

GROUP 35A

BASIC BRAKE SYSTEM

CONTENTS

GENERAL INFORMATION	35A-2	BRAKE PAD REPLACEMENT	35A-18
GENERAL SPECIFICATIONS	35A-2	DISK BRAKE ROTOR CHECK	35A-21
SERVICE SPECIFICATIONS	35A-3	BRAKE DRAG FORCE CHECK	35A-24
LUBRICANTS	35A-4	BRAKE PEDAL	35A-25
BASIC BRAKE SYSTEM DIAGNOSIS 35A-4		REMOVAL AND INSTALLATION	35A-25
INTRODUCTION TO BASIC BRAKE SYSTEM DIAGNOSIS	35A-4	INSPECTION	35A-26
BASIC BRAKE SYSTEM DIAGNOSTIC TROUBLESHOOTING STRATEGY	35A-4	STOPLIGHT SWITCH CHECK	35A-26
SYMPTOM CHART	35A-4	BRAKE PEDAL DISTORTION CHECK	35A-26
SYMPTOM PROCEDURES	35A-5	MASTER CYLINDER ASSEMBLY AND BRAKE BOOSTER ASSEMBLY	35A-27
SPECIAL TOOLS	35A-12	REMOVAL AND INSTALLATION	35A-27
ON-VEHICLE SERVICE	35A-12	FRONT DISC BRAKE ASSEMBLY ..	35A-33
BRAKE PEDAL CHECK AND ADJUSTMENT	35A-12	REMOVAL AND INSTALLATION	35A-33
BRAKE BOOSTER OPERATION CHECK ..	35A-15	INSPECTION	35A-34
CHECK VALVE OPERATION CHECK	35A-16	DISASSEMBLY AND ASSEMBLY	35A-35
BLEEDING	35A-16	INSPECTION	35A-36
BRAKE FLUID LEVEL SWITCH CHECK ..	35A-17	REAR DISC BRAKE ASSEMBLY ...	35A-38
BRAKE PAD CHECK	35A-17	REMOVAL AND INSTALLATION	35A-38
		INSPECTION	35A-39
		DISASSEMBLY AND ASSEMBLY	35A-40
		INSPECTION	35A-41

GENERAL INFORMATION

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The brake system has high reliability and durability, and provides an exceptional braking performance.

FEATURES

IMPROVED BRAKING PERFORMANCE

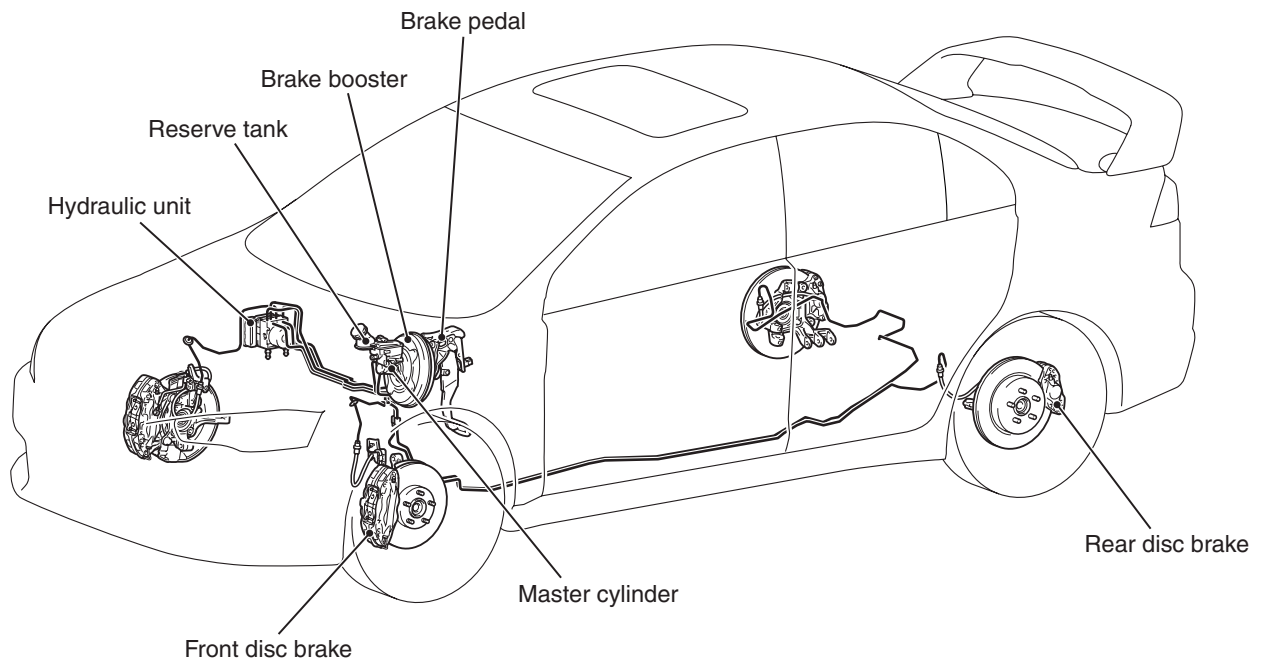
- In addition to the 10-inch through bolt type single brake booster, the small and long stroke-type master cylinder is adopted to provide rigidity, to reduce weight, and to secure the assist force.
- Brembo™ 18-inch 4-pot front ventilated disk brakes and Brembo™ 17-inch 2-pot rear ventilated disk brakes are adopted to provide stable braking force and improved braking feel.

- To the front, two-piece structure brake disk is installed. <GSR: Option, MR: Standard>

IMPROVED STABILITY

- Front- and rear-wheel X-type brake line layout is used.
- The brake pedal retreat suppression mechanism that suppresses the retraction of brake pedal surface upon a frontal collision is adopted.
- To the front brake and rear brake, the brake pads with audible wear indicator are adopted which warn the driver of the wear limit.

CONSTRUCTION DIAGRAM



AC708805AB

GENERAL SPECIFICATIONS

M1351000200599

Item		Specification
Master cylinder	Type	Tandem type
	I.D. mm (in)	23.81 (0.94)
Brake booster	Type	Vacuum type, single
	Effective dia. of power cylinder mm (in)	252 (10)
	Boosting ratio	5.5 {Pedal depression force: 663 N (149 lb)}

Item		Specification
Front brakes	Type (Disk brake nomenclature)	Brembo™ 4-opposed-piston ventilated disk (V8-Z4046)
	Disk effective dia × thickness mm (in)	294 × 32 (11.6 × 1.3)
	Cylinder I.D. mm (in)	40.0 (1.58) × 2, 46.0 (1.81) × 2
	Brake pad thickness mm (in)	9.85 (0.39)
	Clearance adjustment	Automatic adjustment
Rear brakes	Type (Disk brake nomenclature)	Brembo™ 2-opposed-piston ventilated disk (V7-X40)
	Disk effective dia × thickness mm (in)	278 × 22 (10.9 × 0.9)
	Cylinder I.D. mm (in)	40.0 (1.58) × 2
	Brake pad thickness mm (in)	9.0 (0.35)
	Clearance adjustment	Automatic adjustment
Brake fluid		DOT3 or DOT4

SERVICE SPECIFICATIONS

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Item		Standard value	Limit
Brake pedal height mm (in)		219.8 –227.8 (8.7 –9.0)	–
Dimension from the brake booster stud bolt end to the clevis hole center mm (in)		74 (2.91)	–
Brake pedal free play mm (in)		3 –8 (0.12 –0.31)	–
Pedal-to-floor clearance when brake pedal is depressed mm (in) [Pedal depression force: approx. 500 N]		85 (3.35) or more	–
Front disk brake	Pad thickness mm (in)	9.85 (0.39)	2.0 (0.08)
	Brake disk thickness mm (in)	32.0 (1.26)	30.0 (1.18)
	Brake disk runout mm (in)	–	0.06 (0.0024)
	Brake drag force N (lb)	68 (15.3) or less	–
Rear disk brake	Pad thickness mm (in)	9.0 (0.35)	2.0 (0.08)
	Brake disk thickness mm (in)	22.0 (0.87)	20.0 (0.79)
	Brake disk runout mm (in)	–	0.08 (0.0032)
	Brake drag force N (lb)	68 (15.3) or less	–
Brake pedal distortion mm (in)	M/T	240 –246 (9.4 –9.7)	–
	TC-SST	242 –248 (9.5 –9.8)	–

LUBRICANTS

M1351000401002

Item	Specified lubricant	Quantity
Brake fluid	DOT3 or DOT4	Adequate
Brake pad assembly (between pad and shim)	Repair kit grease, Molykote AS880N or equivalent	
Brake pad assembly (shoulder section)	Repair kit grease, Molykote 7439 or equivalent	

BASIC BRAKE SYSTEM DIAGNOSIS

INTRODUCTION TO BASIC BRAKE SYSTEM DIAGNOSIS

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Hydraulic brakes are composed of the brake pedal, master cylinder, brake booster and disk brakes. Malfunctions such as insufficient braking power or the generation of noise may occur due to wear, damage or incorrect adjustment of these components.

BASIC BRAKE SYSTEM DIAGNOSTIC TROUBLESHOOTING STRATEGY

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Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a basic brake system fault.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the symptom chart.
4. Verify malfunction is eliminated.

SYMPTOM CHART

M1351009900410

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Vehicle pulls to one side when brakes are applied	1	P.35A-5
Insufficient braking power	2	P.35A-5
Increased pedal stroke (Reduced pedal-to-floor board clearance)	3	P.35A-6
Brake drag	4	P.35A-7
Scraping or grinding noise when brake are applied	5	P.35A-8
Squealing, groaning or chattering noise when brake are applied	6	P.35A-9
Squealing noise when brakes are not applied	7	P.35A-10
Groaning, clicking or rattling noise when brakes are not applied	8	P.35A-11

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Vehicle Pulls to One Side when Brakes are Applied

DIAGNOSIS

STEP 1. Check for oil, water, etc., on the pad contact surface of all brakes.

Q: Is oil, water, etc., on the pad contact surface?

YES : Replace the part and determine the source/cause of foreign material. Then go to Step 5.

NO : Go to Step 2.

STEP 2. Check disk brake pistons for smooth operation.

(1) With engine not running, depress the brake pedal rapidly several times to deplete booster vacuum reserves.

(2) Test each disk brake assembly one at a time.

- a. Remove the lower caliper bolt, then remove caliper from mount.
- b. Have an assistant slowly depress the brake pedal. Confirm piston(s) extend slowly and smoothly with no jumpiness. Repeat for each disk brake assembly.

Q: Do (does) the piston(s) move correctly?

YES : Go to Step 3.

NO : Disassemble and inspect the brake assembly (Front: refer to [P.35A-35](#), Rear: refer to [P.35A-40](#)). Then go to Step 5.

STEP 3. Check brake disk(s) for runout.

Refer to [P.35A-21](#).

Q: Is runout outside of specifications?

YES : Repair or replace the brake disk(s) as necessary. Then go to Step 5.

NO : Go to Step 4.

STEP 4. Check brake disks for correct thickness.

Refer to [P.35A-21](#).

Q: Is the thickness outside of specifications?

YES : Repair or replace the brake disk(s) as necessary. Then go to Step 5.

NO : Perform the brake line bleeding. Then go to Step 5.

STEP 5. Retest the system.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at Step 1. If a new symptom appears, refer to the appropriate symptom chart.

INSPECTION PROCEDURE 2: Insufficient Braking Power

DIAGNOSIS

STEP 1. Check that the specified brake fluid is used, its level is correct, and no contamination is found.

Q: Is there a fault?

YES : Refill or replace with the specified brake fluid DOT 3 or DOT 4. Bleed the brakes if necessary (Refer to [P.35A-16](#)). Then go to Step 6.

NO : Go to Step 2.

STEP 2. Check for spongy (not firm) brakes.

(1) With engine not running, depress the brake pedal rapidly several times to deplete the booster vacuum reserve.

(2) With the brake pedal fully released, depress the brake pedal slowly until it stops.

(3) With a measuring device (ruler, etc.) next to the brake pedal, depress the pedal firmly and measure the distance the pedal traveled.

Q: Is the distance greater than 20 mm (0.8 inch)?

YES : Bleed the brakes to remove air in the fluid (Refer to [P.35A-16](#)). Then go to Step 6.

NO : Go to Step 3.

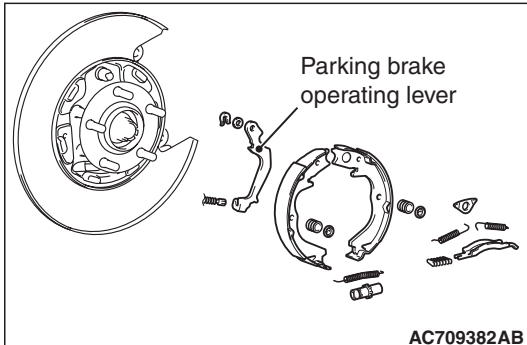
STEP 3. Check the brake booster function.Refer to [P.35A-15](#).**Q: Is there a fault?****YES** : Replace the brake booster. Then go to Step 6.**NO** : Go to Step 4.**STEP 4. Check for pinched or restricted brake tube or hose.****Q: Is there a pinched or restricted brake tube or hose?****YES** : Replace that complete section of brake tube or brake hose. Then go to Step 6.**NO** : Go to Step 5.**STEP 5. Check for oil, water, etc., on the pad contact surfaces of all brakes.****Q: Is oil, water, etc., on the pad contact surface?****YES** : Replace the part and determine the source/cause of foreign material. Recheck symptom. Then go to Step 6.**NO** : The procedure is complete. Then go to Step 6.**STEP 6. Recheck symptom.****Q: Is the symptom eliminated?****YES** : The procedure is complete.**NO** : Start over at step 1. If a new symptom surfaces, refer to the appropriate symptom chart.**INSPECTION PROCEDURE 3: Increased Pedal Stroke (Reduced Pedal-to-Floor Board Clearance)****DIAGNOSIS****STEP 1. Check for spongy (not firm) brakes.**

- (1) With engine not running, depress the brake pedal rapidly several times to deplete booster vacuum reserve.
- (2) With the brake pedal fully released, depress the brake pedal slowly until it stops.
- (3) With a measuring device (ruler, etc.) next to the brake pedal, depress the pedal firmly and measure the distance the pedal traveled.

Q: Is the distance greater than 20 mm (0.8 inch)?**YES** : Bleed the brakes to remove air in the fluid (Refer to [P.35A-16](#)). Then go to Step 5.**NO** : Go to Step 2.**STEP 2. Check the pad for wear.**Refer to [P.35A-17](#).**Q: Is the pad thickness outside of specifications?****YES** : Replace the part. Then go to Step 5.**NO** : Go to Step 3.**STEP 3. Check the vacuum hose and check valve for damage.**Refer to [P.35A-16](#).**Q: Is there a damage?****YES** : Replace the part. Then go to Step 5.**NO** : Go to Step 4.**STEP 4. Check for brake fluid leaks.****Q: Is there a leak?****YES** : Check the connection for looseness, corrosion, etc. Clean and repair as necessary. If leaking in any tube or hose section, replace the complete tube or hose. Then go to Step 5 .**NO** : Go to Step 5.**STEP 5. Recheck symptom.****Q: Is the symptom eliminated?****YES** : The procedure is complete.**NO** : Start over at step 1. If a new symptom surfaces, refer to the symptom chart.

INSPECTION PROCEDURE 4: Brake Drag

DIAGNOSIS

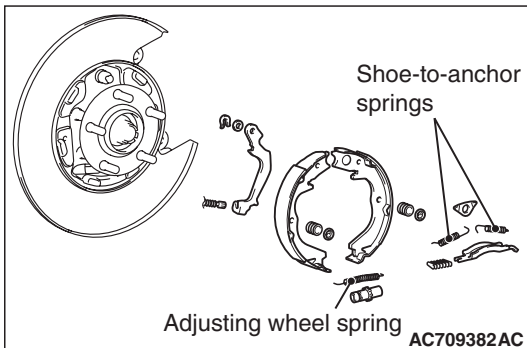


STEP 1. Check the parking brake operating lever return.

Q: Is the operation faulty?

YES : Repair it. Then go to Step 7.

NO : Go to Step 2.



STEP 2. Check the shoe-to-anchor springs and adjusting wheel spring for breakage.

Q: Are the shoe-to-anchor springs and adjusting wheel spring broken?

YES : Replace the spring. Then go to Step 7.

NO : Go to Step 3.

STEP 3. Check the amount of grease at each sliding section.

Refer to GROUP 36, Parking Brake Lining and Drum [P.36-17](#).

Q: Is the grease amount low?

YES : Apply grease. Then go to Step 7.

NO : Go to Step 4.

STEP 4. Check the parking brake pull amount.

Refer to GROUP 36, On-vehicle Service –Parking Brake lever Stroke Check and Adjustment [P.36-11](#).

Q: Is there a fault?

YES : Adjust it. Then go to Step 7.

NO : Go to Step 5.

STEP 5. Check port for clogging.

Q: Is the port clogged?

YES : Repair it. Then go to Step 7.

NO : Go to Step 6.

STEP 6. Check disk brake pistons for sticking.

Depress the brake pedal, then release. Confirm each wheel spins freely.

Q: Does any wheel stick?

YES : Inspect that brake assembly. Then go to Step 7.

NO : Go to Step 7.

STEP 7. Recheck symptom.**Q: Is the symptom eliminated?**

YES : The procedure is complete.

NO : Start over at step 1. If a new symptom surfaces, refer to the symptom chart.

INSPECTION PROCEDURE 5: Scraping or Grinding Noise when Brakes are Applied

DIAGNOSIS

STEP 1. Check the front brakes, then rear brakes, for metal-to-metal condition.**Q: Is any metal-to-metal contact evident?**

YES : Repair or replace the components. Then go to Step 6.

NO : Go to Step 2.

STEP 2. Check for interference between the caliper and wheel.**Q: Is there any interference?**

YES : Repair or replace the part. Then go to Step 6.

NO : Go to Step 3.

STEP 3. Check for interference between the dust cover and brake disk.**Q: Is there any interference?**

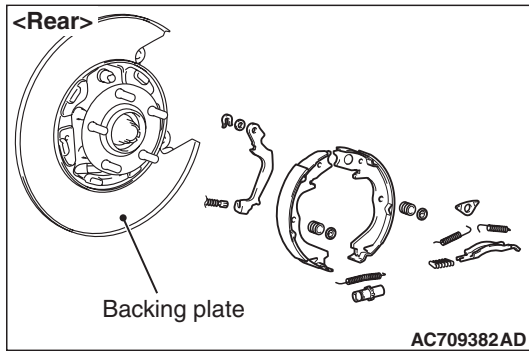
YES : Repair or replace the part. Then go to Step 6.

NO : Go to Step 4.

STEP 4. Check the brake drums or disks for cracks.**Q: Are there cracks?**

YES : Repair or replace the part. Then go to Step 6.

NO : Go to Step 5.



STEP 5. Check for bent backing plate(s).

Q: Is (Are) the backing plate(s) bent?

YES : Repair or replace the part. Then go to Step 6.

NO : Go to Step 6.

STEP 6. Recheck symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at step 1. If a new symptom surfaces, refer to the symptom chart.

INSPECTION PROCEDURE 6: Squealing, Groaning or Chattering Noise when Brakes are Applied

DIAGNOSIS

STEP 1. Check the brake disk and pads for wear or cutting.

Q: Is there wear or cutting?

YES : Repair or replace the part. Then go to Step 4.

NO : Go to Step 2.

STEP 2. Check the calipers for rust.

Q: Is there any rust?

YES : Remove the rust. Then go to Step 4.

NO : Go to Step 3.

STEP 3. Adjust the brake pedal.

Refer to [P.35A-12](#).

Q: Is the brake pedal adjusted correctly?

YES : Go to Step 4.

NO : Adjust the brake pedal. Then go to Step 4.

STEP 4. Recheck symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at step 1. If a new symptom surfaces, refer to the symptom chart.

INSPECTION PROCEDURE 7: Squealing Noise when Brakes are not Applied

DIAGNOSIS

STEP 1. Check whether the backing plate is bent or loose and interfering with the drum.**Q: Is there a fault?****YES** : Replace the part. Then go to Step 9.**NO** : Go to Step 2.

STEP 2. Check whether the drum is damaged due to interference with the backing plate or shoe.**Q: Is there any damage?****YES** : Replace the part. Then go to Step 9.**NO** : Go to Step 3.

STEP 3. Check the brake drum for wear and the shoe spring for damage.**Q: Is there any wear or damage?****YES** : Replace the part. Then go to Step 9.**NO** : Go to Step 4.

STEP 4. Check the brake disks for rust.**Q: Are the brake disks rusted?****YES** : Remove the rust by using sand paper. If still rusted, turn the rotors with an on-the-car brake lathe. Then go to Step 9.**NO** : Go to Step 5.

STEP 5. Check the brake pads for correct installation.**Q: Are the pads installed incorrectly?****YES** : Repair the pads. Then go to Step 9.**NO** : Go to Step 6.

STEP 6. Check the calipers for correct installation.**Q: Are the calipers installed incorrectly?****YES** : Repair the calipers. Then go to Step 9.**NO** : Go to Step 7.

STEP 7. Check the wheel bearings for end play.Refer to GROUP 26 –On-vehicle Service, Wheel bearing end play check [P.26-7](#) <Front> or GROUP 27 –On-vehicle Service, Wheel bearing end play check [P.27-33](#) <Rear>.**Q: Does the measured end play exceed the limit?****YES** : Replace the faulty hub assembly. Then go to Step 9.**NO** : Go to Step 8.

STEP 8. Adjust the brake pedal.

Refer to [P.35A-12](#).

Q: Is the brake pedal adjusted correctly?

YES : Go to Step 9.

NO : Adjust the brake pedal. Then go to Step 9.

STEP 9. Recheck symptom.

Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at step 1. If a new symptom surfaces, refer to the symptom chart.

INSPECTION PROCEDURE 8: Groaning, Clicking or Rattling Noise when Brakes are not Applied.

DIAGNOSIS

STEP 1. Check whether foreign material has entered the wheel covers.

Q: Is there any foreign material?

YES : Remove it. Then go to Step 5.

NO : Go to Step 2.

STEP 2. Check for looseness of the wheel nuts.

Q: Are the wheel nuts loose?

YES : Tighten to 98 ± 10 N·m (73 ± 7 ft-lb). Then go to Step 5.

NO : Go to Step 3.

STEP 3. Check for looseness of the caliper installation bolt.

Q: Is the caliper installation bolt loose?

YES : Tighten to 135 ± 15 N·m (100 ± 11 ft-lb) for the front caliper. Tighten to 80 ± 10 N·m (59 ± 7 ft-lb) for the rear caliper. Then go to Step 5.

NO : Go to Step 4.

STEP 4. Check the wheel bearings for end play.

Refer to GROUP 26 –On-vehicle Service, Wheel bearing end play check [P.26-7](#) <Front> or GROUP 27 –On-vehicle Service, Wheel bearing end play check [P.27-33](#) <Rear>.

Q: Does the measured end play exceed the limit?

YES : Replace the faulty hub assembly. Then go to Step 5.

NO : Go to Step 5.

STEP 5. Recheck symptom.

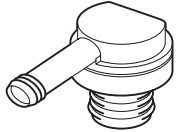
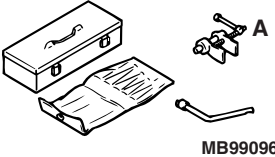
Q: Is the symptom eliminated?

YES : The procedure is complete.

NO : Start over at step 1. If a new symptom surfaces, refer to the symptom chart.

SPECIAL TOOLS

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Tool	Number	Name	Use
 <p>MB992146</p>	MB992146	Booster test adapter	Inspection using a simplified tester
 <p>MB990964</p>	MB990964 A: MB990520	Brake tool set A: Piston expander	Disk brake piston pushing back

ON-VEHICLE SERVICE

BRAKE PEDAL CHECK AND ADJUSTMENT

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⚠ CAUTION

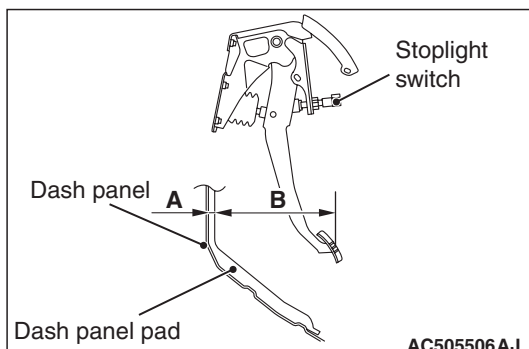
Do not apply grease or lubricant to the switch and the switch installation section to avoid malfunction of the switch. In addition, do not use gloves which have grease on them.

BRAKE PEDAL HEIGHT CHECK

1. Turn up the floor carpet under the brake pedal.
2. Remove the stoplight switch (Refer to P.35A-25).
3. Use a needle or similar tool to measure the dimension A in the figure (distance from the dash panel pad surface to the dash panel).
4. Measure the dimension B in the figure (distance from the pedal pad surface to the dash panel pad surface).
5. Make sure that the total of the dimensions A and B measured in Steps 2 and 3 (brake pedal height) is within the standard value.

Standard value (A+B): 219.8 –227.8 mm (8.7 –9.0 inch)

6. When the brake pedal height is not within the standard value, inspect the brake pedal in the following procedure.
 - (1) Remove the brake pedal assembly (Refer to P.35A-25).

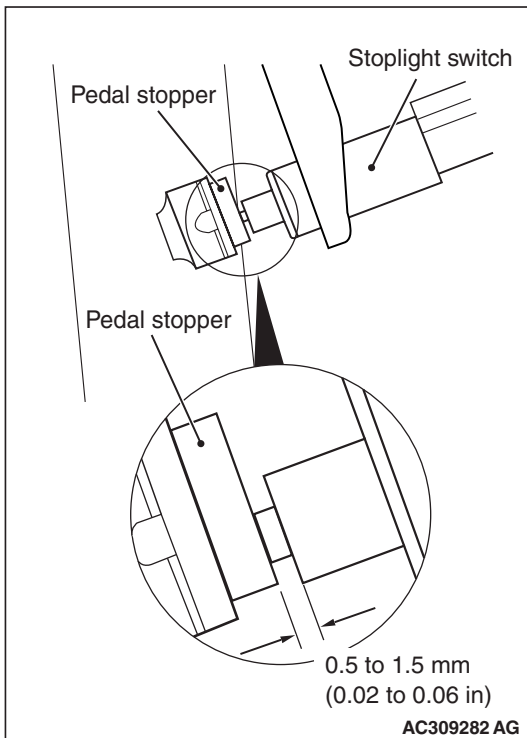
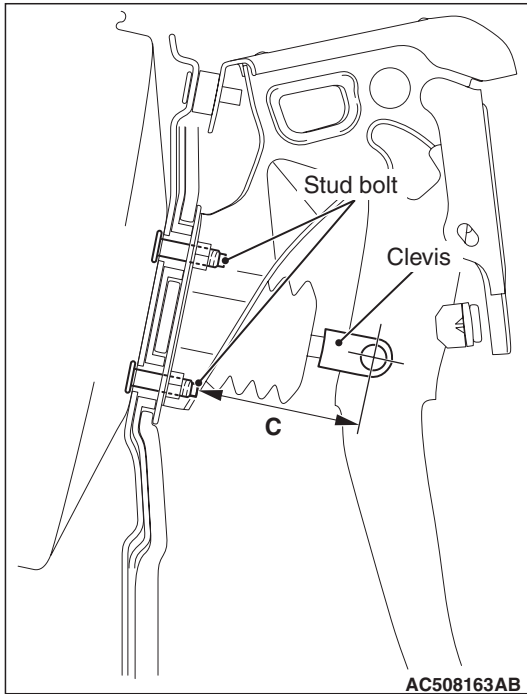


- (2) Check the removed brake pedal assembly for distortion, and replace it when deformed (Refer to [P.35A-26](#)).
- (3) Install the brake pedal assembly (Refer to [P.35A-25](#)).
- (4) Measure the brake pedal height again, and make sure that it is within the standard value (A+B).

When the measured value is not within the standard value, measure the dimension C in the figure (distance from the stud bolt end to the clevis hole center), and make sure it is within the standard value (C).

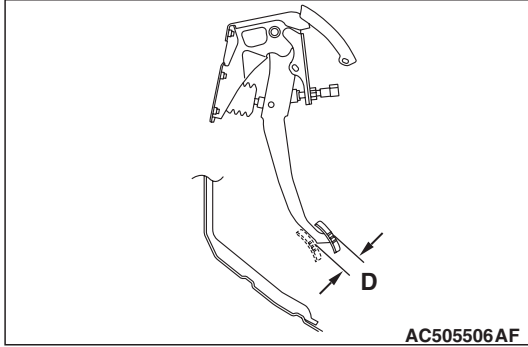
Standard value (C): 74 mm (2.91 inch)

- (5) When the measured value is not within the standard value (C), replace the brake booster (Refer to [P.35A-27](#)).



7. After checking the brake pedal height, install the stoplight switch in the following procedure:
 - (1) Screw in the stoplight switch until its thread contacts the pedal stopper, then turn the switch approximately one eighth of a clockwise turn to fix it. While doing this, pull and hold the brake pedal by hand.
 - (2) Check that the clearance between the stoplight switch and the pedal stopper is as shown in the figure.
 - (3) Connect the stoplight switch connector.

NOTE: Make sure that the stoplight is not illuminated when the brake pedal is not depressed.
8. Check the shift lock mechanism <TC-SST> (Refer to GROUP 22C –On-vehicle Service, Shift Lock Mechanism Check [P.22C-332](#)).
9. Recover the floor carpet under the brake pedal.



BRAKE PEDAL PLAY CHECK AND ADJUSTMENT

1. With the engine stopped, depress the brake pedal 2 or 3 times to release the vacuum in the brake booster. Then, press the brake pedal with your finger and check if the pedal stroke until the pedal becomes heavy (play) is within the standard value.

Standard value (B): 3 –8 mm (0.12 –0.31 inch)

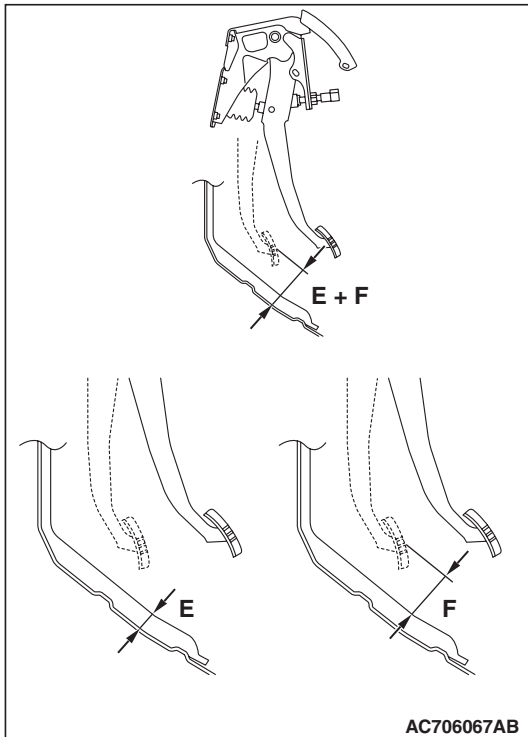
2. When the brake pedal play is not within the standard value, check the brake pedal-to-clevis pin looseness, clevis pin-to-booster operating rod looseness, brake pedal height, and stoplight switch position, and adjust or replace as necessary.

BRAKE PEDAL-TO-FLOOR PANEL CLEARANCE CHECK AND ADJUSTMENT

1. Turn up the floor carpet or other similar material under the brake pedal.
2. Using a needle or similar tools, measure the dimension E shown in the figure (from the dash panel pad surface to the dash panel).
3. Start the engine, and depress the brake pedal with approximately 500 N. Then, measure the dimension F shown in the figure (from the center of pedal pad surface to the dash panel pad surface).
4. Check that the sum of the dimensions E and F measured in Steps 2 and 3 (clearance between the brake pedal and the floor panel) is within the standard value.

Standard value (E+F): 85 mm (3.35 inch)

5. If the clearance between the brake pedal and the floor panel is not within the standard value, check for the air intrusion in brake line and the thickness of disk brake pad. Make corrections or replace components as necessary.
6. Recover the floor carpet or other similar material under the brake pedal.



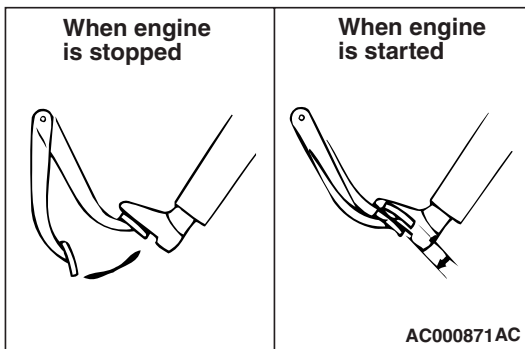
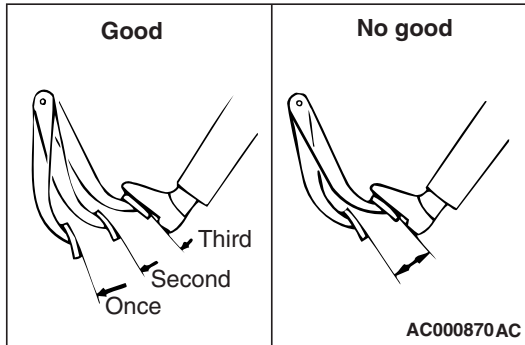
BRAKE BOOSTER OPERATION CHECK

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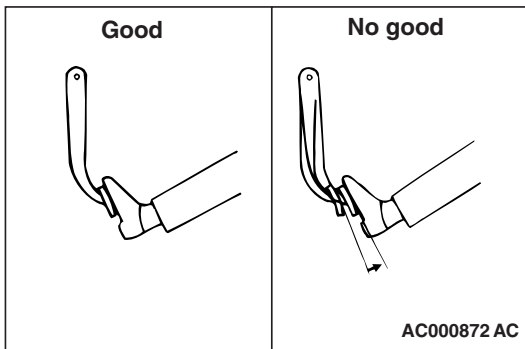
INSPECTION WITHOUT USING TESTER

1. Carry out the simplified brake booster operation check in the following procedure:

- (1) Run the engine for 1 to 2 minutes, and then stop.
Depress the brake pedal with normal depression force.
The result is judged as "Good" when the pedal stroke is great at the first depression, and becomes smaller as you repeat depressing the pedal. If the pedal stroke does not change, the result is judged as "No Good."



- (2) With the engine stopped, depress the brake pedal several times. Keep the brake pedal depressed and start the engine. At this time, when the pedal moves down slightly, the result is judged as "Good." The result is judged as "No Good" if the pedal does not move down.



- (3) With the engine running, depress the brake pedal. Stop the engine in this condition. The result is judged as "Good" when the pedal height does not change for approximately 30 seconds. The result is judged as "No Good" if the pedal moves up.

2. The brake booster is judged as normal when the results of all the above checks are "Good."
When one or more of the above check results are "No Good," then the check valve, vacuum hose, or brake booster is suspected faulty.

CHECK VALVE OPERATION CHECK

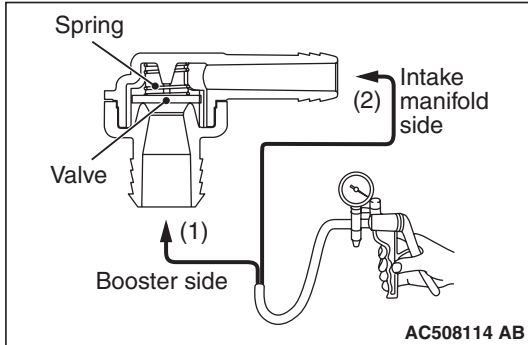
M1351009000815

1. Remove the check valve (Refer to P.35A-27).

CAUTION

Replace the check valve when it is faulty.

2. Using a vacuum pump, check operation of the check valve.



Vacuum pump connection	Normal condition
When connected to the booster side (1)	Vacuum is generated and maintained.
When connected to the engine side (2)	No vacuum is generated.

BLEEDING

M1351001401027

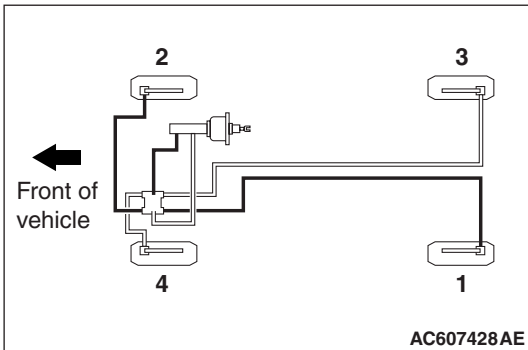
CAUTION

Be sure to use the specified brand and type of brake fluid. Avoid mixing with other type of brake fluid.

Brake fluid: DOT3 or DOT4

BLEEDING OF BRAKE PIPELINE

Perform the bleeding in the order shown in the figure.

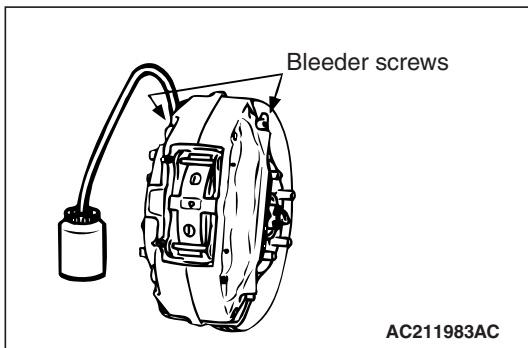


DISK BRAKE BLEEDING

CAUTION

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe it off quickly.

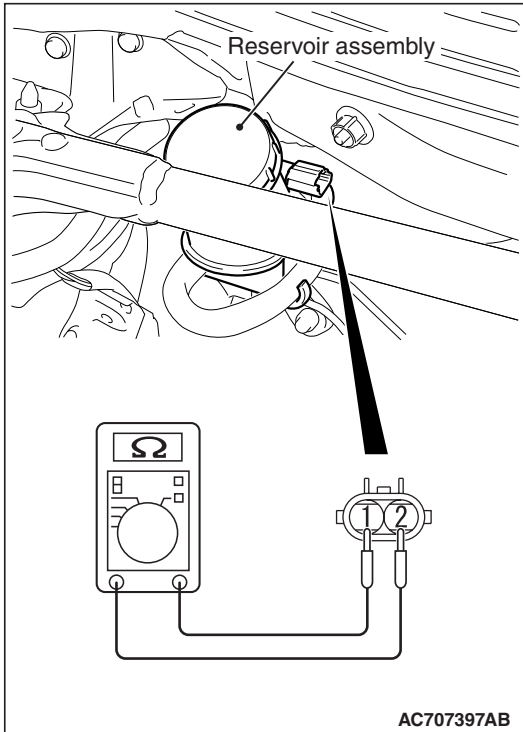
Connect a vinyl tube to the outer end of the air bleeder screws to bleed the circuit of air. Then, connect the vinyl tube to the inner end and bleed the circuit of air. Except for these, the conventional procedures shall be followed. After the circuit has been bled of air, tighten both air bleeder screws securely.



BRAKE FLUID LEVEL SWITCH CHECK

M1351009100801

The brake fluid level switch is normal when the following conditions are met: When the brake fluid level is above "MIN," continuity is detected; and when the level is below "MIN," no continuity is detected.



BRAKE PAD CHECK

M1351017300048

⚠ CAUTION

If there is a significant difference in the thicknesses of the pads on the left and right sides, check moving parts (Refer to [P.35A-21](#)).

1. Visually check the thickness of brake pad from the inspection hole of the caliper body.

Standard value:

9.85 mm (0.39 inch) <Front>

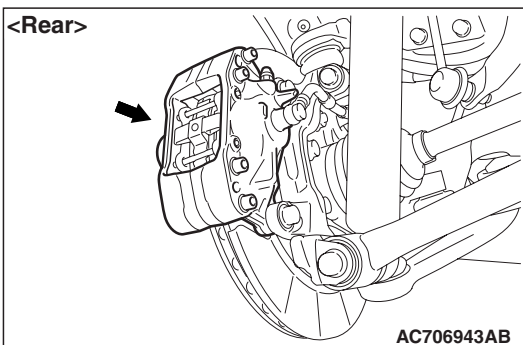
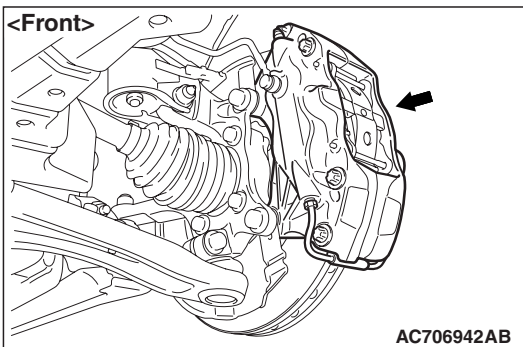
9.0 mm (0.35 inch) <Rear>

Limit:

2.0 mm (0.08 inch) <Front>

2.0 mm (0.08 inch) <Rear>

2. When the thickness is lower than the limit value, replace both brake pads (right and left) as a set (Refer to [P.35A-18](#)).



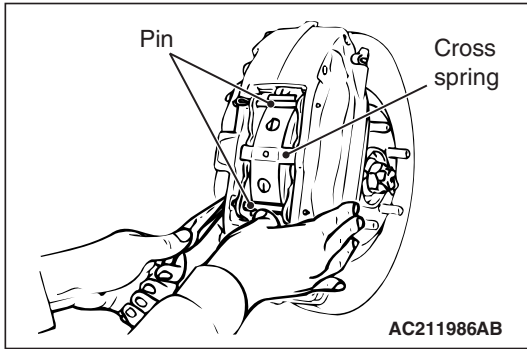
BRAKE PAD REPLACEMENT

M1351017400056

⚠ CAUTION

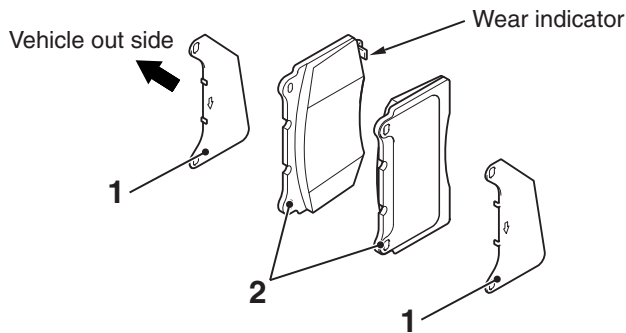
- Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe it off quickly.
- Whenever a pad must be replaced, replace both LH and RH wheel pads as a set to prevent the vehicle from pulling to one side when braking.

1. While pressing the cross spring by hand, remove the pin from the brake caliper assembly.
2. Remove the cross spring from the brake caliper assembly.

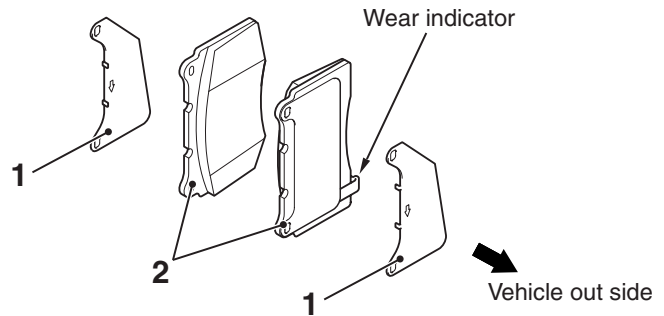


<Front disc brake>

<Right side>

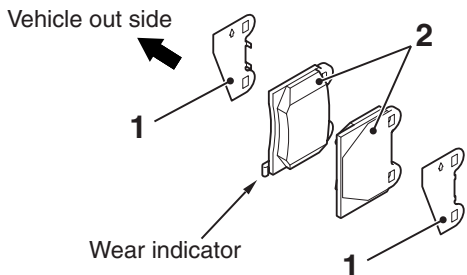


<Left side>

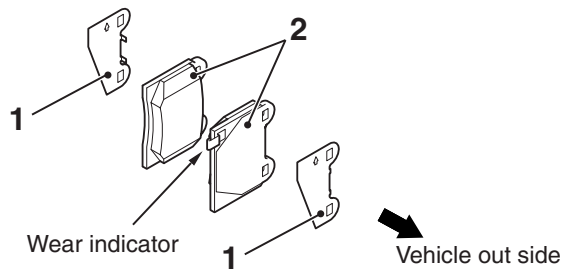


<Rear disc brake>

<Right side>



<Left side>



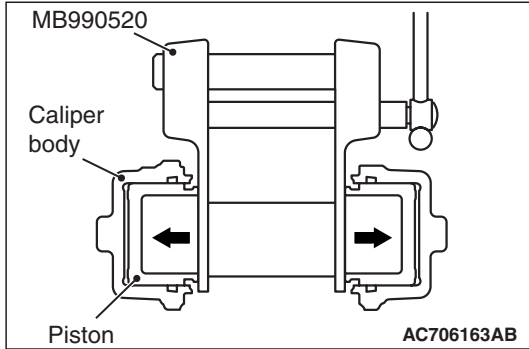
AC710737 AB

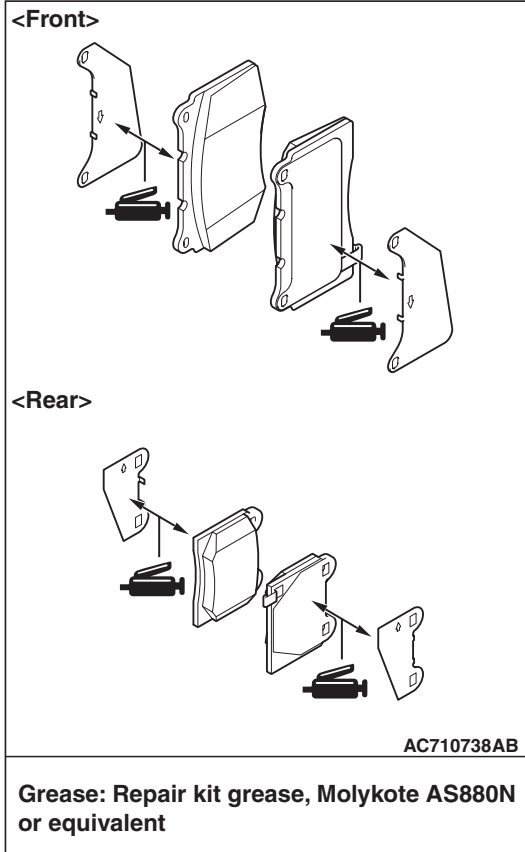
3. Remove the following parts from the brake caliper assembly.
 - (1) Shim
 - (2) Brake pad assembly

⚠ CAUTION

Keep grease or other soiling off the pad and brake disk friction surfaces.

4. Clean the piston, then press the piston into the cylinder using the piston expander (Special tool: MB990520).





5. Apply grease to the pad as shown in the figure.

Grease:

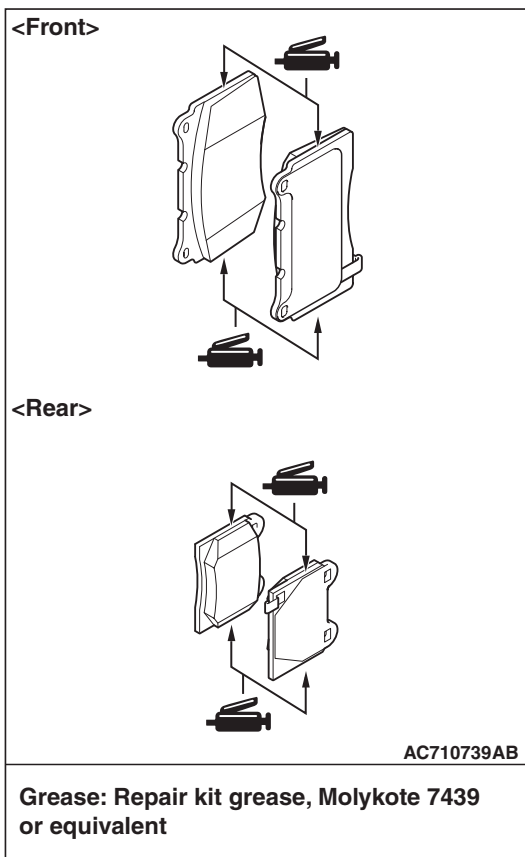
Between pad and shim: Repair kit grease, Molykote AS880N or equivalent

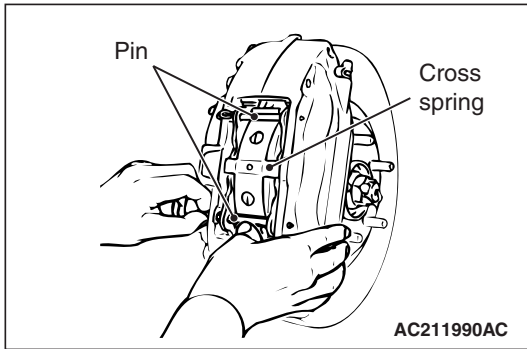
Shoulder section: Repair kit grease, Molykote 7439 or equivalent

6. Install the shim to the brake pad assembly. Then, install the brake pad assembly to the brake caliper assembly so that the direction of shim arrow points to the same direction as the brake disk rotation direction of when the vehicle travels forward.

NOTE: Install the brake pad assembly (with wear indicator) to outside the vehicle.

7. Install the cross spring to the brake caliper assembly.





8. While pressing the cross spring by hand, install the pin to the brake caliper assembly.

DISK BRAKE ROTOR CHECK

M1351002900710

⚠ CAUTION

Disk brakes must be kept within the allowable service values in order to maintain normal brake operation.

Before turning the brake disk, 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 long period of time, sections of the disks that are not in contact with the pads will become rusty, causing noise and shuddering. • If grooves and scratches resulting from excessive disk wear are not removed prior to installing a new pad assembly, there will be inadequate contact between the disk and the lining (pad) until the pads conform to the disk.
Run-out	Excessive run-out of the disks will increase the pedal depression resistance due to piston kick-back.
Change in thickness (parallelism)	If the thickness of the disk changes, this will cause pedal pulsation, shuddering and surging.
Inset or warping (flatness)	Overheating and improper handling while servicing will cause warping or distortion.

BRAKE DISK THICKNESS CHECK

1. Using a micrometer, measure disk thickness at eight positions, approximately 45 degrees apart and 10 mm (0.4 inch) in from the outer edge of the disk.

Standard value:

32.0 mm (1.26 inch) <Front>

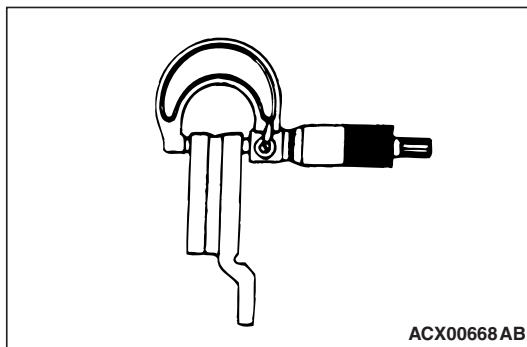
22.0 mm (0.87 inch) <Rear>

Limit:

30.0 mm (1.18 inch) <Front>

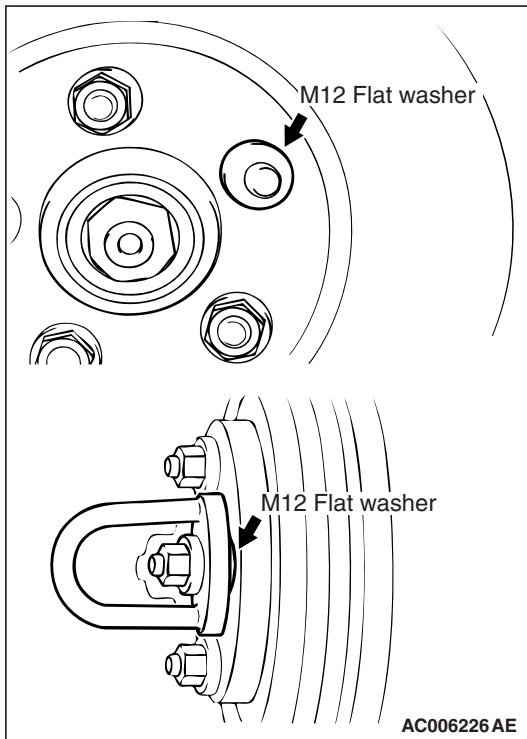
20.0 mm (0.79 inch) <Rear>

NOTE: Thickness variation (at least 8 positions) should not be more than 0.015 mm (0.0006 inch).



⚠ CAUTION

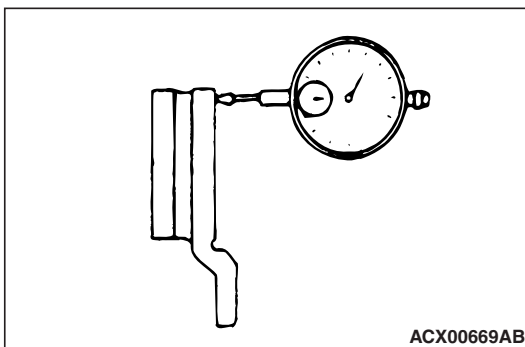
- After a new brake disk is installed, always grind the brake disk with on-the-car type brake lathe. If this step is not carried out, the brake disk run-out exceeds the specified value, resulting in judder.
 - When the on-the-car type brake lathe is used, first install M12 flat washer on the stud bolt in the brake disk side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disk rotor may be deformed, resulting in inaccurate grinding.
 - Grind the brake disk with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m (74 ft-lb). When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disk rotor or drum may be deformed, resulting in judder.
2. If the disk 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 disk.

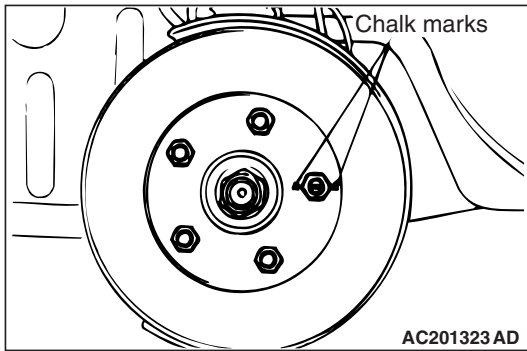
**FRONT BRAKE DISK RUN-OUT CHECK AND CORRECTION**

1. Remove the brake assembly, and then hold it with wire.
2. Temporarily install the disk with the hub nut.
3. Place a dial gauge approximately 5 mm (0.2 inch) from the outer circumference of the brake disk, and measure the run-out of the disk.

Limit:**0.06 mm (0.0024 inch) <Front>****0.08 mm (0.0032 inch) <Rear>**

4. When the brake disk runout exceeds the limit value, correct the brake disk runout according to the following procedure.

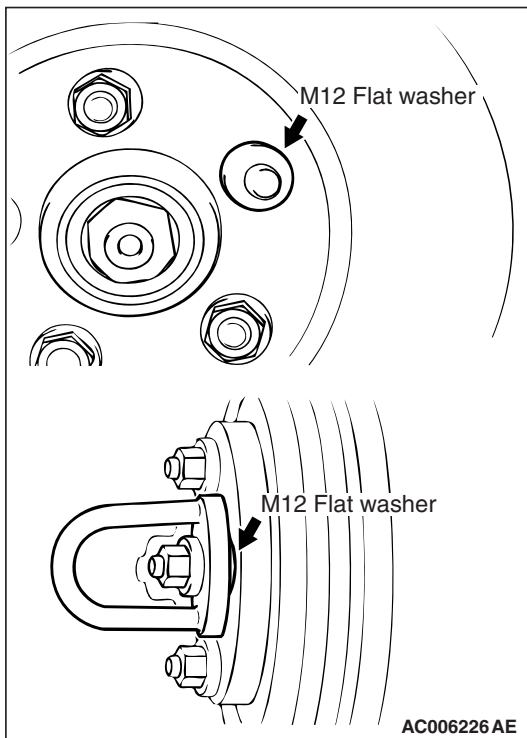


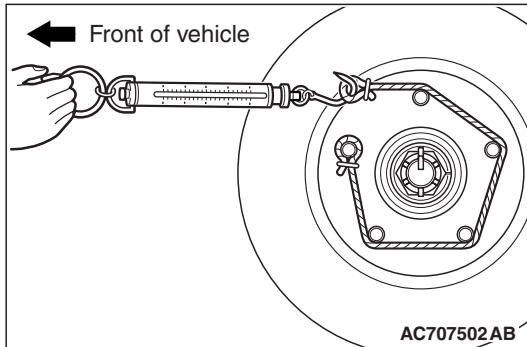


- (1) Before removing the brake disk, make marks using a chalk to the stud bolt on the side with the greater runout and to both sides of the stud bolt.
- (2) Check the wheel bearing axial looseness. (Refer to GROUP 26 –On-vehicle Service, Wheel Bearing End Play Check P.26-7 <Front> or GROUP 27 –On-vehicle Service, Wheel Bearing End Play Check P.27-33 <Rear>.)
- (3) When the looseness is within the limit value, install the brake disk after changing the phase between the hub and the brake disk, then check the runout of the brake disk again.

CAUTION

- After a new brake disk is installed, always grind the brake disk with on-the-car type brake lathe. If this step is not carried out, the brake disk 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 disk side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disk rotor may be deformed, resulting in inaccurate grinding.
 - Grind the brake disk with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m (74 ft-lb). When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disk rotor or drum may be deformed, resulting in judder.
5. If the run-out cannot be corrected by changing the phase of the brake disk, replace the brake disk or grind it with the on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent).





M1351017200052

BRAKE DRAG FORCE CHECK

1. Remove the brake pad, shim, and clip. (Refer to [P.35A-18.](#))
2. Using a spring scale, and with the brake pad, shim, and clip removed, measure the hub sliding torque in the forward direction.
3. Install the brake pad, shim, and clip. (Refer to [P.35A-18.](#))
4. Start the engine, and depress the brake pedal forcibly two or three times. Then, stop the engine.
5. Rotate the brake disk 10 times in the forward direction.
6. Using a spring scale, and with the brake pad, shim, and clip installed, measure the hub sliding torque in the forward direction.
7. Obtain the disk brake drag force (difference between measured values of Step 2 and Step 6).

Standard value:**68 N (15.3 pounds) or less <Front>****68 N (15.3 pounds) or less <Rear>**

8. If the brake drag force exceeds the standard value, disassemble the brake caliper assembly, and check the fouling/rust on the piston sliding section, piston seal deterioration, and the sliding status of guide pin and lock pin. (Refer to [P.35A-35](#) <Front> or [P.35A-40](#) <Rear>.)

BRAKE PEDAL

REMOVAL AND INSTALLATION

M1351003401131

CAUTION

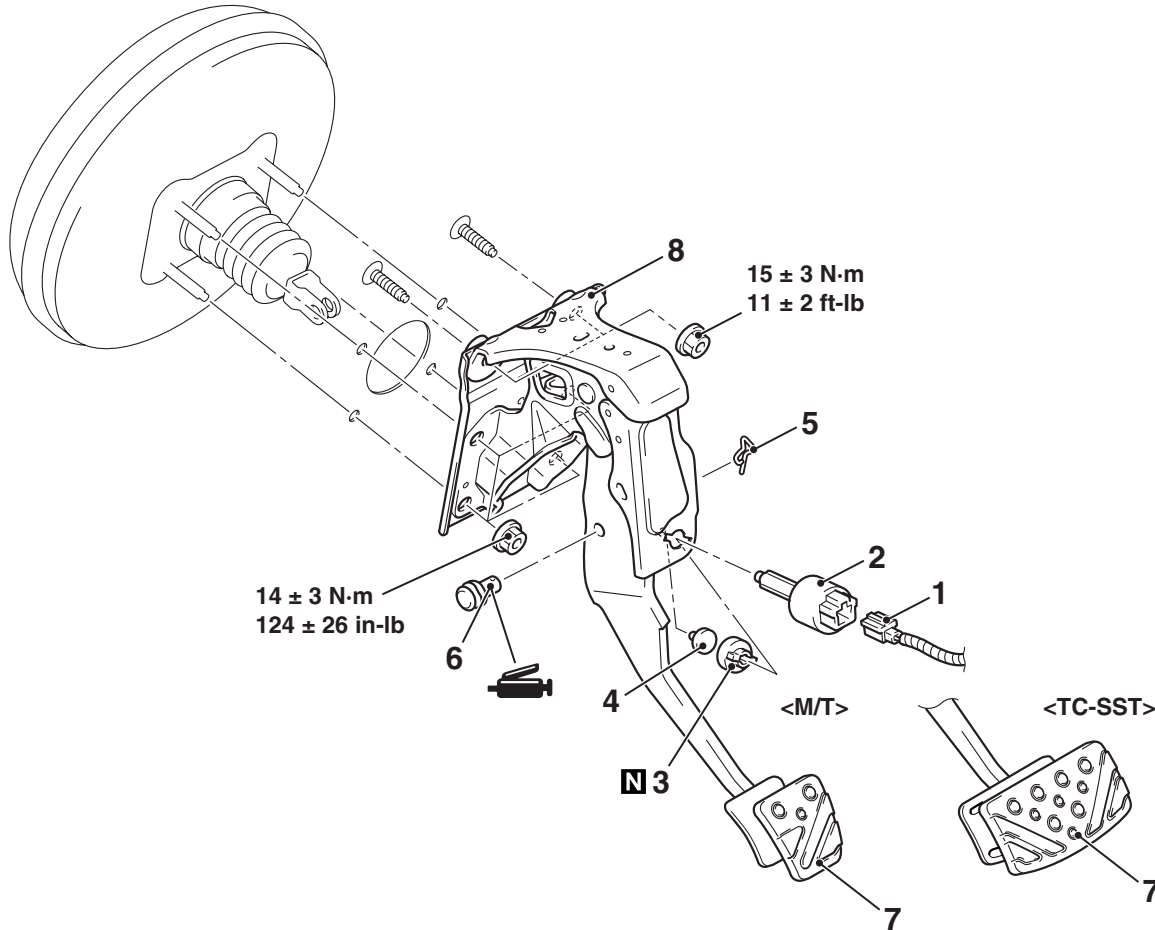
Do not apply grease or lubricant to the switch and the switch installation section to avoid malfunction of the switch. In addition, do not use gloves which have grease on them.

Pre-removal operation

Instrument Panel Cover Lower Removal (Refer to GROUP 52A –Instrument Lower Panel P.52A-8) <MR>.

Post-installation operation

Instrument Panel Cover Lower Installation (Refer to GROUP 52A –Instrument Lower Panel P.52A-8) <MR>.



AC709280AB

Removal steps

1. Stoplight switch connector connection
2. Stoplight switch
3. Pedal clip
4. Pedal stopper

Removal steps (Continued)

5. Snap pin
6. Pin assembly
7. Pedal pad
8. Brake pedal assembly

INSPECTION

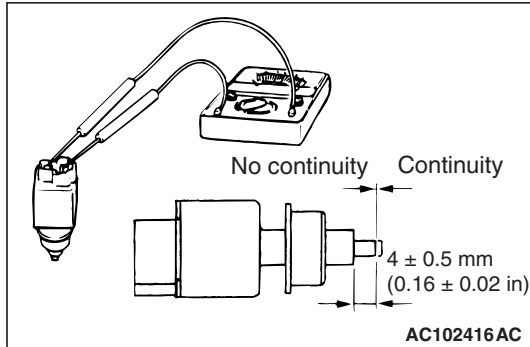
STOPLIGHT SWITCH CHECK

M1351008900398

CAUTION

Do not apply grease or lubricant to the switch and the switch installation section to avoid malfunction of the switch. In addition, do not use gloves which have grease on them.

1. Connect a circuit tester (Orange) to the stoplight switch connector.
2. When no continuity is detected with the plunger pressed from the edge of the outer case by the dimension shown in the figure and when continuity is detected with the plunger released, the stoplight switch is in good condition.



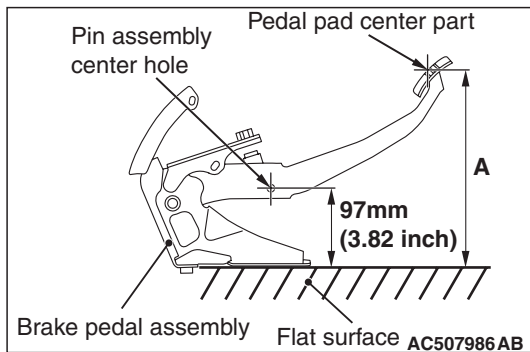
BRAKE PEDAL DISTORTION CHECK

M1351016300197

1. Place the brake pedal assembly on a level surface as shown in the figure, and set the distance from the center of the pin assembly mounting hole to the level surface to 97 mm (3.82 inch). Make sure that the dimension A in the figure (distance from the pedal pad center part to the level surface) is within the standard value.

Standard value (A):**240 –246 mm (9.4 –9.7) <M/T>****242 –248 mm (9.5 –9.8) <TC-SST>**

2. When dimension A is not within the standard value, replace the brake pedal assembly.



MASTER CYLINDER ASSEMBLY AND BRAKE BOOSTER ASSEMBLY

REMOVAL AND INSTALLATION

M1351003701499

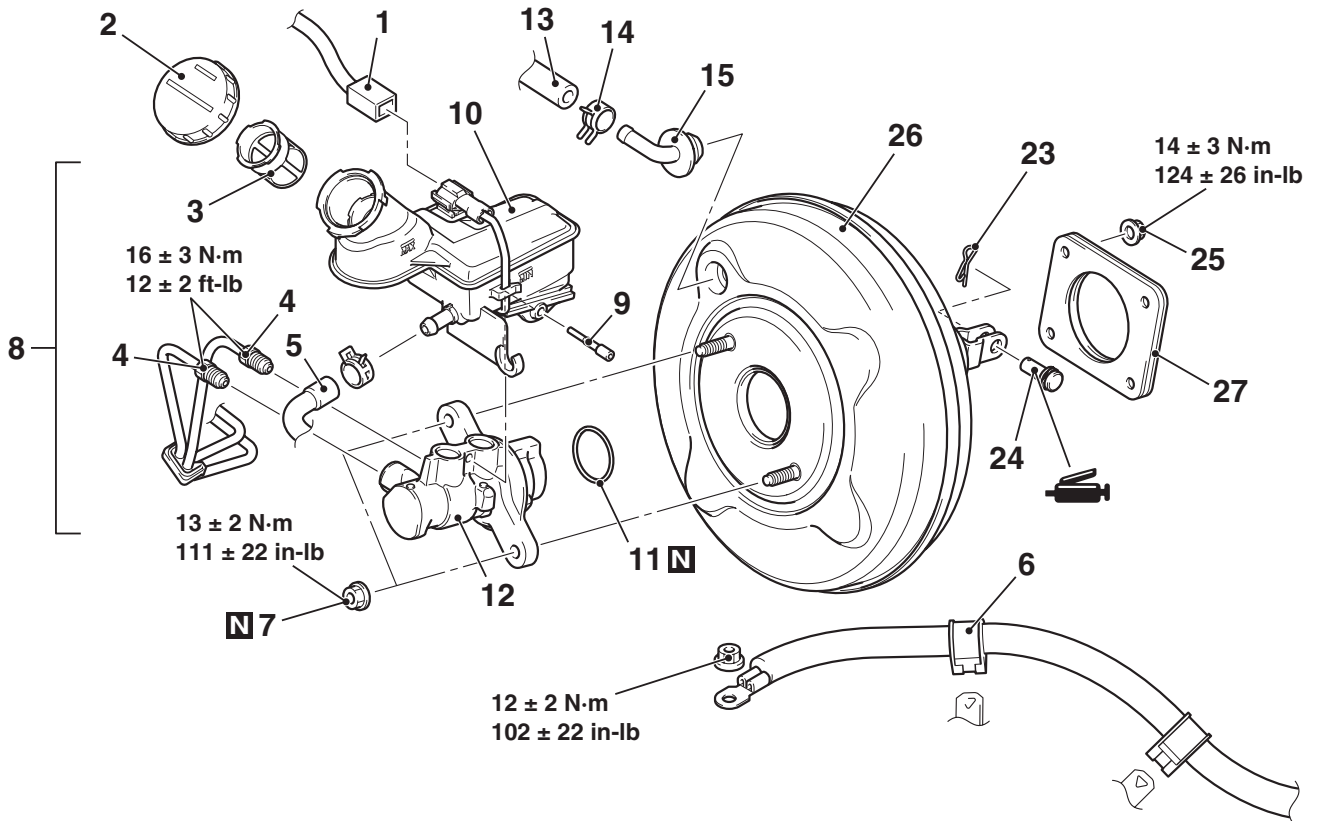
<MASTER CYLINDER AND BRAKE BOOSTER>

Pre-removal operation

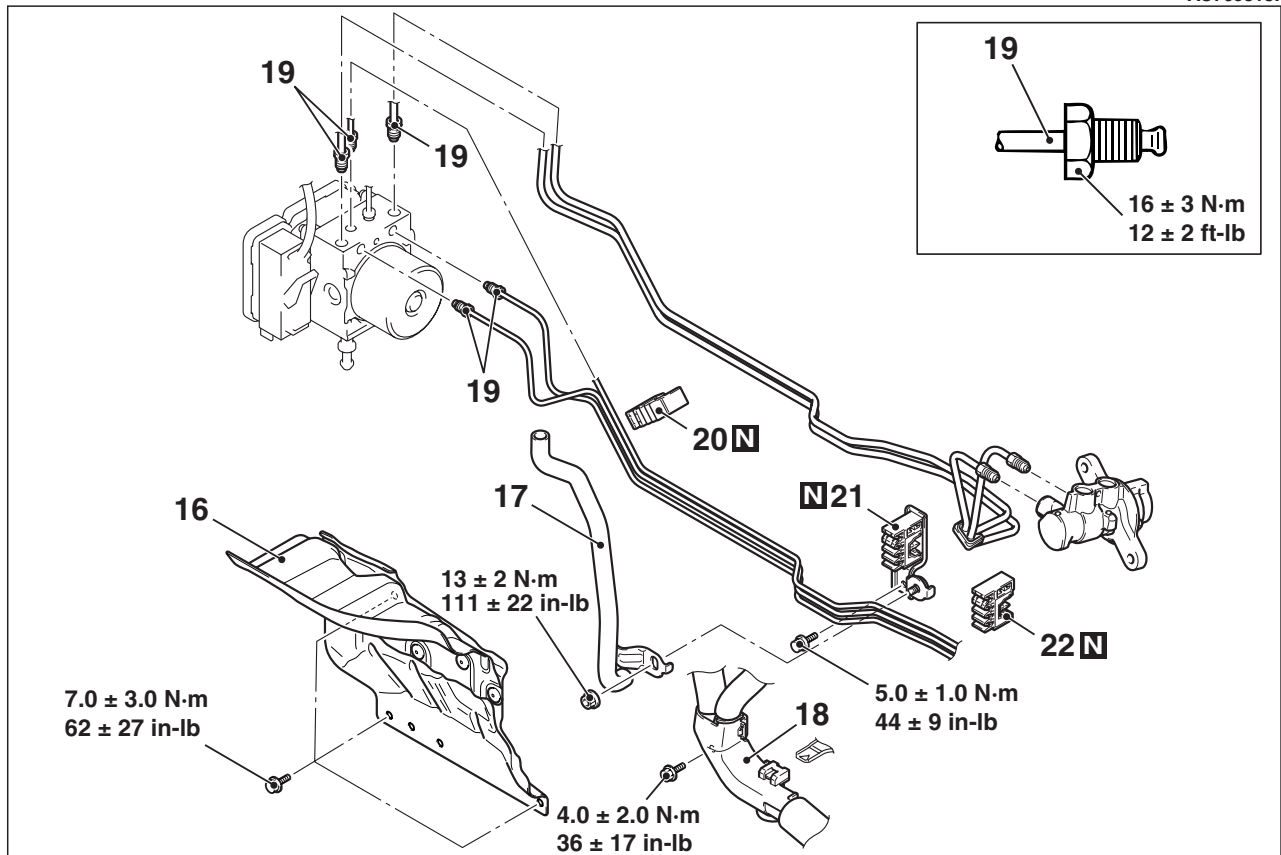
- Brake Fluid Draining
- Strut Tower Bar Removal (Refer to GROUP 42, Strut tower bar [P.42A-15](#)).
- Wiring Joint Removal (Refer to GROUP 54A, Battery [P.54A-10](#)).
- Solenoid Valve Assembly Removal (Refer to GROUP 54A, Battery [P.54A-10](#)).

Post-installation operation

- Solenoid Valve Assembly Installation (Refer to GROUP 54A, Battery [P.54A-10](#)).
- Wiring Joint Installation (Refer to GROUP 54A, Battery [P.54A-10](#)).
- Strut Tower Bar Installation (Refer to GROUP 42, Strut tower bar [P.42A-15](#)).
- Brake Fluid Refilling and Air Bleeding (Refer to [P.35A-16](#)).



AC709313AB



Master cylinder removal steps

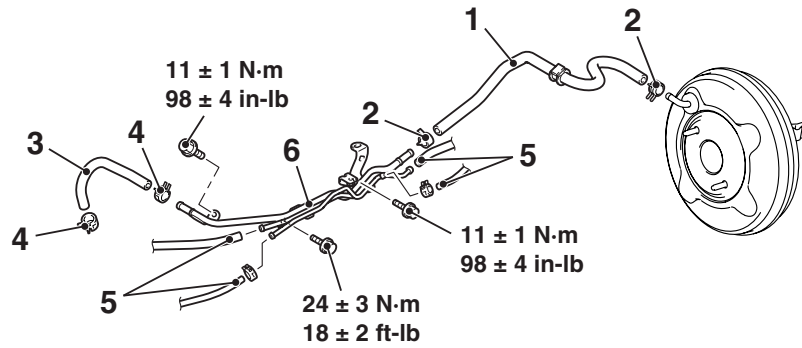
1. Brake fluid level switch connector connection
2. Reservoir cap

Master cylinder removal steps

3. Brake fluid reservoir filter
4. Brake pipe connection

- >>B<<** • **Master cylinder removal steps**
 - 5. Reservoir hose connection <M/T>
 - 6. Battery harness clip connection
 - 7. Self locking nut
 - 8. Reservoir assembly and master cylinder assembly
 - 9. Torx bolt
 - 10. Reservoir assembly
 - 11. O-ring
 - 12. Master cylinder assembly
- **Brake booster removal steps**
 - Air cleaner assembly (Refer to GROUP 15 –Air Cleaner [P.15-10.](#))
 - Cowl top panel (Refer to GROUP 42A, Loose panel [P.42A-192.](#))
 - 1. Brake fluid level switch connector connection
 - 4. Brake pipe connection
- >>B<<** • Master cylinder assembly air bleeding (Only at installation)
 - 5. Reservoir hose connection <M/T>
 - 6. Battery harness clip connection
 - 7. Self locking nut
 - 8. Reservoir assembly and master cylinder assembly
- >>A<<** 13. Vacuum hose connection
 - 14. Hose clip
 - 15. Check valve
 - 16. Dash panel heat protector
 - 17. Dash panel drain hose
 - 18. Chassis FR harness connection
 - 19. Brake pipe connection
 - 20. Clip
 - 21. Clip
 - 22. Clip
 - 23. Snap pin
 - 24. Pin assembly
 - 25. Brake booster mounting nut
 - 26. Brake booster assembly
 - 27. Seal and spacer assembly

<VACUUM HOSE AND VACUUM PIPE>



AC709314AB

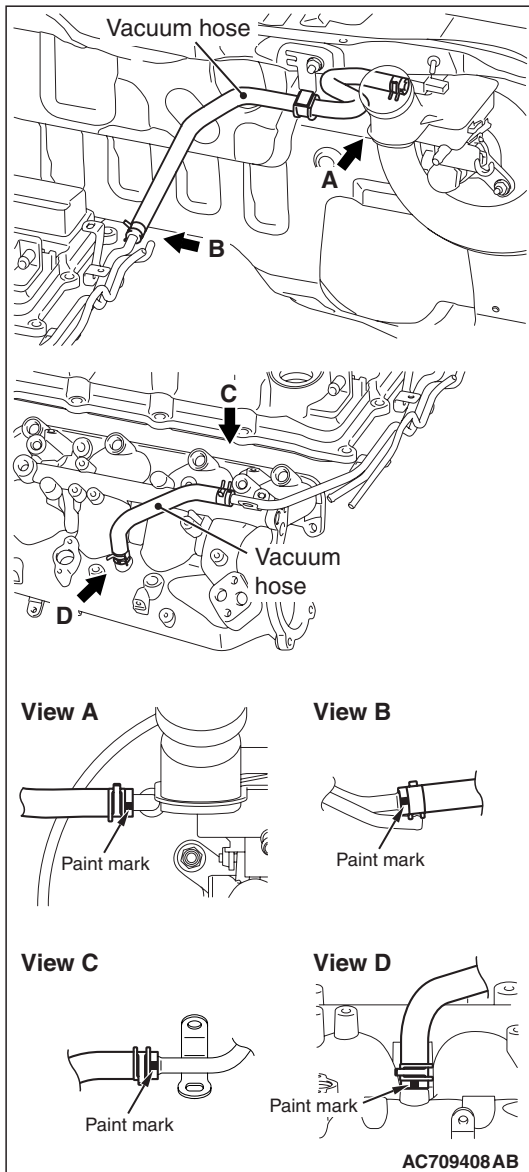
- Removal steps**
- >>A<< 1. Vacuum hose
 2. Hose clip
- >>A<< 3. Vacuum hose
 4. Hose clip
 • Engine Upper Cover (Refer to GROUP 16, Ignition coil P.16-39.)

- Removal steps (Continued)**
5. Emission vacuum hose connection
 • Fuel injector return pipe (Refer to GROUP 13A –Injector P.13A-914.)
 6. Vacuum pipe assembly

INSTALLATION SERVICE POINTS

>>A<< VACUUM HOSE INSTALLATION

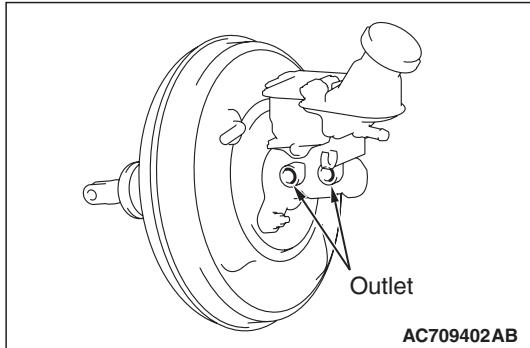
Align the mark as shown in the figure to assemble the vacuum hose.



>>B<< MASTER CYLINDER ASSEMBLY AIR BLEEDING

When removed the master cylinder assembly, bleed the master cylinder in the following procedure to make bleeding of the brake pipeline easier. (When no brake fluid is in the master cylinder)

1. Fill the brake fluid reservoir with the brake fluid.
2. Depress and hold the brake pedal.
3. Another operator closes the master cylinder outlets with his fingers.
4. In this condition, release the brake pedal.
5. Repeat Steps 2 to 4 for 3 or 4 times to fill the master cylinder with the brake fluid.



FRONT DISC BRAKE ASSEMBLY

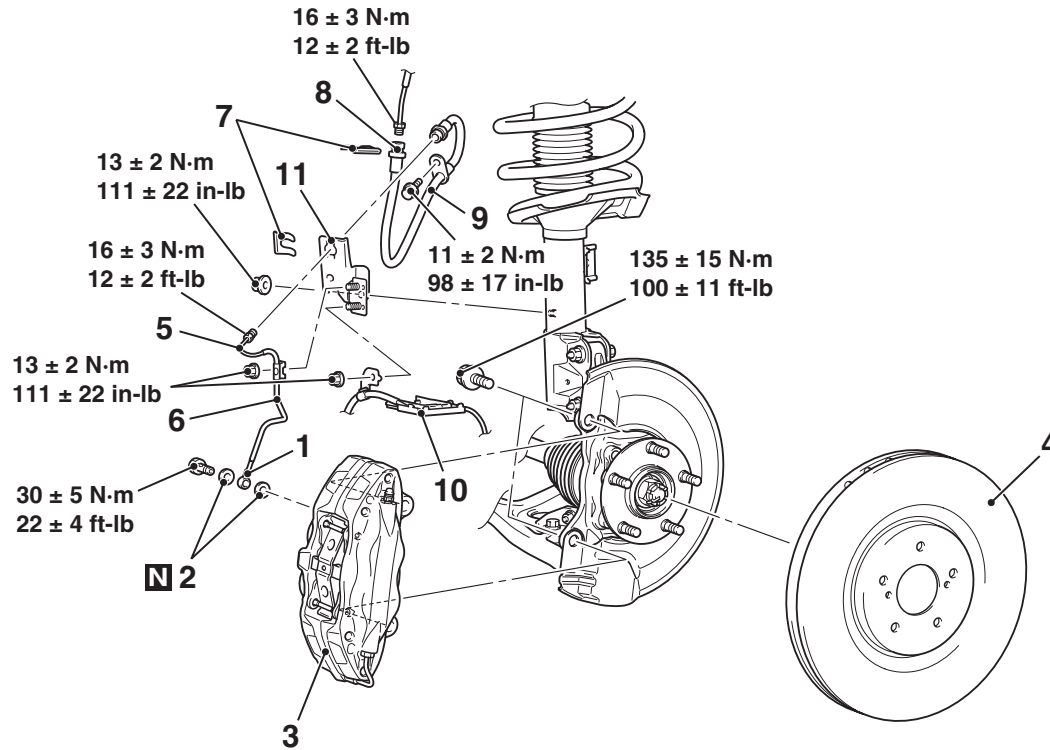
REMOVAL AND INSTALLATION

M1351006001176

CAUTION

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe it off quickly.

<p>Pre-removal Operation Brake Fluid Draining</p>	<p>Post-installation Operation</p> <ul style="list-style-type: none"> • Brake Fluid Supplying and Air Bleeding (Refer to P.35A-16). • Brake Disk Runout Inspection/Correction (Refer to P.35A-21.)
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AC706937AB

Removal steps

1. Brake pipe (brake caliper side) connection
2. Gasket
3. Front brake caliper assembly
4. Front brake disk
5. Brake pipe (brake hose) connection
6. Brake pipe

Removal steps (Continued)

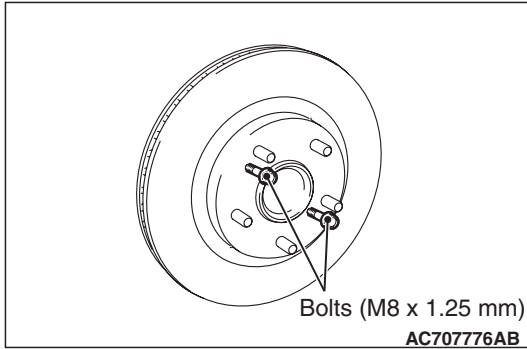
7. Clip
8. Brake hose (brake pipe side) connection
9. Brake hose
10. Front wheel speed sensor wiring harness clip
11. Brake hose bracket

<<A>>

REMOVAL SERVICE POINT

<<A>> FRONT BRAKE DISK REMOVAL

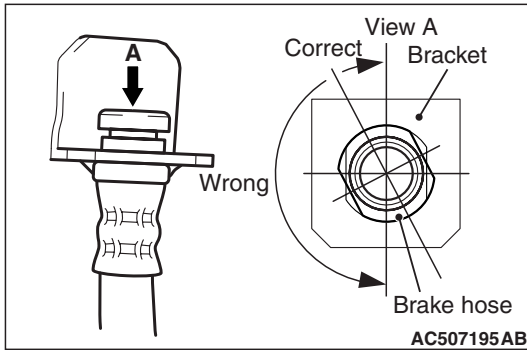
If the front brake disk removal is difficult, install bolts (M8 x 1.25 mm) shown in the figure, and tighten them evenly and gradually to remove the front brake disk.



INSTALLATION SERVICE POINT

>>A<< BRAKE HOSE INSTALLATION

1. Pass the brake hose through the hole in the body-side bracket.
2. Install the brake hose to the brake caliper.
3. Install the brake hose at the two fixing points.
4. Twist the brake hose toward the lesser torsion between the brake hose and body-side bracket as shown in the figure, and fix it to the body-side bracket with a clip.



INSPECTION

M1351006100460

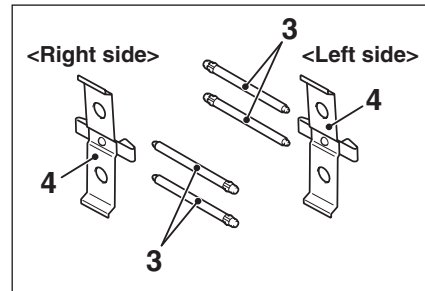
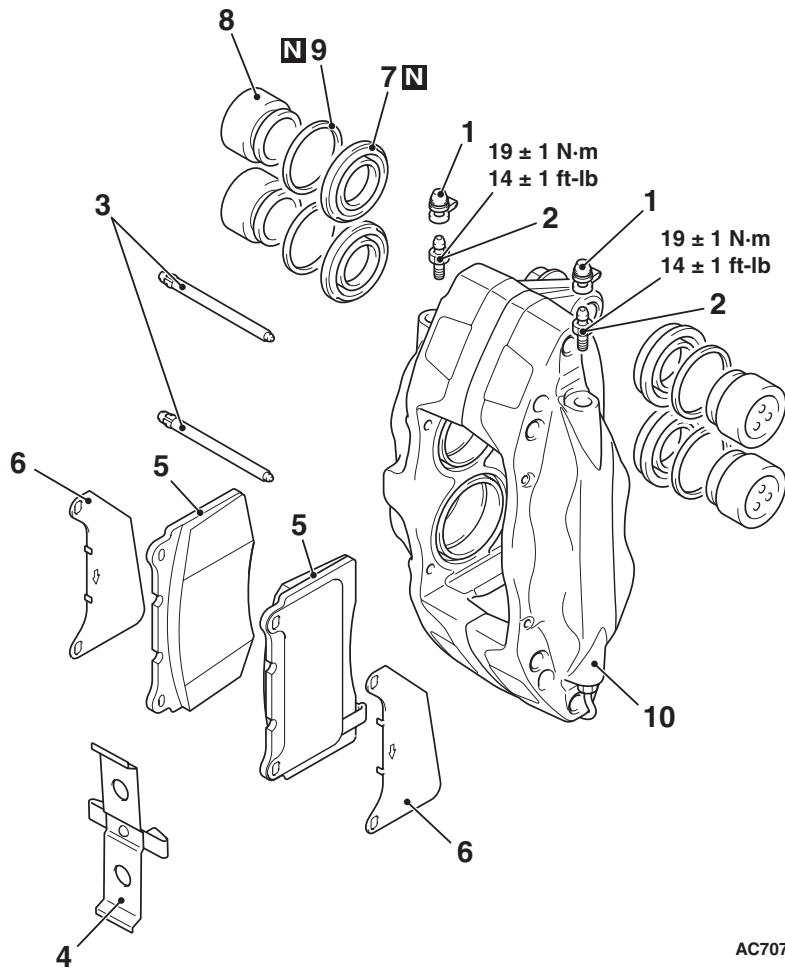
BRAKE DISC CHECK

- Disc wear (Refer to [P.35A-21](#)).
- Disc run-out (Refer to [P.35A-21](#)).

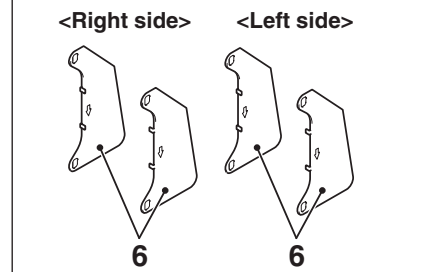
DISASSEMBLY AND ASSEMBLY

CAUTION

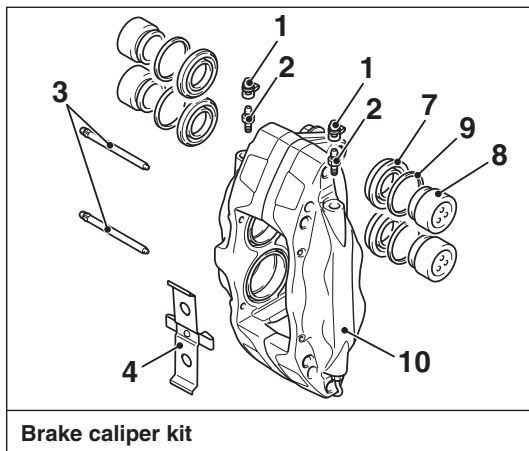
Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe it off quickly.



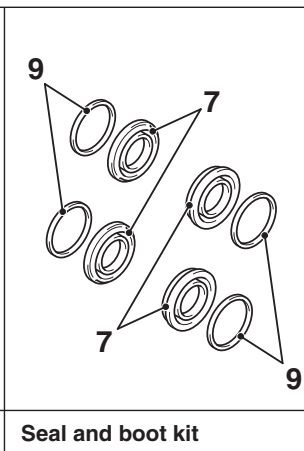
Clip set



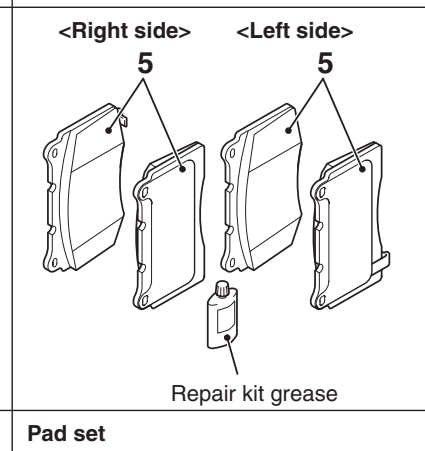
Shim kit



Brake caliper kit



Seal and boot kit



Pad set

Disassembly steps

1. Bleeder cap
2. Bleeder
3. Pin
4. Cross spring
5. Brake pad assembly
6. Shim
7. Piston boot

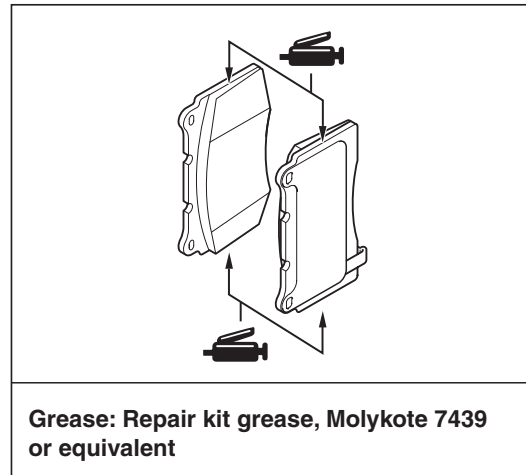
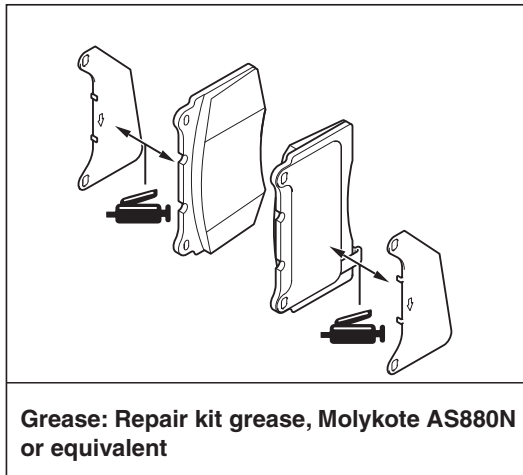
Disassembly steps (Continued)

8. Piston
9. Piston seal
10. Caliper body

NOTE: Install the brake pad assembly (with wear indicator) to outside the vehicle.

<<A>>

LUBRICATION POINTS



AC707832AB

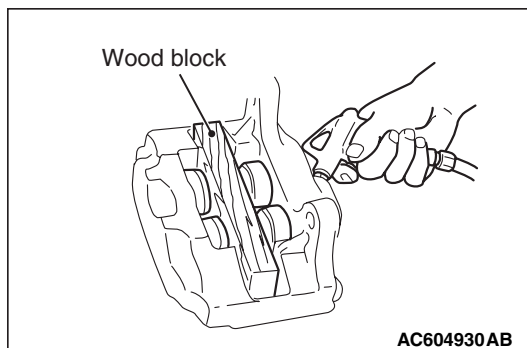
DISASSEMBLY SERVICE POINTS

<<A>> PISTON BOOT/PISTON REMOVAL

⚠ CAUTION

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

Remove the pistons by pumping in air slowly from the brake hose connection. Be sure to use a wood block and adjust the height of the four pistons so that the pistons protrude evenly.



<> PISTON SEAL REMOVAL

⚠ CAUTION

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

1. Remove the piston seal with finger tip.
2. Clean the piston surface and cylinder inner face with alcohol or specified brake fluid.

Brake fluid: DOT3 or DOT4

INSPECTION

M1351006300680

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

BRAKE PAD WEAR CHECK

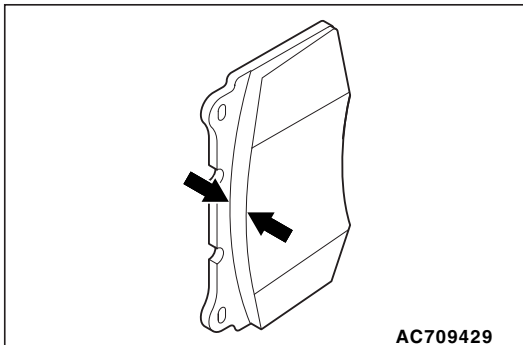
⚠ WARNING

- *Always replace both brake pads on each wheel as a set (both front wheels or both rear wheels). Failure to do so will result in uneven braking, which may cause unreliable brake operation.*
- *If there is significant difference in the thickness of the pads on the left and right sides, check the moving parts.*

Measure thickness at the thinnest, most worn area of the pad. Replace the pad assembly if pad thickness is less than the limit value.

Standard value: 9.85 mm (0.39 inch)

Limit: 2.0 mm (0.08 inch)



REAR DISC BRAKE ASSEMBLY

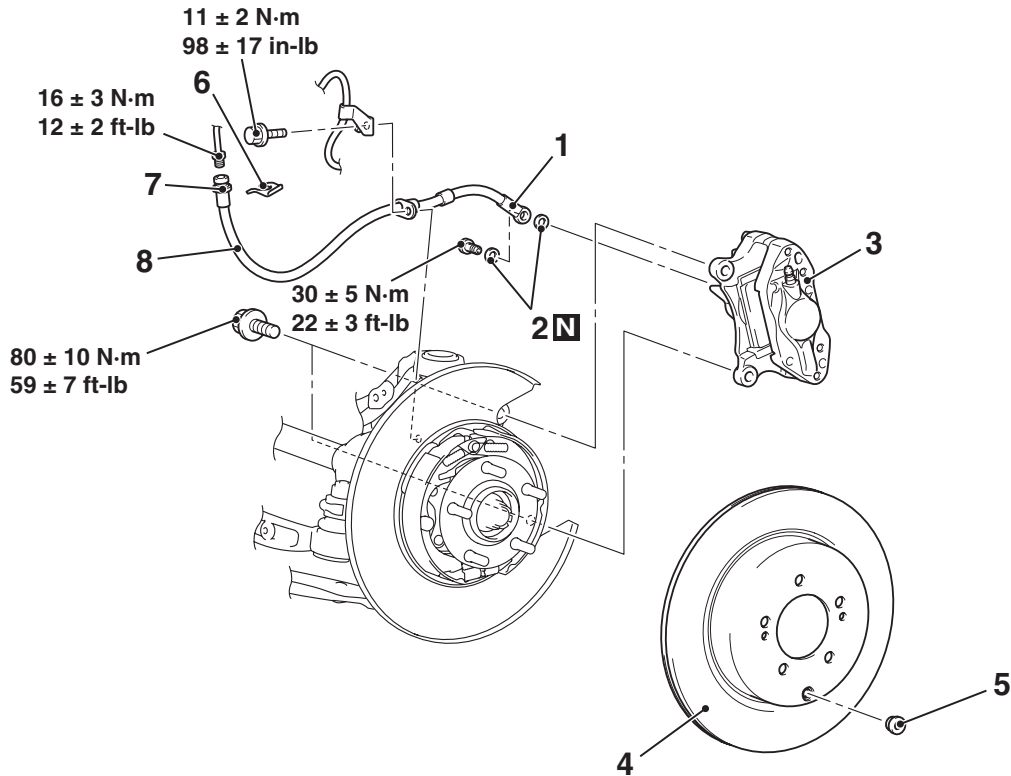
REMOVAL AND INSTALLATION

M1351007000790

CAUTION

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe it off quickly.

<p>Pre-removal Operation Brake Fluid Draining</p>	<p>Post-installation Operation</p> <ul style="list-style-type: none"> • Brake Fluid Supplying and Air Bleeding (Refer to P.35A-16). • Brake Disk Runout Inspection/Correction (Refer to P.35A-21.) • Lining Running-in (Refer to GROUP 36 –Parking Brake Lining Seating Procedure P.36-12.)
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AC707657AB

Removal steps

1. Brake hose (brake caliper side) connection
2. Gasket
3. Rear brake caliper assembly
4. Rear brake disk

Removal steps (Continued)

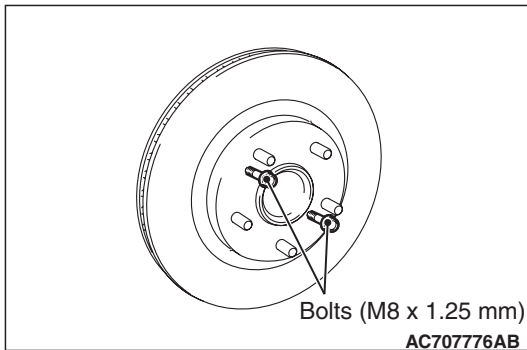
5. Adjusting hole plug
6. Clip
7. Brake hose (brake pipe side) connection
8. Brake hose

<<A>>

REMOVAL SERVICE POINT

<<A>> FRONT BRAKE DISK REMOVAL

If the rear brake disk removal is difficult, install bolts (M8 x 1.25 mm) shown in the figure, and tighten them evenly and gradually to remove the rear brake disk.



INSPECTION

M1351007100399

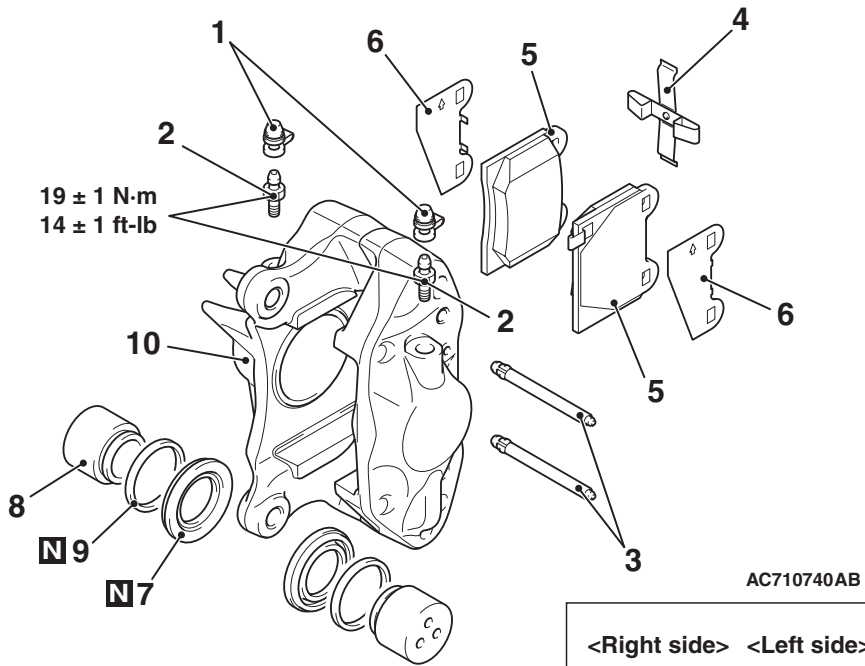
BRAKE DISC CHECK

- Disc wear (Refer to [P.35A-21](#)).
- Disc run-out (Refer to [P.35A-21](#)).

DISASSEMBLY AND ASSEMBLY

CAUTION

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe it off quickly.



	<p>AC710740AB</p> <p><Right side> <Left side></p> <p>6 6</p>	<p><Right side> <Left side></p> <p>3 4</p>
	<p>Shim kit</p> <p>9 7 7 9</p>	<p>Clip set</p> <p><Right side> <Left side></p> <p>5 5</p> <p>Repair kit grease</p>
<p>Brake caliper kit</p>	<p>Seal and boot kit</p>	<p>Pad set</p>

Disassembly steps

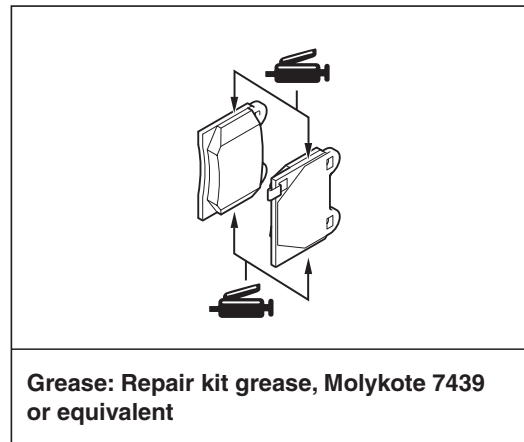
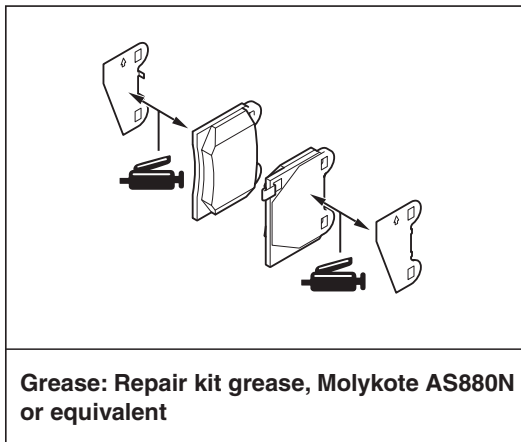
1. Bleeder cap
2. Bleeder
3. Pin
4. Cross spring
5. Brake pad assembly
6. Shim

Disassembly steps (Continued)

7. Piston boot
8. Piston
9. Piston seal
10. Caliper body

NOTE: Install the brake pad assembly (with wear indicator) to outside the vehicle.

LUBRICATION POINTS



AC710741AB

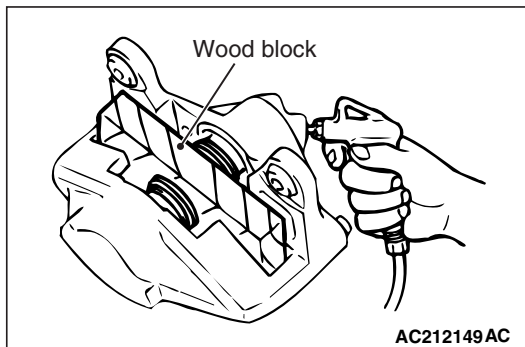
DISASSEMBLY SERVICE POINTS

<<A>> PISTON BOOT/PISTON REMOVAL

⚠ CAUTION

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

Remove the pistons by pumping in air slowly from the brake hose connection. Be sure to use a wood block and adjust the height of the two pistons while so that the pistons protrude evenly.



<> PISTON SEAL REMOVAL

⚠ CAUTION

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

1. Remove the piston seal with finger tip.
2. Clean the piston surface and cylinder inner face with alcohol or specified brake fluid.

Brake fluid: DOT3 or DOT4

INSPECTION

M1351007300412

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

PAD WEAR CHECK

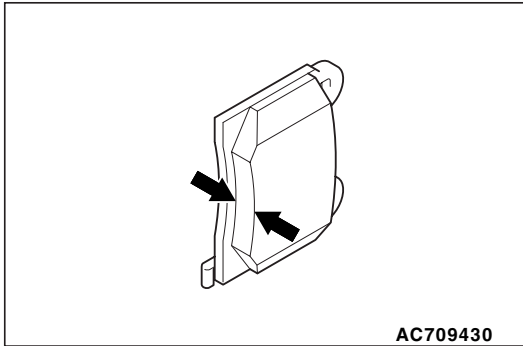
⚠ WARNING

- *Always replace both brake pads on each wheel as a set (both front wheels or both rear wheels). Failure to do so will result in uneven braking, which may cause unreliable brake operation.*
- *If there is significant difference in the thickness of the pads on the left and right sides, check the moving parts.*

Measure thickness at the thinnest, most worn area of the pad. Replace the pad assembly if pad thickness is less than the limit value.

Standard value: 9.0 mm (0.35 inch)

Limit: 2.0 mm (0.08 inch)



AC709430