

2010 Cadillac SRX

2010 BRAKES Disc Brakes - SRX

2010 BRAKES**Disc Brakes SRX****SPECIFICATIONS****FASTENER IDENTIFICATION SPECIFICATIONS**

Application	Specification	
	Metric	English
Brake Caliper Bleeder Valve - Front and Rear	17 .m	13 lb ft
Brake Caliper Bracket Bolt - Front and Rear	110 .m	1 lb ft
Brake Caliper Guide Pin Bolt - Front and Rear	60 .m	44 lb ft
Brake Hose Fitting Bolt - Front and Rear	40 .m	30 lb ft
Brake Rotor Bolt - Front and Rear	9 .m	0 lb in

DISC BRAKE COMPONENT SPECIFICATIONS

Application	Specification	
	Metric	English
Front Brakes		
• Brake Pad Lining Minimum Thickness	2.00 mm	0.0 in
• Brake Rotor Diameter	345.00 mm	13.5 in
• Brake Rotor Discard Thickness	27.00 mm	1.06 in
• Maximum Allowable Lateral Runout	0.06 mm	0.002 in
• Maximum Allowable Scoring	1.50 mm	0.059 in
• Maximum Allowable Thickness Variation	0.025 mm	0.001 in
Rear Brakes		
• Brake Pad Lining Minimum Thickness	2.00 mm	0.0 in
• Brake Rotor Diameter	315.00 mm	12.40 in
• Rotor Discard Thickness	21.50 mm	0.46 in
• Maximum Allowable Lateral Runout	0.06 mm	0.002 in
• Maximum Allowable Scoring	1.50 mm	0.059 in
• Maximum Allowable Thickness Variation	0.025 mm	0.001 in
If brake rotors have a discard thickness 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, LIDS, LUBRICANTS AND SEALERS

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Application	Type of Material	M Part Number	
		nited States	Canada
Brake Caliper Bracket Bolts	Threadlocker	12345493	109534

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.

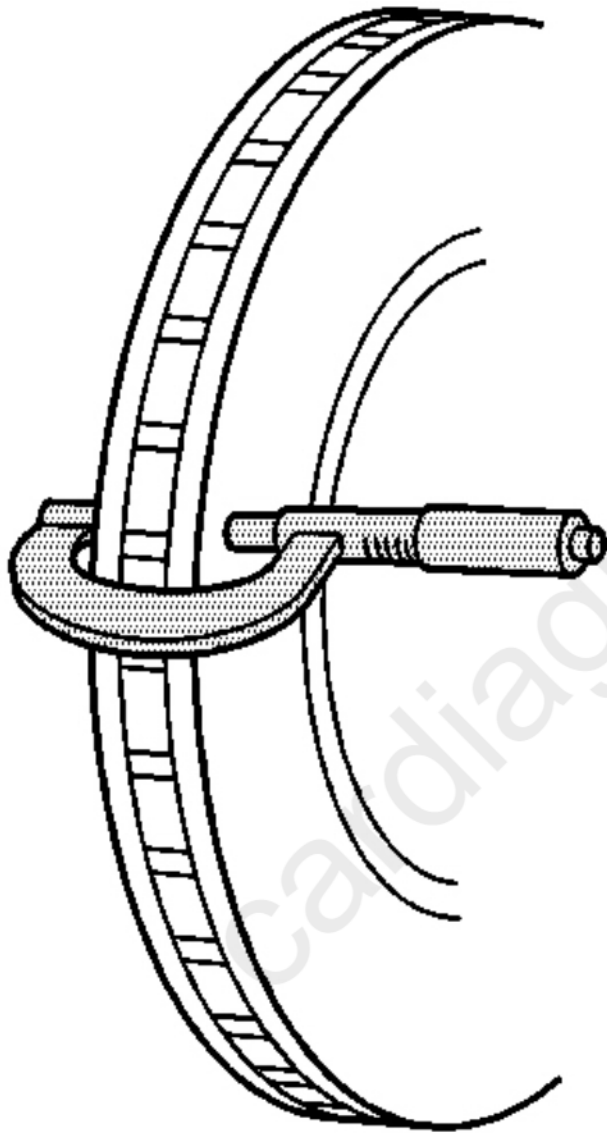


Fig 1: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP

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

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

measurement.

4. Compare the lowest thickness measurement recorded specifications. Refer to **Disc Brake Component Specifications**.
5. If the lowest thickness measurement of the brake rotor is above the minimum allowable thickness after refinishing specification, the rotor may be able to be refinished, depending upon surface and wear conditions which may be present.
6. If the lowest thickness measurement of the brake rotor is at or below the minimum allowable thickness after refinishing specification, the rotor may not be refinished.
7. If the lowest thickness measurement of the brake rotor is at or below the discard thickness specification, the rotor requires replacement.

BRAKE ROTOR THICKNESS VARIATION MEASUREMENT

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.

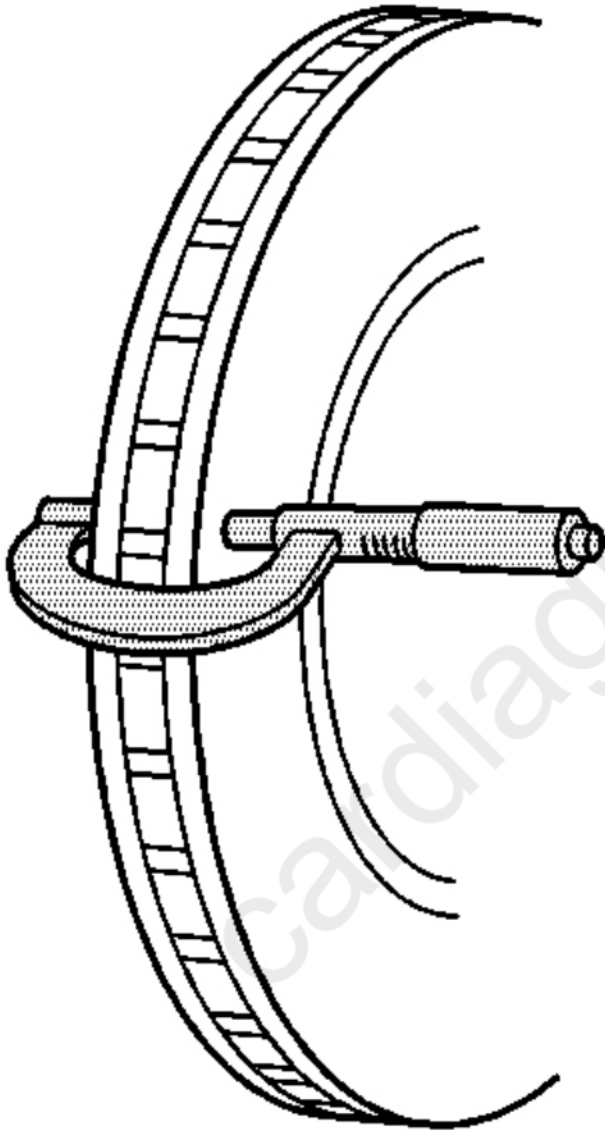


Fig 2: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP

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

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

measurement.

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

Specification: Brake rotor maximum allowable thickness variation: 0.025 mm (0.001 in)

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.

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

BRAKE ROTOR SURFACE AND REAR INSPECTION

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. Inspect the friction surfaces of the brake rotor for the following Braking Surface Conditions:
 - Heavy rust and/or pitting

Light surface rust can be removed with an abrasive disc. Heavy surface rust and/or pitting must be removed by refinishing the rotor.

- Cracks and/or heat spots
 - Excessive blueing discoloration
4. If the friction surfaces of the brake rotor exhibit one or more of the Braking Surface Conditions, the rotor requires refinishing or replacement.

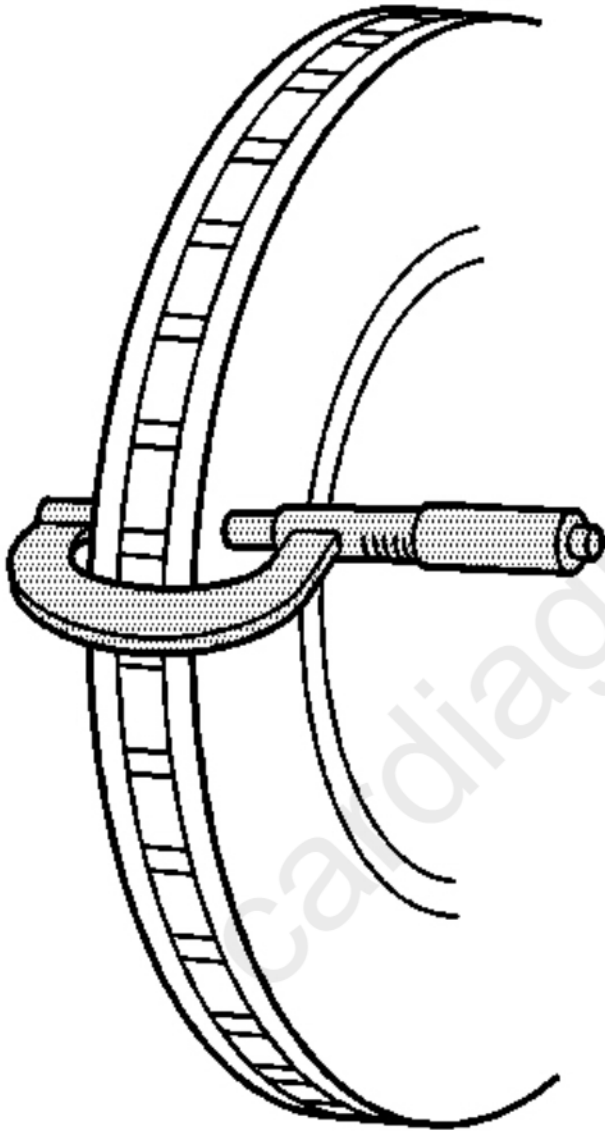


Fig 3: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP

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

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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-3 544-KIT:** Complete Torque Socket Set - 10 PCS, or equivalent
- **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 0.00-11.00 mm (0.000-0.433 in).
- 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.

Measuring Procedure

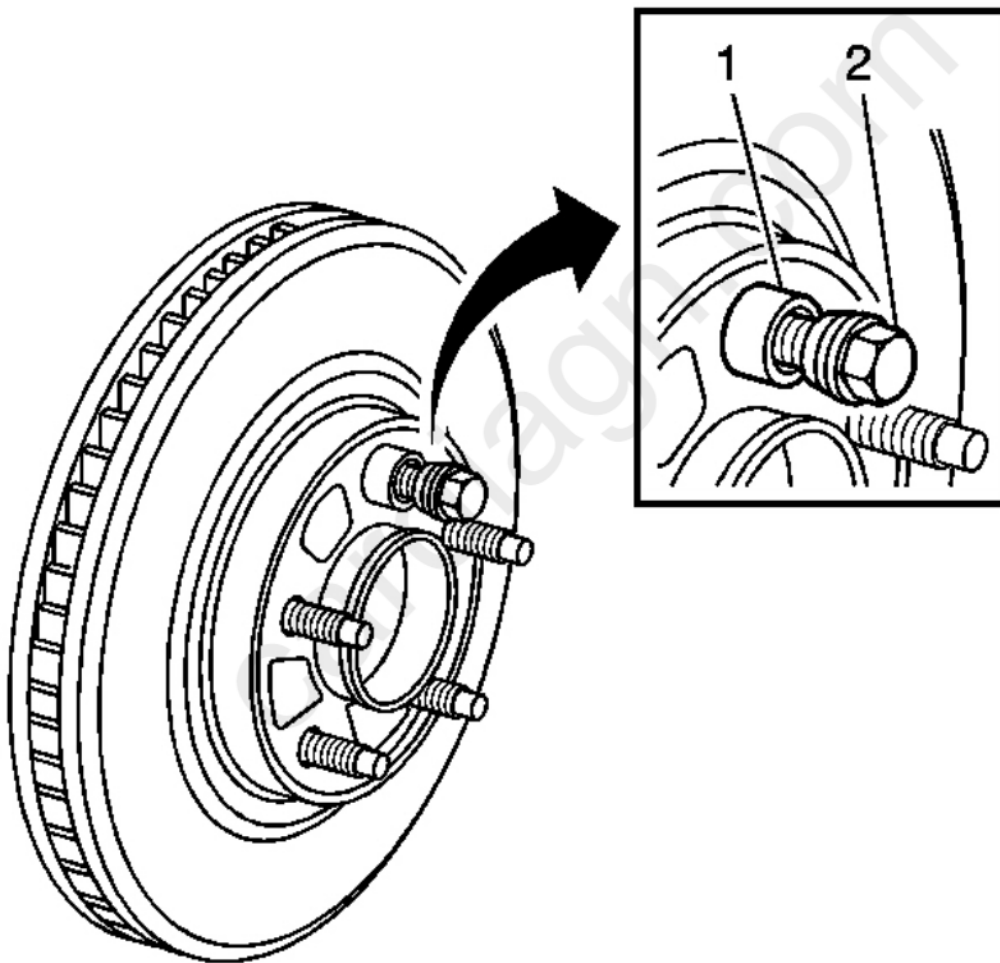
1. Matchmark the position of the brake rotor to the wheel studs if this has not been done already.

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. Inspect the mating surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles, corrosion, rust, or debris remaining. If the wheel hub/axle flange and/or if the brake rotor mating surfaces exhibit these conditions, perform the following steps:
 1. Remove the brake rotor from the vehicle. Refer to Front Brake Rotor Replacement and/or Rear Brake Rotor Replacement .
 2. Using the **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 matchmark made prior to removal.



ig 4: Identifying Special Tools - 45101-100 Lug Nut
Courtesy of GENERAL MOTORS CORP

4. Hold the rotor firmly in place against the hub/axle flange and install one of the **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.

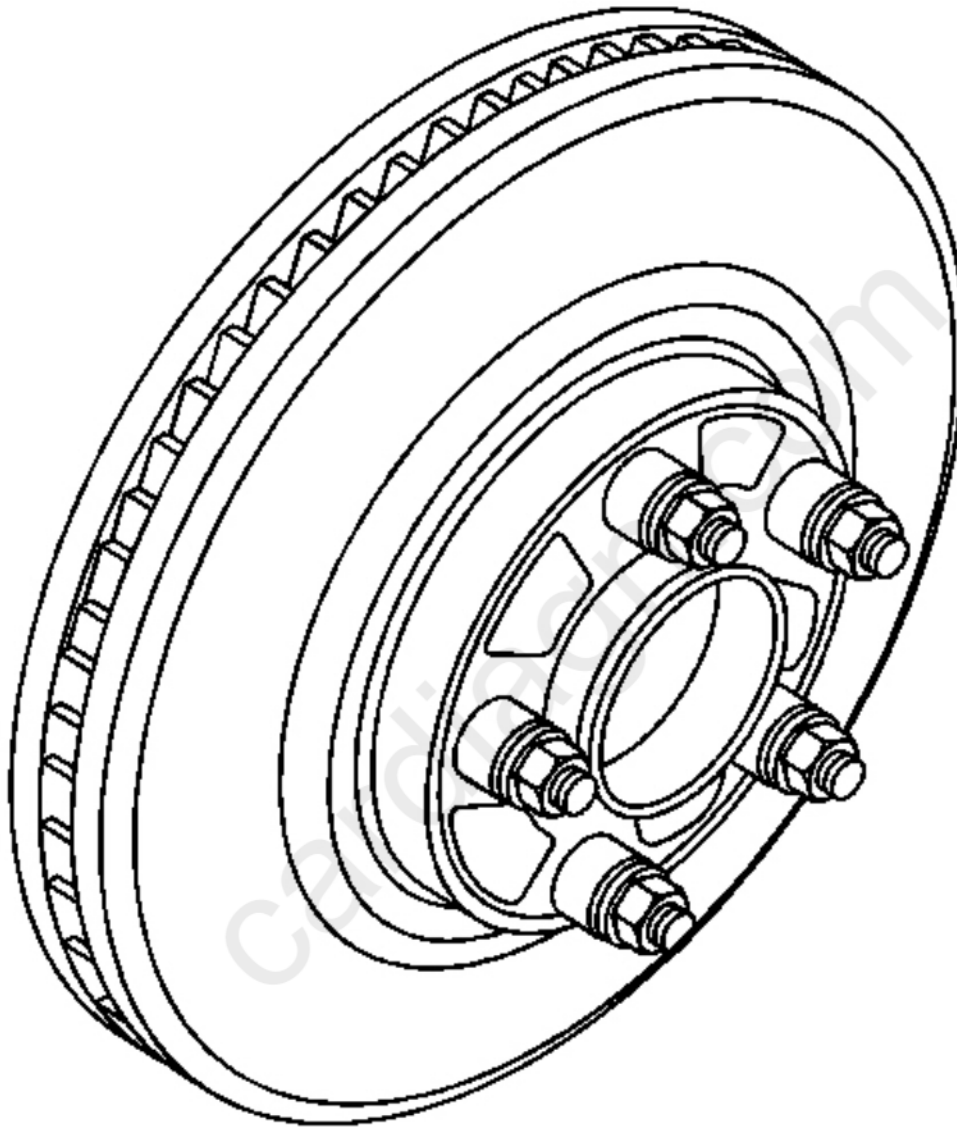


Fig 5: Identifying All Special Tools CH-45101-100s Lug Nuts
Courtesy of GENERAL MOTORS CORP

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.
7. Using the **CH-3 544-KIT**: Complete Torque Socket Set - 10 PCS, or equivalent, 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. If the brake rotor has been REFINISHED or REPLACED with a new rotor, proceed to step 14.
9. If the brake rotor meets the following criteria, proceed to step 10.
 - The rotor is within specifications and is being REUSED.
 - The rotor has NOT been refinished.
 - The rotor does NOT exhibit thickness variation exceeding the maximum allowable level.

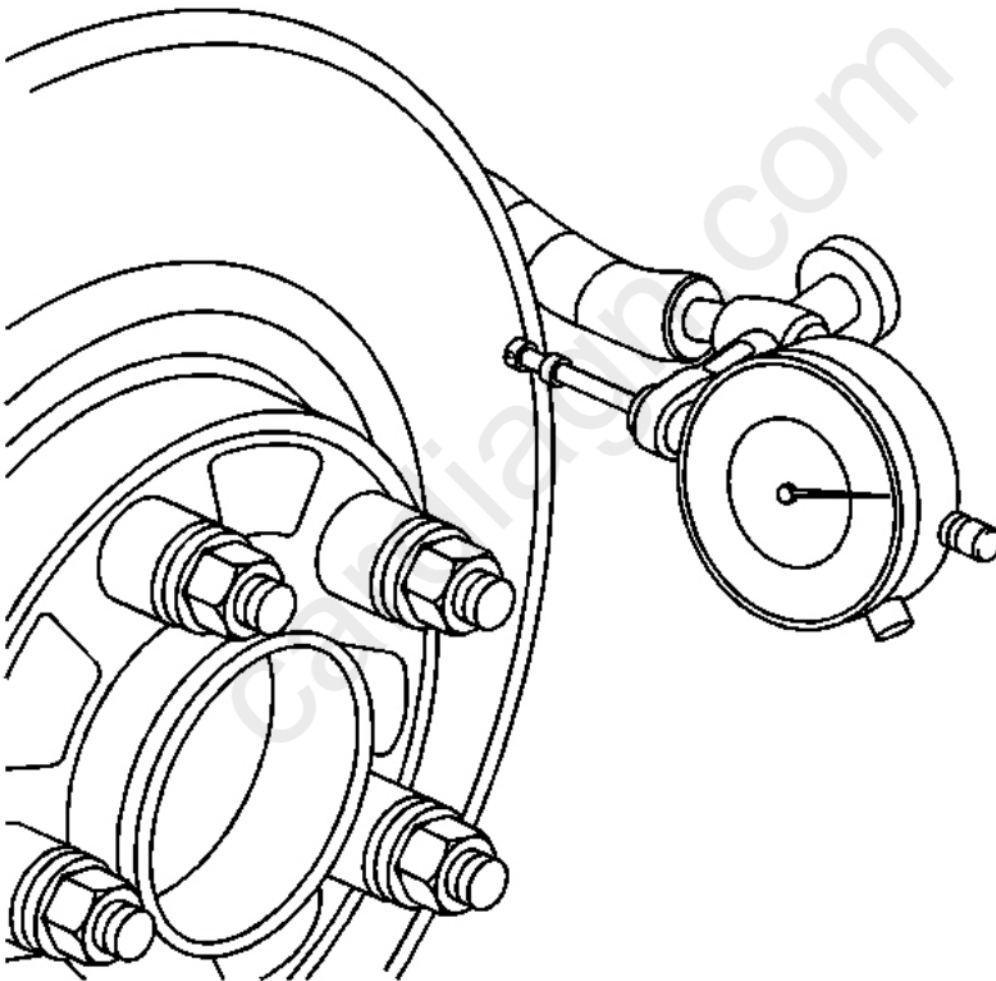


Fig. : Identifying Dial Indicator To Measure Lateral Runout
Courtesy of GENERAL MOTORS CORP.

10. Mount a dial indicator, **CH 101: 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.

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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 101: 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 101 100: Conical Brake Rotor Washers** and the lug nuts.

BRAKE PAD INSPECTION

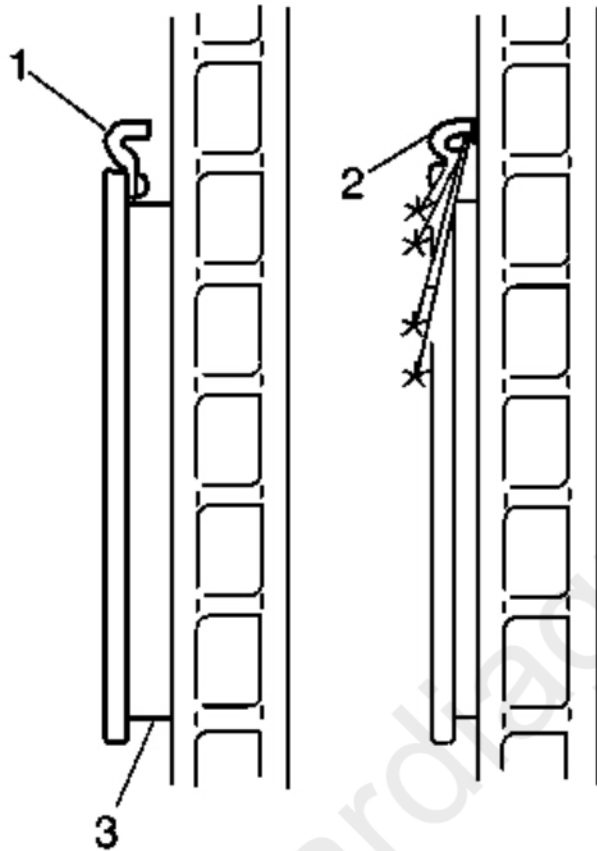


Fig. : View Of Brake Pads & Audible Wear Sensors
Courtesy of GENERAL MOTORS CORP.

WARNING: Refer to Brake Dust Warning .

1. Inspect the disc brake pads at regular intervals, or whenever the tire and wheel assemblies are removed from the vehicle.
2. If replacement is necessary, always replace disc brake pads in axle sets.
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

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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.

6. Replace the disc brake pads when the friction surface (3) is worn to within 0.76 mm (0.030 in) of the mounting plates.
7. Remove the brake calipers and inspect the friction surfaces of the inner and outer disc brake pads to ensure that they are level. Place the disc brake pad friction surfaces together and measure the gap between the surfaces. If more than 0.13 mm (0.005 in) gap exists midway between the length of the disc brake pads, replace the disc brake pads.
8. Verify that any disc brake pad shims that may be required are in place and not damaged or excessively corroded. Replace any missing or damaged shims in order to preserve proper disc brake performance.
9. Replace the disc brake pads if any have separated from the mounting plates.
10. Inspect the disc brake pads friction surfaces for cracks, fractures, or damage which may cause noise or otherwise impair disc brake performance.

BRAKE CALIPER INSPECTION

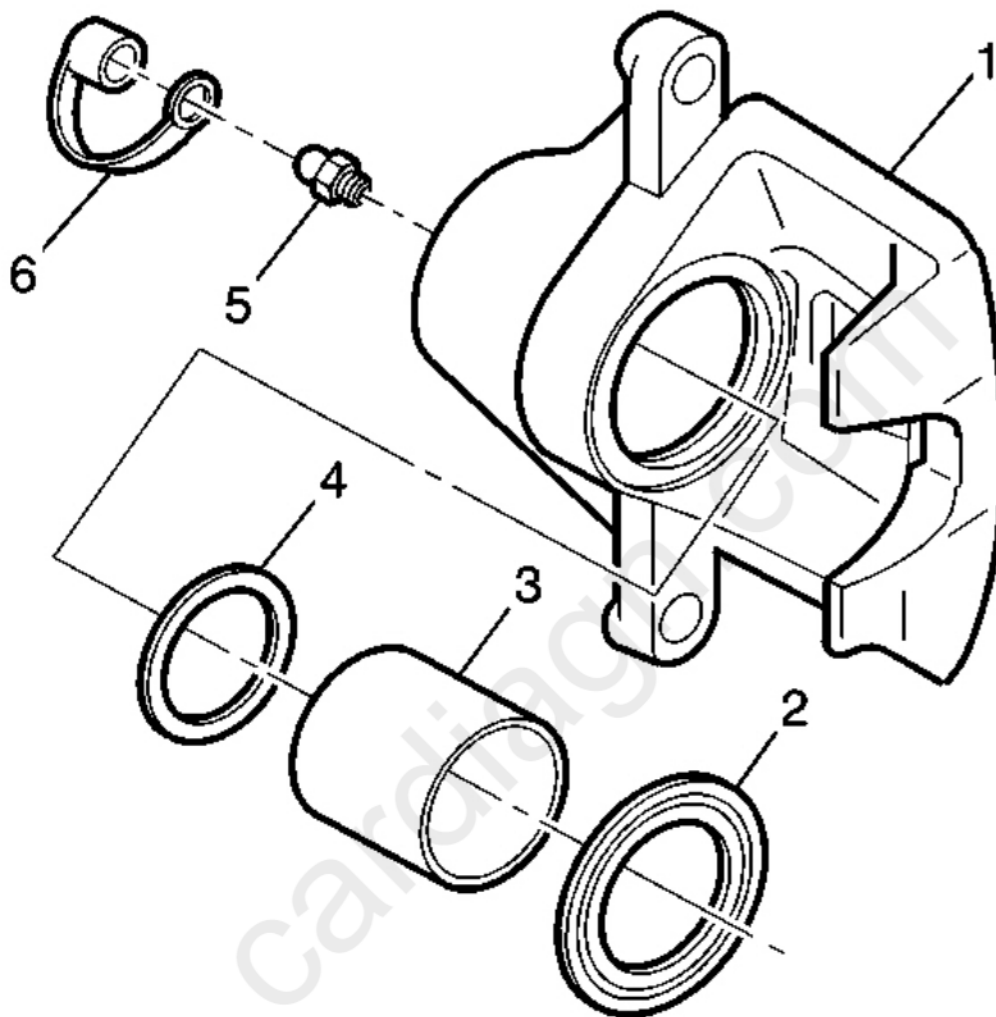


Fig. : Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

WARNING: Refer to Brake Dust Warning .

1. Inspect the brake caliper housing (1) for cracks, excess wear, and/or damage. If any of these conditions are present, the brake caliper requires replacement.
2. Inspect the caliper piston dust boot seal (2) for cracks, tears, cuts, deterioration and/or improper seating in the caliper body. If any of these conditions are present, the brake caliper requires overhaul or replacement.

3. Inspect for brake fluid leakage around the caliper piston dust boot seal (2) and on the disc brake pads. If there is any evidence of brake fluid leakage, the brake caliper requires overhaul or replacement.

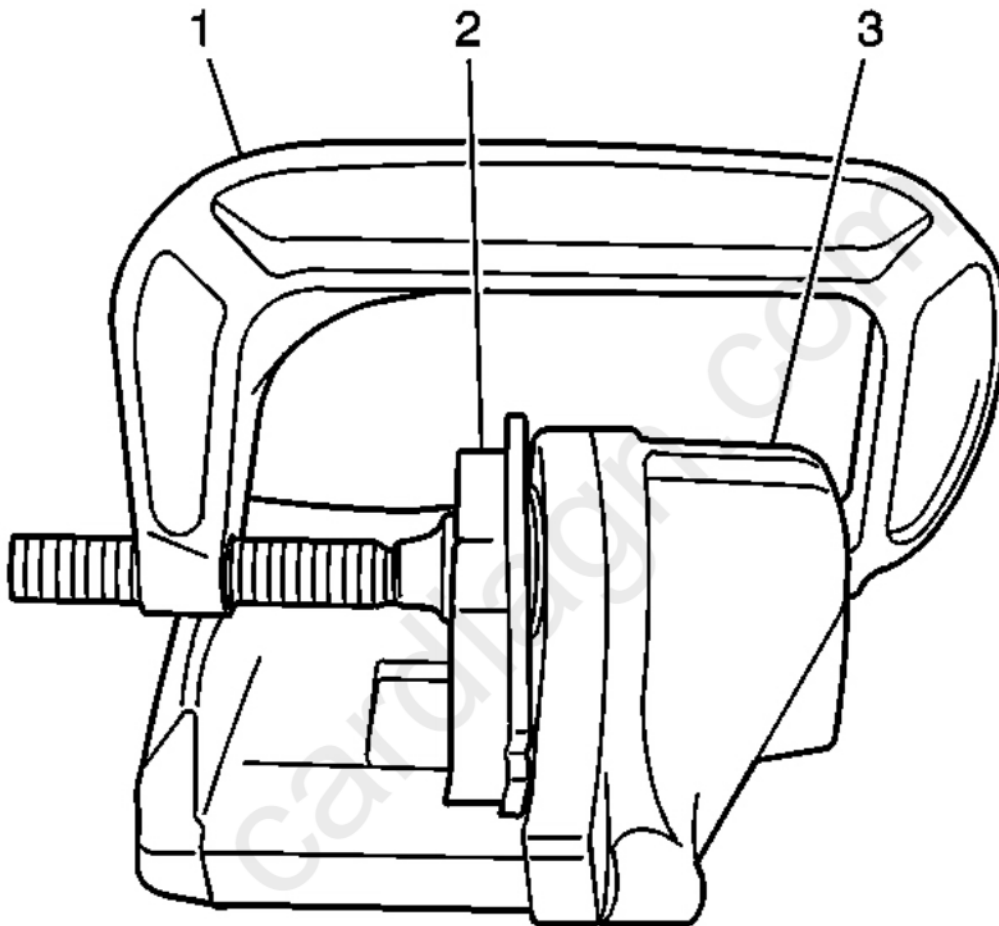


Fig. 9: Compressing Caliper Piston
Courtesy of GENERAL MOTORS CORP.

4. Inspect for smooth and complete travel of the caliper pistons into the caliper bores:

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

- 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 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 .

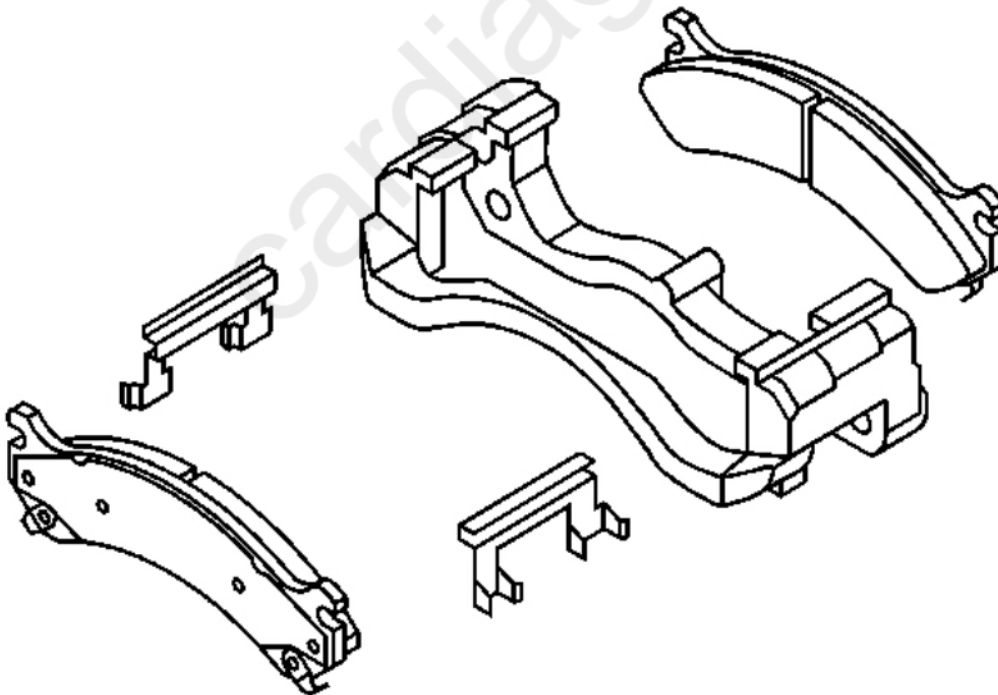


Fig. 10: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

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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.
 - Install a large clamp over the top of the caliper housing and against the back of the outboard pad.
 - Slowly tighten the clamp until the pistons are pushed completely into the caliper bores.
 - Remove the 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.
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.

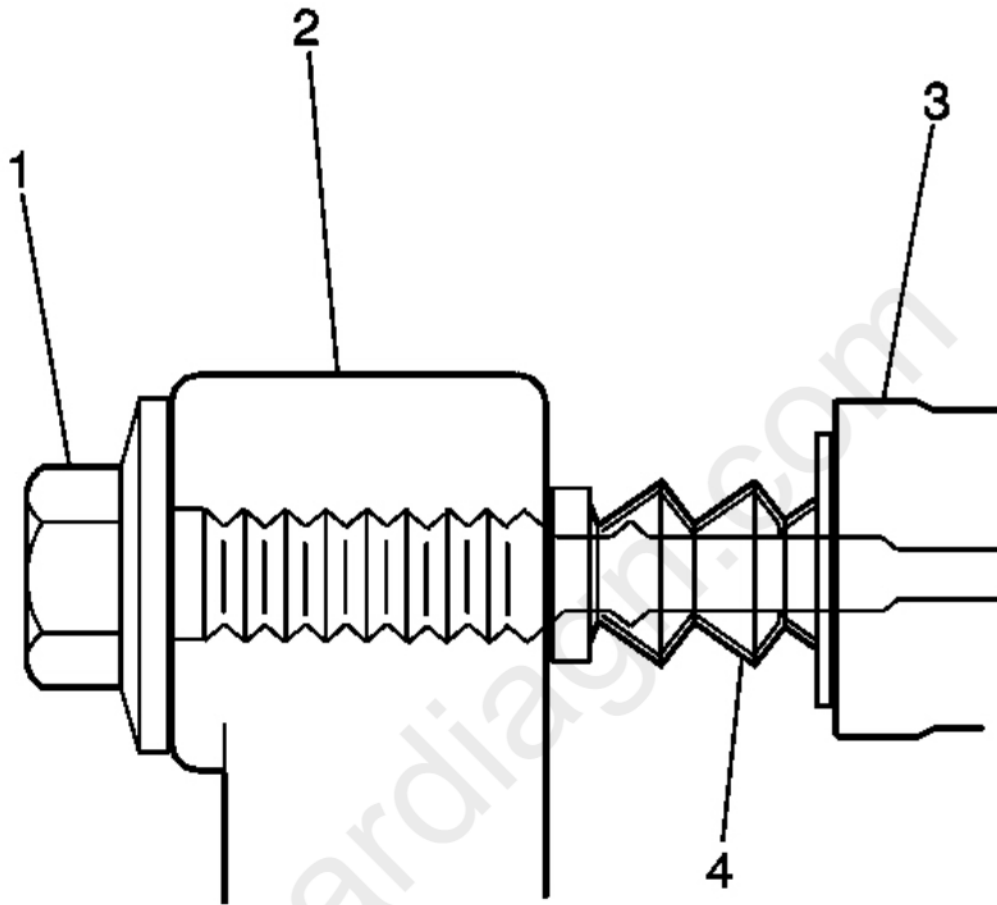


Fig. 11: View Of Caliper, Pin, Boots & Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

14. Inspect the caliper bolts (1) for the following:
 - Binding
 - Seizing
 - Looseness in the brake caliper mounting bracket (3)
 - Bent or damaged brake caliper mounting bolts
 - 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. Install the disc brake caliper to the brake caliper mounting bracket. Refer to **Front Brake Caliper Replacement**.

REAR DISC BRAKE MOUNTING AND HARDWARE INSPECTION

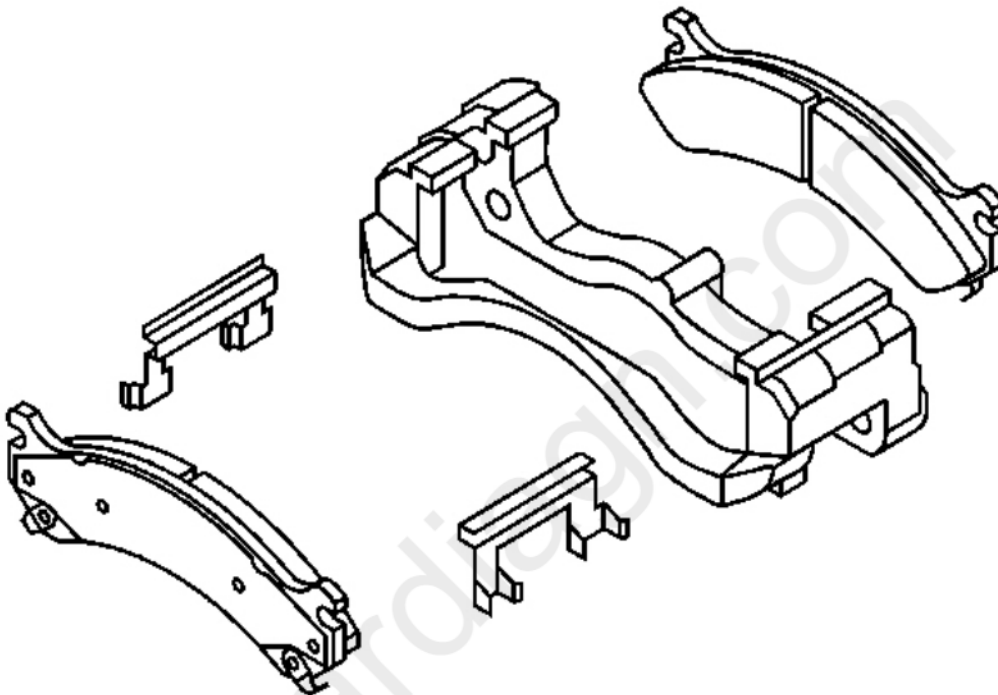


Fig. 12: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

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

1. Remove the disc brake caliper from the caliper mounting bracket.
2. Remove the disc brake pads from the caliper mounting bracket.
3. Inspect the disc brake pad mounting hardware for the following:
 - Missing mounting hardware
 - Excessive corrosion
 - Bent mounting tabs
 - Looseness at the caliper mounting bracket

- Looseness at the disc brake pads
- 4. If any of the conditions listed are found, the disc brake pad mounting hardware requires replacement.
- 5. Ensure the disc brake pads are held firmly in place on the caliper mounting bracket, yet slide easily on the mounting hardware without binding.
- 6. Install the disc brake pads to the caliper mounting bracket.
- 7. Install the disc brake caliper to the mounting bracket.

REPAIR INSTRUCTIONS

FRONT DISC BRAKE PADS REPLACEMENT

Removal Procedure

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, 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. Install a C-clamp against the outer brake pad and the rear of the brake caliper body.
7. Slowly tighten the C-clamp until the brake caliper pistons are compressed into the brake caliper bores.

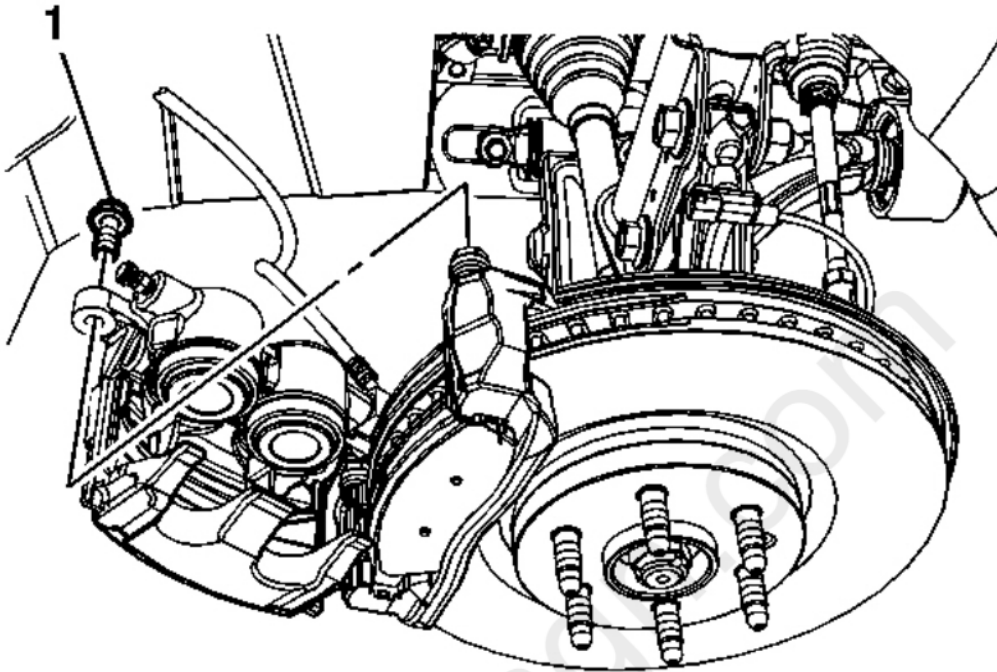


Fig. 1 : Identifying Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

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 the 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.

Using a backup wrench to hold the brake caliper guide pin stationary, remove the upper brake caliper guide pin bolt (1).

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. Pivot the brake caliper forward and support with heavy mechanics wire or equivalent.
10. Place a block of wood or an old brake pad against the brake caliper pistons.
11. Using a brake pad spreader tool or equivalent, fully seat the caliper pistons in the caliper bores.

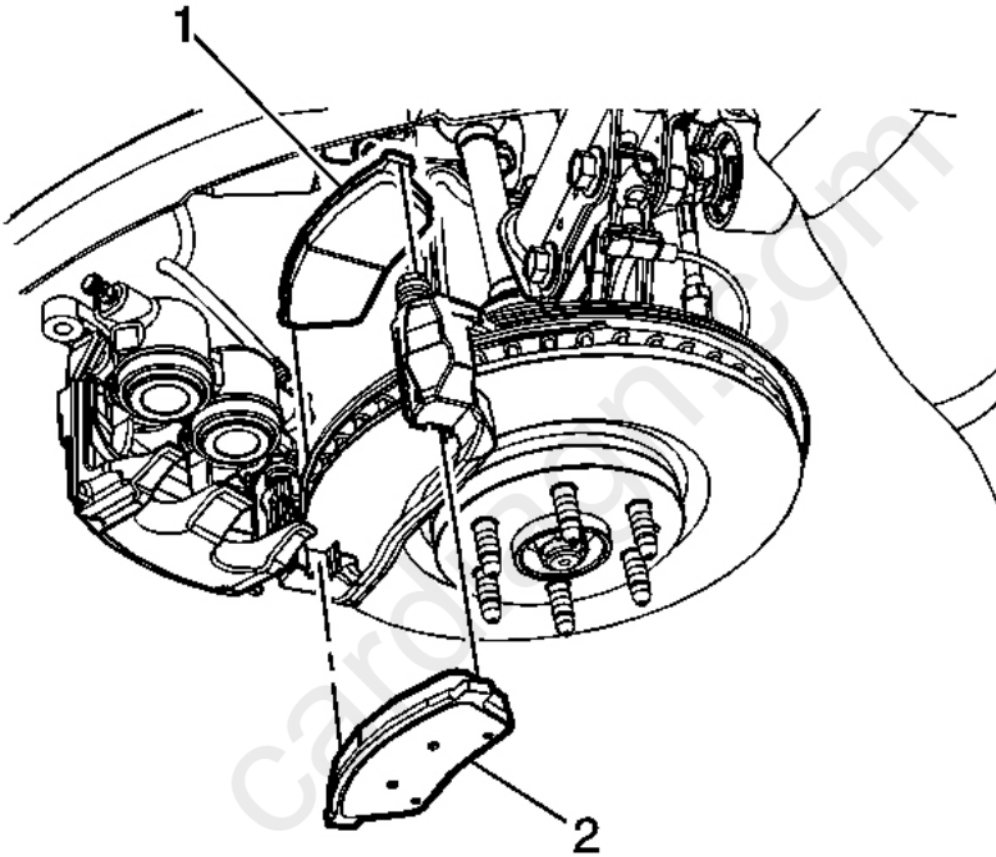


Fig. 1 : Identifying Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

12. Remove the inner brake pad (1) and the outer brake pad (2).

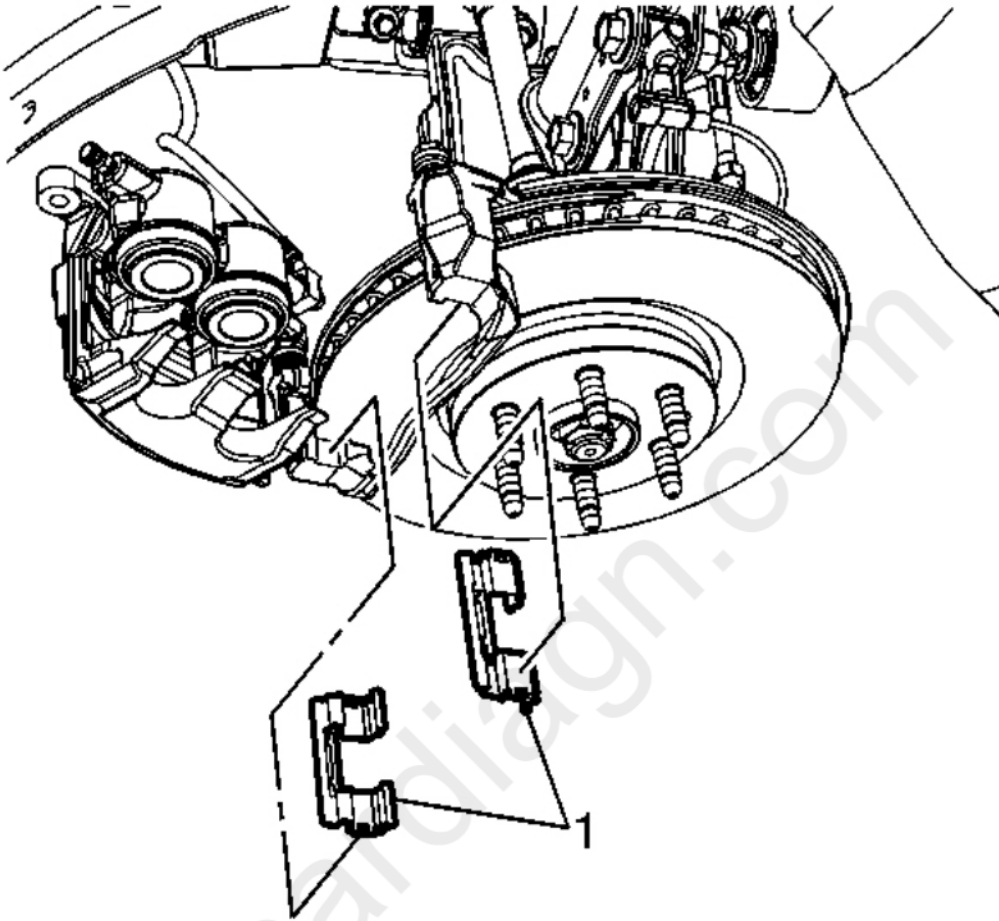


Fig. 1 : View Of Upper & Lower Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

13. Remove the upper and lower brake pad springs (1).
14. If installing new brake pads, discard the springs.

Installation Procedure

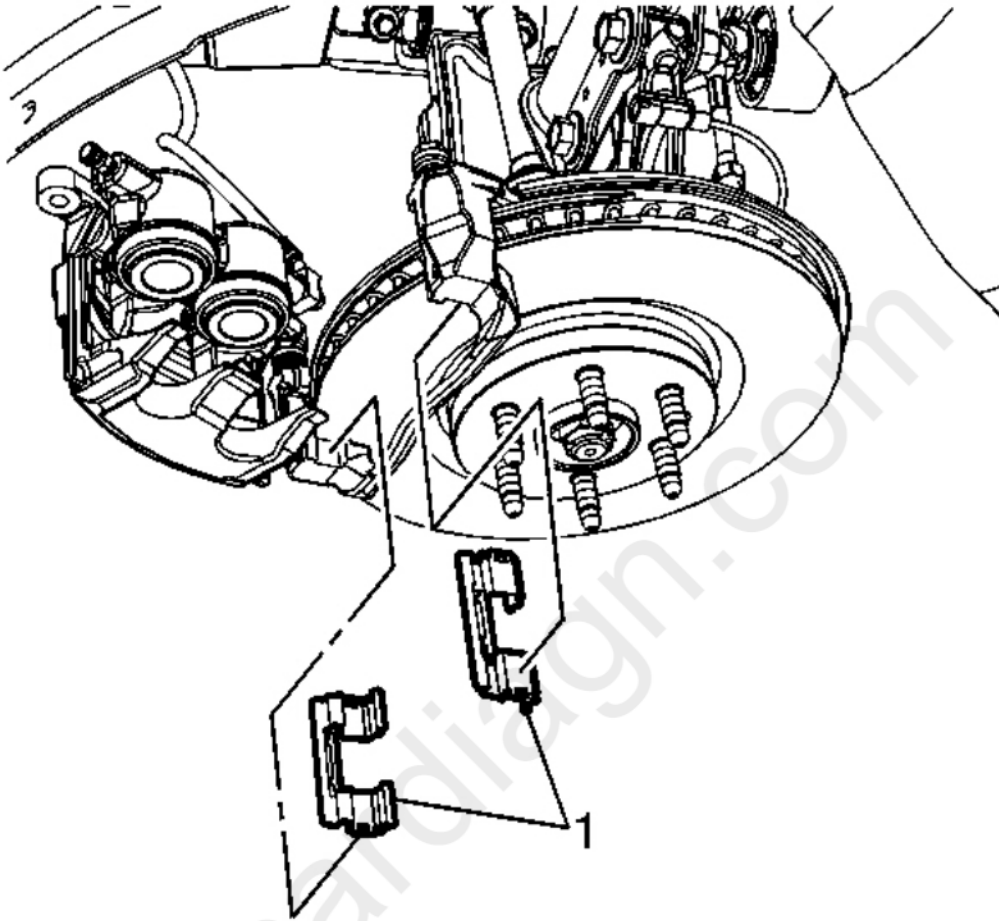


Fig. 1 : View Of Upper & Lower Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

NOTE: If installing new brake pads, install new springs.

1. Install the upper and lower brake pad springs (1).

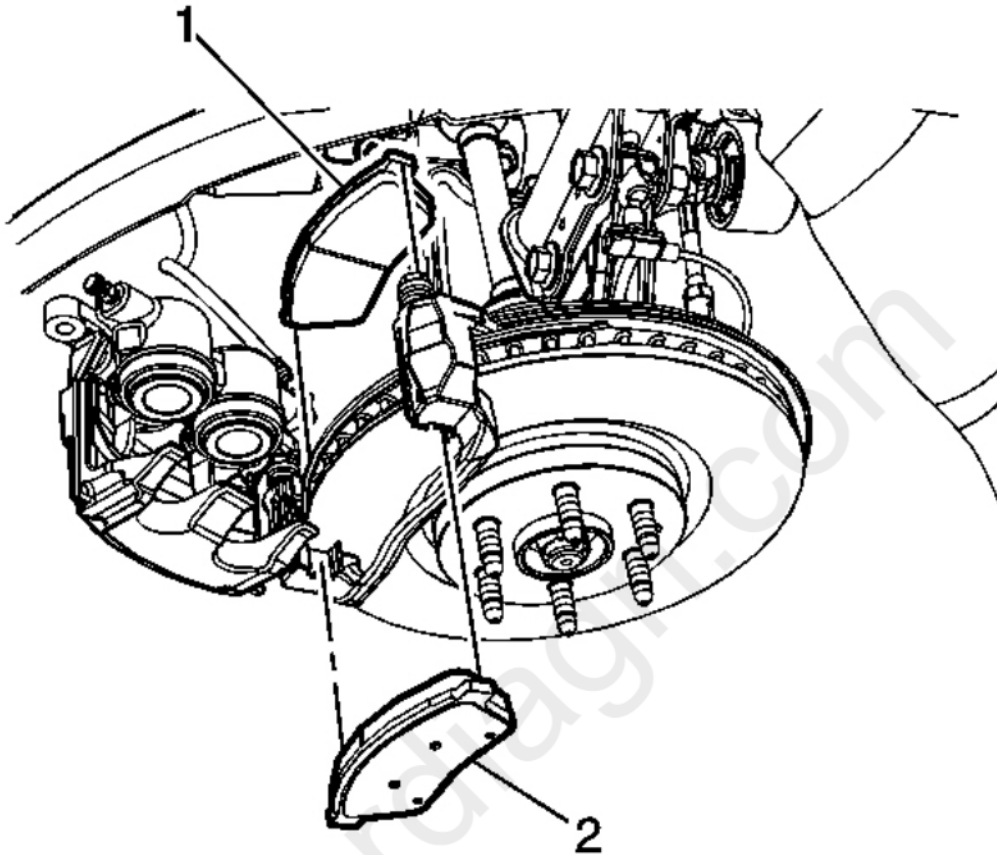


Fig. 17: Identifying Disc Brake Pads

Courtesy of GENERAL MOTORS CORP.

2. Install the inner brake pad (1) and the outer brake pad (2).

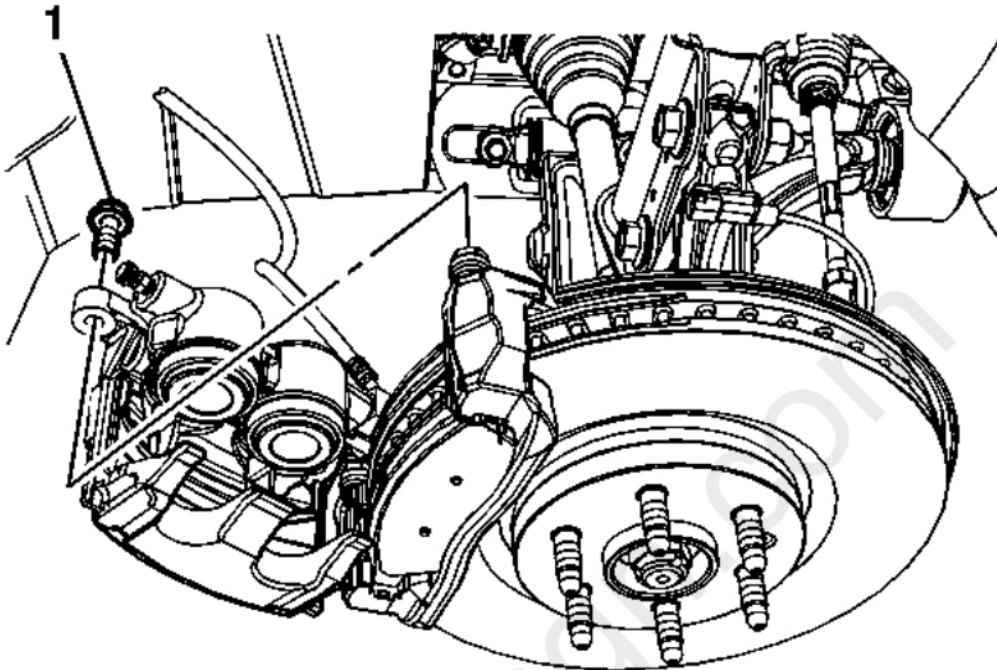


Fig. 18: Identifying Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

3. Rotate the brake caliper into position.

CAUTION: Refer to Fastener Caution .

4. Using a backup wrench to hold the brake caliper guide pin stationary, install the brake caliper guide pin bolt (1) and tighten to 60 N.m (44 lb ft).
5. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
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 master cylinder reservoir to the proper level. Refer to Master Cylinder Reservoir Filling .
10. Turnish the brake pads and rotors. Refer to Brake Pad and Rotor Burnishing.

REAR DISC BRAKE PADS REPLACEMENT

Removal Procedure

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, no brake fluid needs to be removed from the reservoir before proceeding.
3. If the brake fluid level is higher than midway between the maximum full point and the minimum allowable level, remove brake fluid to the midway point before proceeding.
4. Release the electronic park brake cable tension. Refer to **Parking Brake Cable Adjuster Disabling** .
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. Install a clamp against the outer brake pad and the rear of the brake caliper body.
8. Slowly tighten the clamp until the brake caliper piston is compressed into the brake caliper bore.

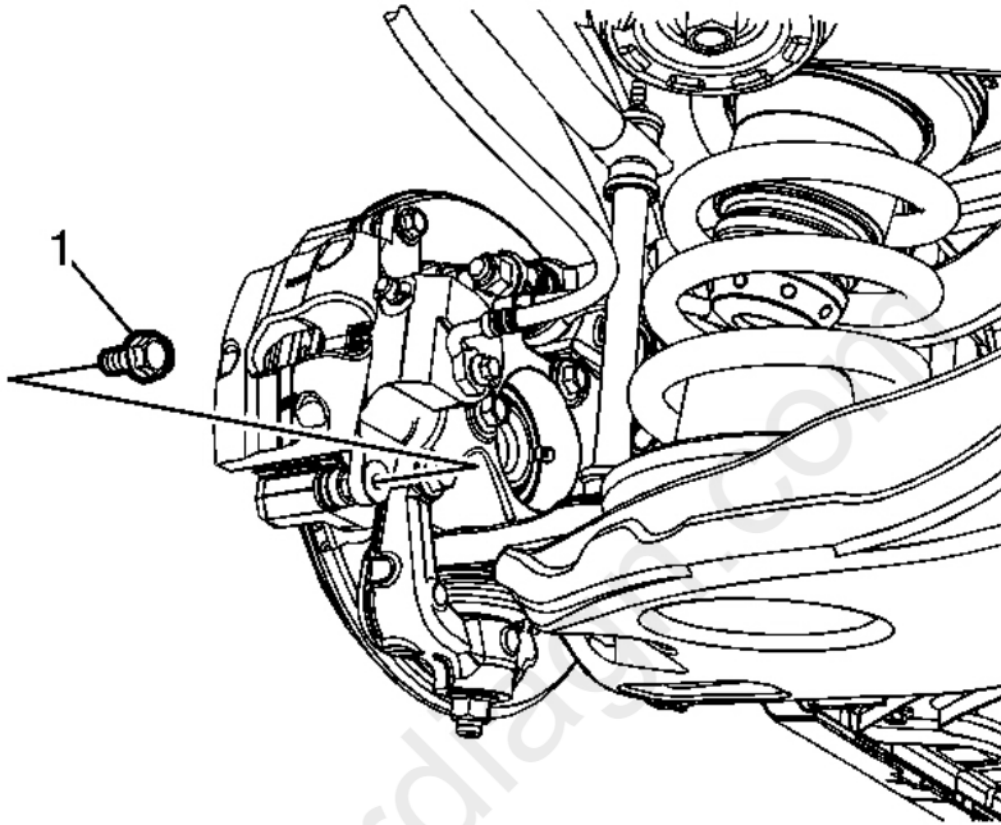


Fig. 19: Identifying Caliper Guide Pin
Courtesy of GENERAL MOTORS CORP.

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 the 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. Using a backup wrench to hold the brake caliper guide pin stationary, remove the lower brake caliper guide pin bolt (1).

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.

10. Pivot the brake caliper upward and support with heavy mechanics wire or equivalent.

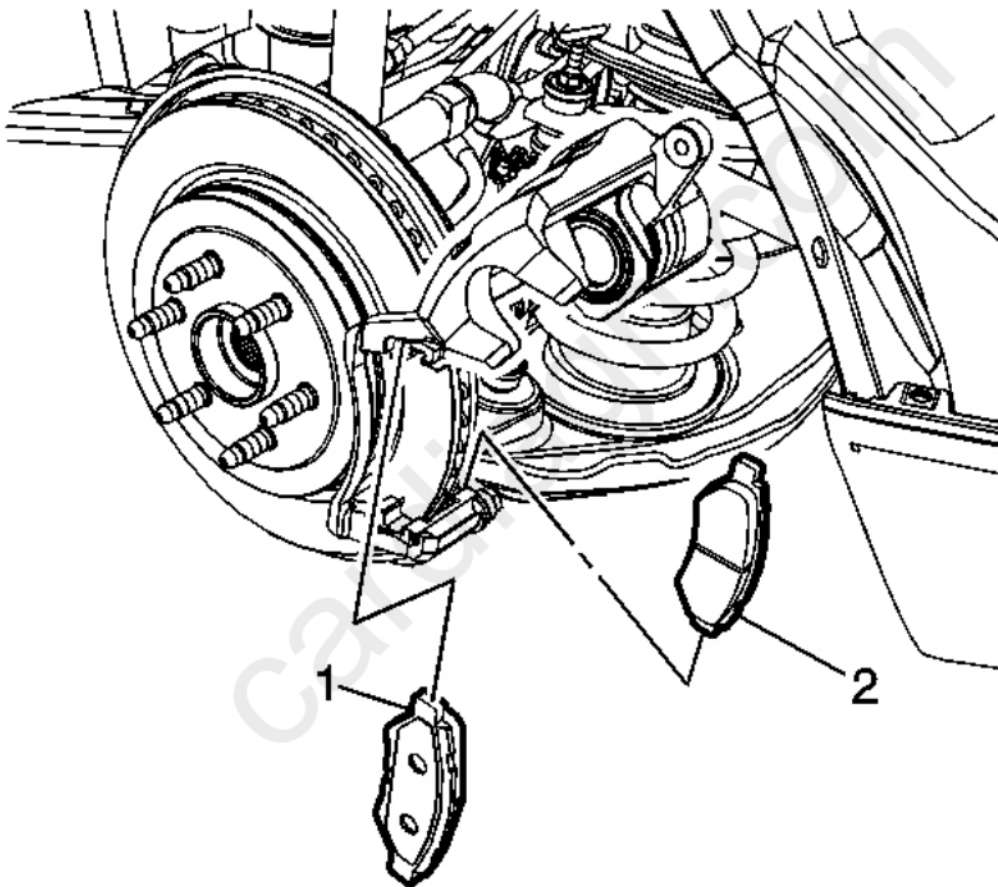


Fig. 20: View Of Inner & Outer Brake Pads
Courtesy of GENERAL MOTORS CORP.

11. Remove the outer brake pad (1).
12. Remove the inner brake pad (2).

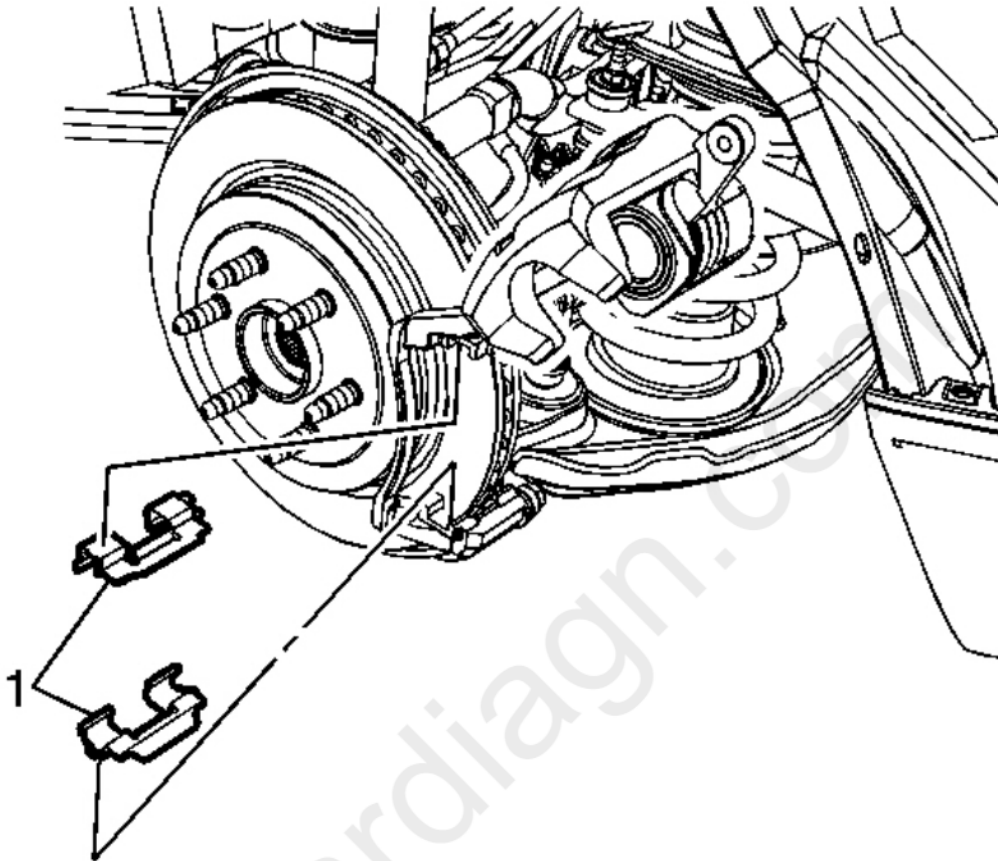


Fig. 2 : Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

13. Remove the brake pad springs (1).
14. If installing new brake pads, discard the brake pad springs.

Installation Procedure

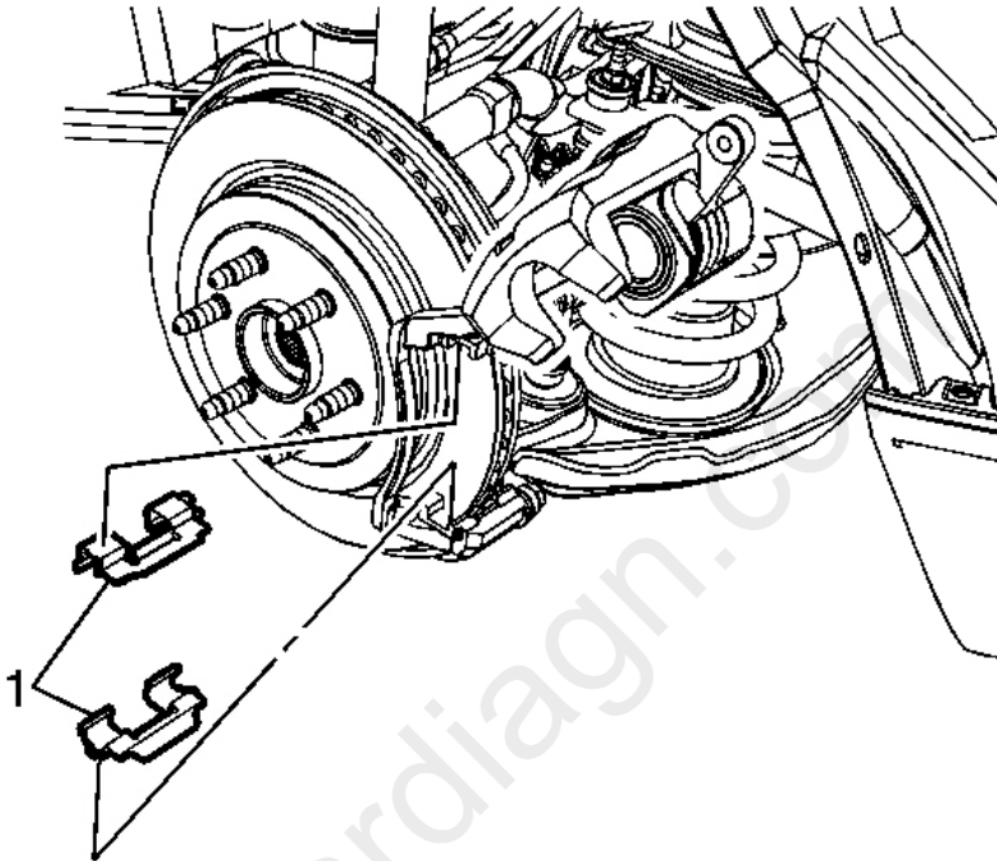


Fig. 22: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

NOTE: If installing new brake pads, install new brake pad springs.

1. Install the brake pad springs (1).

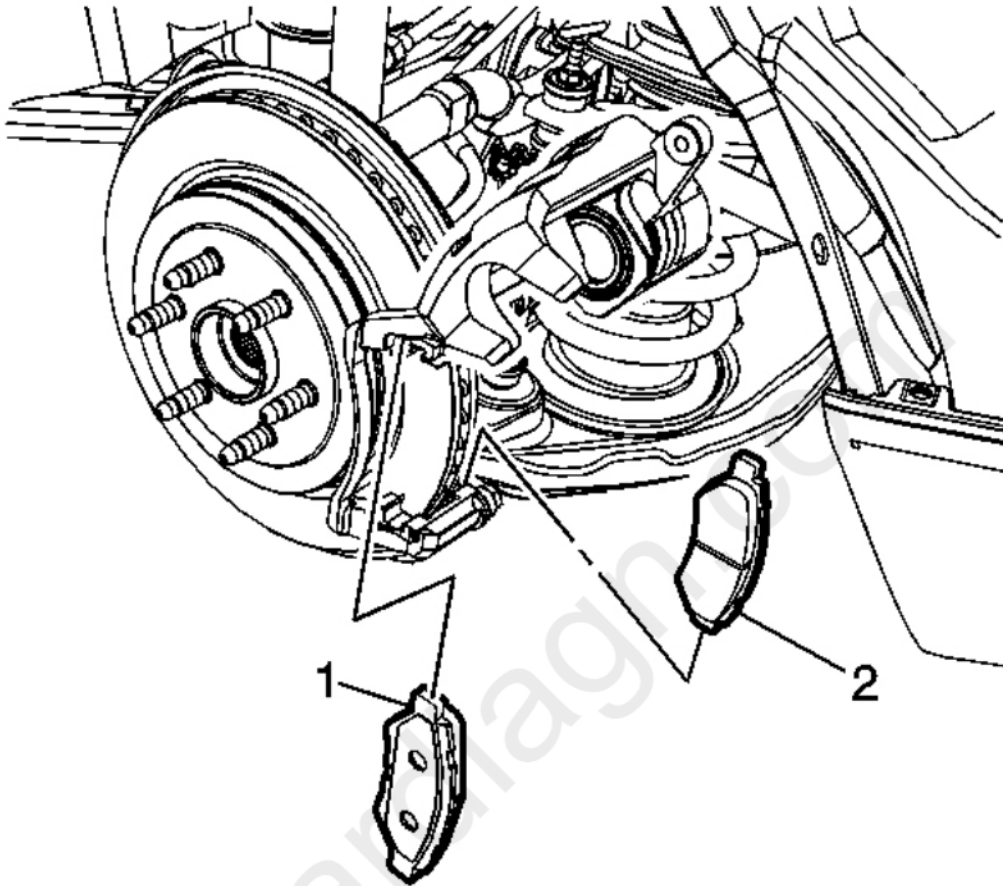


Fig. 2 : View Of Inner & Outer Brake Pads
Courtesy of GENERAL MOTORS CORP.

2. Install the outer brake pad (1).
3. Install the inner brake pad (2).
4. Rotate the brake caliper into position.

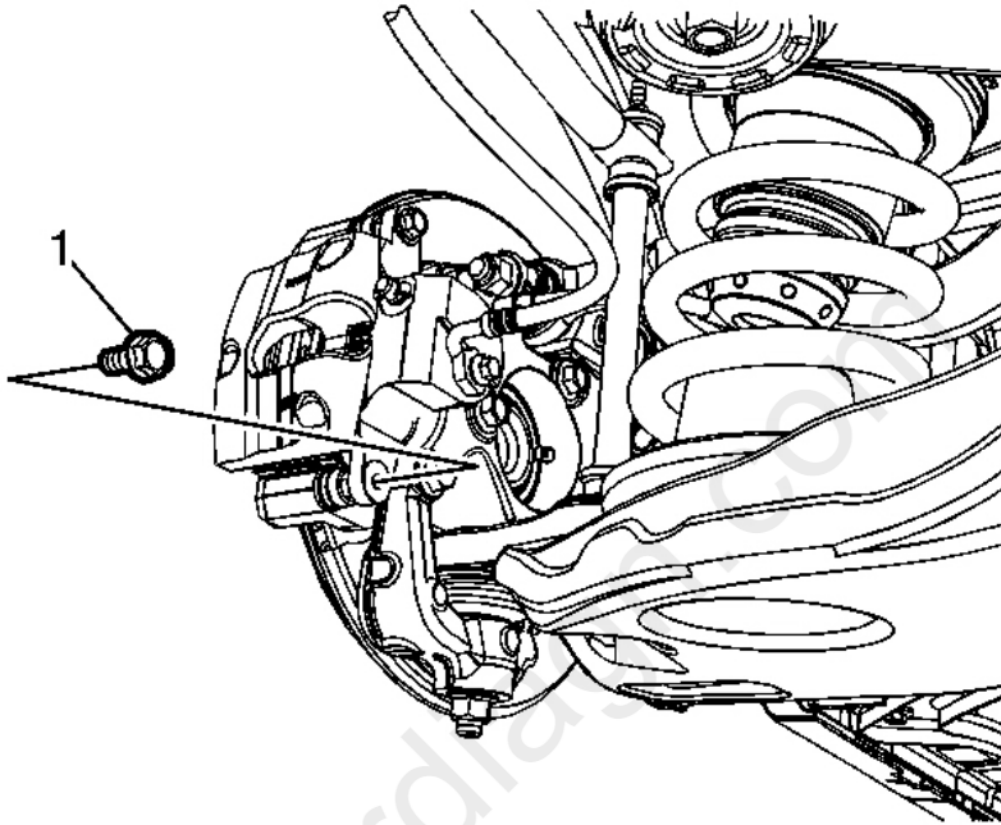


Fig. 2 : Identifying Caliper Guide Pin
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

5. Using a backup wrench to hold the brake caliper guide pin stationary, install the brake caliper guide pin bolt (1) and tighten to 60 N.m (44 lb ft).
6. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
7. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
8. Slowly release the brake pedal.
9. Wait 15 seconds, then repeat steps 7 8 until a firm brake pedal apply is obtained. This will properly seat the brake caliper pistons and brake pads.
10. Fill the brake master cylinder reservoir to the proper level. Refer to Master Cylinder Reservoir Filling .
11. Set the electronic park brake cable tension. Refer to Parking Brake Cable Adjuster Enabling .

12. 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

Removal Procedure

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

WARNING: Refer to **Brake Fluid Irritant 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** .

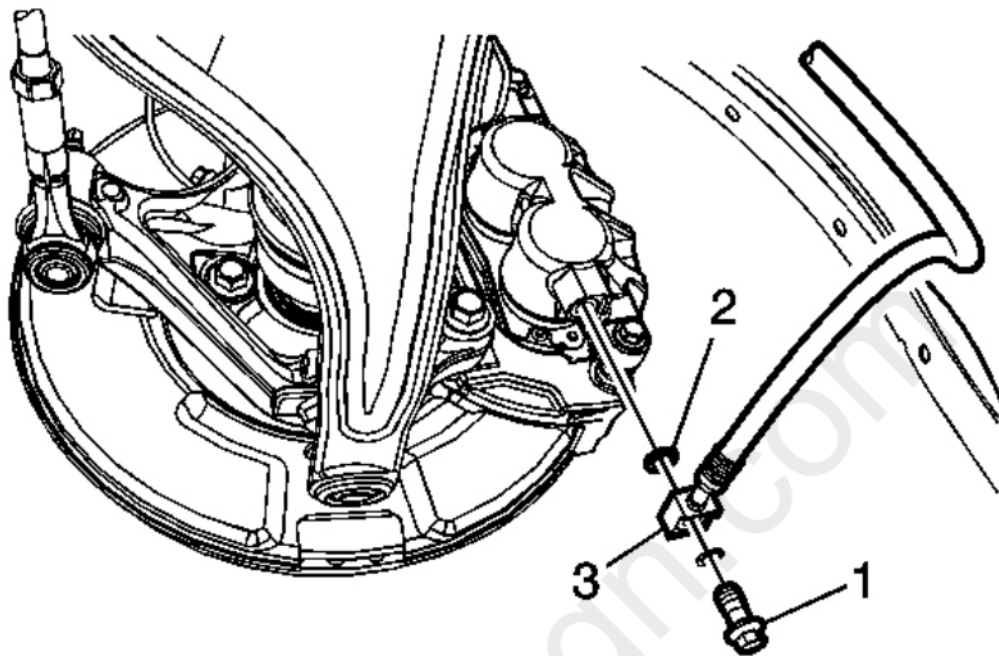


Fig. 25: View Of Brake Hose Fitting Bolt
Courtesy of GENERAL MOTORS CORP.

3. Remove the brake hose fitting bolt (1).

NOTE: Do not reuse the brake hose fitting gaskets.

4. Remove the 2 brake hose fitting gaskets (2) from the brake hose fitting (3) and discard the gaskets.
5. Cap the brake hose fitting to prevent brake fluid loss and contamination.

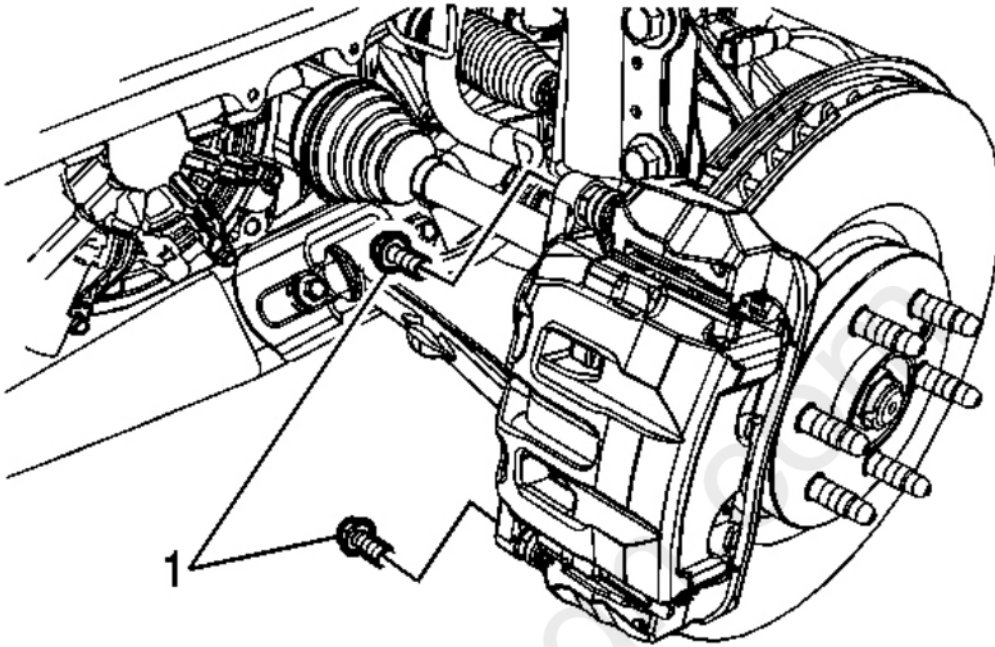


Fig. 26: Identifying Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

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 the 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.

6. Using a backup wrench to hold the brake caliper guide pins stationary, remove the brake caliper guide pin bolts (1).
7. Remove the brake caliper.

Installation Procedure

1. Install the brake caliper to the caliper bracket.

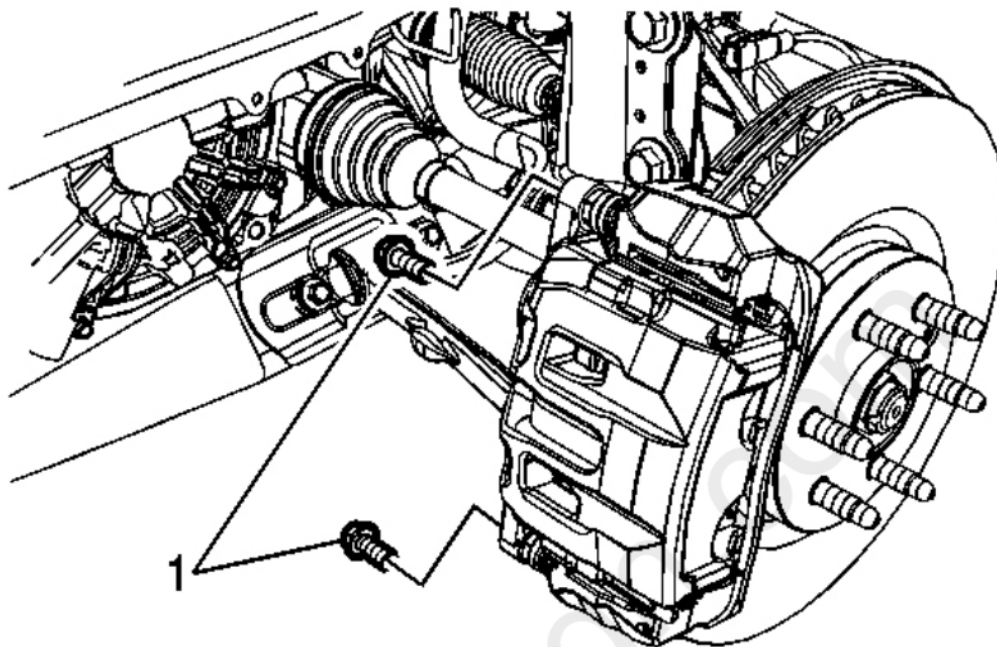


Fig. 27: Identifying Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

2. Using a backup wrench to hold the brake caliper guide pins stationary, install the brake caliper guide pin bolts (1) and tighten to 60 .m (44 lb ft).

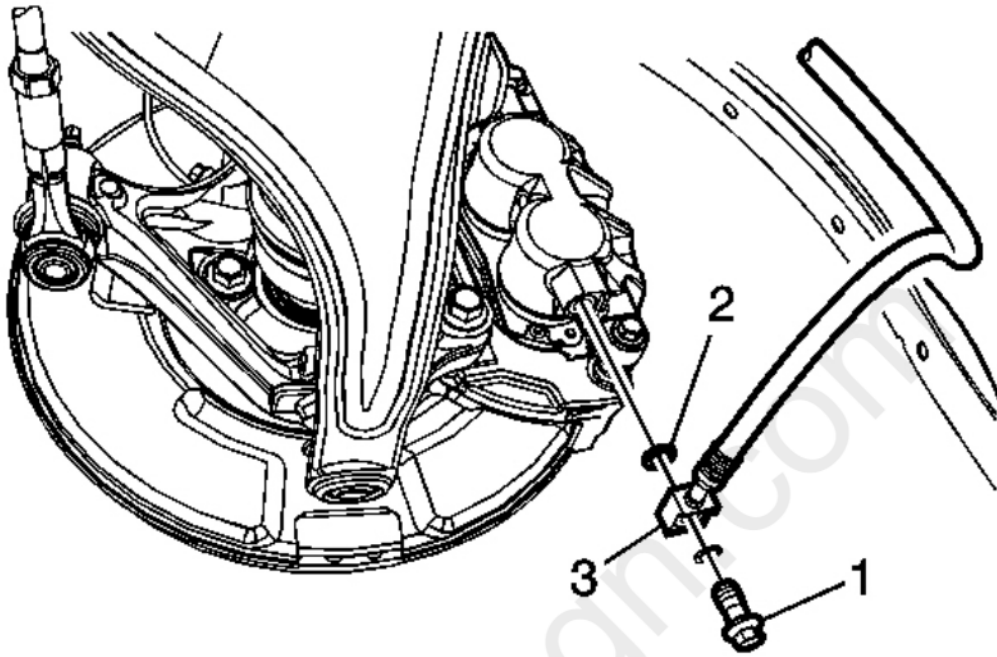


Fig. 28: View Of Brake Hose Fitting Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: Install new brake hose fitting gaskets.

3. Assemble the brake hose fitting bolt (1) and 2 new brake hose fitting gaskets (2) to the brake hose fitting (3).
4. Install the brake hose assembly to the brake caliper and tighten the fitting bolt to 40 .m (30 lb ft).
5. Bleed the hydraulic brake system. Refer to Hydraulic Brake System Bleeding (Manual) or Hydraulic Brake System Bleeding (Pressure).
6. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.

REAR BRAKE CALIPER REPLACEMENT

Removal Procedure

WARNING: Refer to Brake Dust Warning.

WARNING: Refer to Brake Fluid Irritant Warning.

1. Release the electronic park brake cable tension. Refer to Parking Brake Cable Adjuster Disabling .
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 .

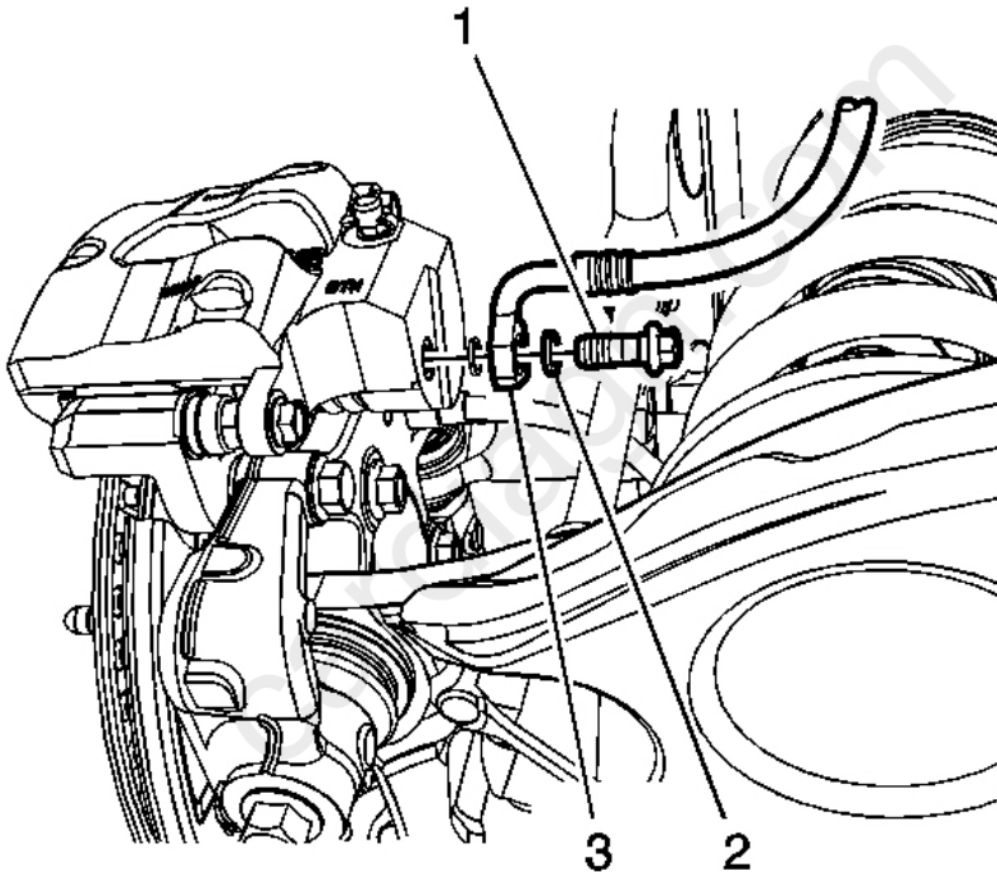


Fig. 29: Identifying Brake Hose Fitting Bolt & Caliper
Courtesy of GENERAL MOTORS CORP.

4. Remove the brake hose fitting bolt (1).

NOTE: Do not reuse the brake hose fitting gaskets.

5. Remove the brake hose fitting gaskets (2) and the brake hose (3).
6. Discard the brake hose fitting gaskets.

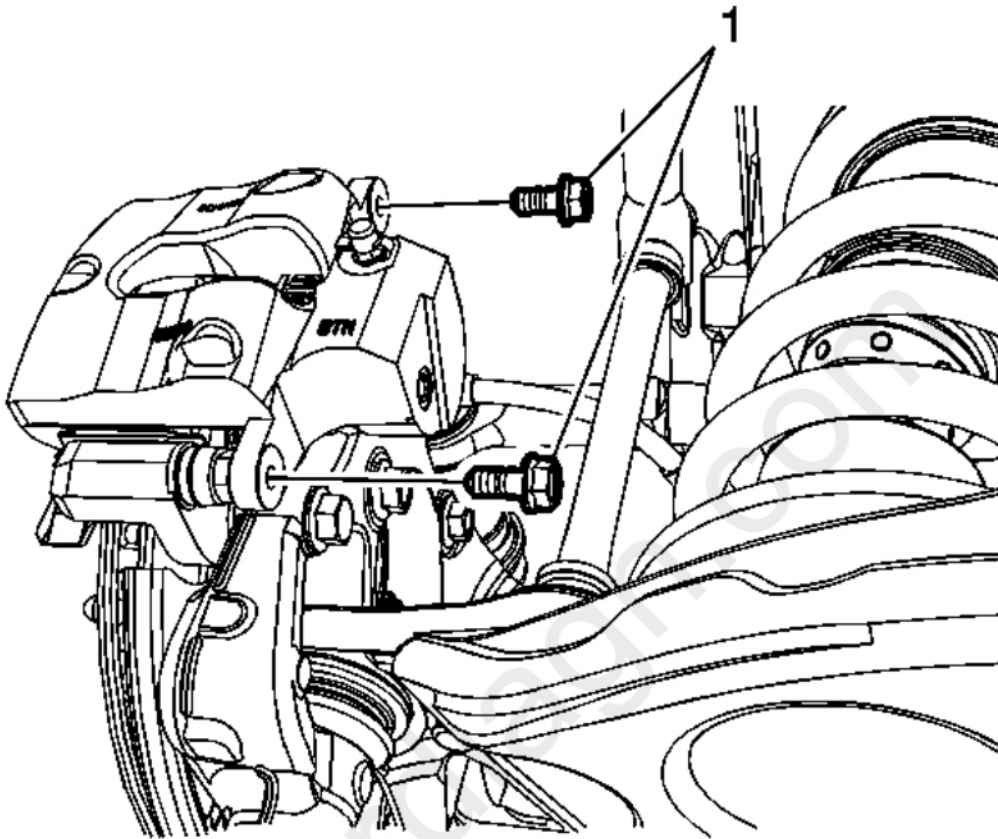


Fig. 3 : Locating Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

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 the 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.

7. Using a backup wrench to hold the brake caliper guide pins stationary, remove the brake caliper guide pin bolts (1).

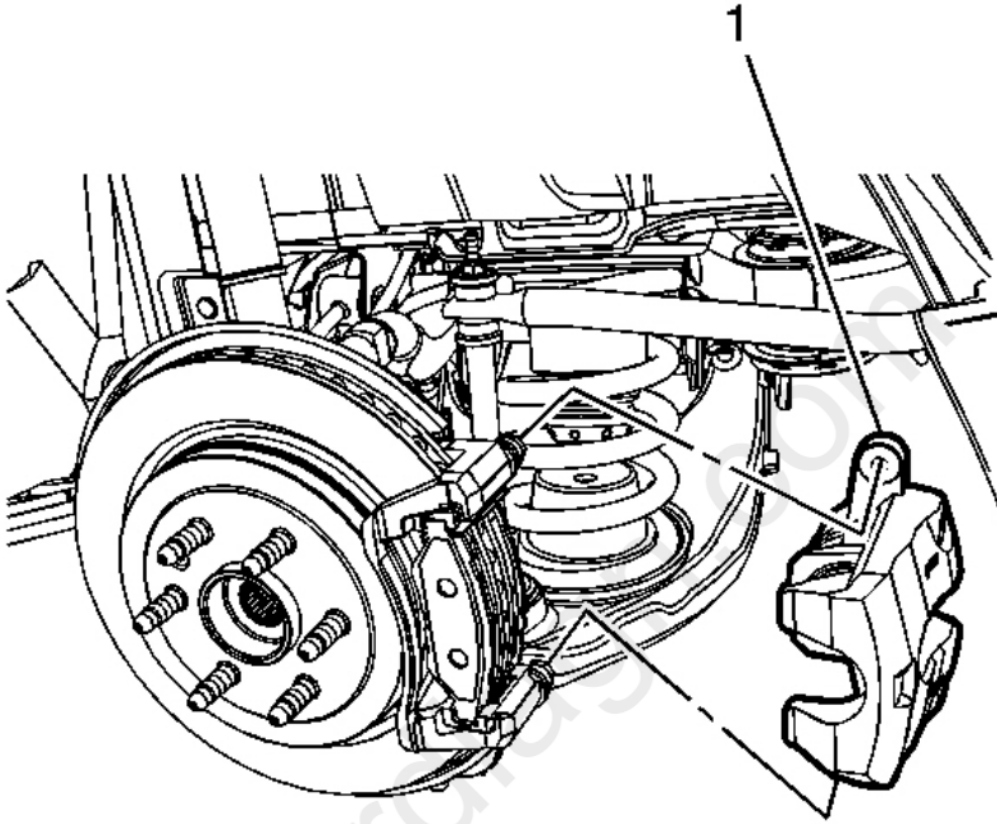


Fig. 3 : Vie Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake caliper (1).

Installation Procedure

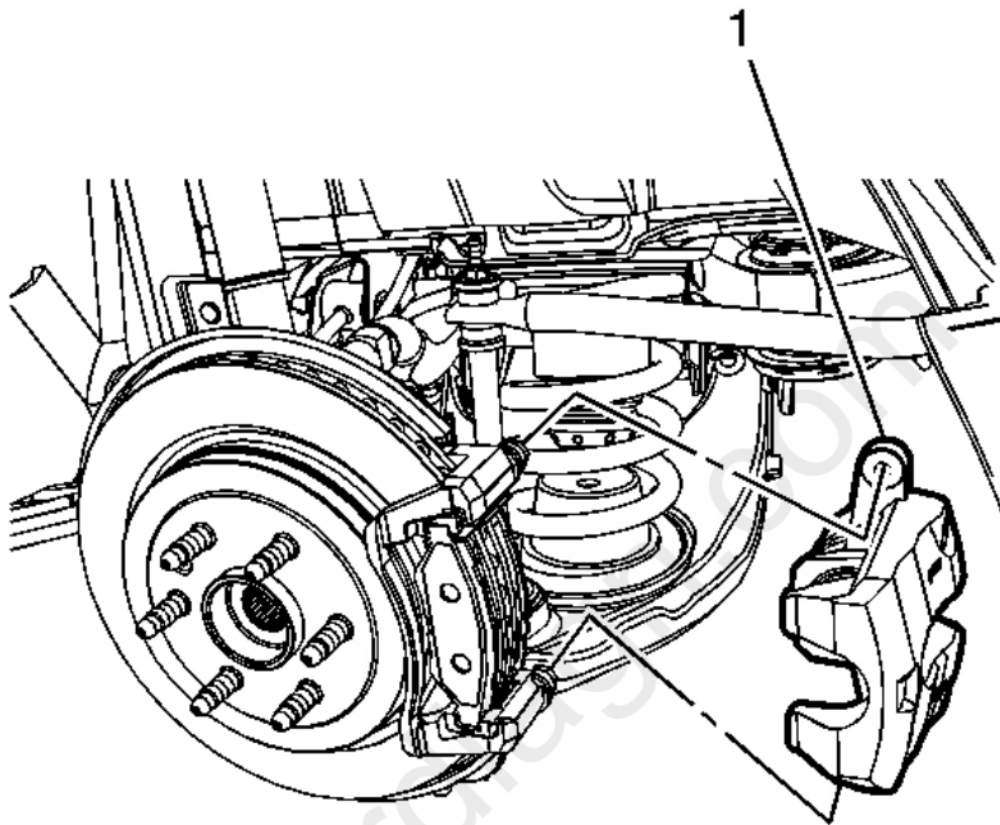


Fig. 3 : Vie Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper (1).

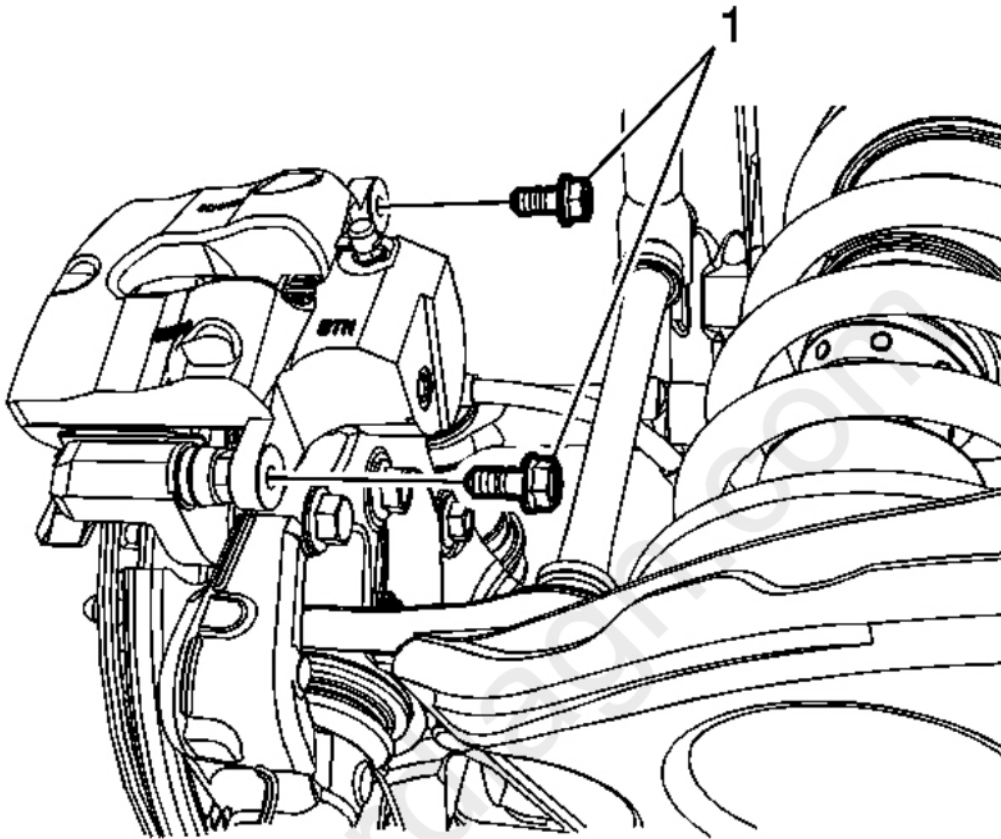


Fig. 33: Locating Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

2. Using a backup wrench to hold the brake caliper guide pins stationary, install the brake caliper guide pin bolts (1) and tighten to 60 N.m (44 lb ft).

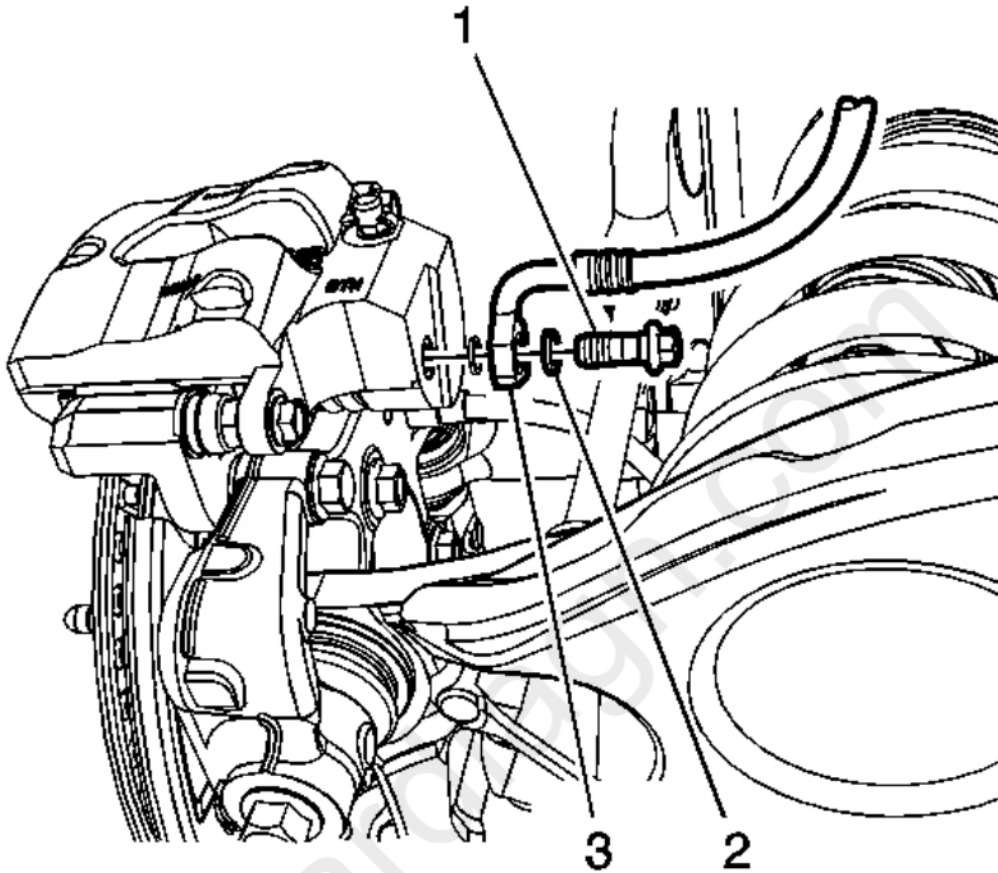


Fig. 3 : Identifying Brake Hose Fitting Bolt & Caliper
Courtesy of GENERAL MOTORS CORP.

3. Assemble the brake hose fitting bolt (1) and 2 new brake hose fitting gaskets (2) to the brake hose (3).
4. Install the brake hose assembly to the caliper and tighten the fitting bolt to 40 N.m (30 lb ft).
5. Bleed the hydraulic brake system. Refer to Hydraulic Brake System Bleeding Manual or Hydraulic Brake System Bleeding Pressure.
6. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.
7. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
8. Slowly release the brake pedal.
9. Wait 15 seconds, then repeat steps 7 8 until a firm brake pedal apply is obtained. This will properly seat the brake caliper pistons and brake pads.
10. Fill the brake master cylinder reservoir to the proper level. Refer to Master Cylinder Reservoir Filling.
11. Set the electronic park brake cable tension. Refer to Parking Brake Cable Adjuster Enabling.

REAR BRAKE CALIPER OVERHAUL

WARNING: Refer to Brake Fluid Irritant Warning .

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

Disassembly Procedure

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

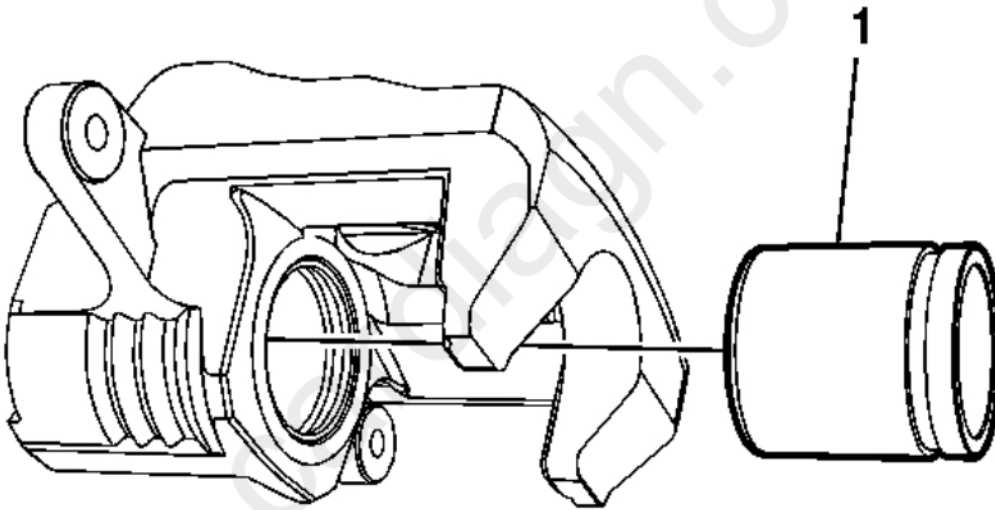


Fig. 35: Identifying Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

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.

2. Remove the brake caliper piston (1) from the caliper bore by directing low pressure compressed air into the caliper bore through the brake hose inlet port.

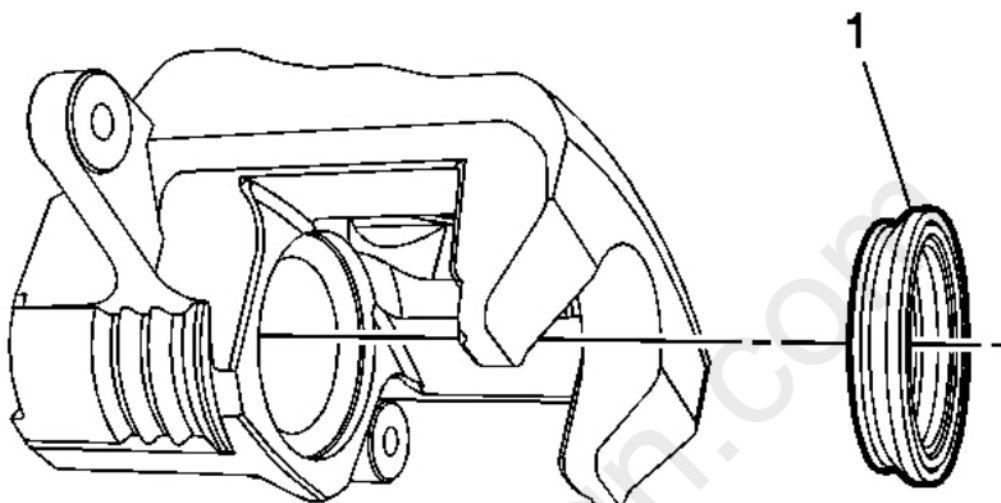


Fig. 36: Identifying Brake Caliper Piston Dust Boot Seal
Courtesy of GENERAL MOTORS CORP.

3. Using a small wooden or plastic tool, remove the brake caliper piston dust boot seal (1) from the brake caliper housing.

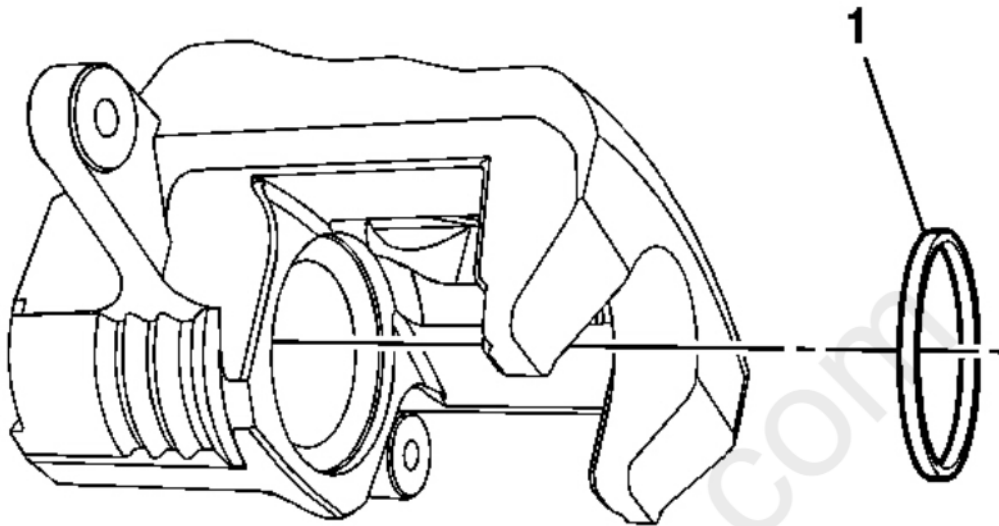


Fig. 37: Identifying Brake Caliper Piston Seal
Courtesy of GENERAL MOTORS CORP.

4. Using a small wooden or plastic tool, remove the brake caliper piston seal (1) from the brake caliper housing.

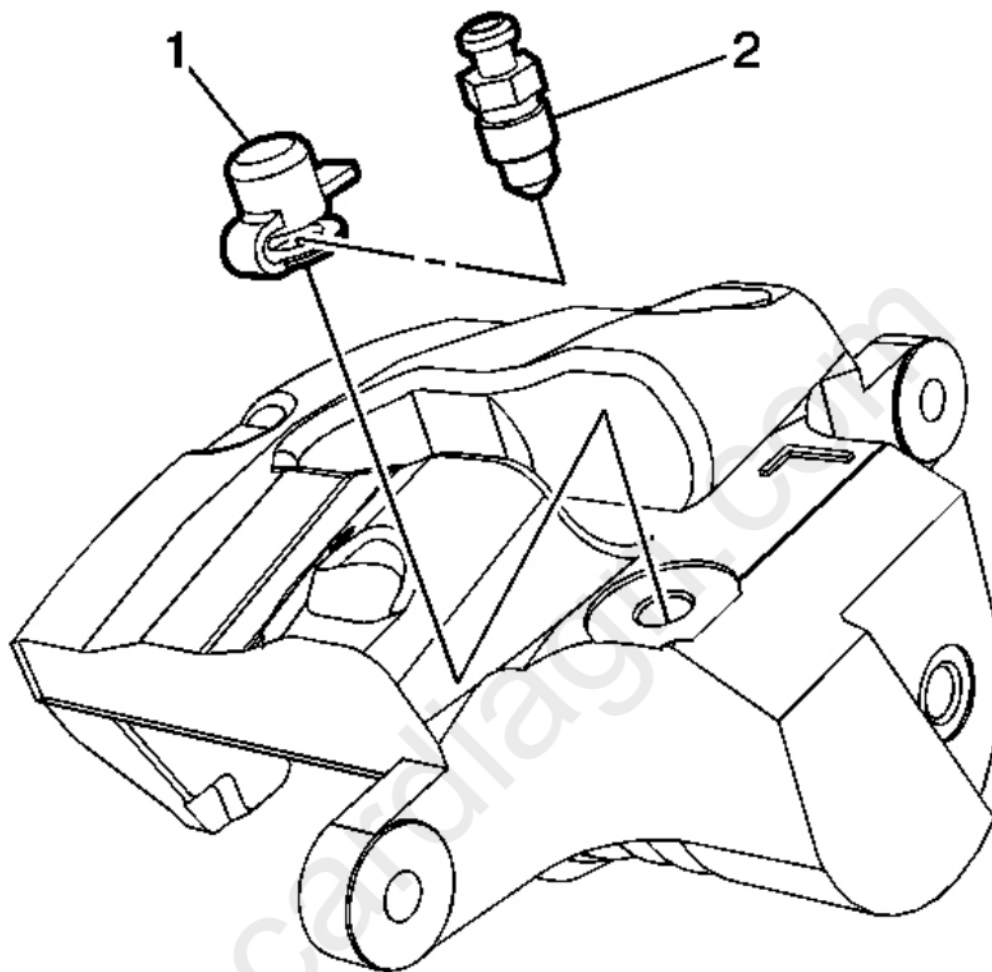


Fig. 38: Identifying Brake Caliper Bleeder Valve Cap & Bleeder Valve
Courtesy of GENERAL MOTORS CORP.

5. Remove the brake caliper bleeder valve cap (1) and bleeder valve (2).
6. Clean the brake caliper piston bore with denatured alcohol, or equivalent.
7. Inspect the caliper bore for cracks, scoring, pitting and excessive corrosion.
 - . If light corrosion is present in the caliper bore, remove the corrosion with emery cloth, or equivalent.
9. If excessive corrosion exists that cannot be removed, replace the brake caliper.

Assembly Procedure

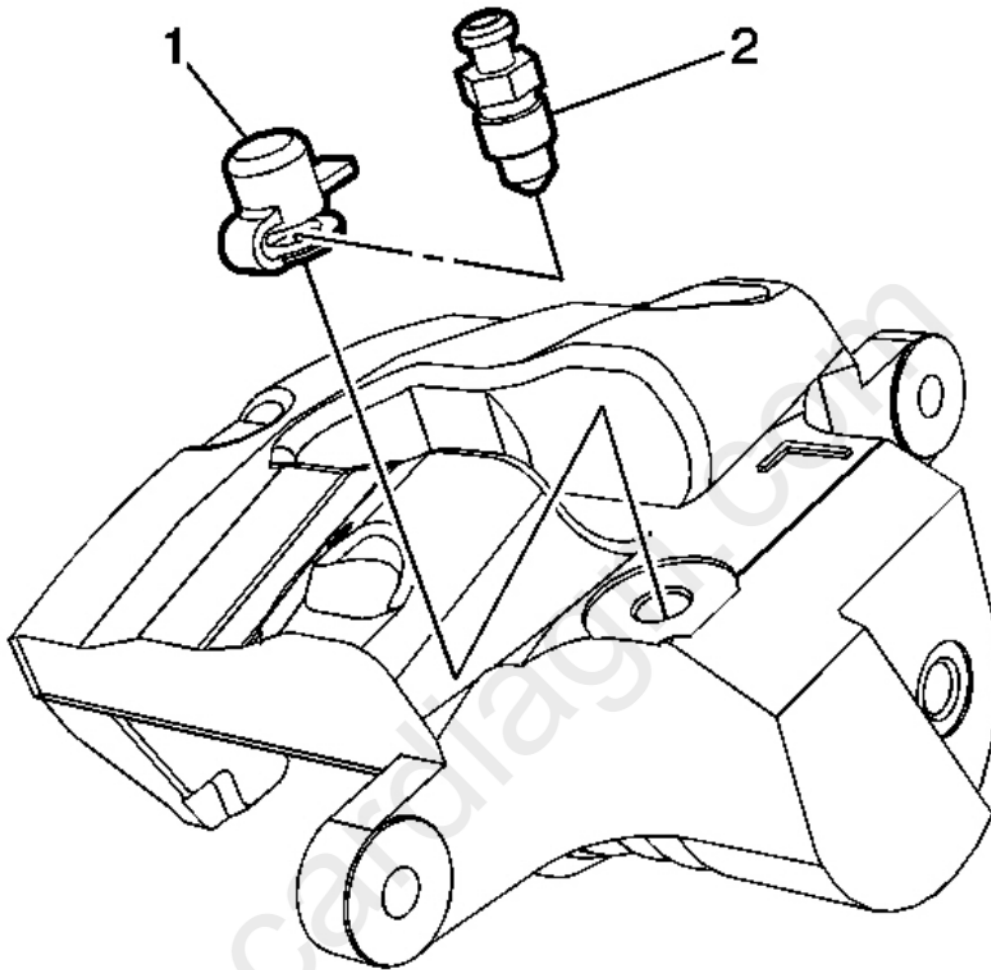


Fig. 39: Identifying Brake Caliper Bleeder Valve Cap & Bleeder Valve
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

1. Install the brake caliper bleeder valve cap (1) and bleeder valve (2) and tighten to 17 .m (13 lb ft).

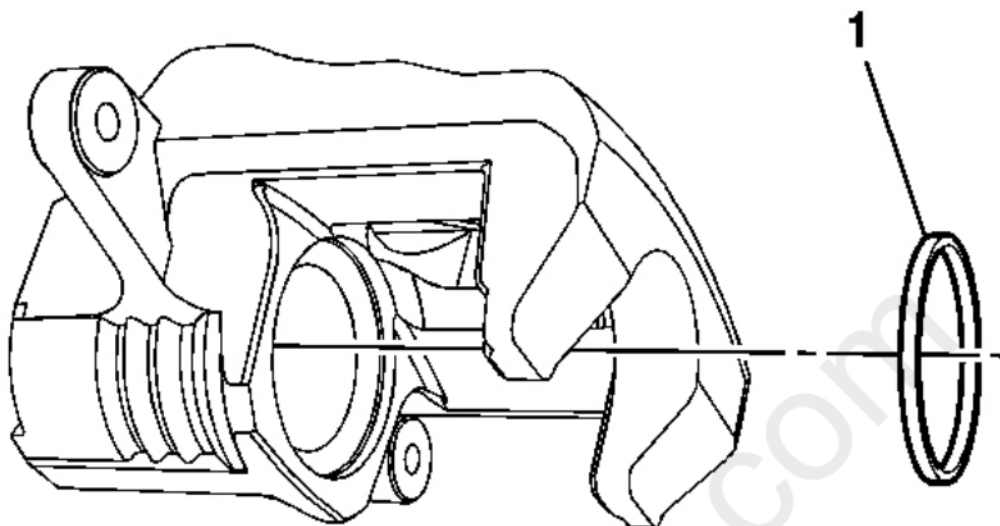


Fig. 40: Identifying Brake Caliper Piston Seal
Courtesy of GENERAL MOTORS CORP.

2. Lubricate the brake caliper piston seal with approved brake fluid from a clean, sealed brake fluid container.
3. Install the brake caliper piston seal (1) into the brake caliper housing groove.
4. Ensure the brake caliper piston seal is properly seated in the caliper housing groove and is not distorted.

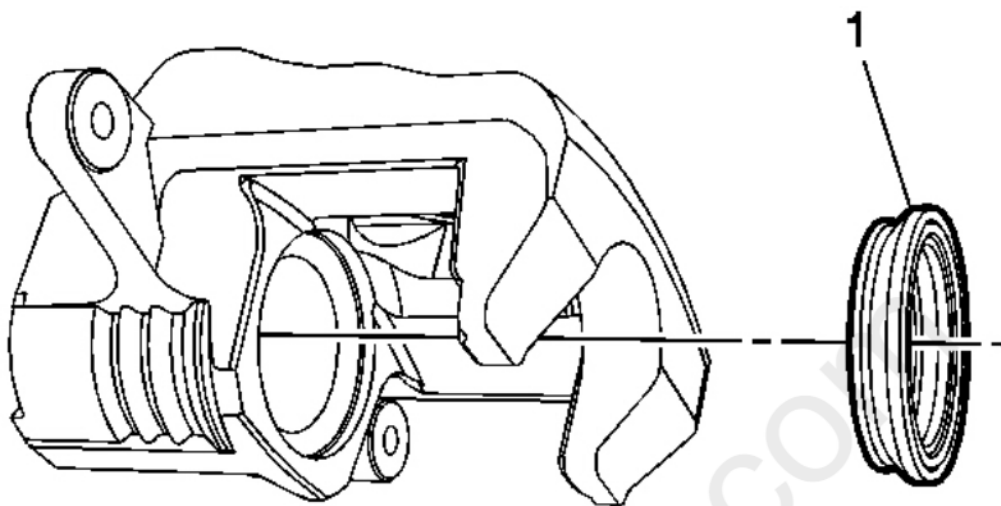


Fig. 41: Identifying Brake Caliper Piston Dust Boot Seal
Courtesy of GENERAL MOTORS CORP.

5. Install the brake caliper piston dust boot seal (1) into the brake caliper housing.
6. Lightly lubricate the brake caliper piston dust boot seal lip with approved brake fluid from a clean, sealed brake fluid container.
7. Lightly lubricate the brake caliper piston with approved brake fluid from a clean, sealed brake fluid container.

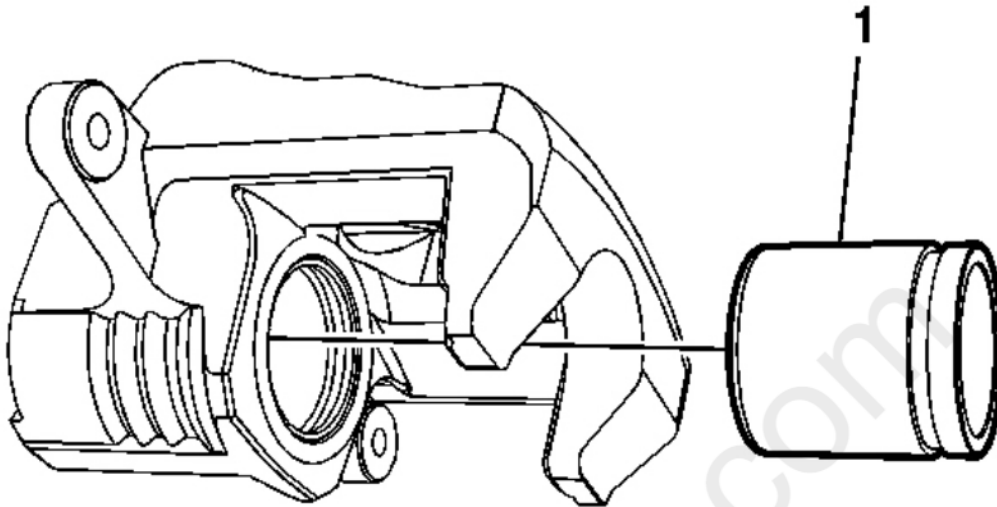


Fig. 42: Identifying Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

8. Place the brake caliper piston (1) in the brake caliper housing bore and press the brake caliper piston squarely into the brake caliper.
9. Install the brake caliper. Refer to Rear Brake Caliper Replacement.

FRONT BRAKE CALIPER HARDWARE REPLACEMENT

Removal Procedure

WARNING: Refer to 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 .

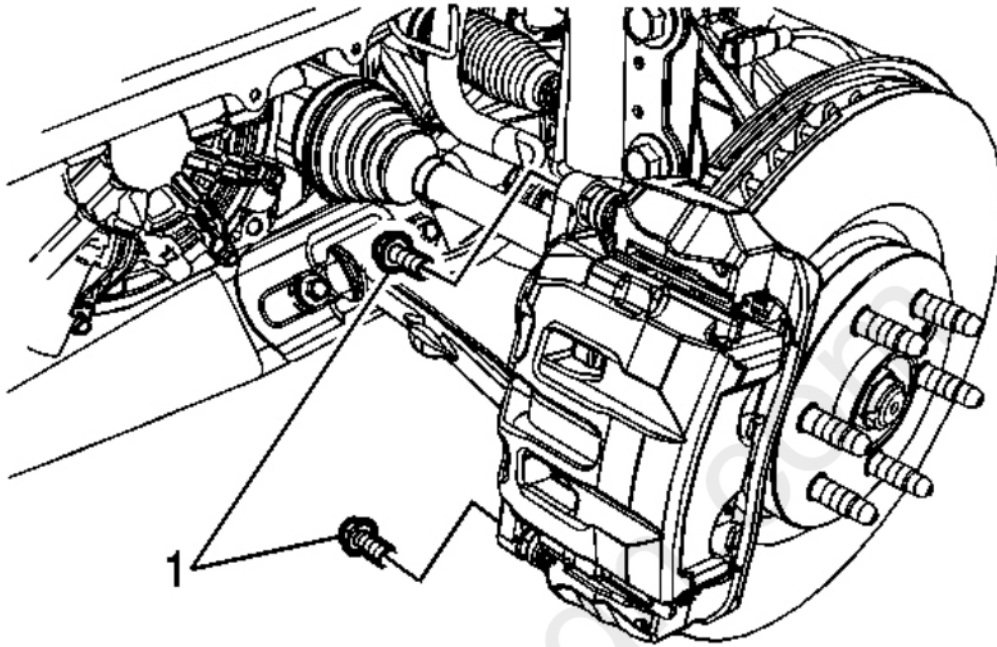


Fig. 43: Identifying Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

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 the 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.

3. Using a backup wrench to hold the brake caliper guide pins stationary, remove the brake caliper guide pin bolts (1).

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.

4. Without disconnecting the brake caliper hose, remove the brake caliper and support with heavy mechanics wire or equivalent.

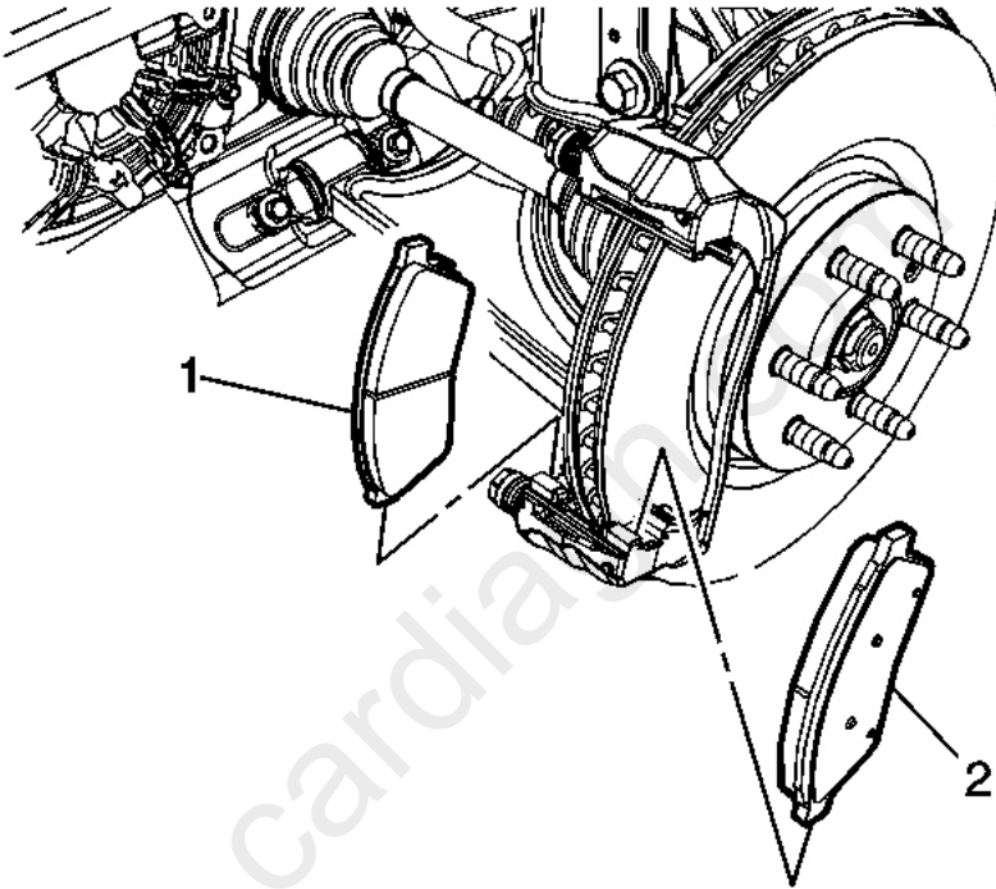


Fig. 44: Identifying Inner & Outer Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

5. Remove the inner brake pad (1).
6. Remove the outer brake pad (2).

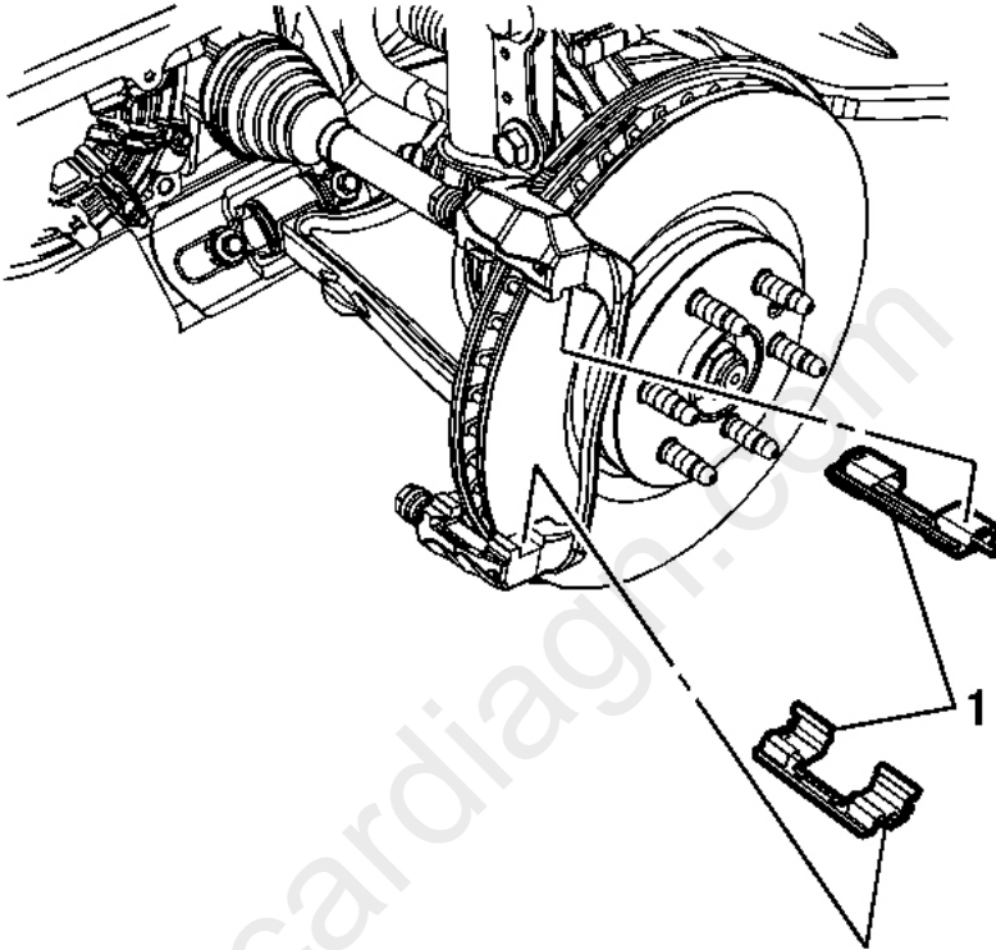


Fig. 45: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake pad springs (1).

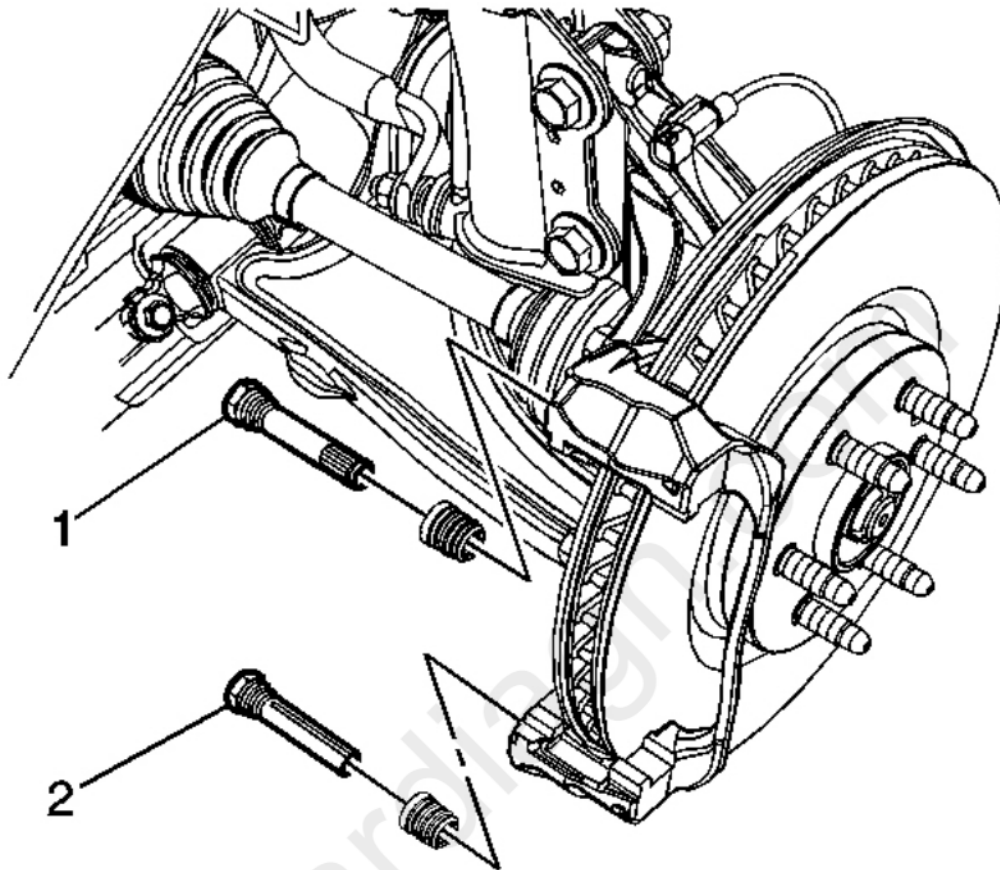


Fig. 46: Identifying Upper & Lower Brake Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

NOTE: The upper brake caliper guide pin is equipped with a bushing and is not interchangeable with the lower brake caliper guide pin.

- . Remove the upper brake caliper guide pin (1) and seal.
9. Remove the lower brake caliper guide pin (2) and seal.
10. Inspect the front disc brake hardware for damage and replace, if necessary. Refer to **Front Disc Brake Mounting and Hardware Inspection**.

Installation Procedure

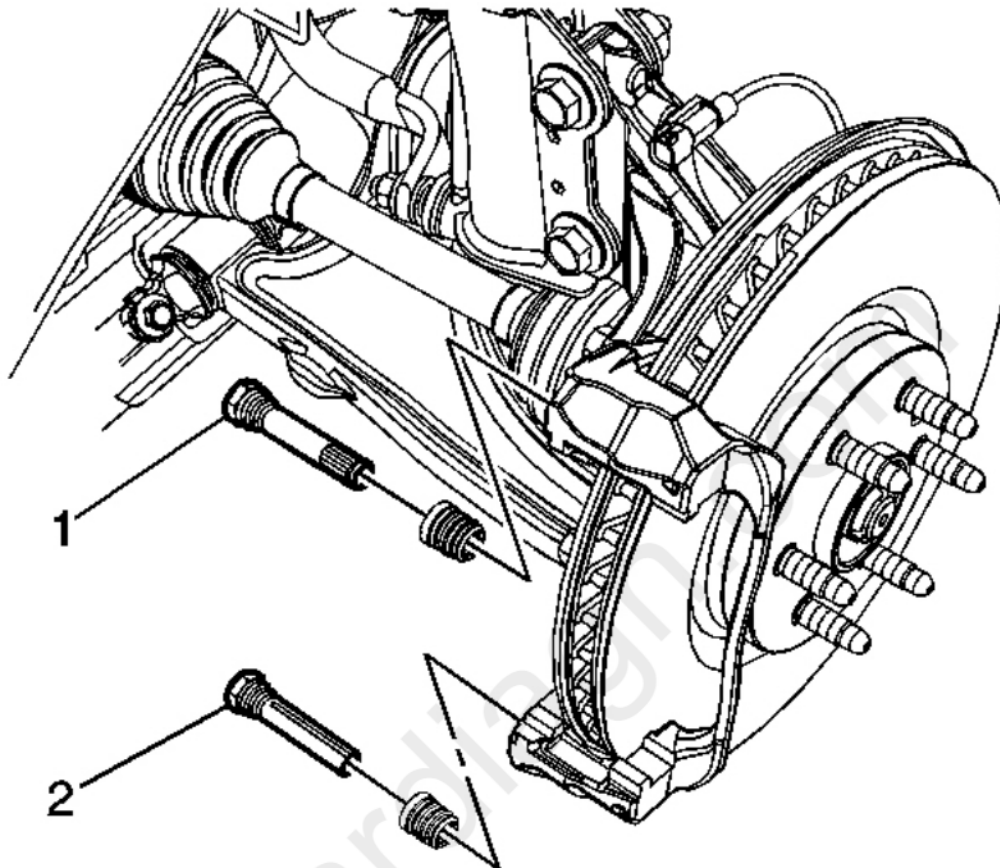


Fig. 47: Identifying Upper & Lower Brake Caliper Guide Pins
 Courtesy of GENERAL MOTORS CORP.

1. Apply a light coat of high temperature silicone brake lubricant to the brake caliper guide pins.
2. Assemble the brake caliper guide pin seals to the brake caliper guide pins.
3. Ensure the lip of the seal is fully seated in the groove of the brake caliper guide pin.

NOTE: The upper brake caliper guide pin is equipped with a bushing and is not interchangeable with the lower brake caliper guide pin.

4. Install the upper brake caliper guide pin (1) and seal assembly to the brake caliper bracket.
5. Ensure the lip of the seal is fully seated in the groove of the brake caliper bracket.
6. Install the lower brake caliper guide pin (2) and seal assembly to the brake caliper bracket.
7. Ensure the lip of the seal is fully seated in the groove of the brake caliper bracket.

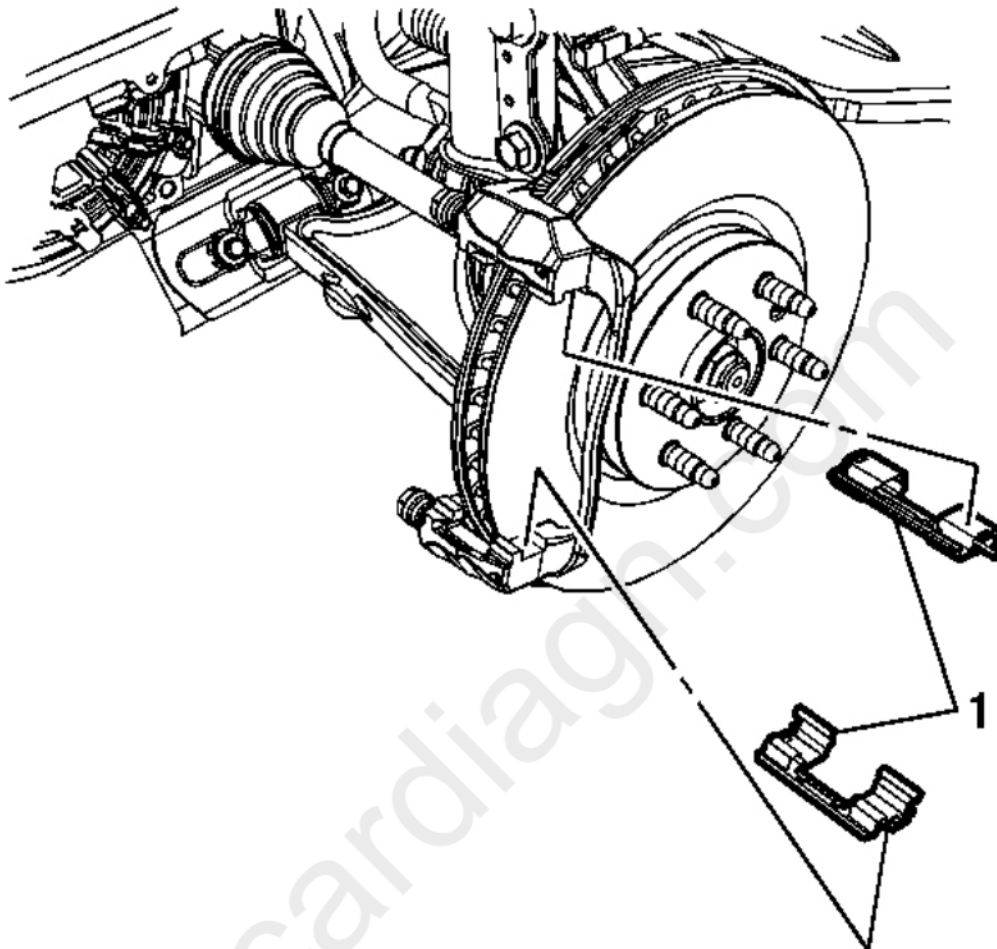


Fig. 48: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

- Install the brake pad springs (1).

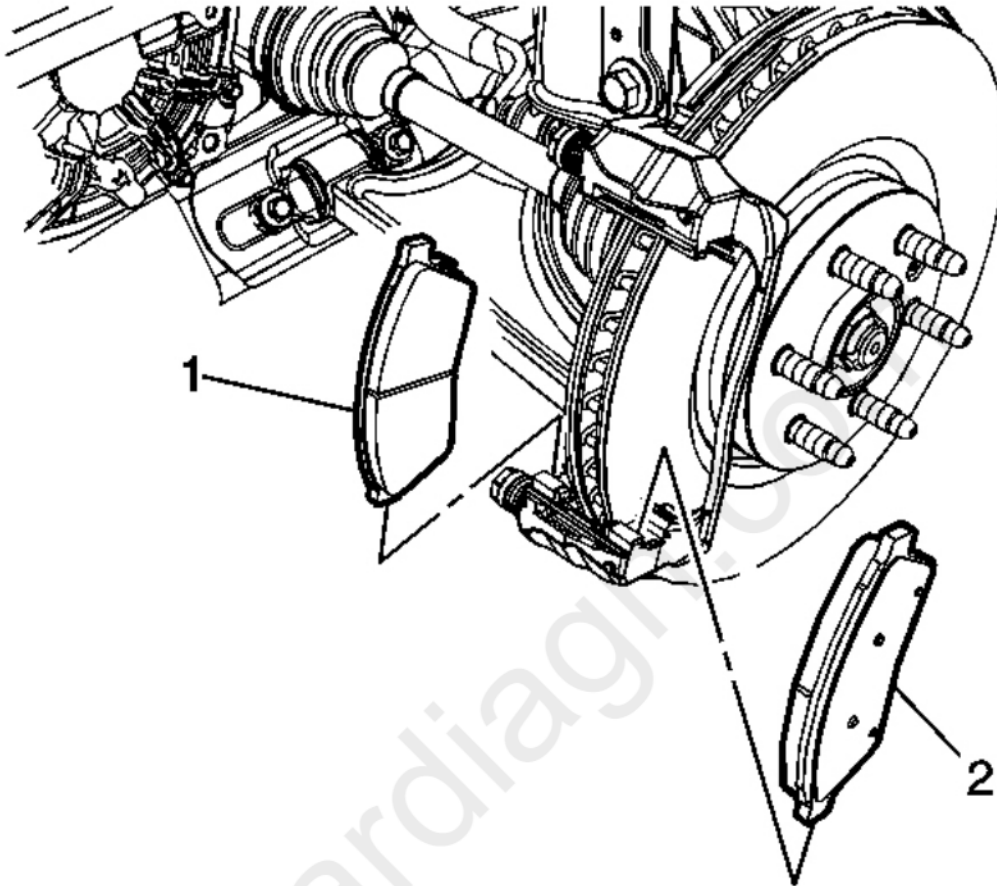


Fig. 49: Identifying Inner & Outer Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

9. Install the inner brake pad (1).
10. Install the outer brake pad (2).

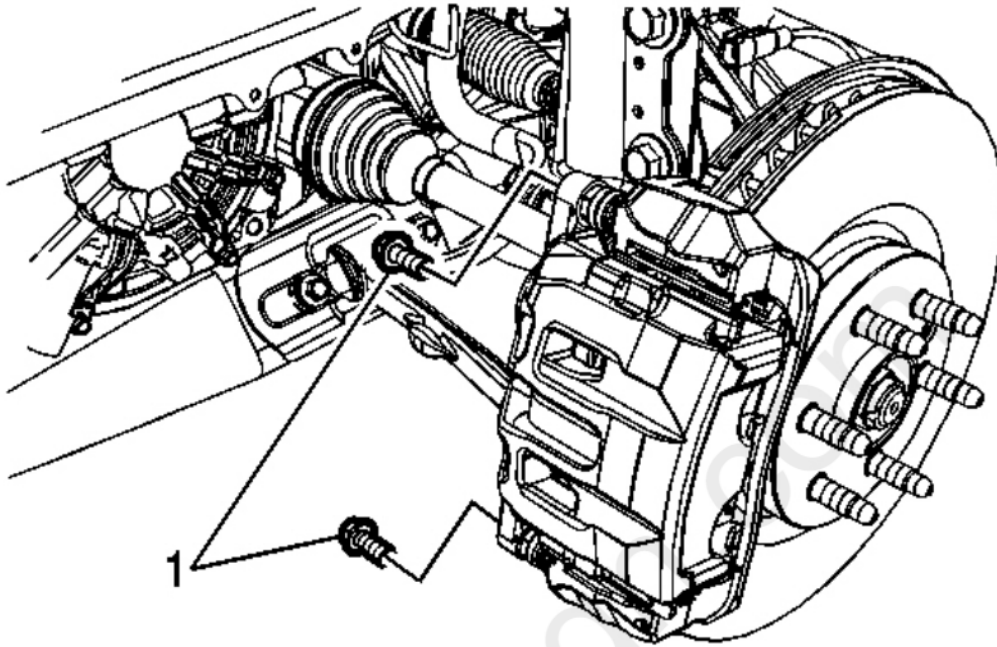


Fig. 50: Identifying Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

11. Position the brake caliper to the bracket.

CAUTION: Refer to Fastener Caution .

12. Using a backup wrench to hold the brake caliper guide pins stationary, install and tighten the guide pin bolts (1) to 60 N.m (44 lb ft).
13. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .

REAR BRAKE CALIPER HARDWARE REPLACEMENT

Removal Procedure

WARNING: Refer to 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 .

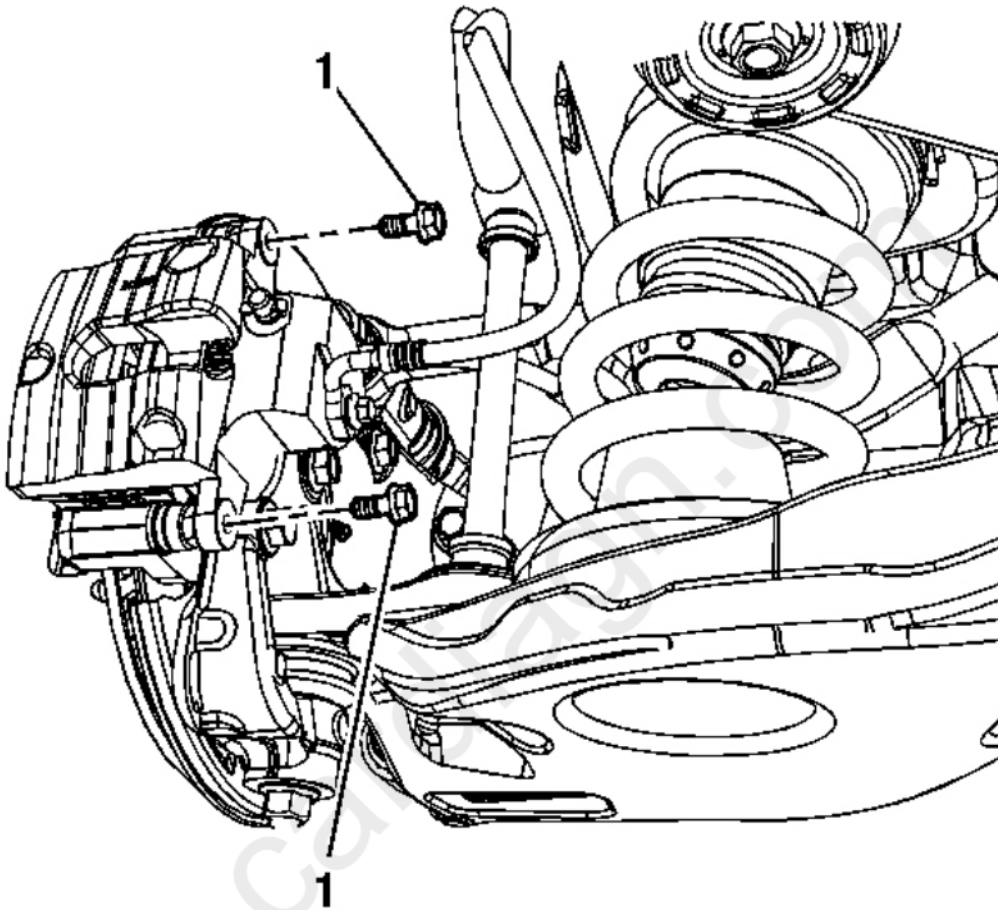


Fig. 51: View Of Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

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 the 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.

3. Using a backup wrench to hold the brake caliper guide pins stationary, remove the brake caliper guide pin

bolts (1).

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.

4. Without disconnecting the brake caliper hose, remove the brake caliper and support with heavy mechanics wire or equivalent.

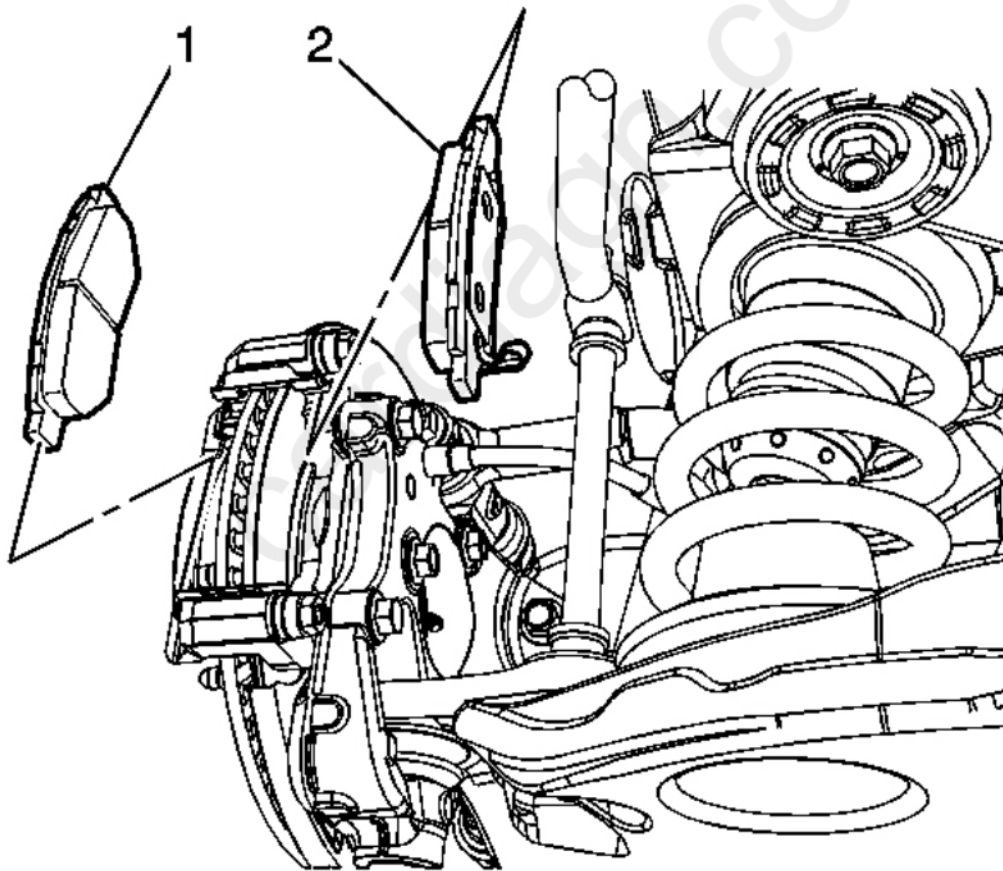


Fig. 52: Illustrating Brake Caliper & Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

5. Remove the outer brake pad (1).

6. Remove the inner brake pad (2).

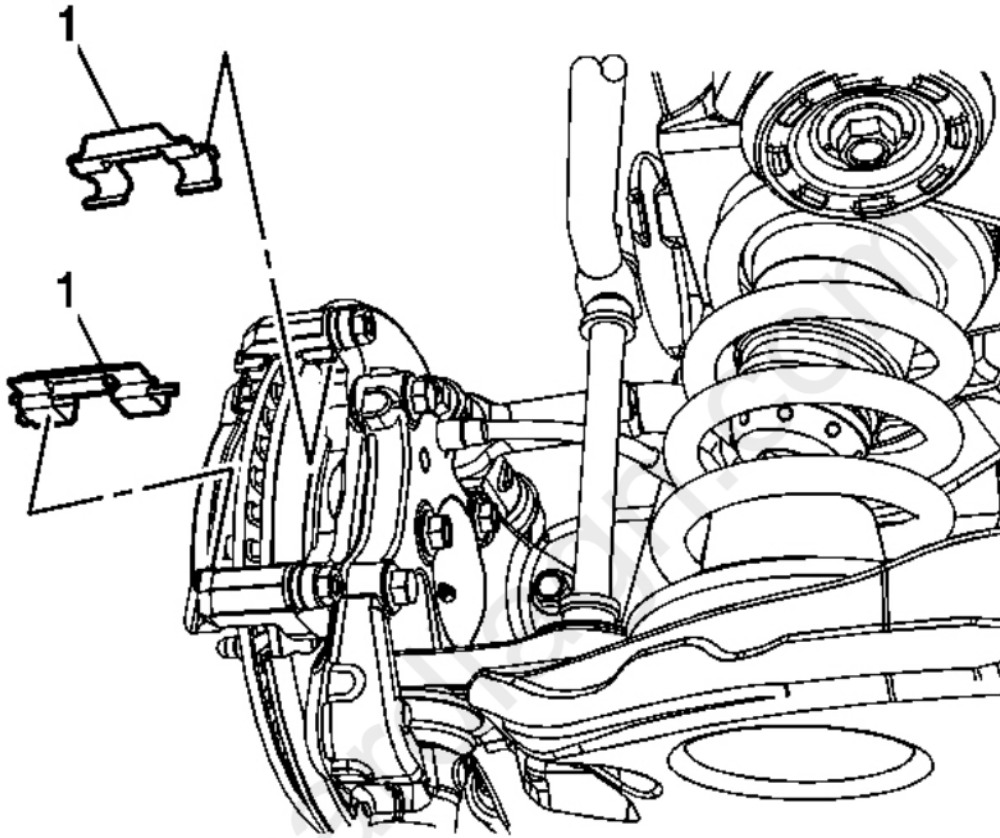


Fig. 53: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

NOTE: If installing new brake pads, do not reuse the brake pad springs.

7. Remove the brake pad springs (1).
8. If installing new brake pads, discard the brake pad springs.

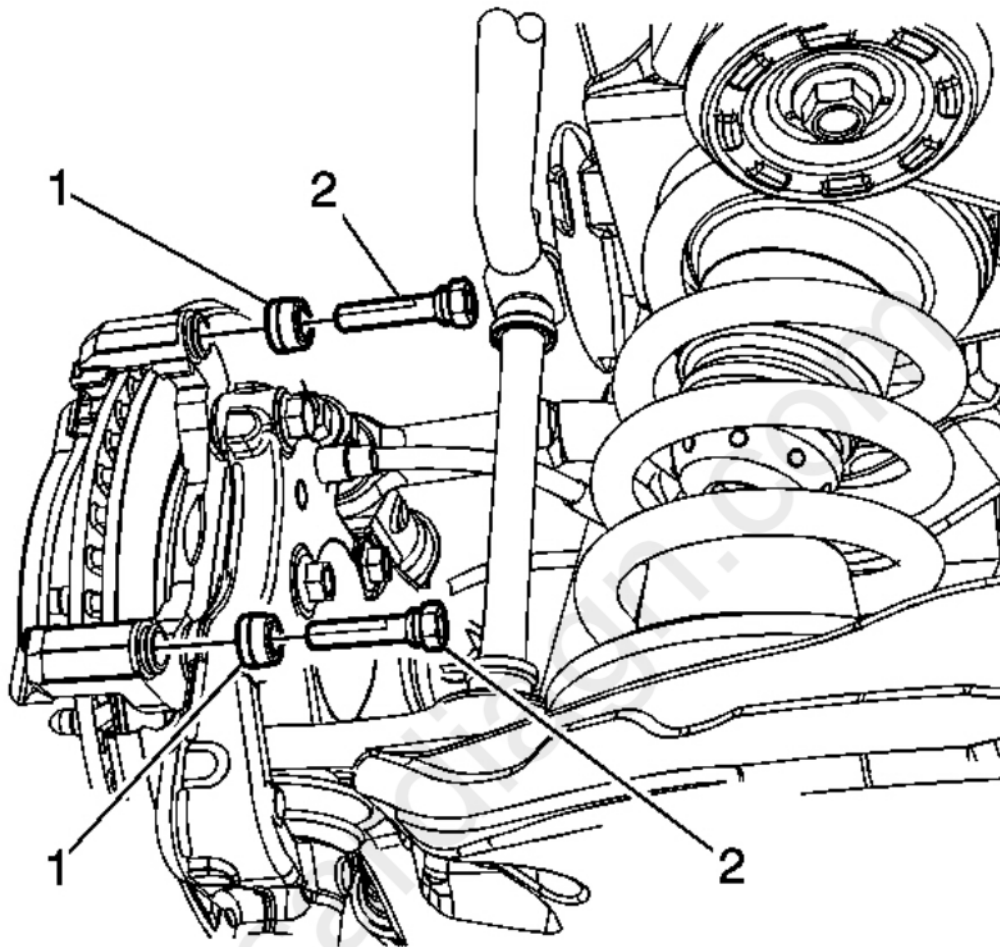


Fig. 54: Identifying Brake Caliper Guide Pin Seals & Guide Pins
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake caliper guide pin seals (1) and guide pins (2).
10. Inspect the rear disc brake hardware for damage and replace, if necessary. Refer to **Rear Disc Brake Mounting and Hardware Inspection**.

Installation Procedure

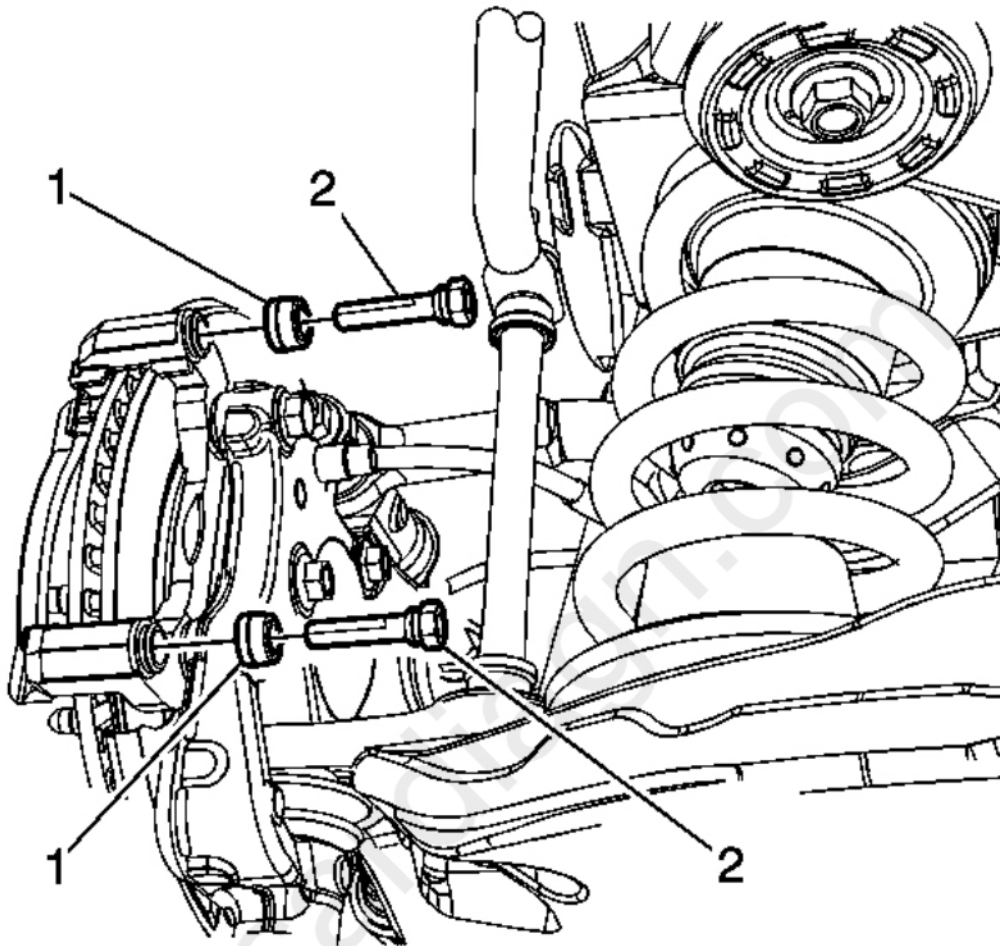


Fig. 55: Identifying Brake Caliper Guide Pin Seals & Guide Pins
Courtesy of GENERAL MOTORS CORP.

1. Apply a light coat of high temperature silicone brake lubricant to the brake caliper guide pins.
Install the brake caliper guide pin seals (1) to the brake caliper bracket.
2. Assemble the brake caliper guide pin seals (1) to the brake caliper guide pins (2).
3. Ensure the lip of the seal is fully seated in the groove of the brake caliper guide pin.
4. Install the brake caliper guide pin and seal assemblies to the brake caliper bracket.
5. Ensure the lip of the seal is fully seated in the groove of the brake caliper bracket.

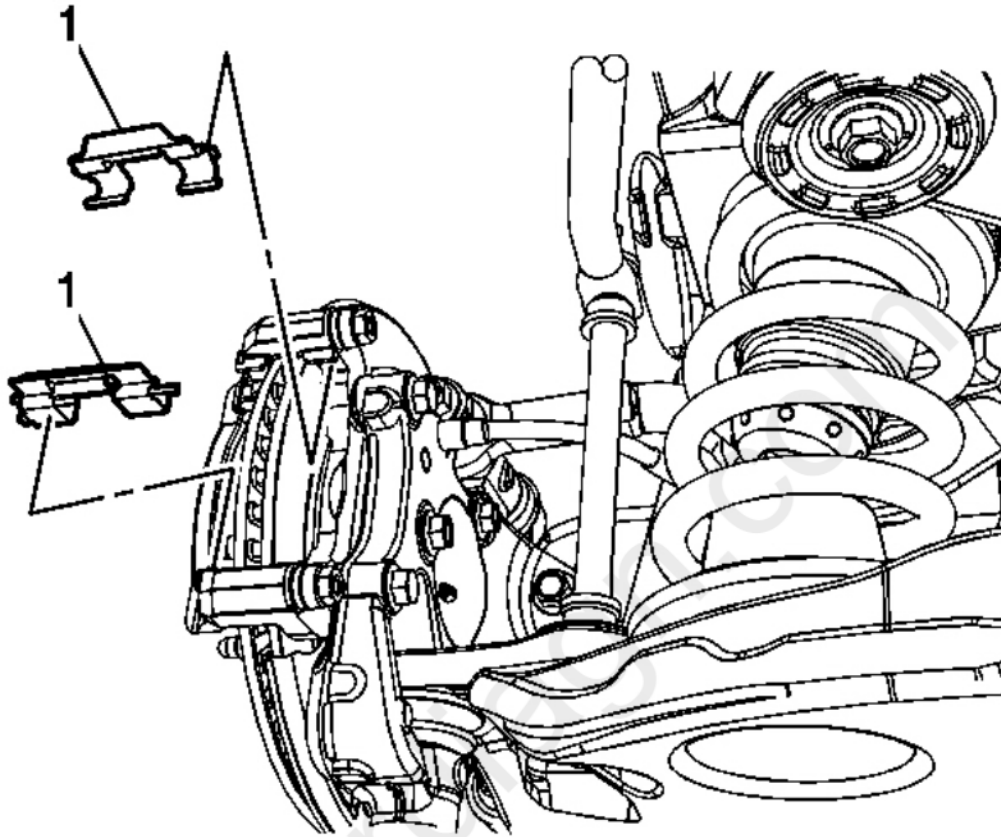


Fig. 56: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

NOTE: If installing new brake pads, install new brake pad springs.

6. Install the brake pad springs (1).

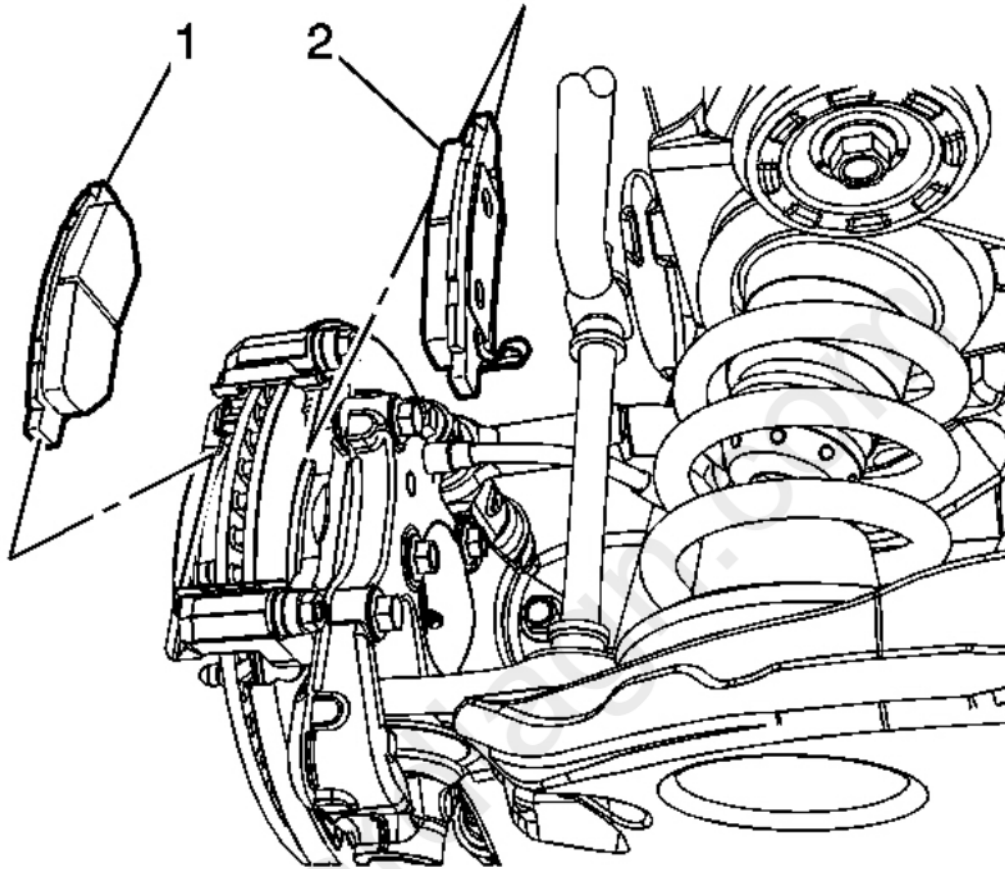


Fig. 57: Illustrating Brake Caliper & Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

7. Install the outer brake pad (1).
- . Install the inner brake pad (2).

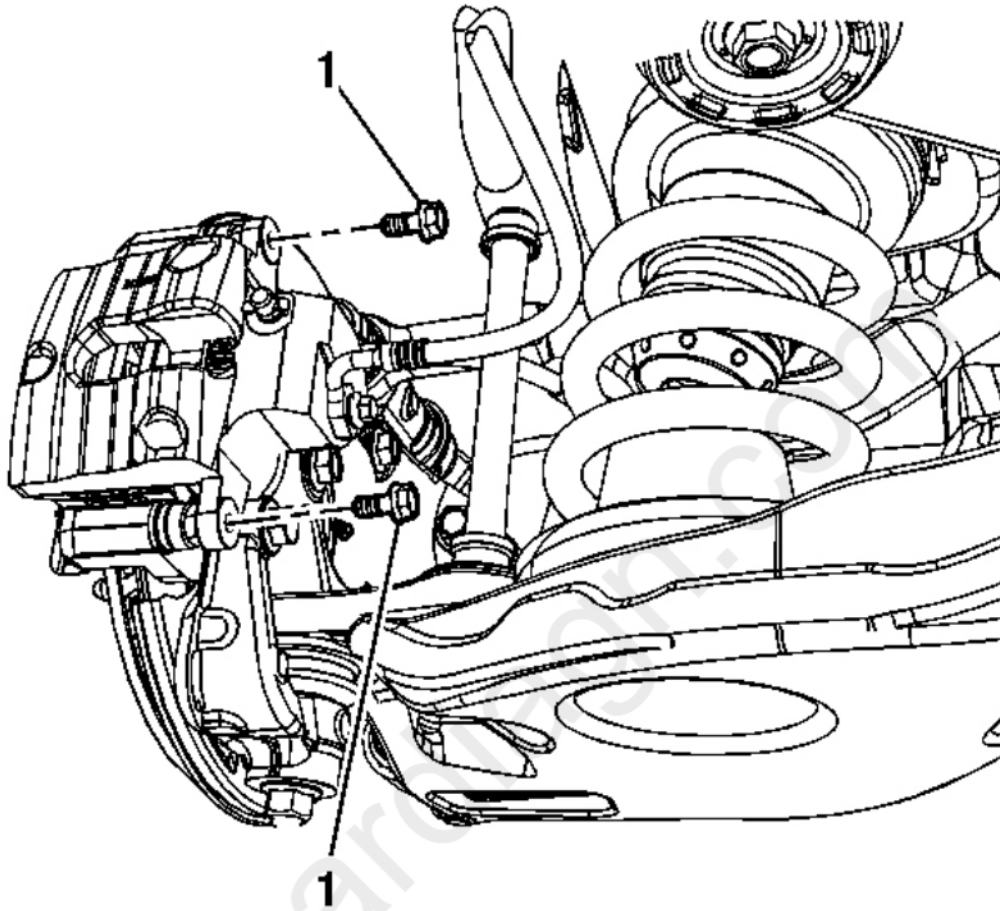


Fig. 58: View Of Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

9. Position the brake caliper to the bracket.

CAUTION: Refer to Fastener Caution .

10. Using a backup wrench to hold the brake caliper guide pins stationary, install and tighten the guide pin bolts (1) to 60 .m (44 lb ft).
11. Install the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .

FRONT BRAKE CALIPER BRACKET REPLACEMENT

Removal Procedure

WARNING: Refer to 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 .

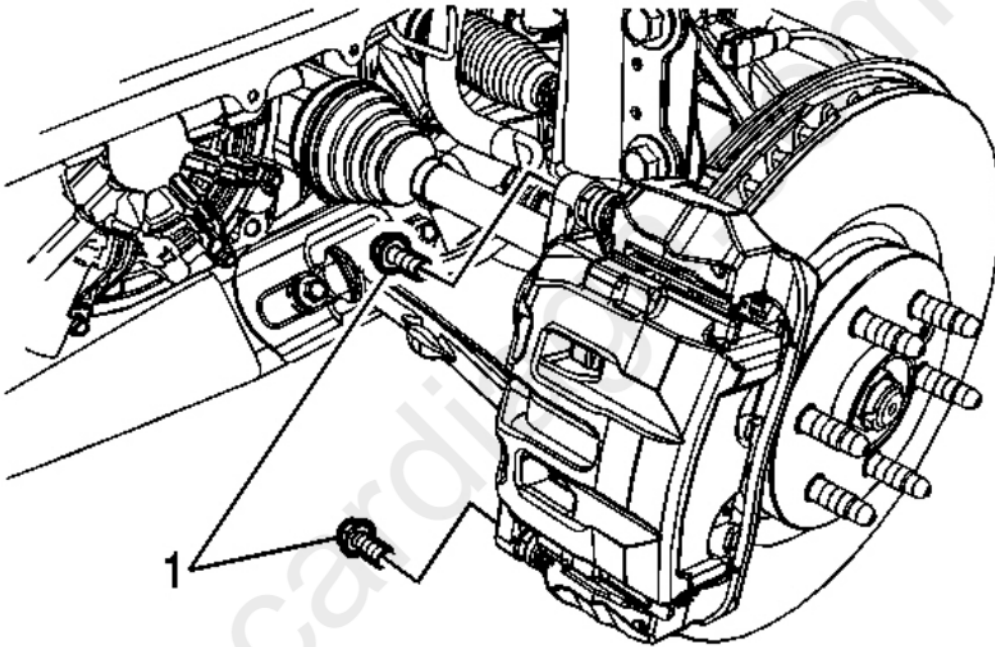


Fig. 59: Identifying Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

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 the 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.

3. Using a backup wrench to hold the brake caliper guide pins stationary, remove the brake caliper guide pin

bolts (1).

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.

4. Without disconnecting the brake caliper hose fitting, remove the brake caliper and support with heavy mechanics wire or equivalent.

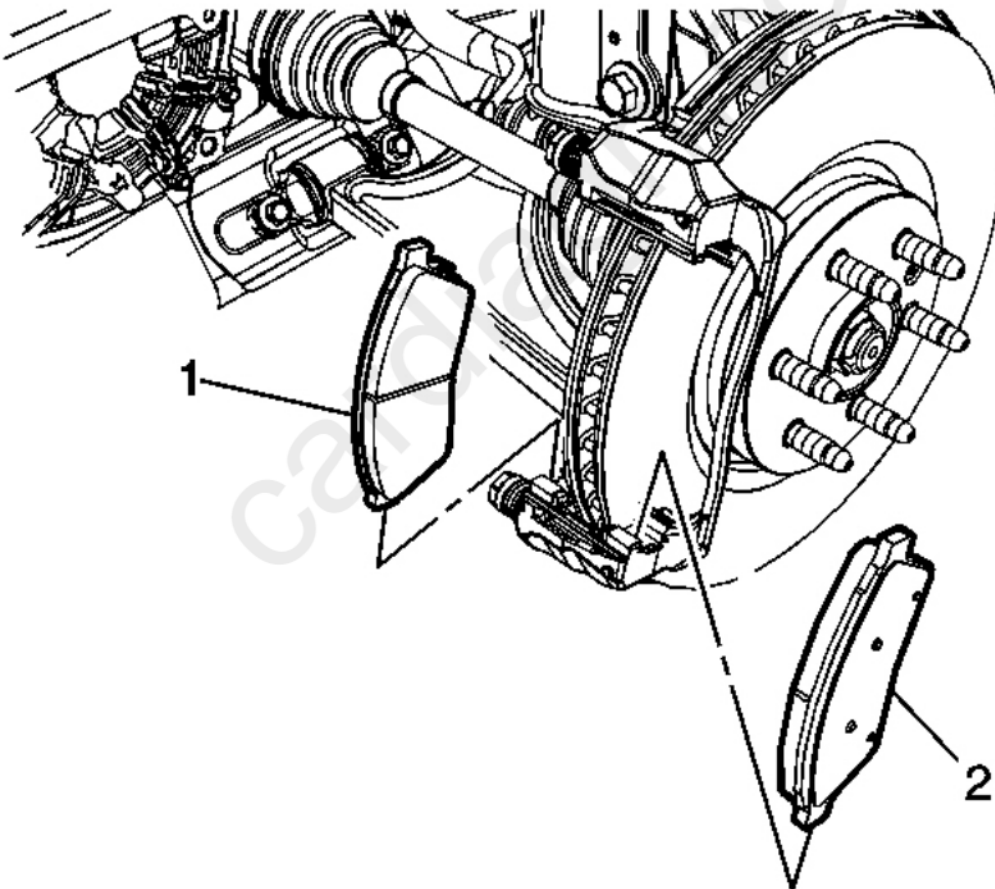


Fig. 60: Identifying Inner & Outer Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

5. Remove the inner brake pad (1).
6. Remove the outer brake pad (2).

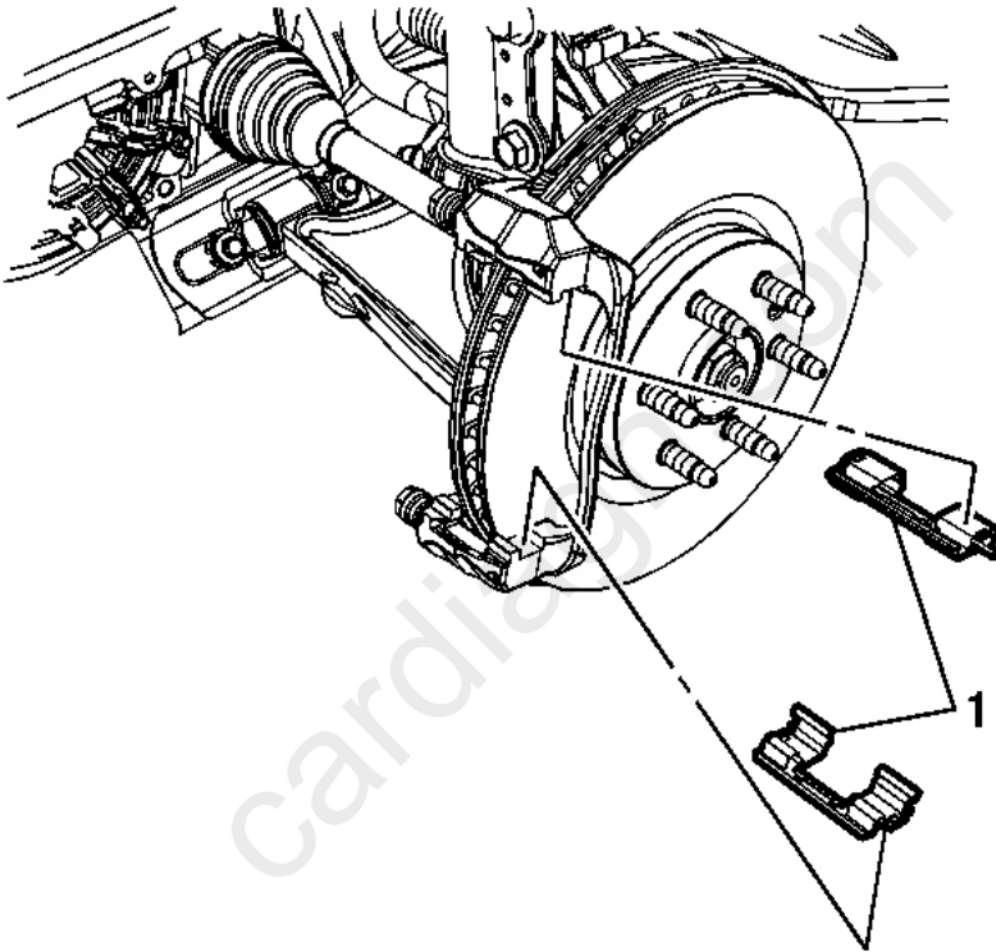


Fig. 61: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake pad springs (1).

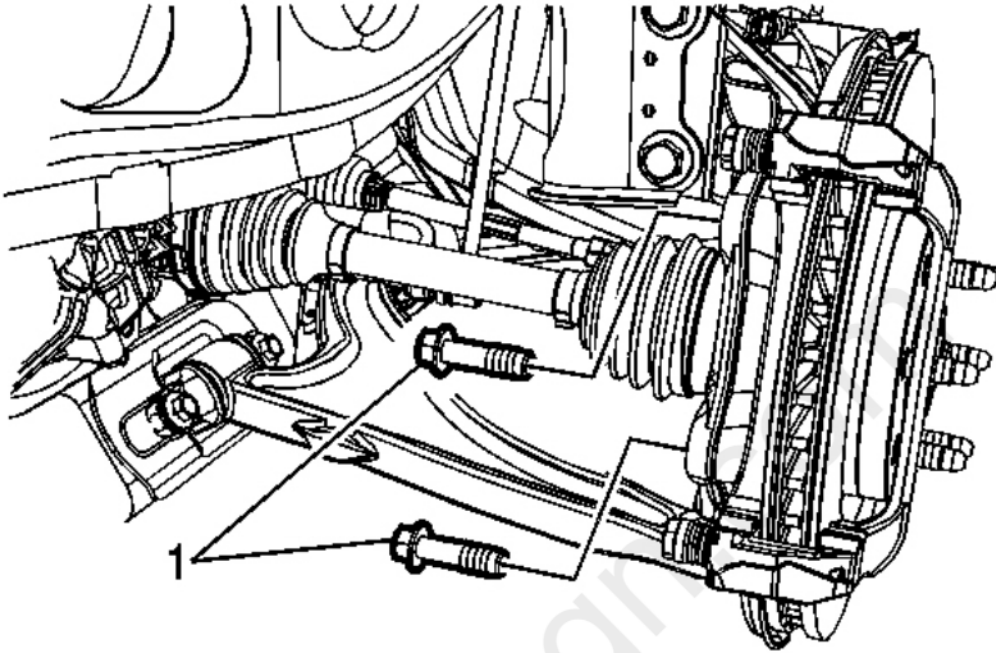


Fig. 62: View Of Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake caliper bracket bolts (1).

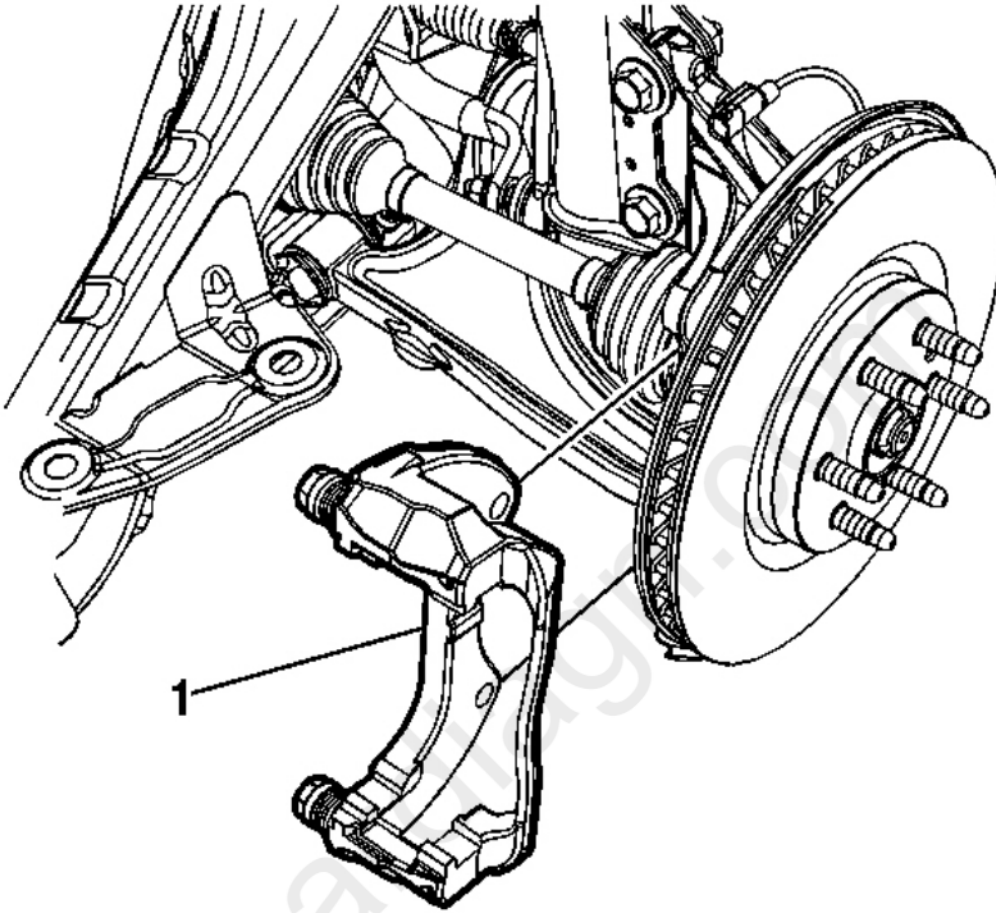


Fig. 63: View Of Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake caliper bracket (1).

Installation Procedure

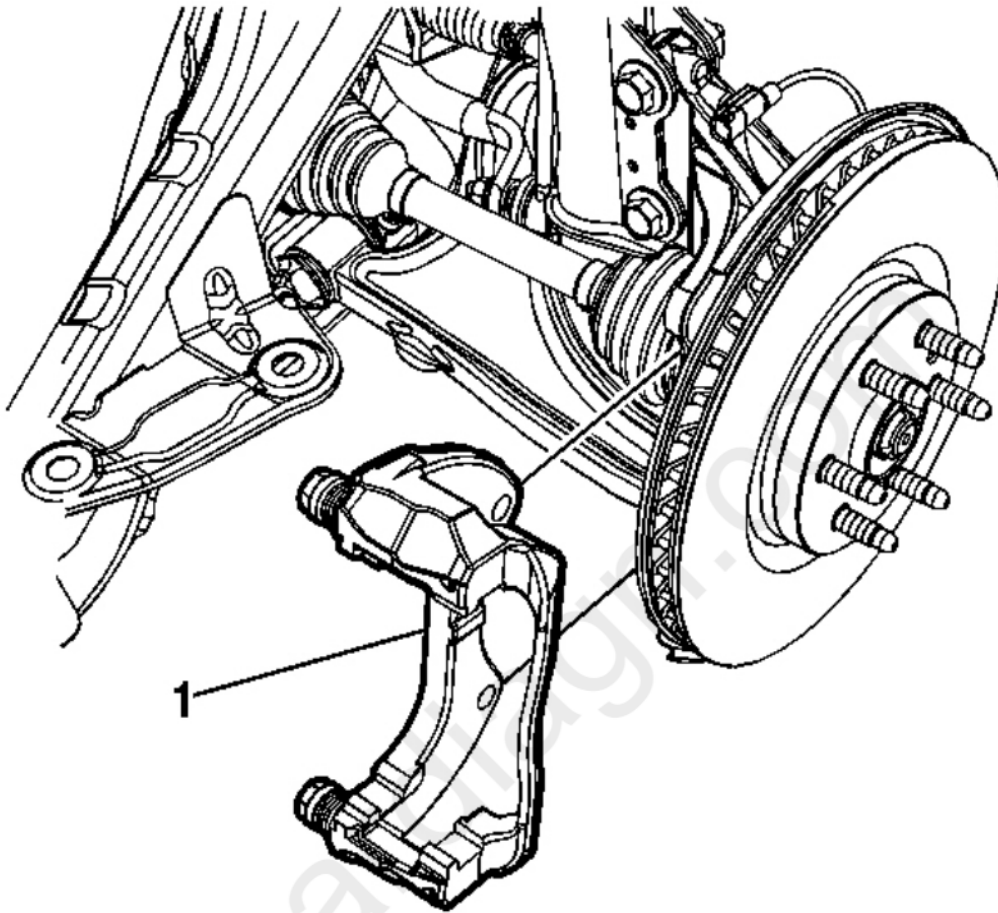


Fig. 64: View Of Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper bracket (1).
2. 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 caliper bracket bolts. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
 - Ensure there are no gaps in the threadlocker along the length of the filled area of the bolts.
 - Allow the threadlocker to cure approximately 10 minutes before installation.

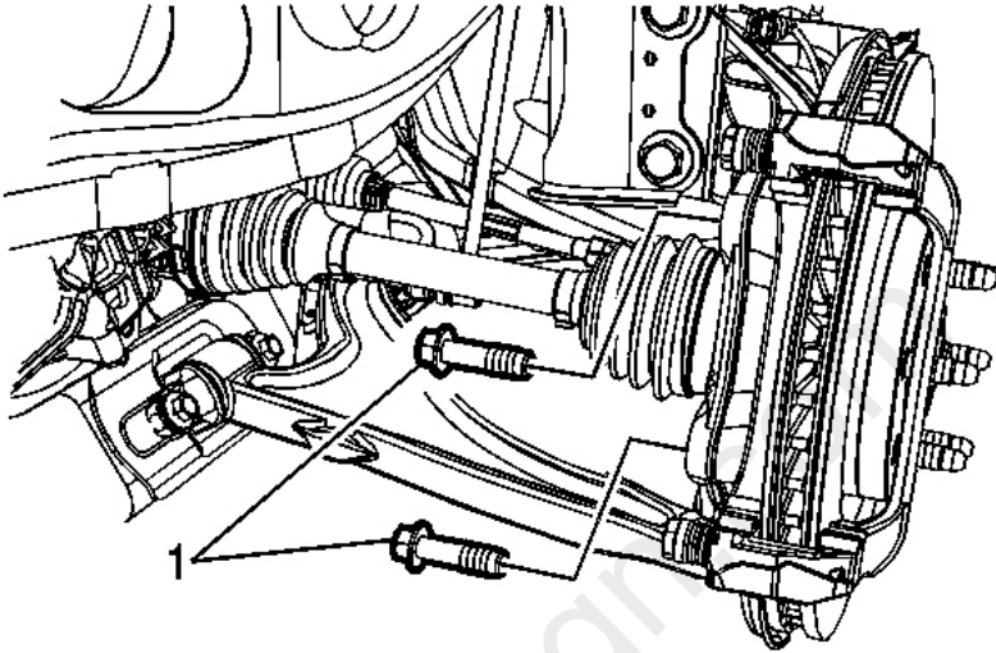


Fig. 65: View Of Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

3. Install the brake caliper bracket bolts (1) and tighten to 110 .m (1 lb ft).

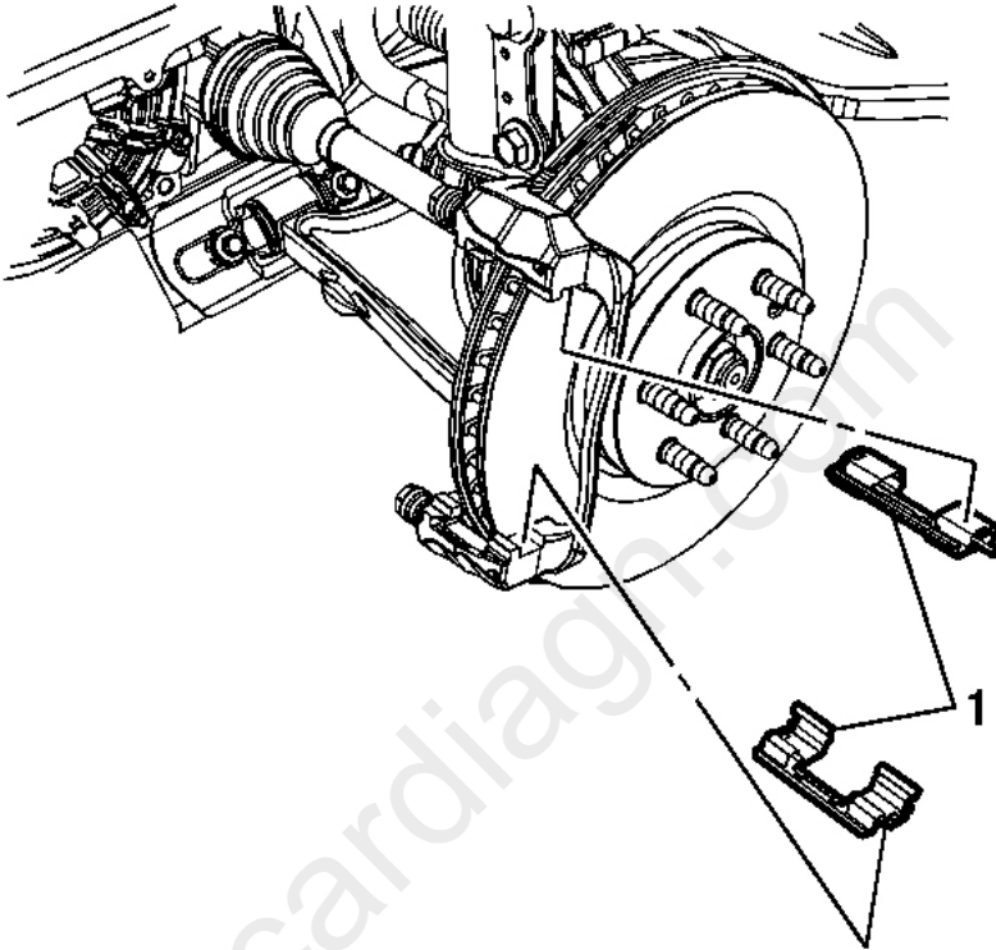


Fig. 66: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

4. Install the brake pad shims (1).

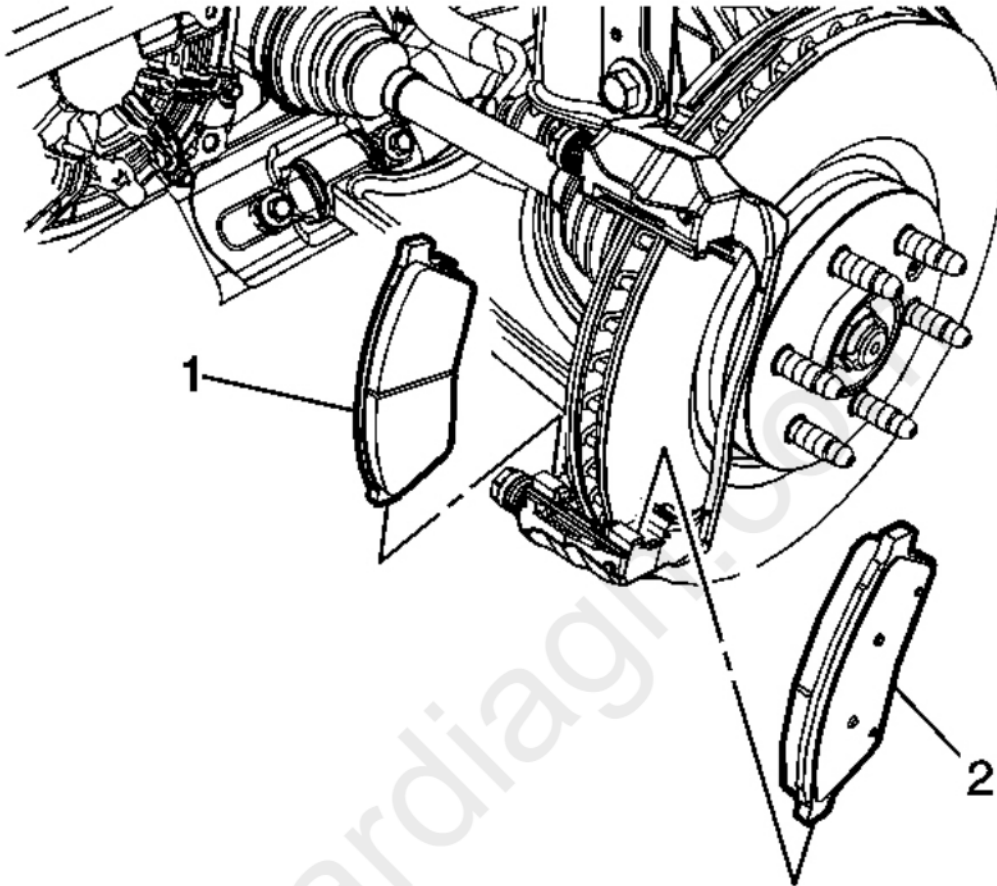


Fig. 67: Identifying Inner & Outer Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

5. Install the inner brake pad (1).
6. Install the outer brake pad (2).

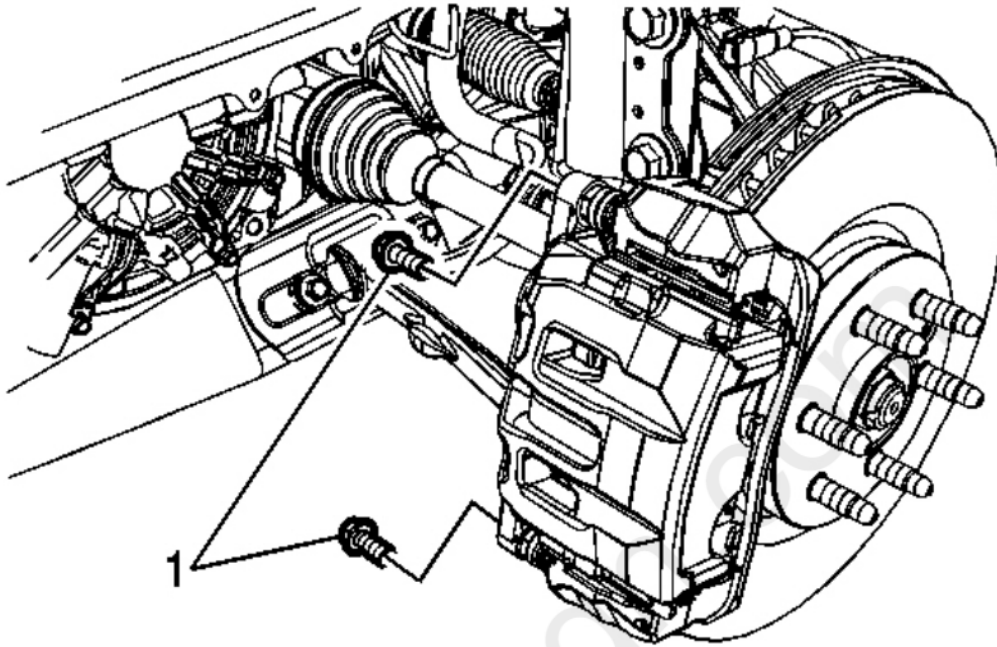


Fig. 68: Identifying Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

7. Position the brake caliper to the bracket.
 - . Using a backup wrench to hold the brake caliper guide pins stationary, install the brake caliper guide pin bolts (1) and tighten to 60 .m (44 lb ft).
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

REAR BRAKE CALIPER BRACKET REPLACEMENT

Removal Procedure

WARNING: Refer to **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** .

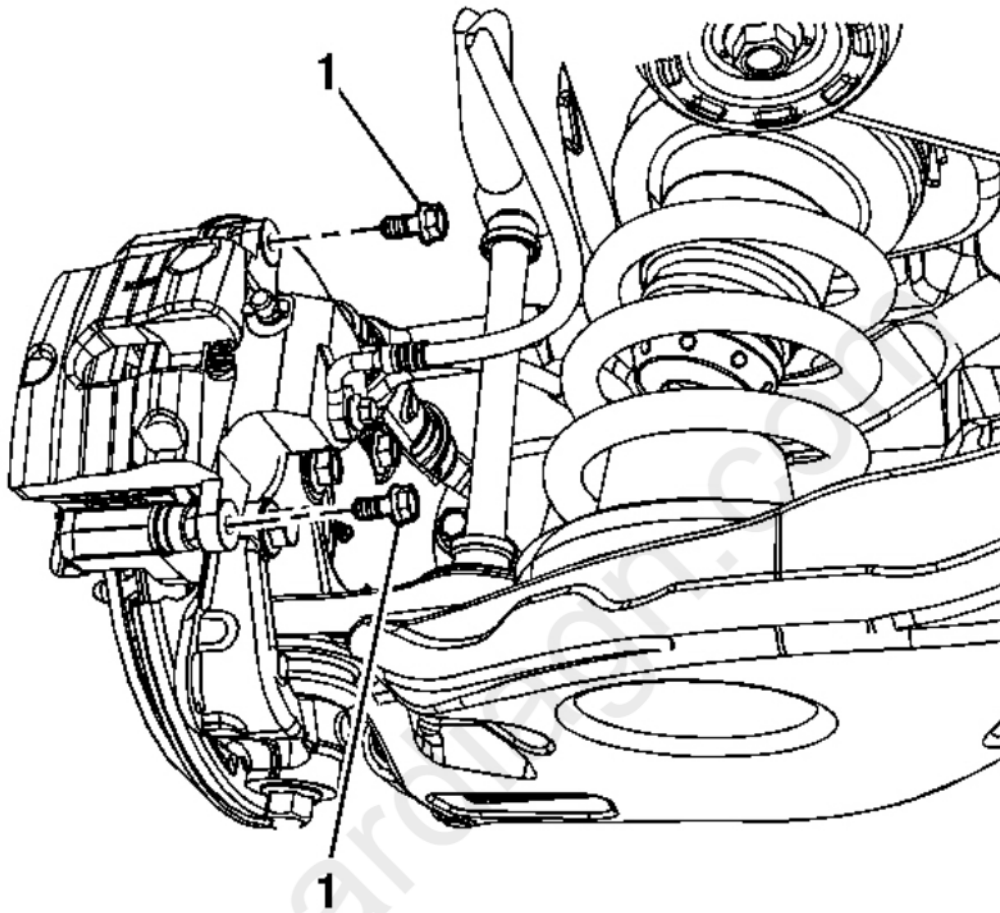


Fig. 69: View Of Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

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 the 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.

3. Using a backup wrench to hold the brake caliper guide pins stationary, remove the brake caliper guide pin bolts (1).

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.

4. Without disconnecting the brake caliper hose fitting, remove the brake caliper and support with heavy mechanics wire or equivalent.

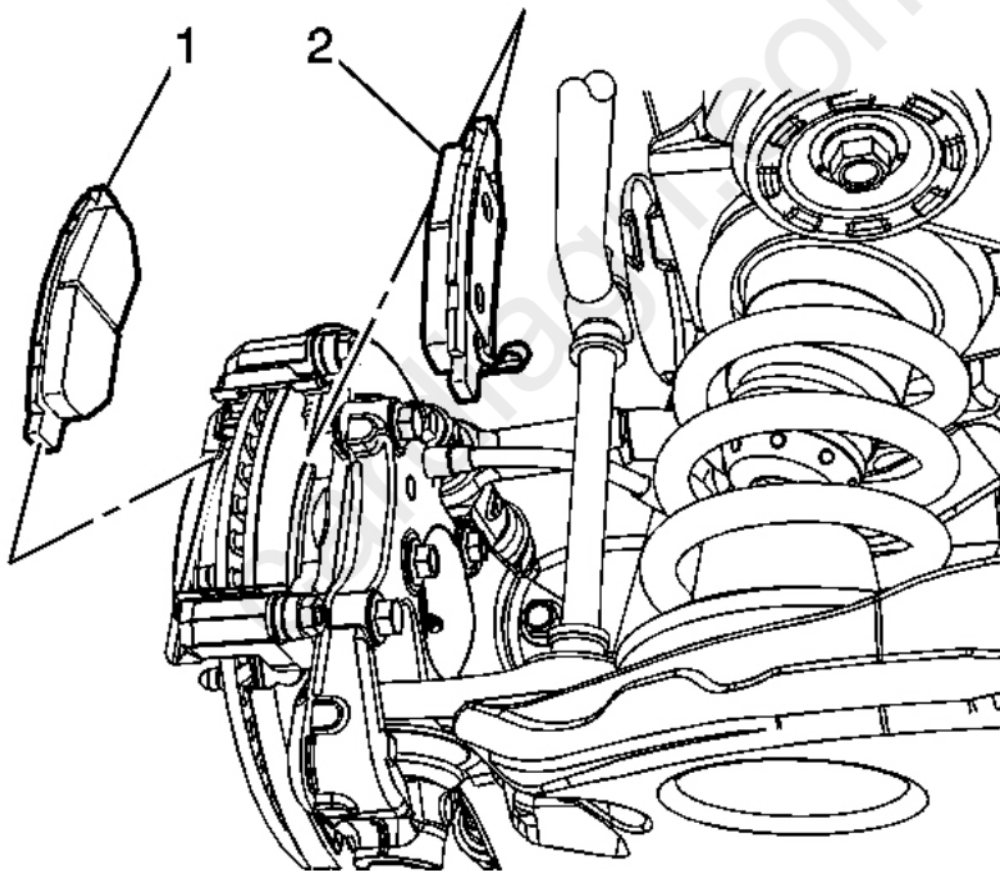


Fig. 70: Illustrating Brake Caliper & Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

5. Remove the outer brake pad (1).
6. Remove the inner brake pad (2).

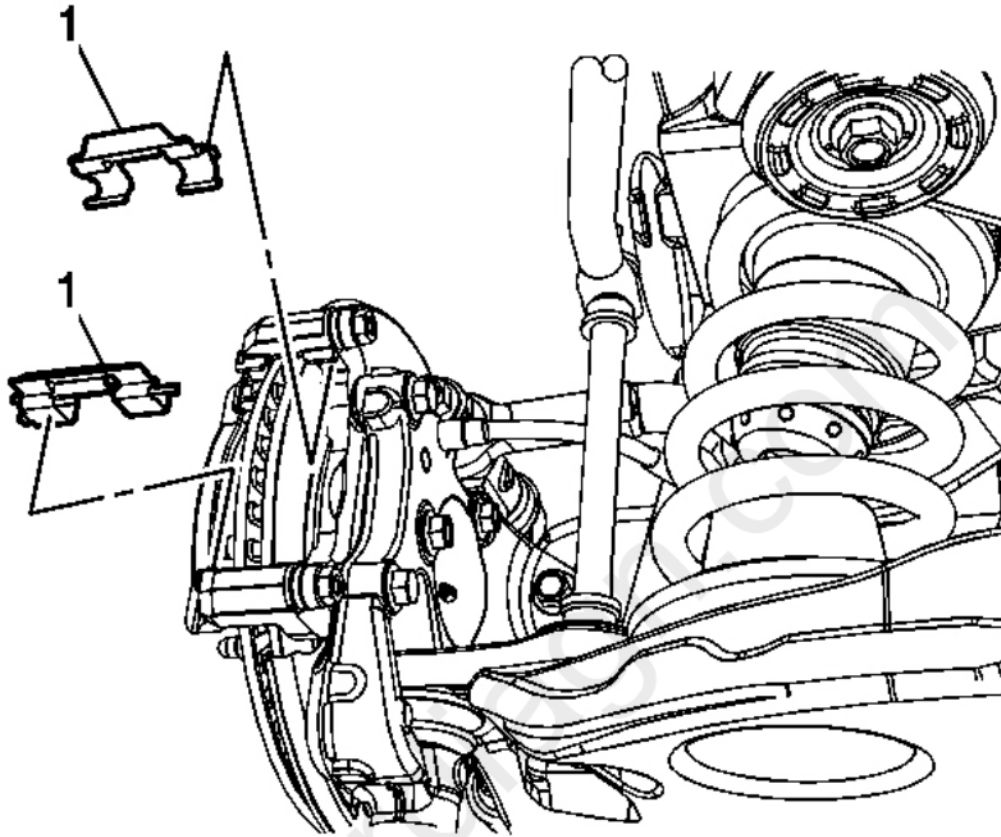


Fig. 71: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

NOTE: If installing new brake pads, do not reuse the brake pad springs.

7. Remove the brake pad springs (1).
8. If installing new brake pads, discard the brake pad springs.

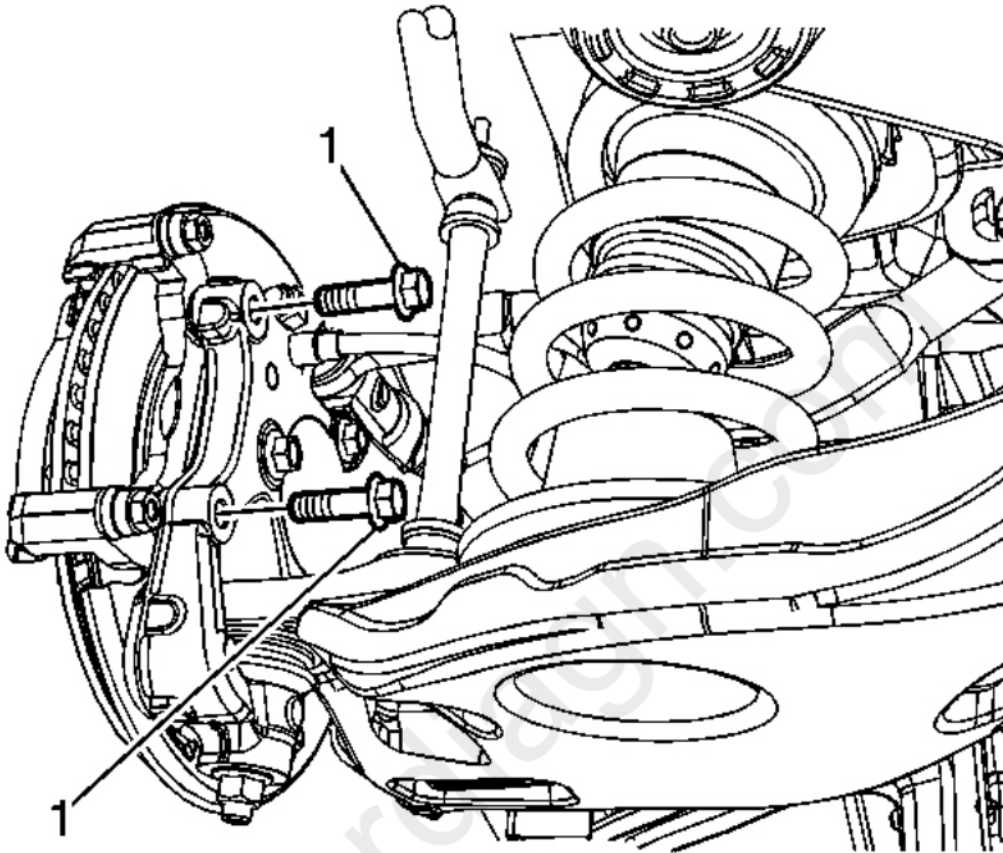


Fig. 72: Identifying Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake caliper bracket bolts (1).

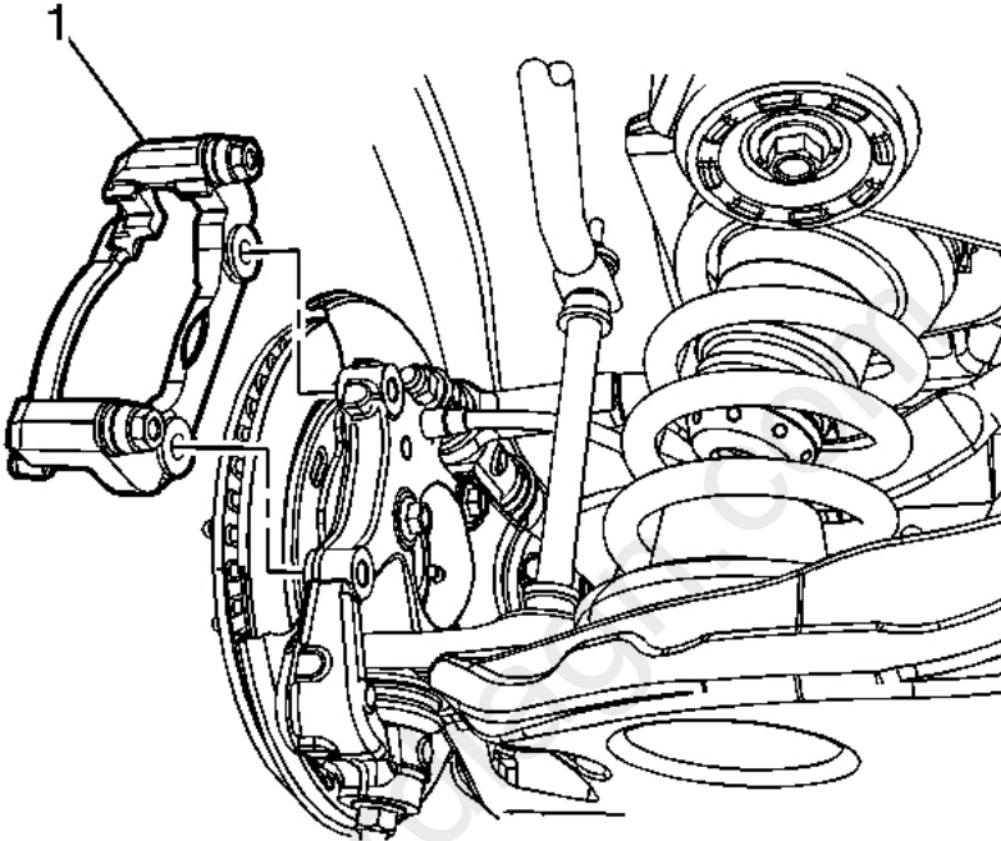


Fig. 73: View Of Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

10. Remove the brake caliper bracket (1).

Installation Procedure

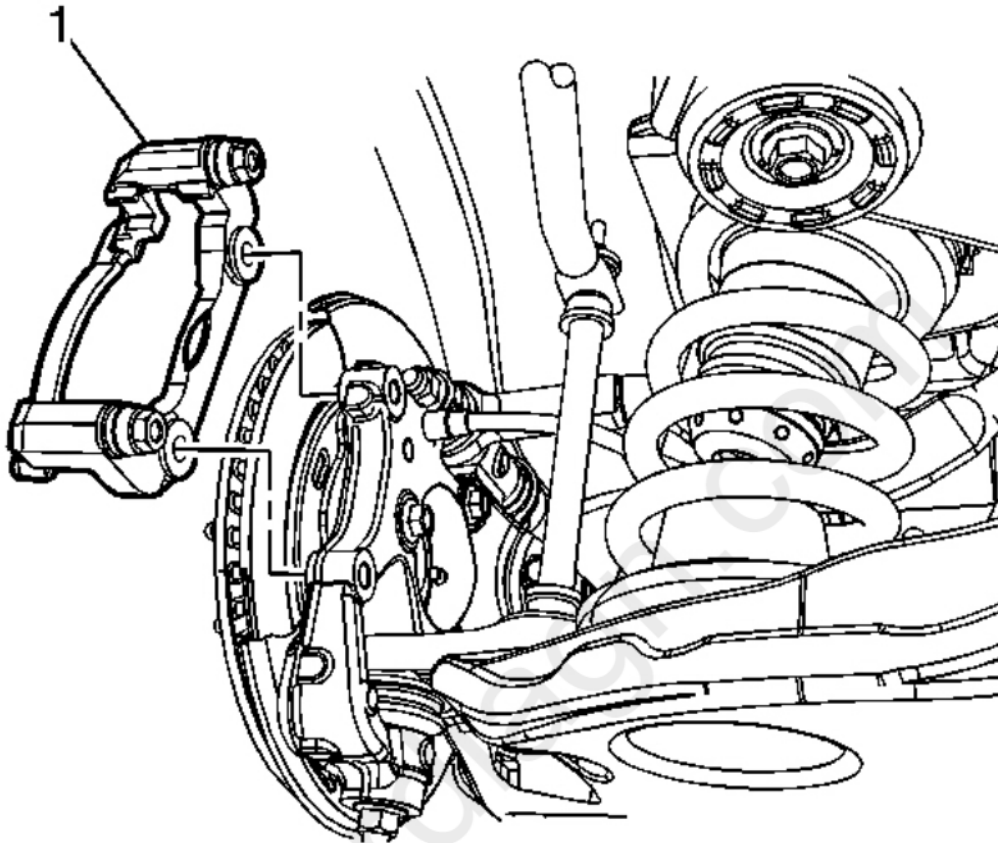


Fig. 74: View Of Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper bracket (1).
2. 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 caliper bracket bolts. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
 - Ensure there are no gaps in the threadlocker along the length of the filled area of the bolts.
 - Allow the threadlocker to cure approximately 10 minutes before installation.

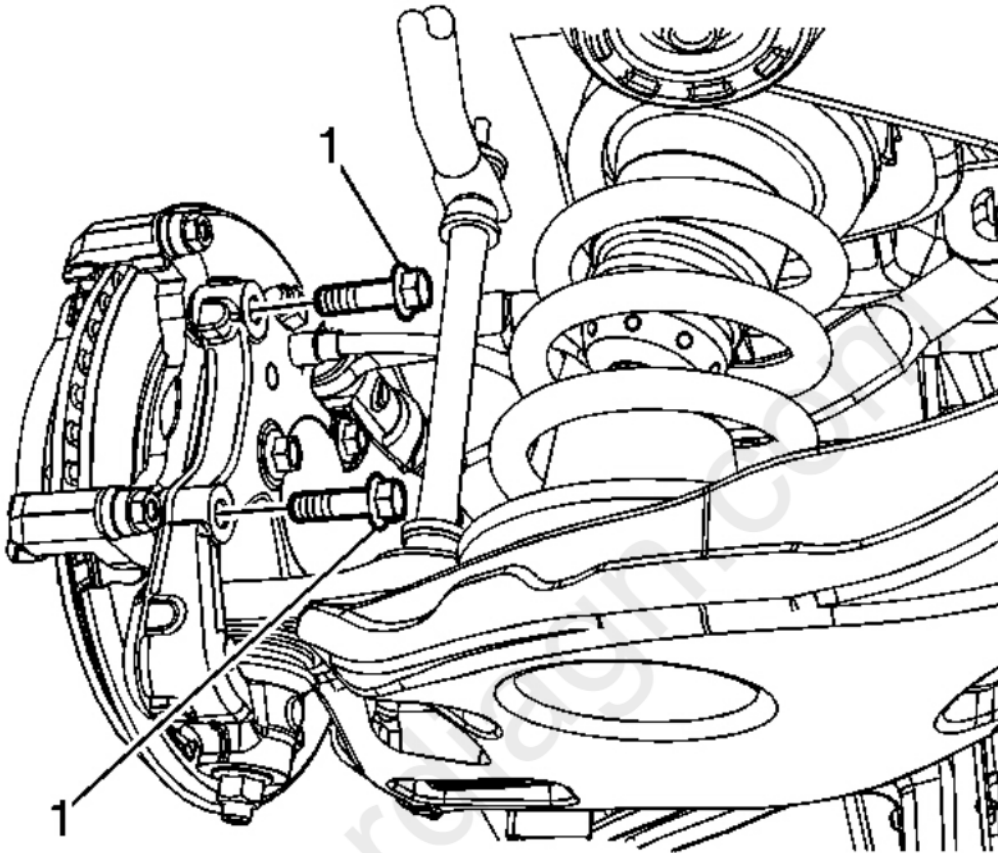


Fig. 75: Identifying Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

3. Install the brake caliper bracket bolts (1) and tighten to 110 N.m (81 lb ft).

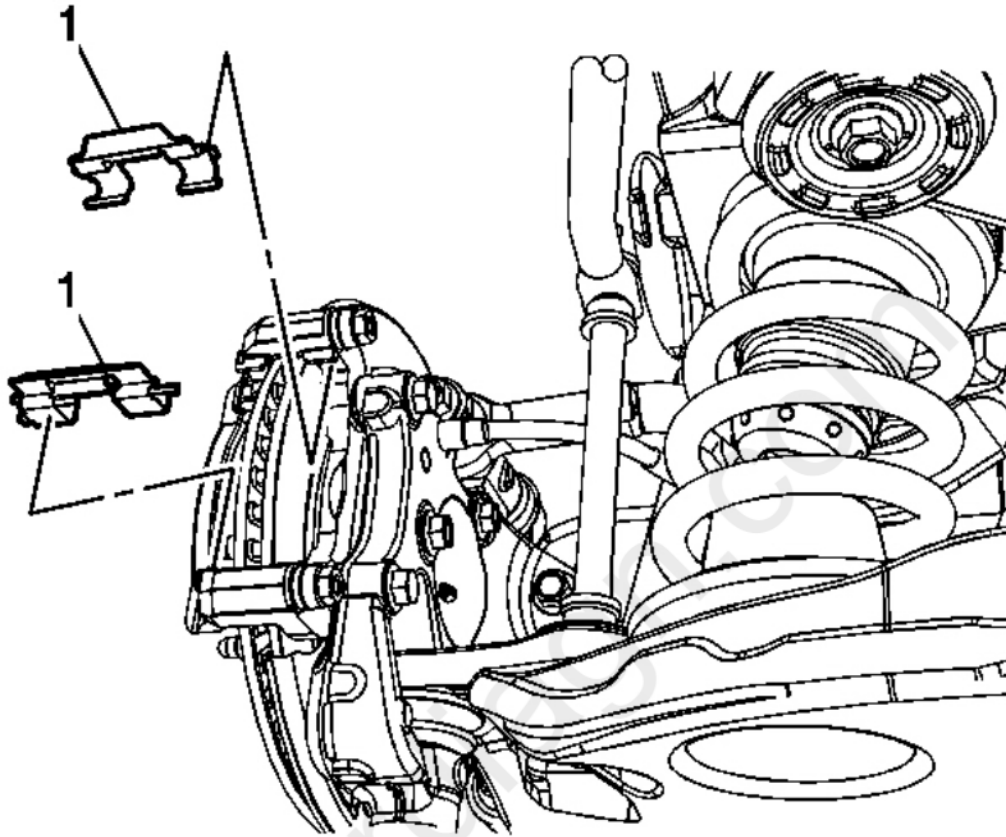


Fig. 76: Identifying Brake Pad Springs
Courtesy of GENERAL MOTORS CORP.

4. Install the brake pad springs (1).

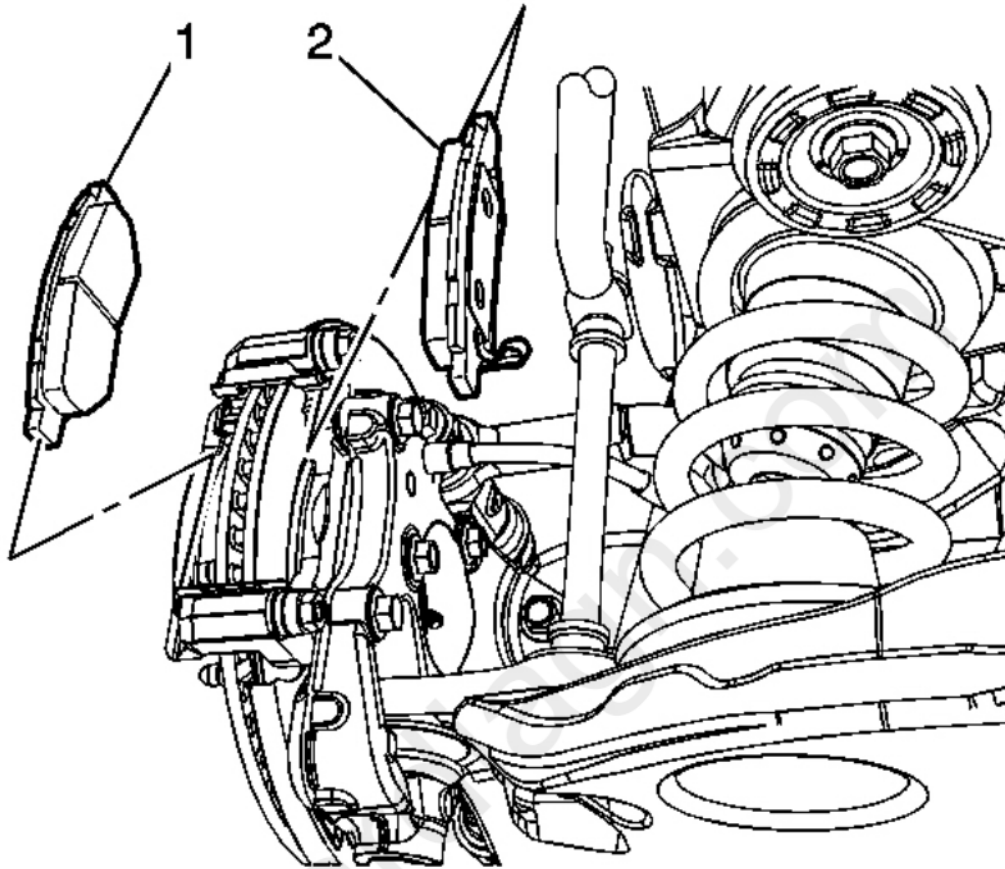


Fig. 77: Illustrating Brake Caliper & Disc Brake Pads
Courtesy of GENERAL MOTORS CORP.

5. Install the outer brake pad (1).
6. Install the inner brake pad (2).

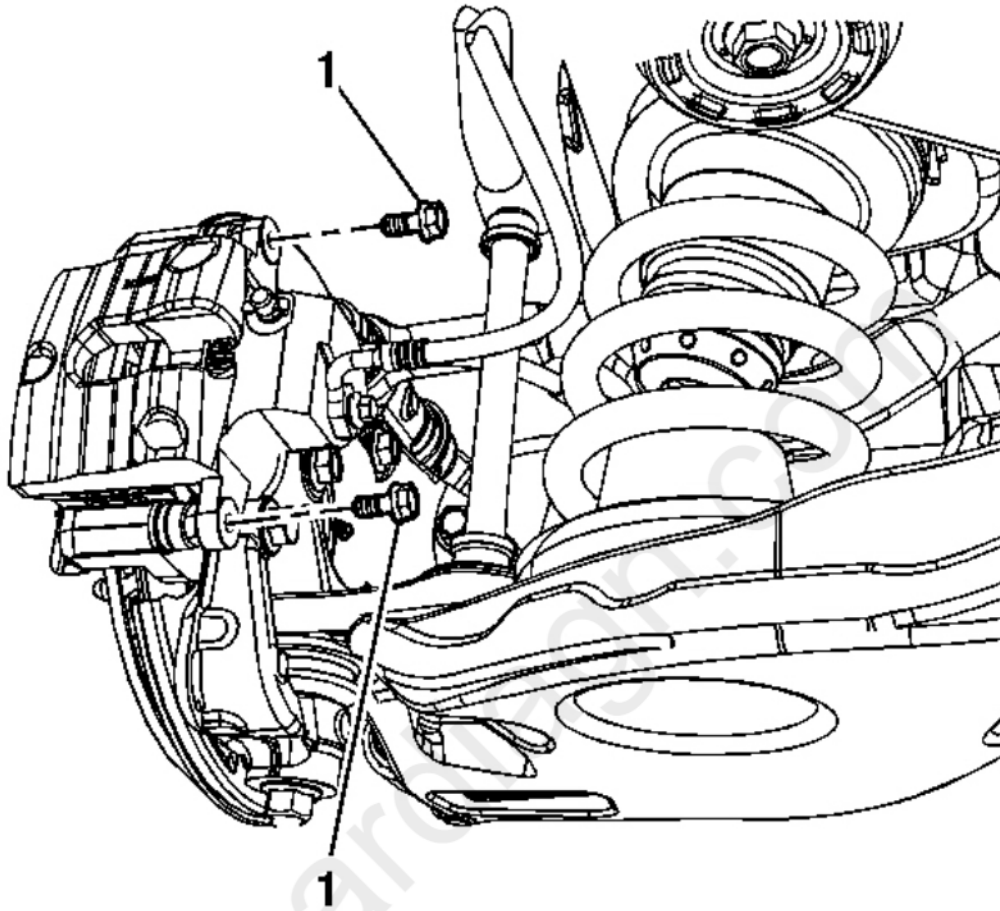


Fig. 78: View Of Caliper Guide Pins
Courtesy of GENERAL MOTORS CORP.

7. Position the brake caliper to the bracket and loosely install the brake caliper guide pin bolts (1).
8. Using a backup wrench to hold the brake caliper guide pins stationary, install and tighten the guide pin bolts to 60 N.m (44 lb ft).
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

FRONT BRAKE ROTOR REPLACEMENT

Special Tools

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

For equivalent regional tools, refer to Special Tools.

Removal Procedure

WARNING: Refer to 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 .

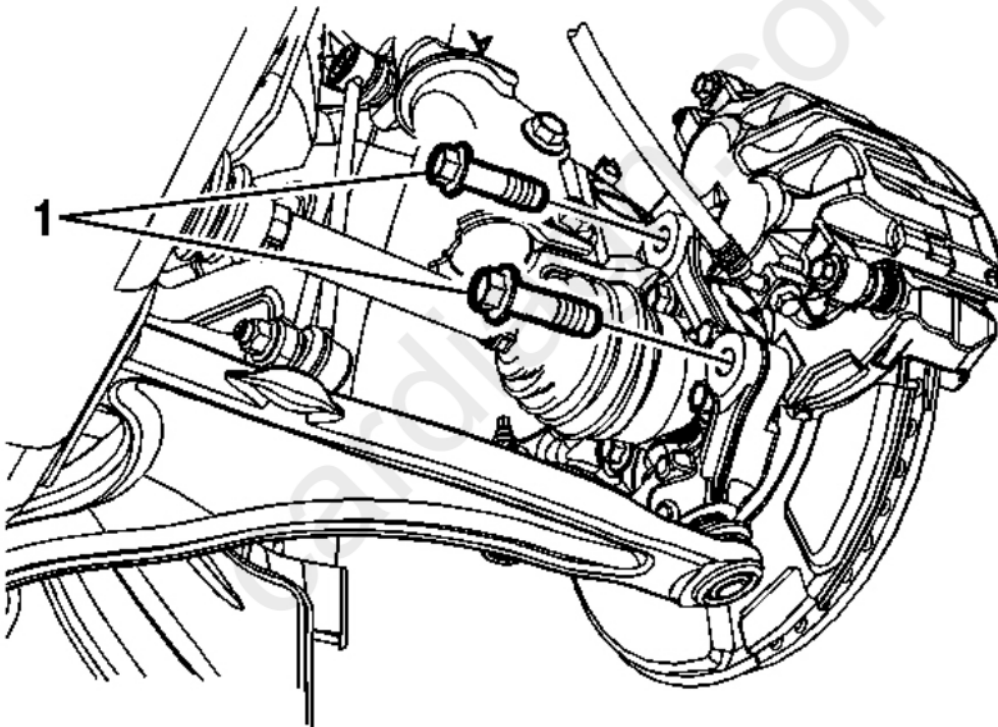


Fig. 79: Identifying Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

3. Remove the brake caliper bracket bolts (1).

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.

4. Without disconnecting the brake caliper hose, remove the brake caliper and bracket assembly and support with heavy mechanics wire or equivalent.
5. If installing the original brake rotor, mark the relationship of the rotor to the wheel hub.

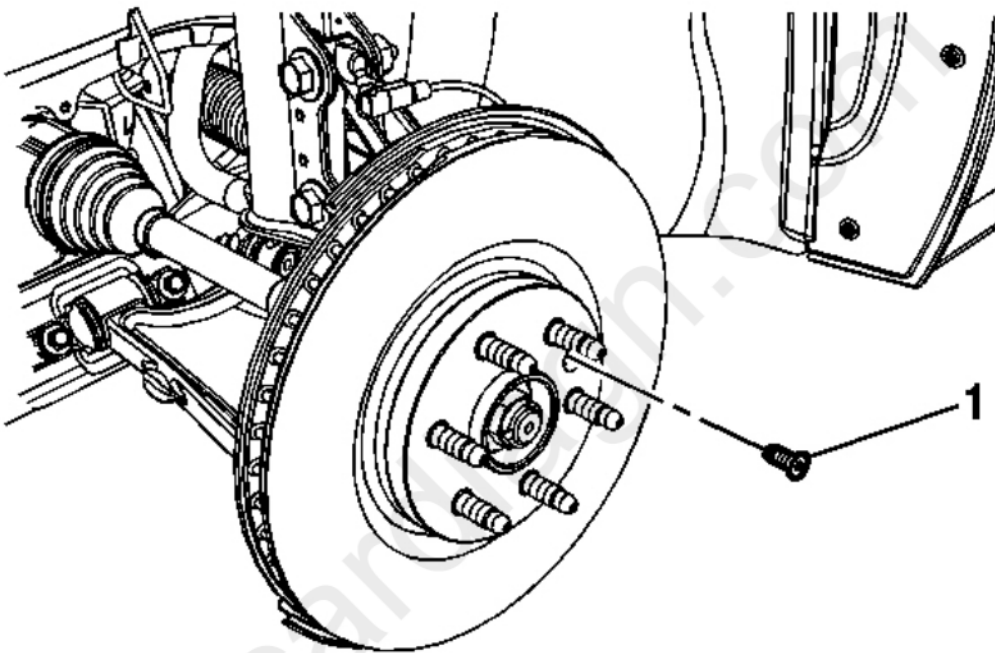


Fig. 80: Identifying Brake Rotor Bolt
Courtesy of GENERAL MOTORS CORP.

6. Remove the brake rotor bolt (1).

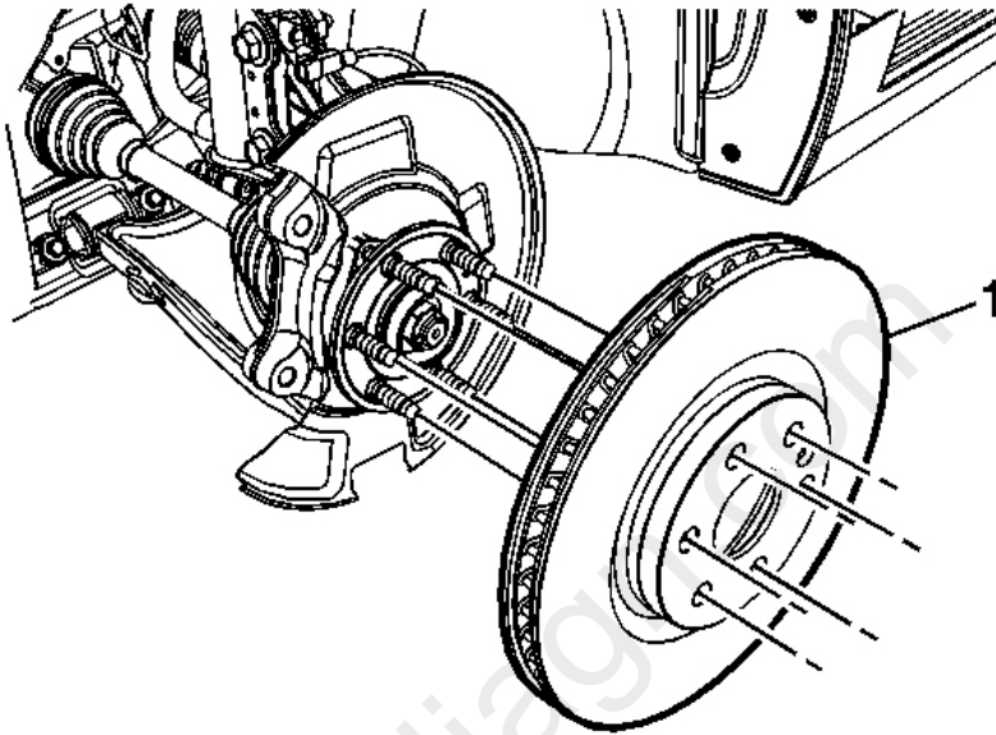


Fig. 81: View Of Disc Brake Rotor
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake rotor (1).

Installation Procedure

1. If installing a new brake rotor, clean the friction surfaces of the brake rotor with denatured alcohol.
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 rotor to the hub/axle flange.

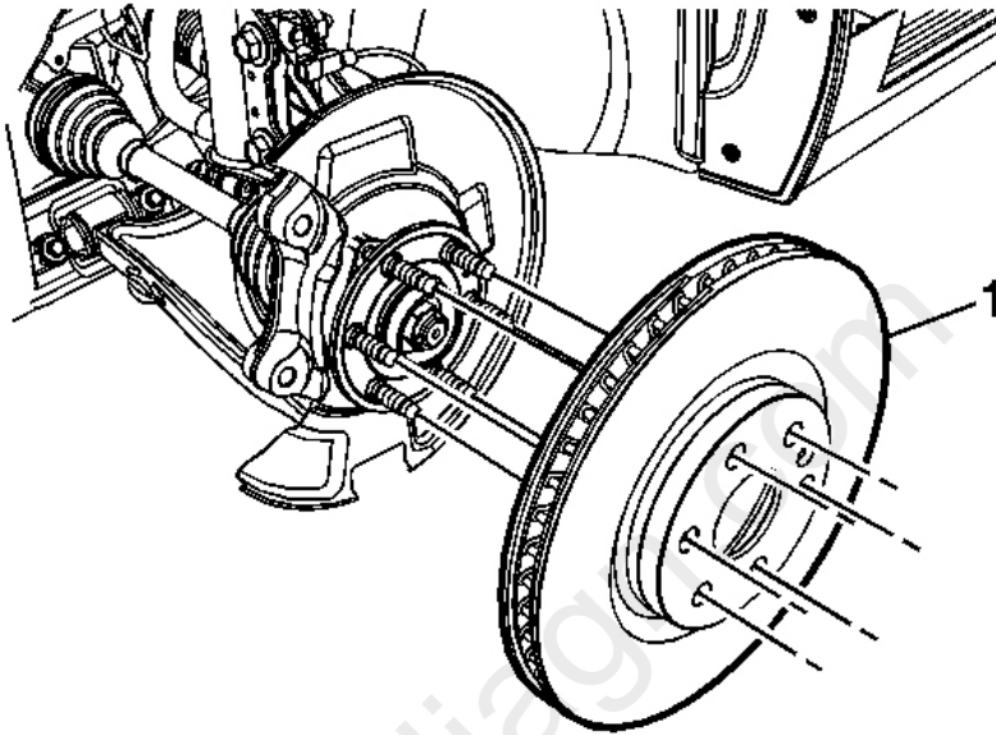


Fig. 82: View Of Disc Brake Rotor
Courtesy of GENERAL MOTORS CORP.

4. Install the brake rotor (1).

If installing the original brake rotor, align the rotor to the wheel hub as noted during removal.

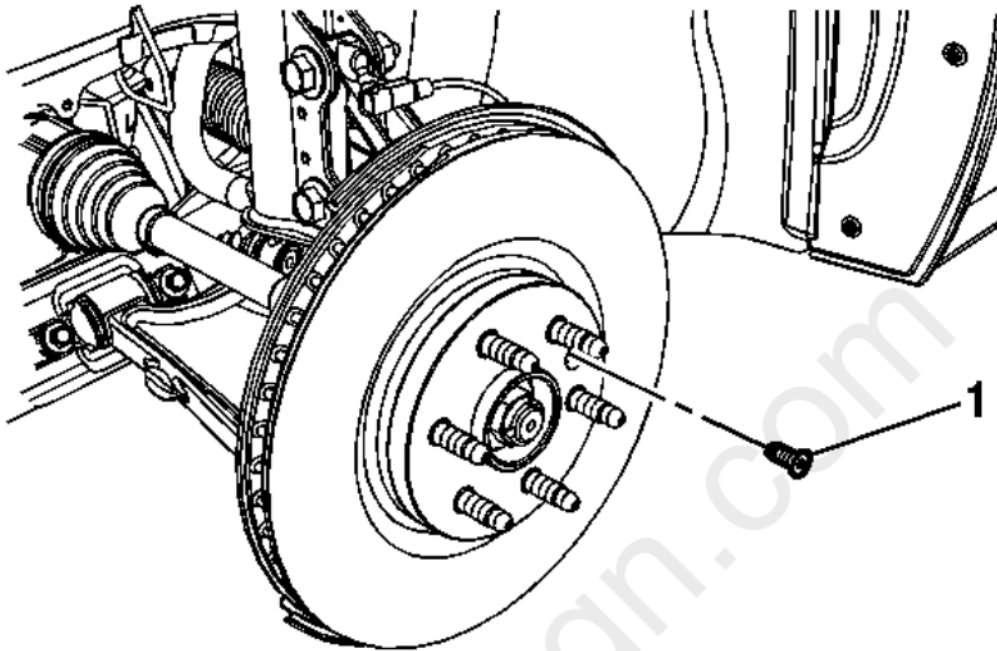


Fig. 83: Identifying Brake Rotor Bolt
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

5. Install the brake rotor bolt (1) and tighten to 9 N.m (80 lb in).
6. After installing the brake rotor, measure the assembled lateral runout (LRO) of the brake rotor. Refer to Brake Rotor Assembled Lateral Runout Measurement.
7. If the brake rotor assembled LRO measurement exceeds specification, bring the LRO to within specification. Refer to Brake Rotor Assembled Lateral Runout Correction.
8. 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 caliper bracket bolts. Refer to Adhesives, Fluids, Lubricants, and Sealers.
 - Ensure there are no gaps in the threadlocker along the length of the filled area of the bolts.

- Allow the threadlocker to cure approximately 10 minutes before installation.

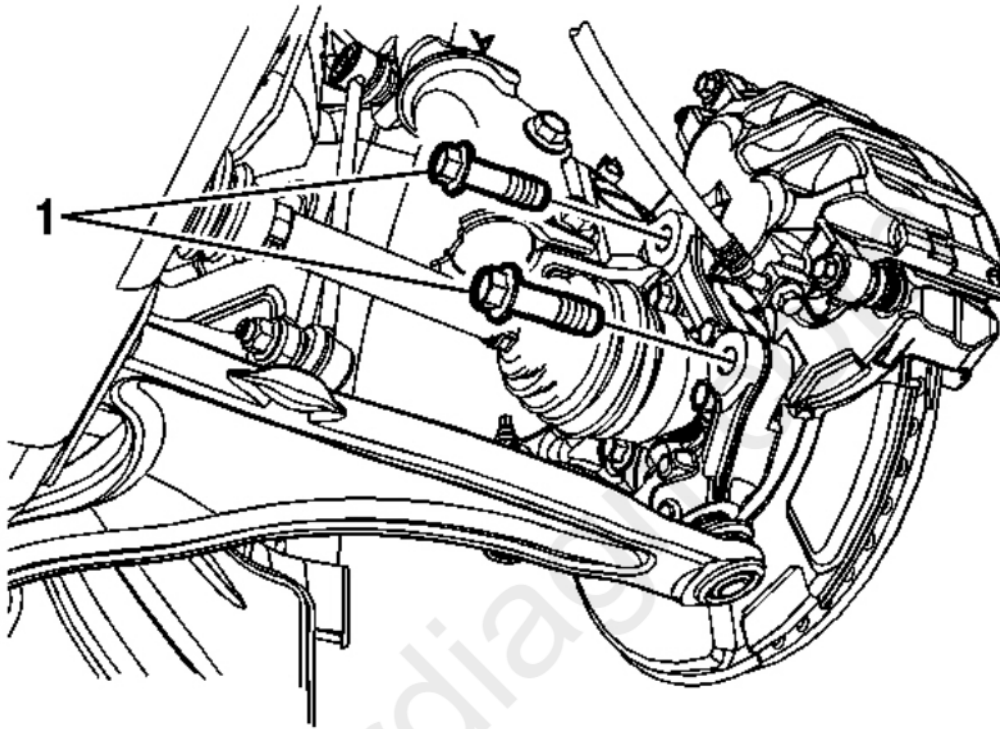


Fig. 84: Identifying Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

9. Position the brake caliper and bracket assembly to the vehicle.
10. Install the brake caliper bracket bolts (1) and tighten to 110 N.m (81 lb ft).
11. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation**.

REAR BRAKE ROTOR REPLACEMENT

Special Tools

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

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

WARNING: Refer to Brake Dust Warning .

1. Disable the parking brake cable adjuster. Refer to Parking Brake Cable Adjuster Disabling .
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 .

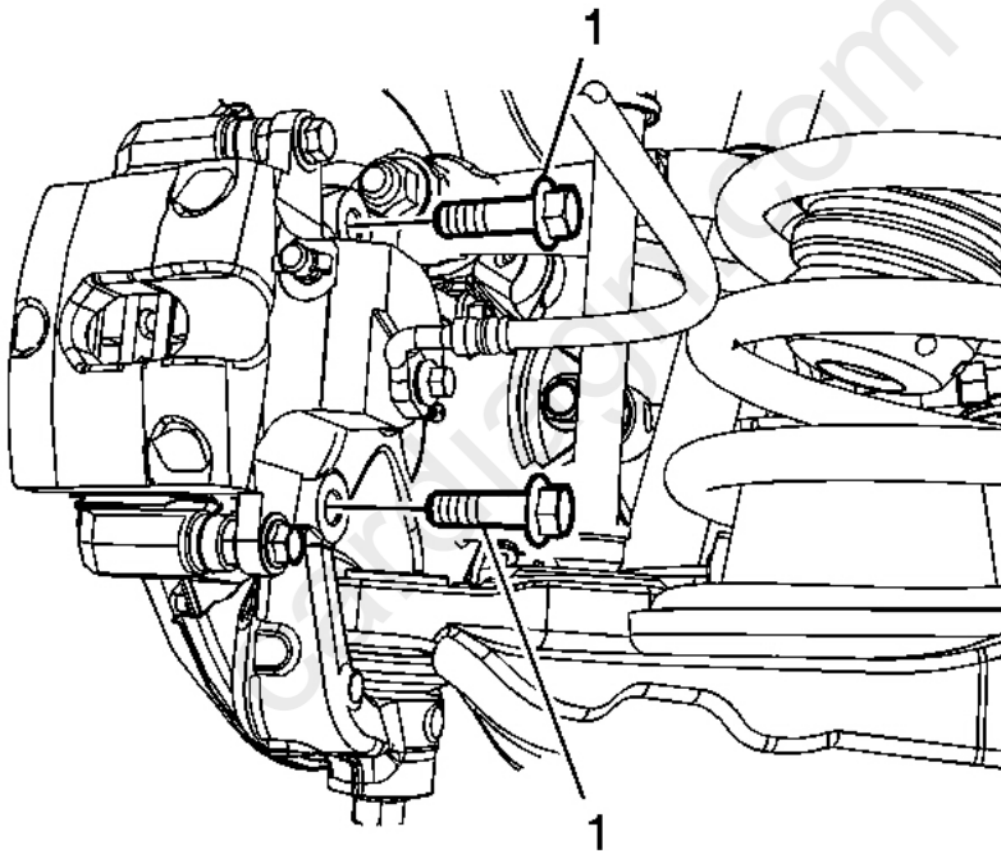


Fig. 85: Identifying Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the brake caliper bracket bolts (1).

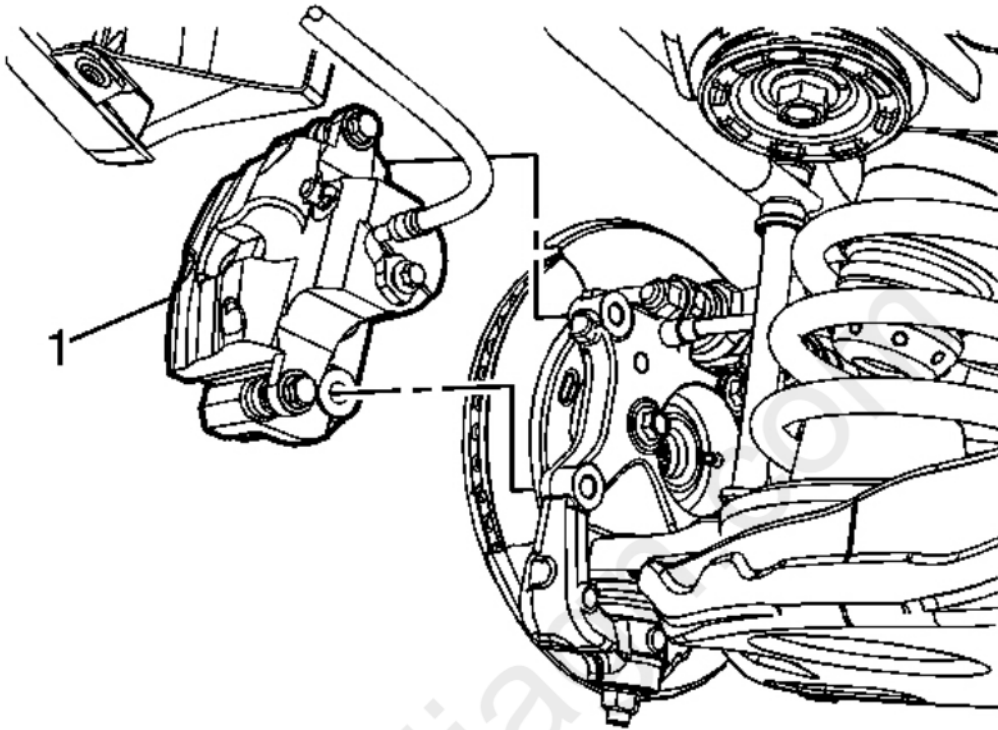


Fig. 86: View Of Disc Brake Caliper, Hose & Rotor
Courtesy of GENERAL MOTORS CORP.

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.

5. Without disconnecting the brake caliper hose, remove the brake caliper and bracket assembly (1) and support with heavy mechanics wire or equivalent.
6. If installing the original brake rotor, mark the relationship of the rotor to the wheel hub.

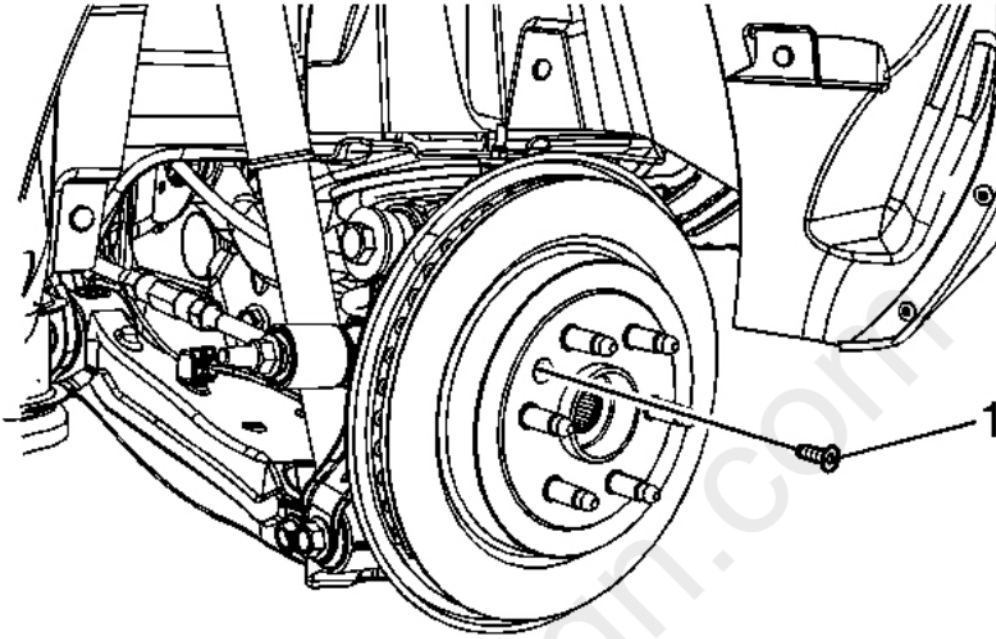


Fig. 87: View Of Brake Rotor Bolt
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake rotor bolt (1).

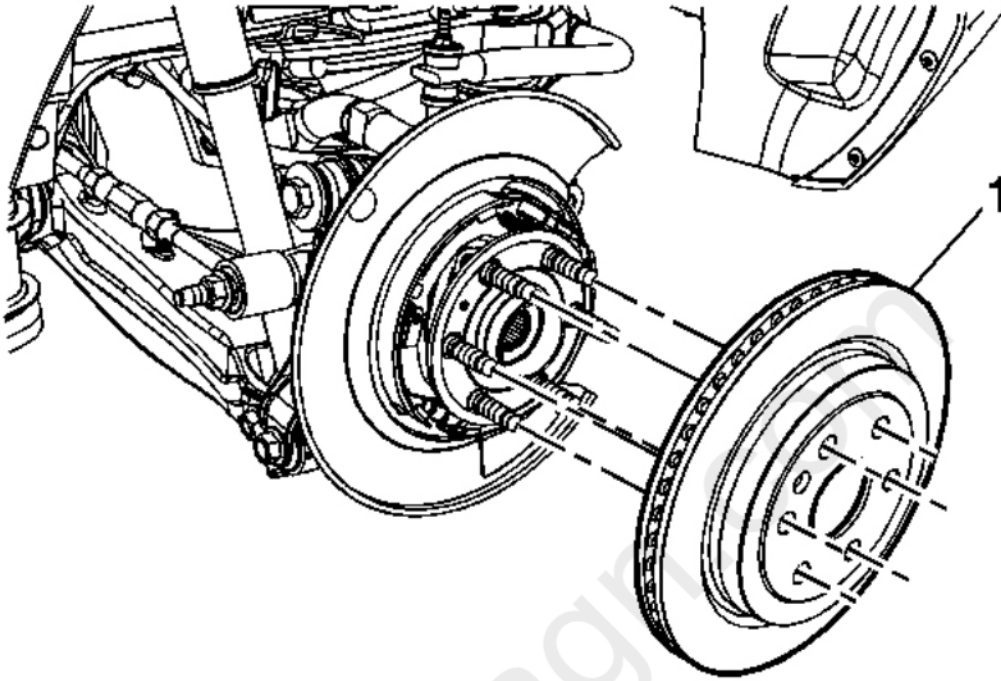


Fig. 88: View Of Disc Brake Rotor
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake rotor (1).

Installation Procedure

1. If installing a new brake rotor, clean the friction surfaces of the brake rotor with denatured alcohol.
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 rotor to the hub/axle flange.
4. Adjust the parking brake. Refer to **Parking Brake Adjustment**.

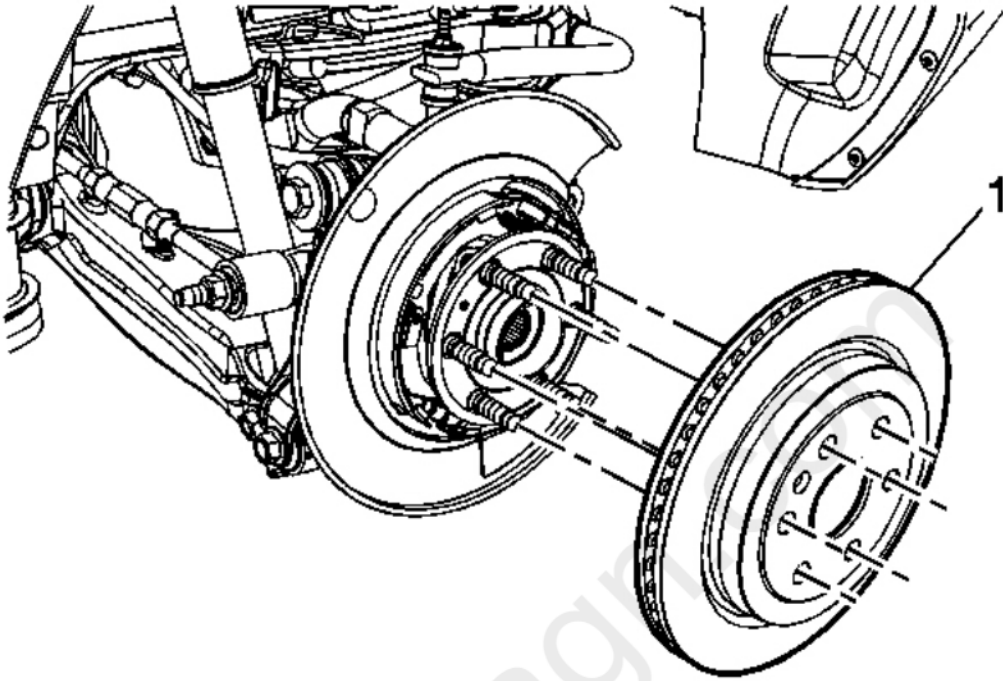


Fig. 89: View Of Disc Brake Rotor
Courtesy of GENERAL MOTORS CORP.

5. Install the brake rotor (1).

If installing the original brake rotor, align the rotor to the wheel hub as noted during removal.

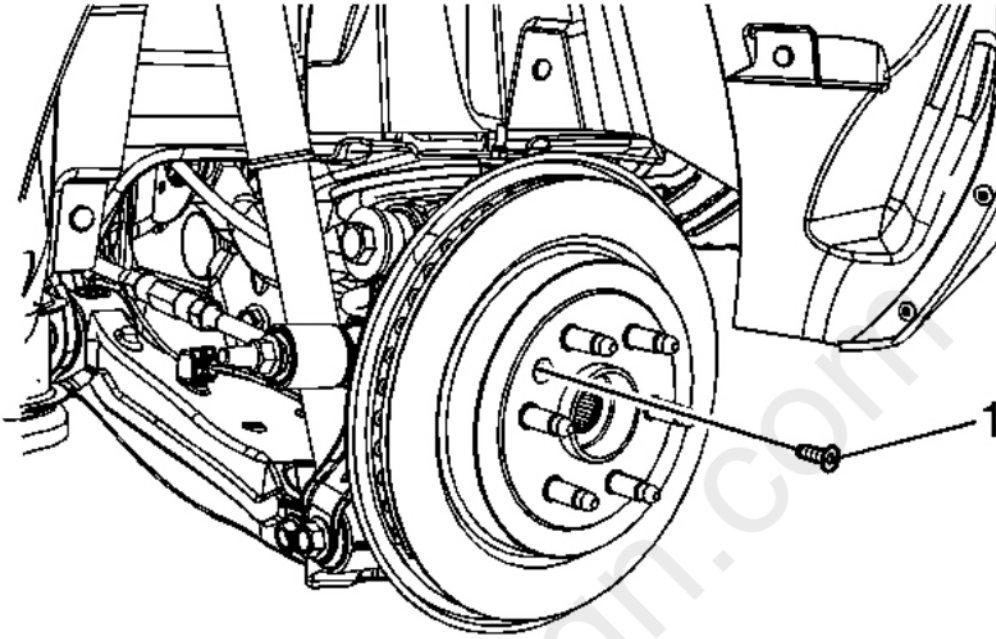


Fig. 90: View Of Brake Rotor Bolt
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

6. Install the brake rotor bolt (1) and tighten to 9 N.m (80 lb in).
7. After installing the brake rotor, measure the assembled lateral runout (LRO) of the brake rotor. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
8. If the brake rotor assembled LRO measurement exceeds specification, bring the LRO to within specification. Refer to **Brake Rotor Assembled Lateral Runout Correction**.
9. 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 caliper bracket bolts. Refer to **Adhesives Fluids Lubricants and Sealers**.
 - Ensure there are no gaps in the threadlocker along the length of the filled area of the bolts.
 - Allow the threadlocker to cure approximately 10 minutes before installation.

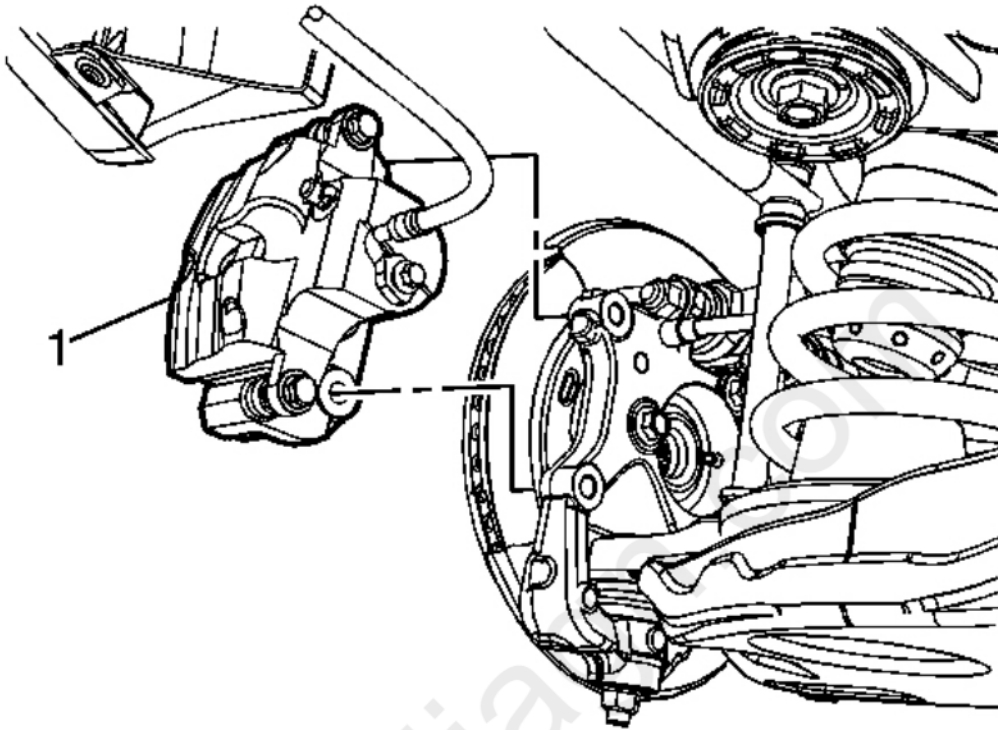


Fig. 91: View Of Disc Brake Caliper Hose Rotor
Courtesy of GENERAL MOTORS CORP.

10. Position the brake caliper and bracket assembly (1) to the vehicle.

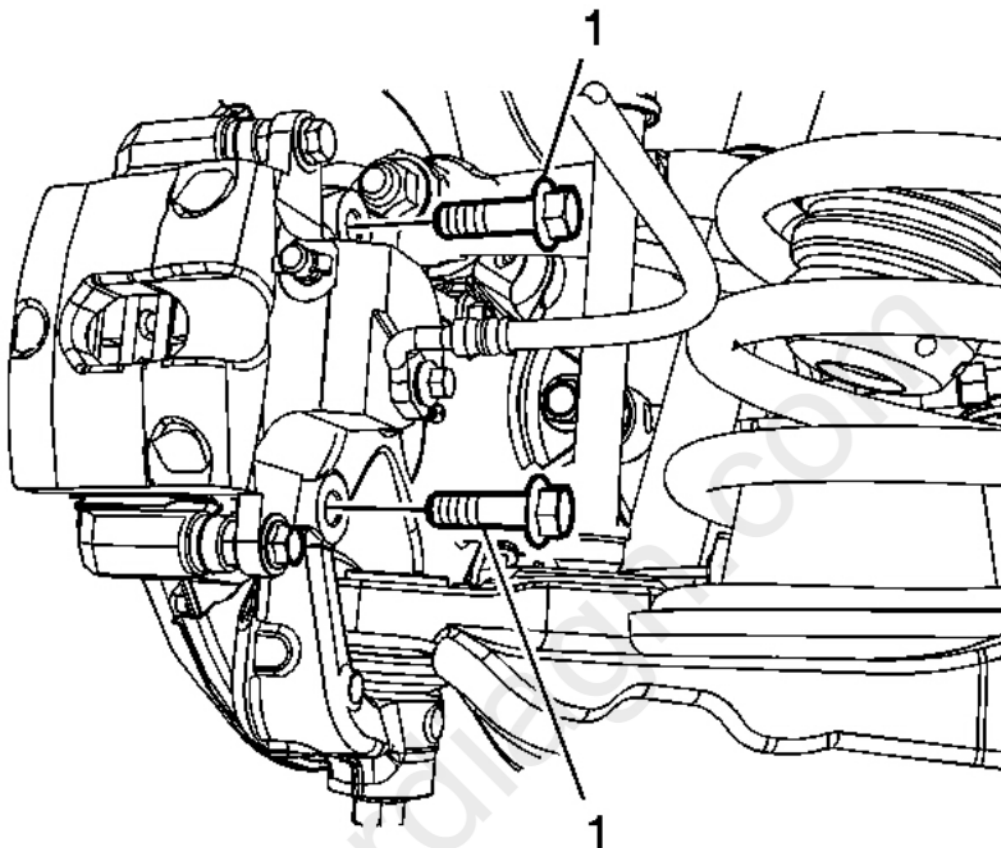


Fig. 9 : Identifying Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

11. Install the brake caliper bracket bolts (1) and tighten to 110 N.m (81 lb ft).
12. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
13. Enable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Enabling** .

FRONT BRAKE SHIELD REPLACEMENT

Removal Procedure

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

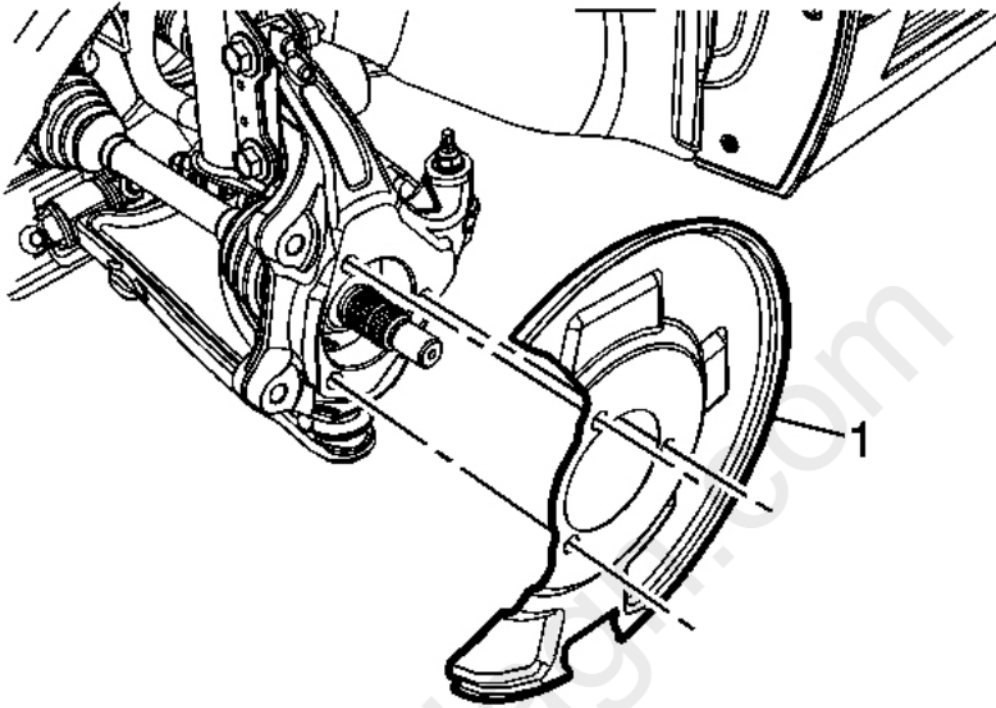


Fig. 93: View Of Front Brake Shield
Courtesy of GENERAL MOTORS CORP.

1. Remove the front wheel bearing and hub assembly. Refer to **Front Wheel Bearing and Hub Replacement** .
2. Remove the front brake shield (1).
3. Clean the front brake shield and steering knuckle mating surfaces of any corrosion.

Installation Procedure

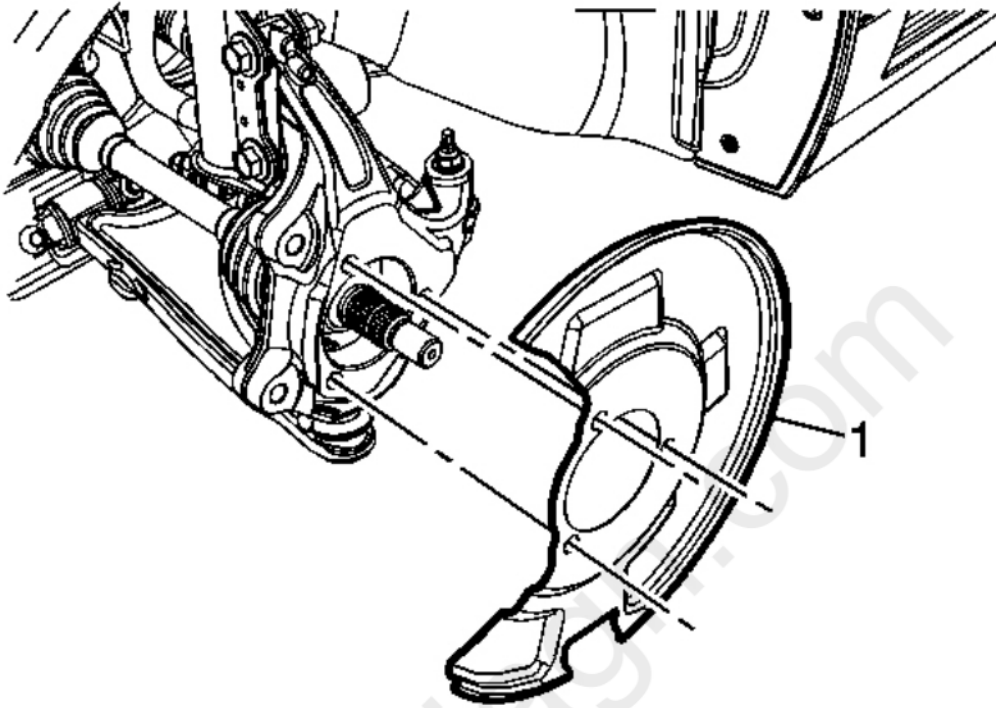


Fig. 94: View Of Front Brake Shield
Courtesy of GENERAL MOTORS CORP.

1. Install the front brake shield (1).
2. Install the front wheel bearing and hub assembly. Refer to Front Wheel Bearing and Hub Replacement .

REAR BRAKE BACKING PLATE REPLACEMENT

Removal Procedure

WARNING: Refer to Brake Dust Warning .

1. Disable the parking brake cable adjuster. Refer to Parking Brake Cable Adjuster Disabling .
2. Turn the ignition to the OFF position.
3. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
4. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
5. Remove the park brake shoes. Refer to Parking Brake Shoe Replacement .

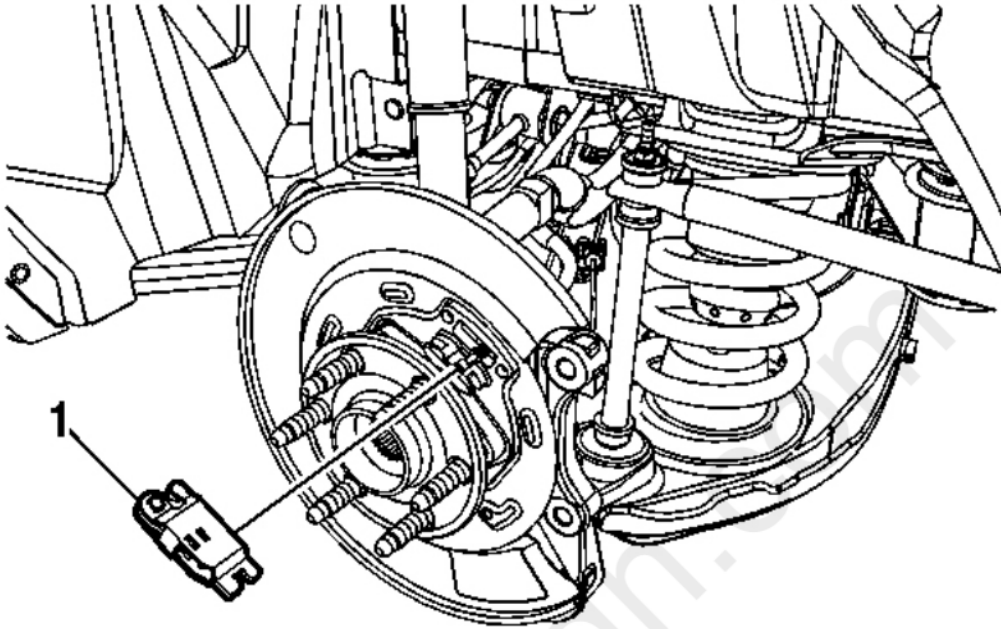


Fig. 95: Identifying Parking Brake Actuator
Courtesy of GENERAL MOTORS CORP.

6. Remove the parking brake actuator (1). Refer to **Parking Brake Actuator Replacement** .
7. Remove the rear wheel bearing and hub assembly. Refer to **Rear Wheel Bearing and Hub Replacement** .

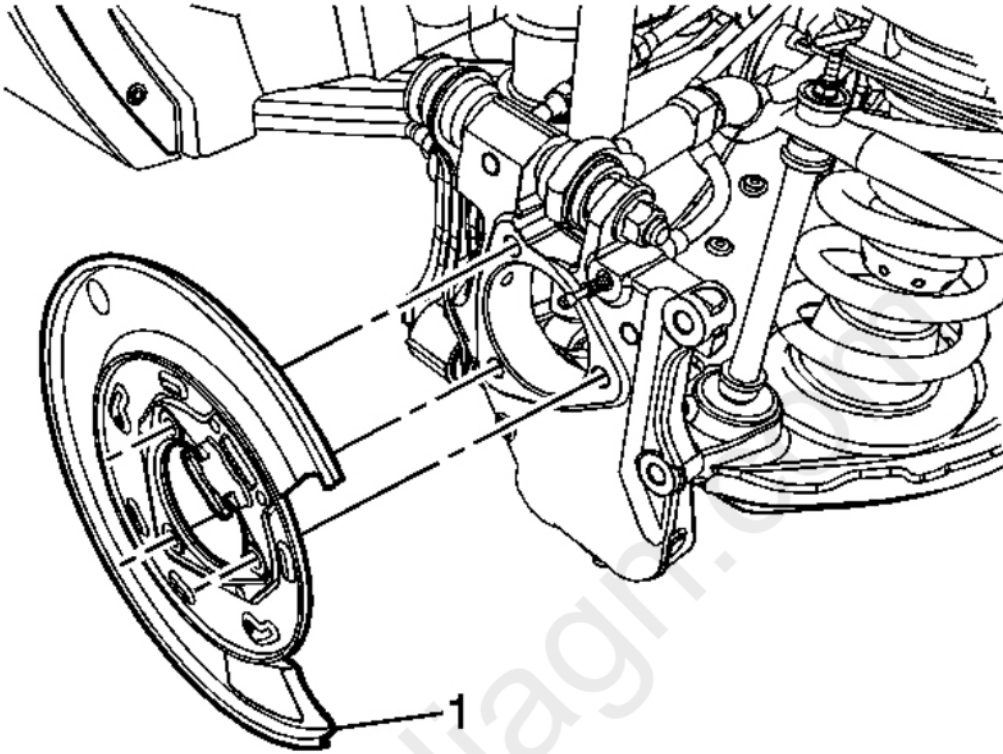


Fig. 96: View Of Rear Disc Brake Backing Plate
Courtesy of GENERAL MOTORS CORP.

8. Remove the rear disc brake backing plate (1).

Installation Procedure

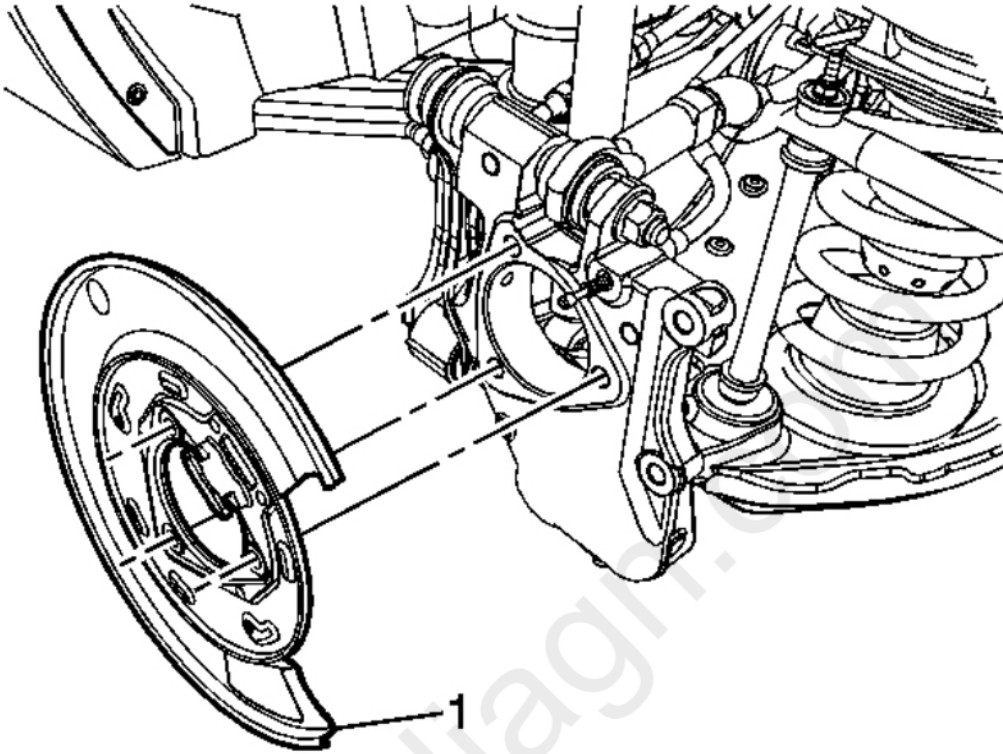


Fig. 97: View Of Rear Disc Brake Backing Plate
Courtesy of GENERAL MOTORS CORP.

1. Install the rear disc brake backing plate (1).
2. Install the rear wheel bearing and hub assembly. Refer to **Rear Wheel Bearing and Hub Replacement** .

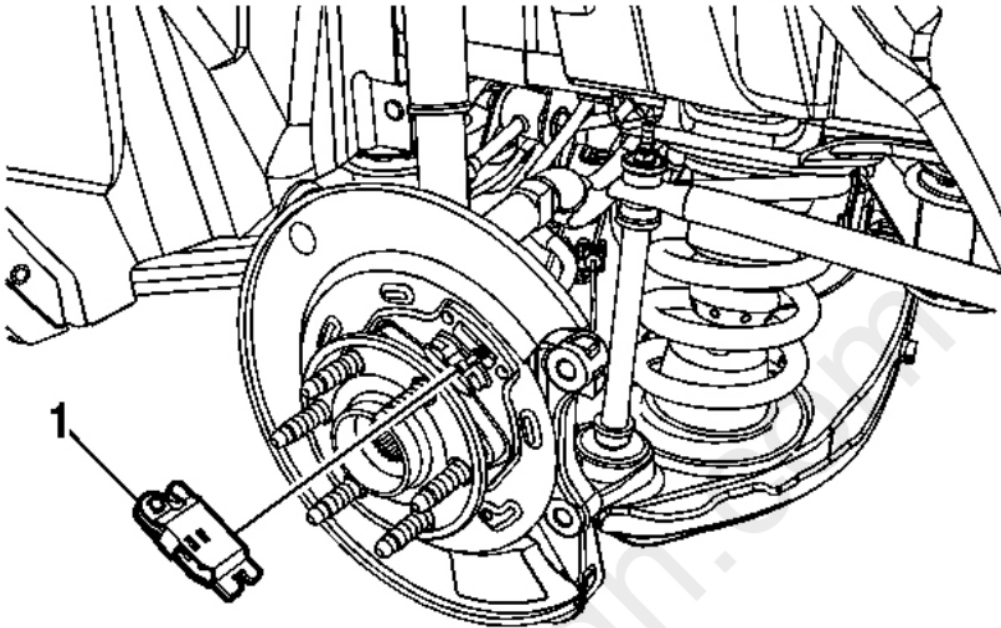


Fig. 98: Identifying Parking Brake Actuator
Courtesy of GENERAL MOTORS CORP.

3. Install the parking brake actuator (1). Refer to [Parking Brake Actuator Replacement](#) .
4. Install the park brake shoes. Refer to [Parking Brake Shoe Replacement](#) .
5. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .
6. Enable the parking brake cable adjuster. Refer to [Parking Brake Cable Adjuster Enabling](#) .

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. Refer to [Brake Rotor Thickness Variation Measurement](#).
- Brake rotor assembled lateral runout (LRO) exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 00-11 00 km (,000- ,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.

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- The indexing method of correcting assembled LRO is most effective when the LRO specification is only exceeded by a relatively small amount: 0.025-0.127 mm (0.001-0.005 in). Indexing is used to achieve the best possible match of high spots to low spots between related components. Refer to **Brake Rotor Assembled Lateral Runout Correction - Indexing**.
- The correction plate method of correcting assembled LRO involves the addition of a tapered plate between the brake rotor and the hub/axle flange. The correction plate method can be used to correct LRO that exceeds the specification by up to 0.23 mm (0.009 in). Refer to **Brake Rotor Assembled Lateral Runout Correction - Correction Plates**.
- The on-vehicle brake lathe method is used to bring the LRO to within specifications through compensating for LRO while refinishing the brake rotor. Refer to **Brake Rotor Assembled Lateral Runout Correction - On Vehicle Lathe**.

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

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - INDEXING

Special Tools

- **CH-39544-KIT:** Complete Torque Socket Set - 10 PCS, or equivalent
- **CH-45101-100:** Conical Brake Rotor Washers

For equivalent regional tools, refer to **Special Tools**.

Indexing Procedure

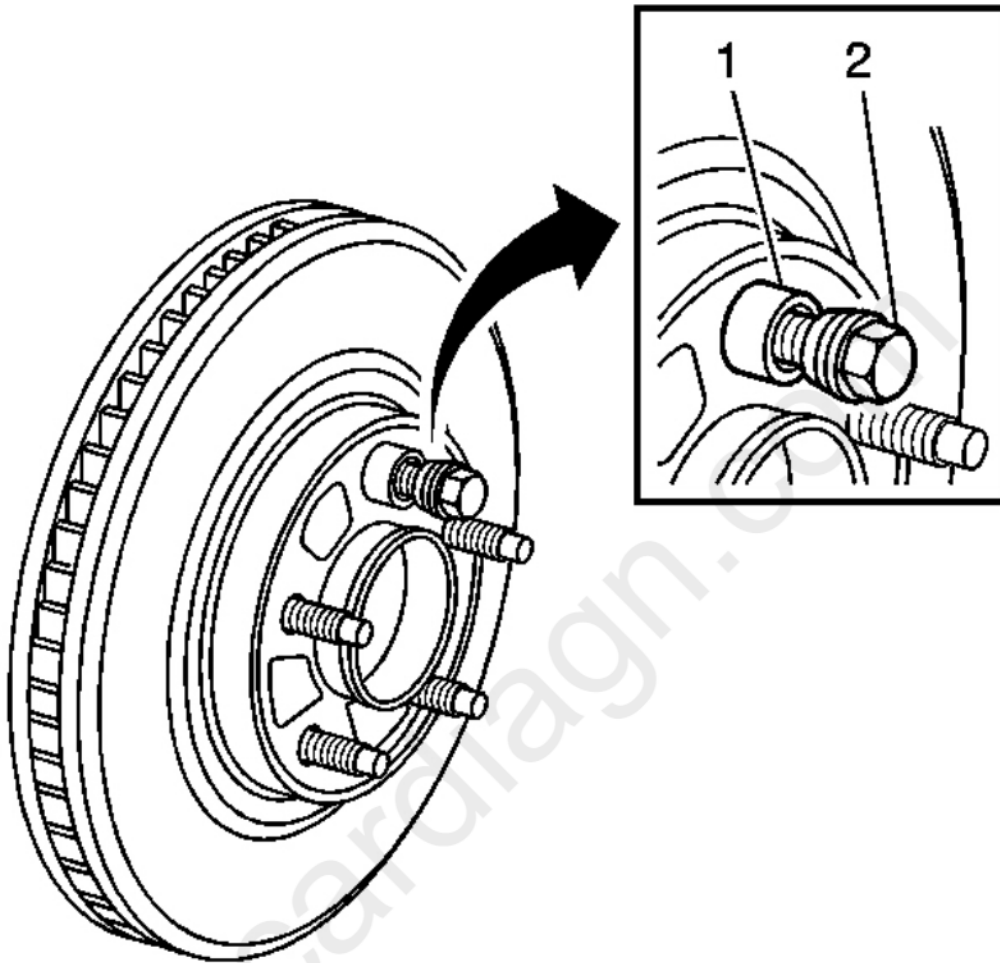


Fig 1 : Identifying Special Tools - 45101-100 Lug Nut
Courtesy of GENERAL MOTORS CORP

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

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**rotor over time, usually between , 00-11, 00 km (,000- ,000 mi).
Refer to Brake Rotor Assembled Lateral Runout Measurement.**

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

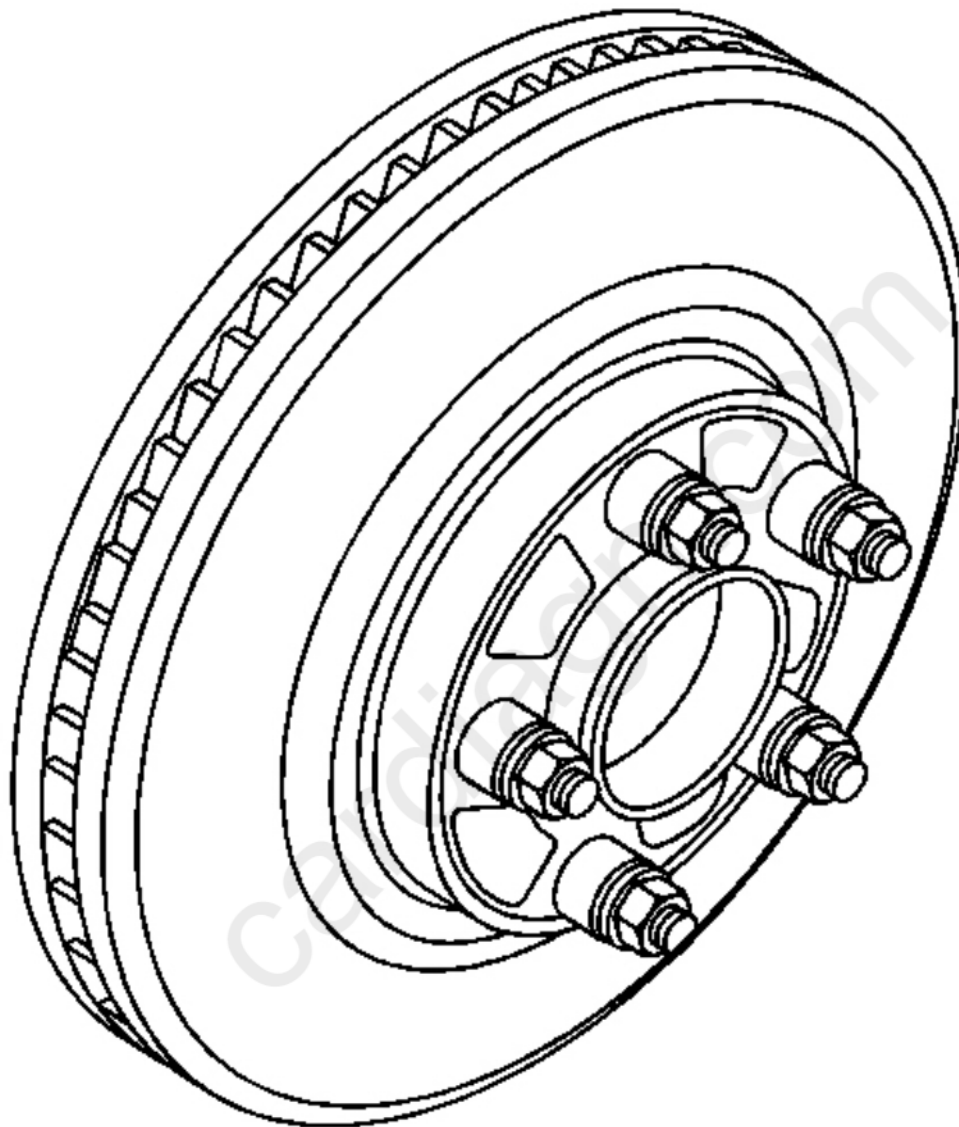


Fig 100: Identifying All Special Tools CH-45101-100s Lug Nuts
Courtesy of GENERAL MOTORS CORP

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.
7. Using the **CH-3 544-KIT:** complete Torque socket set 10 P, or equivalent, 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**.

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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. Mark 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: Original Brake Rotor Washers** and the lug nuts.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - CORRECTION PLATES

Special Tools

- **CH-3 544-KIT:** Complete Torque Socket Set 10 P, or equivalent
- **CH-45101-100:** Original Brake Rotor Washers

For equivalent regional tools, refer to **Special Tools**.

Correction Procedure

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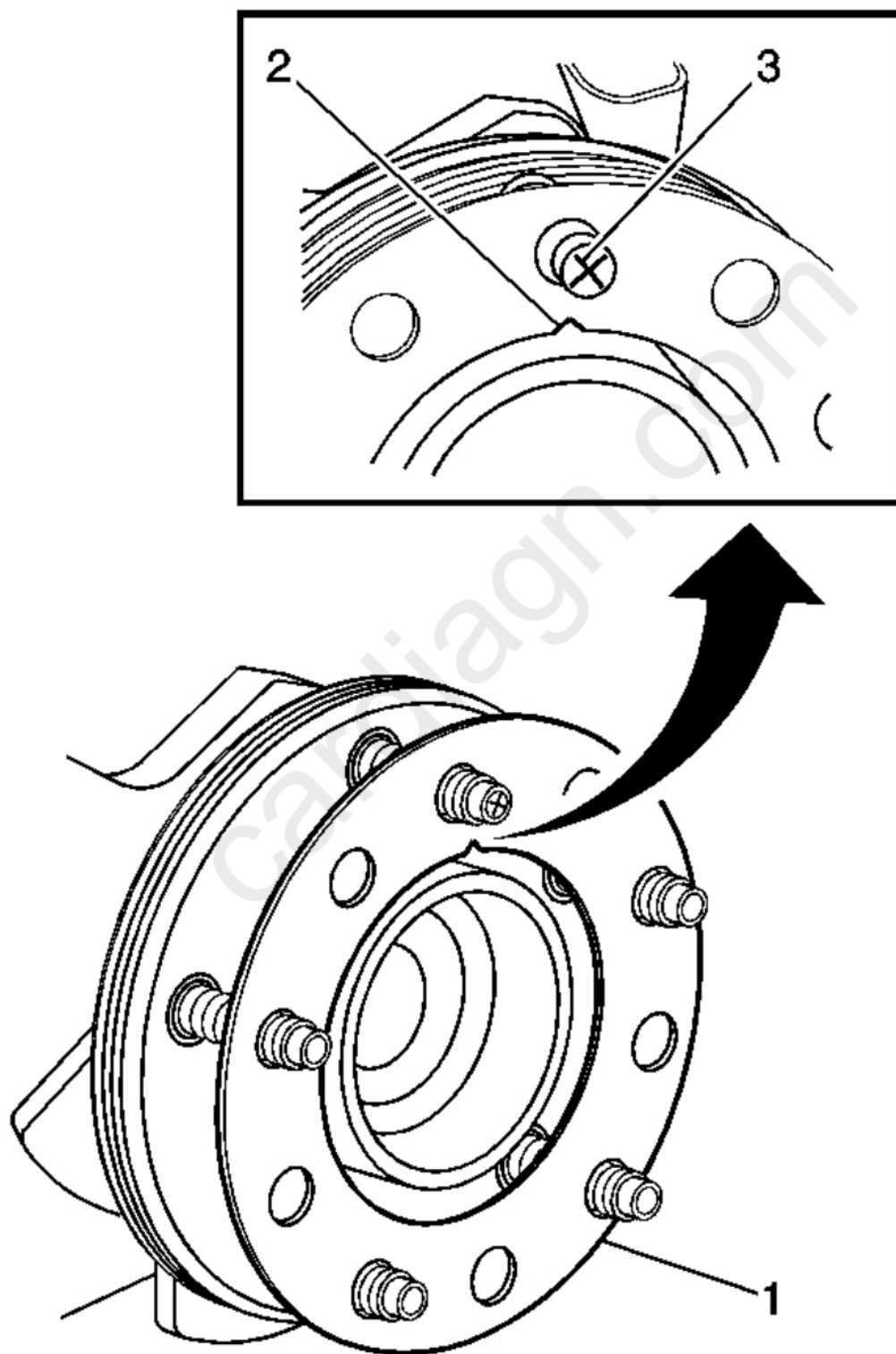


Fig 101: Identifying Correction Plate High Spot Mark -Shaped Notch
Courtesy of GENERAL MOTORS CORP

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 0,00-11,00 km (0,000-11,000 mi). Refer to Brake Rotor Assembled Lateral Runout Measurement.

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

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.

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

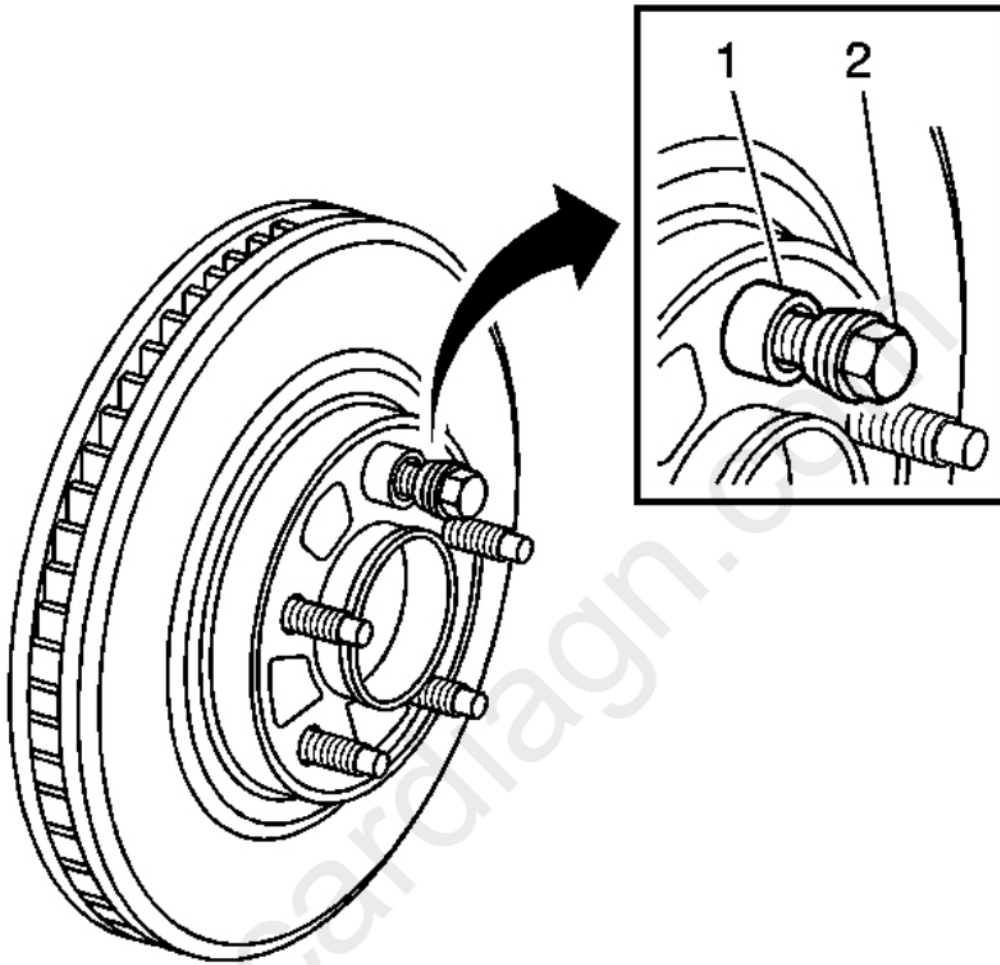


fig 102: Identifying Special Tools - 45101-100 Lug Nut
Courtesy of GENERAL MOTORS CORP

7. Install the brake rotor to the hub/axle flange. Use the matchmark made prior to removal for proper orientation to the flange.
8. Hold the rotor firmly in place against the hub/axle flange and install one of the **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.

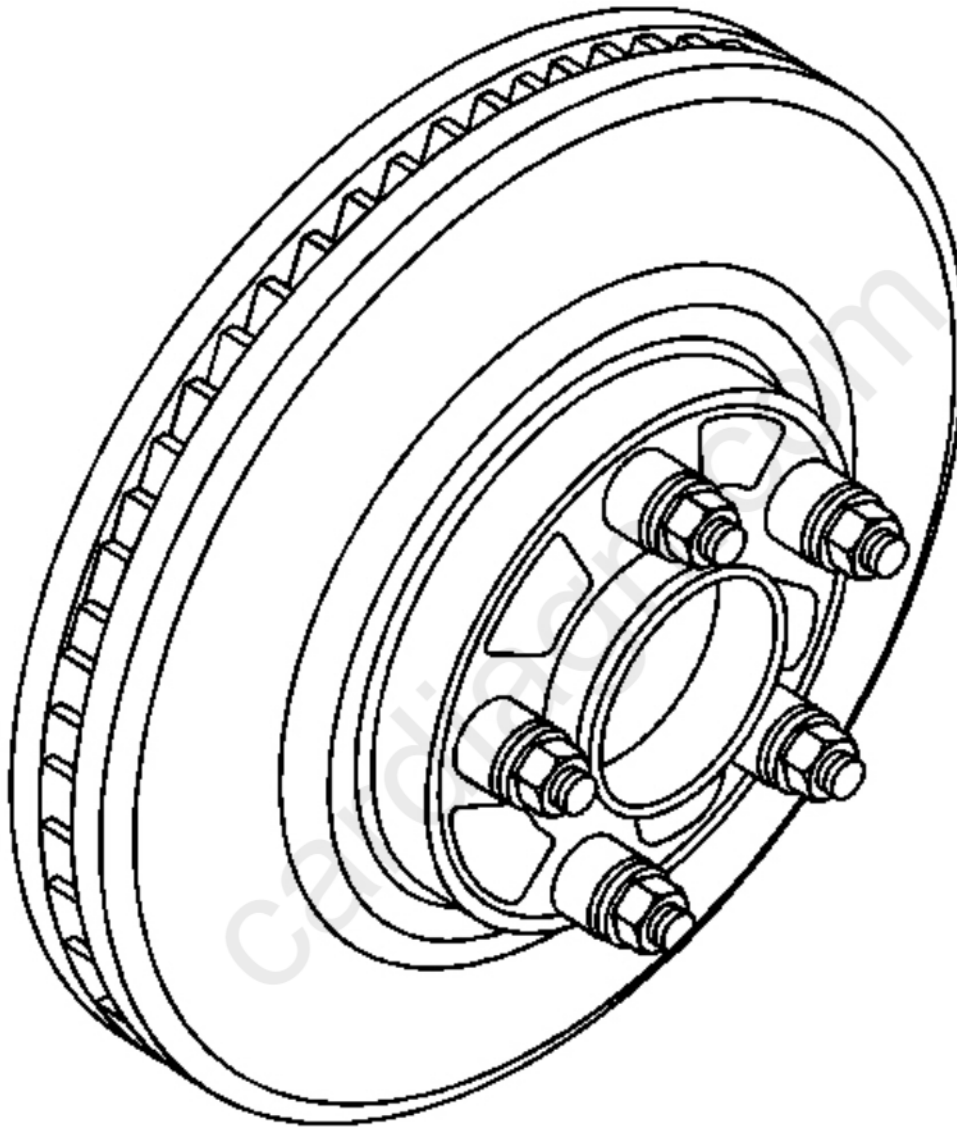


Fig 103: Identifying All Special Tools 45101-100s Lug Nuts
Courtesy of GENERAL MOTORS CORP

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.
11. Using the **CH-3 544-KIT: Complete Torque Socket Set - 10 PCS**, or equivalent, 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

Special Tools

CH-45101-100: Conical Brake Rotor Washers

For equivalent regional tools, refer to **Special Tools**.

Correction Procedure

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 100-1100 km (,000- ,000 mi). Refer to **Brake Rotor Assembled Lateral Runout Measurement**.

1. Ensure that the caliper and caliper bracket that are already being supported, are clear from contacting any rotating components, such as the brake rotor.
2. Remove the **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:

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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**.

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

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.

Refinishing Procedure

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.

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.
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 denatured alcohol, or an equivalent approved brake cleaner and wipe each friction surface using a clean shop towel to remove metal particles remaining from machining. Repeat the cleaning process if necessary to remove all metal particles.
13. Remove the brake rotor from the brake lathe.
14. Measure the assembled LRO of the brake rotor to ensure optimum performance of the disc brakes. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
15. If the brake rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.

DESCRIPTION AND OPERATION

DISC BRAKE SYSTEM DESCRIPTION AND OPERATION

System Component Description

The disc brake system consists of the following components:

Disc Brake Pads

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

Disc Brake Rotors

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

Disc Brake Pad Hardware

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

Disc Brake Caliper Hardware

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

System Operation

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

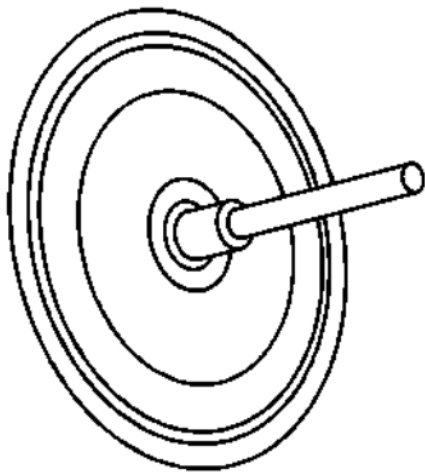
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

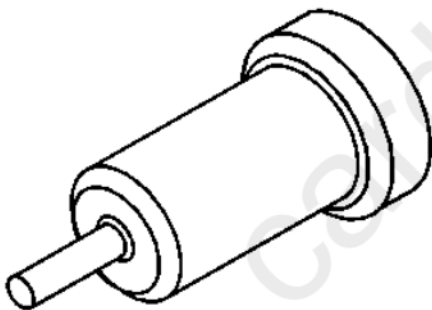
Illustration	Tool Number/Description
	J 39544-KIT Complete Torque Socket Set - 10 Pieces

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J 41013
Rotor Resurfacing Kit

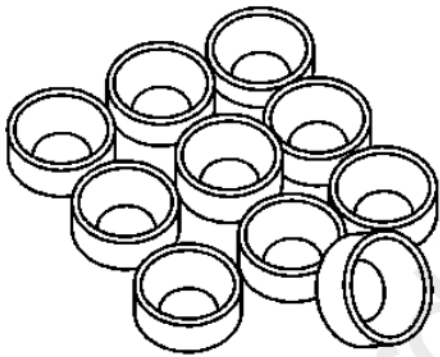


J 42450-A
Wheel Hub Resurfacing Kit

J 45101
Hub and Wheel Runout Gauge

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J 45101-100
Conical Brake Rotor Washers

