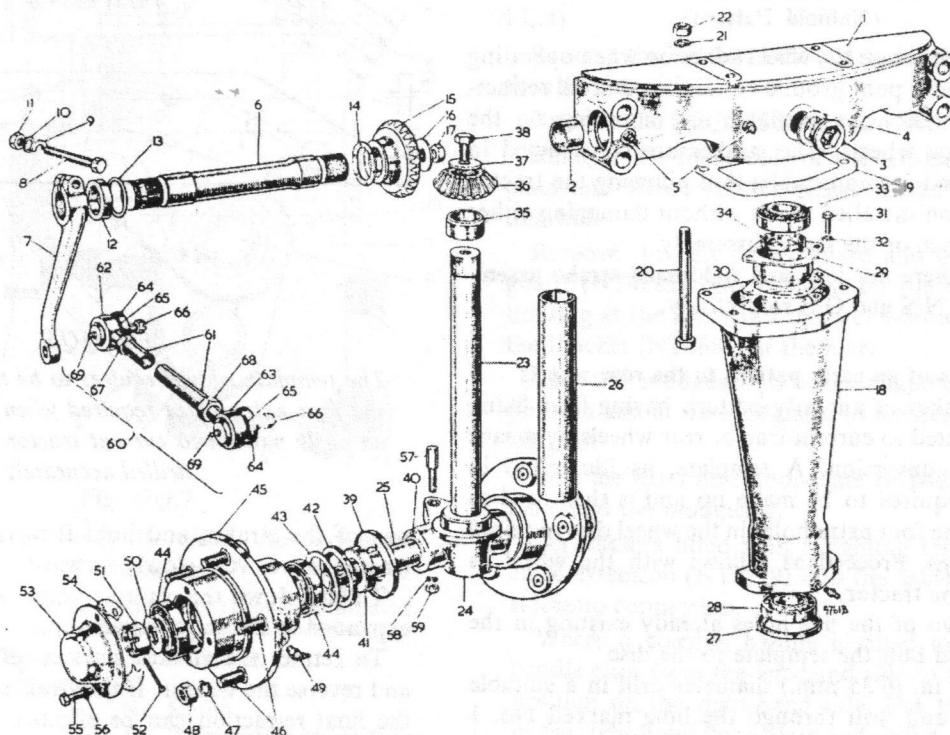


'V' TWIN FRONT AXLE COMPONENTS



No.	Description	No.	Description	No.	Description
1.	Bracket assembly—front extension.	24.	Axle bracket.	47.	Spring washer.
2.	Bush.	25.	Stub axle.	48.	Wheel nut.
3.	Plug.	26.	Spacing tube—shaft.	49.	Greaser.
4.	Washer for plug.	27.	Oil seal—shaft—bottom.	50.	Tab washer.
5.	Greaser.	28.	Bearing—shaft—bottom.	51.	Slotted nut.
6.	Steering shaft.	29.	Housing—oil seal and bearing—top.	52.	Split pin.
7.	Steering lever.	30.	Shim.	53.	Hub cap.
8.	Bolt.	31.	Bolt.	54.	Joint.
9.	Washer—'D' type.	32.	Spring washer.	55.	Bolt.
10.	Spring washer.	33.	Bearing—shaft—top.	56.	Spring washer.
11.	Nut.	34.	Seal—oil—top.	57.	Pin—steering lock stop.
12.	Distance ring.	35.	Sleeve—shaft.	58.	Spring washer.
13.	Sealing ring.	36.	Bevel pinion.	59.	Nut.
14.	Thrust washer.	37.	Belleville washer.	60.	Draglink assembly.
15.	Bevel gear.	38.	Screw.	61.	Tube—intermediate.
16.	Belleville washer.	39.	Dust cover.	62.	Socket assembly—R/H.
17.	Bolt.	40.	Pin—cover locating.	63.	Socket assembly—L/H.
18.	Bracket—pillar.	41.	Distance piece.	64.	Rubber boot.
19.	Shim.	42.	Oil seal.	65.	Clip.
20.	Bolt.	43.	Washer—oil seal protection.	66.	Nut—ball pin.
21.	Spring washer.	44.	Bearing—inner and outer.	67.	Locknut—R/H.
22.	Nut.	45.	Hub sub-assembly.	68.	Locknut—L/H.
23.	Shaft—vertical.	46.	Wheel stud.	69.	Greaser.

Set the front wheels to the straight-ahead position.

Fit the draglink to the steering drop-arm and engage the steering lever with the steering shaft serrations in a position that will allow the front end of the draglink to engage the lower end of the steering lever.

Tighten the ball end nuts, and before inserting the split cotter pins check the steering locks. Jack the front wheels clear of the ground and turn the steering wheel from lock to lock. The travel in each direction should be limited by the lock stop on the front wheel unit and not by the steering box movement.

When wheels fitted with 6.00—16 three-rib tyres are reversed to increase the track of the 'V' twin wheels the draglink nut will foul the tyres unless the steering lever is correctly positioned. After fitting the unit reverse the right-hand wheel and ensure that there is sufficient clearance. If necessary, move the lever one spline on the steering shaft.

Section QQ.9

FITTING RADIUS ARMS

Remove the front axle from the tractor as described in Section K.3.

Slacken the nuts and bolts and remove the track-rod clamps.

Take out the bolts and withdraw each extending axle beam.

Referring to Fig. QQ.10, mark out and drill two $\frac{5}{16}$ in. (7.94 mm.) diameter holes on the under side of the axle beam.

Fit the radius arm assembly to the axle beam with two bolts passing through the axle beam from the inside and into the radius arm bracket. Secure the bolts with nuts and spring washers.

Reassemble the extending axle beams and secure them in position with four bolts. Two bolts are supplied which are $\frac{1}{2}$ in. (6.35 mm.) longer than those previously fitted, and these two bolts must be fitted into the radius arm bracket and axle beam. Secure all four bolts with nuts and spring washers.

Two modified track-rod clamps, provided with tapped holes, are supplied and these must be used together with two of the original clamps to secure the track-rod. The threaded clamps are fitted on the under side with two bolts (fitted with spring washers) passing through the top clamps.

Replace the front axle (Section K.3) complete with radius arms but do not tighten the axle beam pivot bracket securing bolts at this stage.

Thread the pivot pin into the radius arm rear bracket so that approximately an equal amount of thread is showing on either side of the bracket and with the small diameter of the pin facing rearwards.

Slide the radius arm pivot bracket onto the pin, making sure that the bevelled edge of the bracket hole is towards the pivot pin. Use two bolts and spring washers to secure the pivot bracket to the main casing.

Turn the pivot pin by means of the flats provided on its forward end, towards the pivot bracket until it is tight and then slacken back a quarter of a turn. This adjustment is made to counteract a tendency to load the pivot pin threads when the tractor is in motion.

Fit the plain washer and locknut on the pivot pin and securely tighten.

Finally, tighten the bolts securing the axle beam pivot bracket.

Section QQ.10

TWIN REAR WHEELS—SLIDING HUB AXLE

Parts for fitting twin rear wheels to tractors with sliding hub axles are available. The parts are:

Description	Part No.	Illus. Ref.
Wheel (10×36)	NT6428	1
Wheel hub assembly	ATJ8038	2
Distance piece	NT4490	3
Wooden plug	NT4499	4

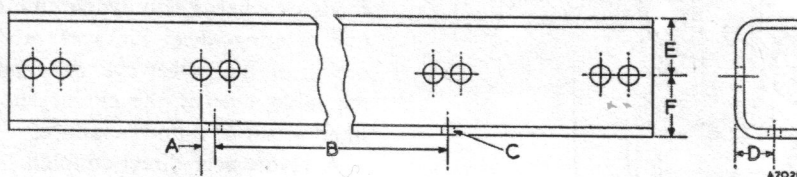


Fig. QQ.10

Axle beam drilling dimensions

- A. On under side of beam from hole shown $\frac{1}{2}$ in. (12.7 mm.).
- B. $26\frac{1}{2}$ in. (673.5 mm.) centres.
- C. Drill two holes $\frac{5}{16}$ in. (11.91 mm.) diameter.

- D. $1\frac{1}{8}$ in. (28.58 mm.) from front face of beam.
- E. 2 in. (50.8 mm.) from top face of beam.
- F. $2\frac{1}{4}$ in. (57.15 mm.) from bottom face of beam.

Before the twin rear wheels are assembled to the tractor the existing rear wheels must be adjusted to the minimum track setting (see Section LL.4).

The distance piece (Part No. NT4490) is intended to separate the two hubs and must be placed on the axle shaft followed by the wheel hub assembly ATJ8038. Slide the hub along the axle shaft to pinch the distance piece between both hubs and then tighten the hub clamping bolts evenly. The wheel studs of both hubs must face outwards. Finally, drive the wooden plug (Part No. NT4499) into the open bore of the outside hub.

Fit the cover and tube to the wheel, taking care that the tread will rotate in the correct direction when fitted to the tractor. Fit the wheel to the outer hub and securely tighten the eight wheel nuts. When fitted, there should be a small gap between the side walls of the inner and outer tyres.

This procedure must be carried out on each side of the tractor.

Section QQ.11

TWIN REAR WHEELS—FLANGED AXLE

When twin rear wheels are to be fitted the inner pair of wheels must be assembled to the minimum track setting of 53 in. (1.34 m.)—see page LL.4.

Secure the inner pair of wheels on the axle first. The locating washers (5, Fig. QQ.12) must be fitted with their radiused side against the wheel disc and the wheel firmly secured in position by means of the wheel nuts (inner, 2).

Assemble the rim of the outer wheel to the wheel disc as shown in Fig. QQ.12, using the distance piece (3) and the special long bolt (4).

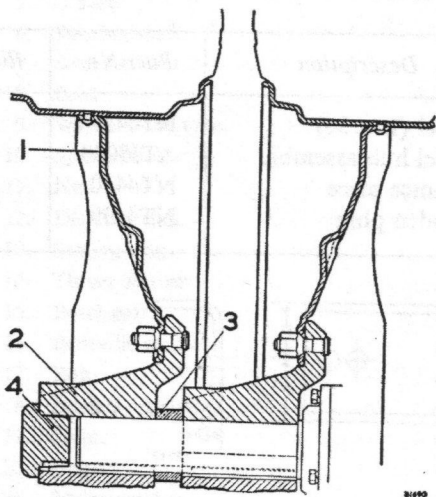


Fig. QQ.11

The correct assembly for twin rear wheels on sliding hub axles

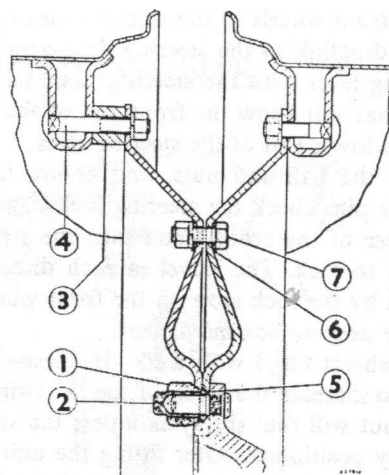


Fig. QQ.12

The correct assembly for twin rear wheels on a flanged hub axle

Assemble the wheel on the axle and secure in position with the wheel nuts (outer 1).

Finally, secure both inner and outer wheel discs together, using seating washers (6) on each side with the nuts and bolts (7).

Section QQ.12

POWER-ASSISTED STEERING

New Nuffield 460 tractors can now be supplied with power-assisted steering as an item of optional equipment, or for present Nuffield tractor owners a kit of parts is available enabling the equipment to be fitted, with very little modification, to earlier 4 DM tractors.

The advantages to be gained with powered steering over conventional manual steering are many. No extra effort is required on the steering-wheel when heavy front-mounted equipment is in use; manual effort at the wheel during long periods of ploughing under adverse conditions is appreciably reduced; the 'feel' of the steering is maintained at all times, even when towing heavy loads or when heavy rear-mounted equipment is in use, and steering-wheel kicks are absorbed by the counteraction of the power cylinder; manual steering is always available, even if the engine should stall or in the unlikely event of a power failure.

A Hydrosteer direct-coupled hydraulic system is used which consists of a double-acting power cylinder, with an integral control valve, coupled by flexible pipes to a pump driven from the engine. The system utilizes the standard steering-box and very little modification is required for fitting the equipment to existing tractors.

Section QQ.13

DESCRIPTION OF OPERATION OF POWER-ASSISTED STEERING

Movement from the steering-box drop-arm is directed via the draglink to the manual ball pin (c, Fig. QQ.13) on the power cylinder, which in turn is coupled directly to the control valve spool. Power assistance from the cylinder is directed to the steering lever on the front axle by the power ball pin (D).

The control valve spool is held in the neutral, or central, position by means of a precompressed spring and by the hydraulic forces acting on the reaction areas.

For steering efforts less than that required to overcome

the valve preload (which is approximately 3 lb. [1.36 kg.] at the steering-wheel) the spool remains central and the fluid circulates freely on open circuit from the pump, through the valve, and back to the reservoir. As there is no resistance to flow there can be no build-up of pressure and the steering remains purely manual.

For steering efforts greater than the valve preload the spool is displaced towards one end of the valve body, directing the fluid to the appropriate side of the piston. The pressure quickly builds up until it is sufficient to overcome the resistance at the wheels, thus transmitting the required steering assistance. The flow of oil and resulting movement of the cylinder is maintained, within the limits of the wheel travel, as long as the driver continues to turn the steering-wheel enough to keep the

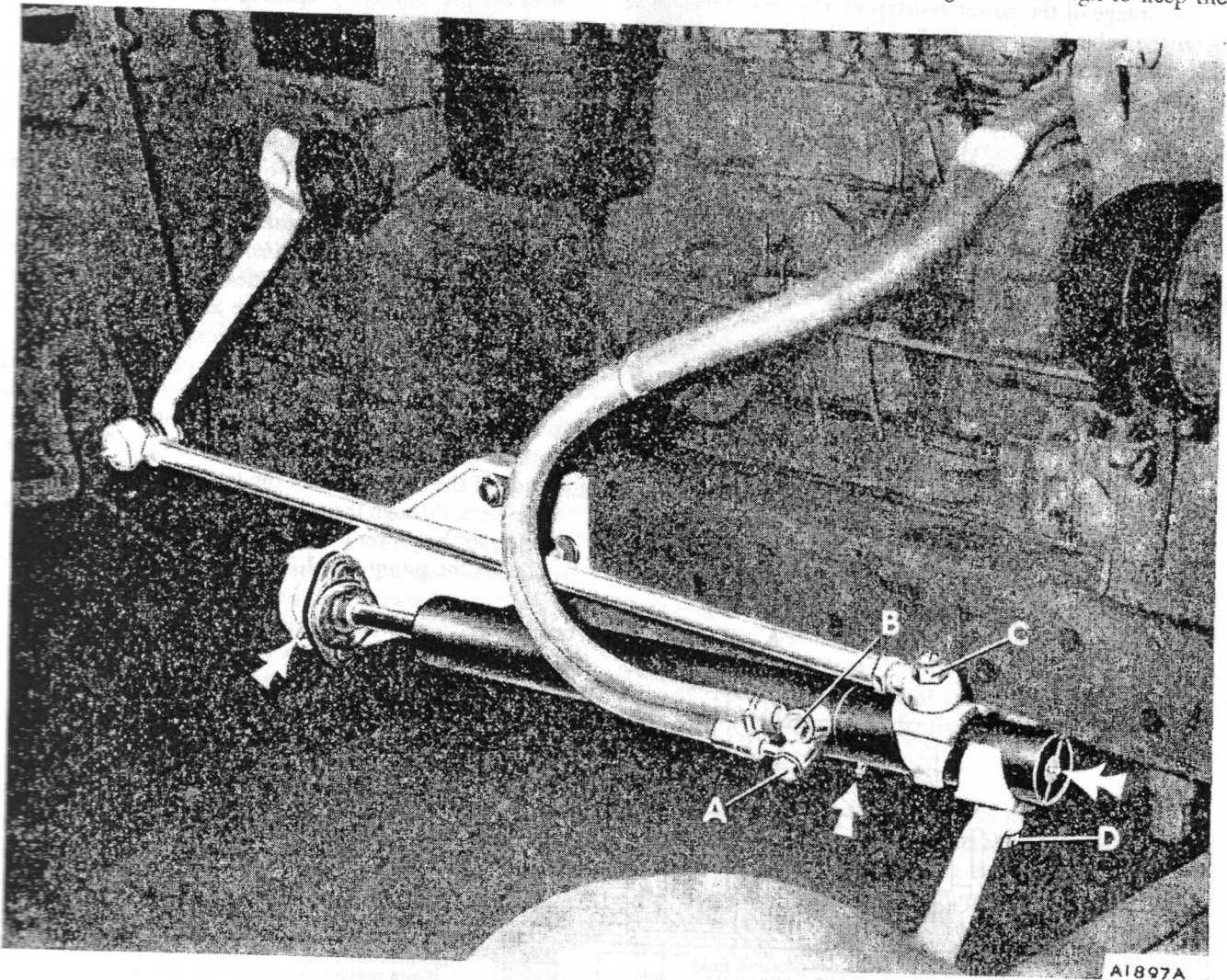


Fig. QQ.13

The general layout of the power cylinder on the right-hand side of the tractor

- A. High-pressure inlet from pump.
- B. Low-pressure outlet to reservoir.

- C. Manual ball pin.
- D. Power ball pin.

The arrows indicate the three lubrication nipples.

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spool displaced from its central position.

It is important to note that steering effort always operates against the valve preload spring pressure plus the pressure build-up on the reaction rings. Since this pressure build-up is dependent on the pressure of the oil pushing on the piston, it is proportional to the required steering force, thereby giving the driver the familiar steering 'feel'.

In the event of the front road wheels being subjected to shock load, the valve spool is moved in the appropriate direction to direct the fluid to the side of the piston which will resist the movement. This 'blocking action' is effective in damping out the kick-backs normally felt at the steering-wheel.

Should it be required to steer manually (without the advantage of the power assistance), the small relief valve in the valve body permits free circulation of oil between both ends of the cylinder and the steering effort is not appreciably increased over that required normally for manual steering.

Control valve

When the road wheels are in the straight-ahead position the control valve spool is held in the central or neutral position (Fig. QQ.14). In this position oil from the pump flows past the valve spool lands and returns to the reservoir through the port in the control valve body.

When the steering-wheel is turned either to the right or left a force is exerted on the control valve spool, thereby displacing it towards one end of the body (Figs. QQ.15 and QQ.16). With the spool in this position the oil passage to one side of the piston is closed to pump pressure but is open to the reservoir. The passage leading to the opposite side of the piston is open to pump pressure, and as the oil from the pump flows into the power cylinder the pressure increases until it is sufficient

to force the steering booster in the required direction, thus providing the power assistance for the turn. The oil displaced from the other side of the piston flows back through the control valve to the reservoir.

Pump

The pump, which is belt-driven from the engine crankshaft, is of the eccentric bi-rotor type. The inner rotor, which has six lobes, is driven by the pump drive shaft, which is supported by two bronze bushes in the body and cover and by a sealed ball bearing to absorb the side-thrust at the driven end. The outer rotor has seven lobes and is driven by the inner rotor.

As the pump rotors turn, the spaces formed between the rotor lobes increase and then decrease in volume with each revolution, propelling oil from the intake side of the pump to a flow control valve.

When the engine is idling the pump is operating at its minimum output, which is, however, sufficient to provide power assistance. To limit pump output at higher engine speeds a spool-type, spring-loaded flow control valve is provided in the pump body. The valve, which is hollow and closed at one end, has two metering orifices drilled through its walls. A pressure relief valve, which is also spring-loaded, is contained inside the flow control valve and is retained in position by means of a circlip. The flow control and pressure relief valve assembly is retained in the pump body by the oil outlet adaptor.

Oil from the pressure side of the pump flows into the chamber containing the flow control valve. A flat ground on the land at the closed end of the valve allows the oil to flow behind it (Fig. QQ.17). The oil also flows to the inside of the valve through the two metering orifices and from here, through the pressure relief valve and the pump outlet, to the power cylinder.

When the pump speed is increased due to an increase

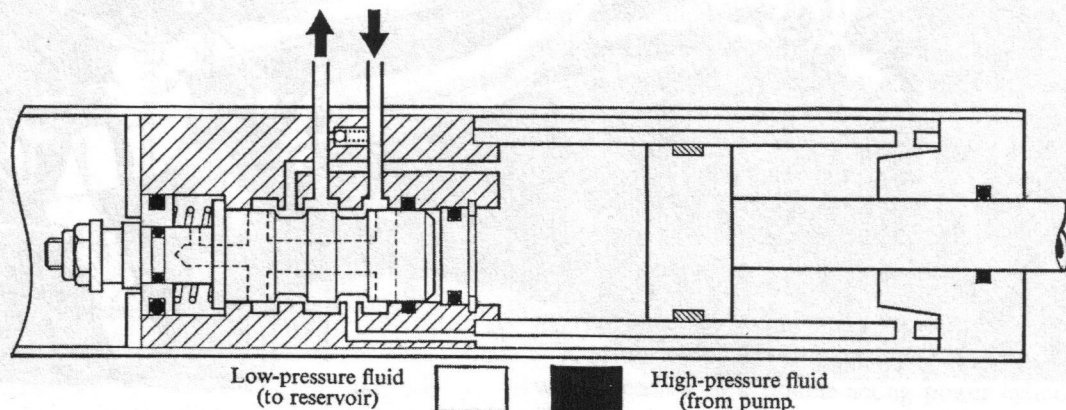


Fig. QQ.14

A section through the power cylinder showing the control valve spool in the central position with fluid circulating 'freely' on open circuit. No resistance to flow, therefore no pressure build-up

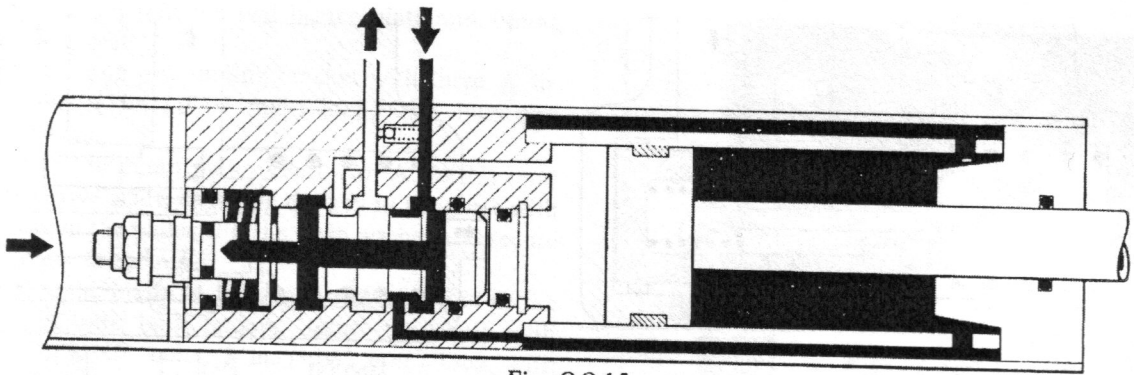


Fig. QQ.15

The control valve spool is moved rearwards and fluid is directed under pressure to the rear side of the piston. The power cylinder moves rearwards

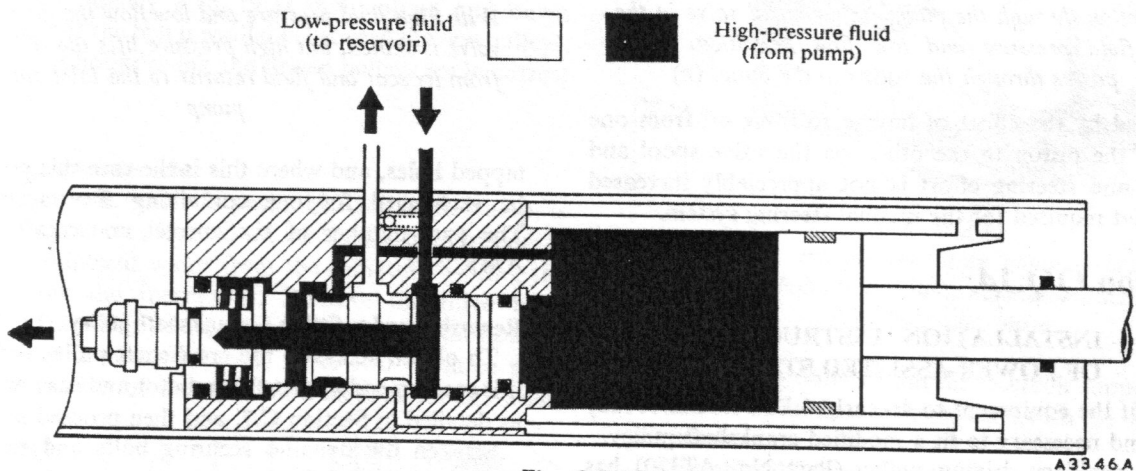


Fig. QQ.16

The control valve spool is moved forwards and the fluid is directed under pressure to the forward side of the piston. The power cylinder moves forwards

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in engine speed the pump output builds up. This creates a pressure differential between the outside and inside of the flow control valve, due to the restricted flow through the metering orifices. Since the pressure at the closed end of the valve (via the flat) exceeds the pressure on the spring-loaded end, the entire valve assembly moves and compresses the flow control valve spring. This movement uncovers an annular relief groove on the flow control valve body which permits the excess oil to flow through passages in the pump body back to the reservoir and the inlet side of the pump (see Fig. QQ.18). Thus the pump output is limited regardless of pump speed.

The pressure produced by the pump is ample to meet all normal requirements of the system, and therefore a pressure relief valve is installed within the flow control valve to limit the pressure. The two ends of the relief valve are of different diameters and the end with the largest area is fitted nearest the pump outlet in order that it may be acted upon by the pressure in the system. When the relief valve lifts, the movement uncovers ports

in the flow control valve, allowing the fluid to return to the reservoir and the inlet side of the pump, thus preventing further pressure build-up (Fig. QQ.19).

The relief valve action is the same, regardless of the position of the flow control valve in its box, since the action of the flow control valve is to control only the volume of fluid delivered by the pump.

Steering without power supply

Should the pump fail to provide oil pressure for any reason, the tractor may be steered manually, and the system operates in the following manner.

When the steering-wheel is turned the effort is applied to the control valve spool. The spool moves, approximately .045 in. (1.15 mm.), until it contacts its stop, when the full manual effort is transmitted mechanically to the steering linkage. With the valve spool in the off-centre position oil is directed to either end of the power cylinder through the cylinder relief valve. Thus, the manual effort required to move the power cylinder is not

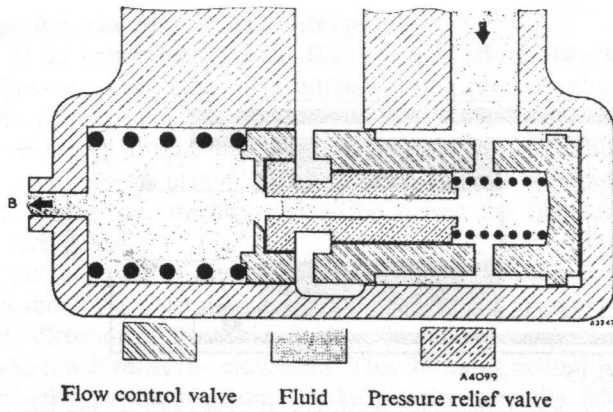


Fig. QQ.17

A section through the pump flow control valve in the low fluid pressure and low flow condition. Fluid passes through the valves to the outlet (B)

increased by the effort of having to force oil from one side of the piston to the other via the valve spool and pump, and steering effort is not appreciably increased over that required for the manual steering system.

Section QQ.14

INSTALLATION INSTRUCTIONS OF POWER-ASSISTED STEERING

To fit the equipment to an early 4 DM tractor it may be found necessary to fit a modified crankshaft pulley.

The auxiliary driving pulley (Part No. ATJ70) has three holes, which are used for attaching the driving pulley to the crankshaft pulley. Early 4 DM tractors are equipped with a crankshaft pulley that has only two

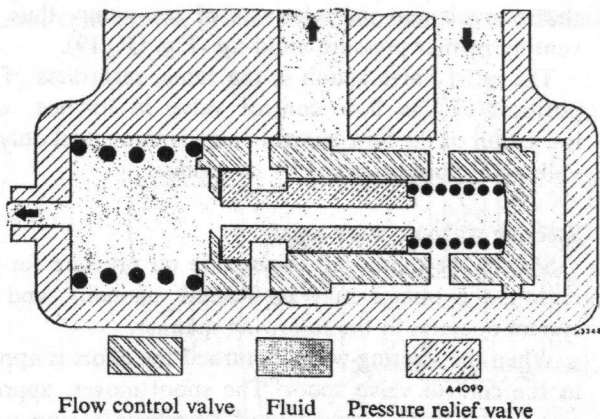


Fig. QQ.18

The flow control valve in the low fluid pressure and high flow condition. Pressure differential on the ends of the valve causes it to move against spring pressure and release fluid to the inlet side of the pump

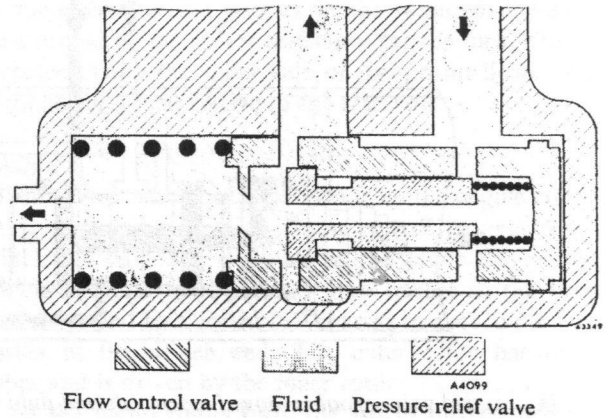


Fig. QQ.19

With high fluid pressure and low flow the flow control valve is seated, but high pressure lifts the relief valve from its seat and fluid returns to the inlet side of the pump

tapped holes, and where this is the case this pulley must be exchanged for one containing five tapped holes. The part number of the correct crankshaft pulley is AMK2570.

Removing and refitting a crankshaft pulley

To obtain access to the crankshaft pulley for removal it is recommended that the radiator and case be removed as detailed in Section C.7, and then proceed as follows.

Slacken the dynamo securing bolts and remove the dynamo driving belt.

Slacken and remove the starting-handle jaw nut, using spanner 18G97, and withdraw the crankshaft pulley with remover 18G231 and adaptors 18G231A. Fit the new crankshaft pulley and secure in position with the starting dog nut. Tighten the nut and bend over the tab washer before fitting the auxiliary driving pulley.

Fit the auxiliary driving pulley (Part No. ATJ70) to the crankshaft pulley by means of the three $\frac{7}{16}$ in. UNF. bolts, $1\frac{1}{2}$ in. (38.1 mm.) long, together with the lock plates provided. Do not omit to bend over the lock plates after the bolts have been securely tightened.

Mounting the pump

The pump mounting bracket is bolted to the rear face of the left-hand side engine bearer plate, and it is therefore necessary to drill three $\frac{5}{16}$ in. (7.94 mm.) clearance holes in the engine bearer plate.

A drilling plate (Part No. ATJ9378) which bolts onto the front of the engine bearer plate, is provided to facilitate this operation. The template is stamped 'TOP' and is secured in position as illustrated in Fig. QQ.20, using the two bolts securing the engine bearer plate and timing case to the cylinder block. After drilling the holes remove

the template and refit the two bearer plate and timing case securing bolts.

Secure the pump mounting bracket with three $\frac{5}{16}$ in. UNF. bolts, $\frac{3}{4}$ in. (19.05 mm.) long, with nuts and spring washers.

Assemble the pump pulley (Part No. ATJ4022) onto the pump drive shaft, engaging the key in the shaft with the keyway in the pulley. Fit the plain washer and secure in position with the nut.

Assemble the pump to the support bracket and fit the driving belt onto both pulleys. Secure the pump with three $\frac{5}{16}$ in. UNF. bolts, $\frac{5}{8}$ in. (15.87 mm.) long, with spring and plain washers.

Slotted holes are provided in the support bracket for belt adjustment and the pump should be so positioned that approximately $\frac{3}{8}$ in. (9.52 mm.) of up and down movement of the belt is available between the two pulleys. Ensure that both driving and driven pulleys are in correct alignment.

Mounting the reservoir

The reservoir, which is positioned above the pump, is fixed to a bracket mounted on the thermostat housing.

Drain sufficient water from the radiator to bring the level below the thermostat. Remove the three bolts securing the water outlet pipe to the thermostat housing but do not remove the pipe. Place two or three plain washers in each of the spot-faced recesses for the heads

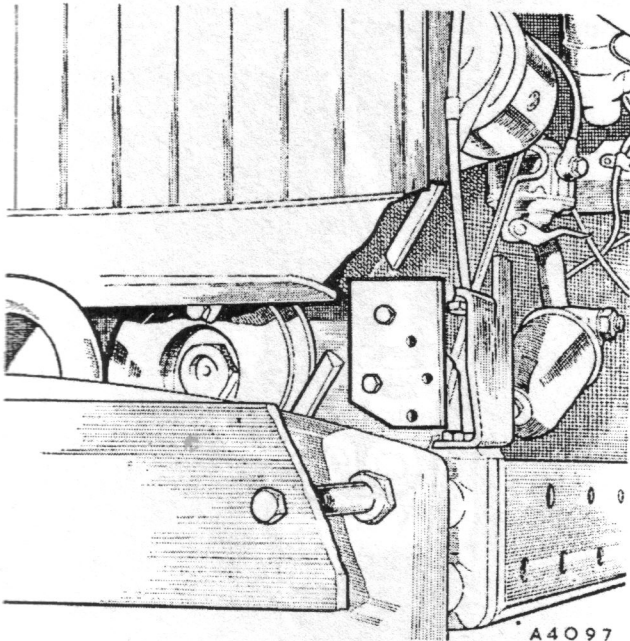


Fig. QQ.20

The bottom left-hand corner of the radiator is cut away to show the drilling jig plate in position on the engine bearer plate

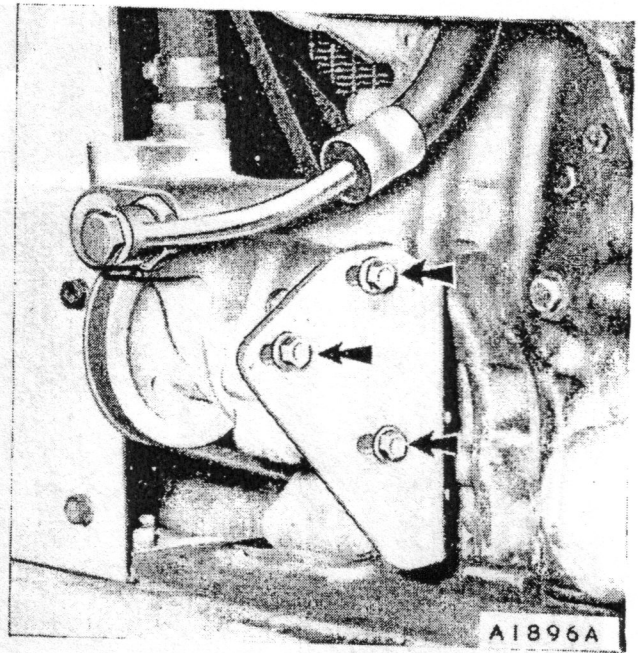


Fig. QQ.21

The arrows indicate the three pump securing bolts. The slotted holes in the pump mounting bracket permit drive belt adjustment

of the securing bolts so that the reservoir support bracket rests upon them. Secure the bracket with the longer bolts provided.

Assemble the reservoir to the support bracket and secure it in position with three $\frac{5}{16}$ in. UNF. bolts, 1 in. (25.4 mm.) long, with nuts and spring washers.

Mounting the power cylinder

The power cylinder is fitted on the right-hand side of the tractor as shown in Fig. QQ.24.

Remove the draglink from the tractor and fit the new draglink assembly (Part No. ATJ4023) to the steering drop-arm and secure with the washer, slotted nut, and split pin. The forward end is connected to the power cylinder after the cylinder is fitted.

Disconnect the track-rod from the steering and track-rod lever, withdraw the clamp bolt, and remove the lever from the stub axle pin. Fit the modified lever (Part No. ATJ4017), ensuring that when fitted it is in the same relative spline position as the previous lever. Refit and tighten the clamp bolt and the track-rod end.

Attach the ram abutment bracket (Part No. ATJ4092) to the right-hand frame member. Two special dowel bolts (Part No. ATJ4033) are provided for attaching the bracket; the two rearmost holes in the frame member should be used and the bolts must be inserted from the inside. Secure the bracket with two nuts and spring washers.

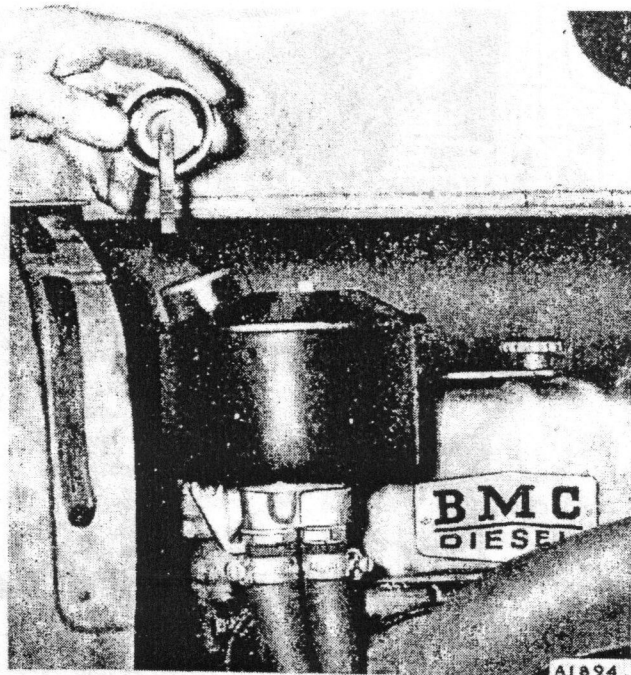


Fig. QQ.22

The hydraulic fluid reservoir is mounted directly above the pump. Here the cap is removed to show the dipstick markings indicating high and low fluid levels

Attached to the abutment end of the piston rod is a spherical bush in a split housing (both halves of the housing are wired together for transit purposes). Shims (predetermined on assembly) are fitted between the two halves of the housing and it is important to ensure that they are not misplaced or lost when fitting the assembly to the abutment bracket.

Slide off the rubber boot from the abutment bush assembly and insert two $\frac{7}{16}$ in. UNF. bolts, $2\frac{1}{2}$ in. (63.5 mm.) long, through both halves of the bush housing. Fit the assembly to the abutment bracket and secure with two nuts and spring washers. Replace the rubber boot over the bush assembly.

The front end of the power cylinder must now be connected to the steering lever on the axle by inserting the power ball pin through the top of the lever. Secure in position with the washer, slotted nut, and split pin.

Connect the draglink front end to the manual ball pin on the power cylinder and secure it in a similar manner.

Pipes and connections

Place a clip (Part No. HCS0709) on each end of the flexible hose (Part No. ATJ4032) and connect the hose to the front adaptor (larger diameter) on the under side of the reservoir and the top adaptor on the pump (see

QQ.20

Fig. QQ.23). Correctly position and tighten the clips.

Place a clip (Part No. ATJ4040) on each end of the flexible hose (Part No. ATJ4034) and thread the hose across the front of the engine above the dynamo and timing case, connecting one end to the adaptor beneath the reservoir and the other end to the banjo adaptor on the power cylinder nearest to the manual ball pin.

Thread the remaining hose (Part No. ATJ4091) across the top of the timing case, taking it below the dynamo to connect with the outlet adaptor on the pump (see Fig. QQ.23), using the short banjo pin (Part No. ATJ4039) and two Dowty washers. The other end of the high-pressure hose is connected to the remaining adaptor on the power cylinder. This banjo utilizes the long banjo

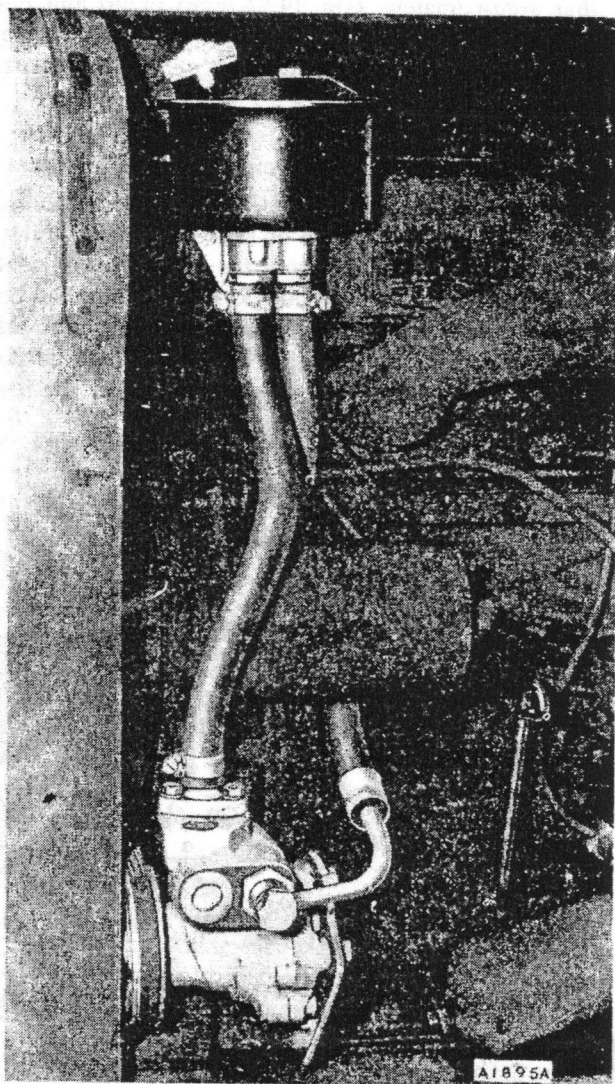


Fig. QQ.23

The layout and run of the connecting pipes from the hydraulic pump and the reservoir

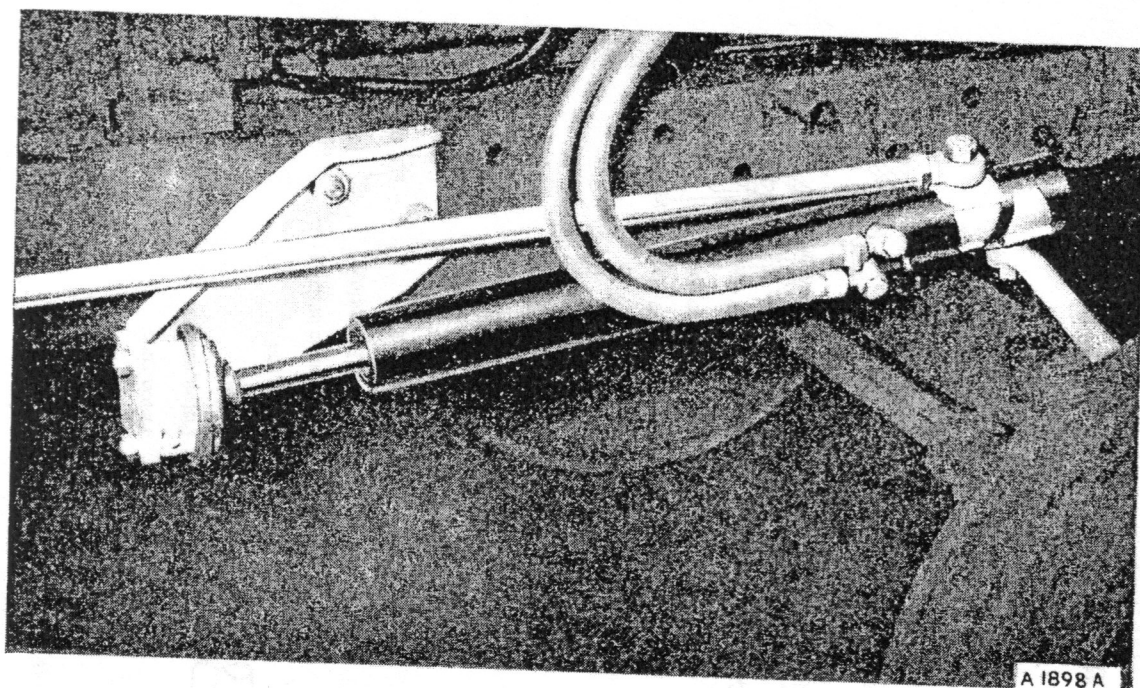


Fig. QQ.24

The power cylinder and abutment bracket

pin (Part No. ATJ4036) and the remaining two Dowty washers.

Neatly secure the hoses to the right-hand side of the timing case with the double clip bracket (Part No. ATJ4038), using one of the timing case bolts. Use a strip of neoprene as padding between the hoses and the clip bracket.

Finally, secure both hoses together with tape midway.

Apply a grease gun to each of the three lubricating nipples on the power cylinder (see 'MAINTENANCE ATTENTION').

To fill the system

High-quality mineral lubricating oil, having a viscosity rating equivalent to S.A.E. 10W, is satisfactory for all normal conditions. When temperatures are consistently below -12°C . (10°F .) use S.A.E. 5W oil.

Vegetable oils such as brake or hydraulic damper fluid must **NOT** be used.

Extreme care must be taken to prevent dirt and other foreign matter from entering the system, and on no account must dirty oil be used.

Fill the reservoir slightly higher than normal, start the engine, and allow it to idle for a short while. With the engine idling turn the steering-wheel back and forth several times from one extreme lock to the other to expel all air from the system.

Check the oil level in the reservoir, and top up if necessary to the upper line on the dipstick marked 'F'.

Repeat the procedure if air still remains in the system. No air bubbles should be present in the fluid returned to the reservoir from the power cylinder when the wheels are turned through full lock.

Section QQ.15

MAINTENANCE ATTENTION OF POWER-ASSISTED STEERING

Check the level of the fluid in the reservoir every 50 hours, and top up if necessary. The correct fluid level is to the upper mark on the filler cap dipstick.

Lubricate the three grease nipples, two on the power cylinder and one on the ram abutment, every 200 hours. Use grease to Ref. C as recommended on pages P.6 and P.7.

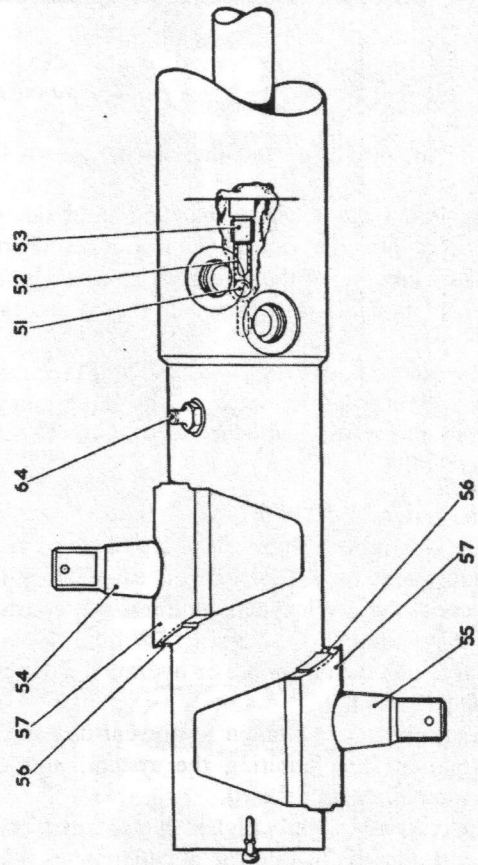
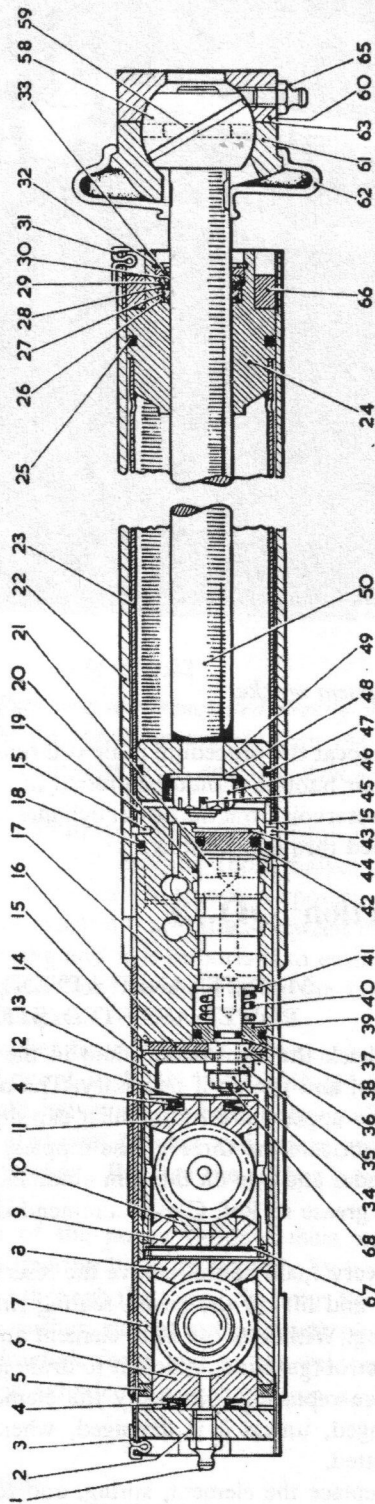
Every 1,000 hours remove the reservoir cover securing bolt and lift off the cover, sealing ring, and the central spring. Withdraw the filter element and wash it carefully in petrol (gasoline). Allow it to drain and dry thoroughly before replacing. Normally the element need never be changed, unless it is damaged, when a new one must be fitted.

Replace the element, spring, and top cover, ensuring that the sealing ring is correctly seated. Insert the securing bolt and tighten firmly but not excessively.

No adjustments are necessary.

In the event of a unit becoming faulty or damaged it is

THE POWER STEERING CYLINDER COMPONENTS



A3332A

KEY TO THE POWER STEERING CYLINDER COMPONENTS

No.	Description	No.	Description	No.	Description
1.	Lubricating nipple.	24.	Bearing.	47.	Piston ring.
2.	End cover.	25.	'O' ring.	48.	Piston washer.
3.	Split pin.	26.	Gland spacer.	49.	Piston.
4.	Belleville washers.	27.	Dowty gland ring.	50.	Piston rod.
5.	Lock ring.	28.	Vellumoid washer.	51.	Relief valve ball.
6.	Ball cup.	29.	Metal washer.	52.	Relief valve spring.
7.	Spacer for ball cups.	30.	Scraper ring.	53.	Plug and pin.
8.	Ball cup.	31.	Split pin.	54.	Manual ball pin.
9.	Ball cup holder.	32.	Internal clip.	55.	Power ball pin.
10.	Ball cup.	33.	Housing.	56.	Grease-retaining pad.
11.	Ball cup.	34.	Hexagon nut.	57.	Spring cover.
12.	Backing plate.	35.	Hardened washer.	58.	Anchor ball.
13.	Operating sleeve.	36.	Collar.	59.	Anchor ball pin.
14.	Locating sleeve.	37.	'O' ring.	60.	Anchor ball cup (outer).
15.	Locating pins.	38.	'O' ring.	61.	Anchor ball cup (inner).
16.	Spacer for valve body.	39.	Reaction ring.	62.	Rubber abutment cover.
17.	Valve body.	40.	Spring.	63.	Shims.
18.	'O' ring.	41.	Reaction washer.	64.	Lubricating nipple.
19.	Locating collar.	42.	'O' ring.	65.	Lubricating nipple.
20.	'O' ring.	43.	Circlip.	66.	Bearing lock.
21.	Spool.	44.	End cover.	67.	Spring locking clip.
22.	Outer tube.	45.	Split pin.	68.	Split pin.
23.	Inner tube.	46.	Slotted nut.		

strongly recommended that a service replacement unit be obtained under the serviced/replacement scheme. Should circumstances make this impracticable, however, then the appropriate servicing instructions in the following section must be adhered to.

Section QQ.16

SERVICING OF POWER-ASSISTED STEERING

Dismantling the power cylinder

Remove the unit from the vehicle and drain the oil from the cylinder by moving the piston rod in and out several times from one extreme end of its travel to the other.

Whilst carrying out any work on the unit under no circumstances should either the inner or outer tubes be held in a bench vice fitted with parallel jaws, as possible damage or distortion could render the unit useless.

To support the unit use a wooden block in which a hole, $2\frac{1}{2}$ in. (63.5 mm.) in diameter, has been bored. Saw the block in half down the length of the hole, and the unit can then be safely secured in it.

Drive out the pin from the anchor ball and unscrew the ball from the end of the piston rod. Hold the piston rod by means of a spanner applied to the flats machined on the end of the rod.

Withdraw the anchor ball inner cup and the rubber cover.

Remove the two spring steel covers and grease-retaining pads from the ball pins. Remove the two grease nipples and the split pins from the ends of the unit.

Unscrew the end cover from the ball pin end of the cylinder, using tool 18G555, and remove the two Belleville washers and the ball cup.

Remove the split pin retaining the lock ring, and again with the aid of Service tool 18G555 unscrew the lock ring, which will permit the withdrawal of the spacer, the power ball pin, and the second ball cup.

Remove the spring steel blade retaining the manual ball pin front cup and unscrew the ball cup, using Service tool 18G556. Remove the manual ball pin.

From the piston rod end of the cylinder remove the split pin and unscrew the bearing lock ring, using 18G555. A few light blows on a shaft of wood inserted in the ball pin end of the cylinder and resting on the ball cup will be sufficient to enable the entire inner cylinder assembly to be withdrawn. This assembly consists of the inner cylinder containing the piston rod, piston, and valve body at one end, and the end bearing at the other.

The valve spool may come away with this assembly, in which case it should be removed from the valve body by exerting a straight pull (by hand only) on the spool. Great care must be exercised in doing this as the spool is a close fit in the body and every care must be taken

to avoid damage to the highly finished and closely ground surfaces of the spool. Should the spool, however, remain in the outer cylinder, it may easily be removed from the ball pin end, together with the locating sleeve.

Extract the ball cup, Belleville washers, and the backing plate by tapping the end of the operating sleeve on a wooden block.

The valve body and end bearing are press fits in the inner tube and must be removed as follows.

Using withdrawing tool 18G2 (with thin, flat-ended legs), locate the legs in the bottom shoulder of the bearing—not in the 'O' ring groove—and apply the centre screw of the tool to the end of the piston rod. In some instances the valve body may come away first, after which the piston rod assembly may be withdrawn from the valve body end of the tube, but first ensure that all traces of dirt or any burrs are removed from the end of the piston rod.

From inside the piston rod bearing remove the circlip, using pliers 18G214A, and withdraw the housing, scraper ring, flat metal washer, vellumoid washer, gland seal, and gland spacer. The end bearing may now be driven out with the aid of a long wooden drift.

In the event of the bearing coming away first, the valve body can be pressed or driven out (after the piston rod assembly has been removed) with the aid of a wooden drift.

Remove the split pin, slotted nut, and steel washer securing the piston and withdraw the piston from the rod. Remove the piston ring.

NOTE.—Extreme care must be exercised that neither the piston nor the rod is marked or damaged in any way during the above operation, and it is strongly recommended that the piston rod is held by use of a close-fitting spanner applied to the flats on the anchorage end of the piston rod.

Using circlip pliers 18G214A, remove the circlip from inside the valve body and slide out the end cover. Remove the 'O' ring from the end cover and from the first groove in the valve body bore.

Unscrew the relief valve screw with the aid of a suitable Allen key and remove the relief valve spring and ball.

Remove the split pin, slotted nut, and plain washer securing the spool to the operating sleeve and withdraw the sleeve, spacer, and collar. Slide off the reaction ring and remove the 'O' ring from its outer diameter. Remove the spring and reaction washer and extract the small 'O' ring from the spool spindle.

Inspection

SPECIAL NOTE.—All 'O' rings and oil seals should be discarded and new ones fitted during reassembly.

Before examination all component parts should be thoroughly cleaned by washing in clean paraffin (kerosene) or petrol (gasoline). Fluffy rags should be avoided

for drying off, and, as with all hydraulic systems, absolute cleanliness is essential.

After cleaning inspect all items for wear or damage as follows.

Outer cylinder

Inspect for burrs, scratches, or scoring, especially around the ball pin apertures.

Inner cylinder

Inspect for internal wear, grooving (from piston ring), or scoring. If at all doubtful, discard and fit new.

Piston rod assembly

Check the piston and ring for wear or damage. The piston ring should have good expansion and sharp corners. The piston rod must be smooth and free from scratches or scoring.

The rod should not be dressed down with any abrasive. If badly marked it should be renewed.

Inner tube end bearing

All interior items must be checked for wear or distortion, and any that are doubtful should be replaced with new ones. The gland oil seal will be renewed automatically.

Valve body

Check internal bores for freedom of scores or scratches.

The locating peg must be tight; if not, a new one should be fitted. The relief valve ball should be free of pitting or marking, and the relief valve ball spring must be of good tension and not distorted in any way.

Valve spool

Examine carefully the spool for burrs or scoring.

Burrs may be removed by the use of very fine emery-cloth, but it is essential that the sharp edges on the spool are maintained and not rounded off, or the efficiency of the valve may be impaired.

With the 'O' rings removed from the valve body and spool, check the closeness of fit. With the spool lightly oiled (S.A.E. 10W), it should pass freely through the body.

Operating and locating sleeves

Inspect for wear or damage. Both inner and outer surfaces must be smooth and free from marks or burrs.

Check the fit of the two sleeves, one within the other. When lightly lubricated with S.A.E. 10W oil the operating sleeve should slide freely and smoothly over the locating sleeve.

Ball pins and cups

Examine for wear or pitting, and if either is evident, new ones should be fitted.

Anchorage components

Rubbers should be examined for distortion or deterioration, and if affected by oil or grease they should be replaced with new ones.

Reassembling the power cylinder

All 'O' rings should be lubricated in S.A.E. 10W mineral oil to facilitate assembly. Extreme care must be exercised when fitting 'O' rings to avoid damage which could cause subsequent leakage.

Fit the relief valve ball and spring and fully tighten the Allen screw.

Assemble new 'O' rings into the valve body and onto the end cover, slide the end cover into the body, and secure with the circlip. Fit a new 'O' ring onto the outside diameter of the body.

Fit the valve body to the inner tube. This should be done preferably by means of a light press or, alternatively, by means of driving with a hide or wooden mallet. Care must be taken that the locating peg in the valve body end is not damaged or misplaced during this operation, and it must also be noted that before attempting any fitting the valve body must be placed so that the peg lines up with the slot in the inner tube.

Fit new 'O' rings to the spool and reaction ring. Assemble the reaction washer, spring, and reaction ring to the spool. Both the reaction ring and the washer are fitted to the spool, chamfer first.

Assemble the collar onto the threaded part of the spool and fit the spacer to locate around the collar. The spacer must be positioned so that its drilled holes line up with the holes and peg in the valve body. Assemble the operating sleeve onto the collar, fit the steel washer, and tighten the nut to a torque figure of 100 to 200 lb. in. (1.26 to 2.30 kg. m.). This is a special nut and the permitted torque range is sufficient to enable one of the slots in the nut to be aligned with the split pin hole in the spool thread.

Fit a split pin via the access hole in the operating sleeve and bend the ends round the flats of the nut. The ends of the split pin must not be folded over the end of the spool.

Grease the operating sleeve and slide the locating sleeve over it.

Piston rod assembly

To eliminate the possibility of damage to any parts, assembly must always be made from the piston end of the rod.

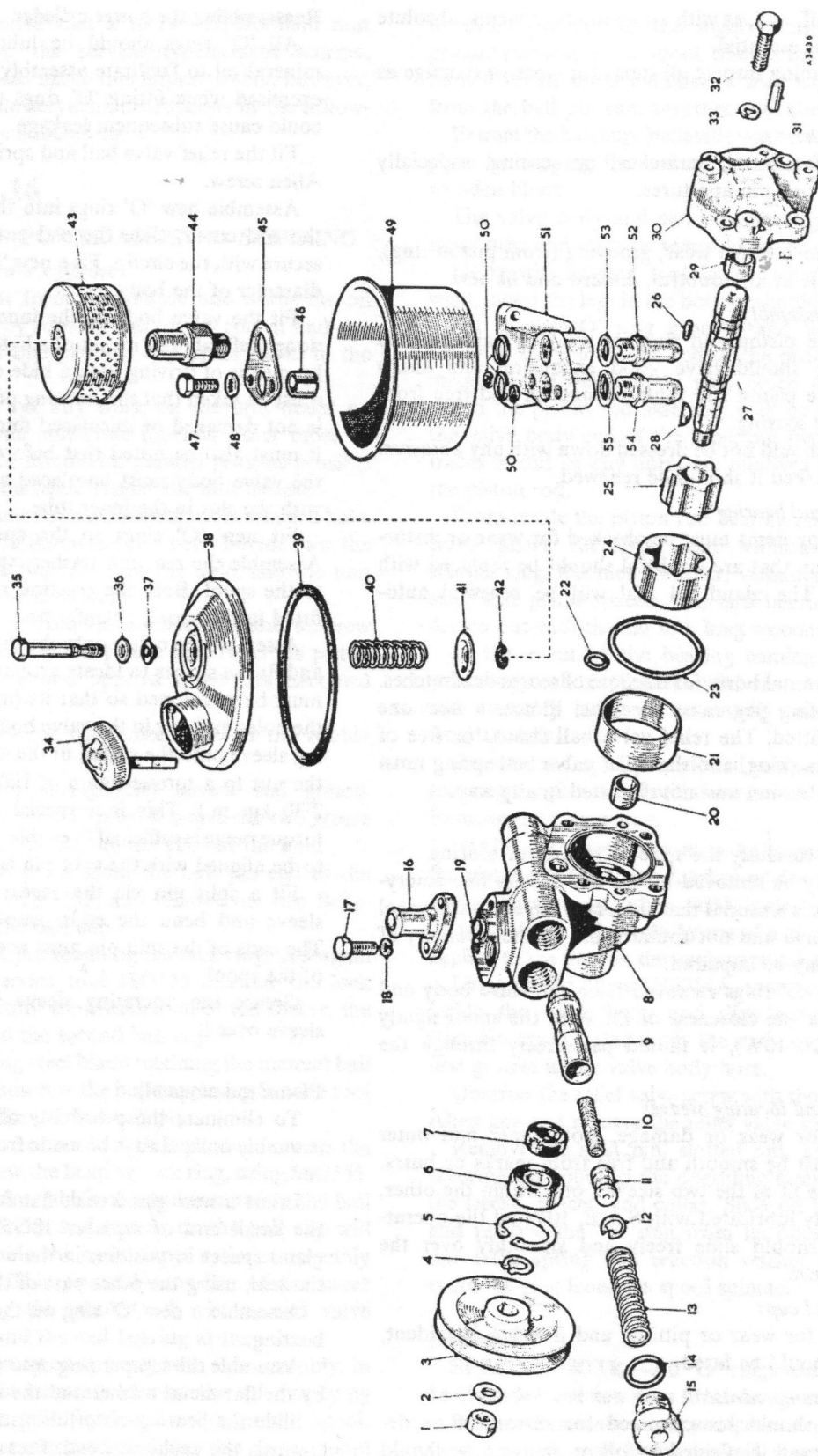
Insert a new gland seal, flat face first, carefully onto the small end of replacer 18G558 and then place the gland spacer in position in the end bearing. Press home the seal, using the other part of the tool.

Assemble a new 'O' ring on the outer diameter of the bearing.

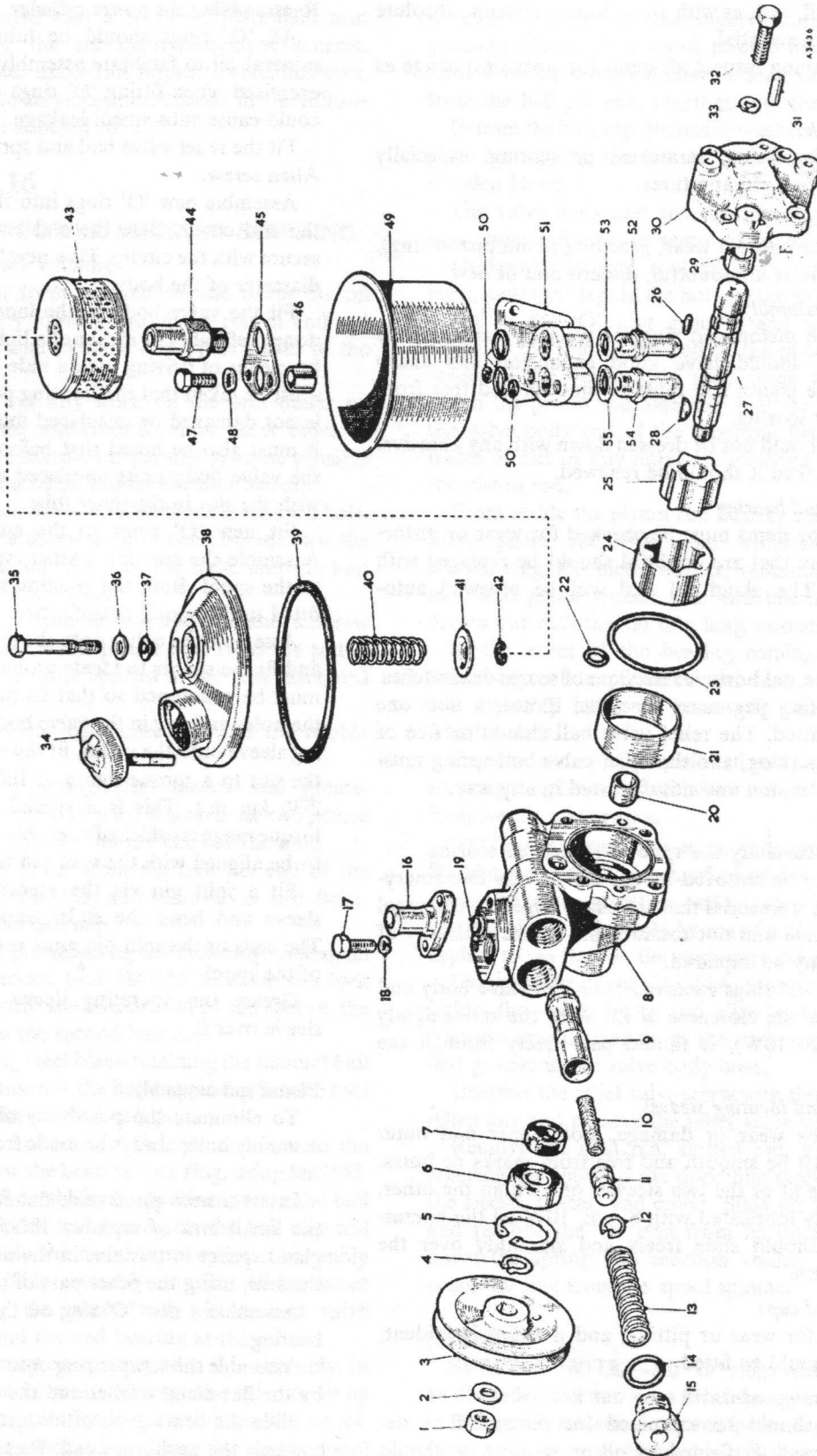
Assemble the scraper ring onto the piston rod, followed by the flat metal washer and the vellumoid washer.

Slide the bearing onto the piston rod and push down towards the anchorage end. Press the vellumoid washer, metal washer, and the scraper ring into the recess in the

THE POWER STEERING HYDRAULIC PUMP COMPONENTS



THE POWER STEERING HYDRAULIC PUMP COMPONENTS



KEY TO THE POWER STEERING HYDRAULIC PUMP COMPONENTS

No.	Description	No.	Description	No.	Description
1.	Nut for pulley.	20.	Bush (in body).	38.	Cover.
2.	Washer.	21.	Rotor sleeve.	39.	Seal—cover.
3.	Pulley.	22.	'O' ring.	40.	Spring—filter seal.
4.	Circlip—shaft.	23.	'O' ring—body cover.	41.	Washer—filter seal.
5.	Circlip—bearing.	24.	Rotor (outer).	42.	Spring clip.
6.	Bearing assembly.	25.	Rotor (inner).	43.	Element.
7.	Oil seal.	26.	Drive key—inner rotor.	44.	Adaptor—oil inlet.
8.	Body—pump.	27.	Shaft.	45.	Sealing plate—reservoir.
9.	Flow control valve.	28.	Drive key—pulley.	46.	Sleeve.
10.	Relief valve spring.	29.	Bush (in cover).	47.	Set screw.
11.	Relief valve.	30.	Cover.	48.	Lock washer.
12.	Retaining circlip.	31.	Dowel pin.	49.	Reservoir.
13.	Flow control spring.	32.	Set screw.	50.	Rubber seals.
14.	'O' ring.	33.	Spring washer.	51.	Body—reservoir.
15.	Adaptor—outlet.	34.	Cap and dipstick—reservoir.	52.	Adaptor—inlet.
16.	Adaptor—inlet.	35.	Bolt—cover retaining.	53.	Gasket.
17.	Set screw.	36.	Plain washer.	54.	Adaptor—outlet.
18.	Spring washer.	37.	Sealing washer (rubber).	55.	Gasket.
19.	Venturi tube.				

bearing. Assemble the scraper housing and secure the whole assembly with the circlip.

Assemble the piston ring onto the piston and then the piston to the piston rod, flat face first, followed by the flat washer and slotted nut. Tighten the nut to a torque figure of 35 to 45 lb. ft. (4.8 to 6.2 kg. m.). Do not over-tighten the nut or the piston may swell and bind in the cylinder. Secure the nut with a split pin.

Final assembly

Compress the piston ring and slide the piston rod assembly into the inner tube as far as it will go, locating the recessed end of the bearing in the end of the tube with the aid of a press or hollow drift. It is essential that the bearing enters the tube squarely and is pressed in up to its shoulder.

Assemble the backing plate into the bore of the operating sleeve, chamfer first, and ensure that it is correctly seated. Place two Belleville washers back to back (inner diameters together) in the recess of the ball cup (a smear of grease will assist in holding the washers in position) and assemble the ball cup into the bore of the operating sleeve. Assemble the second ball cup into the operating sleeve, screwing it in a few threads only to retain it in position.

Slide the complete inner tube assembly into the outer tube from the anchorage end, having first fitted the special 'O' ring protecting tool over the internal threads in the outer tube. A liberal amount of oil should be applied to the bearing 'O' ring before fitting the assembly and care should be taken to see that the hose ports in the valve body line up radially with the ports in the outer tube.

Assemble the bearing lock ring into the end of the outer tube and screw it in until the hose ports in the valve body line up longitudinally. This operation should be carried out with the cylinder horizontal, otherwise the spool will tend to fall out of the valve body.

Apply a liberal amount of grease to the spherical surface of the manual ball pin and assemble it through the holes in the outer tube and sleeves, ensuring that the limit peg is located correctly in the two elongated slots provided. Screw the second ball cup up tight, using 18G556, and then screw back one-eighth to one-quarter of a turn until the retaining clip holes are in line with one of the slots. Lock the cup in position with the spring clip.

Assemble the power pin ball cup, the one with the larger outside diameter, and ensure that it is correctly located. Apply a liberal coating of grease to the power ball pin and assemble it through the hole in the outer tube.

Assemble the spacer and screw in the lock ring with 18G555, ensuring that the spacer and locating sleeve are

in the midway position radially. Tighten the lock ring until one of the slots is in line with the split pin hole in the outer tube.

Lock the whole assembly by tightening the bearing lock ring at the anchor end. Secure in position with a split pin.

Assemble the outer ball cup and place two Belleville washers back to back (inner diameters together) into the recess provided in the ball cup.

Screw in the end cover until tight and then slacken back one-eighth to one-quarter of a turn and lock in position with a split pin.

Screw in the two grease nipples and give a few strokes with a grease gun to each.

Slide the rubber abutment cover and anchor ball inner cup over the end of the piston rod. Screw on the anchor ball and lock in position with the lock pin.

Dismantling the pump

Absolute cleanliness must be maintained when carrying out any maintenance on the pump, as with all hydraulic equipment; therefore, before commencing to dismantle the pump thoroughly clean the pump exterior.

Remove the two set screws securing the flange adaptor to the pump housing.

Extract the split pin from the drive pulley nut and remove the nut and washer. Remove the pulley from the shaft.

Remove the five bolts and spring washers securing the cover to the pump body, remove the cover, and lift the 'O' rings from their grooves in the pump housing.

Withdraw the inner rotor from the drive shaft and extract the drive key.

Clamp the pump body in a vice with soft jaws and remove the circlip retaining the rotor shaft bearing. Press, or drive out with a hide mallet, the rotor shaft and bearing from the housing. Press the bearing from the shaft with the aid of a suitable adaptor which will bear against the inner race of the bearing.

If the rotor shaft oil seal is worn or damaged it may be removed from the pump body with a drift.

Remove the oil pump outlet adaptor and extract the 'O' ring. Withdraw the flow control valve spring and tap out the flow control valve.

Remove the circlip securing the pressure relief valve and spring in the flow control valve and remove them from the bore of the valve. Take care not to damage the relief valve in any way.

Inspection

Wash all parts in petrol (gasoline) or paraffin (kerosene), except the rotor shaft bearing, which is prepacked with lubricant and then sealed.

All 'O' rings must be discarded and new ones fitted on assembly.

Inspect the pump body and cover for signs of wear and check the bushes in the body for wear or scores. Renew if necessary.

Inspect the drive and driven rotors for wear, cracks, or scores. If either rotor is damaged or worn, renew the pump body and rotor assembly.

If the rotors appear to be in good condition press the bearing onto the rotor shaft until it is hard against the shoulder on the shaft. Tap the shaft and bearing assembly into the pump body until the bearing is seated in the body.

Install the drive rotor and the pin on the shaft and then fit the driven rotor. Check the clearance between the rotors at all points with a feeler gauge. If the clearance exceeds .006 in. (.152 mm.) the pump body and rotor assembly must be renewed.

Check the clearance between the top of the rotors and the surface of the pump body with a feeler gauge and straight-edge. If the end-float of the rotor exceeds .0025 in. (.063 mm.) renew the pump body and rotor, or, alternatively, lap the surface of the pump body.

Check the clearance between the outside diameter of the driven rotor and the insert in the pump body. If the clearance exceeds .006 in. (.152 mm.) renew the pump body and rotor assembly. If all the clearances are within the tolerances, remove the rotors, shaft, and bearing from the pump body.

Ensure that the bore of the flow control valve is clean and dry and also the pressure relief valve. Insert the relief valve into the flow valve and check for ease of movement. If the relief valve does not move freely,

extract it and remove any burrs with very fine emery-cloth.

Check the flow control valve for free movement in the pump cover. Remove any burrs with fine emery-cloth.

Assembling the pump

All parts as they are assembled must be covered with a light film of oil. If the rotor shaft oil seal has been removed install a new one with the lip of the seal towards the pump rotors. Install the seal with the aid of a press and ensure that it is firmly seated in the recess in the pump housing.

Tap the rotor shaft and bearing assembly into the pump body and install the circlip.

Assemble the drive rotor and driving pin on the rotor shaft and install the driven rotor.

Fit the pressure relief spring and the pressure relief valve into the bore of the flow control valve and secure in position by fitting the circlip. Place the flow control valve in the bore of the chamber, taking care not to damage the valve lands.

Install a new 'O' ring on the pump outlet adaptor, install the spring on the flow control valve, and fit the outlet adaptor to the pump.

Install new 'O' rings in their recesses in the pump body.

Position the cover on the pump body and secure with the five bolts and spring washers, tightening the bolts in an order of diametrical selection.

Assemble the pump pulley onto the pump drive shaft, engaging the key in the shaft with the keyway in the pulley. Fit the plain washer and secure in position with the nut.

Section QQ.17

THE POWER-ASSISTED STEERING KIT COMPONENTS

Part No.	Description	Qty.	Part No.	Description	Qty.
ATJ70	Auxiliary drive pulley	1	LWN212	Spring washer	2
HBN0712	Bolt-drive pulley to crankshaft pulley	3	FNN112	Nut	2
ATJ71	Tab washer	3	ATJ4091	High-pressure hose assembly ..	1
ATJ4128	Drive belt	1	ATJ4041	Dowty seal	4
ATJ2000	Rotor pump	1	ATJ4039	Pin for banjo (short)	1
ATJ4019	Bracket for rotor pump	1	ATJ4036	Pin for banjo (long)	1
HNS0506	Bolt—pump bracket to engine support	3	ATJ4031	Flexible pipe assembly, comprising:	1
LWN205	Spring washer	2	ATJ4034	Low-pressure hose	1
FNN105	Nut	2	ATJ4035	Banjo adaptor	1
HNS0506	Set screw—pump to bracket ..	3	ATJ4040	Pipe clip	1
LWN205	Spring washer	3	ATJ4036	Pin for banjo	1
ATJ4022	Pulley for rotor pump	1	ATJ4041	Dowty seal	2
WKN405	Woodruff key	1	ATJ4040	Pipe clip	1
FNN107	Nut for pulley	1	ATJ4032	Flexible pipe (low-pressure supply)	1
PWN107	Plain washer	1	HCS0709	Pipe clip	2
ATJ2001	Reservoir	1	ATJ4038	Clip bracket for hoses	1
ATJ4018	Bracket for reservoir	1	FNN410	Nut for manual and power ball pins on power cylinder	2
HNS0408	Bolt—reservoir to bracket ..	3	CPS0412	Split pin	2
LWN204	Spring washer	3	ATJ9378	Template for pump mounting bracket holes	1
FNN104	Nut	3	ATJ4017	Steering and track-rod lever ..	1
ATJ2002	Power cylinder	1	ATJ4023	Draglink assembly, comprising:	1
ATJ4092	Ram abutment bracket	1	ATJ4024	Draglink tube	1
HBN0720	Bolt—cylinder to bracket ..	2	ATJ4025	Draglink end	1
LWN207	Spring washer	2	FNN212	Locknut	1
FNN107	Nut	2		Adhesive tape for hoses	
ATJ4033	Bolt—ram abutment bracket to frame	2		Neoprene strip for hoses	

SECTION R

IMPLEMENT SETTINGS

Setting particulars for fitting Ransomes, Simms and Jeffries, and Ford-Ransome Mounted Implements

Section
R.1

Section R.1

SETTING PARTICULARS FOR FITTING RANSOMES, SIMMS AND JEFFRIES, AND FORD-RANSOME MOUNTED IMPLEMENTS

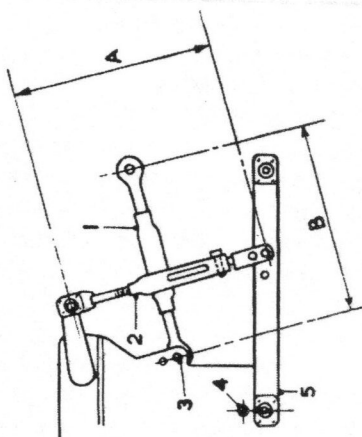


Fig. R.1

1. Upper link.
2. Left-hand lift rod.
3. Pin (y).
4. Higher hitch (z).
5. Lower link.

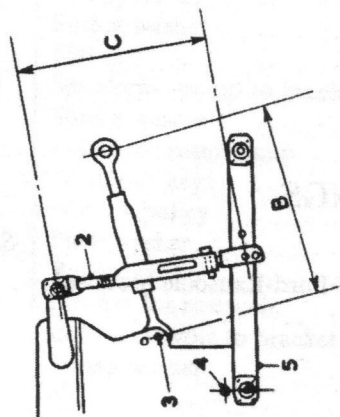


Fig. R.2

1. Upper link.
2. Left-hand lift rod.
3. Pin (y).
4. Higher hitch (z).
5. Lower link.

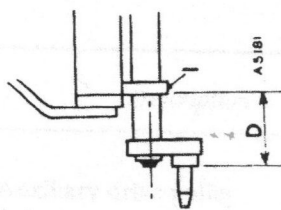


Fig. R.3

1. Bearing (right-hand).

Implement	Nominal width of cut	Rear wheel centres	Front wheel centres	Setting of linkage			Setting of cross-shaft		Remarks (tractor lower link lowest position)
				Fig.	A	B	C	D	
TS55 E. & H. 1-furrow Share Plough	14-16 in. 36-41 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.2	—	26-27 in. 66-68 cm.	L.H. 24½ in. 63 cm. R.H. 23½ in. 59 cm.	R.3 14-2¼ in. 35-5-5-7 cm. 16-4¼ in. 40-6-10-8 cm.	Remove master shield
TS59 M. & N. 3/2-furrow Share Plough	10-12 in. 25-4-30-4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	L.H. 24½ in. 63 cm. R.H. 23½ in. 59 cm.	26-27 in. 66-68 cm.	—	R.3 10-2¼ in. 25-4-5-7 cm. 12-5½ in. 30-4-13-9 cm.	Remove master shield
TS59 M. & N. 3/2-furrow Share Plough	12-14 in. 30-4-35-4 cm.	56-60 in. 142-152 cm.	53-55 in. 127-140 cm. 55-59 in. 140-149 cm.	R.1	L.H. 24½ in. 63 cm. R.H. 23½ in. 59 cm.	26-27 in. 66-68 cm.	—	R.3 12-3½ in. 30-4-9-0 cm. 14-6¼ in. 35-5-16-5 cm.	Remove master shield
TS64 H. & J. 2-furrow Share Plough	10-12 in. 25-4-30-4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	L.H. 24½ in. 63 cm. R.H. 23½ in. 59 cm.	26-27 in. 66-68 cm.	—	R.3 10-2¼ in. 25-4-5-7 cm. 12-5½ in. 30-4-13-9 cm.	Remove master shield
TS64 H. & J. 2-furrow Share Plough	14 in. 35-4 cm.	60 in. 152 cm.	55-59 in. 140-149 cm.	R.1	L.H. 24½ in. 63 cm. R.H. 23½ in. 59 cm.	26-27 in. 66-68 cm.	—	R.3 6¼ in. 16-5 cm.	Remove master shield
TS68A 2-furrow Reversible Share Plough	12 in. 30-4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	22¼ in. 57-7 cm.	28-29 in. 71-1-73-7 cm.	—	—	Remove master shield and reversing handle. 90° bend

IMPLEMENT SETTINGS

R

Implement	Nominal width of cut	Rear wheel centres	Front wheel centres	Setting of linkage				Setting of cross-shaft		Remarks (tractor lower link lowest position)
				Fig.	A	B	C	Fig.	D	
T68A 2-furrow Reversible Share Plough	14 in. 35.4 cm.	60 in. 152 cm.	55-59 in. 140-149 cm.	R.1	22½ in. 57.7 cm.	28-29 in. 71.1-73.7 cm.	—	—	—	Remove master shield and reversing handle. 90° bend
TS74 1-furrow Reversible Share Plough	16 in. 41 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	22½ in. 57.7 cm.	28-29 in. 71.1-73.7 cm.	—	—	—	Remove master shield and reversing handle. 90° bend
TD16A 3-furrow Reversible Disc Plough	8, 9, or 10 in. 20, 22.8, or 25.4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	23½ in. 59.3 cm.	26-27 in. 66-68 cm.	—	—	—	Pin (V) in top position
TD17B 3/2-furrow Disc Plough	8, 9, 10, or 12 in. 20, 22.8, 25.4, or 30.4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	L.H. 24½ in. 63 cm. R.H. 22 in. 55.8 cm.	26-27 in. 66-68 cm.	—	—	—	Pin (Y) in top position
C68A Tool Bar Frame	8 ft. 4 in. 254.0 cm.	56 in. 142 cm.	55 in. 140 cm.	R.2	—	25-26 in. 63.5-66.0 cm.	23½ in. 59.3 cm.	—	—	Remove master shield. Lift-rods in floating position
C73, C74 Tool Bar Frame	8 ft. 4 in., 10 ft 2 in. 254.0, 310.0 cm.	56 in. 142 cm.	55 in. 140 cm.	R.2	—	24-25 in. 61-63.5 cm.	24½ in. 63 cm.	—	—	Remove master shield. Lift-rods in floating position
HR20A Disc Harrow	6 ft. 6 in. 198 cm.	56 in. 142 cm.	55 in. 140 cm.	R.1	21½ in. 55.2 cm.	27-28 in. 68-71.1 cm.	—	—	—	Remove master shield. Fit front frame weight
TPD1008 Potato Digger	—	To suit row width	To suit row width	R.2	—	25-26 in. 63.5-66.0 cm.	24½ in. 63 cm.	—	—	Pin (Y) in top position
TS55H 1-furrow Share Plough	12 in. 30.4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.2	—	26-27 in. 66-68 cm.	L.H. 24½ in. 63 cm. R.H. 23½ in. 59 cm.	R.3	1½ in. 4.4 cm.	Remove master shield

Use higher hitch (Z) only when ground conditions cause excessive wheelspin.
Lift-rod lengths (A) or (C) should then be reduced by 1 in. (25.4 mm.).

Implement	Nominal width of cut	Rear wheel centres	Front wheel centres	Setting of linkage				Setting of cross-shaft		Remarks (tractor lower link lowest position)
				Fig.	A	B	C	Fig.	D	
T68A 2-furrow Reversible Share Plough	14 in. 35.4 cm.	60 in. 152 cm.	55-59 in. 140-149 cm.	R.1	22½ in. 57.7 cm.	28-29 in. 71.1-73.7 cm.	—	—	—	Remove master shield and reversing handle. 90° bend
TS74 1-furrow Reversible Share Plough	16 in. 41 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	22½ in. 57.7 cm.	28-29 in. 71.1-73.7 cm.	—	—	—	Remove master shield and reversing handle. 90° bend
TD16A 3-furrow Reversible Disc Plough	8, 9, or 10 in. 20, 22.8, or 25.4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	23½ in. 59.3 cm.	26-27 in. 66-68 cm.	—	—	—	Pin (y) in top position
TD17B 3/2-furrow Disc Plough	8, 9, 10, or 12 in. 20, 22.8, 25.4, or 30.4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.1	L.H. 24½ in. 63 cm. R.H. 22 in. 55.8 cm.	26-27 in. 66-68 cm.	—	—	—	Pin (y) in top position
C68A Tool Bar Frame	8 ft. 4 in. 254.0 cm.	56 in. 142 cm.	55 in. 140 cm.	R.2	—	25-26 in. 63.5-66.0 cm.	23½ in. 59.3 cm.	—	—	Remove master shield. Lift-rods in floating position
C73, C74 Tool Bar Frame	8 ft. 4 in., 10ft 2 in., 254.0, 310.0 cm.	56 in. 142 cm.	55 in. 140 cm.	R.2	—	24-25 in. 61-63.5 cm.	24½ in. 63 cm.	—	—	Remove master shield. Lift-rods in floating position
HR20A Disc Harrow	6 ft. 6 in. 198 cm.	56 in. 142 cm.	55 in. 140 cm.	R.1	21½ in. 55.2 cm.	27-28 in. 68-71.1 cm.	—	—	—	Remove master shield. Fit front frame weight
TPD1008 Potato Digger	—	To suit row width	To suit row width	R.2	—	25-26 in. 63.5-66.0 cm.	24½ in. 63 cm.	—	—	Pin (y) in top position
TS55H 1-furrow Share Plough	12 in. 30.4 cm.	56 in. 142 cm.	53-55 in. 127-140 cm.	R.2	—	26-27 in. 66-68 cm.	L.H. 24½ in. 63 cm. R.H. 23½ in. 59 cm.	R.3	1½ in. 4.4 cm.	Remove master shield

Use higher hitch (2) only when ground conditions cause excessive wheelspin.
Lift-rod lengths (A) or (C) should then be reduced by 1 in. (25.4 mm.).

LUBRICATION CHARTS

KEY TO LUBRICATION CHART

UNIVERSAL FOUR TRACTOR

EVERY 10 HOURS

- (1) FRONT AXLE. Apply the grease gun filled with grease to Ref. C and give two strokes to each nipple.
- (2) AIR CLEANER. Check the level and condition of the oil in the oil bath, and replenish or change as necessary.
- (3) HAND BRAKE (when fitted). Apply the grease gun filled with grease to Ref. C to the nipple on the brake pedal cross-shaft lever.
- (4) ENGINE. Inspect the level of the engine oil by the dipstick. Replenish if necessary with an oil to Ref. A.
- (5) TRANSMISSION. Inspect the level of the transmission oil by the dipstick. Replenish if necessary with an oil to Ref. B.

EVERY 50 HOURS

- (6) HYDRAULIC POWER UNIT. Remove the magnetic filter. Clean thoroughly and replace.
- (7) HYDRAULIC POWER UNIT CROSS-SHAFT. Apply the grease gun filled with grease to Ref. C and give two strokes to each nipple.

LINKAGE AND CONTROLS. Apply the oilcan filled with engine oil to the following points: foot brakes, hand brake (if fitted), clutch mechanism, radiator shutters, throttle control.

EVERY 200 HOURS

- (8) STEERING. Inspect the level of the steering box oil, and replenish if necessary with an oil to Ref. B.
- (9) ENGINE. Drain the old oil from the engine sump and refill with fresh oil to Ref. A.
- (10) FUEL INJECTION PUMP. Drain off old oil and refill with fresh oil to Ref. A. (Not necessary on latest-type pump—see Section DD.11.)

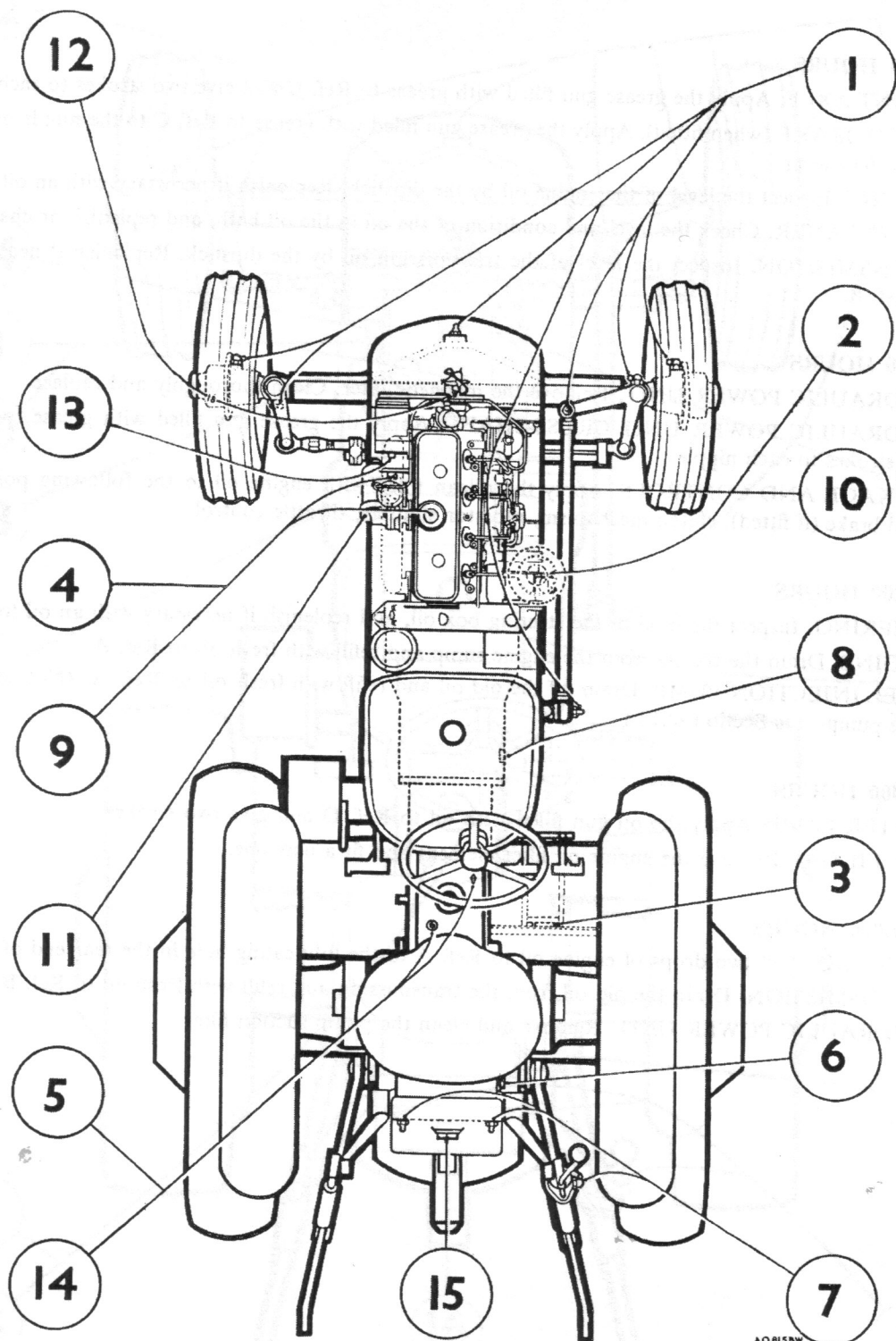
EVERY 400 HOURS

- (11) OIL FILTER. Remove the engine oil filter element and fit a new one.
- (12) WATER PUMP. Apply the oil gun filled with oil to Ref. D and give two strokes.

EVERY 1,000 HOURS

- (13) DYNAMO. Add two drops of engine oil to Ref. A to the lubricating hole in the rear end of the dynamo.
- (14) TRANSMISSION. Drain the old oil from the transmission and refill with fresh oil to Ref. B.
- (15) HYDRAULIC POWER UNIT. Remove and clean the pump suction filter.

NUFFIELD UNIVERSAL FOUR TRACTOR LUBRICATION CHART



AOB/5BW

KEY TO LUBRICATION CHART

UNIVERSAL THREE TRACTOR

EVERY 10 HOURS

- (1) FRONT AXLE. Apply the grease gun filled with grease to Ref. C and give two strokes to each nipple.
- (2) HAND BRAKE (when fitted). Apply the grease gun filled with grease to Ref. C to the nipple on the brake pedal cross-shaft lever.
- (3) ENGINE. Inspect the level of the engine oil by the dipstick. Replenish if necessary with an oil to Ref. A.
- (4) AIR CLEANER. Check the level and condition of the oil in the oil bath, and replenish or change as necessary.
- (5) TRANSMISSION. Inspect the level of the transmission oil by the dipstick. Replenish if necessary with an oil to Ref. B.

EVERY 50 HOURS

- (6) HYDRAULIC POWER UNIT. Remove the magnetic filter. Clean thoroughly and replace.
- (7) HYDRAULIC POWER UNIT CROSS-SHAFT. Apply the grease gun filled with grease to Ref. C and give two strokes to each nipple.
- (8) LINKAGE AND CONTROLS. Apply the oilcan filled with engine oil to the following points: foot brakes, hand brake (if fitted), clutch mechanism, radiator shutters, throttle control.

EVERY 200 HOURS

- (9) STEERING. Inspect the level of the steering box oil, and replenish if necessary with an oil to Ref. B.
- (10) ENGINE. Drain the old oil from the engine sump and refill with fresh oil to Ref. A.
- (11) FUEL INJECTION PUMP. Drain off the old oil and refill with fresh oil to Ref. A. (Not necessary on latest type pump—see Section D.18.)

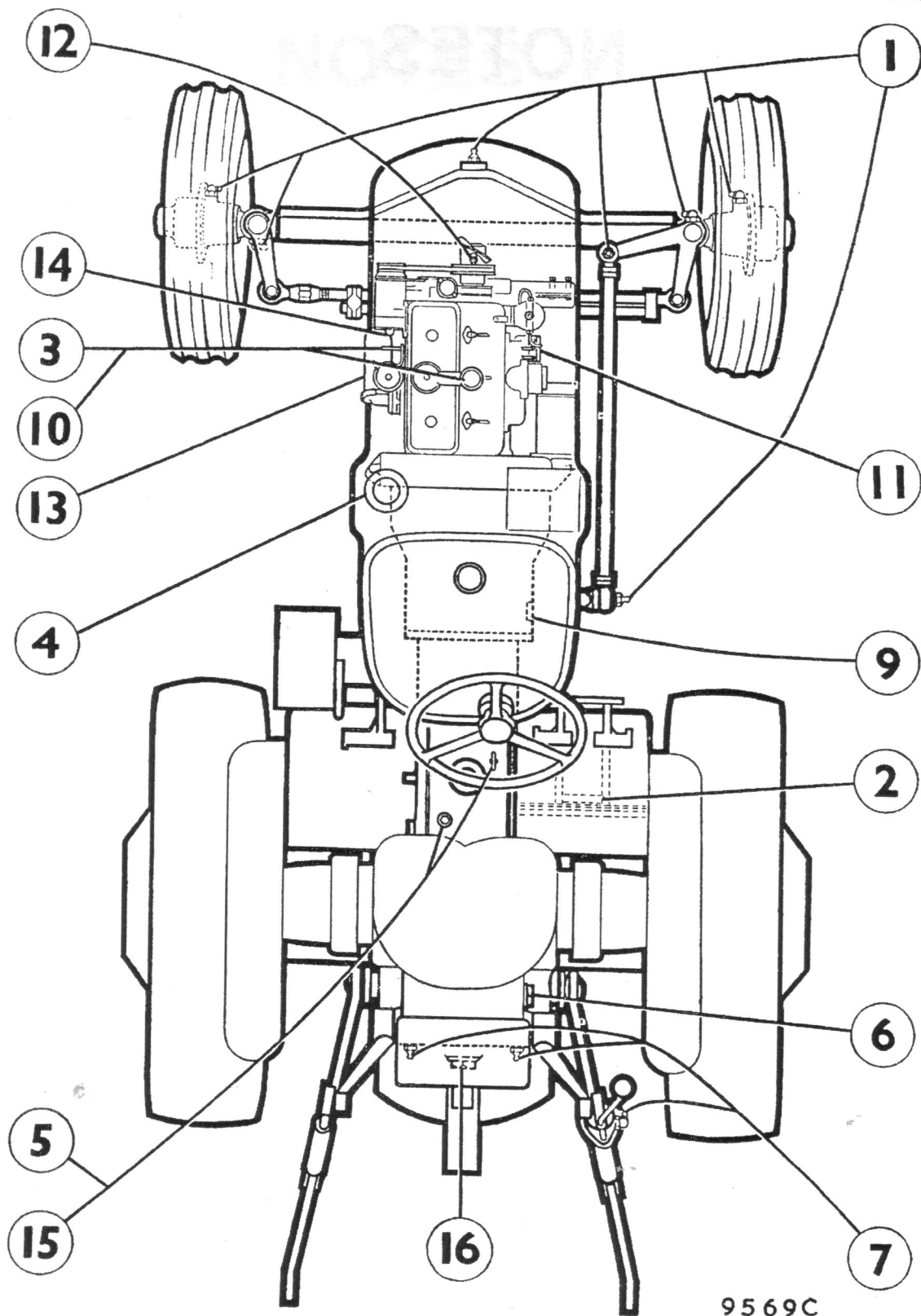
EVERY 400 HOURS

- (12) WATER PUMP. Apply the oil gun filled with oil to Ref. D and give two strokes.
- (13) OIL FILTER. Remove the engine oil filter element and fit a new one.

EVERY 1,000 HOURS

- (14) DYNAMO. Add two drops of engine oil to Ref. A to the lubricating hole in the rear end of the dynamo.
- (15) TRANSMISSION. Drain the old oil from the transmission and refill with fresh oil to Ref. B.
- (16) HYDRAULIC POWER UNIT. Remove and clean the pump suction filter.

NUFFIELD UNIVERSAL THREE TRACTOR LUBRICATION CHART



9569C

10093.2

STD 1725

▽ haut 3,75 mm
□ milieu 2,40
▣ bas 2,40

3 ▣ radess 6,40

▣ 3,2