

RUFNEK 50P

Service/Repair Manual

DESIGN SERIES 001

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FAILURE TO HEED THE FOLLOWING WARNINGS MAY RESULT IN SERIOUS INJURY OR DEATH!

The safety of the winch operator and ground personnel should always be of great concern, and all necessary precautions to insure their safety must be taken. The primary mover and the winch must be operated with care and concern for the equipment and the environment. Additionally, a thorough knowledge of the equipment and its performance capabilities must be understood. These general safety guidelines are offered, however local rules and regulations or national standards may also apply. Recommended references are, but not limited to, ANSI B30, OSHA 1910, AWS D 14.3, and SAE J706.

Additional information can be found at <http://www.team-twg.com/TulsaWinch/>

	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.
	Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

Mounting:

Winch mounting must be secure and able to withstand the applied loads.

- The stability of the mounting system must be approved by a qualified person.
- All welding should also be done by a qualified person.
- Winch mount must be flat so as not to induce binding.
- The flatness must not exceed 1/16 inch across the mounting surface of the winch itself.

Guards must be placed on all open drives in the case of mechanical winches.

Insure that all PTO's and drivelines are sized appropriately for the winch manufactures speed and torque specifications.

Operator:

- Must read and understand the operating and service manual.
Both the **SERVICE MANUAL** and **OPERATING AND MAINTENANCE MANUAL** are available online at <http://www.team-twg.com/TulsaWinch/>
- Must never lift or move people with this winch.
This winch is not designed or intended for any use that involves moving people.
- Must stay clear of the load at all times.
Ground personnel should remain a safe distance from the load and winch cable- at least 1 ½ times the length of cable measured from the winch to the load.
- Must stay clear of the cable at all times.
A broken cable can cause serious injury or death.
- Must avoid shock loads.
Shock loads can impose a strain on the winch that can be many times the design rating.
- Must be aware of the fleet angle of the winch.
All loads should only be pulled with the load line perpendicular to the drum shaft; this is to avoid excessive stresses on the winch and will help prevent the cable from building on one side of the drum flange.
- Must wear personnel protective equipment (PPE) if required.
Check the local, state and federal regulations for compliance.
- Must insure that the drum clutch is fully engaged before hoisting.
A visual inspection of the drum clutch engagement is required before each winching operation.
- Must rig all loads secure before winching.
Pull the load line taut and inspect the condition of load for stability.
- Must inspect the drum brake.
The drum brake is not a load holding device. It is designed to prevent over spooling of the drum, causing the cable to bird nest on the drum. Inspect the brake band for worn lining and the actuation method.
- Must inspect the load control brake.
This winch is equipped with a form of dynamic braking. The worm brake is adjustable for pay-out load control. Before a load is handled the load should be pulled tight and stopped to check this brake.

Operation:

- All winch controls must be well marked for function to avoid confusion.
- Insure that the PTO is disengaged when the winch is not in use.
- All winch controls must be located to provide the operator with a clear view of the load.
- The clutch must be inspected daily for proper operation.
- The winch cable should be inspected daily for serviceability.
- A minimum of five wraps of tightly wound cable must remain on the drum.

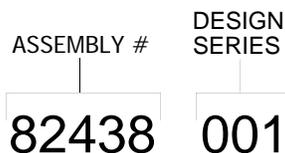
INTRODUCTION AND THEORY OF OPERATION

The Rufnek series planetary winch is designed to use a high-speed gear motor, driving through a multiple disc brake, through three planet sets to the cable drum. The multiple-disc brake is spring applied and hydraulically released through a port in the brake housing. During inhaul, the brake is not released since the load is driven through the one-way cam clutch, bypassing the brake. When the load comes to a stop, the cam clutch locks up and the load is prevented from moving by the brake.

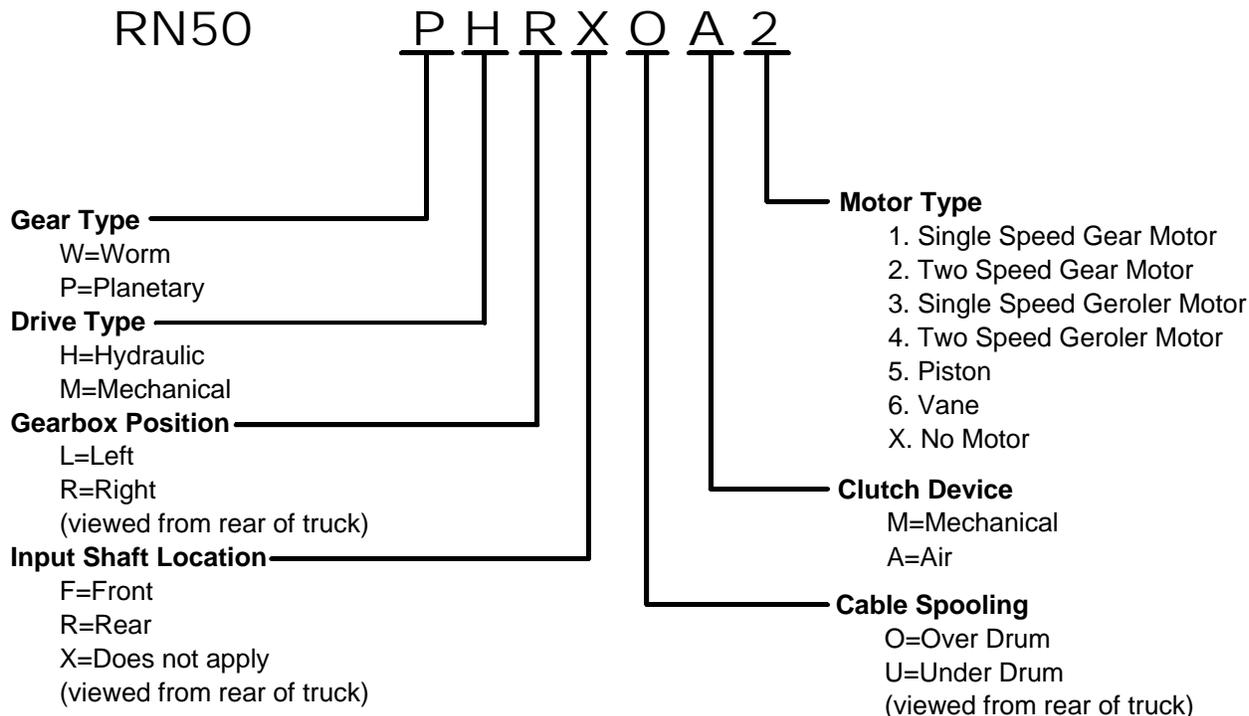
The brake and brake valve receives its signal any time the winch is in pay out. With the brake fully open at about 340 PSI the brake valve will open and dynamically control the lowering of the load.

ASSEMBLY NUMBER EXPLANATION

This manual is for design series 001. In the case of a major design change implementation, a new design series designation number will be issued for the winch. A new manual will also be created for that specific design series.



MODEL CODE



MAINTENANCE AND SERVICE

For safe and consistent operation of TULSA WINCH hoists, swing drives, and winches, a regular program of preventive maintenance is strongly recommended. Regular oil changes with the correct oil for the ambient temperature conditions and an annual inspection of the wear components will help ensure a long life for your planetary geared products.

Tulsa Rufnek series planetary winches, like any other piece of machinery, need to be periodically serviced and well maintained to insure proper operation.

Good maintenance consists of four steps.

1. A daily inspection to insure that there are no oil leaks present and that all mounting bolts and other fasteners are tight, and that the wire rope is in good condition.
2. Changing the oil in both the gearbox and the brake section. *(Severity of use will determine the need for oil changes but it should be checked at a minimum of every 500 hours. Factors such as extremely dirty conditions or widely varying temperature changes may dictate even more frequent servicing).*
3. Lubing drum bushings and sliding clutch with grease thru grease fittings located on drum barrel and clutch.
4. Complete teardowns and component inspections. *(Again, severity and frequency of use will determine how often this should be done).* If the equipment that this winch is mounted to is subject to standards for this type of inspection, then those standards must be followed. If oil changes reveal significant metallic particles then a teardown and inspection must be made to determine the source of wear.

OIL LEVEL MAINTENANCE

Tulsa Winch recommends that the oil level in the gearbox and brake housing be checked and adjusted as part of the pre-use inspection. If the oil level drops frequently or oil leakage is detected during an inspection, maintenance should be performed to correct any problems.

RECOMMENDED OILS

FOR STANDARD TEMP APPLICATIONS -10°F THRU 150°F (-23°C THRU 66°C) oil temp.

*Gearbox oil (GL-5): Any GL-5 75W-90 Oil

FOR LOW TEMP APPLICATIONS -40°F THRU 180°F (-40°C THRU 82°C) oil temp.

*Gearbox oil (GL-5): Shipped from the factory filled with Mobilube SHC SAE 75W-90 synthetic gear oil

**All gearbox oils must meet MIL-PRF2105 & GL-5 specifications.*

OIL CAPACITY	
GEARBOX	7 QTS
BRAKE	.25 QTS



Do not use EP type gear lubes in the brake section of this winch. EP lubes may prevent the clutch from locking up, which, in turn causes the load to fall, resulting in property damage, personal injury, or death.

The hydraulic system should use only high quality hydraulic fluid from reputable suppliers. These oils should contain additives to prevent foaming and oxidation in the system. All hoist hydraulic systems should be equipped with a return line filter capable of filtering 10 micron particles from the system.

OIL CHANGE

The oil is drained by removing the drain plugs (81 & 86) located at bottom of gear housing (60) (Figure 1) and bottom of brake cover (2) (Figure 2).

Then remove the fill plugs (81, 74 & 75) located at the top of the gear housing (3) and the top of the brake cover (2). Inspect the oil for signs of metallic particles and/or burning and dispose of in a proper manner. Then re-install the drain plugs.

Fill the brake end with 75W-90 (1/4 quart), then fill the gear end 75W-90 oil (7 quarts) and replace both of the fill plugs. *See Oil Chart Pg. 6 this manual for recommended oil type and grade for your application.*

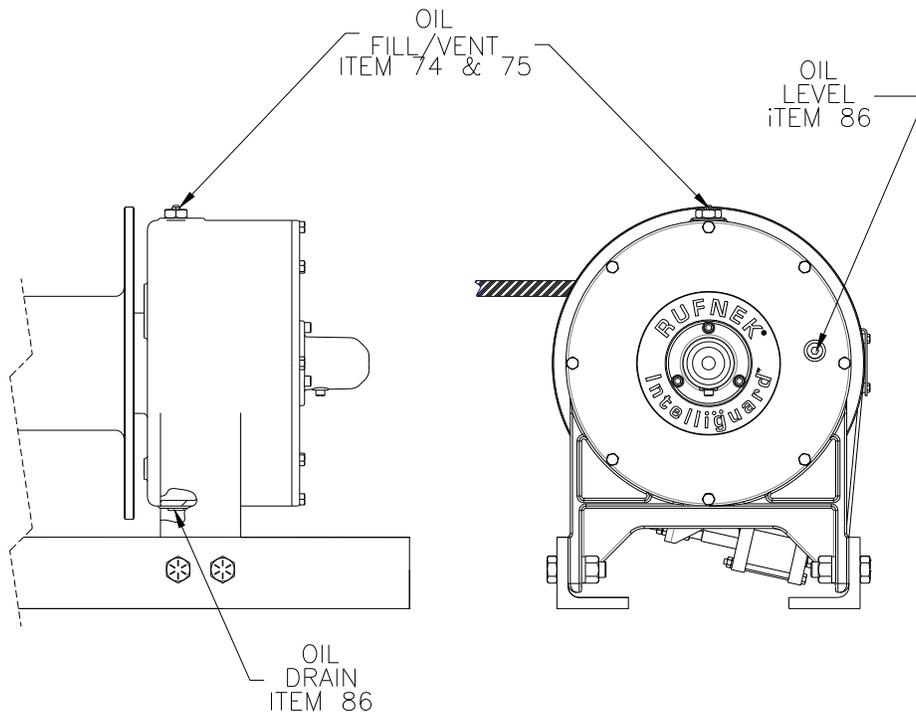


FIG 1

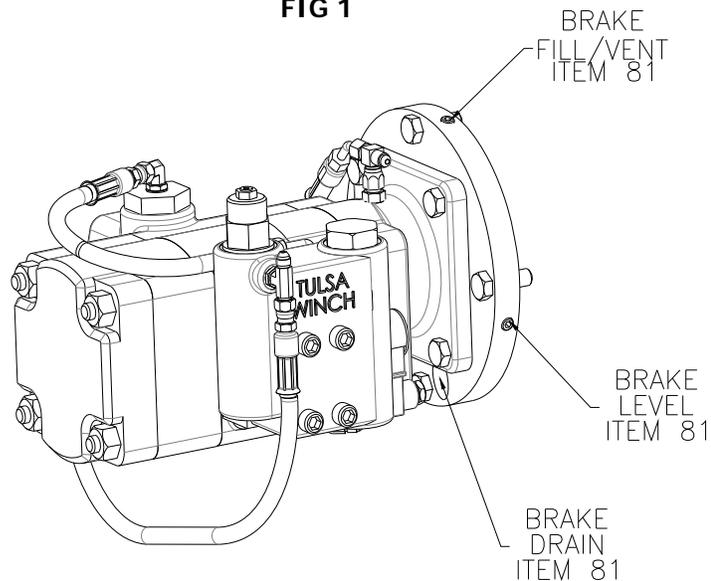
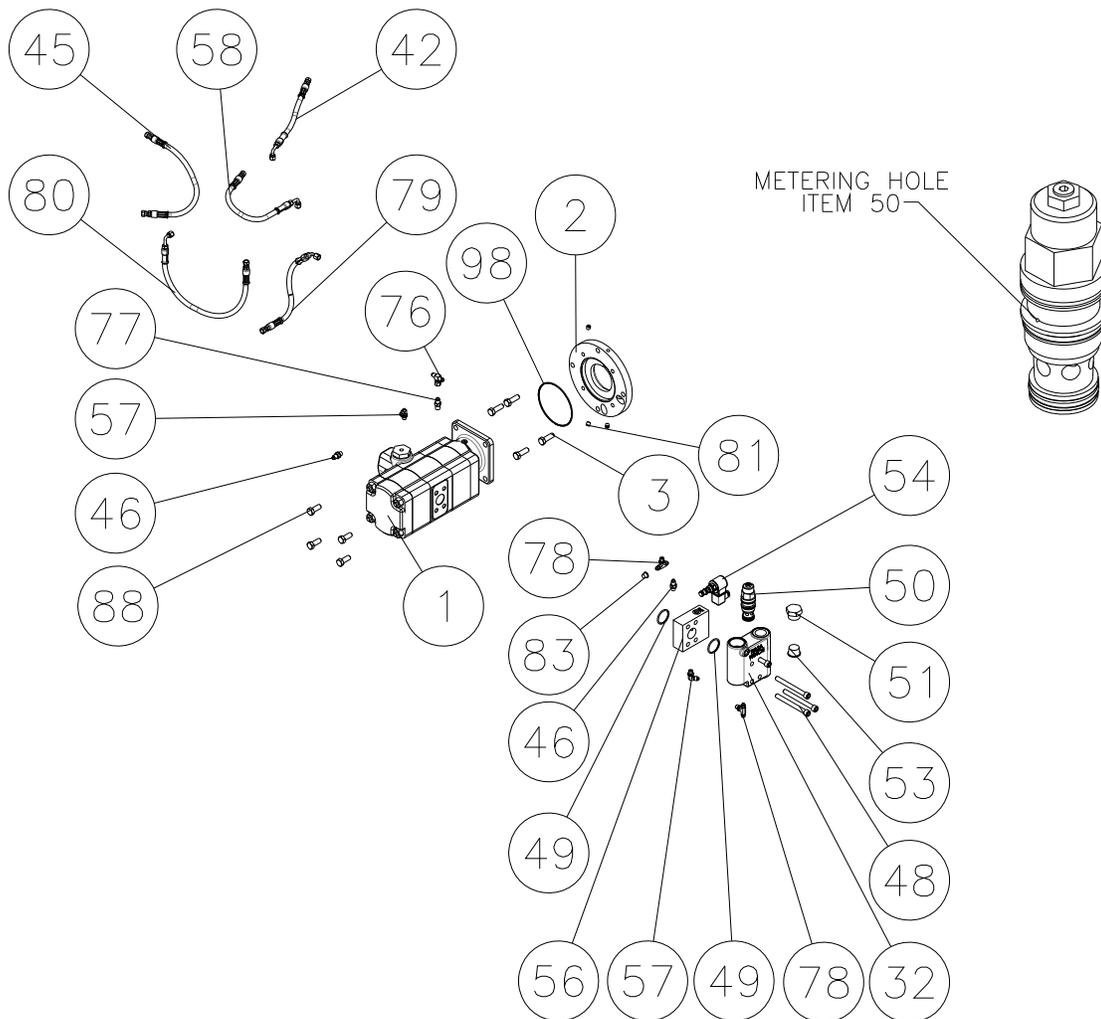


FIG 2

DISASSEMBLY

MOTOR DISASSEMBLY

1. Drain the oil from the brake assembly by removing the plug (81) from the bottom of the brake cover (2).
2. Remove hoses (42, 45, 58, 79, & 80).
3. Remove the counterbalance block (32) and the manifold block (56), from the motor (1) by removing the four cap screws (88).
4. Remove the motor (1) from the winch by removing four capscrews (88).
5. Remove the counterbalance valve (50) from the counterbalance block (32) and inspect the metering hole to make sure it is not obstructed. Also, inspect the o-rings on the valve to insure that they are not flat or cut. Replace if necessary.
6. Motors and counterbalance valves are not serviceable in the field. Return them to an authorized dealer for service.
7. Inspect o-rings (98) & (49) for damage.



BRAKE SECTION DISASSEMBLY

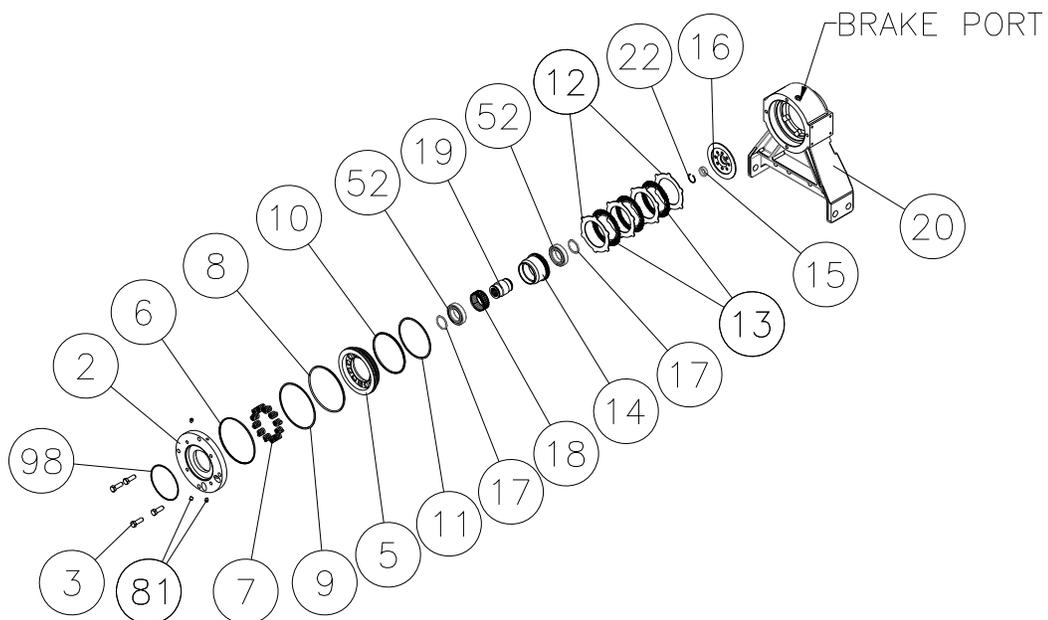
1. Evenly remove the four capscrews (3) that hold the brake cover (2) in place. Spring pressure will raise the cover up as the cap screws are loosened. Carefully remove the cover (2) from the brake housing (20). Inspect the o-ring (6) for damage.
2. Remove the springs (7) from the piston (5) and check the free height. Each spring should measure at least 1.094 inches with no force on them.
3. Remove the piston (5) by installing two pieces of 3/8"-16NC all thread into the two holes in the top of the piston and run in evenly until the piston is clear of the housing. An alternative method of removing the piston is to use shop air to slowly pressurize the brake port to remove the piston from the brake housing (20).
4. Inspect the o-rings (8, 10) and back up rings (9, 11) on the piston. Grasp the brake driver/clutch assembly (assembled items 14, 17, 18, 19, 52) and remove it from the brake housing.
5. Remove the stator plates (12) and friction discs (13) from the brake housing and check them for excessive wear, and replace if necessary. Be sure to check the top stator plate for scoring caused by the removal of the piston and polish if needed. Friction discs should measure no less than .055-in. thickness and stator plates should measure no less than .068-in thick.
6. To disassemble the brake driver/clutch assembly, remove the retaining ring (17) from either end of the driver. Then, remove the brake driver (14) and bearing (52) from the input driver (19). Next, remove the sprag clutch (18). Finally, remove the retaining ring (17) from the other end of the driver, then remove the second bearing (52) from the input driver.



WARNING

Notice the direction of lock-up on the clutch (18) for re-assembly.

7. Remove the bearing housing (16) and inspect the bearing (15).
8. If the bushing or seal in the brake housing needs to be replaced, follow the drum section disassembly and reassembly sections of this manual prior to reassembly of the brake.



DRUM SECTION DISASSEMBLY

1. To remove the drum, first disconnect the cable from the U-bolt (35) and lay aside. If removing the drum from the motor end with the motor and brake disassembled, first remove the cotter keys (93) and clevis pins (100) connecting the yoke (87) to the bracket (101) and air cylinder (67).

NOTICE

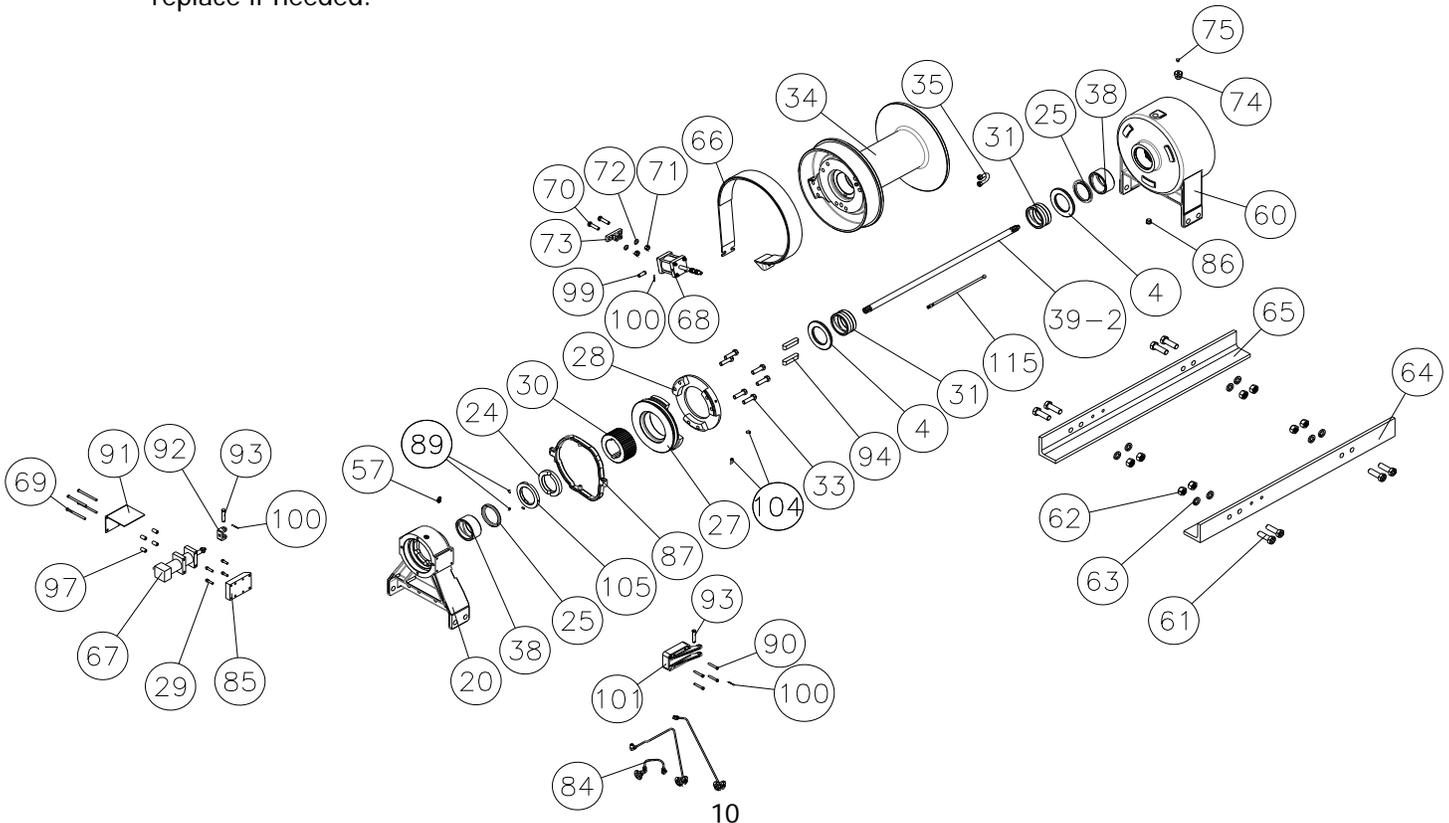
You may need to remove the airlines, mark them for re-assembly.

2. Support the weight of the drum with a hoist. Remove the four cap screws (61) along with the nuts and washers (62, 63) on the bottom of the brake housing (20). Disconnect the airline running from the air cylinder (67) to the brake housing (20). Remove the brake housing by sliding the housing off of the output shaft (40-9). At this time you will need to remove the two cap screws (70), nuts and washers (71 & 72) from the frames (64 & 65). Do not remove the air cylinder (68) yet. Disconnect the airline from the backside of the brake housing (20) that goes to the brake band air cylinder. You can now remove the brake band assembly (66). Note which frame the mounting bolts are on for re-assembly. Inspect and replace if needed.
3. Remove the outer thrust collar (105) by loosening three set screws (89).
4. Remove the yoke (87) and sliding clutch (27). Next remove the coupler (30) from the output shaft (40-9). Remove the two keys (94) and the inner thrust collar (24). Remove the drum using a hoist. Inspect the bushings (31) in both ends of the drum.

NOTICE

You should inspect the bushing and seal (38, 25) that are located in the end of the brake housing

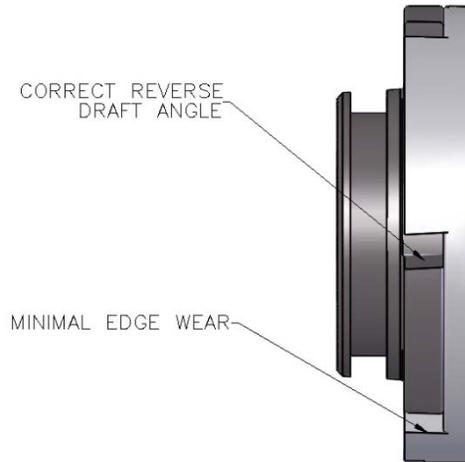
5. Inspect the drum clutch (28) by removing the six capscrews (33) from the drum. Replace the clutch if necessary (See Clutch Inspection on page 11). Torque the capscrews to the specified torque upon re-assembly. (See torque specifications chart on page 25 of this manual.)
6. Inspect the grease tube (115) and fittings (113, 114) inside the drum for wear or damage, replace if needed.



CLUTCH INSPECTION

GOOD

This picture illustrates a sliding and drum clutch with the proper reverse draft and minimum edge wear.

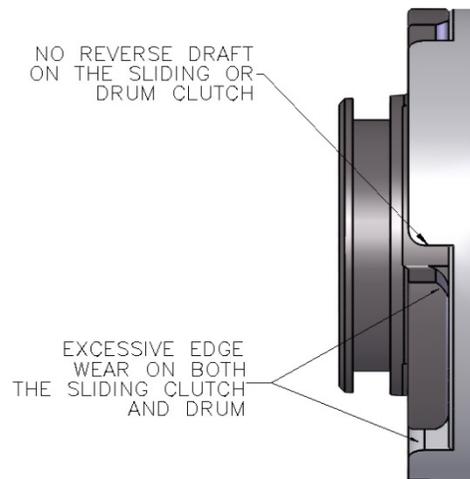


NOTICE

The reverse draft ensures the clutch stays engaged during pay-in.

Without the correct draft, the clutch could dis-engage unpredictably.

BAD

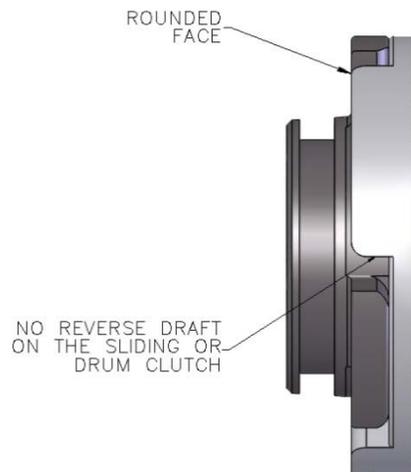


CLUTCH REPLACEMENT CRITERIA



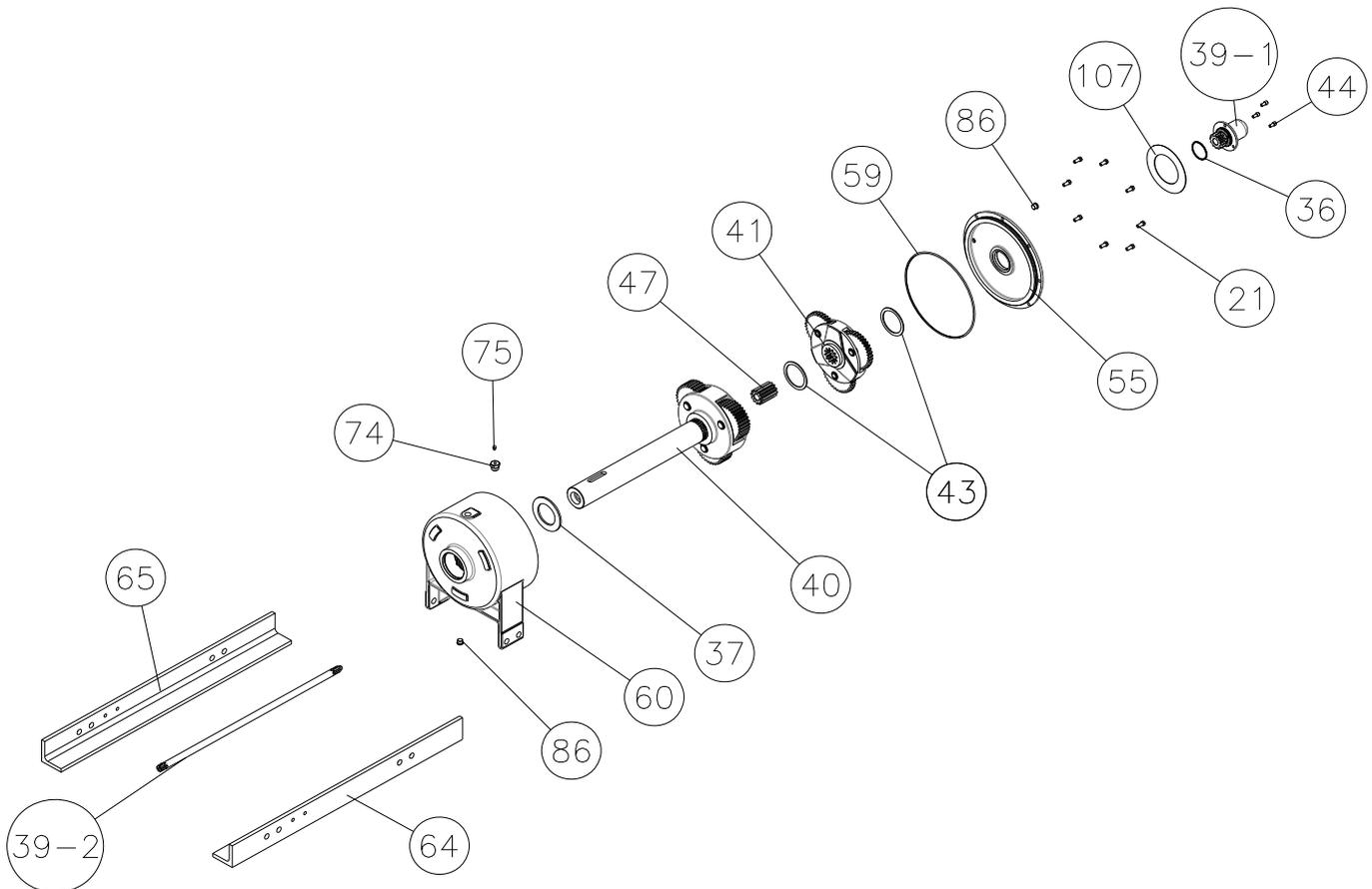
WARNING

If 1/4 of the surface of the face on the sliding clutch or drum clutch is rounded or has no reverse draft, the sliding clutch and/or drum clutch must be replaced.



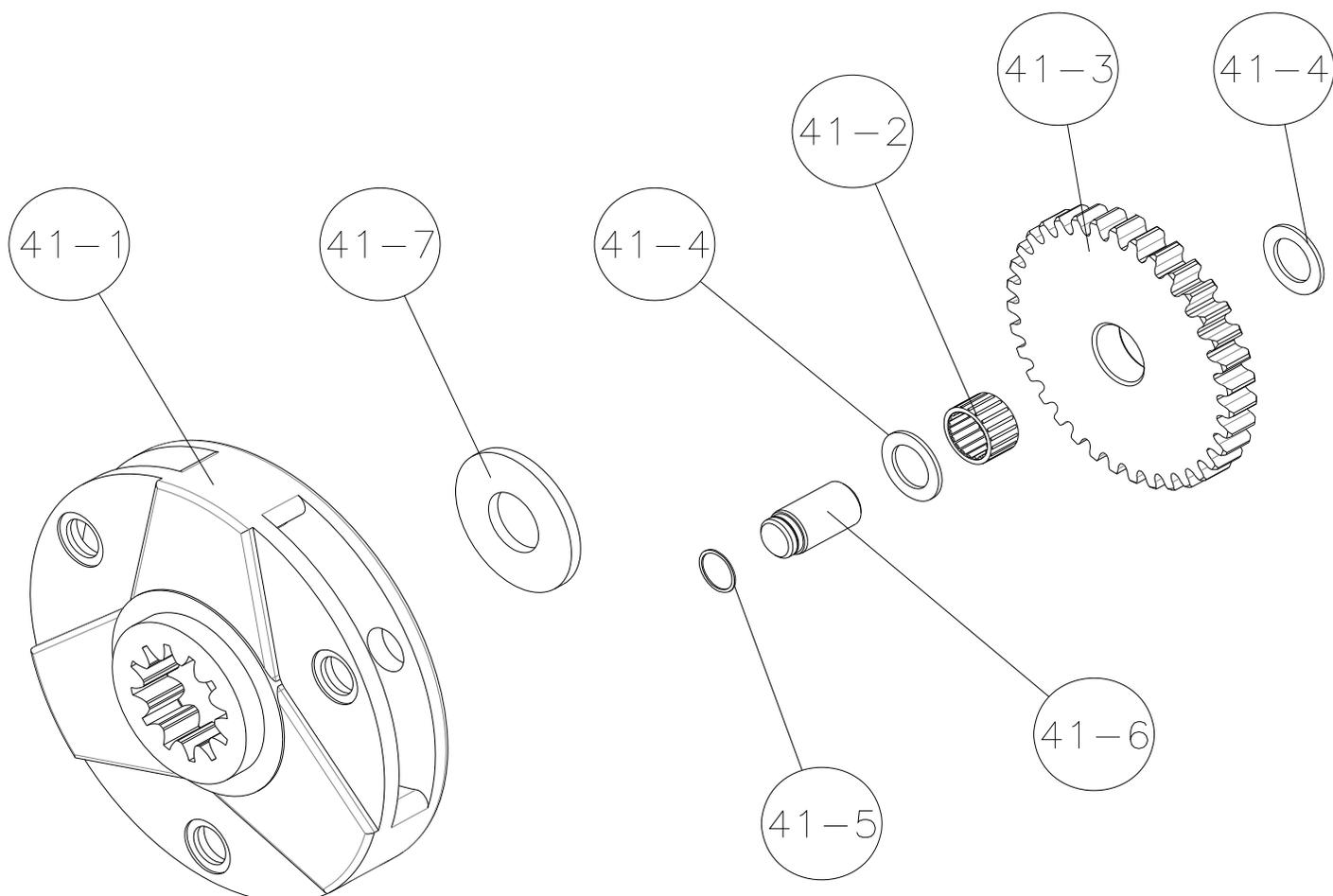
GEAR SECTION DISASSEMBLY

1. Drain the oil by removing the plug (86) located on the bottom of the gear housing (60).
2. To disassemble the gear section, remove the Intelliguard™ (39) from the end cover (55) by removing three capscrews (44). Inspect the gear teeth on the Intelliguard™ (39) for wear. The Intelliguard™ system is not serviceable in the field. Return to an authorized dealer for service.
3. Remove the eight capscrews (21) from the end cover (55), and remove the end cover.
4. Inspect the o-rings (36 & 59) and replace if necessary.
5. Remove the input gear set (41), along with the inner and outer thrust washers (43). Inspect parts and replace if necessary.
6. Remove the output sun gear (47). Carefully remove the output gear set and output shaft assembly (40) from the gear housing.
7. Remove and inspect the thrust washer (37).



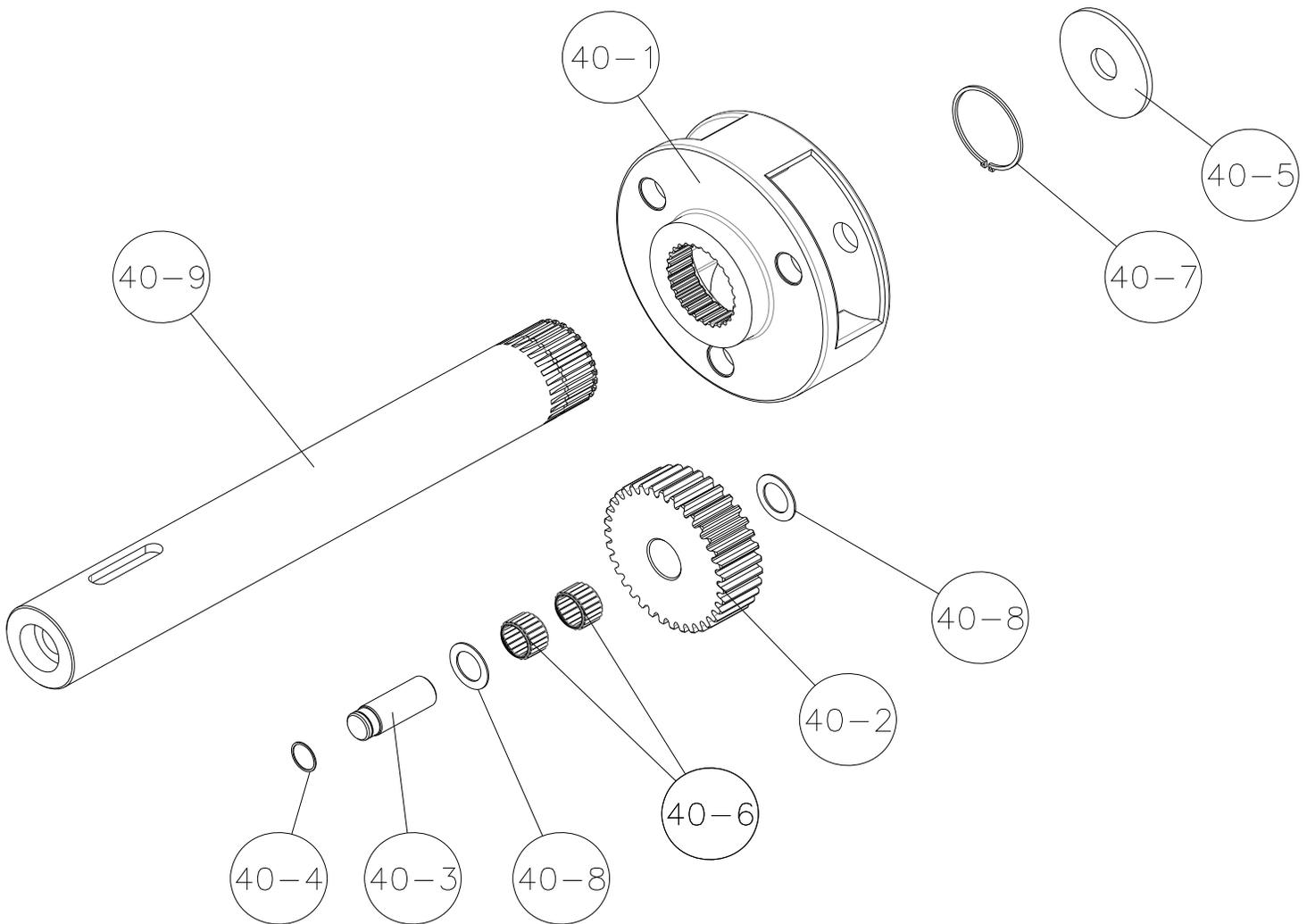
INPUT PLANET SET DISASSEMBLY

1. Remove the retaining rings (41-5) from the planet pins (41-6).
2. Remove the pins from the carrier (41-1) by carefully tapping them out.
3. Remove the planet gears (41-3), thrust washers (41-4), and bearings (41-2) from the carrier (42-1).
4. With the planet gears (41-3) out, remove the plate (41-7).
5. Inspect the parts for wear or damage and replace if necessary.



OUTPUT PLANET SET DISASSEMBLY

1. Remove the retaining rings (40-4) from the planet pins (40-3).
2. Remove the pins from the carrier (40-1) by carefully tapping them out.
3. Remove the planet gears (40-2), thrust washers (40-8), and bearings (40-6) from the carrier (40-1).
4. Inspect the parts for wear or damage and replace if necessary.
5. With the planet gears (40-2) out, remove the plate (40-5) and the retaining ring (40-7). Remove the output shaft (40-9) from the carrier and inspect parts for wear or damage.



ASSEMBLY

OUTPUT PLANET SET ASSEMBLY

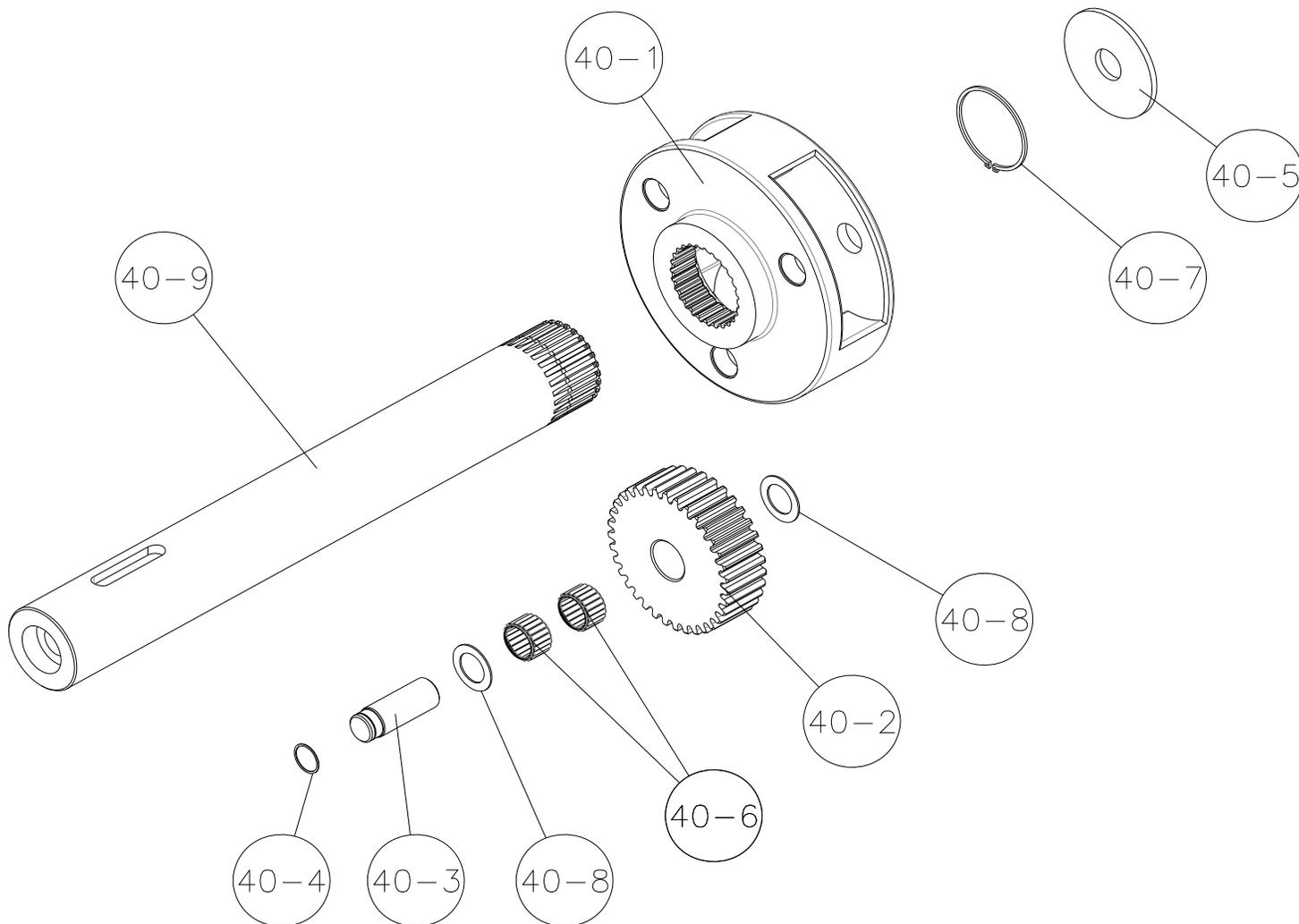
1. Insert the output shaft (40-9) into the carrier (40-1) and install the retaining ring (40-7).
2. Next insert the thrust plate (40-5) into the carrier along with the gears (40-2), bearings (40-6), and washers (40-8).
3. Be careful to line up the thrust washers (40-8) and bearings (40-6) with the planet pins (40-3), press the pin into the carrier (40-1).



CAUTION

If the pins are not lined up properly, the thrust washer can be shattered during the pressing operation.

4. Replace the retaining rings (40-4).



INPUT PLANET SET DISASSEMBLY

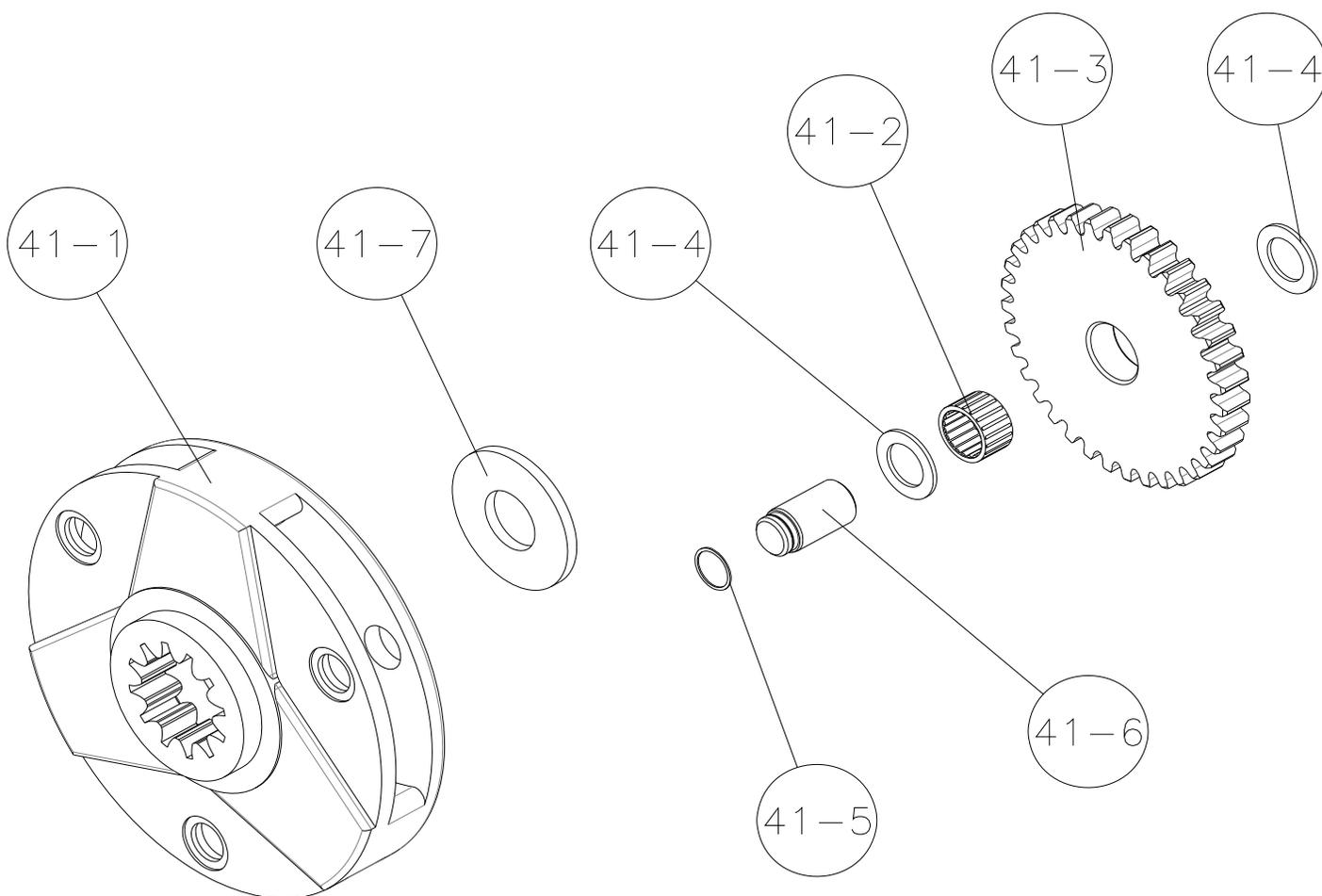
1. Insert the thrust plate (41-7) into the carrier (41-1) along with the gears (41-3), bearings (41-2), and thrust washers (41-4).
2. Being careful to line up the thrust washers (41-4) and bearings (41-2) with the planet pins (41-6), press the pins into the carrier (42-1).



CAUTION

If the pins are not lined up properly, the thrust washer can be shattered during the pressing operation.

3. Replace the retaining rings (41-5).



DRUM SECTION ASSEMBLY

1. After inspecting and replacing the necessary parts, such as the drum bushings (31), install the bushing (4) onto the output shaft (40-9).
2. Install the drum (34) onto the output shaft (40-9). This part is very heavy and you will need the assistance of a hoist. With the weight of the drum supported, install the brake band assembly (66) and the capscrews (70), nuts (71), and washers (72).

NOTICE

You may need to lower the drum to align the holes in the brake band with the holes in the frame.

3. Install the brake band air cylinder (68) making sure the rod of the air cylinder is going through the bracket on the brake band (66). Secure it to the bracket with the clevis pin (99) and cotter pin (100). Tighten the adjusting nut on the air cylinder shaft until there is no space between the drum (34) and the brake band (66). Then, tighten the jam nut to secure the adjusting nut.

NOTICE

The brake band may need to be readjusted once it's in the field.

4. Install the bushing (4) onto the output shaft (40-9). Install the inner thrust collar (24) making sure the half-moon slots are lined up with the key slots in the output shaft (40-9). Tap the two keys (94) into their slots in the output shaft.
5. If necessary, install the new drum clutch (28) using six capscrews (33). Torque to specified torque (see page 25 of this manual). Then, align the coupler (30) with the keys (94) and slide it onto the output shaft (40-9). Install the sliding clutch (27) onto the coupler (30). Then install the yoke (87) onto the sliding clutch (27).
6. Install the outer thrust collar (105), aligning the half-moon slots with the keys (94). Tightly hold the thrust collar (105) against the keys and lock down the three set screws (89).
7. Install the oil seal (25) onto the output shaft (40-9).
8. Slide the brake housing (20) onto the output shaft (40-9).
9. Bolt the brake housing (20) loosely into both frames (64, 65) using four capscrews, washers, and nuts (61, 62, & 63). Lower the drum so the weight of the drum is supported by both the brake and gear housings. The air line from the brake band air cylinder can be attached at this time.
10. Disengage the sliding clutch (27) so you can turn the drum freely and tighten all bolts throughout the frames to the proper torque specification (see page 25 of this manual).
11. Turn the drum to make sure it is not binding.
12. Install the air cylinder (67) and the air cylinder cover (91) to the brake housing with four capscrews (69) and spacers (97).
13. Install the bracket (101) to the brake housing using four capscrews (90).

BRAKE SECTION ASSEMBLY

1. Re-assemble the driver/clutch assembly (14, 17, 18, 19, 52) making sure the clutch is installed properly and checking to make sure the cam clutch is free turning in the pay in direction.
2. Measure the distance from the face of the brake housing to the end of the shaft as shown (Figure 3).
3. If needed, add shims (111, 112) inside the input driver (54) next to the end of the input shaft (39-2) to achieve dimension noted.

NOTICE If measurement is between 1.547 & 1.622, use Item 111 (max of 3 shims). If measurement is between 1.622 & 1.727, use Item 112 (max of 2 shims).

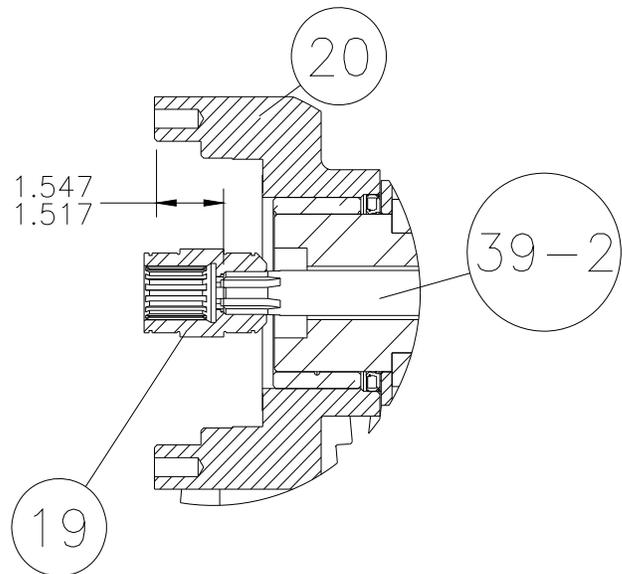


FIG 3

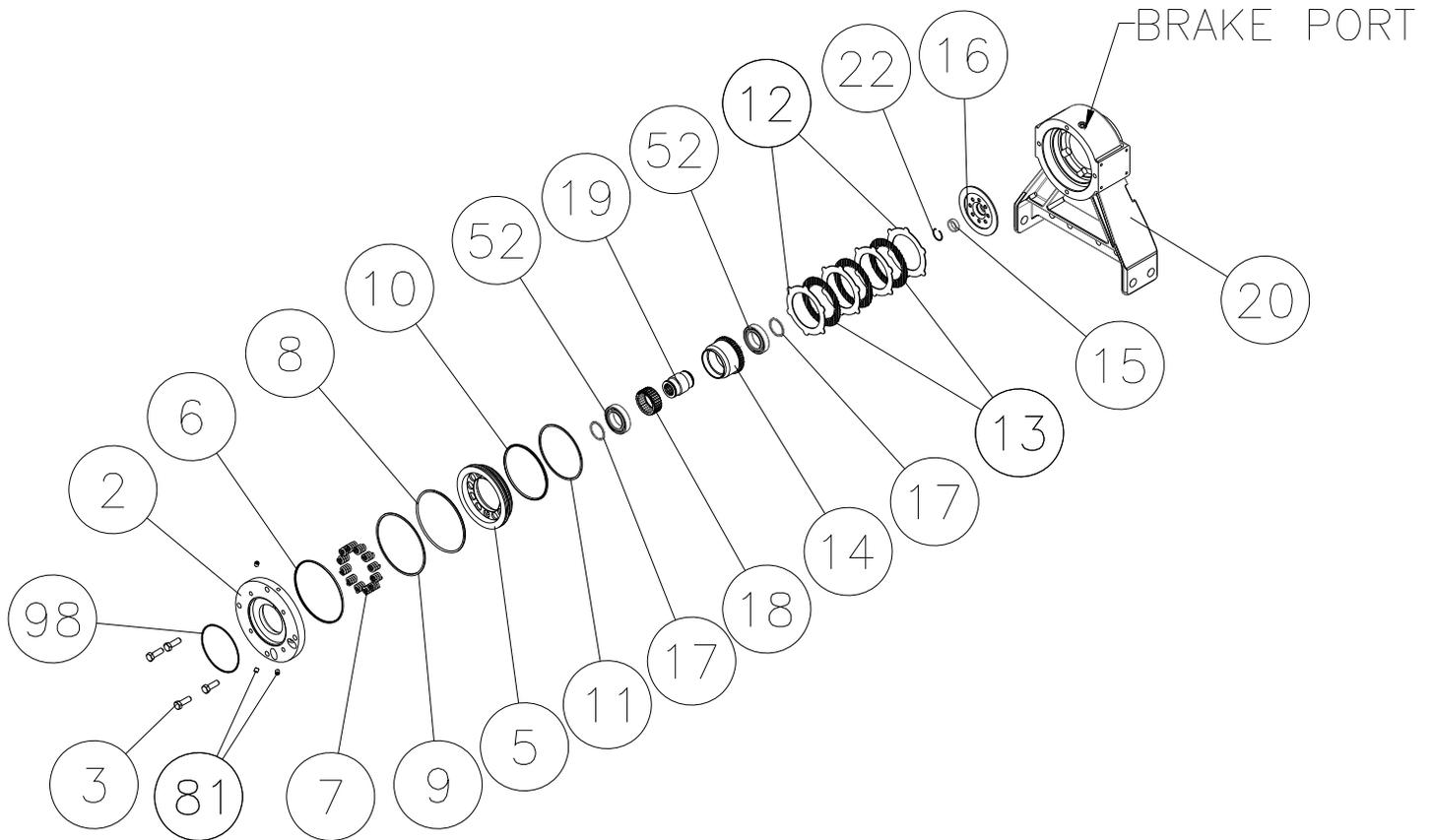
4. Install the bearing housing assembly that contains parts 15, 16, and 22 into the brake housing.
5. Install the driver/clutch assembly onto the input shaft (39-2).
6. Install the stator plates (12) and friction discs (13) starting with a stator plate and alternating between friction discs and stator plates until seven stator plates and six friction discs are used.

NOTICE Dip friction discs in lightweight Non-EP oil before installation.

7. Install the piston (5) into the brake housing (20) and gently tap it down until it is seated making sure not to damage the o-rings (8, 10) or back-up rings (9, 11).
8. Install the springs (7) into the spring pockets. If working in a horizontal position, coat the bottom of each spring with chassis lube to keep it in position.
9. Install the cover (2) onto the brake housing (20) using four capscrews (3) being careful not to damage the o-ring (6). Draw the cover down evenly, alternating between opposite hex bolts. Make sure that the cover is aligned properly with the brake housing in order to orient the motor as it should be.

BRAKE SECTION ASSEMBLY CONT.

10. Check the brake release with a portable hydraulic pump. Full release should be obtained at 400psi, plus or minus 20psi. Also, check the brake for proper operation by applying 0psi to the brake port and adapting a torque wrench to the input shaft. The torque in the payout should be 360 to 440 ft-lbs.



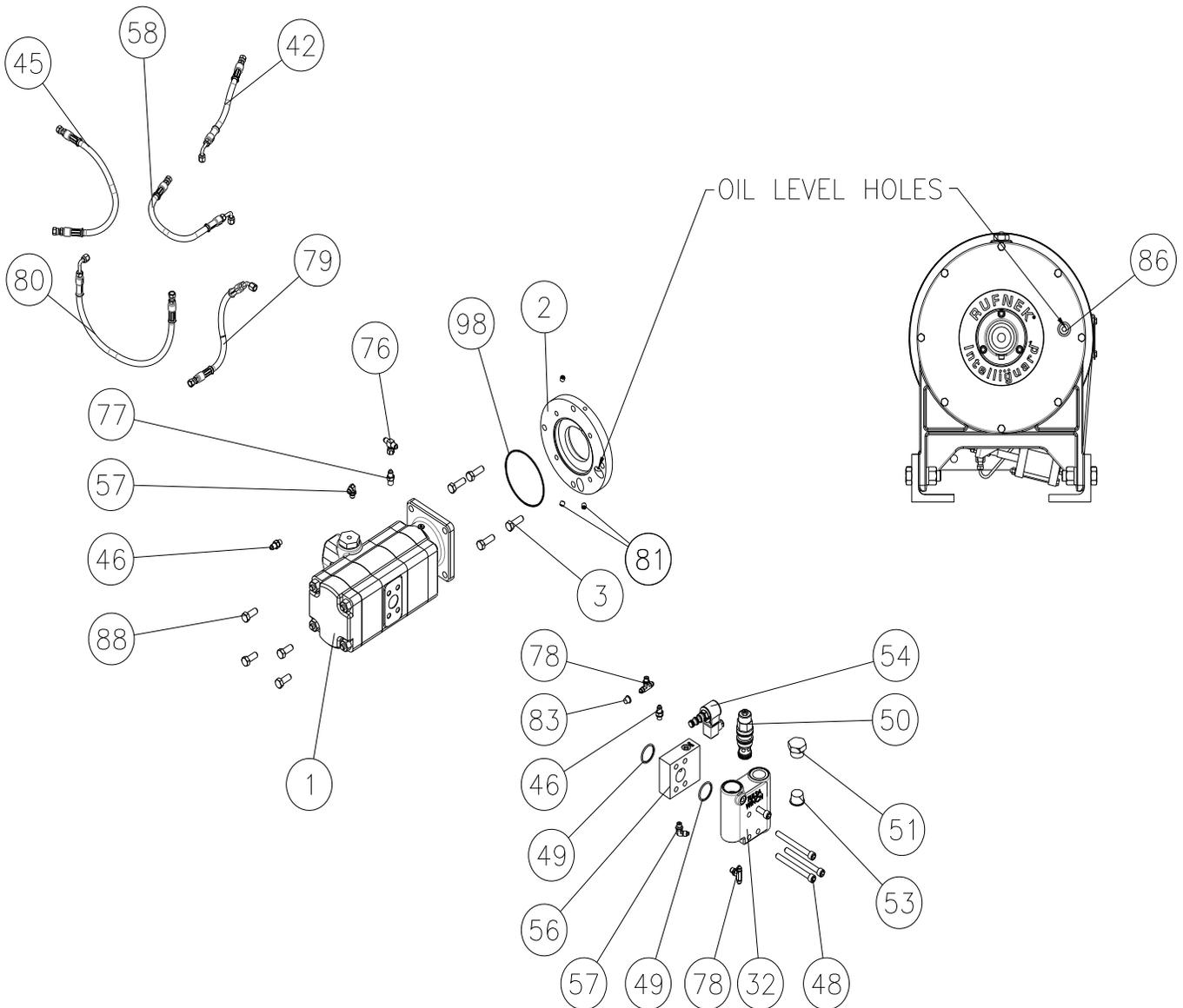
MOTOR ASSEMBLY

1. Install the o-ring (98) onto the motor (1) and install the motor using four capscrews (88). Tighten the capscrews to the proper torque specification (see page 25 of this manual).

NOTICE

Make sure to install the motor with the belly down and the case drain port up.

2. If removed, install cartridge valve (54).
3. Install the counter-balance valve (50) into the counterbalance block (32).
4. Install the o-rings (49) into the manifold block (56) and counterbalance block (32). Install the manifold block (56) and counter-balance block (32) using four capscrews (48).
5. Install hoses (42, 45, 58, 79, and 80).
6. Remove the oil level plugs (81 & 86) from the brake cover (2) and gear housing (58). Fill the brake and gearbox through the oil fill hole located on top of the gearbox with the proper oil until the oil reaches the oil level holes. Replace the oil level plugs.



TROUBLESHOOTING

Winch won't hold load

Possible Solutions:

1. There is excessive back pressure in the hydraulic system. Check the system for line restrictions and reduce the back pressure.
2. The brake discs are worn. Replace the brake discs. Friction discs should measure no less than 0.055 inches thick and the stator plates should measure at least 0.064 inches thick.
3. The winch clutch is slipping due to wear of either driver and/or clutch. Inspect the driver components for wear and replace if necessary.

Winch will not raise the load it should

Possible Solutions:

1. The relief valve setting may be too low to allow proper lifting. Verify that the hydraulic system relief valve is set to the appropriate pressure for the application.
2. The load being lifted may be more than the winches rating. Verify weight and reduce the load or re-rig it to increase mechanical advantage.

Oil leaks from the vent located on top of the gearbox

Possible Solutions:

1. The motor shaft seal may have failed. Motor must be sent back to manufacturer to replace the shaft seal. Hydraulic motors are not serviceable in the field.
2. The brake piston o-ring and or backup rings may have failed. Service the brake section and replace any damaged or worn parts found.

Winch runs too slow

Possible Solutions:

1. Low flow rate. Check the flow rate and increase if necessary.
2. Hydraulic motor worn out. Replace the motor.

Cable drum won't free spool

Possible Solutions:

1. Winch not mounted squarely. Check mounting and confirm that the winch is mounted on a level surface.
2. Clutch not disengaged. Disengage the clutch.

TORQUE SPECIFICATIONS CHART

Nominal	Size	Dry	Plated	Lubricated	Dry	Plated	Lubricated
		SAE Grade 5 Torque *(Ft-Lbs)	SAE Grade 5 Torque *(Ft-Lbs)	SAE Grade 5 Torque *(Ft-Lbs)	SAE Grade 8 Torque *(Ft-Lbs)	SAE Grade 8 Torque *(Ft-Lbs)	SAE Grade 8 Torque *(Ft-Lbs)
1/4	20	8	6	5	12	9	7
1/4	28	10	7	6	14	10	8
5/16	18	17	13	10	25	18	15
5/16	24	19	14	11	27	20	16
3/8	16	31	23	19	44	33	26
3/8	24	35	26	21	49	37	30
7/16	14	49	37	30	70	53	42
7/16	20	55	41	33	78	58	47
1/2	13	76	57	45	106	80	64
1/2	20	85	64	51	120	90	72
9/16	12	109	82	65	153	115	92
9/16	18	122	91	73	172	129	103
5/8	11	150	113	90	212	159	127
5/8	18	170	128	102	240	180	144
3/4	10	266	200	160	376	282	226
3/4	16	297	223	178	420	315	252
7/8	9	430	322	258	606	454	364
7/8	14	474	355	284	668	501	401
1	8	644	483	386	909	682	545
1	14	721	541	433	1019	764	611
1-1/8	7	794	596	475	1288	966	772
1-1/8	12	890	668	534	1444	1083	866
1-1/4	7	1120	840	672	1817	1363	1090
1-1/4	12	1241	930	745	2012	1509	1207

T = BOLT TORQUE (LB. FT.)

K = TORQUE COEFFICIENT (K = 0.20 DRY

W = PRELOAD TENSION

D = NOMINAL BOLT SIZE (IN.)

T = (KWD) / 12

K = 0.15 PLATED K = 0.12 LUBRICATED)

* ALL TORQUE VALUE TOLERANCES ARE ± 5%

BILL OF MATERIAL

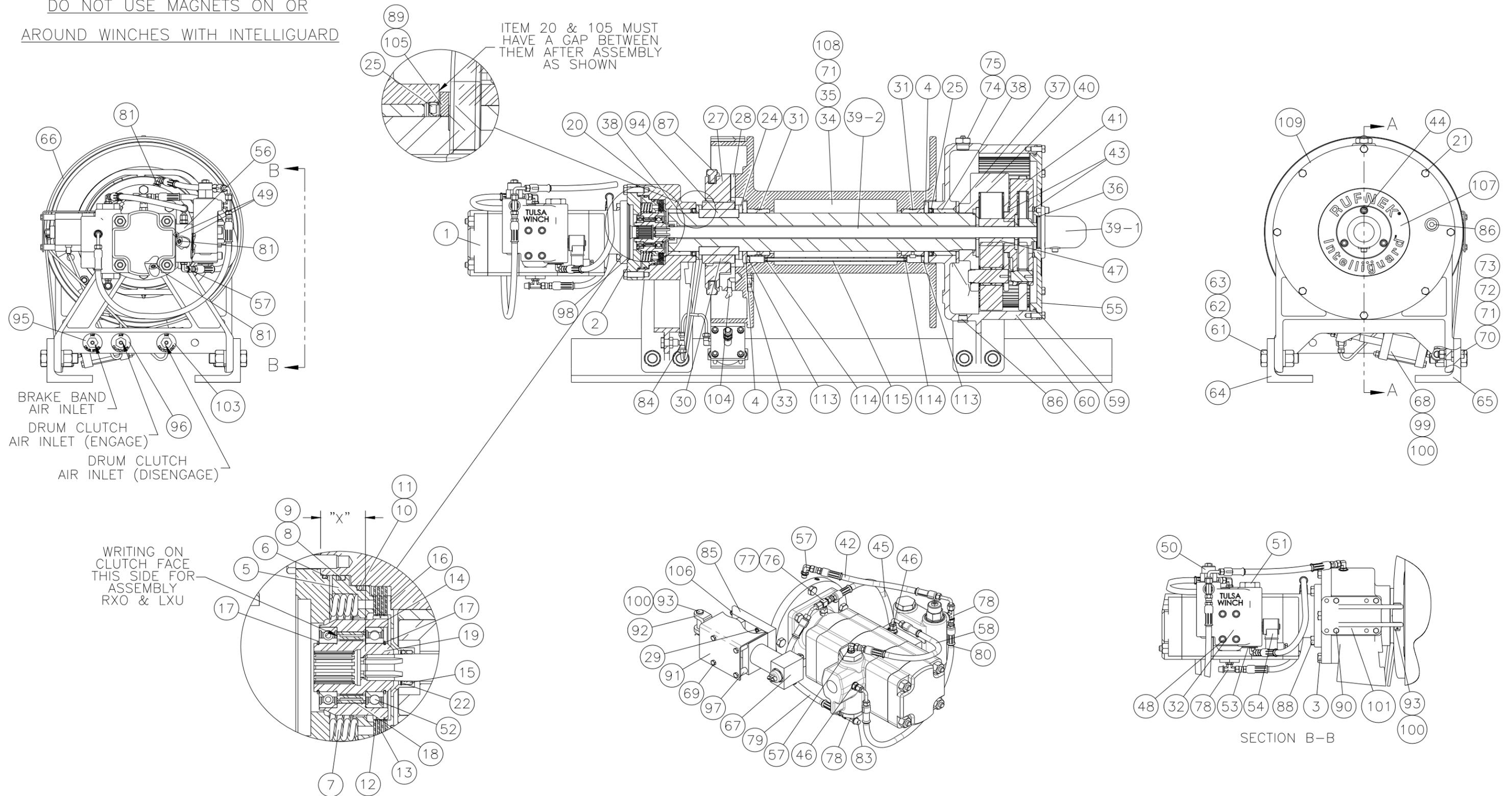
ITEM	DESCRIPTION	QTY.
1	MOTOR, HYD.	1
2	COVER, BRAKE	1
3	CAPSCREW	4
4	BUSHING	2
5	PISTON, BRAKE	1
6	O-RING	1
7	SPRING, BRAKE	9
8	O-RING	1
9	RING, BACK-UP	1
10	O-RING	1
11	RING, BACK-UP	1
12	PLATE, STATOR	4
13	DISC, FRICTION	3
14	DRIVER BRAKE	1
15	BEARING, NEEDLE	1
16	HOUSING, BEARING	1
17	RING, RETAINING	2
18	CLUTCH, SPRAG	1
19	BRAKE, DRIVER, BLANK	1
20	HOUSING, BRAKE	1
21	CAPSCREW	8
22	RING, RETAINING	1
24	THRUST COLLAR	1
25	SEAL, OIL	2
27	CLUTCH, SLIDING	1
28	CLUTCH, DRUM	1
29	CAPSCREW	2
30	COUPLER	1
31	BUSHING	2
32	BLOCK, COUNTERBALANCE	1
33	CAPSCREW	6
34	DRUM	1
35	U-BOLT	1
36	O-RING	1
37	WASHER, THRUST	1
38	BUSHING	2
39	KIT, INTELLIGUARD II	1
40	GEAR SET, OUTPUT	1
41	GEAR SET, INPUT	1
42	HOSE	1
43	WASHER THRUST	2
44	CAPSCREW	3
45	HOSE	1
46	ADAPTER, STRAIGHT	2
47	GEAR, SUN, OUTPUT	1
48	CAPSCREW	4

49	O-RING	2
50	VALVE, COUNTERBALANCE	1
51	PLUG, HEX, ORING	1
52	BEARING	2
53	CAPLUG	1
54	VALVE, CARTRIDGE	1
55	COVER	1
56	BLOCK, MANIFOLD	1
57	ADAPTER, 90 DEGREE	3
58	HOSE	1
59	O-RING	1
60	HOUSING, GEAR	1
61	CAPSCREW	8
62	NUT	8
63	LOCKWASHER	8
64	FRAME, R.H.	1
65	FRAME, L.H.	1
66	BRAKE BAND, ASS'Y	1
67	CYLINDER, AIR	1
68	CYLINDER, AIR,BRAKE BAND	1
69	CAPSCREW	4
70	CAPSCREW	2
71	NUT	4
72	LOCKWASHER	2
73	MOUNTING, BRACKET, AIR CYLINDER	1
74	PLUG, ADAPTER	1
75	BREATHER	1
76	TEE, SWIVEL	1
77	ADAPTER, STRAIGHT	1
78	FITTING, TEE, BRANCH	2
79	HOSE	1
80	HOSE	1
81	PLUG, PIPE	3
83	CAPLUG	1
84	T&F KIT, AIR SHIFT	1
85	SPACER, CYLINDER	1
86	PLUG, O-RING	2
87	YOKE, CLUTCH	1
88	CAPSCREW	4
89	SET SCREW	3
90	CAPSCREW	4
91	COVER AIR CYLINDER	1
92	CLEVIS	1
93	PIN, CLEVIS	2
94	KEY	2
95	LABEL, DRUM BRAKE	1
96	LABEL, CLUTCH IN	1
97	SPACER	4
98	O-RING	1
99	CLEVIS PIN	1
100	COTTER PIN	3
101	BRACKET	1

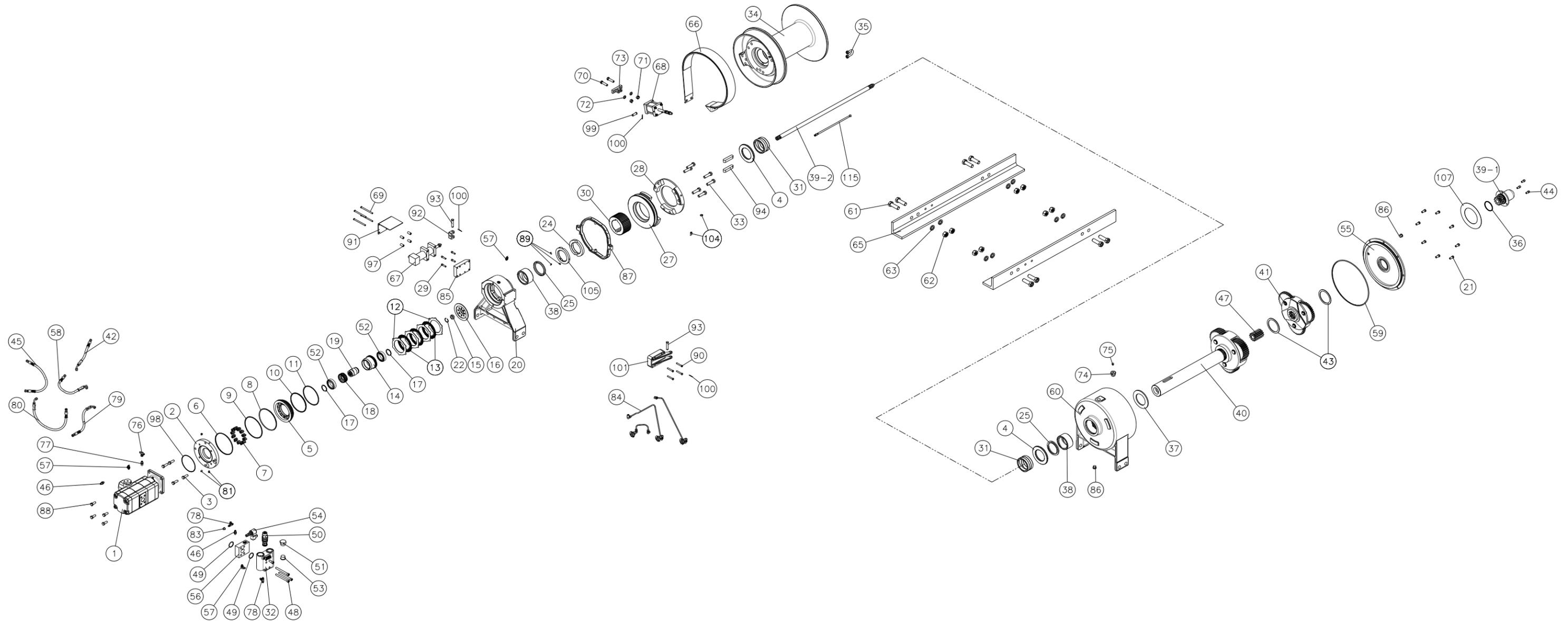
103	LABEL, CLUTCH OUT	1
104	FITTING, GREASE ZERK, 45 DEG	2
105	COLLAR, THRUST	1
106	CAPSCREW	2
107	PLATE, LOGO, INTELLIGUARD	1
108	U-BOLT	1
109	TAG, RUFNEK	1
111	RACE, THRUST	3
112	WASHER, HARDENED STEEL	2
113	CUP EXP PLG	2
114	HOLLOW LOCK SOCKET	2
115	TUBING	1
113	CUP EXP PLG	2

CROSS SECTIONAL ASSEMBLY DRAWING

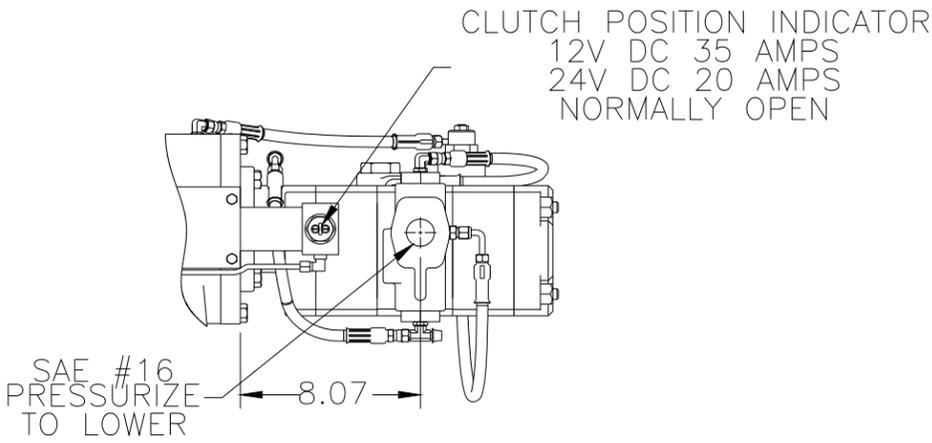
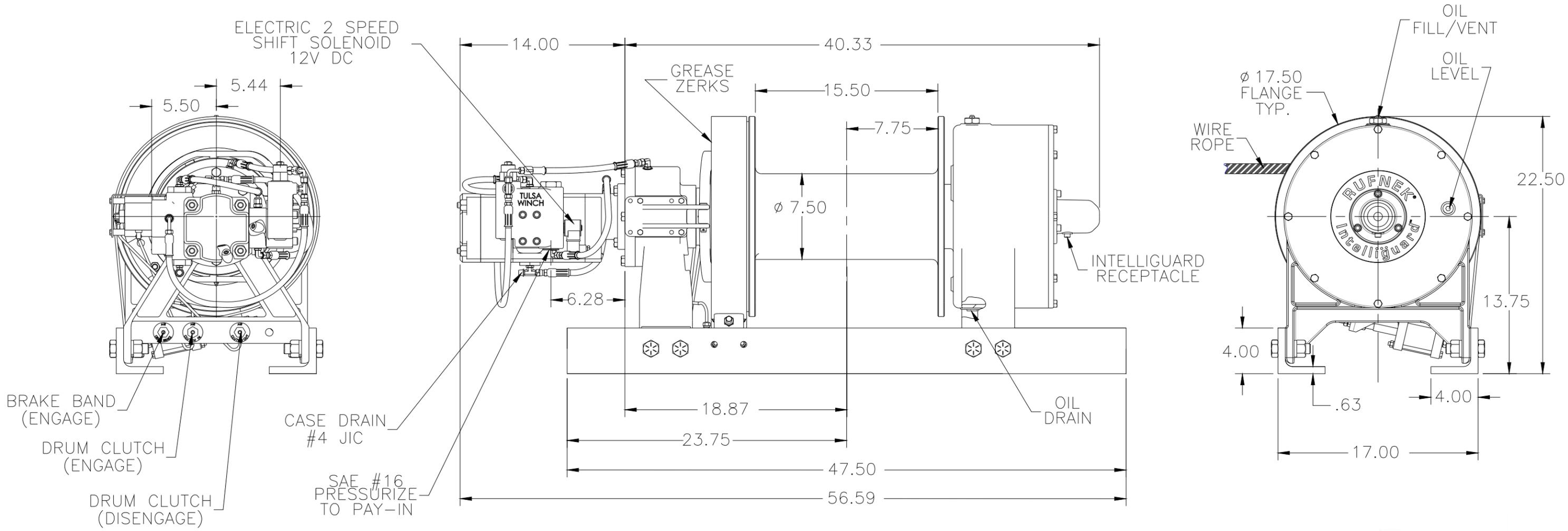
DO NOT USE MAGNETS ON OR
AROUND WINCHES WITH INTELLIGUARD



EXPLODED ASSEMBLY DRAWING



INSTALLATION DRAWING



WINCH PERFORMANCE SPECIFICATIONS					
PRESSURE: 2,500 PSI			CABLE DIA.: .88"		
LAYER	WINCH PERFORMANCE LOW SPEED 60 GPM		WINCH PERFORMANCE HIGH SPEED 60 GPM		TOTAL DRUM CAPACITY (FT)
	STALL LINE PULL (LBS)	WINCH SPEED (FPM)	STALL LINE PULL (LBS)	WINCH SPEED (FPM)	
FIRST	50,000	40	21,230	83	34
SECOND	41,501	49	17,561	100	74
THIRD	35,385	57	14,973	117	122
FOURTH	30,840	65	13,050	134	176
FIFTH	27,330	74	11,565	152	238

