

# Master Cylinders and Fluid

Dr. Robert

Do you have the proper master cylinder and fluid in your Morgan? Here's another practical tech article from the office of the Morgan Doctor with 33 years as a Master Morgan Restorer and connoisseur of all things Morgan.

As I have been sitting at my computer lately and redoing the Morgan Spares illustrated parts catalog an important point came to mind as I was making some minor changes to some of the brake system stuff. By the way the new catalog has lots of nice stuff added to it like external chrome, sheet metal and other neat stuff. It may be done on DVD this time instead of paper.

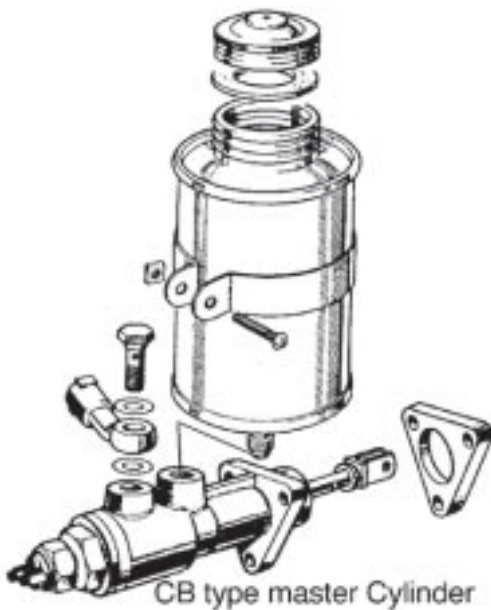
This tech article is meant to draw attention to a brake system situation that I have seen a number of times on cars that have rolled through my shop over the years. This is a *very important word of caution* to all Morgan owners with drum brake cars that may at some future time or may have already been converted to disc brakes.

As the brake shoes wear both in the front and the rear of the car, the pistons in the wheel cylinders move outward a little at a time and in doing so they create a void behind them that must be continually filled with fresh fluid from the master cylinder reservoir.

Morgans from 1950 through 1955 used a cast iron master cylinder with a separate reservoir that was produced by Girling

and know as a "CB" (compression barrel) master cylinder.

Girling choose to produce at this time a cast steel (yes there is a difference between cast iron and cast steel) master cylinder without an integral reservoir. This may have been because it was hard or maybe cost



prohibitive to cast a steel master cylinder with an integral reservoir. We shall never know for sure nor does it really matter.

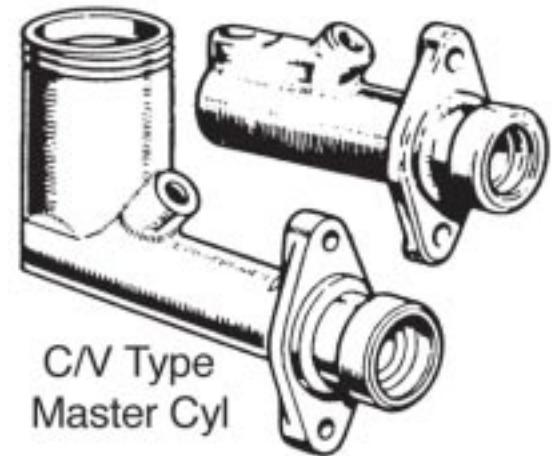
So they supplied a steel cylinder with a separate reservoir to hold the fluid. This type of setup had the reservoir screwed right into the top of the master cylinder. It used no separate feed line like the later aluminum cylinders with a separate reservoir. It also is identified on a Morgan by the mounting of the brake light switch in the very front of it.

Let me wander off my path here for a moment. Morgan cars that were equipped with this type of cylinder also used a 4 way union instead of a 5 way. It's that little brass thing mounted on the chassis just left of the master cylinder that has the master cylinder feed line, front lines, and rear line attached to it. Why you ask a 4 way instead of a 5 way? Because there was no need to mount a brake light switch in this union as long as the switch was mounted on the master cylinder so a 4 way union was all that was needed. But with the introduction of the aluminum master cylinder there was now no place to mount a

brake light switch. So Morgan adapted the 5 way union and the extra port was used to mount the switch in it.

Girling then began to produce an aluminum master cylinder with and without an integral reservoir. This is know as a "CV" (center valve)

master cylinder. In engineering the master cylinder with the integral reservoir, Girling no doubt took the size of the reservoir into



account so that it would hold enough fresh fluid to fill the void behind even the largest of their wheel cylinders and the cars that were so equipped.

Girling's famous disc brakes were not being produced yet. I have seen this style of master cylinder with two sizes of reservoirs, a small and a large. Girling also produced, if needed, an extension reservoir for this style master cylinder. This integral reservoir master cylinder no doubt saved major car manufactures some money in no longer needing to supply a separate reservoir, bracket, and feed line on each car built.

Then Girling produced their famous disc brakes which Morgan began offering as an option and then installing as standard equipment while still offering drum brakes up front for a short time. At this time Morgan continued using the "CV" type master cylinder but no longer with an integral reservoir. Why you ask? It was because of the added large volume behind the caliper pistons.

And here is the main focus of this tech article. I have seen a number of Morgans converted to disc brakes and some original Morgans with disc brakes fitted with the master cylinder with the integral reservoir. Owners of some original disc brake cars have confessed that their cars were done this way. Why? Because it was cheaper to buy the integral reservoir master cylinder than the one that might also need the supply tank replaced due to rust in it. They do get rusty. Lots of these Morgans were done in this way during their restoration. The master cylinders were either missing or frozen up and the supply tanks were also either missing or full of rust. The others were done during their conversion from drum to disc brakes and some during routine maintenance.

So let me finish my point. The added volume in the brake calipers is large enough to drain out the small integral reservoir found in the master cylinders as the pads wear. I have personally heard of this potential disaster happening at least twice. It's not very nice to suddenly have air instead of fluid in your braking system.

So what is a Morgan owner to do if you have a disc brake car equipped with the master cylinder with the integral reservoir?

The safest bet is to:

1. Change the master cylinder and add the supply tank, bracket, feed line and 5-way union.
2. Add a reservoir extension.
3. Keep a faithful eye on the fluid level as the front pads wear and top up the fluid as needed.

As a professional restorer, number 1 is all I would do, with the

third being the responsibility of the owner to faithfully do often.

Also a word of caution concerning brake fluid. I must have been asked this question hundreds of time over the years.

"What kind of fluid is okay to use in my Morgan?"

1. Girling fluid. With Girling brakes installed on a car, which all Morgan's came equipped with until recently, they must use Girling's own brake fluid. Why? Because Girling brake seals are made out of natural rubber and any other fluid will, over time dissolve the seals and the brakes will fail. Not so with Girling fluid.

2. Silicone fluid, yes it can be used except in one instance (more on that below). A full drainage of the system is recommended. What I do is drain the reservoir and fill it with silicone fluid. I then pump the silicone fluid out each corner of the car until pure silicone fluid comes out. You can tell the difference between the two because they are like trying to mix oil and water. I use the NAPA brand and it is purple in color which is really nice to see when it is coming out. Silicone fluid will not fix worn seals in cylinders, it only will prevent further problems caused by water in the system.

How in the heck did water get in my brakes since I put brake fluid not water in it? Regular brake fluid is a hydropscopic. It sucks up moisture out of the air. Silicone fluid is non-hydropscopic so there is never a moisture problem to worry about.

This is the main reason for brake failure, moisture in the fluid hence the reason lots of classic car owners use silicone fluid. Aluminum (Girling) brake parts take a big hit from the moisture. The cars sit around and some moisture tries to work its way into the brake system. Remember the brake reservoir is open to the atmosphere through the little vent in the cap, that's all it takes!

I talked to a brake fluid technician years ago and he said that if you leave a can of brake fluid open it is useless after 1 hour because of the moisture it sucks out of the air. So the best way to do silicone fluid is to rebuild the brakes as needed and fill

with silicone.

I once saw a car that I restored 18 years after I did it. It was a 1958 4 seater with drum brakes front and rear and filled with silicone fluid. The brake cylinders and master cylinder were like brand new all around.

2A: The one instance that silicone fluid won't work. The "CV" (center valve) master cylinder used on early Morgans make their seal around the center piston as it passes through a stationary rubber seal. I was told by the tech people who produce silicone fluid that it can cause the rubber seals in brakes to expand up to 10%. That's okay for a seal that moves back and forth against a bore but for one that seals on the inner part of itself around a moving piston 10% is bad.

I clearly remember the first "Flat Rad" that I did with silicone fluid and I spent the better part of a day trying to bleed the system out. Man did it drive me nuts. Just remember that when you think you have it all figured out there's always a curve ball on it's way. I just could not get a good head of pressure coming out of the master cylinder. After numerous disassembles of the master cylinder I called the brake fluid manufacturer out of desperation and bingo my problem was solved and I used Girling fluid.

What you can do if you desire to have silicone fluid in this braking system setup is to update the early steel master cylinder with an aluminum one. As stated above, if you have drum brakes use the master cylinder with the integral reservoir. What is needed besides the master cylinder is the proper aluminum spacer that goes between the aluminum master cylinder and the chassis and a five-way union so you have a place to mount the brake light switch.

Call the Morgan Doctor at 360 582-9020 for help.

Happy Morganeering!

Robert Couch Sequim Wa.

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