SECTION 4D

FRONT DISC BRAKES

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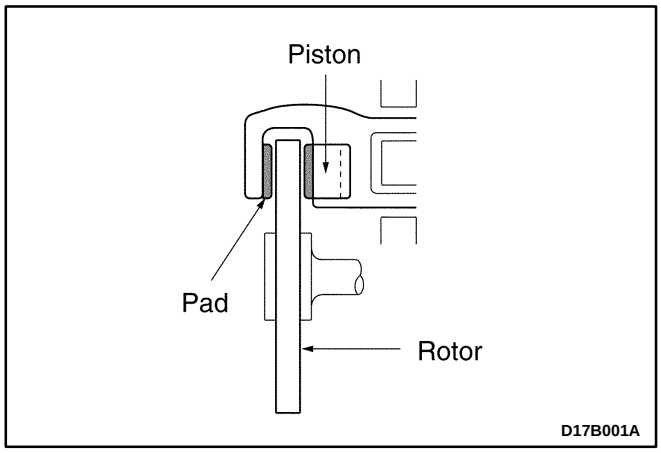
DESCRIPTION AND OPERATION

DISC BRAKE CALIPER ASSEMBLY

This caliper has a single bore and is mounted to the steering knuckle with two mounting bolts. Hydraulic pressure, created by applying the brake pedal, is converted by the caliper to a stopping force. This force acts equally against the piston and the bottom of the caliper bore to move the piston outward and to slide the caliper inward, resulting in a clamping action on the rotor. This clamping action forces the linings against the rotor, creating friction to stop the vehicle.



Important:

- Replace all components included in the repair kits used to service this caliper.
- Lubricate the rubber parts with clean brake fluid to ease assembly.
- Do not use lubricated shop air on brake parts, as damage to the rubber components may result.
- If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.
- Replace the pads in axle sets only.
- The torque values specified are for dry, unlubricated fasteners.
- Perform the service operations on a clean bench, free from all mineral oil materials.

CLEARANCE CALIBRATION

When the hydraulic pressure is applied to the piston, the piston moves leftward. The piston seal, which extent considerable pressure against the piston, moves with cylinder.

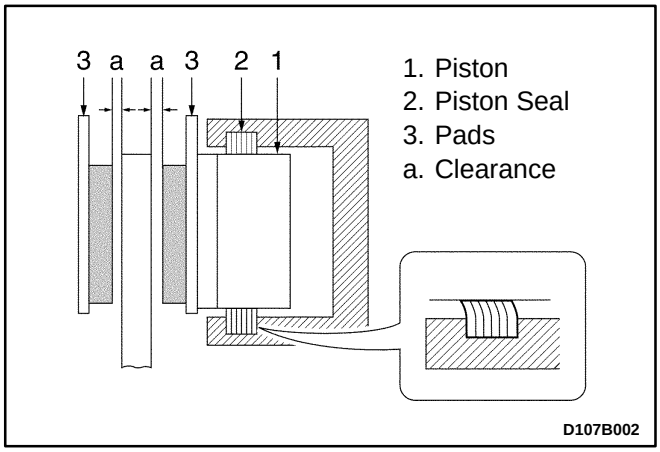
However, as a part of the piston seal is fixed into a grove in the cylinder shape of the seal is as shown in below figure, distorted toward the piston moving direction.

When the pressure is taken off from the brake pedal and the hydraulic pressure is released from the piston, a restoring elastic force is generated at the seal and pushes the piston rightward and back it in original position.

As the pads wear away and the clearance between rotor and pads becomes larger, the piston moves larger.

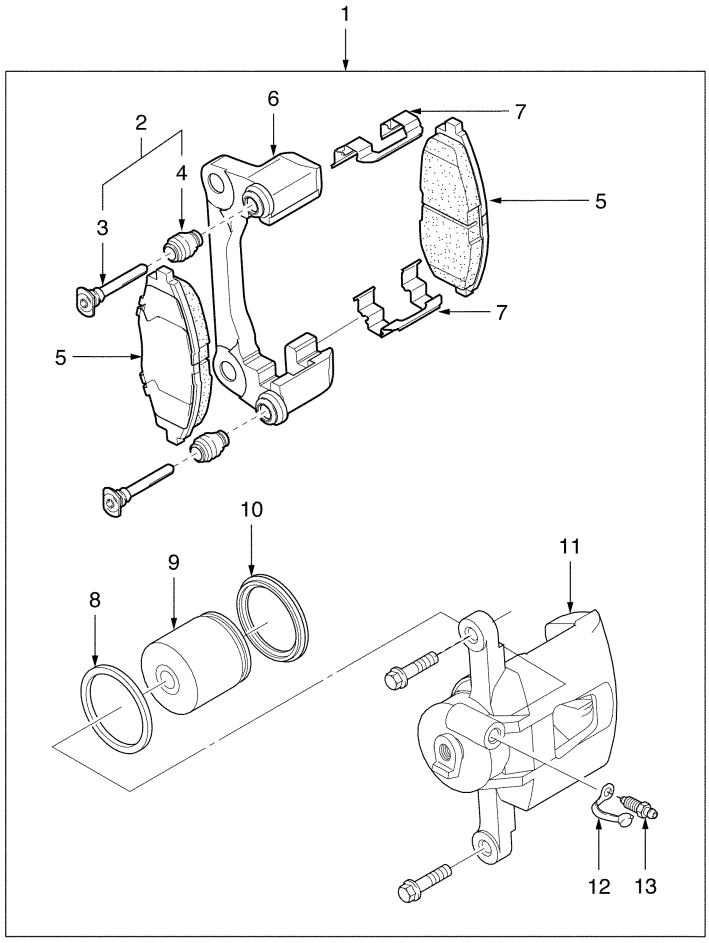
The seal then could change in shape further, but since end of the seal is fixed into the groove in the cylinder, the distortion is limited to the same amount as previously described.

The piston moves further to cover the distance of clearance. As the piston returns by the same distance and the rubber seal recovers its original shape, the clearance between the rotor and pads is maintained in original condition.



COMPONENT LOCATOR

FRONT DISC BRAKES



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1. Front Brake Caliper Assembly
2. Front Brake Boot Assemblies
3. Pins
4. Pin Boots
5. Front Brake Pads
6. Carrier
7. Pad Spring
8. Piston Boot
9. Piston
10. Piston Seal
11. Cylinder
12. Bleeder Screw Cap
13. Bleeder Screw

DIAGNOSTIC INFORMATION AND PROCEDURES

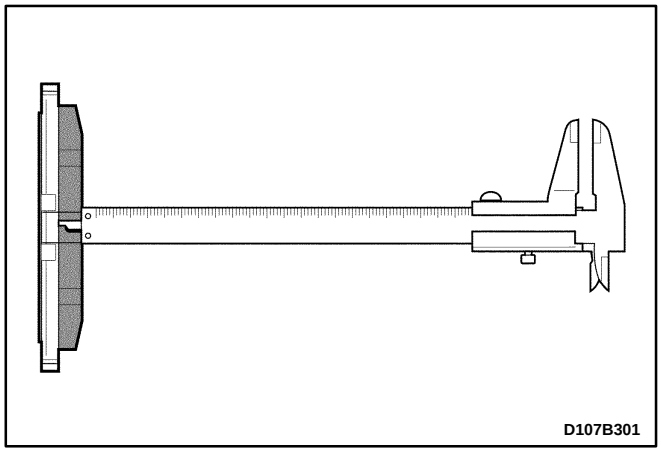
FRONT DISC BRAKE

Condition	Probable cause	Correction
Uneven Braking	● Inoperative carrier.	● Replace the carrier.
	● Sticked caliper piston.	● Repair the caliper piston or replace the caliper assembly, if needed.
Dragging Brake	● Sticked caliper piston.	● Repair the caliper piston or replace the caliper assembly if needed.
Noise and Vibration When Brake Applied	● Excessive rotor run out.	● Replace the rotor.
	● Interference of the dust cover.	● Repair the dust cover.
	● Loose caliper mounting bolts.	● Tighten the mounting bolts.

LINING INSPECTION

1. Raise and suitably support the vehicle.
2. Remove the front wheels. Refer to *Section 2E, Tires and Wheels*.
3. Visually check the linings for minimum thickness and wear.
4. Measure the thickness.

Important: The minimum thickness of the shoe and lining together is 8 mm (0.31 in.).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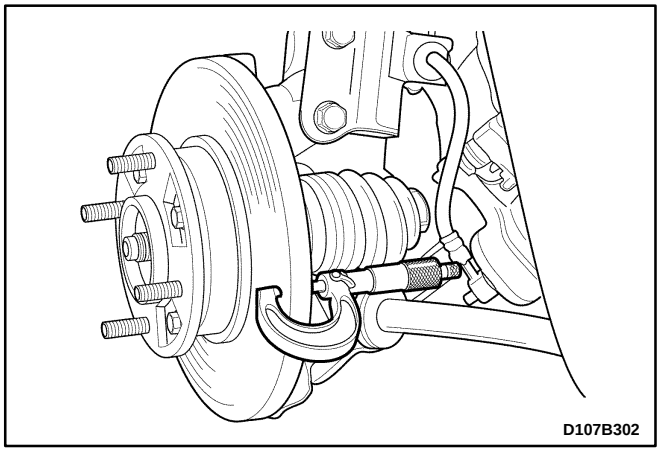
5. Install the shoe and linings in axle sets only.
6. Install the front wheels. Refer to *Section 2E, Tires and Wheels*.
7. Lower the vehicle.

ROTOR INSPECTION

Thickness variation can be checked by measuring the thickness of the rotor at four or more points around the circumference of the rotor. All measurements must be made at the same distance in from the edge of the rotor.

If the thickness of the rotor is below 10 mm (0.40 in.), replace the brake rotor.

During manufacturing, the brake rotor and the tolerances of the braking surface regarding flatness and lateral runout are held very close. The maintenance of close tolerances on the shape of the braking surfaces is necessary to prevent brake roughness.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In addition to these tolerances, the surface finish must be held to a specified range. The control of the braking surface finish is necessary to avoid pulls and erratic performance and to extend lining life.

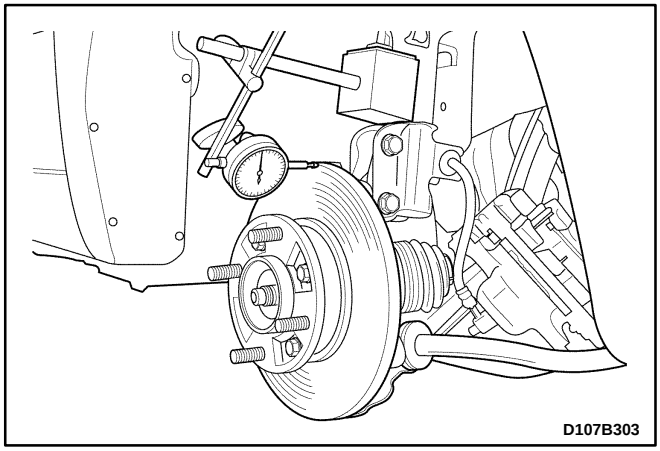
Using a commercially-available dial indicator, check lateral runout as follows:

Notice: Permissible lateral runout is a maximum 0.05 mm (0.002 in.). If lateral runout exceeds the specification, ensure there is no dirt between the rotor and the hub and that contact surfaces are smooth and free from burrs.

1. Position the transaxle in NEUTRAL.
2. Remove the rotor. Refer to “Rotor” in this section.
3. Fasten a dial indicator to the strut.
4. Set the gauge probe tip to approximately 10 mm (0.4 in.) from the outer edge of the brake rotor, perpendicular to the disc and under slight preload.
5. Remove the dial indicator.

Important: Since accurate control of the rotor tolerances is necessary for proper performance of the disc brakes, refinishing of the rotor should be done only with precision equipment.

6. Refinish the rotor, if required, with precision equipment. Discard the rotor if it fails to meet the above specifications after refinishing.
7. Install the rotor. Refer to “Rotor” in this section.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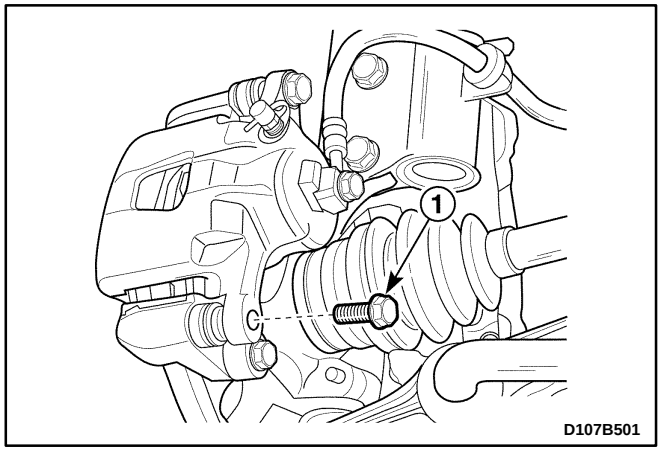
REPAIR INSTRUCTIONS

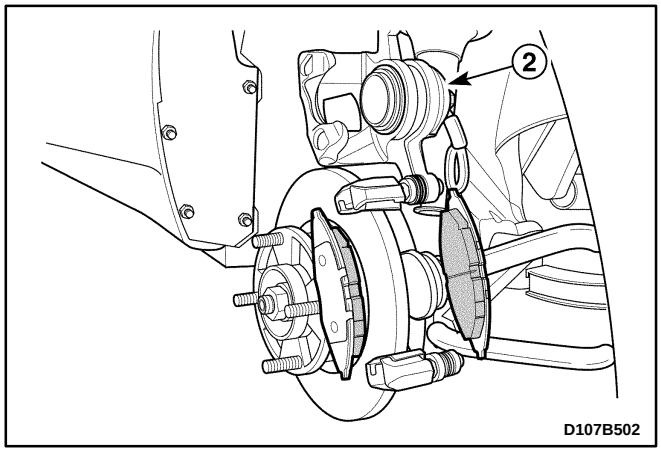
ON–VEHICLE SERVICE



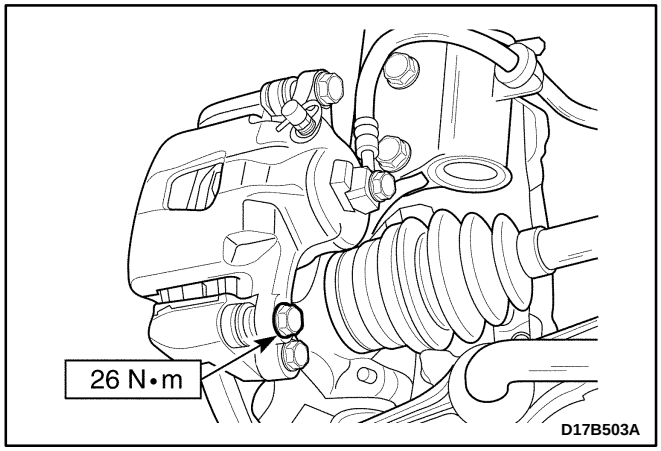
SHOE AND LINING

Removal Procedure

1. Remove the front wheels. Refer to *Section 2E, Tires and Wheels.*
2. Remove the brake pads.
   - Remove the pin bolt (1).



   - Lift up the cylinder assembly (2).

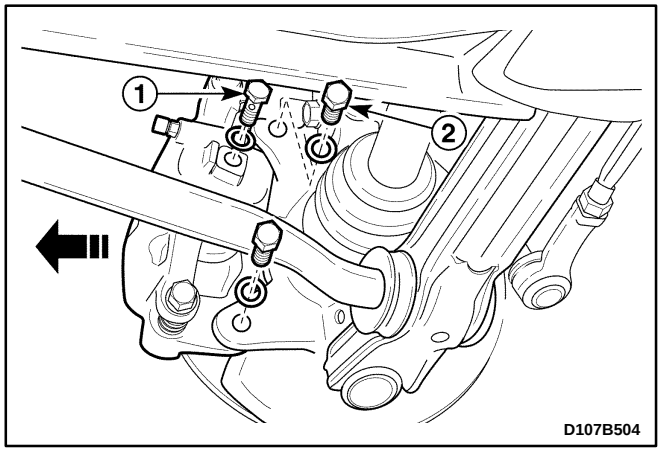


Installation Procedure

1. Install the brake pads and the cylinder assembly with the pin bolt.

   Tighten

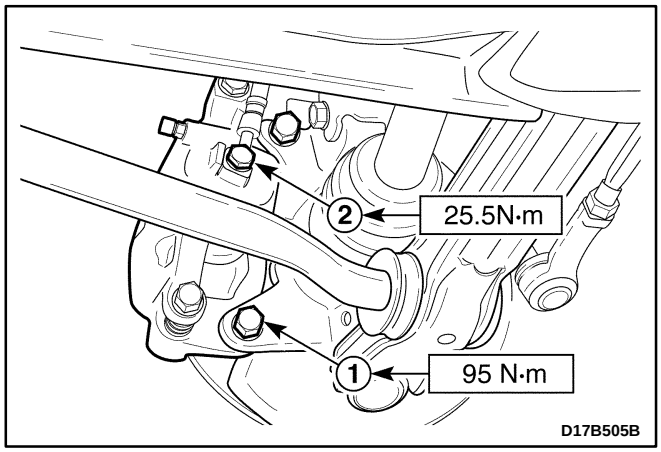
   Tighten the pin bolt to 26 N•m (19 lb-ft).
2. Install the front wheels. Refer to *Section 2E, Tires and Wheels*.



CALIPER ASSEMBLY

Removal Procedure

1. Remove the front wheels. Refer to *Section 2E, Tires and Wheels.*
2. Remove the caliper assembly.
   - Remove the brake hose coupling bolt (1).
   - Plug the opening in the brake hose to prevent fluid loss and contamination.
   - Remove the caliper mounting bolts (2).



Installation Procedure

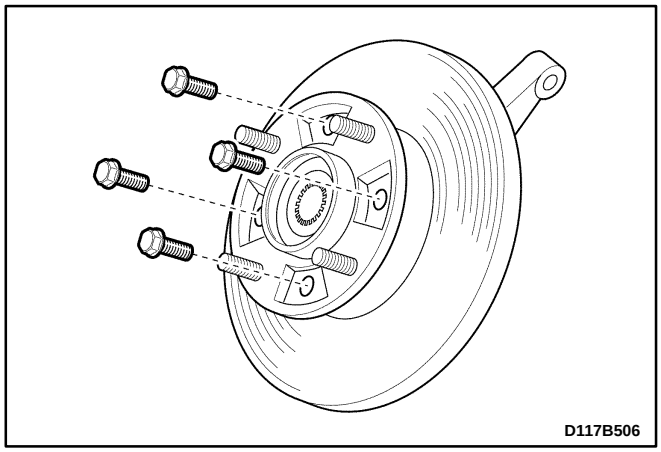
1. Install the caliper assembly with the bolts (1).

   Tighten

   Tighten the caliper–to–steering knuckle bolts to 95 N•m (70 lb-ft).
2. Connect the brake hose (2).

   Tighten

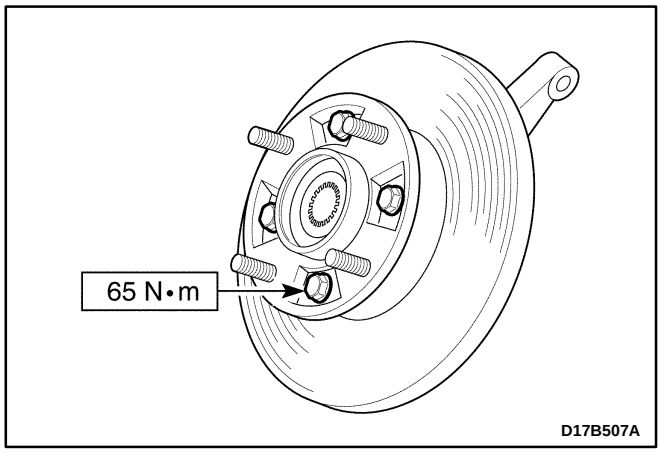
   Tighten the brake hose inlet fitting–to–coupling bolt to 25.5 N•m (19.1 lb-ft).
3. Install the front wheels. Refer to *Section 2E, Tires and Wheels.*
4. Bleed the brake system. Refer to *Section 4A, Hydraulic Brakes.*



ROTOR

Removal Procedure

1. Remove the steering knuckle. Refer to *Section 2C, Front Suspension*.
2. Remove the rotor bolts from the front wheel hub.
3. Remove the rotor. Refer to *Section 2C, Front Suspension*.



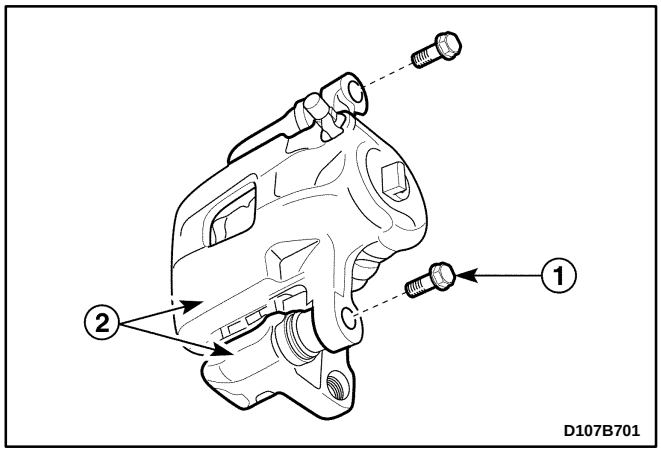
Installation Procedure

1. Install the rotor to the front wheel hub by tightening the detent bolts.

   Tighten

   Tighten the rotor–to–front wheel hub detent bolts to 65 N•m (48 lb-ft).
2. Install the steering knuckle. Refer to *Section 2C, Front Suspension*.

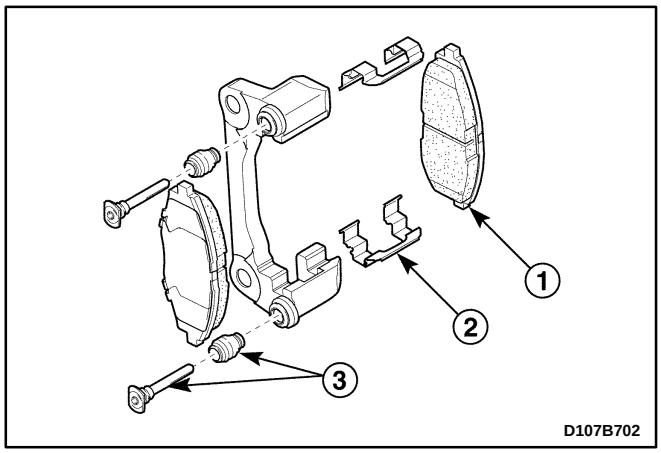
UNIT REPAIR



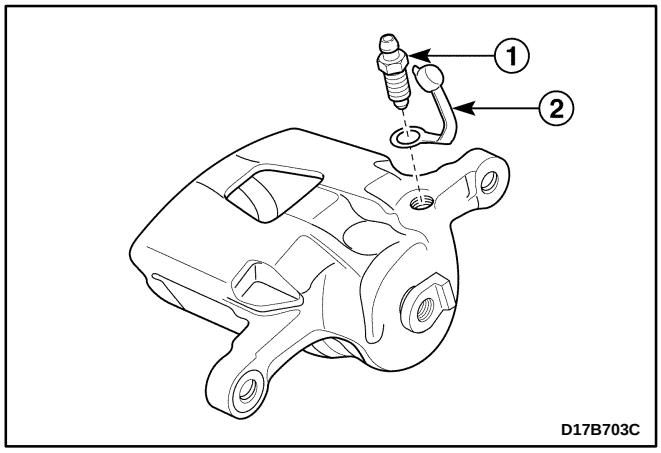
CALIPER OVERHAUL

Disassembly Procedure

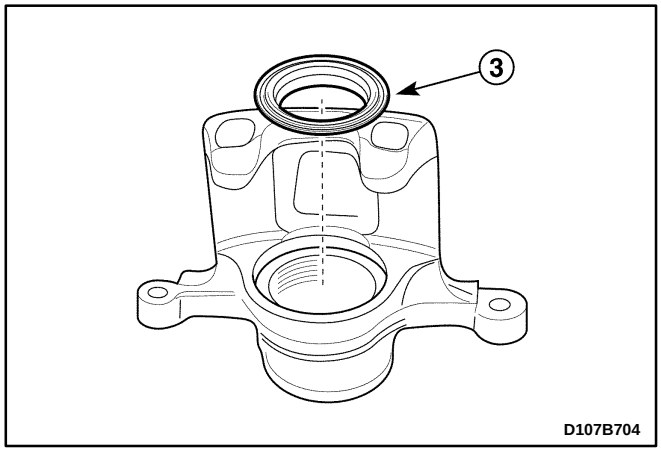
1. Remove the caliper assembly. Refer to “Caliper Assembly” in this section.
2. Separate the cylinder assembly and the carrier.
   - Remove the pin bolts (1).
   - Separate the cylinder assembly and the carrier (2).



3. Disassemble the carrier.
   - Remove the front brake pad set (1).
   - Remove the springs (2).
   - Remove the guide pins and boots (3).
     Refer to “Shoe and Lining” in this section.

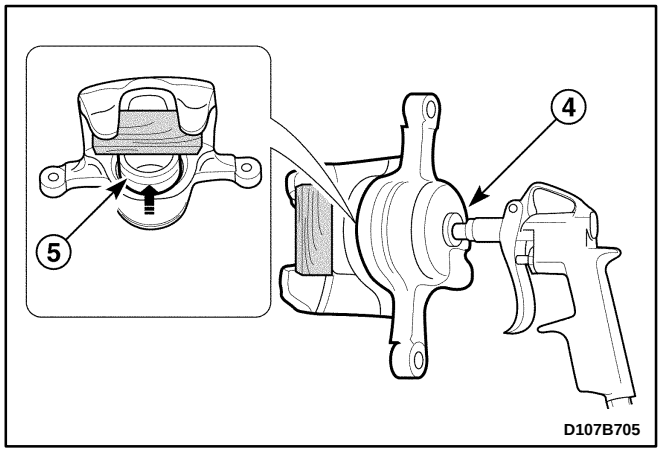


   - Remove the bleeder plug (1).
   - Remove the bleeder plug cap (2).

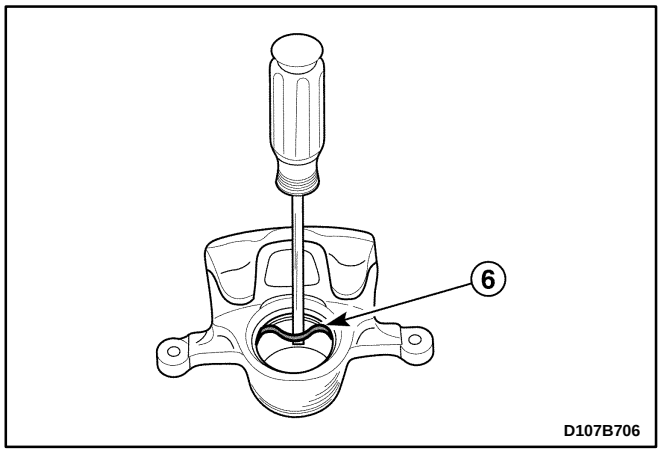


- Remove the piston boot (3).

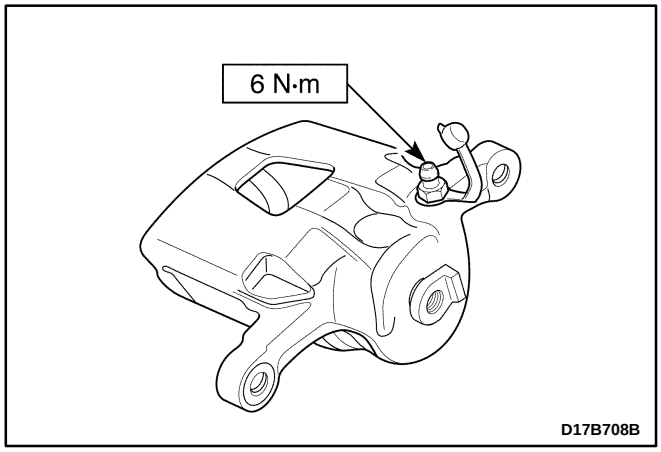
Caution: Do not face in the direction of removing.

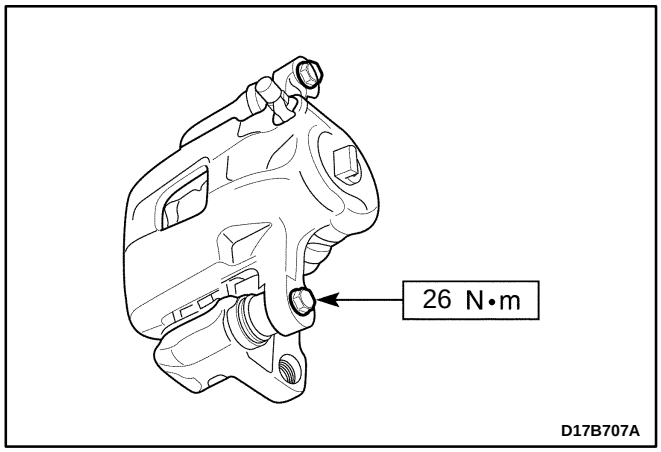


- Using compressed air, blow out the piston from the cylinder (4).
- Remove the piston (5).



- Remove the piston seal (6).





Assembly Procedure

Important: Clean all parts in denatured alcohol. Dry the parts with unlubricated compressed air.

Important: Lubricate the piston with brake fluid.

1. Assembly the cylinder assembly.
   - Install the piston seal.
   - Push the piston inward until it is properly seated.
   - Install the piston boot.
   - Install the bleeder plug.

   ### Tighten

   Tighten the bleeder plug to 6 N•m (53 lb-in).
   - Install the bleeder plug cap.
2. Assemble the carrier.
   - Install the guide pin and boot.
   - Install the spring.
   - Install the pads.
3. Install the pin bolt connecting the cylinder assembly and carrier.

   ### Tighten

   Tighten the pin bolt to 26 N•m (19 lb-ft).
4. Install the caliper assembly. Refer to “Caliper Assembly” in this section.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Application		Unit	Description
Rotor	Outer Diameter	mm (in.)	236 (9.3)
	Thickness	mm (in.)	12.7 (0.5)
	Discard Thickness	mm (in.)	10 (0.4)
	Runout	mm (in.)	0.05 (0.002)
Caliper	Pad Thickness	mm (in.)	10 (0.40)
	Pad Discard Thickness	mm (in.)	8 (0.31)
	Diameter of the Position	mm (in.)	48 (1.89)

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Rotor Bolts	65	48	–
Caliper Mounting Bolts	95	70	–
Pin Bolts	26	19	–
Brake Hose Coupling Bolt	25.5	19.1	–
Bleeder Screw	6	–	53