

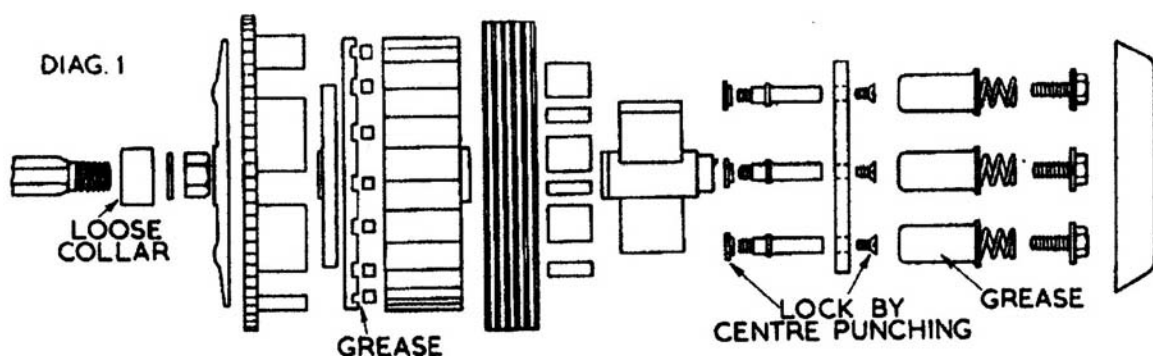
THE NORTON CLUTCH

By DEREK WYBORN

In my previous article on the Norton gearbox I stated that the efficiency of the clutch had a marked affect on the operation of the gearbox. I propose therefore to go into the matter more fully in the hope that some of the information given may be found to increase reliability.

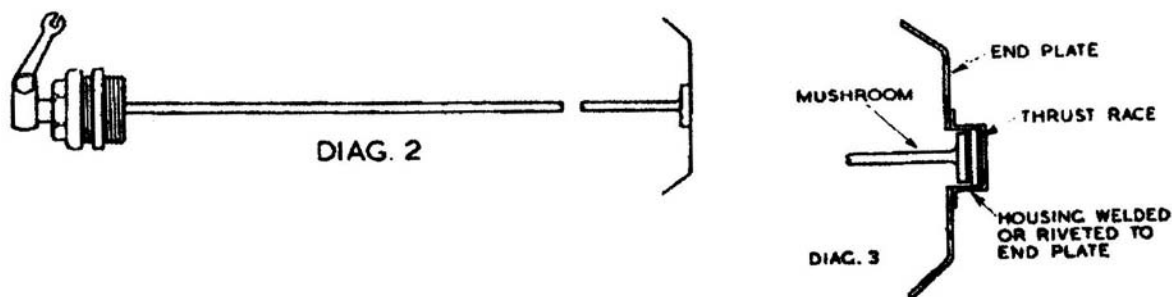
It is my considered opinion that 75% of drivers use their clutch once only during a race, i.e., to leave the starting line. After that a perfunctory stab at the pedal with their left foot, usually sufficient only to take up the free play in the cable, a pile driving thrust with the right arm, and, "jolly good luck we've found the next gear!" Maybe! If only the thunder of the "double knockers" or J.A.Ps. could be silenced on these occasions, the loudly protesting voice of the transmission would assuredly be heard. Try making a clutchless change on your normal road car, you won't have to listen very hard for the bonks emanating from the back axle.

Another piece of butchery in common practice is the slipping of clutches to "keep on the mega." This is quite unnecessary except in exceptional circumstances and a tenth of a second gained by this malpractice can quite easily burn out the clutch and lose the race. The heat generated by a slipping clutch is tremendous and will cause the rubber cushions to melt and the necessary lubrication to dry up.



Norton clutches vary slightly according to year and model but the basic principles of operation and construction are almost identical. The main difference being in the type and number of plates used. In diagram 1 I have taken the ex-W.D. heavy-duty five-plate clutch as an example, as this is probably the most widely used among half-litre competitors. The clutch itself is

comprised of some 45 separate pieces, not counting rollers and inserts, whilst the operating mechanism (diagram 2) consists of six items, plus cable and adjusters. For those unfamiliar with this type of clutch much can be learned by completely dismantling and inspecting each item before reassembling. The following hints may be of assistance in this operation.



Once the end plate cups, springs and mushroom have been removed, the main body of the clutch can be separated from the gearbox mainshaft by unscrewing the locking nut and washer and withdrawing with a special puller. This puller can be obtained from most Norton dealers and is well worth its few shillings cost, as the use of tyre levers or hammer and drift can cause far more expensive damage to both gearbox and clutch, not to mention frayed tempers and barked knuckles.

Removal of the remaining three screws from the front plate will enable the rest of the clutch to be completely dismantled. When this has been carried out, the inspection of each component should be proceeded with on the following lines. Check the back plate for truth and excessive wear on the spider shaft. Two types of back plate are in general use, one being considerably thicker than the other. It is recommended that this plate be used as it will give much longer service and is not prone to buckling.

A very careful inspection of the clutch sprocket should be carried out, especially around its inner edge where it comes in contact with the rollers. This edge is case-hardened and consequently quite brittle. A hair crack undetected here may lead to a complete fracture of the sprocket. The segments in this sprocket need periodic replacement. Wear can be detected by the presence of side play when the clutch is assembled.

Inspect the cage and rollers for fractures or cracks. A split roller can cause serious damage. In replacing the cage care should be taken that the open end faces away from the back plate. The rollers should be lightly greased before reassembly.

The centre spider wears very little, but the rubber cushions need replacement at least twice per season, or after the clutch has been overheated. Assembly of these rubbers is simplified if they are lightly smeared with grease. When both back and front plates have been smeared they should be locked by centre-punching the respective screws and nuts.

If on inspection the clutch caps are found to have a small ridge around the outside, caused by repeated contacts with the clutch centre, these must be filed away or the caps replaced because they can cause a clutch to stick open. It is essential that these caps move freely in their sockets otherwise an undue strain may be put on the cable. A little grease will help in this direction. Springs also get tired and need replacement at least once every season.

Do not over tighten the special studs which retain the springs as the heads break off very easily. As far as the actual linings are concerned some people prefer the metal discs with segmented inserts, whereas others, like myself, prefer the metal bonded solid disc. The solid disc has the advantage of greater frictional area, but also has the disadvantage that the locating ears may tend to break.

The operating mechanism is very simple (diagram 2) and consists of a worm assembly which operates a pushrod passing through the hollow main shaft of the gearbox. This pushrod operates a mushroom which in turn bears against the end-plate of the clutch. When the clutch pedal is operated, the end-plate is forced outwards which relieves pressure between the frictional plates and allows one to rotate against the other.

It has been found that if the clutch is kept open, with the car in gear and the engine running for any length of time, the pushrod is liable to weld itself to the hardened button at the end of the worm. To eliminate this fault a simple modification is necessary to the end plate. This takes the form of a thrust race against which the mushroom rotates more easily. The race is located by a housing welded or riveted to the end-plate.

It is also advisable to place a collar on the main shaft immediately behind the clutch. This will keep the bush in the constant mesh pinion in place, as it may sometimes move along the shaft. It is important that this collar is quite free to move when the clutch is fully home on its shaft.

About 1/8in. to 3/16in. free play should be allowed on the cable at the gearbox end when adjusting the clutch. If new plates have been fitted, rather more clearance should be allowed as free play will be taken up as the plates bed down.