

GEAR OPERATION AND PARTS

FOR

PARAGON

MODELS P200-P300-P400

HYDRAULIC TRANSMISSIONS

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I. SPECIFICATIONS

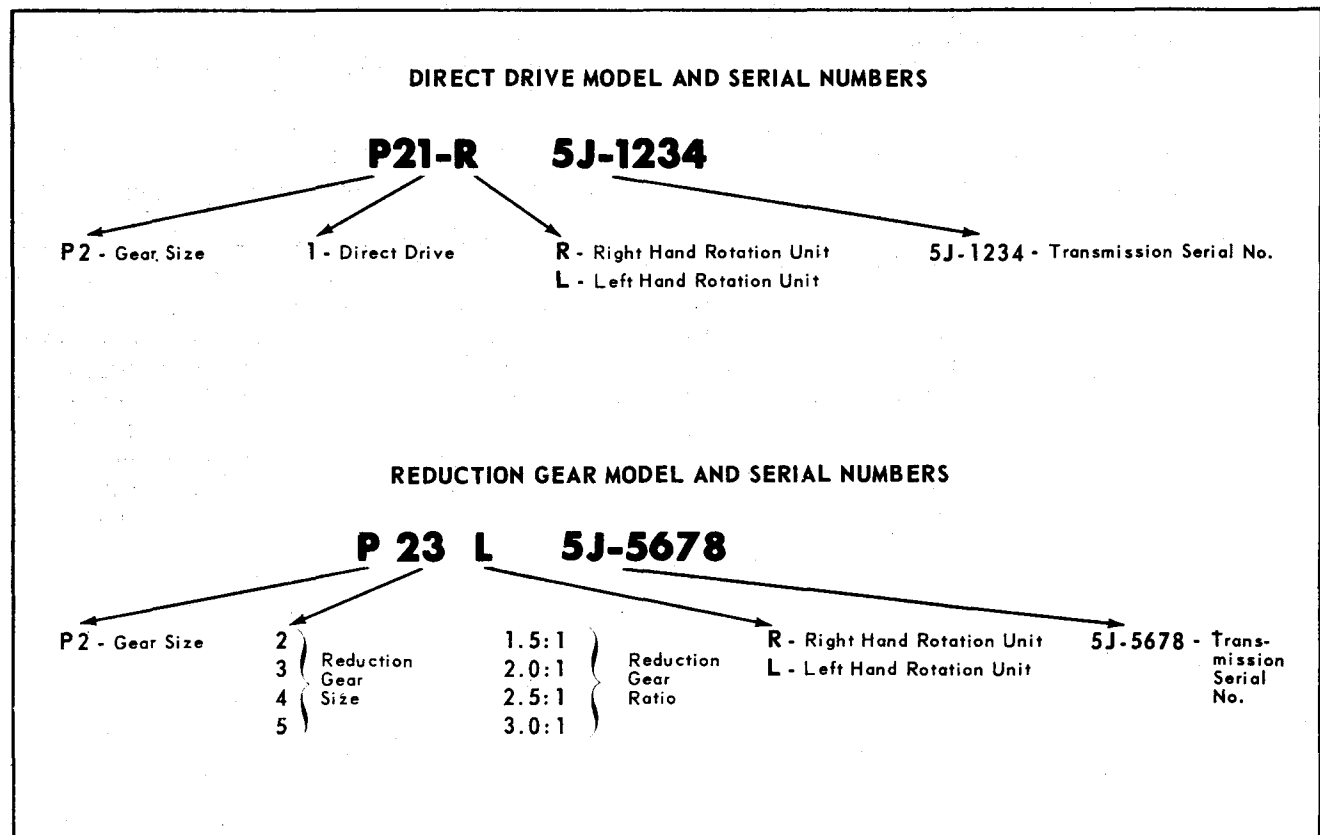
A. Description Chart

P200	MODEL P300	P400	REDUCTION RATIO	DIRECTION OF ROTATION
P21R	P31R	P41R	DIRECT	RIGHT
P21L	P31L	P41L	DIRECT	LEFT
P22R	P32R	P42R	1.5:1	RIGHT
P22L	P32L	P42L	1.5:1	LEFT
P23R	P33R	P43R	2.0:1	RIGHT
P23L	P33L	P43L	2.0:1	LEFT
P24R	P34R	P44R	2.5:1	RIGHT
P24L	P34L	P44L	2.5:1	LEFT
P25R	P35R	P45R	3.0:1	RIGHT
P25L	P35L	P45L	3.0:1	LEFT

B. Model and Serial Numbers

Each reverse gear has a model number and a serial number. These numbers are on the name plate, located on the housing of the transmission.

MODEL AND SERIAL NUMBER CHART



II. INTRODUCTION

The Models P200, P300 and P400 hydraulic transmissions have been designed for smooth operation and dependability in marine use. The transmission is self-contained, having an oil pressure system and oil supply completely separated from engine lubricating oil systems.

Transmission oil under pressure is used to engage a forward or reverse drive. The forward

drive is through a multiple disc clutch arrangement, while the reverse drive utilizes a reverse clamp band and planetary gear train. The transmission oil is circulated and cooled through a separate external oil cooler core, which is in turn cooled by the engine water. Paragon transmissions are furnished with either direct drive or reduction gears. Gear reduction ratios and corresponding model identification numbers are listed in Section I, under "SPECIFICATIONS".

III. INSTALLATION

A. The installation instructions below are for use when the original transmission has been removed for servicing and must be re-installed, or when the transmission unit is to be adapted as non-original equipment to a marine engine.

B. It is important that the engine and transmission rotations are matched. The direction of rotation of an engine is defined in this manual as the direction of rotation of the engine crankshaft as viewed from the output end of the transmission. A clockwise rotation of the engine is a right hand rotation and a counterclockwise rotation of the engine is a left hand rotation.

A letter "R" or "L" appearing on the transmission serial number plate illustrated in Section I, "SPECIFICATIONS", indicates whether the transmission is for use with a right or left hand rotating engine.

C. The hydraulic transmission is attached to the engine in the following manner:

1. Insert two 3-1/2" studs in opposite transmission mounting holes in the engine adapter plate.
2. Place the transmission against the studs so that the studs go through two of the matching holes in the transmission housing flange.
3. Slide the transmission along the studs toward the engine so that the spline on the shaft at the front of the transmission enters the matching splined hole in the engine vibration dampener.

4. Install and tighten four bolts with lockwashers through the transmission housing flange into the engine adapter plate. Remove the 3-1/2" studs. Install and tighten the two remaining bolts with lockwashers through the transmission housing flange.

D. The transmission and propeller shaft coupling must be carefully aligned before the propeller shaft is connected to the transmission, in order to avoid vibration and consequent damage to the transmission, engine, and boat hull during operation. To align the coupling, move the propeller shaft, with attached coupling flange, toward the transmission so that the faces of the propeller shaft coupling flange and transmission shaft coupling flange are in contact. The coupling flange faces should be in contact throughout their entire circumference. The total runout or gap between the faces should not exceed .002" at any point. If the runout exceeds .002", reposition the engine and attached transmission by loosening the engine support bolts and adding or removing shims to raise or lower either end of the engine. If necessary, move the engine sideways to adjust the runout or to align the coupling flange faces laterally. Tighten the engine support bolts and recheck the alignment of the coupling before bolting the coupling flanges together. Connect the coupling flanges with bolts, lockwashers, and nuts.

E. Connect the oil cooler lines to the transmission.

F. Connect the shift control cable from the cockpit control station to the transmission control valve lever, shown in Figure on page 5. Place the transmission control valve lever in the neutral position and

adjust the shaft control cable length until the cockpit control station hand lever is in the neutral position. Move the cockpit control hand lever to forward and reverse positions several times while observing the transmission control valve lever motion. The transmission control valve lever should move fully into forward or reverse position when the hand lever is moved into forward

or reverse position, and should return exactly to the neutral position when the hand lever is in the neutral position.

- G. Remove the oil dipstick, shown in Figure on page 5, and fill the transmission with Type A transmission fluid to the mark on the dipstick. Replace the dipstick in the transmission housing.

IV. OPERATION

Principle of Operation

The transmission forward and reverse drives are operated by transmission oil under pressure. An internal gear type oil pump delivers the transmission oil, under pressure, to the external oil cooler. The transmission oil is returned, still under pressure, to the oil distribution tube and relief valve. The relief valve maintains the oil pressure by remaining closed until the oil pressure reaches 60 PSI. When the control lever is shifted to the forward position, oil under pressure is delivered to the multiple disc clutch piston, which moves to clamp the clutch discs and planetary reverse gear case together. The discs and case then revolve as a solid coupling in the direction of engine rotation. The reverse drive is engaged by shifting the control lever to the reverse position, so that oil under pressure is delivered to the reverse piston. The reverse piston moves to clamp the reverse band around the planetary gear case, preventing the planetary gear case from moving but allowing the planetary gears to revolve to drive the output or propeller shaft in a direction opposite to the rotation of the engine. With the control lever in the neutral position, pressurized oil is prevented from entering the clutch piston or reverse band piston and the propeller shaft remains stationary.

Starting Procedure

1. Always start the engine with the transmission in NEUTRAL to avoid moving the boat suddenly forward or back.
2. When the engine is first started, allow it to idle for a few moments. Stop the engine and check the transmission oil level. Add oil if necessary to bring the oil level up to the mark on the transmission dipstick.

NOTE

ON SUBSEQUENT START-UPS, THE TRANSMISSION OIL LEVEL MAY BE CHECKED BEFORE RUNNING THE ENGINE, WHEN ENGINE OIL IS CHECKED.

3. Start the engine again, with the transmission in NEUTRAL, and allow the engine to warm up to operating temperature.
4. Shift the transmission into FORWARD or REVERSE as desired. If the engine should stall when the transmission is shifted to FORWARD or REVERSE, place the transmission in NEUTRAL before restarting the engine.

It is recommended that shifting be done at speeds below 1000 RPM, and preferably in the 800 RPM, or idle engine range, to prolong the life of the engine, transmission, and boat. EMERGENCY shifts may be at higher engine speeds, but this is not a recommended practice.

V. MAINTENANCE

A. Lubrication

The Models P200, P300 and P400 transmissions are self-contained units, independent of the engine lubricating systems. The units are lubricated by pressure and by splash from its own oil. The type of oil recommended is "Transmission Fluid, Type A", commonly used for automatic transmissions in automobiles.

The quantity of oil depends upon the angle of installation, as well as the reduction model. The level must be maintained at the mark on the dipstick and should be checked periodically to ensure satisfactory operation.

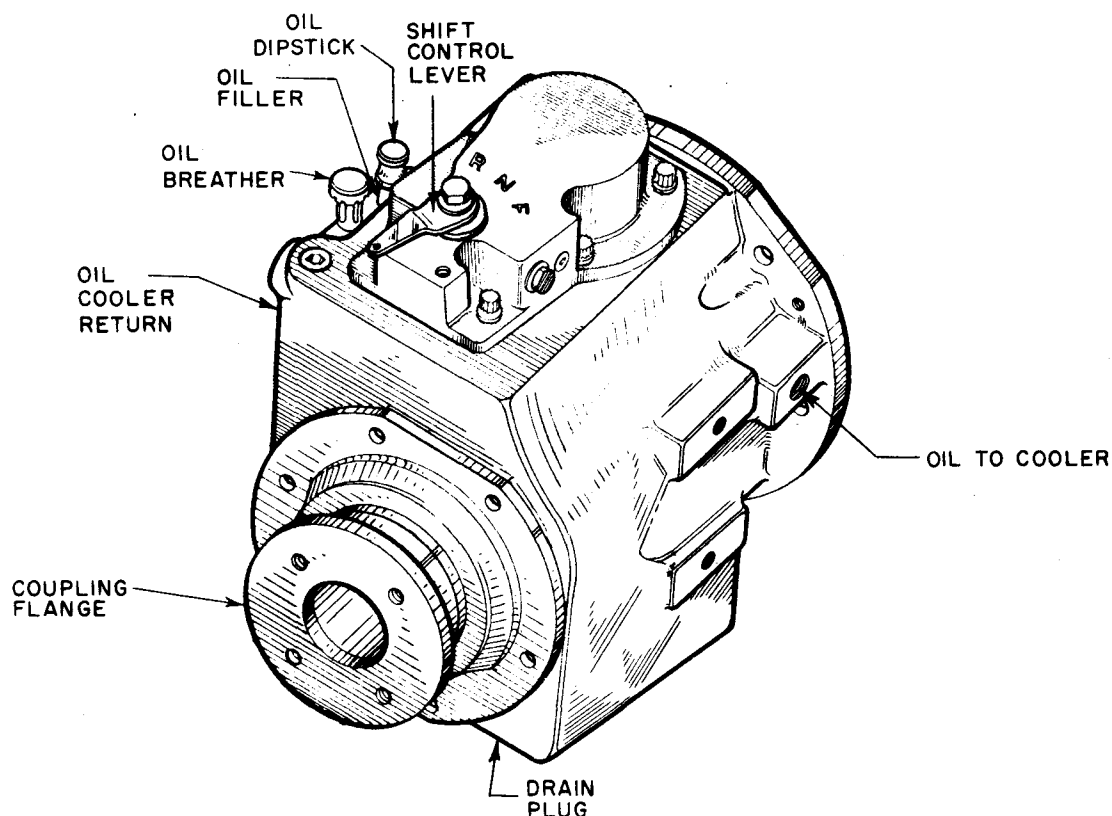
When filling for the first time or refilling after an oil change, check the level after running for a few minutes to make certain that the oil cooler and the various passages

are full. If necessary, refill to the mark on the dipstick to ensure proper operation of the transmission. The transmission oil level should be checked each time the engine oil level is checked, before running the engine.

The oil in the transmission should be changed every 100 hours, or each season under normal conditions. However, the number of hours that can be run between oil changes varies with the operating conditions. Drain plugs are located at the bottom of the reverse gear housing and the reduction gear housing.

B. Adjustments

No adjustment is necessary for the FORWARD drive multiple disc clutches, and the reverse band is self adjusting to compensate for lining wear, so that no external reverse band adjustment is necessary.



PARAGON TRANSMISSION

C. Trouble Shooting Chart

PROBLEM	POSSIBLE CAUSES AND METHODS OF CORRECTION
GEAR INOPERATIVE Drive Shaft does not operate with selector valve in forward or reverse.	1. Low Oil Pressure. a. Low oil supply. Add oil, refer to lubrication. b. Faulty oil gauge. Replace gauge. Oil gauge slow to register, air or obstruction in oil gauge line. Clean and bleed oil gauge line. c. Plugged oil lines or passages. Clean lines or passages. d. Oil pressure relief valve scored and sticking. Remove relief valve. Clean valve and valve bore in control valve housing with crocus cloth to free valve, or replace. e. Defective pistons and oil distributor seal rings. Replace seal rings. f. Defective oil pump. Check for wear, and replace if necessary. 2. High Oil Temperature a. Low oil supply. Add oil, refer to lubrication. b. Low water level in cooling system. Add water, and check for leaks. c. Plugged raw water inlet screen. Clean screen. d. Collapsed or disintegrated water inlet hose. Replace hose. e. Air leak in cooling water suction line. Replace suction line. f. Raw water pump impeller worn or damaged. Replace impeller. g. Clogged or dirty oil cooler element. Remove and clean 3. Reverse Band not engaging Planetary Gear Cage. a. Reverse band lining worn out. Replace lining. b. Defective reverse piston "O" ring. Replace "O" ring. 4. Failure of Planetary Assembly. Remove gear case assembly, and check for defective or damaged parts. Replace defective or damaged parts. 5. Failure of Reduction Gear. Remove reduction gear assembly and check for defective or damaged parts. Replace defective or damaged parts.

PROBLEM	POSSIBLE CAUSES AND METHODS OF CORRECTION	
GEAR DRAGGING Drive Shaft rotates either forward or reverse with Selector Valve in neutral position.	1. Defective forward Clutch Plates.	Forward clutch plates warped and sticking. Remove clutch plates and replace.
	2. Defective forward Clutch Piston Release Spring.	Forward clutch piston release spring broken or weak. Replace spring.
	3. Binding in Planetary Assembly.	a. Bearings and gears worn excessively in gear case. Replace necessary parts. b. Input shaft bearings worn excessively, causing misalignment of input shaft. Replace necessary parts.
GEAR SLIPPING OR SLOW TO ENGAGE With Selector Valve in forward or reverse position.	1. Low Oil Pressure.	See "Gear Inoperative", (1).
	2. Worn forward Clutch Plates.	Remove forward clutch plates and check for wear excessively, replace clutch plates.
	3. Reverse Band not engaging Gear Case.	See "Gear Inoperative", (3).
INTERNAL AND EXTERNAL LEAKS	1. Water in Lubricating Oil.	a. Hole in oil cooler element permitting water to seep into oil compartment. Replace oil cooler element. b. Oil cooler gaskets. Check gaskets and replace.
	2. Excessive Oil in Engine Crankcase or Flywheel Housing.	Defective front end plate oil seal. Replace oil seal.
	3. Oil on Exterior of Marine Gear.	a. Oil seeping from breather. Check for too high oil level. b. Defective rear end oil seal. Replace oil seal.
	4. Loss of Oil from Transmission.	a. Check for defective gaskets and seal.

VI. PARTS

Each part illustrated in the exploded views has a key number and an arrow pointing from the key number to the part. Refer to the key number in the parts list to determine the part number and name.

ALWAYS GIVE THE PART NUMBER, PART NAME, TRANSMISSION MODEL NUMBER, AND TRANSMISSION SERIAL NUMBER WHEN ORDERING PARTS.

ENGINE REVERSE GEAR BACKLASH NOISE

NOTE: Normal backlash noise is permissible at idle speed with engine in gear, but if the noise is severe check for the following problems:

A. Engine needs tune-up

B. Propeller shaft misalignment

C. Bent propeller or shaft

D. Badly worn strut bushing or stuffing box

E. Defective gear

P-200 SERIES

MODEL	SPEC.	RATIO
P-21	Z-7717	Direct
P-22	Z-7718	1.5:1
P-23	Z-7719	2.0:1
P-24	Z-7720	2.5:1
P-25	Z-7721	3.0:1

For Right and Left Rotation

Key No.	Part No.	Part Name	No. Reqd.	Dir.	Where Used			
					P- 22	P- 23	P- 24	P- 25
1	16.04-90553	Gear Case Needle Bearing	1	X	X	X	X	X
2	16.04-92033	Gear Case	1	X	X	X	X	X
3	16.04-90555	Long Pinion	2	X	X	X	X	X
4	16.04-90556	Pinion Thrust Pad	4	X	X	X	X	X
5	16.04-90557	Roller Bearing 1 Set	(128)	X	X	X	X	X
6	16.04-90558	Long Pinion Bearing Spacer	2	X	X	X	X	X
7	16.04-90559	Pinion Shaft	4	X	X	X	X	X
8	16.04-90560	Engine Gear Roller Bearing		X	X	X	X	X
9	16.04-90561	Engine Gear	1	X	X	X	X	X
10	16.04-90562	Short Pinion	2	X	X	X	X	X
11	16.04-90563	Roller Bearing 1 Set	(128)	X	X	X	X	X
12	16.04-90564	Short Pinion Bearing Spacer	2	X	X	X	X	X
13	16.04-90565	Short Pinion Spacer	2	X	X	X	X	X
14	16.04-90566	Pinion Shaft Lock Tab	2	X	X	X	X	X
15	16.04-90567	Case Clip	2	X	X	X	X	X
16	16.04-90568	Capscrew	2	X	X	X	X	X
17	16.04-90569	Engine Gear Thrust Washer	1	X	X	X	X	X
18	16.04-90856	Direct Drive Tailshaft	1	X				
19	16.04-90842	Propeller Gear	1	X	X	X	X	X
20	16.04-91965	Propeller Gear Thrust Washer	1	X	X	X	X	X
21	16.04-90574	Steel Clutch Plate	7	X	X	X	X	X
22	16.04-90575	Bronze Clutch Plate	6	X	X	X	X	X
23	16.04-90802	Screw Collar Spring	1	X	X	X	X	X
24	16.04-90577	Screw Collar Needle Bearing	1	X	X	X	X	X
25	16.04-90800	Screw Collar	1	X	X	X	X	X
26	16.51-00006	Forward Piston "O" Ring-Outer	1	X	X	X	X	X
27	16.51-00005	Forward Piston "O" Ring-Inner	1	X	X	X	X	X
28	16.04-90801	Forward Piston	1	X	X	X	X	X
29	16.04-90396	Clip-Screw Collar	2	X	X	X	X	X
30	16.04-90395	Lockscrew	2	X	X	X	X	X
31	16.04-90397	Oil Distributor Seal Rings	2	X	X	X	X	X
32	16.04-90580	Tailshaft Thrust Washer	1	X				
33	16.04-90545	Tailshaft Seal Washer	1	X				
34	16.45-00007	Woodruff Key	1	X				
35	16.04-90803	Spring Retainer	1	X	X	X	X	X
36	16.04-90804	Retaining Ring	1	X	X	X	X	X
37	16.04-91983	Cover Gasket	1	X	X	X	X	X
38	16.04-90807	Distributor Tube	1	X	X	X	X	X
39	16.04-90849	Tailshaft Needle Thrust Race	1		X	X	X	X
40	16.04-90848	Tailshaft Needle Thrust Bearing	1		X	X	X	X
41	16.04-90756	Retaining Ring	1		X	X		
41	16.04-90674	Retaining Ring	1				X	X

Key No.	Part No.	Part Name	No. Reqd.	Dir.	Where Used			
					P- 22	P- 23	P- 24	P- 25
42	16.04-92036	Ball Bearing	1		X	X		
42	16.04-92037	Ball Bearing	1				X	X
43	16.04-90831	Reduction Pinion Tailshaft	1		X			
		(L.H. Only)						
43	16.04-90830	Reduction Pinion Tailshaft	1		X			
		(R.H. Only)						
43	16.04-90833	Reduction Pinion Tailshaft	1			X		
		(L.H. Only)						
43	16.04-90832	Reduction Pinion Tailshaft	1		X			
		(R.H. Only)						
43	16.04-90835	Reduction Pinion Tailshaft	1				X	
		(L.H. Only)						
43	16.04-90834	Reduction Pinion Tailshaft	1				X	
		(R.H. Only)						
43	16.04-90837	Reduction Pinion Tailshaft	1					X
		(L.H. Only)						
43	16.04-90836	Reduction Pinion Tailshaft	1					X
		(R.H. Only)						
44	16.04-90705	Reduction Adapter Plate	1		X	X	X	X
44	16.04-90846	Reduction Adapter Plate	1			X		
44	16.04-90704	Reduction Adapter Plate	1				X	
44	16.04-90847	Reduction Adapter Plate	1					X
45	16.04-90595	Adapter Plate Seal	1		X	X	X	X
46	16.04-90594	Capscrew Hex. Socket	6		X	X		
46	16.04-90710	Capscrew Hex. Socket	4				X	X
47	16.50-00069	Gasket			X	X		
47	16.50-00069	Gasket	1				X	X
48	16.04-90715	Crescent	1				X	X
49	16.04-90713	Plain Steel Washer	2				X	X
		.065						
50	16.04-90712	Spring Lockwasher Cad. Pl.	2				X	X
51	16.04-90711	Hex. Capscrew Grade 5	2				X	X
52	16.04-90271	Locknut	1	X				
53	16.04-90272	Lockwasher	1	X				
54	16.04-90594	Capscrew Hex. Hd. GR 5	6	X				
55	16.04-90712	SP. L Washer CAB PLATE	6	X				
56	16.90-00017	Ball Bearing	1	X	X	X	X	X
57	16.04-90445	Direct Drive Plate	1	X				
58	16.51-10014	Oil Seal	1	X				
59	16.04-90843	Gear Half Coupling	1	X				
60	16.50-00036	Rear Gasket	1	X	X	X	X	X
61	16.04-91977	Housing	1	X	X	X	X	X
62	16.04-90729	Dipstick Tube	1	X	X	X	X	X
63	16.50-00173	Front Gasket	1	X	X	X	X	X
64	16.04-90810	Reverse Gear Housing Pin	1	X	X	X	X	X
65	16.04-90584	Baffle	1	X	X	X	X	X
66	16.04-90633	Capscrew Socket Flat Hd.	2	X	X	X	X	X
67	16.04-90826	Hold Down Spring	1	X	X	X	X	X
68	16.04-90825	Socket Head Pipe Plug	1	X	X	X	X	X
69	16.04-90911	Pipe Plug	3	X	X	X	X	X
70	16.04-90731	Control Lever Pin	3	X	X	X	X	X

Key No.	Part No.	Part Name	No. Reqd.	Dir.	Where Used			
					P- 22	P- 23	P- 24	P- 25
71	16.04-90633	Capscrew Hex Hd.	1	X	X	X	X	X
72	16.04-90666	Lockwasher Spring CP	1	X	X	X	X	X
73	16.04-90746	Plain Washer	1	X	X	X	X	X
74	16.04-90730	Control Lever	1	X	X	X	X	X
75	16.04-90733	Control Lever Bushing	1	X	X	X	X	X
76	16.04-90732	Control Lever Pawl	1	X	X	X	X	X
77	16.51-00007	Control Lever "O" Ring	1	X	X	X	X	X
78	16.04-91973	Control Valve	1	X	X	X	X	X
79	16.04-90604	Control Valve Retaining Ring	1	X	X	X	X	X
80	16.04-92034	Cover	1	X	X	X	X	X
81	16.51-00011	Reverse Piston "O" Ring	1	X	X	X	X	X
82	16.04-90817	Reverse Piston & Shaft Assy.	1	X	X	X	X	X
83	16.04-90818	Piston Back Up Plate	1	X	X	X	X	
84	16.04-90820	Reverse Piston Shaft Pin	1	X	X	X	X	X
85	16.04-90821	Retaining Ring	4	X	X	X	X	X
86	16.04-90820	Reverse Band Roll Pin	1	X	X	X	X	X
87	16.04-90819	Reverse Band Lever	2	X	X	X	X	X
88	16.04-90822	Reverse Band Roll	1	X	X	X	X	X
89	16.51-00012	Piston Backup Plate "O" Ring	1	X	X	X	X	X
90	16.04-90411	Relief Valve Plug	1	X	X	X	X	X
91	16.04-90410	Relief Valve Spring	1	X	X	X	X	X
92	16.04-90824	Relief Valve Retaining Ring	1	X	X	X	X	X
93	16.51-00009	Relief Valve "O" Ring	1	X	X	X	X	X
94	16.04-90412	Relief Valve Pin	1	X	X	X	X	X
95	16.04-90823	Relief Valve Housing	1	X	X	X	X	X
96	16.51-10013	Front Plate Oil Seal	1	X	X	X	X	X
97	16.04-91968	Front Plate	1	X	X	X	X	X
98	16.04-90622	Front Plate Thrust Washer	1	X	X	X	X	X
99	16.04-90623	Roller Bearing	1	X	X	X	X	X
100	Not Required							
101	Not Required							
102	16.04-90626	Inner Pump Gear	1	X	X	X	X	X
103	16.04-40439	Outer Pump Gear	1	X	X	X	X	X
104	16.04-91970	Pump Housing	1	X	X	X	X	X
105	16.04-90666	Lockwasher Spring	6	X	X	X	X	X
106	16.04-90536	Capscrew Hex. Hd.	6	X	X	X	X	X
107	16.04-90828	Dipstick Assy.	1	X	X	X	X	X
108	16.04-91982	Capscrew Socket Hd.	8	X	X	X	X	X
109	16.04-90813	Breather	1	X	X	X	X	X
110	16.04-90388	Pump Key	1	X	X	X	X	X
111	16.04-90808	Reverse Band Assy.	1	X	X	X	X	X
112	16.58-80013	Pipe Plug	1	X	X	X	X	X
113	16.04-92035	Brass Washer	3	X	X	X	X	X
114	16.04-90878	Brake Band Support Screw	1	X	X	X	X	X
115	16.04-90812	External Socket Ferry Hd. Capscrew	6	X	X	X	X	X
116	16.04-90467	Detent Seal Washer	1	X	X	X	X	X
117	16.04-90606	Detent Ball	1	X	X	X	X	X
118	16.04-91982	Capscrew	1	X	X	X	X	X
119	16.04-90607	Detent Spring	1	X	X	X	X	X
120	16.04-90712	Lockwasher	6		X	X	X	X
121	16.04-90594	Capscrew GR 5	6		X	X	X	X

Key No.	Part No.	Part Name	No. Reqd.	Dir.	Where Used			
					P- 22	P- 23	P- 24	P- 25
122	16.04-90844	Reduction Gear Housing	1		X	X		
122	16.04-90845	Reduction Gear Housing	1				X	X
123	16.58-80010	Pipe Plug	1		X	X	X	X
124	16.51-10020	Oil seal	1		X	X	X	X
125	16.04-90853	Gear Half Coupling	1		X	X	X	X
126	16.04-90854	Lockwasher	1		X	X	X	X
127	16.04-90855	Locknut	1		X	X	X	X
128	16.04-90838	Internal Gear (L.H. Only)	1		X	X		
128	16.04-90839	Internal Gear (R.H. Only)	1		X	X		
128	16.04-90838	Internal Gear (L.H. Only)	1				X	X
128	16.04-90839	Internal Gear (R.H. Only)	1				X	X
129	16.04-90850	Bearing Assy.	1		X	X		
129	16.04-90851	Bearing Assy.	1				X	
130	16.04-90227	Retaining Ring	1		X	X		
130	16.04-90852	Retaining Ring	1				X	
131	16.51-00005	"O" Ring—Reduction Gear	1		X	X	X	
132	16.04-90581	Suction Tube	1		X	X	X	
133	16.04-90573	Screw Collar Thrust Washer	1	X				

P-300 SERIES

MODEL	SPEC.	RATIO
P-31	Z-7705	Direct
P-32-AR	Z-7710-R	1.5:1
P-32-AL	Z-7710-L	1.5:1
P-34-BR	Z-7712-R	2.5:1
P-34-BL	Z-7712-L	2.5:1

For Right and Left Rotation

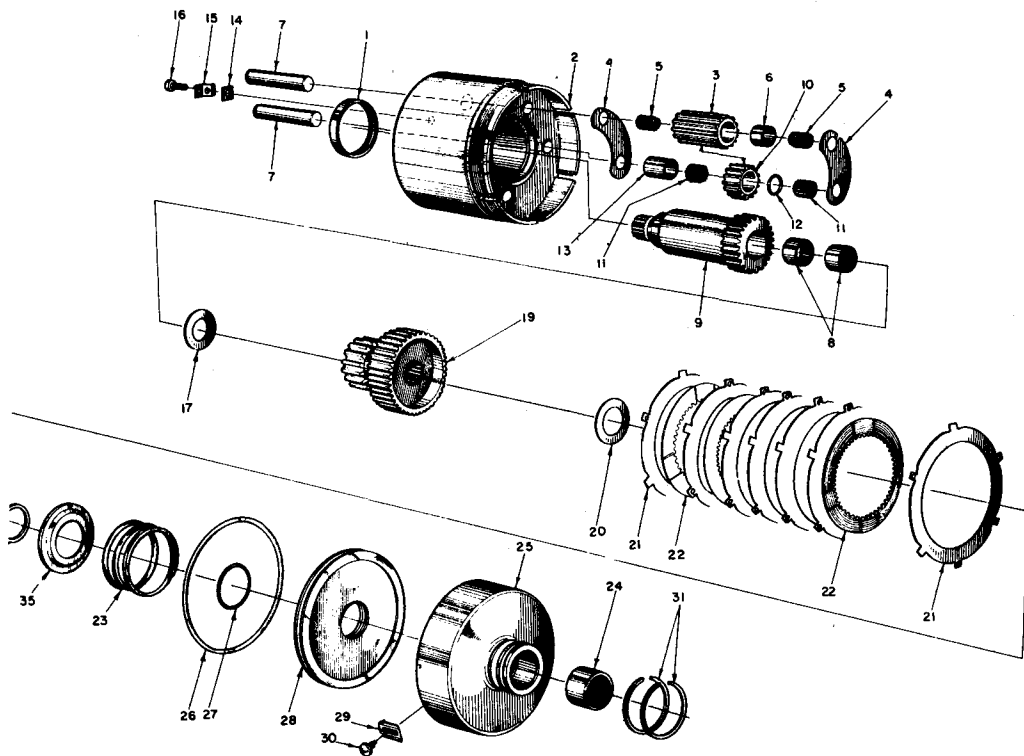
Key No.	Part No.	Part Name	No. Reqd.	Where Used				
				P- 31	P- 32AR	P- 32AL	P- 34BR	P- 35BL
1	16.04-90553	Gear Case Bearing	1	X	X	X	X	X
2	16.04-90554	Gear Case	1	X	X	X	X	X
3	16.04-90555	Long Pinion	3	X	X	X	X	X
4	16.04-90556	Thrust Pads	6	X	X	X	X	X
5	16.04-90557	Roller Bearing 1 Set	(192)	X	X	X	X	X
6	16.04-90558	Long Pinion Bearing Spacer	3	X	X	X	X	X
7	16.04-90559	Pinion Shafts	6	X	X	X	X	X
8	16.04-90560	Engine Gear Roller Bearing	2	X	X	X	X	X
9	16.04-90561	Engine Gear	1	X	X	X	X	X
10	16.04-90562	Short Pinion	3	X	X	X	X	X
11	16.04-90563	Roller Bearing 1 Set	(192)	X	X	X	X	X
12	16.04-90564	Short Pinion Bearing Spacer	3	X	X	X	X	X
13	16.04-90565	Short Pinion Spacer	3	X	X	X	X	X
14	16.04-90566	Pinion Shaft Lock Tab	3	X	X	X	X	X
15	16.04-90567	Case Clip	3	X	X	X	X	X
16	16.04-90568	Capscrew	3	X	X	X	X	X
17	16.04-90569	Engine Gear Thrust Washer	1	X	X	X	X	X
18	16.04-90836	Direct Drive Shaft	1	X				
19	16.04-90842	Propeller Gear	1	X	X	X	X	X
20	16.04-91965	Propeller Gear Thrust Washer	1	X	X	X	X	X
21	16.04-90574	Steel Clutch Plate	7	X	X	X	X	X
22	16.04-90575	Bronze Clutch Plate	6	X	X	X	X	X
23	16.04-90802	Screw Collar Spring	1	X	X	X	X	X
24	16.04-90577	Screw Collar Needle Bearing	1	X	X	X	X	X
25	16.04-90800	Screw Collar	1	X	X	X	X	X
26	16.51-00006	Fwd. Piston "O" Ring-Outer	1	X	X	X	X	X
27	16.51-00005	Fwd. Piston "O" Ring-Inner	1	X	X	X	X	X
28	16.04-90801	Forward Piston	1	X	X	X	X	X
29	16.04-90396	Clip-Screw Collar	2	X	X	X	X	X
30	16.04-90395	Lockwasher	2	X	X	X	X	X
31	16.04-90397	Oil Dist. Seal Ring	2	X	X	X	X	X
32	16.04-90580	Tailshaft Thrust Washer	1	X				
33	16.04-90545	Tailshaft Seal Washer	1	X				
34	16.45-00007	Key	1	X				
35	16.04-90803	Spring Retainer	1	X	X	X	X	X
36	16.04-90804	Retaining Ring	1	X	X	X	X	X
37	16.04-91983	Cover Gasket	1	X	X	X	X	X
38	16.04-90807	Distributor Tube	1	X	X	X	X	X
39	16.04-90849	Tailshaft Needle Thrust Race	1		X	X	X	X
40	16.04-90848	Tailshaft Needle Thrust Brg.	1		X	X	X	X
41	16.04-90674	Retaining Ring					X	X
41	16.04-90756	Retaining Ring			X	X		

Key No.	Part No.	Part Name	No. Reqd.	Where Used				
				P- 31	P- 32AR	P- 32AL	P- 34BR	P- 35BL
42	16.90-00029	Ball Bearing			X	X	X	X
43	16.04-90830	Tailshaft.			X			
43	16.04-90831	Tailshaft.				X		
43	16.04-90834	Tailshaft.					X	
43	16.04-90835	Tailshaft.						X
44	16.04-90705	Reduction Adp. Plate			X	X		
44	16.04-90704	Reduction Adp. Plate					X	X
45	16.04-90595	Adapter Plate Seal	2		X	X	X	X
46	16.04-90594	Capscrew Hex Socket.	6		X	X		
46	16.04-90710	Capscrew Hex Socket.	4				X	X
47	16.50-00069	Gasket	1		X	X		
47	16.50-00069	Gasket	1				X	X
48	16.04-90715	Gasket	1				X	X
49	16.04-90713	Plain Steel Washer	2				X	X
50	16.04-90712	Lockwasher	2		X	X	X	X
51	16.04-90711	No. 5 Capscrew	2				X	X
52	16.04-90271	Locknut	1	X				
53	16.04-90272	Lockwasher	1	X				
54	16.04-90594	Capscrew Grade 5	6	X				
55	16.04-90712	Spring Washer CAB PLATE	6	X				
56	16.90-00017	Ball Bearing	1	X				
57	16.04-90445	Direct Drive Plate	1	X				
58	16.51-10014	Oil seal	1	X				
59	16.04-90843	Gear Half Coupling	1	X				
60	16.50-00036	Gasket	1	X	X	X	X	X
61	16.04-91977	Housing	1	X	X	X	X	X
62	16.04-90729	Dipstick Tube	1	X	X	X	X	X
63	16.50-00173	Front Gasket	1	X	X	X	X	X
64	16.04-90810	Reverse Gear Housing Pin	1	X	X	X	X	X
65	16.04-90584	Baffle	1	X	X	X	X	X
66	16.04-90633	Capscrew Socket Flat Head	2	X	X	X	X	X
67	16.04-90826	Hold Down Spring	1	X	X	X	X	X
68	16.04-90825	Socket Head Pipe Plug	1	X	X	X	X	X
69	16.04-90911	Pipe Plug	3	X	X	X	X	X
70	16.04-90731	Control Lever Pin	3	X	X	X	X	X
71	16.04-90633	Capscrew Hex Hd.	1	X	X	X	X	X
72	16.04-90666	Lockwasher	1	X	X	X	X	X
73	16.04-90746	Plain Washer	1	X	X	X	X	X
74	16.04-90730	Control Lever	1	X	X	X	X	X
75	16.04-90733	Control Lever Bushing	1	X	X	X	X	X
76	16.04-90732	Control Lever Pawl	1	X	X	X	X	X
77	16.51-00007	Control Lever "O" Ring	1	X	X	X	X	X
78	16.04-91973	Control Valve	1	X	X	X	X	X
79	16.04-90604	Control Valve Retaining Ring	1	X	X	X	X	X
80	16.04-92034	Cover	1	X	X	X	X	X
81	16.51-00011	Reverse Piston "O" Ring	1	X	X	X	X	X
82	16.04-90817	Reverse Piston & Shaft Assy.	1	X	X	X	X	X
83	16.04-90818	Piston Back Up Plate	1	X	X	X	X	X
84	16.04-90820	Reverse Piston Shaft Pin	1	X	X	X	X	X
85	16.04-90821	Retaining Ring	4	X	X	X	X	X
86	16.04-90820	Reverse Band Roll Pin	1	X	X	X	X	X

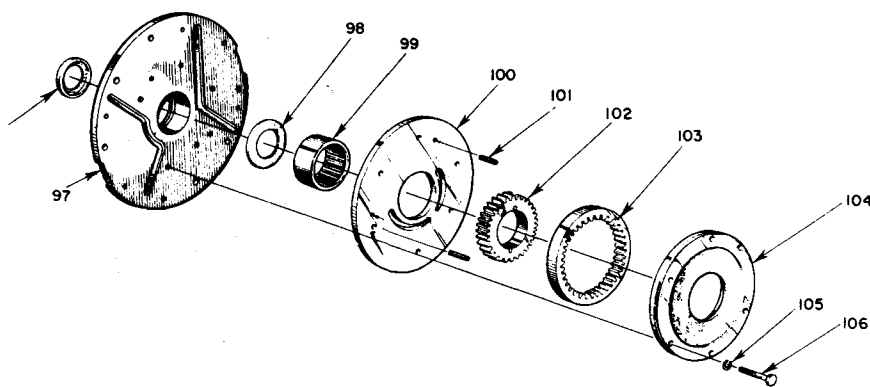
Key No.	Part No.	Part Name	No. Reqd.	Where Used				
				P- 32	P- 32AR	P- 32AL	P- 34BR	P- 35BL
87	16.04-90819	Reverse Band Lever	2	X	X	X	X	X
88	16.04-90822	Reverse Band Roll	1	X	X	X	X	X
89	16.51-00012	Piston Back Up Plate "O" Ring	1	X	X	X	X	X
90	16.04-90411	Relief Valve Plug	1	X	X	X	X	X
91	16.04-90410	Relief Valve Spring	1	X	X	X	X	X
92	16.04-90824	Relief Valve Retaining Ring	1	X	X	X	X	X
93	16.51-00009	Relief Valve "O" Ring	1	X	X	X	X	X
94	16.04-90412	Relief Valve Pin	1	X	X	X	X	X
95	16.04-90823	Relief Valve Housing	1	X	X	X	X	X
96	16.51-10013	Front Plate Oil Seal	1	X	X	X	X	X
97	16.04-91968	Front Plate	1	X	X	X	X	X
98	16.04-90622	Front Plate Thrust Washer	1	X	X	X	X	X
99	16.04-90623	Roller Bearing	1	X	X	X	X	X
100	Not Required							
101	Not Required							
102	16.04-90626	Inner Pump Gear	1	X	X	X	X	X
103	16.04-40439	Outer Pump Gear	1	X	X	X	X	X
104	16.04-91970	Pump Housing	1	X	X	X	X	X
105	16.04-90666	Lockwasher Spring	6	X	X	X	X	X
106	16.04-90536	Capscrew Hex. Hd.	6	X	X	X	X	X
107	16.04-90828	Dipstick Assy.	1	X	X	X	X	X
108	16.04-91982	Capscrew Socket Hd.	8	X	X	X	X	X
109	16.04-90813	Breather	1	X	X	X	X	X
110	16.04-90388	Pump Key	1	X	X	X	X	X
111	16.04-90808	Reverse Band Assy.	1	X	X	X	X	X
112	16.58-80013	Pipe Plug	1	X	X	X	X	X
113	16.04-92035	Brass Washer	3	X	X	X	X	X
114	16.04-90878	Brake Band Support Screw	1	X	X	X	X	X
115	16.04-90812	Capscrew Ext. Socket Hd.	6	X	X	X	X	X
116	16.04-90467	Detent Seal Washer	1	X	X	X	X	X
117	16.04-90606	Detent Ball	1	X	X	X	X	X
118	16.04-91982	Capscrew	1	X	X	X	X	X
119	16.04-90607	Detent Spring	1	X	X	X	X	X
120	16.04-90712	Lockwasher	6		X	X		
120	16.04-90712	Lockwasher	4				X	X
121	16.04-90594	Capscrew GR 5	6		X	X	X	X
122	16.04-90844	Reduction Gear Housing	1		X	X		
122	16.04-90845	Reduction Gear Housing	1				X	X
123	16.58-80010	Pipe Plug	1		X	X	X	X
124	16.51-10020	Oil Seal	1		X	X	X	X
125	16.04-90853	Gear Half Coupling	1		X	X	X	X
126	16.04-90854	Lockwasher	1		X	X	X	X
127	16.04-90855	Locknut	1		X	X	X	X
128	16.04-90838	Internal Gear	1			X		
128	16.04-90839	Internal Gear	1		X			
128	16.04-90838	Internal Gear	1					X
128	16.04-90839	Internal Gear	1				X	
129	16.04-90850	Bearing	1		X	X		
129	16.04-90851	Bearing	1				X	X
130	16.04-90227	Retaining Ring	1		X	X		
130	16.04-90852	Retaining Ring	1				X	X

Key No.	Part No.	Part Name	No. Reqd.	Where Used				
				P- 31	P- 32AR	P- 32AL	P- 34BR	P- 35BL
131	16.51-00005	"O" Ring	1		X	X	X	X
132	16.04-90581	Suction Tube		X	X	X	X	X
133	16.04-90573	Screw Collar Thrust Washer	1	X				

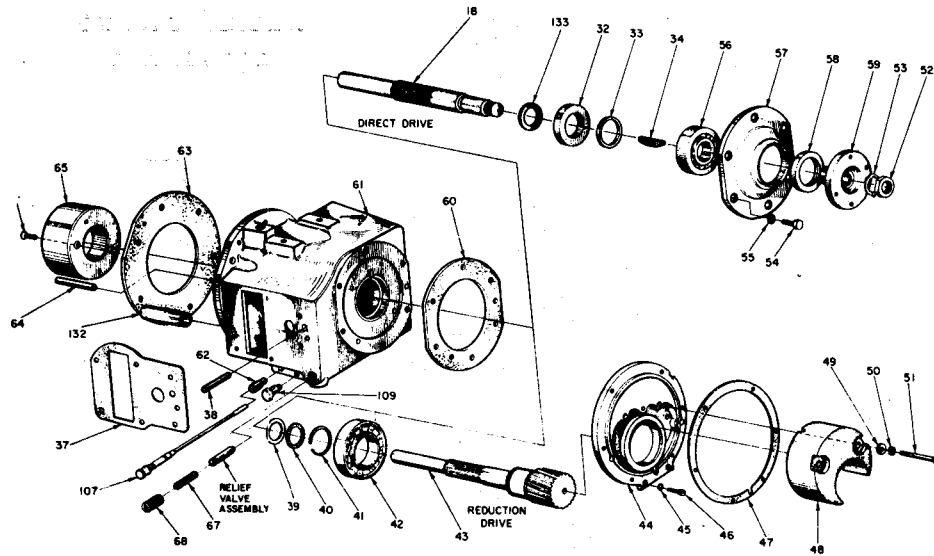
GEAR CASE ASSEMBLY



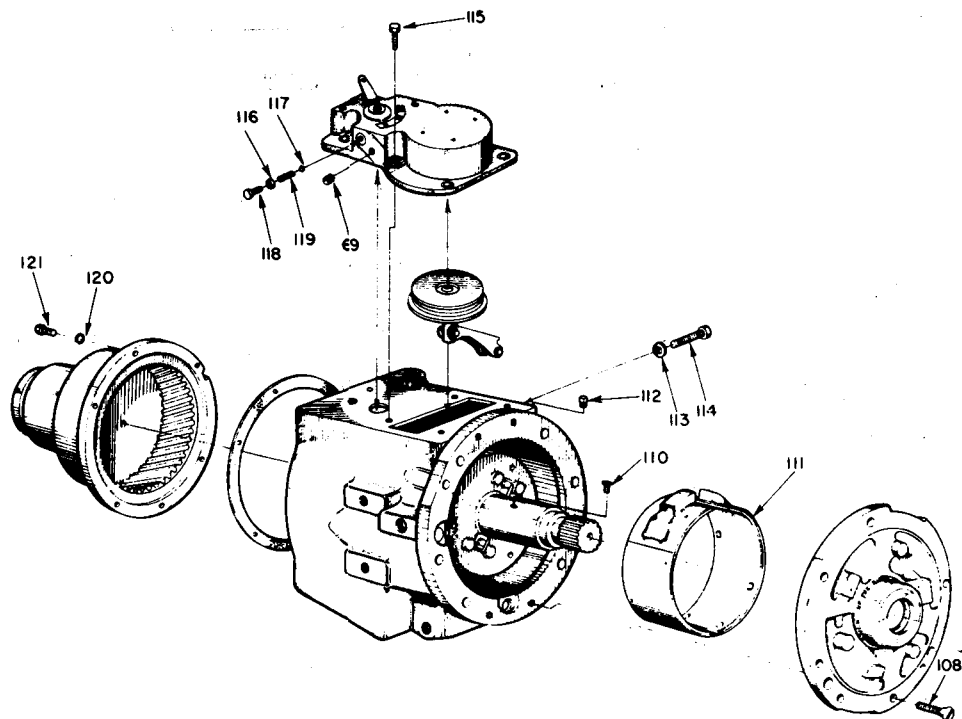
FRONT END PLATE AND PUMP ASSEMBLY



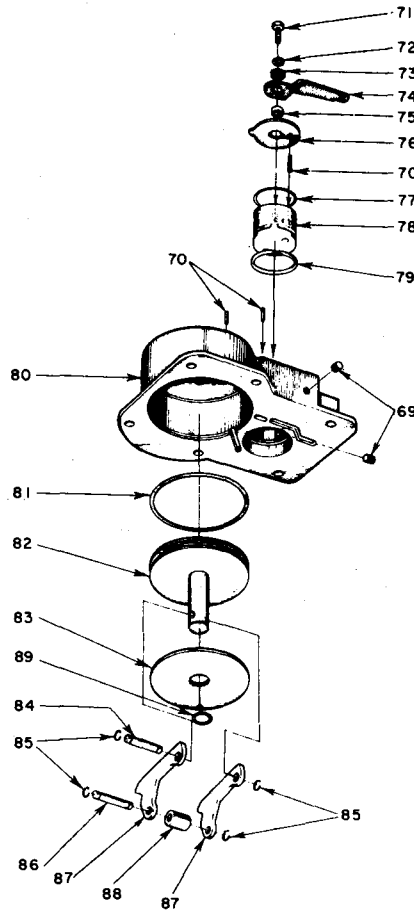
REVERSE GEAR HOUSING ASSEMBLY



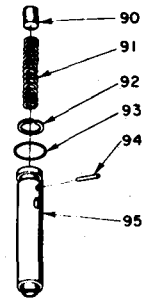
COMPLETE ASSEMBLY



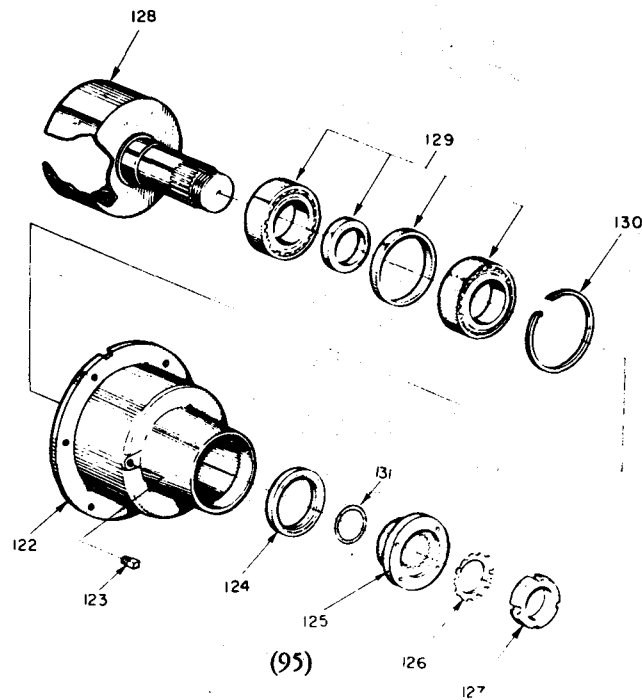
COVER ASSEMBLY



RELIEF VALVE ASSEMBLY



REDUCTION GEAR ASSEMBLY



SPLIT HOUSING V-DRIVE

Model	Ratio	Specification
PV31 R&L	1:1	Z-7867 R&L
PV32 R&L	1.5:1	Z-7868 R&L
PV33 R&L	2.0:1	Z-7869 R&L
PV34 R&L	2.5:1	Z-7870 R&L

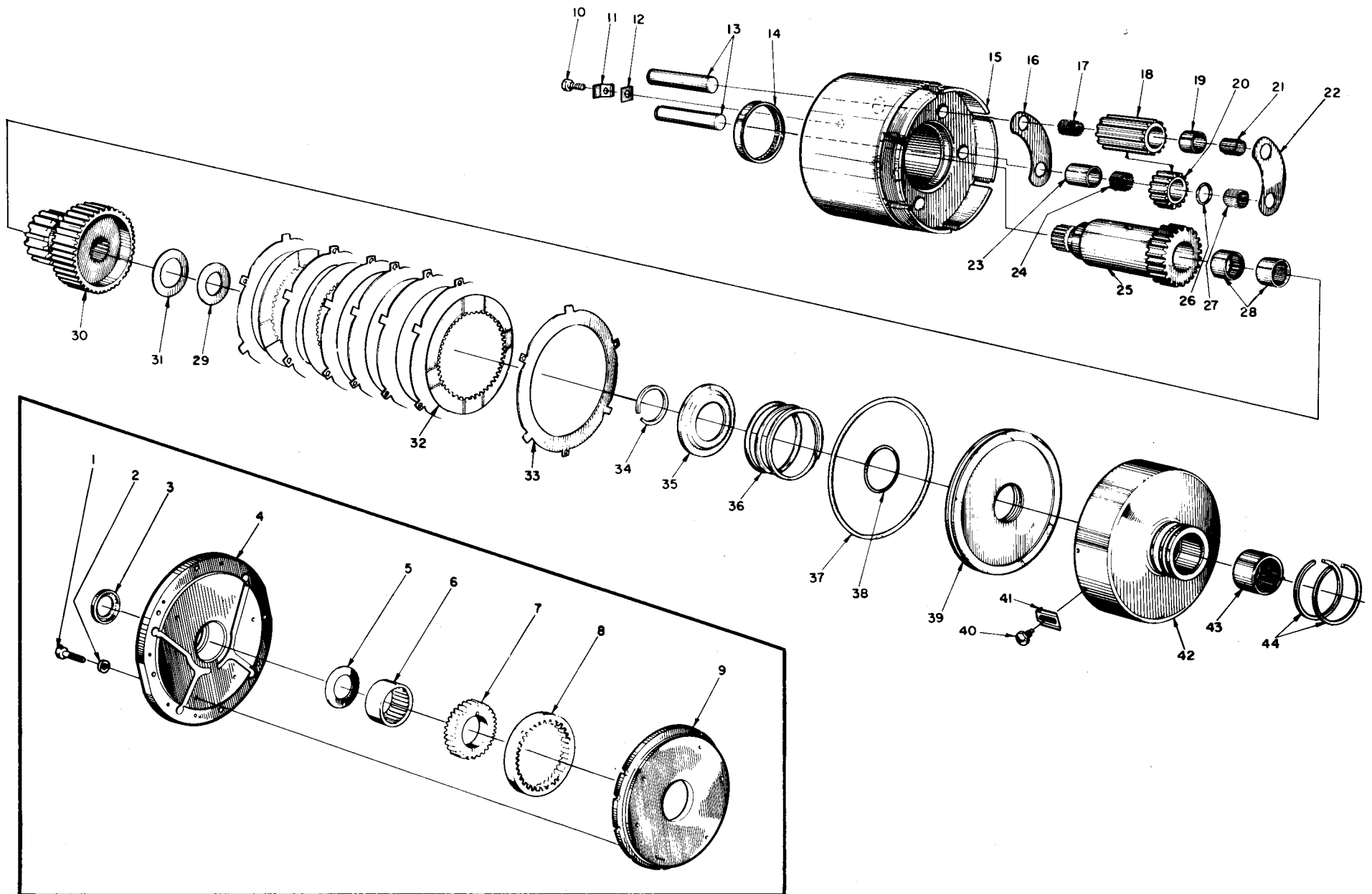
Key No.	Part No.	Part Name	No. Reqd.	Key No.	Part No.	Part Name	No. Reqd.
1	16.04-90536	Capscrew Hex. Hd.	6	44	16.04-90397	Ring	2
2	16.04-90467	Seal Washer	6	45	16.04-90633	Capscrew Hex. Hd.	1
3	16.51-10013	Oil Seal	1	46	16.04-90666	Lockwasher	1
4	16.04-91968	Front Plate	1	47	16.04-90746	Washer	1
5	16.04-90622	Washer	1	48	16.04-90730	Lever	1
6	16.04-90623	Bearing	1	49	16.04-90733	Bushing	1
7	16.04-90626	Pump Gear	1	50	16.04-90732	Pawl	1
8	16.04-40439	Pump Gear	1	51	16.04-90731	Pin	3
9	16.04-91970	Pump Housing	1	52	16.51-00007	"O" Ring	1
10	16.04-90568	Capscrew Hex. Hd.	3	53	16.04-91973	Valve	1
11	16.04-90567	Case Clip	3	54	16.04-90604	Retaining Ring	1
12	16.04-90566	Shaft Locking Tab	3	55	16.04-91974	Detent Plug	1
13	16.04-90559	Shaft	6	56	16.04-92042	Cover	1
14	16.04-90553	Bearing	1	57	16.04-90731	Refer to Code No. 51	
15	16.04-90554	Case	1	58	16.51-00011	"O" Ring	1
16	16.04-90556	Pad	6	59	16.04-90817	Reverse Piston Assembly	1
17	16.04-90557	Bearing 1 Set	(192)	60	16.04-90818	Plate	1
18	16.04-90555	Long Pinion	3	61	16.51-00012	"O" Ring	1
19	16.04-90558	Bearing Spacer	3	62	16.04-90820	Pin	2
20	16.04-90562	Short Pinion	3	63	16.04-90821	Retaining Ring	4
21	16.04-90557	Refer to Code No. 17		64	16.04-90820	Refer to Code No. 62	
22	16.04-90556	Refer to Code No. 16		65	16.04-90819	Lever	2
23	16.04-90565	Short Pinion Spacer	3	66	16.04-90822	Roll	1
24	16.04-90563	Bearing 1 Set	(192)	67	16.04-90819	Refer to Code No. 65	
25	16.04-90561	Engine Gear	1	68	16.04-90821	Refer to Code No. 63	
26	16.04-90564	Bearing Spacer	3	69	16.04-92043	90° Street Elbow	1
27	16.04-90563	Refer to Code No. 24		70	16.04-92044	Hose Assembly	1
28	16.04-90560	Bearing	2	71	16.04-92045	90° Elbow	1
29	16.04-90569	Washer	1	72	16.04-91983	Cover Gasket	1
30	16.04-90842	Propeller Gear	1	73	16.04-90807	Tube	1
31	16.04-91965	Washer	1	74	16.04-90813	Breather	1
32	16.04-90575	Plate	6	75	16.04-90812	Capscrew External Socket	6
33	16.04-90574	Plate	7	76	16.04-90412	Pin	1
34	16.04-90804	Retaining Ring	1	77	16.04-90825	Pipe Plug Sq. Hd.	1
35	16.04-90803	Retainer	1	78	16.04-90826	Spring	1
36	16.04-90802	Spring	1	79	16.04-90411	Relief Valve Plug	1
37	16.51-00006	"O" Ring	1	80	16.04-90410	Relief Valve Spring	1
38	16.51-00005	"O" Ring	1	81	16.04-90824	Retaining Ring	1
39	16.04-90801	Forward Piston	1	82	16.51-00009	"O" Ring	1
40	16.04-90395	Lockscrew	2	83	16.04-90823	Housing	1
41	16.04-90396	Clip	2	84	16.04-90878	Screw	1
42	16.04-90800	Screw Collar	1	85	16.04-92035	Washer	3 (MAX)
43	16.04-90577	Bearing	1	86	16.04-90729	Tube	1

Key No.	Part No.	Part Name	No. Reqd.	Key No.	Part No.	Part Name	No. Reqd.
87	16.04-90388	Pump Key	1	110	16.04-92054	Bearing	2
88	16.04-90828	Dipstick Assembly	1	111	16.04-92055	Pinion 1:1 Only	1
89	16.50-00036	Rear Gasket	1	111	16.04-92056	Pinion 1.5:1 Only	1
90	16.04-90810	Pin	1	111	16.04-92057	Pinion 2.0:1 Only	1
91	16.04-90584	Baffle	1	111	16.04-92058	Pinion 2.5:1 Only	1
92	16.04-90633	Capscrew Fl. Hd. Socket	2	112	16.04-92054	Refer to Code No. 110	
93	16.04-91977	Housing	1	113	16.04-92059	Spacer	1
94	16.04-92014	Pipe Plug Sq. Hd.	1	114	16.04-90911	Pipe Plug Sq. Hd.	1
95	16.04-90581	Tube	1	115	16.04-92050	Bearing	2
96	16.04-90808	Reverse Band Assembly	1	116	16.04-92060	Refer to Code No. 115	
97	16.50-00173	Front Plate Gasket	1	117	16.04-92061	Gear 1:1 Only	1
98	16.04-91982	Capscrew Hex. Socket	8	117	16.04-92062	Gear 1.5:1 Only	1
99	16.04-92046	Universal Joint Assembly	1	117	16.04-92063	Gear 2.0:1 Only	1
100	16.04-92047	Angle Housing Gasket	1	117	16.04-92064	Gear 2.5:1 Only	1
101	16.04-92048	Capscrew Hex. Hd.	6	118	16.04-92065	Bearing	1
103	16.04-92049	Angle Housing	1	119	16.04-92066	Retaining Ring	1
104	16.04-92050	Bearing	1	120	16.04-92067	Oil Seal	1
105	16.04-92051	Bearing	1	121	16.04-92068	Coupling	1
106	16.04-92052	Race	1	122	16.04-92069	"O" Ring	1
107	16.04-90594	Capscrew Hex. Hd.	6	123	16.04-92011	Nut	1
109	16.04-92053	Nut	1	124	16.04-92070	Housing Assembly	1

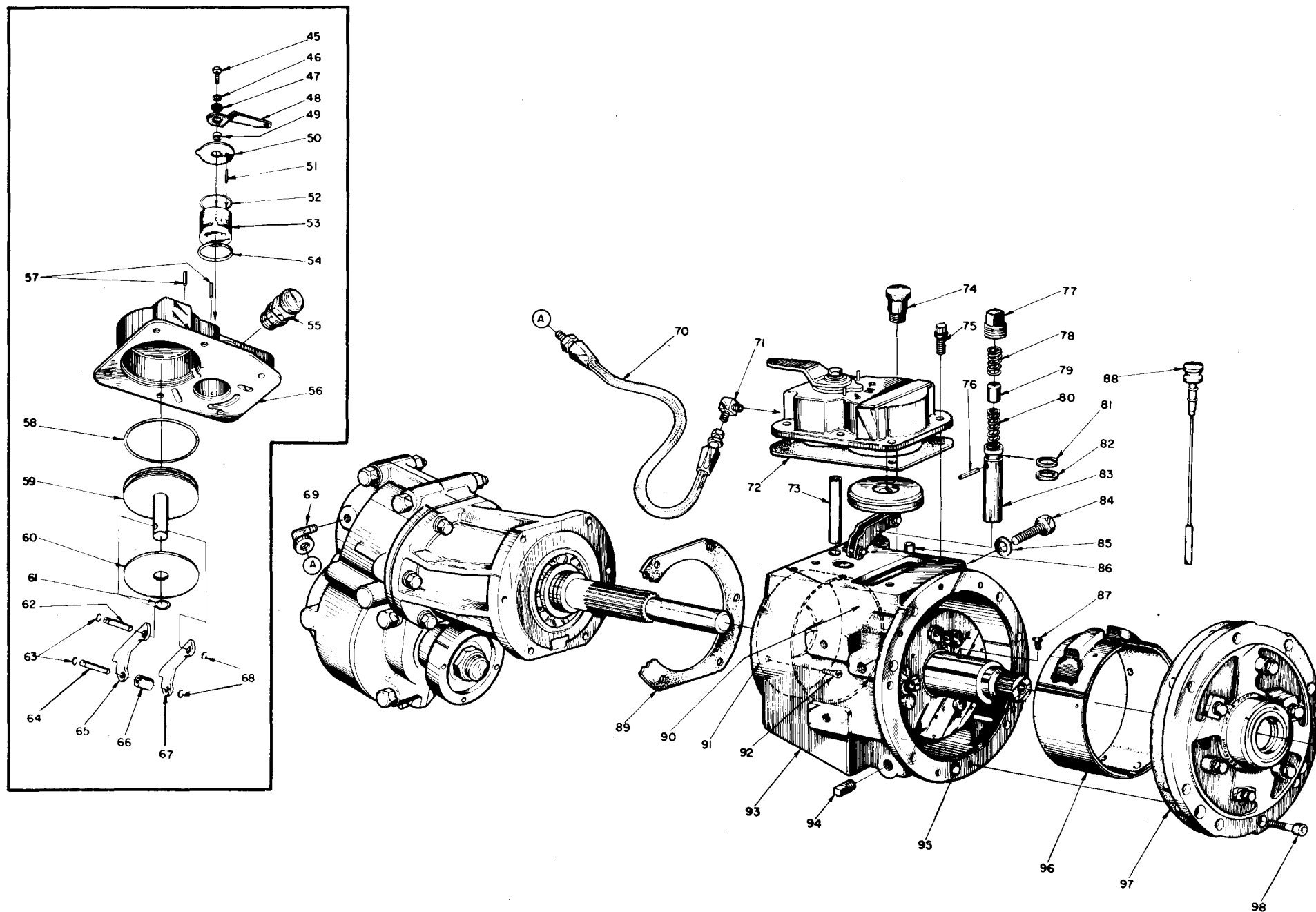
**SERVICE NO. 124 AS AN ASSEMBLY ONLY
CONSISTING OF:**

A	1/2-13x3-1/2	Capscrew Hex. Hd.	3
B	1/2-13x5"	Capscrew Hex. Hd.	3
C	1/2-13	Hex Nut	6
D	1/2	Lockwasher	5
E	1/2	Washer	2
F	X-12771	Alignment Pin	2
G	L. H.	Housing	1
H	R. H.	Housing	1

GEAR CASE ASSEMBLY



PV-300 COMPLETE ASSEMBLY



V-DRIVE ASSEMBLY — STANDARD ROTATION **(2 Gear Set)**

