

CLUTCH AND GEARBOX

CLUTCHES

Three types of clutch are currently in use, two single and one double. The standard single clutch is 11 in. (27.94 cm.) in diameter and for heavy duty use a single clutch 13 in. (33.02 cm.) in diameter is optional. For tractors where a "live" power take off is required a double clutch with 12 in. (30.48 cm.) dia. plates is available.

The double clutch allows the drive from the engine to the transmission to be disconnected without interrupting the drive to the power-take-off and hydraulic pump. This gives the advantage that any power-take-off driven and, or, hydraulically operated equipment can be kept in motion whilst gear changes or momentary stops using the transmission clutch are made.

With the initial introduction of the "live" power take-off (at engine number 1417988) the main front transmission housing was modified by moving the clutch cross-shaft bush bores approximately 2 in. (5.1 mm.) rearwards, to compensate for the increased

length of the double clutch. For standardisation the new housing was also introduced on tractors without "live" power take-off at Engine No. 1418861.

As a result of this change certain parts of the clutch release mechanism and linkage are not directly interchangeable between current and previous standard tractors, nor between any standard tractor and one fitted with "live" power take-off. Care must therefore be taken to ensure that the correct combination of parts are used with each type of tractor.

Do not operate the tractor with the foot resting on the clutch pedal as this will give rise to excessive wear of the release bearing and clutch linings, necessitating frequent adjustment of the clutch, in addition to causing loss of power through clutch slip.

THE SINGLE CLUTCH (11 in. Dia.)

The standard 11 in. (27.94 cm.) clutch is of the

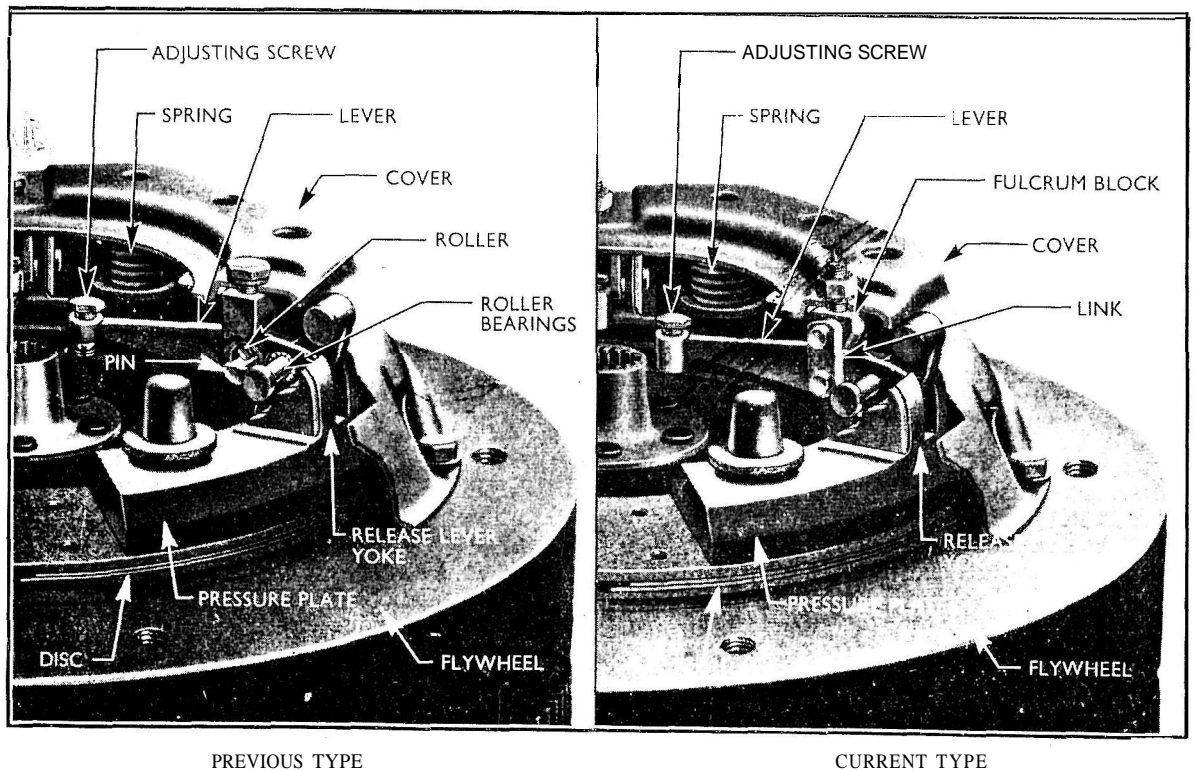


Fig. 1
Sectioned View of 11 in. Single Clutch

single dry plate type having a disc with an internally splined hub and replaceable friction linings on either side of the centre plate.

In the engaged position the clutch disc is clamped between the friction surfaces of the flywheel and a spring-loaded pressure plate, the disc being free to move along the splines of the main drive shaft when the pressure of the plate is released by the clutch withdrawal mechanism.

On tractors prior to engine No. 1524750 the three clutch release fingers pivot at a floating roller and pin mechanism in yokes attached to the clutch cover and the outer ends of the fingers moved the pressure plate by means of needle roller bearings around pins held in lugs on the pressure plate.

On tractors from engine number 1524750 the above pivot arrangement was superseded by fulcrum blocks attached to the clutch cover, the clutch release fingers being attached to these blocks by means of two parallel links and pins; the needle roller bearings and pin being superseded by a pivot pin in a plain hole.

The two types of clutch release mechanism are shown in Fig. 1.

As the clutch pedal is depressed the release fork moves the release bearing into contact with the inner ends of the clutch fingers. Forward movement of the inner ends of the fingers moves the outer ends back, together with the pressure plate, thus compressing the clutch springs and freeing the clutch plate.

Heavy Duty 11 in. Clutch

On early tractors a heavy duty 11 in. clutch was available for use in arduous conditions. This clutch had a disc with special thicker linings which were black in colour inset with metal particles plainly visible on the surface.

This assembly was fitted in conjunction with three spacers positioned between the clutch cover and the flywheel to accommodate the increased thickness of the disc and maintain the correct spring pressure, thus necessitating longer clutch to flywheel bolts.

Clutch Pedal Adjustment

The clutch pedal free travel should be between 1½ in. and 2 in. (38.1 and 50.8 mm.). In service, adjustment can be effected by altering the length of the rod between the cross-shaft and the balance lever in the following manner. (See Fig. 2.)

Remove the split pin from the clevis pin, loosen the locknut and then remove the clevis pin; this will enable the clevis to be freed from the balance lever. Screwing the clevis further onto the rod will reduce the free movement and vice-versa. When the correct free travel of the clutch pedal has been obtained, replace the clevis pin, secure with a split pin and retighten the locknut.

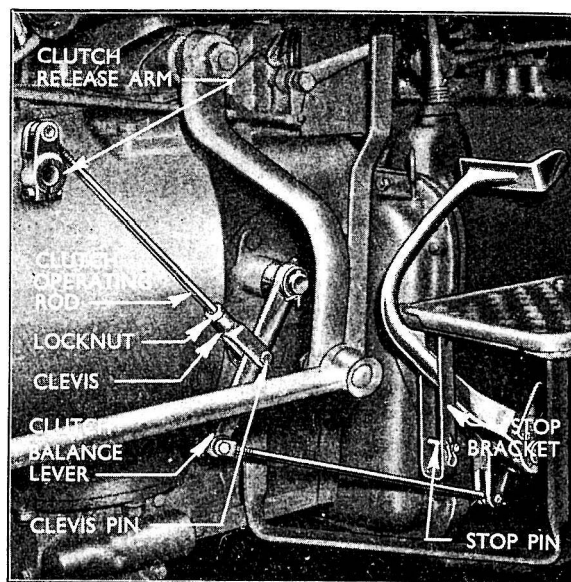


Fig. 2

Clutch Adjustment

To Remove the Clutch Disc and/or Pressure Plate

1. Separate the front axle and engine assembly from the front transmission as described in the appropriate section.
2. Unscrew the six bolts securing the clutch cover plate to the flywheel and remove the pressure plate assembly and the clutch disc. Care should be taken to slacken the six bolts progressively and diagonally across the clutch to avoid distortion of the cover plate.

Inspect the clutch disc to ensure that the linings are not loose and that they are clean and free from oil. The disc should be replaced if there are signs of overheating due to slip or excessive wear, or if the friction surfaces are contaminated with oil. Check that the rivets securing the hub to the clutch disc are tight.

The pressure plate and springs should be examined to make certain that they are not discoloured due to overheating. Check the adjusting screws for wear, and that the clutch fingers operate freely without sticking at any point.

To Replace the Clutch Disc and Pressure Plate Assembly

1. Position the clutch disc on the flywheel face with the longer spigot away from the flywheel.
2. Pass the clutch disc locator (Tool No. T.7024) through the splines of the clutch disc hub into the clutch pilot bearing. (See Fig. 3.)
3. Locate the pressure plate assembly over the clutch disc and refit the six mounting bolts and spring washers. Tighten the bolts evenly, working diagonally across the clutch, to a torque of 12 to 15 lbs. ft. (1.38—2.07 kg.m.).

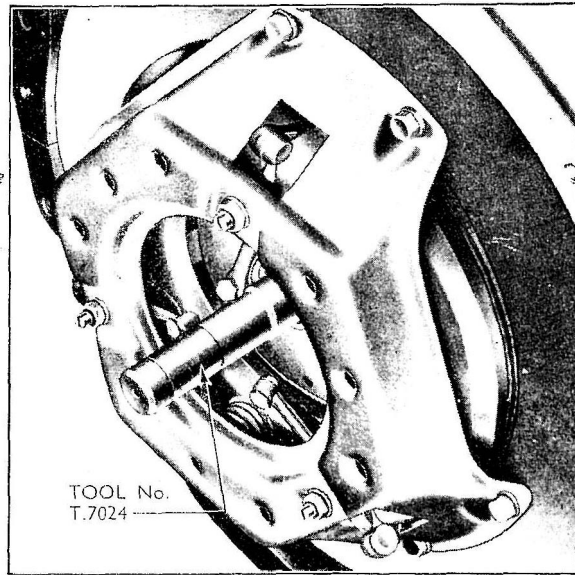


Fig. 3
Clutch Disc Locator

4. Remove the clutch disc locator.
5. Reconnect the front axle and engine assembly to the front transmission and adjust the clutch pedal free travel.

The Clutch Release Bearing

This bearing which is of the pre-lubricated type should require little attention, however, should it require replacement in service it can easily be removed, together with the hub after splitting the tractor at the engine front transmission joint.

Removal of Clutch Release Bearing

1. Separate the engine and front axle assembly from the transmission in the usual manner.
2. Disconnect the clutch release rod from the clutch release arm by removing the split pin and clevis pin.
3. Disengage the clutch release fork return spring, rotate the fork towards the front of the housing and withdraw the release bearing and hub assembly.
4. Press the release bearing off the hub.

Replacement of Clutch Release Bearing

1. Fit a new release bearing to the hub, thrust face outwards.
2. Pack the recess in the release hub bore with a good quality high melting point extreme pressure grease.
3. Rotate the fork towards the front of the housing and slide the release bearing and hub assembly into position at the same time engaging the fork with the slotted arms of the hub. Rotate the fork to its most rearward position and engage the fork return spring.

4. Reconnect the engine and front axle assembly to the transmission.
5. Check and adjust if necessary the clutch pedal linkage, ensuring that on completion the release rod to release arm clevis pin is secured with a split pin.

NOTE.—Early tractors, produced before the introduction of the live power take-off had a clutch release bearing hub with only one pair of lugs and the release bearing was held clear of the clutch fingers by a coil spring attached to the hub and to the drive shaft oil seal retainer. When removing these earlier hubs it will be necessary to disconnect this spring and to reconnect it on reassembly.

The Clutch Pilot Bearing

Two types of clutch pilot bearing have been used, one of the normal radial thrust ball type and the other of sintered bronze; both are pre-lubricated and normally require no attention in service. The space behind the ball type bearing should be packed with a suitable high melting point grease whenever overhaul or replacement is carried out. The sintered bronze bearing should be lightly smeared with high melting point grease on assembly.

Either type of bearing can be withdrawn, using Tool No. T.7600 and adaptor T.7600-1, after splitting the tractor and removing the pressure plate and friction disc from the flywheel. (See Fig. 4.)

When replacing either type of bearing, Tool No. T.7025 should be used to lightly tap the bearing into position to avoid damage. (See Fig. 5.) The ball type pilot bearing should be fitted with the baffle face outwards.

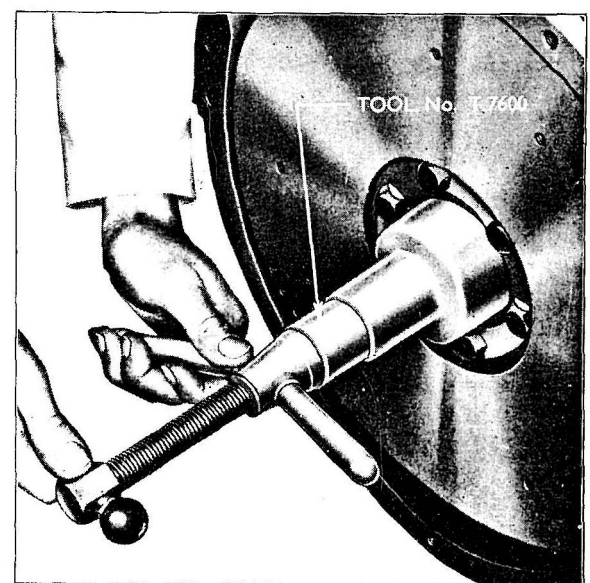


Fig. 4
Removing the Clutch Pilot Bearing

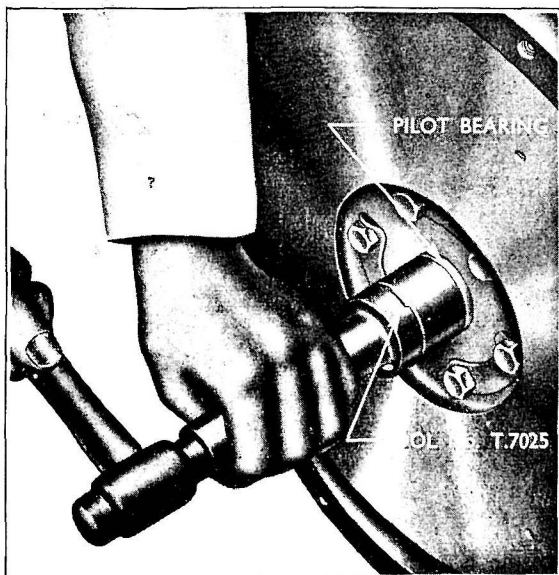


Fig. 5
Fitting the Clutch Pilot Bearing

OVERHAULING THE SINGLE CLUTCH PRESSURE PLATE ASSEMBLY

NOTE.—As this unit is covered by a reconditioning scheme on the domestic market, parts are available only for export territories, therefore the following procedures apply only to these territories. The clutch pressure plate assembly may be overhauled in service, provided that parts are available and that a suitable depth gauge is used to carry out the adjustment of the release levers.

An improved design of single clutch was introduced at engine No. 1524750 and, since parts of both clutches are available for export, the following instructions cover the dismantling, reassembly and adjustment of both types, showing differences where applicable.

To Dismantle

1. Remove the pressure plate as described previously.
2. Clean the assembly thoroughly and check the pressure plate for cracks, scores and signs of discoloration due to overheating. If the pressure plate is damaged a complete new pressure plate assembly should be fitted. Check the condition of the adjusting screws and replace any that show signs of excessive wear.
3. Mark the cover in relation to the plate and locate the assembly (cover upwards and with a clutch disc, or suitable spacers in position) on the bed of a press and place a bar across the top of the cover. Operate the press until the cover is just touching the bed of the press.

Remove the nuts and shakeproof washers (current

type) or screws and spring washers (previous type) securing the yokes or fulcrum blocks to the cover.

4. Release the press carefully, remove the bar and the cover. Lift off the nine springs and seating washers. If it is necessary to remove the release levers they should be marked so that they can be reassembled in the same location.

Current Type

Remove the split pins securing the pivot pins, withdraw the pivot pins and remove the links and release arms.

Previous Type

Remove the split pin from the pressure plate pivot pin, carefully withdraw the pivot pin taking care not to lose the nineteen needle rollers. To dismantle the lever remove the split pin retaining the yoke pin, withdraw the yoke pin and small roller.

To Reassemble and Adjust

NOTE.—To carry out the adjustment of the release levers it will be necessary to obtain three gauge blocks which can be made from metal strips 5 in. (127 mm.) long, 0.356—0.366 in. (9.04—9.29 mm.) thick. These are placed between the pressure plate and the flywheel to represent the clutch disc for the purpose of this adjustment. (See Fig. 7.)

Current Type

1. Fit the links and fulcrum bolt to the release levers by means of the pins, secure with split pins. Assemble the release levers and pivot pins to the pressure plate and secure with a split pin.

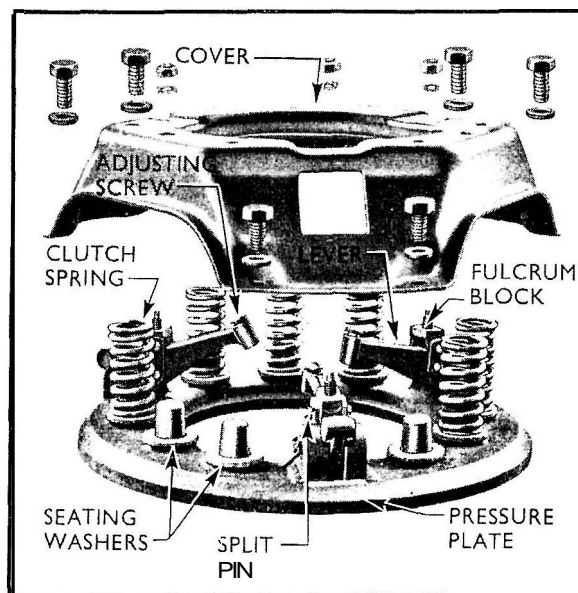


Fig. 6
Exploded View of 11 in. Single Clutch

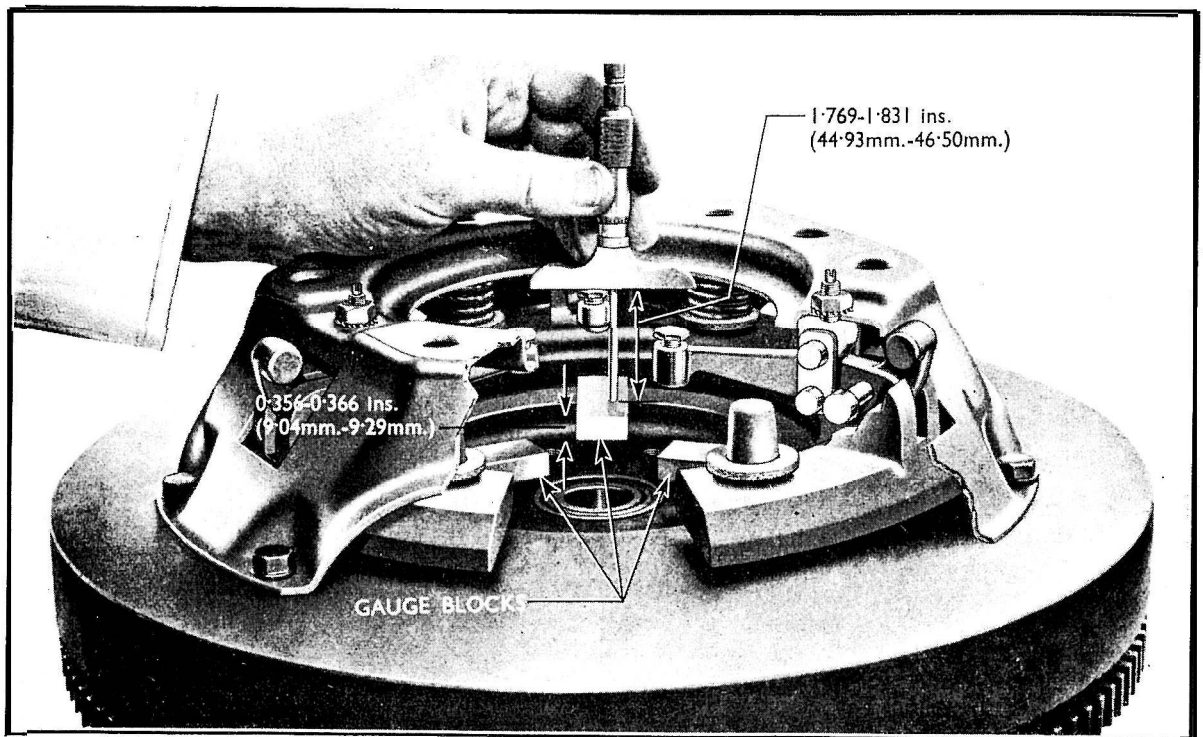


Fig. 7

Adjusting the 11 in. Single Clutch Pressure Plate

2. Suitably support the flywheel, clutch face upwards, on the bed of a press.
3. Place the pressure plate assembly in position on the flywheel and locate the nine seating washers and springs in position over the raised bosses.
4. Carefully slide the three gauge blocks between the pressure plate and flywheel so that they are positioned under each release lever.
5. Locate the cover on the pressure plate assembly ensuring that the marks made on dismantling line up with one another.

NOTE.—To enable the threaded section of the fulcrum bolts to be guided through the cover it is recommended that pieces of tube, approximately 3 in. (7.62 cm.) long and of suitable internal and external diameter are fitted over the threaded section of the fulcrum bolt and passed through the cover. Operate the press sufficiently to allow the threads to pass through the cover, fit the shakeproof washers and securing nuts and tighten evenly until they are fully locked. Ensure that the fulcrum bolts are not twisted during this operation by holding them firmly with a screwdriver. Insert and fully tighten the six cover to flywheel screws and washers. Release the press and remove the bar.

6. Adjust the release lever adjusting screws, using a depth gauge so that a dimension of 1.769 to 1.831 in. (44.93 to 46.50 mm.) exists between the top of the

adjusting screw and the top face of the gauge block. It is important that the three levers are adjusted in this plane to within 0.015 in. (0.38 mm.). (See Fig. 7.) Remove the clutch assembly from the flywheel.

Previous Type

1. (a) On each lever insert the small roller at the top of the hole in the lever (nearest the adjusting screw), locate the yoke and fit the yoke pin with the flat surface towards the roller.
(b) Assemble the nineteen rollers in the outer hole of each lever, using a guide pin or grease, and mount each assembly in correct relation to the pivots on the pressure plate by means of new pivot pins.
2. Suitably support a flywheel, clutch face upwards, on the bed of a press and place the pressure plate assembly in position on the flywheel and locate the nine spring seating washers over the raised bosses on the plate and install the springs.
3. Carefully slide the three gauge blocks between the pressure plate and the flywheel so that they are positioned under each release lever.
4. Locate the cover and position a bar across the top, checking that when compressed the mating marks (made previously) will come together. Operate the press sufficiently to enter the three cover to release plate retaining bolts and lockwashers and the six cover

to flywheel bolts and lockwashers. First tighten the three cover to pressure plate bolts a little at a time until fully locked then fully tighten the six cover to flywheel bolts and lockwashers. Release the press and remove the bar.

5. Adjust the release lever adjusting screws, using a depth gauge so that a dimension of 1.769 to 1.831 in. (44.93 to 46.50 mm.) exists between the top of the adjusting screw and the top face of the gauge block. It is important that the three levers are adjusted in this plane to within 0.015 in. (0.38 mm.). (See Fig. 7.) Remove the clutch assembly from the flywheel.

THE HEAVY DUTY SINGLE CLUTCH

(13 in. dia.)

Where operating conditions are particularly arduous a heavy duty clutch is available.

This is a 13 in. (33.02 cm.) single dry plate clutch secured to a special flywheel with eight bolts (only six used with the 11 in. clutch). Power is transmitted from the cover to the pressure plate by four laminated spring steel straps, which ensure these parts remain concentric at all times and also eliminate the possibility of friction being set up between them.

Four release levers pivot on pins which are retained in eye bolts secured to the cover plate. Movement of the pressure plate is effected by struts which are located at the outer ends of the release levers engaging

with lugs on the pressure plate. The release lever plate, retained by means of springs to the inner ends of the release levers, ensures full face contact on the release bearing. (See Fig. 8.)

A heavy duty clutch release bearing is fitted which has provision for lubrication by means of a screw cap greaser on the outside of the clutch housing with a flexible connection between this and the bearing. For details of this assembly refer to Fig. g. The cup should be filled with lithium based high melting point grease and in service the cap of the greaser should be screwed down one turn per day.

On early tractors the 13 in. heavy duty clutch was used on both agricultural and industrial tractors with a 13 in. diameter "solid" type of clutch disc but on agricultural tractors only, from Engine number 1622437 a new 12 in. diameter "cushioned" type of disc has been fitted, the same pressure plate assembly being retained. The cushioning effect is provided by formed steel plates between the clutch disc linings. These formed plates are evenly disposed around and riveted to a steel centre plate, which in turn is riveted to the splined hub. As the pressure plate assembly is common to these clutches the dismantling and assembly procedure which follows, is correct for both types.

On industrial tractors only from engine number 08B.771912 a new 13 in. clutch pressure plate assembly and 13 in. diameter clutch disc have been

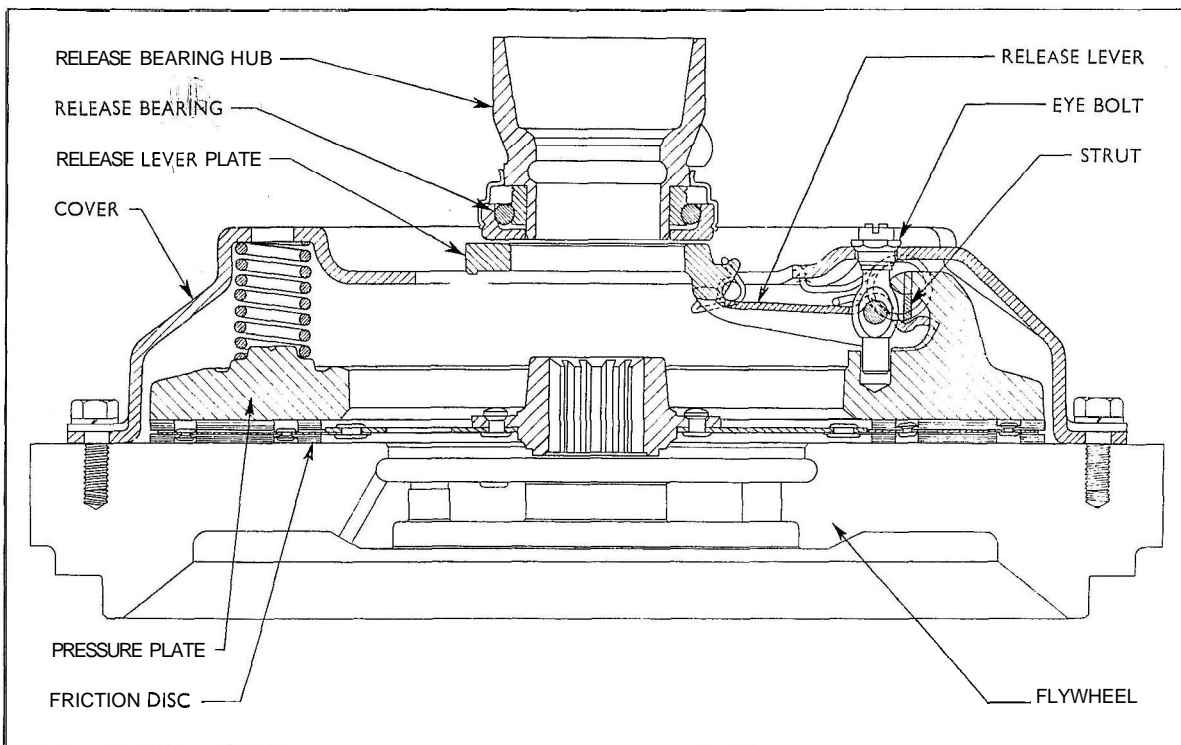


Fig. 8
 Sectioned View of 13 in. Heavy Duty Single Clutch

introduced. These parts must be used together and are not individually interchangeable with the previous 13 in. clutch assembly.

The new cover assembly although of similar design to the previous assembly, is of increased strength and can be identified by three laminations in each spring steel strap, the previous cover assembly having only two laminations in each strap.

The dismantling and assembly procedure which follows also applies to this assembly except where stated in the text.

The new 13 in. diameter clutch disc incorporates thicker organic linings and arcuate cushioning plates. The disc may be identified by an uncompressed thickness across the linings of approximately 0.52 in. (13.21 mm.) (early 13 in. diameter discs approximately 0.33 in. (8.38 mm.)). This increased disc thickness necessitates the fitting of spacers between the clutch cover assembly and the flywheel, and longer securing bolts.

The flywheel assembly used with this clutch has longer dowels, approximately 0.47 in. (11.94 mm.) proud of the flywheel face (previous type 13 in. clutch flywheel, dowels approximately 0.27 in. (6.86 mm.) proud) consequently these flywheels are not interchangeable.

To obviate any possibility of a foul condition a new clutch release bearing hub of overall length 3.25 in. (82.55 mm.) (previous type 3.5 in. (88.90 mm.) long) and a clutch release rod of length 13.35 in. (339.09 mm.) (previous type 13.54 in. (343.92 mm.) long) between centre of pin hole and end of thread, but with the same length of adjusting thread, must be used with this clutch.

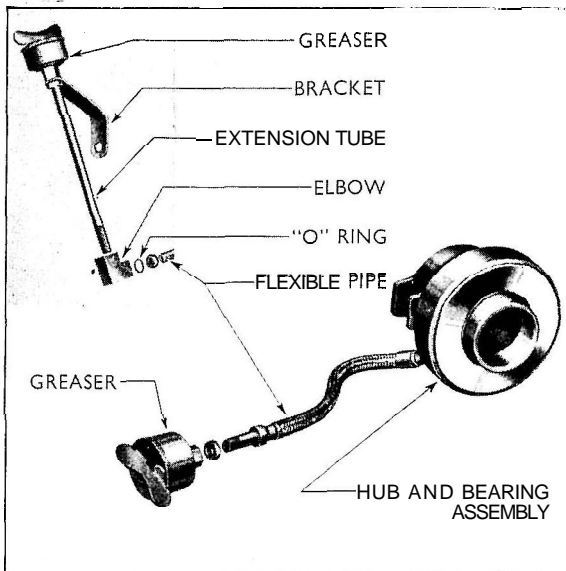


Fig. 9

13 in. Single Clutch Release Bearing Greaser Assembly

(Assembly shown in inset used with belt pulley)

This new hub and release rod may also be used on all previous single clutch tractors.

Clutch Pedal Adjustment

This should be 1½-2 in. (38.1-50.8 mm.) on all 13 in. clutches and the method of adjustment is as given in the 11 in. single clutch section.

Removal and Replacement of the Clutch

The removal and replacement procedure-for the 11 in. clutch also applies for the 13 in. clutches except as follows:

1. Eight screws are used to secure the 13 in. pressure plate to the flywheel.
2. The pressure plate is located on the flywheel by two dowels. These dowels are of different diameters and care should be taken to ensure that the pressure plate is correctly located.

NOTE.—When a 13 in. clutch is supplied through service, red painted keepers are fitted between the release levers and the cover to prevent damage during transit and storage. These are no longer required when the clutch is installed on the tractor and they will fall away when the clutch cover is tightened onto the flywheel. Care must be taken to see that they are collected and not left in the clutch or front transmission housing, otherwise damage may be caused during subsequent operation.

To Dismantle

1. Thoroughly clean the pressure plate assembly and mark the plate, cover, release levers and release lever plate, so that they may be reassembled in the same relative positions.
2. Locate the assembly centrally, cover upwards, on a spare flywheel with either the disc (or the three spacers used for setting the reassembled clutch) between the flywheel and pressure plate.

Secure the assembly tightening evenly, to the flywheel with four of the cover to flywheel retaining bolts (20388-S) spaced evenly around the cover. In the remaining four holes longer bolts (20468-S) should be screwed, the depth of the screw holes in the flywheel will not however, allow these bolts to be fully tightened, but they should be screwed down until they reach the bottom of the threaded holes.

3. Remove the release lever plate retaining springs and release lever plate.
4. Punch the ferrules securing the drive strap screws clear, using a socket spanner through the holes in the cover plate, and remove the screws.
5. Unscrew and remove the four release lever adjusting nuts. These nuts are staked to the release lever eyebolts and considerable force may be needed to free them.
6. Gradually slacken off the shorter bolts (20388-S) securing the cover plate to the flywheel, until the cover plate is retained by the four longer bolts (20468-S), the shorter bolts may then be completely removed;

continue slackening off the longer bolts until all spring pressure is released, then remove the cover.

NOTE.—The bolts must be slackened evenly and diagonally across the clutch to ensure no distortion of the cover takes place.

7. Remove the sixteen thrust springs from their locations on the pressure plate.
8. Holding the release lever inner ends upwards against the eyebolts move the struts until the eyebolts and release levers can be removed from the pressure plate.
9. Withdraw the eyebolts from the release levers and slip out the pivot pins.

To Reassemble

Examine all parts thoroughly and discard any part which is cracked, scored, excessively worn or shows discolouration due to overheating.

1. Position the pivot pins in the eyebolts and pass the threaded end of the eyebolts through the release levers.
2. Place the struts in position under the lugs in the pressure plate and, holding the inner ends of the release levers against the eyebolts, place the plain end of the eyebolts in their locations in the pressure plate. Place three spacers 0.329 to 0.331 in. (8.36 to 8.40

mm.) thick and approximately 3.5 in. (88.9 mm.) long evenly around the spare flywheel as shown in Fig. 10 and position the pressure plate centrally over the spacers.

3. Replace the thrust springs on the bosses of the pressure plate.
4. Locate the cover plate in position over the pressure plate assembly, ensuring that the anti-rattle springs are correctly engaged in the cover and located over the release levers. Turn the assembly to line the holes in the cover plate up with the holes in the flywheel and fit the four longer bolts (20468-S) tightening these down evenly until the bolts reach the base of the threaded holes in the flywheel. Fit the four shorter bolts (20388-S) and continue tightening down evenly until the cover plate is secured to the flywheel.
5. Fit four new adjusting nuts on to the eyebolts but do not fully tighten or lock these nuts.
6. Place new drive strap ferrules in position, ensuring that they are fully located in the drive strap and pressure plate. Insert and fully tighten the strap securing screws and punch the ferrules against the screw heads to prevent the screws slackening off.
7. Replace the release lever plate and securing springs (see Fig. 11).

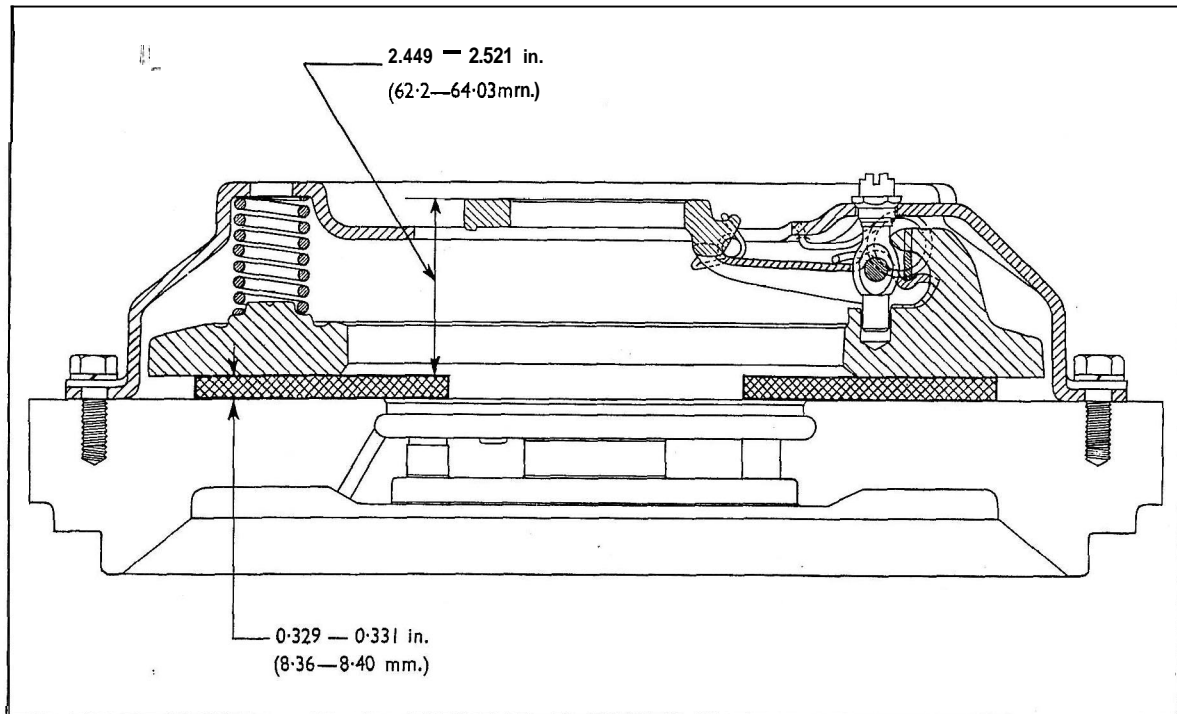


Fig. 10
Finger Height Adjustment—13 in. Clutch Pressure Plate

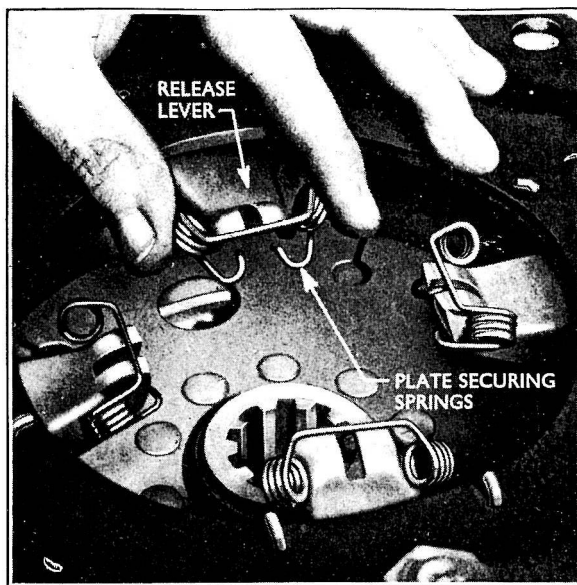


Fig. 11

Refitting Release Lever Plate Securing Springs, 13 in. Clutch

8. Using a suitable depth gauge adjust the release levers until a dimension of 2.449 to 2.521 in. (62.2 to 64.03 mm.) is obtained between the top of the release lever plate and the top of the spacers.

On the new industrial pressure plate assembly (i.e. industrial tractors from O8B 771912) this dimension should be 2.150 to 2.185 in. (54.61 to 55.497 mm.).

NOTE.—Height readings should be carried out at three points, to ensure the release plate is parallel to the flywheel within 0.015 in. (0.38 mm.).

9. If possible, operate the release levers several times to ensure that all parts are settled in position. This can usually be done on a drilling machine or press, with a suitable adaptor on the release lever plate. Check the release lever height, re-adjusting if necessary. Firmly stake the adjusting nuts to the release lever eyebolts. Remove the cover from the spare flywheel.

10. Locate the clutch disc on the engine flywheel, using Tool Number T.7024 with the longer section of the hub outwards. Position the pressure plate assembly on the flywheel, ensuring that it is correctly located in relation to the dowels, and secure with eight screws and lockwashers.

DOUBLE CLUTCH

This clutch is a double pressure plate, 12 in. diameter dry friction disc type and is actually two clutches incorporated in one assembly. Engine power is transmitted to the gearbox by the forward clutch, and to the power take-off by the rearward clutch, of this assembly. The pressure plates are

located on opposite sides of the clutch centre drive plate, which is bolted directly to a special engine flywheel designed to accommodate the double clutch. Between the two pressure plates and the centre drive plate are “non-cushioned” friction discs, which are free to move axially on splines on the power take-off input and transmission main drive shafts.

From tractor No. O8C 960337 a new “cushioned” transmission clutch disc, identical to that already used when a heavy duty 13 in. (33.02 cm.) single clutch is fitted to an agricultural tractor, has been fitted. At the same time a completely new power take-off disc was introduced which is similar in construction to the new transmission disc in that the linings are now rivetted to a series of formed spring steel plates which provide a cushioning effect when the drive is taken up. The inner ends of these plates are in turn rivetted to a steel centre plate which is similarly attached to the hub.

Although the overall thickness of each of the new discs is slightly greater than those used previously, when installed in the double clutch assembly the relative positions of the transmission and power take-off release fingers is identical with that of the previous double clutch and therefore no change has been necessary to the existing assembly fixture. Difficulty may however be experienced in setting the clutch finger adjustment if an attempt is made to fit one of the new transmission discs in conjunction with a previous type power take-off disc, or vice versa, particularly if the previous type part is worn. When it becomes necessary to fit either of the new discs to a previous type double clutch assembly it is recommended that both new type discs are fitted.

Six clutch release levers pivot on pins which also connect them to the clutch cover—the three short levers being attached directly to the power take-off clutch pressure plate and the three long levers being connected by actuating struts to the transmission pressure plate. Each release lever has an adjusting screw at its inner end, against which the clutch release bearing operates. The transmission clutch release levers are set approximately 0.62 in. (15.75 mm.) nearer the clutch release bearing than the power take-off clutch release levers, so ensuring that the transmission clutch is disengaged before the power take-off clutch.

When the clutch pedal is in the fully engaged position, the engine drive is transmitted from the flywheel via the centre drive plate to the pressure plates by means of three driving pins. Twelve spring retaining pins, fixed to the transmission clutch pressure plate, pass through clearance holes in the circumference of the drive and power take-off pressure plates, and an equal number of coil springs are located over, and secured through spring seats and retainer washers to the outer ends of the pins. The springs are compressed between the power take-off pressure plate and the spring seats, thrusting the pressure plates towards the centre drive plate and thus supplying the necessary

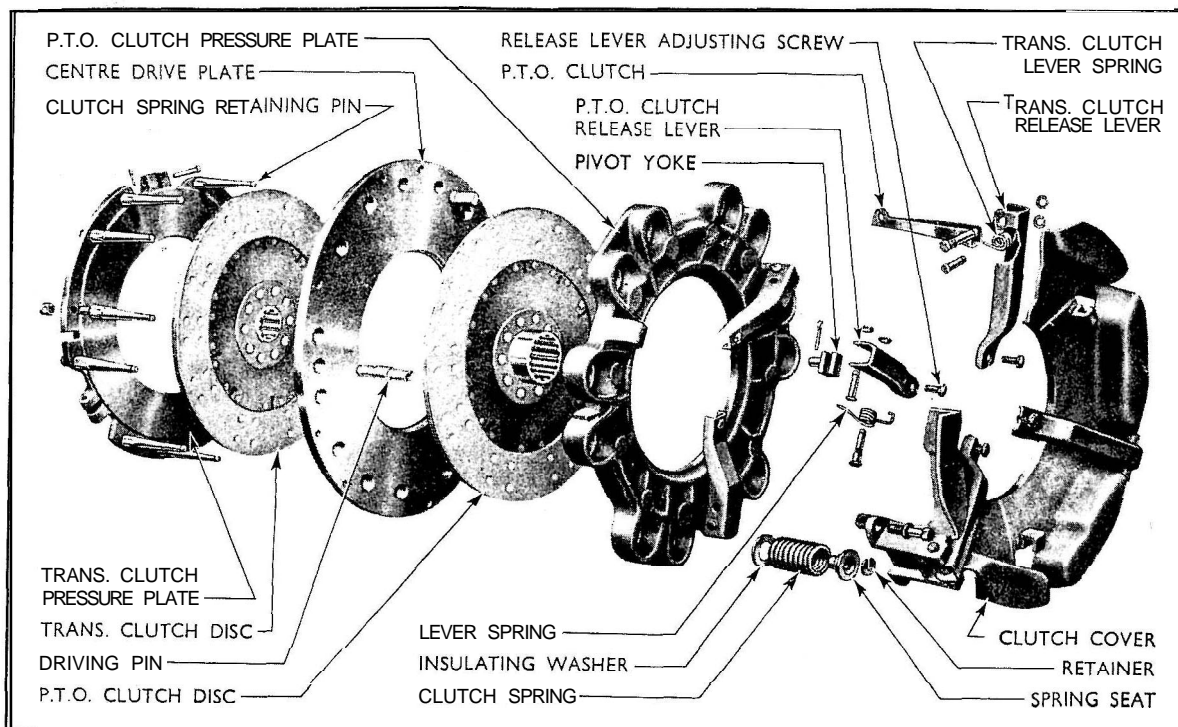


Fig. 12
Exploded View of Double Clutch

force to enable the clutch to transmit engine torque to the transmission and power take-off.

Operation

As the clutch pedal is depressed, initial movement takes up the clearance between the release bearing and the transmission clutch release lever adjusting screws. Further downward movement of the pedal moves the transmission clutch pressure plate away from the centre drive plate, freeing the transmission clutch disc and thus disconnecting the drive between the engine and the transmission. The power take-off remains engaged while the pedal is moving through approximately the first half of its total travel, after which continuance of the downward movement results in a definite increase in resistance at the pedal, as the power take-off pressure plate is also moved away from the centre drive plate, thereby disconnecting the drive between the engine and the power take-off shaft. When the clutch pedal is in the fully depressed position, therefore, the drive is discontinued to both the transmission and the power take-off shaft.

Downward movement of the clutch pedal is controlled by a 'U' shaped pedal stop bracket and pin. (See Fig. 2.) This gives the provision that if it is consistently required to use the transmission clutch only, the stop pin can be positioned in the bracket such that the power take-off clutch is not disengaged, when the pedal is depressed to operate the transmission clutch. This will ensure that the hydraulic pump drive is not interrupted if the clutch is depressed,

when using hydraulically operated equipment such as mounted loaders, earth scoops, etc.

Tractors Prior to the Super Major

The pedal stop bracket has two pairs of holes, the lower pair controlling the total movement of the clutch pedal and the upper pair making only the transmission clutch operative.

Super Major Tractors

The total movement of the pedal is controlled by the base of the bracket, the lower of the pairs of holes making the transmission clutch only operative. The upper pair of holes which are above the clutch pedal fully released position are for storage of the pin when pedal travel is being controlled by the base of the bracket. (See Fig. 2.)

NOTE.—To ensure the power take-off drive **may** be easily disconnected in an emergency, the position where only the transmission clutch is being operated (due to the position of the stop pin), must not be used where power take-off driven implements are being operated.

Removal of Double Clutch

To remove the double clutch, the transmission must first be separated from the engine and front axle assembly in the usual manner. The clutch assembly should then be supported whilst removing the nine screws which clamp the top cover and centre drive plate to the rim of the engine flywheel.

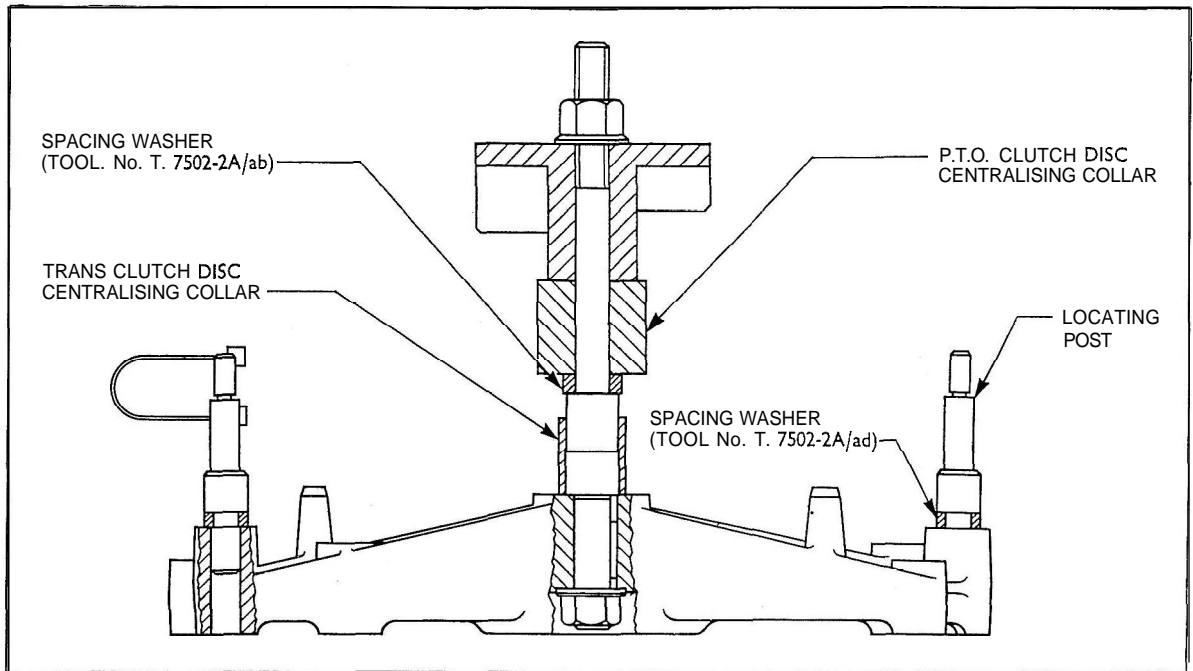


Fig. 13
 Double Clutch Fixture with Spacing Washers

There may be a slight movement of the clutch cover, away from the centre drive plate, when the screws are removed, but no attempt should be made to dismantle until the complete assembly is removed from the tractor.

Dismantling the Double Clutch

Early type double clutch assemblies incorporated balancing bosses on the main transmission pressure plate. On latter type assemblies (after April 1961 approximately), the balancing bosses were replaced by a continuous balancing ridge (see Fig. 14). As it was not possible to adjust the double clutch with the balancing ridge on the transmission plate on the T7502 setting fixture four spacing washers for use with the fixture were introduced to overcome this difficulty (see Fig. 13). These spacers cannot be used in setting the double clutch with the balancing bosses but the procedure covering the setting of the double clutch will include the use of spacers as a part of the setting fixture T7502. All reference to the use of the spacers should be ignored when setting a clutch with the balancing bosses on the transmission pressure plate.

The three smaller spacers T7502-2A/ad are fitted beneath each of the three locating posts in the outer holes of the fixture base. The larger spacer washer T7502-2A/ab locates over the centre post of the fixture to rest on the shoulder formed at the bottom of the centre post (see Fig. 13).

1. Place the double clutch on the Assembly Fixture T.7502 with the cover facing upwards and mark the centre drive plate, transmission pressure plate and power take-off pressure plate, so that they can be reassembled in the same relative position.

2. Remove the pins securing the three transmission plate actuating struts to the transmission pressure plate.

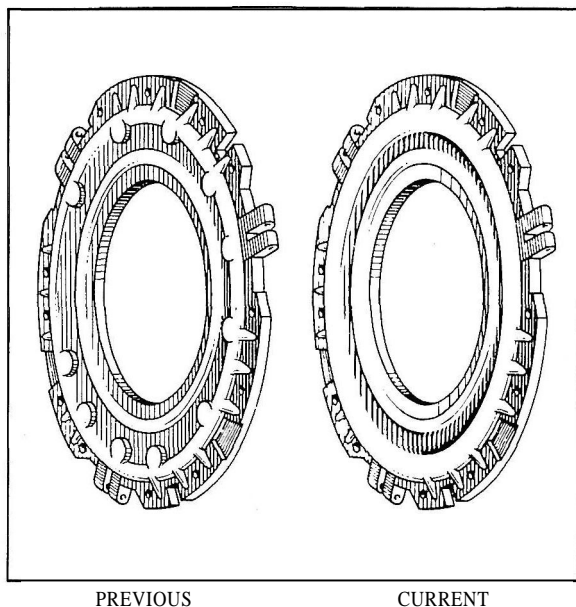


Fig. 14
 Double Clutch—Transmission Pressure Plate

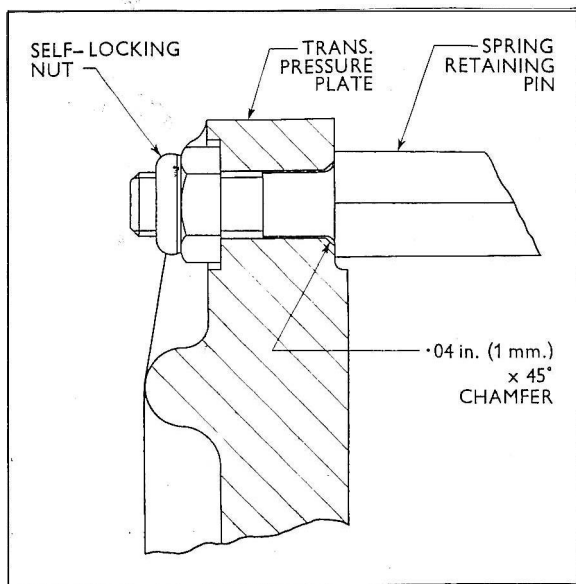


Fig. 15

Spring Retaining Pin Secured to Transmission Pressure Plate

3. Remove the circlips from the three pins that secure the power take-off clutch release levers (shorter levers) to the clutch cover, and remove the pins and release lever torsion springs.
4. Remove the power take-off clutch release lever adjusting screws, move the levers into a vertical position and lift off the clutch cover with the transmission clutch release levers and actuating struts attached.
5. Using spring compressor T.7502-1, compress the clutch pressure springs and remove the spring retainers. Lift off the spring seats, springs and insulating washers.

NOTE.—It is dangerous to attempt to remove the springs by releasing the self-locking nuts securing the spring retaining pins to the transmission pressure plate.

6. The power take-off clutch disc, centre drive plate, transmission clutch disc and transmission clutch pressure plate are now free and can be removed for cleaning and inspection.

Inspection

Inspect the clutch discs to ensure that the linings are not loose and that they are perfectly clean and free from oil. The discs should be replaced if there are signs of excessive wear, of over-heating due to clutch slip, or if there appears to be any distortion.

NOTE.—When one disc requires replacement and the other, although satisfactory for further service is partly worn, it is recommended that both discs are replaced or difficulty may be experienced in obtaining the correct relative transmission and P.T.O. clutch finger heights.

If clutch slip is known to exist, the pressure and centre drive plates should be examined to make sure

that they are not scored or cracked due to over-heating. Particular attention should be paid to the flatness of the centre drive plate and it should be ensured that the three driving pins are not loose in the plate.

If any of the spring retaining pins secured to the transmission pressure plate are bent or damaged they should be replaced with new parts.

On tractors before Engine Number 1615660 spring retaining pins with a $\frac{5}{16}$ in. (7.937 mm.) diameter threaded end and a “mottled black” appearance only must be used. Before fitting these new spring pins a check should be made to ensure that the hole in the pressure plate has a 0.04 in. (1 mm.) by 45° chamfer to accommodate the small radius at the shoulder of this pin, as shown in Fig. 15, if not it will be necessary to chamfer to the edge of the hole as specified.

When replacing these pins new self-locking nuts should be fitted and tightened to a torque of 25 to 28 lb. ft. (3.7 to 3.9 kg.m.).

On tractors after Engine Number 1615660 new spring retaining pins have been introduced identifiable by a $\frac{3}{8}$ in. (9.52 mm.) threaded end. This has necessitated a new transmission clutch pressure plate with larger diameter pin holes and new $\frac{3}{8}$ in. (9.52 mm.) dia. self-locking nuts, which should be tightened to a torque of 30-35 lb. ft. (4.15-4.84 kg.m.).

NOTE.—In both instances only the special self-locking nuts specified for the spring pins must be used.

Two different clutch pressure springs may be encountered on double clutches, the one initially used being replaced, at approximately Engine No. 1517331 by a heavier spring (marked with red paint). It is preferable that these springs are not inter-mixed on a double clutch, i.e. that the current one is not used as an individual replacement on early clutches fitted with the lighter springs. Used clutch pressure springs

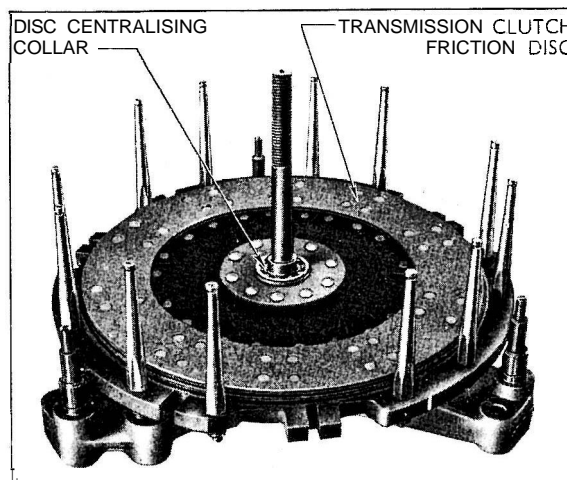


Fig. 16

Transmission Pressure Plate and Clutch Disc Installed on Assembly Fixture

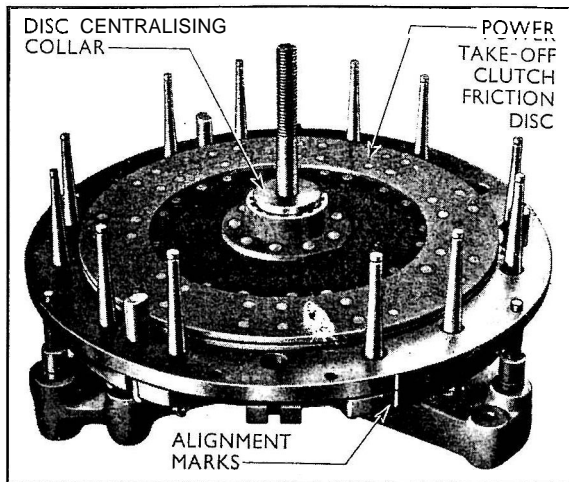


Fig. 17

Centre Drive Plate and Power Take-OR
Clutch Disc on Assembly Fixture

which do not meet the following specification should be discarded.

Free Length	Min. Load to Compress to 2 in. (51 mm.)
Previous Spring 3.23 in. (82 mm.)	92.5 lb. (41.9 kg.)
Current Spring 3.23 in. (82 mm.)	109.5 lb. (49.7 kg.)

The adjusting screws in the clutch release levers should be checked to ensure that they cannot be turned with a torque of less than 5 lb./ft. (0.69 kg.m.). This will necessitate the use of a suitable low range torsion wrench. A new clutch release lever or adjusting screw should be fitted as necessary if the specified torque cannot be obtained also if the screw thrust faces are worn they should be replaced.

Reassembling the Double Clutch

The centre drive plate, power take-off clutch pressure plate and transmission clutch pressure plate are balanced before assembly, but early production plates were not marked to indicate their relative positions in the final assembly.

To facilitate assembly in service, yellow paint marks, indicating the heavy points, are now being placed on the edges of the above mentioned plates.

If, for any reason, one or more of these parts have to be replaced, they should be positioned in the complete double clutch assembly with the yellow paint marks evenly spaced. If, however, the original parts are to be replaced, the marks made before disassembly should be adhered to during the assembly operation.

The double clutch should be assembled in the following manner using the Assembly Fixture T.7502

in conjunction with adaptor set T.7502-2A and the spring compressor T.7502-1.

1. Fit the transmission pressure plate in the assembly fixture so that it is resting on the three raised lugs cast in the base arms, and position the plate so that the slots for the actuating struts are situated centrally between the centre drive plate locating legs on the assembly fixture (see Fig. 16).

2. Install the transmission clutch disc over the fixture centre pillar and disc centralising collar T.7502-2Aa with the long boss of the disc hub facing downwards (see Fig. 16). Place the spacing washer T.7502-2A/ab on the top of the shoulder of the fixture centre post.

3. Fit the centre drive plate over the three locating pegs with the spigoted side of the plate facing downwards, matching up the alignment marks made at the time of dismantling on the centre drive plate and transmission pressure plate, and locating the clutch driving pins in the slots in the transmission clutch pressure plate (see Fig. 17).

4. Install the power take-off clutch disc over the centre pillar and disc centralising collar T.7502-2/b, with the long boss of the disc hub facing upwards (see Fig. 17).

5. Fit the power take-off clutch pressure plate and engage the driving slots with the centre plate driving pins, at the same time matching up the alignment marks on the two plates.

6. Lift the power take-off clutch release levers so that they are in a vertical position and place the coil spring insulating washers, coil springs and spring seats loosely in position over the spring retaining pins. Compress each spring in turn, using spring compressor T.7502-1, and fit one of the special retainers into the groove at the outer end of each retaining pin. Ensure that the spring retainers are fully located in the spring seats.

7. Fit the clutch cover, with the power take-off clutch release levers located through the holes in the cover, and the lower ends of the transmission clutch actuating struts in their respective slots in the transmission clutch pressure plate.

8. Install the power take-off clutch release lever torsion springs, locating the cranked ends in the small holes in the top of the power take-off clutch release levers, and replace the release lever to clutch cover securing pins. Fit circlips to retain the pins in position.

g. Align the lower holes in the actuating struts with the corresponding holes in the transmission pressure plate, and insert the retaining pins and split pins.

Adjustment of Double Clutch Release Levers

1. Using six temporary nuts and bolts, secure the clutch cover to the centre drive plate.

2. Fit the setting pad T.7502-2/d over the centre pillar of the assembly fixture, so that the flat side of the pad contacts the transmission clutch release lever adjusting screws. Fit the flat washer and nut to the centre pillar and screw down the nut until the setting

blocks T.7502-2/e can be inserted between the centre drive plate and the pressure plates (see Fig. 18). The three setting blocks should be positioned 120° apart and must be touching the outer periphery of the clutch friction discs (see Fig. 19).

It is most important that the blocks locate between the centre drive plate and the raised operating surfaces of the pressure plates, i.e. when assembled these surfaces will appear as ridges slightly larger in diameter than the clutch disc.

3. Remove the setting pad, reverse it, and replace on the centre pillar with the stepped side downwards. Do not refit the nut and flat washer. The shorter machined step of the pad is used to set the transmission clutch release levers, and the longer machined step to set the power take-off clutch release levers.

4. Hold the setting pad firmly against the power take-off disc centralising collar and rotate the pad until the appropriate step is immediately above one of the clutch release lever adjusting screws. Turn the adjusting screws until a 0.005 in. (0.13 mm.) feeler gauge can just be inserted between the top of the screw and the underside of the appropriate step on the setting pad (see Fig. 20). Repeat the operation on each of the five remaining release levers.

If any free play exists in the release levers, care must be taken to hold the lever down when making the adjustment.

NOTE.—During the adjusting operations ensure that the setting pad bottoms on the power take-off clutch disc centralising collar, and that this in turn is down on the shoulder of the fixture centre pillar.

5. After completing the adjustment, invert the setting pad and fit the flat washer and nut to the centre pillar.

Screw down the nut until the setting blocks can be extracted. Remove the nut, flat washer and setting pad. Remove the temporary nuts and bolts securing the clutch cover to the centre drive plate.

Providing these instructions have been carefully followed the assembly is correctly adjusted and can be fitted to the flywheel.

Replacement of Double Clutch

Before replacing the double clutch assembly the flywheel spigot bearing should be checked and replaced if worn or rusty and the recess behind the bearing lightly packed with good quality high melting point grease, where the ball race type is fitted.

1. Secure the double clutch assembly to the flywheel, taking care to fit locking washers under the heads of the nine retaining screws.

2. Replace the engine and front axle assembly in the usual manner, with the exception that when making the assembly, the splines on both the power take-off input and the main drive shafts must be aligned with the splined hubs of their respective clutch discs. This may be accomplished by turning the engine whilst easing it towards the gearbox, or alternatively by removing the belt pulley or cover plate, whichever is fitted, from the front transmission housing and turning the shafts from within the primary gearbox.

Adjustment of the Double Clutch Pedal Linkage

On tractors prior to the introduction of the Super Major the effective clutch pedal movement was controlled by altering the length of the clutch release rod, and the pedal free play by a screwed stop on the left-hand side of the clutch pedal.

With the introduction of the Super Major the level of the footplates was raised and this necessitated a new

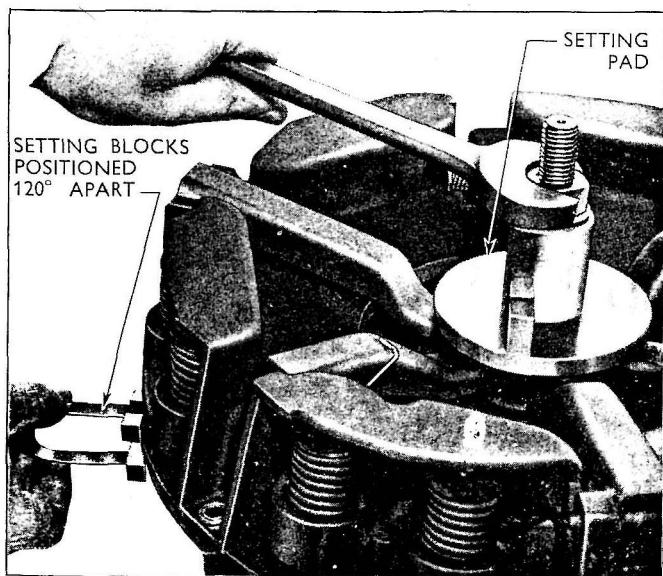


Fig. 18
Fitting Setting Blocks

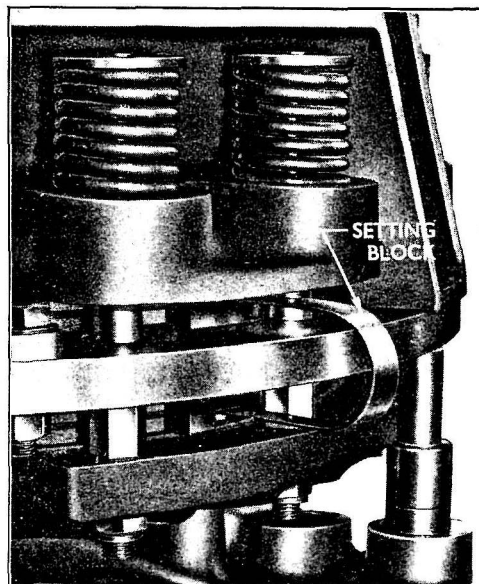


Fig. 19
Setting Block in Position Against Discs

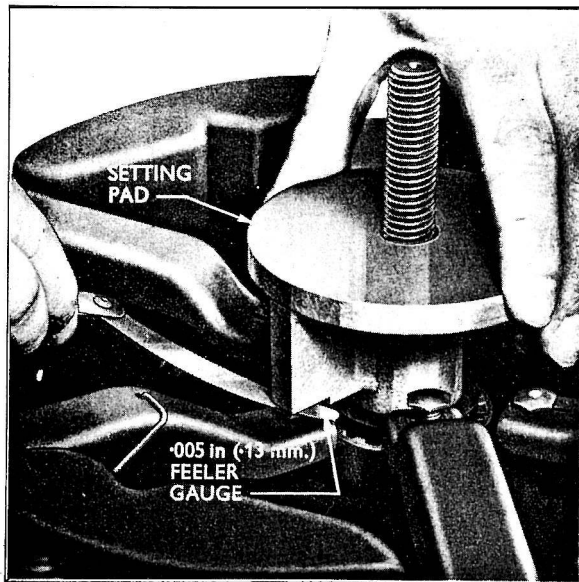


Fig. 20

Checking Adjustment of Release Lever Screw

clutch pedal. This pedal is now common to both standard and Live P.T.O. tractors and no longer has a screwed stop, the pedal free play is now set with the pedal travel by the clutch release rod. (See Fig. 2.)

This pedal and its new stop bracket is not interchangeable with the previous type.

Pedal adjustment on tractors prior to the Super Major:

1. Remove the power take-off shaft guard and cover from the rear of the tractor to expose the shaft.
2. Loosen the locknut and rotate the pedal free movement adjusting screw to its shortest length.
3. Loosen the clutch release rod clevis locknut and disconnect the release rod from the balance lever. Adjust the clevis to give a distance of 15 in. (38.1 cm.) between the centre of the pinhole in the clevis and the centre of the pin connecting the other end of the rod to the clutch release arm and reconnect the release rod to the balance lever with the pin (do not secure with a split pin).
4. Ensure that the stop pin is in the lower pair of holes in the clutch pedal stop bracket. (This pin governs the distance the clutch pedal may be depressed.)
5. Move the power take-off lever into the engaged position and start the engine.
6. Fully depress the clutch pedal. The power take-off shaft should stop revolving just before the clutch pedal contacts the stop pin, if however the shaft does not stop, screw the clevis onto the release rod until the required condition is obtained.

NOTE.—Do not screw the clevis onto the rod to

such an extent that the total release movement of the clutch is taken up before the clutch pedal contacts the stop pin. If the clevis is screwed on too far the clutch mechanism will “bottom” before the pedal meets the stop pin, this can be felt if the pedal is slowly depressed. Movement of the pedal beyond this point may cause damage to the clutch and under such circumstances the clutch and its associated parts should be removed for examination to determine why over-adjustment of the release rod has been necessary.

7. Having carried out the above adjustment, alter the position of the stop pin to the upper pair of holes in the clutch pedal stop bracket.

8. Again depress the clutch pedal until it contacts the stop pin, at which point the transmission clutch should be completely disengaged, this can be verified by engaging and disengaging a gear. If this condition is correct no further adjustment of the release rod is required, if not it will be necessary to readjust the release rod, screwing the clevis onto the rod to obtain the required condition.

NOTE.—If readjustment of the release rod has been necessary, replace the stop pin in the lower pair of holes in the stop bracket and carry out a final check to ensure that the clutch pedal, when depressed, contacts the footplate before the total clutch release movement is expended (see previous Note under Operation 6).

9. With the release rod adjustment completed move the power take-off lever into the disengaged position and stop the engine.

10. Secure the pin connecting the release rod to the balance lever with a split pin and tighten the release rod clevis locknut.

11. Position the stop pin in the appropriate pair of holes in the stop bracket for the required clutch pedal operation and retain with the spring clip.

12. Screw out the pedal adjusting screw to give $\frac{1}{2}$ in. (13 mm.) free movement at the pedal pad. Tighten the adjusting screw locknut.

13. Refit the power take-off shaft cover and guard to the rear of the tractor.

Pedal adjustment on tractors from the introduction of the Super Major:

1. Loosen the clutch release rod clevis locknut and remove the pin securing the clevis to the balance lever.

2. Adjust the length of the release rod until the pedal free travel is $1\frac{1}{2}$ to 2 in. (38.1 to 50.8 mm.). Tighten the locknut after adjustment.

3. If a double clutch is fitted, remove the pedal stop pin from the stop bracket, start the engine, engage the P.T.O. and check that the P.T.O. ceases to rotate when the clutch pedal is fully depressed. Shorten the effective length of the release rod as necessary to obtain this condition.

4. Fit the stop pin to the lower holes in the stop bracket, depress the pedal onto the stop pin and check

that gear changing can be effected without excessive clutch spin. Further shortening of the release rod may be necessary if excessive spin is experienced.

CLUTCH RELEASE BEARING

The double clutch release bearing is of more robust construction and is mounted on a shorter hub, (2.18 in. (55.37 mm.) long), than that used with the single clutch.

NOTE.—The clutch release bearing hub used on standard tractors prior to Engine No. 1418861 (before the clutch cross-shaft hole was moved rearwards) is shorter than that used on current standard tractors.

The bearing should require little attention in service, it is pre-lubricated and must not be cleaned in solvent. If the bearing has excessive side movement or is loose on its hub it should be renewed as described in the 11 in. single clutch section.

Removal and Replacement of Clutch Pedal

The method of removing and replacing the clutch pedal on tractors equipped with "Live" power take-off

off is basically the same as used on tractors without "Live" power take-off.

GEARBOX

The gearbox (front transmission) provides the operator with a choice of six forward and two reverse speeds, selected by main and primary gear shift levers. The main gear shift lever selects three forward and one reverse gear in either high or low ratio, the ratio being selected by the primary gear shift lever. With the standard gearbox, the low ratio is selected by moving the primary lever upwards and high ratio by moving the lever downwards. This sequence of selection is reversed with the Live P.T.O. transmission. The gear selection positions are illustrated on current models by a plate rivetted to the shroud at the base of the fuel tank, whereas for previous models the gear selection positions were cast on the rear transmission top cover.

With the introduction of the New Super Major tractor at Serial No. 08C-960337, various design changes were made to the gearbox and power take-off to introduce new road speeds and a greater P.T.O.

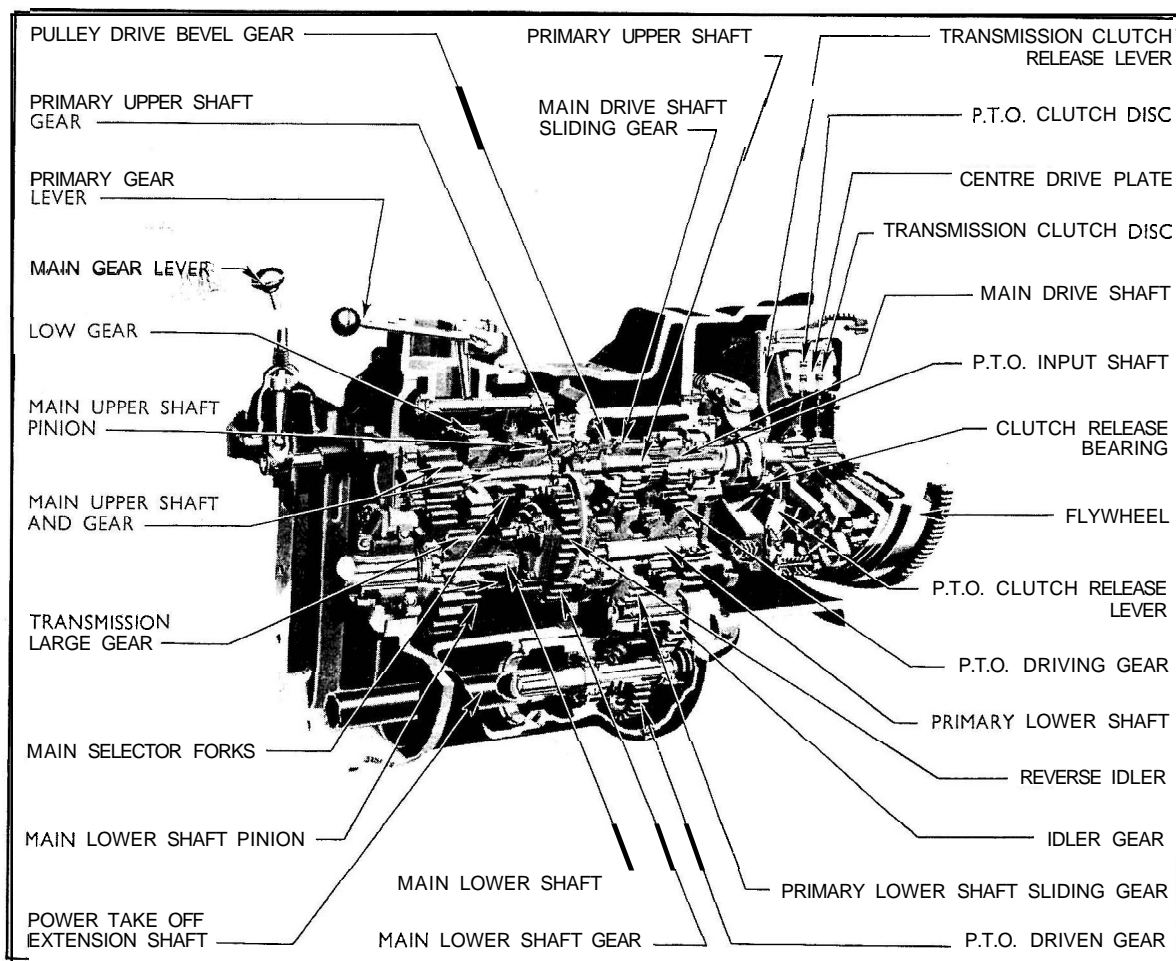


Fig. 21
Sectioned View of Clutch and Gearbox Live Power Take-Off Transmission