

MASTER CYLINDER

Step-by-Step Installation Instructions

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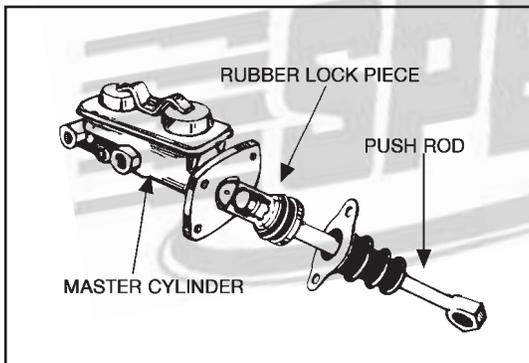
REMOVING THE ORIGINAL MASTER CYLINDER

NOTE: Before beginning work, be sure vehicle is parked in a level area and that wheels are chocked to prevent unintentional movement. The master cylinder **MUST** be level during the procedure.

1. Disconnect the ground cable from the battery.
2. On manual brake master cylinders (except some Chrysler products), disconnect the push rod from the brake pedal linkage under the dash. The rod eyelet is attached to the pedal with a thru-bolt and cotter pin, nut or retaining clip.

NOTE: Some Chrysler vehicles use manual brake master cylinders with a "pop out" pushrod. After removing the flange bolts, support the master cylinder and use a wedge between the flange and firewall to "pop" the pushrod from the piston. **DO NOT** separate the pushrod from the brake pedal linkage (see illustration).

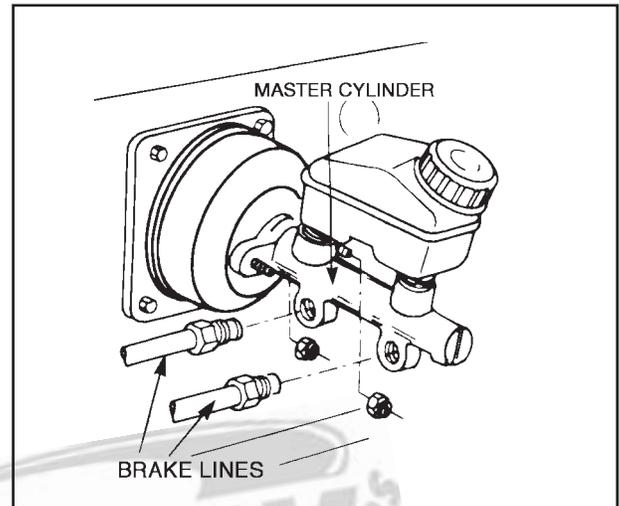
3. Disconnect electrical lead(s) from master cylinder's brake failure warning switch, if so equipped.



4. Clean the area around the brake line connections on the master cylinder.
5. Disconnect brake lines from the master cylinder and proportioning valve, if so equipped. Cover or plug lines to prevent dirt from entering and contaminating the brake system.

CAUTION: **DO NOT** allow brake fluid to contact painted surfaces as the fluid damages paint. If contact occurs, immediately flood the affected area with water.

6. Remove the nuts/bolts securing the master cylinder to the firewall or power brake booster. **DO NOT** remove power brake booster.



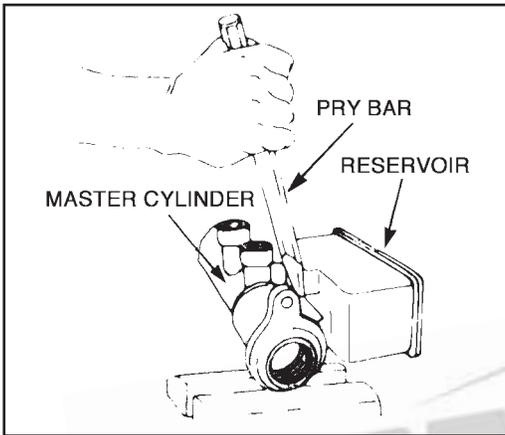
7. Remove the master cylinder from the vehicle. **CAREFULLY** remove and save any fittings, rubber hoses, clamps, plastic pipes, gaskets or other components (including brake warning switches and proportioning valves) for installation on the replacement unit if necessary.

NOTE: If the replacement master cylinder is supplied without a reservoir, you must remove and transfer the reservoir from the original master cylinder to the replacement unit. Refer to the following instructions.

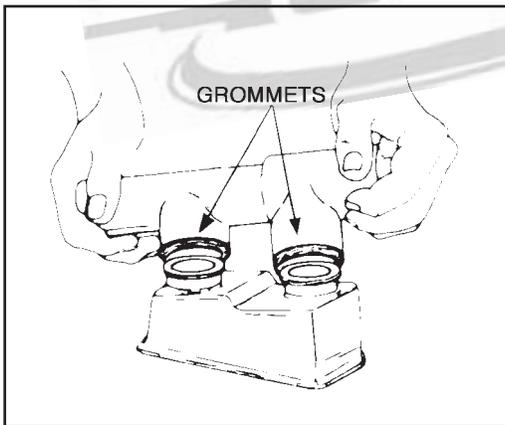
TRANSFERRING THE RESERVOIR

1. Carefully drain remaining brake fluid from the master cylinder.
2. Position the original master cylinder in a vise so the jaws clamp onto the mounting flange. **DO NOT TIGHTEN THE VISE JAWS ON THE MASTER CYLINDER BODY!** This will cause damage and void the unit's core value.

3. Use a pry bar or large screwdriver to "pop" the reservoir off of the master cylinder (see illustration).
4. Remove the reservoir mounting grommets and install them on the replacement unit.
5. Lubricate the grommets and reservoir necks with clean brake fluid. Carefully press the replacement master cylinder body down onto the reservoir using a slight rocking motion.
6. Remove original master cylinder from vise. Put it into replacement carton to assure proper core credit upon return.



NOTE: Cores holding fluid, especially hydraulic units, MUST be drained before they are returned for core credit.



BENCH BLEEDING THE MASTER CYLINDER

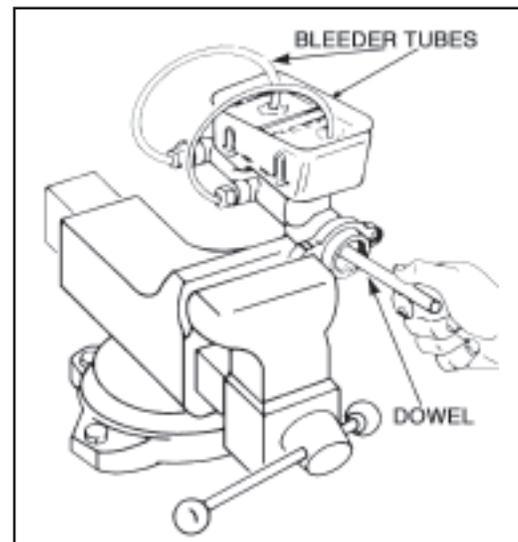
NOTE: "Bench bleeding" (removing air from the master cylinder) must be completed BEFORE the replacement unit is installed in the vehicle. Otherwise, the brake pedal will be insufficient and THE WARRANTY WILL BE VOID!

1. Position the replacement master cylinder in a vise so that the jaws clamp onto the mounting flange. DO NOT TIGHTEN THE VISE JAWS ON THE MASTER CYLINDER BODY! This will cause damage and void the warranty.
2. Install brake failure warning switch and proportioning valve, if so equipped, onto the replacement master cylinder BEFORE bench bleeding the unit. Use the new O-rings supplied with the replacement unit on the valves and switch. Install plugs in the proportioning valve ports, if so equipped, before bench bleeding.
3. Install bleeder tubes, if available, into the brake line outlet ports or use plugs to seal the ports.
4. Add enough clean brake fluid to the reservoir so that the bleeder tube ends are submerged beneath the fluid level.
5. Use a wooden dowel or similar tool to slowly push the master cylinder piston in about one inch, then release the piston slowly.

CAUTION: Be careful to avoid spraying brake fluid! Keep your face away from the open reservoir.

6. Wait 15 seconds and repeat step 5 until you no longer see air bubbles in the reservoir.
7. Replace the reservoir cover. Do not remove bleeder tubes from the brake line fittings yet.

NOTE: Some fluid around the mouth of the piston bore is normal and does not indicate leakage. This is a rust inhibitive bore lubricant used during assembly.

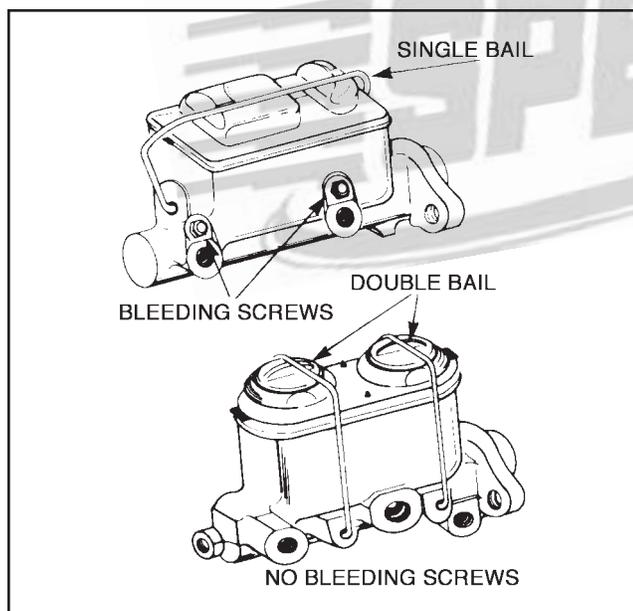


INSTALLING THE REPLACEMENT MASTER CYLINDER

IMPORTANT: Your replacement master cylinder is guaranteed to fit and function in its listed applications, even though it may be different in appearance from the original unit (see illustration).

1. Install any remaining fittings, rubber hoses, clamps, plastic pipes, or other components removed from the original unit onto the replacement master cylinder.
2. If the replacement unit is supplied without a pushrod, the original push rod must be used.

NOTE: For Chrysler "pop out" style push rods, remove the original rubber lock piece and replace with new one



supplied with replacement kit. Lubricate with fresh brake fluid and "pop" back into new master cylinder piston (see illustration on page 1).

3. Install sealing ring, gasket or space, if necessary, between master cylinder and booster or firewall. **THESE PARTS ARE CRITICAL TO THE OPERATION OF THE REPLACEMENT CYLINDER!**

NOTE: On GM applications using angle-mounted master cylinders, the rear of the vehicle must be elevated to bring the master cylinder to a level position. This prevents air from being trapped. When raising the vehicle, use a lift or jack stands. The use of a jack only is very dangerous!

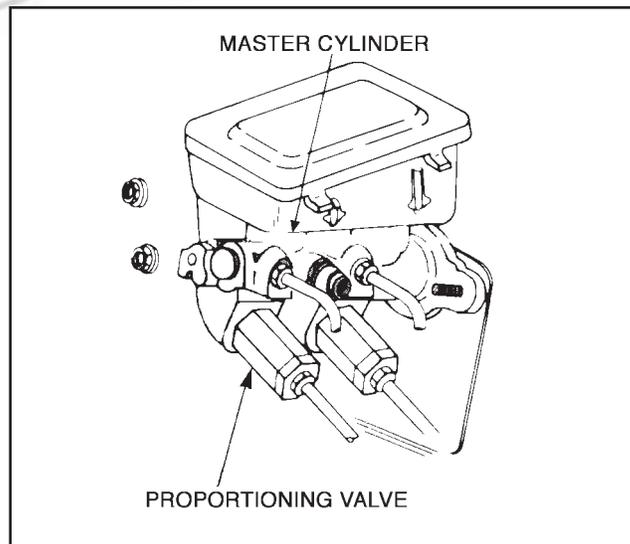
4. Position the replacement master cylinder on the firewall or over the booster mounting studs.

NOTE: The master cylinder flange should fully seat on the power booster face without applying pressure to the master cylinder piston. If it does not seat properly, the push rod must be adjusted or replaced (see "Adjusting the Push Rod" section that follows).

5. Loosely attach master cylinder to firewall or power booster with mounting bolts/nuts.
6. Working under the dash, attach the push rod to the brake pedal linkage (manual brake master cylinders other than Chrysler).
7. Remove temporary plugs from the brake lines. Also, remove bleeder tubes or plugs one at a time from outlet fittings or proportioning valves and connect brake lines to the master cylinder.

NOTE: Use the brass adapters supplied with the replacement unit if brake line fittings differ in size from master cylinder ports.

8. Tighten master cylinder mounting nuts or bolts to the manufacturer's specification.



9. Fill the reservoir to the correct level with fresh brake fluid. **NEVER** reuse brake fluid that has been drained from the system! Replace reservoir cover.

10. Bleed master cylinder by using bleeding screws, if so equipped, or the brake line fittings. Crack them loose one line at a time while an assistant applies medium pressure to the brake pedal. Tighten the fittings before releasing the pedal or air will be sucked into the system. **DO NOT** attempt to bleed air from hydraulic system by using the piston stop screw on the side or bottom of the master cylinder.

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11. Pedal should be high and firm after the bleeding procedure. If it isn't, bleed the entire hydraulic system using the bleeder screws at the calipers or wheel cylinders. Follow the manufacturer's recommended wheel order and procedure.

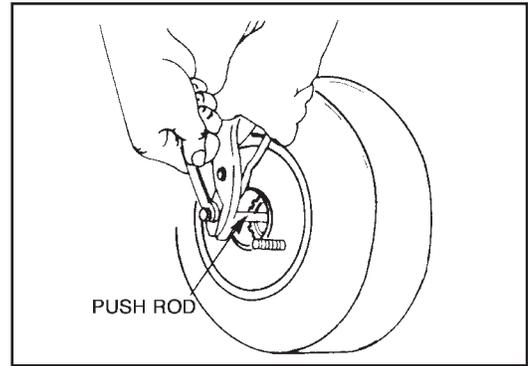
NOTE: Check master cylinder fluid level after bleeding each wheel cylinder. DO NOT allow the master cylinder to run out of fluid!

12. After completing the bleeding procedure, top off the reservoir, if necessary, and replace master cylinder cover.

13. Re-connect brake failure warning switch lead to master cylinder, if so equipped.

14. Re-connect the battery ground cable.

15. Be sure the brake system is working properly before moving the vehicle.



ADJUSTING THE MASTER CYLINDER PUSH ROD

NOTE: Correct push rod length is essential to reliable braking. If the push rod is too long, it causes the master cylinder compensating ports to be blocked off, eventually resulting in brake drag. If the rod is too short, excessive brake pedal travel and, possibly, a groaning noise from the power booster will be noticed. Check the adjustment of the push rod using the following procedure.

1. Remove the master cylinder reservoir cover.
2. Have an assistant depress the brake pedal slightly. Watch for fluid movement when the brake pedal is depressed 3/8" to 1/2". This indicates correct push rod length. On dual system master cylinders, fluid movement may occur in the front reservoir only.
3. If the pedal travels more than 1/2" before fluid movement is noticed, the push rod is too short. If nothing happens no matter how far the pedal is depressed, the push rod is too long.
4. To adjust the push rod's length, remove the master cylinder from the vehicle. Turn the adjusting nut in to shorten the rod or out to lengthen the push rod (see illustration).
5. If the push rod is non-adjustable, use shims between the master cylinder and the firewall or power booster to shorten it. If too short, remove the push rod from the master cylinder or power booster and replace it with one of proper length.
6. Install the master cylinder and recheck push rod length.

TROUBLESHOOTING CHART

PROBLEM	CAUSE AND POSSIBLE SOLUTION					
	INSUFFICIENT BRAKE FLUID	MASTER CYLINDER COMPENSATING PORTS BLOCKED	PUSH ROD OUT OF ADJUSTMENT	BINDING/DAMAGED PEDAL LINKAGE	AIR IN SYSTEM	CONTAMINATED BRAKE FLUID
BRAKES WON'T APPLY	X		X			
EXCESSIVE PEDAL TRAVEL/EFFORT		X		X	X	
SPONGY PEDAL				X	X	X
BRAKES DRAG OR WON'T RELEASE		X	X	X		
BRAKES GRAB	X		X			X

BRAKE INSTALLATION ALERT: The selection and installation of brake components should only be done by personnel experienced in the proper installation and operation of braking systems. The installer must use his/her own discretion to determine the suitability of the brake components and brake kits for every particular application.

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