

Rufus - Tandem Brake Master Cylinder:

Introduction:

The standard brake master cylinder on an early MGB is single line in which a single piston supplies brake fluid to the entire system. Obviously any failure of the hydraulic system to either the front or rear wheel brakes will result in failure of the complete hydraulic braking system; although you will still have a handbrake (try remembering that in an emergency).

Later MGB's had a tandem brake master cylinder operating in conjunction with a brake booster (brake servo) powered by vacuum from the inlet manifold. This tandem master cylinder cannot be fitted to an early MGB pedal box without a servo as the mounting holes are horizontal and not vertical. You cannot re-drill the pedal box as it is not wide enough. In any event an excess of pedal pressure would be required.

A tandem brake master cylinder has two pistons, one behind the other (in tandem) which supply two individual and separate circuits therefore failure of one part of the system does not affect the other circuit. In the event of failure of one part of the braking system the other circuit will provide reduced stopping power.

To enable better control of the car the front brakes** are generally applied before the rear; this is achieved by the circuit that operates the front brakes being pressurised by the piston closest to the master cylinder pushrod.

Note.

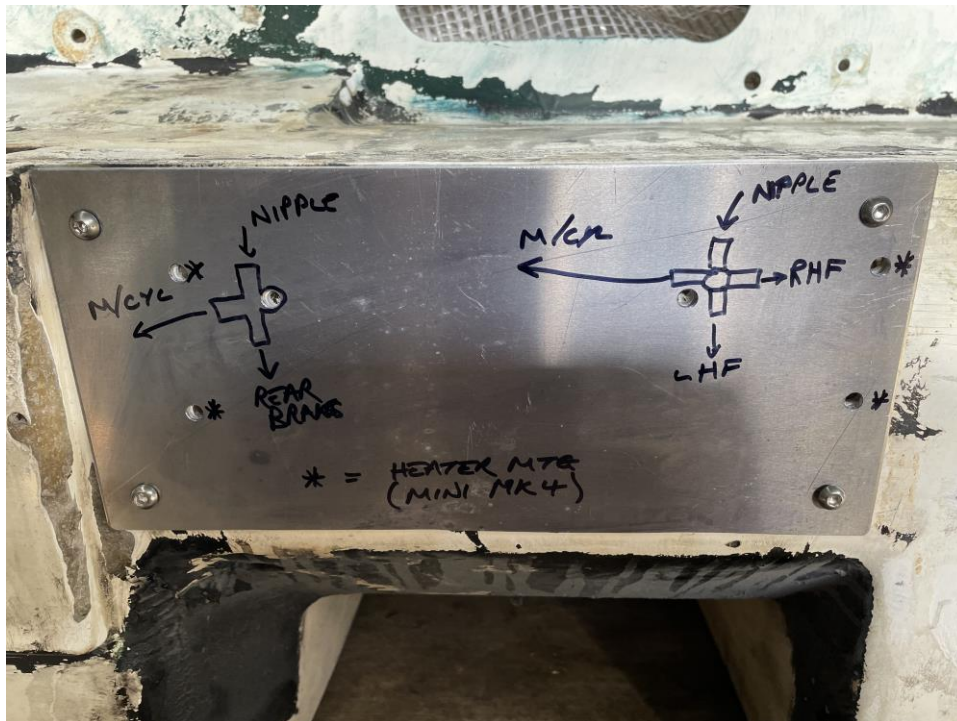
*** I can remember Mike Hailwood being interviewed after a race and told that his rear brake wasn't working properly; his comment was he wouldn't know as he very rarely used it.*

Due to weight transfer under braking the front brakes tend to wear more than the rear which means the front brake circuit will require more fluid to top up the system as the brakes wear down. To prevent all the fluid leaking out of the reservoir in the event of brake failure of one circuit the reservoir is also split, the section that feeds the front brakes (the one closest to the pushrod) is normally larger.

For safety's sake a tandem brake master cylinder is preferable to a single line system.

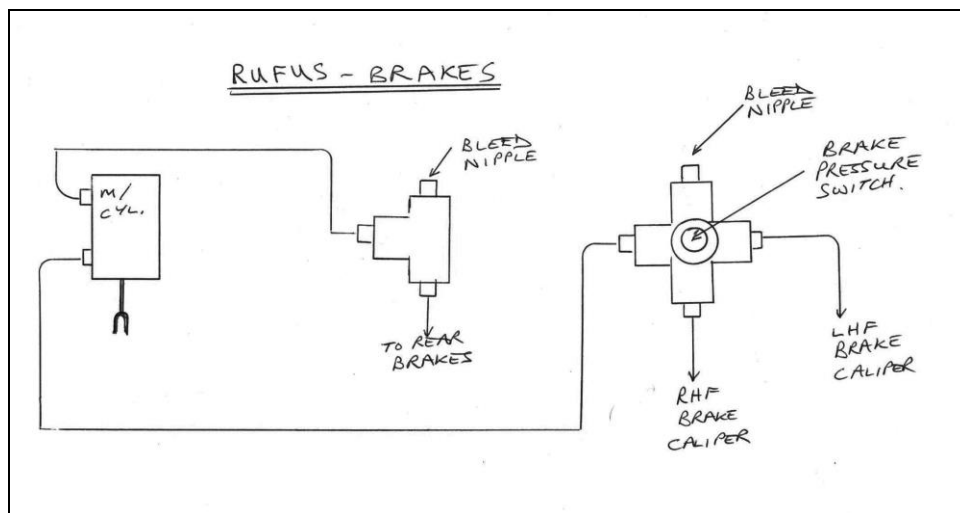
The braking circuit on Rufus:

There are various methods to plumb in a tandem brake master cylinder. I decided to choose the easy option and used two brass unions; a 5-way and 3-way as I already had them. These will be bolted to a 3mm thick aluminium plate which is bolted to the vertical bulkhead area above the gearbox. The aluminium plate also reinforces the front mountings of the Mini MK 4 heater.



The master plan.

A schematic diagram of the pipe connections is shown below. Of course I could have run a single pipe from the master cylinder directly to the rear brakes but because of the way I intend to assemble the car I want a union in the system.



A neater plan.

Choosing a tandem master cylinder:

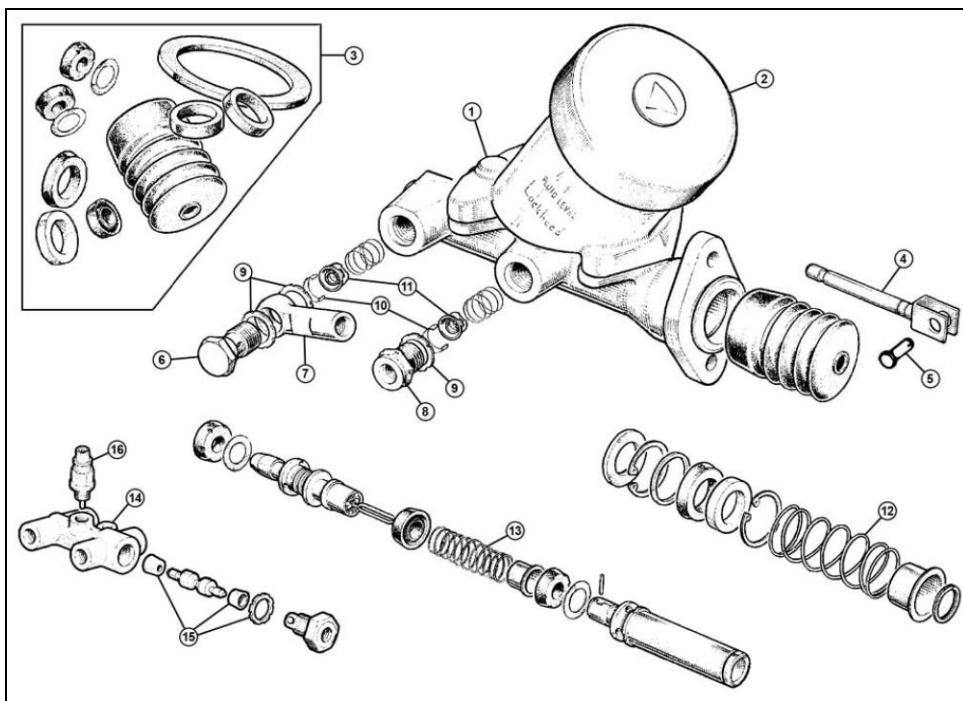
I did not want to fit the later MGB tandem master cylinder and servo (brake booster) plus associated bits as in my view it is not necessary, a servo wasn't needed on the early MGB's and an NG is lighter so what's the point? Emma my TD has a very nice, non-servo, tandem master cylinder that works perfectly without excess pedal pressure so I wanted to fit one like it to Rufus. After considerable research I discovered that Emma's brake master cylinder was fitted to the Morgan Plus 4 and Plus 8 cars. New master cylinders are still available at an eye watering £385. I decided to seek an alternative.



Emma's £385 tandem brake master cylinder.

To be honest I did consider at one stage fitting a Triumph Spitfire master cylinder. At 17.5mm diameter it's slightly smaller than an MGB one. In theory this would give a longer pedal travel but two pistons supplying separate circuits would offset this somewhat. The main problem is that being longer it would extend an inch or so into the bulkhead

During my research I discovered that some MGB's exported to America were fitted with a non-servo tandem master cylinder. Aftermarket copies of the USA master cylinders are available in the UK from £62.95, I checked one out at my local parts supplier and the label on the box said 'Made in China' so I decided to upgrade. OEM (Original Equipment Manufacturer) items being available for £93.60 (both subject to postage). Unfortunately there is a catch, the cylinder is not supplied with items, 10 and 11 or the adjacent spring** in the rear port of the diagram below, nor do they supply the rear port banjo union or the operating pushrod.



The USA tandem master cylinder.

Note.

Items 10, 11 and the spring make up a 'Residual Check Valve' which keeps the fluid in the pipeline under slight pressure which gives a better pedal feel. I suspect that as it is not supplied it was deemed by the manufacturers to be unnecessary. There is one supplied for the front brakes and I may decide to fit an in-line one for the rear brakes. These are readily available at circa £16; of course for optimum effectiveness they should be fitted as close to the master cylinder port as possible

Despite the apparent problems after investigating alternatives (and encouraged by David Woolgar) I decided to purchase and fit the USA master cylinder. I purchased my master cylinder from Rimmer Bros. using 'click and collect'. They offer free tea, coffee and biscuits and have a nice collection of vehicles for you to look at, plus a small 'boot sale' of second hand items. When my parts (I also bought a new clutch master cylinder) were handed to me in pristine sealed boxes I was more than pleased. The only downside to the click and collect experience was that they had run out of biscuits.



The above aftermarket USA spec. tandem brake cylinder is available at £62.95.



A better alternative the OEM cylinder for £93.60.

Fitting the USA spec. tandem master cylinder:

The USA spec. master cylinder bolts directly to the standard early pedal box without modification. The cylinder body behind the mounting bracket fixing point is 6-3/8" long which fits neatly into the 6-1/2" space available, but you need to fit the brake cylinder before you fit the pedal box as the diagonal dimensions of the master cylinder exceed 6-1/2" and you also have to add on the bit that pokes through the bracket. As suggested by David Woolgar there is a way to gain a bit of extra room; namely, fit a rubber blanking grommet in the bulkhead to the rear of the master cylinder. I purchased a gearbox blanking grommet from the MGB Hive, the plan being to fit the pedal box (then the master cylinder as a stand alone item) before sliding the blanking grommet into place. This will make future access easier.

With the cylinder in position and the brake pedal trial fitted I determined that a pushrod 80mm long was required; to retain an amount of pedal adjustment I purchased an adjustable pushrod.

The next problem is to connect the brake pipes to the master cylinder. As mentioned earlier brake banjo bolts and unions are not provided with a new master cylinder and are not generally available from the suppliers of the USA spec. master cylinder; although both Rimmer Bros. and Moss Europe supply the banjo bolt they do not supply the banjo.

One solution is to replace the banjo union with an adapter/reducer similar to that fitted to the port for the front brake line, item 20 in the sketch, these adapters were a common fitment on the later 1500cc MG Midget's, but again they are not readily available from MG Parts Suppliers.** The answer is to make your own or have one made by an engineering firm.

Note.

*** Although not readily available at the moment the main suppliers have the adapter/reducer annotated 'NCA' (Not Currently Available). This is much more encouraging than 'NLA' (No Longer Available). I shall leave the manufacture of a suitable adapter/reducer for the moment and with a bit of luck they will be back in stock before I need one. I shall also search for one at the September Beaulieu Autojumble.*

Plumbing in the system:

Although there are likely to be some exceptions MGB's use 3/16" brake pipes and 3/8" UNF x 24 TPI (threads per inch) fittings. My complete system will be bespoke (homemade) as probably the only standard pipe will be the one across the rear axle.

IVA Test:

The fitment of a tandem brake master cylinder is an IVA Test requirement. The following extracts from the IVA Test Manual refer.

1. The vehicle must be fitted with a split (dual) circuit brake system with each part of the system operating on at least two wheels (one on each side), capable of operating in the event of a failure of the service brake or its power assistance.
2. It must be possible to check the specified minimum level on all brake fluid reservoirs by the actual fluid level being visible through a transparent section of the reservoir, with the minimum level marked permanently on to this section. As an alternative, a red warning lamp must be capable of illuminating when the reservoir fluid falls to the minimum level.

Summary:

In my view a tandem master cylinder is an essential upgrade for any restoration and there are various ways to do it. If your car has yet to pass the IVA Test then the fitment of a USA spec. Tandem master cylinder will 'almost' achieve compliance; I use the word almost because the master cylinder reservoir is not marked with a level line, but this is reasonably easily achieved.

The USA tandem master cylinder is fitted with a sloped reservoir, which is not very aesthetic. Apparently the reservoir can be replaced with the vertical one from a Triumph Stag, it should be noted that the complete Triumph Stag master cylinder is not suitable for an NG car as the mounting holes are incorrectly positioned.

Acknowledgments:

My thanks to NG owners and fellow Forum members David Woolgar and Edward Stubbs for their contributions towards increasing my knowledge of the MGB braking system; in particular making me aware of the MGB USA spec. Tandem Brake Master Cylinder.

I hope this article helps anyone else considering the fitment of a tandem brake master cylinder.