

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.

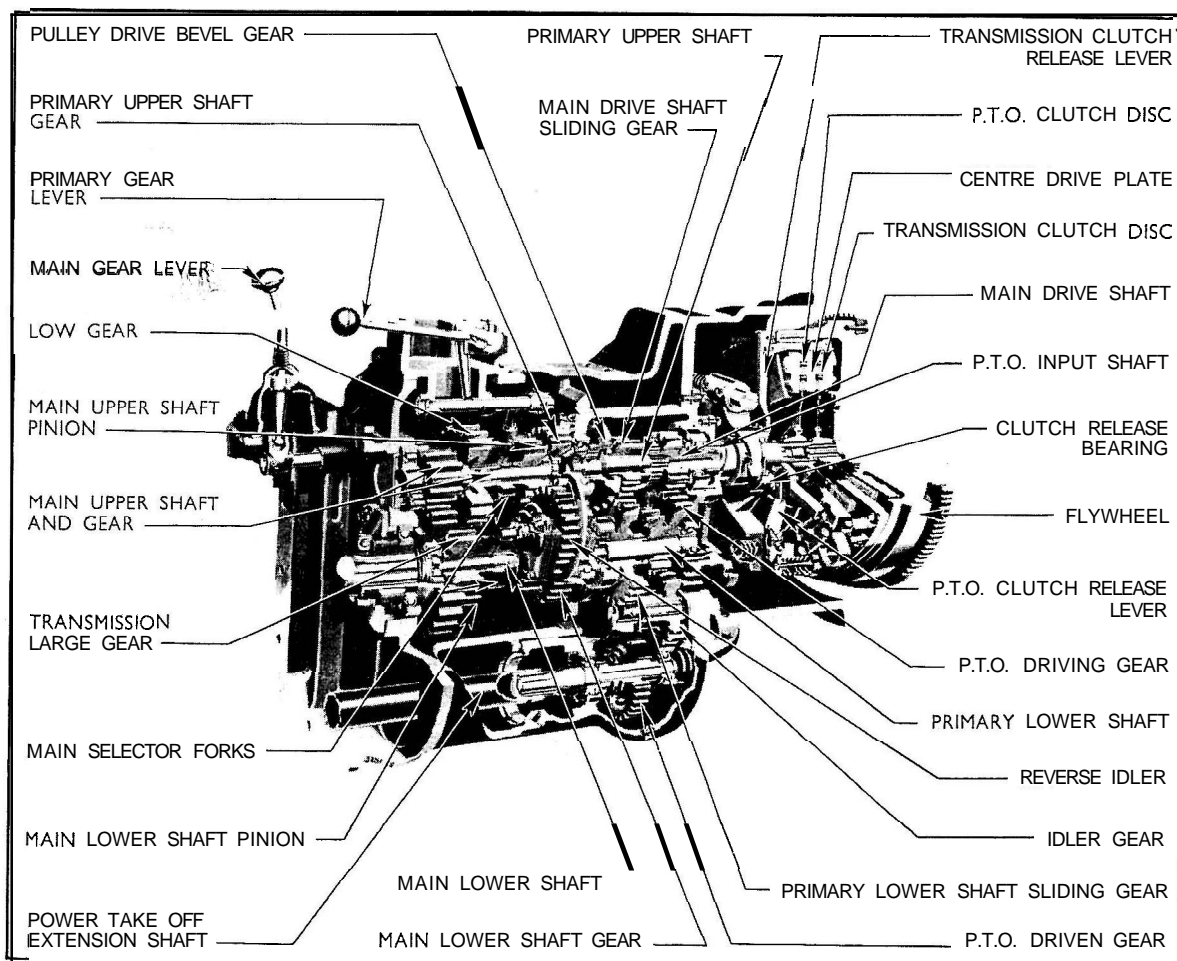


Fig. 21
Sectioned View of Clutch and Gearbox Live Power Take-Off Transmission

horse power output. These modifications to the gearbox whilst not greatly affecting the servicing and repair procedures do introduce differences between the gearboxes on the New Super Major and all Major tractors produced before this change.

Variations between the gearbox will be given in the appropriate sections.

Gearbox Adjustments

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

In accordance with standard engineering practice, bearings are a push fit in the housings and a press fit on the shafts.

Roller bearings with detachable cups must, when removed, be kept in their original pairs in readiness for reassembly. This is extremely important as each bearing is matched with its own cup. If new bearings are fitted, only complete assemblies must be used.

Standard P.T.O. Transmission

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, 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 in place of the standard power take-off to take care of operating conditions which require the power take-off to be at a greater height from the ground.

An optional two-speed belt pulley is located at the right hand side of the front transmission housing and is driven by the pulley drive bevel gear.

Live P.T.O. Transmission

On tractors fitted with "Live" power take-off, the introduction of an extra input shaft, to transmit the drive to the power take-off shaft independently of the main transmission, necessitates a modified primary transmission from that used on tractors without "Live" power take-off.

The main drive shaft is altered to operate within the power take-off input shaft; the entire primary upper shaft and the primary and main lower shafts are re-designed to facilitate the introduction of a system of sliding gears to replace the dog type couplings used in the standard primary gearbox.

This system allows the drive from the engine to be disconnected from the transmission without interrupting the drive to the power take-off and hydraulic pump, giving the advantage that all power take-off driven and hydraulically operated equipment can be kept in motion while the tractor is stationary or gear-changing is being carried out.

With the initial introduction of the "Live" power take-off (Engine No. 1417988) the main front trans-

mission housing was modified by moving the clutch cross-shaft approximately 2 in. (51 mm.) rearwards. This was to compensate for the increased length of the double clutch, and for standardisation purposes the new housing was also introduced on tractors without "Live" power take-off from Engine No. 1418861.

With the introduction of the New Super Major a further change was made to the front transmission housing to accommodate the changes to the P.T.O. This housing produced after Serial No. 08C-960337 is not suitable for tractors produced before this number and should only be fitted as a replacement on the New Super Major.

The current primary gearbox housing is suitable for all applications, but the previous housing, produced before Engine No. 1417988, is not suitable for use on tractors equipped with "Live" power take-off. Only a few of the internal components of the primary gearbox are interchangeable between standard and "Live" power take-off transmissions.

It is also important that the correct type power take-off housing, shaft and idler gear are fitted.

The gear ratios of the "Live" and "Standard" primary gearboxes are the same, therefore there is no difference in final gear ratios or road speeds as the remainder of the transmission is unaltered; speeds and direction of rotation of the belt pulley and power take-off are also identical.

BELT PULLEY

Pulley diameter: 8.5 in. (21.6 cm.)

Belt speed at 1400 r.p.m. (engine) —

Tractors before Serial Number 08C 960337:

High ratio—3115 ft./min. (949.5 metre/min.)

Low ratio—1734 ft./min. (528.6 metre/min.)

Tractors from Serial Number 08C 960337:

High ratio—3115 ft./min. (949.5 metre/min.)

Low ratio—1590 ft./min. (488 metre/min.)

LUBRICATION

The gearbox oil level should be checked every 50 working hours.

The gearbox should be drained, flushed and refilled with the correct grade of lubricant, every six months.

Gearbox oil capacity:

With standard or "live" power take-off 4½ Imp. galls. (20.4 litres)

Without power take-off 4¼ Imp. galls. (19.3 litres)

Lubricant Grade:

Temperature range	S.A.E. Viscosity Number
Above 20°F (−7°C)	30 H.D. } or 20W/30 H.D.
Below 20°F (−7°C)	

OVERALL GEAR RATIOS AND ROAD SPEEDS

(Standard Tyres)

Tractors before Serial Number o8C 960337

Gear	RATIOS		1200 R.P.M.		1400 R.P.M.		1700 R.P.M.	
	Gearbox	Overall	M.P.H.	K.P.H.	M.P.H.	K.P.H.	M.P.H.	K.P.H.
1st	6.62	123 : 1	1.56	2.51	1.82	2.92	2.20	3.55
2nd	4.70	87.3 : 1	2.19	3.53	2.56	4.12	3.11	5.00
3rd	3.68	68.4 : 1	2.80	4.50	3.26	5.25	3.96	6.38
4th	2.615	48.6 : 1	3.94	6.34	4.59	7.39	5.58	8.98
5th	1.875	34.8 : 1	5.49	8.84	6.41	10.30	7.79	12.54
6th	1.043	19.3 : 1	9.87	15.90	11.52	18.54	14.05	22.60
H.R.	2.73	50.7 : 1	3.77	6.07	4.40	7.09	5.35	8.60
L.R.	4.91	91.1 : 1	2.10	3.38	2.45	3.94	2.98	4.79

Tractors from Serial Number o8C 960337

4.375 Crown Wheel and Pinion

Gear	RATIOS		1200 R.P.M.		1400 R.P.M.		1700 R.P.M.	
	Gearbox	Overall	M.P.H.	K.P.H.	M.P.H.	K.P.H.	M.P.H.	K.P.H.
1st	7.82	182.00	1.058	1.708	1.235	1.991	1.50	2.42
2nd	6.04	140.20	1.362	2.175	1.588	2.535	1.93	3.08
3rd	4.00	92.88	2.061	3.32	2.405	3.87	2.92	4.70
4th	3.09	71.65	2.67	4.30	3.115	5.01	3.78	6.08
5th	1.875	43.54	4.38	7.06	5.12	8.24	6.22	10.00
6th	0.958	22.25	8.61	13.83	10.02	16.14	12.19	19.60
H.R.	2.96	68.60	2.781	4.475	3.241	5.22	3.94	6.34
L.R.	5.79	134.50	1.425	2.295	1.662	2.678	2.02	3.25

Optional 3.5 to 1 Crown Wheel and Pinion

Gear	RATIOS		1200 R.P.M.		1400 R.P.M.		1700 R.P.M.	
	Gearbox	Overall	M.P.H.	K.P.H.	M.P.H.	K.P.H.	M.P.H.	K.P.H.
1st	7.82	145.60	1.32	2.13	1.54	2.486	1.87	3.02
2nd	6.04	112.10	1.70	2.72	1.985	3.17	2.41	3.85
3rd	4.00	74.30	2.578	4.15	3.008	4.84	3.65	5.87
4th	3.09	57.32	3.338	5.37	3.89	6.26	4.72	7.60
5th	1.875	34.83	5.48	8.83	6.40	10.30	7.77	12.50
6th	0.958	17.80	10.75	17.30	15.54	20.18	15.23	24.50
H.R.	2.96	54.88	3.478	5.58	4.05	6.51	4.92	7.92
L.R.	5.79	107.60	1.778	2.863	2.075	3.34	2.52	4.06

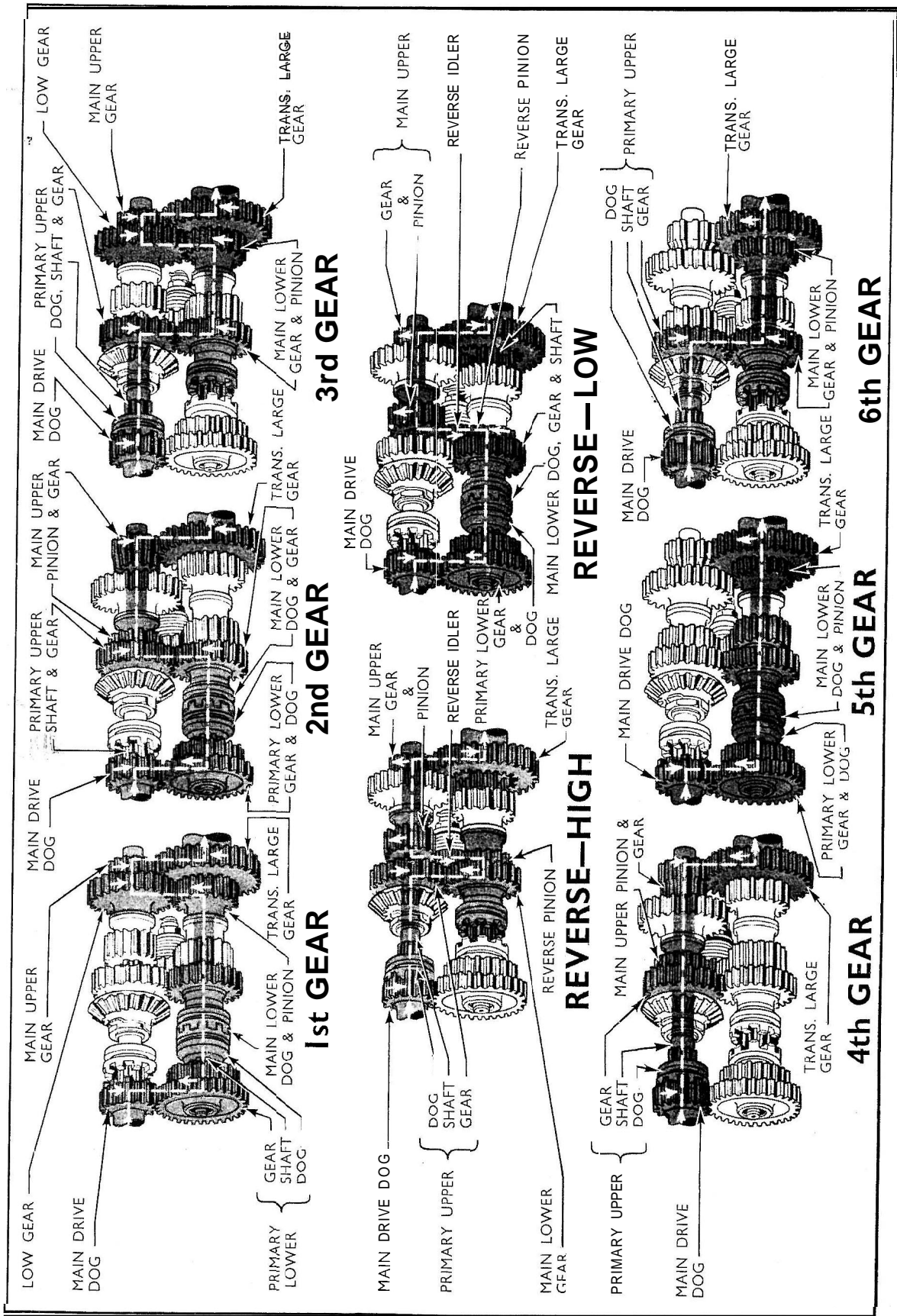


Fig. 22
 Gear Positions

PRIMARY GEAR LEVER

To Remove and Dismantle the Primary Gear Lever

(“ Power Major ” and “ Super Major ” Tractors)

1. Remove the engine bonnet by releasing the two counter-sunk screws holding the rear bonnet hinge and remove the bonnet, lifting it rearwards.
2. Unscrew the steering wheel nut and remove the steering wheel from the steering column.
3. Remove the throttle control arm, unscrewing the retaining clamp screw.
4. Remove the grease nipple from the top end of steering column and the instrument panel retaining screws.
5. Disconnect the wiring loom from the horn (if fitted), generator and oil warning lights, starter—and front lights.
6. Disconnect the proofmeter drive cable at instrument end.
7. Drain the cooling system to below the level of the temperature gauge bulb and after removing the capillary tube retaining clips, remove the temperature gauge bulb, carefully coiling the capillary tube for temporary storage.
8. Lift away instrument panel assembly.
- g. Disconnect the stop control cable from battery holder clamp and injection pump.
10. Disconnect the wiring loom from the main switch.
11. Remove the shroud retaining screws, unscrew the primary lever knob, and remove the shroud.
12. Disconnect the injector leak-off pipe at the fuel tank end and the main fuel feed pipe at the fuel tank tap.
13. Remove the tank support bracket retaining bolts.
14. Drain the fuel tank to ease removal, and remove the tank.
15. Disconnect and remove the starter control lever.
16. Remove the steering box.
17. Remove 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 forms part of this assembly.

18. Extract the rivet, cotter pin or bolt retaining the selector lever and withdraw the lever, shaft and fork. Remove the oil seal.

Re-assembly of the Primary Gear Lever

1. Fit a new oil seal and position the shaft, fork and gear lever in the housing and secure the lever to the shaft.

2. Fit the primary gear lever assembly to the front transmission housing, ensuring the end of the connector enters its location in the primary selector rail, fit and tighten the four bolts.

NOTE. — The correct location of the connector end can be observed through the steering box mounting hole.

3. Replace the steering box assembly.
4. Replace the fuel tank and front tank support bracket assembly. Replace and tighten the retaining bolts at front and rear of tank (four at front, two at rear. Nearside front bolt is gearbox breather).
5. Replace starter control lever and linkage.
6. Reconnect the main fuel feed pipe and the injector leak-off pipe.
7. Replace the shroud and tighten the retaining screws and replace the primary gear lever knob.
8. Reconnect the wiring loom to the main switch.
- g. Reconnect the stop control cable.
10. Replace the instrument panel assembly. Uncoil and re-route the temperature gauge capillary tube, refit the temperature gauge bulb in the cylinder head and refit the capillary tube retaining clips.
11. Reconnect proofmeter drive cable.
12. Reconnect the wiring loom (adjacent to the near-side of the primary gear lever housing) to the horn (if fitted), generator, oil warning lights and starter.
13. Replace the instrument panel retaining screws and the grease nipple at the top of the steering column.
14. Replace the throttle control arm and tighten the retaining screw.
15. Replace the steering wheel on the steering shaft splines and fit the steering wheel retaining nut, tightening securely.
16. Replace the engine bonnet and refit the rear hinge.
17. Top up fuel tank and radiator.

MAIN GEAR LEVER

A new gear change assembly has been introduced from Tractor Number 08A302897. The new assembly consists of a raised fulcrum housing and straight gear lever which replaces the old housing and cranked lever. Although individual parts are not interchangeable; the assemblies are completely interchangeable and the following overhaul operations are common to both types.

To Remove and Dismantle the Main Gear Lever

1. Ensure that the gearbox is in neutral and 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.

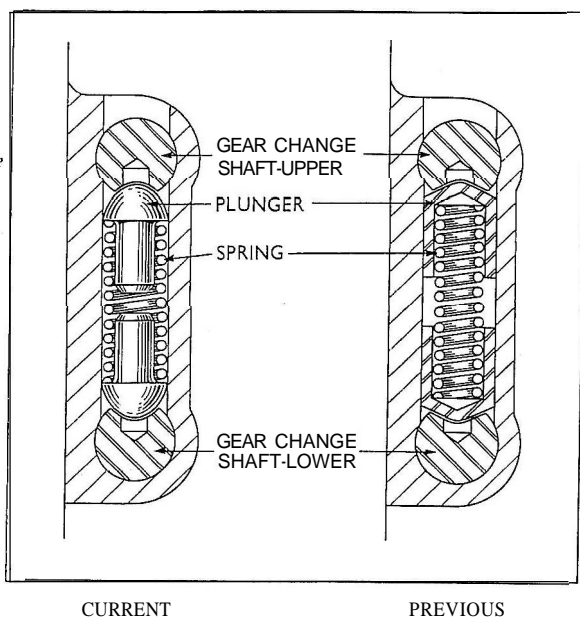


Fig. 23
Gear Selector Plungers

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.

To Reassemble 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 rear transmission housing, ensuring that the end of the lever enters the actuator shaft socket. The rear right-hand bolt also retains the wiring loom clip.

SELECTOR HOUSING AND CLUTCH BALANCE LEVER

To Remove and Dismantle Clutch Balance Lever and Selector Housing

1. Drain the gearbox oil to below the level of lower edge of selector housing.
2. Disconnect the balance lever and clutch release rods, from the balance lever and remove the selector fork plate retaining bolts. The lower rear bolt also acts as a retainer and pivot point for the power take-off engagement lever.
3. Remove the clutch balance lever retaining split pin and washer, and remove the balance lever.
4. Remove the selector fork retaining rivets or tension

pins and extract the top shaft by tapping from the loose plunger end. Remove the locking plungers and their springs.

5. Remove the lower selector shaft and fork.

To Reassemble the Selector Fork Plate and Clutch Balance Levers

1. Replace the lower selector shaft and fork.

NOTE.—The lower fork can be identified by the short stalk and is fitted, with the end of the shaft with three indentations upwards and at the spring loaded plunger end.

2. Pin the fork to the shaft, retaining the tension pin with a split pin.

3. Insert the locking plunger, spring plungers and springs.

NOTE.—An improved design gear change plunger and spring has been fitted to tractors from Serial Number 08B.743082. The previous hollow plungers having been replaced by dome-shaped solid plungers, the shank of which locates inside the new spring, which is of larger diameter than the previous type (see Fig. 23 for details).

The current type parts are the only ones available in service for all Major tractors, and must only be used in sets.

4. Refit the upper shaft and fork (the three indentations downwards and at the spring loaded plunger end), pin in position (retaining the tension pin with a split pin).

5. Refit the selector fork plate and P.T.O. shifter lever to the housing (four bolts and lockwashers) and install the clutch balance lever, secure with a new split pin. (Longer P.T.O. shifter lever, pivot bolt, at lower rear position.)

6. Reconnect the balance lever and clutch release rods to the balance lever using new split pins.

7. Top-up gearbox with oil.

PRIMARY AND MAIN GEARBOX

To Remove the Primary Gearbox—Standard and Live Transmissions.

NOTE.—It is assumed that the operation “Separating the engine from the front transmission” which is fully described in the appropriate section has been carried out.

1. Drain the oil from the front and rear transmission housings.

NOTE.—If no power take-off is fitted it is unnecessary to drain the oil from the rear transmission housing.

2. Disconnect the clutch release rod from the release arm and remove the clutch release bearing and hub assembly (see “Clutch Release Bearing”).

3. Remove the clutch release fork to cross-shaft retaining pins and withdraw the cross-shaft from the housing. Remove the fork and return spring.

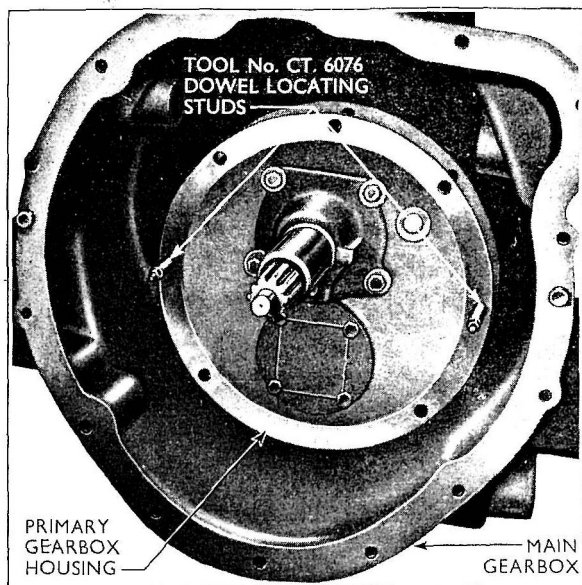


Fig. 24

Removing the Primary Gearbox

4. Partially withdraw the power take-off extension shaft at the rear of the tractor. Disconnect the power take-off engagement lever at the selector shaft and remove the power take-off housing assembly.

Remove the belt pulley if fitted.

5. Disconnect the clutch pedal to balance lever rod at the balance lever. Remove the power take-off engagement lever and the main gearbox selector plate assembly, complete with clutch balance lever and clutch release rod.

6. Place the primary gear lever in the lower (standard transmission) or upper (Live P.T.O. transmission) position. Obtaining access through the main selector plate aperture remove the lockwire and square headed lockscrew securing the connector lever to the primary gear change upper shaft.

7. Move the primary gear lever to the opposite position and, using locating studs C.T. 6076 in the right and left centre screw holes, slide the primary gearbox assembly forward out of the main transmission housing approximately 2 inches. It will then be possible to slide the connector lever from the primary gear change upper shaft and withdraw it from the housing. Remove the primary gearbox assembly (see Fig. 24).

Refitting the Primary Gearbox — Standard and Live Transmissions.

1. Locate the primary gearbox gasket in position on locating studs CT. 6076.

NOTE. — Jointing compound (Part No. EM-4G-47) should be applied to the gasket between the two lower bolt holes. (See Fig. 24.)

2. Guide the primary gearbox on to the locating

studs and, supporting the rear end to obtain correct alignment, ease the primary gearbox into place. Fit the retaining bolts, tighten and wire the heads.

3. Install the power take-off assembly, belt pulley, clutch release shaft and fork, main and primary gear levers, as described in the appropriate sections.

4. Continue to assemble as described in "Separating the Tractor".

To Dismantle the Primary Gearbox — Standard Transmission only.

NOTE. — Assuming the gearbox has already been removed from the tractor as previously described, proceed as follows.

1. Remove the wire locked bolts from the transmission input shaft oil seal housing, remove the housing and oil seal and withdraw the input shaft and bearing from the primary gearbox housing.

2. Remove the input shaft bearing circlip and press the bearing off the input shaft using tool No. T.7000 and T.7000-2a split adaptors. Remove the primary upper shaft front support bearing cup from the rear of the input shaft using Tool No. T.7016.

3. If a transmission handbrake is fitted remove the primary gearbox lower shaft end plate, place the dummy end plate, Tool No. T.7026, in the end plate location in the primary gearbox housing and stand the housing on its front face. Remove the split pin and domed nut retaining the transmission brake spring. Lift off the brake spring, retaining plate, retaining plate spring, seven stationary and five revolving brake plates and reverse idler gear.

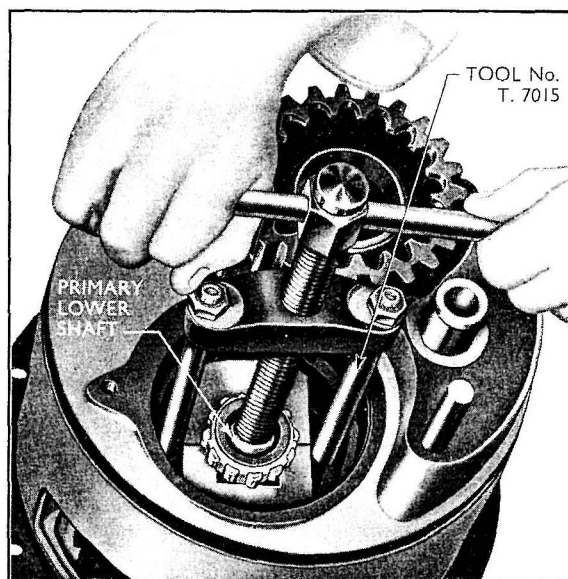


Fig. 25

Removing the Primary Lower Shaft Bearing (Standard Transmission)

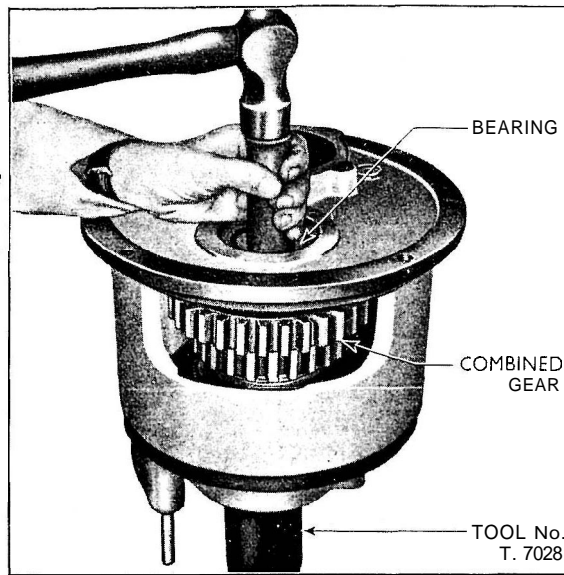


Fig. 26
Removing the Primary Lower Shaft
(Standard Transmission)

NOTE.—The seventh stationary brake plate is located beneath the reverse idler gear. The transmission handbrake assembly retaining bolt will drop through into the primary housing and can be removed at this stage.

4. Remove the inner race of the main lower shaft rear bearing using Tool No. T.7015 with T.7015-1 split adaptors and withdraw the main lower shaft pinion and reverse pinion.

5. Remove the upper and lower shaft bearing locking plates, wired bolts and locking plates from the rear of the primary housing.

NOTE.—The locking plates are not interchangeable.

Withdraw the main lower shaft, gear and bearing from the primary housing. Remove the gear retaining circlip and press the shaft out of the gear and bearing using split adaptors T.7000-2a with the main tool No. T.7000. The bearing is then removed from the gear using split adaptors T.7000-2a with the thrust block T.7000-2b located at the front of the gear as a register for the centre screw of Tool No. T.7000.

6. Remove the bearing race from the rear end of the primary lower shaft using Tool No. 7015 and adaptors T.7015-1. (See Fig. 25.)

7. Locate the body of the primary upper shaft dog nut wrench Tool No. T.7028 on the primary lower shaft dog and drive the primary lower shaft into the tool. Remove the primary lower shaft and Tool No. T.7028 and then remove the lower shaft gear and power take-off cluster gear. (See Fig. 26.)

8. Remove the primary lower shaft bearing from its location in the primary gearbox housing.

g. Withdraw the primary upper shaft bearing inner

race using Tool No. T.7015 and split adaptors T.7015-1, straighten the bevel gear retaining nut lockwasher, locate Tool No. T.7028 on the primary upper shaft dog gear and remove the bevel gear retaining nut using Tool No. T.7027.

10. Withdraw the primary upper shaft and gear and remove the bevel gear, lockwasher, retaining nut and dog gear. Remove the primary upper shaft large bearing using Tool No. T.7000 and adaptors T.7000-2. Drive the bearing cup from the primary upper shaft gear by means of a punch through the two holes provided in the front of the gear.

11. Remove the wire locked selector screw retaining the selector fork and remove the selector shaft, selector fork and lower shaft dog gear. When removing the selector shaft, care should be taken as the spring loaded ball is released.

12. Remove the expansion plug from the end of the selector shaft bore in the primary housing.

To Reassemble the Primary Gearbox — Standard Transmission.

Before re-assembling the primary gearbox a check should be made of the reverse idler gear shaft protrusion above the raised section at the rear of the housing (see Fig. 34).

- (a) If a transmission handbrake is fitted, this dimension must be 1.20 to 1.23 in. (30.5 to 31.2 mm.) to give the required clearance between the brake plates.
- (b) If no transmission handbrake is fitted, this dimension must be 1.30 to 1.31 in. (33.0 to 33.3 mm.) to

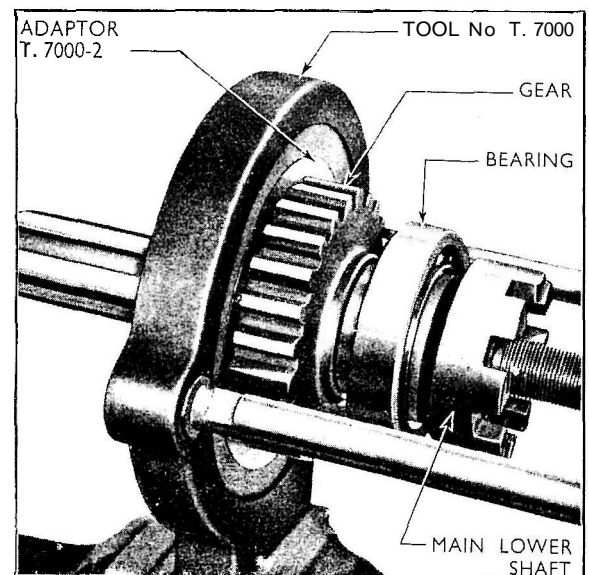


Fig. 27
Fitting the Main Lower Shaft, Gear and
Bearing
(Standard Transmission)

ensure the correct idler gear end float of 0.010 to 0.025 in. (0.25 to 0.64 mm.).

If the idler gear shaft protrusion dimension is incorrect, reposition the shaft accordingly.

1. Locate the selector fork (locking screw to the front) and the lower shaft dog gear (teeth to the rear). Fit the selector shaft spring and ball, hold the ball in position by means of a tapered pilot and slide the selector shaft into position. Tighten the selector fork locking screw and fit the locking wire. Drive the Welch plug into the selector shaft bore at the front of the primary gearbox housing.

2. Fit the dummy end plate Tool No. T.7026 to the primary gearbox housing in order to stabilize the housing during assembly. Stand the primary gearbox housing on its front face. Locate the upper shaft dog in the selector fork with the teeth facing downwards.

3. Pull the large bearing on to the primary upper shaft using split adaptors. Number T.7000-2 in main tool number T.7000.

NOTE. — From tractor number 08C 960337 the number of teeth on the primary uppershaft gear has been increased from 23 to 24, at the same time the main lower gear teeth have been changed from 24 to 23. When, in service, a new type primary upper shaft gear is being fitted to a tractor before the above serial number, a new type main lower gear must also be fitted.

Position the bevel gear retaining nut, lockwasher and bevel gear on the upper shaft dog, then enter the primary upper shaft into the spline of the bevel gear and dog gear and drive into position. Engage Tool No. T.7028 with the teeth of the upper shaft dog gear and tighten the bevel gear retaining nut using Tool No. T.7027. Drive the bearing inner race onto the front of the primary upper shaft.

4. Remove the dummy end plate and insert the primary lower shaft large bearing into its location in the primary housing.

NOTE. — From tractor Serial Number 08C 960337 a larger capacity bearing has been fitted to the primary lower shaft. This new bearing can be identified by an internal bore of 0.98 in. (24.89 mm.) against 1.38 in. (35.05 mm.) for the previous type of bearing.

To accommodate this new bearing a new primary lower shaft with a smaller diameter spigot has been introduced. To restrict forward movement of the primary lower gear towards the bearing a thrust washer has been added between the bearing and the retaining circlip (see Fig. 35).

Only the new primary lower shaft will be supplied in service, therefore if a new shaft is fitted it will be necessary to fit the larger capacity bearing and the thrust washer.

5. Refit the dummy end plate. Replace the circlip in the primary lower shaft cluster gear.

NOTE. — From tractor number 08C 960337 the primary lower shaft gear has received a new heat treatment and can be identified by a "silver" appearance as

compared to the "black" appearance of the previous gear. This latest gear is directly interchangeable with the previous gear.

6. Fit the lower shaft dog gear and place the cluster gear in position with the shoulder towards the bearing. Tap the small roller bearing onto the lower shaft and pass the shaft through the dog gear, and primary lower gear cluster.

When fitting the new type primary lower shaft with the smaller spigot diameter the thrust washer should be fitted in the bore of the primary lower gear to butt against the circlip. Drive the lower shaft into the front support bearing. (The dummy end plate acts as a depth control for the shaft.)

7. Reassembling the lower main shaft, reverse pinion and lower shaft pinion is best carried out before fitting to the primary gearbox.

NOTE. — From tractor Serial Number 08C 960337 the number of teeth on the main lower shaft gear has been reduced from 24 to 23. At the same time the number of teeth on the primary upper shaft gear have been changed from 23 to 24. When, in service, a new type main lower shaft gear is being fitted to a tractor before the above serial number a new type primary upper shaft gear must also be fitted.

8. Locate the larger bearing on the lower shaft, pass the gear (shoulder only) along the shaft to engage the larger splines (see Fig. 27). Place this assembly into Main Tool No. T.7000 and press the shaft through the gear. The bearing must be located on the gear shoulder as the shaft is moving through the gear. Remove the assembly from the tool and fit the circlip behind the gear.

Locate the reverse pinion and lower shaft pinion (selector fork flanges together) fit the small roller bearing on the end of the shaft and place the completed lower shaft assembly in position in the primary gearbox housing (see Fig. 41). The larger bearing of the lower main shaft assembly is a sliding fit in the housing but if slight pressure is required to seat the bearing, it must be applied to the lower main gear and not to the end of the shaft, otherwise the circlip will be damaged.

g. Refit the main lower and upper shaft bearing locking plates (two bolts in each plate, the heads of the bolts to be wired together in pairs through a centre hole in each plate).

10. Pass the transmission handbrake assembly special retaining bolt through the reverse idler gear shaft, fit one stationary plate, reverse idler gear (recess towards the housing) then alternate with first a stationary, and then a revolving plate until six stationary and five revolving plates are fitted. Locate the small spring on the shaft, fit the retaining plate, coil spring, locknut, and split pin. To correctly adjust the brake, the measurement from the head of the brake nut to the inner face of the primary gearbox housing flange must be between 13.870 in. and 13.895 in. (352.30 and 352.94 mm.).

NOTE. — From tractor Serial Number 08C 960337

the assembly of the reverse idler gear and hub (tractors with handbrake only) has been changed. In the previous assembly the gear was retained on the hub by a press fit, on the new assembly the gear is positively retained on the hub by a circlip. Although the individual parts of the current and previous gears and hubs cannot be interchanged, in service, the complete assemblies are fully interchangeable.

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 reverse idler gear shaft. Tighten the self locking nut.

11. Remove the dummy end plate and fit the end plate with a new gasket. (Four bolts and locking wire).

12. Position the upper primary shaft front support bearing cone and locate the circlip in the inner groove of the transmission input shaft rear bearing location of the primary housing. Press the rear bearing onto the transmission input shaft using Tool No. T.7000 with adaptor T.7000-2 and replace the circlip. Replace the primary upper shaft front support bearing cup at the

rear of the transmission input shaft using Tool No. T.7017.

13. Replace the transmission input shaft assembly into the primary housing to engage the primary upper shaft dog.

14. Fit a new oil seal in the retainer and gasket (clutch spring lug to bottom), four bolts and locking wire.

Dismantling the "Live" Power Take-off Primary Gearbox

1. Extract the locking wire and remove the four screws securing the power take-off input shaft oil seal retainer. Withdraw the retainer complete with oil seal and extract the oil seal, if necessary.

2. Withdraw the power take-off input and main drive shaft assemblies from the housing as one unit. After removal, if necessary, draw the main drive shaft away from the power take-off input shaft assembly, and extract the oil seal from the counterbore at the splined end of the input shaft (see Fig. 44).

NOTE.—Unless it is required to replace the

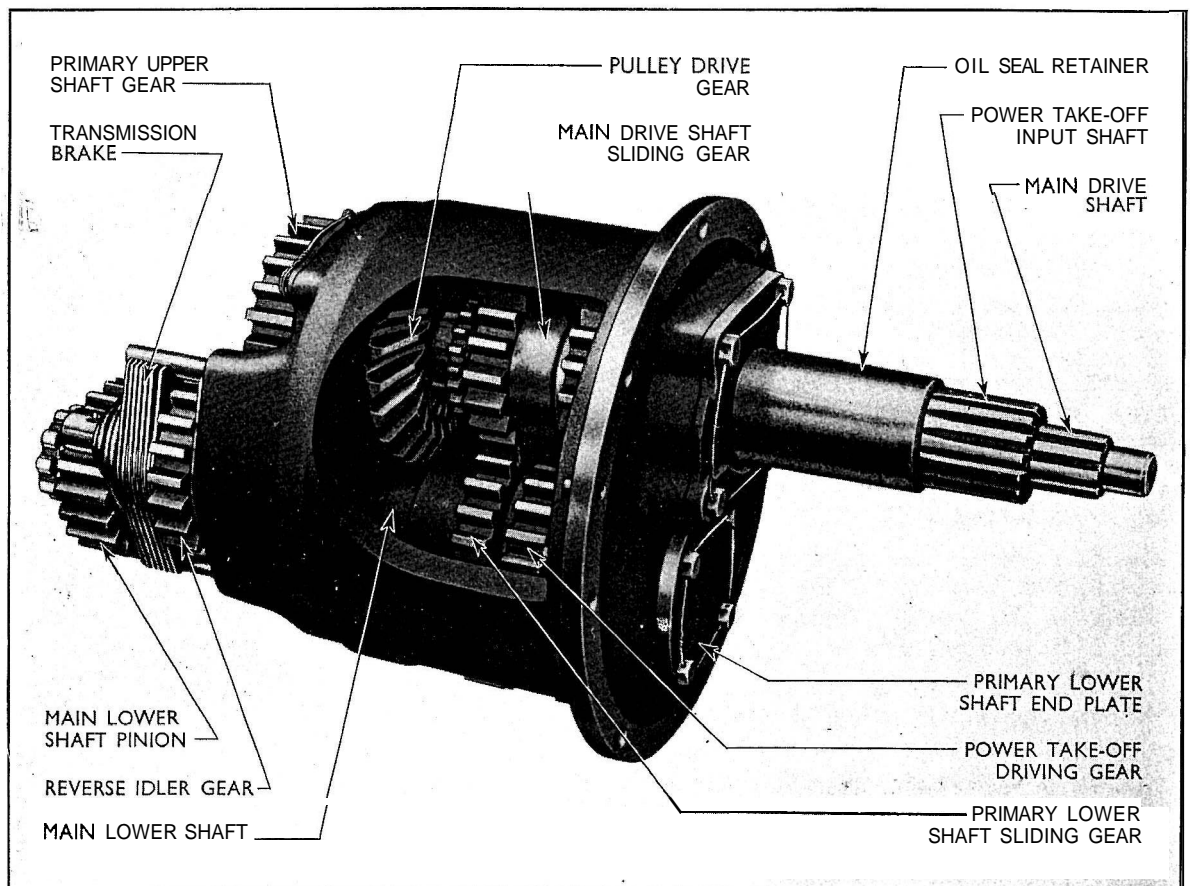


Fig. 28

Live Power Take-Off Primary Gearbox

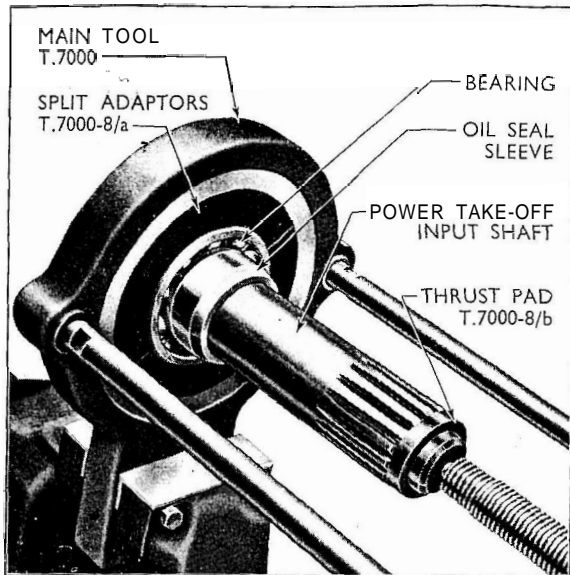


Fig. 29

Removing Bearing and Oil Seal Sleeve from Power Take-Off Input Shaft
(Live P.T.O. Transmission)

oil seal, the two shafts should be kept in the fully assembled position. If separated the seal may be damaged particularly if fitted with an early type main drive shaft, and it is recommended that the seal be renewed if the shafts are, for any reason, separated at all. It should of course, be renewed if there is evidence of oil leakage or if it appears in any way to be worn or damaged.

3. Removal of the power take-off shaft ball bearing or oil seal sleeve necessitates the withdrawal of both these components. If such dismantling is necessary, remove the circlip immediately in front of the oil seal sleeve fit the split adaptors T.7000-8/a around the bearing and place this assembly in Main Tool, T.7000. Locate the thrust pad T.7000-8/b in the front end of the shaft and press the shaft through the bearing and oil seal sleeve (see Fig. 29).

4. Extract the needle roller spigot bearing from the main drive shaft if necessary.

NOTE.—If this bearing is removed it must be discarded and a new part fitted on reassembly.

5. The procedure for the next operation is governed by the presence, or absence, of a transmission brake.

(a) If a transmission brake is fitted:

Extract the split pin and remove the brake adjusting nut, followed by the brake springs, spring retainer, brake plates, and the reverse idler gear and hub assembly. Withdraw the brake shaft through the cast hole in the housing.

(b) If no transmission brake is fitted:

Remove the self-locking nut, outer spigoted

washer and reverse idler gear, then withdraw the centre bolt and inner spigoted washer from inside the housing.

6. Place the Main Tool T.7015 over the main lower shaft, position the split adaptors T.7015-1 behind the roller bearing inner race, and, with the Main Tool located against the adaptors, draw the bearing race from the shaft. Remove the main lower shaft pinion and reverse pinion from the main lower shaft.

7. Stand the housing on its front face, and push the selector shaft into the housing until it reaches its innermost position, i.e. with the selector ball located in the second notch from the inner end of the selector shaft. Extract the locking wire and remove the two securing screws from the main lower shaft bearing locking plate. Remove the plate, followed by the main lower shaft assembly.

8. To dismantle this assembly, remove the gear retaining circlip, place the assembly, with split adaptors T.7000-2/a in position around the bearing, in Main Tool T.7000 and press the shaft out of the gear and bearing assembly. Relocate the adaptors on the opposite side of the bearing and replace the gear and bearing assembly, with adaptors, in Main Tool T.7000. Fit the thrust pad T.7000-2/b in the gear bore, and press the gear out of the bearing.

To extract the primary lower shaft bearing cup, which is seated in the recessed end of the main lower shaft, use Tool T.7016, placing the adaptors and collar of the tool inside the bearing cup, with the feet of the adaptors located behind the cup (see Fig. 30).

g. Straighten the primary upper shaft locking nut

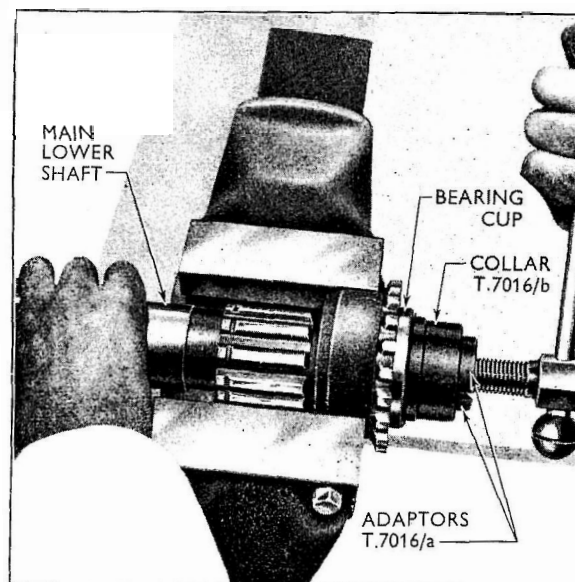


Fig. 30

Removing Bearing Cup from Main Lower Shaft with Tool T.7016
(Live P.T.O. Transmission)

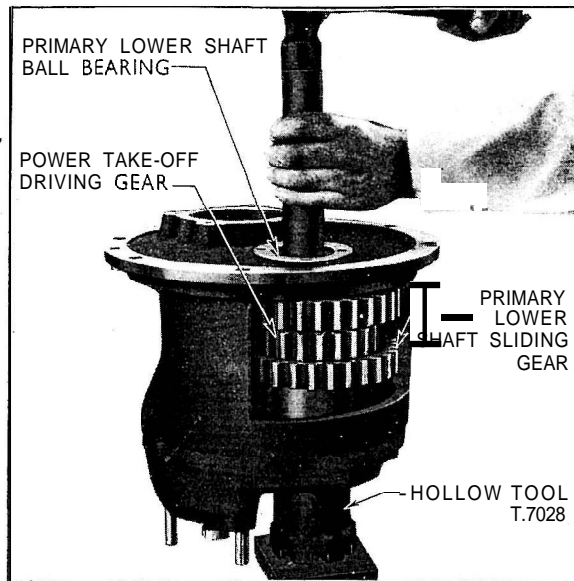


Fig. 31

Removing Roller Bearing Inner Race from Primary Lower Shaft
 (Live P.T.O. Transmission)

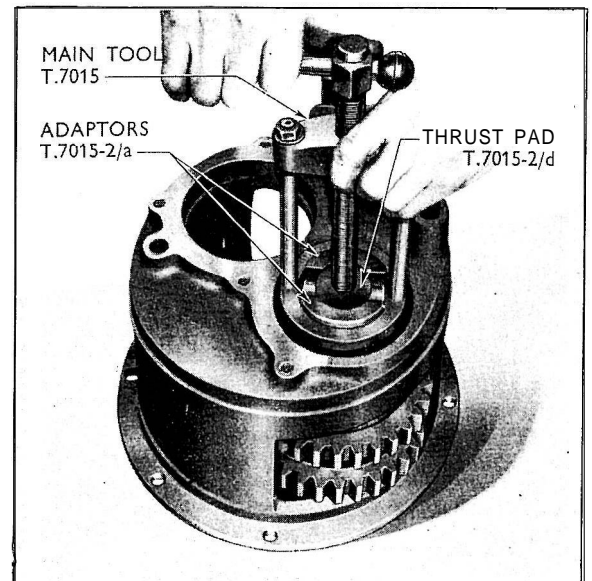


Fig. 32

Removing Primary Lower Shaft
 (Live P.T.O. Transmission)

retainer, remove the nut, using special key T.7030, and extract the retainer.

10. Place the selector shaft in its outermost position. Extract the locking wire and two securing screws from the primary upper shaft bearing locking plate, and remove the plate. Withdraw the primary upper shaft gear and bearing assembly from the housing, leaving the bevel gear located on the primary upper shaft (in the housing). Place the housing on its side, and push the selector shaft into its innermost position. Move the primary upper shaft and main drive shaft sliding gear (as one unit) away from the bevel gear, leaving the latter in the housing. Extract the shaft and sliding gear through the cast hole in the side of the housing, and then withdraw the bevel gear. Separate the shaft and gear.

11. Position the split adaptors T.7000-2/a around the primary upper shaft gear bearing, and place the assembly in Main Tool T.7000. Fit the thrust pad T.7000-2/d in the gear bore (at the bearing end) and press the gear out of the bearing.

The main upper shaft roller bearing cup is seated in the recessed end of the primary upper shaft gear, and may be removed, if necessary, by using a suitable pin punch through the two holes provided in the gear.

12. Extract the locking wire and remove the securing screw from the gear shifter fork. Place a cloth over the selector ball hole in the housing to prevent the spring loaded ball from flying out, and withdraw the selector shaft. The shaft will be removed more easily if it is revolved as it is withdrawn. Remove the selector ball and spring. Revolve the gear shifter fork until it can be lifted out of the groove in the gear and withdrawn through the cast hole in the side of the housing.

13. Rest the housing on its front face and place the adaptors T.7015-2/a within the main lower shaft bearing bore, with the feet of the adaptors located behind the primary lower shaft roller bearing inner race. With the top ends of the adaptors pressed together lower the Main Tool T.7015 over the adaptors and rest it on the face of the primary lower shaft sliding gear. The tool frame must be positioned so that the pillars are approximately in line with the open sides of the adaptors. Move the top ends of the adaptors apart and place the thrust pad T.7015-2/d in the adaptor bore, with the two arms of the thrust pad located between the split halves. The dimpled end of the thrust pad should be directly below the centre pressure screw. Lift the tool until the base ring is

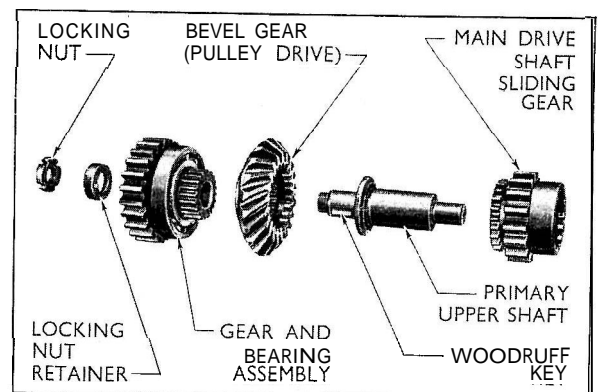


Fig. 33

Primary Upper Shaft and Gears
 (Live P.T.O. Transmission)

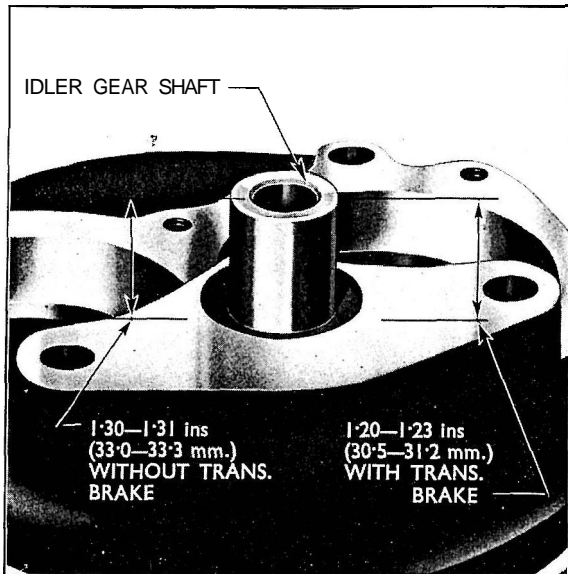


Fig. 34

Reverse Idler Gear Shaft Protrusion

(Standard and Live P.T.O. Transmissions)

located under the flanged ends of the adaptors. Screw in the centre pressure screw and draw the roller bearing inner race from the end of the primary lower shaft (see Fig. 32).

14. Extract the locking wire, withdraw the four securing screws and remove the primary lower shaft end plate. Place the hollow Tool No. T.7028 so that it rests firmly on a piece of wood, with the dog toothed end of the tool against the wood.

Invert the housing and place it over the hollow tool with the primary lower shaft located inside the tool and the recessed rear face of the primary lower shaft sliding gear located against the tool upper face. Drive the shaft into the hollow tool (see Fig. 31). Remove the housing and extract the power take-off driving gear and lower shaft sliding gear through the cast hole.

15. Remove the primary lower shaft ball bearing from the housing.

Reassembling the "Live" Power Take-off Primary Gearbox

Before reassembling the primary gearbox a check should be made of the reverse idler gear shaft protrusion above the raised section at the rear of the housing (see Fig. 34).

- (a) If a transmission handbrake is fitted this dimension must be 1.20 to 1.23 in. (30.5 to 31.2 mm.) to give the required clearance between the brake plates.
- (b) If no transmission handbrake is fitted, this dimension must be 1.30 to 1.31 in. (33.0 to 33.3 mm.) to ensure the correct idler gear end float of 0.010 to 0.025 in. (0.25 to 0.64 mm.).

If the idler gear shaft protrusion dimension is incorrect, reposition the shaft accordingly.

1. Fit the small roller bearing inner race to the rear of the primary lower shaft.

NOTE. — From tractor number 08C 960337 a larger capacity bearing has been fitted to the primary lower shaft. This new bearing can be identified by an internal bore of 0.98 in. (24.89 mm.) against 1.38 in. (35.05 mm.) for the previous type of bearing.

To accommodate this new bearing a new primary lower shaft with a smaller diameter spigot has been introduced.

To restrict forward movement of the P.T.O. driving gear towards the bearing a thrust washer has been added between the bearing and the retaining circlip (see Fig. 35).

Only the new primary shaft will be supplied in service, therefore if a new shaft is fitted it will be necessary to fit the larger capacity bearing and the thrust washer.

2. Enter the primary lower shaft ball bearing into the appropriate bore in the front of the housing. Locate the dummy end plate T.7026 in the bearing bore, and push the plate and bearing into position until the flange of the dummy end plate is against the front face of the housing. Invert the housing and stand it on the dummy end plate.

3. Ensure that the appropriate circlip is fitted to the groove in the bore of the power take-off driving gear. Place the primary lower shaft sliding gear and the power take-off driving gear in the housing, with the hub of the power take-off driving gear against the primary lower shaft ball bearing and the external teeth of the sliding gear adjacent to the power take-off driving gear. This assembly will be facilitated by first entering the sliding gear into the housing, positioning the power take-off driving gear and lowering the sliding gear onto it.

NOTE. — From Tractor Serial Number 08C 960337 the P.T.O. driving gear on the primary lower shaft has received a new form of heat treatment and can be

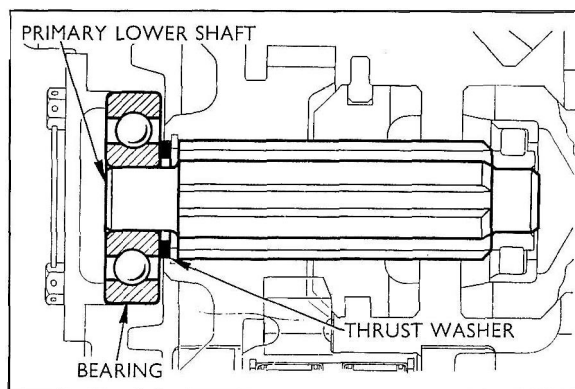


Fig. 35

New Primary Lower Shaft and Bearing Assembly

(Standard and Live P.T.O. Transmissions)

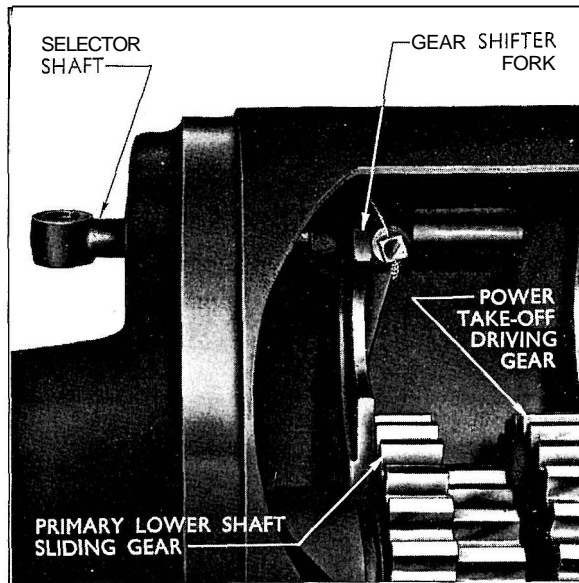


Fig. 36
Gear Shifter Fork Assembly
(Live P.T.O. Transmission)

identified by a "silver" appearance as compared to the "black" appearance of the previous gear.

This latest gear is directly interchangeable with the previous gear in service.

4. Pass the primary lower shaft and roller bearing assembly through the sliding gear, taking care not to damage the bush, and pick up the power take-off driving gear on the splines of the shaft.

On tractors with the new type primary lower shaft with the smaller spigot diameter the thrust washer should be fitted in the bore of the power take-off gear to butt against the circlip. Carefully drive the shaft into the ball bearing until the shaft shoulder abuts the circlip in the power take-off driving gear. Any attempt to drive the shaft beyond this position will result in damage to the circlip groove and splines.

NOTE.—It is not necessary to remove the primary lower shaft in order to service the roller bearing inner race, but when assembling this race onto the rear end of the primary lower shaft with the shaft already positioned in the primary gearbox, the end plate must be removed and the shaft supported. This will obviate any tendency for the primary lower shaft to be driven past the correct position as the bearing is replaced. When this operation is completed, replace the dummy end plate Tool T.7026 and lightly tap the rear end of the shaft to check that it still abuts the circlip in the power take-off driving gear as previously described.

5. Place the housing on its side, remove the dummy end plate and fit the correct end plate, using a new gasket. Replace the four securing screws, fully tighten and lock with wire. Lightly tap the rear end of the

primary lower shaft to ensure that the shaft bearing abuts the spigot of the end plate.

6. Enter the gear shifter fork through the large cast hole in the side of the housing (fork securing screw hole towards the flanged end of the housing) and locate the larger radius of the fork in the machined groove of the primary lower shaft sliding gear. Revolve the fork until it rests against the wall of the housing directly opposite the cast hole. Position the selector spring and ball in the housing. Assemble the selector shaft from the rear of the housing picking up the gear shifter fork, and move the shaft fully into position with the selector ball engaging in one of the two notches on the shaft. Assembly will be facilitated if a tapered pilot is used to compress the ball and spring ahead of the selector shaft.

NOTE.—At Engine No. 1435545 a new main drive shaft sliding gear and selector shaft were introduced to improve gear engagement. The change to the gear increased the length of the small external-teeth from 0.38 in. (9.7 mm.) to 0.44 in. (11.2 mm.) and should it be necessary to replace the previous type gear with one having the longer, small external teeth a current selector shaft must be fitted in place of the one previously used. Similarly, a current selector shaft must not be fitted with the previous type main drive shaft sliding gear.

The selector spring and ball hole in the primary gearbox housing was deepened in production by 0.03 in. (0.8 mm.) at Engine No. 1436181 to prevent any possibility of the spring becoming coil bound. Before fitting a selector shaft to any tractor before this engine number it should be ensured that the spring-loaded selector ball can be pressed below the surface

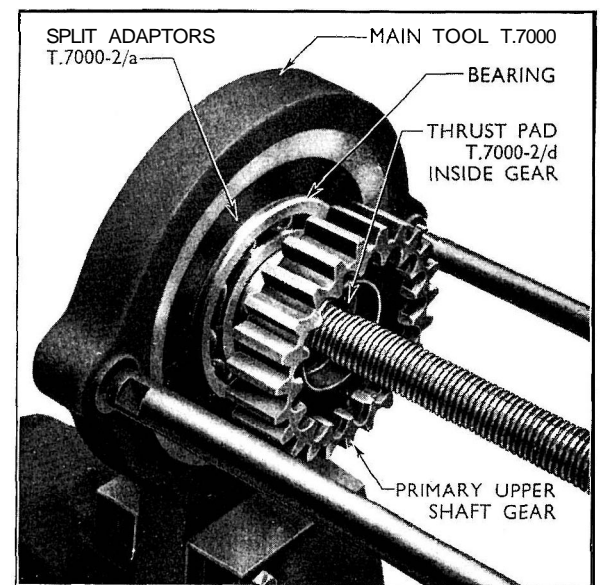


Fig. 37
Replacing Bearing on Primary Upper Shaft Gear
(Live P.T.O. Transmission)

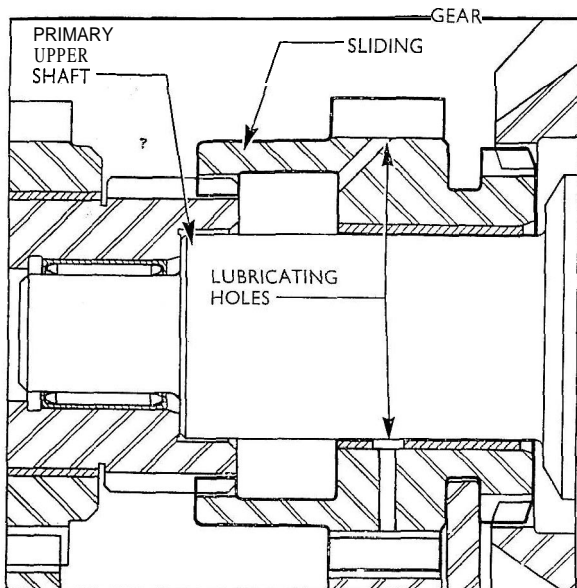


Fig. 38

Section Showing Current Main Drive Shaft Sliding Gear

(Live P.T.O. Transmission)

of the selector shaft bore in the housing, if necessary deepening the hole by 0.03 in. (0.8 mm.) **do not exceed this depth.** A zinc plated selector spring was used initially but a copper plated spring was introduced for the primary gearbox shortly after the introduction of "Live" power take-off.

7. Move the primary lower shaft sliding gear and shifter fork to the tapped hole in the fork into line with the countersunk hole in the selector shaft, fit the shifter fork securing screw, tighten and lock with wire (see Fig. 36).

8. Drive the expansion plug, open end outwards, into the selector shaft bore at the front end of the housing. The plug is located when the outer edge is flush with the housing face.

g. Drive the main upper shaft roller bearing cup into the recessed end of the primary upper shaft gear, using Tool T.7017 with the 550 handle.

NOTE. — From tractor Serial Number 08C 960337 the number of teeth on the primary upper shaft gear has been increased from 23 to 24, at the same time the main lower gear teeth have been changed from 24 to 23. When, in service, a new type primary upper shaft gear is being fitted to a tractor before the above Serial Number a new type main lower gear **must** also be fitted.

10. Fit the split adaptors T.7000-2/a around the primary upper shaft bearing and install the assembly in Main Tool T.7000. Insert the thrust pad T.7000-2/d in the bore at the gear end of the primary upper shaft, position the gear in the bearing bore and press in until fully located (see Fig. 37).

11. Push the selector shaft into the innermost posi-

tion, i.e. with the selector ball located in the second notch from the inner end of the shaft. Place the pulley drive bevel gear into the housing, with the gear hub inside the primary upper shaft bearing bore. Ensure that the Woodruff key is located in the primary upper shaft and assemble the main drive shaft sliding gear onto the primary upper shaft shoulder. Place the shaft and sliding gear in the housing, pass the threaded end of the shaft through the bevel gear bore and locate the sliding gear in the shifter fork.

NOTE. — See previous note concerning main drive shaft sliding gear under reassembly operation 6. In addition, the current main drive shaft sliding gear has two oil holes drilled through from the root of the large gear teeth as shown in Fig. 38 and only this type of gear should be used on Major tractors equipped with "Live" power take-off.

12. Stand the housing on its front face, then position the bevel gear so that the internal gear teeth mesh with the involute dog teeth of the main drive shaft sliding gear. With the shifter fork locating the sliding gear, the primary upper shaft, sliding gear and bevel gear are now positioned for the reassembly of the primary upper shaft gear and bearing assembly.

13. Assemble the primary upper shaft gear and bearing into the housing, adjusting the position of the primary upper shaft to pick up the bore of the gear, mating the Woodruff key with the keyway in the gear (see Fig. 39). It is important that the key is correctly aligned as the gear is pushed in, otherwise there is a possibility that the key will be dislodged.

14. Push the gear and bearing assembly into the housing until the end of the gear abuts the bevel gear.

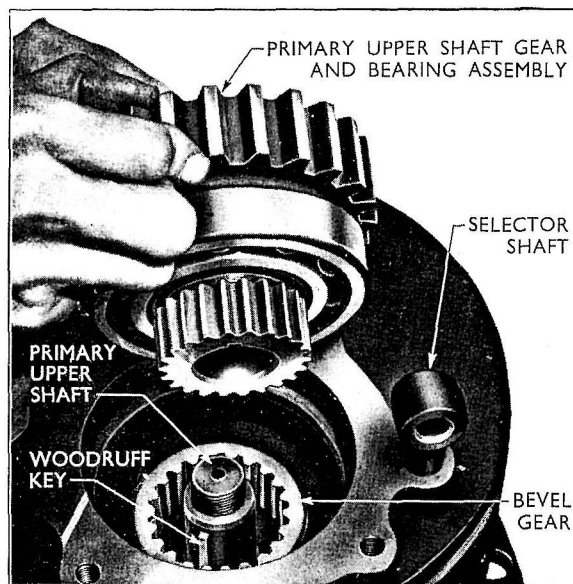


Fig. 39

Installing Primary Upper Shaft Gear and Bearing Assembly

(Live P.T.O. Transmission)

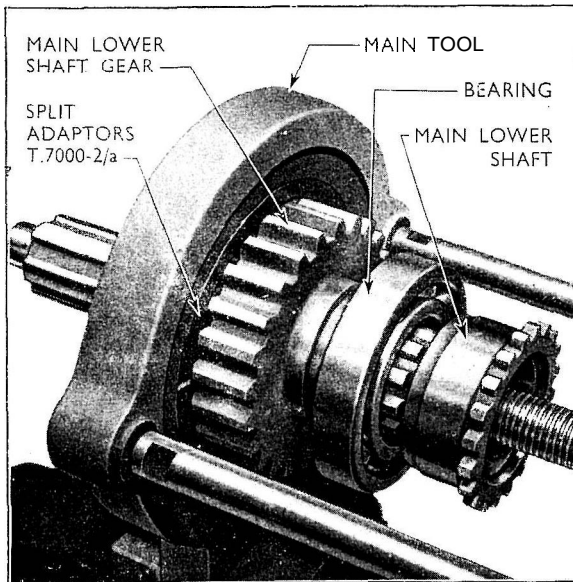


Fig. 40

Replacing Bearing and Gear on Main Lower Shaft

(Live P.T.O. Transmission)

Place one hand through the cast hole in the housing, lift the bevel gear and locate it on the splines of the primary upper shaft gear. Hold the bevel gear and lift the primary upper shaft until the threaded end protrudes through the primary upper shaft gear. Fit the locking nut retainer on the threaded end of the shaft, with the small tongue on the retainer locating in the keyway in the primary upper shaft gear. Fit and tighten the locking nut to 100 lb. ft. (13.8 kg.m.) torque, using the special key Tool T.7030. Bend the edges of the retainer into the four slots in the locking nut.

15. Replace the primary upper shaft bearing locking plate and two securing screws. Tighten the screws and lock with wire.

16. Drive the primary lower shaft roller bearing cup fully into position in the main lower shaft, using tool T.7017 with the 550 handle.

NOTE. — From Tractor Serial Number 08C 960337 the number of teeth on the main lower shaft gear has been reduced from 24 to 23. At the same time the number of teeth on the primary upper shaft have been changed from 23 to 24. When, in service, a new type main lower shaft gear is being jitted to a tractor before the above Serial Number, a new type primary upper shaft gear must also be jitted.

17. Place the main lower shaft ball bearing on the larger splined diameter of the main lower shaft and locate the main lower shaft gear, bearing hub first, on the splines. With split adaptors T.7000-2/a installed in Main Tool T.7000 place the above assembly so that the rear face of the gear locates in the adaptors, and press the shaft partially through the gear. Locate the

bearing on the gear hub and continue to press the shaft through the gear (see Fig. 40) until the bearing is firmly seated between the main lower shaft and the gear hub shoulders. Retain the gear to the shaft with the appropriate circlip.

18. Slide the reverse pinion, gear end first, onto the shaft, followed by the main lower shaft pinion, small flange end adjacent to the flange on the reverse pinion, and carefully tap the roller bearing inner race onto the rear end of the shaft.

19. With the selector shaft still in the innermost position, fit the main lower shaft assembly to the housing (see Fig. 41). As the assembly is replaced it may be necessary to turn the shaft in the bearing to align the involute dog teeth on the shaft with the internal gear in the primary lower shaft sliding gear.

20. Replace the main lower shaft bearing locking plate and two securing screws with the square end of the plate towards the selector shaft. Fully tighten the screws and lock with wire.

21. The procedure for the next operation is governed by the presence, or absence, of a transmission brake.

(a) If a transmission brake is fitted:—

The brake incorporates seven stationary and five revolving plates; the stationary plates anchor between the pins located one either side of the idler gear shaft and the revolving plates locate on the splined idler gear hub.

NOTE. — From tractor serial number 08C 960337 the assembly of the reverse idler gear and hub (tractors with handbrake only) has been changed. In the previous assembly the gear was retained on the hub by a press fit, on the new assembly the gear is positively retained on the

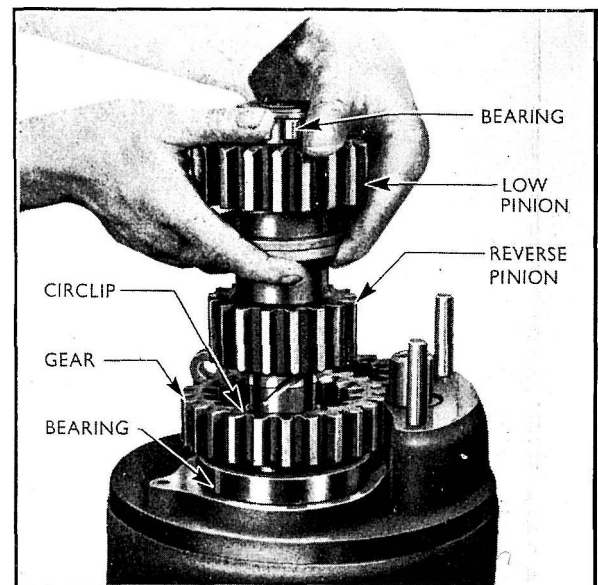


Fig. 41

Installing Main Lower Shaft Assembly

(Standard and Live P.T.O. Transmissions)

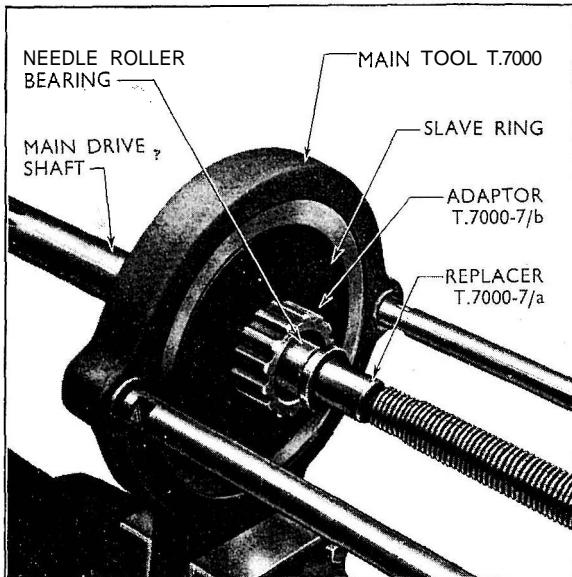


Fig. 42

Installing Needle Roller Spigot Bearing in Main Drive Shaft

(Live P.T.O. Transmission)

hub by a circlip. Although the individual parts of the current and previous gears and hubs cannot be interchanged, in service, the complete assemblies are fully interchangeable.

Position one stationary brake plate against the face of the housing and slide the reverse idler gear and hub assembly onto the shaft, with the recessed face of the gear against the brake plate. Starting with another stationary brake plate, alternate stationary and revolving plates until the remaining six stationary and five revolving plates are located as described.

Fit the transmission brake shaft through the idler gear shaft, making the assembly from inside the housing. Position the small coil spring and locate the spring retainer on the square portion of the brake shaft with the locating spigot for the large conical spring away from the housing. Turn the retainer and shaft until the retainer can be anchored between the pins.

Replace the conical spring, with the larger end located on the retainer spigot, and fit the transmission brake adjusting nut. Tighten the nut until the distance from the inner face of the housing front flange to the radiused end of the nut measures 13.870 in. (352.3 mm.) to 13.895 in. (352.9 mm.). Lock the transmission brake adjusting nut with a new split pin.

(b) If no transmission brake is fitted:—

Make the spigoted washer on the idler gear retaining bolt, with the large diameter against the head of the bolt. Fit the bolt through the hollow idler gear shaft, making the assembly from inside the housing, so that

the small spigot diameter of the washer locates in the bore of the idler gear shaft.

Place the reverse idler gear in position on the shaft, with the gear hub facing away from the housing and fit another spigoted washer at the threaded end of the bolt, locating the small spigot diameter in the bore of the idler gear shaft. Fit and fully tighten the self-locking nut.

22. When fitting a new needle roller spigot bearing to the main drive shaft, pass the shaft through the ring adaptor T.7000-7/b until the face of the large spline abuts the adaptor. Install the slave ring in Main Tool T.7000 and place the shaft and adaptors within the slave ring. Locate the bearing on the replacer T.7000-7/a with the end of the bearing having the stamped identification marking against the shoulder of the replacer, and position in the tool so that the bearing is adjacent to the main drive shaft bearing bore (see Fig. 42). Press the bearing into the bore until the flange face of the replacer abuts the counterbore face in the shaft.

NOTE.—It is important to adhere to the above procedure when replacing this bearing and it is essential that the bearing should be inserted to the correct depth. Do not in any circumstances attempt to seat the bearing by forcing it onto the inner face of the bearing bore.

23. Place the ball bearing and oil seal sleeve (chamfered corner of the outside diameter away from the bearing) onto the power take-off input shaft, followed by the ring adaptor T.7000-6/a, so that the end of the sleeve locates in the counterbore in the adaptor. Fit the slave ring to Main Tool T.7000 and install the

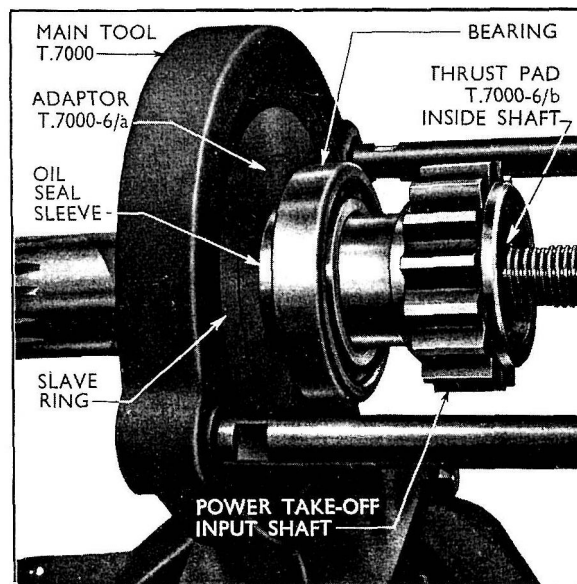


Fig. 43

Replacing Bearing and Oil Seal Sleeve on Power Take-Off Input Shaft

(Live P.T.O. Transmission)

ring adaptor and shaft in the slave ring. Place the thrust pad T.7000-6/b in the bore at the gear end of the shaft, press the shaft into the bearing and sleeve (see Fig. 43) and retain with the appropriate circlip.

24. Slide the main drive shaft through the hollow power take-off input shaft until fully located. The main drive shaft should be allowed to feel its way into position to prevent damage to the power take-off input shaft bushes.

25. At Engine No. 1493622 a spring-loaded rubber oil seal was introduced to replace the composition oil seal packing and steel retainer used in the bore of the power take-off input shaft. The current rubber seal can be used as a direct replacement for the previous packing and retainer, but in all cases the following procedure must be adopted to ensure that the oil seal is not damaged and that it is inserted to the correct depth in the input shaft.

Place the main drive shaft and power take-off input shaft assembly in an upright position with the face of the involute splined diameter of the main drive shaft resting on a suitable piece of wood. Install the driver T.7094/a over the end of the main drive shaft to contact the front bush of the power take-off input shaft and using a hide mallet drive the bush into the shaft until the shoulder of the driver contacts the end of the input shaft (see Fig. 44(a)). This relocation of the

bush should be necessary only if a composition oil seal packing and retainer were removed at the time of dismantling; current production input shafts have the bush correctly positioned. After ensuring that the power take-off input shaft front bush is correctly located, remove the driver and check that the main drive shaft can be rotated freely within the input shaft.

With the shafts still resting on the piece of wood, remove the protector T.7094/e from the pilot sleeve T.7094/b and fully locate the sleeve on the main drive shaft. Thoroughly lubricate the oil seal and the outside diameter of the pilot sleeve—this is most important. Slide the oil seal, sealing lip first, over the sleeve and install the collar T.7094/d against the shoulder of the driver T.7094/a. Locate the driver on the pilot sleeve and, again using a hide mallet, drive the seal into position in the input shaft. The collar and driver ensure that the seal is located at the correct depth in the input shaft (see Fig. 44(b)) and under no circumstances should the tool previously used to fit the oil seal packing and retainer be used to drive the current seal onto the front bush of the input shaft.

NOTE.—Having correctly installed the oil seal, the two shafts should be kept in the fully assembled position otherwise the seal may be damaged.

26. Move the selector shaft to the outermost position

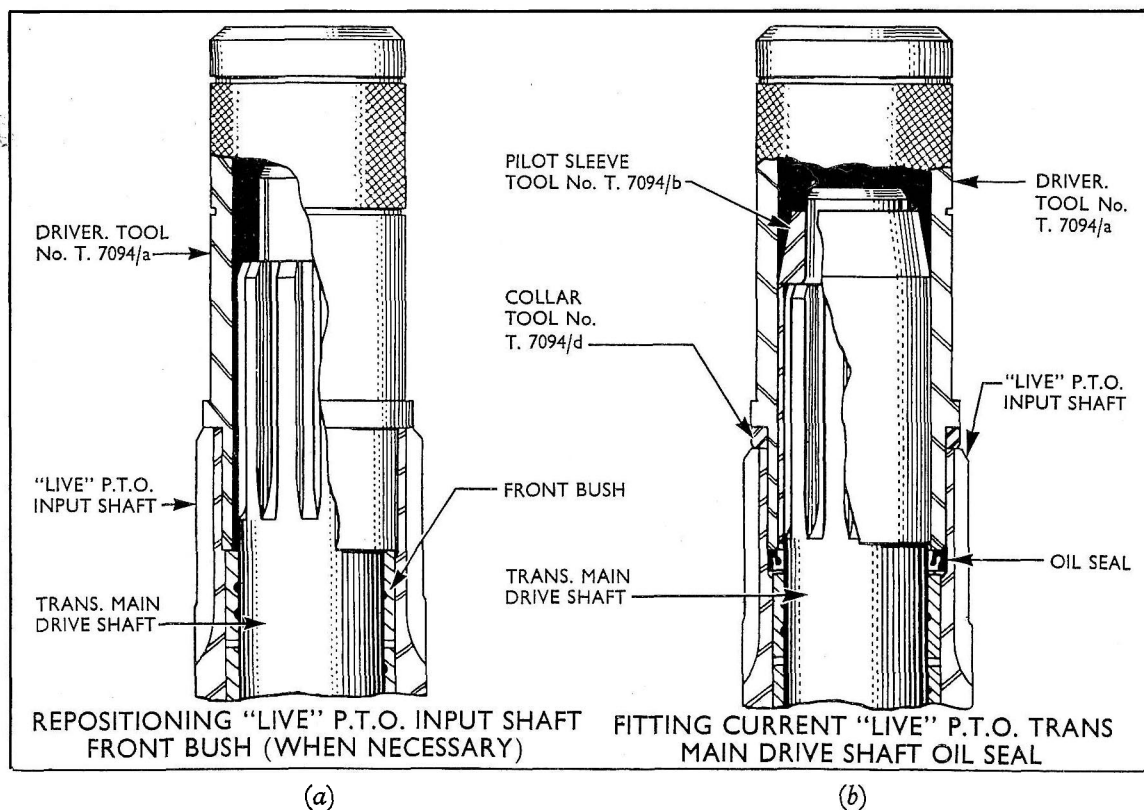


Fig. 44
Using Tool Number T.7094 (Live P.T.O. Transmission)

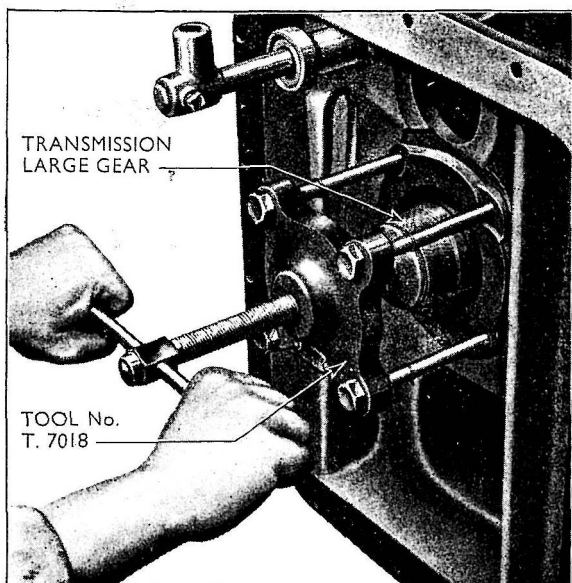


Fig. 45

Removing the Transmission Large Gear

and place the gearbox on its side. Ensure that the circlip is positioned in the power take-off input shaft bearing bore (in the gearbox housing), and install the main drive shaft and power take-off input shaft assembly in the housing as one unit.

It will be necessary, as this assembly is replaced, to mesh the power take-off shaft gear with the power take-off driving gear, and then align the involute splines on the main drive shaft with the internal involute splines in the main drive shaft sliding gear. The assembly is fully located when the power take-off input shaft bearing abuts the circlip in the housing bore.

27. When fitting a new oil seal to the power take-off input shaft oil seal retainer, locate the oil seal against the shoulder of Tool T.7031, ensuring that the lip of the seal faces towards the shoulder. Assemble the 550 handle to the tool and drive the oil seal onto the shoulder of the retainer counterbore.

28. Fit a new gasket to the oil seal retainer. Slide the retainer, complete with oil seal, over the power take-off input shaft and locate the spigot diameter in the power take-off input shaft bearing bore. Fit the four securing screws, tighten fully and lock with wire.

To Dismantle the Main Gearbox — Standard and Live Transmissions

1. Remove the primary gearbox as previously described.
2. Remove the split pin and locking tab and unscrew the transmission large gear retaining nut. Remove the lockwasher and sleeve.
3. Remove the four seal retainer bolts and screw the four legs of Tool No. T.7018 into the holes — line up

the transmission handbrake cam to allow for transmission large gear removal. Tighten up the centre screw of the tool and push the large transmission gear halfway out of the housing (see Fig. 45) sufficiently to allow the upper main shaft assembly to be eased forward to remove the upper main shaft gear bearing from its location. Lift out the upper main shaft assembly.

4. Continue with transmission large gear removal applying a steady pressure with the tool (**do not** attempt to remove the large gear **by** shock methods otherwise there is a risk of damage to the threads) hence remove the retainer and oil seal, oil baffle and large bearing.

5. Remove the large bearing cup if necessary, also the welch plug from the large transmission gear rear bearing recess.

6. Remove the small bearing from the end of the upper main shaft using Tool No. T.7015 and adaptors T.7015-1, slide the low gear and shaft pinion off the shaft. Withdraw the large bearing from the shaft using Tool No. T.7000-5, with main tool No. T.7000.

NOTE.—From Tractor Number 08B 767745 the rear bearing abutment boss on the gearbox upper shaft has been increased in diameter. On the latest shaft due to this increased diameter it is not possible to remove the rear bearing with Tool No. T.7000 and adaptor number T.7000-5.

As however, it is considered unlikely that the bearing will be required to be removed unless it is scrap and being replaced by a new one, the following removal procedure is recommended.

- (a) Break the cage and extract the rollers.
- (b) Grind a flat on the inner race of the bearing to reduce the section until only 0.020 to 0.030 in.

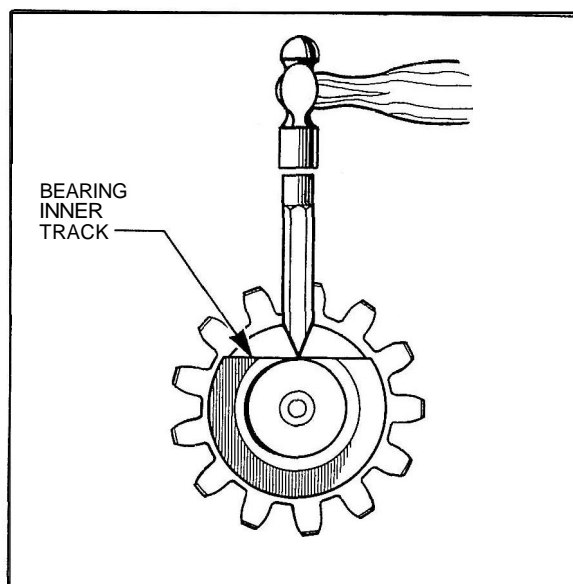


Fig. 46

Upper Shaft Rear Bearing Removal

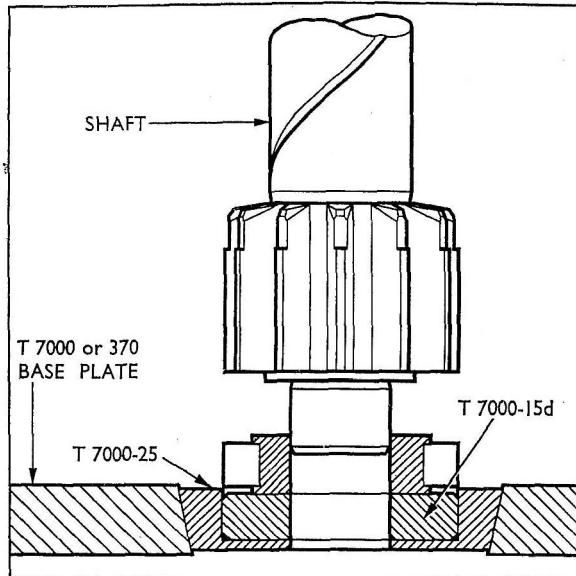


Fig. 47

Fitting Main Upper Shaft Rear Bearing

(0.508 to 0.762 mm.) approximately of the bearing remains over the shaft. (See Fig. 46.)

- (c) Split the track at the centre of the flat with a sharp blow of a chisel.
 - (d) The track can now be removed without damage to the bearing journal on the shaft.
7. Remove the main gear selector shaft and oil seal assembly by unscrewing and removing the retaining screw of the connector then slide the selector and socket out to the rear and withdraw the oil seal.
 8. If it is necessary to remove the transmission handbrake and shaft, drill out the rivet or punch out the tension pin and withdraw the shaft.

To Reassemble the Main Gearbox — Standard and Live Transmissions.

1. Fit the selector shaft oil seal—lip towards gearbox and enter the selector shaft and socket into position, wire locking the retaining screw, then fit the selector fork and wire lock the retaining screw.

2. If the transmission handbrake lever and shaft has been removed, refit and rivet securely.

NOTE. — From Tractor Serial Number 08C 960337 a new main upper shaft gear having eleven gear teeth as against thirteen on the previous type shaft has been introduced. This has necessitated modifications in the tooth form, but not the number of teeth, on the transmission large gear. The new transmission large gear can be identified by an overall diameter of 7.368 in. (18.7 mm.) as compared to the old gear overall diameter of 7.135 in. (18.3 mm.); and also the number of internal dog teeth on the upper shaft low gear has been changed from 13 to 11 to mesh with the new main upper shaft gear.

The new main upper shaft, low gear and large transmission gear are not individually interchangeable with those used previously, both new and old types being available for service.

Locate the transmission large gear bearing, oil baffle and new oil seal and retainer and secure with four bolts, then drive the large transmission gear half-way into the bearing using Tool No. T.7019.

Ensure that the handbrake lever cam is positioned to provide clearance.

3. Press the large bearing onto the rear of the main upper shaft using Tool No. T.7000 and the adaptors shown in Fig. 47.

NOTE. — On tractors before engine No. 1531530 (approx.) this was a ball bearing. Current tractors are fitted with a roller bearing at this location.

Install the low gear and upper shaft pinion (selector flanges together) on the main upper shaft and drive the inner race of the small roller bearing onto the front end of the shaft. Place this assembly in position so that the inner and outer races of the small roller bearing are aligned, then continue to drive the transmission large gear into position. Care should be taken to ensure that the large gear and its bearing are correctly driven into position, as end-float in these components can lead to failure of the gearbox rear oil seal.

Locate the sleeve and fit the locking washer, engaging the tongue with the groove in the gear. Screw on the locknut and tighten fully, locking nut in position with the locking tab.

4. Complete the assembly by re-fitting the primary gearbox assembly.