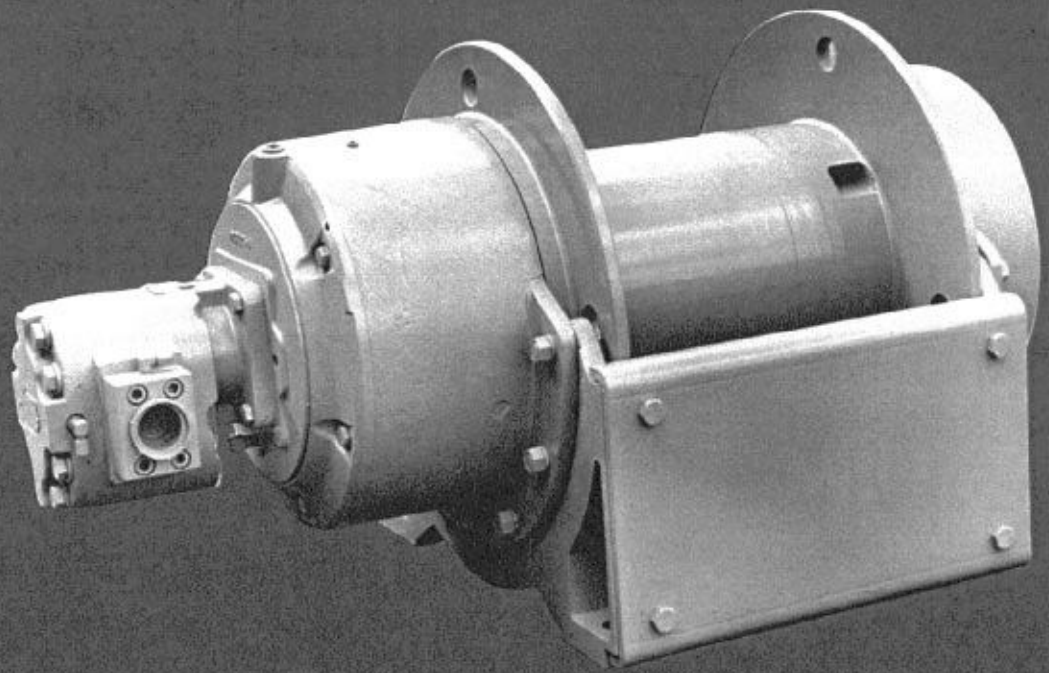
Gearmatic®

GH30 EQUAL SPEED HYDRAULIC WINCH

PARTS SERVICE & MAINTENANCE MANUAL



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PG-11

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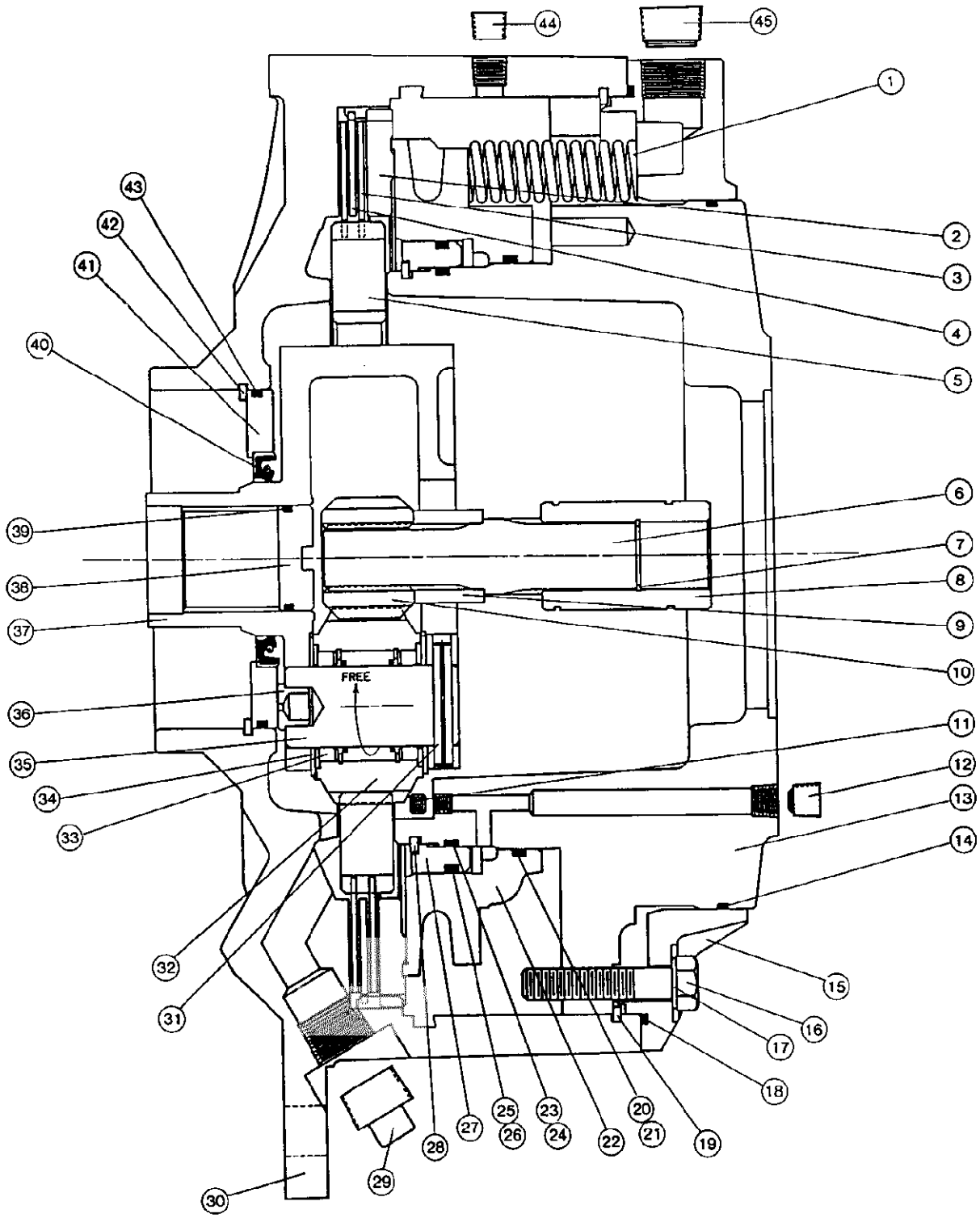
Gearmatic
Model GH30 HSR & G2H30

Temporary Service Manual

The attached Primary Assembly parts list and Two Speed Motor Assembly parts list can be used with the Model GH30 Service Manual (PG-117) to service the Model GH30HSR & G2H30 winches.

Primary Assembly GH30 High Speed Reverse

Item	Part No.	Description	Qty.
	76350	Hydraulic Motor Group (includes items 506 thru 512 on page 26 of GH30 equal speed service manual)	1
1	76382	Die Spring	18
2	76355	Brake Backing Plate	1
3	73221	Brake Plate	2
4	72204	Divider Plate	1
5	76361	Ring Gear	1
6	76339	Input Shaft	1
7	24506	Retaining Ring	1
8	25609	Inner Brake Race	1
9	76360	Spacer, Input Shaft	1
10	71071	Sun Gear	1
11	21335	Plug	1
12	75299	Pipe Plug	1
13	76336	Motor Support	1
14	22666	O-Ring	1
15	72646	Spring Cover	1
16	72186	Capscrew	6
17	72144	Seal Washer	6
18	25016	O-Ring	1
19	72182	Snap Ring	1
20	21675	O-Ring	1
21	72126	Backup Washer	1
22	76354	Brake Piston	1
23	72109	O-Ring	1
24	72125	Backup Washer	1
25	72110	O-Ring	1
26	72127	Backup Washer	1
27	71995	Seal Ring	1
28	72061	Snap Ring	1
29	23378	Plug	1
30	71399	Housing	1
31	75087	Spring Pin	3
32	81957	Planet Gear Assembly	3
33	72376	Bearing	6
34	71074	Spacer	6
35	71064	Planet Pin	3
36	71010	Thrust Spacer	3
37	74848	Planet Hub	1
38	72600	Thrust Pad	1
39	13838	O-Ring	1
40	77336	Oil Seal	1
41	71099	Seal Ring	1
42	72202	Snap Ring	1
43	21040	O-Ring	1
44	77322	Pipe Plug	1
45	75084	Pipe Plug	1
	76363	Motor Mount Assembly (Includes items 1 thru 9, 11 thru 14, 17, 18 and 20 thru 28)	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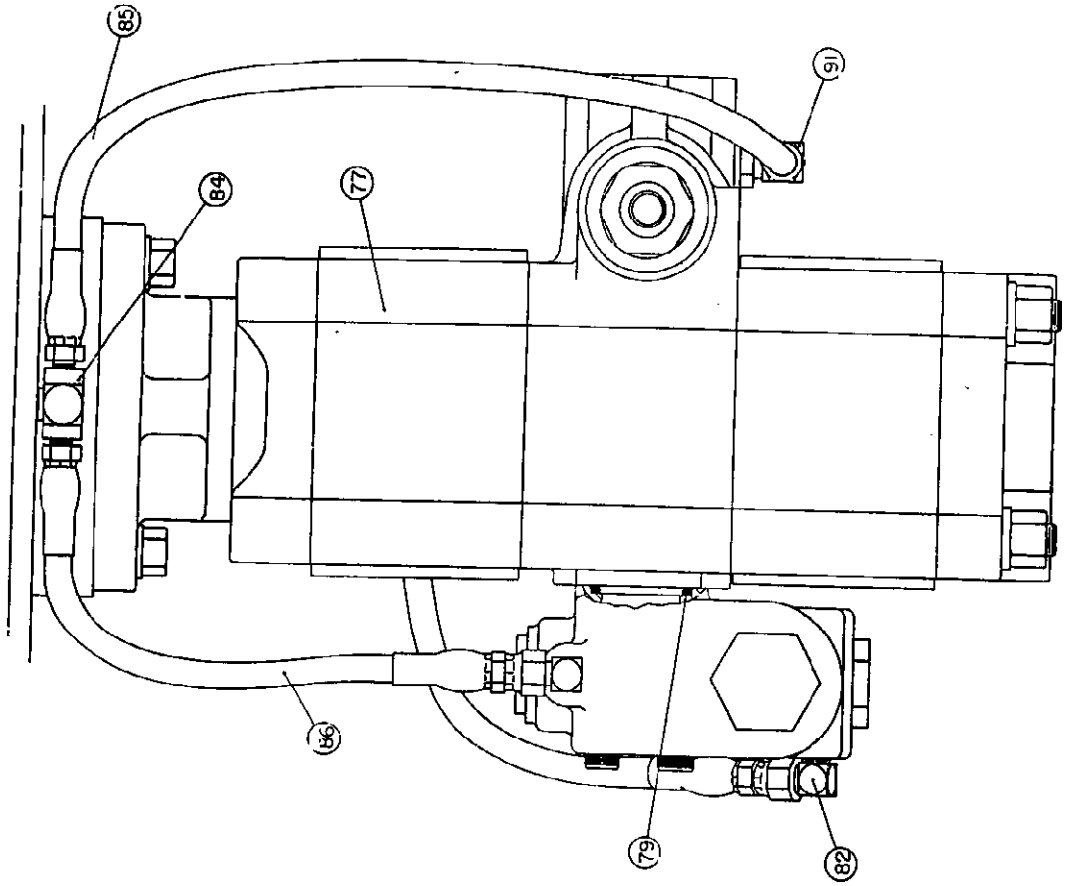
Hydraulic Motor Assembly G2H30

Item	Part No.	Description	Qty.
77	25337	Hydraulic Motor (2 speed)	1
78	81586	Brake Valve	1
79	21150	O-Ring	1
81	10330	O-Ring	1
82	21163	Elbow	2
84	22934	Tee, Male Branch	1
85	13707	Hose Assembly	2
86	13711	Hose Assembly	1
87	13413	Capscrew (1/2 - 13 X 1 1/2 Gr. 5)	4
88	11026	Lockwasher (1/2)	4
89	24236	Reducer Elbow	1
90	24012	Capscrew (7/16 - 14 X 3 1/4 Gr. 5 Socket Head)	4
91	25302	Elbow	1

Most parts in the Primary Assembly of a G2H30 winch are the same as those shown on pages 26 & 27 of the GH30 equal speed service manual, with the following EXCEPTIONS:

Item	Part No.	Description	Qty.
50	76414	Two Speed Planet Hub Assembly	1
51	76415	Two Speed Brake Hub Assembly	1
286	76382	Spring	21
304	76416	Primary Planet Gear	3
309	76417	Planet Hub	1
312	76421	Spacer	2
314	76418	Sun Gear	1
500	21335	Plug	1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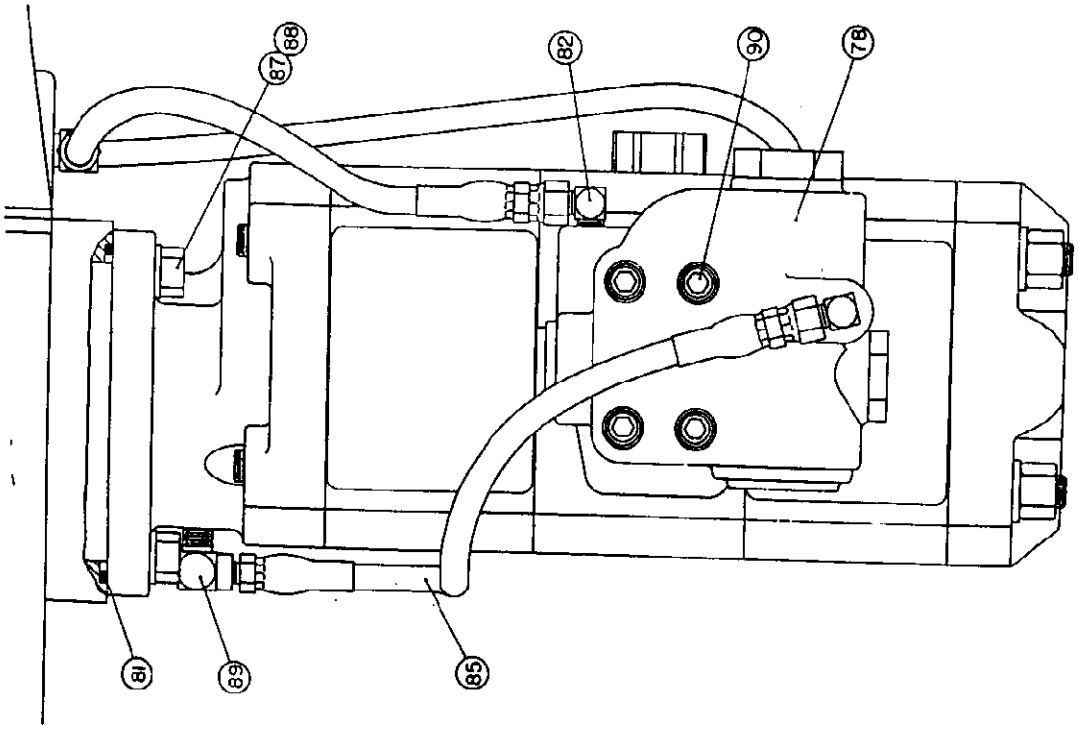
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Technical Data Sheet TD 58	HYDRAULIC WINCH HIGH SPEED REVERSE	Gearmatic®

The Gearmatic Hydraulic Winch consists of a primary drive housing and a final drive housing fastened to a winch base by dowel bolts which hold the housings concentric. The cable drum is carried on anti-friction bearings between the drive housings.

The primary drive housing contains a hydraulic motor which drives the sun gear of a primary planetary reduction. The output of this reduction is transmitted by a shaft which passes through the centre of the cable drum to the sun gear of a final planetary reduction in the final drive housing. The output from the final planetary reduction is transmitted directly to the cable drum through a spline attaching the final drive planet hub to the cable drum.

The ring gear of the primary reduction is held in its drive housing by a metallic friction disc-type brake. The brake is held engaged by springs, and is released by an annular hydraulic piston. This piston is connected to that motor port which is pressurized for reverse rotation, and becomes the exhaust port for forward rotation. In this way the brake is engaged at all times until the winch is powered in reverse.

The planet gears of the primary reduction form the outer races of cam-type overrunning clutches, and are carried on roller bearing assemblies mounted at each end of the planet gears, and on either side of the cam clutches. The planet pins, which carry these gears, cams and roller bearings, are fixed rigidly to the primary planet hub. When the winch is powered in a forward direction of rotation, the overrunning clutches permit the planet gears to run free, and the full power from the hydraulic motor is transmitted through the entire unit to the cable drum. When the winch is stopped by moving the control valve to neutral, the cable load causes the cam clutches to "lock up" and the load is then held entirely by the friction brake.

When hydraulic oil is supplied to the motor for reverse rotation, the cam clutches "lock up" and the winch will not rotate until the pressure builds up and releases the brake sufficiently to permit the primary planet assembly to rotate as a solid unit. When the primary reduction is active for forward rotation it provides a reduction of approximately 5¼ to 1. When the unit is driven in reverse, this reduction is eliminated and the cable drum will rotate 5¼ times faster than it will in the forward direction for the same volume of oil supplied to the motor. This provides a high speed "pay out" of the cable.

INTRODUCTION

The following service instructions have been prepared to provide assembly, disassembly and maintenance information for the Gearmatic Model GH30 winch. It is suggested that before doing any work on these units, all assembly and disassembly instructions should be read and understood.

The instructions are divided into groups. These groups cover a particular subject, subassembly or major assembly.

Refer to the heading of each group to determine applicability.

Continuing improvement and advancement of design may cause changes to your winch which may not be included in this publication. Each publication is reviewed and revised, as required, to update and include these changes in later editions.

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Refer to Service Manual J504B for Freefall Attachment.

GENERAL SAFETY RECOMMENDATIONS

Safety for operators and ground personnel is of prime concern. Always take the necessary precautions to ensure safety to others as well as yourself. To ensure safety, the winch must be operated with care and concern for the equipment and the operator should have a thorough knowledge of the machine's performance capabilities. The following recommendations are offered only as a guide for the operator. Local rules and regulations will also apply.

1. Read all warning tag information and become familiar with all controls BEFORE operating winch.
2. Never attempt to clean, oil or perform any maintenance on a machine with the engine running, unless instructed to do so in the Service Manual.

!WARNING!

ON MACHINES HAVING HYDRAULICALLY, MECHANICALLY AND/OR CABLE CONTROLLED EQUIPMENT, BE CERTAIN THE EQUIPMENT (BOOM, SHEAVE BLOCKS, PENDANTS, ETC.) IS EITHER LOWERED TO THE GROUND OR BLOCKED SECURELY BEFORE SERVICING, ADJUSTING AND/OR REPAIRING THE WINCH.

3. Before starting engine be certain all controls move freely and are placed in the neutral position.
4. Never operate winch controls unless you are sure personnel are clear of work area.
5. Operate winch line speeds to match job conditions.
6. Assure that personnel who are responsible for hand signals are clearly visible and that the signals to be used are thoroughly understood by everyone.
7. Never attempt to handle wire rope when the hook end is not free.
8. Leather gloves should be used when handling wire rope.
9. Ground personnel should stay in view of winch operator and clear of work area. Do not allow ground personnel near wire rope under tension. A safe distance of at least 1½ times the length of the cable in use should be maintained.
10. When winding cable on the winch drum, never attempt to maintain tension by allowing cable to slip through hands. Always use "hand-over-hand" method.
11. Use correct size cable anchor for cable and pocket in winch drum. Never use a knot to secure or attach cable.
12. Inspect rigging, winch and hoses at the beginning of each work shift. Any wire rope with broken strands; or rigging worn; or damaged hoses should be replaced immediately.
13. Be sure of equipment stability before operating winch.
14. Do not weld to any part of the winch.
15. Keep equipment in good operating condition. Perform scheduled servicing and adjustments listed in the "Preventive Maintenance" section of this manual. Keep hydraulic systems clean and free from contamination at all times.
16. An equipment warm-up procedure is recommended for all start-ups and essential at ambient temperatures below +40°F. Refer to "Warm-up Procedure" listed in the "Preventive Maintenance" section of this manual.
17. Do not exceed the maximum pressure (PSI) or flow (GPM) stated in the winch specifications.
18. The GEARMATIC designed wire rope anchors are capable of supporting the rated load when installed properly. For additional safety, ALWAYS maintain a minimum of five (5) wraps of wire rope on the drum.

Safety and informational callouts in this manual include:

!WARNING!

WARNING — This emblem is used to warn against hazards and unsafe practices which COULD result in severe personal injury or death if proper procedures are not followed.

!CAUTION!

CAUTION — This emblem is used to warn against potential or unsafe practices which could result in personal injury, and product or property damage if proper procedures are not followed.

EXPLANATION OF MODEL NUMBER

GH30 __ - 44090 - 00

PRIMARY DRIVE
- **GH30** - Single Speed
- **G2H30** - Two Speed

FINAL DRIVE
- **BLANK** - Without Free Fall
- **F** - Controlled & Full Release Free Fall
- **G** - Controlled Free Fall
- **J** - Full Release Free Fall

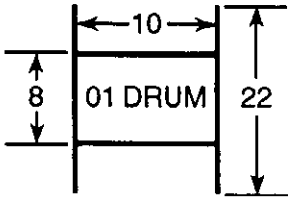
OVERALL RATIO

Equal Speed
- **44** - 44:1 (Low Speed Final Reduction)
- **36** - 36.27:1 (Medium Speed Final Reduction)
- **22** - 22.52:1 (High Speed Final Reduction)

High Speed Reverse
- **44/8** - 44:1 Hoisting, 8.25:1 Lowering
- **36/7** - 36.27:1 Hoisting, 6.80:1 Lowering
- **22/4** - 22.52:1 Hoisting, 4.22:1 Lowering

MOTOR
- **090** - 9.02 Cu. In. Displacement

DRUM
- **00** - Special
- **20** - 8 X 16 X 10
- **01** - 8 X 22 X 10
- **02** - 8 X 22 X 16
- **03** - 8 X 22 X 22
- **04** - 8 X 22 X 28
- **06** - 14 X 22 X 10
- **07** - 14 X 22 X 16
- **08** - 16 X 22 X 16
- **10** - 10 X 16 X 10
- **11** - 12 X 22 X 16
- **13** - 12 X 22 X 10



GH30 EQUAL SPEED PERFORMANCE

Performance data has been calculated at the following conditions:

Winch Reduction	**44:1 (Low Speed Final Reduction)**
Oil Flow & Pressure	**125 US gpm (473 l/min) @ 2,500 psi (172 bar)**
Cable Diameter	**3/4 in. (19 mm)**
Motor Displacement	**9.02 cu in./rev**

	Low Speed 8.25 Final Reduction	Medium Speed 6.80 Final Reduction	High Speed 4.22 Final Reduction
Drum Speed (rpm)	68	82	132
Drum Torque (lb-in.)	116,000	95,600	59,300
Drum Torque (kg-m)	1,336	1,102	683

Drum No.	Line Pull-lbs. & Line Speed-ft/min, Low Speed Final Reduction					
	Bare Drum		Mean Drum		Full Drum	
	lbs.	ft/min	lbs.	ft/min	lbs.	ft/min
20	26,425	154	19,750	208	15,750	261
01	26,425	154	15,750	261	11,225	367
02	26,425	154	15,750	261	11,225	367
03	26,425	154	15,750	261	11,225	367
04	26,425	154	15,750	261	11,225	367
06	15,175	270	12,700	323	10,925	376
07	15,175	270	12,700	323	10,925	376
08	13,825	296	12,700	323	10,925	376
10	21,500	190	18,900	216	15,225	270
11	18,150	225	13,450	305	10,700	385
13	18,150	225	13,450	305	10,700	385

Drum No.	Line Pull-kg. & Line Speed-m/min, Low Speed Final Reduction					
	Bare Drum		Mean Drum		Full Drum	
	kg.	m/min	kg.	m/min	kg.	m/min
20	11,986	47	8,958	63	7,144	80
01	11,986	47	7,144	80	5,092	112
02	11,986	47	7,144	80	5,092	112
03	11,986	47	7,144	80	5,092	112
04	11,986	47	7,144	80	5,092	112
06	6,883	82	5,761	98	4,955	115
07	6,883	82	5,761	98	4,955	115
08	6,271	90	5,761	98	4,955	115
10	9,752	58	8,573	66	6,906	82
11	8,233	69	6,101	93	4,853	117
13	8,233	69	6,101	93	4,853	117

DIMENSIONAL DATA

Dimensions in parenthesis are in millimeters.

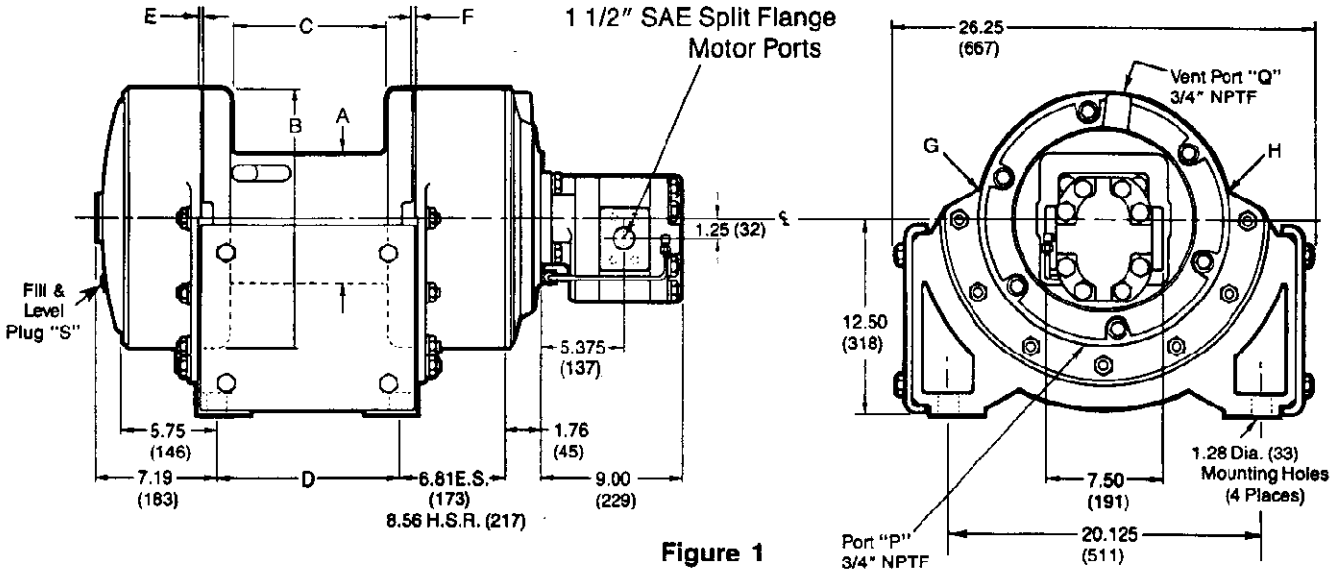


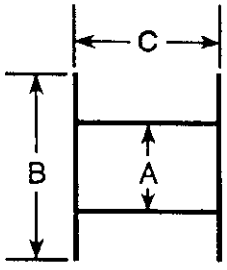
Figure 1

Drum	01	02	03	04	06	07	08	10	11	13	20
A	8	8	8	8	14.5	14.5	16	10	12	12	8
	(203)	(203)	(203)	(203)	(368)	(368)	(406)	(254)	(305)	(305)	(203)
B	22.3	22.3	22.3	22.3	22.3	22.3	22.3	16.2	22.3	22.3	16.2
	(566)	(566)	(566)	(566)	(566)	(566)	(566)	(411)	(566)	(566)	(411)
C	10	16	22	28	10	16	16	10	16	10	10
	(254)	(406)	(559)	(711)	(254)	(406)	(406)	(254)	(406)	(254)	(254)
D	11.625	17.625	23.625	29.625	11.625	17.625	17.625	11.625	17.625	11.625	11.625
	(295)	(448)	(600)	(752)	(295)	(448)	(448)	(295)	(448)	(295)	(295)

WIRE ROPE CAPACITY

Drum No.	Cable Size - In. (mm) & Line Capacity - ft. (m)											
	1/2	(13)	9/16	(14)	5/8	(16)	3/4	(19)	7/8	(22)	1	(25)
20	450	(137)	350	(106)	260	(79)	180	(54)	120	(36)	200	(51)
01	985	(300)	735	(224)	610	(185)	410	(125)	310	(94)	110	(28)
02	1610	(490)	1205	(367)	1000	(305)	675	(205)	515	(157)	240	(61)
03	2235	(681)	1675	(510)	1395	(425)	940	(286)	720	(219)	390	(99)
04	2860	(871)	2145	(653)	1785	(544)	1210	(368)	925	(282)	540	(137)
06	590	(180)	535	(163)	410	(125)	280	(85)	185	(56)	685	(174)
07	960	(292)	880	(268)	670	(204)	465	(141)	310	(94)	120	(30)
08	870	(265)	640	(195)	585	(178)	390	(118)	240	(73)	195	(50)
10	365	(111)	265	(80)	245	(75)	160	(48)	100	(30)	210	(53)
11	1300	(396)	1050	(320)	830	(252)	504	(153)	350	(106)	90	(23)
13	795	(242)	640	(195)	505	(154)	305	(93)	210	(64)	320	(81)

Drum Dimensions - Inches											
Drum	20	01	02	03	04	06	07	08	10	11	13
A	8	8	8	8	8	14.5	14.5	16	10	12	12
B	16	22	22	22	22	22	22	22	16	22	22
C	10	10	16	22	28	10	16	16	10	16	10
Drum Dimensions - millimeters											
A	203	203	203	203	203	368	368	406	254	305	305
B	411	566	566	566	566	566	566	566	411	566	566
C	254	254	406	559	711	254	406	406	254	406	254



THEORY OF OPERATION

DESCRIPTION OF WINCH

The winch has three basic assemblies

1. Primary planetary housing and motor assembly
2. Final planetary housing assembly
3. Drum and Base assembly

The hydraulic motor is bolted to the motor support retained in the primary end housing. The drum assembly is supported by both end bracket assemblies which receive additional support from the side plates.

PLANETARY GEAR TRAIN

The hydraulic motor shaft is directly coupled to the primary sun gear which also acts as the inner race of the over-running brake clutch. When driven by the sun gear, the primary planet gears walk around the ring gear machined in the primary end housing and drive the primary planet carrier.

The primary planet carrier drives the sun gear shaft which passes through the drum and drives the output planet gears. As the output planet gears are driven by the sun gear shaft, the planet gears walk around the ring gear machined in the final end housing and drive the output planet carrier. As the output planet carrier rotates, it drives the drum through a splined connection.

BRAKE SYSTEM

The brake system contains three basic components:

1. Spring applied, friction disc brake
2. Over-running brake clutch assembly
3. Hydraulic piston and cylinder

The brake consists of a friction disc which is internally splined to the outer clutch hub of the over-running brake clutch. When compressed by spring force, the brake piston clamps the brake plate which locks the over-running brake clutch outer hub to the primary end housing.

The sprag type over-running brake clutch is installed between the primary sun gear and the outer clutch hub. The over-running brake clutch allows the primary sun gear to turn freely in the direction to haul in cable and locks up to force the friction brake discs to turn with the primary sun gear to pay out cable. The brake plate remains fully applied when hauling in cable and must be released by pilot pressure to pay out cable.

When hoisting or pulling a load, the brake clutch allows free rotation of the primary sun gear. The sprag cams lay over and permit the primary sun gear to turn free of the outer clutch hub. Figure 2. The friction brake remains fully engaged. The winch is not affected by any braking action when hauling in.

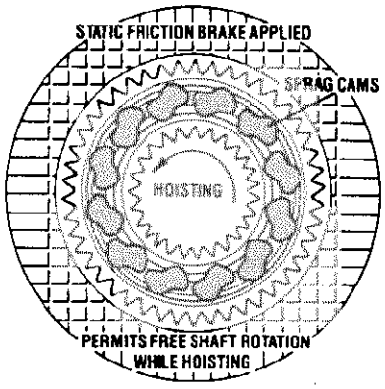


Figure 2

When the haul in operation is stopped, the load attempts to turn the primary sun gear in the opposite direction. This reversed input causes the sprag cams to instantly engage and firmly lock the primary sun gear to the outer brake clutch hub. (Figure 3).

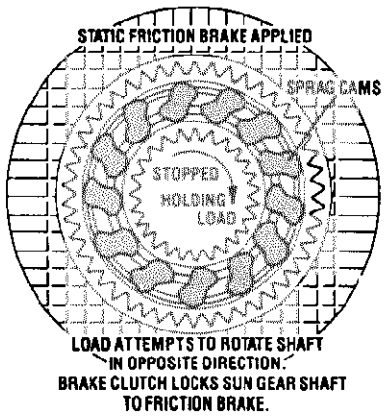


Figure 3

When the winch is powered in reverse, to pay out cable, the motor and gear train will not rotate until sufficient pilot pressure is supplied to the brake release piston to overcome the brake spring force. With no load on the winch, approximately 500 PSI is required to compress the brake springs and allow the friction brake disc splined to the outer brake clutch hub, to turn free. As pilot pressure increases, the brake is gradually released allowing the motor to drive the gear train in reverse to pay out cable.

When the control valve is returned to neutral or "hold", the pilot pressure will drop and the brake will apply to hold the load.

If the load on the drum barrel tries to drive the motor faster than the supply of oil will permit (i.e. if the motor tries to act as a pump), the hydraulic pressure acting on the brake piston will decrease, causing an increase in the effective spring load, resulting in an increase in braking effort. In this way, a balanced pressure is supplied to the motor and brake release piston according to the load on the winch drum.

The speed of the winch in reverse and forward is purely dependent on the volume of oil supplied to the motor through the control valve.

WINCH AND WIRE ROPE INSTALLATION

1. The winch should be mounted with the centerline of the drum in a horizontal position. The mounting plane of the winch may be rotated in any position around this centerline providing the oil circulating port in the motor support is correctly aligned at the twelve o'clock position. Refer to "Final Drive End Service" and "Primary Planetary End Service" for installation instructions.

2. When mounting the winch, use all four (4) mounting holes and grade eight (8) bolts and nuts. Evenly tighten nuts to 800 lb.-ft. (111 kg-m) torque, lubricated with 30W motor oil, in approximately 40 lb. ft. increments.

   It is important that the winch is mounted on a surface that will not flex when the winch is in use, and cause binding of the gear train. Binding in the gear train will result in accelerated wear and heat. Also, the mounting surface should be flat within ± .020 inches. (0.51 mm)

   As a final installation test, check clearance between the drum and end housings at two (2) locations around the winch. The clearance should be equal within .010" (0.254 mm). Repeat test for each side of winch. Left and right hand sides need not equal each other. If necessary, install steel shims under winch mounting pads to achieve even mounting. (Ref. Figure 1)

3. The hydraulic lines and components that operate the winch should be of sufficient size to assure minimum back pressure at the winch. Maximum return line pressure must not exceed 125 psi, measured at the winch motor ports.

   The winch directional control valve must be a three position four way valve with a motor spool such that when the valve is in the center position both work ports are open to tank (open center, open port).

4. High quality hydraulic oil is essential for satisfactory performance and long hydraulic system component life.

OIL RECOMMENDATION

The **Final Drive Assembly** should be filled with SAE 90 gear oil, meeting API GL5 specifications, to the level of the fill plug "S".

The **Primary Drive Assembly** should be filled with the same oil used in the hydraulic system.

!CAUTION!

WINCHES ARE SHIPPED FROM THE FACTORY WITHOUT OIL. OIL MUST BE ADDED TO BOTH THE PRIMARY AND FINAL DRIVE ENDS BEFORE THE WINCH IS OPERATED.

Oil having 150 to 330 SUS viscosity at 100°F (38°C) and viscosity index of 100 or greater will give good results under normal temperature conditions. The use of an oil having a high viscosity index will minimize cold-start trouble and reduce the length of warmup periods. A high viscosity index will minimize changes in viscosity with corresponding changes in temperature.

Maximum cold weather start-up viscosity should not exceed 5000 SUS with a pour point at least 20°F lower than the minimum temperature.

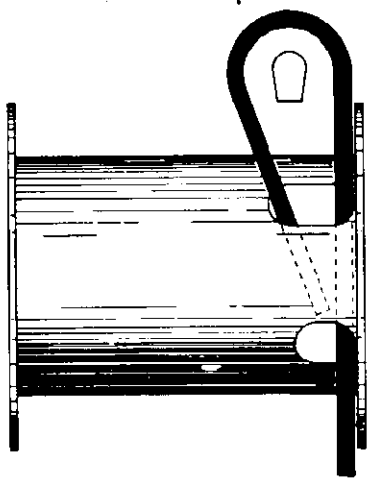
Under continuous operating conditions the temperature of the oil at any point in the system must not exceed 180°F. 120° – 140°F is generally considered optimum.

In general terms: for continuous operation at ambient temperatures between 50 and 110°F use SAE 20W; for continuous operation between 10° and 90°F, use SAE 10W; for applications colder than 10°F, contact the GEARMATIC Service Department. The use of multi-viscosity oils is generally not recommended.

The hydraulic oil filter should have a 10 micron nominal rating and be full flow type.

WIRE ROPE INSTALLATION

Take the free end of the wire rope and insert it through the small opening of the anchor pocket. Loop the wire rope and push the free end about three-fourths of the way back through the pocket. Install the cable anchor with the small end toward the drum, then pull the slack out of the wire rope. The cable anchor will slip into the pocket and secure the wire rope into the drum.



Use cable anchor 71978 for 7/16–5/8 in. (11–16 mm) wire rope on 14.5 in. (368 mm) and 16 in. (406 mm) diameter barrels.

Use cable anchor 71979 for 11/16–7/8 in. (17–22 mm) wire rope on 8 in. (203 mm), 10 in. (254 mm) and 12 in. (305 mm) diameter barrels.

Standard drum rotation, to haul-in cable, is counter clockwise when viewed from the motor end.

HYDRAULIC CIRCUIT

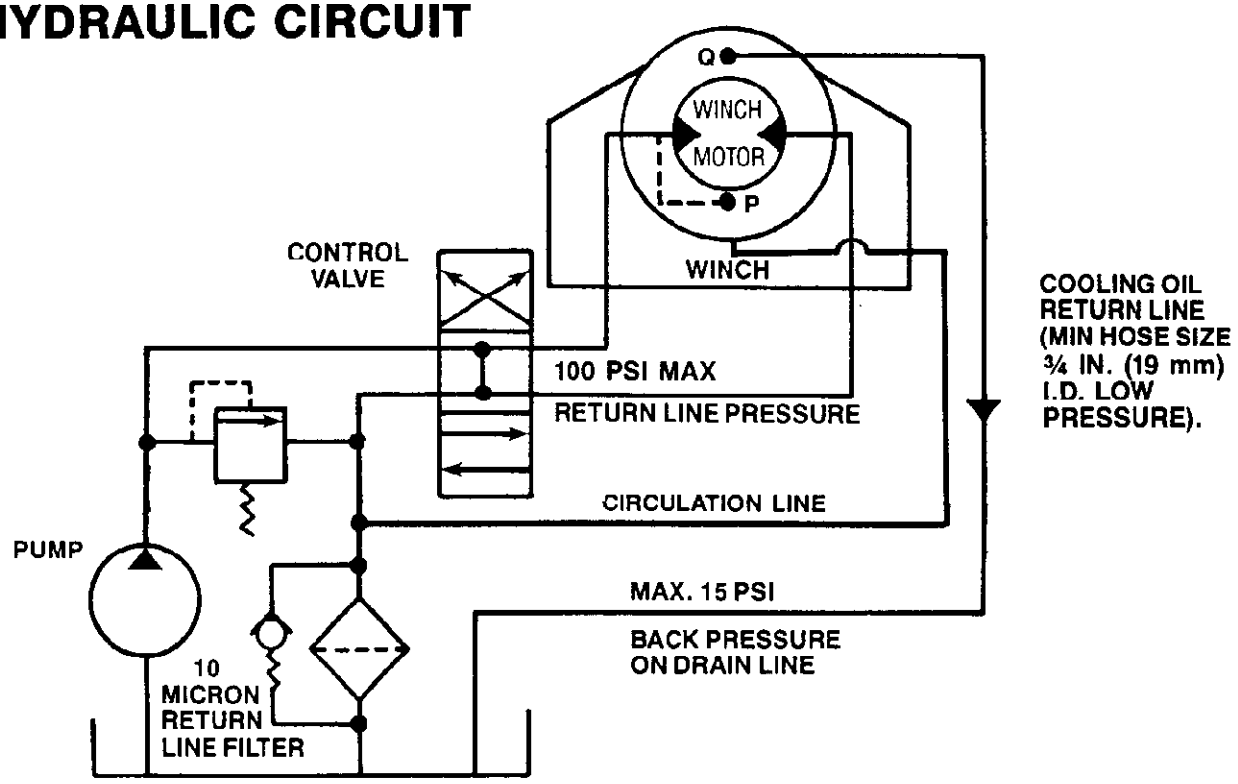


Figure 4

It is necessary to circulate oil through the primary housing. This provides cooling for the brake and also insures that the primary housing is completely filled with oil.

!CAUTION!

The GH30 series winch, with a sealed shaft external motor assembly does **NOT** provide additional primary housing lubrication as did the internal non-sealed motors used on earlier 30 series winches.

Figure 4 illustrates a basic hydraulic circuit. Oil is circulated through the primary housing so that it enters at port 'P' and leaves at port 'Q'. The hose used for circulation lines to ports 'P' and 'Q' can be low-pressure hose with "push on" fittings. Port 'Q' should be located as close to top dead center as possible.

!CAUTION!

The pressure in the winch case due to circulation must never exceed 15 psi. Excessive pressures will damage seals.

In order to maintain maximum efficiency in the winch, select the size of hydraulic lines according to the maximum volume of oil to be used in the winch (see Table). If the hydraulic lines used are too small, they may cause excessive back pressure at the reverse motor port sufficient to release the brake (125 psi maximum) (9/kg/cm²).

The sizes shown in the table are to be used as a guide only. If trouble is experienced due to the use of long hoses it will be necessary to use hoses which are one size larger.

HOSE REQUIREMENTS		
Oil Flow GPM (l/min)	**Pressure Lines Inside Dia.**	**Return Lines Inside Dia.**
36-60 GPM (136-227 l/min)	1¼ in. (32 mm)	1½ in. (38 mm)
61-80 GPM (228-303 l/min)	1½ in. (38 mm)	1¾ in. (44 mm)
81-125 GPM (304-473 l/min)	2 in. (51 mm)	2¼ in. (57 mm)

Line from Port Q — ¾" (19 mm) Minimum

Once the hydraulic circuit has been completed, bleed all air from the primary housing before running the winch. This is done by slackening one spring cover bolt nearest the top of the primary housing while oil is being circulated through the housing.

In order to obtain smooth control during low speed lowering, it is recommended that the hydraulic pump is operated at maximum gpm (l/min) and that the control valve is used to control the speed.

PREVENTIVE MAINTENANCE

A regular program of preventive maintenance for your planetary winch will minimize the need for emergency servicing and help provide extended component life.

NOTE: All service intervals are specified for equipment operating hours of the prime mover.

1. Every 500 hours or six (6) months, whichever occurs first, check the gear oil in the final drive assembly.

2. Every 1000 hours or twelve (12) months, whichever occurs first, disassemble the final drive assembly and thoroughly inspect the parts following the instructions for that section.

3. Every 1000 hours or twelve (12) months, whichever occurs first, remove the motor and motor support assembly to inspect the brake disc and sprag clutch assembly following the instructions for those sections.

4. HYDRAULIC SYSTEM.
   The original filter element should be replaced after the first fifty (50) hours of operation, then every 500 operating hours or three (3) months, or in accordance with the equipment manufacturer's recommendations.

5. WIRE ROPE.
   Inspect entire length of wire rope according to wire rope manufacturer's recommendations.

6. MOUNTING BOLTS.
   Tighten all winch base mounting bolts to recommended torque after the first one hundred (100) hours of operation, then every 500 operating hours or six (6) months, whichever occurs first.

7. WARM-UP PROCEDURE.
   A warm-up procedure is recommended at each start-up and is essential at ambient temperatures below +40°F (4°C).

The prime mover should be run at its lowest recommended RPM with the hydraulic winch control valve in neutral allowing sufficient time to warm up the system. The winch should then be operated at low speeds, forward and reverse, several times to prime all lines with warm hydraulic oil, and to circulate hydraulic oil through the planetary gear sets and brake.

!CAUTION!

Failure to properly warm up the winch, particularly under low ambient temperature conditions, may result in temporary brake slippage due to high back pressures attempting to release the brake, or may cause excessive pressure build-up in the winch housing causing premature seal failures.

RECOMMENDED BOLT TORQUE

The general purpose torque shown in the chart applies to SAE Grade 5 bolts, studs and standard steel full, thick and high nuts.

Higher or lower torques for special applications will be specified such as the use of spanner nuts, nuts on shaft ends, jam nuts and where distortion of parts or gaskets is critical.

Lubricated Torque values based on use of SAE 30W engine oil applied to threads and face of bolt or nut.

To convert lb-ft to N-m, multiply lb-ft by 1.356.

To convert lb-ft to Kg-m, multiply lb-ft by 0.1383.

BOLT DIA. INCHES	THD PER INCH	TORQUE LB-FT. DRY	TORQUE LB-FT. LUBED
1/4	20 28	9	6
5/16	18 24	18	13
3/8	16 24	31	23
7/16	14 20	50	37
1/2	13 20	75	55
9/16	12 18	110	80
5/8	11 18	150	115

BOLT DIA. INCHES	THD PER INCH	TORQUE LB-FT. DRY	TORQUE LB-FT. LUBED
3/4	10 16	265	200
7/8	9 14	420	325
1	8 14	640	485
1 1/8	7 12	790	590
1 1/4	7 12	1110	835
1 3/8	6 12	1460	1095
1 1/2	6 12	1940	1455

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
A. Winch will not pull maximum load.	1. System relief valve may be set too low.	Install a pressure gauge in the haul-in port and apply a stall pull on the winch. If pressure is low, increase relief valve setting until recommended pressure is obtained. NOTE: If pressure does not increase in proportion to adjustment, relief valve may be contaminated or worn out. In either case, the relief valve may require disassembly or replacement.
	2. If this trouble occurs suddenly after working at a maximum pull, a particle of dirt may be lodged under the system relief valve, holding it partially open. If this is the cause, a considerable loss in line speed may be noticed as the load on the cable is increased.	Remove relief valve, disassemble and clean parts thoroughly in a suitable solvent. Reassemble and install relief valve. Reset pressure according to specifications.
	3. If the pump is belt driven, the belts may be slipping.	Check belts when pump is at full PSI (kg/cm²) (stall pull on winch). Tighten belts if they are found to be slipping.
	4. The oil level in the reservoir may be too low. The suction line may be restricted or have an air leak causing cavitation at the inlet port. This will cause the pump to make a whining noise.	Check oil level in the reservoir. Check the suction line for damage, externally and internally. Replace suction line if necessary.
	5. The winch may be mounted on an uneven or flexible surface which causes distortion of the winch base and binding of the gear train. Binding in the gear train will absorb horsepower needed to generate the rated line pull and cause heat.	Reinforce mounting surface. If necessary, use steel shim stock to level winch. First loosen, then evenly retighten all winch mounting bolts to recommended torque.
	6. Be certain hydraulic system temperature is not more than 180 degrees F. Excessive hydraulic oil temperatures increase motor internal leakage and reduce motor performance.	Same as remedy for A-5. Same as remedy for B-4.
	7. Winch line pull rating is based on 1st layer of wire rope. Expected line pull may be in excess of winch rating.	Refer to winch performance charts for additional information.
	8. After all the causes listed above have been investigated and it is found that the winch will stall at maximum pressure without developing the maximum pull on the bare drum, the trouble may be in the winch.	Install a pressure gauge in the motor haul-in port and apply a stall pull on the winch. If the pressure is up to maximum and the bare drum line pull is less than the specified line pull, the trouble will be in the winch. Disassemble winch according to disassembly instructions and check that gear train turns freely. If gear train is found to be satisfactory, inspect the hydraulic motor, according to the service instructions for the hydraulic motor.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
B. Considerable reduction in line speed.	1. Same as A-2.	Same as remedy for A-2.
	2. Same as A-4.	Same as remedy for A-4.
	3. Same as A-6.	Same as remedy for A-5 & B-4.
	4. If this trouble has increased gradually, the hydraulic pump or winch motor may be worn.	Remove and inspect pump. If satisfactory, consult the disassembly instructions for the winch and remove and inspect the motor according to the service instructions for the hydraulic motor.
C. Reverse speed is slower than forward speed.	1. Control valve may be restricted in its travel.	Check the travel of the control valve spool. The spool travel should be the same in both directions.
	2. Same as A-1.	Same as remedy for A-1.
	3. Oil may be too thick causing a high resistance to rotation at the brake plates and causing the relief valve to by-pass.	Follow warm-up procedure in "Preventive Maintenance" section.
	4. Same as F-1.	Same as remedy for F-1.
D. Brake will not hold when control valve is returned to neutral after lifting a load.	1. Excessive system back pressure acting on the brake release port.	Install a pressure gauge at the "pay-out" port of the hydraulic motor. Operate the pump at full throttle and monitor pressure in "neutral" and haul-in positions. If the pressure is greater than 100 PSI, check for restrictions in the return line from the winch to the control valve and the control valve to the reservoir.
	2. Friction brake will not hold due to worn or damaged brake discs.	Disassemble winch to inspect/replace worn parts.
	3. Brake clutch is slipping.	Improper hydraulic oil may cause the brake clutch to slip. Replace brake parts and refill reservoir with recommended hydraulic oil.
		Brake clutch may be damaged or worn. Disassemble and inspect brake clutch.
E. Brake will not control or stop the load when lowering.	1. Same as D-1, 2, or 3.	Same as remedies for D-1, 2, or 3.
	2. Winch is being overloaded.	Install a pressure gauge at the haul-in port and apply a stall pull on the winch. If the pressure is higher than the maximum specified PSI, reduce the pressure.
	3. After the causes listed above have been investigated and found to be satisfactory, the trouble may be in the winch.	Disassemble the primary drive assembly according to the disassembly instructions. Inspect the brake springs, brake plate and brake hub assembly. Check that the brake hub assembly will "lock up" in the required direction of rotation.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
F. The winch will not lower the load or not lower the load smoothly.	1. The friction brake may not be releasing as a result of a defective brake piston seal. NOTE: If the brake piston seal is defective you will usually notice excessive oil flow from the winch vent line.	Check brake piston seals.
	2. Friction brake will not release as a result of damaged brake disc.	Disassemble brake to inspect brake discs.
	3. Hydraulic system flow too low for smooth operation of winch motor and brake release.	Operate pump at maximum RPM.
	4. Same as B-4.	Same as remedy for B-4.
	5. Same as A-3.	Same as remedy for A-3.
	6. Same as A-5.	Same as remedy for A-5.
	7. Control valve handle being operated too quickly	Operate control valve smoothly when starting and stopping a load. Conduct operator training as required.
	8. No oil circulating through the winch.	Install oil circulation line. See section on hydraulic circuit.
	9. Control valve does not have good metering characteristics.	See "Winch Installation" sections for control valve specifications.
G. The winch runs hot.	1. Same as A-5.	Same as remedy for A-5.
	2. Be certain that the hydraulic system temperature is not more than 180 degrees F. Excessive hydraulic oil temperatures may be caused by:	
	A. Plugged heat exchanger.	Thoroughly clean exterior and flush interior.
	B. Too low or high oil level in hydraulic reservoir.	Fill/drain to proper level.
	C. Same as A-1.	Same as remedy for A-1.
	D. Hydraulic pump not operating efficiently.	Remove and inspect pump.
		Check suction line for damage. If pump is belt driven, belts may be slipping. Replace/tighten belts.
	3. Excessively worn or damaged internal winch parts.	Disassemble winch to inspect/replace worn parts.
	4. Circulation oil drain line may be restricted.	Inspect the vent drain line for damage or restrictions.
H. Winch "chatters" while raising rated load.	1. Same as A-1.	Same as remedy for A-1.
	2. Same as B-4.	Same as remedy for B-4.
	3. Same as F-3.	Same as remedy for F-3.
	4. Same as F-7.	Same as remedy for F-7.

WINCH SERVICE

FOREWORD TO WINCH SERVICE

- Before any part is removed from the winch, all service instructions should be read and understood.
- Work in a clean, dust free area as cleanliness is of utmost importance when servicing hydraulic equipment.
- Inspect all replacement parts, prior to installation, to detect any damage which might have occurred in shipment.
- Use only genuine GEARMATIC replacement parts for optimum results. Never reuse expendable parts such as oil seals and o-rings.
- Inspect all machined surfaces for excessive wear or damage . . . before reassembly operations are begun.
- Lubricate all o-rings and oil seals with light general purpose grease or hydraulic oil prior to installation.
- Use a sealing compound on the outside surface of oil seals and a light coat of thread sealing compound on pipe threads. Avoid getting thread compounds inside parts or passages which conduct oil.
- Thoroughly clean all parts in a good grade of non-flammable safety solvent. Wear protective clothing as required.

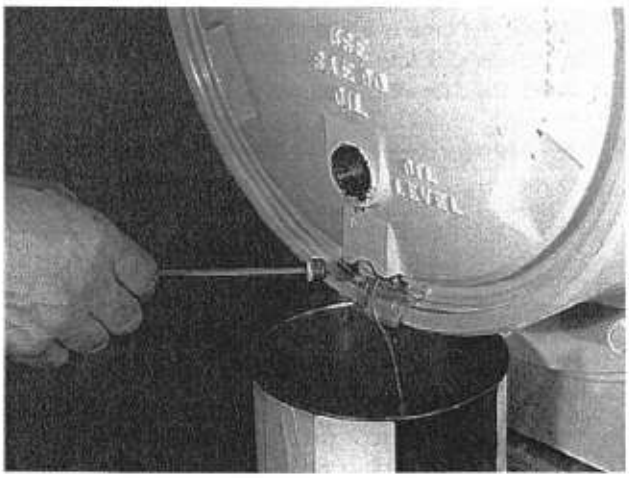
!WARNING!

DO NOT CLEAN BRAKE FRICTION DISCS IN SOLVENT. SOLVENT MAY CAUSE DAMAGE TO FRICTION MATERIAL WHICH MAY RESULT IN BRAKE FAILURE AND LOAD DROP.

- Perform all applicable trouble shooting operations BEFORE disassembling winch.

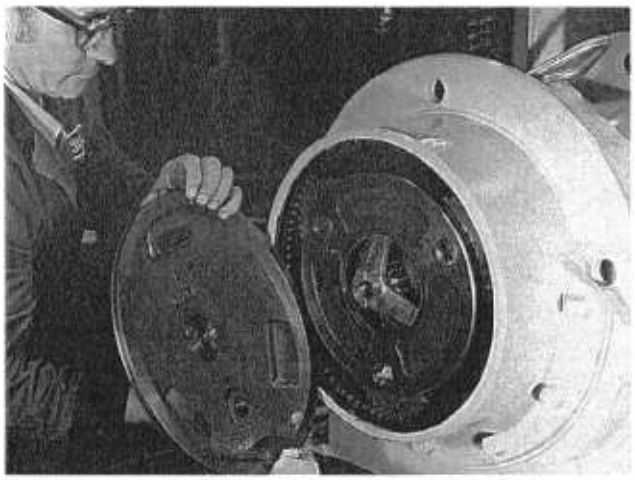
FINAL DRIVE ASSEMBLY

DISASSEMBLY PROCEDURE

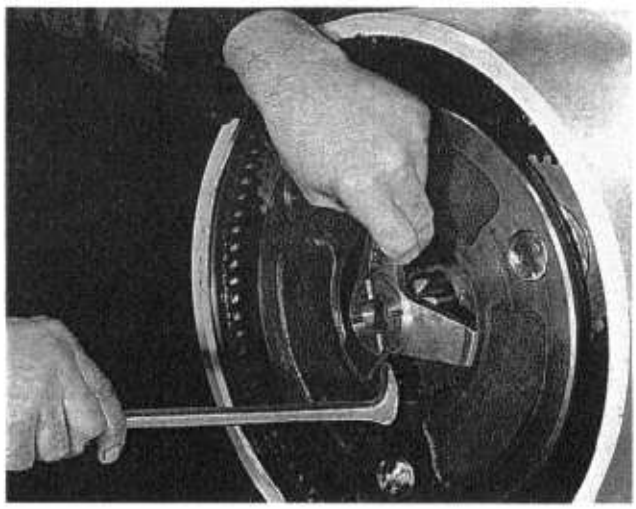


Drain the oil from the final end by removing both the filler plug (110) and the drain plug (111).

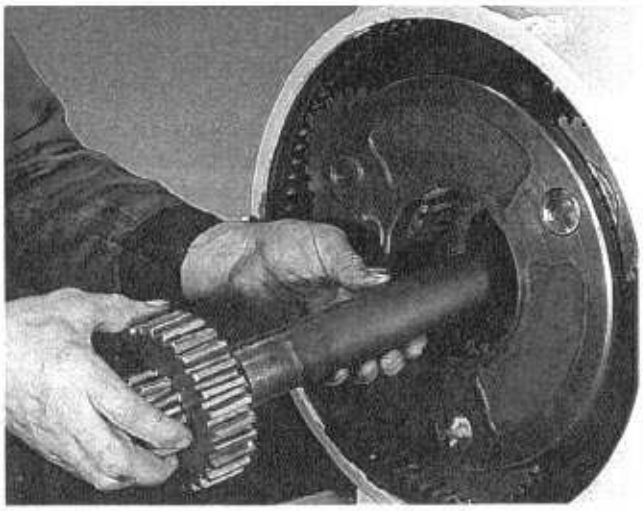
Remove snap ring (112) from the final drive housing (116).



Remove end cover (113) using a pry bar under the bottom lug.

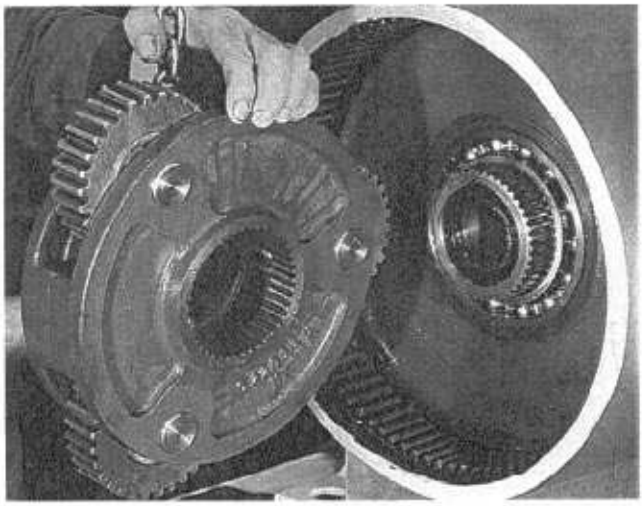


Remove the thrust plug (115) from the planet hub (108), (109) or (119).



Model GH30-22090
Remove sun gear shaft with sun gear (117) attached.

Models GH30-44090 and GH30-36090
Remove planet hub first as in Photograph below.



Remove final drive planet assembly taking care not to damage the pilot bore for the end cover.

INSPECTION OF PARTS

1. Discard the 'O' rings.
2. Wash all parts in suitable solvent and dry thoroughly. Do not wash the final planet assembly unless it is to be disassembled.
3. Check the snap ring (112) for flatness and that it forms a true circle. If it is bent or damaged, replace with a new part.
4. Check for wear at the center of the thrust ring (115). The original thickness was .720" (18.29 mm). If the wear is greater than .062" (1.6 mm) replace the thrust ring.
5. Check that the planet gears run freely in the final planet assembly. For service instructions refer to appropriate section.
6. Inspect the gear teeth in the final drive housing (116) for wear. If wear is greater than .015" (.38 mm) when compared to the unworn part of the teeth, replace the housing.

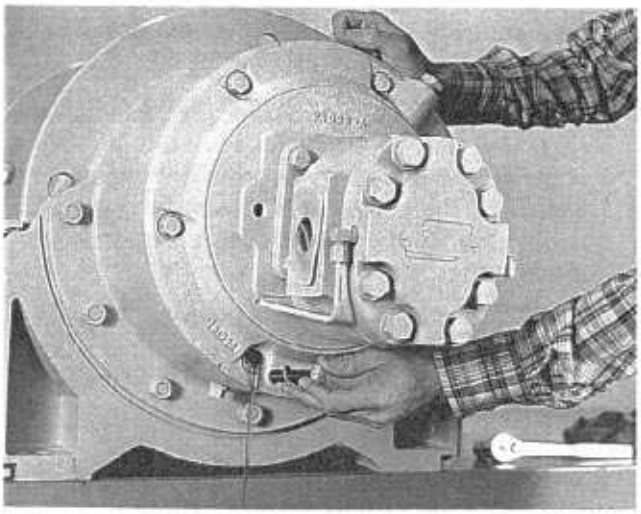
ASSEMBLY INSTRUCTIONS

1. Attach the final drive housing (116) to the base side plate using dowel bolts (142). Use a copper drift to drive the housing and side plate onto the drum bearing. Install the lockwashers (143) and nuts (144) on the dowel bolts (142) and torque to 75 lb-ft (10 kg-m).
2. Install the final planet assembly.
3. Install the sun gear shaft. Be careful not to damage the lip seal (128).
4. Install thrust plate (115).
5. Install 'O' ring (114) on final drive cover (113) and install cover in final drive housing. Be certain to locate the filler plug hole at the correct position.
6. Install snap ring (112).

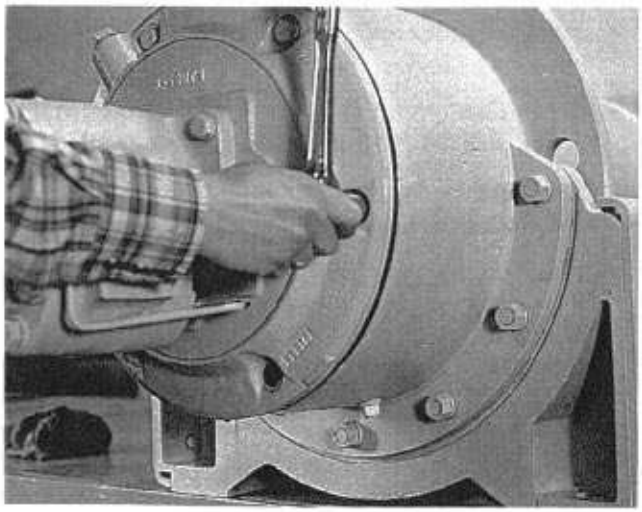
PRIMARY DRIVE ASSEMBLY

It is recommended that work on the primary drive assembly be done only in a clean shop equipped with suitable hoisting equipment.

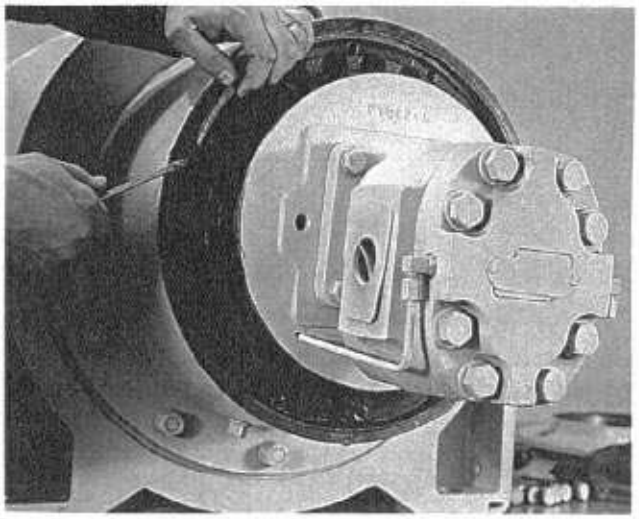
DISASSEMBLY PROCEDURE



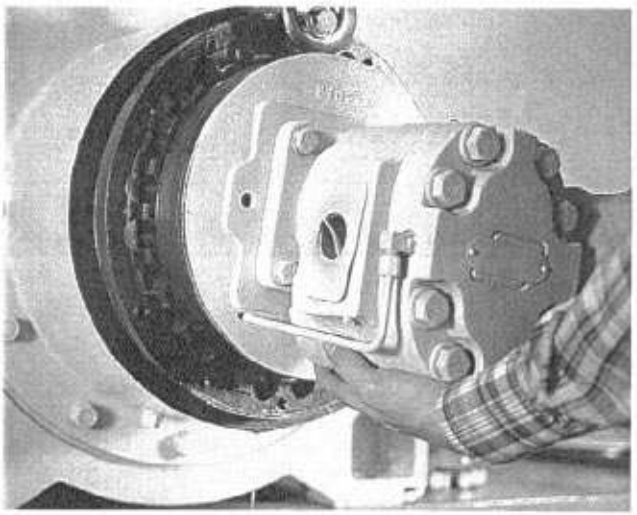
Drain oil from the primary housing by removing lowest capscrew (285) and seal washer (284) from the spring cover (281). Remove pipe plug (324) to vent the housing. Remove external piping (511). If desired, the motor can be removed at this time to reduce the weight of the motor support assembly.



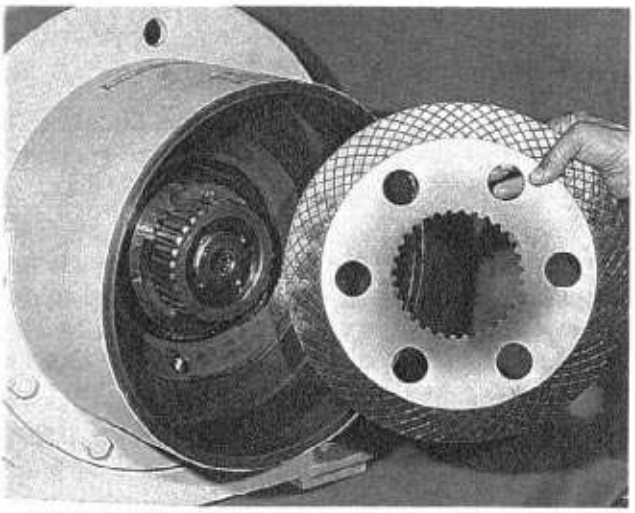
Remove spring cover (281) by slackening each capscrew (285) half a turn at a time progressively around the spring cover (281).



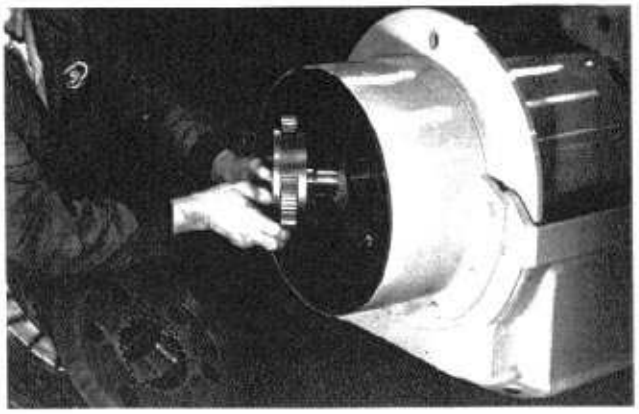
Remove springs (286). Note position for correct assembly later. Remove snap ring (282).



Remove motor support (501) with a slight rotary motion.



Remove brake plate (327) and brake hub assembly. (Early production brake hub shown.)



Remove sun gear shaft from final drive end (see final drive disassembly instructions). Remove primary planet assembly.

Remove seal ring (184).

INSPECTION OF PARTS

1. Discard all 'O' rings and seals.
2. Wash all parts in clean solvent and dry thoroughly. Do not wash the motor, brake hub or primary planet assemblies at this stage.
3. Inspect the bore of the spring cover (281). If damaged, smooth out with extra fine emery cloth.
4. Check that the gears in the primary planet assembly rotate freely in both directions.
5. Inspect the gear teeth in the primary housing. If wear is greater than .015" (.38 mm) when compared to the unworn part of the teeth, replace the housing.
6. Check that the sun gear in the brake hub will rotate freely in one direction and lock up instantly in the opposite direction. If the slightest slippage exists, replace the assembly. Where doubt exists with regard to serviceability, refer to that section for inspection and assembly instructions.
7. Inspect the friction surfaces of the brake plate (327). If wear has removed the grooves, replace the brake plate.
8. Check brake springs (286) for damage or distortion and that free length is not less than 3.875 (98 mm).

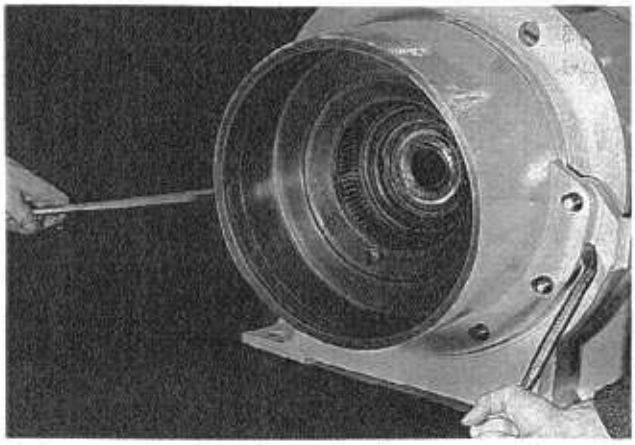
ASSEMBLY INSTRUCTIONS

1. Assemble the brake hub, planet hub and motor assembly as required. (Refer to relevant groups for details.)
2. Install the snap ring (183) in the small bore of the primary housing (325).
3. Lift the primary housing (325) into position on the end of the base. It will be necessary to block the drum up to align the drum bearing with the primary housing. Use a copper drift to drive the housing into position on the drum bearing. Install the lockwashers (143) and nuts (144) on the dowel bolts (142) and torque to 75 lb-ft (10 kg-m).
4. Fit the 'O' ring (185) and oil seal (331) into the seal ring (184). The lip will face away from the flange of the seal ring. Coat these seals with grease and install into the bore of the primary housing (325) so that the lip of the seal faces the open end of the housing.
5. Install the primary planet assembly. The three planet gears must mesh with the internal gear of the primary housing. Be careful not to damage the oil seal (331).
6. **EQUAL SPEED** — Install the brake hub assembly into the primary planet set and install the brake plate (327) onto the brake hub, seating it squarely onto the machined surface in the primary housing.

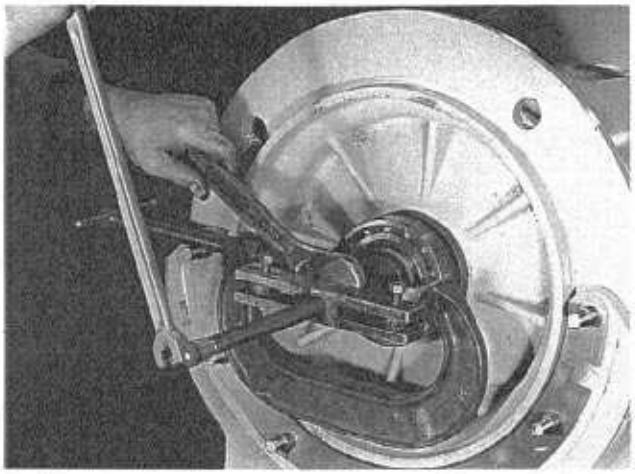
   HIGH SPEED REVERSE — Install the sun gear (600), input shaft spacer (502), input shaft (503) and motor coupling (505). **NOTE:** Be sure retaining ring (504) is installed into the motor coupling, and the coupling is installed in the proper direction. See High Speed Reverse cross-section parts drawing at the end of this publication. Install ring gear (329), brake plates (327), divider plate (328) and brake backing plate (335). Refer to High Speed Reverse cross-section drawing.
7. Install the motor support assembly, and secure with snap ring (282).
8. Grease and install 'O' rings (271) and (283) in the motor support (501) and spring cover (281).
9. Install the brake springs (286). Springs must be installed symmetrically.
10. Install spring cover (281) with seal washers (284) and capscrews (285). Vent port 'Q' should be placed at the required angle. Capscrews (285) should be tightened evenly, one-half turn at a time until the spring cover is fully seated. Torque to 50 lb-ft (6.9 kg-m).

DRUM AND BASE

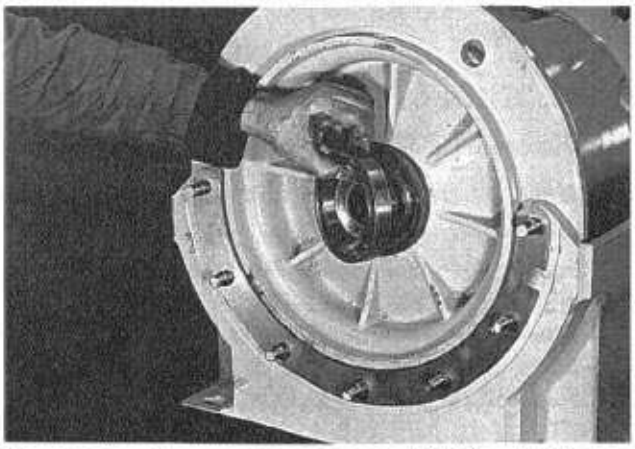
DISASSEMBLY PROCEDURE (All Models)



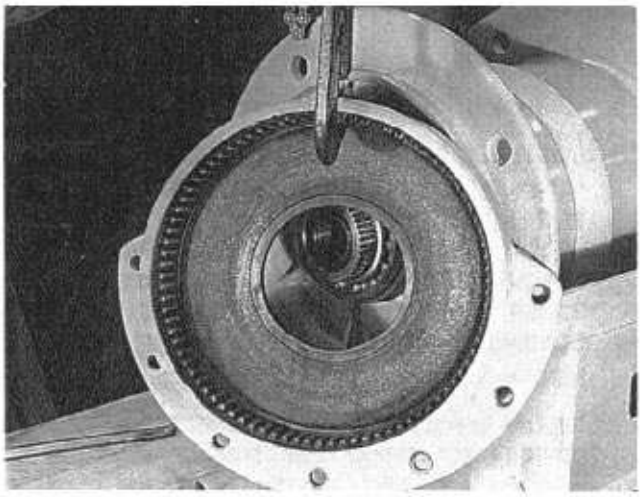
Before removing the primary housing, support the cable drum using two blocks. Remove nuts (144) and washers (143) from dowel bolts (142). Support the weight of the primary housing and remove using 2 pry bars in cast slots provided. It is also acceptable to remove the base side plates and pry off the primary housing and base end plate as an assembly.



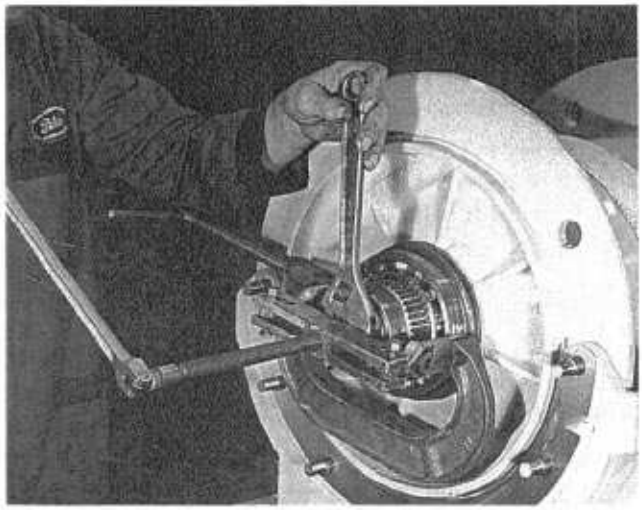
Pull bearing from the drum using a puller to grip in the groove provided in the O.D. of the bearing. Support the puller screw on a plug located in the bore of the drum.



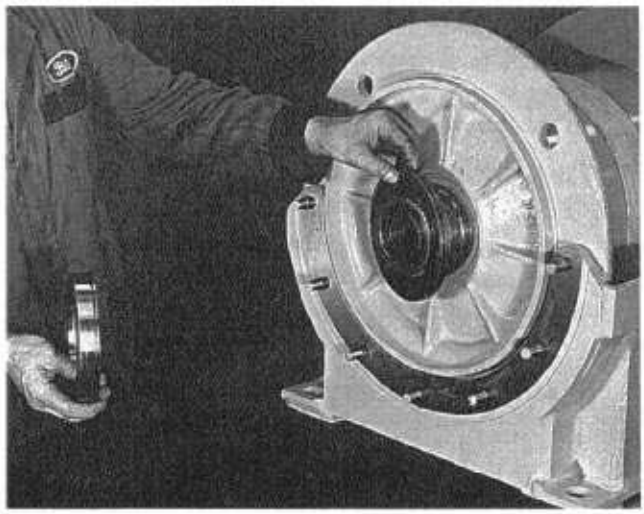
Remove seal ring and replace seal (136) and 'O' ring (139). If damaged or worn, remove drum bushing (135) with a bearing puller.



Remove nuts (144) and washers (143) from the dowel bolts (142). Remove the final housing (116) by using 2 pry bars in slots in flange.



Remove snap ring (130) from bearing I.D. (129). Pull bearing (129) from the drum using a puller to grip in the snap ring groove in the O.D. of the bearing. Support the puller screw on a plug located in the bore of the drum.



Remove seal ring (132) which contains oil seal (131) and 'O' ring (133).

INSPECTION OF PARTS

1. Discard all 'O' rings and seals.
2. Wash all parts in clean solvent and dry thoroughly.
3. Inspect all parts for serviceability. Where doubt exists, replace with new parts. Inspect the drum bushing (135) for bruises, scores and wear. Remove all high spots from bruises or scores using a scraper. The original inside diameter of this bushing was 2.1885" (58.59 mm). If wear is greater than .005" (.13 mm) in diameter, remove the bushing and replace it with a new part.
4. Inspect seal diameter of sun gear shaft for wear or damage and inspect gear teeth for wear. If tooth wear exceeds .005" (.13 mm), replace the sun gear shaft. If seal diameter on seal ring (127) is worn or damaged, replace seal ring (127).

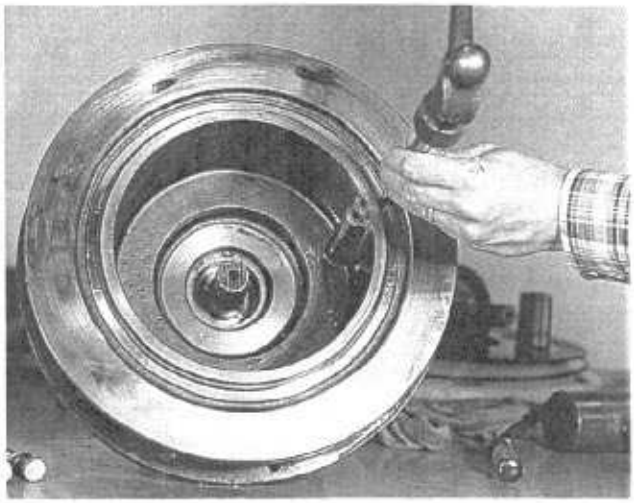
   NOTE: Use Loctite #601 when pressing new seal ring (127) on sun gear shaft.
5. Inspect the seal diameters on the drum for wear and corrosion. Polish with extra fine emery cloth if necessary.
6. Inspect the bearings for freeness of rotation. Check for broken rollers, pits or excessive wear. Replace if any of these conditions exist.

ASSEMBLY INSTRUCTIONS

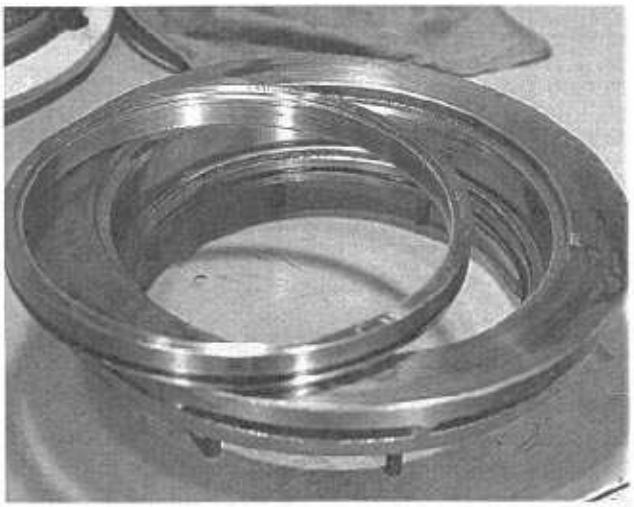
1. Install the dowel bolts (142) in the base end brackets, coat threads with grease. Assemble the final and primary housings to the end brackets.
2. Press bushing (135) into the drum (155-166) using a sizing mandrel that is 2.1885" (55.59 mm) diameter. Install the bushing so that the end of the bushing is flush with the end of the drum.
3. Install seals (131) and (136) and 'O' rings (133) and (139) on seal rings (132) and (138) and apply a liberal coating of grease. Fit the seal ring assembly to the drum, with seal lips toward drum.
4. Pack the drum bearings with grease and press them onto the drum.
5. Set the drum on end and drive the housing assemblies onto the drum with splined end at the final drive end.
6. Install primary housing (325) in accordance with the assembly instructions for the final drive housing.

MOTOR SUPPORT ASSEMBLY

DISASSEMBLY PROCEDURE



Tap seal ring (243) clear of the snap ring (242) O.D. and remove snap ring (242) from the motor housing (501).

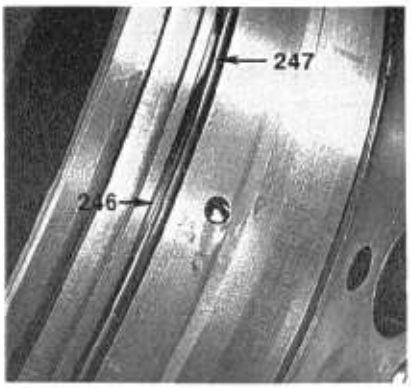


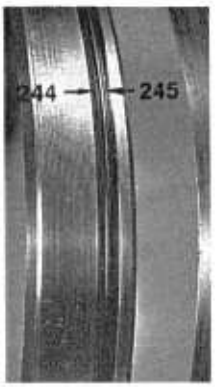
Remove the brake piston (334) from motor housing (501). Slide seal ring (243) from the bore of the brake piston (334).

INSPECTION OF PARTS

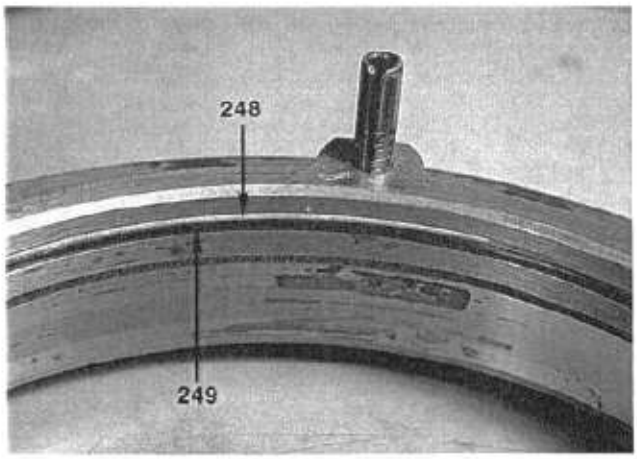
1. Discard all 'O' rings and backup washers.
2. Wash all parts in a suitable solvent and dry thoroughly.
3. Inspect the motor housing (501), seal ring (243) and brake piston (334) for scoring or roughness on the sealing diameters. If roughness exists, remove with a fine emery cloth. If wear or roughness is excessive, replace with new parts.
4. Inspect the pins (340) in the brake piston (334). If bent or damaged, replace with new parts.
5. Rewash all parts that have been honed or reworked.

ASSEMBLY INSTRUCTIONS





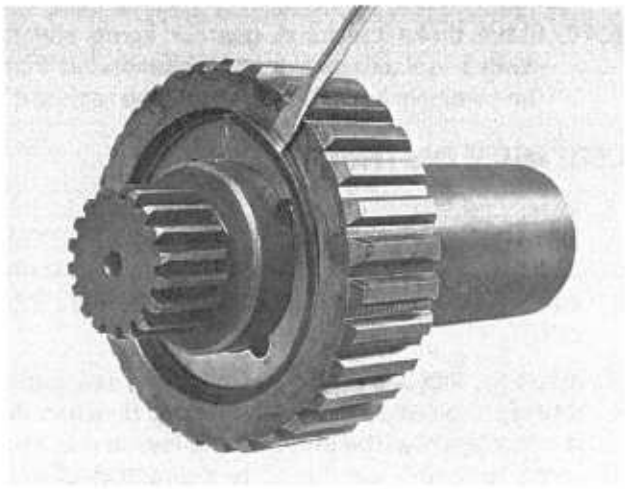
1. Lubricate and install 'O' ring (247) and backup washer (246) in the motor housing (501). Lubricate and install 'O' ring (245) and backup washer (244) in the seal ring (243). 'O' rings to be installed toward the high pressure side.



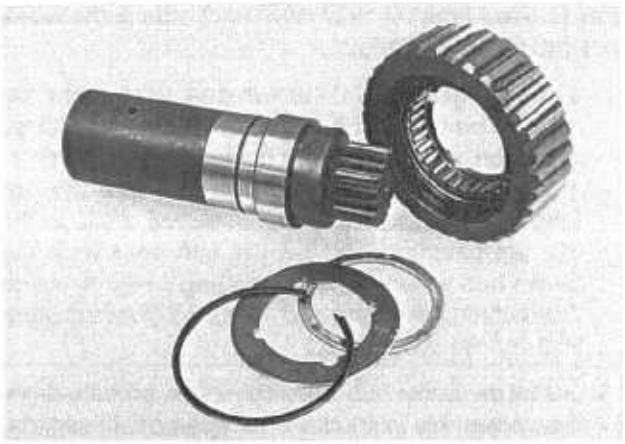
2. Lubricate and install 'O' ring (249) and backup washer (248) and spring pins (340), if removed, in the brake piston (334).
3. Install the brake piston (334) on the motor housing (501). Install the seal ring with seals and locate in position with snap ring (242).
4. Check brake piston (334) for free movement using two pry bars. Move brake piston out until it is seated against the snap ring. (This will make installation of the motor adapter assembly in the primary drive housing easier.)

BRAKE HUB ASSEMBLY

DISASSEMBLY PROCEDURE



Remove snap ring (311).



Slide brake hub (310) off the input shaft (503), rotating it slightly in the free running direction. Remove the spacer (312) and remaining snap ring (311) and spacer (312). Finally, remove sprag assembly (313) with care.

INSPECTION OF PARTS

1. Wash all parts in clean solvent and dry thoroughly.
2. Inspect the sun gear (314) for wear at the sprag clutch areas. If wear is greater than .001" (.025 mm) on this diameter when compared with the unworn area, the primary sun gear should be replaced. Inspect the gear teeth for wear or damage. Replace if either of these conditions exists.
3. Inspect the bore of the brake hub (310) for wear. If there are definite ridges or if the wear in the bore is greater than .001" (.025 mm), the brake hub (310) will have to be replaced. Original diameter of the bore was 3.4998" (88.89 mm).

4. Check the sprag clutch (313) for wear or damage. If either condition exists, replace.
5. Inspect the snap rings (311) and spacers (312). If bent or distorted, replace.

NOTE: If the brake hub, sun gear or sprag clutch require replacement, it is recommended that the complete brake hub assembly be replaced.

ASSEMBLY INSTRUCTIONS

1. Install one spacer (312) and snap ring (311) in the brake hub (310). Assemble the end bearings (315) and cage assembly (316) into the brake hub (310) and install the other spacer (312) and snap ring (311).
2. Insert the sun gear (314) into the sprag assembly rotating it slightly in the free running direction. It is important that the sun gear be installed in the sprag assembly for the correct direction of the rotation.

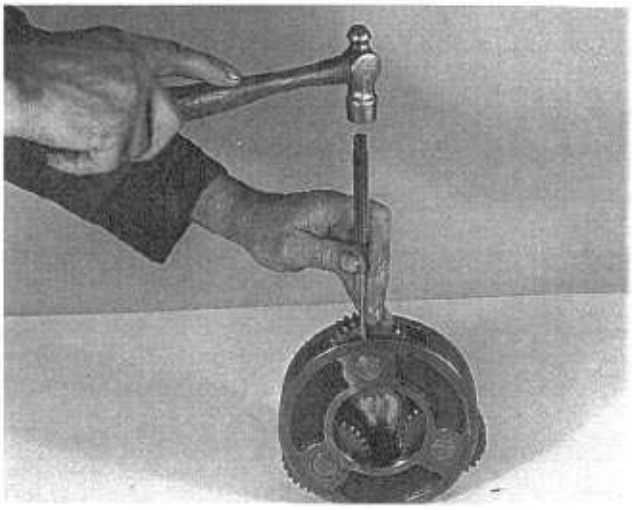
For winches that are to "winch in" in a clockwise direction, (viewed from the final drive end), check the brake hub rotation as follows:

Hold the gear end of the sun gear (314) in the left hand. The brake hub should rotate in a clockwise direction and lock up in a counterclockwise direction when looking at the splined bore of the sun gear (314). If the brake hub does not rotate in the correct direction, remove the sun gear from the brake hub assembly while rotating it slightly in the free running direction and reinstall it from the other side of the brake hub.

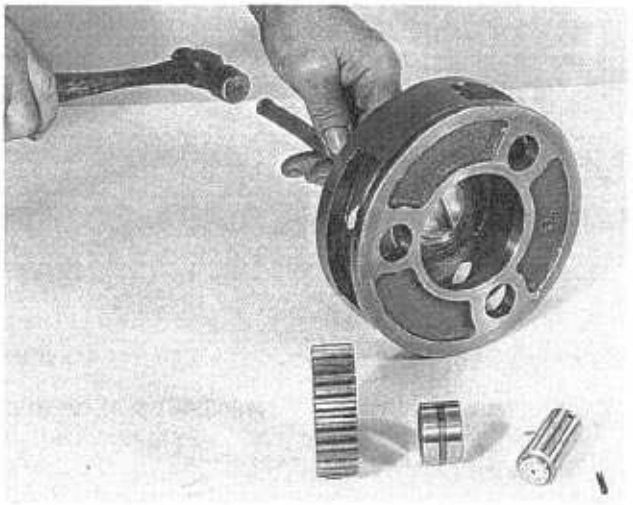
3. Install the brake hub assembly in the primary drive. See assembly instructions for appropriate section.

PRIMARY PLANET HUB ASSEMBLY

DISASSEMBLY PROCEDURE



Drive pins (306) completely into the center of the planet pins (305).



Remove planet pins (305) and remove planet gears (304). Remove pins (306) from planet pins. Remove needle bearings (308) from the planet gears if the bearings are to be replaced. Remove thrust pad (302) and 'O' ring (303). Remove the thrust plugs (307) from the planet pins (305) if they need to be replaced.

INSPECTION OF PARTS

1. Wash all parts in a suitable solvent and dry thoroughly.
2. Inspect the bushing and seal diameters on the planet hub (309) for scores or roughness. If either of these conditions exist and cannot be removed by fine emery cloth, replace the planet hub.
3. Inspect the planet hub bores for scores and bruises. Remove any scores or bruises carefully

with a scraper or fine emery cloth sufficiently to allow a planet pin to be pushed into the planet hub by hand.

4. Inspect the pins (306) for damage. If they are bent or distorted, discard them.
5. Inspect the planet pins (305) for excessive wear at the bearing area. If the wear is greater than .001" (.025 mm), replace the planet pins.
6. Check the planet gears (304) for wear and damage on the teeth. If either of these conditions exist, replace the planet gears.
7. Inspect the needle bearings (308) for serviceability. If in doubt, replace the bearings.

NOTE: If planet pins or needle bearings require replacement, it is recommended that pins and bearings be replaced as a set.

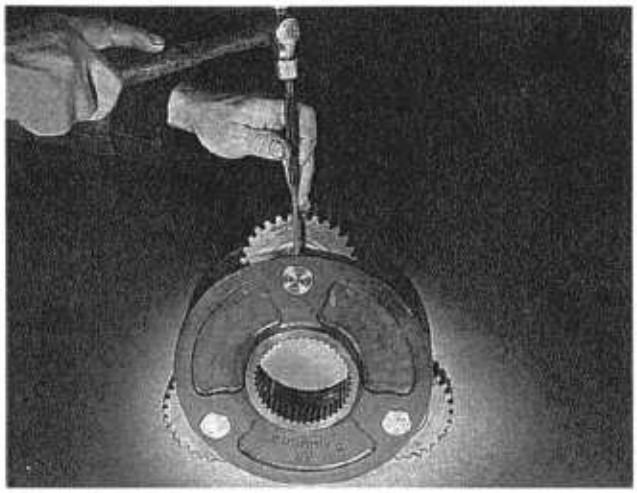
8. Check the thrust pad (302) for wear. Original thickness of thrust pad is .562" (14.3 mm). If wear exceeds .032" (.81 mm) replace.
9. Check the thrust plugs (307) for wear. Original thickness of thrust plug flange is .121" (3.1 mm). If wear exceeds .032" (.81 mm) replace.

ASSEMBLY INSTRUCTIONS

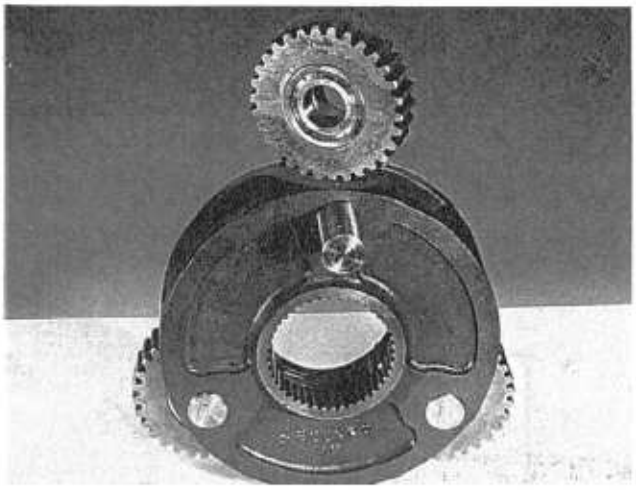
1. Press the needle bearings (308) into the planet gears (304) so they are flush or slightly below the edge of each gear.
2. Install 'O' ring (303) on thrust plug (302) and install the thrust plug in the bore of the planet hub (309).
3. Place the planet gears (304) into the planet hub (309) and install the planet pins (305) so that the spring pin holes in the hub and planet pin are aligned.
4. Install the spring pins (306) so they are located approximately half way in the planet hub and planet pin. Never use pins that are longer than the diameter of the planet pin.
5. Install the thrust plugs (307) in the ends of the planet pins (305).

FINAL PLANET HUB ASSEMBLY

DISASSEMBLY PROCEDURE



Drive pin (124) completely into the center of the final planet pin (123).



Remove final planet pin (123). Remove pin (124) from planet pin (123) and remove planet gear. Remove bearings (125) from planet gears using a punch to tap them out through the center of the gear.

INSPECTION OF PARTS

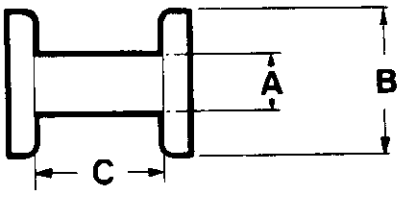
1. Wash all parts in a suitable solvent.
2. Inspect the planet pin bores in the planet hub for scores and bruises. Remove any scores or bruises carefully with a scraper or fine emery cloth sufficiently to allow a planet pin to be pushed into the planet hub by hand.
3. Inspect the pins (124) and snap rings (126) for damage. If they are bent or distorted, replace them.
4. Check the planet gears (120), (121) or (122) for wear and damage on the teeth. If either of these conditions exists, replace the planet gears.
5. Inspect the bearings (125) for serviceability. If in doubt, replace the bearings.

ASSEMBLY INSTRUCTIONS

1. Install the snap rings (126) and bearings (125) in the planet gears (120), (121) or (122).
2. Place the planet gears into the planet hub and install the planet pins (123).
3. Install the pins (124) so that they are located approximately halfway into the planet hub and planet pin.

SEAL KIT CHART

MODEL GH30	SEAL KIT PART NOS. PART NO.	STOCK NO.
Complete Winch Assembly (Standard Final Drive)		76404
Complete Winch Assembly with Free-Fall		76405
Complete Primary Drive Assembly		76403
Final Drive Assembly (Standard)	52803	72865
Drum Assembly	A22107X	71106
Free-Fall Final Drive Assembly	52807	72868



A	B	C	DRUM			SUN GEAR SHAFT					
						4.22 to 1 8.25 to 1			6.80 to 1		
			ITEM #	PART NO.	STOCK NO.	ITEM #	PART NO.	STOCK NO.	ITEM #	PART NO.	STOCK NO.
8	16	10	155	58837	77164	145	51957	72681	146	51925	72665
8	22	10	156	59038	77162	145	51957	72681	146	51925	72665
8	22	16	157	59041	77163	147	51959	72682	148	51952	72677
8	22	22	158	75434	75434	149	51960	72683	150	51953	78500
8	22	28	159	76002	76002	151	51961	72684	152	51954	72678
12	22	10	161	75435	75435	145	51957	72681	146	51925	72665
12	22	16	162	58815	77257	147	51959	72682	148	51952	72677
14.5	22	10	163	75436	75436	145	51957	72681	146	51925	72665
14.5	22	16	164	58824	77153	147	51959	72682	148	51952	72677
16	22	16	165	57230	74272	147	51959	72682	148	51952	72677
10	16	10	166	58803	77256	145	51957	72681	146	51925	72665

DRUMS AND SHAFTS SHOWN IN THE ABOVE TABLE ARE GEARMATIC STANDARD SIZES.
WHEN ORDERING REPLACEMENT PARTS BE SURE TO STATE DRUM SIZE AND FINAL DRIVE RATIO.
FOR DRUMS NOT LISTED ABOVE, CONSULT YOUR NEAREST GEARMATIC DISTRIBUTOR OR THE FACTORY.

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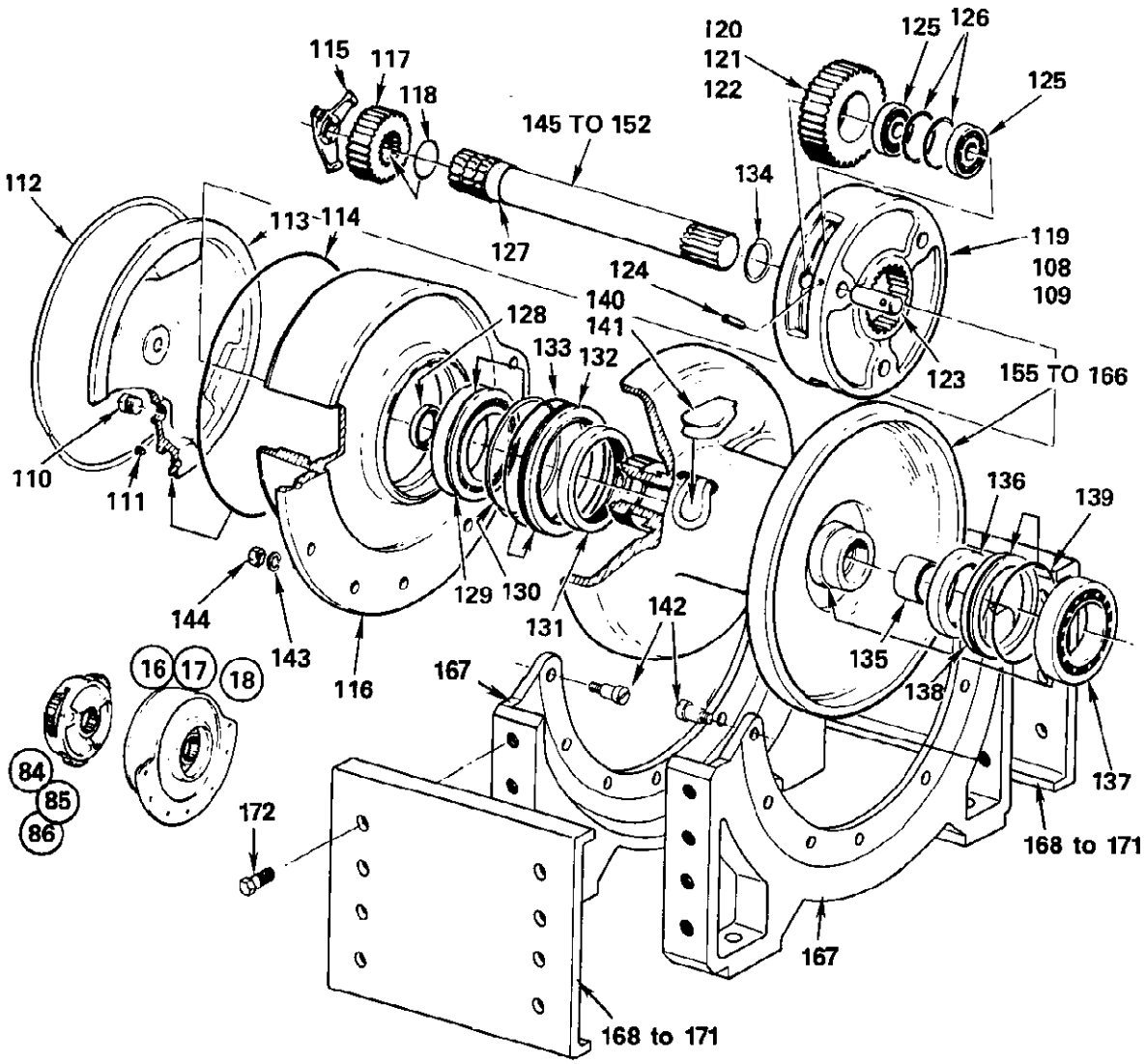
DRUM, BASE, SUN GEAR SHAFT AND FINAL DRIVE



REFER TO ASSEMBLIES (Items 1 thru 100) FOR LISTS OF COMPONENT PARTS

ITEM NO.	PART NO.	STOCK NO.	DESCRIPTION
16	51903 for Model GH30-44090-**	72650	FINAL DRIVE ASSEMBLY includes items 84 and 110 thru 116 and 128
17	51904 for Model GH30-36090-**	72651	FINAL DRIVE ASSEMBLY includes items 85 and 110 thru 116 and 128
18	51905 for Model GH30-22090-**	72652	FINAL DRIVE ASSEMBLY Includes items 86 and 110 thru 116 and 128
84	C22006XS for Model GH30-44090-**	71398	FINAL PLANET HUB ASSEMBLY includes items 119, 120 and 123 thru 126
85	C22006XM for Model GH30-36090-**	71397	FINAL PLANET HUB ASSEMBLY includes items 108, 121 and 123 thru 126
86	B22009X for Model GH30-22090-**	71260	FINAL PLANET HUB ASSEMBLY includes items 109, 117, 118 and 122 thru 126

PARTS LIST FOR DRUM, BASE, SUN GEAR SHAFT AND FINAL DRIVE

ITEM NO.	PART NO.	STOCK NO.	QTY	DESCRIPTION
108	C22006M	71394	1	PLANET HUB
109	C22006H	71393	1	PLANET HUB
110	55286	73348	1	PIPE PLUG
111	50428	77322	1	PIPE PLUG
112	50463	72182	1	SNAP RING
113	51775	72613	1	END COVER
114	50346	25016	1	'O' RING
115	51773	72611	1	THRUST RING
116	C22001	71391	1	FINAL DRIVE HOUSING
117	A22030	71072	1	SUN GEAR
118	A22031	71073	1	RETAINER RING
119	C22006S	71395	1	PLANET HUB
120	50471	72187	3	PLANET GEAR
121	B22134	71302	3	PLANET GEAR
122	B22008	71259	3	PLANET GEAR
123	50472	72188	3	PLANET PIN
124	50451	70862	3	PIN
125	50473	72189	6	BALL BEARING
126	50474	72190	6	SNAP RING
127	51765	72609	1	SEAL RING (Part of Sun Gear Shaft)
128	51008	72381	1	SEAL
129	50480	72193	1	BEARING
130	50479	72192	1	SNAP RING (Part of Item 129)
131	50483	72195	1	SEAL
132	A22002	71062	1	LARGE SEAL RING
133	50333	22357	1	'O' RING
134	51016	72386	1	SNAP RING
135	50276	72084	1	DRUM BUSHING
136	50482	77342	1	SEAL
137	50478	72191	1	BALL BEARING
138	A22008	71066	1	SMALL SEAL RING
139	50328	21040	1	'O' RING
140	50107	71978	1	HONDU 7/16 to 5/8" CABLE - 14.5" & 16" Barrel only
141	50123	71979	1	HONDU 11/16" to 7/8" CABLE - 8" to 12" Barrel only
142	A11041	71017	14	DOWEL BOLT
143	50098	11028	14	LOCKWASHER
144	50099	71974	14	NUT
145	51957	72681	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
146	51925	72665	1	SUN GEAR SHAFT 6.80 to 1
147	51959	72682	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
148	51952	72677	1	SUN GEAR SHAFT 6.80 to 1
149	51960	72683	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
150	51953	78500	1	SUN GEAR SHAFT 6.80 to 1
151	51961	72684	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
152	51954	72678	1	SUN GEAR SHAFT 6.80 to 1
155	58837	77164	1	DRUM
156	59038	77162	1	DRUM
157	59041	77163	1	DRUM
158	75434	75434	1	DRUM
159	76002	76002	1	DRUM
161	75435	75435	1	DRUM
162	58815	77257	1	DRUM
163	75436	75436	1	DRUM
164	58824	77153	1	DRUM
165	59060	79097	1	DRUM
166	58803	77256	1	DRUM
167	76330	76330	2	BASE END
168	76332	76332	2	SIDE PLATE 10"
169	76333	76333	2	SIDE PLATE 16"
170	76334	76334	2	SIDE PLATE 22"
171	76335	76335	2	SIDE PLATE 28"
172	21520	21520	16*	CAPSCREW

Refer to Chart on page 22 for Drum sizes.

*On earlier winches the side plates may only be drilled for 8 capscrews.

TORQUE CHART

ITEM	PART NO.	STOCK NO.	DESCRIPTION	TORQUE	
				lb-ft	kg/m
144	50099	71974	5/8 HEX NUT	75	10.3
285	50468	72186	HEX HEAD CAPSCREW (SPECIAL)	50	6.9
601	50608	72278	5/16 NC × 5/8 HEX HEAD CAPSCREW	17	2.3
608	53378	72947	5/16 NC SOCKET HEAD SHOULDER BOLT	26	3.6
668	58253	74830	1/2 NF × 1 1/4 SOCKET HEAD CAPSCREW	100	13.8
696	58456	74949	5/8 NC × 3 1/2 SOCKET HEAD CAPSCREW	225	31.0

CONVERSION KITS (To convert Models 32, 33, 34, 35 and 36 winches with internal motors to external bolt on motors)

Part No. 76357	CONVERSION KIT	Model 34, 35 & 36 to GH30 E.S.
Part No. 76363	CONVERSION KIT	Model 32 & 33 to GH30 H.S.R.
Part No. 76474	CONVERSION KIT	Model 34, 35 & 36 to G2H30 E.S.

NOTE: These kits do not include the hydraulic motor group 76350 which must be purchased separately. The motor currently offered is the Commercial Shearing WM76 with a 9.02 cu. in. displacement.

WHEN ORDERING PARTS BE SURE TO STATE SERIAL NUMBER OF WINCH

Refer to Service Manual J405B for Freefall Attachment.

PRIMARY ASSEMBLY GH30 EQUAL SPEED

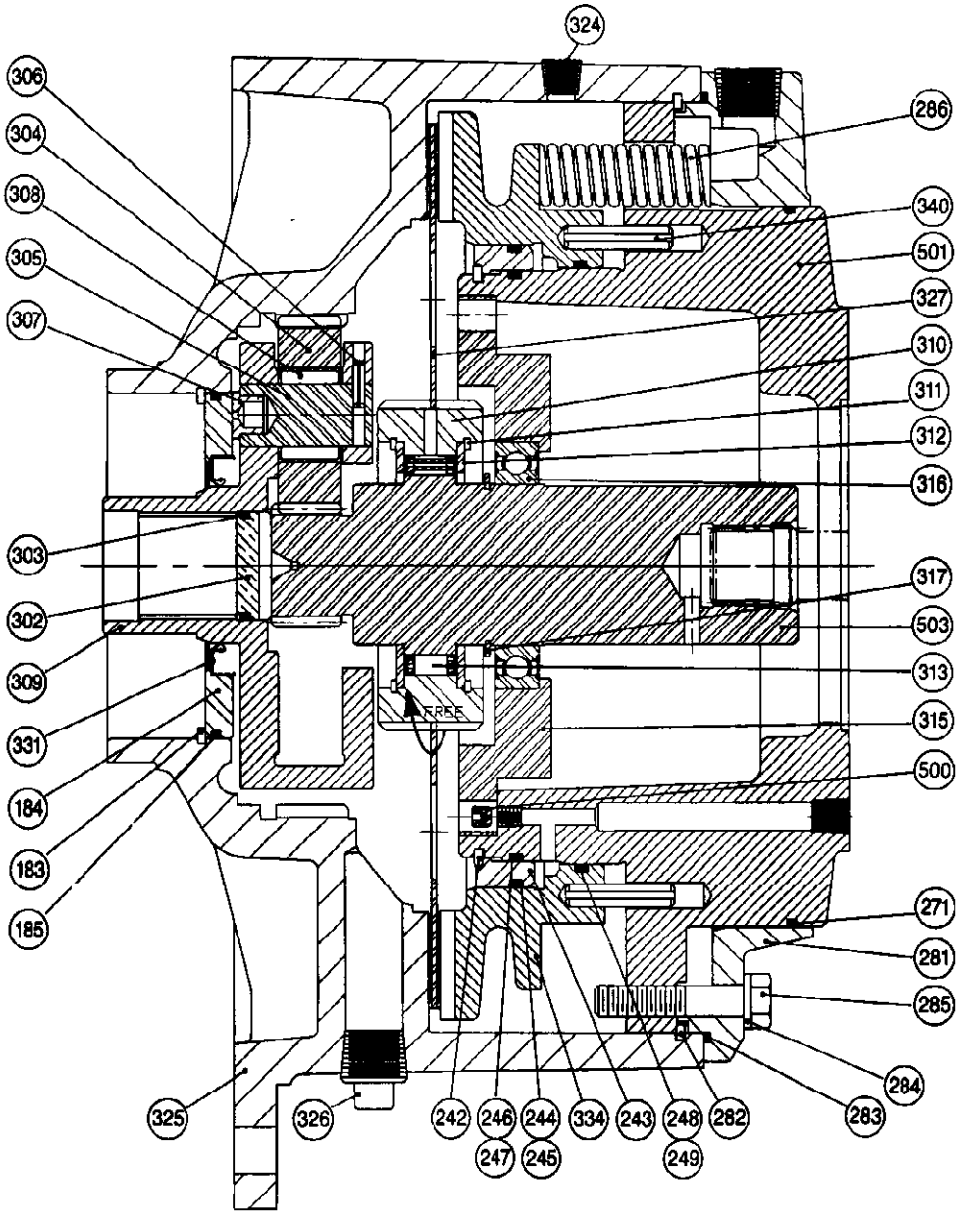
(Single Speed & 2 Speed Motors)

ITEM NO.	PART NO.	DESCRIPTION	QTY.
183	72202	SNAP RING	1
184	71099	SEAL RING	1
185	21040	O-RING	1
242	72061	SNAP RING	1
243	71995	SEAL RING	1
244	72127	BACKUP RING	1
245	72110	O-RING	1
246	72125	BACKUP RING	1
247	72109	O-RING	1
248	72126	BACKUP RING	1
249	21675	O-RING	1
271	22666	O-RING	1
281	72646	SPRING COVER	1
282	72182	SNAP RING	1
283	25016	O-RING	1
284	72144	SEAL WASHER	6
285	72186	CAPSCREW (½ - 13 x 2½ Gr5)	6
286	72181	SPRING (SINGLE SPEED)	18
	76382	SPRING (2 SPEED)	18
302	72600	THRUST PAD	1
303	13838	O-RING	1
304	71090	PRIMARY PLANET GEAR (SINGLE SPEED)	3
	76416	PRIMARY PLANET GEAR (2 SPEED)	3
305	71085	PLANET PIN	3
306	21049	ROLLPIN	3
307	71010	THRUST SPACER	3
308	72328	BEARING	3
309	72599	PLANET HUB (SINGLE SPEED)	1
	76417	PLANET HUB (2 SPEED)	1
310	N.S.S.	BRAKE HUB	1
311	72436	SNAP RING	2
312	76421	SPACER	2

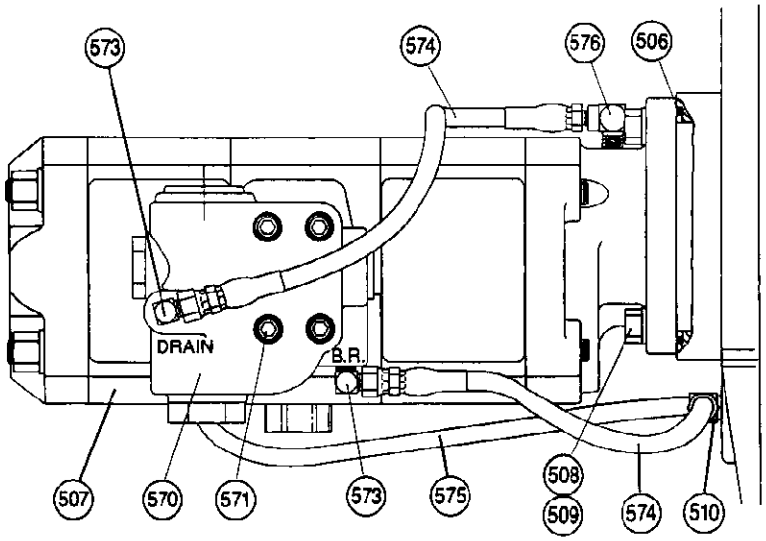
ITEM NO.	PART NO.	DESCRIPTION	QTY.
313	N.S.S.	SPRAG ASSEMBLY	1
315	76593	BEARING CARRIER	1
316	25299	BEARING	1
317	24700	SNAP RING	1
318	21058	ROLLPIN (NOT SHOWN, INSTALLS INTO ITEM 315)	2
324	70120	PIPE PLUG	1
325	71452	PRIMARY HOUSING	1
326	23378	PLUG	1
327	73164	BRAKE PLATE	1
331	77336	OIL SEAL	1
334	72589	BRAKE PISTON	1
340	13650	ROLLPIN	8
500	76494	ORIFICE PLUG	1
501	76616	MOTOR SUPPORT	1
503	N.S.S.	INPUT SHAFT/GEAR	1
506	10330	O-RING	1
507	25272	HYDRAULIC MOTOR (SINGLE SPEED - 090)	1
	25337	HYDRAULIC MOTOR (2 SPEED - 127)	1
508	13413	CAPSCREW (½ - 13 x 1½ Gr5)	4
509	11026	LOCKWASHER (½)	4
510	31341	ELBOW (SINGLE SPEED)	1
	22934	MALE BRANCH TEE (2 SPEED)	1
511	76371	TUBE ASSEMBLY	1
512	25302	ELBOW	1
570	81586	BRAKE VALVE	1
571	24012	CAPSCREW (7/16 - 14 x 3¼ Gr5 SOCKET HEAD)	4
572	21150	O-RING (BRAKE VALVE TO MOTOR - NOT SHOWN)	1
573	21163	ELBOW	2
574	13711	HOSE ASSEMBLY (10 INCH)	2
575	13707	HOSE ASSEMBLY (17 INCH)	1
576	24236	REDUCER ELBOW	1
577	25302	ELBOW (MOTOR TO BRAKE RELEASE HOSE, ITEM 575 - NOT SHOWN)	1

N.S.S. – Not Serviced Separately. If any item marked N.S.S. needs to be replaced, order Brake Hub Assembly.

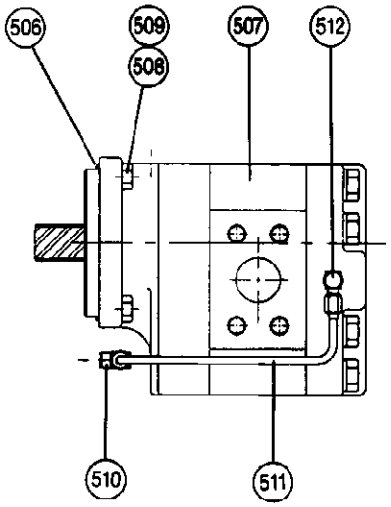
BRAKE HUB ASSEMBLY (INCLUDES ITEMS 503, 310 THRU 313)
SINGLE SPEED — PART NO. 76597
TWO SPEED — PART NO. 76594



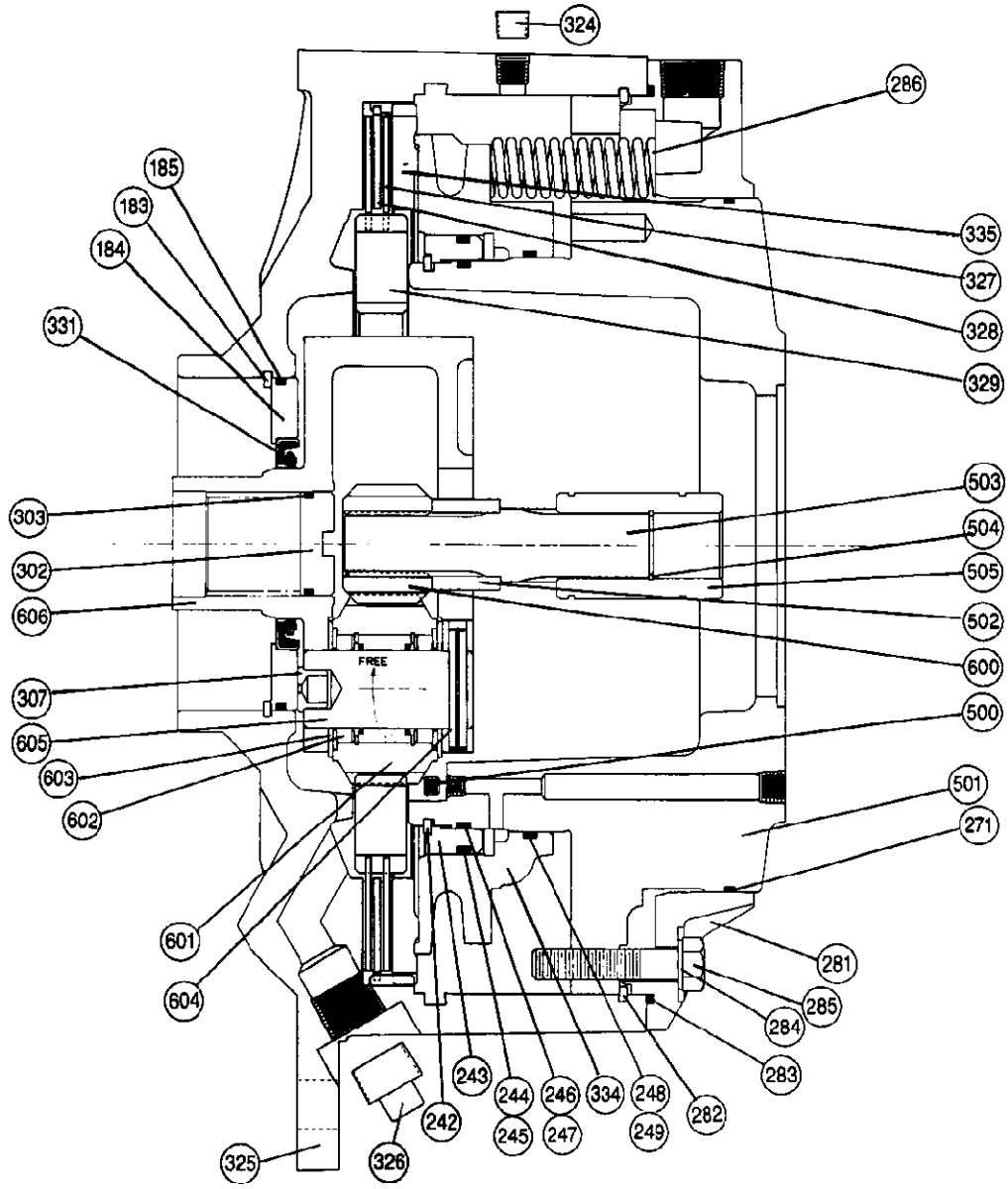
EQUAL SPEED PRIMARY ASSEMBLY



TWO SPEED MOTOR



SINGLE SPEED MOTOR



PRIMARY ASSEMBLY GH30 HIGH SPEED REVERSE

ITEM NO.	PART NO.	DESCRIPTION	QTY.
286	76382	SPRING	18
325	71399	PRIMARY HOUSING	1
327	73221	BRAKE PLATE	2
328	72204	DIVIDER PLATE	1
329	76361	RING GEAR	1
334	76354	BRAKE PISTON	1
335	76355	BRAKE BACKING PLATE	1
502	76360	SPACER, INPUT SHAFT	1
503	76339	INPUT SHAFT	1
504	24506	RETAINING RING	1
505	29388	COUPLING	1
600	71071	SUN GEAR	1
601	81957	PLANET GEAR ASSEMBLY (INCLUDES CAMLOCKS & GARTER SPRINGS)	3
602	72376	BEARING	6
603	71074	SPACER	6
604	75087	ROLLPIN	3
605	71064	PLANET PIN	3
606	74848	PLANET HUB	1

Parts listed above are unique to High Speed Reverse Primary Assembly. See Equal Speed Primary Assembly parts list for items not shown above.