
BASIC BRAKE SYSTEM

Click on the applicable bookmark to selected the required model year.

BASIC BRAKE SYSTEM

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35109000494

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GENERAL INFORMATION

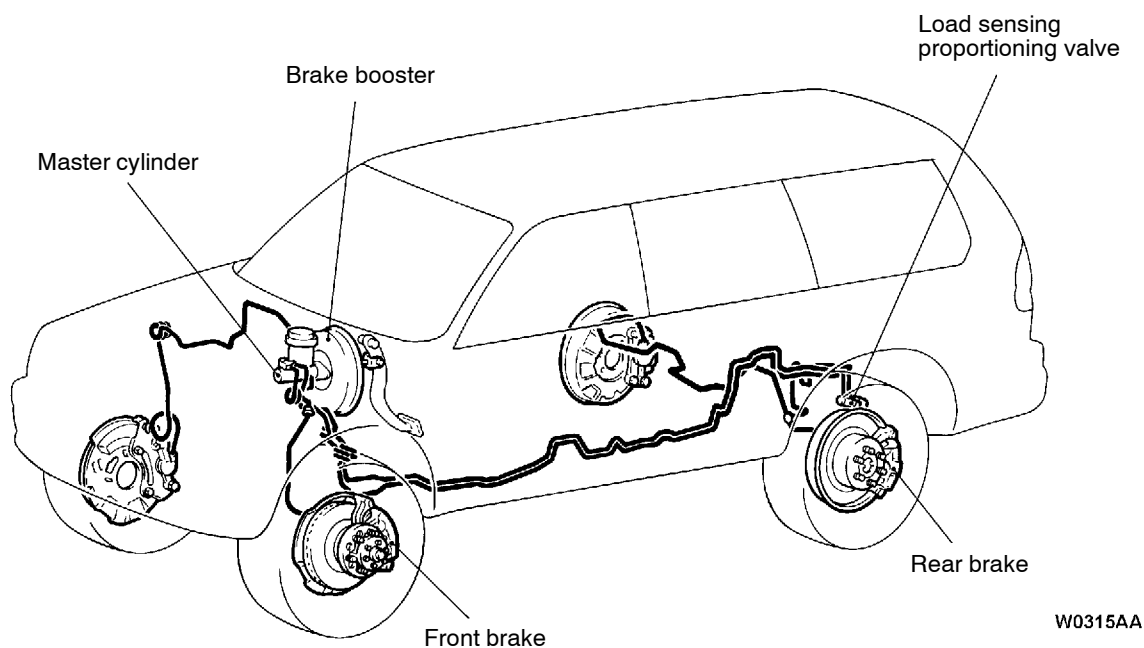
The brake system has high reliability and durability which maintains excellent braking performance and braking feeling. The main features are as follows.

- A dual type master cylinder is equipped in all models.
- A tandem type brake booster has been adopted.
- The following type of brake have been adopted.
Front: Floating caliper, 2-piston, ventilated disc brakes (V5-W43, V6-W43)
Rear: Floating caliper, 1-piston, solid disc brakes (S5-S43P)

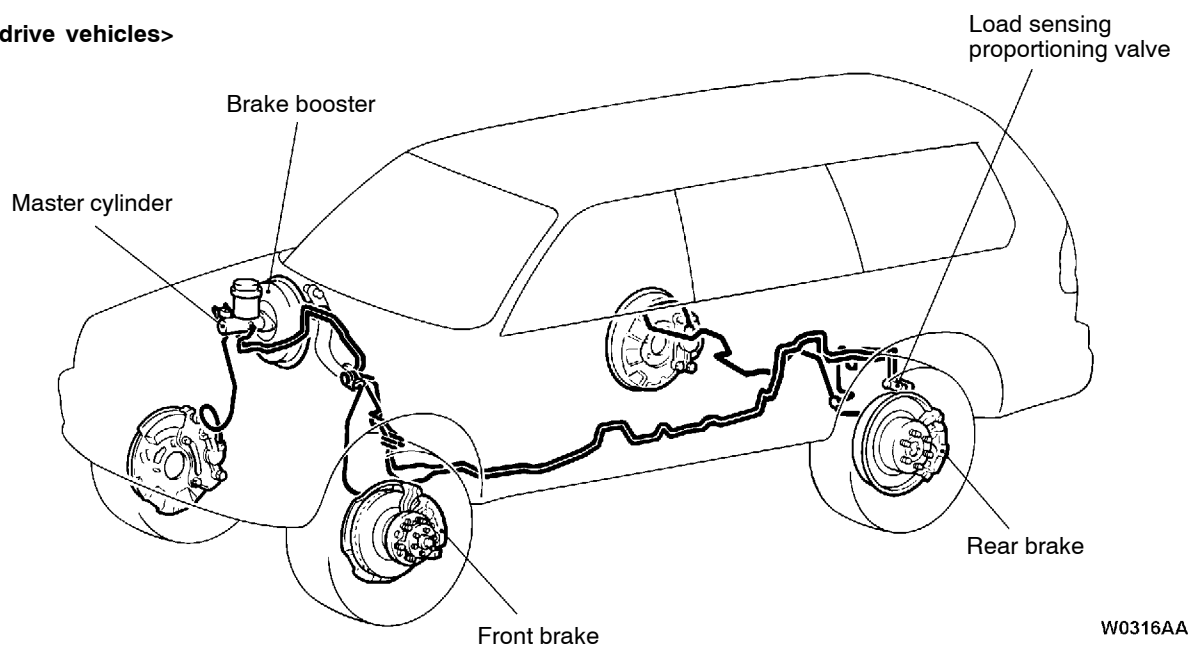
Items	6G7	4D5 <Vehicles without wide fender>	4D5 <Vehicles with wide fender>
Master cylinder I.D. mm	23.8		
Brake booster effective dia. of power cylinder mm	205 + 230	180 + 205	
Brake booster boosting ratio	5.0	6.0	5.0
Front brake disc effective dia. mm	265	227	265
Front brake wheel cylinder I.D. mm	42.86		
Rear brake disc effective dia. mm	272		
Rear brake wheel cylinder I.D. mm	42.85		

CONFIGURATION DIAGRAM

<L.H. drive vehicles>



<R.H. drive vehicles>



SERVICE SPECIFICATIONS

35100030386

Items		Standard value	Limit
Brake pedal height mm		176 – 181	–
Brake pedal free play mm		3 – 8	–
Brake pedal to floor board clearance mm		95 or more	–
Load sensing spring length mm		164 – 168	–
Load sensing proportioning valve output pressure kPa (Input pressure kPa)	When load sensing spring length is 144 mm (when unladen)	3,633 (5,884)	–
		5,610 (13,730)	–
	When load sensing spring length is 208 mm (when laden)	11,160 (13,730)	–
Disc brake pad thickness mm		10	2.0
Brake disc run-out mm	Front	–	0.06
	Rear	–	0.08
Front hub end play mm		0.05	–
Rear axle shaft end play mm		0 – 0.25	–
Brake disc thickness mm	Front	24	22.4
	Rear	18	16.4
Brake lining thickness mm		–	4.5
Brake drum inside diameter mm		197.0	198.0
Booster push rod to master cylinder piston clearance mm	Vehicle which brake booster of power cylinder is 180 mm and 205 mm in effective diameter	0.90 – 1.30	–
	Vehicle which brake booster of power cylinder is 205 mm and 230 mm in effective diameter	0.70 – 1.10	–
Disc brake drag force (tangential force of wheel mounting bolts) N	Front	106 or less	–
	Rear	56 or less	–

LUBRICANTS

35100040174

Items	Specified lubricant
Brake fluid	DOT3 or DOT4
Brake piston seal	Repair kit grease
Guide pin boot inner surface	
Lock pin boot inner surface	
Piston boot mounting grooves	
Sleeve inner surface	
Bushing inner surface	
Pin boot inner surface	

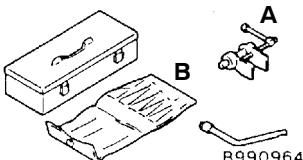
SEALANT

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Item	Specified sealant	Remark
Vacuum switch	3M ATD Part No.8661 or equivalent	Semi-drying sealant
Fitting		

SPECIAL TOOL

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Tool	Number	Name	Use
	MB990964 A: MB990520 B: MB990623	Brake tool set	Pushing-in of the disc brake piston Installation of drum brake wheel cylinder piston cup

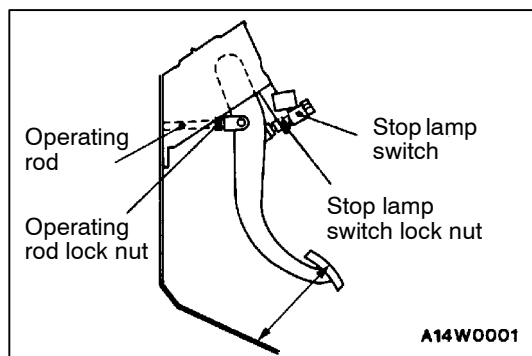
TROUBLESHOOTING

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Symptom	Probable cause	Remedy
Vehicle pulls to one side when brakes are applied	Grease or oil on pad or lining surface	Replace
	Inadequate contact of pad or lining	Correct
Insufficient braking power	Low or deteriorated brake fluid	Refill or change
	Air in brake system	Bleed air
	Overheated brake rotor due to dragging of pad or lining	Correct
	Inadequate contact of pad	
	Brake booster malfunction	
	Clogged brake line	
	Grease or oil on pad surface	Replace
	Load sensing proportioning valve malfunction	
Increased pedal stroke (Reduced pedal to floor board clearance)	Air in brake system	Bleed air
	Worn pad	Replace
	Broken vacuum hose	
	Faulty master cylinder	
	Brake fluid leaks	Correct
	Excessive push rod to master cylinder clearance	Adjust
Brake drag	Incomplete release of parking brake	Correct
	Clogged master cylinder return port	
	Incorrect parking brake adjustment	Adjust
	Improper push rod to master cylinder clearance	
	Faulty master cylinder piston return spring	Replace
	Worn brake pedal return spring	
	Lack of lubrication in sliding parts	Lubricate

Symptom	Probable cause	Remedy
Insufficient parking brake function	Worn brake lining or pad	Replace
	Grease or oil on lining or pad surface	
	Parking brake cable sticking	
	Stuck wheel cylinder or caliper piston	
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable routing
	Auto adjuster malfunction	Adjust
Scraping or grinding noise when brakes are applied	Worn brake pad	Replace
	Caliper to wheel interference	Correct or replace
	Dust cover to disc interference	
	Bent brake backing plate	
	Cracked brake disc	
Squealing, groaning or chattering noise when brakes are applied	Missing or damaged brake pad anti-squeak shim	Replace
	Brake discs and pads worn or scored	Correct or replace
	Burred or rusted calipers	Correct or deburr
	Dirty, greased, contaminated or glazed pad	Clean or replace
	Incorrect brake pedal or booster push rod	Adjust
Squealing noise when brakes are not applied	Bent or warped backing plate causing interference with drum	Replace
	Poor return of brake booster, master cylinder	
	Loose or extra parts in brakes	Retighten
	Improper positioning of pads in caliper	Correct
	Improper installation of support mounting to caliper body	
	Worn, damaged or insufficiently lubricated wheel bearings	Lubricate or replace
	Incorrect brake pedal or booster push rod	Adjust

Symptom	Probable cause	Remedy
Groaning, clicking or rattling noise when brakes are not applied	Loose wheel nuts	Retighten
	Loose installation bolts	
	Worn, damaged or dry wheel bearings	Lubricate or replace
	Failure of shim	Replace
	Wear on sleeve	
	Incorrect brake pedal or booster push rod	Adjust



ON-VEHICLE SERVICE

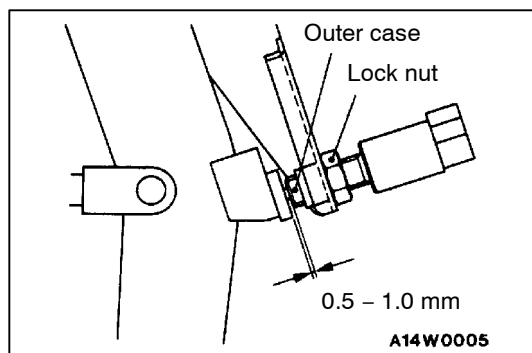
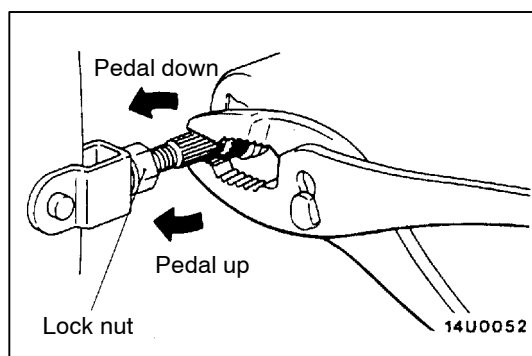
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BRAKE PEDAL CHECK AND ADJUSTMENT

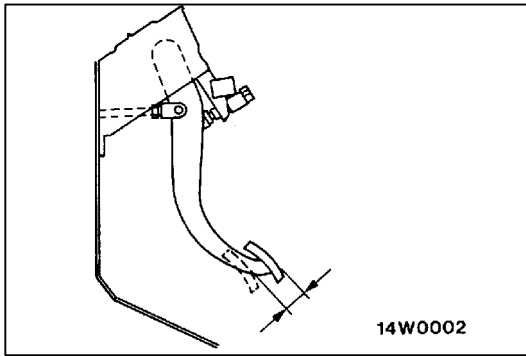
BRAKE PEDAL HEIGHT

1. Turn back the carpet etc. under the brake pedal.
2. Measure the brake pedal height as illustrated. If it is not within the standard value, adjust as follows.

Standard value: 176 – 181 mm (From the surface of melting seat to the face of pedal pad)



- (1) Disconnect the stop lamp switch connector, loosen the lock nut, and move the stop lamp 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).
 - (3) Screw in the stop lamp switch until it contacts the brake pedal stopper (just before brake pedal is caused to move), return the stop lamp switch 1/2 to 1 turn and secure with the lock nut.
 - (4) Connect the connector of the stop lamp switch.
 - (5) Check to be sure that the stop lamp is not illuminated with the brake pedal released.
3. Return the carpet etc.

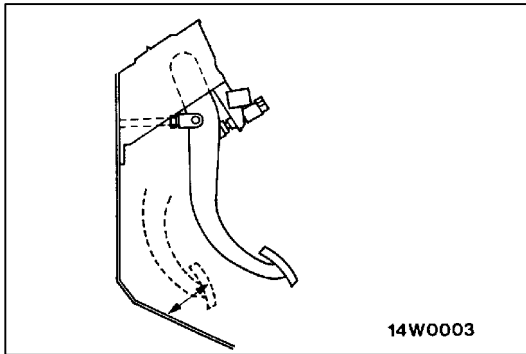
**BRAKE PEDAL FREE PLAY**

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

Standard value: 3 – 8 mm

If the free play exceeds the standard value, it is probably due to excessive play between the clevis pin and brake pedal arm.

Check for excessive clearance and replace faulty parts as required.

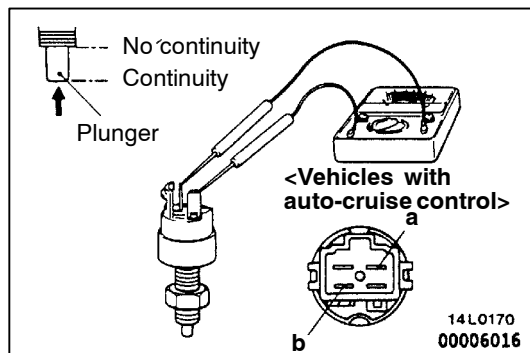
**CREARANCE BETWEEN BRAKE PEDAL AND FLOOR BOARD**

1. Turn back the carpet etc. under the brake pedal.
2. Start the engine, depress the brake pedal with approximately 490 N of force, and measure the clearance between the brake pedal and the floorboard.

Standard value:

95 mm or more (From the surface of melting seat to the face of pedal pad)

3. If the clearance is outside the standard value, check for air trapped in the brake line, clearance between the lining and the drum and dragging in the parking brake. Adjust and replace defective parts as required.
4. Return the carpet etc.

**STOP LAMP SWITCH CHECK**

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Connect a circuit tester to the stop lamp switch, and check whether or not there is continuity when the plunger of the stop lamp switch is pushed in and when it is released. The stop lamp switch is in good condition if there is no continuity when the plunger is pushed in to a depth of within 4 mm from the outer case edge surface, and if there is continuity when it is released.

For vehicles with auto-cruise control system, check the continuity between the terminals “a” and “b” of the stop lamp switch.

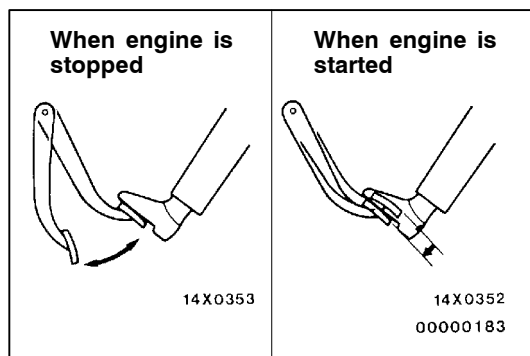
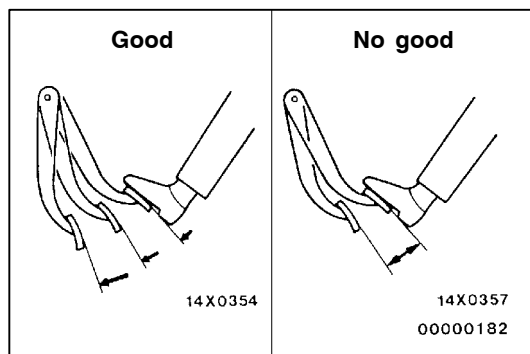
BRAKE BOOSTER OPERATING TEST

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

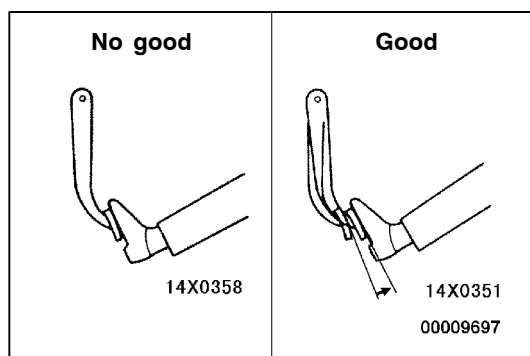
1. Run the engine for one or two minutes, and then stop it.

If the pedal depresses 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.

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.

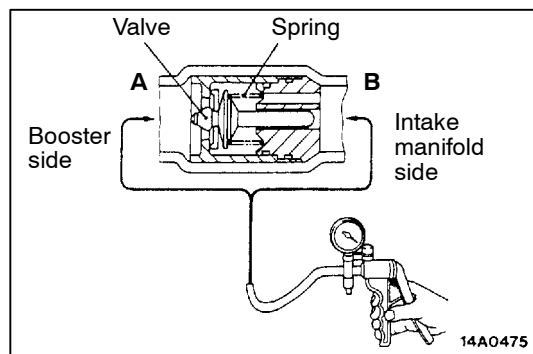
CHECK VALVE OPERATION CHECK

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1. Remove the vacuum hose. (Refer to P.35A-23.)

Caution

The check valve should not be removed from the vacuum hose.



2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the brake booster side (A)	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side (B)	A negative pressure (vacuum) is not created.

Caution

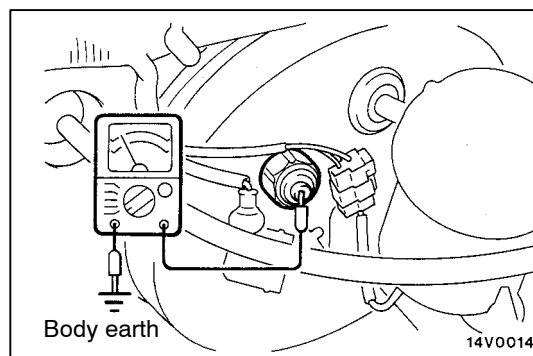
If the check valve is defective, replace it as an assembly unit together with the vacuum hose.

BRAKE BOOSTER VACUUM SWITCH CHECK

<4D5>

35100920041

1. Connect an ohmmeter to the connector of the vacuum switch.
2. Start the engine and check for continuity when the vacuum hose is connected, and when it is disconnected.
The vacuum switch is in good condition if there is no continuity when the vacuum hose is connected, and if there is continuity when it is disconnected.



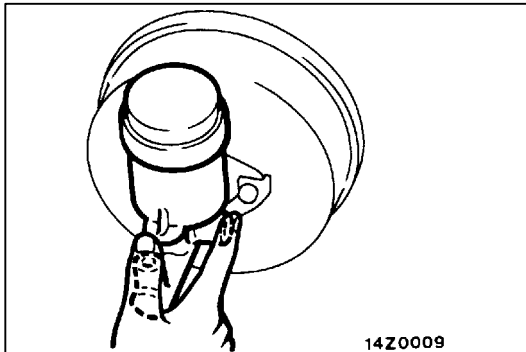
BLEEDING

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Caution

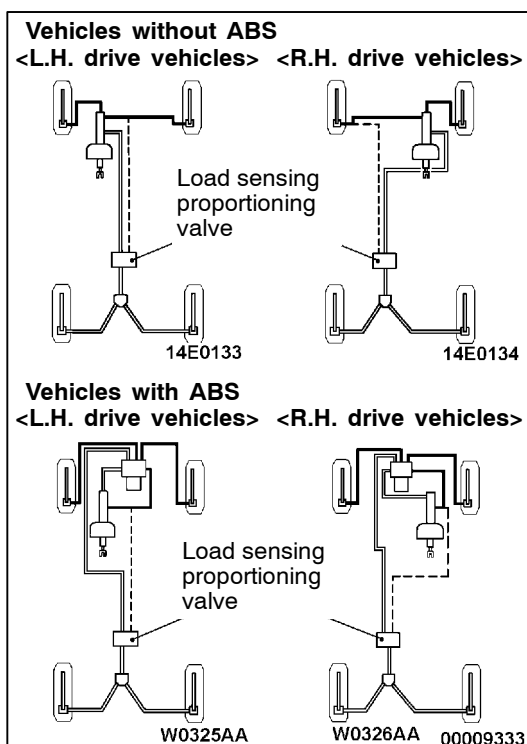
Use the specified brake fluid. Avoid using a mixture of the specified brake fluid and other fluid.

Specified brake fluid: DOT3 or DOT4

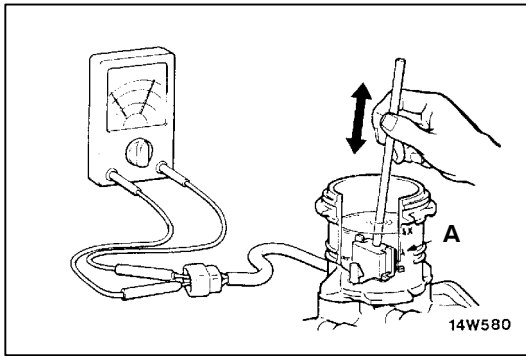
**MASTER CYLINDER BLEEDING**

The master cylinder used has no check valve, so if bleeding is carried out by the following procedure, bleeding of air from the brake pipeline will become easier. (When brake fluid is not contained in the master cylinder.)

1. Fill the reserve tank with brake fluid.
2. Keep the brake pedal depressed.
3. Have another person cover the master cylinder outlet with a finger.
4. With the outlet still closed, release the brake pedal.
5. Repeat steps 2 – 4 three or four times to fill the inside of the master cylinder with brake fluid.

**BRAKE PIPE LINE BLEEDING**

Start the engine and bleed the air in the sequence shown in the figure.



BRAKE FLUID LEVEL SENSOR CHECK

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The brake fluid level sensor is in good condition if there is no continuity when the float surface is above "A" and if there is continuity when the float surface is below "A".

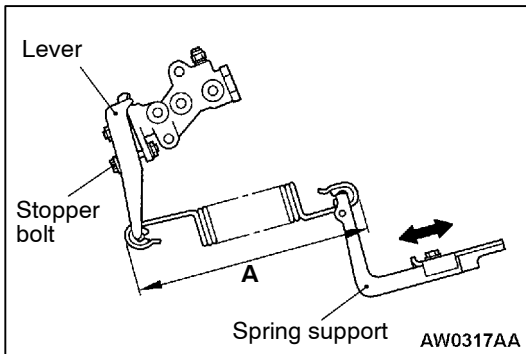
LOAD SENSING SPRING LENGTH CHECK AND ADJUSTMENT

35100120045

1. Park the vehicle on a level ground. The vehicle should be unloaded and supported only by wheels.

Caution

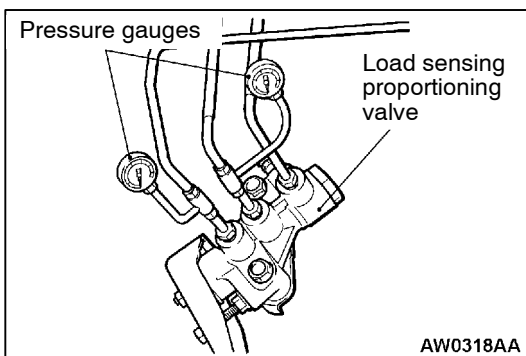
Never support the vehicle with jacks or other similar means.



2. While the lever of the load sensing proportioning valve is touching the stopper bolt, install the spring support so that the distance (A) is at the standard value.

Standard value (A): 164 – 168 mm

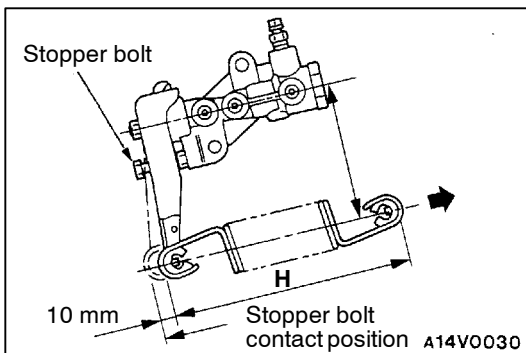
3. If the spring length is not within the standard value, loosen the bolt attaching the spring support and adjust the distance by moving the spring support.



LOAD SENSING PROPORTIONING VALVE FUNCTION TEST

35100130055

1. Connect pressure gauges to the input and output ports of the load sensing proportioning valve.
2. Bleed the system. (Refer to P.35-13.)



3. Disconnect the spring at the support side.
4. Place the spring so that it is in parallel with the load sensing proportioning valve, and pull in the direction indicated by the arrow so that its length H shown in the figure (the length between its ends) is as noted below.

NOTE

At this time the lever is pressed all the way to the load sensing proportioning valve.

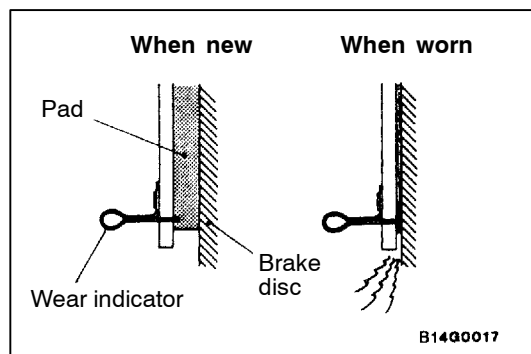
Standard value:

Spring length H mm	Input fluid pressure kPa	Output fluid pressure kPa
144* ¹	5,884	3,633
	13,730	5,610
208* ²	13,730	11,160

NOTE

*¹ and *² indicate the applicable lengths for unladen and laden vehicles respectively.

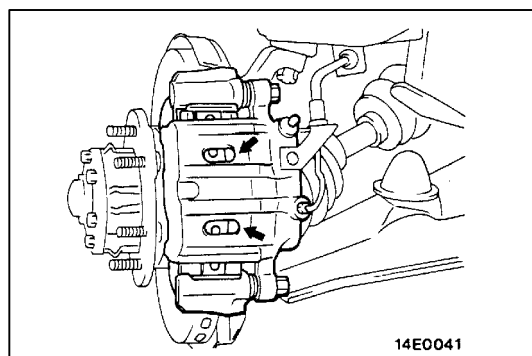
- After making the check, install the spring. Disconnect the pressure gauges from the load sensing proportioning valve and bleed the air. (Refer to P.35A-13.)

**DISC BRAKE PAD CHECK AND REPLACEMENT**

35100150242

NOTE

The brake pads have indicators that contact the brake disc when the brake pad thickness becomes 2 mm, and emit a squealing sound to warn the driver.

**<Front>**

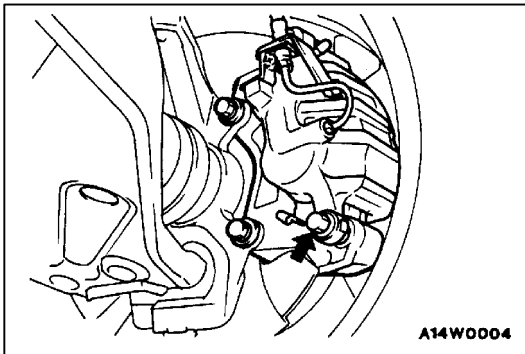
- Check the brake pad thickness through the caliper body check port.

Standard value: 10 mm

Limit: 2.0 mm

Caution

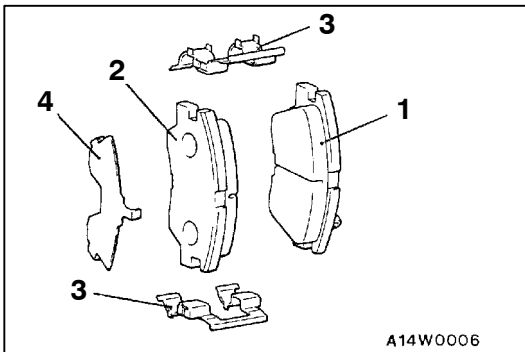
- When the limit is exceeded, replace the pads at both sides, and also the brake pads for the wheels on the opposite side at the same time.
- If there is a significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston, lock pin and guide pin.



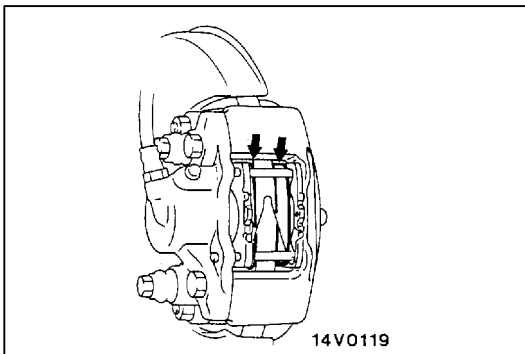
2. Remove the lock pin. Lift the caliper assembly and retain with wire.

Caution

**Do not wipe the special grease from the lock pin.
Do not contaminate the lock pin.**



3. Remove the following parts from caliper support.
 - (1) Pad and wear indicator assembly
 - (2) Pad assembly
 - (3) Clip
 - (4) Outer shim
4. Measure the hub torque with the pad removed to measure the brake drag force after pad installation. (Refer to P.35A-28.)
5. Install the pad and caliper assembly, and check the brake drag force. (Refer to P.35A-28.)



<Rear>

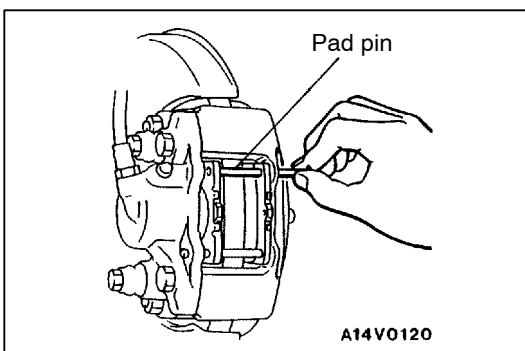
1. Check the brake pad thickness through the caliper body check port.

Standard Value: 10 mm

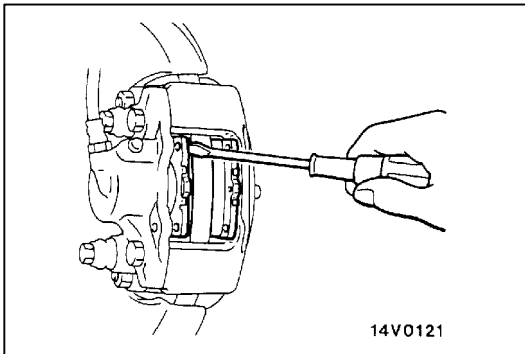
Limit: 2.0 mm

Caution

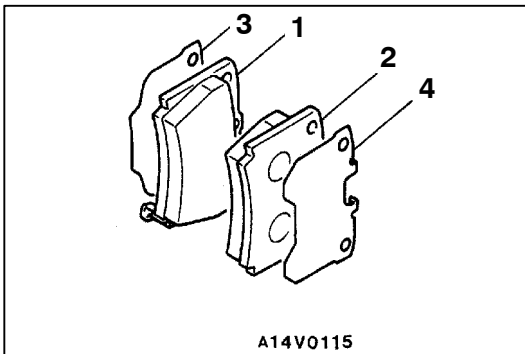
- (1) When the limit is exceeded, replace the pads at both sides, and also the brake pads for the wheels on the opposite side at the same time.
- (2) If there is a significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston and pad pin.



2. Remove the clip and pad pin.



3. Remove the pad and shim with a flat-tipped screwdriver.
 - (1) Pad and wear indicator assembly
 - (2) Pad assembly
 - (3) Inner shim
 - (4) Outer shim
4. Measure the hub torque with the pads removed to measure the brake drag force. (Refer to P.35A-33.)
5. Install the pad and caliper assembly, and check the brake drag force. (Refer to P.35A-33.)



DISC BRAKE ROTOR CHECK

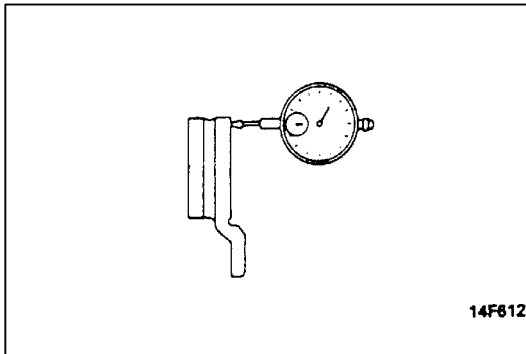
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CAUTION

When servicing disc brakes, it is necessary to exercise caution to keep the disc brakes within the allowable service values in order to maintain normal brake operation.

Before re-finishing or re-processing the brake disc surface, the following conditions should be checked.

Inspection items	Remarks
Scratches, rust, saturated lining materials and wear	<ul style="list-style-type: none"> • If the vehicle is not driven for a certain period, the sections of the discs that are not in contact with lining will become rusty, causing noise and shuddering. • If grooves resulting from excessive disc wear and scratches are not removed prior to installing a new pad assembly, there will momentarily be inappropriate contact between the disc and the lining (pad).
Run-out or drift	Excessive run-out or drift of the discs will increase the pedal depression resistance due to piston knock-back.
Change in thickness (parallelism)	If the thickness of the disc changes, this will cause pedal pulsation, shuddering and surging.
Inset or warping (flatness)	Overheating and improper handling while servicing will cause inset or warping.

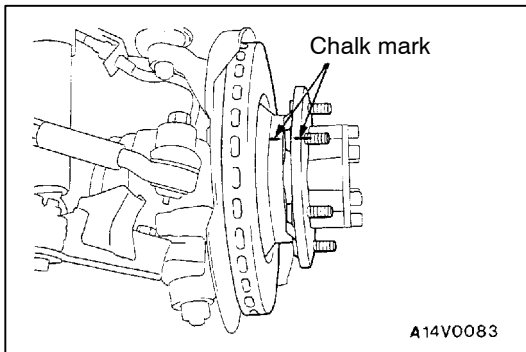


FRONT DISC BRAKE RUN-OUT CHECK AND CORRECTION

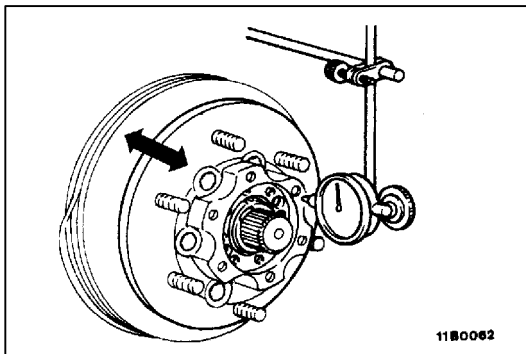
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1. Remove the caliper support; then raise the caliper assembly upward and secure by using wire.
2. Inspect the disc surface for grooves, cracks and rust. Clean the disc thoroughly and remove all rust.
3. Place a dial gauge approximately 5 mm from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.06 mm



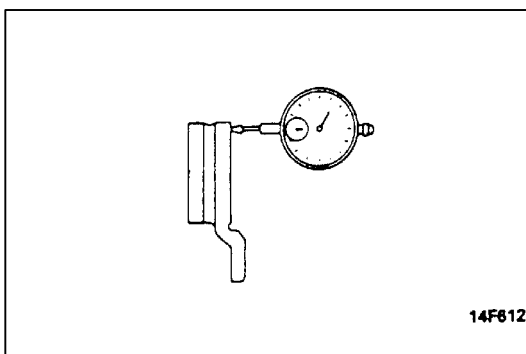
4. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.
 - (1) Before removing the brake disc, chalk both sides of the wheel stud on the side at which run-out is greatest.



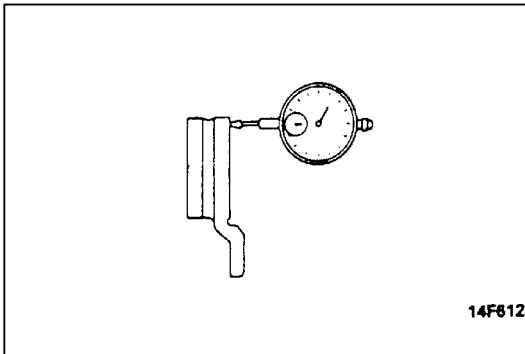
- (2) Place a dial gauge as show in the illustration, and then move the hub in the axial direction and measure the play.

Standard value: 0.05 mm

If the play is equal to or exceeds the standard value, adjust the wheel bearing preload. (Refer to GROUP 26 – Front Hub Assembly.)

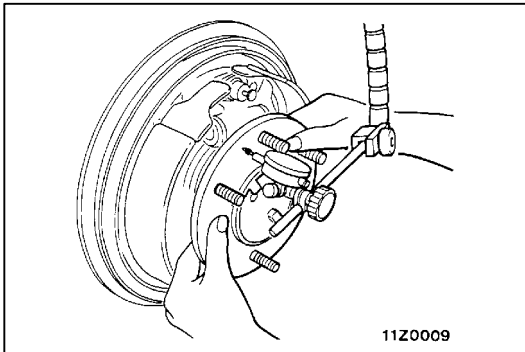


- (3) If the play does not exceed the standard value specification, install the brake disc at a position 180° away from the chalk mark, and then check the run-out of the brake disc one again.
5. If the run-out cannot be corrected by changing the phase of the brake disc, replace the disc or turn rotor with on the car type brake lathe ("MAD, DL-8700PF" or equivalent).

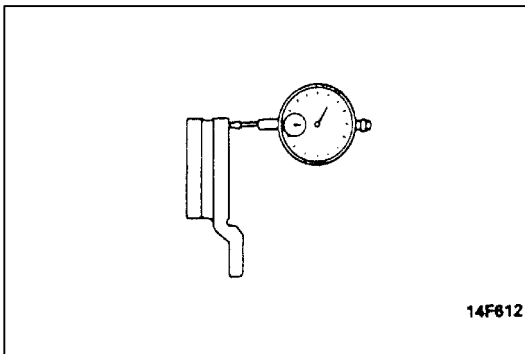
**REAR DISC BRAKE RUN-OUT CHECK AND CORRECTION**

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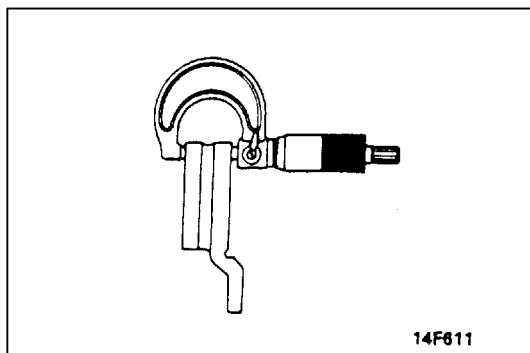
1. Remove the caliper support; then raise the caliper assembly upward and secure with a wire.
2. Check the disc surface for grooves, cracks and rust. Clean the disc thoroughly and remove all rust.
3. Place a dial gauge approximately 5 mm from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.08 mm

4. If the runout of the brake disc is the limit value or more, change the phase of the disc and hub, and then measure the run-out again.
 - (1) Before removing the brake disc, place a mating mark on both the wheel stud and disc with chalk on the point at which the run-out is greatest.
 - (2) Place a dial gauge as shown in the illustration, and then move the hub in the axial direction and measure the play.

Standard value: 0 – 0.25 mm

- (3) If the play does not exceed the standard value install the brake disc at a different phase, and then check the run-out of the brake disc again.
5. If the run-out cannot be corrected by changing the phase of the brake disc, replace the disc.

**THICKNESS CHECK**

35100160221

<Front>

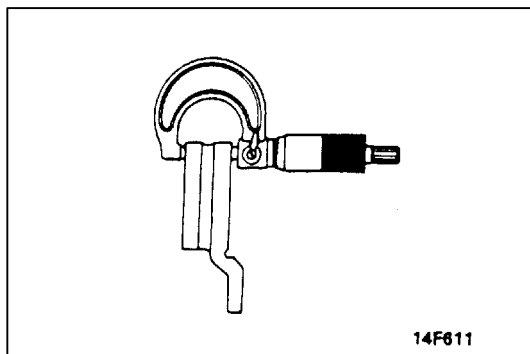
1. Using a micrometer, measure disc thickness at eight positions, approximately 45° apart and 10 mm in from the outer edge of the disc.

Brake disc thickness**Standard value: 24 mm****Limit: 22.4 mm**

Thickness variation (at least 8 positions)

The difference between any thickness measurements should not be more than 0.015 mm.

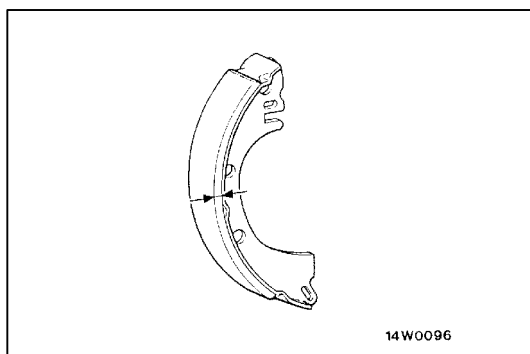
2. If the disc is beyond the limits for thickness, remove it and install a new one. If thickness variation exceeds the specification, replace the brake disc or turn rotor with on the car type brake lathe ("MAD, DL-8700PF" or equivalent).

**<Rear>**

1. Remove dirt and rust from the brake disc surface.
2. Measure the disc thickness at four locations or more.

Standard value: 18 mm**Limit: 16.4 mm**

Replace the discs and pad assembly for both left and right sides of the vehicle if they are worn beyond the specified limit.

**BRAKE LINING THICKNESS CHECK**

35100300272

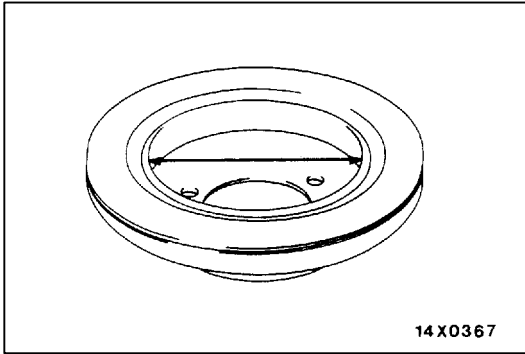
1. Remove the rear brake assembly, raise the rear brake assembly and secure it by using a wire, etc.
2. Remove the brake disc.
3. Measure the wear of the brake lining at the place worn the most.

Limit: 4.5 mm

4. Replace the shoe and lining assembly if brake lining thickness is less than the limit if it is not worn evenly.

Caution

Whenever the shoe and lining assembly is replaced, replace both R.H. and L.H. assemblies as a set to prevent car from pulling to one side when braking.

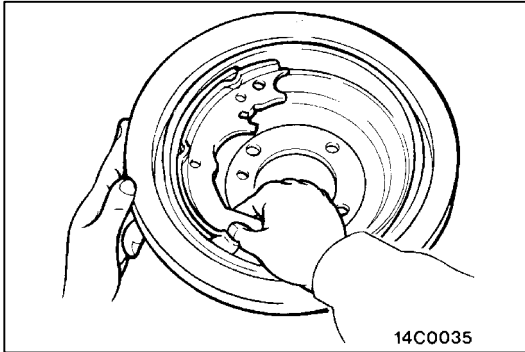
**BRAKE DISC INSIDE DIAMETER CHECK**

35100320216

1. Remove the rear brake assembly, raise the rear brake assembly and secure it by using a wire, etc.
2. Remove the brake disc.
3. Measure the inside diameter of the brake disc at two or more locations.

Standard value: 197.0 mm**Limit: 198.0 mm**

Replace brake disc, shoe and lining assembly when wear exceeds the limit value or is badly imbalanced.

**BRAKE LINING AND BRAKE DISC CONNECTION CHECK**

35100310275

1. Remove the rear brake assembly, raise the rear brake assembly and secure it by using a wire, etc.
2. Remove the brake disc.
3. Remove the shoe and lining assembly.
4. Chalk inner surface of brake disc and rub with shoe and lining assembly.
5. Replace shoe and lining assembly or brake disc if very irregular contact area.

NOTE

Clean off chalk after check.

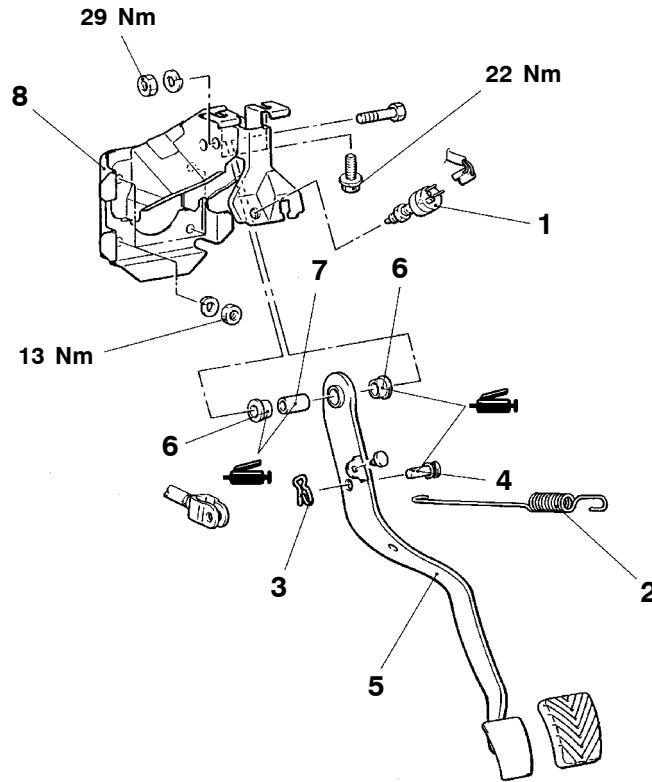
BRAKE PEDAL

35100340403

REMOVAL AND INSTALLATION

Post-installation Operation

- Brake Pedal Adjustment (Refer to P.35A-9.)



BT0108AA

Removal steps

- A◄
1. Stop lamp switch
 2. Brake pedal return spring
 3. Snap pin
 4. Pin assembly
 5. Brake pedal
 6. Bushing
 7. Spacer
 8. Pedal support member

INSTALLATION SERVICE POINT

▶◀ BRAKE PEDAL RETURN SPRING INSTALLATION

For L.H. drive vehicles, face the coil of brake pedal return spring toward the steering column side.

For R.H. drive vehicles, face it toward the brake pedal side.

MASTER CYLINDER AND BRAKE BOOSTER

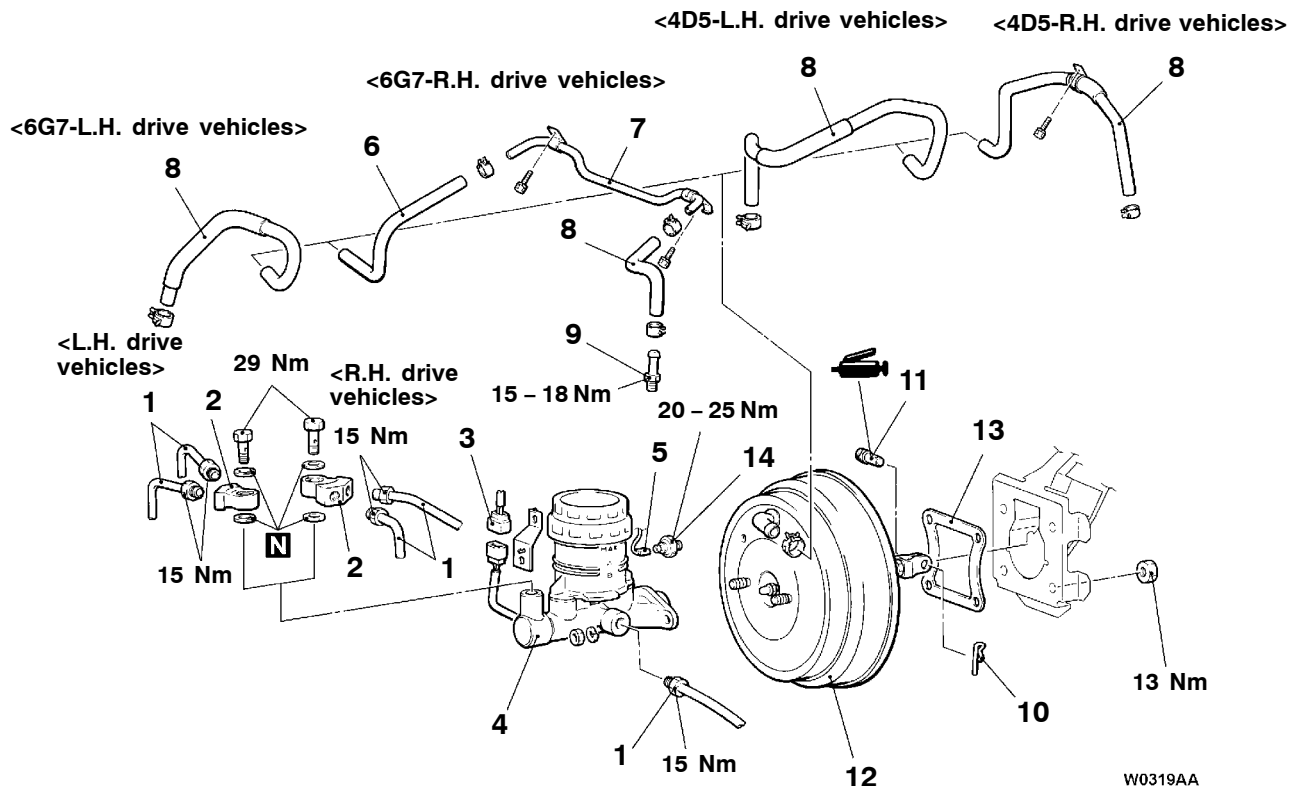
REMOVAL AND INSTALLATION

Pre-removal Operation

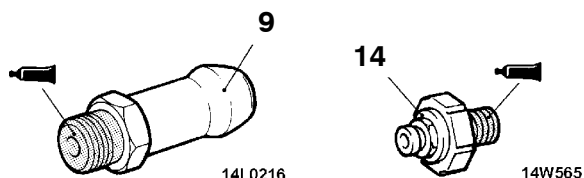
- Brake Fluid Draining

Post-installation Operation

- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-13.)
- Brake Pedal Adjustment (Refer to P.35A-9.)



W0319AA
00009334



Sealant: 3M ATD Part No.8661 or equivalent

Removal steps

1. Brake tube connection
 2. Connector
 3. Brake fluid level sensor connector
 4. Master cylinder assembly
- B◀ • Adjustment of clearance between brake booster push rod and primary piston
5. Vacuum switch connector <4D5>
 6. Vacuum hose
 7. Vacuum pipe
- A◀ 8. Vacuum hose (with built-in check valve)

9. Fitting
10. Snap pin
11. Pin assembly
12. Brake booster
13. Sealer
14. Vacuum switch <4D5>

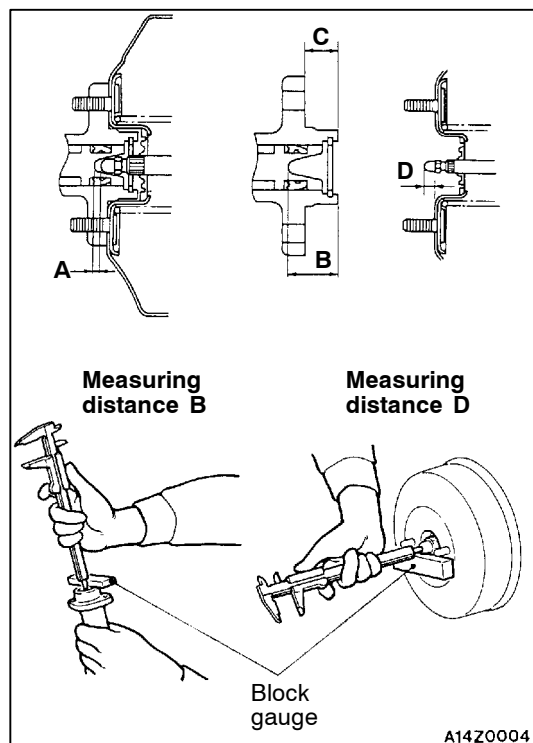
Caution

Do not remove the check valve from the vacuum hose. If the check valve is defective, replace it together with the vacuum hose.

INSTALLATION SERVICE POINTS

►A◄ VACUUM HOSE CONNECTION

Insert securely and completely until the vacuum hose at the engine side contacts the edge of the hexagonal part of the fitting, and then secure by using the hose clip.



►B◄ CLEARANCE ADJUSTMENT BETWEEN BRAKE BOOSTER PUSH ROD AND PRIMARY PISTON

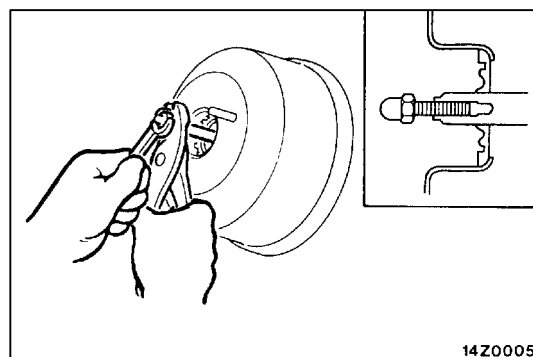
Calculate clearance A from the B, C and D measurements.
 $A = B - C - D$

Standard value:

Brake booster size	Clearance A standard valve mm
Vehicle which brake booster of power cylinder is 180 mm and 205 mm in effective diameter	0.90 – 1.30
Vehicle which brake booster of power cylinder is 205 mm and 230 mm in effective diameter	0.70 – 1.10

NOTE

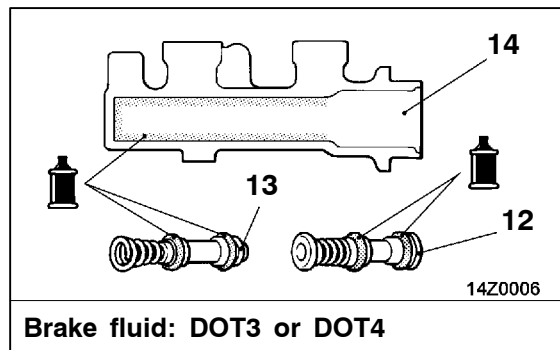
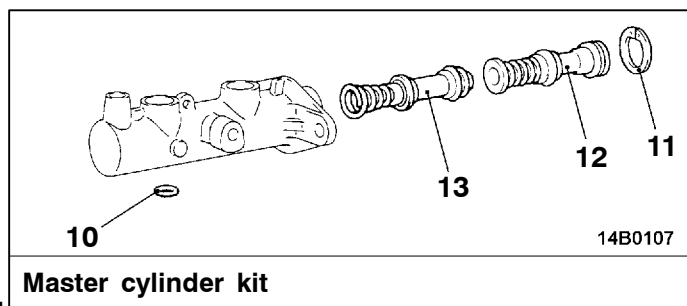
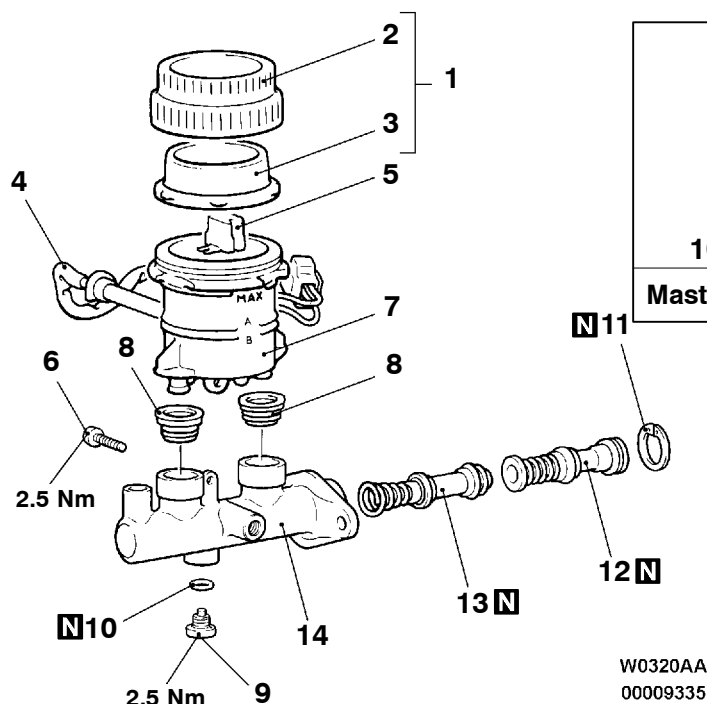
When brake booster negative pressure (6G7: -66.7 kPa, 4D5: -93.3 kPa) is applied, clearance value will become 0.10 – 0.50 mm.



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.

35100420206

MASTER CYLINDER DISASSEMBLY AND REASSEMBLY



Disassembly steps

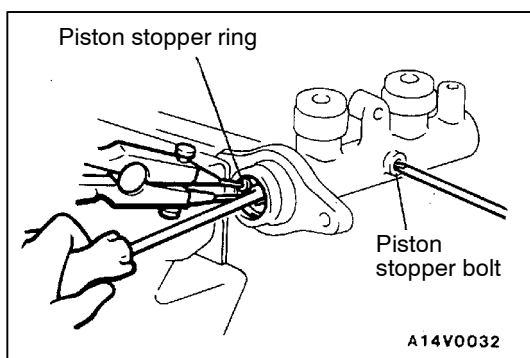
1. Reservoir cap assembly
2. Reservoir cap
3. Diaphragm
4. Brake fluid level sensor
5. Float
6. Reservoir stopper bolt
7. Reservoir tank
8. Reservoir seal
9. Piston stopper bolt

10. Gasket
11. Piston stopper ring
12. Primary piston assembly
13. Secondary piston assembly
14. Master cylinder body



Caution

Do not disassemble the primary piston and secondary piston assembly.



DISASSEMBLY SERVICE POINT

◀A▶ PISTON STOPPER BOLT/PISTON STOPPER RING DISASSEMBLY

Remove the piston stopper bolt and piston stopper ring while depressing the piston.

INSPECTION

35100430056

- Check the inner surface of master cylinder body for rust or pitting.
- Check the primary and secondary pistons for rust, scoring, wear or damage.
- Check the diaphragm for cracks and wear.

LOAD SENSING PROPORTIONING VALVE

35100540032

REMOVAL AND INSTALLATION

Caution

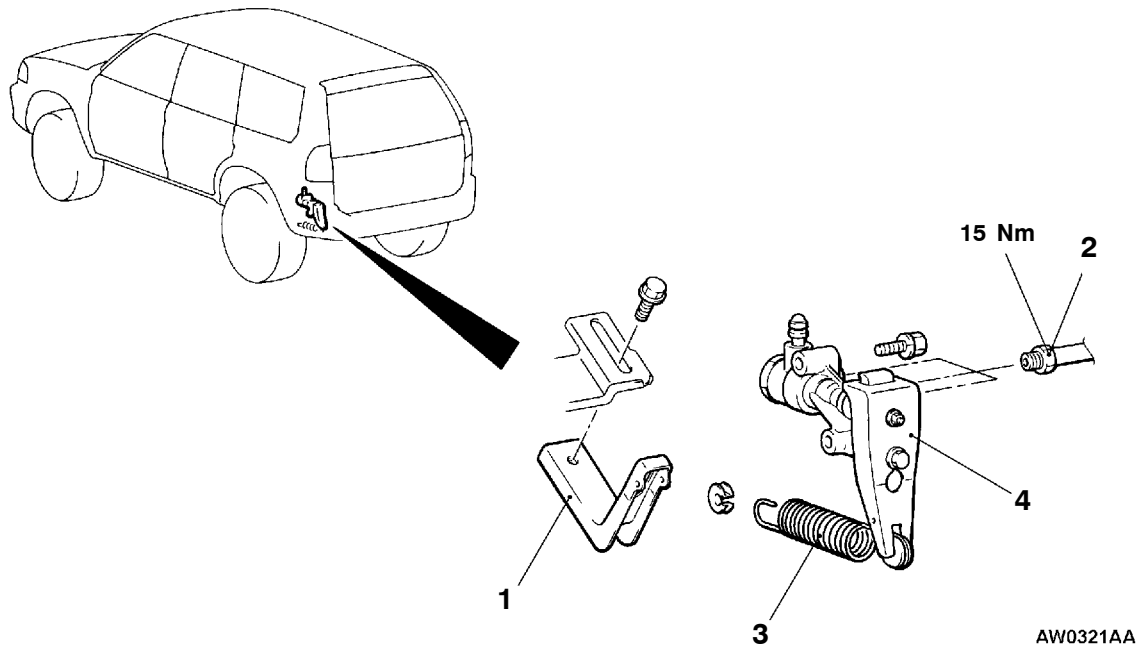
Do not disassemble the load sensing proportioning valve.

Pre-removal Operation

- Brake Fluid Draining

Post-installation Operation

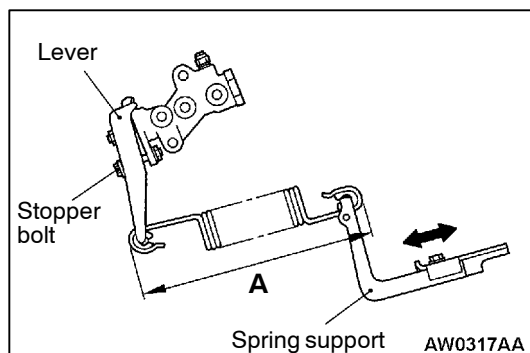
- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-12.)



Removal steps

- A◄
1. Spring support
 2. Brake tube connection

3. Load sensing spring
4. Load sensing proportioning valve



INSTALLATION SERVICE POINT

►A◄ SPRING SUPPORT INSTALLATION

While the lever of the load sensing proportioning valve is touching the stopper bolt, install the spring support so that the distance (A) is within the standard value.

Standard value (A): 164 – 168 mm

35100600259

FRONT DISC BRAKE

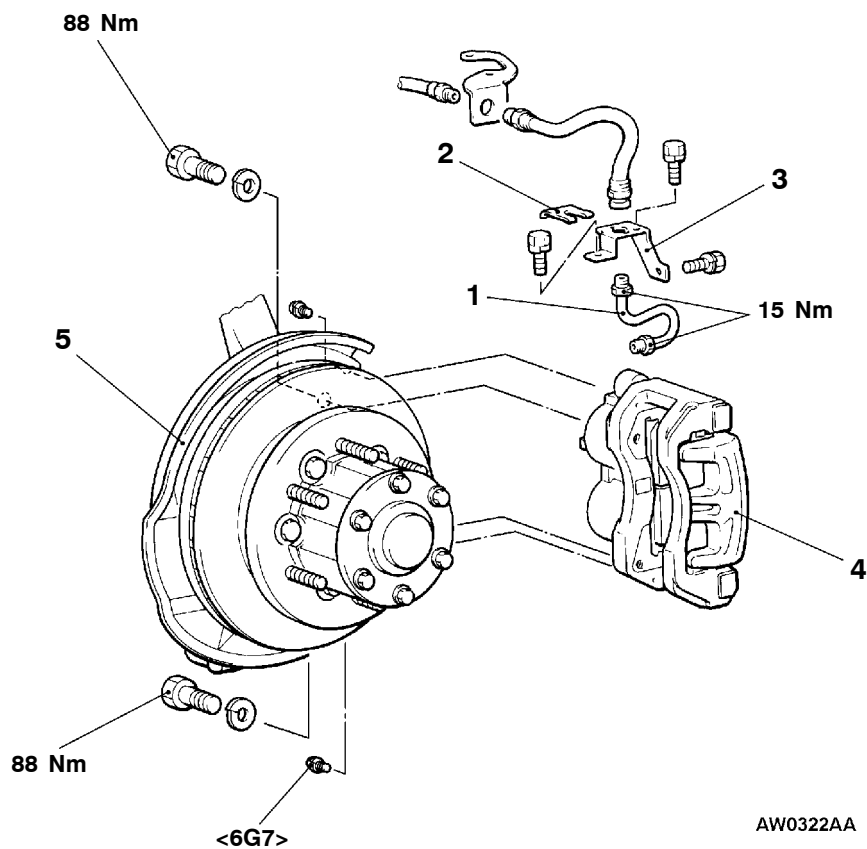
REMOVAL AND INSTALLATION

Pre-removal Operation

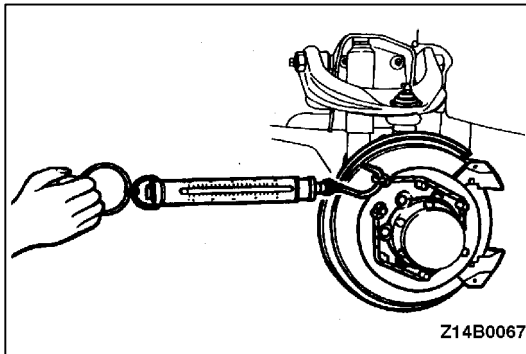
- Brake Fluid Draining

Post-installation Operation

- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-13.)

**Removal steps**

- A◄
1. Brake tube
 2. Clip
 3. Brake hose bracket
 4. Front brake assembly
 5. Brake disc (Refer to GROUP 26 – Front Hub Assembly)



INSTALLATION SERVICE POINT

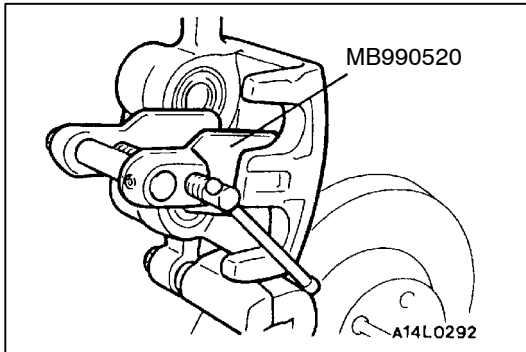
►A◄ FRONT BRAKE ASSEMBLY INSTALLATION

1. Measure hub torque (A) with the pad removed to measure the brake drag force after pad installation.

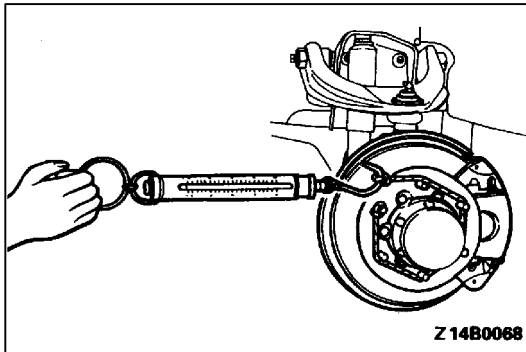
Caution

Engage 2WD before measurement.

2. Securely attach the pad clip to the caliper support.



3. Clean the piston and insert into cylinder with special tool.
4. Be careful that the piston boot does not become caught, when lowering the caliper assembly and installing the lock pin.
5. Check the brake drag force as follows.
 - (1) Start the engine and hold the brake pedal down for 5 seconds. (Pedal depression force: approx. 196 N)
 - (2) Stop the engine.
 - (3) Turn the brake disc forward 10 times.



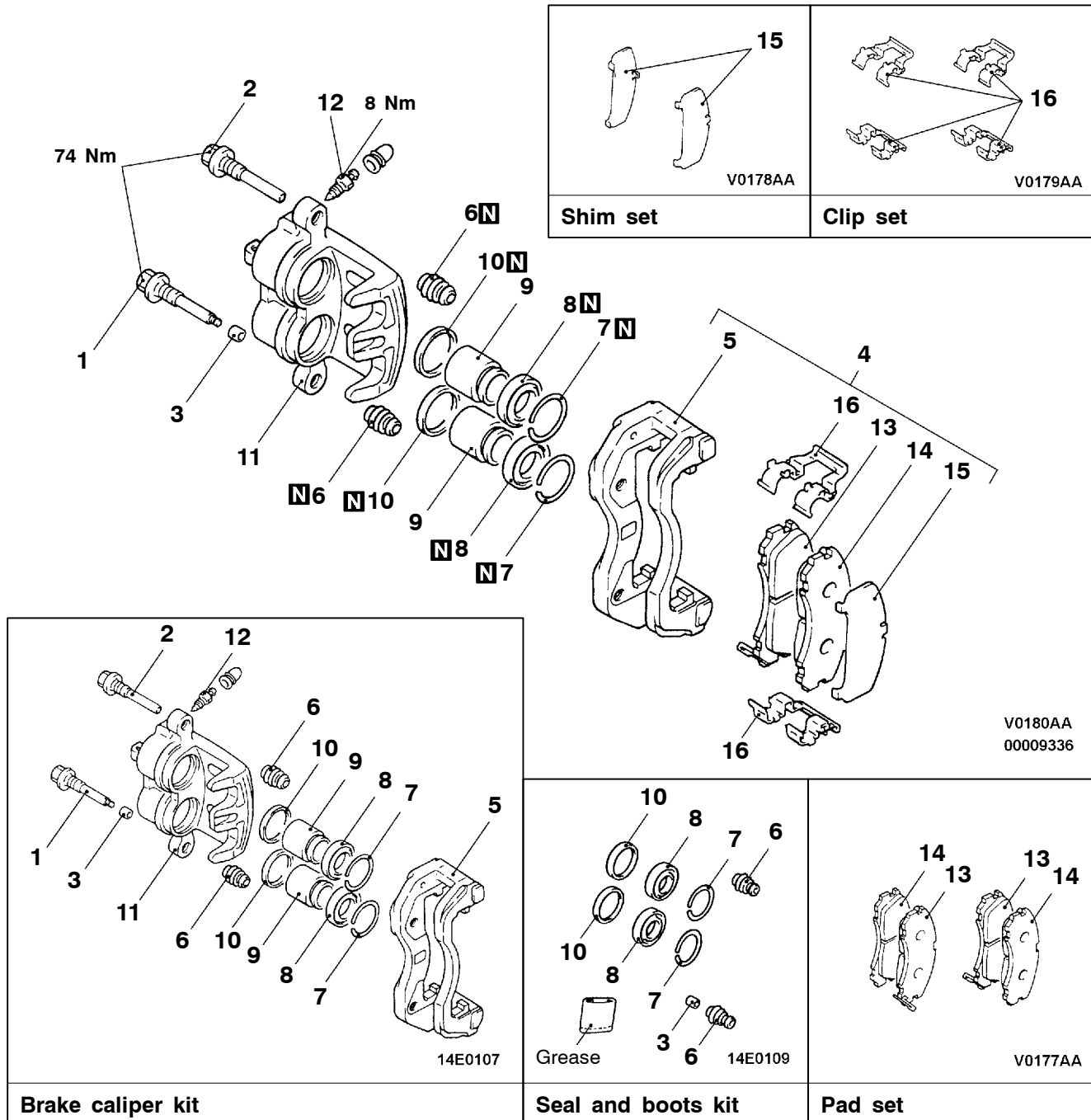
- (4) Check the hub torque (B) with a spring balance.
- (5) Calculate the drag force of the disc brake [difference between hub torque (B) and hub torque (A)].

Standard value: 106 N or less

6. If the brake drag force exceeds the standard value, disassemble and clean the piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.

DISASSEMBLY AND REASSEMBLY

35100620293



Caliper assembly disassembly steps



1. Lock pin
2. Guide pin
3. Bushing
4. Caliper support, pad, clip and shim assembly
5. Caliper support
6. Pin boot
7. Boot ring
8. Piston boot
9. Piston
10. Piston seal
11. Caliper body
12. Bleeder screw

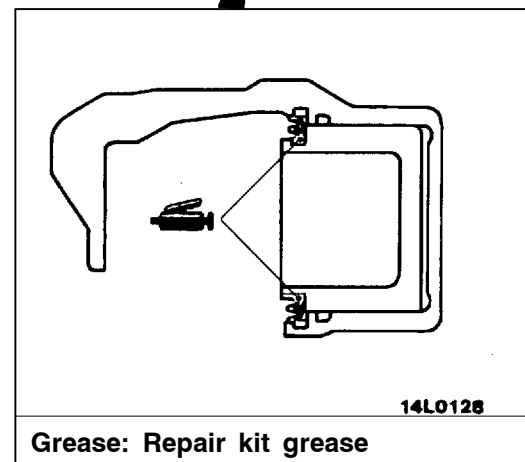
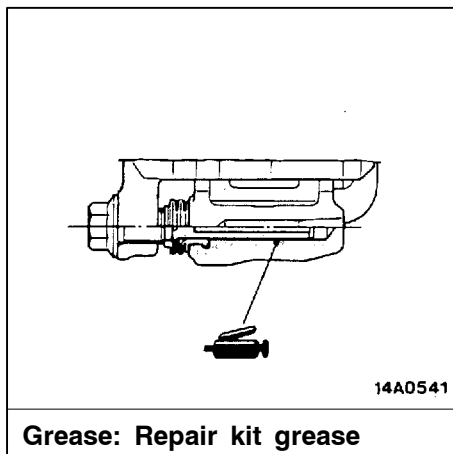
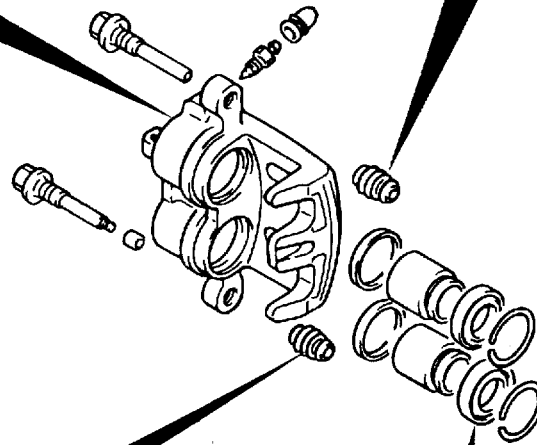
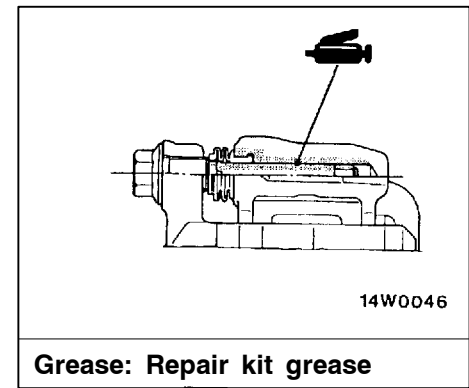
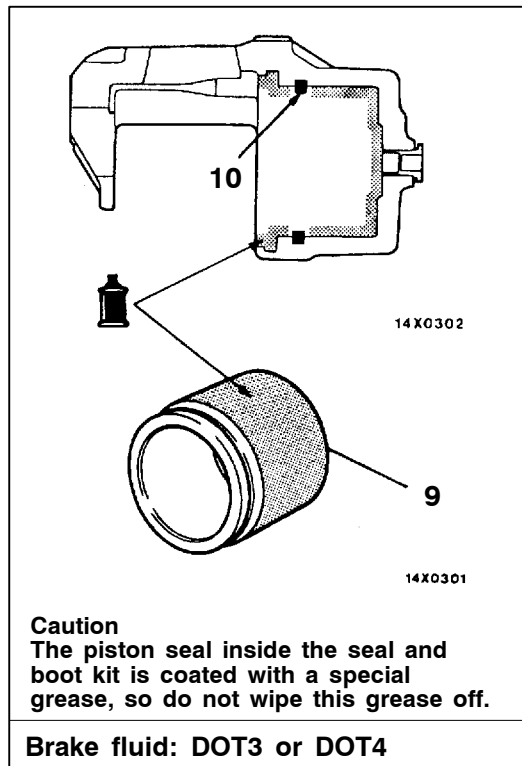
Pad assembly disassembly steps



1. Lock pin
2. Guide pin
3. Bushing
4. Caliper support, pad, clip and shim assembly
13. Pad and wear indicator assembly
14. Pad assembly
15. Outer shim
16. Clip



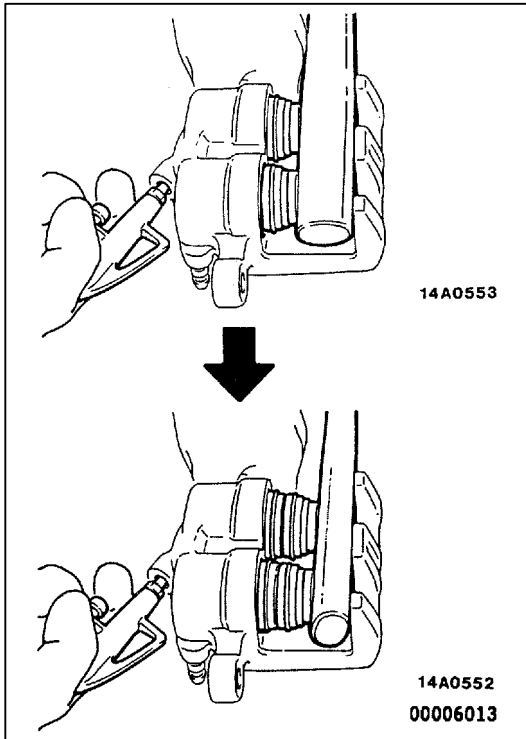
LUBRICATION POINTS



00006012

DISASSEMBLY SERVICE POINTS

When disassembling the front disc brakes, disassemble both sides (left and right) as a set.

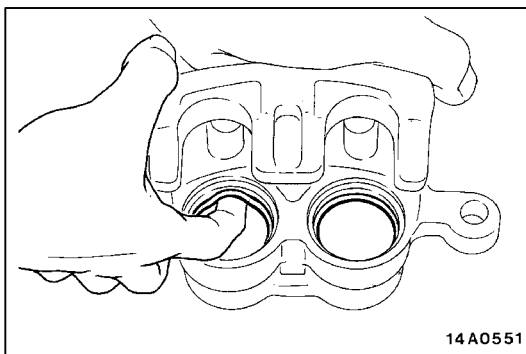
**◀A▶ PISTON BOOT/PISTON REMOVAL**

Protect caliper body with cloth. Blow compressed air through brake hose to remove piston boot and piston.

Caution

When removing the pistons, be sure to use the handle of a plastic hammer and adjust the height of the two pistons while pumping in air slowly so that the pistons protrude evenly.

Do not remove one piston completely before trying to remove the other piston, because it will become impossible to remove the second piston.

**◀B▶ PISTON SEAL REMOVAL**

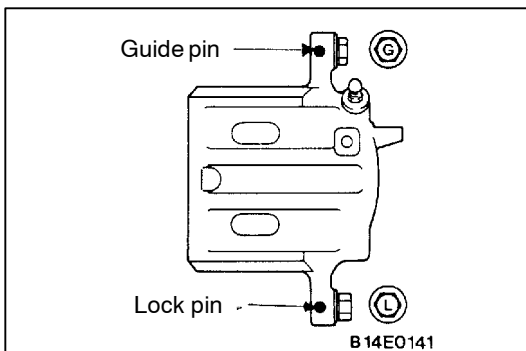
- (1) Remove piston seal with finger tip.

Caution

Do not use a flat-tipped screwdriver or other tool to prevent damage to inner cylinder.

- (2) Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid: DOT3 or DOT4

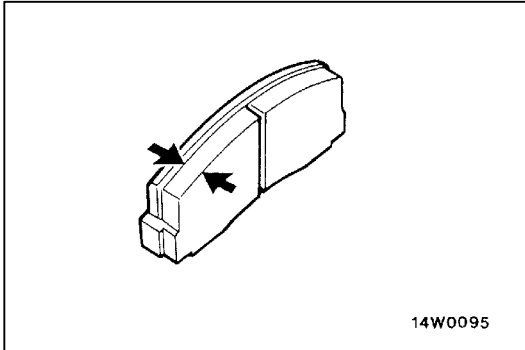
**REASSEMBLY SERVICE POINT****▶A◀ LOCK PIN/GUIDE PIN INSTALLATION**

Install the lock pin and guide pin to the caliper body as shown in the illustration.

INSPECTION

35100630104

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.

**PAD WEAR CHECK**

Measure the thickness at the thinnest and worn area of the pad.

Replace the pad assembly if pad thickness is less than the limit value.

Standard value: 10 mm

Limit: 2.0 mm

Caution

1. Replace the pads always at both sides, and also the brake pads for the wheels on the opposite side at the same time.
2. If there is significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston, lock pin and guide pin.

REAR DISC BRAKE

35100700140

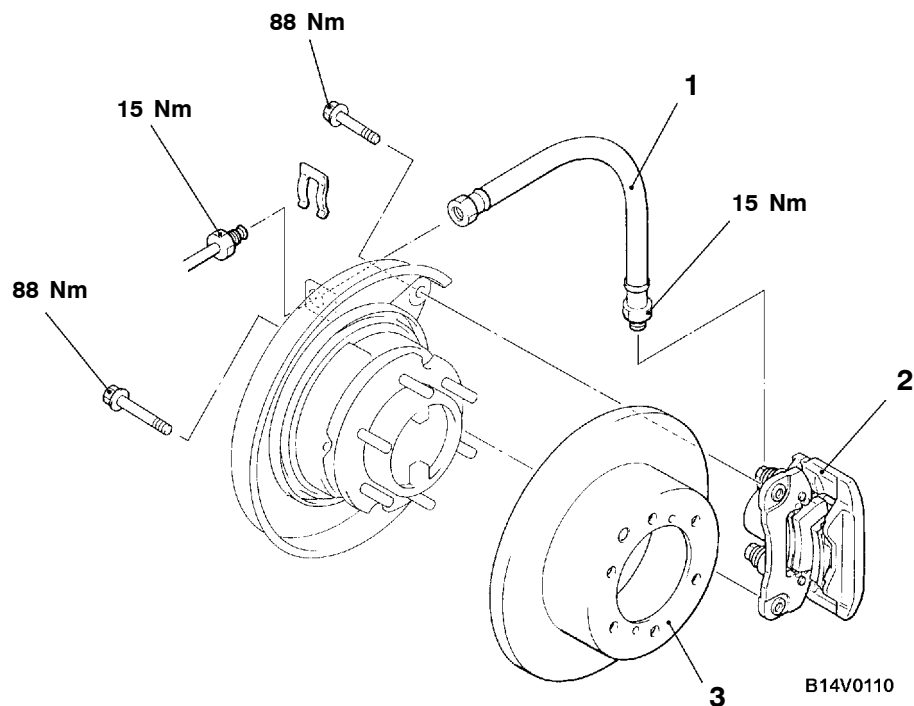
REMOVAL AND INSTALLATION

Pre-removal Operation

- Brake Fluid Draining

Post-installation Operation

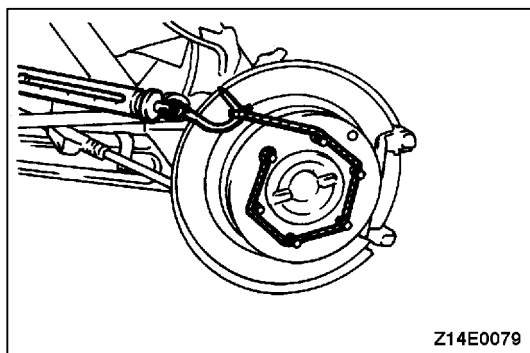
- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-13.)



Removal steps



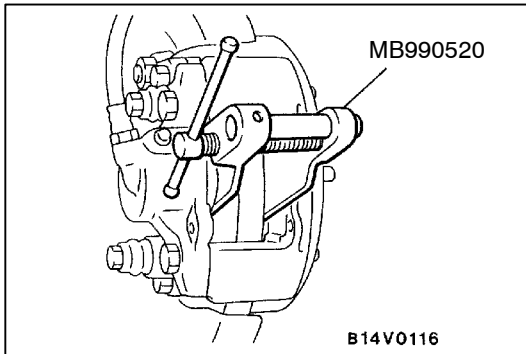
1. Brake hose connection
2. Rear brake assembly
3. Brake disc



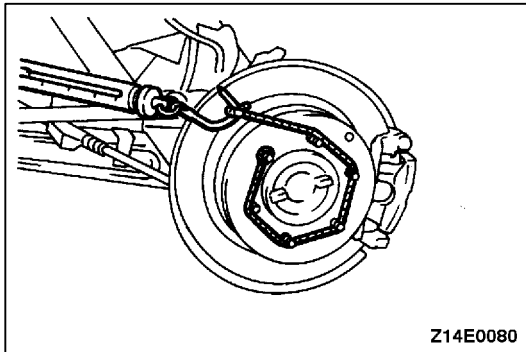
INSTALLATION SERVICE POINT

►A◄ REAR BRAKE ASSEMBLY INSTALLATION

1. Measure hub torque (1) with the pad removed to measure the brake drag force after pad installation.



2. Clean the piston and insert into the cylinder with special tool.
3. Install the pad assembly to the caliper.
4. Start the engine. Depress the brake pedal fully a few times, and then stop the engine.
5. Turn the brake disc forward 10 times.



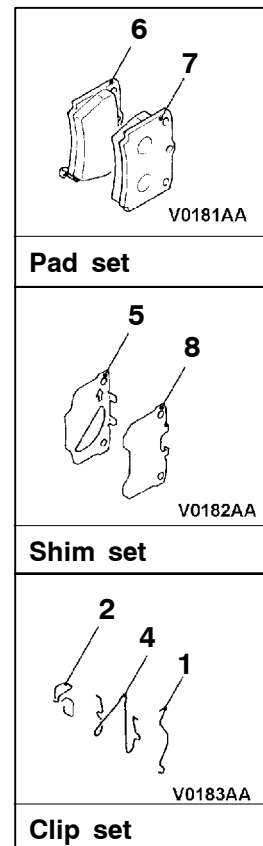
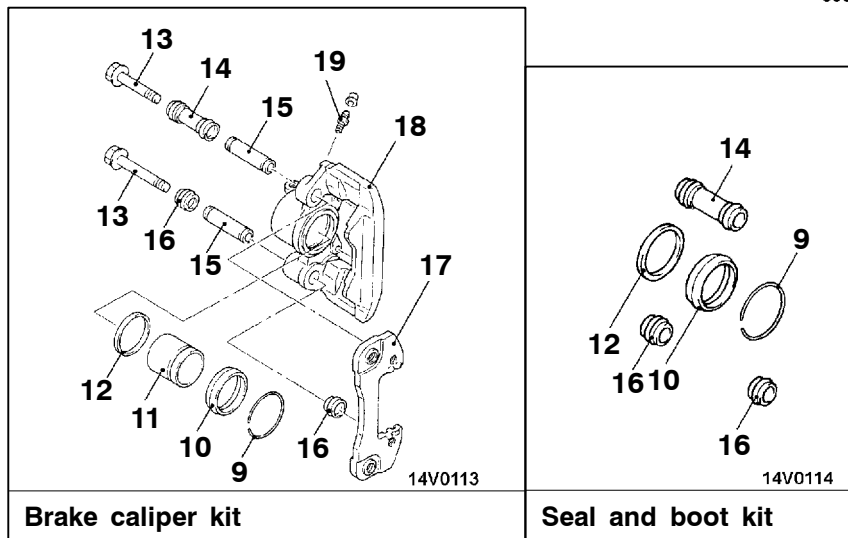
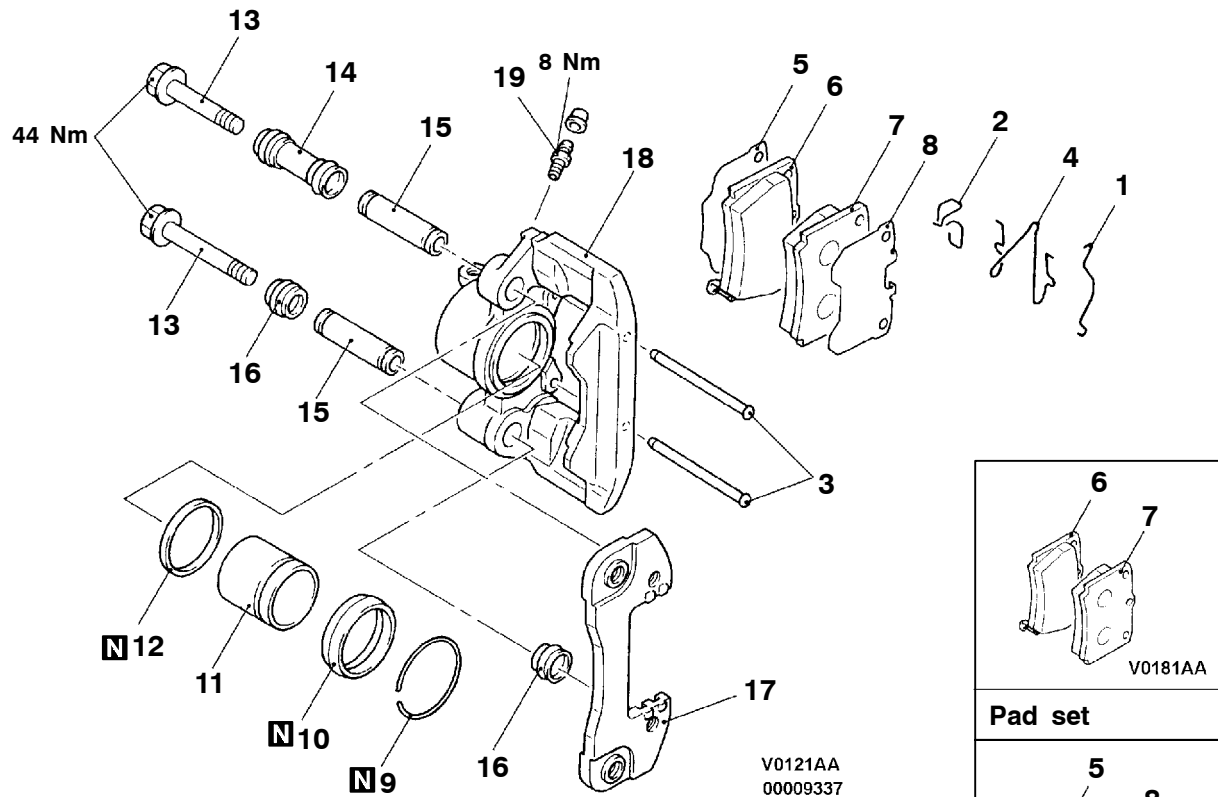
6. Check the hub torque (6) with a spring balance.
7. Calculate the drag force of the disc brake [difference between hub torque (1) and hub torque (6)].

Standard value: 56 N

8. If the brake drag torque exceeds the standard value, disassemble and clean the piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.

DISASSEMBLY AND REASSEMBLY

35100720184



Caliper assembly disassembly steps

1. Clip
2. K-spring
3. Pad pin
4. Spring
5. Inner shim
6. Pad and wear indicator assembly
7. Pad assembly
8. Outer shim
9. Retaining ring
10. Piston boot
11. Piston
12. Piston seal
13. Sleeve bolt
14. Bushing
15. Sleeve

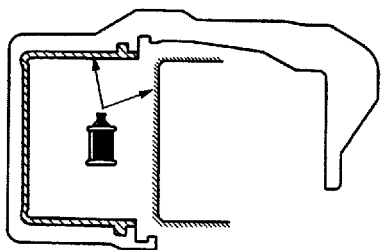
16. Pin boot
17. Inner caliper
18. Torque plate
19. Bleeder screw

Pad assembly disassembly steps

1. Clip
2. K-spring
3. Pad pin
4. Spring
5. Inner shim
6. Pad and wear indicator assembly
7. Pad assembly
8. Outer shim



LUBRICATION POINTS

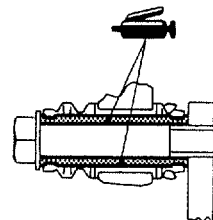


14V0132

Caution

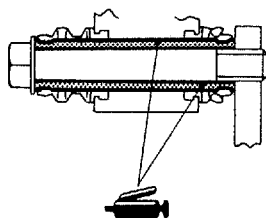
The piston seal inside the seal and boot kit is coated with special grease, so do not wipe this grease off.

Brake fluid: DOT3 or DOT4



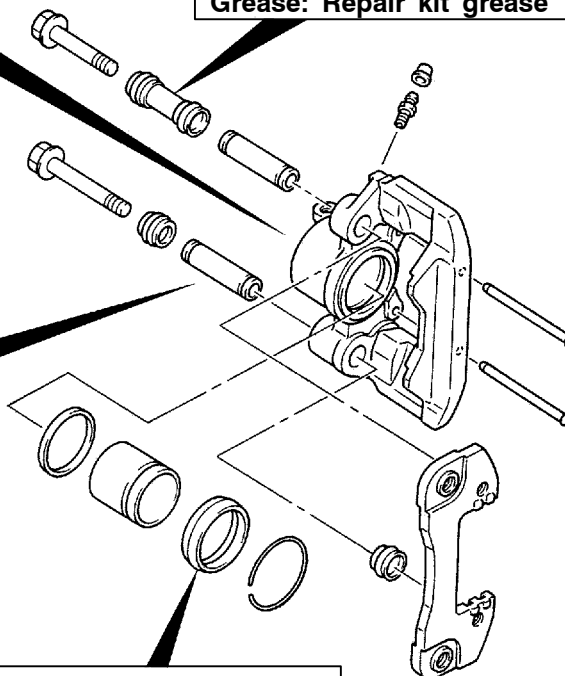
14V0122

Grease: Repair kit grease

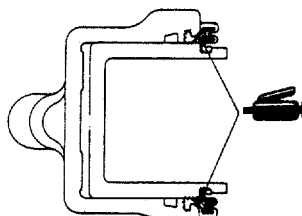


14V0123

Grease: Repair kit grease



14V0113



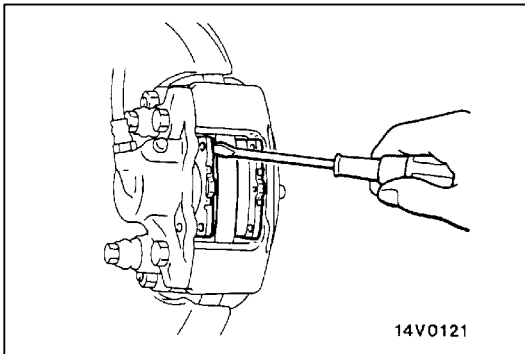
14M0083

Grease: Repair kit grease

00006015

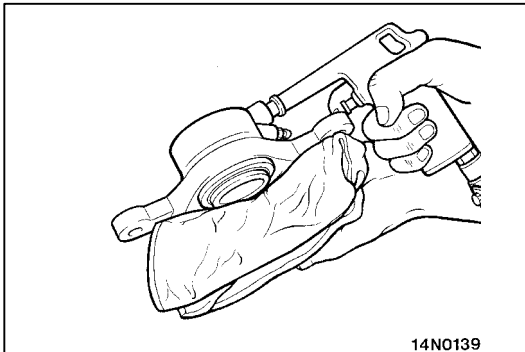
DISASSEMBLY SERVICE POINTS

When disassembling the rear disc brakes, disassemble both sides (left and right) as a set.



◀A▶ PAD AND WEAR INDICATOR ASSEMBLY/PAD ASSEMBLY REMOVAL

Use a flat-tipped screwdriver to remove the pad and wear indicator assembly and the pad assembly.

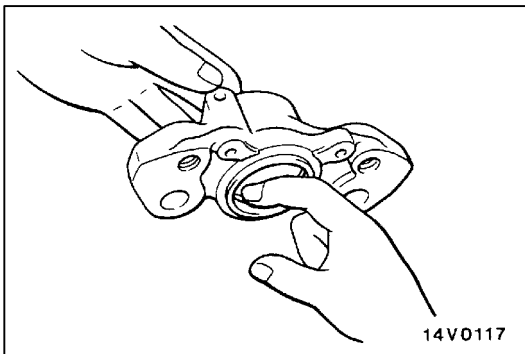


◀B▶ PISTON BOOT/PISTON REMOVAL

Protect the caliper body with a shop towel. Blow compressed air through the brake hose to remove the piston boot and piston.

Caution

Blow compressed air gently.



◀C▶ PISTON SEAL REMOVAL

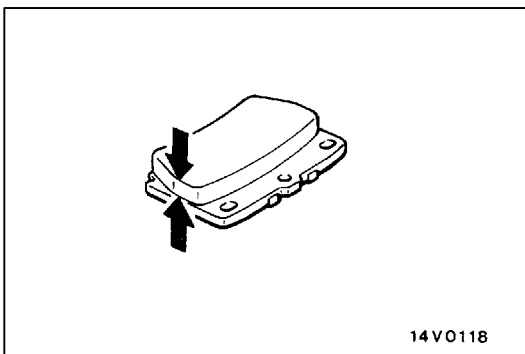
1. Remove the piston seal with your finger tip.

Caution

Do not use a flat-tipped screwdriver or other tool to prevent damage to inner cylinder.

2. Clean the piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified break fluid: DOT3 or DOT4



INSPECTION

35100730118

PAD WEAR CHECK

Measure the thickness at the thinnest and worn area of the pad.

Replace the pad assembly if pad thickness is less than the limit value.

Standard value: 10 mm

Limit: 2.0 mm

Caution

1. Always replace both pads on each wheel as a set (both front wheels or both rear wheels). Failure to do so will result in un-even braking which may cause an unpredictable vehicle condition.
2. If there is significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston, lock pin and guide pin.

NOTES


Service Bulletins

Click on the applicable bookmark to select the Service Bulletin.



SERVICE BULLETIN

QUALITY INFORMATION ANALYSIS
OVERSEAS SERVICE DEPT. MITSUBISHI MOTORS CORPORATION

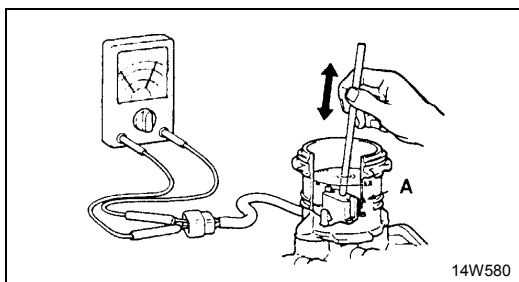
SERVICE BULLETIN		No.: MSB-99E35-502	
		Date: 1999-09-30	<Model> (EC) PAJERO SPORT (K9) <M/Y> 99-10
Subject: CORRECTION TO SHAPE OF LSPV AND TO SPRING SUPPORT INSTALLATION			
Group: SERVICE BRAKE		Draft No.: 99SY040216 (EC) MONTERO SPORT	
CORRECTION	OVERSEAS SERVICE DEPT	 T. NITTA - VICE GENERAL MANAGER QUALITY INFORMATION ANALYSIS	

1. Description:

Correction has been made to the shape of the load sensing proportioning valve (LSPV) and to the spring support installation procedure.

2. Applicable Manuals:

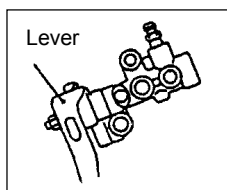
Manual	Pub. No.	Language	Page(s)
'99 PAJERO SPORT Workshop Manual Chassis	PWJE9812	(English)	35A-14, 26
	PWJF9814	(French)	
	PWJG9815	(German)	
'99 PAJERO SPORT Workshop Manual Chassis	PWJS9813	(Spanish)	

**BRAKE FLUID LEVEL SENSOR CHECK**

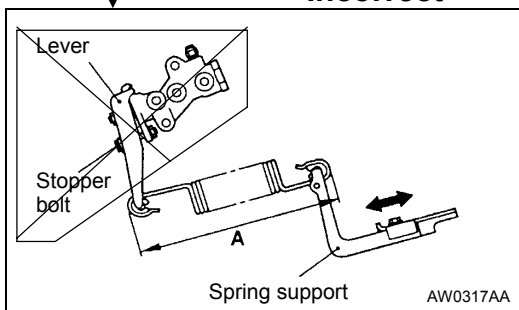
35100910086

The brake fluid level sensor is in good condition if there is no continuity when the float surface is above "A" and if there is continuity when the float surface is below "A".

<Correct>



<Incorrect>

**LOAD SENSING SPRING LENGTH CHECK AND ADJUSTMENT**

35100120045

1. Park the vehicle on a level ground. The vehicle should be unloaded and supported only by wheels.

Caution

Never support the vehicle with jacks or other similar means.

<Correct>

vehicle is on the ground in an unladen condition,

<Incorrect>

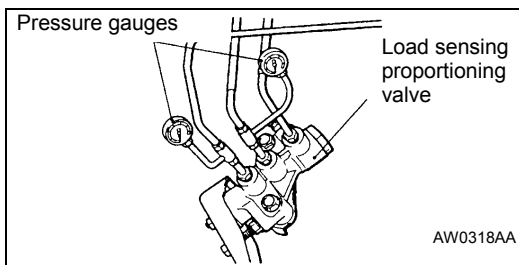
2. While the lever of the load sensing proportioning valve is touching the stopper bolt, install the spring support so that the distance (A) is at the standard value.

Standard value (A): 164 - 168 mm

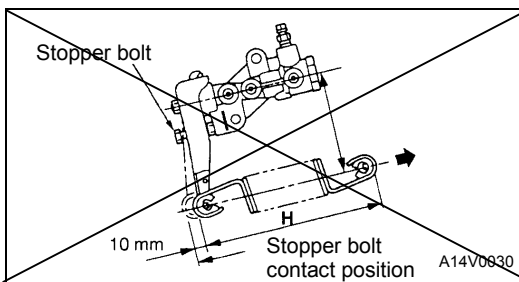
3. If the spring length is not within the standard value, loosen the bolt attaching the spring support and adjust the distance by moving the spring support.

LOAD SENSING PROPORTIONING VALVE FUNCTION TEST

35100130055



1. Connect pressure gauges to the input and output ports of the load sensing proportioning valve.
2. Bleed the system. (Refer to P.35-13)



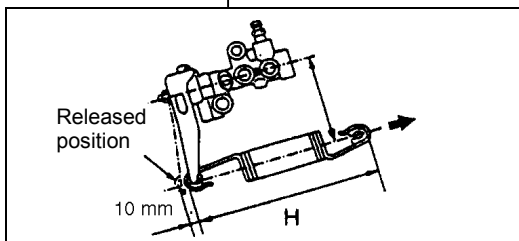
3. Disconnect the spring at the support side.
4. Place the spring so that it is in parallel with the load sensing proportioning valve, and pull in the direction indicated by the arrow so that its length H shown in the figure (the length between its ends) is as noted below.

NOTE

At this time the lever is pressed all the way to the load sensing proportioning valve.

<Incorrect>

<Correct>



LOAD SENSING PROPORTIONING VALVE

REMOVAL AND INSTALLATION

Caution

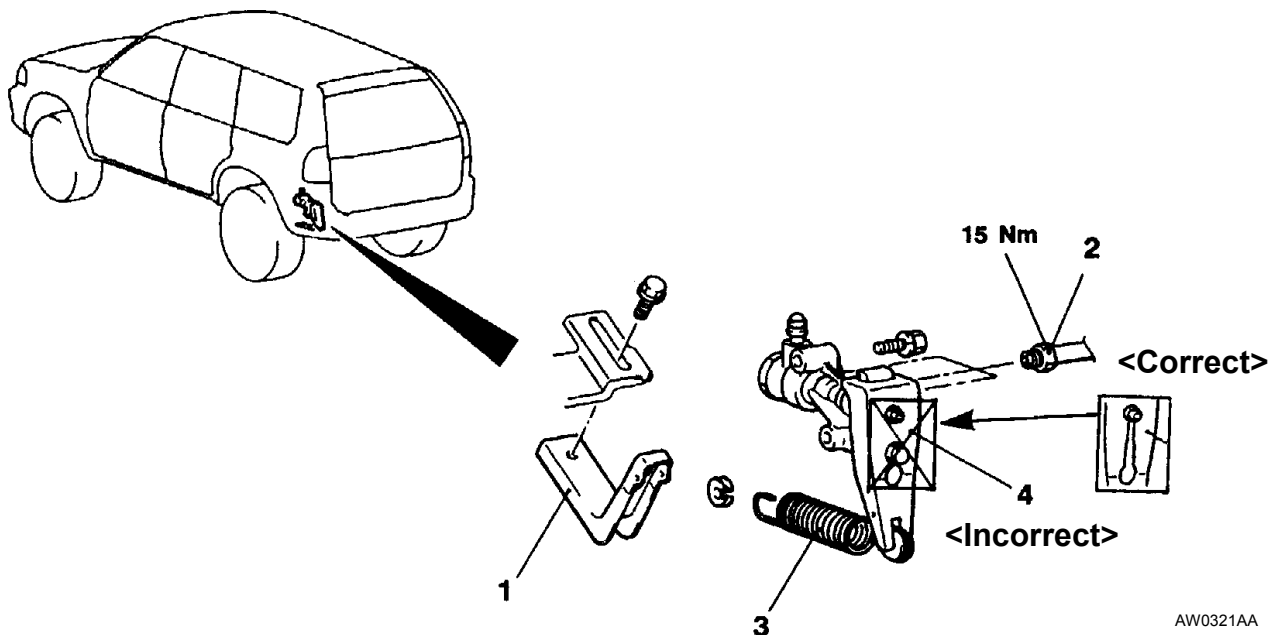
Do not disassemble the load sensing proportioning valve.

Pre-removal Operation

- Brake Fluid Draining

Post-Installation Operation

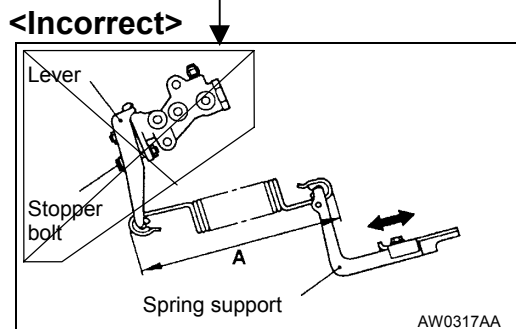
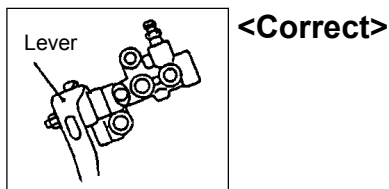
- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-12.)



Removal steps

- A◄
1. Spring support
 2. Brake tube connection

3. Load sensing spring
4. Load sensing proportioning valve



<Correct>

Vehicle is on the ground in an unladen condition,

INSTALLATION SERVICE POINT

►A◄ SPRING SUPPORT INSTALLATION

While the lever of the load sensing proportioning valve is touching the stopper bolt, install the spring support so that the distance (A) is at the standard value.

Standard value (A): 164 - 168 mm

<Incorrect>

GROUP 35A

BASIC BRAKE SYSTEM

GENERAL


OUTLINE OF CHANGE

The following service procedures have been added due to the addition of vehicles with A/T.

ON-VEHICLE SERVICE

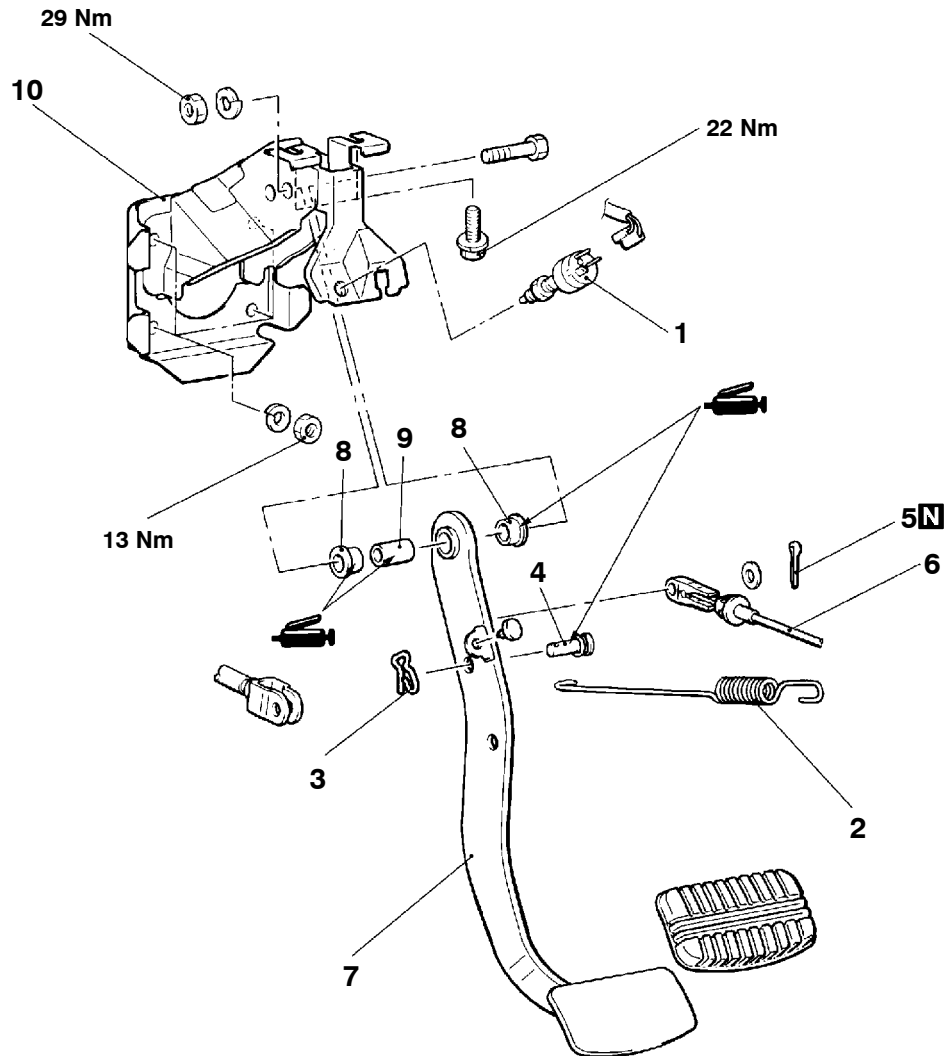
BRAKE PEDAL CHECK AND ADJUSTMENT

BRAKE PEDAL HEIGHT <A/T>

1. Turn up the carpet and so on under the brake pedal.
 2. Adjust the brake pedal height the same way with the vehicles with M/T.
 3. Check the key interlock and shift lock mechanisms.
(Refer to GROUP 23 - On-vehicle Service.)
 4. Return the carpet and so on.
- 

BRAKE PEDAL<A/T>**REMOVAL AND INSTALLATION****Post-installation Operation**

Brake Pedal Adjustment (Refer to P.35A-1.)



AX0473AA

Removal steps

1. Stop lamp switch
2. Brake pedal return spring
3. Snap pin
4. Pin assembly
5. Split pin

6. Shift lock cable connection
7. Brake pedal
8. Bushing
9. Spacer
10. Pedal support member

INSTALLATION SERVICE POINT**▶A◀ BRAKE PEDAL RETURN SPRING INSTALLATION**

For L.H. drive vehicles, face the coil of brake pedal return spring toward the steering column side.

For R.H. drive vehicles, face it toward the brake pedal side.

GROUP 35A

BASIC BRAKE SYSTEM

GENERAL

OUTLINE OF CHANGE

The load sensing proportioning valve has been discontinued due to the addition of an Electronic Brake force Distribution (EBD*). <Vehicles with ABS >

NOTE

*: Refer to GROUP 35B for an explanation of EBD operation.