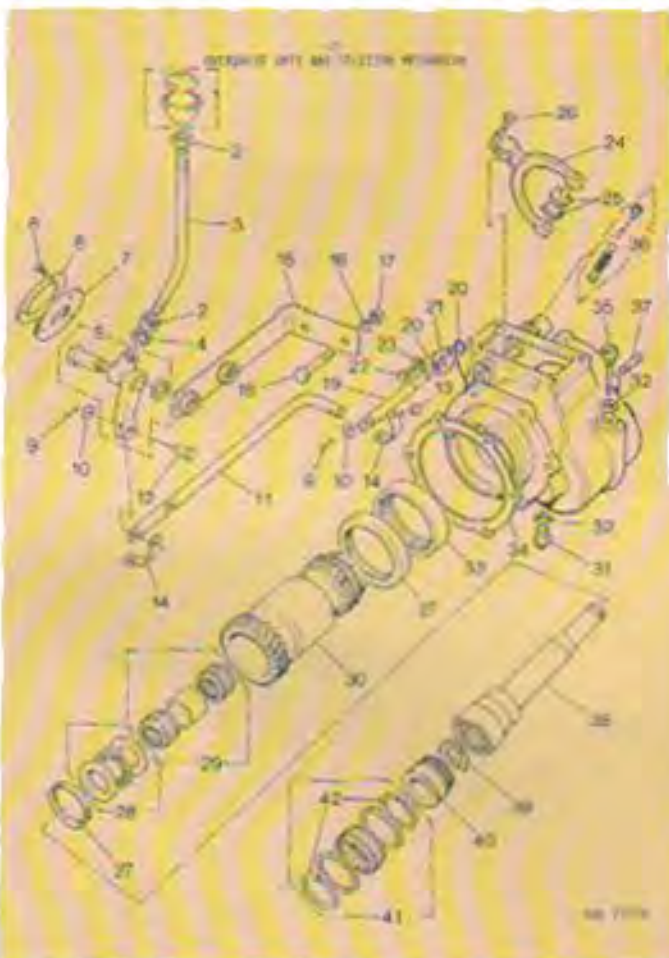


Maximum overdrive

In the first part of a short series, Michael Burn of the Series One Club introduces the Fairey overdrive, and tells you how to buy a good one



Top, position of selector fork with overdrive disengaged (left) and engaged. Above, output gearshaft teeth should look like this

Like all good ideas, the Fairey Land Rover overdrive unit has stood the test of time - nearly 20 years so far. Developed by Fairey Winches in the early '70s, it could be fitted to all Series I, II, IIa and III Land Rovers. Apart from some minor changes made soon after its introduction in August 1974, the Fairey overdrive has remained basically the same ever since.

Fitting an overdrive has two main advantages: better fuel economy, and less engine wear. Not to mention less driver wear! Since adding overdrive to both my Series I Land Rovers, I have cut fuel consumption by 10 per cent, but it is the reduction in noise and vibration at cruising speeds that makes all the difference.

This article describes how the

overdrive unit works and how to check out a secondhand buy. In the next instalment I'll tell you how to take one off a vehicle and strip it down.

HOW IT WORKS

THE overdrive picks up drive from the gearbox mainshaft using a clutch sleeve, which replaces the transfer box mainshaft gear.

Because the splines on the clutch sleeve are in constant mesh with the overdrive mainshaft, this overdrive mainshaft is always rotating, regardless of whether overdrive is engaged or not.

Engagement is achieved by a synchro hub, fixed to the overdrive mainshaft, and selector fork, which has three positions - disengaged, neutral and engaged.

When overdrive is disengaged, the synchro hub is in its forward position and the output gearshaft is locked to the mainshaft. These two shafts consequently rotate at the same speed and there is no effect on gearing.

With the selector in neutral, the synchro hub is in its midway position and not connected to either input or output gearshafts. Although the overdrive mainshaft and synchro hub will rotate, no drive is transmitted to the transfer box. This is a useful anti-theft feature and can catch out even experienced Land Rover owners!

With overdrive engaged, the synchro hub is in its rearward position and meshing with the overdrive input gear assembly. This small gear itself meshes with a similar gear on the

laygear cluster, which transmits power via a large gear to the output gearshaft. This makes the output shaft spin faster and gives the overdrive effect.

Confused? Then study the parts diagram, which should help to make it clearer. Incidentally, the overdrive bolts to the back of the transfer box using the rear power take-off position, so if you want to keep this function, then you'll need to install a bottom PTO to the underside of the transfer box.

HOW TO USE IT

OVERDRIVE is effectively another gearbox and you should treat it like one. This means using the clutch when engaging or disengaging overdrive. Also, although it is fitted with synchromesh, gear changes are best made deliberately.

Because of the relatively low power outputs of the Series I-III engines, the manufacturers state that overdrive can be used in any gear. However, vehicles with powerful diesel engines, V8s, or which are used for heavy towing, should be restricted to third or fourth gear, high range, when overdrive is being used.

In practice, I only use overdrive on the top two gears in high ratio, and I'd recommend that you do likewise.

HOW TO BUY A GOOD ONE

If YOU decide to buy a secondhand overdrive unit, then there are a number of points you should look out for.

First, is the unit complete? Are the gear change rods and levers present, and does it come with the clutch sleeve? Most don't, and a new one will cost you £35 from Superwinch.

Check the colour and quantity of oil inside the casing because it may give you some idea of whether the unit has been abused in the past. Examine the casing for signs of any cracks.

The large gear that sticks out of the front of the unit is the output gearshaft. Look at the teeth carefully: if they have developed a pointed shape, then the unit has done a high mileage (see photo).

Next, check the splines on the overdrive mainshaft by looking down the centre of the output gearshaft. They should be square and true; if not, the unit may have been used for heavy towing or fitted to a very powerful vehicle.

Hold the output gearshaft firmly and try rocking it sideways to pick up any wear in the roller bearing. Also try pulling it outwards - there should only be a barely perceptible amount of movement. If there is any roughness when you rotate the shaft in either direction, you can expect big trouble!

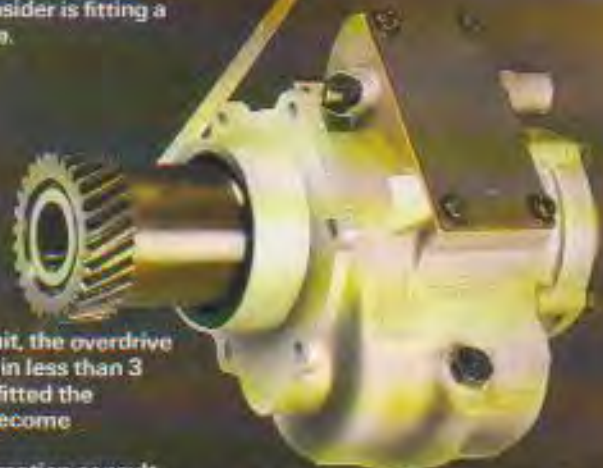
CONCLUSION

THE only sure way of checking a secondhand overdrive is to test it on a vehicle. Therefore, try to buy from a reputable source where you have some comeback if all is not well. Secondhand

Up to 15% saving on fuel*



With the continuing increase in fuel costs, running any vehicle is expensive. Therefore, to reduce fuel consumption, the first thing to consider is fitting a Fairey Overdrive.



Supplied as a unit, the overdrive can be installed in less than 3 hours and once fitted the benefits really become apparent. For further information consult your local dealer.

OVERDRIVE
Exclusive to Land Rover

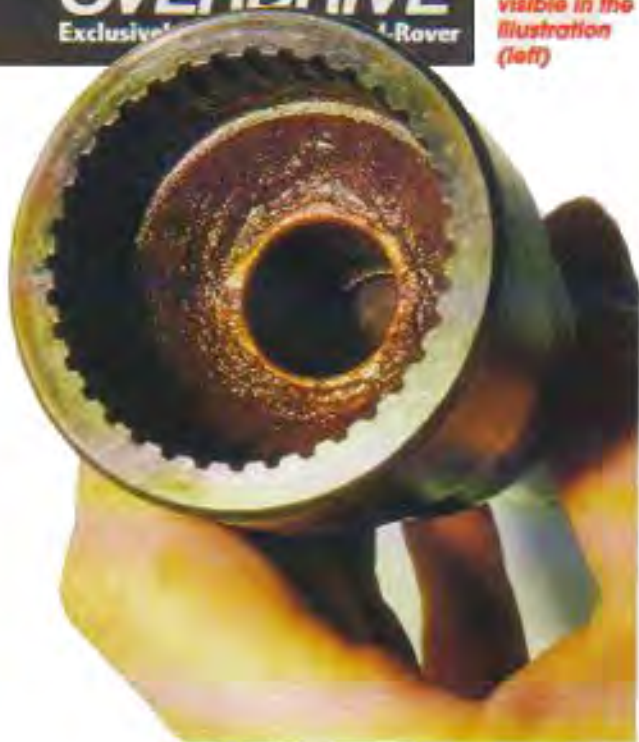
*Based on economy figures from the 1984-85 Annual Report of the Rover Group.

Below, overdrive mainshaft has internal splines which pick up drive from the clutch sleeve, just visible in the illustration (left)

units normally sell for £150-£250, and if any major parts need replacing then the price will soon increase and come close to that of a new unit.

If you don't want to take the gamble of buying secondhand, then new units are available from regular LRO advertiser Paddock Motors (01629 584499). Superwinch Ltd, which bought out Fairey Winches in 1988, can supply fitting instructions as well as exploded diagrams. ■

Next month Michael Burn shows you how to remove an overdrive from a vehicle and how to strip it down for inspection.



USEFUL ADDRESSES

Superwinch Ltd, Abbey Rise, Whitchurch Road, Tavistock, Devon PL19 1DR. Tel 01822 614101/7, fax 01822 615204.



A parts washer is used to give the overdrive unit a thorough degreasing of all the muck that usually accumulates

Maximum overdrive

In the concluding part of his series, Michael Burn of the Series One Club shows how to remove, strip down and examine the Fairey overdrive

part two

REMOVAL

- 1 Remove the drain plug from the bottom of the overdrive unit, drain oil into a suitable container and replace the plug to prevent dirt entering the unit. It goes without saying that while working under any Land Rover, its handbrake must be firmly applied and wheel chocks used as well.
- 2 Remove all three seat bases and the seat box centre cover (it's much easier to remove the overdrive unit from above rather than by crawling about underneath the vehicle).
- 3 Disconnect the operating rod from the overdrive by

removing the split pin and clevis pin from the overdrive end. Tie the operating rod out of the way.

4 Undo six nuts holding the overdrive unit to transfer box. The overdrive will have to be pulled rearwards for the nuts to be fully removed from the studs.

5 Holding the unit firmly, pull it rearwards until the output gearshaft is fully exposed. The overdrive can now be lifted clear of the transfer box. Be warned, the overdrive is quite a heavy unit.

6 Before attempting any work on the overdrive, check the condition of the gearbox mainshaft nut by shining a

torch through the transfer box/overdrive hole. The mainshaft nut is torqued to 100lb ft and held in place by a tab washer (part no KTC 7169). If all doesn't appear sound and secure, fit a new mainshaft nut and tab washer.

All three tabs must be firmly bent over otherwise the overdrive mainshaft will not fit into the clutch sleeve. Gearbox mainshaft nuts have been known to work loose and ruin overdrive units - you have been warned!

7 Overdrive units are invariably filthy due to oil leaks typical of older Land Rovers. All this muck must be removed before the stripdown.

STRIPDOWN

- 1 The stripdown and rebuild of an overdrive does not require any special tools but you will need some circlip pliers, feeler gauges, Allen keys and various spanners.
- 2 Before attempting any stripdown you must obtain the parts diagrams and fitting instructions for Land Rover overdrive units. These are available from Superwinch Ltd, Abbey Rise, Whitchurch Road, Tavistock, Devon PL19 9DR, tel 01822 614101.
- 3 Remove the top cover plate by undoing the four (M8x16mm) bolts.
- 4 Remove the rear cover to

the overdrive casing by undoing the four (M8) nuts. A large rubber 'O' ring under this cover prevents oil loss and must be replaced on assembly.

5 Remove the overdrive selector shaft by undoing the pinch bolt ($\frac{5}{16}$ UNF x $\frac{7}{16}$ in) on the selector fork. The selector detents (found both sides of the shaft) must be removed using $\frac{3}{16}$ in and $\frac{3}{16}$ in Allen keys. Catch the spring and chrome ball as they fall out of the casing from the bottom detent. The selector shaft can now be removed rearwards.

The 'O' ring on the rear of the selector shaft must be replaced on assembly. The selector fork and two brass swivel pads can now be removed through the top of the overdrive casing.

6 Gently tap the face of the output gearshaft (the large gear that sticks out of the front of the overdrive unit) which

forces the main ball bearing out of the rear of the overdrive casing. Using circlip pliers, remove the two small circlips on the mainshaft (the inner circlip is hidden under a collar).

7 The input gear and ball bearing can now be removed from the rear of the unit. The thrust bearings, washers and any shims must be retained in the correct order for reassembly. Refer to the excellent Superwinch parts diagrams during the stripdown process so that you are familiar with all the parts and the order in which they go.

Do not remove the large circlip holding the ball bearing on to the input gear unless either needs replacing.

8 The overdrive mainshaft can now be removed by pushing it forwards and out through the output gearshaft.

Remove the two synchroneshub cores and the complete synchroneshub out from the rear of the overdrive casing.

The synchro hub should not be dismantled from its inner section unless you want the three springs and chrome balls to fly everywhere. The various needle and thrust bearings which support the mainshaft in the output gearshaft must be retained in the right order for correct reassembly. They are best hooked out of the output gearshaft and fitted back on to the mainshaft.

9 The output gearshaft cannot be removed from the overdrive casing as its inner end fouls the large gear on the layshaft. Remove the layshaft by screwing a small metric bolt into the exposed end of the layshaft and pulling it out rearwards.

The 'O' ring on the layshaft

must be replaced on reassembly. The laygear, thrust bearings and shims can now be allowed to fall into the bottom of the casing, which enables the output gearshaft to be removed from the front of the unit.

Remove the laygear, thrust and needle bearings, plus any shims from the casing. Assemble the laygear, bearings and shims back on to the layshaft.

10 Hook out the main oil seal from the front of the casing, taking care not to damage the roller bearing located behind it. Remove the roller bearing only if it needs replacing.

EXAMINATION

1 After thoroughly cleaning the inside of the overdrive casing, check it for signs of misuse. Any cracks in the



After removing the top and rear casing covers, the selector shaft is withdrawn from the casing. To do this you have to undo a pinch bolt and the selector detents



Once the selector shaft has been withdrawn, the selector fork can be lifted through the top of the casing. Note the brass swivel pads on the inner face of each fork end



A small metric bolt is screwed into the end of the layshaft so that it can be pulled out with the aid of a wrench. This is necessary before the output gearshaft can be removed



The synchroneshub hubs must be inspected for wear and damage to the teeth. Be careful not to lose the springs, chrome ball bearings and sliding blocks when dismantling

Right, this is what makes up the laygear and layshaft. Far right, the shallow gap between two sets of teeth show that this synchromesh cone is sound



For left, badly grooved washers indicate a worn thrust bearing. Left, the main oil seal has a roller bearing tucked behind it. Below, the overdrive mainshaft and all its components reassembled for safe keeping



casing will probably mean it's scrap. Check the drain plug threads as they can become cross-threaded. A helicoil can be inserted if need be.

2 All circlips and gaskets which have been removed must be replaced with new items. Both oil seals and all four 'O' rings must also be replaced. Check the two main overdrive bearings for 'roughness' and wear and replace as necessary. The following must be renewed:

- Oil seals, part no RTC7173 (kit of two);
- Circlips, RTC7172 (kit of five);
- 'O' rings, RTC7166 (kit of four);
- Top cover gasket, RTC7182;
- Shims, RTC7189 (kit of eight);
- O/ drive transfer box gasket, (22047);

Copper washer for drain plug, RTC7178.
All the above items can be ordered from Superwinch Ltd, which operates an excellent mail order service:

3 The overdrive unit contains three main gears - the output gearshaft, the input gear assembly and the laygear. Examine each carefully; any with chipped teeth or excessive wear must be replaced.

4 Examine the inner surface of the overdrive mainshaft where it engages into the clutch sleeve. The teeth should be square and true, with no sharp edges. Damage here could be due to a loose gearbox mainshaft nut or excessive loading on the overdrive unit.

The inner surface of the overdrive mainshaft is coated with an anti-scuffing grease and should be left in place.

Various needle roller bearings are fitted to the mainshaft and no scoring or grooves should be apparent where these bearings are located.

5 Place the complete synchromesh hub in a polythene bag and slide the inner hub out of the outer unit, catching the three springs, chrome balls and sliding blocks in the bag. Examine the grooves on the inner and outer hubs for wear and damage. Wear in the synchro hub could cause gear selection problems.

The brass coloured synchromesh cones must be replaced if the teeth look at all worn. When fitted to the relevant gear there should be a small gap between the two sets of teeth (see photograph). If they touch, then the inner surface of the synchro cone is worn and must be replaced.

6 Examine all thrust and needle bearings for wear and damage and replace where necessary. The washers located each side of a thrust bearing must not be grooved. Damage to either the mainshaft or layshaft means replacement. The needle bearing that may have caused the damage will also need replacing. ■

These overdrive units are well engineered and should give many years of trouble-free motoring. As they only hold 3/4 pint (0.4 litre) of EP 90 it pays to change the oil every year. Excessive wear and damage is usually a result of low oil level. Losses or gains in oil level are usually the result of poor sealing between the output gearshaft and overdrive casing.