



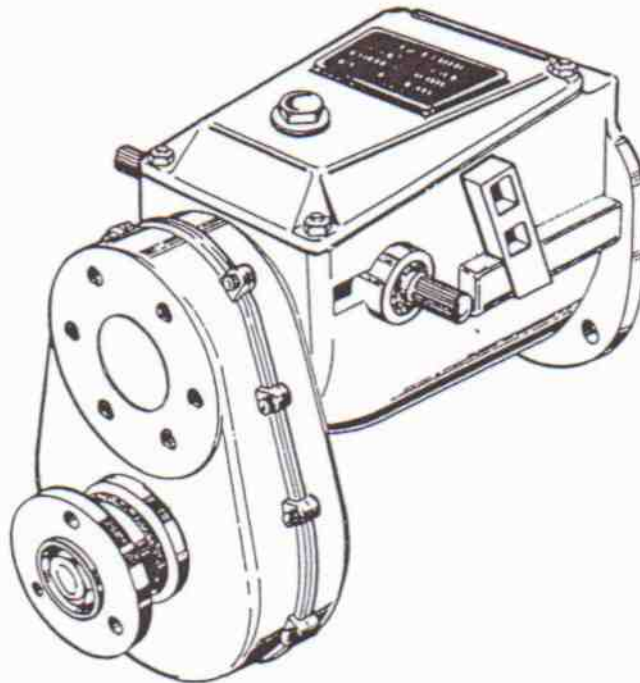
J TYPE MARINE GEARBOX

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THE WATERMOTA MARINE REVERSE GEAR

This Marine Reverse Gear is manufactured in our Works to a specification based on JOES Type 505B Gear. Parts are similar to Joes, resulting in a World Wide Service for spare parts. The gear has been used for many years on many types of engines, with outstanding reliability. The information included in this booklet will facilitate the service of the gearbox, especially the ordering of spare parts from the illustrated Parts Lists.



SPECIFICATION

O/A Length (Direct Drive)	. 10 in.
O/A Length (Reduction 2:1)	. 12 $\frac{3}{4}$ in.
Maximum Width	. 9 $\frac{3}{4}$ in.
Weight (Direct Drive)	. 28 $\frac{1}{2}$ lb.
Weight (Reduction 2:1)	. 41 $\frac{1}{2}$ lb.
H.P. Rating	. 1.5 h.p. per 100 r.p.m.
Torque Capacity	. 50 lb./ft. Diesel 80 lb./ft. Petrol
Maximum R.P.M.	. 4,000 r.p.m.
Astern Revolutions	. 79% of Ahead
Lubrication — Splash	. Oil as Engine
Oil Capacity:	
Direct Drive	. 1 pint
2:1 Reduction	. 1 $\frac{3}{4}$ pint

Note: Rotation of reduction output is same as direct drive.

DESCRIPTION OF REVERSE GEAR

The Forward Drive is engaged by moving the gear lever forward which engages the double friction clutch. The operation takes place through a ball-bearing control operating a system of toggles which force home a set of plungers, thus clamping together a series of hardened steel friction discs which are interleaved, alternative plates being attached to the engine shaft and propeller shaft. Additionally, at the engine end a split cone clamps the engine shaft and frictionally locks the epicyclic gearing to it. The double clutch arrangement eliminates entirely the slight rattle at low speeds noticeable in the normal type of epicyclic gear.

The Neutral Position is obtained with the lever midway between forward and reverse, the forward and reverse drives are then released and permit the gearing to run idle.

The Reverse Drive is obtained by drawing the lever right back. This releases the forward drive and contracts a lined brake band by means of a cam, thus clamping the outer portion of the gear and causing a reverse motion of the propeller shaft through epicyclic gearing. The reverse drive is approximately 79% of the engine speed.

IMPORTANT: See that oil level is maintained in the reverse gear and reduction drive, if fitted.

Use one of the following grades: BP Energol SAE30; Castrol XL; Mobiloil A; Shell X-100 30; Essolube 30. Keep to 'Full' mark on dip-stick.

ADJUSTMENT OF GEAR

First remove Inspection Cover of Gear Box.

AHEAD CLUTCH

Rotate the drum M4 until the locking tab M20 is observed. This tab locks the aft part of drum to the forward part and engages in castellations cut in the forward portion. Lock the drum by pulling the Gear Control Lever into reverse and slack off the set screw M22 securing locking tab. Take care not to slacken too far and drop the screw into the gearbox. Lift tab out of the slot. Tighten the Ahead Clutch by turning the aft portion clockwise one or two divisions. Do NOT overdo this, otherwise you may burst the drum since tremendous pressure can be exerted by the leverage obtained through the toggles. These toggles M23 must throw over dead centre and are thus self-locking in Ahead. There must be NO continual strain on the Operating Collar such as would be caused by constant pressure on the gear lever. The lever

is held lightly in position in neutral by means of a roller which engages the indent in the cam plate. See illustration on page 4.

REVERSE BAND

If the gear slips in reverse, remove Inspection Cover. Tighten the hexagon lock nut M43 slightly so that drum is locked when lever is pulled right back. Do NOT overtighten or the reverse band will drag in Neutral and Ahead. This will cause overheating and loss of power. When the correct adjustment is found, replace top cover. If the lock nut is slack remove and give a sharp blow to the top locking portion and re-assemble.

REDUCTION GEAR

The drive is by triple roller chain and all bearings are Ball Bearings. THERE ARE NO ADJUSTMENTS. Careful alignment with the Propellor Shaft is VERY IMPORTANT. The Gear Box and reduction gear have a common lubricating system.

CHANGE the oil once per season or every 500 hours, whichever is the more frequent. To DRAIN OIL, attach sump pump to tube on side of gearbox having first removed the hexagon plug M49.

RIGHT

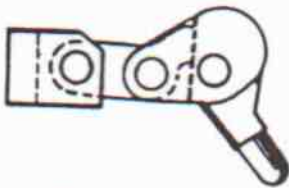


FIG 1

IMPORTANT

Ahead clutch must not be adjusted so tight that toggles will not close up with links at 'A' Fig. 2. Fig. 1 shows correct position with central pin just past dead centre and therefore locked in ahead without constant pressure on the control lever and operating collar.

WRONG

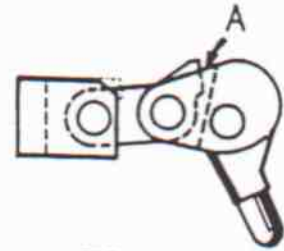
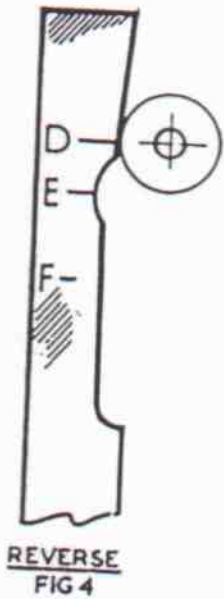


FIG 2



REVERSE
FIG 4

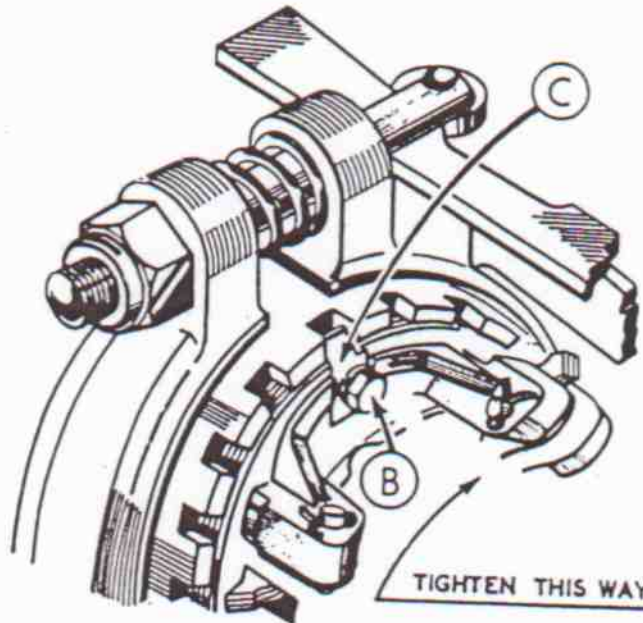
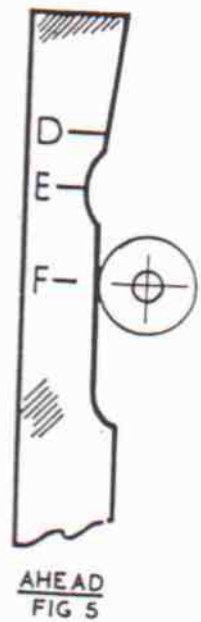


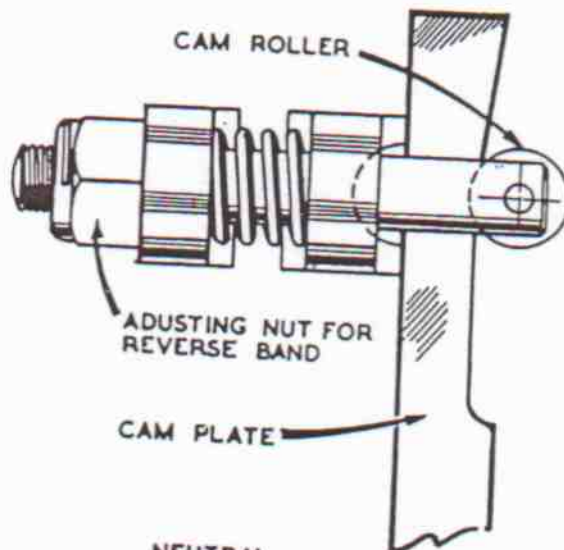
FIG 3



AHEAD
FIG 5

ADJUSTMENT OF REVERSE BAND

Pull control lever aft until rollers rests on cam at 'D', see Fig. 4. Now tighten nut sufficiently to lock drum. Do not overtighten the nut so as to cause the band to pinch the drum as the roller rides out of neutral notch between 'E' and 'F'. Figures 4, 5, and 6 show relative positions of the cam roller and cam plate in reverse, ahead and neutral.

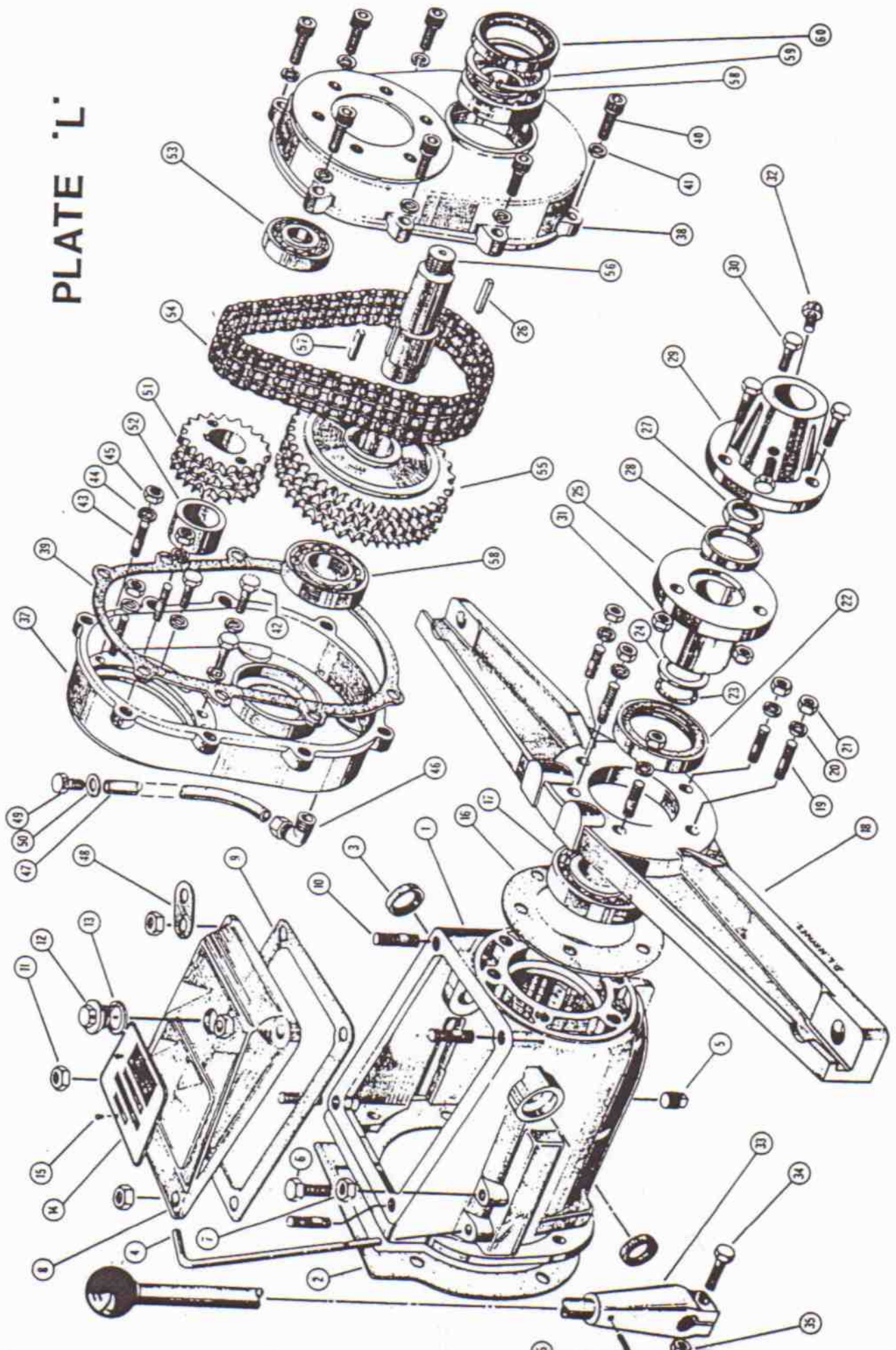


NEUTRAL
FIG 6

ADJUSTMENT OF AHEAD DRIVE

Turn drum so that tab 'C' is at top position. See Fig. 3. Pull control lever aft so as to lock drum. Slack off screw 'B', lift tab 'C' out of slot. Tighten ahead clutch by turning clockwise aft portion that carries toggles. Correct adjustment is important. If too tight gear will not remain in ahead. See Fig. 2. If too slack the clutch will slip under load. A notch or two either way will make all the difference. Note the tab is offset and can be reversed for closer adjustment.

PLATE 'L'



SPARE PARTS LIST GEARBOX AND REDUCTION GEAR

Plate	Revised Part No.	Old Part No.	Description	Dates	Dates	Qty.
L1	L010	660R	Gearbox Mk. II		49-J-62	1
	L011	660R	Gearbox 'O' ring cross shaft	50-J-62	35567	1
	L012	660R	Gearbox unified oiling	R16866	35567	1
	L013	661	Gearbox Mk. III	35667		1
	L014		Gearbox			1
L2	L020	660RJ	Joint fwd.			1
L3	L030	W36	'O' ring	50-J-62	35567	2
	L031	W252	Seal	35667		2
L4	L040	660A	Dipstick			1
	L041	660AR	Dipstick			1
L5	L050	58B	Plug			1
L6	L060	G50S	Screw			1
	L061		Set screw			1
L7	L070	1/4 F	Nut			1
	N1780		Nut			1
L8	L080	652R	Cover Mk. II			1
L9	L090	652RJ	Joint Mk. II lid			1
L10	L100	FD422G	Screw		25567	4
	L101	W15	Stud	25667		4
L11	N1780	1/4 W	Nut	25667		4
L12	L120	490CR	Filler breather			1
	L121	490CR	Filler solid		16767	1
L13	L130	490J	Washer			1
L14	L140	653	Label			1
L15	L150	652B	Pins for label			2
L16	L160	651J	Joint aft.			1
L17	L170	412B	Bearing			1
L18	L180	W169	Bracket DD (16 1/2)			1
	L181		RG aft. bearer J (16 1/2)			1
L19	L190	491A	Bolt		35567	6
	L101		Stud	35667		6
L20	N5040	6W	Washer		35667	6
	N1490		Washer		35667	6
L21	N1780	516W	Nut	35667		6
L22	L220	454S	Seal DD coupling	35667		1
L23	L230	4565R	'O' ring coupling	34167		1
L24	L240	456W	Washer	34167		1
L25	L250	456	1/2 bore coupling 1/4 key		R7668	1
	L251		1/2 'O' ring 1/4 key	34167	R7668	1
L26	L252		1/2 'O' ring 1/2 key	R7768	38068	1
	L253	456R	1" coupling 1/2 key	38168		1
L27	L260	455A	Woodruff key 1/4		R7668	1
	L261	J7C	Key 1/4	R7768		1
L28	L270	456C	Nut		34067	1
	L271		Circlip	34167	38068	1
L29	L280	456B	Register	38168		1
L30	L290	56R	Coupling 1"			1
	L291		Coupling 25mm			1
	L292		Coupling 30mm			1
	L293		Tailshaft cplg. 1 1/2" J			1
	L300	59C	Bolt		19976	3
L31	L301		Bolt	20076		3
	L302		Coupling bolt M8 x 35			3
L32	L310	516s/1	s/1 nut		19976	3
	L311	516s/1	s/1 nut	20076		3
L33	L320	P126	Lock screw			2
	L321	W248	Lock screw			2
L34	L330	R23R	Gear lever assembly		22-J-65	1
	L331	W249	Gear lever splined assembly	23-J-65	36-JR-65	1
L35	L340	R22	Pin cotter	37-JR-65		1
	L300	59C	Bolt	22-J-65	36-JR-65	1
L36	N3420		Bolt	23-J-65		1
	L310	516s/1	Nut	37-JR-65	19976	1
L37	N5120	516s/1	Nut	20076		1
	M470	HC41	Pin	23-J-65		1
	L370	670	Housing reduction	37-JR-65	19976	1
				20076		1
					16766	1

Plate	Revised Part No.	Old Part No.	Description	Dates	Dates	Qty.
L37	L371	670R	Housing unified oil ring	16866	369R68	1
	L372	700	Housing Mk. II reduction	370R68		1
L38	L380	671	Cover reduction		369R68	1
	L381	701	Cover reduction	370R68		1
L39	L390	670J	Joint		369R68	1
	L391	702	Joint	370R68		1
L40	L400	671A	Screw		369R68	1
	L401	704	Screw	370R68		1
L41	N1490	5W	Washer	370R68		8
L42	L190	491A	Bolt	370R68		8
	N1330	74B	Bolt		369R68	3
L43	L190	491A	Bolt	370R68		3
	L101	W15	Stud		369R68	3
L44	N5040	6W	Washer	370R68		3
	N1490	5W	Washer		369R68	6
L45	N1780	516W	Nut	370R68		6
L46	N1420	W16	Elbow	370R68		6
L47	L470	W250	Pipe drain	16866		1
L48	L480	W250C	Clip	16866		1
L49	L490	W101S	Screw	16866		1
L50	N2710	W251	Washer	16866		1
L51	L510	493	Sprocket 19T			1
	L511	705	Sprocket 19T		369R68	1
L52	L520	707	Spacer	370R68		1
L53	L530	492B	Bearing top	370R68		1
	L531	706	Bearing top		369R68	1
L54	L540	496	Chain	370R68		1
L55	L550	494	Sprocket 38T			1
	L551	709	Sprocket 38T		369R68	1
L56	L560	495	Shaft $\frac{3}{4}$ " $\frac{1}{2}$ " reduction	370R68		1
	L561	495R	$\frac{1}{2}$ key shaft reduction		R7768	1
	L562	708	Shaft reduction		369R68	1
L57	L260	455A	Woodruff key	370R68		1
	L261	J7C	Key		77R68	1
L58	L580	491B	Bearing lower	R7868		1
L59	L590	712	Circlip			2
L60	L220	454S	Seal	370R68		1
	L601	713	Seal		369R68	1
L25A	L610	S72	Coupling GB $\frac{1}{2}$ flex	370R68		1
L33	L620	W29	Socket cotter			1
	L621	W29R	Socket splined		23-J-65 36-JR-65	1
L33A	L630		Lever	24-J-65		1
L33B	L640		Knob	37JR65		1
L33C	N6310	S155	Stub morse 64			1
	L650		Vetus coupling adaptor			1
L54A	L660	496S	Chain			1
L55A	L670	497	Sprocket 31T			1
	L671	709S	Sprocket 31T		369R68	1
L60A	L680	651	Cover aft. DD	370R68		1
L60B	L690	W169T	Bracket Tiger 16 $\frac{1}{2}$ "			1
L60C	L700	S28R	Bracket STBD Freeman			1
L60D	L710	W227	Elbow Freeman oil level			1
L60G	L720	W169R	Bracket DD 20"			1
	L721		Bracket R.G. 20"			1
L60H	L722		Tiger aft. bearer SJ 20"			1
	L730		Pipe water to pump			1
	L740		Vetus flex coupling 1"			1
	L750		Bolt M10 x 75 (Vetus)			1
	L760		RD flexible coupling			1
	L770		Gearbox coupling RD flex			1
L60E	H1530		Plug			1
L60F	H1540		Washer			1
M1	M010	J8	Cear stub shaft			1
M2	M020	J8A	Bush assembly pilot			1
M3	M030	J8C	Key			1
M4	M040	J1	Drum			1
M5	M050	J1B	Bush for drum			1
M6	M060	J4C	Cone split			1
M7	M070	J3C	Plate fwd. push			1
M8	M080	J3AB	Stud long pinion			1
	M081		Long pinion stud (oversize)			2
M9	M090	J3A	Stud short pinion			1
	M091		Short pinion stud (oversize)			2
M10	M100	J9	Pinion long			1
M11	M110	J9B	Bush long			2

PLATE 'M'

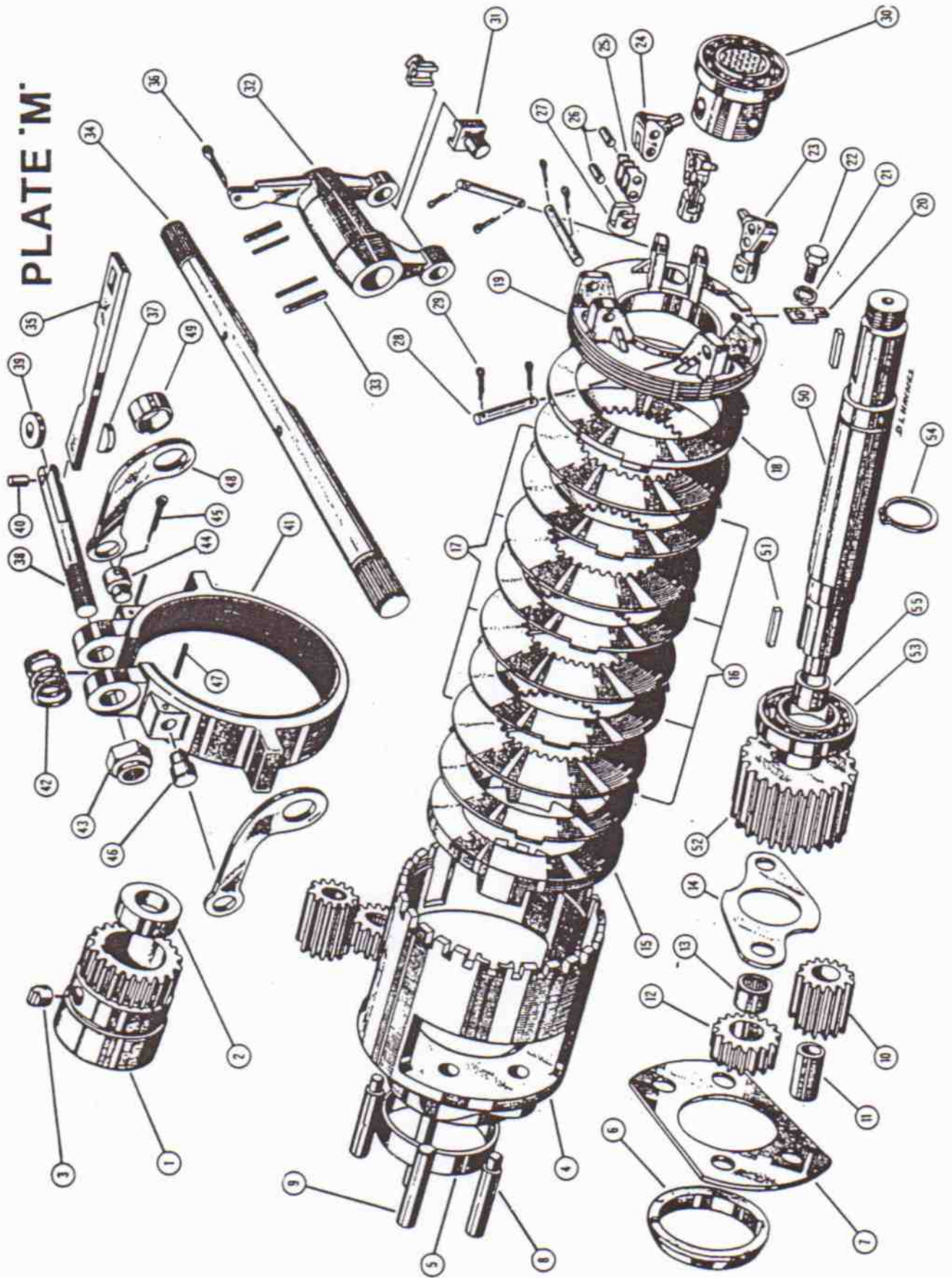


Plate	Revised Part No.	Old Part No.	Description	Dates	Dates	Qty.
M12	M120	J9A	Pinion short			2
M13	M130	J9C	Bush		15968	2
	M131	J9CR	Needleroller	16068		2
M14	M140	J17	Disc thrust			1
M15	M150	J3R	Head		33768	1
	M151	J3RT	Head	33868		1
M16	M160	J4A	Disc lugs		33768	3
		J4A	Disc lugs	33868		4
M17	M170	J4	Disc teeth		33768	3
		J4	Disc teeth	33868		4
M18	M180	J4B	Disc thick			1
M19	M190	J2	Plate d.a.			1
M20	M200	J24	Clip ad.			1
M21	M2280	4W	Washer			1
M22	M220	J24A	Screw			1
M23	M230	J13Y	Toggle assembly			3
M24	M240	J13	Toggle			3
M25	M250	J13A	Links (3)			3
M26	M260	J13C	1/2 pin link			6
M27	M270	J18	Plunger			3
M28	M280	J13B	Bolt			3
	M281	J13B	Pin pivot			3
M29	M290	J13N	Nut			3
	M291	J13P	Split pin			6
M30	M300	J16Y	Collar assembly		28-J-62 7-JR-62	1
	M301	J16RY	Collar assembly	29-J-62 8-JR-62		1
M31	M310	W38	Shoe	29-J-62 8-JR-62		2
M32	M320	J14/14F	Levers		28-J-62 7-JR-62	1
	M321	W37	Lever fork	29-J-62 8-JR-62		1
M33	M330	J27B	Keys		100-J-62	2
	M331	HC7	Pin transax outer	101-J-62		2
	M332	HC7A	Pin transax inner			2
M34	M340	J27A	Shaft cross		100-J-62	1
	M341	J27AR	Shaft (T pin) cross	101-J-62	22-J-65 37-JR-65	1
		W188	Shaft (spline) cross	38-JR-65 23-J-65		1
M35	M350	J10	Camplate			1
M36	M360	J5B	Pin split			1
M37	M370	J22A	Shoe cam			1
M38	M380	J15Y	Shaft assembly			1
M39	M390	J22	Roller			1
M40	M260	J22B	Pin for roller			1
M41	M410	J5Y	Band assembly		10-J-60	1
	M411	J5RY	Band assembly	11-J-60		1
M42	M420	J15C	Spring			1
M43	M430	J15A	Nut			1
	M431	J15AR	s/1. nut			1
M44	M440	J5A	Pin link starboard			1
M45	M360	J5B	Pin split			1
M46	M460	J5AR	Pin link port			1
M47	M470	HC41R	Pin transverse			1
M48	M480	J19	Plate link			2
M49	M490	J19C	Spacer for plate			2
M50	M500	655	Shaft (Woodruff) DD			1
	M501	655	Shaft (circlip) DD	34167	34067	1
	M502	655	Shaft 1/2 key DD	R7768	R7668	1
	M503	655D	Shaft Mk. II DD	38068	37968	1
M51	L261	J7C	Key			1
M52	M520	J7A	Gear main			2
M53	M530	J2A	Bearing d.a. plate			1
M54	M540	656	Bush adaptor		37969	1
	M541	655C	Circlip	38069		1
35	M550	655A	Bush shaftend			1
30A	M560	J16RYA	Body J16			1
	M561		Sleeve			1
30B	M570	J16RYC	Bearing J16			1
30	M580	J16RYB	Bush J16			1
38	M590	J15	Camshaft			1
41	M600	J5RYEX	Band assembly exchange			1
	M610	J5R	Band			1
41A	M620	J5L	Liner	11-J-60		1

