

2017 BRAKES

Disc Brakes - CT6

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>
Application
Brake Hose Fitting Gasket
Caliper Piston Dust Boot Seal
Caliper Piston Seal

Reusable Threaded Fastener Tightening Specifications

NOTE:
All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Brake Caliper Bleeder Valve - Front	17-20 N.m (13-15 lb ft)
Brake Caliper Bolt	160 N.m (118 lb ft)
Brake Caliper Bracket Bolt	125 N.m (92 lb ft)
Brake Caliper Guide Pin Bolt	40 N.m (30 lb ft)
Brake Hose Fitting Bolt	40 N.m (30 lb ft)
Brake Rotor Bolt	10 N.m (89 lb in)
Front Brake Shield Bolt	9 N.m (80 lb in)

DISC BRAKE COMPONENT SPECIFICATIONS

Application	Specification	
	Metric	English
Disc Brake Pads - Front and Rear		
Maximum Allowable Taper	0.15 N.m	0.0059 in
Minimum Friction Material Thickness	2.0 mm	0.787 in
Front Brake Rotor - J55		
Diameter	321.0 mm	12.638 in
Discard Thickness*	27.0 mm	1.063 in
Maximum Allowable Assembled Lateral Runout	0.05 mm	0.002 in
Maximum Allowable Scoring	1.50 mm	0.59 in
Maximum Allowable Thickness Variation	.025 mm	0.001 in
Minimum Allowable Thickness After Refinish	28.0 mm	1.102 in
Thickness - New	30.0 mm	1.181 in
Front Brake Rotor - J56		
Diameter	345.0 mm	13.582 in
Discard Thickness*	27.0 mm	1.063 in
Maximum Allowable Assembled Lateral Runout	0.05 mm	0.002 in
Maximum Allowable Scoring	1.50 mm	0.59 in

Application	Specification	
	Metric	English
Maximum Allowable Thickness Variation	.025 mm	0.001 in
Minimum Allowable Thickness After Refinish	28.0 mm	1.102 in
Thickness - New	30.0 mm	1.181 in
Rear Brake Rotor - J55, J56		
Diameter	315.0 mm	12.402 in
Discard Thickness*	21.0 mm	0.827 in
Maximum Allowable Assembled Lateral Runout	0.05 mm	0.002 in
Maximum Allowable Scoring	1.50 mm	0.59 in
Maximum Allowable Thickness Variation	.025 mm	0.001 in
Minimum Allowable Thickness After Refinish	22.0 mm	0.866 in
Thickness - New	23.0 mm	0.906 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 discard thickness specification.		

ADHESIVES, FLUIDS, LUBRICANTS AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Brake Caliper Bolt Brake Caliper Bracket Bolt	Threadlocker	89021297	10953488

DIAGNOSTIC INFORMATION AND PROCEDURES

BRAKE ROTOR THICKNESS MEASUREMENT

WARNING: Refer to [Brake Dust Warning](#) .

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](#).
2. Clean the friction surfaces of the brake rotor with denatured alcohol or an equivalent approved brake cleaner.
3. Using a micrometer (1) calibrated in thousandths-of-a-millimeter or ten-thousandths-of-an-inch, measure and record the lowest thickness of the brake rotor at 4 or more points, equally spaced around the rotor.

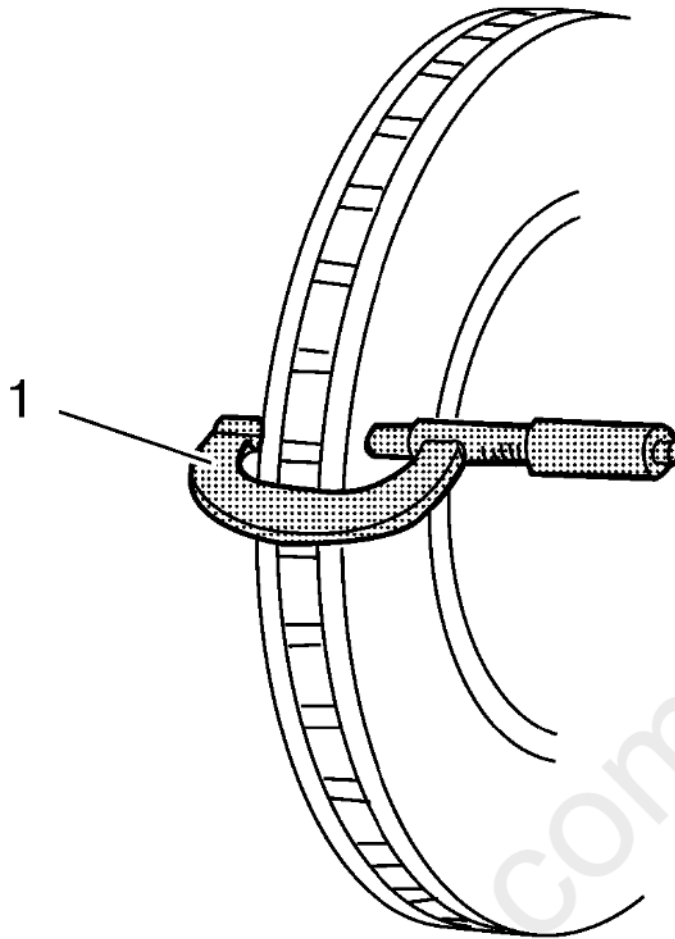


Fig. 1: Micrometer On Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

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

4. Compare the lowest thickness measurement recorded to the brake rotor discard thickness specifications. Refer to [Disc Brake Component Specifications](#).
5. If the lowest thickness measurement of the brake rotor is above the discard thickness specification, the brake rotor may be refinished, depending upon surface and wear conditions which may be present.
6. If the lowest thickness measurement of the brake rotor is at or below the discard thickness specification, the rotor requires replacement. Refer to [Front Brake Rotor Replacement](#) and/or [Rear Brake Rotor Replacement](#).

BRAKE ROTOR THICKNESS VARIATION MEASUREMENT

WARNING: Refer to [Brake Dust Warning](#) .

NOTE: 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](#).

2. Clean the friction surfaces of the brake rotor with denatured alcohol or an equivalent approved brake cleaner.
3. Using a micrometer (1) 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.

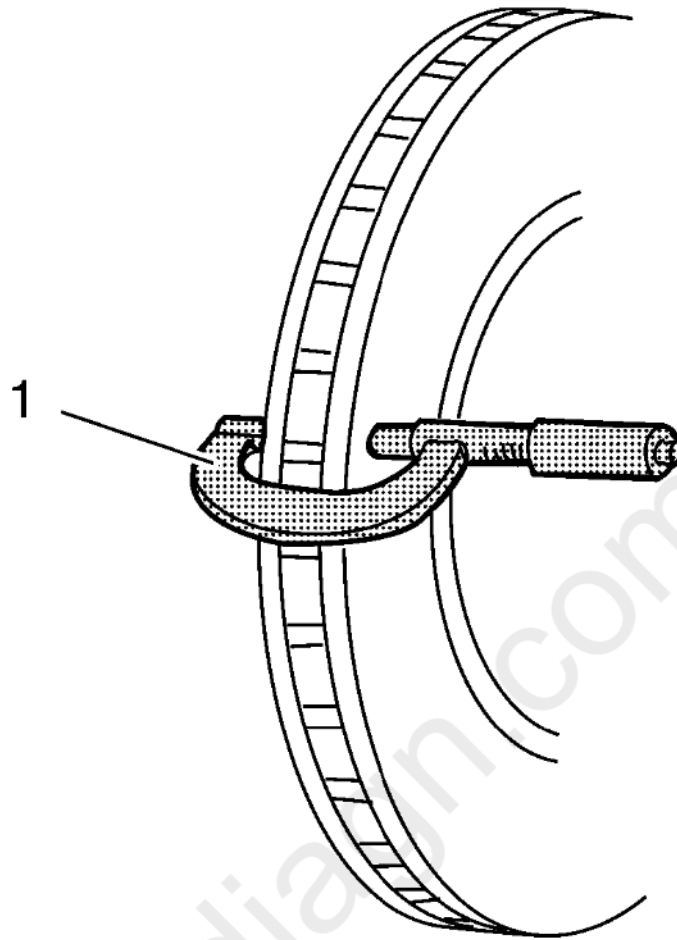


Fig. 2: Micrometer On Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

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: 0.006 mm (0.00024 in)

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

NOTE: 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.

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](#).
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.
5. Using a micrometer (1) 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.

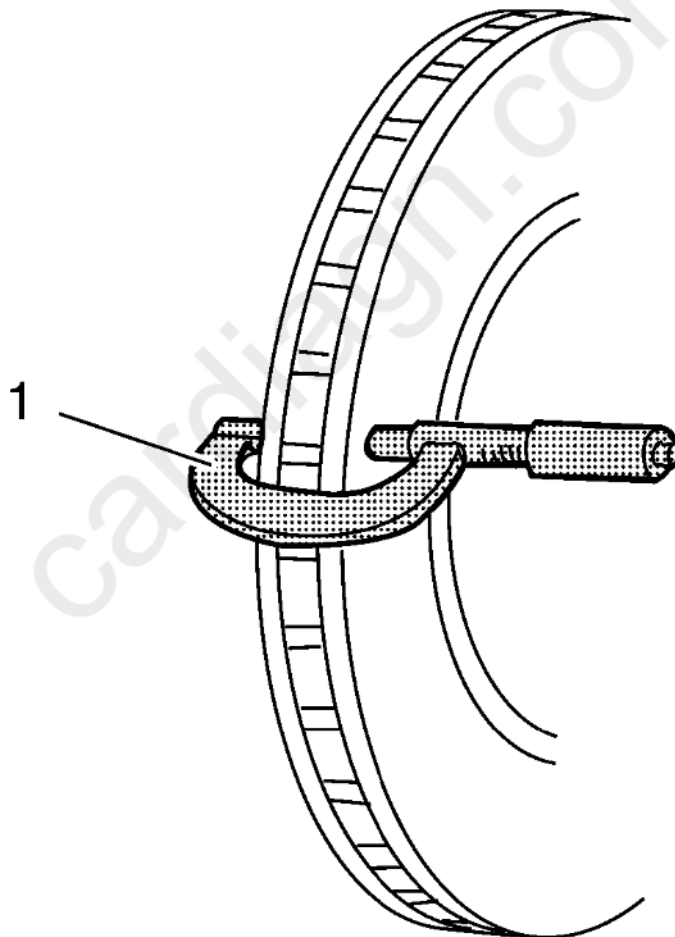


Fig. 3: Micrometer On Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

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

Special Tools

- **CH-41013** Rotor Resurfacing Kit
- **CH-42450-A** Wheel Hub Resurfacing Kit
- **CH-45101** Hub and Wheel Runout Gauge
- **CH-45101-100** Conical Brake Rotor Washers

For equivalent regional tools, refer to [Special Tools](#).

WARNING: Refer to [Brake Dust Warning](#) .

NOTE:

- 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. Match-mark the position of the brake rotor to the wheel studs if this has not been done already.
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:

NOTE: 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.

1. Remove the brake rotor from the vehicle. Refer to [Front Brake Rotor Replacement](#) and/or [Rear Brake Rotor Replacement](#).
 2. Using the **CH-42450-A** wheel hub resurfacing kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.
 3. Using the **CH-41013** rotor resurfacing kit, thoroughly clean any rust or corrosion from the mating surface of the brake rotor.
 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 match-mark made prior to removal.
 4. Hold the rotor firmly in place against the hub/axle flange and install one of the **CH-45101-100** conical brake rotor washers (1) and one lug nut (2) onto the upper-most wheel stud.

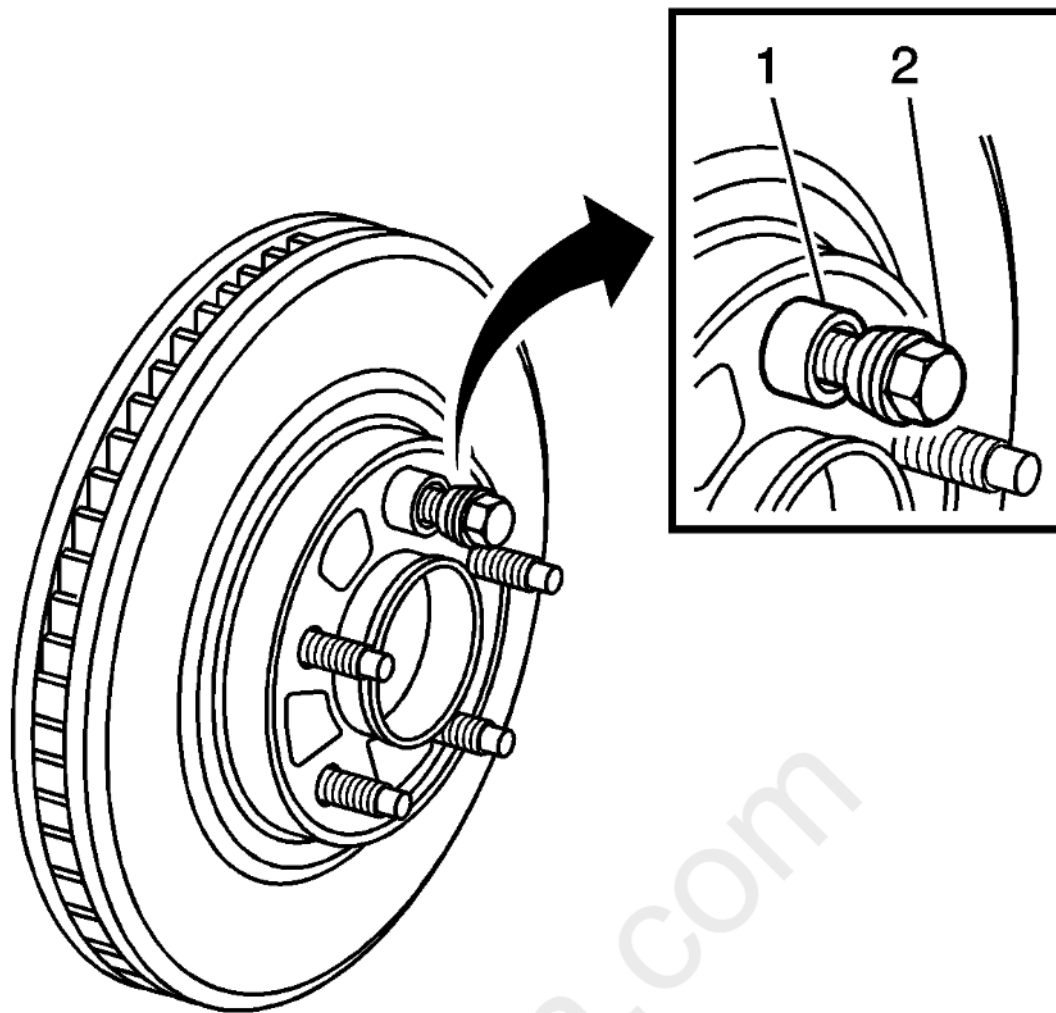


Fig. 4: Lug Nuts & Conical Washers

Courtesy of GENERAL MOTORS COMPANY

5. Continue to hold the rotor secure and tighten the lug nut firmly by hand.
6. Install the remaining **CH-45101-100** conical brake rotor washers and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern.

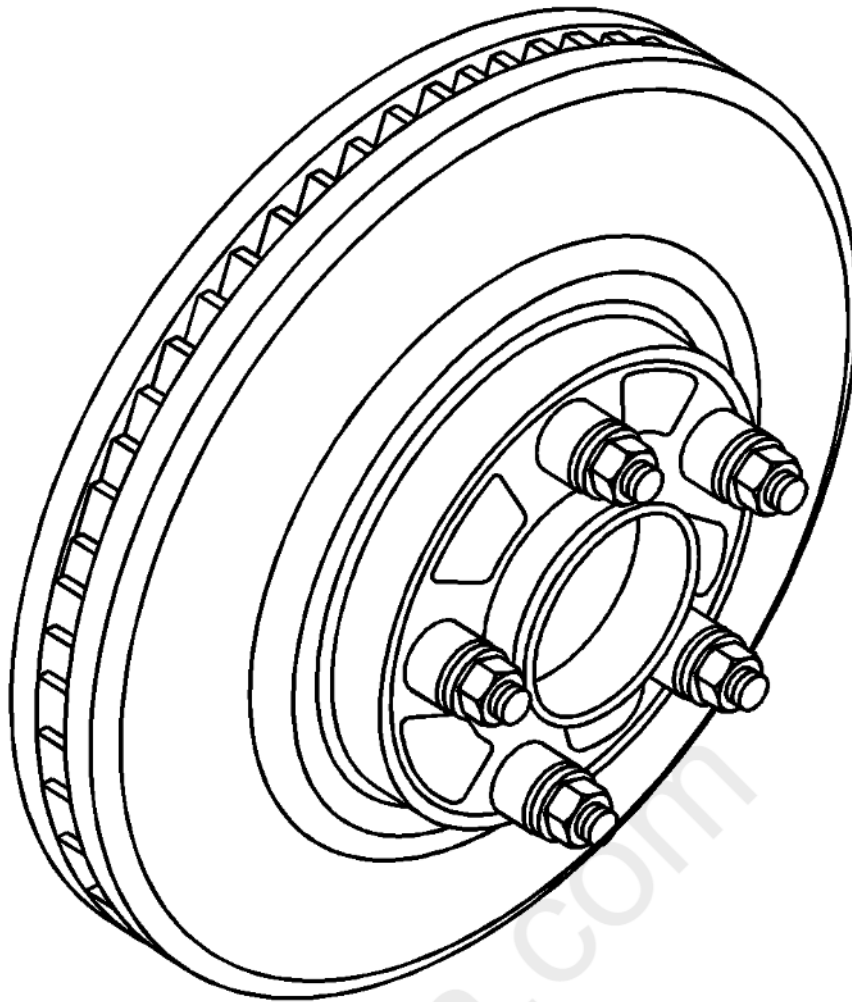


Fig. 5: Lug Nuts & Conical Washers

Courtesy of GENERAL MOTORS COMPANY

7. Tighten the lug nuts in a star-pattern to specification. 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.
10. Mount a dial indicator, **CH-45101** hub and wheel runout gauge 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.

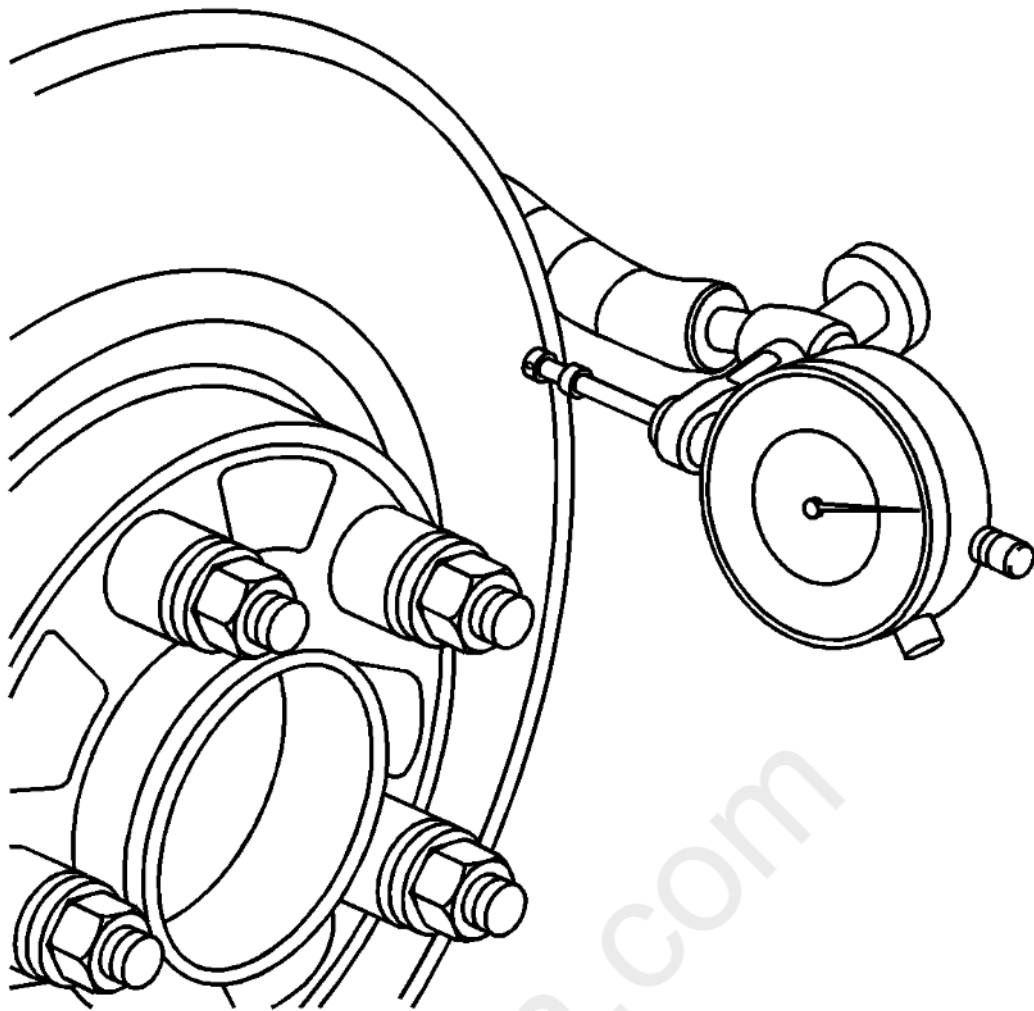


Fig. 6: Using Dial Indicator To Measure Lateral Runout

Courtesy of GENERAL MOTORS COMPANY

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, **CH-45101** hub and wheel runout gauge 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 **CH-45101-100** conical brake rotor washers and the lug nuts.

BRAKE PAD INSPECTION

1. Inspect the disc brake pads at regular intervals or whenever the tire and wheel assemblies are removed from the vehicle.

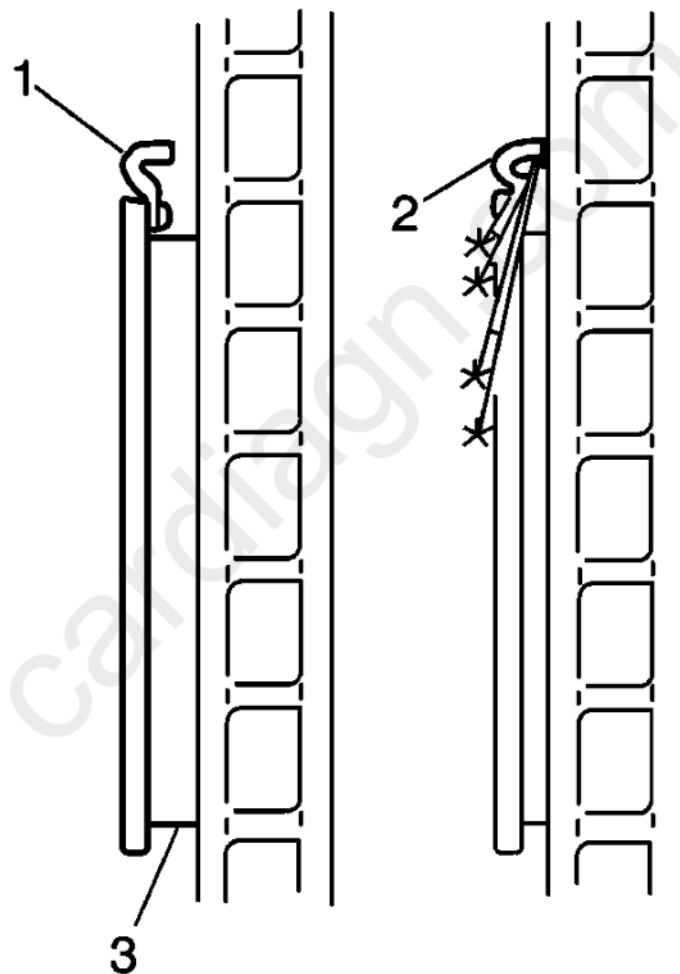


Fig. 7: View Of Brake Pads & Audible Wear Sensors

Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to [Brake Dust Warning](#) .

2. If replacement is necessary, always replace disc brake pads in axle sets.

NOTE: Some pads are designed to be bonded to the caliper for noise suppression. This bond should only be undone when pads are replaced.

3. 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.
4. 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.
5. 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.

NOTE: When replacing the disc brake pads, maintain the same disc brake pad wear sensor orientation.

6. Replace the disc brake pads when the friction surface (3) is worn to within 2.0 mm (0.080 in) of the mounting plates.
7. Replace the disc brake pads if any have separated from the mounting plates.
8. 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

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.

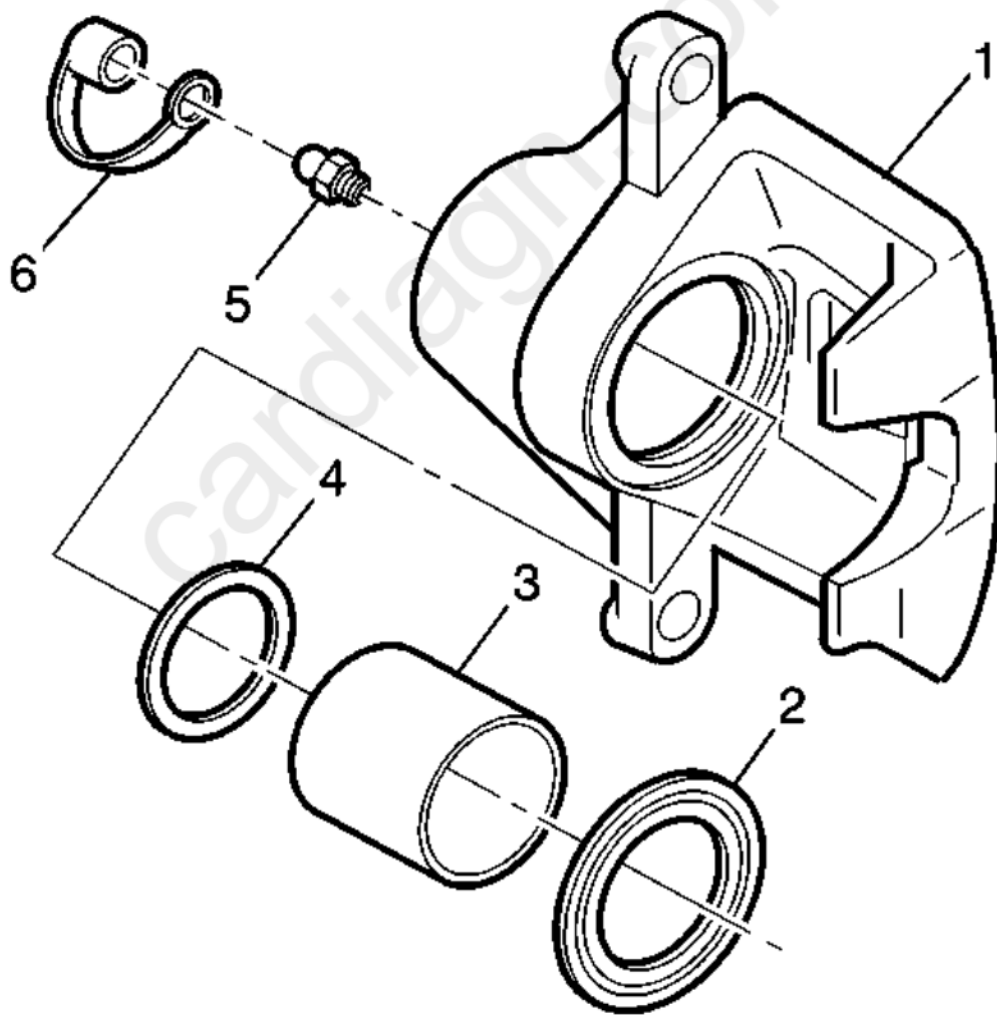


Fig. 8: Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to [Brake Dust Warning](#) .

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:

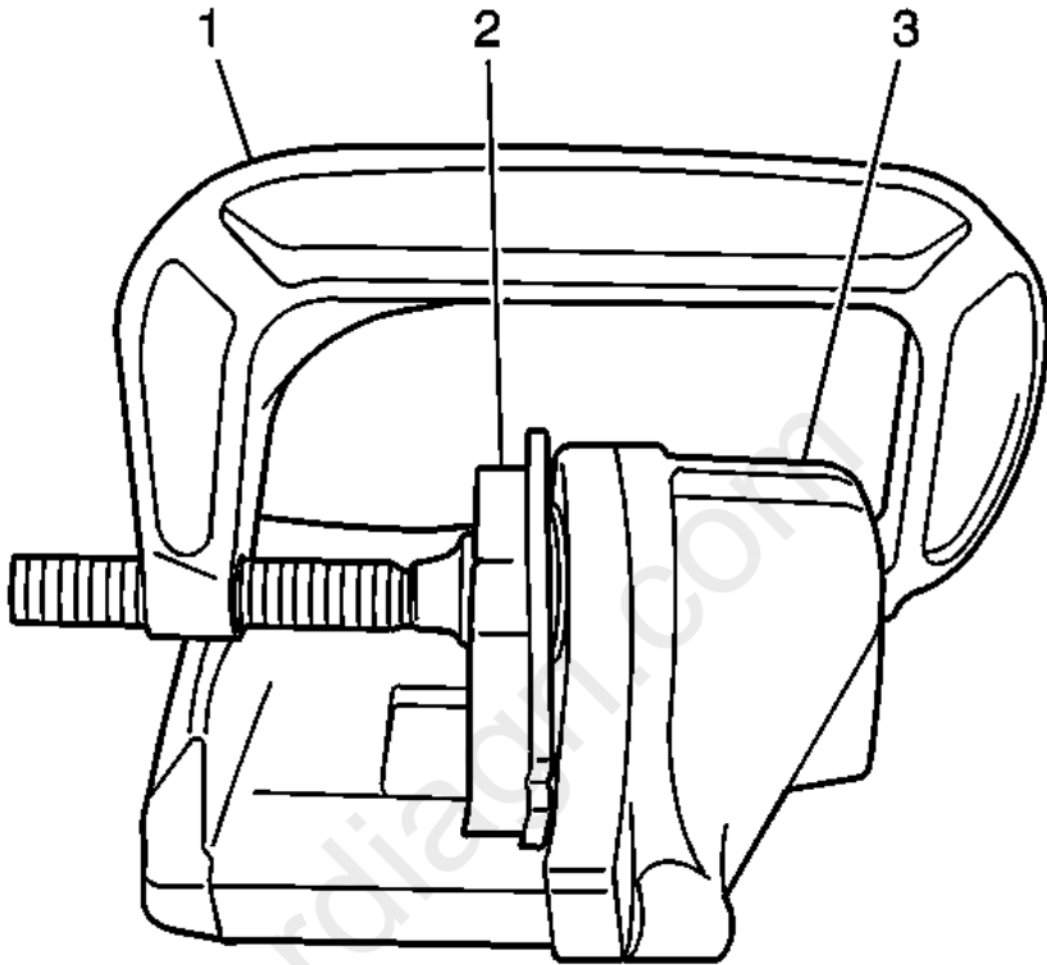


Fig. 9: Compressing Caliper Piston

Courtesy of GENERAL MOTORS COMPANY

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.

- For single piston caliper applications, insert a discarded inner brake pad (2) or 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 in the bore.
- For dual piston caliper applications, insert a discarded inner brake pad (2) or block of wood in front of the pistons. Using 2 large C-clamps (1) installed over the body of the caliper (3) and against the brake pad or block of wood, slowly bottom the pistons evenly into the bores.

FRONT DISC BRAKE MOUNTING AND HARDWARE INSPECTION

WARNING: Refer to [Brake Dust Warning](#) .

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.
3. 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.

4. Raise and support the vehicle. Refer [Lifting and Jacking the Vehicle](#) .
5. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .
6. Grasp the brake caliper housing and try to move the brake caliper housing up/down and forward/reverse in relation to the brake caliper mounting bracket. If excessive looseness is observed the brake caliper bracket bushings and/or the brake caliper mounting bolts may need to be replaced.
7. Compress the front caliper pistons.
 1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
 2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
 3. Remove the C-clamp from the caliper.
8. With the pistons compressed into the caliper bores, grasp the brake caliper housing and slide it back and forth on the brake caliper mounting bolts. Check for smooth operation. If the brake caliper housing slide force is high or the brake caliper housing does not slide smoothly, inspect the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings for wear or damage. If wear or damage conditions are found, replacement of the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings is necessary.
9. Remove the brake caliper mounting bolts from the brake caliper mounting bracket and support the brake caliper using heavy mechanics wire. Do Not remove the hydraulic brake hose from the caliper. Refer to [Front Brake Caliper Replacement](#).
10. Remove the disc brake pads from the brake caliper mounting bracket.

NOTE: When replacing the disc brake pads, maintain the same disc brake pad wear sensor orientation.

11. Inspect the disc brake pad mounting hardware for the following:
 - Missing mounting hardware
 - Excessive corrosion
 - Bent mounting tabs
 - Looseness at the brake caliper mounting bracket
 - Looseness at the disc brake pads
 - Excessive contaminants in the brake caliper mounting bracket surface and threads.
12. If any of the conditions listed are found, the disc brake pad mounting hardware requires replacement.
13. 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.
14. Inspect the brake caliper guide pin bolt (1), brake caliper (2), caliper bracket (3) and the guide pin seal (4) for the following:

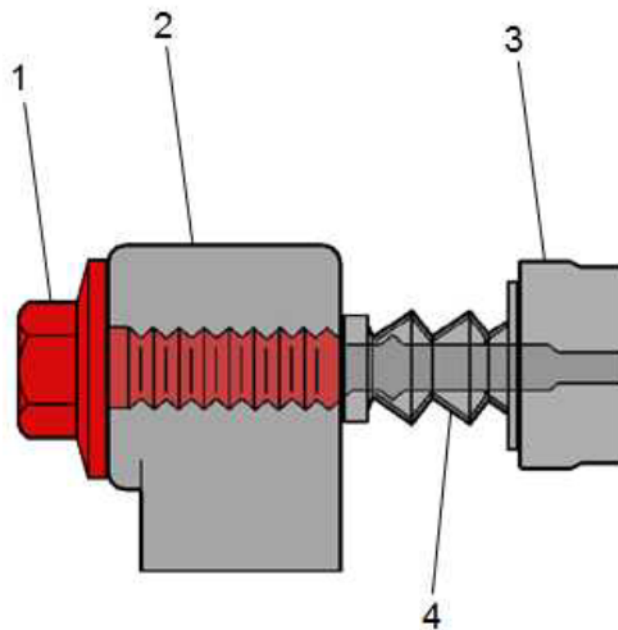


Fig. 10: View Of Caliper, Pin, Boots & Caliper Mounting Bracket

Courtesy of GENERAL MOTORS COMPANY

- Binding
 - Seizing
 - Looseness in the brake caliper mounting bracket
 - Bent or damaged brake caliper mounting bolts
 - Cracked or torn boots
 - Missing boots
 - Bent or damaged brake caliper mounting bracket
15. If any of the conditions listed are found then the brake caliper mounting hardware requires replacement.
 16. Install the disc brake pads to the brake caliper mounting bracket.
 17. Install the disc brake caliper to the brake caliper mounting bracket. Refer to **Front Brake Caliper Replacement**.

REAR DISC BRAKE MOUNTING AND HARDWARE INSPECTION

WARNING: Refer to **Brake Dust Warning** .

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.
3. 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.
4. Raise and support the vehicle. Refer **Lifting and Jacking the Vehicle** .

WARNING: Do not use a service jack in locations other than those specified to lift this vehicle. Lifting the vehicle with a jack in those other locations could cause the vehicle to slip off the jack and roll; this could cause injury or death.

5. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Grasp the brake caliper housing and try to move the brake caliper housing up/down and forward/reverse in relation to the brake caliper mounting bracket. If excessive looseness is observed the brake caliper bracket bushings and/or the brake caliper mounting bolts may need to be replaced.
7. Compress the rear caliper piston.

1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
3. Remove the C-clamp from the caliper.
8. With the piston compressed into the caliper bore, grasp the brake caliper housing and slide it back and forth on the brake caliper mounting bolts. Check for smooth operation. If the brake caliper housing slide force is high or the brake caliper housing does not slide smoothly, inspect the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings for wear or damage. If wear or damage conditions are found, replacement of the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings is necessary.
9. Remove the brake caliper mounting bolts from the brake caliper mounting bracket and support the brake caliper using heavy mechanics wire. Do not disconnect the hydraulic brake hose from the caliper. Refer to **Rear Brake Caliper Replacement**.
10. Remove the disc brake pads from the brake caliper mounting bracket.
11. Inspect the disc brake pad mounting hardware for the following:
 - Missing mounting hardware
 - Excessive corrosion
 - Bent mounting tabs
 - Looseness at the brake caliper mounting bracket
 - Looseness at the disc brake pads
 - Excessive contaminants in the brake caliper mounting bracket surface and threads.
12. If any of the conditions listed are found, the disc brake pad mounting hardware requires replacement.
13. 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.
14. Inspect the caliper bolts (1) or guide pins for the following:

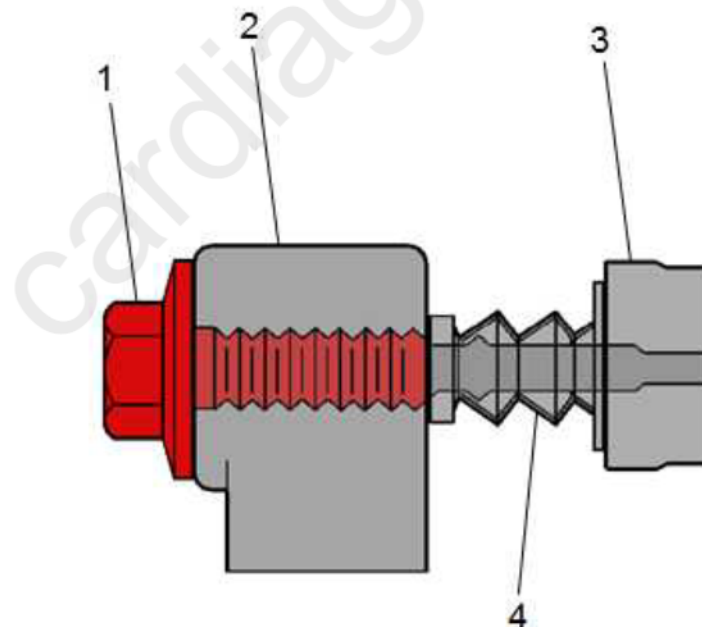


Fig. 11: View Of Caliper, Pin, Boots & Caliper Mounting Bracket
Courtesy of GENERAL MOTORS COMPANY

- Binding
- Seizing
- Looseness in the brake caliper mounting bracket (3)
- Bent or damaged brake caliper mounting bolts or guide pins
- Cracked or torn boots (4)
- Missing boots

- Bent or damaged brake caliper mounting bracket (3)
15. If any of the conditions listed are found then the brake caliper mounting hardware requires replacement.
 16. Install the disc brake pads to the brake caliper mounting bracket.
 17. Gently pull the edge of the upper guide pin seal (1) away from the brake caliper guide pin (2) while simultaneously pushing the brake caliper guide pin into the brake caliper bracket to expel any trapped air and excess brake lubricant.



Fig. 12: Upper Guide Pin Seal And Guide Pin Seal
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Excess brake lubricant and trapped air must be expelled from the brake caliper guide pin bore to allow full caliper movement and prevent premature brake pad wear.

18. Repeat step 17 for the lower guide pin seal and brake caliper guide pin.
19. With a clean shop towel, clean any excess brake lubricant from the guide pin seal and brake caliper guide pin.
20. Install the disc brake caliper to the brake caliper mounting bracket. Refer to [Rear Brake Caliper Replacement](#).

REPAIR INSTRUCTIONS

FRONT DISC BRAKE PADS REPLACEMENT

Removal Procedure

WARNING: [Brake Dust Warning](#)

WARNING: [Brake Fluid Irritant Warning](#)

NOTE: Always replace disc brake pads in axle sets.

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 assembly. Refer to [Tire and Wheel Removal and Installation](#)
6. Brake Caliper Pin (1) Remove [2x]

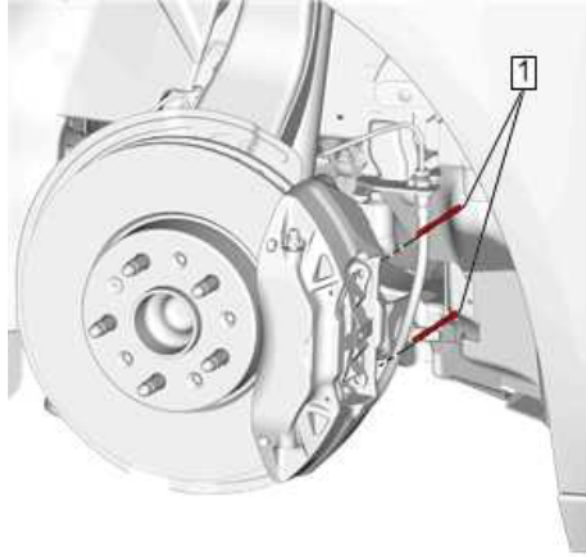


Fig. 13: Brake Caliper Pin

Courtesy of GENERAL MOTORS COMPANY

7. Brake Pad Spring (1) » Remove.

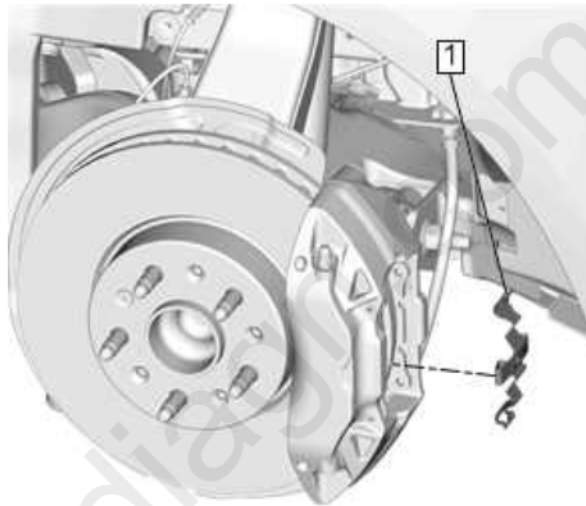


Fig. 14: Brake Pad Spring

Courtesy of GENERAL MOTORS COMPANY

8. Disc Brake Pad (1) » Remove [2x]

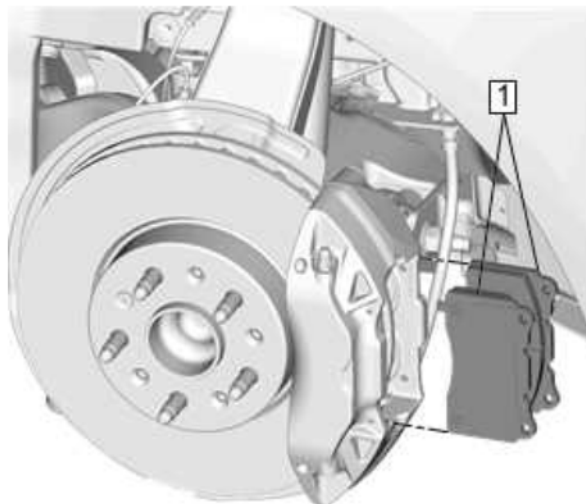


Fig. 15: Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

9. Using a spreader tool, carefully push the brake caliper pistons into the caliper bores until fully seated.

Installation Procedure

1. Inspect the brake caliper pins and brake pad spring for damage or excessive corrosion and replace, if necessary.
2. Disc Brake Pad (1)» Install [2x]

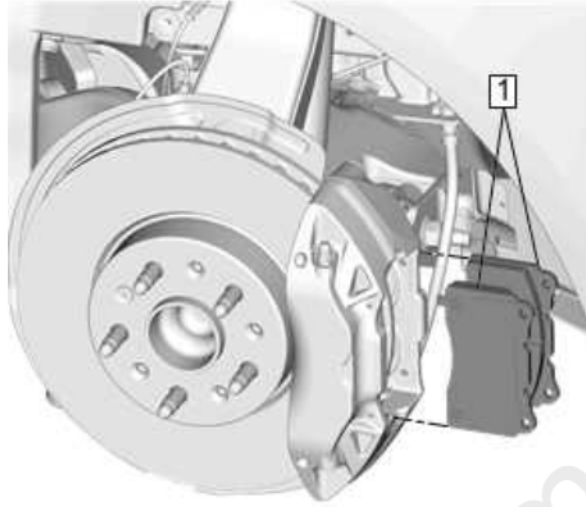


Fig. 16: Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

3. Brake Pad Spring (1)» Install.

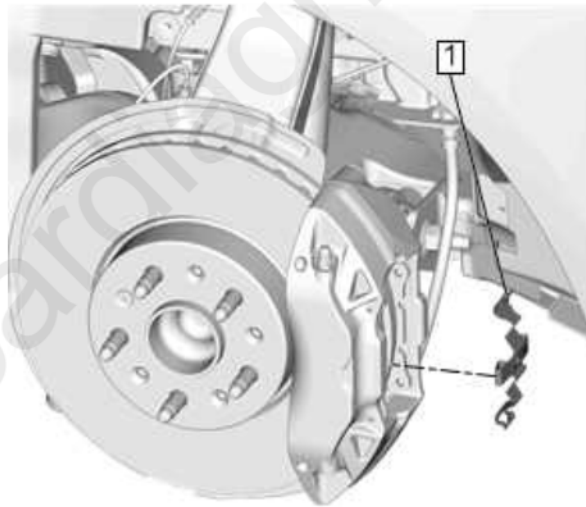


Fig. 17: Brake Pad Spring

Courtesy of GENERAL MOTORS COMPANY

4. Brake Caliper Pin (1)» Install [2x]

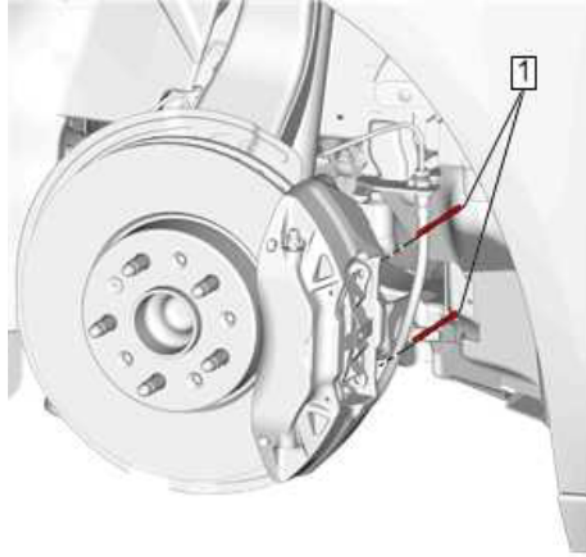


Fig. 18: Brake Caliper Pin

Courtesy of GENERAL MOTORS COMPANY

5. Carefully drive the brake caliper pins into the brake caliper until fully seated.
6. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
7. Slowly release the brake pedal.
8. Wait 15 seconds, then repeat steps 6-7 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads.
9. Fill the brake master cylinder reservoir to the maximum-full level with GM approved brake fluid from a clean, sealed brake fluid container. Refer to [Master Cylinder Reservoir Filling](#)
10. Burnish the brake pads and rotors. Refer to [Brake Pad and Rotor Burnishing](#)

REAR DISC BRAKE PADS REPLACEMENT

Removal Procedure

WARNING: [Brake Dust Warning](#)

WARNING: [Brake Fluid Irritant Warning](#)

NOTE: Always replace disc brake pads in axle sets.

1. Set the parking brake in Service Mode.
 1. Install a scan tool.
 2. Turn the ignition ON with the engine OFF.
 3. Select Electronic Brake Control Module.
 4. Select Control Functions.
 5. Select Rear Brake Calliper Piston Retract.

NOTE: Do NOT apply any brake pressure during this step.

2. Inspect the fluid level in the brake master cylinder reservoir.
3. 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.
4. 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.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
6. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
7. Brake Caliper Guide Pin Bolt (1)» Remove [2x]

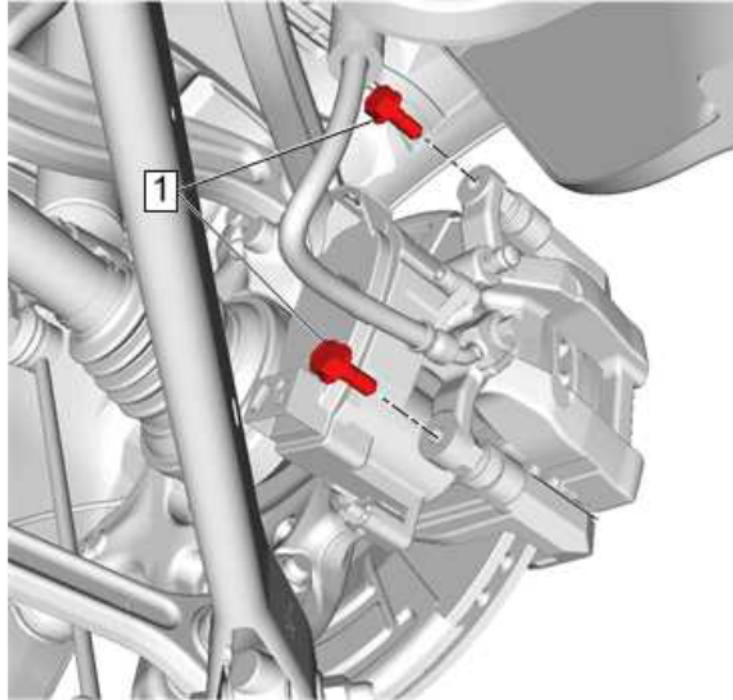


Fig. 19: Brake Caliper Guide Pin Bolt

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- DO NOT use any air tools to remove or install the guide pin bolts. Use hand tools ONLY.
- Install an open end wrench to hold the caliper guide pin in line with the brake caliper while removing or installing caliper guide pin bolt. DO NOT allow the open end wrench to come in contact with the brake caliper. Allowing the open end wrench to come in contact with the brake caliper will cause a pulsation when the brakes are applied.

8. Rear Brake Caliper (1) » Remove

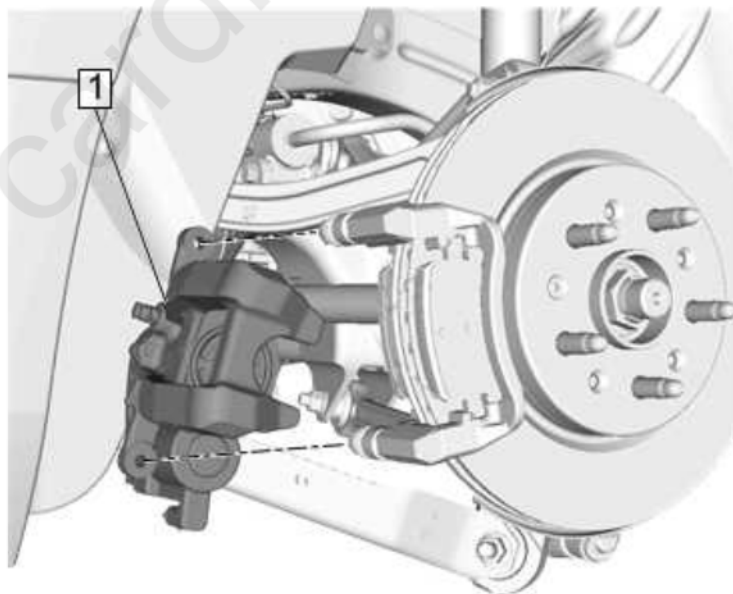


Fig. 20: Rear Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

CAUTION:

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.

9. Support the brake caliper with heavy mechanics wire.
10. Disc Brake Pad Retainer (1)» Remove [2x]
11. Inner Disc Brake Pad (1)» Remove

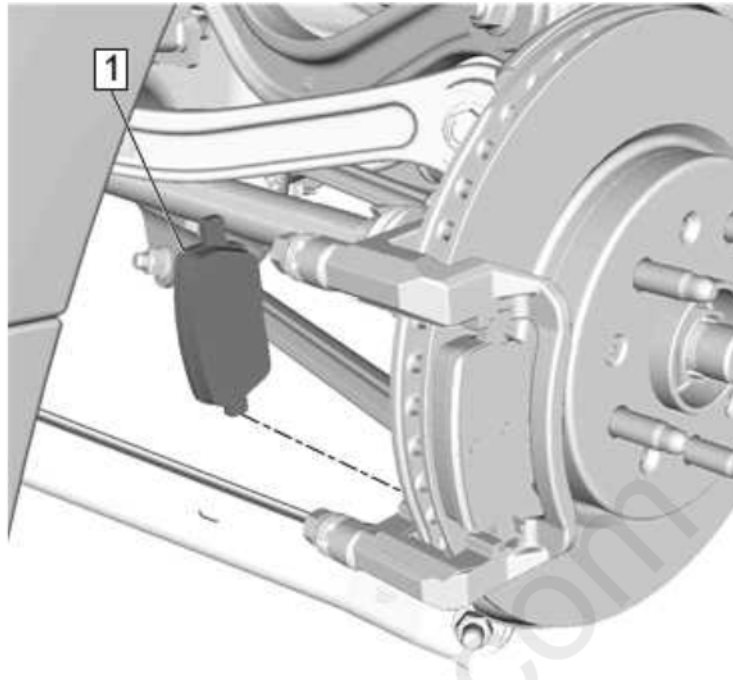


Fig. 21: Inner Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

12. Outer Disc Brake Pad (1)» Remove

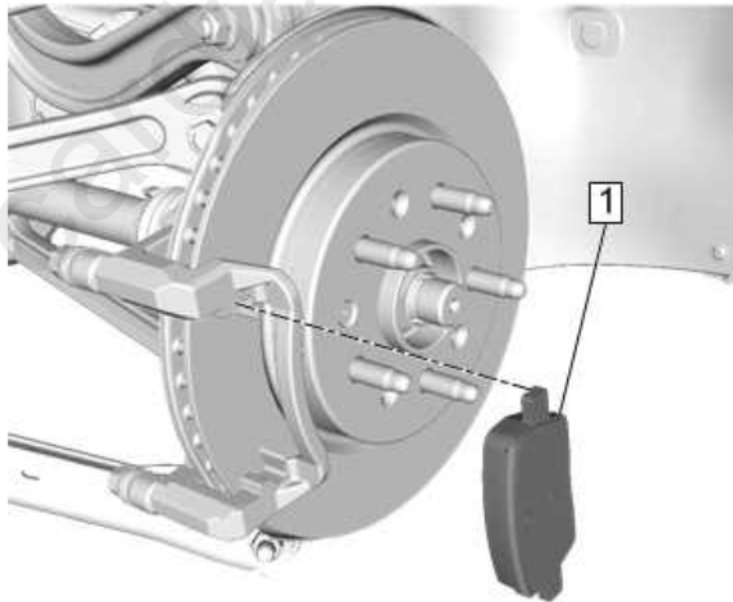


Fig. 22: Outer Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

13. Disc Brake Pad Retainer Spring (1)» Remove and DISCARD [2x]

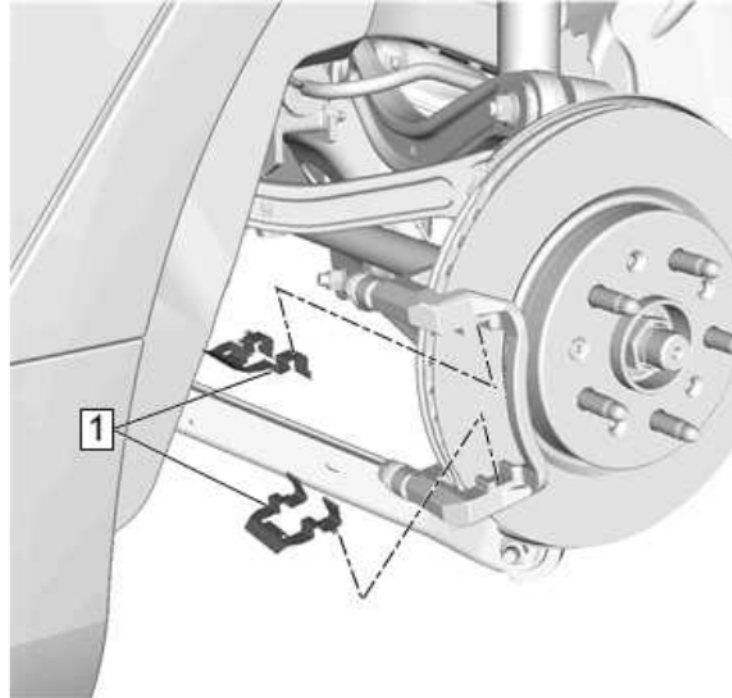


Fig. 23: Disc Brake Pad Retainer Spring

Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Using an appropriate brake caliper piston spanner tool, slowly rotate the brake caliper piston clockwise while applying inward pressure to the brake caliper piston until the piston is fully seated in the brake caliper housing.
2. Ensure the notches in the brake caliper piston align correctly with the pins on the inner disc brake pad.
3. Disc Brake Pad Retainer Spring (1) » Install [2x]

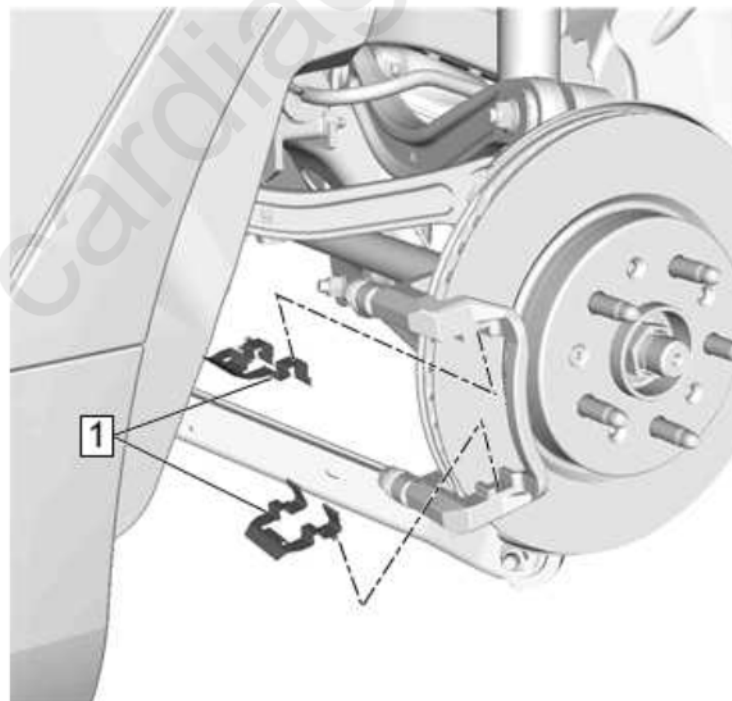


Fig. 24: Disc Brake Pad Retainer Spring

Courtesy of GENERAL MOTORS COMPANY

NOTE: Install NEW disc brake pad springs.

4. Apply a thin coat of high temperature brake lubricant to the disc brake pad spring arms.

NOTE: Only apply the lubricant to the brake pad spring arms where it contacts the metal disc brake pad plates.

5. Outer Disc Brake Pad (1)» Install

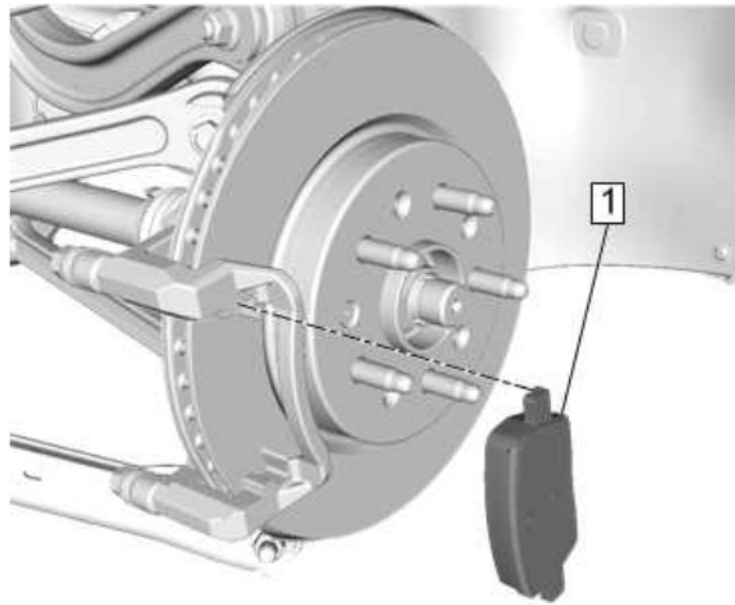


Fig. 25: Outer Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

6. Inner Disc Brake Pad (1)» Install

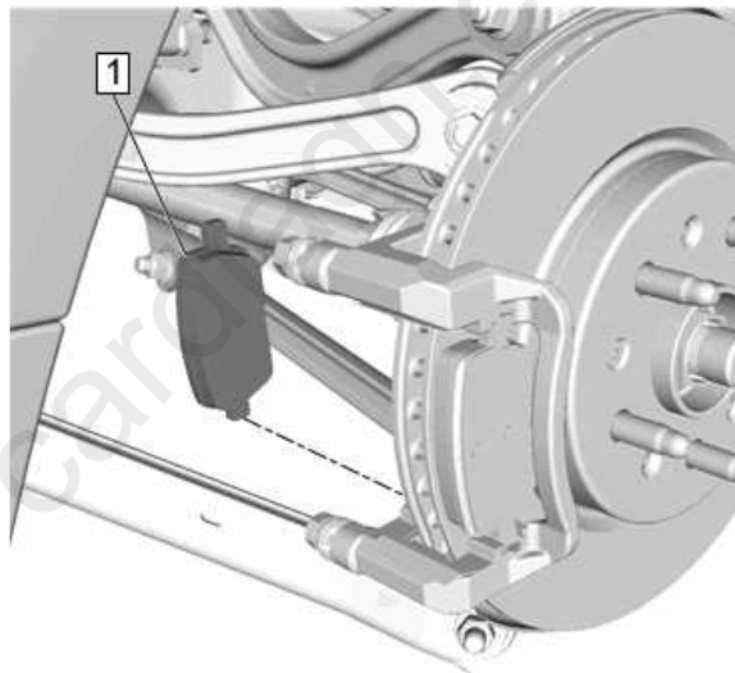


Fig. 26: Inner Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

7. Disc Brake Pad Retainer (1)» Install [2x]

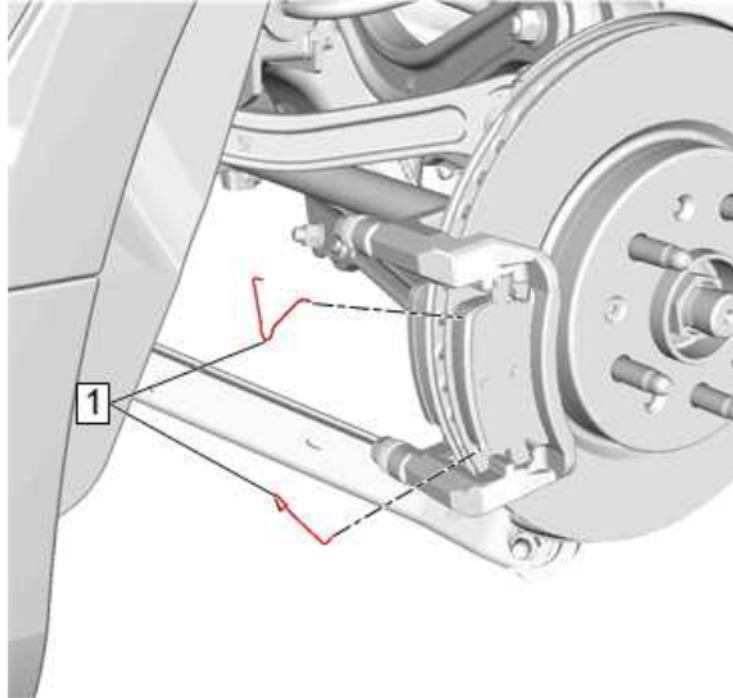


Fig. 27: Disc Brake Pad Retainer

Courtesy of GENERAL MOTORS COMPANY

8. Rear Brake Caliper (1)» Install

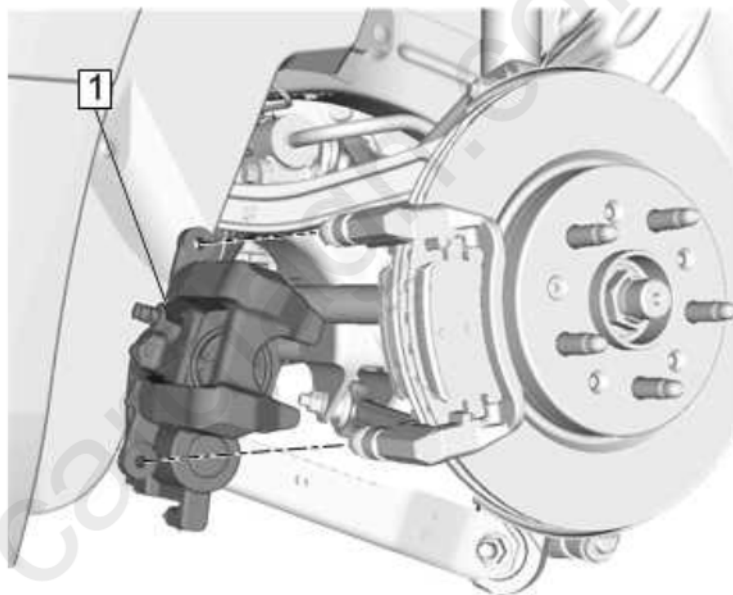


Fig. 28: Rear Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

9. Brake Caliper Guide Pin Bolt (1)» Install and tighten 40 N.m (30 lb ft) [2x]

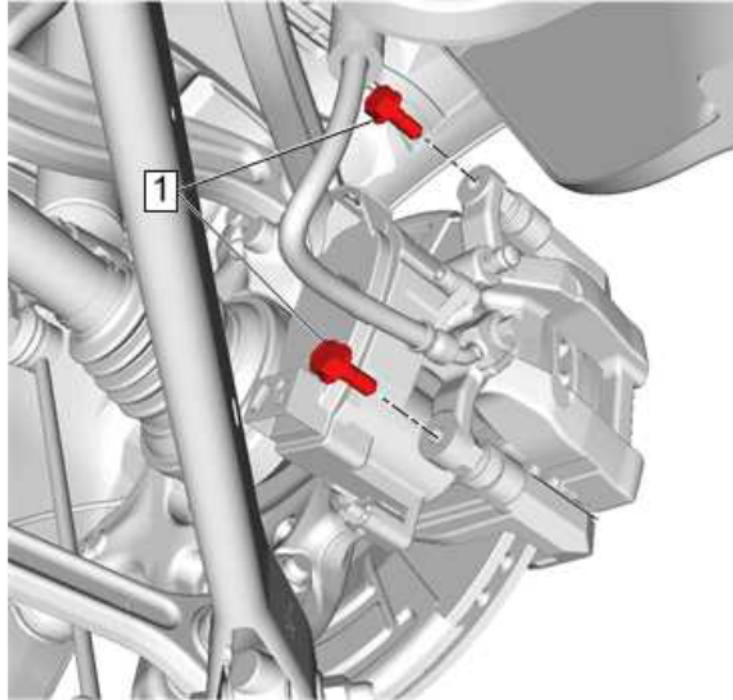


Fig. 29: Brake Caliper Guide Pin Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Fastener Caution

10. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation
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. Fill the brake master cylinder reservoir to the maximum-full level with GM approved brake fluid from a clean, sealed brake fluid container. Refer to Master Cylinder Reservoir Filling
15. Calibrate the park brake. Refer to Park Brake Calibration
16. Burnish the brake pads and rotors. Refer to Brake Pad and Rotor Burnishing

BRAKE PAD AND ROTOR BURNISHING

WARNING: Road test a vehicle under safe conditions and while obeying all traffic laws. Do not attempt any maneuvers that could jeopardize vehicle control. Failure to adhere to these precautions could lead to serious personal injury and vehicle damage.

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).

NOTE: 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

WARNING: Brake Dust Warning

WARNING: Brake Fluid Irritant Warning

1. Front Disc Brake Pads Replacement » Remove
2. Brake Hose Fitting Bolt (1) » Remove

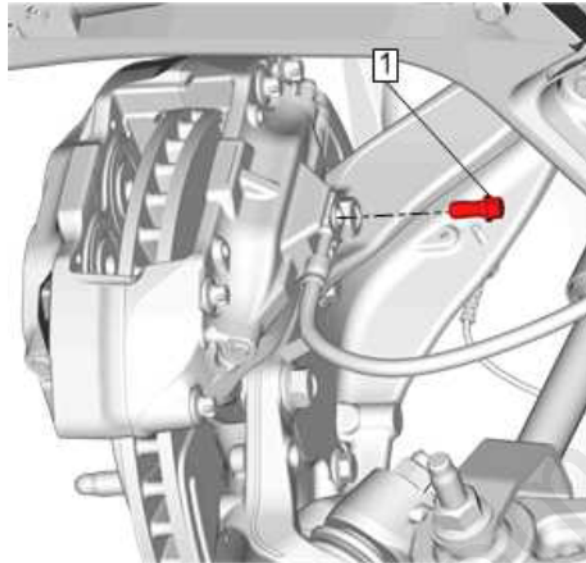


Fig. 30: Brake Hose Fitting Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Brake Hose Fitting Gasket (1) @ Brake Hose Fitting (2) » Remove and DISCARD [2x]

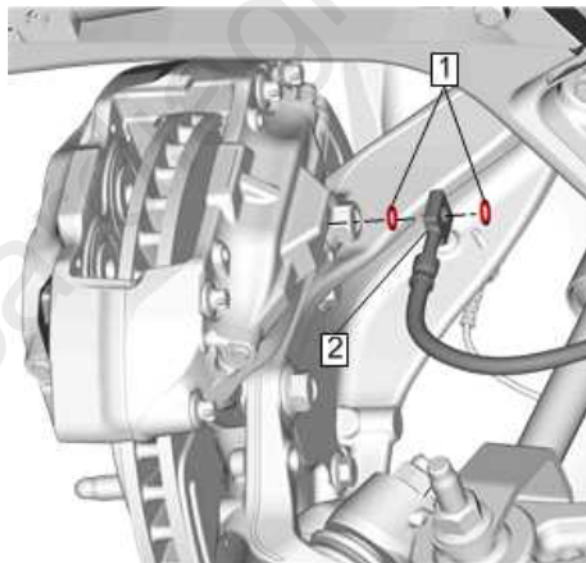


Fig. 31: Brake Hose Fitting Gasket
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not reuse the brake hose fitting gaskets.

4. Cap the brake hose fitting to prevent brake fluid loss and contamination.
5. Brake Caliper Bolt (1) » Remove [2x]

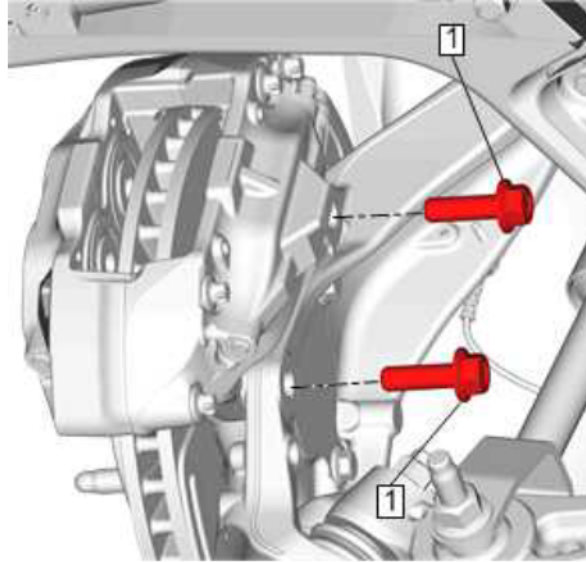


Fig. 32: Brake Caliper Bolt

Courtesy of GENERAL MOTORS COMPANY

6. Brake Caliper (1)» Remove

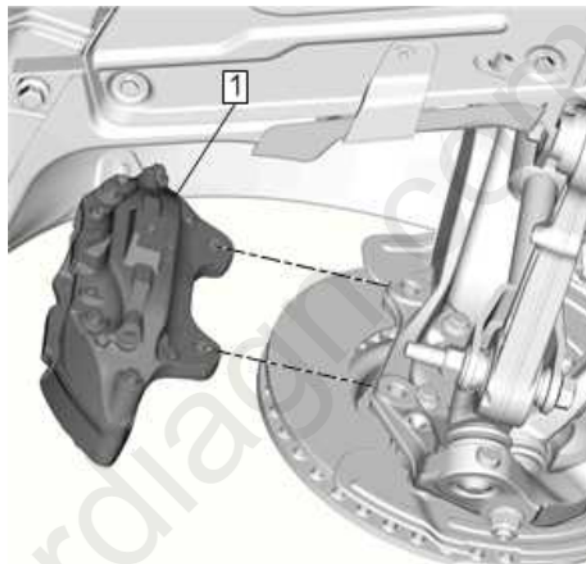


Fig. 33: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Prepare the brake caliper bracket bolts and the bracket threaded holes for assembly:
 1. Thoroughly clean the residue from the bolt threads with denatured alcohol or equivalent and allow to dry.
 2. Thoroughly clean the residue from the threaded holes with denatured alcohol or equivalent and allow to dry.
 3. Apply threadlocker to 2/3 of the threaded length of the bolts. Refer to **Adhesives, Fluids, Lubricants and Sealers**
2. Brake Caliper (1)» Install

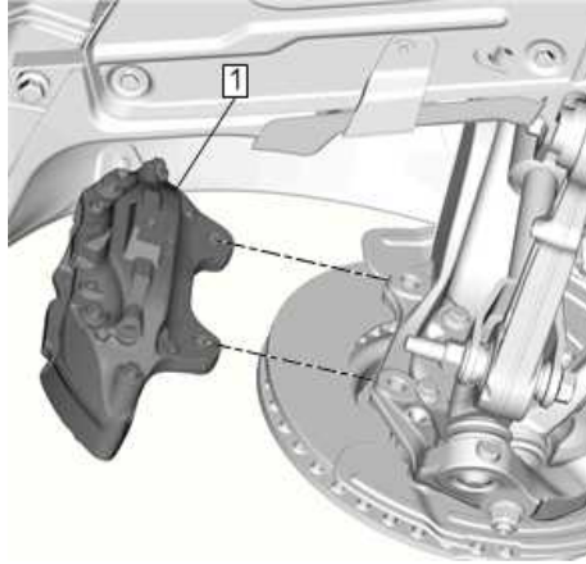


Fig. 34: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

3. Brake Caliper Bolt (1)» Install and tighten [2x] 160 N.m (118 lb ft)

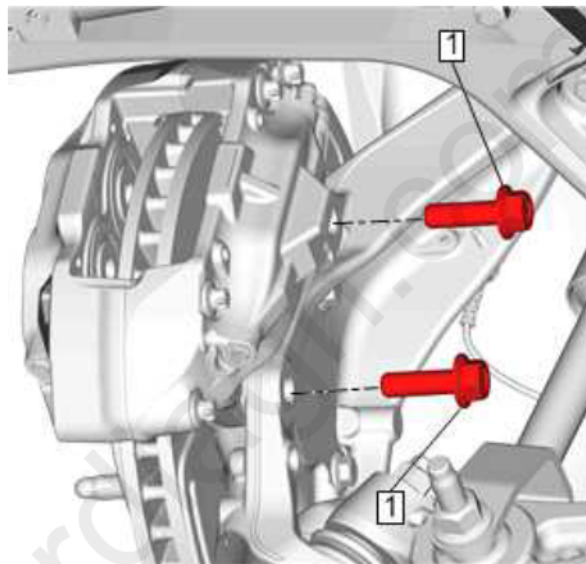
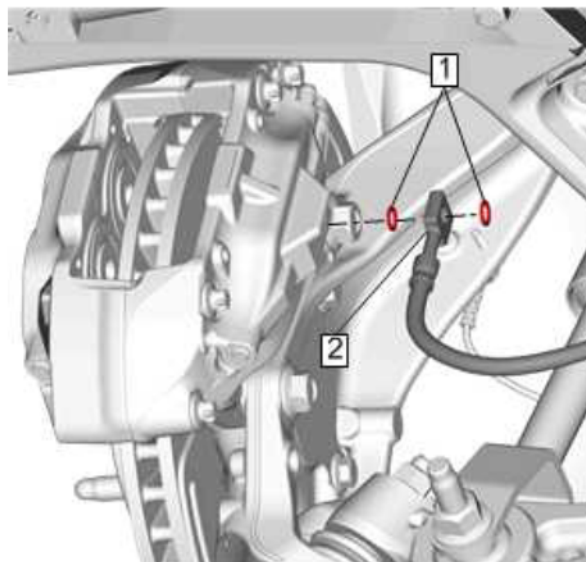


Fig. 35: Brake Caliper Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Fastener Caution

4. Brake Hose Fitting Gasket (1) @ Brake Hose Fitting (2)» Install [2x]



NOTE: Install NEW brake hose fitting gaskets.

5. Brake Hose Fitting Bolt (1)» Install and tighten 40 N.m (30 lb ft)

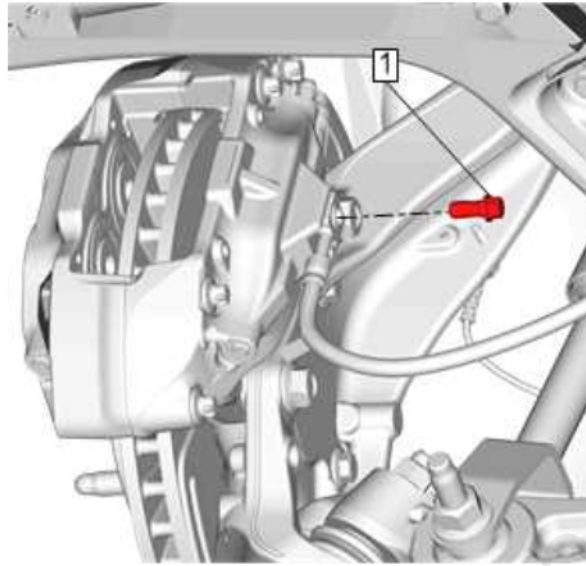


Fig. 37: Brake Hose Fitting Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Bleed the brake system. Refer to [Hydraulic Brake System Bleeding.\(Manual\)](#) and/or [Hydraulic Brake System Bleeding.\(Pressure\)](#)
7. [Front Disc Brake Pads Replacement](#)» Install

REAR BRAKE CALIPER REPLACEMENT

Removal Procedure

WARNING: [Brake Dust Warning](#)

WARNING: [Brake Fluid Irritant Warning](#)

1. Release the electronic parking brake.
2. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
3. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
4. Disconnect the electronic parking brake actuator electrical connector.
5. Brake Hose Fitting Bolt (1)» Remove

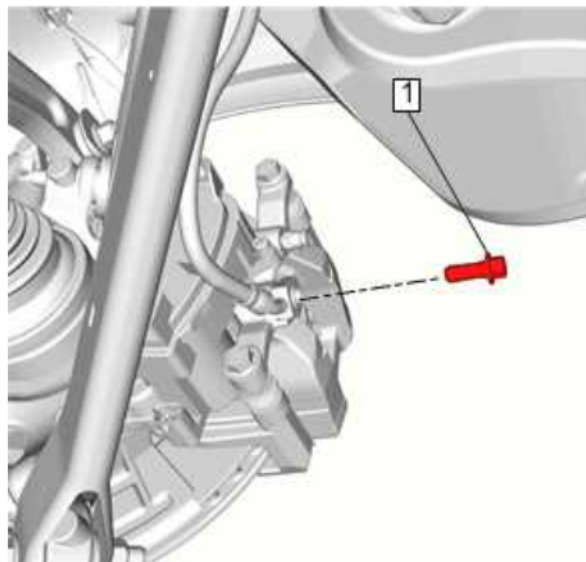


Fig. 38: Brake Hose Fitting Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Brake Hose Fitting Gasket (1) @ Brake Hose Fitting (2) » Remove and DISCARD [2x]

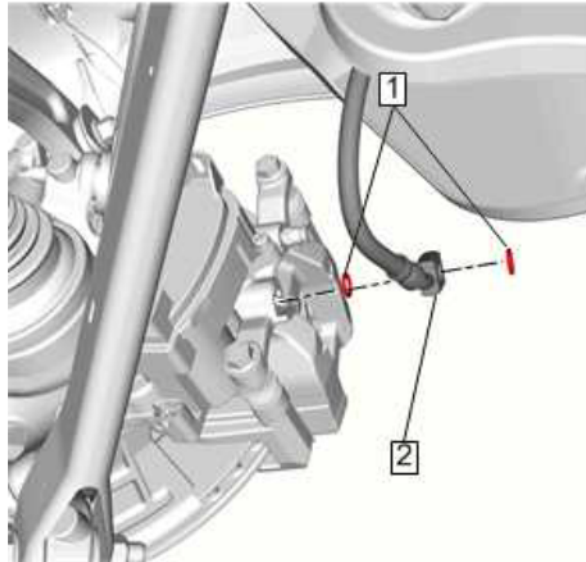


Fig. 39: Brake Hose Fitting Gasket
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not reuse the brake hose fitting gaskets.

7. Cap the brake hose fitting to prevent brake fluid loss and contamination.

8. Brake Caliper Guide Pin Bolt (1) » Remove [2x]

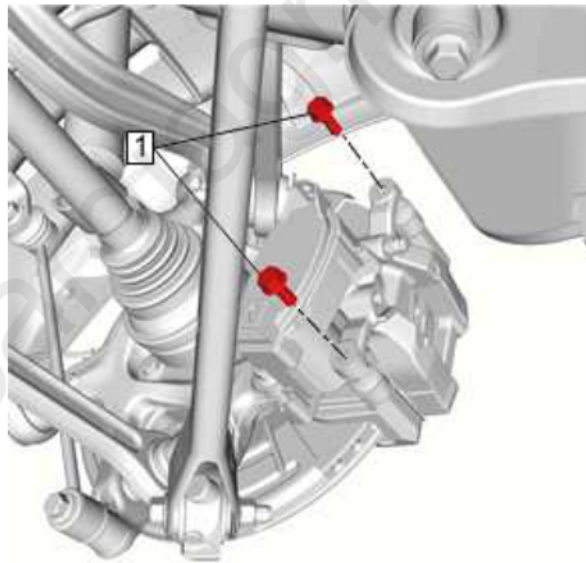


Fig. 40: Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE:

- DO NOT use any air tools to remove or install the guide pin bolts. Use hand tools ONLY.
- Install an open end wrench to hold the caliper guide pin in line with the brake caliper while removing or installing caliper guide pin bolt. DO NOT allow the open end wrench to come in contact with the brake caliper. Allowing the open end wrench to come in contact with the brake caliper will cause a pulsation when the brakes are applied.

9. Brake Caliper (1) » Remove

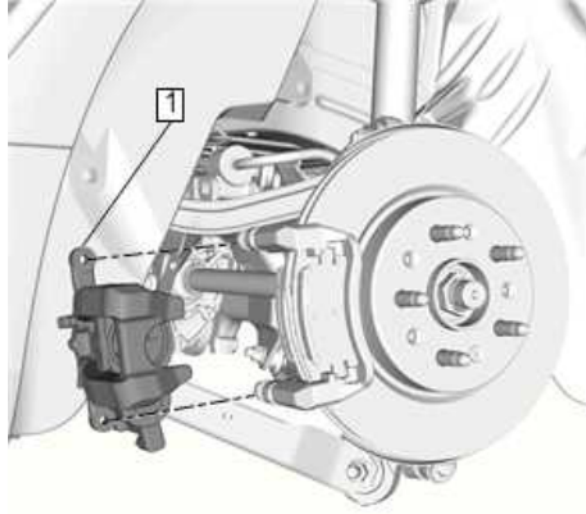


Fig. 41: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Brake Caliper (1)» Install

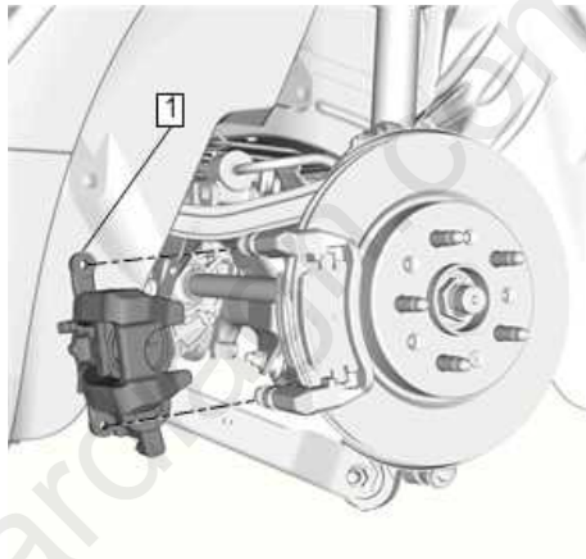
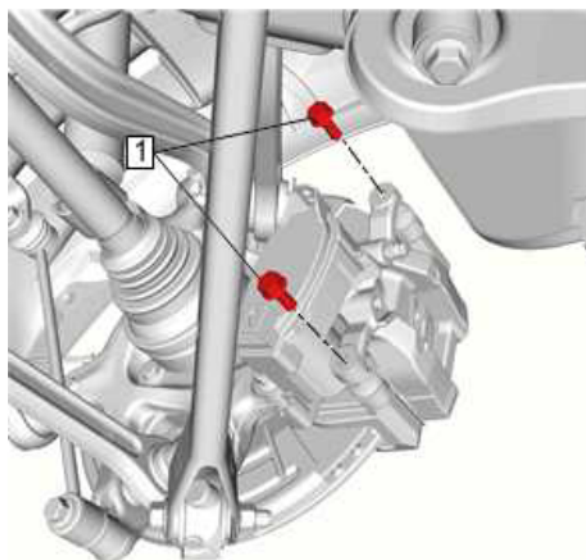


Fig. 42: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

2. Brake Caliper Guide Pin Bolt (1)» Install and tighten [2x] 40 N.m (30 lb ft)



CAUTION: Fastener Caution

3. Brake Hose Fitting Gasket (1) @ Brake Hose Fitting (2) » Install [2x]

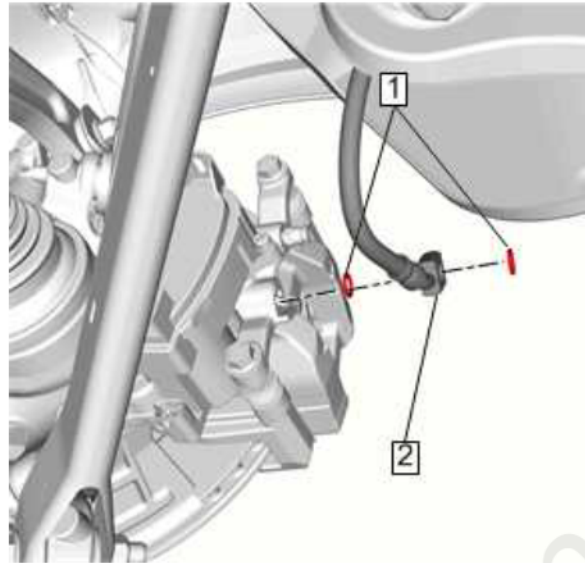


Fig. 44: Brake Hose Fitting Gasket
Courtesy of GENERAL MOTORS COMPANY

NOTE: Install NEW brake hose fitting gaskets.

4. Brake Hose Fitting Bolt (1) » Install and tighten 40 N.m (30 lb ft)

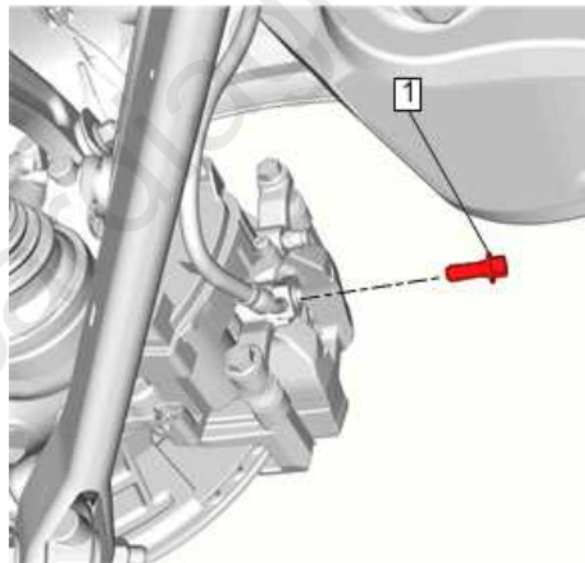


Fig. 45: Brake Hose Fitting Bolt
Courtesy of GENERAL MOTORS COMPANY

5. Connect the electronic parking brake actuator electrical connector.
6. Bleed the brake system. Refer to Hydraulic Brake System Bleeding (Manual) and/or Hydraulic Brake System Bleeding (Pressure)
7. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation
8. Calibrate the park brake. Refer to Park Brake Calibration

FRONT BRAKE CALIPER OVERHAUL

WARNING: Refer to Brake Fluid Irritant Warning .

CAUTION: Refer to Brake Fluid Effects on Paint and Electrical Components Caution .

CAUTION: This brake caliper is coated with a specialized paint. Use care when handling and servicing to ensure the paint does not get chipped or scratched. Clean any brake fluid from painted surfaces with denatured alcohol or equivalent, as soon as possible.

NOTE:

- Replace all the components included in the repair kits used to service this brake caliper.
- Lubricate the rubber parts with GM approved brake fluid from a clean, sealed brake fluid container.
- If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.
- The torque values specified are for dry, non-lubricated fasteners.
- Perform the service operations on a clean bench, free from all mineral oil materials.

Disassembly Procedure

WARNING: 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.

CAUTION: 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.

NOTE: It will be necessary to fabricate one or more blocks of wood to the following dimensions to be used during this procedure:

- Must fabricate 1 block: 19 mm (3/4 in) X 72 mm (3 in) X 72 mm (3 in)
- Optional to fabricate 1 block, rather than using an old brake pad: 19 mm (3/4 in) X 72 mm (3 in) X 131 mm (5 in)
- Optional to fabricate 1 block to cushion piston removal: 19 mm (3/4 in) X 72 mm (3 in) X 131 mm (5 in)

1. Remove the brake caliper from the vehicle. Refer to [Front Brake Caliper Replacement](#).
2. Drain and properly dispose the brake fluid from the brake caliper.
3. Place the caliper in a vise using plastic vise caps or suitable material to protect the caliper mounting bosses from the vise jaws.
4. Remove the brake caliper bleeder valve caps (1).

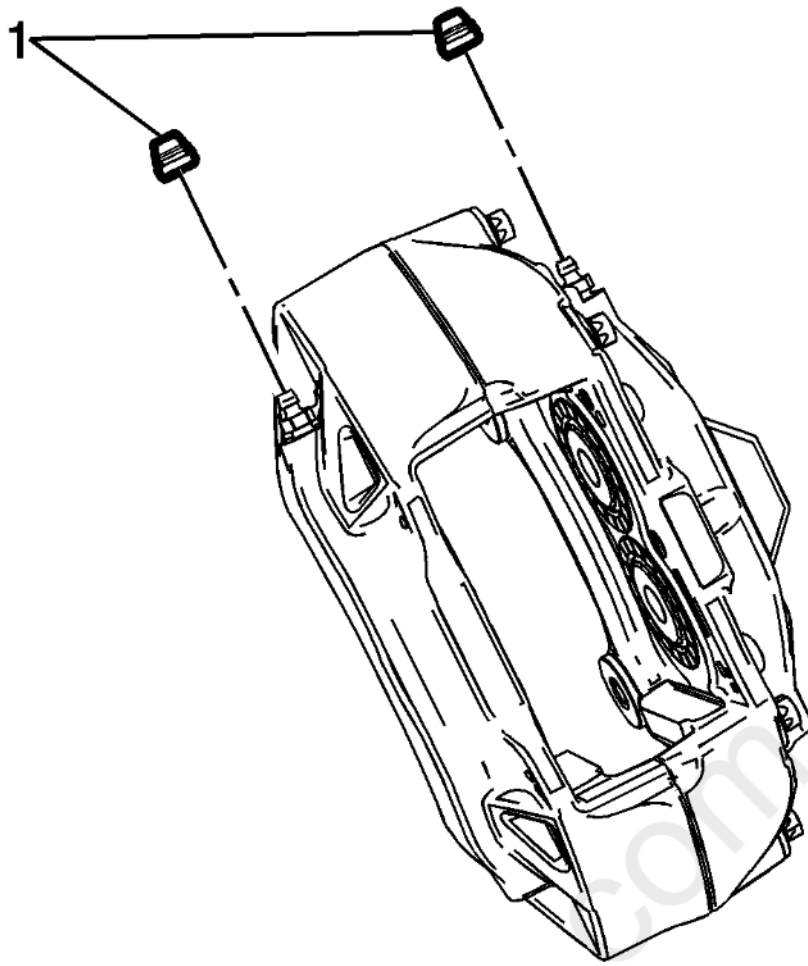


Fig. 46: Brake Caliper Bleeder Caps
Courtesy of GENERAL MOTORS COMPANY

5. Remove the brake caliper bleeder valves (1).

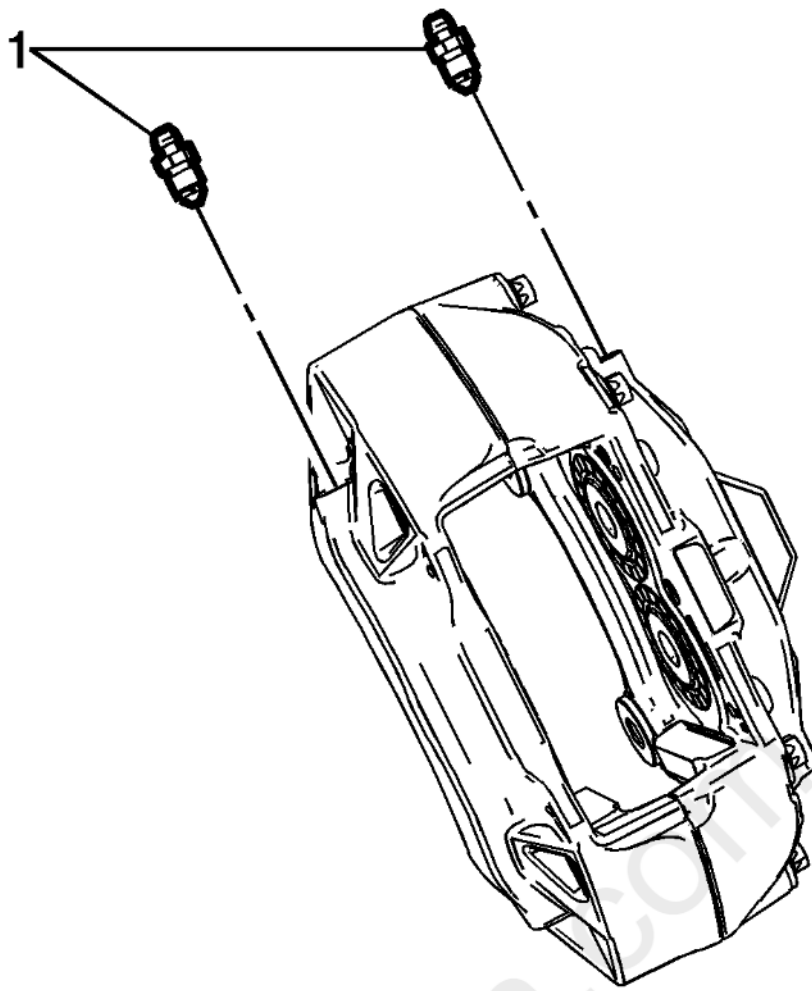


Fig. 47: Brake Caliper Bleeders

Courtesy of GENERAL MOTORS COMPANY

6. Place a discarded brake pad or the fabricated 131 mm (5 in) long block of wood over 2 adjoining caliper piston bores and secure in place with a non-marring C-clamp.
7. Place the fabricated 72 mm (3 in) long block of wood over one of the opposing caliper piston bores and secure it in place with a non-marring C-clamp.
8. Use clean cloths or the other fabricated 131 mm (5 in) long block of wood to cushion the interior of caliper housing during removal of the caliper piston.
9. Carefully remove the brake caliper piston (1) by directing low pressure compressed air into the brake hose fitting inlet.

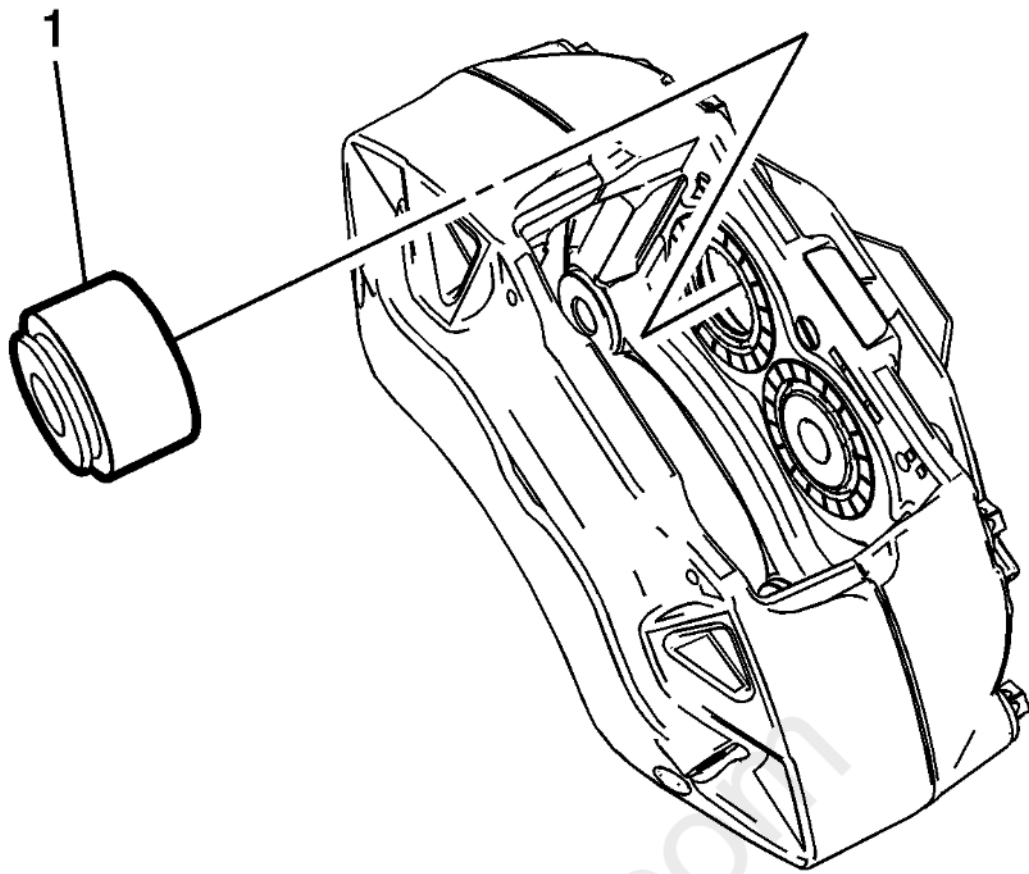


Fig. 48: Brake Caliper Piston

Courtesy of GENERAL MOTORS COMPANY

10. Move the fabricated 72 mm (3 in) long block of wood over the emptied caliper piston bore and secure it in place with a non-marring C-clamp.
11. Move the clean cloths or the other fabricated 131 mm (5 in) long block of wood to cushion the interior of caliper housing during the removal of the piston.
12. Carefully remove the brake caliper piston by directing low pressure compressed air into the brake hose fitting inlet.
13. Using care to not scratch or mar the painted surfaces or piston bore, remove the caliper piston dust boot seal (1) using a flat-bladed tool. Discard the dust boot seal.

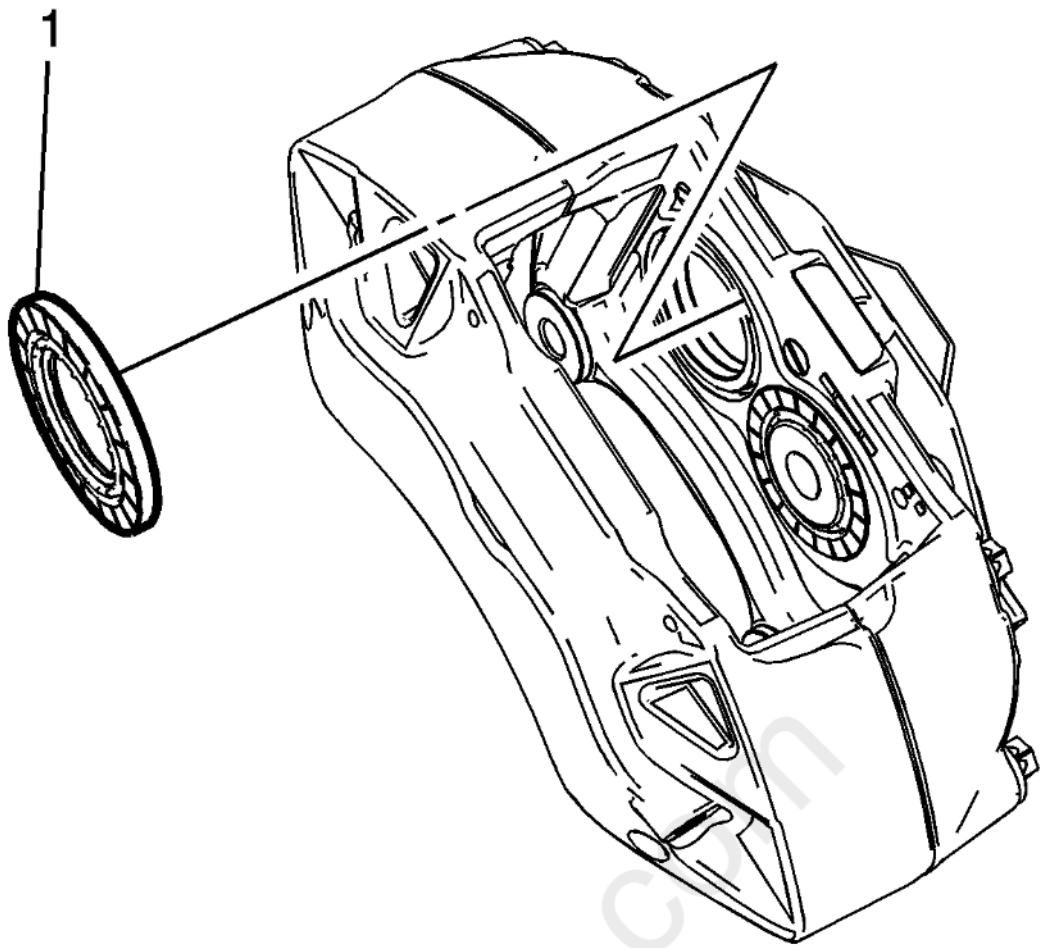


Fig. 49: Removing Dust Boot Seal

Courtesy of GENERAL MOTORS COMPANY

14. Using wooden or plastic tool, remove the caliper piston seal (1) from the brake caliper bore.
Discard the caliper piston seal.

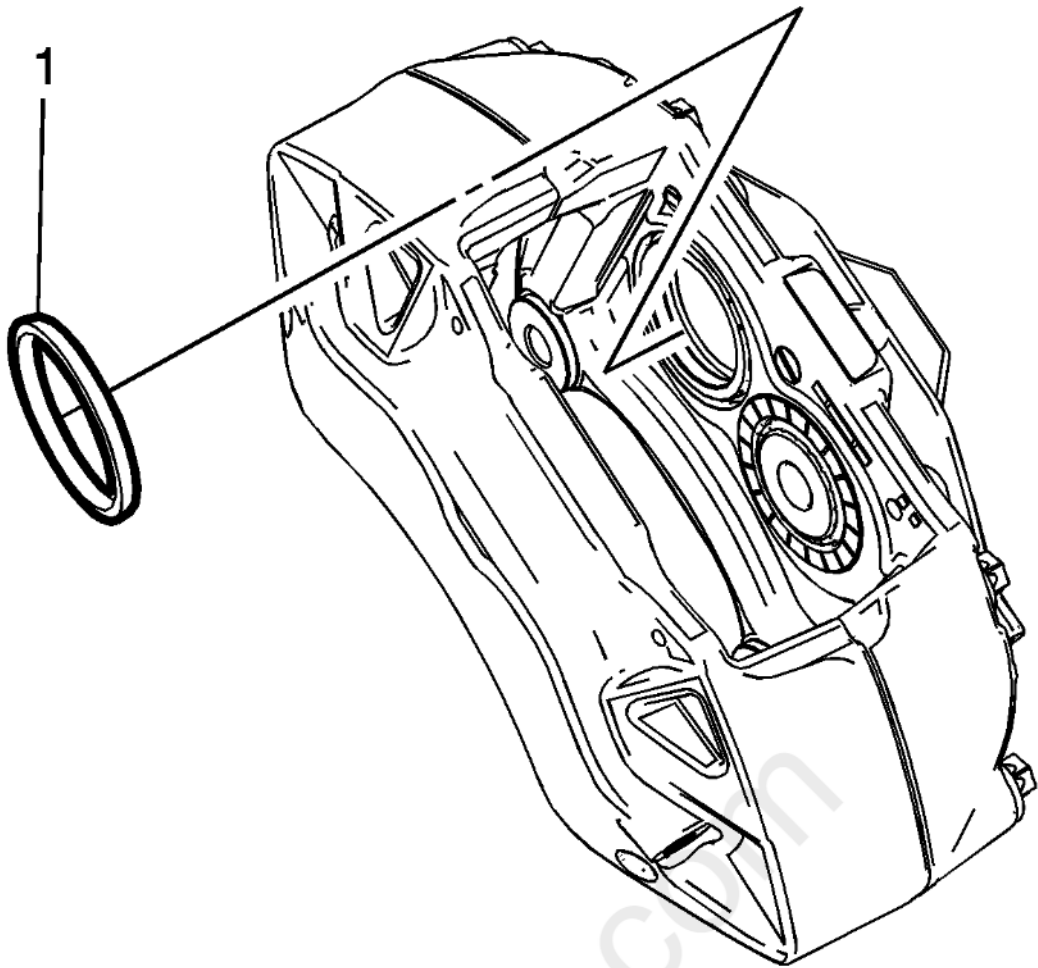


Fig. 50: Removing Caliper Piston Seal
Courtesy of GENERAL MOTORS COMPANY

15. Repeat steps 6 through 14 for the opposite side of the caliper.
16. Remove the caliper from the vise and clean the entire caliper with denatured alcohol or equivalent.
17. Dry the caliper piston bores with non-lubricated, filtered compressed air.
18. Inspect the caliper piston bores and piston seal counter-bores for scratches, cracks, pitting and/or corrosion.
19. If the caliper piston bores are scratched, cracked or pitted or if corrosion cannot be cleaned with denatured alcohol, replace the caliper assembly.

NOTE: Do NOT clean the caliper piston bores by honing or cleaning with abrasives.

Assembly Procedure

1. Lubricate the new caliper piston seals (1) with GM approved brake fluid from a clean, sealed brake fluid container.

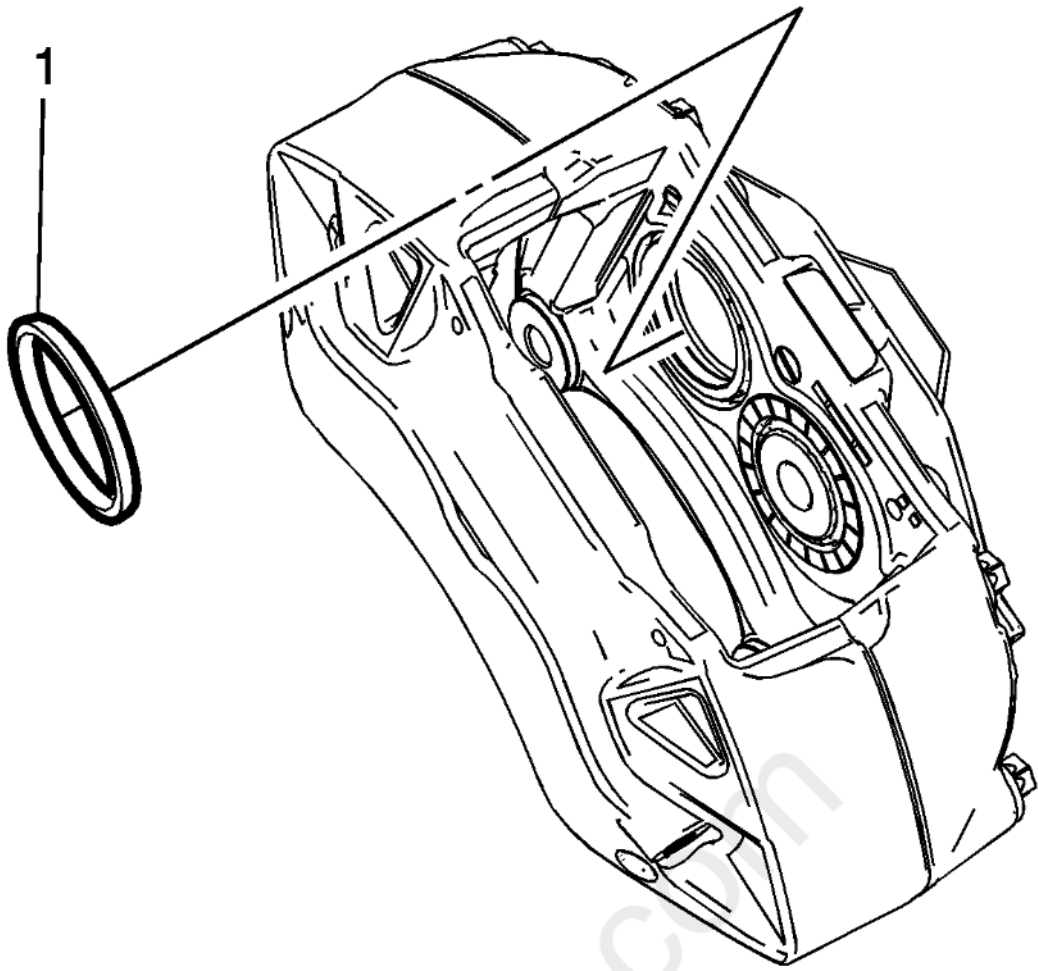


Fig. 51: Removing Caliper Piston Seal

Courtesy of GENERAL MOTORS COMPANY

2. Install the lubricated, new caliper piston seals into the brake caliper piston bore seal grooves. Ensure the seals are not twisted.
3. Install the new caliper piston dust boot seals (1) over adjoining brake caliper piston bores.

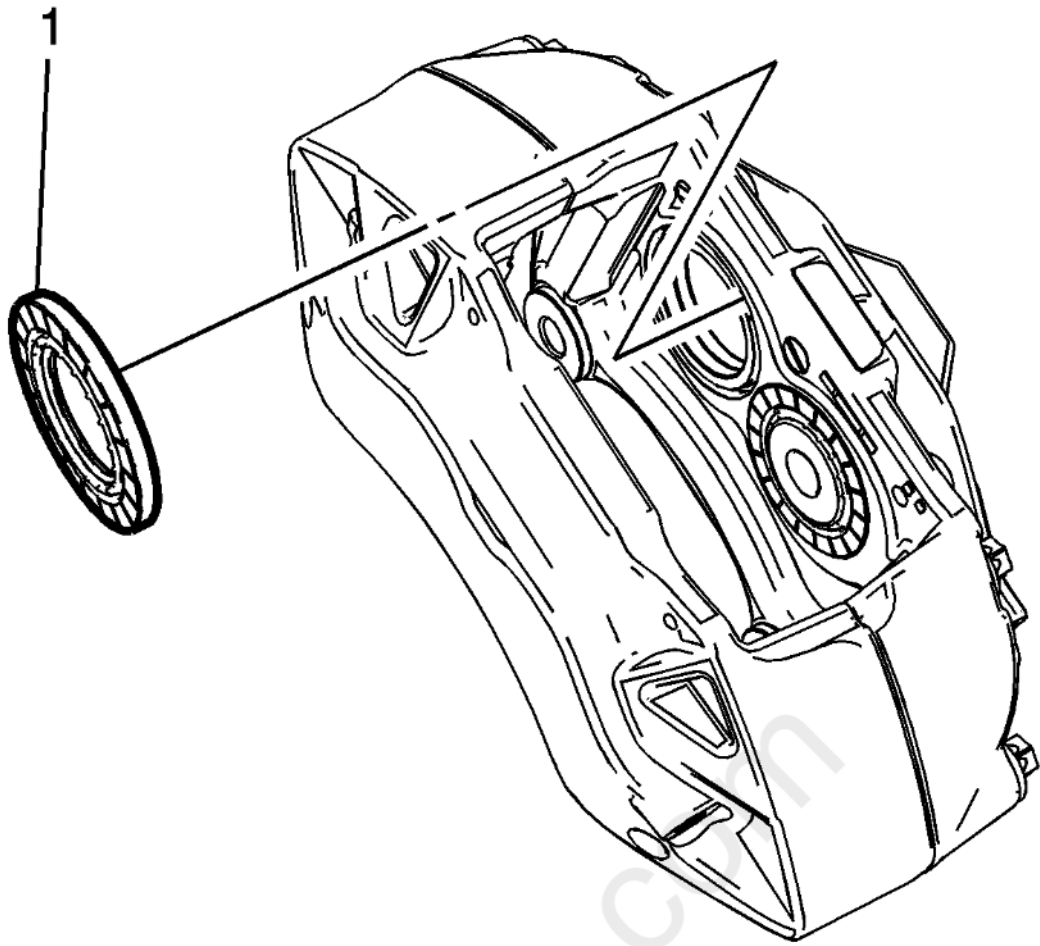


Fig. 52: Removing Dust Boot Seal

Courtesy of GENERAL MOTORS COMPANY

4. Place a clean discarded brake pad or the fabricated 131 mm (5 in) long block of wood over the 2 adjoining caliper piston bores and apply light pressure with non-marring C-clamp. This will ensure the dust boot seals are fully seated into the caliper.
5. Lightly lubricate the brake caliper piston bores and outer surface of the brake caliper pistons with GM approved brake fluid from a clean, sealed brake fluid container.
6. Install the caliper pistons (1) into the caliper bores. Press the caliper pistons all the way in by hand.

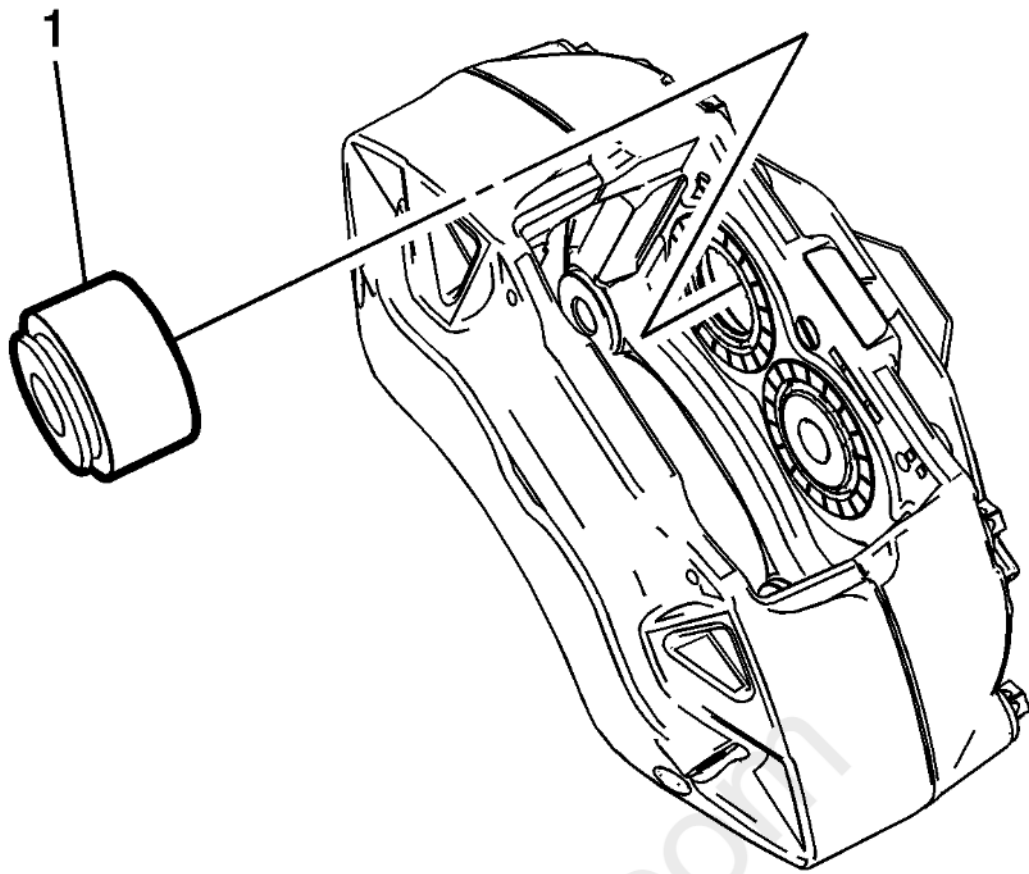


Fig. 53: Brake Caliper Piston

Courtesy of GENERAL MOTORS COMPANY

7. Repeat step 6 for the opposite pistons.
8. Install the brake caliper bleeder valves (1) and tighten to 17-20 N.m (13-15 lb ft).

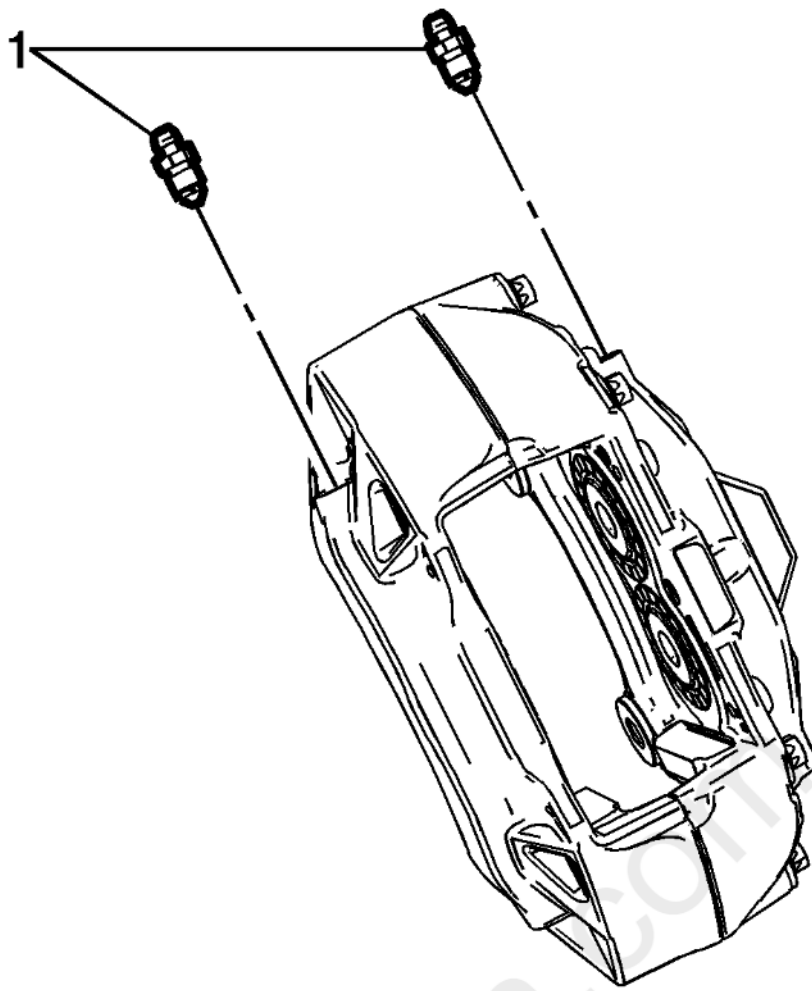


Fig. 54: Brake Caliper Bleeders

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

9. Install the brake caliper bleeder valve caps (1).

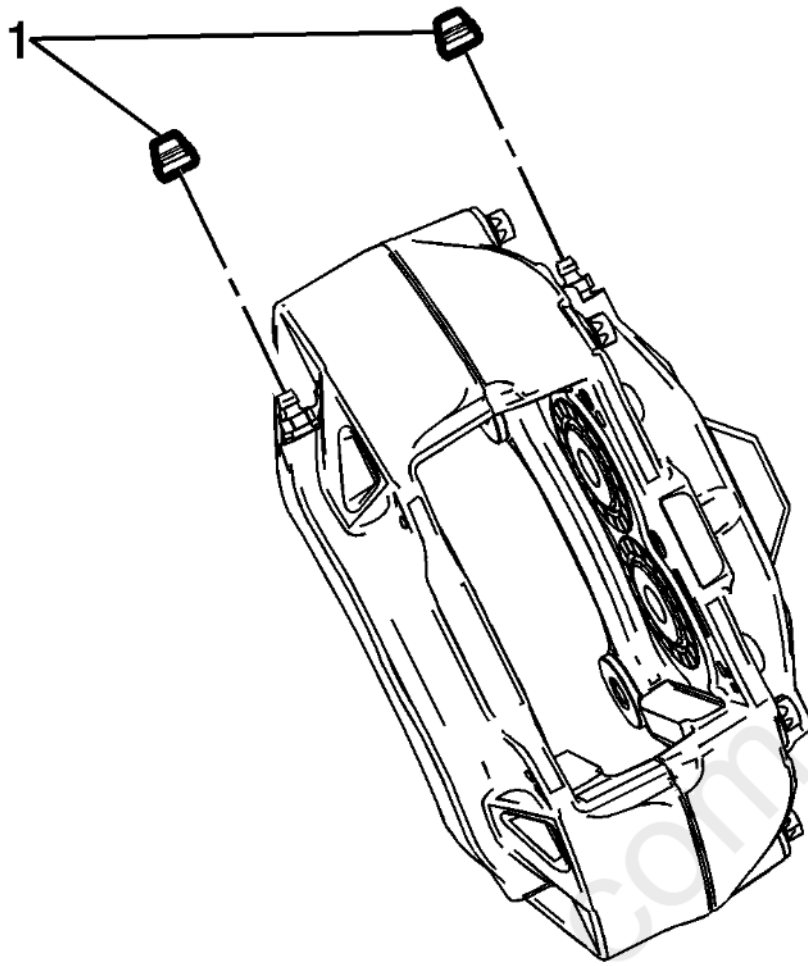


Fig. 55: Brake Caliper Bleeder Caps

Courtesy of GENERAL MOTORS COMPANY

10. Install the caliper to the vehicle. Refer to [Front Brake Caliper Replacement](#).

FRONT BRAKE CALIPER HARDWARE REPLACEMENT

Removal Procedure

WARNING: [Brake Dust Warning](#)

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
3. Brake Caliper Pin (1) » Remove [2x]

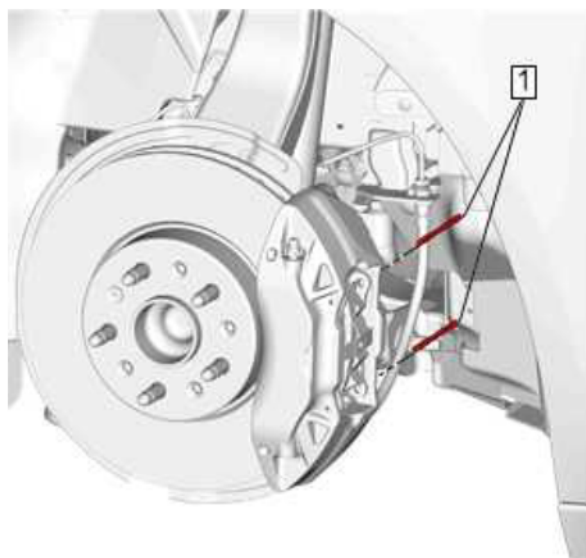


Fig. 56: Brake Caliper Pin
Courtesy of GENERAL MOTORS COMPANY

4. Brake Pad Spring (1)» Remove.

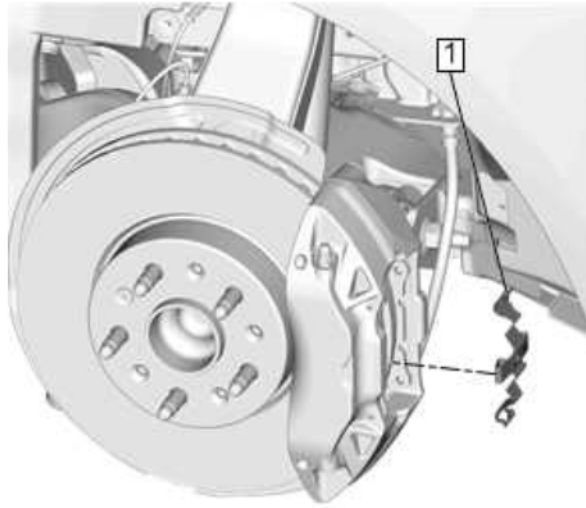


Fig. 57: Brake Pad Spring
Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Brake Pad Spring (1)» Install.

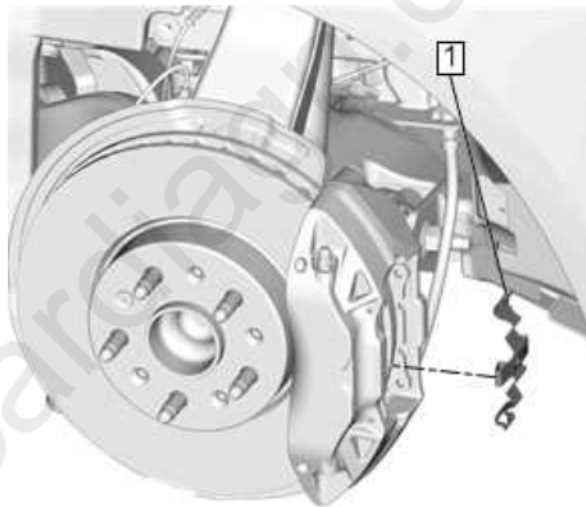


Fig. 58: Brake Pad Spring
Courtesy of GENERAL MOTORS COMPANY

2. Brake Caliper Pin (1)» Install [2x]

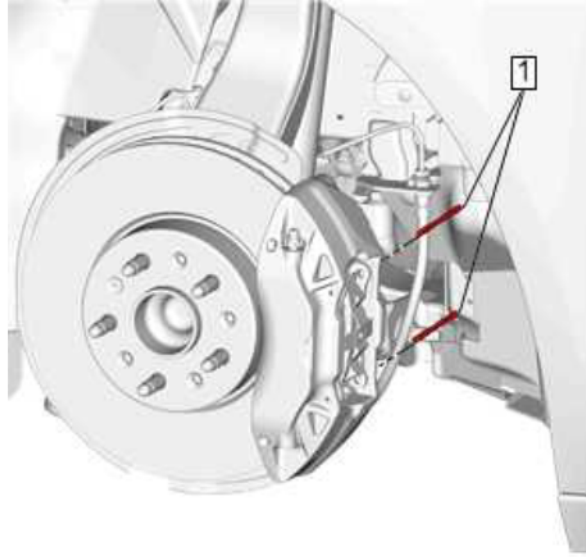


Fig. 59: Brake Caliper Pin

Courtesy of GENERAL MOTORS COMPANY

3. Carefully drive the brake caliper pins into the brake caliper until fully seated.
4. **Tire and Wheel Removal and Installation** » Install

REAR BRAKE CALIPER BRACKET REPLACEMENT

Removal Procedure

WARNING: Brake Dust Warning

1. Release the electronic parking brake.
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle**
3. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation**
4. Brake Caliper Guide Pin Bolt (1) » Remove [2x]

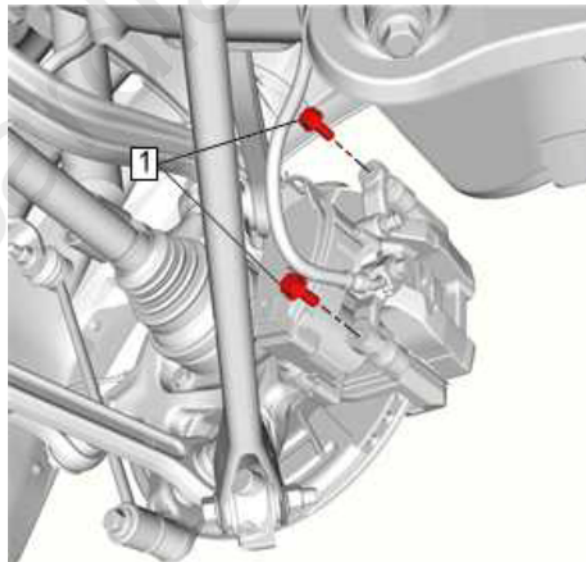


Fig. 60: Brake Caliper Guide Pin Bolt

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- DO NOT use any air tools to remove or install the guide pin bolts. Use hand tools ONLY.
- Install an open end wrench to hold the caliper guide pin in line with the brake caliper while removing or installing caliper guide pin bolt. DO NOT allow the open end wrench to come in contact with the brake caliper. Allowing the open end wrench to come in contact with the brake caliper will cause a pulsation when the brakes are applied.

5. Remove the brake caliper (1) and support with heavy mechanics wire.

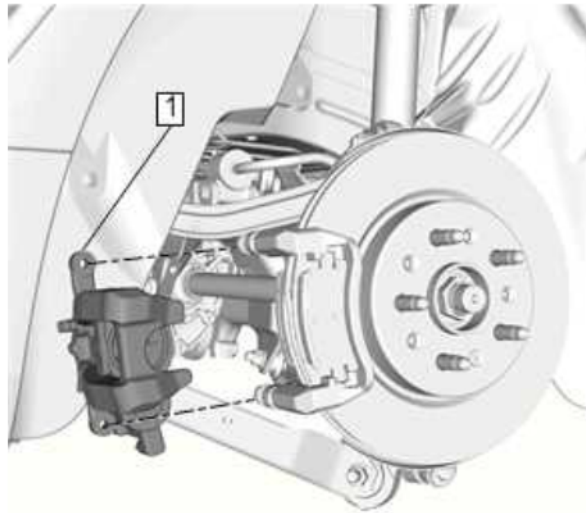


Fig. 61: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

CAUTION: 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.

6. Retainer (1) » Remove [2x]

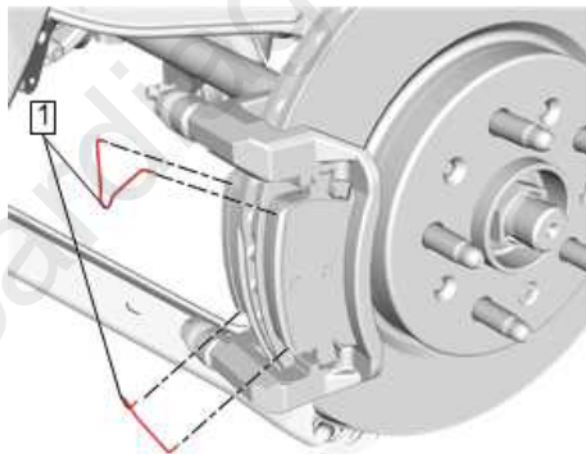


Fig. 62: Retainers

Courtesy of GENERAL MOTORS COMPANY

7. Inner Disc Brake Pad (1) » Remove

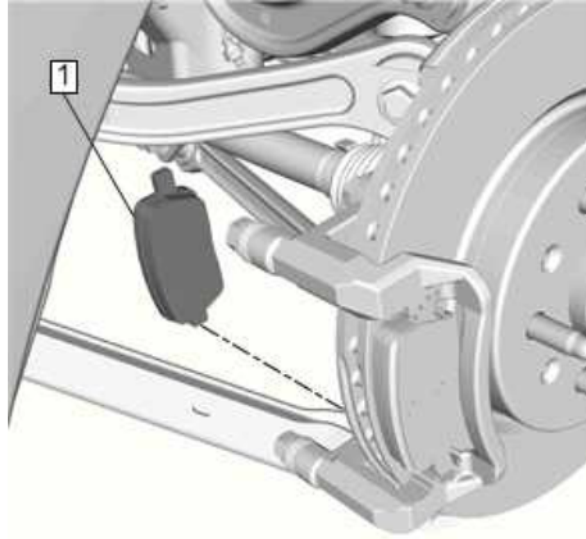


Fig. 63: Inner Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

8. Outer Disc Brake Pad (1)» Remove

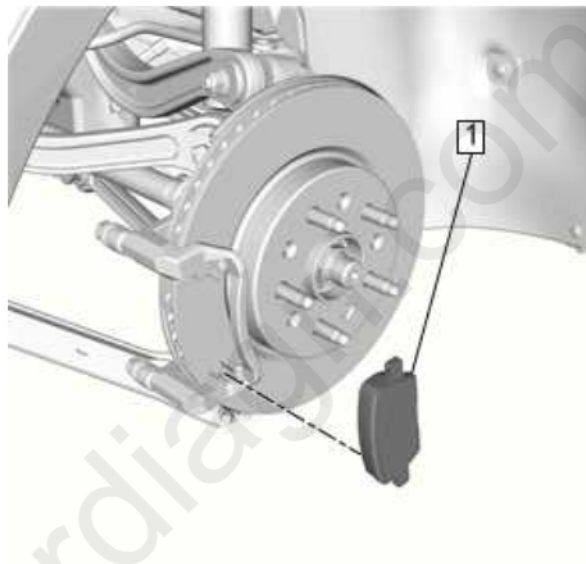


Fig. 64: Outer Disc Brake Pad

Courtesy of GENERAL MOTORS COMPANY

9. Disc Brake Pad Spring (1)» Remove [2x]

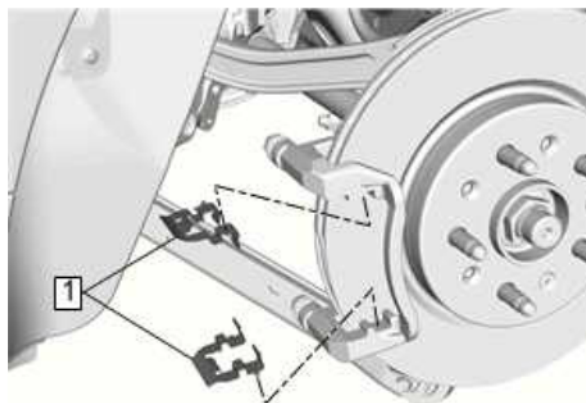


Fig. 65: Disc Brake Pad Spring

Courtesy of GENERAL MOTORS COMPANY

10. Brake Caliper Bracket Bolt (1)A, A» Remove [2x]

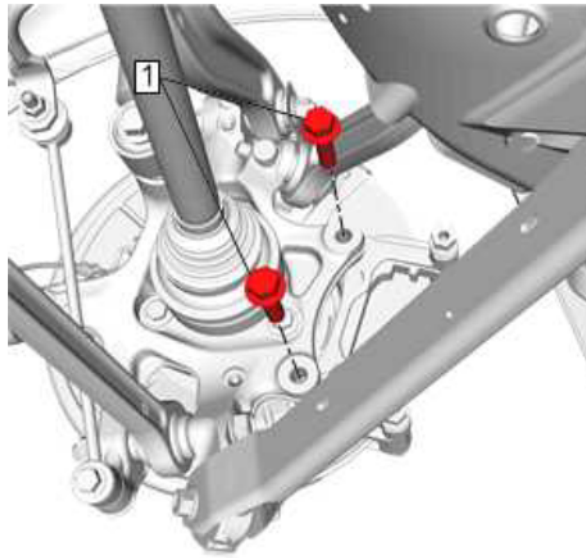


Fig. 66: Brake Caliper Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

11. Rear Brake Caliper Bracket (1)A, A» Remove

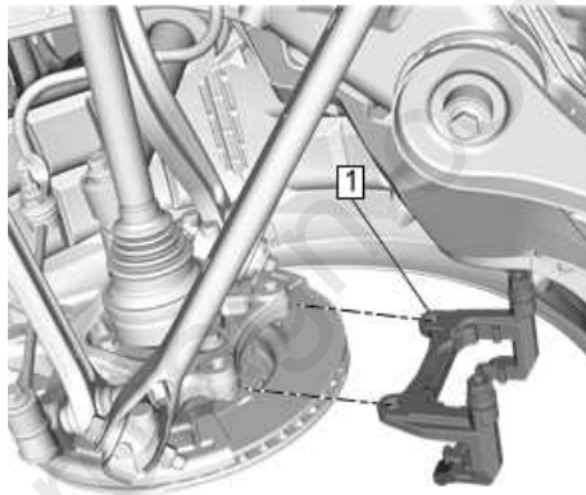


Fig. 67: Rear Brake Caliper Bracket

Courtesy of GENERAL MOTORS COMPANY

12. Rear Brake Caliper BracketA, A» Inspect for damage

13. Replace the brake caliper bracket if cracked or damaged.

Installation Procedure

1. Prepare the brake caliper bracket bolts and the bracket threaded holes for assembly:

- Thoroughly clean the residue from the bolt threads with denatured alcohol or equivalent and allow to dry.
- Thoroughly clean the residue from the threaded holes with denatured alcohol or equivalent and allow to dry.
- Apply threadlocker to 2/3 of the threaded length of the bolts. Refer to **Adhesives, Fluids, Lubricants and Sealers**

2. Rear Brake Caliper Bracket (1)A, A» Install

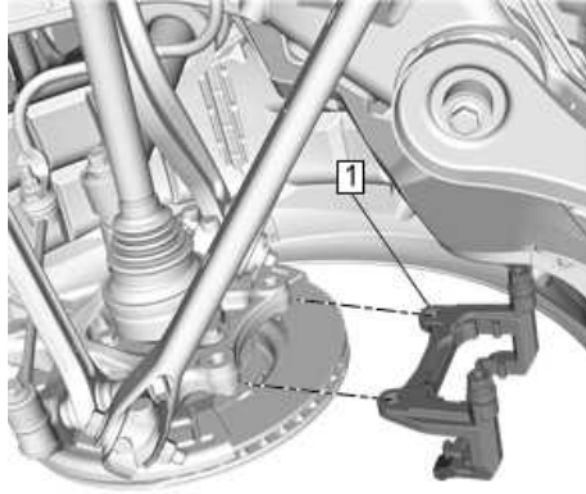


Fig. 68: Rear Brake Caliper Bracket

Courtesy of GENERAL MOTORS COMPANY

3. Brake Caliper Bracket Bolt (1)» Install and tighten 125 N.m (92 lb ft) [2x]

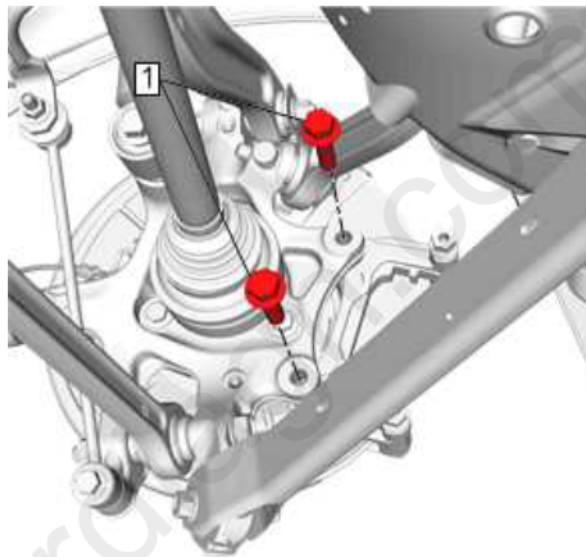


Fig. 69: Brake Caliper Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Fastener Caution

4. Disc Brake Pad Spring (1)» Install [2x]

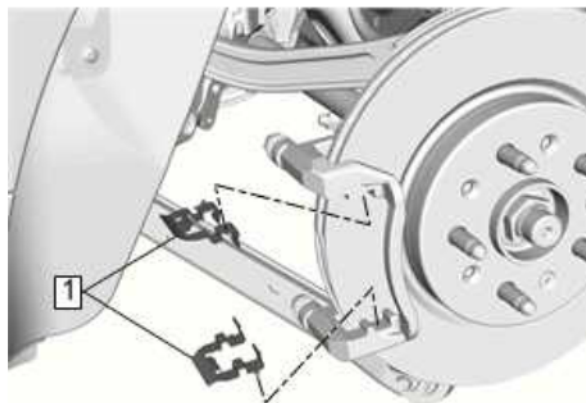


Fig. 70: Disc Brake Pad Spring
Courtesy of GENERAL MOTORS COMPANY

5. Outer Disc Brake Pad (1)» Install

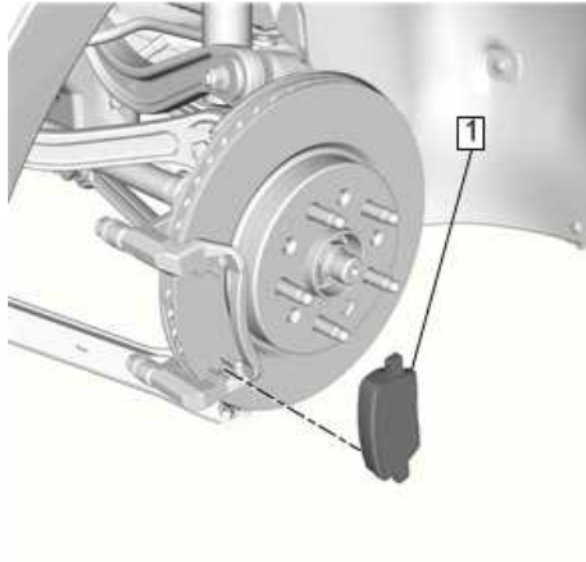


Fig. 71: Outer Disc Brake Pad
Courtesy of GENERAL MOTORS COMPANY

6. Inner Disc Brake Pad (1)» Install

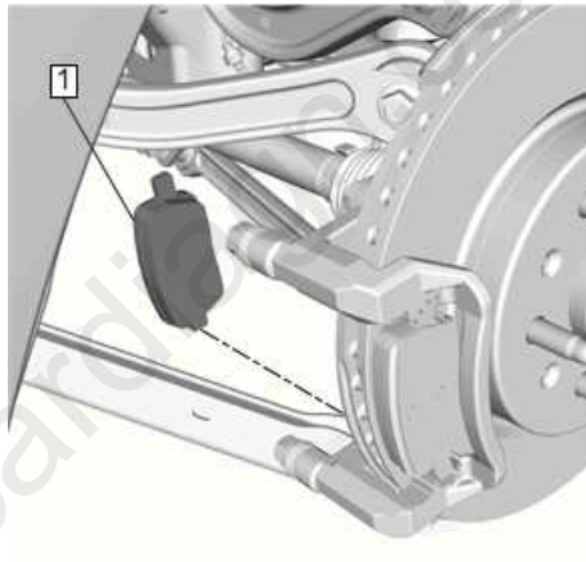


Fig. 72: Inner Disc Brake Pad
Courtesy of GENERAL MOTORS COMPANY

7. Retainer (1)» Install [2x]

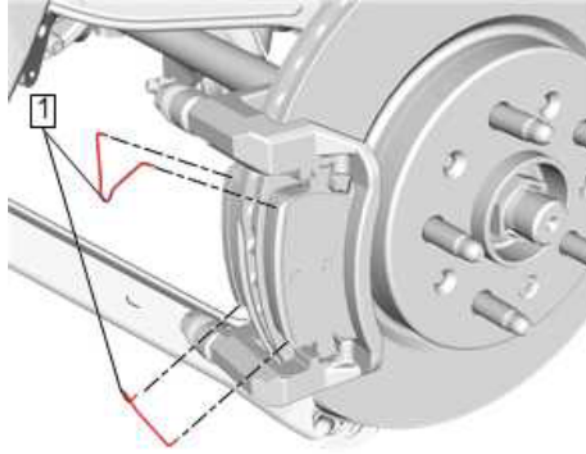


Fig. 73: Retainer

Courtesy of GENERAL MOTORS COMPANY

8. Brake Caliper (1)» Install

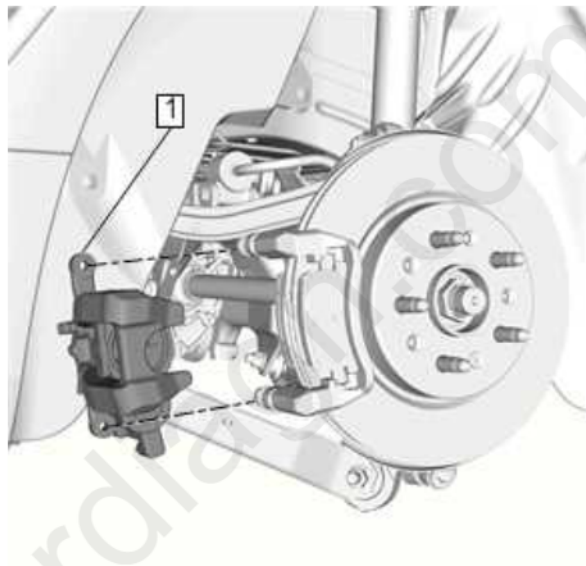


Fig. 74: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

9. Brake Caliper Guide Pin Bolt (1)» Install and tighten 40 N.m (30 lb ft) [2x]

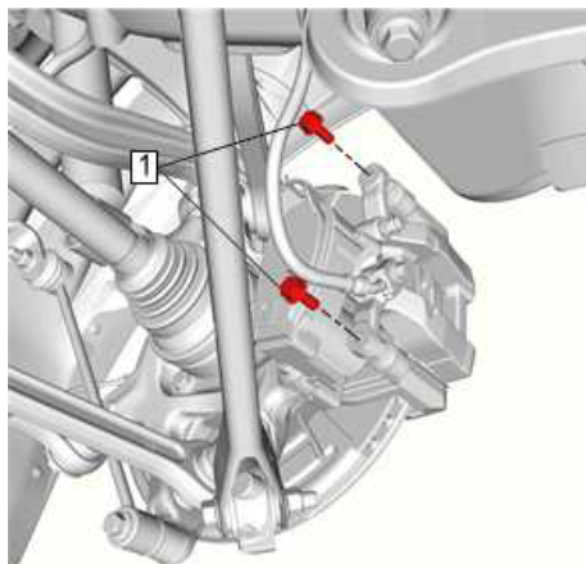


Fig. 75: Brake Caliper Guide Pin Bolt

Courtesy of GENERAL MOTORS COMPANY

10. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
11. Calibrate the park brake. Refer to [Park Brake Calibration](#)

FRONT BRAKE ROTOR REPLACEMENT

Special Tools

- CH-41013 Rotor Resurfacing Kit
- CH-42450-A Wheel Hub Resurfacing Kit

Equivalent regional tools: [Special Tools](#).

Removal Procedure

WARNING: [Brake Dust Warning](#)

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
3. Brake Caliper Bolt (1) Remove [2x]

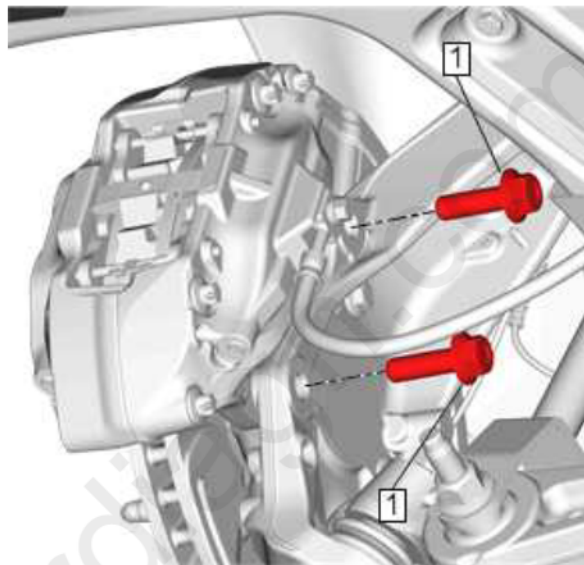


Fig. 76: Brake Caliper Bolt

Courtesy of GENERAL MOTORS COMPANY

4. Brake Caliper (1) Remove

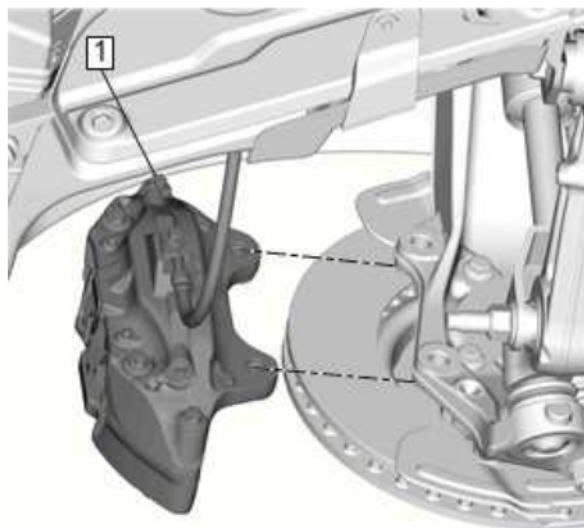


Fig. 77: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

5. Support the brake caliper with heavy mechanics wire.

CAUTION:

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.

6. Brake Rotor Bolt (1)» Remove

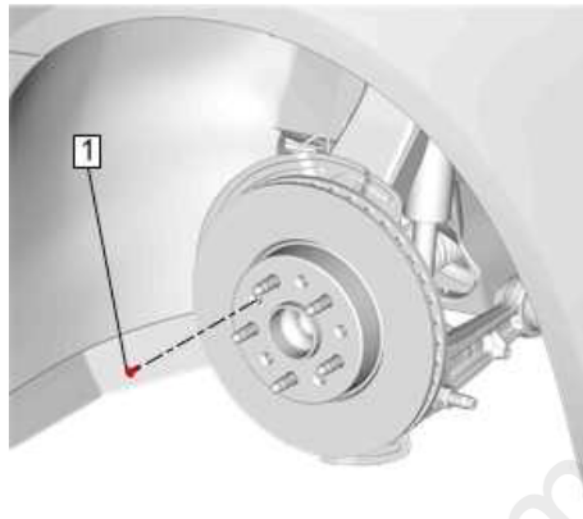


Fig. 78: Brake Rotor Bolt

Courtesy of GENERAL MOTORS COMPANY

7. Brake Rotor (1)» Remove

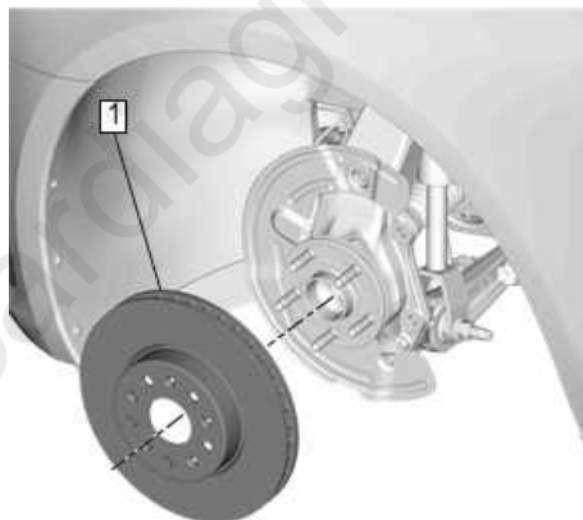


Fig. 79: Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Using the **CH-42450-A** Wheel Hub Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.

NOTE:

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. Using the **CH-41013** Rotor Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure there are no foreign particles or debris remaining.
4. Brake Rotor (1)» Install

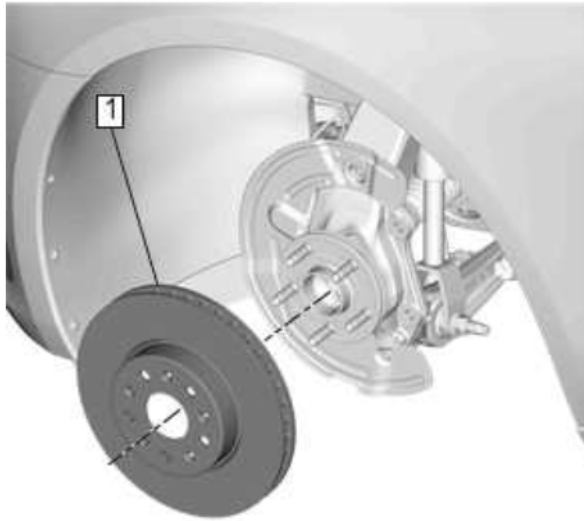


Fig. 80: Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

5. Brake Rotor Bolt (1)» Install and tighten 10 N.m (89 lb in)

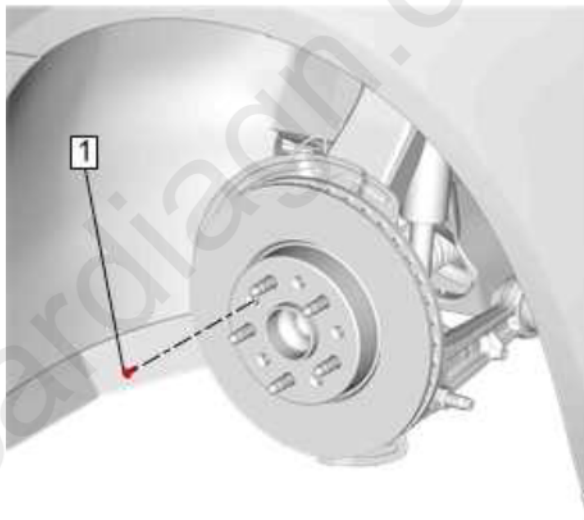


Fig. 81: Brake Rotor Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Fastener Caution

6. Prepare the brake caliper bracket bolts and the bracket threaded holes for assembly:
 - Thoroughly clean the residue from the bolt threads with denatured alcohol or equivalent and allow to dry.
 - Thoroughly clean the residue from the threaded holes with denatured alcohol or equivalent and allow to dry.
 - Apply threadlocker to 2/3 of the threaded length of the bolts. Refer to Adhesives, Fluids, Lubricants and Sealers
7. Brake Caliper (1)» Install

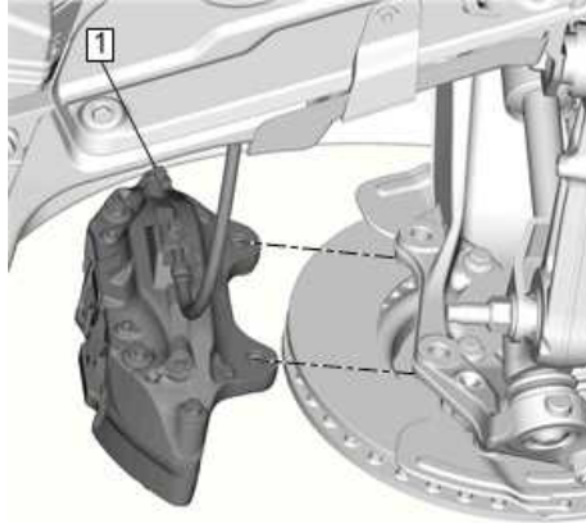


Fig. 82: Brake Caliper

Courtesy of GENERAL MOTORS COMPANY

8. Brake Caliper Bolt (1)» Install and tighten 160 N.m (118 lb ft) [2x]

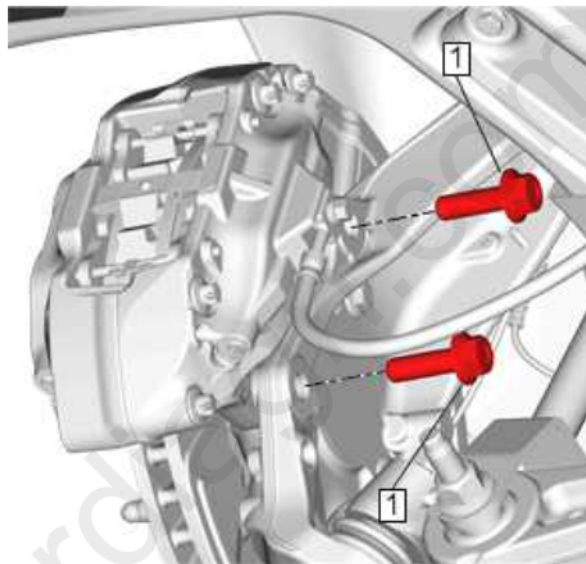


Fig. 83: Brake Caliper Bolt

Courtesy of GENERAL MOTORS COMPANY

9. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
 10. Burnish the brake pads and rotors. Refer to [Brake Pad and Rotor Burnishing](#).

REAR BRAKE ROTOR REPLACEMENT

Special Tools

- **CH-41013** Rotor Resurfacing Kit
- **CH-42450-A** Wheel Hub Resurfacing Kit

Equivalent regional tools: [Special Tools](#).

Removal Procedure

WARNING: Brake Dust Warning

1. Release the electronic parking brake.
2. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#)
3. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
4. Brake Caliper Bracket Bolt (1)» Remove [2x]

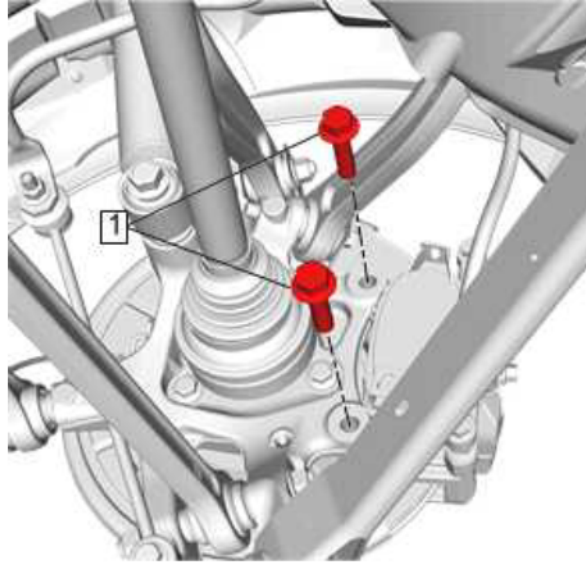


Fig. 84: Brake Caliper Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

5. Brake Caliper and Bracket Assembly (1)» Remove

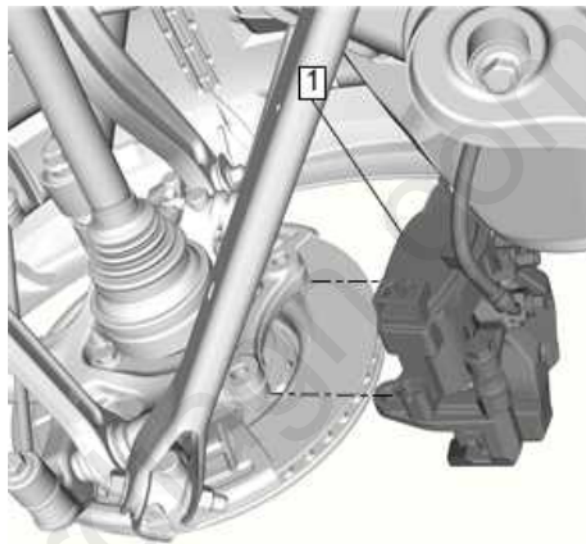


Fig. 85: Brake Caliper and Bracket Assembly
 Courtesy of GENERAL MOTORS COMPANY

6. Support the brake caliper and bracket assembly with heavy mechanics wire.

CAUTION: 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.

7. Brake Rotor Bolt (1)» Remove

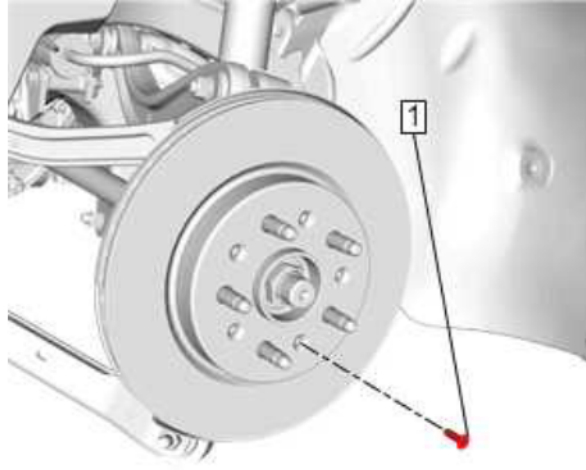


Fig. 86: Brake Rotor Bolt

Courtesy of GENERAL MOTORS COMPANY

8. Brake Rotor (1)» Remove

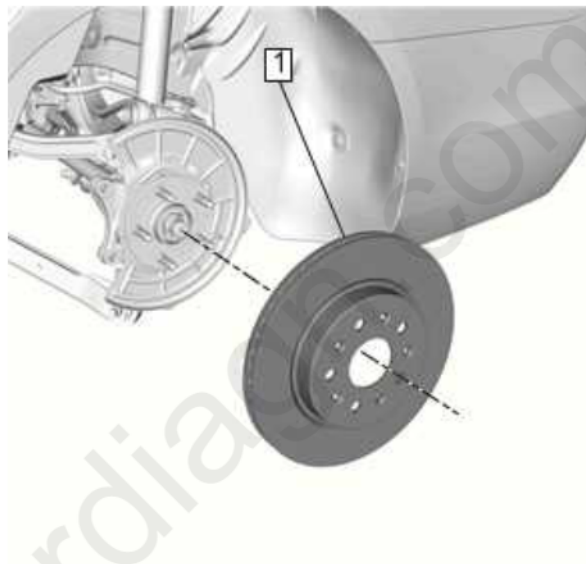


Fig. 87: Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Using the **CH-42450-A** Wheel Hub Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.

NOTE: 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. Using the **CH-41013** Rotor Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure there are no foreign particles or debris remaining.
4. Brake Rotor (1)» Install

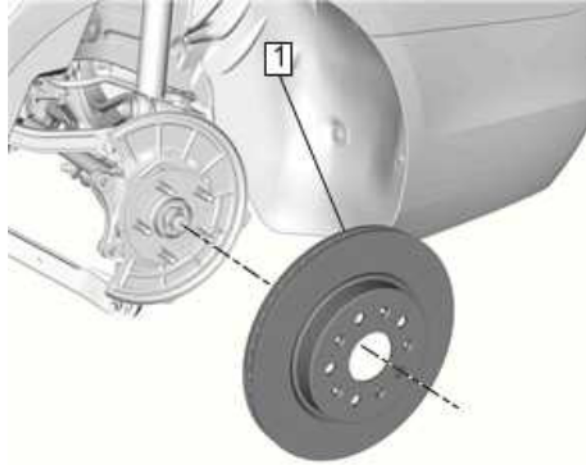


Fig. 88: Brake Rotor

Courtesy of GENERAL MOTORS COMPANY

5. Brake Rotor Bolt (1)» Install and tighten 10 N.m (89 lb in)

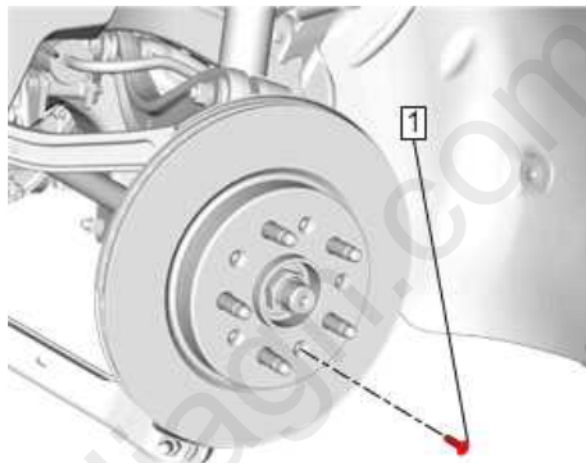


Fig. 89: Brake Rotor Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Fastener Caution

6. Prepare the brake caliper bracket bolts and the bracket threaded holes for assembly:
- Thoroughly clean the residue from the bolt threads with denatured alcohol or equivalent and allow to dry.
 - Thoroughly clean the residue from the threaded holes with denatured alcohol or equivalent and allow to dry.
 - Apply threadlocker to 2/3 of the threaded length of the bolts. Refer to Adhesives, Fluids, Lubricants and Sealers
7. Brake Caliper and Bracket Assembly (1)» Install

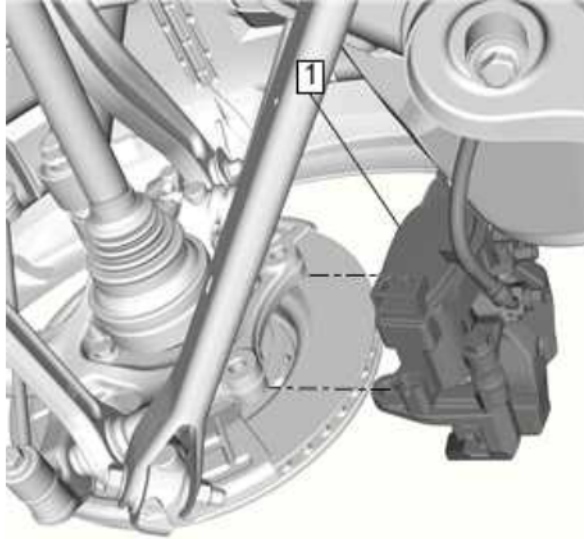


Fig. 90: Brake Caliper and Bracket Assembly
 Courtesy of GENERAL MOTORS COMPANY

8. Brake Caliper Bracket Bolt (1)» Install and tighten 125 N.m (92 lb ft) [2x]

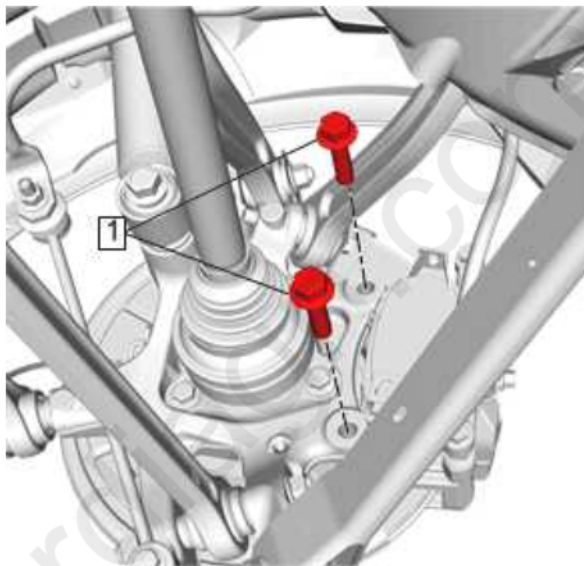


Fig. 91: Brake Caliper Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

9. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#)
10. Calibrate the park brake. Refer to [Park Brake Calibration](#)
11. Burnish the brake pads and rotors. Refer to [Brake Pad and Rotor Burnishing](#).

FRONT BRAKE SHIELD REPLACEMENT

Removal Procedure

WARNING: Brake Dust Warning

1. [Front Brake Rotor Replacement](#)» Remove
2. Front Brake Shield Bolt (1)» Remove [3x]

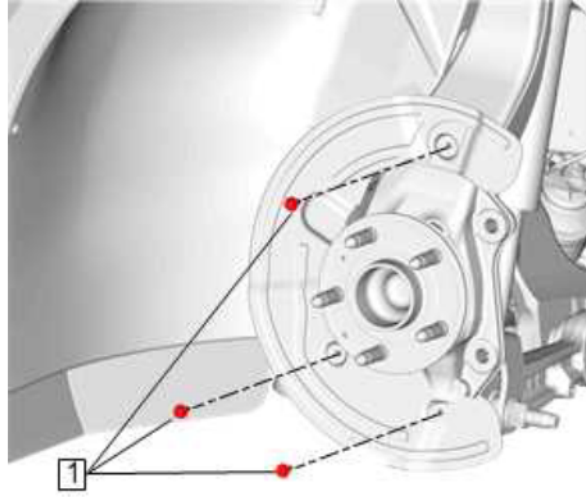


Fig. 92: Front Brake Shield Bolt
 Courtesy of GENERAL MOTORS COMPANY

3. Front Brake Shield (1) » Remove

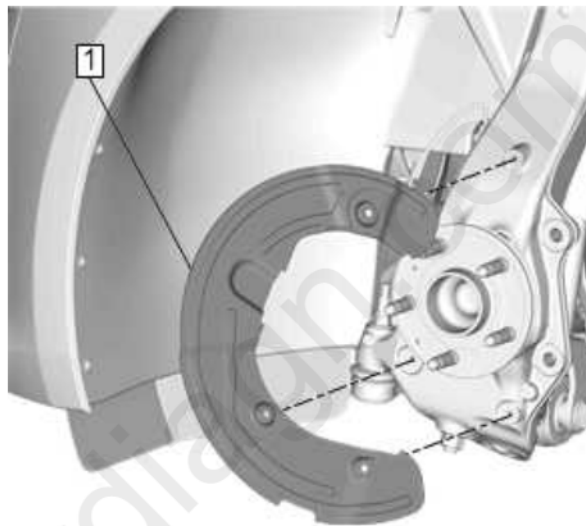


Fig. 93: Front Brake Shield
 Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Front Brake Shield (1) » Install

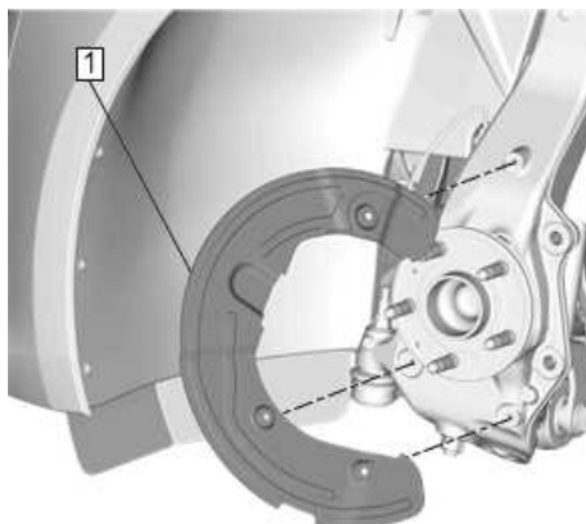


Fig. 94: Front Brake Shield

Courtesy of GENERAL MOTORS COMPANY

2. Front Brake Shield Bolt (1)» Install and tighten 9 N.m (80 lb in) [3x]

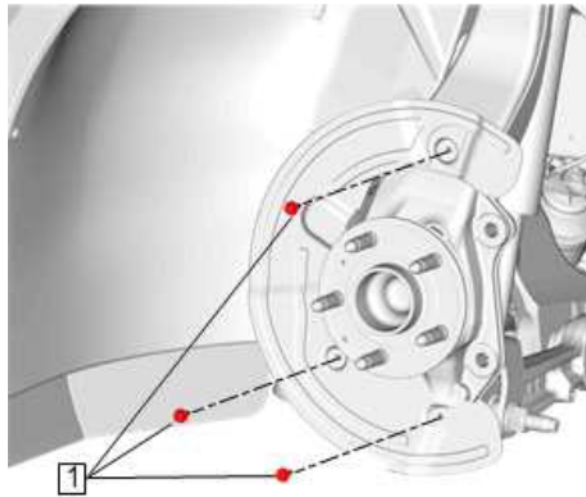


Fig. 95: Front Brake Shield Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Fastener Caution

3. Front Brake Rotor Replacement» Install

FRONT BRAKE BEARING SHIELD REPLACEMENT

Removal Procedure

WARNING: Brake Dust Warning

1. Front Wheel Bearing and Hub Replacement (RWD) Front Wheel Bearing and Hub Replacement (AWD) » Remove
2. Front Brake Bearing Shield (1)» Remove

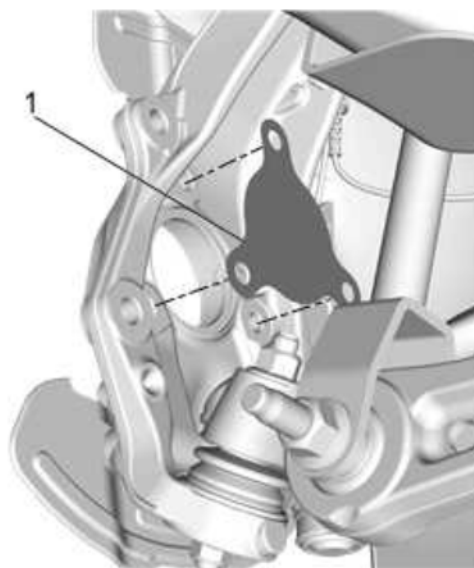


Fig. 96: Front Brake Bearing Shield

Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Front Brake Bearing Shield (1)» Install

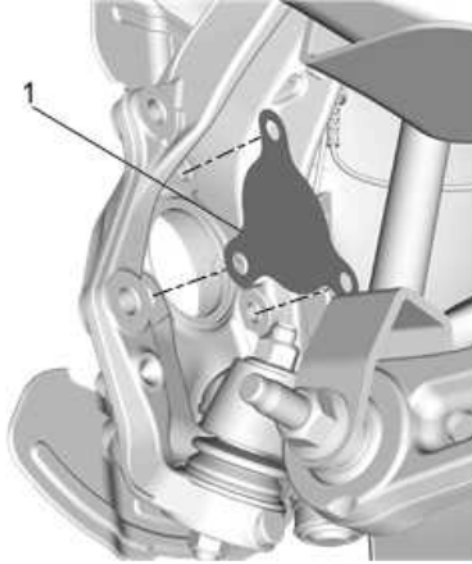


Fig. 97: Front Brake Bearing Shield

Courtesy of GENERAL MOTORS COMPANY

2. **Front Wheel Bearing and Hub Replacement (RWD) Front Wheel Bearing and Hub Replacement (AWD)** » Install

REAR BRAKE SHIELD REPLACEMENT

Removal Procedure

WARNING: Brake Dust Warning

1. **Rear Wheel Bearing and Hub Replacement** » Remove
2. Rear Brake Shield (1) » Remove

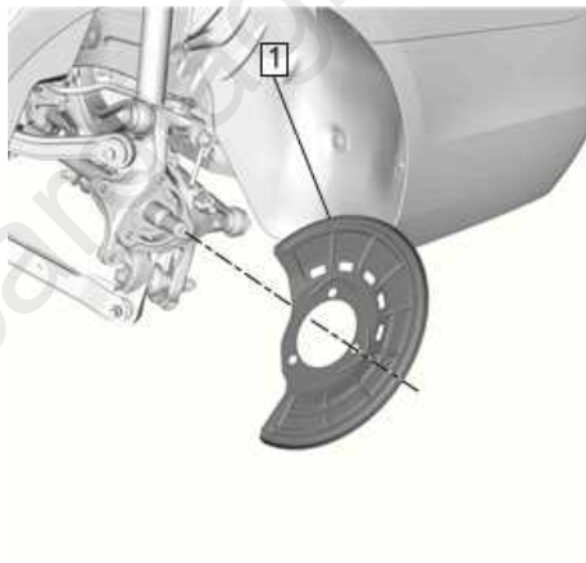


Fig. 98: Rear Brake Shield

Courtesy of GENERAL MOTORS COMPANY

Installation Procedure

1. Rear Brake Shield (1) » Install

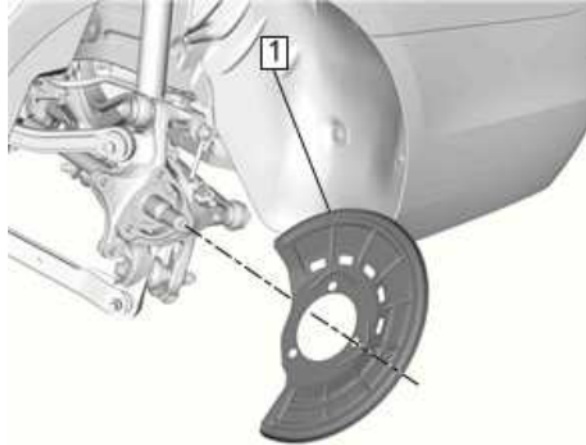


Fig. 99: Rear Brake Shield

Courtesy of GENERAL MOTORS COMPANY

2. **Rear Wheel Bearing and Hub Replacement** » Install

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION

NOTE:

- 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. **[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. **[Brake Rotor Assembled Lateral Runout Correction - Indexing](#)**
- 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

NOTE: This Procedure is not used in Europe

Special Tools

CH-45101-100 Conical Brake Rotor Washers

For equivalent regional tools, refer to **[Special Tools](#)**.

1. Remove the **CH-45101-100** Conical Brake Rotor Washers and the lug nuts that were installed during the assembled LRO measurement procedure.

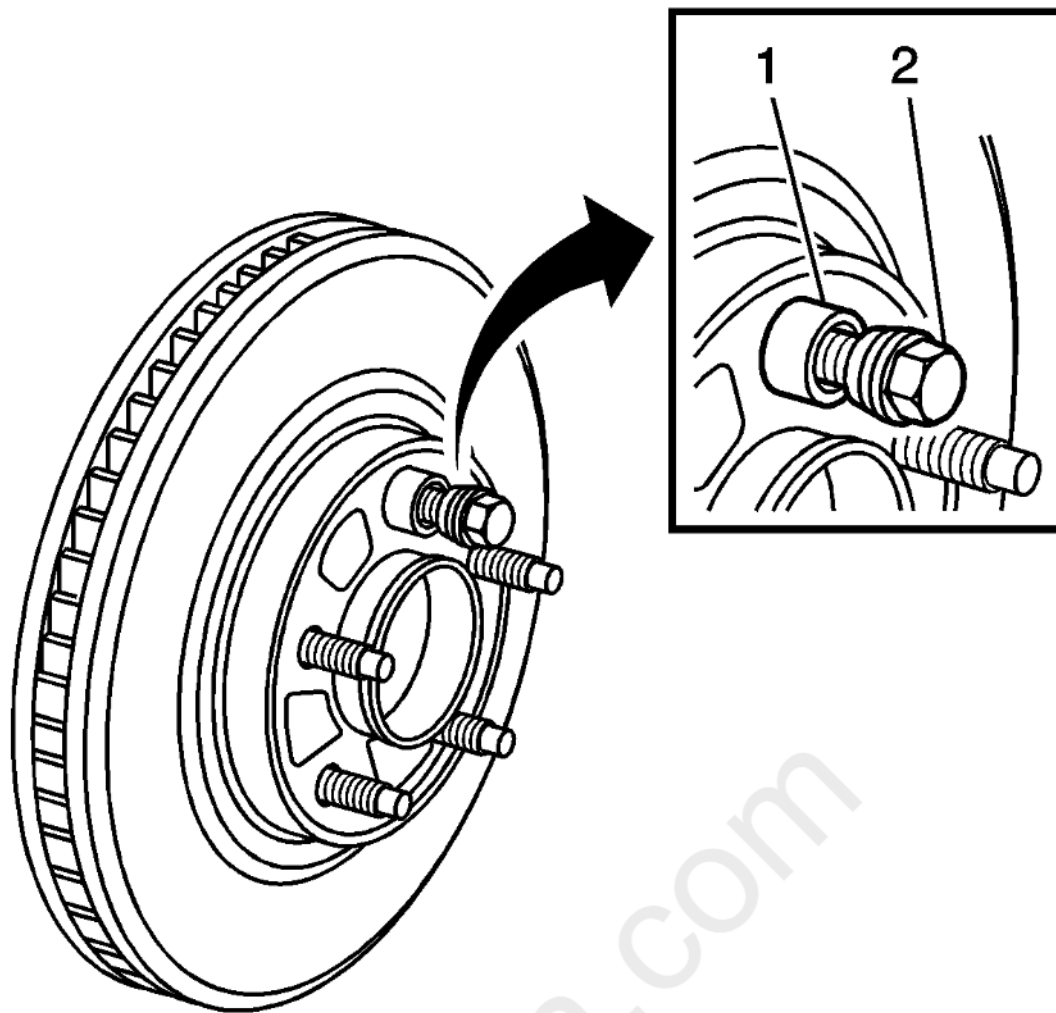


Fig. 100: Lug Nuts & Conical Washers
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to [Brake Dust Warning](#) .

NOTE:

- 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](#)

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 **CH-45101-100** Conical Brake Rotor Washers (1) and one lug nut (2) onto the upper-most wheel stud.
5. Continue to hold the rotor secure and tighten the lug nut firmly by hand.
6. Install the remaining **CH-45101-100** Conical Brake Rotor Washers and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern.

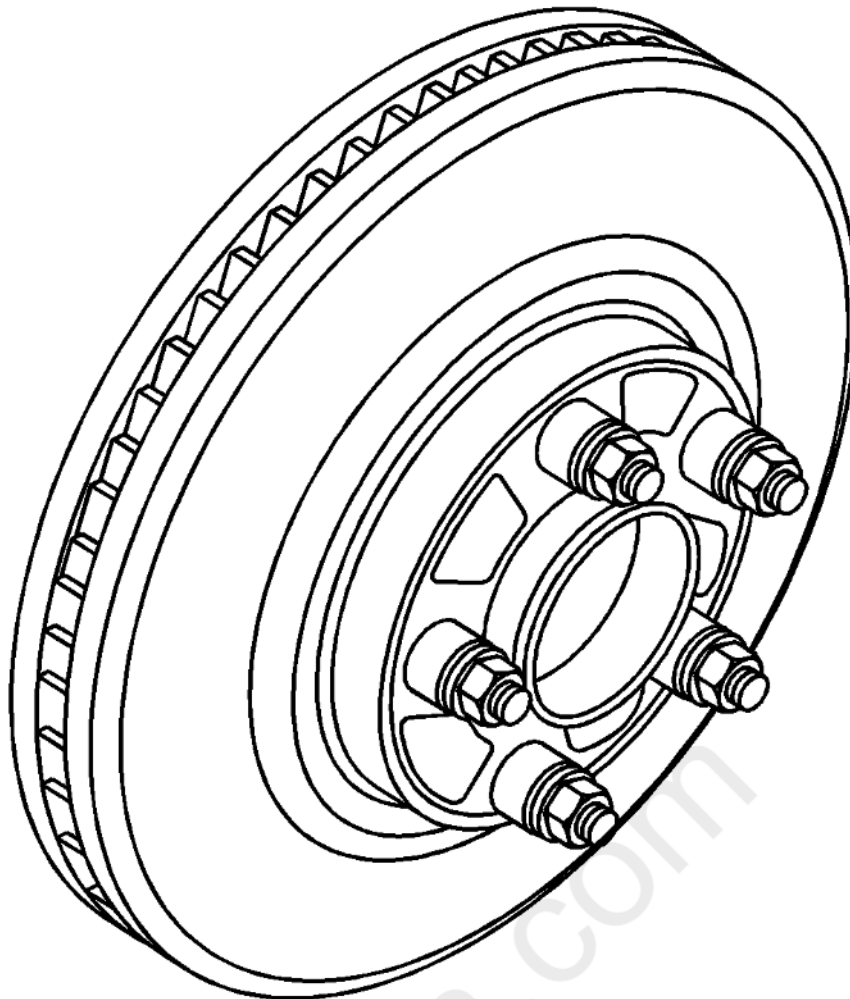


Fig. 101: Lug Nuts & Conical Washers

Courtesy of GENERAL MOTORS COMPANY

7. Tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. 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 **CH-45101-100** Conical Brake Rotor Washers and the lug nuts.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - CORRECTION PLATES

NOTE: This procedure not used in Europe

Special Tools

CH-45101-100 Conical Brake Rotor Washers

For equivalent regional tools, refer to [**Special Tools**](#).

1. Rotate the brake rotor to position the high spot, identified and marked during the brake rotor assembled LRO measurement procedure, to face upward.

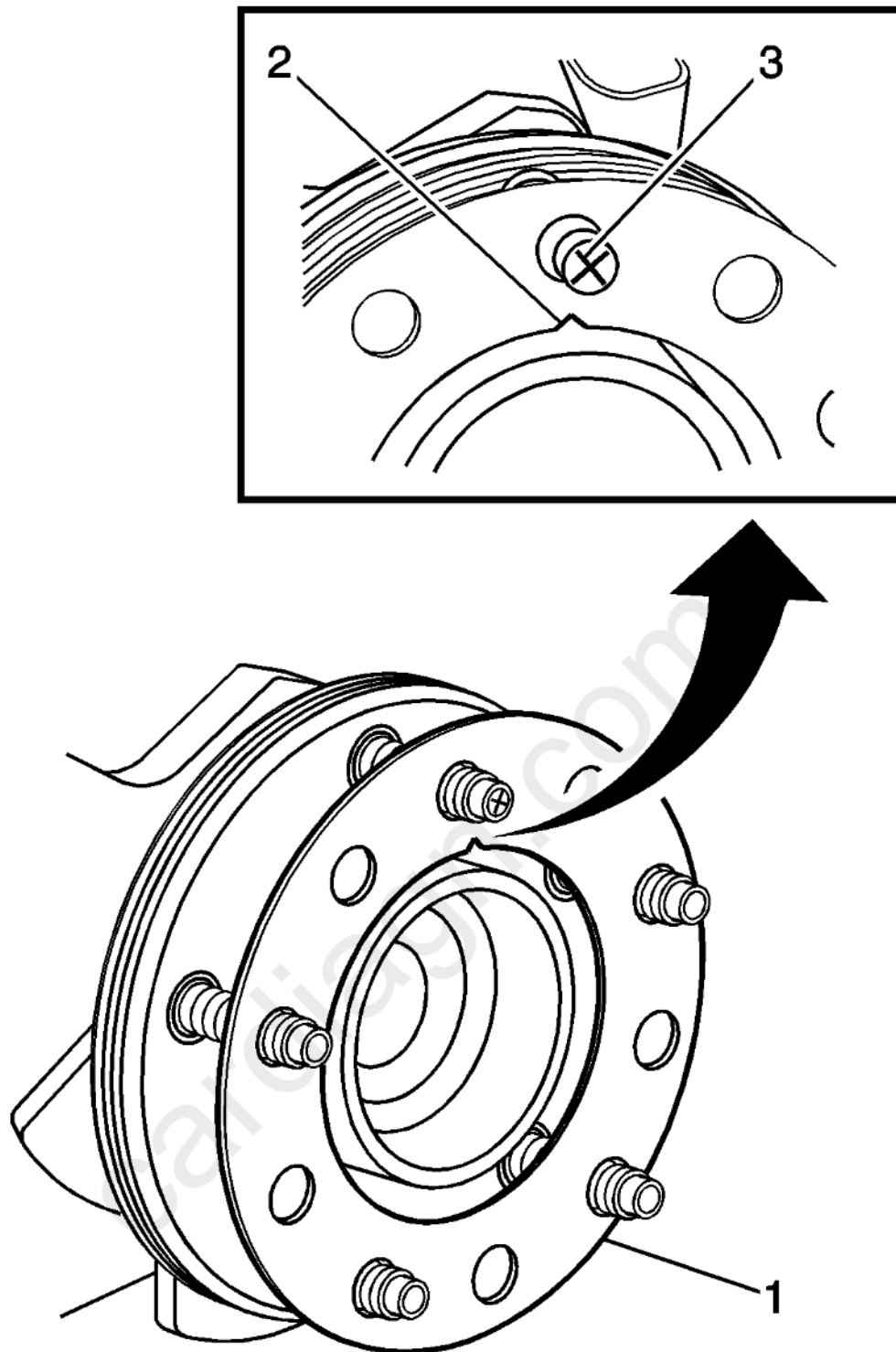


Fig. 102: Identifying Correction Plate, High Spot Mark & V-Shaped Notch
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to [Brake Dust Warning](#) .

NOTE:

- 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,

2. Remove the **CH-45101-100** Conical Brake Rotor Washers and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction procedure.
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.

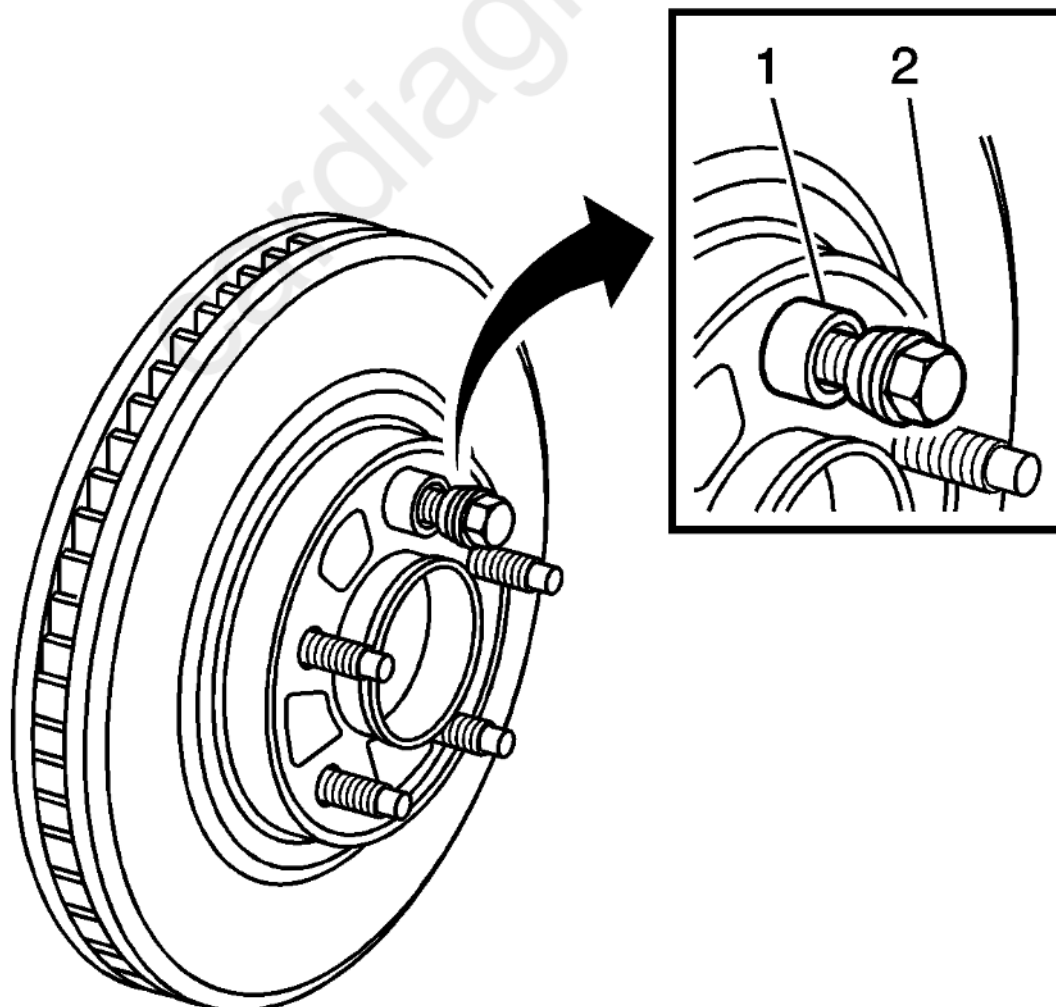
For example: If the assembled LRO measurement was 0.076 mm (0.003 in), the 0.076 mm (0.003 in) correction plate would be used. If the measurement was 0.127 mm (0.005 in), the 0.152 mm (0.006 in) correction plate would be used.

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

NOTE:

- **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.**

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 **CH-45101-100** Conical Brake Rotor Washers (1) and one lug nut (2) onto the upper-most wheel stud.
9. Continue to hold the rotor secure and tighten the lug nut firmly by hand.
10. Install the remaining **CH-45101-100** Conical Brake Rotor Washers and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern.

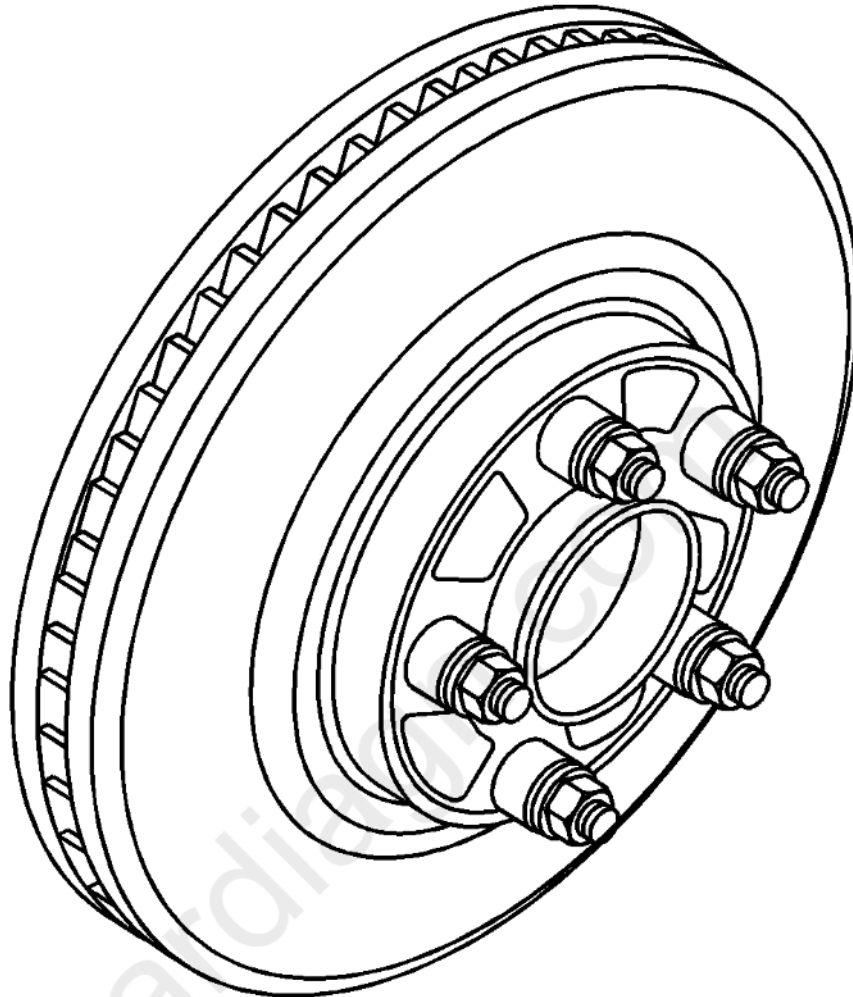


Fig. 104: Lug Nuts & Conical Washers
Courtesy of GENERAL MOTORS COMPANY

11. Tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. 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 **CH-45101-100** Conical Brake Rotor Washers and the lug nuts.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - ON VEHICLE LATHE

NOTE: This procedure is not used in Europe.

Special Tools

CH-45101-100 Conical Brake Rotor Washers

For equivalent regional tools, refer to [Special Tools](#).

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.

WARNING: Refer to [Brake Dust Warning](#) .

NOTE:

- 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](#)
2. Remove the **CH-45101-100** Conical Brake Rotor Washers and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction procedure.
 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 **CH-45101-100** Conical Brake Rotor Washers and the lug nuts.

BRAKE ROTOR REFINISHING

Special Tools

- **CH-41013** Rotor Resurfacing Kit
- **CH-42450-A** Wheel Hub Resurfacing Kit

For equivalent regional tools, refer to [Special Tools](#).

NOTE:

- 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.

NOTE:

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.

1. Using the **CH-42450-A** Wheel Hub Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.

NOTE:

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.

2. Using the **CH-41013** Rotor Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor.
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 a solution of mild dish washing detergent and water or a GM approved brake cleaner and a clean shop towel to remove metal particles remaining from machining. Repeat the cleaning process if necessary to remove all metal particles.

NOTE: Thoroughly cleaning the brake rotor will prevent the possible transfer of finite metal dust left as a by-product of machining to the brake pad material during the burnishing process, thereby reducing the possibility for brake squeal or other brake noises to occur.

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 (Floating Caliper)

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 (Floating Caliper)

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.

System Operation (Fixed Caliper)

Mechanical output force is applied from the hydraulic brake caliper inboard and outboard pistons to the inner and outer brake pads. The brake calipers are a fixed, opposed-piston design, allowing the output force to be equally distributed through the distribution of the pressurized brake fluid within the caliper. 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 the brake pad hardware and of the brake caliper inboard and outboard pistons is essential for even distribution of braking force.

System Characteristics

Brake Noise

Brake noise can occur and to a degree, some brake noise is normal. Variations in driving conditions such as the weather, environment, driving patterns, differences in vehicle loading and type or style of driving, can affect brake wear. Any one of these variations can cause brake noise to become apparent. Inspect and verify that all metal-to-metal contact areas of the brake pads, brake pad guides or springs, brake caliper housing, caliper bracket and/or suspension knuckle, as applicable, are clean and free of corrosion and scale.

Brake noise is a "slip-stick" vibration of disc brake components and, if it occurs intermittently, can be considered normal. Most brake noise may be eliminated or temporarily reduced by performing 3 or 4 aggressive brake applications. If the brake noise persists or consistently recurs, application of a damping compound to the brake pad mounting plate where it contacts the caliper can lessen the vibration as the components move relative to each other. Refer to [Adhesives, Fluids, Lubricants and Sealers](#) for recommended compounds.

The following brake noises are characteristic of all brake systems. These noises cannot be avoided and may not indicate improper operation of the brake system.

Squeak/Squeal Noise

A squeak or squeal noise can occur on vehicles with front semi-metallic brake pads during light to medium brake pedal application at low to moderate vehicle speeds. Occasionally this noise may appear from the front or rear brakes after a period of non-use such as overnight or cold brakes and/or in high humidity conditions.

Grinding Noise

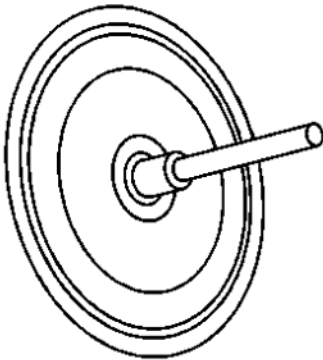
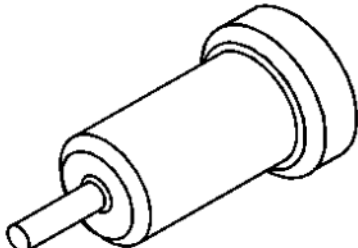
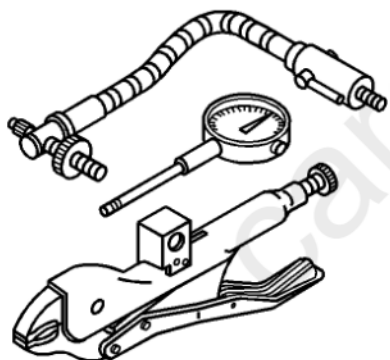
Common occurrence for rear brakes and some front disc brakes during initial brake applications after the vehicle has been parked overnight. Caused by light corrosion forming on the metal brake component friction surfaces during vehicle non-use. Typically disappears after the first few brake applications.

Groan Noise

A groan type noise may be heard during a quick stop or when slowly moving forward from a complete stop. On vehicles equipped with antilock brake systems (ABS), a groan or moan noise may occur during heavy brake application or on road surfaces with compromised traction such as loose gravel or on wet or icy roads. This is a normal function of ABS activation.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
	CH 41013 J 41013 Rotor Resurfacing Kit Not used in Europe
	CH 42450-A J 42450-A Wheel Hub Resurfacing Kit Not used in Europe
	CH 45101 J 45101 Hub and Wheel Runout Gauge Not used in Europe
	CH 45101-100 J 45101-100 Conical Brake Rotor Washers Not used in Europe