Dry Systems®
Technologies

Technology for a cleaner environment

10420 Rising Court Woodridge, IL 60517

Customized Parts & Operators Manual

HYDRAULIC WINCH

M363-505-01

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GENERAL WARNING SHEET

Review entire manual before installation or operation of winch.

DANGER

Do not disengage gear box while winch is under load. Immediate loss of load control will result.

DANGER

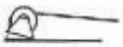
The last five wraps of wire rope must be left on the drum to assist the wire rope clamp in holding the load.

DANGER

Winches are not to be used for the lifting or moving of persons.

WARNING

Wire rope can break without warning. Always keep a safe distance from the winch and wire rope while under a load. Consult the wire rope manufacturer for wire rope ratings and maintenance procedures.



WARNING

Failure to adequately align, support, or attach winch to a suitable mounting base could result in a loss of efficiency or premature failure of winch, wire rope, or mounting base.

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OPERATING PROCEDURES FOR SHIFTING GEARS

The following steps are necessary for proper gear shifting operations.

Gear Dis-Engagement:

1. Winch must be " at rest " and have **no** load on cable.
2. Shift winch to out of gear " free spool " mode.

Gear Engagement:

1. Winch must be " at rest " and have **no** load on cable.
2. Shift winch to in-gear mode and **slowly** rotate drum 90 deg in pay out direction, and then **stop** rotation. Next, **slowly** rotate drum in pay in direction to insure gears are fully engaged and **begin** paying in load.

WARNING !

If your winch has ever been "shifted under load" or has ever encountered "rotational face contact of non-engaged gear components", the gear teeth could be damaged. Damaged gear teeth can prevent your winch from fully engaging into gear and could allow it to jump out of gear. If this has happened to your winch, this procedure may not insure that it is fully engaged and it may need to be inspected for possible gear damage.

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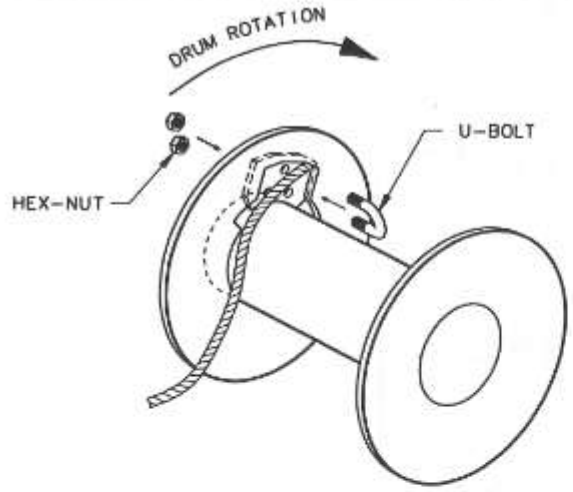
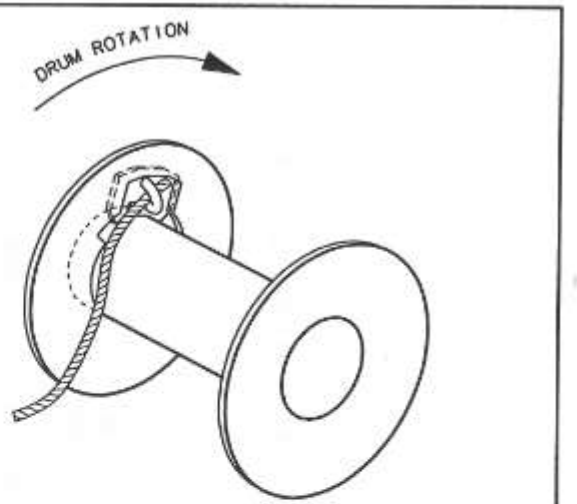


STEP 1

ALIGN WIRE ROPE BETWEEN PROPER HOLES ACCORDING TO DRUM ROTATION. INSERT U-BOLT INTO HOLES AND THREAD ON NUTS FROM BACK OF FLANGE.

CAUTION:

IF WINCH WIRE ROPE IS NOT INSTALLED FOR THE CORRECT DRUM ROTATION, THE WINCH BRAKE VALVE WILL NOT HOLD THE LOAD.



STEP 2

ONCE NUTS ARE TIGHTENED SECURE, THE WIRE ROPE IS PROPERLY INSTALLED.

CAUTION:

DO NOT OPERATE WINCH WITH LESS THAN 5 FULL WIRE ROPE WRAPS ON THE DRUM.

WIRE ROPE INSTALLATION

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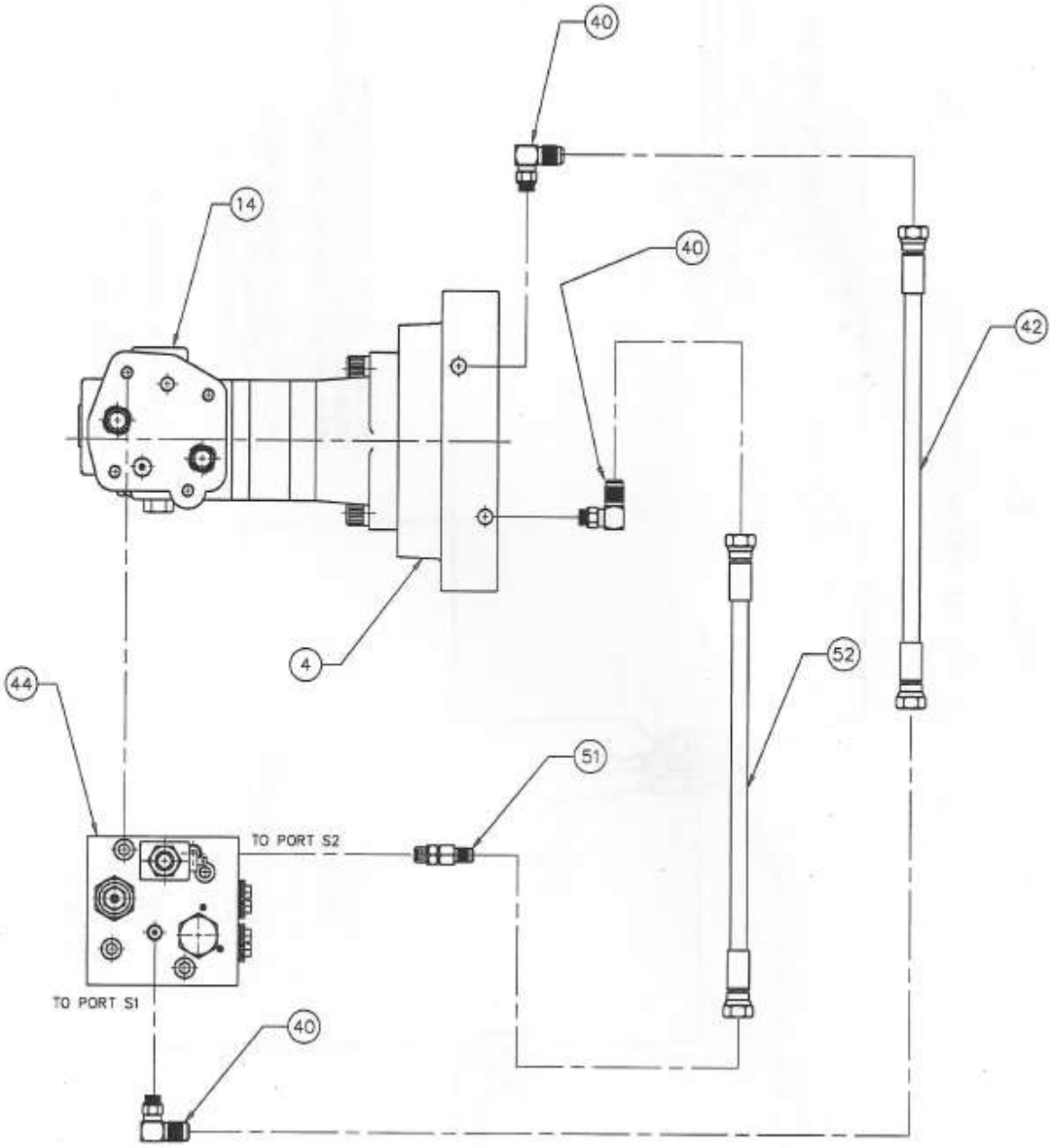
WINCH PLUMBING DIAGRAM



REFER TO MOTOR END PARTS LIST

SERVICE INSTRUCTIONS DP BRAKE

GENERAL:

The winch is fully hydraulic with a multi disc wet brake. The brake is spring applied and hydraulically released, and will automatically set any time the winch control valve is in neutral or in case of power failure. When the hydraulic pressure is less than 270 psi, the brake will set.Hydraulic power must be restored before brake will release.Maximum brake torque is achieved at 0 psi.**(These winches are not to be used for moving or lifting people.)**

DISASSEMBLY OF BRAKE
REFER TO MOTOR END INSTALLATION DRAWING

1. Disconnect brake hoses (item 42) at connections (item 40) on brake housing (item 4). wrap hose ends to prevent dirt contamination.
2. Disconnect motor (item 14) from brake housing (item 4) by removing two capscrews (item 20), lock washers (item 21). Allow oil to drain.
3. Remove outer brake housing (item 4) by removing six capscrews (item 22) and lock washers (item 23). **CAUTION: Since housing is under spring loading of approximately 3,500 lbs., the capscrews should be loosened evenly until spring force has been relieved.**
4. In removing housing (item 4), the bearing (item 31) may come with it or remain on brake shaft (item 2), or the brake shaft may also slide out.
5. Remove o-ring (item 24) from brake adapter (item 3).
6. Remove friction plates (item 15), drive plates (item 16), and dowel pins (item 29). from piston (item 8).
7. Remove piston (item 8) from brake adapter (item 3) being careful not to damage o-rings on piston. Next, remove o-rings and back-up rings (item 25, 26, 27, & 28) from piston.
8. Finally, remove springs (item 33) and bearing (item 31) from brake adapter (item 3).

ASSEMBLY OF BRAKE

1. Lubricate all o-rings and back-up rings with clean hydraulic oil used in the system.
2. Clean all parts thoroughly and visually examine for cuts, dents or other damage before assembly. Repair or replace parts with such defects.
3. Install bearing (item 31) into brake adapter (item 3), and insert twelve springs (item 33) into holes in adapter. Next install shaft (item 2) into bearing (item 31).
4. Insert dowel pins (item 29) into respective holes in brake adapter (item 3).
5. Assemble o-rings and back up rings (item 25, 26, 27, & 28) on piston (item 8). Position back up rings as illustrated.
6. Insert piston (item 8) fitted with seals into brake adapter (item 3) and over dowel pins (item 29) and tap down until piston face is resting against springs (item 33).
7. Insert a friction plate (item 15) alternating with a drive plate (item 16) into piston (item 8) and over shaft (item 2) until all plates are in place in sequence illustrated.
8. Next, place bearing (item 31) onto brake shaft (item 2).
9. Place o-ring (item 24) in position on brake adapter (item 3). Finally and with care not to pinch o-ring seals on piston, slide the housing (item 4) into place over the dowel pins (item 29) and tap down until firm. Install lock washers (item 23) and capscrews (item 22) in place until all six shoulder up. proceed to tighten evenly against spring pressure until housing face (item 4) is in full contact and capscrews are torqued to 50 ft. lbs.
10. The motor (item 14), and o-ring (item 19) can now be reinstalled on the housing (item 4). Then secure with capscrews (item 20), lock washers (item 21). Reconnect brake hoses (item 42) as shown on winch plumbing diagram.
11. Refill winch with oil through gear end cover fill port (refer to gear end cover installation drawing). Allow time for oil to travel throgh brake end.
12. Before running winch, loosen adapter connections (item 40) at brake slightly to bleed air from brake release hoses (item 42) with hydraulic oil under pressure. Retighten connections and winch is ready to operate. (Note: pressure should not exceed 100 psi during bleeding.)

BRAKE TROUBLE SHOOTING

1. Brake will not release:
   (a) Insufficient system pressure to brake. (b) Damaged o-rings or back up ring seals (item 25, 26, 27, or 28).
   (c) Damaged piston (item 8). (d) Damaged seal surfaces within housing (item 4).
   (e) Damaged bearing (item 31). (f) Friction or drive plates (items 15 or 16) warped or heat damaged.
2. Brake will not apply or applies but torque low:
   (a) Damaged springs (item 33), either broken or heat damaged and having taken a permanent set.
   (b) Friction plates (item 15) worn out.
3. Oil leaks externally from brake: (a) Damaged o-ring seal (item 24).

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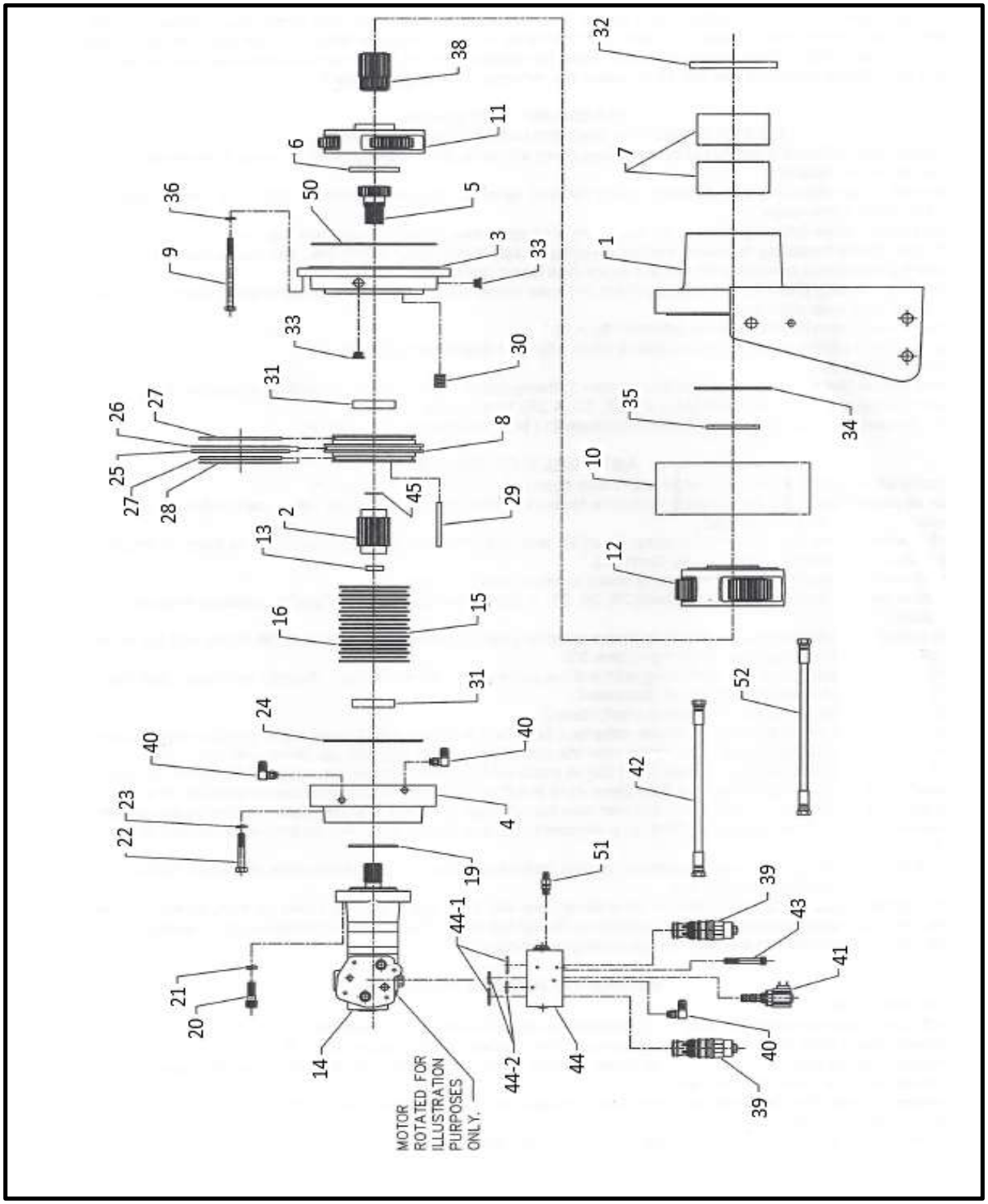
MOTOR END INSTALLATION



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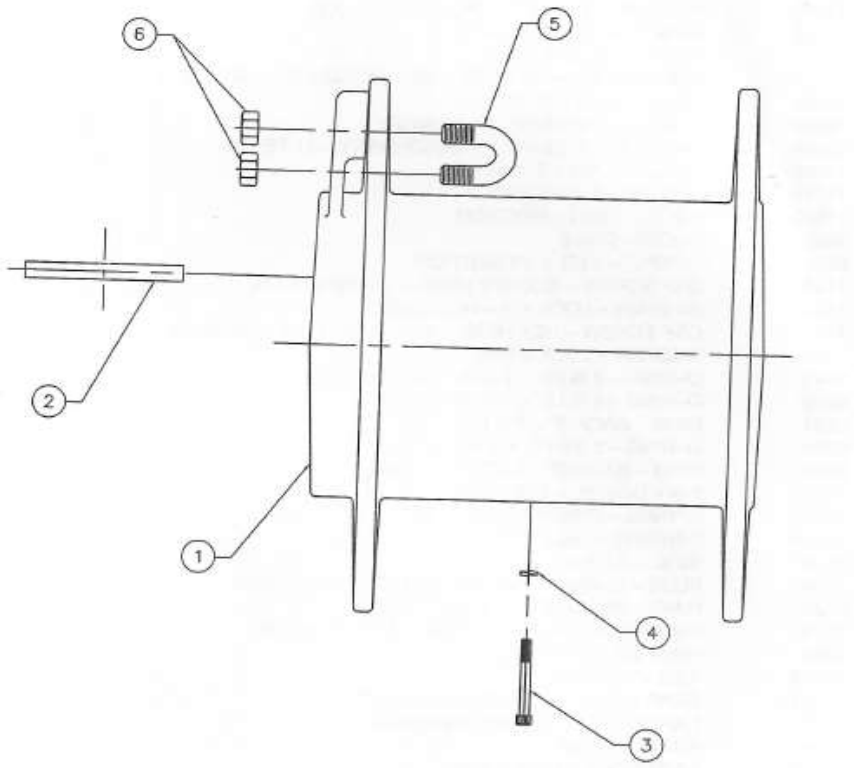
MOTOR END INSTALLATION

Item	Qty	Part Number	Description
1	1	M363-505-03	Support - Motor
2	1	M363-505-04	Shaft - Brake
3	1	M363-505-05	Adapter
4	1	M363-505-06	Housing – Brake - Outer
5	1	M363-505-07	Gear – Sun – Primary – 15 Teeth
6	1	M363-505-08	Washer – Thrust – Bronze
7	2	M363-505-09	Bearing – Bronze
8	1	M363-505-10	Piston - Brake
9	12	M515-500-41	Cap Screw – Hex Head – 3/8-16 x 6 1/2 GR8
10	1	M363-505-11	Gear – Ring – 81 Teeth
11	1	M363-505-12	Carrier – Assembly - Primary
12	1	M363-505-13	Carrier – Assembly – Secondary – 21 Teeth
13	1	M363-505-14	Spacer – Shaft - Input
14	1	M363-505-15	Motor - Hydraulic
15	10	M363-505-16	Plate – Disc - Friction
16	9	M363-505-17	Plate - Drive
19	1	M363-505-18	O-Ring
20	2	M515-500-42	Cap Screw – Socet Head – 1/2-13 x 1 1/2
21	2	M515-530-09	Lock Washer – Hi Collar – 1/2”
22	6	M515-500-43	Cap Screw – Hex Head – 7/16-14 x 2 1/2 GR8
23	6	M600-139-01	Lock Washer – 7/16
24	1	M363-505-19	O-Ring
25	1	M363-505-20	O-Ring
26	1	M363-505-21	Ring - Backup
27	2	M363-505-22	O-Ring
28	1	M363-505-23	Ring - Backup
29	2	M363-505-24	Pin – Dowel – 5/16 x 3 1/2
30	12	M363-505-25	Spring – Compression – 3/4

Item	Qty	Part Number	Description
31	2	M363-505-26	Bearing - Ball
32	1	M363-505-27	Seal
33	2	M363-505-28	Plug – O-Ring – SAE #6 – Socket Head – 9/16
34	1	M363-505-29	Ring - Retainer
35	2	M363-505-30	Washer – Thrust - Nylon
36	12	M600-123-01	Lock Washer – 3/8
37	1	M363-505-31	Tag – Warning (not shown)
38	1	M363-505-32	Gear – Sun – Secondary – 15 Teeth
39	2	M363-505-33	Cartridge - Counterbalance
40	3	M363-505-34	Adapter – 90 Deg
41	1	M363-505-35	Cartride – Valve – 3 Way
42	1	M363-505-36	Hose – 1/4 - R1 x 14”
42	4	M515-500-44	Cap Screw – Socket Head – 3/8-24 x 2 1/2
44	1	M363-505-37	Valve - Counterbalance
44-1	2	M363-505-38	O-Ring
44-2	2	M363-505-39	O-Ring
45	1	M363-505-40	Ring - Retainer
50	1	M363-505-41	O-Ring
51	1	M363-505-42	Adapter – Straight - #4 – O-Ring
52	1	M363-505-43	Hose – 1/4 - R1 x 16”

DRUM INSTALLATION



Item	Qty	Part Number	Description
1	1	M363-505-44	Drum - Winch
2	2	M363-505-45	Key - Drum
3	2	M515-500-45	Cap Screw – Socket Head – 3/8-16 x 3
4	2	M150-538-01	Lock Washer – Hi Collar – 3/8
5	1	M363-505-46	U-Bolt – 1”
6	2	M515-560-17	Nut – Hex – 3/4-10

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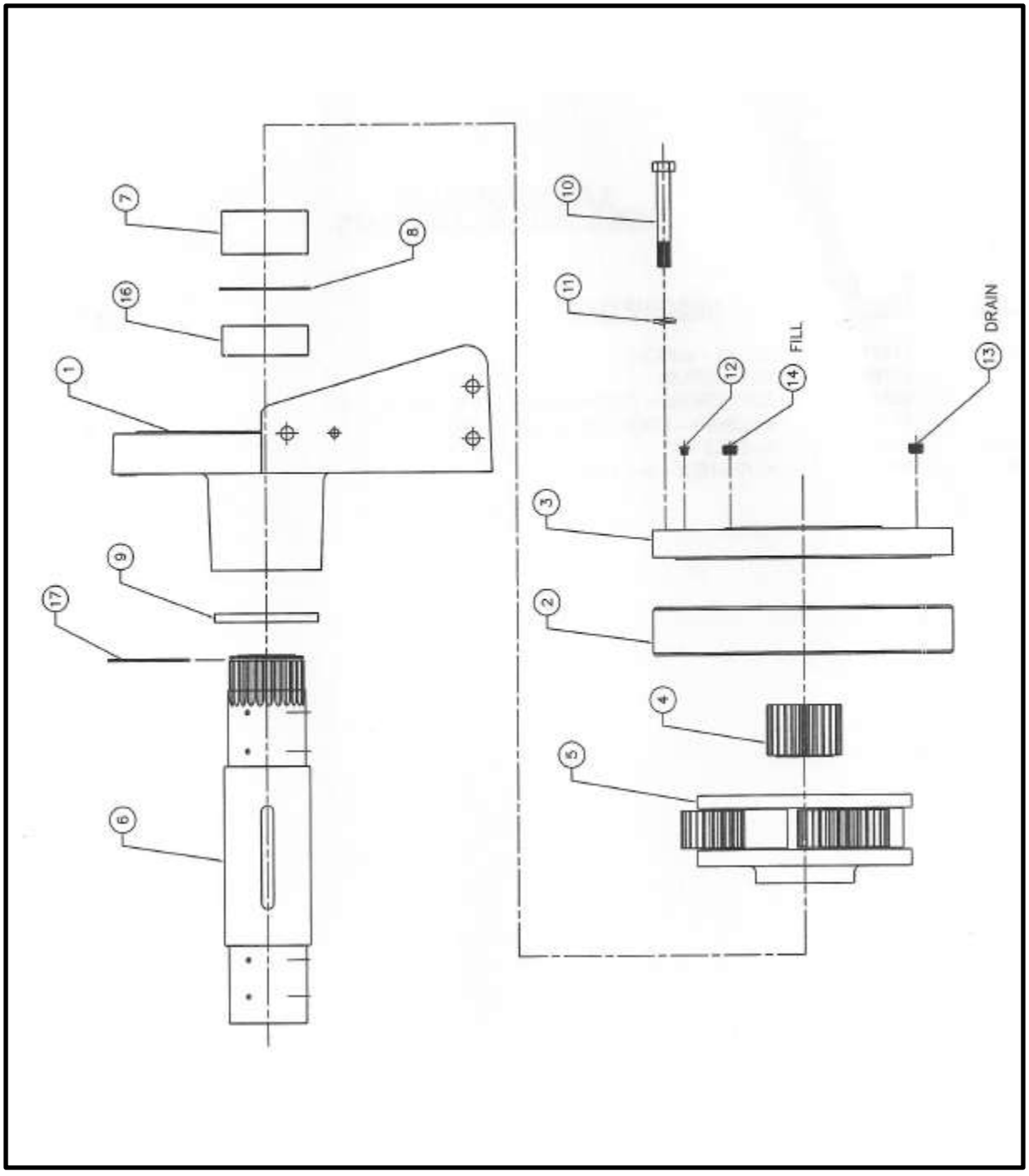
GEAR END INSTALLATION



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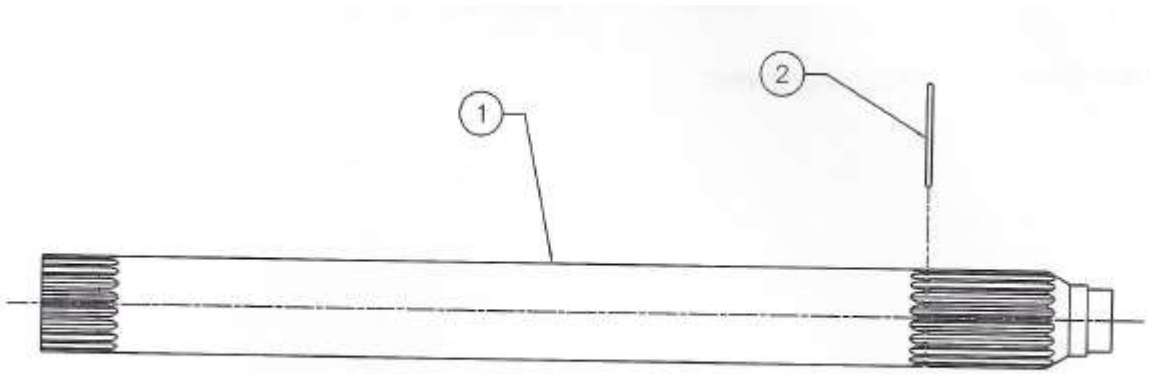
GEAR END INSTALLATION

Item	Qty	Part Number	Description
1	1	M363-505-47	Support – Gear End
2	1	M363-505-48	Gear - Ring
3	1	M363-505-49	Adapter - Cover
4	1	M363-505-50	Gear – Sun – Clutch
5	1	M363-505-51	Carrier - Assembly
6	1	M363-505-52	Shaft - Output
7	2	M363-505-09	Bearing - Bronze
8	1	M363-505-29	Ring - Retainer
9	1	M363-505-27	Seal
10	12	M515-500-46	Cap Screw – Hex Head – 3/4-10 x 7 GR5
11	12	M515-530-04	Lock Washer – 3/4
12	1	M363-505-53	Vent - Relief
13	1	M363-505-54	Plug – Magnetic – 1/2 NPT – Hollow – Socket Head
14	1	M363-505-55	Plug – Pipe – Hex Socket – 1/2
15	1	M363-505-56	Label – Warning (not shown)
16	1	M363-505-57	Ring - Retainer

INPUT SHAFT INSTALLATION



Item	Qty	Part Number	Description
1	1	M363-505-58	Shaft - Input
2	1	M363-505-59	Ring – Retainer – Round Section

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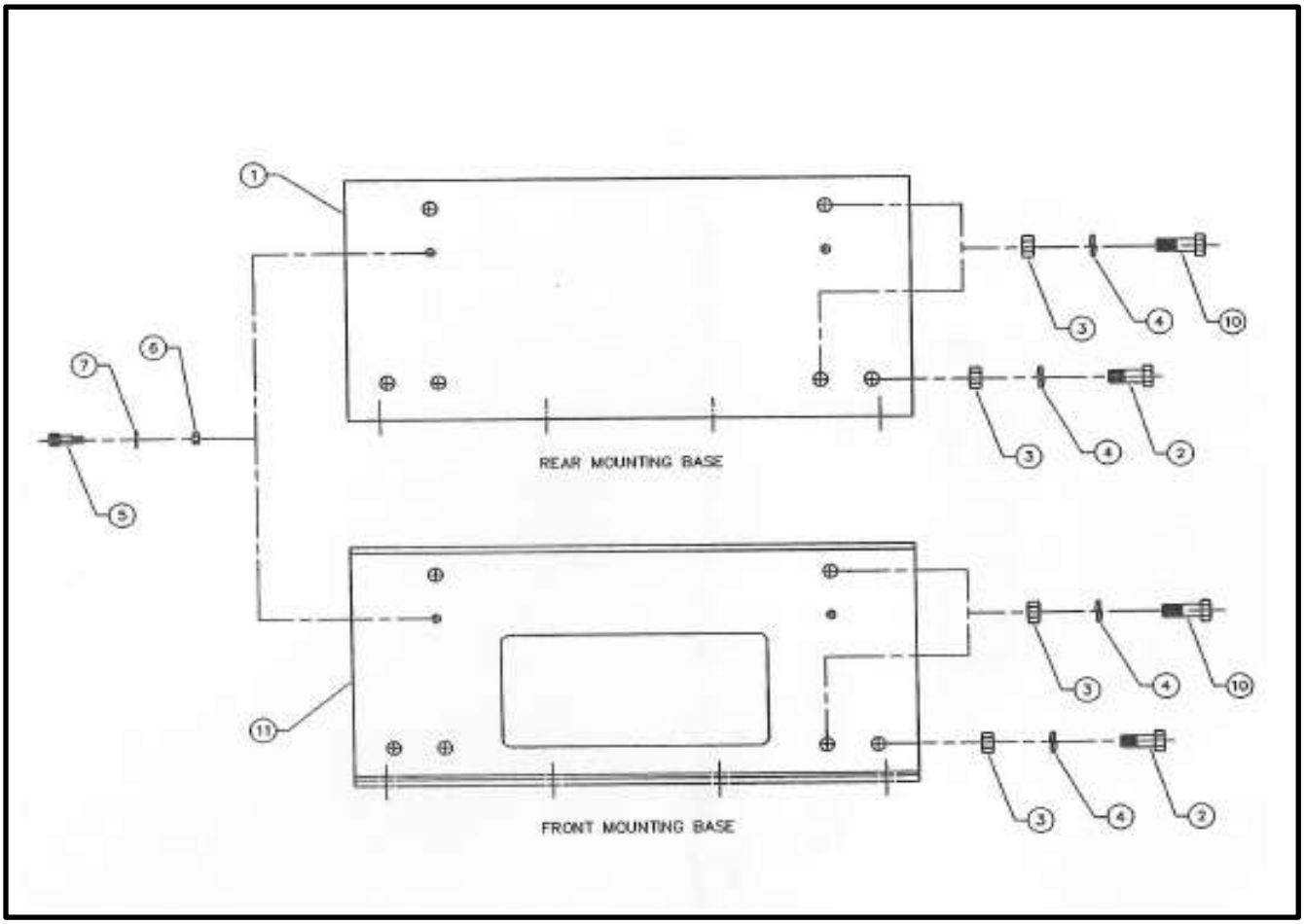
BASE MOUNT INSTALLATION



Item	Qty	Part Number	Description
1	1	M363-505-60	Base - Mount
2	4	M515-500-13	Cap Screw – Hex Head – 3/4-10 x 2 GR8
3	12	M515-560-17	Nut – Hex – 3/4-10
4	12	M515-530-04	Lock Washer – 3/4
5	4	M515-500-50	Shoulder Bolt – Socket Head – 1/2 x 1
6	4	M515-560-18	Nut – Hex – 3/8-16 GR2
7	4	M250-107-05	Washer – Flat – 3/8
8	1	M363-505-61	Plate – ID – Winch (not shown)
9	4	M363-505-73	Rivet – Type U (not shown)
10	8	M515-500-47	Cap Screw – Hex Head – 3/4-10 x 2 ¼ GR5
11	1	M363-505-62	Base - Mount

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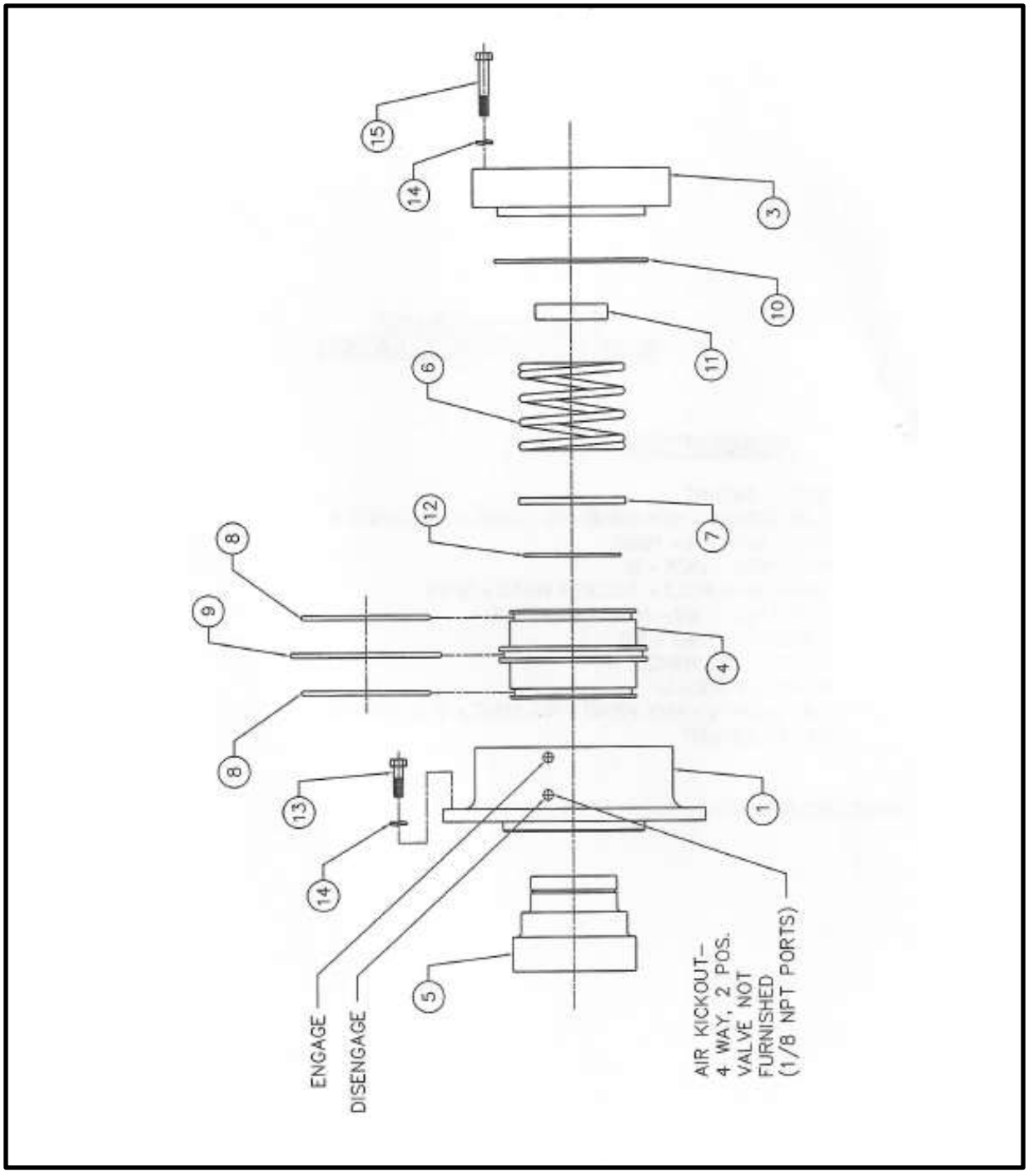
CLUTCH GEAR END COVER INSTALLATION



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CLUTCH GEAR END COVER INSTALLATION

Item	Qty	Part Number	Description
1	1	M363-505-63	Adapter - Clutch
3	1	M363-505-64	Cover – End - Clutch
4	1	M363-505-65	Piston
5	1	M363-505-66	Gear – Drive - Clutch
6	1	M363-505-67	Spring – Compression - #90 / IN
7	1	M363-505-68	Ring - Thrust
8	2	M363-505-69	O-Ring
9	1	M363-505-70	O-Ring
10	1	M363-505-71	O-Ring
11	1	M363-505-26	Bearing - Ball
12	1	M363-505-72	Ring - Retainer
13	6	M515-500-48	Cap Screw – Hex Head – 3/8-16 x 1 1/4 GR5
14	12	M600-123-01	Lock Washer – 3/8
15	6	M515-500-49	Cap Screw – Hex Head – 3/8-16 x 2 1/4 GR8

Calculated Generic Bolt Installation Torques

Nominal Diameter/ Thread Pitch	Grade (5) T		Grade (8) T	
	lb*Ft	(lb*in)	lb*Ft	(lb*in)
1/4-20	6.3	(76)	8.9	(107)
5/16-18	13	(156)	18.5	(221)
3/8-16	23		33	
7/16-14	37		53	
1/2-13	57		80	
5/8-11	113		159	
3/4-10	200		282	
7/8-9	322		454	
1-8	483		682	
1 1/8-7	596		966	

This table is used for applications without external loads. Reference EN11000.

This standard defines generic torque values for installing threaded fasteners used in the manufacture of DP products. This document is not intended to over-ride or otherwise change specific torque values defined individually on other DP documents.

GENERAL INFORMATION

MISCELLANEOUS LUBRICATION POINTS

dp fairlead rollers require lubrication by a medium heavy oil on a weekly basis. Fairlead rollers are supplied with oil impregnated bronze bearing and require a few drops of medium heavy oil at each bearing location.

Manual kick out levers should be cleaned and lubricated with a coat of light oil on the shaft and detent mechanism (avoid excessive oil build up, which will attract dust).

PNEUMATIC SYSTEM

This product uses air pressure to power the drum disengagement. This component requires clean dry air for trouble free service. A typical pneumatic system should have an FDL (filter, dryer, lubricator) and a pressure regulator. More than (1) pressure regulator may be required, depending on the pressure requirements of the different components. It is important to keep moisture from entering the winch. Moisture could cause corrosion. If temperatures fall below 32°F, moisture could freeze and render the component inoperable. *See the dimensional drawing for the pressure requirements.*

EXTENDED STORAGE PROCEDURES

If you plan to store your ***dp*** product for more than 90 days some extra precautions are required to insure your product will be ready to perform when put back into service.

- Wash and dry the exterior of the winch.
- Service the wire rope as recommended by the wire rope manufacturer.
- The winch should be filled with the appropriate corrosion-inhibiting lubricant and operated for 5 minutes in both directions to distribute the lubricant. The winch should then be filled to the highest possible level, I.E. vent high (this will insure the maximum coverage of internal components). *Note: drain oil to normal operation level before returning to service.*
- The internal components of the pneumatic system should be coated with a corrosion-inhibiting lubricant. If a pneumatic lubrication system is not installed, this can be accomplished by spraying an aerosol lubricant into the ports of the components and shifting several times to distribute the lubricant evenly.
- All ports should be plugged (i.e. motor inlet/outlet ports, drum disengagement)
- Lubricate all external components
    - Fairlead rollers
    - Pivot points of cable hold down
    - Manual drum disengagement handle

HYDRAULIC SYSTEM

FLUID SPECIFICATIONS

When choosing a fluid, it is important to consider the start-up and operating temperatures of the hydraulic system. Generally the fluid is thick when started and with movement it warms and thins out. Premium grade petroleum based hydraulic fluids will provide the best performance. They contain anti-wear agents, rust/oxidation inhibitors, and anti-foaming agents. ***dp*** recommends an oil viscosity of 20-43 cSt and a temperature range of 100-140°F. The oil viscosity should never fall below 13 cSt or the temperature rise above 180°F. Oil viscosity greater than 43 cSt is not normally detrimental to the motors used on ***dp*** products, except 2 speed and variable displacement motors. *Consult your local hydraulic fluid distributor for assistance in selecting a fluid that would best suit your climate and application.*

FLUID / SYSTEM MAINTENANCE

Maintaining correct fluid viscosity and cleanliness level is essential for all hydraulic systems. ***dp*** products are used in a wide variety of applications and it is impossible to publish a fluid maintenance schedule that would cover every situation. ***dp*** recommends that the minimum hydraulic fluid cleanliness be maintained at an ISO Cleanliness Code 18/13 rating. *Your hydraulic system designer can recommend an adequate filtration system and maintenance schedule to achieve this rating.*

WINCH LUBRICATION

LUBRICANT SPECIFICATIONS

Gear lubrication is an important component in insuring the long life of your winch. The type of lubricant will have a great influence. Generally a gear lubricant should have a viscosity of 100 to 250 cSt at the expected ambient operating temperature. For operation in lower temperature ranges, it is imperative that the pour point of the lubricant be at least 10° below the lowest ambient temperature. The oil you select should meet GL5 performance standards for high pressure, possess rust/oxidation inhibitors, and low foaming properties. Many lubricants available under a variety of trade names meet these requirements. Unless otherwise requested, the gear oil your winch was shipped with is *GL5 80W90. Consult your local lubricant distributor on the selection that best fits your climate and application.*

GENERAL LUBRICANTS

For Reference Only

Temperature (°F)	Type of oil	Viscosity (cSt) At 40°/100°C
10° to 120°	85W140	360/25
-25° to 40°	80W90	145/15
-50° to 30°	Synthetic ISO 32	31/6

All types of lubricant listed here conform to MIL SPEC-L-2105D.

CHANGE INTERVAL

The initial lubricant should be changed after the first 10 hours of operation. During this "breaking in" period it is normal for the lubricant to contain minuscule black & bronze particles. Subsequent changes should be scheduled every 250 hours of operation or annually.

LUBRICATION LEVEL

The oil level should be checked with the winch centerline horizontal. The winch should be filled to the bottom of the fill/level plug. If your winch has more than (1) fill/level plug, select the plug that is slightly above the centerline. *If unit is mounted in a non-standard orientation, consult* ***dp*** *Service Department for lubrication level information.*

GREASE

If the winch comes with a fairlead that has grease fittings on the rollers, the grease used conforms to MIL-G-10924 and should be used in the temp range of -50° F to 120° F.

1. Oil Check and Fill
   a. Remove oil fill plug.
   b. Oil level should be visible. If overfull and thin it may indicate hydraulic oil leakage through the brake. correct by draining and refilling before operating winch. If this condition continues winch should be checked for seal failure. See Trouble Shooting Information.
   c. Add specified gear lubrication oil as required to bring to proper lever.
   d. If winch lubrication oil consistently checks low, inspect unit for leaking seals or gaskets.
2. Oil Drain and Replacement
   a. Remove oil drain & fill plug.
   b. Drain oil.
   c. Clean drain plug and replace. Fill with oil to proper level.
   d. Oil should be changed after the first 6 weeks of operation. Change should then be on an annual basis.
3. **CAUTION**: Winch lubrication oil is not hydraulic oil.

Note: dp Manufacturing, Inc. takes no responsibility for the subsequent performance of hydraulic or mechanical components if oil, grease or hydraulic fluid possessing properties other than what dp Manufacturing, Inc. recommends is used.