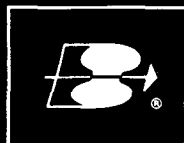
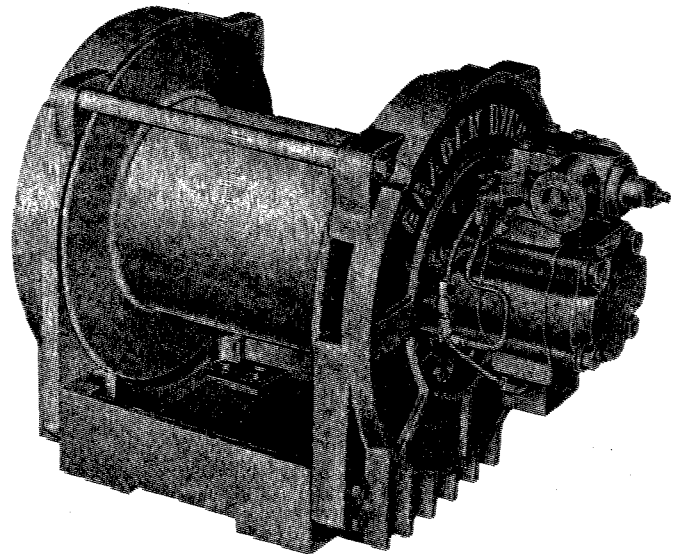


INSTALLATION, MAINTENANCE AND SERVICE

BRADEN SERIES **PD10**



BRADEN WINCH

DIVISION OF BRADEN INDUSTRIES, INC.

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

FOR BEST RESULTS, USE ONLY FACTORY CERTIFIED REPLACEMENT PARTS.

WARNING: GOODS ARE NOT INTENDED 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 the drum barrel to achieve rated load.

THIS SALE IS MADE ON THE EXPRESS UNDERSTANDING THAT THERE IS NO IMPLIED WARRANTY THAT THE GOODS SHALL BE FIT FOR THE PURPOSE OF LIFTING OR MOVING PERSONS OR OTHER IMPROPER USE AND THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY FOR SUCH PURPOSES.

DESCRIPTION OF WINCH

The winch has three basic component parts:

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

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

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

The hydraulic motor is bolted directly to the brake assembly housing (brake cylinder). This housing is bolted and doweled to the side plate. The motor end of the cable drum, which houses a large bushing, is supported by the brake housing. A quad ring in the bushing prevents oil leakage. The ring gear of both planetary reducers is splined to the brake housing.

The final planet carrier is supported through a roller bearing by a shaft projecting from the other side plate. The cable drum is supported on this end by the final planet carrier to which it is splined.

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 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 consists of a dynamic braking sub-system and a static braking sub-system.

The dynamic braking sub-system has two operating component parts:

1. Brake Valve Assembly
2. Hydraulic Motor

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 neutral. When the operating valve is placed in the reverse or lowering position the check valve remains closed until sufficient pressure is present for the pilot piston to open the check valve. After the check valve cracks open, the pilot pressure becomes flow-dependent and modulates the check valve opening which controls the rate of descent of the load. The brake valve also contains a small pressure relief valve set to prevent excessive shocks on the motor when a lowering operation is stopped abruptly.

The static braking sub-system has three operating component parts:

1. Spring Applied, Multiple Disc Friction Brake
2. Over-riding Cam Clutch
3. Hydraulic Piston and Cylinder (Brake Release and Balance)

The static brake is released by the brake valve pilot pressure at a point lower than that required to open

the pilot operated check valve. This sequence assures that dynamic braking takes place in the brake valve and that little, if any, heat is absorbed by the friction brake.

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

The over-riding clutch is splined to the primary sun gear shaft between the motor and the primary 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 to the primary sun gear runs free. The over-riding clutch between the drive 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 back pressure.

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 opens 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.

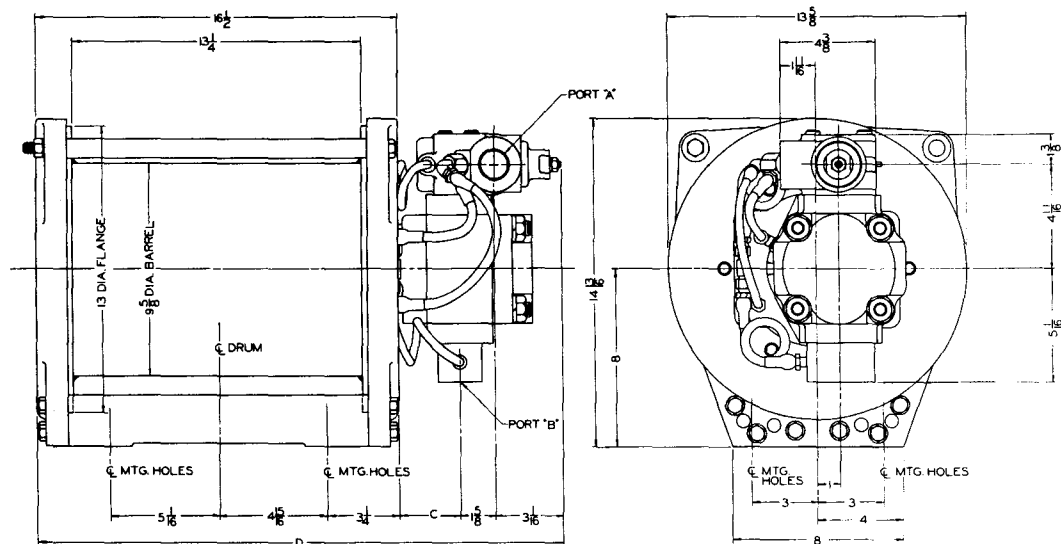
SUMMARY

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 level 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.

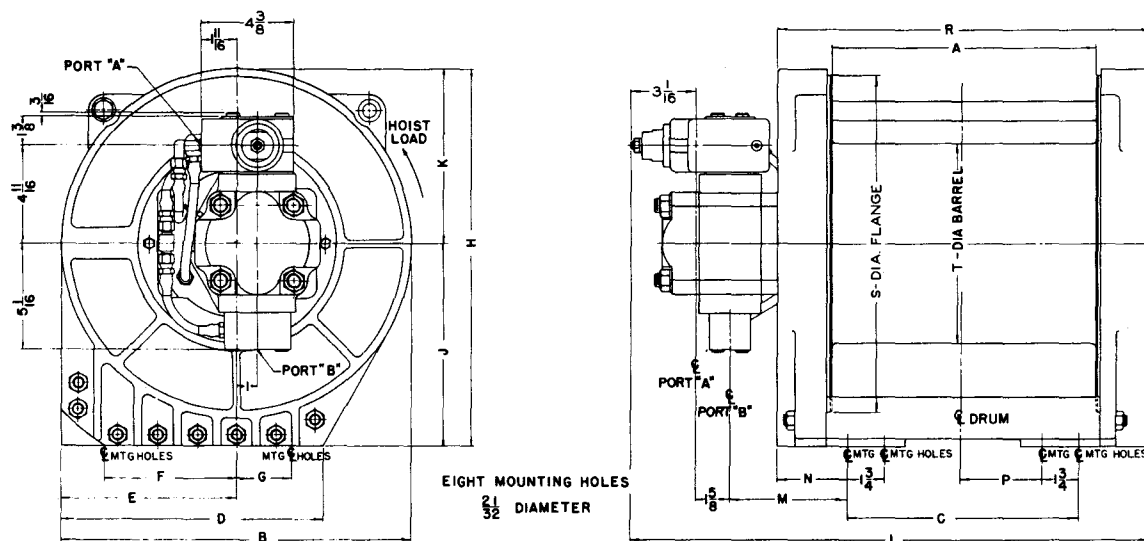
DIMENSIONAL DATA

PD10 Power Drums



With Smooth Cast Side Plates and Standard Cast Base

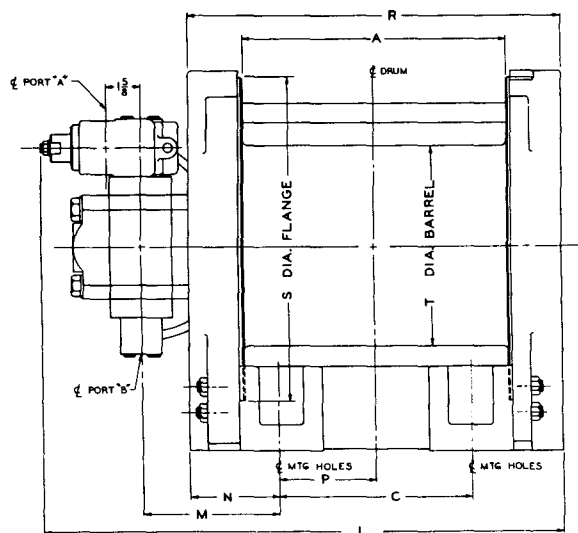
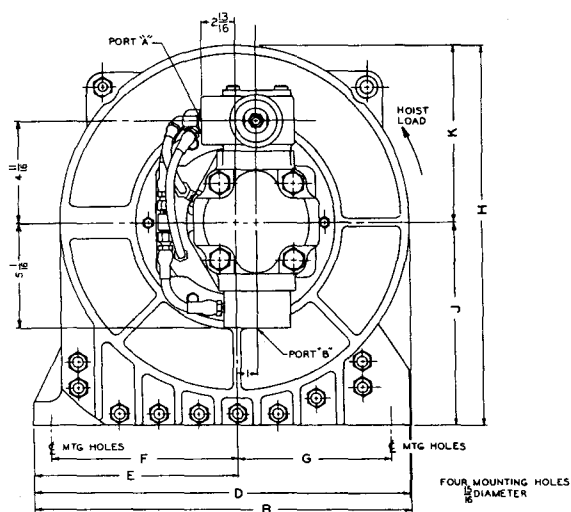
MODEL	LOAD CAPACITY 1st LAYER	GEAR RATIO	DIMENSION DATA		WEIGHT POUNDS
			C	D	
PD10-71	10,000	36:1	2 15/16	24 1/8	350
PD10-71A	7,600	36:1	2 11/16	23 7/8	344



With Ribbed Cast Side Plates and Standard Cast Base

MODEL	LOAD CAPACITY 1st LAYER	GEAR RATIO	DIMENSIONAL DATA																	WEIGHT POUNDS
			A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	
PD10-75	10,000	36:1	16½	16%	14⅞	12⅝ ₁₆	8⅝ ₁₆	6¼	2⅝	17⅝ ₁₆	9%	8⅝ ₁₆	28⅞ ₁₆	5%	3⅜	52 ¹ / ₃₂	21⅝	16	9%	475
PD10-75-2	8,900	36:1	16½	16%	14⅞	12⅝ ₁₆	8⅝ ₁₆	6¼	2⅝	17⅝ ₁₆	9%	8⅝ ₁₆	28⅞ ₁₆	5%	3⅜	52 ¹ / ₃₂	21⅝	16	10¾	500
PD10-77	10,000	36:1	12%	16%	11	12⅝ ₁₆	8⅝ ₁₆	6¼	2⅝	17⅝ ₁₆	9%	8⅝ ₁₆	25⅝	6⅝ ₁₆	3⅜	32 ³ / ₃₂	17¾	16	9%	400
PD10-77-2	8,900	36:1	12%	16%	11	12⅝ ₁₆	8⅝ ₁₆	6¼	2⅝	17⅝ ₁₆	9%	8⅝ ₁₆	25⅝	6⅝ ₁₆	3⅜	32 ³ / ₃₂	17¾	16	10¾	425

Ratings shown are on first layer of cable.



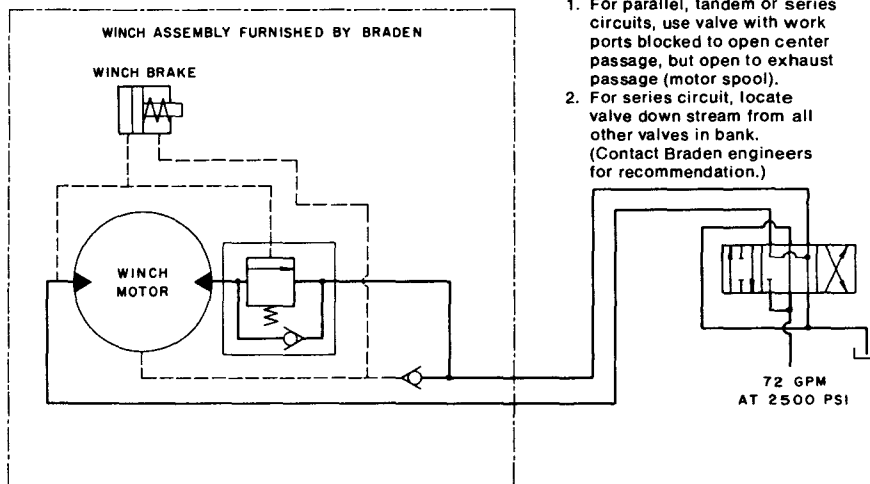
With Ribbed Cast Side Plates and Universal Cast Base

MODEL	LOAD CAPACITY 1st LAYER	GEAR RATIO	DIMENSIONAL DATA																	WEIGHT POUNDS
			A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	
PD10-71-1	10,000	36:1	13 1/4	16 1/2	9 3/16	18	9 3/4	8 7/8	7 3/8	16 3/8	9 5/8	6 3/4	25 3/32	6 15/16	4 3/16	4 5/8	17 19/32	13	9 5/8	415
PD10-71-127	7,500	27:1	13 1/4	16 1/2	9 3/16	18	9 3/4	8 7/8	7 3/8	16 3/8	9 5/8	6 3/4	25 3/32	6 15/16	4 3/16	4 5/8	17 19/32	13	9 5/8	420
PD10-71-120	5,600	20 1/4 :1	13 1/4	16 1/2	9 3/16	18	9 3/4	8 7/8	7 3/8	16 3/8	9 5/8	6 3/4	25 3/32	6 15/16	4 3/16	4 5/8	17 19/32	13	9 5/8	420
PD10-77-1	10,000	36:1	12 5/8	18 1/16	9 3/16	18	9 3/4	8 7/8	7 3/8	17 15/16	9 5/8	8 5/16	25 7/8	7 1/8	4 3/16	4 23/32	17 3/4	16	9 5/8	450
PD10-77-127	7,500	27:1	12 5/8	18 1/16	9 3/16	18	9 3/4	8 7/8	7 3/8	17 15/16	9 5/8	8 5/16	25 7/8	7 1/8	4 3/16	4 23/32	17 3/4	16	9 5/8	455
PD10-77-120	5,600	20 1/4 :1	12 5/8	18 1/16	9 3/16	18	9 3/4	8 7/8	7 3/8	17 15/16	9 5/8	8 5/16	25 7/8	7 1/8	4 3/16	4 23/32	17 3/4	16	9 5/8	455
PD10-79-1-2	10,000	36:1	16 1/2	21 1/2	9 3/16	18 1/2	9 3/4	8 7/8	8 7/8	23 1/8	12 3/8	10 3/4	25 5/8	9 25/32	6 19/32	4 19/32	21 5/8	20 3/4	10 3/4	

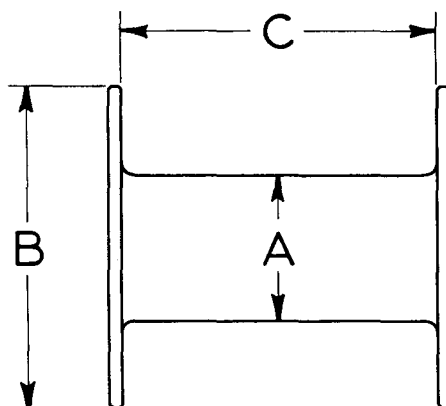
Ratings shown are on first layer of cable.

WINCH CONTROL CIRCUIT

The winch directional control valve must be 4-way, free flow with motor spool. Work ports must open directly into tank in neutral position.



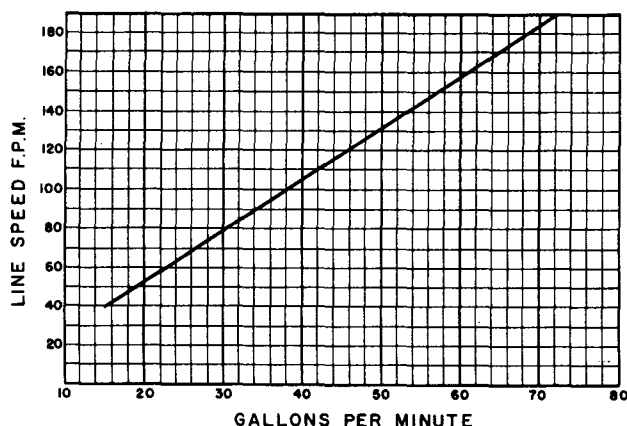
PERFORMANCE DATA



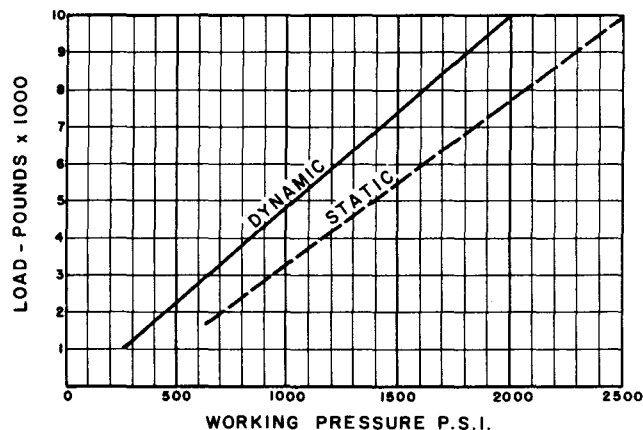
MODEL	GEAR RATIO	DRUM DIMENSIONS (INCHES)			TOTAL DRUM CABLE CAPACITY (FEET)								LINE PULL (POUNDS), LINE SPEED (F.P.M.), DRUM CAPACITY (FEET) 72 G.P.M. @ 2500 P.S.I. (STATIC), 2000 P.S.I. (DYNAMIC) WITH 9/16 CABLE															
					WIRE ROPE								ROPE		1st LAYER Accumulative Total			2nd LAYER Accumulative Total			3rd LAYER Accumulative Total			4th LAYER Accumulative Total			5th LAYER Accumulative Total	
		A	B	C	3/8	7/16	1/2	9/16	5/8	3/4	1	POUNDS	FPM	FEET	POUNDS	FPM	FEET	POUNDS	FPM	FEET	POUNDS	FPM	FEET	POUNDS	FPM	FEET		
PD10-71	36:1	9 5/8	13	13 1/4	410	360	230	210	120	—	—	10,000	195	65	9,000	215	135	8,200	235	210	—	—	—	—	—	—		
PD10-71A*	36:1	9 5/8	13	13 1/4	410	360	230	210	120	—	—	7,600	220	65	6,900	245	135	6,300	270	210	—	—	—	—	—	—		
PD10-71-1	36:1	9 5/8	13	13 1/4	410	360	230	210	120	—	—	10,000	190	65	8,900	210	135	8,100	235	210	—	—	—	—	—	—		
PD10-71-127	27:1	9 5/8	13	13 1/4	410	360	230	210	120	—	—	7,500	250	65	6,700	280	135	6,100	310	210	—	—	—	—	—	—		
PD10-71-120	20 1/4:1	9 5/8	13	13 1/4	410	360	230	210	120	—	—	5,600	335	65	5,000	380	135	4,600	415	210	—	—	—	—	—	—		
PD10-75	36:1	9 5/8	16	16 1/2	1330	870	650	475	435	290	170	10,000	190	80	8,900	210	165	8,100	235	260	7,500	260	365	6,900	275	475		
PD10-75-2	36:1	10 3/4	16	16 1/2	1080	790	575	400	370	225	110	8,900	215	85	8,100	235	180	7,500	260	285	6,900	275	400	—	—	—		
PD10-77	36:1	9 5/8	16	12 5/8	1025	665	495	360	335	225	120	10,000	190	60	8,900	210	125	8,100	235	200	7,500	260	280	6,900	275	360		
PD10-77-1	36:1	9 5/8	16	12 5/8	1025	665	495	360	335	225	120	10,000	190	60	8,900	210	125	8,100	235	200	7,500	260	280	6,900	275	360		
PD10-77-127	27:1	9 5/8	16	12 5/8	1025	665	495	360	335	225	120	7,500	250	60	6,700	280	125	6,100	310	200	5,600	340	280	5,200	365	360		
PD10-77-120	20 1/4:1	9 5/8	16	12 5/8	1025	665	495	360	335	225	120	5,600	335	60	5,000	380	125	4,600	415	200	4,200	450	280	3,900	490	360		
PD10-77-2	36:1	10 3/4	16	12 5/8	830	605	440	310	280	170	85	8,900	215	65	8,100	235	140	7,500	260	220	6,900	275	310	—	—	—		
PD10-79-1-2	36:1	10 3/4	20 3/4	16 1/2	—	—	—	1095	870	—	—	10,000	190	85	9,100	210	195	8,350	235	285	7,700	260	400	7,150	275	520		
												6th LAYER Accumulative Total			7th LAYER Accumulative Total			8th LAYER Accumulative Total			9th LAYER Accumulative Total							
												POUNDS	FPM	FEET	POUNDS	FPM	FEET	POUNDS	FPM	FEET	POUNDS	FPM	FEET					
												6,700	290	650	6,250	310	790	5,900	330	940	5,550	350	1095					

* Based on 64 G.P.M. @ 2500 P.S.I. (STATIC), 2000 P.S.I. (DYNAMIC) with 9/16 cable.

CABLE SPEED

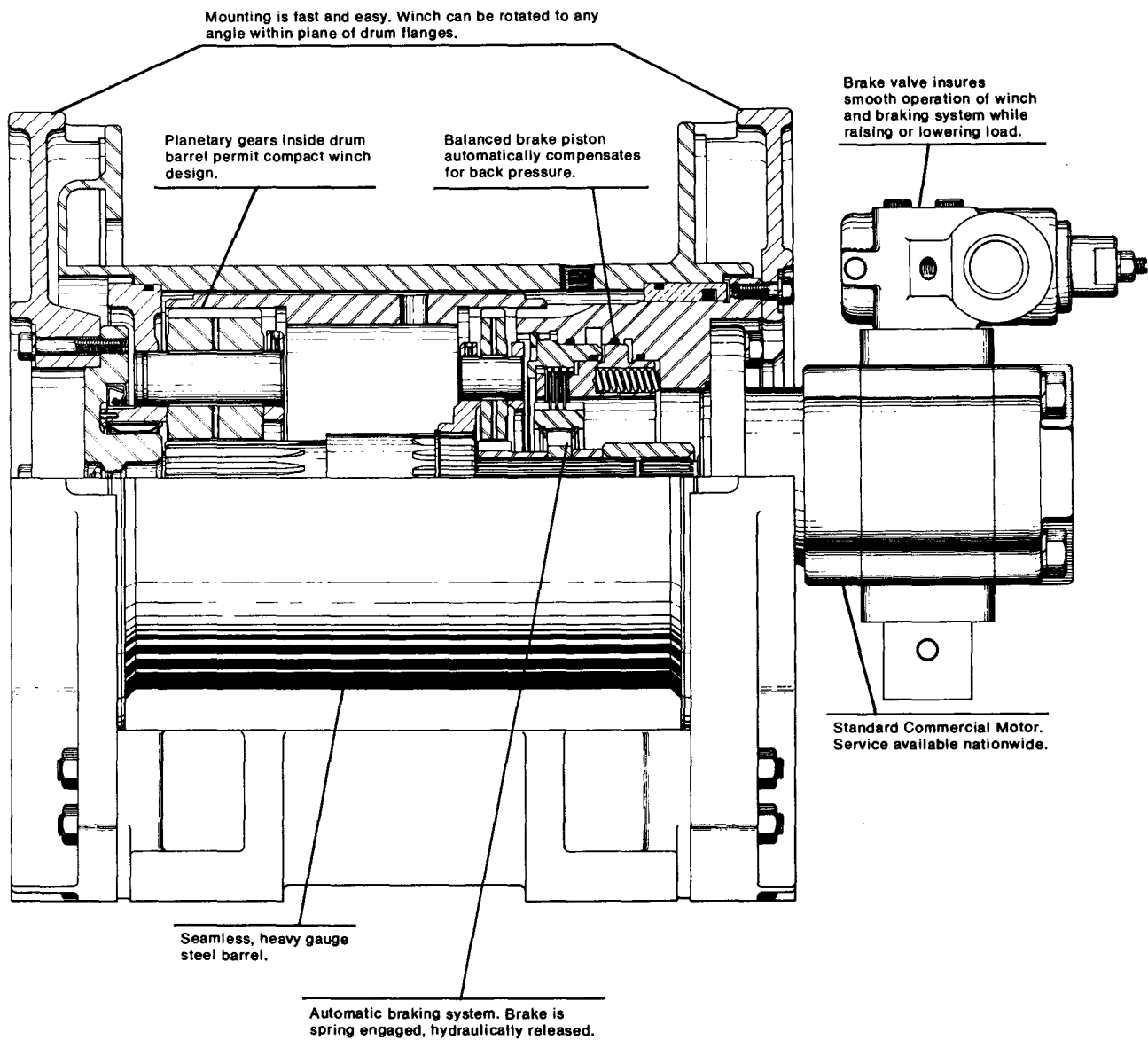


CABLE PULL



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

CROSS-SECTIONAL VIEW



INSTALLATION SUGGESTIONS

1. The winch should be mounted with the centerline of the cable drum in a horizontal position. The mounting plane can be in any position around this horizontal centerline.
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. Mounting surfaces should be co-planar within $\pm .020"$.
3. Hydraulic lines that operate the winch should be of sufficient diameter to assure that back pressure at the winch will not exceed 150 P.S.I.
4. The winch directional control valve must be 4-way, 3 position, parallel circuit with motor type spool. Work ports must open directly into tank in neutral position.
5. Hydraulic oil filter should have 10 micron nominal rating and be a full flow type.

MAINTENANCE SUGGESTIONS

I. CHECKING OIL LEVEL

1. Unwind the cable far enough to expose the two pipe plugs in the drum barrel.
2. Turn the winch drum until one plug is at the highest point on the drum. Oil should be level with the bottom of the lowest plug. Add approved 90 weight 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 gear oil. Oil should then be changed every six months.

III. OIL CAPACITY RECOMMENDATIONS

POWER DRUM MODEL	OIL CAPACITY (PINTS)	POWER DRUM MODEL	OIL CAPACITY (PINTS)
PD10-1	2.75	PD10-75-2	8.5
PD10-1-27	2.25	PD10-77	2.75
PD10CB-1	2.75	PD10-77-1	2.75
PD10CB-1-27	2.25	PD10-77-127	2.5
PD10-71-1	2.75	PD10-77-120	2.25
PD10-71-127	2.25	PD10-77-2	7
PD10-71-120	2.25	PD10-79-1-2	8.5
PD10-75	5.5	—	—

IV. APPROVED GEAR OIL

BRAND	DESCRIPTION	SAE-90
Humble	Pen-O-Led EP	#3
Phillips	Phillips Worm Gear Oil	#9332
Sinclair	Pennant EP	#3
Standard	Stanogear	#3
Texaco	Maropa	#3

USE ONLY FACTORY CERTIFIED REPLACEMENT PARTS.

SUGGESTIONS FOR TROUBLE SHOOTING

A. Winch will not lower load

1. This is probably caused by stoppage of the orifice plug in the brake valve or jamming of the brake release piston.
2. To check orifice plug, remove hose, Item 70 from brake valve, Item 46. Remove the plug, using a screwdriver with a $\frac{1}{8}$ " wide blade, or a $\frac{5}{32}$ " Allen wrench. Check the hole in the plug with a wire of less than .020" diameter. If the hole is open, the fault is probably not in the brake valve.
3. Disassemble the winch brake cylinder and release piston to determine cause of non-release of brake.

B. Winch leaks a large volume of oil through the vent plug.

1. This is caused by hydraulic oil leaking into the winch from one or both of the following; damaged or worn hydraulic motor shaft seal, damaged O-ring in the winch brake mechanism.
2. Disconnect hoses, Items 71 and 70, and tee, Item 32, from the brake release port. Attach the hose of a hydraulic hand pump, which is equipped with a dial guage that reads 600 P.S.I. or more, to the nipple just exposed. Apply 600 P.S.I. to the brake. The brake should hold this pressure for ten minutes. If pressure holds, detach the pump hose and connect it to the brake balancing input, and repeat the pressure test.
3. If the preceding test fails, the winch should be returned to the factory for repair.
4. If pressure holds on the preceding test, then the hydraulic motor shaft seal is leaking and should be replaced.

C. Winch will not hoist rated load

1. Be certain that the winch has not been mounted

on an uneven surface. If necessary, shim stock should be used.

2. Check for proper hydraulic pressure to the inlet port in the side of the brake valve. This pressure should be checked right at the valve 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 any cable sheaves, used with the winch, are operating efficiently.

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

1. Make 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. The relief valve in the hydraulic system may be trying to by-pass.
2. The flow of hydraulic fluid to the motor may be low.

F. Winch vibrates or chatters when lowering rated capacity load.

1. The orifice plug in the brake valve is probably loose. Remove hose, Item 70, from brake valve, Item 46. Check orifice plug for tightness. This plug should be snug in the orifice hole. Use a screwdriver with a $\frac{1}{8}$ " wide blade or a $\frac{5}{32}$ " Allen wrench to snug-up the orifice plug in the hole. Do not damage the part by over-tightening. Replace hose. Readjust brake valve pressure, per instructions on page 15, if required.

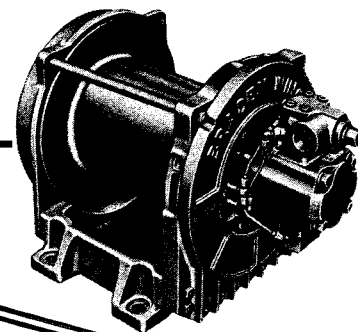
FOR ANY PROBLEM NOT COVERED ABOVE, CONSULT THE FACTORY FOR ASSISTANCE

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, O-rings and quad rings. 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 oil prior to installation.

COMPONENTS — MODEL PD10



PD10 SERIES O-RING KIT NO 61259*

ITEM	QTY.	5-DIGIT NUMBER	CATALOG NUMBER	DESCRIPTION
**	2	10052	1858003	O-Ring
**	1	10467	10467	O-Ring
12	1	21033	1885002	O-Ring
**	2	21040	1885003	O-Ring
26	1	21063	1885004	O-Ring
27	2	21150	1885009	O-Ring
13	1	22419	1885005	Quad Ring
**	3	22932	22932	O-Ring

*When O-Ring replacements are required, order complete O-Ring Kit No. 61259.

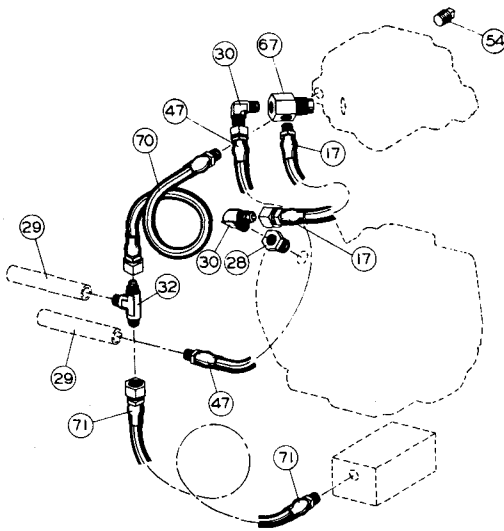
**Not shown in drawing on this page. Shown in sub-assemblies on pages 16, 17 and 18.

MATERIAL LIST VARIABLES

ITEM NO.	DESCRIPTION	PD10-1			PD10-1-27			PD10-71			PD10-71A		
		QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.	QTY.	5-DIGIT NO.	CATALOG NO.
2	Primary Planet Carrier Assembly	1	81317	850300	1	81317	850300	1	81317	850300	1	81317	850300
3	Final Planet Carrier Assembly	1	81318	850340	1	81328	851070	1	81318	850340	1	81318	850340
4	Input Sun Gear	1	21054	850420	1	21054	850420	1	21054	850420	1	21054	850420
7	Output Sun Gear	1	21095	850710	1	21109	850830	1	21095	850710	1	21095	850710
8	Ring Gear	1	21101	850770	1	22548	850771	1	21101	850770	1	21101	850770
14	Retaining Ring	1	21149	1951001	1	21149	1951001	1	21149	1951001	1	21149	1951001
15	Hydraulic Motor	1	21020	850020	1	21020	850020	1	21020	850020	1	23635	23635
19	Lockwasher (3/8")	16	18003	A037	16	18003	A037	12	18003	A037	12	18003	A037
22	Capscrow (3/8" x 1")	10	21961	S037-10PH5	10	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5
29	Nipple	2	21161	850510	2	21161	850510	2	21161	850510	2	21161	850510
36	Cable Drum Assembly	1	81321	850910	1	81321	850910	1	81531	81531	1	81531	81531
37	Brake Cylinder Assembly	1	81478	81478	1	81478	81478	1	81478	81478	1	81478	81478
38	Input Shaft	1	22416	850491	1	22416	850491	1	22416	850491	1	22416	850491
41	Spacer Pipe	1	21206	850984	1	21206	850984	1	23594	23594	1	23594	23594
42	Side Plate — Motor End	1	21077	850580	1	21077	850580	1	23592	23592	1	23592	23592
43	Side Plate — Support End	1	21078	850590	1	21078	850590	1	23593	23593	1	23593	23593
44	Base	1	21082	850640	1	21082	850640	1	23591	23591	1	23591	23591
45	Capscrow (1/2" x 15/16")	—	—	—	—	—	—	1	23595	23595	1	23595	23595
45	Capscrow (1/2" x 15/16")	1	23256	850393	1	23256	850393	—	—	—	—	—	—
48	Dowel Pin	2	21112	2085001	2	21112	2085001	2	21112	2085001	2	21112	2085001
49	Dowel Pin	4	21112	2085001	4	21112	2085001	8	10391	570622	8	10391	570622
50	Lockwasher (7/16")	8	11014	AK043	8	11014	AK043	12	11014	AK043	12	11014	AK043
51	Capscrow (7/16" x 1")	4	21964	S043-10PH5	4	21964	S043-10PH5	—	—	—	—	—	—
51	Capscrow (7/16" x 13/16")	—	—	—	—	—	—	6	22695	S043-17PH5	6	22695	S043-17PH5
52	Capscrow (7/16" x 1")	4	21964	S043-10PH5	4	21964	S043-10PH5	—	—	—	—	—	—
52	Capscrow (7/16" x 13/16")	—	—	—	—	—	—	6	22695	S043-17PH5	6	22695	S043-17PH5
53	Spacer	1	22417	850841	1	22417	850841	1	22417	850841	1	22417	850841
55	Capscrow (3/8" x 1")	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5
57	Hex Nut (1/2")	1	11788	S050P	1	11788	S050P	1	11788	S050P	1	11788	S050P
Not Shown	Cable Anchor Kit	1	61254	61254	1	61254	61254	—	—	—	—	—	—
Not Shown	Cable Clamp	—	—	—	—	—	—	1	22842	22842	1	22842	22842
Not Shown	Cable Clamp Stop	—	—	—	—	—	—	1	51917	51917	1	51917	51917
Not Shown	Capscrow (3/8" x 1")	—	—	—	—	—	—	1	13567	S037-10A	1	13567	S037-10A
Not Shown	Strap	2	21184	851100	2	21184	851100	—	—	—	—	—	—

USE ONLY FACTORY CERTIFIED REPLACEMENT PARTS.

MATERIAL LIST



ITEM	QTY.	5 DIGIT NO.	CATALOG NO.	DESCRIPTION
1	1	81316	850240	Brake Clutch Assembly
5	1	21055	850430	Motor Coupling
6	1	21056	850440	Spacer (Winches built before April, 1973)
6	—	—	—	Not Used (Winches built after March, 1973)
9	2	19045	E050W	Pipe Plug
10	1	18062	28-FTD-2	Vent Plug
11	1	21062	1885001	Oil Seal
12	1	21033	1885002	O-Ring (8 1/2" x 8 3/4" x 1/8")
13	1	22419	1885005	Quad Ring (8" x 8 1/2" x 1/4")
16	1	21136	850960	Manifold
17	1	13710	13710	Hose Assembly — 8" Long
20	3	11026	S050	Lockwasher (1/2")
23	4	21144	S043-20A	Capscrew (7/16" x 2")
24	4	21134	S043-30A	Capscrew (7/16" x 3")
25	2	13413	S050-15PH5	Capscrew (1/2" x 1 1/2")
26	1	21063	1885004	O-Ring (4" x 4 1/4" x 1/8")
27	2	21150	1885009	O-Ring (1 1/4" x 1 1/8" x 1/8")
28	1	23508	23508	Reducer Bushing
30	1	23570	23570	Male Elbow (1/4" Tube x 1/8" NPT)
32	1	21166	2685011	Male Tee
35	1	21022	850060	Drum Support
46	1	22235	850951	Counterbalance Valve
47	1	13711	13711	Hose Assembly — 10" Long
54	1	18009	E012T	Pipe Plug
67	1	81339	851220	Check Valve Assembly
70	1	13706	13706	Hose Assembly — 16" Long
71	1	13705	13705	Hose Assembly — 14" Long

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

MATERIAL LIST VARIABLES

ITEM NO.	DESCRIPTION	PD10-71-1			PD10-71-120			PD10-71-127			PD10-75			PD10-75-2		
		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.
2	Primary Planet Carrier Assembly	1	81317	850300	1	81327	851060	1	81317	850300	1	81317	850300	1	81317	850300
3	Final Planet Carrier Assembly	1	81318	850340	1	81328	851070	1	81328	851070	1	81318	850340	1	81318	850340
4	Input Sun Gear	1	21054	850420	1	23184	23184	1	21054	850420	1	21054	850420	1	21054	850420
7	Output Sun Gear	1	21095	850710	1	21109	850830	1	21109	850830	1	21095	850710	1	21095	850710
8	Ring Gear	1	21101	850770	1	21108	850820	1	22548	850771	1	21101	850770	1	21101	850770
14	Retaining Ring	1	21149	1951001	1	21149	1951001	1	21149	1951001	1	21149	1951001	1	21149	1951001
15	Hydraulic Motor	1	21020	850020	1	21020	850020	1	21020	850020	1	21020	850020	1	21020	850020
19	Lockwasher (3/8")	12	18003	A037	12	18003	A037	12	18003	A037	12	18003	A037	12	18003	A037
22	Capscrew (3/8" x 1")	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5
29	Nipple	2	21161	850510	2	21161	850510	2	21161	850510	2	22436	850511	2	22436	850511
36	Cable Drum Assembly	1	81321	850910	1	81321	850910	1	81321	850910	1	81331	850811	1	81476	81476
37	Brake Cylinder Assembly	1	81478	81478	1	81478	81478	1	81478	81478	1	81329	851090	1	81329	851090
38	Input Shaft	1	22416	850491	1	22416	850491	1	22416	850491	1	21111	850850	1	21111	850850
41	Spacer Pipe	1	22779	850986	1	22779	850986	1	22779	850986	1	21197	850983	1	21197	850983
42	Side Plate — Motor End	1	22780	850664	1	22780	850664	1	22780	850664	1	21179	850661	1	21179	850661
43	Side Plate — Support End	1	22781	850684	1	22781	850684	1	22781	850684	1	21181	850681	1	21181	850681
44	Base	1	22448	850643	1	22448	850643	1	22448	850643	1	21172	850701	1	21172	850701
45	Capscrew (1/2" x 1 1/4")	1	23256	850393	1	23256	850393	1	23256	850393	—	—	—	—	—	—
45	Capscrew (1/2" x 20")	—	—	—	—	—	—	—	—	—	1	21171	850391	1	21171	850391
48	Dowel Pin	2	21112	2085001	2	21112	2085001	2	21112	2085001	4	21112	2085001	4	21112	2085001
50	Lockwasher (1/2")	20	11026	A050	20	11026	A050	20	11026	A050	16	11026	A050	16	11026	A050
51	Stud	10	21145	850380	10	21145	850380	10	21145	850380	8	21145	850380	8	21145	850380
52	Stud	10	21192	850381	10	21192	850381	10	21192	850381	8	21192	850381	8	21192	850381
53	Spacer	1	22417	850841	1	22417	850841	1	22417	850841	1	21110	850840	1	21110	850840
55	Capscrew (3/8" x 1")	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5
57	Hex Nut (1/2")	21	11788	S050P	21	11788	S050P	21	11788	S050P	17	11788	S050P	17	11788	S050P
Not Shown	Cable Anchor Kit	1	61254	61254	1	61254	61254	1	61254	61254	—	—	—	—	—	—

ITEM NO.	DESCRIPTION	PD10-77			PD10-77-1			PD10-77-120			PD10-77-127			PD10-77-2			PD10-79-1-2		
		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.	QTY.	5-DIGIT NO.	CATALOG NO.
2	Primary Planet Carrier Assembly	1	81317	850300	1	81317	850300	1	81327	851060	1	81317	850300	1	81317	850300	1	81317	850300
3	Final Planet Carrier Assembly	1	81318	850340	1	81318	850340	1	81328	851070	1	81328	851070	1	81318	850340	1	81318	850340
4	Input Sun Gear	1	21054	850420	1	21054	850420	1	23184	23184	1	21054	850420	1	21054	850420	1	21054	850420
7	Output Sun Gear	1	21095	850710	1	21095	850710	1	21096	850720	1	21109	850830	1	21095	850710	1	21095	850710
8	Ring Gear	1	21101	850770	1	21101	850770	1	21074	850540	1	22548	850771	1	21101	850770	1	21101	850770
14	Retaining Ring	1	21149	1951001	1	21149	1951001	—	—	—	1	21149	1951001	1	21149	1951001	1	21149	1951001
14	Thrust Bearing	—	—	—	—	—	—	1	21061	1441009	—	—	—	—	—	—	—	—	—
15	Hydraulic Motor	1	21020	850020	1	21020	850020	1	21020	850020	1	21020	850020	1	21020	850020	1	23178	23178
19	Lockwasher (3/8")	12	18003	A037	12	18003	A037	12	18003	A037	12	18003	A037	12	18003	A037	18	18003	A037
22	Capscrew (3/8" x 1")	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5	6	21961	S037-10PH5
29	Nipple	2	21161	850510	2	21161	850510	2	21161	850510	2	21161	850510	2	21161	850510	2	22436	850511
36	Cable Drum Assembly	1	81330	851031	1	81338	851033	1	81338	851033	1	81338	851033	1	81436	850333	1	81503	81503
37	Brake Cylinder Assembly	1	81478	81478	1	81478	81478	1	81329	851090	1	81478	81478	1	81478	81478	1	81329	851090
38	Input Shaft	1	22416	850491	1	22416	850491	1	21111	850850	1	22416	850491	1	22416	850491	1	21111	850850
41	Spacer Pipe	1	21170	850985	1	21170	850985	1	21170	850985	1	21170	850985	1	21170	850985	1	21197	850983
42	Side Plate — Motor End	1	21179	850661	1	22460	850663	1	22460	850663	1	22460	850663	1	21179	850661	1	23171	23171
43	Side Plate — Support End	1	21181	850681	1	22459	850683	1	22459	850683	1	22459	850683	1	22181	850681	1	23172	23172
44	Base	1	21175	850641	1	22448	850643	1	22448	850643	1	22448	850643	1	21175	850641	1	23175	23175
45	Capscrew (1/2" x 1 1/4")	1	23256	850393	1	23256	850393	1	23256	850393	1	23256	850393	1	23256	850393	—	—	—
45	Capscrew (1/2" x 20")	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	21171	850391
48	Dowel Pin	2	21112	2085001	2	21112	2085001	4	21112	2085001	2	21112	2085001	2	21112	2085001	4	21112	2085001
50	Lockwasher (1/2")	16	11026	A050	20	11026	A050	20	11026	A050	20	11026	A050	16	11026	A050	16	11026	A050
51	Stud	8	21145	850380	10	21145	850380	10	21145	850380	10	21145	850380	8	21145	850380	8	21145	850380
52	Stud	8	21192	850381	10	21192	850381	10	21192	850381	10	21192	850381	8	21192	850381	8	21192	850381
53	Spacer	1	22417	850841	1	22417	850841	1	21110	850840	1	22417	850841	1	22417	850841	1	21110	850840
55	Capscrew (3/8" x 1")	6	21961	S037-10PH5	—	—	—	—	—	—	—	—	—	6	21961	S037-10PH5	6	21961	S037-10PH5
55	Capscrew (3/8" x 2")	—	—	—	6	22704	S037-20PH5	6	22704	S037-20PH5	6	22704	S037-20PH5	—	—	—	—	—	—
57	Hex Nut (1/2")	17	11788	S050P	21	11788	S050P	21	11788	S050P	21	11788	S050P	17	11788	S050P	17	11788	S050P

PROCEDURE FOR DISASSEMBLY OF THE BRADEN MODEL PD10 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 43.

Remove hose assemblies, Items 17, 47, 70 and 71.

Remove two (2) capscrews and lockwashers, Items 25 and 20.

Remove hydraulic motor, Item 15.

Remove O-ring, Item 26.

Remove motor coupling, Item 5.

Remove spacer, Item 53.

Remove input shaft, Item 38.

Remove brake clutch assembly, Item 1.

Remove input sun gear, Item 4.

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 1, when it is re-installed in the winch.

Insert the input shaft, Item 38, into the brake clutch assembly, Item 1. 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.

If the brake 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 (primary planet carrier assembly, ring gear, final planet carrier assembly, drum support and cable drum), turn the 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 42, 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 the other end, the blocks will not be needed.

Remove nuts and lockwashers, Items 57 and 50, from studs, Item 51 (Models PD10-71-1, PD10-71-120, PD10-71-127, PD10-75, PD10-75-2, PD10-77, PD10-77-1, PD10-77-120, PD10-77-127, PD10-77-2 and PD10-79-1-2). Remove capscrews and lockwashers, Items 51 and 50, (Models PD10-71 and PD10-71A). Remove capscrews and lockwashers, Items 51 and 50, and capscrews and lockwashers, Items 22 and 19 (models PD10-1 and PD10-1-27).

Remove nut and lockwasher, Items 57 and 20, from spacer capscrew, Item 45.

Remove side plate, Item 43, drum support, Item 35, and oil seal, Item 11, as a complete assembly (Models PD10-71-1, PD10-71-120, PD10-71-127, PD10-75, PD10-75-2, PD10-77, PD10-77-1, PD10-77-120, PD10-77-127, PD10-77-2 and PD10-79-1-2). Remove side plate, drum support and oil seal, Items 43, 35 and 11, by tapping with a plastic hammer to free side plate from dowel pins, Item 49 (Models PD10-1, PD10-1-27, PD10-71 and PD10-71A).

The final planet carrier assembly, Item 3, 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 7.

Remove ring gear, Item 8.

Remove primary planet carrier assembly, Item 2.

If complete disassembly was started on other end bypass the remainder of this paragraph and proceed with the next paragraph. Remove input sun gear, Item 4. Remove input shaft, Item 38. Remove brake clutch assembly, Item 1. Remove spacer, Item 53. Remove motor coupling, Item 5.

Remove cable drum assembly, Item 36.

Set winch on base.

Remove nuts and lockwashers, Items 57 and 50, from studs, Item 52 (Models PD10-71-1, PD10-71-120, PD10-71-127, PD10-75, PD10-75-2, PD10-77, PD10-77-1, PD10-

77-120, PD10-77-127, PD10-77-2 and PD10-79-1-2). Remove capscrews and lockwashers, Items 52 and 50 (Models PD10-71 and PD10-71A). Remove capscrews and lockwashers, Items 52 and 50, and capscrews and lockwashers, Items 22 and 19 (models PD10-1 and PD10-1-27).

Remove side plate, Item 42, and brake cylinder assembly, Item 37, from base, Item 44 (Models PD10-71-1, PD10-71-120, PD10-71-127, PD10-75, PD10-75-2, PD10-77, PD10-77-1, PD10-77-120, PD10-77-127, PD10-77-2 and PD10-79-1-2). Remove side plate plate, Item 42, and brake cylinder assembly, Item 37, from base, Item 44, by tapping with a plastic hammer to free side plate from dowel pins, Item 49 (Models PD10-1, PD10-1-27, PD10-71 and PD10-71A).

Remove six (6) capscrews and lockwashers, Items 22 and 19. With plastic hammer tap side plate, Item 42, to loosen from brake cylinder dowel pins, Item 48.

For disassembly of brake cylinder, refer to page 17 or 18.

PROCEDURE FOR REMOVAL OF BRAKE CYLINDER ONLY

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

Remove hose assemblies, Items 17, 47, 70 and 71.

Remove two (2) capscrews and lockwashers, Items 25 and 20.

Remove hydraulic motor, Item 15.

Remove O-ring, Item 26.

Remove motor coupling, Item 5.

Remove spacer, Item 53.

Remove input shaft, Item 38.

Remove brake clutch assembly, Item 1.

Remove nuts and lockwashers, Items 57 and 50, from studs, Item 52 (Models PD10-71-1, PD10-71-120, PD10-71-127, PD10-75, PD10-75-2, PD10-77, PD10-77-1, PD10-77-120, PD10-77-127, PD10-77-2 and PD10-79-1-2). Remove capscrews and lockwashers, Items 52 and 50 (Models PD10-71 and PD10-71A). Remove capscrews and lockwashers, Items 52 and 50, and capscrews and lockwashers, Items 22 and 19 (models PD10-1 and PD10-1-27).

Remove spacer capscREW, Item 45.

Remove six (6) capscrews and lockwashers, Items 22 and 19.

Remove side plate, Item 42, by tapping with plastic hammer to free from brake cylinder dowel pins, Item 48 (all models) and base dowel pins, Item 49 (Models PD10-1, PD10-1-27, PD10-71 and PD10-71A).

Secure with two (2) capscrews, a short length of chain, or similar lifting device, to brake cylinder, Item 37. Lift brake cylinder assembly from cable drum, Item 36, being careful to pull straight to avoid damaging cable drum bushing.

For disassembly of brake cylinder, refer to page 17 or 18.

PROCEDURE FOR REASSEMBLY OF THE BRADEN MODEL PD10 POWER DRUM

Assemble brake cylinder assembly per instructions on page 17 or 18.

Assemble brake clutch assembly per instructions on page 19.

Assemble final planet carrier assembly per instructions on page 16.

Assemble primary planet carrier assembly per instructions on page 15.

Attach brake cylinder assembly, Item 37, to motor side plate, Item 42, with six (6) capscrews and lockwashers, Items 22 and 19, and four (4) or (2) dowel pins, Item 48.

Coat new quad ring, Item 13, with a light lubricating oil and install in groove in cable drum bushing.

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

Install cable drum, Item 37, using care not to damage the quad ring.

Install primary planet carrier assembly, Item 2, in place in ring gear, Item 8. Install this assembly on brake cylinder by engaging teeth in ring gear with teeth on brake cylinder.

Install retaining ring, Item 14, in groove on output sun gear, Item 7. Install output sun gear, Item 7 (All models except PD10-77-120).

On model PD10-77-120 only, slip thrust bearing, Item 14, onto output sun gear, Item 7. Insert this assembly into spline of primary planet carrier.

Install O-ring, Item 12, in groove on final planet carrier, Item 3.

Install final planet carrier assembly, Item 3. 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 44. Secure to motor side plate, Item 42, with studs, lockwashers and nuts, Items 52, 50 and 57 (Models PD10-71-1, PD10-71-120, PD10-71-127, PD10-75, PD10-75-2, PD10-77, PD10-77-1, PD10-77-120, PD10-77-127, PD10-77-2 and PD10-79-1-2). Secure to motor side plate, Item 42, with capscrews and lockwashers, Items 52 and 50 (Models PD10-71 and PD10-71A). Secure to motor side plate, Item 42, with capscrews and lockwashers, Items 52 and 50, and cap-

screws and lockwashers, Items 22 and 19 (models PD10-1 and PD10-1-27).

Check oil seal, Item 11, for damage. Replace if necessary (new seal is recommended). Press seal into drum support, Item 35. Attach drum support, Item 35, to side plate Item 43, with six (6) capscrews and lockwashers, Items 55 and 19.

Install side plate assembly, carefully engaging drum support into roller bearing and oil seal onto wear sleeve. Secure side plate, Item 43, to base, Item 44, with studs, lockwashers and nuts, Items 51, 50 and 57 (Models PD10-71-1, PD10-71-120, PD10-71-127, PD10-75, PD10-75-2, PD10-77, PD10-77-1, PD10-77-120, PD10-77-127, PD10-77-2 and PD10-79-1-2). Secure side plate, Item 43, to base, Item 44, with capscrews and lockwashers, Items 51 and 50 (Models PD10-71 and PD10-71A). Secure side plate, Item 43, to base, Item 44, with capscrews and lockwashers, Items 51 and 50, and capscrews and lockwashers, Items 22 and 19 (models PD10-1 and PD10-1-27).

Install spacer pipe, Item 41, capscrew, Item 45, lockwasher, Item 20, and hex nut, Item 57.

Be certain that vent plug, Item 10, is in place.

Turn winch over and stand on side plate, Item 43.

Install input sun gear, Item 4.

IMPORTANT: Check the rotation of the brake clutch assembly, Item 1.

Insert the input shaft, Item 38, into the brake clutch assembly, Item 1. 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.

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.

Insert the brake clutch assembly, Item 1, into the brake cylinder assembly, Item 37.

Align splines and install input shaft, Item 38, through brake clutch assembly, Item 1, into input sun gear, Item 4.

Install spacer, Item 53.

Install motor coupling, Item 5.

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 29, and tee, Item 32. Use a good grade of thread compound with Teflon on these fittings.

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

Install hydraulic motor, Item 15, in place on the brake cylinder, Item 37. Secure with two (2) capscrews and lockwashers, Items 25 and 20.

Insert O-ring, Item 27, in counterbore of counterbalance valve assembly, Item 46. Secure this assembly to motor with four (4) capscrews, Item 24.

Insert O-ring, Item 27, in counterbore of manifold, Item 16. Secure manifold to motor with four (4) capscrews, Item 23.

Install hose assembly, Item 71, from manifold, Item 16, to tee, Item 32.

Install hose assembly, Item 47, from nipple, Item 29, to elbow, Item 30, in check valve, Item 67.

Install hose assembly, Item 17, from check valve, Item 67, to elbow, Item 30, and reducer, Item 28, in motor drain.

Install Hose assembly, Item 70, from brake valve, Item 46, to tee, Item 32.

If oil was drained from winch, refill with approved 90 weight gear oil according to the chart shown on page 8.

BRAKE VALVE INFORMATION

The brake valve assembly, Item 46, 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 repair or replacement.

BRAKE VALVE ADJUSTMENT

The brake valve contains an adjusting screw and lock nut which allows 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. 81317 & 81327 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS

ITEM NO.	QTY.	DESCRIPTION	81317		81327	
			5-DIGIT NUMBER	CATALOG NUMBER	5-DIGIT NUMBER	CATALOG NUMBER
1	1	Planet Carrier	21023	850080	21023	850080
2	3	Planet Gear	21046	850310	21099	850750
3	3	Planet Gear Shaft	21048	850360	21048	850360
4	3	Rollpin	21049	R18-075	21049	R18-075

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 and planet gear, Item 2, for inspection.

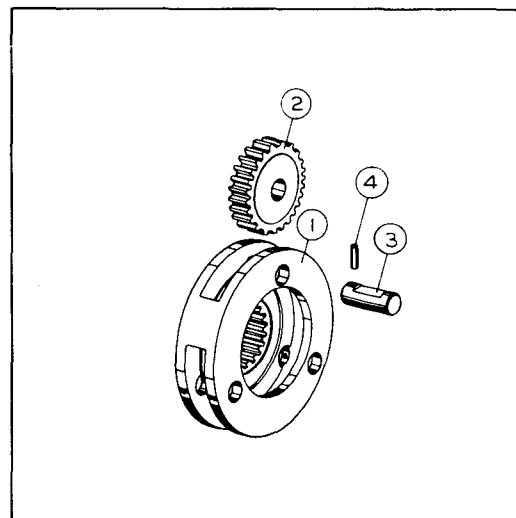
Drive old rollpin completely from the shaft and use new rollpin, $\frac{3}{16}$ " x $\frac{3}{4}$ ", for reassembly.

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 $\frac{1}{8}$ "

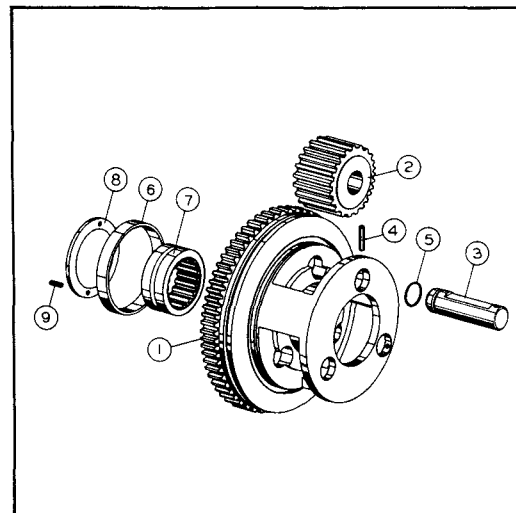
below the surface of the planet carrier. With a center-punch, dimple the edge of rollpin hole to keep the pin from backing out.

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



FINAL PLANET CARRIER ASSEMBLY, PART NO. 81318 & 81328 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS

ITEM NO.	QTY.	DESCRIPTION	81318		81328	
			5-DIGIT NUMBER	CATALOG NUMBER	5-DIGIT NUMBER	CATALOG NUMBER
1	1	Planet Carrier	21021	850040	21021	850040
2	3	Planet Gear	21047	850350	21073	850530
3	3	Planet Gear Shaft	21057	850320	21057	850320
4	3	Spirol Pin	23584	23584	23584	23584
5	3	O-Ring	22932	22932	22932	22932
6	1	Wear Sleeve	21050	2785001	21050	2785001
7	1	Roller Bearing	21051	1385001	21051	1385001
8	1	Thrust Washer	21059	850450	21059	850450
9	2	Pin	21060	850460	21060	850460



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 oil.

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 center-punch to prevent pin from backing out.

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

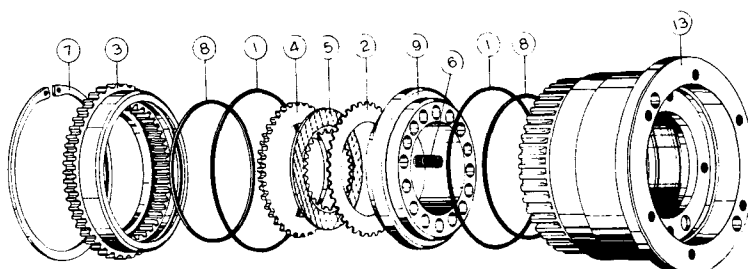
Insert roller bearing, Item 7, into hole provided.

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 12 on Basic Material List, Page 11) with oil and install in groove in planet carrier.

BRAKE CYLINDER ASSEMBLY, PART NO. 81478 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS



ITEM NO.	QTY.	5-DIGIT NUMBER	CATALOG NUMBER	DESCRIPTION
1	2	10052	1858003	O-Ring
2	5	21029	850200	Brake Disc
3	1	21034	850130	Brake Ring
4	1	21035	850150	Backup Plate
5	4	21036	850170	Friction Disc

ITEM NO.	QTY.	5-DIGIT NUMBER	CATALOG NUMBER	DESCRIPTION
6	16	21037	850190	Brake Spring
7	1	21038	1985001	Retaining Ring
8	2	21040	1885003	O-Ring
9	1	21212	850161	Brake Release Piston
13	1	22620	850102	Brake Cylinder

DISASSEMBLY PROCEDURE

Set cylinder into a hand operated arbor press and apply sufficient pressure to the brake ring, Item 3, to depress the brake springs. Remove retaining ring, Item 7, with retaining ring pliers.

Remove as an assembly: brake ring, Item 3, O-ring, Item 8, backup plate, Item 4, friction discs, Item 5, brake discs, Item 2, brake release piston, Item 9, and brake springs, Item 6.

Remove two (2) O-rings, Item 1, and one (1) O-ring, Item 8.

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.

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

Install O-ring, Item 8, in groove in brake cylinder, Item 13. Install two (2) O-rings, Item 1, in grooves in brake cylinder.

Set brake ring, Item 3, on flat surface with O-ring

groove up. Insert backup plate, Item 4, brake disc, Item 2, and friction disc, Item 5. Continue to alternate discs until five (5) brake discs and four (4) friction discs are in place. Install O-ring, Item 8, in groove in brake ring.

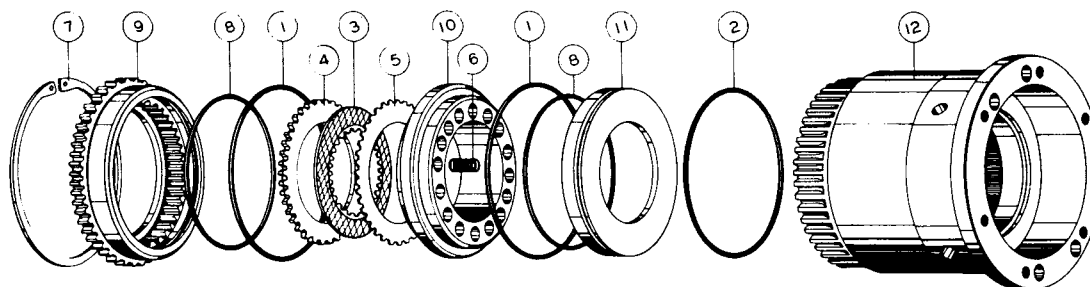
Insert brake release piston, Item 9, into brake ring, being sure the spring holes are up, using a plastic or rubber hammer. Coat sealing surfaces of the brake release piston and brake ring with oil. Insert sixteen (16) brake springs, Item 6, into holes in brake release piston.

Set brake cylinder, Item 13, down over brake assembly, aligning teeth of brake ring, Item 3, 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. Test brake cylinder assembly per instructions on page 19.

BRAKE CYLINDER ASSEMBLY, PART NO. 81329 — 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	5	21029	850200	Brake Disc
4	3	21035	850150	Backup Plate
5	4	21036	850170	Friction Disc
6	16	21037	850190	Brake Spring

ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
7	1	21038	1985001	Retaining Ring
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	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, can now be driven from the brake cylinder, Item 12, 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 12, by applying air pressure to all grooves and oil passages.

Set brake cylinder on flanged end.

Use new O-rings throughout when reassembling brake cylinder. Lightly coat all O-rings with oil 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 12, 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, Item 12.

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 five (5) brake discs and four (4) friction discs are in place. Install two (2) backup plates, Item 4. 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 oil. Insert sixteen (16) brake springs, Item 6, into holes in brake release piston.

Set brake cylinder, Item 12, 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. Test brake cylinder assembly per instructions on page 19.

TESTING THE REASSEMBLED BRAKE CYLINDER FOR LEAKS

Turn motor side of the assembly in the upward position. Observe two holes with ¼" N.P.T. threads. 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 29, in brake release port. This port is located at 90° from motor bolt holes.

Connect a hydraulic hand pump which is equipped with a dial gauge that reads to 600 P.S.I. 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.

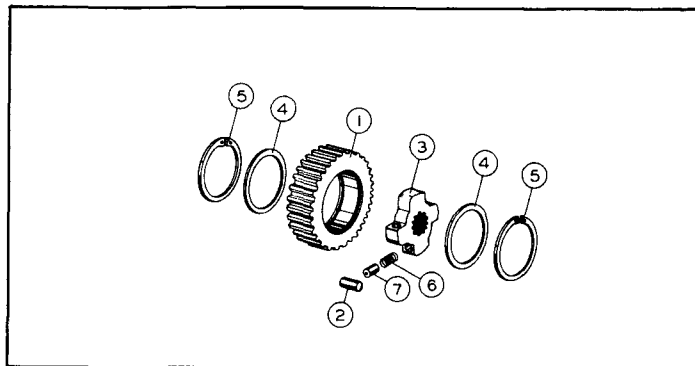
If the piston assembly does not hold pressure and the gauge indicator returns to zero, check the hose and fittings from the pump to the brake cylinder for leaks. If no leaks are visible, the brake cylinder assembly must be disassembled and the O-rings and all parts checked for damage where leakage could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

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

BRAKE CLUTCH ASSEMBLY, PART NO. 81316 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS



ITEM NO.	QTY.	5-DIGIT NO.	CATALOG NO.	DESCRIPTION
1	1	21041	850250	Brake Race
2	4	12048	238-148-3	Brake Roller
3	1	21042	850260	Brake Cam
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 input shaft (Item 38 on Variable Material Lists, Pages 10 and 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 input shaft. It should turn in one direction.