

# SERVICING FRONT BRAKE CALIPERS

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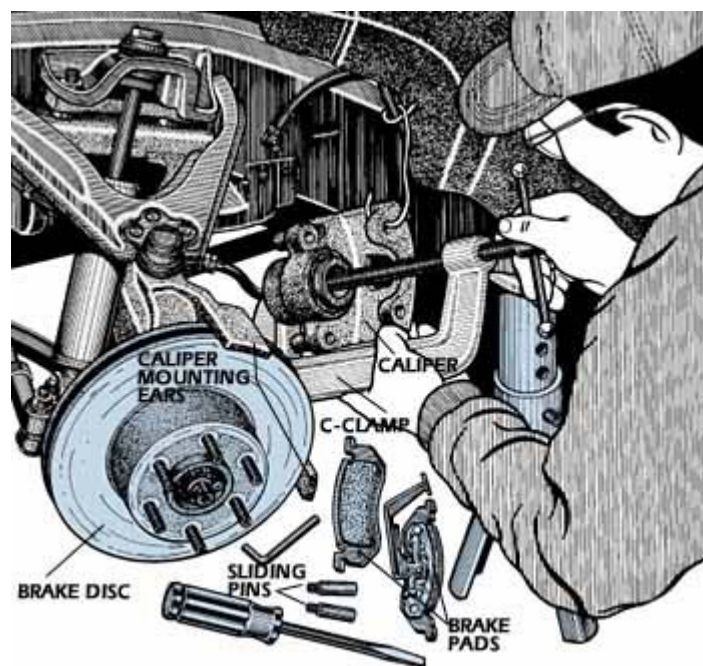
**Brake lights in front** of you flash suddenly, and for no discernible reason. You mash the brake pedal to avoid rear-ending a driver who must have suddenly remembered leaving the stove on. Your car stops, but you've swerved well into the adjacent lane, where, fortunately, an alert driver slowed and pulled over to give you some clearance. Too close. Your panic braking attempt should have had two different results: Your car should have slowed more rapidly, and should have tracked in a straight line as it slowed. There's obviously something wrong.

## Check It Out

Your car pulled to the left, but the problem is more likely to be at the right front wheel. It didn't brake as well as the left, so the car pulled in the opposite direction.

Remove the wheel and take a look. Don't be surprised if you see that both shoes have a reasonable amount of brake lining left. The problem is more likely to be a bad caliper, that big hydraulic clamp that forces the brake shoes against the disc-brake rotor.

Most cars have sliding calipers with a single hydraulic piston. When you step on the brake pedal and that piston is pushed out, it forces the inner brake shoe against the inner side of the rotor. The caliper simultaneously slides inward, pulling the brake shoe in the outer side of the caliper against



Check for a frozen caliper by attempting to push the piston back. Don't hang the caliper by the hose use a piece of wire.

the outer surface of the rotor. Some cars have fixed calipers with one or two pistons in each side of the caliper (two or four pistons total). When you step on the pedal, all of the pistons force the brake shoes against the rotor.

Check the brake fluid level in the reservoir and if its been topped up to maximum level, siphon out a small amount (otherwise it may overflow during the test). Set up the clamp so the top edge of the C is against the midpoint of the inboard side of the caliper (behind the piston) with the tip of the forcing screw directly opposite. Depending on the shape of the caliper, the forcing screw could also bear against the back side of the outboard brake shoe or even against the rotor surface.

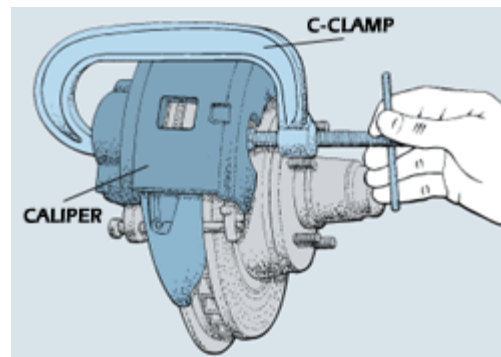
Turn the forcing screw and the caliper should move smoothly as the piston is pushed back.

If the caliper passes this test, make one more: Check the bleeder valve to be sure it loosens. If it doesnt, you can drill it out and install a replacement. But this can be a difficult operation, and installing a remanufactured caliper is a safer bet. If the caliper binds or moves only with unusual effort, there are two possibilities: The caliper piston is frozen in place (the most common), or the caliper is not able to slide because of corroded bolts (along which most calipers slide), cocked or damaged bushings through which the bolts go, or rusted sliding ways (guides) in the anchor that holds the caliper. Youll have to remove the caliper to see.

### Sliding Caliper

Taking off a sliding caliper is a straightforward operation. Usually there are two bolts that hold it to its anchor frame. Or, theres a single bolt at the bottom and a locating stud at the top, a design called a flip up. Clamp off the brake hose close to the caliper with a C-clamp or padded locking pliers to minimize loss of brake fluid and to reduce the necessity of after-the-job bleeding. Next, loosen the bolt that holds the hose to the caliper. Remove the bolt or bolts holding the caliper.

If the caliper is the type that is held in machined guides, there are two common setups. There is a lower guide that can be unbolted and driven off the anchor. Do this, and then lift the caliper up from the bottom of the anchor and off the upper guide. Or,



Some types of sliding calipers can be pushed back without removing them from the caliper mounts. Be sure its not seized sliding surfaces that are binding, though.

there are bolt-on retainers at the top and bottom to hold the caliper against the guides. Remove both, then pull the caliper away from the anchor.

## Replacement

With the caliper off the bracket, unthread the brake-hose banjo bolt and catch any drops of fluid with a rag. Install a replacement caliper, using new sealing washers for the brake hose. Many caliper bolts are not recommended for reuse, so if the vehicle manufacturer says this is the case, get new ones.

## Making It Slide

If the caliper piston returns smoothly, you'll likely find that the caliper isn't sliding properly because the movement of the caliper bolts is hindered by corrosion or sticking in the caliper ear bushings. Or, the machined guides are rusted. You can use a wire brush to remove rust from the guides (and the caliper edges), then lubricate both with suitable water-repellent grease. Heavy rust may require a light touchup with a file. However, if the bolts are sticking in the bushings, replace them, and lubricate with the same type of grease.

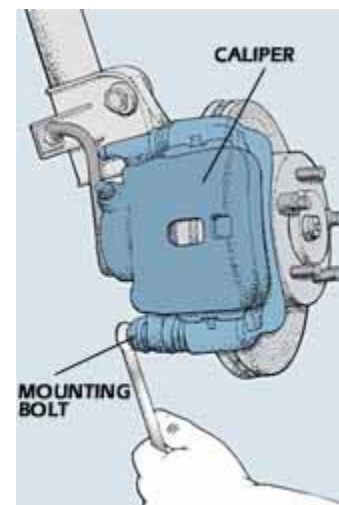
If the O-rings are deteriorated, replace them, or they could allow the bushings to cock. In any case, clean the caliper ears, then relubricate the O-rings.

## The Details

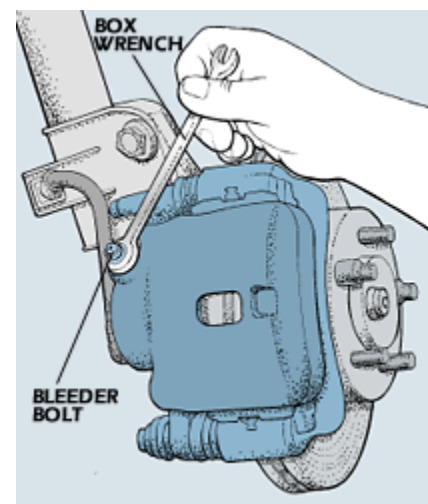
Don't leave out any dust or moisture boots from the caliper ears. And if the old ones are deteriorated, replace them (they could be the cause for corrosion seizure of the sliding caliper bolts in the bushings). If a sliding rear caliper is reusable and it incorporates the parking brake mechanism behind the piston, be sure to thread back the piston (turn back the internal screw mechanism).

With a fixed caliper, you won't know if the pistons are sticking until you take them off. So don't loosen the brake hose (although you should determine if the bleeder valve is frozen). Remove the mounting bolts—usually just two but possibly four. Hang the caliper with wire to relieve any tension on the brake hose. Now use the C-clamp to check the pistons. Place a brake shoe against a piston (or pair of pistons) to distribute the force evenly, and put the C-clamp forcing screw against the shoe. Then, turn the forcing screw to determine if the piston moves smoothly. If it's sticking, replace the caliper.

A fixed caliper will be more expensive than a slider, and you may be tempted to salvage one by drilling out a frozen bleeder. Don't take the risk. Let a machine shop do it for you. Also note if the fixed caliper bolts are reusable.



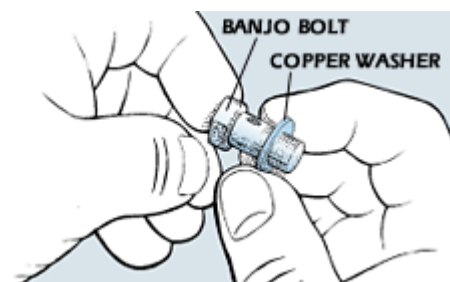
Some makers say that the mounting bolts cannot be reused. Check before removing.



Before you go too far, be sure the bleeder isn't frozen. It may need to be retapped.

## Restricted Brake Hose

Its rare, but you may find that theres no leak and the problem isnt at the caliper. Its possible that the brake isnt applying normally because theres inadequate hydraulic pressure to the caliper, the result of a restricted hose. Have a helper apply the brake and see if you can turn the wheel with a wrench on a lug nut make a real effort and use a wrench with a long shank. If the wheel can be turned at all, no matter how much effort youre applying, the caliper isnt getting full hydraulic pressure. To check, open the bleeder valve fully (with a hose over it and the other end in a glass jar) and have a helper apply the brakes. Look to see if theres a solid column of fluid coming out of the hose. There isnt? Either a brake line is kinked or the hose is defective.



Always replace any copper sealing washers on brake line connections with new ones.



Rear calipers with parking brakes require special techniques to retract the pistons at pad replacement time.

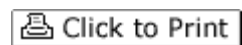
## HOW IT WORKS: Rear Disc Caliper With Parking Brake

If the parking brake uses the rear disc-brake shoes instead of a separate set of drum-brake shoes, there is a mechanism in the caliper piston cylinder to push the piston and apply the rear brakes when the driver operates the linkage. That mechanism, which is connected to the parking brake linkage, has a screw setup to compensate for the fact that in normal foot-brake operation, the piston automatically moves out to adjust for brake-shoe lining wear. The type shown here is a common design. There is a cone behind the piston and it moves with the piston when the foot brake is applied. When the parking brake is operated, the brake lever turns the screw on which it is mounted (it also is an adjusting screw threaded through an adjusting nut). The nut cant turn because its splined into the cone. With the inboard brake shoe in place, the piston (and shoe) cant turn either. So the lever operation causes the piston to be pushed out to apply the disc-brake shoes. When the lining wears, some clearance develops between the piston/cone and the nut. When the foot brake is released, hydraulic pressure in the caliper cylinder also is released. The adjusting spring then causes the nut to thread out on the adjusting screw to take up the clearance.

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