F THE GEARBOX *(Updated: Nov 2011 by Peter Hehir)*

Section F.2

TO DISMANTLE THE GEARBOX

It will be found advantageous to support the gearbox in a vice by means of a steel bar approximately 1/2" (40mm) square by 5" (127mm) long, this being suitably machined and threaded at one end to enable it to be screwed into the gearbox drain plug hole (see Fig.F.2).

Remove the dipstick and drain plug from the gearbox and drain off the oil.

Release the clutch housing from the gearbox by removing the fixing bolts and spring washers.

Extract the split pin from the nut at the rear of the gearbox sliding shaft and remove the nut and plain washer.

Place the gearbox into neutral.

Remove the six nuts securing the top cover assembly to the gearbox. *Here, a word of caution is in order. Note that the cover is under spring tension from the three selector springs located in the three holes in the casing above the selector shafts. Take off the cover and* remove the three selector springs *and the three balls.*

At this point, as an aid to reassembly, it is advisable to photograph the gearbox, paying attention to the position of the various components and the 3/4 sliding hub in particular.

It is essential to resist the temptation to operate the gears with the cover, springs & balls removed. On early boxes, unless the balls have been peened into position, this will certainly result in the 3/4 sliding hub balls & springs exploding into the box!

Which of course means completely stripping the gearbox to retrieve the springs and balls and to reinstate them into the hub and dog assembly. Not a real problem during disassembly but at the end of a hard days work assembling the box, believe me it's enough to drive you to drink!. Been there & done that.

Remove the four bolts and spring washers securing the remote control cover assembly to the gearbox extension.

Remove the remote control unit.

If necessary, use the extractor, Tool No T.108 to withdraw the propeller shaft driving flange. It is advisable to use an extractor of this type to avoid distortion of the flange face.

In practice, this flange is easily removed by hand without the need of an extractor, making it very easy to miss the next step!

Before doing *so* it is advisable to mark both the flange and the shaft so they can be replaced in exactly the same position.

Detach the speedometer drive housing from the right hand side of the gearbox. *In later gearboxes the speedometer gear was keyed to the mainshaft.* Care should be exercised not to *lose the key* or damage the paper gasket on the joint face of the housing, *as this is not included in the gasket set.*

Whilst the manual says to extract the eight square headed screws, *hex head on later boxes*, locking the gear shifters and stops to the selector shafts and remove the screws, *it is not necessary to remove all eight screws, as the three securing the selectors can remain intact.*

The manual also says to slacken the nuts and set bolts securing the gearbox rear casing to the gearbox and withdraw sufficiently to allow the gear shifters to be removed from the ends of the selector shafts. *This step is unnecessary. If the selectors are to be replaced this can be done during final assembly.*

Remove the nuts and set bolts securing the *gearbox rear casing* and withdraw the rear casing from the gearbox.

On early type gearboxes, withdraw the selector shafts one at a time, taking care not to lose the *two remaining horizontal* lock balls in the process. *These two balls lie in the edge of the case, between the three visible holes, either side of the centre selector shaft.*

Prior to removal, observe the correct position of the gear shifters and stops on the selector spindles (*shafts*) as shown in the plan view of the selectors and shafts.

(Reference to page E.10 will show the interlocking mechanism of the shifter balls).

Later models have a third and top selector shaft extended at *both its rear and* front end and fitted with a circlip to prevent its accidental withdrawal and the loss of the synchromesh balls. In this case the circlip must, of course, be removed before the shaft can be withdrawn. This also makes it imperative to remove the gearbox from the engine before dismantling.

With the selector shafts removed, place a feeler gauge between the fork and dog and check for play. If there is more than .010", consider replacing the dog, or the fork, or both.

Now lift out the selector forks *and examine for wear. It will be noted that the 1/2 and the 3/4 forks are not interchangeable.*

Rotate the mainshaft and examine the condition of the gears, looking for chipped or broken teeth and for signs of pitting.

Remove the layshaft spindle (*shaft*) locating screw from the rear of the gearbox.

Extract the layshaft spindle (*shaft*) by tapping it at the forward end with a suitable copper or brass drift.

If you have a dummy layshaft to hand, use it to drive out the layshaft. Continue to push the layshaft towards the rear of the box from where it can then be easily removed.

Retain the layshaft.

If replacing it, cut the old layshaft to the length of the layshaft gear unit (cluster gear). It can then be used as a dummy. This will make the reassembly of the cluster gear unit and its subsequent replacement in the box so much simpler.

The first motion shaft bearing nut can now be removed.

It is essential to note that this nut has a left hand thread!

Perhaps it is stating the obvious but the manual neglects to mention this! As a result, both the nut and the locking tab washer will almost certainly be quite severely damaged, no doubt caused by many previously unsuccessful attempts to undo the nut, by actually over tightening it!!

Whilst it is possible to repair the damaged nut with a file, it may well be prudent to replace both items.

Remove the drive gear (*first motion shaft*) with its journal (*front)* bearing by tapping the mainshaft towards the front of the gearbox, using a suitable copper drift.

Before the mainshaft can be removed, it is necessary to extract the journal bearing from its housing, using a suitable drift for the purpose.

The mainshaft assembly can then be withdrawn from the gearbox as shown in Fig. F.3

Lift out the layshaft gear unit, observing that the tabs on the thrust pads (*washers*) line up with the slots cut in the boss at the front and rear walls of the gearbox.

Section F.3

TO DISMANTLE THE MAINSHAFT

Withdraw the top and third gear synchromesh hub from the forward end of the shaft, observing that the plain side of the hub goes to the rear of the gearbox.

It is worth pausing at this point & noting that the hub can be inserted into the dog in either of two ways.

Hold the still assembled dog and hub and view it end on, noting their relevant positions. The projection of the dog from the hub may appear to be equal on each side or it may seem to be slightly offset, as was the case with my box.

It seems prudent to mark the adjacent faces in such a manner so that this precise relationship can either be maintained, or intentionally altered, when reassembling the hub and dog.

Do not attempt to disassemble the hub & dog at this stage without reading Sections F.4 & F.5.

Remove the third speed gear collar by pressing down *on* the spring loaded plunger and rotating the collar until the female splines register with the male splines on the mainshaft (see Fig. F.4)

The third gear can now be withdrawn.

Care must be exercised to prevent the loss of the plunger and spring or the thirty two needle bearings on which the third gear is mounted.

Extract the circlip from the rear end of the mainshaft and remove the first and second gear synchromesh hub; the conical lining end of the hub faces to the front of the gearbox.

The withdrawal of the second gear from the mainshaft is executed in a similar manner to that for the third gear, namely by pressing down the locking plunger through the hole provided and rotating the collar until the two sets of splines coincide.

Again care must be exercised not to lose the spring and plunger or the twenty eight needle bearings. (See Fig. F4.) And it must be noted that next to the second gear collar is a thrust washer, which is in two halves, having tongues which engage with slots in the forward face of the collar. It is important that this washer is correctly replaced on reassembly to centralise the collar.

Section F.4

DISMANTLING THE SYNCHROMESH MECHANISM

The striking dogs for top, third and second gears are retained on *two* sliding hubs by balls and springs which are housed within the sliding hubs and register with a central groove in the internally cut gear of the striking dogs.

Please ensure you have re-read Section F.3 & noted the dog & hub relationship before continuing.

Each sliding hub, therefore, can be pushed out from its striking dog when sufficient effort is applied to overcome the springs.

On earlier gearboxes care should be taken to ensure that the 6 balls do not fly everywhere when the hub is removed as the balls almost certainly will not have been peened over.

On later gearboxes the ball housing openings are peened over to retain the balls in position and prevent their loss.

It is wise to incorporate this change when reconditioning an earlier box. A small cold chisel, ten to twelve mm wide, placed over the centre of the ball and given a sharp tap with a hammer will retain the ball. This simple, quick and effective modification will make assembling the hub and dog so much easier.

If unwilling to peen the balls into position please note it is impossible to retain and compress all six balls at once, without the aid of a six pronged compressing tool, or a modified dog as detailed in Horst Schach's book "The Complete M.G.TD Restoration Manual".

Using a jubilee clip to compress the balls seems promising in theory but in practice proves to be frustratingly ineffective, in spite of assertions to the contrary.

Section F.5

REASSEMBLY OF THE SYNCHROMESH MECHANISM

The striking dog is placed against the end of the sliding hub and pushed through into engagement with it, when the balls will spring into an indentation ground into the center of the teeth *of the striking dog* and the assembly is completed.

As mentioned earlier in Section F.3, the central groove may appear to be offset when the assembly is viewed end on.

If, on earlier inspection, the projection of the hub seemed to be equal on each side, it makes sense to reassemble the hub and dog without altering their relative positions.

However, if the assembly appeared to be asymmetrical, as was the case with my box, i.e. if the hub seemed to protrude from the dog more on one side than the other, this is almost certainly due to wear by the 6 spring loaded balls in the central groove of the sliding dog, thus creating the appearance that the groove is slightly off centre.

In this case, reassemble the dog & hub using the adjacent spline set & recheck the projection. The goal should be to have the balls come into contact with an unworn section of the central groove to ensure an equal projection of the hub on each side of the dog.

At the time of writing it is not known whether this asymmetry can/does affect the operation of the synchromesh hub. I'll have a better idea when the car is on the road.

The remainder of the text in Sections F.5., F.6 and F.7 remains unchanged.

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NB: The Arial Narrow font is the Manual. *The additions in italics are mine.*

I would welcome a review of my rewrites. Feel free to contact me either by email or phone.

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