

Six to One Brake Pedal Modifications

Several years ago I was doing research on brake systems with the idea of upgrading the brakes on my white pearl Tiger. This led to a lot of reading of published information on brake system design and the realization that a pedal mechanical ratio of six to one was essentially an industry standard practice. For reasons that are not clear, the Rootes Group designed the brake system used in Sunbeam Alpines and Tigers with a pedal ratio of approximately four point four to one and added a vacuum/hydraulic booster to obtain acceptable brake pedal pressures.

At that time, I designed a new pedal system for my Tiger and had my shop machine up a couple of prototype pedal assemblies with this 6 to 1 ratio.



Figure 1. Here's the prototype pedals still sitting on my shelf, waiting to be completed. Note that the clutch replicates the OEM configuration, whereas the brake was designed as a dual master cylinder design with a balance bar which is not shown.

Well time flies, things happen, and this new system is still sitting on my shelf waiting for the next restoration of my Tiger. I was discussing this situation with Bill Martin of the current Rootes Group in Santa Clara. He had made some prototype efforts with the modification of the stock pedal system and was finding that it was difficult to get the full stroke of the pedal without having the

actuation rod rub on the internal retaining ring in the Girling master cylinder. So I went home and looked up some of my old design work and spent several hours in AutoCAD looking for a design that

gave the 6 to 1 ratio with a very flat movement of this 5/16 diameter Actuation Rod. It turns out that moving the pedal pivot point both to the rear as well as down, gave a much improved travel path for the Actuation Rod.

So I located some surplus brake pedals and created the tooling necessary to machine a new pin location on the OEM pedal, the hardware to modify the OEM pivot, and the adapter to space this pivot to the desired location. I took this prototype hardware to Tigers United 33 in Los Angeles, where I gave a technical session on Tiger development. I also discussed this hardware with Dale Akuszcwski of Dale's Restorations. He was quite interested and offered to install a prototype system for evaluation.



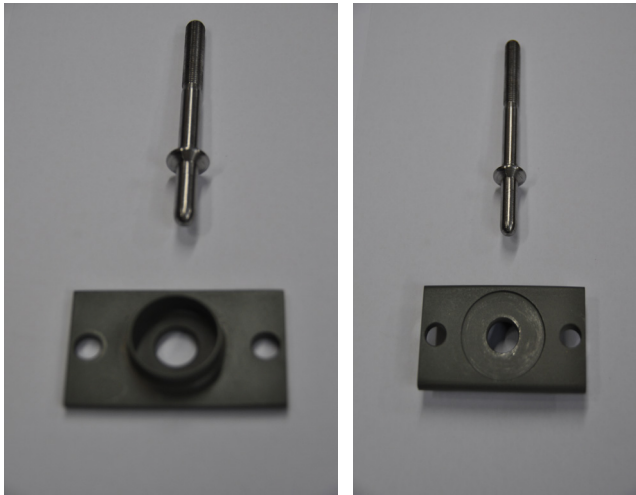
Figures 2 & 3. Here's a comparison of the OEM pedal and the MTE 6 to 1 modified brake pedal. The aluminum adapter that relocates the modified pedal pivot both back and down is shown. Also shown here is the relocation of the pedal pad, so that the pad remains the same distance from the floor.

After some successful evaluation, he wanted to

ModTiger Engineering - Tech Tips

try this design with the Wilwood 1" Tandem Master cylinder he had been using. This Wilwood package provides a straight Actuation Rod with no mechanism for retention, so that the Rod and brake pedal are free to move to the rear. As most of you know, the OEM Girling Master Cylinder designs have an internal stop, held in place with an internal snap ring, which keeps the Actuation Rod and thus the pedal, retained and in close proximity to the internal piston.

Some more hours in AutoCAD yielded a new actuation rod and an additional plate to be located on the interior of the firewall that provided both the retension requirement and also a mount for the rubber boot that comes with the Wilwood cylinder that keeps dirt out of the piston area.



Figures 4 & 5. Here's the new Wilwood Actuation Rod and the Retainer Plate that captures the rod. Note that the plate is counterbored to the precise depth of the Master Cylinder at the inside of the firewall and the outside has a ring to hold the rubber boot that protects this area from dirt.

So now I have two basic Kit designs. One that works with the standard 7/8" Girling Master Cylinder, and the second that works with the 1" Wilwood Tandem Master Cylinder. Both of these designs provide a mechanical ratio that makes the vacuum booster virtually unnecessary, in that it raises the foot pressure you apply to the pedal by a factor of about 1.5 to 1, mechanically, which is about the same amount as the booster does with its vacuum/hydraulic system. It's possible to use this basic system with other master cylinders that have been used on Tigers or Alpines, but they will need review and may need more design, and or, hardware to work successfully.

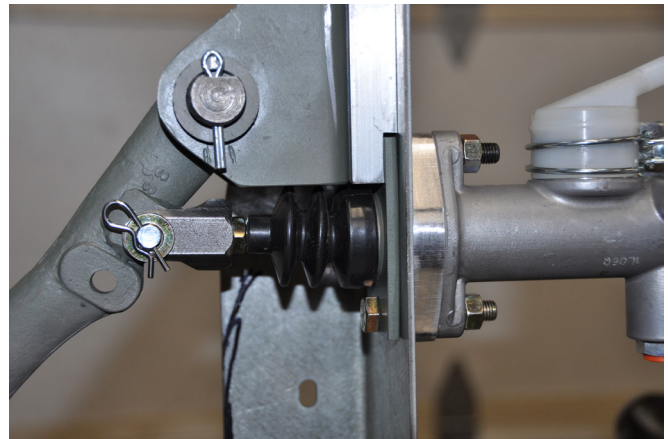


Figure 6. Here's a closeup of the Wilwood assembly showing the Retainer plate, the rubber boot and the Adjustable Clevis and jam nut. This clevis allows you to set the pedal height to your personal preference. The Girling configuration is essentially the same, but uses the OEM conical spring and stamped retainer. The galvanized plate also visible here is shimmed to the precise thickness of the firewall panel, and I use it to set and test the internal length of the Actuation Rod to minimize free play.

Attached to this tip are the pages I developed that show all the pieces involved with the two currently available modification kits. I need your pedal assembly as the input for this modification, as well as the pivot assembly and in the case of the Wilwood cylinder, I also need the 1/2" firewall spacer to custom fit the actuation rod.

Both of these kits contain a new clevis assembly that allows you to set initial pedal height to your preference and all the hardware necessary to reinstall them into your chassis.

Current pricing on the Girling Kit is \$500 and \$550 for the Wilwood Kit. I can supply the Wilwood Master Cylinder with my Kit, and I need it to pre-assemble the Kit and determine the exact internal length of the Actuation Rod. I also need the 1/2" Firewall Spacer used with the Girling Master. If this is not sent with the brake pedal assembly, I will have to supply one at extra cost.

This Kit will work with other master cylinders not tested so far, but I will need the cylinder to determine the suitability of the related components. It may also require further engineering design efforts and new components.

If you have questions or want to discuss this Kit, please e-mail me at: modtiger@comcast.net