## 7.0 Gearbox

### 7 1. INTRODUCTION

Many competitors are guilty of inconsistent preparation as regards the specification of the car they build. To go out and buy a gleaming 1800ec BDA with 45 DCOE Webers, BD3 cams, etc, and they try to bolt it all together with a 2000E gearbox obtained from the local scrapyard, is not uncommon. Net result, a boxful of neutrals on the first event which may not only blow the engine apart, but could alternatively give the driver a heart-stopping moment, as the back wheels lock on solid.

As an approximate guide-line, English axles and 2000E gearboxes are OK up to 150-160 bhp. Thereafter, transmission failures are likely to be a major problem.

### 7. 2. ROCKET BOX

The next step is to use a rocket gearbox, which is homologated on Gp 1 RS2000's, but can also make a good basis for a Group II RS 1800, the limit here being 170-180 bhp approximately.

Listed below are the gear ratios of the above gearboxes:

| | **2000E** | **RS2000** | **Rocket** |
|---|---|---|---|
| **1st** | 2.972:1 | 3.65:1 | 2.54:1 |
| **2nd** | 1.97:1 | 1.97:1 | 1.66:1 |
| **3rd** | 1.4:1 | 1.37:1 | 1.255:1 |
| **4th** | 1:1 | 1:1 | 1:1 |

'Rocket' gearbox for all Escorts:
an ultra close ratio gearbox 905 2507
- requires some floor pan modification to fit.

Gear kit - close ratio:
A complete gear kit to bring the standard Cortina 2000 or Escort RS2000 gearbox to 'Rocket' specification. 905 1637

To fit the 'Rocket' gearbox into an Escort Mexico, Twin Cam, RS 1600, the following parts are required:

**Rallye Sport:**

| | |
|---|---|
| Clutch housing - Alloy | 905 1203 |
| Clutch release lever | 905 1928 |
| Hub - clutch release bearing | 905 3075 |
| Kit spacer - gearbox mounting to body | 905 2867 |
| Propshaft | see 'Rear Axles' |
| Short-shift kit | 905 2908 |

**Standard Parts:**

| | |
|---|---|
| Bearing - clutch release | 150 1250 |
| Pivot pin - clutch release | 02 2530 |
| Spacer - clutch release | 905 2486 |
| Plate - reinforcement - transmission tunnel | 905 2502 |
| Gasket | 148 1202 |
| Speedo cable | 601 1863 |
| Cap | 142 5662 |
| Seal | 145 1589 |
| Bolt - 4 off | 341 4943 |
| Bolt - 4 off | 171 5883 |
| Bolt - 4 off | 175 7038 |
| Washer - 4 off | 341 5308 |
| Circlip | 341 6354 |
| Bolt | 142 0737 |
| Speedo gear - 22T | 147 3921 |
| 23T | 143 8509 |
| 24T | 143 8507 |
| 25T | 147 3922 |

Over and above 180 bhp, you have two alternatives: The ZF gearbox (not eligible for Gp 2 cars though), and the Escort Gp 2 gear kits. These gear kits are designed to fit in the standard RS1800 gearbox, and each gear is individually machined and can be interchanged, thereby giving a wide range of ratios. This set-up is good for 240 bhp+, and should ultimately be cheaper than the ZF assembly.

Although the RS2000 and RS1800 gearboxes are different internally, they are fully interchangeable as complete units.

That is to say that a Gp 2 gearbox based on the RS1800 assembly, will also fit into a Gp II RS2000 (OHC engine) without any exterior modifications.

If you intend running an hydraulic clutch system on an RS1800, then you will have to purchase the parts listed below:

| | |
|---|---|
| RS Parts: Clutch housing alloy | 905 1203 |
| Clutch release lever | 905 1928 |
| Hub | 905 3075 |
| Pedal box - kit - hydraulic clutch | 905 2599 |
| Standard Parts: Bearing - clutch release | 150 1250 |
| Pivot pin " " | 602 2530 |
| Spacer " " | 905 2486 |

Remember, though, that your car is no longer eligible for Gp 2, as the original bellhousing has to be retained.

The following gear kits are available from RS Parts:

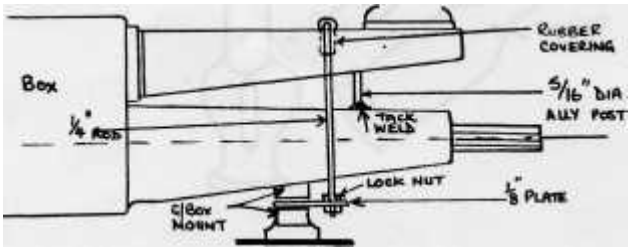
**Gear kits - Escort Group Two**

| | |
|---|---|
| Rally - ratios 2.30, 1.58, 1.27, 1.00:1 | 905 3375 |
| Rally/Race - 2.30, 1.51, 1.16, 1.00:1 | 905 3372 |
| Race -2.05, 1.51, 1.21, 1.00:1 | 905 3377 |
| Kit - gearbox build | 905 3376 |

ZF GEARBOXES

## 7. 3.1 ZF SELECTOR TIE

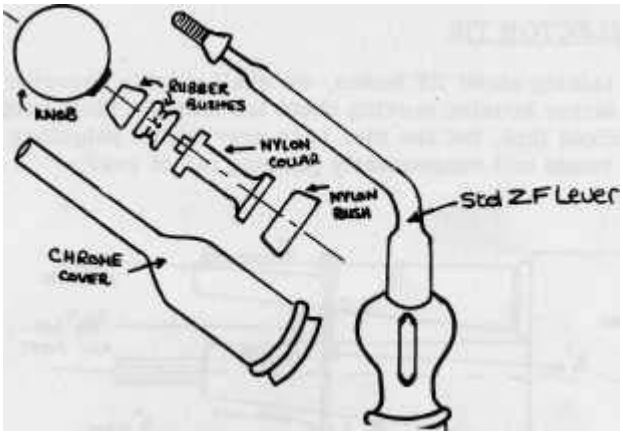
While talking about ZF boxes, we shall quickly describe a mod to stop the selector housing moving about too much. Most people using ZF boxes know about this, but the idea is to prevent the selectors shaking about on rough roads and consequently jumping out of gear.




An 1/8" plate is sandwiched between the underneath of the gear-box, and the rear mount block, as above. This plate is drilled to accept 1/4" dia. rod on either side of the box, in fact, you can use a battery tie rod which has a threaded end. The rod forms a hoop over the top of the lever housing, and is effectively pulled down by a nut on the underside of the plate. Note that there is a lock nut above the plate to ensure that it doesn't work loose, and a rubber sleeve - a piece of strong plastic tube will do as well - over the housing to absorb vibration. To ensure that undue strain is not placed on the housing to gearbox casing bolts, by being pulled down too much, an ally post of 5/16" dia. is tack welded to the output shaft housing so that it fits neatly under the lever extension.

## 7. 4. ZF GEARBOX LEVER ADAPTION

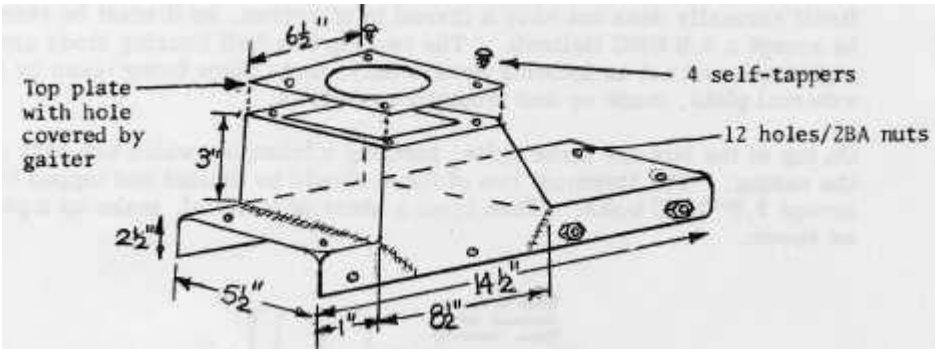
Those of you who have ZF boxes will know that, even after you've paid a lot of bread for one, they are delivered without a pukka gear-lever. What can be done, therefore, is to use a series of standard FIAT parts to provide something that looks smart and doesn't rattle itself off every 200 miles. The parts can be obtained from most Fiat dealers and come from any of their 5 speed box models (125S, 124C, 124ST, 132S). Bits needed are (1) Knob - even has 5 speeds marked on the drop for drivers! (2) Rubber cushion. (3) Rubber spacer. (4) Nylon collar. (5) Nylon bush. (6) Chrome outer lever. All the bits go together as shown and simply push or screw on.




**7. 5. ZF GEARBOX FITTING**

If you are going to use the ZF 5 speed gearbox, the rear mounts on either side of the transmission tunnel will have to be repositioned further back. Standard mounts are used here. You can either fit new ones, standard Ford Finis Code No: 143 4773, or if cut off neatly from their original, spot welded positions, the same mounts can be re-used. Mounts should be relocated 5 3/4" back (centre to centre vertical). To double support the mount, a 16 gauge steel plate measuring 4 3/4"x5" can be mounted inside the cockpit against the tunnel before repositioning the mounts. As a foolproof way of repositioning the mounts, it's best to tack-weld them against the tunnel sides with the engine, gearbox and prop-shaft in position to check adequate clearance around the ZF and bell housing, because it is a very close fit.

To fit a ZF, you're going to have to chop a lump out of the top of the tunnel for the gear lever. This removable panel will also give you a good access area to the top of the box for servicing and box removal on an event. The panel measures 14½"x5½" and is formed as the top of the tunnel - it can be carpet covered to look smart. There are 12 easily removable captive 2 BA nuts around the panel. The lever box at the back measures 6½"x5½"x3" as per the drawing. The sides of the original tunnel are turned in, to obviate sharp edges, after the captive nuts have been brazed in.

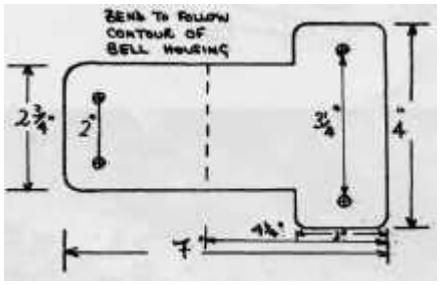


Revised gearbox mounting support viewed from inside the cockpit. The cut-away for the ZF box on the tunnel top is clearly visible.

### 7. 6. ZF BOX QUICK RELEASE BELL HOUSING

A worthwhile adaption for the ZF box, especially if considering entering an International, where service time is at a premium, is to make the box easy to remove and replace to facilitate clutch replacement.

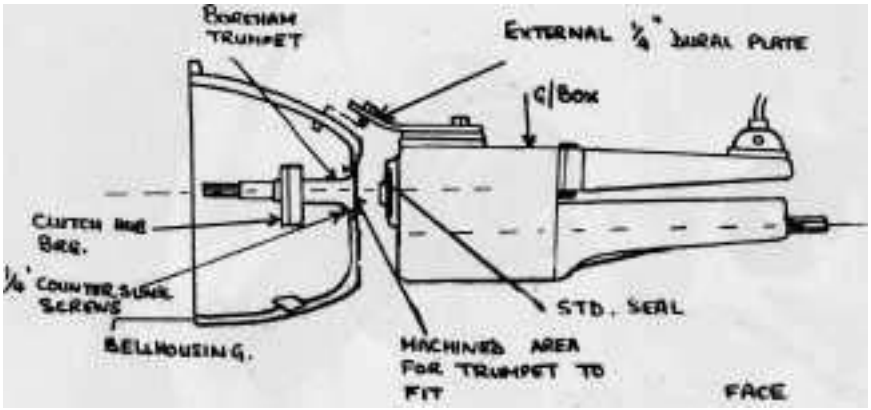
First of all, the bell housing release bolts, usually accessible only from inside have to be made external. The lower four bolt locating lugs on the box are drilled through to 3/8" dia. so that the bolt can pass straight through to thread in the bell housing, from the outside. The bell housing itself normally does not have a thread in of course, so it must be reamed to accept a 3/8 UNC Helicoil. The two top box/bell housing studs are cut right back and act as locating dowels only, their place being taken by an external plate, made up and mounted as follows: On top of the box are three bolts, forming a triangle, which are part of the casing. The foremost two of these should be drilled and tapped to accept 3/8" UNC bolts. Then from a sheet of 1" dural, make up a plate as shown.



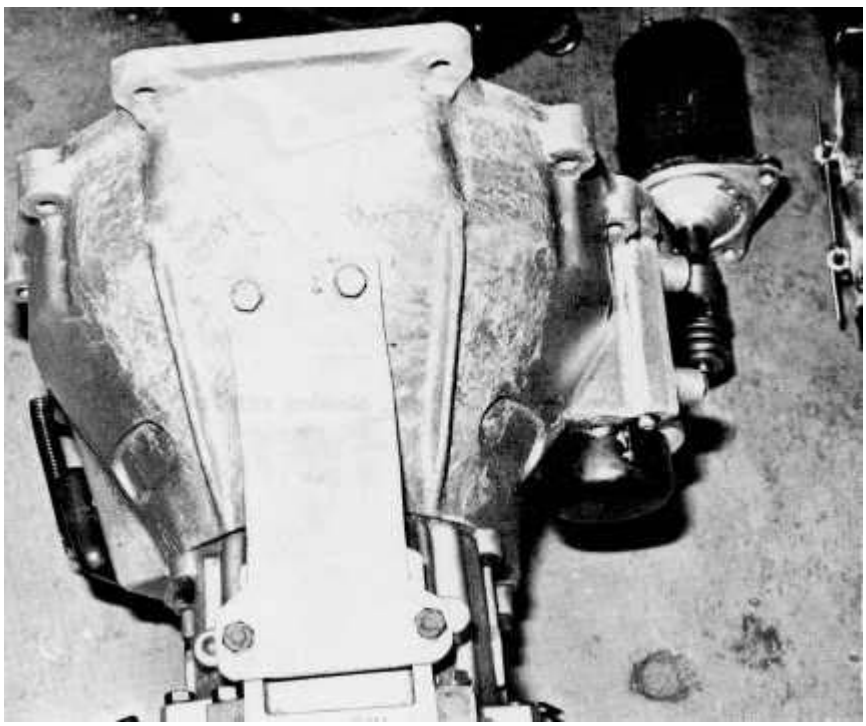

The plate should now be attached to the gearbox via the two 3/8" bolts, and the position of the two foreward holes marked on the bell housing top. The housing can now be drilled to accept two 1" bolts which are secured from inside the bell housing as a permanent attachment.

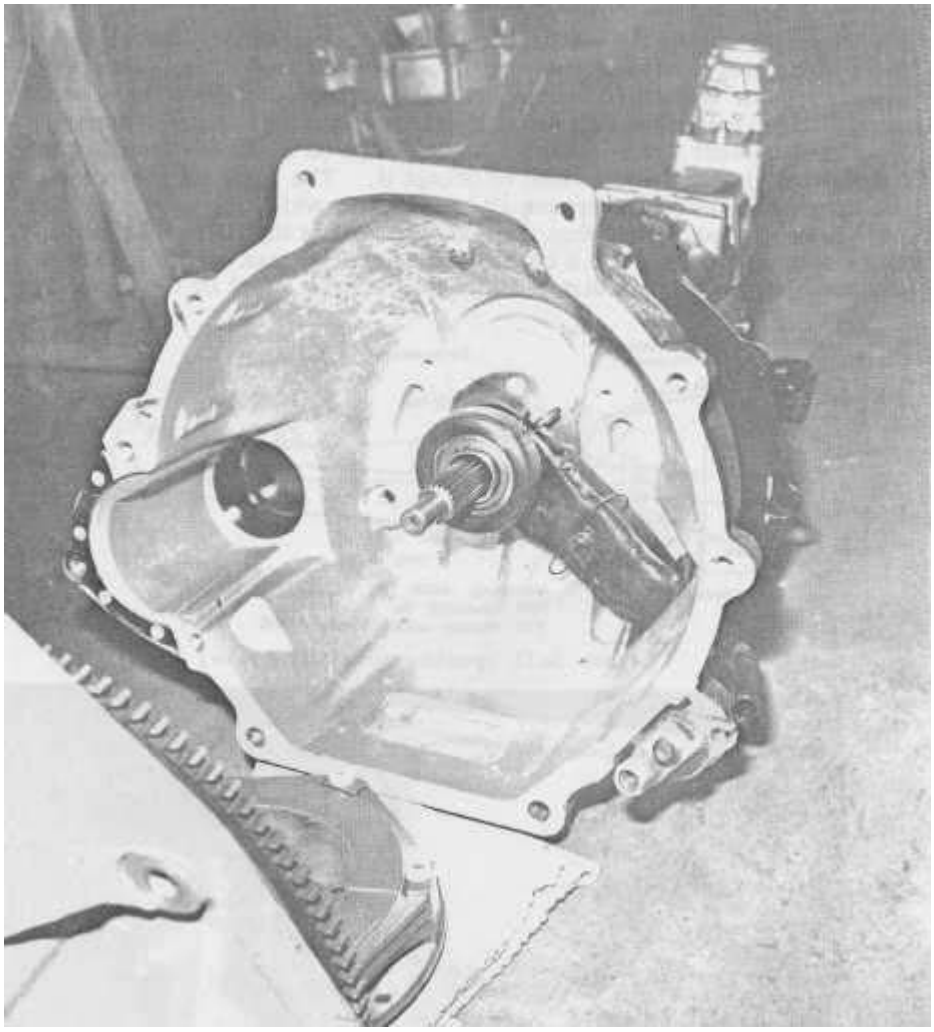
So, now, by undoing only external bolts on the gearbox, it can be pulled back without having to drop the engine at all. But it doesn't finish here, because if you think about it, withdrawing the gearbox would result in the clutch release mechanism falling out of position and there would be problems replacing it.

So then, what the works do is to build in a mechanism that attaches all the clutch release mechanism to the inside of the bell housing, as follows: The 'trumpet' on the ZF box that surrounds the mainshaft, and along which the clutch release bearing travels, is cut off at its neck, and just acts as a simple locator in the bell housing. It is replaced, however, by a similar arrangement inside the bell housing which is available from RS Parts. This replacement 'trumpet' has a broad flange on it, so the inside of the bell housing has to be machined to accept it. The 'trumpet' is located in the housing by four countersunk ¼" screws, for which threaded drillings have to be tapped. Note that the standard seal of the ZF box remains, and a useful tip is to slide a couple of rubber 'O' rings over the neck of the 'trumpet' to prevent dirt getting onto the area swept by the clutch release bearing.




Below: Bell housing mounting plate.





Inside the quick release bell housing, showing release mechanism with built-in trumpet.

The following relevant components are available from RS Parts:

### 7.7. ZF - PARTS NEEDED (RS)

To fit the ZF-5 speed gearbox to an Escort the following parts are required:

**Rallye Sport:**

| | |
|---|---|
| Gearbox - ratios 2.3, 1.6, 1.36, 1.14, 1.00:1 | 905 3635 |
| Bellhousing ZF/BDA - crossflow | 905 2595 |
| Propshaft ZF/Atlas | 905 2598 |
| Multi-plate clutch | 905 2594 |
| Pivot pin - clutch release | 905 3625 |
| Hub - clutch release bearing | 905 3623 |
| 'O' ring - clutch release - 2 off | 905 3616 |
| Seal - oil | 905 3624 |

**Please be aware that these articles were written in the 70s and some of the regulations may have changed. Please consult the MSA Blue Book before preparing your car**