

Massey Ferguson foot brakes

Repair/Replacement of
the disc brakes of my
MF 65



by Uwe Schatz

During the interesting repair of the disc brakes on my MF 65 the question arose 'When were the first disc brakes installed in tractors and who invented them? Was Harry Ferguson the first or perhaps one of the first people to use them?'

NB: As this is a German market tractor, it has both disc and drum brakes as it was a legal requirement to have two separate brake systems in Germany and several other European markets, excluding the UK.

The difficult search to find the answer led me to the British engineer Frederick W. Lanchester, who developed the first disc brakes in 1890 and achieved the patent in 1902. In the same year the first tests commenced on a motorcar. Those first brake plates were constructed of copper.

Probably the first, or one of the first installations on a tractor took place in the 1940s, not a Ferguson, but in a Massey-

Harris 81, in theory all part of the family. The Massey-Harris 81 (built between 1941 and 1947) ran with disc brakes, principally similar to those of the later MF 65, but fitted with rollers instead of balls.

Massey-Harris in France began experimenting very early on brakes similar to disc brakes on the M-H 25, and M-H 30. The brake linings were designed in a V-profile and were pressed into a piece looking like a belt pulley.

Early years

In 1931, Joseph Lucas Ltd took over the complete brake business for the UK from Bendix France and signed an agreement of co-operation with Bendix. During 1943, Lucas took over the patents from New Hudson as well as the brake business from Bendix on the continent and established Girling Ltd. From then on all disc brakes, i.e. also the brakes for the MF 42, were produced and sold by Girling Ltd.

The International Harvester Company (IHC) also installed disc brakes in its

Farmall tractors. The simple reason; the disc brakes were fitted outside at both ends of the differential gear so that the axle shafts were left free to be adjusted in order to be able to change the track width on the rear wheels. In the early 1950s IHC DED 3 and DED 4 models ran with ball disc brakes from Girling/Lucas.

In 1957 the MF 65 MK I was provided with disc brakes from Girling. These brakes were always referred to by the engineers as Ausco-Girling and were of the twin dry disc type. In 1960, Ford fitted the Fordson Super Major with disc brakes, whilst John Deere did the same with its German built models, the John Deere-Lanz 300, 500 and 700.

During 1961 Ford USA equipped its Ford 600 for the first time with disc brakes (differential hydraulic wet disc) and in 1963 the MF 65 MK II continued with double disc brakes from Girling. David Brown followed suit during the 1970s with its 1410 and 1412 models.

In earlier times the Dunlop company was also in the brake business, mainly for the automotive market, and its products were used very successfully on the Jaguar C and D type models to win the Le Mans 24 hours race in 1953/55/56/57. It should also be noted that during the development of the early disc brakes, they were also used as hand brakes, steering brakes and drum brakes.

The Dunlop company was a huge concern, manufacturing a great range of tyres at their Fort Dunlop plant in Birmingham, plus an enormous range of wheels for both the automotive and aircraft industries; the company carrying out this work and the brake manufacture being designated Dunlop Rim and Wheel Ltd., which was based in Coventry. The tyre division does still exist, albeit under different management, but the rest is now long gone.

The major change and breakthrough in the use of disc brakes on tractors occurred during the late 1960s with the adoption by many manufacturers of the oil immersed version of these brakes. They offered a big improvement, not only in performance and consistency of operation, but also a huge increase in service life and reliability. The first Massey-Ferguson recipients of these brakes in Europe were the MF 165/168/185 and 188 models, introduced in late 1970.

In 1998 TRW-Lucas sold its brake business for trucks and tractors with unrestricted rights to Meritor. The takeover being completed, the production and sale of all truck and tractor brakes took place by Meritor. Today Meritor uses the trade names Lucas, ROR and Rockwell. Major competitors are for example Ate/Continental and Honeywell.



MF 65 Brakes

Principal scheme of disc brakes

The seven-inch diameter disc brakes are situated on each side of the differential unit and are separated from the differential unit by diaphragm plates which carry the differential bearings. The brakes are completely enclosed, being dust and water free. When you operate the brake pedal, the plates are pressurised by the brake actuator plates, these are slightly rotated by the operating rods connected to the brake pedals. This slight rotation causes the plates to be pushed apart as the ball bearings run up an angled slot causing expansion, which in turn pressurises the brake plates against both the diaphragm plates and the face of the trumpet housing, slowing the vehicle down. The independent brake pedals on the right hand side of the differential unit can be locked together, a necessity when driving on roads.

A problem often encountered with these original type dry brakes is that due to the heat generated when braking hard, this can cause both the actuators and the liners to expand, resulting in the brakes locking on. Reversing the tractor will usually release the locked brake, or brakes, but it is an annoying thing when it happens.

When the wheels on my MF 65 seriously locked during a tractor tour on Ascension Day I decided once back home that I had to strip down and repair the foot disc brakes, with the help of my good friend Jörg Brodkorb. Unknown to us at the time, this would turn out to become a real challenge.

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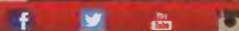


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Dismantling of the disc brakes

The spare parts I required were bought from a company in Germany called Granit and I know they do have a base in the UK, a quick search on the internet brings up their details across Europe. I required two sets of brake linings for the disc brakes, one set of brake linings for the drum brakes, two complete brake anchor plates, six springs for brake shoes, two pin sets for the brake shoes, two shaft seals, two paper seals, ceramic grease, ceramic grease spray, sealing paste and 30 litres of Gearoil 80W90.

Granit are specialists in high quality replacement parts for all brands, supplying 35,000 distributors across Europe. Their unique range includes original spare parts, A-brands and their own range of Granit quality spare parts. In addition, they offer technical consulting services as well as marketing support.

We sourced two or three cardboard boxes so that we could safely save all the dismantled parts such as screws, washers etc., which made it easier to find them later when refitting, it is surprising how many small parts go missing during a restoration or repair project.

When the tractor was jacked up under its rear axle the rear wheels were taken off as well as the mudguards. An important point of note here is to use strong axle stands or blocks of wood to secure the jacked up tractor, plus to prevent the front axle from pivoting – safety is and was paramount. The electric wires from the rear of the tractor had to be removed from the cable junction box and marked to make refitting easier.

This operation can be a little difficult, as the best way to remove the trumpet housings is to wedge the front axle to stop tilting, and jack up under the centre of the rear axle if both trumpet housings are to be removed.

The alternative is to remove one trumpet housing at a time, putting an axle stand under the side not being worked on, but still having to jack up under the centre housing.

The next step was to drain the transmission oil.

We took off the left hand trumpet housing only, dismantled and repaired it. Having installed the new brake into the left shaft and refitted it onto the tractor we then followed the same procedure on the right shaft.

Not every single part was within our control as we had decided to install new brake anchor plates (the old ones being at least 50 years old). The brake plates had a new lining, we had to be careful as the lining can bend during riveting. We constantly measured the thickness to check and ensure that the surface remained even.

Thank you to Jörg Brodkorb for the technical help and once again to my wife, Christa, for translating from German to English.



After having removed the hexagonal nuts of the half-shafts to the differential housing, the axle shafts were removed. The brake drum of the hand brake was also taken off. The adjusting nuts of the operating rods, the two screws fixing the rods to the housing were removed.



The half-shaft was placed upright, the hexagon socket screws were removed in order to be able to take the differential plate off the axle unit. The complete brake assembly, along with the brake plates, was lifted out. The position of the brake discs were marked for later reinstalling.



The old brake anchor plate with the balls running up the machined ramps are slightly rotated by the operating rods.

Refitting of the brakes



Brake plates and brake anchor plates were replaced into the axle shafts.



After greasing the paper seal it was fitted to the bolts.



Before fastening the brake drums the new lined brake shoe was fitted.

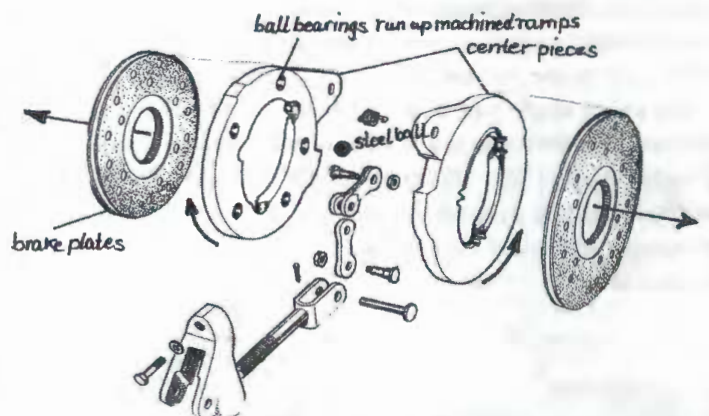


The refitted mudguards.



The repaired MF 65.

Disc Brakes



Next, 30 litres of 80W90 gear oil was poured in. The last step was testing the brakes by calibrating the adjusting screws. Now my 50 year old MF 65 runs perfectly without the brakes snatching or locking on.