly | (9) Upper (inner) Return Spring |
| (2) Drum | (10) Auto Adjuster Lever |
| (3) Hold-down Spring and Cup | (11) Parking Brake Lever |
| (4) Hold-down Spring and Cups | (12) Adjuster Assembly |
| (5) Lower Return Spring | (13) Wave Washer |
| (6) Upper (other) Return Spring | (14) Retainer |
| (7) Trailing Shoe Assembly with Parking Brake Lever | (15) Hold-down Pin |
| (8) Leading Shoe Assembly with Upper (inner) Return Spring | (16) Hold-down Pin |

Removal

1. Raise the vehicle and support with suitable safety stands.
2. Remove wheel and tire assembly (1).
 - Refer to *Wheel and Tires* in Wheel and Tire System section.
3. Remove Drum (2).
 - If difficulty is encountered in removing the drum:
 - Mark the position of the drum to the axle.
 - Make sure the parking brake is released.
- Use a rubber mallet to tap gently on the outer rim of the drum and/or around the inner drum. Be careful to avoid damaging the drum.
4. Remove upper (other) return spring (6) and auto adjuster lever.
5. Remove lower return spring (5).
6. Remove hold-down spring and cups (4) and hold-down pin (15).
7. Remove adjuster assembly (12).
8. Remove leading shoe assembly (8) with upper (inner) return spring (9).

NOTE: Do not over stretch the return spring.



305RS003

9. Remove upper (inner) return spring (9).
10. Remove hold-down spring and cup (3) and hold-down pin (16).
11. Remove Trailing shoe assembly (7) with parking brake lever (16).
12. Remove parking brake cable from parking brake lever (11).
13. Remove retainer (14), wave washer (13), and parking brake lever (11).

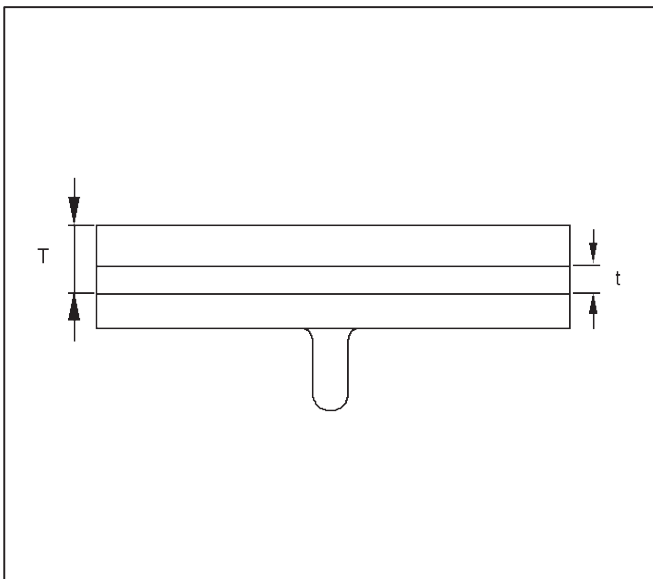
Brake Lining Inspection

Check the shoe assemblies for wear by removing brake drum.

Replace the shoe assemblies, if lining thickness is less than 1.0 mm (0.039 in).

The shoe assemblies have a wear indicator that makes a noise when the linings wear to a degree where replacement is required.

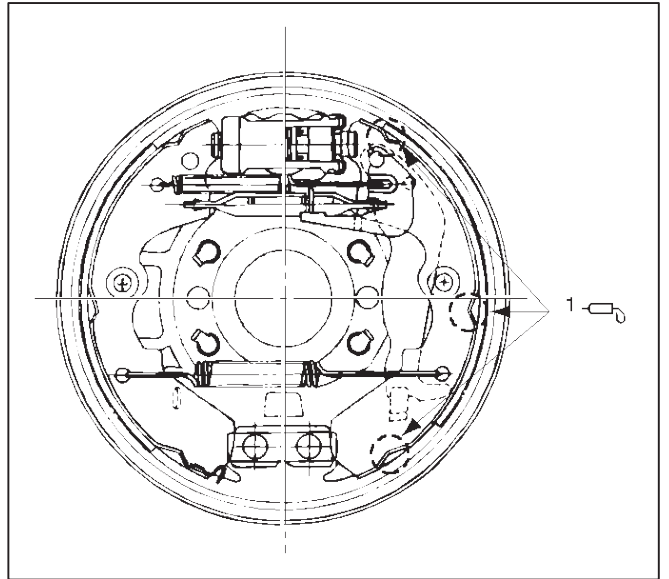
Minimum limit: 1.0 mm (0.039 in)



305RS001

Installation

1. Apply grease lightly to back place A.



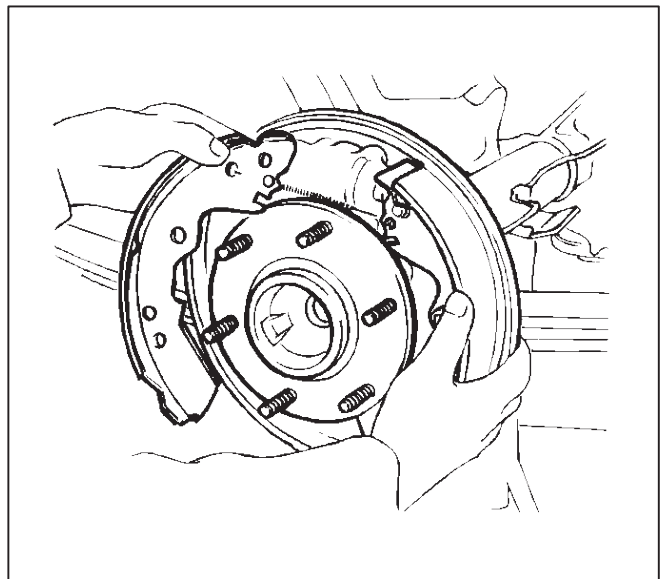
305RW002

Legend

- (1) Place A (3 portions for each side)

2. Install parking brake lever (11), wave washer (13), and retainer (14).
3. Install trailing shoe assembly (7) with parking brake lever (16).
4. Install the parking brake cable to parking brake lever (11).
5. Install hold-down pin (16) and hold-down spring and cup (3).
6. Install upper (inner) return spring (9).
7. Install leading shoe assembly (8) with upper (inner) return spring (9).

NOTE: Do not over stretch the return spring.



305RS003

5C-114 POWER-ASSISTED BRAKE SYSTEM

8. Install adjuster assembly (12).
9. Install hold-down pin (15) and hold-down spring and cups (4).
10. Install lower return spring (5).
 - Use brake spring tool.
11. Install auto adjuster lever (10).
12. Install upper (outer) return spring (6).
 - Use brake spring tool.
13. Install brake drum (2).
 - Adjust the brakes, refer to the *Drum Brake Adjustment* in this section.
14. Install wheel and tire assembly (1).
 - Refer to *Wheels and Tires* in wheel and Tire System section.

Drum Brake Adjustment (4×2 Model)

NOTE: All brakes are self-adjusting. Brakes are adjusted by repeated stepping on the brake pedal. (After stepping on the pedal and releasing it, the rear auto adjuster, in the rear brake, produces a clicking sound.

The same operation should be repeated until the sound disappears.)

Take the following steps after overhauling the rear brake assembly.

1. Move the parking brake handle to its fully released position.
2. Parking cable must be loosened sufficiently. (Loosen the adjust nut and the lock nut.)
3. Repeat stepping on the brake pedal firmly, and releasing it until the clicking sound can no longer be heard.

If the difference between the brake drum inside diameter and diameter of the brake shoes is adjusted to be 0,5 mm, the number of times for depressing the brake pedal can be reduced.

4. Remove the drum. Measure the brake drum inside diameter and diameter of the brake shoes.

Shoe clearance: 0.25-0.4 mm (0.0098-0.0157 in)

If incorrect, check the brake auto-adjusting system.

5. Rotate the adjust nut until all slack disappears from the cable. Set the adjust nut.
6. Applying about 30 kg (66 lb) of force, pull the parking brake handle to its fully set position three or four times.
7. If the parking brake is properly adjusted, the travel between the fully disengaged position and the fully engaged position will be between 9 and 11 notches. If the traveling range is not within these limits, again repeat steps 1 through 5.

After adjusting has been done, check to see if the rear wheel rotates smoothly without drag when turned by hand.

Servicing The Brake Drum

Whenever the brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves and out-of-round.

Cracked, Scored or Grooved Drum

A cracked drum is unsafe and must be replaced.

Do not attempt to weld a cracked drum.

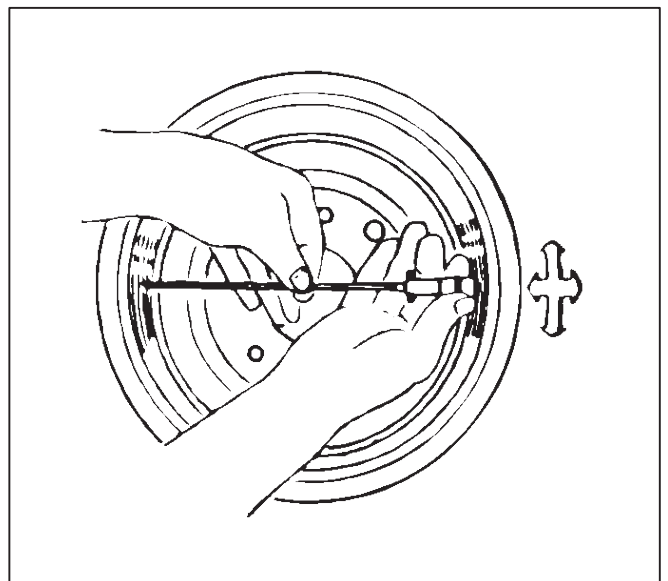
Smooth any slight scores. Heavy or extensive scoring will cause excessive brake lining wear, and it will probably be necessary to machine the drum braking surface.

If the brake linings are slightly worn and the drum is grooved, the drum should be polished with fine emery cloth but should not be machined. At this stage, eliminating all the grooves in the drum and smoothing the ridges on the lining would require the removal of too much metal and lining. If left alone, the grooves and ridges match and satisfactory service can be obtained. If brake linings are to be replaced, a grooved drum should be machined. Using a grooved drum with new linings will create inefficient braking performance and cause the linings to wear quicker.

Out-Of-Round Drum

An out-of-round drum makes accurate brake shoe adjustment impossible and is likely to cause excessive wear to other parts of the brake mechanism due to its eccentric action. An out-of-round drum can also cause severe and irregular tire tread wear as well as a pulsing brake pedal. When the braking surface of a brake drum exceeds the specification limit of 0.15 mm (0.006 in) in out-of-round, the drum should be machined to true up the braking surface. Out-of-round can be accurately measured with an inside micrometer fitted with proper extension rods. When measuring a drum for out-of-round and wear, take measurements at the open and closed edges of machines surfaces and at right angles to each other.

Maximum out-of-round: 0.15 mm (0.006 in)



Machining The Drum

If a drum is to be machined, only enough metal should be removed to obtain a true, smooth braking surface. If a drum does not clean-up when machined to a maximum diameter, it must be replaced. Removal of more metal will

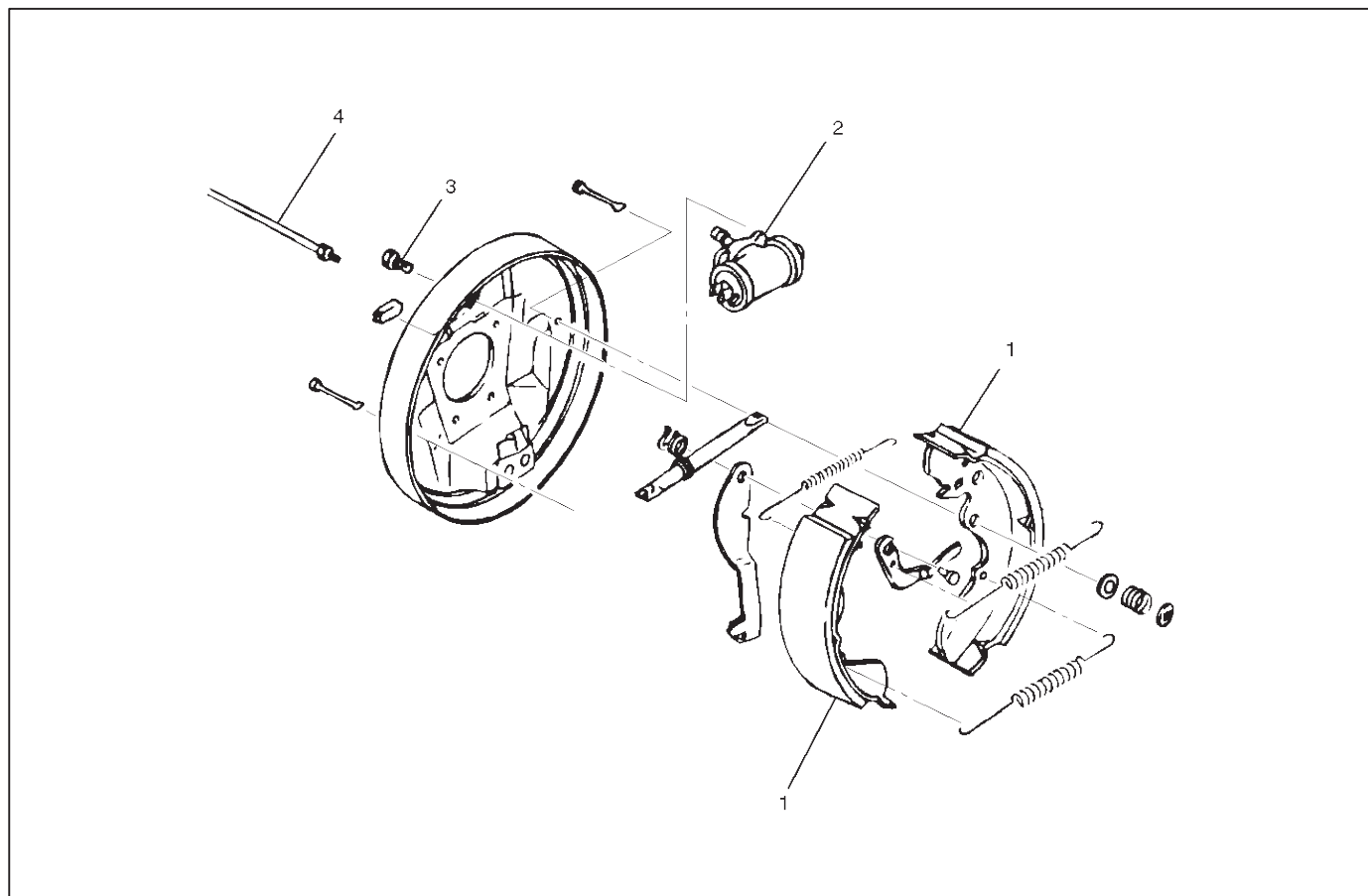
affect dissipation of heat and may cause distortion of the drum.

After refinishing, replace any drum that exceeds a maximum inside diameter of 296.5 mm (11.673 in). Do not use a brake drum that is not within the specification.

Maximum inside diameter: 296.5 mm (11.673 in)

Wheel Cylinder Assembly (4×2 Model)

Wheel Cylinder Assembly and Associated Parts



305RW003

Legend

- (1) Brake Linings
- (2) Wheel Cylinder

- (3) Bolts
- (4) Brake Pipe

Removal

1. Remove brake linings (1).
 - Refer to *Brake Lining and Associated Parts* in this section.
2. Remove brake pipe (4).
 - Plug the opening in the line to prevent fluid loss and contamination.
3. Remove bolts (3) and wheel cylinder (2).

Installation

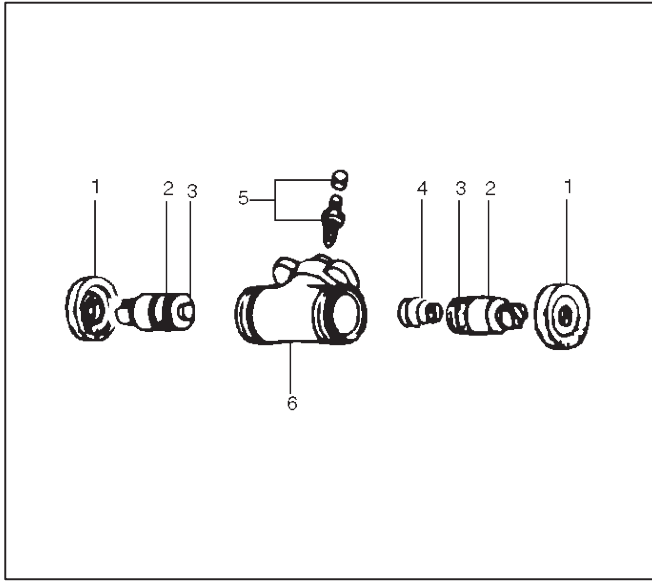
1. Install wheel cylinder (2) and tighten bolts (3) to the specified torque.

Torque: 10 N·m (8 lb ft)
2. Install brake pipe (4) and tighten the nut to the specified torque.

Torque: 16 N·m (12 lb ft)
3. Install brake linings (1).
 - Refer to *Brake Lining Replacement* in this section.
 - Bleed brake system. Refer to *Hydraulic Brake* in this section.

5C-116 POWER-ASSISTED BRAKE SYSTEM

Disassembled View



Legend

- (1) Boot
- (2) Piston Assembly
- (3) Piston Cup
- (4) Return Spring
- (5) Bleeder
- (6) Wheel Cylinder

Disassembly

1. Remove boot (1) and piston assembly (2).
2. Remove piston cup (3) from piston assembly (2).
3. Remove return spring (4) and bleeder (5) from wheel cylinder (6).

Inspection and Repair

1. Make necessary parts replacement if wear, damage, corrosion or any other abnormal condition are found through inspection.

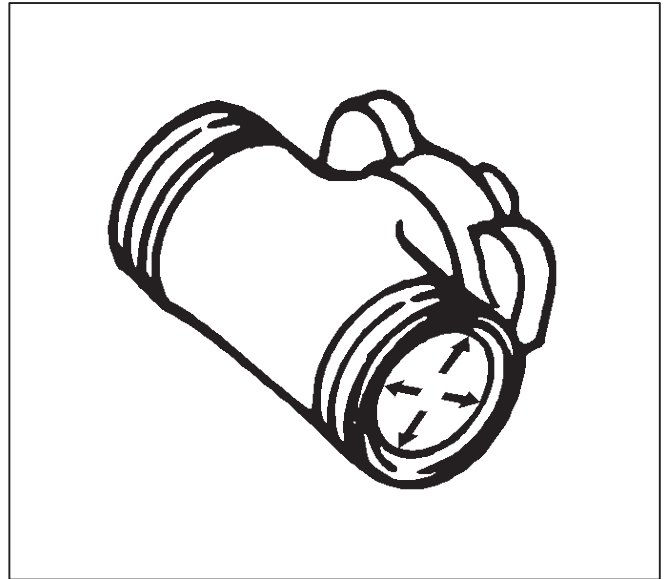
Check the following parts;

- Wheel cylinder body
- Cylinder bore
- Piston
- Return spring
- Bleeder

NOTE: Replace the piston cups and boots each time the wheel cylinder is overhauled. Discard these used rubber parts and replace with new ones.

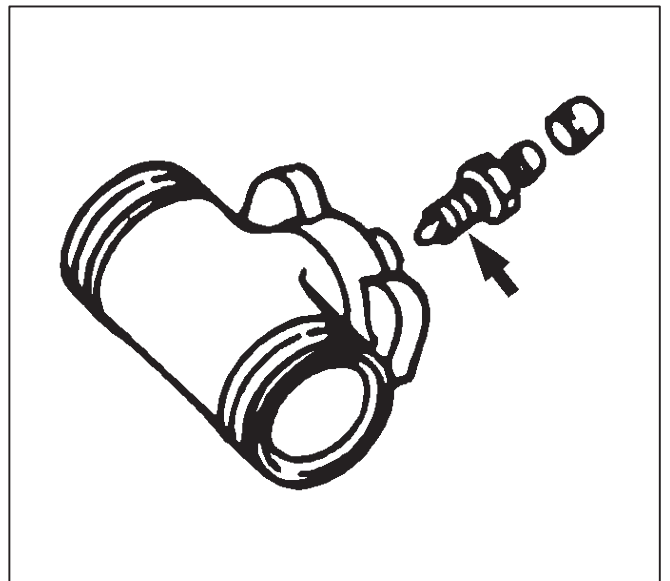
Reassembly

1. Lubricate the cylinder bore with clean rubber grease.



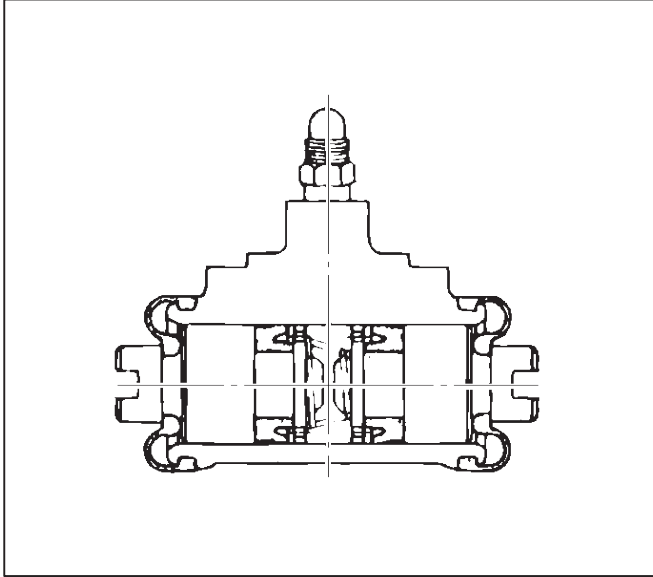
2. Install bleeder (5) to wheel cylinder (6).

Torque: 10 N·m (8 lb ft)



3. Install new piston cups (3) on each piston so that the flared end of the cups are turned to the inboard side of the pistons.

Attach the return spring (4) and the boot (1) to the piston.



4. Apply DELCO silicone lube No. 5459912 (or equivalent) to the piston and the inner face of the boots.
5. Install piston assembly (2) to wheel cylinder (6).

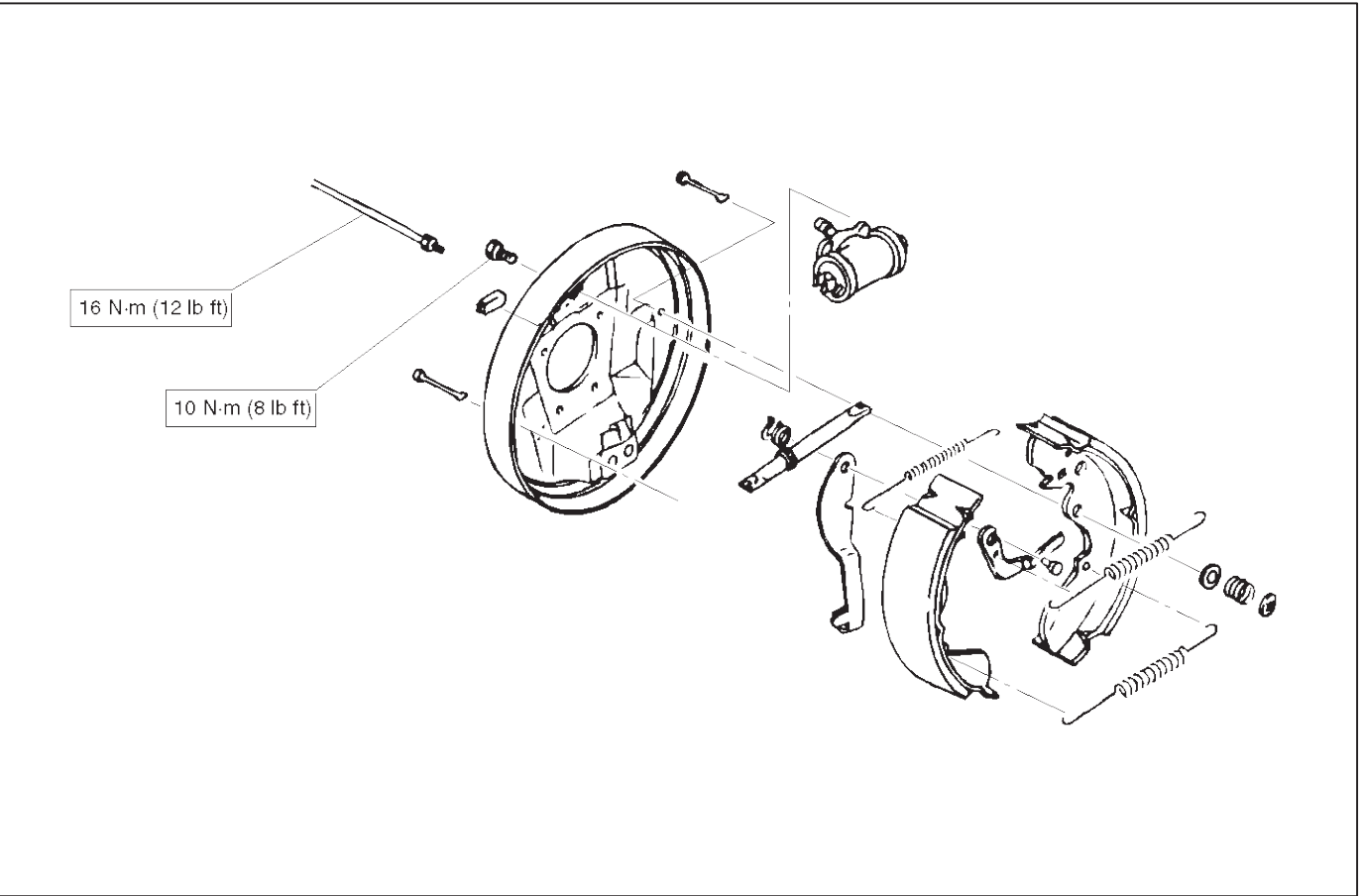
5C-118 POWER-ASSISTED BRAKE SYSTEM

Main Data and Specifications

General Specifications

Rear drum brake	
Type	Leading-trailing, non-servo
Drum inside diameter	295 mm (11.6 in)
Wheel cylinder diameter	22.22 mm (7/8 in)

Torque Specifications



BRAKES

PARKING BRAKE SYSTEM (4×4 Model)

CONTENTS

Service Precaution	5D1-1	Parking Brake Rear Cable	5D1-4
General Description	5D1-1	Parking Brake Rear Cable and Associated	
Operation	5D1-2	Parts	5D1-4
Parking Brake Lever and Front Cable	5D1-3	Removal	5D1-5
Parking Brake Lever Assembly and		Installation	5D1-5
Associated Parts	5D1-3	Inspection and Repair	5D1-6
Removal	5D1-3	Parking Brake Adjustment	5D1-6
Installation	5D1-3	Main Data and Specifications	5D1-7

Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fasteners joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fasteners. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

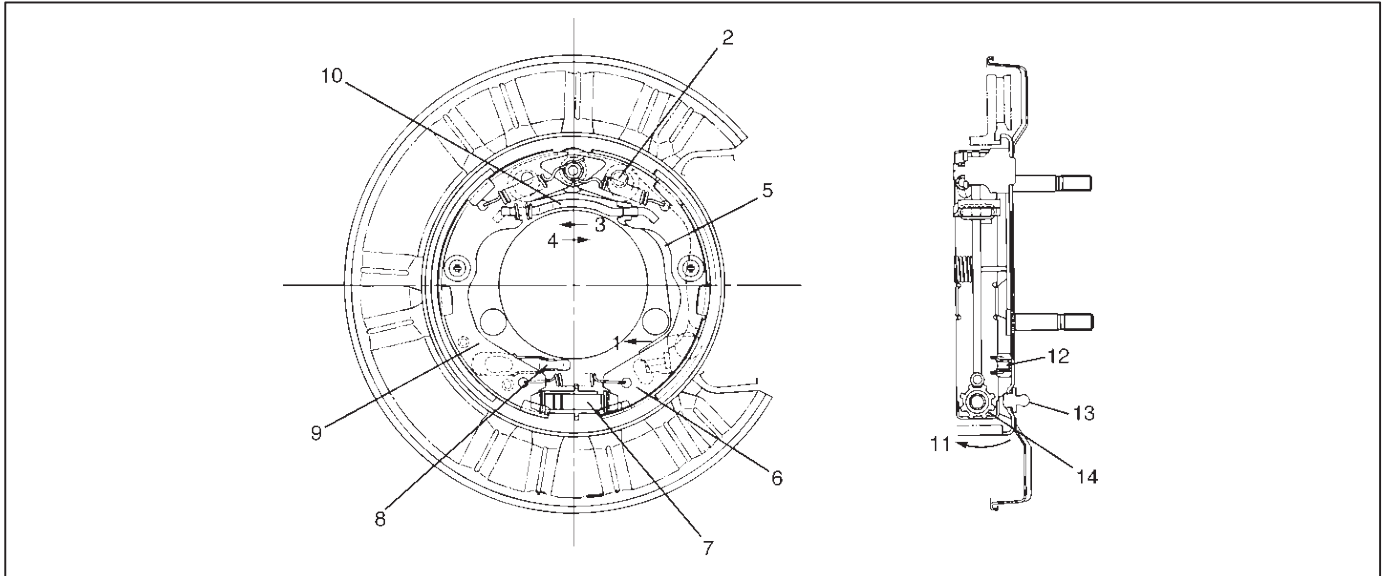
General Description

Pulling up the parking brake lever by hand will set the parking brake. By means of a ratchet type lock, the lever can be held in that position until it is released. The position of the lever is transmitted through cable/lever systems to the rear wheels. These parts are designed to obtain sufficient braking force even when parking on slopes. When the parking brake is set, or when the ignition SW is in the "ON" position, the brake warning light illuminates. The rear wheel parking brake is a duo-servo brake (mechanical inside expansion type) built in the rear disc brake. Parking brake adjustment is made through the adjusting hole (bored through back plate). Parking brake lever stroke should be adjusted to 6–8 notches. Refer to *Parking Brake Adjustment* in this section.

5D1-2 PARKING BRAKE SYSTEM (4x4 Model)

Operation

When pulled in the direction “A”, the parking lever presses the secondary shoe against the brake drum using the lever/shoe joint “B” as a fulcrum and pushes the strut in the direction “C”. The strut, in turn, presses the primary shoe against the brake drum. Counter force “D” to the primary shoe is transmitted again to the secondary shoe through the fulcrum “B”. The secondary shoe contacts the drum thereby producing braking effect. Clearance which may result from worn parking brake shoe lining can be adjusted by turning the adjusting screw. Refer to *Parking Brake Adjustment* in this Section.



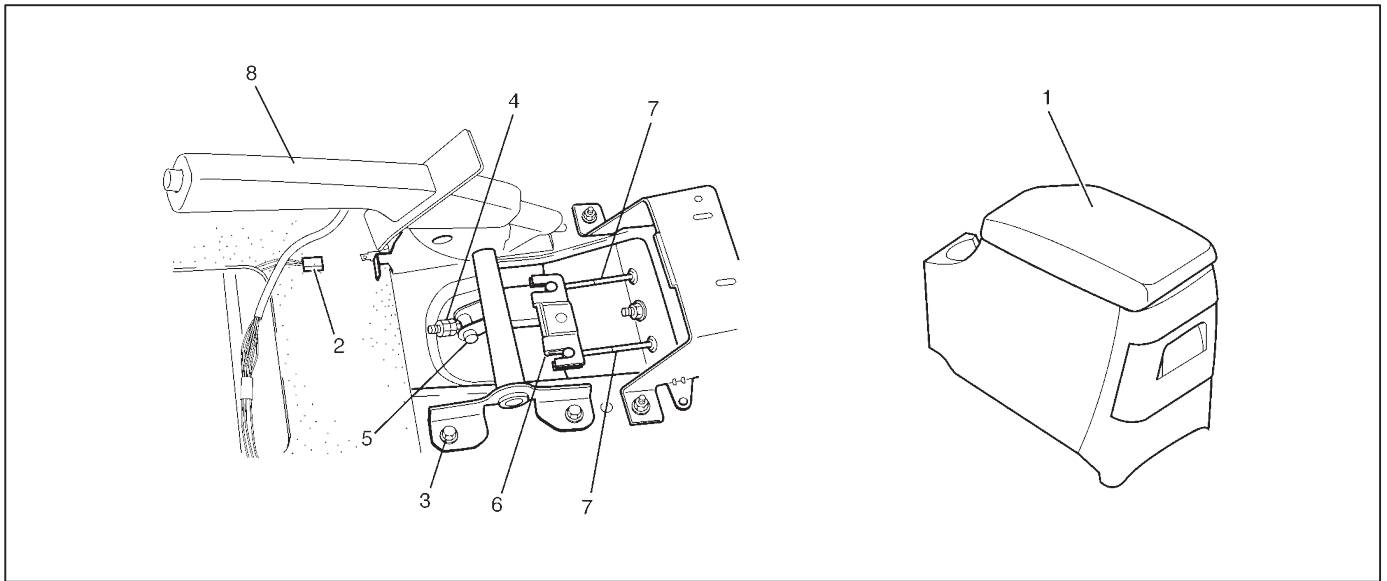
A05RS002

Legend

- | | |
|---------------------------------------|--------------------------------|
| (1) Direction “A” | (8) Parking Cable Guide |
| (2) Lever/Shoe Joint “B” as a fulcrum | (9) Primary Shoe |
| (3) Direction “C” | (10) Strut |
| (4) Counter Force “D” | (11) Shoe Expanding Direction |
| (5) Parking Lever | (12) Parking Brake Cable Guide |
| (6) Secondary Shoe | (13) Adjusting Hole Plug |
| (7) Adjusting Screw Notch | (14) Adjusting Screw Notch |

Parking Brake Lever and Front Cable

Parking Brake Lever Assembly and Associated Parts



311R200001

Legend

- | | |
|-----------------------------|------------------------------|
| (1) Rear Console | (5) Trunnion Pin |
| (2) Switch Connector | (6) Equalizer |
| (3) Bolt | (7) Parking Brake Rear Cable |
| (4) Adjust Nut and Lock Nut | (8) Parking Brake Lever |

Removal

1. Remove rear console (1).
 - Refer to *Body and Accessories* section in this manual.
2. Disconnect switch connector (2).
3. Remove bolt (3).
4. Remove adjust nut and lock nut (4).
5. Pull out equalizer (6) from trunnion pin (5).
6. Disconnect trunnion pin (5) from Parking brake lever (8).
7. Disconnect parking brake rear cable (7).

Installation

1. Apply grease (BESCO L-2 or equivalent) to the connecting portion of the rear cable (7) and equalizer (6).
2. Connect parking brake rear cable (7) to equalizer
3. Install trunnion pin (5) to parking brake lever (8).
4. Insert equalizer (6) into trunnion pin (5) and tighten adjust nut and lock nut (4).
 - To adjust the parking brake lever, see "Parking Brake Adjustment" in this section.

Lock Nut Torque: 13 N·m (113 lb in)

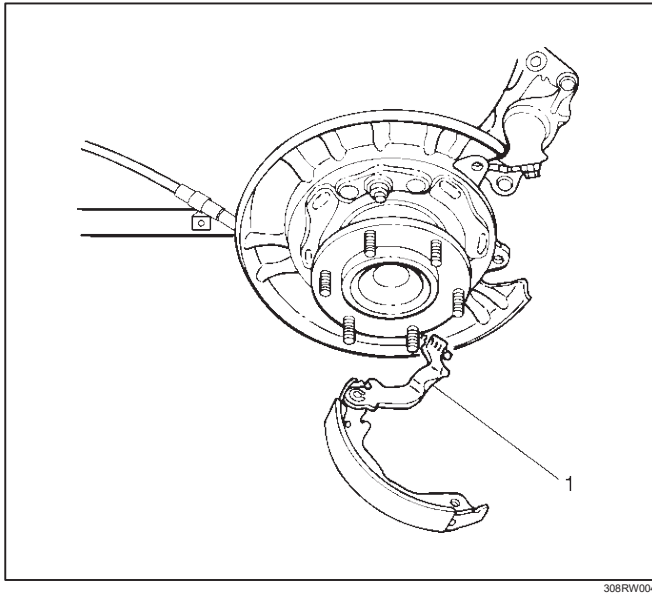
5. Tighten the parking brake lever fixing bolt (3) to the specified torque.

Torque: 15 N·m (11 lb ft)

6. Connect switch connector (2).
7. Install rear console (1).
 - Refer to *Body and Accessories* section in this manual.

Removal

1. Remove rear wheels (1).
2. Remove 2 bolts to remove the caliper assembly (2) from the support bracket. Refer to "Rear Disc Brakes" in *Power Assisted Brake System* section. Temporarily hang the caliper with wire etc.
3. Remove rotor (drum) (3).
4. Remove holding spring (4), upper return spring (5) and lower return spring (6).
5. Previously remove the rear cable from the parking brake lever, then remove the brake shoe assembly (7).



Legend

- (1) Parking Brake Lever

6. Remove cable fixing bolt (8) and bolt (9) (10) (11).
7. Remove nut (12).
8. Remove nut (13) and retainer (14).
9. Remove rear cable (15).

Installation

1. Apply grease (BESCO L-2 or equivalent) to the connecting portion of the rear cable and equalizer. Install rear cable (15).
2. Install retainer (14).
 - Tighten nut (13) to the specified torque.

Torque: 41N·m (30lb ft)
3. Tighten nut (12) to the specified torque.

Torque: 15N·m (11lb ft)
4. Tighten bolt (11) (10) (9) to the specified torque.

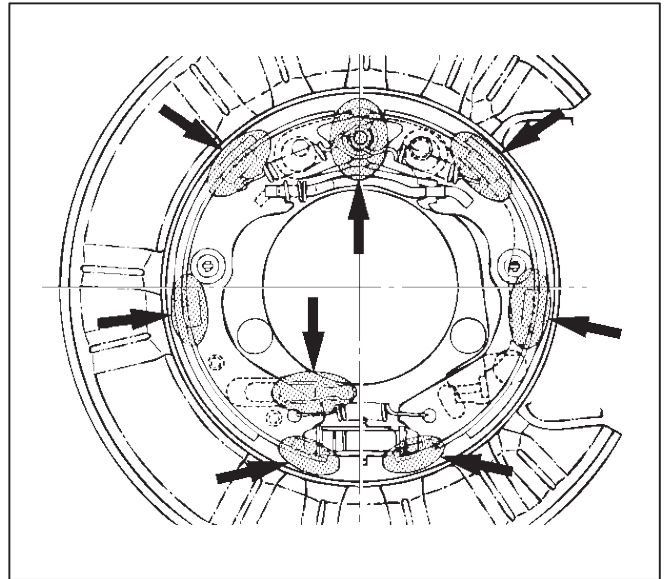
Torque: 6.5N·m (57lb in)

 - To adjust the parking brake, refer to *Parking Brake Adjustment* in this section.
5. Tighten the cable fixing bolt (8) to the specified

Torque: 6.5N·m (57lb in)

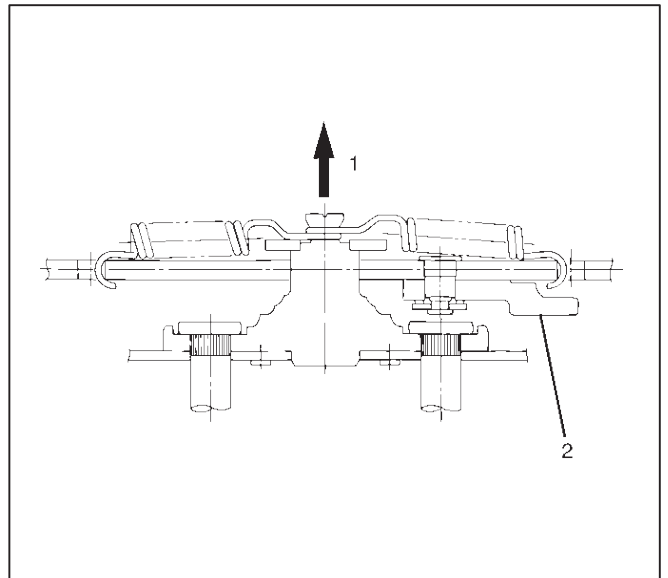
6. Install shoe assembly (7).

After installation of the shoe and cable assembly, apply special grease (included in the repair kit) to the following portions indicated in the figure.



7. Install lower return spring (6) and upper return spring (5).

The parking brake lever side (secondary side) return spring must be installed on the outer side of the primary side return spring.



Legend

- (1) Outer Side
(2) Parking Lever

8. Install holding spring (4).
9. Install rotor (drum) (3).
10. Install caliper assembly (2).
11. Install rear wheels (1).

5D1-6 PARKING BRAKE SYSTEM (4x4 Model)

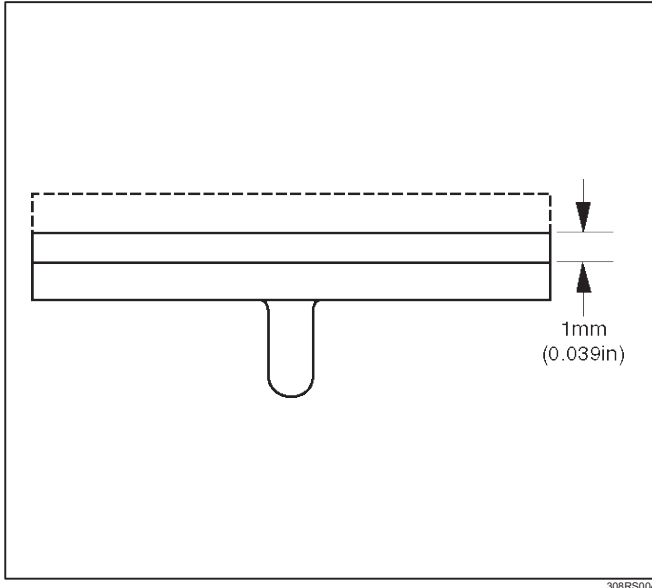
Inspection and Repair

Parking Brake Lining Inspection

Check the shoe assemblies for wear by removing the brake drum.

Replace the shoe assemblies if the lining thickness is less than 1.0 mm (0.039 in).

Minimum limit: 1.0 mm (0.039 in)



Parking Brake Rotor (Drum) Inspection

Refer to "Rear Disc Brakes" in *Power-Assisted Brake System* section for inspection procedure of the rotor (drum).

Parking Brake Adjustment

1. Prior to lever stroke adjustment, adjust rear brake shoe/rotor (drum) gap. Perform this procedure with loosening the adjust nut of the hand brake lever.
2. Remove the adjusting hole plug (rubber) and turn the shoe adjusting screw downward with a small screwdriver so that shoes will expand until they get into close touch with the rotor. (Turn down the adjusting screw notch by notch until the rotor does not turn.)
3. Turn the adjusting screw in the opposite direction (upward) until the rotor can be turned lightly. Standard number of notches to turn upward: 7 or 8 notches
Turn the rotor and make sure that there is no brake dragging.
4. After the rear brake shoe/rotor (drum) gap has been adjusted, perform parking brake cable adjustment.
5. Turn the adjusting nut so that the parking brake lever travels 6-8 notches when pulled up with a force of 30 kg (66 lb).
6. Make sure there is no brake dragging. Then tighten the cable lock nut

Torque : 13 N·m (113 lb in)

7. When poor braking effect possibly resulting from insufficient break-in is felt, or just after replacement of parking brake shoe, be sure to conduct break-in as follows:

8. Forward 50 km/h (30 mph) × 400 m (About 30 seconds) with a lever pull force of 15 kg (33 lb).
9. Backward 10 km/h (6 mph) × 50 m (About 18 seconds) with a lever pull force of 15 kg (33 lb).

NOTE: Break-in procedures must be performed under safe conditions and traffic rules.

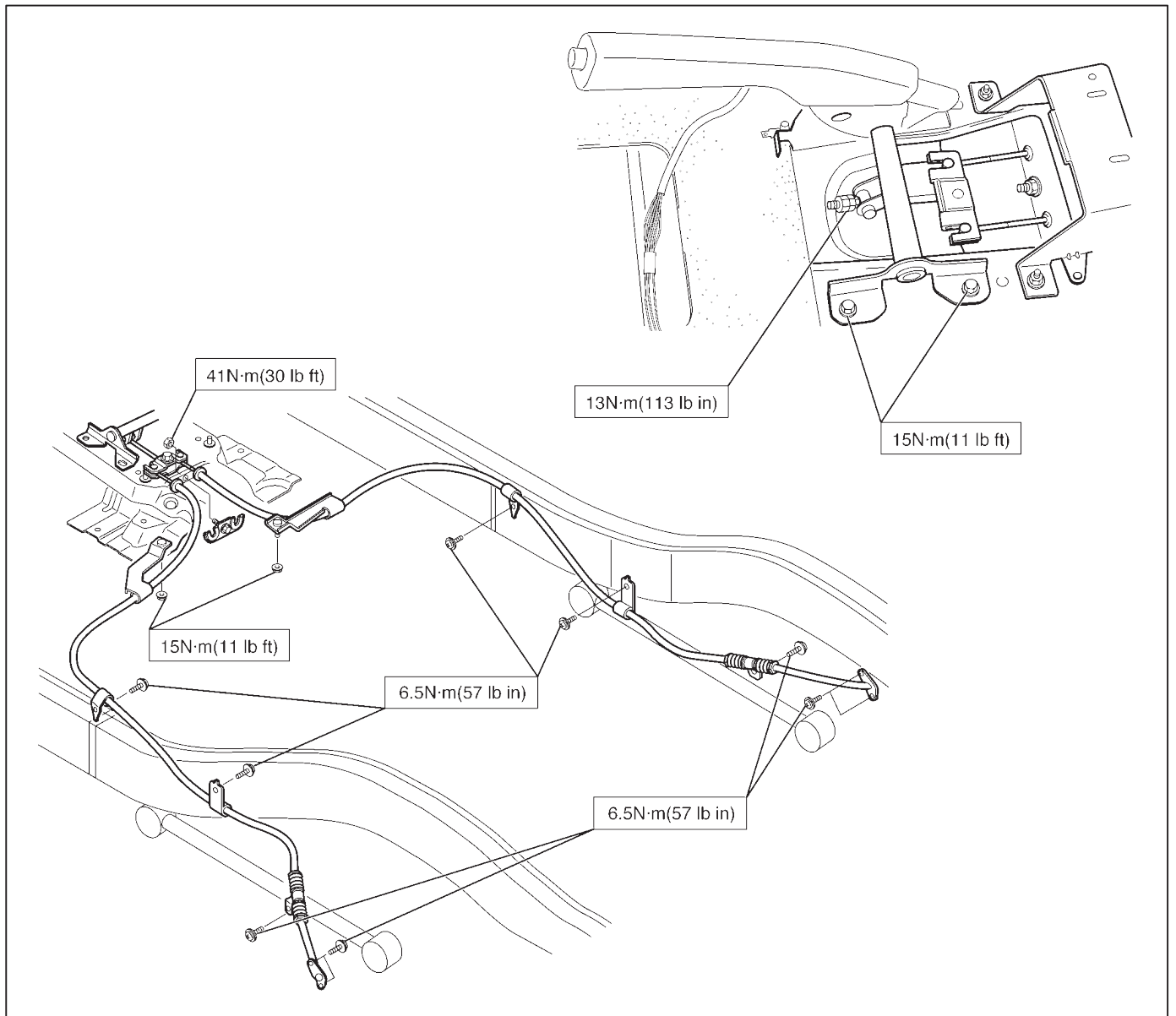
- If braking effect still remains poor after the above break-in, wait for some time until parking brake shoe cools down and repeat the procedures 8. and 9. noted above.
- On completion of break-in, inspect parking brake lever stroke, and if the lever does not come within the specified number of notches when pulled up, readjust.
- Excessive break-in may cause premature wear of the parking brake lining.

Main Data and Specifications

General Specifications

	Model
Type	Duo-servo
Drum inside diameter	210 mm(8.27 in)
Parking brake lever stroke	6-8 notches When pulled with a force of 30 kg (66 lb)

Torque Specifications



AXIOM

BRAKES

PARKING BRAKE SYSTEM (4×2 Model)

CONTENTS

Service Precaution	5D2-1	Parking Brake Rear Cable	5D2-3
General Description	5D2-1	Parking Brake Rear Cable and Associated Parts	5D2-3
Parking Brake Lever	5D2-2	Removal	5D2-4
Parking Brake Lever Assembly and Associated Parts	5D2-2	Installation	5D2-4
Removal	5D2-2	Parking Brake Adjustment	5D2-4
Installation	5D2-2	Main Data and Specifications	5D2-5

Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

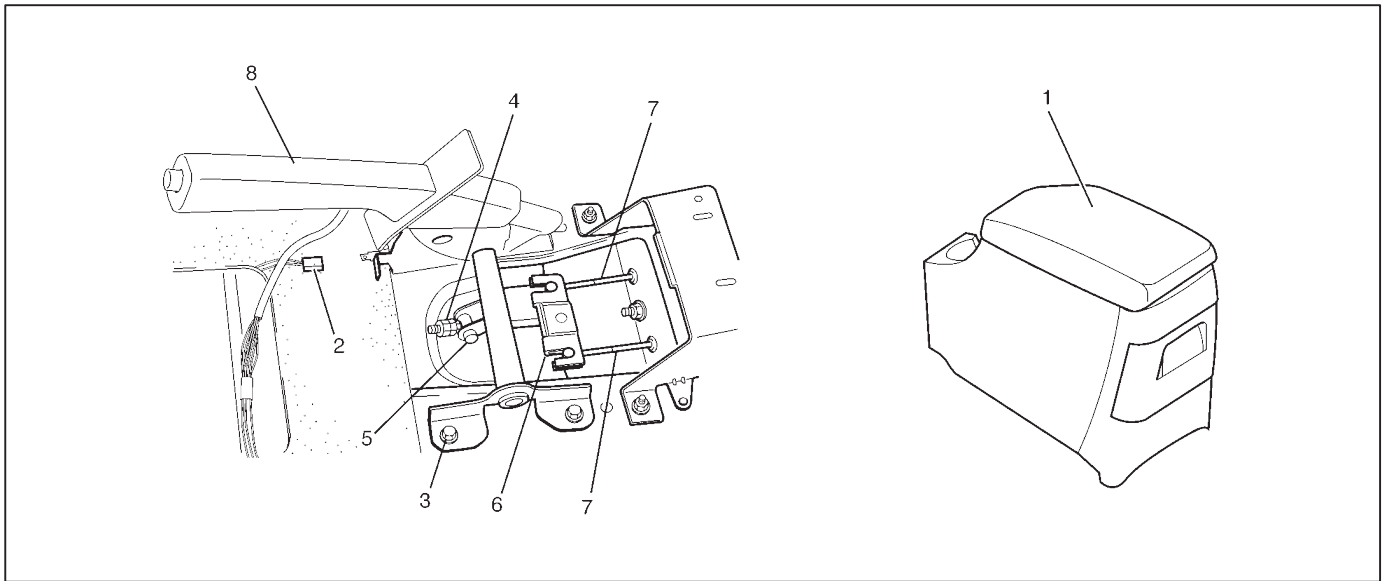
CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description

Pulling up the parking brake lever by hand will set the parking brake. By means of a ratchet type lock, the lever can be held in that position until it is released. The position of the lever is transmitted through cable/lever systems to the rear wheels. These parts are designed to obtain sufficient braking force even when parking on slopes. When the parking brake is set, or when the ignition SW is in the "ON" position, the brake warning light illuminates. The rear wheel parking brake is a leading/trailing brake (mechanical inside expansion type). Parking brake adjustment is made through the adjusting hole (bored through back plate). Parking brake lever stroke should be adjusted to 6 notches. Refer to *Parking Brake Adjustment* in this section.

Parking Brake Lever

Parking Brake Lever Assembly and Associated Parts



Legend

- | | |
|-----------------------------|------------------------------|
| (1) Rear Console | (5) Trunnion Pin |
| (2) Switch Connector | (6) Equalizer |
| (3) Bolt | (7) Parking Brake Rear Cable |
| (4) Adjust Nut and Lock Nut | (8) Parking Brake Lever |

Removal

1. Remove rear console (1).
 - Refer to *Body and Accessories* section in this manual.
2. Disconnect switch connector (2).
3. Remove bolt (3).
4. Remove adjust nut and lock nut (4).
5. Pull out equalizer (6) from trunnion pin (5).
6. Disconnect trunnion pin (5) from parking brake lever (8).
7. Disconnect parking brake rear cable (7).

Installation

1. Apply grease (BESCO L-2 or equivalent) to the connecting portion of the rear cable (7) and equalizer (8).
2. Connect parking brake rear cable (7) to equalizer (6).
3. Install trunnion pin (5) to parking brake lever (8).
4. Insert equalizer (6) into trunnion pin (5) and tighten adjust nut and lock nut (4).
 - To adjust the parking brake lever, see "Parking Brake Adjustment" in this section.

Lock Nut Torque: 13 N·m (113 lb in)

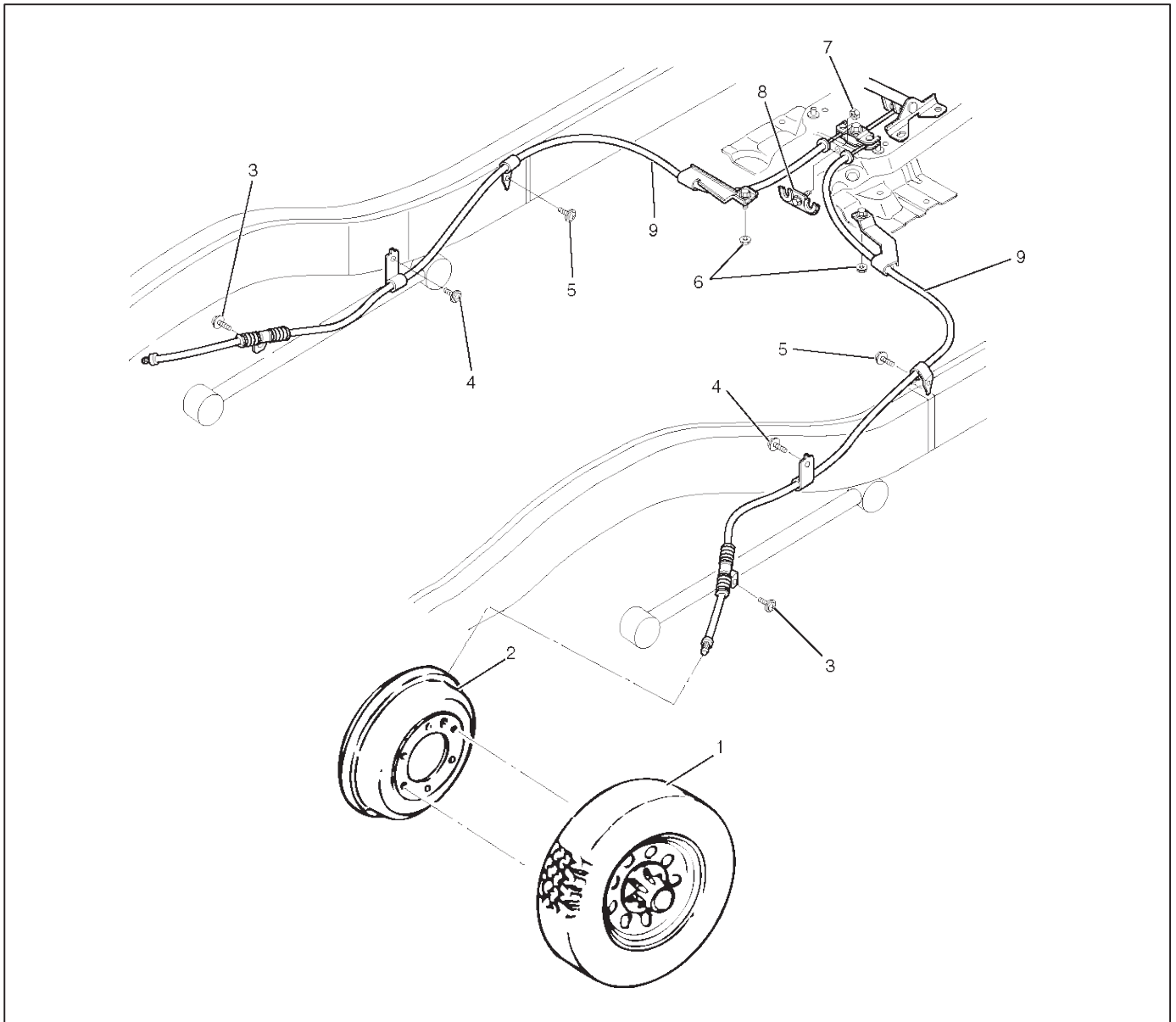
5. Tighten parking lever fixing bolt (3) to the specified torque.

Torque: 15 N·m (11 lb ft)

6. Connect switch connector (2).
7. Install rear console (1).
 - Refer to *Body and Accessories* section in this manual.

Parking Brake Rear Cable

Parking Brake Rear Cable and Associated Parts



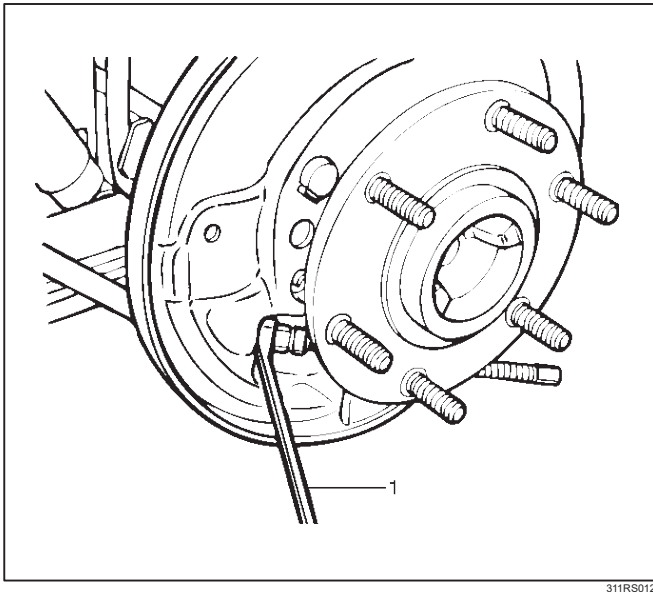
311RY00006

Legend

- | | |
|-------------------|--|
| (1) Rear Wheels | (5) Clip and Bolt (Only Long Wheel Base Model) |
| (2) Drums | (6) Nut |
| (3) Clip and Bolt | (7) Nut |
| (4) Clip and Bolt | (8) Retainer |
| | (9) Rear Cable |

Removal

1. Remove rear wheels (1) and drums (2).
2. Remove bolt (3) (4) (5).
3. Remove nut (6).
4. Remove nut (7) and retainer (8).
5. Remove rear brake shoe assemblies. Refer to "*Brake Lining Assembly and Associated Parts*" in *Power Assisted Brake System* section.
6. Use offset box wrench (13 mm hex.) to compress the locking lugs on the cable, then remove the rear cable (9) from the Backing plate.



Legend

- (1) Offset Box Wrench

Installation

1. Install rear cable (9).
2. Install retainer (8).
3. Tighten nut (7) to the specified torque.
Torque : 41 N·m (30 lb ft)
 - To adjust the parking brake, refer to *Parking Brake Adjustment* in this section.
4. Tighten nut (6) to the specified torque.
Torque : 15 N·m (11 lb ft)
5. Tighten bolt (5) (4) (3) to the specified torque.
Torque : 6.5 N·m (57 lb in)
6. Install rear drums (2) and wheels (1).

Parking Brake Adjustment

NOTE: All brakes are self adjusting. Brakes are adjusted by repeated stepping on the brake pedal. (After stepping on the pedal and releasing it, the rear auto-adjuster, in the rear brake, produces a clicking sound. The same operation should be repeated until the sound disappears.)

Take the following steps after overhauling the rear brake assembly.

1. Move the parking brake lever to its fully released position.
2. Parking cable must be loosened sufficiently. (Loosen the adjust nut and the lock nut.)
3. Repeat stepping on the brake pedal firmly, and releasing it until the clicking sound can no longer be heard.

If the difference between the brake drum inside diameter and diameter of the brake shoes is adjusted to be 0.5 mm, the number of times for depressing the brake pedal can be reduced.

4. Remove the drum. Measure the brake drum inside diameter and diameter of the brake shoes.

Shoe clearance: 0.25 mm to 0.40 mm

(0.0098 in to 0.0157 in)

If incorrect, check the brake auto-adjusting system.

5. Rotate the adjust nut of hand brake lever until all slack disappears from the cable. Set the adjust nut.
6. Applying about 30 kg (66 lb) of force, pull the parking brake lever to its fully set position three or four times.
7. If the parking brake is properly adjusted, the travel between the fully disengaged position and the fully engaged position will be 6 notches.

If the traveling range is not within these limits, repeat steps 1 through 5 again .

After adjusting has been done, check to see if the rear wheel rotates smoothly without drag when turned by hand.

Main Data and Specifications

General Specifications

	Model
Type	Leading-Trailing
Drum inside diameter	295 mm (11.6 in)
Parking brake lever stroke	6-8 notches When pulled with a force of 30 kg (66 lb)

Torque Specifications

