

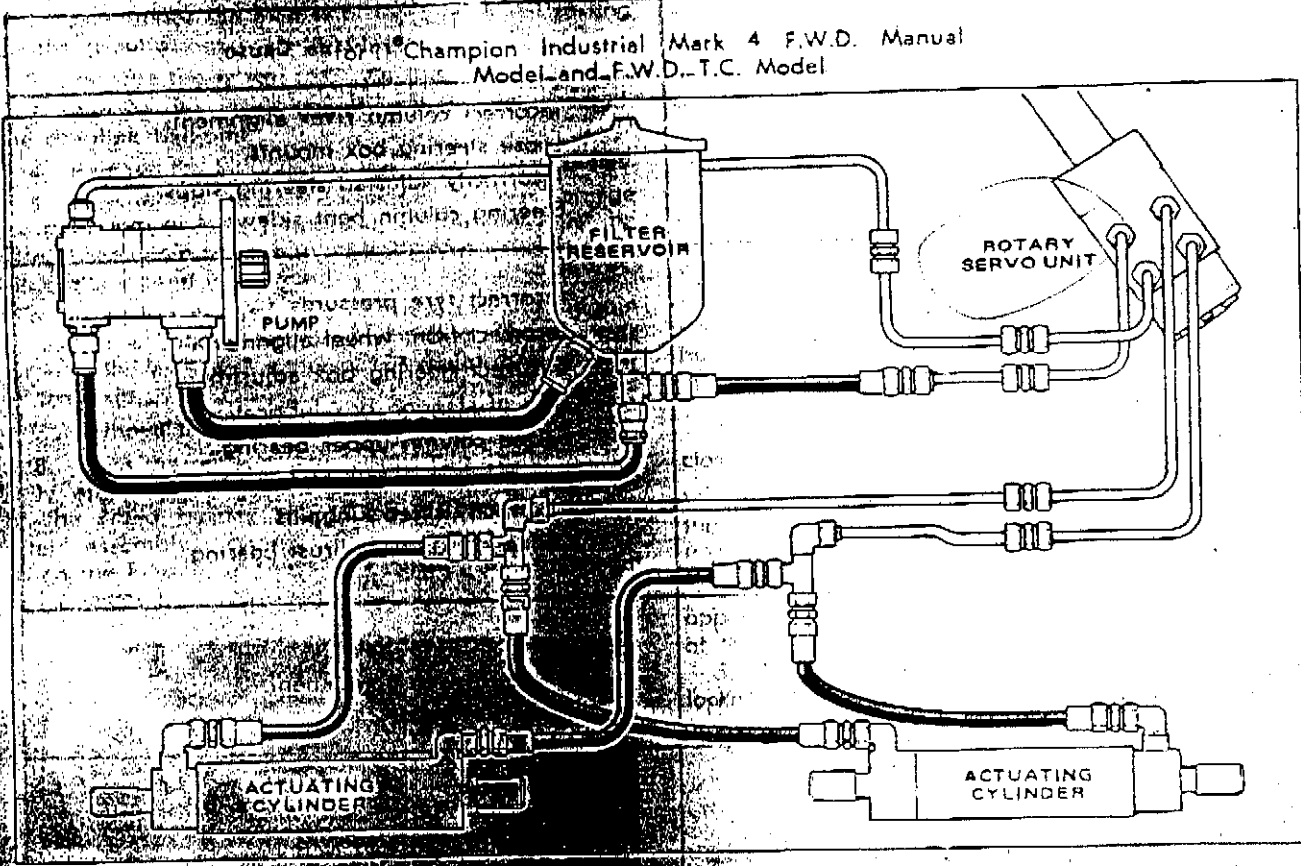
FA- 98815185

JASON

Tractor - Mark 4 Series

A18. FWD Power Steering Description Specification

ORBITROL POWER STEERING



DESCRIPTION

The power assisted steering system provides effort less steering as it requires low input torque which is helpful in reducing operator fatigue. The system comprises a direct engine driven vane type pump with remote mounted reservoir, rotary servo control unit, actuating cylinders connected to the steering arms and anchored centrally on the axle and plates and hoses connecting the reservoir, pump, control and cylinders.

No worm gear or lower steering column bearings are used, as the "Orbitrol" is a remote rotary hydraulic control with the steering wheel attached. Both the control valving and fluid meter are contained in one integral unit which feeds fluid as directed by the manually controlled valving, measures the fluid required to control steering and uses the fluid measuring meter to reposition the steering reference base. A ball valve enables the unit to revert to emergency manual control automatically in the event of supply pressure loss.

SPECIFICATIONS

- Pump — Vickers V10F vane type with remote mounted reservoir
- Capacity — 4 g.p.m. nominal
- Relief valve pressure — 750 p.s.i.

- Rotary servo unit — Char-Lynn "Orbitrol" Model WC-11 (load reaction)
- Displacement (cu. in. per steering wheel revolution) — 6.2 cu. in.
- Capacity — 6 g.p.m. maximum
- Input torque — 26 lbs./ins.
- Max. "out" port back pressure — 30 p.s.i.
- Port threading — 1/2" — 16 UNF.
- Actuating cylinders — Malcolm Moore
- Bore — 2"
- Stroke — 6"

MAINTENANCE

The sealed system requires a periodical oil level check and, at 1200 hours, renewal of the oil and filter element.

Oil level:

Remove the filter cover and check that the oil is within 1/2" of the lip of the barrel when the boosters are centralised. Add oil, of the recommended type, as necessary.

Oil and Filter Element Renewal:

Drain the reservoir oil, remove the element and thoroughly clean inside the barrel. Install a new element and, with the boosters centralised, fill with new

4 Series

Mark 4 Series

allowing sufficient time for the element to absorb and air to escape. Operate the steering to each lock to bleed the system of air and, when no bubbles are apparent with the boosters connected, top up the reservoir to within $\frac{1}{4}$ " of the barrel. Initial the cover ensuring that the seal is correctly

installation. Absolute cleanliness is essential as any dirt introduced into the oil will cause premature component wear.

OPERATION

The Pump Description, Overhaul and Trouble Shooting procedures, contained in pages A 6. to A10. of this section also apply to this power steering system and should be used as necessary.

In the basic 'Orbitrol' unit depicted in Fig. A32 the control valve maintains an open-centre circuit which recirculates fluid from the pump back to the reservoir. A relatively low pressure drop is maintained with the 'Orbitrol' in the neutral position (zero force on the steering wheel).

When steering action is initiated by rotation of the steering wheel, the control spool is rotated by direct action from the input shaft. Rotation of the spool closes the neutral porting while opening ports to allow oil to be fed to the meter section of the unit. The oil displaced by the meter is then ported to feed the

proper cylinder control port. The alternate cylinder port is simultaneously coupled to return displaced cylinder fluid to the system reservoir. At slow steering speeds, when all of the fluid delivered to the 'Orbitrol' is not needed at the remote steering cylinder, partial closing of the control porting allows part of the fluid to be routed back to the reservoir without passing through the meter and actuator circuit.

While measuring fluid required by the remote cylinder, the 'Orbitrol' metering section is in motion. This motion is fed back through the unit to reposition the control sleeve, providing a rotary follow-up action in the steering wheel. This feature is responsible for the sensitive feel experienced at the steering wheel when using the 'Orbitrol'.

In the event of pump or power source failure the 'Orbitrol' automatically reverts to a manual steering system. In this condition the fluid metering section becomes a rotary hand pump and directs fluid to move the cylinder in either direction when the steering wheel is manually rotated. A check valve within the unit allows recirculation of the fluid within the remote cylinder system.

SERVICE

Functional Check :

A normal periodic functional check of the entire power steering system will generally be adequate to ensure satisfactory service. The oil level of the reser-

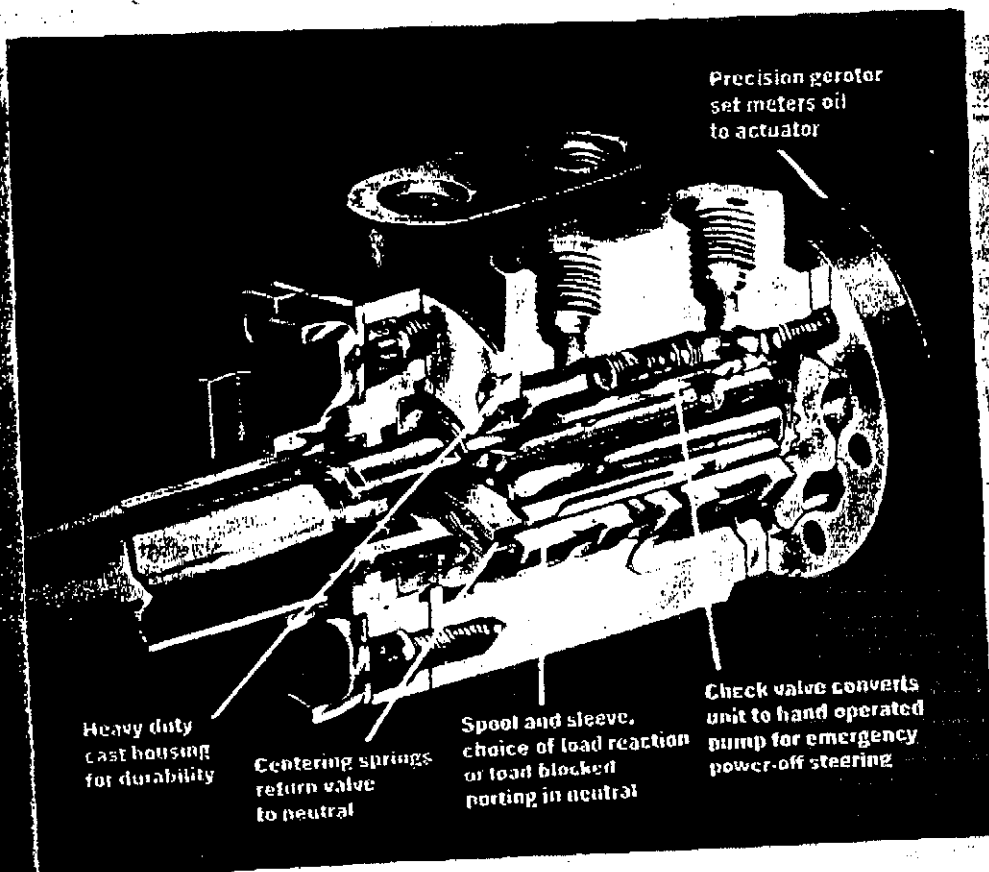


Fig. A31 — Rotary Servo Control

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THE LOADER

DESCRIPTION

The F1000 (rear wheel drive) and R1250 (front wheel drive) loaders are the Mark 4 tractor having manual or torque converter drive and fitted with the appropriate equipment.

The loaders are hydraulically operated with power supplied by an intra-vane type double pump driven by the engine crankshaft through a short telescoping coupling shaft. The shaft end of the pump has a 95.5 litres (21 gals imp) p.m. cam ring to supply the loader hydraulic circuit and backhoe if supplied, while the cover end of the pump has a 22.7 litres (5gals imp) p.m. cam ring to activate power steering (R1250) or 36.3 litres (8 gals imp) p.m. to activate power steering and 3 P.L. if fitted (F1000).

The hydraulic oil reservoir is mounted on the differential housing (F1000) and on the loader subframe (R1250) and is provided with a gauze strainer under the filler cap also one in the reservoir outlet line. The filler cap also embodies the reservoir dipstick. The pump draws oil from the reservoir

and feeds it to the two-spool stack valve which is manually controlled to operate (a) the two double-acting cylinders operating the bucket rise and fall (b) the two double-acting cylinders operating the bucket tilt. The return oil circuit passes through a micron filter prior to entering the reservoir.

To protect the circuits from being overloaded and possible damage in the event of a blockage or abnormal load relief valves are provided in the inlet section and in the 'lift' and 'tilt' oil ways.

All oil lines are of seamless steel tubing and hoses are double wire braided. J.I.C. flare fittings are used on hoses and pressure lines. 'O' rings are used on valve ports.

The loader subframe including the pivot bosses are fabricated from structural steel. Lift arms are box welded to provide maximum strength with low weight. Linkages on the lift arms and bucket have grease fittings to each pivot point to ensure positive lubrication.

SPECIFICATION

General	F1000		R1250	
Overall length - tractor and loader	5233mm	17ft 2ins	5321mm	17ft 5½ins
Overall height (over muffler)	2184mm	7ft 2ins	2184mm	7ft 2ins
Overall height - tractor	1560.5mm	5ft 1.7/16in	1560.5mm	5ft 1.7/16in
Bucket capacity - Std.	0.75 cu.m	1 yard	0.94 cu.m	1¼ yard
- Alt.	0.56 cu.m	¾ yard	0.56 cu.m	¾ yard
- Alt.	0.94 cu.m	1½ yard	0.75 cu.m	1 yard
Bucket width - Std.	1829mm	72 ins	2235mm	88 ins
- Alt.	1422mm	56 ins	1422mm	56 ins
- Alt.	2235mm	88 ins	1829mm	72 ins
Lift capacity - full height	1914kg	4220 lbs	1860 kg	4100 lbs
Breakout force	56.9 kN	12800 lbf	56.9 kN	12800 lbf
Raising time	5.4 secs.	-	5.4 secs.	-
Lowering time	3.0 secs.	-	3.0 secs.	-
Dump time	1.0 secs.	-	1.0 secs.	-
Overall operating height	4140mm	13ft 7ins	4115mm	13ft 6ins
Height to hinge pin - fully raised	3277mm	10ft 9ins.	3251mm	10ft 8ins.
Dump angle - max. height	50°	-	50°	-
Dump height - 45° dump angle	2591mm	8ft 6ins	2566mm	8ft 5ins
Reach - fully raised	772mm	2ft 6½ins.	838mm	2ft 9ins
Reach at height for 45° dump angle	772mm	2ft 6½ins.	838mm	2ft 9ins
Roll back - max. at ground	45°	-	47°	-
Roll back - max. at fully raised	47°	-	47°	-
Digging depth - bucket level	38mm	1½ins	63mm	2½ins
Grading angle - Max.	34°	-	34°	-
Loader clearance circle	14m	46ft 0ins	11.7m	38ft 6ins
Hydraulic System				
Pump model	Vickers 2620V -		Vickers 2620V -	
Pump output - rear section	1.32 l/s, 17.5 g.p.m. Imp.		1.32 l/s, 17.5 g.p.m. Imp.	
Valve	Vickers CM2 -		Vickers CM 2 -	
Control valve relief setting - Std.	13.79MPa	2000lbf in ²	13.79MPa	2000 lbf in ²
- Wheat Bucket	-	-	15.51MPa	2250 lbf in ²
Control	Hand lever	-	Hand lever	-
Filters - suction strainer	16 mesh 24G	-	16 mesh 24G	-
- return line	OFM 100	-	OFM 100	-

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	F1000		R1250	
Lift cylinders	88.9x762mm	3½x30ins	88.9x762mm	3½x30ins
Bucket cylinders	88.9x304.8mm	3½x12ins	88.9x304.8mm	3½x12ins
Reservoir capacity	45.4 litres	10 gals. Imp	45.4 litres	10 gals. Imp
Recommended Lubricants	Heavy Duty Motor Oil API MS.			
Hyd. fluid	Below -18°C (0°F) to 82°C (180°F) — SAE 10W			
	Above 10°C (50°F) to 89°C (210°F) — SAE 20W			
	Lithium base multi-purpose grease N.L.G.I. No. 2			
Grease points				
Weights				
Tractor and loader — bare	6380 kg	14065 lbs.	6160 kg	13580 lbs.
Tractor and loader — 80kg (175 lb) operator, full fuel & hydraulics, max. load in bucket.	8360 kg	18431 lbs.	8080 kg	17813 lbs.

MAINTENANCE

Keep the hydraulic reservoir oil up to the level marked on the dipstick. Check the level daily or after each 10 hours working. The bucket must be level and on the ground when making the check.

It is recommended that the reservoir be drained and cleaned after the first 150 hours of operation, thereafter at each 600 hours of operation. At this time the suction strainer should be removed and cleaned by sluicing thoroughly in clean distillate and allow to dry in a dust free position before re-fitting. Carefully examine the filter and gasket. Discard and fit a new unit if showing signs of deterioration. If the oil shows signs of contamination before the above hours are reached it should be drained and replaced with clean new oil.

Never run the engine without oil in the hydraulic reservoir as the engine will be turning a dry pump with consequent possible damage.

Do not use hydraulic brake fluid — see specification for "Recommended Lubricants".

The Strainer — to service or renew

1. Drain the oil from the reservoir.
2. Remove the suction pipe and gasket from the reservoir — held by 4 setscrews.
3. Withdraw the strainer.

When re-assembling, fit a new gasket if necessary.

The Return Line Filter — to service or renew

1. Remove the bowl and element by releasing the bolt at the bottom of the bowl. Retrieve the spring and gasket washer.
2. Discard the element and seal ring from the filter head.
3. Fit a new element and seal ring, replace the bowl, noting the positions of the spring and gasket washer.

Lubrication

Charge all grease nipples at every 10 hours of operation. Wipe the nipples clean before charging. Avoid excessive lubrication as excessively greased parts collect dirt and increase wear.

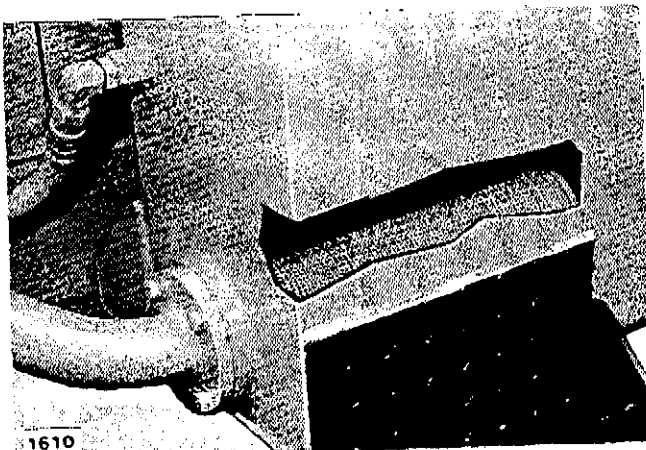


Fig. R5 — Suction Strainer in Hydraulic Circuit

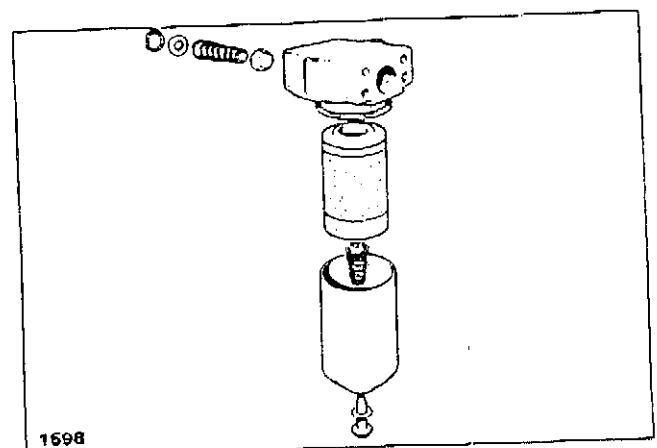


Fig. R6 — Hydraulic Filter in Return Line

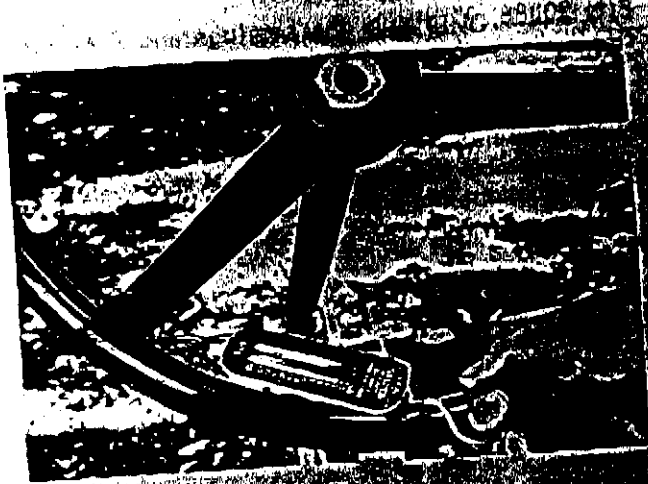


Fig. A12 — Check Bearing Pre-Load

Rocker Shaft:
Backlash between the rocker shaft fork and the worm nut is decreased by screwing in the adjusting screw.

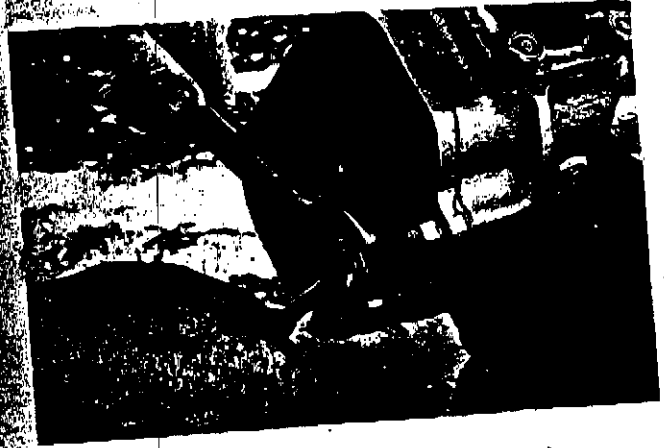


Fig. A13 — Rocker Shaft Screw Adjustment

Adjust to remove all backlash at the centre of travel. Check that the force required to turn the steering wheel does not exceed 2½ lbs. after adjusting the backlash. Check through the full travel of the box.

POWER STEERING

for: Champion Industrial Mark 4 Standard Model
Manual and Standard Model T.C.

DESCRIPTION

The power steering system provides effortless steering for all applications. Steering is positive under any driving condition as the steering mechanism is hydraulically locked while the hydraulic pump is operating. A ball check valve is incorporated in the booster to enable the tractor to be steered manually if the hydraulic pump is not operating.

The system comprises a direct engine driven vane type pump, with remote mounted reservoir, ram type booster cylinder for actuation, hoses (connecting the pump, reservoir and booster), and a drag link to connect the booster to the pitman arm. A lug welded to the chassis anchors the booster, and the booster extension rod socket locates in the stub axle steering arm; a special stop bracket being attached to the chassis to prevent the steering box from "bottoming" in either direction.

SPECIFICATION

Pump	— Vickers V10F vane type with remote mounted reservoir.
Capacity	— 3 g.p.m. nominal.
Relief valve pressure	— 750 p.s.i.
Booster	— Vickers S22N.
Rated thrust capacity	— 1500 lbs. @ 600 p.s.i. pressure.
Cylinder bore	— 2".
Maximum piston stroke	— 10½".
Lubrication	— Chassis grease.

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