CPP GENERAL PURPOSE BRAKE BLEEDING GUIDE

Read these instructions *carefully* and *completely* before installing your kit! This guide is set up to be generally followed in order. Here are a few basic to help ensure a safe brake system:

- Following the steps in this guide will ensure that you will easily pinpoint any trouble spots in your brake system while installing and assembling the system, eliminating many headaches. "Follow it to the T," and we are certain you will have a pleasurable experience with your upgrade.
- Use only new brake fluid. Contaminated fluid can cause damage to the sensitive hydraulic brake components during the bleeding process, corrodes components and increases likelihood of system failure. Even unused fluid that was opened at an earlier time should not be used. Brake fluid is hygroscopic meaning that it absorbs moisture from the air. This moisture degrades the properties of the brake fluid.
- Cleanliness is very important. Make sure you clean the fittings and surrounding area before opening any part of the brake system to keep contaminants from entering the fluid.
- Power brake upgrades, be sure to check for a minimum of 18 in. of vacuum prior to performing the upgrade. Vehicles with tall heads or superchargers most likely will not have sufficient vacuum. If you do not have sufficient vacuum, check your intake manifold for clogging, vacuum fittings and for collapsed vacuum lines. Also ask us about our 12 volt vacuum pump.
- Never eliminate loops from vacuum lines as these act as moisture and vapor traps. Check the vacuum lines for gas odor or the presence of moisture. Gas fumes can deteriorate the internal rubber components of the booster.
- Do not use petroleum-based solvents to clean brake components. Use only cleaning fluids specifically designed for brakes since they leave no residue when they dry.
- Do not use compressed air to dry brake components, even filtered air may contain moisture or traces of oil.
- Check brake lines for cracked, leaking or swollen lines, these must be replaced.
- Do not move or drive the vehicle until a firm pedal is established.

Rear Disc Brakes and Parking Brake Adjustment

This is a critical item that many people miss when upgrading to rear disc brakes. Our rear disc brake calipers that are equipped with an parking brake are self-adjusting. Every time you use the parking brake they adjusts themselves for pad wear by clicking to the next stop on the internal ratchet. If you do not use your parking brake during normal operation of the vehicle, over time the pads will wear and there will be insufficient contact between the pads and the parking brake mechanisms. When this happens the parking brake will never engage. This step should always be performed prior to bleeding.

To adjust the parking brake while installing or servicing the calipers, use the following directions. Failure to adjust the parking brake can result in no parking brake, brakes dragging, overheating and premature brake wear.

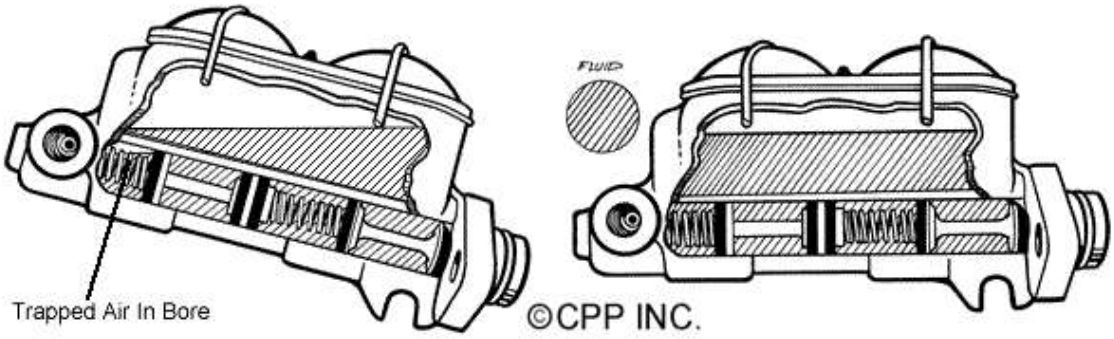
1. If you are adjusting the parking brake after the system has been bled, remove the master cylinder lid and make sure that the fluid level is no more than 1/2 full, this is so that in the following steps when the caliper piston is pressed back, fluid does not overflow the master.
2. Remove the parking brake spring and lever arm. Remove the seal and nylon washer from the adjusting screw and place them in a clean location.
3. Turn the adjusting screw counterclockwise to tighten it and collapse the pads until the pads are tight against the rotor.
4. Note that the adjusting screw clamps the pads closed when tightened counterclockwise. When the adjusting screw is turned counterclockwise past a certain point, it turns the internal ratchet. This is how it is adjusted. Adjusting the screw can be tricky because when the it is tightened all the way, its hex head recedes into the caliper body and you can't get a wrench around it.

5. Turn the adjusting screw in counterclockwise by hand until there is resistance.
6. To push the adjusting screw back out to provide access to it's hex, use two channel-locks to squeeze the rear brake pad and compress the caliper piston. Place the wrenches on either side of the pad locating the jaws on the pad bracketry and the body of the caliper.
7. Then use a wrench to turn the adjusting screw counterclockwise to change the position of its hex and slip the internal ratchet.
8. Back the adjusting screw out by turning it clockwise, place the lever arm over the adjusting screw hex and apply a medium amount of hand force clockwise to the lever arm to push it past the lever stop on the caliper. Once the force has been applied, the lever should be located within 1/4" of the lever stop and should be easy to put on the adjusting screw head. There should also be mild contact between the pads and the rotor when properly adjusted. It is highly likely that this will need to be done a number of times before it is properly adjusted.
9. Remove the lever arm and replace the nylon bushing and seal, then replace the lever arm and secure with the nut.
10. Replace the return spring.

Bench Bleed and Test the Master Cylinder

Many people skip this VITALLY important step in bleeding their brake system. Bench bleeding the master cylinder MUST be performed any time a master cylinder is installed. If the master cylinder is not bled, it will take you at least twice as long to bleed the system and then there is no guarantee that you have removed all the air from the system. The master cylinder test is a preliminary precaution and may need to be performed at a later time should further troubleshooting need to take place.
DO NOT SKIP THIS STEP! Failure to follow these procedures is unsafe and may void your warranty!

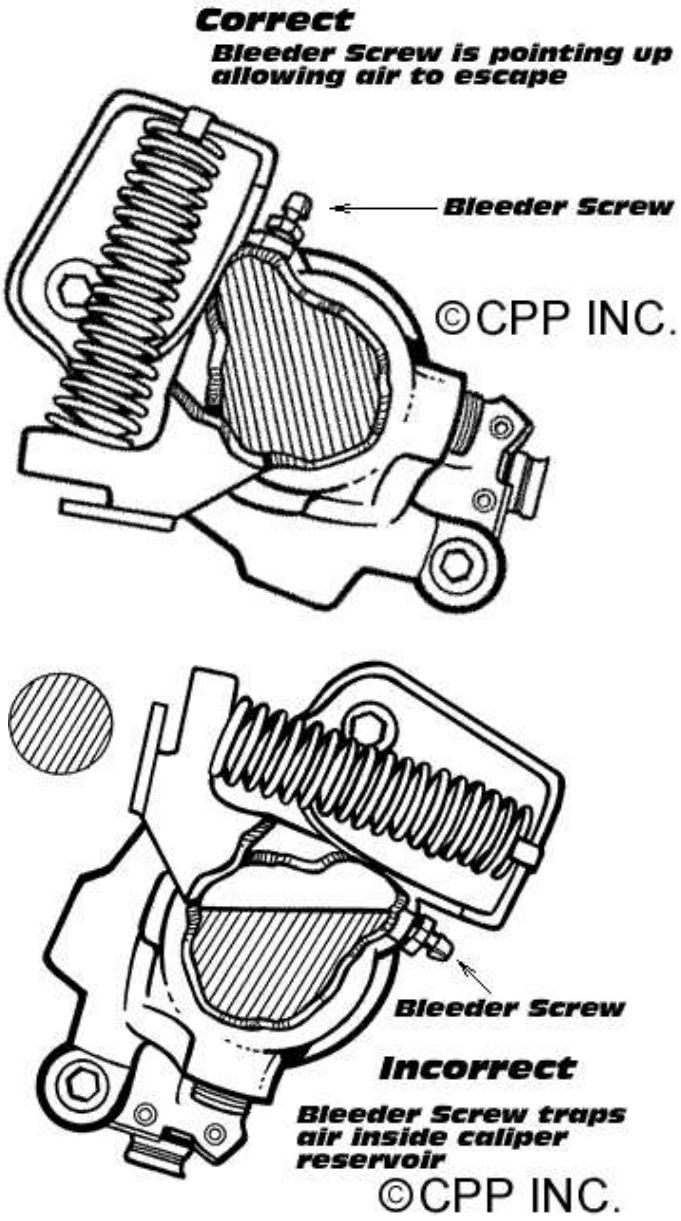
1. All new master cylinders from Classic Performance include a bench bleeding kit that includes everything you need to perform the bench bleed process.
2. Before bench bleeding the master, completely install all of your brake components and upgrades including the master cylinder and brake lines. This is so that you can hook up the master cylinder as soon as possible after it has been bench bled to keep gravity from leeching fluid from the master cylinder during the installation of the other components.
3. After installing the system, remove the master cylinder completely from the vehicle. Master cylinders MUST be bench bled outside the vehicle and without any other components attached. This means that if the kit is shipped with a booster, proportioning valve and plumb lines attached to the master cylinder, they must all be removed prior to bench bleeding.
4. Be sure to place the master cylinder level in a vice to secure it properly. If the master cylinder is not level, not all the air will be able to be removed from the master cylinder. This is one of the main reasons we bench bleed the master cylinder off of the vehicle, to get it perfectly level during the bleeding process. (See fig. below) Remove the master cylinder top and fill with brand new brake fluid to the appropriate level as indicated in the master cylinder. This is generally about 1/2" - 1" from the top of the reservoir lip to allow for thermal expansion of the brake fluid.
5. Insert the plastic fittings that fit into the two side ports of the master cylinder, (Note: on dual ported master cylinders where there are four ports, choose one side and use both ports on that one side to perform the bleed process.) Insert one rubber tube into each of the plastic fittings and the loose ends should be inserted into the master cylinder reservoir. The plastic tab should be used to hold the tubes in place by slipping it over the reservoir separator and the hoses through the round holes.
6. Cover the top of the master cylinder with a rag to help prevent fluid from splattering in order to protect your person as well as your vehicle. Be aware that brake fluid is mildly corrosive and may damage painted surfaces.
7. Using a wooden dowel or a blunt metal rod, compress the master cylinder plunger with slow deep strokes.
8. Once the large bubbles have subsided it should become increasingly more difficult to compress the master cylinder piston. Continue to do so with slow short strokes at the bottom of the piston stroke until no more bubbles appear.
9. The rubber hoses and plastic fittings may be removed from the master cylinder.
10. Secure the master cylinder top
11. Now test the master cylinder by "blocking off" the master cylinder ports using the correct size inverted flare plugs or bolts with the appropriate thread size for the ports on your master cylinder. Dual port master cylinders that have ports on both sides need to have all four ports plugged. The protruding cone of the inverted flare seat in the master cylinder port is made of a soft material that can easily be deformed if over tightened. If using bolts, be sure to just snug the bolts so as not to damage the cone seal surface. This cone mates with the inverted flare (expanded mouth opening) of the brake lines. If you have the ability, you can also drill a point into the end of the bolt to help prevent this from occurring.
12. Attempt to compress the master cylinder piston for approximately 30 seconds. The master should give a solid and unchanging resistance to the constant force.
13. Install the Master Cylinder and leave enough room on the mounting nuts to allow for some movement of the master. This will allow you some breathing room while screwing in the hydraulic lines to help prevent cross-threading the fittings.



Bleeding the Lines

Many of you will be tempted to glaze over this section thinking that you already know this. Continue reading anyway, just bear with us. You may prevent small oversights that will cause major headaches. We have devised this to assist you in the installation of your kit and to reduce the number of technical calls in regards to these issues. Many times we get calls from people who "should have known better." So let's work together to make sure your installation will be as smooth as possible.

1. For master cylinder upgrades to existing power booster set ups, remove any residual vacuum in the booster by applying the brake pedal a few times with the engine off.
2. Remove the master cylinder cover and check the fluid level. Make sure it is at the appropriate level for your master cylinder, this is typically 1/2" to 1" from the lip. Be sure to check the fluid level often during the bleeding process and add fluid as necessary to prevent air from entering the master cylinder. If this happens you **MUST** start over at bench bleeding the master!
3. Replace the master cylinder cap
4. The use of our Speed Bleeders will allow you to perform this job by yourself by simply cracking the Speed Bleeder enough to allow fluid to be forced through. The Speed Bleeder has an internal check valve that prevents fluid and air from returning into the caliper once the pedal is released. This removes the necessity of closing the bleeder screw before the pedal is released, allowing one person to bleed the brakes. Otherwise you will need an assistant to pump the brake pedal while you open and close the bleeder screws at the appropriate times during this process.
5. The wheel farthest away from the master cylinder is bled first which in most cases is in this order: Right Rear, Left Rear, Right Front, Left Front. Failure to bleed in the proper order will cause air to remain in the lines. This is because if you bleed a short line, (ex. front lines) before bleeding a long line (ex. rear lines), the fluid in the short line will compress and prevent enough pressure from being built up in the long line to expel the air. Furthermore, incorrect bleeding order will cause pressure to build up on one side of the proportioning valve, causing it to close on the low pressure side making it impossible to force fluid to the rear lines. If this happens you will never be able to bleed the system until you readjust the proportioning valve as described later under the heading Test Combination/Proportioning Valve and then start over.
6. It may be necessary to remove the Calipers from the caliper brackets while leaving the hoses attached. The calipers must be oriented in such a way as to ensure the bleeder screws point up. (See fig. below) If you bleed the lines with the calipers on the rotor, air may become trapped inside the caliper reservoir and the bleeding will be unsuccessful. The caliper should be oriented in such a way as to allow air inside the caliper internal reservoir to escape. Sometimes this means the bleeder screw is pointing straight up and sometimes it is at a little bit of an angle. It is recommended that you do not allow the caliper to hang from the brake hose. Instead use a piece of wire or hangar to position the calipers correctly. Otherwise damage to the brake hoses may result. If you do find it necessary to remove the caliper from the rotor, be certain to insert a block that is approximately the same thickness as the rotor between the brake pads to prevent the caliper pistons from being pushed out of the caliper.
7. Crack the bleeder screws at the appropriate wheel just enough to make it easy to loosen later. Attach a length of 3/16" clear plastic, vinyl tube to the end of the bleeder screw. Submerge the other end of the tube into a container filled with brake fluid.
8. Crack the bleeder screw open just enough to allow fluid to leave the valve and have the assistant slowly and firmly apply pressure to the pedal. Have the assistant hold the pressure on the pedal until you see no more air bubbles coming out of the hose. Close the bleeder screw. Then have the assistant release the brake pedal.
9. Repeat step 8 until no more air is seen leaving the tube.
10. Close the bleeder screw to the appropriate torque for your application and proceed to the next wheel in the bleeding order, repeating steps 8 and 9 for each. Be sure to check the fluid level in the master cylinder frequently.
11. Refill the master cylinder to the appropriate level when finished with the entire bleeding process.
12. Check the pedal, it should feel solid when depressed with no sponginess and should hold under constant pressure without dropping. If necessary, repeat the entire process.
13. If you are in doubt of the effectiveness of the brake system DO NOT DRIVE THE VEHICLE!



Why change to Disc Brakes?

- Disc brakes offer a significant advantage over drum brakes in a number of areas, the most important is in safety.
- Disc brakes resist heat induced brake fade. The design of disc brakes dissipates heat much more quickly than drum brakes. Also, heat causes the disc to expand which has no effect on braking ability where as the drum expands it increases the amount of travel required for the shoes to apply effective stopping force.
- Disc brakes resist water induced brake fade. When disc brakes become wet, the large majority of the water is spun off of the disc during rotation. The residual water evaporates from the heat caused during braking. In a drum brake set up, water can become trapped inside the drum and act as a lubricant between the drum and shoes causing water induced brake fade.
- Disc brakes are better at straight-line stops. Drum brakes have a tendency to pull due to inconsistent alignment of the shoes from the left to right wheels due to a dependency on multiple complex floating mechanisms. These inconsistencies can cause the car to veer unexpectedly to one side or the other during panic braking. Since disc brakes apply equal force through clamping, they are much safer during straight line braking.
- Ease of serviceability. Disc brakes are much easier to service than drum brakes.
- Lighter weight
- Drawback is that disc brakes require the addition of a power brake booster

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