

Brake Overhaul Tips – GS1000S

by James I. Almuli

I prepared this how-to as a way of giving back to BassCliff's excellent website and the good folks over at the GS Resources forum who have helped tremendously with the restoration of my Suzuki GS1000S.

If you're reading this, you probably have an interest in overhauling the brakes on your GS. If you're in need of a little extra motivation, just remember that good brakes are the only thing standing between you and an accident when an emergency situation happens (note I said *when* not if).

Enough preaching, let's get started. You'll need a few special items to complete the job before starting. You'll need a container to collect the old brake fluid and to bleed the air out of the brake lines after the overhaul is done. You'll also need clear (transparent) plastic hoses to carry the fluid from the calipers to the container. The lines must be clear so that you can see when air bubbles are present. In the case of my bike, the breather screw nipples required 9mm tubing for a good fit. If you go the pickle jar route, try to drill the holes in the top so that the tubing fits snugly to reduce chances of spillage.



Before the calipers can be removed from the bike, all the brake fluid must be drained from the system. I found it practical to start by opening the reservoir on the front master cylinder and draining its contents with a syringe.



..... next remove the plastic ring plate and the diaphragm



Oh, now is probably a good time to say a word or three about brake fluid. As you can see from the pics, I didn't use gloves, but was careful to always wipe my hands clean with rubbing alcohol whenever I got some on, and had no problems. However it probably would have been wiser to use latex gloves for protection.

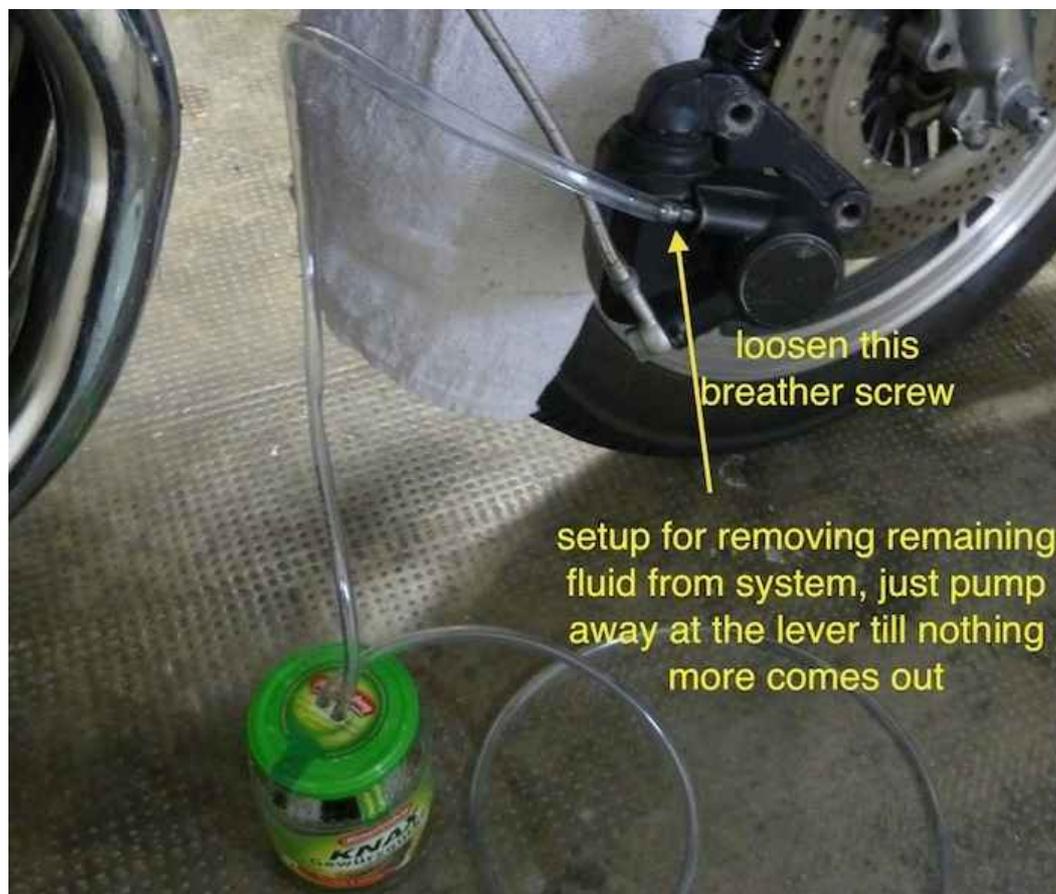
Speaking of which..... it *is* imperative to protect the bike from any brake fluid spillage because it works as a wonderful paint stripper and you really don't want this stuff ruining your bike's paint job. Note the drop cloth thrown over the tank.



While you're at it, inspect the inside of the reservoir for any gunk that shouldn't be there. If cleaning is required, loosen the 2 screws visible inside the cup and remove it. Be prepared to exert some force as (on my bike at least) the plastic cup is a tight fit on the master cylinder body proper due to the presence of a sealing o-ring. In my case, there was enough gunk in there to warrant disassembly. I also wanted to inspect the tiny breather hole underneath the reservoir to make sure it was not blocked (it wasn't).



To remove the remaining fluid in the brake lines, place the cap temporarily back on the reservoir (don't bother with the diaphragm for now) and get a hold of your pickle jar and lines. Connect the lines to the nipples atop the breather screws.



Once the clear tubing is attached to the breather screw nipple, turn the breather screw about $\frac{1}{2}$ a turn counter-clockwise to open it. Now go back to the brake lever and pump away – keep pumping until there is no fluid left in the brake lines. Again note old towel protecting fender from brake fluid spillage.

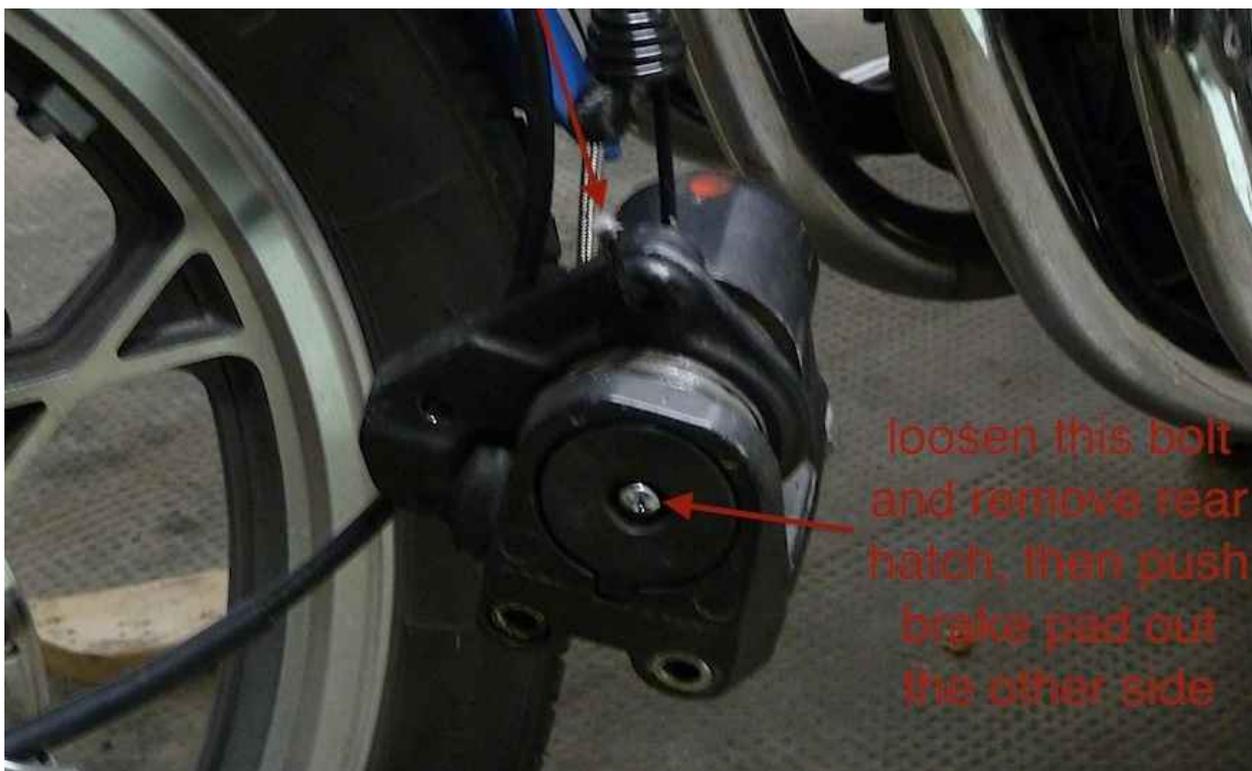
In the picture, the caliper has already been removed from the fork legs, but I would recommend you do this only after all the fluid has been drained from the lines.

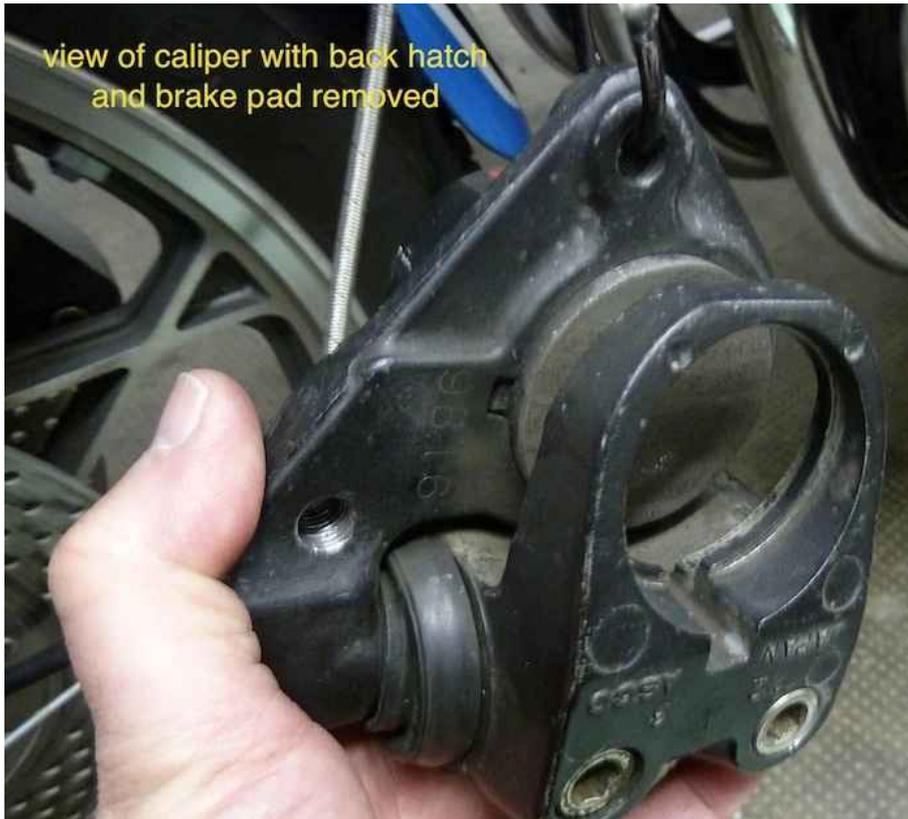
Next, remove the caliper from the bike by removing the 2 caliper mounting bolts and the “banjo” bolt which connects the brake line to the caliper. Place some old newspaper beneath the caliper to catch any remaining brake fluid that might dribble out of the loosened brake lines.



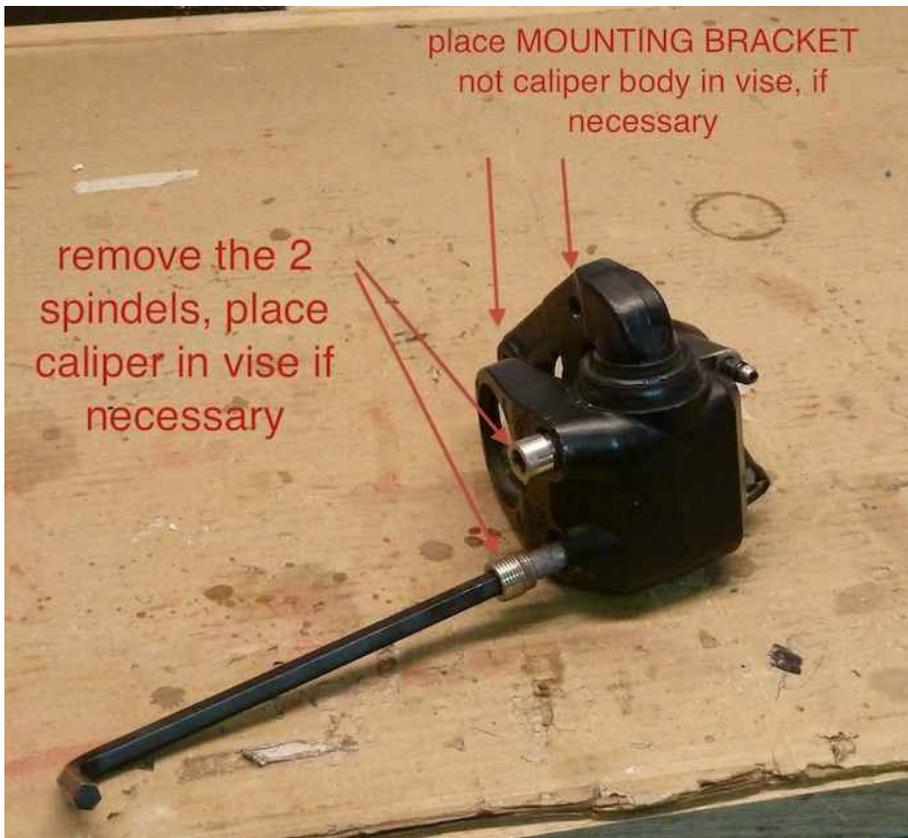
Once the banjo bolt has been removed check it for any gunk clogging up its passages.

You can now start disassembling the caliper. I started while it was still attached to the brake line, but in hindsight it would be better to do it on the work bench. Anyway, begin by loosening the bolt at the back of the caliper that holds the inside brake pad to the black plastic hatch. Then push the brake pad out towards the center of the caliper and it should just fall out. If it's still within its wear limits, place it aside until reassembly.





Next remove the 2 spindels that connect the mounting bracket to the caliper.



You might need to place the caliper assembly in a vise to do this. If so, place the **bracket**, not the caliper body in the vise so as to avoid warping it.

Once both spindels have been removed, pull out the bracket and remove the other brake pad if it hasn't fallen out on its own already.



Note how dust boot is dry and cracked, it will need to be replaced. Inspect the inside of the caliper cavity, if there's crud inside, clean it out with a stiff wire brush and kerosene.

Inspect the spindels, if they are badly corroded they will need to be replaced. Minor surface rust, can be polished off, but if they look like the one on left, replace it.



Now comes the hardest part of the brake overhaul, removing the piston. The best way to do this is to use compressed air blown into the banjo bolt hole. Trust me on this, if you don't have access to a compressor, take the caliper to any automotive or bike shop and ask them to blow the piston out for you. Trying to pry out the piston with a screw driver, or most other mechanical means, will likely damage the piston like this....

damage to piston caused by "chiseling" it out instead of using compressed air



With the piston removed, pull off and discard the old rubber piston boot.

Ok, with the piston out, inspect it and the cylinder cavity for gunk or corrosion. Mine were pretty clean, fortunately. If yours are not, clean them out.



Next remove the piston seal from inside the cylinder. A dentist's pick works great for this, but the tip of an Exacto knife will work too. Whatever method you use, be careful not to score the cylinder walls.

By the way, I believe it's good practice to replace *all* rubber components when you perform a brake overhaul. These parts might be dry, cracked and, in any event, decades old, which certainly warrants their replacement. Your brake caliper is now disassembled, not much to it, huh?

If you are performing a restoration, you'll likely want to repaint the calipers. First, give them a good cleaning with hot soapy water, then lightly wet sand them with 400 or 600 grit sand paper. Thoroughly wash them again and finish preparing them for painting by masking off all the openings. Your Exacto knife come in handy here too. I used engine block paint on my calipers, but if you can bear the expense, sending the parts off to be professionally powder-coated yields the best results.



Once painted, the calipers can be reassembled. Here's what you'll need:



First, take a new piston seal and give it a thin coat of clean brake fluid. Now place the piston seal inside the groove for it in the cylinder wall. Start at any one point in the cylinder wall groove and work your way around with your fingers until it's all in. Next, use an old ¼" paint brush and give the whole cylinder a light coat of clean brake fluid.

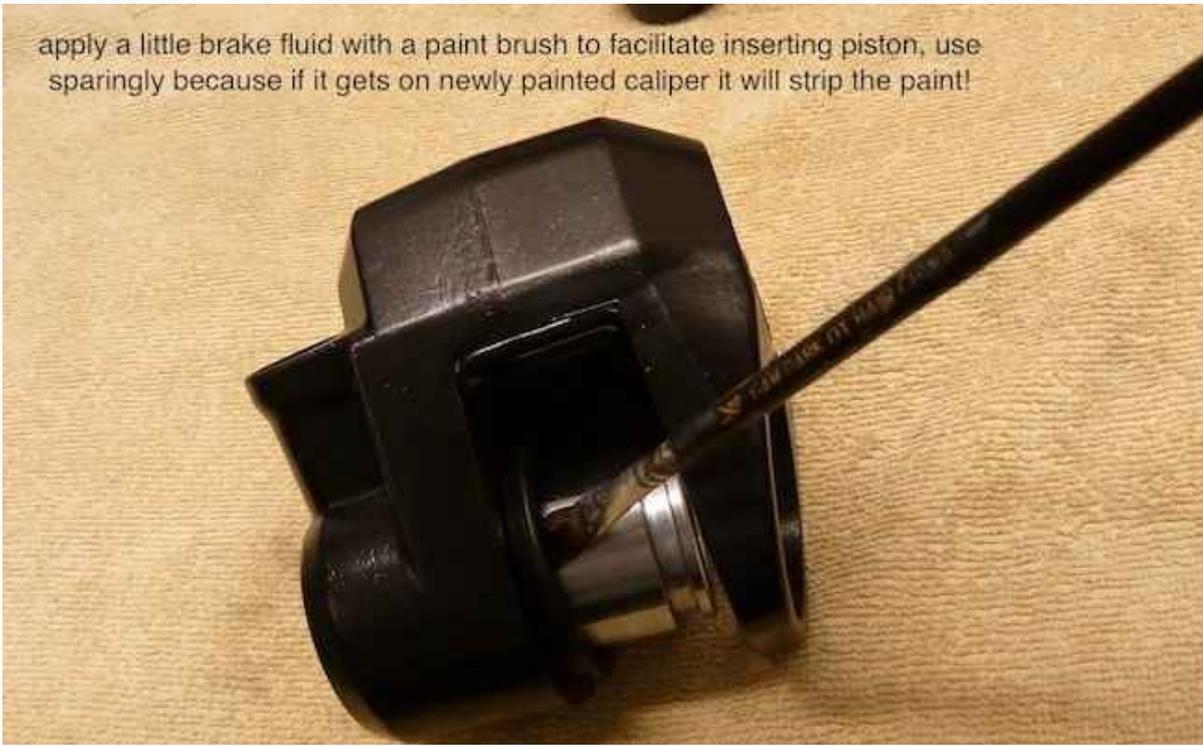
Now for the tricky part: installing the piston and new piston boot. I suppose there might be more than one way to do this, but for me, the easiest was to pre-fit the piston boot onto the lower piston before installing the whole assembly in the cylinder. Note that the piston boot has 2 ridges: a thin *outer* one that fits into a suitably sized groove near the top of the cylinder wall (above the piston seal) , and another thicker *inner* one that fits into the groove at the top of the piston.

Place the piston boot on the piston so that its lower lip just hangs a little beyond the end of the piston as per the picture. Start fitting the piston & boot assembly into the cylinder by fitting the boot's outer ridge into the groove in the upper cylinder wall. I used a small flat head jeweler's screw driver to help push the boot into the groove and got the last bit in using a paper clip end bent to get into the tight space. Be patient and make sure that your tools' edges are not so sharp as to tear the boot rubber. Call me nuts, but I actually radiused the end of my "paper clip tool" with some sandpaper to remove any sharp edges.



Once your piston & boot assembly is properly fitted into the cylinder it should look like the picture below. Double check that the piston boot is properly fitted and give the sides of the piston a *thin* coat of clean brake fluid to facilitate the next step.

apply a little brake fluid with a paint brush to facilitate inserting piston, use sparingly because if it gets on newly painted caliper it will strip the paint!



I found that using a pistol-style clamp was easiest way to re-install the piston.

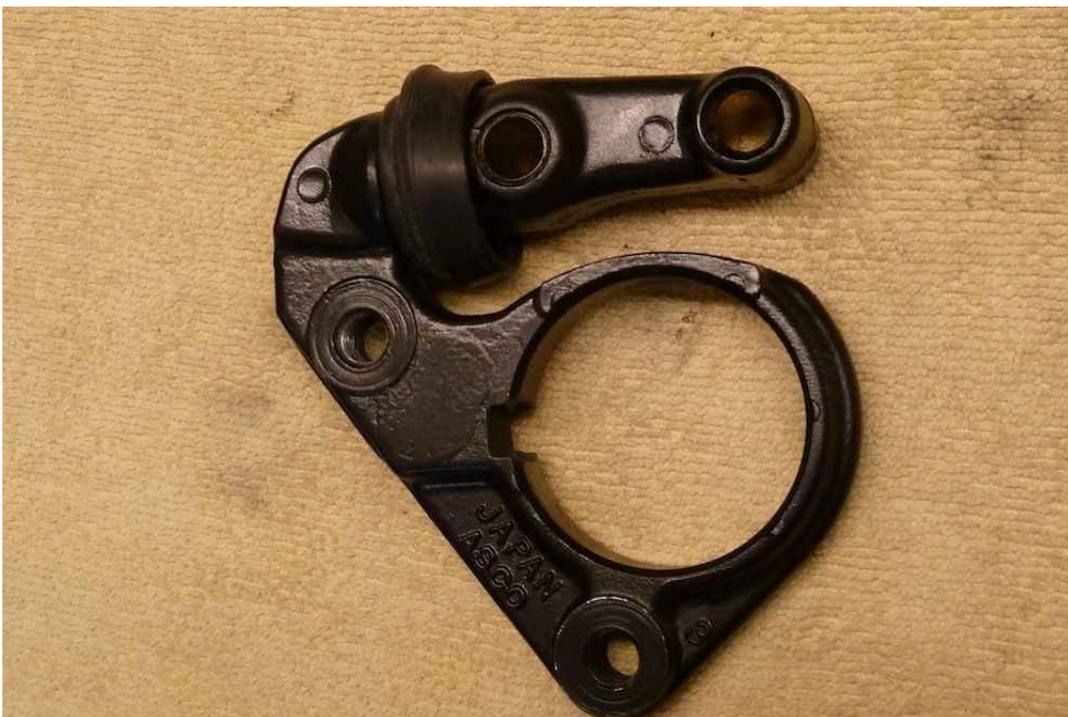
use block of wood suitably sized and pistol-style clamp to help insert piston



A suitably sized block of wood (approx $\frac{3}{4}$ " x 3" x $1\frac{1}{4}$ ") gives the clamp the needed reach through the caliper body. Using the pistol-style clamp push the piston all the way into the cylinder. The inner ridge of the piston boot normally pops into the groove at the top of the piston once the piston is all the way in. (make sure this happens).



The next step is to pre-install a new dust boot on the mounting bracket. I found a little petroleum jelly helped get the boot sliding along the bracket body.



Before re-installing the bracket and spindels to the caliper, take a moment to notice the position of the *threads* on the spindels. They are different and only the front one takes 2 o-rings. After installing the o-rings, give both spindels a liberal coating of high-temp grease (I used copper based grease). While you're at it, give the inside of the caliper cavity itself (accessed through the opening for the bracket) a liberal coating of grease to prevent future corrosion. Now insert the bracket into the caliper and secure it by screwing the spindels through its 2 holes. Make sure the spindels are properly torqued down, we don't want them coming loose! Also don't forget to seat the dust boot properly around the caliper opening so water doesn't get inside.

Still with me? Great, now for the fun part, installing the brake pads! Take a moment to notice which pad goes inside and which outside (the inside one has a threaded hole in the back). Instal the outside one first by placing it into its hole in the mounting bracket



I used new EBC organic pads on my overhaul and these were too tight a fit in the bracket. I had to sand the pad's outer edge slightly. The outer pad is designed to move with the piston, it is therefore recommended that a *thin* coat of grease be applied along its outer edge. It goes without saying, that you should not get *any* grease on the face of the pad itself (where it contacts the disk), because this would seriously compromise your braking..... Now push the bracket & pad combo as far as possible towards the piston to give you room to instal the inside pad.



Once the inside pad is properly seated in its place in the caliper, secure it with a 5mm bolt through the back of the plastic hatch. Voila, your calipers are done and ready to be remounted to the forks!

Note from BassCliff:

I just wanted to thank 'GS Jim' for putting together this excellent guide for rebuilding the early style of front brake calipers.

Join us at <http://www.thegsresources.com/> and the forum at <http://www.thegsresources.com/forum/> for everything you ever wanted to know about the Suzuki GS series of classic motorcycles.

Thank you for your indulgence,

BassCliff