

2008 BRAKES

Disc Brakes - LaCrosse

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Front Brakes		
• Brake Hose Fitting Bolt	54 N.m	40 lb ft
• Brake Rotor Retention Screw	14 N.m	124 lb in
• Caliper Bracket Bolt	180 N.m	133 lb ft
• Caliper Guide Pin Bolt	36 N.m	27 lb ft
Rear Brakes		
• Brake Hose Fitting Bolt	54 N.m	40 lb ft
• Brake Rotor Retention Screw	14 N.m	124 lb in
• Caliper Bracket Bolt	120 N.m	89 lb ft
• Caliper Guide Pin Bolt	44 N.m	32 lb ft

DISC BRAKE COMPONENT SPECIFICATIONS

Application	Specification	
	Metric	English
Front Brake Rotors		
• Rotor Discard Thickness *	30.7 mm	1.21 in
• Rotor Maximum Allowable Lateral Runout	0.06 mm	0.002 in
• Rotor Maximum Scoring	1.50 mm	0.059 in
• Rotor Maximum Allowable Thickness Variation	0.025 mm	0.001 in
• Rotor Minimum Allowable Thickness After Refinishing	31.0 mm	1.22 in
• Rotor Thickness-NEW	32.2 mm	1.27 in
Rear Brake Rotors		
• Rotor Discard Thickness *	12.5 mm	0.49 in
• Rotor Maximum Allowable Lateral Runout	0.05 mm	0.002 in
• Rotor Maximum Scoring	1.50 mm	0.059 in
• Rotor Maximum Allowable Thickness Variation	0.02 mm	0.001 in
• Rotor Minimum Thickness After Refinishing	12.9 mm	0.51 in
• Rotor Thickness-NEW	14.0 mm	0.55 in
* All brake rotors have a discard dimension cast into them. Replace any rotor that does not meet this specification. After refinishing the rotor, replace any rotor that does not meet the minimum thickness specification.		

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - DISC BRAKES

Begin the disc brake system diagnosis with **Diagnostic Starting Point - Hydraulic Brakes**. The use of the Diagnostic Starting Point will lead to the identification of the correct procedure for diagnosing the system and where the procedure is located.

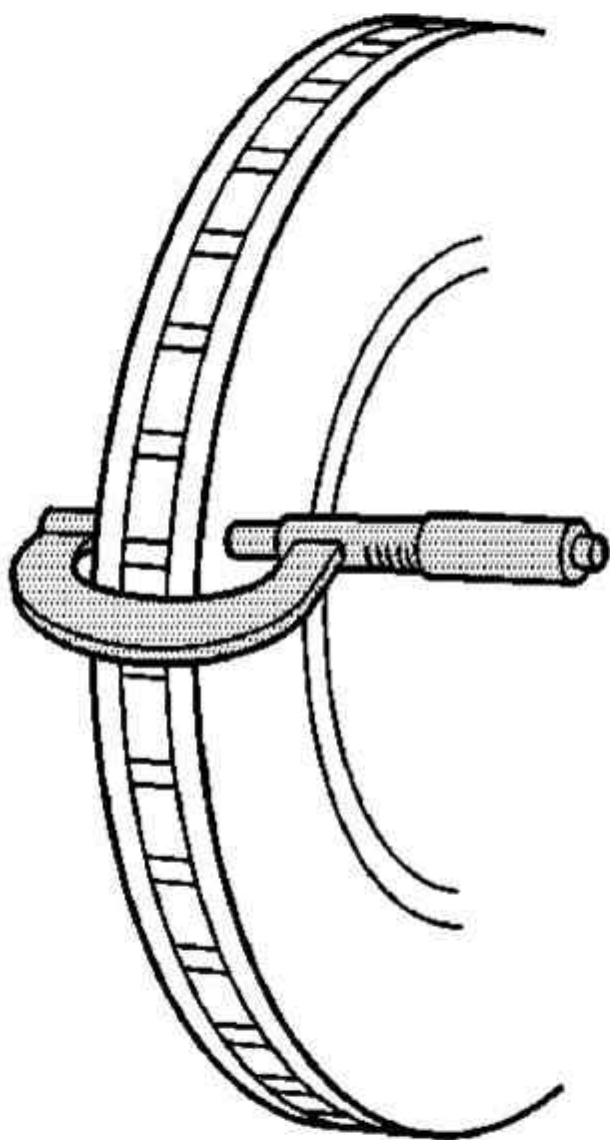
BRAKE ROTOR THICKNESS MEASUREMENT

Fig. 1: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP.

1. Clean the brake pad lining contact surface of the brake rotor with denatured alcohol or an equivalent brake cleaner.
2. Using a micrometer calibrated in ten-thousands of an inch, measure and record the lowest thickness of the brake rotor at four or more points, equally spaced around the rotor.

Ensure that the measurements are only taken within the brake pad lining contact area and that the micrometer is positioned the same distance from the outside edge of the rotor for each measurement.

3. Compare the lowest thickness measurement recorded to the following specifications:

Specification:

- Front brake rotor minimum allowable thickness after refinishing 31.08 mm (1.224 in).
 - Rear brake rotor minimum allowable thickness after refinishing 12.9 mm (0.508 in).
4. If the lowest thickness measurement of the brake rotor is above the minimum allowable thickness after refinishing specification. The rotor may be able to be refinished, depending upon surface and wear conditions which may be present.
 5. If the lowest thickness measurement of the brake rotor is at or below the minimum allowable thickness after refinishing specification. The rotor may not be refinished.
 6. Compare the lowest thickness measurement recorded to the following specifications:

Specification:

- Front brake rotor discard thickness 30.7 mm (1.21 in).
 - Rear brake rotor discard thickness 12.5 mm (0.49 in).
7. If the lowest thickness measurement of the brake rotor is at or below the discard thickness specification; the rotor requires replacement.

BRAKE ROTOR THICKNESS VARIATION MEASUREMENT

CAUTION: Refer to Brake Dust Caution .

IMPORTANT: Any disc brake rotor that exhibits thickness variation exceeding the maximum acceptable level must be refinished or replaced. Thickness variation exceeding the maximum acceptable level can cause brake pulsation.

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the caliper with the brake pads. Refer to Front Disc Brake Pads Replacement and/or Rear Disc Brake Pads Replacement (JL9) or Rear Disc Brake Pads Replacement (J65).
2. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.

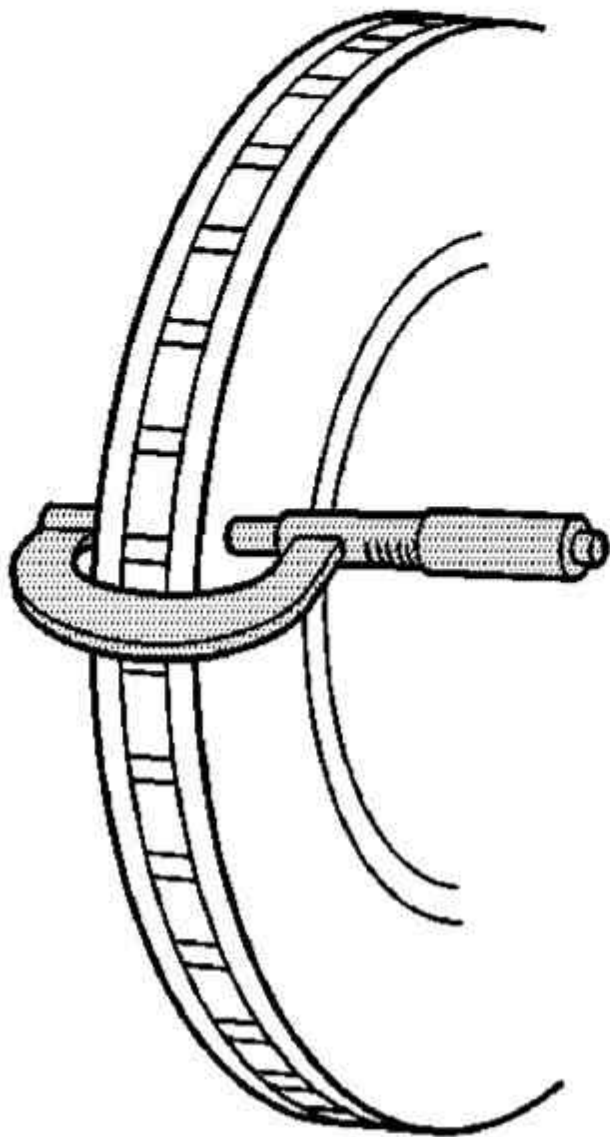


Fig. 2: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP.

3. Using a micrometer calibrated in thousandths-of-a-millimeter, or ten-thousandths-of-an-inch, measure and record the thickness of the brake rotor at 4 or more points, evenly spaced around the rotor.

Ensure that the measurements are only taken within the friction surfaces and that the micrometer is positioned the same distance from the outer edge of the rotor, about 13 mm (1/2 in), for each measurement.

4. Calculate the difference between the highest and lowest thickness measurements recorded to obtain the amount of thickness variation.
5. Compare the thickness variation measurement to the following specification:

Specification: Brake rotor maximum allowable thickness variation: 0.02 mm (0.001 in)

IMPORTANT: Whenever a brake rotor is refinished or replaced, the assembled lateral runout (LRO) of the rotor must be measured to ensure optimum performance of the disc brakes.

6. If the brake rotor thickness variation measurement exceeds the specification, the rotor requires refinishing or replacement.

BRAKE ROTOR SURFACE AND WEAR INSPECTION

CAUTION: Refer to Brake Dust Caution .

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the caliper with the brake pads. Refer to **Front Disc Brake Pads Replacement** and/or **Rear Disc Brake Pads Replacement (JL9)** or **Rear Disc Brake Pads Replacement (J65)**.
2. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
3. Inspect the friction surfaces of the brake rotor for the following Braking Surface Conditions:
 - Heavy rust and/or pitting

Light surface rust can be removed with an abrasive disc. Heavy surface rust and/or pitting must be removed by refinishing the rotor.
 - Cracks and/or heat spots
 - Excessive blueing discoloration
4. If the friction surfaces of the brake rotor exhibit one or more of the Braking Surface Conditions, the rotor requires refinishing or replacement.

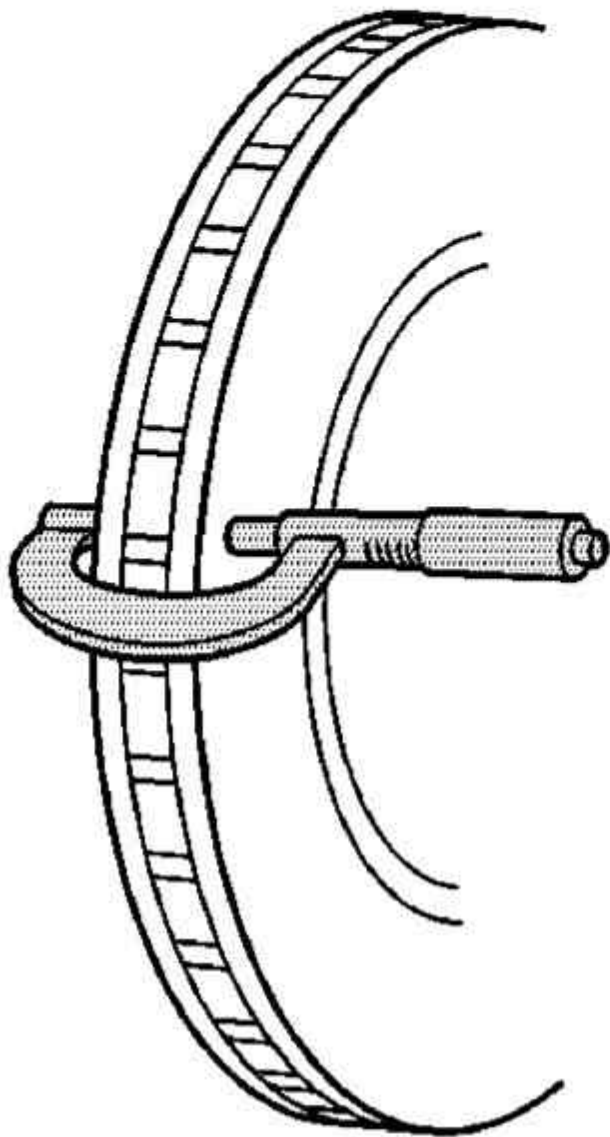


Fig. 3: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP.

5. Using a micrometer calibrated in thousandths-of-a-millimeter, or ten-thousandths-of-an-inch, measure and record the scoring depth of any grooves present on the rotor friction surfaces.
6. Compare the groove scoring depth recorded to the following specification:

Specification: Brake rotor maximum allowable scoring: 1.50 mm (0.059 in)

7. If the brake rotor scoring depth exceeds the specification, or if an excessive amount of scoring is present, the rotor requires refinishing or replacement.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT MEASUREMENT

Tools Required

- **J 39544-KIT** Torque-Limiting Socket Set, or equivalent. See **Special Tools**.
- **J 41013** Rotor Resurfacing Kit. See **Special Tools**.
- **J 42450-A** Wheel Hub Resurfacing Kit. See **Special Tools**.

- **J 45101** Hub and Wheel Runout Gage. See Special Tools.
- **J 45101-100** Conical Brake Rotor Washers. See Special Tools.

CAUTION: Refer to Brake Dust Caution .

- IMPORTANT:**
- Brake rotor assembled lateral runout (LRO) exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4 800-11 300 km (3,000-7,000 mi).
 - Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. Refer to Brake Rotor Thickness Variation Measurement.

1. Matchmark the position of the brake rotor to the wheel studs if this has not been done already.

IMPORTANT: Whenever the brake rotor has been separated from the hub/axle flange, any rust or contaminants should be cleaned from the hub/axle flange and the brake rotor mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

2. Inspect the mating surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles, corrosion, rust, or debris remaining. If the wheel hub/axle flange and/or if the brake rotor mating surfaces exhibit these conditions, perform the following steps:
 1. Remove the brake rotor from the vehicle. Refer to Front Brake Rotor Replacement and/or Rear Brake Rotor Replacement .
 2. Using the **J 42450-A** , thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange. See Special Tools.
 3. Using the **J 41013** , thoroughly clean any rust or corrosion from the mating surface of the brake rotor. See Special Tools.
 4. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
3. Install the rotor to the hub/axle flange using the matchmark made prior to removal.

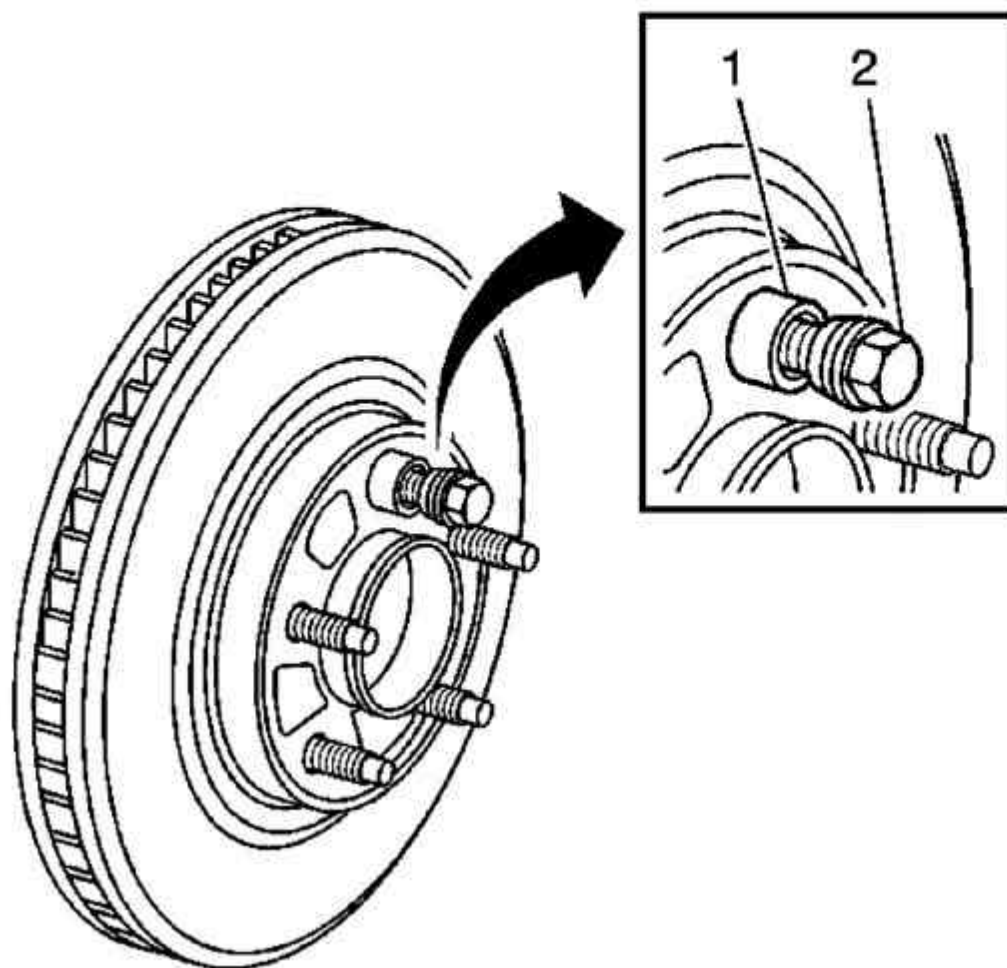


Fig. 4: Identifying J 45101-100 & Lug Nut
Courtesy of GENERAL MOTORS CORP.

4. Hold the rotor firmly in place against the hub/axle flange and install one of the **J 45101-100** (1), and one lug nut (2) onto the upper-most wheel stud. See **Special Tools**.
5. Continue to hold the rotor secure and tighten the lug nut firmly by hand.

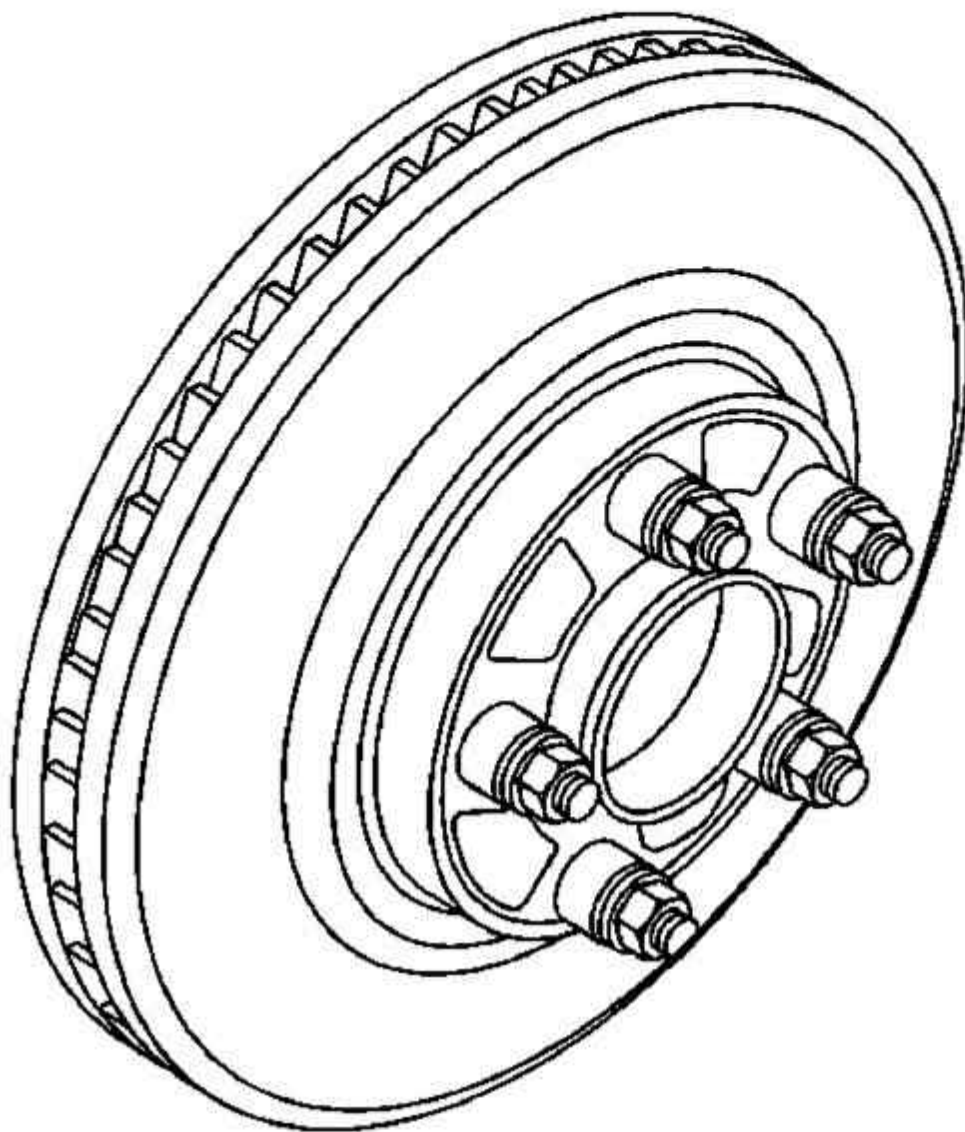


Fig. 5: Identifying All J 45101-100s & Lug Nuts
Courtesy of GENERAL MOTORS CORP.

6. Install the remaining **J 45101-100** and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern. See **Special Tools**.
7. Using the **J 39544-KIT**, or equivalent, tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. See **Special Tools**. Refer to **Tire and Wheel Removal and Installation**.
8. If the brake rotor has been REFINISHED or REPLACED with a new rotor, proceed to step 14.
9. If the brake rotor meets the following criteria, proceed to step 10.
 - The rotor is within specifications and is being REUSED.
 - The rotor has NOT been refinished.
 - The rotor does NOT exhibit thickness variation exceeding the maximum allowable level.

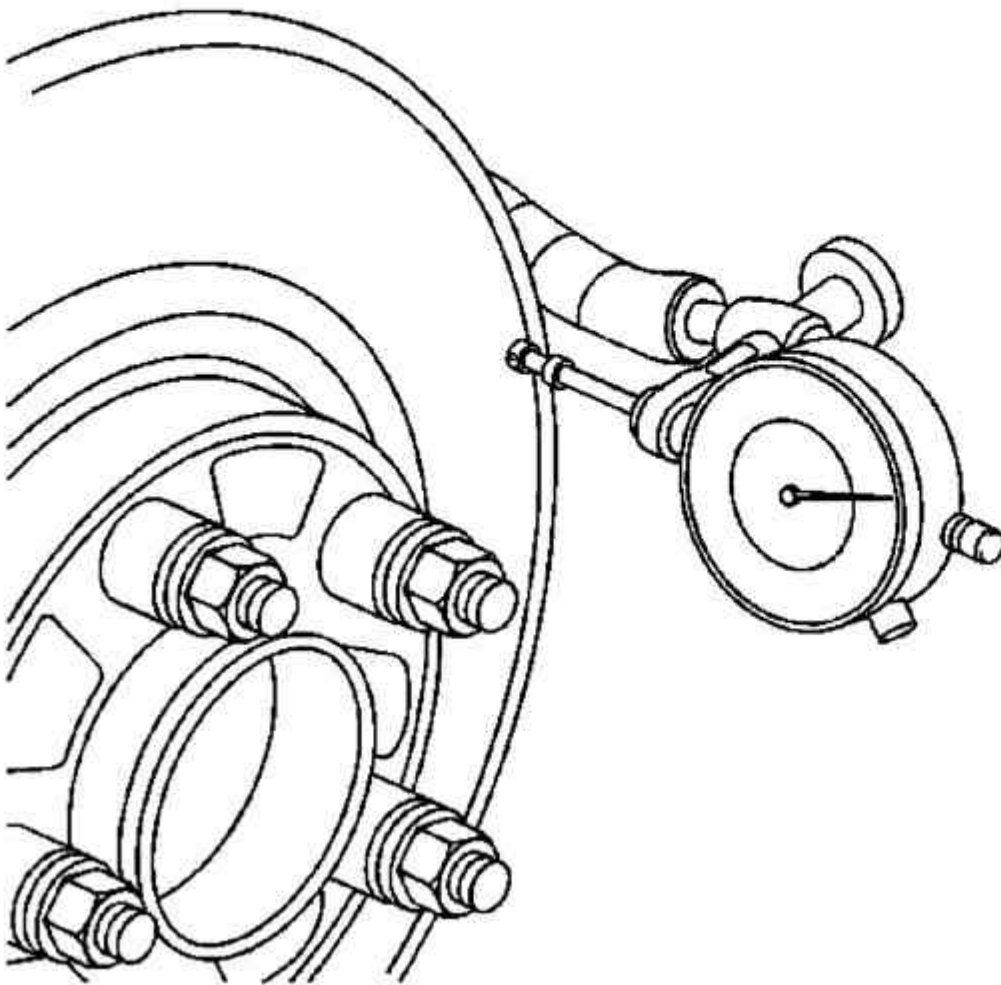


Fig. 6: Mounting Dial Indicator To Measure Lateral Runout
Courtesy of GENERAL MOTORS CORP.

10. Mount a dial indicator, **J 45101**, or equivalent, to the steering knuckle and position the indicator button so it contacts the brake rotor friction surface at a 90 degree angle, approximately 13 mm (0. See **Special Tools.5** in) from the outer edge of the rotor.
11. Measure and record the assembled LRO of the brake rotor.
 1. Rotate the rotor until the lowest reading is displayed on the indicator dial, then set the dial to zero.
 2. Rotate the rotor until the highest reading is displayed on the dial.
 3. Mark the location of the high spot relative to the nearest wheel stud, or studs.
 4. Measure and record the amount of LRO.
12. Compare the brake rotor assembled LRO to the following specification:

Specification:

- Front brake rotor maximum allowable assembled lateral runout: 0.05 mm (0.002 in)
- Rear brake rotor maximum allowable assembled lateral runout: 0.05 mm (0.002 in)

13. If the brake rotor assembled LRO is within specifications, proceed to step 18.

If the brake rotor assembled LRO exceeds the specification, refinish the rotor to ensure true parallelism. Refer to **Brake Rotor Refinishing**. After refinishing the rotor, proceed to step 14.

14. Mount a dial indicator, **J 45101**, or equivalent, to the steering knuckle and position the indicator button so it contacts the brake rotor friction surface at a 90 degree angle, approximately 13 mm (0.5 in) from the outer edge of the rotor.
15. Measure and record the assembled LRO of the brake rotor.
 1. Rotate the rotor until the lowest reading is displayed on the indicator dial, then set the dial to zero.
 2. Rotate the rotor until the highest reading is displayed on the dial.
 3. Mark the location of the high spot relative to the nearest wheel stud, or studs.
 4. Measure and record the amount of LRO.
16. Compare the brake rotor assembled LRO to the following specification:

Specification:

- Front brake rotor maximum allowable assembled lateral runout: 0.05 mm (0.002 in)
 - Rear brake rotor maximum allowable assembled lateral runout: 0.05 mm (0.002 in)
17. If the brake rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.
 18. If the brake rotor assembled LRO measurement is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **J 45101-100** and the lug nuts. See **Special Tools**.

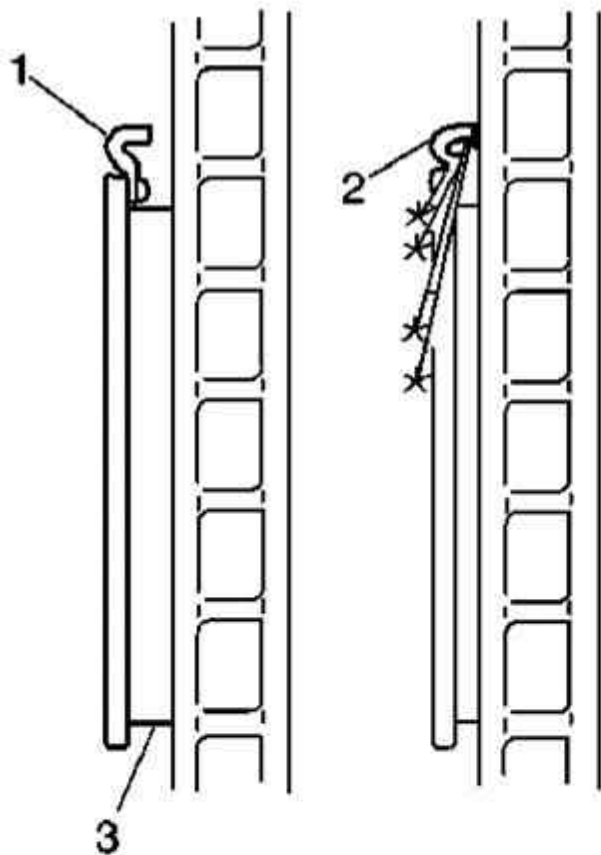
BRAKE PAD INSPECTION

Fig. 7: View Of Brake Pads & Audible Wear Sensors
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Brake Dust Caution .

- Inspect the disc brake pads at regular intervals, or whenever the tire and wheel assemblies are removed from the vehicle.
- If replacement is necessary, always replace disc brake pads in axle sets.
- Inspect both edges of the disc brake pad friction surfaces (3). The highest rate of wear normally occurs at the trailing edge of the disc brake pads.
- Inspect the thickness of the disc brake pads (3) in order to ensure that they have not worn prematurely. The disc brake pad wear should be approximately even per axle set.
- Both front and rear disc brake pads have integral, audible wear sensors (1). When the disc brake pad wear reaches the minimum allowable thickness, the wear sensor contacts the disc brake rotor (2). The wear indicator will then produce an audible, high-pitched warning noise during wheel rotation.
- Replace the disc brake pads when the friction surface (3) is worn to within 0.76 mm (0.030 in) of the mounting plates.
- Remove the brake calipers and inspect the friction surfaces of the inner and outer disc brake pads to ensure that they are level. Place the disc brake pad friction surfaces together and measure the gap between the surfaces. If more than 0.13 mm (0.005 in) gap exists midway between the length of the disc brake pads, replace the disc brake pads.
- Verify that any disc brake pad shims that may be required are in place and not damaged or excessively corroded. Replace any missing or damaged shims in order to preserve proper disc brake performance.
- Replace the disc brake pads if any have separated from the mounting plates.
- Inspect the disc brake pads friction surfaces for cracks, fractures, or damage which may cause noise or otherwise impair disc brake performance.

BRAKE CALIPER INSPECTION

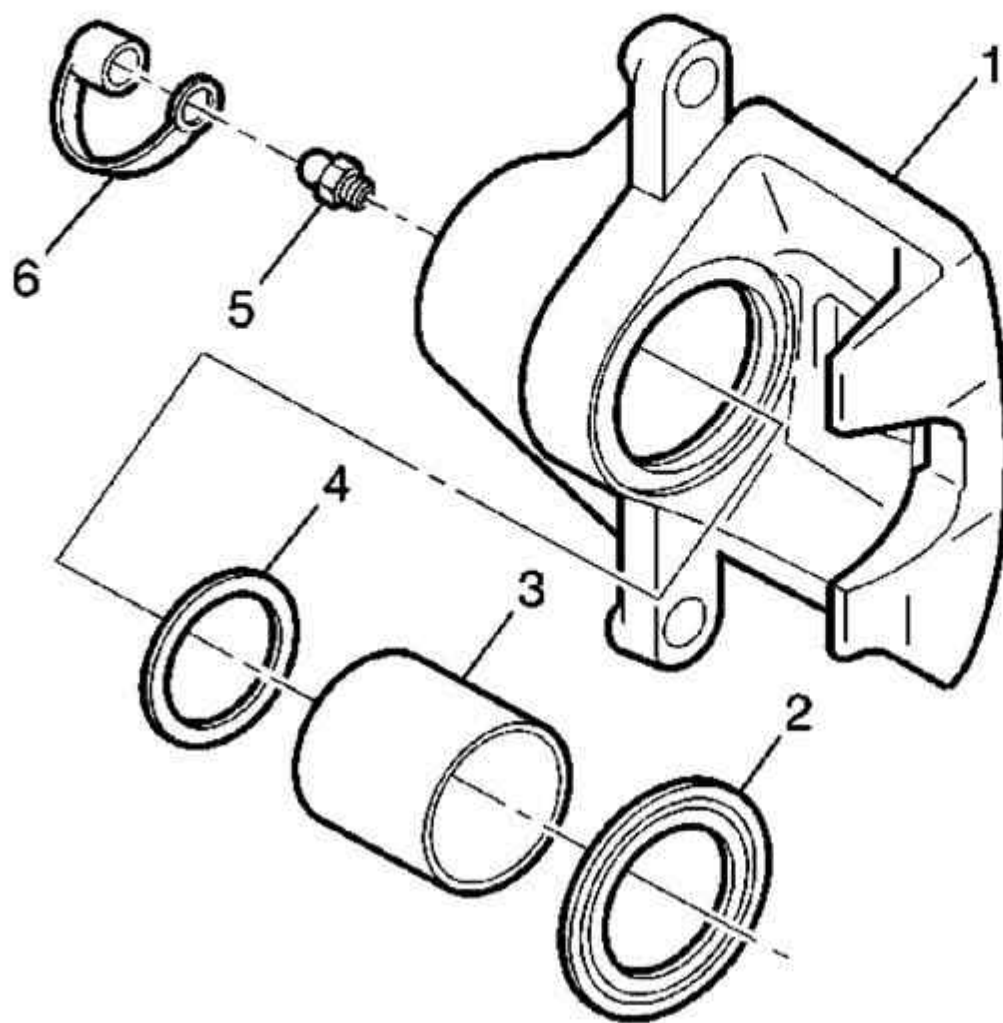


Fig. 8: Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Brake Dust Caution .

1. Inspect the brake caliper housing (1) for cracks, excess wear, and/or damage. If any of these conditions are present, the brake caliper requires replacement.
2. Inspect the caliper piston dust boot seal (2) for cracks, tears, cuts, deterioration and/or improper seating in the caliper body. If any of these conditions are present, the brake caliper requires overhaul or replacement.
3. Inspect for brake fluid leakage around the caliper piston dust boot seal (2) and on the disc brake pads. If there is any evidence of brake fluid leakage, the brake caliper requires overhaul or replacement.
4. Inspect for smooth and complete travel of the caliper pistons into the caliper bores:

The movement of the caliper pistons into the caliper bores should be smooth and even. If the caliper piston is frozen or difficult to bottom, the caliper requires overhaul or replacement.

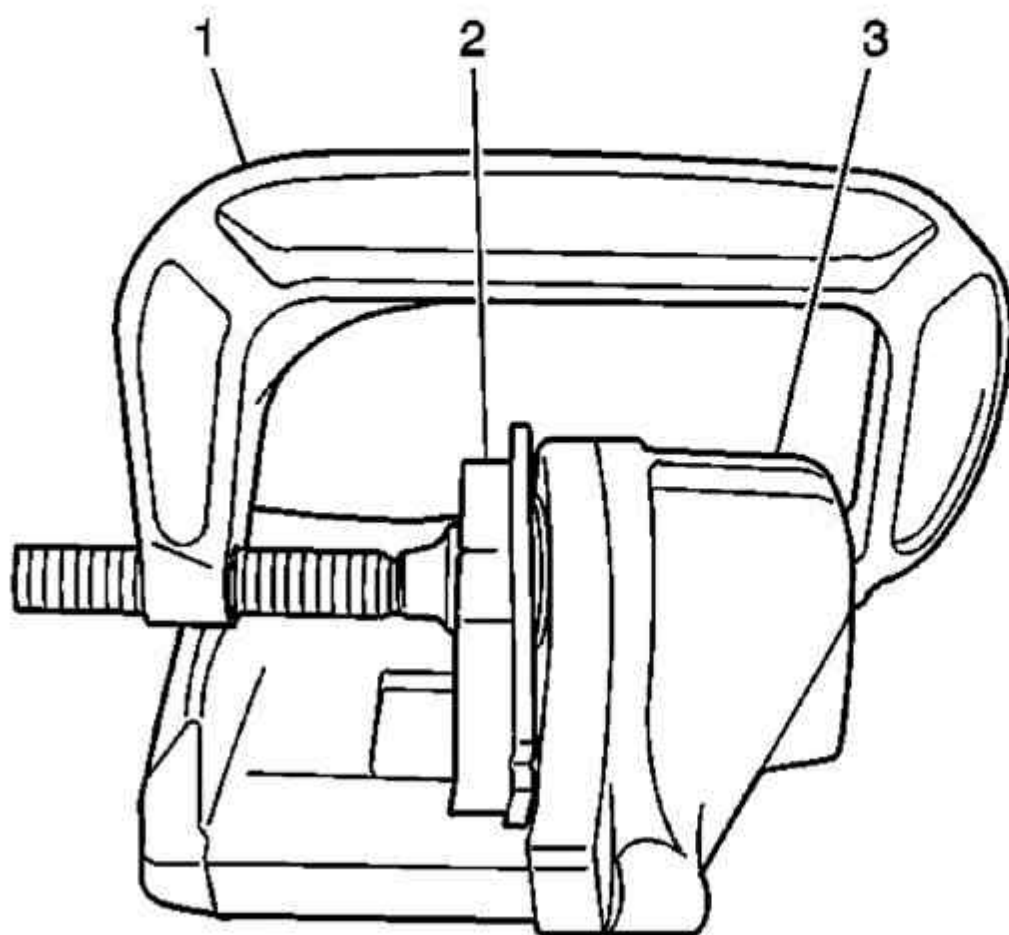


Fig. 9: Compressing Caliper Piston
Courtesy of GENERAL MOTORS CORP.

5. For front caliper applications insert a discarded inner brake pad (2) or a block of wood in front of the piston. Using a large C-clamp (1) installed over the body of the caliper (3) and against the brake pad or block of wood, slowly bottom the piston on the bore.

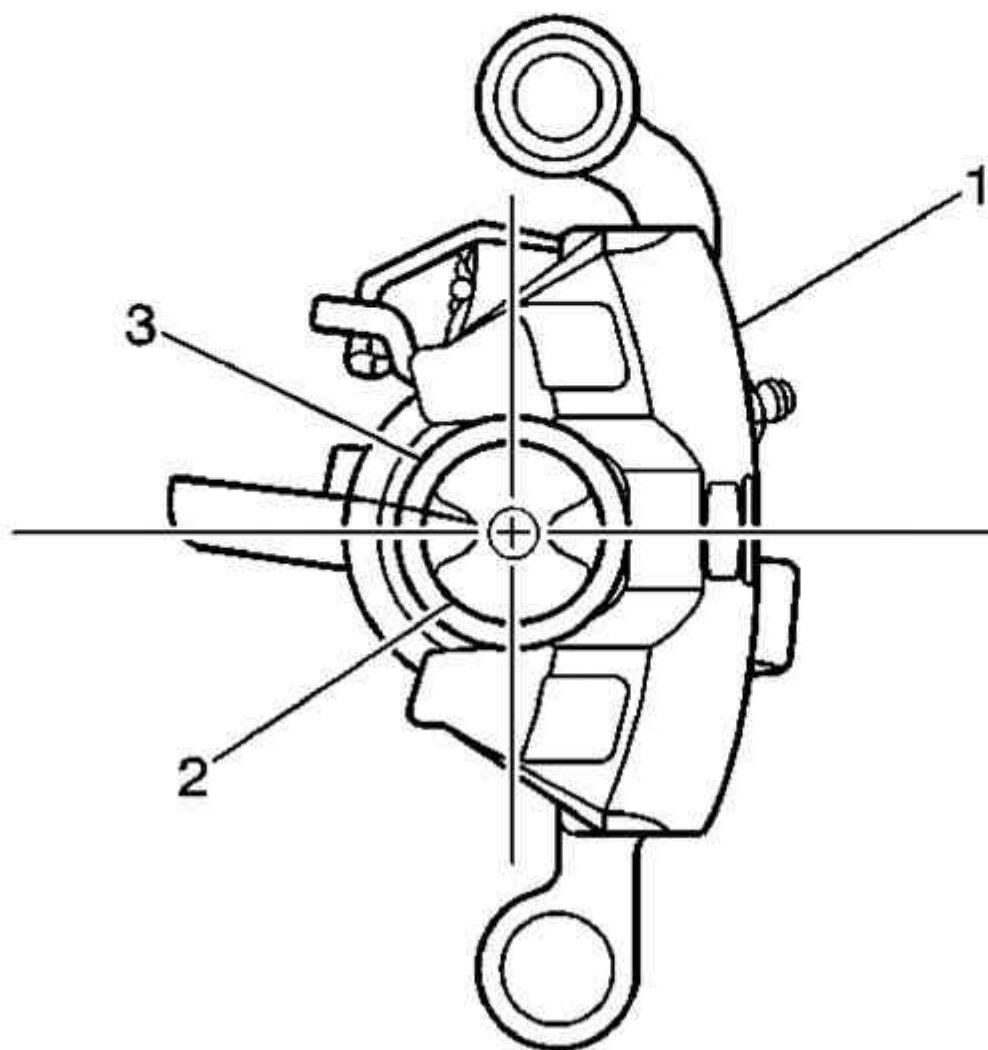


Fig. 10: Illustrating Rotating Piston In Caliper Body
Courtesy of GENERAL MOTORS CORP.

6. For rear applications, retract the brake caliper piston (2) into the brake caliper bore utilizing a suitable spanner-type tool and fully bottoming out the piston by turning clockwise using the MAC®Tools DBC 2500 MA Disc Brake Caliper Tool Set or equivalent.

FRONT DISC BRAKE MOUNTING AND HARDWARE INSPECTION

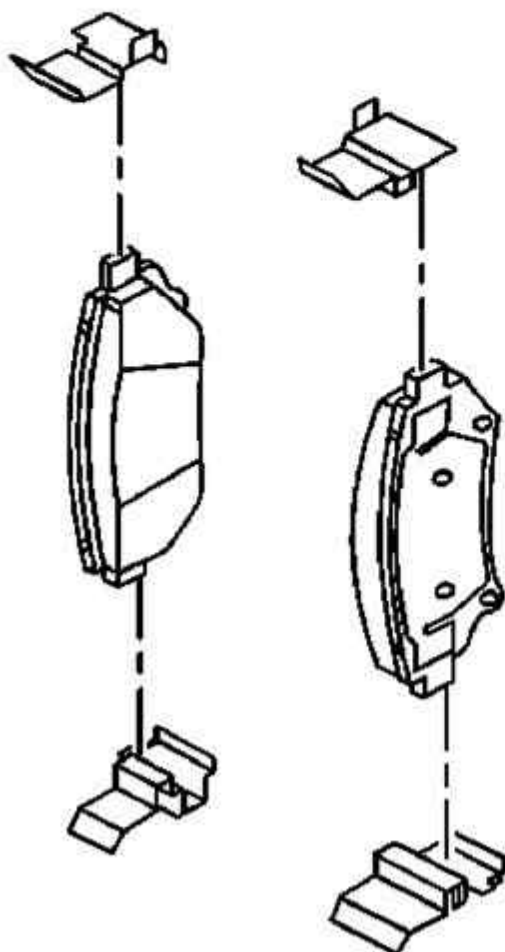


Fig. 11: View Of Disc Brake Pad Mounting Hardware
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Brake Dust Caution .

1. Remove the disc brake caliper from the caliper mounting bracket.
2. Remove the disc brake pads from the caliper mounting bracket.
3. Inspect the disc brake pad mounting hardware for the following:
 - Missing mounting hardware
 - Excessive corrosion
 - Bent mounting tabs
 - Looseness at the caliper mounting bracket
 - Looseness at the disc brake pads
4. If any of the conditions listed are found, the disc brake pad mounting hardware requires replacement.
5. Ensure the disc brake pads are held firmly in place on the caliper mounting bracket, yet slide easily on the mounting hardware without binding.

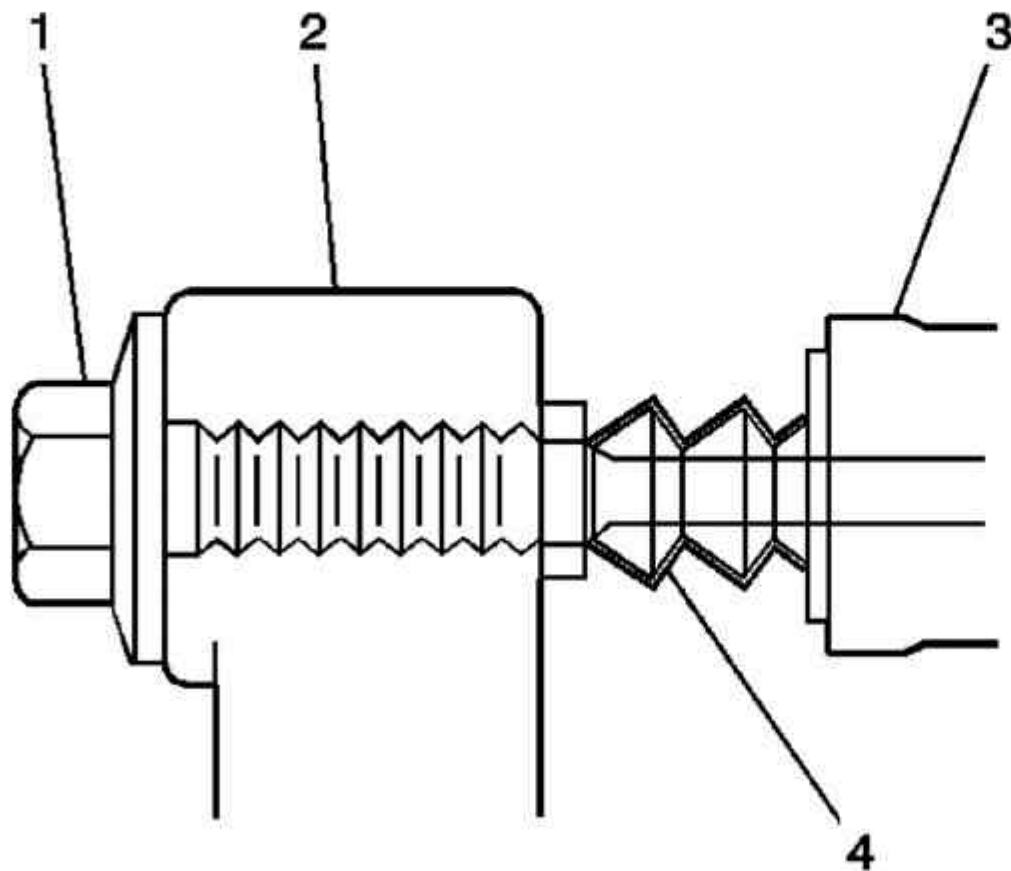


Fig. 12: Inspecting Caliper Bolt
Courtesy of GENERAL MOTORS CORP.

6. Inspect the caliper bolts (1) for the following:
 - Binding
 - Seizing
 - Looseness in the caliper mounting bracket (3)
 - Bent or damaged caliper bolts
 - Cracked or torn boots (4)
 - Missing boots
 - Bent or damaged caliper mounting bracket (3)
7. If any of the conditions listed are found, the caliper mounting hardware requires replacement.
8. Install the disc brake pads to the caliper mounting bracket.
9. Install the disc brake caliper to the mounting bracket.

REAR DISC BRAKE MOUNTING AND HARDWARE INSPECTION

CAUTION: Refer to Brake Dust Caution .

1. Grasp the brake caliper and try to move the brake caliper up or down. The brake caliper should not have excessive looseness.
2. Grasp the brake caliper and try to move the brake caliper in and out. The brake caliper should slide smoothly with minimal force.

3. Inspect the brake caliper retainers (1).
4. Inspect the disc brake pad mounting hardware for the following:
 - Bent mounting tabs
 - Excessive corrosion
 - Looseness at the brake caliper mounting bracket
 - Looseness at the disc brake pads
 - Missing mounting hardware
5. If any of the conditions listed are found, the disc brake pad mounting hardware requires replacement.
6. Ensure the disc brake pads are held firmly in place on the brake caliper mounting bracket, yet slide easily on the mounting hardware without binding.
7. Inspect the brake caliper bolts for the following:
 - Bent or damaged brake caliper bolts
 - Bent or damaged brake caliper mounting bracket
 - Binding
 - Corrosion
 - Cracked or torn boots
 - Looseness in the brake caliper mounting bracket
 - Missing boots
 - Seizing
8. If any of the conditions listed are found, the brake caliper mounting hardware requires replacement.

REPAIR INSTRUCTIONS

FRONT DISC BRAKE PADS REPLACEMENT

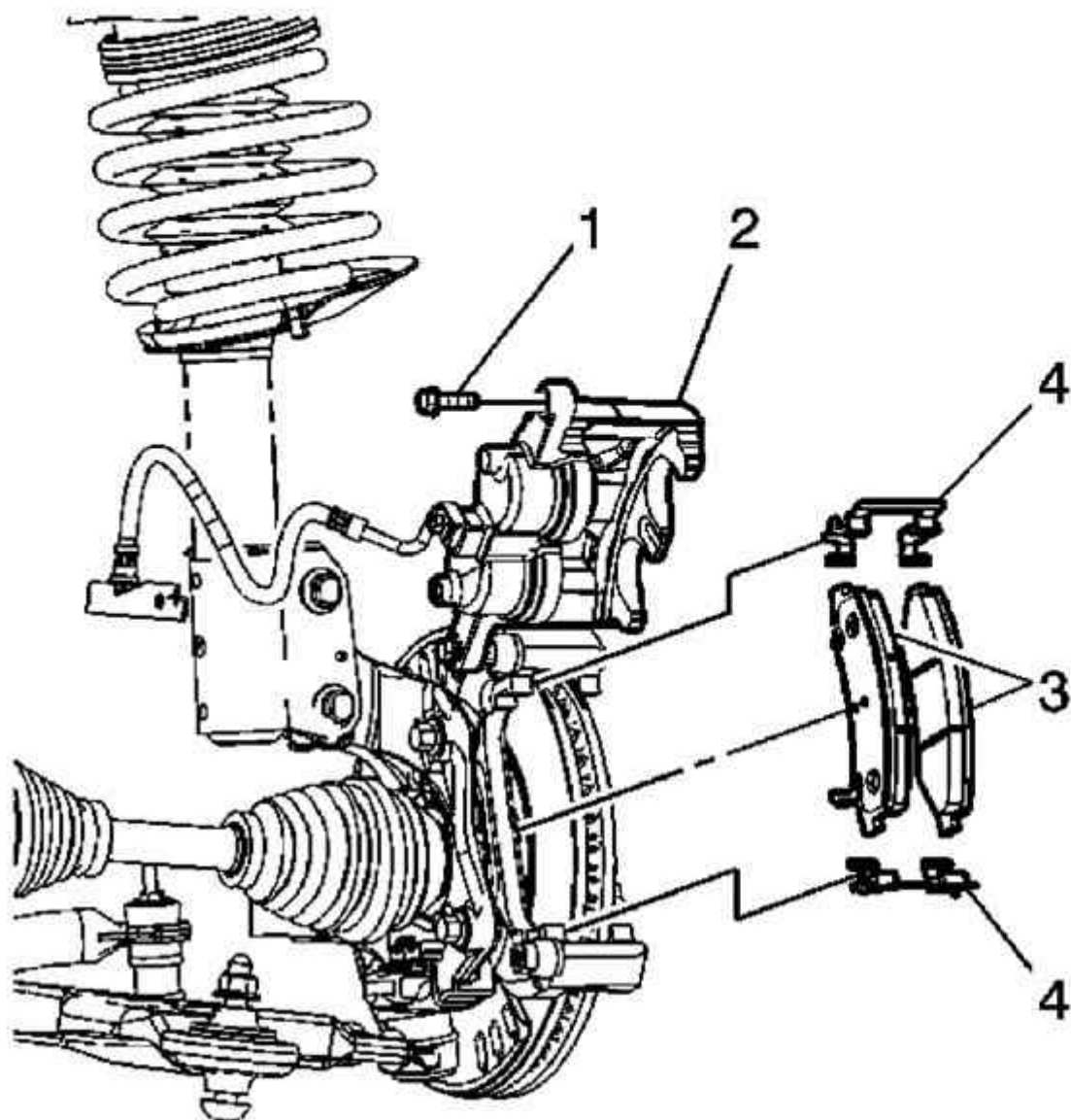


Fig. 13: Replacing Front Brake Pads
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
CAUTION: Refer to <u>Brake Fluid Irritant Caution</u> . CAUTION: Refer to <u>Brake Dust Caution</u> . NOTE: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak. Preliminary Procedures 1. Inspect the fluid level in the brake master cylinder reservoir. 2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, no brake fluid needs to be removed before proceeding. 3. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove brake fluid to the midway point before proceeding. 4. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .	

5. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .

1	Guide Pin Bolt NOTE: Refer to <u>Fastener Notice</u> . Tighten: 36 N.m (26 lb ft)
2	Brake Caliper Procedure 1. Rotate the brake caliper up and to the rear until it rests on the mounting bracket and support with heavy mechanics wire or equivalent. 2. Place a block of wood or an old disc brake pad against the brake caliper pistons. 3. Using a brake pad spreader or equivalent tool, slowly compress the brake caliper pistons squarely into the caliper bores.
3	Brake Pad Procedure 1. If installing the original brake pads, note the brake pad location for proper installation. 2. When replacing the brake pads, ensure the brake pad with the wear indicator is positioned inboard of the brake rotor and the wear indicator is pointing down. 3. Clean the friction surfaces of the brake rotor with denatured alcohol.
4	Spring Retainer (Qty: 2) Procedure 1. If replacing the brake pads, DO NOT reuse the spring retainers. Install NEW spring retainers. 2. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance. 3. Slowly release the brake pedal. 4. Wait 15 seconds, then repeat steps 2-3 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and the brake pads. 5. Fill the master cylinder reservoir to the proper level. Refer to <u>Master Cylinder Reservoir Filling</u> . 6. Burnish the pads and rotors. Refer to <u>Brake Pad and Rotor Burnishing</u>.

REAR DISC BRAKE PADS REPLACEMENT (JL9)**Removal Procedure****CAUTION: Refer to Brake Dust Caution .**

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, then no brake fluid needs to be removed from the reservoir before proceeding. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, then remove brake fluid to the midway point before proceeding.

3. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle**.
4. Remove the rear tire and the wheel assembly. Refer to **Tire and Wheel Removal and Installation**.
5. Install a hand tightened lug nut to retain the rotor to the hub.

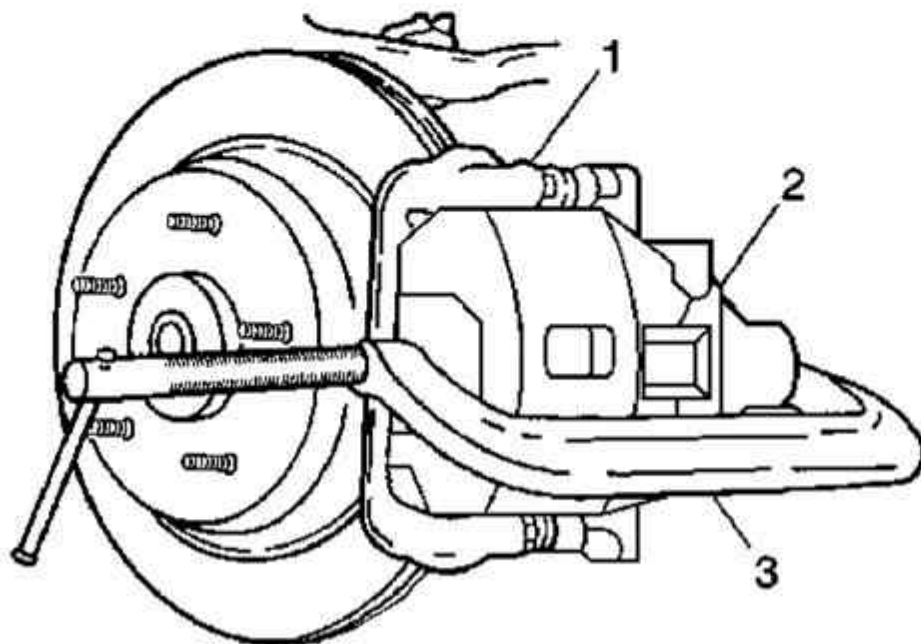


Fig. 14: Pushing In Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

6. Compress the caliper piston enough for clearance. Use a C-clamp (3).

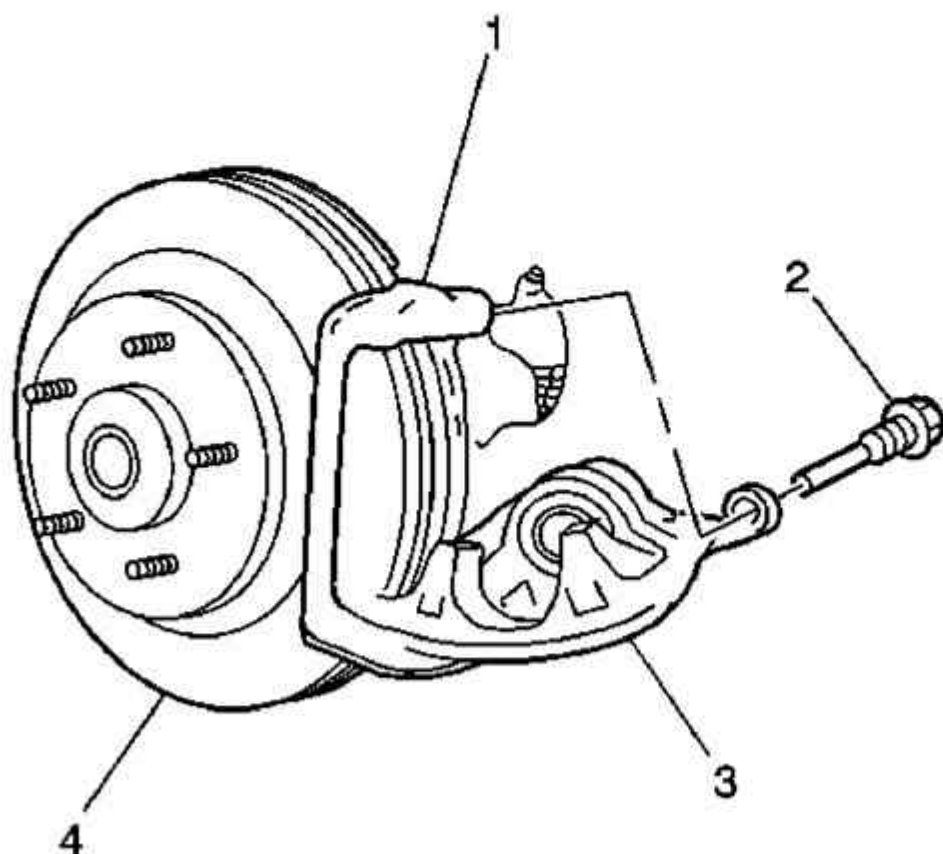


Fig. 15: View Of Upper Caliper Bolt - Rear
Courtesy of GENERAL MOTORS CORP.

7. Remove the upper caliper bolt (2).

NOTE: Use care to avoid damaging pin boot when rotating caliper.

NOTE: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

8. Pivot the caliper down in order to access the pads. It is not necessary to remove the caliper.

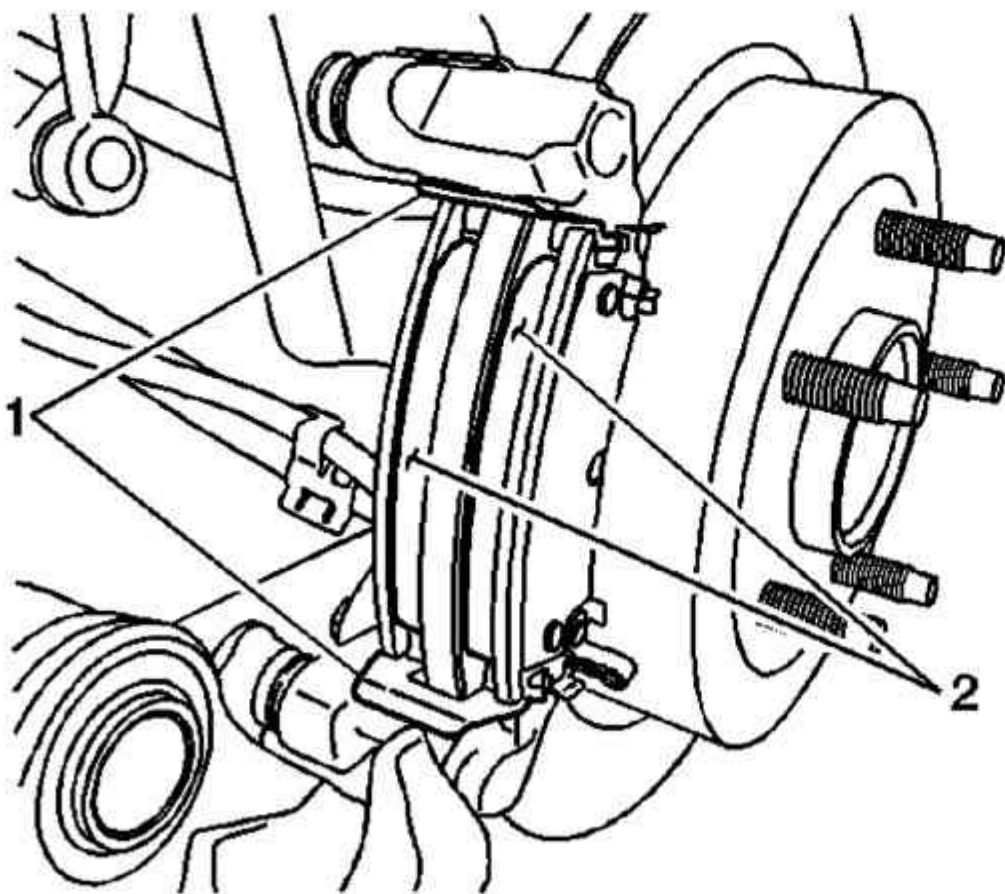


Fig. 16: Identifying Rear Brake Pads & Clips
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake pads (2) from the caliper bracket.
10. Remove the 2 pad clips (1) from the caliper bracket.
11. Inspect the caliper mounting hardware for the following conditions:
 - Cuts
 - Tears
 - Deterioration

Replace any hardware if damage exists. Refer to **Rear Disc Brake Mounting and Hardware Inspection**.

12. Inspect the caliper dust boot for the following conditions:
 - Cuts
 - Tears
 - Deterioration

Replace the caliper dust boot if damage exists. Refer to **Brake Caliper Inspection**.

13. Inspect the caliper bolts for corrosion or damage. If corrosion exists, use new caliper bolts when installing the caliper.

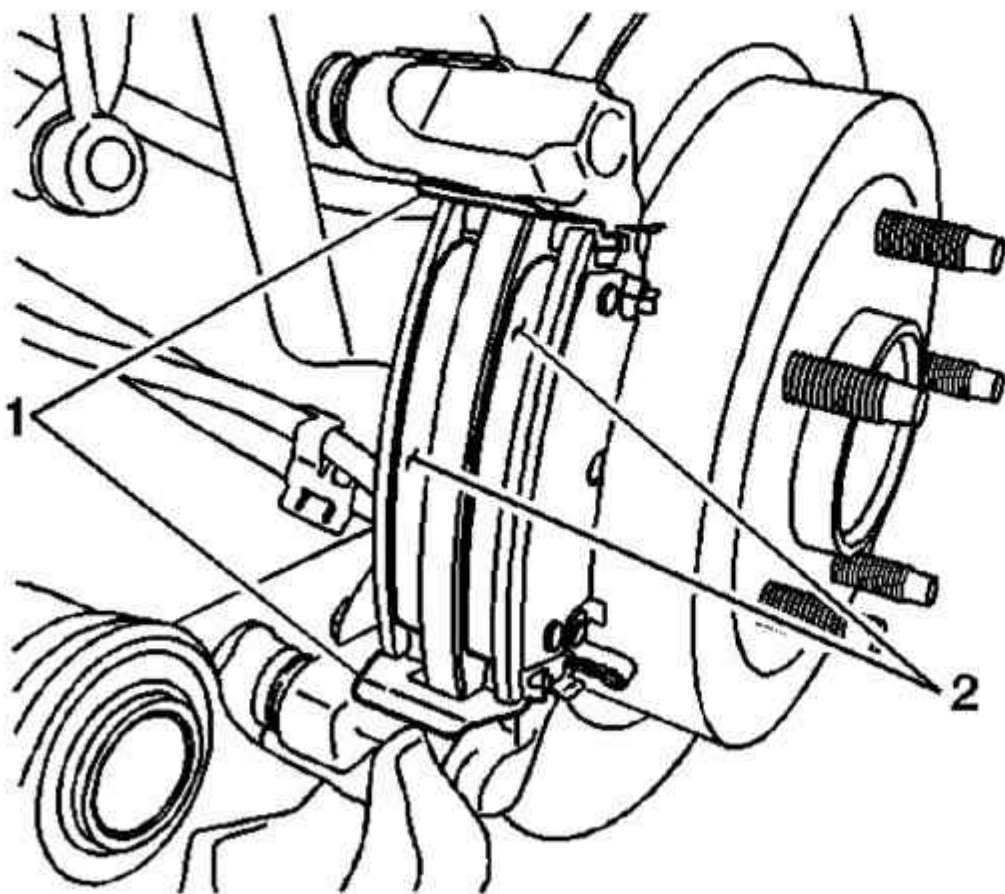


Fig. 17: Identifying Rear Brake Pads & Clips
Courtesy of GENERAL MOTORS CORP.

1. Bottom the piston into the caliper bore.

Use a C-clamp before installing new brake pads in order to compress the piston. Use an old brake pad or wooden block across the face of the piston to avoid damage to the piston or the caliper boot.

2. Install the 2 retainers (1) to the caliper bracket.

IMPORTANT: The wear sensor is on the outside pad. The sensor is positioned at the trailing or downward edge of the pad during forward wheel rotation.

3. Install the pads (2) to the caliper bracket.

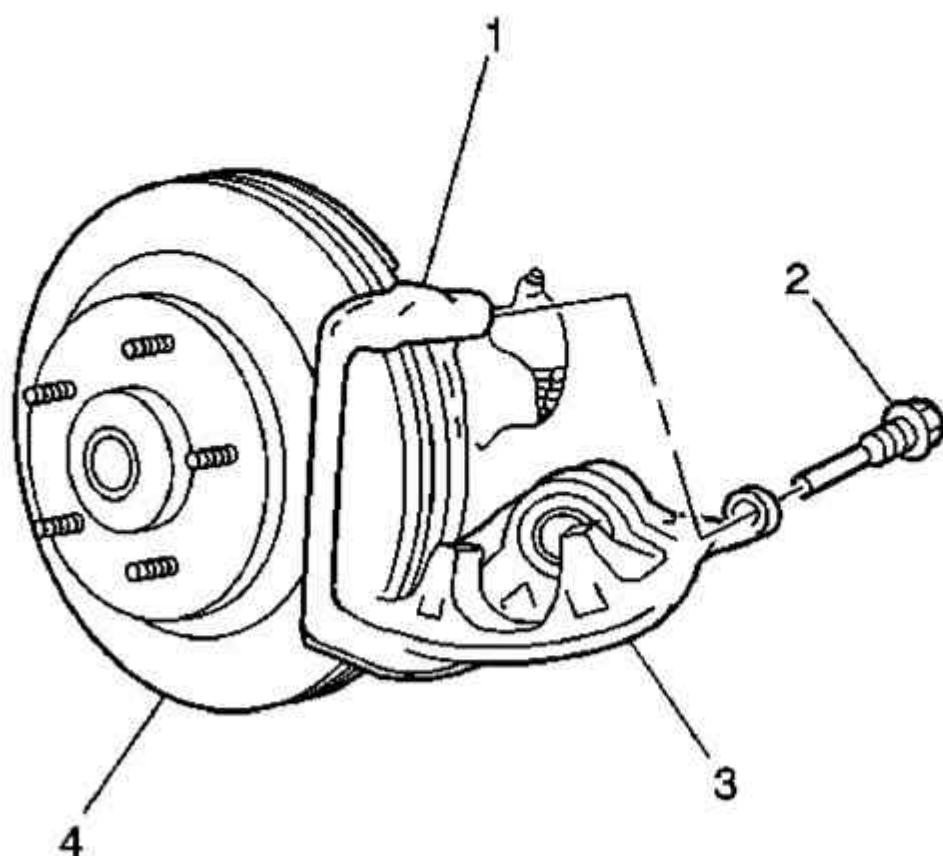


Fig. 18: View Of Upper Caliper Bolt - Rear
Courtesy of GENERAL MOTORS CORP.

NOTE: Use care to avoid damaging pin boot when rotating caliper.

4. Swing the caliper (3) upward in position around the pads.
5. Lubricate the bolt and the bolt boot. Use silicone grease.

NOTE: Refer to Fastener Notice .

6. Install the upper caliper bolt (2).

Tighten: Tighten the caliper bolt to 44 N.m (32 lb ft).

7. Remove the wheel lug nut retaining the rotor to the hub.
8. Install the rear tire and the wheel assembly. Refer to Tire and Wheel Removal and Installation . Align the previous marks on the wheel, hub and bearing.
9. Lower the vehicle.
10. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
11. Slowly release the brake pedal.
12. Wait 15 seconds, then repeat steps 10 and 11 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads.
13. Fill the brake master cylinder reservoir to the proper level. Refer to Master Cylinder Reservoir Filling .
14. Burnish the pads and rotors. Refer to Brake Pad and Rotor Burnishing.

REAR DISC BRAKE PADS REPLACEMENT (J65)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, no brake fluid needs to be removed from the reservoir before proceeding.
3. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove brake fluid to the midway point before proceeding.
4. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
5. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
6. Release the wheel speed sensor wire harness from the lower control arm.

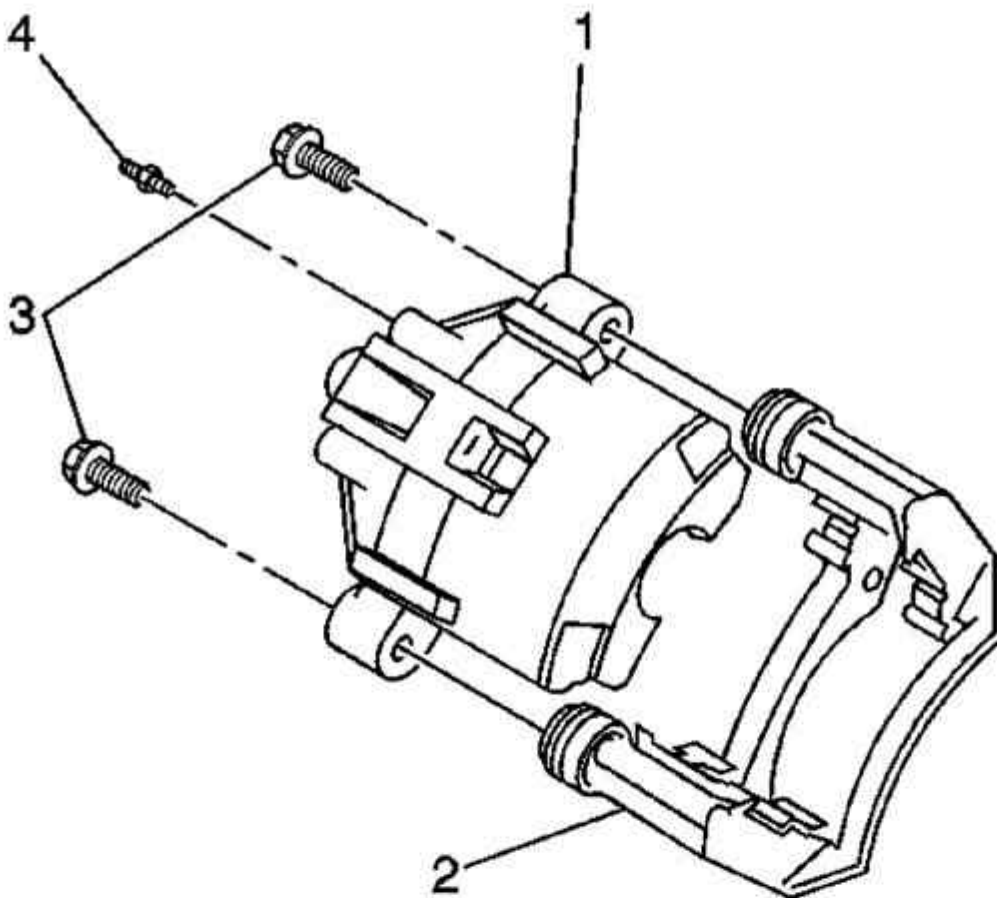


Fig. 19: Locating Brake Caliper Bolts
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake caliper bolts (3) from the caliper (1).

NOTE: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause

damage to the brake hose and in turn may cause a brake fluid leak.

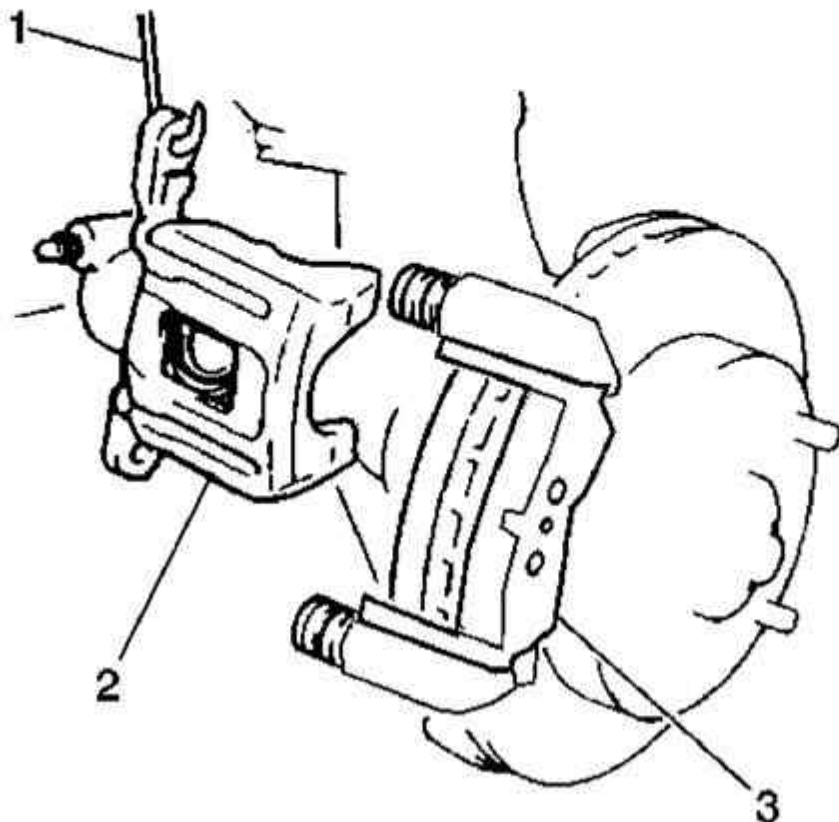


Fig. 20: View Of Brake Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

8. Using heavy mechanics wire (1) or equivalent, position and support the brake caliper (2) aside.
9. Remove the disc brake pads from the brake caliper bracket (3).
10. Inspect the brake caliper guide pin seals. Refer to **Rear Disc Brake Hardware Replacement**.
11. Clean the brake pad hardware mating surfaces on the caliper bracket of any debris or corrosion.
12. Inspect the brake pad retainer clips for damage and replace, if necessary.
13. Inspect the caliper piston boot for damage and replace, if necessary. Refer to **Rear Brake Caliper Overhaul (JL9)** or **Rear Brake Caliper Overhaul (J65)**.

Installation Procedure

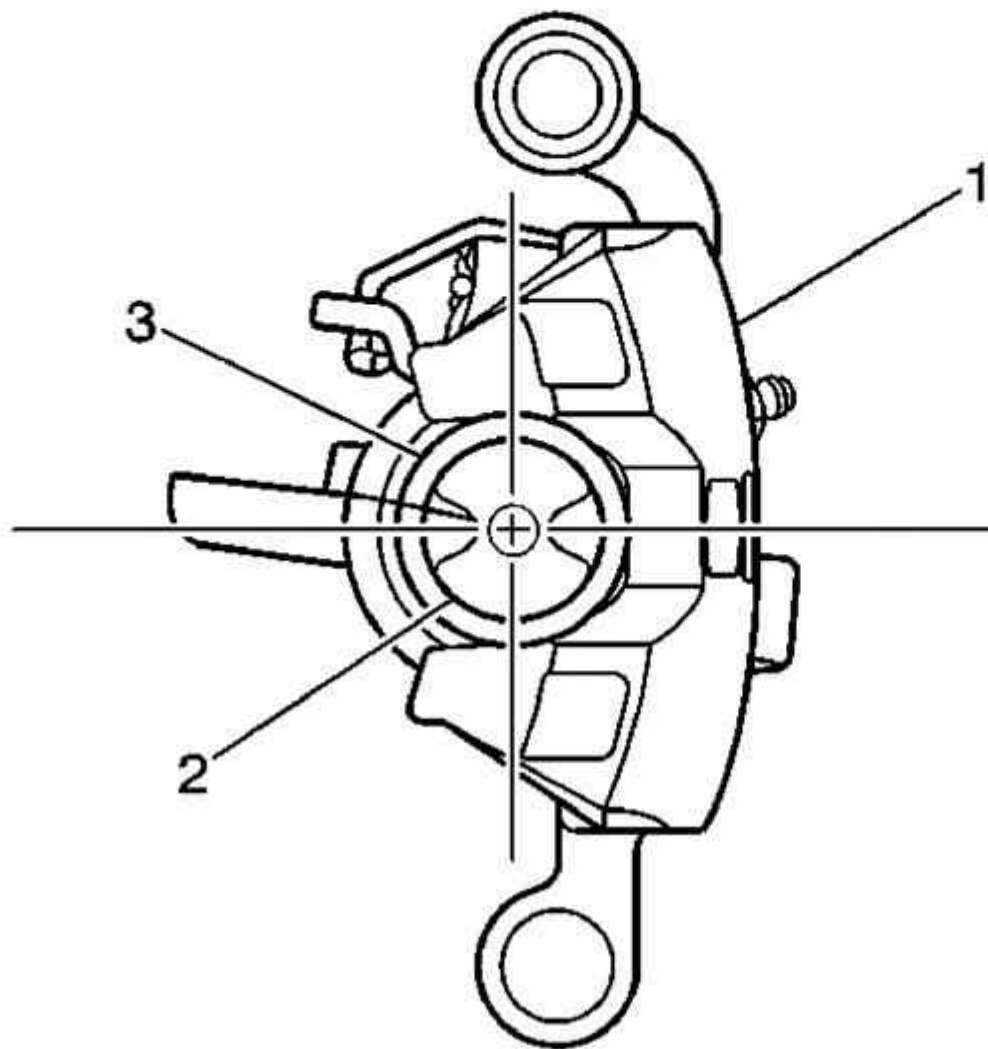


Fig. 21: Illustrating Rotating Piston In Caliper Body
Courtesy of GENERAL MOTORS CORP.

1. Retract the brake caliper piston (2) into the brake caliper bore. Use a suitable spanner type wrench and turn the piston clockwise until it bottoms out fully in the brake caliper (Mac® Tools DBC 25 C 2500 MA Disc Brake Caliper Tool Set, or equivalent).
2. Rotate the caliper piston until the notches on the piston face align with the pins on the back of the inboard brake pad.
3. Install the brake pad retainers to the brake caliper bracket.
4. Install the brake pads to the brake caliper bracket.

Ensure the brake pad equipped with the wear sensor is placed on the inboard side of the brake rotor.

5. Install the brake caliper to the caliper bracket.

Do not damage the brake caliper guide pin seals.

NOTE: Refer to Fastener Notice .

6. Insert the brake caliper guide pin bolts.

Tighten: Tighten the bolts to 34 N.m (25 lb ft).

7. Install the wheel speed sensor wire harness to the lower control arm.
8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation**.
9. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle**.
10. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
11. Slowly release the brake pedal.
12. Wait 15 seconds, then repeat steps 10-11 until the brake pedal becomes firm. This will properly seat the brake caliper pistons and brake pads.
13. Fill the brake master cylinder reservoir to the proper level. Refer to **Master Cylinder Reservoir Filling**.
14. Burnish the pads and rotors. Refer to **Brake Pad and Rotor Burnishing**.

BRAKE PAD AND ROTOR BURNISHING

CAUTION: Refer to **ROAD TEST CAUTION**.

Burnishing the brake pads and brake rotors is necessary in order to ensure that the braking surfaces are properly prepared after service has been performed on the disc brake system.

This procedure should be performed whenever the disc brake rotors have been refinished or replaced, and/or whenever the disc brake pads have been replaced.

1. Select a smooth road with little or no traffic.
2. Accelerate the vehicle to 48 km/h (30 mph).

IMPORTANT: Use care to avoid overheating the brakes while performing this step.

3. Using moderate to firm pressure, apply the brakes to bring the vehicle to a stop. Do not allow the brakes to lock.
4. Repeat steps 2 and 3 until approximately 20 stops have been completed. Allow sufficient cooling periods between stops in order to properly burnish the brake pads and rotors.

FRONT BRAKE CALIPER REPLACEMENT

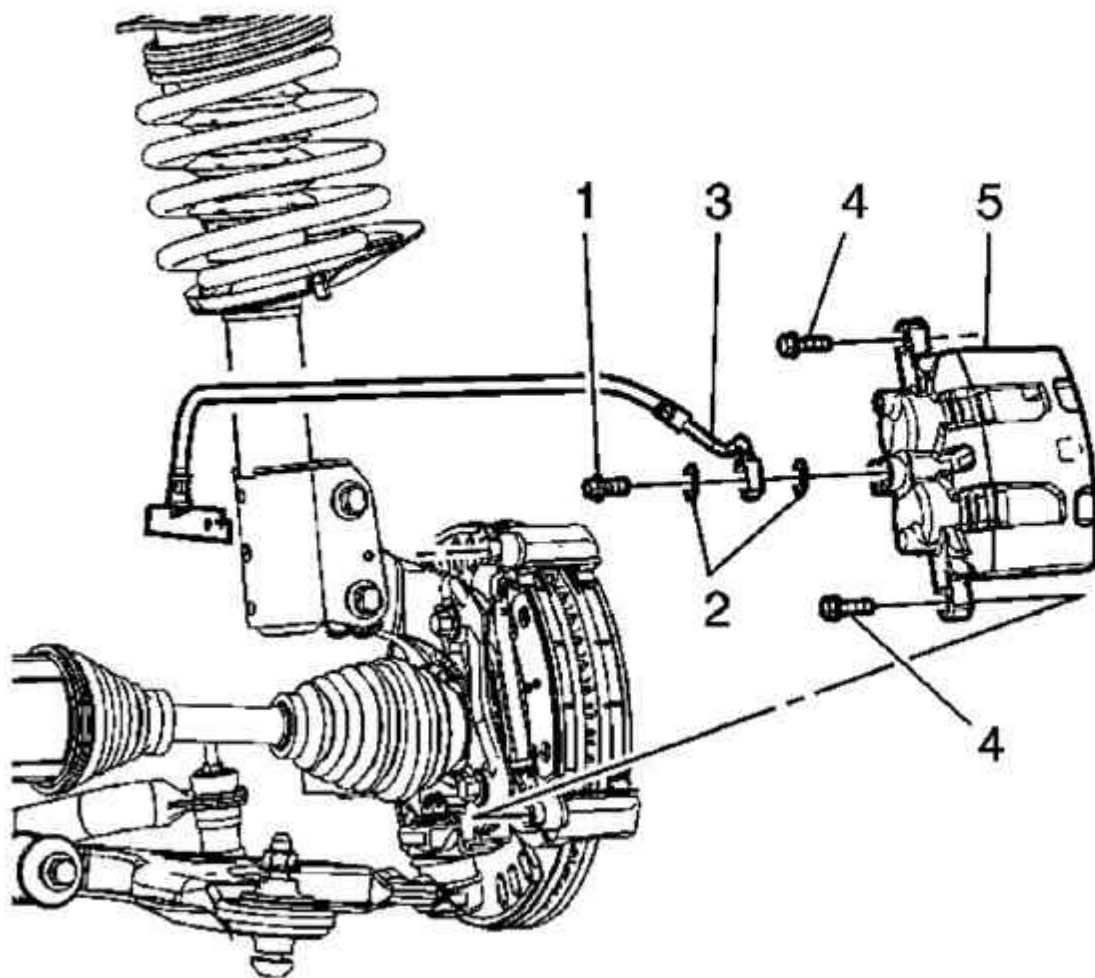


Fig. 22: Replacing Front Brake Caliper
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
CAUTION: Refer to <u>Brake Fluid Irritant Caution</u> .	
CAUTION: Refer to <u>Brake Dust Caution</u> .	
Preliminary Procedures	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Remove the tire and wheel. Refer to <u>Tire and Wheel Removal and Installation</u> .	
1	Brake Hose Fitting Bolt NOTE: Refer to <u>Fastener Notice</u> . Tighten: 54 N.m (40 lb ft)
2	Brake Hose Fitting Gasket (Qty: 2) Tip: DO NOT reuse the brake hose fitting gaskets. Install NEW gaskets.
3	Brake Hose Procedure 1. Cap or plug the brake hose fitting to prevent brake fluid leakage and contamination. 2. Relocate the brake hose to the side. Secure the brake hose with the fitting facing UP at

	the highest point without damaging the brake hose.
4	Guide Pin Bolt (Qty: 2) Tighten: 36 N.m (27 lb ft)
5	Brake Caliper Procedure 1. Bleed the hydraulic brake system. Refer to <u>Hydraulic Brake System Bleeding (Manual)</u> or <u>Hydraulic Brake System Bleeding (Pressure)</u> . 2. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance. 3. Slowly release the brake pedal. 4. Wait 15 seconds, then repeat steps 2-3 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads. 5. Fill the master cylinder reservoir to the proper level. Refer to <u>Master Cylinder Reservoir Filling</u> . 6. Burnish the pads and rotors. Refer to <u>Brake Pad and Rotor Burnishing</u>.

REAR BRAKE CALIPER REPLACEMENT (JL9)

Removal Procedure

CAUTION: Refer to **Brake Dust Caution** .

CAUTION: Refer to **Brake Fluid Irritant Caution** .

NOTE: Refer to **Brake Fluid Effects on Paint and Electrical Components Notice** .

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, then no brake fluid needs to be removed from the reservoir before proceeding. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, then remove brake fluid to the midway point before proceeding.
3. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
4. Remove the rear tire and the wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
5. Hand tighten 2 wheel lug nuts to retain the rotor to the hub.

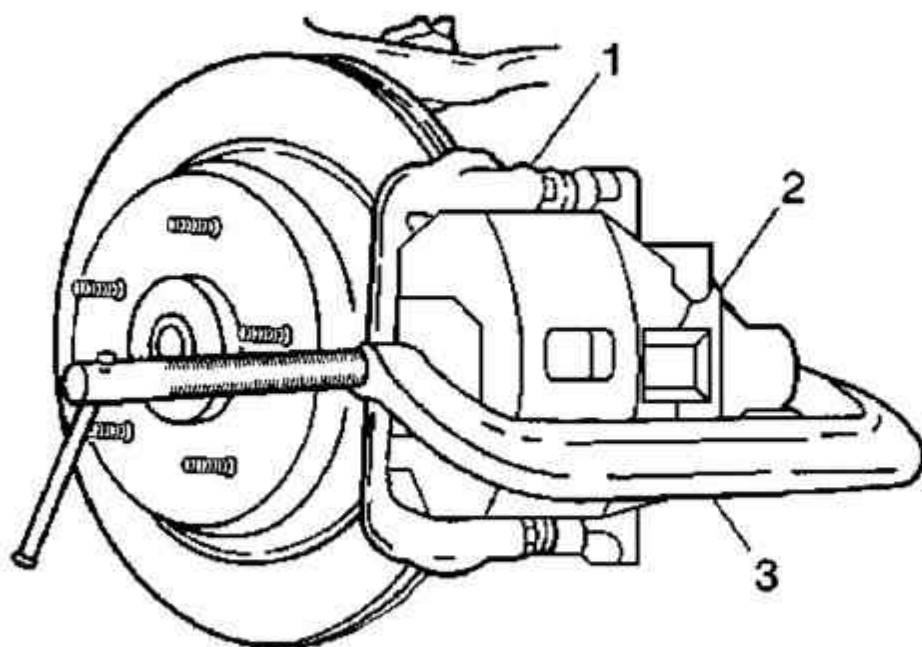


Fig. 23: Pushing In Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

6. Install a large C-clamp (3) over the top of the brake caliper (2) and against the back of the outboard brake pad.
7. Tighten the C-clamp (3) until the caliper piston is pushed into the caliper bore enough to slide the caliper off the rotor.
8. Remove the C-clamp (3) from the caliper.

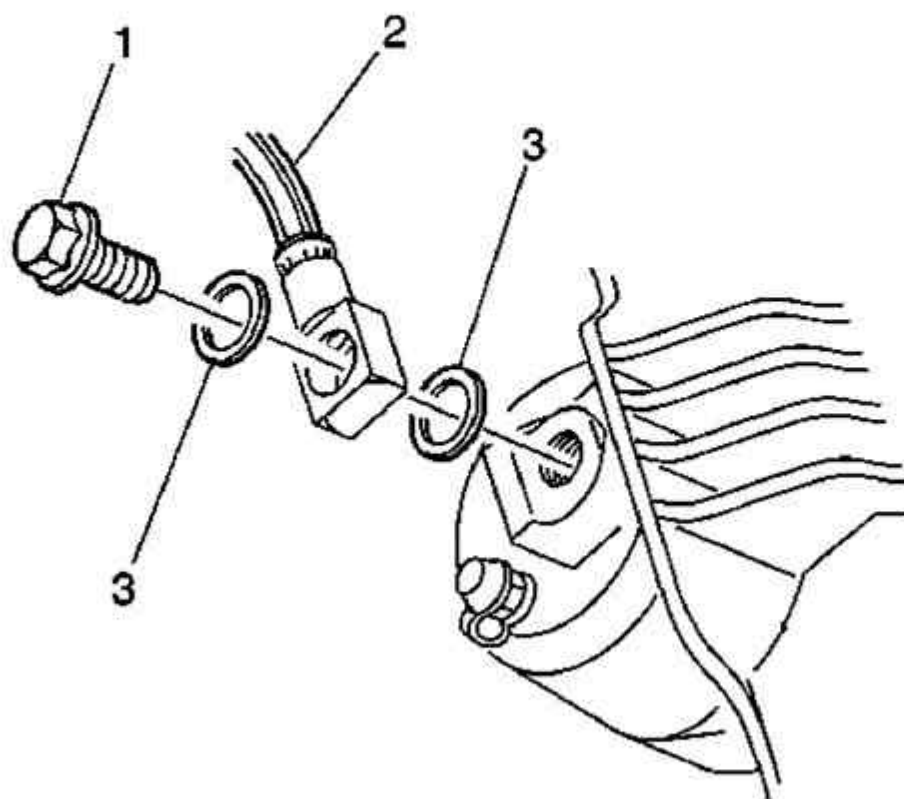


Fig. 24: Identifying Brake Hose & Components
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake hose-to-caliper bolt (1) from the caliper.

Discard the 2 copper brake hose gaskets (3). These gaskets may be stuck to the brake caliper and/or the brake hose end.

10. Plug the opening in the rear brake hose (2) to prevent excessive brake fluid loss and contamination.

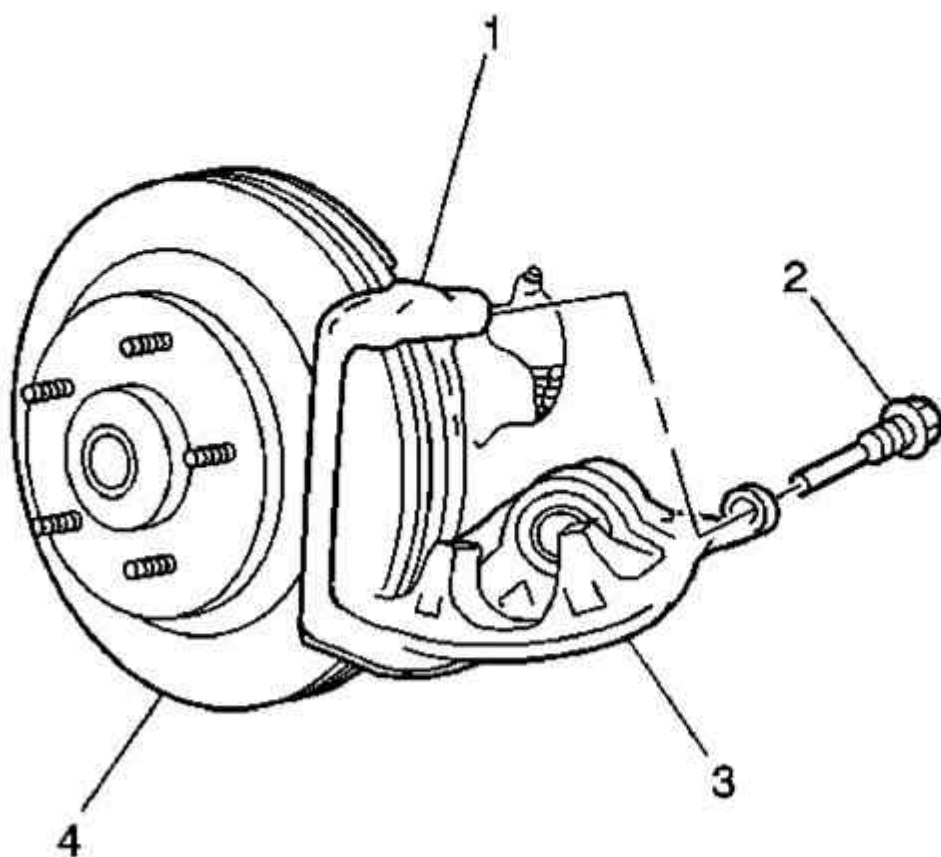


Fig. 25: View Of Upper Caliper Bolt - Rear
Courtesy of GENERAL MOTORS CORP.

11. Remove the caliper bolts (1 and 3).
12. Remove the caliper (3) from the rotor (4) and the caliper bracket (1).
13. Inspect the caliper bracket bolt boots on the caliper bracket for the following conditions:
 - Cuts
 - Tears
 - Deterioration

Replace any damaged caliper bracket bolt boots. Refer to **Rear Disc Brake Hardware Replacement**.

14. Inspect the caliper bolts (2) for corrosion or damage. If corrosion is found, use new caliper bolts, including bushings, when installing caliper.

Installation Procedure

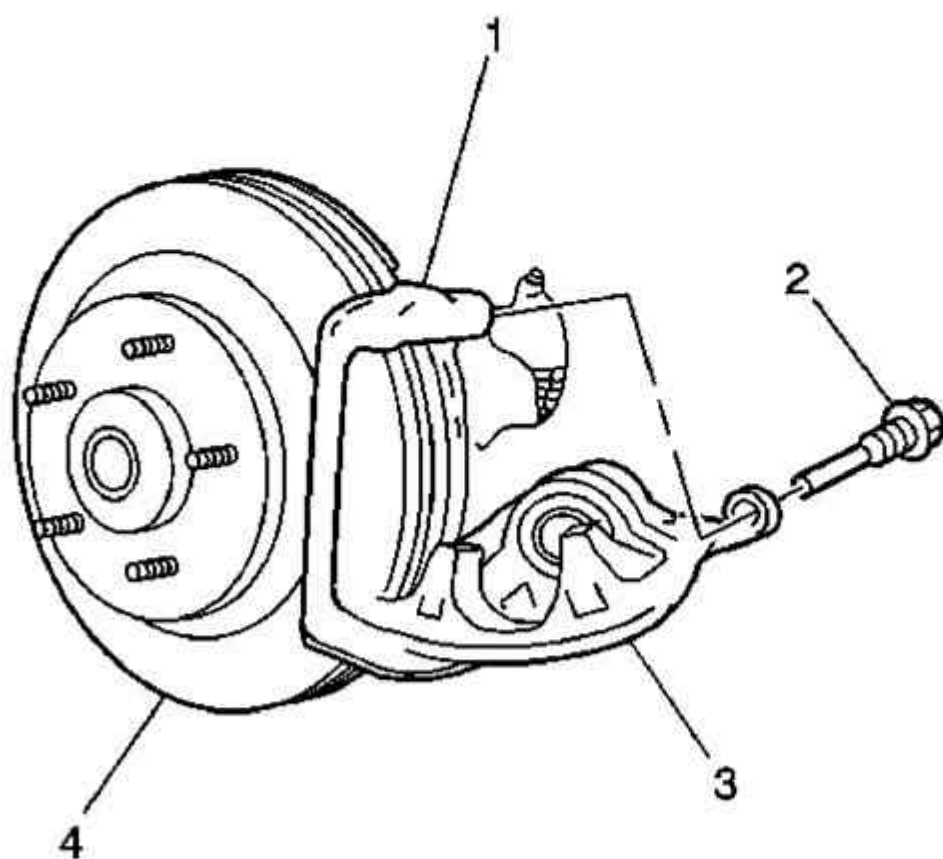


Fig. 26: View Of Upper Caliper Bolt - Rear
Courtesy of GENERAL MOTORS CORP.

1. Install the caliper (3) over the rotor (4) and the caliper bracket (1). Ensure that the bushings are in place.

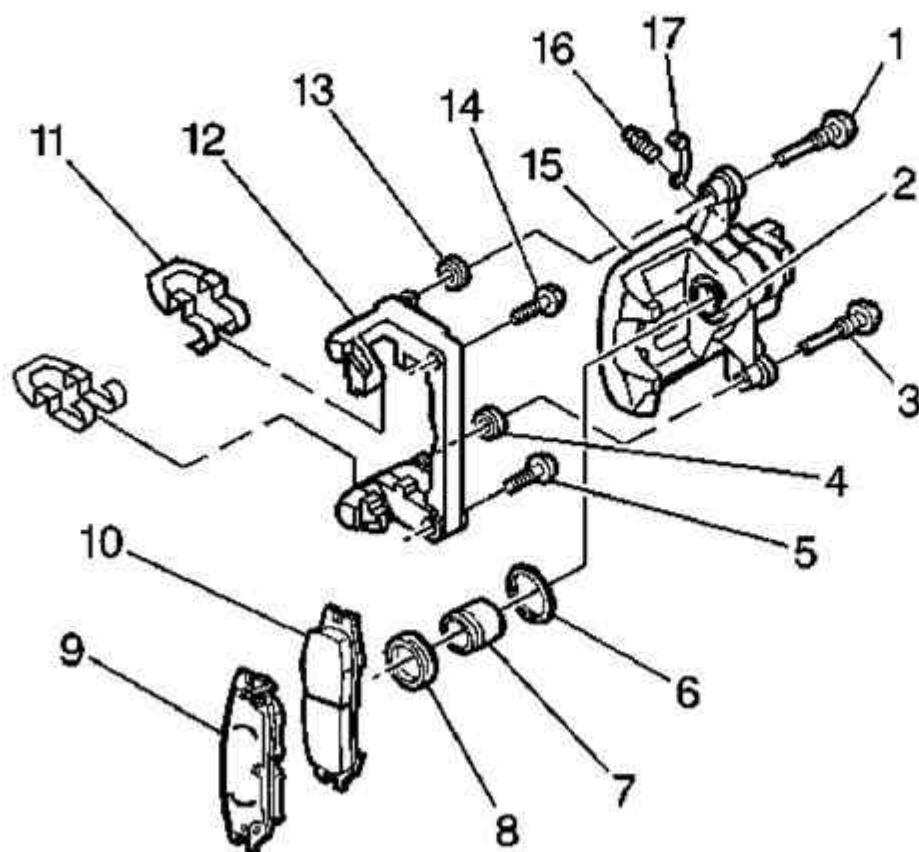


Fig. 27: Exploded View Of Rear Brake Caliper Components
Courtesy of GENERAL MOTORS CORP.

2. Lubricate the caliper bolts (1 and 3). Use silicone grease. Do not lubricate the threads.
3. Lubricate the 2 bolt boots (13 and 4) in the caliper bracket (12). Use silicone grease.

NOTE: Refer to Fastener Notice .

4. Install the caliper bolts (1 and 3). Ensure that the bolt boots fit securely in the groove of the caliper bolts. Be sure not to pinch or tear the boots. If the boots are damaged, they must be replaced.

Tighten: Tighten the bolts to 44 N.m (32 lb ft).

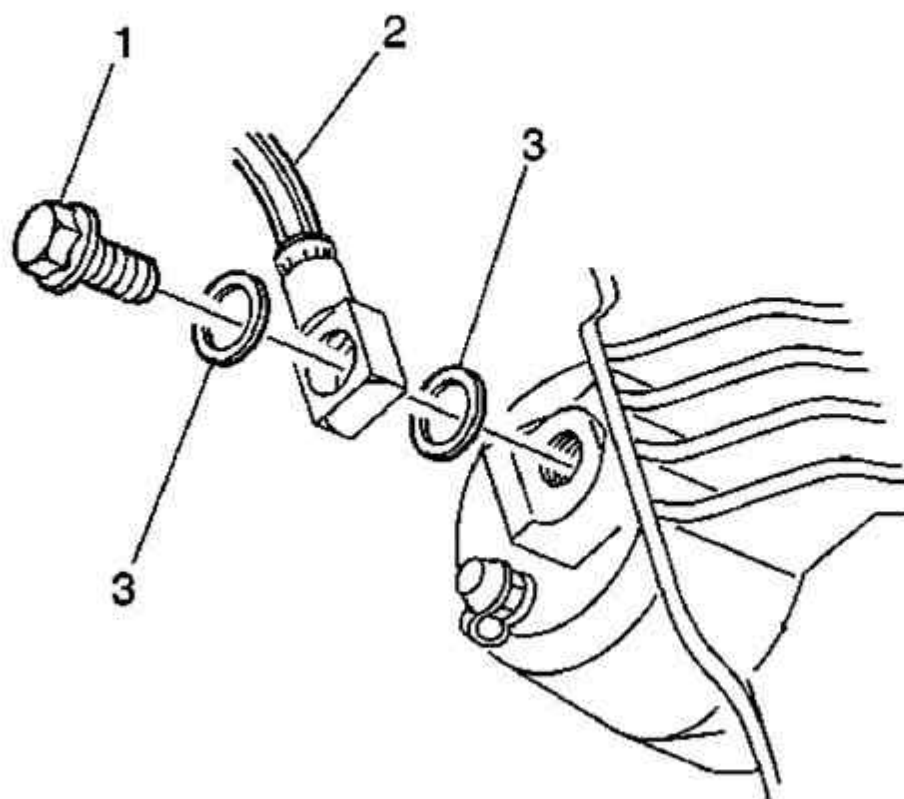


Fig. 28: Identifying Brake Hose & Components
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Install NEW copper gaskets.

5. Assemble the brake hose bolt (1) and the NEW copper brake hose gaskets (3) to the brake hose (2).
6. Install the brake hose-to-caliper bolt to the brake caliper.

Tighten: Tighten the bolt to 54 N.m (40 lb ft).

7. Remove the 2 wheel lug nuts retaining the rotor to the hub.
8. Install the rear tire and the wheel assembly. Refer to **Tire and Wheel Removal and Installation**.
9. Lower the vehicle.
10. Fill the master cylinder to the proper level with clean brake fluid. Refer to **Master Cylinder Reservoir Filling**.
11. Bleed the brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.
12. Inspect the hydraulic brake system for brake fluid leaks.

REAR BRAKE CALIPER REPLACEMENT (J65)

CAUTION: Refer to **Brake Dust Caution**.

CAUTION: Refer to **Brake Fluid Irritant Caution**.

Removal Procedure

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, no brake fluid needs to be removed from the reservoir before proceeding.
3. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove brake fluid to the midway point before proceeding.
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle**.
5. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation**.

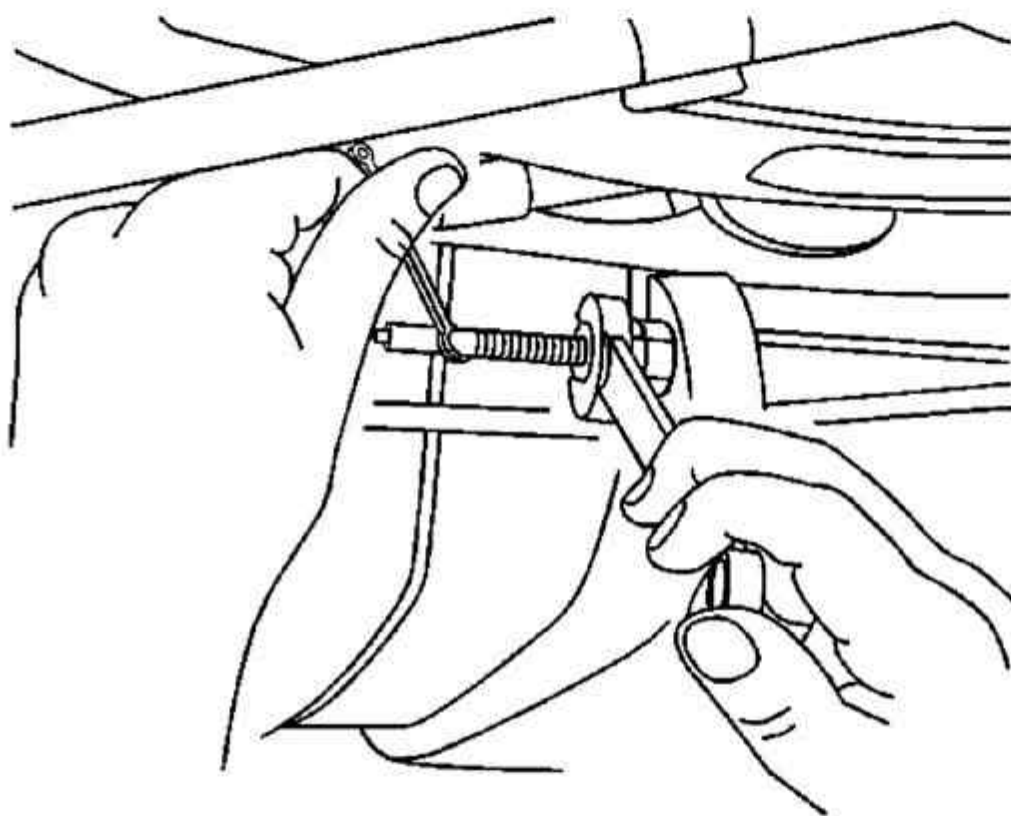


Fig. 29: Adjusting Park Brake Tension At Equalizer Assembly
Courtesy of GENERAL MOTORS CORP.

6. Release the park brake cable tension at the equalizer.

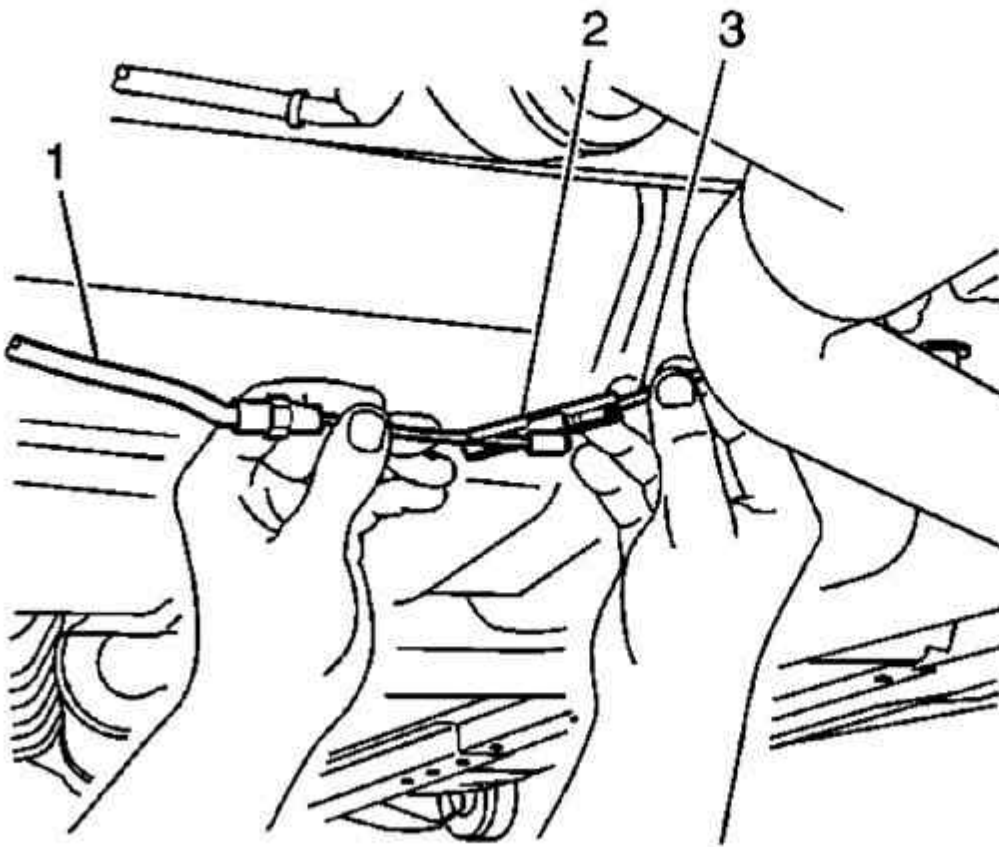


Fig. 30: View Of Front Brake Cable Connected To Right Rear Cable
Courtesy of GENERAL MOTORS CORP.

7. Disconnect the front and rear cables at the connector clip (2).
8. Disconnect the park brake cable from the park brake lever on the brake caliper.
9. Remove the park brake cable from the caliper bracket.

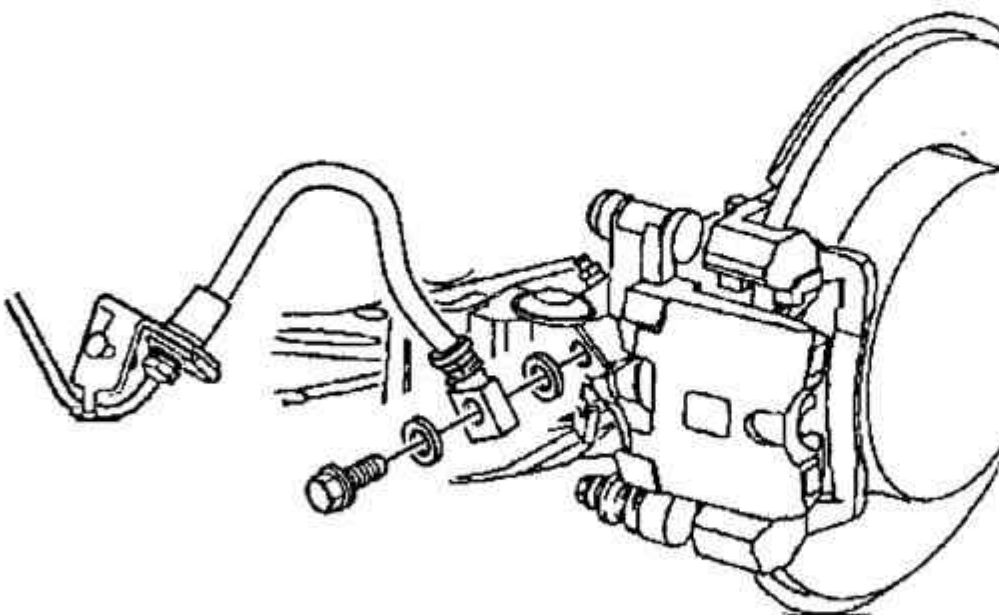


Fig. 31: Brake Hose To Caliper View
Courtesy of GENERAL MOTORS CORP.

10. Remove brake hose to caliper bolt.
11. Remove the brake hose from the brake caliper.
12. Remove and discard the 2 copper brake hose gaskets.
13. Plug the opening in the brake caliper and brake hose to prevent fluid loss contamination.
14. Remove the brake caliper bolts.
15. Remove the brake caliper.

Installation Procedure

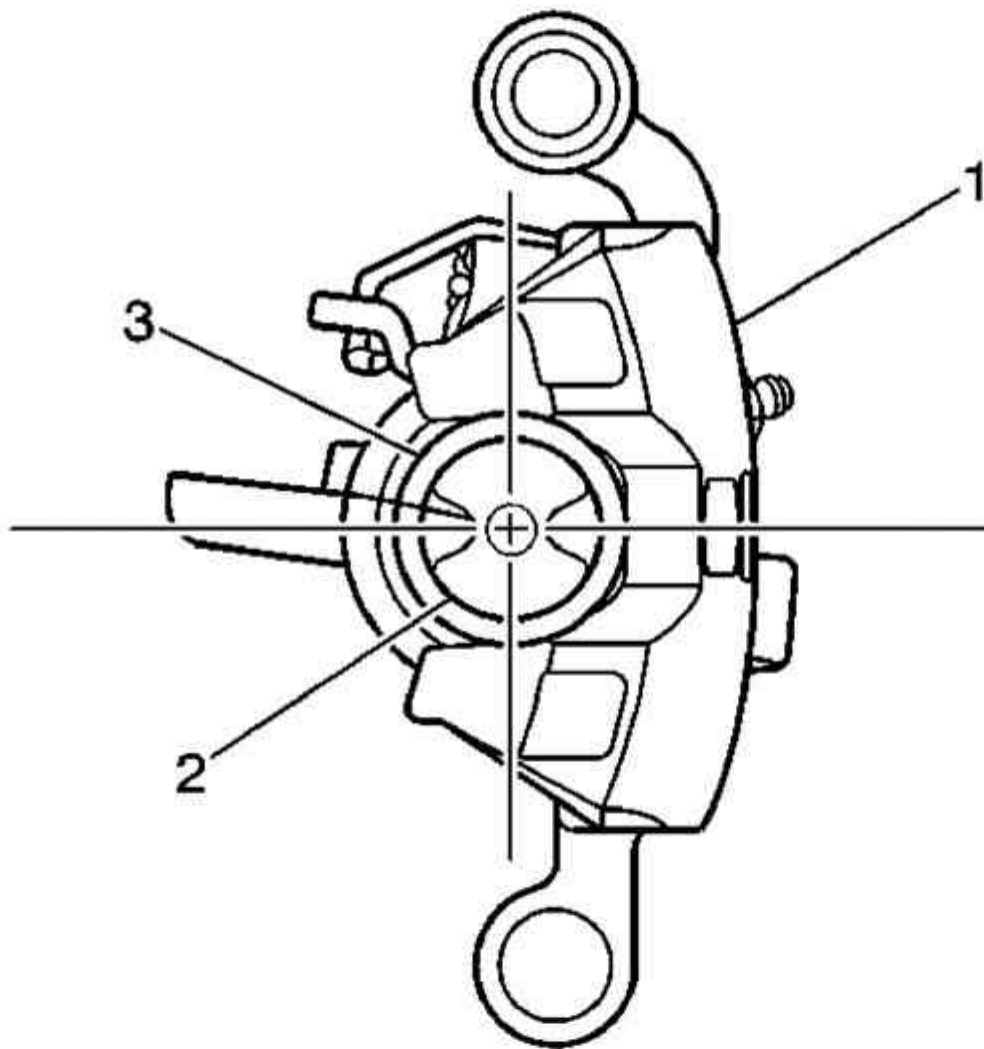


Fig. 32: Illustrating Rotating Piston In Caliper Body
Courtesy of GENERAL MOTORS CORP.

1. Align the indents on the piston face (2) to match the pin on the brake pad.
2. Inspect the bracket bolt guide assembly. Refer to **Rear Disc Brake Hardware Replacement**.
3. Inspect the brake pad hardware and replace if necessary.
4. Install the brake caliper (1) onto the caliper bracket insuring that the guide boots are not damaged.

NOTE: Refer to Fastener Notice .

5. Install the brake caliper bolts.

Tighten: Tighten the brake caliper bolts to 34 N.m (25 lb ft).

IMPORTANT: Install NEW copper brake hose gaskets.

6. Assemble the brake hose bolt and the NEW copper brake hose gaskets to the brake hose.

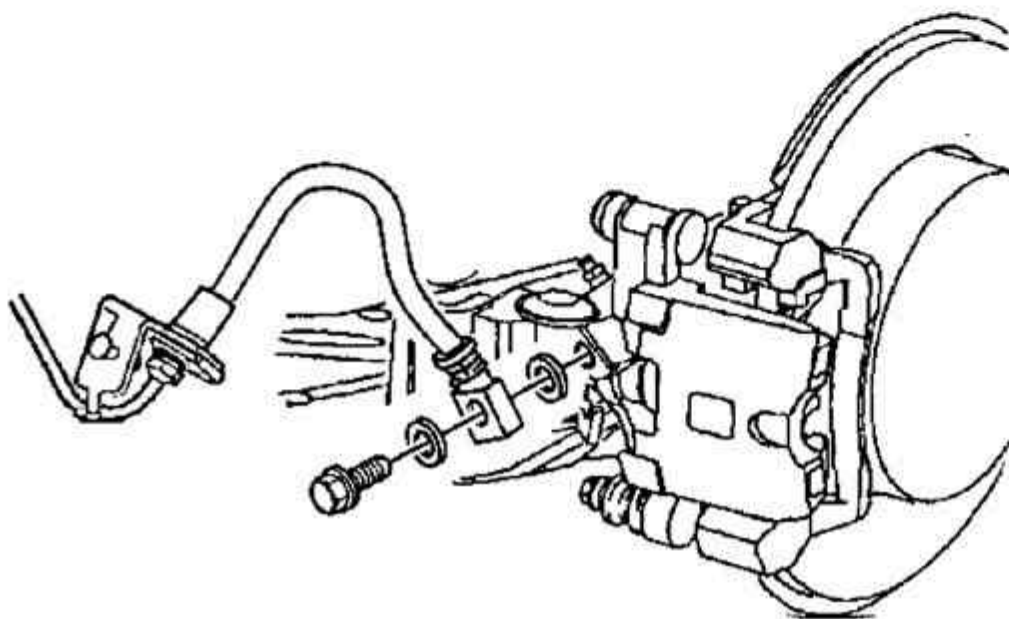


Fig. 33: Brake Hose To Caliper View
Courtesy of GENERAL MOTORS CORP.

7. Install the brake hose to caliper bolt to the brake caliper.

When installing the right rear brake hose to caliper, hold hose up while tightening.

Tighten: Tighten the brake hose to caliper bolt to 54 N.m (40 lb ft).

8. Install the park brake cable into the park brake bracket on the caliper.
9. Connect the park brake cable to the park brake lever on the brake caliper.

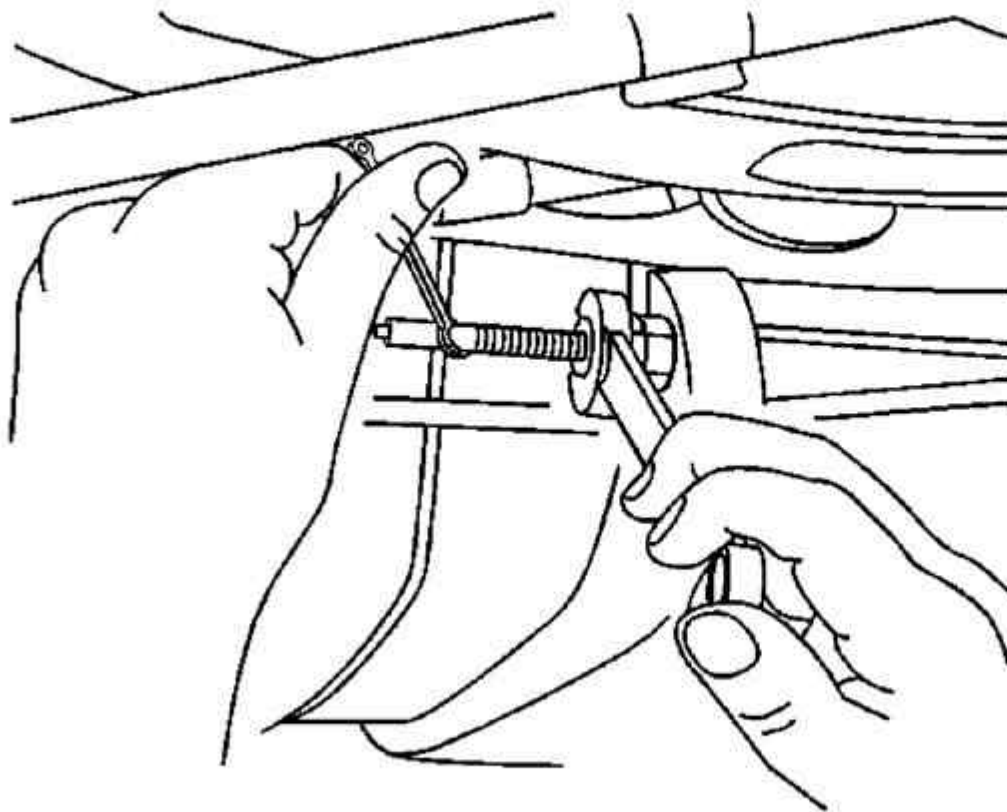


Fig. 34: Adjusting Park Brake Tension At Equalizer Assembly
Courtesy of GENERAL MOTORS CORP.

10. Bleed the hydraulic brake system. Refer to Hydraulic Brake System Bleeding (Manual) or Hydraulic Brake System Bleeding (Pressure).
11. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
12. Slowly release the brake pedal.
13. Wait 15 seconds, then repeat steps 11-12 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads.
14. Adjust the park brake system. Refer to Park Brake Adjustment (L26 and L32).
15. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.
16. Lower the vehicle.

FRONT BRAKE CALIPER OVERHAUL

Tools Required

J 35777 Caliper Piston Seal Installer. See Special Tools.

Removal Procedure

CAUTION: Refer to Brake Dust Caution.

CAUTION: Refer to Brake Fluid Irritant Caution.

NOTE: Refer to Brake Fluid Effects on Paint and Electrical Components Notice.

1. Remove the front brake caliper from the vehicle. Refer to Front Brake Caliper Replacement.

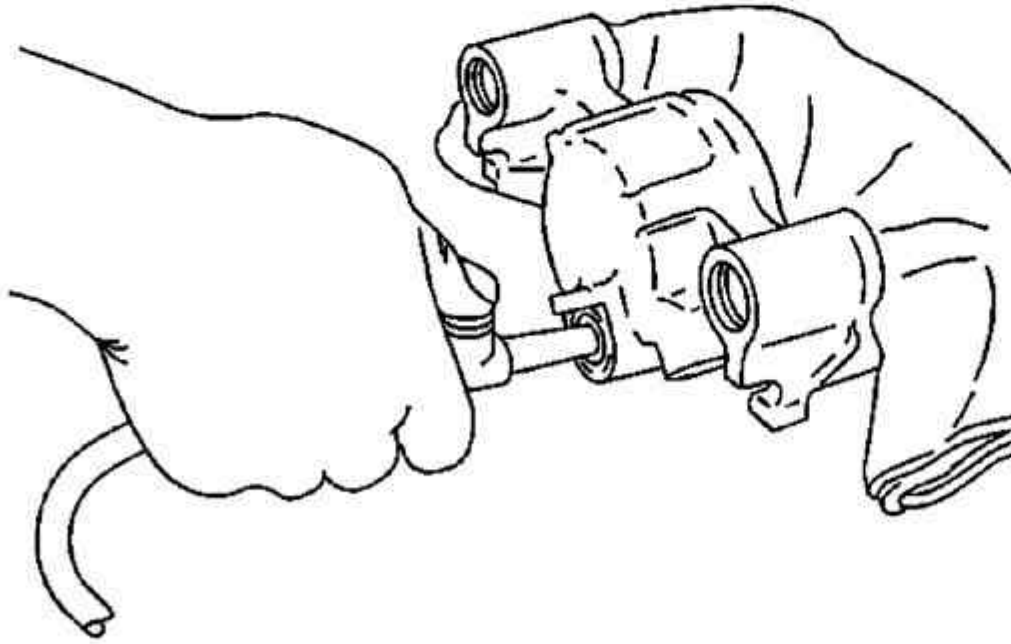


Fig. 35: Directing Low Pressure Compressed Air Into Rear Caliper Bore
Courtesy of GENERAL MOTORS CORP.

CAUTION: Do not place fingers in front of the caliper piston(s) in an attempt to catch or protect it when applying compressed air. The piston(s) can fly out with force and could result in serious bodily injury.

NOTE: Use clean cloths to pad interior of caliper housing during piston removal. Use just enough air to ease the pistons out of the bores. If the pistons are blown out, even with the padding provided, it may be damaged.

2. Remove the brake caliper piston from the caliper bore by directing low pressure compressed air into the caliper bore through the fluid inlet hole.

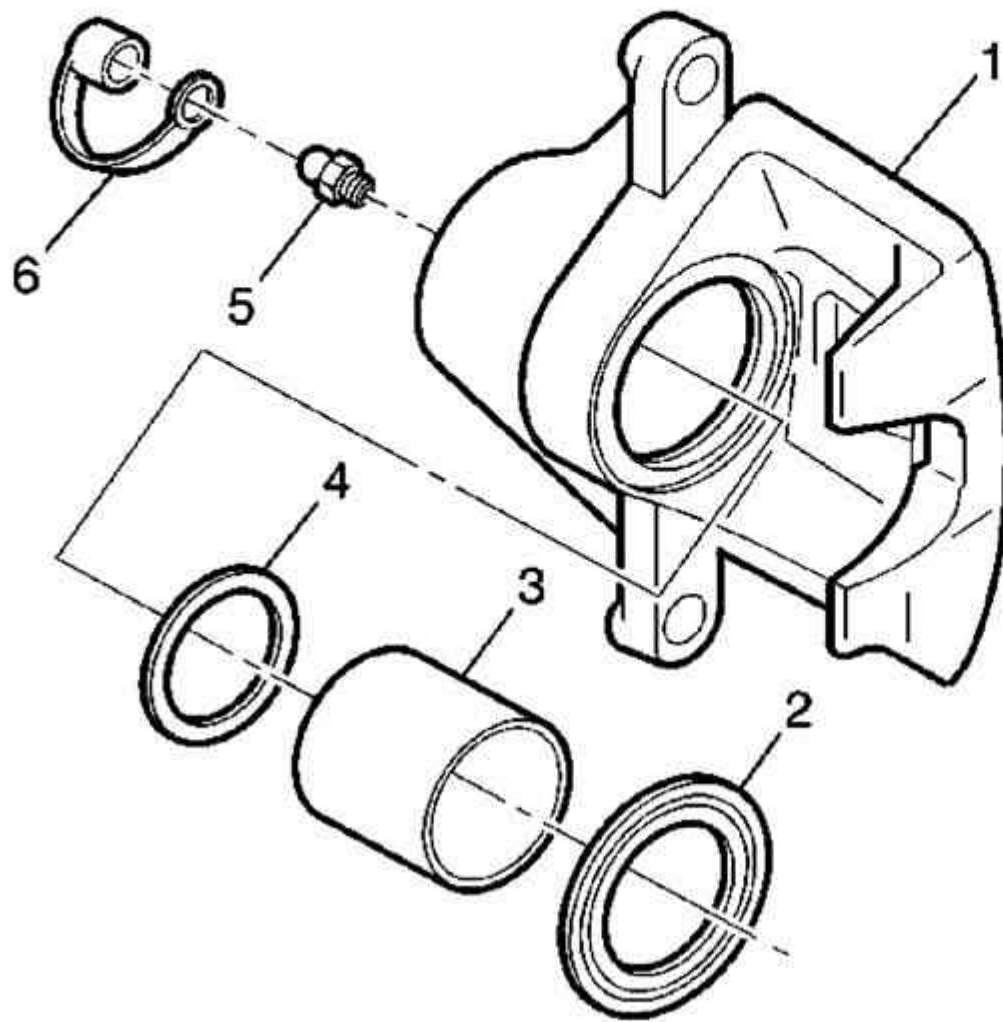


Fig. 36: Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

3. Using a small wooden or plastic tool, remove the caliper dust boot seal (2) from the seal counterbore in the caliper (1) and discard the boot seal.
4. Using a small wooden or plastic tool, remove the piston seal (4) from the caliper bore and discard the piston seal.
5. Remove the bleeder valve (5) and cap (6) from the caliper (1).

IMPORTANT: Do not use abrasives to clean the brake caliper piston.

6. Clean the brake caliper piston bore and seal counterbore, and the caliper piston with denatured alcohol, or equivalent.
7. Dry the caliper piston bore and counterbore, and the piston with non-lubricated, filtered air.
8. Inspect the caliper bore for cracks, scoring, pitting, excessive rust, and/or excessive corrosion.
9. If light rust or light corrosion are present in the caliper bore, attempt to remove the imperfection with a fine emery paper. If the imperfection cannot be removed, replace the caliper assembly.
10. If cracks, scoring, pitting, excessive rust, and/or excessive corrosion are present in the caliper bore, replace the caliper assembly.
11. Inspect the caliper piston for cracks, scoring, and/or damage to the finished surface area. Replace the caliper piston if any of these conditions exist.

Installation Procedure

1. Lubricate the new piston seal with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667) or equivalent, DOT-3 brake fluid from a clean, sealed brake fluid container.
2. Install the lubricated, new piston seal into the caliper bore.
3. Install the caliper piston into the caliper bore. Press the piston to the bottom of the bore.
4. Install the new piston dust boot seal over the piston.

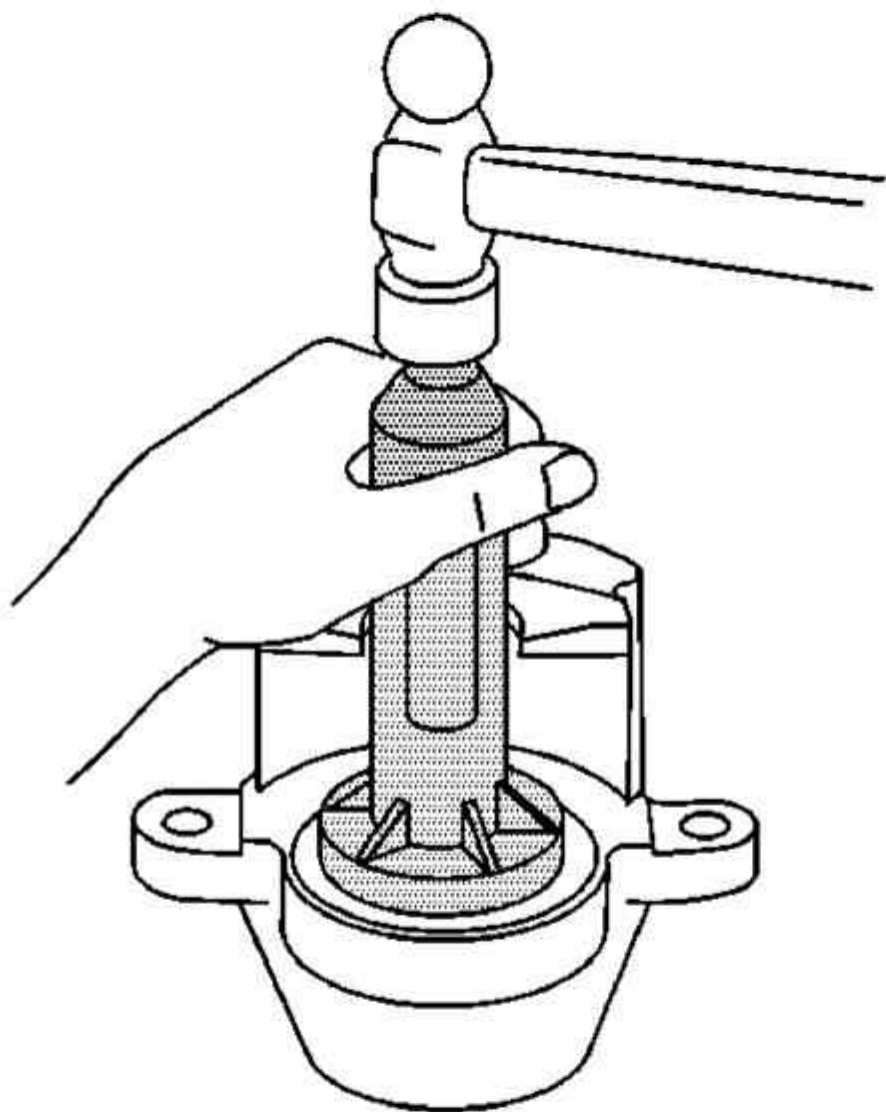


Fig. 37: Seating Caliper Boot
Courtesy of GENERAL MOTORS CORP.

5. Use **J 35777** to fully seat the caliper piston seal into the counterbore. See **Special Tools**.
6. Install the bleeder valve and cap to the caliper and tighten the valve securely.
7. Install the front brake caliper to the vehicle. Refer to **Front Brake Caliper Replacement**.

REAR BRAKE CALIPER OVERHAUL (JL9)**Removal Procedure**

CAUTION: Refer to Brake Dust Caution .

CAUTION: Refer to Brake Fluid Irritant Caution .

1. Remove the rear brake caliper from the vehicle. Refer to Rear Brake Caliper Replacement (JL9) or Rear Brake Caliper Replacement (J65).

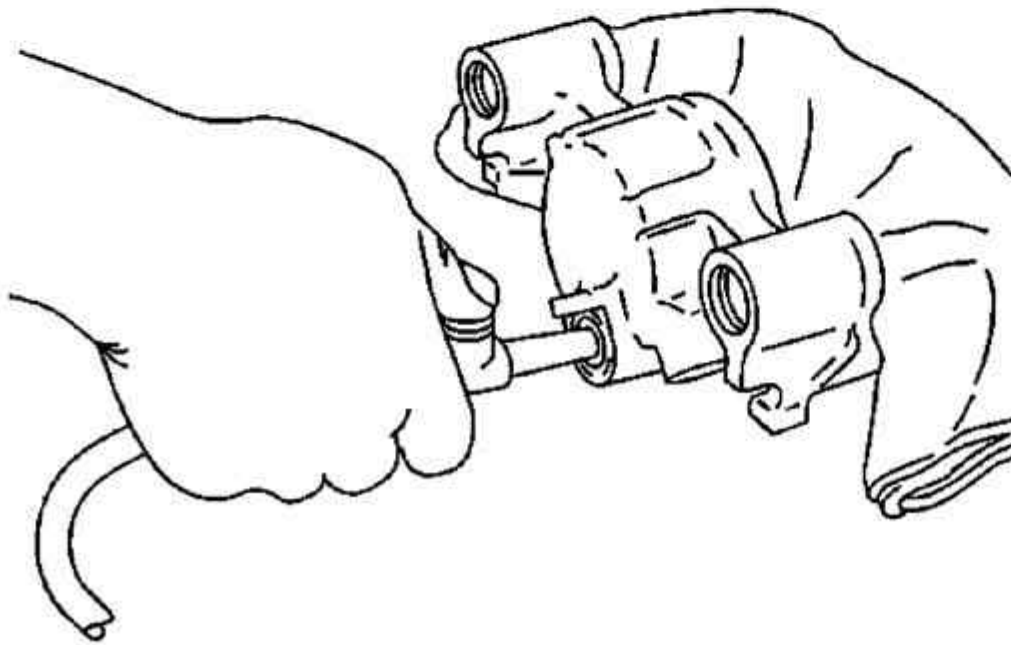


Fig. 38: Directing Low Pressure Compressed Air Into Rear Caliper Bore
Courtesy of GENERAL MOTORS CORP.

CAUTION: Do not place fingers in front of the caliper piston(s) in an attempt to catch or protect it when applying compressed air. The piston(s) can fly out with force and could result in serious bodily injury.

NOTE: Use clean cloths to pad interior of caliper housing during piston removal. Use just enough air to ease the pistons out of the bores. If the pistons are blown out, even with the padding provided, it may be damaged.

2. Remove the brake caliper piston from the caliper bore by directing low pressure compressed air into the caliper bore through the fluid inlet hole.

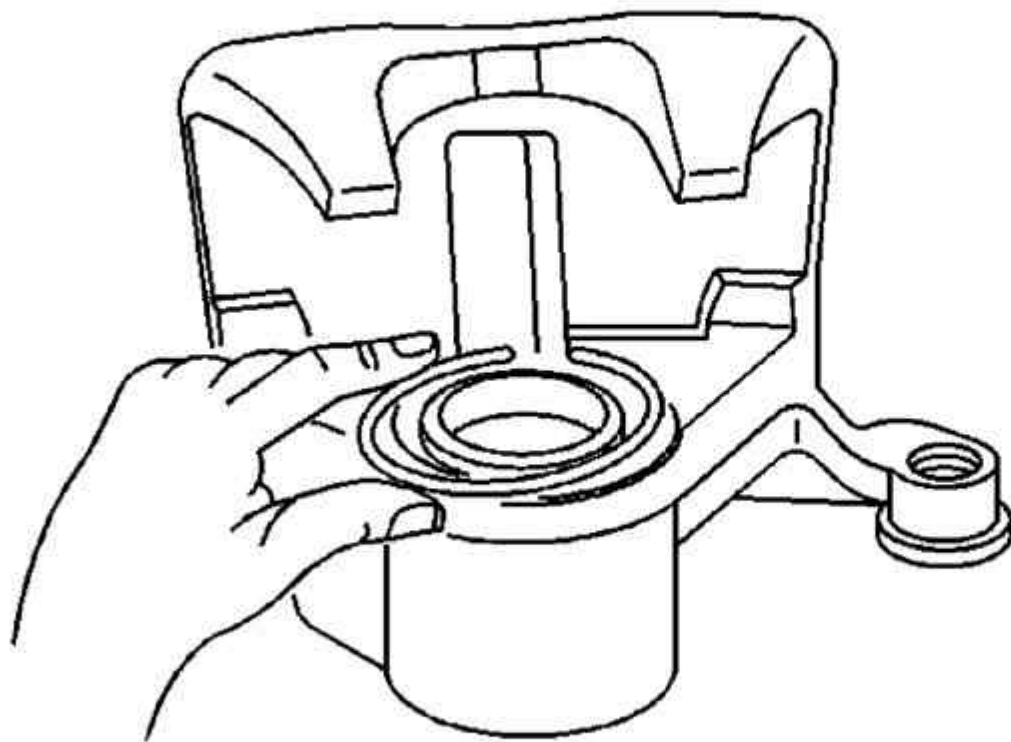


Fig. 39: View Of Dust Boot Retaining Ring
Courtesy of GENERAL MOTORS CORP.

3. Remove the retaining ring that secures the dust boot to the caliper housing.

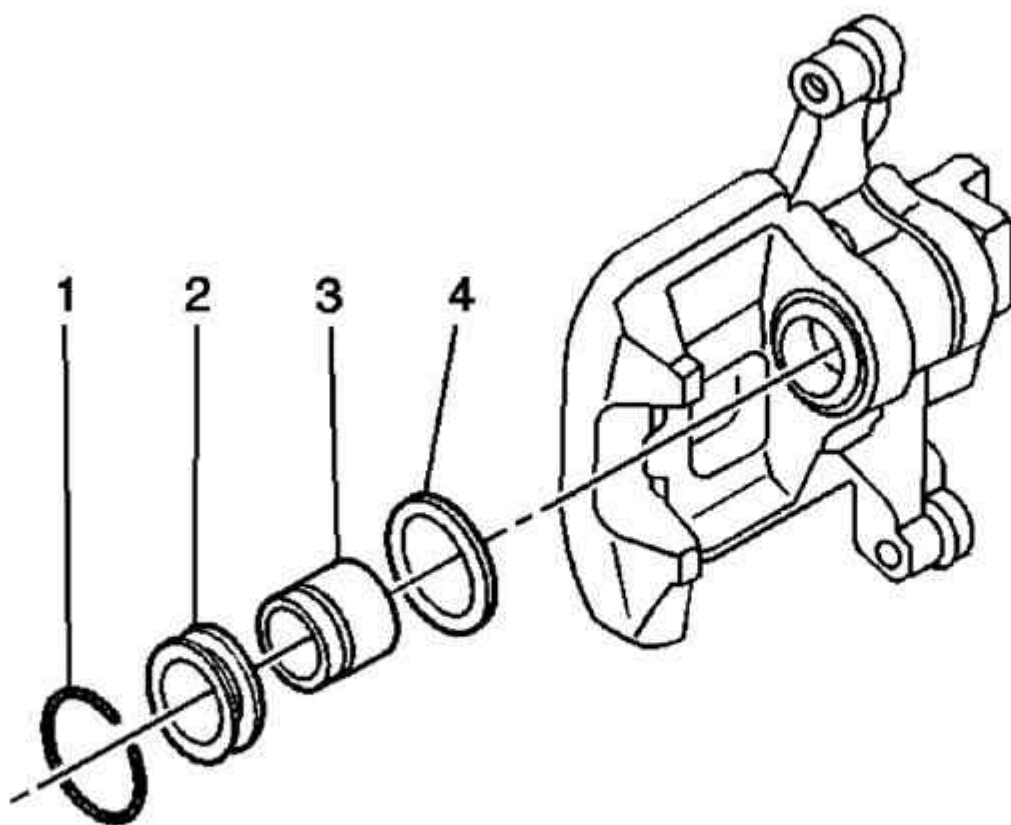


Fig. 40: Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

4. Remove the piston dust boot seal (2) from the seal counterbore in the caliper. Discard the boot seal.
5. Using a small wooden or plastic tool, remove the piston seal (4) from the caliper bore. Discard the piston seal.

IMPORTANT: Do not use abrasives to clean the brake caliper piston.

6. Clean the brake caliper piston bore and seal counterbore, and the caliper piston with denatured alcohol, or equivalent.
7. Dry the caliper piston bore and counterbore, and the piston with non-lubricated, filtered air.
8. Inspect the caliper bore for cracks, scoring, pitting, excessive rust, and/or excessive corrosion.
9. If light rust or light corrosion are present in the caliper bore, attempt to remove the imperfection with a fine emery paper. If the imperfection cannot be removed, replace the caliper assembly.
10. If cracks, scoring, pitting, excessive rust, and/or excessive corrosion are present in the caliper bore, replace the caliper assembly.
11. Inspect the caliper piston for cracks, scoring, and/or damage to the chrome plating. Replace the caliper piston if any of these conditions exist.

Installation Procedure

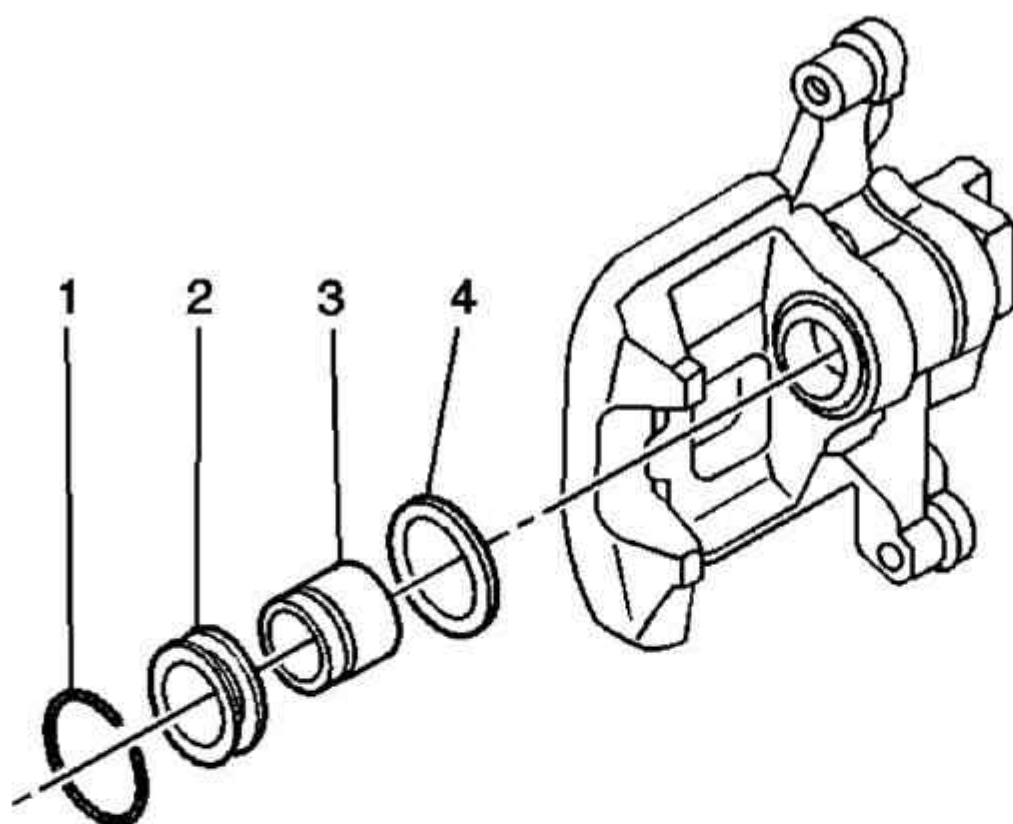


Fig. 41: Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the new piston seal (4) with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.

2. Install the lubricated, new piston seal (4) into the caliper bore.
3. Apply a thin coat of Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667) or equivalent, DOT-3 brake fluid from a clean, sealed brake fluid container onto the outer surface area of the caliper piston (3).

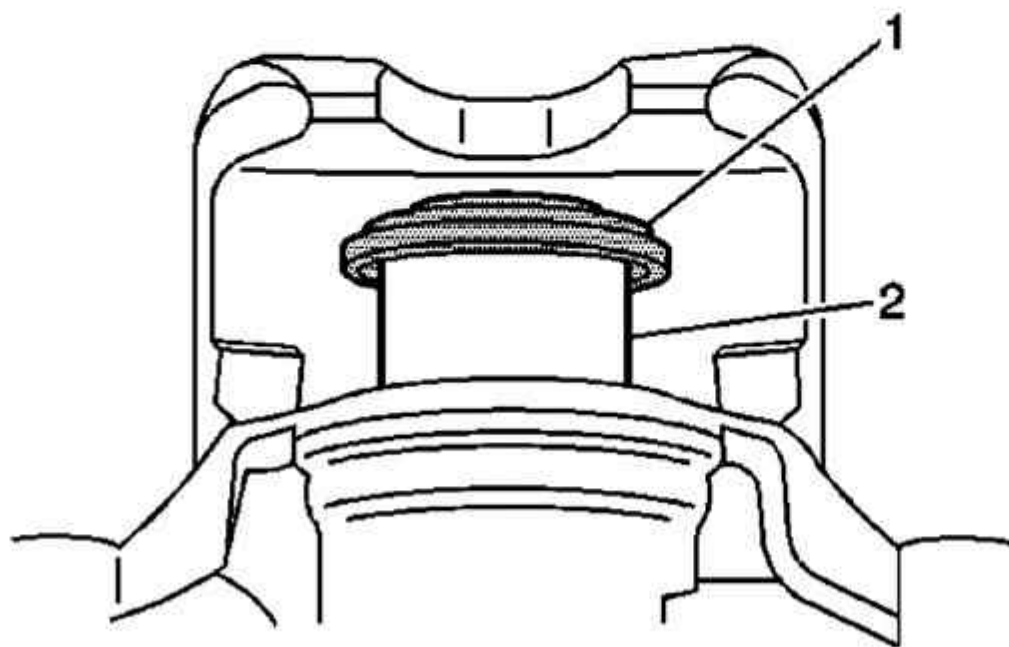


Fig. 42: Identifying Caliper Piston & Piston Dust Boot Seal
Courtesy of GENERAL MOTORS CORP.

4. Install the bottom half of the caliper piston (2) into the caliper bore.
5. Install the new piston dust boot seal (1) over the caliper piston (2).
6. Compress the caliper piston (2) to the bottom of the caliper bore.
7. Fully seat the piston dust boot seal (1) into caliper counterbore.

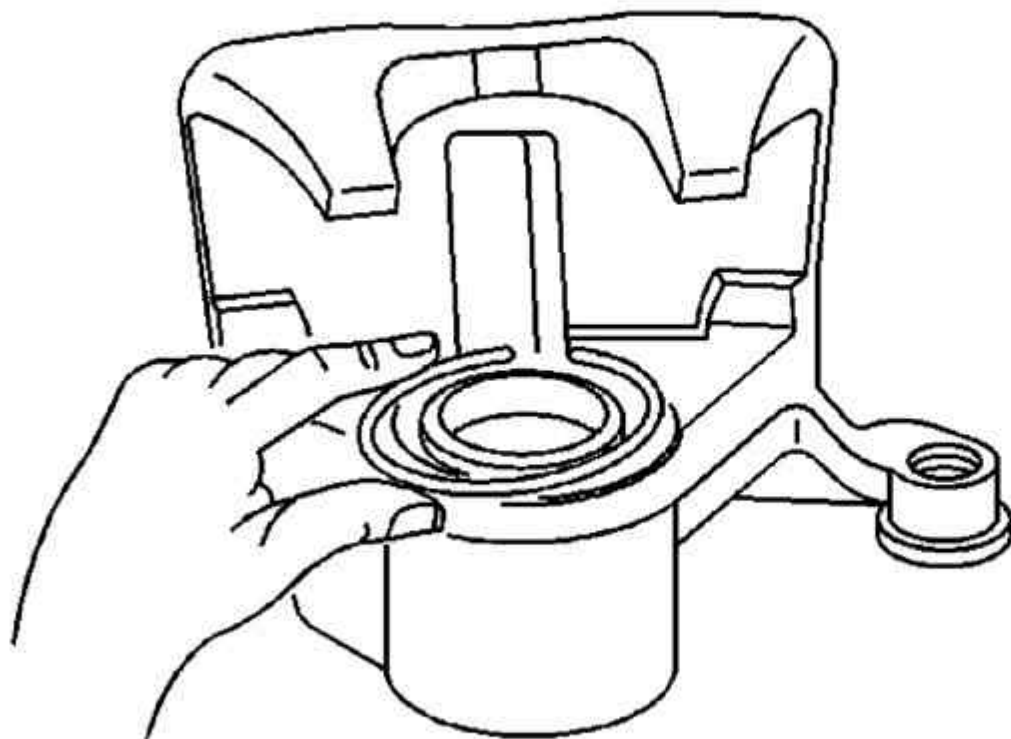


Fig. 43: View Of Dust Boot Retaining Ring
Courtesy of GENERAL MOTORS CORP.

8. Install the retaining ring that secures the dust boot to the caliper housing.
9. Install the bleeder valve and cap to the caliper and tighten the valve securely.
10. Install the rear brake caliper to the vehicle. Refer to **Rear Brake Caliper Replacement (JL9)** or **Rear Brake Caliper Replacement (J65)**.

REAR BRAKE CALIPER OVERHAUL (J65)

Removal Procedure

CAUTION: Refer to **Brake Dust Caution** .

CAUTION: Refer to **Brake Fluid Irritant Caution** .

NOTE: Refer to **Brake Fluid Effects on Paint and Electrical Components Notice** .

1. Remove the rear brake caliper from vehicle. Refer to **Rear Brake Caliper Replacement (JL9)** or **Rear Brake Caliper Replacement (J65)**.

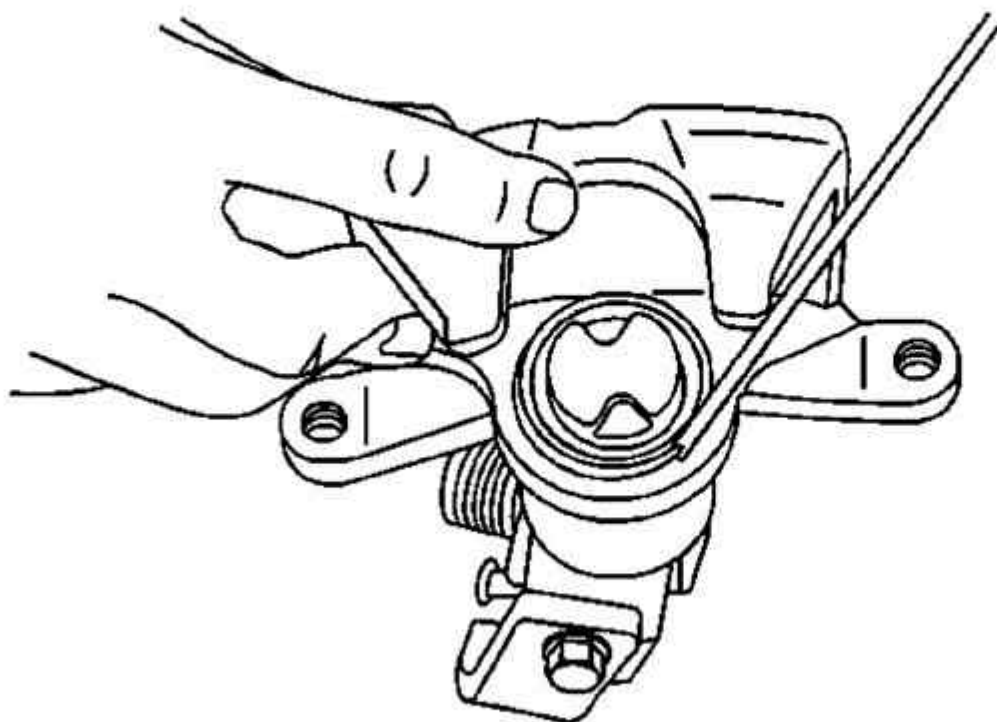


Fig. 44: View Of Rear Brake Caliper
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the brake caliper was leaking brake fluid from the REAR of the caliper past the integral park brake actuator shaft seal, replace the brake caliper assembly. The park brake integral mechanism contains a non-serviceable seal which may be allowing brake fluid to leak past it and into the non-serviceable integral park brake mechanism.

2. Drain the brake fluid from the caliper assembly.
3. Using a small wooden or plastic tool, carefully remove the brake caliper piston dust boot seal retaining ring from the groove in the caliper seal counterbore.

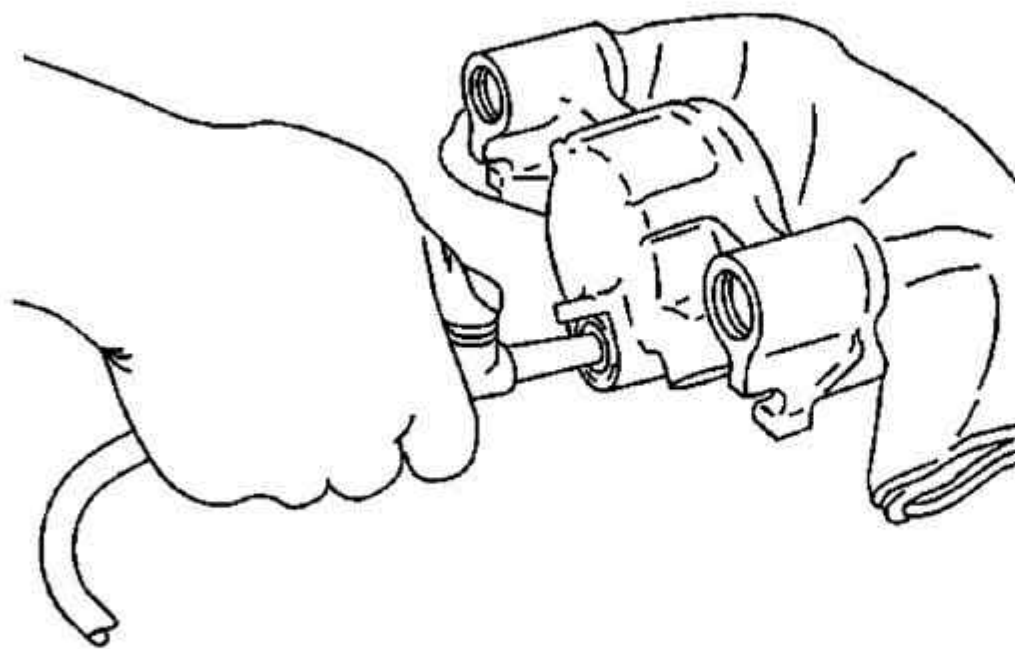


Fig. 45: Directing Low Pressure Compressed Air Into Rear Caliper Bore
Courtesy of GENERAL MOTORS CORP.

4. Place a block of wood against the inside of the caliper body, opposite of the caliper piston.
5. Direct low pressure compressed air through the caliper inlet hose to remove the caliper piston.

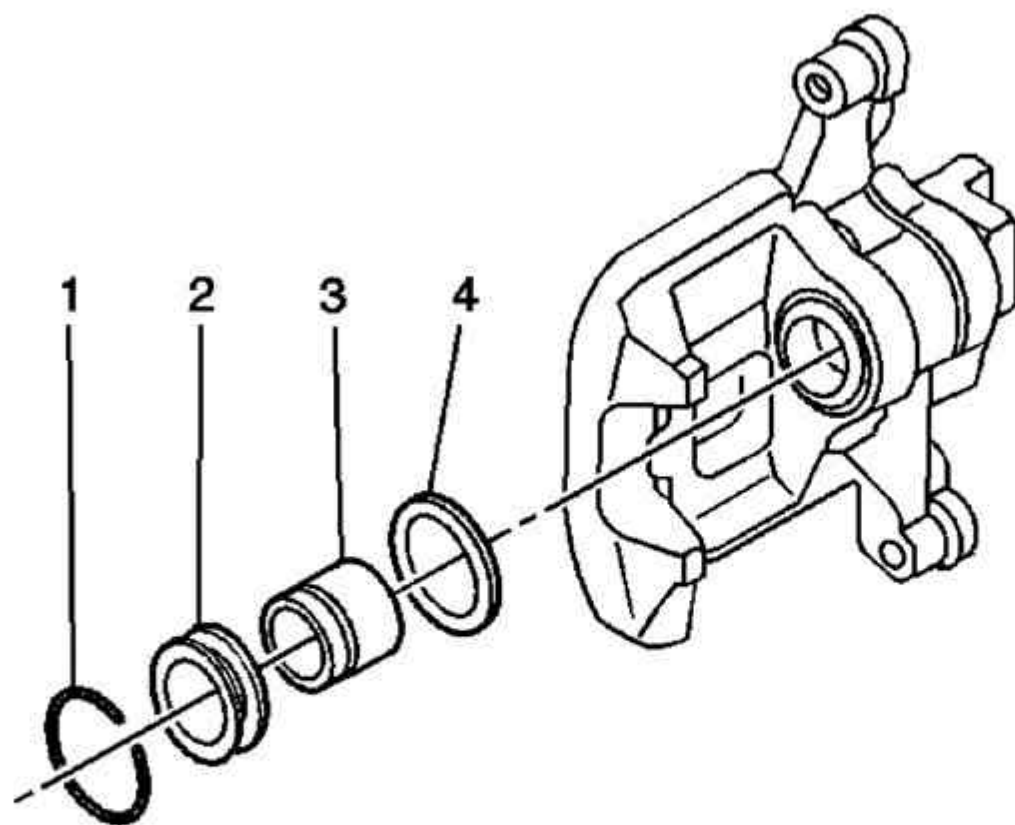


Fig. 46: Exploded View Of Brake Caliper

Courtesy of GENERAL MOTORS CORP.

6. Remove the piston dust boot seal (2) from the seal counterbore in the caliper and discard the dust boot seal.

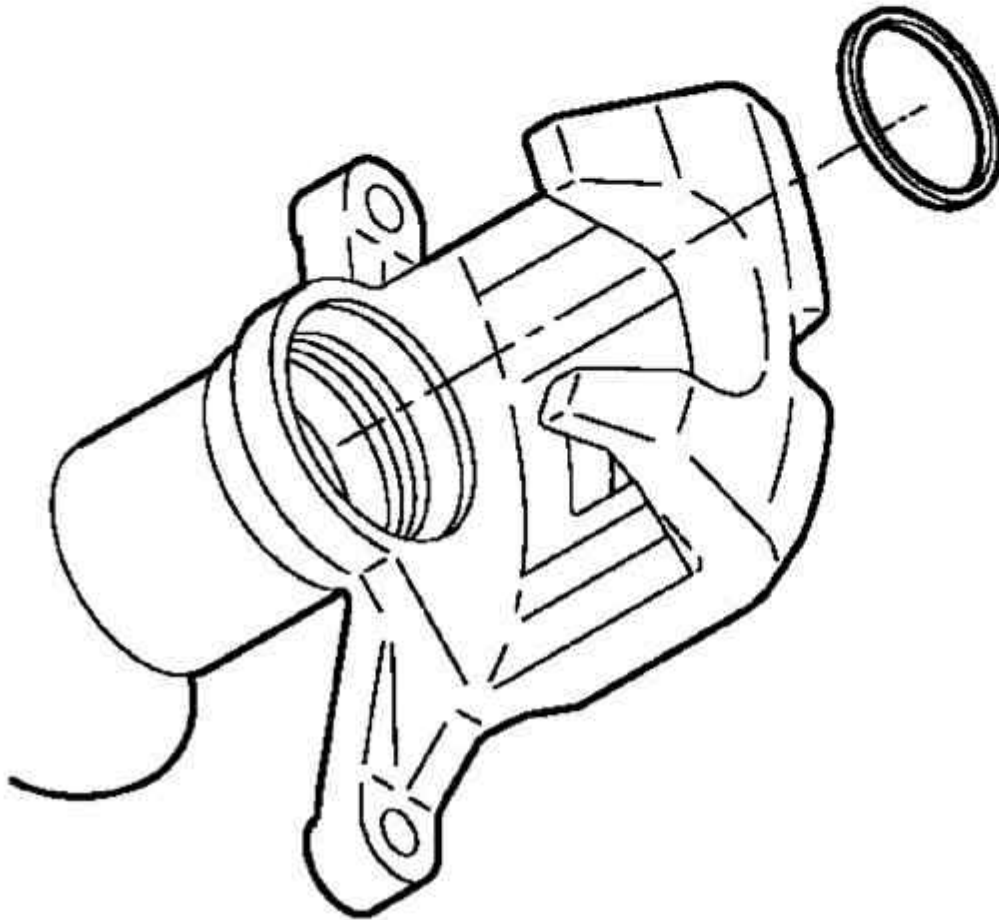


Fig. 47: View Of Piston Seal

Courtesy of GENERAL MOTORS CORP.

7. Using a small wooden or plastic tool, remove the piston seal from the caliper bore and discard the piston seal.
8. Inspect the operation of the integral park brake mechanism. Rotate the park brake lever back and forth while observing the movement of the park brake mechanism actuator assembly in the caliper bore.

IMPORTANT: The park brake lever, lever return spring and actuator shaft seal are not serviceable components of the integral park brake mechanism. Do not disassemble the integral park brake mechanism.

9. If the integral park brake mechanism was not operating properly (binding or seized), replace the brake caliper assembly.

Installation Procedure

IMPORTANT: Do not use abrasives to clean the brake caliper piston.

1. If cracks, scoring, pitting, excessive rust, and/or excessive corrosion are present in the caliper bore, replace the caliper assembly.
2. If light rust or light corrosion are present in the caliper bore, attempt to remove the imperfection with a fine

emery paper. If the imperfection cannot be removed, replace the caliper assembly.

3. Clean the brake caliper piston bore and seal counterbore, the caliper piston, and the caliper sleeves with denatured alcohol, or equivalent.
4. Dry the caliper piston bore and counterbore, the piston, and the sleeves with non-lubricated, filtered air.
5. Inspect the caliper piston for cracks, scoring, damage to the chrome plating, and/or damage to the integral adjusting mechanism. Replace the caliper piston if any of these conditions exist.
6. Inspect the caliper mounting holes for cracks, scoring, pitting, rust, and/or excessive corrosion. Replace the caliper assembly if any of these conditions exist.

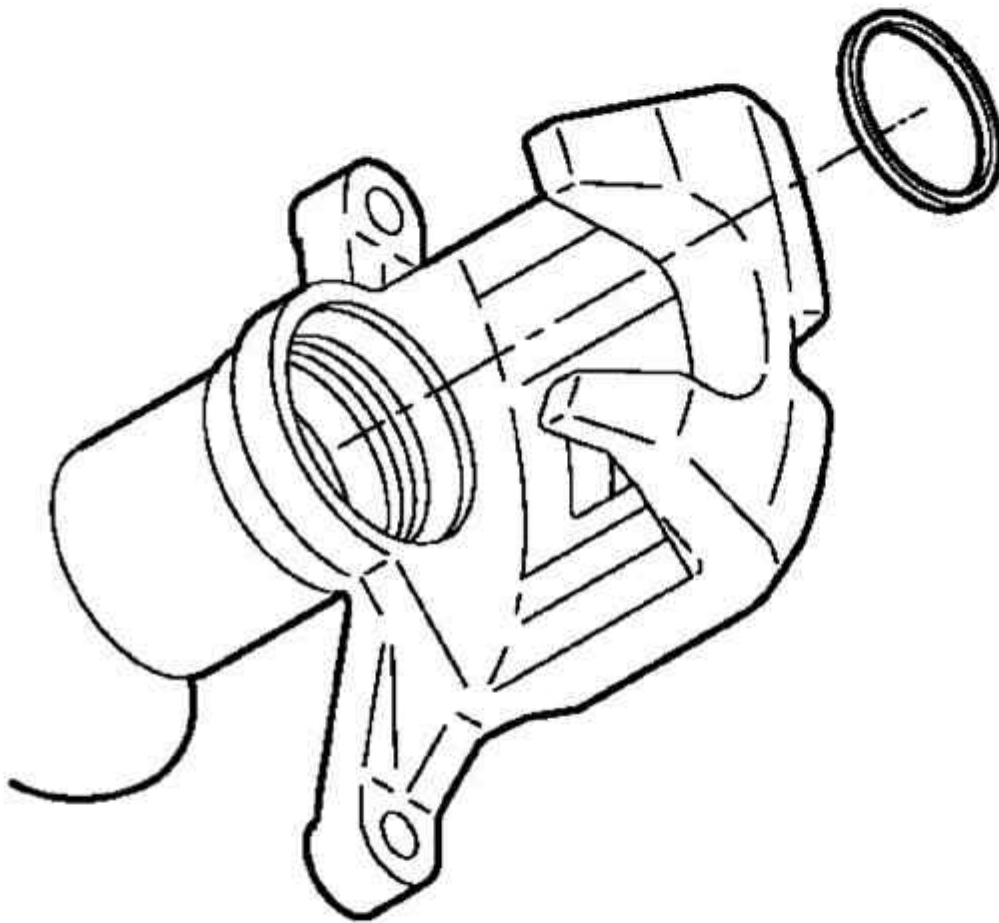


Fig. 48: View Of Piston Seal

Courtesy of GENERAL MOTORS CORP.

7. Lubricate the new piston seal with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667) or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
8. Install the lubricated, new piston seal into the caliper bore.

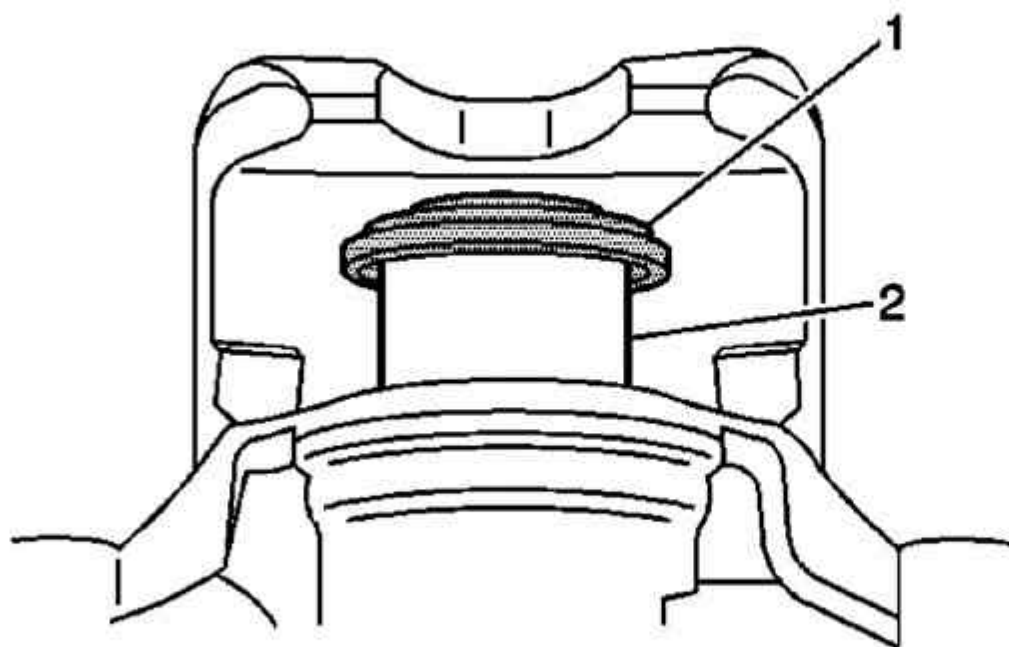


Fig. 49: Identifying Caliper Piston & Piston Dust Boot Seal
Courtesy of GENERAL MOTORS CORP.

9. Install the new dust boot seal onto the caliper piston (2).

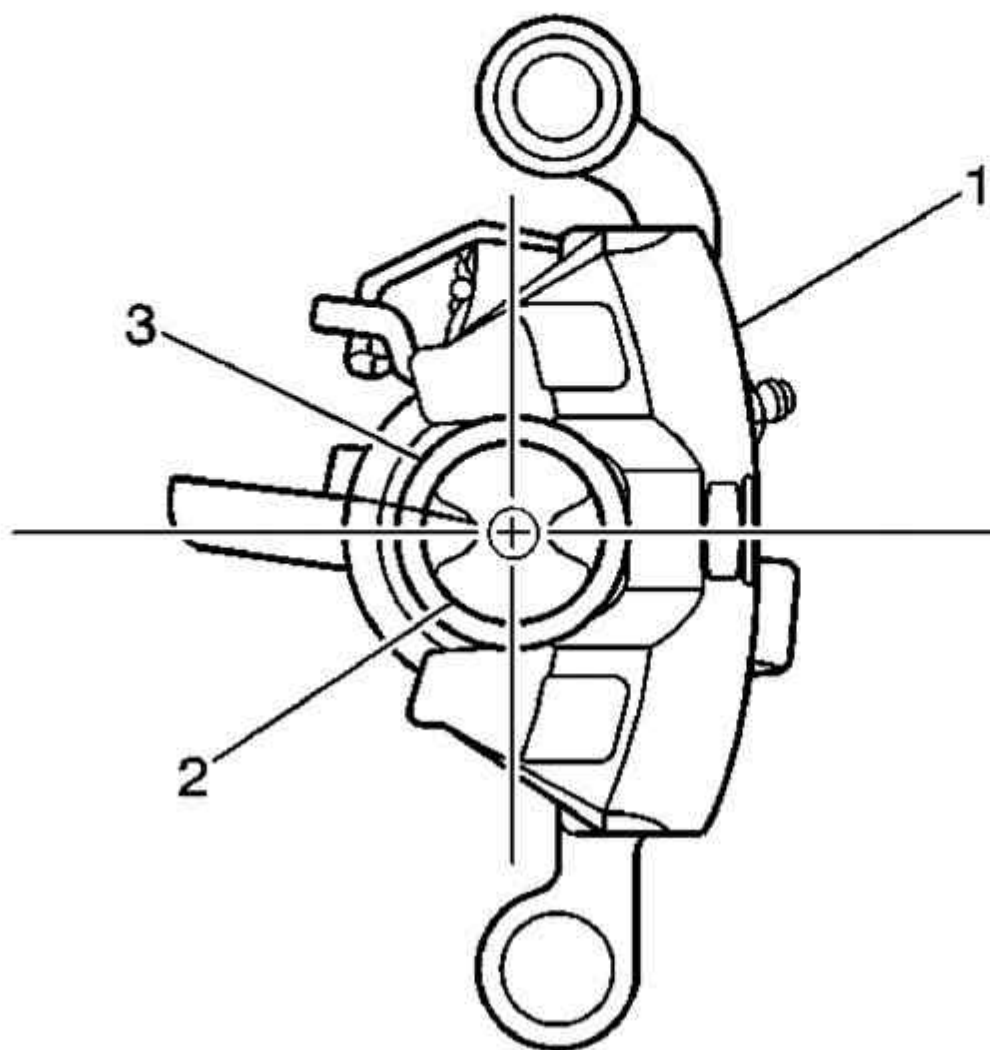


Fig. 50: Illustrating Rotating Piston In Caliper Body
Courtesy of GENERAL MOTORS CORP.

10. Insert the caliper piston into the caliper bore; using a spanner type wrench, rotate the piston (2) clockwise to fully seat the piston into the caliper body (1).

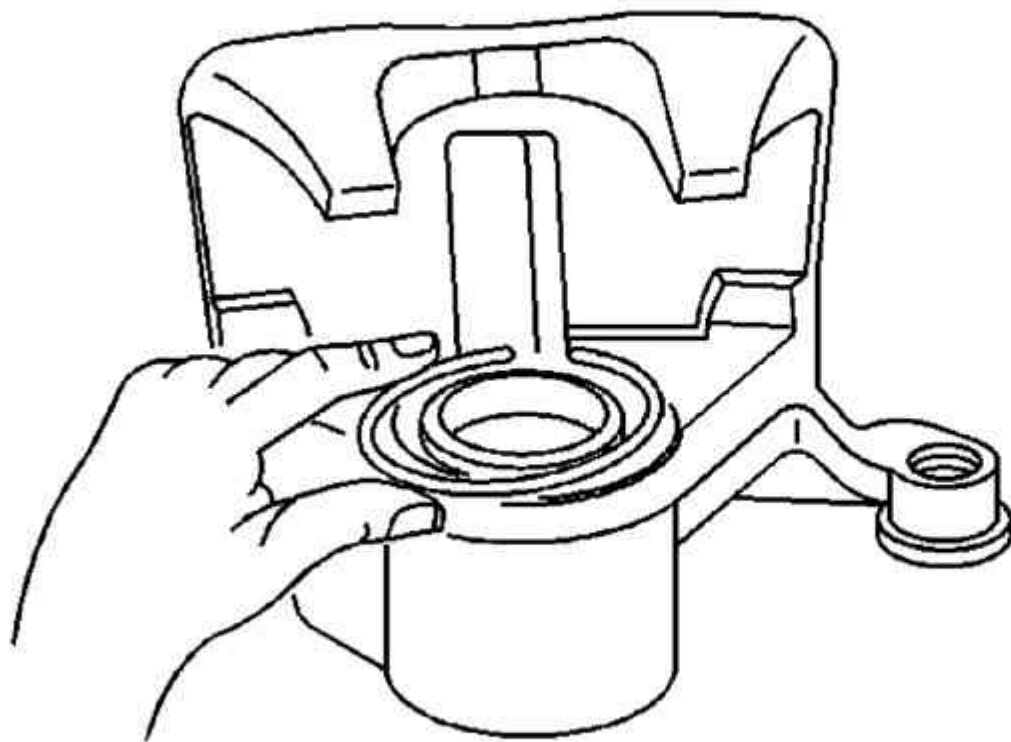


Fig. 51: View Of Dust Boot Retaining Ring
Courtesy of GENERAL MOTORS CORP.

11. Fully seat the piston dust boot seal in the seal counterbore.
12. Install the piston dust boot seal retaining ring to the groove in the caliper seal counterbore.
13. Install the brake caliper to the vehicle. Refer to **Rear Brake Caliper Replacement (JL9)** or **Rear Brake Caliper Replacement (J65)**.

Inspect the brake caliper for brake fluid leaks while performing the hydraulic brake system bleeding procedure after the caliper has been installed to the vehicle. If the brake caliper leaks brake fluid from the FRONT of the caliper past the piston dust boot seal, replace the caliper piston assembly. The piston integral adjustment mechanism contains a non-serviceable seal which may be allowing brake fluid to leak past it through a bleed hole near the end of the caliper piston.

FRONT DISC BRAKE HARDWARE REPLACEMENT

Removal Procedure

CAUTION: Refer to **Brake Dust Caution** .

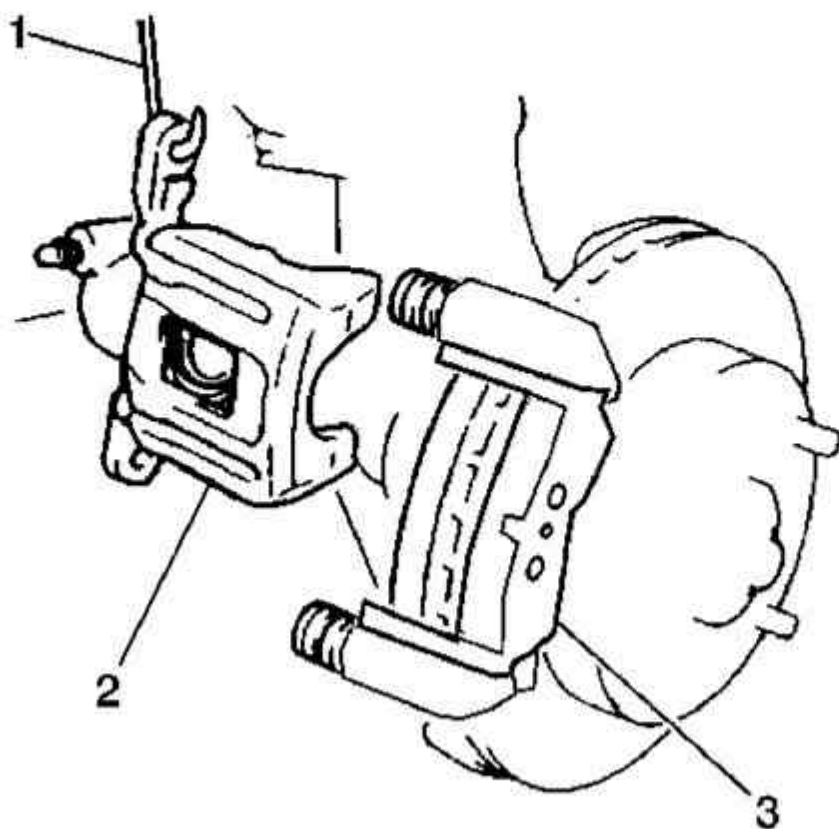


Fig. 52: View Of Brake Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

1. Remove the brake caliper from the mounting bracket and support the brake caliper (2) with heavy mechanic's wire (1), or equivalent. Discard the old caliper pin bolts, new bolts are supplied in the hardware kit. It is not necessary to disconnect the hydraulic brake flexible hose from the caliper. Refer to **Front Brake Caliper Replacement**.

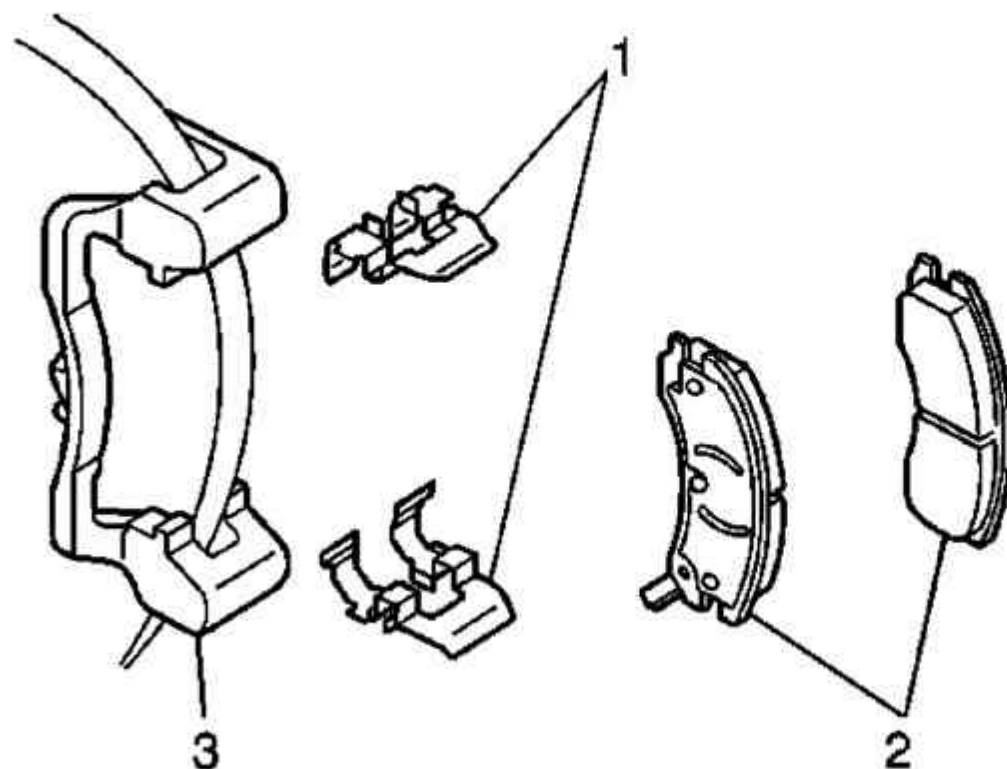


Fig. 53: View Of Brake Pads, Brake Pad Retainers, & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

2. Remove the brake pads (2) from the brake caliper bracket.
3. Remove the brake pad retainers (1) from the brake caliper bracket.

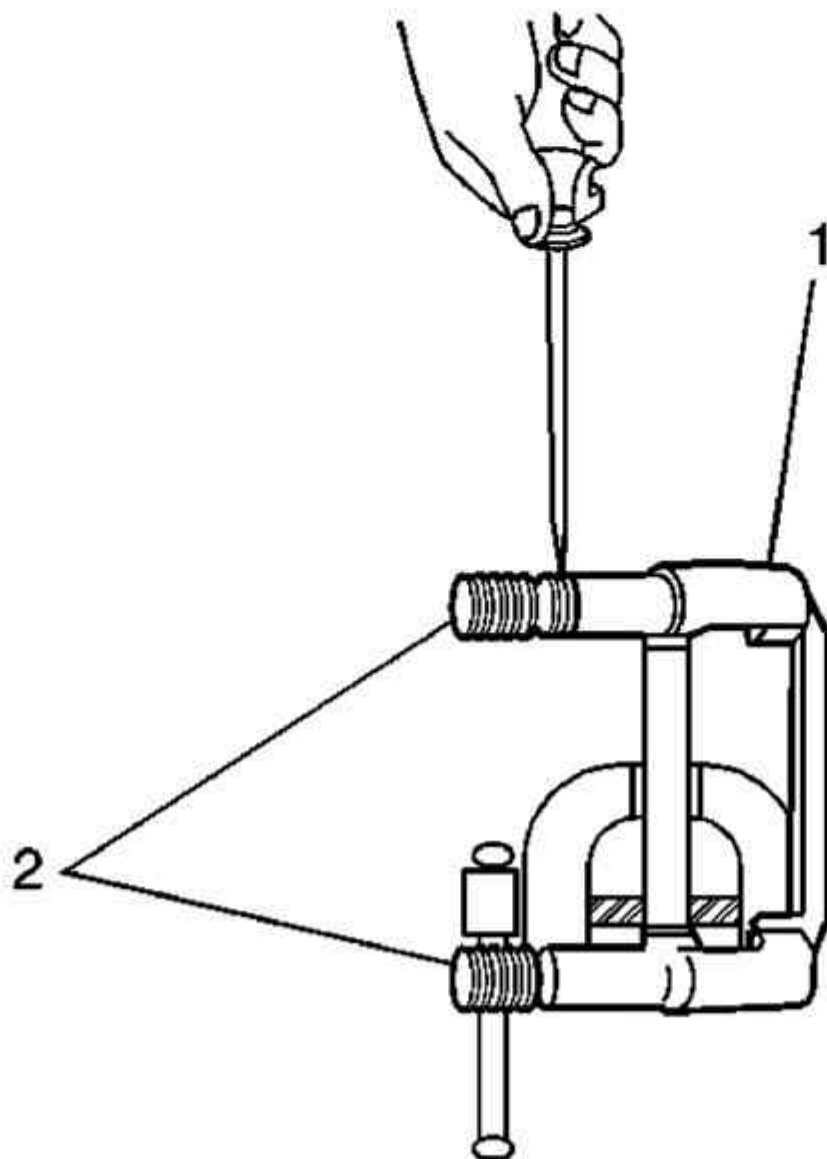


Fig. 54: Identifying Front Caliper Pin Boots & Bracket
Courtesy of GENERAL MOTORS CORP.

4. Remove the brake caliper bracket. Refer to Front Brake Caliper Bracket Replacement.
5. Mount the brake caliper bracket (1) in a vise.
6. Using a flat-bladed tool or punch carefully remove the caliper pin boots (2) from brake caliper bracket (1).

IMPORTANT:

- Clean the caliper bracket with denatured alcohol.
- Dry with low pressure, non-lubricated, filtered air.
- Inspect the brake caliper bracket for damage. If damaged, replace the bracket.

7. Thoroughly clean the caliper bracket bores of all lubricant.

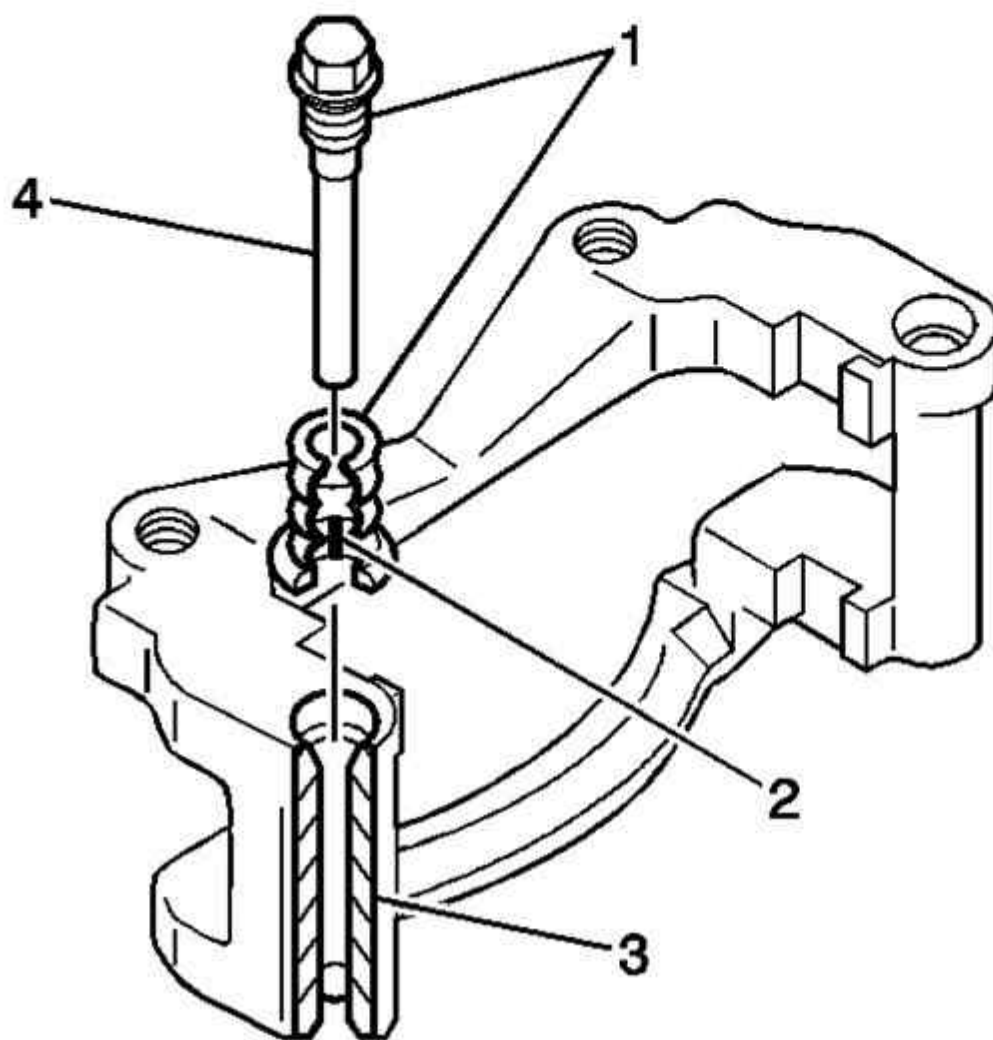


Fig. 55: View of New Caliper Pin Bolt Boots & Caliper Guide Pin
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the bores (3), the inside part of the bolt boot (2) and the caliper pin bolts (4) with GM P/N 18047666, or equivalent.
2. Press the new caliper pin bolt boots into the caliper pin bores.
3. Install the brake caliper bracket. Refer to **Front Brake Caliper Bracket Replacement**.

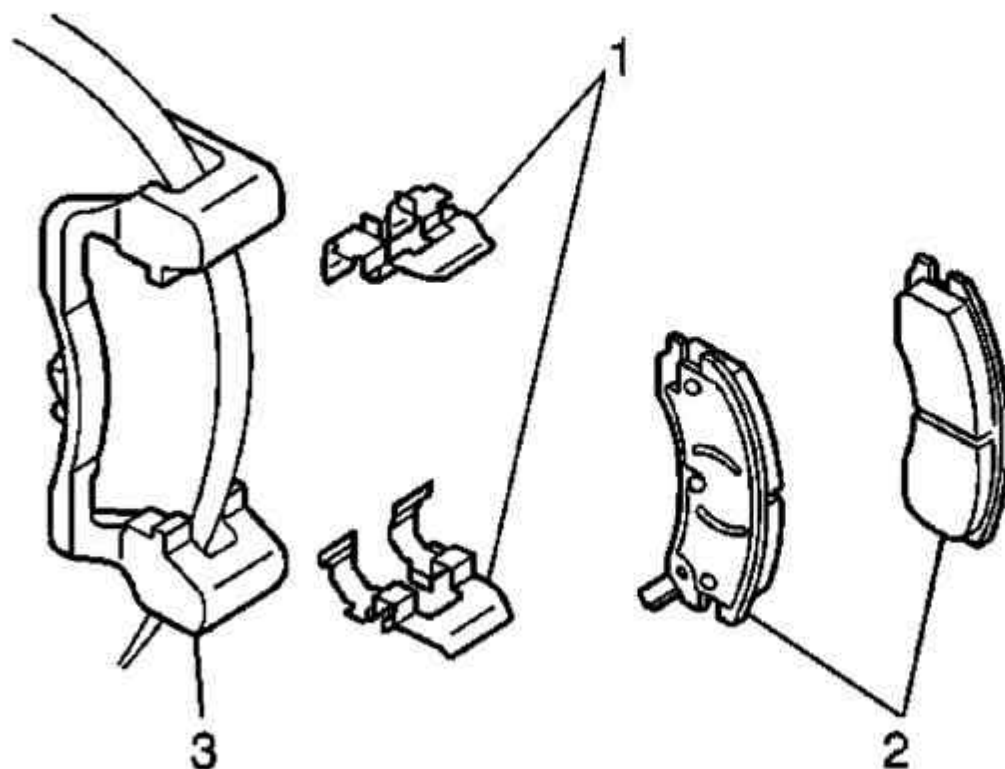


Fig. 56: View Of Brake Pads, Brake Pad Retainers, & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

4. Install the brake pad retainers (1) to the caliper bracket.
5. Install the brake pads (2) to the caliper bracket.

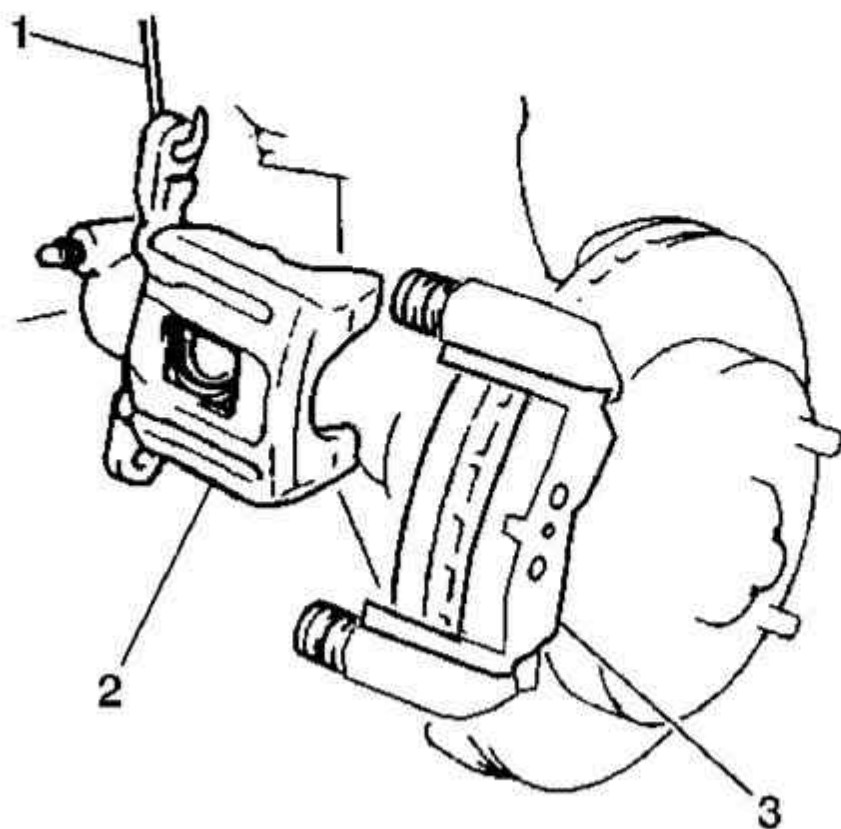


Fig. 57: View Of Brake Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

6. Remove the heavy mechanics wire (1) and install the brake caliper. Refer to **Front Brake Caliper Replacement**.

REAR DISC BRAKE HARDWARE REPLACEMENT

Removal Procedure

CAUTION: Refer to **Brake Dust Caution** .

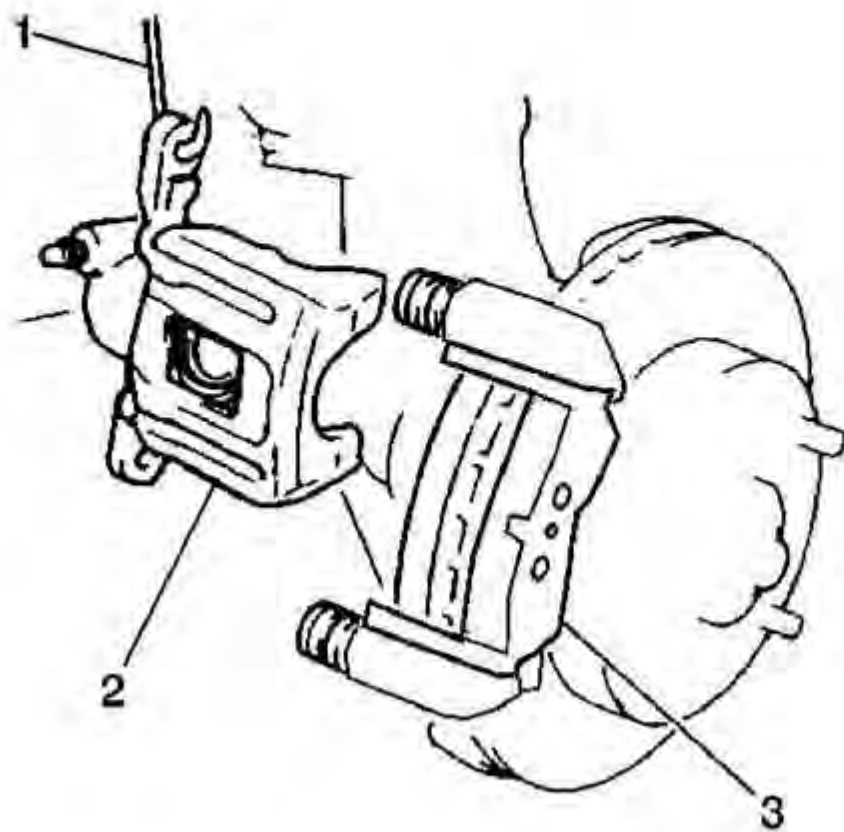


Fig. 58: View Of Brake Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

1. Remove the brake caliper from the mounting bracket and support the brake caliper (2) with heavy mechanic's wire (1), or equivalent. It is not necessary to disconnect the hydraulic brake flexible hose from the caliper. Refer to [Rear Brake Caliper Replacement \(JL9\)](#) or [Rear Brake Caliper Replacement \(J65\)](#).

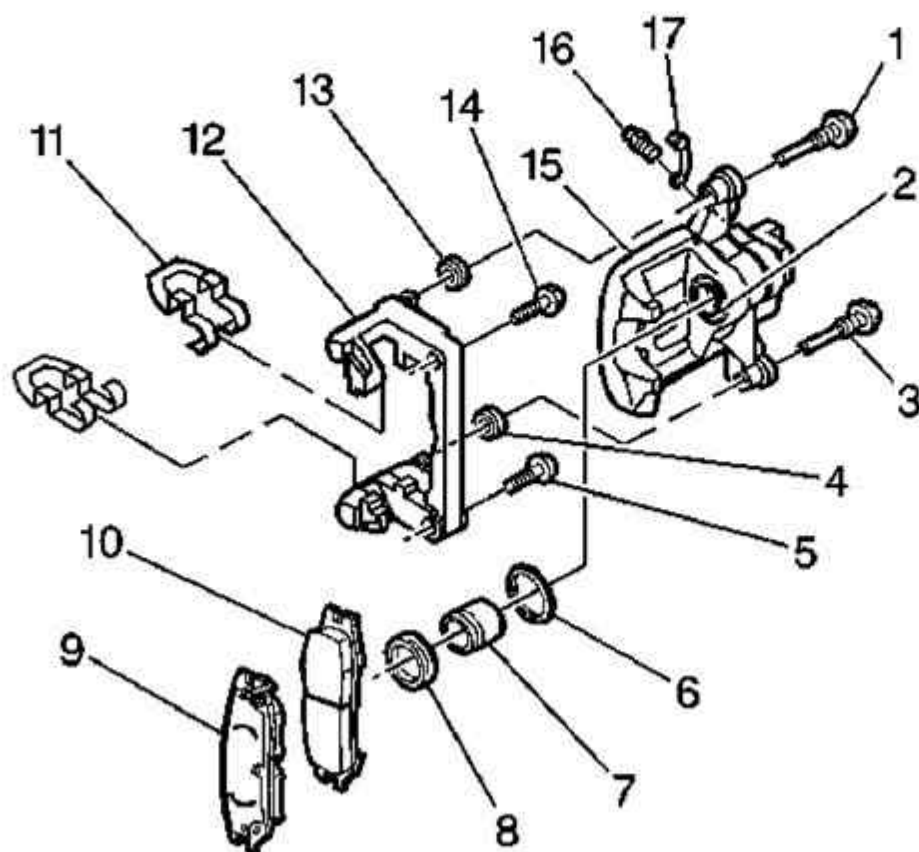


Fig. 59: Exploded View Of Rear Brake Caliper Components
Courtesy of GENERAL MOTORS CORP.

2. Remove the brake pads (9, 10) from the brake caliper bracket (12).
3. Remove the brake pad retainers (11) from the brake caliper bracket (12).
4. Remove the brake caliper bracket (12). Refer to **Rear Brake Caliper Bracket Replacement**.
5. Mount the brake caliper bracket (12) in a vise.

Installation Procedure

1. Clean all parts in clean, denatured alcohol.
2. Dry with low pressure, non-lubricated, filtered air.
3. Inspect the brake caliper bracket for cracks. If cracked, replace bracket.
4. Lubricate the brake caliper pin bolt sleeves with high temperature silicone lubricant.
5. Install the brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement**.

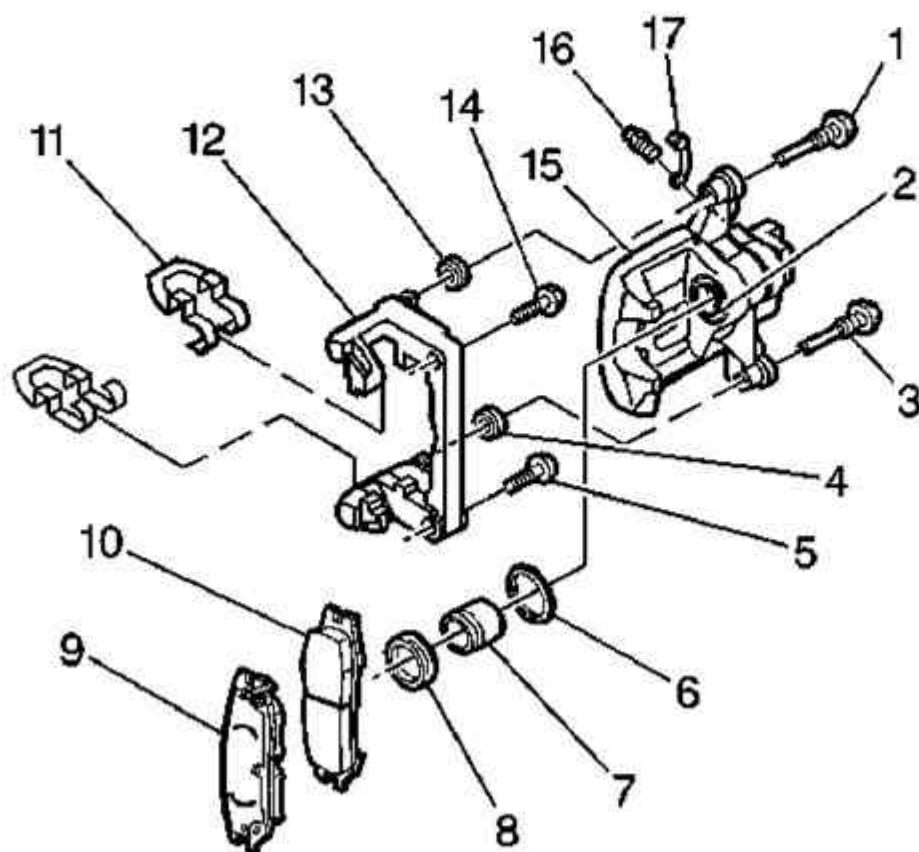


Fig. 60: Exploded View Of Rear Brake Caliper Components
Courtesy of GENERAL MOTORS CORP.

6. Install the brake pad retainers (11) to the bracket caliper bracket (12).
7. Install the brake pads (9, 10) to the bracket caliper bracket (12).
8. Install the brake caliper (15) to the brake caliper bracket (12). Refer to Rear Brake Caliper Replacement (JL9) or Rear Brake Caliper Replacement (J65).

FRONT BRAKE CALIPER BRACKET REPLACEMENT

Removal Procedure

CAUTION: Refer to Brake Dust Caution .

NOTE: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

1. Remove the caliper from the mounting bracket and support the caliper with heavy mechanics wire or equivalent. It is not necessary to disconnect the hydraulic brake flexible hose from the caliper. Refer to Front Brake Caliper Replacement.
2. Remove the front brake pads.

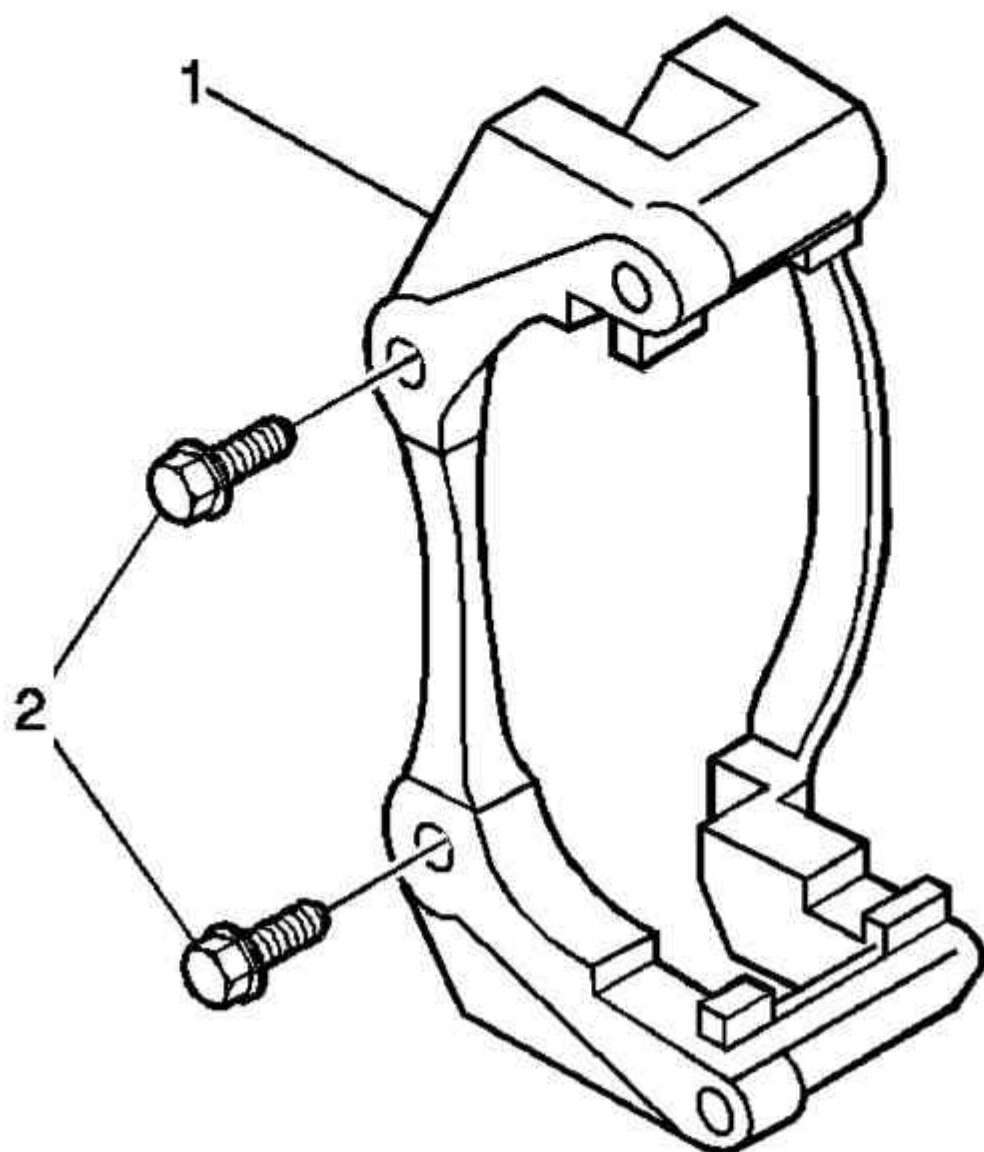


Fig. 61: Identifying Brake Caliper Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

3. Remove the caliper bracket bolts (2).
4. Remove the caliper bracket (1).

Installation Procedure

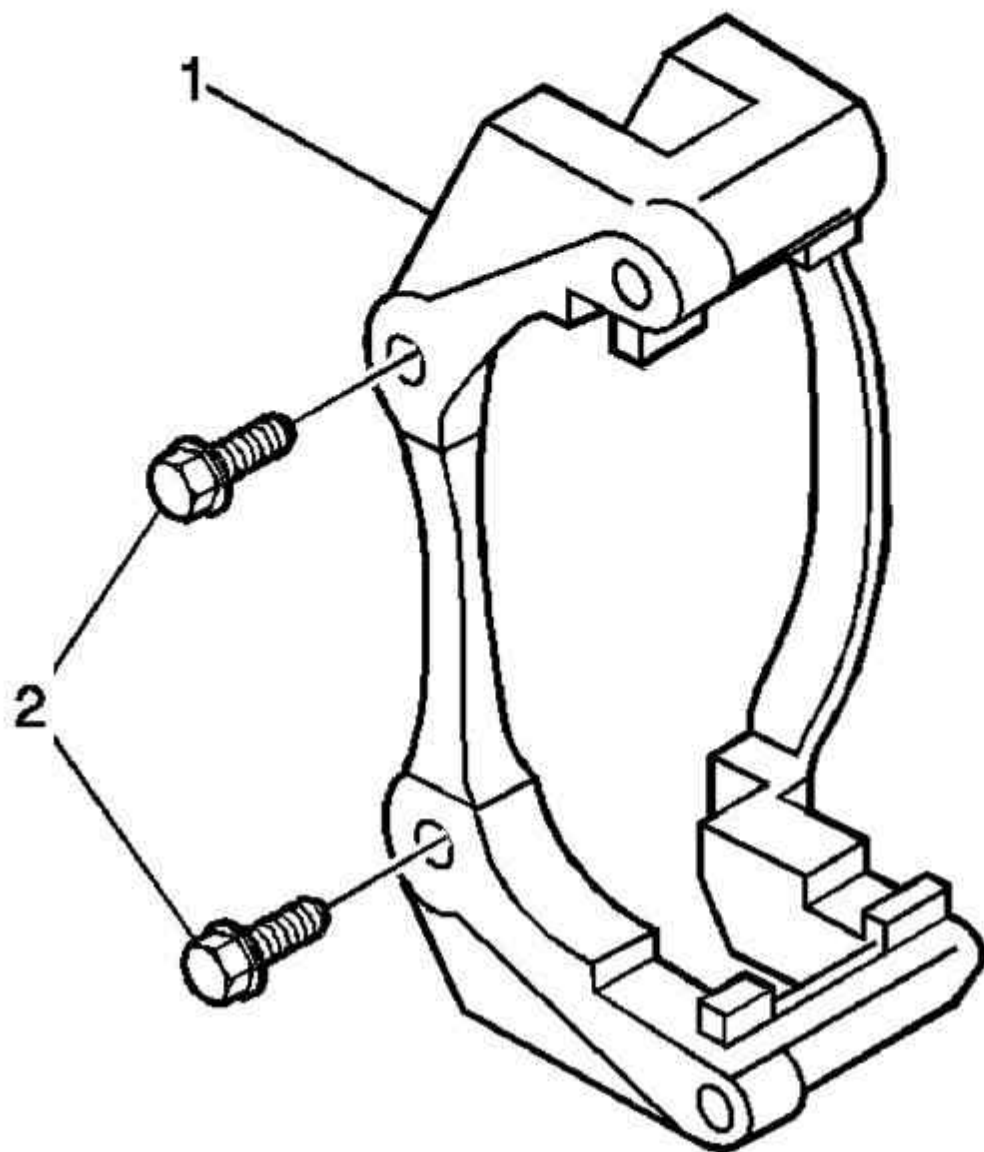


Fig. 62: Identifying Brake Caliper Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: To ensure the proper clamp load will be present when installed, it is imperative the threads on the brake caliper bracket bolts as well as the threaded holes in the caliper bracket are cleaned of all debris and inspected before proceeding with the installation.

1. Clean and visually inspect the threads of the caliper bracket bolts (2) and mounting holes in the bracket.
2. Apply THREADLOCKER, GM P/N 12345493 (Canadian P/N 10953488) or equivalent, to the threads of the brake caliper bracket bolts (2).

NOTE: Refer to Fastener Notice .

3. Install the caliper bracket (1) with the bracket bolts (2).

Tighten: Tighten the caliper bracket bolts to 180 N.m (133 lb ft).

4. Install the front brake pads.

5. Install the caliper. Refer to Front Brake Caliper Replacement.

REAR BRAKE CALIPER BRACKET REPLACEMENT

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

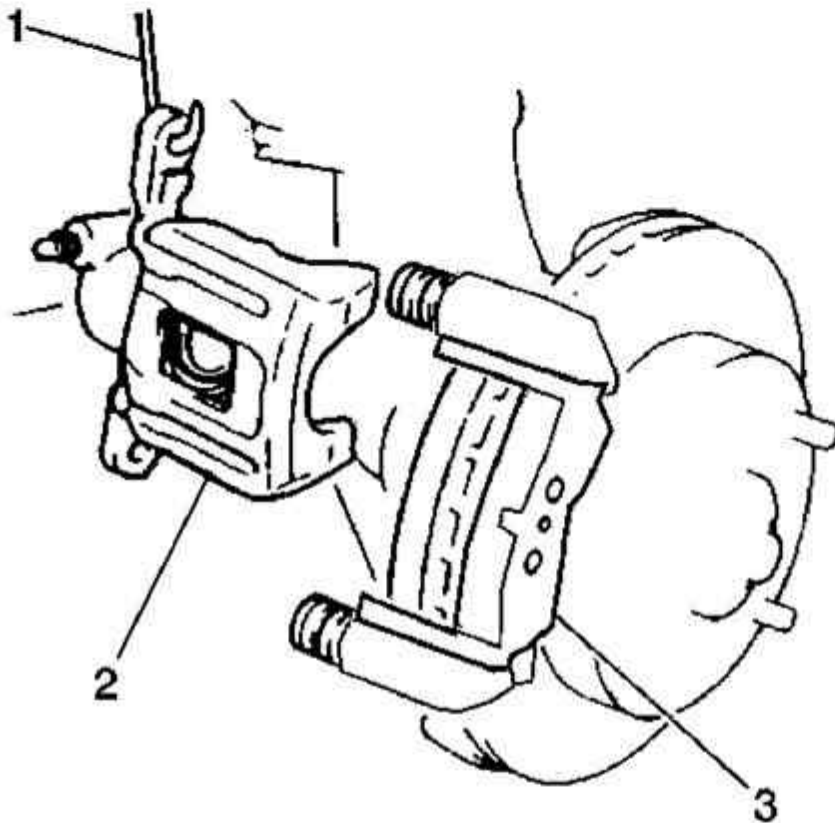


Fig. 63: View Of Brake Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

NOTE: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

1. Remove the brake caliper from the mounting bracket and support the brake caliper (2) with heavy mechanics wire (1), or equivalent. Do NOT disconnect the hydraulic brake flexible hose from the caliper. Refer to Rear Brake Caliper Replacement (JL9) or Rear Brake Caliper Replacement (J65).
2. Remove the brake pads from the brake caliper bracket (3).
3. Remove the brake pad retainers from the brake caliper bracket (3).

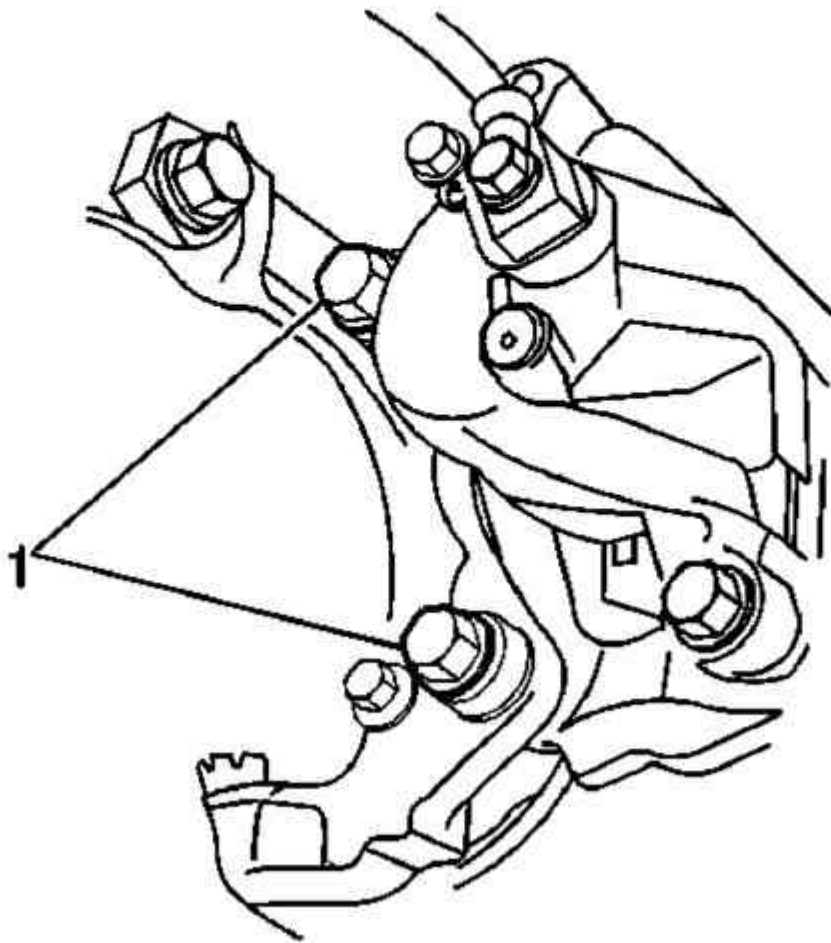


Fig. 64: Locating Caliper Mounting Brackets
Courtesy of GENERAL MOTORS CORP.

4. Remove the brake caliper bracket bolts (1).
5. Remove the rear brake caliper bracket.
6. Use a wire brush to remove any rust and debris from the brake caliper bracket.
7. Inspect the brake mounting and hardware. Refer to Rear Disc Brake Hardware Replacement.

Installation Procedure

IMPORTANT: The caliper bracket bolts threads and the threaded holes of the caliper bracket must be free of threadlocker residue and debris prior to re-application of threadlocker in order to ensure proper adhesion and fastener retention.

- Prepare the bolts and the threaded holes for assembly.
- Thoroughly clean the residue from the fastener threads using denatured alcohol or equivalent and allow to dry.
- Thoroughly clean the residue from the threaded holes using denatured alcohol or equivalent and allow to dry.
- If reusing the old caliper bracket bolts, apply threadlocker GM P/N 12345493 (Canadian P/N 10953488), or equivalent to 2/3 of the threaded length of the fastener. Ensure that there are no gaps in the threadlocker along the length of the filled area of the fastener.

- Allow the threadlocker to cure approximately ten minutes before installation.

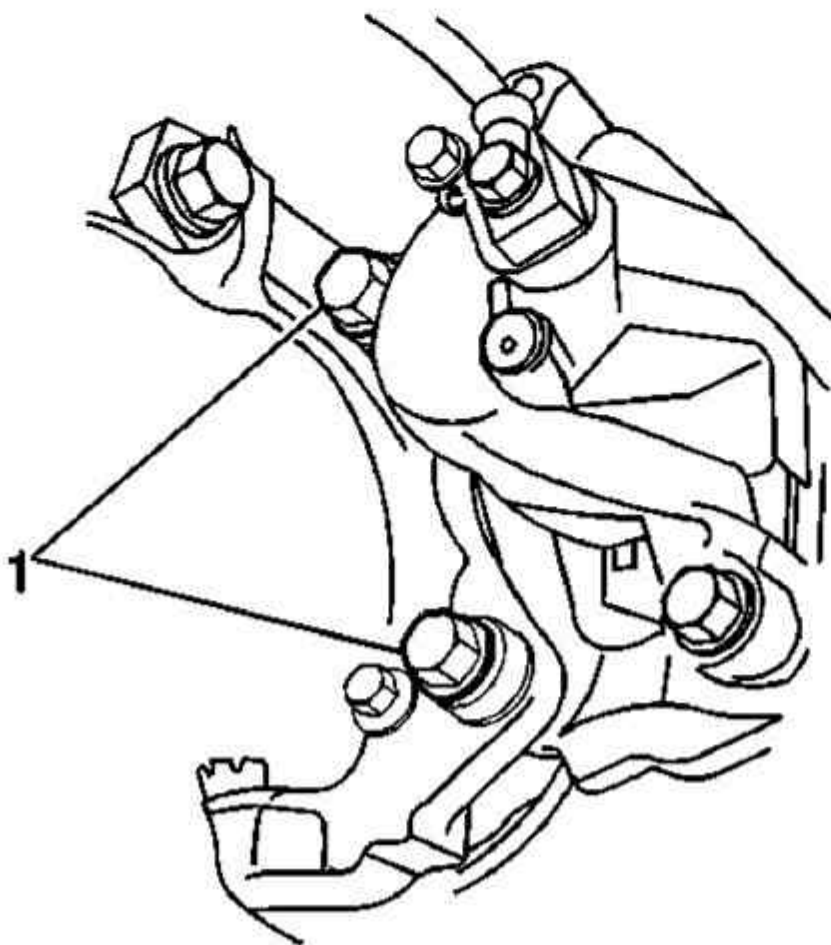


Fig. 65: Locating Caliper Mounting Brackets
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper bracket.

NOTE: Refer to Fastener Notice .

2. Install the brake caliper bracket bolts (1).

Tighten: Tighten the rear brake caliper bracket bolts to 120 N.m (89 lb ft).

3. Lubricate the brake caliper pin bolts with a thin coat of high temperature silicone lube.
4. Install the brake pad retainers to the brake caliper bracket.
5. Install the brake pads to the brake caliper bracket.
6. Install the brake caliper. Refer to Rear Brake Caliper Replacement (JL9) or Rear Brake Caliper Replacement (J65).

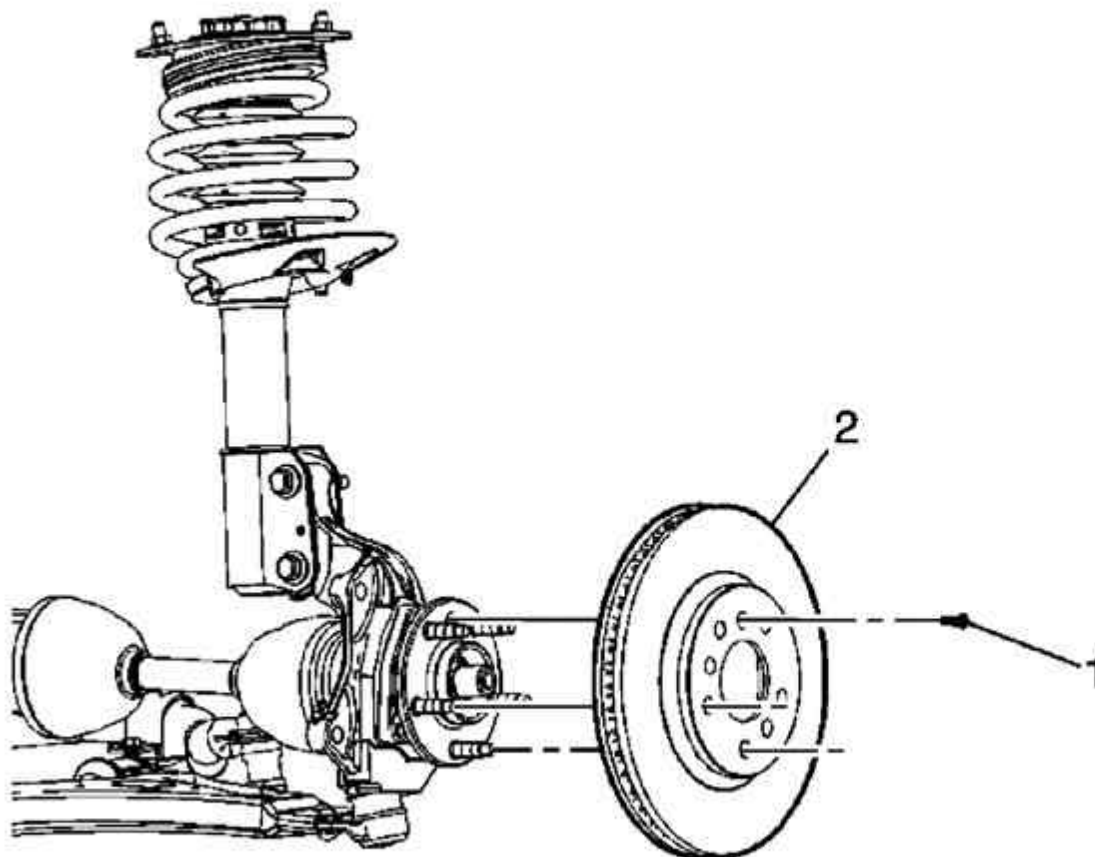


Fig. 66: Replacing Front Brake Rotor
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
CAUTION: Refer to <u>Brake Dust Caution</u> .	
Preliminary Procedures	
1. Remove the tire and wheel. Refer to <u>Tire and Wheel Removal and Installation</u> . 2. Remove the brake caliper mounting bracket. Refer to <u>Front Brake Caliper Bracket Replacement</u> .	
1	Retaining Screw NOTE: Refer to <u>Fastener Notice</u> . Tighten: 14 N.m (124 lb in)
2	Brake Rotor Procedure 1. If removing the rotor to service the brake system, mark the relationship of the rotor to the wheel stud for proper installation. 2. Using the J 41013 , clean the contact area of the brake rotor and the wheel bearing if the rotor is to be reused. See <u>Special Tools</u> . 3. Using the J 42450-A , remove the rust and dirt from the contact area of the wheel bearing if replacing the rotor. See <u>Special Tools</u> . 4. Inspect the assembled lateral runout (LRO). Refer to <u>Brake Rotor Assembled Lateral Runout Correction</u> .

REAR BRAKE ROTOR REPLACEMENT

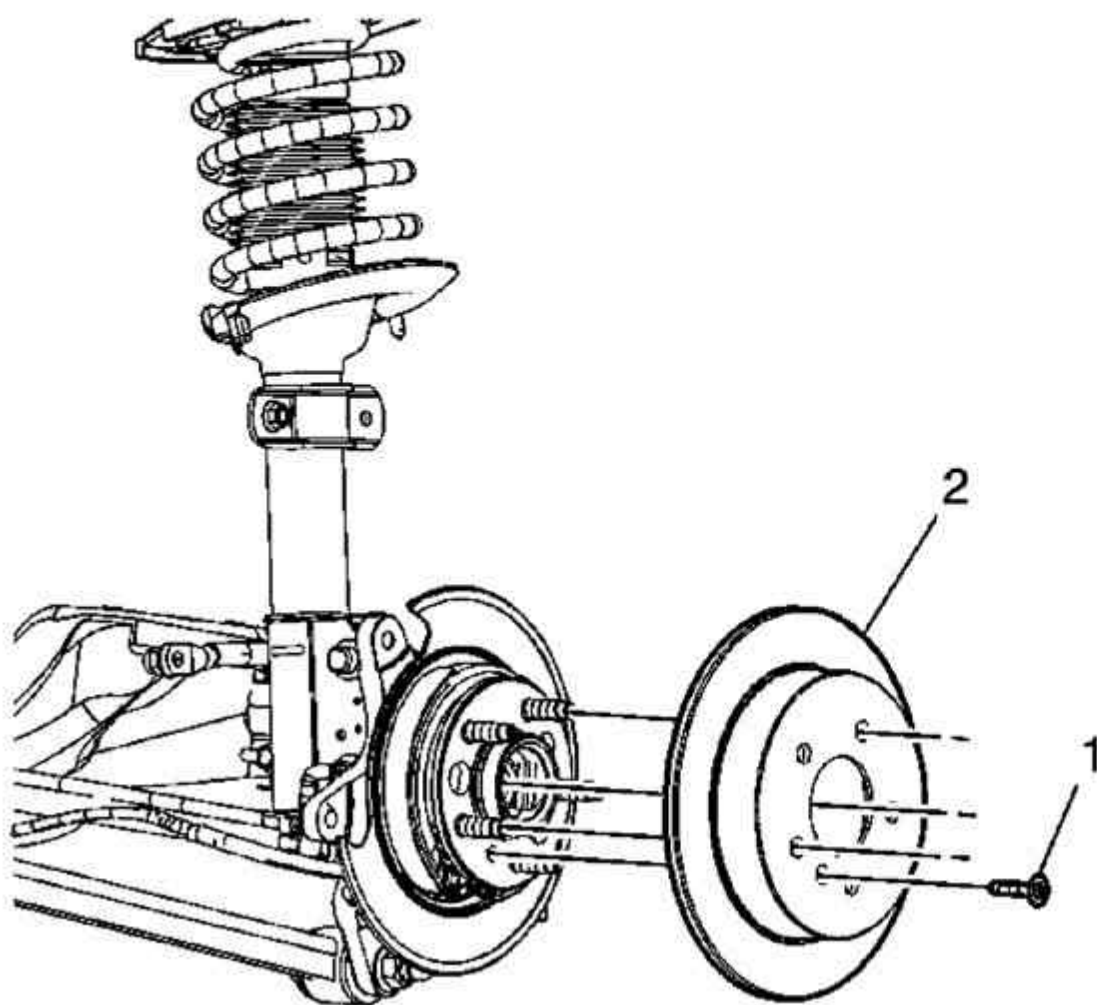


Fig. 67: Replacing Rear Brake Rotor
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
CAUTION: Refer to <u>Brake Dust Caution</u> .	
Preliminary Procedures 1. Raise the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Remove the tire and wheel. Refer to <u>Tire and Wheel Removal and Installation</u> . 3. Remove the rear brake caliper mounting bracket. Refer to <u>Rear Brake Caliper Bracket Replacement</u> .	
1	Rotor Retention Screw NOTE: Refer to <u>Fastener Notice</u> . Tighten: 14 N.m (124 lb in)
	Brake Rotor Procedure 1. If removing the rotor to service the brake system, mark the relationship of the rotor to the wheel stud for proper installation.

2

2. Using the **J 41013** , clean the contact area of the brake rotor and the wheel bearing/hub if the rotor is to be reused. See **Special Tools**.
3. Using the **J 42450-A** , remove the rust and dirt from the contact area of the wheel bearing/hub if replacing the rotor. See **Special Tools**.
4. Inspect the assembled lateral runout (LRO). Refer to **Brake Rotor Assembled Lateral Runout Correction**.
5. Check park brake operation. Adjust only if needed. Refer to **Park Brake Adjustment (L26 and L32)** .

FRONT BRAKE SHIELD REPLACEMENT

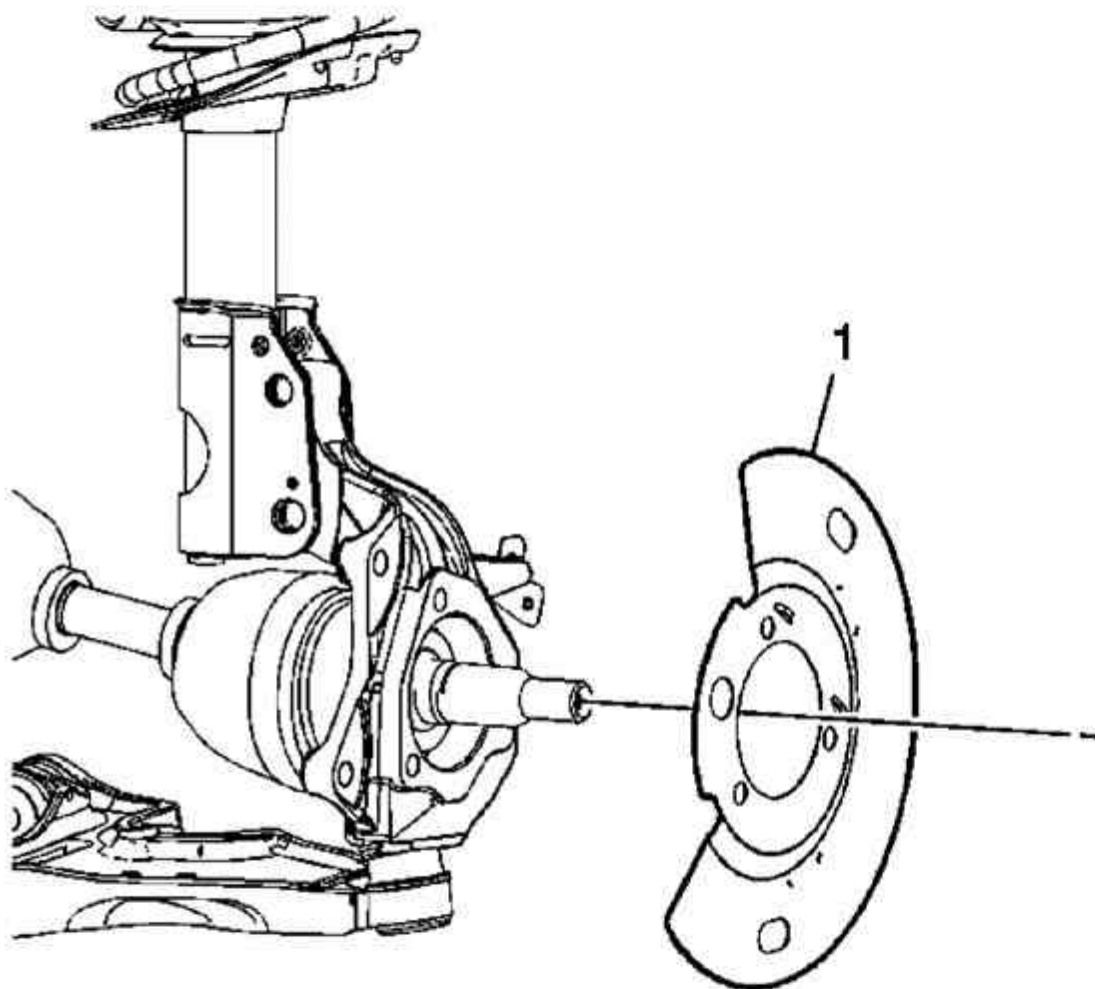


Fig. 68: View Of Front Disc Brake Splash Shield
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .	
2. Remove the tire and wheel. Refer to Tire and Wheel Removal and Installation .	
3. Remove the wheel bearing/hub assembly. Refer to Front Wheel Bearing and Hub Replacement .	
1	Front Brake Shield

REAR DISC BRAKE BACKING PLATE REPLACEMENT

Removal Procedure

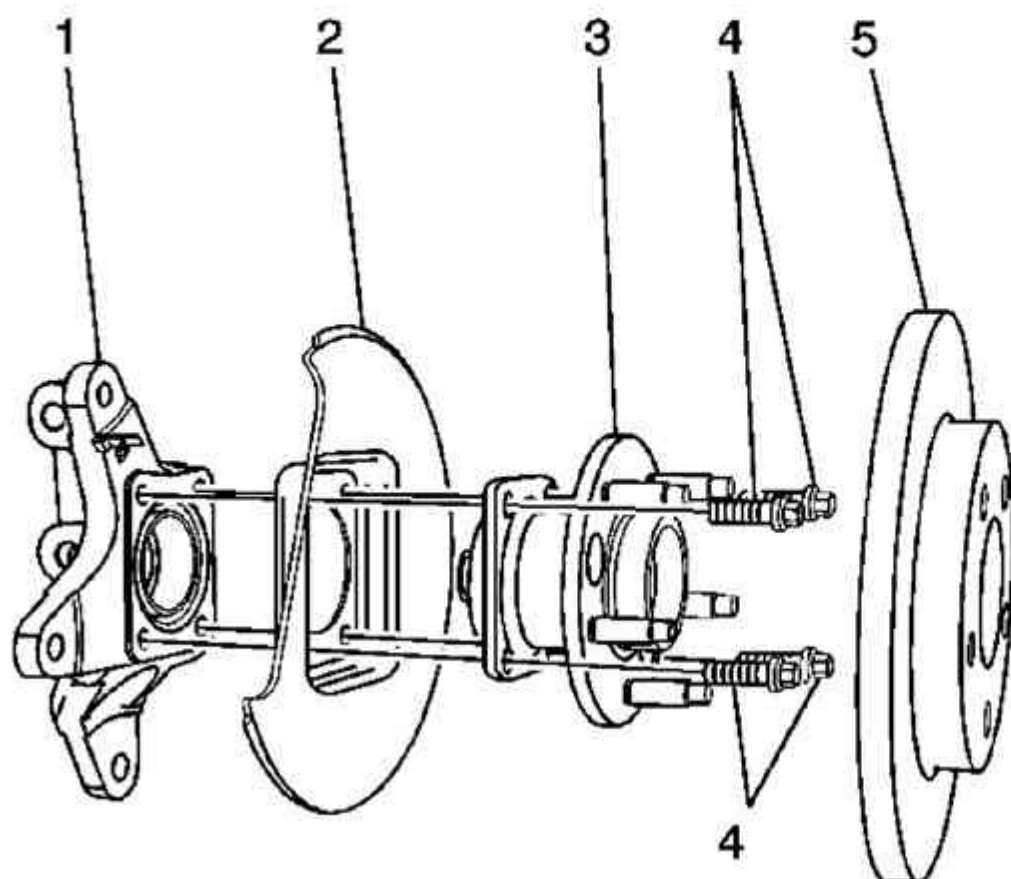


Fig. 69: Identifying Backing Plate & Wheel Bearing/Hub
Courtesy of GENERAL MOTORS CORP.

1. Remove the wheel bearing/hub (3). Refer to Rear Wheel Bearing and Hub Replacement.

IMPORTANT: The backing plate (2) is attached to the knuckle (1) through the wheel bearing hub bolts (4).

2. Remove the backing plate (2) from the knuckle (1).

Installation Procedure

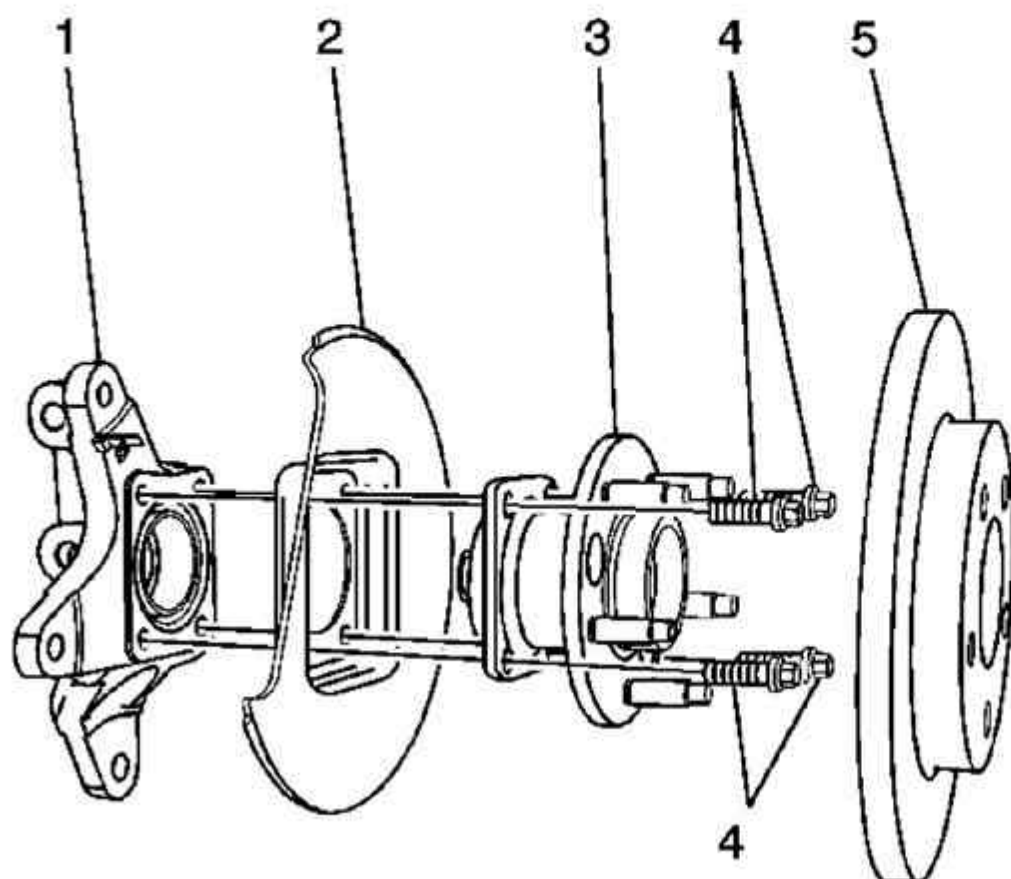


Fig. 70: Identifying Backing Plate & Wheel Bearing/Hub
 Courtesy of GENERAL MOTORS CORP.

1. Install the backing plate (2) to the knuckle (1).
2. Install the wheel bearing/hub (3). Refer to Rear Wheel Bearing and Hub Replacement.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION

IMPORTANT:

- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. Refer to Brake Rotor Thickness Variation Measurement.
- Brake rotor assembled lateral runout (LRO) exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4 800-11 300 km (3,000-7,000 mi). Refer to Brake Rotor Assembled Lateral Runout Measurement.

Review the following acceptable methods for bringing the brake rotor assembled LRO to within specifications. Determine which method to use for the specific vehicle being repaired.

- The indexing method of correcting assembled LRO is most effective when the LRO specification is only exceeded by a relatively small amount: 0.025-0.127 mm (0.001-0.005 in). Indexing is used to achieve the best possible match of high spots to low spots between related components. Refer to Brake Rotor Assembled Lateral Runout Correction - Indexing.
- The correction plate method of correcting assembled LRO involves the addition of a tapered plate between the brake rotor and the hub/axle flange. The correction plate method can be used to correct LRO that exceeds

the specification by up to 0.23 mm (0.009 in). Refer to **Brake Rotor Assembled Lateral Runout Correction - Correction Plates**.

- The on-vehicle brake lathe method is used to bring the LRO to within specifications through compensating for LRO while refinishing the brake rotor. Refer to **Brake Rotor Assembled Lateral Runout Correction - On Vehicle Lathe**.

If the assembled LRO cannot be corrected using these methods, then other components must be suspected as causing and/or contributing to the LRO concern.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - INDEXING

Tools Required

- **J 39544-KIT** Torque-Limiting Socket Set, or equivalent. See **Special Tools**.
- **J 45101-100** Conical Brake Rotor Washers. See **Special Tools**.

CAUTION: Refer to **Brake Dust Caution** .

IMPORTANT:

- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. Refer to **Brake Rotor Thickness Variation Measurement**.
- Brake rotor assembled LRO exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4 800-11 300 km (3,000-7,000 mi). Refer to **Brake Rotor Assembled Lateral Runout Measurement**.

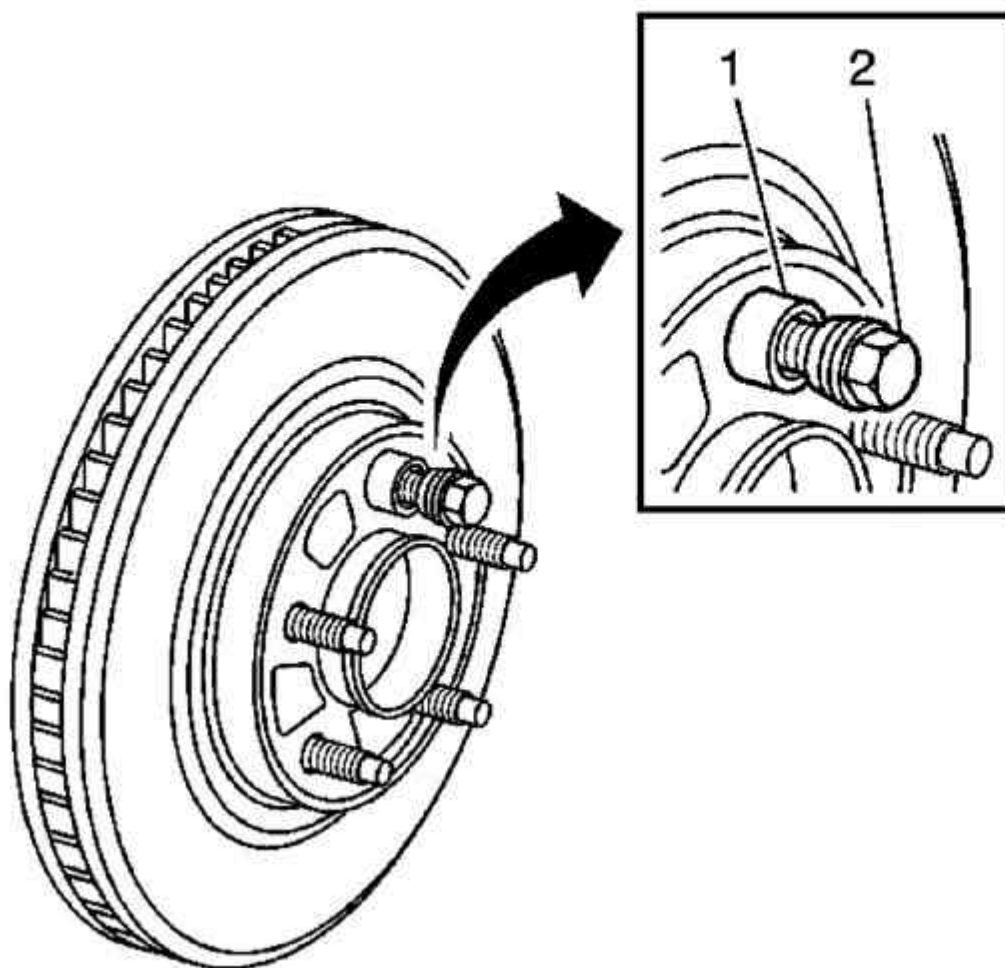


Fig. 71: Identifying J 45101-100 & Lug Nut
Courtesy of GENERAL MOTORS CORP.

1. Remove the **J 45101-100** and the lug nuts that were installed during the assembled LRO measurement procedure. See **Special Tools**.
2. Inspect the mating surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles or debris remaining.
3. Index the brake rotor in a different orientation to the hub/axle flange.
4. Hold the rotor firmly in place against the hub/axle flange and install one of the **J 45101-100** (1) and one lug nut (2) onto the upper-most wheel stud. See **Special Tools**.
5. Continue to hold the rotor secure and tighten the lug nut firmly by hand.

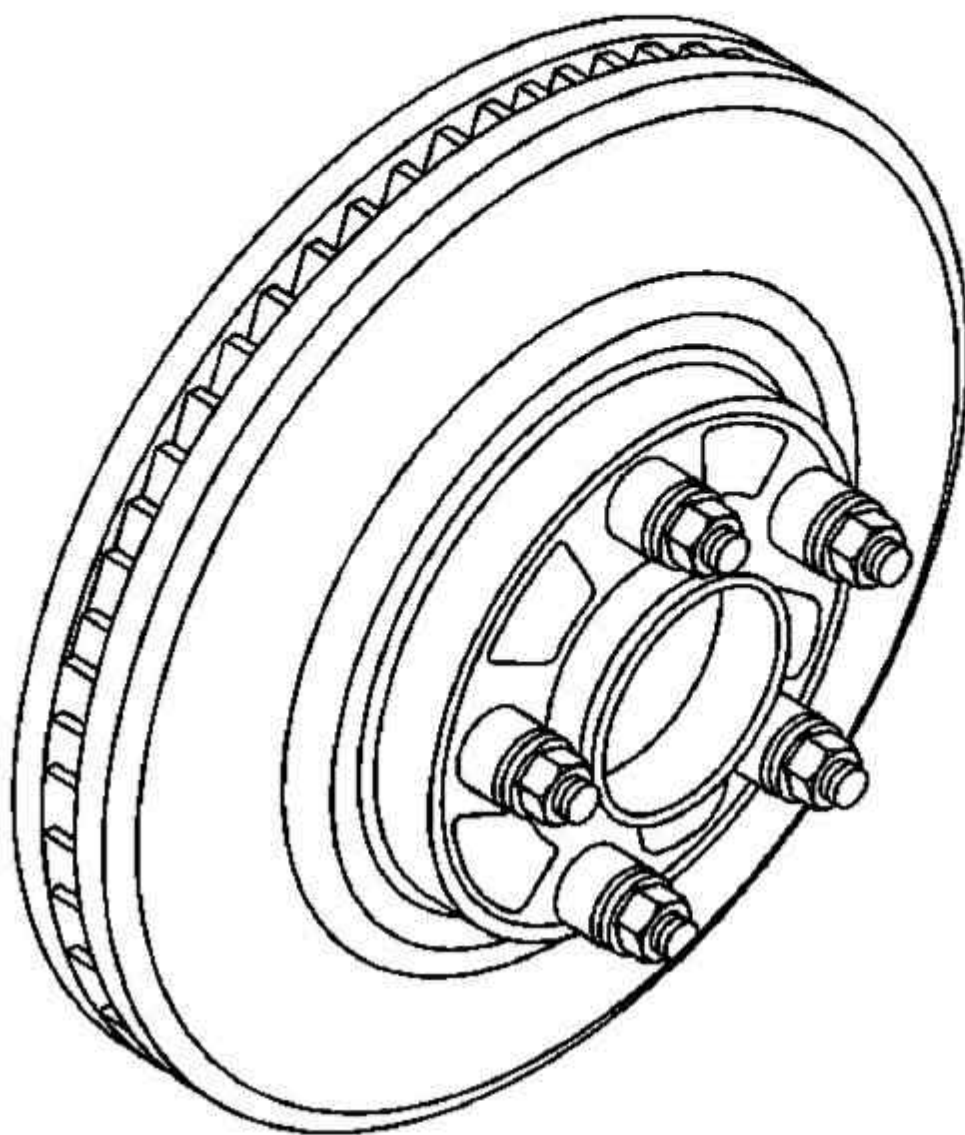


Fig. 72: Identifying All J 45101-100s & Lug Nuts
Courtesy of GENERAL MOTORS CORP.

6. Install the remaining **J 45101-100** and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern. See **Special Tools**.
7. Using the **J 39544-KIT**, or equivalent, tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. See **Special Tools**. Refer to **Tire and Wheel Removal and Installation**.
8. Measure the assembled LRO of the brake rotor. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
9. Compare the amount of change between this measurement and the original measurement.
10. If this measurement is within specifications, proceed to step 14.
11. If this measurement still exceeds specifications, repeat steps 1-9 until the best assembled LRO measurement is obtained.
12. Matchmark the final location of the rotor to the wheel studs if the orientation is different than it was originally.
13. If the brake rotor assembled LRO measurement still exceeds the maximum allowable specification, refer to **Brake Rotor Assembled Lateral Runout Correction**.
14. If the brake rotor assembled LRO is within specification, install the brake caliper and depress the brake pedal

several times to secure the rotor in place before removing the **J 45101-100** and the lug nuts. See **Special Tools**.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - CORRECTION PLATES

Tools Required

- **J 39544-KIT** Complete Torque Socket Set-10 Pieces, or equivalent. See **Special Tools**.
- **J 45101-100** Conical Brake Rotor Washers. See **Special Tools**.

CAUTION: Refer to **Brake Dust Caution** .

- IMPORTANT:**
- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. Refer to **Brake Rotor Thickness Variation Measurement**.
 - Brake rotor assembled LRO exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4 800-11 300 km (3,000-7,000 mi). Refer to **Brake Rotor Assembled Lateral Runout Measurement**.

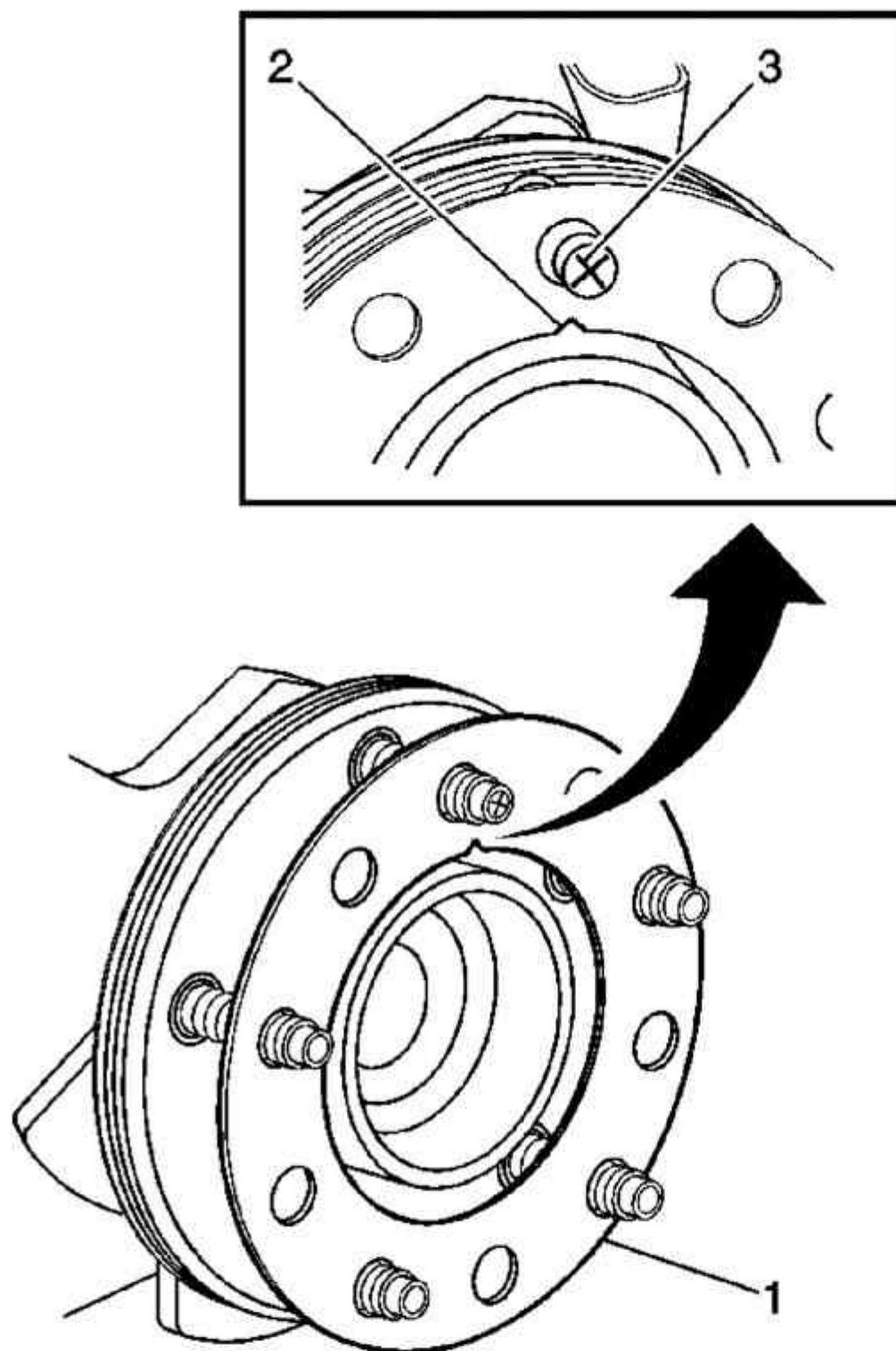


Fig. 73: Identifying Correction Plate, High Spot Mark & V-Shaped Notch
Courtesy of GENERAL MOTORS CORP.

1. Rotate the brake rotor to position the high spot, identified and marked during the brake rotor assembled LRO measurement procedure, to face upward.
2. Remove the **J 45101-100** and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction procedure. See **Special Tools**.
3. Inspect the mounting surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles or debris remaining.
4. Select the correction plate, following the manufacturer's instructions, which has a specification closest to the assembled LRO measurement.

For example: If the assembled LRO measurement was 0.076 mm (0.003 in), the 0.076 mm (0.003 in) correction plate would be used. If the measurement was 0.127 mm (0.005 in), the 0.152 mm (0.006 in) correction plate would be used.

5. Determine the positioning for the correction plate (1) using the high spot mark (3) made during the brake rotor assembled LRO measurement procedure.

IMPORTANT:

- Do NOT install used correction plates in an attempt to correct brake rotor assembled LRO.
- Do NOT stack up, or install more than one correction plate onto one hub/axle flange location, in an attempt to correct brake rotor assembled LRO.

6. Install the correction plate (1) onto the hub/axle flange, with the V-shaped notch (2) orientated to align with the high spot mark (3), that was positioned to face upward.

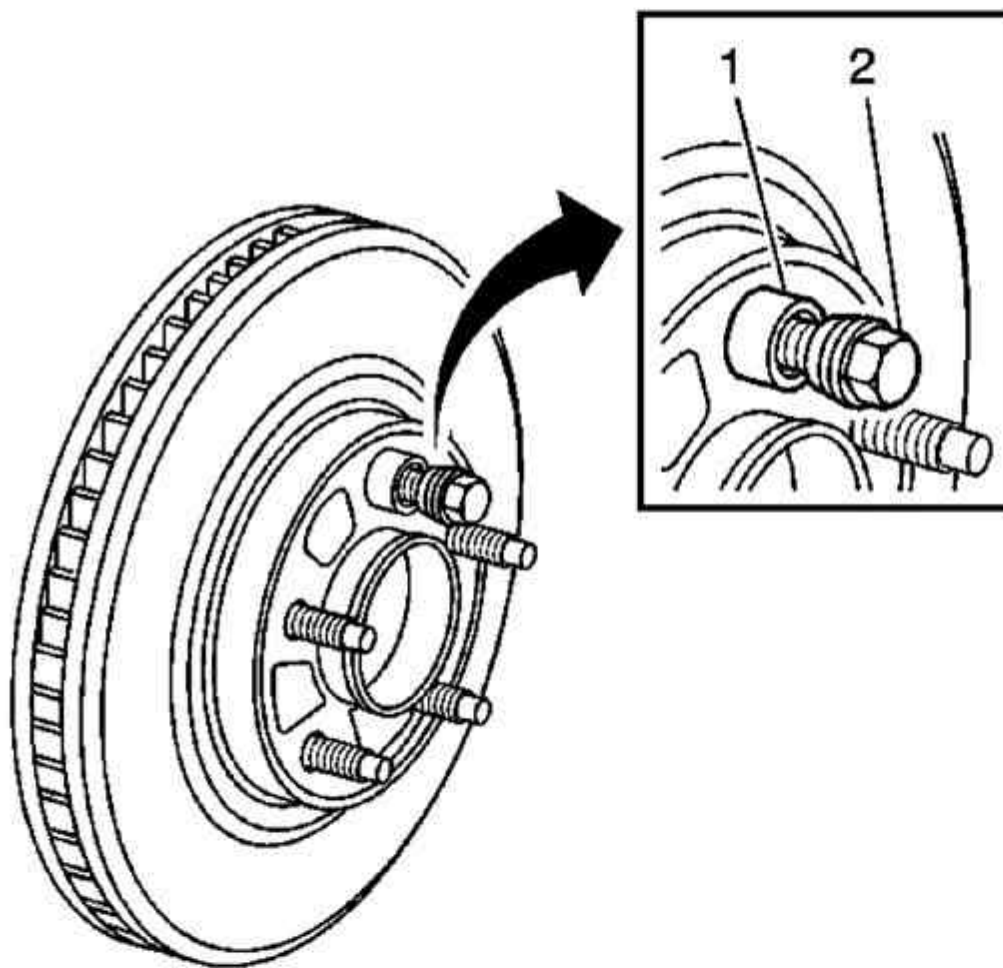


Fig. 74: Identifying J 45101-100 & Lug Nut
Courtesy of GENERAL MOTORS CORP.

7. Install the brake rotor to the hub/axle flange. Use the matchmark made prior to removal for proper orientation to the flange.
8. Hold the rotor firmly in place against the hub/axle flange and install one of the **J 45101-100** (1) and one lug nut (2) onto the upper-most wheel stud. See **Special Tools**.
9. Continue to hold the rotor secure and tighten the lug nut firmly by hand.

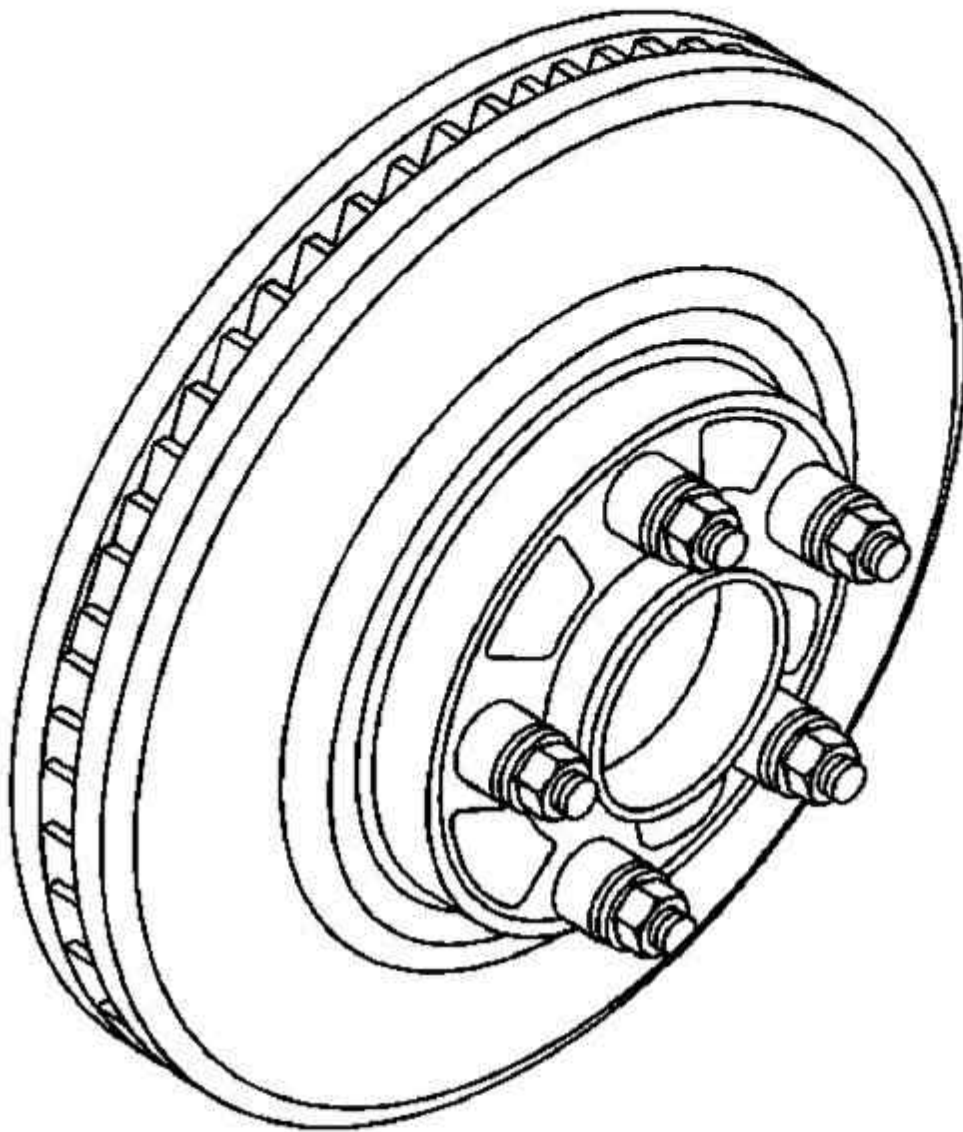


Fig. 75: Identifying All J 45101-100s & Lug Nuts
Courtesy of GENERAL MOTORS CORP.

10. Install the remaining **J 45101-100** and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern. See **Special Tools**.
11. Using the **J 39544-KIT**, or equivalent, tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. See **Special Tools**. Refer to **Tire and Wheel Removal and Installation**.
12. Measure the assembled LRO of the brake rotor. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
13. If the brake rotor assembled LRO measurement still exceeds the maximum allowable specification, refer to **Brake Rotor Assembled Lateral Runout Correction**.
14. If the brake rotor assembled LRO measurement is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **J 45101-100** and the lug nuts. See **Special Tools**.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - ON VEHICLE LATHE

Tools Required

J 45101-100 Conical Brake Rotor Washers. See Special Tools.

CAUTION: Refer to Brake Dust Caution .

- IMPORTANT:**
- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. Refer to Brake Rotor Thickness Variation Measurement.
 - Brake rotor assembled LRO exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4 800-11 300 km (3,000-7,000 mi). Refer to Brake Rotor Assembled Lateral Runout Measurement.

Procedure

1. Ensure that the caliper and caliper bracket that are already being supported, are clear from contacting any rotating components, such as the brake rotor.
2. Remove the **J 45101-100** and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction procedure. See Special Tools.
3. Inspect the mounting surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles or debris remaining.
4. Set up the lathe, following the manufacturer's instructions.
5. Refinish the brake rotor, following the brake lathe manufacturer's instructions.
6. After each successive cut, inspect the brake rotor thickness. Refer to Brake Rotor Thickness Measurement.
7. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced. After replacing the rotor, proceed to step 10.
8. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
 1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish.
 2. Using moderate pressure, apply the non-directional finish:
 - If the lathe is equipped with a non-directional finishing tool, apply the finish with 120-grit aluminum oxide sandpaper.
 - If the lathe is not equipped with a non-directional finishing tool, apply the finish with a sanding block and 150-grit aluminum oxide sandpaper.
 3. After applying a non-directional finish, clean each friction surface of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
9. Remove the lathe from the vehicle.
10. Measure the assembled LRO of the brake rotor. Refer to Brake Rotor Assembled Lateral Runout Measurement.
11. If the brake rotor assembled LRO measurement still exceeds the maximum allowable specification, refer to Brake Rotor Assembled Lateral Runout Correction.
12. If the brake rotor assembled LRO is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **J 45101-100** and the lug nuts. See Special Tools.

BRAKE ROTOR REFINISHING

Tools Required

- **J 41013** Rotor Resurfacing Kit. See Special Tools.
- **J 42450-A** Wheel Hub Resurfacing Kit. See Special Tools.

CAUTION: Refer to Brake Dust Caution .

- IMPORTANT:**
- The disc brake rotors do not require refinishing as part of routine brake system service. New disc brake rotors do not require refinishing.
- Do not refinish disc brake rotors in an attempt to correct the following conditions:
- Brake system noise - squeal, growl, groan
 - Uneven and/or premature disc brake pad wear
 - Superficial or cosmetic corrosion/rust of the disc brake rotor friction surface
 - Scoring of the disc brake rotor friction surface less than the maximum allowable specification
 - Before refinishing a brake rotor, the rotor **MUST** first be checked for adequate thickness to allow the rotor to be refinished and remain above the minimum allowable thickness after refinish specification. Refer to Brake Rotor Thickness Measurement.

Disc brake rotors should only be refinished if they have adequate thickness to be refinished and if one or more of the following conditions exist:

- Thickness variation in excess of the maximum allowable specification
- Excessive corrosion/rust and/or pitting
- Cracks and/or heat spots
- Excessive blueing discoloration
- Scoring of the disc brake rotor surface in excess of the maximum allowable specification
- Disc brake rotors may need to be refinished as part of the process for correcting brake rotor assembled lateral runout (LRO) that exceeds the maximum allowable specification.

IMPORTANT: If the vehicle is equipped with cross-drilled rotors, use a lathe with positive rake tooling. This setup requires less cutting pressure, which will result in less vibration, and a better surface finish. Also, use a vibration dampener when cutting. Otherwise, refinish according to the following instructions.

IMPORTANT: Whenever the brake rotor has been separated from the hub/axle flange, clean any rust or contaminants from the hub/axle flange and the brake rotor mating surfaces. Failure to do this may result in increased assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

1. Using the **J 42450-A** , thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange. See Special Tools.

2. Using the **J 41013**, thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor. See **Special Tools**.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure that there are no foreign particles or debris remaining.
4. Mount the brake rotor to the brake lathe according to the lathe manufacturer's instructions, ensuring that all mounting attachments and adapters are clean and free of debris.
5. Ensure that any vibration dampening attachments are securely in place.
6. With the brake lathe running, slowly bring in the cutting tools until they just contact the brake rotor friction surfaces.
7. Observe the witness mark on the brake rotor. If the witness mark extends approximately three-quarters or more of the way around the brake rotor friction surface on each side, the brake rotor is properly mounted to the lathe.
8. If the witness mark does not extend three-quarters or more of the way around the brake rotor, re-mount the rotor to the lathe.
9. Following the brake lathe manufacturer's instructions, refinish the brake rotor.
10. After each successive cut, inspect the brake rotor thickness. Refer to **Brake Rotor Thickness Measurement**.
11. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced.
12. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
 1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish.
 2. Using moderate pressure, apply the non-directional finish:
 - If the lathe is equipped with a non-directional finishing tool, apply the finish with 120-grit aluminum oxide sandpaper.
 - If the lathe is not equipped with a non-directional finishing tool, apply the finish with a sanding block and 150-grit aluminum oxide sandpaper.
 3. After applying a non-directional finish, clean each friction surface of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
13. Remove the brake rotor from the brake lathe.
14. Measure the assembled LRO of the brake rotor to ensure optimum performance of the disc brakes. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
15. If the brake rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.

DESCRIPTION AND OPERATION

DISC BRAKE SYSTEM DESCRIPTION AND OPERATION

System Component Description

The disc brake system consists of the following components:

Disc Brake Pads

Applies mechanical output force from the hydraulic brake calipers to friction surfaces of brake rotors.

Disc Brake Rotors

Uses mechanical output force applied to friction surfaces from the disc brake pads to slow speed of tire and

wheel assembly rotation.

Disc Brake Pad Hardware

Secures disc brake pads firmly in proper relationship to the hydraulic brake calipers. Enables a sliding motion of brake pads when mechanical output force is applied.

Disc Brake Caliper Hardware

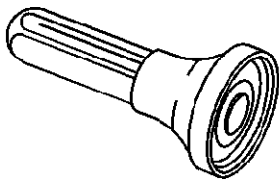
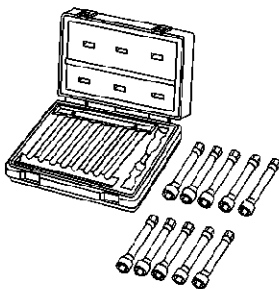
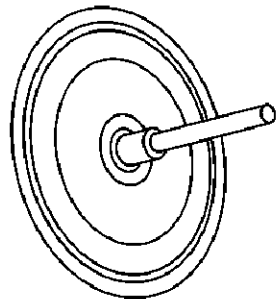
Provides mounting for hydraulic brake caliper and secures the caliper firmly in proper relationship to caliper bracket. Enables a sliding motion of the brake caliper to the brake pads when mechanical output force is applied.

System Operation

Mechanical output force is applied from the hydraulic brake caliper pistons to the inner brake pads. As the pistons press the inner brake pads outward, the caliper housings draw the outer brake pads inward. This allows the output force to be equally distributed. The brake pads apply the output force to the friction surfaces on both sides of the brake rotors, which slows the rotation of the tire and wheel assemblies. The correct function of both the brake pad and brake caliper hardware is essential for even distribution of braking force.

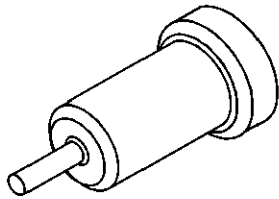
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

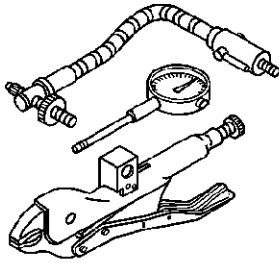
Illustration	Tool Number/ Description
	J 35777 Caliper Piston Seal Installer
	J 39544-KIT Complete Torque Socket Set - 10 Pieces
	J 41013 Rotor Resurfacing Kit

2008 Buick LaCrosse CXL

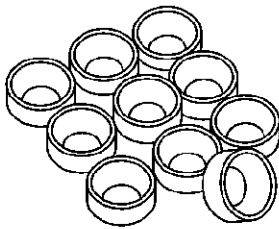
2008 BRAKES Disc Brakes - LaCrosse



J 42450-A
Wheel Hub Resurfacing Kit



J 45101
Hub and Wheel Runout Gage



J 45101-100
Conical Brake Rotor Washers

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2008 BRAKES Disc Brakes - LaCrosse

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