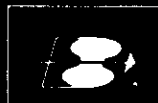
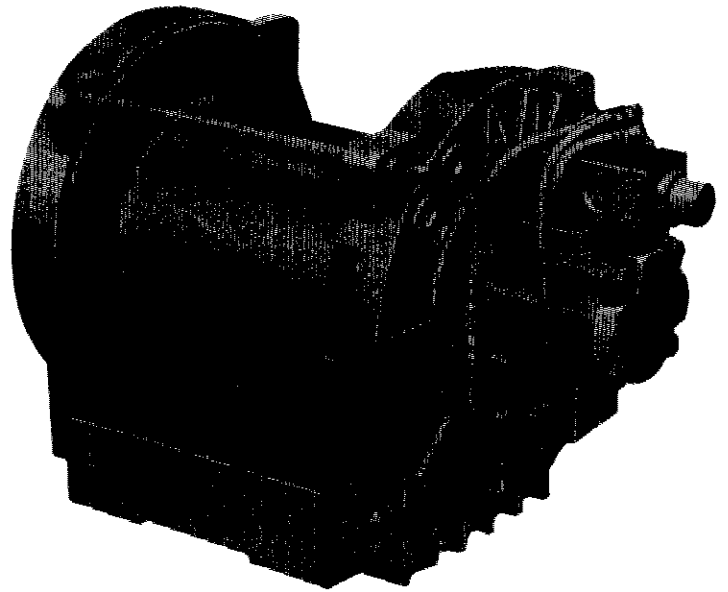


# INSTALLATION, MAINTENANCE AND SERVICE

BRADEN SERIES

# PD15

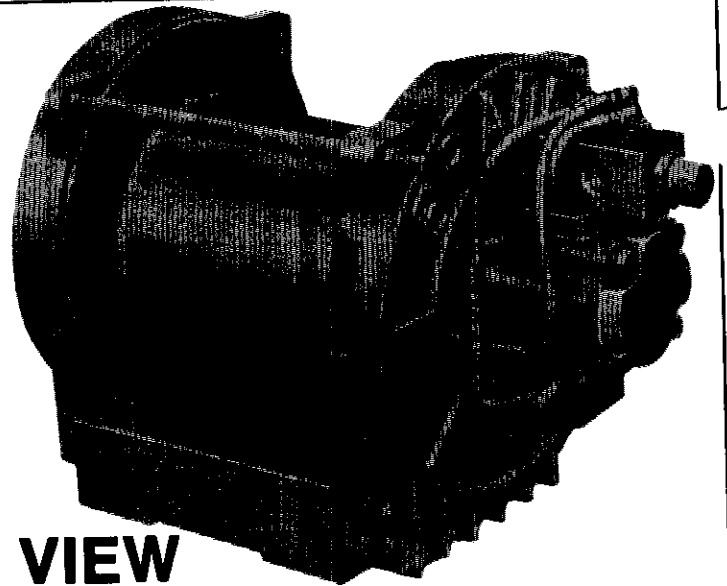


A DIVISION OF  
**PACCAR**

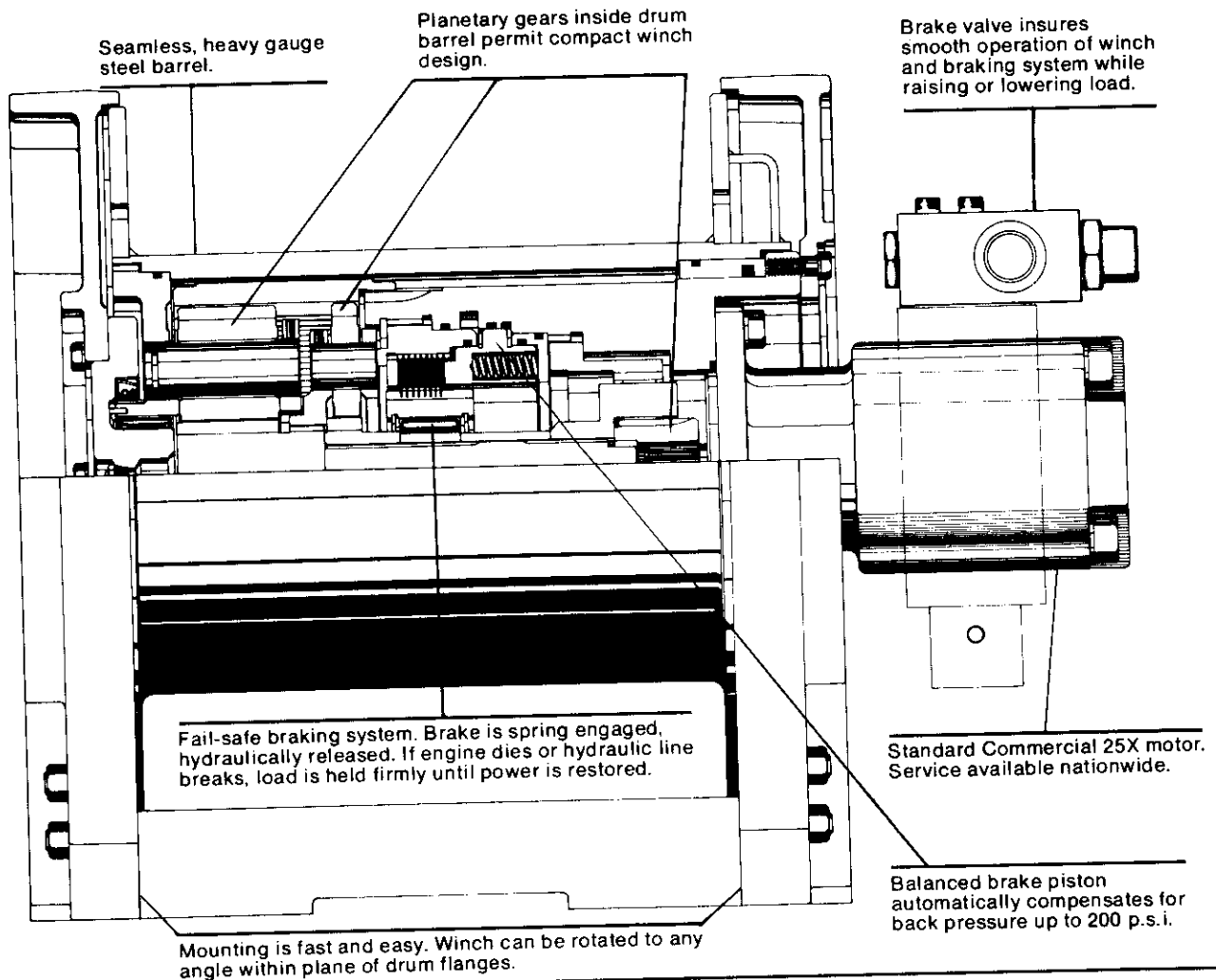
## BRADEN WINCH CO.

PHONE: 918 — 251-8511 • BROKEN ARROW, OKLAHOMA 74012

**BRADEN**  
**Hydraulically Operated**  
**SINGLE SPEED**  
**Series PD15**  
**POWER DRUMS**



**CROSS-SECTIONAL VIEW**



**WARNING!**

**GOODS ARE NOT DESIGNED FOR USE IN THE LIFTING OR MOVING OF PERSONS!**  
 The winches described herein are neither designed nor intended for use or application to equipment used in the lifting or moving of persons.

**THE CABLE CLAMPS ALONE ON WINCHES ARE NOT DESIGNED TO HOLD RATED LOADS.**  
 Therefore, a minimum of 5 wraps of cable must be left on drum barrel to achieve rated load.

## DESCRIPTION OF WINCH

The Winch has three basic component parts:

1. Winch Base and Side Frames
2. Hydraulic Motor and Brake Valve
3. Cable Drum Assembly

The Cable Drum Assembly is made up of five basic assemblies:

1. Cable Drum
2. Brake Assembly
3. Primary Planetary Reducer
4. Secondary Planetary Reducer
5. Final Planetary Reducer

The hydraulic motor is bolted directly to the brake assembly housing. This housing is bolted and doweled to the side frame. The ring gears of all three planetary reducers are splined to the brake housing. The cable drum is supported by this brake housing through a large bushing. A quad ring in the bushing prevents oil leakage.

The cable drum is supported on the other end by the final planet carrier to which it is splined. The carrier is supported by an anti-friction roller bearing on a ground and polished shaft projecting from the end frame.

## HOW IT OPERATES

The hydraulic motor drives the sun gear of the primary planetary reducer. The output is transmitted, by the planet carrier, to the sun gear of the secondary planetary reducer. The output of the secondary planetary reducer is transmitted by the planet carrier to the sun gear of the final planetary reducer.

This output is transmitted directly to the cable drum by a splined fitting between the planet carrier and the drum.

## THE BRAKE SYSTEM

The automatic braking system has four operating component parts:

1. Brake Valve attached to Hydraulic Motor
2. Spring Loaded Friction Brake
3. Over-riding Cam Clutch
4. Hydraulic Piston and Cylinder

The brake valve is basically a counterbalance valve. It contains a check valve to allow free flow of oil to the motor in a hoisting direction of rotation, and a pilot operated check valve that prevents flow of oil out of the motor when the operating valve is placed in the reverse or lowering position until sufficient pressure is present for the pilot piston to open the check valve. It also contains a small pressure relief valve set to prevent excessive shocks on the motor when a lowering operation is stopped.

The friction brake is a load holding brake only and has nothing to do with dynamic braking or stopping the descent of a load.

The over-riding clutch is splined to the secondary sun gear shaft between the primary planet carrier and the secondary sun gear. It will allow this shaft

to turn freely in a rotation to raise a load and force the brake discs to turn with the shaft in rotation to lower a load.

The hydraulic cylinder, when pressurized, will release the spring pressure on the brake discs. This is a double acting cylinder and is balanced to back pressure when the winch is not being operated.

## HOW IT OPERATES

When the winch is powered in a hoisting direction, the drive from the motor thru the primary planet carrier to the secondary sun gear runs free. The over-riding clutch between the secondary sun gear shaft and the brake discs allows complete freedom of rotation in this direction. The brake remains fully engaged as the brake release piston is balanced to any amount of back pressure that may exist.

When the lifting operation is stopped, the brake, being fully engaged, prevents the load from lowering.

When the winch is powered to reverse, the motor cannot rotate until sufficient pressure is present to open the brake valve. The friction brake within the winch will completely release at a pressure lower than that required to open the brake valve. The extent to which this valve will open will determine the amount of oil that can flow through it and the speed at which the load will be lowered. Increasing the flow of oil to the winch motor will cause the pressure to rise and the opening in the brake valve to enlarge, speeding up the descent of the load. Decreasing this flow causes the pressure to lower, the opening in the brake valve to decrease, slowing down the descent of the load.

When the operating valve is shifted to neutral the pressure will drop, the brake valve will close, stopping the load. The friction brake will engage after the valve has closed and hold the load.

When lowering a load very slowly for precise positioning, no oil flow actually occurs through the winch motor. The pressure will build up to a point where the brake will release sufficiently to allow the load to rotate the motor through its own leakage. This feature results in a very slow speed and extremely accurate positioning.

## SUMMARY

The winch, in raising a load, is not affected by any braking action. When lowering a load the brake valve has complete control of the speed at which it is lowered. When the winch is stopped by returning the control lever to neutral — the brake valve stops the load and the friction brake engages to hold the load.

Thus the brake receives very little wear in lowering operations. All of the heat generated by the lowering and stopping of a load is absorbed by the hydraulic oil where it can be readily dissipated. The only heat absorbed by the winch in either hoisting or lowering is due to the efficiency losses within the winch itself.

# DIMENSIONAL DATA

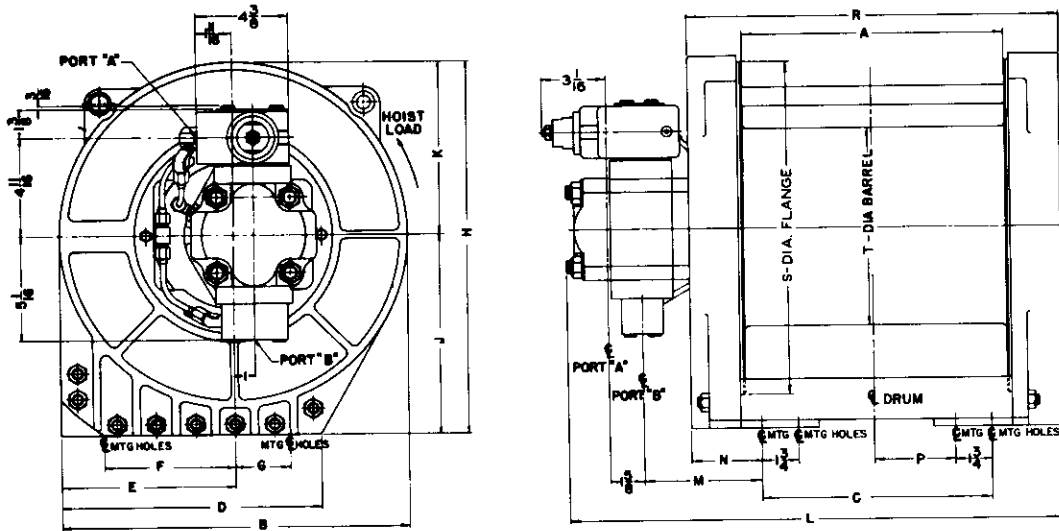
## PD15 Power Drums

With Fabricated Type Side Plates

MODEL	MOTOR MOUNTING	LOAD CAPACITY 1st LAYER	GEAR RATIO	DIMENSIONAL DATA												
				A	B	C	D	E	F	G	H	J	K	MTG. HOLES	N	P
PD15-1	SHOWN	15,000	64:1	13 $\frac{1}{4}$	14	11 $\frac{1}{2}$	8	4	7	8 $\frac{3}{8}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	23 $\frac{13}{32}$	L 2 $\frac{1}{32}$	14	9 $\frac{3}{8}$
PD15-2	OPPOSITE END	15,000	64:1	13 $\frac{1}{4}$	14	11 $\frac{1}{2}$	8	4	7	8 $\frac{3}{8}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	23 $\frac{13}{32}$	L 2 $\frac{1}{32}$	14	9 $\frac{3}{8}$
PD15-5	SHOWN	15,000	64:1	16 $\frac{1}{2}$	16	15 $\frac{1}{2}$	10	4 $\frac{1}{4}$	8	9 $\frac{3}{8}$	17 $\frac{1}{2}$	19 $\frac{1}{2}$	27 $\frac{1}{2}$	L & M 2 $\frac{5}{32}$	16	9 $\frac{3}{8}$
PD15-6	OPPOSITE END	15,000	64:1	16 $\frac{1}{2}$	16	15 $\frac{1}{2}$	10	4 $\frac{1}{4}$	8	9 $\frac{3}{8}$	17 $\frac{1}{2}$	19 $\frac{1}{2}$	27 $\frac{1}{2}$	L & M 2 $\frac{5}{32}$	16	9 $\frac{3}{8}$
PD15-7	SHOWN	15,000	64:1	12 $\frac{3}{4}$	16	11 $\frac{1}{2}$	10	4 $\frac{1}{4}$	8	9 $\frac{3}{8}$	17 $\frac{1}{2}$	15 $\frac{1}{2}$	23 $\frac{13}{32}$	L & M 2 $\frac{5}{32}$	16	9 $\frac{3}{8}$
PD15-8	OPPOSITE END	15,000	64:1	12 $\frac{3}{4}$	16	11 $\frac{1}{2}$	10	4 $\frac{1}{4}$	8	9 $\frac{3}{8}$	17 $\frac{1}{2}$	15 $\frac{1}{2}$	23 $\frac{13}{32}$	L & M 2 $\frac{5}{32}$	16	9 $\frac{3}{8}$

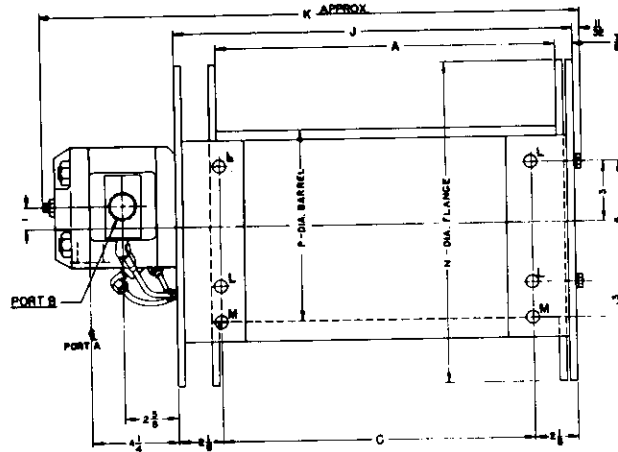
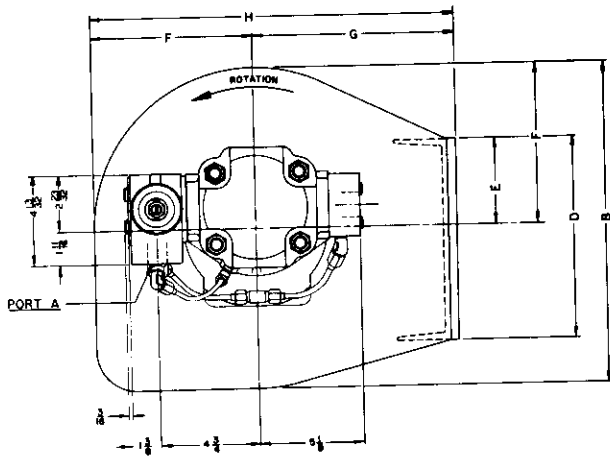
Ratings shown are on first layer of cable.  
Shipping weights: Model PD15-1 approximately 340 lbs. (winch only)

## With Cast Type Side Plates and Standard Base



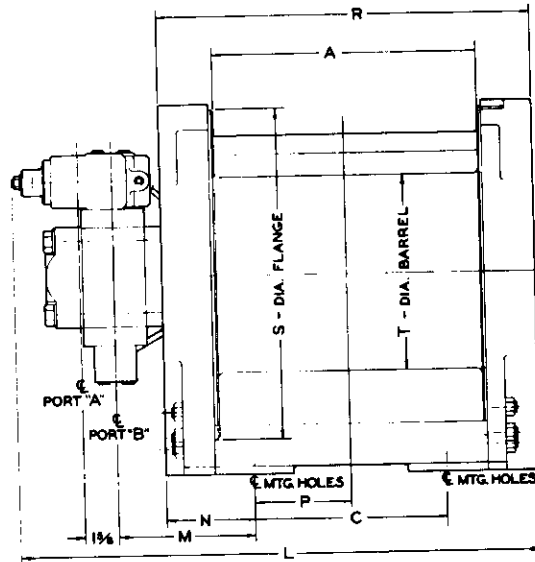
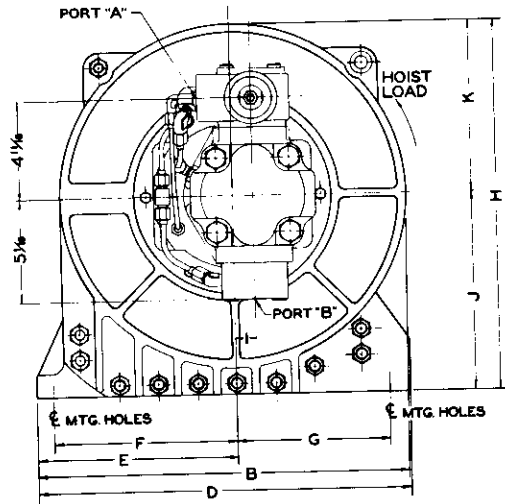
MODEL	MOTOR MOUNTING	LOAD CAPACITY 1st LAYER	GEAR RATIO	DIMENSIONAL DATA																
				A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
PD15-75	SHOWN	15,000	64:1	16 $\frac{1}{2}$	16 $\frac{1}{2}$	14 $\frac{1}{2}$	12 $\frac{1}{4}$	8 $\frac{1}{4}$	6 $\frac{1}{4}$	2 $\frac{1}{2}$	17 $\frac{1}{4}$	9 $\frac{3}{8}$	8 $\frac{1}{4}$	27 $\frac{1}{2}$	5 $\frac{1}{2}$	3 $\frac{1}{2}$	52 $\frac{1}{32}$	21 $\frac{1}{2}$	16	9 $\frac{3}{8}$
PD15-75-2	SHOWN	13,200	64:1	16 $\frac{1}{2}$	16 $\frac{1}{2}$	14 $\frac{1}{2}$	12 $\frac{1}{4}$	8 $\frac{1}{4}$	6 $\frac{1}{4}$	2 $\frac{1}{2}$	17 $\frac{1}{4}$	9 $\frac{3}{8}$	8 $\frac{1}{4}$	27 $\frac{1}{2}$	5 $\frac{1}{2}$	3 $\frac{1}{2}$	52 $\frac{1}{32}$	21 $\frac{1}{2}$	16	10 $\frac{3}{8}$
PD15-77	SHOWN	15,000	64:1	12 $\frac{3}{4}$	16 $\frac{1}{2}$	11	12 $\frac{1}{4}$	8 $\frac{1}{4}$	6 $\frac{1}{4}$	2 $\frac{1}{2}$	17 $\frac{1}{4}$	9 $\frac{3}{8}$	8 $\frac{1}{4}$	23 $\frac{1}{2}$	5 $\frac{1}{2}$	3 $\frac{1}{2}$	31 $\frac{1}{8}$	17 $\frac{1}{2}$	16	9 $\frac{3}{8}$
PD15-77-2	SHOWN	13,200	64:1	12 $\frac{3}{4}$	16 $\frac{1}{2}$	11	12 $\frac{1}{4}$	8 $\frac{1}{4}$	6 $\frac{1}{4}$	2 $\frac{1}{2}$	17 $\frac{1}{4}$	9 $\frac{3}{8}$	8 $\frac{1}{4}$	23 $\frac{1}{2}$	5 $\frac{1}{2}$	3 $\frac{1}{2}$	31 $\frac{1}{8}$	17 $\frac{1}{2}$	16	10 $\frac{3}{8}$

Ratings shown are on first layer of cable.  
Shipping weights: Model PD15-75 approximately 500 lbs. (winch only).



PORT 'B' - BARE LOAD 1 5/16-12 SLYTMD 'O' RING  
 PORT 'A' - LOWER LOAD 1 5/16-12 SLYTMD 'V' RING  
 MOUNTING HOLES "L" 8"x8" - SEE TABLE

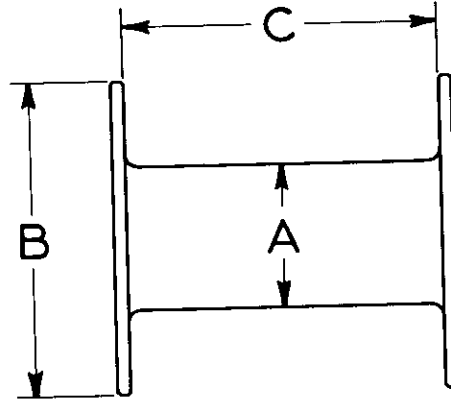
**With Cast Type Side Plates and Universal Base**



MODEL	MOTOR MOUNTING	LOAD CAPACITY 1st LAYER	GEAR RATIO	DIMENSIONAL DATA																
				A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
PD15-71-1	SHOWN	15,000	64:1	13 3/4	16 1/2	9 3/8	18	9 3/4	8 3/8	7 3/4	16 3/8	9 3/4	8 3/4	22 1/2	6 3/4	4 1/8	4 1/2	17 1/2	13	8 3/4
PD15-77-1	SHOWN	15,000	64:1	12 3/4	8 1/8	9 3/8	18	9 3/4	8 3/8	7 3/4	17 1/8	9 3/4	8 3/8	23 1/2	5 3/4	3 3/4	4 1/8	17 3/4	16	9 3/4

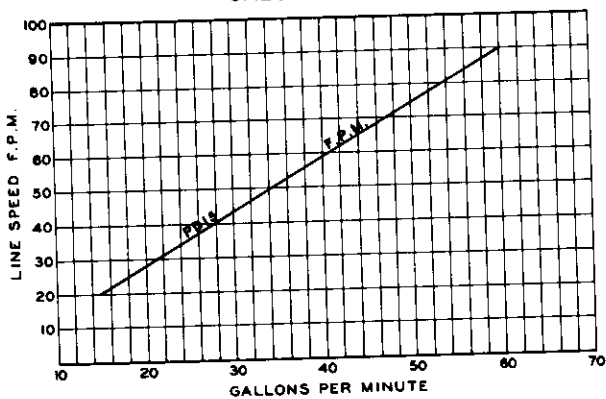
Ratings shown are on first layer of cable.  
 Shipping weights: Model PD15-77-1 approximately 480 lbs. (winch only).

# PERFORMANCE DATA

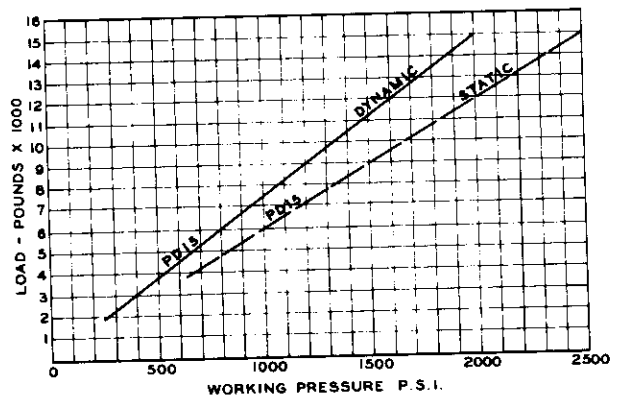


MODEL	DRUM DIMENSIONS (INCHES)			CABLE CAPACITY (FEET)							LINE PULL (LBS.), LINE SPEED (FPM), DRUM CAPACITY (FT.) 80 G.P.M. @ 2500 P.S.I. WITH 1/4" CABLE														
				WIRE ROPE				ROPE			1st LAYER			2nd LAYER (TOTAL)			3rd LAYER (TOTAL)			4th LAYER (TOTAL)			5th LAYER (TOTAL)		
	A	B	C	3/8	7/16	1/2	5/8	3/4	7/8	1	LBS.	FPM	FT.	LBS.	FPM	FT.	LBS.	FPM	FT.	LBS.	FPM	FT.	LBS.	FPM	FT.
PD15-1	9 3/4	14	13 1/4	655	465	320	290	190	—	—	15,000	80	55	13,200	90	120	11,800	100	190	—	—	—	—	—	—
PD15-71-1	9 3/4	13	13 1/4	410	360	230	210	120	—	—	15,000	80	55	13,200	90	120	—	—	—	—	—	—	—	—	—
PD15-5	9 3/4	16	16 1/2	1330	870	650	475	435	290	170	15,000	80	70	13,200	90	150	11,800	100	235	10,800	110	330	10,000	120	435
PD15-75	9 3/4	16	16 1/2	1330	870	650	475	435	290	170	15,000	80	70	13,200	90	150	11,800	100	235	10,800	110	330	10,000	120	435
PD15-75-2	10 3/4	16	16 1/2	1080	790	575	400	370	225	110	13,200	90	80	11,800	100	155	10,800	110	260	10,000	120	370	—	—	—
PD15-7	9 3/4	16	12 3/4	1025	665	495	360	335	225	120	15,000	80	53	13,200	90	115	11,800	100	180	10,800	110	255	10,000	120	335
PD15-77	9 3/4	16	12 3/4	1025	665	495	360	335	225	120	15,000	80	53	13,200	90	115	11,800	100	180	10,800	110	255	10,000	120	335
PD15-77-1	9 3/4	16	12 3/4	1025	665	495	360	335	225	120	15,000	80	53	13,200	90	115	11,800	100	180	10,800	110	255	10,000	120	335
PD15-77-2	10 3/4	16	12 3/4	830	605	440	310	280	170	85	13,200	90	60	11,800	100	125	10,800	110	200	10,000	120	280	—	—	—

CABLE SPEED

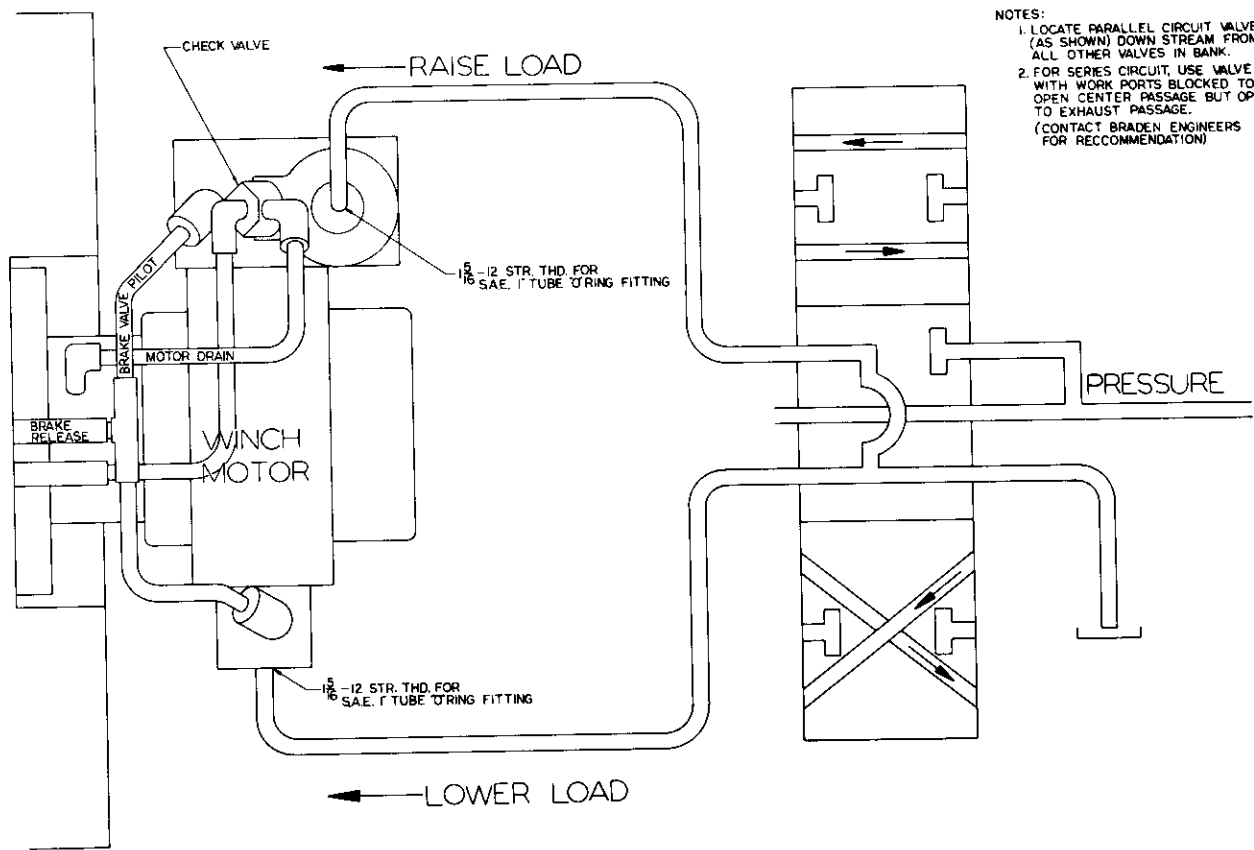


CABLE PULL



Ratings and speeds shown are per the first layer of cable.

# WINCH CONTROL CIRCUIT



- NOTES:
1. LOCATE PARALLEL CIRCUIT VALVE (AS SHOWN) DOWN STREAM FROM ALL OTHER VALVES IN BANK.
  2. FOR SERIES CIRCUIT, USE VALVE WITH WORK PORTS BLOCKED TO OPEN CENTER PASSAGE BUT OPEN TO EXHAUST PASSAGE. (CONTACT BRADEN ENGINEERS FOR RECOMMENDATION)

## INSTALLATION SUGGESTIONS

1. The winch should be mounted with the center line of the cable drum in a horizontal position. The base can be mounted in any position around this horizontal center line.
2. It is important that the winch is mounted on a surface that will not flex when the winch is used, since this would bind working parts of the winch. Be sure that the winch is not mounted on an uneven surface. If necessary, use shim stocks to insure even mounting.
3. Hydraulic lines that operate the winch should be one inch (1") pipe or larger. Make lines as short as possible.
4. The winch directional control valve must be 4-way, free flow with motor spool. Work ports must open directly into tank in neutral position.

## MAINTENANCE SUGGESTIONS

### I. CHECKING OIL LEVEL

1. Remove cable from winch.
2. There are two pipe plug holes in the drum of the winch. Turn the winch drum until one plug is at the highest point on the drum. Oil should be level with the lowest plug. Add 90 weight (specified brands or equal) worm gear oil through top plug, if necessary.

### II. OIL CHANGE INFORMATION

1. Oil should be drained after first two (2) months operating time.
2. Fill winch with clean kerosene and run for 15 minutes in each direction. Drain kerosene and add proper amount of approved 90 weight worm gear oil. Oil should then be changed every 6 months.

### III. OIL CAPACITY RECOMMENDATIONS

POWER DRUM MODEL	OIL CAPACITY (PINTS)	POWER DRUM MODEL	OIL CAPACITY (PINTS)
PD15-71-1	5	PD15-1	5
PD15-75	5.5	PD15-2	5
PD15-75-2	5.5	PD15-5	5.5
PD15-77	5	PD15-6	5.5
PD15-77-1	5	PD15-7	5
PD15-77-2	5	PD15-8	5

USE ONLY FACTORY CERTIFIED REPLACEMENT PARTS.



## SUGGESTIONS FOR TROUBLE SHOOTING

### A. Winch will not lower load.

1. This is an indication that either the orifice plug in the brake valve is stopped up or the brake is not being released. To check orifice plug, remove hose assembly, Item 20. Remove the plug, using a screwdriver with a 1/8" wide blade. Check the hole in the plug with a wire of less than .020" in diameter. If the hole is open, the fault is probably not in the brake valve. Since the winch brake is not being released, the brake cylinder should then be removed and disassembled to determine the cause.

### B. Winch leaks a large volume of oil through the vent plug. This is caused by the hydraulic oil leaking into the winch through the hydraulic motor seal or a damaged O-ring in the winch brake.

1. In order to determine the cause of the leak, remove the hose from the motor manifold to the winch brake.
2. Attach a hydraulic jack to the brake connection and apply 500 PSI to the brake. The brake should be able to hold this pressure for ten minutes. Be certain that all connections are tight and that oil does not leak back into the jack.
3. If the brake holds the pressure, then the motor seal is leaking and should be replaced.
4. If the hydraulic seal must be replaced, it is necessary to remove the drain line check

valve from the brake valve. Be certain that the check valve is clean and that it does not leak. Replace, if necessary.

5. If the brake will not hold pressure, the winch should be returned to the factory for repair.

### C. Winch will not hoist rated load.

1. Be certain that the winch has not been mounted on an uneven surface. If necessary, shim shock should be used.
2. Be certain to check for proper hydraulic pressure to the winch brake valve. Check the pressure at the winch for accurate readings.
3. Be certain that the hydraulic system which operates the winch is not running more than 180°F.
4. Remember that the winch ratings are established on the first layer of cable.
5. Be certain that the cable sheaves, used with the winch, are operating efficiently.

### D. Winch runs hot (over 200°F) or makes excessive noise.

1. Be certain that the winch has not been mounted on an uneven surface.
2. Be certain that the hydraulic system which operates the winch is not running more than 180°F.

### E. Winch chatters while raising rated capacity load.

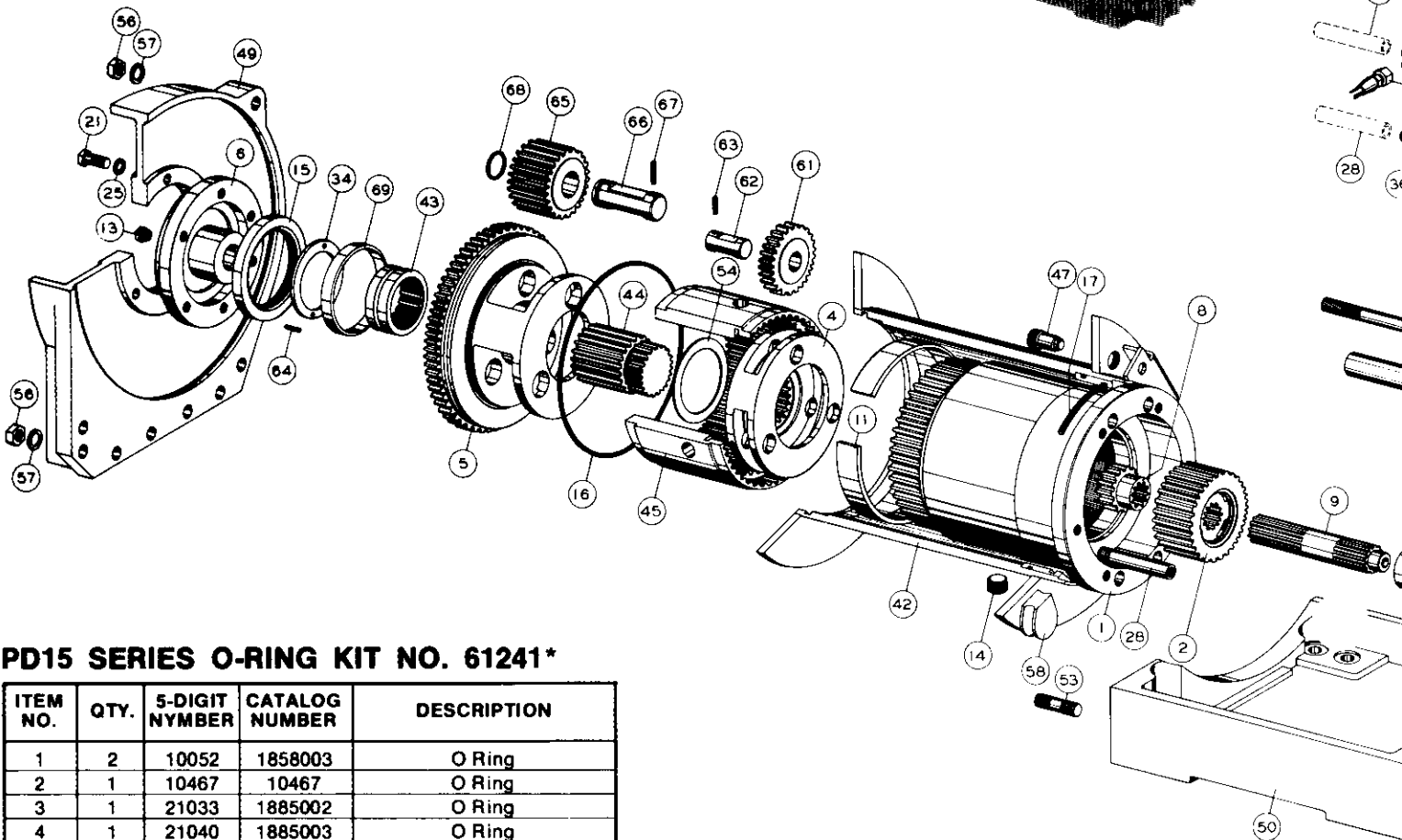
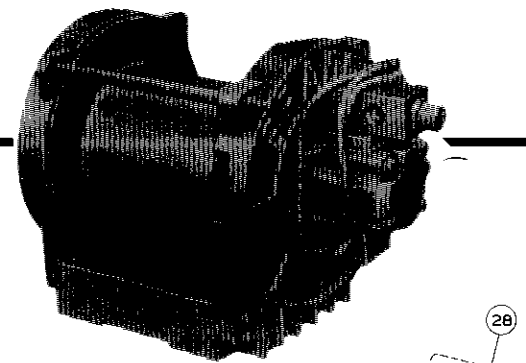
1. This is probably caused by the relief valve in the hydraulic system trying to by-pass.

A regular program of preventive maintenance will tend to eliminate the need for much emergency servicing and insure a long life and trouble-free service from your planetary winch.

### SOME THINGS TO REMEMBER IN YOUR SERVICING OPERATIONS:

- Work in a clean, dust free area as cleanliness is of utmost importance when servicing any hydraulic equipment.
- Inspect all replacement parts, prior to installation, to detect any damage which might have occurred in shipment.
- Use only factory certified replacement parts for optimum results. Never re-use expendable parts such as oil seals, backup washers, O-rings and seals. Although they may appear to be in good condition, many times they are not.
- Clean all parts and inspect all machined surfaces for excessive wear or damage . . . before reassembly operations are begun.
- Lubricate all O-rings and oil seals with grease prior to installation.

# COMPONENTS-MODEL PD15



## PD15 SERIES O-RING KIT NO. 61241\*

ITEM NO.	QTY.	5-DIGIT NUMBER	CATALOG NUMBER	DESCRIPTION
1	2	10052	1858003	O Ring
2	1	10467	10467	O Ring
3	1	21033	1885002	O Ring
4	1	21040	1885003	O Ring
5	1	21063	1885004	O Ring
6	2	21150	1885009	O Ring
7	3	22932	22932	O Ring
8	1	22419	1885005	Quad Ring

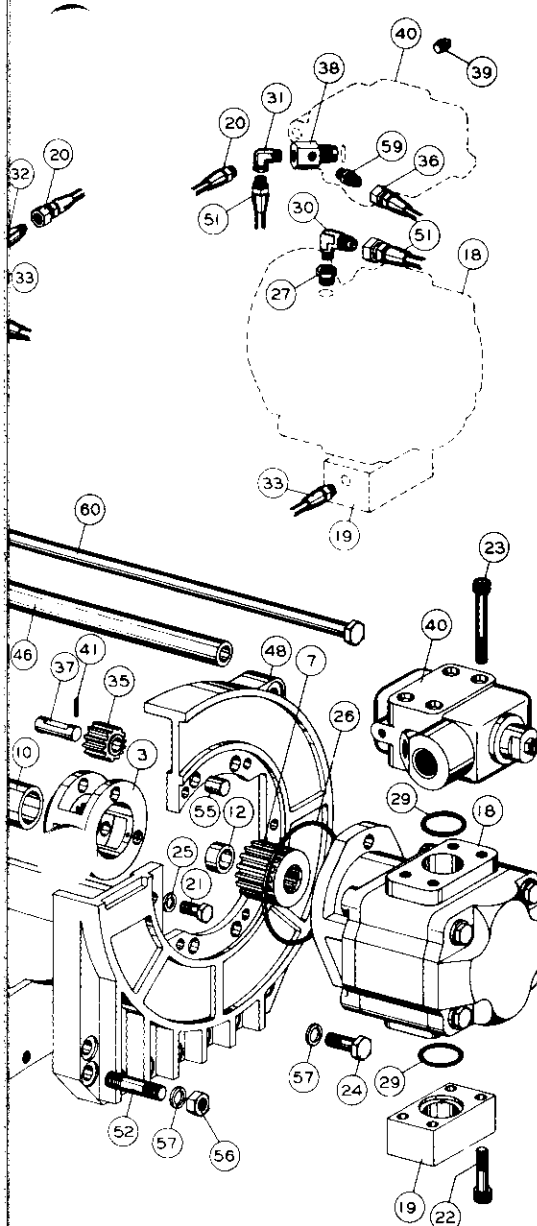
\*When O-ring replacements are required, order complete O-ring Kit No. 61241.

## MATERIAL LIST VARIABLES

ITEM NO.	DESCRIPTION	PD15-71-1		PD15-75		PD15-75-2		PD15-77		PD15-77-1		PD15-77-2							
		QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.			
42	Cable Drum Assembly	1	81321	850910	1	81331	850811	1	81476	81476	1	81330	851031	1	81338	851033	1	81436	850333
44	Output Sun Gear	1	21096	850720	1	21109	850830	1	21109	850830	1	21096	850720	1	21096	850720	1	21096	850720
45	Ring Gear	1	21074	850540	1	21108	850820	1	21108	850820	1	21074	850540	1	21074	850540	1	21074	850540
46	Spacer Pipe	1	22779	850986	1	21197	850983	1	21197	850983	1	21170	850985	1	21170	850985	1	21170	850985
47	Anchor Pin	—	—	—	1	21204	851260	1	21204	851260	1	21204	851260	—	—	—	1	21204	851260
48	Side Plate — Motor	1	22780	850664	1	21179	850661	1	21179	850661	1	21179	850661	1	22460	850663	1	21179	850661
49	Side Plate — Drum Support	1	22781	850684	1	21181	850681	1	21181	850681	1	21181	850681	1	22459	850683	1	21181	850681
50	Base	1	22448	850643	1	21172	850701	1	21172	850701	1	21175	850641	1	22448	850643	1	21175	850641
52	Stud	10	21145	850380	8	21145	850380	8	21145	850380	8	21145	850380	10	21145	850380	8	21145	850380
53	Stud	10	21192	850381	8	21192	850381	8	21192	850381	8	21192	850381	10	21192	850381	8	21192	850381
54	Thrust Bearing	1	21061	1441009	1	21061	1441009	1	21061	1441009	1	21061	1441009	1	21061	1441009	1	21061	1441009
55	Dowel Pin	4	21112	2085001	4	21112	2085001	4	21112	2085001	4	21112	2085001	4	21112	2085001	4	21112	2085001
56	Hex Nut	20	16034	SH050P	17	11788	S050P	17	11788	S050P	17	11788	S050P	21	11788	S050P	17	11788	S050P
57	Lockwasher	23	11026	A050	17	11026	A050	17	11026	A050	19	11026	A050	23	11026	A050	19	11026	A050
58	Cable Clamp	—	—	—	1	21186	850930	1	22562	22562	1	21186	850930	1	21186	850930	1	22562	22562
60	Capcrew	1	22782	850392	1	21171	850391	1	21171	850391	1	21207	850390	1	21207	850390	1	21207	850390
Not Shown	Cable Anchor Kit	1	61255	61255	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

USE ONLY FACTORY CERTIFIED REPLACEMENT PARTS.

# MATERIAL LIST



ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
1	1	81325	851080	Brake Cylinder Assembly
2	1	81324	851040	Brake/Clutch Assembly
3	1	21069	850290	Primary Planet Carrier
4	1	21023	850080	Secondary Planet Carrier
5	1	21021	850040	Output Planet Carrier
6	1	21022	850060	Drum Support
7	1	21098	850740	Input Sun Gear
8	1	21072	850070	Secondary Sun Gear
9	1	21070	850030	Secondary Sun Gear Shaft
10	1	21071	850050	Spacer
11	1	21056	850440	Spacer
12	1	21076	850560	Bushing
13	1	18062	28-FTD-2	Vent Plug
14	2	19045	E050W	Plug
15	1	21062	1885001	Seal
16	1	21033	1885002	O Ring
17	1	22419	1885005	Quad Ring
18	1	21020	850020	Hydraulic Motor
19	1	21136	850960	Manifold
20	1	13706	13706	Hose Assembly
21	12	21961	S037-10PH5	Capscrew
22	4	21144	S043-20A	Capscrew
23	4	21134	S043-30A	Capscrew
24	2	13411	S050-15P	Capscrew
25	12	18003	A037	Lockwasher 3/8"
26	1	21063	1885004	O Ring
27	1	21162	2385003	Reducer
28	2	22436	850511	Nipple
29	2	21150	1885009	O Ring
30	1	21163	2685008	Elbow — Male 90°
31	1	13708	13708	Elbow — Street 90°
32	1	21166	2685011	Tee — Male
33	1	13705	13705	Hose Assembly
34	1	21059	850450	Thrust Washer
35	3	21067	850270	Primary Planet Gear
36	1	13710	13710	Hose Assembly
37	3	21068	850280	Primary Planet Gear Shaft
38	1	81339	851220	Check Valve Assembly
39	1	17309	E012TC	Plug
40	1	22235	850951	Counterbalance Valve Assembly
41	3	21045	R12-075	Rollpin
43	1	21051	1385001	Roller Bearing
51	1	13710	13710	Hose Assembly
59	1	21219	2685014	Connector — Male
61	3	21099	850750	Secondary Planet Gear
62	3	21048	850360	Secondary Planet Gear Shaft
63	3	21049	R18-075	Rollpin
64	2	21060	850460	Pin
65	3	21073	850530	Output Planet Gear
66	3	21057	850320	Output Planet Gear Shaft
67	3	21058	R18-100	Rollpin
68	3	22932	22932	O Ring
69	1	21050	2785001	Wear Sleeve

NOTE: Refer to "Material List Variables" for items not shown on basic material list.

## MATERIAL LIST VARIABLES

ITEM NO.	DESCRIPTION	PD15-1		PD15-2		PD15-5		PD15-8		PD15-7		PD15-8							
		QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.						
42	Cable Drum Assembly	1	81319	850330	1	81319	850330	1	81331	850811	1	81331	850811	1	81323	851030	1	81323	851030
44	Output Sun Gear	1	21096	850720	1	21096	850720	1	21109	850830	1	21109	850830	1	21096	850720	1	21096	850720
45	Ring Gear	1	21074	850540	1	21074	850540	1	21108	850820	1	21108	850820	1	21074	850540	1	21074	850540
46	Spacer Pipe	1	21206	850984	1	21206	850984	1	21137	850970	1	21137	850970	1	21206	850984	1	21206	850984
47	Anchor Pin	—	—	—	—	—	—	—	21204	851280	1	21204	851280	—	—	—	—	—	—
48	Side Plate — Motor	1	21080	850610	1	21080	850610	1	21083	850680	1	21083	850680	1	21083	850680	1	21083	850680
49	Side Plate — Drum Support	1	21081	850620	1	21081	850620	1	21084	850680	1	21084	850680	1	21084	850680	1	21084	850680
50	Base	1	21082	850640	1	21082	850640	1	21085	850700	1	21085	850700	1	21086	850630	1	21086	850630
52	Capscrew	8	21964	S043-10PH5	8	21964	S043-10PH5	14	21964	S043-10PH5	14	21964	S043-10PH5	12	21964	S043-10PH5	12	21964	S043-10PH5
53	Capscrew	4	21961	S037-10PH5	4	21961	S037-10PH5	—	—	—	—	—	—	—	—	—	—	—	—
54	Thrust Bearing	1	21061	1441009	1	21061	1441009	—	—	—	—	—	—	—	—	—	—	—	—
54	Snap Ring	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55	Dowel Pin	8	21112	2085001	8	21112	2085001	10	21112	2085001	10	21112	2085001	10	21112	2085001	10	21112	2085001
56	Hex Nut	1	11788	S050P	1	11788	S050P	—	—	—	—	—	—	—	—	—	—	—	—
57	Lockwasher	3	11026	A050	3	11026	A050	3	11026	A050	3	11026	A050	3	11026	A050	3	11026	A050
58	Cable Clamp	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60	Capscrew	1	21207	850390	1	21207	850390	—	—	—	—	—	—	—	—	—	—	—	—
Not Shown	Cable Anchor Kit	1	61255	61255	1	61255	61255	—	—	—	—	—	—	—	—	—	—	—	—
Not Shown	Strap	2	21184	851100	2	21184	851100	2	21185	851110	2	21185	851110	2	21185	851110	2	21185	851110

## PROCEDURE FOR DISASSEMBLY OF THE BRADEN MODEL PD15 POWER DRUM

Disassembly of winch may be done from either end. Remove the winch from the equipment on which it is mounted.

For complete disassembly, place the winch in a horizontal position, drain the oil and flush.

For partial disassembly, from either end, the oil need not be drained.

### DISASSEMBLY FROM THE MOTOR END

Stand winch in vertical position, resting on side plate, Item 49.

Remove hose assemblies, Items 20, 33, 36 and 51.

Remove two (2) capscrews and lockwashers, Items 24 and 57.

Remove hydraulic motor, Item 18.

Remove O-ring, Item 26.

Remove input sun gear, Item 7.

Remove primary planet carrier assembly, No. 81326 (Items 3, 35, 37 and 41).

Remove spacer, Item 10.

Remove secondary sun gear shaft, Item 9.

Remove brake clutch assembly, Item 2.

Remove secondary sun gear, Item 8.

This completes partial disassembly from the motor end.

To reassemble the winch from this point, reverse the foregoing procedure.

**NOTE 1**— It is important to check the rotation of the brake clutch assembly, Item 2, when it is re-installed in the winch.

For those PD15 winches which carry the motor on the right side when facing the spacer bar, i.e. Models PD15-71-1, PD15-75, PD15-77, PD15-77-1, PD15-1, PD15-5 and PD15-7 (uneven numbered units), insert the secondary sun gear shaft, Item 9, into the brake clutch assembly, Item 2. Place the brake clutch in the left hand and rotate the shaft in a counter-clockwise direction. If the rotor of the brake clutch assembly turns in this direction install it in place. If it will not turn in this direction, turn it over and insert the shaft in the other side.

For those PD15 winches which carry the motor on the left side when facing the spacer bar, i. e. Models PD15-2, PD15-6 and PD15-8 (even numbered units), the procedure is the same as for the uneven numbered units except that the brake clutch is held in the left hand and the secondary sun gear shaft is rotated in a clockwise direction.

If the brake clutch is installed opposite to

the above procedure, the winch will be working against the brake, the brake will not release, and there will be no forward rotation of the winch.

**NOTE 2**— In reassembly, it is important to carefully align all splines to enable the parts to seat properly.

**NOTE 3**— Install new O-rings to replace those removed.

If complete disassembly of the winch is desired (secondary planet carrier assembly, ring gear, final planet carrier assembly, drum support and cable drum), turn winch over to rest on the motor side and proceed according to the instructions in the following section.

### DISASSEMBLY FROM THE DRUM SUPPORT END

Stand winch in a vertical position on motor end with side plate, Item 48, resting on blocks high enough from the work surface to allow clearance for hydraulic motor, manifold and brake valve. If complete disassembly was started on other end, the blocks will not be needed.

Remove nuts and lockwashers, Items 56 and 57, from studs, Item 53 (Models PD15-71-1, PD15-75, PD15-77 and PD15-77-1). Remove capscrews and washers, Items 53 and 57 (Models PD15-1, PD15-2, PD15-5, PD15-6, PD15-7 and PD15-8).

Remove side plate, Item 49, drum support, Item 6, and seal, Item 15, as a complete assembly.

The final planet carrier assembly, No. 81328 (Items 5, 65, 66, 67 and 68), can now be removed with the aid of a small hook inserted into bearing area. If there is evidence of oil leakage through the planet carrier around the planet gear shafts, refer to page 16 for disassembly and reassembly of final planet carrier assembly.

Remove output sun gear, Item 44.

Remove ring gear, Item 45.

Remove secondary planet carrier assembly, No. 81327 (Items 4, 61, 62 and 63).

If complete disassembly was started on other end bypass the remainder of this paragraph and proceed with the next paragraph. Remove secondary sun gear, Item 8. Remove secondary sun gear shaft, Item 9, and brake clutch assembly, Item 2. Remove spacer, Item 10.

Remove cable drum, Item 42.

Set winch on base.

Remove nuts and lockwashers, Items 56 and 57, from studs, Item 52 (Models PD15-71-1, PD15-75,

PD15-77 and PD15-77-1). Remove capscrews and washers, Items 52 and 57 (Models PD15-1, PD15-2, PD15-5, PD15-6, PD15-7 and PD15-8).

Remove side plate, Item 48, and brake cylinder assembly, Item 1, from base, Item 50.

Remove capscrews and lockwashers, Items 21 and 25. With plastic hammer tap side plate, Item 48, to loosen from brake cylinder dowel pins, Item 55.

For disassembly of brake cylinder, refer to page 18.

### **PROCEDURE FOR REMOVAL OF BRAKE CYLINDER ONLY**

If the brake cylinder only is to be removed for inspection or replacement, place winch in a vertical position with motor end up.

Remove hose assemblies, Items 20, 33, 36 and 51.

Remove two (2) capscrews and lockwashers, Items 24 and 57.

Remove hydraulic motor, Item 18.

Remove O-ring, Item 26.

Remove input sun gear, Item 7.

Remove primary planet carrier assembly, No. 81326 (Items 3, 35, 37 and 41).

Remove spacer, Item 10.

Remove secondary sun gear shaft, Item 9.

Remove brake clutch assembly, Item 2.

Remove nuts and lockwashers, Items 56 and 57, from studs, Item 52 (Models PD15-71-1, PD15-75, PD15-77 and PD15-77-1). Remove capscrews and lockwashers, Items 52 and 57 (Models PD15-1, PD15-2, PD15-5, PD15-6, PD15-7 and PD15-8).

Remove spacer bolt, Item 60.

Remove six (6) capscrews and lockwashers, Items 21 and 25. Remove side plate, Item 48, by tapping with plastic hammer to loosen from base and/or brake cylinder dowels, Item 55.

Secure with two capscrews, a short length of chain, or similar lifting device, to brake cylinder, Item 1. Lift brake cylinder assembly from cable drum, Item 42, being careful to pull straight to avoid damaging quad ring, Item 17.

For disassembly of brake cylinder, refer to page 18.

### **PROCEDURE FOR REASSEMBLY OF THE BRADEN MODEL PD15 POWER DRUM**

Assemble brake cylinder assembly per instructions on Page 18.

Assemble brake clutch assembly per instructions on Page 17.

Assemble final planet carrier assembly per instructions on Page 16.

Assemble secondary planet carrier assembly per instructions on Page 15.

Assemble primary planet carrier assembly per instructions on Page 15.

Attach brake cylinder assembly, Item 1, to motor side plate, Item 48, with six (6) capscrews and lockwashers, Items 21 and 25, and four (4) dowel pins, Item 55.

Install spacer, Item 11, in place on brake cylinder.

Inspect quad-ring, Item 17 for damage. Replace if necessary.

It is recommended that a light lubricating grease be used on O-rings and the surfaces to be sealed.

Install cable drum, Item 42, using care not to damage the quad-ring.

Install secondary planet carrier assembly, No. 81327 (Items 4, 61, 62 and 63), in place in ring gear, Item 45. Install this assembly on brake cylinder by engaging teeth in ring gear with teeth on brake cylinder.

Install thrust bearing, Item 54, on hub of secondary planet carrier, Item 4, except on Models PD15-5 and PD15-6 where Item 54 is a retaining ring which

is installed in the groove on the output sun gear, Item 44.

Install output sun gear, Item 44. Be sure retaining ring is in place on Models PD15-5 and PD15-6.

Install O-ring, Item 16, in groove on final planet carrier, Item 5.

Install final planet carrier assembly, No. 81328 (Items 5, 65, 66, 67 and 68). All splines and gears must be aligned for this step. Planet carrier may require a few light taps with a plastic hammer to be seated properly in the drum. Care should be taken to prevent damage to the O-ring seal.

Install base, Item 50. Secure to motor side plate, Item 48, with studs, lockwashers and nuts, Items 52, 57 and 56 (Models PD15-71-1, PD15-75, PD15-77 and PD15-77-1). Secure to motor side plate, Item 48, with capscrews, dowels and lockwashers, Items 52, 55 and 57 (Models PD15-1, PD15-2, PD15-5, PD15-6, PD15-7 and PD15-8).

Check seal, Item 15, for damage. Replace if necessary. Press seal into drum support, Item 6. Attach drum support, Item 6, to side plate, Item 49, with six (6) capscrews and lockwashers, Items 21 and 25.

Install side plate assembly, carefully engaging support into roller bearing, Item 43, and seal onto wear sleeve, Item 69.

Secure side plate, Item 49, to base, Item 50, with studs, lockwashers and nuts, Items 53, 57 and 56 (Models PD15-71-1, PD15-75, PD15-77 and

PD15-77-1). Secure to base, Item 50, with capscrews, dowels and lockwashers, Items 52, 55 and 57 (Models PD15-1, PD15-2, PD15-5, PD15-6, PD15-7 and PD15-8).

Install spacer pipe, Item 46, capscrew, Item 60, lockwasher, Item 57 and nut, Item 56.

Be certain that vent plug, Item 13, is in place.

Turn winch over and stand on side plate, Item 49.

Install secondary sun gear, Item 8, in secondary planet carrier, Item 4.

**IMPORTANT:** Check the rotation of the brake clutch assembly, Item 2.

For those PD15 winches which carry the motor on the right side when facing the spacer bar, i.e. Models PD15-71-1, PD15-75, PD15-77, PD15-77-1, PD15-1, PD15-5 and PD15-7 (uneven numbered units), insert the secondary sun gear shaft, Item 9, into the brake clutch assembly, Item 2. Place the brake clutch in the left hand and rotate the shaft in a counter-clockwise direction. If the rotor of the brake clutch assembly turns in this direction install it in place. If it will not turn in this direction, turn it over and insert the shaft in the other side.

For those PD15 winches which carry the motor on the left side when facing the spacer bar, i.e. Models PD15-2, PD15-6 and PD15-8 (even numbered units), the procedure is the same as for the uneven numbered units except that the brake clutch is held in the left hand and the secondary sun gear shaft is rotated in a clockwise direction.

If the brake clutch is installed opposite to the above procedure, the winch will be working against the brake and the brake will not release and there will be no forward rotation of the winch.

Insert brake clutch assembly, Item 2, into the brake cylinder housing, Item 1.

Align splines and install secondary sun gear shaft, Item 9, through brake clutch assembly, Item 2, into secondary sun gear, Item 8.

Install spacer, Item 10.

Insert primary planet carrier assembly, No. 81326 (Items 3, 35, 37 and 41), engaging all splines.

Inspect bushing, Item 12, inside input sun gear, Item 7. If necessary, replace bushing by driving old bushing out with a punch and pressing a new bushing into input sun gear. Use of a hand operated arbor press is recommended for this purpose.

Insert input sun gear, Item 7, in place.

**NOTE:** If plumbing fittings were removed from brake cylinder, they should be replaced before the motor is reinstalled on the brake cylinder. Install nipples, Item 28, and tee, Item 32. Use a good grade of thread compound with Teflon on these fittings.

Insert O-ring, Item 26, after coating with all-purpose grease, into counterbore in brake cylinder.

Install hydraulic motor, Item 18, in place on the brake cylinder, Item 1. Secure with two (2) capscrews and lockwashers, Items 24 and 57.

Insert O-ring, Item 29, in counterbore of counterbalance valve assembly, Item 40. Secure this assembly to motor with four (4) capscrews, Item 23.

Insert O-ring, Item 29, in counterbore of manifold, Item 19. Secure manifold to motor with four (4) capscrews, Item 22.

Install hose assembly, Item 33, from manifold, Item 19, to tee, Item 32.

Install hose assembly, Item 20, from pilot connection on counterbalance valve, Item 40, to tee, Item 32.

Install hose assembly, Item 36, from nipple, Item 28, to connector, Item 59, in check valve, Item 38.

Install hose assembly, Item 51, from elbow, Item 31, in check valve, to elbow, Item 30, and reducer, Item 27, in motor drain.

If oil was drained from the winch, refill with a good grade of 90 weight All-purpose Gear Oil according to the chart shown on page 8.

## **BRAKE VALVE INFORMATION**

The brake valve assembly, Item 40, is a purchased component, manufactured to exacting Braden specifications. Should a failure occur, or repairs be needed in this assembly, it is suggested that the entire part be removed from the winch and forwarded to the Braden factory for inspection and replacement.

## **BRAKE VALVE ADJUSTMENT**

The brake valve contains an adjusting screw and

lock nut which allow pressure adjustments to be made.

If the winch oscillates when lowering a load, turn the adjusting screw one-half ( $\frac{1}{2}$ ) turn in a clockwise direction. If oscillation continues, again turn adjusting screw one-half ( $\frac{1}{2}$ ) turn in a clockwise direction.

Use caution in this adjustment and be certain that pressure does not exceed 1500 p.s.i. A good working pressure is approximately 800 p.s.i. Excessive pressure could damage the O-ring seal located inside the brake cylinder.

## BRAKE VALVE INSPECTION

If down pressure is erratic, and cannot be controlled by the adjusting screw, a defect might exist in the O-ring or backup rings inside the brake valve.

To gain entry to the valve, remove the large nut, being careful of the springs and spring retainers.

Grasp the spool with a pair of long nosed pliers, or similar device, and pull it straight out of the brake valve housing. The O-ring and backup rings can now be inspected.

Replace the spool, springs and retainers and replace nut.

## PRIMARY PLANET CARRIER ASSEMBLY, PART NO. 81326 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS

ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
3	1	21069	850290	Planet Carrier
35	3	21067	850270	Planet Gear
37	3	21068	850280	Planet Gear Shaft
41	3	21045	R12-075	Rollpin

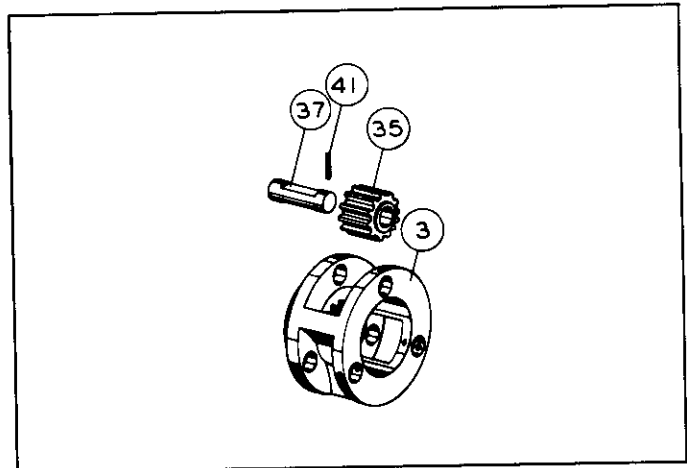
### DISASSEMBLY PROCEDURE

Remove rollpin, Item 41, by inserting a  $\frac{1}{8}$ " punch into hole provided in planet carrier, Item 3. A few taps on the punch will drive the rollpin completely through the shaft, Item 37. The shaft, Item 37, and planet gear, Item 35, can now be removed for inspection.

Drive old rollpin completely from the planet carrier and use new rollpin,  $\frac{1}{8}$ " x  $\frac{3}{4}$ ", for reassembly.

### REASSEMBLY PROCEDURE

Install planet gear, Item 35, into planet carrier, Item 3. Insert planet gear shaft, Item 37, into planet



carrier through hole provided, passing it through planet gear and into planet carrier. Align rollpin holes. Install new rollpin, Item 41, so that it is flush with planet carrier, both top and bottom.

Install remainder of gears, shafts and pins in the manner described.

## SECONDARY PLANET CARRIER ASSEMBLY, PART NO. 81327 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS

ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
1	1	21023	850080	Planet Carrier
2	3	21099	850750	Planet Gear
3	3	21048	850360	Planet Gear Shaft
4	3	21049	R18-075	Rollpin

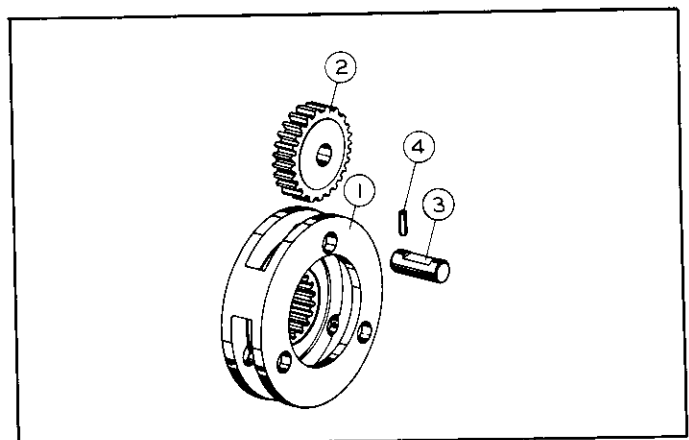
### DISSASSEMBLY PROCEDURE

Remove rollpin, Item 4, by inserting a  $\frac{3}{16}$ " punch into hole provided in planet carrier, Item 1. A few taps on the punch will drive the rollpin into the planet gear shaft, Item 3, thus allowing removal of the shaft and planet gear, Item 2, for inspection.

Drive old rollpin completely from the shaft and use new rollpin,  $\frac{3}{16}$ " x  $\frac{3}{4}$ ", for reassembly.

### REASSEMBLY PROCEDURE

Install planet gear, Item 2, into planet carrier, Item 1. Insert planet gear shaft, Item 3, into planet carrier through hole provided, passing it through

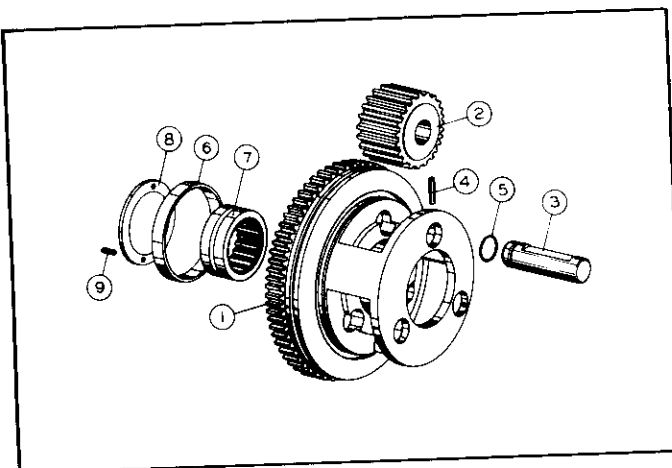


planet gear and into planet carrier. Align rollpin holes. Install new rollpin, Item 4. This pin should be countersunk to  $\frac{3}{16}$ " below the surface of the planet carrier. With a centerpunch, dimple the edge of the rollpin hole to keep the pin from backing out.

Install remainder of gears, shafts and pins in the manner described.

## FINAL PLANET CARRIER ASSEMBLY, PART NO. 81328 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS

ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
1	1	21021	850040	Planet Carrier
2	3	21073	850530	Planet Gear
3	3	21057	850320	Planet Gear Shaft
4	3	21058	R18-100	Rollpin
5	3	22932	22932	O-ring
6	1	21050	2785001	Wear Sleeve
7	1	21051	1385001	Roller Bearing
8	1	21059	850450	Thrust Washer
9	2	21060	850460	Pin



### DISASSEMBLY PROCEDURE

Remove rollpin, Item 4, by inserting a  $\frac{3}{16}$ " punch into hole provided in planet carrier, Item 1. A few taps on the punch will drive the rollpin into the planet gear shaft, Item 3, thus allowing removal of the shaft, planet gear, Item 2, and O-ring, Item 5, for inspection.

After removing all shafts, gears, O-rings and pins, roller bearing, Item 7, thrust washer, Item 8, and thrust washer pins, Item 9, can be removed.

For best performance, the O-ring seals and rollpins should be replaced with new parts prior to reassembly of the planet carrier.

### REASSEMBLY PROCEDURE

Insert planet gear, Item 2, into planet carrier, Item 1.

Install O-ring, Item 5, in groove of planet gear shaft, Item 3, and coat lightly with all-purpose grease.

Insert rollpin end of shaft into hole in planet carrier on O-ring side, pass through gear. Press or tap lightly until pin end of shaft is aligned with rollpin hole in planet carrier.

Install new rollpin, Item 4, to lock shaft in place and prevent rotation. Countersink rollpin to  $\frac{3}{16}$ " below surface of planet carrier. Dimple edge of hole with centerpunch to prevent pin from backing out.

Install remainder of gears, shafts, O-rings and rollpins in the manner described.

Insert roller bearing, Item 7, into hole provided.

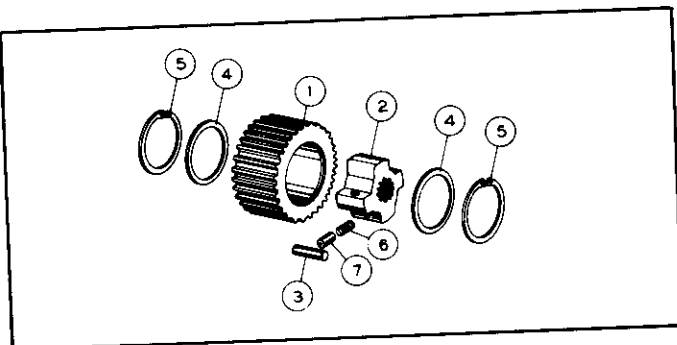
Install wear sleeve, Item 6, by using a hand press to prevent damage to the part.

Install thrust washer, Item 8, secured by pins, Item 9.

Coat O-ring (Item 16 on Basic Material List, Page 11) with all-purpose grease and install in groove in planet carrier.



## BRAKE CLUTCH ASSEMBLY, PART NO. 81324 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS



ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
1	1	21094	850690	Brake Race
2	1	21093	850670	Brake Cam
3	4	21097	850730	Brake Roller
4	2	12592	630300	Brake Roller Retainer
5	2	12913	MU7-121	Retaining Ring
6	4	12050	238-148-5	Spring
7	4	12049	238-148-4	Plunger

### DISASSEMBLY PROCEDURE

- Remove retaining rings, Item 5.
- Remove brake roller retainers, Item 4.
- This will release the brake cam, Item 2, brake rollers, Item 3, plungers, Item 7, and springs, Item 6, from the brake race, Item 1.
- Check for wear on race and rollers.

### REASSEMBLY PROCEDURE

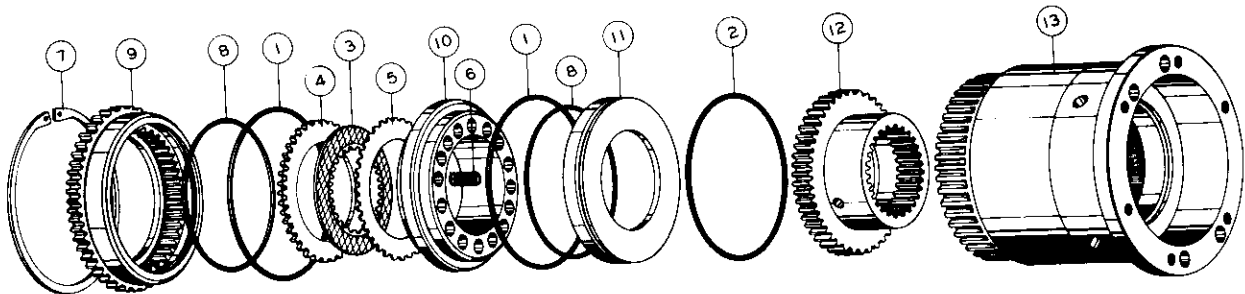
- Insert brake cam, Item 2, into brake race, Item 1, just far enough to insert springs, Item 6, plungers, Item 7, and rollers, Item 3.

By using the secondary sun gear shaft (Item 9 on Basic Material List, Page 11) to hold the cam, the springs, plungers and rollers can be inserted with the aid of a small screwdriver.

After the springs, plungers and rollers are installed and the cam is in place, install the brake roller retainers, Item 4, and secure with retaining rings, Item 5.

After all parts have been installed, rotate the brake cam with the aid of the secondary sun gear shaft. It should turn in one direction.

## BRAKE CYLINDER ASSEMBLY, PART NO. 81325 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS



ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
1	2	10052	1858003	O-ring
2	1	10467	10467	O-ring
3	9	21029	850200	Brake Disc
4	1	21035	850150	Backup Plate
5	8	21036	850170	Friction Disc
6	16	21037	850190	Brake Spring
7	1	21038	1985001	Retaining Ring

ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
8	2	21040	1885003	O-ring
9	1	21092	850370	Brake Ring
10	1	21212	850161	Brake Release Piston
11	1	21213	850090	Brake Release Cylinder
12	1	21220	850500	Floating Ring Gear
13	1	22389	850572	Brake Cylinder

## DISASSEMBLY PROCEDURE

Set cylinder into a hand operated arbor press and apply sufficient pressure to the brake ring, Item 9, to depress the brake springs. Remove retaining ring, Item 7, with retaining ring pliers.

Remove as an assembly: brake ring, Item 9, O-ring, Item 8, backup plate, Item 4, friction discs, Item 3, brake discs, Item 5, brake release piston, Item 10 and brake springs, Item 6.

The brake release cylinder, Item 11, with O-rings, Items 2 and 8, and the floating ring gear, Item 12, can now be driven from the brake cylinder, Item 13, by using a piece of hardwood or plastic and a small hammer.

Remove two (2) O-rings, Item 1.

## REASSEMBLY PROCEDURE

Prior to reassembly of parts, clean brake cylinder, Item 13, by applying air pressure to all grooves and oil passages.

Set brake cylinder on flanged end. Insert floating ring gear, Item 12, engaging teeth in brake cylinder.

Use new O-rings throughout when reassembling brake cylinder. Lightly coat all O-rings with all-purpose grease before installing.

Install O-ring, Item 2, in external groove on brake release cylinder, Item 11. Insert brake release cylinder carefully into its seat in brake cylinder, Item 13, using care not to damage the O-ring.

Install O-ring, Item 8, in groove in brake release cylinder. Install two (2) O-rings, Item 1, in grooves in brake cylinder.

Set brake ring, Item 9, on flat surface with O-ring groove up. Insert backup plate, Item 4, brake disc, Item 5, and friction disc, Item 3. Continue to alternate discs until nine (9) brake discs and eight (8) friction discs are in place. Install O-ring, Item 8, in groove in brake ring.

Insert brake release piston, Item 10, into brake ring, being sure the spring holes are up, using a plastic or rubber hammer. Coat sealing surfaces of the brake release piston and brake ring with all-purpose grease. Insert sixteen (16) brake springs, Item 6, into holes in brake release piston.

Set brake cylinder, Item 13, down over brake assembly, aligning teeth of brake ring, Item 9, with

teeth in brake cylinder and push into place.

Turn brake cylinder assembly over and set into a hand operated arbor press. Lay retaining ring, Item 7, on end of assembly. Apply enough pressure to compress the brake springs to the extent that the retaining ring groove is visible. Install the retaining ring in its groove and release the pressure. Do not use a power press for this assembly since too much pressure may be generated resulting in damage to the brake cylinder assembly.

Remove cylinder from press. Turn motor side of the assembly in the upward position. Observe two holes with  $\frac{1}{4}$ " N.P.T. thread. These two holes are the pressure inputs into the brake cylinder which operate the brake. When pressure is applied to one side, the brake is released and the winch can be operated in a reverse direction for lowering the load. The second hole is for balancing the floating piston to back pressure.

Install nipple, Item 28, in brake release port. This port is located at  $90^\circ$  from motor bolt holes.

Connect a hydraulic hand pump which is equipped with a dial gauge that reads to 600 PSI or more.

Apply 600 lbs. pressure into brake cylinder and hold for about five minutes. If the pressure holds, the installation of the brake piston is proper. A slight drop in pressure may be evident; but, after the brake is operated a few times, the O-ring will seat and the pressure will hold.

If the piston assembly does not hold pressure and the gauge indicator returns to zero, check the hose and fittings from the pump to the brake cylinder for leaks. If no leaks are visible, the brake cylinder assembly must be disassembled and the O-rings and all parts checked for damage where leakage could occur.

During the time that pressure is applied, check the brake friction discs. There should be no tension on the discs. Centering and aligning the discs with the brake clutch assembly is recommended and will be helpful in the final assembly to the motor end of the winch.

Use the pressure for checking the other side of the piston by attaching the hand pump to the other port. Pressure here will not release the brake as only back pressure of the hydraulic system will be present when winch is operated.

If the brake cylinder holds pressure in both tests, the brake assembly is ready for installation.

① PD15 Series Power Drum with fabricated side plates.

② PD15 Series Power Drum with cast side plates and standard base.

③ PD15 Series Power Drum with cast side plates and universal base.

