Brake Slave Cylinder Refurbishment on a 1937 Morris 8

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Background:

A couple of years back I related some of my experiences in rebuilding our Series 1 Tourer. The brakes had been relined before we bought the car in bits 40 years ago, so I optimistically thought that the slave cylinder would probably be OK. This turned out to be wishful thinking, as the first test drive showed the foot brake to be almost completely ineffective. The hand brake appeared to work, at least on one wheel. In fact, I don't think the cylinders had been touched, but if they had, time was not kind. So winter came after I thought we were all ready to go, and the Morrie continued to sulk quietly in the storage shed. This article may be useful to others needing to remove the brake slave cylinders, as I struggled to find any practical "hands-on" information on how best to do this. Before I go further, I should note that the well-known Morris 8 restorer Bob Bryant has very useful general information on the braking system here: http://www.morris8-bobbryan.co.uk/articles/M8%20Lockheed%20Hydraulic%20Braking%20System.pdf and http://www.morris8-bobbryan.co.uk/articles/M8%20Brake%20Faults.pdf He suggests several points to look for and address in respect to bedding-in problems (which was what I thought I was facing). For example, oversize drums changing the curvature relative to on the rim inner radius), and not tapering (sanding) the first 50mm of the piston end of both linings (starting at ~0.5mm depth). He feels that for the non the shoes, caused by wear or refacing (initial diameter is 203mm), width of linings (nominally 30mm, but should not be > 28.5mm to avoid rubbing floating shoes to grip properly, the effective shoe diameter should be one to two mm less than the drum diameter, but no more. Effective operation can be a problem following relining, because the new linings may not be concentric, or the drums may have worn out of round over the years. This may require complete refurbishment (skimming both drums and relined shoes at a common new diameter, to achieve accurate fit), or it may be

possible to individually sand down and fit the linings to mate with the worn drums (providing they are not too badly worn). A suggestion I have not tried is to attach self-stick sand paper to the inside of the drum, assemble the wheel and rotate the wheel to bed-in the lining. The piston side leading edge (leading shoe) should tend to self-adjust. The trailing shoe will have limited effect if it is not aligned closely to the drum at the leading edge of the lining. This is important for best braking performance. To me, it would appear that the trailing shoe will become less effective as the lining wears. To optimise the friction effect, light scuffing of the linings (100-200 grit) and the drum surface (200-300 grit) is helpful. Investigation I checked all these points and made some adjustments accordingly on reassembly. However, this did not seem to help. I found that my problem was more fundamental - at least half of the 8 pistons in the slave cylinders were seized solid. After removing a drum and peeling back the edge of the rubber dust covers on the cylinder, I found that the two pistons were either seized solid, or there was dark muck appearing around the edge of the piston when the brakes were operated a few times. Over are some notes on the reconditioning process that I followed. I considered trying to recondition the slave cylinders in-situ, but to do this the shoes must first be removed. I found I initially removed and examined the cylinder on one wheel. This showed that the rubber cup seals had seriously deteriorated, allowing fluid to seep out and promote rust formation around the pistons. There was no alternative to removing the lot, and dismantling and refurbishing all four slave cylinders. This confirmed that most of the rubber cups had gone very hard and could not seal properly that on the rear at least, this was not possible without removing the hubs, which means splitting the hub flange and withdrawing the half shaft first, and then removing the centre nut, hub and bearing. At the front, the centre nut, hub and bearing would also have to be removed. Don’t even consider it! Bite the bullet and remove the cylinders. As it happened, they all had to be rehoned to remove varying levels of corrosion, which is far easier to do on the workbench

than in-situ. One was replaced with a more serviceable unit from the Club box of old slave cylinders.

My Process Before starting on the wheels, seal the brake master cylinder by blocking off the breather hole in the cap. This could be done with some Blue-tack or similar pliable sealant packed over the hole and ensuring the cap gasket seals properly. I prefer to cut a new flat circular seal from a piece of soft sheeting (such as an old tyre tube) and use this as a full seal under the cap. A piece of polythene film with the cap screwed on over it can also work satisfactorily. Once you have the car up on blocks or axle stands, etc. as necessary to ensure a 100% safe work environment, remove the wheels. Then go around with a spray can of CRC, or whatever you use for penetrating oil, and coat all the screws and nuts you need to undo. (Per wheel: on or behind the backing plate 2 hexagon head brake shoe adjusters, 2 hexagon head set screws securing the slave cylinder, 1 bleed nipple, 1 brake line banjo bolt, and on the face of the brake drum 2 countersunk set screws). Note that, because the shoe pivot point is not floating, there is an adjustment bolt for each shoe, i.e. two per wheel. Leave the penetrating oil to soak in overnight if you can spare the time. As an aside, I have found that a very good eco-friendly penetrating solution is: get the lowest cost canola oil you can buy and add about 10% acetone in an old squirt bottle. Just give it a good shake and squirt. The acetone does the initial penetration, and the vegetable oil does the follow up. Cheap and effective. Turn the two shoe adjusters (opposite directions) on each wheel backing plate so that the shoes are fully in. Remove the brake drums by unscrewing the two countersunk screws on the face and easing the drum off with a mallet and/or large screwdrivers. Now turn the adjusters so that both shoes are fully out. This allows the cylinders to be easily withdrawn once their bolts are removed. If you want to examine the ends of the cylinder and the piston movement, you can now pull the rubber dust boots off the cylinder and pistons (2 boots per cylinder). This should be possible without damaging them due to the gap between the jacked out shoe and the piston. If

necessary and if it will move, ease the piston in with your fingers or a large screwdriver. The dust boots can be reused if they are in good condition. If both piston ends look fine and there is no sign of brake fluid leakage or piston binding, you may decide not to proceed further with this cylinder without further checking the operation of both pistons with the wheel off. Assuming you need to now remove the cylinder, put a rag under the backing plate brake line hose/tube connection to absorb the small quantity of fluid that will be lost. Undo the hydraulic connection banjo bolt (18mmA/F) on the slave cylinder and remove the two copper washers (one each side of the banjo coupling). Because the air inlet on the master cylinder has been blocked off, the fluid does not drain from the piping. This makes later bleeding much, much simpler! Undo the two (9mmA/F) set screws holding the cylinder to the backing plate collecting the spring washers, and withdraw the cylinder from the front. It's that easy. In my case the pistons were all corroded to some extent, with several locked solid. The dust covers were set aside, and where possible the cylinders were disassembled and the cup seals discarded. The metal parts were soaked overnight in petrol, keeping each set separate. The remaining seized pistons were drifted out and everything brush cleaned. The machined face of the cylinder hydraulic coupling point and the faces of the banjo bolts were lightly sanded using around 400 grit wet and dry and then polished with 1200 grit. The pistons were sanded as necessary with 200/400 grit to remove all the rust deposits, and polished with 1200 grit. The cylinders were then all honed using a basic drill operated honing tool, cleaned again and blown out with air. They were then lightly treated with rust converter to help inhibit reoccurrence of rust. New 7/8" cup seals were purchased (8 of) from the club parts shed. The little spring-finger spreaders that originally sat inside each seal between the internal spring and the piston had mostly corroded away and were not replaced. They are apparently not obtainable any longer, and are not needed anyway. New copper washers for the banjo bolt hydraulic connection were obtained from Safe R Brakes (4 of each size). I have learnt from bitter experience to NEVER reuse the old copper washers on braking

systems without at least re-annealing them. Any with grooves or defects in the surfaces must be discarded, which usually means all of them. New ones are so cheap that if you can get them, just replace fully. The dust boots help to hold the pistons in. Additionally if necessary, use a cable-tie to assemble the cylinders before refitting or masking tape wrapped end on end. I know that it is not usually recommended, but I like to coat all surfaces with something prior to, or during refitting. Typically this consists of: Paint the cylinder external surfaces with a one coat sealer, e.g. epoxy enamel. Lightly coat brake fluid on the cylinder internal surface and rubber cups. Lightly smear silicone grease on screws, washers and other internal surfaces (including the inside of dust boots). Lightly smear ordinary grease on all other external bolt threads. This provides for some protection against corrosion, and makes for much easier disassembly in the future. I lightly scuffed the surfaces of all the drums with 200 emery. The visible high spots on the shoes, along with approx. 50 mm of the leading edges were sanded down and roughened up with 80 emery. Refitting the assembled cylinders is the reverse of removal. Insert and tighten the two cylinder mounting screws including spring washers (don't over-tighten). Make sure the new copper washer seals are clean and seated properly on the banjo bolt. The one with the larger ID goes against the bolt head, followed by the banjo pipe fitting, and then the washer with the smaller ID. This must be slipped between the banjo fitting and the cylinder as the bolt is inserted. It helps to initially screw the banjo bolt in by hand to make sure the washers seat properly. Tighten the banjo fitting bolt with the 18 mm A/F spanner. The copper washers can be felt to deform, maybe 1/6 turn (one flat). Check that the bleed nipple is closed. Reset the shoe adjusters so that the shoes are in as far as possible. Refit the drums with the countersunk screws. Then turn the adjusters so that the shoes are as far out as possible (shoes both jammed against the drum) and then carefully bring both back until the drum is just free to rotate without rubbing or catching. Repeat this assembly process on all wheels. Remove the air seal that was applied to the master cylinder cap, and top up if necessary with new fluid (unlikely at

this stage). Bleeding After trying all sorts of techniques for bleeding the brakes, I now use the simple process described below. This is only suitable when I have broken into the slave cylinder end of the hydraulic system (it is DIY, so no bored, frustrated "helper" is required). Because hardly any fluid has been lost, there is correspondingly hardly any air in the system. Due to the layout of the piping, there is usually just a small bubble of air at each disturbed slave cylinder. What I do is: obtain a large plastic syringe (50cc or so), set the plunger to about half way, and connect it to a bleed nipple with a short length of silicone or PVC tubing. I then open the bleed nipple and withdraw the plunger a little to apply a suction effect to the cylinder. Then I pump the pedal once or twice (no more), go back and shut the relevant bleed valve. There should be a small quantity of brake fluid in the syringe. I withdraw the plunger a little more as it may now be under pressure, and then remove the tube. Repeat this for each wheel. Done. Top up, and check the brake pedal for travel and firmness. Repeat if necessary, although I have never had to. Service manuals usually recommend commencing with the most remote wheel (i.e. left rear) but it doesn't really matter as the piping is still filled with fluid. Vindication, a test drive confirmed greatly improved and reasonably well balanced braking. Hardly any road miles after completing this job, I finally overcame my trepidation about submitting the car for compliance. That's another story which took over 3 months to complete, but I was gratified to have the assessor comment that he was impressed with the way the brakes performed. I hope this information might be useful to anyone willing to give slave cylinder refurbishment a go.