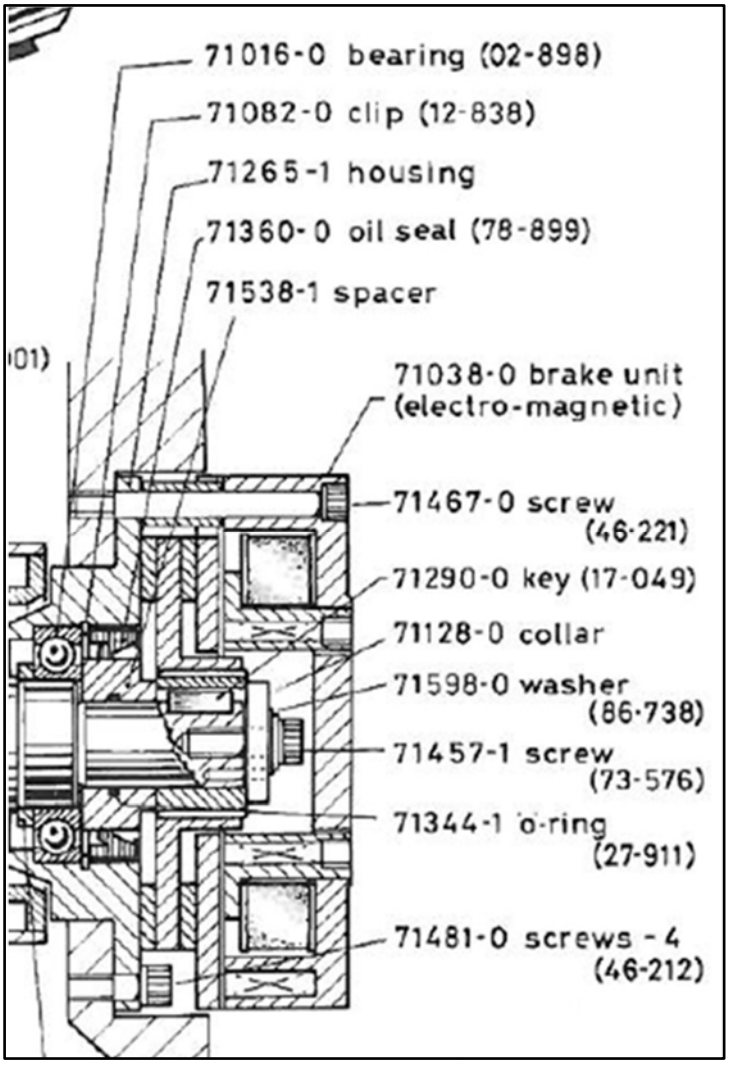
The Ortlinghaus Electromagnetic Brake-an explanation by Alan Bryan

Colchester first introduced the Master 2500 with a foot operated spindle brake. This was a common type of fitting on the Triumph 2000 & other machines also. At some point in the manufacturing cycle the mechanical brake gave way to an electromagnetic brake although I understand that it didn't completely replace the mechanical alternative on the Master 2500 until quite late in the model run. Units were supplied by Matrix & Ortlinghaus. Both companies also produced the clutches used in the headstock & I believe that Matrix & Ortlinghaus were not mixed on machines. A lathe either had 2 clutches & a brake by Ortlinghaus or similar components from Matrix.

With that said, I believe that an Ortlinghaus brake can be retrofitted to a machine that was originally Matrix equipped providing that the splined adaptor relevant to the brake is also fitted.

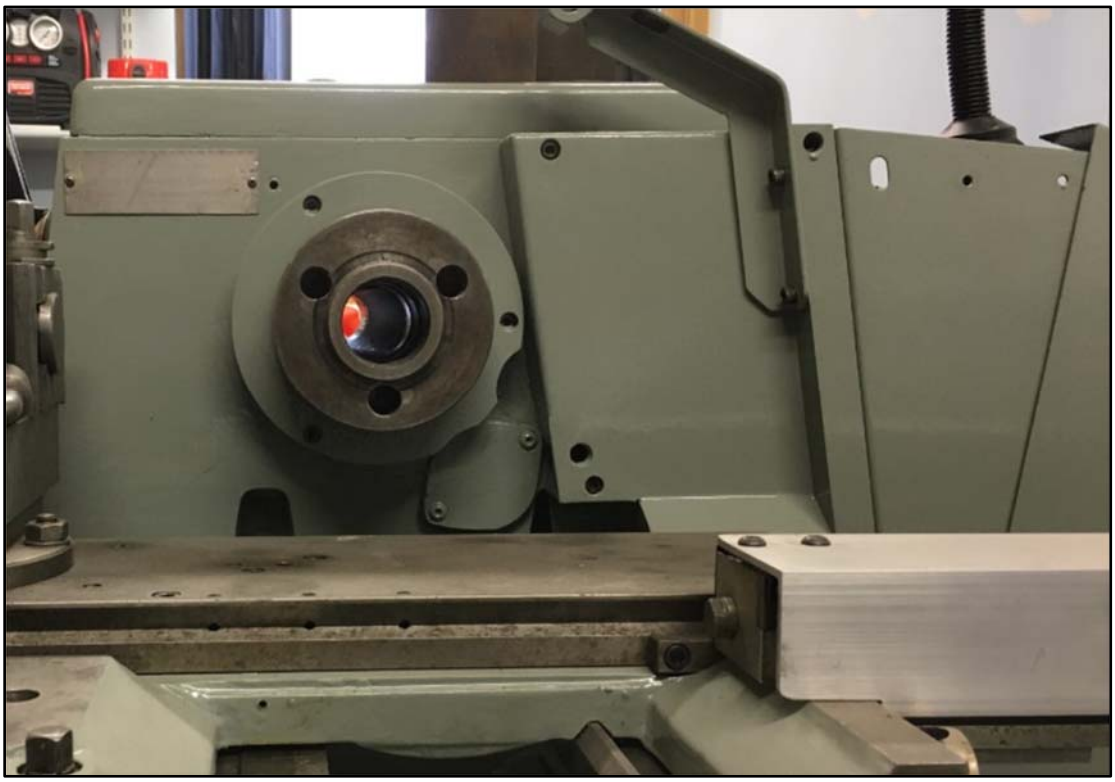
The principle of operation



The friction plate, see the section above, is held against the housing 71265-1 by springs acting against the pressure plate. When the control lever on the lathe apron is moved to either forward or reverse, it actuates the microswitch at the rear of the headstock & completes the circuit which allows an electric current to flow through the magnetic coil. That activates the magnet which pulls the pressure plate against the spring force to release the friction plate & thus allows the headstock spindle to rotate.

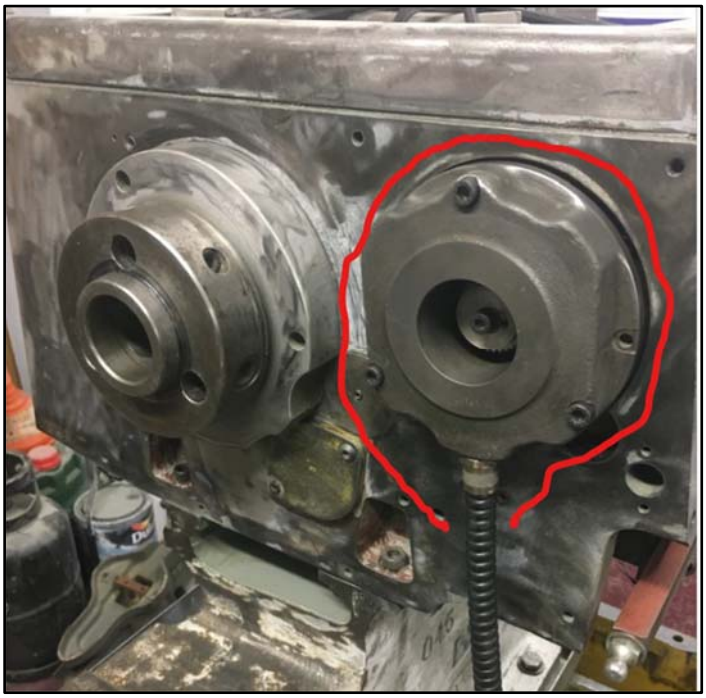
Brake Location

The brake is coaxial with the lathe input shaft that carries the twin sheaved vee belt pulley. It is protected by a substantial fabricated sheet steel housing that is secured to the headstock casting by Allen cap-screws plus a button headed Allen screw to the headstock portion of the swarf tray.

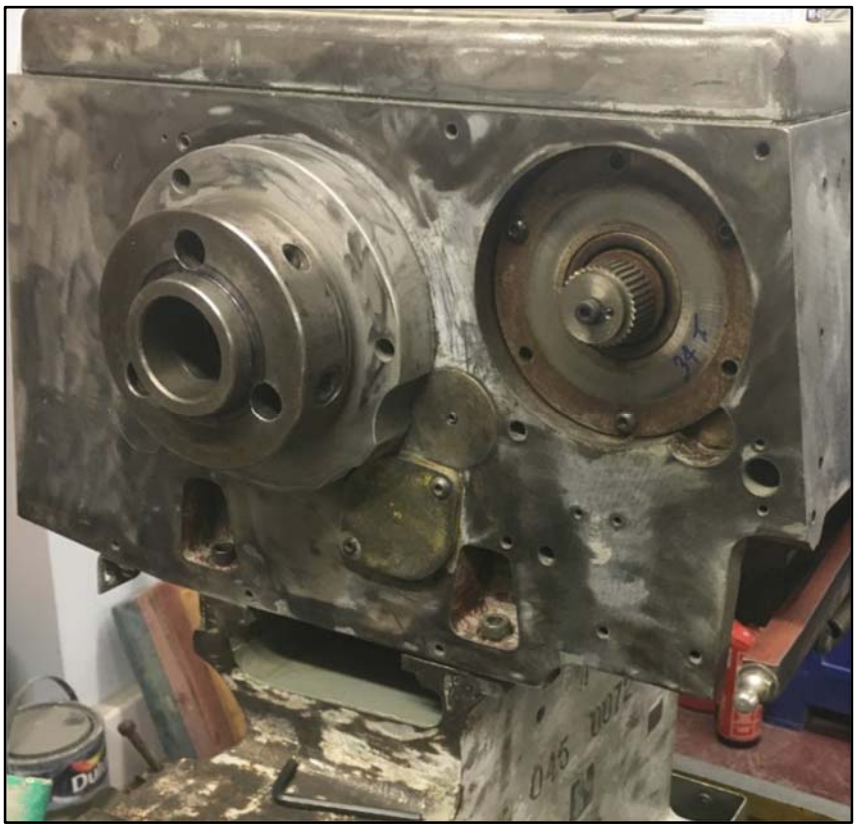


To remove it you first must unscrew & lift away the splashback. The triangular sheet metal part can then be unbolted & placed to one side before unscrewing the brake cover.

When the cover is removed it reveals the brake which in this case is an Ortlinghaus component. The brake is secured to the headstock by 3 Allen cap-screws. Please excuse the lack of paint, all of these photos were taken during refurbishment.

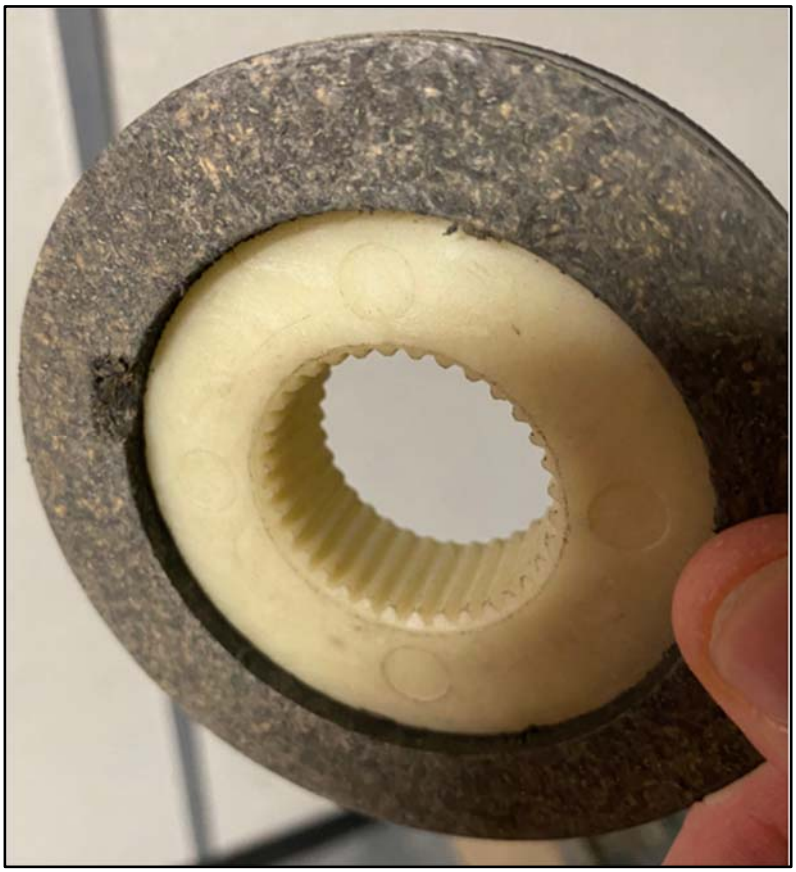


Remove the 3 cap screws & this is what you see. The following description is of an Ortlinghaus brake. I understand that the Matrix part is broadly similar.



Close-Up Detail showing the splined centre which is keyed to the output shaft. The Ortlinghaus splines measure 35mm outside diameter whereas those on the Matrix are 40mm diameter.

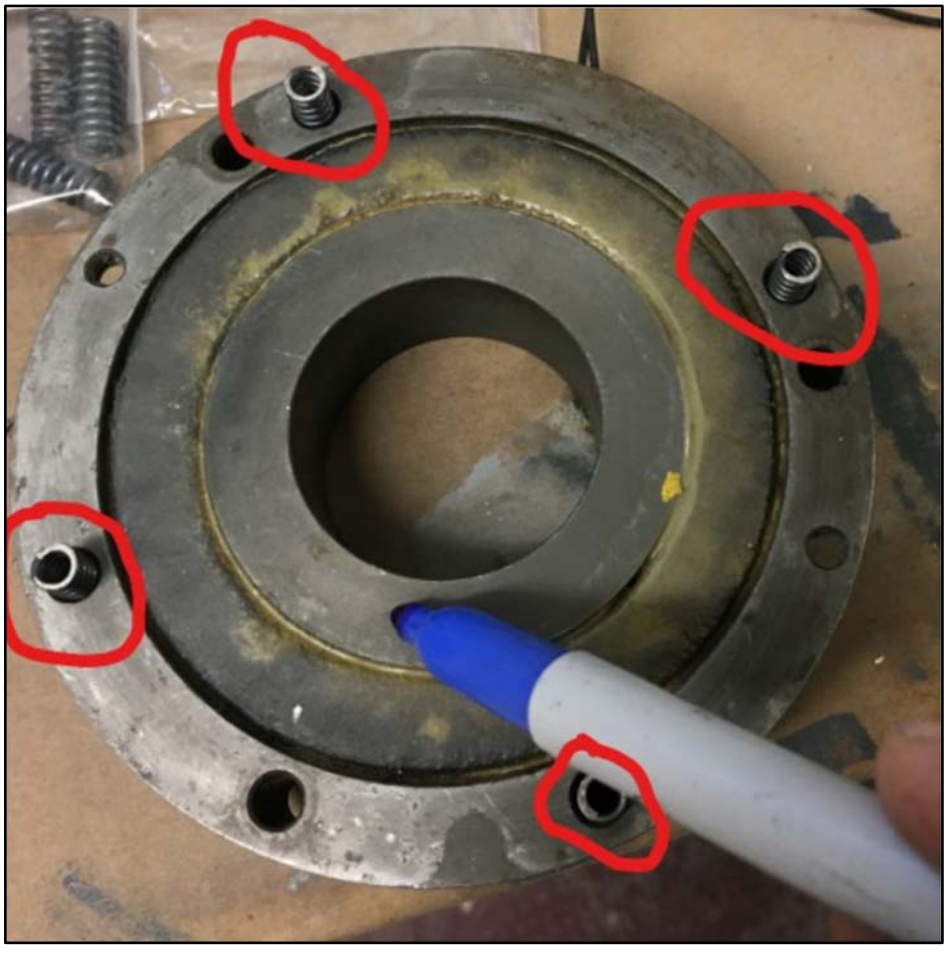
The Friction Plate slides on the splines.



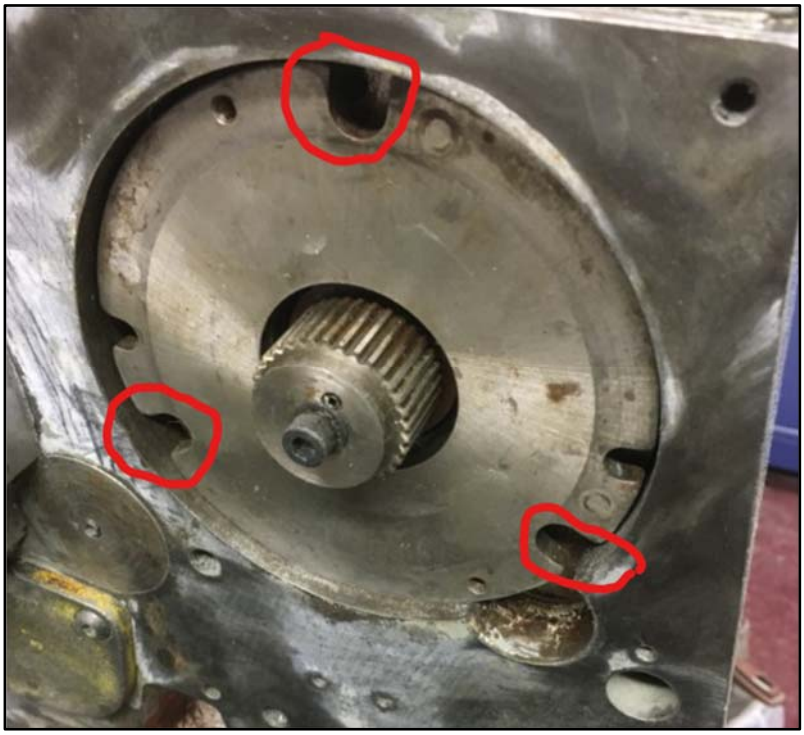
I have no idea what the friction material is. Ortlinghaus wouldn't tell me, claiming doing so would breach their IPR.

The Pressure Plate

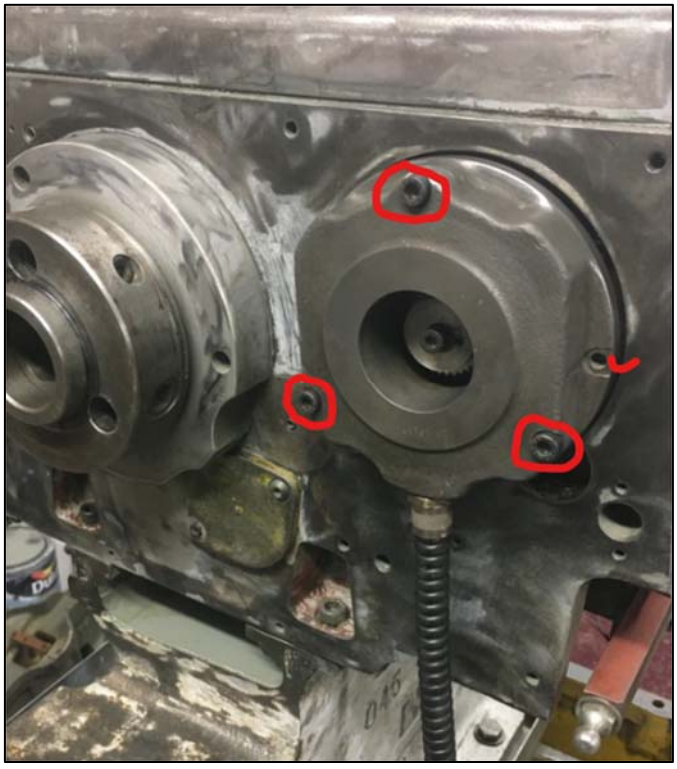
Which is actuated by the springs shown circled below on the view of the ‘inside’ of the brake housing. The pen is pointing to the pole of the electromagnet which attracts the pressure plate away from the friction plate to allow it to rotate independently.



To reassemble-after ensuring that the friction surface on part 71265-1-Housing is grease free, slide the friction plate onto the splined hub. Then the pressure plate can be fitted over it. Ensure that the cut-outs indicated are positioned as shown where the 3 fixing screw holes are located. No friction plate is fitted in the view shown. It should be sandwiched between the pressure plate & the housing.



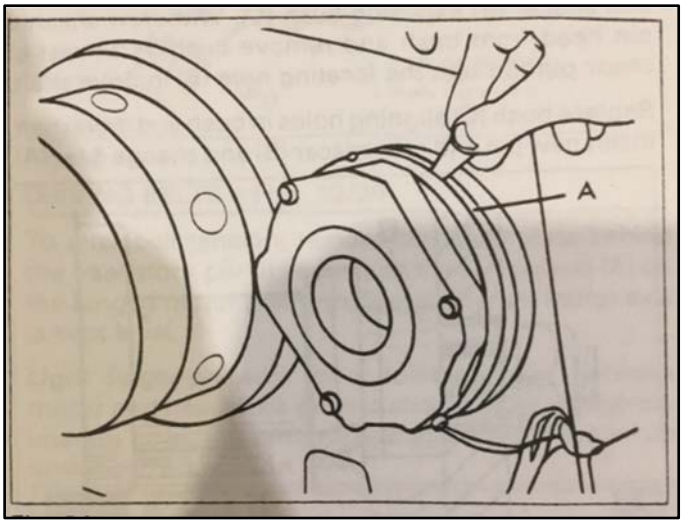
The brake housing complete with springs & the tubular spacers fitted over the pre-inserted Allen fixing screws can then be offered into place. Locate the screws into the tapped holes & progressively tighten against the headstock which will compress the springs. Alternatively, 2 M6 screws can be used in the opposing holes one of which is marked below to screw into the pressure plate to compress the springs before offering the brake up to the headstock.



The brake is now reinstalled.

To maintain the handbook states: -

'The spindle brake is of the spring applied type requiring practically no maintenance apart from ensuring that its friction disc & its mating faces are always clean & free from oil & grease. After many thousands of operations, however adjustment of the airgap may be needed. The gap A should be measured with feeler gauges at three points around the circumference. It should be between a minimum of 0.016" (0.4mm) & a maximum of 0.080" (2mm). When due to normal wear on the friction disc, maximum allowable air gap is exceeded, the bolts holding the magnet assembly to the machine should be removed & & the spacer sleeves on the bolts reduced in length by the appropriate amount to its nominal minimum dimension & the unit reassembled & tested.'



The illustration is somewhat disingenuous because it shows the brake unit mounted to the outside surface of the headstock whereas it is embedded into a counterbored recess & access with the feeler gauges is severely limited.

Electrical Actuation

The brake is DC actuated via the rectifier on the main electrical board. The two connections for it are marked below.

In use

The brake is always applied that the lathe chuck is not under power i.e., when either clutch is disengaged. It is also applied when the motor is switched off. As previously written "*When the control lever on the lathe apron is moved to either forward or reverse, it actuates the microswitch at the rear of the headstock & completes the circuit which allows an electric current to flow through the magnetic coil*". That activates the magnet which disengages the brake & allows the spindle to rotate.

That allows then to safely place a workpiece into the chuck, but the problem comes when the chuck needs to be rotated by hand to either check that a part is running truly or to set up a part in either a four-jaw chuck or on the faceplate. Colchester have therefore provided an electrical release for the brake which allows the brake to be disengaged so the spindle can be rotated by hand.

The switch is located next to the main motor switch to the left of the coolant pump switch. When it is actuated a light shows in the switch. Pressing it again locks the brake & the light goes out.

That is fine if the power is switched on, but if you want to rotate the chuck when the motor is switched off then you will have to select a neutral sector on the speed selectors which will permit the chuck to be turned by hand. Just don't forget to put it back into gear when you have finished.

Conclusion

The electromagnetic brake is an essential safety fitting. It automatically virtually stops the chuck dead when the operating lever is moved to the centre position which is essential when going from forward to reverse when performing operations like screw-cutting. It is a big improvement over the foot operated version simply because it is automatically applied, every time. When it wears, parts are readily available from the manufacturer for the unit if it is an Ortlinghaus part. I do not have information about the availability of Matrix components. Ortlinghaus still produce a variant of the Master 2500 brake https://www.ortlinghaus.com/english/products/brakes/electromagnetic-brake-series-207/207.html & Matrix probably do also https://www.matrix-international.com/

LatheWorkshop thanks Alan for his input