Austin Seven – Hydraulic Brakes

Most of my Austin Sevens over the years have enjoyed hydraulic brakes but by way of a change - my current Special project was initially fitted with Semi Girling cable brakes (See *Crankhandle* No 83 of November 2023). However, I recently had the opportunity to acquire a set of part machined alloy hydraulic back plates – and just couldn't resist.

This article describes how I prepared and fitted hydraulic brakes to the A7 Special I'm building. I am not claiming 'this is how it should be done', the following notes are simply a description of what I have done - which happily seems fine. The front stub-axles and rear axle ends are all Semi-Girling pattern and therefore ready to accept these hydraulic backplates.

Front brakes –

Fig's 1 and 2 show the alloy backplates as received - with only the central register hole and the outer (drum-side) rim pre-machined. Elsewhere, all surfaces were as cast.

Fig 1 – Back & front, outside faces

Fig 2 – Back & front, inside faces

I started by taking a light cut over the inside of the rim of the front backplates, using the vertical mill as shown in in Fig 3, with the plates set flat on the already machined outer (drum side) edges and the sides of the recessed boss (underneath) set at right angles to the milling table. The light outer cut would enable accurate parallel machining of the central boss when the backplates were later flipped. The inner mounting face of the recess was then machined with the plates clamped at their periphery as shown in Fig 4, removing sufficient material to ensure a clearance between the drum and backplate when finally assembled. It initially seemed difficult to assess how much material to remove until I took some careful measurements from the steel hydraulic backplates on the Chummy.

Fig 3 - A light cut on the inside of the rim

Fig 4 - Truing-up the inner face of the recess

The outer surfaces of the recesses were then skimmed as shown in Fig 5, then offered-up to a hub to mark the position of the wheel stud holes - which were then drilled and lightly spot-faced. Next, the

provided paper template was used to establish the positions of the cut-outs and securing holes for the hydraulic cylinders. Photo 6 shows the cylinder apertures milled-out prior to filing the corners square. It was necessary to take great care that the cylinders were positioned to give the correct 'twin leading shoe' arrangement, noting that the off-side and near-side backplates were a mirror image of one another.

Fig 5 Skimming the outer boss face

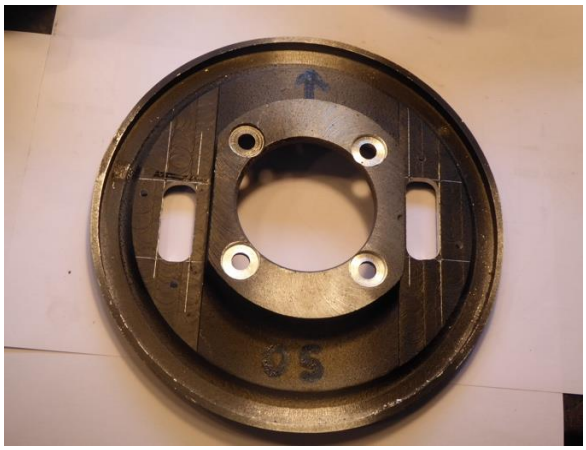


Fig 6 Cylinder positions marked-out

The cylinders, brake shoes, return springs, adjusters, shrouds and bee-hive springs were all as fitted to early Morris Minor seven inch brakes and most items were obtained new from a Morris Minor specialist. The remainder were found in my spares box. A trial assembly showed that the outer flat sides of each central boss needed some material removed to better accommodate the shoe return springs.

A final assembly was then completed as shown in Fig's 7 and 8 using short lengths of ¾" PVC tube to space the shoes from the backplates at the beehive spring positions and keep the linings exactly square to the brake drum friction surface. Split-pins were then hooked onto the beehive springs, pulled through 1/8" diameter holes drilled in the backplates and turned-over to give a light tension in each spring. A ¼" hole was than drilled in each drum to access the adjusters, whose two locations were marked on the periphery of each backplate, to assist location when later adjusting the brakes.

Fig 7 Inside view of assembled backplate

Fig 8 Complete front backplates

Rear brakes –

Machining the rear brake backplate bosses required a similar approach to the fronts but two key differences were the need to accommodate the sliding action of the single hydraulic cylinder and the need for a suitable hard-wearing pad to support the 'pivot' end of the brake shoes.

The required cylinder aperture was marked-out using the provided template and each rear back-plate cut as appropriate. The plates were then thinned to the provided dimensions at each end of the cylinder, allowing it to slide smoothly, ensuring the shoes would exert equal pressure on the drum.

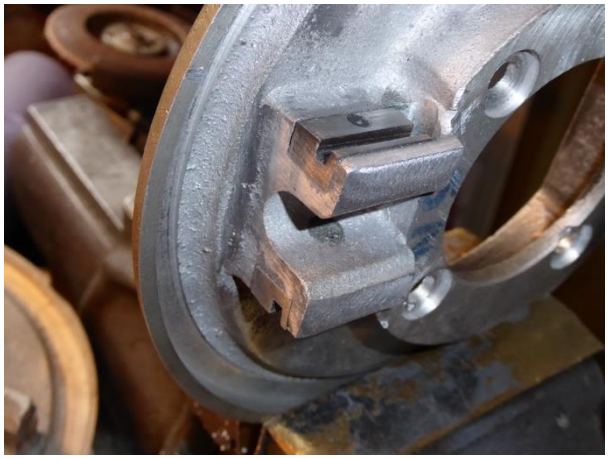


Fig 9 - M S rear brake shoe pivots

It would be poor practice to let the shoes pivot directly onto aluminium. So, the cast shoe pivot upstands on each rear backplate were milled to accept a close fitting mild steel grooved block. The pivot blocks were held in position by high strength Loctite and a 5BA setscrew as shown in Fig 9.

The 5/16" BSF setscrews securing the backplates to the axle needed their heads turned-down (thinned) and the spot-faces deepened, to clear the backs of the hubs. Although the bolting face was reduced to about 3/16", this was not a concern - because the highest operational load on the mounting bolts under heavy braking is in shear, thus easily accommodated.

The cylinder, adjuster, mask, shoes and springs were assembled as shown in Fig 10. However, when the inner hub, seal and bearing were slid into position as Fig 11, there was a minor clash between the outer edge of the wheel stud fixing plates and the thin pressed steel top cylinder shroud. This was easily cured by carefully grinding a small chamfer to the outer edge of the wheel stud mounting plates, taking care to keep clear of the holding rivets.

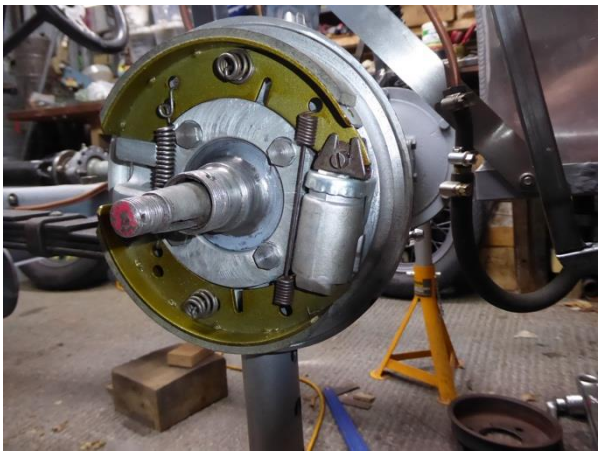


Fig 10 - Rear brakes assembled

Fig 11 - Inner hub in position

After lightly greasing the moving parts, the rear brakes were assembled much as described earlier for the fronts.

Brake pedal and master cylinder –

(See fig's 12, 13, 14 and 15). The steering box had previously been mounted on a 1.3" wide, 21° aluminium wedge, to ensure the bottom of the 13" steering wheel was around 11.5" above the cockpit floor. The wedge was drilled horizontally to accept a longer brake pedal pivot pin and a bracket was fabricated in 3 mm mild steel which bolted to the top and side of the chassis rail with six ¼" BSF machine screws, nuts and locking washers. The bracket was designed to hold the ¾" bore

Girling master cylinder aligned fore & aft - parallel to the centreline of the car and with a 3.5” lever arm from the pivot pin centreline. An original A7 brake pedal lever was straightened (cherry red heat) and a mild steel block drilled & reamed 5/16” (for a HSS clevis pin) screwed and bronze welded onto its trailing edge. Then, an adjustable forked push rod was machined to suit. These dimensions having been found to work well on a previous A7 Special albeit requiring a fairy firm pedal effort.

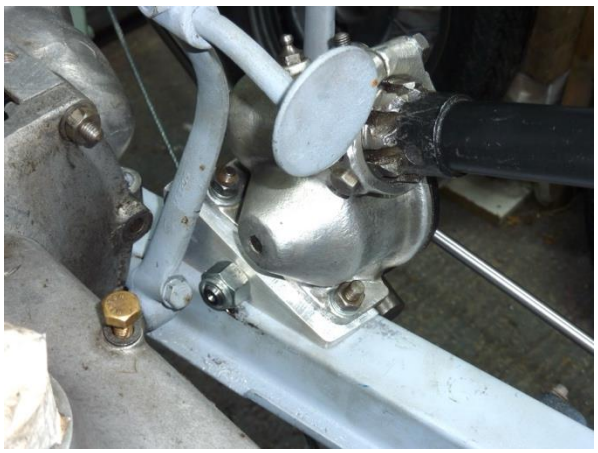


Fig 12 - 21º steering box wedge

Fig 13 - Footbrake pivot pins (top as machined, bottom standard A7)

Fig 14 - Brake pedal and master cylinder

Fig 15 - Master cylinder chassis bracket

The master cylinder bracket seems sufficiently rigid, however, it can easily be strengthened if necessary at a later stage by adding connecting brackets to the tubular steel body frame.

Hydraulic pipework –

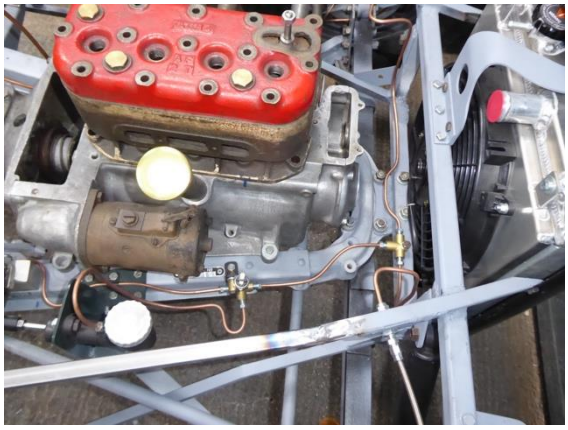
The rigid ‘plumbing’ was formed using 3/16” dia ‘Kunifer’ (copper/nickel) pipework which is cheap and fairly easy to bend to shape by hand around simple grooved formers turned-up in the lathe - all neatly attached to the A7 chassis with home-made brass ‘P’ clips and 2BA setscrews.

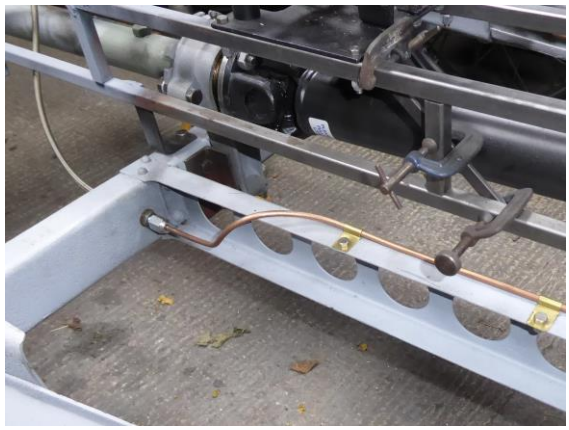
The pipe ends (single and double SAE flares) were prepared using a simple spanner operated press tool that works remarkably well if a little grease is applied to the business-end before forming. It is also important to slide the end fittings onto the tube before forming the second flare. A mistake you only make once!

Routing the bridge pipes on the front backplates was slightly tricky, but a safe arrangement was eventually discovered that would avoid the pipes being damaged on full lock whilst positioning the bleed nipples in a favourable and accessible position.

Having been quoted nearly £150 for three ready-made, rather splendid ¼" OD stainless steel braided flexible hoses to my specified lengths, I decided to have a go myself. A length of flexible pipe and the six end fittings were obtained for around £40. Carefully following the remarkably clear instructions proved unexpectedly straightforward and particularly rewarding - I just hope everything stays connected when I jump on the brakes.

One or two photo's of the hydraulic pipework in position on the chassis –





Finally, a classic Mini handbrake (£15) was bolted to the transmission tunnel sub-frame to operate the rear cylinder levers via shortened Morris Minor rear brake cables. Job done!

Bob Garrett