

Refurbishing Kettle Front Brake Callipers

The Brake Callipers on any motor vehicle have a hard time particularly in our climate being subjected to rain, salt, grit and stones, spills on the road and of course wide variations in temperature, all of which can reduce the effectiveness of braking systems by eroding lubrication, causing wear, corrosion and seizure of components. So, it is important that we properly check and maintain the hydraulic braking system periodically to ensure that the 1970's performance disc brakes work to the best of their capabilities.

On the matter of safety, everyone knows that your brakes save your life every time you apply them, so it is essential that they are set up and maintained properly. If you are in **any doubt** at all about your abilities to repair or refurbish your brakes, leave it to the professionals at your local bike workshop or someone you know is competent to do the work! You must be satisfied that all of the other bits that the Brake Calipers connect to, namely the Master Cylinder, Hoses, Discs and Three Way Joint are in good serviceable condition. The fluid that operates the brakes will be replaced with new during a re-build so there should be no doubt about its serviceability but don't use that old bottle or can that's been standing on a shelf in the shed for the last 5 years..... it does go off! Having established all other components are in good working order and you have confidence in your abilities to carry out the job, give it a try and there's another skill you will have mastered. Safety warning over!!!!

If your Callipers are in generally good condition with no damaged rubber boots or leaking seals and pistons that move freely but firmly, you may just need to do a minor service on them involving removing the Calliper slider pins, checking pads and rubbers for wear or splitting, re-greasing the moving parts and re-assembling them. Fresh brake fluid should, as previously mentioned, also be used. However, I have gone for a total strip, paint and re-build which should extend the serviceability and look of the Callipers for a number of years. In conjunction with a Master Brake Cylinder re-build, your brakes will be well up to the job they were designed to do.

Removing and Stripping the Callipers

Firstly, you will need to drain the brake fluid by removing the Master Cylinder cap, putting a rubber/plastic hose over the bleed nipples and pumping out the fluid with the brake lever into a container for disposal later. Remove the 14mm banjo hose connector and the 2 Calliper mounting bolts and they should be easily removed. If the Calliper is a tight fit on the disc due to corrosion or seizure, you may have to twist it against the disc to get it free, but if your brakes work reasonably well at the

moment it shouldn't be a problem. To make splitting the Calliper easier, it is better to loosen the Allen Head slider pins before undoing the Calliper mounting bolts prior to removing it from the fork leg. All of the Calliper component parts can now be taken apart for inspection and cleaning so you can give the internals a good clean and decide whether the Callipers are safe to re-use or are just scrap and need replacing. The best way to "pop out" a piston is to use compressed air, but be careful as they can come out with considerable force so make sure it is pointing away from you, preferably into a plastic bucket or similar to catch it. If the piston can be moved and you are going to replace it anyway, pull off the rubber dust cover and you might be able to lever it out so far being careful not to damage the Calliper body, then grip it with a pipe wrench and pull it out twisting as you go. The piston seal can now be gently levered out with a small screwdriver for subsequent replacement. You will note that the seal has a square cross section and is not round as is the case with a traditional "O" ring. Please **don't** be tempted to cut corners by replacing it with an "O" ring that you might have in your toolbox, the square section is an important feature that makes the Calliper work properly, if you use an "O" ring it won't and you will experience brake failure..... **be warned!!!!!!**

Calliper removed and ready for stripping



Calliper taken apart showing damaged rubber seal and "dry" sliding pins



Piston appears to be in good condition note missing sliding pin "O" rings



Piston removed, showing that it is badly pitted and in need of replacement



Old piston and new Stainless Steel item



Sliding pins in good condition, just need a cleanup and new "O" rings



Check bore for wear or damage, clean thoroughly and fit new seal



Examining the Dismantled Callipers

Okay, so you now have a pile of black or not so black aluminium, rubber and other bits in front of you. Before starting to remove the old paint you should examine the Callipers to establish whether they are in good serviceable condition with particular attention to two important areas, the piston and piston bores ensuring there are no grooves, pitting, scratches or any other damage that might make it unsafe to re-build and put back on your bike. If the bores are free from corrosion and have **no** obvious scuffing which would indicate excessive wear, grooves, or deep scratches that may allow fluid to leak past the seals or cause damage to the pistons, the Callipers can be re-furbished. Unlike the Master Cylinder, the seals do not move in the Calliper bores, being tightly fixed in their grooves and are comparatively thick gripping the pistons very firmly. The pistons move very little once the brakes are fully assembled and bled, it is in fact the distortion of the square section seal when the brakes are applied and its subsequent return to its original position when released that forms the

braking action, not the piston sliding back and forth through the seal, therefore it is the condition of the seal and the piston that are most important to get right so replacing both of these items is a must with Callipers that haven't been serviced for some time or are of unknown history. The gradual movement of the piston through the seal that occurs over a period of time is actually due to wear of the brake pads. Any minor blemishes or light corrosion found in the piston bores may be removed with metal polish but be careful how much you use so as not to obstruct the fluid inlet/bleed channels. You **must** take time to ensure that the bores, banjo connector/bleed nipple connections and the small internal fluid channels are perfectly clean with **no** remnants of old fluid or particles of debris that might float around the hydraulic lines and cause a blockage resulting in no brakes or indeed locked-on seized brakes due to a blocked "return", believe me, it doesn't take much! It is also worthwhile having a look at the slider pins and the bushes that they fit into on the Calliper carriers (the bit the two Calliper halves slide along when fastened together and is mounted to the fork leg) to see if there is any excessive wear on either due to lack of lubrication or damaged "O" rings. If they are too loose a fit the lubricating grease will be more likely to leak out and be washed away and the Calipers twist when the brakes are applied causing further wear.

Stripping the Paint and Re-finishing

Being satisfied that the Callipers are suitable for rebuilding, you will need to consider the method of stripping the old paint and finish that you are going to use. Many go for bead blasting followed by powder coating for the most durable finish, but I didn't have a great deal of time and decided to do the lot myself with a wire brush and cans of spray paint!!!! The wire brush was a brass one on an electric drill and the paint Halfords Grey Primer and Satin Black, but no doubt you will have your own favourite paints. Brake fluid that had been spilled over the Callipers had the effect of loosening some of the paint along with the corrosion that occurs from road salt etc., so some areas were fairly easy to strip but others needed quite heavy pressure to get the paint off down to the bare metal. All of the paint was stripped off in about an hour except for the Calliper carriers which were in good condition and only required a top coat to finish them off. Once stripped all of the components **must** be thoroughly cleaned to remove any grease or dirt before painting and areas that you don't want paint getting on to such as the piston bores and ring that the piston dust cover fits into, brake hose inlet, bleed nipple housing and sliding bushes must be masked off. I applied 2 coats of Grey undercoat and 3 Satin Black topcoats leaving them to dry for a few hours before re-assembly.

Callipers painted and ready for re-assembly



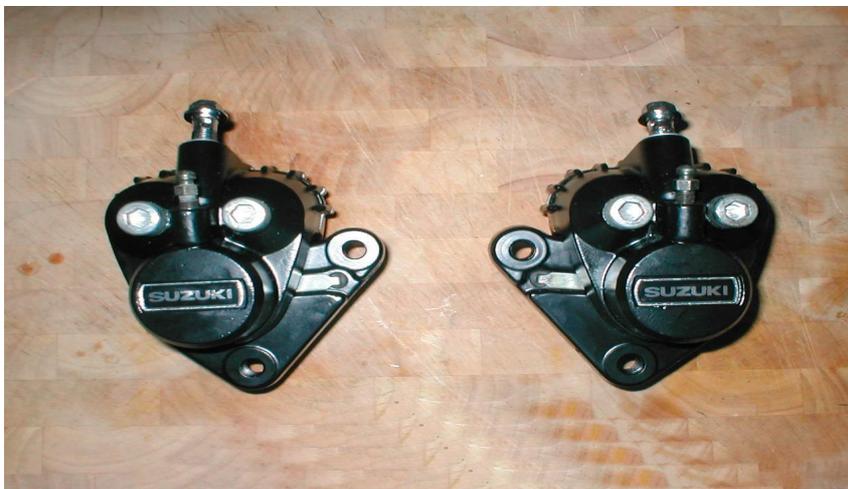
Re-assembling the Callipers

Now that all of the metalwork has been re-painted you will need to fit the new seals/rubbers etc. Kits which include all of the necessary parts or individual items are available from your usual parts supplier or of course Ebay, but beware of paying over inflated prices, check with your dealer first. The kits should include a piston, piston seal and dust cover, sliding pin rubbers and "O" rings and the metal brake pad locator rubber bush. Some also come with brake pads. Alternatively, you may want to obtain Stainless Steel pistons like the ones I used from the Kettle Clubs very own Chris Roberts (see The Kettle Club Website and click on the Regalia tab) and purchase the seals and rubbers individually, it may save you some money! The sliding pins are Nickel plated and can be in a variety of conditions from very corroded to only requiring a quick polish, it just depends on how hard a life your bike has had . If they are really bad they can be sent away for re-plating or you might want to obtain new ones. But bear in mind you only see the Allen headed portion of the sliding pins, the rest will be to a certain extent protected by grease in the Calliper carriers so that might not be so important to you and the effectiveness of the brakes won't be impaired if they are not worn or in pristine condition! "Suzuki" Calliper decals are also available from The Kettle Club Website Regalia section. If you are totally rebuilding the Callipers, it also makes sense to fit a new set of brake pads. If not, make sure the ones you intend to use are undamaged, not contaminated with oil/grease/brake fluid or anything else that might prevent them from giving the maximum braking efficiency and there is plenty of friction material left on them.

Now you can put your Callipers back together and re-install them. Push the small cylindrical rubber into the Calliper carrier with the slot running from top to bottom and fit the brake pad locator in place bending it as close to the shaped recess as possible (see pic below). Smear the inside of the Calliper carrier slider pin bushes with Copper grease/High melting point grease.....if you load it with too much it will just

push out on assembly then fit the 4 rubber boots. Install the “O” rings on the slider pins making sure that they are located on the first and second groove from the threaded end, there is no “O” ring in the groove next to the Allen head end. Fit the square section piston seal into the Calliper and then the piston, pushing it all of the way down the bore but firstly, lightly lubricate the bore and seal with brake fluid, wiped on with a clean lint free cloth. The piston dust cover can then be fitted and manoeuvred into position over the piston and the grooved ring on the Calliper. Put a light smearing of grease on the back of the brake pad (the one with a threaded hole near the rim) **avoiding the friction material** of course and screw it into place in the Calliper. Do the same with the other brake pad (with a cut out on the rim) and slide that into place in the Calliper carrier (no screw this time) making sure it is facing in the correct direction, friction material to friction material. Lightly coat the sliding pins with grease, particularly over the rubber “O” rings and fit them through the Calliper/Calliper slider twisting them as you go so that they won’t catch and split as you push them through due to the fairly tight tolerances involved, then fasten them together. If you’ve overdone applying the grease you will find a plug of it pushes out of the threaded portion of the Calliper, just wipe it off. It is of course important to make sure that on assembly you have put the Callipers together as right/left handed assemblies as shown in the picture below!!

Refurbished Callipers re-assembled and ready for fitting



Re-fit the Callipers, connect up the brake hoses with new copper or aluminium sealing washers, fill the Master Cylinder with DOT 4 brake fluid and bleed the system by your preferred method!!!!

Other Brake Components

There are of course other brake components that are part of your braking system and can have a marked effect on its performance, being the Hydraulic Hoses, Discs, Three Way Joint and the Master Cylinder.

Hydraulic Fluid Lines (Brake Hoses)

It is important to make sure that all of the hydraulic braking system is in good serviceable condition and that includes the hoses. You **must** therefore examine all of the hoses whether rubber, or in part metal in the earlier model instance, for any sign of rubber perishing, surface cracking, nicks, bulges, kinks, corrosion, leaks or any other indications of damage that may cause your brakes to fail to operate at anything other than their optimum capabilities. Any potential problems found **must** be addressed before your bike is put back on the road. As an example, both Suzuki and Yamaha recommend that all rubber brake hoses on their modern machinery is replaced every 4 years, but in the real world I am sure that there are many, many bikes on our roads where this does not occur. Please bear this in mind if your hoses are very many years old, it may be time to replace them even if they appear superficially to be in good condition!

Genuine Suzuki Brake Hoses come in 5 sections, one from the Master Cylinder to the Three Way Joint at the lower fork yoke with separate hoses, one left, one right, to intermediate junctions at the mudguard hose supports behind the fork legs, then connecting to each of the Callipers. On K models the lower sections that connect to the Callipers are of the solid metal tube type, whilst L – B models use the same kind of flexible rubber hoses as the rest of the system. I am not too certain, but think some of the solid metal tube hoses may have continued into early L models. The best option if you want to retain the original Kettle look and brake “feel” is to replace all of your hoses with new items but this can be at a cost perhaps up to £150, but shop around for bargains, for example Paul Miller has Master Cylinder/Calliper Refurb Kits plus all new hoses on Ebay for £156. The alternative option as many have done is to fit braided Stainless Steel hoses which come in 3 instead of 5 lengths at £55 - £70 and are available in a plain braided metal finish or coatings which make them look a little less out of place although they are much narrower in cross section than the rubber originals. There is a different firmer “feel” to braided hoses when applying the brakes compared to the softer rubber ones but they do work very well. The choice is yours!!!!

Discs

The dual front Discs are made of Stainless Steel so will not lose any of their surface and therefore thickness due to rust. You must, however, examine them for signs of cracking or any other damage. The “new” Disc thickness is 7.00 mm or 0.276 ins., the wear limit is 6.00 mm or 0.236 ins., at any point on the Disc. Run- out (warping) must be no more than 0.03 mm or 0.012 ins. Excessive scoring due to the extended use of Sintered brake pads which contain pieces of soft metal or a stone or other piece of road debris caught between the brake pad and Disc can make a Disc unserviceable and in need of replacement.

Three Way Joint

The Three Way Joint is an aluminium casting which has no moveable parts to wear out and only serves to split the hydraulic lines from the Master Cylinder to the dual Callipers. It can be bead blasted and coated in the same way as the Calliper bodies to get a new look finish, but again you must make sure that the internal channels inside are scrupulously clean to avoid the fluid becoming contaminated and causing wear or a blockage.

Master Cylinder

The Master Cylinder is the “business end” which makes your brakes operate and the moving parts with their seals must be in good condition with no leaks. But you will already have installed a re-furbish kit and cleaned it up as described in the guide I did some time ago and which is also in the Files Section!!!!