PROJECT '63 - INSTALLING A DUAL MASTER CYLINDER & POWER BRAKE BOOSTER WITH GM STYLE PROPORTIONING VALVE

By Vann Von Luebben

Now’s a great time to shrug off those winter doldrums and work toward getting the Project '63 ready for some spring and summer fun. There are very few things that will keep you as warm as looking forward to breaking out your Chevy after a long and cold winter storage.

Our Project '63 now has a set of snazzy four-wheel disc brakes, now we need some reliable pedal pressure to make it all happen. The best way to accomplish this is by installing a dual master cylinder and power brake booster system. The old original single cylinder master cylinder did its job 50 years ago, but by today’s standards this system is unsafe and unreliable. In a single cylinder brake system, the front and rear lines are tied together as one. If a line or a hose suddenly “walks off the job”, you loose all you brake pressure. Additionally, GM did not install a proportioning valve in this system. Brake pressure was often not correctly distributed, or proportioned, between front and rear. The front wheels of the brake system bears 70 percent of the total stopping power. My 409 powered '60 still had the single master cylinder and original plumbing system. The headers ran so close to the left frame rail that it would heat up all the brake lines and cause very erratic brake behavior. Not the kind of thing that you really want to have happen. With this dual master cylinder power brake booster and proportioning valve system, we can eliminate this type of hairy situation. So, let’s leave that single cylinder stuff on the old farm tractor.

Tools Needed:
Basic Hand Tools, Socket Set & Combination Wrenches
Drill - 3/8 Drill Bit
Hammer (optional)
Paint Respirator (optional)

Parts Needed:
Power Conversions
563835 Dual Master Cylinder w/Disc
563186 Dual Master Cylinder w/Drum
Non-Power Conversions
564177 Dual Master Cylinder w/Disc
564042 Dual Master Cylinder w/Drum
535276 POR-15 Semi Gloss Paint
563594 Chassis Black Spray Paint
530121 Chassis Black Paint

Late Great Chevys offers four (4) different types of the dual master cylinder conversion. All four systems feature the superior stopping power of the dual master cylinder - choose power or non power, disc or drum! Our Project '63 now features kit P/N 563835, the dual master cylinder, power brake booster and GM style proportioning valve combination.

Photo #1:
This kit comes with everything you need for installation… booster to firewall brackets, dual master cylinder, GM style proportioning valve and brackets, protective sleeve, clevis, pin, cotter key nuts and bolts.

This combination is a perfect choice for Project '63 simply because it looks like a factory installation. Plus, hey, why not make it a joy to push that pedal; I opted for a kit featuring the power assist booster as well. The booster in this kit is a seven inch dual diaphragm unit. Being cadmium plated and smaller in size than a factory booster, it will look good and fit nicely. Who wants a large, ugly booster being the first thing noticed when you proudly pop the hood of your Chevy? The booster in
this kit requires 14 inches of manifold vacuum to properly operate. If you have a high duration camshaft and your engine makes less low RPM vacuum than an old rug sweeper, then you would want to also install a vacuum reservoir. You can get one of these little gems from your local speed shop or mail order.

Assembly:
Let’s get started. A good practice before starting any project of this size is to lay out all of the parts on a table or bench, ensuring that all parts are present before starting the disassembly process. Make sure your master cylinder is empty before you begin; brake fluid loves to eat paint and damage other materials. Use quality penetrating oil and spray the line nut coming out of the master cylinder and all the attaching hardware. Using a 3/8” or 7/16” line wrench, loosen the line nut and remove the brake line from the master cylinder. If it has been in place for some time, it may twist off. No problem if it does. It will be discarded anyway. Loosen the fitting on the other end of the same line. It is attached to the brass “T” distribution block below the steering column, at the left front wheel. Remove and discard this brake line.

Loosen and remove the two master cylinder nuts and washers. Remove the master cylinder from the car. Remember to immediately clean up any spilled fluid even if your car has lousy paint. Brake fluid can eat the paint and possibly contaminate the surface for future paint and body work. Since you’ve already decided on the master cylinder/power booster combination per your application, you may want to clean off the fire wall and get it looking nice at this time… that’s what I did (hmm, maybe I’ll should do a detailing article)? You’re now ready to begin assembling your new booster.

Bracket & Booster Assembly:
**Photo #2a, 2b & 2c:** Test fit the brackets and bolts to the firewall and then to the booster. The brackets and the booster should be oriented as shown below. There is a one way check valve on the booster. I oriented ours so that the valve is in the 10 o’clock position as seen on factory boosters. I recommend installation this way due to personal preference; but, I do not know of any physical reason that it cannot be oriented in another position. Do not completely tighten the bracket nuts and bolts at this time. Leave them snug, this will allow for final adjustments on the car. Set the assembly aside on the bench.

**Photo #3a & 3b:** From inside the car, loosen and remove the pedal clevis and push rod. Locate the original hole on the pedal swing arm. The new push rod and clevis assembly will mount exactly one inch below the original hole (Photo 3a). Our swing arm had a smaller hole already drilled in the exact location that the new rod will mount. I just drilled it out to the correct size of 3/8-inch (Photo 3b.) The new hole location changes the angle and travel of the rod for use with the new booster. Don’t forget your safety eye wear when drilling this hole.

**Pedal Assembly & Detailing:**
**Photo #4a, 4b, 4c & 4d:** I went on a treasure hunt through several boxes of parts to find the Project ‘63 pedal assembly. I found the assembly looking like this (Photos 4a). Since it was already out of the car, I decided to freshen it up a bit. I had the luxury of using a bead blaster to clean off most of the scale and rust. A machine shop can do this for you at a nominal charge. I gave the assembly a quick coat of POR-15 semi-gloss paint PN 535276, (Photo 4b & 4c). Great stuff that POR-15! Be sure you use a proper painting respirator. I applied some ant-size to the studs and reunited the assembly with project 63’s firewall (Photo 4d).

**Photo #5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h & 5i:** Now it’s back to your bench or table. Install the white protective sleeve over the rubber accordion style boot (Photo 5a, 5b & 5c). Next install the push rod into the booster (Photo 5d & 5e) and then the clevis onto the push rod (Photo 5f & 5g). I like to give everything the aircraft style three thread minimum test;
Attaching The Swing Arm To The Booster:

From inside the car, connect the swing arm to the clevis. Do not lock the clevis pin in with the cotter key at this time. Set the cotter pin in place so the clevis pin does not fall out and get lost, (Photos 6a & 6b).

You're now ready to assemble the master cylinder to the booster. You will want to bench bleed the master cylinder meaning there are at least three threads protruding from the clevis and three threads into the booster. The clevis opening should be vertical. The clevis has to engage the pedal swing arm when installed in the car. Again, I used ant-seize on the threads. When you have everything properly aligned, tighten them and the double lock nut (Photo 5h). I put a bit of clear sealant on the opening inside edge of the white protective sleeve at this time. This will ensure a good seal between the sleeve and the firewall. Fit the booster assembly to the car by sliding the brackets over the studs on the pedal assembly protruding out of the firewall. If you installed the booster brackets incorrectly, the booster will not bolt up. In this case, remove the booster and flip the bracket to the other side. Trust me, I know (Photo 5i)! Again, do not completely tighten the bracket to firewall nuts at this time as other final adjustments may be needed.

Master Cylinder Installation:

The proportioning valve bracket comes to your door in primer. This may be a good time to scuff down the bracket with some 320 sand-paper. Then paint it the color of your choice. I used P/N 563594 chassis black in the spray can. It also comes in quarts P/N 530121 (Photo 7a). Do not sand through the primer; scuffing the primer down provides a good mechanical bonding surface. Apply a little anti-seize to the stud threads then mount the master cylinder to the two studs supplied on the booster. The master cylinder should slide over the studs fairly easily. I’ve found with some boosters the studs need a little tweaking one way or another. If this is the case, using a soft block of wood as an insulator, tap the studs with a

before final installation of the brake lines. Bench bleeding got its name because most mechanics will mount the master cylinder on a bench like this (Photo 6c). Next you attach temporary lines to the outlet orifices and point the open end of the lines back into the master cylinder. The cylinder is filled half full of brake fluid. Then, take the push rod plunger and manually actuate the cylinder. Of course when it’s all said and done, you have a sore hand from the push rod and fluid all over the place because fluid will continue to leak out through the master cylinder outlet orifices.

I like the idea of mounting the cylinder to the car and getting everything set in place first. Then I temporarily connect the master cylinder brake lines to check for fit and finish. I then remove these lines and install aforementioned bleeder lines, which allows me to bleed the master cylinder on the car. The brake pedal mechanism now does the work naturally, instead of the push rod trying to punch a hole in my hand. It’s nice, neat and simple. So, if you choose to bench bleed the cylinder do so now, we’ll wait for you. Otherwise, for the rest of us it’s time to proceed to the master cylinder installation.
hammer. With this installation, everything went together nicely (Photo 7b). Once dry, after installing the master cylinder, slide the proportioning valve bracket over the studs. The bracket should mount so that the flat surface (where the proportioning valve bolts to) will be outboard of the engine, closest to the left (drivers) fender well (Photo 7c). Tighten down the master cylinder mounting nuts evenly. The shop manual does not give a torque value, but you want them tight. Use caution to not over-tighten as this could crack the cast iron master cylinder. Generally, I tighten these down hand snug then approximately 1/2 to 3/4 of a turn more (Photo 7d).

Photos #8a, 8b & 8c: You’re now ready to mount the proportioning valve. For this application, it mounts on the bracket only one way. You want the rubber plug to the front and the orifice on the opposite end to the rear. This will make the machined-in bosses face outward for the bolt heads to tighten down on like a built in washer (Photos 8a & 8b). The bolts go through the valve from the outboard side and the nuts will face the engine. Insert a bolt then the lock washers, one on each bolt, followed by the nuts (Photo 8c). Tighten everything down hand snug then approximately 1/2 to 3/4 a turn more like you did on the master cylinder.

Adjusting The Assembly:

Photo #9:
Now with everything in place and somewhat snug, remove the protective caps from the master cylinder orifices and slowly actuate the brake pedal. Be watchful for any interference, noise, or ratchet-like operation. The reason for leaving everything snug, but not completely tight, is so you can push or pull up or down on the system to achieve a smooth swing of the pedal. It took a few minor adjustments to make this system on the Project ’63 have just the right angle for smooth operation. Once you happy with the way everything is working, go back and tighten everything down. I tend to use the 1/2 to 3/4 turn rule for things without a torque value. Now permanently install that cotter pin on the swing arm clevis. My aircraft training shows again, as I bent the pin in a “bow”. This way nothing can snag on it later. In this photo, you can clearly see the cotter pin installed aircraft fashion and the location of the clevis pin in the new hole (Photo 9). With everything permanently tightened down, you’re now ready to fit your master cylinder to proportioning valve lines.

Checking Cylinder To Valve Line Fit:

Photo #10a, 10b, 10c, 10d & 10e:
The master cylinder to proportioning valve lines included in the rear disc brake kit P/N 563178 that we installed on Project ’63 are for four-wheel disc brakes. These are actually installed in an “X” or criss-cross pattern. I needed to tweak the lines a little bit by bending them slightly. This is normal, I think every line I’ve ever installed, factory or not, required a bit of adjustment somewhere along the way. If you are installing 4-wheel disc brakes your lines should look like this when you’re done, (Photos 10a & 10b). If you were using rear drum brakes, your proportioning valve lines would be different than on our four-wheel brake car. You would use the lines that came in your master cylinder/booster kit. These lines connect in a more “traditional” way (Photos 10c & 10d). The front outlet orifice on the master cylinder is plumbed to the front inlet orifice on the proportioning valve and the rear of the master cylinder goes to the rear of the proportioning valve. Remember to leave your lines connected, but not completely tight. When you are finished with the installation, you will need to remove them to bleed the master cylinder before you bleed the entire system. You cannot bleed both the cylinder and the brake lines together as one operation. By the time you have this system installed, we’ll be ready to start on our brake line plumbing! Stay warm, keep cool!