

Brake master cylinder replacement

8-25-2010

I had replaced the front brake master cylinder a few years ago when it developed a bad leak, at that time, I ordered a new master cylinder from Spartan, very pricey, close to \$400 delivered. Last spring just before I started out on an 8000 mile trip I bled the brakes as I usually do before the first trip in the spring. I had noticed that the braking actions and the peddle feel had and was changing so I thought first I would bleed the brakes and then see how it goes.

During bleeding, front went well, then going to the back (there are separate master cylinders, front and rear), it didn't seem like the fluid was flowing as well as the front, my son reported that he felt the peddle hit a stop, I told him to push harder and when he did, something went BING! After that every time he pushed the peddle there was a definite BING sound, Didn't see much air in the system so we continued a few more brake operations. When I looked under the coach, there was a lot of brake fluid coming from the rear master cylinder. Each time the brake peddle was pressed and released, a new stream of brake fluid would come out of the junction between the air canister and the master cylinder. NOT GOOD! We were supposed to leave in an hour!

Searching the "net" I found a new master cylinder assembly in Sacramento, about 2 hours drive, so off I went. Got there and the guys very apologetically told me the box was mislabeled and it wasn't the right master cylinder assembly, further they checked with the manufacturer and there were none within 3 days of me.

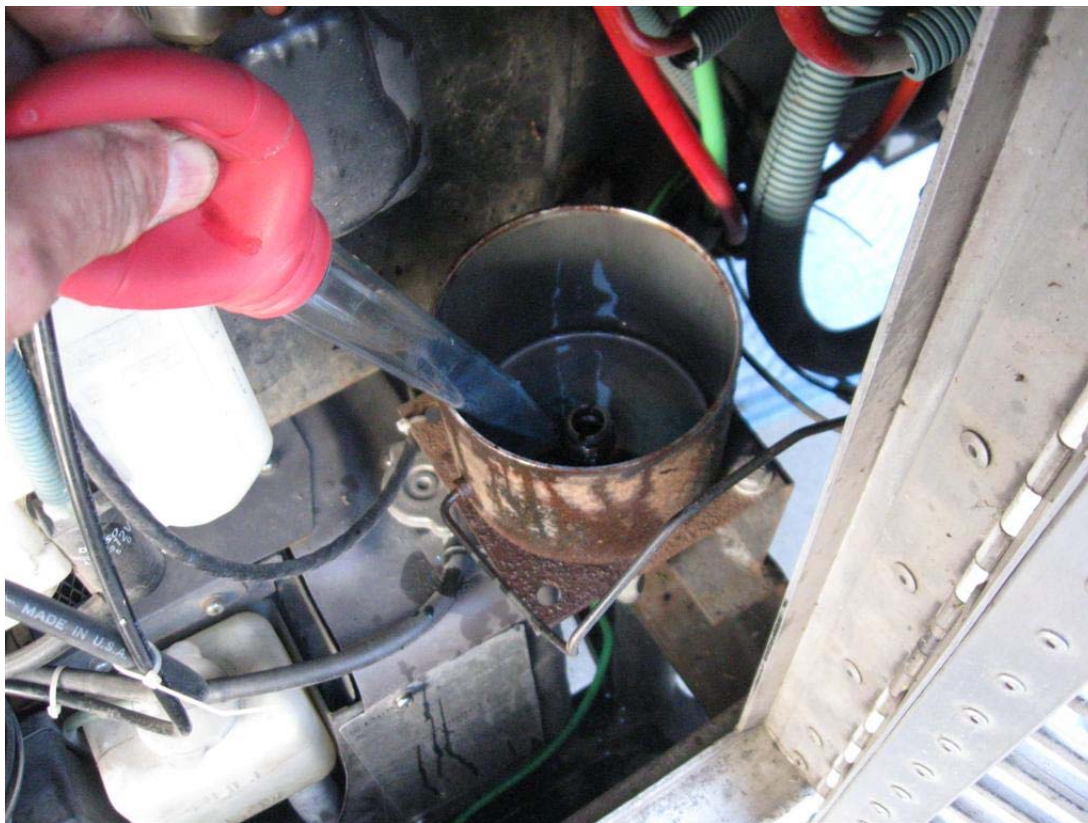
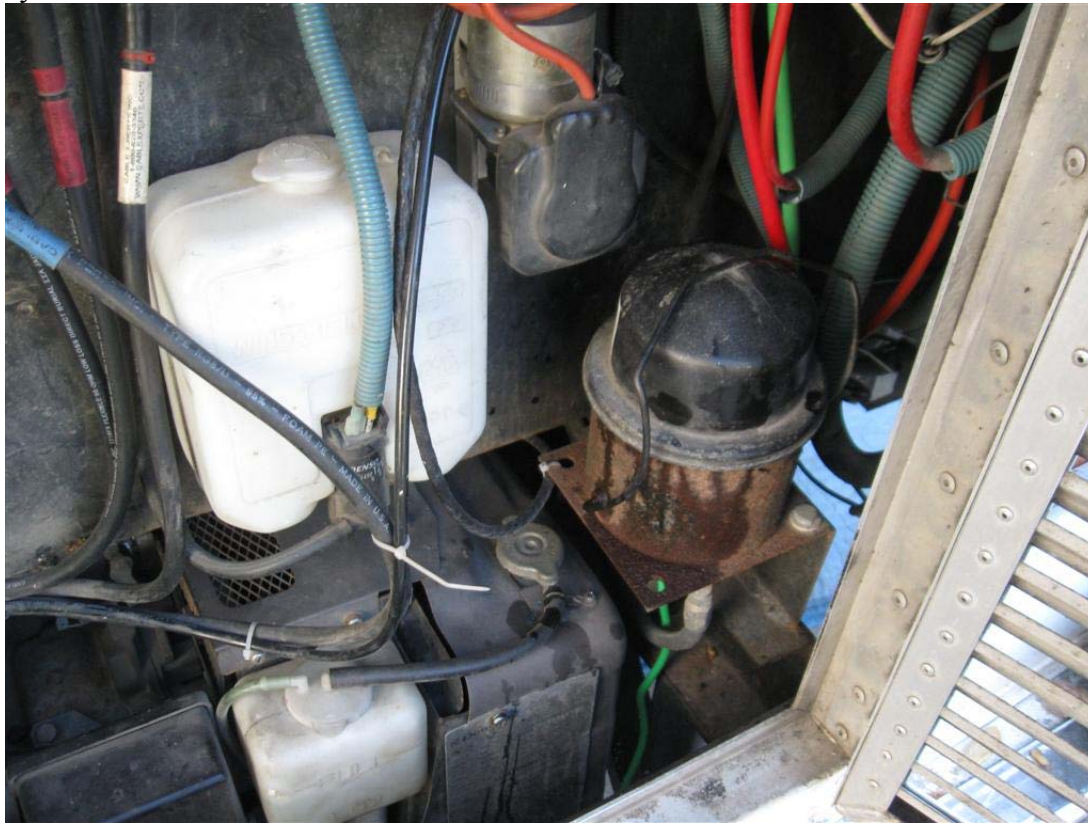
Another 2 hours drive and home, I looked at the situation and found that I still had the front master that I had taken out before, so I removed the rear master cylinder and disassembled both, exchanging parts to try to come up with something that would work for the trip. About an hour later I had a "rebuilt master cylinder" back in and re-bled the system. There still was a leak (just a drop or two) but it was on the low pressure side so it should be OK, I just had to check the fluid each fuel fill. After the second check the fluid stopped going down and stayed that way for the remainder of the trip. Brakes were OK but didn't have quite the authority that I thought was proper, reasoned that there probably still was a bit of air in the rear system.

During the last trip I stopped in Sacramento and picked up a new master cylinder assembly---price now was nearly \$800! They gave me a break because of my previous run up there returning empty handed. Still was nearly \$600. You can not get the master cylinder by itself, and no one on the West Coast can or does a rebuild, Spartan price is over \$700 for each assembly! We are stuck and have very few choices!

Today, I finally got around to replace the rear master cylinder. Job took about 1 hour. Bleeding the brakes took almost the same length of time. If done correctly it isn't a bad job, might be a bit messy, I tipped over a can of brake fluid, I usually do that, but there are few things to do correctly and be careful of!

1. NEVER use any other wrench on the brake line fittings other than a tubing wrench! There is usually a lot of corrosion around these fitting and is very easy to bugger up the fittings!
2. Always clean around the fittings BEFORE removal to prevent any contamination of the brake system.
3. Always use fresh, new fluid when replacing the fluid in the reservoir
4. Do not over tighten any fittings, particularly the air line to the air canister.
5. Check and double check for leaks often after the exchange, if there is any brake fluid leakage then air will get into the system and brake authority will be compromised!

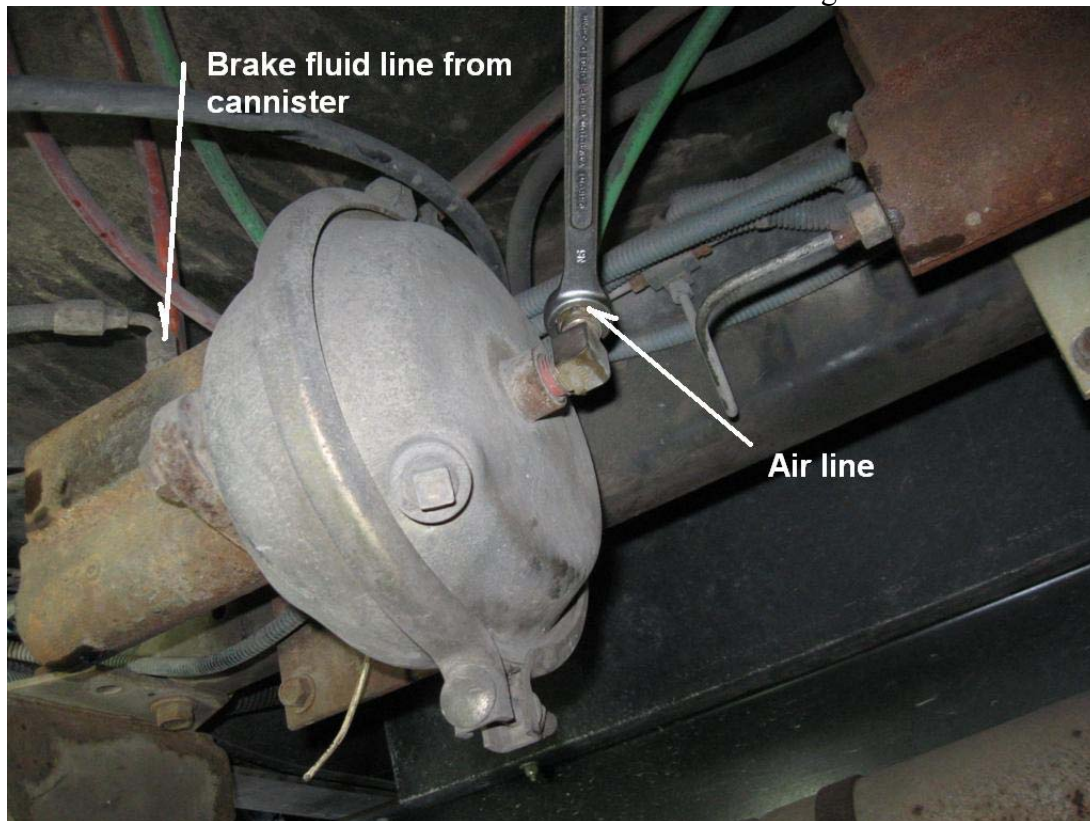
Start by locating the brake fluid reservoir and then use a CLEAN baseter, remove all the brake fluid, do not operate the brakes while the canister is empty, the canister supplies both front and rear master cylinders.



After the canister is empty, loosen the brake line from the master cylinder and let it drain into a cup, will save a lot of mess later.



While draining the master cylinder, remove the air line and the brake fluid fill line on top of the master cylinder. Also remove the electrical connection to the brake warning switch on the air canister.



Remove 4 bolts holding the assembly from the frame member and remove the master cylinder assembly.



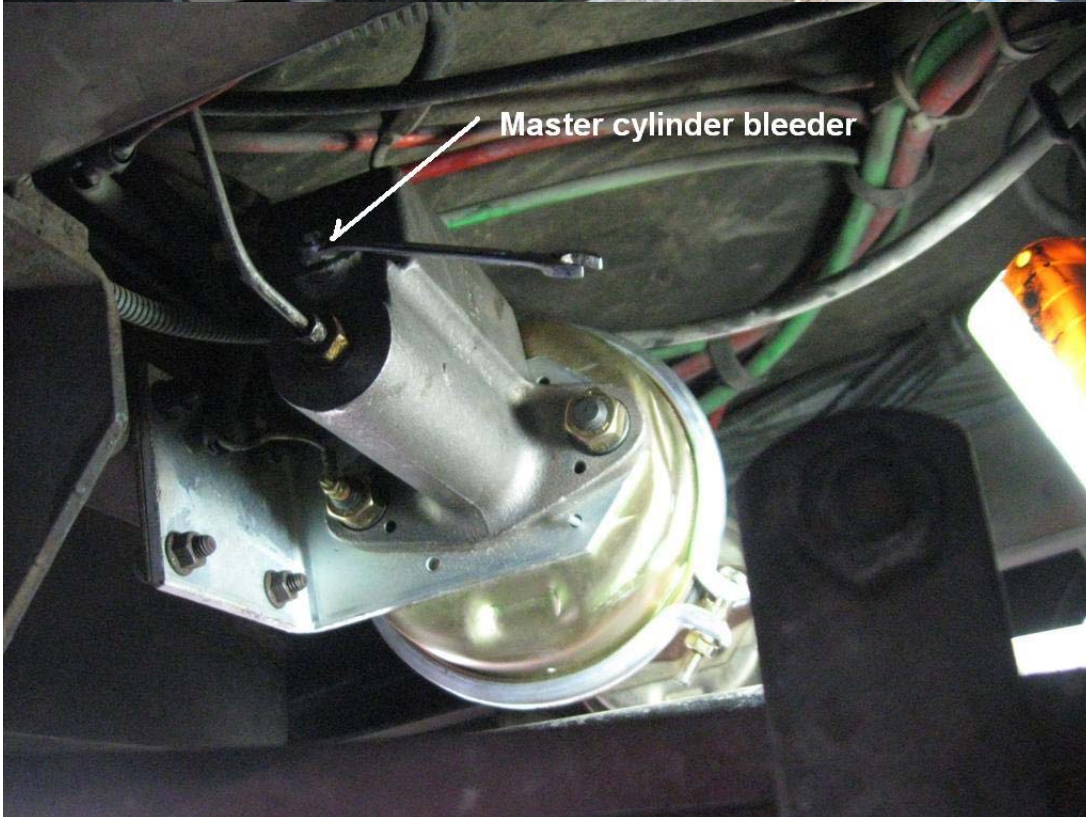
Once the old master cylinder has been removed, exchange three fittings from the old master cylinder to the new one. There is a "O" ring on the top fill connector which should be replaced and there is a CU crush washer on the brake line connection that should be replaced, Can be purchased at a good full service parts store.



Exchange all three fits from old to new, clean them well before re-installing them!

Re-install the new master cylinder using the original bolts, it is a good idea to turn them around so the bolts point to the rear of the coach.

After all the connections are made, brake fluid fill line, brake line, air line, and electrical connection, it will be time to bleed the master cylinder. Fill the fluid canister with fresh fluid and check for leaks on the fill line. Then open the bleeder screw on the master cylinder



If one has a vacuum bleeding system, it will greatly speed up the process, attach the vacuum hose from a small bleeding bottle and pull a vacuum with a small hand vacuum pump, once there is fluid pulled out into the small bottle close the bleed screw and proceed to bleed the entire system.



Before I start bleeding the system OR operate the brake peddle, I will now go to the brake caliper furthest from the master cylinder (in this case the right rear) and with a flat large screwdriver, force the caliper so that the pistons will be pushed back into the caliper housing, The small amount of air that got in to the disconnected brake line will be at the master cylinder end and would be pushed back into the master cylinder and will greatly speed up the bleeding process and reduce the amount of fluid required to purge all the air out of the system.

I always take care to have someone press the brake peddle firmly BEFORE I open the caliper bleed screw, I only open for a short amount of time and never allow the master cylinder to bottom out, if that happens air will get back into the system. I also use a small bottle container to catch the fluid each time I open the bleeder screw and watch for the bubbles to diminish, once I see no more bubble I tighten the bleeder screw and go to the other caliper, repeat the process back and forth between the two calipers twice and consider it finished!

Post Mortem:

Both master cylinders on my coach failed for the same reason and both failed immediately after a brake bleeding, WHY?

Corrosion!

In a disk brake system, the master cylinder usually moves the same amount no matter how good the pads are or how worn the pads become. We refer to this system as “self-adjusting”. The pressure applied to the caliper will force brake pads contact the rotor and when released, will only be forced back by a very small amount. The rotors are what forces the pads back, it is the very slight amount of eccentricity (rotor wobble) of the rotor that does this. So, even thou the brake pads wear, the amount of fluid needed to apply braking every time will be nearly the same. That also means that the movement of the master cylinder will be the same on each brake stroke.

Because the movement if the master cylinder is limited and the same, it will not move further down its bore and scrub off any contamination and buff the bore, only where the seals contact the cylinder bores will it be fairly clean and clear. With a build up of water in the brake fluid (braked fluid is hydroscopic, it absorbs water) the cylinder bore starts to corrode and if not scrubbed off by the piston in the master cylinder will degrade the quality of the surfaces that need to be clean and provide a tight seal to build brake fluid pressure.

During the bleeding process, when opening the bleeder screw, one allows a lot more fluid movement, which by default allows more piston travel in the master cylinder. The piston now will travel over areas that have heavy corrosion and in doing so will compromise the rubber seals on the piston required to make fluid pressure. After a few times the seals will break down and the master cylinder will start to leak. Leak can occur at either the high pressure side or the low pressure side. If it is the high pressure side, it will be obvious as the brake peddle, when brakes are applied, will slowly move downward as the fluid moves backward across the piston. If the leak is on the low pressure side it will be obvious by fluid leaking out. In either case, there is a chance that once the piston seals are gone, air can be induced into the system and braking effectiveness will go down. For safety the master cylinder should be replaced as soon as possible.

Am I saying that brake should not be bled? NO, absolutely, this should be done on a regularly scheduled basis BUT, be prepared on older vehicle that items may need to be replaced, particularly if good maintenance practices were not followed in past history!