

## REAR TRANSMISSION — REAR AXLE

The rear axle is of the semi-floating type with a spiral bevel drive pinion and crown wheel as shown in the section view, Fig. 168.

The drive pinion is splined into the front transmission large gear and is supported by two large adjustable taper roller bearings. A four-pinion type differential is rivetted to the crown wheel, the four pinions being in mesh with their two gears which are splined to accommodate the bull pinion shafts. The bull pinion gears mesh with the large reduction gears which are splined to the rear axle shafts.

The axle shafts are mounted in taper roller bearings and a flange formed integral with the shaft provides a mounting for the rear wheel.

The crown wheel and large reduction gears are partially submerged in oil whilst lubrication to the differential and drive pinion bearings is obtained by oil collected on the periphery of the crown wheel being deflected into an oil scoop and passed along suitable piping, also through a duct to the drive pinion bearings.

A dipstick for checking the oil level is situated on the left-hand side at the rear of the gearbox housing. The filler plug is on the rear axle cover plate (when hydraulic equipment is fitted the filler plug is located in the top of the rear cover

plate. The drain plug is in the pump pedestal or the cover plate, at the bottom of the housing).

The axle shaft and bull pinion shaft outer bearings are lubricated by means of grease through the grease nipples provided.

### REAR WHEELS

#### Rear Wheel Width Adjustment

Rear wheel width may be altered in stages of 4 ins. (101.6 mm.) by suitably mounting the wheels and wheel discs as shown in Fig. 166.

The wheel disc is offset with respect to the axle shaft flange and may be reversed, in conjunction with the wheel rim which has spoke mountings, also offset in relation to the wheel centre to give the following track widths:—

52 ins. (132 cm.)	56 ins. (142.2 cm.)	60 ins. (152.4 cm.)
64 ins. (162.6 cm.)	68 ins. (172.7 cm.)	72 ins. (182.9 cm.)

In track widths 52 ins., 56 ins. and 60 ins. the wheel disc has the dished part towards the tractor, whilst for 64 ins., 68 ins. and 72 ins. the dish is outwards, or away from the tractor. The wheel itself may be reversed and bolted to the outer or inner face of the disc as illustrated in Fig. 166.

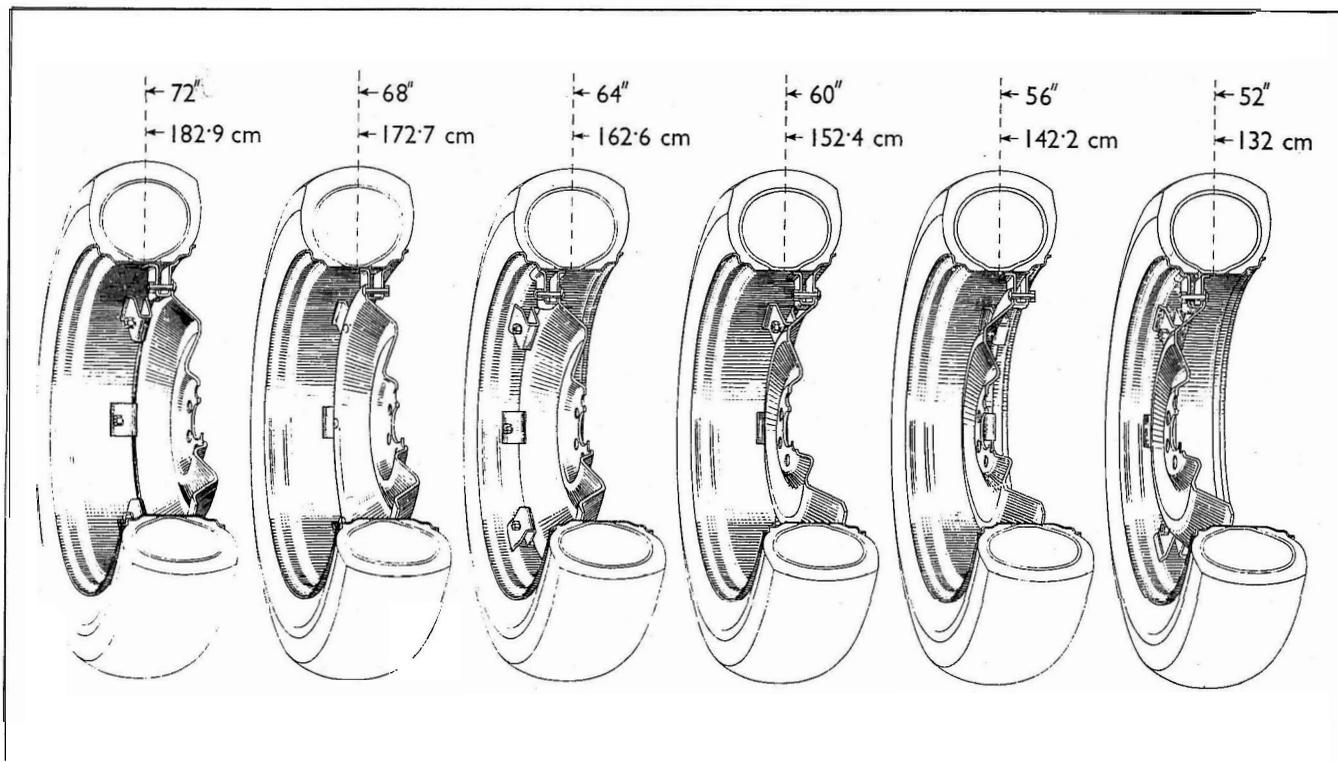


Fig. 166  
Rear Wheel Width Adjustment

To Remove the Rear Wheels

- 1 Apply the brakes and place the jack in position beneath the rear axle shaft housing. Loosen the six wheel nuts.
- 2 Jack up the axle housing just sufficient to ease the wheel off the studs after the wheel nuts and washers have been removed. Take care not to damage the threads by allowing the weight of the wheel to be taken on the studs.

To Replace

- 1 Ensure that the flange of the axle shaft on the mating surfaces is clean, then place the wheel in position so that the studs on the flange of the shaft enter the counterbore. Take care not to damage the wheel stud threads when mounting the wheel in position.
- 2 Install the washers on the studs with the taper to the wheel, replace the nuts and tighten them up a little at a time diagonally across the circle. When securely tightened, remove the jack. After the tractor has been in use for a short period, the nuts should be checked for final tightness.

To Remove the Drawbar

- 1 Detach the two drawbar guide bracket pins and lynch pins.
- 2 Support the front of the drawbar, unscrew the four bolts retaining the front pin and housing. Lift the assembly away from the tractor.

To Replace the Drawbar

- 1 Fit the drawbar to the drawbar guide brackets and secure with two bracket pins and-lynch pins.

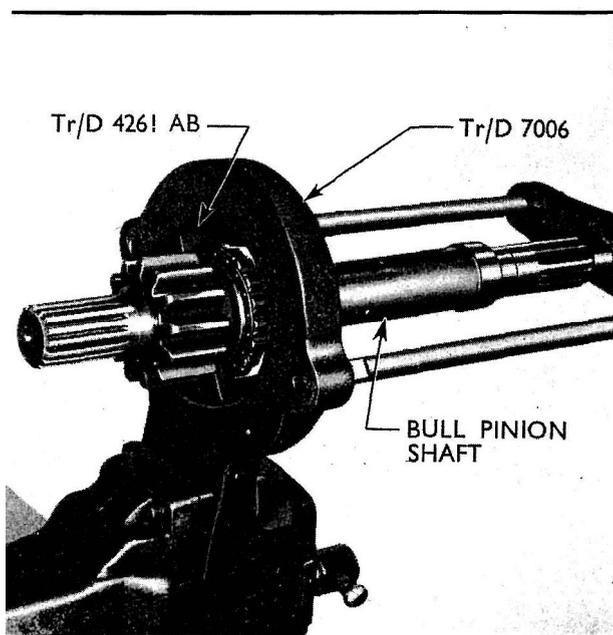


Fig. 167  
Removing Bull Pinion Shaft Bearings

- 2 The drawbar can now be pivoted at the bracket pins and supported at the front end so that the front pin and housing can be retained with the four bolts.

Removing Bull Pinion Shaft and Bearings

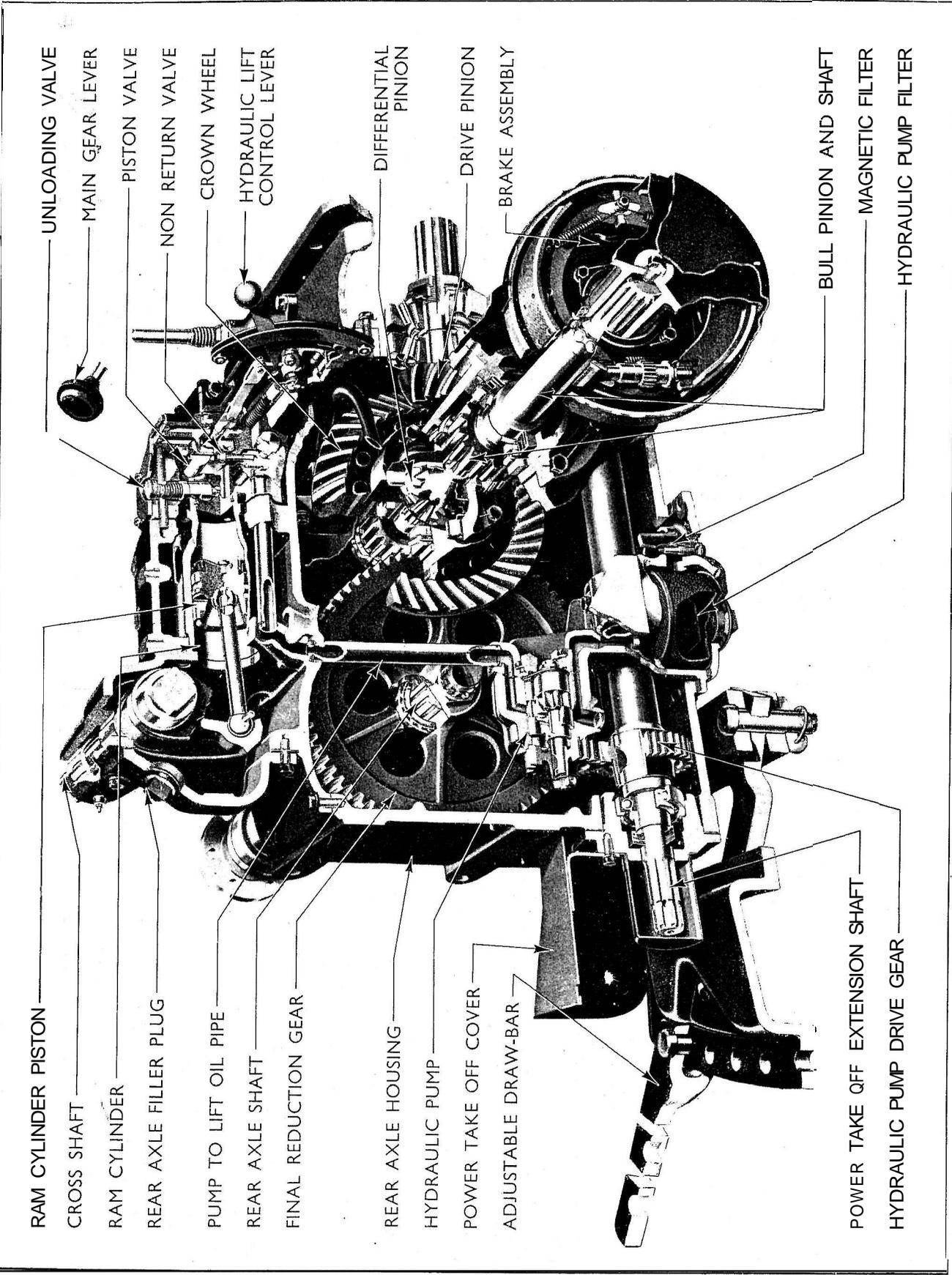
- 1 Drain or lower the rear axle oil level by removing the drain plug in the hydraulic pump pedestal or cover plate in the bottom of the housing, below the level of the bull pinion housings.
- 2 Remove the rear wheels as described above.
- 3 Disconnect the battery, brake cable, uncouple the side lamp looms and remove the mudguard and rear foot plate.
- 4 Remove the locking wire and six bolts securing the bull pinion and brake extension housing assembly to the rear axle housing. The two lower bolts retain the brake cable conduit support. Withdraw the assembly, taking care not to disturb the bull pinion housing in the rear axle.

Dismantling the Brake Extension Housing Assembly

- 1 Remove the brake drum cover (three screws), brake drum (one bolt and a plain washer) and brake plate assembly (four bolts and a locking wire). (See "Braking System.")
- 2 Stand the assembly with the large flange to the bottom and gently drive out the shaft. Next, remove the circlip and inner bearing from the shaft using the tool No. Tr/D 7006, with the adaptors Tr/D 4621-AB. (Reverse the shaft in the tool to fit the new bearing.)
- 3 Remove the outer oil seal, detach the circlip and extract the bearing.
- 4 Detach the inner oil seal from the housing.

To Reassemble

- 1 Using tool No. Tr/7006 with Tr/D 4261-AB adaptors, refit or renew the inner bearing to the bull pinion shaft and retain with a circlip.
- 2 Fit a new inner bearing oil seal into the housing (large flange end), using tool Nos. 550 and Tr/D 2773-B, with the lip of the seal towards the handle.
- 3 Reverse the housing (large flange downwards) and fit a new outer bearing. Retain in position by means of a circlip fitted in the groove in the housing.
- 4 Locate the outer bearing oil seal (the lip away from the handle), using tool No. Tr/D 2217-B, then drive the seal into the housing until the tool contacts the bearing. With the tool still in position, stand it on end, enter the bull pinion shaft into the housing and gently locate it in the outer bearing.



Sectioned View of Rear Transmission

Fig. 168

- 5 Refit the brake plate assembly to the housing and secure with four bolts and locking wire.
- 6 Refit the brake drum to the splines of the bull pinion shaft and secure with a bolt and flat washer. If necessary, the brakes can be centralised and adjusted as described in the appropriate section in the "Braking System." Refit the brake drum cover and secure with three screws.

### Reassembling the Brake and Bull Pinion Extension Housing to Rear Axle

- 1 Locate the bull pinion and brake extension housing assembly, and secure with the six bolts and locking wire. The lower two bolts also secure the brake cable conduit support.
- 2 Reconnect the brake cable as described in the "Brake" section, and secure with a pin and split pin.
- 3 Replace the rear foot plate and secure with retaining bolts and nuts.
- 4 Refit the mudguard with the two mudguard to axle shaft housing bolts and the three mudguard to foot-plate bolts.
- 5 Install the rear wheel, taking care not to damage the threads of the studs. Fit the washers with the taper to the wheel, then secure the wheel with the six wheel nuts as described on page 138.
- 6 Remove the jack and top up the axle with oil of the approved grade and to the correct level.

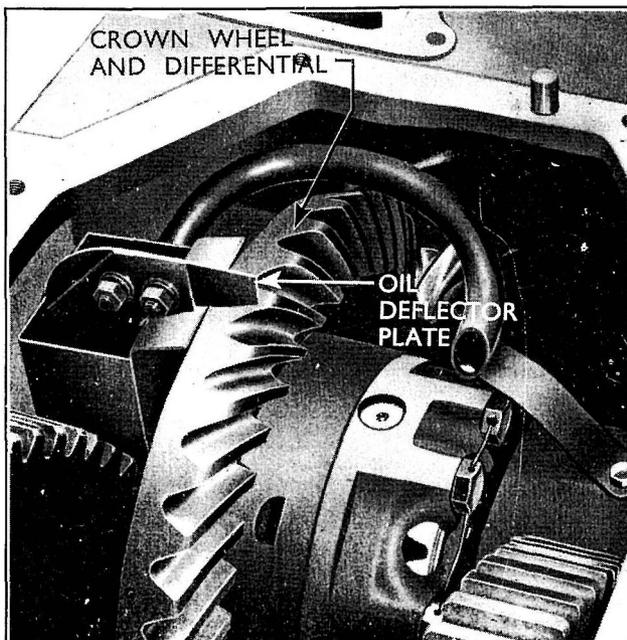


Fig. 169  
Oil Deflector Plate

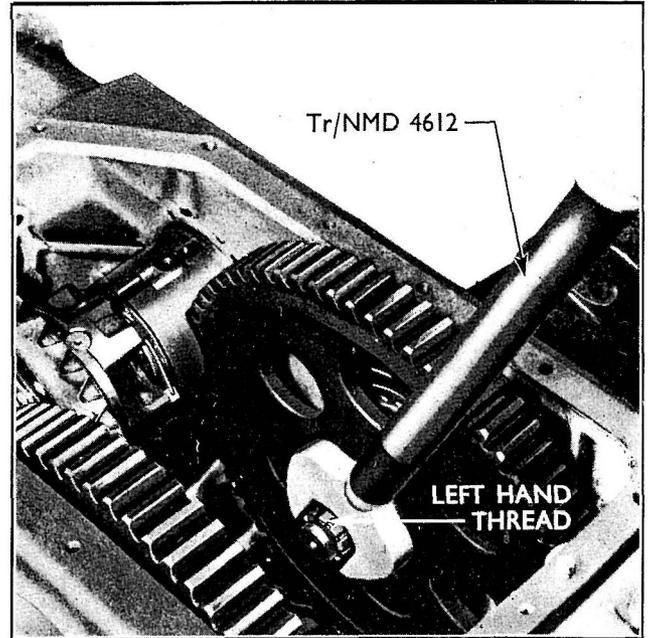


Fig. 170  
Pitting the Large Reduction Gear

### To Remove Bull Pinion Housing and Bearing Cups

- 1 Remove the axle shaft, large reduction gear and brake extension housing assembly as described above.
- 2 Remove the three bolts securing the oil deflector assembly to the bull pinion housing.
- 3 Withdraw the bull pinion housing from the axle housing. If necessary, the bull pinion housing may be withdrawn by means of the two bolts inserted in the tapped holes provided. (If both bull pinion housings are to be removed, proceed as follows:—

Remove one bull pinion housing, then remove the crown wheel before removing the second bull pinion housing.)

After a bull pinion housing has been removed, count the number of shims fitted between the rear axle and the bull pinion housing.

- 4 Remove the bearing cup out of the housing.

### To Replace Bull Pinion Housing and Bearing Cups

- 1 Refit the bearing cup into the bull pinion housing.
- 2 If both bull pinion housings have been removed, refit the right-hand side housing first by fitting the original number and thickness of shims and securing the housing with two bolts. Next replace the crown wheel.
- 3 Fit the locating studs (tool No. Tm/N 4301) to the rear transmission housing and then refit the left-hand bull pinion housing, together with the correct number and thickness of shims and secure with two bolts.

- 4 With a feeler blade, check for 0.004 in. to 0.018 in. backlash between the crown wheel and pinion. Backlash can be adjusted by moving the shims between the bull pinion and rear axle housings from one side to the other, i.e., if the backlash exceeds 0.018 in., removing shims from the left-hand side will decrease the backlash.

If the backlash is less than 0.004 in., moving the shims from the right-hand to the left-hand side bull pinion housing will increase the backlash. Shims of 0.003 in. and 0.005 in. thickness are available, but at all times the total shim thickness between the bull pinion housing and the rear axle housing must be 0.016 in.

- 5 Refit and pre-load the axle shaft and large reduction gear as described below.
- 6 Refit the bull pinion and brake extension housing assembly.
- 7 Refit the oil deflector assembly to the bull pinion housing and secure with three bolts and spring washers. Check for 0.004 in. clearance between the oil deflector plate and the periphery of the crown wheel, adjust, if necessary, by moving the plate in the elongated holes (see Fig. 169).
- 8 Refit the rear axle cover plate, mudguard(s), wheel(s) and linkage as described in the appropriate sections.

### To Remove Axle Shaft

- 1 Drain or lower the rear axle oil level by removing the drain plug in the bottom of the housing, so that it is below the axle shaft housing.
- 2 Remove the rear wheel as described on page 138. If the tractor is fitted with hydraulic equipment, disconnect the lifting rods from the lift arms as described in the "Hydraulic System" Section.
- 3 Remove the rear axle top cover. (See "Hydraulic Section" if hydraulic system is fitted.)
- 4 Remove the split pin and castellated nut (left-hand thread) retaining the large reduction gear to the axle shaft (tool No. Tr/NMD 4612, see Fig. 170).
- 5 Lift the lip of the axle shaft seal retainer from the axle shaft housing and then withdraw the axle shaft from the housing. Whilst the axle shaft is being withdrawn from the large reduction gear, it is advisable to support this gear.

### To Replace Axle Shaft

- 1 Remove the brake extension housing (see page 138) to facilitate adjusting the shaft bearing pre-load on reassembly. Enter the shaft into its housing,

supporting the large reduction gear whilst the axle shaft splines enter those in the large reduction gear.

- 2 Secure the shaft with the castellated nut, using the tool No. Tr/NMD 4612, and then pre-load the axle shaft bearings to 40 to 45 in. lbs., using tool No. Tr/MD 4235, as illustrated in Fig. 171, after which the castellated nut should be secured with a split pin and the oil seal retainer staked to the rear axle housing. Replace the brake extension housing (see page 140).
- 3 Fit the rear wheel as described on page 138, and refill the axle housing with the approved grade of oil to the correct level and then refit the top cover plate (and linkage if fitted), as described in the "Hydraulic System" section.

### To Remove Axle Shaft Outer Bearing and Oil Seal

- 1 Remove the axle shaft as described above.
- 2 Locate the bearing remover so that the puller end fits behind the bearing cone and clear of the oil seal retainer. Pull off the bearing when the oil seal retainer can be removed.

### To Replace Axle Shaft Outer Bearing and Oil Seal

- 1 Refit the oil seal retainer, felt, seal and bearing, using tool No. Tr/MD 4221-B1, to draw the bearing into position.
- 2 Fit a new cork gasket over the axle shaft and position it in the oil seal retainer, then refit the shaft as described above.

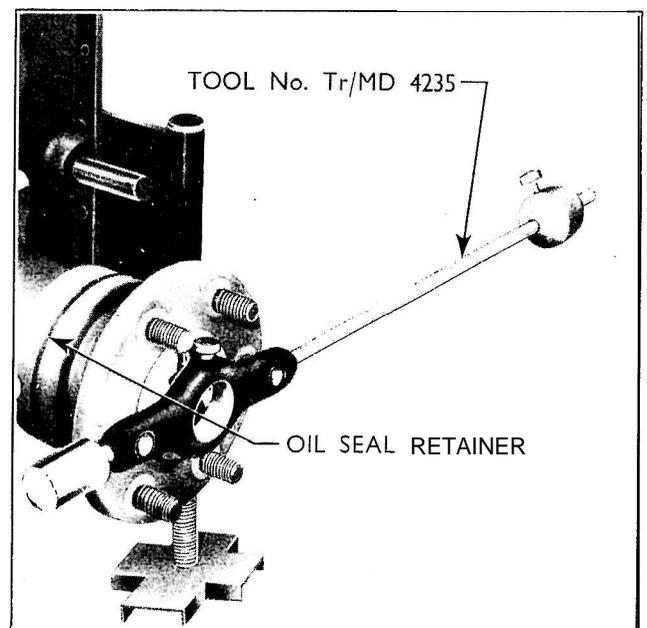


Fig 171  
Checking Rear Transmission Shaft Pre-load

### AXLE SHAFT BEARINGS AND CUPS

#### To Remove

- 1 Disconnect the battery positive terminal and the side lamp loom.
- 2 Remove the two bolts retaining the check chain bracket to the axleshaft housing.
- 3 Remove the mudguard and foot plate as a unit by unscrewing the two mudguard to axle housing bolts and nuts, two foot plate to bull pinion extension housing bolts and nuts and two gearbox to rear axle flange bolts and nuts.
- 4 Remove the silencer tail pipe by unscrewing the two bolts and nuts.
- 5 Remove the rear wheel and axle shaft as described on pages 138 and 141 respectively.
- 6 Remove the axle shaft housing retaining bolts and ease the housing out of the rear axle.
- 7 Withdraw the inner cup from the housing, using the tool No. Tr2/MD 4220/2A2 as shown in Fig. 172, and the tool No. Tr2/MD 4220/2A2 for the outer cups as illustrated.
- 8 Remove the bearing from the large reduction gear, using tool No. Tr2/NMD 4220-A1. Insert the adaptor in the splined hole of the gear and the tool claws fitted under the bearing, apply the centre screw to remove the bearing as shown in Fig. 173.

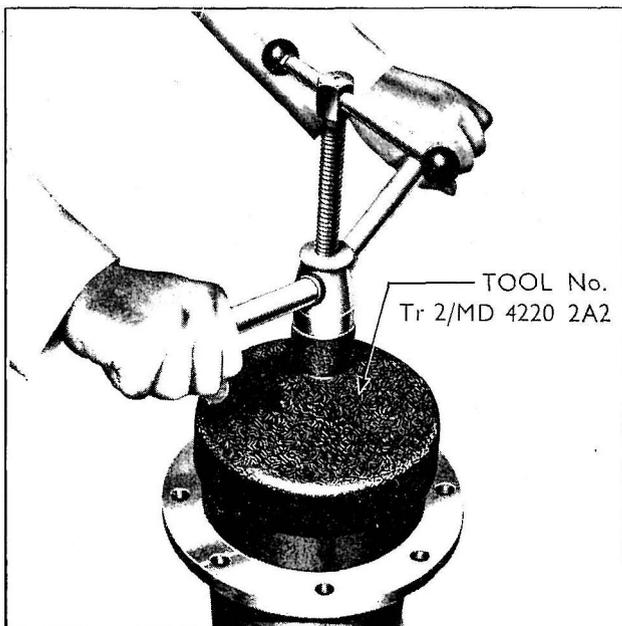


Fig. 172  
Removing Axle Shaft Inner Cups

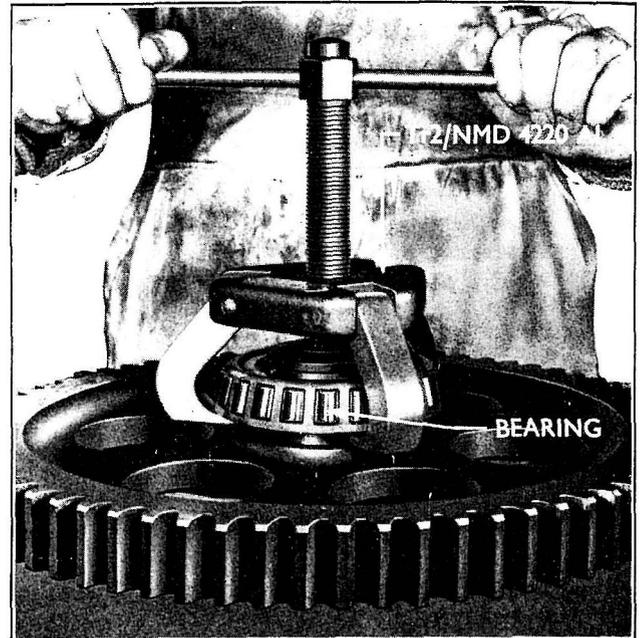


Fig. 173  
Removing Large Reduction Gear Bearing

#### To Replace

- 1 Replace the bearing on the large reduction gear, using tool No. Tr/MD 4220-B1.
- 2 Fit the inner- and outer bearing cups on the axle housing. The tool No. Tr/MD 4220/2B2 permits both cups to be replaced simultaneously (see Fig. 174.)
- 3 Fit the axle housing guide studs (TTr/MD 6050) to the rear axle housing, locate a new gasket and securely mount the axle shaft housing to the rear axle housing with the seven bolts.
- 4 Re-attach the silencer tail pipe bracket to the rear axle shaft housing and secure by means of the nuts, bolts and spring washers.
- 5 Refit the check chain bracket to the axle shaft housing and secure by the two bolts and spring washers.
- 6 The mudguard and foot plate can now be fitted as an assembly, and retained by the two mudguard to axle housing bolts and nuts, two foot plate to bull pinion extension housing bolts and nuts, two gearbox to rear axle flange bolts and nuts.
- 7 Reconnect the side lamp loom and the battery positive terminal.
- 8 Refit the rear wheels as described on page 138.

#### To Remove the Rear Transmission

Note — Details in respect of removing the rear transmission from the front transmission are also given on pages 115 to 118 “Separating the Tractor.”

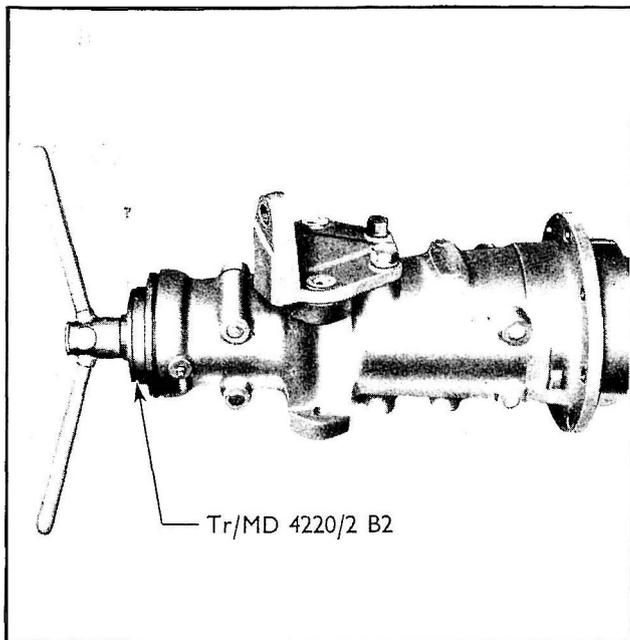


Fig. 174  
Fitting the Shaft Bearing Cups

- 1 Drain oil from the rear axle by removal of the drain plug from the base of the housing.
- 2 Withdraw the power take-off extension shaft as described in the "Power Take-off" Section.

Note — The oil will drain from this aperture.

- 3 Place the front axle wedge tool No. Tr<sub>7</sub>NMD 3004 in position, and then locate the dismantling stand in position by laying the rails under the centre of the tractor, positioning the gearbox support, rear axle front support and jack. (If a power take-off is fitted, disconnect the operating link.)
- 4 Remove the clutch pedal retracting spring and disconnect the clutch pedal to fulcrum lever rod. Remove the pedal stop.
- 5 Disconnect the left-hand and right-hand foot brake pedal cables.
- 6 Remove the brake pedal cotter pin, retracting pin and withdraw the pedal sufficiently to allow the top of the pedal to clear the gearbox flange.
- 7 Disconnect the battery terminal and uncouple the side lamp looms.
- 8 Remove the mudguards and foot plates as a unit by unscrewing the two mudguard to axle housing bolts and nuts, two foot plate to bull pinion extension housing bolts and nuts and two gearbox to rear axle flange bolts and nuts.
- 9 Detach the silencer tail pipe bracket by unscrewing the two bolts and nuts.
- 10 Remove the main gear lever and housing by unscrewing the four bolts.

- 11 Remove the tail lamp assembly, then the remaining gearbox to rear axle flange bolts and nuts and separate the gearbox from the rear axle. Position the rear axle front support (part of the dismantling stand).
- 12 Remove the rear wheels as described on page 138.
- 13 Lift the rear transmission top cover from the housing after removing the retaining bolts, using the lifting eyebolt Tr D 994781.

Note — With hydraulic equipment, the top cover is integral with the ram cylinder housing (see "Hydraulic System" Section).

- 14 If hydraulic system is fitted, remove the hydraulic pump feed pipe. Lift the hydraulic pump from the pedestal after removing the three retaining bolts.
- 15 Remove the pump pedestal and oil filter from the base of the rear axle housing.
- 16 Unscrew the three bolts and remove the differential and drive pinion oil deflector from the pinion housing.
- 17 Remove the brake extension housing and brake assemblies by unscrewing and removing the six wired bolts (see page 140).
- 18 Remove the axle shafts and large reduction gears as described on page 141.
- 19 Remove the bull pinion housings and lift out the crown wheel and differential. Remove the thrust pad.
- 20 Withdraw the drive pinion assembly from the housing after unscrewing the six retaining bolts. Do not drive out.

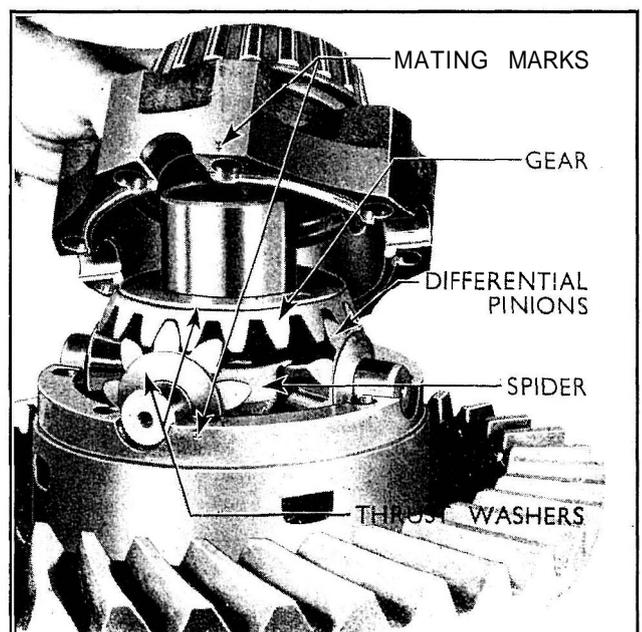


Fig. 175  
Assembling Crown Wheel and Differential

**To Dismantle the Crown Wheel and Differential**

- 1 To separate the differential housings, remove the eight wired bolts, note that the housings are marked (see Fig. 175).
- 2 Lift out the differential spider, gears, pinions and thrust washers.
- 3 Two holes are provided in the crown wheel side of the differential case to enable the bearing cone to be driven off. Remove the other bearing, using suitable equipment.

*Note — The crown wheel is rivetted to the differential case and should not be detached.*

**To Reassemble the Crown Wheel and Differential**

- 1 Refit the bearings to the differential case, using tool No. TTr/VMD 4221-B1.
- 2 Locate the differential gear thrust washers and position the gear in the cage.
- 3 Fit a pinion and thrust washer on each arm of the spider and locate in position, bolting the two halves of the differential together with the mating marks in line. Ensure that the bolts are securely tightened and wire the heads of the bolts.

**To Dismantle the Drive Pinion**

- 1 Remove the locknut, lockwasher, adjusting nut and thrust washer.
- 2 Push the pinion out of the housing, supporting the latter firmly. Lift out the front bearing.

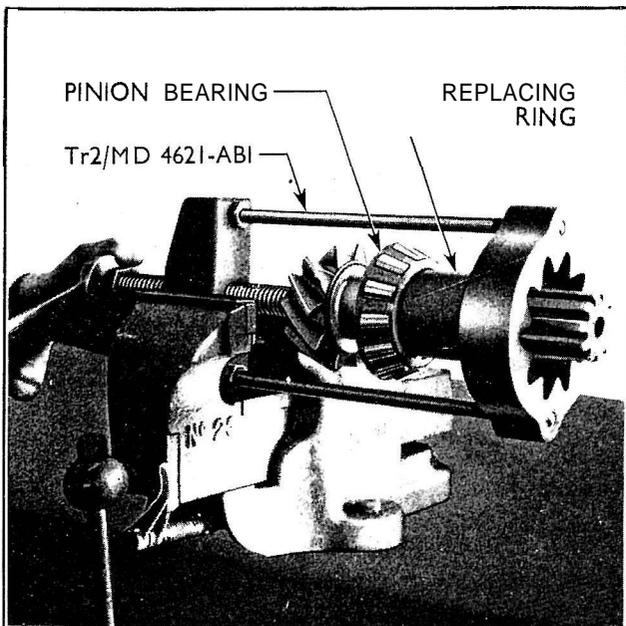


Fig. 176  
Replacing Drive Pinion Bearing

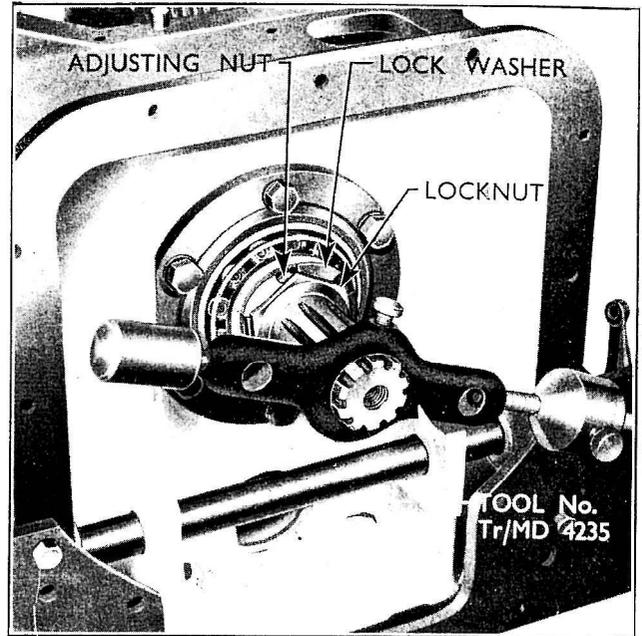


Fig. 177  
Checking Drive Pinion Bearing Pre-load

- 3 Remove the rear pinion bearing, using tool No. Tr2/MD 4621-AB1.
- 4 Remove the pinion housing cup, using tool No. Tr2/MD 4616-AB2.

**To Reassemble the Drive Pinion**

- 1 Replace the rear pinion bearing, using tool No. Tr2/MD 4621-AB1 (see Fig. 176).
- 2 Replace the pinion housing cups, using tool No. Tr2/MD 4616-AB2.
- 3 Locate the pinion into the housing and fit the front bearing.
- 4 Position the thrust washer, adjusting nut, lockwasher and locknut, but **do not** tighten until assembled in the rear axle.

**To Reassemble**

- 1 Refit the drive pinion in the rear axle (using the locating studs Tr/MD 6050). Secure with the six bolts.

*Note — The small bolt locates in the top.*

- 2 Tighten up the adjusting nut and check that the bearing pre-load is between 12 to 16 in. lbs., using the tools Nos. Tr/MD 4634, Tr/MD 4610 and Tr/MD 4235, as shown in Fig. 177. Lock and secure the lockwasher and recheck the pre-load.
- 3 Position the two locating studs (tool No. Tr/MD 4301) and fit the right-hand bull pinion housing with the correct number and thickness of shims.

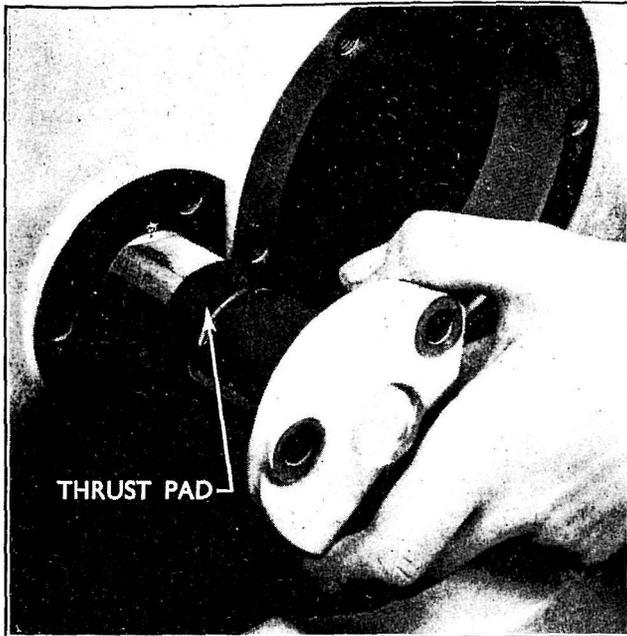


Fig. 178  
Fitting the Thrust Pad

- 4 Position the crown wheel and differential, and assemble the left-hand bull pinion housing and shims. Fit the thrust pad and secure with the three bolts (see Fig. 178).
- 5 Secure both housings temporarily and check the backlash between the crown wheel and drive pinion, using a suitable feeler gauge. The shims fitted to both bull pinion housings must always total 0.016 in. irrespective of how they are divided between the housings, with a correct backlash of 0.004 in. to 0.018 in. (see pages 140 and 141).
- 6 Check the clearance between the thrust pad and crown wheel (0.004 in. to 0.014 in.) adding gaskets to increase the clearance if necessary.
- 7 Replace the axle shafts and large reduction gears as described on page 142.
- 8 Enter the brake and bull pinion extension housings and brake assemblies and replace as described on page 140. Do not forget to lock the bolt heads with a piece of wire.
- 9 Mount the oil deflector on the bull pinion housing and adjust the position of the plate to give 0.004 in. clearance between the plate and the periphery of the crown wheel. Adjust by moving the plate in the elongated holes.
- 10 Locate the hydraulic pump pedestal (if fitted) and oil filter in position, securing with six bolts.
- 11 Mount the hydraulic pump in position, securing with the three bolts. Locate the oil feed pipe (9 ins. long) from pump to ram cylinder with a new oil seal fitted at each end (see Fig. 179).

- 12 Enter the power take-off extension shaft and replace as described in the appropriate section.
- 13 Couple the rear axle to the gearbox, noting the top left-hand and bottom right-hand bolts in the flanges are dowelled bolts and must be fitted first.
- 14 Position the rear transmission top cover and check that the oil feed pipe enters the delivery passage in the cover. Secure with the retaining bolts.
- 15 Replace the rear wheels as described on page 138.
- 16 Replace tail lamp assembly and the remaining gearbox to rear axle flange bolts and nuts.
- 17 Refit the silencer tail pipe bracket and secure with two bolts and nuts.
- 18 Replace the mudguards and foot plates.
- 19 Replace the main gear lever and housing, securing with four bolts.
- 20 Reconnect the side lamp looms and the battery.
- 21 Refit the brake cotter pin, retracting spring, and right- and left-hand brake cables. (See "Braking System" section.)
- 22 Reconnect the clutch pedal retracting spring.
- 23 Remove the gearbox to rear axle front support and jack. (If a power take-off is fitted, install the extension shaft and reconnect the operating link.) (See "Power Take-off" section.)
- 24 Install the drawbar and hydraulic linkage as described in the appropriate section.
- 25 Refill the rear axle housing with the approved grade of lubricant to the correct level.

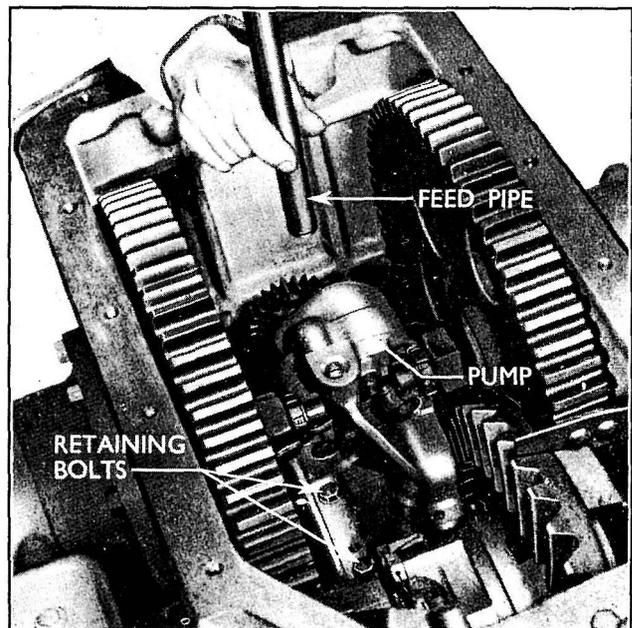


Fig. 179  
Fitting Hydraulic Pump Feed Pipe

**SPECIFICATION AND REPAIR DATA**

REAR AXLE (All Models)

Type	.. .. .	Semi-floating
Axle ratio	.. .. .	Crown wheel and pinion, 3.5 to 1
	7	Final reduction gear, 5.308 to 1
		Overall reduction 18.58 to 1
Axle shaft dia.	.. .. .	2.5" (63.5 mm.)
Axle shaft bearing preload	.. .. .	40 to 45 in./lbs.
	(.45 to .51	K'gram/metres)
No. of teeth on drive pinion	.. .. .	10
No. of teeth on bull pinion	.. .. .	13
No. of teeth on crown wheel	.. .. .	35
No. of teeth on large reduction gear	.. .. .	69
Crown wheel and pinion backlash		0.004"–0.018"
		(.102–.457 mm.)
Drive pinion bearing preload	.. .. .	12 to 16 in./lbs.
	(.138 to .178	K'gram/metres)
Differential preload	.. .. .	Total of .016"
		(.406 mm.)
Crown wheel thrust block clearance		0.004"–0.014"
		(.102–.356 mm.)
Oil deflector plate to crown wheel clearance	.. .. .	0.004 (.102 mm.)
Differential spider dia.	.. mfg.	0.871"–0.873"
		(22.12–22.17 mm.)
Wear limit	..	0.868" (22.047 mm.)

Differential spider gear I.D.	mfg.	0.876"–0.878"
		(22.25–22.301 mm.)
	Wear limit	..
		0.881" (22.37 mm.)
Differential gear thrust washer thickness	.. .. mfg.	0.0292"–0.0312"
		(.742–.792 mm.)
	Wear limit	..
		0.025" (0.635 mm.)
Half shaft gear thrust washer thickness	.. .. mfg.	0.058"–0.062"
		(1.473–1.575 mm.)
	Wear limit	..
		0.055" (1.397 mm.)

Lubrication

For correct grade of lubricant see Operators Instruction Book	
Oil capacity	.. .. 9 imp. galls. (40.9 litres)

