

SEPARATING THE TRACTOR

To enable the tractor to be separated into its major units, the following operations have been detailed: separating the engine and front axle assembly from the remainder of the tractor, removing the primary gearbox, and separating the rear axle assembly from engine and gearbox assembly. For full details covering dismantling the major units, after the tractor has been separated, reference can be made to the appropriate section.

TO SEPARATE THE ENGINE AND FRONT AXLE ASSEMBLY FROM THE FRONT TRANSMISSION

Should it be necessary at any time to dismantle the tractor in order to carry out repairs on the clutch or gearbox the following general procedure should be applied dis-regarding any operation not associated with the type of tractor concerned.

To Dismantle

- 1 Drain the cooling system through the two taps, one on the radiator and one on the cylinder block.
- 2 Remove the bonnet by unscrewing the two screws in the rear bracket and lifting the bonnet rearwards.
- 3 Disconnect the battery cables and remove the battery.
- 4 Pull out the snap connectors of the headlamp

wiring at the right-hand side of the radiator cowl, and release the wires from their clip on the front end of the right-hand side member.

- 5 Disconnect the two wires from the generator and release them from the clip at the left-hand side of the front mounting plate.
- 6 Release the main wiring from the two clips on the tappet side cover bolts, and the clip under the front of the battery tray.
- 7 Disconnect the two wires from the starter relay switch, and remove the cable from the starter motor to the solenoid by disconnecting at both ends. Disconnect the starter operating rod at the starter end.
- 8 Release the main wiring loom from its clip at the top of the clutch housing on the left-hand side of the tractor and tie the front part of the loom clear of the front of the tractor.
- 9 Remove the temperature gauge bulb from the front of the cylinder head and release the capillary tubing from the two clips on the tappet side cover bolts. Position the tubing clear of the front of the tractor.
- 10 Remove the fuel pipe from between the fuel tank and the fuel lift pump.

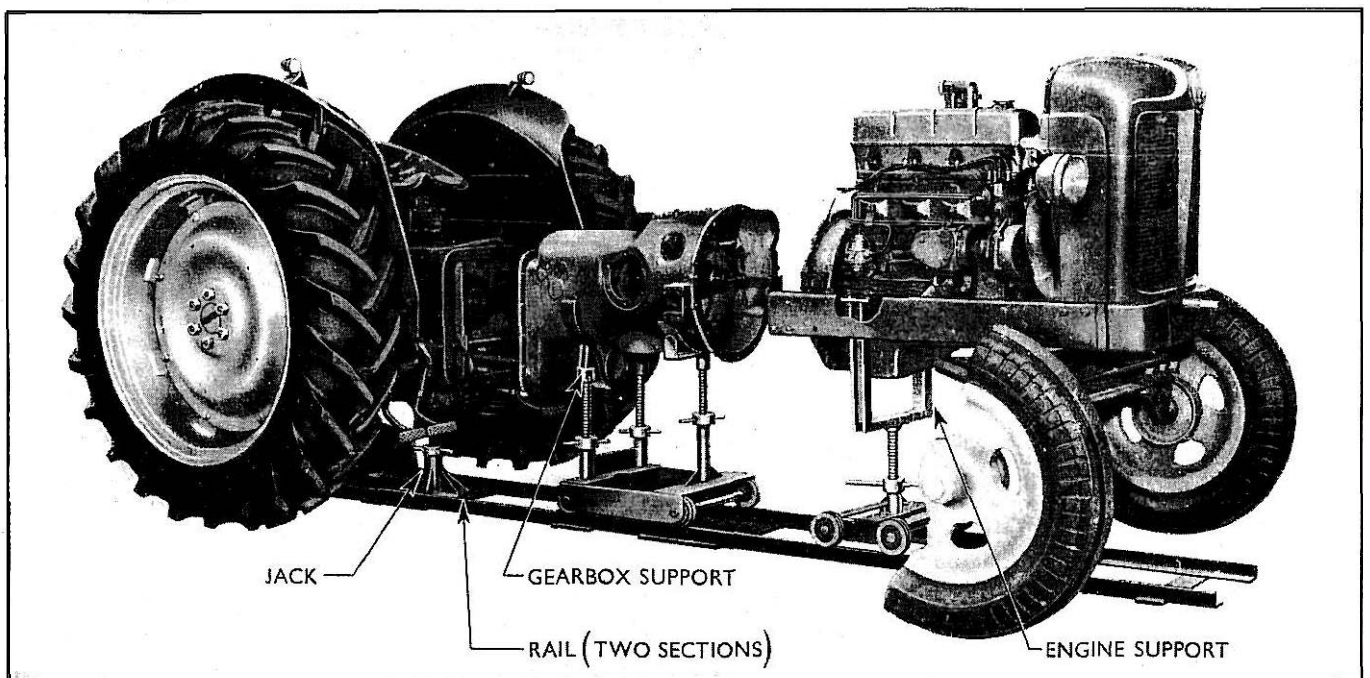


Fig. 145

View of Tractor on Dismantling Stand Tr/NMD 27

SEPARATING THE TRACTOR

- 11 Disconnect the governor control rod at the operating lever end and the shutter control at both ends.
 - 12 Disconnect the stop control cable at the lever on the fuel injection pump by releasing the pinch screw.
 - 13 Disconnect the leak-off pipe at the rear of the cylinder head by removing the banjo union bolt or unscrewing the connection nut, whichever type is fitted.
 - 14 Remove the oil pressure pipe to oil pressure gauge by disconnecting at both ends and releasing it from its clip at the clutch housing on the left-hand side of the tractor.
 - 15 Disconnect the rubber hose from the air cleaner by unscrewing the clamp at the air cleaner end only.
 - 16 Remove the exhaust pipe, silencer and tail pipe complete by removing the two bolts and one nut at the exhaust manifold and the bolt from the silencer bracket at the side member and the bolt securing the tail pipe to the rear axle.
 - 17 Remove the tool box and disconnect the steering drag link from the drop arm by unscrewing the drag link ball plug.
 - 18 Support the engine and transmission, using the tractor dismantling stand (tool No. Tr/NMD 27). Place the two rail sections under the tractor and position the engine and gearbox supports. (See Fig. 145.)
- Note** — It will be necessary to disconnect the power take-off lever link at the front end to allow the gearbox support to be correctly located.
- 19 Place the front axle wedge (tool No. Tr2/NMD 3004) in position to prevent movement between the engine and front axle assembly.
 - 20 Lock the track rod by means of the front axle clamp (tool No. Tr/MD 3000).
 - 21 Remove the four bolts from the rear of each side member, securing the side members to the gearbox housing and the bolts retaining the engine to the gearbox.
- Note** — Do not forget the two bolts behind the side channels.
- 22 Withdraw the engine, radiator and front axle assembly moving it forward until clear of the gearbox.
- Note** — See “Dismantling the Front Transmission after Engine and Front Axle Separated” (page 117) if it is desired to dismantle the gearbox
- ### To Reassemble
- 1 Move the engine, radiator and front axle assembly towards the front transmission, ensuring that the mainshaft lines up with the clutch pressure plate splines.
 - 2 Replace the bolts retaining the engine to the gearbox and the four bolts securing each side channel to the gearbox housing.
 - 3 Remove the front axle clamp (tool No. Tr/MD 3000) and the front axle wedge (tool No. Tr 2/NMD 3004).
 - 4 Remove the tractor dismantling stand (tool No. Tr/NMD 27).
 - 5 Refit the tool box and reconnect the steering drag link to the steering drop arm.
 - 6 Refit the exhaust system by replacing the two bolts and a nut at the manifold, the bolt securing the silencer bracket to the side channel and the bolt securing the tail pipe to the rear axle.
 - 7 Connect the rubber hose between the air cleaner and inlet manifold by fitting the clamp in position at the air cleaner end and tightening the screw.
 - 8 Replace the oil pressure pipe between the cylinder block and the back of the dash panel and refit the clip to the clutch housing.
 - 9 Replace the banjo union bolt and two fibre washers, securing the leak-off pipe to the right-hand side rear of the cylinder head or reconnect the connection nut on the earlier-type tractors.
 - 10 Reconnect the stop control cable to the lever on the fuel injection pump, and tighten up the pinch screw.
 - 11 Refit the governor control rod at the operating lever end and the shutter control rod at both ends.
 - 12 Replace the fuel pipe between the fuel tank and the fuel lift pump.
 - 13 Carefully replace the capillary tube of the temperature gauge bulb in the two clips on the tappet side cover bolts and refit the bulb in the front of the cylinder head.
 - 14 Refit the main wiring loom into its clip at the top of the clutch housing on the left-hand side of the tractor, replace the cable between the starter motor and solenoid and reconnect the two wires to the starter relay switch. Reconnect the starter operating rod.
 - 15 Refit the main wiring to the clip under the front of the battery tray and the two clips on the tappet side cover bolts, and reconnect the two wires to the generator.
 - 16 Reconnect the headlamp wiring by pushing in the snap connectors at the right-hand side of the radiator cowl and refit their clip to the front of the right-hand side chassis member.
 - 17 Refit the battery and reconnect the leads.
 - 18 Replace the bonnet and fit the two screws securing the rear bracket.
 - 19 Refill the cooling system with clean water.

DISMANTLING THE FRONT TRANSMISSION
AFTER ENGINE AND FRONT AXLE SEPARATED

To carry out repairs to the primary gearbox it is necessary to separate the engine and gearbox, and the following additional operations must be carried out.

- 1 Drain the oil from the gearbox. (Front Transmission.)
- 2 Remove the split pin and clevis pin securing the clutch relay lever to the cross shaft.
- 3 Disconnect the clutch release bearing retracting spring and remove the release bearing.
- 4 Remove the split pin and clevis pin securing the clutch release fork to the cross shaft.
- 5 Remove the collar retaining the clutch cross shaft in the housing and withdraw the shaft and clutch release fork from the housing.
- 6 Remove the split pin and clevis pin securing the power take-off engagement lever to the selector shaft.
- 7 Remove the four bolts securing the power take-off selector housing.
- 8 Remove the six bolts securing the power take-off to the gearbox housing.

Note — The left- and right-hand centre bolts are pilot bolts.

- 9 Remove the nut, spring washer and flat washer securing the steering wheel to the shaft and remove the steering wheel.
- 10 Remove the four bolts securing the front bracket of the fuel tank.

Note — The left-hand rear bolt is the gearbox breather.

- 11 Remove the two bolts at the rear of the fuel tank and lift the tank clear of the steering gear.
- 12 Disconnect the tail and side lamp loom from the terminal under the instrument box and remove the assembly.
- 13 Remove the five bolts securing the steering gear to the gearbox housing.

Note — Flat washers are fitted under the bolt heads.

- 14 Remove the four bolts from the primary gearbox selector housing and remove the housing.

Note — On the diesel engine the starter control bracket is retained by two of these bolts.

- 15 Remove the four bolts securing the main gearbox selector plate and remove the plate.
- 16 Remove the belt pulley assembly.

Note — To carry out further dismantling see "Gearbox—Front Transmission" section.

To carry out repairs to the main gearbox, the gearbox and rear axle must be separated to permit removal of the large transmission gear (see page 118).

To Reassemble

- 1 Refit the belt pulley assembly with six bolts.
- 2 Refit the main gearbox selector plate with four bolts.

Note — One of these bolts is the pivot pin for the power take-off engagement lever.

- 3 Refit the primary gearbox selector housing to the gearbox casing.

Note — On the diesel engine the starter control bracket is retained by the two left-hand bolts.

- 4 Locate the steering gear on the gearbox housing with the five bolts and flat washers.

- 5 Refit the instrument box and reconnect the side and tail lamp loom to the terminal under the box.

- 6 Refit the fuel tank and the two rear support bolts.

- 7 Refit the four bolts securing the fuel tank front support bracket. The left-hand rear bolt of this bracket is the gearbox breather.

- 8 Refit the steering wheel using the large flat washer, spring washer and nut.

- 9 Locate the power take-off housing. Fit and tighten the pilot bolts in the left and right-hand centre holes. Refit the four remaining bolts.

- 10 Secure the power take-off selector housing into place with four bolts.

- 11 Reconnect the power take-off engagement lever to the selector shaft. Refit the clevis pin and split pin.

- 12 Enter the clutch cross shaft into the housing and locate the clutch release fork.

- 13 Fit the collar and lock it to the shaft with a clevis pin and split pin.

- 14 Lock the clutch release fork to the shaft with a clevis pin and split pin.

- 15 Refit the clutch release bearing and re-connect the retracting spring.

- 16 Reconnect the clutch relay lever to the cross-shaft. Fit the clevis pin and split pin.

- 17 Refill the gearbox to the "FULL" mark on the filler plug boss with lubricant of correct grade as shown in the Operators Instruction Book.

TO SEPARATE THE REAR TRANSMISSION FROM THE FRONT TRANSMISSION AND ENGINE ASSEMBLY

To carry out repairs to the rear axle it is only necessary to separate the rear transmission from the engine and gearbox assembly. To support the tractor during this operation use the tractor dismantling stand (tool No. Tr/NMD 27), (Fig. 145.)

- 1 Drain the oil from the rear axle.
- 2 Install the front axle wedge tool (tool No. Tr2/NMD 3004).
- 3 Lock the track rod by means of the front axle clamp (tool No. Tr/MD 3000).
- 4 Pull back the rubber sleeve and disconnect the side an6 tail lamp loom at the terminal beneath the instrument box.
- 5 Release the clip securing the loom to the R.H. front foot plate.
- 6 Remove the two bolts holding the R.H. front foot plate to the bull pinion shaft housing, three bolts holding it to the bracket and three to the wing. Remove the footplate.
- 7 Release the brake pedal retracting springs and disconnect the brake cables.
- 8 Remove the bolt holding the brake locking lever guide to the rear transmission housing, and detach the guide.
- 9 Remove the two bolts holding the K.H. front foot plate support bracket to the rear transmission housing and remove the bracket.
- 10 Remove the two bolts holding the L.H. front foot plate to the bull pinion shaft housing, three bolts to the support bracket and three bolts to the wing. Remove the footplate.
- 11 Disconnect the clutch pedal retracting spring.
- 12 Remove the split pin and clevis pin holding the clutch relay lever to the clutch pedal.
- 13 Remove the two bolts holding the L.H. foot plate support bracket to the rear transmission housing. Remove the bracket.
- 14 Remove the bolt holding the tail pipe bracket to the rear foot plate.
- 15 Remove the four bolts holding the power take-off extension shaft housing to the rear axle casing and withdraw the shaft.
- 16 Locate the rail sections of the dismantling stands and position the support under the gearbox, and the support under the rear axle.

Note — It will be necessary to disconnect the power take-off lever link at the front end to allow the gearbox support to be correctly located.

To carry out further dismantling, see "Rear Transmission" section.

- 17 Remove the main gearbox selector housing. (Four bolts.)
- 18 Remove the remaining bolts holding the rear axle housing to the gearbox.

Note — The top left-hand and right-hand bolts are pilot bolts.

- 19 Disconnect the gearbox and engine assembly from the rear axle.

TO RECONNECT THE GEARBOX AND ENGINE ASSEMBLY TO THE REAR AXLE

- 1 Connect the gearbox and engine assembly to the rear axle
- 2 Fit the two pilot bolts to the top left-hand and bottom right-hand bolts to the flange joint.
- 3 Enter the power take-off extension shaft into the housing and refit the bolts.
- 4 Bolt the tail pipe to the right-hand rear foot plate.
- 5 Refit the left-hand foot plate support bracket and the two bolts securing the bracket to the rear transmission housing.
- 6 Reconnect the clutch pedal to the clutch relay lever and reconnect the clutch pedal retracting spring.
- 7 Refit the left-hand front foot plate with two bolts to the bull pinion shaft housing, three bolts to the support bracket and three bolts to the wing.
- 8 Refit the right-hand front foot plate support bracket and secure it to the rear transmission housing with two bolts.
- 9 Refit the brake locking lever guide to the rear transmission housing with one bolt.
- 10 Reconnect the brake cables and the brake pedal retracting springs.
- 11 Refit the right-hand front foot plate with two bolts to the bull pinion housing, three bolts to the bracket and three bolts to the wing.
- 12 Refit the remaining bolts to the front and rear transmission housing flanges.
- 13 Secure the side lamp loom with the clip under the right-hand foot plate.
- 14 Refit main gearbox selector housing.
- 15 Reconnect the tail and side lamp loom to the terminal beneath the instrument box and replace the rubber sleeve.
- 16 Remove the front axle damp (Tool No. Tr/MD 3000).
- 17 Remove front axle wedge tool (Tool No. Tr2/NMD 3004).
- 18 Refill rear transmission to correct level, as indicated by "FULL" mark on dipstick, with lubricant of correct grade as shown in the Operators Instruction Book.

THE CLUTCH

The clutch is of the single dry plate type with a solid hub. The clutch disc is pressed against the flywheel by a spring-loaded pressure plate. The clutch disc is free to slide along the splines of the main drive gear when the pressure of the plate is released by the clutch withdrawal components. (See Fig. 146.)

The three clutch fingers pivot on yokes secured to the cover and their outer ends are free to rotate in needle roller bearings and pins mounted on bosses formed on the pressure plate. As the clutch pedal is depressed the release arm moves the release bearing into contact with the inner ends of the clutch fingers. Movement of the inner ends of the fingers moves the outer ends back, together with the pressure plate, so compressing the clutch springs and freeing the clutch.

With the engine running and the main gear lever in neutral, the clutch disc, when released, remains stationary on the main drive shaft, the pilot bearing in the flywheel providing the necessary support. The clutch pilot bearing only rotates relative to the main drive shaft when the clutch pedal is depressed.

The clutch release mechanism is operated by the clutch pedal through a cross-shaft and external linkage. (See Fig. 146.)

The clutch is located in its own compartment which forms part of the front transmission housing. The clutch release bearing is of the pre-lubricated type and requires no lubricant in service. The pilot bearing should be packed with grease on assembly.

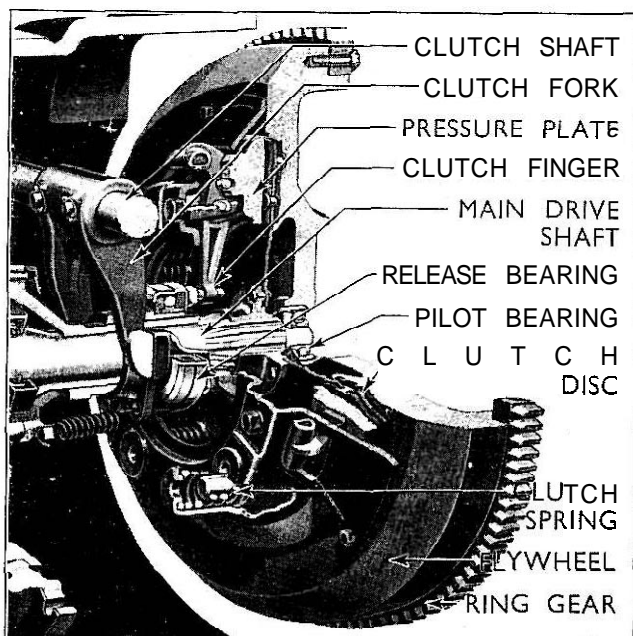


Fig. 146
Sectioned View of Clutch

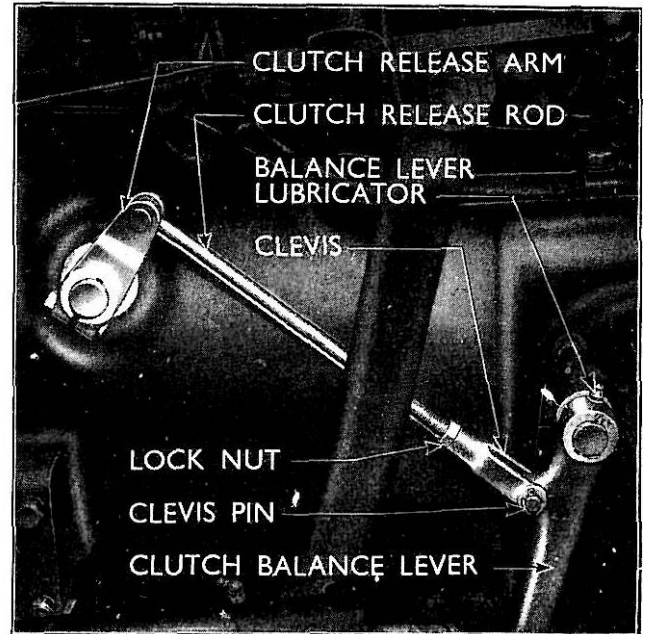


Fig. 147
Clutch Adjustment

Heavy Duty Clutch

Dumpers, shovels, hydraulic loaders and other similar machines adapted to suit the New Fordson Major Tractor are fitted with a heavy duty clutch disc assembly. The clutch disc differs from the standard disc in respect of the facings, which are thicker, almost black in colour with metallic particles inset and plainly visible on the surface. On no account may the standard disc be fitted in its place.

The heavy duty clutch disc assembly is fitted in conjunction with three spacers positioned between the cover and flywheel to accommodate the increased thickness of the disc and maintain the spring pressure. Longer clutch to flywheel retaining bolts are fitted.

Clutch Adjustment

The clutch pedal free travel should be between 1½ ins. and 2 ins. (38.1 to 50.8 mm.). In service adjustment can be effected to the external linkage between the cross-shaft and the balance lever as shown in Fig. 147.

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 on to the rod will reduce the free movement. When the free travel of the clutch pedal has been readjusted, fit a new split pin in the clevis pin and retighten the locknut.

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

THE CLUTCH

To Remove Clutch Disc and Pressure Plate

- 1 Separate the front axle and engine assembly from the front transmission as described on page 115.
- 2 Unscrew the six bolts securing the pressure plate to the flywheel to release the pressure plate and clutch disc. In the case of the heavy duty clutch (see previous page) do not lose the three spacers fitted between the pressure plate cover and the flywheel. (See Fig. 148.)

Note — Inspect the clutch disc to ensure that the linings are not loose and that they are perfectly clean and free from oil. The disc should be replaced if there are signs of overheating due to slip or excessive wear.

Check that the rivets securing the boss to the clutch disc are perfectly tight.

The pressure plate should be examined to make certain that the springs or the face of the pressure plate are not discoloured due to overheating.

Depress each clutch finger in turn, and release it slowly to check for signs of the fingers sticking.

To Replace

- 1 Position the clutch disc on the flywheel face with the longest spigot away from the flywheel.
- 2 Insert the clutch disc locator (tool No. Tr/D 7563) through the splines of the clutch disc hub into the clutch pilot bearing. (See Fig. 149.)
- 3 Locate the pressure plate assembly over the clutch disc and refit the six mounting bolts and spring washers. Tighten the bolts evenly to a torque of 12 to 15 lbs. ft.

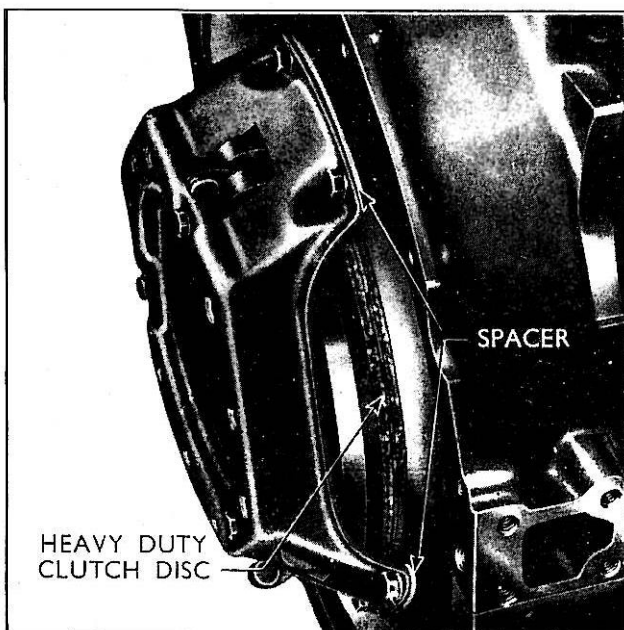


Fig. 148
Heavy Duty Clutch

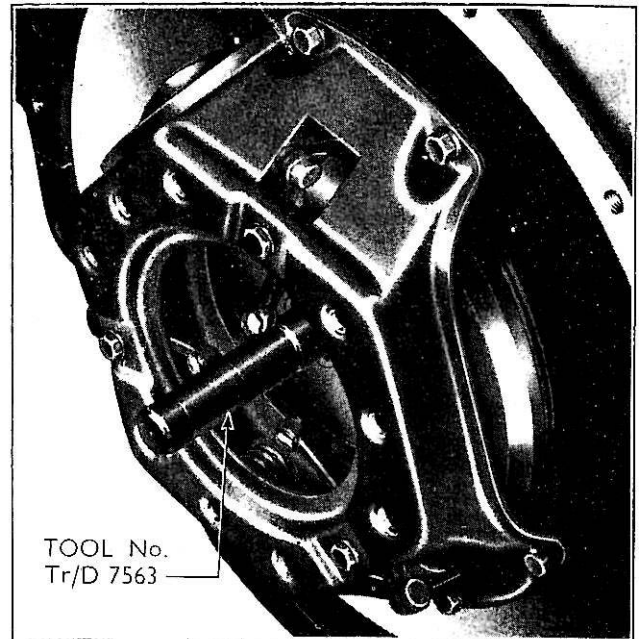


Fig. 149
Clutch Disc Locator

Note — If a heavy duty clutch is fitted (see previous page), do not forget the three spacers between cover and flywheel also use six longer securing bolts.

- 4 Remove the clutch disc locator Tr D 7563.
- 5 Reconnect the front axle and engine assembly to the front transmission as described on page 116, and adjust the clutch pedal free travel as described on page 119.

To Remove the Clutch Release Bearing

Note — The release bearing is of the pre-lubricated type and should require little attention in service.

- 1 Separate the front axle and engine assembly from the front transmission as described on page 115.
- 2 Unhook the clutch release bearing spring and remove the hub and bearing assembly from the fork.
- 3 Withdraw the bearing from the hub.

To Replace

- 1 Fit the new bearing to the hub, thrust face towards clutch disc.
- 2 Mount the bearing and hub assembly in position in the fork and connect up the spring.
- 3 Reconnect the front axle and engine assembly to the front transmission as described on page 116, connect and adjust the linkage to give the correct pedal free travel.

Clutch Pilot Bearing

This bearing serves as a mounting for the front end of the main drive shaft and rotates relative to the main drive shaft when the clutch pedal is depressed.

The bearing is of the pre-lubricated normal ball radial thrust type.

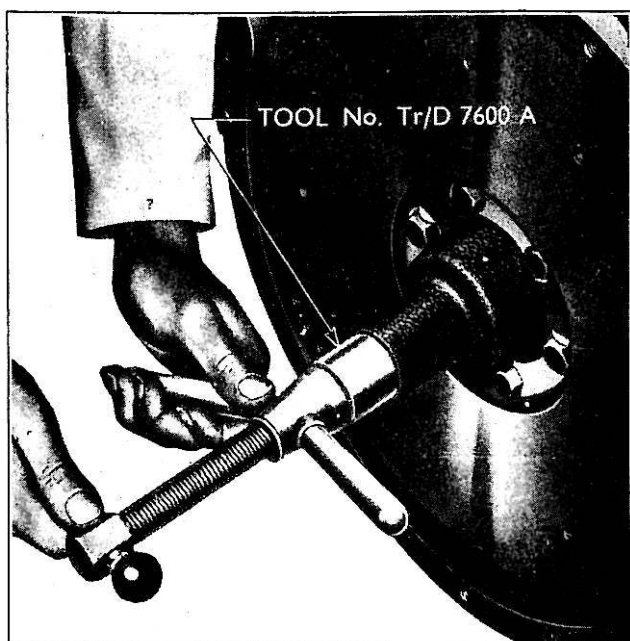


Fig. 150
Removing the Clutch Pilot Bearing

To Remove the Clutch Pilot Bearing

- 1 Separate the front axle and engine assembly from the front transmission as described on page 115.
- 2 Remove the clutch disc and pressure plate as described on page 120.
- 3 Withdraw the clutch pilot bearing from the flywheel, using the bearing remover tool No. Tr/D 7600-A, as shown in Fig. 150.

To Replace

- 1 Locate the new pilot bearing in its location (baffle face outwards) and tap into position using the clutch pilot bearing replacer, tool No. Tr2/D 7600-B, as shown in Fig. 151.
- 2 Refit the clutch disc and pressure plate and reconnect the front axle and engine assembly

To Remove Clutch Release Cross-shaft

- 1 Separate the front axle and engine assembly from the front transmission as described on page 115.
- 2 Unhook the clutch release bearing spring and remove the bearing.
- 3 Remove the split pins retaining the two clevis pins securing the clutch fork to the shaft. Withdraw both clevis pins.
- 4 Disconnect the clutch release rod at the front end. Remove the split pin retaining shaft collar clevis pin, withdraw the clevis pin and pull off the collar. Pull the cross-shaft out of the housing, supporting the clutch fork at the same time.
- 5 Remove the circlip at the outer end of the shaft, unscrew the clutch release arm clamp bolt and withdraw the arm from the shaft.

To Replace

- 1 Locate the release arm at the end of the cross-shaft, fit the retaining circlip at the outer end, and tighten the clamp bolt.
- 2 Position the large plain washer on the shaft and enter the assembly in the housing locating the clutch fork at the same time. Retain the shaft by means of the collar, clevis and split pin.
- 3 Fit the two fork retaining clevis pins and secure by means of split pins.
- 4 Mount the clutch release bearing and hub assembly and fit the spring. Reconnect the clutch release rod.
- 5 Reconnect the front axle and engine assembly to the front transmission as described on page 116 and adjust the clutch pedal free travel.

To Remove Clutch Pedal

- 1 Disconnect the fulcrum rod between the clutch balance lever and the clutch pedal.
- 2 Disconnect the left-hand side brake cable and remove the circlip at the outer end of the cross-shaft. Unscrew the brake lever clamp bolt, withdraw the lever and extract its key.
- 3 Disconnect the clutch pedal return spring and slide the pedal off the shaft. The bush may now be renewed if necessary.

To Replace

- 1 Locate the pedal on the cross-shaft and reconnect the return spring.
- 2 Place the brake lever key in the shaft, position the lever and tighten the clamp bolt. Refit the circlip and connect up the cable.
- 3 Connect the fulcrum rod between the clutch balance lever and the clutch pedal.

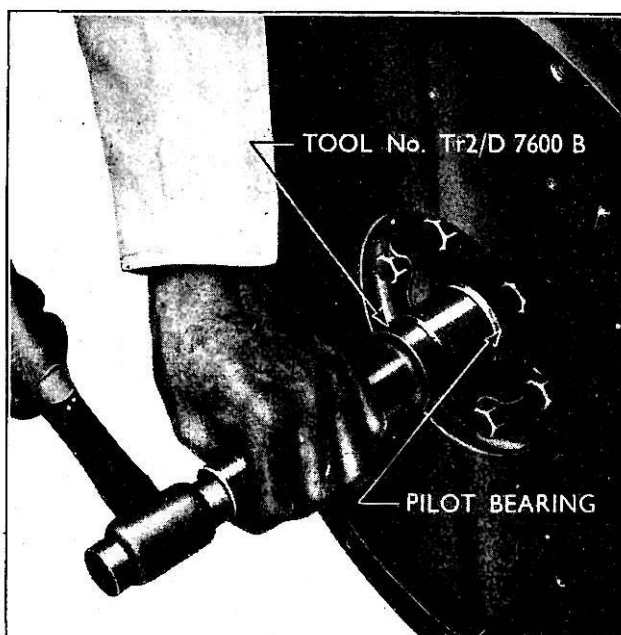


Fig. 151
Fitting the Clutch Pilot Bearing

HYDRAULIC AUTOMATIC CLUTCH RELEASE

The hydraulic automatic clutch release provides positive means of clutch disengagement under conditions of excessive resistance to the earth working parts of the implement. The unit, together with its upper link support bracket is completely interchangeable with the standard upper link and support bracket, and the method of attaching the implement to the tractor is in no way affected.

The hydraulic automatic clutch release consists of a cylinder, piston rod, piston and recuperation valve assembly, adjuster rod, adjuster piston and relief valve assembly.

The cylinder is sealed at both ends by synthetic rubber glands, and the piston is sealed to prevent oil from being forced past the piston into the reservoir, before sufficient pressure has built up to open the relief valve. The unit is completely self contained and has its own oil supply.

Operation of the Top Link

When the implement is in work, the resistance of the earth to the passage of the implement tends to rotate it about its lower link mounting pins. The top link, fitted between the rear of the tractor and the top of the implement opposes any tendency for rotation and is therefore permanently in compression when the implement is in work.

The hydraulic automatic clutch release takes the place of the standard top link, and when in the "Normal working position" position, oil between the piston head and the end of the cylinder is trapped by the relief valve as indicated by the dark shaded area in Fig. 152 "Normal working position."

When the earth working parts of the implement meet an obstruction, the compressive end loading on the top link will build up sufficient pressure in the oil at the front of the piston head to force the relief valve off its seat, and allow the oil to flow past the valve to the reservoir as indicated by the arrows in Fig. 152 "Clutch release". This will allow the cylinder to slide forward along the piston rod and operate the linkage to disengage the clutch.

When the tractor is brought to rest, and the implement lifted out of the ground clear of the obstruction, the weight of the implement will place the top link in tension. This will cause the cylinder to slide back along its piston, a depression will be created inside the cylinder which will draw the recuperation valves off their seats and allow oil to be drawn from the reservoir into the cylinder recharging it ready for the next operation, as illustrated in Fig. 152 "Recuperation."

Operation of the Linkage

As the cylinder moves forward, the buffer which is connected to the automatic clutch release by means of an attachment plate, is also moved forward (see Fig. 154).

This movement causes the cross-shaft to be rotated so moving the cam which is rivetted to the L.H. end of the shaft.

The cam bears against the outer spring loaded pawl of the release hand lever assembly, and as it is rotated it moves the release lever sector rearwards. The bell crank lever rod is moved rearwards in turn and the clutch is disengaged (see Fig. 153).

The clutch is retained in the disengaged position, by the spring loaded plunger on the inside of the release hand lever

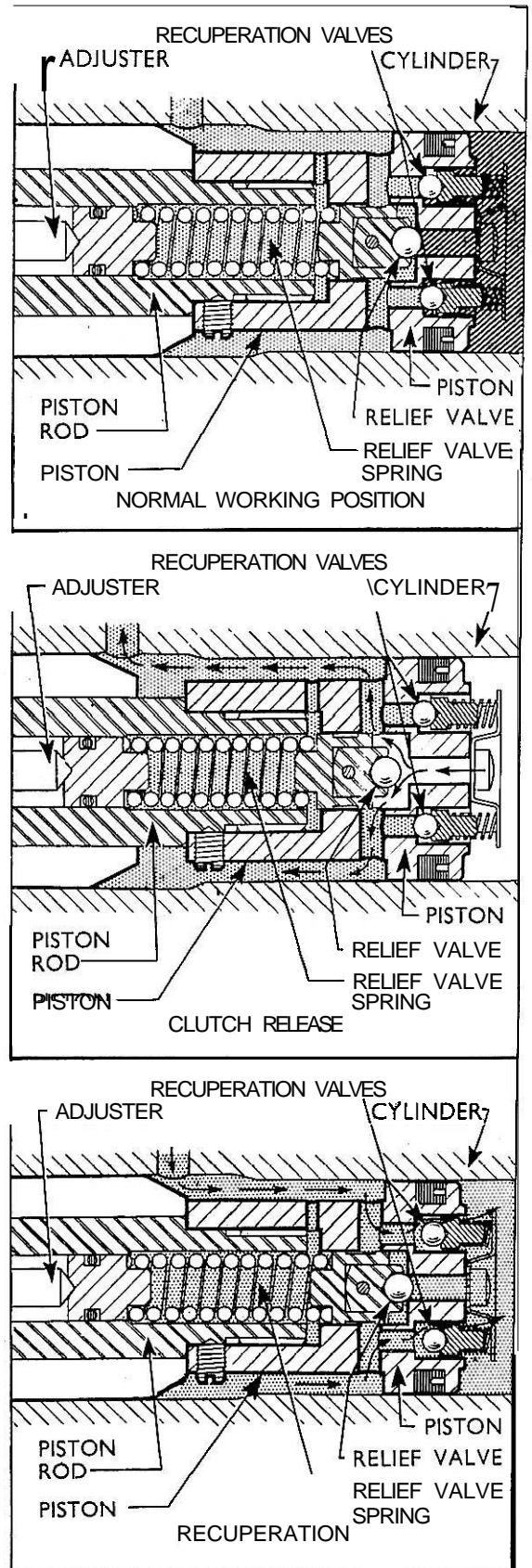


Fig. 152 Diagrammatic Representation of Operation of Top Link

engaging in the recess of the fixed cam on the upper link support bracket.

Note — In some instances on early units, a build up of tolerances on the release hand lever assembly and linkage gave rise to a condition where the clutch was not fully disengaged when the top link was under full compression. As a result, the compressive end loading applied to the piston rod by the tractor failing to stop was sufficient to bend the rod.

To overcome this condition in service approximately .125 ins. (3.175 mm.) of metal should be removed from the vertical face of the fixed cam (see Fig. 154).

Later units embody dimensional change to prevent this condition from arising.

When the tractor has been brought to rest after disengagement of the clutch the gear lever should be moved into the neutral position.

The clutch may be re-engaged by further depressing the clutch pedal, and by moving the release hand lever rearwards at the same time. The spring loaded plungers will be raised clear of the two cams allowing the clutch pedal linkage to become operative.

The obstruction should be cleared by reversing slowly, and raising the implement at the same time. When the implement has been completely or partially raised, its weight will cause extension of the top link, in which position it will be recuperated and re-set for further work. The release hand lever will be automatically returned to its normal position.

Adjustments

The only adjustment necessary to the automatic clutch release is setting the relief valve to provide a suitable breaking load for varying soil conditions in cultivating operations.

The relief valve is easily adjusted by removing the unit from the tractor.

Adjusting the Relief Valve

Line up the hole in the ball joint with the hole in the tractor end of the link. A screwdriver can now be inserted through these holes, and the relief valve adjusting rod can be screwed in or out as required.

The average setting of the adjusting rod from the fully tightened position for general conditions is as follows:—

Light work	7 to 9 turns
Heavy work	5 to 7 turns

The relief valve should be set to operate at a pressure slightly above that required to overcome normal resistance generated by the implement, taking into consideration the type of soil, depth of operation etc., otherwise extensive damage to the implement may result if obstructions are encountered.

If operating conditions are such that a setting above that for which the unit is already set is required, the adjusting rod may be screwed in a clockwise direction until the necessary breaking load is obtained.

For reducing the operating pressure the adjusting rod should be turned anti-clockwise.

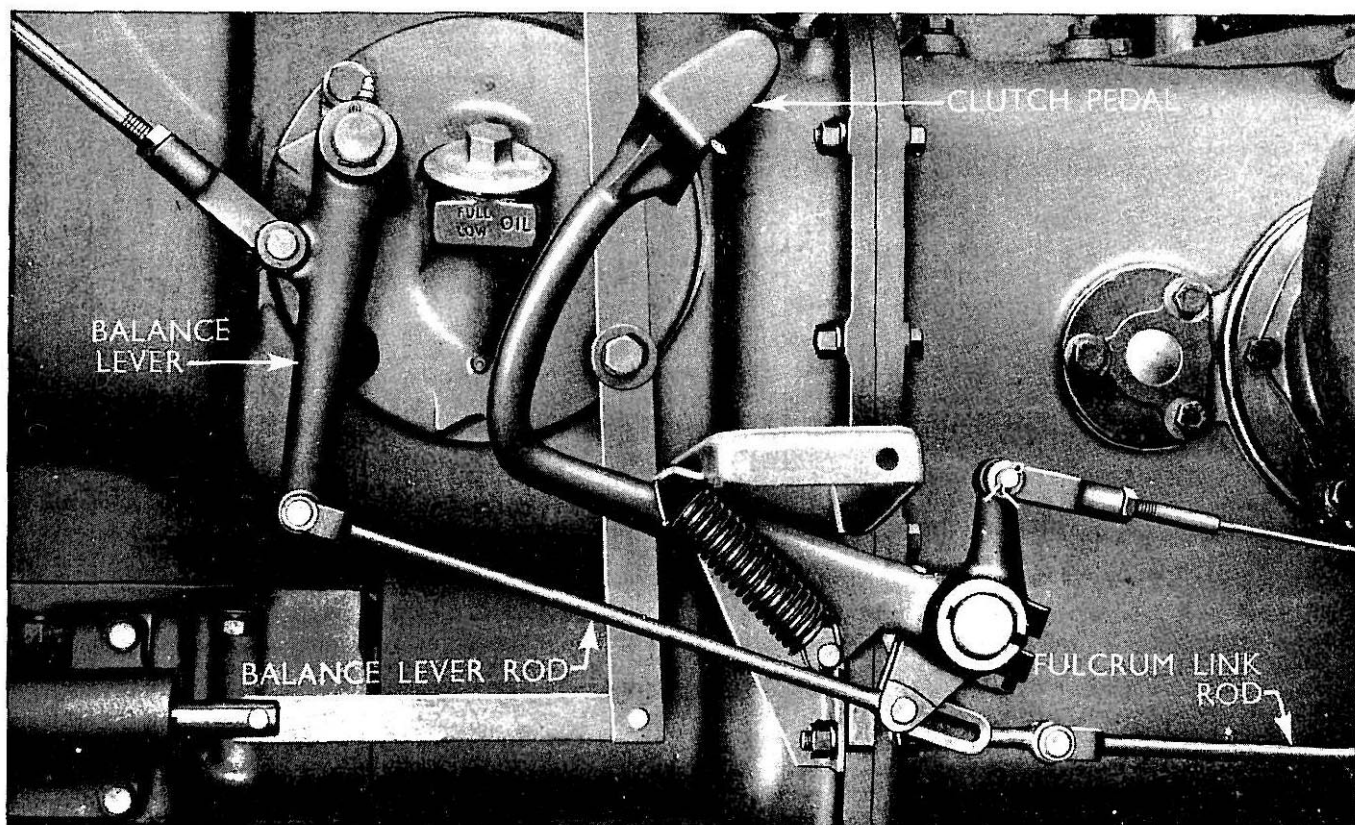


Fig. 153
Hydraulic Automatic Clutch Release Linkage

THE CLUTCH

Maintenance

The unit is **completely** self contained and does not require lubricating, as it operates in its own supply. The oil capacity is a half pint of hydraulic fluid (Part No. M-100502-C), and the **filler plug** and air bleed plugs are clearly illustrated in Fig. 155.

In the event of the unit operating, and so causing the clutch to be disengaged without obstructions being encountered, it may be due to insufficient oil, incorrect relief valve adjustment or air in the system. With the unit detached from the tractor or implement, it should not be possible to compress the link more than $\frac{1}{8}$ ins. (1.588 mm.) by hand. Any movement in excess of this indicates that the unit requires topping up or bleeding or both.

To Fill and **Bleed** the Unit

- 1 Screw the relief valve adjusting rod right in.
- 2 Loosen the air bleed plug
- 3 Completely compress the unit by hand
- 4 Tighten the air bleed plug.
- 5 Remove the oil filler plug and pour half a pint of hydraulic fluid (Part No. M-100502-c) slowly into the reservoir through the filler plug. Air will now be displaced from the oil ways and the unit should be rocked gently to assist displacing it. This is important.
- 5 Replace the filler plug and fibre washer loosely.
- 6 Tilt the unit approximately 30° with the air bleed plug uppermost.
- 7 Extend the unit so that the oil will be drawn from the reservoir into the space at the head of the piston.
- X Loosen the air bleed plug in the rear cover, and gently tap the piston rod to expel any air which will be in the system, and tighten the bleed plug.
- 9 Check the unit for compression by hand. If more than $\frac{1}{8}$ ins. (1.588 mm.) free movement of the rod is possible, the above procedure will have to be repeated. Do not at any time extend the unit whilst the bleed plug is loose.
- 10 With the link extended and placed in the horizontal position and the filler plug still loose, remove the oil level plug from the left-hand side of the cylinder, when the surplus oil will drain away. Tighten the oil level plug and filler plug securely.
- 11 Adjust the relief valve as described previously.

Installing the Hydraulic Automatic Clutch Release

When it is desired to install the hydraulic automatic clutch release on tractors not so equipped, the following procedure should be adopted.

- 1 Remove the existing upper link support bracket and install the new upper link support bracket assembly (see Fig. 154). This assembly is secured to the rear transmission housing by the same four bolts and washers.
- 2 Attach the buffer to the legs of the cross-shaft, and secure by means of a clevis pin and split pin at each side.

- 3 Remove the existing clutch pedal to balance lever rod.
- 4 Replace with the slotted rod and fulcrum link, so that the slot in the rod end fits into the forked end of the clutch pedal (see Fig. 153).
- 5 Remove the two lower front bolts from the nearside axle shaft housing, and fit the bell crank lever bracket; retain with two $\frac{9}{16}$ ins. (14.29 mm.) by $2\frac{1}{4}$ ins. (57.15 mm.) bolts and spring washers.
- 6 Connect the bell crank lever to its bracket, and retain with a clevis pin and split pin. The hole for the adjustable bell crank lever to sector rod must be to the rear.
- 7 Fit the non-adjustable fulcrum link rod between the bell crank lever and the fulcrum link. The slotted end of the rod fits in the forked end of the bell crank lever.
- 8 Fit the long adjustable bell crank lever to sector rod to the bell crank lever but do not connect the adjustable clevis to the sector at this point.
- 9 Push the release hand lever forward as far as possible
- 10 Pull the buffer rearwards, avoiding the bell crank lever rod clevis, thus rotating the cross-shaft away from the tractor.
- 11 Place the hydraulic clutch release in its location in the upper link support bracket, fit the retaining pin and linch pin. Secure the unit to the buffer by means of the attachment plate, securely tightening the attachment plate bolt.
- 12 Pull the release hand lever assembly to the rear, so that the inside spring loaded plunger is on top of the inside cam, and the outside plunger is abutting the outside cam.
- 13 Adjust the clevis end of the bell crank lever rod so that the holes just line up with the hole in the sector. Insert the clevis pin and secure it with a split pin.

Note:

On no account pull the rod to the sector to fit the clevis **pin**.

The automatic clutch release and linkage assembly is now ready for work.

To Remove the Assembly

- 1 Disconnect the bell crank lever rod at the sector
- 2 Remove the attachment plate from the upper link
- 3 Remove the linch pin and link retaining pin, and remove the upper link.
- 4 Remove the four bolts and the upper link support bracket assembly from the rear transmission housing.

To Replace the Assembly

- 1 Fit the upper link support bracket assembly and secure to the rear transmission housing with four bolts and spring washers.
- 2 Push the release hand lever forward as far as possible.
- 3 Pull the buffer rearwards avoiding the bell crank lever rod clevis thus rotating the cross-shaft away from the tractor.

- 4 Place the automatic clutch release unit in its location in the upper link support bracket. Fit the retaining pin and lynch pin and secure the unit to the buffer by means of the attachment plate, securely tightening the attachment plate bolt.
- 5 Ensure that the clutch is engaged, and then move the release hand lever rearwards until the outside spring loaded plunger is abutting the outside cam, and the inner plunger is on top of the inside cam.
- 6 Adjust the clevis of the bell crank lever rod so that the holes line up with the hole in the release hand lever sector. Insert the clevis pin through the rod and sector, and secure with a split pin.

To Dismantle the Upper Link

- 1 Remove the unit from the tractor, extract the six bolts securing the top cover and remove the cover together with its gasket.
- 2 Remove the spring and baffle plate.
- 3 Drain the oil from the reservoir into a suitable container.
- 4 Remove the four bolts securing the rear cover, remove the cover and allow the oil in the cylinder to drain into a container.
- 5 Remove the four bolts which retain the piston rod seal housing to the cylinder, and withdraw the piston rod and piston assembly together with the seal housing.
- 6 Remove the grub screw which locks the piston assembly to the piston rod.
- 7 Unscrew the piston assembly from the rod, taking care not to lose the relief valve assembly which is loosely located in the bore at the rear of the piston. Remove the piston seal.
- 8 The piston rod seal housing can now be pressed off the piston rod by hand, and the seal removed.
- 9 Remove the relief valve spring from the bore in the piston rod. If it is required to remove the adjuster rod and piston, proceed as follows:—
- 10 Line up the hole in the ball joint with the axial hole in the end of the upper link. Insert a screwdriver through the aligned holes and turn the adjuster anti-clockwise to remove it.
- 11 To remove the adjuster piston, it will be necessary to insert a brass or copper drift through the holes and gently tap out the piston. Damage to the bore will affect the range of relief valve adjustment and therefore the above operation requires care.
- 12 Extract the two recuperation valve plate retaining

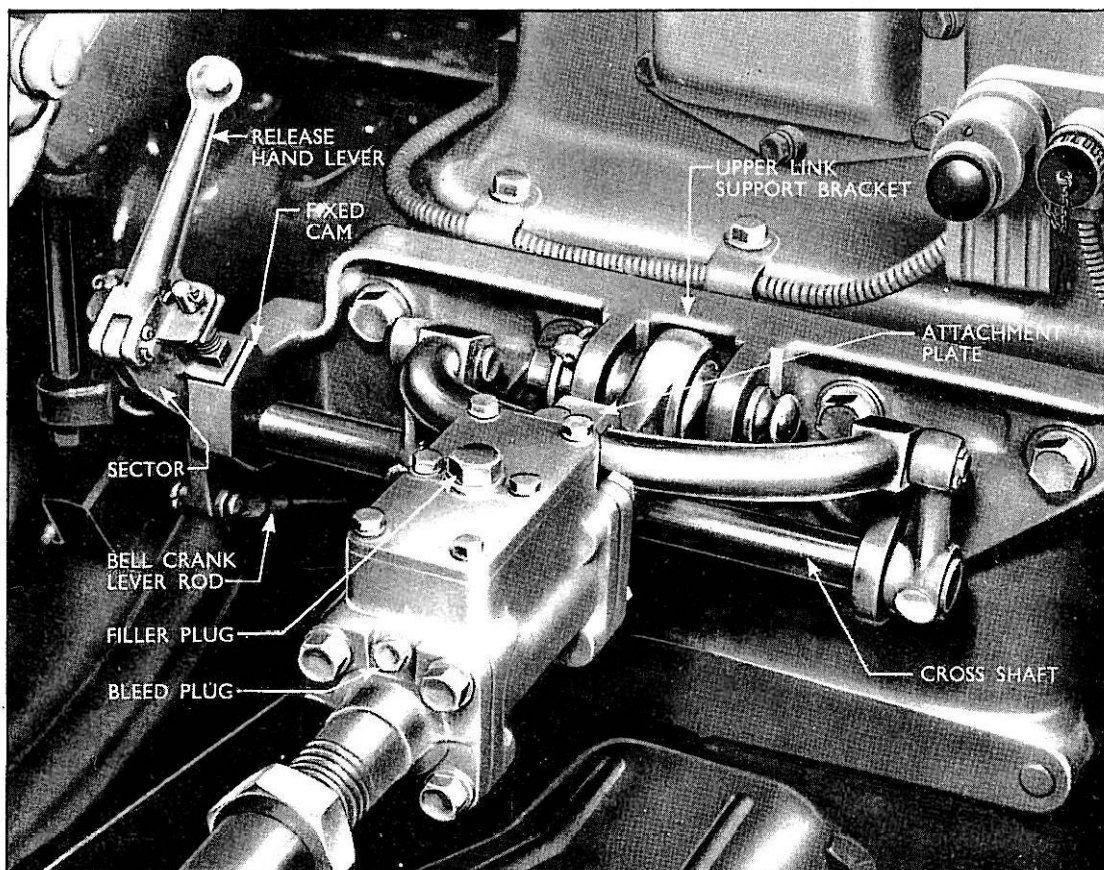


Fig. 154
Hydraulic Automatic Clutch Release

screws and remove the plate, coil springs, valve cages and ball valves.

To Re-assemble the Upper Link

Before re-assembling, the cylinder and components should be thoroughly cleaned and all oilseals renewed.

All rubber seals, bores and counter-bores for seals should be smeared with a thin grease before assembling.

- 1 Place the recuperation valve balls in their location in the front face of the piston.
- 2 Fit the recuperation valve cages with the recessed face to the balls.
- 3 Re-fit the recuperation valve coil springs which locate over the stems of the cages and retain the assembly with the recuperation valve plate and screws.

No adjustment is required for this type of assembly. If, however, the original type valve spring and plate is fitted, it must be fitted so that with the spring just touching the tips of the cages, and the plate secured in place by the screws, the gap between the end of the spring and plate is between 0.060 ins. (1.52 mm.) and 0.090 ins. (2.29 mm.).

Note:

The latest type recuperation valve assembly improves the recuperation process, and is designed so that the valve cages, coil springs and retaining plate can be used to replace the previous type assembly if

necessary. There are no dimensional changes to the valve balls.

- 4 Place the relief valve assembly in the bore at the rear of the piston, tapping lightly to ensure that the valve is seating correctly.
- 5 Fit a new oilseal in the piston rod seal housing so that the lip seal faces towards the cylinder and press the housing by hand on to the piston rod.
- 6 Fit a new seal to the adjuster piston and assemble it into the piston rod with the spring locating spigot facing outwards.
- 7 Insert the relief valve spring and fill the spring recess with the correct operating oil.
- 8 Screw the piston assembly on to the rod, ensuring that the spring locates over the spigot ends of the relief valve and adjuster piston.
- 9 When the piston has been screwed home fully, line up the indentation in the shoulder of the piston rod with the tapped hole in the piston, and lock by means of a grub screw.
- 10 Fit a new seal in the recess in the piston with the lip facing towards the recuperation valve assembly. Fit a new oil sealing ring into the counterbore at the piston rod housing end of the cylinder and introduce the piston seal housing and piston rod assembly into the cylinder, taking care to avoid damaging the piston seal.

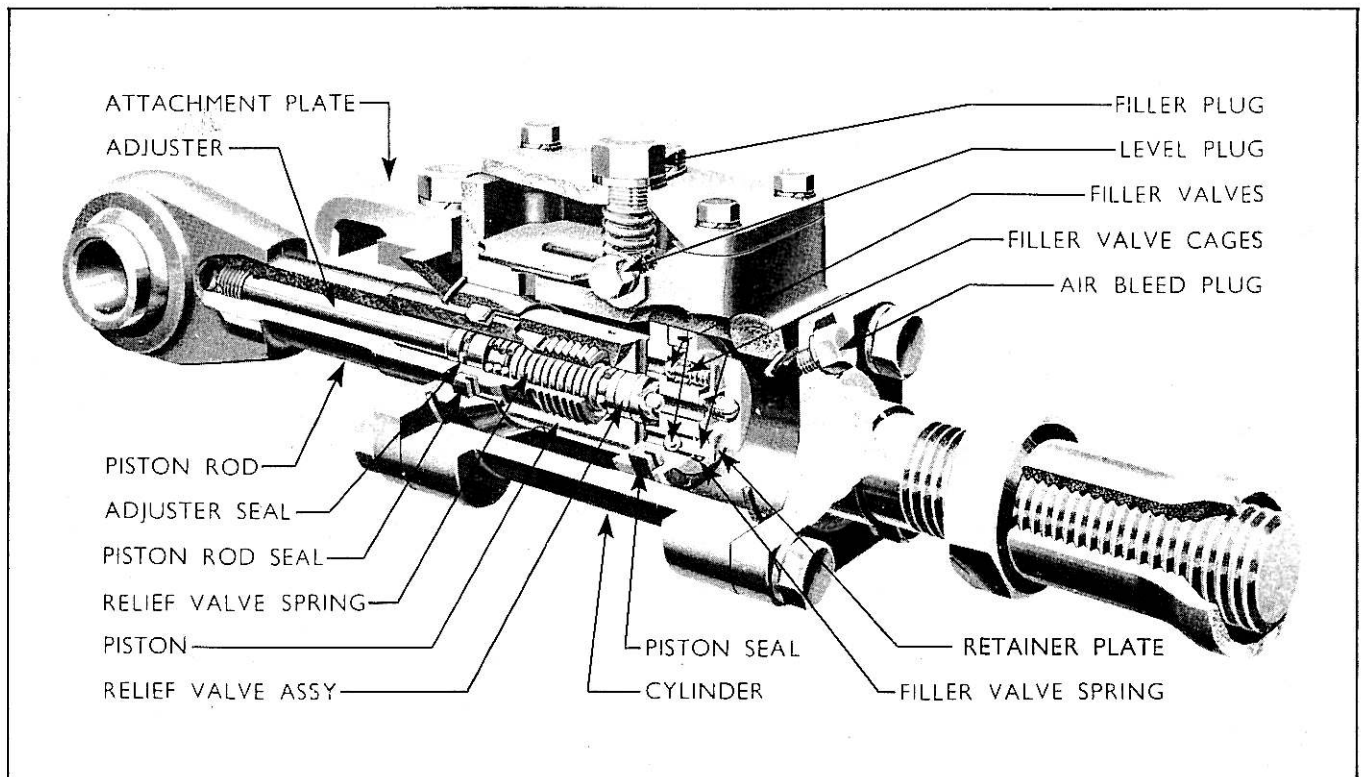
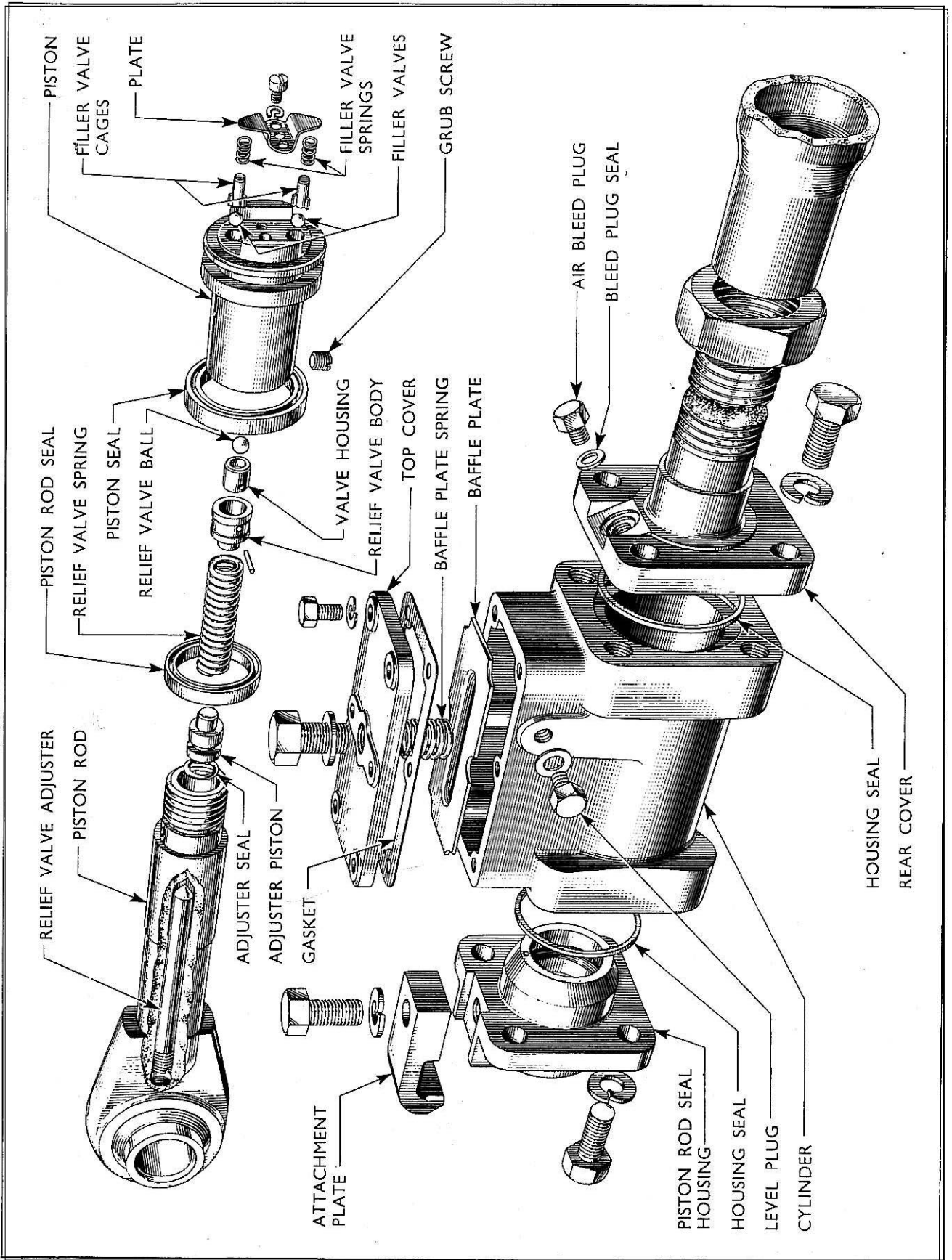


Fig. 155
Sectioned View of Hydraulic Automatic Clutch Release



Exploded View of Hydraulic Automatic Clutch Release

Fig. 156

THE CLUTCH

- 11 Replace the four bolts and washers in the piston seal housing and tighten fully.
 - 12 Fit a new oil sealing ring into the counter-bore at the rear of the cylinder and replace the rear cover plate and retaining bolts.
 - 13 Fit the baffle plate and spring, and replace the top cover gasket. Re-fit the top cover and secure by six bolts.
 - 14 Fill the unit with the correct grade of oil.
 - 15 Fit the adjusting rod and screw it right in. (This will expel all air from behind the piston.)
 16. Bleed the unit.
 - 17 Adjust the relief valve breaking load and replace the unit on the tractor.
-

FRONT TRANSMISSION—GEARBOX

The front transmission-gearbox has six forward and two reverse speeds, controlled by a main and primary gear levers.

The main gear lever selects three forward and one reverse gear positions and the primary gear lever provides high or low gear ratios (see Figs. 157, 158 and 159). The gear lever positions are cast on the front of the rear transmission cover.

The drive is taken from the engine, via the clutch, to the main drive shaft and transmitted through the primary gearbox to the main gearbox, which is connected to the rear axle by the transmission drive pinion. A power take-off shaft (optional equipment), independently controlled by a hand lever, is driven from the combined lower shaft and power

take-off gear. The hydraulic pump, when fitted, is driven by a gear located at the rear of the power take-off extension shaft.

A raised power take-off is available as an accessory and can be fitted to the standard power take-off to take care of certain operating conditions requiring the power take-off to be at a greater height than the standard fitment. (See "Power Take-Off Equipment" section.)

A two-speed belt pulley (additional equipment) is located at the right-hand side of the front transmission housing and is driven by the pulley drive bevel gear. The full details of gearbox overall ratio, road speeds and all relative data are shown in tabulated form overleaf.

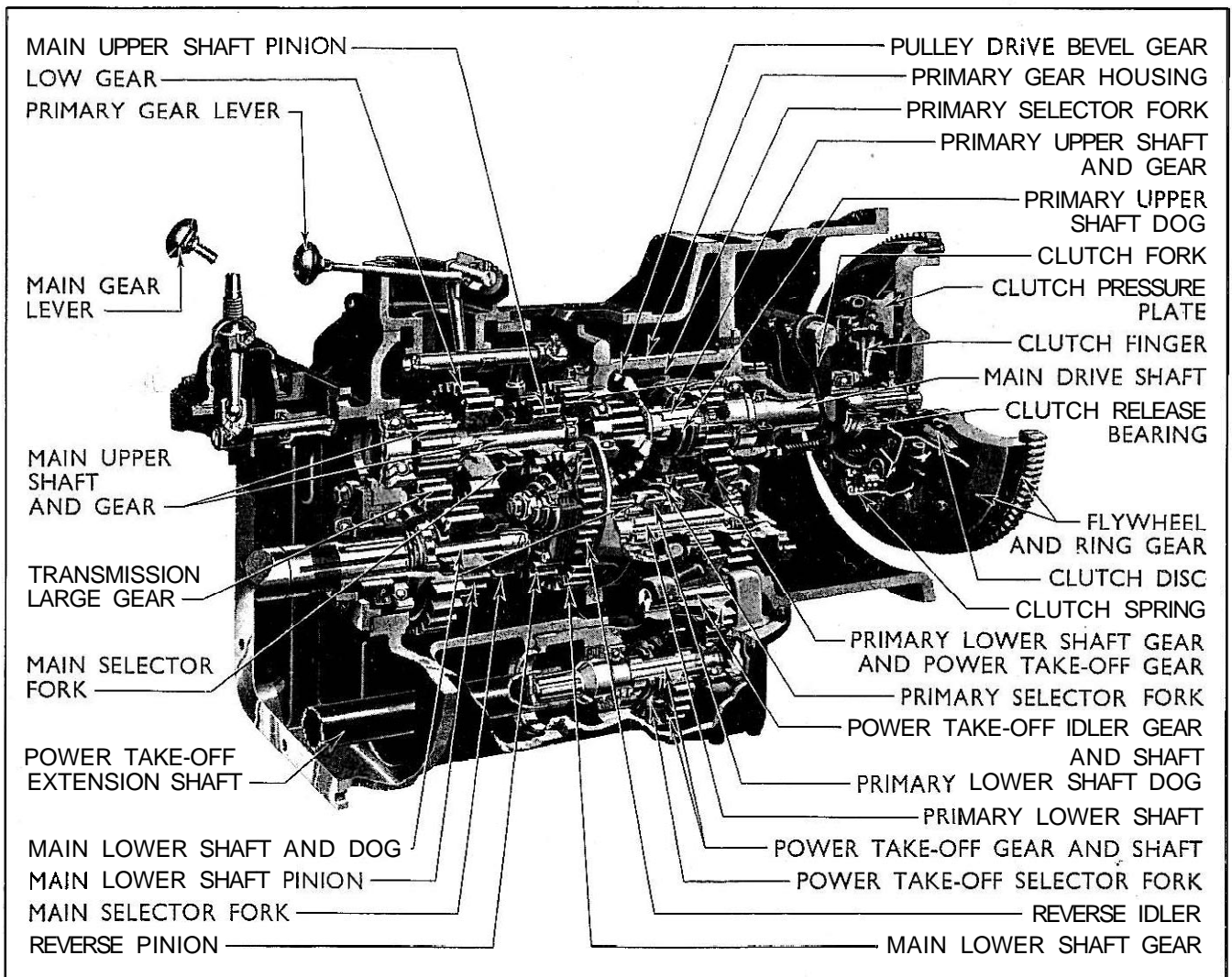


Fig. 157

Sectioned View of Front Transmission—Gearbox

	RATIO		ROAD SPEEDS						
	Gearbox	Overall	800 R.P.M.		1,200 R.P.M.		1,600 R.P.M.		
			Tyre Size		Tyre Size		Tyre Size		
			11—36 & 14—30	11—38	11—36 & 14—30	11—38	11—36 & 14—30	11—38	
		M.P.H.	M.P.H.	M.P.H.	M.P.H.	M.P.H.	M.P.H.	M.P.H.	
1st Gear	6.62	123.0	1.04	1.08	1.56	1.61	2.07	2.15	
2nd Gear	4.7	87.3	1.46	1.52	2.19	2.27	2.92	3.03	
3rd Gear	3.68	68.4	1.86	1.93	2.80	2.90	3.73	3.87	
4th Gear	2.615	48.6	2.63	2.72	3.94	4.09	5.25	5.45	
5th Gear	1.875	34.8	3.66	3.80	5.49	5.70	7.32	7.60	
6th Gear	1.043	19.3	6.58	6.85	9.87	10.2	13.16	13.7	
Low Reverse	4.91	91.0	1.40	1.45	2.10	2.18	2.80	2.9	
High Reverse	2.73	50.7	2.52	2.61	3.77	3.92	5.03	5.22,	
Belt Pulley	Pulley speed at 1,400 R.P.M.—High speed 1,400 R.P.M. Low speed 779 R.P.M. Pulley diameter 84 ins.								
Power Take-Off	Direction of Rotation—Clockwise. 722 R.P.M. at 1,600 engine R.P.M.		Shaft diameter—Rear End 1 ³ / ₈ ins. 6-spline (B.S.I. & S.A.E. Standards).						
Raised Power Take-Off	Direction of Rotation—Clockwise. 540 R.P.M. at 1,600 engine R.P.M.								
GEARS AND SHAFTS (All Models)									
Description	Part No.	Identification	End-float						
Primary lower shaft gear and power take-off gear	E1ADKN-77102	22 ext. teeth 30 ext. teeth 6 splines	—						
Main drive shaft and dog	E1ADKN-7017	16 ext. teeth 8 dog teeth	—						
Pulley drive bevel gear	E1ADKN-7018	21 teeth 10 splines	—						
Transmission large gear	E1ADKN-7150	20 int. teeth 34 ext. teeth 10 splines	—						
Main lower shaft and dog	E1ADKN-7111	8 dog teeth 10 splines and 6 splines	0.010" —0.043"						
Main lower shaft gear	E1ADKN-77103	17 int. teeth 24 ext. teeth 10 splines	—						
Primary upper shaft and gear	E1ADKN-7024	17 int. teeth 23 ext. teeth 10 splines	—						
Primary lower shaft	E1ADKN-77112	6 splines	0.010" —0.050"						
Reverse pinion	E1ADKN-7124	17 teeth	—						
Main upper shaft and gear	E1ADKN-7059	13 teeth	0.0102" —0.0352"						
Low gear	E1ADKN-7114	13 int. teeth 27 ext. teeth	—						
Main upper shaft pinion	E1ADKN-7103	17 teeth	—						
Primary upper shaft dog	E1ADKN-77105	8 dog teeth 6 splines	0.010" —0.047"						
Main lower shaft pinion	E1ADKN-7113	20 teeth	—						
Reverse idler	N-7141-E	20 teeth	—						

Fig. 158 Gearbox Data

GEARBOX ADJUSTMENTS

Shaft end-float adjustments are taken care of in design by manufacturing tolerances and, provided that the outlined assembling procedure is followed, the correct working clearances will be established.

PRIMARY GEAR LEVER

Removing and Dismantling the Primary Gear Lever

- 1 Remove the engine bonnet, steering wheel, oil pressure gauge pipe, stop control cable (Diesel only) and instrument box (place the latter to one side). Disconnect the radiator shutter control.
- 2 Disconnect the leak-off pipe and main fuel supply from the fuel tank. Next remove the fuel tank and front support bracket. (Four bolts secure front bracket and two at the rear.)
- 3 Remove the steering column (see "Steering Gear" section) and then unscrew the four bolts securing the primary gear lever assembly to the front transmission housing, turn the gear lever assembly to the rear and tilt it over as it is withdrawn.

Note — The fuel tank rear mounting bracket forms part of this assembly.

- 4 Extract the rivet retaining the selector lever and withdraw the lever, shaft and fork. Remove the oil seal.

Reassembling the Primary Gear Lever

- 1 Fit a new oil seal and position the shaft, fork and gear lever in the housing and rivet the lever securely to the shaft.
 - 2 Mount the gear lever assembly in position ensuring the end of the connector enters its location in the lower shaft, tighten up the four bolts.
- Note — The correct location of the end of the gear connector can be observed through the steering gear mounting hole.
- 3 Refit the steering gear assembly, fuel-tank front support bracket (four bolts at front, two at rear: nearside bolt is gearbox breather), governor control bracket, starter control lever, fuel tank and the control box.
 - 4 Reconnect stop control cable, starter control, shutter control, oil pressure gauge pipe, fuel leak-off and main supply pipes.
 - 5 Refit the steering wheel and engine bonnet.

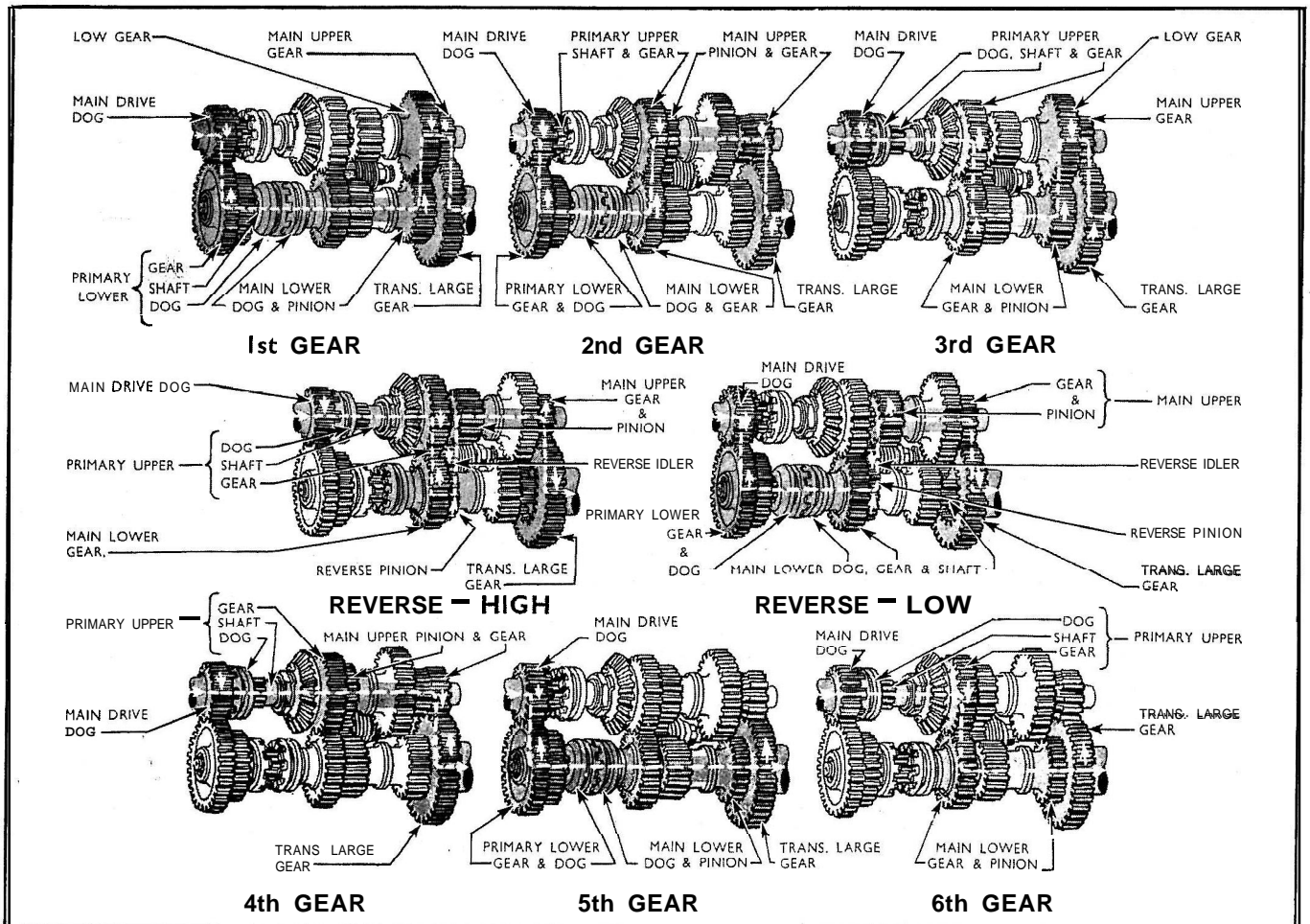


Fig. 159
Gear Positions

MAIN GEAR LEVER

Removing and Dismantling Main Gear Lever

- 1 Remove the four bolts retaining the main gear lever assembly to the housing.

Note — One of these bolts retains the wiring loom clip in position.?

Lift out gear lever assembly.

- 2 Unscrew the knob, remove the snap ring and lift off the spring and cap.
- 3 Remove the screw retaining the lever in the housing and separate the two parts.

Reassembling the Main Gear Lever

- 1 Install the lever in the housing and securely tighten the retaining screw.
- 2 Mount the cap and spring in position and fit the snap ring.
- 3 Fit the assembly, and a new gasket, to the front transmission housing. The rear right-hand bolt also retains the wiring loom clip.

SELECTOR HOUSING AND CLUTCH BALANCE LEVER

- 1 Disconnect the operating rods and remove the selector fork plate (left-hand side of housing) four bolts.
- 2 Remove the clutch fulcrum lever after extracting the split pin.

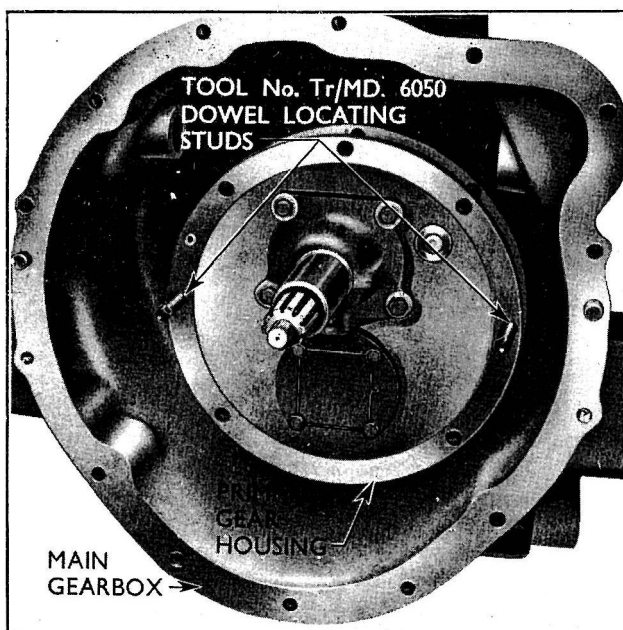


Fig. 160
Removing the Primary Gearbox

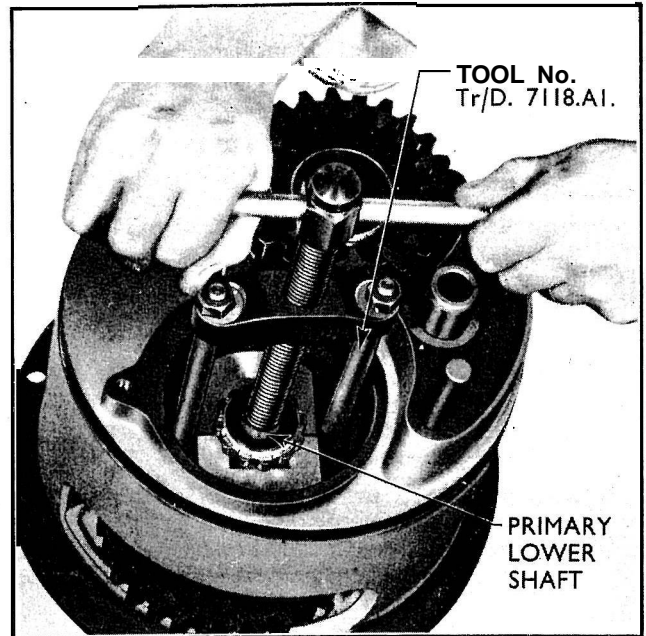


Fig. 161
Removing the Primary Lower Shaft Bearing

- 3 Remove the fork retaining rivets and extract the top shaft by tapping from the loose plunger end. Remove the loose plunger, then the two spring-loaded plungers and their springs.
- 4 Tap the lower selector shaft out of the housing and fork.

Reassembling the Clutch Balance Lever and Selector Fork Plate

- 1 Refit the lower selector shaft and fork in position.
- Note — This fork is identified by the short stalk and is fitted with the end of the shaft with three indentations at the spring-loaded plunger end upwards.
- 2 Rivet the fork to the shaft (rivet head uppermost).
 - 3 Insert the loose plunger, spring-loaded plungers and their springs.
 - 4 Refit the upper shaft and fork (the three indentations at the spring-loaded plunger end downwards). Rivet in position (head uppermost).
 - 5 Refit the selector fork plate to the housing (four bolts and lockwashers) and install the clutch fulcrum lever, secure with a new split pin.

PRIMARY AND MAIN GEARBOX

Note — The operations covering "Separating the engine from the front transmission—gearbox and the rear transmission from the front transmission," are fully covered in the appropriate section on pages 115 to 118. The following operations give the subsequent sequence after the front transmission has been separated from the tractor.

Removing the Primary Gearbox

- 1 Separate the front transmission from the engine or the rear transmission as desired. Refer to pages 115 to 118 for full details.

For details of the correct sequence for dismantling and reassembly of the power-take off assemblies, refer to the "Power Equipment" section.

- 4 Unscrew the seven wire-locked securing bolts, fit two locating studs Tr/MD 6050 at the right- and left-hand centre bolt holes and then ease the primary gearbox out of the main housing (see Fig. 160).

Note — The box is spigotted and dowelled.

To Dismantle the Primary Gearbox

Note — *All* bearings and cups must be kept in original pairs.

- 1 Withdraw the main drive shaft, oil seal retainer and bearing out of the housing after removing the wire-locked bolts (the bearing is a sliding fit in the housing).
- 2 Remove the circlip and press the bearing off the main drive shaft, using tool No. Tr/D 7006, then remove the cup from the dog gear of the main drive shaft.
- 3 Remove the split pin and unscrew the transmission brake adjusting nut, lift off the brake springs and brake plates, then remove the reverseidler gear and withdraw the shaft. If a transmission brake is not fitted the reverse idler is secured by a bolt and two retainers.
- 4 Slide the lower drive pinion and reverse pinion from the main lower shaft after removing the small bearing from the rear of the shaft, using tool No. Tr/D 7006.
- 5 Remove the upper and lower shaft bearing locking plates after cutting the locking wire and unscrewing the bolts. (These plates are not interchangeable.)
- 6 Lift the main lower shaft, gear and bearing from the gearbox and dismantle further by removing the gear retaining circlip. Press the shaft out of the gear and bearing, using tool No. Tr/D 7006. Reverse the tool adaptor and press the bearing off the gear. The cup can then be removed from the main lower shaft dog.
- 7 Remove the primary lower shaft, lower shaft gear and power take-off drive gear, after withdrawing the small bearing from the end of the shaft, using tool No. Tr/D 7118-A1. Split adaptors fit behind the bearing as shown in Fig. 161.
- 8 Remove the end plate (four bolts) and locate the hollow tool (Tr/D 77105) to the dog gear and the drive shaft into the hollow portion of the tool. (See Fig. 162.) Move the dog gear along the splines to facilitate lifting out the primary lower shaft and power take-off gear. (The dog gear is left in the position in the selector fork.) Remove the shaft.

- 9 Push the large bearing out of the housing.
- 10 The primary upper shaft and gear, dog gear and bevel gear can now be withdrawn after removal of the circlip from the groove in the housing and withdraw the small bearing from the end of the shaft. (Tool No. Tr/D 7118-A1.)
- 11 Straighten the tab of the bevel gear lockwasher, engage the tool Tr/D 77105 in the dog gear teeth and unscrew the bevel gear nut.

Support the bevel gear, lift out the upper shaft and gear, nut, lockwasher and dog gear. Remove the bearing from the gear using tool No. Tr/D 7006. To facilitate removing the cup from the inside of the gear, two holes are provided in the shaft gear so that a suitable tool may be inserted and the cup driven out.

- 12 The selector shaft, selector fork and lower shaft dog gear may now be removed after cutting the locking wire and removing the retaining screw. Place a cloth over the selector ball passage as the shaft is withdrawn to retain the ball and spring.
- 13 Remove the welsh plug from the end of the shaft housing.

Reassembly of Primary Gearbox

- 1 Locate the selector fork (locking screw towards the front) and selector shaft dog (teeth to gearbox). Enter the spring and ball, using a tapered pilot and move the shaft into position, tighten and lock the screw with wire, then refit the welsh plug.

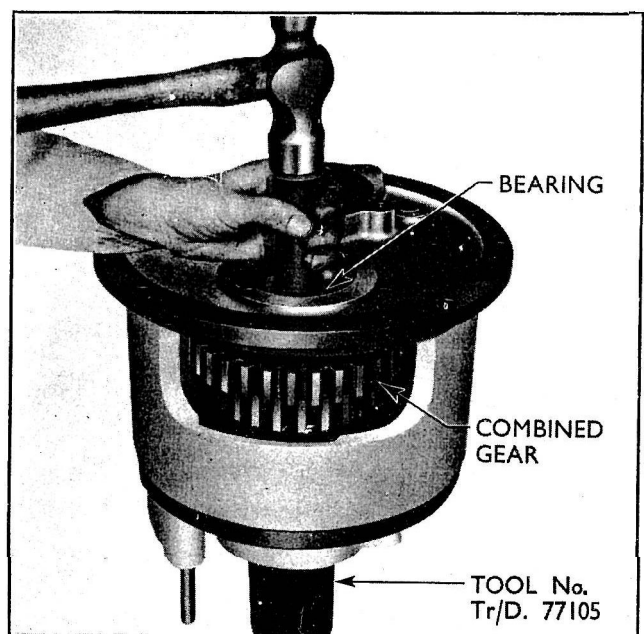


Fig. 162

Removing the Primary Lower Shaft

- 2 To assemble the primary upper shaft and gear, dog gear and bevel gear, fit the dummy end plate (Tr/D 77012) in the front face to stabilise the housing during assembly, then move the selector shaft downwards and locate the dog gear in the fork (teeth downwards). Position the nut, lockwasher and bevel gear on top of the dog gear then press the bearing on to the primary upper shaft, and enter the primary shaft, gear and bearing into the bevel gear and dog gear splines, then gently tap into position. Tighten up and lock the bevel gear nut, using tools Tr/D 77025 and Tr/D 77105.
- 3 To refit the primary lower shaft and lower shaft gear and power take-off gear, first enter the large bearing at the front of the box and refit the dummy end plate. Ensure the circlip is fitted in the lower shaft gear and power take-off gear, lift the selector dog and place the gear in position (shoulder towards bearing).

Tap the smaller roller bearing on to the lower shaft and pass the shaft through the dog gear and lower shaft gear and power take-off splines. Drive into position (shaft against surface of dummy end plate).

- 4 The reassembly of the main drive shaft, reverse pinion and lower shaft pinion is most conveniently carried out before fitting into the gearbox. Locate the large bearing on the lower shaft, pass the gear (shoulder first) along the gear to engage the larger splines. (See Fig. 163.) Place this assembly in tool No. Tr/D 7006 and press the shaft through the gear. As it moves through, locate the bearing on the gear shoulder. Fit the circlip behind the gear and remove the assembly from the tool.

Locate the reverse pinion and lower shaft pinion (selector fork flanges together) fit the small roller

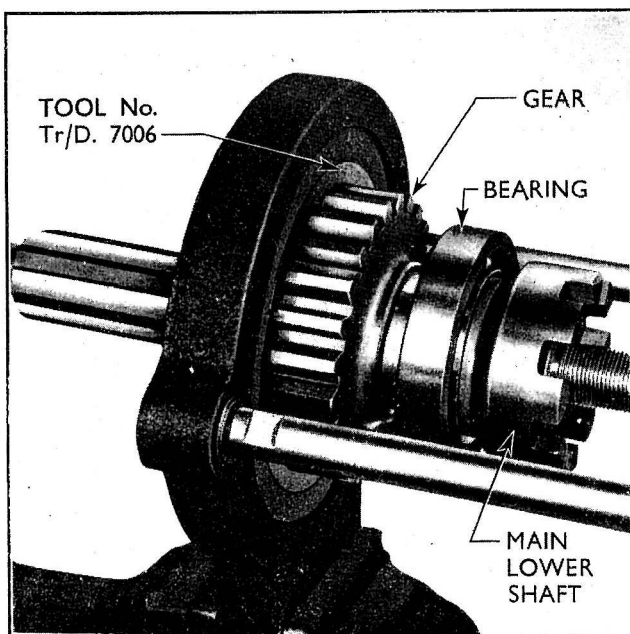


Fig. 163
Fitting the Main Lower Shaft, Gear and Bearing

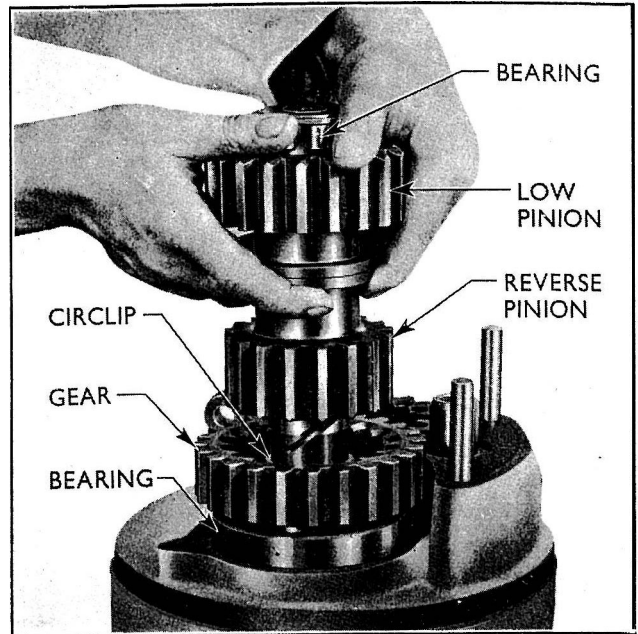


Fig. 164
Installing the Main Lower Shaft, Gears and Bearings

bearing on the end of the shaft and place the assembly in position in the housing. (See Fig. 164.) *If slight pressure is required to seat the large bearing in the housing, it must be applied to the **main lower shaft gear** and not the end of the shaft, otherwise the circlip will be damaged.*

- 5 Refit the lower shaft and upper shaft bearing locking plates. (Two bolts each with heads wired together through the centre holes in the plate.)
- 6 Pass the transmission brake and reverse idler shaft through its location in the housing and fit one stationary plate, reverse idler (recess towards the housing) and then alternate with first a stationary plate and then a revolving plate.

Note — Six stationary and five revolving plates are fitted.

Locate the small spring on the shaft, fit the retainer plate, coil spring and locknut. To correctly adjust the brake the measurement from the head of the nut to the inner face of the primary gearbox housing flange must be between 13.870 ins. and 13.895 ins. Do not forget to fit a new split pin.

If a transmission brake assembly is not fitted the reverse idler gear is secured by a bolt, two retainers and a self-locking nut. The retainers are fitted with the shoulders located in the ends of the tubular shaft. Tighten the self-locking nut thoroughly and check that there is 0.010 in. to 0.025 in. (.254 to .508 mm.) endfloat between the retainer and the hub of the reverse idler gear. If not satisfactory press the shaft in, or out, to obtain the desired endfloat.

Remove the dummy end plate (Tr/D 77012) and fit the original plate and gasket. (Four bolts and locking wire.)

- 8 Position the small roller on the spigot of B e primary upper shaft and locate the circlip in the inner groove in the primary gearbox. Next, fit the main drive shaft and oil seal retainer.

Press the bearing on the main shaft (tool No. Tr/D 7006) and fit the circlip. Check that the bearing cup is fitted in the end of the main drive shaft gear and engage the shaft to the primary upper shaft dog.

Fit a new oil seal in the retainer (lip towards gearbox) using the tool No. Tr/D 7052-B, locate the retainer and gasket (clutch spring lug to bottom), four bolts and locking wire.

To Dismantle the Main Gearbox

Note — All bearings and cups must be kept in original pairs.

- 1 Withdraw the clutch shaft, and remove the primary gearbox as described on page 133.)
- 2 Position the transmission hand brake cam suitably to remove the transmission large gear and the main upper shaft gears by withdrawing the split pin, bolt and locking tab from the retaining nut, then unscrew the large gear retaining nut and withdraw the locking washer and sleeve.

Remove the oil seal retainer bolts (four) and screw the four legs of the tool Tr/MD 7150-A, in the holes. Tighten up the centre screw to push the transmission large gear half way out of the housing. (See Fig. 165.)

Note — Do not use shock methods to remove this gear, otherwise it will burr over the end.

- 3 Lift out the main upper shaft, gear and shaft pinion, then continue applying pressure to the centre screw to complete the removal of the large gear. Remove the retainer and oil seal, oil baffle and large bearing. Remove the cup if necessary, also the welsh plug from the large gear.

Remove the small bearing from the end of the upper shaft, using tool No. Tr/D 7118-A1, slide the low gear and shaft pinion off the shaft. Withdraw the large bearing from the shaft, using tool No. Tr/D 7006.

- 4 Remove the main gear selector shaft and oil seal by unscrewing and removing the retaining screw, then slide the shaft and socket out to the rear and withdraw the oil seal.
- 5 If necessary to remove the transmission hand brake and shaft, drill out the rivet and withdraw the shaft.

To Reassemble the Main Gearbox

- 1 Fit the selector shaft oil seal lip to gearbox, then enter the gearbox selector shaft and socket into position. Lock the retainer screw with a wire then fit the selector fork and lock the retainer screw with wire.

- 2 If the transmission hand brake lever and shaft has been removed refit in position and rivet securely.
- 3 Refit the transmission large gear and main upper shaft and gear. Locate the transmission large gear bearing, oil baffle and new oil seal and retainer and secure with four bolts, then drive the transmission large gear half-way into the bearing, using tool No. Tr/MD 7150-B. Ensure that transmission hand brake lever cam is positioned to provide clearance.
- 4 Press the large bearing onto the rear of the main upper shaft, using tool No. Tr/D 7006, then slide on the low gear and upper shaft pinion (selector flanges together) and drive the small roller bearing on the front end of the shaft, then enter this assembly into position in the housing.

Continue to drive the transmission large gear into position, then locate the sleeve and fit the locking washer, engaging the tongue with the groove in the gear. Screw on the locknut and fit the locking tab, locking screw and split pin.

Refitting the Primary Gearbox

- 1 Locate the primary gearbox and gasket in position, using the locating studs (Tr/MD 6050) and supporting the rear end suitably to obtain correct alignment. Tighten up the bolts and wire the heads.
- 2 Install the power take-off assembly, belt pulley, clutch release shaft and fork, main and primary gear levers as described in the appropriate sections.
- 3 Continue to assemble as described in separating the tractor on pages 115 to 118.

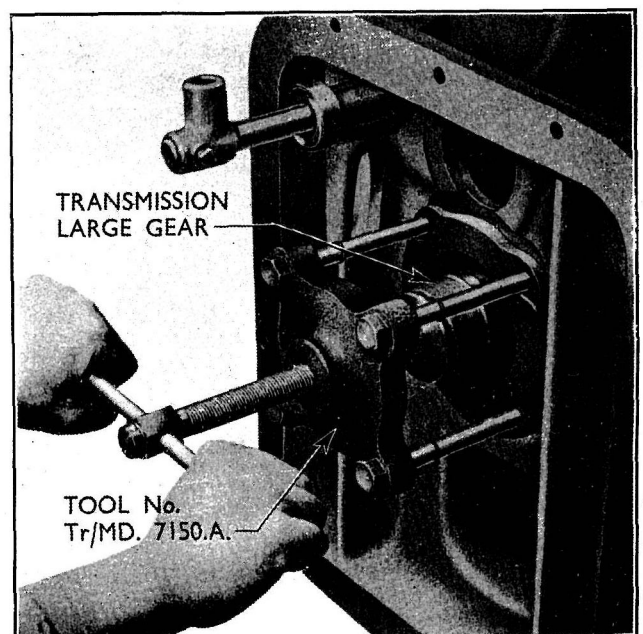


Fig. 165
Removing the Transmission Large Gear

SPECIFICATIONS AND REPAIR DATA

	RATIO		ROAD SPEEDS							
	Gearbox	Overall	800 R.P.M.		1,200 R.P.M.		1,600 R.P.M.			
			Tyre Size		Tyre Size		Tyre Size			
			11-36 & 14-30	11-38	11-36 & 14-30	11-38	11-36 & 14-30	11-38		
		M.P.H.	M.P.H.	M.P.H.	M.P.H.	M.P.H.	M.P.H.	M.P.H.		
1st Gear	6.62	123.0	1.04	1.08	1.56	1.61	2.07	2.15		
2nd Gear	4.7	87.3	1.46	1.52	2.19	2.27	2.92	3.03		
3rd Gear	3.68	68.4	1.86	1.93	2.80	2.90	3.73	3.87		
4th Gear	2.615	48.6	2.63	2.72	3.94	4.09	5.25	5.45		
5th Gear	1.875	34.8	3.66	3.80	5.49	5.70	7.32	7.60		
6th Gear	1.043	19.3	6.58	6.85	9.87	10.2	13.16	13.7		
Low Reverse	4.91	91.0	1.40	1.45	2.10	2.18	2.80	2.9		
High Reverse	2.73	50.7	2.52	2.61	3.77	3.92	5.03	5.22		

Transmission lower shaft diameter ..	1.872"-1.882" (47.5-47.8 mm.)
Transmission reverse idler I.D. ..	1.745"-1.7465" (44.3-44.303 mm.)
Wear limit	1.749" (44.45 mm.)
Reverse idler gear I.D.	1.124"-1.125" (28.6-28.63 mm.)
Wear limit	1.127" (28.8 mm.)
Reverse idler shaft diameter ..	1.122"-1.223" (28.55-28.58 mm.)
Wear limit	1.20 (30.5 mm.)
Upper shaft diameter	1.743"-1.744" (44.3-44.33 mm.)
Wear limit	1.741" (44.2 mm.)
Lower gear pinion I.D.	1.747"-1.751" (43.4-43.43 mm.)
Wear limit	1.748" (44.4 mm.)

Primary lower shaft end-float ..	0.010"-0.050" (.254-1.27 mm.)
Primary upper shaft and dog end-float	0.010"-0.047" (.254-1.194 mm.)
Main upper shaft and gear end-float	0.0102"-0.0352" (.259-.894 mm.)
Main lower shaft and gear end-float	0.010"-0.043" (.254-1.092 mm.)

Lubrication

<i>Temperature Range</i>		<i>Grade of Gear Oil</i>
Above 90°F.	S.A.E. 140	
Summer and Winter	S.A.E. 90	
Below + 10°F.	S.A.E. 80	
Below - 10°F.	80 Mild E.P. + 10% Kerosene	
Oil capacity	4.5 imp. galls. (20.4 litres)	