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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 in the C2H10 and six in the C2H10D.

1. Cable Drum
2. Two speed clutch assemblies and primary planet reducer
3. Brake Assembly
4. Secondary Planet Reducer
5. Final Planet Reducer
6. Free fall clutch assembly C2H10D only

The hydraulic motor is bolted directly to the two speed assembly housing. This housing is bolted and doweled to the side frame. The brake assembly housing is bolted and doweled to the two speed assembly housing. The ring gear of both final planetary reducers is splined to the brake housing. The cable drum is supported by the two speed assembly housing through a large ball bearing. A spring loaded oil seal prevents oil leakage.

In the C2H10 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.

In the C2H10D the cable drum is supported on the other end by a bronze bushing running on the drop clutch hub. This plate is supported 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. A series of friction elements and steel discs are positioned between a splined land on the clutch backup plate and an internally splined area in the cable drum. Nine large heavy duty springs supply the pressure to engage the clutch discs. A large single acting hydraulic cylinder and piston located between the final planet carrier and the clutch pressure plate can,

when pressurized completely, release the spring pressure on the clutch discs allowing the cable drum to rotate freely.

TWO SPEED ASSEMBLY

This assembly has five operating component parts:

1. Primary Planetary Reducer
2. Full floating ring gear
3. High speed spring loaded friction clutch
4. Low speed friction clutch
5. Double acting hydraulic piston

The friction elements of the high speed clutch are located between the planet carrier and the ring gear of the planet assembly. When engaged, the ring gear is locked to the planet carrier and will rotate with the planet assembly, directly connecting the motor shaft to the sun gear of the secondary planetary assembly.

The friction elements of the low speed clutch are located between the ring gear of the planet assembly and the stationary housing. When engaged the ring gear is locked to the housing causing the planetary assembly to function as a reducer to increase the ratio of the gear train of the winch with resulting lower drum speeds and greater hoisting capacity.

The high speed clutch is engaged by the brake springs. The low speed clutch is engaged by the movement of the hydraulic piston. Further movement of this piston compresses the brake springs releasing the high speed clutch. Directing oil to the opposite side of the piston moves the piston away from the low speed clutch allowing the springs to fully engage the high speed clutch.

As no neutral exists during the change from one speed to the other, the winch will not drop its load if the shift is made in either raising or lowering operations.

CAUTION —

Both clutches are momentarily engaged during the shift. Excessive wear can result on the high speed clutch if the speed change is repeatedly made while the winch is in operation.

Hydraulic pressure must always be present on one or the other side of the clutch operating piston when the winch is operated. Rapid wear of the low speed clutch will result if the piston is not moved away from this clutch and spring pressure engages the high speed clutch.

The valve used to operate the shift must be of the type that has no neutral position. A spring offset, four way, solenoid valve is highly recommended.

HOW IT OPERATES:

The hydraulic motor drives the sun gear of the small primary planetary reducer. In high speed this speed and torque is transmitted directly to the sun gear of the secondary planetary reducer. In low speed a reduced speed and higher torque is transmitted to this sun gear. The output of the secondary planetary reducer is transmitted by the planet carrier to the sun gear of the final planetary reducer. In the C2H10 the output of this reducer is transmitted directly to the cable drum by the spline between the planet carrier and the drum. In the C2H10D the output of the final planetary reducer is transmitted to the large free fall clutch and thence to the cable 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. An over-riding Cam Clutch
4. A 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 drive shaft between the motor and primary sun gear. It will allow this driveshaft 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 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.

FREE FALL VALVE — C2H10D ONLY

The free fall clutch is a spring loaded hydraulically released multiple disc clutch.

The free fall clutch control contains eight operating component parts.

1. A sensitive pressure reducing valve
2. Double acting hydraulic piston and cylinder
3. Control lever
4. Movable rod with a center detent to operate winch directional control valve
5. Single acting hydraulic piston with spring return
6. Steel ball poppet
7. Four way, spring offset, solenoid valve
8. Micro switch in lever to operate solenoid
9. Micro switch in lever to operate two speed

The pressure reducing valve can direct oil pressure

to the free fall clutch spring pressure release cylinder.

The double acting piston, when pressurized on one side, can move to compress the spring of the pressure reducing valve to increase the pressure to the free fall clutch release cylinder. When pressurized on the other side, the piston and piston rod is locked in an out position.

The control lever is pivotally attached to this piston rod and also pivotally attached to the winch directional control actuating rod.

The single acting hydraulic piston when pressurized locks the winch control actuating rod in its center or neutral position.

The spring, in this piston cylinder also applies pressure to the steel ball poppet forming the neutral detent in the winch control rod.

The four way, spring offset, solenoid valve is bolted to the pressure reducing valve housing and normally directs oil pressure to the double acting hydraulic piston to lock it in its out position.

The two micro switches, in the control handle, are momentary contact type of switches and must be held down to maintain winch operation. One switch energized the solenoid of the two speed valve. This valve should normally direct oil to place the winch in low speed; and, when its solenoid is energized, shift the winch to high speed. The other switch energizes the solenoid of the valve fastened to the free fall control valve and places the winch in free fall operation.

HOW IT WORKS:

This one lever controls all of the winch functions. With neither switch depressed the double acting piston rod is locked in its out position forming the pivot point for the lever. Moving the lever will operate the winch in low speed raise or lower. Depressing the high speed switch and moving the lever will operate the winch in high speed raise or lower.

When the free fall switch is depressed, oil pressure is directed to the single acting piston locking the

directional control valve actuating rod in its center or neutral position. This forms a new pivot point for the lever. Oil pressure is also directed to the pressure reducing valve and to the double acting piston to move it in the direction to compress the spring of this valve. The piston must move compressing the spring before free fall can occur. As the piston rod is attached to the lever the lever must also move. The force of the compressed spring determines the amount of oil pressure that is directed to the free fall clutch release cylinder.

If the lever is allowed to be pulled forward, increasing the oil pressure to the free fall clutch release cylinder, free fall will occur. If the lever is pulled back against the force of the piston the oil pressure will drop and the clutch re-engage stopping the descent of the load. The maximum force that can be exerted by the piston is 125 lbs. With a 10:1

lever ratio the maximum pull on the lever handle is twelve and one-half lbs.

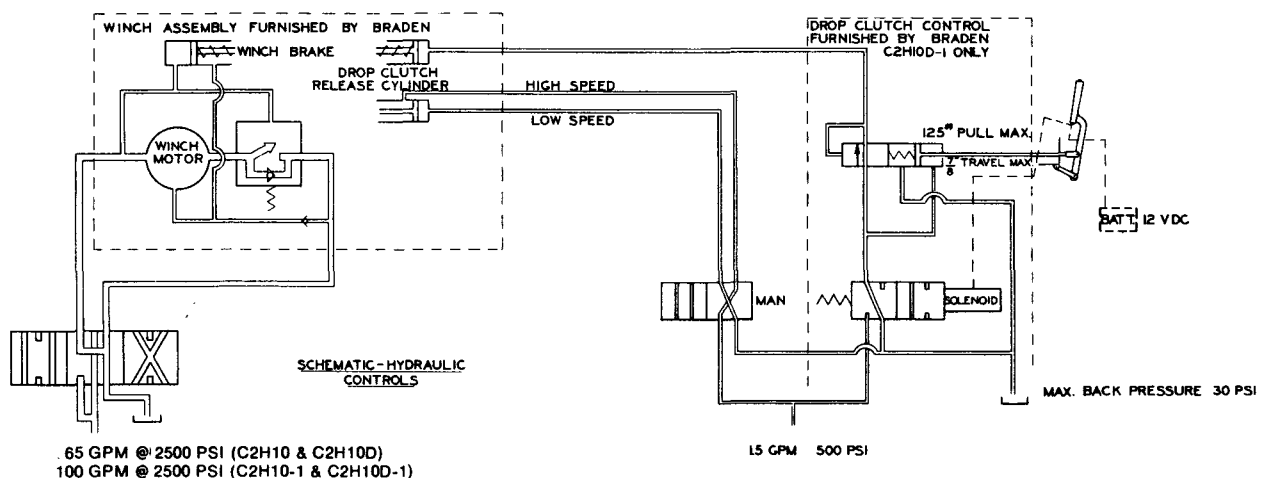
This free fall control is accident proof. The switch button must remain depressed and the lever must move before free fall can occur. If at any time during free fall operation the lever or switch button is released the clutch will be instantly and fully engaged.

CAUTION.

The thermal capacity of this free fall clutch is 50,000 ft. lbs. per minute. That is, a 500 lb. load can be dropped and caught from a height of 100 ft. once every minute; or, a 1000 lb. load can be allowed to free fall and caught from a height of 100 feet once every two minutes.

No load heavier than 3500 lbs. should be dropped and caught.

In pile driving operations, as no heat is absorbed by the clutch, there is no load or time limit.



WINCH CONTROL CIRCUIT

CROSS-SECTIONAL VIEW

Drop clutch is spring engaged, hydraulically released. A suspended load must be lowered under hydraulic pressure

Planetary gears inside drum barrel permit change of speed and load by gearing changes rather than motor changes

Seamless, heavy gauge steel barrel.

Brake valve insures smooth operation of winch and braking system while raising or lowering load.

Standard Commercial Motor. Service available nationwide.

Balanced brake piston automatically compensates for back pressure up to 200 p.s.i.

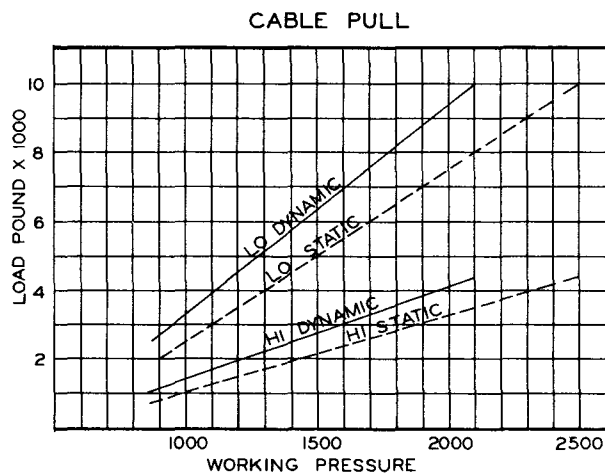
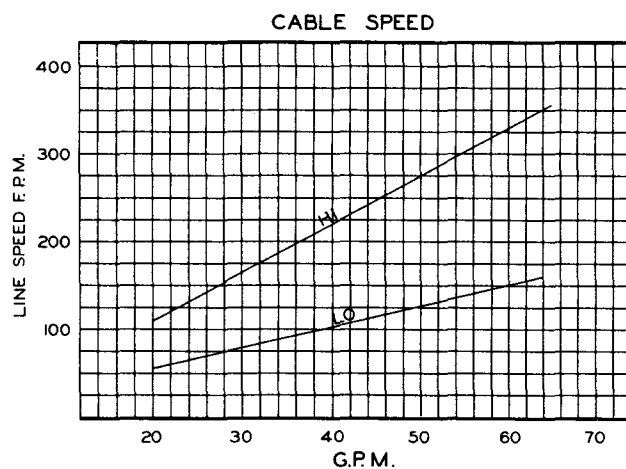
Fail-safe braking system. Brake is spring engaged, hydraulically released. If engine dies or hydraulic line breaks, load is held firmly until power is restored.

Heavy duty mounting pads at each extreme of winch for maximum support.

Model C2H10D Illustrated

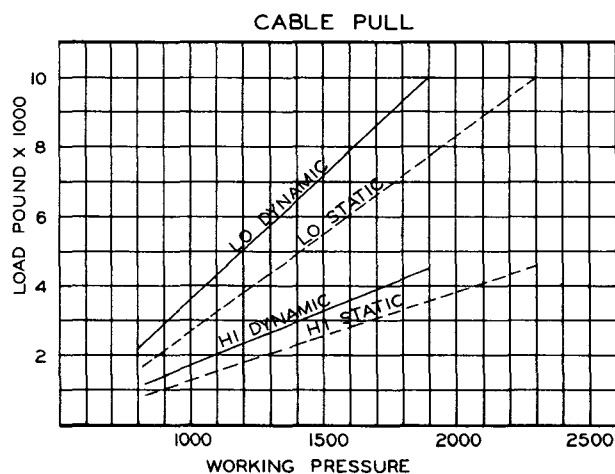
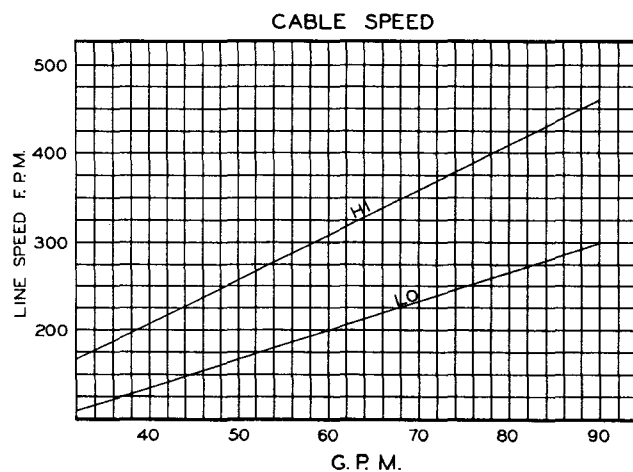
PERFORMANCE DATA

MODELS C2H10 & C2H10D (65 G.P.M. @ 2500 P.S.I.)



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

MODELS C2H10-1 & C2H10D-1 (100 G.P.M. @ 2500 P.S.I.)



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

PERFORMANCE DATA

MODELS C2H10 & C2H10D (65 G.P.M. @ 2500 P.S.I.)

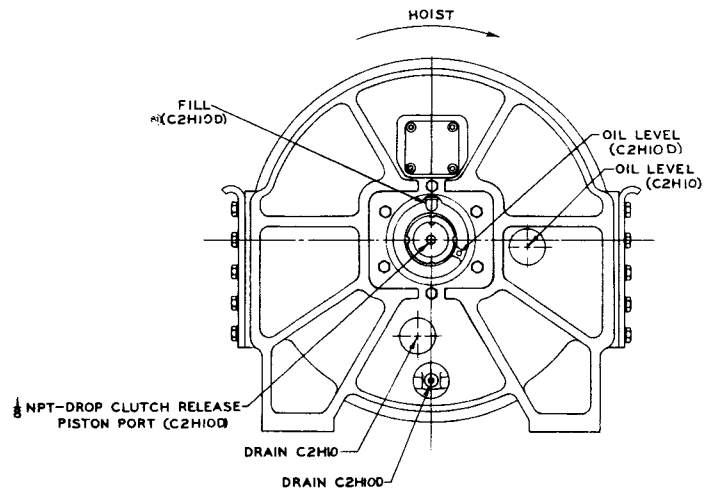
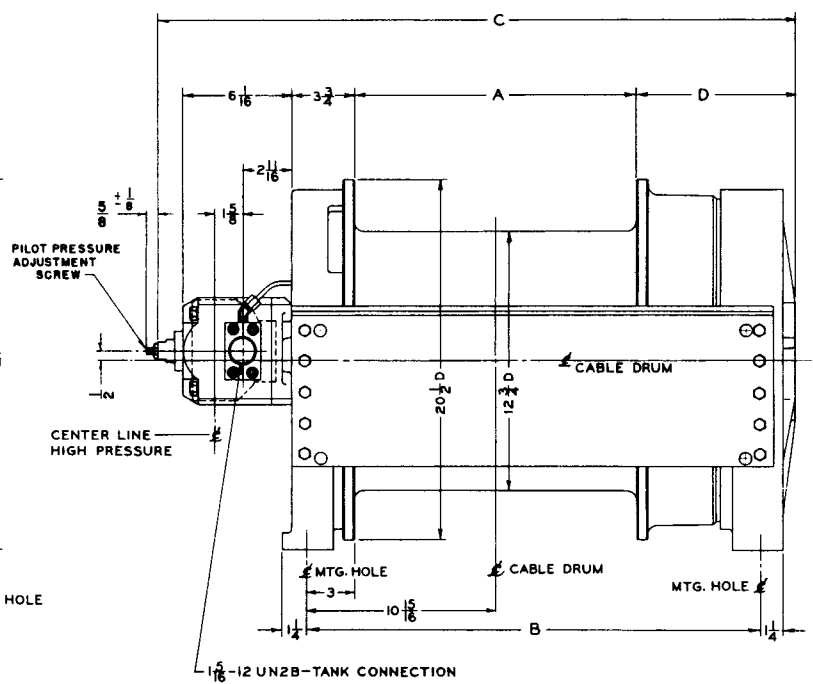
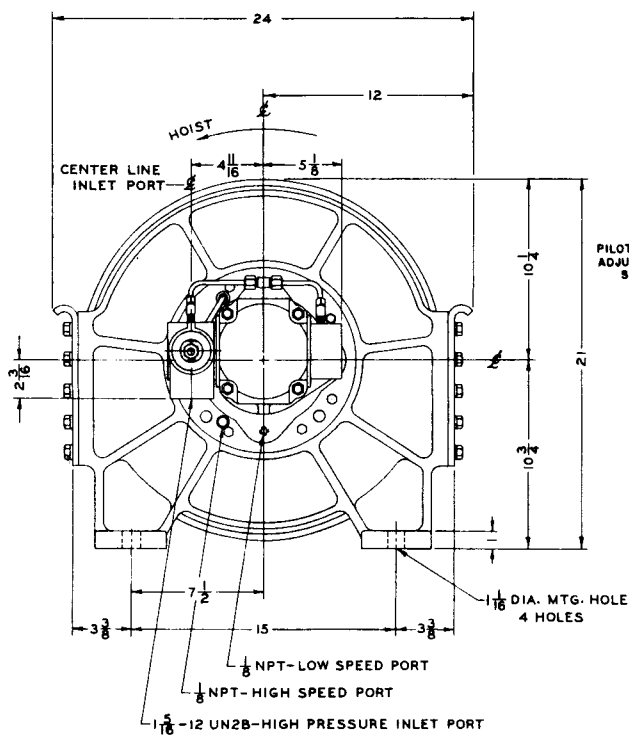
LAYER OF CABLE	5/8" DIAMETER CABLE						1/2" DIAMETER CABLE					
	LOW SPEED			HIGH SPEED			LOW SPEED			HIGH SPEED		
	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)
1st	10,000	161	85	4,655	362	85	10,000	160	103	4,750	360	103
2nd	9,025	176	178	4,227	395	178	9,262	172	214	4,370	388	214
3rd	8,265	192	279	3,895	432	279	8,645	184	333	4,085	415	333
4th	7,600	208	388	3,562	468	388	8,075	196	460	3,800	442	460
5th	7,125	223	505	3,325	500	505	7,600	208	595	3,562	468	595
6th	6,745	238	630	3,182	535	630	7,220	220	748	3,420	495	748
7th	—	—	—	—	—	—	6,935	232	898	3,230	520	898

MODELS C2H10-1 & C2H10D-1 (100 G.P.M. @ 2500 P.S.I.)

LAYER OF CABLE	5/8" DIAMETER CABLE						1/2" DIAMETER CABLE					
	LOW SPEED			HIGH SPEED			LOW SPEED			HIGH SPEED		
	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)	HOIST CAPACITY (POUNDS)	LINE SPEED (F.P.M.)	CABLE CAPACITY (FEET)
1st	10,000	219	85	4,655	492	85	10,000	218	103	4,750	490	103
2nd	9,025	234	178	4,227	525	178	9,262	230	214	4,370	518	214
3rd	8,265	250	279	3,895	562	279	8,645	242	333	4,085	545	333
4th	7,600	266	388	3,562	598	388	8,075	254	460	3,800	572	460
5th	7,125	281	505	3,325	620	505	7,600	266	595	3,562	598	595
6th	6,745	296	630	3,182	655	630	7,220	278	748	3,420	625	748
7th	—	—	—	—	—	—	6,935	290	898	3,230	650	898

DIMENSIONAL DATA

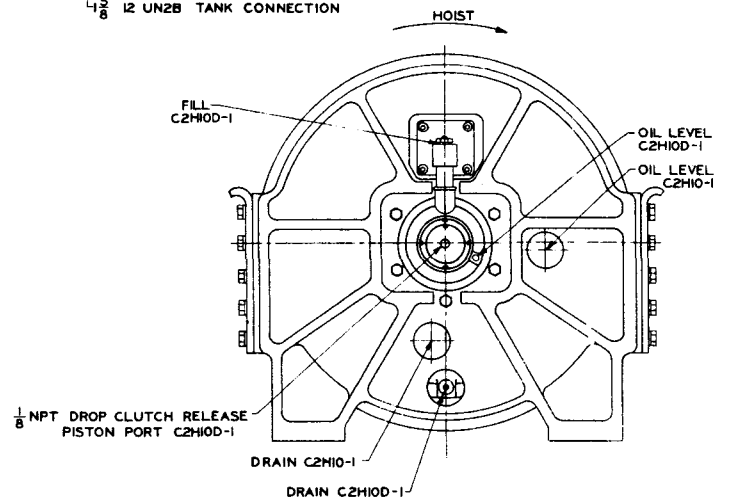
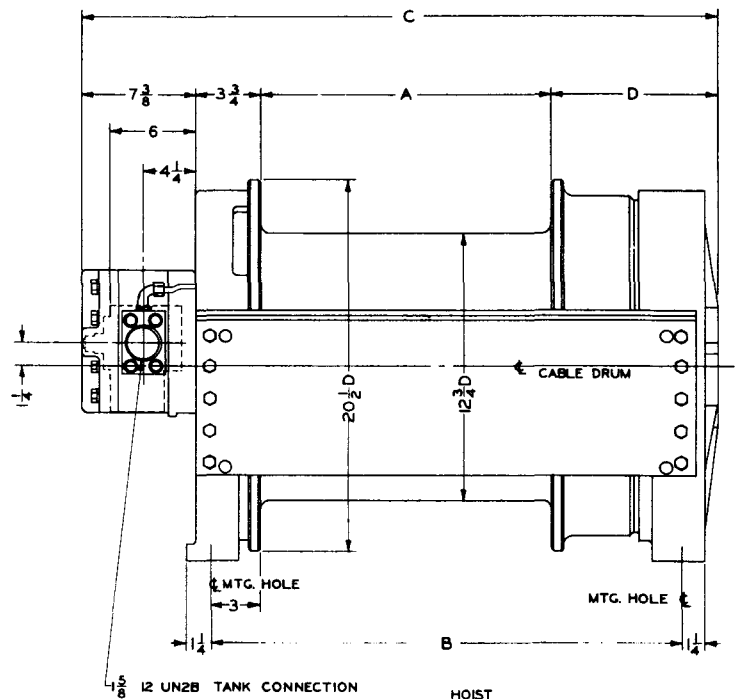
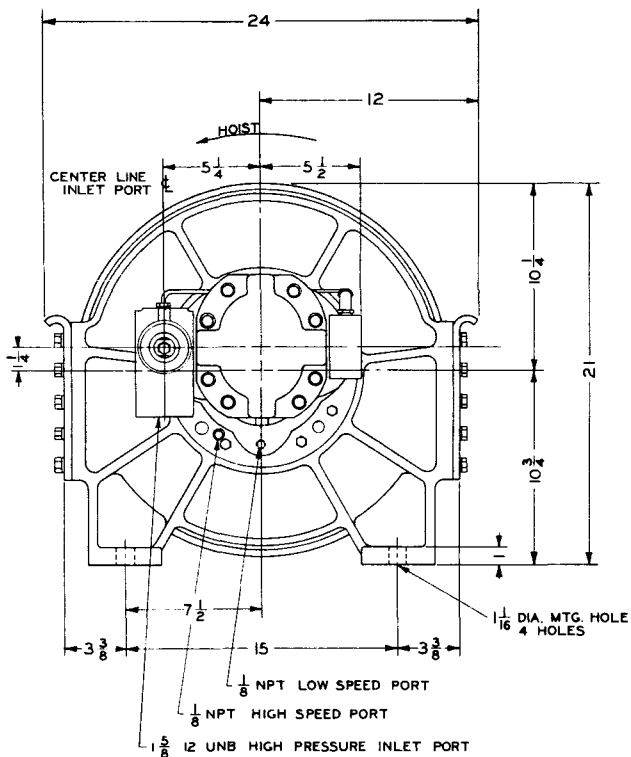
CONSTRUCTION HOIST MODELS C2H10 & C2H10D



Model	Dim. A	Dim. B	Dim. C	Dim. D
C2H10D	15 7/8	26	35 13/16	9 1/16
C2H10	15 13/16	21 11/16	31 7/16	4 13/16

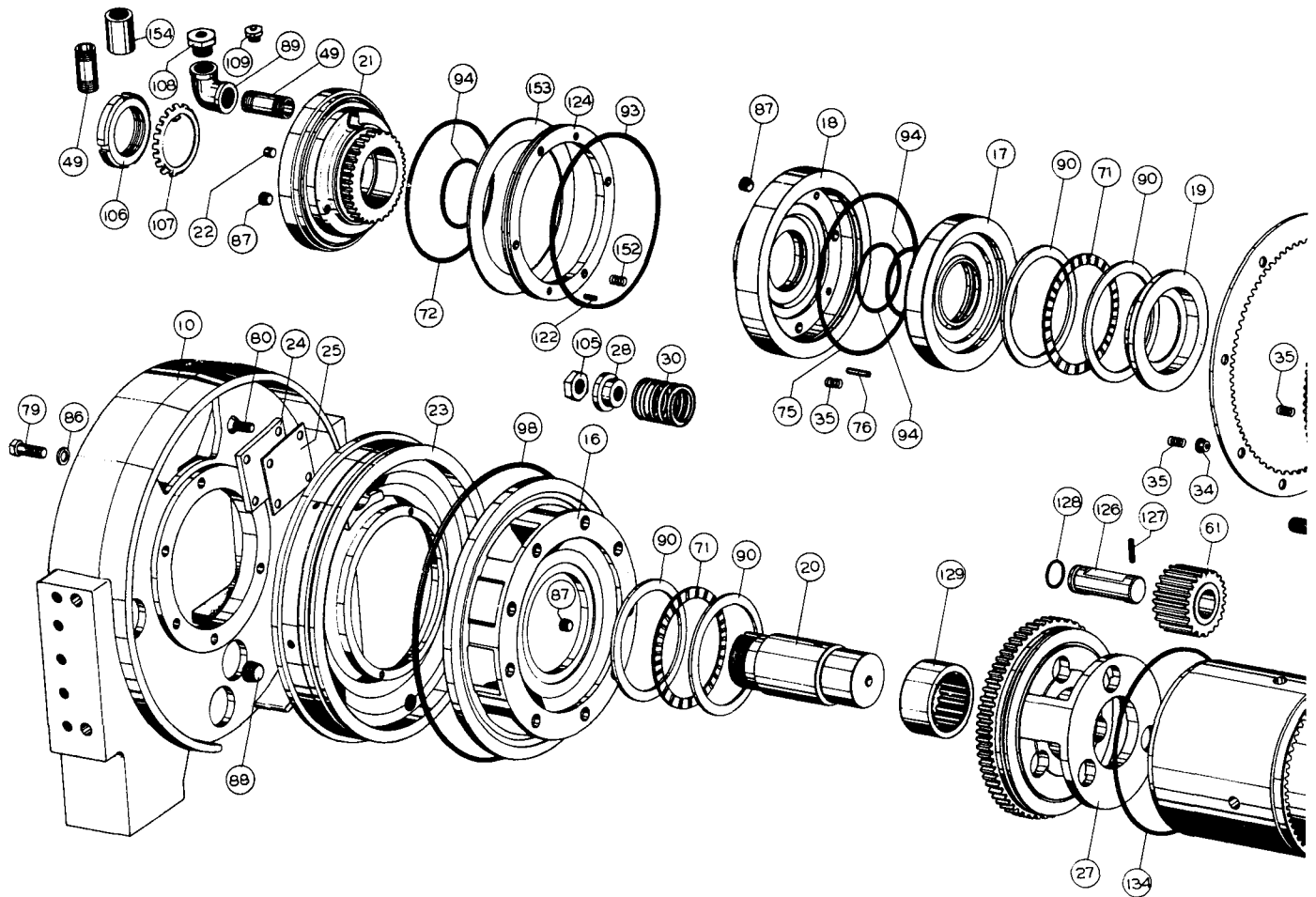
DIMENSIONAL DATA

CONSTRUCTION HOIST MODELS C2H10-1 & C2H10D-1



Model	Dim. A	Dim. B	Dim. C	Dim. D
C2H10D-1	15 1/4	26	36 1/16	9 1/16
C2H10-1	15 13/16	21 11/16	31 11/16	4 13/16

COMPONENTS-MODELS C2H10D & C2H10E



BRADEN 2-SPEED CO

MATERIAL LIST

Construction Hoist Models C2H10D & C2H10D-1

Item No.	Qty.	Catalog No.	Description	Item No.	Qty.	Catalog No.	Description
1	1	22300	Bearing Support	71	4	1457001	Thrust Bearing
2	1	22301	Brake Cylinder	72	3	1858003	O-Ring
3	1	22302	Planet Carrier	73	3	1885003	O-Ring
4	3	22303	Planet Gear Shaft	75	1	10467	O-Ring
5	1	22304	Sun Gear Shaft	76	4	R18-087	Rollpin
7	1	22306	Motor Gear Bushing	77	12	2085001	Dowel Pin
8	3	22307	Planet Gear	78	7	S050-15PDH8	Bolt
9	1	22308	End Bracket	79	6	S037-12PH5	Bolt
10	1	22463	End Bracket	80	4	S031-07AF	Bolt
11	1	22310	Brake Piston	81	20	S050-12PH5	Bolt
12	1	22311	Spacer	82	9	B050E	Slotted Nut
13	1	81334	Drum Assembly	83	9	D12-125	Cotter Pin
14	1	22315	Clutch Hub	85	36	A050	Lockwasher
15	1	22316	Drum Bushing Support	86	6	A037	Lockwasher
16	1	22317	Pressure Plate	87	9	E012A	Pipe Plug
17	1	22318	Piston	88	1	E050W	Pipe Plug
18	1	22319	Cylinder	89	1	2341004	Elbow
19	1	22320	Thrust Bearing Support	90	8	22351	Thrust Bearing Race
20	1	22321	Carrier Bearing Shaft	91	1	22352	Ball Bearing
21	1	22467	Bearing Shaft Support	92	1	22353	Oil Seal
22	1	22323	Bearing Shaft Key	93	1	10450	O-Ring
23	1	22468	Clutch Cover	94	3	22355	O-Ring
24	1	22325	Clutch Cover Plate	95	2	22356	O-Ring
25	1	22326	Plate Gasket	96	2	22357	O-Ring
26	1	22327	Drum Bushing	97	2	22358	O-Ring
27	1	850040	Output Carrier	98	1	22359	O-Ring
28	9	22329	Adjusting Nut	99	1	22360	Thrust Washer
29	9	22330	Spring Stud	100	3	R12-112	Rollpin
30	9	22331	Clutch Spring	101	4	22361	Shoulder Bolt
31	2	22332	Tie Plate	103	6	MS037-10FA	Machine Screw
32	6	22333	Friction Disc	104	8	S050-17PH5	Bolt
33	6	22334	Drive Disc	105	9	B062J	Jam Nut
34	48	22335	Spring Retainer	106	1	22366	Bearing Lock Nut
35	52	22233	Clutch Plate Spring	107	1	22367	Lockwasher
36	1	22336	Back-Up Plate	108	1	58-RD6-1	Reducer Bushing
37	6	22337	Clutch Disc	109	1	2558001	Vent Plug
38	5	22338	Friction Disc	110	1	22368	Retainer Ring
39	1	22339	Piston	116	3	94058	Lockwire
40	1	22340	Ring Gear	117	7	22379	Brake Disc
41	1	22341	Thrust Bearing Support	118	8	22380	Friction Disc
42	1	22342	Clutch Hub	122	2	R18-075	Rollpin
43	1	22343	Ring Gear Spacer	124	1	22465	Face Seal Plate
44	1	22344	Pressure Plate	126	3	850320	Planet Gear Shaft
45	1	22345	Carrier Spring	127	3	R18-100	Rollpin
46	16	22346	Brake Spring	128	3	1885010	O-Ring
47	1	22347	Piston Cylinder	129	1	1385001	Roller Bearing
49	2	12047	Nipple	131	1	850930	Cable Clamp
55	1	850080	Planet Carrier	132	1	S050-15AD	Bolt
56	1	851040	Brake/Clutch Assy	138	2	MU7-121	Snap Ring
58	1	850070	Sun Gear	139	2	630300	Cam Retainer
59	1	850370	Brake Ring	140	1	850670	Brake Cam
60	1	850150	Back-Up Plate	141	1	850690	Brake Race
61	3	850530	Planet Gear	142	4	870730	Roller
62	1	850820	Ring Gear	143	4	238-148-4	Plunger
63	1	850830	Sun Gear	145	4	238-148-5	Spring
64	8	850170	Friction Disc	149	3	850750	Planet Gear
65	8	850200	Brake Disc	150	3	850360	Planet Gear Shaft
66	1	850440	Spacer	151	3	R18-075	Rollpin
68	1	1985001	Snap Ring	152	8	22566	Spring
69	2	1951001	Snap Ring	153	1	22770	Face Seal Washer
70	1	21-RD6-1	Snap Ring	154	1	22872	Pipe Collar

NOTE: REFER TO "MATERIAL LIST VARIABLES" FOR ITEMS NOT SHOWN IN BASIC MATERIAL LIST.

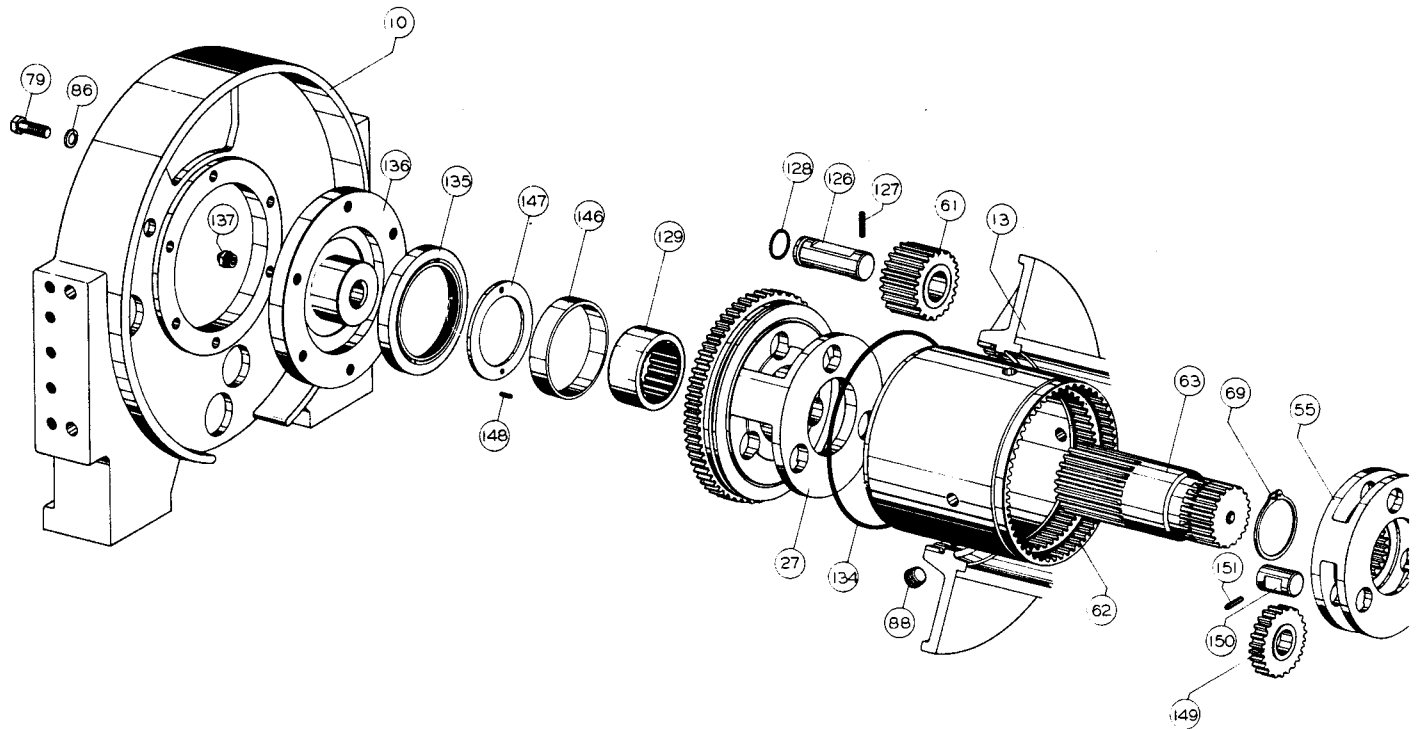
MATERIAL LIST VARIABLES

Construction Hoist Models C2H10D & C2H10D-1

Item No.	Description	Model C2H10D		Model C2H10D-1	
		Qty.	Cat. No.	Qty.	Cat. No.
6	Motor Gear	1	22305	1	22633
48	Hydraulic Motor	1	22348	1	22634
50	Nipple	3	22350	4	22350
51	Brk. Release Tube	1	22370	1	22635
52	Assy. Pilot Valve Tube	1	22371	1	22636
53	Back Press. Comp. Tube Assy.	1	22372	1	22637
54	Motor Drain Tube Assy.	1	22373	1	22638
57	Counterbalance Valve	1	850952	1	22557
67	Manifold	1	850960	1	22565
74	O-Ring	1	10330	2	10330
84	Lockwasher	6	A062	8	A062

Item No.	Description	Model C2H10D		Model C2H10D-1	
		Qty.	Cat. No.	Qty.	Cat. No.
102	Bolt	2	S062-17PH5	2	S062-30A
111	Elbow — 45° Male	3	21165	1	2685010
112	Tee — Male Branch	1	21166	2	2685011
113	Bolt	4	S043-20A	4	S050-20A
114	Bolt	4	S043-30A	4	S050-40A
115	O-Ring	1	21150	1	22574
119	Elbow — 90° Male	3	21163	3	2685008
120	Plug	1	E025W	—	—
121	Reducer Bushing	1	21162	—	—
133	Check Valve Assy.	1	851220	1	851220
155	Motor Adapter	—	—	1	22679
156	Connector — Male	—	—	1	2685014
157	Elbow-Tube Fitting	—	—	1	2685015
158	Tube	—	—	1	850990
159	O-Ring	—	—	1	1875012

COMPONENTS-MODELS C2H10 & C2H10-1



BRADEN 2-SPEED

MATERIAL LIST

Construction Hoist Models C2H10D & C2H10D-1

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4	3	22303	Planet Gear Shaft	75	1	10467	O-Ring
5	1	22304	Sun Gear Shaft	76	4	R18-087	Rollpin
7	1	22306	Motor Gear Bushing	77	12	2085001	Dowel Pin
8	3	22307	Planet Gear	78	7	S050-15PDH8	Bolt
9	1	22308	End Bracket	79	6	S037-12PH5	Bolt
10	1	22463	End Bracket	80	4	S031-07AF	Bolt
11	1	22310	Brake Piston	81	20	S050-12PH5	Bolt
12	1	22311	Spacer	82	9	B050E	Slotted Nut
13	1	81334	Drum Assembly	83	9	D12-125	Cotter Pin
14	1	22315	Clutch Hub	85	36	A050	Lockwasher
15	1	22316	Drum Bushing Support	86	6	A037	Lockwasher
16	1	22317	Pressure Plate	87	9	E012A	Pipe Plug
17	1	22318	Piston	88	1	E050W	Pipe Plug
18	1	22319	Cylinder	89	1	2341004	Elbow
19	1	22320	Thrust Bearing Support	90	8	22351	Thrust Bearing Race
20	1	22321	Carrier Bearing Shaft	91	1	22352	Ball Bearing
21	1	22467	Bearing Shaft Support	92	1	22353	Oil Seal
22	1	22323	Bearing Shaft Key	93	1	10450	O-Ring
23	1	22468	Clutch Cover	94	3	22355	O-Ring
24	1	22325	Clutch Cover Plate	95	2	22356	O-Ring
25	1	22326	Plate Gasket	96	2	22357	O-Ring
26	1	22327	Drum Bushing	97	2	22358	O-Ring
27	1	850040	Output Carrier	98	1	22359	O-Ring
28	9	22329	Adjusting Nut	99	1	22360	Thrust Washer
29	9	22330	Spring Stud	100	3	R12-112	Rollpin
30	9	22331	Clutch Spring	101	4	22361	Shoulder Bolt
31	2	22332	Tie Plate	103	6	MS037-10FA	Machine Screw
32	6	22333	Friction Disc	104	8	S050-17PH5	Bolt
33	6	22334	Drive Disc	105	9	B062J	Jam Nut
34	48	22335	Spring Retainer	106	1	22366	Bearing Lock Nut
35	52	22233	Clutch Plate Spring	107	1	22367	Lockwasher
36	1	22336	Back-Up Plate	108	1	58-RD6-1	Reducer Bushing
37	6	22337	Clutch Disc	109	1	2558001	Vent Plug
38	5	22338	Friction Disc	110	1	22368	Retainer Ring
39	1	22339	Piston	116	3	94058	Lockwire
40	1	22340	Ring Gear	117	7	22379	Brake Disc
41	1	22341	Thrust Bearing Support	118	8	22380	Friction Disc
42	1	22342	Clutch Hub	122	2	R18-075	Rollpin
43	1	22343	Ring Gear Spacer	124	1	22465	Face Seal Plate
44	1	22344	Pressure Plate	126	3	850320	Planet Gear Shaft
45	1	22345	Carrier Spring	127	3	R18-100	Rollpin
46	16	22346	Brake Spring	128	3	1885010	O-Ring
47	1	22347	Piston Cylinder	129	1	1385001	Roller Bearing
49	2	12047	Nipple	131	1	850930	Cable Clamp
55	1	850080	Planet Carrier	132	1	S050-15AD	Bolt
56	1	851040	Brake/Clutch Assy	138	2	MU7-121	Snap Ring
58	1	850070	Sun Gear	139	2	630300	Cam Retainer
59	1	850370	Brake Ring	140	1	850670	Brake Cam
60	1	850150	Back-Up Plate	141	1	850690	Brake Race
61	3	850530	Planet Gear	142	4	870730	Roller
62	1	850820	Ring Gear	143	4	238-148-4	Plunger
63	1	850830	Sun Gear	145	4	238-148-5	Spring
64	8	850170	Friction Disc	149	3	850750	Planet Gear
65	8	850200	Brake Disc	150	3	850360	Planet Gear Shaft
66	1	850440	Spacer	151	3	R18-075	Rollpin
68	1	1985001	Snap Ring	152	8	22566	Spring
69	2	1951001	Snap Ring	153	1	22770	Face Seal Washer
70	1	21-RD6-1	Snap Ring	154	1	22872	Pipe Collar

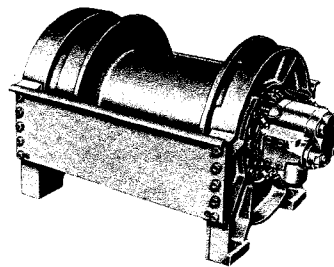
NOTE: REFER TO "MATERIAL LIST VARIABLES" FOR ITEMS NOT SHOWN IN BASIC MATERIAL LIST.

MATERIAL LIST VARIABLES

Construction Hoist Models C2H10D & C2H10D-1

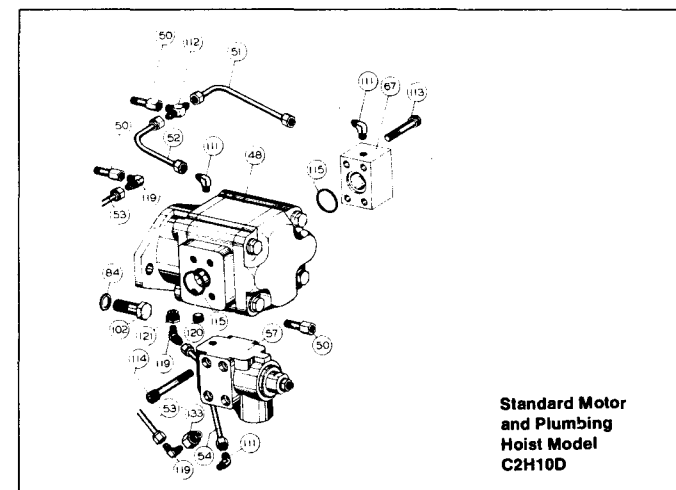
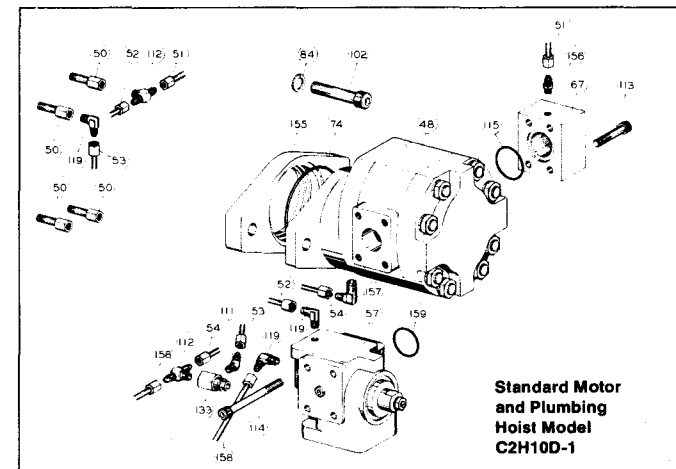
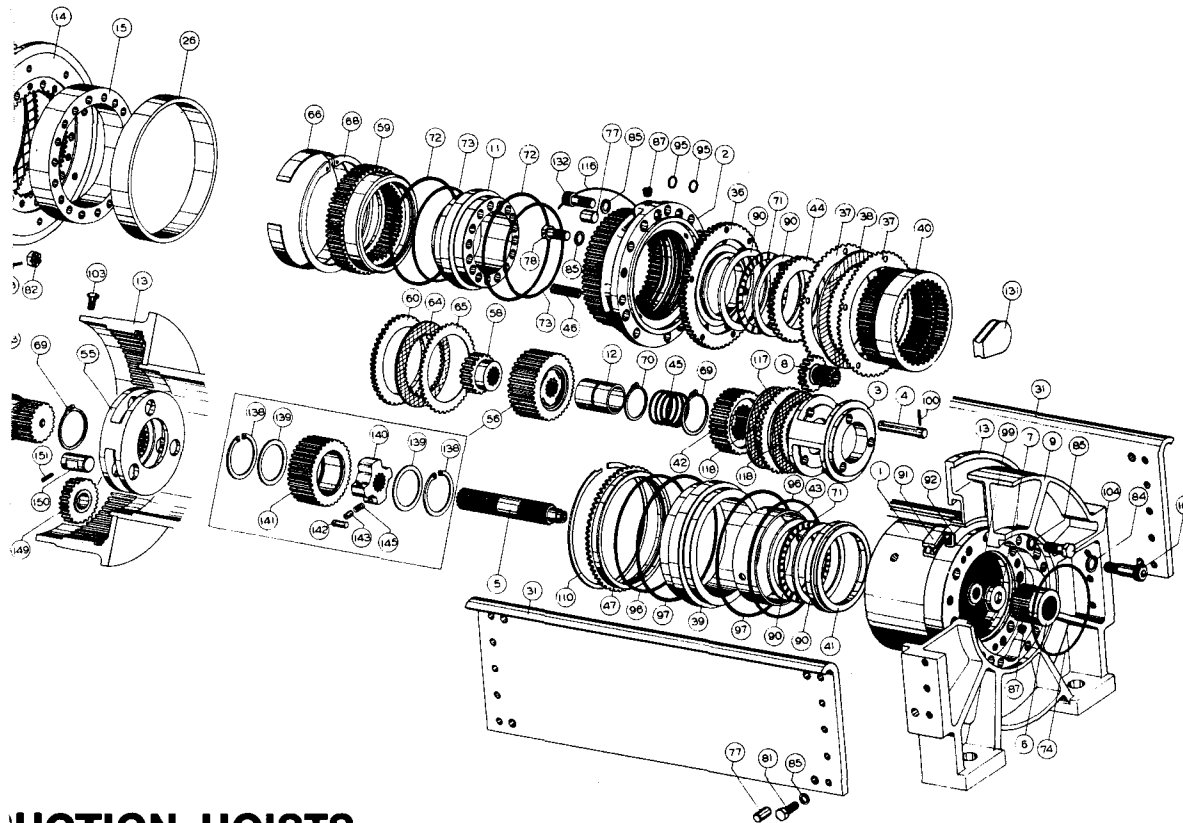
Item No.	Description	Model C2H10D		Model C2H10D-1	
		Qty.	Cat. No.	Qty.	Cat. No.
6	Motor Gear	1	22305	1	22633
48	Hydraulic Motor	1	22348	1	22634
50	Nipple	3	22350	4	22350
51	Brk. Release Tube	1	22370	1	22635
52	Assy. Pilot Valve Tube	1	22371	1	22636
53	Back Press. Comp. Tube Assy.	1	22372	1	22637
54	Motor Drain Tube Assy.	1	22373	1	22638
57	Counterbalance Valve	1	850952	1	22557
67	Manifold	1	850960	1	22565
74	O-Ring	1	10330	2	10330
84	Lockwasher	6	A062	8	A062

Item No.	Description	Model C2H10D		Model C2H10D-1	
		Qty.	Cat. No.	Qty.	Cat. No.
102	Bolt	2	S062-17PH5	2	S062-30A
111	Elbow — 45° Male	3	21165	1	2685010
112	Tee — Male Branch	1	21166	2	2685011
113	Bolt	4	S043-20A	4	S050-20A
114	Bolt	4	S043-30A	4	S050-40A
115	O-Ring	1	21150	1	22574
119	Elbow — 90° Male	3	21163	3	2685008
120	Plug	1	E025W	—	—
121	Reducer Bushing	1	21162	—	—
133	Check Valve Assy.	1	851220	1	851220
155	Motor Adapter	—	—	1	22679
156	Connector — Male	—	—	1	2685014
157	Elbow-Tube Fitting	—	—	1	2685015
158	Tube	—	—	1	850990
159	O-Ring	—	—	1	1875012



CONSTRUCTION HOIST MODELS C2H10D & C2H10D-1
O-RING KIT NO. 61277

Item No.	Qty.	Catalog Number	Description	Item No.	Qty.	Catalog Number	Description
1	3	1858003	O-Ring	8	2	22357	O-Ring
2	3	1885003	O-Ring	9	2	22358	O-Ring
3	1	10330	O-Ring	10	2	22359	O-Ring
4	1	10467	O-Ring	11	1	1885009	O-Ring
5	1	10450	O-Ring	12	3	1885010	O-Ring
6	3	22355	O-Ring	13	1	22374	O-Ring
7	2	22356	O-Ring	14	1	1875012	O-Ring



CONSTRUCTION HOISTS

For best results, use only factory certified replacement parts.

MATERIAL LIST

Construction Hoist Models C2H10 & C2H10-1

Item No.	Qty.	Catalog No.	Description	Item No.	Qty.	Catalog No.	Description
1	1	22300	Bearing Support	78	7	S050-15PDH8	Bolt
2	1	22301	Brake Cylinder	79	6	S037-12PH5	Bolt
3	1	22302	Planet Carrier	81	20	S050-12PH5	Bolt
4	3	22303	Planet Gear Shaft	85	56	A050	Lockwasher
5	1	22304	Sun Gear Shaft	86	6	A037	Lockwasher
7	1	22306	Motor Gear Bushing	87	6	E012A	Pipe Plug
8	3	22307	Planet Gear	88	2	E050W	Pipe Plug
9	1	22308	End Bracket	90	4	22351	Thrust Bearing Race
10	1	22309	End Bracket	91	1	22352	Ball Bearing
11	1	22310	Brake Piston	92	1	22353	Oil Seal
12	1	22311	Spacer	95	2	22356	O-Ring
13	1	81335	Drum Assembly	96	2	22357	O-Ring
27	1	850040	Output Carrier	97	2	22358	O-Ring
31	2	22377	Tie Plates	99	1	22360	Thrust Washer
36	1	22336	Back Up Plate	100	3	R12-112	Rollpin
37	6	22337	Clutch Disc	101	4	22361	Shoulder Bolt
38	5	22338	Friction Disc	104	8	S050-17PH5	Bolt
39	1	22339	Piston	110	1	22368	Retainer Ring
40	1	22340	Ring Gear	116	3	94058	Lockwire
41	1	22341	Thrust Bearing Support	117	7	22379	Brake Disc
42	1	22342	Clutch Hub	118	8	22380	Friction Disc
43	1	22343	Ring Gear Spacer	126	3	850320	Planet Gear Shaft
44	1	22344	Pressure Plate	127	3	R18-100	Rollpin
45	1	22345	Carrier Spring	128	3	188-5010	O-Ring
46	16	22346	Brake Spring	129	1	1385001	Roller Bearing
47	1	22347	Piston Cylinder	131	1	85093	Cable Clamp
55	1	850080	Planet Carrier	132	1	S050-15AD	Bolt
56	1	851040	Brake Clutch Assy	134	1	21033	O-Ring
58	1	850070	Sun Gear	135	1	1885001	Oil Seal
59	1	850370	Brake Ring	136	1	850060	Drum support
60	1	850150	Back Up Plate	137	1	28-FTD-2	Vent Plug
61	3	850530	Planet Gear	138	2	MU7-121	Snap Ring
62	1	850820	Ring Gear	139	2	630300	Cam Retainer
63	1	850830	Sun Gear	140	1	850670	Brake Cam
64	8	850170	Friction Disc	141	1	850690	Brake Race
65	8	850200	Brake Disc	142	4	850730	Roller
66	1	850440	Spacer	143	4	238-148-4	Plunger
68	1	1985001	Snap Ring	145	4	238-148-5	Spring
69	2	1951001	Snap Ring	146	1	2785001	Wear Sleeves
70	1	21-RD6-1	Snap Ring	147	1	850450	Thrust Washer
71	2	1457001	Thrust Bearing	148	2	850460	Thrust Washer Pin
72	2	1858003	O-Ring	149	3	850750	Planet Gear
73	2	1885003	O-Ring	150	3	850360	Planet Gear Shaft
77	12	2085001	Dowel Pin	151	3	R18-075	Rollpin

NOTE: REFER TO "MATERIAL LIST VARIABLES" FOR ITEMS NOT SHOWN IN BASIC MATERIAL LIST.

MATERIAL LIST VARIABLES

Construction Hoist Models C2H10 & C2H10-1

Item No.	Description	Model C2H10		Model C2H10-1	
		Qty.	Cat. No.	Qty.	Cat. No.
6	Motor Gear	1	22305	1	22633
48	Hydraulic Motor	1	22348	1	22634
50	Nipple	3	22350	4	22350
51	Brk. Release Tube	1	22370	1	22635
52	Pilot Valve Tube	1	22371	1	22636
53	Back Press. Comp.	1	22372	1	22637
54	Motor Drain Tube	1	22373	1	22638
57	Counterbalance Valve	1	850952	1	22557
67	Manifold	1	850960	1	22565
74	O-Ring	1	10330	2	10330
84	Lockwasher	6	A062	8	A062

Item No.	Description	Model C2H10		Model C2H10-1	
		Qty.	Cat. No.	Qty.	Cat. No.
102	Bolt	2	S062-17PH5	2	S062-30A
111	Elbow — 45° Male	3	21165	1	2685010
112	Tee — Male Branch	1	21166	2	2685011
113	Bolt	4	S043-20A	4	S050-20A
114	Bolt	4	S043-30A	4	S050-40A
115	O-Ring	1	21150	1	22574
119	Elbow — 90° Male	3	21163	3	2685008
120	Plug	1	E025W	—	—
121	Reducer Bushing	1	21162	—	—
133	Check Valve Assy.	1	851220	1	851220
155	Motor Adapter	—	—	1	22679
156	Connector — Male	—	—	1	2685014
157	Elbow-Tube Fitting	—	—	1	2685015
158	Tube	—	—	1	850990
159	O-Ring	—	—	1	1875012

PROCEDURE FOR DISASSEMBLY OF CONSTRUCTION HOIST MODELS C2H10, C2H10-1, C2H10D and C2H10D-1

The winch may be opened from either end.

For complete disassembly, remove winch from equipment, place in horizontal position, drain oil and flush. For partial disassembly, from either end, the oil need not be drained.

If disassembly begins at motor end, stand winch in a vertical position resting on end bracket, Item 10.

Remove control tubing, Items 51, 52, 53 and 54.

Remove capscrews and washers, Items 102 and 84.

Remove hydraulic motor, Item 48 and nipples, Item 50.

Remove capscrews and washers, Items 104 and 85, and shoulder bolts and lockwashers, Items 101 and 84.

Remove capscrews and washers, Items 81 and 85, from tie plates, Item 31. Remove tie plates. Remove motor end bracket, Item 9.

The end of the bearing support, Item 1, is now exposed. Remove motor gear, Item 6, and thrust washer, Item 99.

To remove bearing support, Item 1, attach a short length of chain, or similar device, by the aid of ½" N.C. capscrews through the links to the ½" capscrew holes in the bearing support.

With the aid of a hoist, lift bearing support from drum assembly, Item 13, keeping it as near vertical as possible to eliminate binding that could cause damage to the bearing or oil seal.

Remove spacer, Item 12, carrier spring, Item 45 and input sun gear shaft, Item 5.

Remove brake clutch assembly, Item 56.

Remove input sun gear, Item 58.

Remove secondary planet carrier, Item 55.

Remove output sun gear, Item 63.

Remove ring gear, Item 62.

Remove output carrier assembly, Item 27, from drum support end.

Disassembly procedures for hoist models C2H10, C2H10-1, C2H10D and C2H10D-1 are consistent to this point.

Reassembly of these components can be accomplished by reversing the above procedures.

Care should be exercised in the installation of the bearing support assembly, Item 1. Lower into position and check, by hand, the alignment of the three (3) sets of splines. When splines are aligned, tap bearing support assembly into place using a plastic hammer.

PROCEDURE FOR DISASSEMBLY FROM THE DRUM SUPPORT END OF CONSTRUCTION HOIST MODELS C2H10 and C2H10-1.

Stand winch on motor end with end bracket, Item

9, resting on blocks high enough from work surface to allow clearance for motor and brake valve.

Remove tie plates, Item 31, after removing capscrews and washers, Items 81 and 85.

Remove end bracket, Item 10, and drum support, Item 136, as a unit.

Remove output planet carrier assembly, Item 27. This can be accomplished by using a small bar with hook to lift carrier. If carrier is tight, use a grease seal removing tool to obtain leverage.

The sun gear, Item 63 and ring gear, Item 62 can be inspected or removed.

Remove secondary planet carrier, Item 55, and input sun gear, Item 58.

REASSEMBLY PROCEDURE

Replace O-ring, Item 134, and planet gear shaft O-rings, Item 128, on planet carrier, Item 27. Lubricate with light coating of grease. Inspect bearing, Item 129.

Install planet carrier in drum, Item 13, using care not to damage O-ring.

Inspect thrust washer, Item 147, and oil seal, Item 135, for damage. Replace if necessary.

If drum support, Item 136, was removed from end bracket, Item 10, re-install in bearing, Item 129.

Install end bracket, Item 10.

Install tie plates, Item 31.

PROCEDURE FOR DISASSEMBLY FROM THE DRUM SUPPORT END OF CONSTRUCTION HOIST MODELS C2H10D and C2H10D-1.

Stand winch on motor end with end bracket, Item 9, resting on blocks high enough from work surface to allow clearance for motor and brake valve.

Remove capscrews and washers, Items 81 and 85 and remove tie plates, Item 31. Remove oil filler and vent assembly, Items 49, 89, 108 and 109.

Remove capscrews and washers, Items 79 and 86.

Remove end bracket, Item 10, bearing support, Item 21, bearing shaft support locknut, Item 106, lockwasher, Item 107 and carrier bearing shaft, Item 20, as complete assembly.

Being careful of springs, Item 152, remove face seal plate, Item 124.

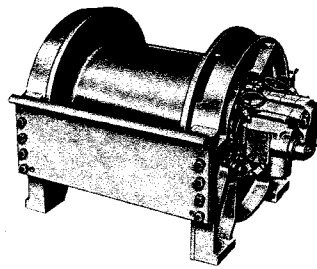
Remove clutch cover, Item 23. The drop clutch is now exposed and can be removed as an assembly.

Attach a lifting device to the spring studs, Item 29, and remove drop clutch from drum assembly, Item 13.

For further inspection below the drop clutch, remove output sun gear, Item 63 and ring gear, Item 62.

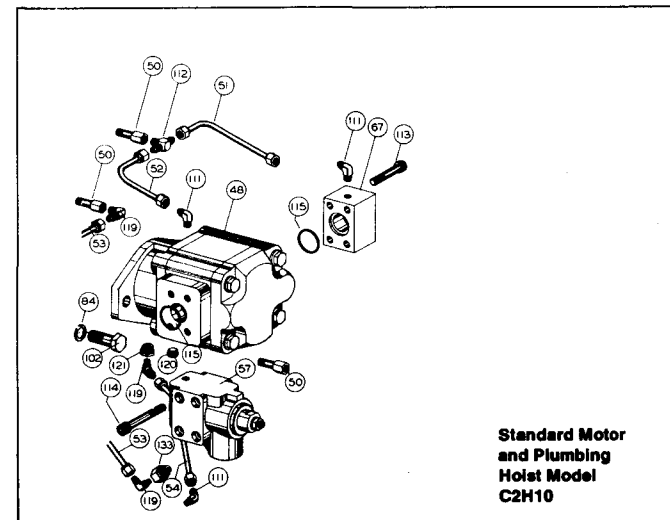
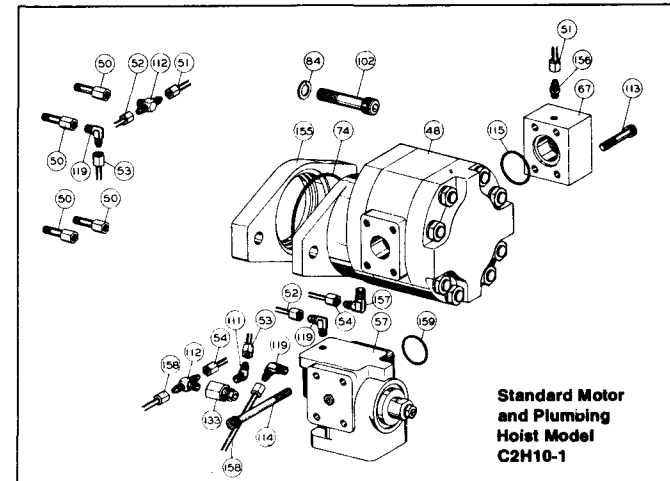
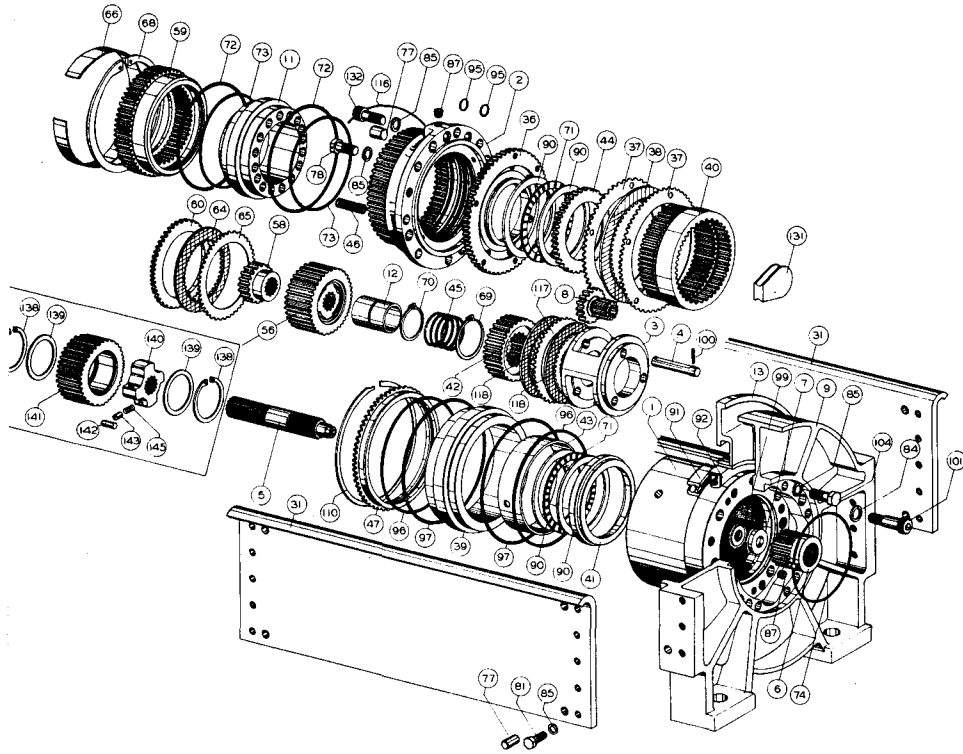
Remove secondary planet carrier assembly, Item 55.

Reassembly of these components can be accomplished by reversing the above procedures.



CONSTRUCTION HOIST MODELS C2H10 & C2H10-1
O-RING KIT NO. 61276

Item No.	Qty.	Catalog Number	Description	Item No.	Qty.	Catalog Number	Description
1	2	1858003	O-Ring	6	2	22358	O-Ring
2	2	1885003	O-Ring	7	1	1885002	O-Ring
3	2	10330	O-Ring	8	1	22574	O-Ring
4	2	22356	O-Ring	9	1	1875012	O-Ring
5	2	22357	O-Ring	10	1	1885009	O-Ring



CONSTRUCTION HOISTS

For best results, use only factory certified replacement parts.

PROCEDURE FOR DISASSEMBLY OF THE DROP CLUTCH OF CONSTRUCTION HOIST MODELS C2H10D and C2H10D-1.

Remove jam nuts, Item 105, adjusting nuts, Item 28 and clutch springs, Item 30.

Remove pressure plate, Item 16.

Remove drive discs, Item 33, friction discs, Item 32, clutch plate springs, Item 35 and retainer springs, Item 34.

Remove drop clutch hydraulic releasing cylinder, Item 18, and piston, Item 17. Inspect and replace O-rings, Items 75 and 94, and clutch plate springs, Item 35.

Remove and inspect thrust bearings, Item 71, and thrust bearing races, Item 90.

Remove thrust bearing support, Item 19, for inspection.

Remove output planet carrier, Item 27, for inspection of bearing and gears.

Remove clutch hub, Item 14, and inspect drum bushing, Item 26 and drum bushing support, Item 15.

REASSEMBLY PROCEDURE

After all parts have been cleaned and inspected, install clutch hub, Item 14, in drum using care not to damage bushing, Item 26.

Install output planet carrier, Item 27. All splines must be in alignment before carrier will drop into place.

Insert clutch friction disc, Item 32. Install eight (8) clutch plate springs, Item 35, and retainer springs, Item 34.

Install drive disc, Item 33.

It is important to arrange drive discs, Item 33, so that clutch plate springs are alternately offset so that spring holes will not be located in the same position.

When discs, springs and retainers are in place, install cylinder assembly, Item 18.

Place thrust bearing support, Item 19, on output carrier, Item 27. Install thrust bearing, Item 71 and thrust bearing races, Item 90.

Install O-ring, Item 75, in cylinder, Item 18. Lubricate with light coating of chassis grease. Install clutch plate springs, Item 35, and piston, Item 17.

Check vent plug, Item 87, to be certain it is secure.

Install drop clutch release assembly on bearing support, Item 19, being certain that thrust bearing, Item 71, and bearing race, Item 90, are in place on bearing support, Item 19.

Install thrust bearing races, Item 90, and thrust bearing, Item 71, on drop clutch release cylinder, Item 17.

Install clutch pressure plate, Item 16.

Place clutch springs, Item 30, over spring studs, Item 29, and install adjusting nut, Item 28.

DROP CLUTCH ADJUSTMENT

Tighten adjusting nuts, Item 28, until reaching a measurement of 2 17/32" from the top of the adjusting nut to the bottom of the clutch spring where it contacts the pressure plate.

If the clutch slips during the hoisting of a load, it may be due to wear on the friction discs. Tension on the springs can be increased by turning adjusting nuts in one quarter turn increments. Use care in tensioning springs as too much tension will cause improper operation of the free fall system.

The drop clutch can be easily adjusted with the winch mounted on equipment and cable on the drum.

With the aid of a hydraulic pumping unit (portapower, energpac, etc.) apply approximately 500 p.s.i. into fitting which releases drop clutch for free fall. This will release the drum so that it may be turned by hand. The drum may also be turned with power from the equipment.

Turn drum until square clutch cover plate, Item 24, appears at the large hole in end bracket, Item 10.

Remove four socket head bolts, Item 80, clutch cover plate, Item 24, and plate gasket, Item 25.

With power, center each of the adjusting nuts in the round hole of the aluminum clutch cover, Item 23, loosen jam nut, Item 105, and tighten adjusting nut as needed through the use of a 1 5/8" socket or tool which will go through the hole in the cover.

If the drum should turn with the clutch released, place a wood block, or similar object, under the flange of the drum. If the adjusting nut starts to turn while tightening the jam nut, it should be held down with a flat bar. Since there are nine adjusting nuts to be serviced, mark the first nut with a center punch to eliminate a second adjustment to the same nut.

Replace gasket and cover and secure with bolts. Release pressure on pump. Disconnect pump from winch fitting. Remove wood block from flange.

The winch is now ready for slip testing. If slipping continues to occur, repeat the procedure on clutch adjustments.

PROCEDURE FOR DISASSEMBLY OF THE BEARING SUPPORT MECHANISM OF CONSTRUCTION HOIST MODELS C2H10, C2H10-1, C2H10D and C2H10D-1.

Place bearing support, Item 1, on work bench, with motor side down.

Remove lockwire, Item 116.

Remove seven (7) 1 1/2" x 1/2" capscrews, Item 78.

Remove one (1) 1 1/2" x 1/2" socket head capscrews, Item 132.

Remove brake cylinder from bearing support with two (2) 1 1/2" x 1/2" capscrews inserted in threaded holes in flange to provide the needed leverage for pulling the assembly.

Remove snap ring, Item 68. Remove brake piston assembly, Item 11, complete with brake ring, Item 59, back-up plate, Item 60, friction discs, Item 64, brake discs, Item 65, O-ring, Item 72, O-ring, Item 73 and brake springs, Item 46.

The high and low speed clutches are now visible.

Remove thrust bearing races, Item 90, and thrust bearing, Item 71.

Remove high speed pressure plate, Item 44, and low speed clutch disc, Item 37.

Remove low speed friction disc, Item 38, high speed clutch discs, Item 117, and friction discs, Item 118.

Remove ring gear, Item 40, and spacer, Item 43.

Remove primary planet assembly, Items 3, 4 and 8, and roll pins, Item 100.

Remove retainer ring, Item 110, and piston cylinder, Item 47.

With a length of hardwood and a hammer, remove piston, Item 39, from bearing support.

Remove thrust bearing races, Item 90, and thrust bearing, Item 71, from thrust bearing support, Item 41. Remove O-rings, Items 96 and 97 for replacement.

Inspect bearing support, Item 1.

REASSEMBLY PROCEDURE

After lubricating with a light grease, install O-rings, Items 96 and 97, in bearing support, Item 1.

Install piston, Item 39, into bearing support, Item 1, using care not to damage O-rings.

Install thrust bearing support, Item 41, and insert thrust bearing races, Item 90, and thrust bearing, Item 71.

Insert motor drive gear, Item 6, into the primary planet assembly, Item 3; and, with motor gear in place, install in bearing support, Item 1. Be certain that the planet assembly fits into thrust bearing. (By installing in this manner, the planet gears will be timed with the ring gear.)

Install ring gear spacer, Item 43.

Install ring gear, Item 40.

Install three (3) low speed clutch discs, Item 37, next to piston, Item 39, then install one (1) friction disc, Item 38. Alternate discs between Items 37 and 38, until eight (8) clutch discs, Item 37, and five (5) friction discs, Item 38, have been installed.

Install high speed brake clutch assembly, Item 56, beginning by alternating friction discs, Item 118, and clutch discs, Item 117, until a total of eight (8) discs of each type have been installed.

Install pressure plate, Item 44, thrust bearing races, Item 90, and thrust bearing, Item 71.

Install back-up plate, Item 36.

Measure to make certain that clutch assembly is properly installed. With a carpenter's combination square, or similar measuring device, measure the dimension from the edge of back-up plate, Item 36,

close to the splines to the top or flat surface of the bearing support, Item 1. If the dimension reads $\frac{1}{4}$ " plus nothing, minus $\frac{1}{32}$ ", the clutch and primary planet are properly installed. If the dimension varies from standard, the assembly should be re-checked. A foreign object, a dislocated disc or a misplaced bearing could cause a stack up error.

The next step is the reassembly of the brake cylinder, Item 2.

Inspect cylinder housing and eliminate any dirt or foreign objects. Install new O-rings, Items 72 and 73.

Inspect O-ring groove in brake ring, Item 59, install O-ring, Item 73, and back-up plate, Item 60.

Inspect brake discs, Item 65, and friction discs, Item 64, for damage or defects.

Insert a friction disc, Item 64, into brake ring, Item 59, next to back-up plate, Item 60. Install brake disc, Item 65, and continue to alternate discs until eight (8) of each are in place.

Install brake piston, Item 11, being careful not to damage O-ring which should be lightly coated with chassis grease prior to installation.

Insert 16 brake springs, Item 46, in holes in piston, Item 11. A small amount of light grease will hold springs in place for installing piston assembly in brake cylinder, Item 2.

Install brake cylinder, Item 2, on bearing support, Item 1, using care to align brake control oil holes. Check O-rings at these locations.

After bearing support and brake cylinder assembly are completed and capscrews, Item 78, are tightened and dowel pins, Item 77, are in place, an oil pressure test will detect any leakage occurring around the O-ring seals.

Attach the hose of a hydraulic pumping device, such as a Porta-power pump, to the low speed side of the bearing support, Item 1, and apply 600 p.s.i. into this part of the low speed piston. If pressure holds, detach pump hose and connect it to the high speed side of the support and, again, apply 600 p.s.i. If pressure holds at this location, remove pump hose and attach it to the brake balancing input of the brake cylinder, Item 2, and then to the brake release input. Check both points at 600 p.s.i.

If leaks appear during these tests, re-check all O-ring installations and re-test.

The brake cylinder friction discs and brake discs must be aligned and centered and this is accomplished while the brake cylinder is under pressure.

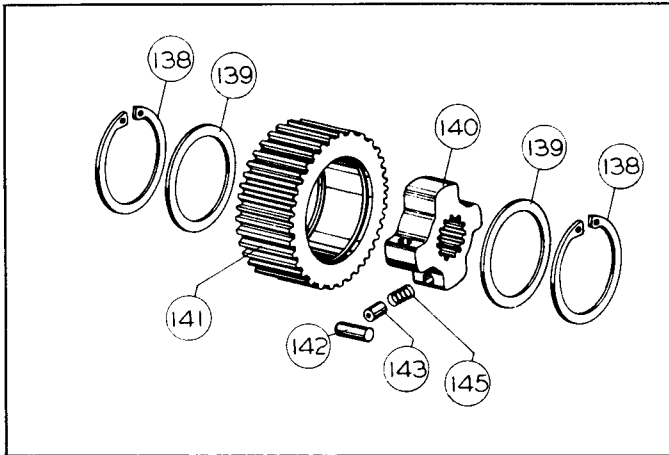
Insert sun gear shaft, Item 5, into position as a guide.

Install brake clutch assembly, Item 56, on sun gear shaft and into splines of brake discs. When all splines are aligned and the brake clutch assembly moves freely, release the pressure on the brake assembly. Tension on the brake springs will secure the brake discs in place.

Remove the sun gear shaft and brake clutch assembly.

Tie all capscrews together with mechanics tie wire to keep them from becoming lost.

BRAKE CLUTCH ASSEMBLY PART NO. 851040 — MATERIAL LIST AND ASSEMBLY INSTRUCTIONS



Item No.	Qty.	Catalog No.	Description
138	2	MU7-121	Snap Ring
139	2	630300	Cam Retainer
140	1	850670	Brake Cam
141	1	850690	Brake Race
142	4	870730	Roller
143	4	238-148-4	Plunger
145	4	238-148-5	Spring

DISASSEMBLY PROCEDURE

Remove Snap rings, Item 138.

Remove cam retainers, Item 139.

This will release the brake cam, Item 140, brake race, Item 141, brake rollers, Item 142, plungers, Item 143, and springs, Item 145.

Check for wear on race and rollers.

REASSEMBLY PROCEDURE

Insert brake cam, Item 140, into brake race, Item 141, just far enough to insert springs, Item 145, plungers, Item 143, and rollers, Item 142.

By using the input shaft, Item 5, to hold the cam, the springs, plungers and rollers can be inserted with

the aid of a small screwdriver.

After these parts are in place, install the cam retainers, Item 139, and secure with snap rings, Item 138.

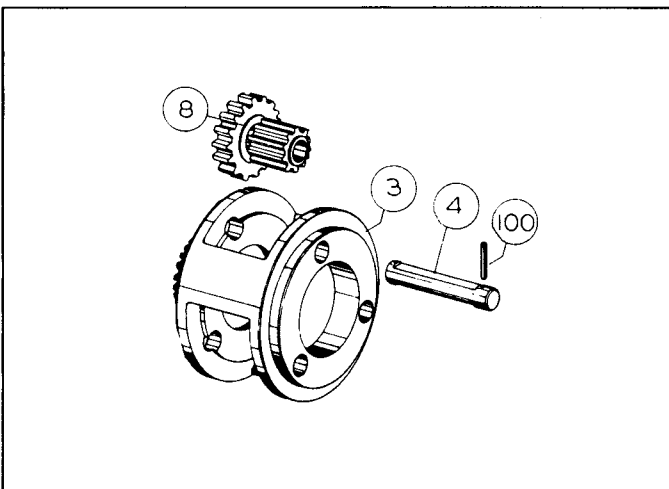
When all parts have been assembled, it is important to check the rotation of the brake clutch assembly.

Insert the input shaft, Item 5, into the brake clutch assembly, Item 56. Place the brake clutch in the left hand and rotate the shaft in a counter-clockwise direction. If the rotor of the brake assembly turns in this direction, the brake clutch is properly assembled and can be inserted into the brake cylinder housing. If it will not turn in this direction, the installation of the brake clutch assembly should be reversed.

If the brake is installed opposite to this procedure, the winch will be working against the brake and the brake will not release. There will be no forward rotation or raising action of the load.

PLANET CARRIER INSPECTION PROCEDURES

PLANET CARRIER, PART NO. 22302



Item No.	Qty.	Catalog No.	Description
3	1	22302	Planet Carrier
4	3	22303	Planet Gear Shaft
8	3	22307	Planet Gear
100	3	R12-112	Rollpin

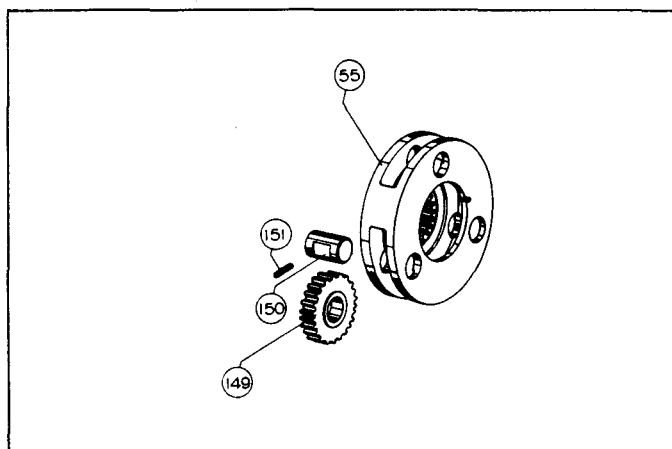
on the punch will drive the rollpin completely from the shaft, Item 4. The shaft and planet gear, Item 8, can be removed for inspection.

To reassemble, install planet gear, Item 8, into planet carrier, Item 3. Insert planet shaft, Item 4, into planet carrier through hole provided. Align rollpin holes. Install rollpin, Item 100, so that it is flush with the carrier, both top and bottom.

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

Remove rollpin, Item 100, by inserting $\frac{1}{8}$ " pin punch into hole provided in planet carrier, Item 3. A few taps

PLANET CARRIER, PART NO. 850080



Remove rollpin, Item 151, by inserting 3/16" punch into hole provided in planet housing, Item 55. A few taps on the punch will drive the rollpin into the planet shaft, thus allowing for the removal of the shaft and

Item No.	Qty.	Catalog No.	Description
55	1	850080	Planet Carrier
149	3	850750	Planet Gear
150	3	850360	Planet Gear Shaft
151	3	R18-075	Rollpin

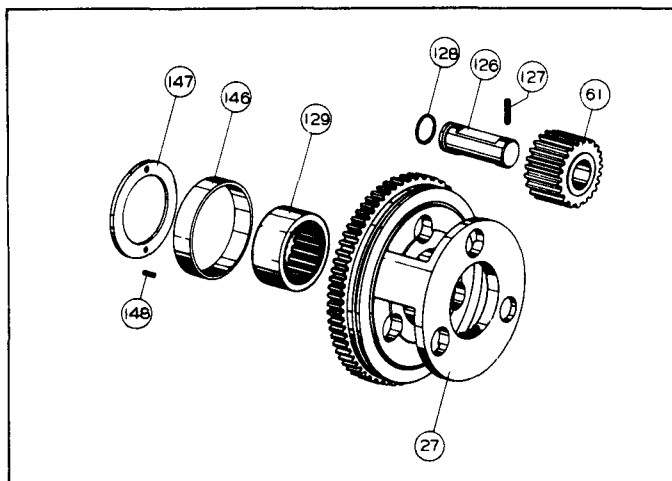
planet gear, Item 149.

To reassemble, install planet gear, Item 149, into carrier. Item 55, aligning shaft holes. Insert planet gear shaft into carrier hole through gear into carrier. Be certain that rollpin holes are in alignment.

Install rollpin, Item 151. Countersink pin to 3/16" below the surface of the carrier. With a center punch, dimple the edge of the rollpin hole to keep the pin from backing out.

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

PLANET CARRIER, PART NO. 850040



Remove rollpin, Item 127, by inserting 3/16" punch into hole provided in planet housing, Item 27.

Tap rollpin into planet shaft, allowing for the removal of the shaft, Item 126, O-ring, Item 128, planet gear, Item 61, and roller bearing, Item 129.

On hoist Models C2H10 and C2H10-1, the wear sleeve, Item 146, thrust washer, Item 147, and thrust washer pin, Item 148, can be removed.

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

To reassemble, insert planet gear, Item 61, into carrier, Item 27.

Install O-ring, Item 128 in groove of planet gear shaft, Item 126, and coat lightly with all purpose grease.

Item	Description	C2H10 C2H10-1		C2H10D C2H10D-1	
		Qty.	Cat. No.	Qty.	Cat. No.
27	Output Carrier	1	850040	1	850040
61	Planet Gear	3	850530	3	850530
126	Planet Gear Shaft	3	850320	3	850320
127	Rollpin	3	R18-100	3	R18-100
128	O-Ring	3	1885010	3	1885010
129	Roller bearing	1	1385001	1	1385001
146	Wear Sleeve	1	2785001	—	—
147	Thrust Washer	1	850450	—	—
148	Thrust Washer Pin	2	850460	—	—

Install planet gear, Item 61, in carrier and insert rollpin end of shaft through gear, into O-ring side of planet carrier.

Press or tap lightly until pin end of shaft is through and aligned with roll pin hole in carrier.

Install rollpin, Item 127, into position to lock shaft into place and prevent turning. Countersink rollpin to 3/16" below the surface of the carrier. Dimple edge of hole with center punch to prevent pin from backing out.

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

Insert roller bearing, Item 129, into hole provided.

On Hoist Models C2H10 and C2H10-1, install wear sleeve, Item 146, by using a hand press to prevent damage to the part.

Install thrust washer, Item 147, and thrust washer pin, Item 148.

Install O-ring, Item 134.

BRAKE VALVE INFORMATION

The brake valve assembly, Item 57, 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 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. 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 then be inspected.

Replace the spool, springs and retainers and replace nut.

CONVERSION FROM STANDARD UNIT TO HIGH-SPEED UNIT

Standard Construction Hoist Models C2H10 and C2H10D are equipped with a commercial motor which will utilize 65 G.P.M. at 2500 p.s.i.

Construction Hoist Models C2H10-1 and C2H10D-1 carry a larger commercial motor, manifold and brake valve which utilizes 100 G.P.M. @2500 p.s.i. with either $\frac{5}{8}$ " or $\frac{1}{2}$ " diameter cable.

Standard units may be changed to higher speed units through the addition of the parts listed in the variable bills of material.

The conversion requires a different motor gear, Item 6, and a motor adapter, Item 155, in addition to the motor, manifold, brake valve and additional plumbing parts.

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 be 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 valve should have both working parts open directly into the tank line in neutral positions.

MAINTENANCE SUGGESTIONS

I. Oil Capacities

Hoist Model	Oil Capacity (Pints)
C2H10	14
C2H10-1	14
C2H10D	22
C2H10D-1	22

Use approved 90 weight worm gear oil in all hoists.

II. Checking Oil Level

On Construction Hoist Models C2H10 and C2H10-1, the filler and oil level plugs are located in the support end of the drum, identified as two (2) $\frac{1}{2}$ " square socket plugs.

Rotate winch drum until one plug is visible in the large hole at the top of the end bracket.

The second, or oil level plug, should appear in a round hole 90 degrees from the top plug. If this plug pattern does not show, rotate the winch drum another $\frac{1}{4}$ of a turn.

The oil should be level with the lower plug.

On Construction Hoist Models C2H10D and C2H10D-1, the filler and oil level plugs are located in the end of the bearing shaft support, Item 21.

Vent section Item Numbers 49, 89, 108 and 109 are removed to provide an oil fill access for the winch.

The oil level plug, Item 87, is located below center and to the side of the filler plug. The oil should be level with this plug.

The drain plug, Item 88, is located near the outside edge of the aluminum clutch cover, Item 23. Drum must be rotated until plug is visible in the round hole at the bottom of the end bracket.

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 tube and elbow. 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 tubing 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.

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

1. If the winch is equipped with a Racine brake valve, the orifice plug should be checked. Remove pilot control tubing and fitting and check orifice plug for tightness. This plug should be snug in the orifice hole. Do not damage part by over tightening. Replace fitting and tubing. Readjust pressure with set screw if required.

