In the second of these articles Roger Williams explains the first part of his ID/DS 4-speed gearbox conversion for the Traction.

Whilst renovating the bodywork of my Light 15 I de-cided that a four speed gearbox would be better than the fragile [or so I was told] original three speed box. I saw Tom Evans's car at the Dent rally in 1980 and although at the time it did not mean much to me as I had never seen an ID 19 engine/gearbox before, various statements coming over the shoulders of the front row of onlookers did stick in my mind... 'across the gate movement... joined to cables... behind the dash... difficult to get into reverse sometimes... bags of space' etc.

In due course I acquired an ID 19 engine/gearbox and set about fitting it into my Light 15 with the brief that the modifications to the car itself should be minimal, so that the original power unit could be put back in without further work. I soldiered-on on my own and eventually got my prototype conversion working but not road tested, when Jonathan Howard asked me to do a similar conversion for his Commerciale. This became Mk II, which performed very satisfactorily under hard everyday driving conditions, and this was followed by Mk III for his Light 15 and Mk IV as a spare. Mk V, Mk VI and finally Mk VII followed with small but

TRACTION TRANSPLANT II

successive refinements, and the current version described here, Mk VIII, represents, dare I say it, the final version!

The ID/DS power unit was not designed for fitting into a Traction, and the solution to one problem seems to generate another, and whilst none of the modifications necessary are major, there are quite a few of them.

The final result, however, is a robust, reliable and economic power unit which, not being a purist, I think is a great improvement over the original.

The basis of the conversion is;

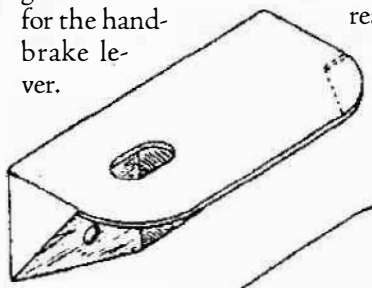
[i] The ID/DS engine block is similar to the Traction allowing direct transfer of engine, side suspension brackets and timing chain cover with the rear rubber mounting block.

[ii] The Traction differential unit, and hence the output shafts, can with suitable bushing and shimming replace the original ID/DS one.

The ID/DS bellhousing, however, is 35mm shorter than the Traction bellhousing, thus when the output shafts from the gearbox are aligned with the drive shafts, the engine block side and rear mountings do not align with the original hull mountings.

The hull side mounting brackets are replaced by new ones as shown in Fig I, and the housing for the rear rubber mounting modified as shown in Fig 2.

Figure 1 [L]: New brackets for engine side mountings. The cut-out is necessary on narrow-bodied cars to give clearance for the handbrake lever.



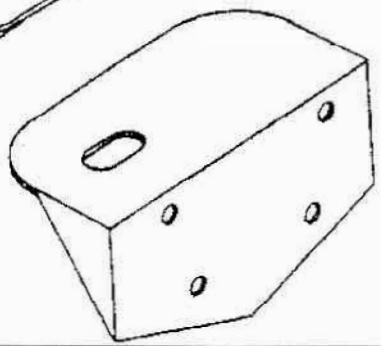
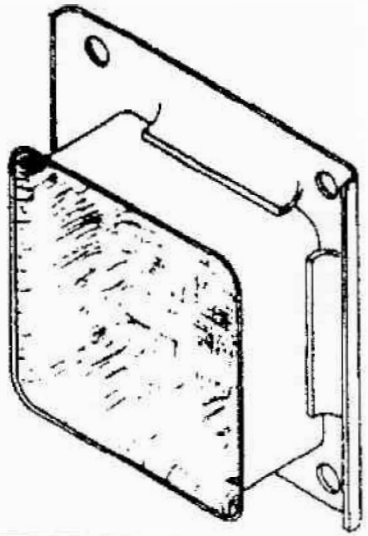
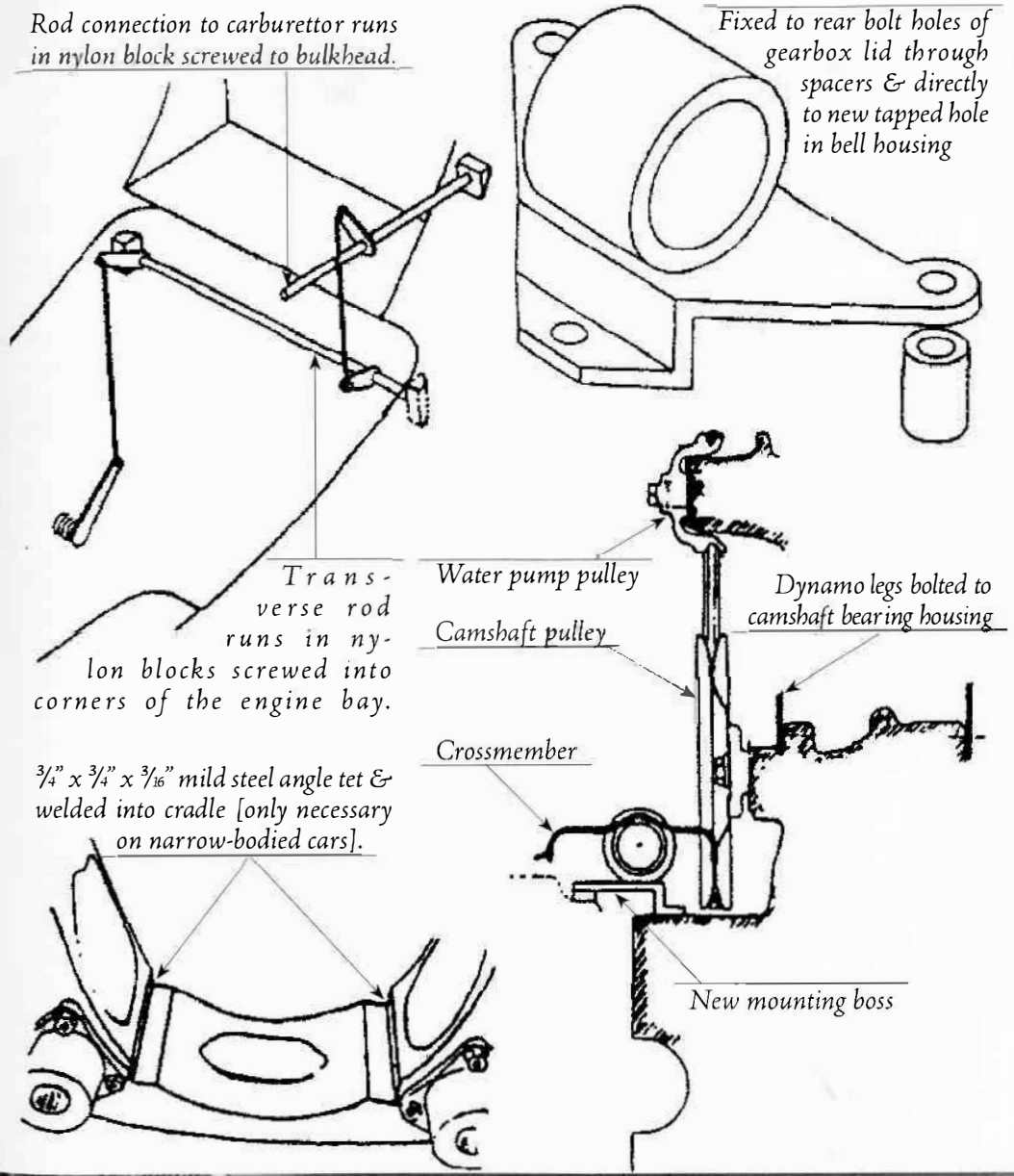


Figure 2 [R]: Modified housing for the rear engine mounting.

1. *Grind off original weld between box & plate*
2. *Reverse plate [also locating peg]*
3. *Reweld box flush with back of plate*
4. *Remember spacer washers between plate & bulkhead.*



Figures 3 to 6 below, clockwise from top left.
Figure 3: Carburettor control mechanism for RHD cars.
Figure 4: Front engine/gearbox mounting boss.
Figure 5: Modification to cradle [narrow bodied cars only].
Figure 6: Camshaft pulley fouling cross member.



There certainly is not 'bags of space' in the narrow bodied cars, and the mechanism shown in Fig 3 is necessary to operate the carburettor on RHD cars. The LHD cars are easier because the throttle pedal is on the 'correct' side of the car, and a direct connection to the carburettor drive rod is, therefore, fairly straightforward.

A steel mounting boss, to the same dimensions as the one cast into the top of the Traction gearbox, is machined and welded to a steel plate as shown in Fig 4, and bolted to the top of the ID/DS gearbox, such that its position relative to the output shafts is the same as the Traction.

Unfortunately, however, the gearbox side lower flanges foul the suspension cradle on the narrow bodied cars, and the cradle has to be modified as shown in Fig 5 to allow the power unit to float on/about its mounting.

The next problem to be overcome is to provide a clearance between the camshaft pulley and the cross member which, in the original state, can be seen from Fig 6 as being about minus 5mm. The radiator, however is mounted on the cross member and anything other than minor modification will affect the position of the radiator, which in turn affects the alignment and fit of the grill/bonnet/side valance panels/wings etc.

Various solutions were tried on the earlier prototypes, all of which were variations of machining back the camshaft and water pump pulleys as far as possible, combined with cutting and strengthening of the cross member to give sufficient clearance to run the pulley, and to also allow a fan belt to be changed without dismantling half the car!

If all the original parts are to be re-used, the limiting factor is the water pump pulley which can only be set back about 5mm before it fouls the nose of the water pump body. When the camshaft pulley is then lined up with it there is just enough running clearance, and the extra 10mm required to change a fan belt can only be obtained by cutting into the cross member. The solution is to machine a completely new water pump pulley, as shown in Fig 7, which changes the limiting factor to the clearance between the rim of the camshaft pulley and the pivot bar of the clutch fork lever.

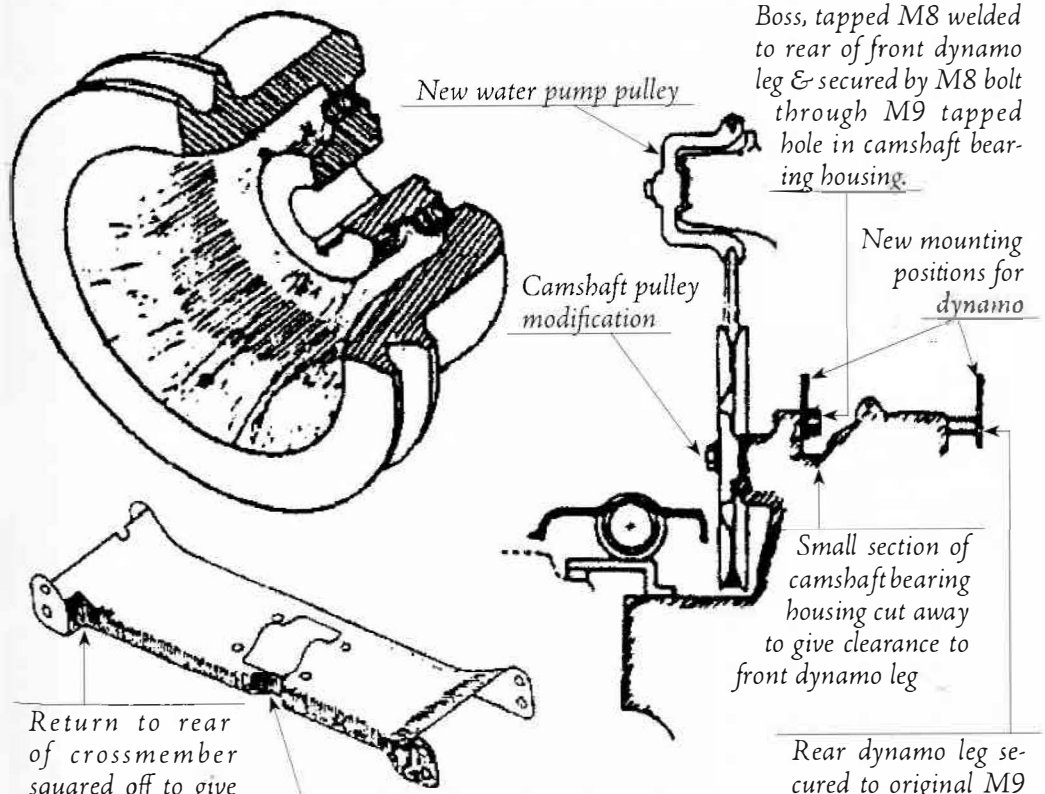
The camshaft pulley is a steel pressing, dished towards the front and riveted to a central boss. The most satisfactory way of re-positioning it is to separate it, reverse the dish and then re-rivet the dish to the central boss. The result of these modifications is to move the line of the pulley train back by about 15mm as shown in Fig 8, which also gives details of the new mounting position of the dynamo.

Some modification is still necessary to the cross member, but it is extremely minor and is shown in Fig 9.

Now we get to the heart of the problem – the output shafts from the gearbox. The original ID/DS gearbox is shown in Fig 10.

The easy way is to swap the ID/DS differential for a Traction one, and machine a bush into the ID/DS crown wheel in which the Traction planetary wheel shaft can run. Whilst this is an easy, and in many ways, a practical

Figures 7 to 9 below, clockwise from top left.
Figure 7: New water pump pulley.
Figure 8: New water pump pulley and modified camshaft pulley in position.
Figure 9: Modified rear edge of cross member



solution it uses a Traction differential, which is not particularly well engineered. It is inherently weak because the planetary wheel shaft, onto which the output flange is splined, runs in a bush bearing from which the face of the output flange overhangs by about 50mm.

The only other work necessary is to machine off the gearbox flange to accept a 3" x 1 3/8" x 9/16" oil seal, machine down the Traction output flange from 36mm to 1 3/8" and re-shim the differential-side taper roller bearings.

This layout is shown on the right-hand side of Fig 11.

By the time I'd got to Mk IV, I was convinced it would be far superior to retain the ID/DS differential and make up a new pair of output shafts. These are machined from a solid 3" x 3" bar of EN24 steel, and it grieves me to see over 90% of the original bar disappear in swarf! The shafts are then hardened and tempered after basic machining, and finally ground to the correct dimensions and finish for the bearing seating/oil seal face.

The principle is the same as the original; the outer end of the output shaft runs in a ball bearing. I considered various arrangements for retaining the bearing to the output shaft and the flange of the gearbox using standard bearing and oil seals, but could not better the original layout, with the possible exception of using circlips instead of threaded sections.

The existing bearing/oil seal housing, however, is begging to be re-used, which I did by machining down the outside of the housing and shrinking it into the flange, as shown in the left-hand side of Fig 11.

In order to provide proper support for the bearing, it must be located mostly within the flange and this pushes the oil seal outside the line of the flange. This in turn pushes the face of the output flange out so far that it would be impossible to install if the normal stud fixings to the drive shafts were used. The output flange is therefore made a little thicker and the stud holes tapped for connection to the drive shafts via caphead allen screws.

The flanges are held to the gearbox via four No M7 bolts and six No M9 bolts. The M9 bolts pass through the original gearbox support brackets and are too long for re-use. Replace these with 3/8" BSF bolts 1¼" or 1½" lg. [M9 is 0.354" dia. with 20.32 TPI – 3/8" BSF is 0.375" dia. with 20TPI – just run a plug tap through original holes but be careful not to leave swarf inside the gearbox]. It is necessary to recess countersunk head allen screws for the bottom two holes

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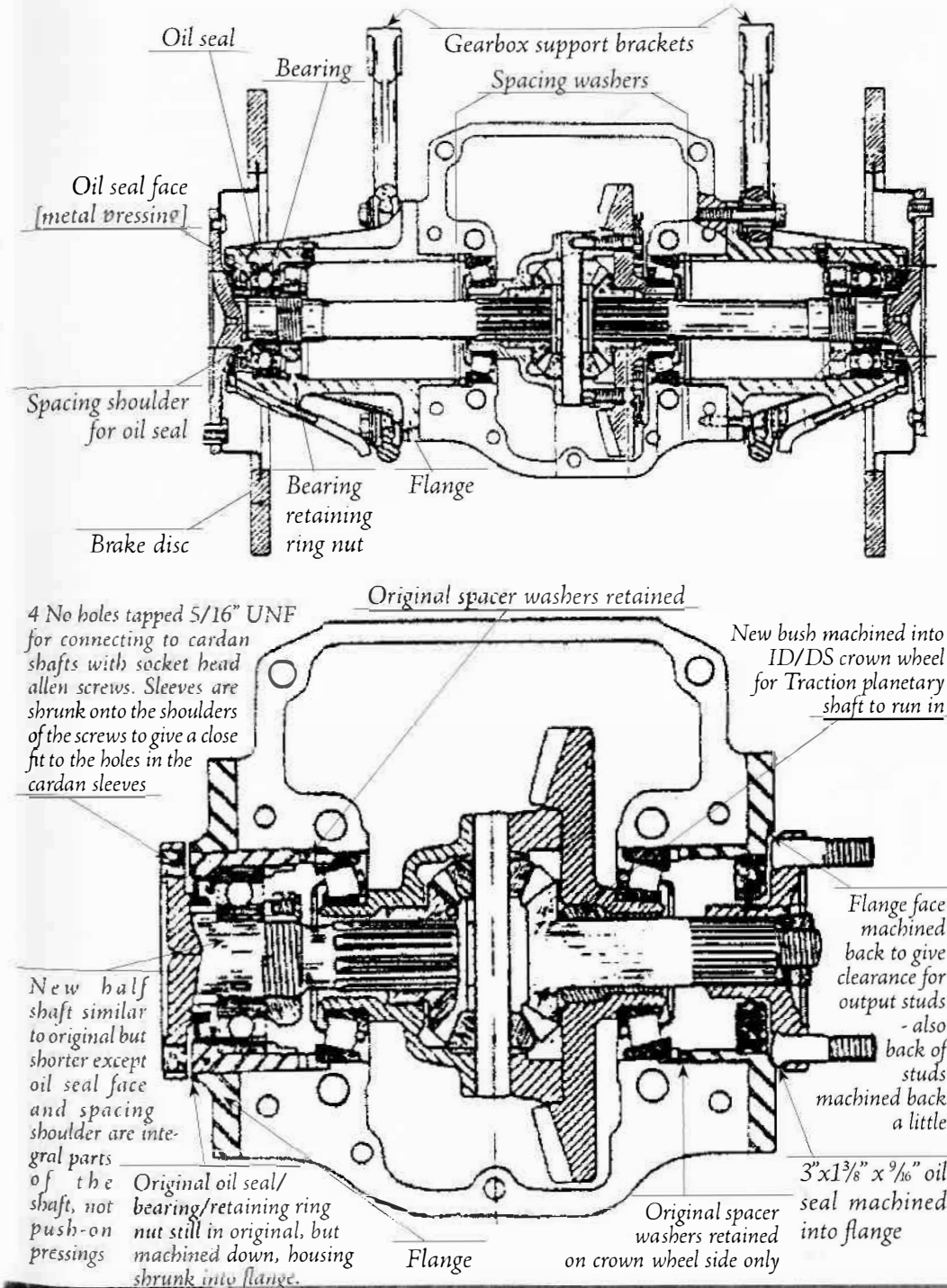
Figure 10 [right]: Original ID/DS gearbox before modifications
Figure 11 [below]: Section through ID/DS gearbox showing conversion.



on each side, and file away the bottom of the flange for the narrow-bodied cars, to give clearance in the cradle.

The engine/gearbox unit is now ready for installation in the car, so we are about half way there! I will describe the gear change mechanism and the other ancillary modifications necessary to complete the conversion in the next issue.

Roger has certainly given a lot of thought and hard work into the planning and development of his 4 speed gearbox conversion in recent years and we are fortunate to be able to publish details of his work for the benefit of all members.

Many members may feel, however, that the actual task of doing the conversion themselves is beyond their ability and scope, or just as likely, they do not have the engineering equipment required! Whilst every effort is made to ensure the accuracy off the information and advice published in this magazine, neither the TOC, CCOCA or the officers and members thereof or the authors, accept any liability whatsoever for such information and advice.

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