Fastener Tightening Specifications

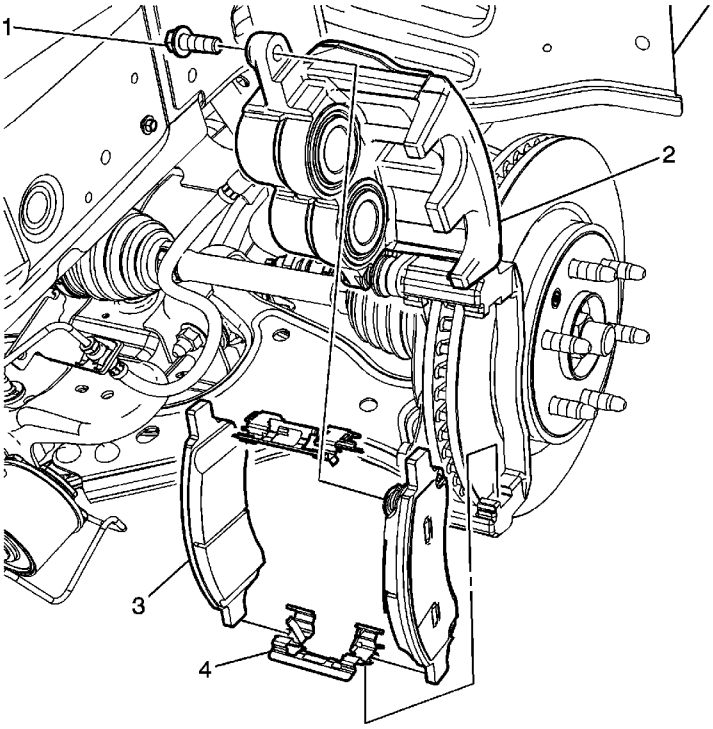
Application	Specification	
	Metric	English
Brake Caliper Bleed Valve - Front	13 N·m	115 lb in
Brake Caliper Bleed Valve - Rear	7 N·m	62 lb in
Brake Caliper Bracket Bolts - Front	175 N·m	129 lb ft
Brake Caliper Bracket Bolts - Rear	205 N·m	151 lb ft
Brake Caliper Guide Pin Bolts - Front Tighten the guide pin bolt closest to the bleed valve first.	64 N·m	47 lb ft
Brake Caliper Guide Pin Bolts - Rear Tighten the guide pin bolt closest to the bleed valve first.	27 N·m	20 lb ft
Brake Hose Fitting Bolt - Front	40 N·m	30 lb ft
Brake Hose Fitting Bolt - Rear	50 N·m	37 lb ft
Brake Rotor Retention Screw - Front	12 N·m	106 lb in
Brake Rotor Retention Screw - Rear	12 N·m	106 lb in

Disc Brake Component Specifications

General Specifications

Application	Specification	
	Metric	English
Front Brakes		
Rotor Minimum Thickness *	27.5 mm	1.08 in
Rotor Thickness (new)	29.0 mm	1.14 in
Rotor Maximum Allowable Assembled Lateral Runout	0.06 mm	0.002 in
Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
Rotor Maximum Allowable Thickness Variation	0.025 mm	0.001 in
Rear Brakes		
Rotor Minimum Thickness *	18.4 mm	0.72 in
Rotor Thickness (new)	20 mm	0.79 in
Rotor Maximum Allowable Assembled Lateral Runout	0.06 mm	0.002 in
Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
Rotor Maximum Allowable Thickness Variation	0.025 mm	0.001 in
* All brake rotors have a minimum thickness dimension cast into them. Replace any rotor that is worn or machined below this specification.		

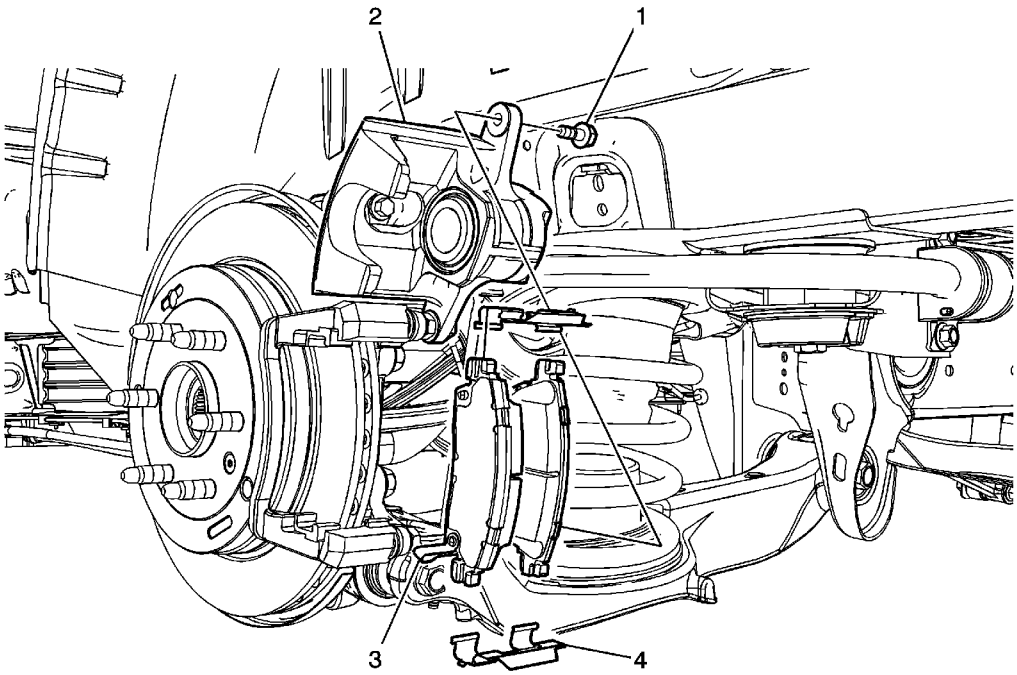
Front Disc Brake Pads Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 1. Inspect the fluid level in the brake master cylinder reservoir. 2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, no brake fluid needs to be removed before proceeding. 3. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove brake fluid to the midway point before proceeding. 4. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 5. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.
	Brake Caliper Guide Pin Bolt **Caution:** Refer to Fastener Caution in the Preface section. **Procedure**

1	1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools ONLY. 2. 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 contact the brake caliper. Allowing the open end wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. Ensure the brake caliper guide pin seal is fully seated in the groove of the brake caliper guide pin and the guide pin slides freely in caliper bracket bore. **Tighten** 64 N·m (47 lb ft)
2	Brake Caliper **Procedure** 1. Install 2 large C-clamps over the top of the caliper housing and against the back of the outboard brake pad. 2. Slowly and evenly tighten the C-clamps until the caliper pistons are completely retracted into the brake caliper bores. 3. Remove the C-clamps. 4. Without disconnecting the brake hose, pivot the brake caliper upward. 5. Support the brake caliper with heavy mechanics wire or equivalent.
3	Disc Brake Pad (Qty: 2) **Tip** Note the location of the inner and outer brake pads to aid installation.
4	Brake Pad Shim (Qty: 2) **Procedure** 1. Discard the brake pad shims. 2. Thoroughly clean the brake pad hardware mating surfaces of the caliper bracket of any debris and corrosion. 3. Apply a very thin coating of high temperature silicone brake lubricant to the pad hardware mating surfaces of the caliper bracket only. 4. After the installation is complete and with the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance. 5. Slowly release the brake pedal. 6. Wait 15 seconds, then repeat steps 4-5 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads. 7. Fill the master cylinder to the proper level. Refer to Master Cylinder Reservoir Filling. 8. Burnish the brake pads and rotors. Refer to Brake Pad and Rotor Burnishing.

Rear Disc Brake Pads Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 1. Inspect the fluid level in the brake master cylinder reservoir. 2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, no brake fluid needs to be removed before proceeding. 3. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove brake fluid to the midway point before proceeding. 4. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 5. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.
	Brake Caliper Guide Pin Bolt **Caution:** Refer to Fastener Caution in the Preface section. **Procedure**

1	1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools ONLY. 2. 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 contact the brake caliper. Allowing the open end wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. Ensure the brake caliper guide pin seal is fully seated in the groove of the brake caliper guide pin and the guide pin slides freely in caliper bracket bore. **Tighten** 27 N·m (20 lb ft)
2	Brake Caliper **Procedure** 1. Without disconnecting the brake hose, pivot the brake caliper upward. 2. Support the brake caliper with heavy mechanics wire or equivalent. 3. Using a suitable tool, retract the brake caliper piston into the brake caliper bore.
3	Disc Brake Pad (Qty: 2)
4	Brake Pad Shim (Qty: 2) **Procedure** 1. Thoroughly clean the brake pad hardware mating surfaces of the caliper bracket of any debris and corrosion. 2. Apply a very thin coating of high temperature silicone brake lubricant to the pad hardware mating surfaces of the caliper bracket only. 3. After the installation is complete and with the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance. 4. Slowly release the brake pedal. 5. Wait 15 seconds, then repeat steps 3-5 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads. 6. Fill the master cylinder to the proper level. Refer to Master Cylinder Reservoir Filling. 7. Burnish the brake pads and rotors. Refer to Brake Pad and Rotor Burnishing.

Brake Pad and Rotor Burnishing

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

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

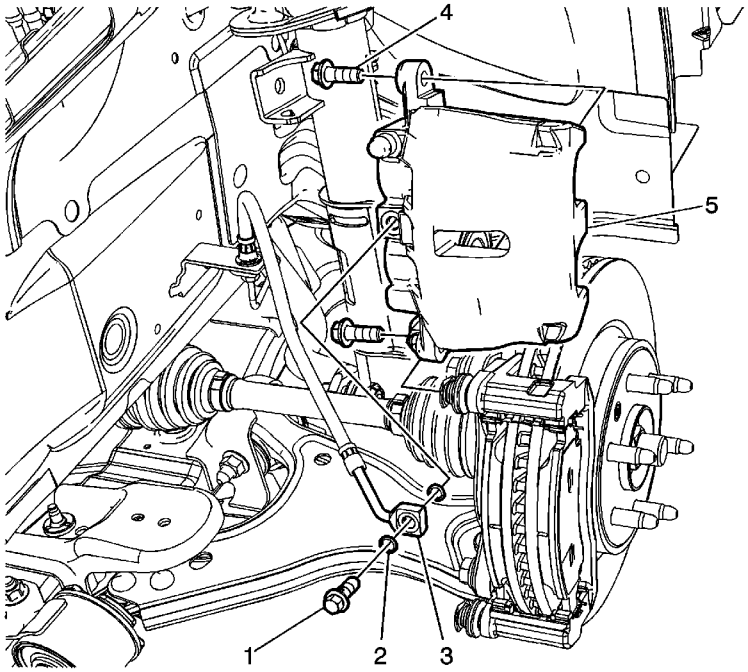
This procedure should be performed whenever the disc brake rotors have been refinished or replaced, and/or whenever the disc brake pads have been replaced.

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

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

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

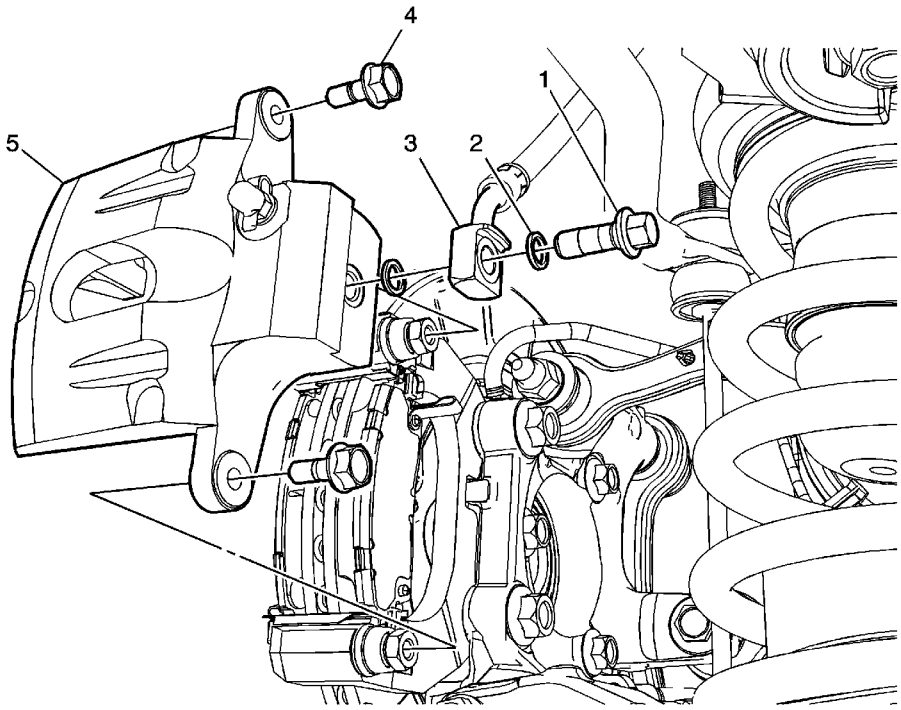
Front Brake Caliper Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Warning:** Refer to Brake Fluid Irritant Warning in the Preface section. **Preliminary Procedures** 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.
1	Brake Hose Fitting Bolt **Caution:** Refer to Fastener Caution in the Preface section. **Tighten** 40 N·m (30 lb ft)
2	Brake Hose Fitting Gasket (Qty: 2) **Procedure**

	Discard the brake hose fitting gaskets and install new gaskets.
3	Brake Hose Fitting **Tip** Plug the brake hose fitting to prevent brake fluid loss and contamination.
4	Brake Caliper Guide Pin Bolt (Qty: 2) **Procedure** 1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools ONLY. 2. 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 contact the brake caliper. Allowing the open end wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. Ensure the brake caliper guide pin seal is fully seated in the groove of the brake caliper guide pin and the guide pin slides freely in caliper bracket bore. 4. When installing the brake caliper guide pin bolts, tighten the guide pin bolt closest to the bleed valve first. **Tighten** 64 N·m (47 lb ft)
5	Brake Caliper **Procedure** 1. Bleed the hydraulic brake system. Refer to Hydraulic Brake System Bleeding. 2. After the installation is complete and with the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance. 3. Slowly release the brake pedal. 4. Wait 15 seconds, then repeat steps 2-3 until a firm brake pedal is obtained. This will properly seat the brake caliper piston and the brake pads. 5. Fill the master cylinder to the proper level. Refer to Master Cylinder Reservoir Filling.

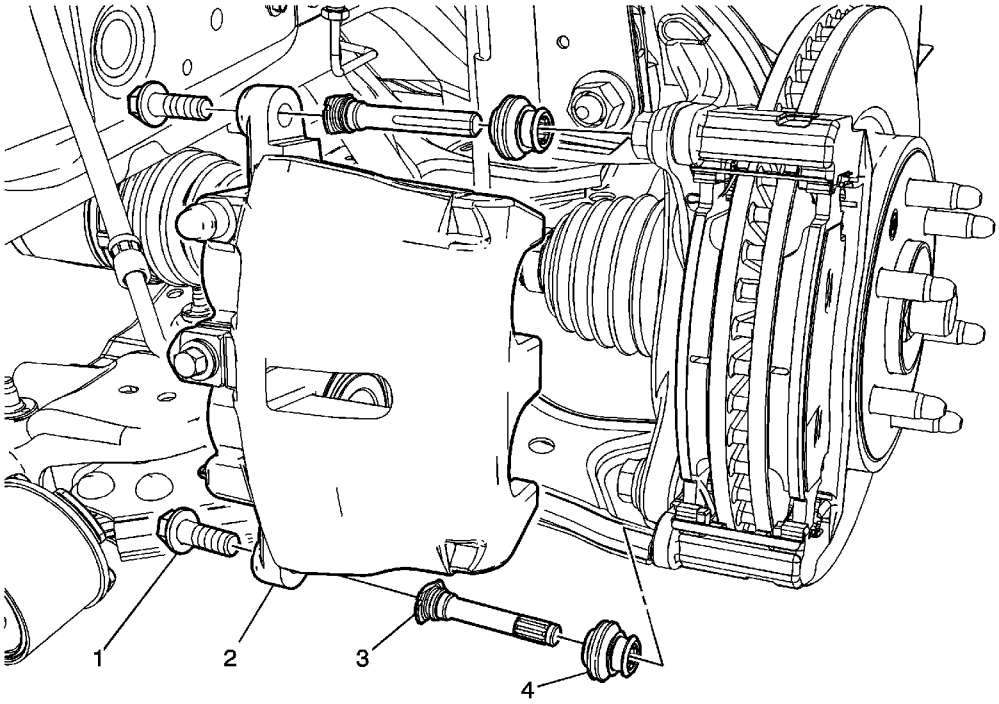
Rear Brake Caliper Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Warning:** Refer to Brake Fluid Irritant Warning in the Preface section. **Preliminary Procedures** 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.
1	Brake Hose Fitting Bolt **Caution:** Refer to Fastener Caution in the Preface section. **Tighten** 50 N·m (37 lb ft)
2	Brake Hose Fitting Gasket (Qty: 2) **Procedure**

	Discard the brake hose fitting gaskets and install new gaskets.
3	Brake Hose Fitting **Tip** Plug the brake hose fitting to prevent brake fluid loss and contamination.
4	Brake Caliper Guide Pin Bolt (Qty: 2) **Procedure** 1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools ONLY. 2. 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 contact the brake caliper. Allowing the open end wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. Ensure the brake caliper guide pin seal is fully seated in the groove of the brake caliper guide pin and the guide pin slides freely in caliper bracket bore. 4. When installing the brake caliper guide pin bolts, tighten the guide pin bolt closest to the bleed valve first. **Tighten** 27 N·m (20 lb ft)
5	Brake Caliper **Procedure** 1. Bleed the hydraulic brake system. Refer to Hydraulic Brake System Bleeding. 2. After the installation is complete and with the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance. 3. Slowly release the brake pedal. 4. Wait 15 seconds, then repeat steps 2-3 until a firm brake pedal is obtained. This will properly seat the brake caliper piston and the brake pads. 5. Fill the master cylinder to the proper level. Refer to Master Cylinder Reservoir Filling.

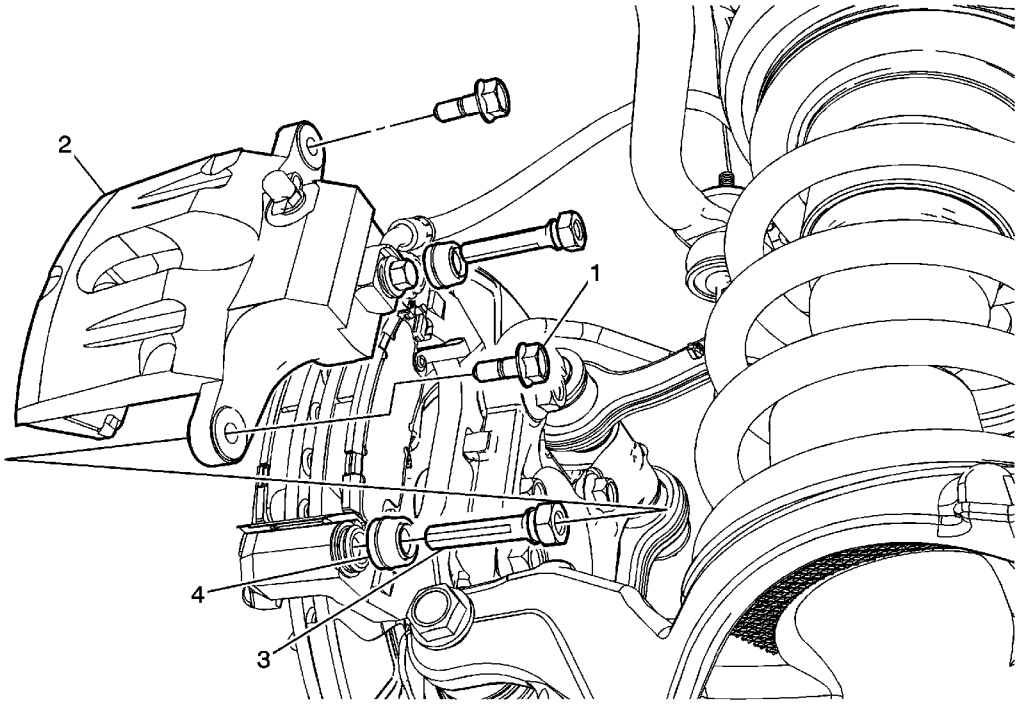
Front Disc Brake Hardware Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 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.
1	Brake Caliper Guide Pin Bolt (Qty: 2) **Caution:** Refer to Fastener Caution in the Preface section. **Procedure** 1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools only. 2. 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 contact the brake caliper. Allowing the open end

	wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. When installing the brake caliper guide pin bolts, tighten the guide pin bolt closest to the bleed valve first. **Tighten** 64 N·m (47 lb ft)
2	Brake Caliper **Procedure** Without disconnecting the brake caliper hose, support the brake caliper with heavy mechanics wire or equivalent.
3	Brake Caliper Guide Pin (Qty: 2) **Procedure** 1. Note the location of the brake caliper guide pins. The brake caliper guide pin with the bushing must be installed in the lower brake caliper bracket bore. 2. Apply a thin coating of high temperature silicone brake lubricant to the brake caliper guide pins and the guide pin bores of the brake caliper bracket.
4	Brake Caliper Guide Pin Seal (Qty: 2) **Procedure** 1. Apply a thin coating of high temperature silicone brake lubricant to the brake caliper guide pin seals. 2. Ensure the brake caliper guide pin seal is fully seated in the groove of the brake caliper guide pin and the guide pin slides freely in the brake caliper bracket bore.

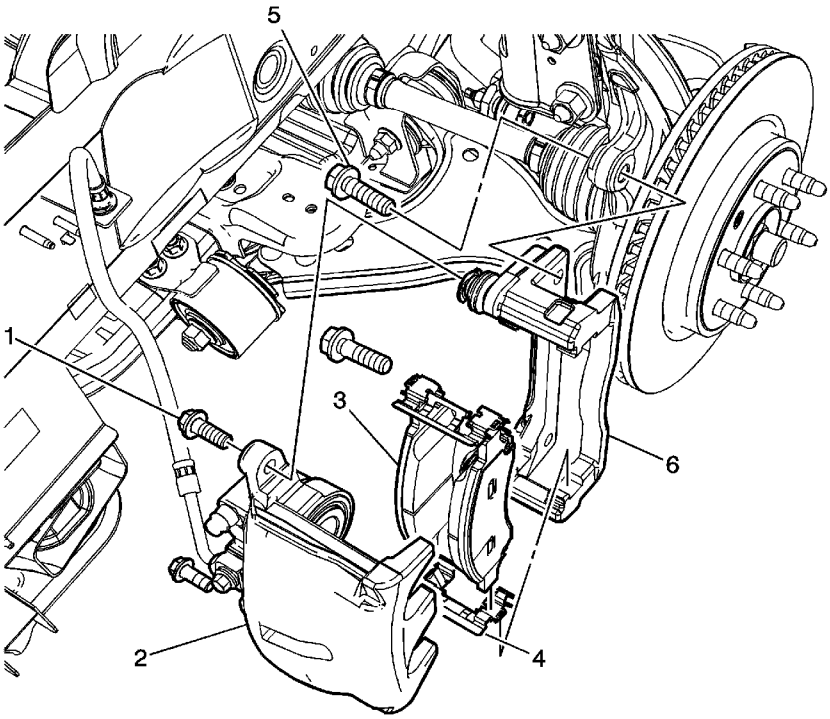
Rear Disc Brake Hardware Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 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.
1	Brake Caliper Guide Pin Bolt (Qty: 2) **Caution:** Refer to Fastener Caution in the Preface section. **Procedure** 1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools only. 2. 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 contact the brake caliper. Allowing the open end

	wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. When installing the brake caliper guide pin bolts, tighten the guide pin bolt closest to the bleed valve first. **Tighten** 27 N·m (20 lb ft)
2	Brake Caliper **Procedure** Without disconnecting the brake caliper hose, support the brake caliper with heavy mechanics wire or equivalent.
3	Brake Caliper Guide Pin (Qty: 2) **Procedure** Apply a thin coating of high temperature silicone brake lubricant to the brake caliper guide pins and the guide pin bores of the brake caliper bracket.
4	Brake Caliper Guide Pin Seal (Qty: 2) **Procedure** 1. Apply a thin coating of high temperature silicone brake lubricant to the brake caliper guide pin seals. 2. Ensure the brake caliper guide pin seal is fully seated in the groove of the brake caliper guide pin and the guide pin slides freely in the brake caliper bracket bore.

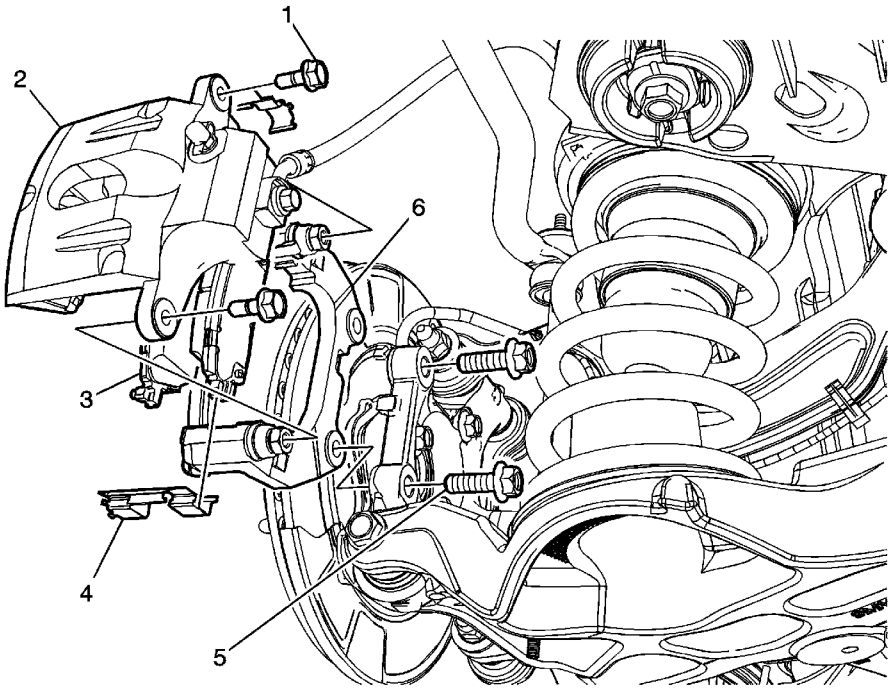
Front Brake Caliper Bracket Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 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.
1	Brake Caliper Guide Pin Bolt (Qty: 2) **Caution:** Refer to Fastener Caution in the Preface section. **Procedure** 1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools ONLY. 2. 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 contact the brake caliper. Allowing the open end

	wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. When installing the brake caliper guide pin bolts, tighten the guide pin bolt closest to the bleed valve first. **Tighten** 64 N·m (47 lb ft)
2	Disc Brake Caliper **Procedure** Without disconnecting the brake caliper hose, remove and support the brake caliper with heavy mechanics wire or equivalent.
3	Disc Brake Pad (Qty: 2) **Tip** Note the location of the inner and outer brake pads to aid installation.
4	Brake Pad Shim (Qty: 2) **Procedure** 1. Thoroughly clean the brake pad hardware mating surfaces of the caliper bracket of any debris and corrosion. 2. Apply a very thin coating of high temperature silicone brake lubricant to the pad hardware mating surfaces of the caliper bracket only.
5	Brake Caliper Bracket Bolt (Qty: 2) **Procedure** 1. Remove all traces of the adhesive patch on the brake caliper bracket bolts and threaded holes of the brake caliper bracket. 2. Clean the brake caliper bracket bolt threads and the threaded holes of the brake caliper bracket with denatured alcohol or equivalent and allow to dry. 3. Apply threadlocker G/M P/N 12345493 (Canadian P/N 10953488) to 2/3 of the threaded portion of the brake caliper bolts. **Tighten** 175 N·m (129 lb ft)
6	Brake Caliper Bracket

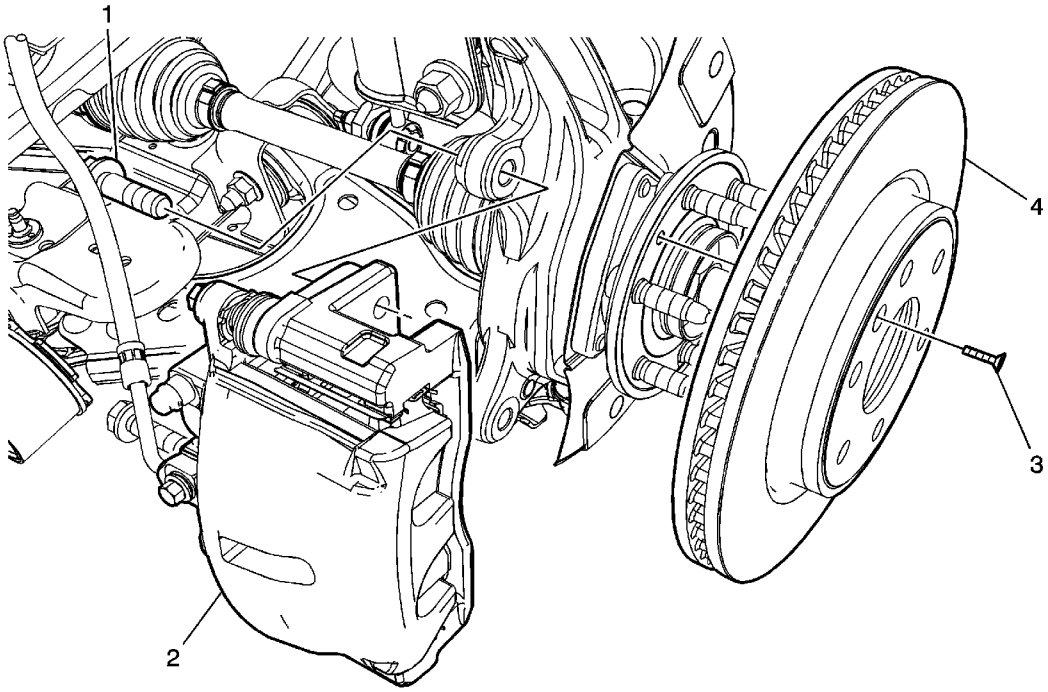
Rear Brake Caliper Bracket Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 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.
1	Brake Caliper Guide Pin Bolt (Qty: 2) **Caution:** Refer to Fastener Caution in the Preface section. **Procedure** 1. DO NOT use any air tools to remove or install the brake caliper guide pin bolts. Use hand tools ONLY. 2. 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 contact the brake caliper. Allowing the open end

	wrench to contact the brake caliper will cause a pulsation when the brakes are applied. 3. When installing the brake caliper guide pin bolts, tighten the guide pin bolt closest to the bleed valve first. **Tighten** 27 N·m (20 lb ft)
2	Disc Brake Caliper **Procedure** Without disconnecting the brake caliper hose, remove and support the brake caliper with heavy mechanics wire or equivalent.
3	Disc Brake Pad (Qty: 2)
4	Brake Pad Shim (Qty: 2) **Procedure** 1. Thoroughly clean the brake pad hardware mating surfaces of the caliper bracket of any debris and corrosion. 2. Apply a very thin coating of high temperature silicone brake lubricant to the pad hardware mating surfaces of the caliper bracket only.
5	Brake Caliper Bracket Bolt (Qty: 2) **Procedure** 1. Remove all traces of the adhesive patch on the brake caliper bracket bolts and threaded holes of the brake caliper bracket. 2. Clean the brake caliper bracket bolt threads and the threaded holes of the brake caliper bracket with denatured alcohol or equivalent and allow to dry. 3. Apply threadlocker G/M P/N 12345493 (Canadian P/N 10953488) to 2/3 of the threaded portion of the brake caliper bolts. **Tighten** 205 N·m (151 lb ft)
6	Brake Caliper Bracket

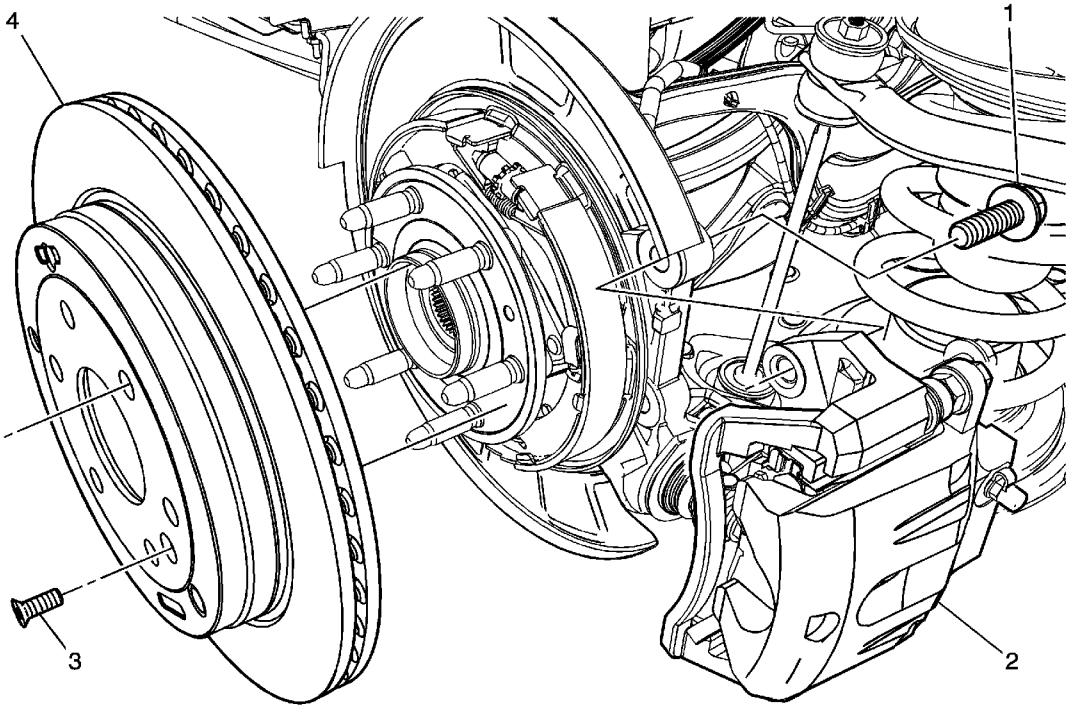
Front Brake Rotor Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 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.
1	Brake Caliper Bracket Bolt (Qty: 2) **Caution:** Refer to Fastener Caution in the Preface section. **Procedure** 1. Remove all traces of the adhesive patch on the brake caliper bracket bolts and threaded holes of the brake caliper bracket. 2. Clean the brake caliper bracket bolt threads and the threaded holes of the brake caliper bracket with denatured alcohol or equivalent and allow to dry. 3. Apply threadlocker G/M P/N 12345493 (Canadian P/N 10953488) to 2/3 of the

	threaded portion of the brake caliper bolts. **Tighten** 175 N·m (129 lb ft)
2	Brake Caliper and Bracket Assembly **Procedure** Without disconnecting the brake hose from the brake caliper, remove the brake caliper and bracket as an assembly and support with heavy mechanics wire or equivalent.
3	Brake Rotor Retention Screw **Tighten** 12 N·m (106 lb in)
4	Brake Rotor **Procedure** 1. If reinstalling the original brake rotor, mark the position of the brake rotor to the wheel stud. 2. Using the J 42450-A , clean any rust or corrosion from the mating surface of the hub/axle flange. 3. Using the J 41013 , clean any rust or corrosion from the mating surface the brake rotor. 4. After installing the brake rotor, measure the assembled lateral runout (LRO). Refer to Brake Rotor Assembled Lateral Runout Measurement. 5. If the brake rotor was refinished or replaced, burnish the brake pads and rotors. Refer to Brake Pad and Rotor Burnishing. **Special Tools** • J 41013 Rotor Resurfacing Kit • J 42450-A Wheel Hub Resurfacing Kit

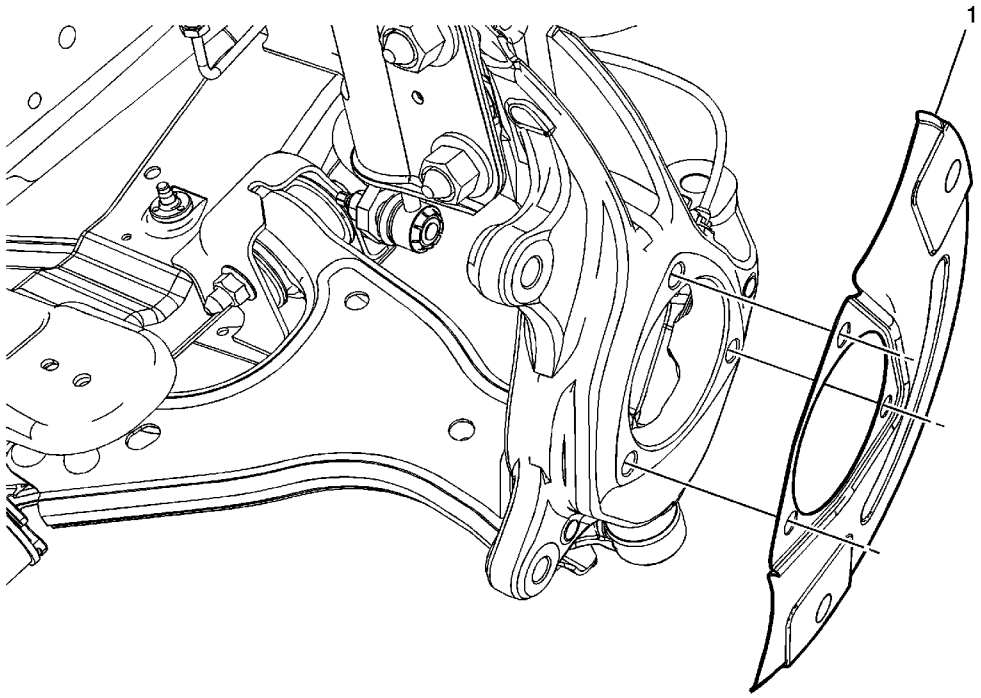
Rear Brake Rotor Replacement



Callout	Component Name
	Warning: Refer to Brake Dust Warning in the Preface section. **Caution:** Refer to Brake Caliper Caution in the Preface section. **Preliminary Procedures** 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.
1	Brake Caliper Bracket Bolt (Qty: 2) **Caution:** Refer to Fastener Caution in the Preface section. **Procedure** 1. Remove all traces of the adhesive patch on the brake caliper bracket bolts and threaded holes of the brake caliper bracket. 2. Clean the brake caliper bracket bolt threads and the threaded holes of the brake caliper bracket with denatured alcohol or equivalent and allow to dry. 3. Apply threadlocker G/M P/N 12345493 (Canadian P/N 10953488) to 2/3 of the

	threaded portion of the brake caliper bolts. **Tighten** 205 N·m (151 lb ft)
2	Brake Caliper and Bracket Assembly **Procedure** Without disconnecting the brake hose from the brake caliper, remove the brake caliper and bracket as an assembly and support with heavy mechanics wire or equivalent.
3	Brake Rotor Retention Screw **Tighten** 12 N·m (106 lb in)
4	Brake Rotor **Procedure** 1. If reinstalling the original brake rotor, mark the position of the brake rotor to the wheel stud. 2. If the brake rotor is difficult to remove, remove the park brake shoe adjuster access plug on the face of the brake rotor to gain access to the park brake adjuster. Loosen the park brake shoe adjuster. 3. After the installation is complete, adjust the park brake. Refer to Park Brake Adjustment. 4. Using the J 42450-A , clean any rust or corrosion from the mating surface of the hub/axle flange. 5. Using the J 41013 , clean any rust or corrosion from the mating surface the brake rotor. 6. After installing the brake rotor, measure the assembled lateral runout (LRO). Refer to Brake Rotor Assembled Lateral Runout Measurement. 7. If the brake rotor was refinished or replaced, burnish the brake pads and rotors. Refer to Brake Pad and Rotor Burnishing. **Special Tools** • J 41013 Rotor Resurfacing Kit • J 42450-A Wheel Hub Resurfacing Kit

Front Brake Shield Replacement



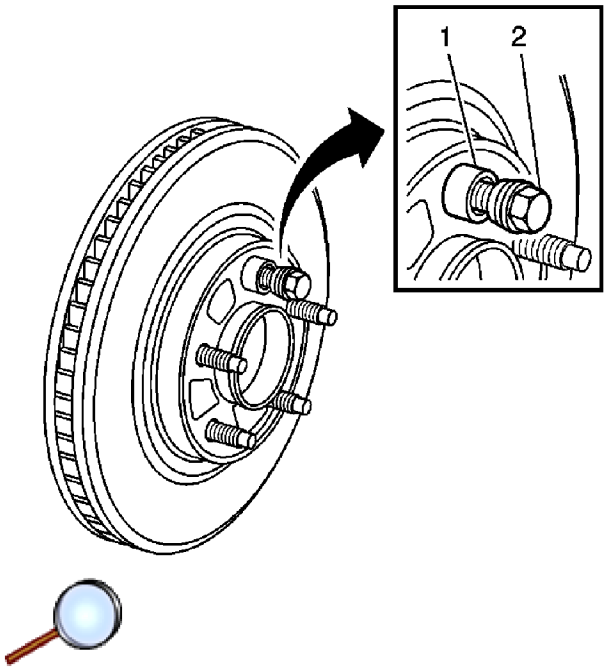
Callout	Component Name
Warning: Refer to Brake Dust Warning in the Preface section. **Preliminary Procedures** 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation. 3. Remove the disc brake rotor. Refer to Front Brake Rotor Replacement. 4. Remove the wheel hub and bearing assembly. Refer to Front Wheel Bearing and Hub Replacement.	
1	Disc Brake Shield

Brake Rotor Assembled Lateral Runout Correction - Indexing

Special Tools

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

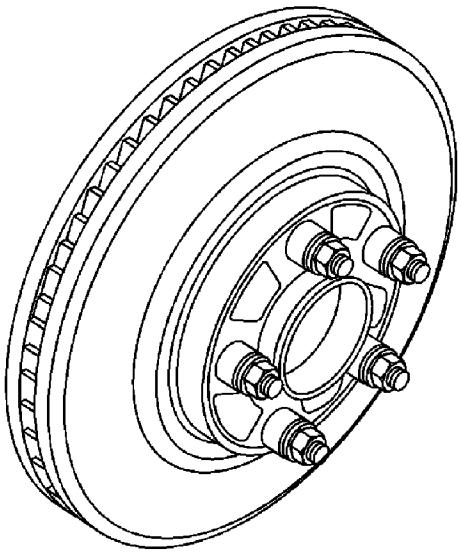
Warning: Refer to Brake Dust Warning in the Preface section.



Note:

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

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



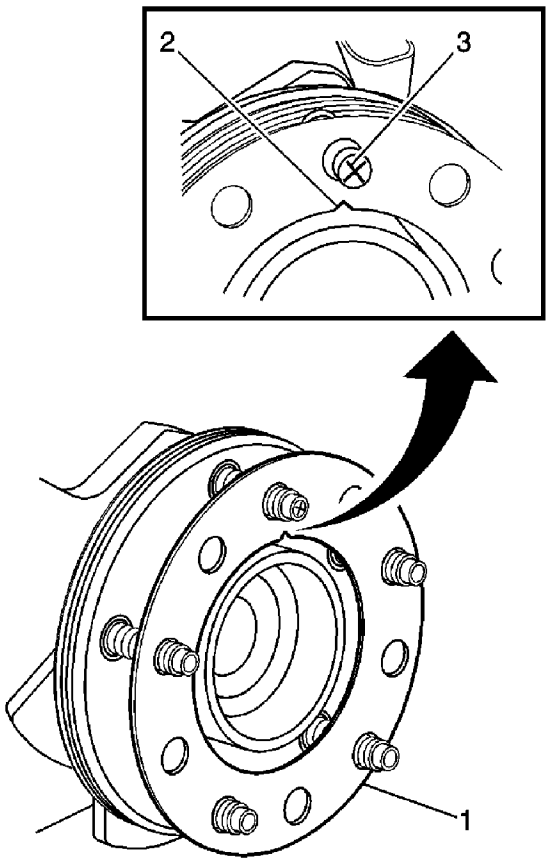
6. Install the remaining *J-45101-100* washers and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern.
7. Using the *J-39544-KIT* set , or equivalent, tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. Refer to Tire and Wheel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

Brake Rotor Assembled Lateral Runout Correction - Correction Plates

Special Tools

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

Warning: Refer to Brake Dust Warning in the Preface section.



Note:

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

Measurement.

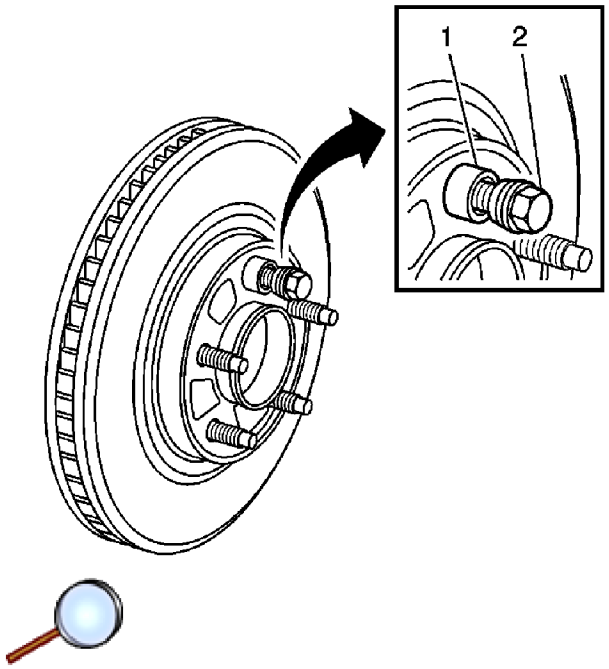
1. Rotate the brake rotor to position the high spot, identified and marked during the brake rotor assembled LRO measurement procedure, to face upward.
2. Remove the *J-45101-100* washers and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction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

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

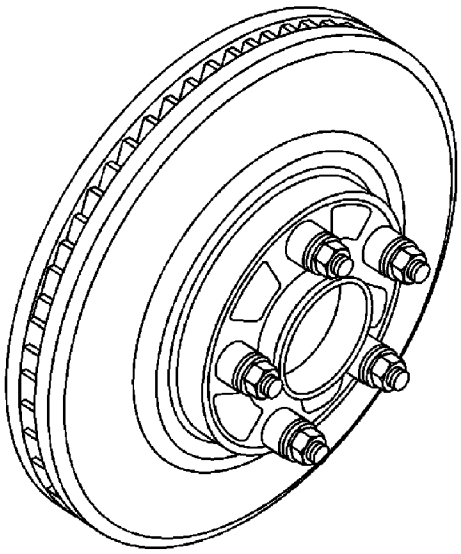
5. Determine the positioning for the correction plate (1) using the high spot mark (3) made during the brake rotor assembled LRO measurement procedure.

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

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



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



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

Brake Rotor Assembled Lateral Runout Correction - On Vehicle Lathe

Special Tools

J-45101-100 Conical Brake Rotor Washers

Warning: Refer to Brake Dust Warning in the Preface section.

Note:

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

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* washers and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction procedure.
3. Inspect the mounting surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles or debris remaining.
4. Set up the lathe, following the manufacturer's instructions.
5. Refinish the brake rotor, following the brake lathe manufacturer's instructions.
6. After each successive cut, inspect the brake rotor thickness. Refer to Brake Rotor Thickness Measurement.
7. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced. After replacing the rotor, proceed to step 10.
8. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
   8.1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish.
   8.2. 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.
   8.3. 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* washers and the lug nuts.

Brake Rotor Refinishing

Special Tools

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

Warning: Refer to Brake Dust Warning in the Preface section.

Note:

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

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

  - Brake system noise - squeal, growl, groan
  - Uneven and/or premature disc brake pad wear
  - Superficial or cosmetic corrosion/rust of the disc brake rotor friction surface
  - Scoring of the disc brake rotor friction surface less than the maximum allowable specification
- Before refinishing a brake rotor, the rotor MUST first be checked for adequate thickness to allow the rotor to be refinished and remain above the minimum allowable thickness after refinish specification. Refer to Brake Rotor Thickness Measurement.

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

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

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

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

1. Using the *J-42450-A* kit , thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.
2. Using the *J-41013* kit , thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure that there are no

foreign particles or debris remaining.

4. Mount the brake rotor to the brake lathe according to the lathe manufacturer's instructions, ensuring that all mounting attachments and adapters are clean and free of debris.
5. Ensure that any vibration dampening attachments are securely in place.
6. With the brake lathe running, slowly bring in the cutting tools until they just contact the brake rotor friction surfaces.
7. Observe the witness mark on the brake rotor. If the witness mark extends approximately three-quarters or more of the way around the brake rotor friction surface on each side, the brake rotor is properly mounted to the lathe.
8. If the witness mark does not extend three-quarters or more of the way around the brake rotor, re-mount the rotor to the lathe.
9. Following the brake lathe manufacturer's instructions, refinish the brake rotor.
10. After each successive cut, inspect the brake rotor thickness. Refer to Brake Rotor Thickness Measurement.
11. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced.
12. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
    12.1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish.
    12.2. 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.

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