

## How to achieve 1G force braking

*Text and photos by Goran Malmberg  
Bromma, Sweden  
PI European master mechanic*

**T**he brake master cylinder has long been a subject of vigorous discussion and debate. Some problems include: lack of repair kits, the proportioning valve is stuck or nonfunctional, the brake-warning switch is broken and on and on. Top this off with the fact that the whole pedal casting is next to impossible to dismount from the car.

This is my idea on how to solve all of these problems. I have invested a great deal of time in my brake system trying to achieve higher stopping power. Right now, my biggest problem facing me is in trying to balance the front and rear braking power. Until now, I been using a Wilwood brand, adjustable proportioning valve. Even with this device, I find that it is insufficient and that I am still locking up the front wheels. This is true even with a full front braking reduction adjustment on the proportioning valve.

My approach is to abandon the servo, reduction valve and dual piston master cylinder. My new brake configuration incorporates a brake balance bar, as on my previous Pantera.

The whole set up consists of two Wilwood master cylinders, and one Wilwood balance bar kit. The balance kit includes a one-inch piping that must be welded in place on the brake pedal arm.

In addition, I have fabricated a cutout at the same level as the original bracket that attaches to the brake cylinder rod. By taking this extra step, I am now allowed to return to the original set-up if desired.

The pedal stand must be modified for the two cylinders as depicted in image number 1. There is a large hole for the brake booster that has to be filled up to the sides.

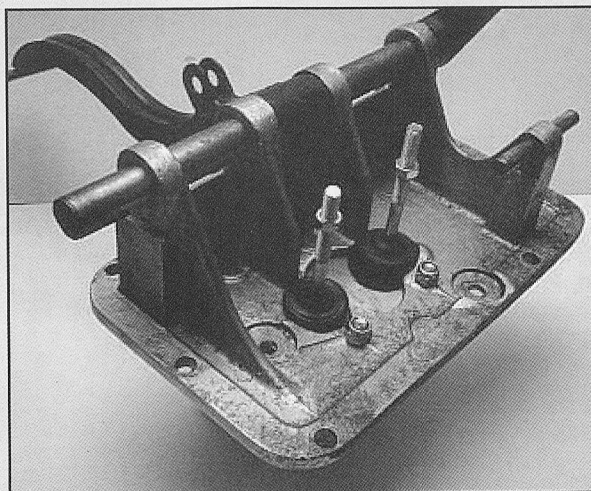
For a flat mounting surface and to get rid of the large "booster hole" I selected an aluminum adapter plate to mount the cylinders.

For easy adaptation, I used stud bolts for the cylinder mount as shown to the right in image number 3. The two top studs are tapped all the way in to the pedal casting reinforcement on the pedal side. The two lower stud bolts are supported or secured by two nuts.

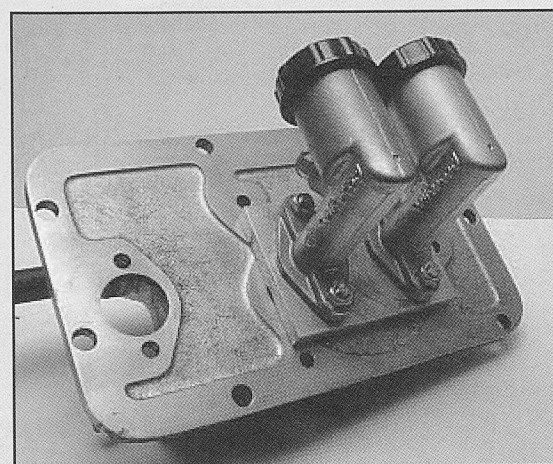


*You've built a strong motor with over 4-500 horsepower. How are you going to stop that speeding bullet? Goran shows us how you can have positively riveting brakes. Make an appointment with your Chiropractor before following these steps!*

**Image 0:** This is the pedal arm with the balance tubing in place.



**Left: Image 1:** The aluminum adapter plate Goran selected for mounting the cylinders.



**Right: Image number 3:** The cylinders are mounted with stud bolts tapped all the way in to the pedal casting reinforcement.

While we are at it, I think it is a good idea to tap in two stud bolts for the clutch cylinder.

The whole setup with the balance bar in place is shown in image number 2 to the right. The extending 7/16 balance bolt is there if one prefers to attach a wire remote adjustment control on the dash or console.

My front calipers have slightly larger piston area compared to the original Girling units and about twice the area of the standard rear calipers. Therefore, I use a 5/8ths inch piston rear master and 1 inch front cylinder. This may be a good starting point even with the Girling front caliper. The presentation of the completed installation is very impressive.

Without a remote control, the driver must go under the dash with one arm to adjust the balance. But that is not hard work. Of course, a manual brake is quite a bit harder to handle.

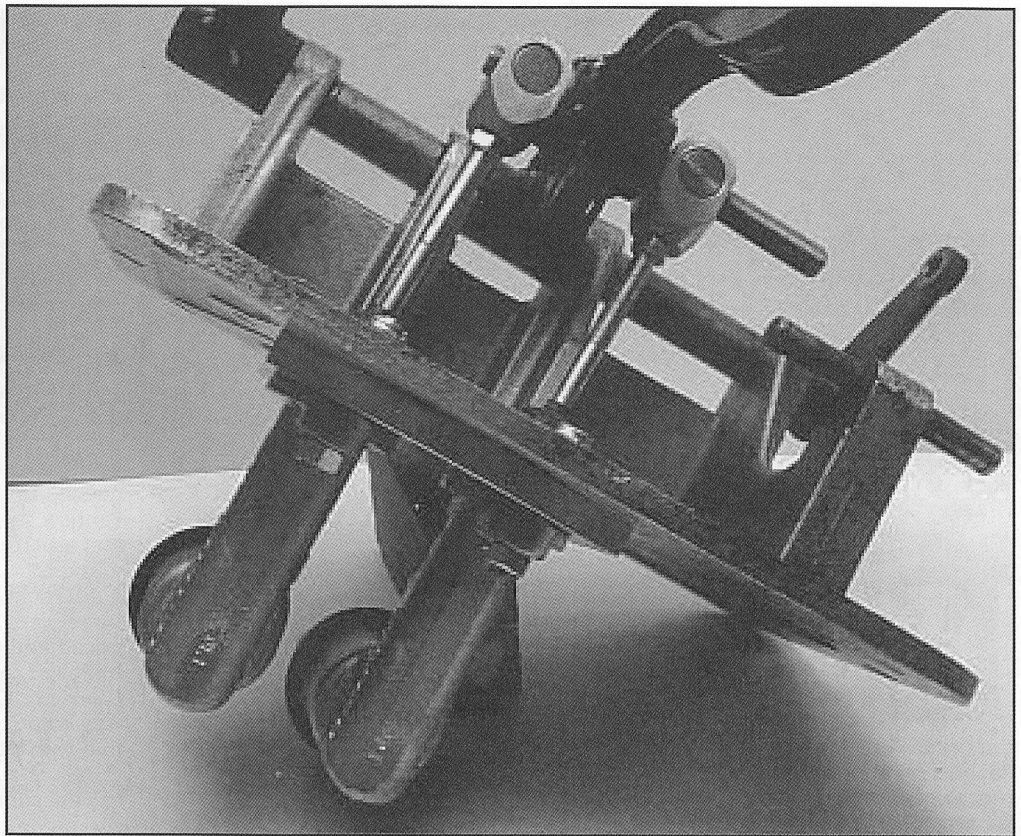
More than convenience, we must remember that a Pantera is a very fine sports car and by properly adjusting the balance, you will discover that it is now much easier to brake at the limit of traction, which is the most important factor in my estimation.

Finally, it is mandatory that you use regular brake fluid. NO silicone in this high gear-piston ratio manual system. These small master cylinders do not tolerate any "flex" anywhere. And bigger "masters" makes the brake pedal way too hard and will dramatically increase the effort.

Shown to the right is the cutout made in the pedal housing on the car. This is sufficient to be able to remove the pedal arrangement from the car. Sweet isn't it?

In conclusion, it will be *VERY* interesting to sort out the braking in the approaching driving season. Up until now I have posted a best braking power of 1.06 continuous G's at 60-30 mph. This is a gain from 0.92 G's as a starting point with the formerly overwhelmed and underpowered, front calipers. By reducing the front braking, I raised the figure to 1.06 G's over my former brake system. Hopefully, I will now be able to brake even harder.

Goran Malmberg



**Above:** Image number 2 demonstrates the entire assembly with the balance bar in place. The extending balance bolt is used to attach a wire remote adjustment control. Adjustments can be made by the driver in flight. Some drivers prefer not to have access from the cabin to the balance control. Decide which is right for your application and driving skills.

## One G Braking Balance Bar

**Below:** The cut-out is shown in the pedal housing. This greatly speeds the installation and removal of the pedal mechanicals.

