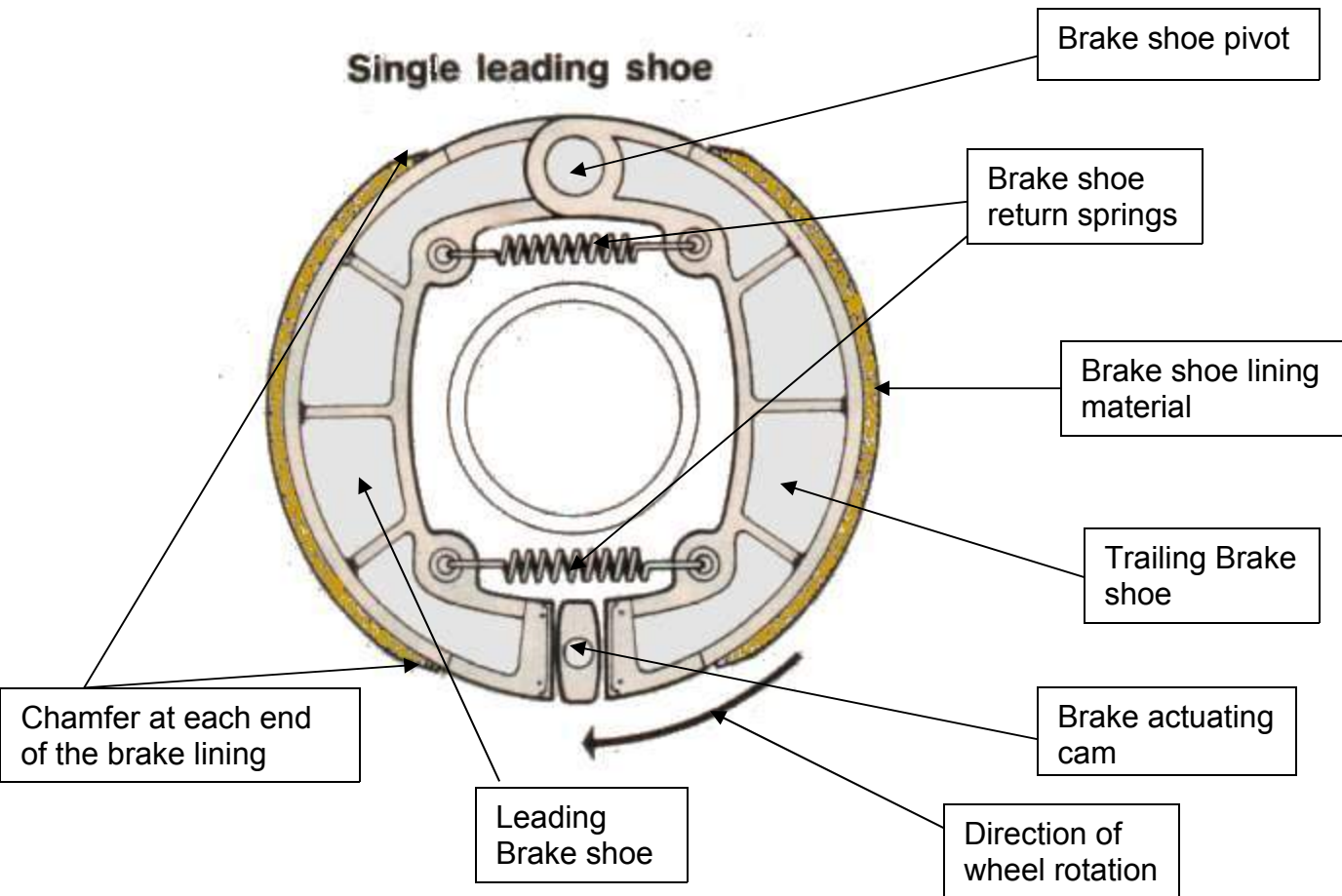




Kettle Rear Brake Service

The rear brake on a Kettle is an example of one of the earliest, most simple and reliable systems used on any motor vehicle, the internal expanding single leading shoe drum brake. The braking action has a “self servo” effect on the leading brake shoe which means when applied the rotation of the wheel “grabs” the leading shoe forcing it more tightly against the brake drum giving a more powerful braking effect. This effect does not occur on the trailing brake shoe which is to some extent pushed away from the drum surface. To get a more powerful braking action this is why many manufacturers developed units with twin or more leading shoe front brakes as was the case with early four leading shoe Kettles.



The main problems you may find associated with these simple braking devices other than merely not being used for many years can be the result of:-

- 1) Worn out, damaged or contaminated brake shoes which will of course mean fitting new ones
- 2) "Glazed" shoe linings where a hard polished surface has built up due to being in constant light contact with the drum as a result of poor adjustment. This has the effect of reducing friction between the lining and brake drum when the brake is applied. If there is plenty of friction material on the shoes and they are in good condition, **not made with asbestos**, they can be roughened with sandpaper to remove the glaze, but replacement is the best option
- 3) Brake "binding on" due to a seized actuating cam, brake pedal or corroded cable. Servicing the brake as described here with cleaning, lubrication and if necessary replacing the rear brake cable will solve this problem
- 4) The brake "grabbing" due to the drum wearing "oval" over years of use. To check the brake drum for ovality you can usually detect this with the wheel still in place on the bike by adjusting the cable so that the brake shoes are tight on the drum then backing them off until the wheel will just turn without the brake shoes touching the drum. If the drum is oval you will feel the wheel tighten and loosen at the same points as you spin it and find that no amount of adjustment will prevent this. Corrosion on the drum can have a similar effect, but you should be able to identify this when the brake is fully disassembled
- 5) Poorly made cheap pattern brake shoes must be replaced with good quality items
- 6) An excessively worn or damaged brake drum where there may be deep scores or even cracks in the braking surface. A mildly scored drum can be machined within tolerances to achieve a new surface or replaced as necessary, which is the only solution with an excessively worn or cracked example
- 7) Brake squeal caused by a buildup of brake dust in the drum more often through poor maintenance should be silenced following a brake service

Before even contemplating servicing your rear drum brake, a health warning, particularly if you have recently got the bike or don't know if the brake has been disturbed for some years. DO NOT UNDER ANY CIRCUMSTANCES BREATHE IN THE DUST FOUND IN ANY BRAKE DRUM AS THE LININGS MAY CONTAIN ASBESTOS IN THEIR COMPOSITION. As we know ASBESTOS can cause cancers so it is vital that you avoid airborne or skin contact with it. It is therefore advisable to wear a face mask, eye protection and latex/vinyl gloves when cleaning the drum, shoes and ancillary parts and NEVER blow dust particles away with an airline, or worse your mouth! The brake can then be wiped clean with a cloth soaked

in a cleaner made for the purpose, or use a spray bottle or other device capable of delivering a fine mist of water with a detergent, at low pressure to wet all brake parts prior to wiping them clean. There is some debate over the use of this method of cleaning, but in the absence of “industrial” HEPA filter cleaners it is the most practical available to the home workshop mechanic. If however, you are concerned or in any doubt about potential risks, get your local bike shop or someone with experience to service your rear brake for you. Having said this, modern brake shoes and pads don't contain asbestos for obvious reasons, but they often have “secret” materials in their composition which might not necessarily be accepted as safe in the future. So it is best to be cautious when cleaning out any drums **be warned and be safe!**

Okay, sorry to go back to basics and explain what is probably a run of the mill task for many but for anyone who hasn't removed a Kettle rear wheel, there are a few simple operations which should present little difficulty. But firstly, don't worry, your bike won't fall over backwards when the rear wheel is removed because there's so much weight in front of the centre stand that it is unlikely to tip over backwards unless you push it or are careless enough to put something heavy on the rear of your bike!!!! However, if you are still concerned put an axle stand or scissors jack under the swing arm. If out on the road laden with luggage on a rack or the back of the seat and unfortunate enough to have to deal with a puncture it makes sense to remove that luggage to prevent the possibility of your bike becoming unstable with the rear wheel removed! You may not know, but it is not necessary to remove the wheel axle to get the rear wheel out as the swing arm is open where the chain adjusters fit and undoing all of the items as described later will allow you with a bit of jiggling to pull the wheel out as a complete unit.

The Kettle in the photos is fitted with Gibson “Allspeeds” which gives you a bit more room to work with but normally exhausted Kettles are only slightly more tricky to manaeuvre the bits and pieces you remove.

With the bike is on the centre stand, you should undo the brake cable and torsion rod fastening before undoing the rear axle nut as this will give you a firm base to work on. Remove the split pin from the end of the brake cable yes, there should be one and unscrew the adjuster nut off the cable then pull the threaded portion out of the retainer barrel removing it from the lever arm so you won't lose it. Pull back the rubber bellows and the cable outer from it's location on the back plate the inner cable will pull through the slot and is now free.

Brake backplate, you will need to undo and disconnect the cable and torque arm fittings



Remove the split pin from the torque arm bolt then undo and remove the bolt from the back plate. The torque arm will now be free but needn't be disconnected at the other end which is fastened to the swing arm.

Torque arm fastening



If your drive chain has a spring link join in it and is not of the continuous riveted type, split the chain and let it hang free. You may however want to remove the chain to examine it and both sprockets for wear and if all is well give it a thorough clean and lubrication before refitting!!! A continuous chain is a little more tricky

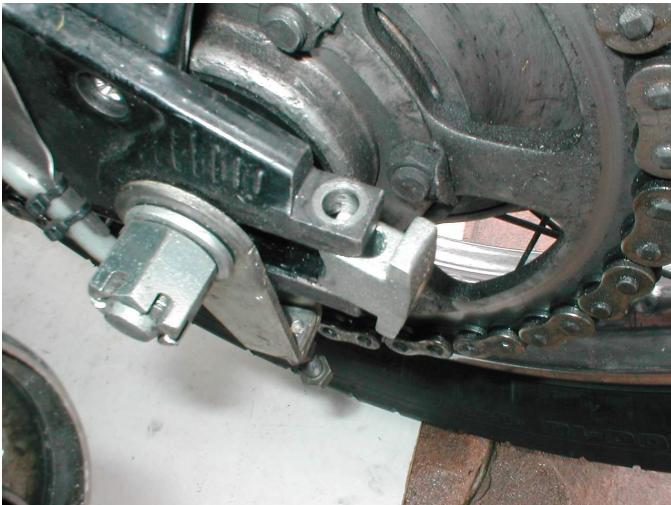
and needs to be “unhooked” from the sprocket and rear axle before the wheel can be removed.

Should the brake actuating lever look as if it might not come off without a struggle remove it now by undoing the retaining bolt and manhandle it off taking care not to lose the metal washer, rubber “O” ring and return spring.

Before loosening the rear axle nut, check the wheel bearings for wear by firmly grasping the tyre with your hands opposite each other, pushing and pulling to feel for any movement. If there is any movement of the wheel in its mountings this would indicate the wheel bearings are worn and in need of replacement. If new bearings are required you will need to replace 2 in the wheel itself and it makes sense to change the bearing in the sprocket carrier along with its rubber grease seal. You can do this very inexpensively yourself with the 3 bearings costing typically less than £20 from your local bearing supplier and a fiver or so for a Suzuki grease seal.

Pull out the rear axle split pin and loosen the axle nut, there is no need to remove it at this stage. Undo the chain adjuster lock nuts and wind back the adjuster bolts to enable the wheel to be pushed forward to give enough slack for the removal of a continuous type chain. Undo the chain adjuster support bolts and remove them.

Remove the chain adjuster support bolts and the supports



Push the rear wheel forward as far as it will go and unhook the chain from the rear sprocket. If you are running a wider tyre and/or chain or are basically very clumsy like me, you might want to remove the chainguard to give a bit more room to allow the chain to come off more easily. For even more working space you can

also remove the left shock absorber. With the wheel now free from the swing arm and chain, pull it back and tip it to one side to clear the rear mudguard and it can now be removed. As the wheel rear axle nut is still in place none of the spacers can fall off and roll away! Note where the wheel spacers are located, the larger one fits on the brake plate side and the smaller one on the drive chain side fitting into the sprocket carrier rubber seal.

Rear wheel removed as a complete unit with wheel axle still in place

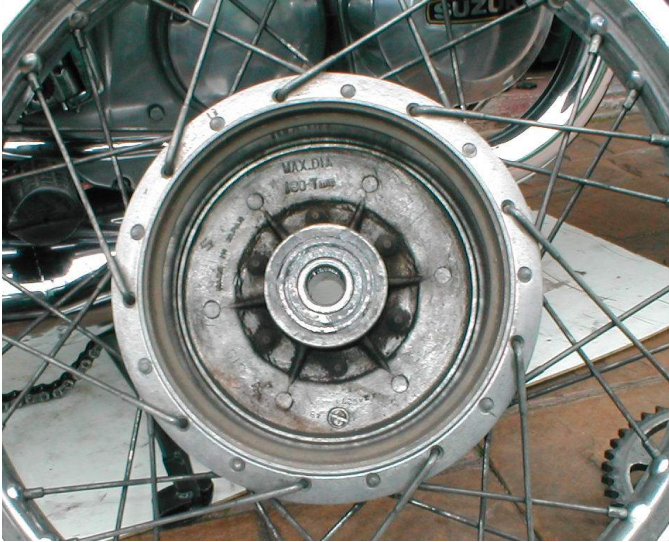


Remove the rear axle nut and pull out the axle ensuring that the washer, chain adjuster and chain side spacer don't fall off and go missing. I always put them back on the axle in the order they came off to keep them all together.

Servicing the Rear Brake

Should you be happy to continue and being mindful of the safety warnings above, the sprocket carrier can be pulled out of its housing and then the brake back plate. You will then get some idea of the job before you and can start inspecting the brake internal parts, give them a good clean, replace any if necessary then lubricate the moving parts.

Rear hub with backplate removed



Backplate with brake shoes still in place



The first thing you will probably come across is caked on brake dust, old grease and corrosion. Thoroughly clean the drum as described and inspect the braking surface for any deep grooves, cracking or corrosion that might make it unserviceable and therefore unsafe to be of any further use. It is possible to measure drum runout with a dial gauge and there should be no variation in the drum diameter greater than 0.051 mm. Drum runout should not exceed 0.152 mm out of round but if variations do exceed these values the drum should be skimmed or replaced. An excessively worn drum will have a noticeable ridge

either side of the shoe to drum contact surface width. Certainly any cracking will render the drum useless but corrosion or grooves can be machined out **provided the drum will remain within the maximum wear limits, please note the maximum hub wear limit cast in the hub is 180.7 mm.** An oval or mildly scored drum can be machined back to trueness without needing to remove the hub from the rim. Light rust can be removed with fine abrasive paper to give a smooth clean braking surface.

Maximum wear limit cast into the drum housing



Remove the brake shoes with their return springs then the actuating cam spindle from the backplate and all components should be thoroughly cleaned. Inspect the shoe mounting surfaces for wear or corrosion and clean any found to achieve perfectly smooth surfaces otherwise further wear will occur at these points even if the moving parts are properly lubricated. Examine the linings for remaining useable material, contamination or damage and the contact wear pattern to see if the shoes are twisted and therefore in need of replacement. The linings should show contact with the drum, across the entire width of the friction material, extending from the cam to the pivot ends but in reality, the leading edge on one shoe and trailing edge on the other will contact the drum first and it takes a while for them to bed in to somewhere near the shape of the drum. Should the brake shoes appear reasonably new and have plenty of useable life in them they can of course be re-installed, but if they look old and degraded or the friction material is lifting at all you must replace them. It makes sense to re-install the brake shoes in the same locations as they were originally fitted as they will be worn to match the profile of the drum surface. When purchasing new brake shoes you will note that there is a chamfer in the lining material at each end. If there was no chamfering the brake could not operate properly as there would be insufficient clearance within the drum for the linings to come into proper contact with the drum surface resulting in very little braking effect. Unfortunately, some cheap aftermarket brake shoes do not match the profile of the drum too accurately and you may find that the contact patch is not as much as would be desirable resulting in a poor braking effect over an extensive “bedding in” period.

Re-assembling the rear brake is simply the opposite of the stripdown, but you will need to sparingly apply high melting point grease to the brake shoe pivot points and actuating cam shaft making sure you don't get any on the lining material which will contaminate it and greatly reduce the braking effect. At this point it is best to refit the actuating cam shaft/ "O" ring/washer/ return spring and actuating lever, as the lever can be installed further onto the cam shaft giving a better seal between the "O" ring and the metal washer. If you leave it until the wheel is fitted back on the bike there is a tendency for the cam shaft to move a small amount into the drum when applying the necessary force to fit the lever, giving a poor seal which can let in water and allow corrosion to commence much more quickly.

Whilst access to the wheel bearings is available, having previously been checked for wear when still fitted to your bike, they can be visually examined and if not in need of replacement, re-packed with grease.

Fit the brake shoes with their springs onto the backplate and it can be refitted into the hub, then the sprocket carrier and rear axle slid into place with its spacers, the chain adjusters, washer and nut.

The rear wheel should be re-installed and the brake cable/torque arm fitted making sure the chain tension and wheel alignment are correct. The cable must be adjusted at the actuating lever and in association with the brake pedal adjuster so that there is no "binding" when the wheel is spun and the travel at the pedal is not restricted by the exhaust system.

If new brake shoes have been installed, they will require a few miles of gentle use to bed in properly, but in any event test ride your bike to make sure that all is well and the brake operates smoothly. The cable may need to be adjusted after a test run and also checked after a hundred or so miles .

Now that you have refurbished your Front Brake Master Cylinder/Hoses, Brake Calipers and now Rear Drum Brake, your Kettle will stop much more efficiently than it used to, within the limits of the technologies available in its late 1960's design, but no "stoppies" I'm afraid!!!!