

GENERAL

OUTLINE OF CHANGES

The service procedures have been established due to the following changes.

<EXCEPT VR-X>

- The proportioning valve has been changed. <Vehicles without ABS>
- The stop lamp switch has been changed.

<VR-X>

- 15-inch front disc brakes and 14 inches rear disc brakes have been adopted.
- 8 + 9 inch brake booster has been adopted.

GENERAL SPECIFICATION <VR-X>

Item		New	Old
Brake booster	Type	Vacuum type, tandem	Vacuum type, single
	Effective dia. of power cylinder mm	205 + 230	255
	Boosting ratio	7.0 <Pedal depressing force: 516 N>	5.0 <Pedal depressing force: 163 N>
Proportioning valve <Vehicles without ABS>	Type	Single type × 2	Single type × 2
	Decompression ratio	0.25	0.25
Front disc brakes	Type	Floating caliper, 1 piston, ventilated disc	Floating caliper, 1 piston, ventilated disc
	Disc effective dia. × thickness mm	222 × 26	207 × 24
	Wheel cylinder I.D. mm	60.3	54.0
	Pad thickness mm	10.0	10.0
	Clearance adjustment	Automatic	Automatic
Rear disc brakes	Type	Floating caliper, 1 piston, solid disc	—
	Disc effective dia. × thickness mm	226 × 10	—
	Wheel cylinder I.D. mm	38.1	—
	Pad thickness mm	10.0	—
	Clearance adjustment	Automatic	—
Rear drum brakes	Type	—	Leading trailing
	Drum I.D. mm	—	203
	Wheel cylinder I.D. mm	—	19.0
	Lining thickness mm	—	4.3
	Clearance adjustment	—	Automatic
Brake fluid		DOT3 or DOT4	DOT3 or DOT4

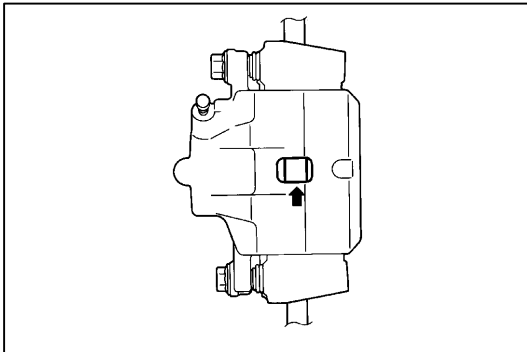
SERVICE SPECIFICATIONS

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Item		Standard value	Limit
Brake booster push rod protrusion amount mm		8.98 – 9.23	–
Proportioning valve <Vehicles without ABS (Except VR-X)>	Split point MPa	3.43 ± 0.24	–
	Output fluid pressure (Input fluid pressure) MPa	4.41 ± 0.24 (7.35)	–
	Output fluid pressure difference between left and right MPa	–	0.5
Front disc brake <VR-X>	Pad thickness mm	10.0	2.0
	Disc thickness mm	26.0	24.4
	Disc runout mm	–	0.04
	Drag force N	68 or less	–
Rear disc brake <VR-X>	Pad thickness mm	10.0	2.0
	Disc thickness mm	10.0	8.4
	Disc runout mm	–	0.04
	Drag force N	68 or less	–

ON-VEHICLE SERVICE <VR-X>**DISC BRAKE PAD CHECK AND REPLACEMENT****NOTE**

The inner side pad of the front disc brake assembly (LH) have a wear indicator that contact the brake disc when the brake pad thickness reaches approximately 2 mm and emit a squealing sound to warn the driver.



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

Standard value: 10.0 mm

Limit: 2.0 mm

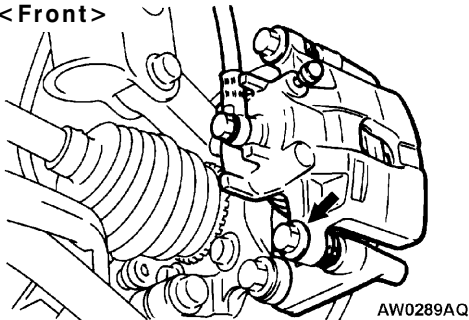
2. When the thickness is less than the limit, always replace the pads at an axle set.

3. Remove the guide pin lock bolt <Front> or slide pin(sub) <Rear>. Pivot the caliper assembly and hold it with wires.

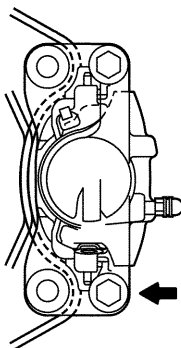
Caution

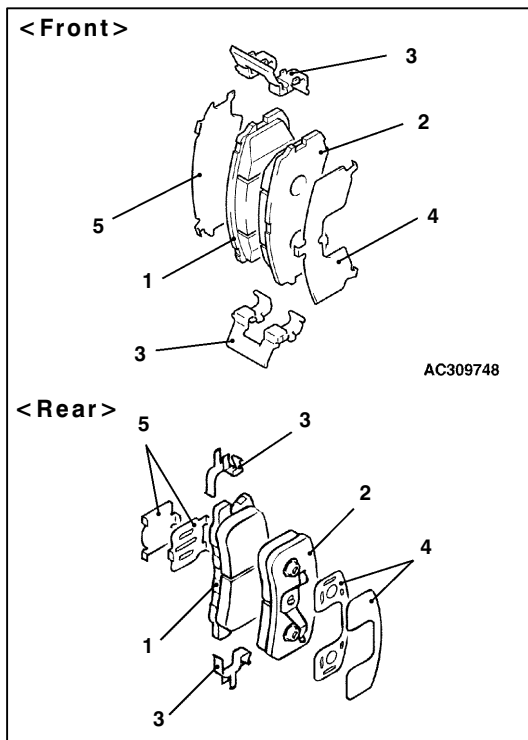
Do not wipe off the special grease that is on the slide pin (sub) <Rear> or allow it to contaminate the slide pin (sub) <Rear>.

<Front>



<Rear>





4. Remove the following parts from the caliper support.
 - (1) Pad assembly or Pad and wear indicator assembly
 - (2) Pad assembly
 - (3) Clip
 - (4) Outer shim
 - (5) Inner shim
5. In order to measure the brake drag force after pad installation, measure the rotary-sliding resistance of the hub with the pads removed. (Refer to P.35A-12.)
6. Install the pads and caliper assembly, and then check the brake drag force. (Refer to P.35A-12.)

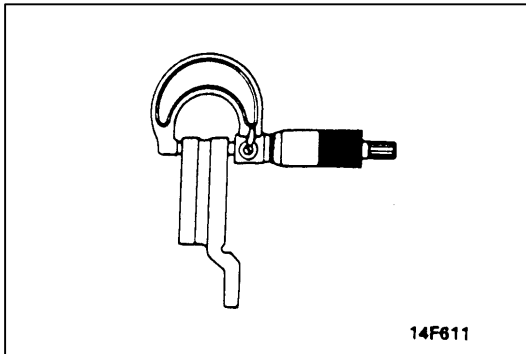
DISC BRAKE ROTOR CHECK

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 item	Remark
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.



BRAKE DISC THICKNESS CHECK

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

Standard value:

<Front> 26.0 mm

<Rear> 10.0 mm

Limit:

<Front> 24.4 mm

<Rear> 8.4 mm

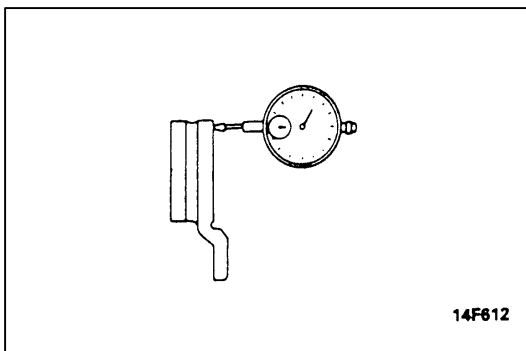
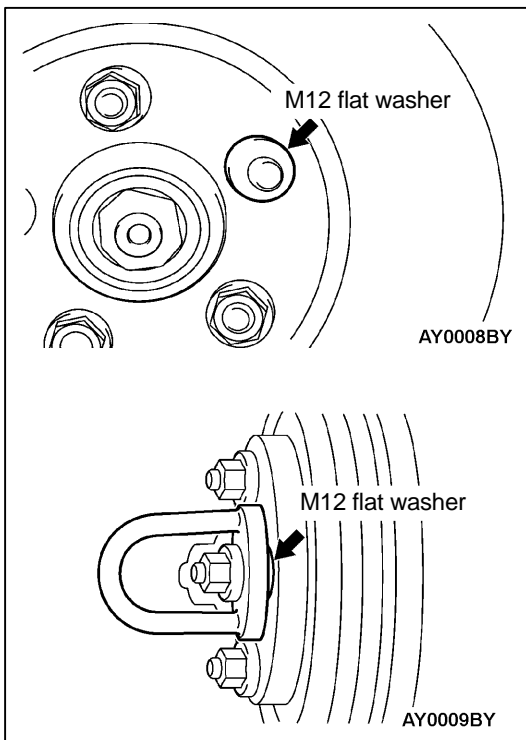
NOTE

Thickness variation (at least 8 positions) should not be more than 0.015 mm.

Caution

- After a new brake disc is installed, always grind the brake disc with on-the-car type brake lathe. If this step is not carried out, the brake disc run-out exceeds the specified value, resulting in judder.
- When the on-the-car type lathe is used, first install M12 flat washer on the stud bolt in the brake disc side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disc rotor may be deformed, resulting in inaccurate grinding.
- Grind the brake disc with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m. When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disc rotor or drum may be deformed, resulting in judder.

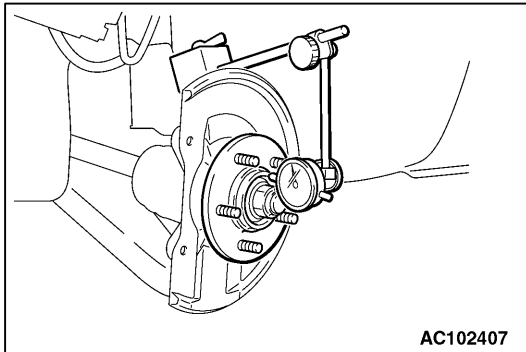
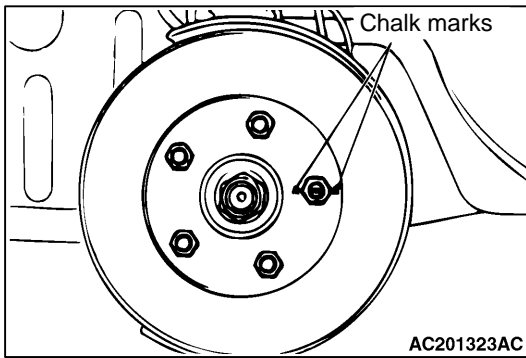
- If the disc thickness is less than the limits, replace it with a new one. If thickness variation exceeds the specification, turn rotor with an on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent). If the calculated final thickness after turning the rotor is less than the standard value, replace the disc.



BRAKE DISC RUN-OUT CHECK AND CORRECTION

- Remove the brake assembly, and then hold it with wire.
- Temporarily install the disc with the hub nut.
- Place a dial gauge approximately 5 mm from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.04 mm



4. If the brake disc run-out exceeds the limit, correct it as follows:

(1) Chalk phase marks on the wheel stud and the brake disc, which run-out is excessive as shown.

(2) Remove the brake disc. Then place a dial gauge as shown, and measure the end play by pushing and pulling the wheel hub.

Limit: 0.05 mm

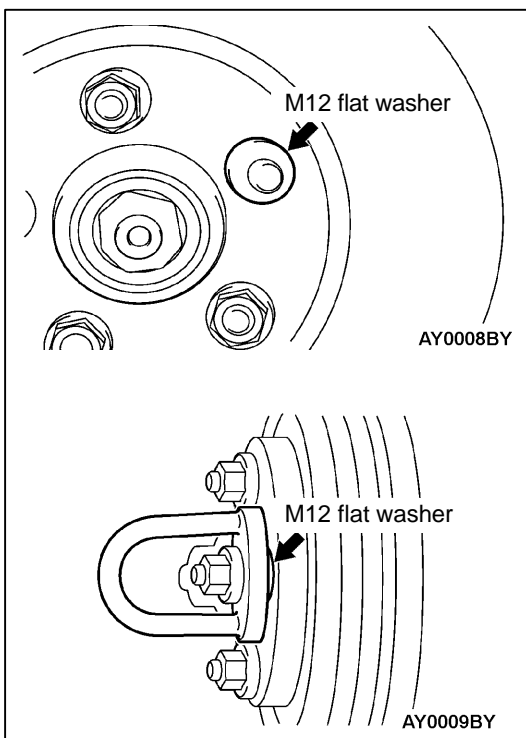
(3) If the end play exceeds the limit, disassemble the hub and knuckle assembly to check each part.

(4) If the end play does not exceed the limit, dephase the brake disc and secure it. Then recheck the brake disc run-out.

5. If the run-out cannot be corrected by changing the phase of the brake disc, replace the brake disc or grind it with the on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent).

Caution

(1) After a new brake disc is installed, always grind the brake disc with on-the-car type brake lathe. If this step is not carried out, the brake disc run-out exceeds the specified value, resulting in judder.



(2) When the on-the-car type lathe is used, first install M12 flat washer on the stud bolt in the brake disc side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disc rotor may be deformed, resulting in inaccurate grinding.

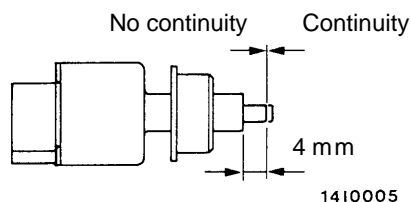
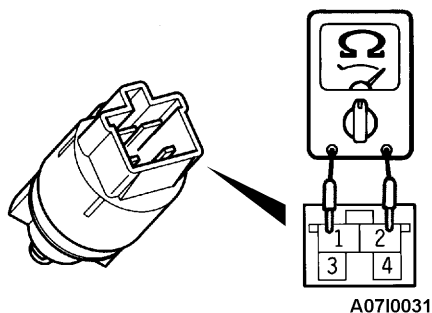
(3) Grind the brake disc with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m. When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disc rotor or drum may be deformed, resulting in judder.

BRAKE PEDAL <EXCEPT VR-X>**REMOVAL AND INSTALLATION**

Removal and installation are the same as before.

INSPECTION**STOP LAMP SWITCH CHECK**

1. Connect an ohmmeter between the stop lamp switch connector terminals.
2. There should be no continuity between the terminals when the plunger is pushed in as shown. There should be continuity when it is released.



MASTER CYLINDER AND BRAKE BOOSTER <VR-X>

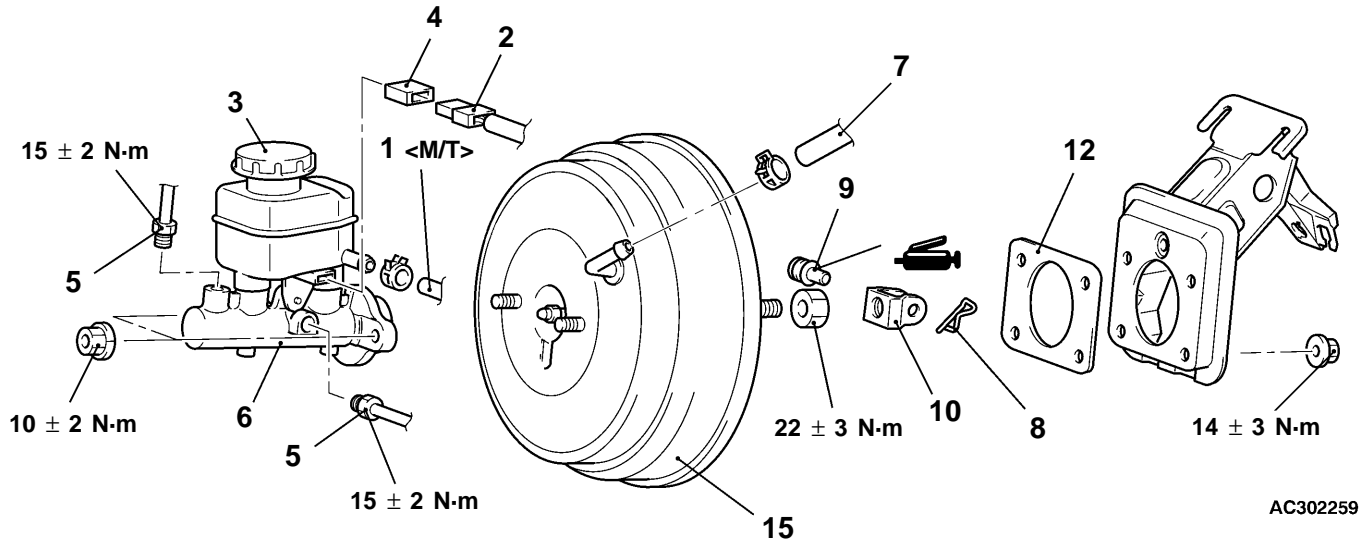
REMOVAL AND INSTALLATION

Pre-removal Operation

- Brake Fluid Draining

Post-installation Operation

- Brake Fluid Supplying and Air Bleeding
- Air Intake Hose and Air Cleaner Installation



Master cylinder removal steps

1. Clutch hose connection <M/T>
2. Brake fluid level sensor connector
3. Reservoir cap assembly
4. Brake fluid level sensor
5. Brake pipe connection
6. Master cylinder

Brake booster removal steps

2. Brake fluid level sensor connector
 5. Brake pipe connection
 6. Master cylinder
- Push rod protrusion amount check and adjustment

- ▶A◀ 7. Vacuum hose (With built-in check valve)
- 8. Snap pin
- 9. Pin assembly
- 10. Clevis
 - Remove A/C liquid pipe B from the retaining clip. (Refer to GROUP 55A – Refrigerant Line.)
- 11. Brake booster
- 12. Sealer

INSTALLATION SERVICE POINTS

▶A◀ VACUUM HOSE CONNECTION

Insert the vacuum hose to the brake booster with its paint mark facing upward, and then secure the hose by using the hose clip.

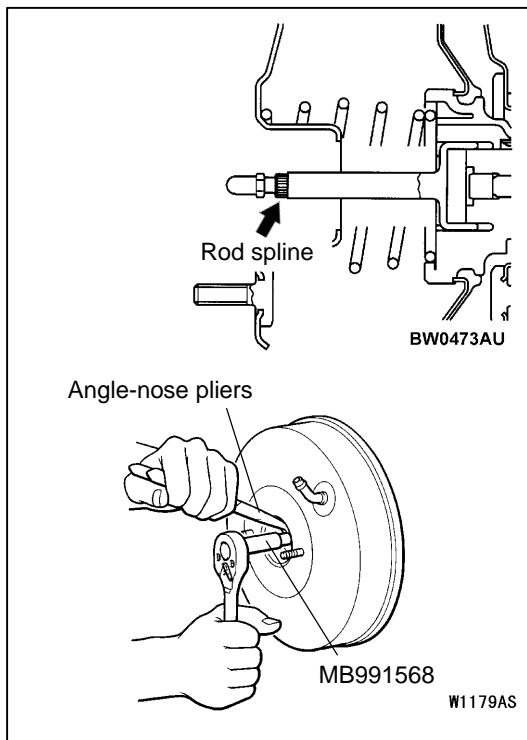
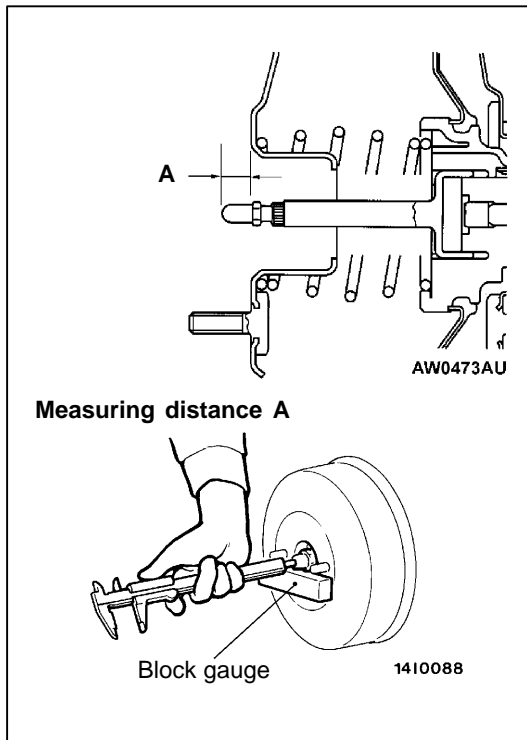
►B◄ PUSH ROD PROTRUSION AMOUNT CHECK AND ADJUSTMENT

1. Measure dimension (A).

Standard value (A) : 8.98 – 9.23 mm

NOTE

When a negative pressure of 66.7 kPa is applied to the brake booster, the push rod should protrude 10.28 – 10.53 mm.



2. If the protrusion amount is not within the standard value range, adjust the push rod length by turning the push rod. Use the special tool push rod adjusting socket (MB991568) to turn the push rod while holding the rod spline with angle-nose pliers.

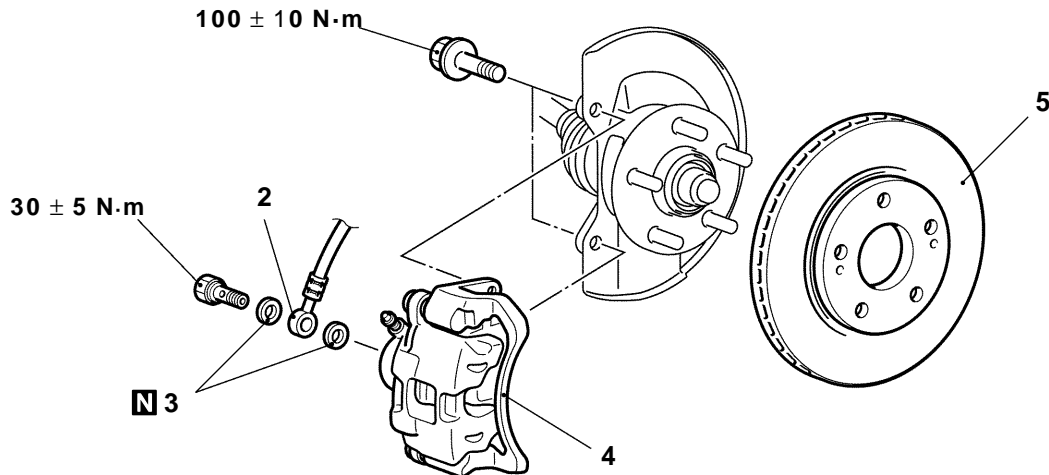
DISC BRAKE <VR-X>

REMOVAL AND INSTALLATION

Pre-removal Operation
Brake Fluid Draining

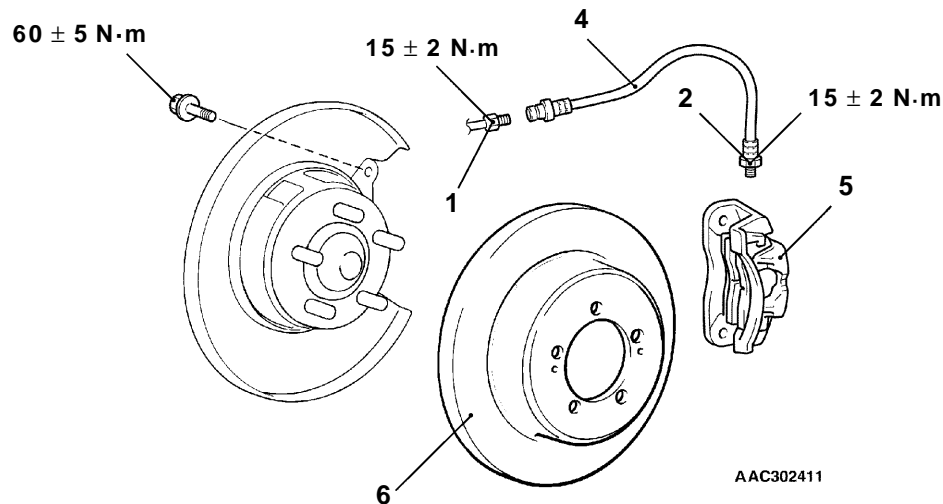
Post-installation Operation
Brake Fluid Supplying and Air Bleeding

<Front>



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<Rear>



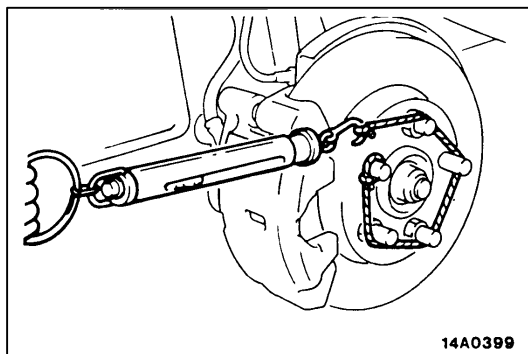
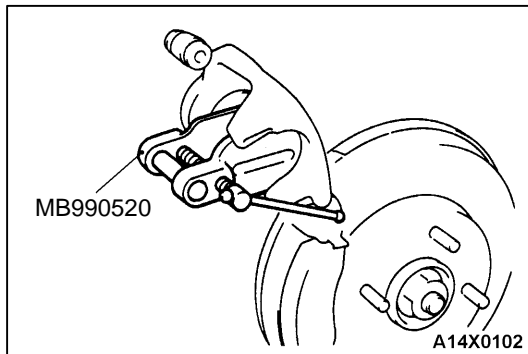
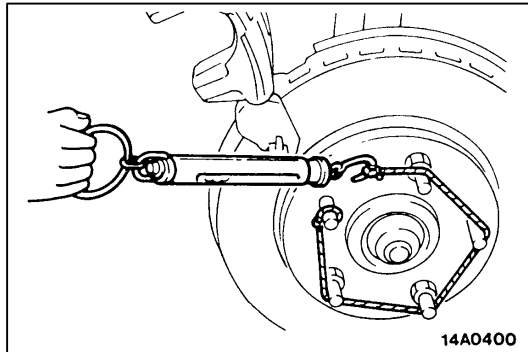
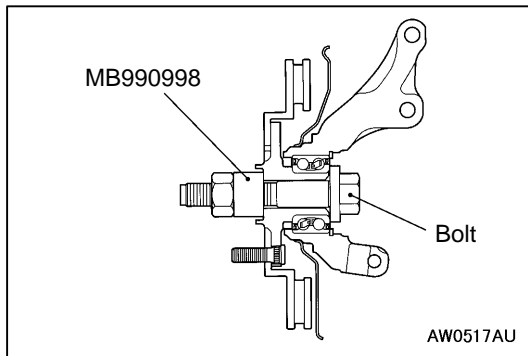
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Removal steps

1. Brake tube and brake hose connection <Rear>
2. Brake hose connection
3. Gasket <Front>



4. Brake hose
5. Disc brake assembly
6. Brake disc



INSTALLATION SERVICE POINT

►A◄ DISC BRAKE ASSEMBLY INSTALLATION

1. In order to measure the brake drag force after pad installation, measure the rotary-sliding resistance of the hub by the following procedure with the pads removed.

<Front>

- (1) Withdraw the drive shaft.
- (2) Attach the special tool front hub remover and installer (MB990998) to the front hub assembly as shown in the illustration, and tighten it to the specified torque.

Tightening torque: 245 ± 29 N·m

- (3) Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.

<Rear>

Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.

2. Install the caliper support to the knuckle, and then assemble the pad and the clip to the caliper support.

Caution

Do not contaminate the friction surfaces of the pads and brake discs by any oil or grease.

3. Clean the piston and insert it into the cylinder with the special tool piston expander (MB990520).
4. Be careful that the piston boot does not become caught, when lowering the caliper assembly and install the guide pin lock bolt <Front> or slide pin (sub)<Rear> to the caliper.
5. Start the engine, and then depress the brake pedal two or three times strongly. Then stop the engine.
6. Turn the brake disc forward 10 times.

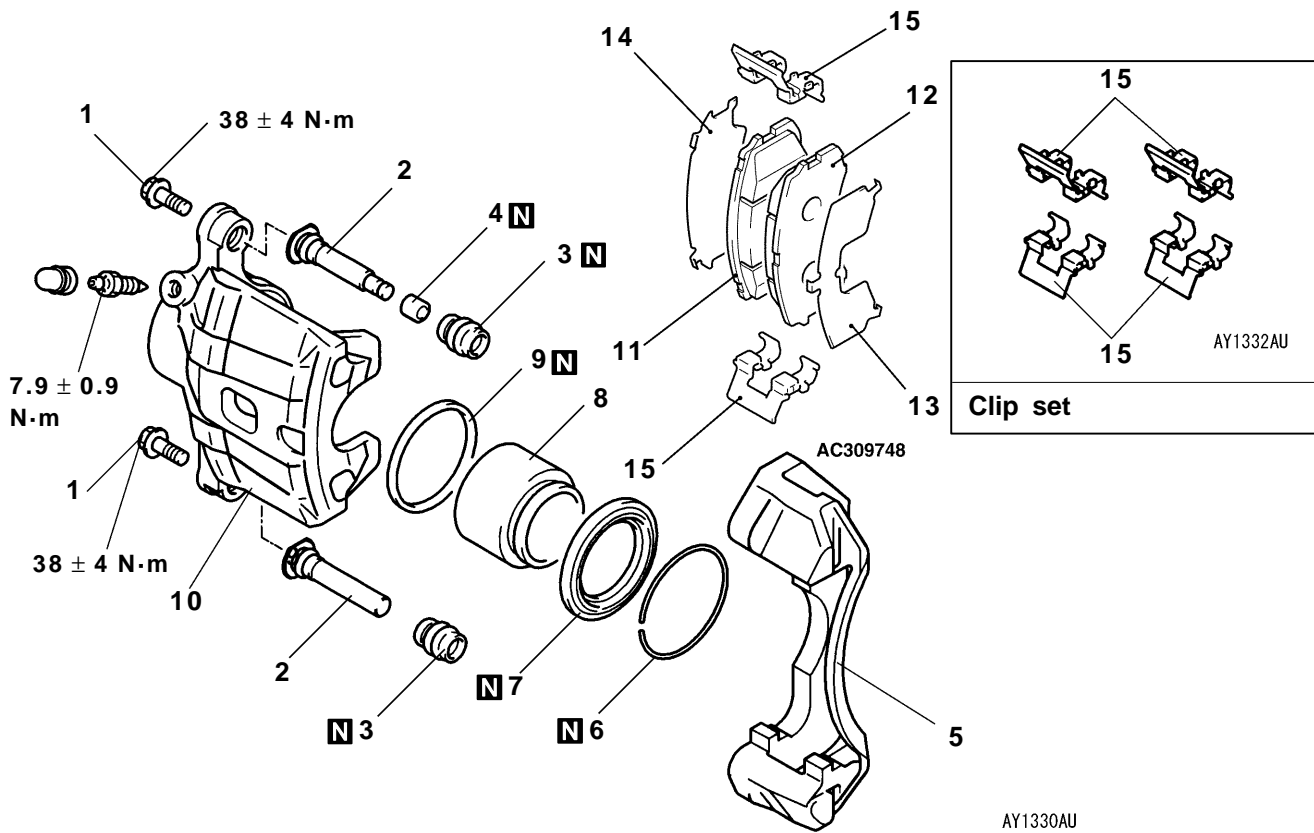
7. Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.
8. Calculate the drag force of the disc brake [difference between the values measured at steps 1 and 7].

Standard value: 68 N or less

9. If that drag force exceeds the standard value, disassemble the piston assembly. Then check the piston for contamination or rust, and confirm if the piston or the piston seal is deteriorated, and if the guide pin <Front> or slide pin (sub) <Rear> slide smoothly.

DISASSEMBLY AND REASSEMBLY

<Front>



Brake caliper kit	Pad set	Shim set	Seal and boot kit

Disassembly steps

1. Guide pin locking bolt
2. Guide pin
3. Boot
4. Bushing
5. Caliper support (including pad, clip, and shim)
6. Piston ring
7. Piston boot



8. Piston
9. Piston seal
10. Caliper body
11. Pad and wear indicator assembly
12. Pad assembly
13. Outer shim
14. Inner shim
15. Clip



NOTE

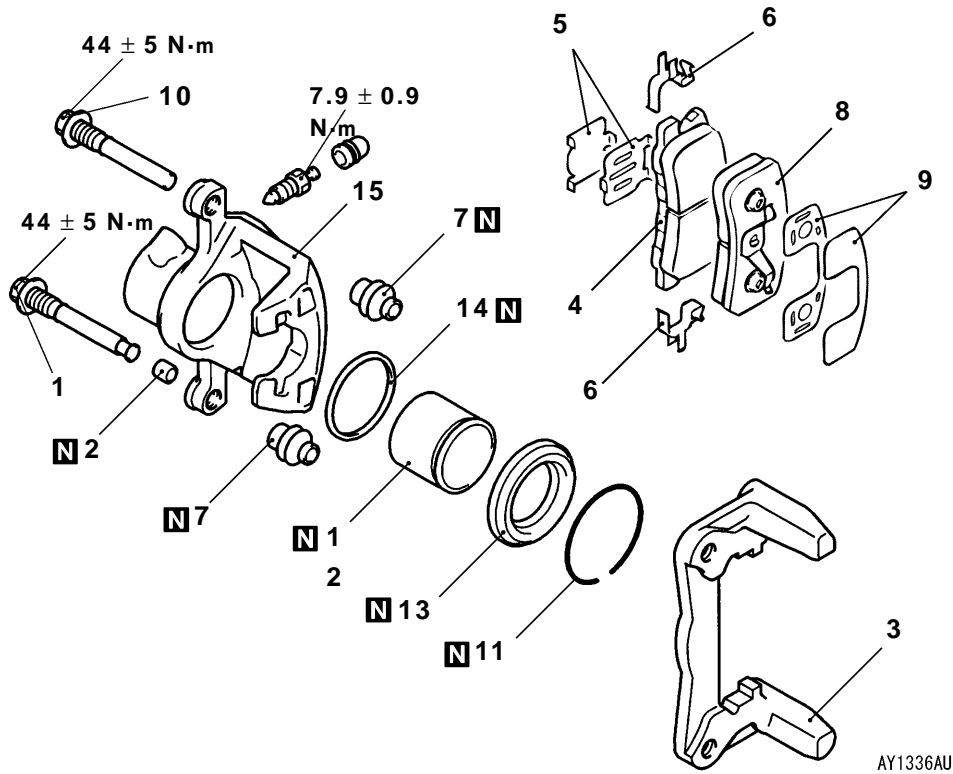
Disassembly and reassembly service points are the same as before.

35A BASIC BRAKE SYSTEM – Disc Brake

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35A

<Rear>



<p>BY1336AU</p>	<p>AY1337AU</p>	<p>AY1338AU</p>	<p>Grease</p>
<p>Brake caliper kit</p>	<p>Pad set</p>	<p>Clip set</p>	<p>Shim set</p>

Disassembly steps

1. Lock pin
2. Bushing
3. Caliper support (including pad, clip, and shim)
4. Pad and wear indicator assembly
5. Inner shim
6. Clip
7. Pin boot



8. Pad assembly
9. Outer shim
10. Guide pin
11. Boot ring
12. Piston
13. Piston boot
14. Piston seal
15. Caliper body

NOTE

Disassembly and reassembly service points are the same as previous front brake.

LUBRICATION POINTS

<Front>

Same as before.

<Rear>

