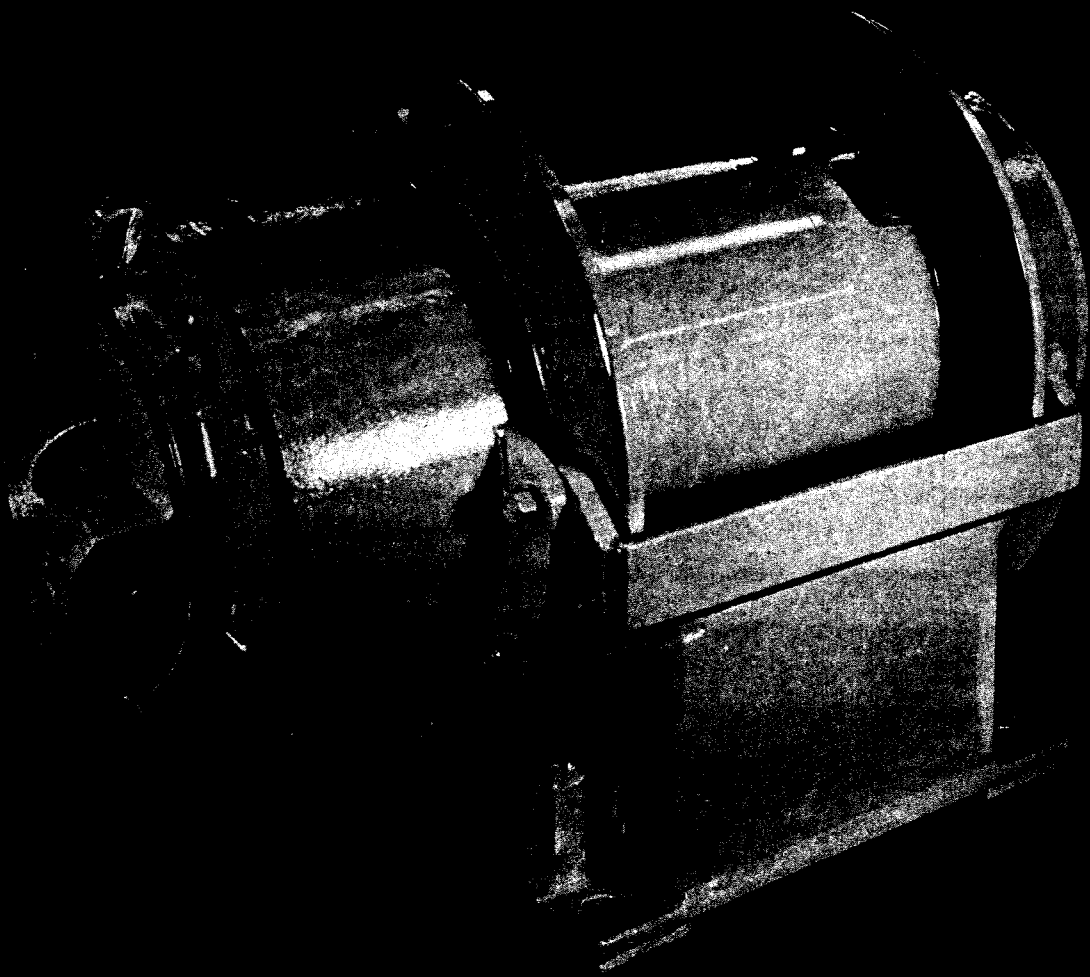


Gearmatic®

model 35

**HYDRAULIC
WINCH**



INTRODUCTION

The following service instructions have been prepared to provide assembly, disassembly and maintenance information for the Gearmatic Model 35 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, sub-assembly 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 FREE FALL MANUAL No. J504 FOR
FREE FALL PARTS & SERVICE INSTRUCTIONS**

GROUP 1.

DESCRIPTION

This 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 winch drum is carried on antifriction 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 center of the winch drum to the sun gear of a planetary reduction in the final drive housing. The output from the planetary reduction is transmitted directly to the winch drum through a spline attaching the final drive planet hub to the winch drum.

The primary housing also contains a metallic disc-type friction brake which is attached to the sun gear of the primary planetary reduction by a cam-type overrunning clutch. The brake is held engaged by springs and is released by an annular hydraulic cylinder. This cylinder 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 held engaged at all times until the winch is powered in reverse.

This unit can be used to lower any load (up to the designed maximum load) with smooth acceleration and deceleration. This is achieved by the special design of the automatic friction brake. When a load is applied to the cable on the winch drum, it is held by the brake through the overrunning clutch on the primary sun gear. In order to lower a load with the winch, hydraulic pressure is applied to the reversing side of the motor. This pressure, which is also effective on the brake piston, builds up until the brake is released sufficiently to allow it to slip. If the load on the 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 will decrease on the brake piston causing 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 barrel. 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.

MODEL 35 WINCH

Standard Drum Dimensions

Barrel Dia.	= 8" (203 mm)
Flange Dia.	= 16.2" (411 mm)
Barrel Length Between Flanges	= 10" (254 mm)
Cable Storage Capacity 9/16" dia. (14 mm) cable	= 350 ft. (106 m)

Maximum Line Pull on Bare Drum at 2350 psi (165 kg/cm²)

Model 35-11-10-**-** = 26600 lbs. (12000 kg)

Model 35-11-20-**-** = 21900 lbs. (9933 kg)

Model 35-11-30-**-** = 13000 lbs. (6000 kg)

Maximum Line Speed on Bare Drum at 120 US gpm (454 l/min)

Model 35-11-10-**-** = 110 f/min (33 m/mm)

Model 35-11-20-**-** = 131 f/min (40 m/mm)

Model 35-11-30-**-** = 220 f/min (66 m/mm)

GROUP 2. MODEL EXPLANATION

MODEL NUMBER = * * — * * — * * — * * — * *

MODEL NO.

3*-**-**-** Series 30 Winch
5-**-**-** Gear Motor

PRIMARY DRIVE ASSEMBLY

35-1*-**-**-** Single Speed
35-*1*-**-**-** Hydraulic Motor 120 US gpm at 2350 psi
(454 l/min at 165 kg/cm²)

FINAL DRIVE REDUCTION

35-11-10-**-** 8.25 to 1 Final Ratio
35-11-20-**-** 6.80 to 1 Final Ratio
35-11-30-**-** 4.22 to 1 Final Ratio

ROTATION AND BRAKE [viewed from final drive end]

35-11-**-11-** Clockwise Forward Rotation, Brake
Effective in Opposite Direction
35-11-**-13-** Brake Effective Both Directions External Brake
Port with Shuttle Valve
35-11-**-15-** Clockwise Forward Rotation, Brake
Effective in Opposite Direction
External Brake Port with Shuttle Valve
35-11-**-17-** Same as 13 Above, Without Shuttle Valve
35-11-**-18-** Same as 15 Above, Without Shuttle Valve

Note: When viewed from the final drive end the drum rotates in a clockwise direction to haul in cable.

FREE-FALL

35-11-**-**-0* Free-Fall Not Used
35-11-**-**-1* Full Release and Controlled Free-Fall
35-11-**-**-2* Controlled Free-Fall Only
35-11-**-**-3* Full Release Free-Fall Only

ACCESSORIES

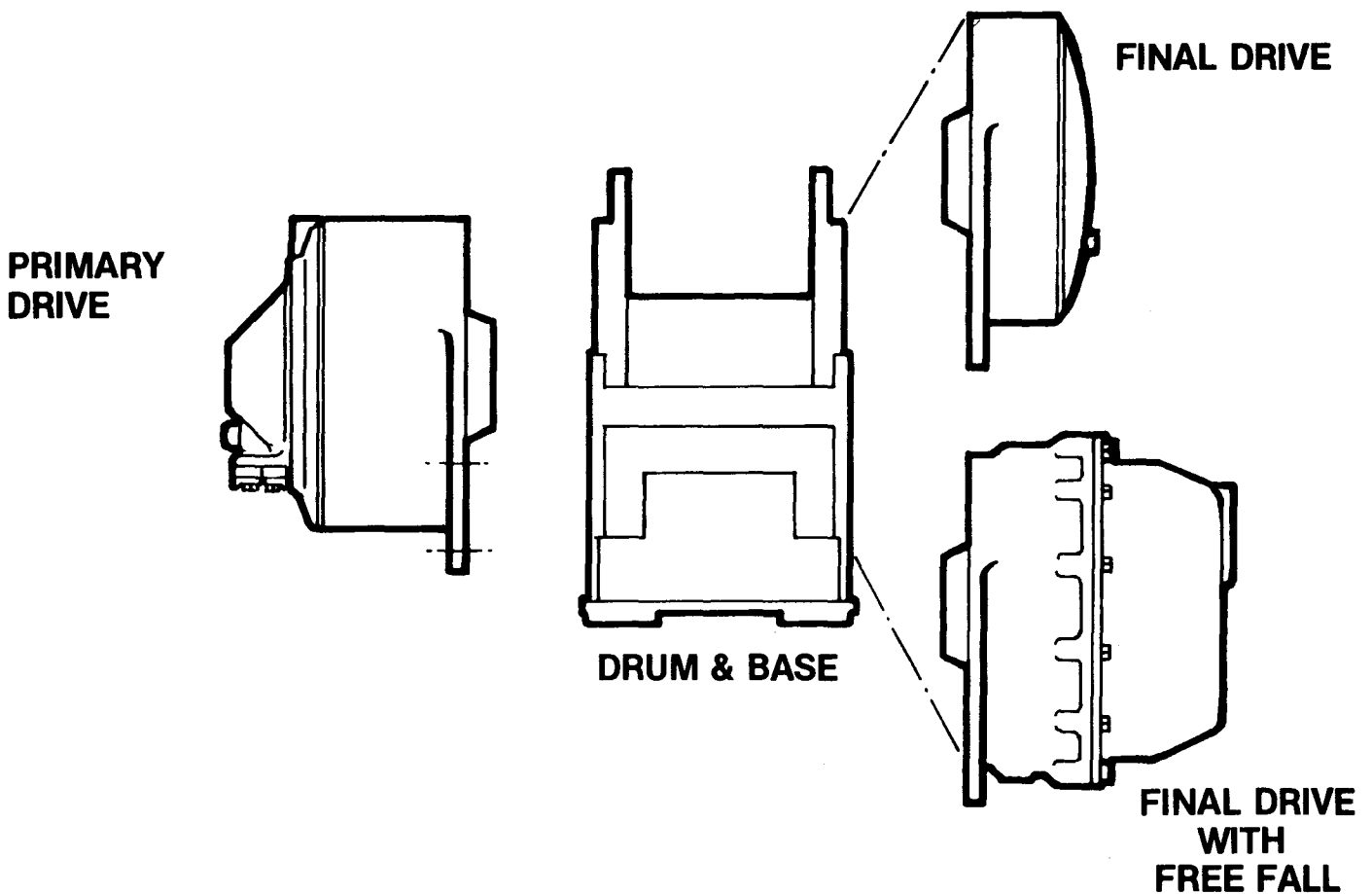
35-11-**-**-0 No Accessories
35-11-**-**-1 Rotation Indicator Drive (or provision for)

GROUP 2.

The Gearmatic Model 35 winch consists of three basic sub-assemblies. These are the primary drive, the drum and base, and the final drive.

This winch can be supplied with a variety of primary drive assemblies and final drive assemblies with or without the free-fall option (see page 3). Various drum sizes can be supplied to meet almost any requirement (see page 18).

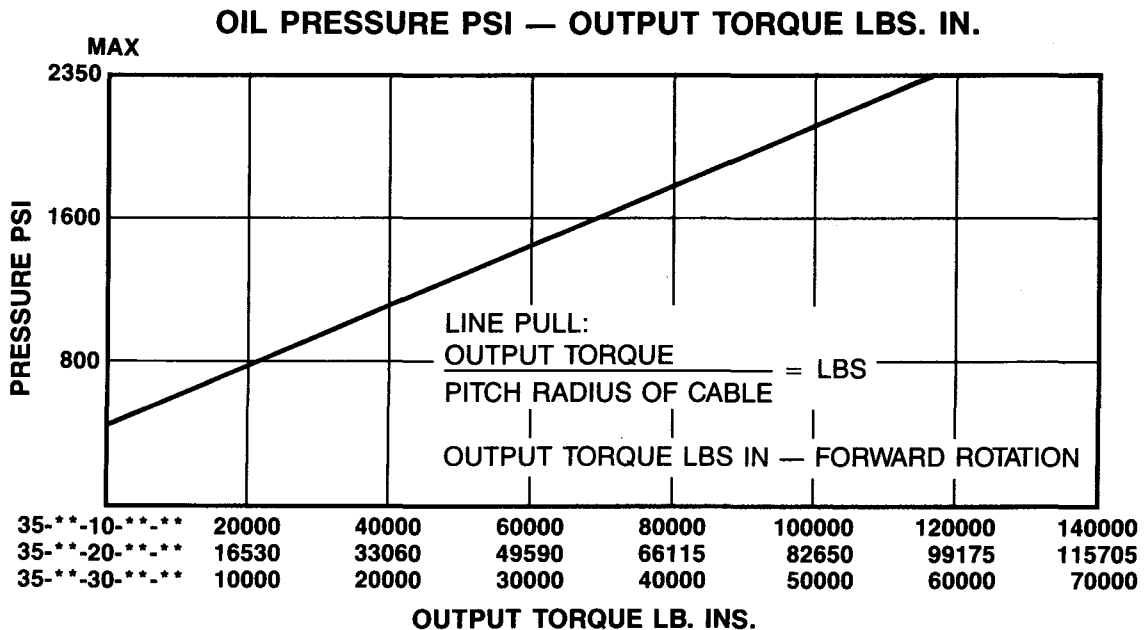
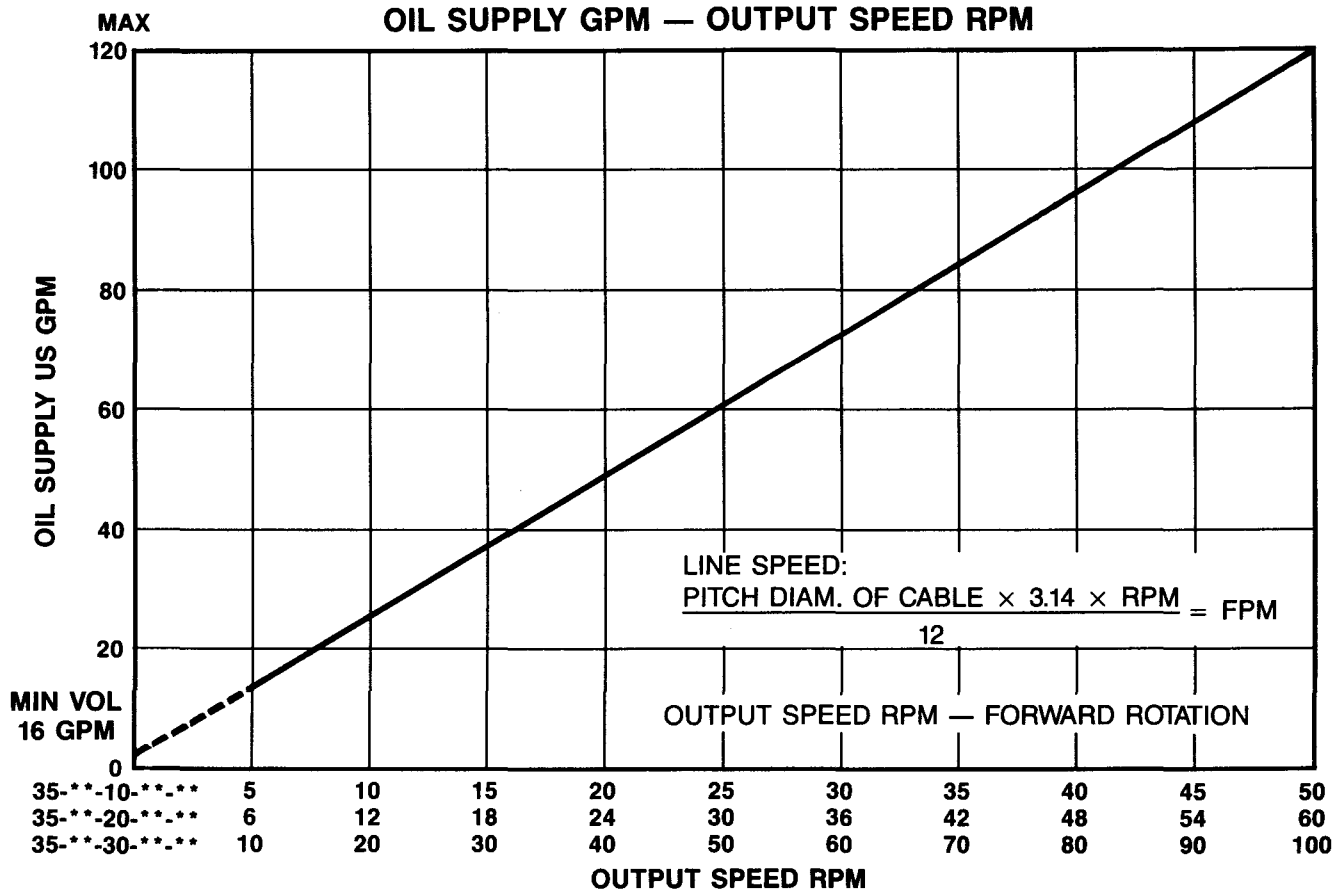
SUB-ASSEMBLIES



GROUP 3. SPECIFICATIONS

Hydraulic Oil Supply for Maximum Performance

Model 35-11-**-**-** = 120 US gpm at 2350 psi
(454 l/min at 165 kg/cm²)



PERFORMANCE BASED ON TESTS WITH OIL TEMP. AT 120°F (48°C) VISC OF 135 SSU

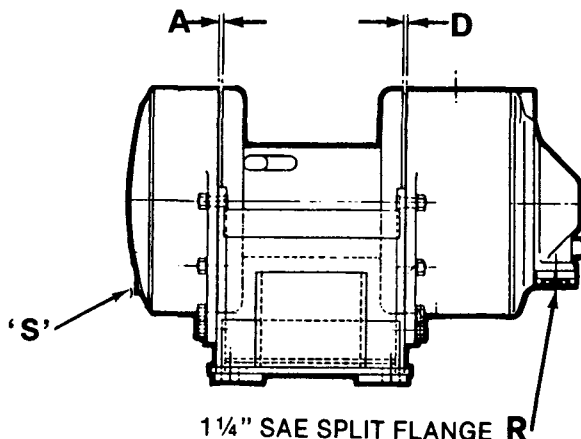
GROUP 4. WINCH INSTALLATION

MOUNTING INSTRUCTIONS GENERAL INFORMATION

1. The winch should be fastened securely to a flat mounting plate having a minimum thickness of 1" (25 mm). This plate should be reinforced if necessary to prevent distortion of the winch under load.

Drill mounting holes for 1-1/4" (32 mm) grade 5 (or better) capscrews, install and shim the winch to provide good alignment as described under the heading "Check Alignment".

2. Do not weld to any part of the winch.
3. Check alignment of the winch when mounted.
4. Use correct type of control valve.
5. Use hose and control valve sizes recommended.
6. Use oil recommended.
7. Connect vent port 'Q' (Figure 'A') directly to the reservoir.
8. Do not exceed the maximum psi (kg/cm²) or gpm (l/min) stated in the winch specifications.
9. Keep the hydraulic system clean and free from dust and grit at all times.
10. If the winch does not perform according to specifications, check the hydraulic system before dismantling the winch.



11. Read the disassembly and assembly instructions for the winch before removing any part of the winch.
12. Disassemble the winch and subassemblies in a work area that is clean and free from dust and grit.
13. Do not use kinked or frayed wire rope cable. Wear gloves whenever handling wire rope cable.

CHECK ALIGNMENT [ref. fig. A]

Measure clearance A with feeler gauges at points B and C. Measure clearance D at points B and C. For good alignment, clearance A should be equal when measured at points B and C within .005" (.12 mm). Clearance D should also be equal when measured at B and C within .005" (.12 mm). Clearance A does not require to be equal to clearance D. If the clearances measured at B and C are not within .005" (.12 mm), install shims under corner of the winch base until clearances B and C are within .005" (.12 mm) when the winch is bolted solidly to its mounting.

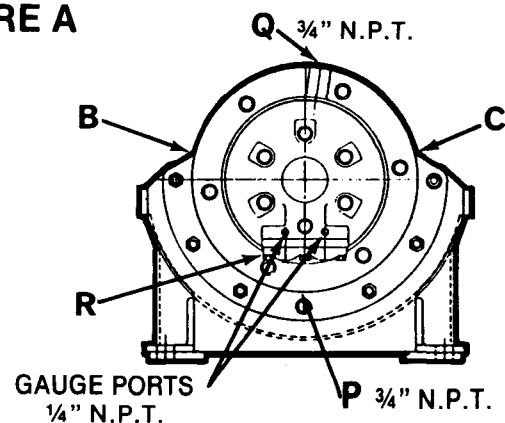
LUBRICATION

The final drive assembly is to be filled with SAE 90 transmission oil to the level of the filler plug 'S'.

The primary drive assembly is to be filled with the same oil as used in the hydraulic system. Refer to lowering application.

The primary drive bearing is packed with bearing grease on assembly at the factory and should be repacked whenever the winch is reassembled after an overhaul.

FIGURE A



GROUP 4.

HYDRAULIC OILS

Any good quality hydraulic oil may be used in the hydraulic system. The following specifications will serve as a guide in selecting suitable oils. To express these oils in general terms, for areas where the minimum climatic temperature is above 32°F (0°C), a hydraulic oil having a weight equivalent to a SAE rating of 10W will be satisfactory. When the minimum climatic temperature is between 0°F (-17.7°C) and 32°F (0°C), use a hydraulic oil having a weight equivalent to an SAE rating of 5W. For low temperature climates below 0°F (-17.7°C), consult the local oil company representative for a hydraulic oil having a maximum viscosity of 3,000 SSU's at the minimum temperature encountered.

Oils having 150 to 250 SSU 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 warm-up periods. A high viscosity index will minimize changes in viscosity with corresponding changes in temperature.

Under continuous operating conditions the temperature of the oil at any point in the system must not be allowed to exceed 180°F (82°C). It is recommended that the pump inlet temperature be limited to 130°F (54°C). Definite operational advantages will be obtained by operating below 130°F (54°C).

Oils that are heavily supplemented with E.P. (extreme pressure) additives are not recommended for use in Gearmatic products. The use of certain E.P. additives may adversely affect the performance of the brake and its related parts.

Contact the factory if in doubt regarding the selection of hydraulic oil.

WARM UP PROCEDURE

A warm up procedure is recommended for all start up and 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 hydraulic winch should then be operated at low speeds, forward and reverse, several times to prime all lines with warm hydraulic oil.

Failure to properly warm up the hydraulic winch, particularly under low ambient temperature conditions, can result in excessive pressure build-ups in the primary housings, causing damage to the housing, cover and premature seal failure.

BASIC COMPONENTS TO BE USED WITH THE WINCH

1. PUMP

The pump used with the winch should be capable of producing pressure and volumes as shown under specifications Group 3.

2. CONTROL VALVE

The control valve used to operate this winch should be a four-way, spring return to neutral, open centre valve having a motor spool, that is, all work ports must be open to the reservoir when the valve spool is in the neutral position. This control valve should have good metering characteristics in order to provide smooth winch control and have a built-in relief valve suitable for the maximum operating pressure.

When the winch control valve is to be installed between the pump and an existing control valve, it will be necessary to use a control valve for the winch which has a "high pressure carryover" or "power beyond" port.

Refer to Gearmatic or nearest distributor for control valve recommendations.

3. HOSES

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 1). If the hydraulic lines used are too small, they may cause excessive back pressure at the reverse motor port sufficient to release the brake (95 psi (6.7 kg/cm²) maximum).

The sizes shown in Table 1 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.

TABLE 1

HOSE REQUIREMENTS		
OIL FLOW US gpm (l/min.)	PRESSURE LINES INSIDE DIA.	RETURN LINES INSIDE DIA.
16 – 20 US gpm 60 – 229 l/min	1" 25 mm	1¼" 32 mm
61 – 80 US gpm 230 – 303 l/min	1¼" 32 mm	1½" 38 mm
81 – 120 gpm 304 – 454 l/min	1½" 38 mm	1¾" 44 mm

LINE FROM PORT Q — ¾" (19 mm) MINIMUM

GROUP 4.

4. FILTER

When these winches are installed with their own hydraulic system or when there is no filter in the existing circuit, a partial flow micro-filter should be installed between the control valve and the reservoir. This should trap particles over 10 microns in size.

Servicing schedule for Filter.

The original filter cartridge should be replaced after 50 hours operation.

Average Atmosphere — Replace after each 500 hours.

Dirty Atmosphere — Replace after each 250 hours.

The above schedule is for an open system equipped with a micro-air breather. Open systems without micro-air breathers are not recommended.

Visual inspection cannot be used to determine when the cartridge should be replaced. Particles below 40 microns are not visible to the human eye.

LOWERING APPLICATION

In all lowering applications, 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.

Figure 'B' illustrates the basic hydraulic circuit for a lowering application. Oil is circulated through the primary housing so that it enters at port 'P' and leaves at port 'Q'. The hose used for the circulation lines to ports 'P' and 'Q' can be low pressure hose with "push on" fittings. Port 'Q' should be located within 45° of top dead center.

Figure 'B' illustrates a partial flow micro-filter being used to filter the oil and create a back pressure to cause circulation through the winch.

The filter should be installed close to the reservoir and the circulating line to port 'P' should be connected from a point close to the oil filter as shown. Port 'Q' should be connected directly to the reservoir as shown (below oil level).

THE PRESSURE IN THE PRIMARY HOUSING DUE TO THE CIRCULATION OIL MUST NOT EXCEED 15 PSI (1 ATM.).

EXCESSIVE PRESSURES WILL DAMAGE THE SEALS.

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 installations where the amount of heat absorbed by the oil is greater than the cooling capacity of the reservoir and the other components, it is necessary to install a heat exchanger. The temperature of oil at any point in the system must not be allowed to exceed 180°F (82°C). It is recommended that the pump inlet temperature be limited to 130°F (54°C). Definite operational advantages will be obtained by operating below 130°F (54°C).

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.

HYDRAULIC CIRCUITS LOWERING APPLICATION

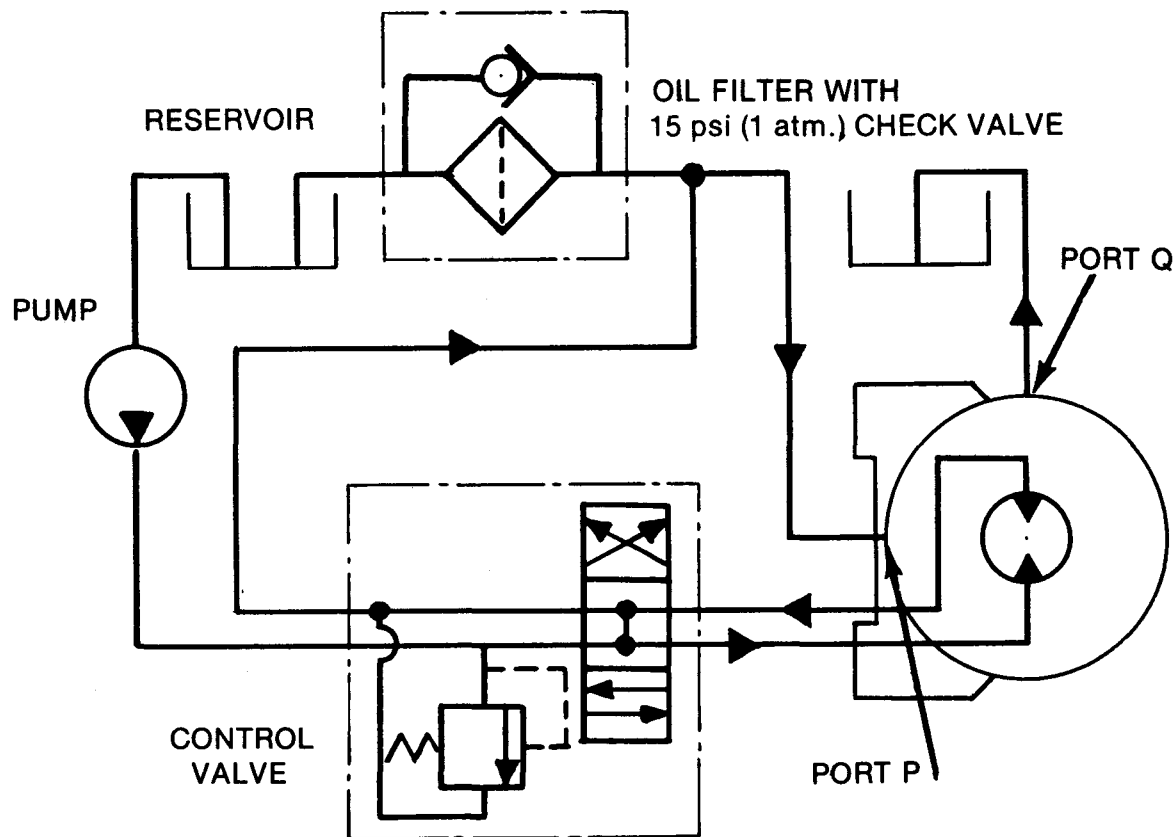


FIGURE B.

GROUP 5.

MAINTENANCE PROCEDURE FOREWORD TO SERVICING

Before any part is removed from the winch, all relevant disassembly steps should be read and understood.

Expendable parts such as oil seals, backup washers and 'O' rings should never be re-used even though inspection may show these items as being serviceable for future use. The cost of these items is negligible compared to the labour

involved in replacing such items if they do not function properly.

All replacement parts should be given your final inspection to ensure that no damage has resulted after the final factory inspection was made.

Cleanliness is of prime importance when working on any part of this winch. Before commencing disassembly, be sure that a clean work area with a dust and grit free work bench is available.

GROUP 5

GENERAL MAINTENANCE

The following service recommendations are to be carried out whenever the safety of personnel is involved and are made with a view of providing trouble-free service from this winch.

Steps 1,3, and 4 are to be carried out every twelve months or every 500 hours of winch operation, whichever occurs first.

1. Disassemble the final drive assembly and thoroughly inspect the parts as per instructions detailed in Groups 11 and 12.
2. On standard final drive assemblies, check the oil level at least every six months.
3. Disassemble the primary drive assembly and thoroughly inspect all parts, by following the disassembly instructions for this assembly. Do not disassemble the motor assembly unless it is known to be faulty. Check the brake springs for permanent set. Free length should not be less than 3-15/16" (100mm).
4.
 - a) Disassemble the brake hub and check the sprag clutch and bearing surfaces for wear and flat spots. When wear exceeds .001 (.025 mm) on the diameter, replace the complete assembly. Check sprags for flats and replace with new parts if flats exist.
 - b) Clean out the inside of the primary housing, reassemble the primary drive assembly and refill the primary housing with the same oil as is used in the hydraulic system.

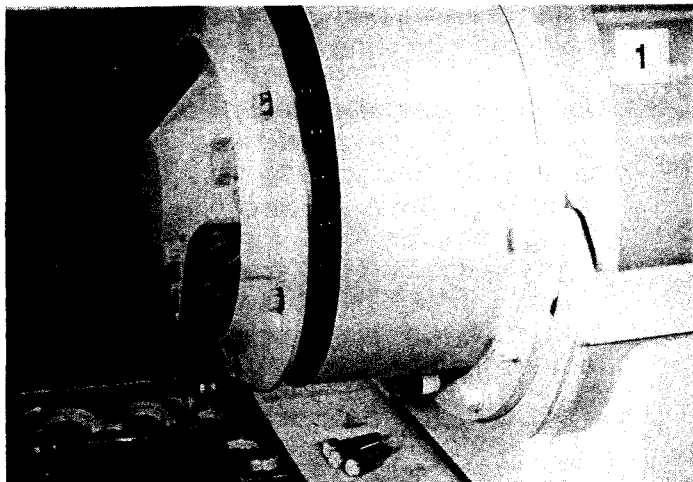
WINCH REMOVAL INSTRUCTIONS

1. Remove the cable and cable anchor (hondur) from the drum.
2. Relieve all pressure in oil system before any lines, fittings or related items are disconnected or removed.
3. Drain all the oil from the primary and final drive ends. Remove all hydraulic lines.
4. Remove the four mounting bolts, nuts, and washers. Check for loose shims, note and mark location of shims for reassembly later on.
5. Secure a lifting chain to the cable drum and using a suitable overhead hoist with a lifting capacity of approximately 2000 lbs (910 kgs) lift the winch and set it in the work area on a sturdy work bench.
6. Mark the base, "FINAL DRIVE END" and "PRIMARY DRIVE END". This will ensure correct assembly of the winch when it is re-assembled.

GROUP 6. PRIMARY DRIVE ASSEMBLY

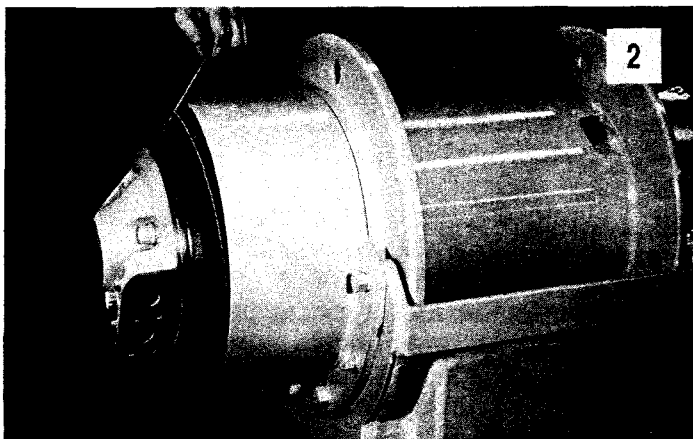
It is recommended that work on the primary drive assembly be done only in a clean shop equipped with suitable hoisting equipment.

DISASSEMBLY PROCEDURE

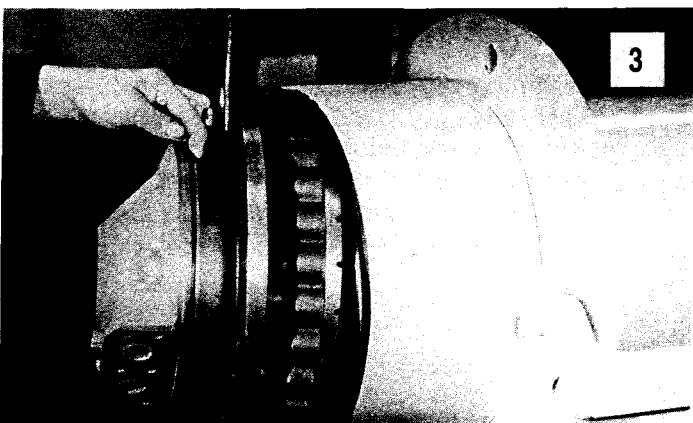


Drain oil from the primary housing by removing lowest cap screw (285) and seal washer (284) from the spring cover, (281). Remove pipe plug (485) to vent the housing (325).

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



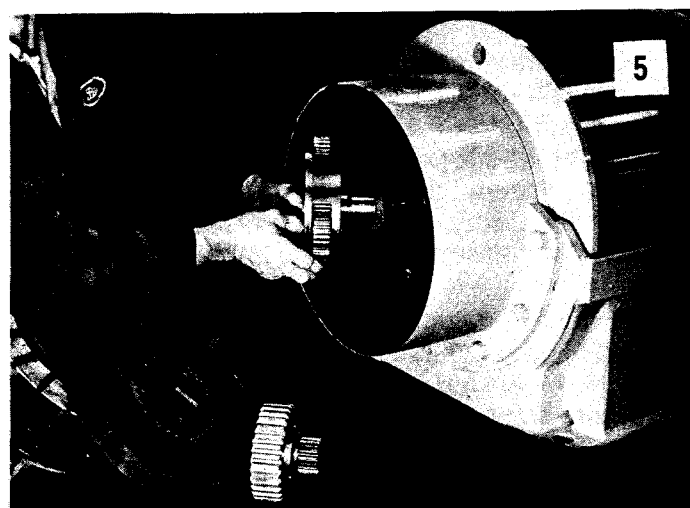
Remove springs (286) and snap ring (282).



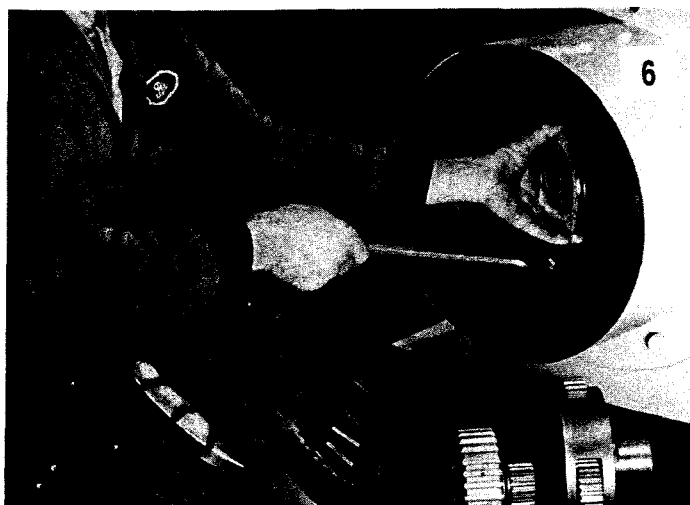
Slide out the motor assembly using a cap screw in one of the top tapped holes and a lifting hoist.



Remove brake plate (327) and brake hub assembly (51) or (52).



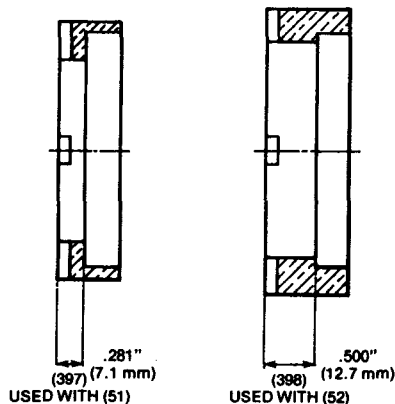
Remove sun gear shaft from final drive (see final drive disassembly instructions Group 11). Remove primary planet assembly (50).



Remove seal ring (184). Discard 'O' Ring (185) and oil seal (331).

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.
NOTE: Never wash the brake plates.
3. Inspect the bore in the spring cover (281) for scores and bruises. If damaged, smooth out with extra fine emery cloth.
4. Check that the gears (304) in the primary planet assembly (50) rotate freely in both directions. Where doubt exists with regard to serviceability, refer to Group 10 for inspection and assembly instructions.
5. Check that the sun gear (314) in the brake hub (51) 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 Group 9, for inspection and assembly instructions.
6. Inspect the gear teeth in the primary housing (325). If wear is greater than .015" (.38 mm) when compared to the unworn part of the teeth, replace the housing (325).
7. Inspect the friction surfaces of the brake plate (327). If wear has removed the grooves, replace the brake plate (327).
8. Inspect thickness of the motor bushing (397), original thickness .281" (7.1 mm), or (398), original thickness .500" (12.7 mm). If wear exceeds 1/32" (.80 mm), replace.

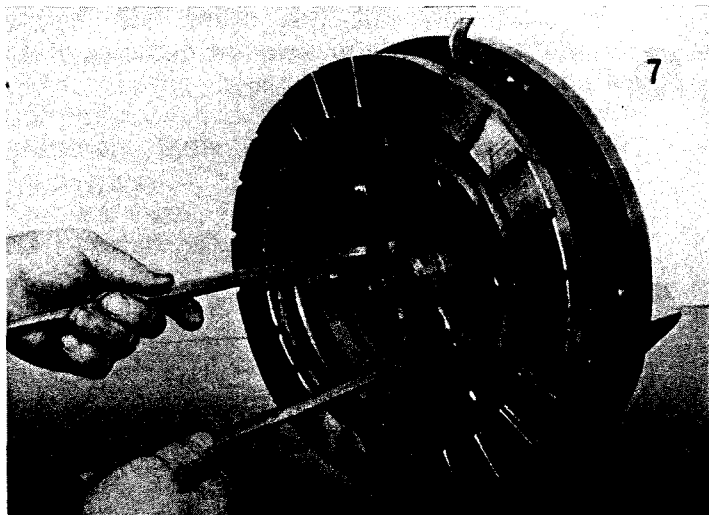


9. Refer to Group 8 for motor servicing and inspection.

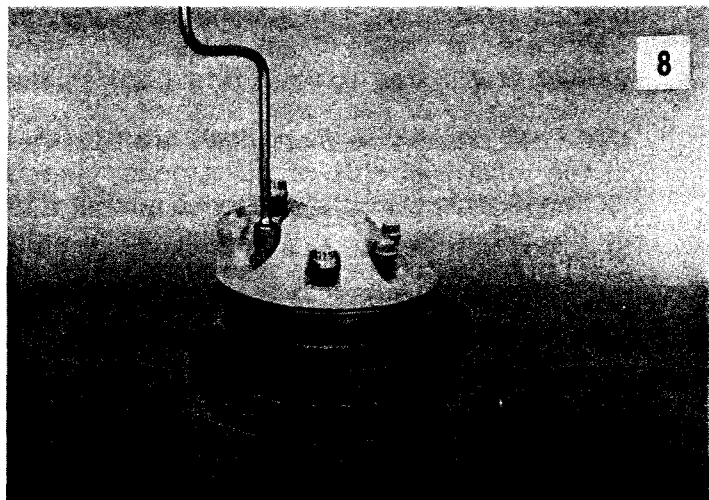
ASSEMBLY INSTRUCTIONS

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. Using the overhead crane, 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 (137) with the primary housing (325). Use a copper drift to drive the housing into position on the drum bearing. Install the lock-washers (143) and nuts (144) on the dowel bolts (142) and torque to specifications (see page 27).
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 (184). 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 (325).
5. Install the primary planet assembly (50). The three planet gears must mesh with the internal gear of the primary housing (325). Be careful not to damage the oil seal (331).
6. Install the brake hub assembly (51 or 52) and brake plate (327).
7. Using an overhead crane, install the motor assembly and snap ring (282).
8. Rotate the motor ports to the correct port angle as previously marked during disassembly. Grease and install 'O' rings (271 and 283) on the port end cover (354) (355) and spring cover (281).
9. Install the brake springs (286).
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 lbs. ft. (7 kg/m).

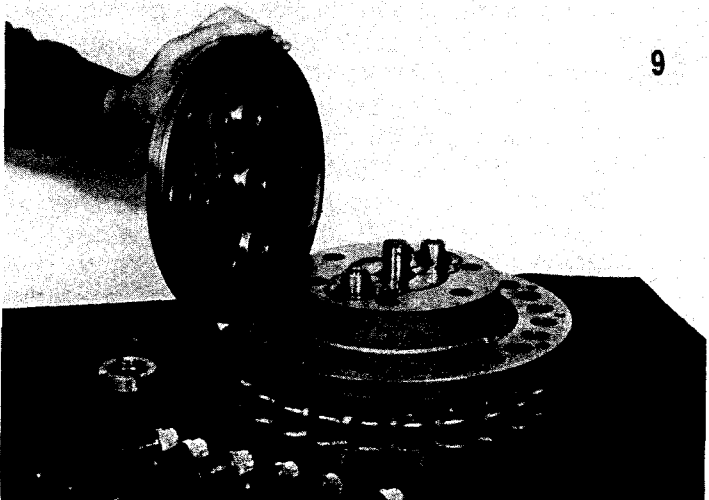
GROUP 7. MOTOR ASSEMBLY DISASSEMBLY PROCEDURE



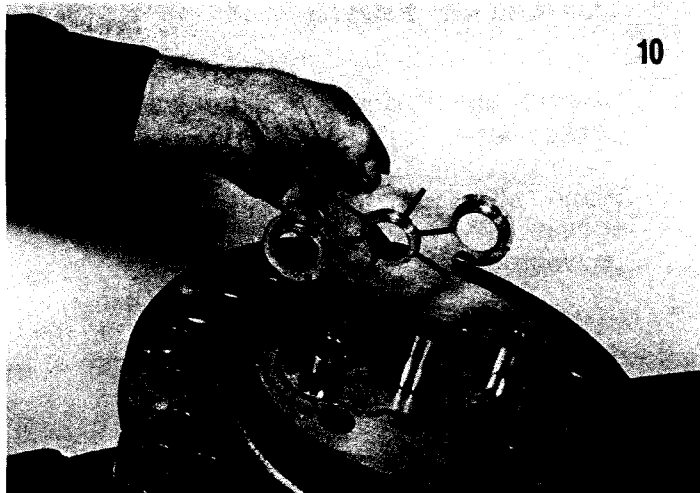
Remove all external piping. Remove bushing (397) or (398).



Remove capscrews (357) (359). On reassembly, torque to 200 lb. ft. (28 kg m).



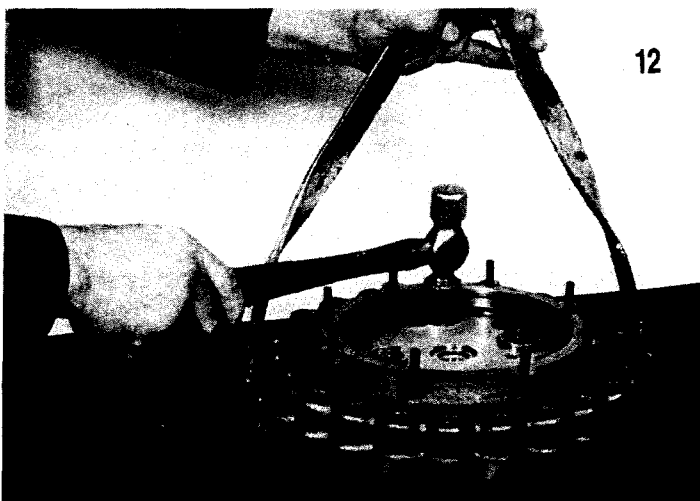
Remove port end cover (354) or (355).



Remove brass thrust plate (392). The thrust plate (392) will sometimes remain on the port end cover (354) or (355). Replace pocket seals (389) (390) and (391) on reassembly.



Remove 'O' ring (393). Remove the matched gear set (396) and motor shaft (352). Note which end of each gear was next to the port end cover (354) or (355).



Remove brake piston (380) from shaft end cover (376) or (377).

INSPECTION OF PARTS

1. Discard all 'O' rings, backup washers and pocket seals.
2. Wash all parts thoroughly in a suitable solvent. Dry thoroughly with compressed air or clean cloths.

WARNING: Do not dry bearings with compressed air, allow them to air dry after they are properly cleaned.

3. Inspect the needle bearings (382) for freeness of rollers. Check for pits, broken rollers or excessive wear and replace if any of these conditions exist.
4. Inspect the gears (396), check the edges of the gear teeth and faces for scoring or roughness. If possible, remove roughness or scoring with a fine hone. Also inspect the gear hubs for excessive wear at the bearing points. If wear exceeds .001" (.025 mm) on the hub diameter, the gears should be replaced. When replacing gears, they should be replaced in sets since they are matched at the time of manufacture.
5. Stone the machined surfaces of the port end cover (354) or (355), the gear housing (394) or (395), and shaft end cover (376) or (377) to remove any roughness. If roughness is excessive the components will have to be replaced.

Measure the gear housing bore and replace if radial wear is in excess of .006" (.152 mm). A new gear housing measures 2.0025" (50.863 mm) in the small bores and 3.7525" (95.314 mm) in the large bore.

6. Replace thrust plates (392) that show any erosion or excessive wear on the running surfaces. Excessive wear can be caused by using contaminated oil in the hydraulic system.
7. Rewash all parts that have been stoned and dry thoroughly.

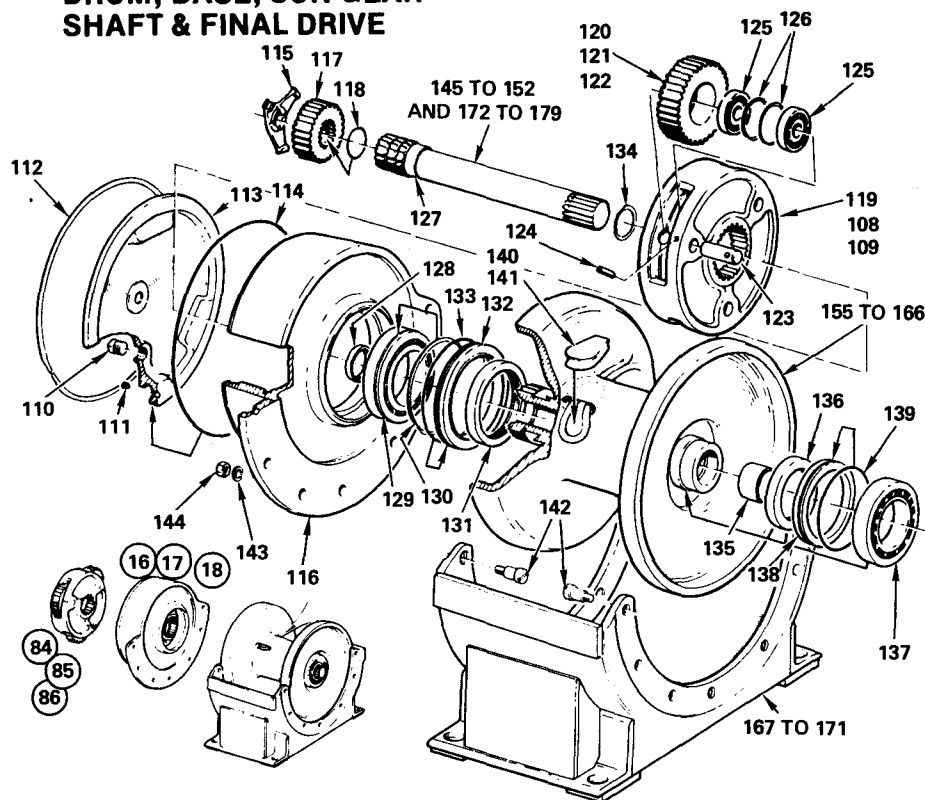
NOTE: If either the gears (396) or needle bearings (382) are replaced because of excessive wear, it is good practice to replace both the gears and bearings. Replacement of one part and not the other will cause premature wear of the new part because of its attempt to conform to the wear pattern of the old part. Also if the gears and bearings are replaced due to excessive wear, carefully check the side of the gear housing bore which has most wear. In most cases the gear housing (394) or (395) will also have to be replaced along with the gears and bearings.

ASSEMBLY INSTRUCTIONS

1. Install two backup washers (386) in the inside groove in the seal bushings (385) and one backup washer (383) in the outside groove. Lubricate 'O' rings (384) and (387) with grease and install one 'O' ring (387) in the inside groove of each seal bushing (385) so that both backup washers (386) are together at the thick wall side of the groove; install 'O' ring (384) in the outside groove so that it is at the same end of the bushing as 'O' ring (387) installed in the inside groove. Give all 'O' rings an additional coat of grease.
2. Place the port end cover (354) or (355) and shaft end cover (376) or (377) on the work bench with the bearing bores facing up. Install the seal bushing (385) in the centre bore in the port end cover (354) or (355) so that the backup washers (383) and (386) enter before the 'O' rings (384) and (387). Install the bearing (382) in the centre bore of the port end cover (354) or (355) and the shaft end cover (376) or (377) so that they bottom at the end of the bearing bore. Install the remaining seal bushing (385) in the shaft end cover (376) or (377) so that the backup washers (383) and (386) enter the bore before the 'O' rings (384) and (387), then locate against the bearing (382). Place the spacer (388) in the in the centre bore next to the seal bushing (385) in the shaft end cover (376) or (377). Press both bushings in until they seat on the end of each bore. Be sure that all 'O' rings (384) and (387) are installed toward the gear side of the end covers (354) or (355) and (376) or (377).

(Continued on Page 19)

DRUM, BASE, SUN GEAR SHAFT & FINAL DRIVE



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

ITEM NO.	OLD PART NO.	NEW PART NO.	DESCRIPTION
16	51903 for Model 34-**-10-***	72650	FINAL DRIVE ASSEMBLY includes items 84 and 110 thru 116 and 128
17	51904 for Model 34-**-20-***	72651	FINAL DRIVE ASSEMBLY includes items 85 and 110 thru 116 and 128
18	51905 for Model 34-**-30-***	72652	FINAL DRIVE ASSEMBLY includes items 86 and 110 thru 116 and 128
84	C22006XS for Model 34-**-10-***	71398	FINAL PLANET HUB ASSEMBLY includes items 119, 120 and 123 thru 126
85	C22006XM for Model 34-**-20-***	71397	FINAL PLANET HUB ASSEMBLY includes items 108, 121 and 123 thru 126
86	B22009X for Model 34-**-30-***	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

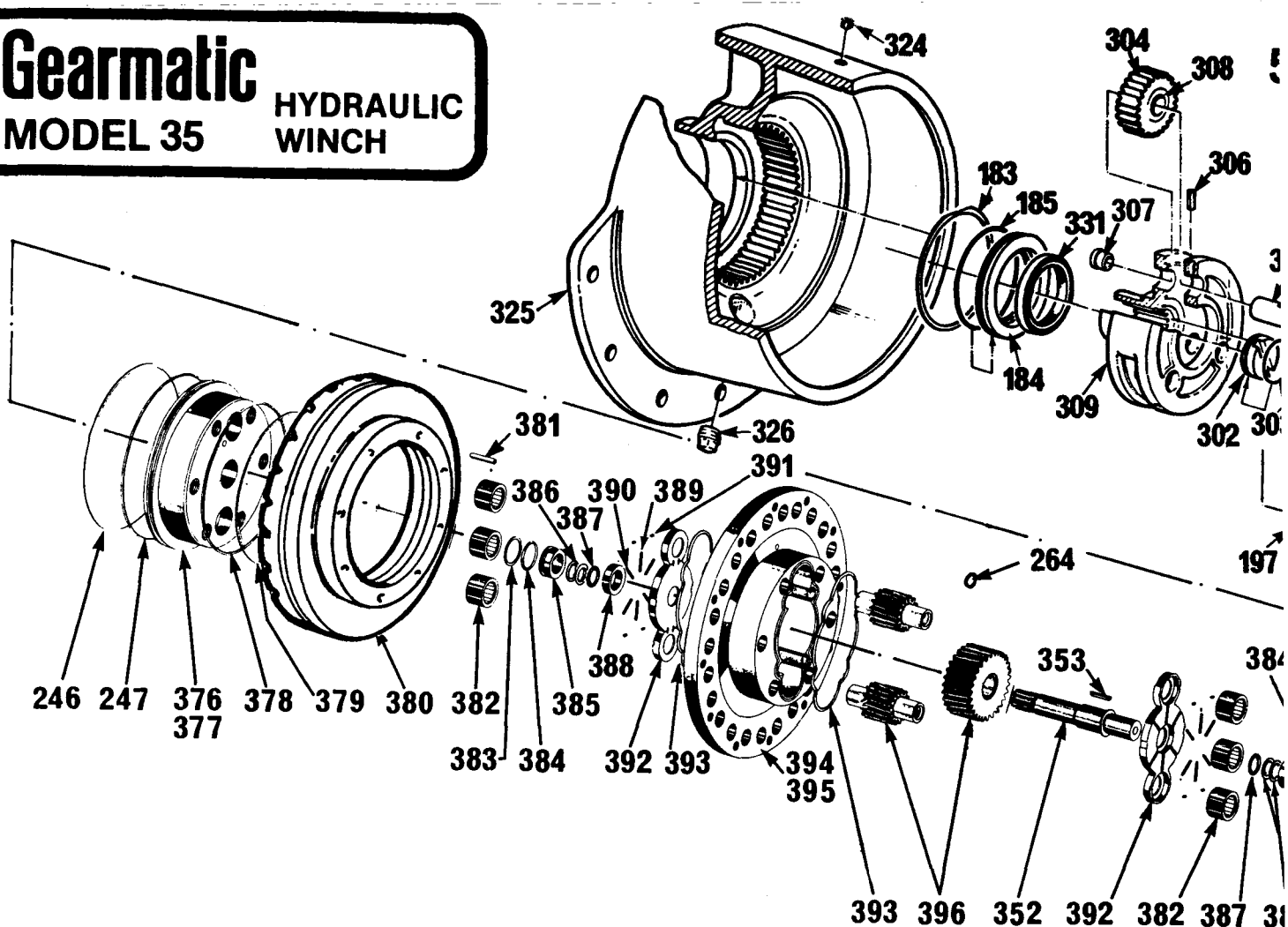
ITEM NO.	OLD PART NO.	NEW PART NO.	QTY	DESCRIPTION	ITEM NO.	OLD PART NO.	NEW PART NO.	QTY	DESCRIPTION
108	C22006M	71394	1	PLANET HUB	143	50098	11028	14	LOCKWASHER
109	C22006H	71393	1	PLANET HUB	144	50099	71974	14	NUT
110	55286	73348	1	PIPE PLUG	145	51957	72681	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
111	50428	77322	1	PIPE PLUG	146	51925	72665	1	SUN GEAR SHAFT 6.80 to 1
112	50463	72182	1	SNAP RING	147	51959	72682	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
113	51775	72613	1	END COVER	148	51952	72677	1	SUN GEAR SHAFT 6.80 to 1
114	50346	25016	1	'O' RING	149	51960	72683	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
115	51773	72611	1	THRUST RING	150	51953	78500	1	SUN GEAR SHAFT 6.80 to 1
116	C22001	71391	1	FINAL DRIVE HOUSING	151	51961	72684	1	SUN GEAR SHAFT 4.22 to 1, 8.25 to 1
117	A22030	71072	1	SUN GEAR	152	51954	72678	1	SUN GEAR SHAFT 6.80 to 1
118	A22031	71073	1	RETAINER RING	155	58837	77164	1	DRUM
119	C22006S	71395	1	PLANET HUB	156	59038	77162	1	DRUM
120	50471	72187	3	PLANET GEAR	157	59041	77163	1	DRUM
121	B22134	71302	3	PLANET GEAR	158	75434	75434	1	DRUM
122	B22008	71259	3	PLANET GEAR	159	76002	76002	1	DRUM
123	50472	72188	3	PLANET PIN	161	75435	75435	1	DRUM
124	50451	70862	3	PIN	162	58815	77257	1	DRUM
125	50473	72189	6	BALL BEARING	163	75436	75436	1	DRUM
126	50474	72190	6	SNAP RING	164	58824	77153	1	DRUM
127	51765	72609	1	SEAL RING (Part of Sun Gear Shaft)	165	59060	79097	1	DRUM
128	51008	72381	1	SEAL	166	58803	77256	1	DRUM
129	50480	72193	1	BEARING	167	75489	75489	1	BASE
130	50479	72192	1	SNAP RING (Part of Item 129)	169	75490	75490	1	BASE
131	50483	72195	1	SEAL	170	D22051X-22	71565	1	BASE
132	A22002	71062	1	LARGE SEAL RING	171	D22051X-28	71566	1	BASE
133	50333	22357	1	'O' RING	172	58870	NA	1	SUN GEAR SHAFT
134	51016	72386	1	SNAP RING	173	58872	NA	1	SUN GEAR SHAFT
135	50276	72084	1	DRUM BUSHING	174	58873	NA	1	SUN GEAR SHAFT
136	50482	77342	1	SEAL	175	58874	NA	1	SUN GEAR SHAFT
137	50478	72191	1	BALL BEARING	176	58848	75940	1	SUN GEAR SHAFT
138	A22008	71066	1	SMALL SEAL RING	177	58850	75942	1	SUN GEAR SHAFT
139	50328	21040	1	'O' RING	178	58851	75943	1	SUN GEAR SHAFT
140	50107	71978	1	HONDU 7/16 to 5/8" CABLE - 14.5" Barrel only	179	58852	75944	1	SUN GEAR SHAFT
141	50123	71979	1	HONDU 1/16" to 7/8" CABLE - 8" to 12" Barrel only					
142	A11041	71017	14	DOWEL BOLT					

WHEN ORDERING PARTS BE SURE TO STATE SERIAL NUMBER OF WINCH

Gearmatic

MODEL 35

HYDRAULIC
WINCH

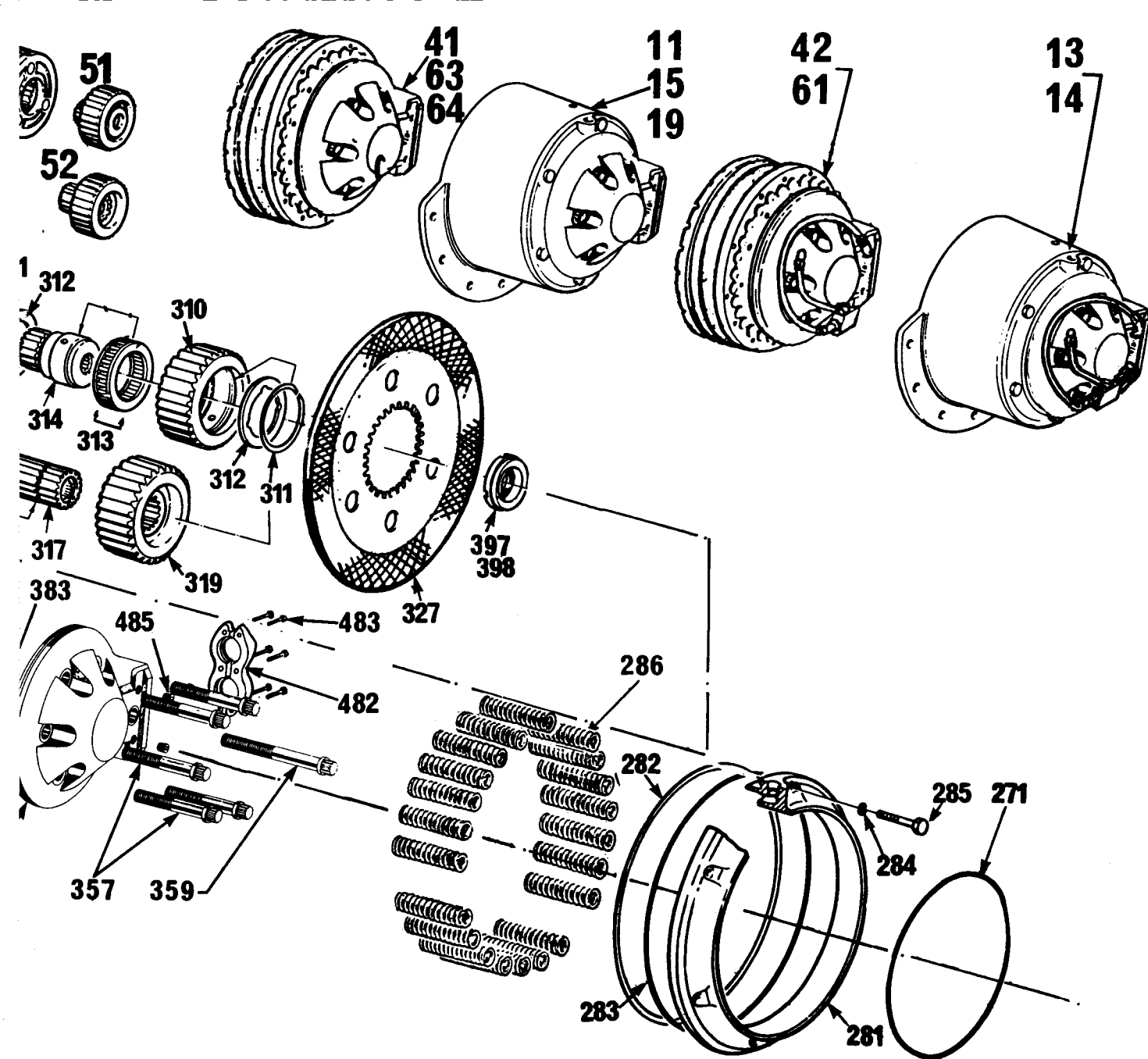


REFER TO ASSEMBLIES (Items 1 thru 100)
FOR LISTS OF COMPONENT PARTS

Item	Old Part No.	New Part No.	Description	Item	Old Part No.	New Part No.	Description
11	52296 for Model 35-11-**-11-**-	72783	PRIMARY DRIVE ASSEMBLY, includes items 41, 50, 51, 183 through 185, 271, 281 through 286, 324 through 327, 331 and 397.	42	53717 for Model 35-11-**-15-**-	73006	MOTOR ASSEMBLY, includes items 62, 246, 247, 264, 352 through 354, 357, 359, 376, 378 through 394, 396, 483 and 484.
13	52297 for Model 35-11-**-13-**-	72784	PRIMARY DRIVE ASSEMBLY, includes items 50, 52, 61, 183 through 185, 271, 281 through 286, 324 through 327, 331 and 398.	64	52291 for Model 35-11-**-18-**- 35-11-**-17-**-	72779	MOTOR ASSEMBLY, includes items 246, 247, 264, 352 through 354, 357, 359, 376, 378 through 394, 396, 483 and 484.
14	53577 for Model 35-11-**-15-**-	—	PRIMARY DRIVE ASSEMBLY, includes items 42, 50, 51, 183 through 185, 271, 281 through 286, 324 through 327, 331 and 397.	50	51740 for Model 35-11-**-1-**-	72601	PLANET HUB ASSEMBLY, includes items 302 through 309.
15	54147 for Model 35-11-**-17-**-	—	PRIMARY DRIVE ASSEMBLY, includes items 50, 52, 64, 183 through 185, 271, 281 through 286, 324 through 327, 331 and 398.	51	51734 for Models 35-11-**-11-**- 35-11-**-15-**- 35-11-**-18-**-	72596	BRAKE HUB ASSEMBLY, includes items 310 through 314.
19	54149 for Model 35-11-**-18-**-	73113	PRIMARY DRIVE ASSEMBLY, includes items 50, 51, 64, 183 through 185, 271, 281 through 286, 324 through 327, 331 and 397.	52	51950 for Models 35-11-**-13-**- 35-11-**-17-**-	72676	BRAKE HUB ASSEMBLY, includes items 197, 317 and 319.
41	52292 for Model 35-11-**-11-**-	72780	MOTOR ASSEMBLY, includes items 246, 247, 352, 353, 355, 357, 359, 377 through 393, 395, 396, 483 and 484.	62	52294	72781	PIPING ASSEMBLY (see page 18).
61	52295 for Model 35-11-**-13-**-	72782	MOTOR ASSEMBLY, includes items 60, 246, 247, 264, 352 through 354, 357, 359, 376, 378 through 394, 396, 483 and 484.	60	53716	73005	PIPING ASSEMBLY (see page 18).

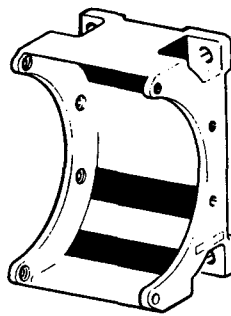
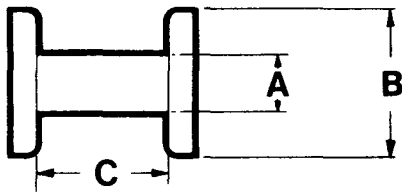
Item	Old Part No.
183	50492
184	A22081
185	50328
197	50580
246	50368
247	50339
264	50295
271	50343
281	51896
282	50463
283	50346
284	50392
285	50468
286	50462
302	51739
303	50307
304	A22071
305	A22071
306	50573
307	A11011
308	50829
309	51738
310	51733
311	51258
312	51732

WHEN ORDERING PARTS BE SURE TO STATE SERIAL NUMBER OF WINCH



Item No.	Qty.	Description	Item	Old Part No.	New Part No.	Qty.	Description	Item	Old Part No.	New Part No.	Qty.	Description
302	1	SNAP RING	313	51729	72591	1	SPRAG ASSEMBLY	379	50367	72124	1	BACKUP WASHER
399	1	SEAL RING	314	51730	72592	1	SUN GEAR	380	52625	76268	1	BRAKE PISTON
340	1	O RING	317	A22082	71098	1	PRIMARY SUN GEAR					Incl's item 381
349	1	SNAP RING	319	51956	72680	1	BRAKE HUB	381	50831	75130	8	PIN
325	1	BACKUP WASHER	325	C22190	71452	1	PRIMARY END HOUSING	382	50493	77340	6	BEARING
397	1	O RING	326	50464	75084	2	PIPE PLUG	383	50362	72119	2	BACKUP WASHER
366	2	O RING	327	54487*	73164	1	BRAKE PLATE	384	50306	21150	2	O RING
346	1	O RING	331	50454	77336	1	OIL SEAL	385	A22069	71083	2	BUSHING
182	1	SPRING COVER	352	B22040	71275	1	MOTOR SHAFT	386	50487	72199	4	BACKUP WASHER
316	1	SNAP RING	353	50481	72194	1	KEY	387	50488	72200	2	O RING
144	6	SEAL WASHER	354	51788	72616	1	PORT END COVER	388	A22070	71084	1	SPACER
186	6	CAPSCREW	355	D22016	71550	1	PORT END COVER	389	50485	72197	4	POCKET SEAL
181	21	SPRING	357	58198	74795	5	CAPSCREW	390	50486	72198	8	POCKET SEAL
300	1	THRUST PAD	359	58199	74796	1	CAPSCREW	391	50484	72196	8	POCKET SEAL
338	1	O RING	376	C22053B	71410	1	SHAFT END COVER	392	C22043	71404	2	THRUST PLATE
390	3	PLANET GEAR	377	C22053C	71411	1	SHAFT END COVER	393	50332	10052	2	O RING
385	3	PLANET PIN	378	50337	21033	1	O RING	394	51743	72603	1	GEAR HOUSING
349	3	PIN						395	C22205	71456	1	GEAR HOUSING
310	3	THRUST PLUG						396	B22041	71276	1	GEAR SET
328	3	NEEDLE BEARING						397	52284	72776	1	BUSHING USED
399	1	PLANET HUB										WITH #51
395	1	BRAKE HUB						398	52285	78521	1	BUSHING USED
326	2	SNAP RING										WITH #52
394	2	SPACER						482	B22015A	71262	1	SPLIT FLANGE SET
								483	50396	21044	6	CAPSCREW
								485	55647	77335	2	PIPE PLUG

* NOTE: Brake plate 54487 (item 327) recognized by its black coloured brake material was 51736 recognized by its copper/bronze coloured brake material. Serial number effectivity of brake plate 54487, is 35-577. Brake plate 51736 uses 24 brake springs item 286 part no. 50462.



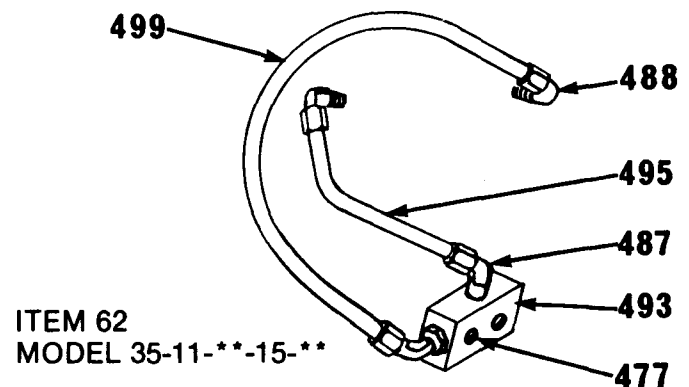
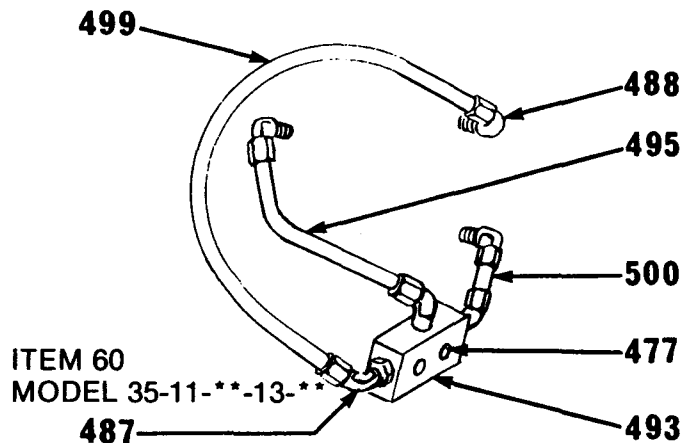
†Sun gear shafts, items 145, 147, 149, and 151, include item 127

A	B	C	DRUM			BASE			SUN GEAR SHAFT WINCHES WITHOUT R.I.D.*						SUN GEAR SHAFT WINCHES WITH R.I.D.*					
									4.22 to 1 8.25 to 1			6.80 to 1			4.22 to 1 8.25 to 1			6.80 to 1		
			Item #	Old Part No.	New Part No.	Item #	Old Part No.	New Part No.	Item #	Old Part No.	New Part No.	Item #	Old Part No.	New Part No.	Item #	Old Part No.	New Part No.	Item #	Old Part No.	New Part No.
8	16	10	155	58837	77164	167	D22050X	71560	145	51957	72681	146	51925	72665	172	58870	NA	176	58848	75940
8	22	10	156	59038	77162	167	D22050X	71560	145	51957	72681	146	51925	72665	172	58870	NA	176	58848	75940
8	22	16	157	59041	77163	169	D22051X-16	71564	147	51959	72682	148	51952	72677	173	58872	NA	177	58850	75942
8	22	22	158	75434	75434	170	D22051X-22	71565	149	51960	72683	150	51953	78500	174	58873	NA	178	58851	75943
8	22	28	159	76002	76002	171	D22051X-28	71566	151	51961	72684	152	51954	72678	175	58874	NA	179	58852	75944
12	22	10	161	75435	75435	167	D22051X-10	71560	145	51957	72681	146	51925	72665	172	58870	NA	176	58848	75940
12	22	16	162	58815	77257	169	D22051X-16	71564	147	51959	72682	148	51952	72677	173	58872	NA	177	58850	75942
14.5	22	10	163	75436	75436	167	D22050X	71560	145	51957	72681	146	51925	72665	172	58870	NA	176	58848	75940
14.5	22	16	164	58824	77153	169	D22051X-16	71564	147	51959	72682	148	51952	72677	173	58872	NA	177	58850	75942
16	22	16	165	57230	74272	169	D22051X-16	71564	147	51959	72682	148	51952	72677	173	58872	NA	177	58850	75942
10	16	10	166	58803	77256	167	D22050X	71560	145	51957	72681	146	51925	72665	172	58870	NA	176	58848	75940

DRUMS, SHAFTS AND BASES 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.

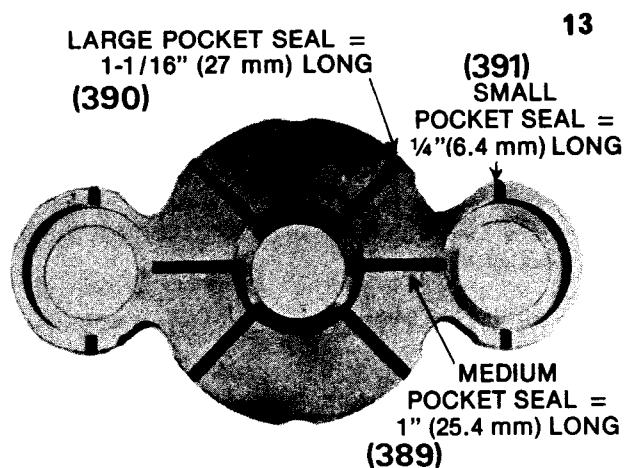
PIPING ASSEMBLIES



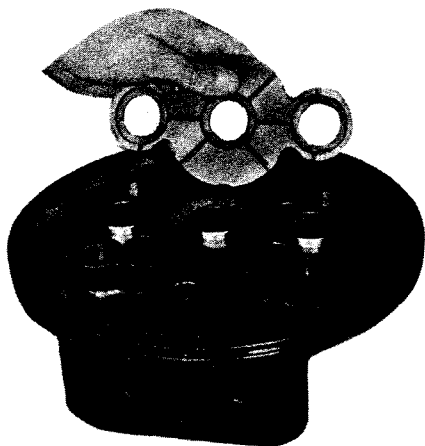
Item No.	Old Part No.	New Part No.	Description
60	52294 for Model 35-11-**-13-**	72781	PIPING ASSEMBLY, includes items 477, 487, 488, 493, 495, 499 and 500.
62	53716 for Model 35-11-**-15-**	73005	PIPING ASSEMBLY, includes items 477, 487, 488, 493, 495, 499 and 485.

Item No.	Old Part No.	New Part No.	Qty.	Description
485	55647	77335	2	PIPE PLUG Items 15 & 19
	50588	75099	1	CAPLUG
477	50834	75131	2	SCREW
487	52778	72856	2/3	ELBOW 2 Required Item 60 3 Required Item 62
488	51310	72461	2/3	ELBOW 2 Required Item 60 3 Required Item 62
493	50835	72331	1	SHUTTLE VALVE
495	53719	73007	1	TUBE ASSEMBLY
499	53720	73008	1	TUBE ASSEMBLY
500	54162	73115	1	TUBE ASSEMBLY

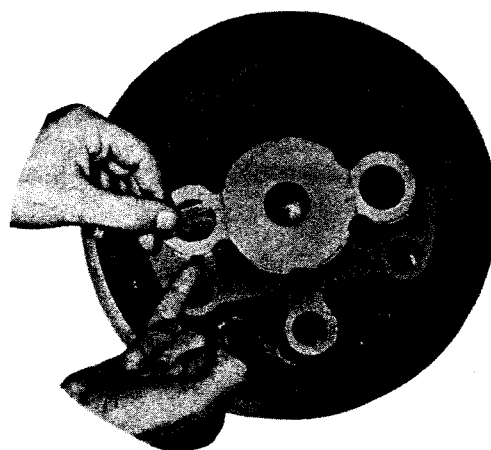
WHEN ORDERING PARTS BE SURE TO STATE SERIAL NUMBER OF WINCH



3. Check that the outside bores are clean and install the needle bearings (382) so that they bottom at the end of the bearing bores.
4. Place a small amount of heavy grease into the middle slots in the open face of each thrust plate (392) and insert two medium pocket seals (389) (see figure 13) in each thrust plate.



6. Into each of the four centre radial slots in the thrust plate (392) insert a large pocket seal (390) and into each of the four outside slots in the thrust plate (392) insert a small pocket seal (391). Be sure to push each seal all the way into the slots so that the hidden end is always in contact with the needle bearing race. Then tap the assembled thrust plate (392) into position against the face of the end cover (354) or (355) and (376) or (377). Trim away the excess from the exposed ends of the small pocket seals (391) with a razor blade (figure 15). Be sure to trim the exposed ends of the small pocket seals square and flush with the thrust plate (392).



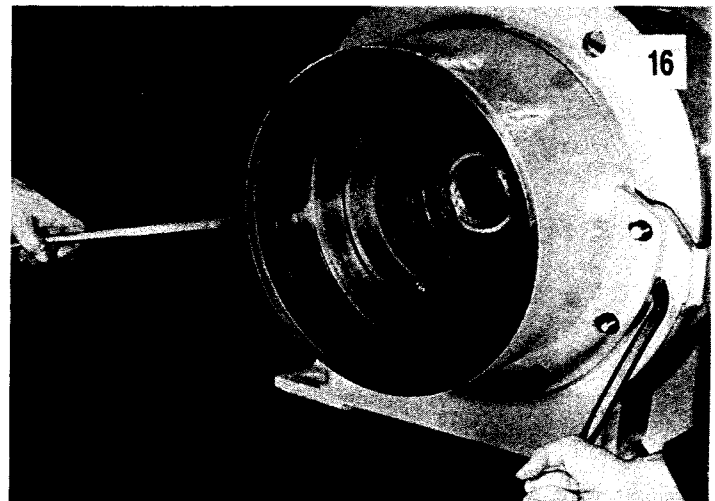
5. Place the thrust plate (392) with the pocket seal slots towards the end covers (354) or (355) and (376) or (377) and install over the bearings (figure 14). Check to see that the pocket seals (389) in the centre slots are still in place and tap the thrust plate into position with a soft hammer until approximately 1/32" (.81 mm) clearance is left between the thrust plate (392) and the end covers (354) or (355) and (376) or (377).

7. Install backup washer (246) in the outside groove of the shaft end cover (376) or (377). Lubricate 'O' ring (247) and install it next to the backup washer (246) so that it is on the side of the backup washer nearest to the thrust plate (392) end of the shaft end cover. Give the 'O' ring (247) and backup washer (246) an additional coat of grease.
8. Install backup washer (379) in the inside groove in the brake piston (380). Lubricate 'O' ring (378) and install it next to the backup washer (379) so that it is on the side of the backup washer nearest to the large bore of the brake piston (380). Give the 'O' ring (378) and backup washer (379) an additional coat of grease.

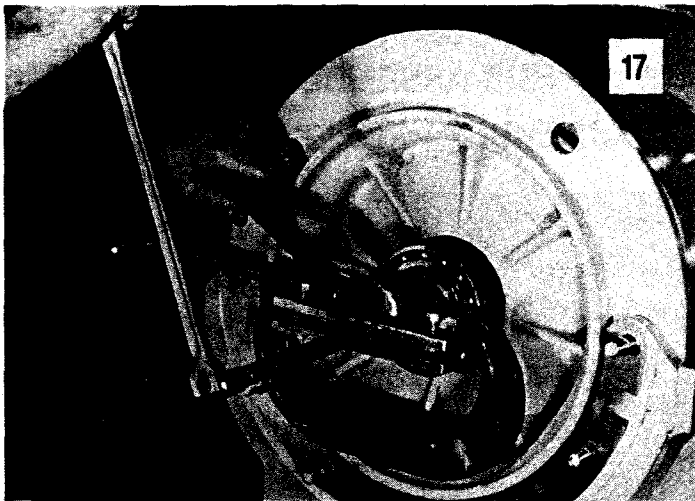
9. Check that pins (381) are installed in the brake piston (380). Assemble the brake piston (380) to the shaft end cover (376) or (377) taking care that the backup washers (379) and (246) do not extrude and get pinched between the mating diameters of the brake piston (380) and the shaft end cover (376) or (377).
 10. Place the key (353) in the keyway of the motor shaft (357), then press the large gear (396) over the motor shaft (352). Check that the gear bottoms against the shaft shoulder. If the gear set (396) is not being replaced with new parts, reassemble the gear set with respect to the port end cover (354) or (355) as noted during the disassembly.
 11. Place the shaft end cover (376) or (377), thrust plate up, on parallel bars on the work bench so that it does not rest on the end of the motor shaft. Install the motor shaft assembly through the seal bushing (385). Take care not to extrude backup washer (386).
 12. Lubricate 'O' rings (393) and install one in each side of the motor housing (394) or (395). Give the 'O' rings (393) an additional coat of grease.
 13. Assemble the motor housing (394) or (395) over the thrust plate (392) on the shaft end cover (376) or (377) so that the motor housing (394) or (395) and the shaft end cover (376) or (377) are concentric and pins (381) locate in the motor housing (394 or 395). Place the large diameter end of the motor housing (394) or (395) next to the shaft end cover (376) or (377) and tap the motor housing (394) or (395) into place with a soft hammer. Be careful not to pinch the 'O' ring (393) during this assembly.
 14. Take the matched small gears of gear set (396) and install them so that they pilot into the bearings (382) in the shaft end cover (376) or (377) and mate with the large gear (396). If the gear set (396) is not being replaced with new parts, reassemble the gear set (396) with respect to the port end cover (354) or (355) as noted during the disassembly instructions.
 15. Install the port end cover (354) or (355) previously assembled, onto the gear housing (394) or (395) so that the hubs of the gear set (396) pilot into the needle bearings (382) and the thrust plate (392) pilots into the gear housing (394) or (395). Use a soft hammer to seat the port end cover taking care that 'O' ring (393) does not get pinched during the assembly.
 16. Install the five capscrews (357) and one capscrew (359) then tighten evenly in stages to a torque of 200 lb. ft. (28 kg m.).
- CAUTION:** After tightening the capscrews to their specified torque, be sure that the motor shaft can be rotated by hand.

GROUP 8.

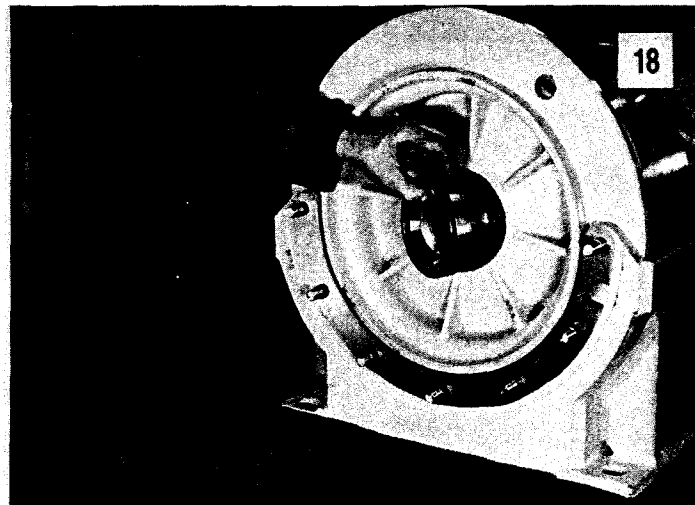
DRUM & BASE DISASSEMBLY PROCEDURE



Before removing the primary housing, support the cable drum using two blocks between the drum and winch base. Remove nuts (144) and washers (143) from dowel bolts (142). Support the weight of the primary housing (325) and remove using 2 pry bars in cast slots provided.



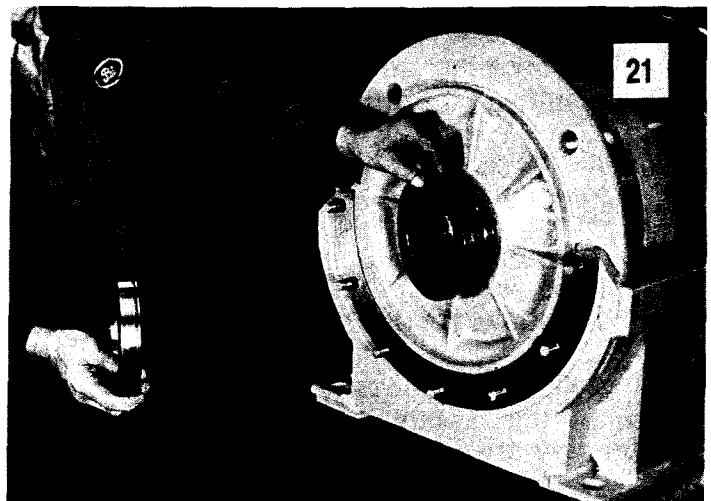
Pull bearing (137) from the drum using a puller to grip in the groove provided in the O.D. of the bearing. Support the puller screw on a plug located in the bore of the drum.



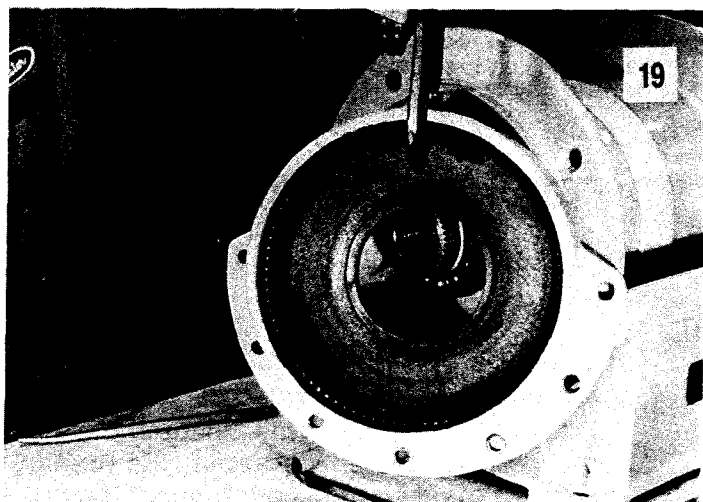
Remove seal ring (138) and replace seal (136) and 'O' ring (139). If damaged or worn, remove drum bushing (135) with a bearing puller.



Remove snap ring (130) from bearing (129) O.D. 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. Gearmatic tool No. C13115 can be supplied for removing this bearing.



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



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.

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" (55.59 mm). If wear is greater than .005" (.13 mm) in diameter, remove the bushing and replace it with a new part.

4. Inspect seal (127) 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.
5. Inspect the seal diameters on the drum for wear and corrosion. Polish with extra fine emery cloth if necessary.

ASSEMBLY INSTRUCTIONS

1. Install the dowel bolts (142) in the winch base, coat threads with grease.
2. Press bushing (135) into the drum (155-166) using a sizing mandrel that is 2.1885" (55.59 mm) in diameter. Install the bushing (135) so that the end of the bushing is flush with the end of the drum. Gearmatic tool #B1397 can be used to install this bushing.
3. Install seals (131) (136) and 'O' rings (133) (139) on seal rings (132) (138) and apply a liberal coating of grease. Fit the seal ring assembly to the drum, seal lip towards drum.
4. Pack the drum bearings (129) and (137) with grease and press them onto the drum.
5. Set the drum into position in the base with splined end at the final drive end. Block up the drum with blocks used in disassembly.
6. Install primary housing (325) in accordance with the assembly instructions for the primary drive assembly (Group 6).
7. Install final housing (116) in accordance with the assembly instructions for the final drive assembly (Group 11).

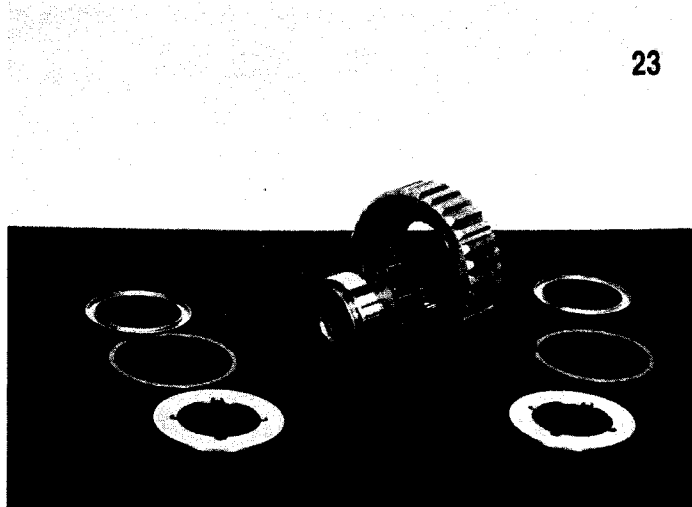
GROUP 9.

BRAKE HUB ASSEMBLY

DISASSEMBLY PROCEDURE



Remove snap ring (311).



Slide brake hub (310) off the sun gear (314) 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 3.5915" (91.22 mm).
4. Check the sprag assembly (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 (310), sun gear (314) or sprag clutch (313) 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 and cage assembly 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 (313) rotating it slightly in the free running direction. It is important that the sun gear (314) be installed in the sprag assembly (313) for the correct direction of 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:

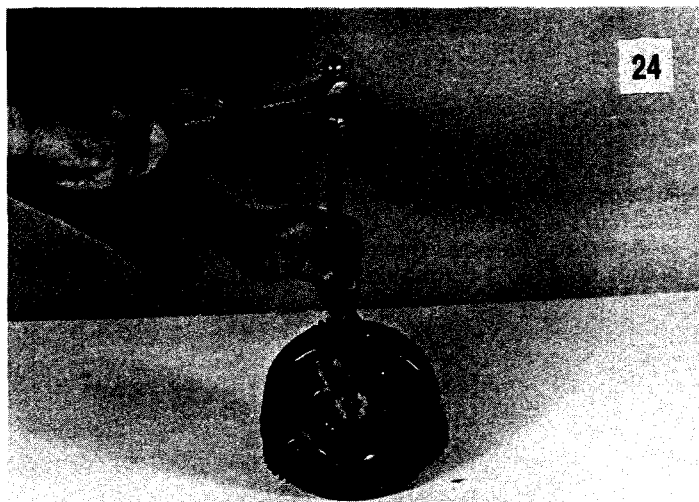
Hold the gear end of the sun gear (314) in the left hand. The brake hub (319) should rotate in a clockwise direction, and lock up in a counter clockwise direction when looking at the splined bore of the sun gear (314). If the brake hub (319) does not rotate in the correct direction, remove the sun gear from the brake hub assembly (51) 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 (51) or (52) in the primary drive. See assembly instructions for the primary drive Group 6.

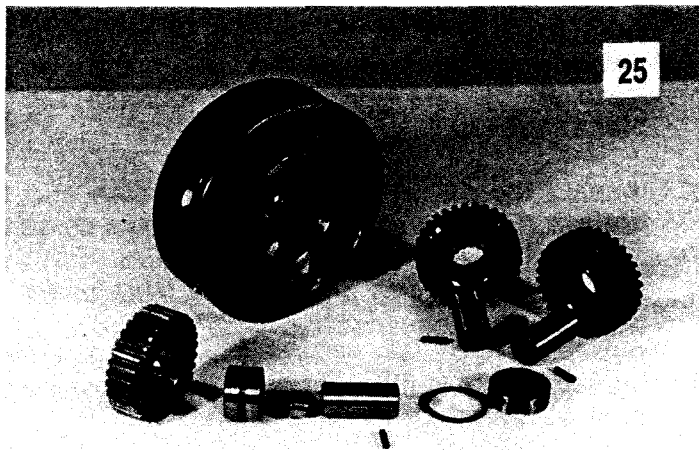
GROUP 10.

PRIMARY PLANET HUB ASSEMBLY

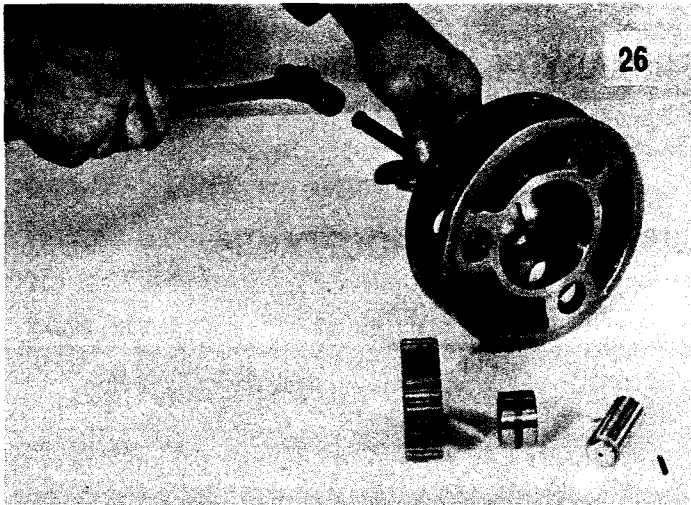
DISASSEMBLY PROCEDURE



Drive pins (306) completely into the centre 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 (304) if the bearings are to be replaced.



After all planet gears have been removed, the thrust pad (302) and 'O' ring (303) can be removed from the planet hub. Remove the thrust plugs (307) from the planet pins (305) if they require to be replaced.

INSPECTION OF PARTS

1. Wash all parts in a suitable solvent and dry thoroughly.
2. Inspect the seal diameter on the planet hub (309) for scores or roughness. If either of these conditions exist and can not be removed by fine emery cloth, replace the planet hub (309).
3. Inspect the planet pin bores for scores and bruises. Remove any scores or bruises carefully with a scraper or fine emery cloth sufficiently to allow a planet pin (305) to be pushed into the planet hub (309) 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 (305), needle bearings (308), or thrust plugs (307) required replacement, it is recommended that pins, bearings and plugs be replaced as a set.

8. Check the thrust pad (302) for wear. Original thickness of thrust pad is .562" (14.27 mm). If wear exceeds .062" (1.57 mm), replace.
9. Check thrust plugs (307) for wear. Original thickness of flange on thrust plug (307) is .123" (3.12 mm). If wear exceeds .030" (.76 mm), replace thrust plugs.

ASSEMBLY INSTRUCTIONS

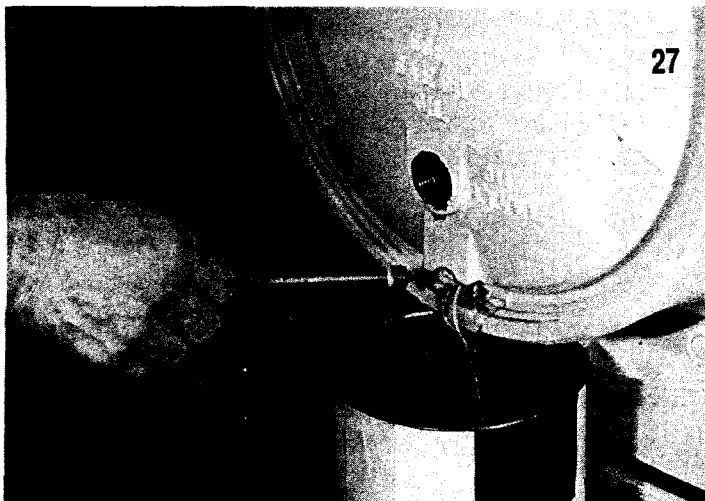
1. Press the needle bearings (308) into the planet gears (304) so that they are flush or slightly below the edge of each gear.
2. Install 'O' ring (303) on thrust pad (302) and install the thrust pad (302) in the bore of the planet hub (309).
3. Place the planet gears (304) into the planet hub and install 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 that they are located approximately one-half way in the planet hub and planet pin.
5. Install thrust plugs (307) in planet pins (305).

GROUP 11.

FINAL DRIVE ASSEMBLY

Models 35-11-10-**-**
35-11-20-**-**
35-11-30-**-**

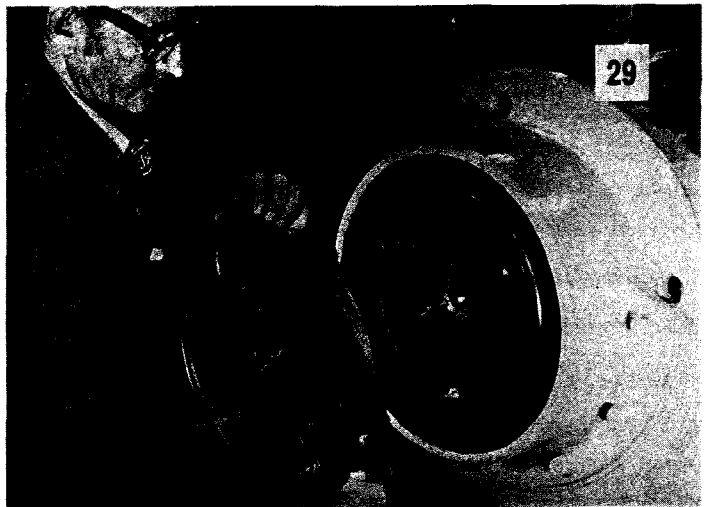
DISASSEMBLY PROCEDURE



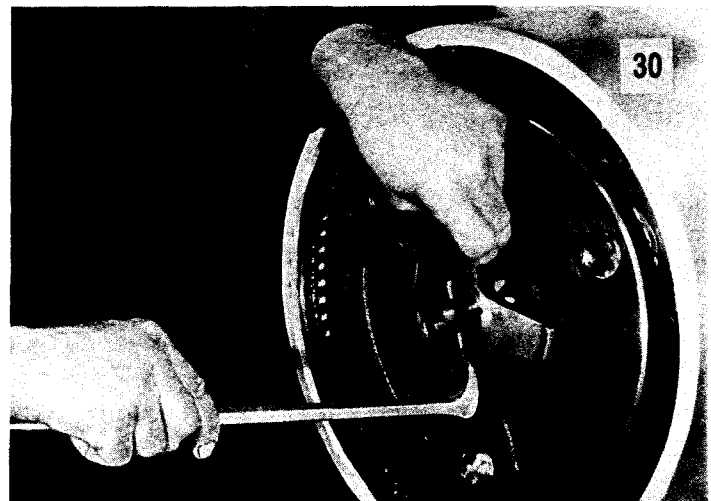
Drain the oil from the final end by removing both the filler plug (110) and the drain plug (111).



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



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



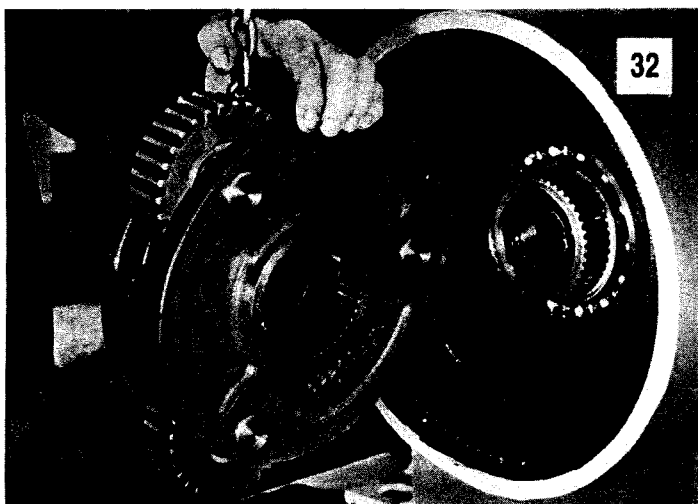
Remove the thrust ring (115) from the planet hub (108) (109) or (119).



Model 35-11-30-**-**

Models 35-11-10-**-**
35-11-20-**-**

Remove sun gear shaft with sun gear (117) attached. Remove planet hub first as in Photograph No. 32.



Remove final drive planet assembly taking care not to damage the pilot bore for the end cover (113).

ASSEMBLY INSTRUCTIONS

1. Using a sling and hoist, install the final drive housing (116) on the end of the base. The drum should be supported with blocks to aid in alignment of the drum bearing. Use a copper drift to drive the housing (116) onto the drum bearing (129). Install the lock-washers (143) and nuts (144) on the dowel bolts (142) and torque to 75 lb. ft. (10 kg/m).
2. Install the final planet assembly (84), (85) or (86).
3. Install the sun gear shaft (145 - 152). Be careful not to damage the lip seal.
4. Install thrust ring (115).
5. Install 'O' ring (114) on final drive cover (113) and install cover in final drive housing (116). Be certain to locate the filler plug hole at the correct position.
6. Install snap ring (112).

INSPECTION OF PARTS

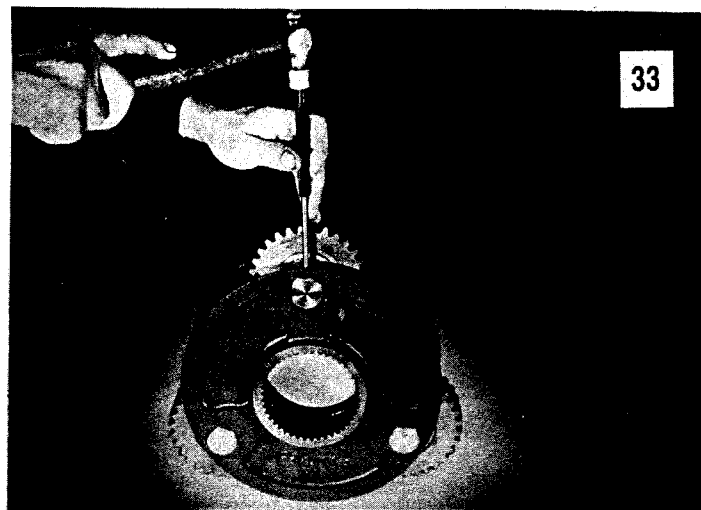
1. Discard all 'O' rings.
2. Wash all parts in suitable solvent and dry thoroughly. Do not wash the final planet assembly unless it is to be disassembled.
3. Check the snap ring (112) for flatness and that it forms a true circle. If it is bent or damaged, replace with a new part.
4. Check for wear at the center of the thrust ring (115). The original thickness was .720" (18.3 mm). If wear is greater than .063" (1.6 mm), replace the thrust ring.
5. Check that the planet gears run freely in the final planet assembly. For service instructions see Group 12.
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.

GROUP 12.

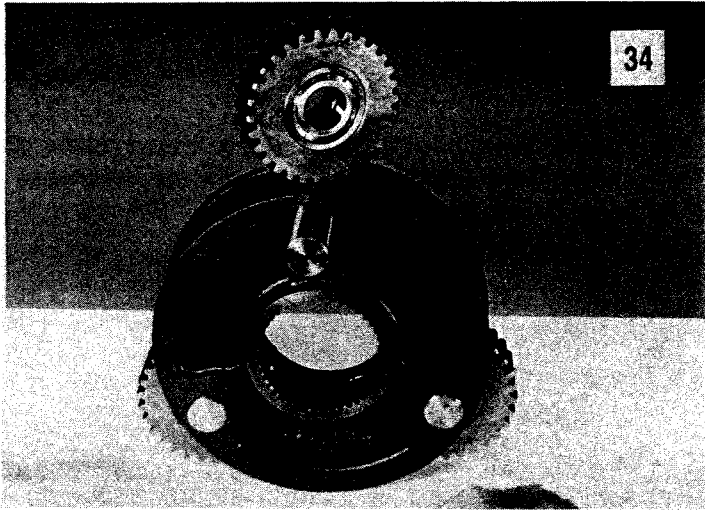
FINAL PLANET HUB ASSEMBLY

Models 35-11-10-**-**
 35-11-20-**-**
 35-11-30-**-**

DISASSEMBLY PROCEDURE



Disassemble final planet assembly. Drive pin (124) completely into the centre 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 centre 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 (123) 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 one-half way in the planet hub and planet pin (123).

TORQUE CHART

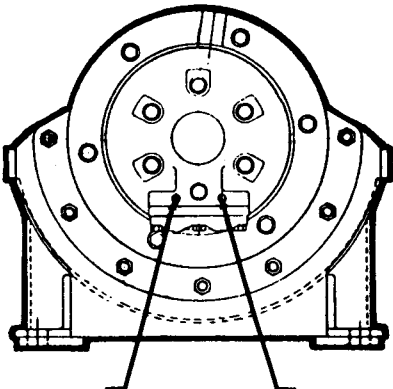
ITEM	DESCRIPTION	ITEMS CONNECTED	PART NAME	TORQUE LBS. FT. Kg. m	
357	7/8" N.C. x 5" Socket Head Capscrew	354 or 355 to 394 or 395 & 376 or 377	Motor End Cap to Gear Housing & Shaft End Cover	200	28
359	7/8" N.C. x 7" Socket Head Capscrew	354 or 355 to 394 or 395 & 376 or 377	Motor End Cap to Gear Housing & Shaft End Cover	200	28
285	Special	281 & 394 or 395	Spring Cover to Motor Assembly	50	7
144	Nut	Base to 116 & 325	Primary and Final Drives to Base	75	10
483	7/16" N.C. x 1 1/4" Hex. Head Capscrew	482 to 354 or 355	Split Flange to Motor End Cap	50	7

SEAL KIT CHART

MODEL 35 SEAL KITS	NEW SEAL KIT PART No.	OLD SEAL KIT Part No.	OLD SEAL KIT Part No. *BUTYL	NEW SEAL KIT Part No. *BUTYL
Complete Winch Assembly (Standard Final Drive)	72996	53663	54394	—
Complete Winch Assembly with Free-Fall and Control Valve	73118	54199	54197	—
Complete Primary Drive Assembly	72997	53664	54393	—
Final Drive Assembly (Standard)	72865	52803	—	—
Drum Assembly	71106	A22107X	—	—
Free-Fall Final Drive Assembly	72868	52807	54351	—

*NOTE: Butyl oil seals are only for use with phosphate ester fluids.

GROUP 13. TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
<p>A.</p> <p>Winch will not pull maximum load.</p>	<ol style="list-style-type: none"> 1. Relief valve may be set too low.  <p>LOCATION 1 LOCATION 2</p> <ol style="list-style-type: none"> 2. If this trouble occurs suddenly after working at maximum pull, a particle of dirt may be lodged under the 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. 3. If the pump is belt driven, the belts may 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. 5. 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. 	<p>Install a pressure gauge in location 1 and apply a stall pull on the winch. If pressure is low, increase relief valve setting until recommended pressure is obtained.</p> <p>Remove relief valve, disassemble and clean parts thoroughly in a suitable solvent. Reassemble and install relief valve. Reset pressure according to remedy under Trouble A Cause 1.</p> <p>Check belts when pump is at full psi kg/cm² (stall pull on winch). Tighten belts if they are found to be slipping.</p> <p>Check oil level in the reservoir. Check the suction line for damage, externally and internally. Replace suction line if necessary.</p> <p>Install a pressure gauge in location 1, and apply a stall pull on the winch. If the pressure is up to a 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 inspect. Check that all gears turn freely for "winching in" rotation. If gears are found to be satisfactory, inspect the hydraulic motor, according to the service instructions for the hydraulic motor.</p>

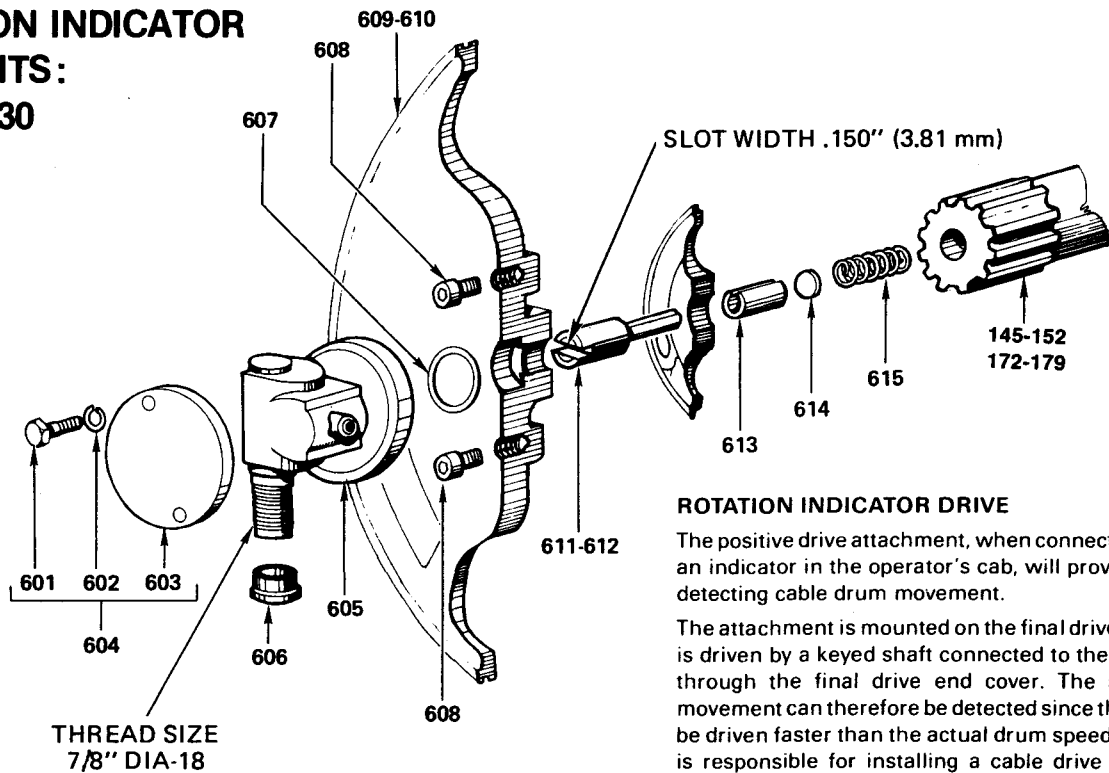
GROUP 13. TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
<p>B.</p> <p>Considerable reduction in line speed.</p>	<ol style="list-style-type: none"> 1. Same as A - 2 2. Same as A - 4 3. If this trouble has increased gradually, the hydraulic pump or winch motor may be worn. 	<p>Same as Remedy 2 of Trouble A.</p> <p>Same as Remedy 4 of Trouble A.</p> <p>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.</p>
<p>C.</p> <p>Reverse speed is slower than forward speed.</p>	<ol style="list-style-type: none"> 1. Control valve may be restricted in its travel. 2. Same as 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. 4. Oil may be escaping past a damaged 'O' ring in the brake cylinder. 	<p>Check the travel of the control valve spool. The spool travel should be the same in both directions.</p> <p>Same as Remedy 1 of Trouble A.</p> <p>Change to a lighter weight oil in the hydraulic system and primary housing. Check the flow of oil from the vent line of the winch while the winch is run at full speed reverse for 2 or 3 minutes with the outlet circulating line removed. If the flow continues, remove the motor as per disassembly instructions. Disassemble and inspect the 'O' rings in the brake cylinder according to the service instructions for the hydraulic motor.</p>
<p>D.</p> <p>Brake will not hold when control valve is returned to neutral after pulling or lifting a load.</p>	<ol style="list-style-type: none"> 1. Control valve is not correct type. The correct control valve must have all ports open to tank when the spool is returned to neutral. See Group 4 "Control Valve". 2. There is excessive back pressure acting on the reverse port of the winch motor. This back pressure is usually caused by the use of a control valve and hoses that are too small. It can also be caused by a restriction in the return line from the control valve to the reservoir. 	<p>Remove hose lines from control valve and with the spool in neutral, blow air through the cylinder or motor ports. The air should escape through the return port on the valve. If the motor ports in the valve are blocked by the spool when the spool is in neutral, remove the valve and replace with correct valve.</p> <p>Install a pressure gauge in location 2. Run the pump at its maximum RPM and with the control valve in the neutral position, read the pressure gauge. If the pressure is greater than 95 psi (6.7 kg/cm²), it is too high. Consult the winch manual for the recommended hose and control valve size and install the correct size if necessary. If the hose and control valve are as recommended, check for restriction in the return line from the control valve to the reservoir.</p>

GROUP 13. TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
<p>E.</p> <p>Brake will not control or stop the load when lowering.</p>	<ol style="list-style-type: none"> 1. Same as D - 1 or 2 2. Winch is being over-loaded. 3. After the causes listed above have been investigated and found to be satisfactory, the trouble may be in the winch. 	<p>Same as Remedy 1 or 2 of Trouble D.</p> <p>Install a pressure gauge in Location 1 and apply a stall pull on the winch. If the pressure is higher than the maximum specified psi, reduce the pressure.</p> <p>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.</p>
<p>F.</p> <p>Brake vibrates when lowering a load.</p>	<ol style="list-style-type: none"> 1. Hydraulic pump RPM's too slow. 2. Control valve handle being operated too quickly. 3. Primary and final end assemblies are mis-aligned. 4. Control valve does not have good metering characteristics. 5. No oil circulating through the primary housing. 6. Air in the primary drive assembly. 	<p>Operate hydraulic pump at maximum.</p> <p>Operate the valve smoothly when starting and stopping a load.</p> <p>See "Winch Installation" Group 4 for required alignment.</p> <p>See "Winch Installation" Group 4 for control valve specifications.</p> <p>See "Lowering Application" Group 4</p> <p>See "Lowering Application" Group 4</p>

ROTATION INDICATOR DRIVE KITS: SERIES 30



ROTATION INDICATOR DRIVE

The positive drive attachment, when connected by a cable to an indicator in the operator's cab, will provide a means of detecting cable drum movement.

The attachment is mounted on the final drive end cover and is driven by a keyed shaft connected to the sun gear shaft through the final drive end cover. The slightest drum movement can therefore be detected since the indicator will be driven faster than the actual drum speed. The customer is responsible for installing a cable drive from the drive attachment on the winch to a rotation indicator in the operator's cab. The drive attachment will accept a standard SAE J678d $\frac{3}{16}$ " heavy-duty flexible drive shaft.

Item No.	Old Part No.	New Part No.	Qty.	Description	R.I.D. Kit Old Part No.	New Part No.	Items Included	Description
601	50608	11762	2	SUN GEAR SHAFT (see page 18)	53901	73038	605 thru 608, 611, 613 thru 615	For use in winches with Standard Final Drive and with End Cover having provision for R.I.D. kit
602	50097	11024	2	CAPSCREW				
603	53848	73025	1	LOCKWASHER	53937	73040	605 thru 608, 612 thru 615	For use in winches with free-fall Final Drive and with End Cover having provision for R.I.D. kit
604	—	—	—	PLUG for end cover				
605	—	—	—	SHIPPING PLUG KIT for end cover having provision for R.I.D. kit. Includes items 601 thru 603, 607				
606	53558	72977	1	ADAPTOR ASSEMBLY	53862	—	605 thru 609, 611, 613 thru 615	For use in winches with Standard Final Drive and with End Cover not having provision for R.I.D. kit
607	—	—	1	CAP PLUG (part of adaptor assembly, used for shipping)				
608	50408	78312	1	'O' RING (1 used with R.I.D. kit and 1 used with plug end cover; Item 603)	53863	—	605 thru 608, 610, 612 thru 615	For use in winches with free-fall Final Drive and with End Cover not having provision for R.I.D. kit
609	53378	72947	3	SHOULDER SCREW				
610	53371	72944	1	END COVER for winches with standard final drive having provision for R.I.D. kit.				
611	53483	72967	1	END COVER for winches with free-fall final drive having provision for R.I.D. kit				
612	53610	72979	1	FLEXIBLE SHAFT for winches with standard final drive				
613	53482	72966	1	FLEXIBLE SHAFT for winches with free-fall final drive				
614	53368	72943	1	SLEEVE				
615	53614	72983	1	WASHER				
	53615	72984	1	SPRING				

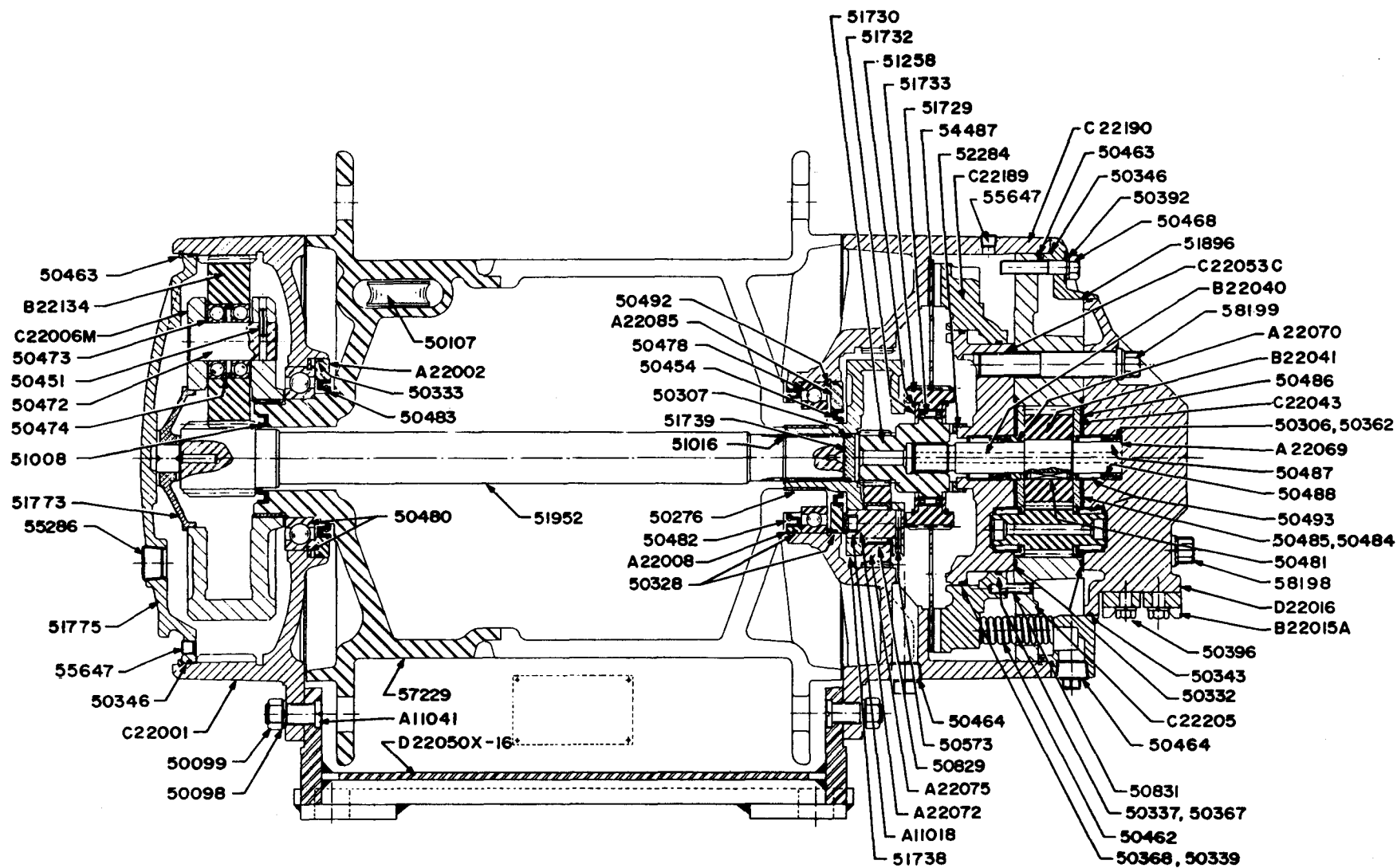
NOTE: Kits do not include sun gear shafts.

Sun gear shafts used in Model 35 winches, Serial Number 175 thru 2350, are drilled for this attachment and need not be replaced.

Sun gear shafts, Model 35 winches, Serial Number 174 and down must be replaced if a kit is added.

Refer to sun gear shaft chart on page 18 when ordering sun gear shafts for kits and spares.

WHEN ORDERING PARTS, BE SURE TO STATE SERIAL NUMBER OF WINCH



CROSS SECTION OF THE GEARMATIC MODEL 35 WINCH