Twin Leading Shoe Brake System Conversions

By Steve Priston

Less expensive TC front brake improvement.

Steve Priston now has twin leading shoe front brakes on his TC using a Morris Marina backplate as a template to alter his TC backplates ….. and just a few other mods!

Over to Steve……

"I have recently fitted the twin leading shoe front brake upgrade onto my TC and I must say I feel that it was well worth all of the work involved, I can't make claims about it being worth the expense because it wasn't at all expensive, just time consuming, as well as requiring the services of a good welder, one of whom I am lucky enough to have as a very good friend.

My trade is as a mechanical fitter, currently working shifts over weekends and nights, so during quiet times it has been almost therapeutic, having a project like this one.

I first needed to find the most modern vehicles that I could, employing a nine-inch front drum brake, this turned out to be the Girling set-up, as used on a Triumph Toledo, Vauxhall Victor & Morris Marina 10CWT van or pick-up.

Source of supply was of course eBay, where a set of NOS (new old stock) wheel cylinders are to be had for as little as £20, shoes at £10, return springs £6.75, along with 22.5mm long shoe springs, cupped Girling type washers, 42mm hold down pins and Ford Fiesta spring clips; the adjusters are replicas made for a Willys Jeep at £12 a set. It even turned out that I could use the original TC hoses.

What made the job less daunting, was the purchase of a set of TC back plates and most importantly, the luck of finding a NOS offside brake plate, for a Marina van, at a hefty £28!

***Above*: The lucky find of a NOS offside backplate, stamping number 64276625, from a Marina van. *Below*: an alloy alignment dolly was made to centralise it with the TC plates, it being turned around, to give the opposite side/hand.**

The Marina brake plate was my template/drilling jig, to ensure correct position of each of the critical components, with all of the positions being transposed onto my back plates, simply reversing the plate to give the opposite hand.

All of the holes were filled that were no longer required and a very important modification had to be made to the lower part of the back plates, to enable the lower shoes to fit. The Marina backplate is quite an intricate piece of press work for 10-gauge steel, so care needed to be taken in altering the plate without losing rigidity. This was done by only removing the minimum where needed and replacing what was removed with a very closely fitted piece of folded metal; this avoided any distortion issues on welding, unlike another article I have seen, where this was not done, causing problems.

The important modification referred to in the text.

Unlike a conversion using TD/TF parts, that has previously been featured, I did it the way it was fitted to the intended vehicles, but having been trained in bench fitting at 16 years old, with a few years' experience since, knew the importance of accuracy, when it came to making the various blanking pieces fit, with minimal clearances so as to avoid distortion during the welding process.

Thanks to the skill of my TIG man, I had no distortion to deal with and very little cleaning up to do.

This picture shows the modified TC back plates, prior to blasting & painting, having had all of the redundant holes filled, wheel cylinder spacer plates attached, the brake spring anchor plates along with the re-positioned brake shoe guides, it also shows the holes for the Jeep adjusters, along with the holes for the shoe hold down pins.

The wheel cylinders needed to be spaced off of the back plate with 5mm packing, the small plates next to them are the spring anchor points, the triangular shoe guides were carefully removed, being re-attached in new positions.

The shoes required quite a bit of alteration, firstly being too wide, requiring one eighth of an inch taken off each side, after the original linings were carefully removed & responsibly disposed of.

The shoes already have short slots for the hold down pins but these needed extending towards the underside of the linings, by about the same length again, another job was to attach a pair of one sixteenth of an inch-thick spacer plates to the trailing end of the shoes, for a better fit in their tracks.

The shoes were relined using a modern woven, brass wire reinforced material, which I know works well on vintage motorcycles with steel brake drums, which turned out to be the single greatest expense, at £50.

The adjusters needed a bit of head scratching because a flat area is required around them on the back plates so new bespoke 8mm pins were made & fitted to the shoes for them to act against, simply using modified bolts, with two nuts.

The Willy's Jeep adjusters give a movement equivalent to the lining thickness and I chose not to use spring washers, with the plain nuts as supplied but used dowty washers, with stainless nylock nuts, in an effort to prevent seizure through corrosion, by sealing the area of thread within the nuts, having of course copper slipped them on assembly.

One of the wheel cylinders from each side (Girling 64678875/6 or 64676115/6) required the three eighths UNF tapping on its inner port, increasing to seven sixteenths, enabling the TC hoses to fit. If using NOS cylinders they may be a bit grubby outside but the length of time spent on the shelf will require them to be stripped and cleaned as a matter of course.

What I have now is a floating, twin leading shoe assembly, which gives very good feel, being nicely progressive and powerful, rather than feeling like a piece of wood is being pushed against the inside of the drum, it is also lacking the unsightly/costly plumbing as used on the TD/TF, being pretty easy to bleed, with very accessible adjusters.

TA/B/C Front brake twin leading shoe (TLS) conversion

Issue 55 featured an article by Steve Priston about a TLS conversion he did on his TC, using a backplate from a Morris Marina 10cwt van as a pattern for altering his TC backplates. The article raised not a whisper, so Steve, having done the job a second time (this time for Trad Harrison), thought he would explain in more detail the various processes to encourage other brave souls who might be contemplating the task.

Over to Steve……

The job can be broken down into the following tasks:

- Stripping the original back plates of the unwanted parts
- Modifying the back plates (some 'surgery' required)
- Making pieces to fill the holes in the back plates
- Welding to fill the holes (akin to 'sewing the patient up after surgery')
- Cleaning-up after welding & straightening, due to the distortion
- Using a template for the first holes to be drilled into the backplates.
- Preparing the wheel cylinders.
- Modifying the brake shoes
- The revised return spring plates, along with those little triangular guide plates, including the last bit of welding.
- Ensuring that the return springs are able to let the shoes move adequately.
- Positioning the adjuster peg/pins on the shoes
- Final assembly

Stripping

Modifying

Cutting out the 'bulge' at the bottom of the backplate to enable the lower brake shoes to fit.

Making pieces to fill the holes

These pieces to fill the gap where the bulge has been cut out and to be welded in, along with the circular pieces.

Cleaning-up after welding & straightening, due to the distortion.

I didn't take any pictures of the actual straightening but this is how it was done. Firstly, I found a small circular steel blanking flange, which when it had 2 opposite edges cut back, then sat nicely into the recess, in the centre of the backplate, along with a second unmodified flange of a similar size.

Then I found another much larger steel blanking flange, to act as a flat base plate, under the hydraulic press, larger in diameter than the backplate; but any heavy enough plate, larger than the backplate will do.

Now the Work's press, has a pair of parallel supports so with the ‘bananafied’ plate the right way up, to ;de-banana’ it, the cutdown little flange, was put into the recess, for the press to push against and the plate was very carefully adjusted, probably only showing a 2 or 3 tons of pressure so even a small press in someone's shed or garage would do it.

The next stage, was to lay the large flange onto the parallels, with the plain small flange under the centre offset portion of the backplate, then the cutdown flange was dropped into the recess, with the press then used, simply as a clamp on top.

So out with a steel rule, to measure the variations between the rim and the plate below, time to realise that the offset should have been carefully measured before welding but I did have 2 original plates so, "be warned", measure the original offset of the backplate before getting it welded, if you want to be really careful!

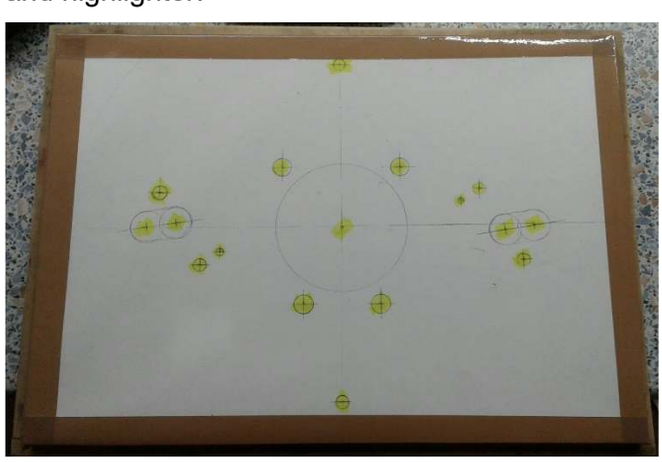
You can however, when measuring what is before you, determine what you should be aiming for, as a gap measurement, then with that naughty number 2 Thor mallet, that you frighten those spinners off with, instead of using the next size down, use it to adjust the rim of the back plate, remembering that you want the area between the rim and the centre recess, to be parallel with the flat plate below, as well as getting the gap between the rim even, with the lower plate.

I didn't require anything else to get it flat again but you will need to revisit the press, after stage 2 of welding.

Using a template for the first holes to be drilled into the backplates.

I made a cardboard template, combining the centre hole, with the four 3/8" diameter mounting hole positions, of the MG TC backplate, along with the required geometry, from the Morris Marina 10cwt van backplate, that I had previously used, but needed to somehow easily create a drilling jig from it.

The jig needed to be made by the person in possession of a single sheet of A4 paper, with the hole centres printed on it, this I have managed to do, if you look at the sheet of paper, marked in pen and highlighter.



I wanted a readily obtainable material, that was easy to work with, for the drilling jig, not initially realising the advantages of my first choice, which was clear perspex, something that can be purchased, cut to A4 size, in various thicknesses.

So, I obtained some 6mm thick clear perspex sheet, cutting it into two A4 pieces but as I wanted to create a "master" template, I asked my friend, with a nice milling machine in his home workshop, to align a 2.5mm drill, with each of the marked hole centres on the paper template, drilling through both paper then perspex below.

What Mike, my welder friend and very clever model engineer said, was that he thought simply using a centre punch, through the paper, indenting the perspex below, would probably be good enough, to

then pick-up the hole positions OK for what was intended.

But what he produced for me with his mill, also gave me a working template/drilling jig, hence the 2 sheets of perspex, the reason for choosing only 2.5mm, as a drill size was because with a 0.5mm propelling pencil, it could be used as an accurate stencil, producing just a dot on the paper, also drilling such a small hole through both perspex and 10 gauge mild steel, is very easy.

The first thing to do with the perspex jig, was to open up the 4 mounting holes to 3/8", by first using a centre drill, then a twist drill, as shown.

Then using these first holes, the jig was attached to the backplate as shown, with the perspex being spaced away from the backplate by a single plain washer, at each hole, in an effort to keep the plastic as flat as possible.

One thing I must now point out, is that the remaining holes in the jig/template, must stay at only 2.5mm and that the first upward face of the jig to be used, must be marked as "*SIDE 1*", as must the plate that it is used on, when orientated this way.

The other side must be marked as "*SIDE 2*", to avoid any confusion because the layout of the twin leading shoe brake, has to be "handed", for it to work and by simply turning over the jig, you obtain the opposite hand so clear markings must be made, to avoid any mistakes.

I only used the very basic drill shown *(see next but one pic)* because I could lift it outside for pictures, then with a piece of board attached to it, the plates fitted OK. The most important things to consider when using the jig, is to make sure that the drill is perpendicular to the job, that the hole in the plastic is lubricated, that the job is not clamped to the drill table and that before the drill is under power, that it is free to move vertically in the hole of the jig, to preserve the accuracy of the hole for later.

As can be seen from the pictures, the use of clear perspex has another great advantage, i.e. that you can see exactly what is going on below.

There are two important things to note about the jig; first none of the pictures of it show the positions for the adjuster holes because I had to work those out later and the second, most important thing to mention, is that there are two hole positions on the jig, closest to the centre, are for holes that cannot be drilled at this stage, for the return springs, the plates for which are not yet attached, hence the two pieces of yellow tape over them.

At this stage, the two hold down pin holes are drilled, the two pairs of wheel cylinder fixing holes, the holes which form the ends of the slot for the elongated wheel cylinder port boss and now on the updated jig, the two holes for the brake shoe adjusters.

This drilling process is then repeated on the second backplate, only after the jig has been attached the opposite way up, as previously explained.

When both plates have had this batch of 2.5mm holes drilled, then both plates can systematically have their hole sizes increased, as required.

So, that is the very important bit of the process started, <u>getting the geometry right.</u>

The drilling table.

Ed's note: This article is continued further on in this issue.

TA/B/C Front brake twin leading shoe (TLS) conversion (continued…..)

Preparing the wheel cylinders. The wheel cylinders that I have chosen to use, are those listed for the Marina 10cwt van or pick-up, being Girling 64678875 (N/S) & 64678876 (O/S), however previously I used the Vauxhall Victor type, which are 64676115/6, sharing the same bodies, which are now looking a bit scarce, both types having 7/8" bores so are identical in size to those on TD/TFs.

What I have found since starting this build, is that there is yet another alternative, that has both the same bore size & the same fixing hole positions, the only obvious difference being that it has a rectangular boss for the 3/8" UNF ports, which are 64678928/9, these also have a larger flat mating face around the fixing holes so that a gasket can be employed between the cylinder/backplate but I must stress that I haven't done any more, than confirm the hole positions/bore size.

I have also found, that pattern cylinders, marketed by both Borg Beck and Quinton Hazell, are freely available, listed as direct replacements, for those listed above first but when enquiring further, are only 3/4" bore, as they are listed for numerous models of cars so "one size fits all" or not, if you wanted 7/8"?

A modification is required to one of each of the two different handed wheel cylinder ports, as shown, if you want to reuse the original front brake hoses, which is to enlarge the inner port, from 3/8" UNF, to 7/16" UNF.

The picture shows how a piece of 3/8" UNF studding can be used to easily locate a stripped-down wheel cylinder, in a machine vice so that it is mounted vertically, prior to first opening the beginning of the existing hole, to a depth of about one thread, to 7/16".

Next, drilling the remainder of the hole carefully to the correct tapping drill size for 7/16" UNF, then without removing the cylinder from the vice, using the chuck to hold the taps, the threads can be tapped by hand or to simply start the tap off squarely.

The two copper link pipes are 3/16” diameter, being formed from lengths cut to 13.25" so as to get tight to the bottom mounting bolts and out of harm's way.

The bleed nipples are stainless, being fitted into the front ports and are really easy to bleed, due to the layout of the cylinders, being one in front of the other, instead one above the other, I suppose that bleeding would be even quicker, were you to jack the front of the car up, more than just getting the tyres clear of the ground?

Fitting the wheel cylinders. Because of the significant differences between the TC and Marina backplates, 5mm thick mild steel spacers are required to place the centreline of the wheel cylinders correctly in-line with the brake shoes.

The pictures show that they are a simple spacer but the area shown within the red circle, requires a significant chamfer to be created; this is to allow the end of the brake return springs to move sufficiently, to allow the spring to rest, when the shoes are centralised, without any side loading.

Easier to do this now, than to have to do it later, as I did, with a mini grinder!

These spacers only require a light weld along each end and when they are attached, just leaving the return spring mounting plates to be fitted.

Unfortunately, you will once again need to check the plates for flatness and most importantly, that they have not dished because the cylinders need to be perpendicular to the drum face so out with the straight edge, then perhaps back to the press?

Modifying the brake shoes.

The brake shoes employed on this conversion, are those used on three vehicles, manufactured in the same time frame, the most exotic being the Morris Marina 10cwt van or pick-up, then the Triumph Toledo 1300 and lastly the Vauxhall Victor. They all used 9" diameter Girling brakes so their diameter is compatible with the first 3 models of T-Type, having only S.L.S. brakes.

New old stock shoes are available at the moment, for varying prices but by now their linings will be a little on the hard side, not to mention containing the dreaded "A" word so the first thing to do, is to go outside, hold the linings over one of the many holes in the top of your trusty B & D workmate, then using a punch, remove the rivets by punching them out through the linings, then please be responsible about disposing of the 4 old linings.

The existing adjuster pegs need to be then removed so a bit of sawing, drilling & punching, then with the use of either a lathe, milling machine or a pair of odd leg calipers and a hacksaw/file, carefully remove 1/8" from each edge of the shoes because they are 1/4" wider than is required, as can be seen in the pictures of before, then after.

On the trailing edge of each shoe, I decided to fit 1" square packers, made from 16 swg stainless steel but mild steel or brass should be fine, these are attached simply using 1/8" aluminium pop rivets but to make a neater job, I countersunk the back 16swg plate's 2 holes, to allow the rivet to spread into it, then allowing me to flatten it into the countersink, leaving it looking similar to its head.

I marked out 4 plates first so that the holes would be away from the guide slot in the back of the wheel cylinders, first drilling them just under 1/8", then carefully clamped the 3 layer sandwich together, with some long nosed mole grips, before drilling each assembly individually 1/8" and riveting them so as to avoid mixing up any of the parts.

When the plates are attached, I filed them to match the radiused profile on the end of the shoes, then filed a shallow chamfer up the sides of these curved edges, to allow the sandwich to move freely in their slots in the back of the cylinders, giving them the ability to rock a little, both up and down, to aid correct alignment of the shoes with the drums.

The original Marina brake plate had them sitting on a ledge, only allowing them to move into the drum, against the hold down springs but I wanted it to float a bit more than that.

The piston end of the shoe is guided by one of the original triangular guide plates, as previously removed, rewelded into a new position so the shoe sits centrally, as originally intended but can pivot both ways a bit, against its central hold down springs.

The new adjuster pegs/pins are simply cut down stainless steel M8 bolts, nuts and washers, as shown, luckily in the 2 bottom shoes, they make use of an already existing hole from the previous peg but on the top shoes this is not the case because this area on the backplate is not flat, which is what the new adjuster requires.

The position for the top shoe adjuster pegs can be determined by first fitting that shoe, with its return spring to the modified back plate, along with the lower shoe the same, then by having the brake plate uppermost, under a bench drill or mill, first making sure by rule measurement, that the shoe is seated centrally with the edge of the back plate, the either 3/8" or 2.5mm hole, for the adjuster cam, needs to be carefully spotted through, onto the brake shoe.

This is safest perhaps being done by rotating the chuck with just your hand, in the reverse direction, as you only require it to mark the centre position of the hole, then with the shoe removed so that the mark is visible, the position for the new adjuster peg/pin, needs to be 11.5mm towards the lining, from the mark left by the drill, this should then only hold the shoe off of the bottomed cylinder by about 0.5mm, hopefully ensuring that the finished assembly will easily enter the drum, even if a brand new one, with plenty of adjustment remaining.

After previously having used a woven lining material, that works well on steel motorcycle brake drums, I found their annoying squealing noise, when just feathering the brakes so bad, that I

switched lining materials to the type recommended by Frans Sitton, being Ferodo DS3920, which is a great improvement, being done this time for me by Villiers Services, who despite what is going on with Covid, turned them around in a respectable time and were reasonably priced too.

As standard, DS3920 comes in a 5mm thickness so is ideal for slightly worn drums, being only about 0.2mm or 8 thou oversize, it is a soft material, of a greenish colour so easy to file some nice gentle chamfers on, giving you a nice progressive feeling.

Brake Shoe Adjusters, Hold Down Pin Assemblies & Return Springs. The modified brake shoes employed on this conversion, were retained by hold down pins, passing through short slots, about midway along the steel shoe, these slots are reused, without any modification required but had previously used different length pins, as well as different springs to those now used. The amount of work to get everything to fit, depends on the gauge of pin acquired, as I have only just discovered because 42mm long pins, suitable for use on Fords, can be supplied as either a heavy gauge pin, with a 9mm diameter head or one which is lighter gauge, with an 8mm head, the latter will avoid some fiddly filing, as mine were the heavy ones.

In the picture of the hold down pin components, the coil springs are I believe for British Leyland, being 14.5mm in diameter by 22.5mm long, at each end of these springs are "Girling Type" hold down washers, which if you have the better pins, will not require slight modification, with a needle file, the spring clips, that hold it all together, are for Fords, either Fiestas or MK5 Escorts, maybe others as well, these will require squeezing down a bit, as shown, then the whole lot goes together OK.

The brake shoe return springs used, are the type employed on the 3 original vehicles concerned, being Girling SS2.

Adjusters are however a complete "foreigner", in more ways than one, being intended for use on "Willys Jeeps" but readily available, as pattern parts. What I have chosen to do with them, is to not use the nuts & spring washers, as supplied but to substitute stainless steel nyloc nuts, with Dowty washers.

This has 2 advantages, the first being that it enables the area of thread within the nuts to be sealed so if copper grease is used, it should always come undone - but I also found through use, that the Dowty washers act like a friction washer, enabling the adjuster to be rotated, then staying in position, in a similar way to the original adjusters, making their use a very simple affair, just needing a tiny spanner by comparison to the original brake.

The last few 'fiddly bits'. These are quite fiddly bits to make and fit, the return spring plates but very important to get right, easy with a milling machine, otherwise some careful sawing & filing required, with maybe a little bit of mini grinding to finish off.

As with much of this, it needs to end up right, fitting well, my first attempt was not good enough, as it needs to fit closely around the shoulder of the wheel cylinder mounting points, to give enough metal around the area for the return spring holes to go, you can improve this slightly by only marking the position for these holes with the jig.

When marked, carefully eye things up and like me you should be able to move the hole positions over a millimetre or so, gaining some more metal where needed around the holes.

When drilled, you will need either to be patient with a rat tail needle file or use a mini grinder, to chamfer the hole, as required on one side only at the top and on the opposite side to that below because the spring needs to be seated horizontally to be parallel with the bracket, allowing the shoes to sit down on the guide plate, at the piston end of the shoe, before even the hold down pins are fitted.

Also as previously mentioned, the return springs need to swing across, slightly past the position required when the shoes are centred, to ensure there are no side loads, causing any bias to the shoe position, when the shoes retract.

That is how you get it to be a "floating" brake shoe, with a bit of patience so why rush, when if you take the time now, you can more confidently rush later!

The finished job.

Ed's note: A couple of updates from Steve Priston as follows:

There is actually a fourth popular model of car that employed the same nine-inch brake shoes, making them even more plentiful. This is the MK1 Cortina Super, from the 1200s up. Also, EBC make the required shoes new, at about £35, part number EBC6235, so sustainable for a good while but original NOS shoes are a lot cheaper!

If anybody is seriously interested in tackling this conversion a paper copy of the template can be made available for a modest cost, as well as many more pictures.

There are, also, some laser cut blanking discs available for the hole left by the original wheel cylinders and arrangements could be made for some more infill plates to be folded-up locally as long as his costs are covered.

Steve Priston has collected some of the required components, for his future use, whilst they are still plentiful and relatively cheap, as he is intending to make one more set. Whilst he is not in position to actually manufacture currently, due to an impending house move, he would be willing to source kits of parts for those who might prefer it or could pass on the relevant eBay/part numbers.

Steve is willing to share his knowledge and experience gained in the manufacture of this TLS conversion.

He can be contacted at: steve.priston(at)virgin.net [Please substitute @ for (at)].