Tulsa Winch

DESIGN SERIES 001

RUFNEK 10 AND MODEL 1138

SERVICE MANUAL

WARNING

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 and with 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/

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.
NOTICE	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 hydraulic hoses, valves and fittings are rated to winch manufacturer's operating pressures.

Relief valves should be set to winch manufacturer's specifications.
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 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 if equipped.
The drum brake is not a load holding device it is design to prevent over spooling of the drum and causing bird nesting of the cable on the drum. Inspect the brake for wear of the lining and the actuation method.

Must inspect the load control brake.
These winches can be equipped with two (2) forms of dynamic braking. The worm brake is one method and is adjustable for pay-out load control. Before a load is handled the load should be pulled tight and stopped to check this brake. The second method is a hydraulic lowering control that is not field adjustable. The same method should be used to check this brake.

Operation:

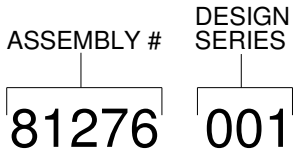
- All winch controls must be well marked for function to avoid confusion.
- Insure that the PTO is disengaged when the winch is not in use.
- All winch controls must be located to provide the operator with a clear view of the load.
- The clutch must be inspected daily for proper operation.
- The winch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

GENERAL INFORMATION
INTRODUCTION AND THEORY OF OPERATION

The Rufnek series worm gear winch is operated by turning the input of the worm using a hydraulic motor or PTO driven sprocket and chain. The winch utilizes an adjustable brake that activates only during pay-out to provide maximum efficiency during pay-in. The torque is transferred from the gearbox through the drum shaft which is keyed to a mechanically actuated sliding clutch that when engaged transfers the torque to the drum.

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.



WINCH BREAK-IN

Winches, like any other kind of machinery, require a “break-in” to perform well and to maximize their life. The following guidelines should be used in the break-in of Tulsa Winches.

Use extreme care when first spooling cable onto the winch. DO NOT run the winch at high speeds when performing this operation. Make sure that the cable is payed-out in a straight line (to prevent kinks) and SLOWLY pay-in the winch to install the cable.

DO NOT exceed one half rated load or one half rated line speed for the first thirty minutes of operation. This will insure that the worm and gear have an opportunity to wear in properly. Periodically, check the gearbox for temperature rises and allow the winch to cool down between pulls. Worm gear winches are designed and intended for intermittent duty application only; using them in extremely long pulls may generate excessive heat and shorten the life of the winch.

MODEL CODE

RN10 W H R F 1 M O

Gear Type
- W=Worm
- P=Planetary

Drive Type
- H=Hydraulic
- M=Mechanical

Gearbox Position
- L=Left
- R=Right
- (viewed from rear of truck)

Input Shaft Location
- F=Front
- R=Rear
- X=Does not apply
- (viewed from rear of truck)

Motor Type
1. Single Speed Gear Motor
2. Two Speed Gear Motor
3. Single Speed Geroler Motor
4. Two Speed Geroler Motor
5. Piston
6. Vane

X. No Motor

Clutch Device
- M=Mechanical
- A=Air

Cable Spooling
- O=Over Drum
- U=Under Drum
- (viewed from rear of truck)

MAINTENANCE

Tulsa Rufnek series worm gear winches require regular maintenance to ensure safe and reliable operation. Routine oil changes with the correct oil for the ambient temperature conditions and a regular inspection of the wear components is strongly recommended.

Maintenance Scheduling

The owner is to insure proper inspection intervals, in compliance with the API RP 2D Section 4, ANSI B30.5, 5-2.3 or ANSI B30.7, 7-2.1, and will review winch usage categories on a periodic basis. A qualified inspector should perform all maintenance and inspections.

USE (HRS PER MONTH)	API RP 2D RECOMMENDED INSPECTION SCHEDULE
0-10	PRE-USE, ANNUAL
11-50	PRE-USE, QUARTERLY
51+	PRE-USE, MONTHLY

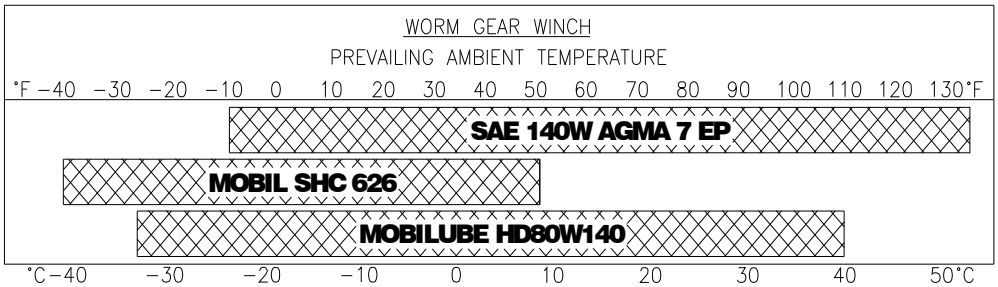
Oil Maintenance

The oil should be changed every **1000 hrs** or **6 months** of normal usage.

- Tulsa Winch recommends that the oil level in the gearbox 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.

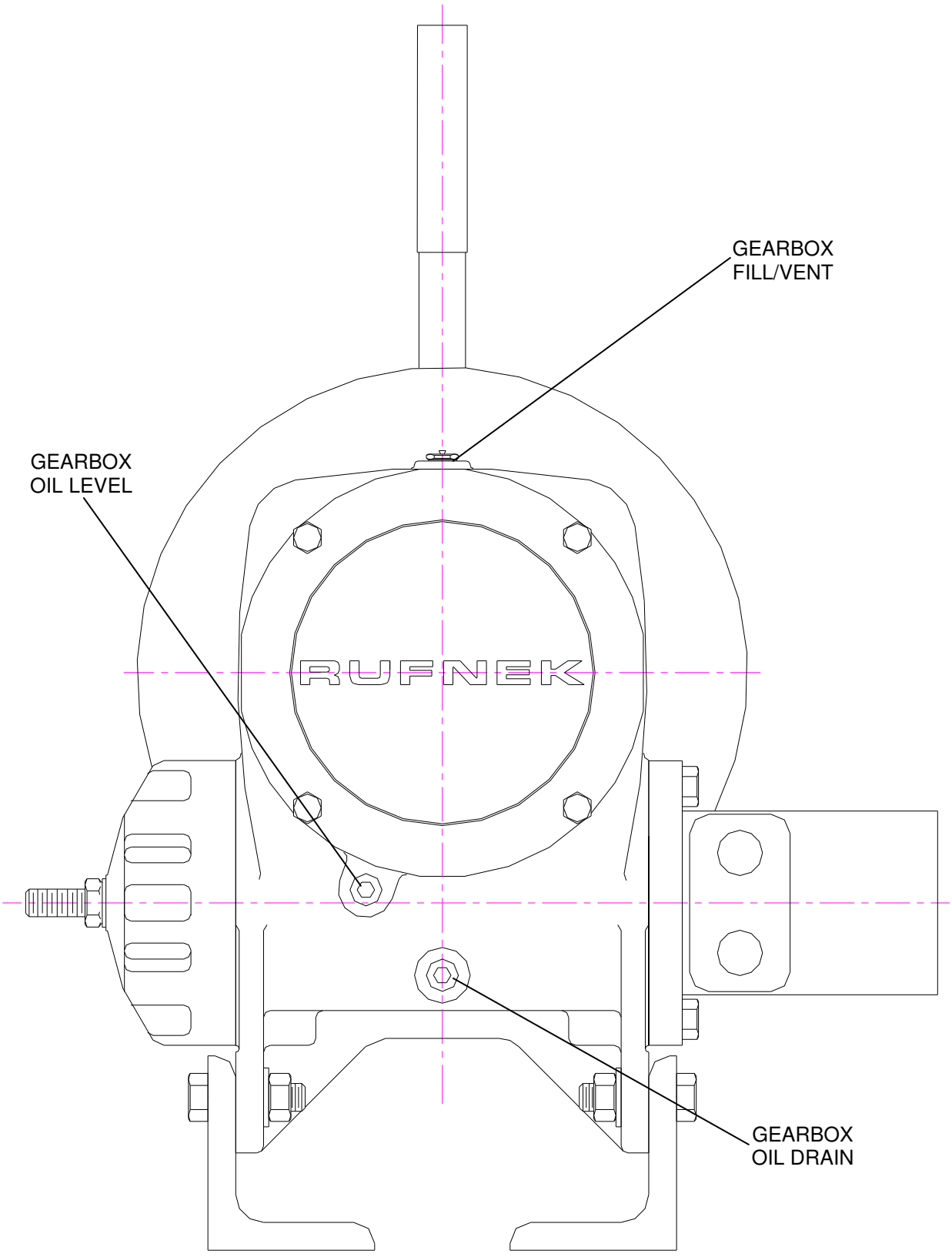
OIL CAPACITY = .75 QTS

- Gearbox oil level inspection is achieved by removing the oil level inspection plug and visually inspecting the oil level. Minimum oil level is to the bottom of the threads of the oil level hole (see page 7 for oil level hole location). Refer to the chart below for the recommended oil type and grade for your application.



All oils must meet MIL-PRF2105E standards. Substitution from a reputable manufacturer is allowed as long as type and grade are maintained.

OIL LEVELS


GEARBOX
FILL/VENT
GEARBOX
OIL LEVEL
RUFNEK
GEARBOX
OIL DRAIN

MAINTENANCE CONTINUED
BRAKE ADJUSTMENT

This brake uses a one way cam clutch (49) allowing free spooling in the in-haul direction and engages in the payout direction. To increase the brake torque, follow the steps listed below.

1. Loosen the locknut (53).

2. Increase the brake torque by turning the adjusting screw (52) clockwise.

3. Tighten the locknut (53) after the brake adjustments are completed.

The brake should be adjusted to hold no more than the winch rating. If the brake does not respond to adjustment, the brake must be disassembled and inspected per brake disassembly section of this manual.

⚠ CAUTION

Excessive brake torque can cause over heating and premature wear.

DISASSEMBLY
BRAKE DISASSEMBLY

1. Remove the bottom plug (34) to drain the oil.

2. Loosen the locknut (53) and brake adjusting screw (52) to reduce spring force on brake housing (45).

3. Remove the capscrews (56) from the brake housing (45).

4. Remove the brake housing (45), thrust washer (51), and spring (50) from the gearbox.

5. Remove the stator plates (48), friction discs (47), brake hub (46), spacer (55), and cam clutch (49) from the worm (30).

NOTICE

Make sure to note the direction that the cam clutch and brake hub are installed. They must be re-installed the same way.

6. Inspect parts as follows, replace if necessary:

   A. Inspect the friction discs (47) for excessive wear. Friction discs should measure no less than .065-in thick.

   B. Inspect the flat surfaces of the brake hub (46), stator plates (48), and thrust plate (51) for warpage, excessive wear, or other damage.

   C. Examine the spring (50) for any discoloration.

   D. The cam clutch (49) should be free of any debris and have all rollers intact. If cam clutch needs to be replaced, a new cam clutch should be carefully pressed into the brake hub (46).

CLUTCH AND DRUM DISASSEMBLY

1. Remove the four capscrews (12), nuts (15), and washers (16) attaching the end bracket (1) to the frames (13).

2. Remove the end bracket (1), lever assembly (17), sliding clutch (24), and keys (14) from the output shaft (3).

3. Remove the thrust washer (27).

4. With the support of a hoist, remove the drum (2).

5. Inspect parts as follows, replace if necessary:

   A. Inspect the bushing (19) in the end bracket (1) for excessive wear.

   B. Inspect the lever assembly (17), sliding clutch (24), keys (14), and thrust washer (27) for excessive wear. See page 14 for clutch inspection.

   C. Inspect the bores of the drum (2) for excessive wear or damage.

   D. Check the drag brake (8) for excessive wear.

   E. Inspect the oil seal (25) for any leaks.

GEARBOX DISASSEMBLY

1. Remove the brake from the gearbox. See brake disassembly section of this manual.

2. Remove either the motor (23) or the end cap (58) (depending on type of drive) by removing two capscrews (38).

3. Remove the snap ring (32) from the brake end of the worm.

4. From the brake end, push the worm while rotating it in order to remove the worm from the gearbox.

5. Remove the cover (6) from the gearbox by removing the four capscrews (11).

6. Remove the thrust washer (27) and gear (29).

NOTICE

If the bushing in the gearbox needs to be replaced, a complete teardown is necessary.

7. Inspect parts as follows, replace if necessary:

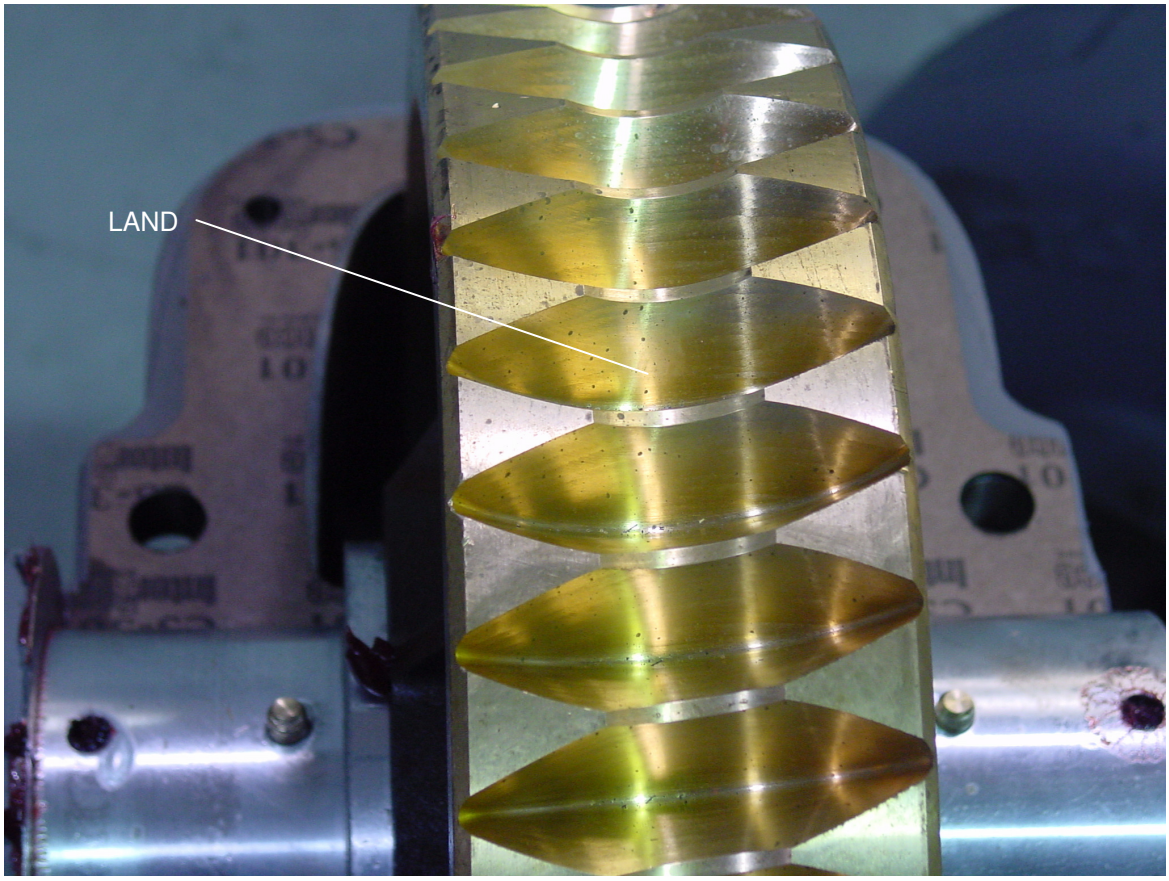
   A. Inspect the worm (30) for excessive wear, signs of heat checking, or cracks.

   B. Inspect the bearings (33) for excessive wear or damage.

   C. Inspect the thrust washers (27), bushing (26), and gear (29) for excessive wear.

   D. Inspect the keys (28) and output shaft (3) for damage.

GEAR INSPECTION INSTRUCTIONS



Check gear wear by removing the cover and visually inspecting the bronze gear. If the gear is worn such that there is no visible land on the throat of the gear between the gear flanks as shown in picture above the gear should be replaced.

ASSEMBLY

GEARBOX ASSEMBLY

1. Install the bushings (26) into the gearbox (4) and cover (6).

2. Install the thrust washer (27) and keys (28) onto the output shaft (3). Slide the gear (29) over the keys (28) and against the thrust washer (27). Slide the other thrust washer (27) onto the output shaft (3).

3. Install the cover (6) using the four capscrews (11), being careful not to damage the o-ring (10).

4. Install one bearing (33) and retaining ring (32) onto the end of the worm (30), then install the worm (30) into the gearbox (4) engaging the gear (29) as you push it through. Once the worm (30) is in place, install the other bearing (33) and retaining ring (32) onto the worm (30).

5. If your winch uses mechanical input, install a new oil seal (59) into the end cap (58). Install the end cap with two capscrews (38).

6. If your winch uses a hydraulic motor. Install the motor (23) and o-ring (35).

7. Fill to the proper oil level with the recommended lubricant. See maintenance section of this manual on page 6.

BRAKE ASSEMBLY

1. Insert the following parts into the brake housing (45) in this order:

    - Thrust washer (51)
    - Spring (50)
    - Stator plate (48)
    - Friction disc (47)
    - Cam clutch/brake hub assembly (46,49)
    - Friction disc (47)
    - Stator plate (48)
    - Brake spacer (55)
    - Gasket (21)

2. Install the brake assembly onto the gearbox (4) with two capscrews (56).

3. Tighten the brake adjustment screw (52) until tension from the spring (50) is felt. See brake adjusting section of this manual.

    NOTICE

    Factory preset is 8 ft/lbs @ worm input

4. Fill to the proper oil level with the recommended lubricant. See maintenance section of this manual on page 6.

CLUTCH AND DRUM ASSEMBLY

1. If necessary, replace the oil seal (25) in the gearbox (4)

2. Place some grease into the pockets located on the back of the gearbox (4) and install the springs (9) and drag brakes (8). The grease should hold them in place.

3. Grease the inside of the drum bore and the output shaft. Install the drum (2) and thrust washer (27) onto the output shaft (3).

4. Install the sliding clutch (24), lever (17), and end bracket (1).

5. Attach the end bracket (1) to the frames using four capscrews (12), nuts (15), and washers (16).

6. Install the plug (34) into the bottom of the gearbox (4). Fill to the proper oil level with the recommended lubricant (see page 6 of this manual).

TROUBLESHOOTING

FAILURE	PROBABLE CAUSE
Clutch handle won't latch	a) Clutch jaws aren't aligned. Align the jaws by rotating drum. b) Damaged yoke or linkage. Replace damaged parts.
Oil leaks from housing	a) Seal damaged or worn. Replace the seal(s). b) Too much gearbox oil. Drain excess oil.
Load drifts down	a) Oil-cooled brake out of adjustment or worn. Adjust brake until load doesn't drift. Replace the parts as required.
Winch runs too slow	a) Low flow rate. Check the flow rate and increase if necessary. b) Hydraulic motor worn out. Replace the motor.
Cable drum won't free spool	a) Winch not mounted squarely. Check mounting and confirm that the winch is mounted on a flat surface. b) Clutch not disengaged. Disengage the clutch.
Cable birdnests when clutch is disengaged.	a) Drag brakes are worn. Replace the drag brakes.
Hydraulic fluid leaks from the gearbox	a) Damaged motor shaft seal. Replace the seal.
Winch won't pick up heavy loads.	a) Too much cable on the drum. Use the snatch block or remove some cable from the drum. b) System pressure too low. Increase the hydraulic system pressure. c) Winch not broke-in. Run winch at half of rated load for several pulls.

RUFNEK 10 BILL OF MATERIAL

81276001-BOM SEPTEMBER 2005

ITEM	QTY	P/N	DESCRIPTION
1	1	41207	END BRACKET
2	1	41190	DRUM
3	1	41193	OUTPUT SHAFT
4	1	41188	HOUSING
5	1	12208	BUSHING
6a	1	44046	RUFNEK 10W COVER
6b	1	41192	MODEL 1138 COVER
7	1	23582	SET SCREW
8	3	25692	DRAG BRAKE
9	3	25774	SPRING
10	1	40547	O-RING
11	4	40407	CAPSCREW
12	8	10381	CAPSCREW
13	2	41197	FRAME
14	2	25762	KEY
15	8	20521	NUT
16	8	20518	LOCKWASHER
17	1	4069	LEVER ASSEMBLY
17-1	1	41185	YOKE
17-2	1	20296	PIN
17-3	1	20299	SPRING
17-4	1	20304	PIN
17-5	2	33786	FLAT WASHER
17-6	1	20723	BRACKET
17-7	1	20116	PIN
17-8	2	24724	RETAINING RING
18	--	--	OMIT
19	1	41238	BUSHING
20	--	--	OMIT
21	2	40147	GASKET
22	1	13050	BREATHER
23	1	40121	HYDRAULIC MOTOR
24	1	20712	CLUTCH
25	1	11637	OIL SEAL
26	2	41196	BUSHING
27	3	40510	THRUST WASHER
28	2	40518	KEY
29	1	41198	GEAR
30a	1	40598	WORM (HYDRAULICALLY DRIVEN)
30b	1	40635	WORM (MECHANICALLY DRIVEN)
31	--	--	OMIT
32	2	40396	RETAINING RING
33	2	40395	BEARING
34	2	32220	PLUG

RUFNEK 10 BILL OF MATERIAL CONTINUED						
35		1		32566		O-RING
36		--		--		OMIT
37		--		--		OMIT
38		2		40410		CAPSCREW
39		2		20270		CAPSCREW
40		2		20271		NUT
41		2		20526		LOCKWASHER
42		1		41244		C.T.O. HANDLE
43		1		41250		HANDLE GRIP
44		1		21128		GREASE ZERK
45		1		40069		BRAKE HOUSING
46		1		40617		BRAKE HUB
47		2		40075		FRICTION DISC
48		2		40076		STATOR PLATE
49		1		40113		CLUTCH CAM
50		1		40077		SPRING
51		1		40078		THRUST WASHER
52		1		40775		SET SCREW
53		1		40774		LOCKNUT
54		1		29044		WASHER
55		1		40599		BRAKE SPACER
56		2		40546		CAPSCREW
57		--		--		OMIT
58		1		40082		END CAP
59		1		20232		OIL SEAL
60		1		20105		KEY
61		1		20092		WASHER
62		1		20278		CAPSCREW
63		1		44024		RUFNEK PLATE

Tulsa Winch

TORQUE SPECIFICATIONS CHART

		Dry	Plated	Lubricated	Dry	Plated	Lubricated
		SAE Grade 5	SAE Grade 5	SAE Grade 5	SAE Grade 8	SAE Grade 8	SAE Grade 8
Nominal	Size	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	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.) **T = (KWD) / 12**

K = TORQUE COEFFICIENT (K **= 0.20 DRY** **K = 0.15 PLATED** **K = 0.12 LUBRICATED)**

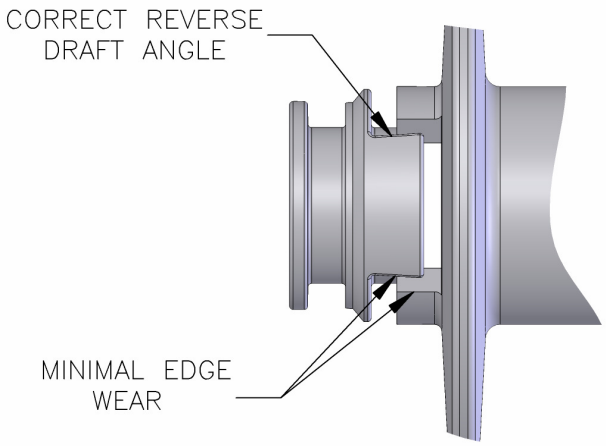
W = PRELOAD TENSION

D = NOMINAL BOLT SIZE (IN.) *** ALL TORQUE VALUE TOLERANCES ARE ± 5%**

CLUTCH INSPECTION

GOOD

THIS PICTURE ILLUSTRATES A SLIDING & DRUM CLUTCH WITH THE PROPER REVERSE DRAFT AND MINIMUM EDGE WEAR

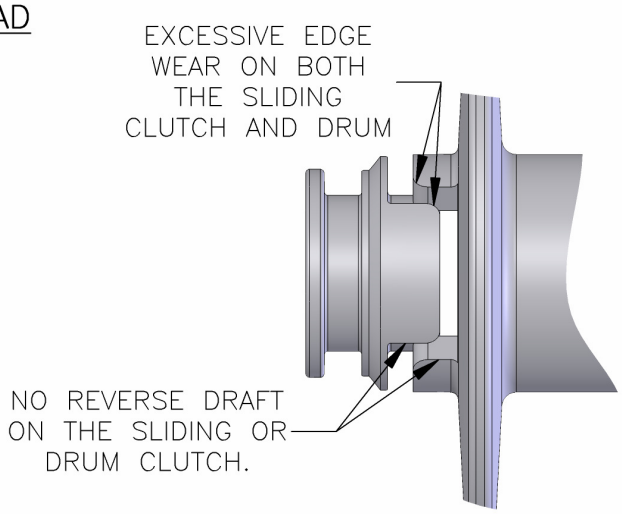


BAD

⚠ WARNING

THE REVERSE DRAFT ENSURES THE CLUTCH STAYS ENGAGED DURING PAY–IN.

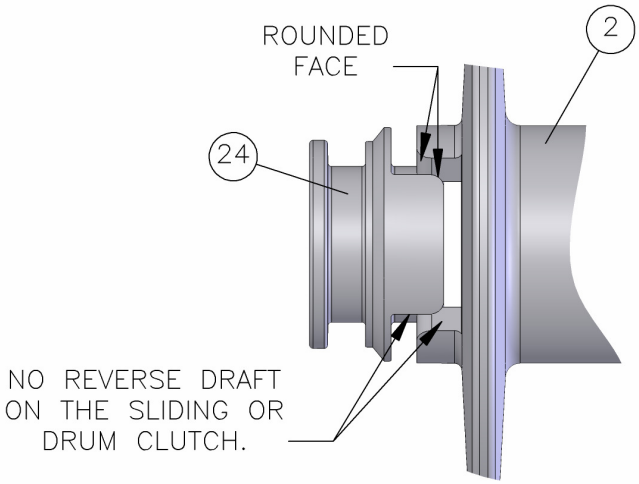
WITHOUT THE CORRECT DRAFT, THE CLUTCH COULD DIS–ENGAGE UNPREDICTIBLY.



CLUTCH REPLACEMENT CRITERIA

NOTICE

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.



RUFNEK 10 ISOMETRIC DRAWING