2007 BRAKES

Disc Brakes - Avalanche, Escalade, Suburban, Tahoe & Yukon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Caliper Bleeder Screw	12 N.m	106 lb in
Brake Caliper Bracket Mounting Bolt, Front (1500 Series)	200 N.m	148 lb ft
Brake Caliper Bracket Mounting Bolt, Front (2500 Series)	300 N.m	221 lb ft
Brake Caliper Bracket Mounting Bolt, Rear (1500 Series)	165 N.m	122 lb ft
Brake Caliper Bracket Mounting Bolt, Rear (2500 Series)	200 N.m	148 lb ft
Brake Caliper Guide Pin Bolt, Front (1500 Series)	100 N.m	74 lb ft
Brake Caliper Guide Pin Bolt, Front (2500 Series)	108 N.m	80 lb ft
Brake Caliper Guide Pin Bolt, Rear (1500 Series)	38 N.m	28 lb ft
Brake Caliper Guide Pin Bolt, Rear (2500 Series)	108 N.m	80 lb ft
Brake Disc Retaining Screw (1500 Series)	12 N.m	106 lb in
Brake Hose to Caliper Bolt (1500 Series)	40 N.m	30 lb ft
Brake Hose to Caliper Bolt (2500 Series)	45 N.m	33 lb ft

DISC BRAKE COMPONENT SPECIFICATIONS

Disc Brake Component Specifications

Application	Specification	
	Metric	English
Front Brakes JD9		
• Rotor Discard Thickness	27.50 mm	1.0826 in
• Rotor Minimum Allowable Thickness After Refinish	28.0 mm	1.102 in
• Rotor Thickness (new)	30.0 mm	1.181 in
• Rotor Maximum Allowable Lateral Runout	0.05 mm	0.001 in
• Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
• Rotor Maximum Allowable Thickness Variation	0.009 mm	0.0004 in
Front Brakes JH6		
• Rotor Discard Thickness	36.50 mm	1.437 in
• Rotor Minimum Allowable Thickness After Refinish	37.0 mm	1.457 in
• Rotor Thickness (new)	38.0 mm	1.496 in

cardiagn.com

• Rotor Maximum Allowable Lateral Runout	0.13 mm	0.005 in
• Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
• Rotor Maximum Allowable Thickness Variation	0.025 mm	0.001 in
Rear Brakes JD9		
• Rotor Discard Thickness	18.0 mm	0.709 in
• Rotor Minimum Allowable Thickness After Refinish	18.5 mm	0.7282 in
• Rotor Thickness (new)	20.0 mm	0.787 in
• Rotor Maximum Allowable Lateral Runout	0.25 mm	0.010 in
• Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
• Rotor Maximum Allowable Thickness Variation	0.009 mm	0.0004 in
Rear Brakes JH6		
• Rotor Discard Thickness	27.5 mm	1.083 in
• Rotor Minimum Allowable Thickness After Refinish	28.0 mm	1.102 in
• Rotor Thickness (new)	30.0 mm	1.181 in
• Rotor Maximum Allowable Lateral Runout	0.13 mm	0.005 in
• Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
• Rotor Maximum Allowable Thickness Variation	0.025 mm	0.001 in
• Rotor Maximum Allowable Thickness Variation	0.025 mm	0.001 in
* All brake rotors have a discard dimension cast into them. Replace any rotor that does not meet this specification. After refinishing the rotor, replace any rotor that does not meet the minimum thickness specifications.		

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - DISC BRAKES

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

BRAKE ROTOR THICKNESS MEASUREMENT

CAUTION: Refer to Brake Dust Caution .

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the caliper with the brake pads. Refer to **Front Disc Brake Pads Replacement (1500 Series)** or **Front Disc Brake Pads Replacement (2500 Series)** and/or **Rear Disc Brake Pads Replacement (1500 Series)** or **Rear Disc**

cardiagn.com

Brake Pads Replacement (2500 Series).

2. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.

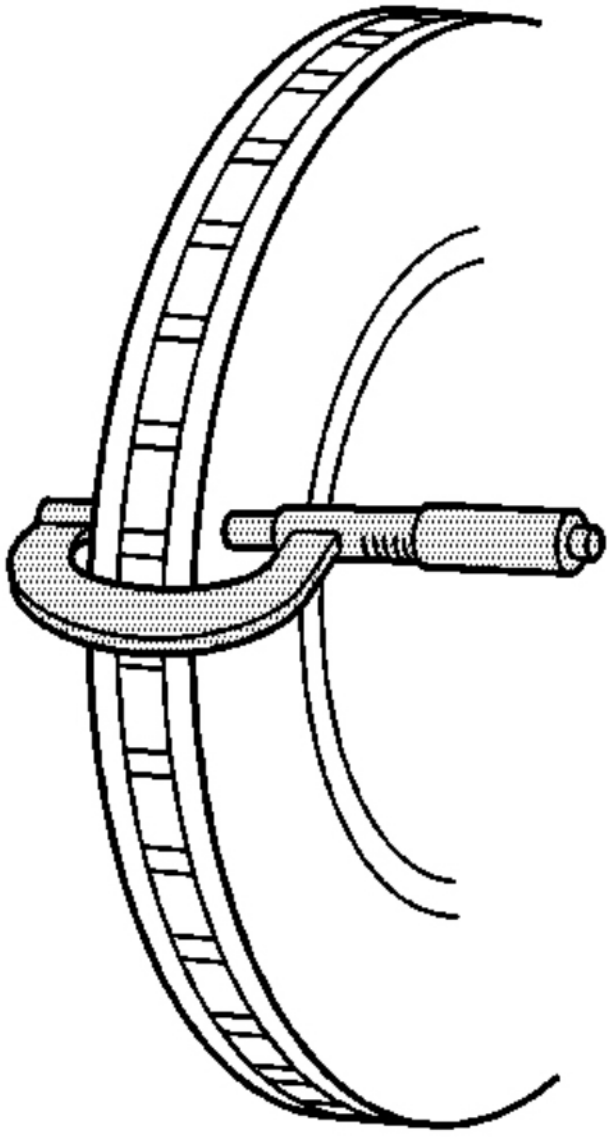


Fig. 1: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP.

cardiagn.com

3. Using a micrometer calibrated in thousanths-of-a-millimeter, or ten-thousanths-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 to the following specifications:
   - **Specification - Front Brake JH6/JD9:**
     - Brake rotor minimum allowable thickness after refinishing 37.0 mm (1.457 in)
     - Brake rotor discard thickness 36.50 mm (1.437 in)
   - **Specification - Rear Brake JH6:**
     - Brake rotor minimum allowable thickness after refinishing 28.0 mm (1.102 in)
     - Brake rotor discard thickness 27.50 mm (1.083 in)
   - **Specification - Rear Brake JD9:**
     - Brake rotor minimum allowable thickness after refinishing 18.5 mm (0.728 in)
     - Brake rotor discard thickness 18.0 mm (0.709 in)
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

CAUTION: Refer to Brake Dust Caution .

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

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the caliper with the brake pads. Refer to **Front Disc Brake Pads Replacement (1500 Series)** or **Front Disc Brake Pads Replacement (2500 Series)** and/or **Rear Disc Brake Pads Replacement (1500 Series)** or **Rear Disc Brake Pads Replacement (2500 Series)**.
2. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.

cardiagn.com

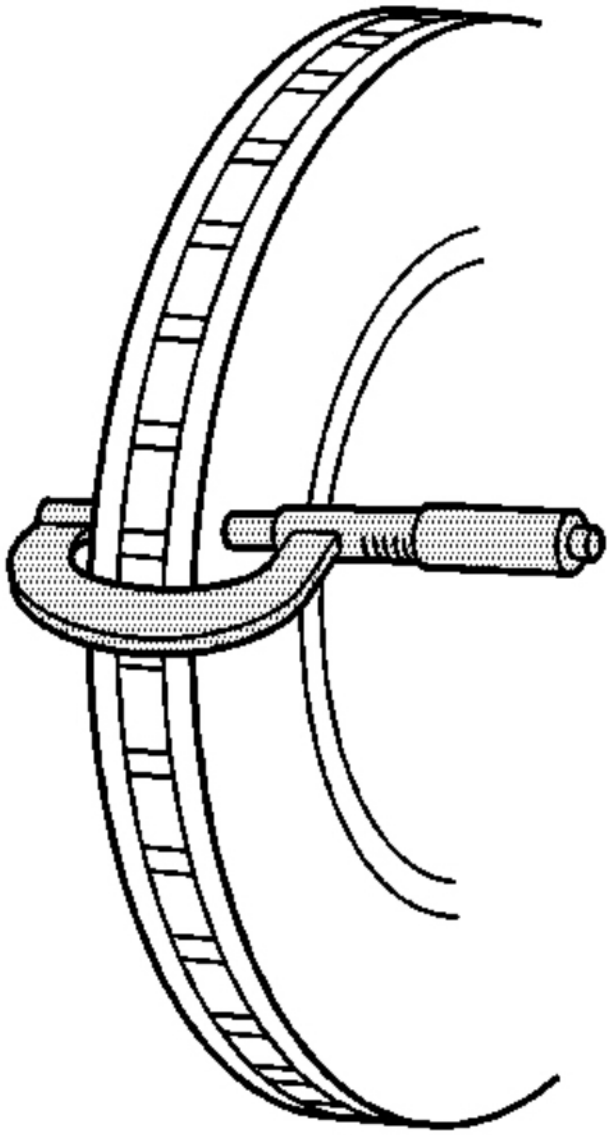


Fig. 2: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP.

3. Using a micrometer calibrated in thousanths-of-a-millimeter, or ten-thousanths-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

cardiagn.com

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 measurement recorded to obtain the amount of thickness variation.
5. Compare the thickness variation measurement to the following specifications:
   - **Specification - JH6, JD9 Front and JH6 Rear:** Brake rotor maximum allowable thickness variation: 0.025 mm (0.001 in)
   - **Specification - JD9 Rear:** Brake rotor maximum allowable thickness variation: 0.009 mm (0.0004 in)

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

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

BRAKE ROTOR SURFACE AND WEAR INSPECTION

CAUTION: Refer to Brake Dust Caution .

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the caliper with the brake pads. Refer to **Front Disc Brake Pads Replacement (1500 Series)** or **Front Disc Brake Pads Replacement (2500 Series)** and/or **Rear Disc Brake Pads Replacement (1500 Series)** or **Rear Disc Brake Pads Replacement (2500 Series)**.
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.

cardiagn.com

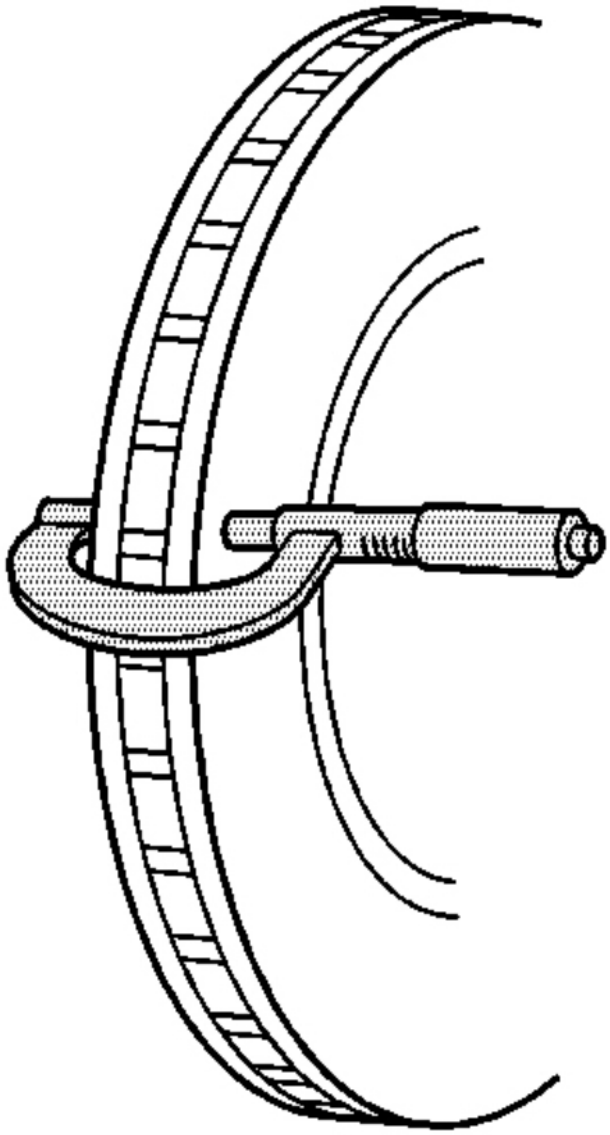


Fig. 3: Measuring Brake Rotor Thickness
Courtesy of GENERAL MOTORS CORP.

5. Using a micrometer calibrated in thousanths-of-a-millimeter, or ten-thousanths-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:

cardiagn.com

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

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

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT MEASUREMENT

Tools Required

- **J 39544-KIT** Torque-Limiting Socket Set, or equivalent. See **Special Tools**.
- **J 41013** Rotor Resurfacing Kit. See **Special Tools**.
- **J 42450-A** Wheel Hub Resurfacing Kit. See **Special Tools**.
- **J 45101** Hub and Wheel Runout Gage. See **Special Tools**.
- **J 45101-100** Conical Brake Rotor Washers. See **Special Tools**.

CAUTION: Refer to Brake Dust Caution .

IMPORTANT:

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

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

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

2. Inspect the mating surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles, corrosion, rust, or debris remaining. If the wheel hub/axle flange and/or if the brake rotor mating surfaces exhibit these conditions, perform the following steps:
    1. Remove the brake rotor from the vehicle. Refer to **Front Brake Rotor Replacement (1500 Series)** **Front Brake Rotor Replacement (2500 Series)** and/or **Rear Brake Rotor Replacement (1500 Series)Rear Brake Rotor Replacement (2500 Series)** .
    2. Using the **J 42450-A** , thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange. See **Special Tools**.
    3. Using the **J 41013** , thoroughly clean any rust or corrosion from the mating surface of the brake

cardiagn.com

rotor. See **Special Tools**.

4. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.

3. Install the rotor to the hub/axle flange using the matchmark made prior to removal.

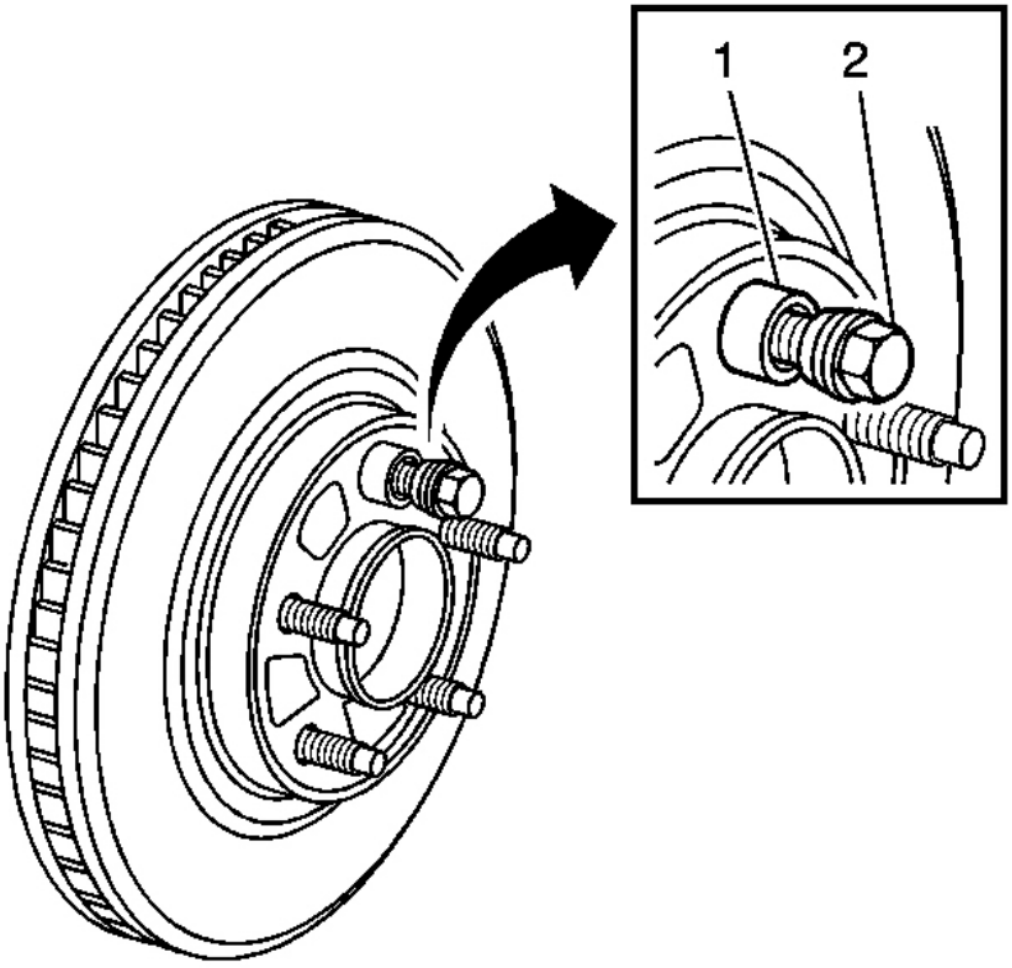


Fig. 4: Identifying J 45101-100 & Lug Nut
Courtesy of GENERAL MOTORS CORP.

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

cardiagn.com

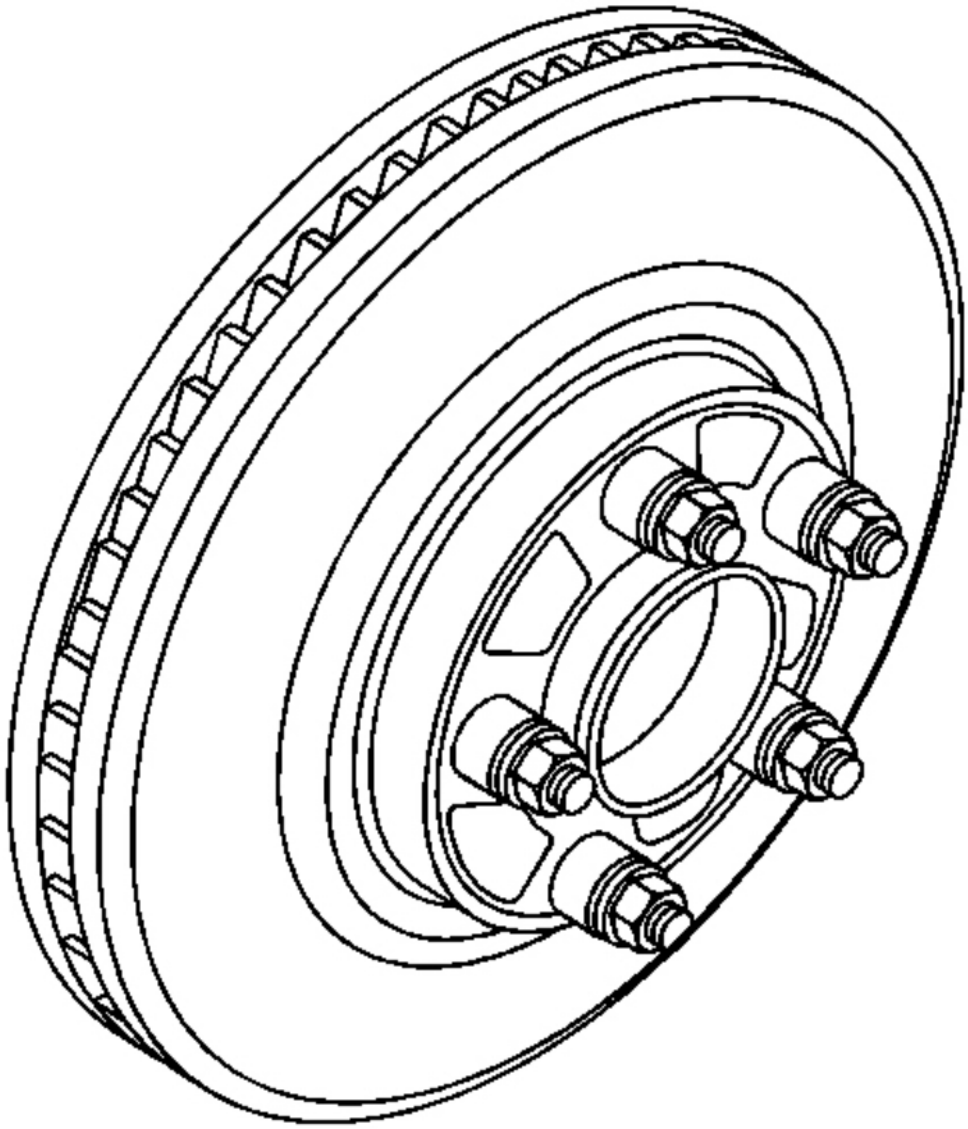


Fig. 5: Identifying Brake Rotor
Courtesy of GENERAL MOTORS CORP.

6. Install the remaining **J 45101-100** and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern. See **Special Tools**.
7. Using the **J 39544-KIT** , or equivalent, tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. See **Special Tools**. Refer to **Tire and Wheel Removal and Installation** .

cardiagn.com

8. If the brake rotor has been REFINISHED or REPLACED with a new rotor, proceed to step 14.
9. If the brake rotor meets the following criteria, proceed to step 10.
    - The rotor is within specifications and is being REUSED
    - The rotor has NOT been refinished
    - The rotor does NOT exhibit thickness variation exceeding the maximum allowable level

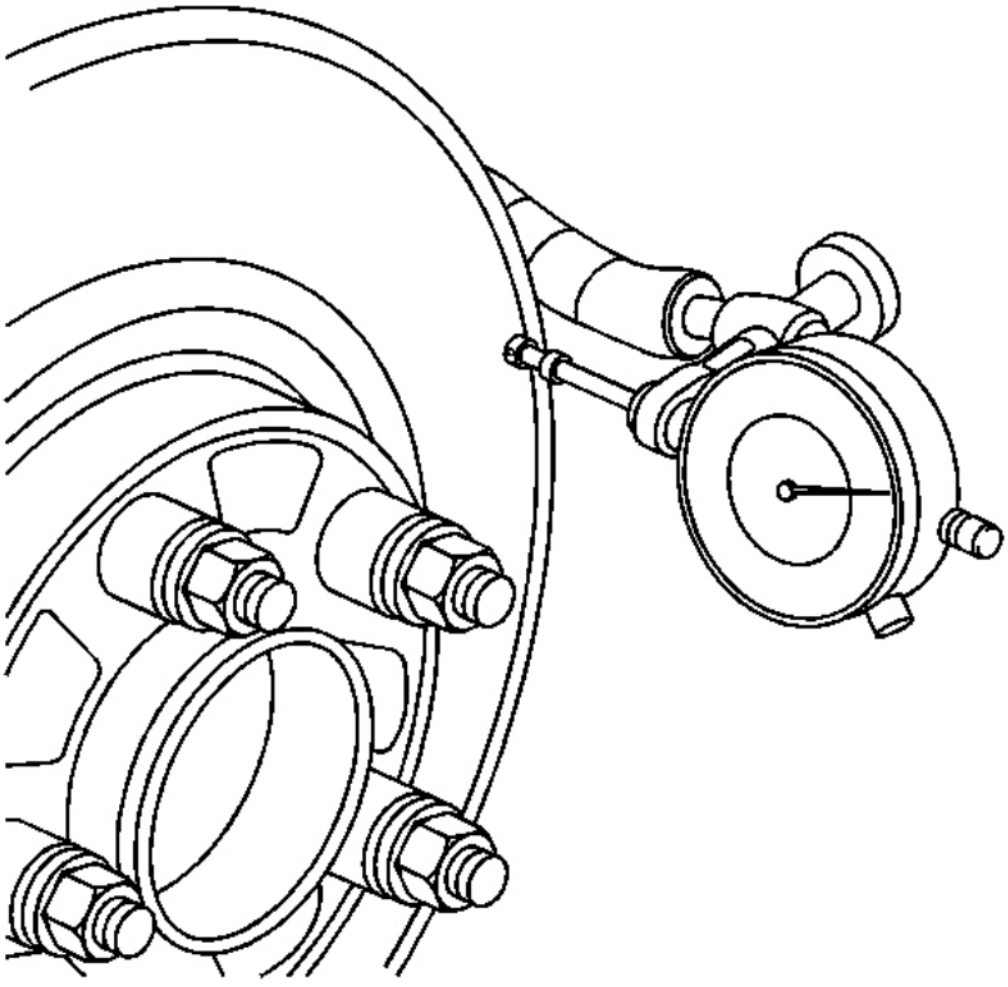


Fig. 6: Mounting Dial Indicator To Measure Lateral Runout
Courtesy of GENERAL MOTORS CORP.

10. Mount a dial indicator, **J 45101** , or equivalent, to the steering knuckle and position the indicator button so it contacts the brake rotor friction surface at a 90 degree angle, approximately 13 mm (0. See **Special**

cardiagn.com

Tools.5 in) from the outer edge of the rotor.

11. Measure and record the assembled LRO of the brake rotor.
    1. Rotate the rotor until the lowest reading is displayed on the indicator dial, then set the dial to zero.
    2. Rotate the rotor until the highest reading is displayed on the dial.
    3. Mark the location of the high spot relative to the nearest wheel stud, or studs.
    4. Measure and record the amount of LRO.
12. Compare the brake rotor assembled LRO to the following specifications:
    - **Specification - JH6, JD9 Front and JH6 Rear:** Brake rotor maximum allowable assembled lateral runout: 0.13 mm (0.005 in)
    - **Specification - JD9 Rear:** Brake rotor maximum allowable assembled lateral runout: 0.25 mm (0.010 in)
13. If the brake rotor assembled LRO is within specifications, proceed to step 18.

    If the brake rotor assembled LRO exceeds the specification, refinish the rotor to ensure true parallelism, refer to **Brake Rotor Refinishing**. After refinishing the rotor, proceed to step 14.
14. Mount a dial indicator, **J 45101** , or equivalent, to the steering knuckle and position the indicator button so it contacts the brake rotor friction surface at a 90 degree angle, approximately 13 mm (0. See **Special Tools**.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 - JH6, JD9 Front and JH6 Rear:** Brake rotor maximum allowable assembled lateral runout: 0.13 mm (0.005 in)
    - **Specification - JD9 Rear:** Brake rotor maximum allowable assembled lateral runout: 0.25 mm (0.010 in)
17. If the brake rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.
18. If the brake rotor assembled LRO measurement is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **J 45101-100** and the lug nuts. See **Special Tools**.

BRAKE PAD INSPECTION

CAUTION: Refer to Brake Dust Caution in Cautions and Notices.

cardiagn.com

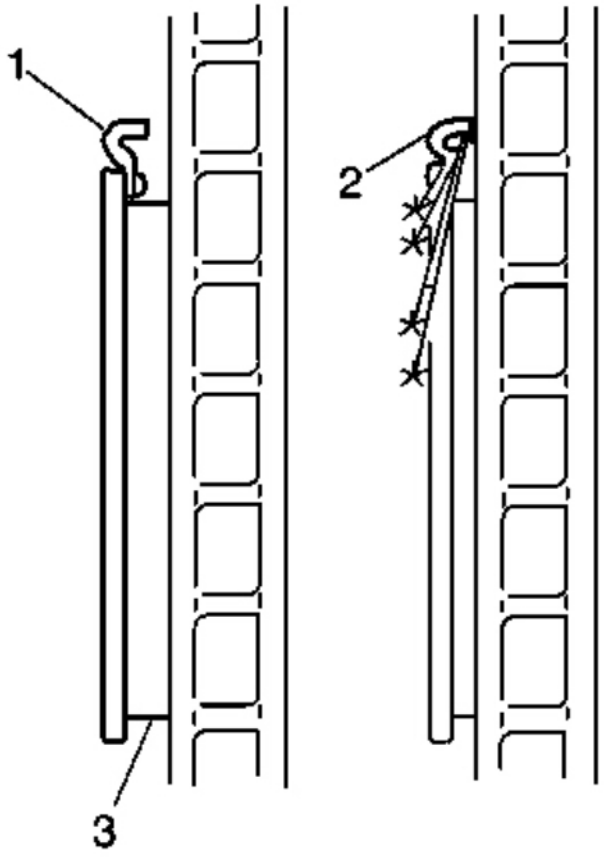


Fig. 7: View Of Brake Pads & Audible Wear Sensors
Courtesy of GENERAL MOTORS CORP.

- Inspect the disc brake pads at regular intervals, or whenever the tire and wheel assemblies are removed from the vehicle.
- If replacement is necessary, always replace disc brake pads in axle sets.
- Inspect both edges of the disc brake pad friction surfaces (3). The highest rate of wear normally occurs at the trailing edge of the disc brake pads.
- Inspect the thickness of the disc brake pads (3) in order to ensure that they have not worn prematurely. The disc brake pad wear should be approximately even per axle set.
- Both front and rear disc brake pads have integral, audible wear sensors (1). When the disc brake pad wear reaches the minimum allowable thickness, the wear sensor contacts the disc brake rotor (2). The wear indicator will then produce an audible, high-pitched warning noise during wheel rotation.

cardiagn.com

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

BRAKE CALIPER INSPECTION

CAUTION: Refer to Brake Dust Caution in Cautions and Notices.

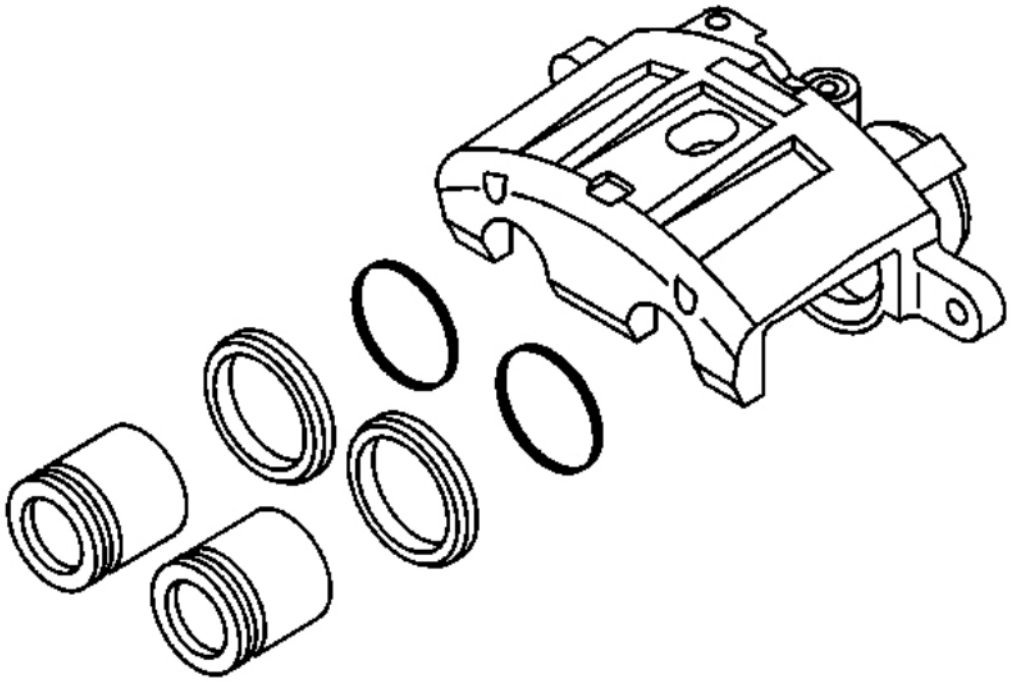


Fig. 8: View Of Brake Caliper Pistons, Boots & Seals
Courtesy of GENERAL MOTORS CORP.

cardiagn.com

1. Inspect the brake caliper housing 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 seals 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 seals and on the disc brake pads. If there is any evidence of brake fluid leakage, the brake caliper requires overhaul or replacement.

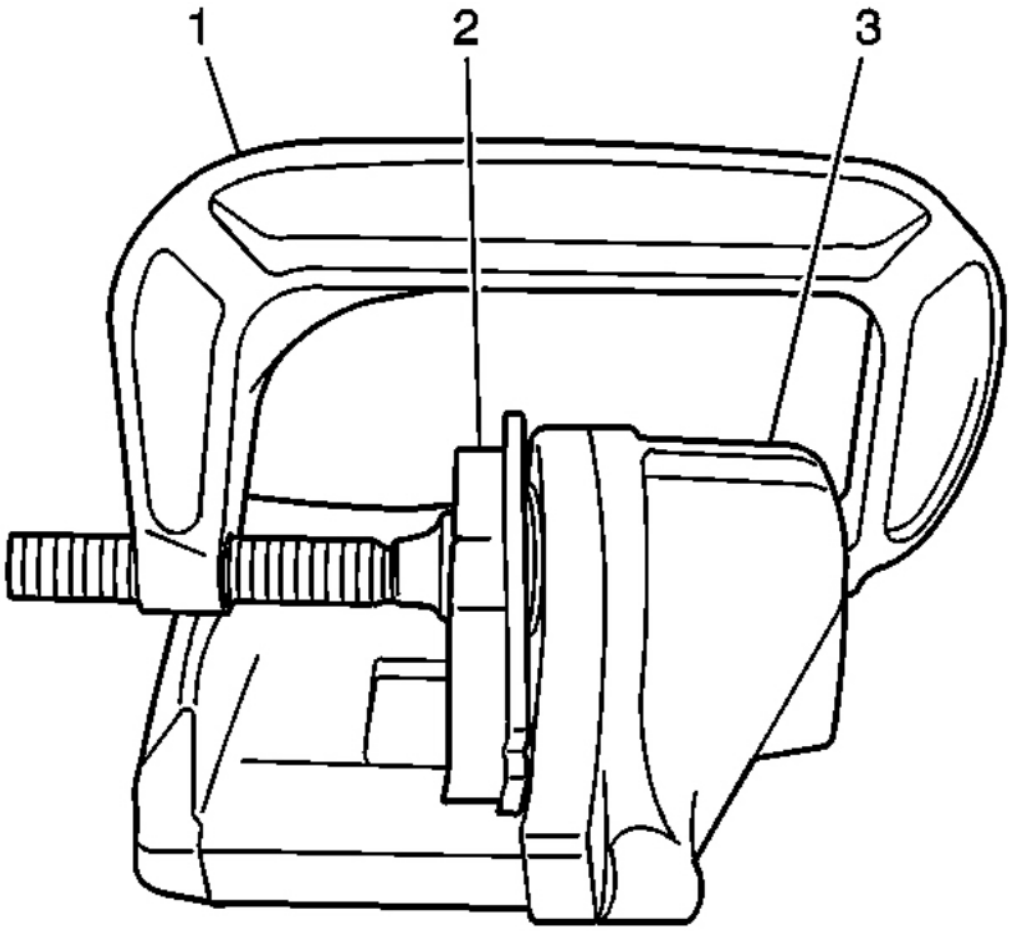


Fig. 9: Compressing Caliper Piston
Courtesy of GENERAL MOTORS CORP.

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

cardiagn.com

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.

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

DISC BRAKE MOUNTING AND HARDWARE INSPECTION - FRONT

CAUTION: Refer to Brake Dust Caution in Cautions and Notices.

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** to in General Information.
5. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.

cardiagn.com

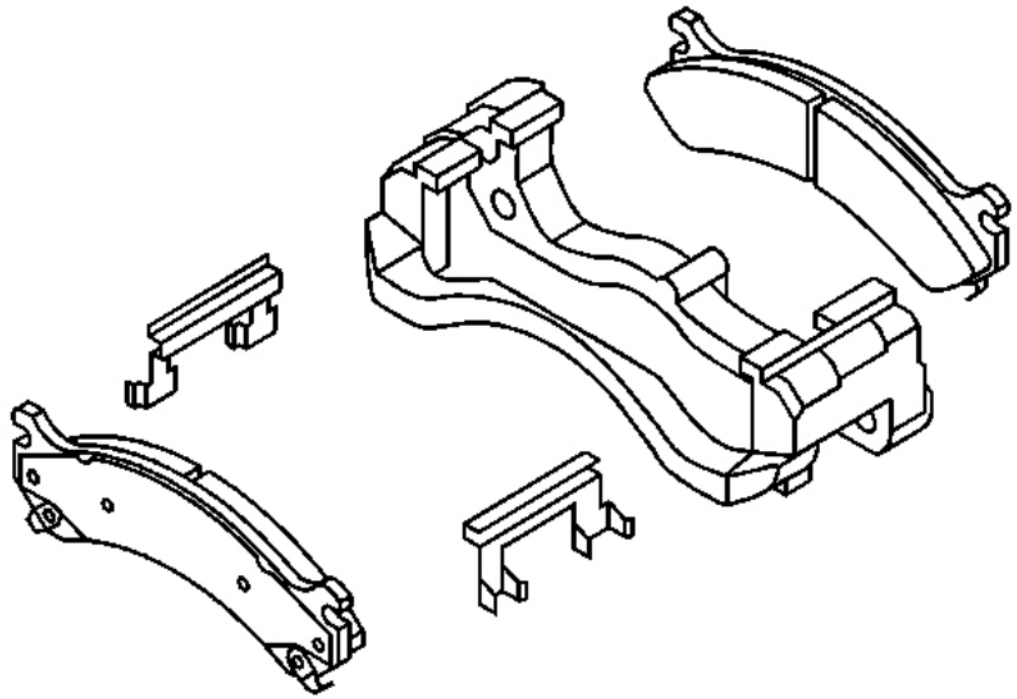


Fig. 10: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

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 C-clamp over the top of the caliper housing and against the back of the outboard pad.
   - Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
   - Remove the C-clamp from the caliper.
8. With the pistons compressed into the caliper bores, grasp the brake caliper housing and slide it back and forth on the brake caliper mounting bolts. Check for smooth operation. If the brake caliper housing slide force is high or the brake caliper housing does not slide smoothly, inspect the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings for wear or damage. If wear or damage conditions are found, replacement of the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings is necessary.
9. Remove the brake caliper mounting bolts from the brake caliper mounting bracket and support the brake caliper using heavy mechanics wire. Do Not remove the hydraulic brake hose from the caliper. Refer to **Front Brake Caliper Replacement (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)**

cardiagn.com

in Disc Brakes.

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.

cardiagn.com

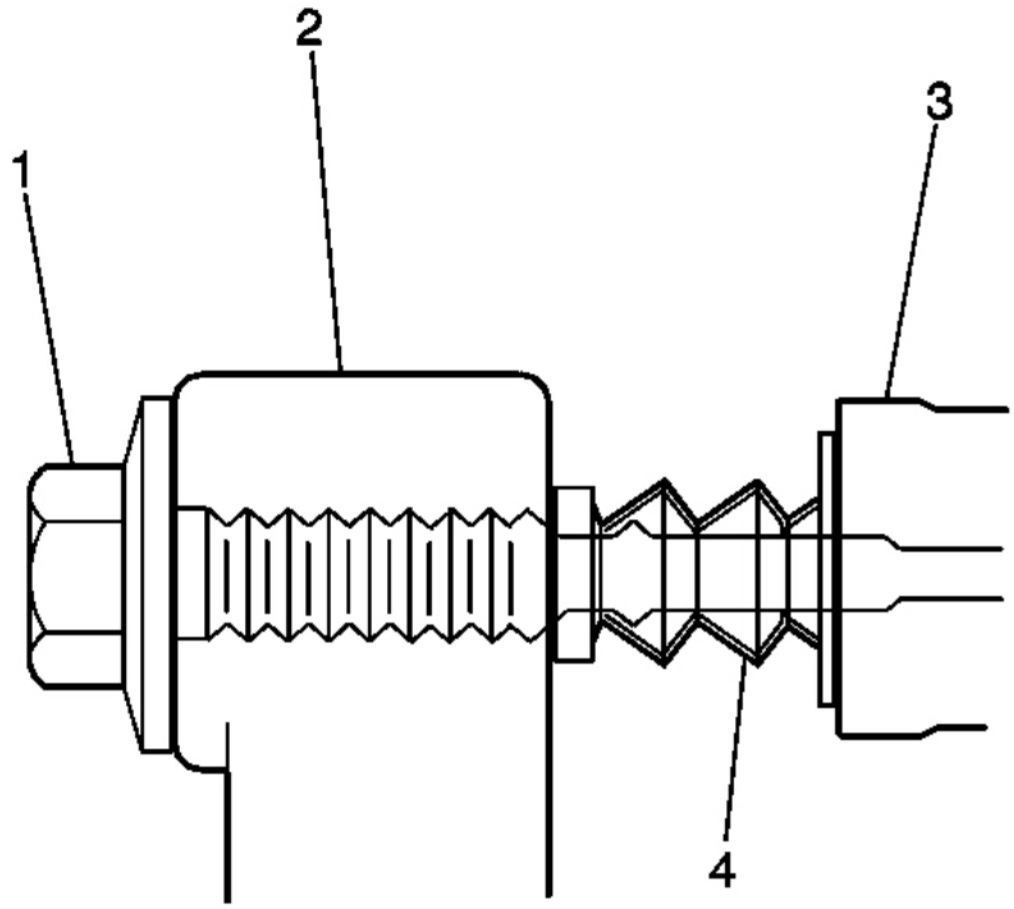


Fig. 11: View Of Caliper, Pin, Boots & Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

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.

cardiagn.com

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 (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)** in Disc Brakes.

DISC BRAKE MOUNTING AND HARDWARE INSPECTION - REAR

CAUTION: Refer to Brake Dust Caution in Cautions and Notices.

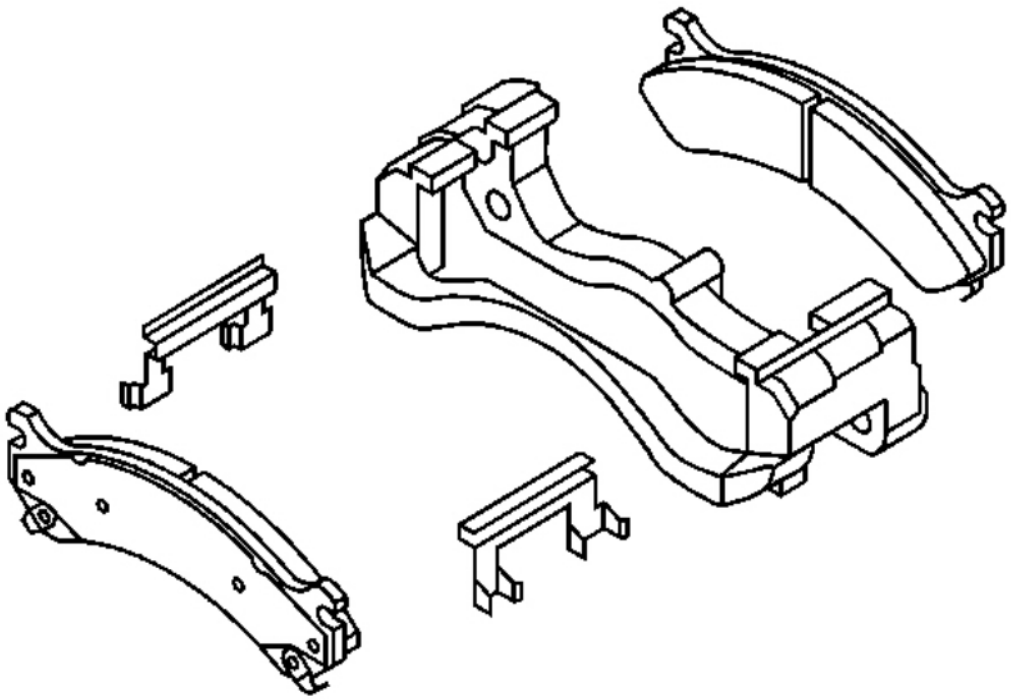


Fig. 12: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

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

cardiagn.com

- 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 (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

cardiagn.com

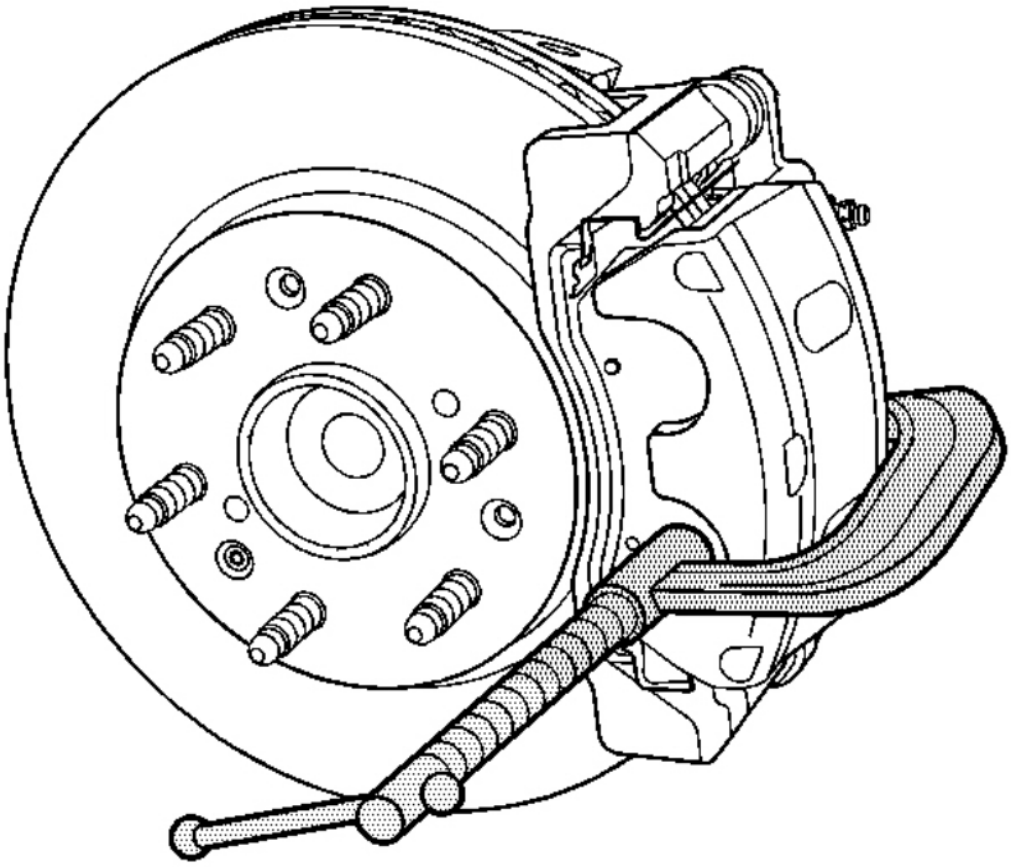


Fig. 13: Compressing Brake Caliper Pistons
Courtesy of GENERAL MOTORS CORP.

6. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamps until the pistons are pushed completely into the caliper bores.
    3. Remove the C-clamps from the caliper.

IMPORTANT:

- **DO NOT use any air tools to remove 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**

cardiagn.com

brake caliper. Allowing the open end wrench to come in contact with the brake caliper will cause a pulsation when the brakes are applied.

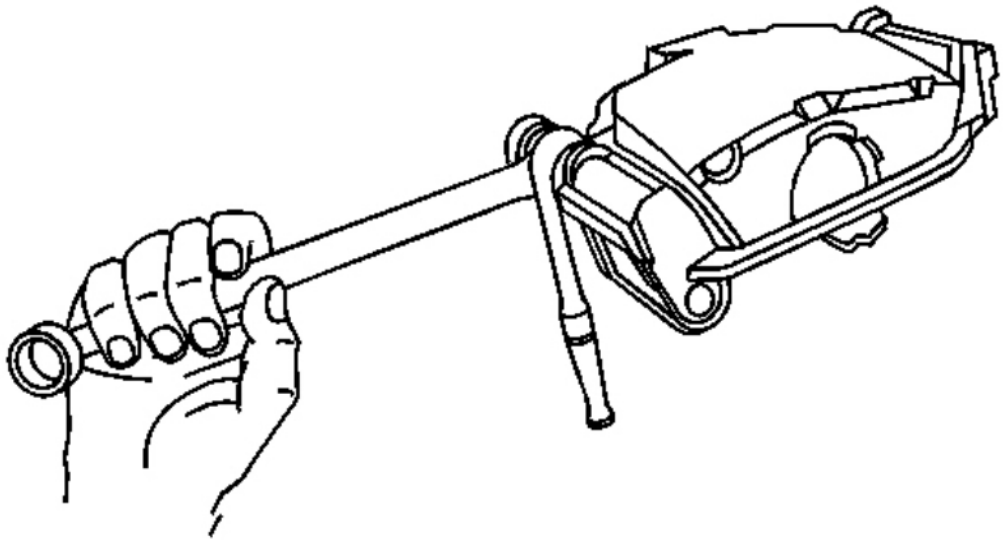


Fig. 14: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

7. Using an open end wrench to hold the guide pin, loosen the brake caliper guide pin bolt.

cardiagn.com

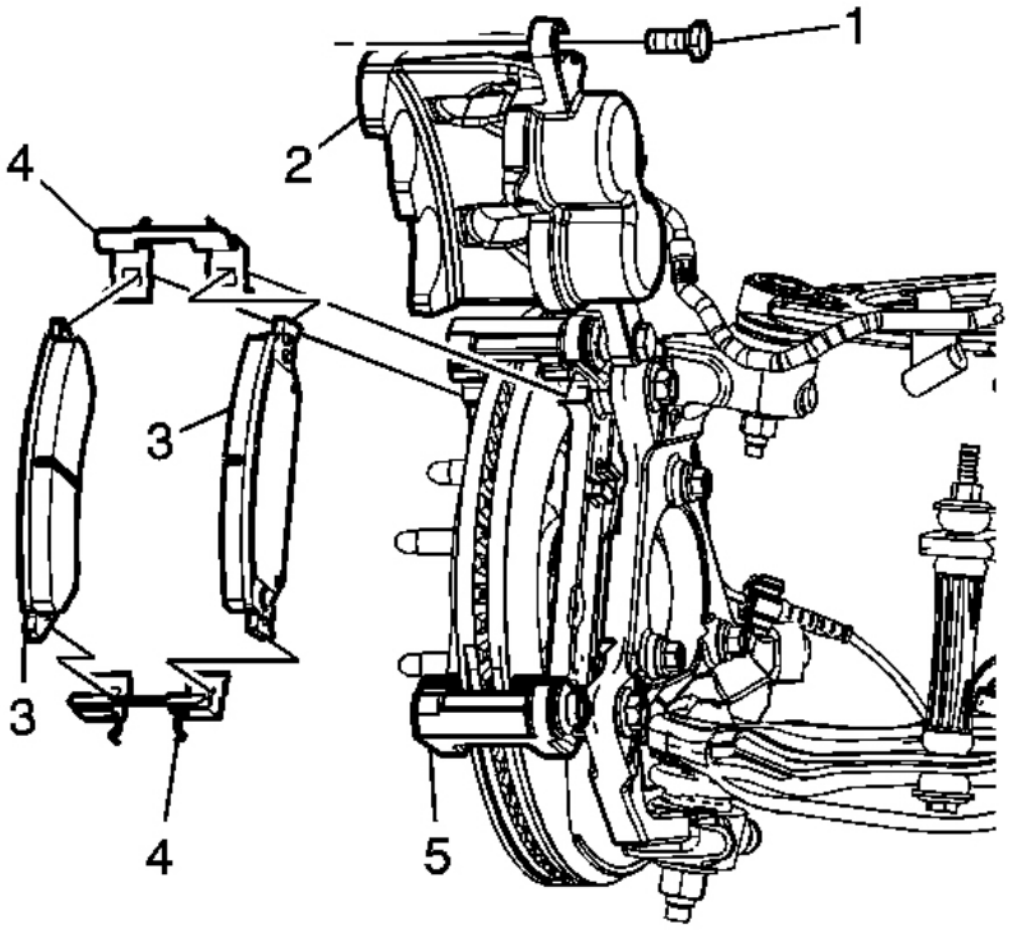


Fig. 15: View Of Lower Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

8. Remove the lower brake caliper guide pin bolt (1).

NOTE: **Support the brake caliper with heavy mechanic's 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.**

IMPORTANT: DO NOT disconnect the flexible brake hose from the brake caliper.

cardiagn.com

9. Rotate the brake caliper (2) upward until it rests on the brake caliper mounting bracket and support with heavy mechanics wire or equivalent.

IMPORTANT: If installing the original brake pads, mark the position of the inner and outer brake pads for proper installation.

10. Remove the brake pads (3).

IMPORTANT:

- **If installing the original brake pads and shims, mark the position of the shims for the proper installation.**
- **DO NOT reuse the brake pad shims with new brake pads. Replace with NEW only.**

11. Remove the brake pad shims (4) from the mounting bracket (5).

Installation Procedure

cardiagn.com

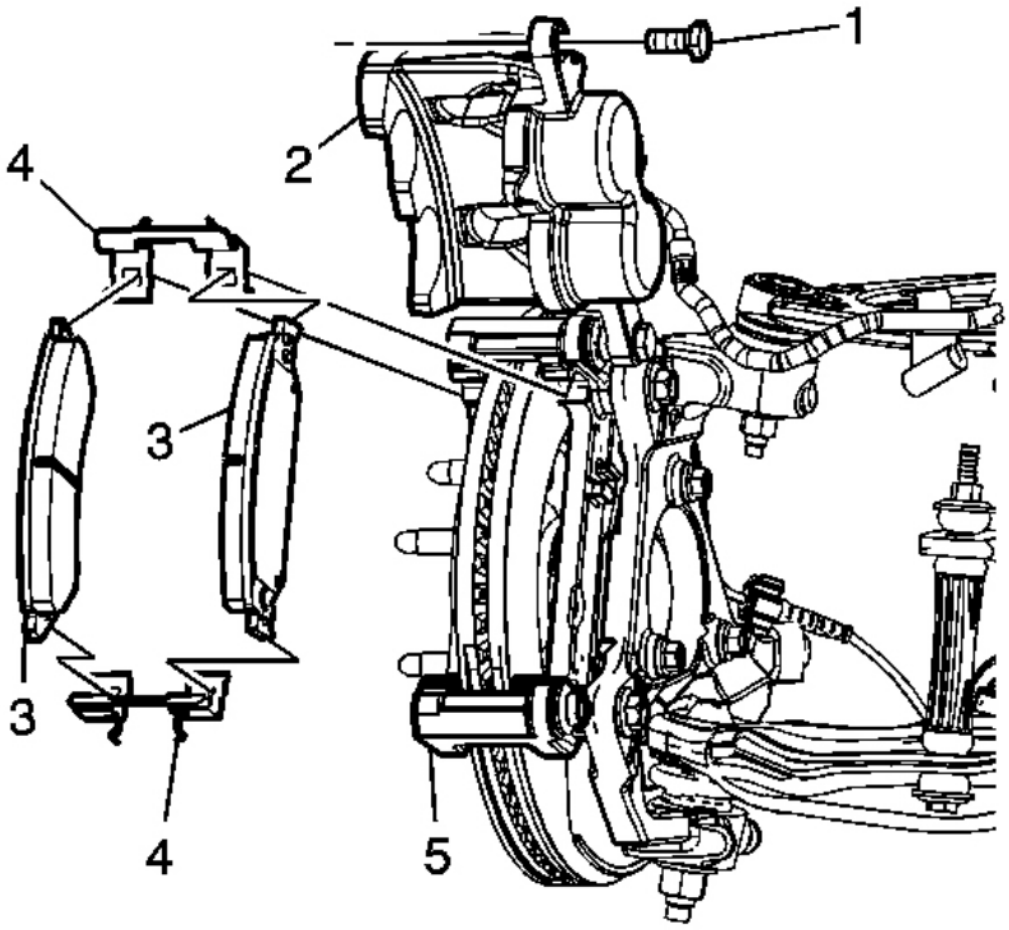


Fig. 16: View Of Lower Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

1. Install the shims (4) to the mounting bracket.
   - Install the NEW shims if replacing the brake pads.
   - Install the original shims in their original position if installing the original brake pads.

IMPORTANT: If installing the original brake pads, position the brake pads as marked during the removal procedure.

2. Install the brake pads (3).
3. Rotate the brake caliper (2) into the proper position on the mounting bracket (5).

cardiagn.com

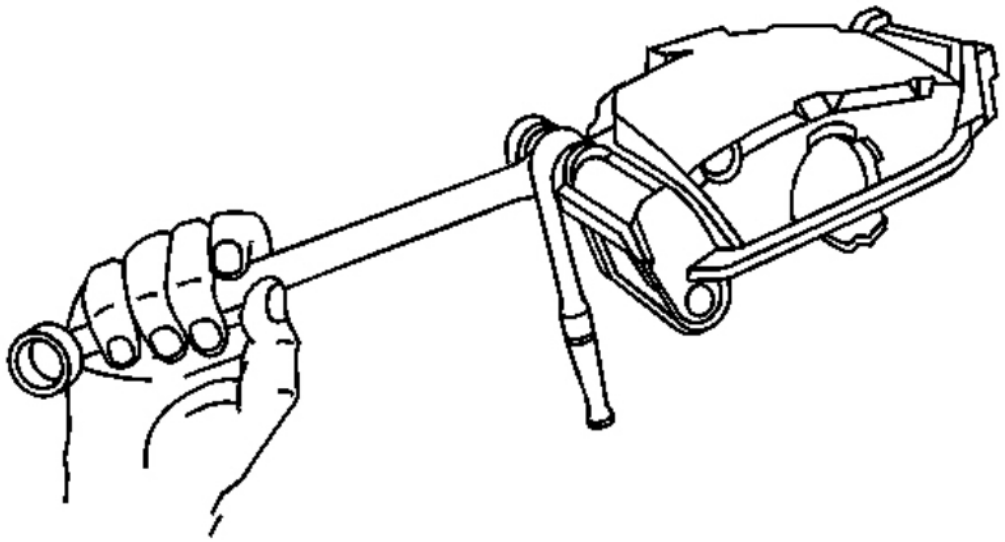


Fig. 17: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

IMPORTANT:

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

4. Use an open end wrench to hold the caliper guide pin while tightening the brake caliper guide pin bolt.

   Tighten: Tighten the bolt to 100 N.m (74 lb ft).

5. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Lower the vehicle.
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 pedal is obtained to properly seat the brake caliper

cardiagn.com

pistons and pads.

10. Fill the brake master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .
11. Burnish the pads and rotors. Refer to **Brake Pad and Rotor Burnishing**.

FRONT DISC BRAKE PADS REPLACEMENT (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

cardiagn.com

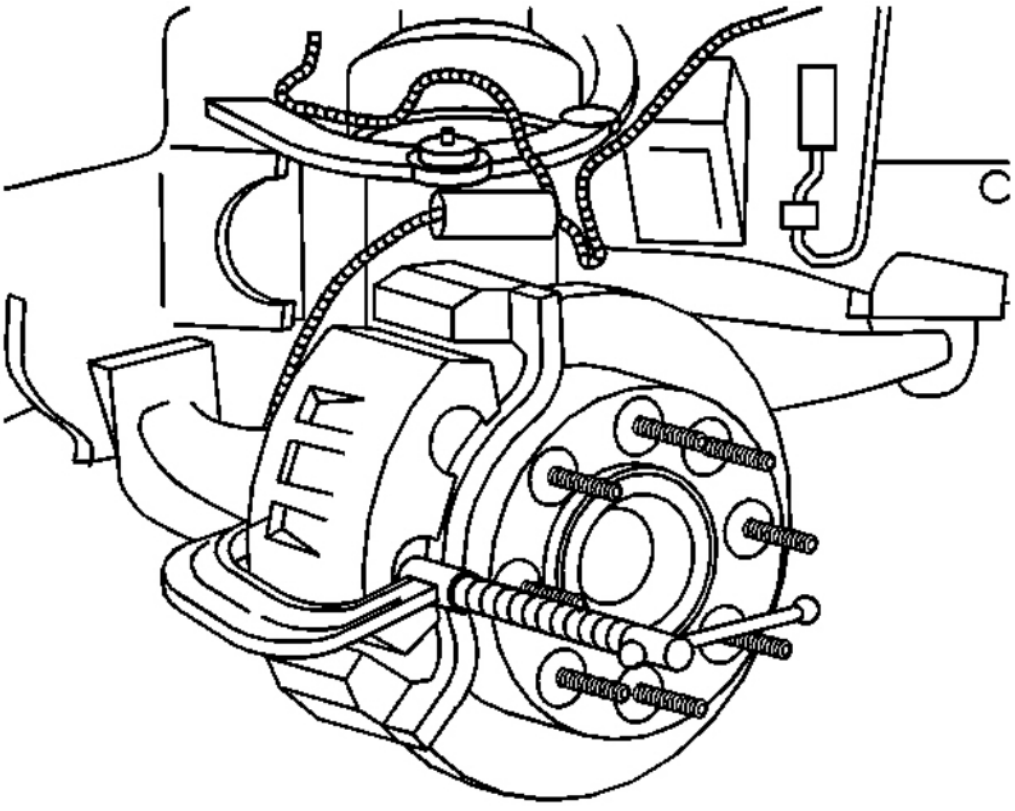


Fig. 18: Compressing Brake Caliper Pistons
Courtesy of GENERAL MOTORS CORP.

6. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard brake pad.
    2. Slowly tighten the C-clamps until the caliper pistons a pushed completely into the caliper bores.
    3. Remove the C-clamps from the caliper.

cardiagn.com

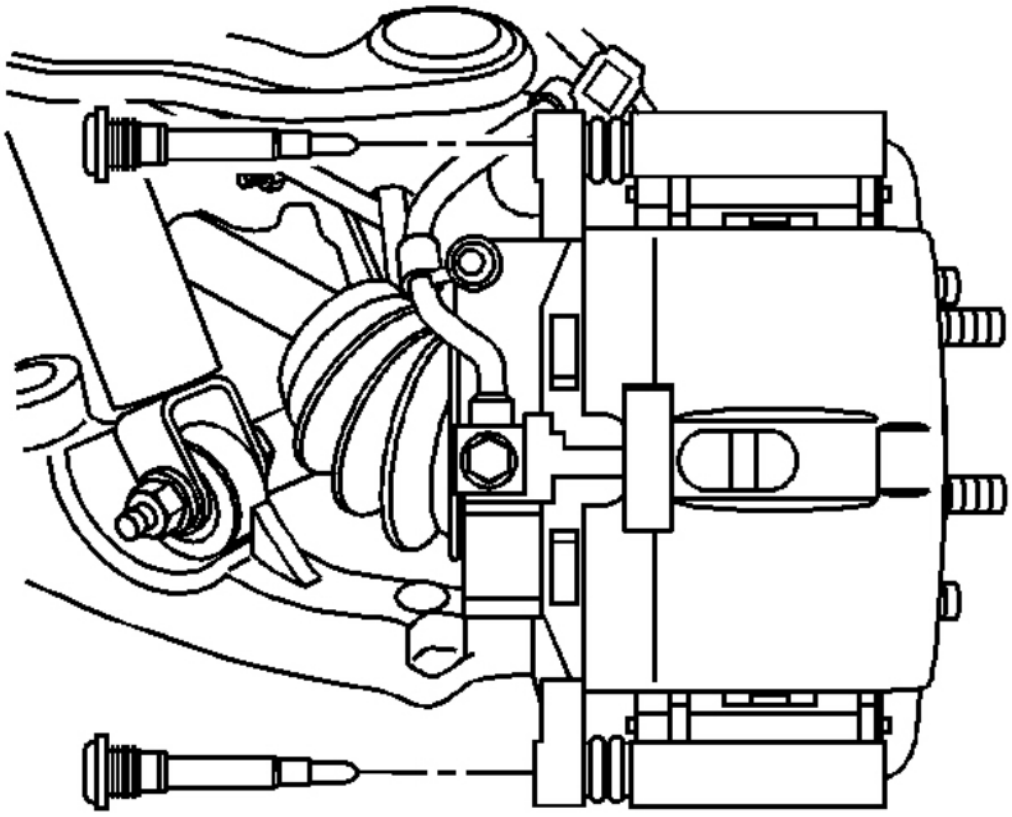


Fig. 19: View Of Brake Caliper Mounting
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake caliper guide pin bolts.

NOTE: **Support the brake caliper with heavy mechanic's 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.**

NOTE: **Refer to Brake Caliper Notice .**

8. Remove the brake caliper from the brake caliper bracket and support with heavy mechanics wire or equivalent.
9. Remove the brake pads from the brake caliper bracket.

cardiagn.com

10. Note the orientation of the brake pad wear sensor (if equipped) for installation.

IMPORTANT: Do not reuse the brake pad retaining springs.

11. Remove and discard the brake pad retaining springs.
12. Inspect the brake caliper. Refer to **Brake Caliper Inspection**.

Installation Procedure

1. Install NEW brake pad retaining springs to the caliper bracket.
2. Install the disc brake pads to the brake caliper bracket, positioning the brake pad wear sensor (if equipped) as noted during removal.

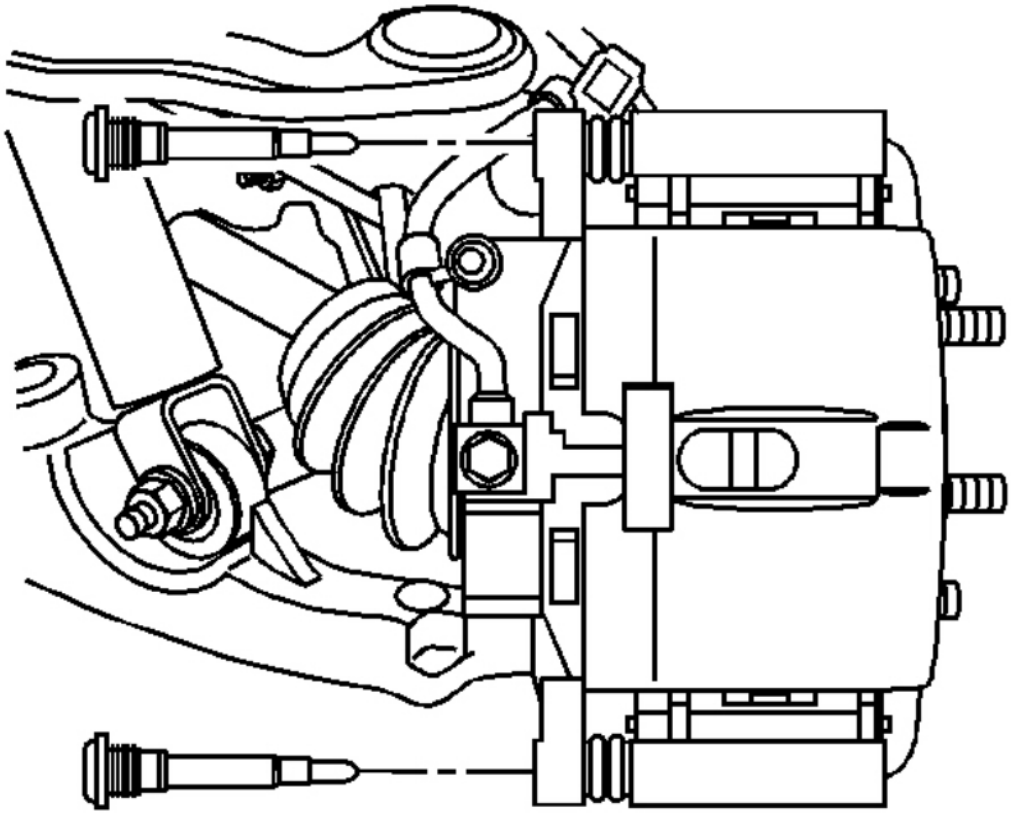


Fig. 20: View Of Brake Caliper Mounting
Courtesy of GENERAL MOTORS CORP.

cardiagn.com

3. Install the brake caliper to the caliper bracket.

NOTE: **Refer to Fastener Notice .**

4. Install the brake caliper guide pin bolts.

Tighten: Tighten the bolts to 108 N.m (80 lb ft).

5. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Lower the vehicle.
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 is obtained, to properly seat the brake caliper pistons and brake pads.
10. Fill the brake master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .
11. Burnish the brake pads and discs. Refer to **Brake Pad and Rotor Burnishing**.

REAR DISC BRAKE PADS REPLACEMENT (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

cardiagn.com

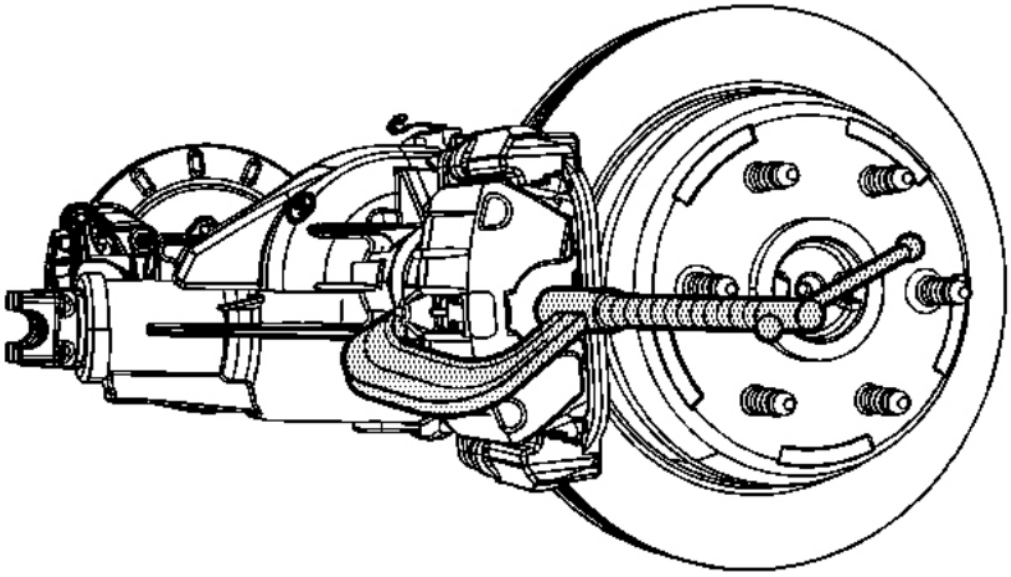


Fig. 21: Compressing Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

6. Compress the brake caliper piston.
    1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the piston is pushed completely into the caliper bore.
    3. Remove the C-clamp from the caliper.

cardiagn.com

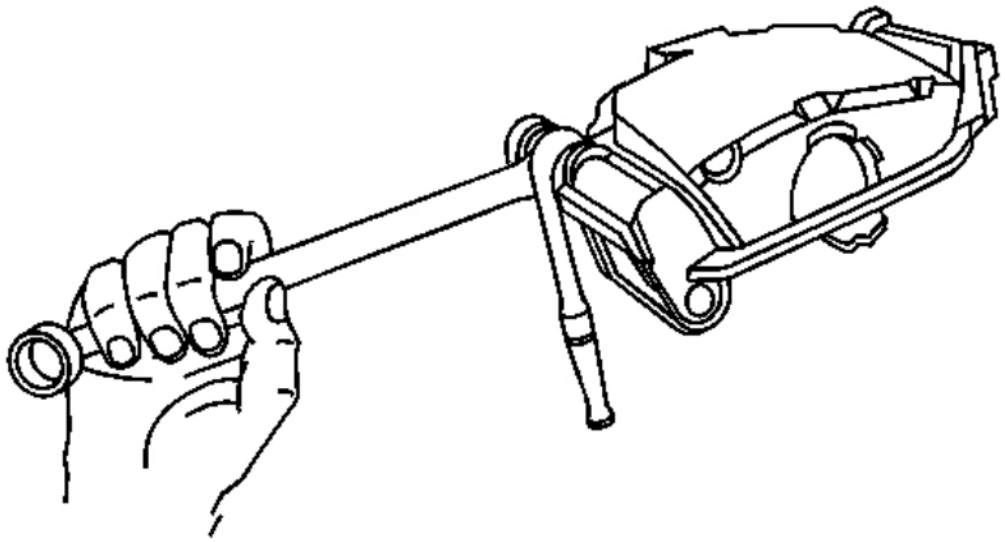


Fig. 22: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **DO NOT use any air tools to remove 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 brake are applied.**

7. Using an open end wrench to hold the guide pin, loosen the guide pin bolt.

NOTE: **Support the brake caliper with heavy mechanic's 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.**

cardiagn.com

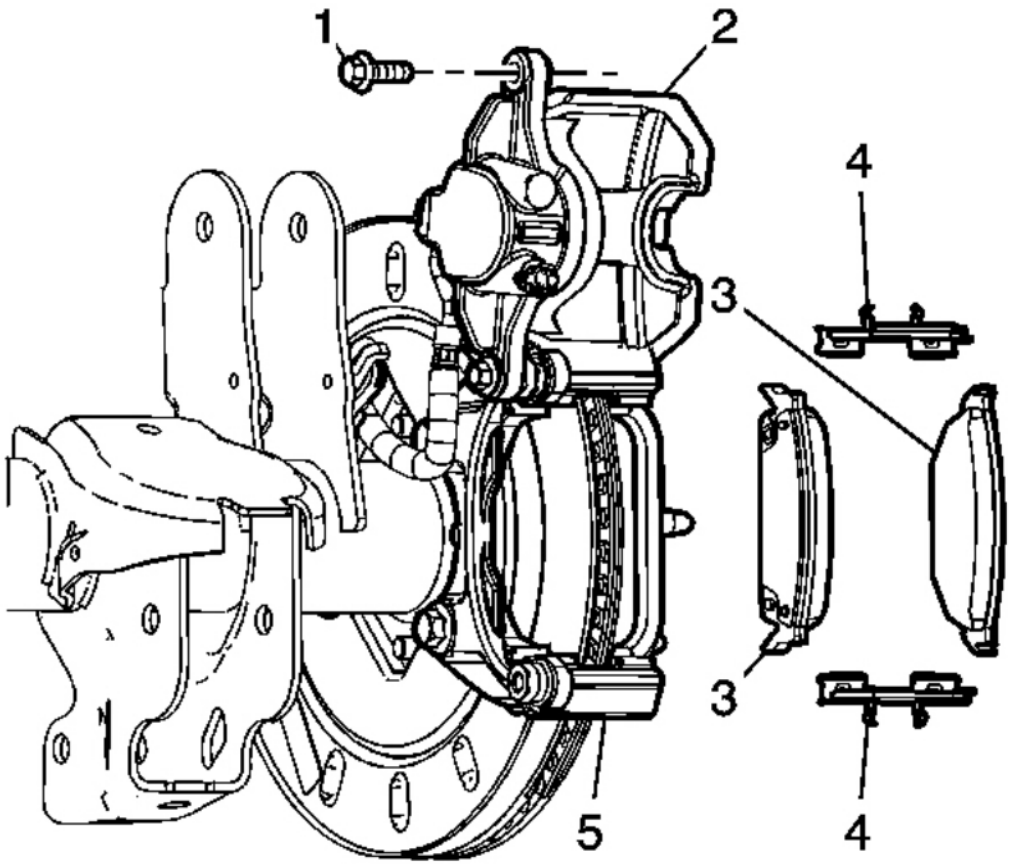


Fig. 23: View Of Brake Components
Courtesy of GENERAL MOTORS CORP.

8. Remove the guide pin bolt (1) from the brake caliper (2).
9. Rotate the brake caliper (2) upward until it stops on the caliper mounting bracket (5) and support the caliper with heavy mechanics wire or equivalent.

IMPORTANT:

- **If removing and installing the original brake pads and retaining springs, reference mark the position of the brake pads and retaining springs for proper installation.**
- **DO NOT re-use the old brake pad retaining springs with new brake pads. Replace with NEW only.**

10. Remove the brake pads (3) and retaining springs (4) from the mounting bracket (5).

cardiagn.com

Installation Procedure

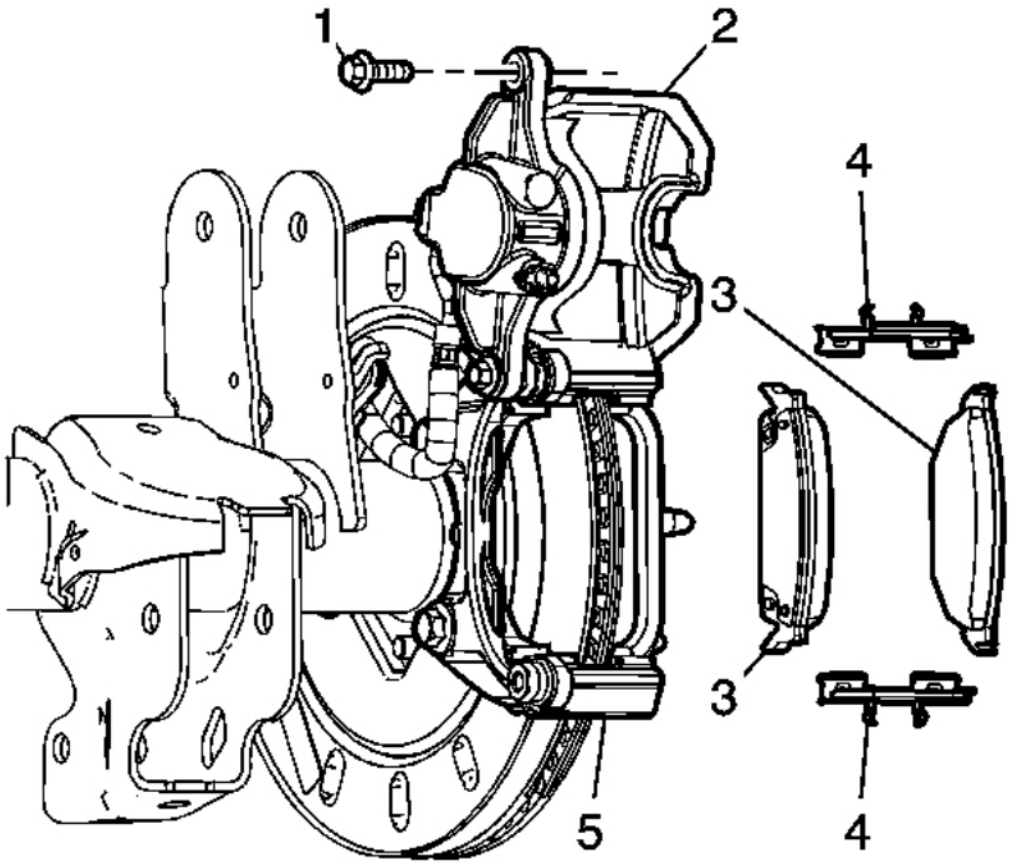


Fig. 24: View Of Brake Components
Courtesy of GENERAL MOTORS CORP.

1. Install the retaining springs (4) on the caliper mounting bracket (5).
2. Install the brake pads (3).
   - Install the new brake pads.
   - Install the original brake pads in their original position.
3. Remove the mechanics wire and rotate the brake caliper (2) into position on the mounting bracket (5).
4. Install NEW caliper guide pin bolts.

cardiagn.com

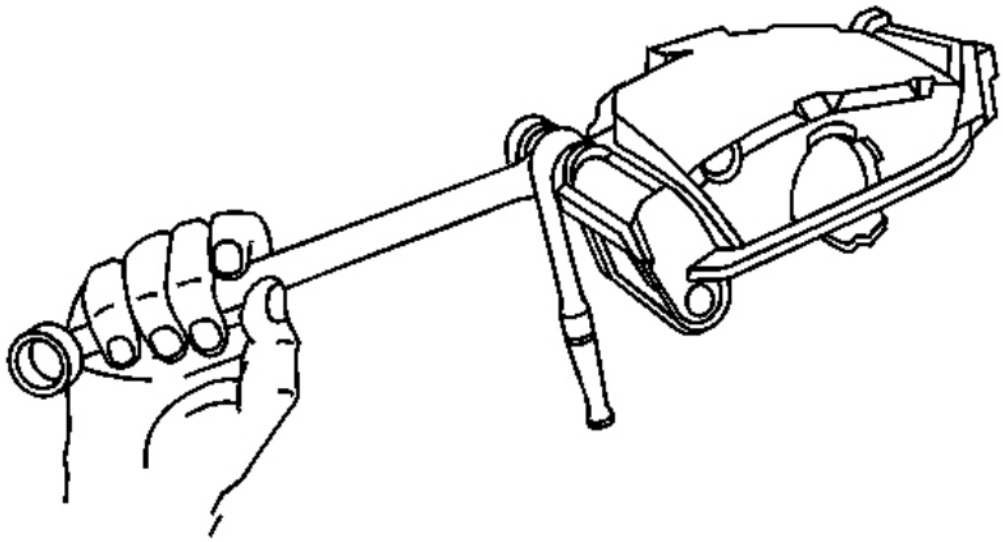


Fig. 25: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

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

NOTE: **Refer to Fastener Notice .**

5. Use a open end wrench to hold the caliper guide pin while tightening the guide pin bolt.

   Tighten: Tighten the bolt to 38 N.m (28 lb ft)

6. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
7. Lower the vehicle.
8. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
9. Slowly release the brake pedal.
10. Wait 15 seconds, then repeat steps 8-9 until a firm pedal is obtained, to properly seat the brake caliper

cardiagn.com

pistons and brake pads.

11. Fill the brake master cylinder reservoir to the proper level with clean brake fluid. Refer to **Master Cylinder Reservoir Filling** .
12. Burnish the brake pads and rotors. Refer to **Brake Pad and Rotor Burnishing**.

REAR DISC BRAKE PADS REPLACEMENT (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

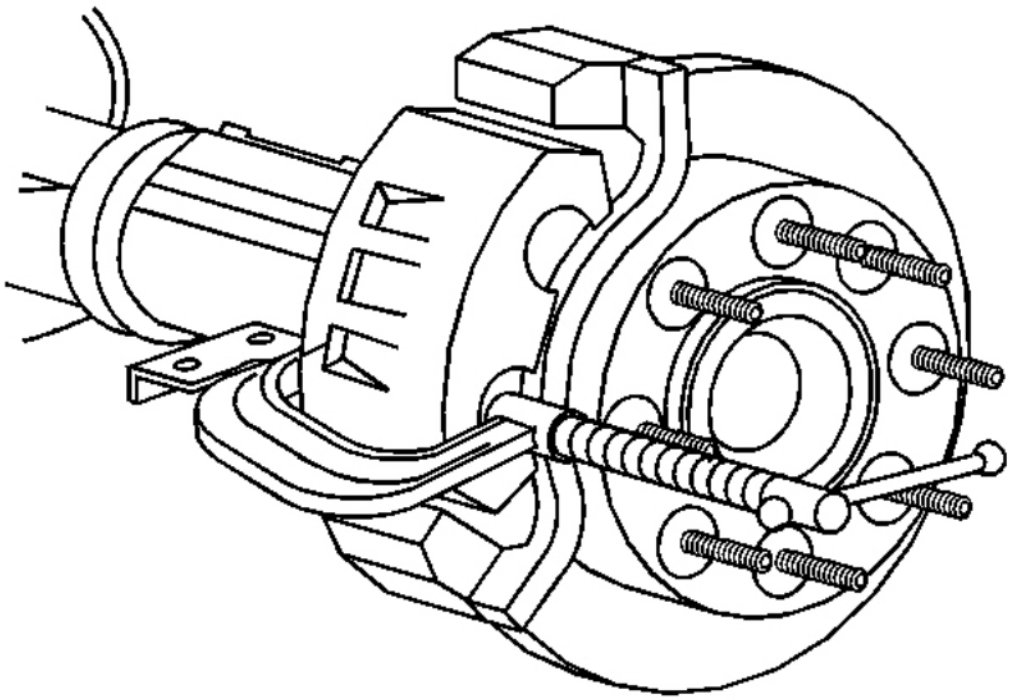


Fig. 26: C-Clamp & Rear Caliper
Courtesy of GENERAL MOTORS CORP.

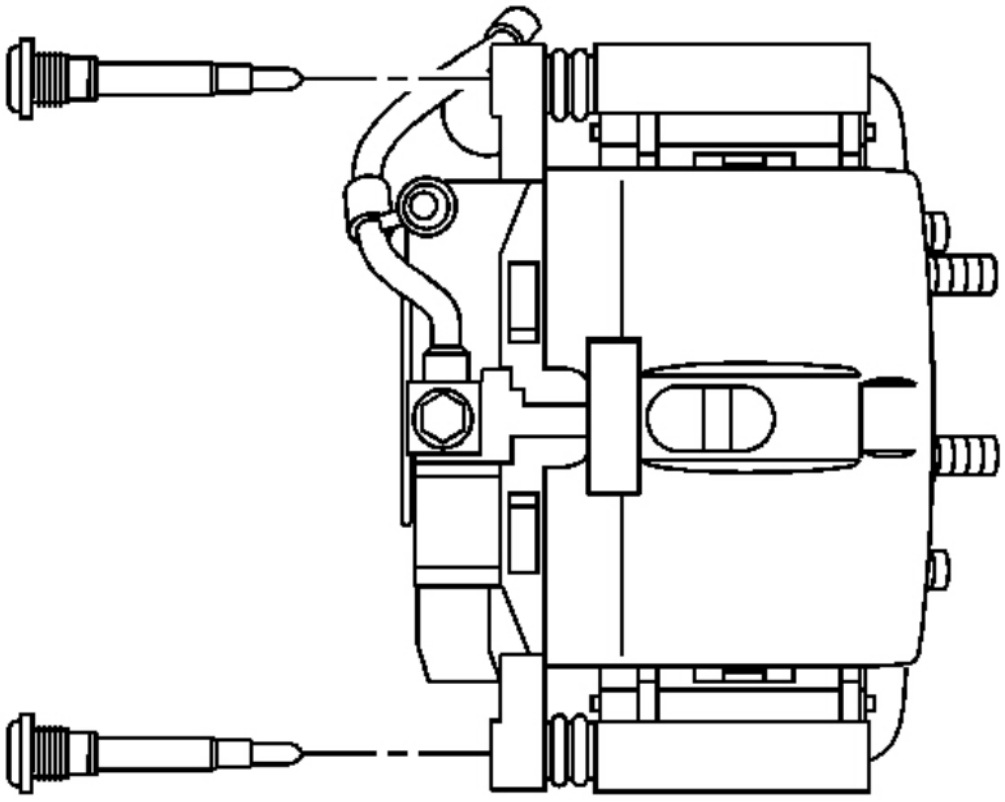
1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the fluid level is midway between the maximum - full point, and the minimum allowable level, no fluid needs to be removed from the reservoir before proceeding.
3. If the fluid level is higher than midway between the maximum - full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

cardiagn.com

level, remove 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. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
    3. Remove the C-clamp from the caliper.

NOTE: **Support the brake caliper with heavy mechanic's 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.**



cardiagn.com

Fig. 27: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake caliper guide pin bolts.
8. Remove the caliper from the caliper bracket and support with heavy mechanics wire or equivalent.

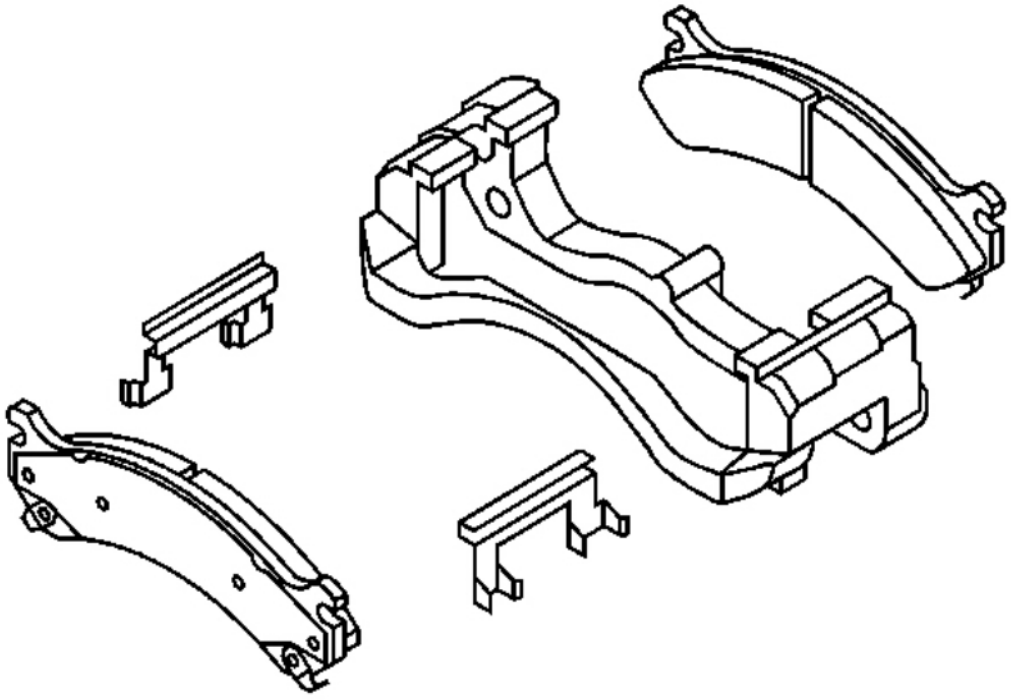


Fig. 28: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake pads from the caliper bracket.

IMPORTANT: Do not reuse the brake pad retaining springs.

10. Remove and discard the brake pad retaining springs.
11. Inspect the brake caliper. Refer to **Brake Caliper Inspection**.

Installation Procedure

cardiagn.com

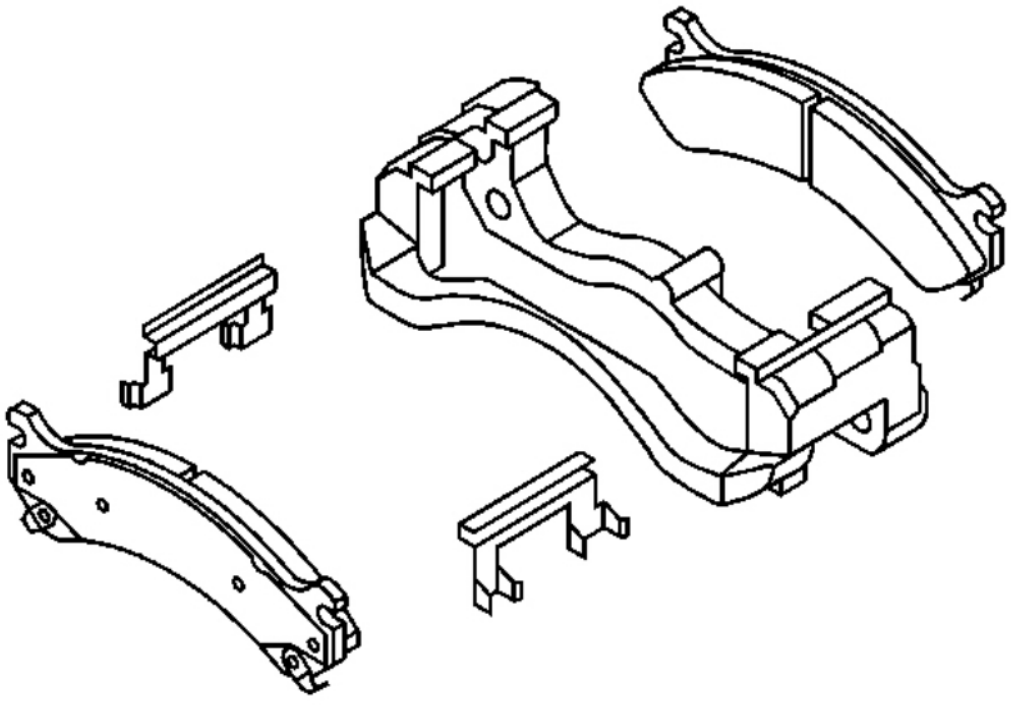


Fig. 29: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install NEW brake pad retaining springs to the caliper bracket.
2. Install the brake pads to the caliper bracket.

cardiagn.com

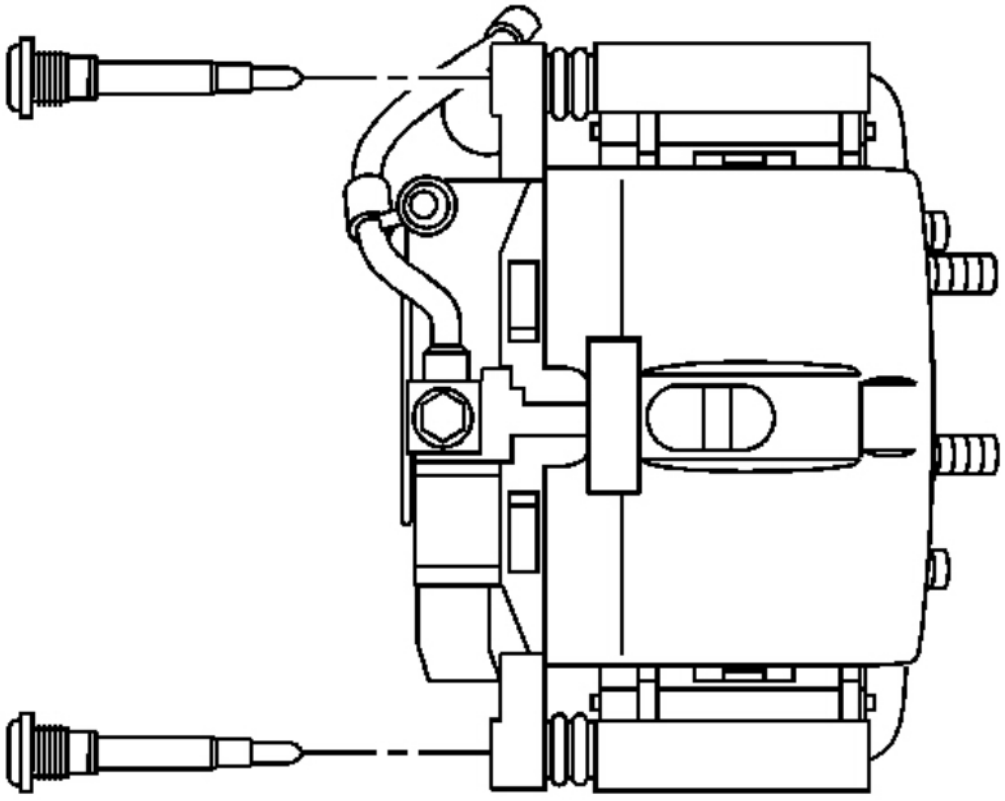


Fig. 30: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

3. Install the caliper to the caliper bracket.

NOTE: **Refer to Fastener Notice .**

4. Install the brake caliper bolts.

Tighten: Tighten the bolts to 108 N.m (80 lb ft).

5. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Lower the vehicle.
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 pedal is obtained, to properly seat the brake caliper

cardiagn.com

pistons and brake pads.

10. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .
11. Burnish the pads and rotors. Refer to **Brake Pad and Rotor Burnishing**.

BRAKE PAD AND ROTOR BURNISHING

CAUTION: Refer to Road Test Caution in Cautions and Notices.

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

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

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

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

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

FRONT BRAKE CALIPER REPLACEMENT (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

CAUTION: Refer to Brake Fluid Irritant Caution .

Removal Procedure

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

cardiagn.com

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

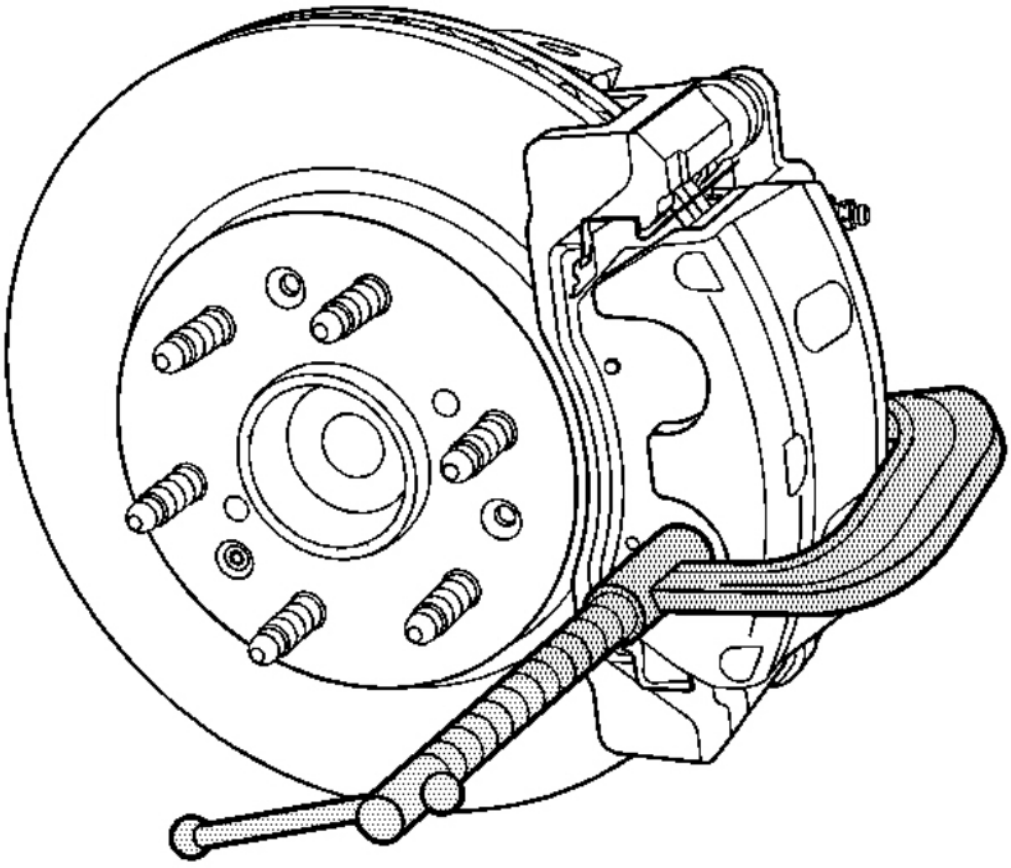


Fig. 31: Compressing Brake Caliper Pistons
Courtesy of GENERAL MOTORS CORP.

6. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamps until the pistons are pushed completely into the caliper bores.
    3. Remove the C-clamps from the caliper.

cardiagn.com

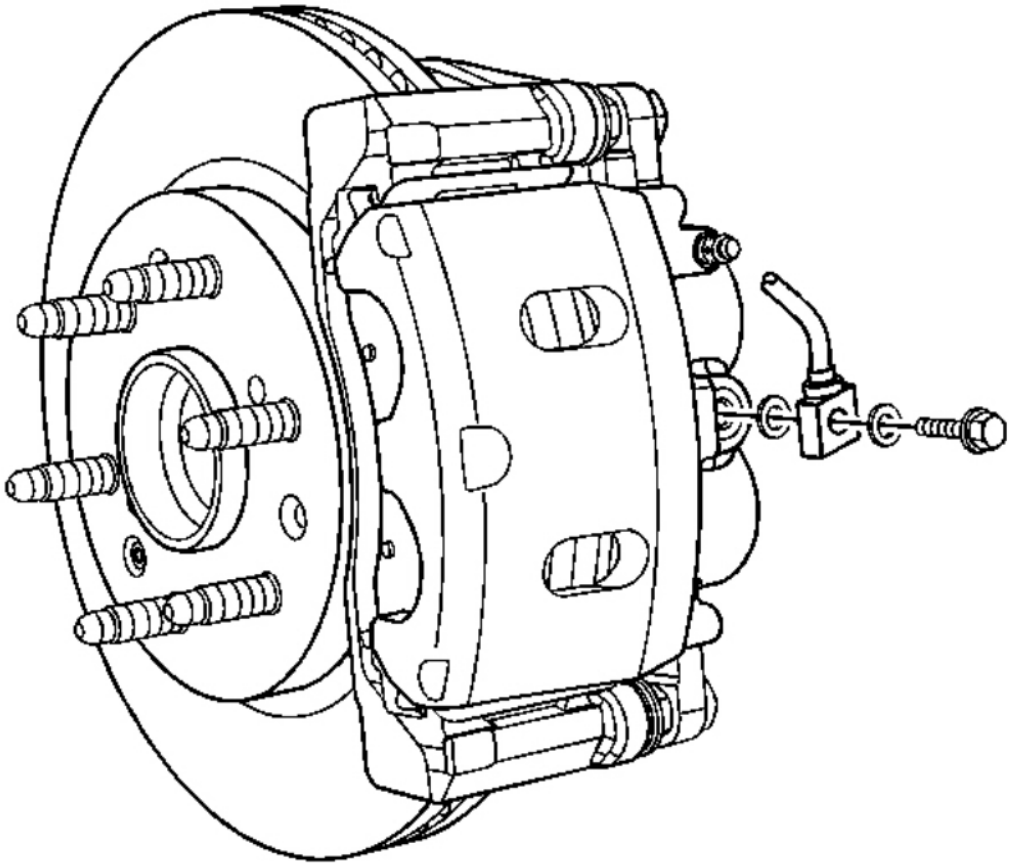


Fig. 32: Brake Hose Fitting
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Cap or plug the brake hose to prevent brake fluid loss and contamination.

7. Clean all dirt and foreign material from the brake caliper.
8. Remove the brake hose to caliper bolt.

IMPORTANT: Ensure the washers are not still attached to the brake hose or the brake caliper.

9. Remove and discard the 2 copper brake hose gaskets.
10. Remove the brake hose from the brake caliper.

cardiagn.com

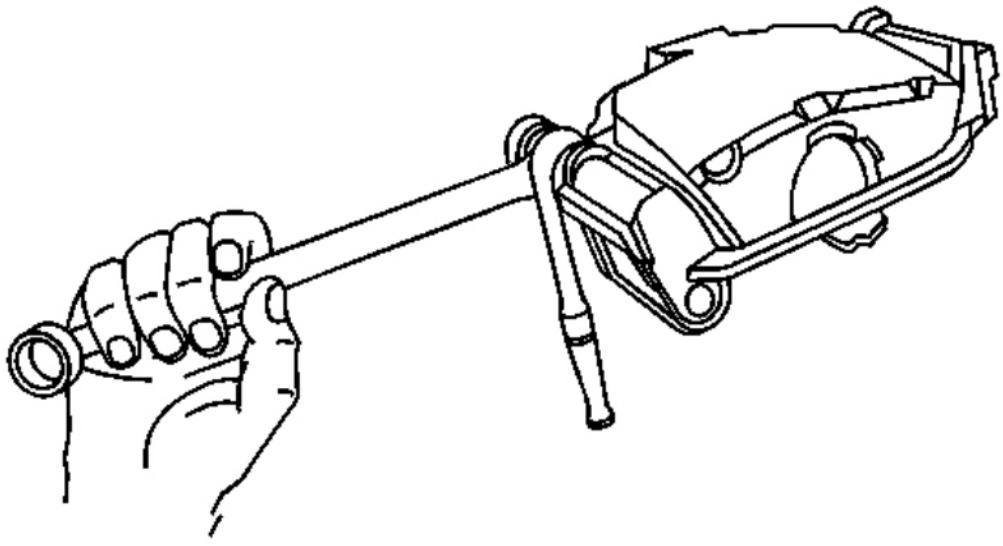


Fig. 33: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **DO NOT use any air tools to remove or install the brake caliper 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 brake caliper 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.**

11. Using an open end wrench to hold the guide pin, loosen the brake caliper bolts.

cardiagn.com

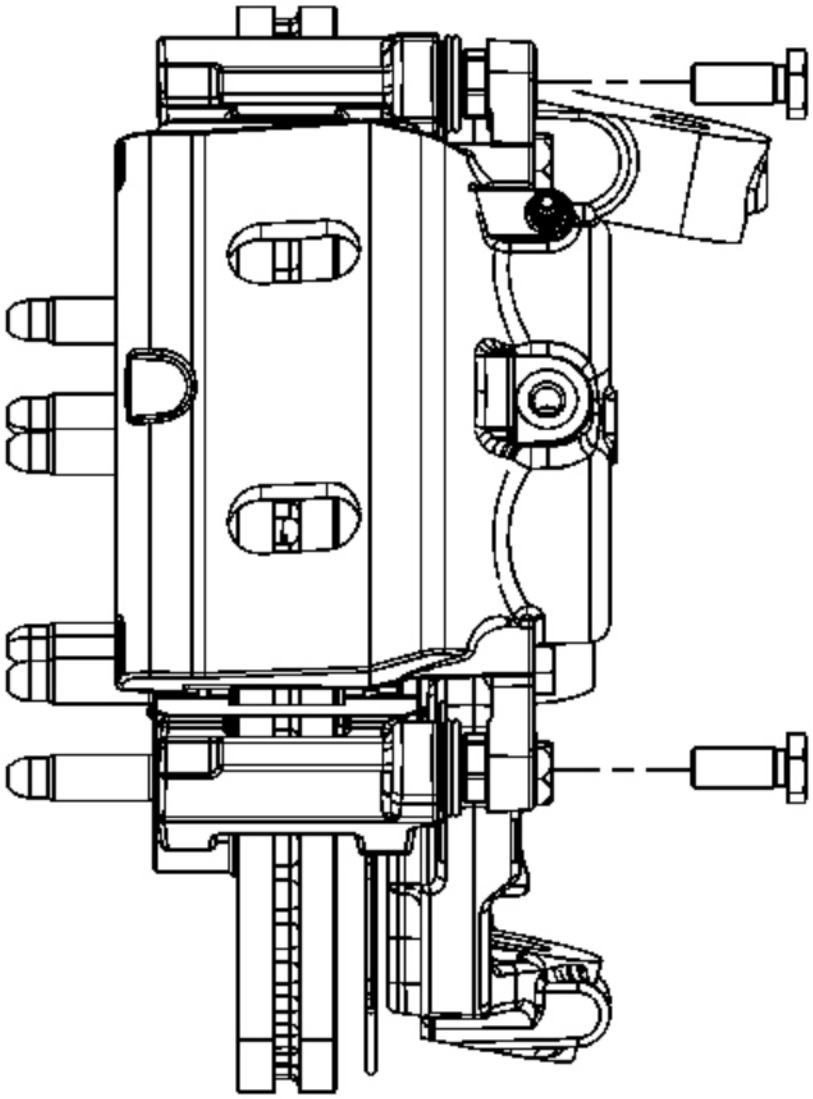


Fig. 34: Brake Caliper Bolt
Courtesy of GENERAL MOTORS CORP.

12. Remove the brake caliper bolts.

cardiagn.com

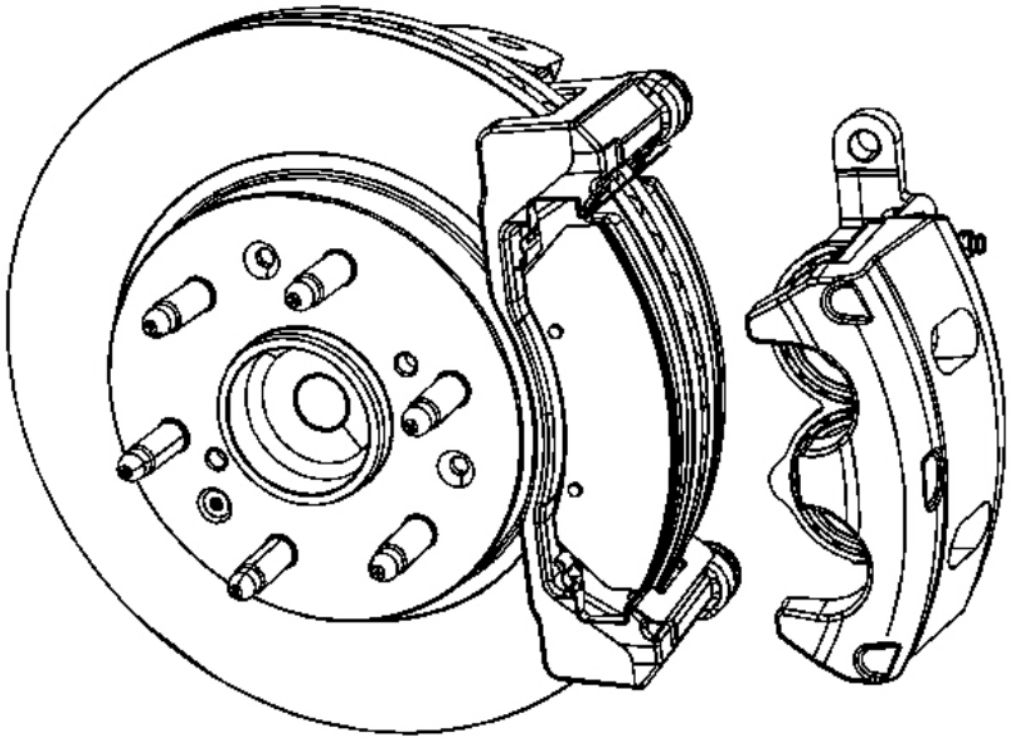


Fig. 35: Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

13. Remove the brake caliper from the mounting bracket.

Installation Procedure

cardiagn.com

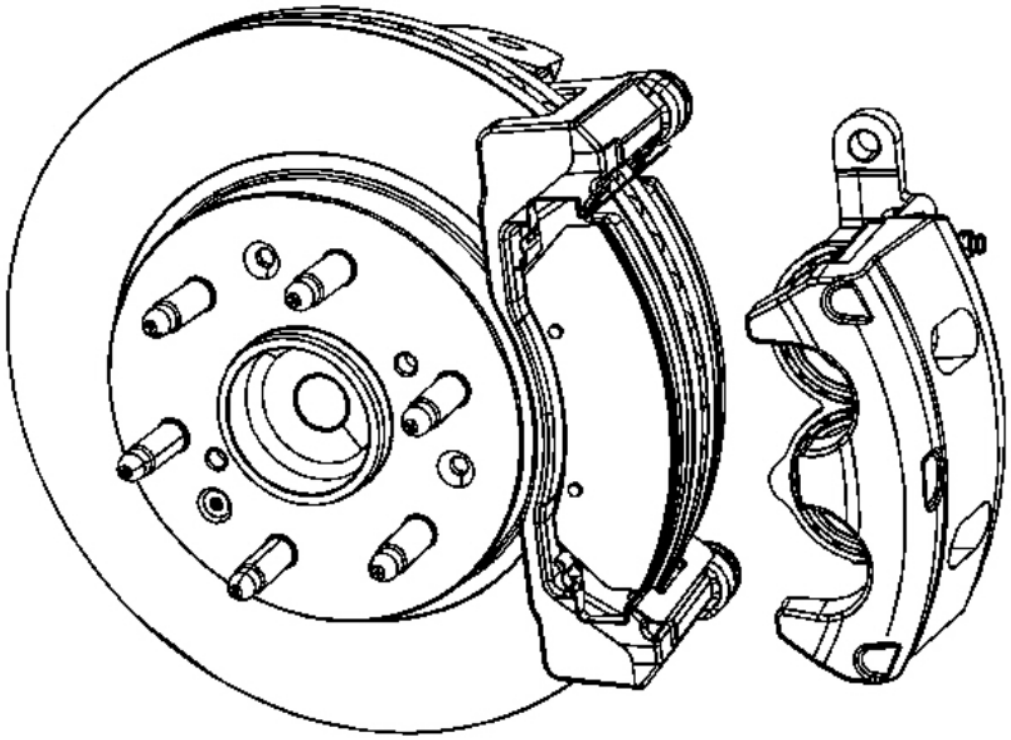


Fig. 36: Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install the caliper to the caliper bracket.

cardiagn.com

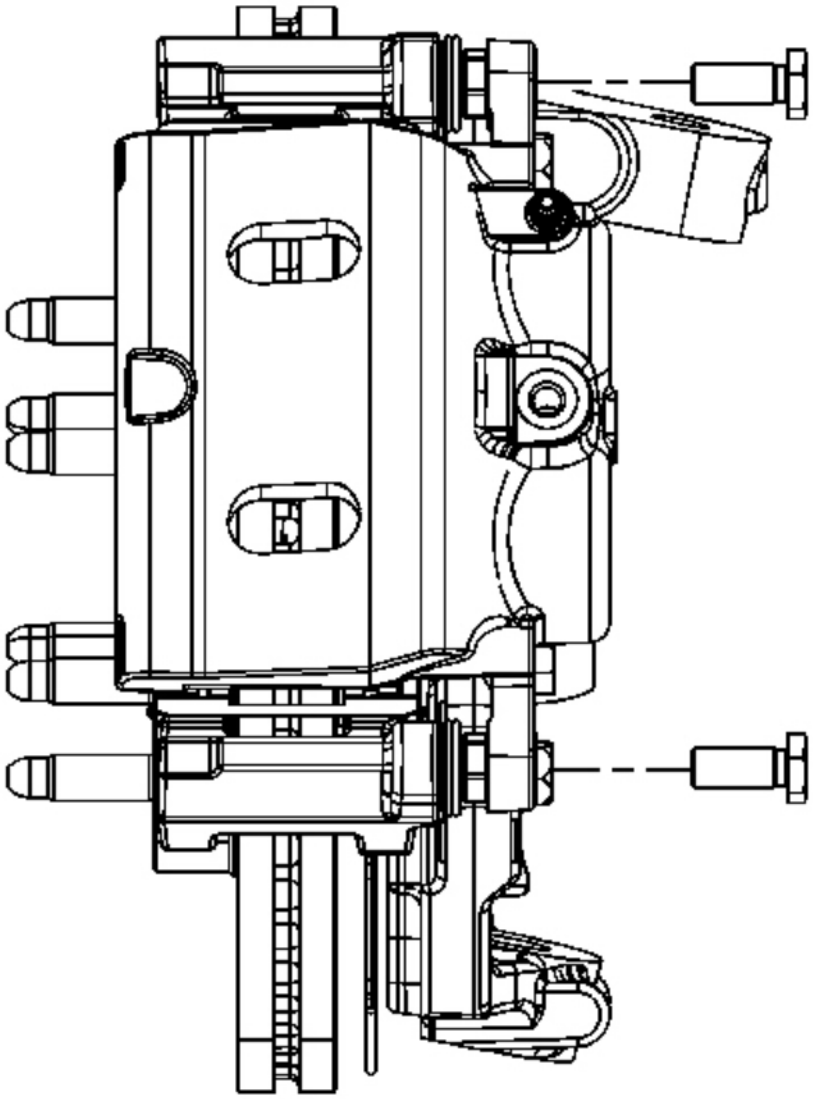


Fig. 37: Brake Caliper Bolt
Courtesy of GENERAL MOTORS CORP.

2. Install the brake caliper bolts.

cardiagn.com

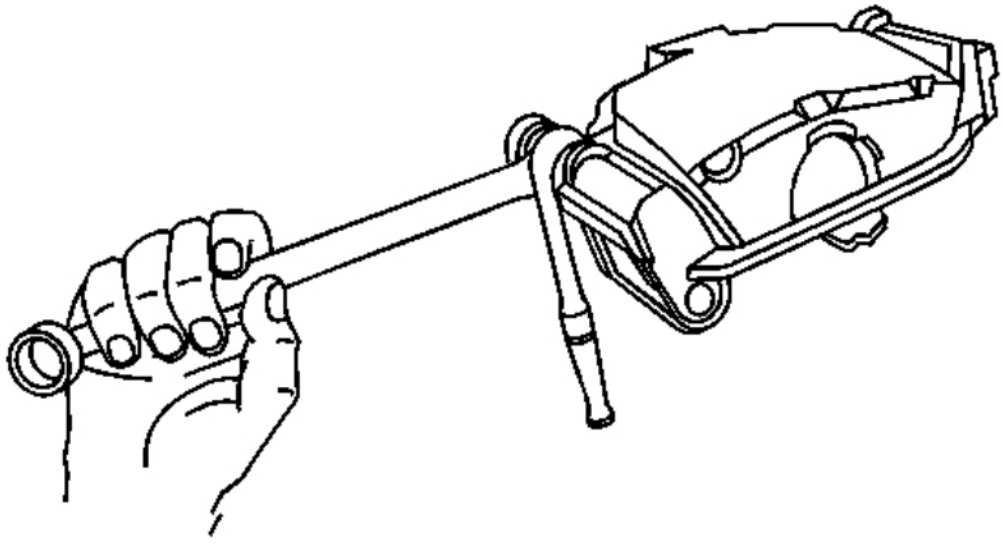


Fig. 38: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

IMPORTANT:

- **DO NOT use any air tools to remove or install the brake caliper 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 brake caliper 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 an open end wrench to hold the guide pins while tightening the brake caliper bolts.

   Tighten: Tighten the bolts to 100 N.m (74 lb ft).

4. Remove the cap or plug from the brake hose fitting end.

cardiagn.com

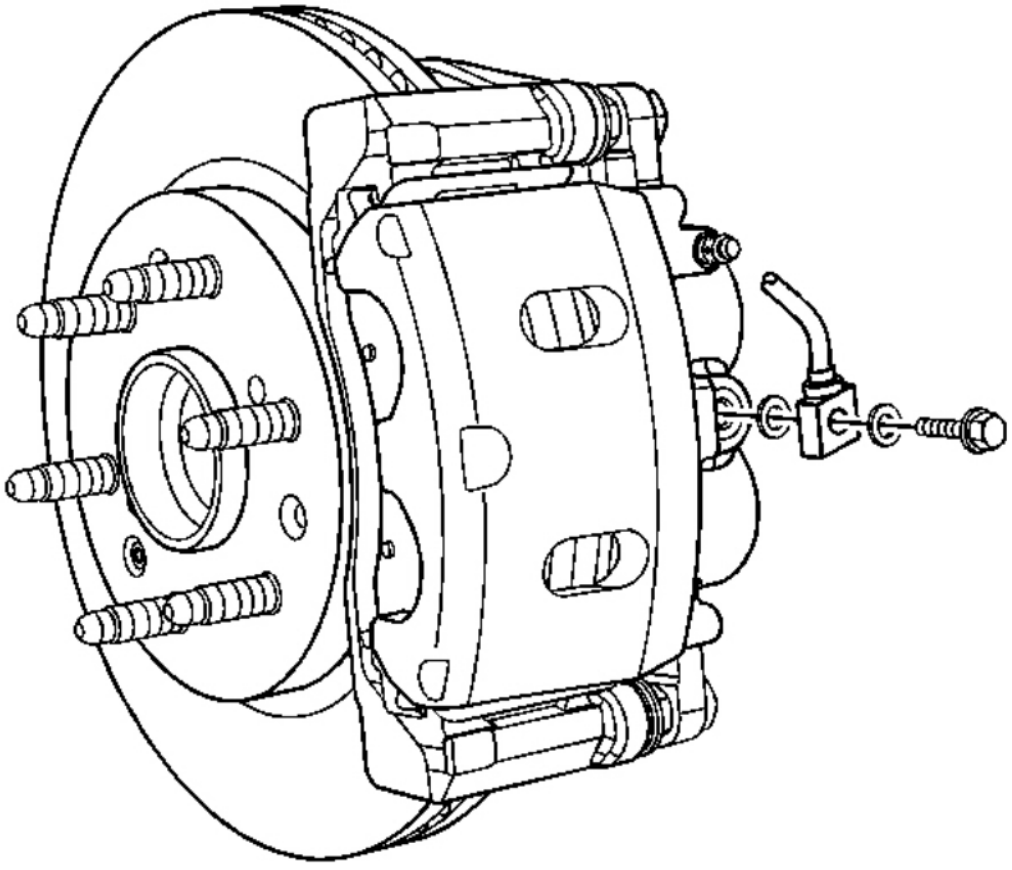


Fig. 39: Brake Hose Fitting
Courtesy of GENERAL MOTORS CORP.

5. Install the brake hose to caliper bolt.

   Tighten: Tighten the bolt to 40 N.m (30 lb ft).

6. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)** .
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
8. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

FRONT BRAKE CALIPER REPLACEMENT (2500 SERIES)

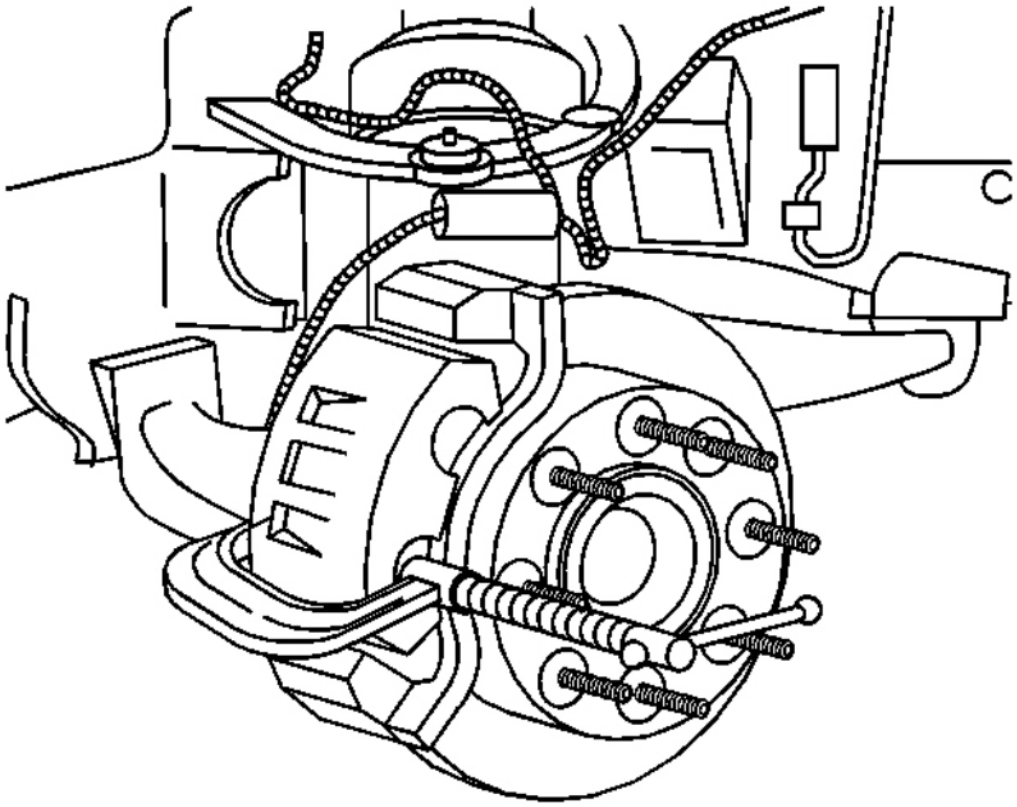
cardiagn.com

CAUTION: Refer to Brake Dust Caution .

CAUTION: Refer to Brake Fluid Irritant Caution .

Removal Procedure

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



cardiagn.com

Fig. 40: Compressing Brake Caliper Pistons
Courtesy of GENERAL MOTORS CORP.

6. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard brake pad.
    2. Slowly tighten the C-clamps until the caliper pistons are pushed completely into the caliper bores.
    3. Remove the C-clamps from the caliper.
7. Clean all dirt and debris from the brake caliper and fittings.

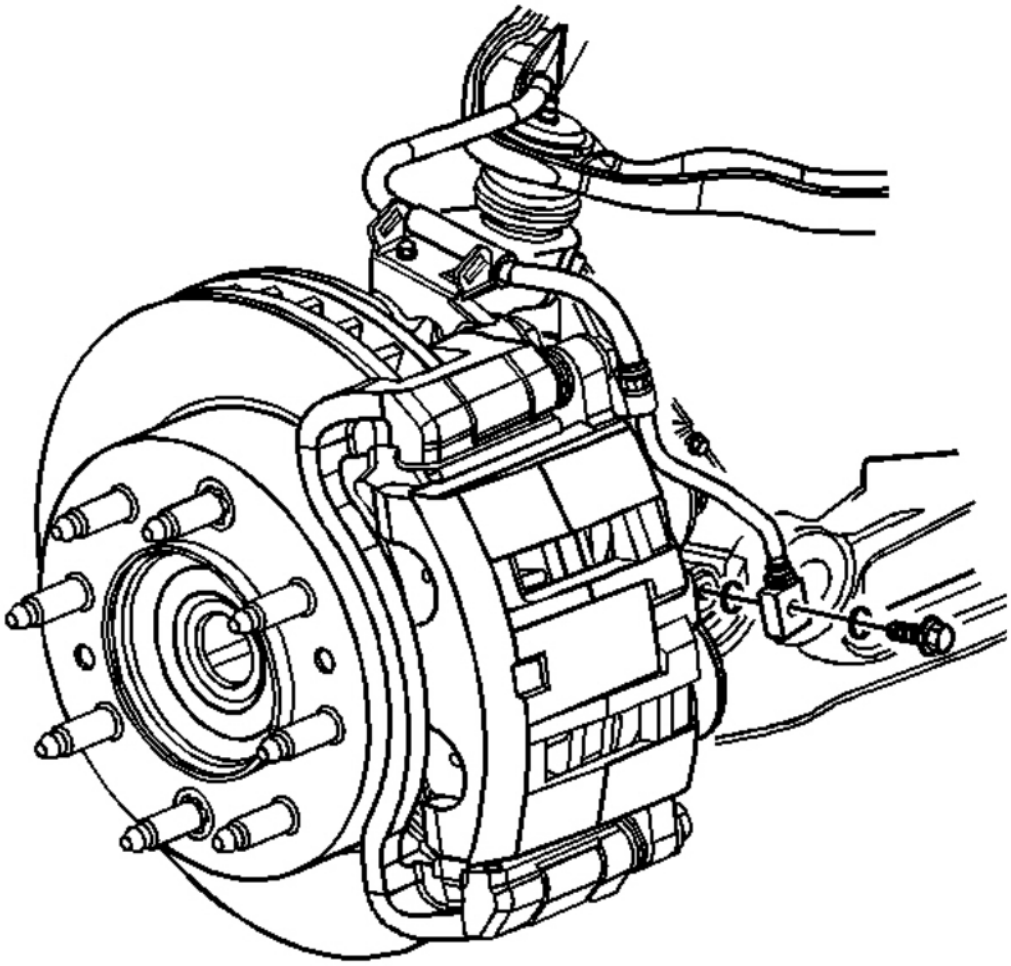


Fig. 41: View Of Brake Hose To Caliper Bolt
Courtesy of GENERAL MOTORS CORP.

cardiagn.com

IMPORTANT:

- **Cap or plug the brake hose to prevent brake fluid leakage and contamination of the brake system.**
- **Ensure that the washers are not still attached to the brake hose or the brake caliper.**
- **DO NOT re-use the washers, discard and replace with new.**

8. Remove the brake hose to caliper bolt.
9. Remove the brake hose from the brake caliper.
10. Remove and discard the 2 copper brake hose gaskets.

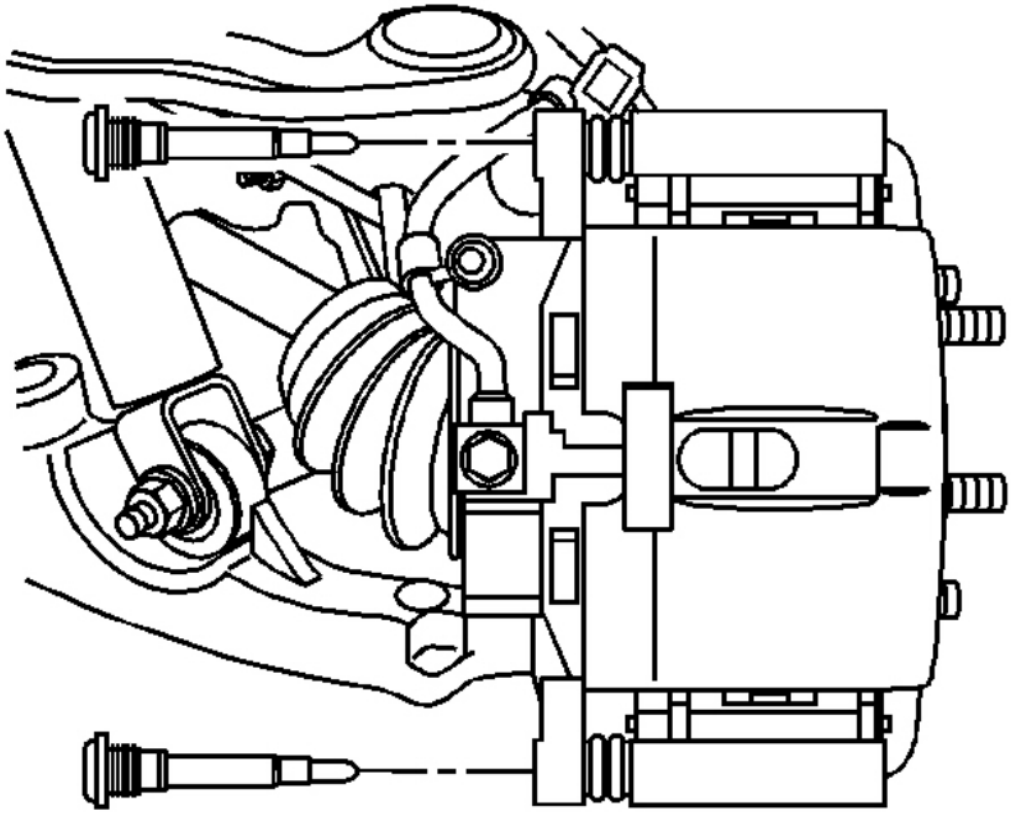


Fig. 42: View Of Brake Caliper Mounting
Courtesy of GENERAL MOTORS CORP.

CAUTION: Do not depress the brake pedal with the brake rotors/calipers and/or the brake drums removed. Damage to the brake system may result. If

cardiagn.com

brake system damage occurs and is not repaired, vehicle damage and/or personal injury or death may result.

11. Remove the brake caliper guide pin bolts from the brake caliper.
12. Remove the brake caliper from the caliper mounting bracket.

Installation Procedure

1. Install the brake caliper to the caliper mounting bracket.

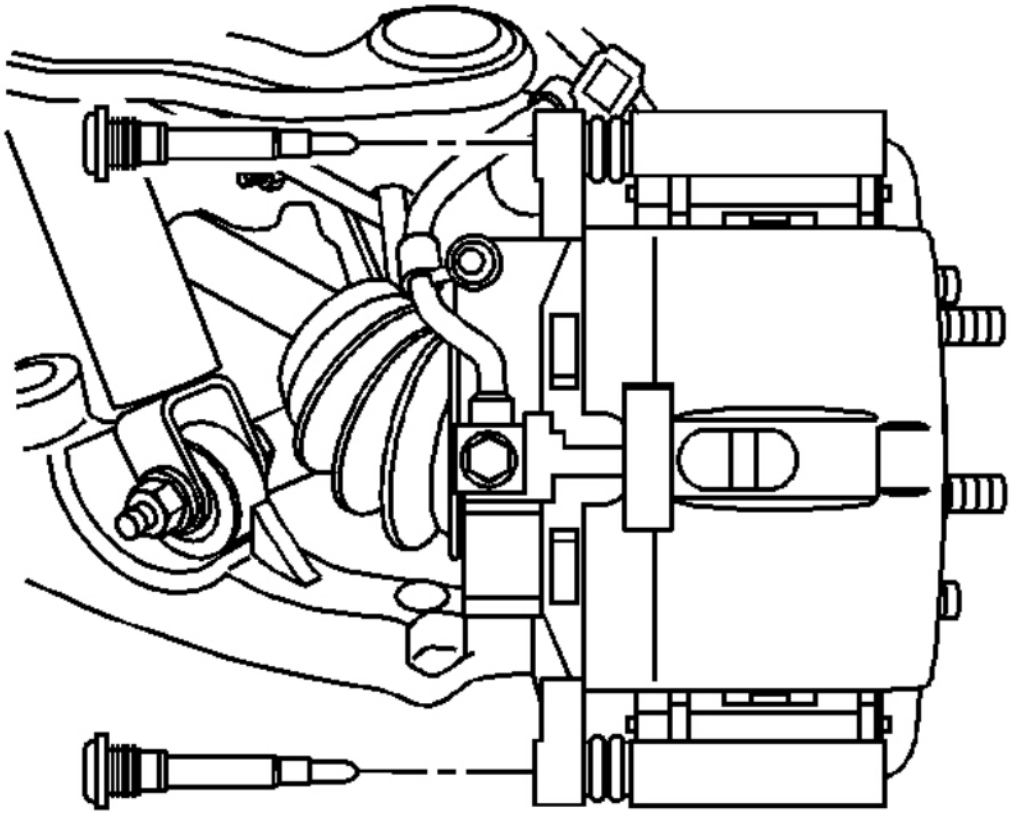


Fig. 43: View Of Brake Caliper Mounting
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

2. Install brake caliper guide pin bolts.

cardiagn.com

Tighten: Tighten the bolts to 108 N.m (80 lb ft).

3. Remove the cap or plug from the brake hose to caliper fitting.

IMPORTANT: Install 2 NEW copper brake hose gaskets.

4. Assemble the 2 copper brake hose gaskets to the brake to caliper bolt and the brake hose.

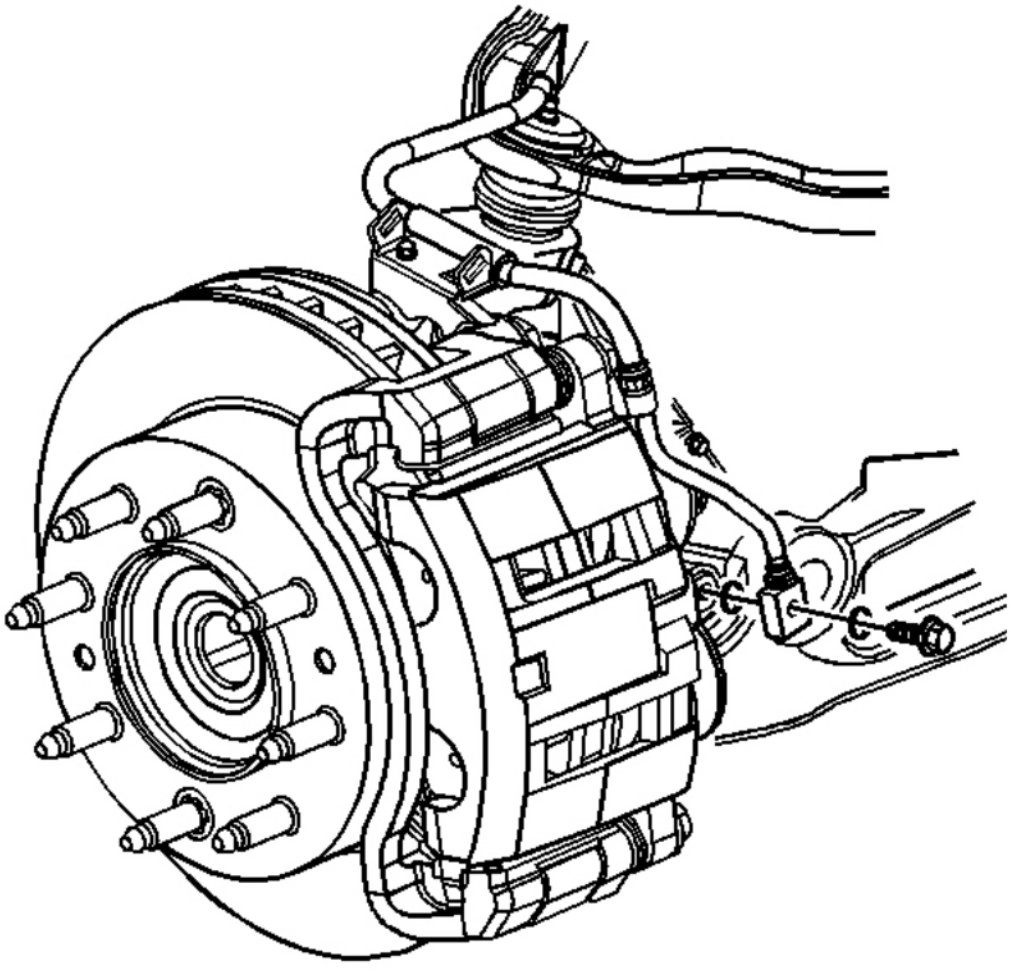


Fig. 44: View Of Brake Hose To Caliper Bolt
Courtesy of GENERAL MOTORS CORP.

5. Install the brake hose to caliper bolt.

cardiagn.com

Tighten: Tighten the bolts to 45 N.m (33 lb ft).

6. Bleed the brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)** .
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
8. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

REAR BRAKE CALIPER REPLACEMENT (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

CAUTION: Refer to Brake Fluid Irritant Caution .

Removal Procedure

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the fluid level is midway between the maximum-full point and the minimum allowable level, no fluid needs to be removed from the reservoir before proceeding.
3. If the fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove 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. Clean all dirt and foreign material from the brake hose fitting.

cardiagn.com

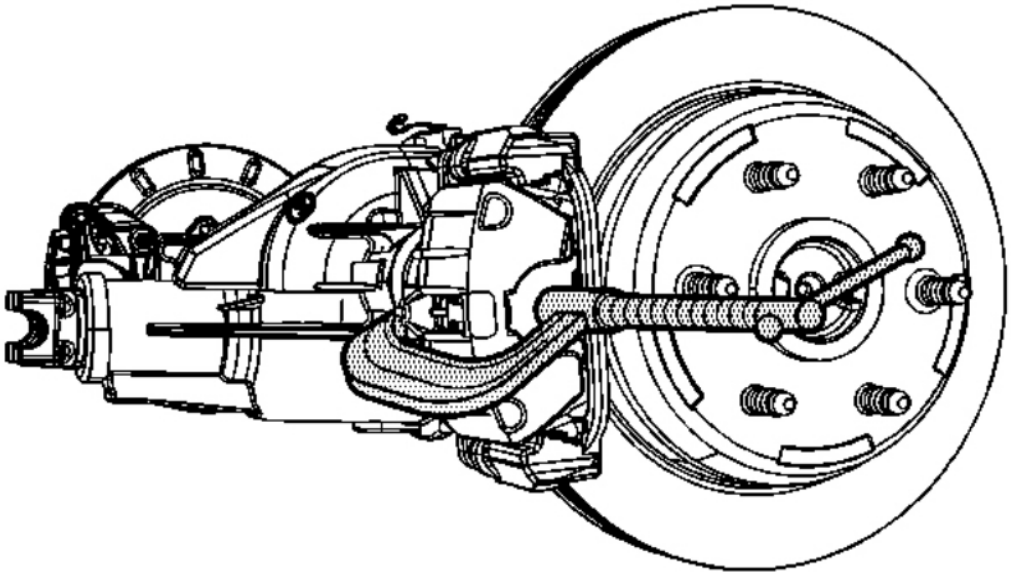


Fig. 45: Compressing Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

7. Compress the caliper piston.
    1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the piston is pushed completely into the caliper bore.
    3. Remove the C-clamp from the caliper.

cardiagn.com

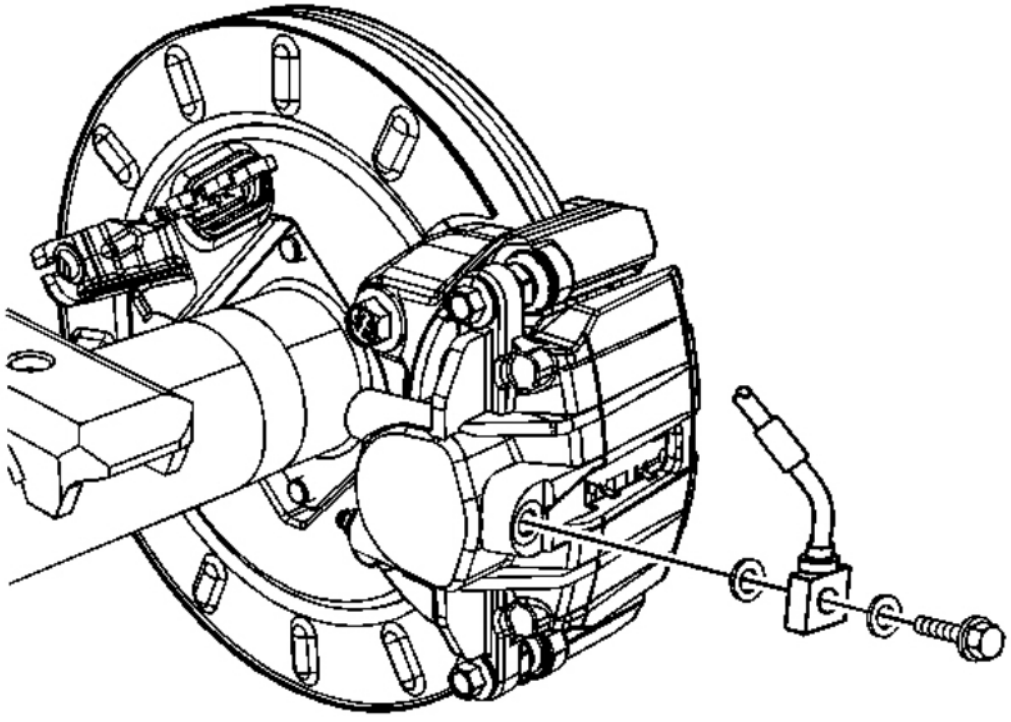


Fig. 46: Brake Hose Fitting
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Cap or plug the brake pipe to prevent brake fluid leakage and contamination of the brake system.

8. Remove the brake hose to caliper bolt. Position the brake hose to the side.

IMPORTANT:
- **Ensure that the copper gaskets are not attached to the brake caliper or the brake hose.**
- **DO NOT re-use the copper gaskets, replace with NEW.**

9. Remove and discard the 2 copper brake hose gaskets.

cardiagn.com

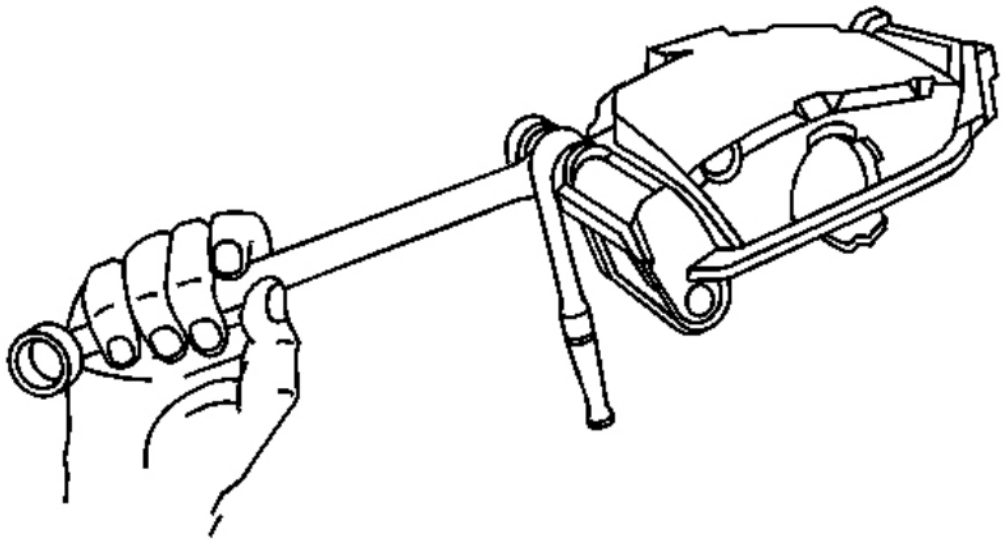


Fig. 47: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **DO NOT use any air tools to remove or tighten the guide pin bolts. Use hand tools only.**
- **Install an open end wrench to the guide pin and hold it in line with the caliper while removing or installing the caliper bolts. DO NOT allow the wrench to come in contact with the brake caliper. Allowing the wrench to come in contact with the brake caliper will cause a pulsation when the brake is applied.**

10. Using an open end wrench to back up the caliper guide pin, remove the guide pin bolt

cardiagn.com

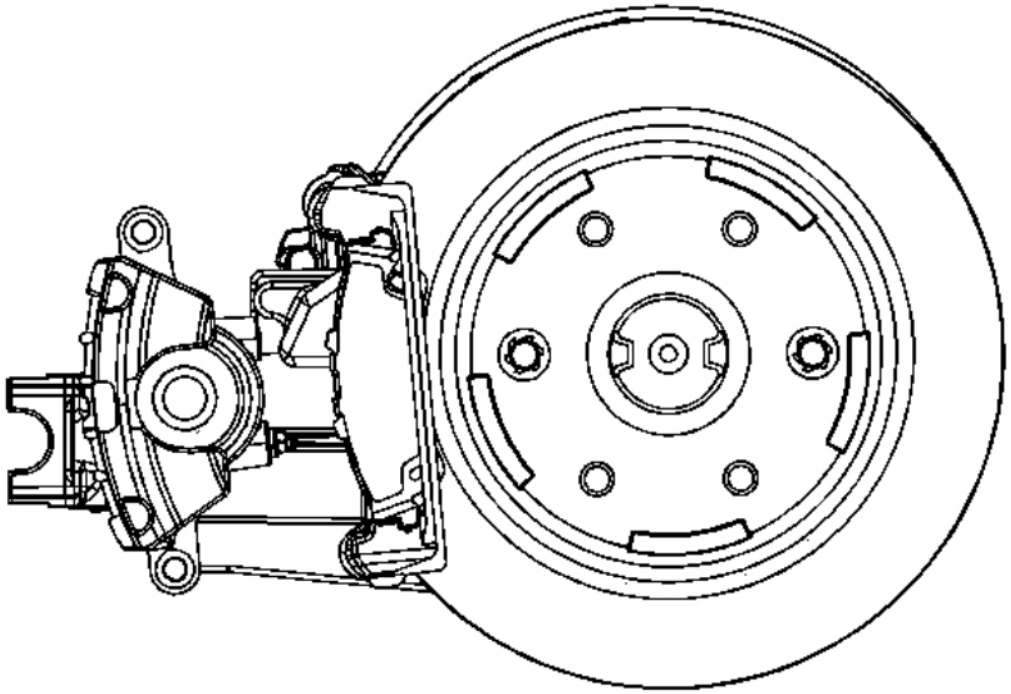


Fig. 48: Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

11. Remove the brake caliper from the mounting bracket.

Installation Procedure

cardiagn.com

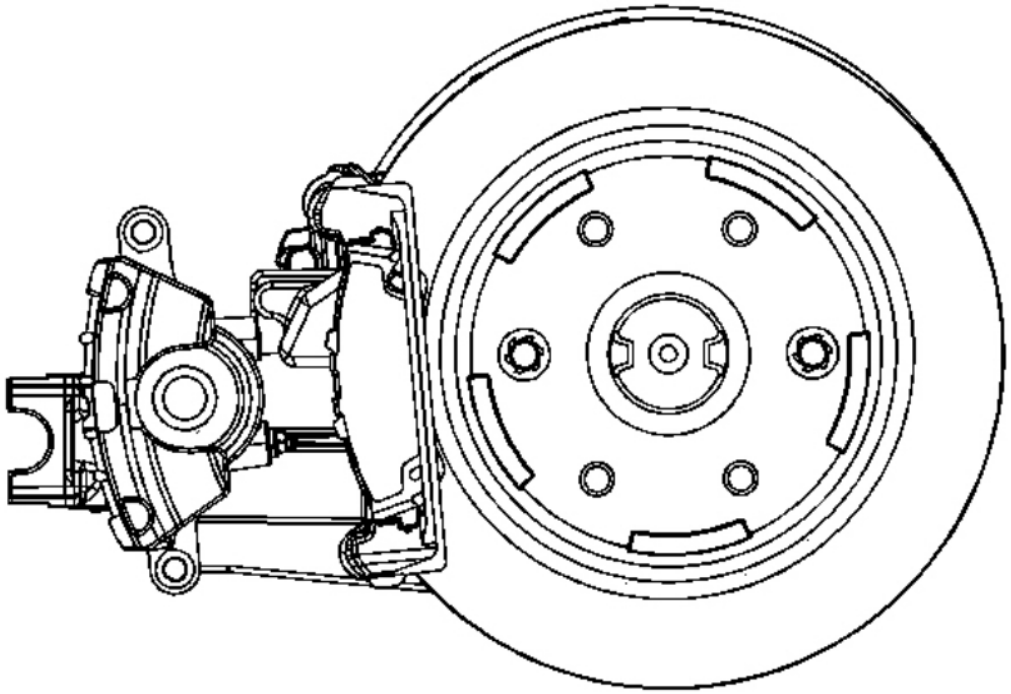


Fig. 49: Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper on to the mounting bracket.

cardiagn.com

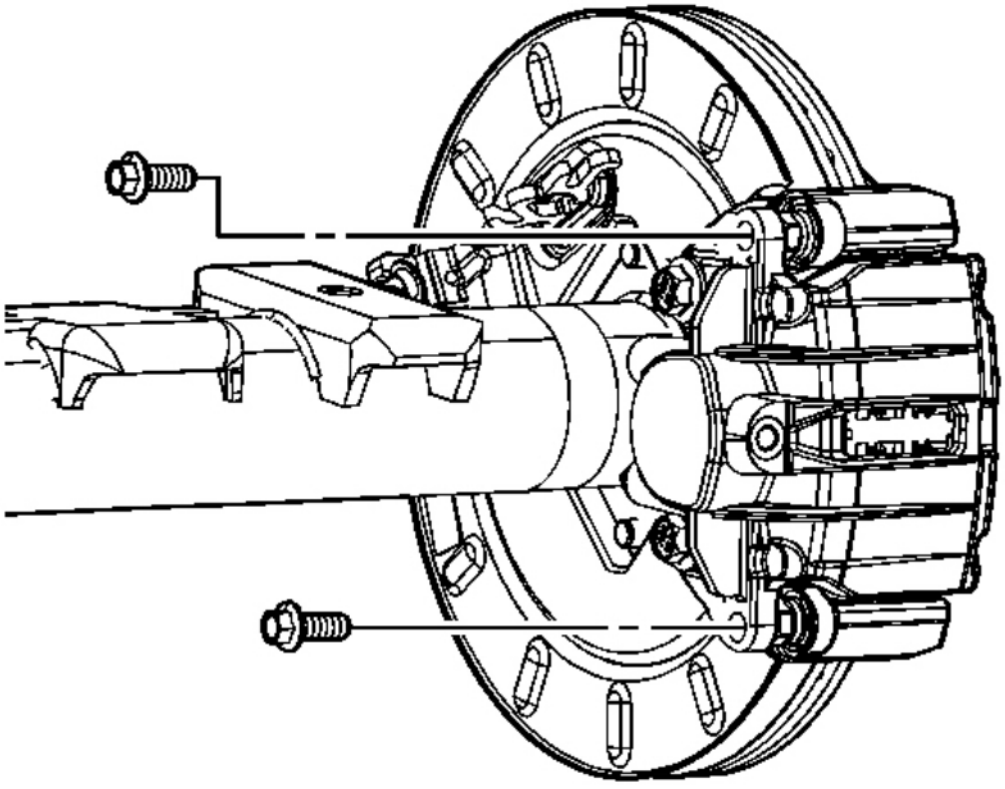


Fig. 50: Brake Caliper Bolts
Courtesy of GENERAL MOTORS CORP.

2. Perform the following procedure before installing the brake caliper guide pin bolts.
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolt with brake parts cleaner or the equivalent and allow to dry.
    3. Apply Threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolt.

cardiagn.com

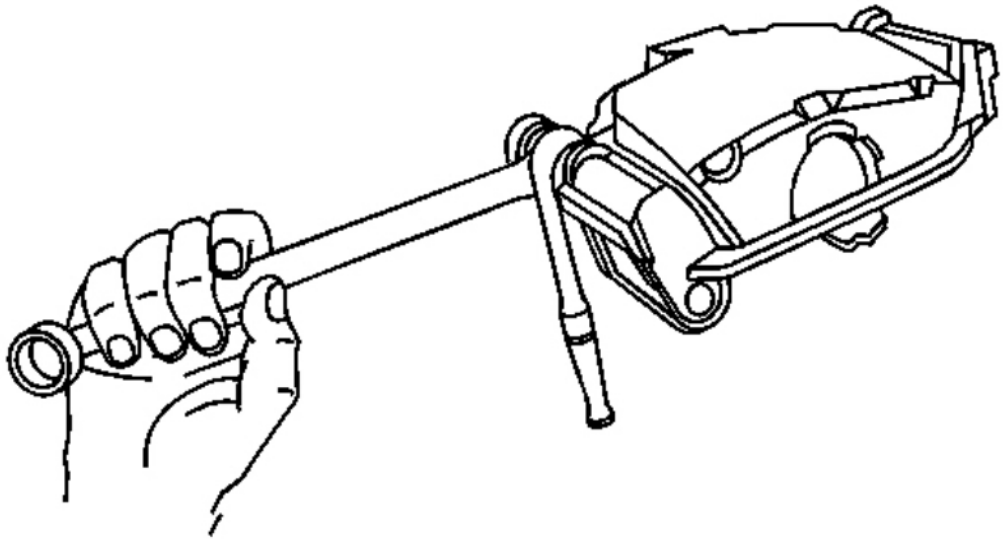


Fig. 51: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

IMPORTANT:

- **DO NOT use any air tools to remove or tighten the guide pin bolts. Use hand tools only.**
- **Install an open end wrench to the guide pin and hold it in line with the caliper while removing or installing the caliper bolts. DO NOT allow the wrench to come in contact with the brake caliper. Allowing the wrench to come in contact with the brake caliper will cause a pulsation when the brake is applied.**

3. Use an open end wrench to hold the guide pins while tightening the guide pin bolts.

Tighten: Tighten the bolts to 38 N.m (28 lb ft).

cardiagn.com

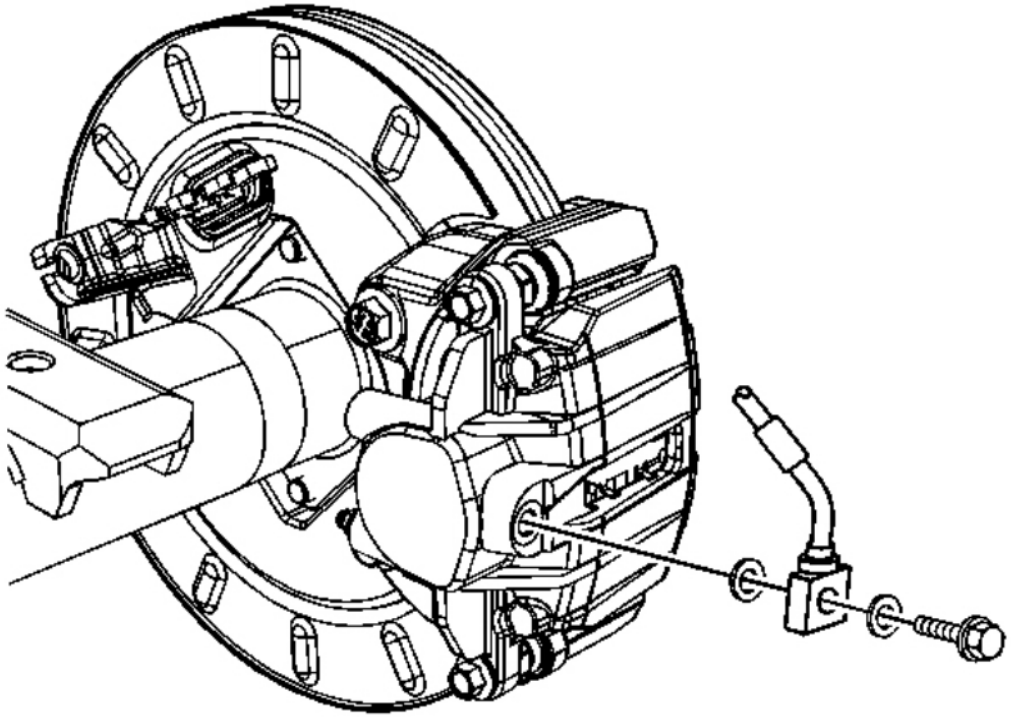


Fig. 52: Brake Hose Fitting
Courtesy of GENERAL MOTORS CORP.

4. Remove the rubber cap or plug from the exposed brake hose fitting end.
5. Install the 2 NEW copper gaskets to the brake hose bolt and the brake hose fitting.
6. Install the brake hose to caliper bolt.

   Tighten: Tighten the bolt to 40 N.m (30 lb ft).

7. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)** .
8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
9. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

REAR BRAKE CALIPER REPLACEMENT (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

cardiagn.com

CAUTION: Refer to Brake Fluid Irritant Caution .

Removal Procedure

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

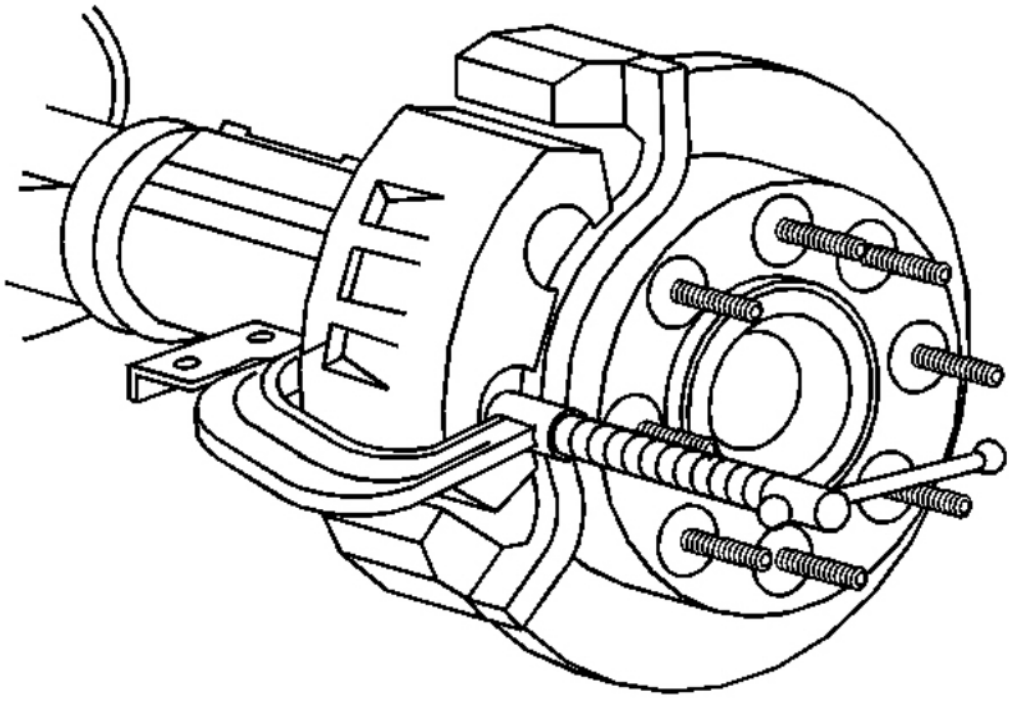


Fig. 53: C-Clamp & Rear Caliper
Courtesy of GENERAL MOTORS CORP.

6. Compress the brake caliper pistons.

cardiagn.com

1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard brake pad.
2. Slowly tighten the C-clamps until the caliper pistons are pushed completely into the caliper bores.
3. Remove the C-clamps from the caliper.

7. Clean all dirt and debris from the brake caliper and fittings.

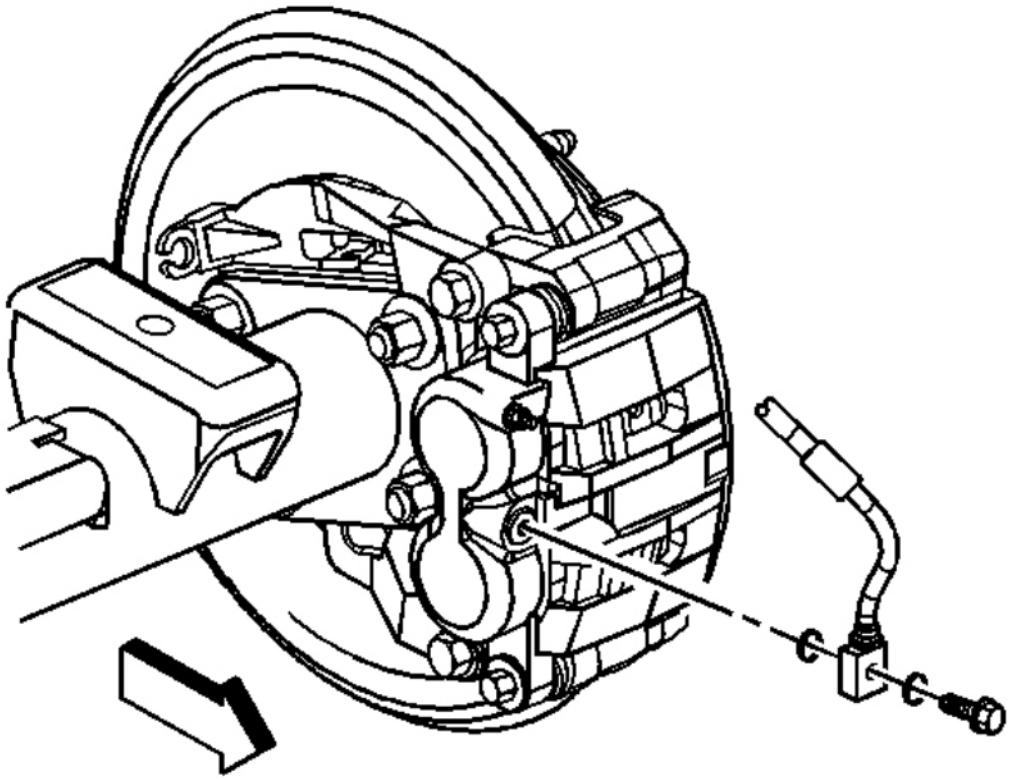


Fig. 54: View Of Brake Hose To Caliper - Rear
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Cap or plug to the brake hose to prevent brake fluid leakage and contamination of the brake system.

8. Remove the brake hose to caliper bolt.
9. Remove the brake hose from the caliper.

IMPORTANT:

- **Ensure that the copper gaskets are not attached to the brake caliper**

cardiagn.com

or the brake hose.

- **DO NOT re-use the copper gaskets, replace them with NEW.**

10. Remove and discard the 2 copper brake hose gaskets.

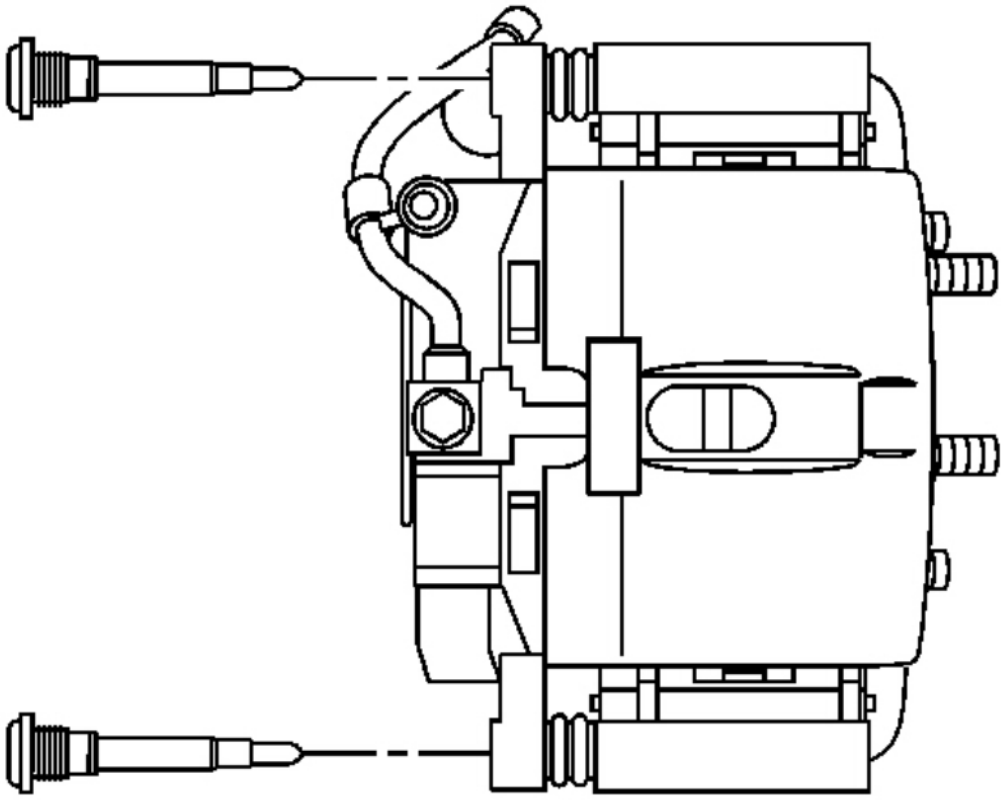


Fig. 55: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

11. Remove the brake caliper guide pin bolts from the brake caliper.
12. Remove the brake caliper from the mounting bracket.

Installation Procedure

1. Install the brake caliper to the mounting bracket.

NOTE: **Refer to Fastener Notice .**

cardiagn.com

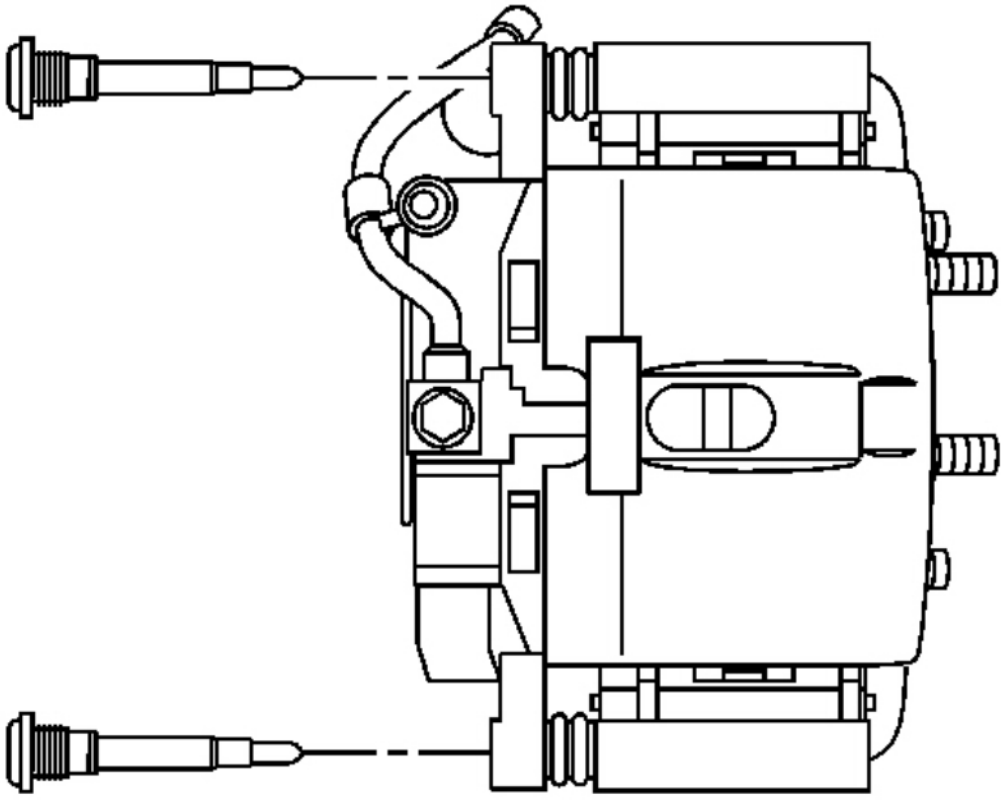


Fig. 56: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

2. Install the brake caliper guide pin bolts.

   Tighten: Tighten the bolts to 108 N.m (80 lb ft).

3. Remove the cap or plug from the brake hose to caliper fitting.

cardiagn.com

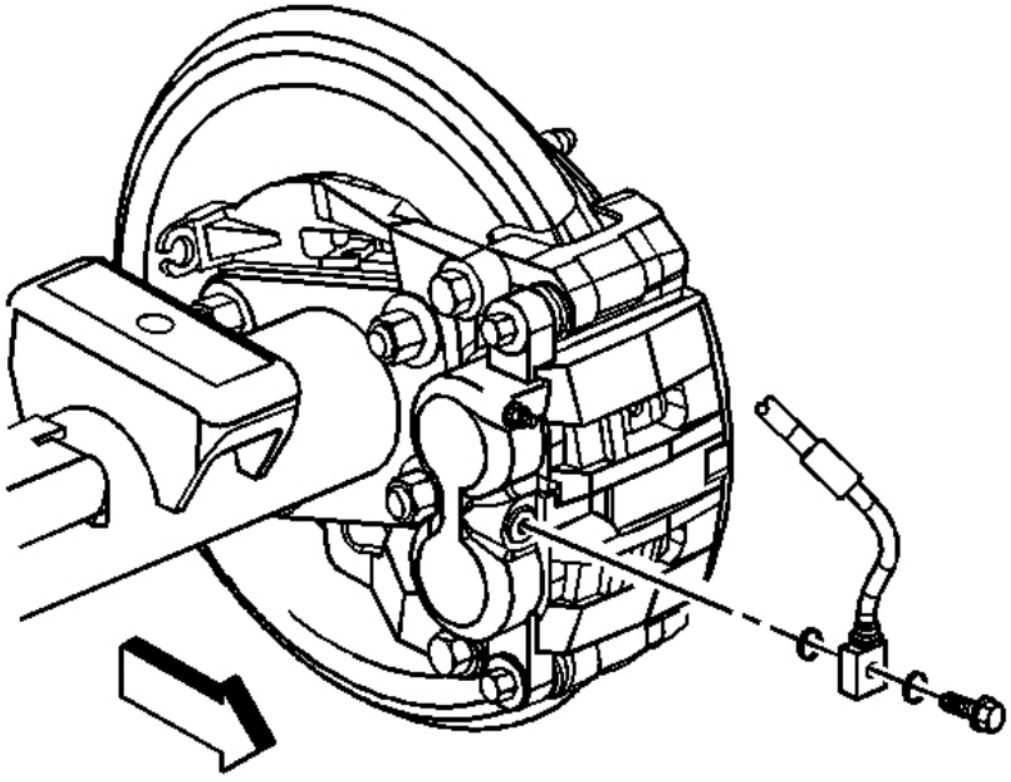


Fig. 57: View Of Brake Hose To Caliper - Rear
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Install 2 NEW copper brake hose gaskets.

4. Assemble the 2 NEW copper brake hose gaskets to the brake hose bolt and brake hose.
5. Install the brake hose to caliper bolt.

   Tighten: Tighten the bolt to 45 N.m (33 lb ft).

6. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)** .
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
8. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

FRONT BRAKE CALIPER OVERHAUL (2500 SERIES)

cardiagn.com

CAUTION: Refer to Brake Dust Caution .

CAUTION: Refer to Brake Fluid Irritant Caution .

Disassembly Procedure

1. Remove the brake caliper. Refer to **Front Brake Caliper Replacement (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)**.
2. Drain all the brake fluid from the caliper.

CAUTION: Do not place your fingers in front of the piston in order to catch or protect the piston while applying compressed air. This could result in serious injury.

IMPORTANT: The brake calipers use phenolic pistons that have stainless steel caps which contact the brake pads. Use compressed air to remove the piston from the brake caliper.

3. Secure the brake caliper in a suitable holding device.
4. Insert a piece of wood in the brake caliper between the pistons and the outer bridge.

cardiagn.com

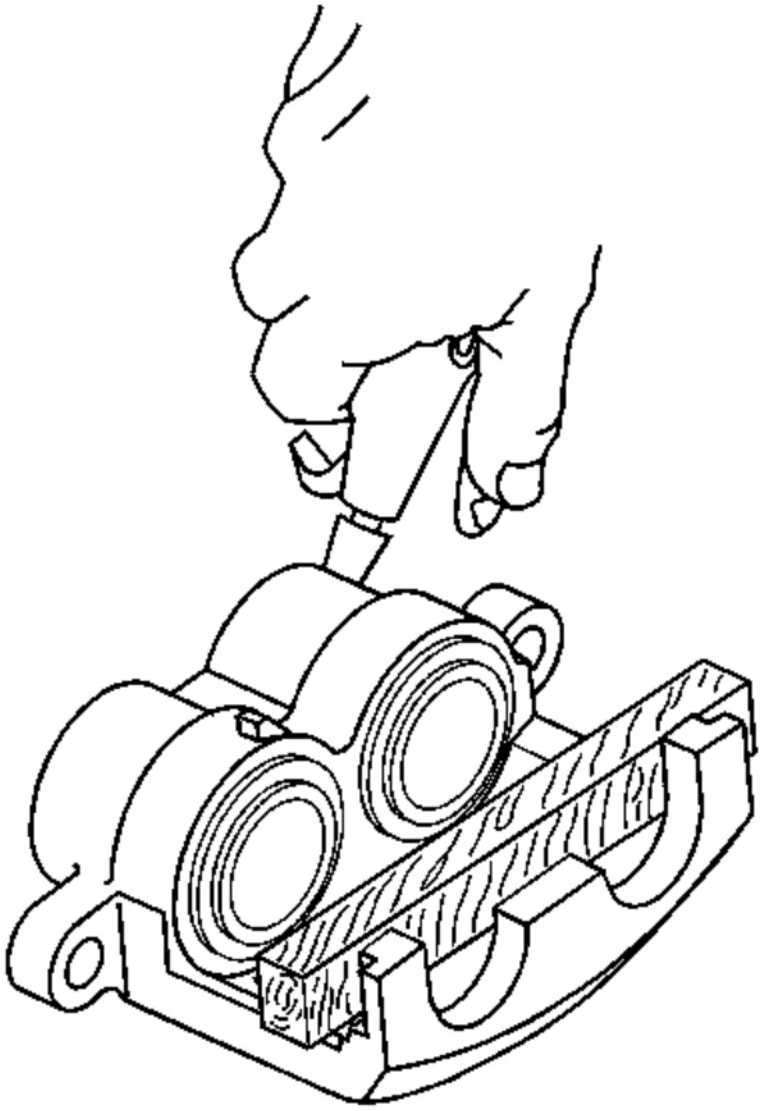


Fig. 58: Applying Air To Brake Caliper
Courtesy of GENERAL MOTORS CORP.

5. Cover the brake caliper with a shop towel.
6. Apply filtered, non-lubricated compressed air into the brake hose inlet fitting port of the brake caliper.

cardiagn.com

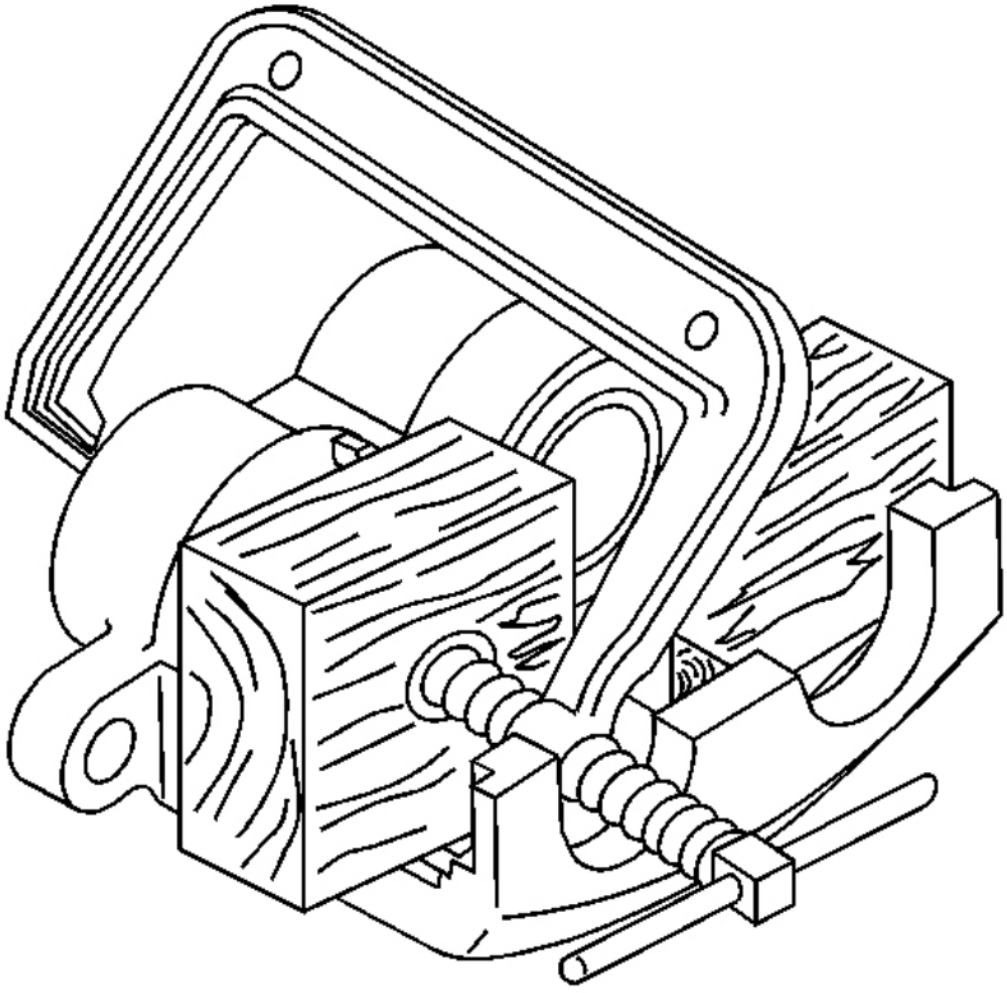


Fig. 59: Clamping Brake Caliper
Courtesy of GENERAL MOTORS CORP.

7. If one of the pistons fails to be removed from the brake caliper, perform the following steps.
    1. Reposition the piston that has been removed back into the brake caliper.
    2. Using a small block of wood and a C-clamp, slowly tighten the C-clamp until the piston is half way into the brake caliper. It does not have to be fully seated.
    3. Position a second block of wood in front of the piston that remains in the brake caliper.
    4. Cover the brake caliper with a shop towel.
    5. Apply filtered, non-lubricated compressed air into the brake hose inlet fitting port of the brake caliper.

cardiagn.com

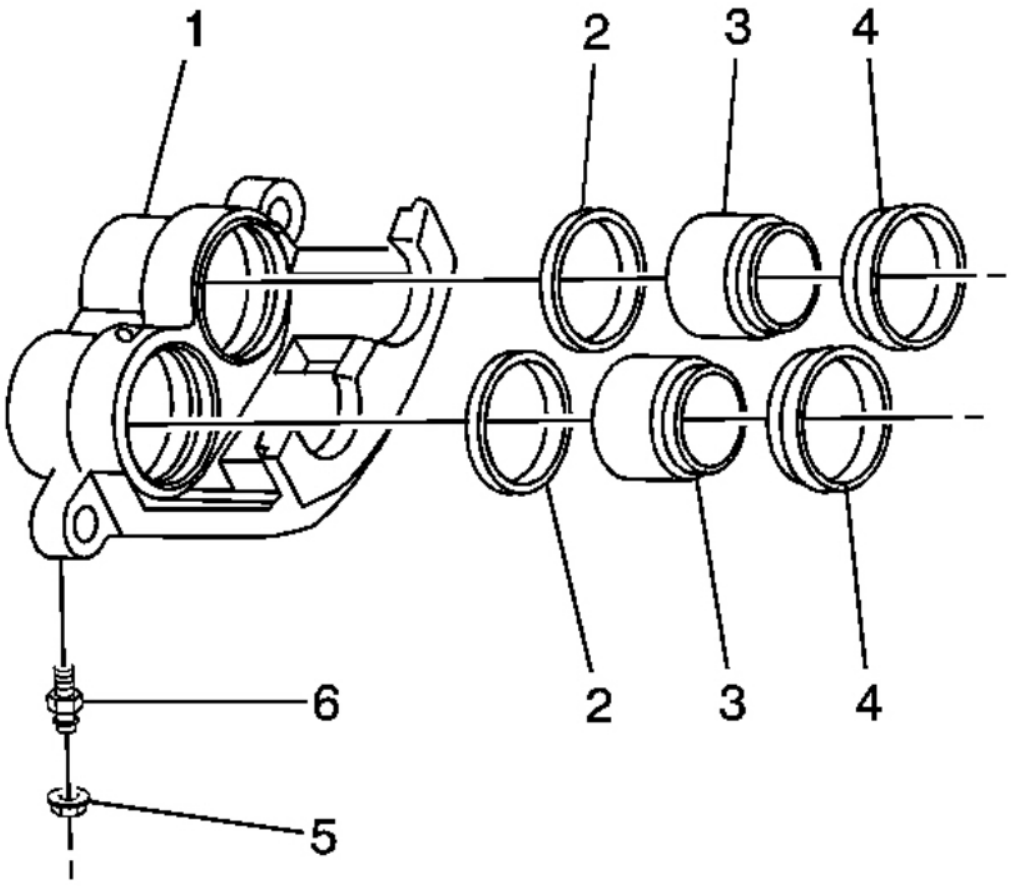


Fig. 60: Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

8. Remove the pistons (3) from the caliper bores.
9. Remove the boots (4) from the caliper bores. Do not scratch the caliper bores.
10. Remove the piston seals (2) from the caliper bores. Do not use a metal tool.
11. Remove the bleeder valve cap (5).
12. Remove the bleeder valve (6) from the caliper housing (1).
13. Clean the bleeder valve, the caliper bores, the caliper passages and the pistons with denatured alcohol. Dry the parts and blow out the brake fluid passages using filtered, non-lubricated compressed air.
14. Replace the pistons or the caliper if any of the following conditions exist:
    - Scoring in the caliper bores
    - Corrosion in the caliper bores

cardiagn.com

- Pitting in the caliper bores
- Damage to the pistons (phenolic)

15. Clean the brake caliper assembly with denatured alcohol.
16. Dry with filtered, non-lubricated compressed air.

Assembly Procedure

IMPORTANT: When applying the clean brake fluid to the piston bores, piston seals and pistons, only apply the brake fluid to one bore at a time. This is done to ensure that the brake caliper, seals and pistons DO NOT become contaminated with dirt or other foreign material.

1. Apply a small amount of clean DOT-3 brake fluid to the piston, piston seal, and piston bore.

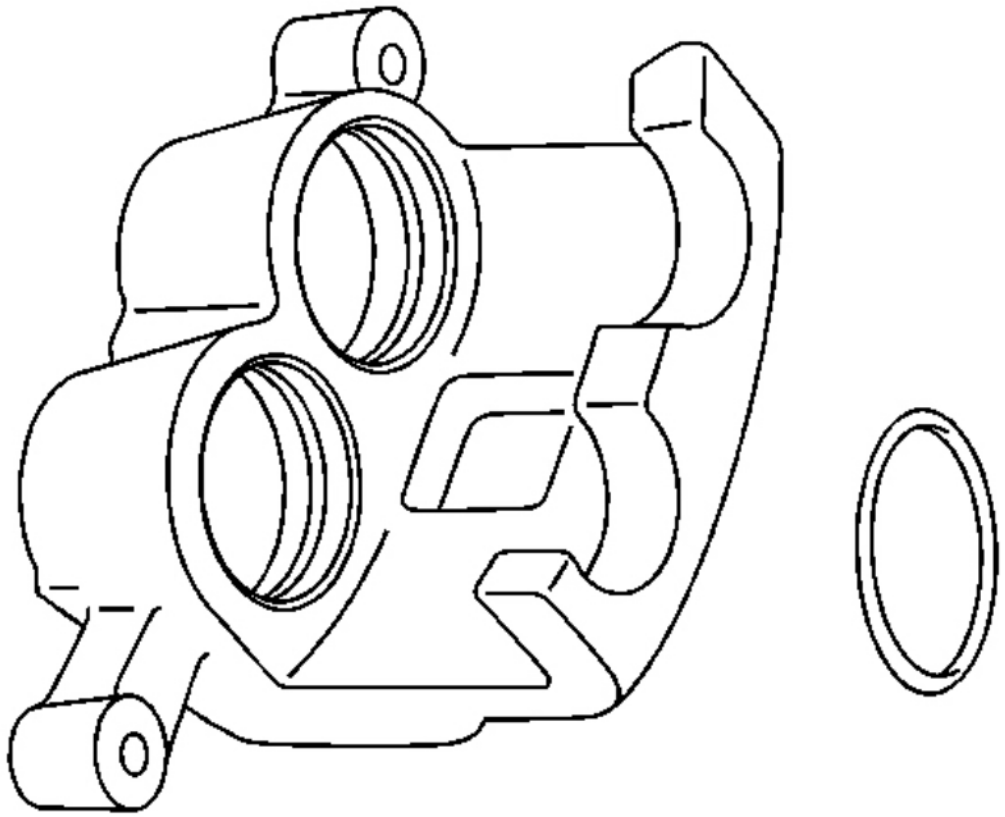


Fig. 61: View Of Brake Caliper Piston Seal

cardiagn.com

Courtesy of GENERAL MOTORS CORP.

2. Install the square-cut piston seal in the brake caliper bore groove.
3. Ensure that the square-cut piston seal is not twisted.

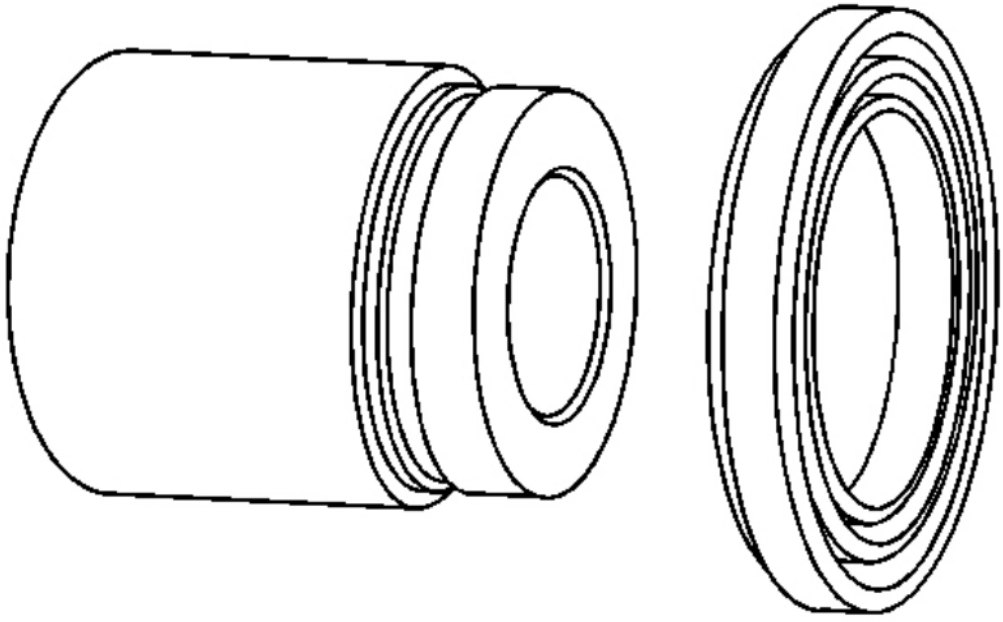


Fig. 62: View Of Piston Dust Seal
Courtesy of GENERAL MOTORS CORP.

4. Install the boot over the end of the piston so that the fold will face toward the brake caliper housing piston bore opening.

cardiagn.com

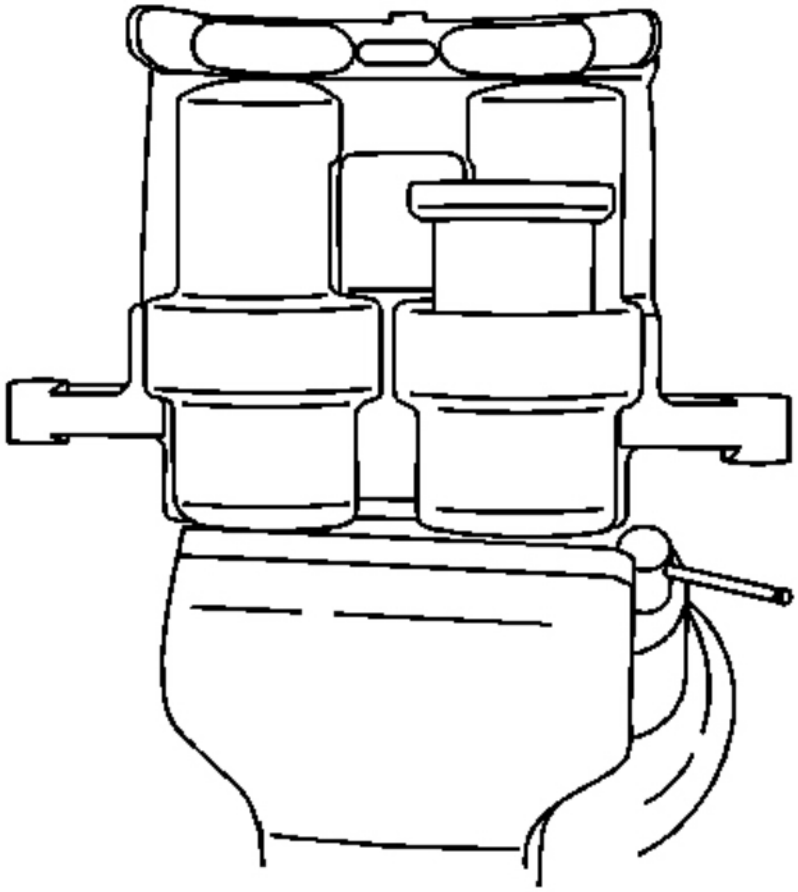


Fig. 63: Installing Piston To Brake Caliper
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Position the piston in the bore so that it is straight and level.

5. Position the piston to the brake caliper bore and seat the boot into the brake caliper bore groove.

cardiagn.com

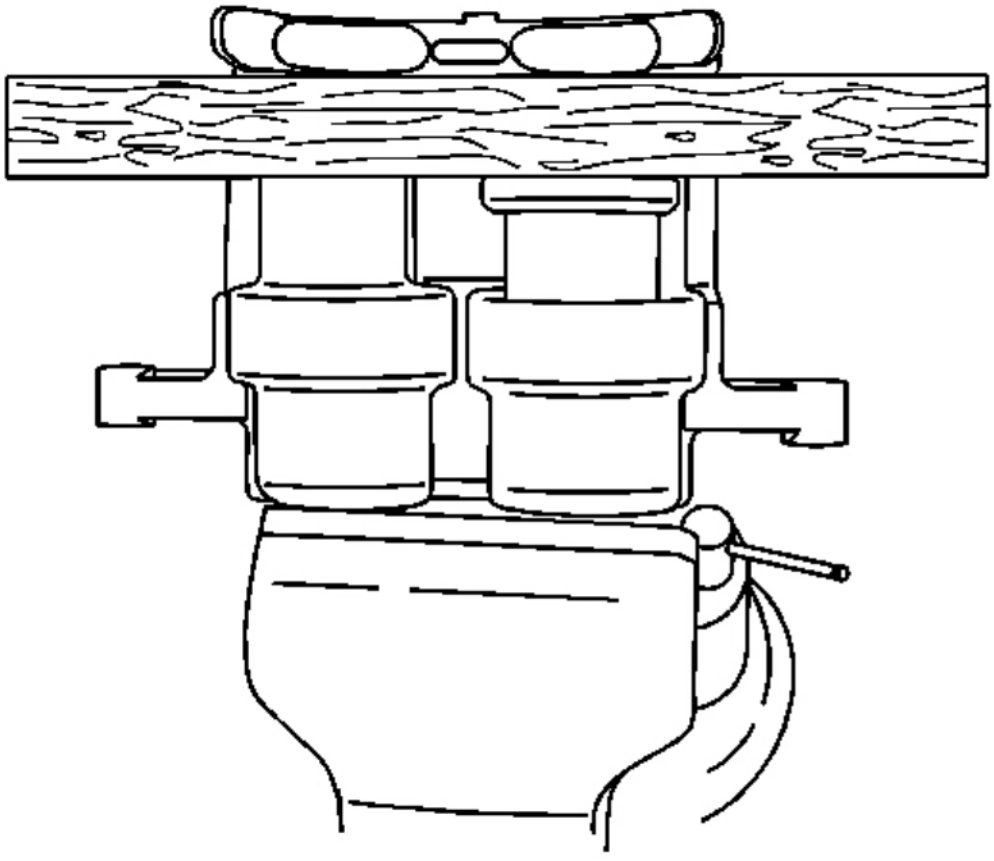


Fig. 64: Installing Piston Into Bore
Courtesy of GENERAL MOTORS CORP.

6. Position a piece of wood across the piston to be installed.
7. Applying equal pressure by hand while pushing down, install the piston in the bore.
8. Remove the piece of wood.

cardiagn.com

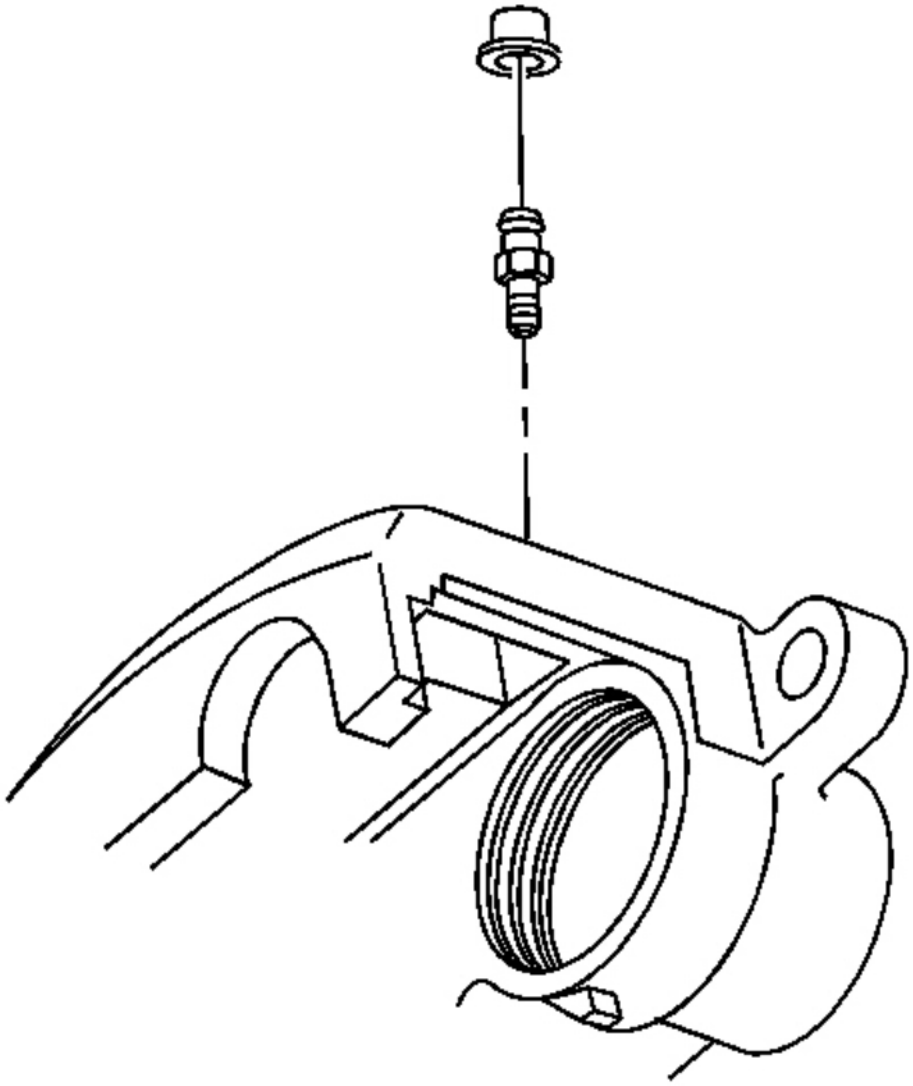


Fig. 65: View Of Bleeder Valve Cap
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

9. Install the bleeder valve in the brake caliper housing.

   Tighten: Tighten the bleeder valve to 12 N.m (106 lb in).

cardiagn.com

10. Install the bleeder valve cap.
11. Install the brake caliper. Refer to **Front Brake Caliper Replacement (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)**.

REAR BRAKE CALIPER OVERHAUL (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

CAUTION: Refer to Brake Fluid Irritant Caution .

Disassembly Procedure

1. Remove the brake caliper. Refer to **Rear Brake Caliper Replacement (1500 Series)** or **Rear Brake Caliper Replacement (2500 Series)**.
2. Drain all the brake fluid from the caliper.

IMPORTANT: The brake calipers use phenolic pistons with stainless steel caps which contact the brake pads. Use compressed air to remove the piston from the brake caliper.

3. Secure the brake caliper in a suitable holding device.
4. Insert a piece of wood in the brake caliper between the pistons and the outer bridge.

cardiagn.com

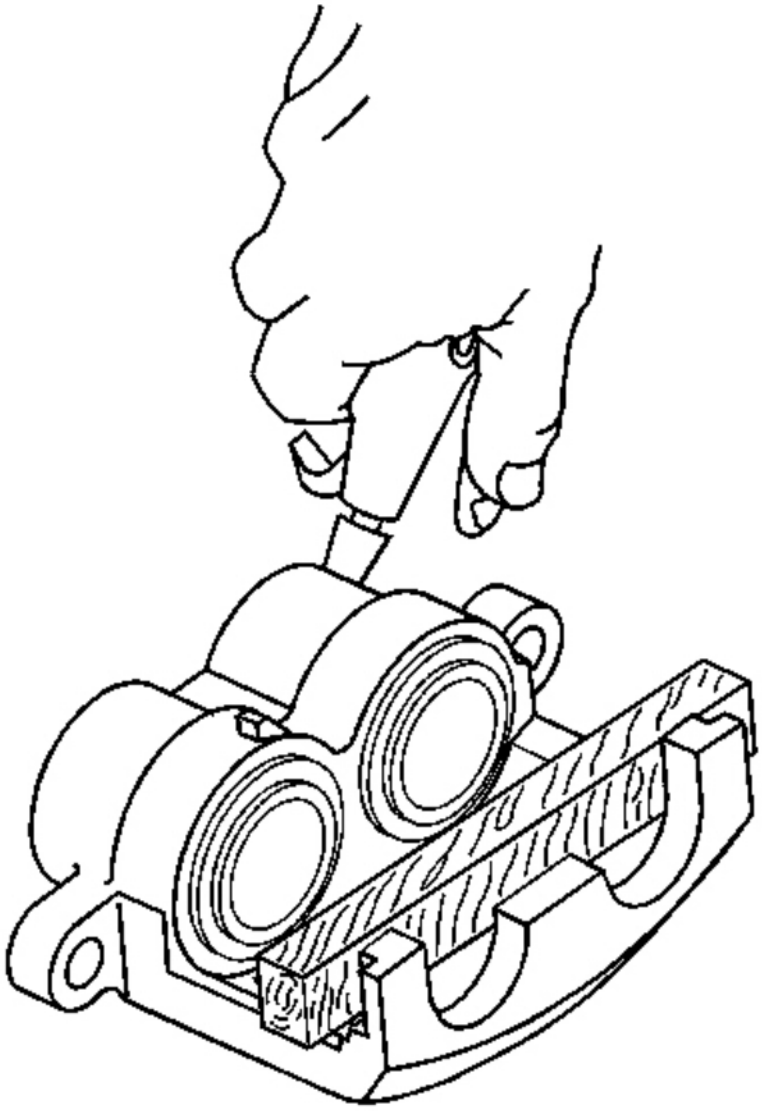


Fig. 66: Applying Air To Brake Caliper
Courtesy of GENERAL MOTORS CORP.

5. Cover the brake caliper with a shop towel.
6. Apply filtered, non-lubricated compressed air into the brake hose inlet fitting port of the brake caliper.

cardiagn.com

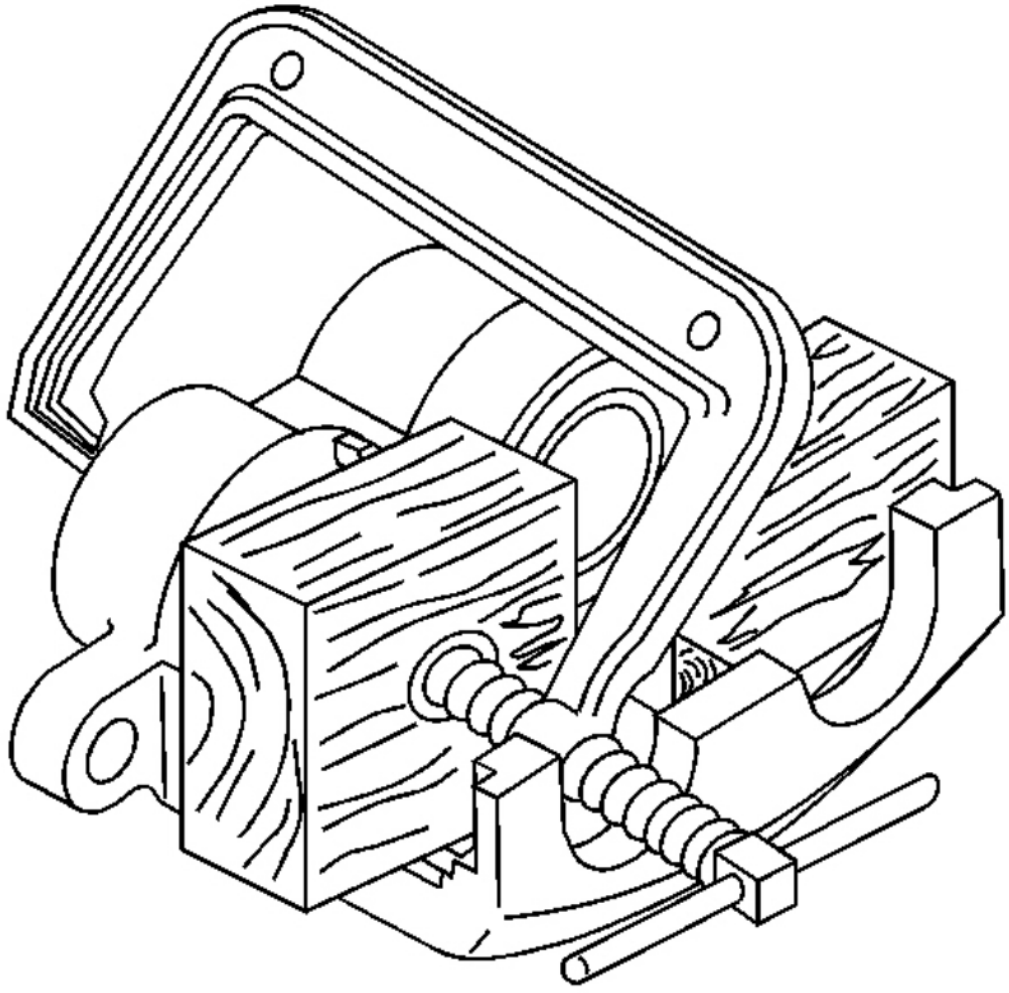


Fig. 67: Clamping Brake Caliper
Courtesy of GENERAL MOTORS CORP.

7. If one of the pistons fails to be removed from the brake caliper, perform the following steps.
    1. Reposition the piston that has been removed back into the brake caliper.
    2. Using a small block of wood and a C-clamp, slowly tighten the C-clamp until the piston is half way into the brake caliper. It does not have to be fully seated.
    3. Position a second block of wood in front of the piston that remains in the brake caliper.
    4. Cover the brake caliper with a shop towel.
    5. Apply filtered, non-lubricated compressed air into the brake hose inlet fitting port of the brake caliper.

cardiagn.com

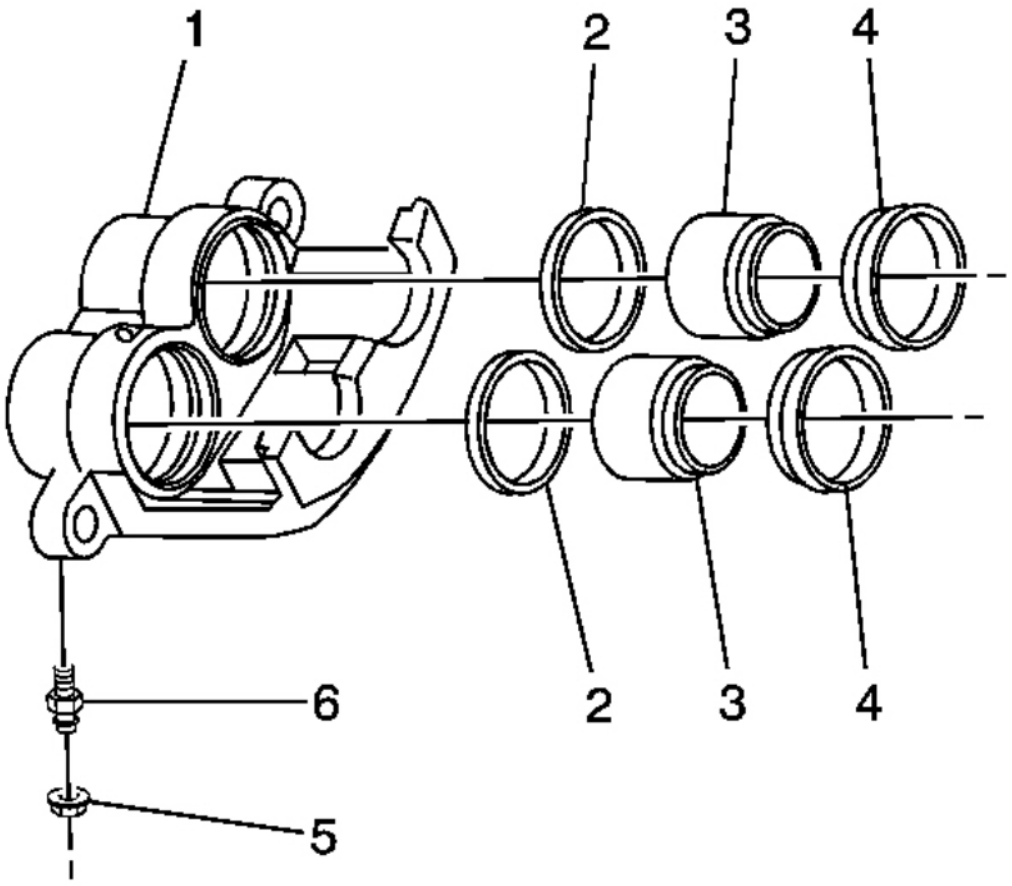


Fig. 68: Exploded View Of Brake Caliper
Courtesy of GENERAL MOTORS CORP.

8. Remove the pistons (3) from the caliper bores.
9. Remove the boots (4) from the caliper bores. Do not scratch the caliper bores.
10. Remove the piston seals (2) from the caliper bores. Do not use a metal tool.
11. Remove the bleeder valve cap (5).
12. Remove the bleeder valve (6) from the caliper housing (1).
13. Clean the bleeder valve, the caliper bores, the caliper passages and the pistons with denatured alcohol. Dry the parts and blow out the brake fluid passages using filtered, non-lubricated compressed air.
14. Replace the pistons or the caliper if any of the following conditions exist:
    - Scoring in the caliper bores
    - Corrosion in the caliper bores

cardiagn.com

- Pitting in the caliper bores
- Damage to the pistons (phenolic)

15. Clean the brake caliper assembly with denatured alcohol.
16. Dry with filtered, non-lubricated compressed air.

Assembly Procedure

IMPORTANT: When applying the clean brake fluid to the piston bores, piston seals and pistons, only apply the brake fluid to one bore at a time. This is done to ensure the brake caliper, seals and pistons DO NOT become contaminated with dirt or other foreign material.

1. Apply a small amount of clean DOT-3 brake fluid to the piston, piston seal, and piston bore.

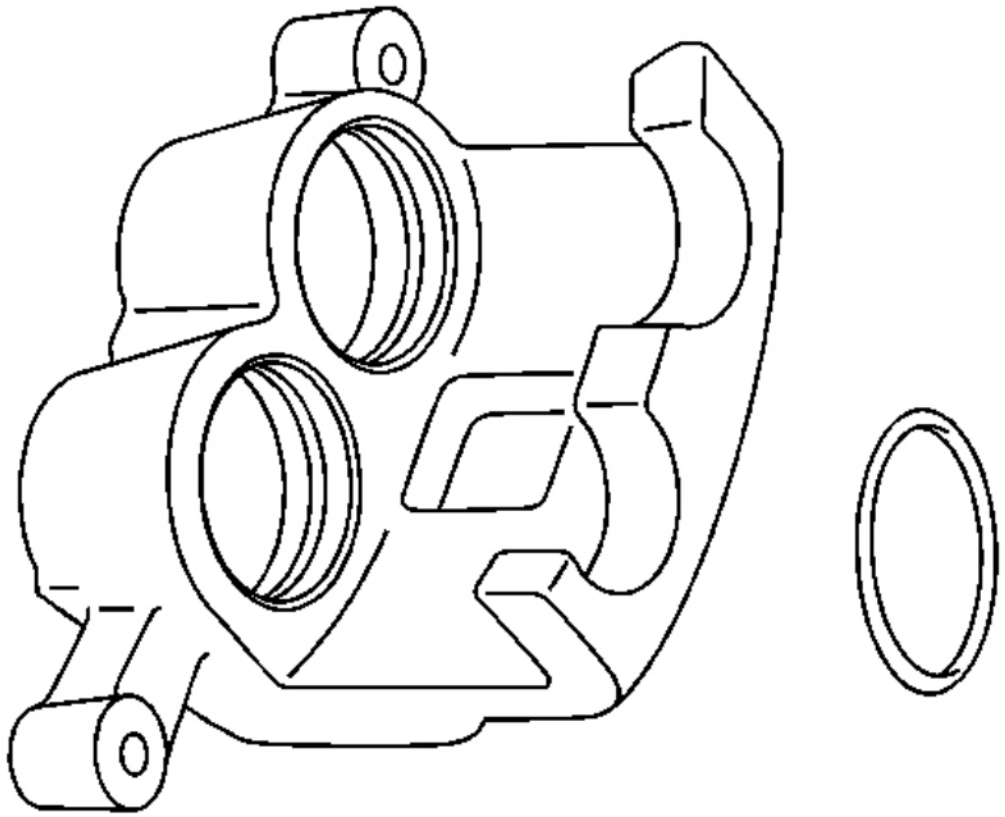


Fig. 69: View Of Brake Caliper Piston Seal

cardiagn.com

Courtesy of GENERAL MOTORS CORP.

2. Install the square-cut piston seal in the brake caliper bore groove.
3. Ensure the square-cut piston seal is not twisted.

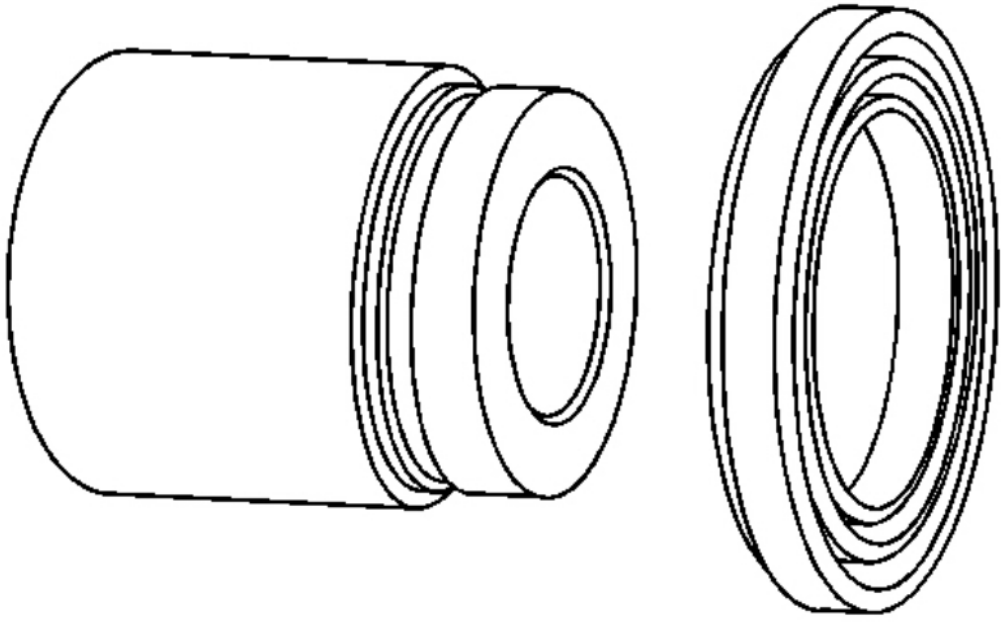


Fig. 70: View Of Piston Dust Seal
Courtesy of GENERAL MOTORS CORP.

4. Install the boot over the end of the piston so the fold will face toward the brake caliper housing piston bore opening.

cardiagn.com

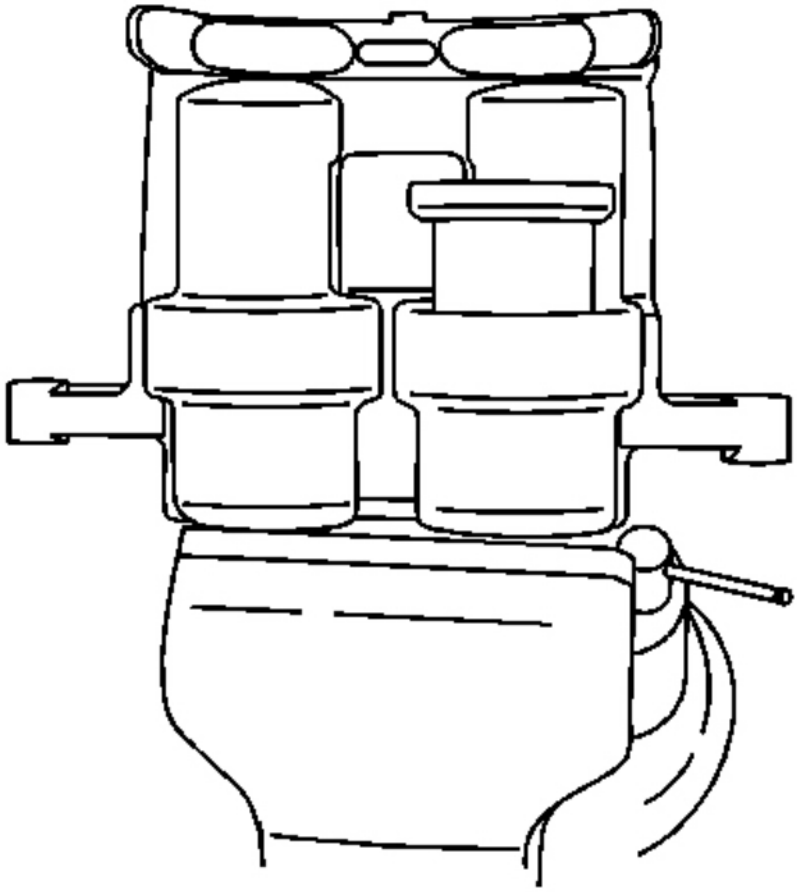


Fig. 71: Installing Piston To Brake Caliper
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Position the piston in the bore so that it is straight and level.

5. Position the piston to the brake caliper bore and seat the boot into the brake caliper bore groove.

cardiagn.com

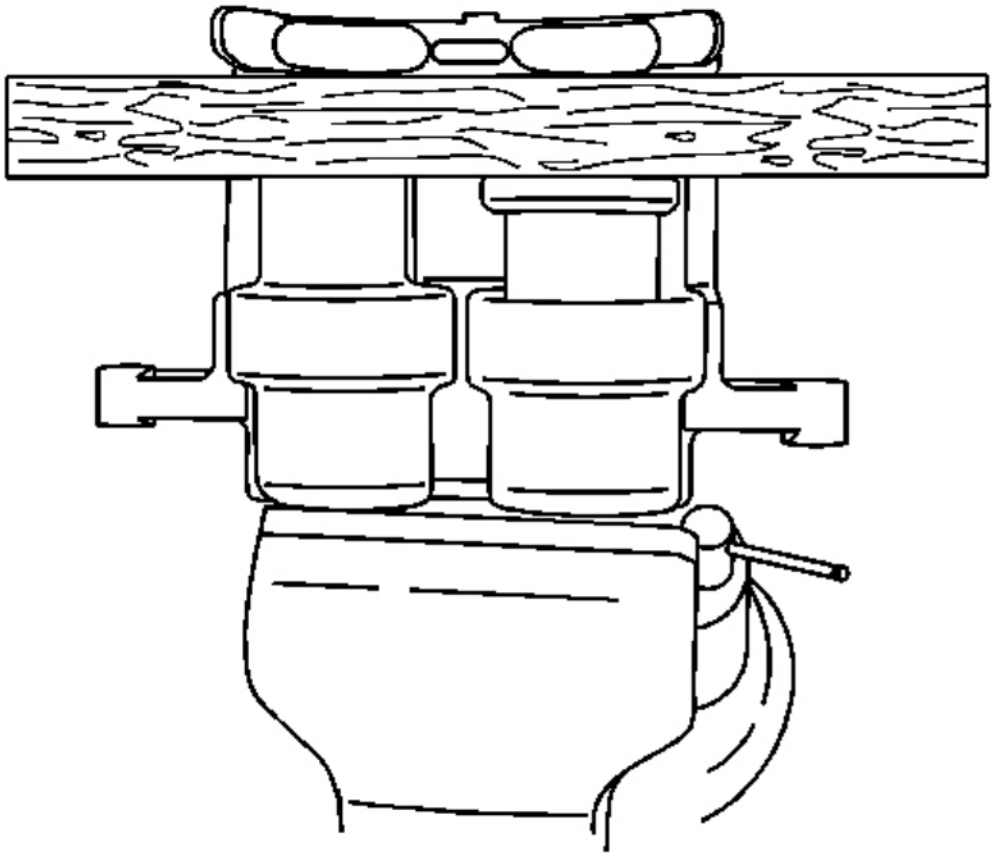


Fig. 72: Installing Piston Into Bore
Courtesy of GENERAL MOTORS CORP.

6. Position a piece of wood across the piston to be installed.
7. Applying equal pressure by hand while pushing down, install the piston in the bore.
8. Remove the piece of wood.

cardiagn.com

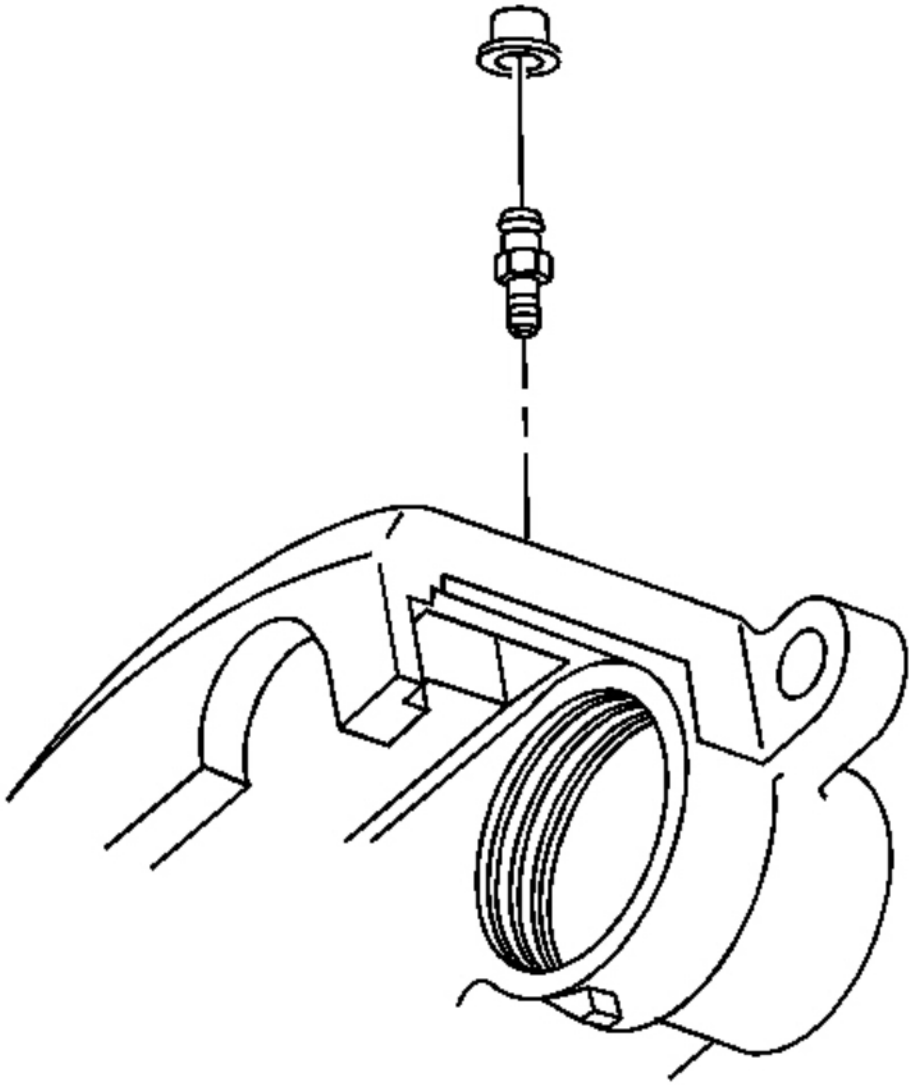


Fig. 73: View Of Bleeder Valve Cap
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

9. Install the bleeder valve in the brake caliper housing.

   Tighten: Tighten the bleeder valve to 12 N.m (106 lb in).

cardiagn.com

10. Install the bleeder valve cap.
11. Install the brake caliper. Refer to **Rear Brake Caliper Replacement (1500 Series)** or **Rear Brake Caliper Replacement (2500 Series)**.

DISC BRAKE HARDWARE REPLACEMENT - FRONT (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

IMPORTANT: Support the caliper with heavy mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the caliper.

2. Remove the brake caliper from the caliper bracket. Refer to **Front Brake Caliper Replacement (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)**.

cardiagn.com

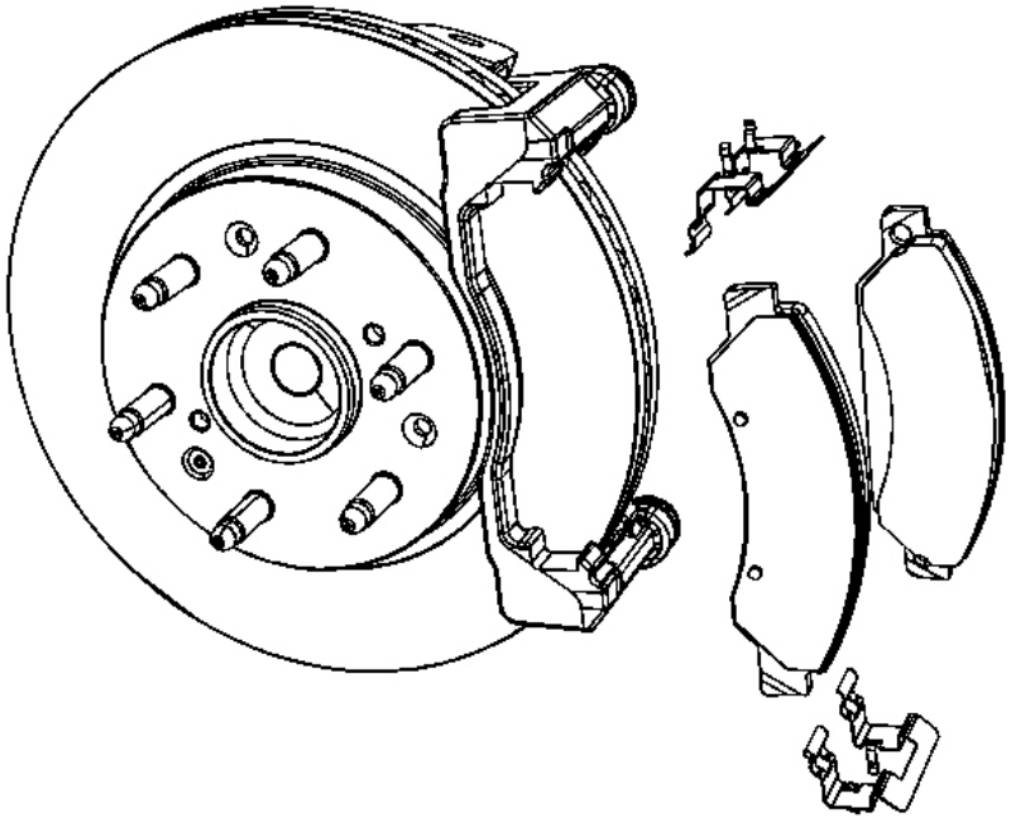


Fig. 74: View Of Brake Pads
Courtesy of GENERAL MOTORS CORP.

3. Remove the brake pads from the caliper bracket.
4. Remove the brake pad retainers.

cardiagn.com

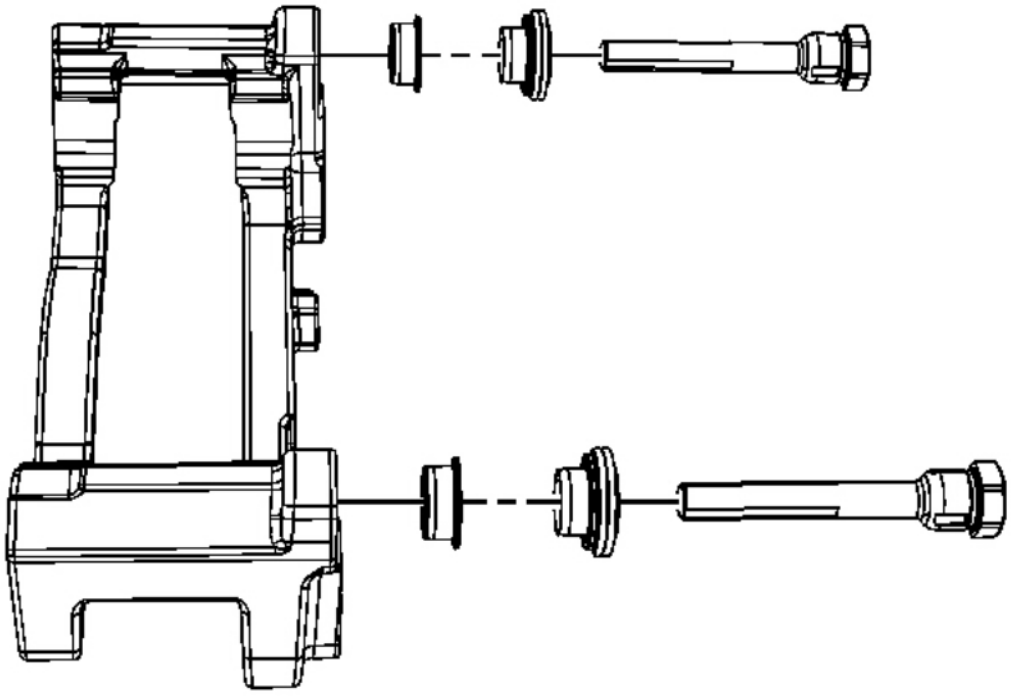


Fig. 75: Caliper Pins, Seals & Bushings
Courtesy of GENERAL MOTORS CORP.

5. Remove the caliper pins, seals, and bushings from the caliper bracket.

Installation Procedure

cardiagn.com

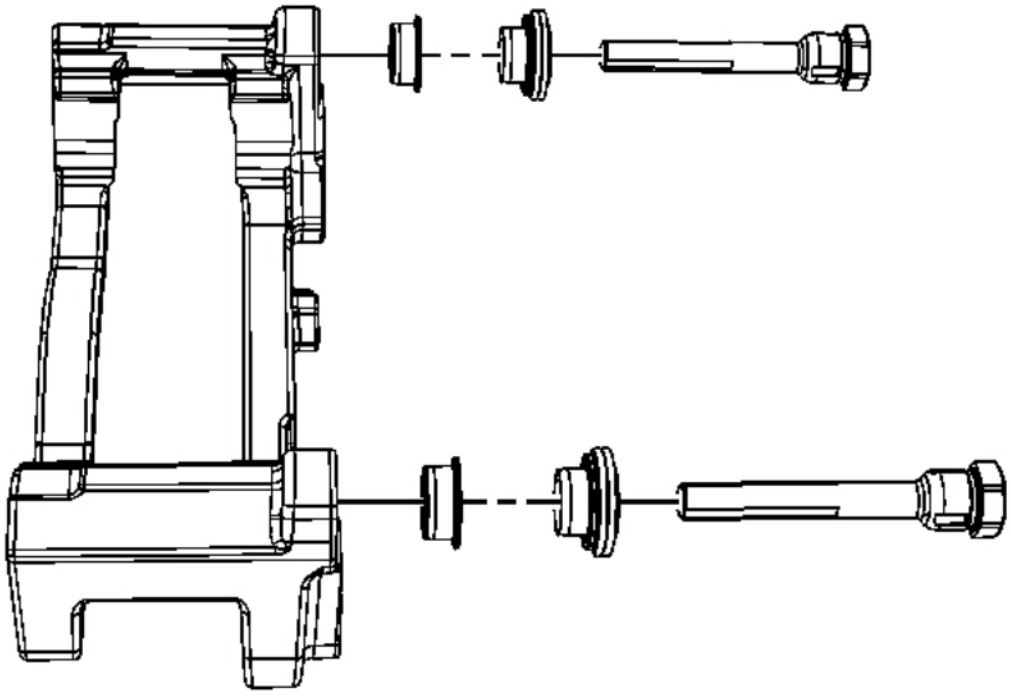


Fig. 76: Caliper Pins, Seals & Bushings
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the caliper bushings, bolts and seals with high temperature silicone brake lubricant.
2. Install the caliper pin bushings, seals and pins to the caliper bracket.

cardiagn.com

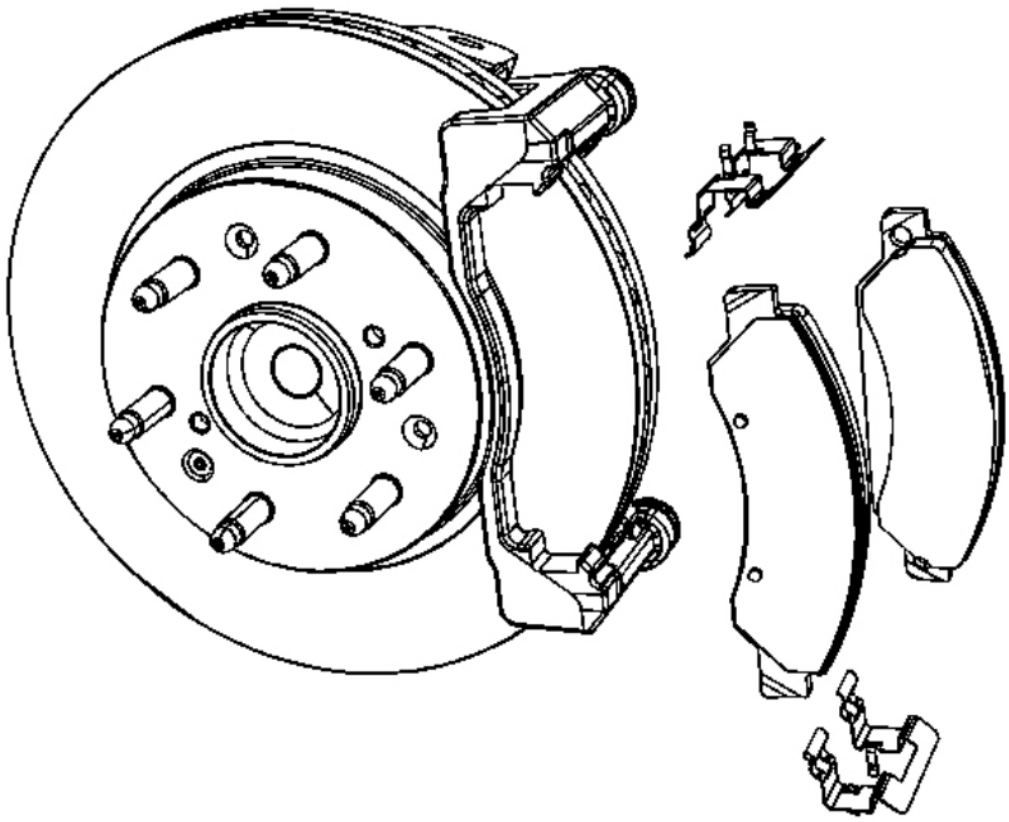


Fig. 77: View Of Brake Pads
Courtesy of GENERAL MOTORS CORP.

3. Install the brake pad retainers to the caliper bracket.
4. Install the brake pads.

cardiagn.com

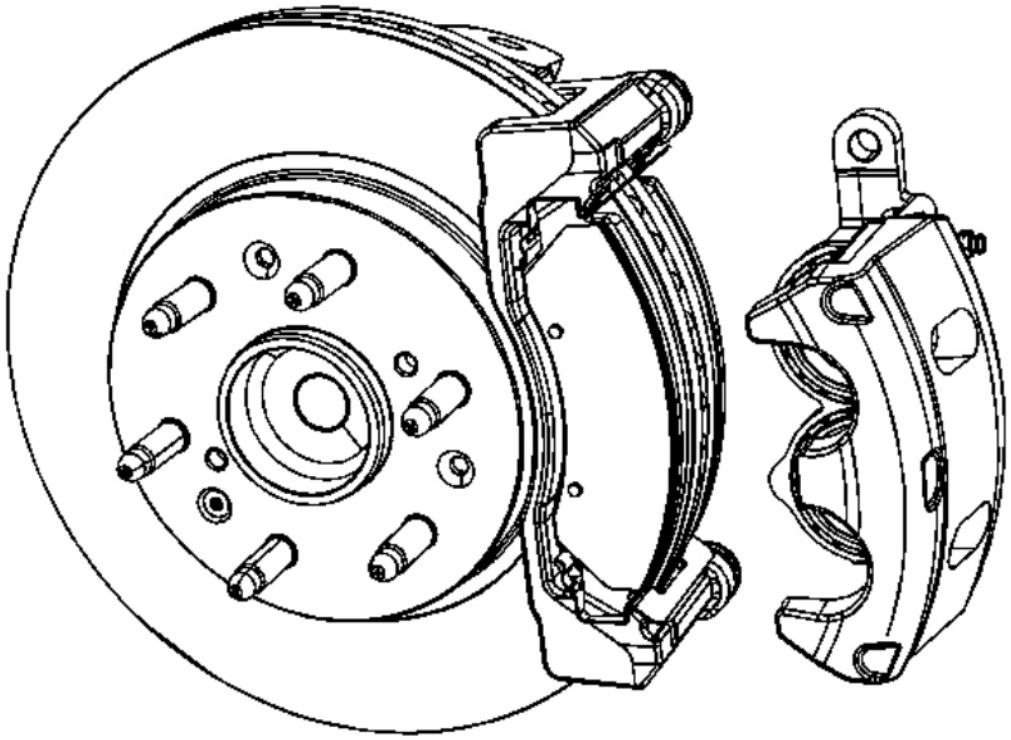


Fig. 78: Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

5. Install the caliper to the caliper bracket. Refer to **Front Brake Caliper Replacement (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)**.
6. Slowly apply pressure to the brake pedal until a firm pedal is achieved.
7. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .
8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

DISC BRAKE HARDWARE REPLACEMENT - FRONT (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

1. Inspect the fluid level in the brake master cylinder reservoir.

cardiagn.com

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

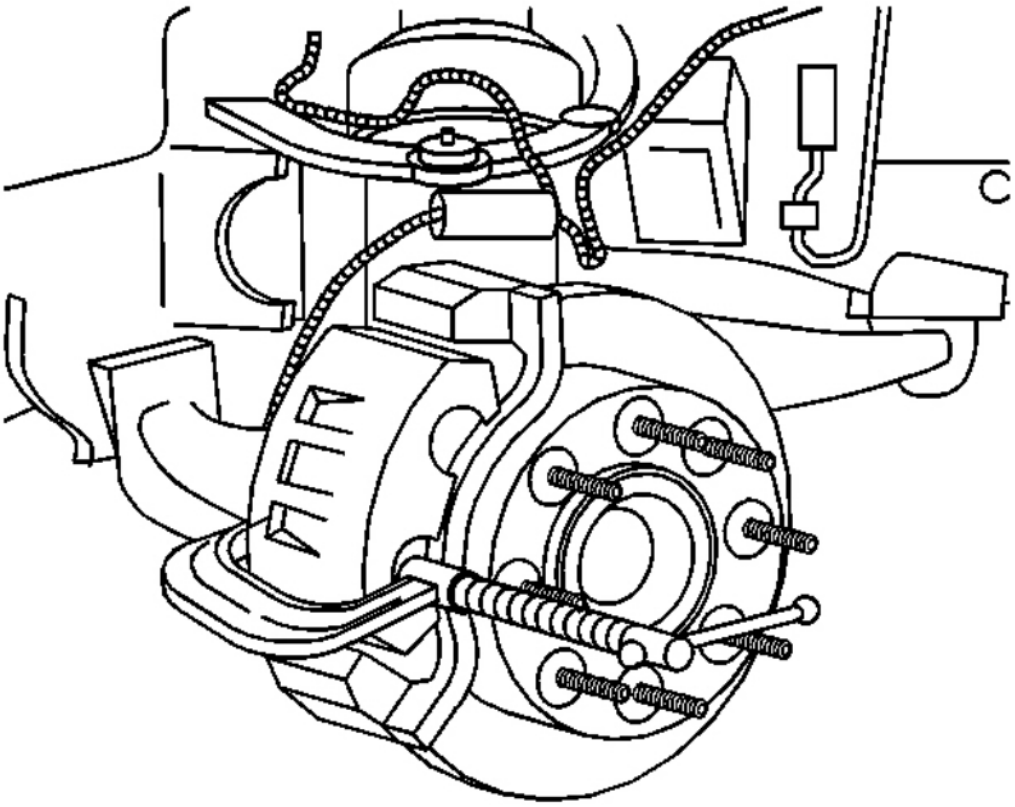


Fig. 79: Compressing Brake Caliper Pistons
Courtesy of GENERAL MOTORS CORP.

6. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard brake pad.
    2. Slowly tighten the C-clamps until the caliper pistons are pushed completely into the caliper bores.
    3. Remove the C-clamps from the caliper.

cardiagn.com

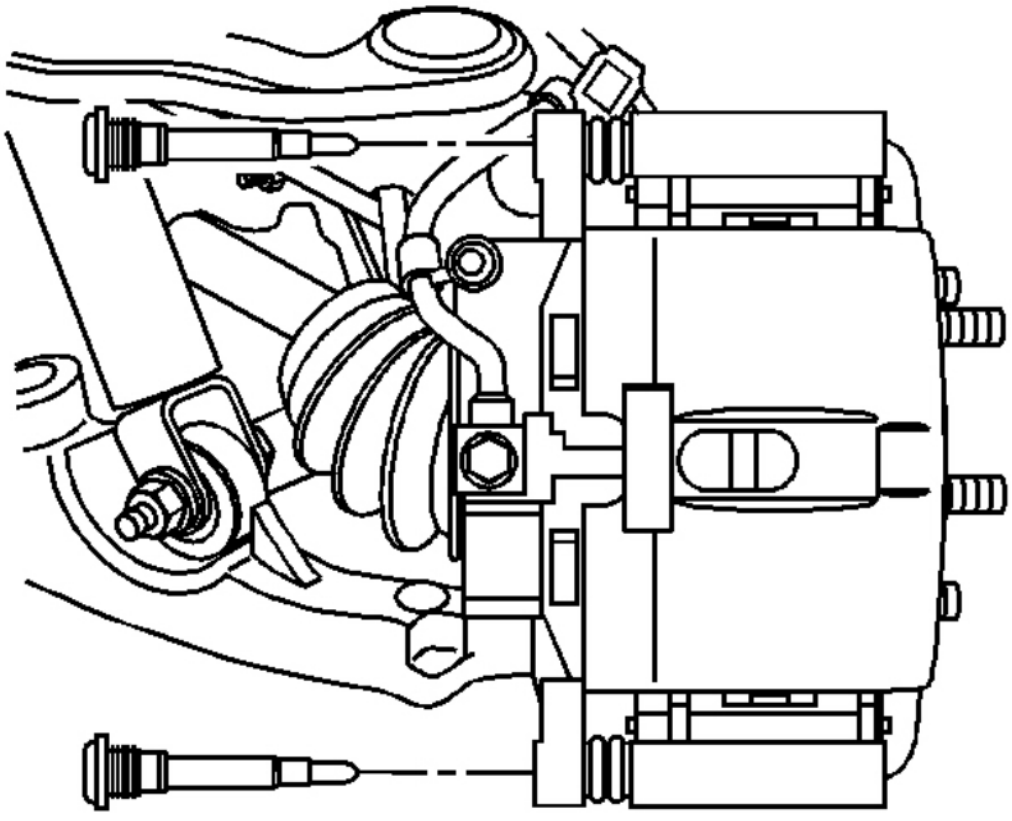


Fig. 80: View Of Brake Caliper Mounting
Courtesy of GENERAL MOTORS CORP.

7. Remove the brake caliper guide pin bolts.

CAUTION: Do not depress the brake pedal with the brake rotors/calipers and/or the brake drums removed. Damage to the brake system may result. If brake system damage occurs and is not repaired, vehicle damage and/or personal injury or death may result.

NOTE: Support the brake caliper with heavy mechanic's 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.

cardiagn.com

NOTE: **Refer to Brake Caliper Notice .**

8. Remove the brake caliper from the brake caliper bracket and support with heavy mechanics wire or equivalent.

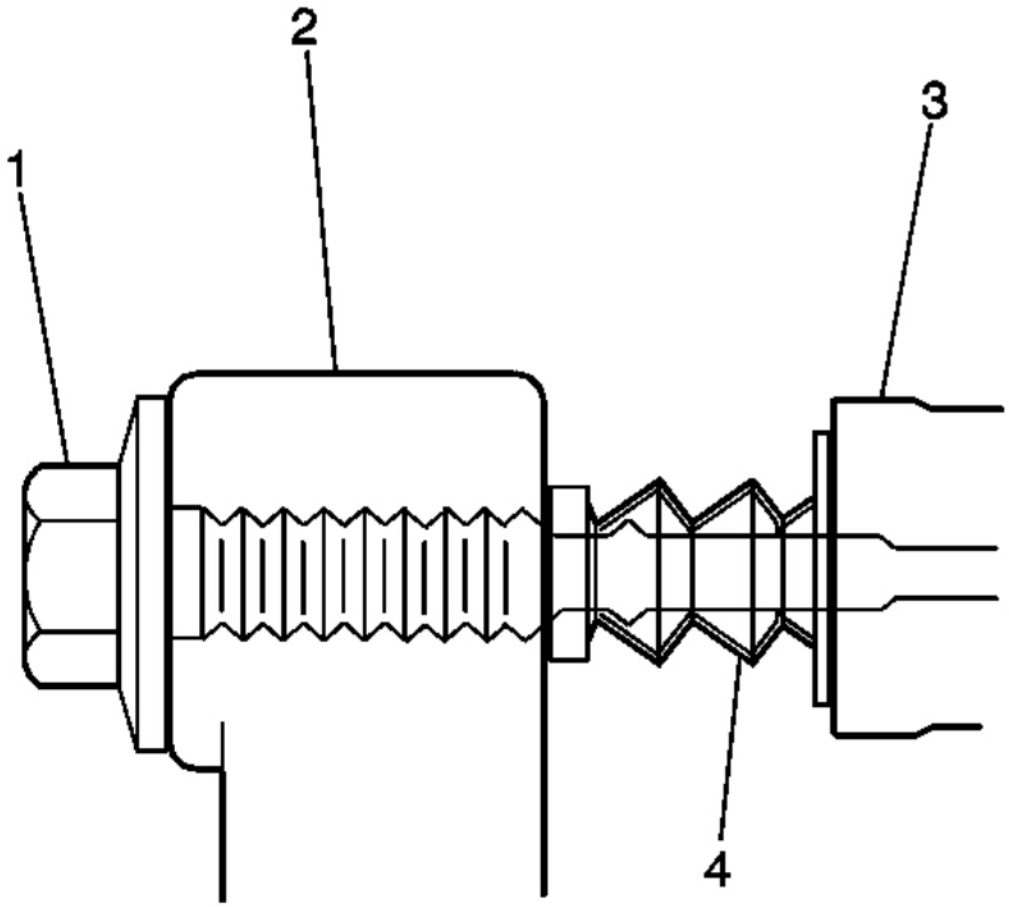


Fig. 81: View Of Caliper, Pin, Boots & Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake caliper guide pin boots (4) from the brake caliper bracket (3)..

Installation Procedure

cardiagn.com

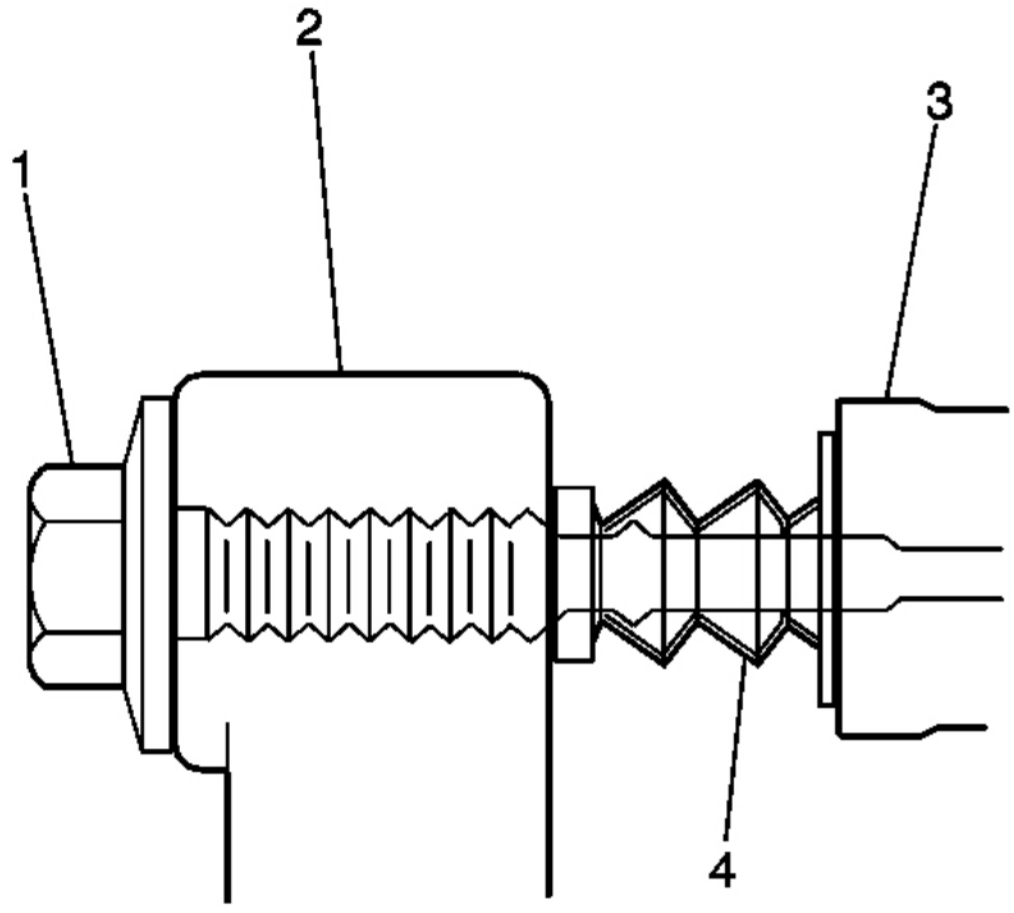


Fig. 82: View Of Caliper, Pin, Boots & Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the caliper bushings, bolts and seals with high temperature silicone brake lubricant.
2. Install the caliper guide pin boots (4) to the caliper bracket (3).

cardiagn.com

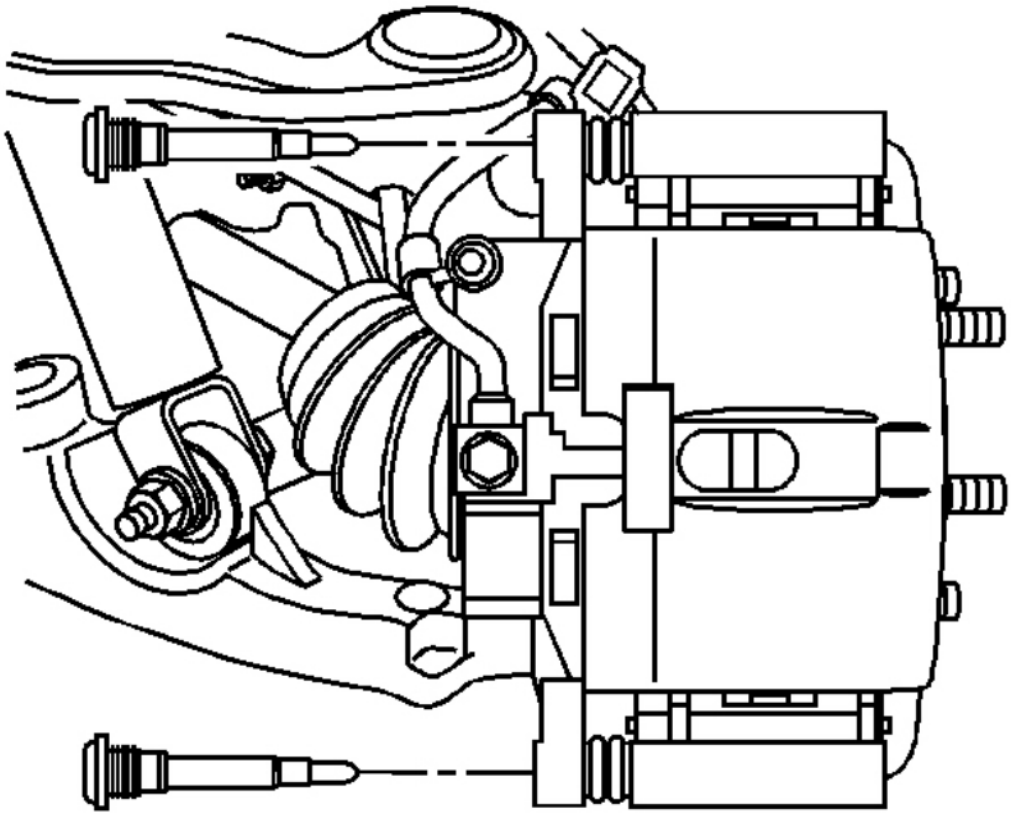


Fig. 83: View Of Brake Caliper Mounting
Courtesy of GENERAL MOTORS CORP.

3. Install the brake caliper to the caliper bracket.

NOTE: Refer to **Fastener Notice** .

4. Install the brake caliper guide pin bolts.

Tighten: Tighten the bolts to 108 N.m (80 lb ft).

5. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Lower the vehicle.
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 is obtained, to properly seat the brake

cardiagn.com

caliper pistons and brake pads.

10. Slowly apply pressure to the brake pedal until a firm brake pedal is achieved.
11. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

DISC BRAKE HARDWARE REPLACEMENT - REAR (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

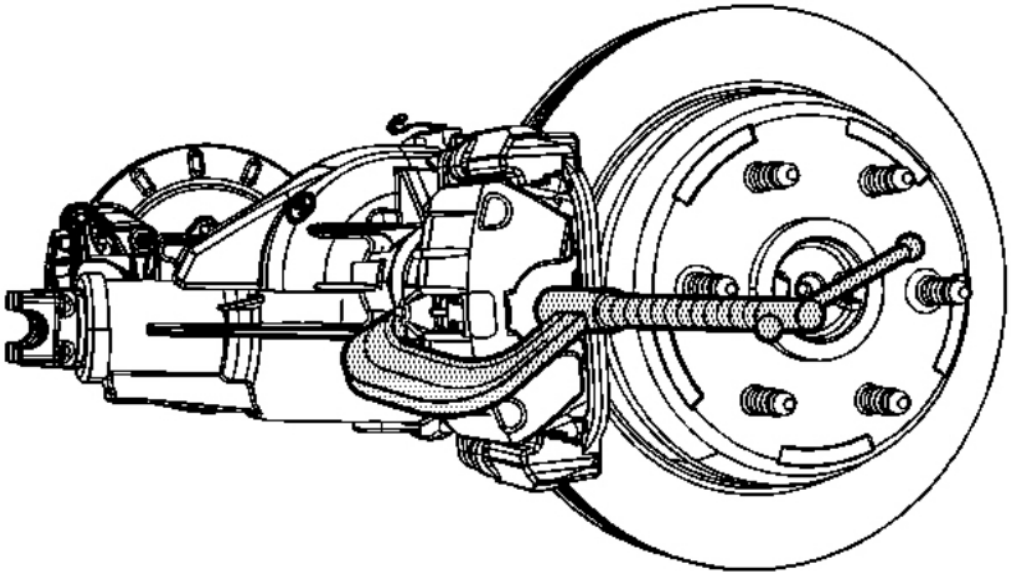


Fig. 84: Compressing Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

cardiagn.com

6. Compress the brake caliper pistons.
    1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the piston is pushed completely into the caliper bore.
    3. Remove the C-clamp from the caliper.

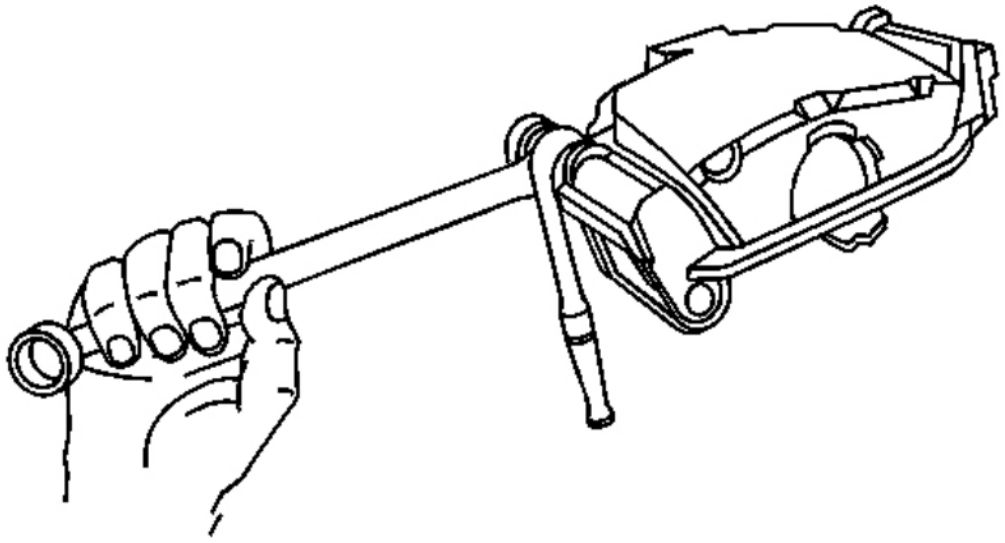


Fig. 85: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **DO NOT use any air tools to remove or tighten 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 bolts. 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 brake is applied.**

7. Using an open end wrench to hold the guide pins, loosen the guide pin bolts.

cardiagn.com

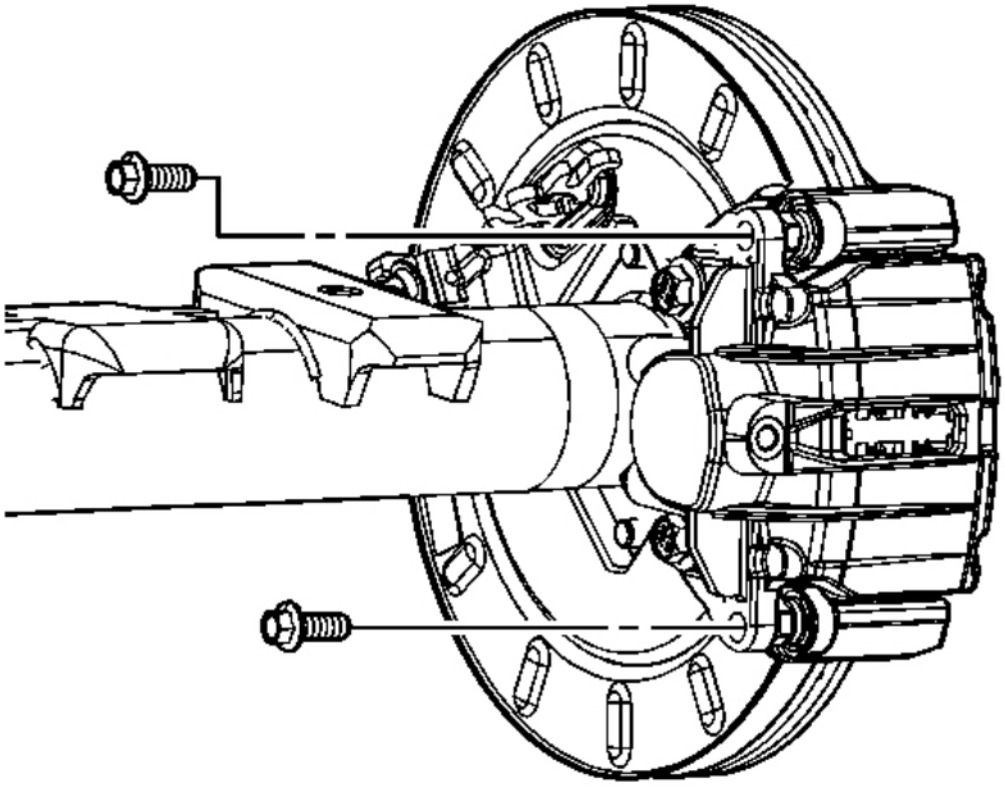


Fig. 86: Brake Caliper Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake caliper guide pin bolts.

NOTE: **Support the brake caliper with heavy mechanic's 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.**

cardiagn.com

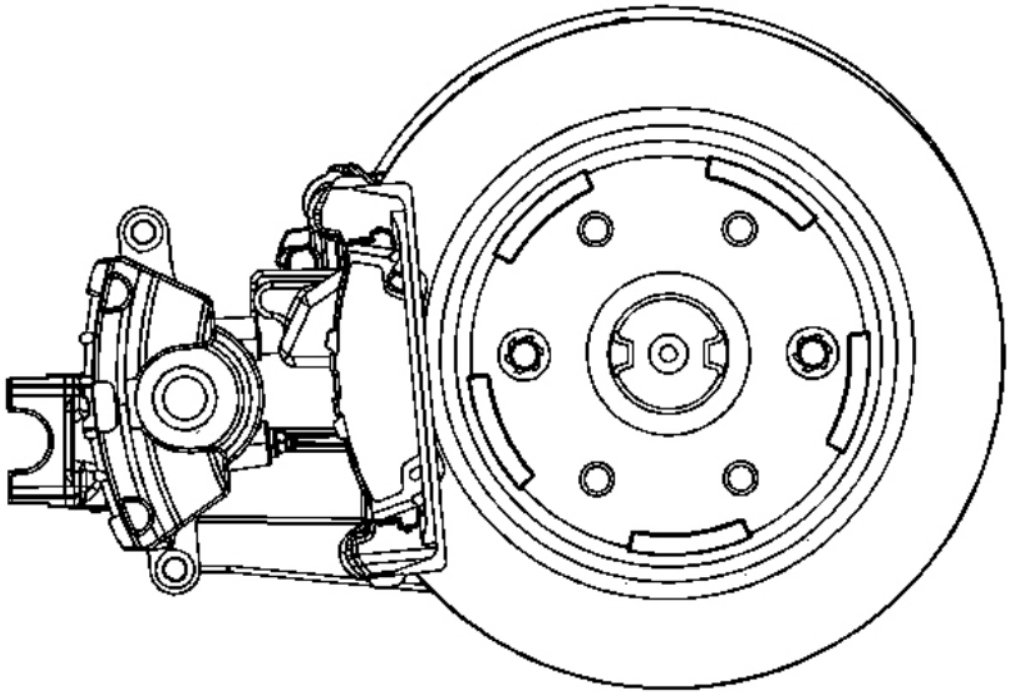


Fig. 87: Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

9. Remove the caliper from the caliper bracket and support with heavy mechanics wire or equivalent. DO NOT disconnect the hydraulic brake hose from the caliper.

cardiagn.com

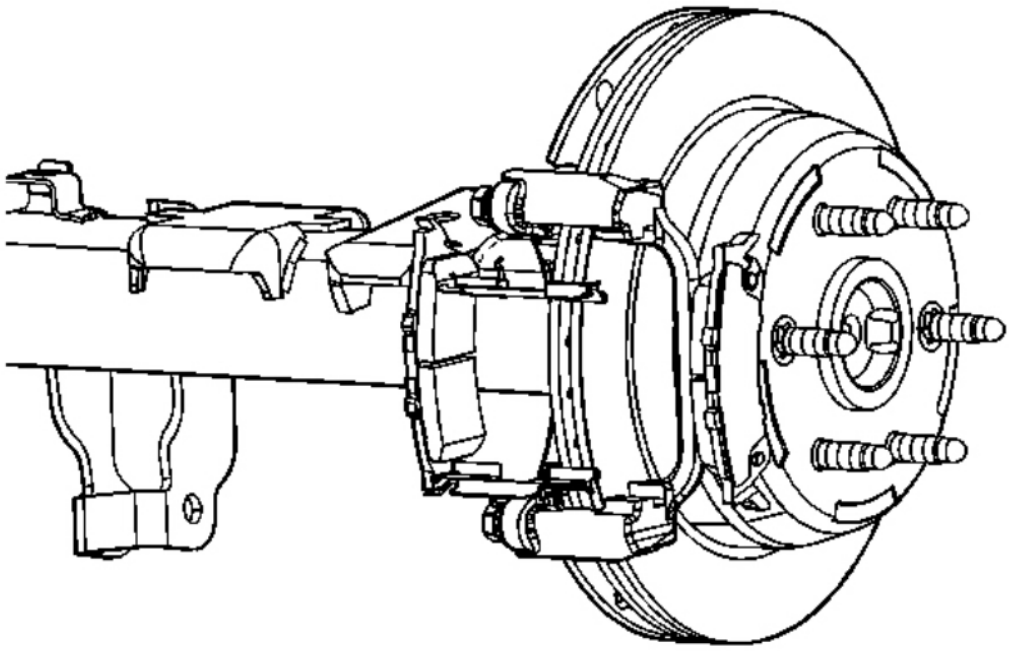


Fig. 88: Brake Pads & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Mark the position of the brake pads for proper installation.

10. Remove the brake pads from the brake caliper bracket.
11. Remove the brake pad retaining springs.

cardiagn.com

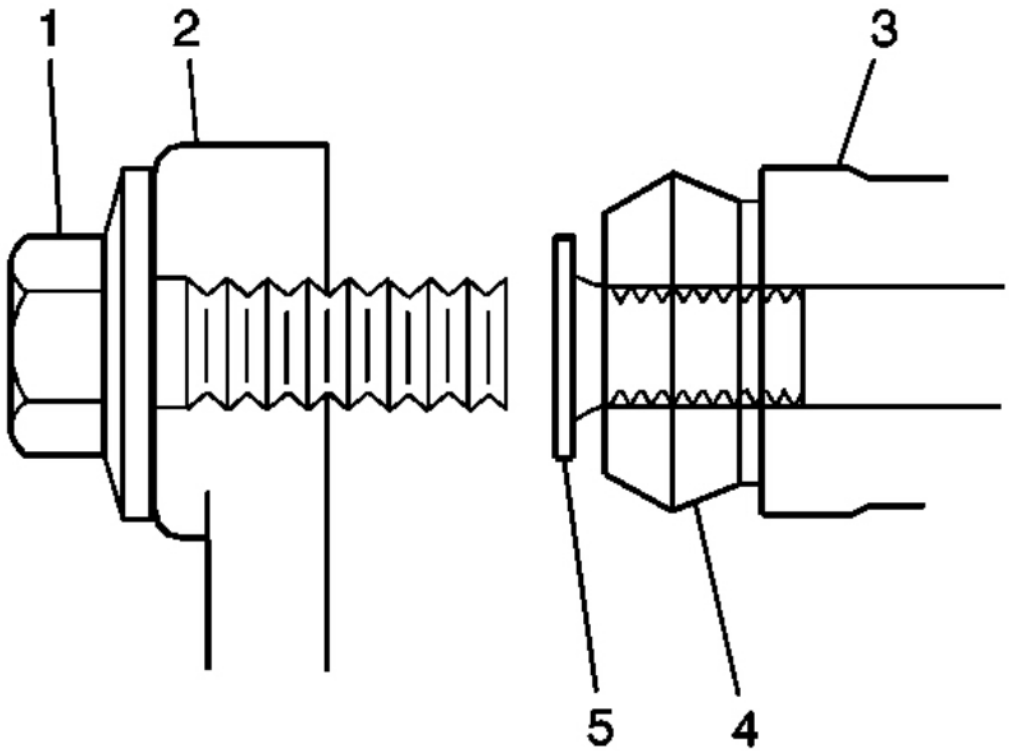


Fig. 89: Caliper Mounting Bolt, Bracket, Boot & Slid Pins
Courtesy of GENERAL MOTORS CORP.

12. Remove the guide pins (5) from brake caliper bracket (3).
13. Remove the guide pin boots (4) from the caliper bracket.

Installation Procedure

cardiagn.com

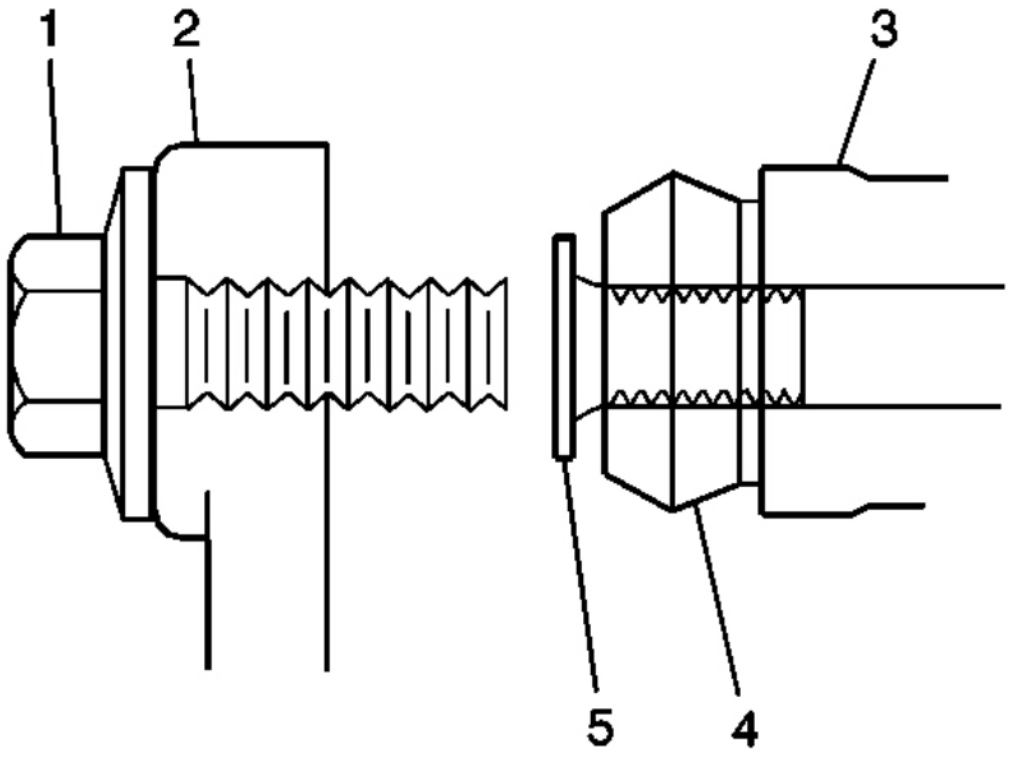


Fig. 90: Caliper Mounting Bolt, Bracket, Boot & Slid Pins
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the caliper bracket bushings and guide pins with high temperature silicone brake lubricant.
2. Install the guide pin boots (4) to the brake caliper bracket.
3. Install the guide pins (5) to the brake caliper bracket (3).

cardiagn.com

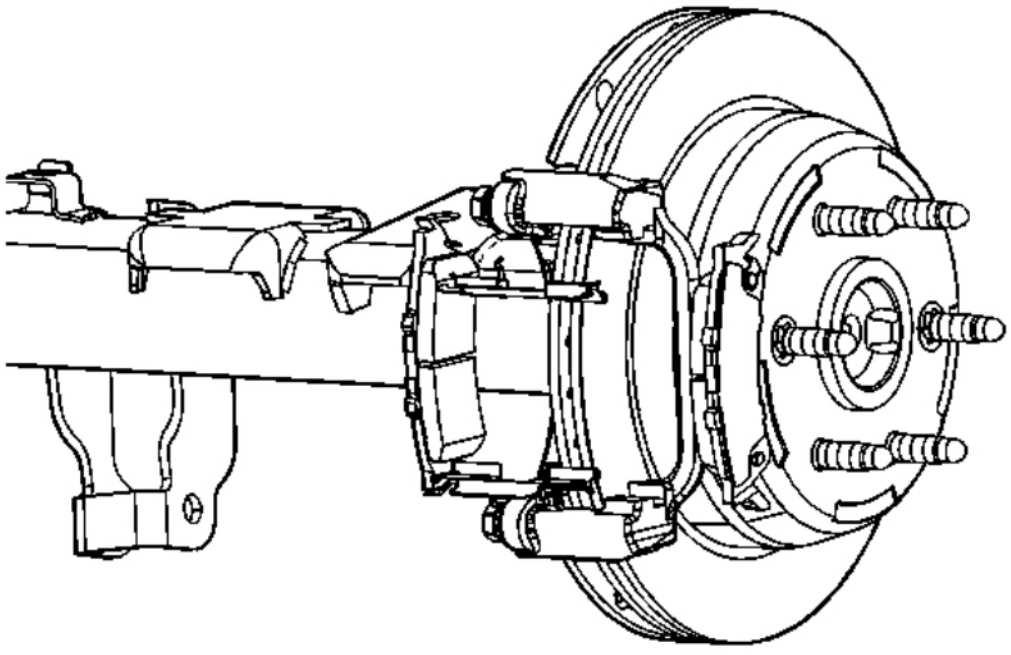


Fig. 91: Brake Pads & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

4. Install the brake pad retaining springs to the brake caliper bracket.

IMPORTANT: If installing the original brake pads, position the brake pads in the location marked during removal.

5. Install the brake pads.

cardiagn.com

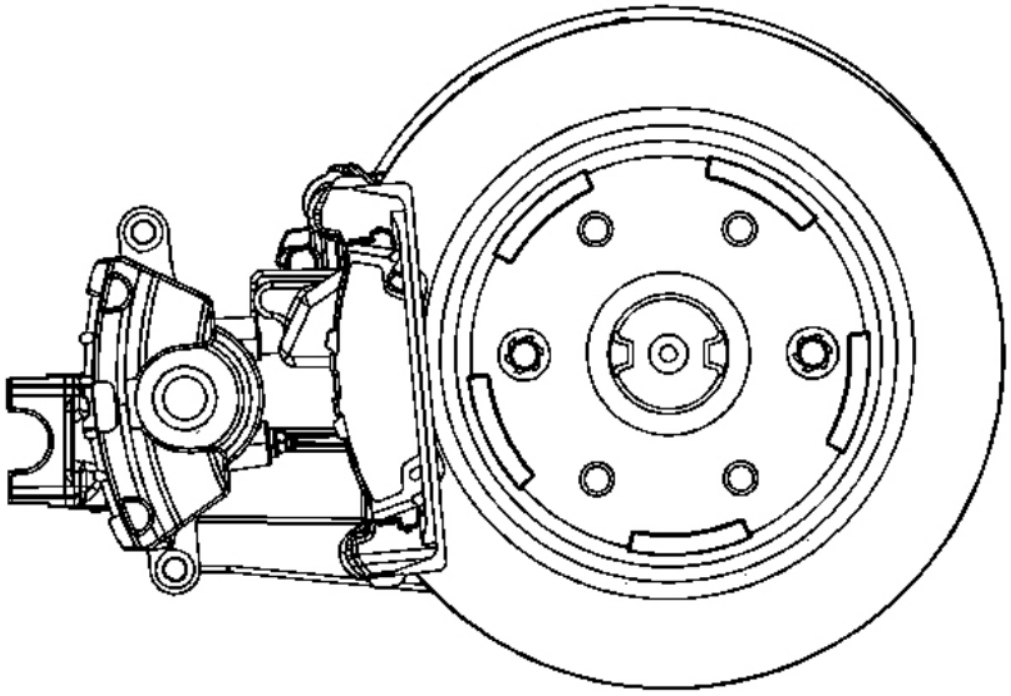


Fig. 92: Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

6. Install the brake caliper to the brake caliper bracket.

cardiagn.com

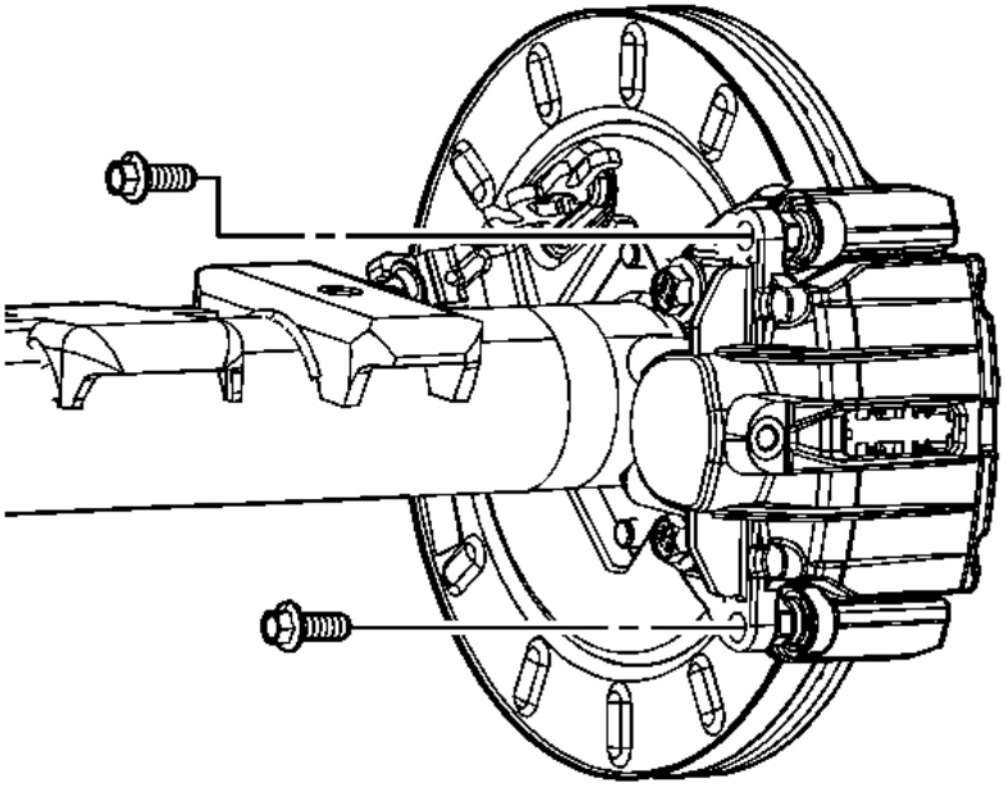


Fig. 93: Brake Caliper Bolts
Courtesy of GENERAL MOTORS CORP.

7. Install the brake caliper guide pin bolts.

cardiagn.com

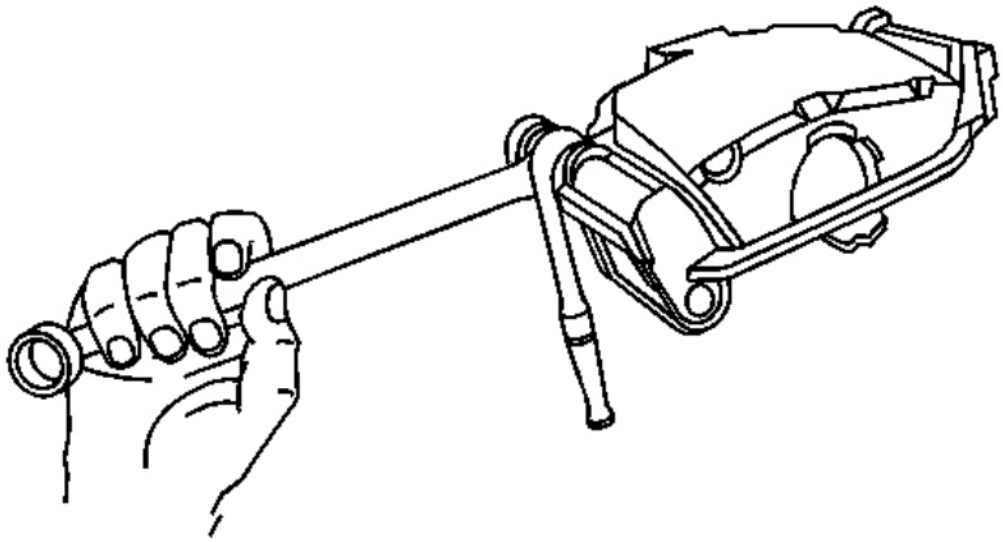


Fig. 94: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

IMPORTANT:

- **DO NOT use any air tools to remove or tighten 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 bolts. 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 brake is applied.**

8. Use an open end wrench to hold the caliper guide pin while tightening the guide pin bolt.

   Tighten: Tighten the bolts to 38 N.m (28 lb ft).

9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** .
11. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
12. Slowly release the brake pedal.

cardiagn.com

13. Wait 15 seconds, then repeat 11-12 until a firm pedal is obtained to properly seat the brake caliper pistons and pads.
14. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

DISC BRAKE HARDWARE REPLACEMENT - REAR (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

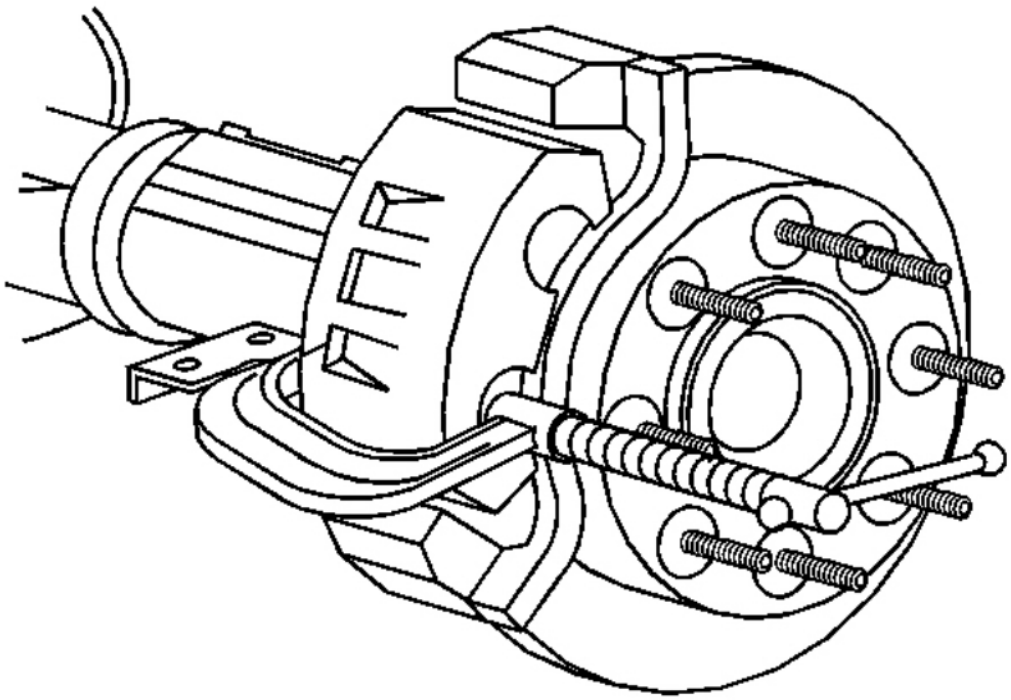


Fig. 95: C-Clamp & Rear Caliper
Courtesy of GENERAL MOTORS CORP.

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

cardiagn.com

level, remove fluid to the midway point before proceeding.

4. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
5. Compress the brake caliper pistons.
    1. Install a large C-clamp over the body of the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
    3. Remove the C-clamp from the caliper.

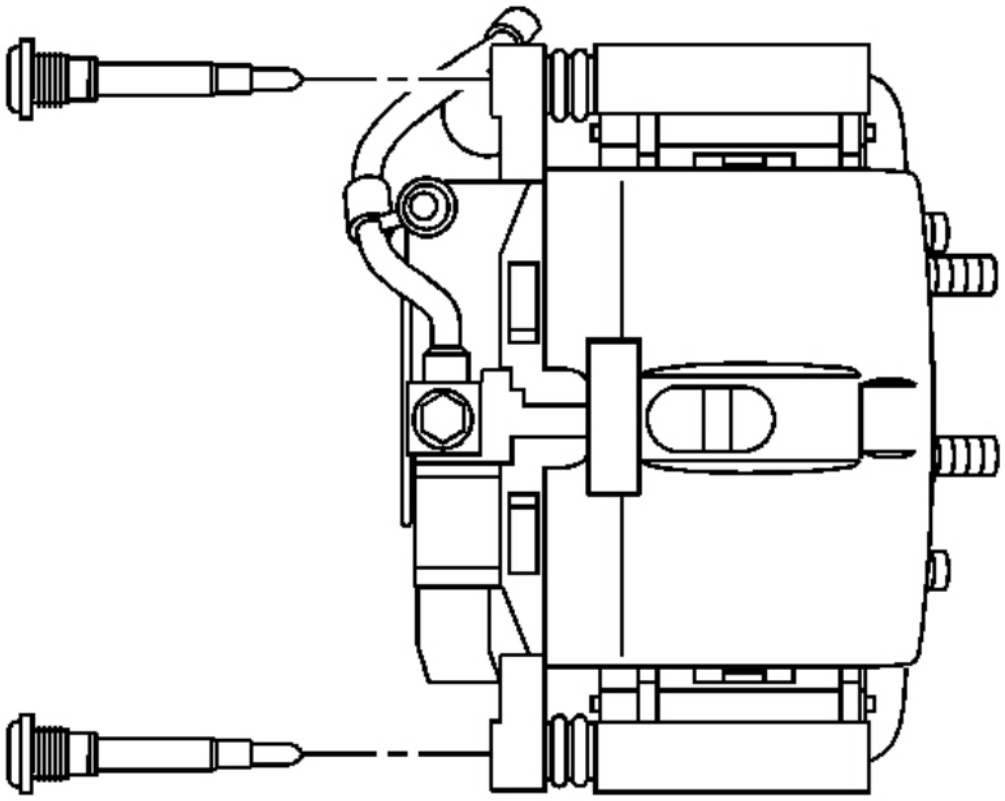


Fig. 96: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

CAUTION: Do not depress the brake pedal with the brake rotors/calipers and/or the brake drums removed. Damage to the brake system may result. If brake system damage occurs and is not repaired, vehicle damage and/or personal injury or death may result.

cardiagn.com

6. Remove the brake caliper bracket bolts.

NOTE: Refer to Brake Caliper Notice .

7. Remove the caliper and caliper bracket as an assembly.
8. Remove the brake caliper bolts.
9. Remove the caliper from the caliper bracket.

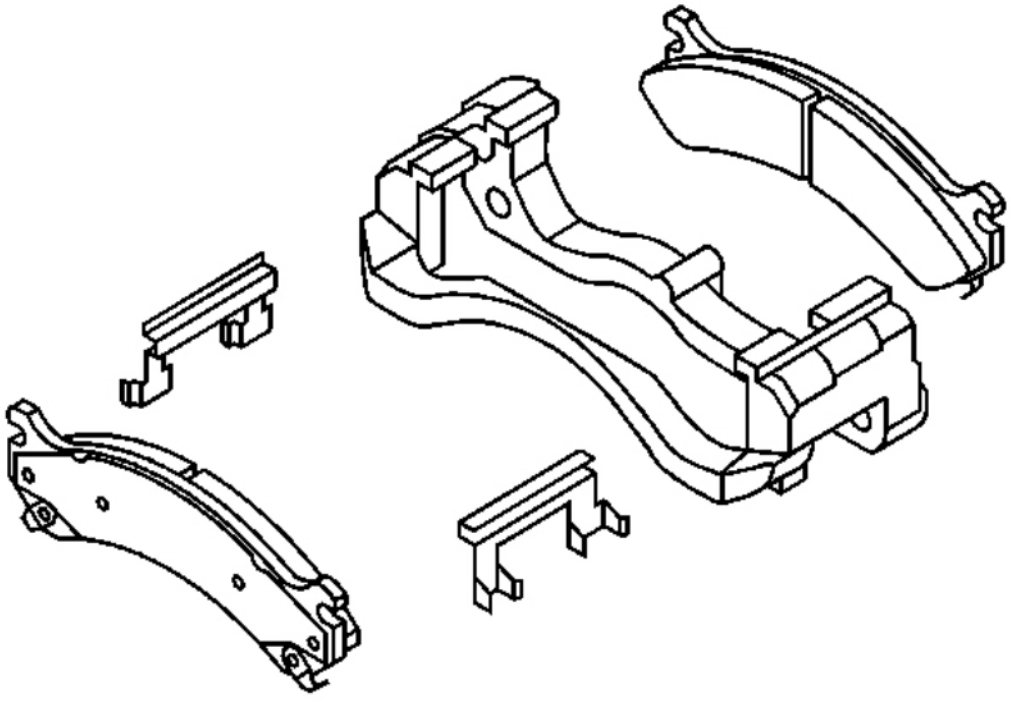


Fig. 97: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

10. Remove the brake pads from the caliper bracket.
11. Remove the anti-rattle clips.

cardiagn.com

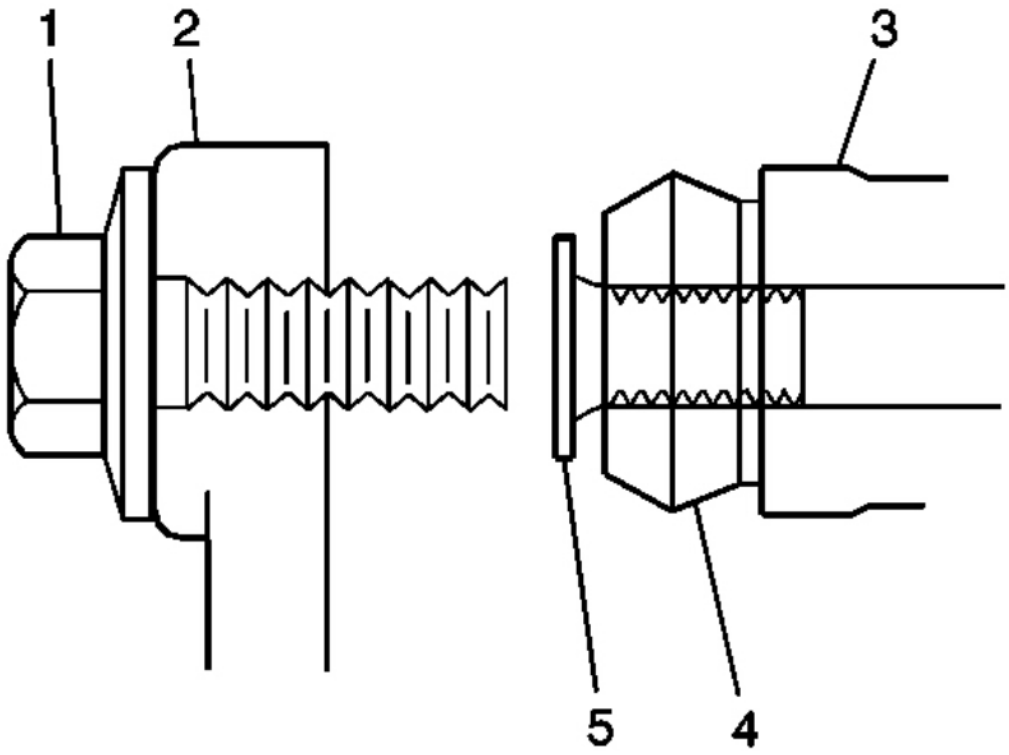


Fig. 98: Caliper Mounting Bolt, Bracket, Boot & Slid Pins
Courtesy of GENERAL MOTORS CORP.

12. Remove the slide pins (5) from the caliper bracket (3).
13. Remove the slide pin boots (4) from the caliper bracket.
14. Inspect the disc brake hardware. Refer to **Disc Brake Mounting and Hardware Inspection - Rear**.

Installation Procedure

cardiagn.com

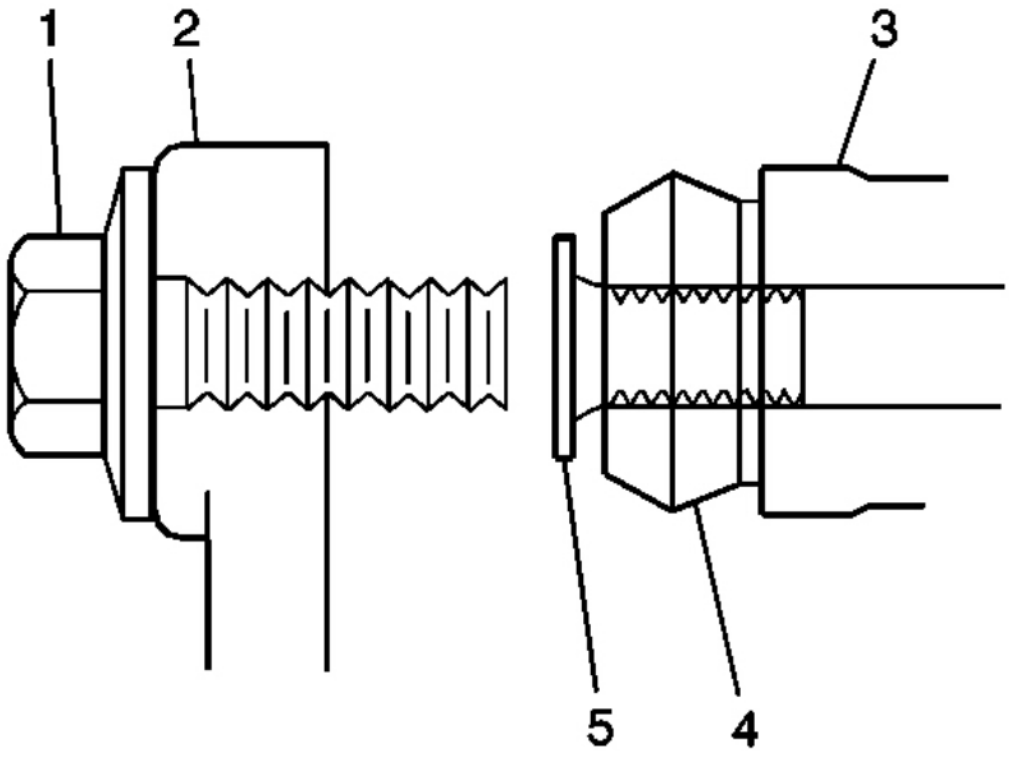


Fig. 99: Caliper Mounting Bolt, Bracket, Boot & Slid Pins
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the caliper bracket bushings and the slide pins with high temperature silicone brake lubricant.
2. Install the slide pin boots (4) to the caliper bracket.
3. Install the slide pins (5) to the caliper bracket (3).

cardiagn.com

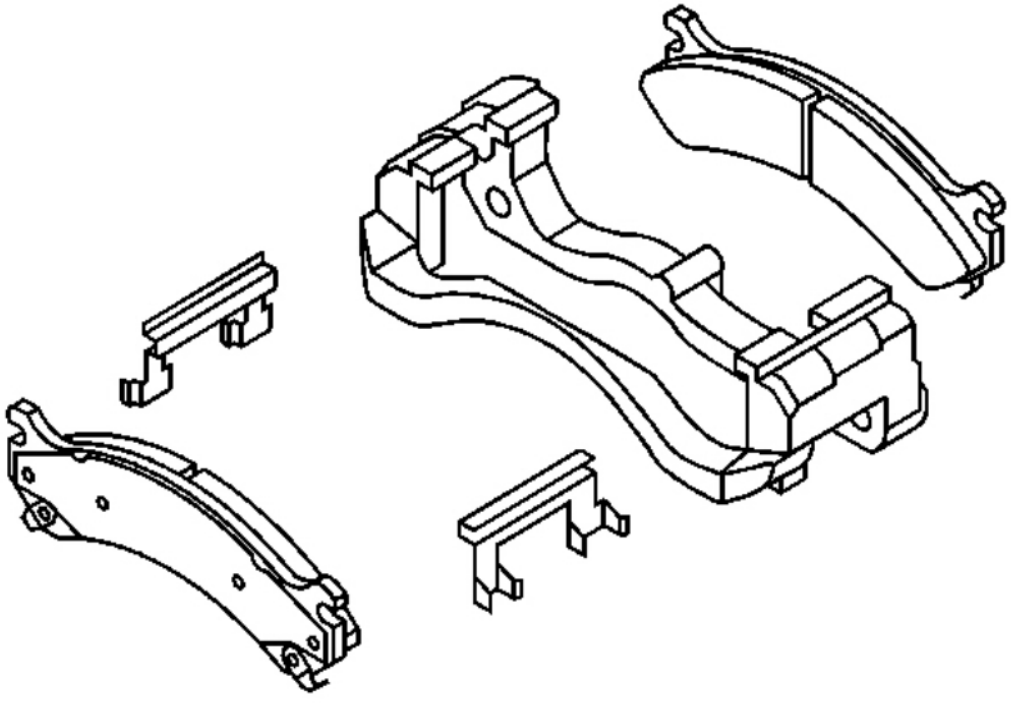


Fig. 100: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

4. Install the anti-rattle clips to the caliper bracket.
5. Install the brake pads.
6. Install the caliper to the caliper bracket.
7. Perform the following procedure before installing the caliper bracket bolts and the brake caliper bolts:
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolt with brake parts cleaner or the equivalent and allow to dry.
    3. Apply Threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolt.
8. Install the brake caliper bolts. DO NOT tighten.

cardiagn.com

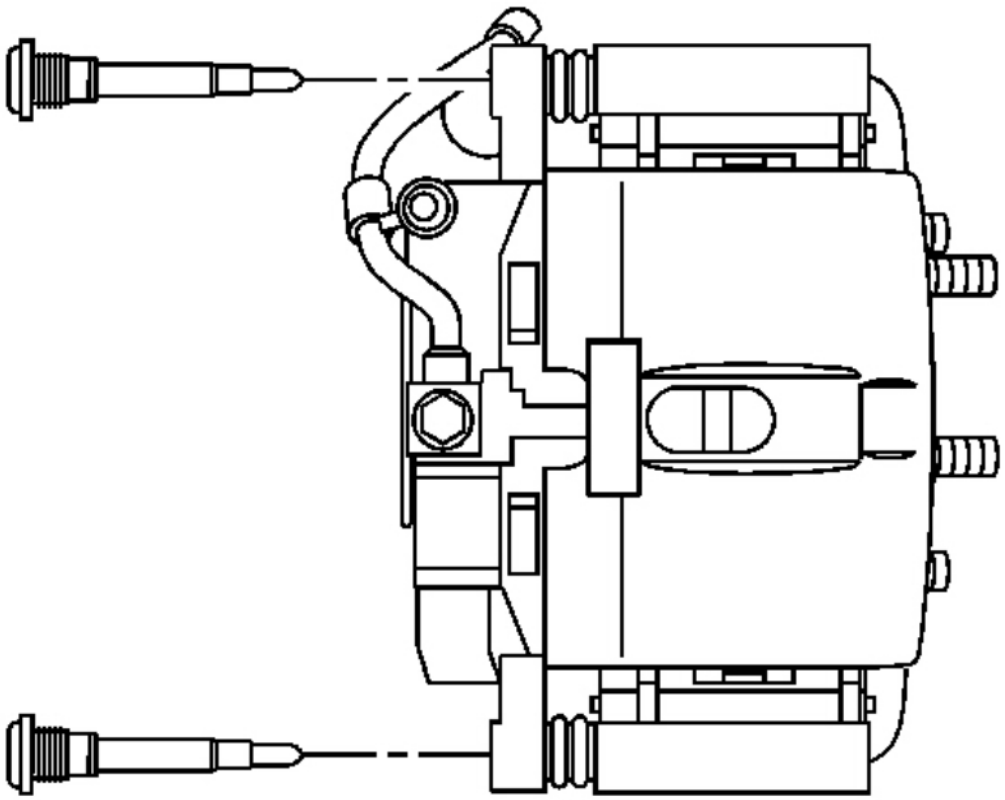


Fig. 101: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

9. Install the brake caliper bracket and caliper as an assembly.

NOTE: **Refer to Fastener Notice .**

10. Install the brake caliper bracket bolts.

Tighten: Tighten the bolts to 300 N.m (221 lb ft).

11. Tighten the brake caliper bolts.

Tighten: Tighten the bolts to 108 N.m (80 lb ft).

12. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
13. With the engine OFF, gradually apply the brake pedal approximately 2/3 of its travel distance.

cardiagn.com

14. Slowly release the brake pedal.
15. Wait 15 seconds, then repeat steps 7-8 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads.
16. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

BRAKE CALIPER BRACKET REPLACEMENT - FRONT (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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** .

NOTE: Support the brake caliper with heavy mechanic's 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.

3. Without disconnecting the brake hose from the caliper, remove the caliper and support with heavy mechanics wire or equivalent. Refer to **Front Brake Caliper Replacement (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)**.

IMPORTANT: Note the location of the brake pads to aid installation.

4. Remove the brake pads and springs.

cardiagn.com

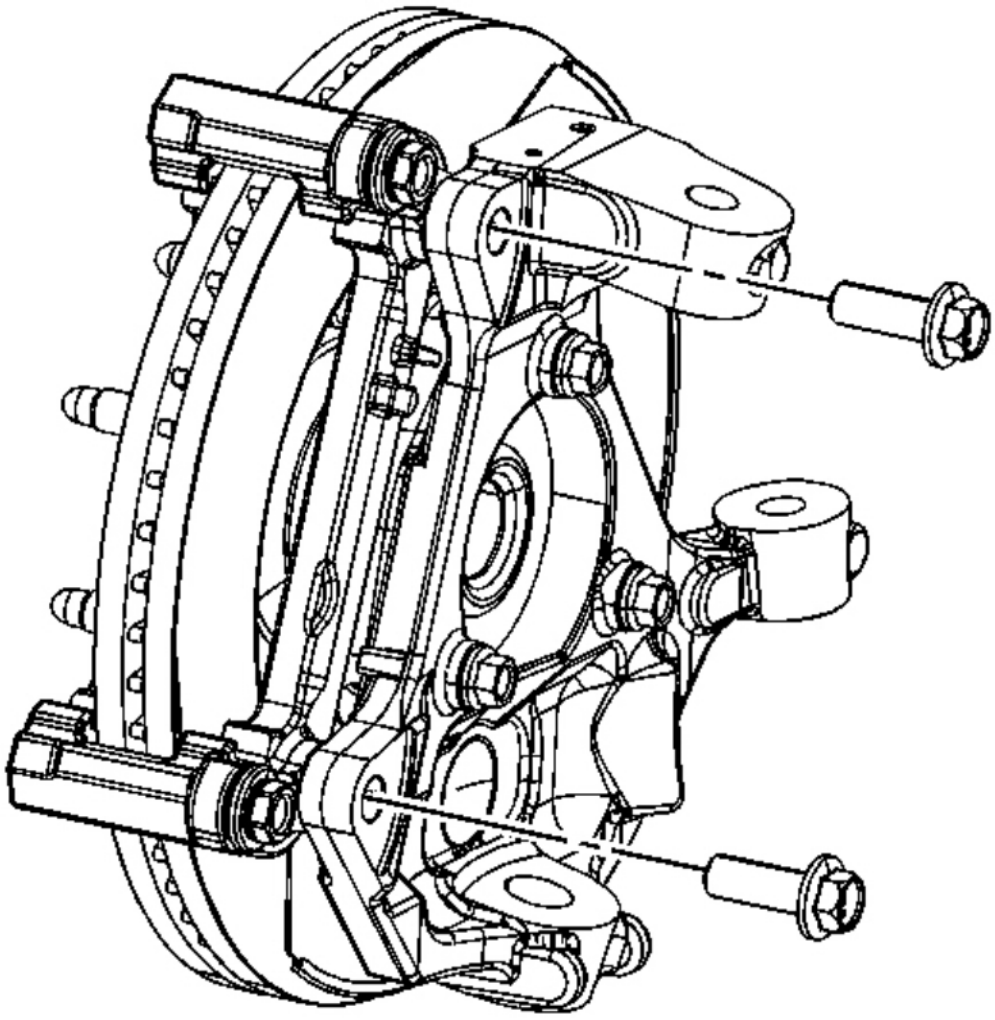


Fig. 102: Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the brake caliper bracket mounting bolts.

cardiagn.com

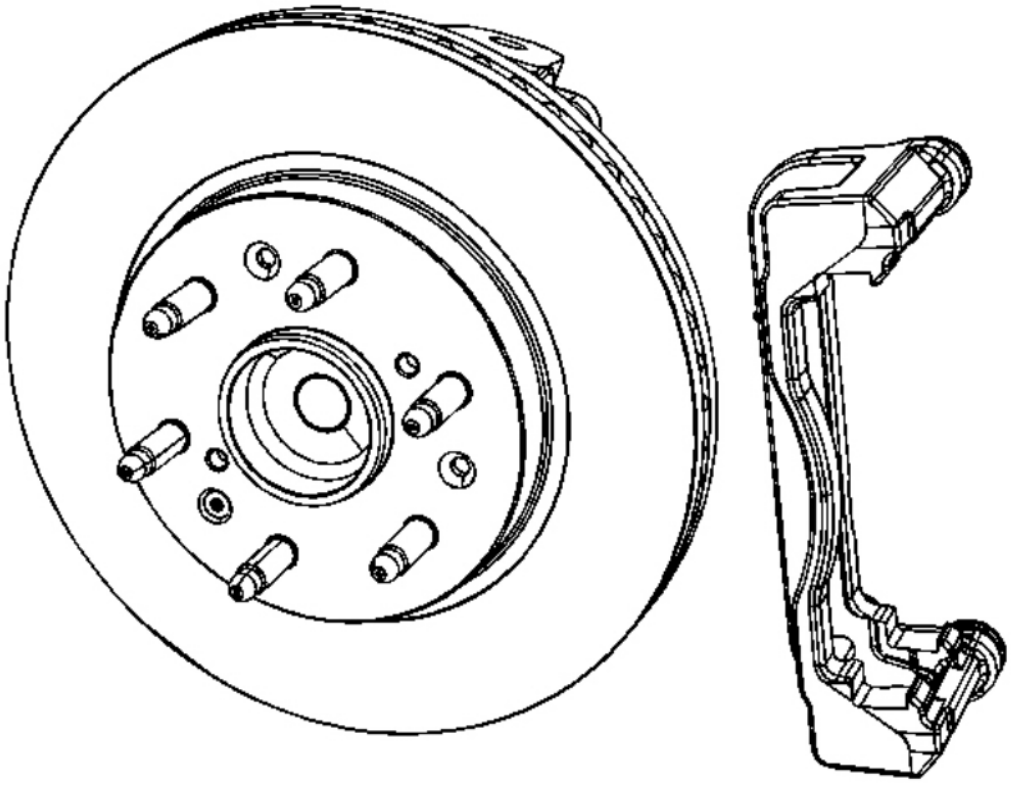


Fig. 103: Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

6. Remove the brake caliper bracket.

Installation Procedure

cardiagn.com

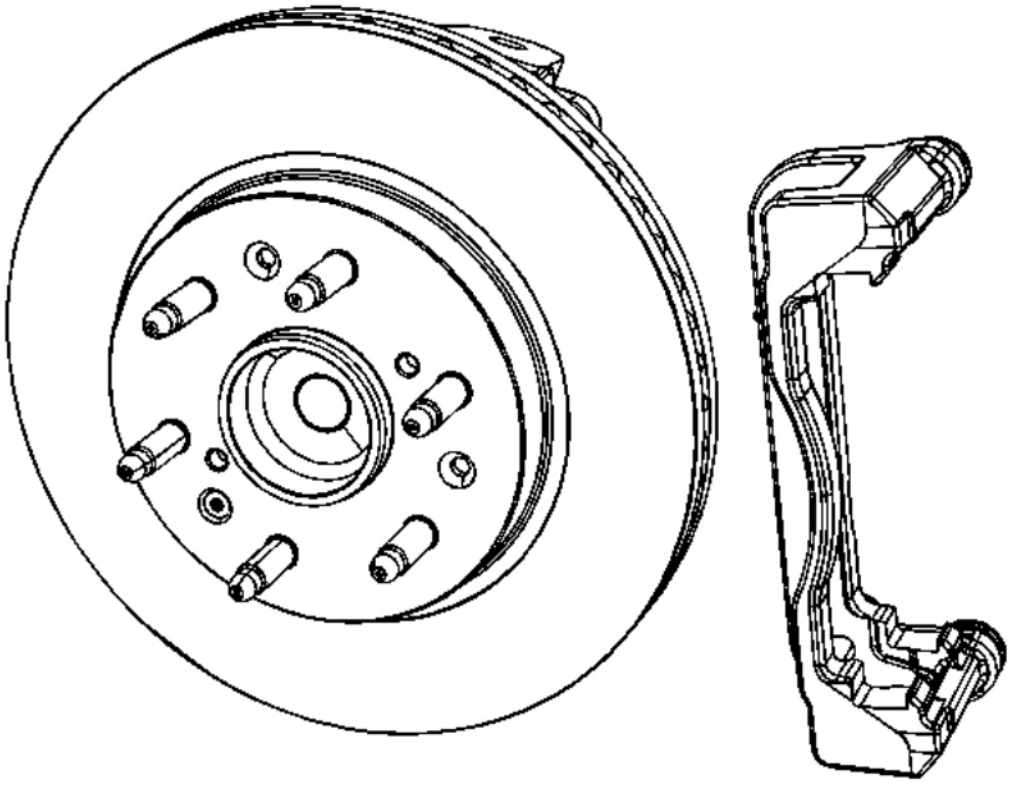


Fig. 104: Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper bracket.
2. Perform the following procedure before installing the brake caliper bracket bolts.
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
    3. Apply threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolt.

cardiagn.com

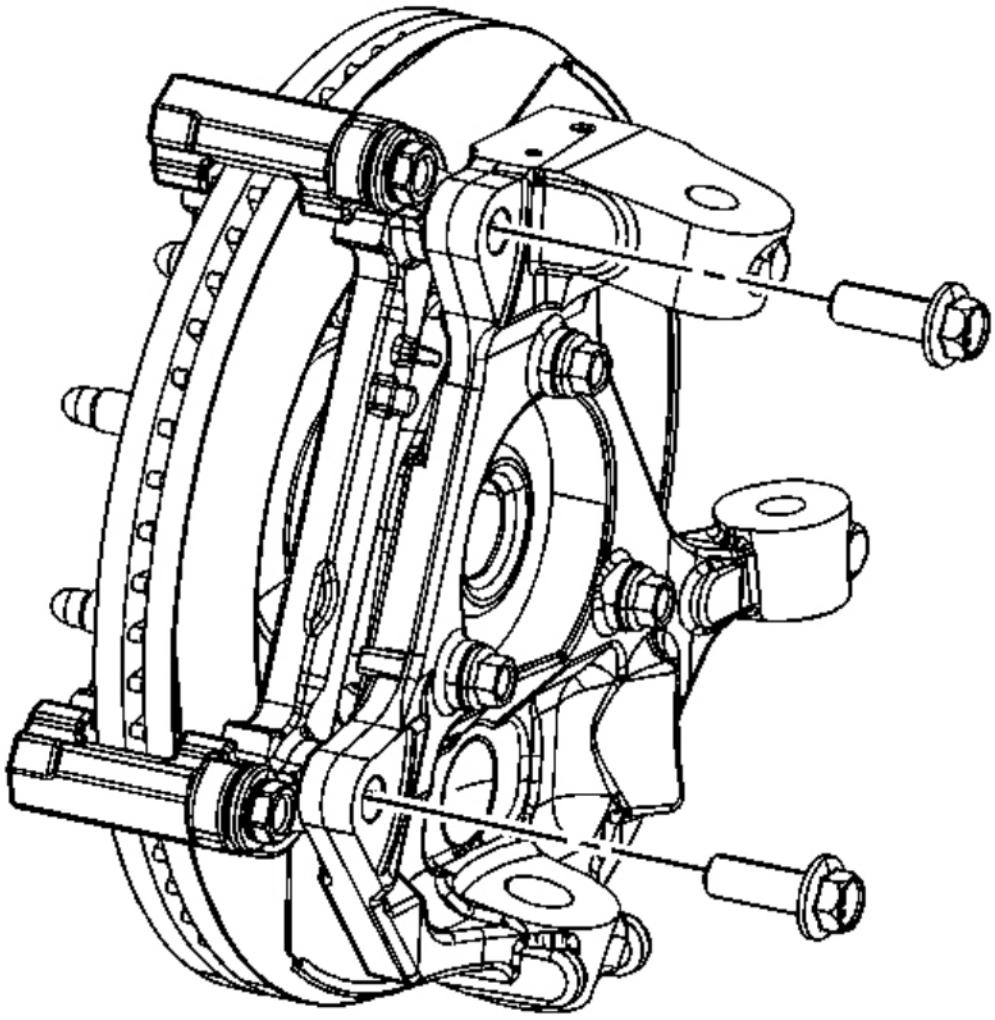


Fig. 105: Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

3. Install the brake caliper bracket mounting bolts.

   Tighten: Tighten the bolts to 200 N.m (148 lb ft).

4. Install the brake pad springs.

cardiagn.com

IMPORTANT: Install the brake pads in the same location noted during removal.

5. Install the brake pads.
6. Install the brake caliper to the bracket. Refer to **Front Brake Caliper Replacement (1500 Series)** or **Front Brake Caliper Replacement (2500 Series)**.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
8. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

BRAKE CALIPER BRACKET REPLACEMENT - FRONT (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the brake pads. Refer to **Front Disc Brake Pads Replacement (1500 Series)** or **Front Disc Brake Pads Replacement (2500 Series)**.
4. Remove the brake pad retaining springs.

cardiagn.com

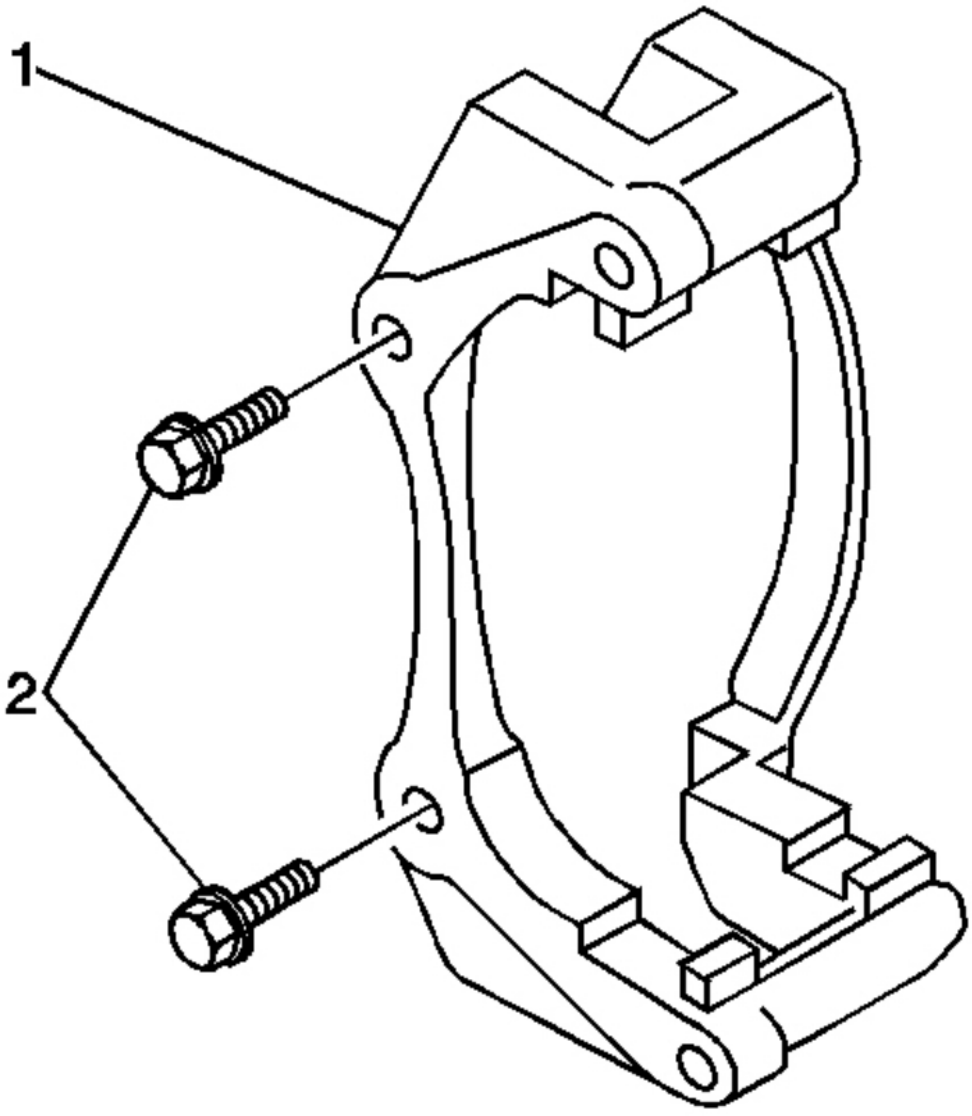


Fig. 106: Brake Caliper Bracket Mounting & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the brake caliper bracket mounting bolts (2).
6. Remove the brake caliper bracket (1).

Installation Procedure

cardiagn.com

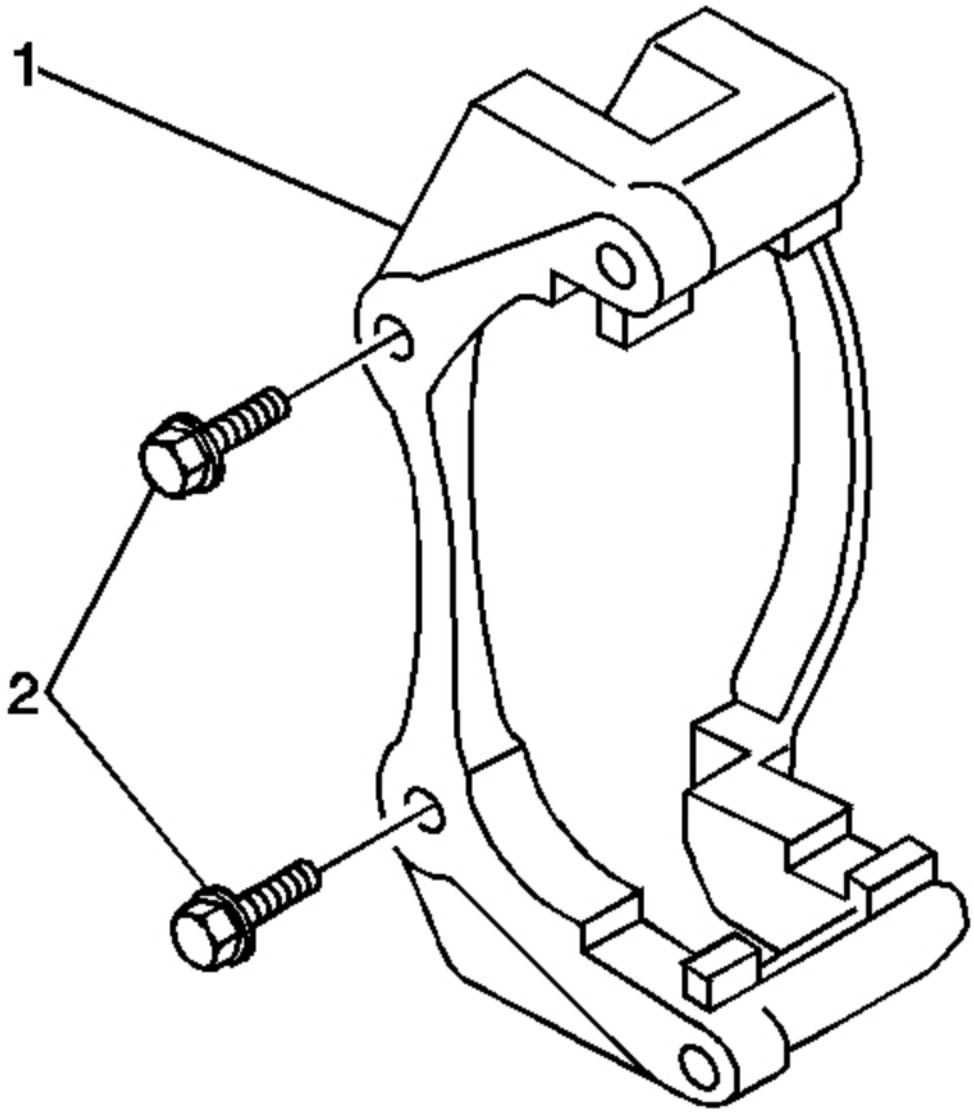


Fig. 107: Brake Caliper Bracket Mounting & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper bracket (1) to the steering knuckle.
2. Perform the following procedure before installing the brake caliper bracket bolts.
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.

cardiagn.com

3. Apply Threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolt.

NOTE: Refer to Fastener Notice .

3. Install the brake caliper bracket mounting bolts (2).

   Tighten: Tighten the bolts to 300 N.m (221 lb ft).

4. Install NEW brake pad retaining springs to the brake caliper bracket.
5. Install the brake pads. Refer to **Front Disc Brake Pads Replacement (1500 Series)** or **Front Disc Brake Pads Replacement (2500 Series)**.
6. Slowly apply pressure to the brake pedal until a firm pedal as been achieved.
7. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .
8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

REAR BRAKE CALIPER BRACKET REPLACEMENT (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

cardiagn.com

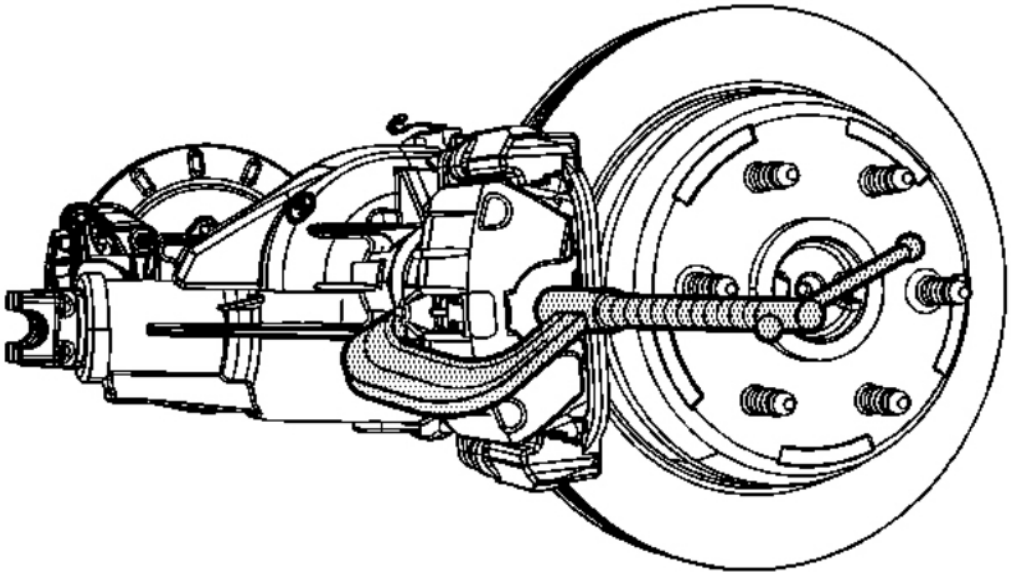


Fig. 108: Compressing Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the fluid level is midway between the maximum - full point and the minimum allowable level, no fluid needs to be removed from the reservoir before proceeding.
3. If the fluid level is higher than midway between the maximum - full point and the minimum allowable level, remove 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. Compress the brake caliper pistons.
    1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
    3. Remove the C-clamp from the caliper.

cardiagn.com

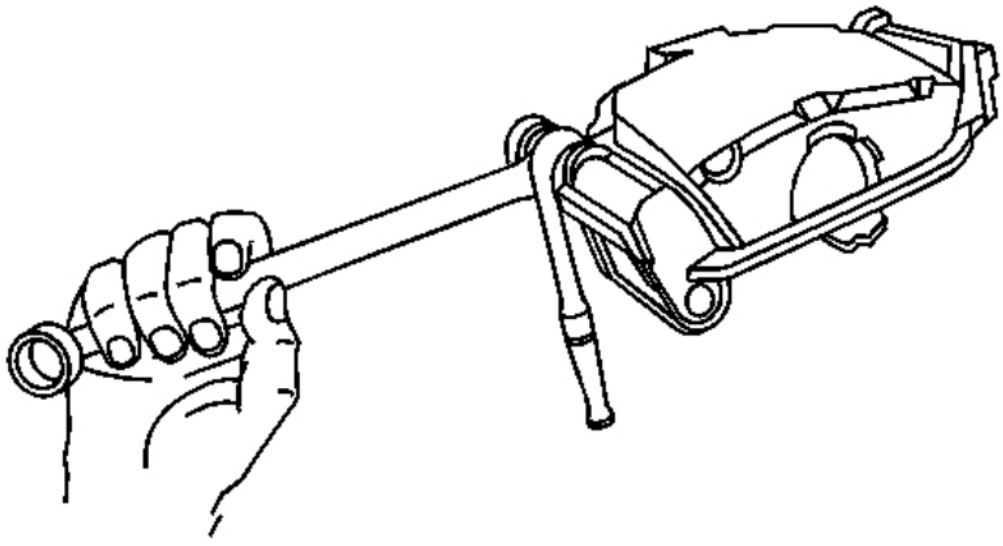


Fig. 109: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **DO NOT use any air tools to remove or tighten 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 brake is applied.**

7. Using an open end wrench to hold the guide pin, loosen the guide pin bolt.

cardiagn.com

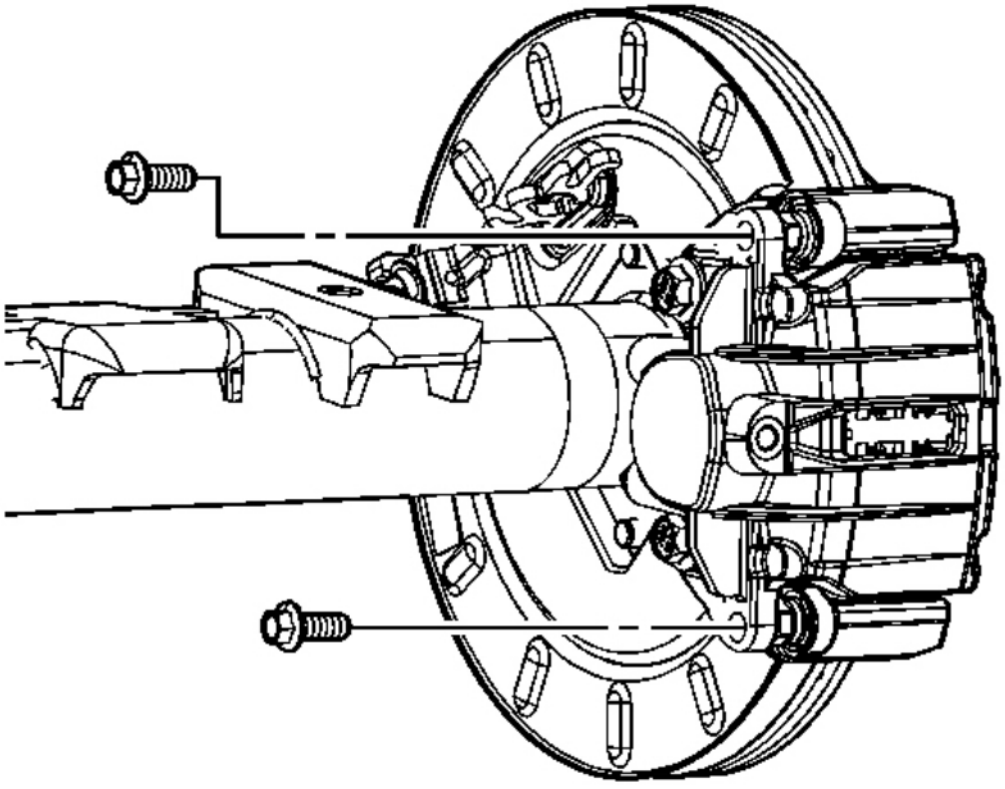


Fig. 110: Brake Caliper Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake caliper guide pin bolts.

NOTE: **Support the brake caliper with heavy mechanic's 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.**

cardiagn.com

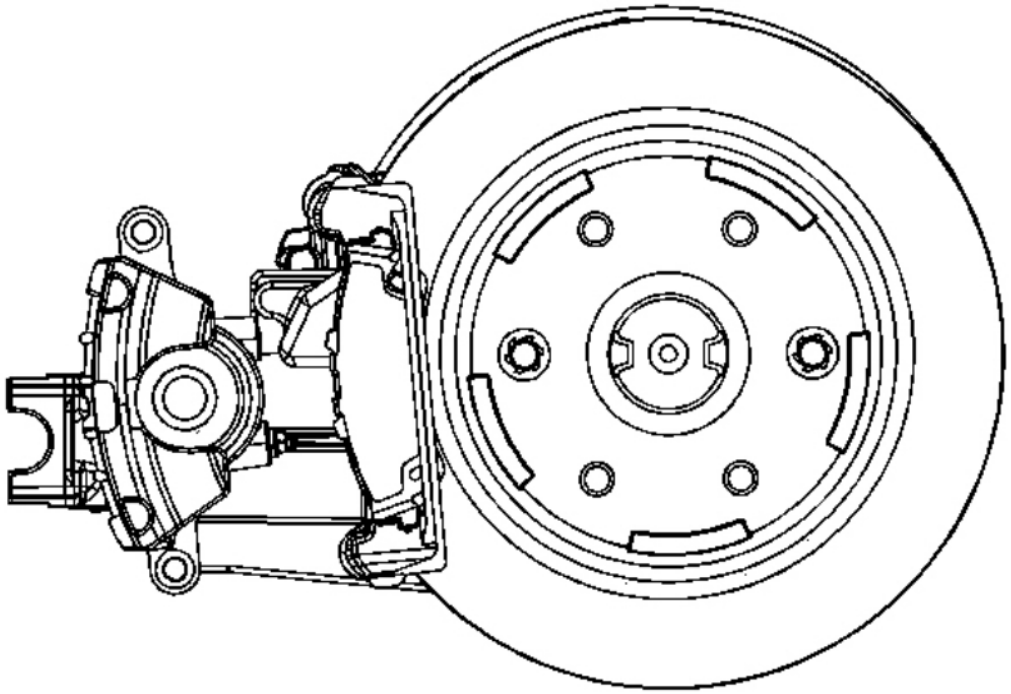


Fig. 111: Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

9. Remove the caliper from the caliper bracket and support with heavy mechanics wire or equivalent.

cardiagn.com

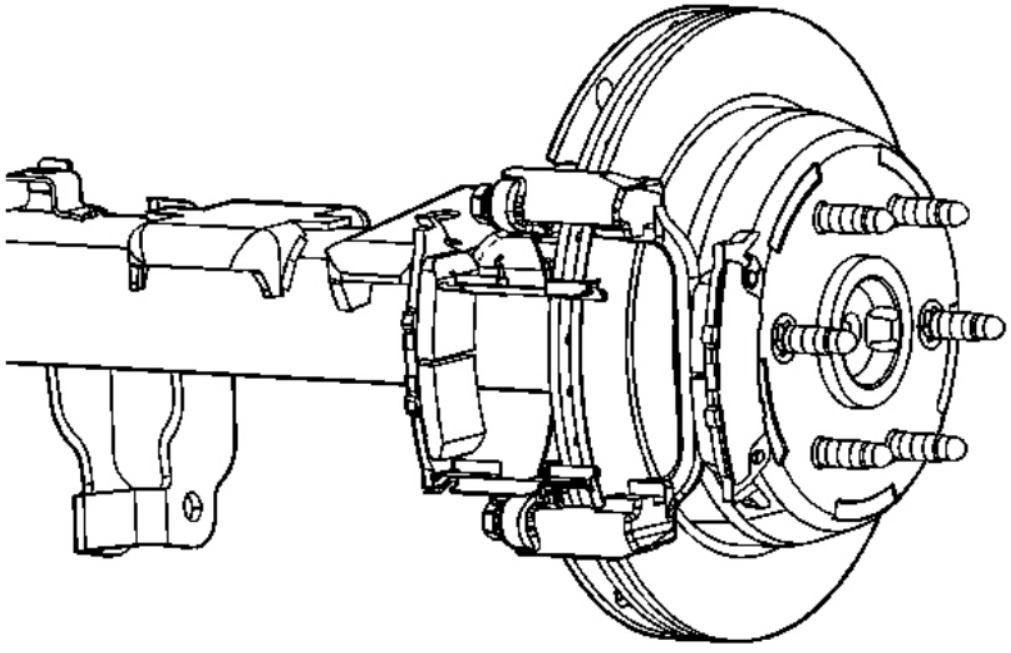


Fig. 112: Brake Pads & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **If installing the original brake pads and retaining springs, mark the position of the pads and springs for proper assembly.**
- **DO NOT reuse the old brake pad retaining springs with new brake pads. Replace with NEW only.**

10. Remove the brake pads from the caliper bracket.
11. Remove the retaining springs.

cardiagn.com

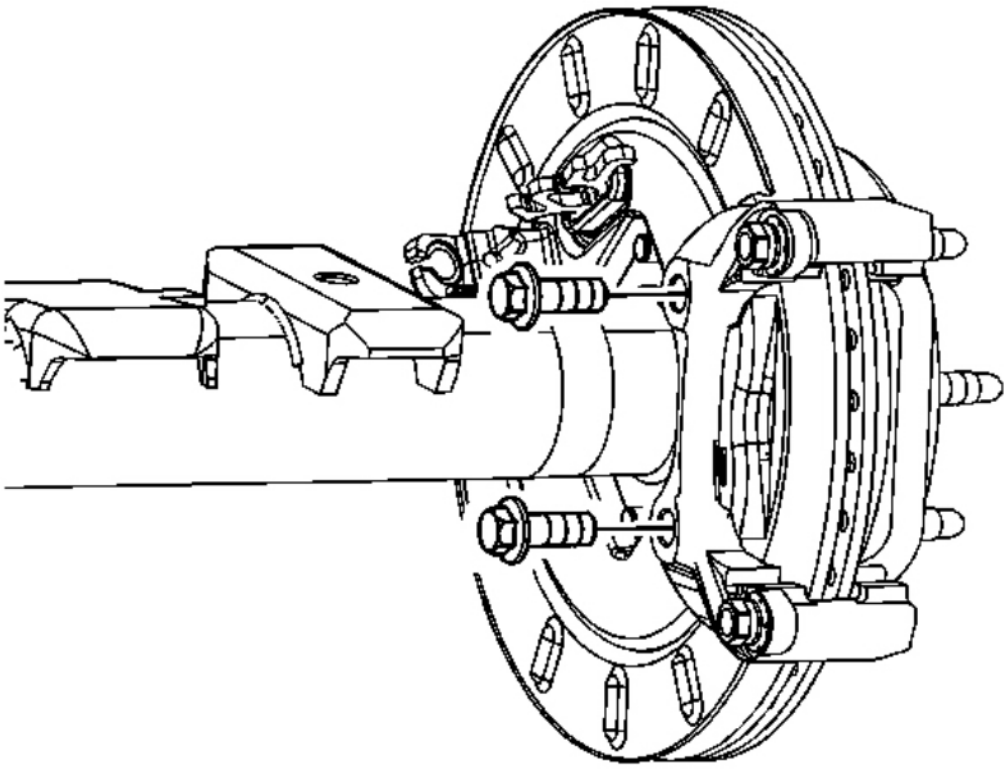


Fig. 113: Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

12. Remove the brake caliper bracket bolts.
13. Remove the brake caliper bracket.
14. Remove any contaminants or foreign material from the inside ends of the brake caliper bracket.
15. Clean the mounting surface and threads of the brake caliper bracket.

Installation Procedure

cardiagn.com

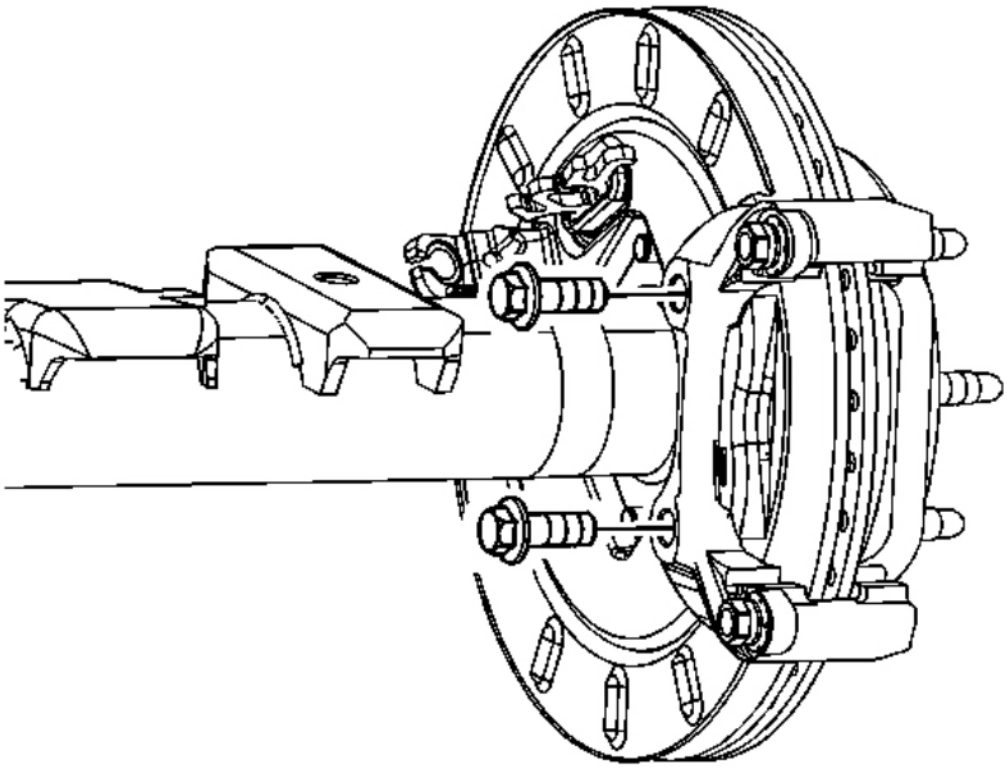


Fig. 114: Brake Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the brake caliper bracket.
2. Perform the following procedure before installing the brake caliper bracket bolts.
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
    3. Apply threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolt.

NOTE: **Refer to Fastener Notice .**

3. Install the brake caliper bracket bolts.

Tighten: Tighten the bolts to 165 N.m (122 lb ft).

cardiagn.com

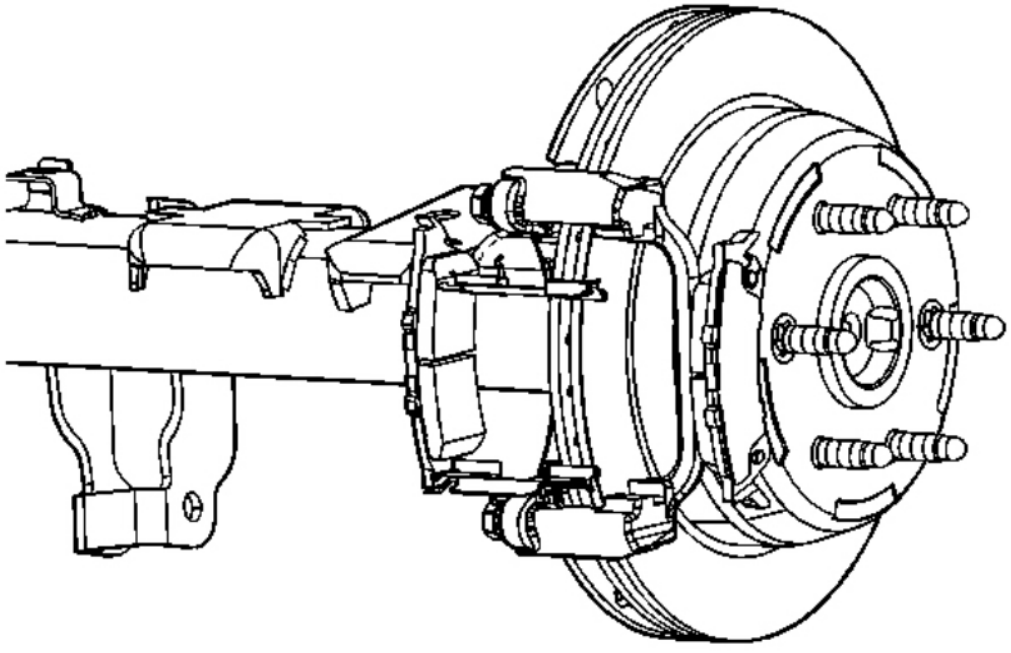


Fig. 115: Brake Pads & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **If installing the original brake pads and retaining springs, position the brake pads and retaining springs in the original location.**
- **DO NOT reuse the old brake pad retaining springs with new brake pads. Replace with NEW only.**

4. Install the retaining springs to the brake caliper bracket.
5. Install the brake pads.

cardiagn.com

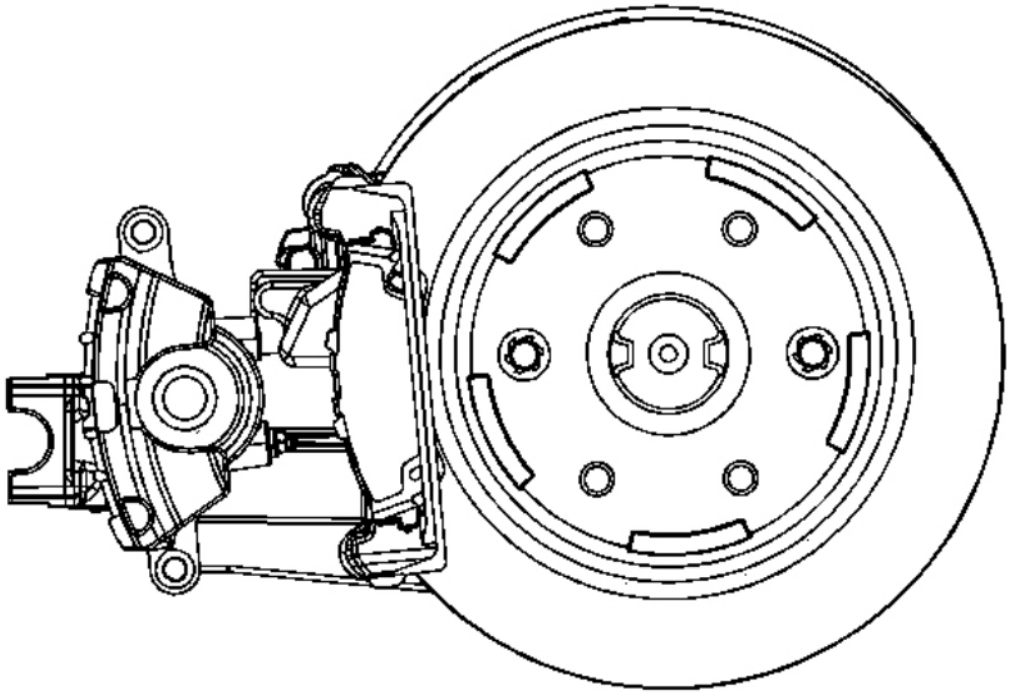


Fig. 116: Caliper & Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

6. Install the caliper to the caliper bracket.

cardiagn.com

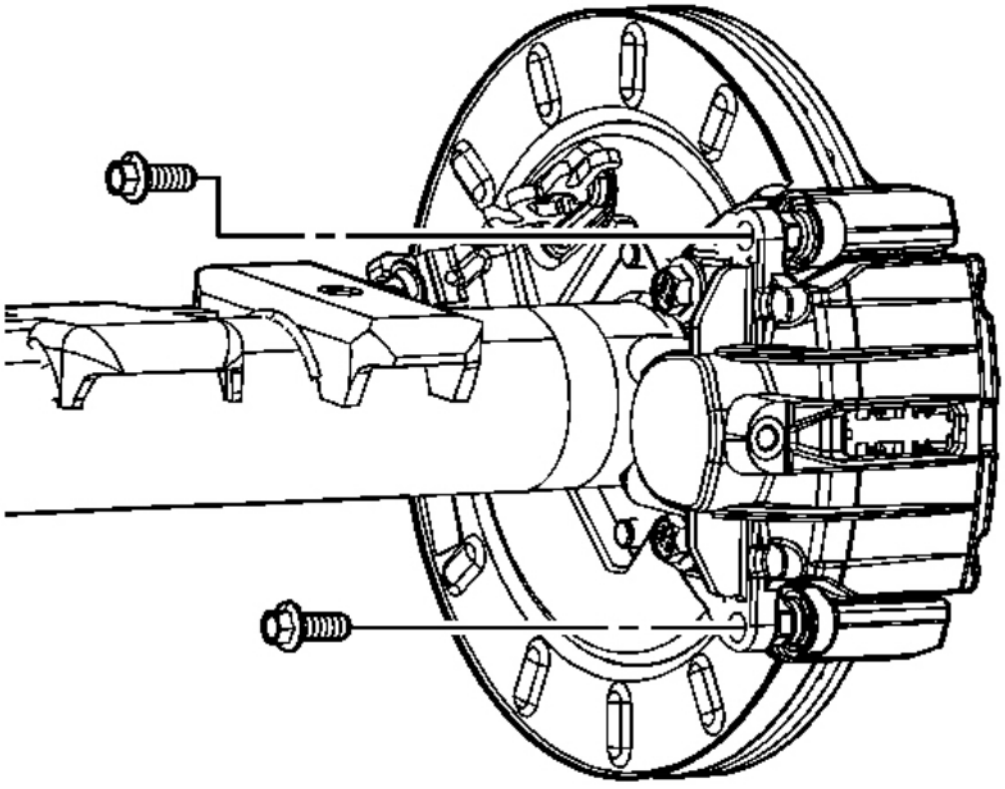


Fig. 117: Brake Caliper Bolts
Courtesy of GENERAL MOTORS CORP.

7. Install the brake caliper guide pin bolts.

cardiagn.com

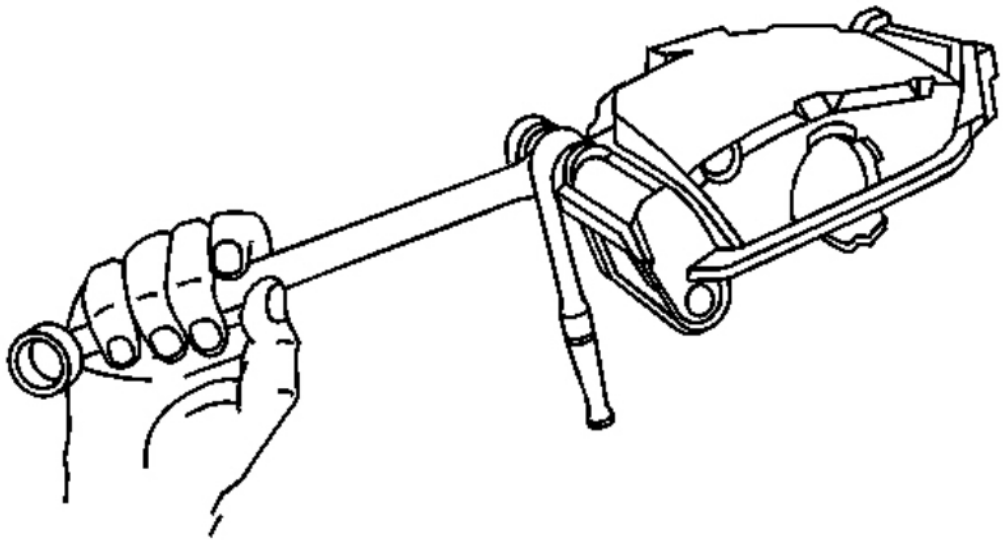


Fig. 118: Using Open End Wrench To Loosen Brake Caliper Guide Pin Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **DO NOT use any air tools to remove or tighten 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 brake is applied.**

8. Use an open end wrench to hold the guide pins while tightening the guide pin bolts.

   Tighten: Tighten the bolts to 38 N.m (28 lb ft).

9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** .
11. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
12. Slowly release the brake pedal.
13. Wait 15 seconds, then repeat steps 11-12 until a firm pedal is obtained to properly seat the caliper pistons and pads.
14. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master**

cardiagn.com

Cylinder Reservoir Filling .

REAR BRAKE CALIPER BRACKET REPLACEMENT (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

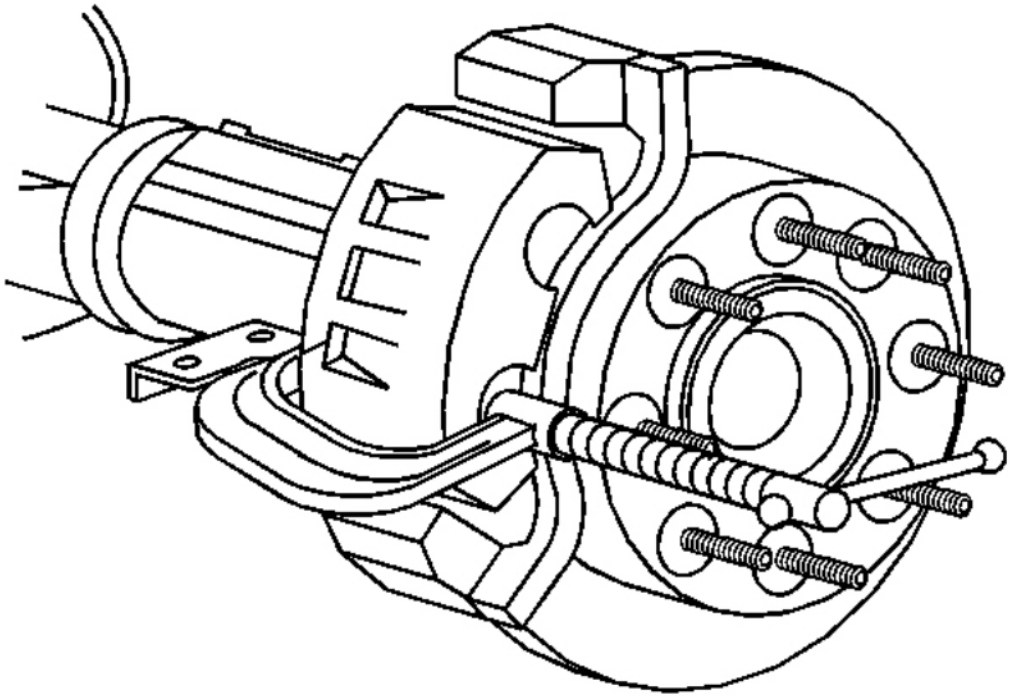
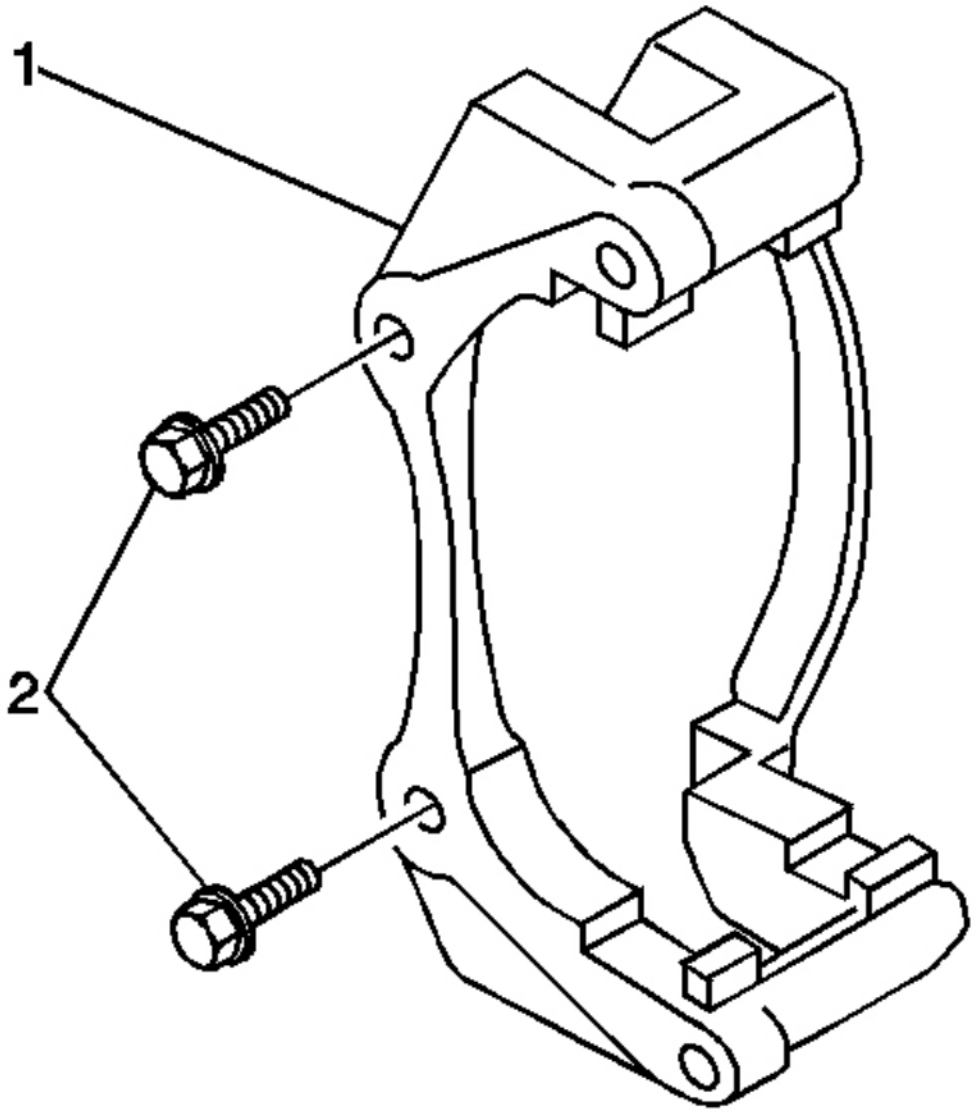


Fig. 119: C-Clamp & Rear Caliper
Courtesy of GENERAL MOTORS CORP.

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

cardiagn.com

6. Compress the brake caliper pistons.
    1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
    3. Remove the C-clamp from the caliper.
7. Loosen, but do not remove the rear brake caliper guide pin bolts.



cardiagn.com

Fig. 120: Brake Caliper Bracket Mounting & Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the brake caliper bracket mounting bolts (2).
9. Remove the caliper bracket (1) and brake caliper as an assembly.

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

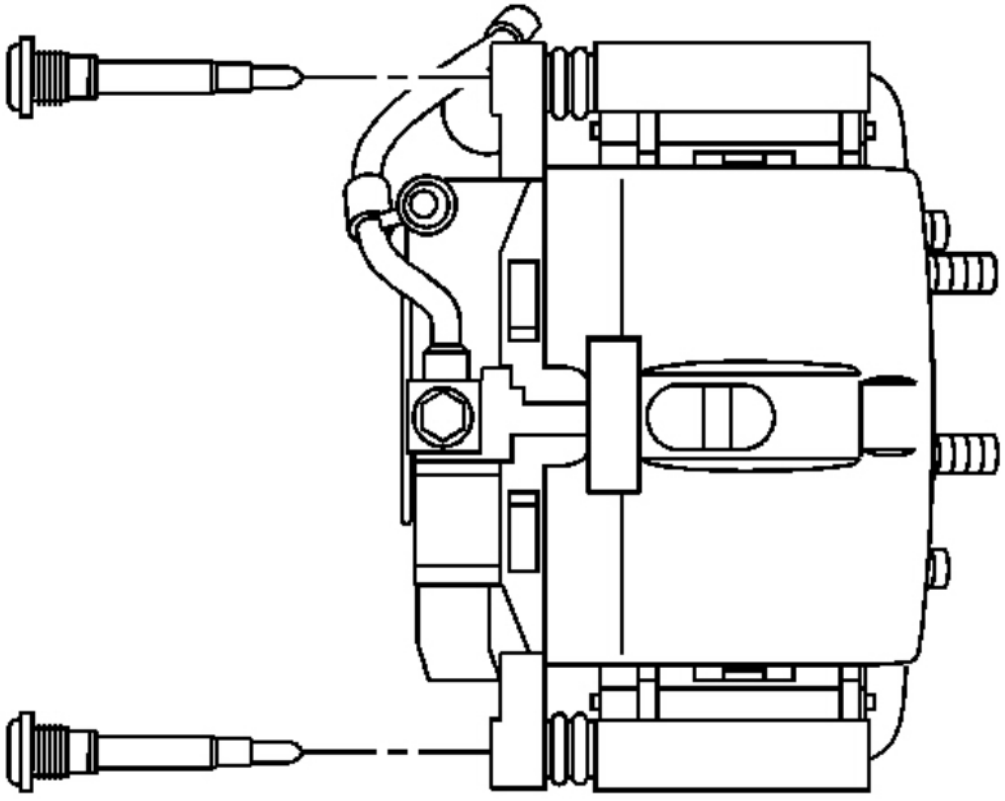


Fig. 121: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

10. Remove the caliper guide pin bolts from the caliper bracket.

cardiagn.com

Support the caliper with heavy mechanic's wire or equivalent. DO NOT disconnect the hydraulic brake hose from the caliper.

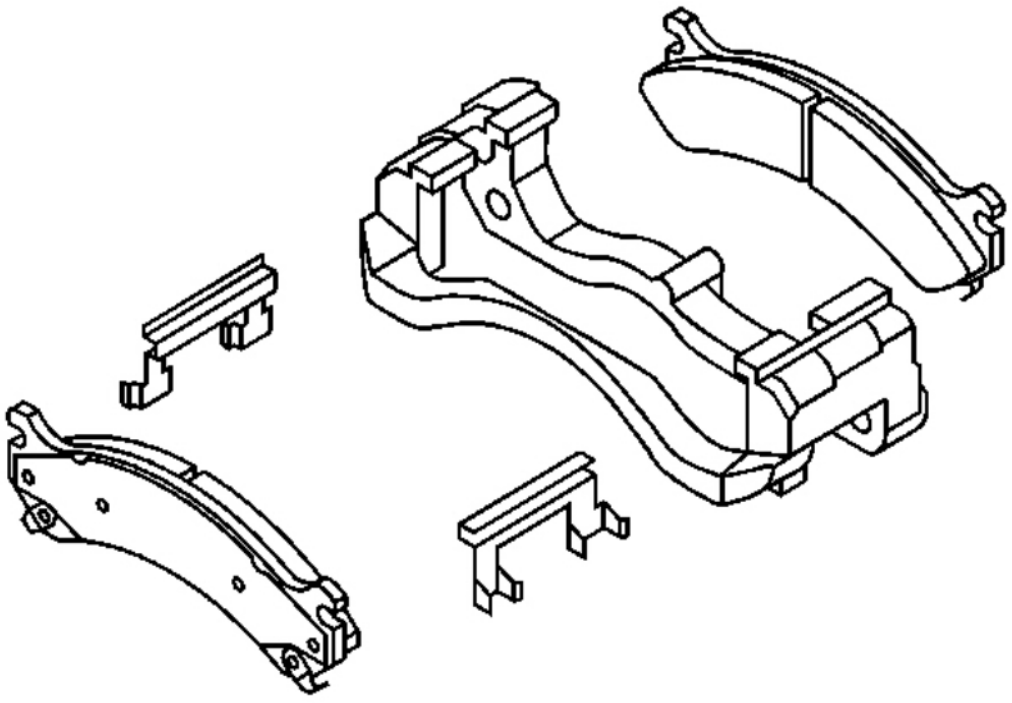


Fig. 122: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

11. Remove the brake pads from the caliper bracket.
12. Remove the retaining springs.

Installation Procedure

cardiagn.com

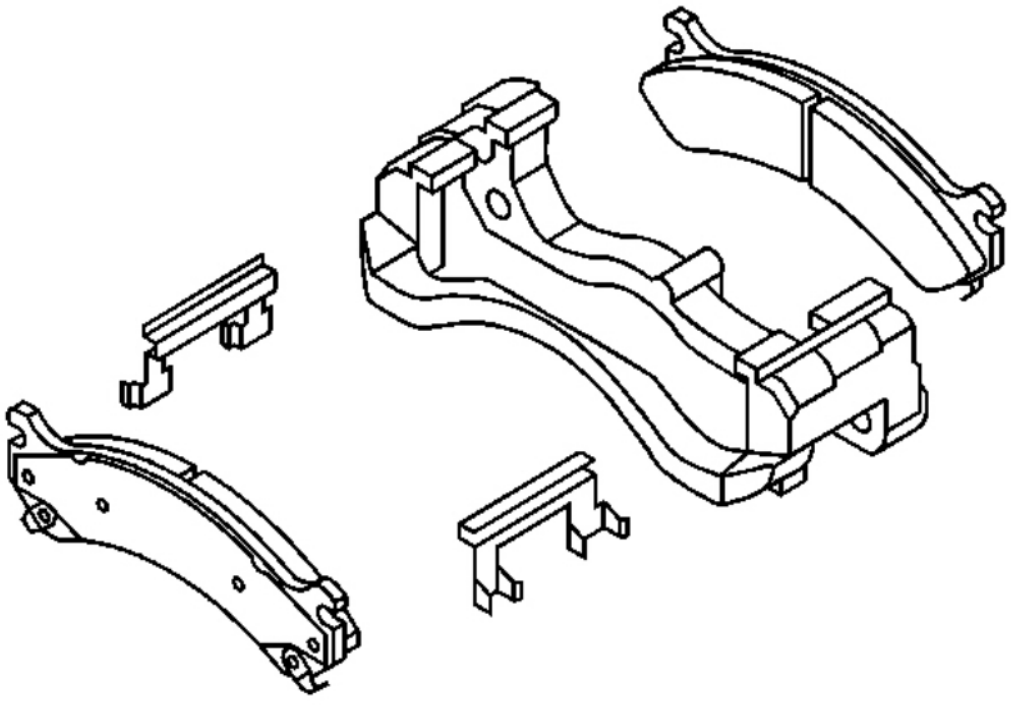


Fig. 123: View Of Disc Brake Pads & Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install the retaining springs to the caliper bracket.
2. Install the brake pads.

cardiagn.com

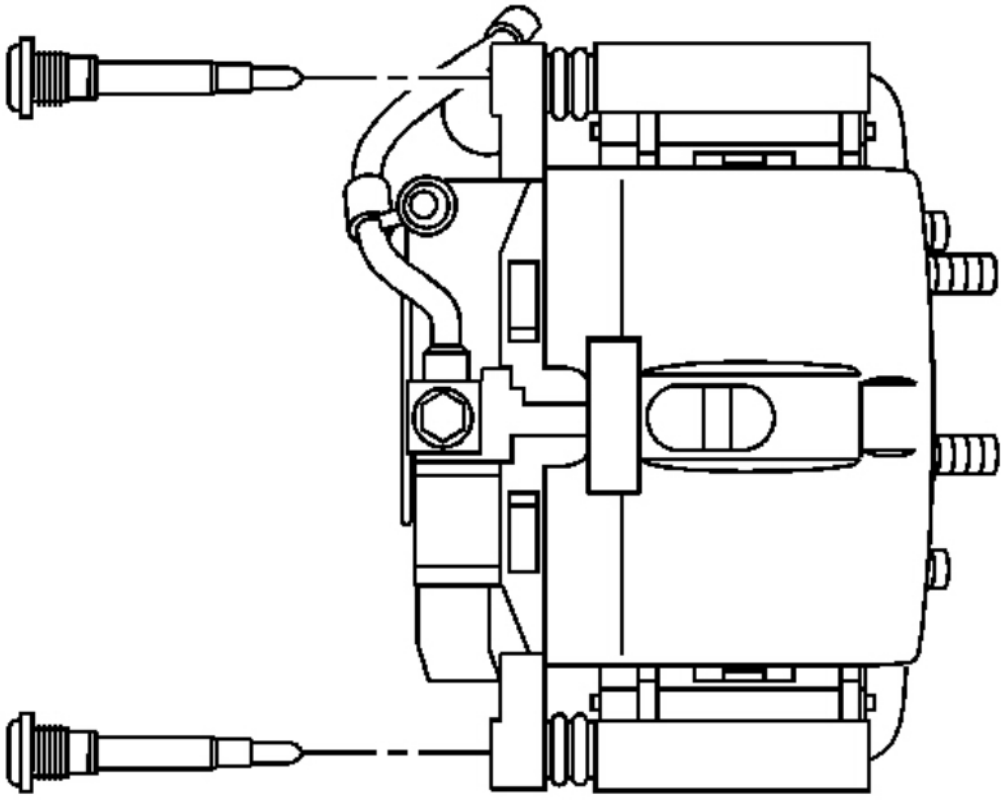


Fig. 124: View Of Rear Caliper Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

3. Install the caliper to the caliper bracket.
4. Install the brake caliper guide pin bolts to the caliper bracket. DO NOT tighten.

cardiagn.com

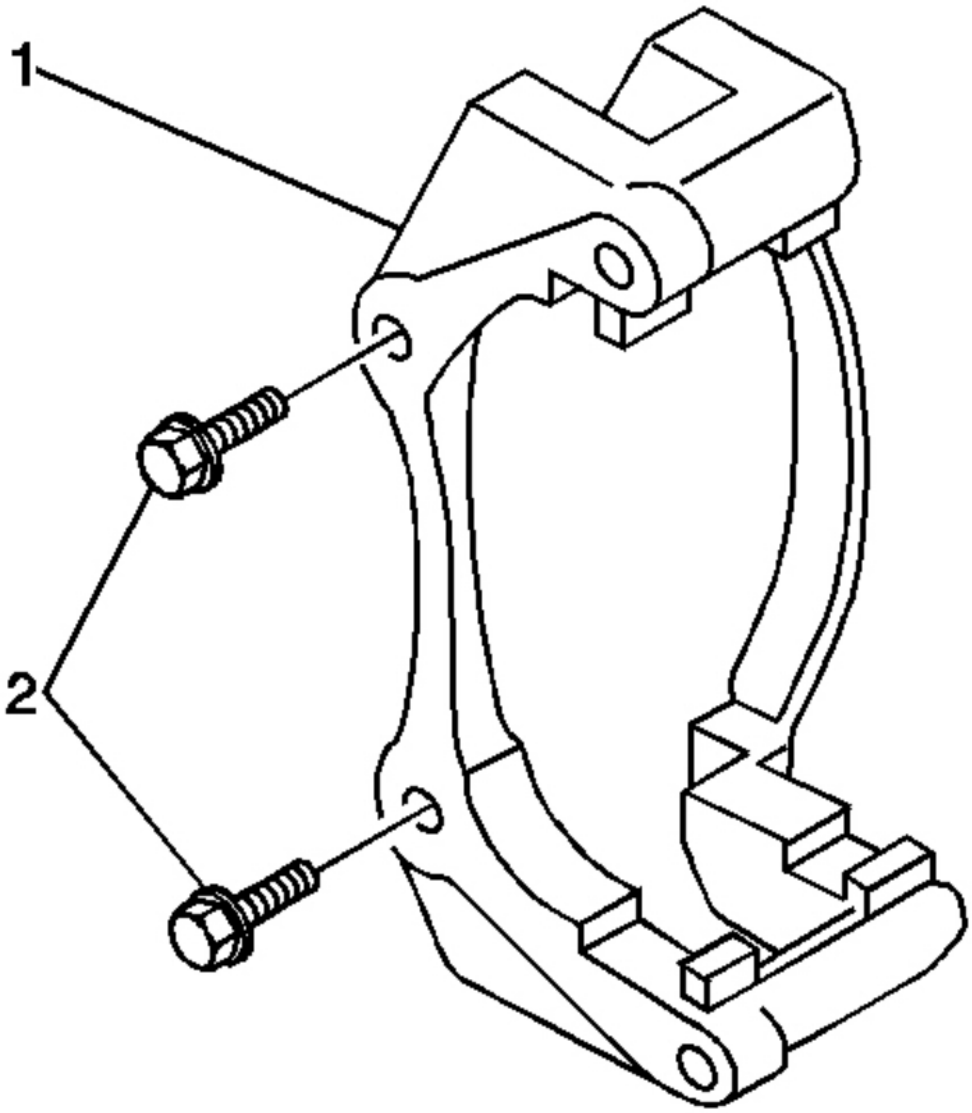


Fig. 125: Brake Caliper Bracket Mounting & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Install the caliper and caliper bracket (1) as an assembly.
6. Perform the following procedure before installing the caliper bracket bolts.
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.

cardiagn.com

3. Apply threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolt.

NOTE: Refer to Fastener Notice .

7. Install the brake caliper bracket mounting bolts (2).

   Tighten: Tighten the bolts to 200 N.m (148 lb ft).

8. Tighten the brake caliper guide pin bolts.

   Tighten: Tighten the bolts to 108 N.m (80 lb ft).

9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
11. Slowly release the brake pedal.
12. Wait 15 seconds, then repeat steps 10-11 until a firm pedal is obtained to properly seat the brake caliper pistons and brake pads.
13. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

FRONT BRAKE ROTOR REPLACEMENT (1500 SERIES)

Tools Required

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

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

cardiagn.com

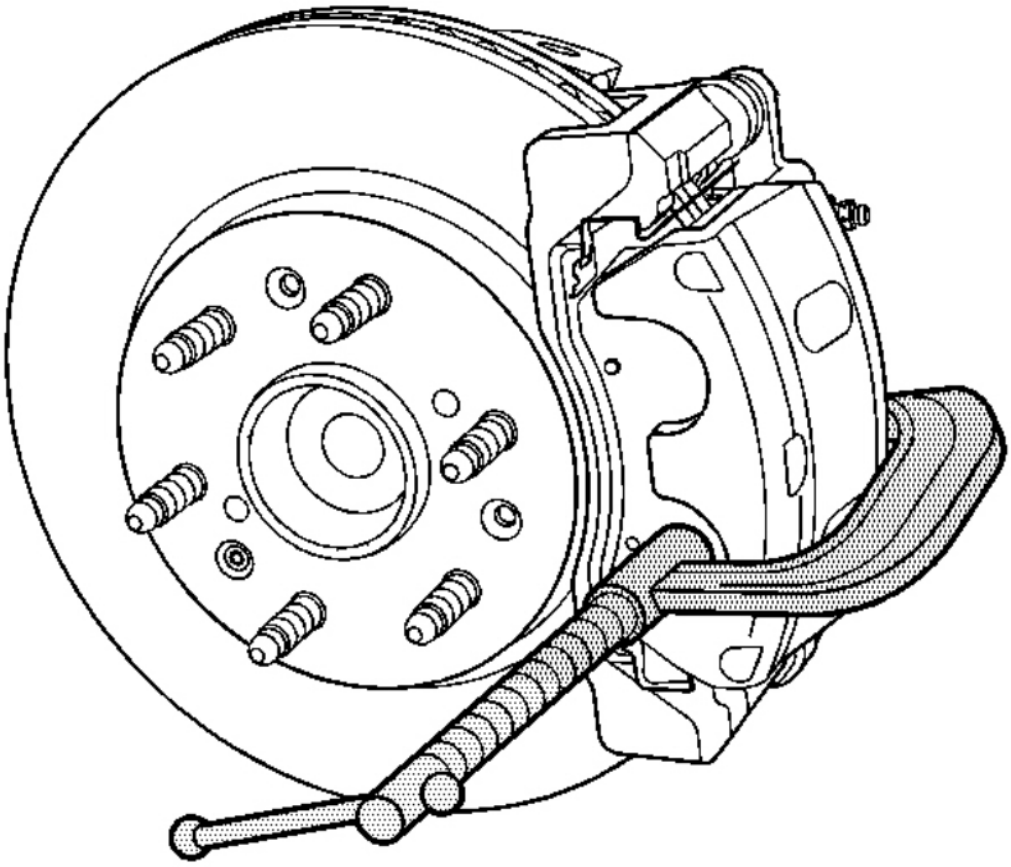


Fig. 126: Compressing Brake Caliper Pistons
Courtesy of GENERAL MOTORS CORP.

7. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard brake pad.
    2. Slowly tighten the C-clamps until the caliper pistons are pushed completely into the caliper bores.
    3. Remove the C-clamps from the caliper.

NOTE: Support the brake caliper with heavy mechanic's 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.

cardiagn.com

IMPORTANT: Remove the brake caliper bracket and the brake caliper as an assembly.

8. Remove the 2 brake caliper bracket mounting bolts.
9. Remove the caliper and bracket assembly and support with heavy mechanics wire or equivalent.

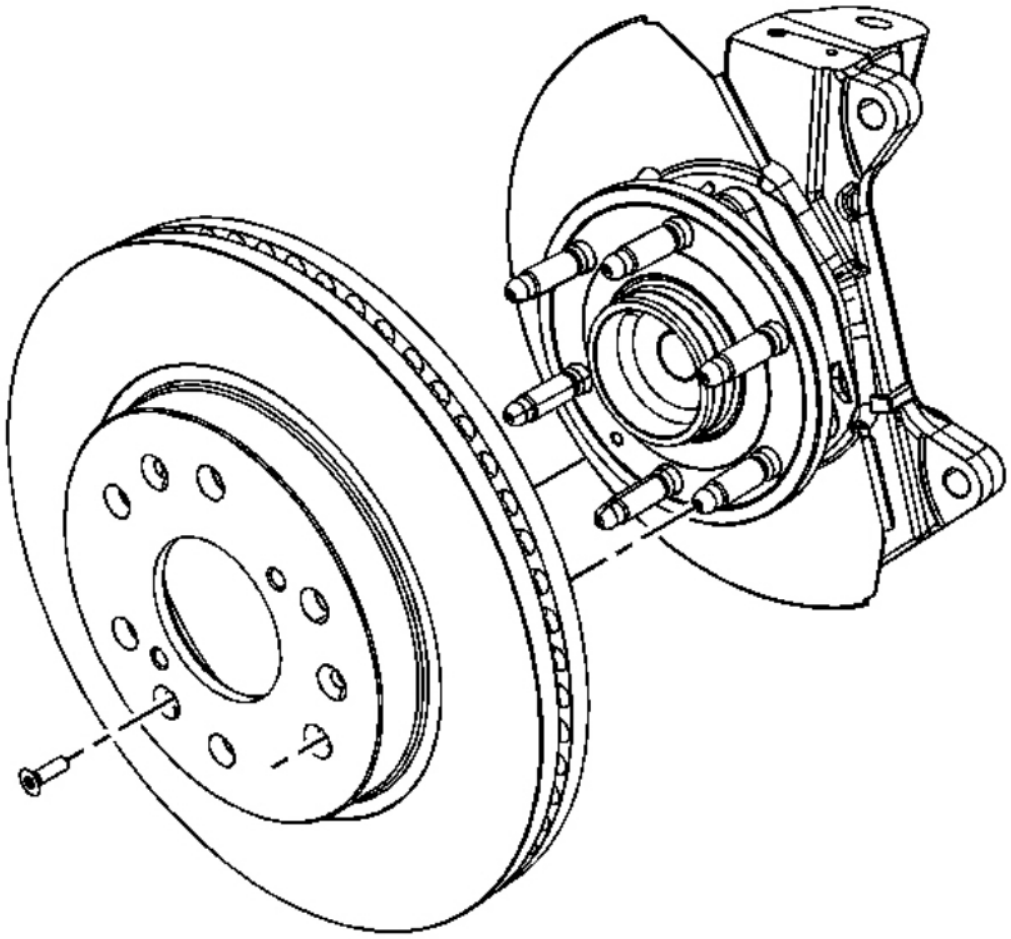


Fig. 127: Brake Rotor Screw
Courtesy of GENERAL MOTORS CORP.

10. Remove the brake rotor retaining push nuts from the wheel studs, if necessary.
11. Remove the brake rotor screw.

IMPORTANT: Perform the following service procedures to separate the brake rotor from the wheel hub.

cardiagn.com

12. Install the wheel nuts on the wheel studs.
13. Using a deadblow hammer, strike the rotor between the wheel studs to separate the rotor from the wheel hub.
14. Remove the wheel nuts.
15. Remove the rotor.
16. If the brake rotor does not separate from the wheel hub, perform the following steps.
    - Clean all the surface areas and the threaded holes of contamination.
    - Generously apply penetrating oil or equivalent to the hub/rotor area.
    - Insert 2 M10 x 1.5 bolts into the threaded holes of the rotor.
    - Tighten the bolts evenly to force the rotor from the hub.

Installation Procedure

NOTE: Any new rotor must have the protective coating removed from the friction surfaces before being placed in service. Remove the protective coating using denatured alcohol or an equivalent, and wipe the surface clean with clean cloths. Do not use gasoline, kerosene, or other oil base solvents which may leave an oily residue. This residue is damaging to the brake lining and is flammable.

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

1. Using the **J 42450-A** , clean all rust and contaminants from the mating surface of the hub flange. See **Special Tools**.
2. Using the **J 41013** , clean all rust and contaminants from the inside diameter of the hat section of the brake rotor to prevent any foreign material from getting between the brake rotor and the hub flange. See **Special Tools**.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure that there are no foreign particles or debris remaining.

IMPORTANT: If the rotor was removed using the jack screw method you must ensure that the hub flange is free of nicks or marks caused by this procedure. Remove all raised nicks or marks before installing the rotor.

cardiagn.com

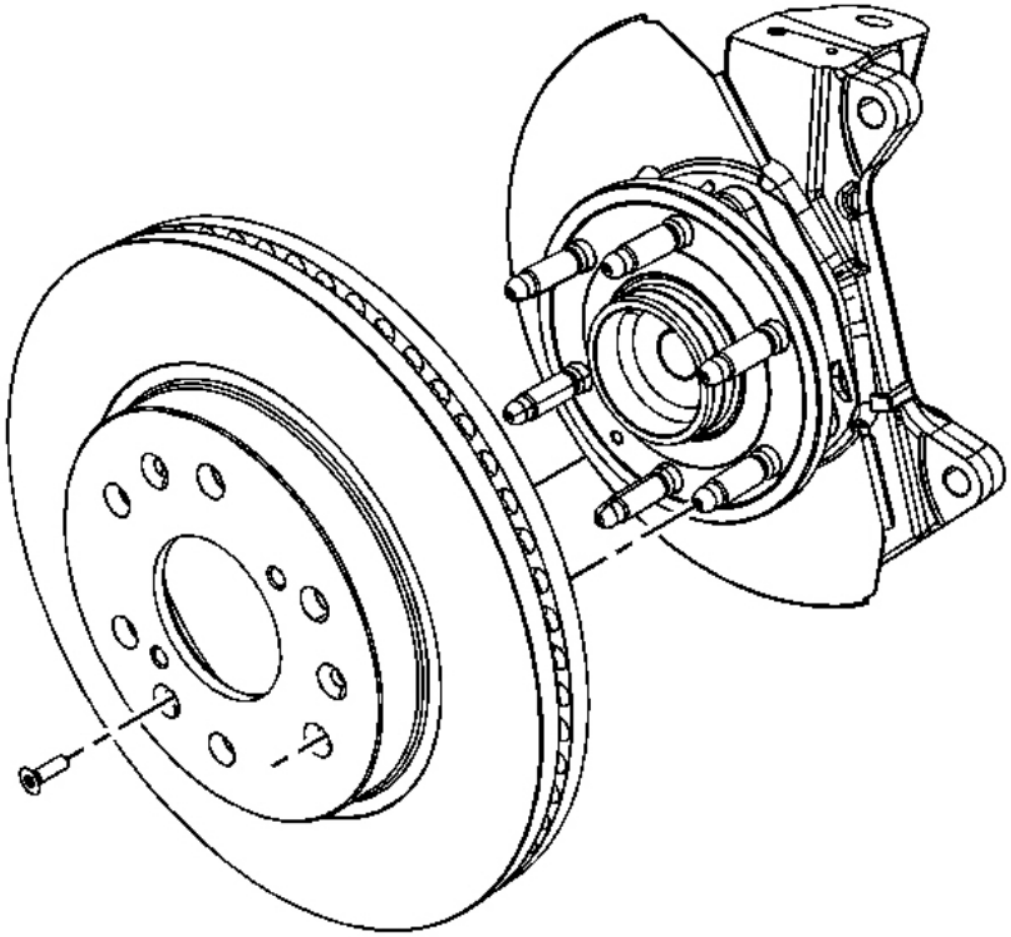


Fig. 128: Brake Rotor Screw
Courtesy of GENERAL MOTORS CORP.

4. Align the rotor to its original position on the hub, if applicable, and install the rotor.

   NOTE: **Refer to Fastener Notice .**

5. Install the brake rotor screw.

   Tighten: Tighten the screw to 12 N.m (106 lb in).

6. If the rotor was removed and installed as part of a brake system repair, measure the assembled lateral runout (LRO) of the rotor to ensure optimum performance of the disc brakes. Refer to **Brake Rotor**

cardiagn.com

Assembled Lateral Runout Measurement.

7. If the rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.

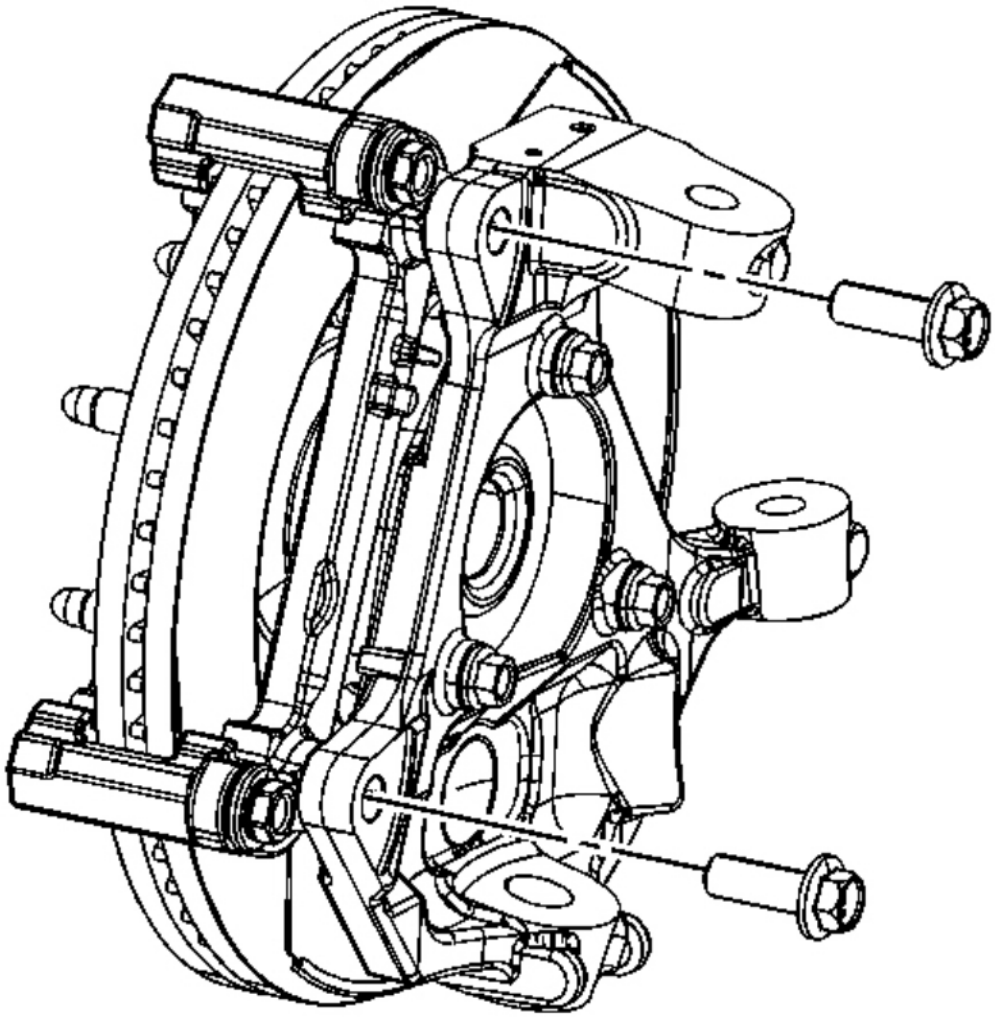


Fig. 129: Caliper Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

8. Install the brake caliper and brake caliper bracket.
9. Perform the following procedure before installing the brake caliper bracket mounting bolts.
    1. Remove all traces of the original adhesive patch.

cardiagn.com

2. Clean the threads of the bolts with brake parts cleaner or equivalent and allow to dry.
3. Apply threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolts.

10. Install the 2 brake caliper bracket mounting bolts.

    Tighten: Tighten the bolts to 200 N.m (148 lb ft).

11. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
12. Lower the vehicle.
13. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
14. Slowly release the brake pedal.
15. Wait 15 seconds, then repeat steps 13-14 until a firm pedal is obtained to properly seat the caliper pistons and the brake pads.
16. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

FRONT BRAKE ROTOR REPLACEMENT (2500 SERIES)

Tools Required

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

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

cardiagn.com

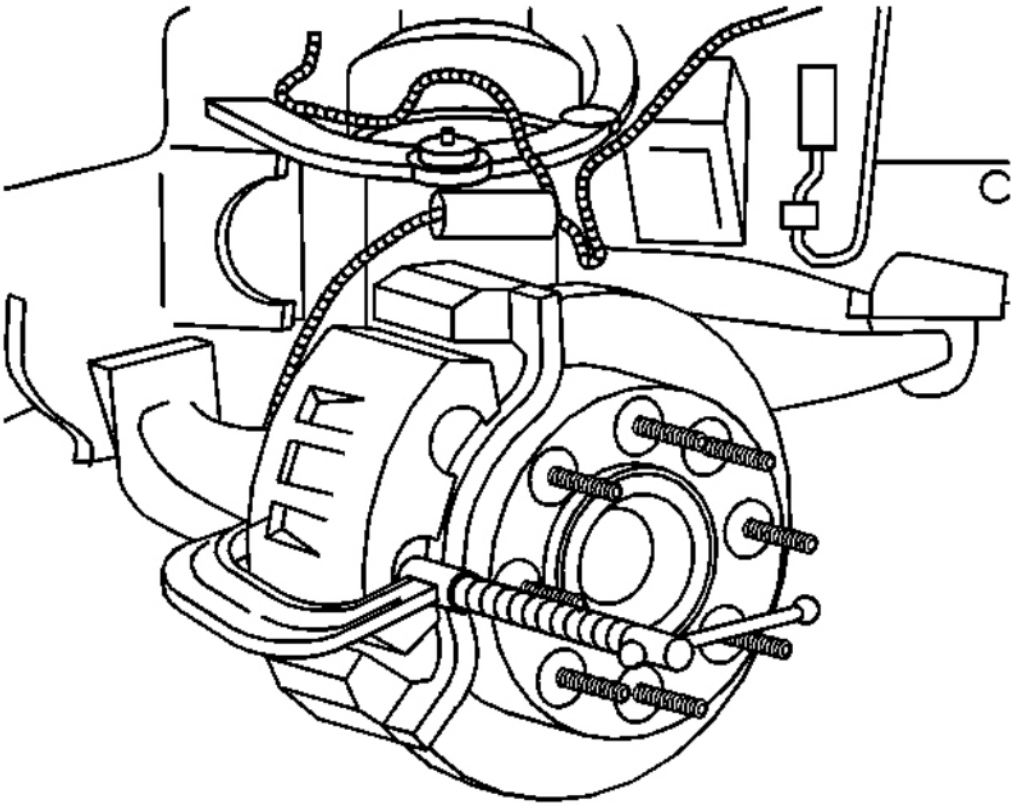


Fig. 130: Compressing Brake Caliper Pistons
Courtesy of GENERAL MOTORS CORP.

7. Compress the brake caliper pistons.
    1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard brake pad.
    2. Slowly tighten the C-clamps until the caliper pistons are pushed completely into the caliper bores.
    3. Remove the C-clamps from the caliper.

cardiagn.com

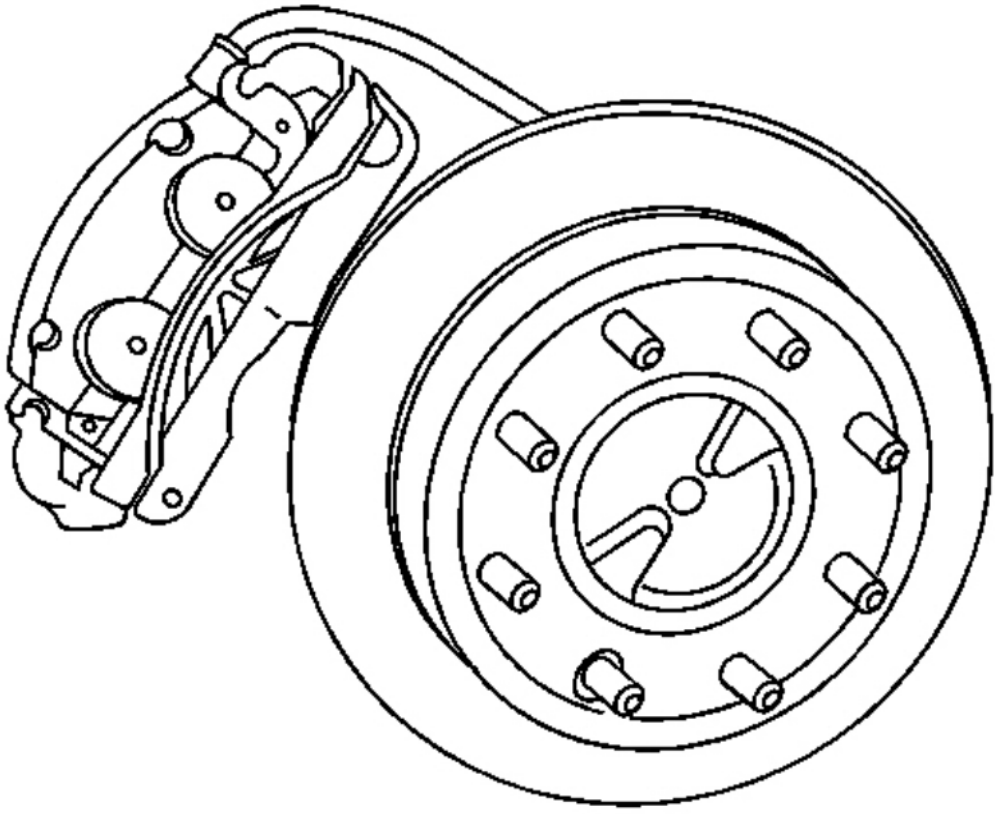


Fig. 131: View Of Brake Caliper & Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

NOTE: Support the brake caliper with heavy mechanic's 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.

IMPORTANT: Remove the brake caliper and bracket as a single unit. It is not necessary to separate them.

8. Remove the 2 brake caliper bracket mounting bolts.
9. Remove the caliper and bracket assembly and support with heavy mechanics wire or equivalent.
10. Remove the rotor retaining push nuts from the wheel studs, if applicable.

cardiagn.com

11. It may be necessary to strike the end of the hub or the rotor with a deadblow hammer to separate the rotor from the hub.
    1. Install the wheel nuts on the wheel studs to protect the ends of the wheel studs.
    2. Strike the brake rotor between the wheel studs to separate the brake rotor from the wheel hub.
    3. Remove the wheel nuts.

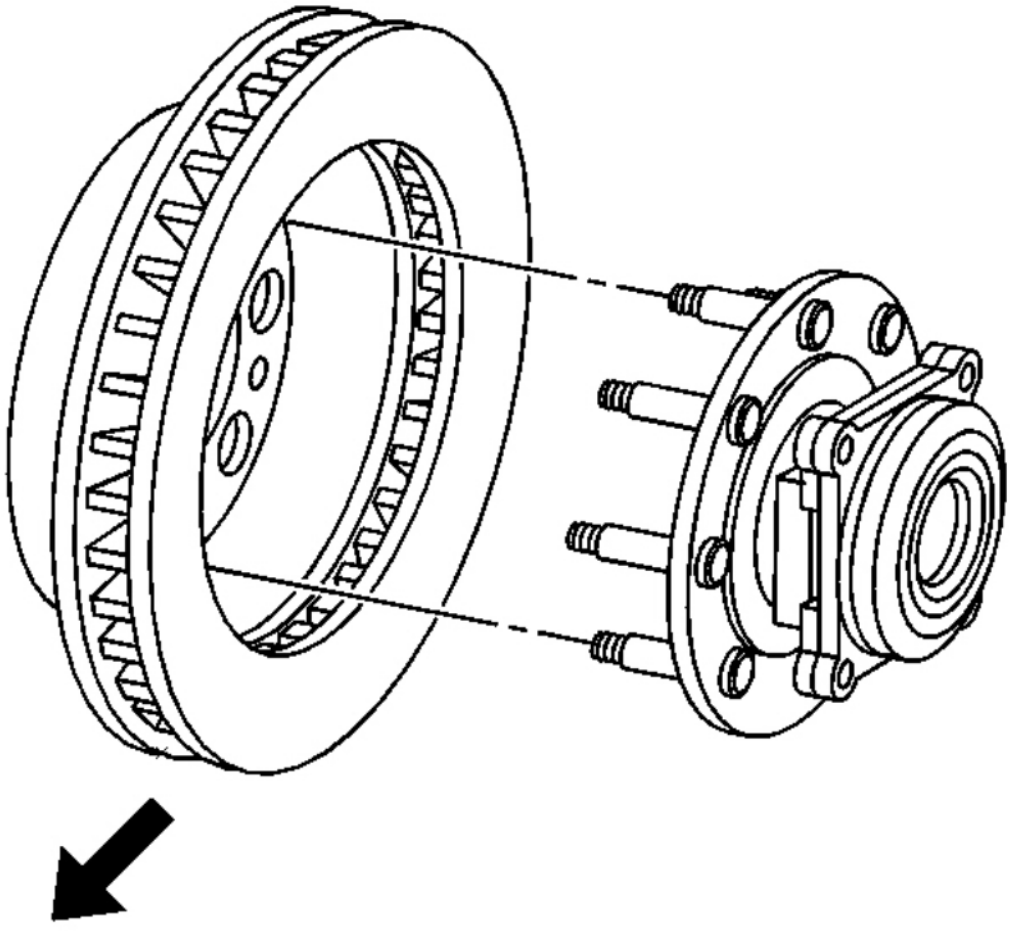


Fig. 132: View Of Front Brake Rotor And Hub
Courtesy of GENERAL MOTORS CORP.

12. Remove the brake rotor.
13. If the brake does not separate from the wheel hub, perform the following steps.
    - Clean all the surface areas and the threaded holes of contamination.

cardiagn.com

- Generously apply penetrating oil or the equivalent to the hub/rotor area.
- Insert 2 M10 x 1.5 bolts into the threaded holes of the rotor.
- Tighten both bolts evenly to force the rotor from the hub.

Installation Procedure

NOTE: Any new rotor must have the protective coating removed from the friction surfaces before being placed in service. Remove the protective coating using denatured alcohol or an equivalent, and wipe the surface clean with clean cloths. Do not use gasoline, kerosene, or other oil base solvents which may leave an oily residue. This residue is damaging to the brake lining and is flammable.

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

1. Use the **J 42450-A** to clean all rust and contaminants from the mating surface of the hub flange. See **Special Tools**.
2. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure that there are no foreign particles or debris remaining.

IMPORTANT: If the rotor was removed using the jack screw method you must ensure that the hub flange is free of nicks or marks caused by this procedure. Remove all raised nicks or marks before installing the rotor.

cardiagn.com

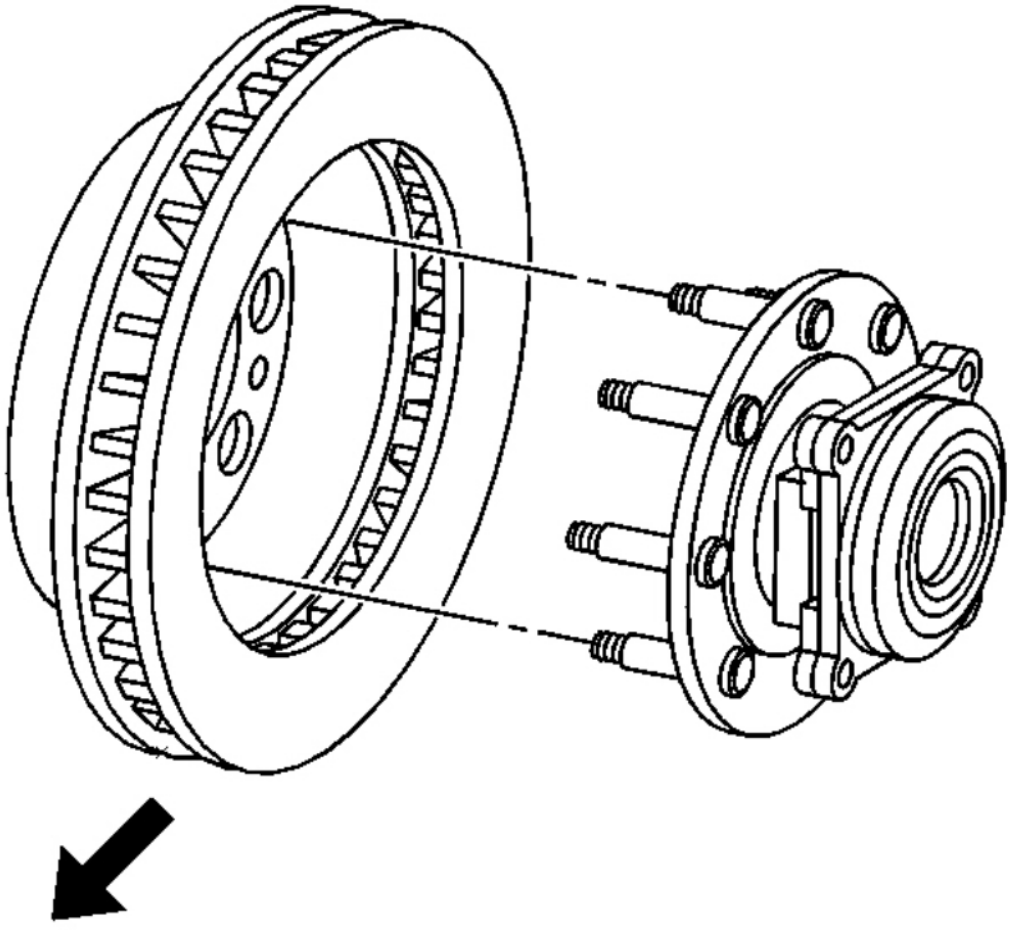


Fig. 133: View Of Front Brake Rotor And Hub
Courtesy of GENERAL MOTORS CORP.

3. Align the rotor to its original position on the hub, if applicable, and install the rotor.
4. If the brake rotor was removed and installed as part of a brake system repair, measure the assembled lateral runout (LRO) of the brake rotor to ensure optimum performance of the disc brakes. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
5. If the brake rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.

cardiagn.com

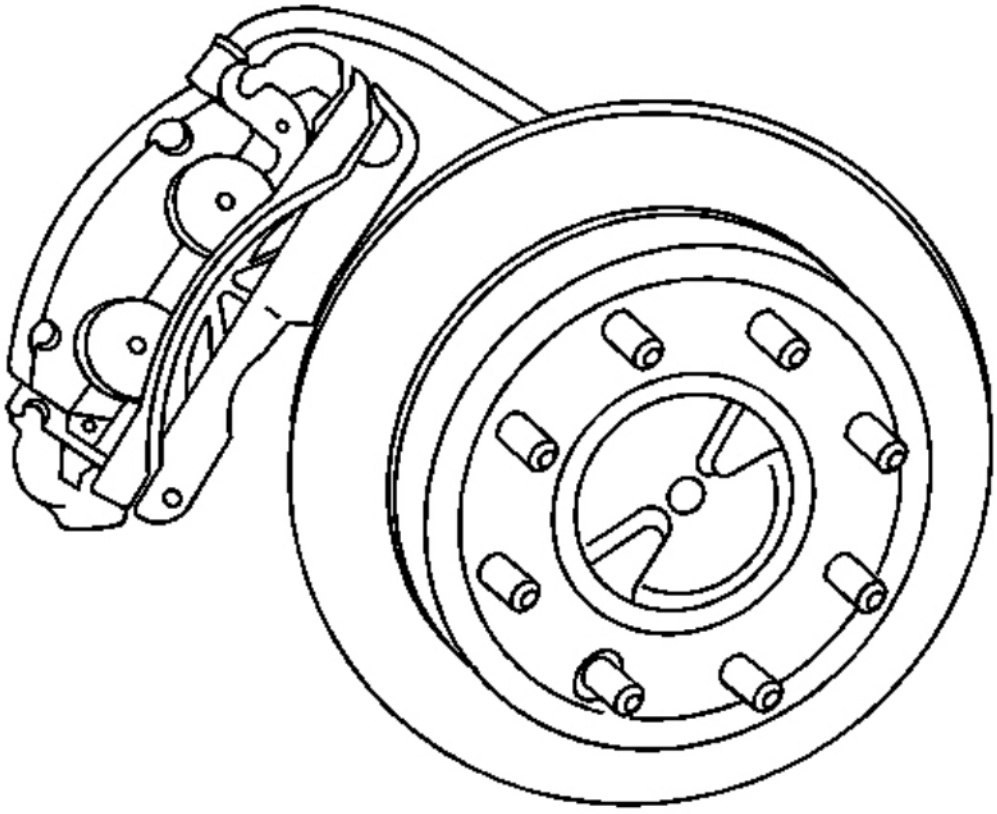


Fig. 134: View Of Brake Caliper & Brake Caliper Bracket
Courtesy of GENERAL MOTORS CORP.

6. Install the brake caliper and bracket assembly.
7. Perform the following procedure before installing the caliper bracket mounting bolts.
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolts with brake parts cleaner or equivalent and allow to dry.
    3. Apply Threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolts.

NOTE: **Refer to Fastener Notice .**

8. Install the brake caliper bracket mounting bolts.

Tighten: Tighten the bolts to 300 N.m (221 lb ft).

cardiagn.com

9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. Lower the vehicle.
11. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
12. Slowly release the brake pedal.
13. Wait 15 seconds, then repeat steps 11-12 until a firm pedal is obtained to properly seat the brake caliper pistons and the brake pads.
14. Fill the master cylinder reservoir to the proper level with clean brake fluid. Refer to **Master Cylinder Reservoir Filling** .

REAR BRAKE ROTOR REPLACEMENT (1500 SERIES)

Tools Required

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

Removal Procedure

CAUTION: Refer to Brake Dust Caution .

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

cardiagn.com

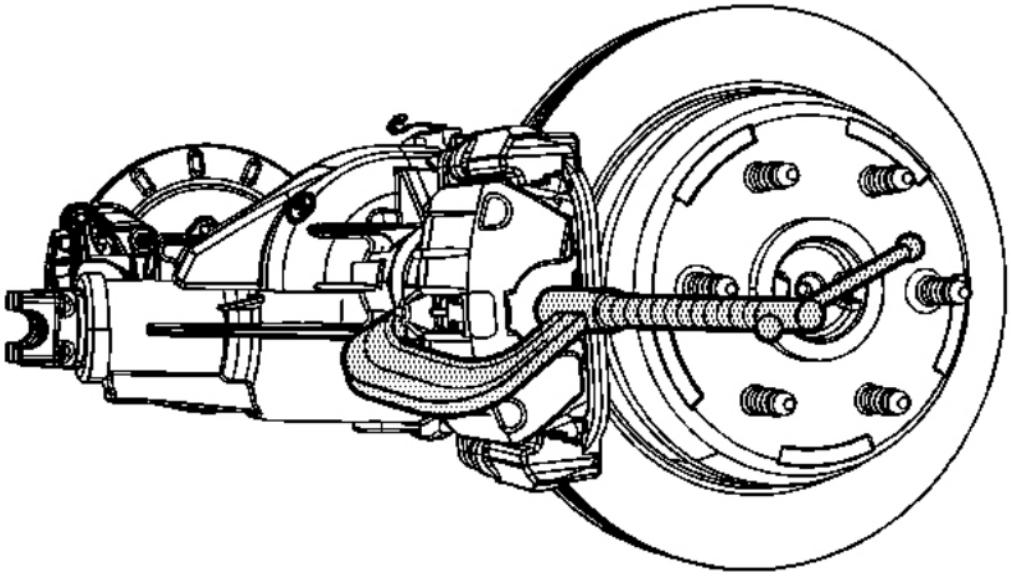


Fig. 135: Compressing Brake Caliper Piston
Courtesy of GENERAL MOTORS CORP.

7. Compress the brake caliper piston.
    1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the piston is pushed completely into the caliper bore.
    3. Remove the C-clamp from the caliper.
8. Remove the brake caliper bracket mounting bolts.

NOTE: **Support the brake caliper with heavy mechanic's 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.**

cardiagn.com

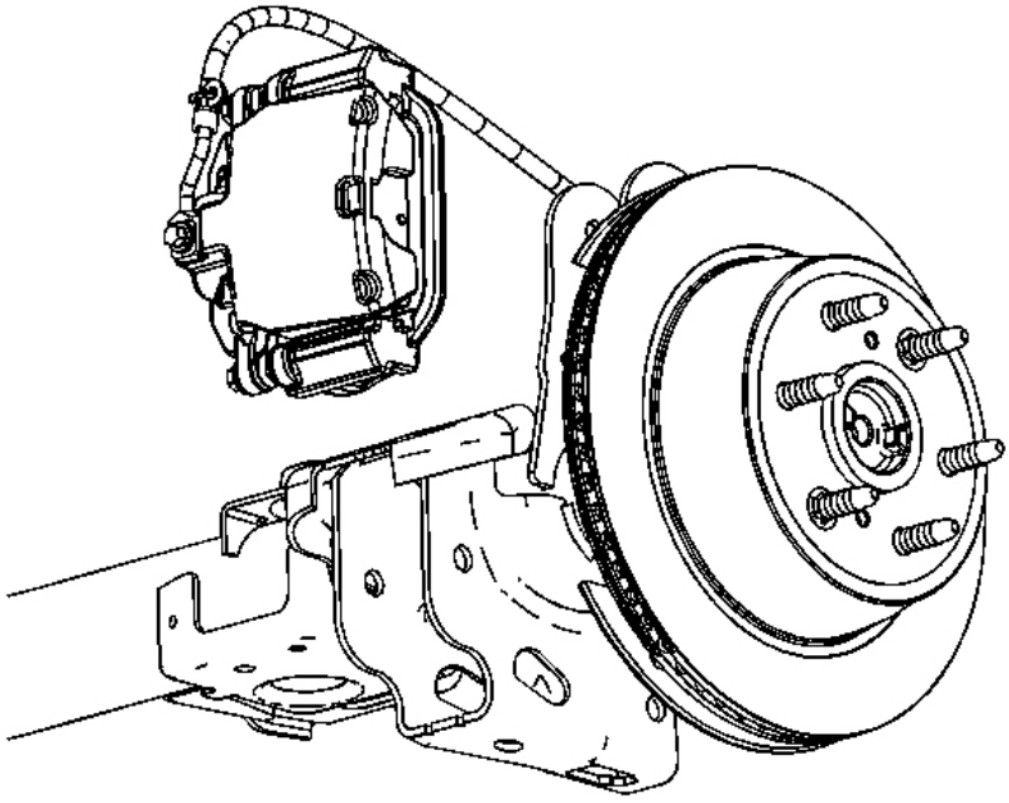


Fig. 136: View Of Brake Caliper & Bracket Assembly
Courtesy of GENERAL MOTORS CORP.

9. Remove the brake caliper and the bracket as an assembly and support with heavy mechanics wire or equivalent.
10. If installing the original brake rotor, mark the relationship of the rotor to the hub.
11. Adjust the park brake so that the adjuster is fully seated.

cardiagn.com

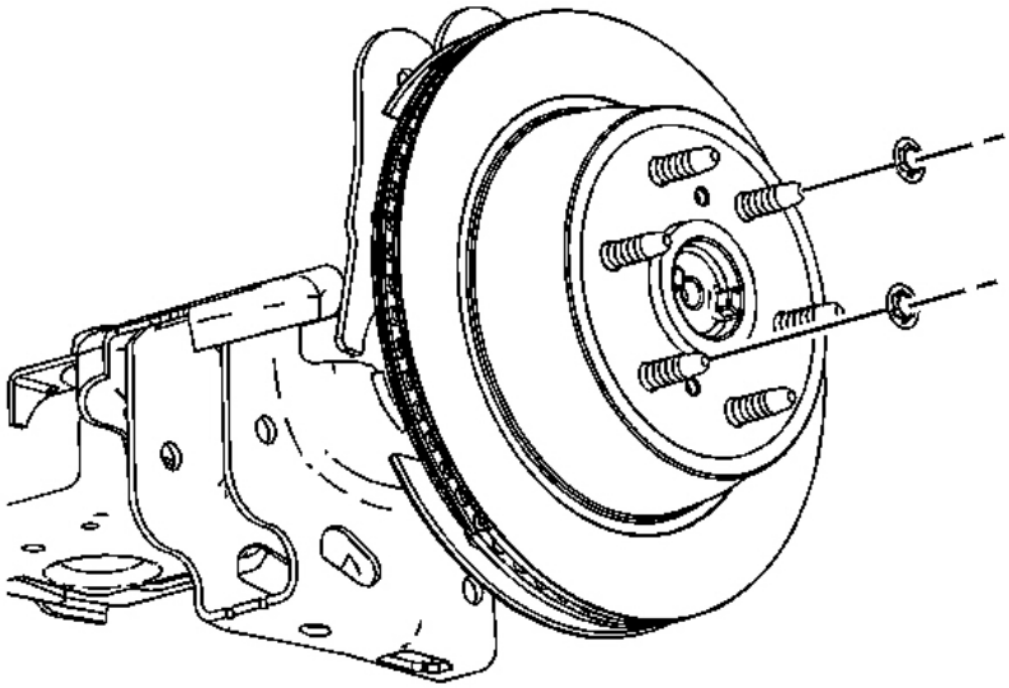


Fig. 137: View Of Push Nuts
Courtesy of GENERAL MOTORS CORP.

12. Remove the push nuts from the brake rotor if necessary.
13. Apply a small amount of penetrating oil to the wheel studs.
14. Install the lug nuts on the end of the wheel studs.
15. Using a dead blow hammer, tap the brake rotor between the wheel studs.
16. Remove the lug nuts from the wheel studs.

cardiagn.com

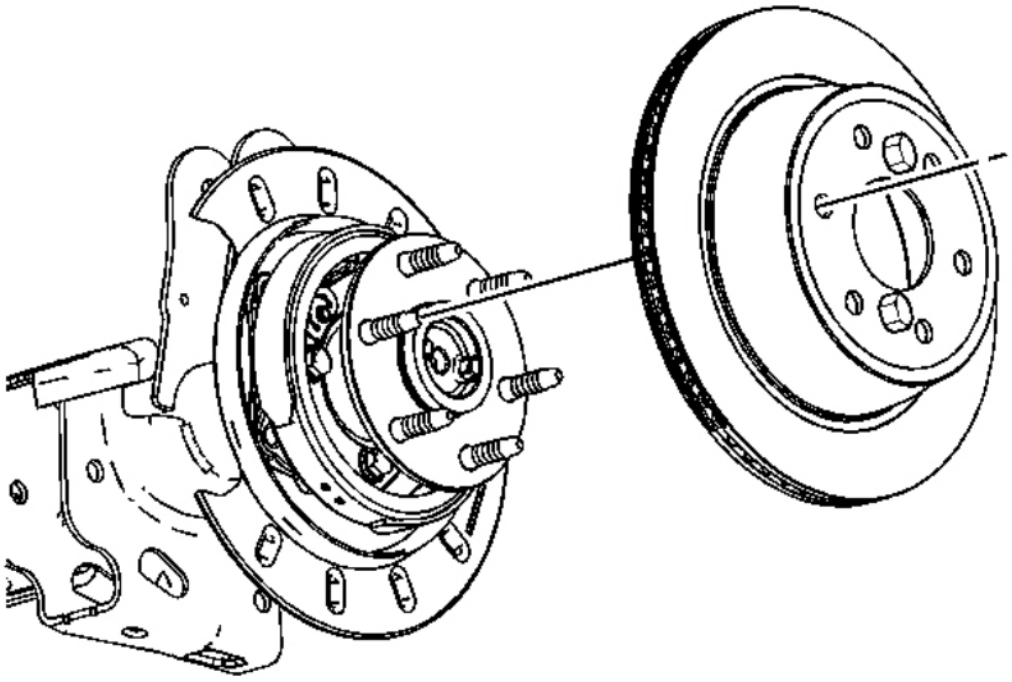


Fig. 138: View Of Brake Rotor
Courtesy of GENERAL MOTORS CORP.

17. Remove the brake rotor from the axle flange.

Installation Procedure

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

1. Using the **J 42450-A** , clean the rust and contaminants from the mating surface of the hub flange. See **Special Tools**.
2. Using the **J 41013** , clean all rust and contaminants from the inside diameter of the hat section of the brake rotor to prevent any foreign material from getting between the brake rotor and the hub flange. See **Special Tools**.

cardiagn.com

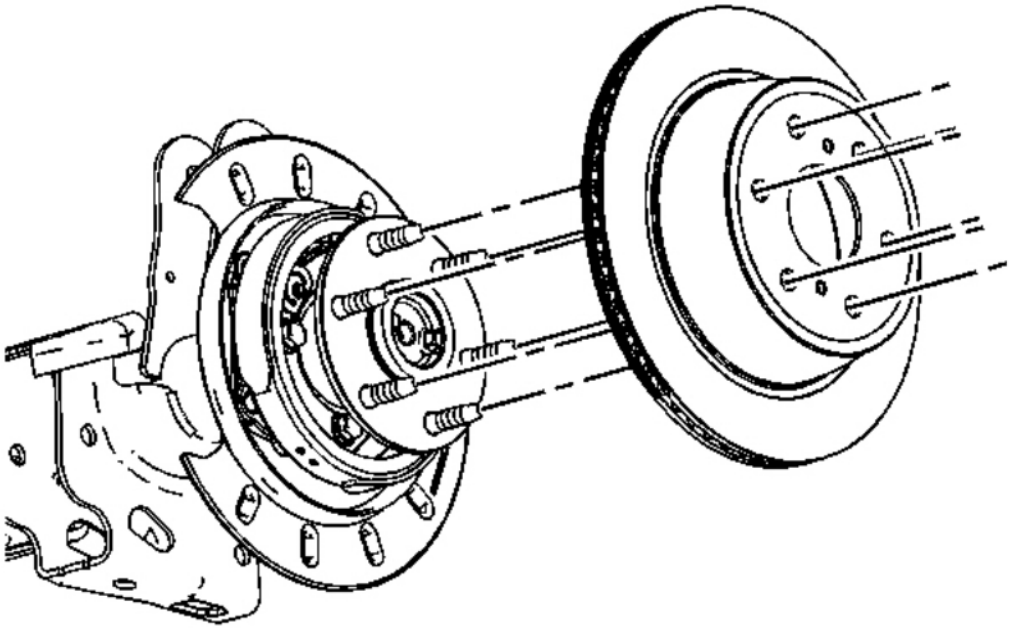


Fig. 139: View of Brake Rotor
Courtesy of GENERAL MOTORS CORP.

3. Align the rotor to its original position on the hub, if applicable, and install the rotor.
4. If the rotor was removed and installed as part of a brake system repair, measure the assembled lateral runout (LRO) of the rotor to ensure optimum performance of the disc brakes. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
5. If the rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.

cardiagn.com

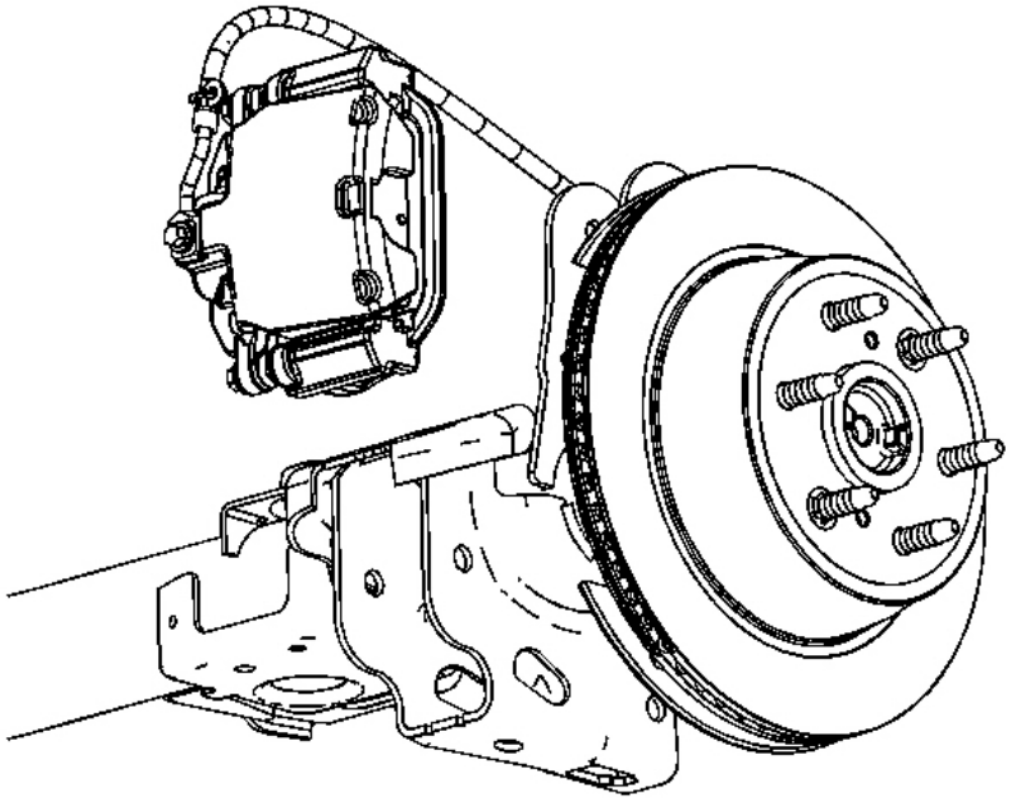


Fig. 140: View Of Caliper & Bracket Assembly
Courtesy of GENERAL MOTORS CORP.

6. Install the caliper and caliper bracket assembly.
7. Perform the following procedure before installing the brake caliper bracket mounting bolts.
    1. Remove all traces of the original adhesive patch from the threads of the bolts.
    2. Clean the threads of the bolts with denatured alcohol or equivalent and allow to dry.
    3. Apply threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolts.

NOTE: **Refer to Fastener Notice .**

8. Install the brake caliper bracket mounting bolts.

    Tighten: Tighten the bolts to 165 N.m (122 lb ft).

9. Adjust the park brake. Refer to **Park Brake Adjustment** .

cardiagn.com

10. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
11. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** .
12. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
13. Slowly release the brake pedal.
14. Wait 15 seconds, then repeat steps 12-13 until a firm pedal is obtained to properly seat the caliper pistons and pads.
15. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

REAR BRAKE ROTOR REPLACEMENT (2500 SERIES)

Tools Required

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

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

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

cardiagn.com

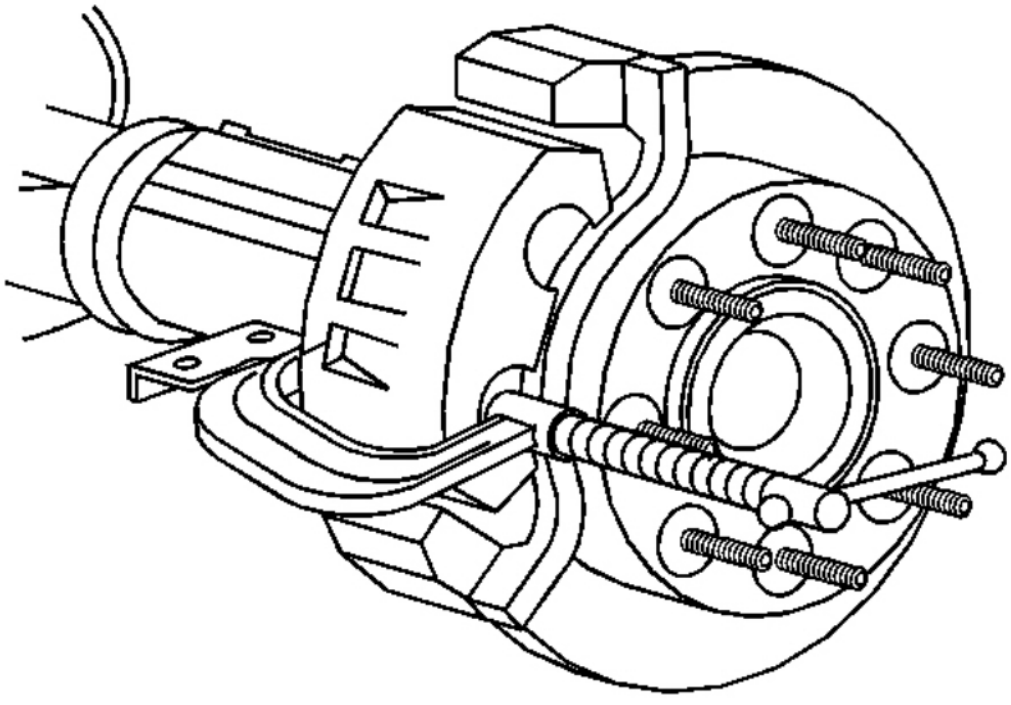


Fig. 141: C-Clamp & Rear Caliper
Courtesy of GENERAL MOTORS CORP.

8. Compress the brake caliper pistons.
    1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
    2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
    3. Remove the C-clamp from the caliper.

cardiagn.com

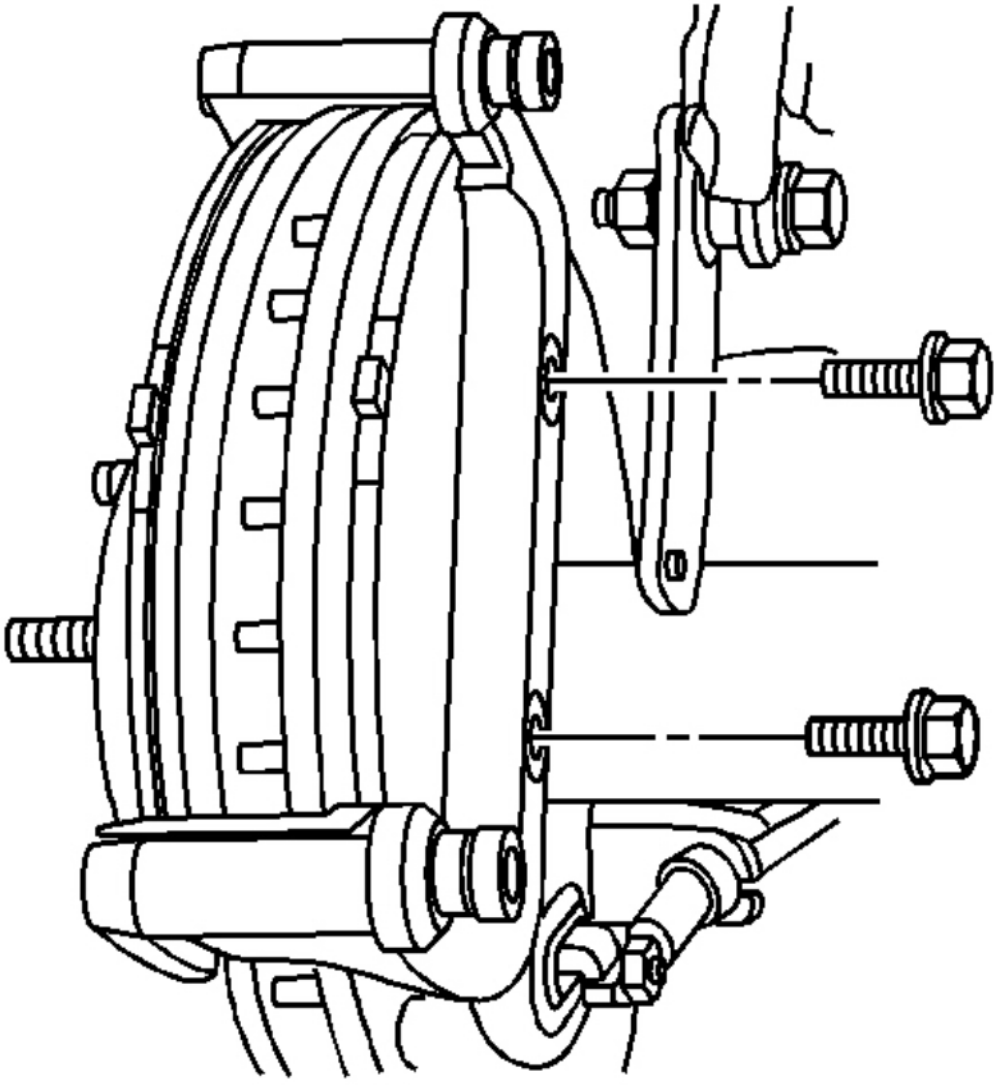


Fig. 142: View Of Brake Caliper Mounting Bracket Bolts -- Rear (W/NYS)
Courtesy of GENERAL MOTORS CORP.

NOTE: **Support the brake caliper with heavy mechanic's 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.**

cardiagn.com

9. Remove the brake caliper bracket bolts.
10. Remove the caliper and caliper bracket as an assembly and support with heavy mechanics wire or equivalent. DO NOT disconnect the hydraulic brake flexible hose from the caliper.

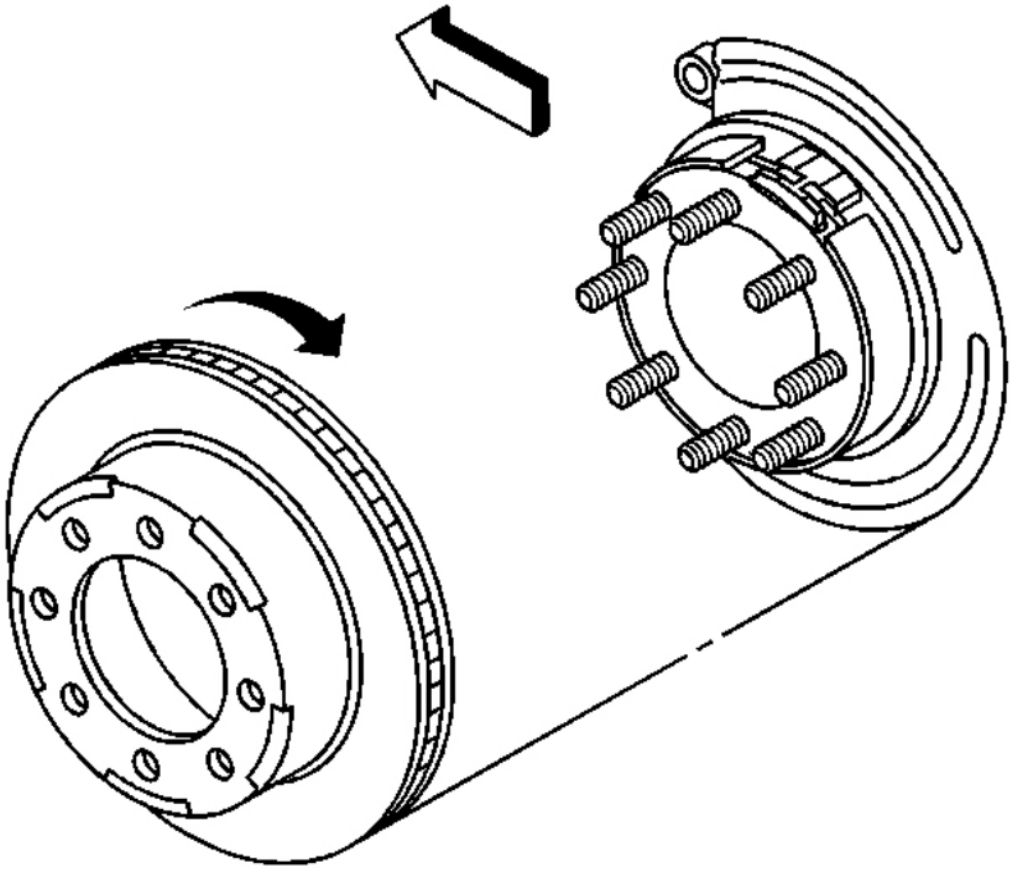


Fig. 143: View Of Rear Brake Rotor & Backing Plate Assembly (25 Series)
Courtesy of GENERAL MOTORS CORP.

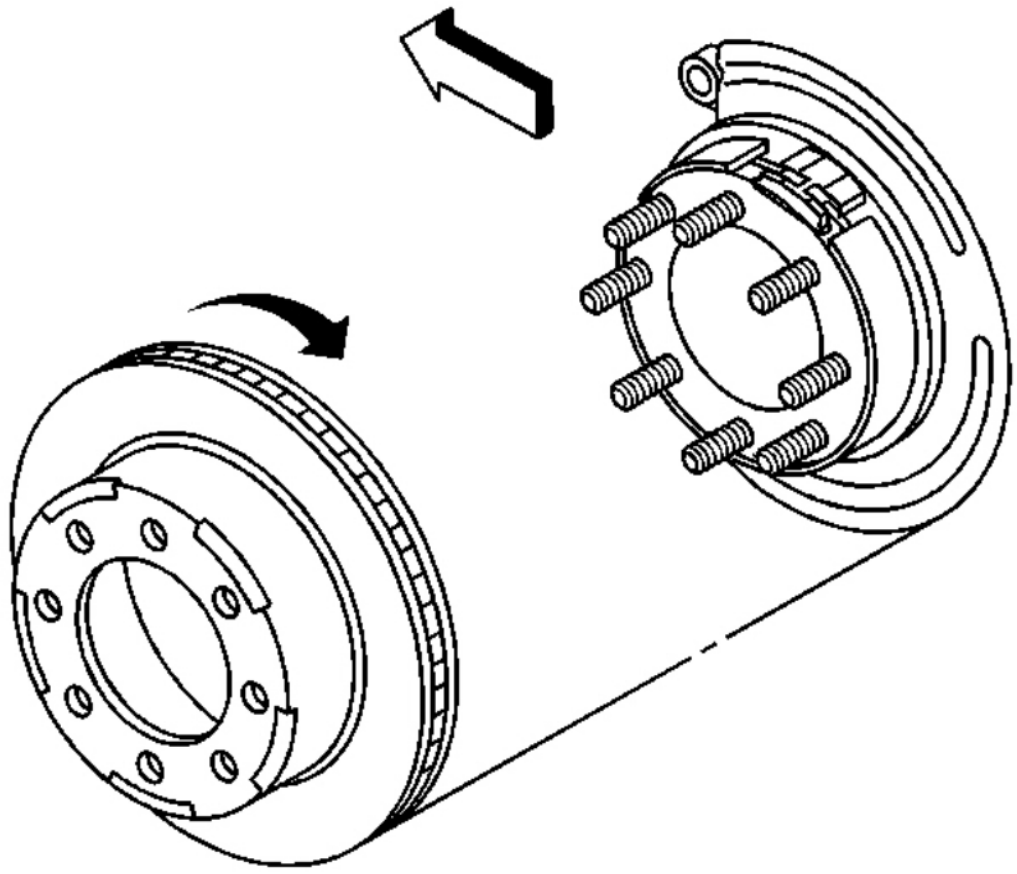
11. Remove the brake rotor retaining push nuts from the wheel studs, if applicable.
12. It may be necessary to strike the end of the hub or the rotor with a deadblow hammer to separate the rotor from the hub.
13. Remove the rotor by slowly turning the rotor while pulling the rotor away from the axle.

Installation Procedure

cardiagn.com

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

1. Use the **J 42450-A** to clean all rust and contaminants from the mating surface of the hub flange. See **Special Tools**.
2. Use the **J 41013** to clean all rust and contaminants from the inside diameter of the hat section of the brake rotor to prevent any foreign material from getting between the brake rotor and the hub flange. See **Special Tools**.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure that there are no foreign particles or debris remaining.
4. Align the rotor to its original position on the hub, if applicable.



cardiagn.com

Fig. 144: View Of Rear Brake Rotor & Backing Plate Assembly (25 Series)
Courtesy of GENERAL MOTORS CORP.

5. Install the rotor by slowly turning the rotor while pushing the rotor towards the axle.
6. If the rotor was removed and installed as part of a brake system repair, measure the assembled lateral runout (LRO) of the rotor to ensure optimum performance of the disc brakes. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
7. If the rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. Refer to **Brake Rotor Assembled Lateral Runout Correction**.

cardiagn.com

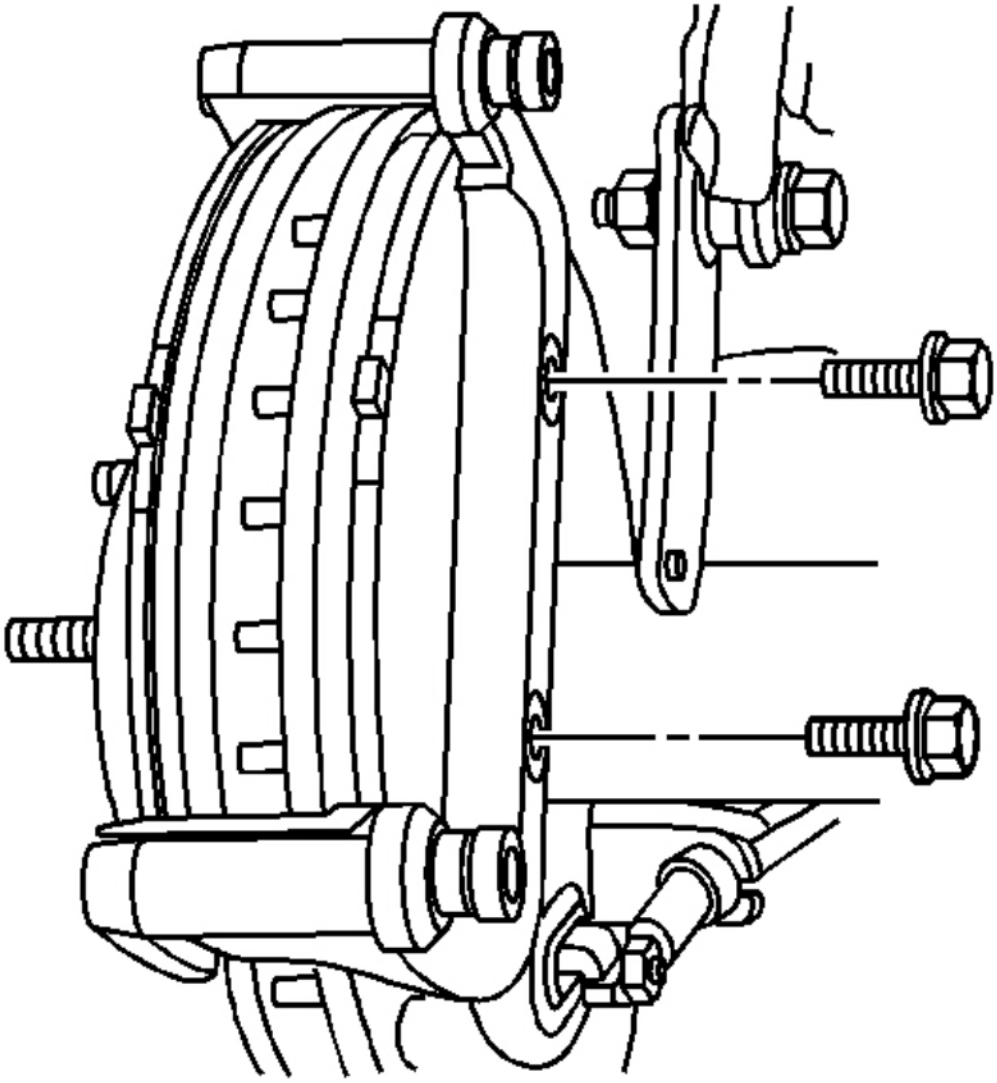


Fig. 145: View Of Brake Caliper Mounting Bracket Bolts -- Rear (W/NYS)
Courtesy of GENERAL MOTORS CORP.

8. Install the caliper and caliper bracket as an assembly.
9. Perform the following procedure before installing the brake caliper bracket bolts.
    1. Remove all traces of the original adhesive patch.
    2. Clean the threads of the bolts with brake parts cleaner or the equivalent and allow to dry.
    3. Apply threadlocker GM P/N 12345493 (Canadian P/N 10953488) to the threads of the bolts.

cardiagn.com

NOTE: **Refer to Fastener Notice .**

10. Install the brake caliper bracket bolts.

    Tighten: Tighten the bolts to 200 N.m (148 lb ft).

11. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
12. Lower the vehicle.
13. With the engine OFF gradually apply the brake pedal to approximately 2/3 of its travel distance.
14. Slowly release the brake pedal.
15. Wait 15 seconds then repeat steps 13-14 until a firm pedal is obtained. This will properly seat the caliper pistons and pads.
16. Fill the master cylinder reservoir to the proper level with clean brake fluid, if necessary. Refer to **Master Cylinder Reservoir Filling** .

DISC BRAKE SPLASH SHIELD REPLACEMENT - FRONT (1500 SERIES)

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

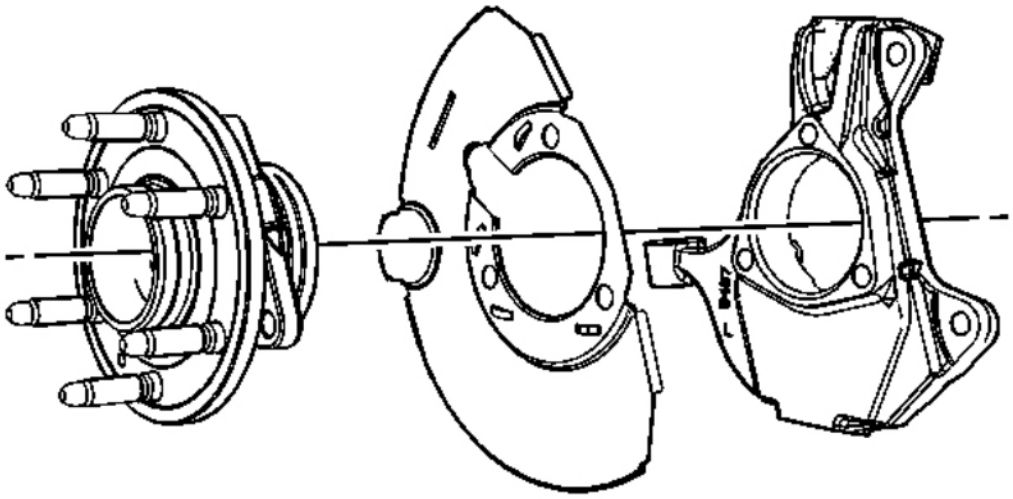


Fig. 146: View Of Wheel Hub & Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

cardiagn.com

1. Remove the wheel hub and bearing assembly. Refer to **Wheel Hub, Bearing, and Seal Replacement (1500 Series)** or **Wheel Hub, Bearing, and Seal Replacement (2500 Series)** .

IMPORTANT: Note the orientation of the disc brake splash shield for proper assembly.

2. Remove the splash shield from the steering knuckle.

Installation Procedure

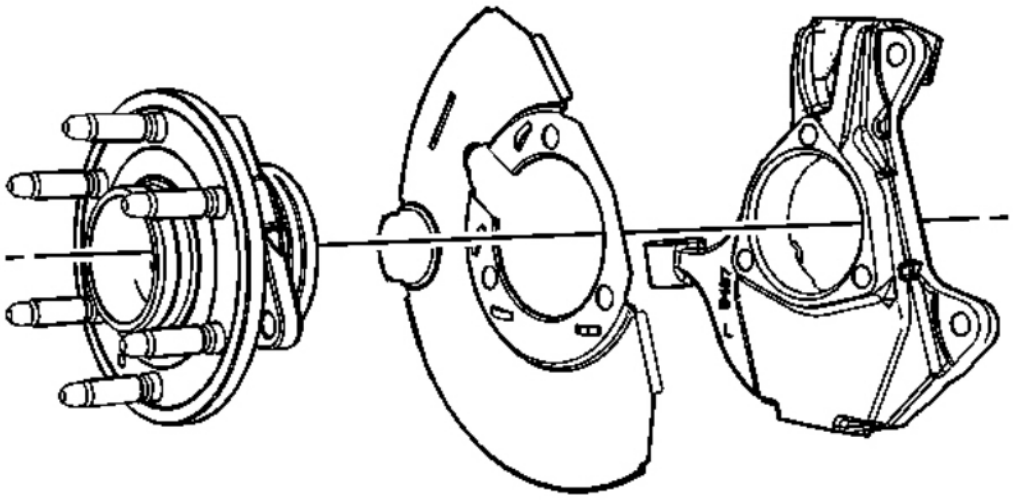


Fig. 147: View Of Wheel Hub & Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Align the relief in the forward edge of the disc brake splash shield with the steering arm on the steering knuckle.

1. Install the splash shield to the steering knuckle.
2. Install the wheel hub and bearing assembly. Refer to **Wheel Hub, Bearing, and Seal Replacement (1500 Series)** or **Wheel Hub, Bearing, and Seal Replacement (2500 Series)** .

DISC BRAKE SPLASH SHIELD REPLACEMENT - FRONT (2500 SERIES)

CAUTION: Refer to Brake Dust Caution .

cardiagn.com

Removal Procedure

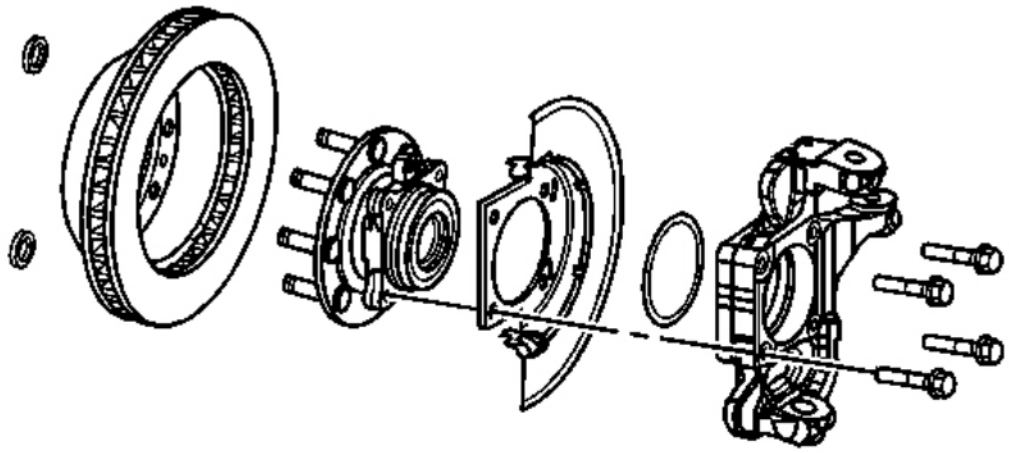


Fig. 148: Splash Shield (25/35 Series)
Courtesy of GENERAL MOTORS CORP.

1. Remove the hub and bearing assembly. Refer to **Wheel Hub, Bearing, and Seal Replacement (1500 Series)** or **Wheel Hub, Bearing, and Seal Replacement (2500 Series)** .
2. Remove the splash shield.

Installation Procedure

cardiagn.com

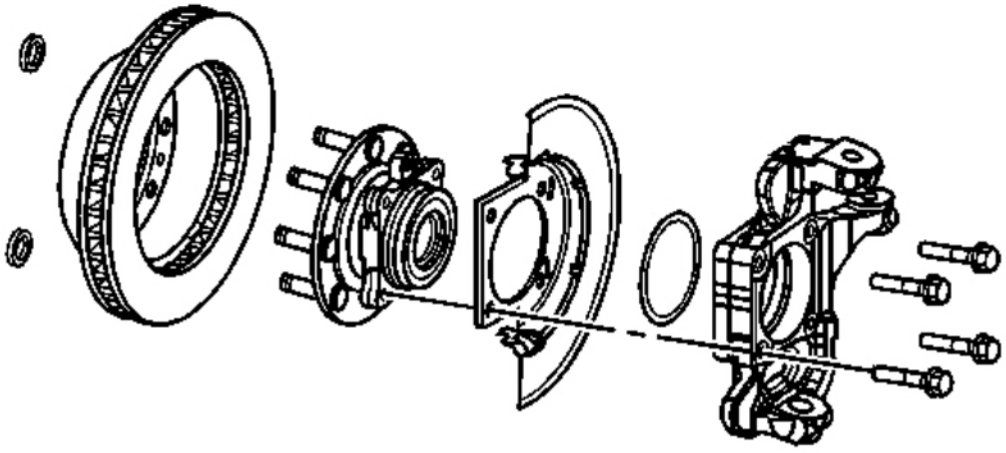


Fig. 149: Splash Shield (25/35 Series)
Courtesy of GENERAL MOTORS CORP.

1. Install the splash shield.
2. Install the hub and bearing assembly. Refer to **Wheel Hub, Bearing, and Seal Replacement (1500 Series)** or **Wheel Hub, Bearing, and Seal Replacement (2500 Series)** .

DISC BRAKE BACKING PLATE REPLACEMENT - REAR

CAUTION: Refer to Brake Dust Caution .

Removal Procedure

cardiagn.com

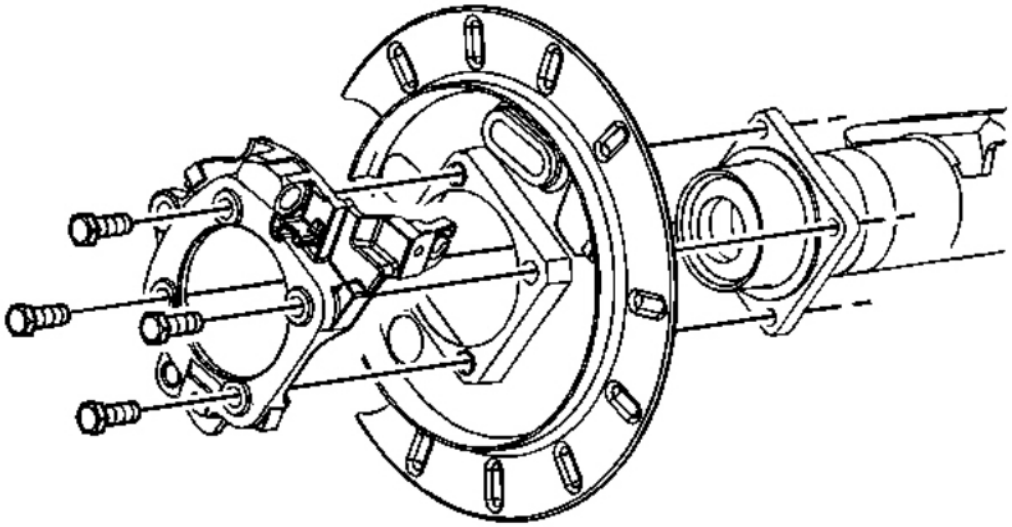


Fig. 150: Park Brake Backing Plate & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the park brake backing plate. Refer to **Park Brake Backing Plate Replacement** .
2. Remove the disc brake backing plate from the axle housing flange.

Installation Procedure

cardiagn.com

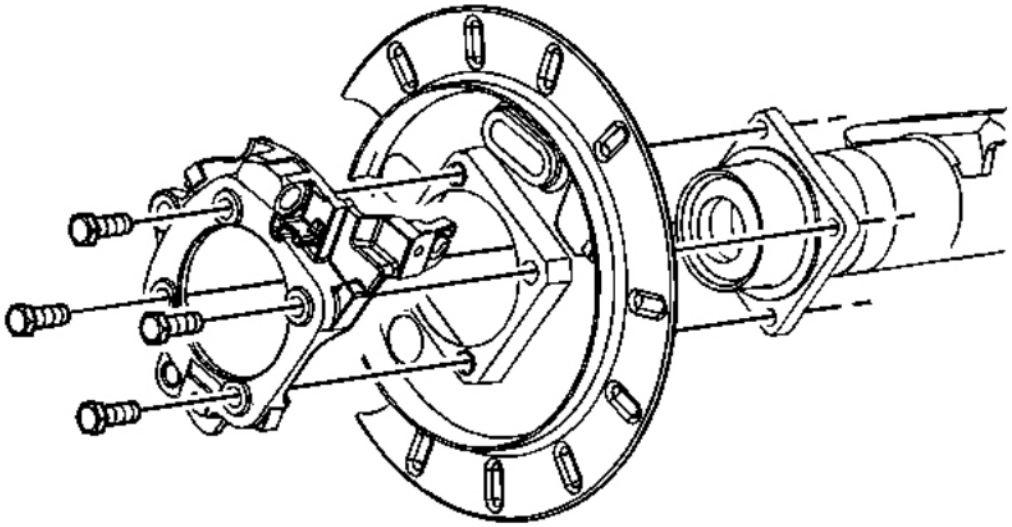


Fig. 151: Park Brake Backing Plate & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the disc brake backing plate to the axle housing flange.
2. Install the park brake backing plate. Refer to **Park Brake Backing Plate Replacement** .

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION

IMPORTANT:

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

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

- **Brake Rotor Assembled Lateral Runout Correction - Indexing**

  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

cardiagn.com

best possible match of high spots to low spots between related components.

- **Brake Rotor Assembled Lateral Runout Correction - On Vehicle Lathe**

  The on-vehicle brake lathe method is used to bring the LRO to within specifications through compensating for LRO while refinishing the brake rotor.

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

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - INDEXING

Tools Required

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

CAUTION: Refer to Brake Dust Caution .

IMPORTANT:

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

cardiagn.com

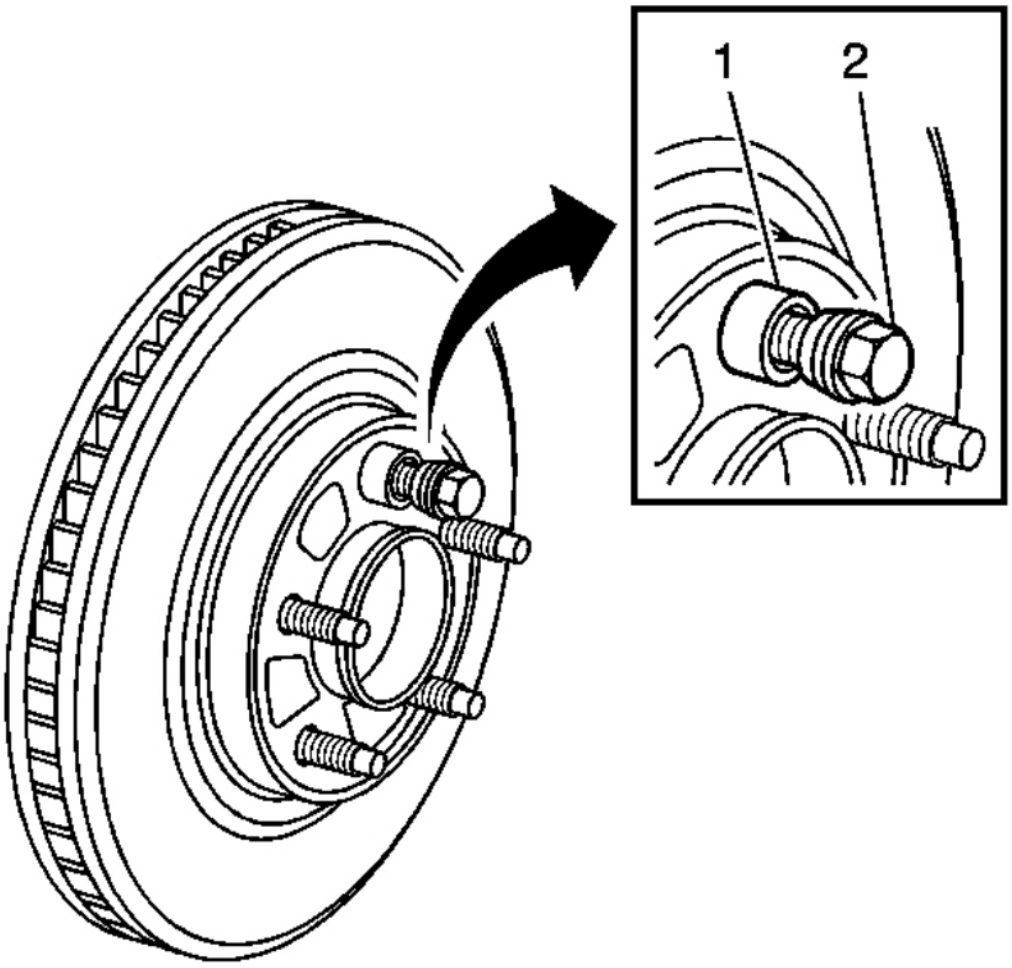


Fig. 152: Identifying J 45101-100 & Lug Nut
Courtesy of GENERAL MOTORS CORP.

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

cardiagn.com

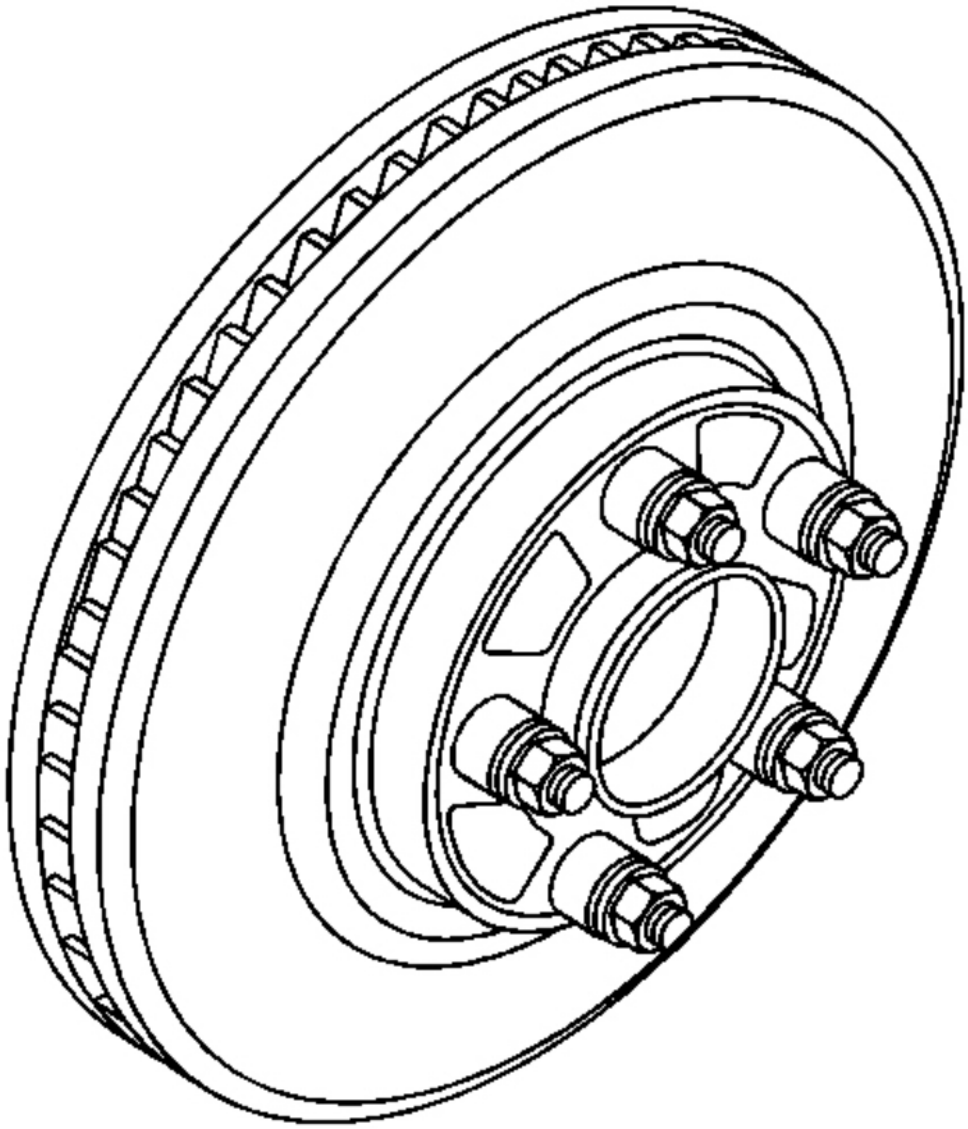


Fig. 153: Identifying Brake Rotor
Courtesy of GENERAL MOTORS CORP.

6. Install the remaining **J 45101-100** and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern. See **Special Tools**.
7. Using the **J 39544-KIT** , or equivalent, tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. See **Special Tools**. Refer to **Tire and Wheel Removal and Installation** .

cardiagn.com

8. Measure the assembled LRO of the brake rotor. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
9. Compare the amount of change between this measurement and the original measurement.
10. If this measurement is within specifications, proceed to step 14.
11. If this measurement still exceeds specifications, repeat steps 1-9 until the best assembled LRO measurement is obtained.
12. Matchmark the final location of the rotor to the wheel studs if the orientation is different than it was originally.
13. If the brake rotor assembled LRO measurement still exceeds the maximum allowable specification, refer to **Brake Rotor Assembled Lateral Runout Correction**.
14. If the brake rotor assembled LRO is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **J 45101-100** and the lug nuts. See **Special Tools**.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - ON VEHICLE LATHE

Tools Required

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

CAUTION: Refer to Brake Dust Caution .

IMPORTANT:

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

1. Ensure that the caliper and caliper bracket that are already being supported, are clear from contacting any rotating components, such as the brake rotor.
2. Remove the **J 45101-100** and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction procedure. See **Special Tools**.
3. Inspect the mounting surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles or debris remaining.
4. Set up the lathe, following the manufacturer's instructions.
5. Refinish the brake rotor, following the brake lathe manufacturer's instructions.
6. After each successive cut, inspect the brake rotor thickness. Refer to **Brake Rotor Thickness Measurement**.

cardiagn.com

7. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced. After replacing the rotor, proceed to step 10.
8. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
    1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish
    2. Using moderate pressure, apply the non-directional finish:
        - If the lathe is equipped with a non-directional finishing tool, apply the finish with 120 grit aluminum oxide sandpaper
        - If the lathe is not equipped with a non-directional finishing tool, apply the finish with a sanding block and 150 grit aluminum oxide sandpaper
    3. After applying a non-directional finish, clean each friction surface of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner
9. Remove the lathe from the vehicle.
10. Measure the assembled LRO of the brake rotor. Refer to **Brake Rotor Assembled Lateral Runout Measurement**.
11. If the brake rotor assembled LRO measurement still exceeds the maximum allowable specification, refer to **Brake Rotor Assembled Lateral Runout Correction**.
12. If the brake rotor assembled LRO is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **J 45101-100** and the lug nuts. See **Special Tools**.

BRAKE ROTOR REFINISHING

Tools Required

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

CAUTION: Refer to Brake Dust Caution .

IMPORTANT:

- **The disc brake rotors do not require refinishing as part of routine brake system service. New disc brake rotors do not require refinishing.**

  Do not refinish disc brake rotors in an attempt to correct the following conditions:

    - **Brake system noise - squeal, growl, groan**
    - **Uneven and/or premature disc brake pad wear**
    - **Superficial or cosmetic corrosion/rust of the disc brake rotor friction surface**

cardiagn.com

  - **Scoring of the disc brake rotor friction surface less than the maximum allowable specification**
- **Before refinishing a brake rotor, the rotor MUST first be checked for adequate thickness to allow the rotor to be refinished and remain above the minimum allowable thickness after refinish specification. Refer to Brake Rotor Thickness Measurement.**

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

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

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

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

1. Using the **J 42450-A** , thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange. See **Special Tools**.
2. Using the **J 41013** , thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor. See **Special Tools**.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure that there are no foreign particles or debris remaining.
4. Mount the brake rotor to the brake lathe according to the lathe manufacturer's instructions, ensuring that all mounting attachments and adapters are clean and free of debris.
5. Ensure that any vibration dampening attachments are securely in place.
6. With the brake lathe running, slowly bring in the cutting tools until they just contact the brake rotor

cardiagn.com

friction surfaces.

7. Observe the witness mark on the brake rotor. If the witness mark extends approximately three-quarters or more of the way around the brake rotor friction surface on each side, the brake rotor is properly mounted to the lathe.
8. If the witness mark does not extend three-quarters or more of the way around the brake rotor, re-mount the rotor to the lathe.
9. Following the brake lathe manufacturer's instructions, refinish the brake rotor.
10. After each successive cut, inspect the brake rotor thickness. Refer to **Brake Rotor Thickness Measurement**.
11. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced.
12. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
    1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish
    2. Using moderate pressure, apply the non-directional finish:
        - If the lathe is equipped with a non-directional finishing tool, apply the finish with 120 grit aluminum oxide sandpaper
        - If the lathe is not equipped with a non-directional finishing tool, apply the finish with a sanding block and 150 grit aluminum oxide sandpaper
    3. After applying a non-directional finish, clean each friction surface of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner
13. Remove the brake rotor from the brake lathe.
14. Measure the assembled lateral runout (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

cardiagn.com

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.

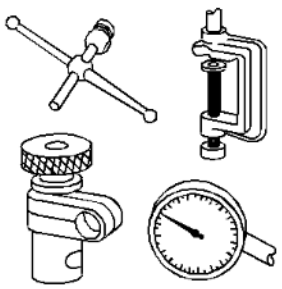
System Operation

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.

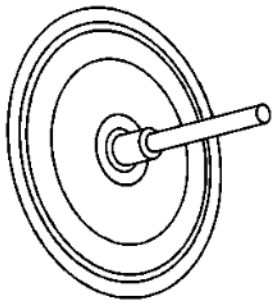
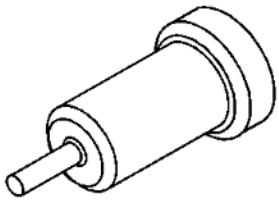
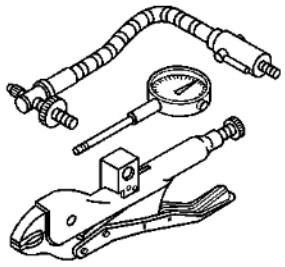
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

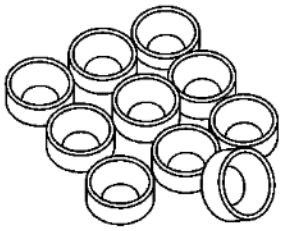
Special Tools

Illustration	Tool Number/Description
	J 8001 Dial Indicator Set
	J 39544-KIT Torque-Limiting Socket Set

cardiagn.com

	
	J 41013 Rotor Resurfacing Kit
	J 42450-A Wheel Hub Resurfacing Kit
	J 45101 Hub and Wheel Runout Gage

cardiagn.com

	J 45101-100 Conical Brake Rotor Washers

cardiagn.com