

11 Brake System

11.1 General

SPECIFICATIONS EJTC0010

Master cylinder	
Type	Tandem type
I.D. mm(in.)	20.64 mm (0.813 in.)
Fluid level warning sensor	Provided
Brake booster	
Type	Vacuum
Boosting ratio	4.0 : 1
Proportioning valve	
Cut-in pressure (Split point)	15 kg/cm ²
Decompression ratio	0.27 : 1
Front brake	
Type	Floating type with ventilated disc
Disc O.D.	234 mm (9.213 in.)
Disc thickness	18 mm (0.709 in.)
Pad thickness	10 mm (0.39 in.)
Pad effective thickness	8 mm (3.15 in.)
Cylinder I.D.	51.1 mm (2.01 in.)
Parking brake	
Type	Mechanical brake acting on rear wheels
Braking Type	Lever type (cam shape)
Cable arrangement	V type

SERVICE STANDARD EJTC0020

	Standard value	Service limit
Brake pedal height	145.2-150.2 mm (5.72-5.91 in.)	
Brake pedal stroke	118.4 mm (4.66 in.)	
Stop lamp switch outer case to pedal stopper clearance	0.5-1.0 mm (0.020-0.040 in.)	
Brake pedal free play	3-8 mm (0.118-0.315 in.)	
Brake pedal to floorboard clearance	50 mm (1.969 in.) or more	
Booster push rod to master cylinder piston clearance	0 (at 500 mmHg vacuum)	
Parking brake lever stroke when lever assembly is pulled with 196N (20kg, 44lb force)	10-14 clicks	
Front disc brake pad thickness	10 mm (0.39 in.)	2.0 mm (0.079 in.)
Front disc thickness (minimum)	18 mm (0.709 in.)	16 mm (0.63 in.)
Front disc runout	-	0.05 mm (0.02 in.)

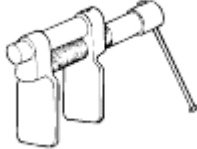
TIGHTENING TORQUE EJTC0030

	Nm	Kg-cm	lb-ft
Master cylinder to booster mounting nut	8-12	80-120	6-9
Brake booster mounting nut	8-12	80-120	6-9
Brake booster vacuum hose fitting to surge tank	8-12	80-120	6-9
Bleeder screw : Front	7-13	70-130	5-10
Bleeder screw : Rear	7-9	70-90	5-7
Brake tube flare nut, brake hose	13-17	130-170	10-13
Proportioning valve mounting nut	8-12	80-120	6-9
Caliper guide rod bolt	22-32	220-320	16-24
Caliper pin bolt	35-45	350-450	26-33
Caliper assembly to knuckle	65-75	650-750	48-55
Brake hose to front caliper	25-30	250-300	18-22

CAUTION

Replace the self-locking nuts with new ones after removal.

SPECIAL TOOLS EJTC0040

Tool (Number and Name)	Illustration	Use
09581 - 11000 Piston expander		Spreading the front brake piston.

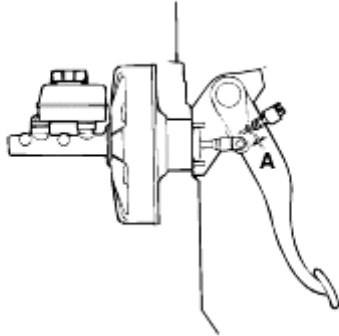
TROUBLESHOOTING EJDA0440

Symptom	Probable cause	Remedy
Noise or vibration when brakes are applied	Calliper improperly mounted	Correct
	Calliper mounting bolts	Retighten
	Unevenly worn brake disc	Replace
	Seized pad or lining contact surface	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 brakes are applied	Difference in left and right tire inflation pressure	Adjust
	Inadequate contact of pad	Correct
	Grease or oil on pad surface	Replace
	Drum warpage or uneven wear	Replace
Insufficient braking power	Air in the brake system	Bleed the system
	Brake booster malfunction	Correct
	Inadequate contact of pad	Correct
	Grease or oil on pad	Replace
	Low or deteriorated brake fluid	Refill or change
	Overheated brake rotor due to dragging of pad	Correct
	Restricted brake line	Replace
	Proportioning valve malfunction	Replace
	Air in the system	Bleed the system
Increased pedal stroke required (Reduced pedal to floorboard clearance)	Brake fluid leaks	Correct
	Excessive push rod to master cylinder clearance	Adjust
	Incomplete release of parking brake	Adjust
	Incorrect parking brake adjustment	Adjust
Brake drag	Worn brake pedal return spring	Replace
	Restricted master cylinder return port	Correct
	Lack of lubrication in sliding parts	Lubricate
	Defective master cylinder check valve or piston return spring	Replace
	Insufficient push rod to master cylinder clearance	Replace
Insufficient parking brake function	Parking brake cable sticking	Replace
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable routing
	Worn brake lining or pad	Replace
	Grease or oil on lining or pad surface	Replace

BRAKE PEDAL INSPECTION AND ADJUSTMENT EJTC0050

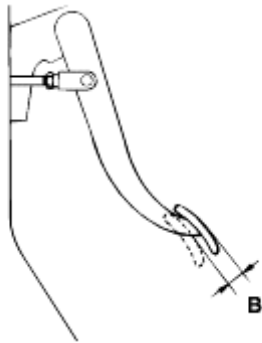
1. Turn the stop lamp switch until the clearance between the stop lamp switch outer case and pedal arm reaches the standard value, and secure the stop lamp switch with the lock nut.

Clearance between pedal and stop lamp switch A :
0.5-1.0 mm (0.02-0.039 in.)



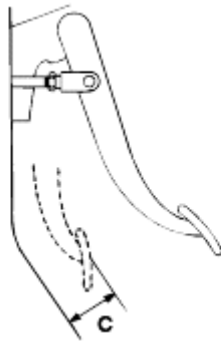
2. Brake pedal free play.

Brake pedal free play B :
3-8 mm (0.118-0.315 in.)



3. Start the engine, apply the brake pedal with approximately 50kg (110 lbs.) of force, and measure the clearance between the brake pedal and the floor board.

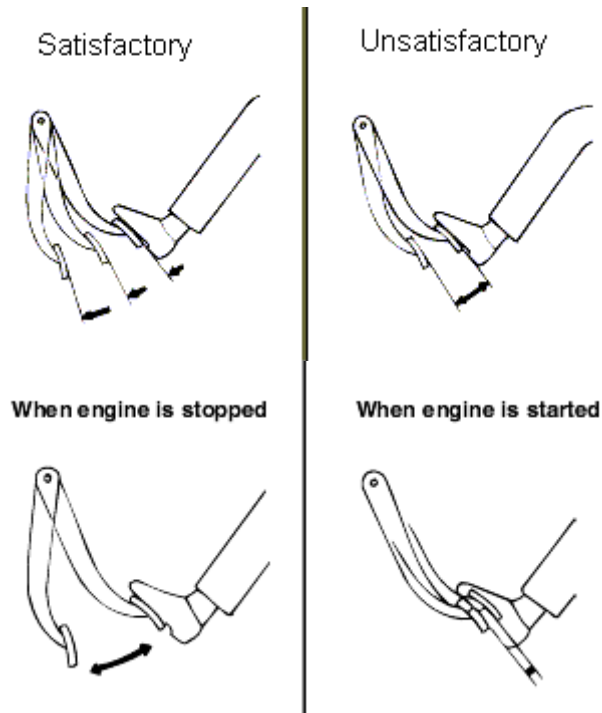
Pedal to floor board clearance C :
45.1 mm (1.78 in.) or more



BRAKE BOOSTER OPERATION TEST WITHOUT A TESTER EJT0060

For a simple check of brake booster operation, perform the following tests.

1. Run the engine for one or two minutes, then stop it. Depress the brake pedal several times using normal foot pressure. If the pedal goes down further at the first time, but gradually rises after the second or third time, the brake booster is functioning properly. Go to step 2.
2. With the engine stopped, depress the brake pedal several times. Depress the brake pedal and start the engine. If the pedal goes down slightly, the booster is in good condition. Go to step 3.
3. With the engine running, depress 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 height does not change, the booster is in good condition. If one of the above three tests is not okay, check the vacuum hoses, the check valve and the brake booster, make any necessary corrections. If all the tests are OK, unit is good.



BLEEDING THE BRAKE SYSTEM EJTC0070

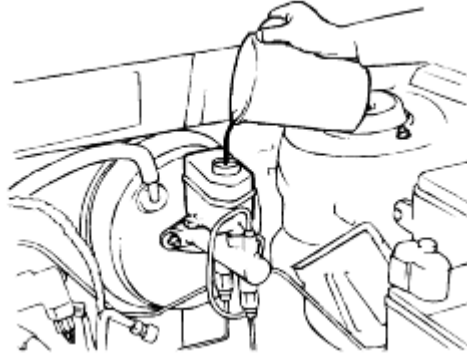
1. Remove the reservoir cap and fill the brake fluid to reservoir.

CAUTION

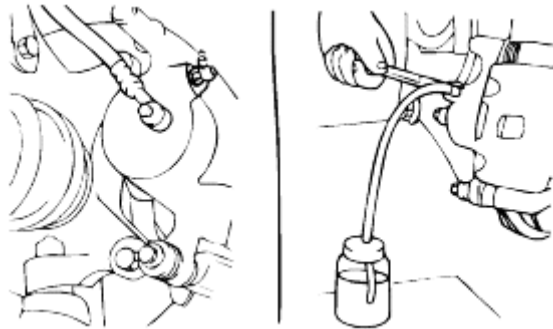
Do not allow brake fluid to remain on a painted surface. Wash it off immediately.

NOTE

When bleeding by pressurized fluid; do not depress the brake pedal.



2. Connect a vinyl tube to the calliper bleeder screw and insert the other end of tube in a half full container of brake fluid.
3. Slowly pump the brake pedal several times.
4. While depressing the brake pedal fully, loosen the bleeder screw until fluid starts to run out. Then close the bleeder screw.



5. Repeat steps 3 and 4 step until there are no more bubbles in the fluid.
6. Tighten the bleeder plug screw.

Bleeder screw tightening torque :

Front : 7-13 Nm (70-130 kg-cm, 5-10 lb-ft)

Rear : 7-9 Nm (70-90 kg-cm, 5-6.5 lb-ft)

7. Repeat the above procedure for each wheel.

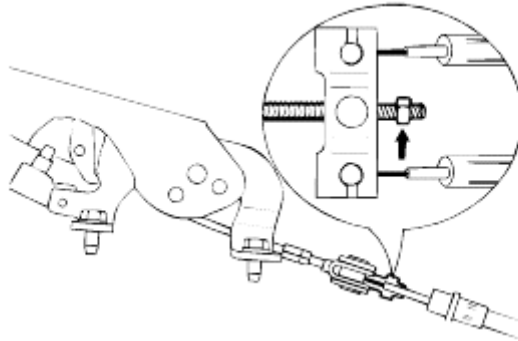
PARKING BRAKE STROKE ADJUSTMENT EJTC0080

1. Pull the brake lever with a force of approximately 196 N (20 kg, 44 lbs.), and count the number of clicks.

Parking brake lever stroke (Standard value) :

7-8 clicks

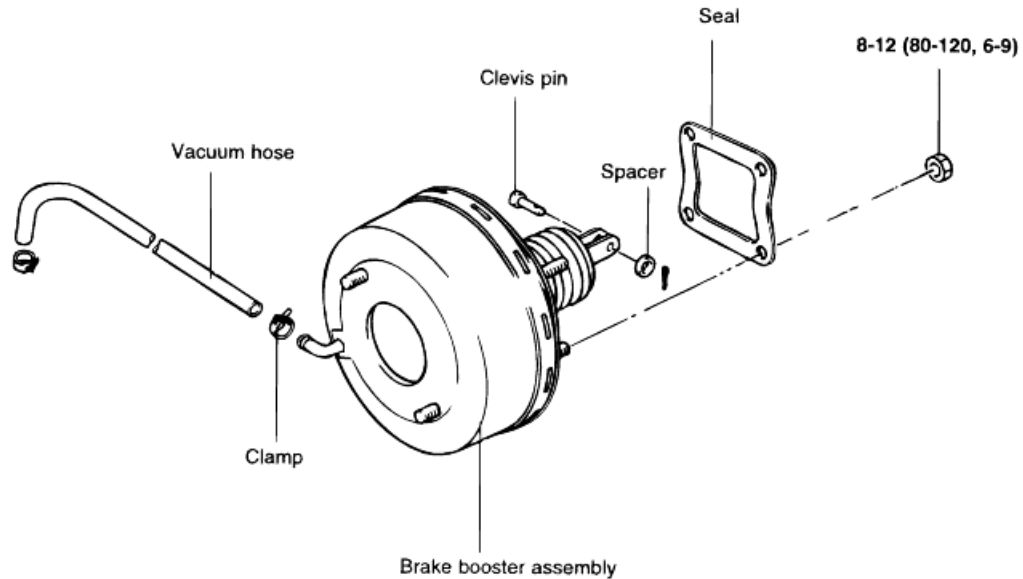
2. If the number of notches is not within the standard value, adjust the cable length with the adjusting nut of the equalizer.



3. The indicator light will go out when the brake lever is fully released, and will light when the lever is pulled up one notch. If it does not operate, replace it.
4. After the adjustment, check that the rear brakes do not drag with the parking brake lever released.

11.2 Brake System

COMPONENTS EJTC0190



TORQUE : Nm (kg-cm, lb-ft)

REMOVAL EJTC0210

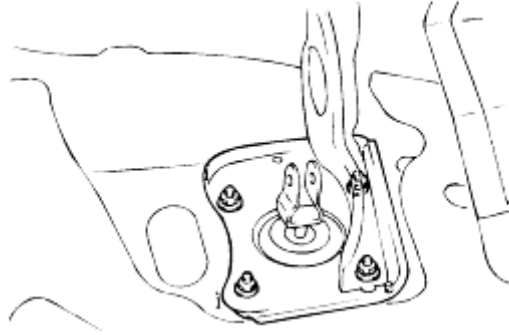
1. Disconnect the brake tube from the master cylinder.
2. Remove the master cylinder.

CAUTION

Do not allow brake fluid to remain on a painted surface. Wash it off immediately.

3. Disconnect the vacuum hose from the booster.
4. Remove Knee Guard and retaining bolts
5. Remove the brake pedal.
6. Pry console back and use a block to hold it
7. Loosen the booster mounting nuts.

8. Lift out the booster assembly.



INSTALLATION EJTC0220

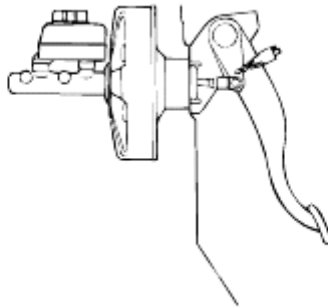
1. When the booster assembly is installed, replace the packing at each end of the booster mounting holder, if necessary.

2. Install brake booster and tighten the mounting nuts.

Tightening torque :

8-12 Nm (80-120 kg·cm, 6-9 lb·ft)

3. Connect clevis to brake pedal with clevis pin and install the split pin to the clevis pin.
4. Install master cylinder and connect the brake tube to the master cylinder.
5. Connect vacuum hose to brake booster.
6. Fill brake reservoir with brake fluid and bleed the system.
7. Check for fluid leakage.
8. Check and adjust the brake pedal.
9. After installation, apply sufficient grease to the clevis and brake pedal contacting points.

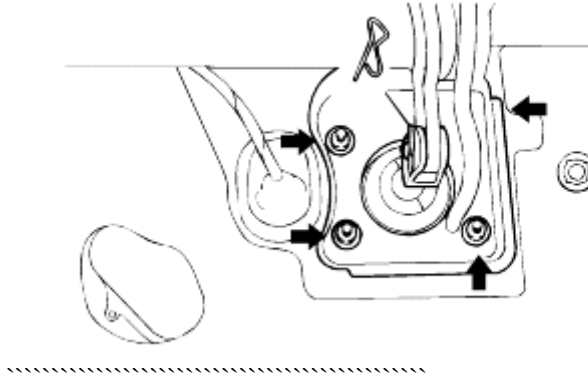


COMPONENTS EJTC0090



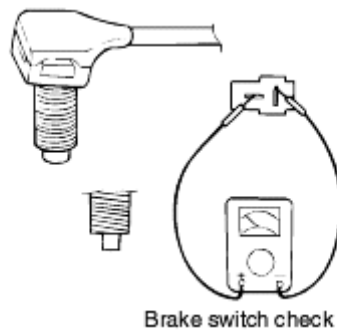
REMOVAL EJTC0100

1. Remove the knee guard
2. Remove the through-bolt.
3. Remove the clevis pin.
4. Remove the brake pedal assembly.



INSPECTION EJTC0110

1. Check the bushing for wear.
2. Check the brake pedal for distortion.
3. Check the stop lamp switch
 - With an ohmmeter connected to the stop lamp switch terminals, check for continuity.
 - If there is no continuity when the plunger is depressed and there is continuity when the plunger is released, the stop lamp switch is normal.



INSTALLATION EJTC0120

1. Apply chassis grease to the sliding surface of the brake pedal and operating rod clevis pin.

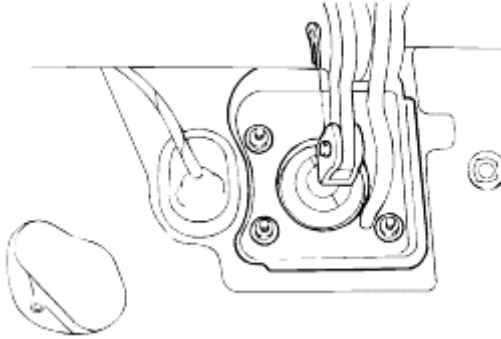
CAUTION

Be sure to install the split pin on the operating rod clevis pin.

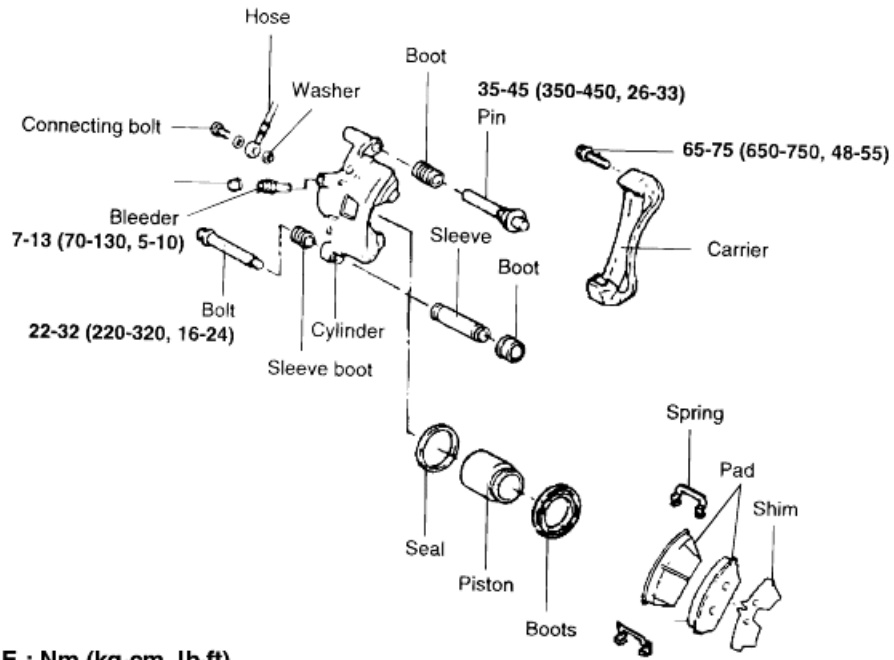
2. Install the brake pedal assembly and tighten the through-bolt.

Tightening torque :

8-12 Nm (80-120 kg·cm, 6-9 lb·ft)

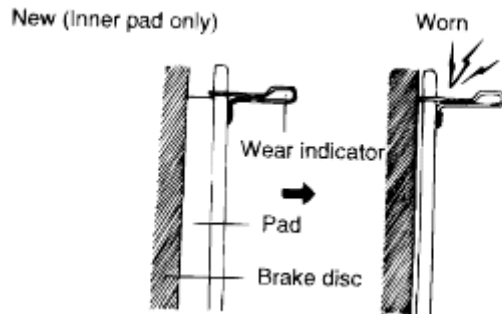


COMPONENTS EJTC0230



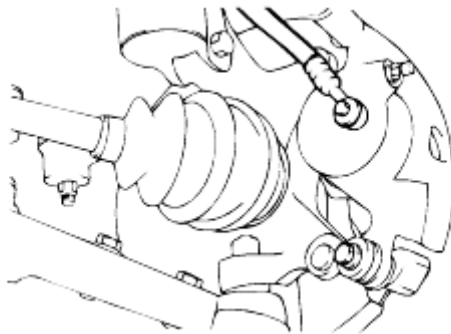
BRAKE PAD EJTC0240

The brake pads have wear indicators that contact the brake disc when the brake pad thickness becomes 2 mm (0.08 in.). The wear indicators will generate a squealing sound to warn the driver.



REMOVAL

1. Remove the lower bolt and lift the caliper assembly up and out of the way. Secure it with a wire or some other retaining method.



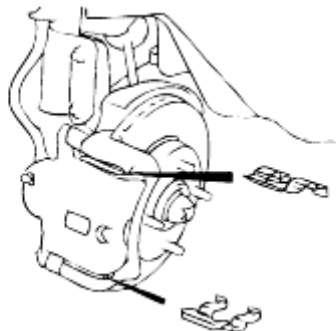
2. Remove the pads.

CAUTION

Do not depress the brake pedal while disassembling the pads.

INSTALLATION EJTC0260

1. Install the pad clips.

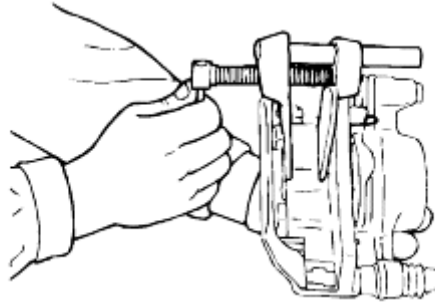


2. Install the pads onto each pad clip.

NOTE

Position the pad with its wear indicator toward the disc side and facing upward.

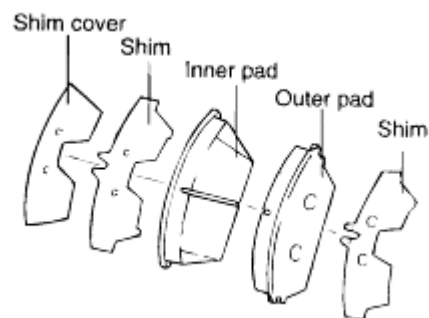
3. Seat the piston in the cylinder using Special Tool (09581-11000).



4. Install the new pads. The shims are attached to the each pad as illustrated.

CAUTION

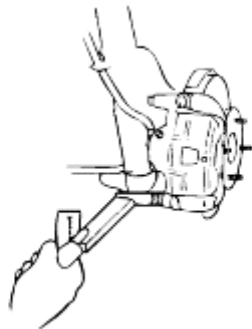
Never apply grease to the disc or pads.



5. Install the bolt and tighten to the specified value.

Tightening torque :

22-32 Nm (220-320 kg-cm, 16-24 lb-ft)

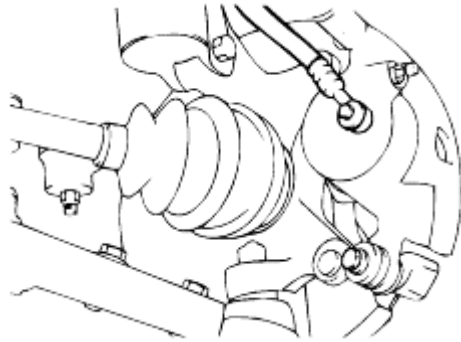


CALIPER ASSEMBLY EJTC0270 REMOVAL

1. Remove the wheel and tire.
2. Disconnect the brake hose.

NOTE

Plug the brake hose, to prevent brake fluid from running out.



3. Remove the cylinder mounting bolt.
4. Remove cylinder and pads.
5. Remove the caliper mounting bolts (2EA) from knuckle.
6. Remove the carrier.

DISASSEMBLY EJTC0280

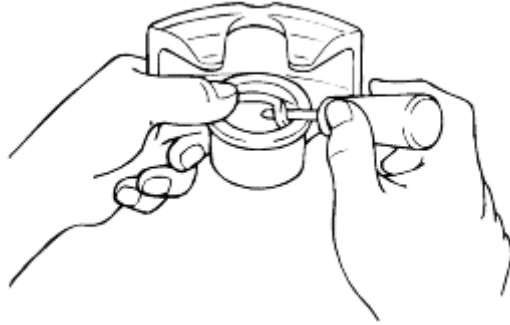
1. Remove the piston boot.
2. Remove the piston using compressed air.

CAUTION

- a. **Do not place fingers in front of the piston when using compressed air.**
- b. **Be careful not to splatter the brake fluid.**



3. Remove the piston seal from the caliper using a screw driver.



INSPECTION EJTC0290

1. Check the caliper for wear, damage, cracks and rust.
2. Check the piston for rust, damage, cracks and wear on the outer surface.
3. Check the sleeve and pin for damage and rust.
4. Check the pad spring and boots for damage.
5. Check the carrier for damage, rust, wear and cracks.

CAUTION

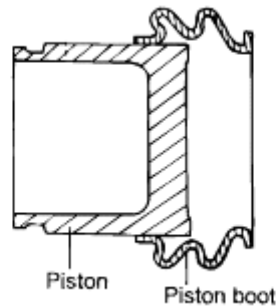
- a. **Do not use sand paper on the piston surface.**
 - b. **All rubber parts must be replaced with new parts.**
6. Inspect the disc using a calipers and dial gauge.

	Standard value	Service limit
Thickness of disc mm (in.)	18 (0.709)	16 (0.63)
Total runout of front axle assembly mm (in.)	-	0.05 (0.002)

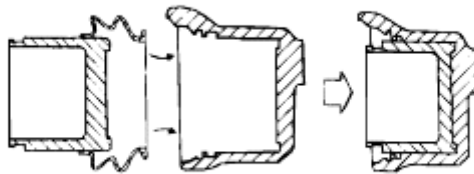
7. If necessary, replace the brake disc.

REASSEMBLY EJTC0300

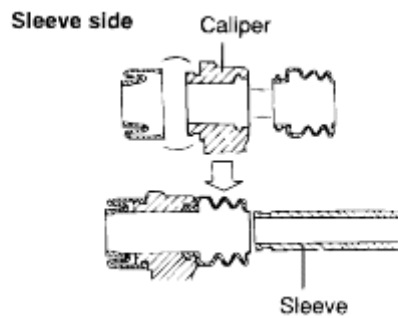
1. Clean all components with isopropyl alcohol except the pads and shim.
2. Apply rubber grease to the piston seal and install the piston seal in the cylinder.



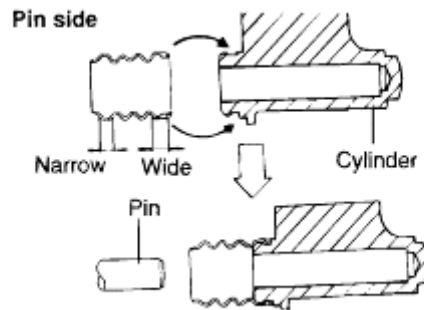
3. Assemble the piston and piston boots according to the following procedure.
 - Apply rubber grease to the caliper bore, outside surface of the piston and piston boot.
 - Install the piston boot on the piston as illustrated.
 - Insert the piston boot in the inner groove of caliper and slide the piston into the caliper.



4. Assemble the sliding parts according to the following procedure.
 - Apply rubber grease to the outside surface of the sleeve and pin, pin and sleeve bore of the caliper, pin boot and sleeve boot.



- Insert the boots into the groove of the caliper.



5. Install the pads.

NOTE

Do not apply grease to the disc or pads.

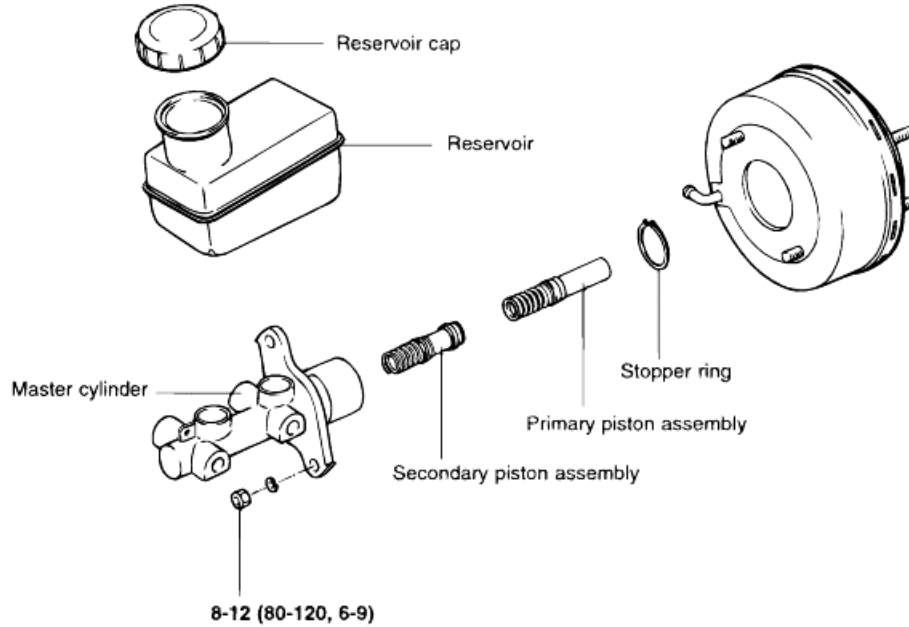
6. Tighten the brake hose connecting bolt.

Tightening torque	Nm (kg-cm, lb-ft)
Sliding pin	35-45 (350-450, 26-33)
Sliding bolt	22-32 (220-320, 16-24)
Carrier mounting bolt	65-75 (650-750, 48-55)
Brake hose mounting bolt	25-30 (250-300, 19-22)

NOTE

- a. Check that the surface of the pin and bolts are not damaged before tightening.
- b. Bleed the system. Depress the pedal several times and check for fluid leakage from all connecting parts.

COMPONENTS EJTC0130



TORQUE : Nm (kg-cm, lb-ft)

REMOVAL EJTC0140

1. Remove the fluid level warning device connector.
2. Disconnect the brake lines from the master cylinder, and plug the open ports.
3. Remove knee guard.
4. Remove Brake pedal.
5. Pry back console and use block to hold it.

CAUTION

Do not allow brake fluid to remain on a painted surface. Wash it off immediately.

- 6.
7. Remove the master cylinder mounting nuts. Then lift out the master cylinder.

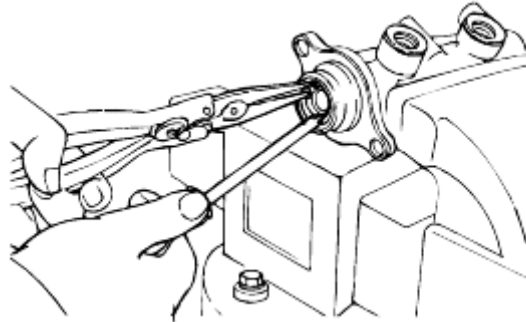
DISASSEMBLY EJTC0150

1. Remove the reservoir cap and drain the brake fluid into a suitable container.
2. Remove the reservoir from the master cylinder.

NOTE

If necessary, support the master cylinder in a vice at its flange not at its bore.

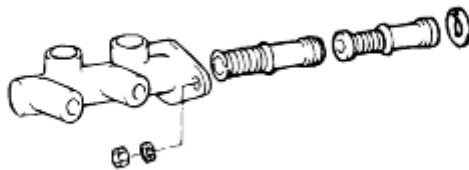
3. While depressing the piston, remove the snap ring.



4. Remove the primary and secondary piston from the master cylinder body.

NOTE

- a. Be careful not to damage the cylinder bore.
- b. Do not disassemble the primary and secondary piston assemblies.



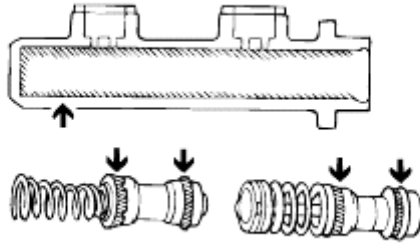
INSPECTION EJTC0160

1. Check the inner surface of the master cylinder body for rust or scoring.
2. Check the primary and secondary pistons for rust, scoring, wear, damage or deterioration.
3. Check the primary and secondary piston spring for deterioration.

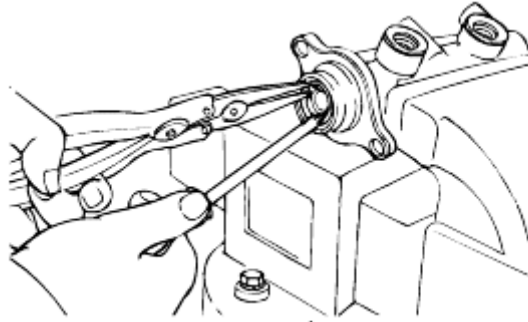
REASSEMBLY EJTC0170

1. Apply the specified brake fluid to the inner surface of the master cylinder body and to the outside of the secondary and primary pistons.

Recommended brake fluid : DOT 3 or DOT 4



2. Carefully insert the spring and secondary piston assembly in the master cylinder bore.
3. Carefully insert the primary piston assembly in the master cylinder bore.
4. Depress the primary piston and install the retaining ring in the cylinder bore groove as illustrated.

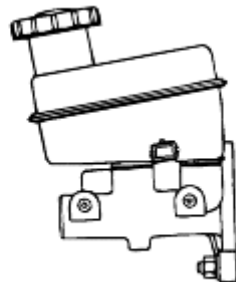


5. Install the reservoir cap on the master cylinder.
6. Lubricate the two grommets at both inside and outside with genuine brake fluid and then insert them into the master cylinder body.

NOTE

Whenever the reservoir is replaced, the grommets must also be replaced.

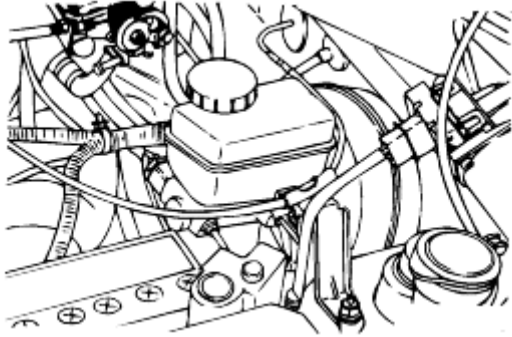
7. Press the reservoir into the grommets with the fluid level indicator socket facing inboard. The reservoir should snap in place indicating that it is secure as illustrated.



8. Connect the fluid level warning connector in the socket on the reservoir.

INSTALLATION EJTC0180

1. Install the master cylinder to the brake booster with two nuts.
Nut : 8-12 Nm (80-120 kg-cm, 6-9 lb-ft)
2. Connect two brake tubes and fluid level warning connector.
Brake tube flare nut :
13-17 Nm (130-170 kg-cm, 10-13 lb-ft)
3. Fill the master cylinder reservoir with brake fluid and bleed the system.



PROPORTIONING VALVE EJTC0183

The proportioning valve distributes the proper fluid pressure to the front and rear wheels to obtain greater braking efficiency and prevents premature rear wheel lock-up. You should not disassemble it because the performance of the valve is closely connected with the mounting tension of the spring.

PROPORTIONING VALVE FUNCTION TEST

1. Remove the proportioning valve from the master cylinder.
2. Connect two pressure gauges; one to the input side, and one to the output side.

NOTE

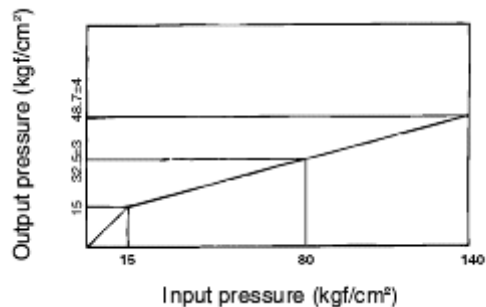
Be sure to bleed the system after connecting the pressure gauges.

3. With the brakes applied, measure the input pressure and the output pressure. If the measured pressures are within the specified range as illustrated, the proportioning valve is good.
4. Reconnect the brake lines in their original positions and bleed the system.

NOTE

This figure shows characteristics of the proportioning valve as the pressure increases.

5.



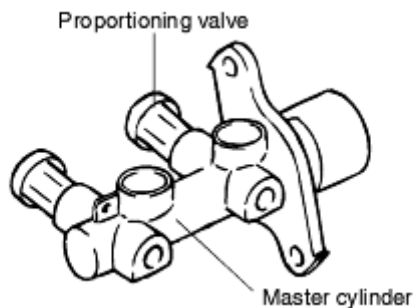
INSTALLATION OF PROPORTIONING VALVE

1. Install the master cylinder according to the illustration.
2. Tighten the flare nuts and bleed the system.

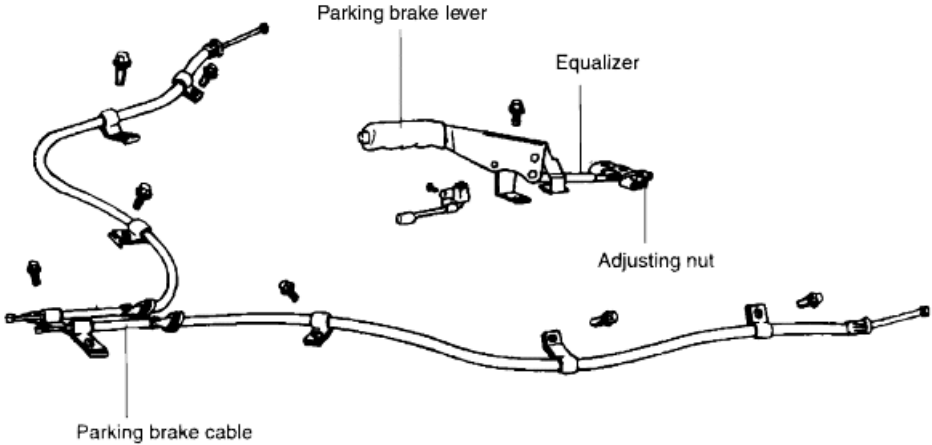
Tightening torque Nm (kg-cm, lb-ft)

Brake tube flare nut : 13-17 (130-170, 9-12)

Proportioning valve mounting nut : 8-12 (80-120, 6-9)



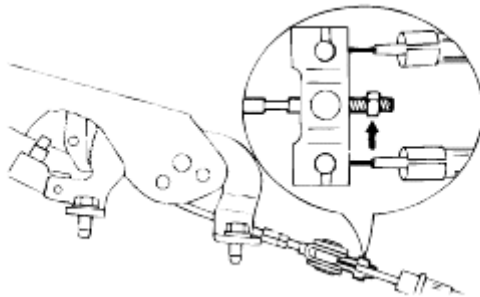
11.3 Parking Brake System



COMPONENTS EJTC0360

REMOVAL EJTC0370

1. Remove the shifter cover.
2. Loosen the adjusting nut and detach the parking brake cable.



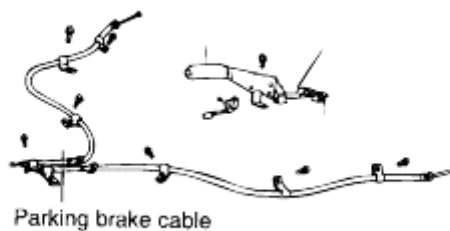
3. Detach the parking brake switch assembly.
4. Remove the parking brake lever assembly. .
5. Loosen the parking brake cable clamp and remove the parking brake cable assembly.

INSPECTION EJTC0380

1. Check the parking brake switch operation.
2. Check the parking brake lever ratchet for wear.
3. Check the parking brake cable for fraying or damage.

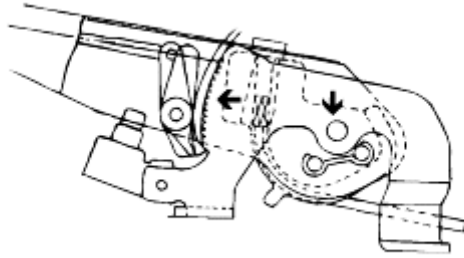
INSTALLATION EJTC0390

2. Check the parking brake cables for left and right identification marks and install accordingly. The right cable is slightly longer.



Specified grease

Multipurpose grease SAE J310, NLGI NO.2



3. After installing the cable adjuster, adjust the parking brake lever stroke.

11.4 BLEEDING OF BRAKE SYSTEM

This procedure should be followed to ensure adequate bleeding of air and filling of the unit, brake lines and master cylinder with brake fluid.

1. Remove the reservoir cap and fill the brake reservoir with brake fluid.

CAUTION

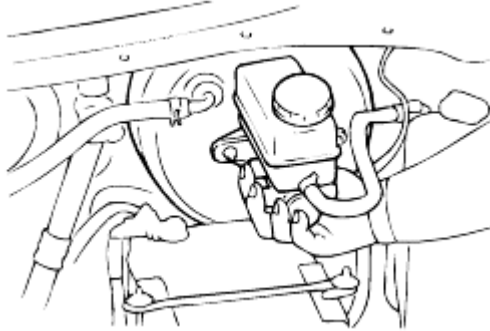
Do not allow brake fluid to contact with painted surfaces.

Wash any off immediately.

NOTE

When pressure bleeding, do not depress the brake pedal.

Recommended fluid.....DOT3 or equivalent



3. Connect a clear plastic tube to the calliper bleeder plug and insert the other end of the tube into a half filled clear plastic bottle.
4. Pump the brake pedal several times, and then loosen the bleeder screw until fluid starts to run out without bubbles. Then close the bleeder screw.
5. Repeat step 5 until there are no more bubbles in the fluid for each wheel.
6. Tighten the bleeder screw.

Bleeder screw tightening torque :

7-9 Nm (70-90 kg·cm, 5-6.6 lb·ft)