



BRAKES

SERVICE AND PARKING

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CAUTION

When servicing brake assemblies or components, do not create dust by sanding, grinding or by cleaning brake parts with a dry brush or with compressed air. A WATER DAMPENED CLOTH SHOULD BE USED. Many brake components contain asbestos fibers which can become airborne if dust is created during service operations. Breathing dust which contains asbestos fibers can cause serious bodily harm.



SPECIFICATIONS

GENERAL SPECIFICATIONS

mm (in.)

Master cylinder	
Type	Tandem type
I.D.	23.81 (.94)
Brake booster	
Type	Vacuum type
Front brakes	
Type	FS17 type disc
Disc O.D.	
Vehicles without an intercooler	255 (10.04)
Vehicles with an intercooler	276 (10.87)
Pad thickness	10.0 (.39)
Cylinder I.D.	57.2 (2.25)
Clearance adjustment	Automatic
Rear brakes	
Type	AD type disc
Disc O.D.	
Vehicles without an intercooler	247 (9.72)
Vehicles with an intercooler	266 (10.47)
Pad thickness	8.5 (.33)
Cylinder I.D.	41.3 (1.63)
Clearance adjustment	Automatic
Parking brakes	
Type	Mechanical brake acting on rear wheels
Brake lever type	Lever type
Cable arrangement	V-type

SERVICE SPECIFICATIONS

Standard value	
Brake pedal height mm (in.)	177-183 (7.0-7.2)
Stop light switch outer case to pedal arm clearance mm (in.)	0.5-1.0 (.02-.04)
Brake pedal free play mm (in.)	10-15 (.4-.6)
Brake pedal to floorboard clearance mm (in.)	80 (3.1) or more
Vacuum decrease by brake booster air-tightness test with no load kPa (mmHg)	3.0 (25)
Vacuum decrease by brake booster air-tightness test under load kPa (mmHg)	3.0 (25)
Brake booster characteristic test-booster function test	
at 100 N (22 lbs.) foot force MPa (psi)	2.5-4.0 (355-570)
at 300 N (66 lbs.) foot force MPa (psi)	6.0-8.0 (850-1,140)
Brake booster characteristic test-non-booster function test	
at 100 N (22 lbs.) foot force MPa (psi)	0.2 (28) or less
at 300 N (66 lbs.) foot force MPa (psi)	1.5 (213) or less

SPECIFICATIONS



Proportioning valve split point	MPa (psi)	
Vehicles without rear brake-lock up control system		2.90–3.29 (420–476)
Vehicles with rear brake-lock up control system		3.58–4.27 (519–619)
Output pressure at proportioning valve input pressure of 5.88 MPa (853 psi) – Vehicles without rear brake-lock up control system	MPa (psi)	3.79–4.18 (549–606)
Output pressure at proportioning valve input pressure of 6.86 MPa (996 psi) – Vehicles with rear brake-lock up control system	MPa (psi)	4.80–5.48 (696–795)
Booster push rod to master cylinder piston clearance	mm (in.)	0.7–1.1 (.028–.043)
Front and rear disc brake dragging force at hub bolt	N (lbs.) [Nm (ft.lbs.)]	70 (15) or less [4 (3) or less]
Parking brake lever stroke		4–5 clicks
Resistance between the terminals of rear brake lock-up control system		
Pulse generator	Ω	600–800
Release solenoid valve	Ω	3.8–4.8
Build-up solenoid valve	Ω	4.5–5.5
Limit		
Master cylinder to piston clearance	mm (in.)	0.15 (.006)
Disc runout	mm (in.)	0.15 (.006)
Pad thickness		
Front	mm (in.)	1.0 (.04)
Rear	mm (in.)	1.0 (.04)
Disc thickness		
Front	mm (in.)	22.4 (.88)
Rear	mm (in.)	16.4 (.65)

TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Brake pedal to pedal support	25–35 (18–25)
Brake booster to pedal support	8–12 (6–9)
Reservoir band	2.5–4.0 (1.8–2.9)
Check valve case	40–50 (29–36)
Check valve cap	25–35 (18–25)
Secondary piston stopper	1.5–3.0 (1.1–2.2)
Master cylinder to brake booster	8–12 (6–9)
Fitting	15–18 (11–13)
Master cylinder to brake line connector	25–35 (17–25)
Brake line flare nut	13–17 (9–12)
Proportioning valve to body	5.5–8.5 (4.0–6.0)
Combination valve to body	8–12 (6–9)
Front disc brake hub to disc	35–40 (25–29)
Front disc brake dust cover	8–12 (6–9)



SPECIFICATIONS

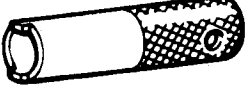
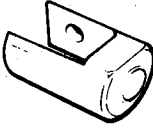


Front brake assembly	80-100 (58-72)
Slide pin	85-95 (61-69)
Rear axle housing to caliper support	40-50 (29-36)
Parking brake bracket to caliper body	40-55 (29-40)
Guide pin and lock pin	50-60 (36-43)
Bleeder screw	7-9 (5-7)
Valve cap of modulator hydraulic cylinder	30-40 (22-29)
Hydraulic cylinder to vacuum cylinder assembly	5-10 (3.6-7.2)
Bleeder cap	20-30 (14-22)

LUBRICANTS

	Specified lubricants	Quantity
Brake pedal bushing and spacer	MOPAR Multi-Mileage Lubricant Part Number 2525035 or equivalent	Small quantity
Brake booster push rod seal lip	Silicone grease	Small quantity
Brake booster push rod perimeter	Silicone grease	Small quantity
Brake booster push rod body perimeter	Silicone grease	Small quantity
Brake fluid	MOPAR Brake Fluid Part Number 2933249 or equivalent	As required
Lip of cylinder (Front brake assembly)	Repair kit grease (pink)	Small quantity
Front brake caliper plug seat surface	Repair kit grease (pink)	Small quantity
Front brake caliper slide pin hole	Repair kit grease (pink)	Small quantity
Front brake slide pin	Repair kit grease (pink)	Small quantity
Front brake bushing inner surface	Repair kit grease (pink)	Small quantity
Opposing surfaces of front brake inner shims and pad side surfaces of inner and outer shims	Repair kit grease	Small quantity
Rear brake dust boot fitting groove	Repair kit grease (orange)	Small quantity
Rear brake contact surface of caliper body and spring washers	Repair kit grease (orange)	Small quantity
Rear brake lever cap inner surface and lip of lever cap	Repair kit grease (orange)	Small quantity
Rear brake guide pin and lock pin	Repair kit grease (pink)	Small quantity
Parking brake lever bearing	Repair kit grease (orange)	Small quantity
Rear brake caliper support guide pin and lock pin boot	Repair kit grease (pink)	Small quantity
Dust seal of modulator	Repair kit grease (silicone grease)	Small quantity

SPECIAL TOOLS



Tool (Number and name)	Use	Tool (Number and name)	Use
<p>MB990652 Rear disc brake piston driver</p> 	<p>Screwing in the rear disc brake piston</p>	<p>MB990666 Rear disc brake connecting link installer</p> 	<p>Installation of the spring washer for the rear disc brake automatic adjuster</p>
<p>MB990520 Piston expander</p> 	<p>Pushing-in of the front disc brake piston</p>	<p>MB990665 Rear disc brake bearing remover and installer</p> 	<p>Removal and installation of the rear disc brake lever assembly bearing</p>



TROUBLESHOOTING

Symptom	Probable cause	Remedy
Noise and vibration when applying brakes	Caliper improperly mounted	Correct
	Loose caliper mounting bolts	Retighten
	Unevenly worn or cracked brake disc	Replace
	Worn pad friction material	Replace
	Excessive caliper to pad assembly clearance	Correct
	Uneven pad contact	Correct
	Lack of lubrication in sliding parts	Lubricate
	Loose suspension parts	Retighten
Vehicle pulls to one side when applying brakes	Difference in left and right tire inflation pressure	Adjust
	Inadequate contact of pad	Correct
	Grease or oil on pad surface	Replace
	Auto adjuster malfunction	Correct
Insufficient braking force	Low or deteriorated brake fluid	Replenish or change
	Air in brake system	Bleed the system
	Brake booster malfunction	Correct
	Inadequate contact of pads	Correct
	Grease or oil on pad surface	Replace
	Auto adjuster malfunction	Correct
	Overheated brake rotor due to dragging of pad	Correct
	Clogged brake line	Correct
Proportioning valve or combination valve malfunction	Replace	
Increased pedal stroke (Reduced pedal to floor clearance)	Air in brake system	Bleed the system
	Brake fluid leaks	Correct
	Auto adjuster malfunction	Correct
	Excessive push rod to master cylinder clearance	Adjust

TROUBLESHOOTING



Symptom	Probable cause	Remedy
Brake drag	Incomplete release of parking brake	Correct
	Incorrect parking brake adjustment	Adjust
	Worn brake pedal return spring	Replace
	Clogged master cylinder return port	Correct
	Lack of lubrication in sliding parts	Lubricate
	Defective master cylinder check valve or piston return spring	Replace
	Excessive push rod to master cylinder clearance	Adjust
Insufficient parking brake function	Worn brake pad Grease or oil on pad surface Parking brake cable sticking	Replace
	Auto adjuster malfunction	Correct
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable arrangement



SERVICE ADJUSTMENT PROCEDURES

SERVICE BRAKE PEDAL INSPECTION AND ADJUSTMENT

1. Measure the brake pedal height as illustrated. If the brake pedal height is not within the standard value, adjust as follows.

Pedal height (from upper surface of matsheet on floor to top of brake pedal pad) A
 [Standard value] 177–183 mm (7.0–7.2 in.)

- (1) Move the stop light switch to a position where it does not contact the brake pedal arm.
- (2) Adjust the brake pedal height by turning the operating rod with pliers (with the operating rod lock nut loosened), until the correct clearance is obtained.
- (3) Adjust the stop light switch until the dimension between the outer case of the stop light switch and the brake pedal arm reaches the standard value, and then lock the switch in place with lock nut.

Dimension B [Standard value]
 0.5–1.0 mm (.02–.04 in.)

2. While the engine is stopped, depress the brake pedal two or three times. After thus eliminating the vacuum in the power brake booster, press the pedal down by hand, and confirm that the amount of movement before resistance is met (the free play) is within the standard value range.

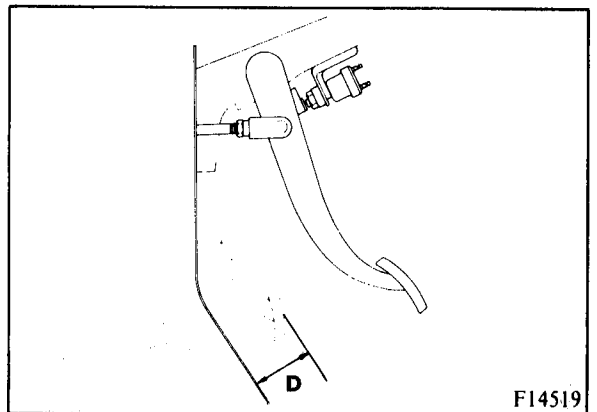
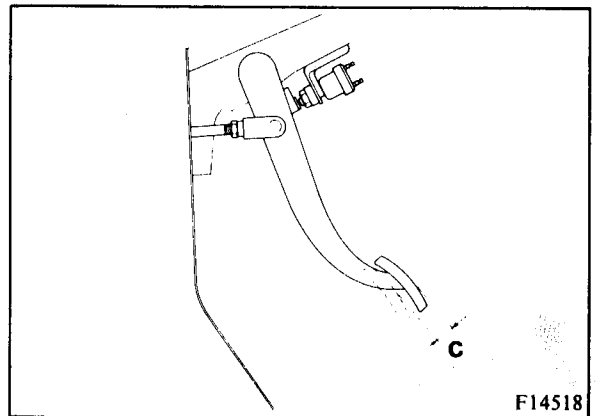
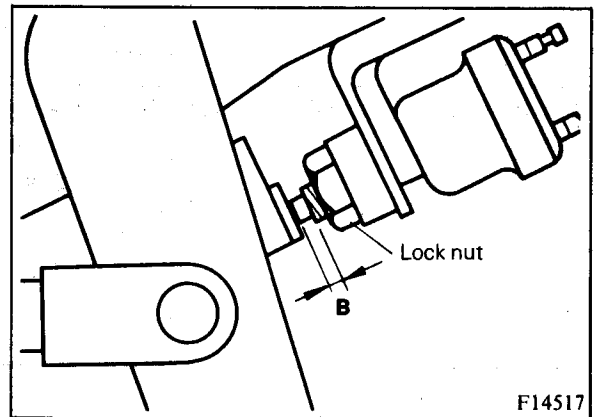
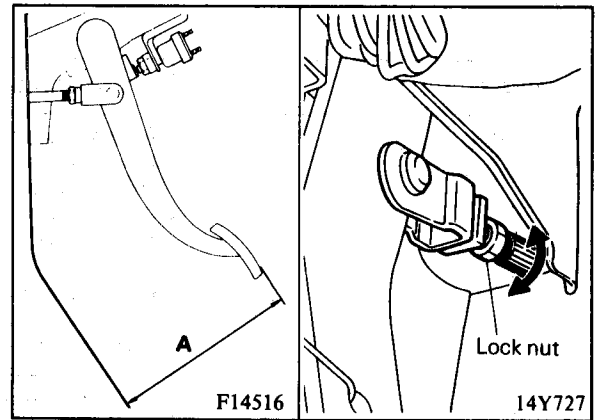
Brake pedal free play C [Standard value]
 10–15 mm (.4–.6 in.)

If the free play is less than the standard value, check to make sure that normal clearance is maintained between the stop light switch and the pedal arm.

3. Start the engine, depress the brake pedal with approximately 500 N (110 lbs.) of force, and measure the clearance between the brake pedal and the floorboard.

Pedal to floorboard clearance D when pedal is depressed [Pedal depressing force about 500 N (110 lbs.)] [Standard value]
 80 mm (3.1 in.) or more

If the clearance is less than the standard value, see TROUBLESHOOTING.



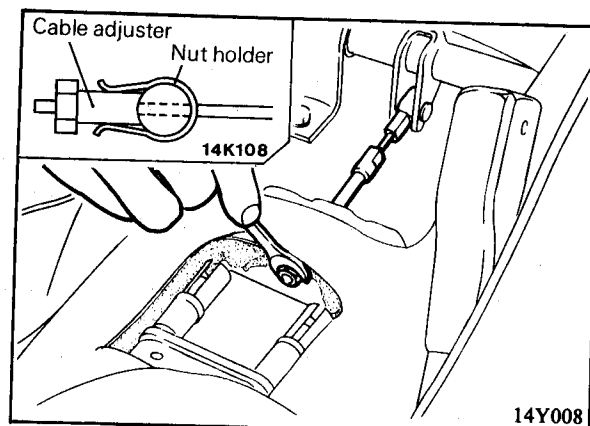


PARKING BRAKE STROKE ADJUSTMENT

1. Pull the brake lever, and count the number of clicks to apply the parking brake. If the parking brake lever stroke exceeds the standard value, adjust it by turning the cable adjuster.

Parking brake lever stroke [Standard value]
 4 – 5 clicks

2. Remove the center console and adjust the parking brake as illustrated. (14Y008)
3. After adjusting the parking brake lever stroke, fit the nut holder positively on the flats of cable adjuster to lock the adjuster.



Caution

Overtightening of the parking brake will result in dragging brakes.

BRAKE BOOSTER OPERATING TESTS

Test Without a Tester

For simple checking of the brake booster operation, carry out the following tests:

1. Run the engine for one or two minutes, and then stop it. Step on the brake pedal several times with normal pressure.
 If the pedal depress fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly. If the pedal height remains unchanged, the booster is defective.
2. With the engine stopped, step on the brake pedal several times with the same foot pressure to make sure that the pedal height will not change. Then step on the brake pedal and start the engine. If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is defective.
3. With the engine running, step on the brake pedal and then stop the engine.
 Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition, if the pedal rises, the booster is defective.

If the above three tests are okay, the booster performance can be determined as good.

If one of the above three tests is not okay at last, the check valve, vacuum hose or booster will be defective.



SERVICE ADJUSTMENT PROCEDURES

Test Using Simple Testers

Before performing this test, remove the check valve from the brake booster and check the operation of the check valve. (Refer to P.5-20.)

While the check valve is removed, connect the vacuum hose directly, and then connect a different check valve (MB238892, etc.) as shown in the illustration.

Prior to the test, connect a vacuum gauge, pressure gauges and foot force gauge as shown in the illustration. Bleed the system.

TEST 1 – AIR-TIGHTNESS TEST WITH NO LOAD

1. Start the engine.
2. Stop the engine when the vacuum gauge reaches approximately 68 kPa (500 mmHg).
After stopping the engine, wait approximately 15 seconds, and then measure the decrease in vacuum.

Vacuum decrease by brake booster air-tightness test with no load [Standard value] 3.0 kPa (25 mmHg)

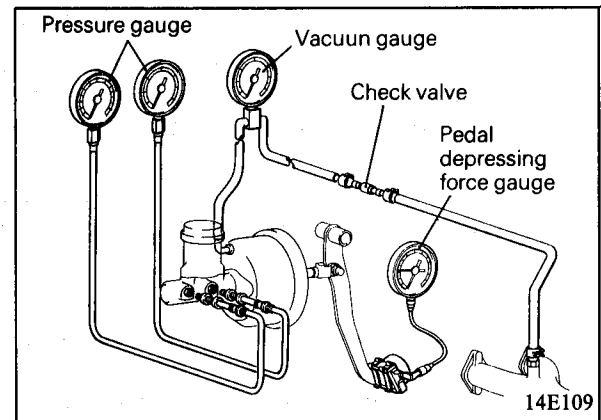
If the vacuum decrease exceeds the standard value, check the check valve, the vacuum hoses, and the brake booster, and make any necessary corrections.

TEST 2 – AIR-TIGHTNESS TEST UNDER LOAD

1. Start the engine.
2. Depress the brake pedal at a force of approximately 200 N (44 lbs.).
Stop the engine when the vacuum gauge reaches approximately 68 kPa (500 mmHg).
3. After stopping the engine, wait approximately 15 seconds, and then measure the decrease in vacuum.

Vacuum decrease by brake booster air-tightness test under load [Standard value] 3.0 kPa (25 mmHg)

If the vacuum decrease exceeds the standard value, check the check valve, the vacuum hoses, and the brake booster, and make any necessary corrections.





BRAKE BOOSTER CHARACTERISTICS TESTS

Just as in the brake booster operating tests, a vacuum gauge, two pressure gauges, and a foot gauge are used for these tests.

TEST 1 – BOOSTING FUNCTION TEST

1. Start the engine.
2. Depress the brake pedal when the vacuum gauge reaches approximately 68 kPa (500 mmHg).
3. Check to be sure that the brake fluid pressure is the standard value when the brake pedal is depressed at a foot force of 100 N (22 lbs.) and 300 N (66 lbs.).

Brake fluid pressure by brake booster characteristics test – booster function test [Standard value]

At 100 N (22 lbs.) foot force	2.5–4.0 MPa (355–570 psi)
At 300 N (66 lbs.) foot force	6.0–8.0 MPa (850–1,140 psi)

TEST 2 – NON-BOOSTING FUNCTION TEST

1. Stop the engine.
2. Confirm that the vacuum gauge indicates 0 kPa (0 mmHg).
3. Check to be sure that the brake fluid pressure is the standard value when the brake pedal is depressed at a foot force of 100 N (22 lbs.) and 300 N (66 lbs.).

Brake fluid pressure by brake booster characteristics test – non-boost function test [Standard value]

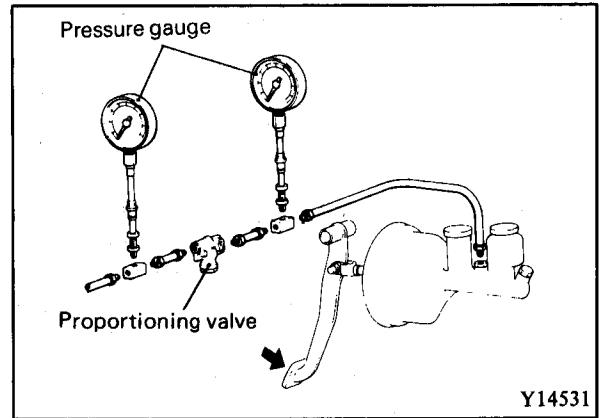
At 100 N (22 lbs.) foot force	0.2 MPa (28 psi) or less
At 300 N (66 lbs.) foot force	1.5 MPa (213 psi) or less



SERVICE ADJUSTMENT PROCEDURES

PROPORTIONING VALVE FUNCTION TEST

1. Connect two pressure gauges, one each to the input side and output side of the proportioning valve, as illustration.
2. With the brake pedal depressed, make the following measurements and check to be sure that the measured values are within the allowable range.
 - (1) Output pressure begins to drop relative to input pressure (split point)

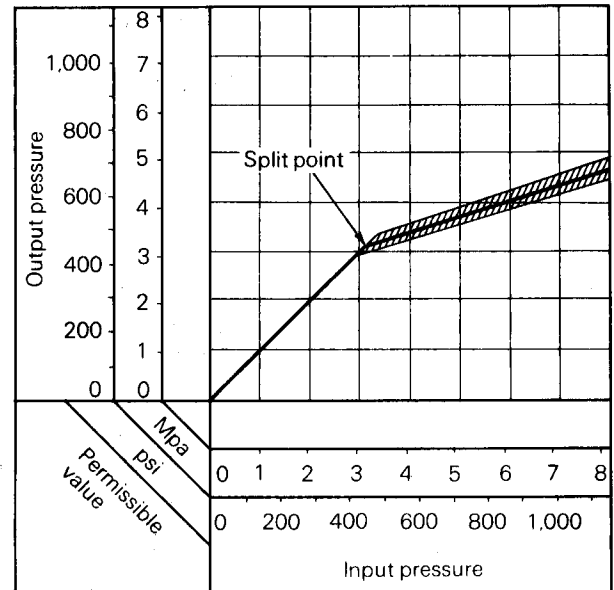


Split point [Standard value]	
Vehicles without rear brake-lock up control system	2.90 – 3.29 MPa (420 – 476 psi)
Vehicles with rear brake-lock up control system	3.58 – 4.27 MPa (519 – 619 psi)

(2) Relationship between input pressure and output pressure

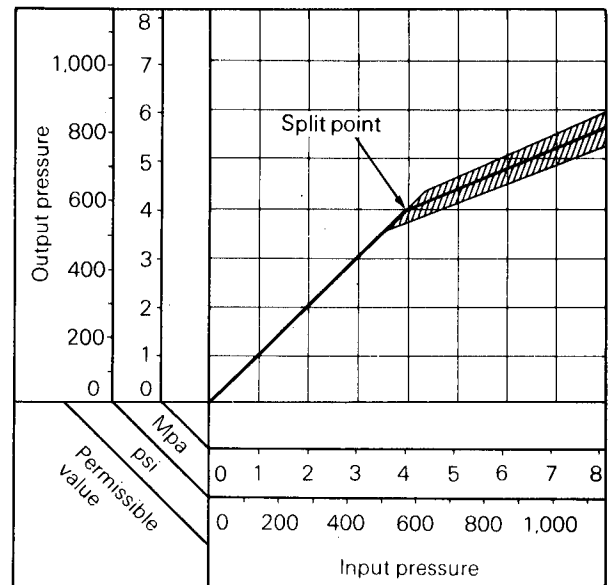
Brake fluid pressure [Standard value]	
Vehicles without rear brake-lock up control system at input pressure of 5.88 MPa (853 psi)	3.79 – 4.18 MPa (549 – 606 psi)
Vehicles with rear brake-lock up control system at input pressure of 6.86 MPa (996 psi)	4.80 – 5.48 MPa (696 – 795 psi)

Vehicles without rear brake-lock up control system



14Y741

Vehicles with rear brake-lock up control system



14Y740



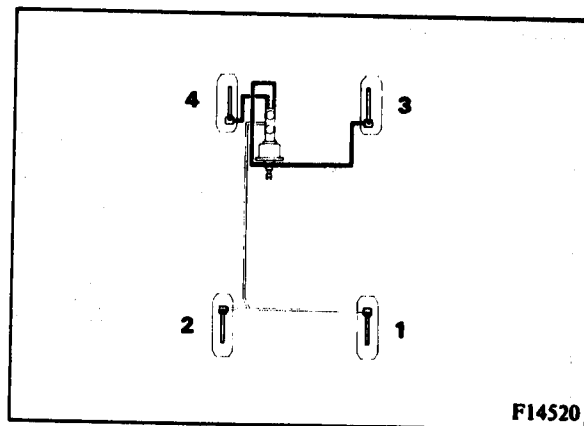
BLEEDING

NOTE

The brake hydraulic system should be bled whenever the brake tube, brake hose, master cylinder or wheel cylinder has been removed or whenever the brake pedal feels spongy when depressed.

Bleed the brake system in the sequence shown in the illustration.

Recommended brake fluid
 MOPAR Brake Fluid Part Number 2933249
 or equivalent



Caution

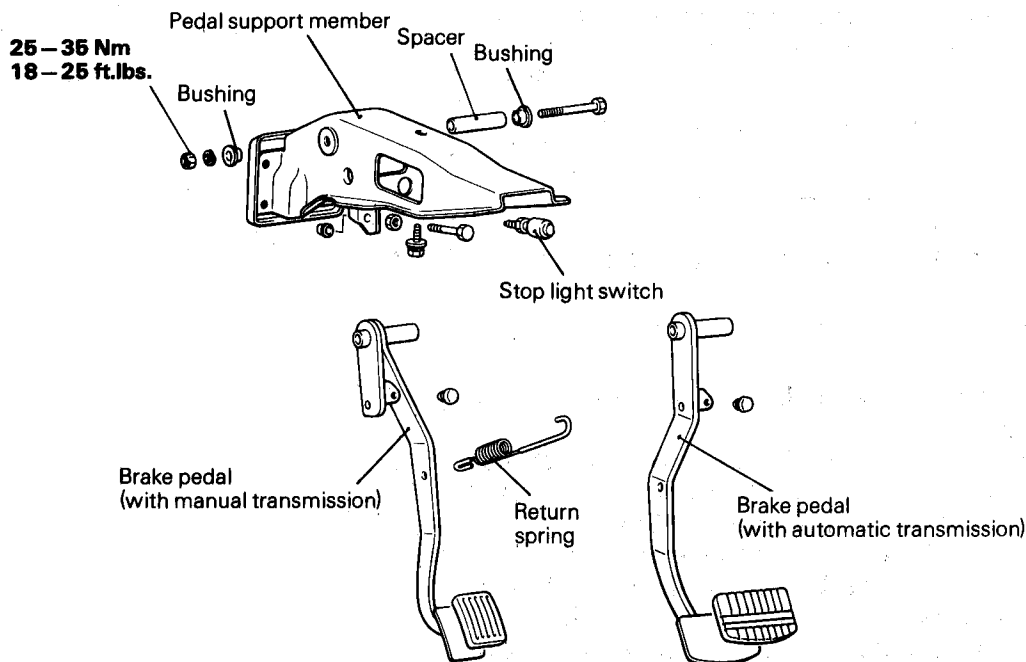
Use the specified brake fluid. Avoid using a mixture of the specified brake fluids.

If brake fluid is exposed to the air, it will absorb moisture; as water is absorbed from the atmosphere, the boiling point of the brake fluid will decrease and the braking performance will be seriously impaired. For this reason, use a hermetically sealed 1 liter (1.06 U.S.qt., 0.88 Imp.qt.) or 0.5 liter (0.52 U.S. qt., 0.44 Imp.qt.) brake fluid container.

Firmly close the cap of the brake fluid container after use.



COMPONENTS

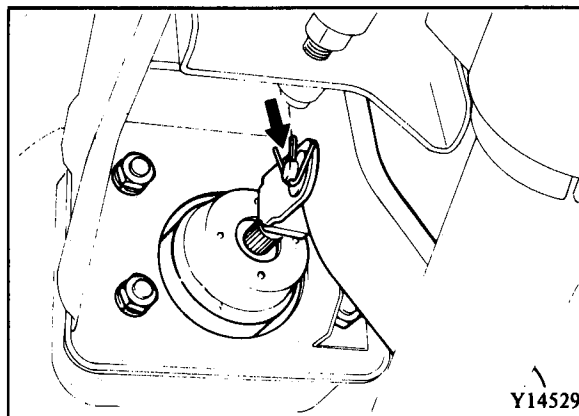


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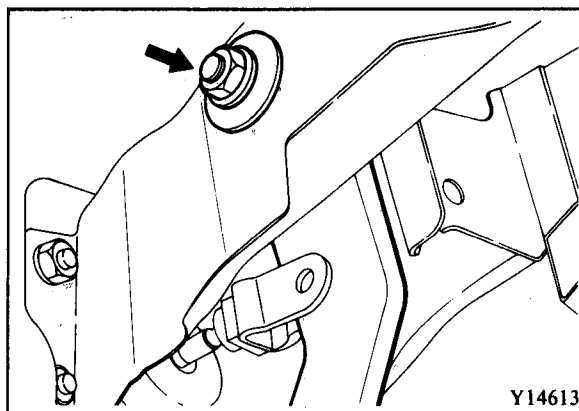
REMOVAL

Brake Pedal

1. Remove the return spring and stop light switch.
2. Remove the cotter pin that connects the operating rod of the brake booster to the brake pedal.



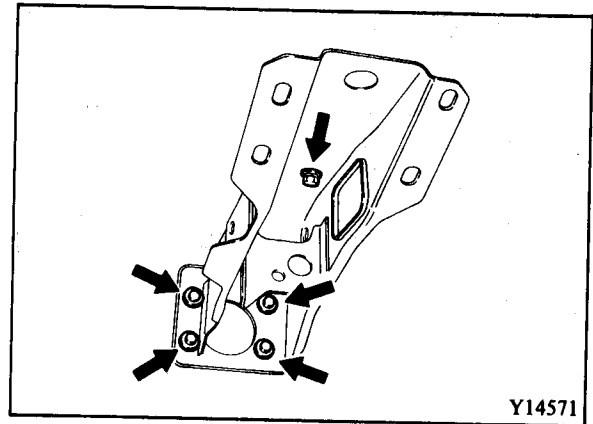
3. Remove the through bolt that attaches the brake pedal to the pedal support member.
4. Remove the brake pedal.





Brake Pedal Support

1. Remove the steering column assembly. (Refer to GROUP 19.)
2. Pull the speedometer cable out from the rear of the combination meter assembly.
3. Remove the antenna lead from the radio.
4. Remove the pedal support member. (Y14571)



Y14571

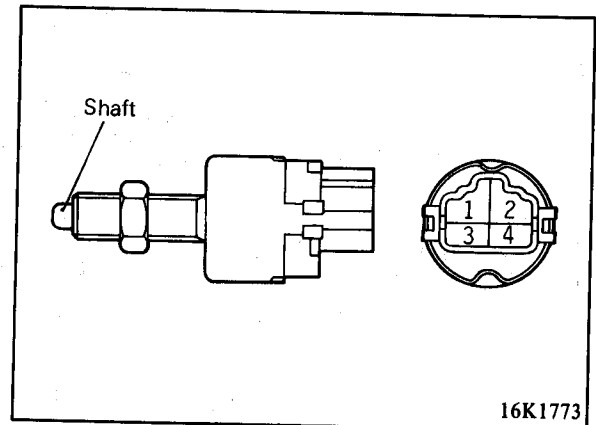
INSPECTION

1. Check the spacer and bushing for wear.
2. Check the brake pedal for bend or twisting.
3. Check the brake pedal return spring for damage.

Stop Light Switch

Operate the switch and check for continuity between the terminals.

Circuit	Terminal	Shaft dimension mm (in.)	
		Free	Full stroke
Stop light	2-3	5.8-6.8 (.23-.27)	3.4-5.0 (.13-.20)
Speed control	1-4	3-5 (.12-.20)	Continuity



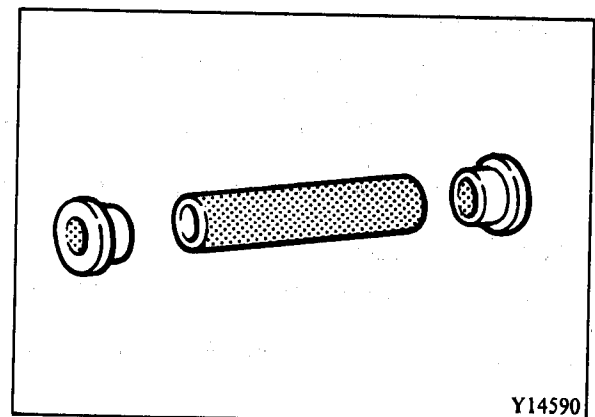
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INSTALLATION

1. Apply the specified multipurpose grease to the bushing and the spacer. (Y14590)

Recommended multipurpose grease
 MOPAR Multi-Mileage Lubricant
 Part Number 2525035 or equivalent

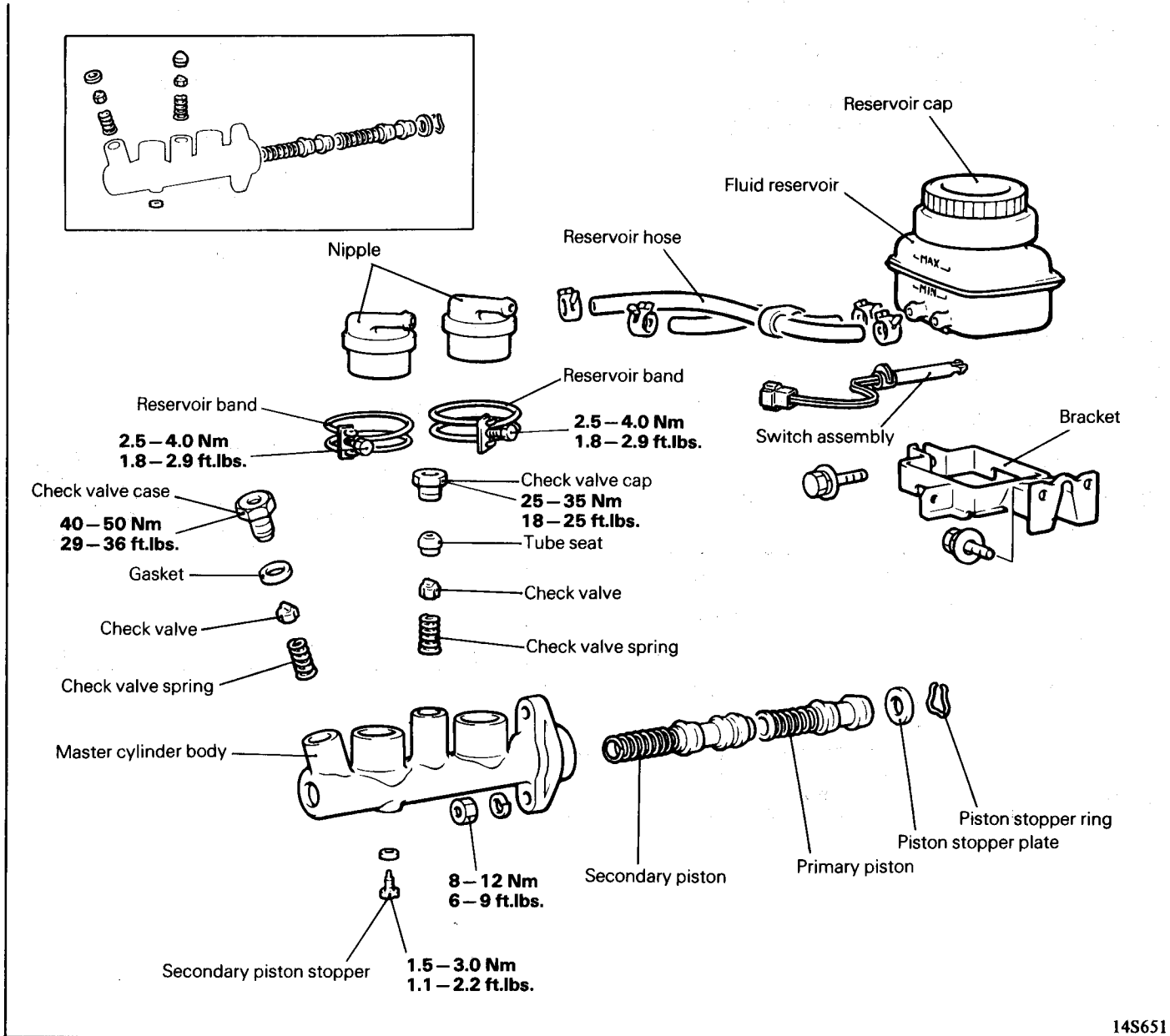
2. Install the brake support member and brake pedal.



Y14590



COMPONENTS



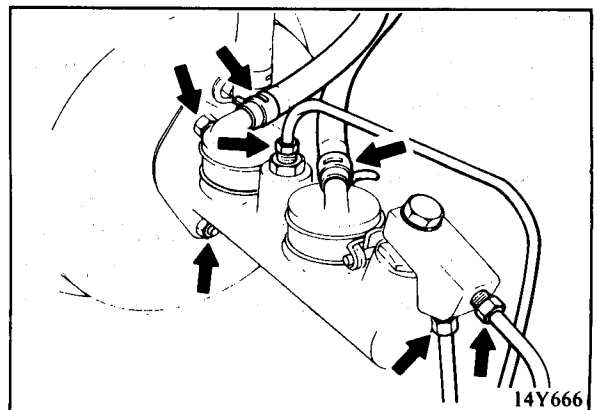
14S651

REMOVAL

1. Drain the brake fluid at the bleeder screws of the front and rear brake assemblies.
2. Disconnect the reservoir hoses and the brake tubes from the master cylinder.
3. Remove the master cylinder from the brake booster.

INSTALLATION

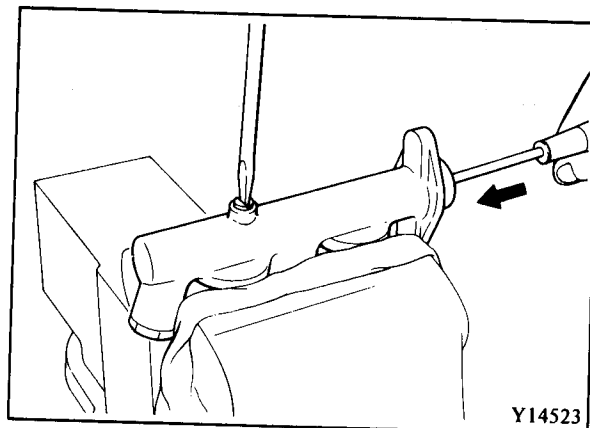
1. Check master cylinder push rod adjustment. (Refer to P. 5-18.)
2. Bleed the brake system. (Refer to P. 5-13.)





DISASSEMBLY

1. Remove the nipples.
2. Remove the secondary piston stopper while pushing the piston. (Y14523)

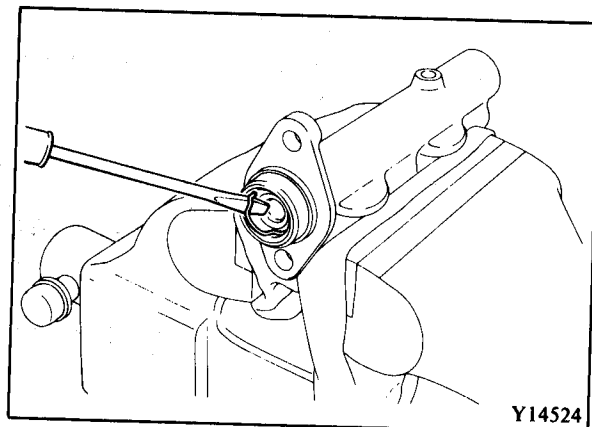


3. Remove the piston stopper ring. (Y14524)
4. Take out the primary and secondary pistons from the master cylinder body.

Caution

Do not disassemble the primary and secondary pistons.

5. Remove the check valve case and check valve cap, and then take out the check valves, check valve spring, gasket and tube seat.



INSPECTION

1. Check the check valve and check valve spring for deterioration.
2. Check gasket and tube seat for damage.
3. Check inner surface of master cylinder body for rust and scars.
4. Check primary and secondary pistons for rust, scars, wear and deformation.
5. Check primary and secondary piston springs for deterioration.
6. Measure the master cylinder I.D. and the piston O.D. with sliding calipers.

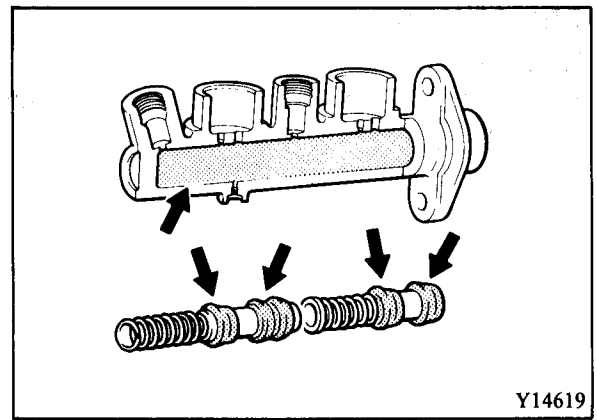
Master cylinder to piston clearance [Limit]
0.15 mm (.006 in.)

If the clearance exceeds the limit, replace the master cylinder and/or piston assembly.



REASSEMBLY

Apply the specified brake fluid sufficiently to the inner surface of the master cylinder body and to the entire periphery of the secondary and primary pistons.



MASTER CYLINDER PUSH ROD ADJUSTMENT

1. Measure the clearance between the brake booster push rod and the primary piston.

Booster push rod to master cylinder piston clearance
A (A = B - C - D) [Standard value]
0.7 - 1.1 mm (.028 - .043 in.)

NOTE

If the clearance is not within the standard value range, adjust by changing the push rod length by turning the screw of the push rod.

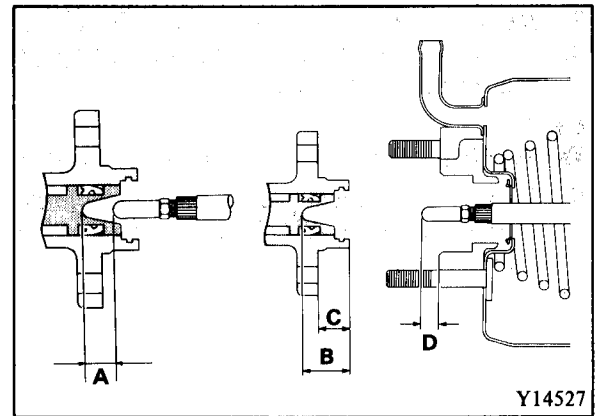
Caution

Insufficient clearance may cause excessive brake drag.

2. Make sure that the brake pedal free play is within the standard value range.

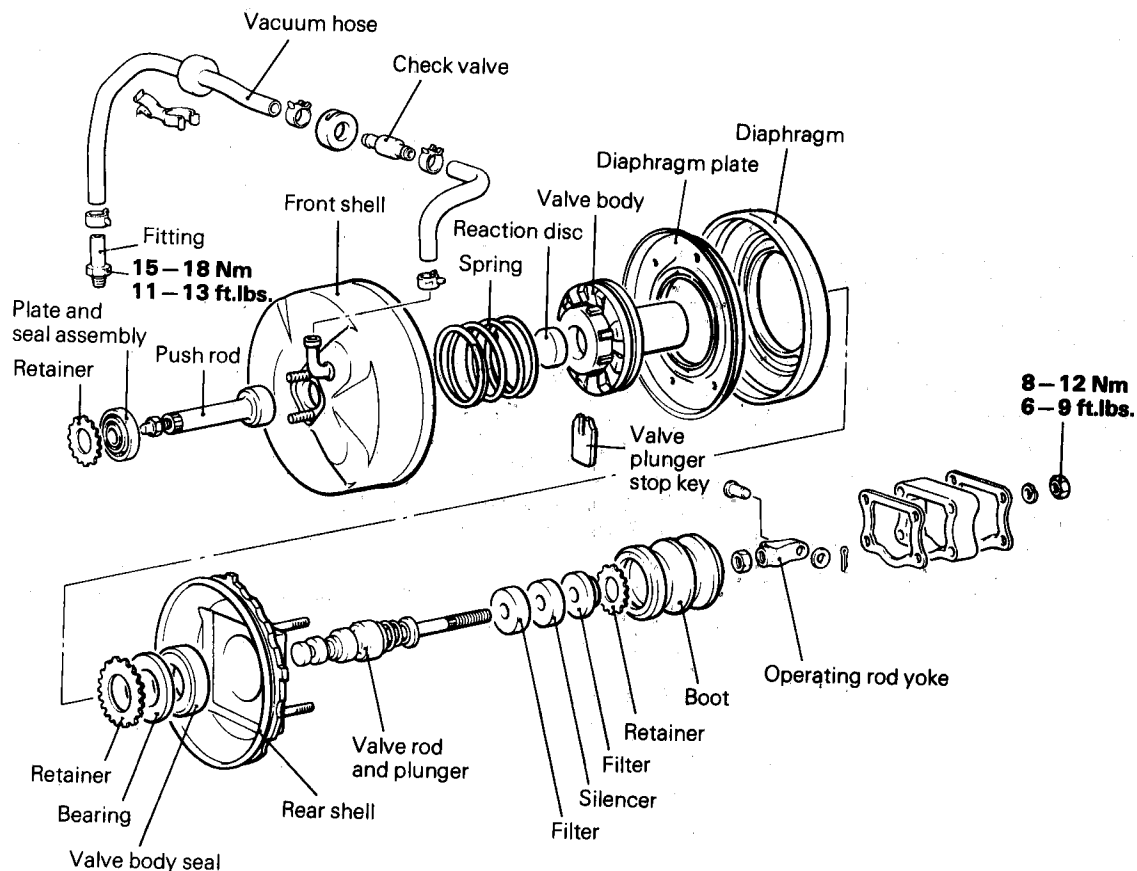
Brake pedal free play [Standard value]
10 - 15 mm (.4 - .6 in.)

3. Torque all parts to specifications during assembly.





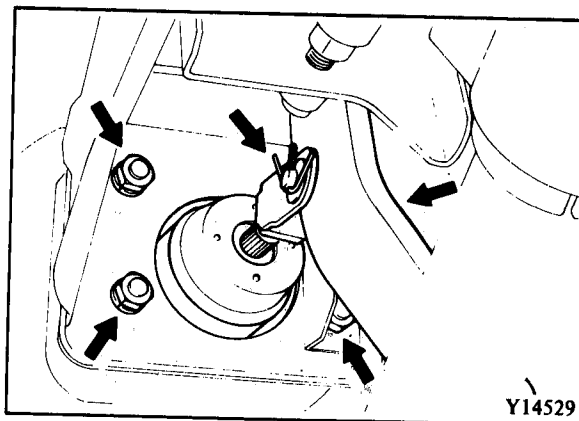
COMPONENTS



14Y670

REMOVAL

1. Remove the master cylinder. (Refer to P. 5-16.)
2. Disconnect the vacuum hose at the booster.
3. Disconnect the operating rod from the brake pedal.
4. Remove the brake booster.



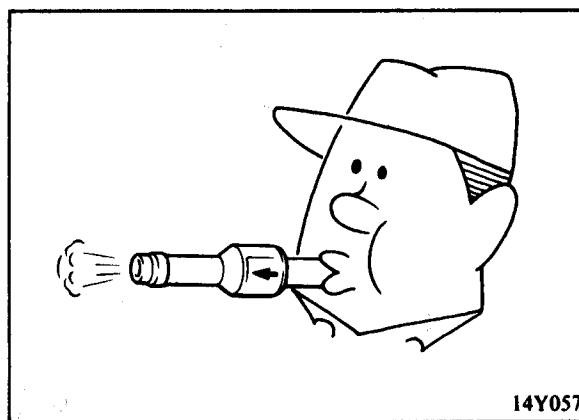
Y14529



INSPECTION

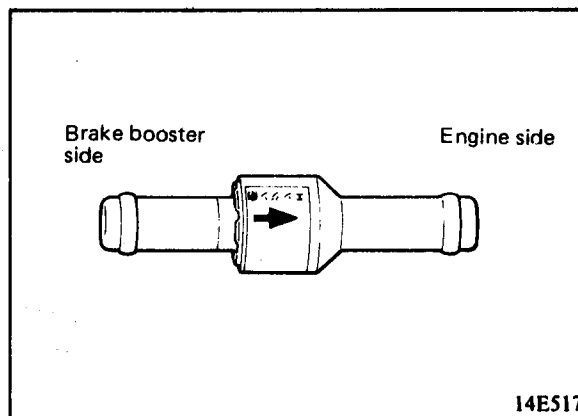
Check the check valve for operation as follows (14Y057):

1. Blow into the check valve.
2. If the air passes through when you blow from the booster side, but not when you blow from the engine side, the check valve is functioning properly.



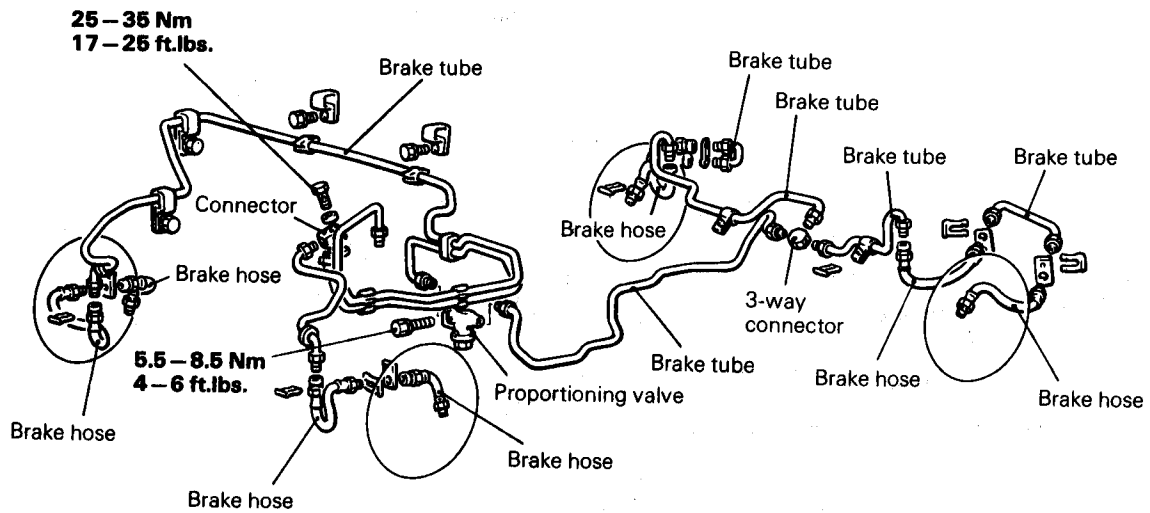
INSTALLATION

1. Check the booster push rod to master cylinder piston clearance. (Refer to P. 5-18.)
2. Install the check valve, noting the direction of installation. (14E517)
3. Fasten the vacuum hose securely to prevent air leaks from the connections.
4. After bleeding, adjust the brake pedal. (Refer to P. 5-8.)
5. Confirm that the brake booster operates properly. When installing the vacuum hose fitting, apply semi-drying sealant to its threaded portion and tighten it to the specified torque.





COMPONENTS



Brake hose flare nut:
13–17 Nm (9–12 ft.lbs.)

14Y673

INSPECTION

1. Check the brake tubes for cracks, crimps and corrosion.
2. Check the brake hoses for cracks, damage and leakage.
3. Check the brake tube flare nuts for damage and leakage.

INSTALLATION

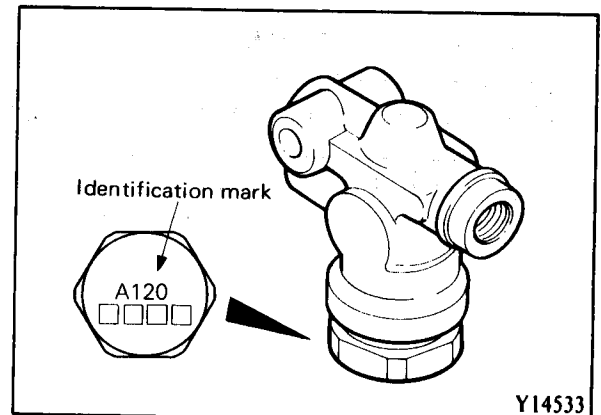
1. Install the brake hoses without twisting them.
2. The brake tubes should be installed away from edges, weld beads or moving parts.
3. Tighten the connections to the specified torque.

Flare nuts tightening torque
13–17 Nm (9–12 ft.lbs.)

Proportioning Valve

Cautions

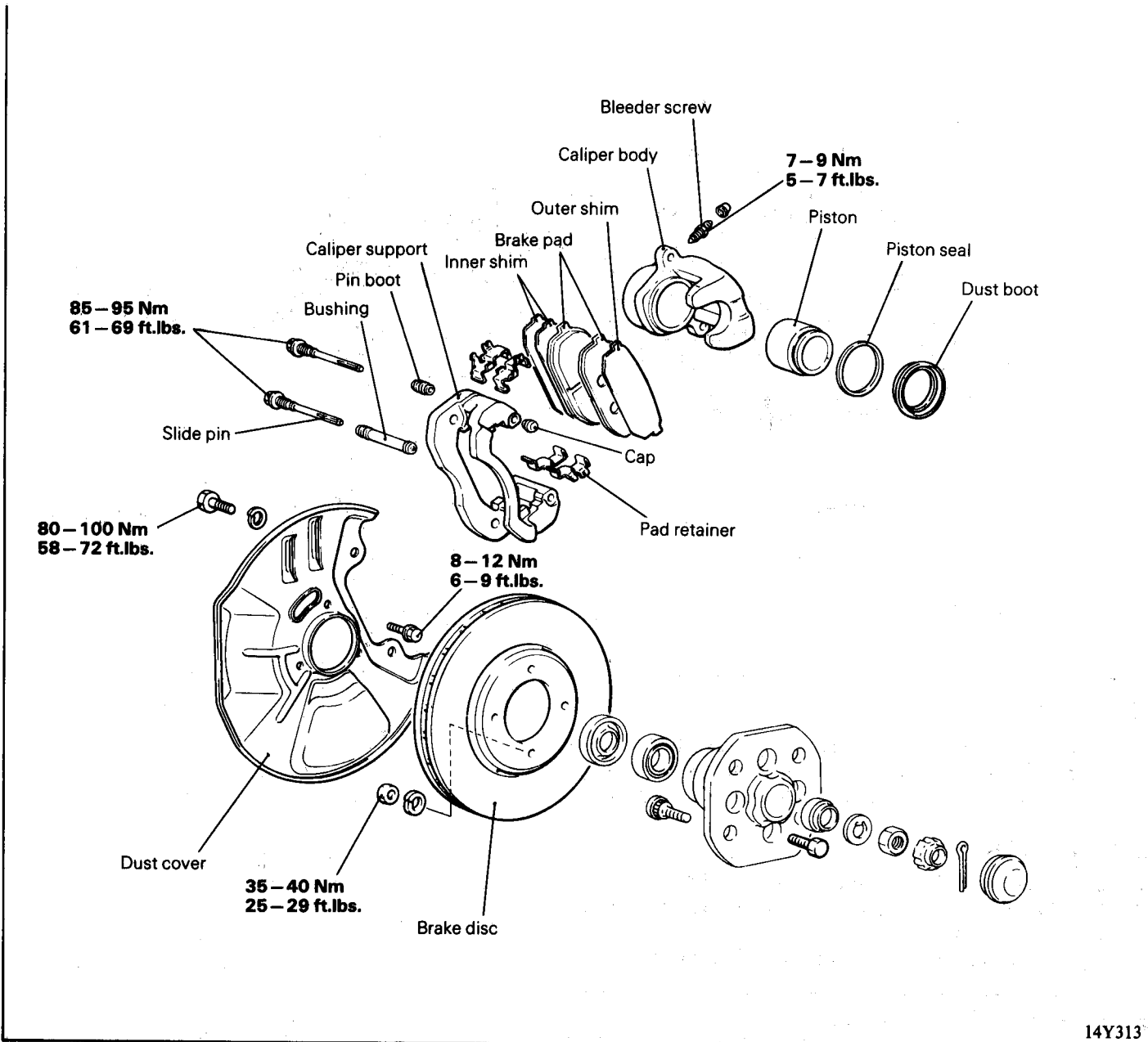
1. Do not disassemble the proportioning valve because its performance depends on the set load of the spring.
2. On vehicles with rear brake lock-up control system, use the proportioning valve bearing A123 mark. On vehicles without rear brake lock-up control system, use the proportioning valve bearing A120 mark.





COMPONENT SERVICE — FRONT DISC BRAKES

COMPONENTS

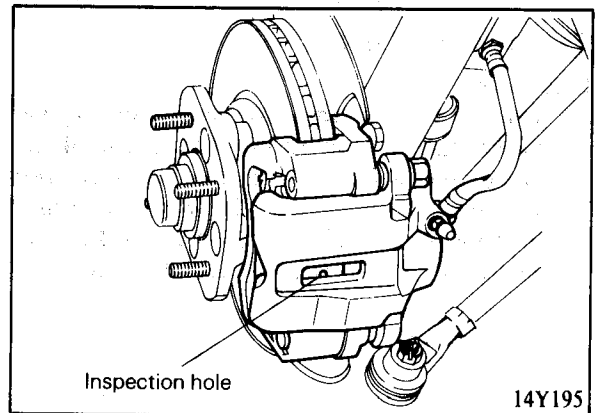


14Y313

BRAKE PAD INSPECTION

1. Check the pads for wear. (14Y195)
2. If the pad thickness is less than the limit, replace the pads.

Brake pad thickness [Limit] 1 mm (.04 in.)



14Y195



BRAKE PAD REPLACEMENT

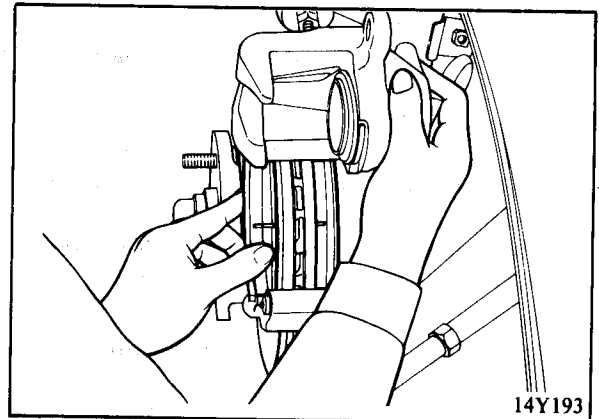
Removal

1. Remove the lower caliper slide pin.

NOTE

The slide pin is coated with a special grease. Do not remove this grease or get dirt on the pin.

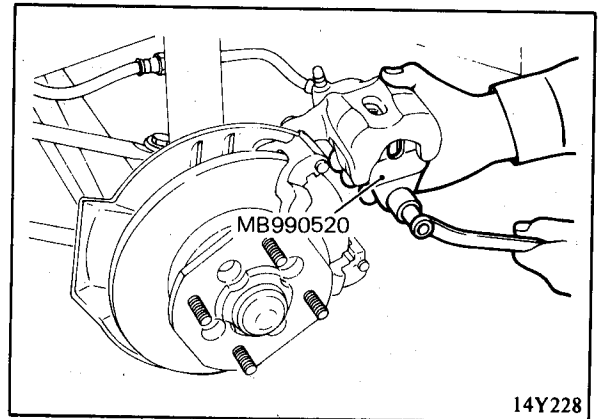
2. Lift the caliper up and suspend it with wire.
3. Remove the brake pads together with the inner shims and outer shim. (14Y193)



14Y193

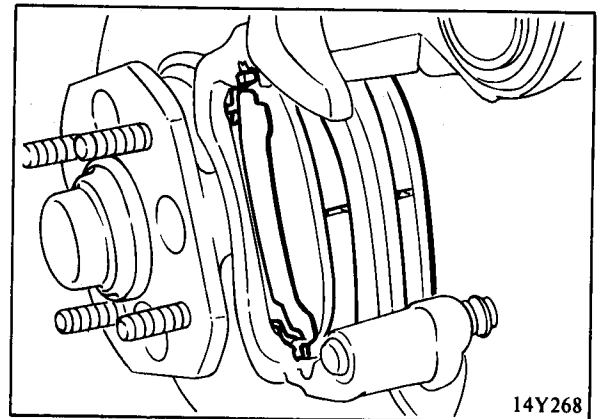
Installation

1. Push the piston into the caliper with piston expander.



14Y228

2. Install the pad retainer.



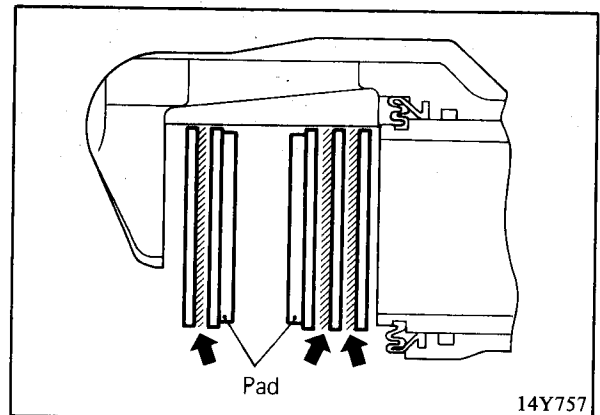
14Y268

3. Apply the repair kit grease to the opposing surfaces of both inner shims and also to the pad side surfaces of the inner and outer shims. (14Y757).

Recommended grease Repair kit grease

4. Fit the pad and shim together into an assembly and install to the caliper support.
5. Slide the caliper body over the brake pads and install the slide pin. Tighten the slide pin to the specified torque.

Slide pin tightening torque
85–95 Nm (61–69 ft.lbs.)



14Y757

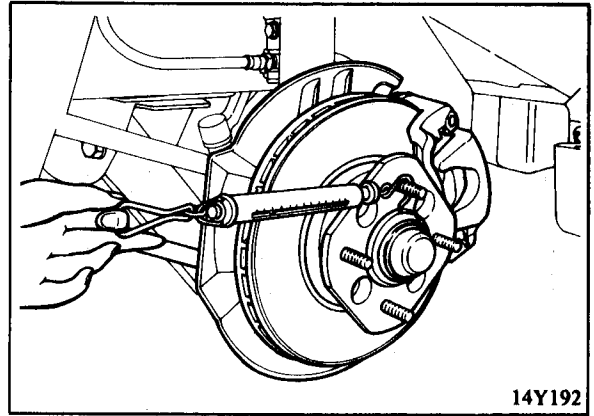


BRAKE DRAG INSPECTION

1. Start the engine and depress the brake pedal for 5 seconds.
2. Turn engine off.
3. Rotate the brake disc a few revolutions.
4. Use a spring scale as illustrated to measure the brake drag.
5. Remove the brake pads and use the spring scale to measure the rotational force.

The difference between brake drag and rotational force should not exceed the standard value.

Brake dragging force [Standard value]
 70 N (15 lbs.) or less
 [4 Nm (3 ft.lbs.) or less]



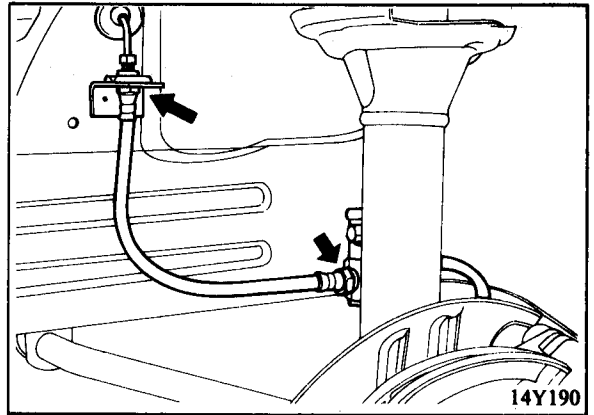
NOTE

If the difference exceeds the standard value, remove the caliper body and disassemble it. Check the piston and seal for deterioration, corrosion, dirt or scoring.

FRONT BRAKE ASSEMBLY

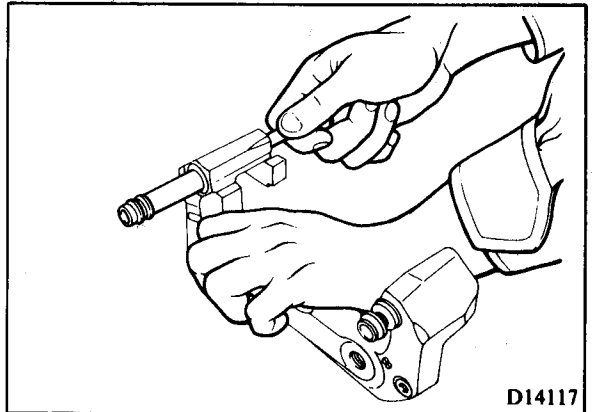
Removal

1. Disconnect the brake hose at the wheel house and strut assembly. (14Y190)
2. Remove the front brake assembly.
3. Remove the brake pads, then separate the caliper body from the caliper support.



Disassembly

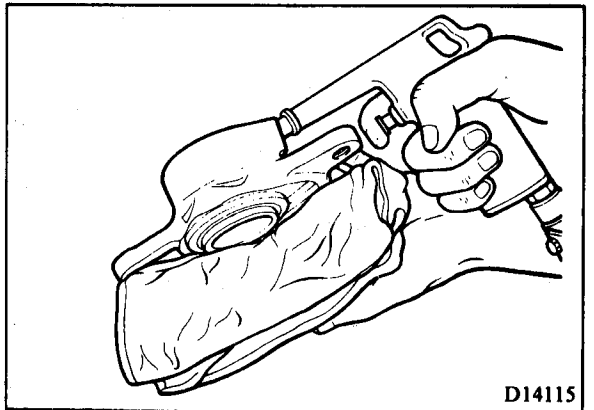
1. Push out the bushing from the caliper support by using the slide pin. (D14117)
2. Remove the cap and pin boot from the caliper support.



3. Remove the piston and dust boot by applying compressed air through the brake hose fitting hole.

Caution

Place a shop towel in front of the piston, and slowly increase the amount of compressed air being applied behind the piston to push it out of the caliper body.





- Remove the piston seal. (D14618)

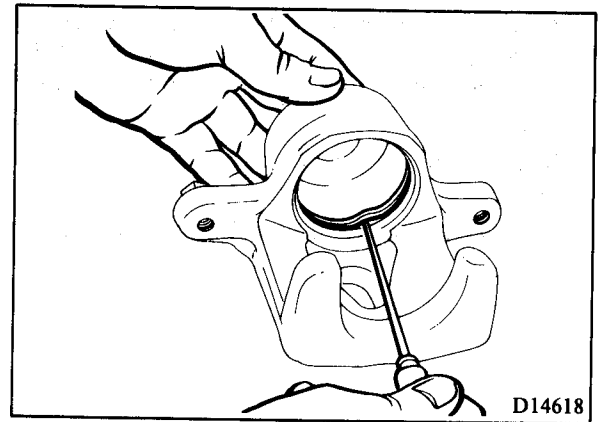
Caution

Be careful not to damage the caliper bore. The piston seal must be replaced with a new one.

- Clean the caliper bore with alcohol or brake fluid.

Inspection

- Check the caliper slide pin bushings and slide pins for scoring.
- Check the caliper support for cracks.
- Check the caliper body for rust and corrosion.
- Check the piston for scoring and corrosion.



Reassembly

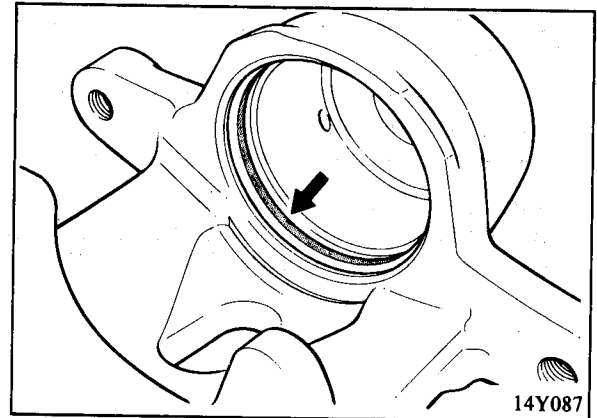
- Fit a new piston seal into the cylinder.

NOTE

The piston seal in the repair kit is coated with special grease. Do not wipe off this grease.

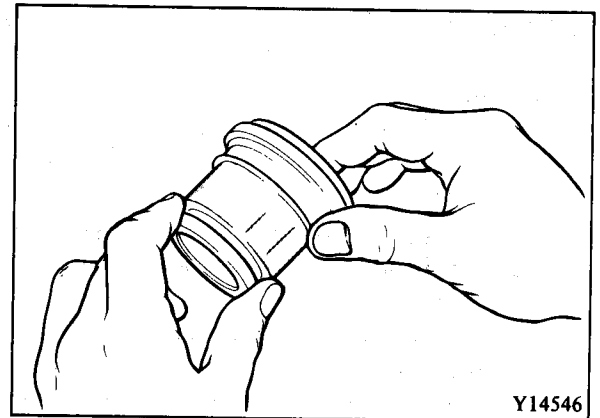
- Apply the pink grease supplied in the kit to the lip of the cylinder.

Recommended grease Repair kit grease (pink)



- Apply brake fluid to the external surface of the piston.

Recommended brake fluid
MOPAR Brake Fluid Part Number 2933249
or equivalent



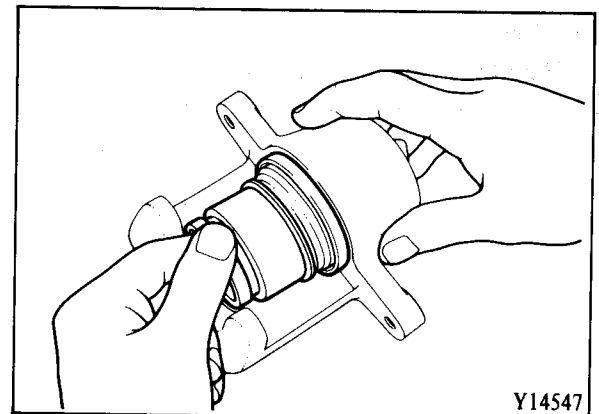
- Install a new dust boot onto the piston as illustrated.

- Fit the end of the dust boot into the caliper body groove and insert the piston into the cylinder by hand. (Y14547)

NOTE

Take care not to score the piston.

- Make certain that the end of the dust boot is fitted into the piston groove.





COMPONENT SERVICE — FRONT DISC BRAKES

7. Apply the specified grease to the contact surface of the slide pin, the seat surface of the cap for the caliper support, and the inside surface of the pin boot. (14Y669)

Recommended grease Repair kit grease (pink)

8. Mount the cap and the pin boot to the caliper support.

9. Apply the specified grease to the inside surface of the bushing.

Recommended grease Repair kit grease (pink)

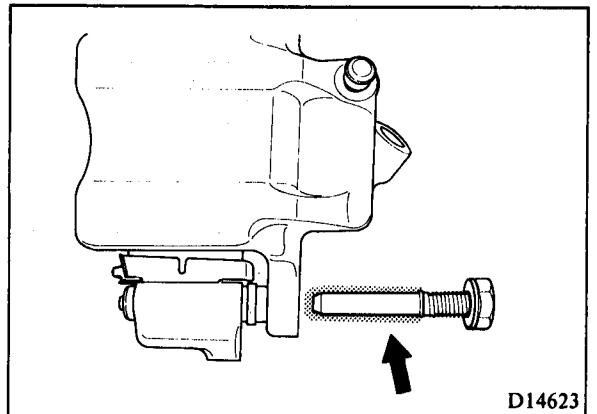
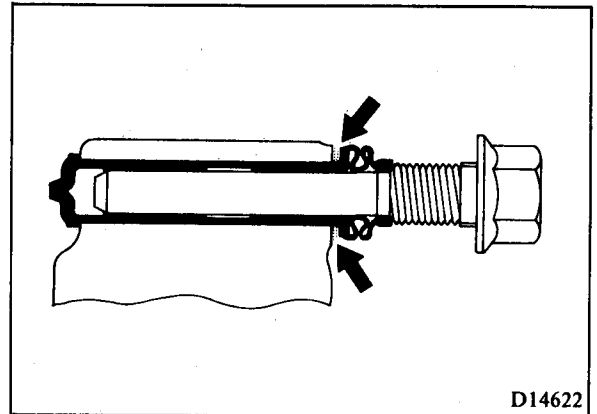
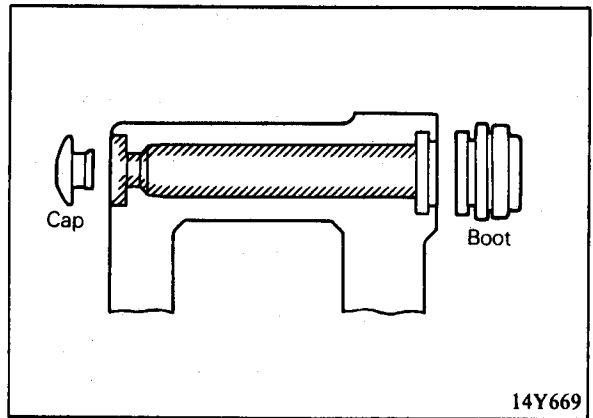
10. Apply the adhesive furnished in the repair kit to the lip of the slide pin bushing, and insert the bushing into the caliper support using the slide pin. (D14622)

11. Apply brake fluid to the screw part of the slide pin.

Recommended brake fluid
MOPAR Brake Fluid Part Number 2933249
or equivalent

12. Apply a thin coat of the specified grease to the slide pin, and then install the caliper body to the caliper support. (D14623)

Recommended grease Repair kit grease (pink)



Installation

1. Bleed the caliper of air. (Refer to P. 5-13.)
2. Check the brake dragging force. (Refer to P. 5-24.)



BRAKE DISC

Inspection

BRAKE DISC WEAR

If the brake disc thickness becomes less than the limit, replace the disc.

Disc thickness [Limit] 22.4 mm (.88 in.)

BRAKE DISC DAMAGE

Replace the brake disc if necessary.

BRAKE DISC RUNOUT

1. If the brake disc runout exceeds the limit, change its position on the hub and/or retorque evenly.

Disc runout [Limit] 0.15 mm (.006 in.)

2. Check the runout again, and if it cannot be corrected, resurface the brake disc.

Caution

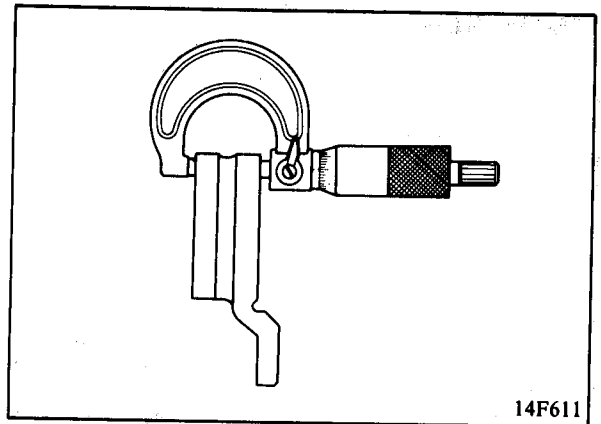
Do not grind the brake disc beyond the limit of disc thickness.

Removal

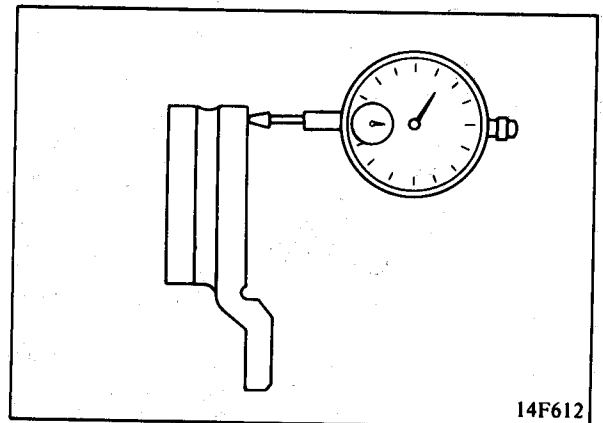
1. Remove the front brake assembly, and use wire to support it.
2. Remove the front hub assembly from the knuckle.
3. Make mating marks, and then disassemble the brake disc from the hub. (F12013)

Installation

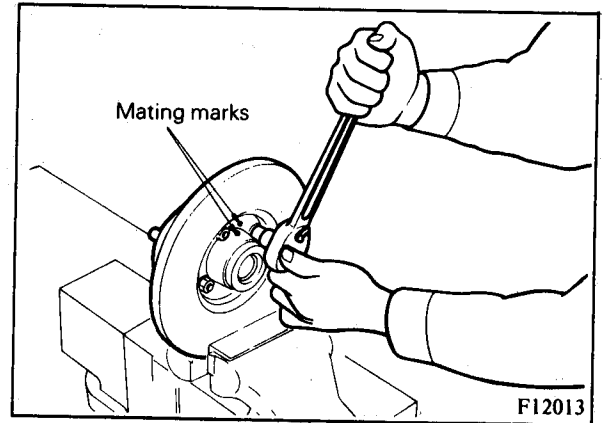
1. Align the mating marks and assemble the brake disc to the hub.
2. Check the brake dragging force. (Refer to P. 5-24.)



14F611



14F612

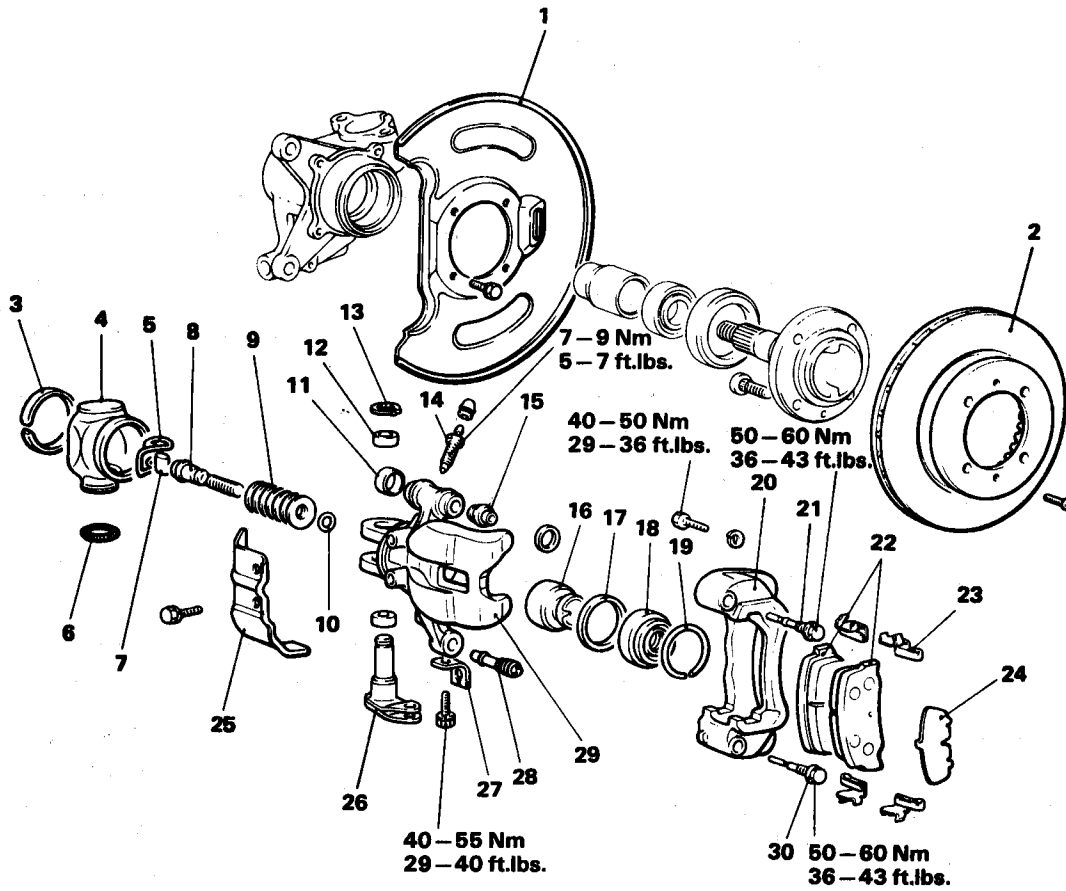


F12013



COMPONENT SERVICE — REAR DISC BRAKES

COMPONENTS



- | | |
|--------------------|----------------------------|
| 1. Dust cover | 16. Piston assembly |
| 2. Brake disc | 17. Piston seal |
| 3. Cap ring | 18. Piston boot |
| 4. Lever cap | 19. Boot ring |
| 5. Return spring | 20. Caliper support |
| 6. Garter spring | 21. Guide pin |
| 7. Connecting link | 22. Brake pad |
| 8. Spindle | 23. Pad clip |
| 9. Spring washer | 24. Outer shim |
| 10. Spindle seal | 25. Dust cover |
| 11. Lid | 26. Parking lever assembly |
| 12. Bearing | 27. Parking cable bracket |
| 13. Retaining ring | 28. Lock pin boot |
| 14. Bleeder screw | 29. Caliper body |
| 15. Guide pin boot | 30. Lock pin |

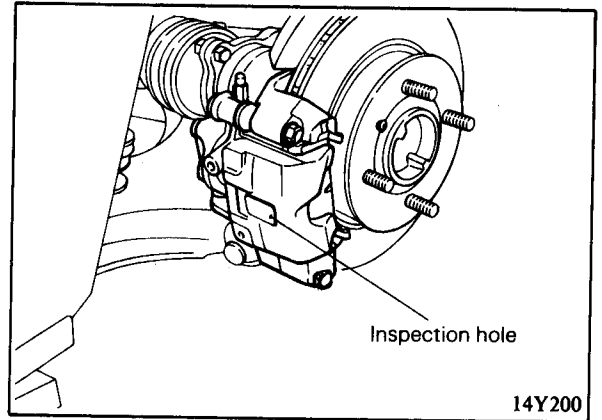
14Y242



BRAKE PAD INSPECTION

1. Remove the dust cover from the caliper body. Check the pad assembly for wear.
2. If the pad thickness is less than the limit, replace the pads.

Brake pad thickness [Limit] 1 mm (.04 in.)



BRAKE PAD REPLACEMENT

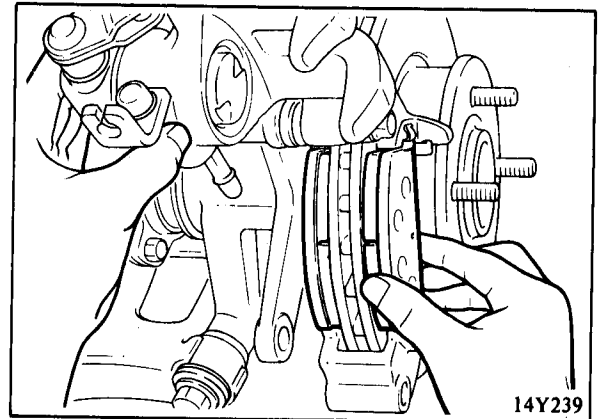
Removal

1. Disconnect the parking brake cable.
2. Remove the lower caliper lock pin.

NOTE

The lock pin is coated with a special grease. Do not remove this grease or get dirt on the pin.

3. Lift the caliper up and suspend it with wire.
4. Remove the brake pads. (14Y239)



Installation

1. Push the piston into the caliper with special tool. (Y14558)

NOTE

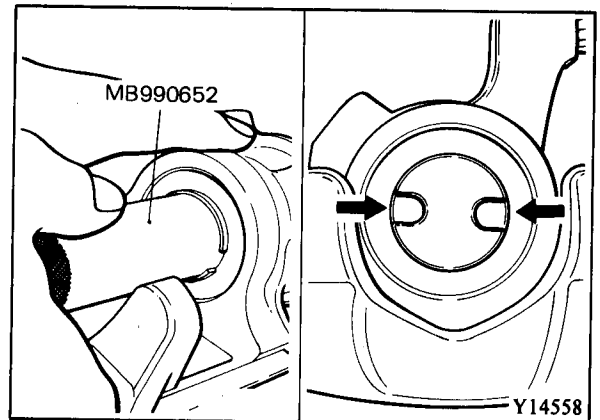
Align the grooves as illustrated.

2. Install the pad clips.
3. Fit the pad and shim together into an assembly and install to the caliper support.

NOTE

The pins on the back side of the brake pad must be placed in the grooves in the piston.

4. Slide the caliper body over the brake pads and install the lock pins. Tighten the lock pin to the specified torque.



Lock pin tightening torque
50–60 Nm (36–43 ft.lbs.)

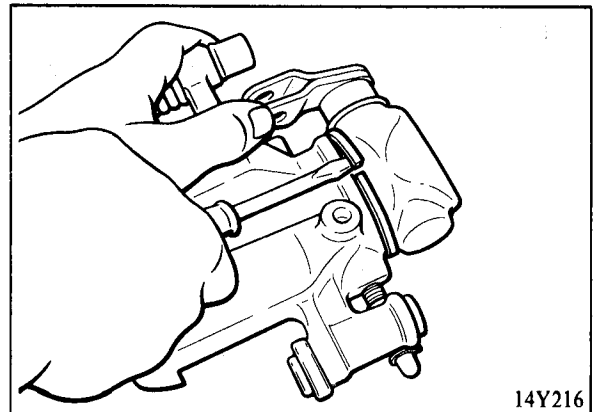
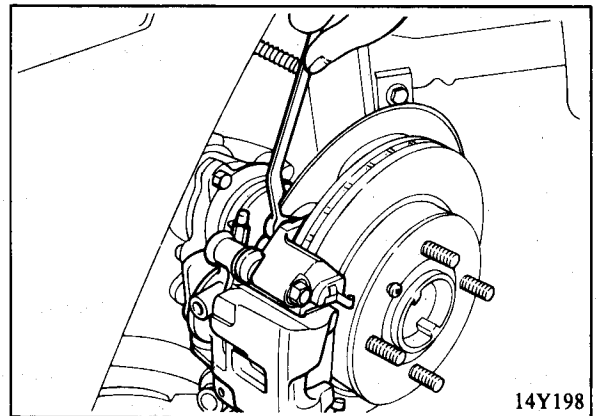
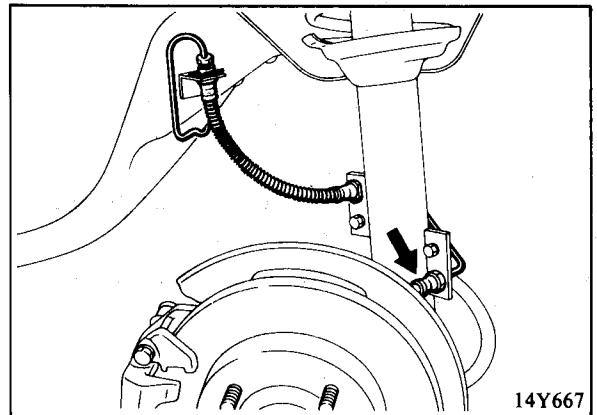
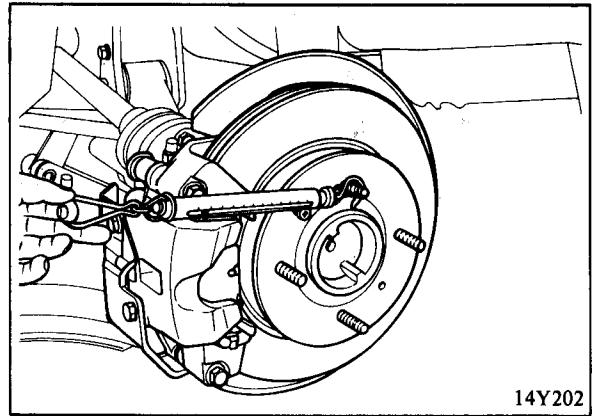


BRAKE DRAG INSPECTION

1. Start the engine and depress the brake pedal for 5 seconds.
2. Turn engine off.
3. Rotate the brake disc a few revolutions.
4. Use a spring scale as illustrated to measure the brake drag.
5. Remove the brake pads and use the spring scale to measure the rotational force.

The difference between brake drag and rotational force should not exceed the standard value.

Brake dragging force [Standard value]
 70 N (15 lbs.) or less
 [4 Nm (3 ft.lbs.) or less]



NOTE

If the difference exceeds the standard value, remove the caliper body and disassemble it. Check the piston and seal for deterioration, corrosion, dirt or scoring.

REAR BRAKE ASSEMBLY

Removal

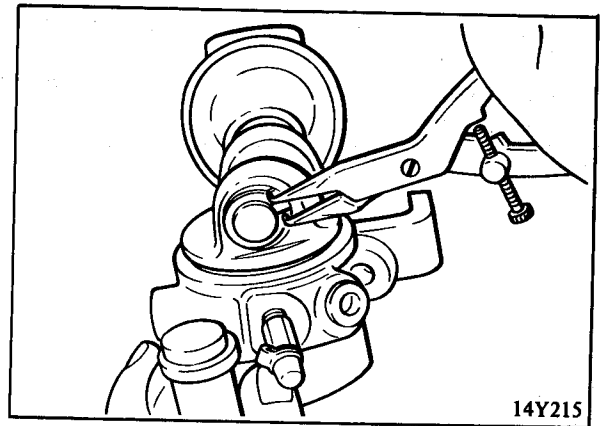
1. Disconnect the brake hose. (14Y667)
2. Disconnect the parking brake cable from the rear brake assembly.
3. Remove the rear brake assembly.
4. Remove the brake pads, then separate the caliper body from the caliper support.

Disassembly

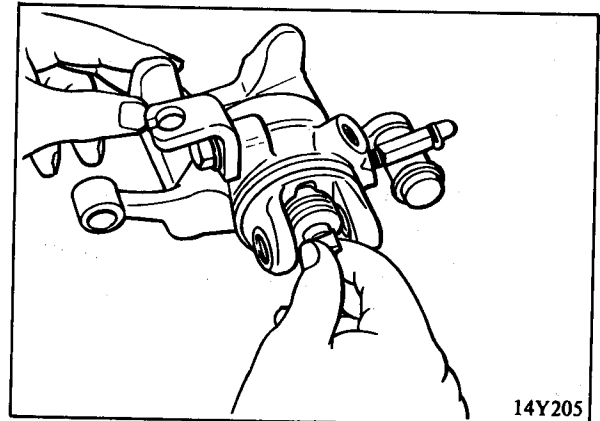
1. Remove the cap ring and garter spring from the lever cap.



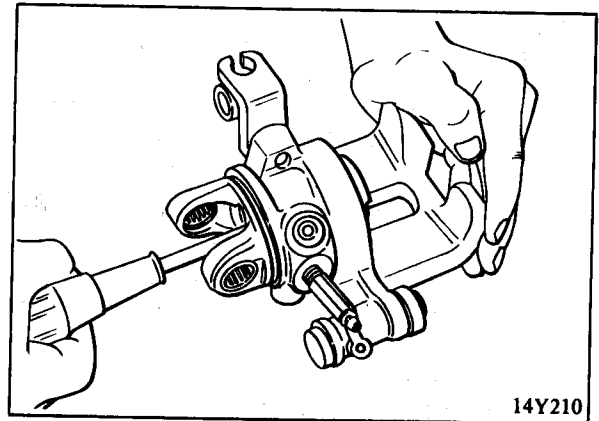
2. Remove the lever cap from the caliper groove.
3. Remove the retaining ring and pull out the parking lever assembly. (14Y215)



4. Remove the spindle by unscrewing it. (14Y205)
5. Remove the boot ring.

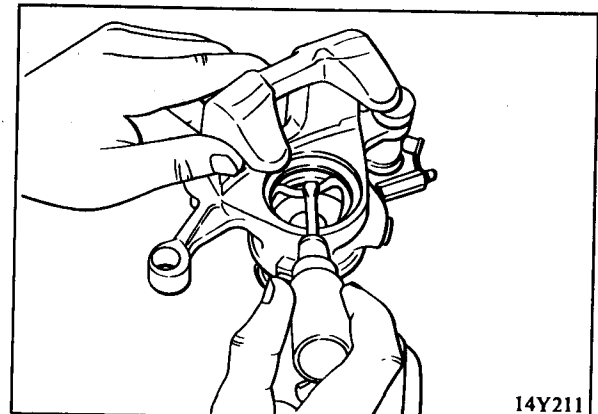


6. Push the piston out of the caliper body.



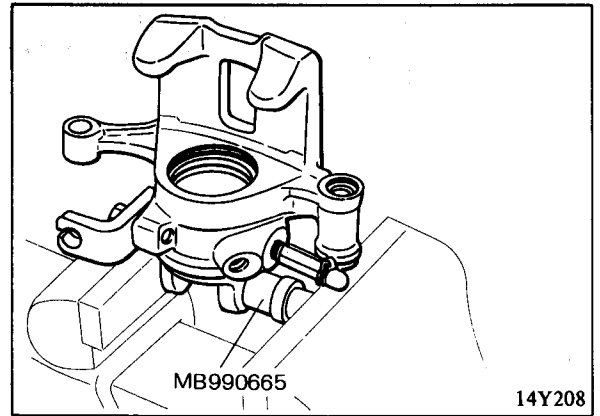
7. Remove the piston seal.

Caution
Be careful not to damage the caliper bore. The piston seal must be replaced with a new one.





8. Press out the bearings as illustrated using special tool. (14Y208)
9. Remove the guide pin boot and lock pin boot from the caliper body.
10. Clean the caliper body bore with alcohol or brake fluid.



Inspection

1. Check the caliper slide pin bushings and slide pins for scoring.
2. Check the caliper support for cracks.
3. Check the caliper body for rust and corrosion.
4. Check the piston for rust and corrosion.
5. Check the connecting link and spindle.
6. Check all rubber parts for cracks and deterioration.
7. Check the parking lever for rust.

Reassembly

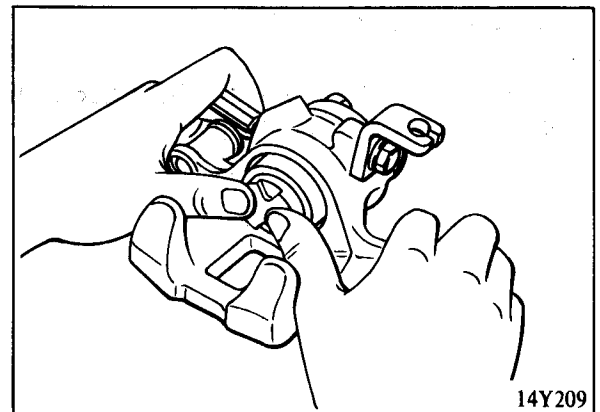
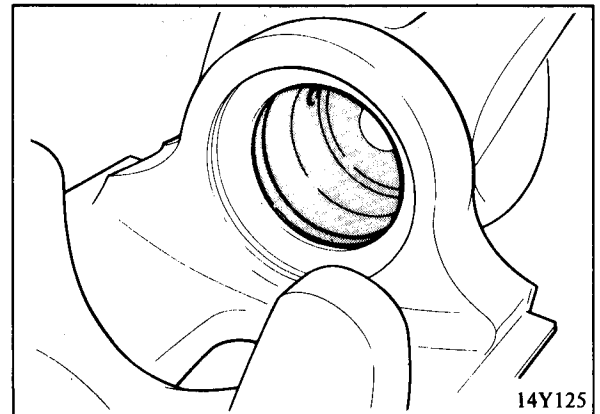
1. Apply the specified grease to the bearing.

Recommended grease Repair kit grease (orange)

2. Press in the bearings with special tool (MB990665) until it is flush with the caliper body.
3. Fit a new piston seal into the cylinder.
4. Apply the specified brake fluid to the piston seal and inside surface of the cylinder. (14Y125)

Recommended brake fluid
MOPAR Brake Fluid Part Number 2933249
or equivalent

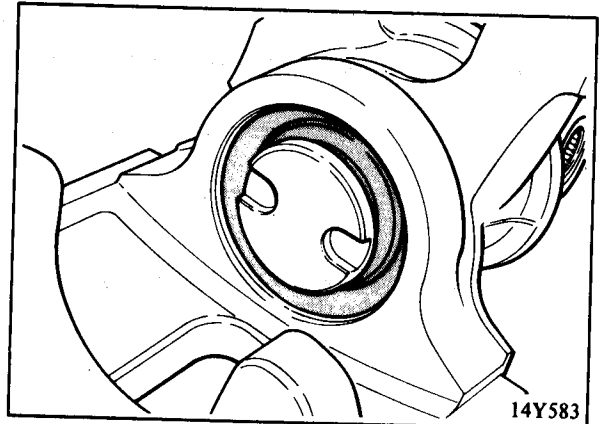
5. Insert the piston assembly into the cylinder by hand, being careful not to score the piston. (14Y209)





6. Apply the specified grease to the dust boot fitting groove in the caliper body. Install a new dust boot and boot ring.

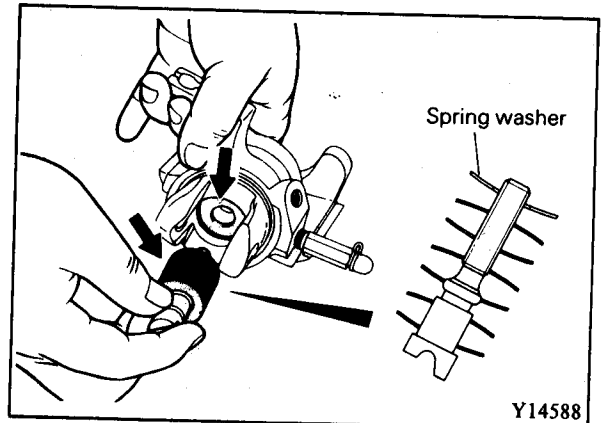
Recommended grease Repair kit grease (orange)



14Y583

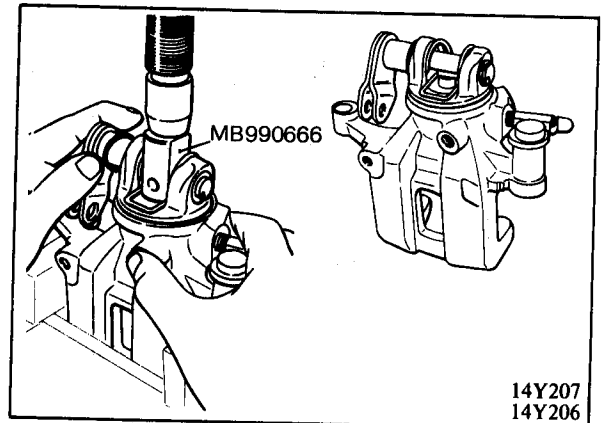
7. Apply the specified brake fluid to the spindle seal. Install the spring washers onto the spindle as illustrated. (Y14588)
8. Apply the specified grease to the contact surface of the caliper body and spring washers.

Recommended grease Repair kit grease (orange)



Y14588

10. Compress the spring washers with special tool in a press then screw the spindle into the caliper. (14Y207, 14Y206)
11. Set the connecting link and return spring on the spindle.
12. Install the lever cap to the parking lever assembly, and then insert them in the caliper body.
13. Hold the parking lever assembly with the retaining ring.



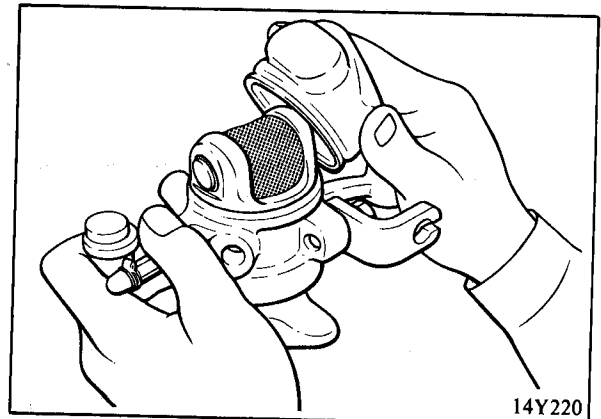
14Y207
14Y206

14. Apply plenty of the specified grease to the lever cap as well as to the lip section. (14Y220)

Recommended grease Repair kit grease (orange)

15. Install the lever cap to the caliper body assembly.
16. Coat the contact point of the caliper support guide pin and the inside of the lock pin boot with the specified grease.

Recommended grease Repair kit grease (pink)



14Y220

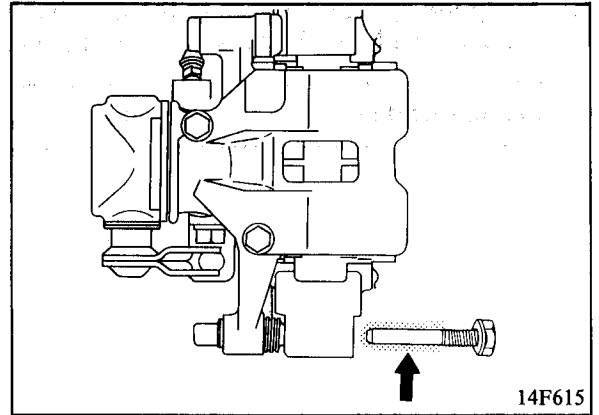


17. Apply a thin coat of specified grease to the guide pin and lock pin, and then install the caliper body to the caliper support.

Recommended grease Repair kit grease (pink)

Installation

1. Bleed the caliper of air. (Refer to P. 5-13.)
2. Check the brake dragging force. (Refer to P. 5-30.)



BRAKE DISC

Inspection

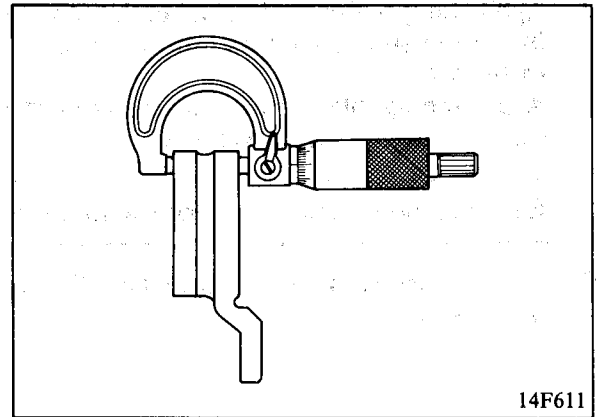
BRAKE DISC WEAR

If the brake disc thickness becomes less than the limit, replace the disc.

Disc thickness [Limit] 16.4 mm (.65 in.)

BRAKE DISC DAMAGE

Replace the brake disc if necessary.



BRAKE DISC RUNOUT

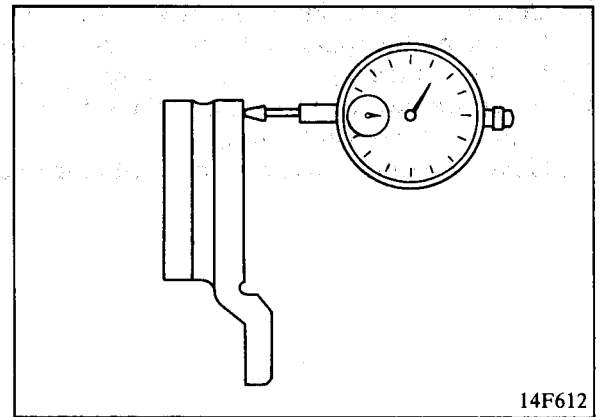
1. If the brake disc runout exceeds the limit, change its position on the hub and/or retorque evenly.

Disc runout [Limit] 0.15 mm (.006 in.)

2. Check the runout again, and if it cannot be corrected, resurface the brake disc.

Caution

Do not grind the brake disc beyond the limit of disc thickness.

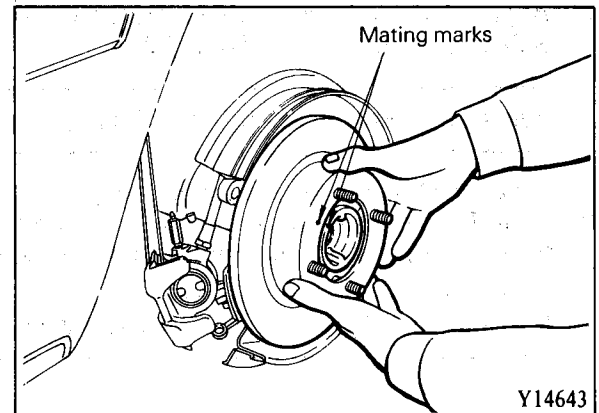


Removal

1. Remove the rear brake assembly, and use wire to support it.
2. Remove the brake disc from the axle shaft.
3. Make mating marks and then disassemble the brake disc from the axle shaft. (Y14643)

Installation

1. Align the mating marks and assemble the brake disc to the hub.
2. Check the brake dragging force. (Refer to P. 5-30.)





SUMMARY

This system is an automatic brake control system designed to achieve maximum braking efficiency for quick stops on wet or icy road surfaces, and to reduce the possibility of the vehicle skidding. If the wheels become locked when the brakes are applied suddenly while driving on roads slippery with snow or rain, the braking efficiency will be drastically reduced, and in addition, the driver could possibly lose complete control of the vehicle. The rear brake lock-up control system is designed to reduce the possibility of these dangerous conditions occurring by automatically maintaining optimum control of braking in accordance with the road conditions. This system, however, is designed for rear wheel control only. If the front wheels become locked, the brakes will not be automatically controlled.

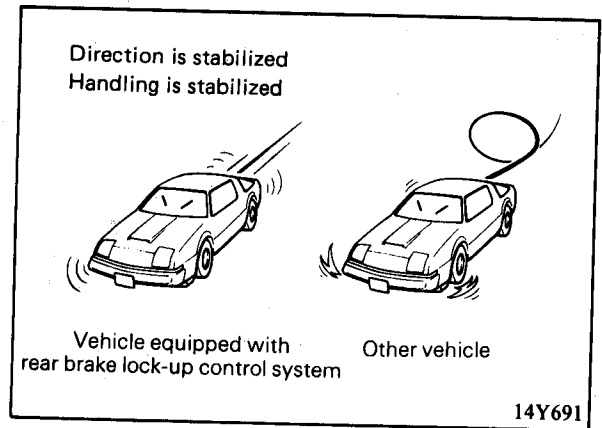
THE PRINCIPLES OF THE REAR BRAKE LOCK-UP CONTROL SYSTEM

The rear brake lock-up control system is designed to control the physical characteristics of the relationship between the tires and the road surface (the friction factor between the tires and the road surface and the slipping rate of the tires*)

The illustration shows the basic curves of μ versus s^{**} and of lateral stability.

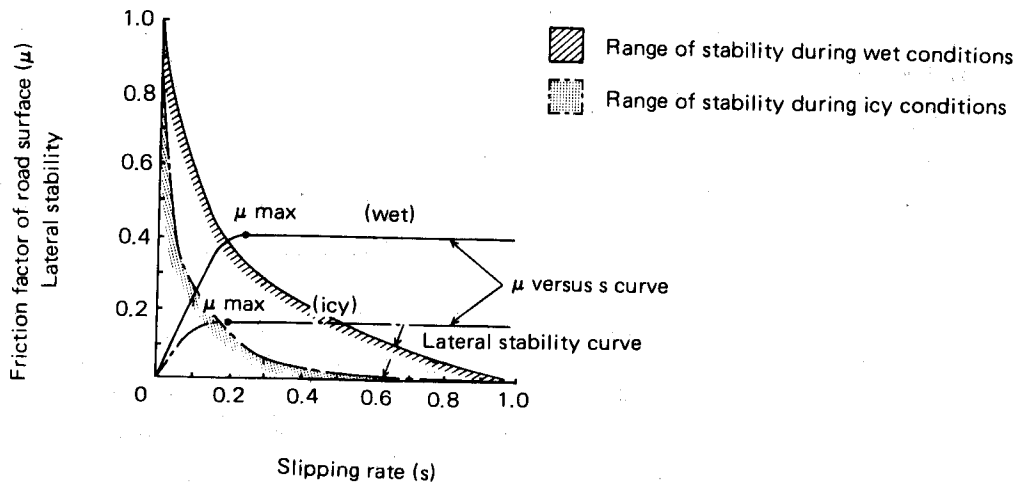
From the illustration, it can clearly be seen that, by maintaining control in the area of μ max (the maximum friction factor), the braking distance can be reduced, and in addition, lateral stability can be maintained.

This rear brake lock-up control system has been designed to implement these principles in the braking function.



* Slipping rate (s) = $\frac{\text{Speed of the vehicle} - \text{the speed of the wheels}}{\text{Speed of the vehicle}}$

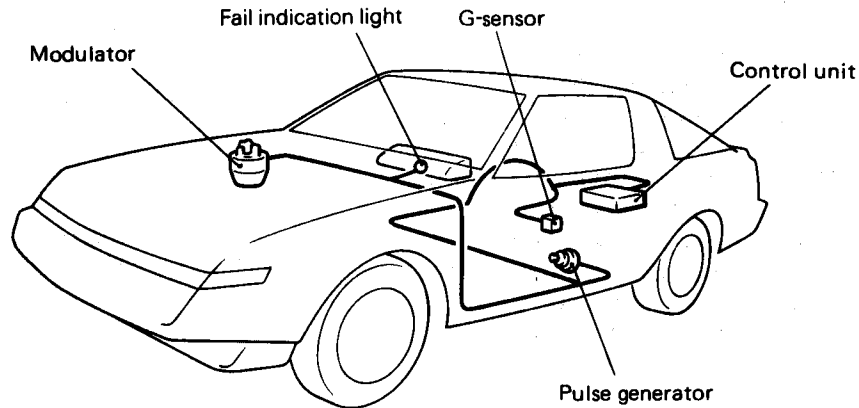
** The curve of μ versus s is determined by the relationship between the road surface friction factor and the slipping rate.



14Y697



COMPONENTS



14Y692

The rear brake lock-up control system is composed of the following five units:

PULSE GENERATOR

Generates a rotation pulse in accordance with the speed of the rear wheels.

G-SENSOR

Generates a voltage in accordance with the reduction of the vehicle speed.

CONTROL UNIT

Controls each of the signals.



MODULATOR

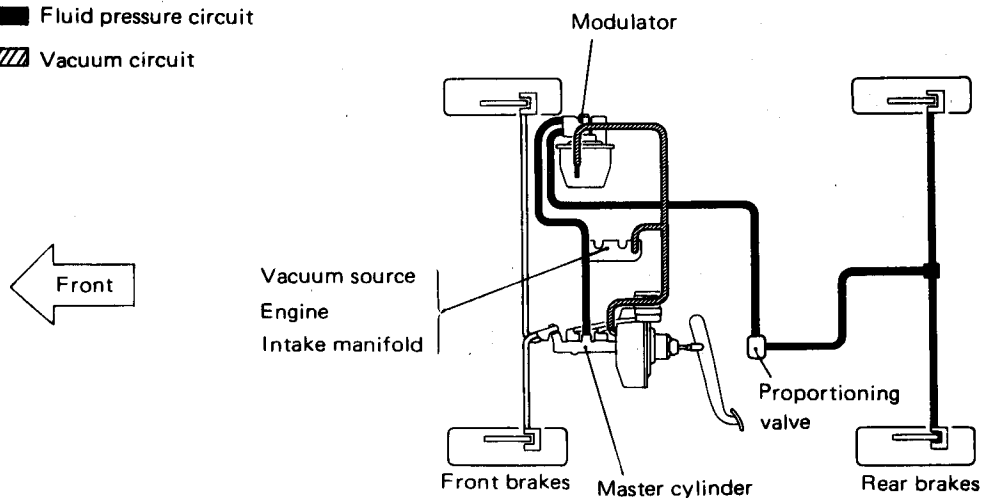
Controls the pressure of the brake fluid.

FAIL INDICATION LIGHT

Illuminates in the event of a malfunction of the control unit.

DIAGRAM OF THE FLUID PRESSURE AND VACUUM CIRCUITS

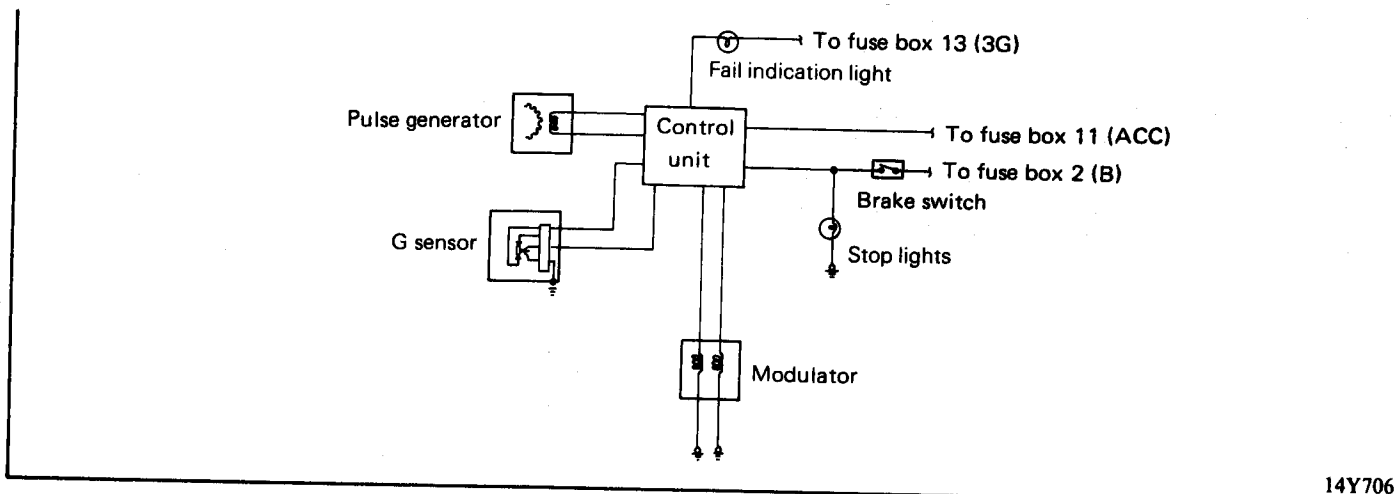
 Fluid pressure circuit
 Vacuum circuit



14Y694



ELECTRIC CIRCUIT DIAGRAM



14Y706

OPERATION DESCRIPTION

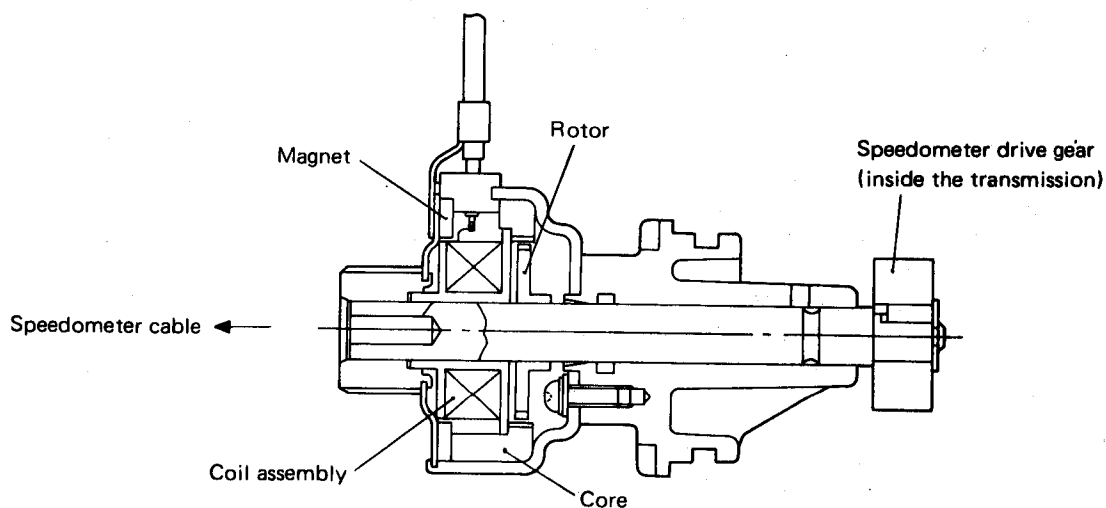
Pulse Generator (Detection of the Speed of the Wheels)

The pulse generator is composed of a permanent magnet, a coil and a rotor. It is installed at the speedometer exit port of the transmission. The rotor is rotated by the speedometer drive gear. The magnetic flux generated from the permanent magnet varies according to the rotation of the rotor, and an AC voltage is generated in the coil (Electromagnetic induction action).

The AC voltage is proportionate to the rotating speed of the rotor, and the frequency varies. Accordingly, the speed of the wheels is detected by using the frequency variations of the AC voltage generated by the pulse generator.

The frequency of the generated voltage is the average value of the speeds of the left and right wheels.

Construction of the pulse generator



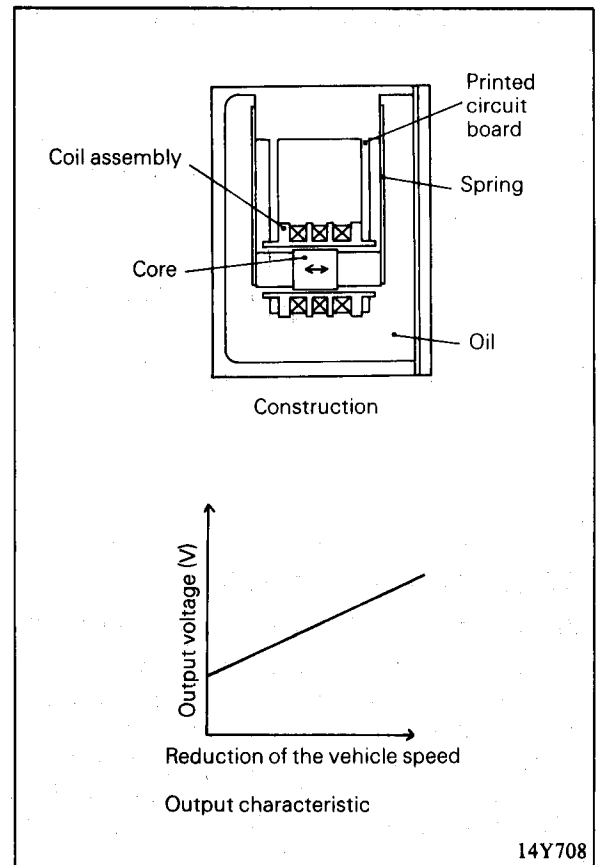
14Y709



G-Sensor (Detection of the Reduction of the Vehicle Speed)

The G-sensor is composed of a differential transformer, a control circuit (in the form of a printed circuit board), etc. It is installed on the floor of the luggage compartment.

The core within the differential transformer is usually stationary at the center of the coil; however, when a reduction in speed is applied, the core moves and a voltage corresponding to the amount of displacement of the core is generated. In other words, the extent of the reduction in the vehicle speed is detected.

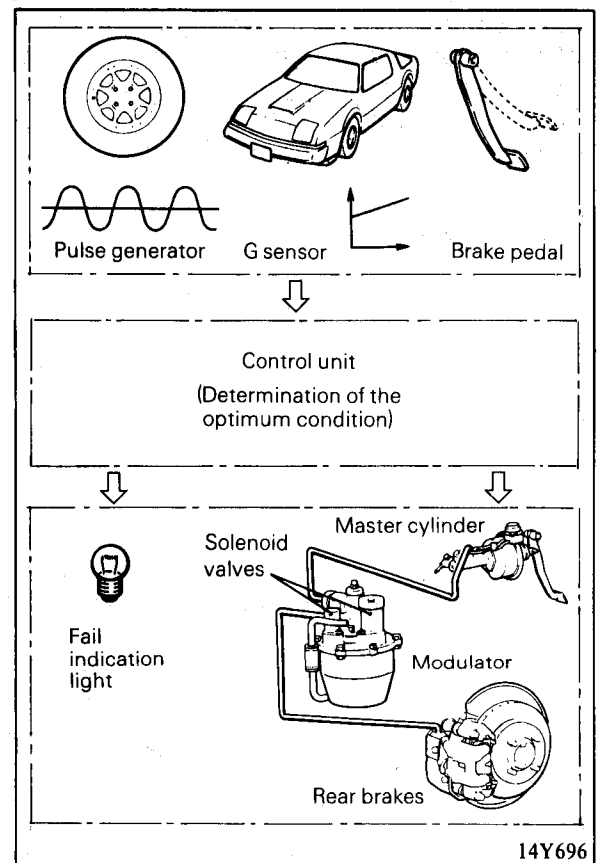


Control Unit (Signal Control)

The control unit is installed inside the luggage compartment. It receives the signals from the pulse generator, the G-sensor, and the brake switch (which is also used as the stop light switch), and transmits the brake fluid pressure control signal to the modulator. If there is a malfunction in either the control unit or the modulator (the solenoid valve section), or in the event of an open circuit, the condition is detected. The brake system is returned to conventional operation, and the fail indication light illuminates to warn the driver of the existence of a malfunction.

In addition, if an open circuit occurs in the wiring of the control unit power supply, the G-sensor, the inside of the pulse generator, or the brake switch (input wiring), or if all the stop light bulbs burn out, the brake system is returned to conventional operation, and the fail indication light illuminates in the same way to warn the driver.

The signal to lower the brake fluid pressure of the rear brakes causes the modulator release valve (the valve used to lower the brake fluid pressure) to operate in the event that the amount of slipping of the tires on the road surface becomes greater than the specified value which is determined in accordance with the speed reduction of the wheels and also in the event that the speed reduction of the wheels becomes greater than the specified value in relationship to the reduction of the vehicle speed. Note that there is no lock-up control of the rear brakes when the speed of the vehicle is approximately 8 km/h (5 mph) or less.





OUTLINE OF OPERATION

The control unit determines the ideal vehicle speed reduction curve in accordance with the input signals from the G-sensor and the pulse generator. As shown in the operation curve, the ideal vehicle speed reduction and the actual speed reduction of the wheels are compared. If the actual speed reduction of the wheels is greater (if the rotation speed of the wheels is slowing down too rapidly), the brake fluid pressure for the rear brakes is decreased, and the ideal vehicle speed reduction rate is restored. On the other hand, if the actual speed reduction of the wheels is smaller (if the rotation speed of the wheels is slowing down too slowly), the brake fluid pressure for the rear brakes is increased, and the ideal wheel speed reduction rate is restored. In this way, the wheels are controlled to maintain the ideal rate of speed reduction.

FAIL-SAFE FUNCTION

The fail-safe function causes the control unit to cease operation, the brake system to return to conventional operation, and the fail indication light to illuminate in the event that any of the following malfunctions occur in the rear brake lock-up control system:

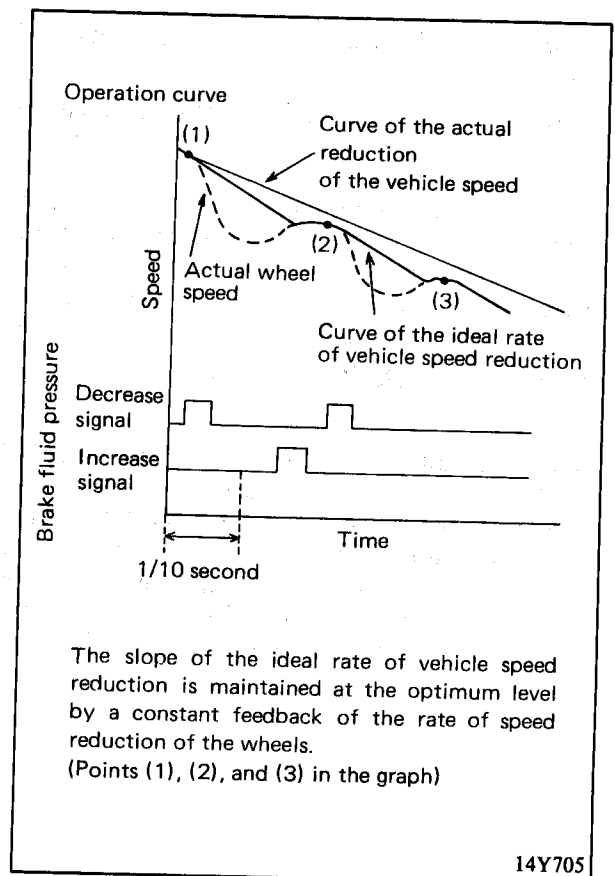
1. The wiring of the solenoid valve used for vacuum control of the modulator becomes disconnected.
2. The wiring of the solenoid valve used for vacuum control of the modulator operates continuously for five seconds or longer.
3. The wiring of the brake switch becomes disconnected.
4. A problem occurs inside the pulse generator, or the wiring of the pulse generator becomes disconnected.
5. A problem occurs in the G-sensor, or the wiring of the G-sensor becomes disconnected.
6. The power supply line of the control unit becomes disconnected.
7. The wiring of the stop light becomes disconnected.

If the fail indication light illuminates, refer to the troubleshooting section.

CONTROL UNIT FUNCTION CHECK

Run the engine for five seconds or longer while the vehicle is not in motion. Next, set the ignition key to the "LOCK" position, depress the brake pedal, and then, while keeping the brake pedal depressed, set the ignition key back to the "ON" position. At this time, confirm that the operation sound of the modulator solenoid valve can be heard. If this sound can be heard, then the control unit is functioning normally.

In other words, self-diagnosis of the control unit is done by causing the release solenoid valve to operate.





Modulator (Vacuum-servo Type Brake Fluid Pressure Control)

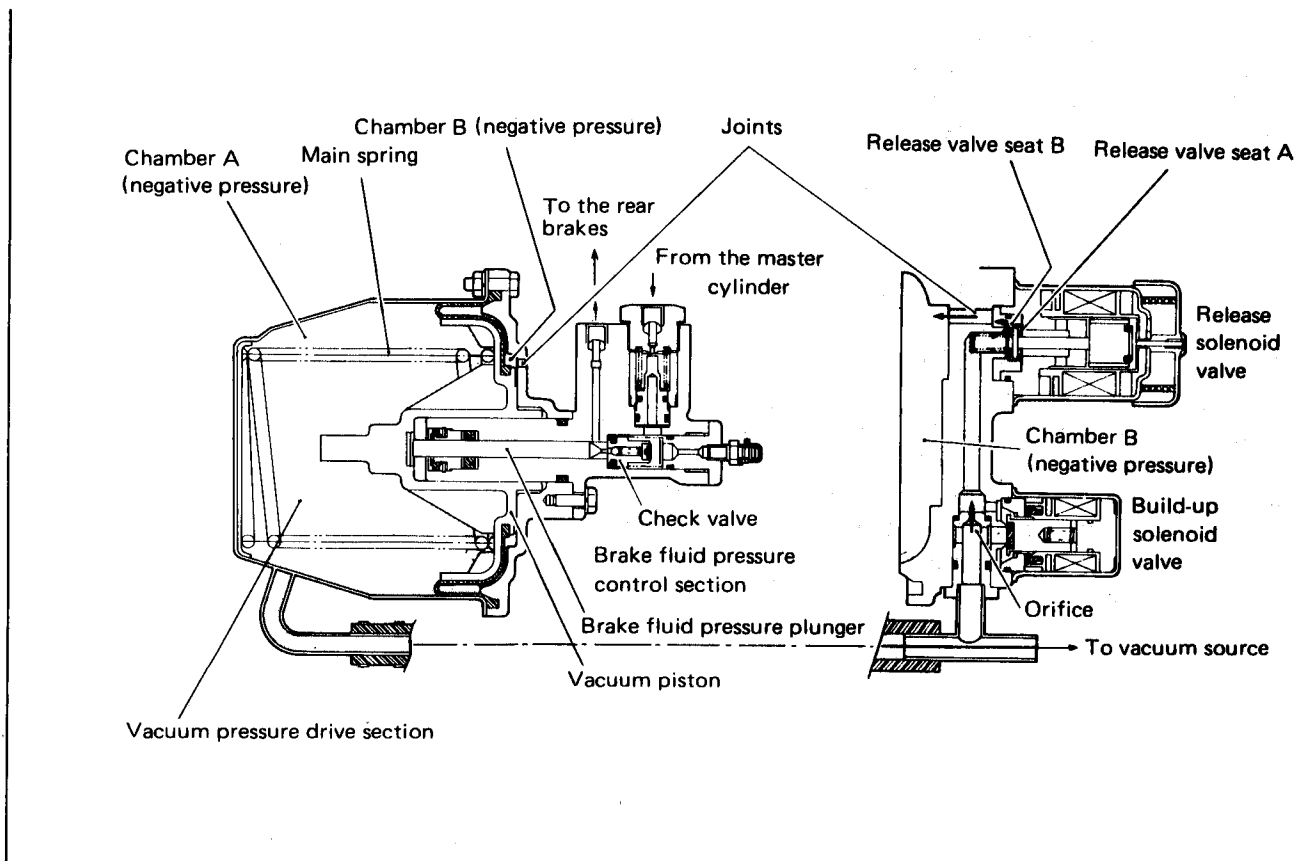
The modulator receives the control signal (electrical signal) from the control unit, and controls the brake fluid pressure for the rear brakes.

The modulator is composed of a brake fluid pressure control section to control the brake fluid pressure for the rear brakes, a vacuum pressure drive section to drive the brake fluid pressure control section, and a solenoid valve to control the vacuum pressure of the vacuum pressure drive section.

OPERATION DESCRIPTION

Non-operating Condition

When the solenoid valves (the release solenoid valve and the build-up solenoid valve) are not in the operating condition, the pressures in chambers A and B become equal because of the opening of release seat B. For this reason, the brake fluid plunger is pressed to the right through the vacuum piston by the main spring, the check valve opens, and continuity exists for the master cylinder and the rear brake circuit.

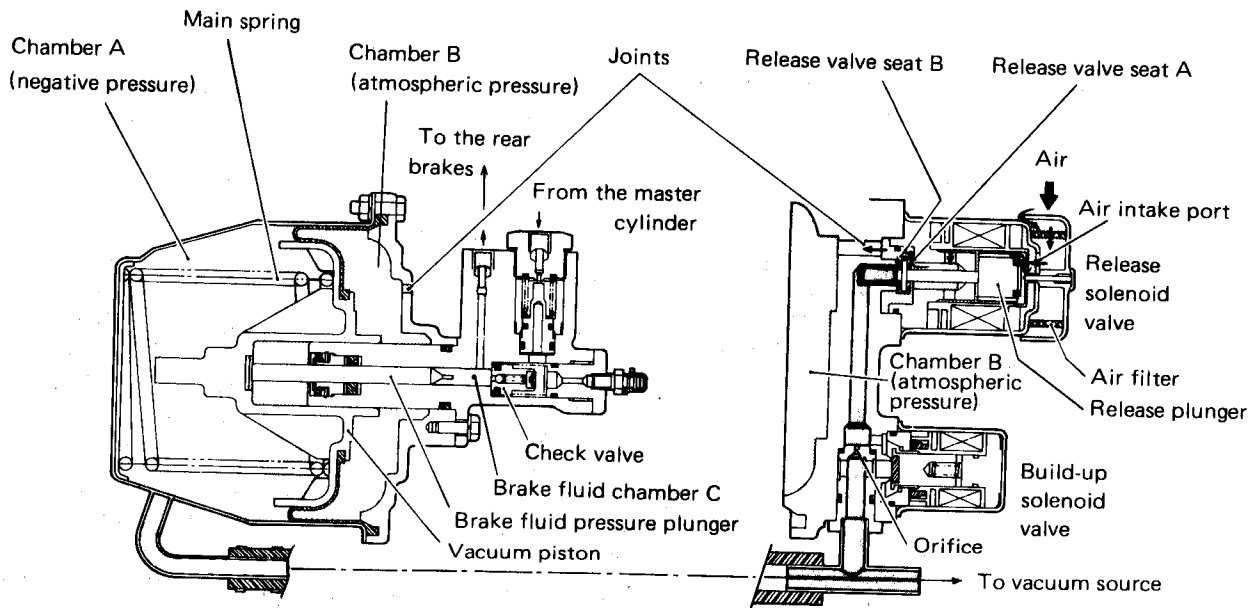


14Y700



During Operation

1. Reduction of the brake fluid pressure for the rear brakes
 If the signal for reduction of the brake fluid pressure is output from the control unit, the electric current will flow to the release solenoid valve, the release plunger will move to the left, release valve seat A will open, and, simultaneously, release valve seat B will close. Air will flow into chamber B through the air filter, to the air intake port, and to release valve seat A. When chamber B reaches atmospheric pressure, the pressure difference between chamber A (vacuum condition) and chamber B will cause the vacuum piston to move to the left, compressing the main spring. The brake fluid pressure plunger will move to the left simultaneously with the vacuum piston and close the check valve. When the check valve is closed, the flow of brake fluid from the master cylinder to the rear brakes is disrupted, and, at the same time, the brake fluid pressure is decreased because of the increase in the capacity of brake fluid in chamber C.



14Y698



2. Slow restoration of the brake fluid pressure for the rear brakes to a normal level

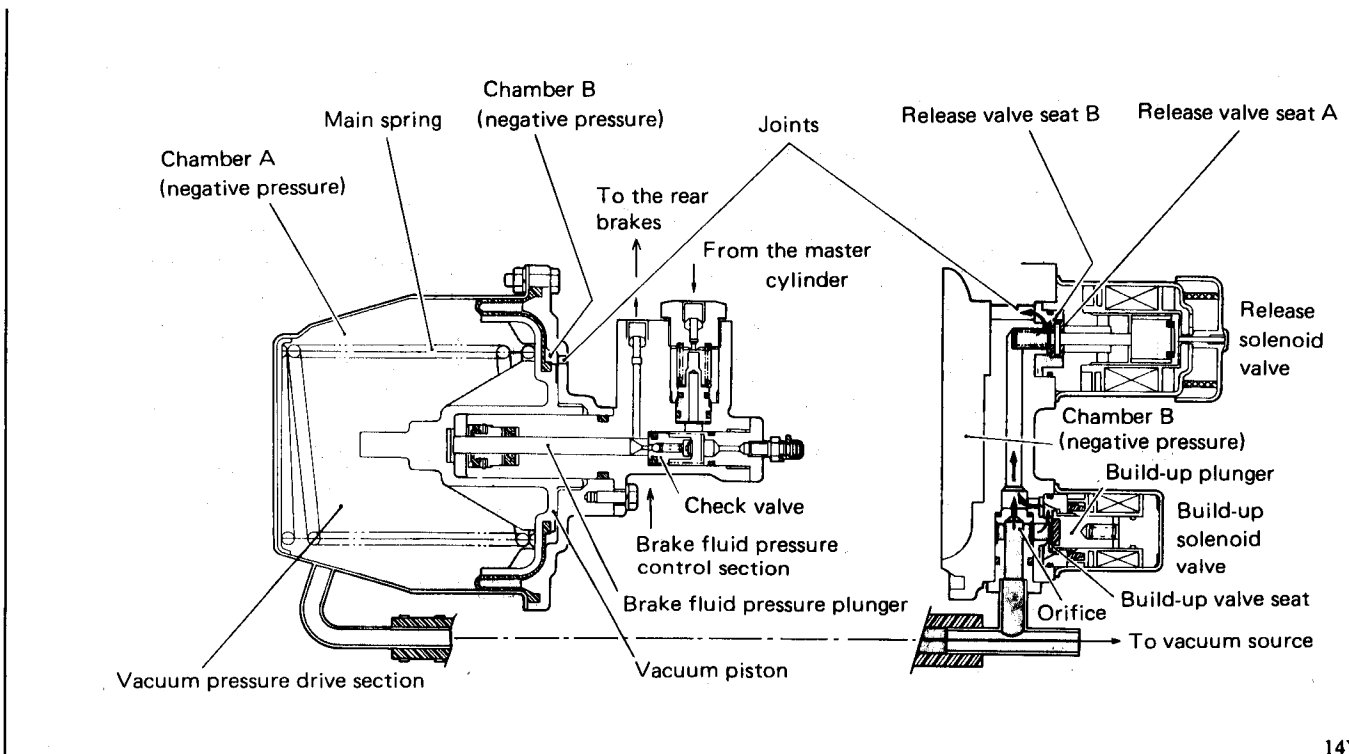
Once the brake fluid pressure to the rear brakes has been reduced, the brake fluid pressure reduction signal will cease to be output, the release solenoid valve will return to its non-operating condition, and the air intake to chamber B will be stopped. Because the atmospheric pressure of chamber B passes through the orifice, the pressure in chamber B will gradually change from atmospheric pressure to a vacuum, and, as a result, the pressure difference between chamber A and chamber B will gradually disappear. The brake fluid plunger will be pressed back to the right by the force of the main spring, the condition will be the same as when not operating, and the normal level of brake fluid pressure will be supplied to the rear brakes.

3. Quick restoration of the brake fluid pressure for the rear brakes to normal level

The electric current will flow to the build-up solenoid valve, the build-up plunger will move to the right, and the build-up valve seat will open. Because the pressure reduction of chamber B is done through both the orifice and the build-up valve seat, the pressure of chamber A and chamber B will quickly equalize.

NOTE

If the brake fluid pressure is reduced too much and the level of wheel speed reduction becomes significantly lower than the desired level, the build-up solenoid valve will operate to rapidly achieve the desired level of speed reduction.

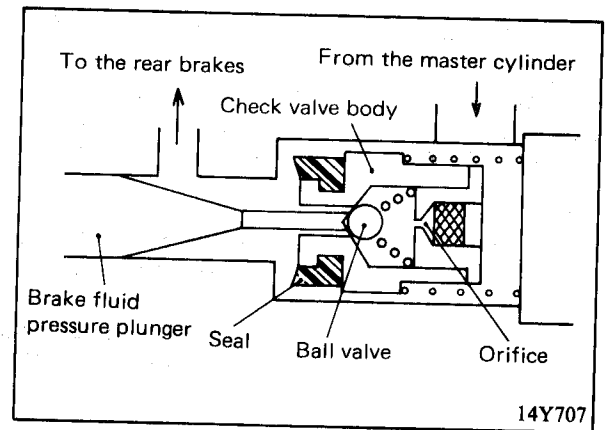


14Y699



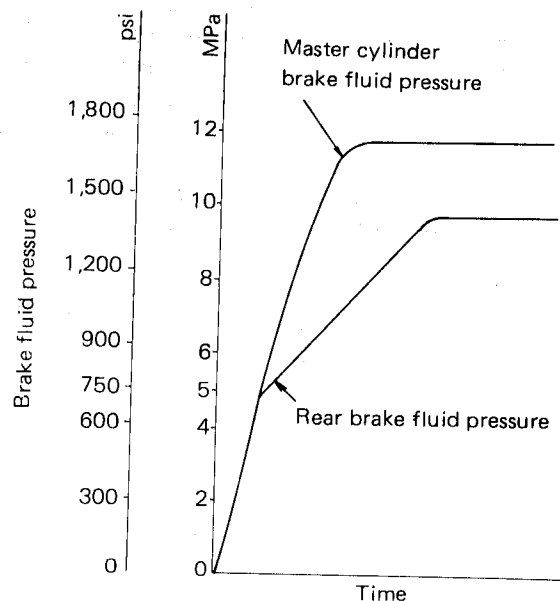
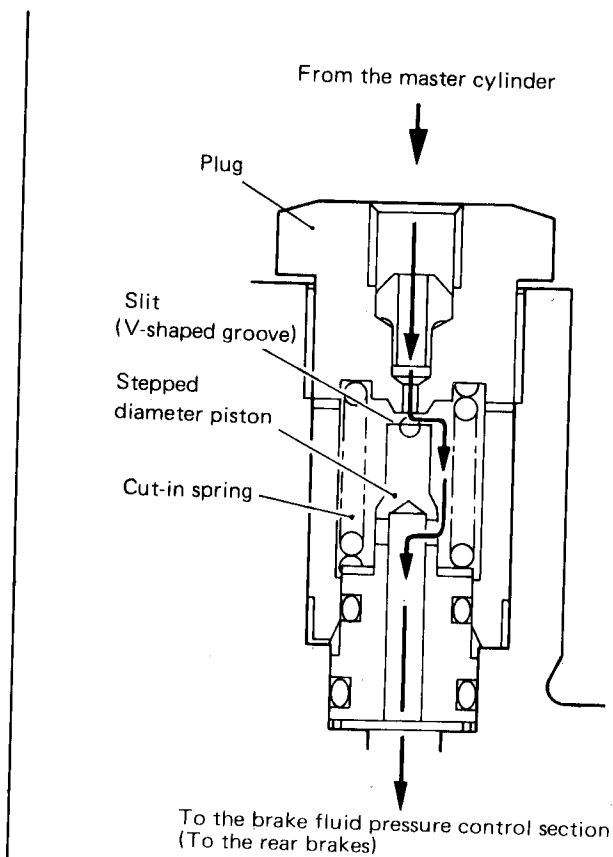
CHECK VALVE FUNCTIONS

1. When the brake fluid pressure for the rear brakes is to be decreased, the brake fluid pressure plunger moves to the left. At this time, the check valve body also moves to the left, the brake fluid line is closed by the seal and ball valve, and the rear brake fluid pressure is decreased.
2. When the brake fluid pressure for the rear brakes is to be restored to normal, a sudden increase in the brake fluid pressure is avoided as follows: The brake fluid pressure plunger moves to the right, pushing on the ball valve which opens the brake fluid line, allowing the brake fluid from the master cylinder to pass through the orifice and gradually flow to the rear brakes.



CHOKE VALVE FUNCTION

Extreme increase in the master cylinder brake fluid pressure will occur when the brake pedal is operated suddenly during quick stops etc. The choke valve prevents sudden increase in the rear brake fluid pressure to allow the system to correctly perform the control function even during sudden braking. The brake fluid flows freely to the rear brakes until the brake fluid pressure of the master cylinder reaches 4,903 kPa (711 psi), as shown in the graph.



14Y701
14Y703



When the brake fluid pressure reaches 4,903 kPa (711 psi), the stepped diameter piston will press the cut-in spring upward, and contact the plug. The brake fluid will pass only through the V-shaped groove, thus limiting the rate of increase of the brake fluid pressure to the rear brakes.

Fail Indication Light

If any malfunction occurs in the rear brake lock-up control system, a signal from the control unit will cause the fail indication light to illuminate to warn the driver of the malfunction. In addition, the light will illuminate for approximately three seconds when the ignition key is set to the "ON" position in order to provide confirmation that the light is connected and functioning properly.

If the light does not illuminate, there is a malfunction of the light or the light circuit.

If the light remains on, there is a malfunction of the rear brake lock-up control system.

Notes Regarding Handling

1. Because there is such a large number of transistor circuits, the system could be easily and instantly damaged if a terminal is improperly contacted during a check for a malfunction; handle with care.
2. Do not open the cover of the control unit to inspect the internal parts. The unit might easily be damaged if a part is mistakenly touched, or if dust or other foreign particles enter the unit.
3. The connections of the battery **MUST NEVER** be reversed. During replacement of the battery, be sure to set the ignition key to the "LOCK" position, and connect the new battery carefully so that there are no mistakes.
4. During removal and installation, be careful not to expose any of the components to any violent shaking or impacts. Special care must be observed in the handling of the G-sensor; however, all of the other components of the rear brake lock-up control system should also be handled with care.
5. When checking the system with a circuit tester, be careful not to mistakenly touch an adjacent terminal, or to connect the tester to the wrong terminal. If this occurs, the system could be easily and instantly damaged.
6. If the system is being checked during rainy weather, be careful not to allow water to get into any of the components.
7. The G-sensor is filled with a special oil. If it is opened, it can no longer be used.

**IF A RADIO TRANSMITTER/RECEIVER IS TO BE INSTALLED IN THE VEHICLE:**

The computer of the electronic control system has been provided with sufficient resistance to external radio-wave interference; however if a radio transmitter/receiver is installed in the vehicle, it may affect the computer. Care must be taken with regard to the following points:

1. Install the antenna of the radio transmitter/receiver as far as possible from the location of the computer. Computer is located at the right rear part of the vehicle; therefore, install the antenna at the front of the vehicle, and avoid installing it in the luggage compartment area.
2. Radio waves will be emitted from the antenna's coaxial cable; therefore, keep the cable at least 200 mm (8 in.) away from the computer and from the wiring harness. It is especially important that the cable does not cross the wiring harness; if this can not be avoided, route the cable so that it crosses the wiring harness at a right angle.
3. Select an antenna and cable which are sufficiently well-matched so that the standing-wave ratio will be low.
4. Do not install a CB radio which has a large power output.

REAR BRAKE LOCK-UP CONTROL SYSTEM FUNCTION CHECK POINTS

1. Operate the engine for five seconds or longer while the vehicle is not moving, turn the ignition key to the "LOCK" position, and then depress the brake pedal. Turn the ignition key from the "LOCK" position to the "ON" position, and confirm that the sound of the modulator operating can be heard. If the operating sound can be heard, the solenoid valve is functioning properly.

NOTE

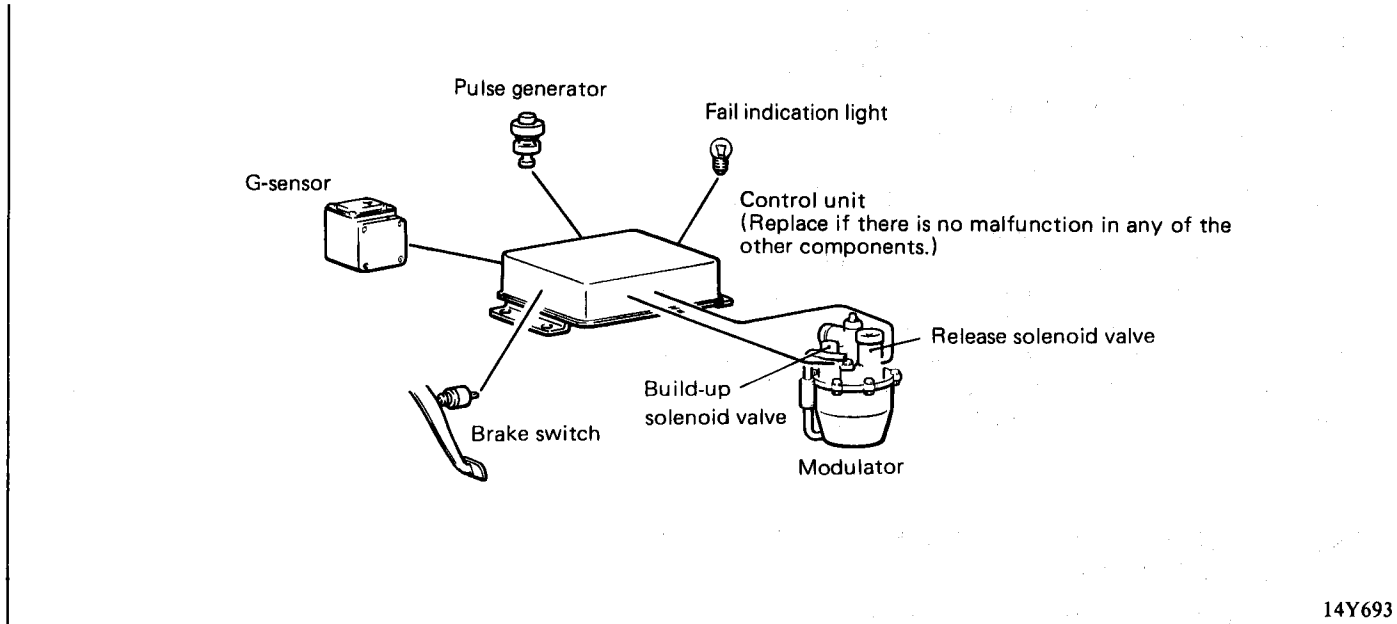
The sound of the modulator operating should be a dull clicking sound.

2. Raise the vehicle on a jack (the rear wheels should be completely off the ground), and then support the vehicle on rigid racks. Block the front wheels.
3. Warm up the engine, set the shift lever to the second gear position, depress the accelerator pedal, and maintain the speedometer reading at approximately 30 km/h (19 mph).
4. Keep the accelerator pedal depressed in the same position, and then depress the brake pedal suddenly.
5. The brakes will attempt to stop the rotation of the rear wheel; however, because the operation of the rear brake lock-up control system will cut off the supply of brake fluid pressure, the rotation of the rear wheels will be restored. This reduction and increase process should keep repeating itself.



TROUBLESHOOTING

If a malfunction occurs in the rear brake lock-up control system, follow the troubleshooting procedure to check the system. Check all components (including wiring harness) except the control unit. If there are no malfunctions in any of the components, replace the control unit.



14Y693

Before beginning the troubleshooting procedure, check each of the following items:

1. The connections of the wiring harness and components of the rear brake lock-up control system.
2. Check the master cylinder, the brake booster, the rear brakes, and other brake equipment.

Troubleshooting Table

Components to be checked	Fuse No.10	Fuse No. 2	Pulse generator	G-sensor	Brake switch	Release solenoid valve (modulator)	Build-up solenoid valve (modulator)	Wiring harness	Stop lights	Modulator
Fail indication light illuminates	○		○	○	○	○	○	○	○	
No self-diagnosis (Refer to P. 5-39.)	○	○			○	○		○	○	
Weak brakes (Braking power is insufficient)			○	○			○			○
Brakes lock (High tendency to skid)	○	○	○	○	○	○		○	○	○

NOTE

Check the system by following the troubleshooting table. If no malfunction can be found, replace the control unit and then recheck the system to see if the malfunction still exists.



Checking Procedure

PULSE GENERATOR

1. Measure the resistance between the terminals. If the resistance is not within the standard value, replace the pulse generator. (14Y675)

Resistance between the terminals of pulse generator [Standard value]	600—800 Ω
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2. Measure the resistance between the terminals and the case.
3. The resistance should be at infinity. If continuity exists, replace the pulse generator.

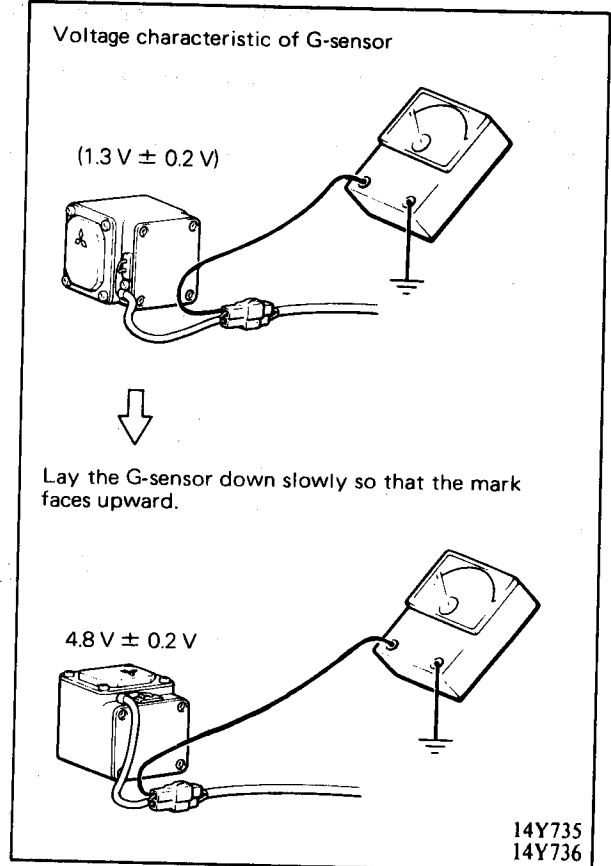
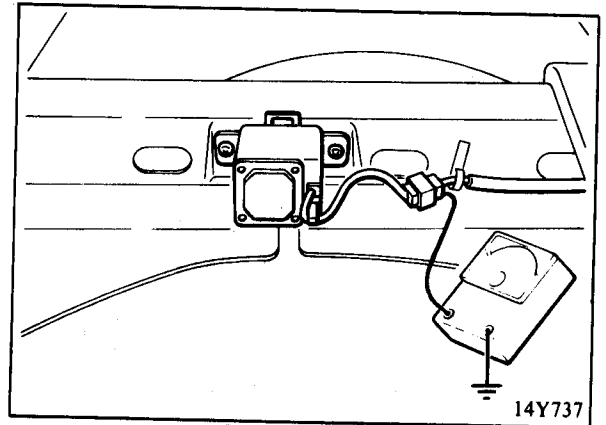
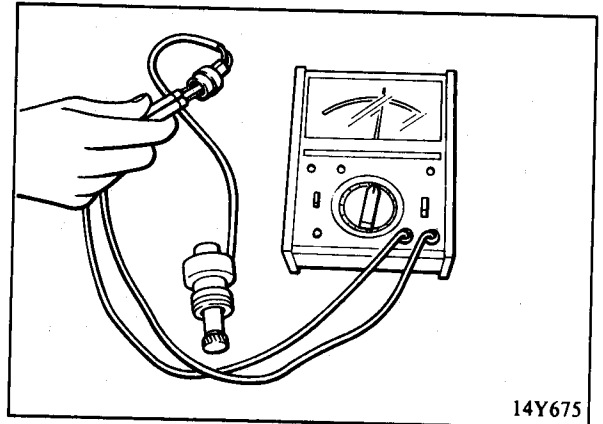
G-SENSOR

1. Check that the G-sensor is mounted correctly to the vehicle body. (The vehicle should be empty, and on a flat, level surface.)
2. Check that the mounting is correct by using a level. If the G-sensor varies $\pm 1^\circ$ or more from the horizontal position, use a suitable shim to adjust it to be perfectly horizontal.
3. Check that there is no oil leakage. If any oil leakage exists, replace the G-sensor.
4. Measure the voltage of the G-sensor when it is laid down in accordance with the following procedures.
 - (1) Check voltage across R terminal of control unit and ground for 7.0 to 7.5V. Voltage other than 7.0 to 7.5V indicates faulty control unit.

Caution

Be sure to set volt-ampere tester to volt range before measurement to protect control unit from possible damage.

- (2) Remove G-sensor and ground to car body by wire.
- (3) Turn G-sensor with mark upward. Measure voltage across G terminal of G-sensor and ground. If the voltage is not $4.8\text{ V} \pm 0.2\text{ V}$, replace the G-sensor.



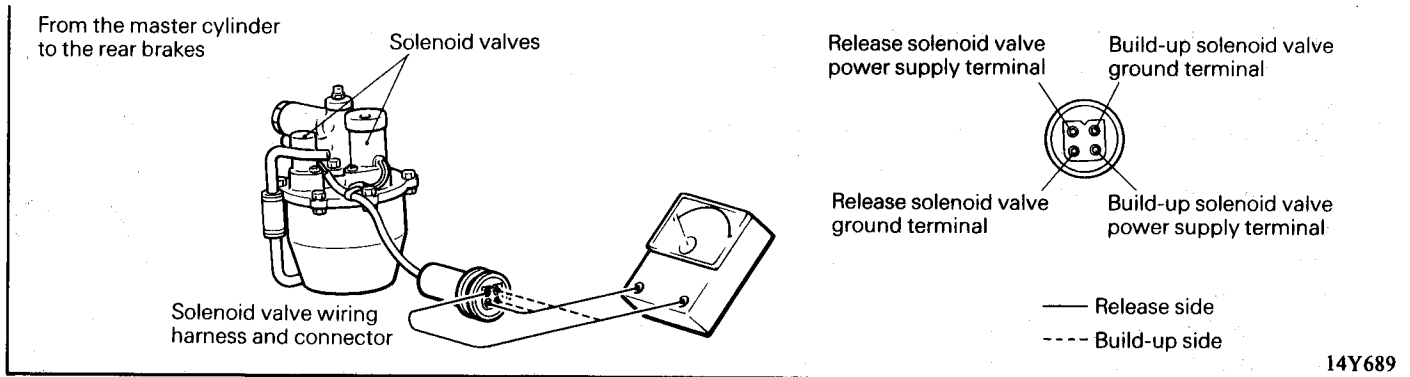


RELEASE SOLENOID VALVE AND BUILD-UP SOLENOID VALVE

Measure the resistance values of the solenoid valve terminals for both of the solenoid valves. If the resistance value for the release solenoid valve is not within the standard value range, replace the valve; if the resistance value for the build-up solenoid valve is not within the standard value range, replace the valve.

Resistance between solenoid valve terminals

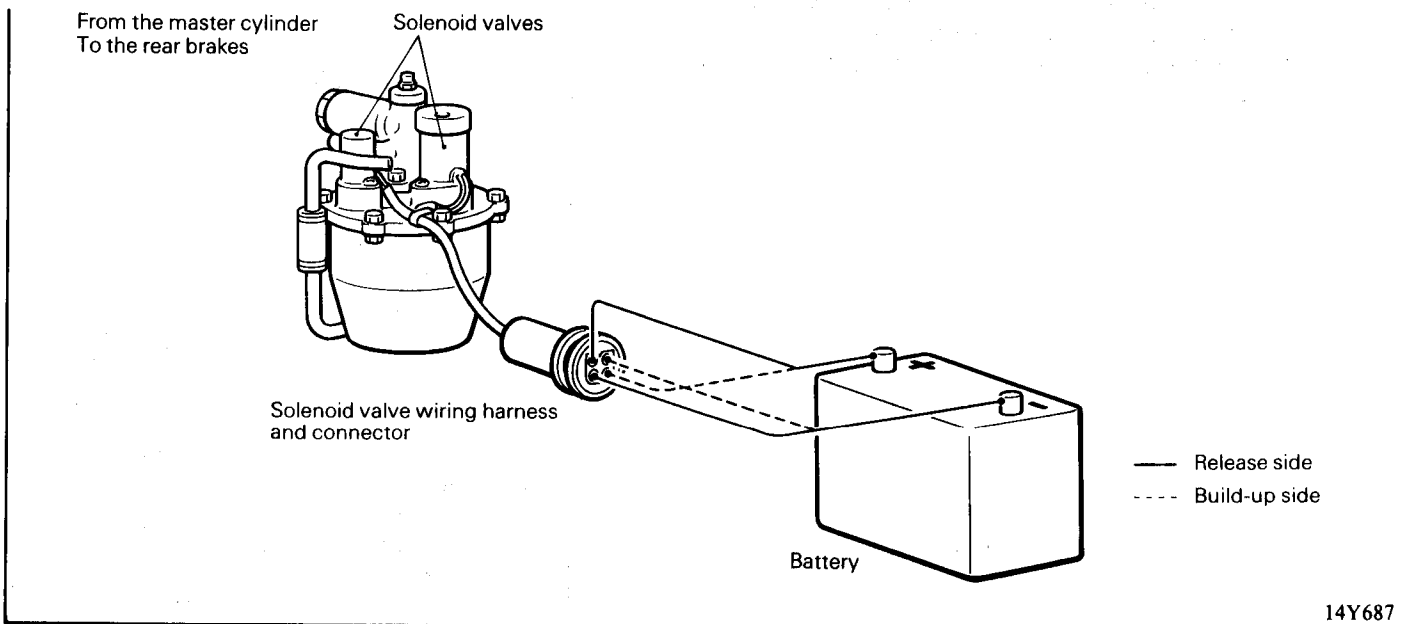
[Standard value]
	Release solenoid valve: 3.8 – 4.8 Ω
	Build-up solenoid valve: 4.5 – 5.5 Ω



If a circuit tester is not available, check the solenoid valves by listening to the operating sound. If the operating sound cannot be heard, replace the solenoid valves.

Caution

If a battery is to be connected, do not connect it for more than one minute.



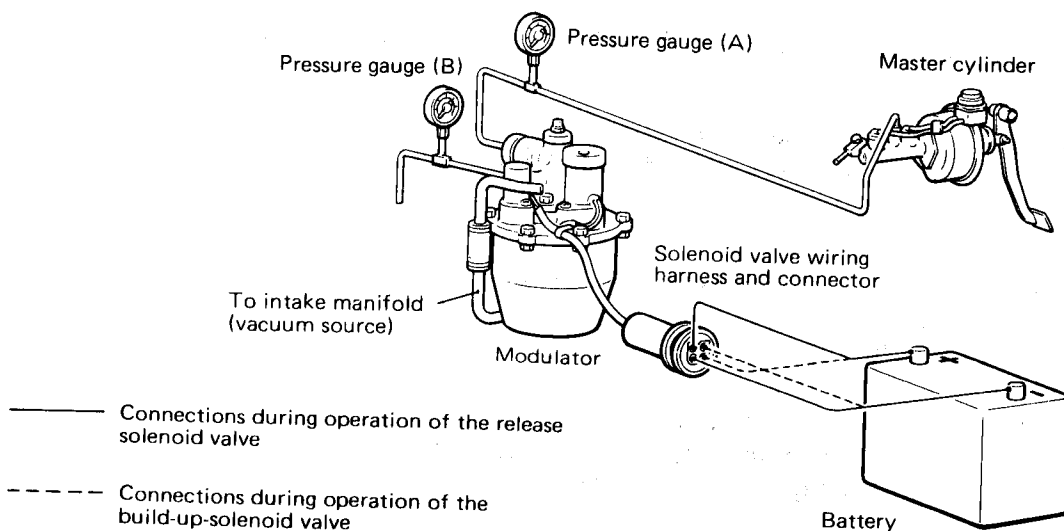


CHECKING THE VACUUM PIPING FOR THE MODULATOR

1. Check the vacuum piping (including the brake booster piping) for vacuum leakage caused by loose, disconnected or cracked hoses.
2. Check the check valves (for the modulator and the brake booster) for any abnormal condition such as clogging, etc.

CHECKING THE MODULATOR OPERATION

1. Connect pressure gauges [(A) and (B) with ranges of 0 to 14,709 kPa (0 to 2,133 psi) or more], one to the rear brake exit point of the modulator, and the other between the master cylinder and the modulator.
2. Let the engine run at idling speed.
3. Hold the brake pedal at the point which will result in a reading of about 4,903 kPa (711 psi) on the pressure gauge connected to the rear brake exit point of the modulator.
4. While watching pressure gauge (B), operate the release solenoid valve.
The condition is normal if the reading suddenly drops almost to 0 kPa (0 psi).
5. While maintaining the condition in step 4, operate the build-up solenoid valve.
6. Then, while in the condition in step 5, stop the operation of the release solenoid valve while watching the pressure gauge.
If the pressure suddenly rises to about 4,903 kPa (711 psi), the condition is normal.
7. Repeat step 4 and then, with the build-up solenoid valve in the non-operating condition, stop the operation of the release solenoid valve while watching pressure gauge (B).
If the pressure rises about one second later to about 4,903 kPa (711 psi), the condition is normal.



14Y688

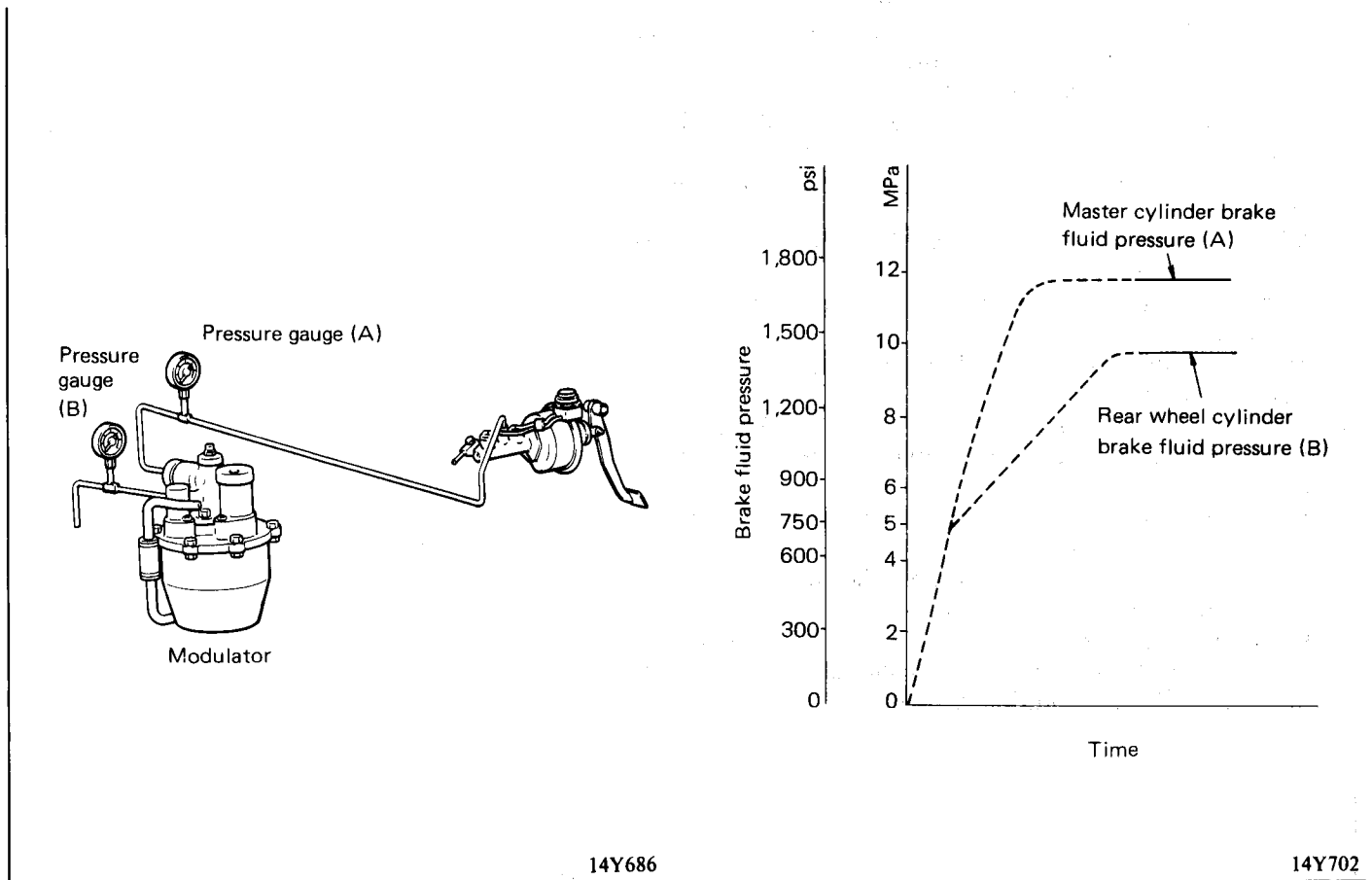


8. With both solenoid valves in the non-operating condition, increase the fluid pressure of the master cylinder, and check the relationship with the rear brake fluid pressure.

NOTE

Check to be sure that gauge (B) show a reading of 9,807 kPa (1,422 psi) when the brake pedal is depressed until gauge (A) shows a reading of 11,768 kPa (1,707 psi).

If these values cannot be satisfied, replace the modulator.



14Y686

14Y702

FUSE

Check the continuity by using a circuit tester. If continuity does not exist, replace the fuse and check the related wiring harness for a short circuit.

WIRING HARNESSSES

Use a circuit tester to check for continuity in the wiring harness between the components.

If continuity does not exist, repair the wiring harness.

STOP LIGHT SWITCH

Check to be sure the switch is set correctly. If not, adjust it.

Use a circuit tester to check for continuity while causing the stop lights to turn on and off (by depressing and releasing the brake pedal).

If continuity does not exist, replace the stop light switch.

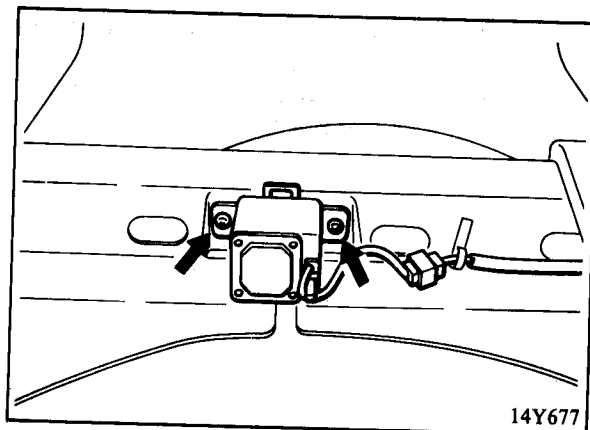


REMOVAL

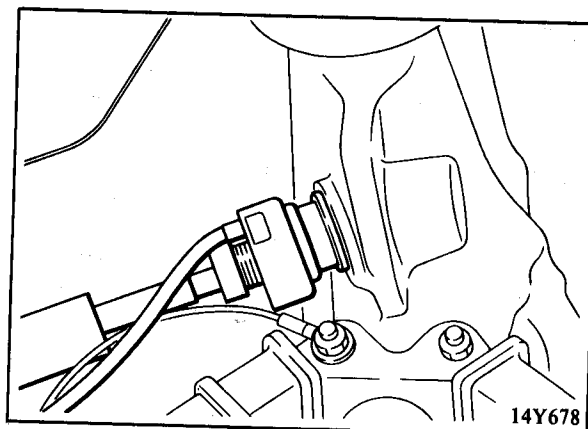
1. Remove the G-sensor from its position on the luggage compartment floor.

Caution

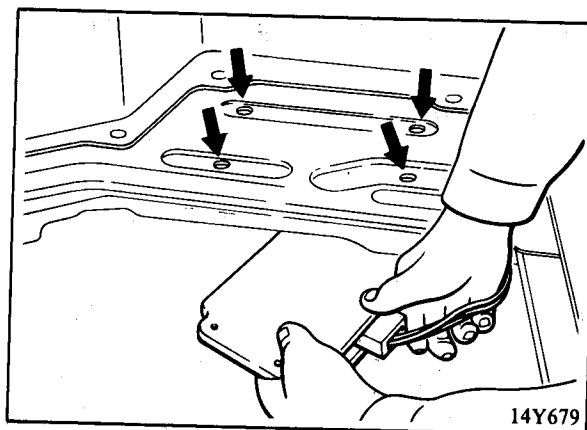
When removing the G-sensor, be careful not to subject it to any impact or violent shaking.



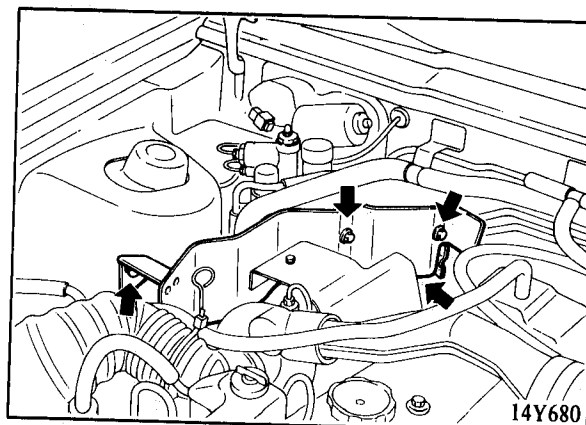
2. After disconnecting the speedometer cable at the pulse generator side, remove the pulse generator.



3. Remove the control unit from its position beneath the high floor side panel on the right side of the luggage compartment.

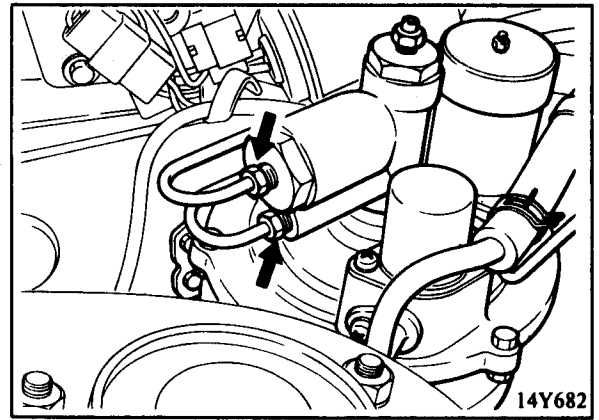


4. Remove the modulator as described below:
 - (1) Remove the heat protector.





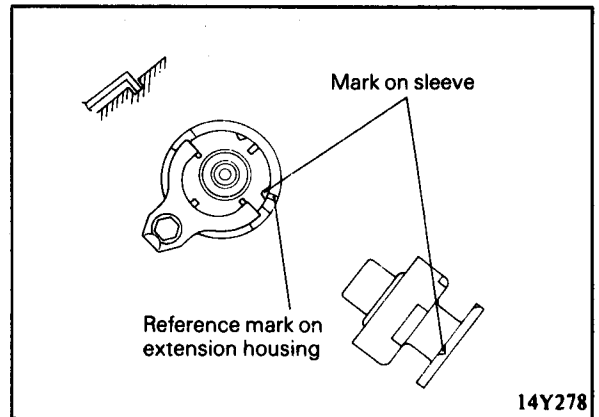
- (2) Remove the vacuum hose, the brake tube and the connector for the solenoid valves.
Remove the modulator bracket from the bulkhead, and then remove the modulator.



INSTALLATION

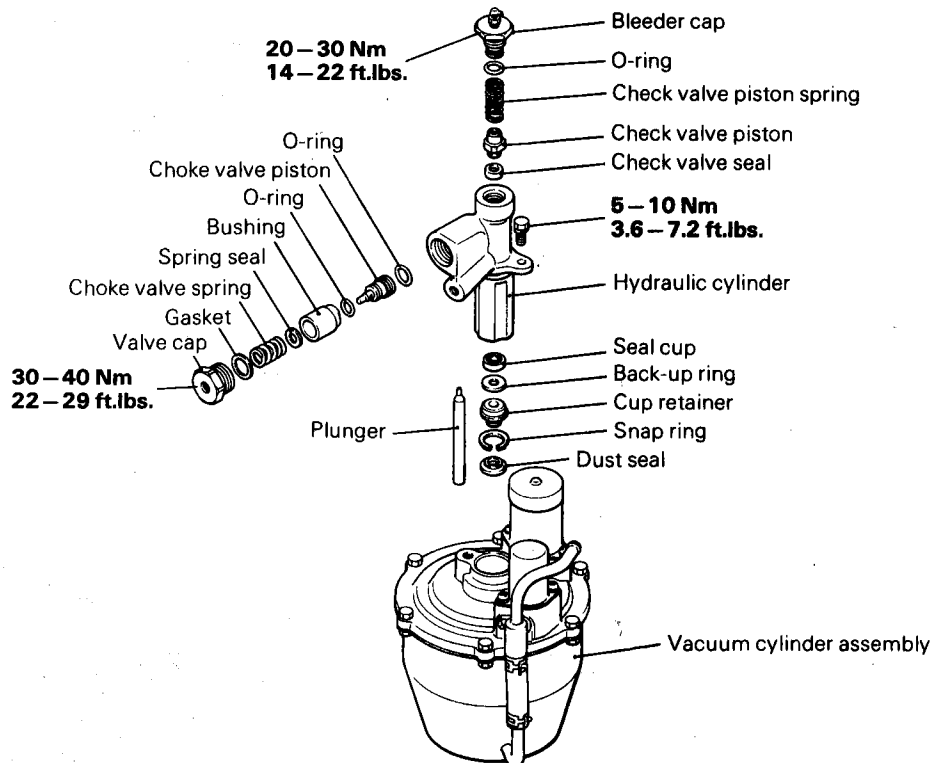
For installation of the G-sensor, park the vehicle on a level surface, and then install the G-sensor while using a level to be sure that it is perfectly horizontal.

In order to install a pulse generator in a vehicle with a manual transmission, count the number of speedometer driven gear teeth and select the mark on the sleeve of the pulse generator which indicates that number of teeth. Align the selected mark with the reference mark on the extension housing.



REPLACEMENT OF MODULATOR O-RINGS AND SEALS

Components

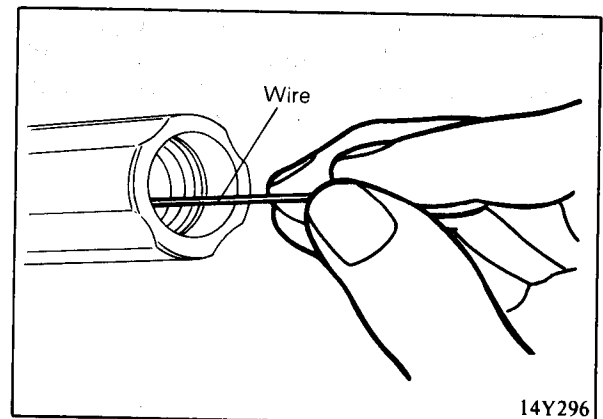
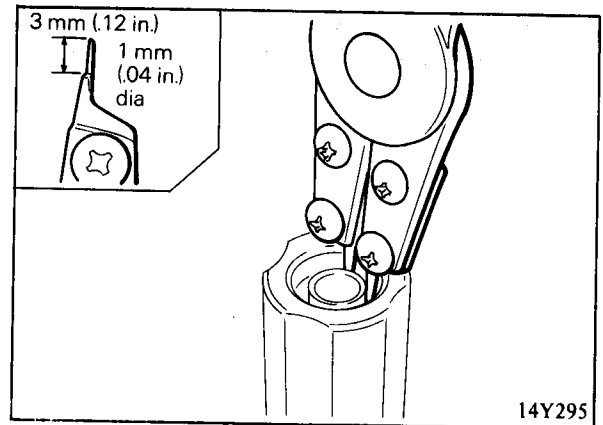
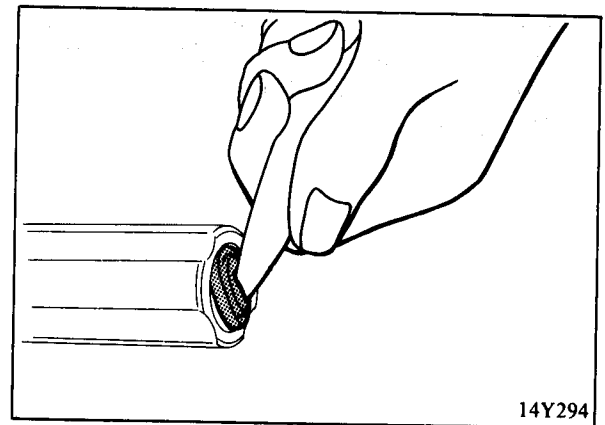
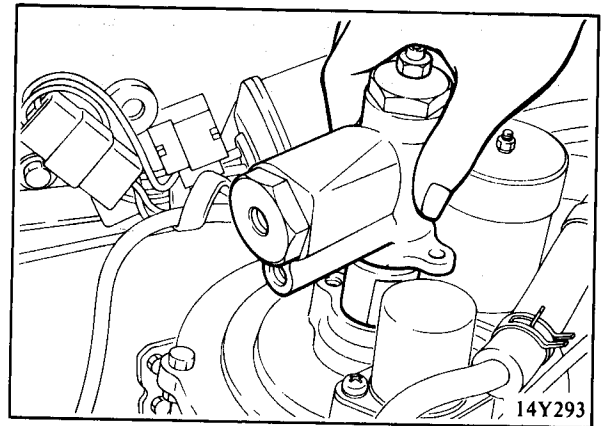


14Y292



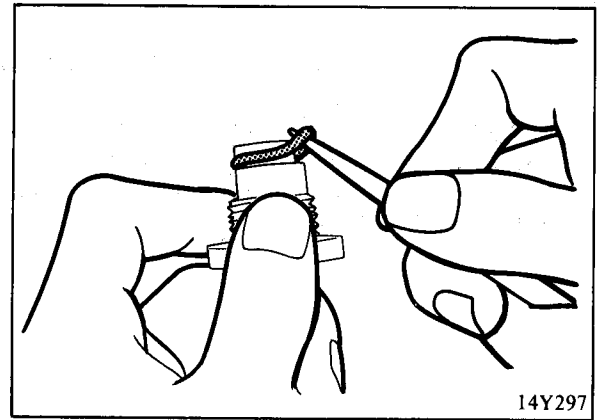
Disassembly

1. Disconnect the vacuum hose, brake lines and electrical wiring from the modulator.
2. Remove the two mounting bolts of the hydraulic cylinder and pull the hydraulic cylinder from the vacuum cylinder. Seal the hole of the vacuum cylinder to prevent dirt from entering. (14Y293)
3. Pull the plunger from the hydraulic cylinder and protect the surfaces of the plunger from damage. With the trim stick, remove the dust seal from the bottom of the hydraulic cylinder.
4. With the snap-ring plier tip as shown, remove the snap-ring, being careful not to damage the inner surface of the hydraulic cylinder. Then pull out the cup retainer and back-up ring. If necessary use a long nose pliers to lightly hold the cup retainer and pull it out.
5. Remove the cup seal with a brass wire with an L-shaped end.

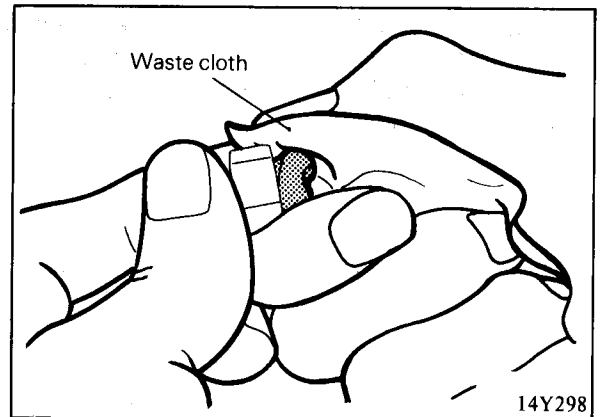




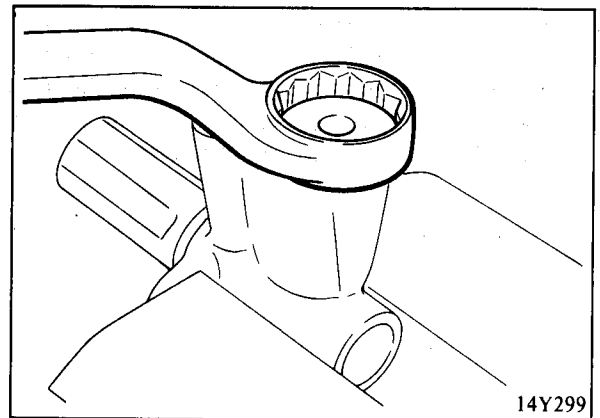
6. Put black painted portion of the hydraulic cylinder into a soft jaw vise and remove the bleeder cap. Remove the O-ring from the bleeder cap with the trim stick.



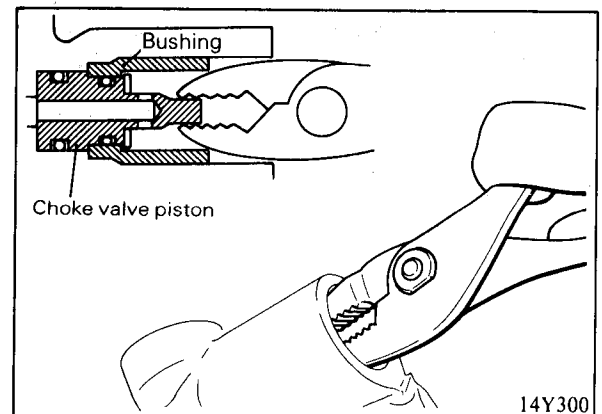
7. Remove check valve spring, check valve piston, and check valve seal from the hydraulic cylinder. Using a shop towel and thumb, pull the check valve seal off the check valve piston.



8. Re-position the hydraulic cylinder in the vise and remove the valve cap, gasket, choke valve spring, and spring seat.

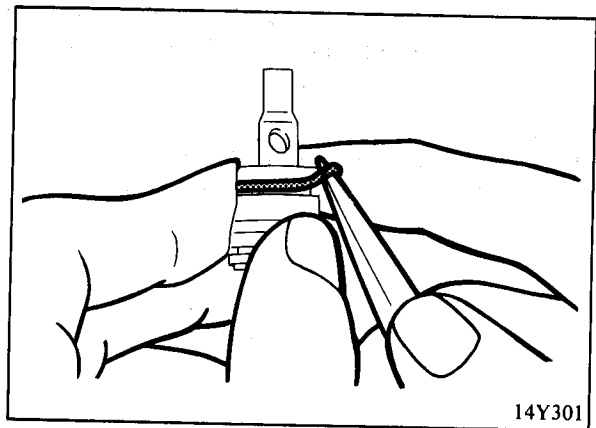


9. Hold the end of the choke valve piston with long nose pliers and pull the choke valve piston and bushing from the hydraulic cylinder. Push the choke valve piston out of the bushing with your fingers.





10. Remove the O-rings from the choke valve with trim stick. (14Y301)
11. Clean all parts and inspect for wear and damage.

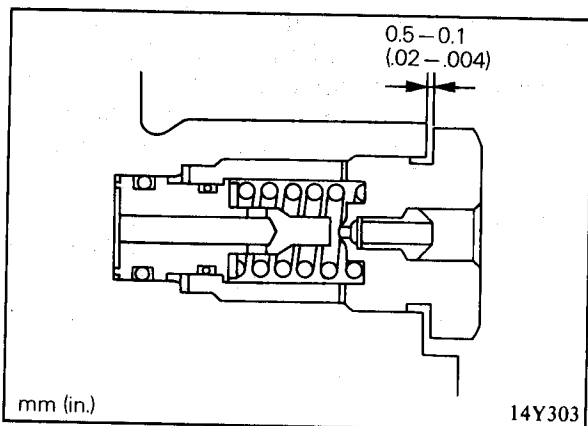
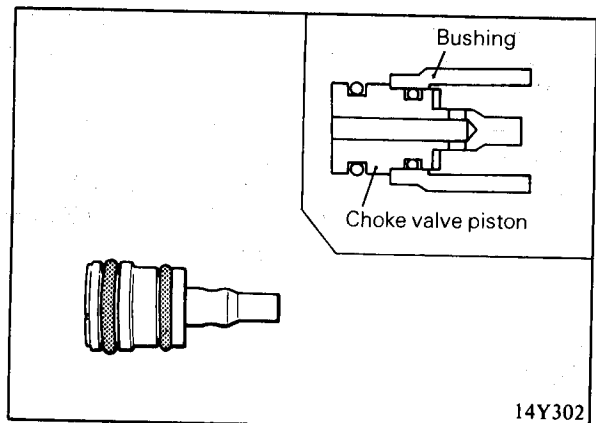


Reassembly

1. Coat the O-rings with specified brake fluid and install them on the choke valve piston.

Recommended brake fluid
MOPAR Brake Fluid
 Part Number 2933249 or equivalent

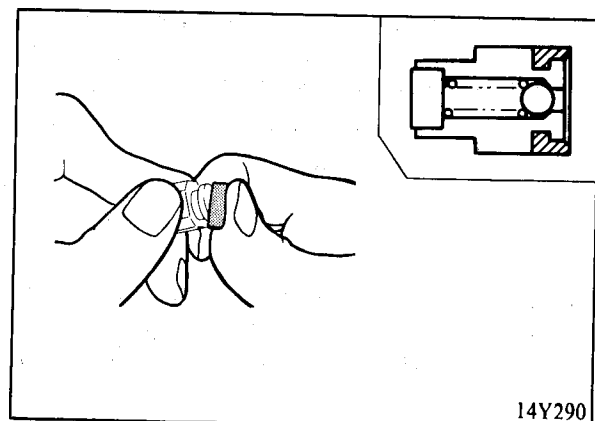
2. Assemble the choke valve piston and bushing first; and then install them together into the hydraulic cylinder. Make sure to replace the gasket with a new one.
3. Install the spring seat, choke valve spring, gasket, and the valve cap in that order into the hydraulic cylinder. Make sure to replace the gasket with a new one.
4. After tightening the valve cap to the specified torque of 30 to 40 Nm (22 to 29 ft.lbs.), a clearance of 0.5 to 0.1 mm (.020 to .004 in.) must remain.



5. Coat the check valve seal with brake fluid and install it on the check valve piston with the larger inner diameter of the seal facing toward the outside.

NOTE

If the check valve seal is installed upside down, the rear brake lock-up control system will become inoperative.



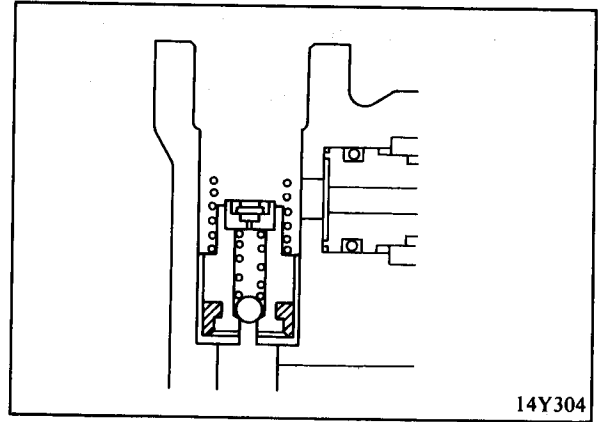


COMPONENT SERVICE — REAR BRAKE LOCK-UP CONTROL SYSTEM

- Install the check valve with the check valve seal end first into the hydraulic cylinder. Next, install the check valve spring.

NOTE

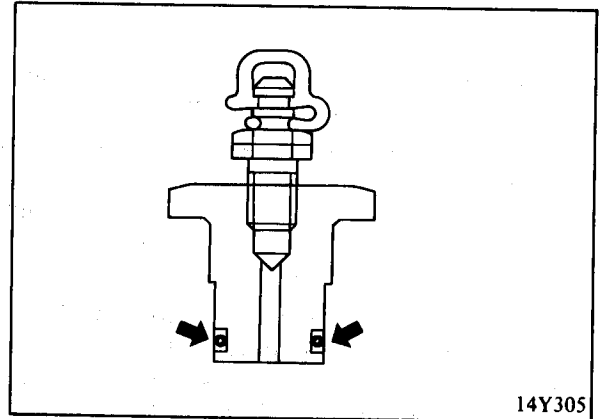
If the check valve is installed upside down, the rear brake lock-up control system will become inoperative.



14Y304

- Coat the O-ring with specified brake fluid and install it on the bleeder cap. Install the bleeder cap and torque to 20 to 30 Nm (15 to 22 ft.lbs.).

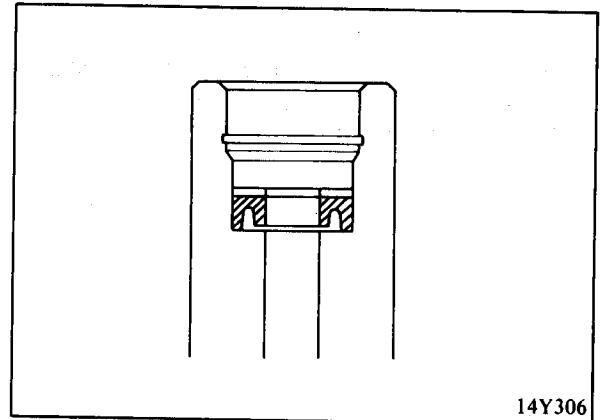
Recommended brake fluid
MOPAR Brake Fluid
 Part Number 2933249 or equivalent



14Y305

- Coat the cup seal with specified brake fluid and install it with its lipped side first into the hydraulic cylinder. Next, install the back-up ring, the cup retainer (large outer diameter first) into the hydraulic cylinder. Install the snap ring into its groove and make sure it is fully seated.

Recommended brake fluid
MOPAR Brake Fluid
 Part Number 2933249 or equivalent



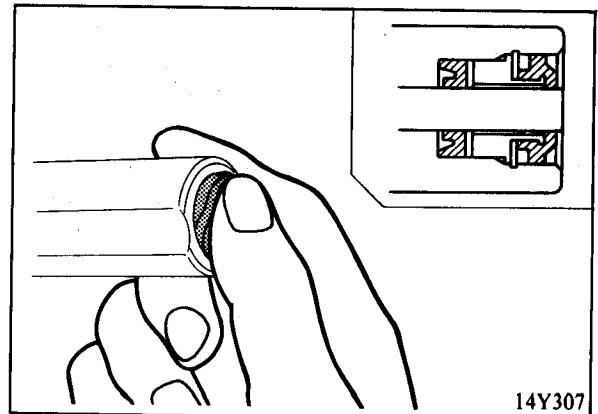
14Y306

- Coat the dust seal with the specified silicone grease furnished with the kit and push the dust seal with your fingers until it snaps into place on the cup retainer.

Recommended silicone grease
 Repair kit grease

NOTE

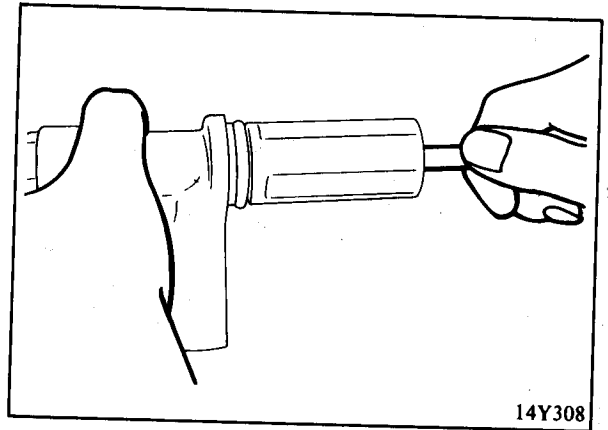
Do not force the outside edge of the dust seal too far into the hydraulic cylinder, since a certain amount of clearance must be provided between the dust seal and the snap ring.



14Y307



10. Install the plunger with the smaller diameter end first into the hydraulic cylinder.



11. Install the hydraulic cylinder to the vacuum cylinder assembly.
12. Re-connect the vacuum hose, brake lines, and electrical wiring.
13. Bleed air from the rear brake system modulator first, and then the rear brakes.

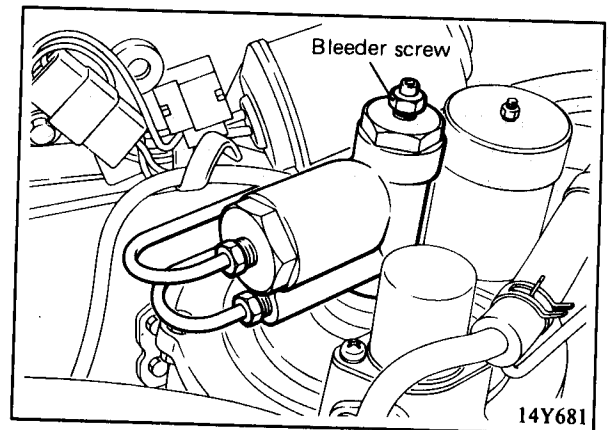
NOTE REGARDING REPLACEMENT PARTS

No repair or replacement parts, except those in the kit, are available for servicing the rear brake lock-up control system modulator. If a part is lost or damaged, the entire modulator must be replaced.

BLEEDING THE BRAKE LINES

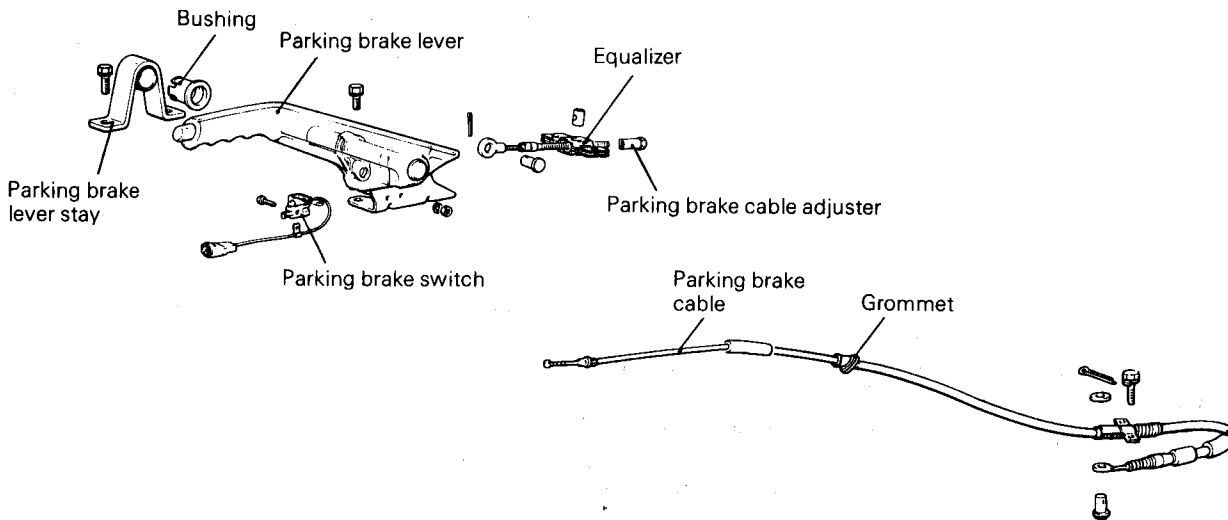
Bleed the brake lines in the following order:

- (1) Rear wheel caliper (right side)
- (2) Rear wheel caliper (left side)
- (3) Bleeder screw of modulator
- (4) Front wheel calipers





COMPONENTS

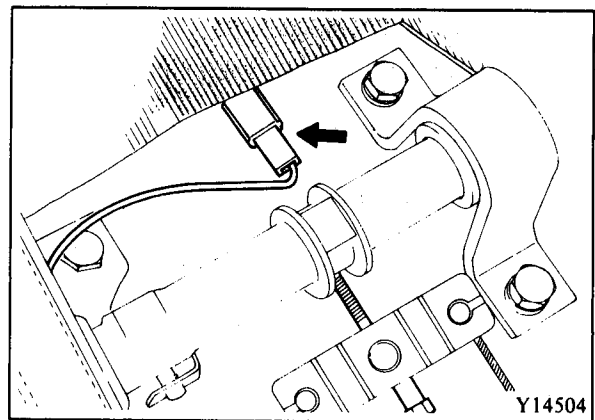


Y14500

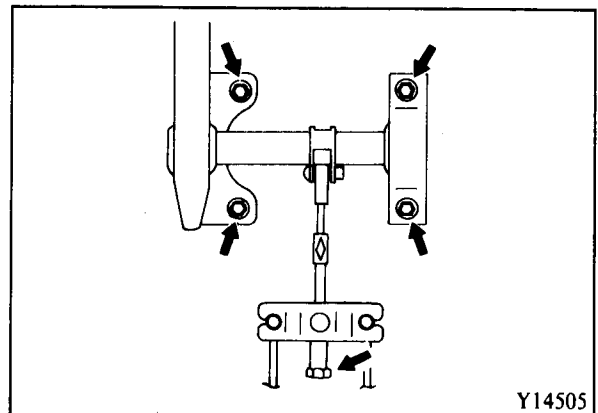
REMOVAL

Parking Brake Lever

1. Remove the console box. (Refer to GROUP 23.)
2. Disconnect the brake connector of the parking brake indicator light switch. (Y14504)



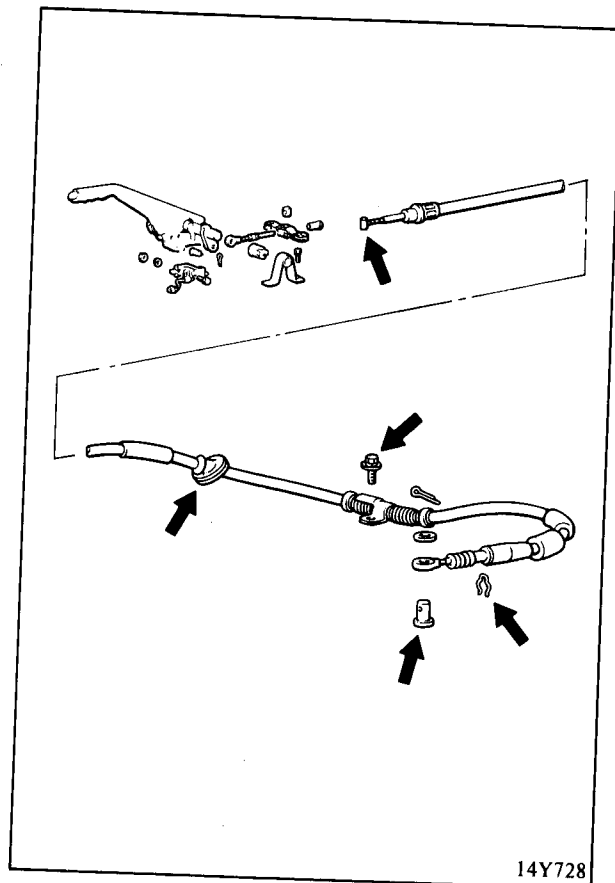
3. Disconnect the parking brake cable from the parking brake lever assembly.
4. Remove the parking brake lever assembly. (Y14505)





Parking Brake Cable

1. Remove the console box and rear seat. (Refer to GROUP 23.)
2. Disconnect all parking brake cable connections, and pull the cable out of the vehicle. (14Y728)



14Y728

INSPECTION

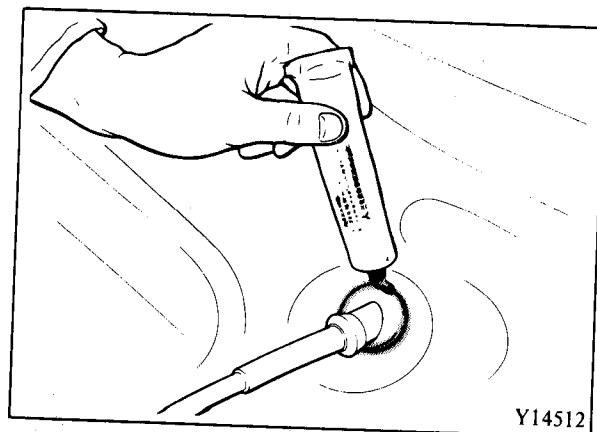
1. Check bushing for wear.
2. Check parking brake switch for malfunction.
3. Check parking brake lever ratchet for wear.
4. Check parking brake cable for operation or damage.

INSTALLATION

1. Apply drying sealant to the grommet and body panel contact surface. (Y14512)
2. Adjust the parking brake lever stroke.

 Parking brake lever stroke [Standard value] 4—5 clicks

3. Adjust the switch so that the indicator light illuminates when the parking brake lever is pulled one notch.



Y14512

