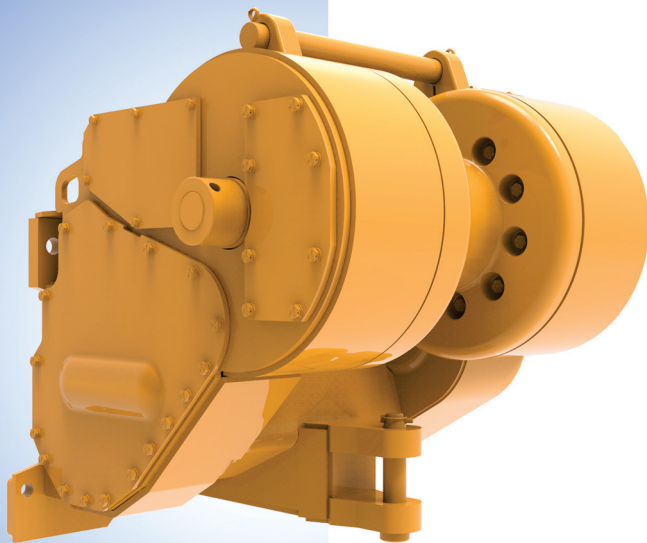




Service Manual



Allied W6F

Power Controlled Towing Winch

Please check the Allied Systems website
regularly for updates to this manual.
www.alliedsystems.com

CUSTOMER EDITION

A PRODUCT OF
Allied Systems
COMPANY

SHERWOOD, OREGON USA

P/N 599032W

Printed in U.S.A.

06/15/2016

Safety Precautions

Read, understand and observe the precautions on the following pages to prevent injury to personnel and damage to equipment.

Winch serial number _____

Date put into service _____

**NOTE: This publication may be translated to different languages for sole purpose of easy reference in non-English speaking locations.
Should there be differences in interpretations to the text,
please refer to the English language edition published by Allied Systems Company as the controlling document.**

Safety Summary

General Safety Notices

The following pages contain general safety warnings which supplement specific warnings and cautions appearing elsewhere in this manual. All electrical and hydraulic equipment is dangerous. You must thoroughly review and understand the Safety Summary before attempting to operate, troubleshoot or service this winch.

The following symbols and terms are used to emphasize safety precautions and notices in this manual:

DANGER

The “**DANGER**” symbol indicates a hazardous situation which, if not avoided, will result in serious injury or death. Carefully read the message that follows to prevent serious injury or death.

WARNING

The “**WARNING**” symbol appears wherever incorrect operating procedures or practices could cause serious injury or death. Carefully read the message that follows to prevent serious injury or death.

CAUTION

The “**CAUTION**” symbol appears where a hazardous situation which, if not avoided, could result in minor to moderate injury and equipment damage.

NOTICE

This signal word alerts to a situation that is not related to personal injury but may cause equipment damage.

NOTE: ...

The term “**NOTE**” highlights operating procedures or practices that may improve equipment reliability and/or personnel performance.

NOTE: All possible safety hazards cannot be foreseen so as to be included in this manual. Therefore, you must always be alert to potential hazards that could endanger personnel and/or damage the equipment.

Safety Regulations

Each country has its own safety legislation. It is in the operator’s own interest to be conversant with these regulations and to comply with them in full. This also applies to local bylaws and regulations in force on a particular work site.

Should the recommendations in this manual deviate from those in the user’s country, the national regulations should be followed.

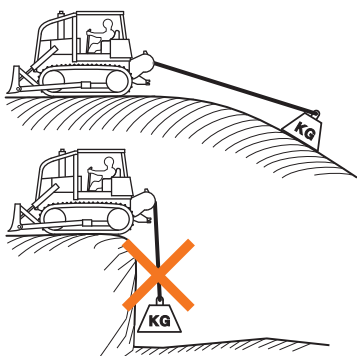
Operation, Inspection, and Maintenance Warnings

WARNING

Obey the following cautions and warnings before using your winch to avoid equipment damage, personal injury or death.

- Do not operate the winch unless you are authorized and trained to do so.
- Do not operate the winch unless the vehicle is equipped with a screen to protect the operator if the wire rope breaks.
- Read, understand, and follow the operating, inspection, and maintenance instructions in this manual.
- Do not use the control levers for hand holds when entering or leaving the vehicle.
- Do not permit other people near the control area when you inspect or repair a machine.
- Never inspect, repair, or perform maintenance on a machine that is in motion.
- Inspect the winch before each use:
 - » Make sure that the controls and instruments operate correctly.
 - » Report the need for repairs immediately.
 - » Do not work with a damaged or worn wire rope.
 - » Do not use a winch that needs repairs.
- » If the wire rope and ferrule must be removed from the drum, make sure the end of the wire rope and ferrule are controlled when the ferrule is released. The end of the wire rope can suddenly move from the drum like a compressed spring when the ferrule is released, and cause an injury.

- Stay in the operator's seat when operating the winch.
- Do not stand on the vehicle when operating the winch.
- Avoid winch operation near people or other machines.
- Never stand nor permit others to stand in the bight (loop) of a wire rope.
- Do not stand nor permit others to be near the winch or wire rope when there is tension on the wire rope.
- Observe job site rules.
- Be in complete control at all times.
- Do not use the control levers as hangers for clothes, water bags, grease guns, lunch pails, etc.
- Do not leave the vehicle when the winch wire rope is under tension.
- Do not permit riders on the vehicle or load.
- Do not use the winch as an anchor for a double or two-part line.
- Do not pull the hook through the throat or over the drum, which will cause damage.
- When the winch is not in use, make sure the control lever is in **BRAKE-ON** position and the winch brake is applied.
- Do not use winch as a hoist. Tractor and skidder mounted winches are designed for towing.



- Always inspect wire rope, tail chain and other rigging components for wear, damage, broken strands or abuse before use.
- Never use wire rope, tail chain or other rigging that is worn-out, damaged or abused.

- Never overload wire rope, tail chain or rigging.
- Wire rope and tail chain will fail if worn-out, overloaded, misused, damaged, improperly maintained or abused. Wire rope or tail chain failure may cause serious injury or death!



- Do not terminate wire rope to tail chain by the use of a knot.
- Do not handle wire rope if the hook end is not free. A load could break away, suddenly tensioning the wire rope, resulting in serious injury or death.
- Stay clear of wire rope entry areas (fairlead or arch rollers, winch drum etc).
- Make sure ground personnel are in plain view of the operator, and at a distance of at least 1½ times the working length of the wire rope.
- Make sure that any hand signals used by ground personnel are clearly defined and understood by everyone involved.
- Do not attempt to "jerk" or "shock" a load free. Doing so can cause loads in excess of the rated capacity of the wire rope, winch, or mounting hardware.
- Replace any parts only with genuine Allied Winch parts. Refer to Parts Manual 599750W.
- Maintain a **minimum of three (3) complete wraps of wire rope** on the drum for normal operation. It may help to paint the last five (5) wraps of wire rope a contrasting color, to serve as a visual indicator.
- Do not handle wire rope with bare hands. Wear leather gloves at all times.
- Align the tractor with the load to prevent side loading the winch, and to maintain even spooling of the wire rope.

- If applying tension to the wire rope manually during spooling:
 - » ensure that the operator is winching in slowly,
 - » keep your hands and clothing well clear of any rollers or the winch drum,
 - » do not maintain tension by letting the wire rope to slip through your hands,
 - » use a hand-over-hand technique to maintain tension.
- Be aware of the ground conditions, and make sure the ground and tractor are stable enough to pull the intended load.
- Do not attempt to pull loads in excess of the rated capacity of the winch.
- Keep yourself informed of any applicable codes, regulations and standards for the job.
- Your winch may have temperature shut-off system for protection of tractor and winch. Manual override of high temperature shut-off will cause damage to tractor and winch.
- This winch is neither intended, designed, nor rated for any application involved in the lifting or moving of personnel.
- Use only the lubricants listed in the Recommended Oil List. See page 1-7.
- Do not weld on any part of the winch. Contact Allied Systems Company if weld repairs are needed.
- The hydraulic system must be kept clean and free of contamination at all times.
- Be aware of the hazards of pressurized hydraulics:
 - » Wear personal protective equipment, such as gloves and safety glasses, whenever servicing or checking a hydraulic system.
 - » Assume that all hydraulic hoses and components are pressurized. Relieve all hydraulic pressure before disconnecting any hydraulic line.
 - » Never try to stop or check for a hydraulic leak with any part of your body; use a piece of cardboard to check for hydraulic leaks.
 - » Small hydraulic hose leaks are extremely dangerous, and can inject hydraulic oil under the skin, even through gloves.
 - » Infection and gangrene are possible when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.



Ordering Parts:

When ordering replacement parts, give the winch serial number, part number, name of part and quantity required.

For any further information on parts, service or ordering, consult your local winch dealer, or contact Allied Systems Company:

Allied Systems Company
21433 SW Oregon Street
Sherwood, Oregon 97140
U.S.A.

Phone: 503-625-2560
Fax: 503-625-5132
E-Mail: parts@alliedsystems.com

Also see our website, www.alliedsystems.com, where the most current copy of this manual is always available.

Contents

Safety Summary	i	Freespool Cable Adjustments	3-3
		Freespool Drag Adjustment	3-3
Section 1: General	1-1	Hydraulic System Pressure Checks	3-4
Introduction	1-1	Preparation.....	3-4
Description	1-1	Pressure gauges	3-4
Unit Identification	1-2	Brake Pressure Check	3-4
W6F Installation Drawings by Tractor.....	1-5	Cooling Oil Pressure Check.....	3-4
Serial Number Codes.....	1-6	Accumulator Pressure Check.....	3-4
Nameplate	1-6	Forward Clutch Pressure Check and Forward Modulator Valve Check	3-5
Capacities & Specifications	1-7	Reverse Clutch Pressure Check and Reverse Modulator Valve Check	3-5
Recommended Oil List.....	1-7	Hydraulic Systems Pressure Ports & Diagram...	3-6
Approximate Winch Wire Rope Capacities	1-7	Hydraulic Systems Pressure Tests Chart.....	3-7
Oil Capacity.....	1-7	Control Valve Spool Travel Check	3-8
Hydraulic Specifications.....	1-7	Decal, Nameplate & Service Plate Installation	3-9
Winch Torque Specifications	1-8		
Gear Train	1-9	Section 4: Repairs	4-1
Operation and Control	1-10	General	4-1
Freespool Operation	1-11	Winch Removal	4-1
Hydraulic System	1-12	Winch Disassembly	4-1
Forward & Reverse Clutches	1-13	Gear Arrangement.....	4-2
Oil Brake	1-14	PTO Shaft Removal & Disassembly	4-4
Hydraulic Control Valve	1-15	Oil Brake Removal & Disassembly	4-8
Hydraulic Control Relief Valve.....	1-15	Hydraulic Pump Removal & Disassembly	4-12
Hydraulic Pump.....	1-15	Pump Disassembly	4-12
Accumulators	1-16	Pump Inspection	4-13
Accumulator Control Valve	1-16	Pump Gear.....	4-13
Cooling Oil Relief Valve.....	1-16	Pump Front & Backplates.....	4-13
Sequence of Operation - BRAKE-ON	1-17	Pump Body	4-13
Sequence of Operation - LINE-IN	1-18	Clutch Shaft Removal & Disassembly	4-14
Sequence of Operation - LINE-OUT INCHING.....	1-19	Oil Clutch Disassembly.....	4-18
Sequence of Operation - LINE-OUT	1-20	Brake Shaft Removal.....	4-22
Sequence of Operation - BRAKE-OFF	1-21	Intermediate Shaft Removal, Non-Freespool	4-24
		Intermediate Shaft Removal, Freespool	4-26
Section 2: Troubleshooting	2-1	Drum Shaft & Drum Removal.....	4-28
General	2-1	Winch Assembly	4-32
Troubleshooting Analysis Check Chart	2-1	Visual Inspection.....	4-32
Troubleshooting Analysis Check Chart for FREESPOOL Option	2-4	Drum Shaft & Drum Installation.....	4-36
		Intermediate Shaft Installation, Freespool	4-40
Section 3: Service.....	3-1	Intermediate Shaft Installation, Non-Freespool	4-44
General	3-1	Brake Shaft Installation.....	4-46
Maintenance.....	3-1	Oil Clutch Reassembly	4-48
Maintenance Points.....	3-1	Clutch Shaft Reassembly & Installation.....	4-52
Maintenance Schedule	3-1	Hydraulic Pump Reassembly & Installation	4-58
Checks Before Operation.....	3-2	Pump Installation	4-59
Checks During Operation.....	3-2	Oil Brake Reassembly & Installation.....	4-60
Checks and Adjustments, Cable Controls	3-2	PTO Shaft Reassembly & Installation.....	4-64
Control Cable Adjustments	3-2	Winch Installation	4-70
		Special Tools.....	4-72

General

Introduction

This service manual is for the W6F winch. The following information is included in this manual:

Section 1. General includes operation descriptions of systems and components as an aid for troubleshooting and repair.

Section 2. Troubleshooting lists common problems and the possible causes and corrections.

Section 3. Service provides a guide for periodic maintenance, checks and adjustments.

Section 4. Repairs describes the removal, disassembly, assembly, and installation of the winch.

NOTE: This publication may be translated to different languages for sole purpose of easy reference in non-English speaking locations. Should there be differences in interpretations to the text, please refer to the English language edition published by Allied Systems Company as the controlling document.

Description

The W6F Winch is a Power Forward (**LINE-IN**) and Power Reverse (**LINE-OUT**) winch used on tractors with a constant running power takeoff (PTO). The winch utilizes a Self Contained Hydraulic (SCH) system where all hydraulic power is produced internally inside the winch case. The design of the winch case permits different arrangements of PTO gear assemblies to fit different tractors that use these winches. (See Section 4 for the PTO gear assemblies.)

The W6F winch has a **BRAKE-OFF** function, which permits the wire rope to be pulled from the drum. A **FREESPOOL** function is also available.

The W6F winch has a rated line pull capacity of 266,880 N (60,000 lbf) when there is one layer or less of wire rope on the drum. In certain situations, the winch will generate more line pull and can break the wire rope, rigging or the winch.

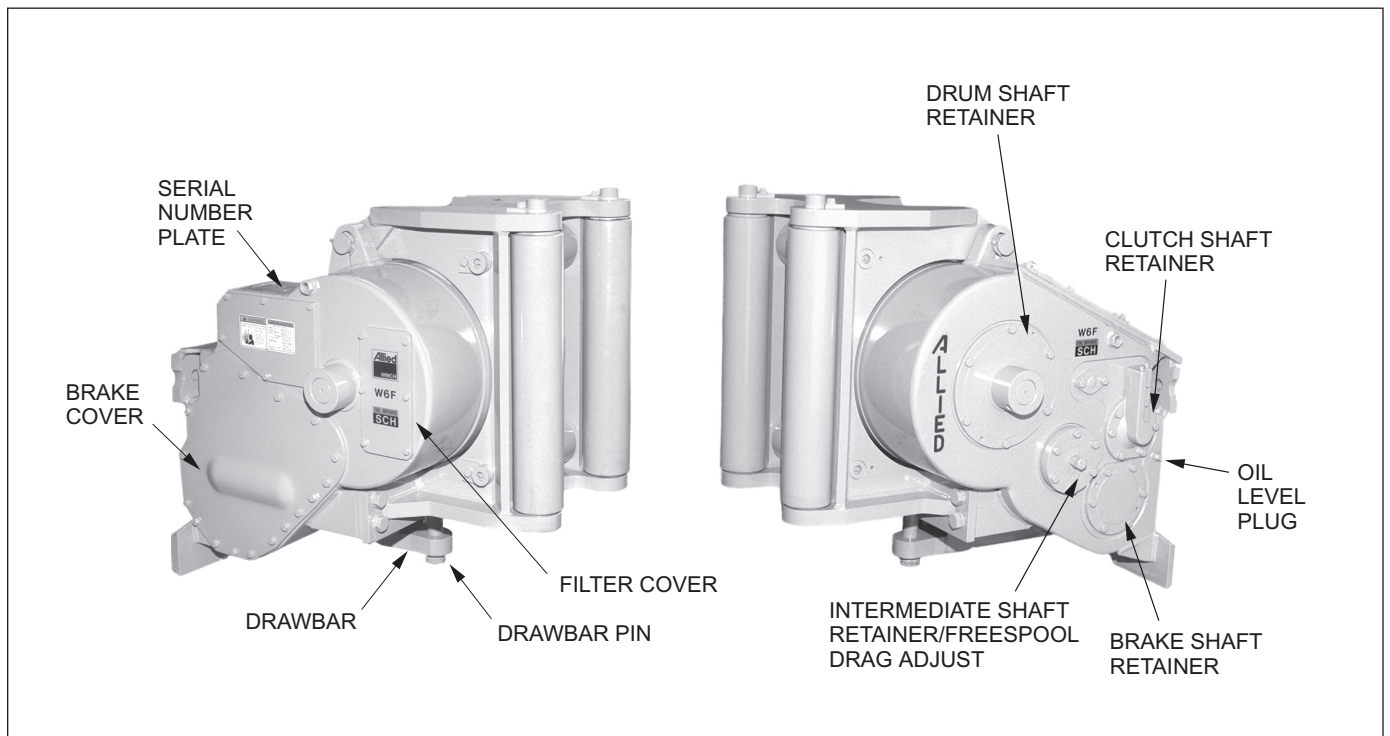


Figure 1-1 Model Views (Winch Shown with Optional Fairlead Installed)

Unit Identification Allied Winch S/N Nameplate Data For Tractor Mountings

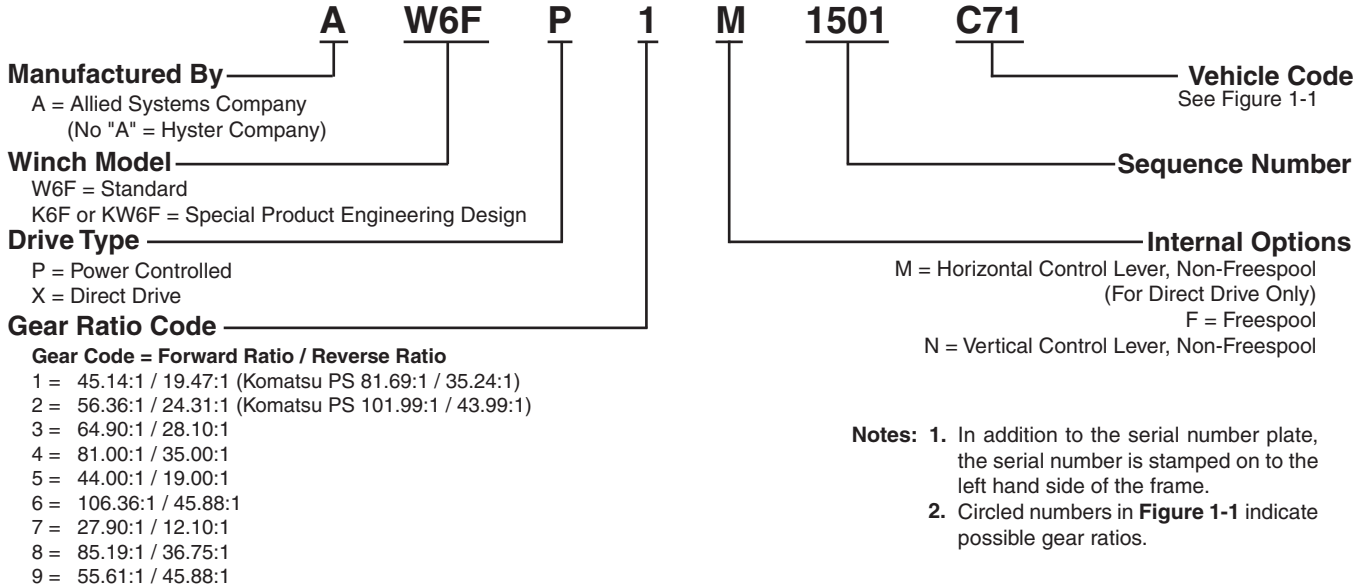


Figure 1-1 Tractor Identification and Gear Ratio_1

Tractor Make Model and Starting Tractor Serial Number Where Applicable											
C O D E	A New Holland/ Fiat-Hitachi	C Caterpillar	E John Deere	H International, Dresser, Dressta	K Komatsu	L Liebherr	M MF	N Zoomlion	R Case	U Shantui	X Xuanhua
32			750/750B, 755 W/CAB ③ ④ ⑥ ⑧								
40		527 ① ② ⑥ ⑧ ⑨				732B ⑥ ⑧					
41	11B PS ①	D5B 24X 25X D5E PS 95J 96J ① ② ④	750/750B, 755 W/O CAB ③ ④ ⑥ ⑧	TD15B/C PS, 175C ① ② ④ ⑥ ⑧ ⑨	D60E-6, D60E-8, D60LE-8, D70LE ② ③ ④ ⑥ ⑧		D600C/D ①	1550 ② ③ ④ ⑥ ⑧ ⑨			T150F ① ② ⑥ ⑧
42	11B DD ①	D5B D53-DD 22X 23X 26X ① ② ④	850/850B W/ CAB ⑥ ⑧ ⑨	TD15BG DD, 501 ① ② ④	D65A/E6 D65E-7 ① ② ④						
43	12G ①	D6D PS 3X 4X 5X 10X 76A, D6E PS ① ② ④ ⑥ ⑧ ⑨	850/850B W/O CAB ② ③ ④ ⑥ ⑧ ⑨	250C/E ① ② ④ ⑥ ⑧ ⑨	D65S-6 ①						
44	FL 14B, 14B PS, 14C ①	D6D DD 3X 5X 74A 99J, D6E DD ① ② ④ ⑥ ⑧	855 ①	TD15E PS ① ② ④ ⑥ ⑧ ⑨	D75S-3 ①						

Unit Identification Allied Winch S/N Nameplate Data For Tractor Mountings

Figure 1-1 Tractor Identification and Gear Ratio_2

Tractor Make Model and Starting Tractor Serial Number Where Applicable											
C O D E	A New Holland/ Fiat-Hitachi	C Caterpillar	E John Deere	H International, Dresser, Dressta	K Komatsu	L Liebherr	M MF	N Zoomlion	R Case	U Shantui	X Xuanhua
45	14B 14C DD FD14 ①②③	977 ①②④ ⑥⑧⑨	750C, 750C II ⑥⑧	TD15E DD ①② ④⑥⑧	D65-8, D65E-8 D68-1 ①②						
46	F/H14C FD14 ①②③ ⑥⑧⑨	977L ①②④	850C, 850C II PS ②⑥ ⑧⑨	TD15H ⑥⑨	D65E-12 D65EX-12 D65EX-15 D65PX-12 D65PX-15 ①②			ZD160 ⑥⑧⑨		SD16 ①	
462			850J & K ⑥⑧⑨								
464			750J & K ⑥⑧⑨								
47	F/H10C F/H10C PS ①②③ ⑥⑧⑨			TD15H- TIER II, TD15M ⑥⑨	D61EX-12 ①②						
470		D5R2 ①②④ ⑥⑧⑨									
48	FD14E, FD175, DX175, DX195L ①② ⑥⑧⑨	D6H*, D6R* ①②④ ⑥⑧⑨									
480		D6H* D6R PS ①②④ ⑥⑧⑨									
481		D6H DD ①②④ ⑥⑧⑨									
49	New Holland DC-180 ⑥⑧⑨								1850K ⑥⑧⑨		

Unit Identification Allied Winch S/N Nameplate Data For Tractor Mountings

Figure 1-1 Tractor Identification and Gear Ratio_3

Tractor Make Model and Starting Tractor Serial Number Where Applicable											
C O D E	A New Holland/ Fiat-Hitachi	C Caterpillar	E John Deere	H International, Dresser, Dressta	K Komatsu	L Liebherr	M MF	N Zoomlion	R Case	U Shantui	X Xuanhua
50		D6R* ⑥ ⑧ ⑨									
71		D6R II, III; D6T ⑥ ⑧ ⑨									
711		D6R2 ⑥ ⑧ ⑨ S/N's PPP, SSS, TTT									
73		D6G ⑥ ⑧ ⑨									
82		D6G2 ⑥ ⑧ ⑨									
<p>* D6H and D6R have separate tractor codes after winch serial number AW6F-4442. See Tractor code C71 for D6R Series II.</p>											

Figure 1-3 List of Installation Drawings

W6F INSTALLATION DRAWINGS BY TRACTOR

Winch Serial Number	Description	Installation Drawing Part Number
Power Control		
W6FP**A46	W6F FIAT 14C & FD14	286047W
W6FP**A47	W6F FIAT 10C	335455W
W6FP**A48	W6F F/H FD14E & FD175	1321652W
W6FP**A49	W6F NEW HOLLAND DC-180	2304802W
W6FP**C40	W6F CAT 527	2302314W
W6FP**C43	W6F CAT D6D PS	282143W
W6FP**C46	W6F CAT 977L	300643W
W6FP9FC470	W6F CAT D5R2	2314960
W6FP**C480	W6F CAT D6 H/R PS	383151W
W6FP**C481	W6F CAT D6 H/R PS	383151W
W6FP**C49	W6F CAT D6 H/R PS	383171W
W6FP**C50	W6F CAT D6R	383151W
W6FP**C71	W6F CAT D6R SERIES II & III, D6T	383151W
W6FP**C711	W6F CAT D6R2, S/N PREFIXES PPP, SSS & TTT	2315800
W6FP**C73	W6F CAT D6G	2307251W
W6FP**C82	W6F CAT D6G2	2310210
W6FP**E41	W6F JD750B	225099W
W6FP**E42	W6F JD850B	225099W
W6FP**E43	W6F JD850B	225099W
W6FP**E44	W6F JD750B	225099W
W6FP**E45	W6F JD750C	2301767W
W6FP**E46	W6F JD850C	2301767W
W6FP9FE462	W6F JD 850 J&K	2313837
W6FP9FE464	W6F JD 750 J&K	2313837
W6FP**H41	W6F DRESSER TD15C	268495W
W6FP**H44	W6F DRESSER TD15E PS	373649W
W6FP**H45	W6F DRESSER TD15E DD	373649W
W6FP**H46	W6F DR TD15H PS	373649W
W6FP**H47	W6F DRESSER TD15H TIER II, TD15M	373649W
W6FP**K45	W6F KOM D65-1/D65-8	347001W
W6FP**K46	W6F KOMATSU D65EX-12	2300314W
W6FP**K47	W6F KOMATSU D61EX-12	2303690W
W6FP**L40	W6F LIEBHERR 732 B	2304895W
W6FP**N46	W6F ZOOMLION ZD160	2315525
W6FP**R41	W6F CASE 1550	1310781W
W6FP**R49	W6F CASE 1850K	2304802W
W6FP1FU46	W6F SHANTUI SD16	2313557
Direct Drive		
W6FX**C44	W6FDD CAT D6D DD	281940W
W6FX**K41	W6FDD KOM D60-6 OR -8	226642W
W6FX**X41	W6FDD XUANHUA T150F	2302178W
W6FX**CX1	W6FDD Cat 955L Traxcavator (Similar to D6D with FA drop box)	SKS 6403-18

Notes: 1. This list is for operators to keep track of necessary information of their winch installation drawings by tractors.

2. If any of the installation drawings listed above is needed, please contact the Service Department of Allied Systems Company at 503-625-2560.

Serial Number Codes

The serial number codes are described on pages 1-2 through 1-4 of this manual. The nameplate with the serial number code is found on the top left hand side of the winch case. The serial number code is also stamped on the left hand side of the winch frame.

Nameplate

Each winch is shipped from the factory with a nameplate as shown in Figure 1-4. The nameplate is stamped with:

- winch model
- winch serial number
- maximum bare drum line pull
- maximum wire rope diameter

DO NOT operate the winch with larger diameter wire rope. If the nameplate is missing, DO NOT operate the winch until its capacity is known.

The serial number for the winch is also stamped into the frame next to the nameplate.



Figure 1-4 Nameplate

Capacities and Specifications

Recommended Oil List

Recommended Oils* - General Conditions			
Manufacturer	Oil Type	Ambient Temperature Range	
		°F	°C
ExxonMobil	Mobil Fluid 424 (Factory fill)	-13 to 105	-25 to 43
John Deere	Hy-Gard™	-13 to 122	-25 to 50
Chevron	1000 THF	-13 to 105	-25 to 43
Caterpillar	Multipurpose Tractor Oil (MTO)	-13 to 104	-25 to 40
Case	Hy-Tran Ultra	-20 to 122	-30 to 50

Recommended Oils* - Low Temperature Conditions			
Manufacturer	Oil Type	Ambient Temperature Range	
		°F	°C
ExxonMobil	Mobil Fluid LT	-40 to 86	-40 to 30
John Deere	Low Viscosity Hy-Gard	-40 to 86	-40 to 30
Chevron	THF W	-40 to 86	-40 to 30

* Note: Use of non-recommended oils may void warranty.

Figure 1-5 Recommended Oil List

Approximate Winch Wire Rope Capacities

Wire Rope Diameter	Capacity for 254 mm (10 in) Drum Diameter	Capacity for 178 mm (7 in) Drum Diameter
19 mm (3/4 in)	113 m (307 ft)	129 m (425 ft)
22 mm (7/8 in)	89 m (293 ft)	93 m (305 ft)
25 mm (1 in)	63 m (206 ft)	72 m (237 ft)

NOTE: Loosely or unevenly spooled line will change capacities. Use flexible wire rope with independent wire rope center.

Figure 1-6 Drum Line Capacities

Oil Capacity

Winch Model	Oil Capacity
W6FP - Standard	16.5 Gal (62.5L)
W6FP - with Dropbox	17 Gal (64.5L)

Figure 1-7 Oil Capacity

Hydraulic Specifications

Pump Gear Type
 10-13 gpm (38-50 l/min) at 1000 rpm
 Operating pressure.....225 psi (1,550 kPa)
 Valve.....One Spool
 Filters..... Full flow magnetic strainer
 20 micron paper cartridge

Winch Torque Specifications

**NOTE: Unless otherwise specified, torque Grade 5:
1/2 UNC to 50 ft-lbs (7 kg-m)
3/8 UNC to 25 ft-lbs (4 kg-m)**

NOTE: All torque values given with threads lubricated.

ITEM	W6F	
	ft-lbs	kg-m
PTO Shaft Assembly Bearing Carrier Capscrews	75	10
Clutch Shaft Assembly Bearing Retainer Capscrews Bearing Locknut	75 200	10 28
Pump Mounting Capscrews	25	4
Brake Shaft Assembly Bearing Retainer Capscrews	75	10
Intermediate Shaft Assembly Bearing Retainer Capscrews	75	10
Freespool Shift Shaft	75	10
Drum Shaft Assembly RH Bearing Retainer Capscrews Drum Gear to Adapter Capscrews Drum Shaft Nuts Drum to Adapter Capscrews	75 90 400 220	10 12 55 30
Clutch Assembly Clutch Piston Housing Capscrews Clutch Piston Housing Setscrews	70 40	10 6
Brake Assembly Cover Nuts	130	18
Control Valve Mounting Capscrews	50	7
Winch Mounting to Tractor	See Installation Drawings	

Figure 1-8 Torque Specifications

Gear Train (See Fig. 1-9 & 1-10)

Torque transfer during operation is shown in Figure 1-10.

The gear train (Figure 1-9) consists of:

1. a PTO shaft assembly
2. a clutch shaft assembly
3. a brake shaft assembly
4. an intermediate shaft assembly; and
5. a drum shaft assembly

NOTE: PTO rotation direction is determined by standing behind tractor and looking forward at the PTO shaft entering the winch case.

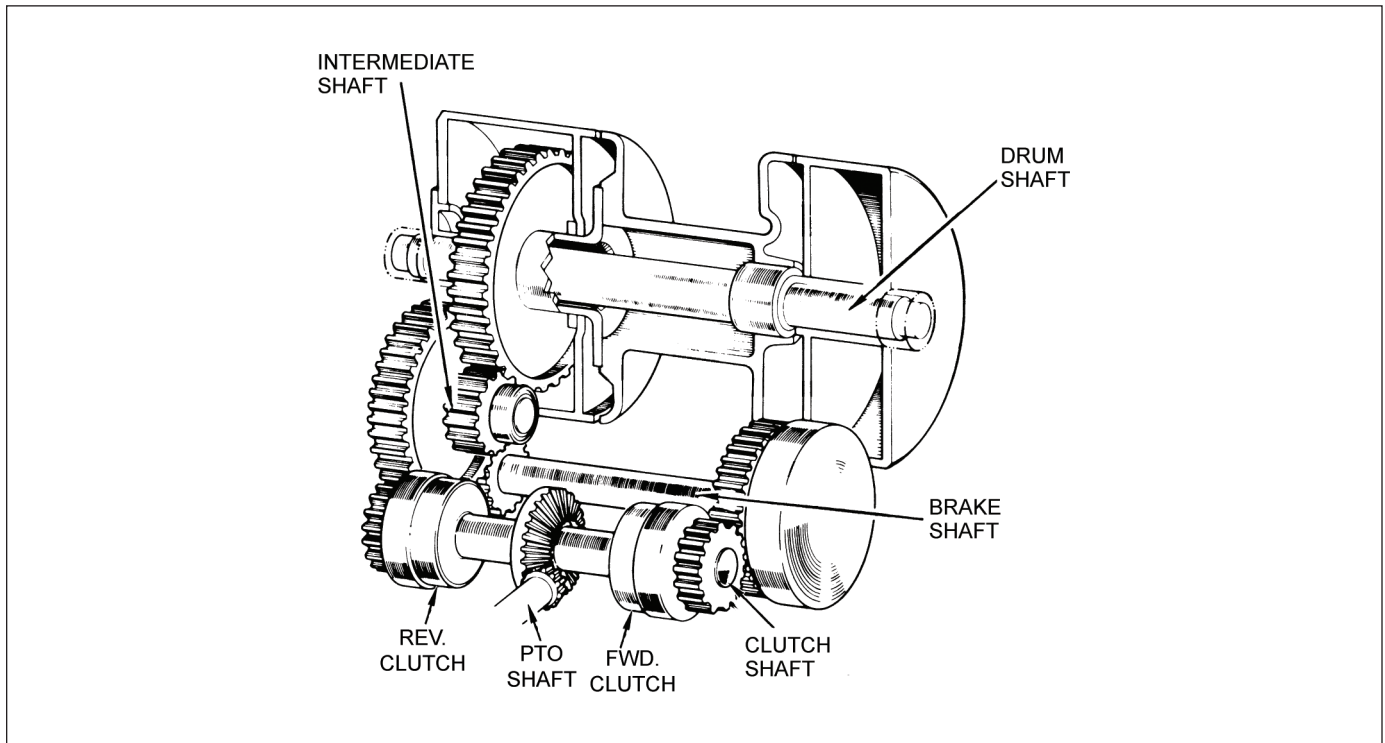


Figure 1-9 Gear Train

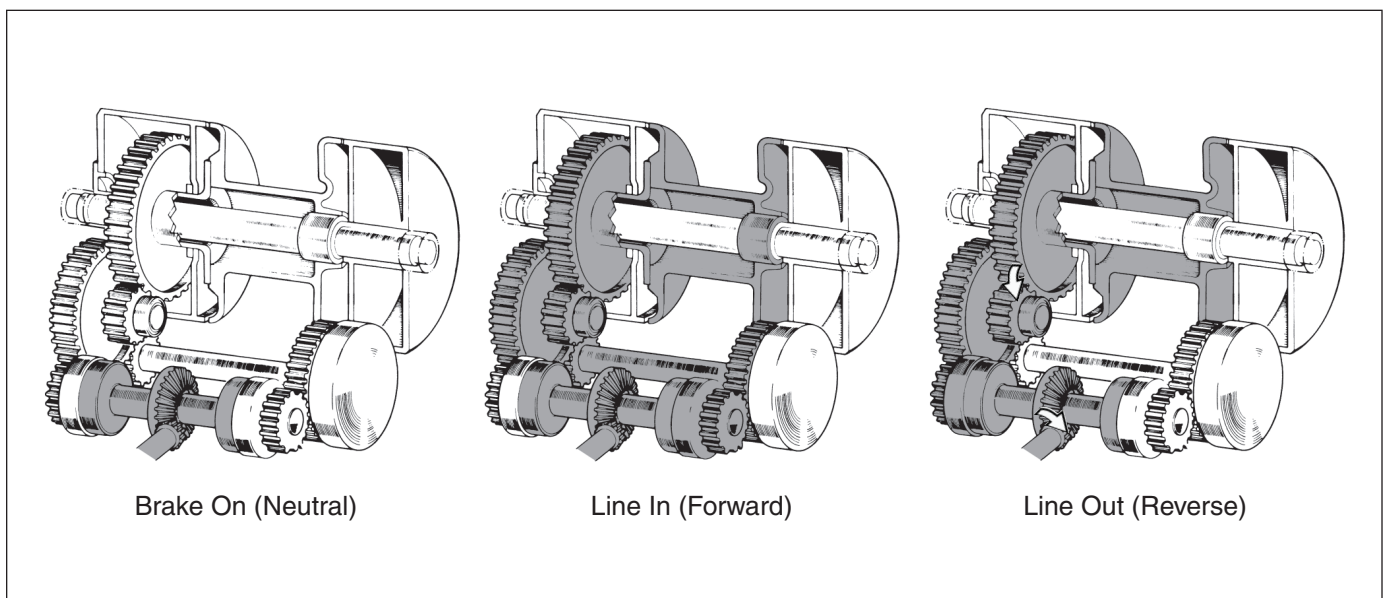
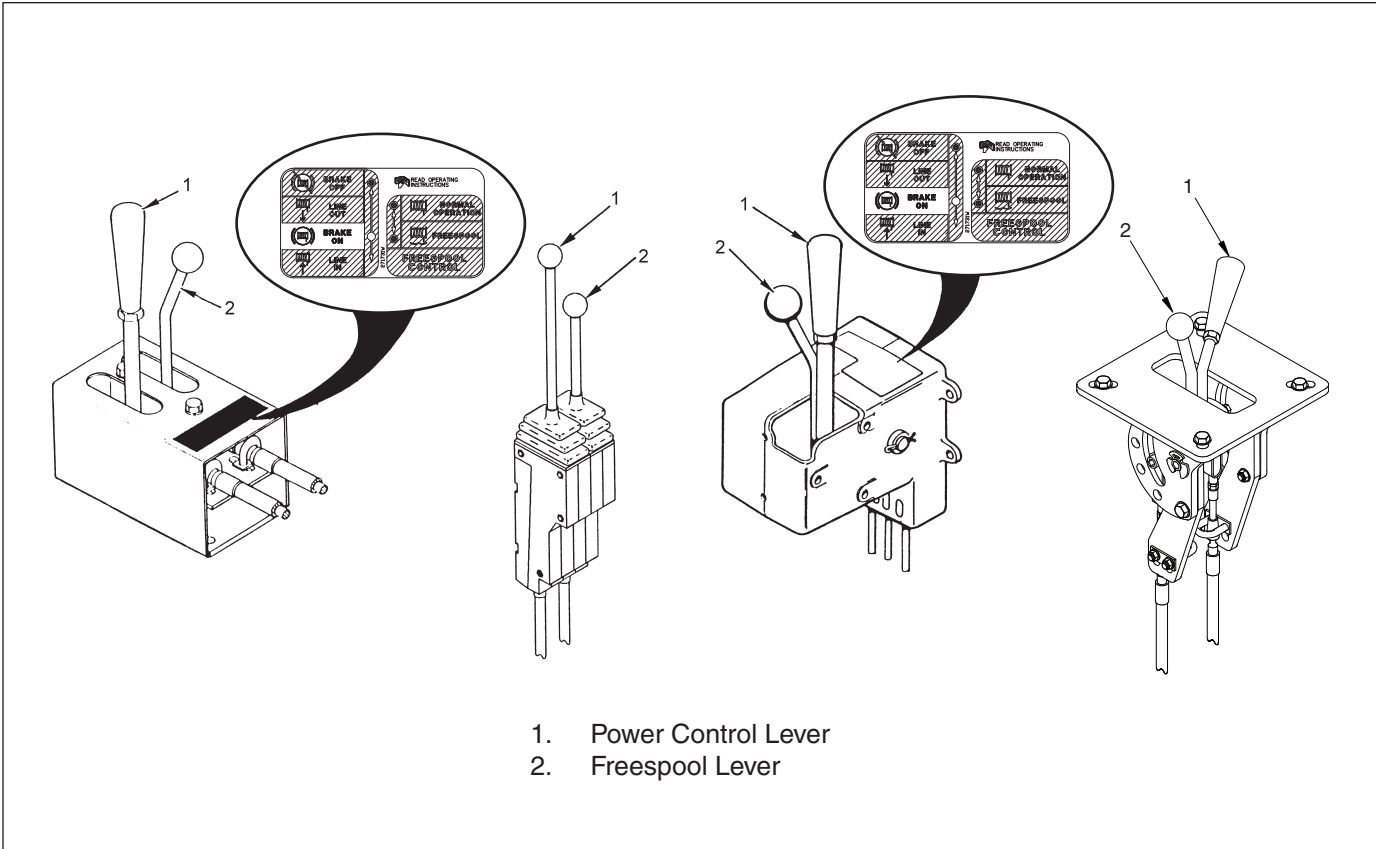


Figure 1-10 Gear Train Rotation Torque Transfer



1. Power Control Lever
2. Freespool Lever

Figure 1-11 Typical Winch Controls

Operation and Control (See Fig. 1-11)

The control lever assembly has a power control lever for winch control (See Fig 1-11). If the winch does not have the **FREESPOOL** function, the second control lever is not used. Both control levers are connected to the winch through control cables. The power control lever is connected to the spool in the control valve. The power control lever is used to select one of the following operations:

- BRAKE-OFF**
- LINE-OUT**
- BRAKE-ON**
- LINE-IN**

Except for the **BRAKE-OFF** position, a spring arrangement on the spool of the control valve returns the spool and power control lever to the **BRAKE-ON** position. A ball and detent arrangement will hold the spool and control lever in **BRAKE-OFF**, and the operator must pull the control lever to release it from that position.

The **BRAKE-ON** position is a neutral position. No hydraulic pressure is applied to the brake or the clutches. Springs apply the brake so that the winch drum will not rotate.

The **BRAKE-OFF** position has a detent and is a neutral position for the clutches. Hydraulic pressure is applied to release the brake. The winch will not rotate easily because of friction in the clutches, brake, and gear train. Wire rope cannot be pulled from the winch by hand. The **BRAKE-OFF** position is different from the **FREESPOOL** position where the drum is disengaged from the gear train. The **BRAKE-OFF** position is used when the operator has a load on the winch wire rope. The operator can move the tractor forward without moving the load.

A second control lever disengages and engages a dental clutch to control the **FREESPOOL** operation. The **FREESPOOL** control lever has two positions: **POWER** and **FREESPOOL**. The **FREESPOOL** control lever disengages the gear train so that the cable can be pulled from the winch by hand.

Freespool Operation (See Fig. 1-12)

The **FREESPOOL** arrangement allows mechanical disengagement of the drum gear from the remainder of the gear train. When the **FREESPOOL** control lever is shifted, the dental clutch engages or disengages the drum pinion and intermediate gear.

WARNING

When the control lever is moved to the **FREESPOOL** position, it will release the gear train and any load that may be on the wire rope. An uncontrolled release of the load may occur. Loss of the load can result in injury and damage.

The power control lever must be in the **BRAKE-ON** or **BRAKE-OFF** positions to operate the **FREESPOOL** control lever. When the **FREESPOOL** control lever is moved to the **FREESPOOL** position, the sliding sleeve disengages the drum pinion gear from the intermediate gear. The gear train is disengaged from the drum gear so that the wire rope can be pulled from the drum by hand. Only the drum and drum pinion gear rotates when the wire rope is pulled during **FREESPOOL** operation. The resistance to rotation by the drum during **FREESPOOL** is controlled by the preload on the bearings for the intermediate shaft.

If the **FREESPOOL** control lever cannot be moved to engage the gear train for power operation, apply the clutch to move the gear train a small amount. This action will align the splines in the dental clutch so that the intermediate gear can be engaged.

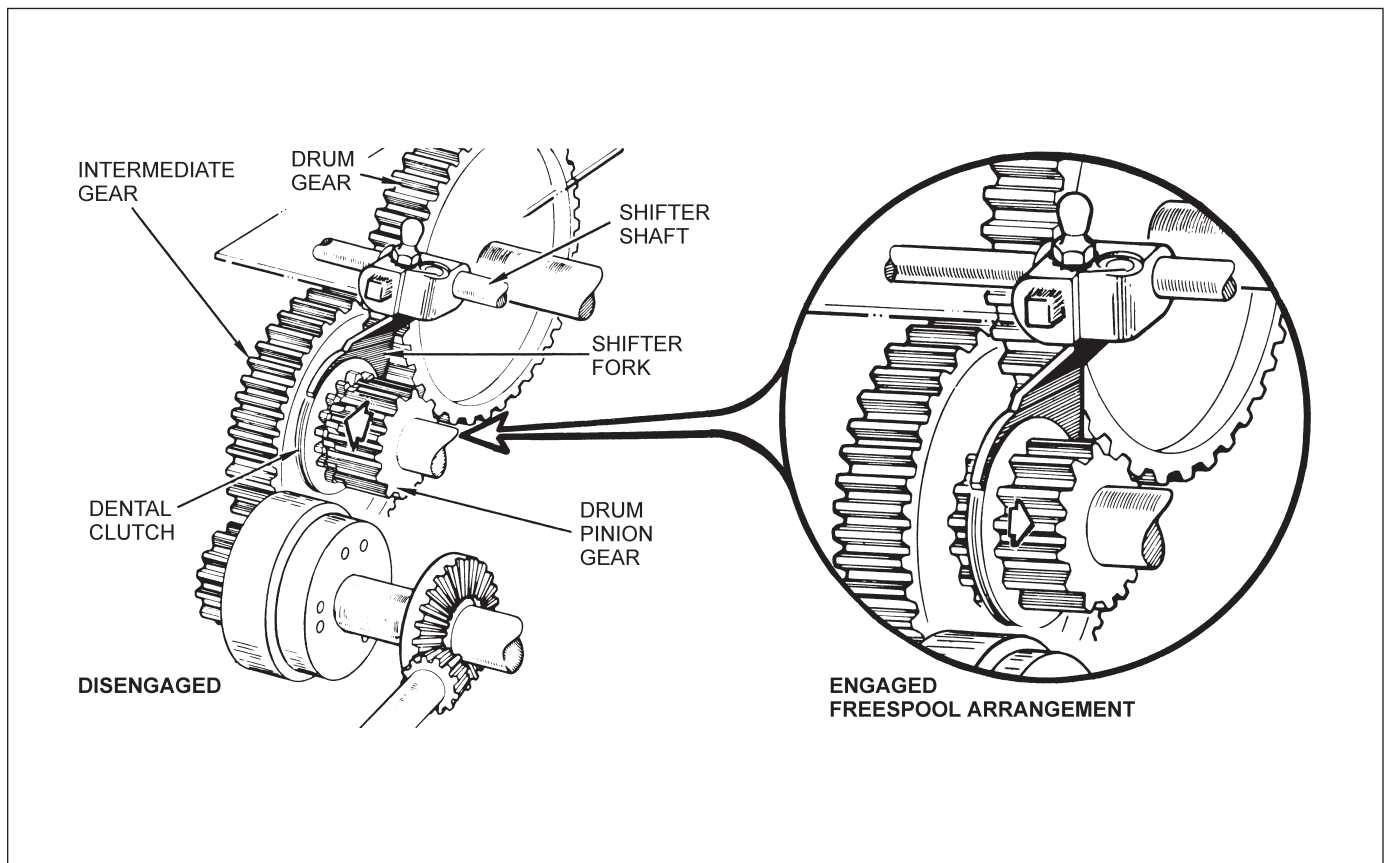


Figure 1-12 Freespool

Hydraulic System (See Fig.1-13)

The operation of the winch is controlled by an internal hydraulic system. This system directs the flow of oil for winch control functions. The suction and pressure filters remove contaminants from the oil. The hydraulic pump supplies pressurized oil for the system. The control valve is connected by a cable to the control lever. The control valve distributes and regulates the flow and pressure of hydraulic oil to the clutches and brake while maintaining the cooling oil flow.

A separate accumulator valve, mounted on the front of the control valve body, controls the release of pressurized oil from the accumulators. The accumulators provide pressurized oil for a limited amount of actuation if the hydraulic pump is not functioning. This allows the release of the winch brake when the tractor engine or the hydraulic pump is not operating.

The operation of the winch is controlled by the clutches and the brake except when the intermediate shaft is disengaged for **FREESPOOL**.

When the tractor's PTO is operating, the hydraulic system provides pressure and flow. The hydraulic flow path of the various functions is depicted in Fig. 1-20 through Fig. 1-24.

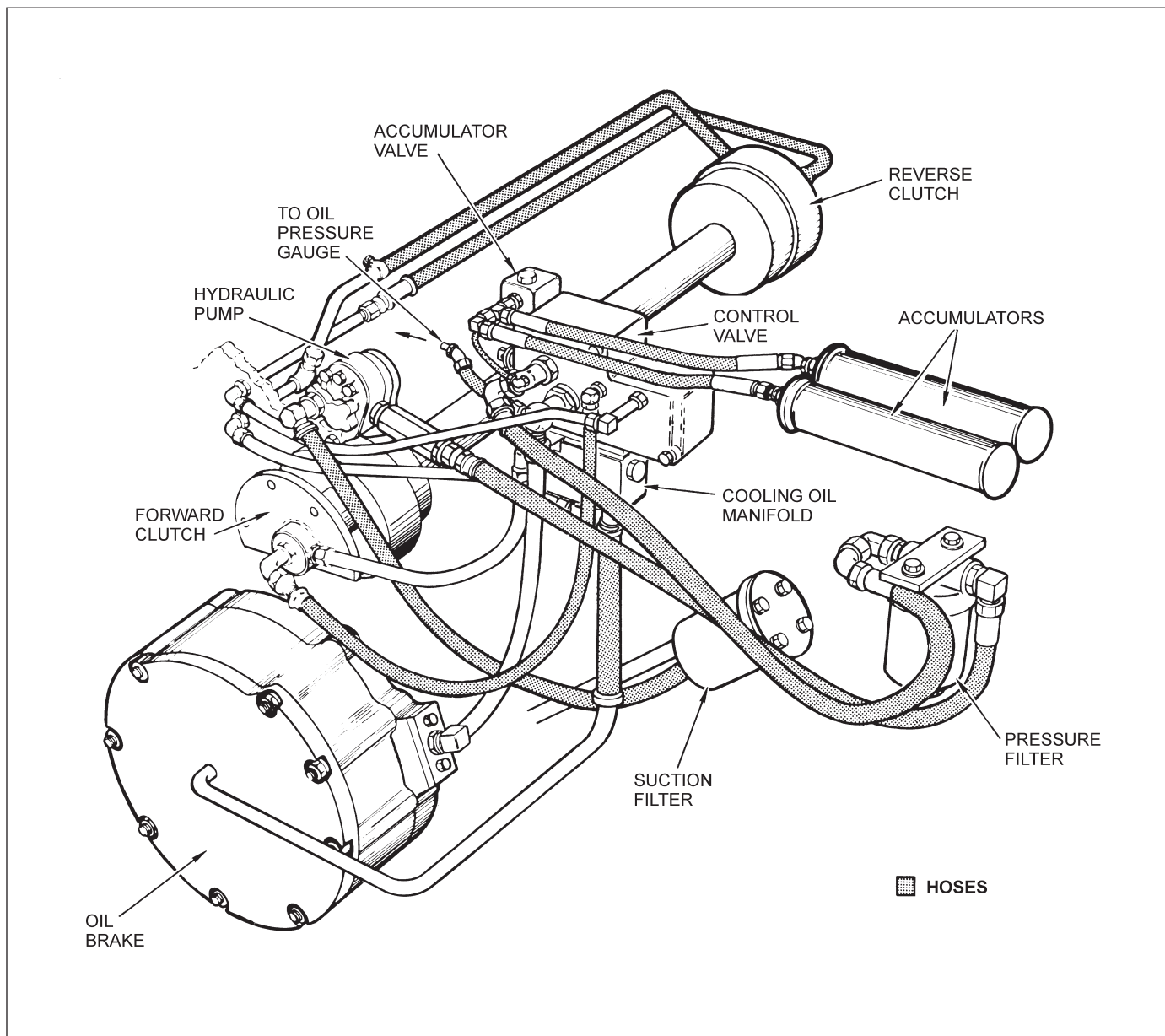


Figure 1-13 Hydraulic System

Reverse and Forward Clutches (See Fig. 1-14 and 1-15)

and spring released. Oil flow through the clutches is maintained under all operating conditions for cooling.

The reverse clutch (Fig.1-14) and forward clutch (Fig. 1-15) are multi-disc types that are hydraulically applied

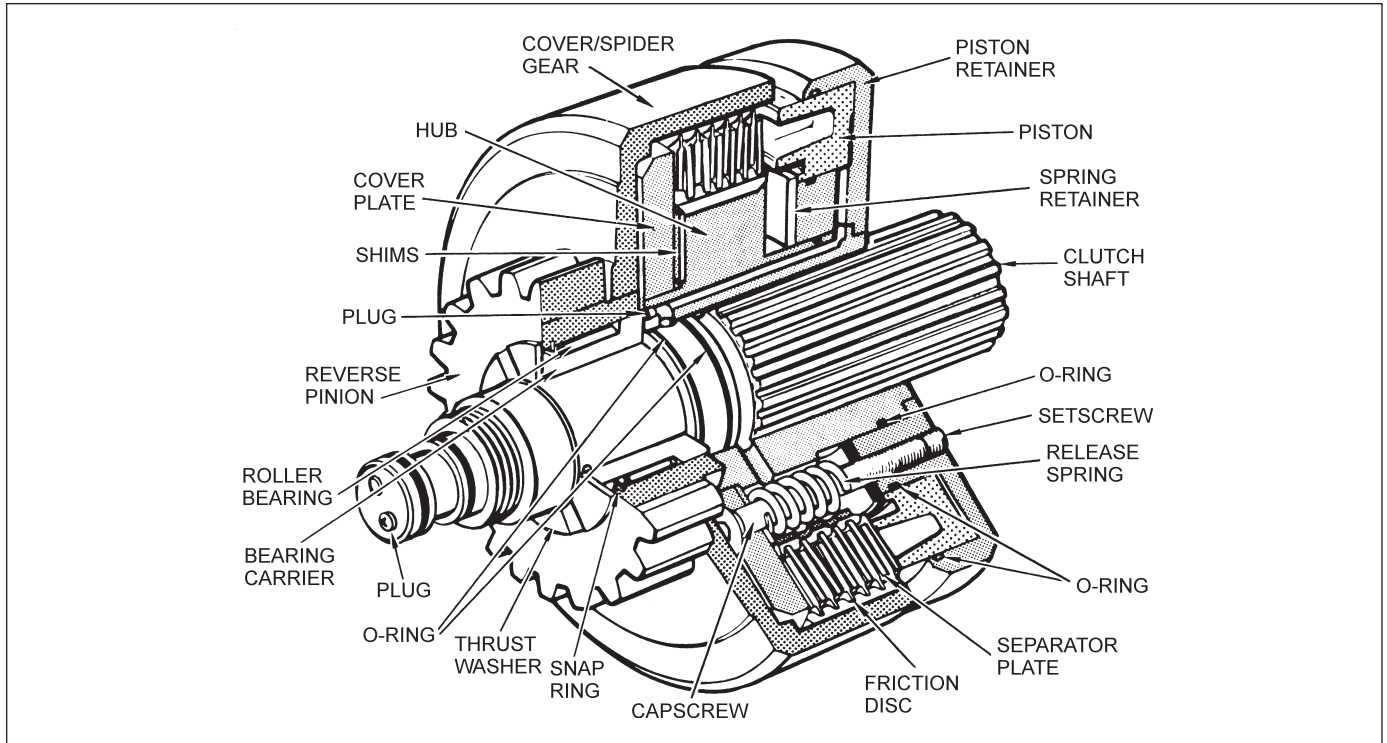


Figure 1-14 Reverse Clutch

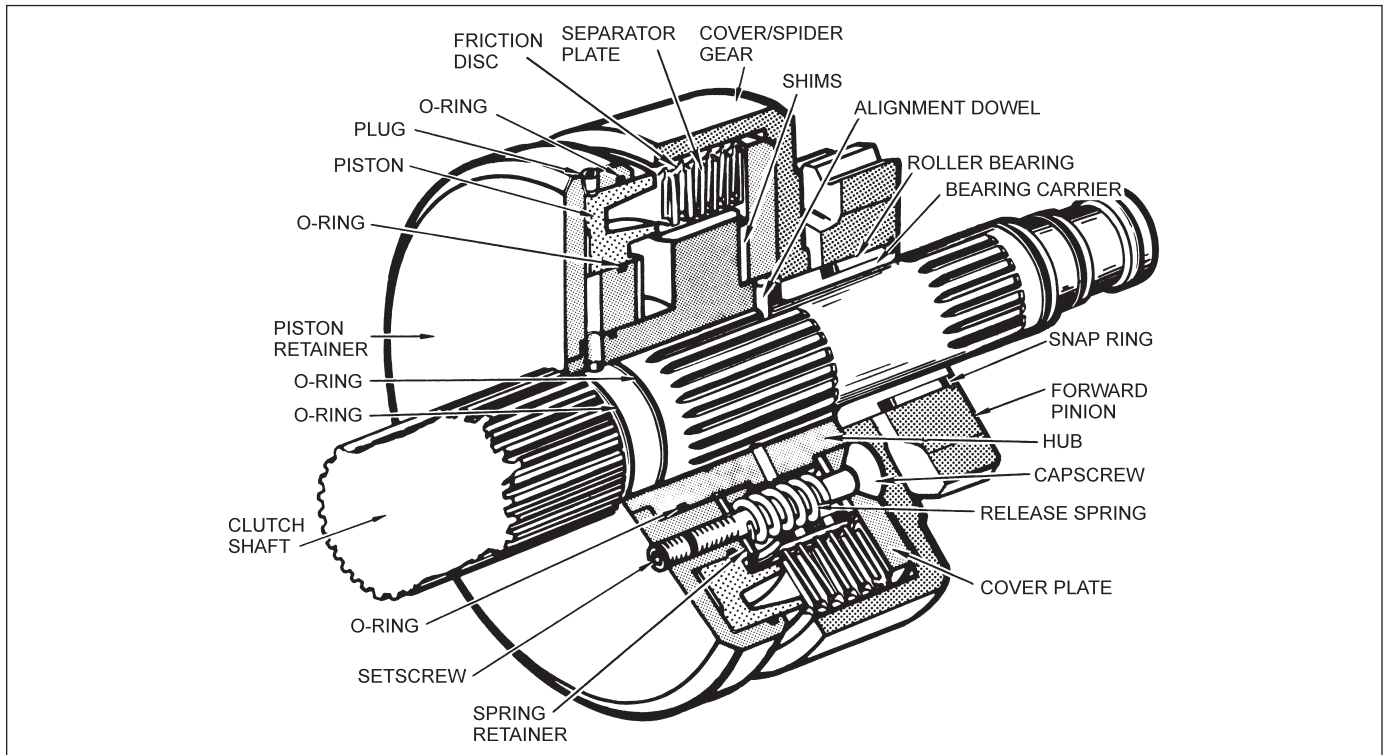


Figure 1-15 Forward Clutch

Oil Brake Assembly (See Fig. 1-16)

The oil brake is a multi-disc brake that is spring applied and hydraulically released. When pressurized oil is directed

into the cavity between the piston and piston housing, the piston moves outward, compressing the belleville spring, which then releases the brake.

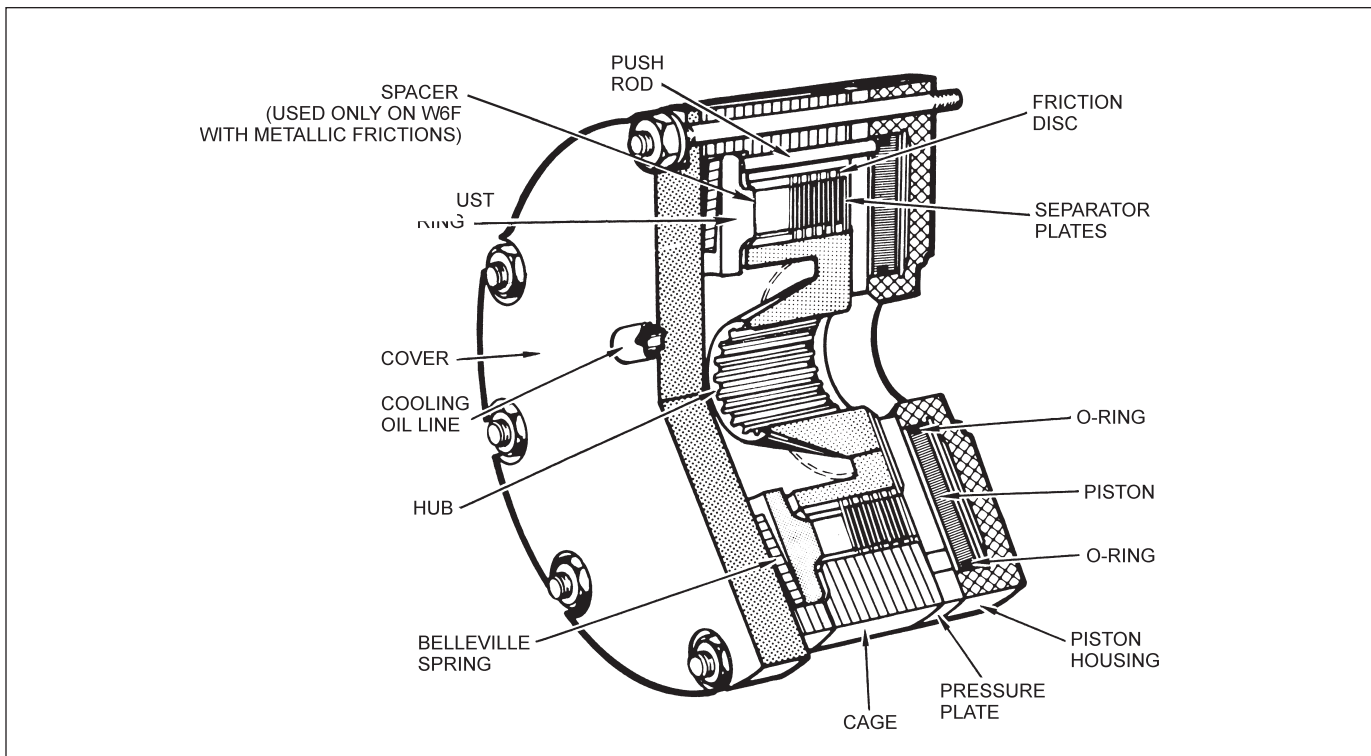


Figure 1-16 Oil Brake Assembly

Hydraulic Control Valve (See Fig. 1-17)

The hydraulic control valve is a single spool valve installed inside the winch frame. The flow of hydraulic oil to and from the clutches and brake is controlled by the control valve. Passages inside the valve body connect the oil flow and pressure with the functions that control the winch. The control valve spool opens and closes passages to apply and release the clutches and brake.

The control valve spool is connected by a cable to the control lever for operator operation. Built-in pressure modulators automatically ensure positive clutch engagement before the brake is fully released. The forward modulator and reverse modulator are adjustable. The control valve spool is spring loaded in the **BRAKE-ON** position and has a detented position to hold it in the **BRAKE-OFF** position.

Hydraulic Control Relief Valve

A relief valve is in the control valve to prevent excessive hydraulic oil pressure. Oil from the relief valve is discharged directly to cooling oil passage. Cooling oil is distributed through the hydraulic lines to the brake and clutches to remove excess heat.

Hydraulic Pump (See Fig. 1-18)

The hydraulic pump is a fixed displacement gear pump that supplies the hydraulic flow necessary for operation of the winch. The pump shaft is driven by a spur gear off of the input shaft. The pump inlet port is connected to the winch suction filter. The outlet is connected through the pressure filter to the control valve inlet port.

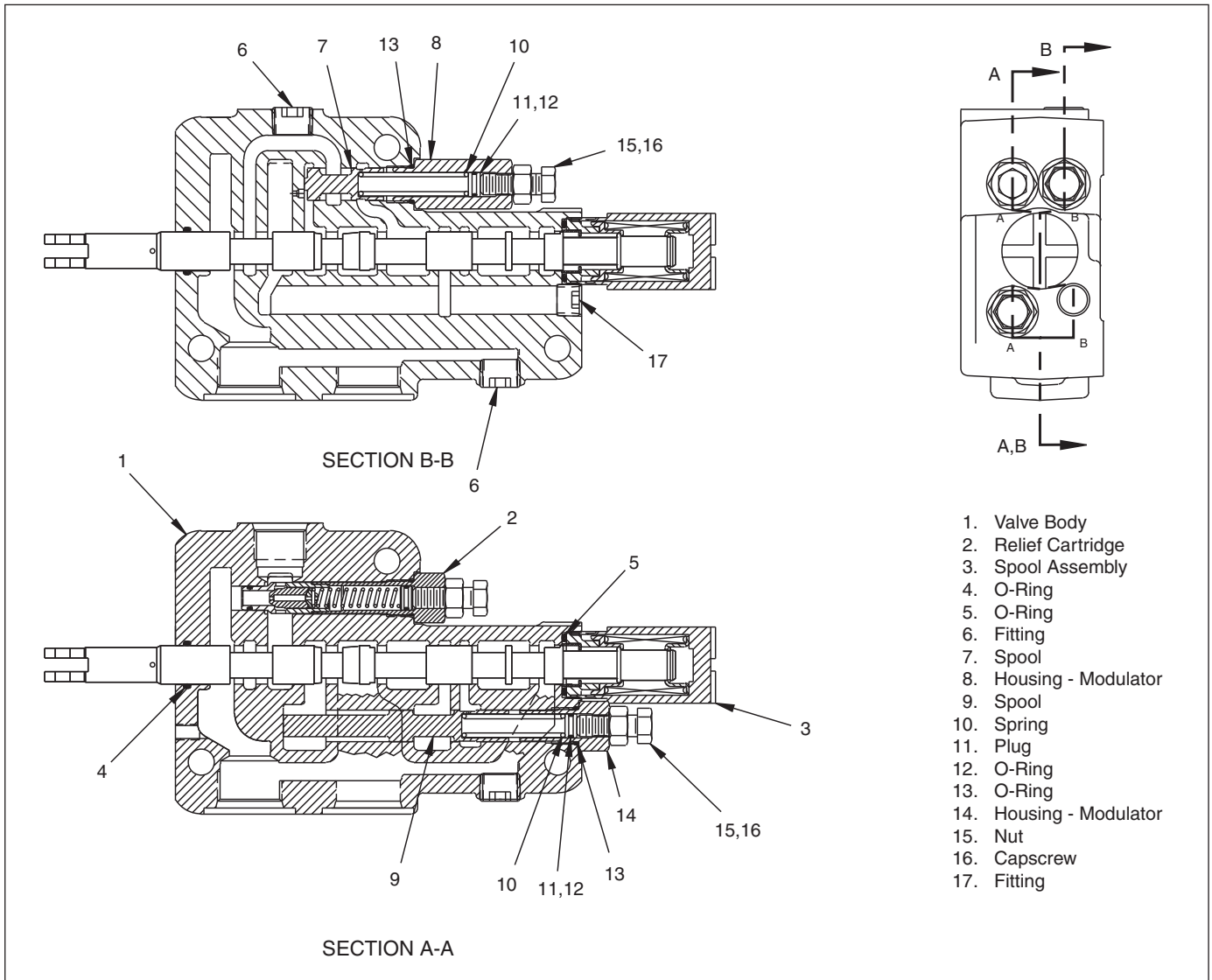


Figure 1-17 Hydraulic Control Valve

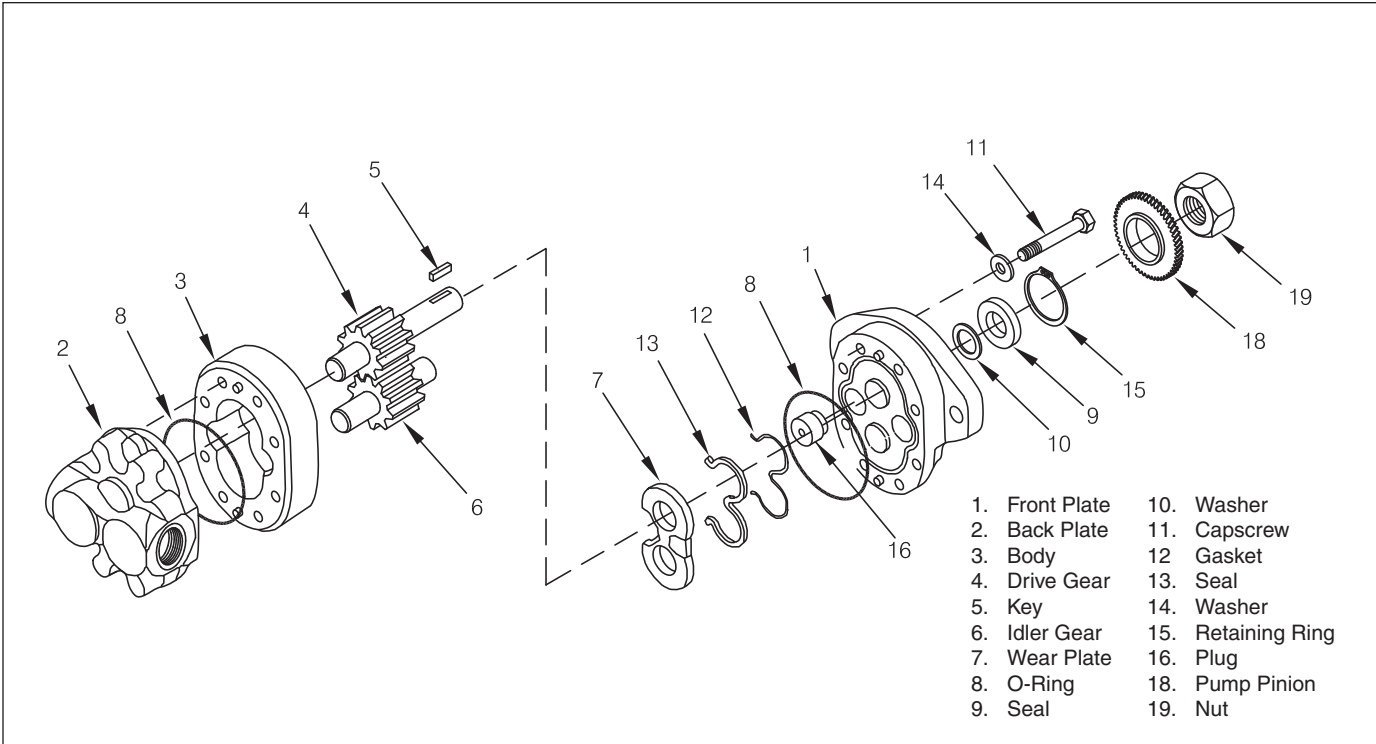


Figure 1-18 Hydraulic Pump

Accumulators

Accumulators are connected to the hydraulic system. They have a nitrogen pre-charge, so that the oil stored in the accumulators will be under pressure. When released, this oil will provide pressure for the hydraulic system during low engine rpm shifts or if the PTO shaft stalls. They are charged with nitrogen to 100-115 psi.

Accumulator Control Valve

The accumulator valve is mounted to the control valve and is actuated by the control valve spool cam. As the hydraulic system builds pressure, oil can flow past the check ball in the valve to be stored in the accumulators. When the control valve spool is moved to the **LINE-IN** or **LINE-OUT** position, a cam on the spool pushes up on the accumulator valve pin. This pin lifts the check ball off its seat to release the oil stored in the accumulators. If the PTO should stall so the hydraulic pump does not provide sufficient flow, the stored oil will be released, thus releasing the brake and applying the clutch.

Cooling Oil Relief Valve (See Fig. 1-19)

The cooling oil relief valve is a spring-loaded, poppet-type valve. The valve is mounted in the control valve dump port and maintains cooling oil pressure (See Fig. 3-8, Hydraulic System Pressure Tests). Cooling oil is distributed through

the hydraulic lines to the brake and clutches to remove excess heat. Oil from the cooling relief valve is discharged directly into the inside of the winch housing.

Turning the center cap clockwise will increase pressure. They have holes drilled into the valve body flats for access to the cap's threads. Threads can be upset with a punch when correct pressure is obtained, therefore locking the cap into position.

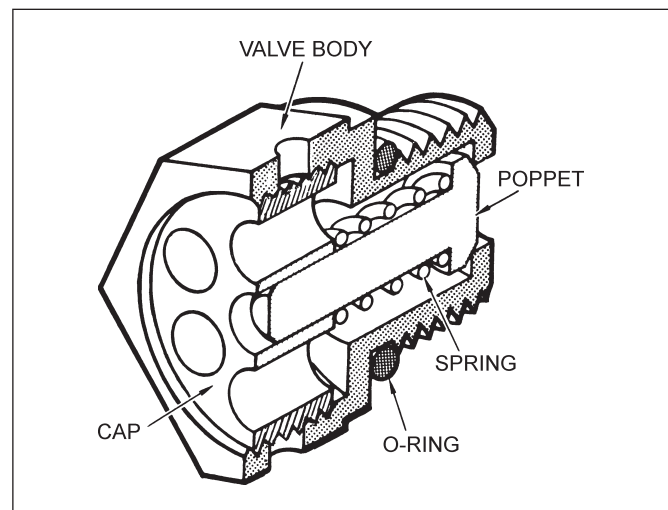


Figure 1-19 Cooling Oil Relief Valve

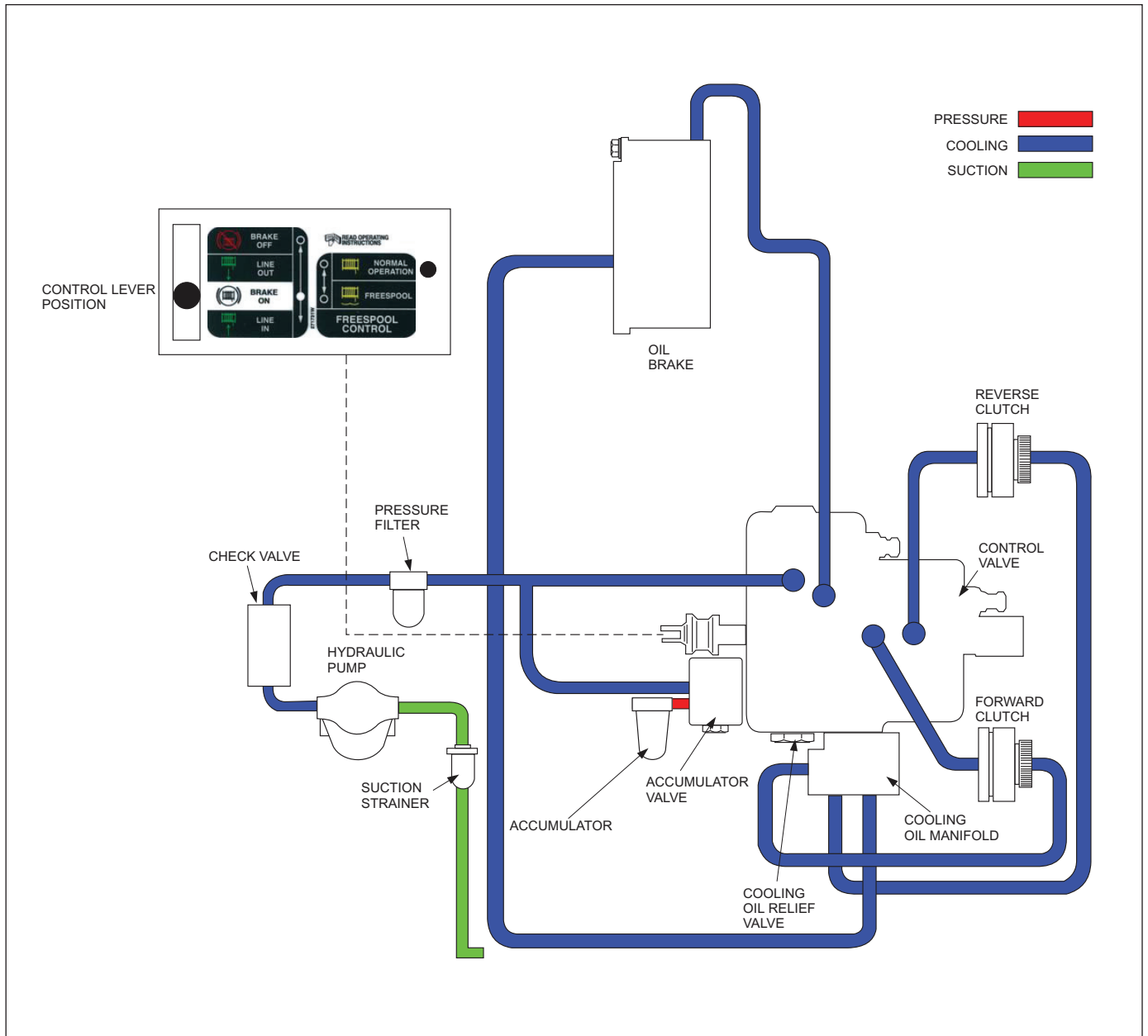


Figure 1-20 Hydraulic System - BRAKE-ON (Neutral)

Sequence of Operation - BRAKE-ON

The control valve spool is spring centered to **BRAKE-ON**. In this position, oil entering the open center valve flows into the cooling oil passages. Cooling oil flows out of the

cooling oil manifold to lubricate and cool the brake and clutch assemblies. Excess flow goes directly to the sump.

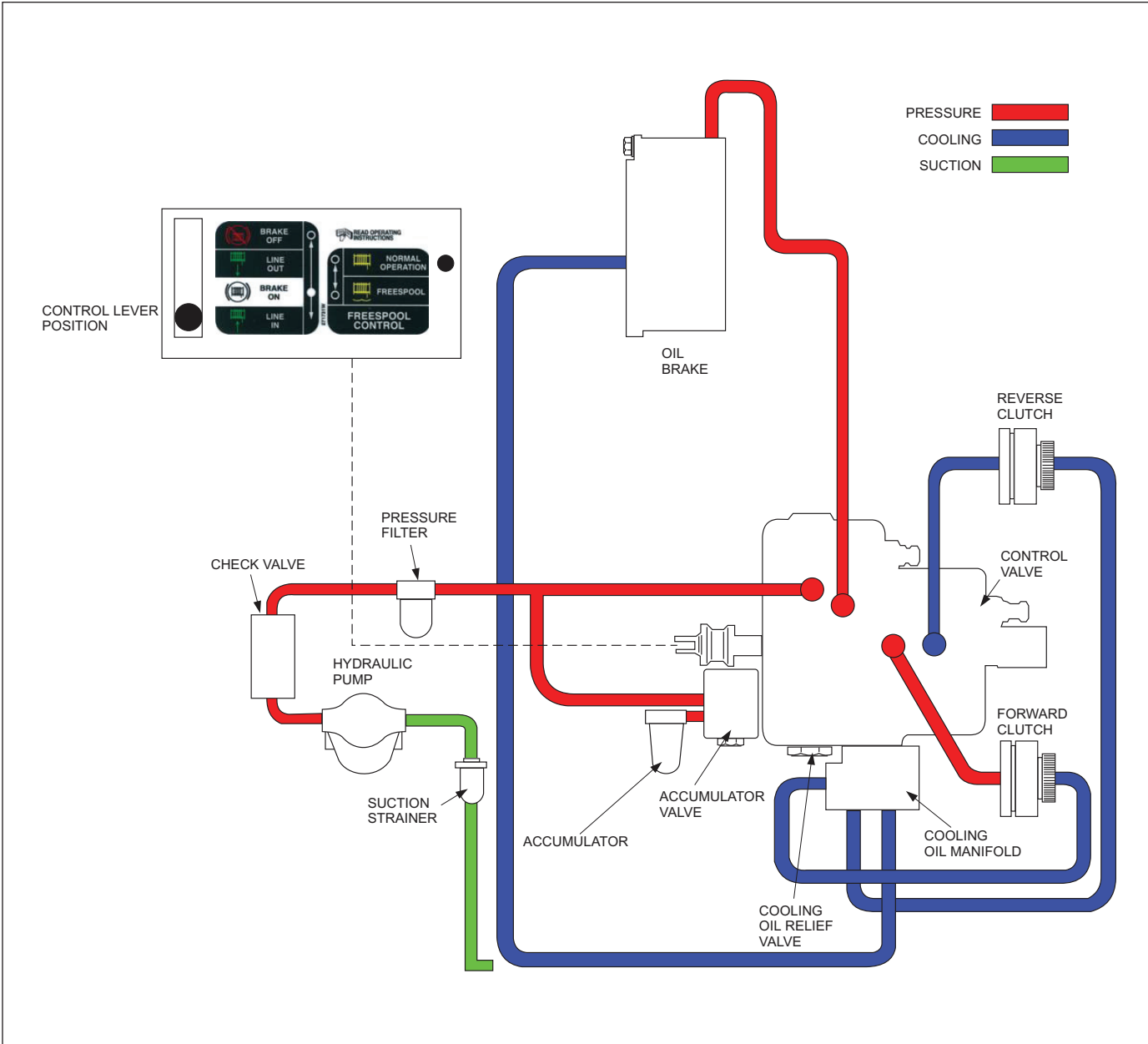


Figure 1-21 Hydraulic System - LINE-IN (Forward)

Sequence of Operation - LINE-IN

For **LINE-IN** (forward) operation, the operator pulls the lever towards him/herself, which causes the spool to move into the valve, closing off the flow of oil to the cooling passage. This allows a pressure buildup in the inlet passage. Oil flows from the inlet passage to the brake passage through an orifice, producing a pressure drop between the inlet and brake passage, depending on the amount of oil flow. As the brake port to sump is closed off by the spool, the oil flow to sump is reduced, allowing the brake pressure to build up. As the brake pressure increases, the forward modulator valve will regulate the oil pressure to the forward clutch and maintain a constant pressure differential between the brake and clutch through the inching mode (See Fig. 3-8, Hydraulic

System Pressure Tests, for factory setting). At the end of the spool travel, a direct port to the clutch is opened.

NOTE: On a fast shift, the spool moves into the full forward position, routing oil directly to the forward clutch and bypassing the forward modulator valve completely, thereby avoiding any delay in operation.

When pressure starts to rise above 220±5 psi (1520±35 kPa) at the inlet port passage, the spring loaded poppet in the relief valve will bypass the excess flow to the cooling passage. An orifice in the relief valve poppet prevents oil from becoming trapped behind the poppet and causing a hydraulic lock.

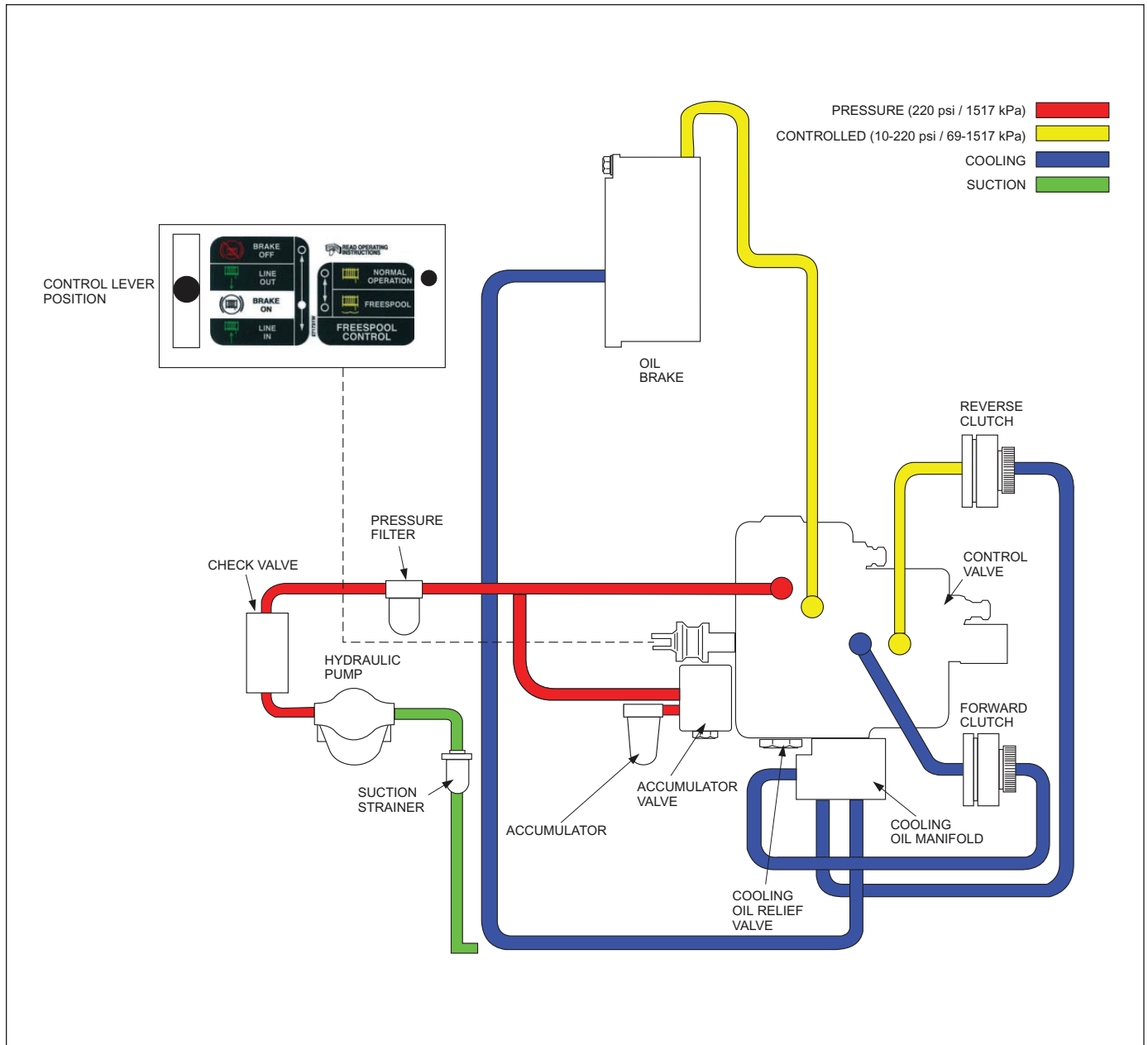


Figure 1-22 Hydraulic System - LINE-OUT INCHING

Sequence of Operation - LINE-OUT INCHING

LINE-OUT INCHING (gradual brake release) is achieved by slowly pushing the control lever out of the brake on (neutral) position towards the line out (reverse) position. As the control spool moves, the flow of oil to the cooling passage is blocked. This allows pressure to build up in the inlet passage. Oil flows from the inlet passage to the brake passage through an orifice, producing a pressure drop between the inlet and brake passages, depending on

the amount of oil flow. As the brake port to sump is closed off by the spool, the oil flow to sump is reduced, allowing the brake pressure to build up. As the brake pressure increases, the reverse modulator valve will regulate the oil pressure of the reverse clutch and maintain a constant 120 psi (827 kPa) pressure differential between the brake and the clutch through the inching mode.

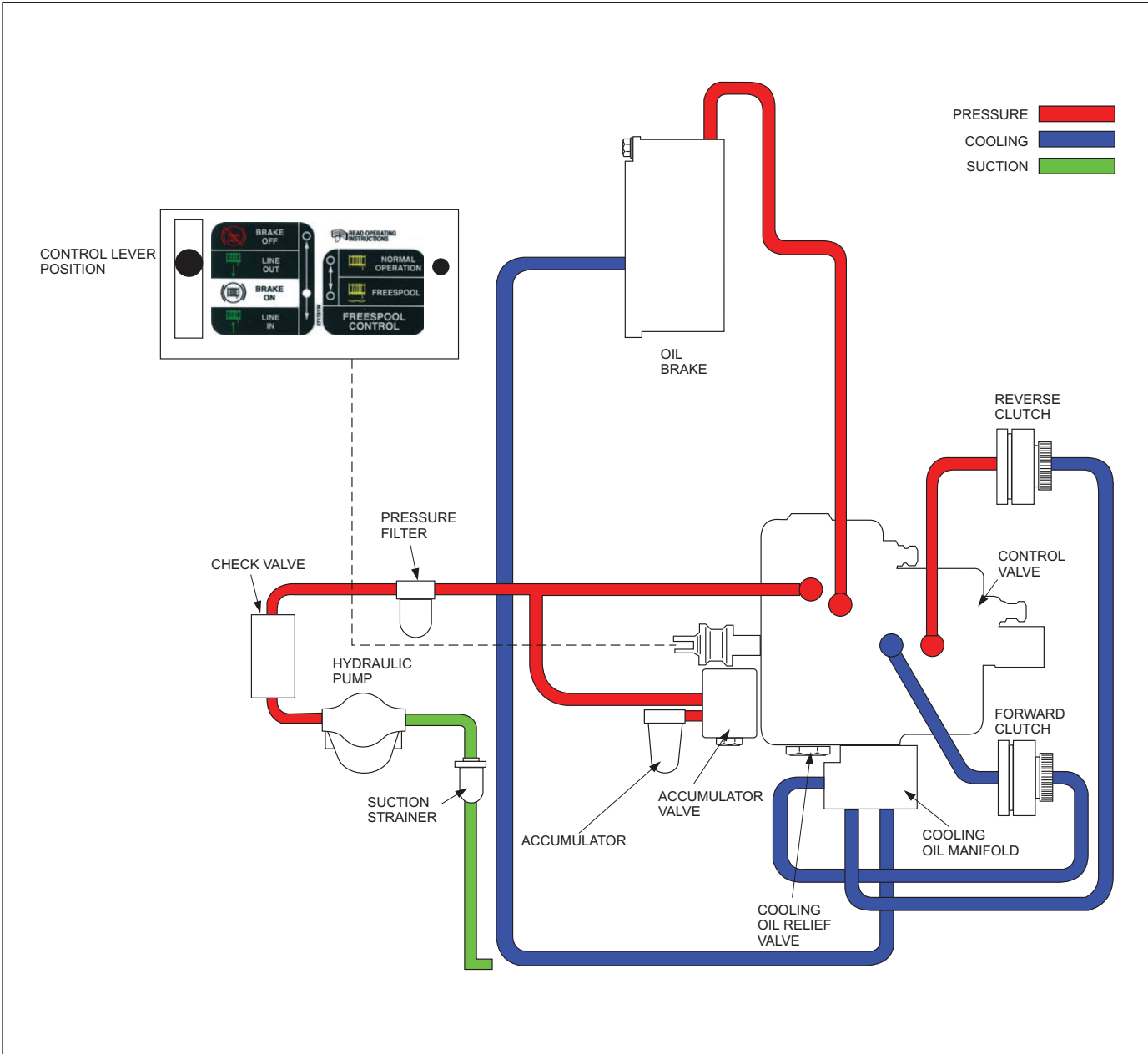


Figure 1-23 Hydraulic System - LINE-OUT (Reverse)

Sequence of Operation - LINE-OUT

LINE-OUT, or reverse, is achieved by pushing the control lever to the reverse position, thereby pulling the control spool out. As the control spool moves, the flow of oil to the cooling passage is blocked. This allows pressure to build up in the inlet passage. Oil flows from the inlet passage to the brake passage through an orifice, producing a pressure drop between the inlet and brake passages, depending on the amount of oil flow. As the brake port to sump is closed off by the spool, the oil flow to sump is reduced, allowing the brake pressure to build up. As the brake pressure increases, the reverse modulator valve

will regulate the the oil pressure to the reverse clutch and maintain a constant 120 psi (827 kPa) pressure differential between brake and clutch through inching mode. At the end of spool travel, a direct port to the reverse clutch is opened.

NOTE: On a fast shift, the spool moves into the full reverse position, routing oil directly to the reverse clutch and bypassing the reverse modulator valve completely, thereby avoiding any delay in operation.

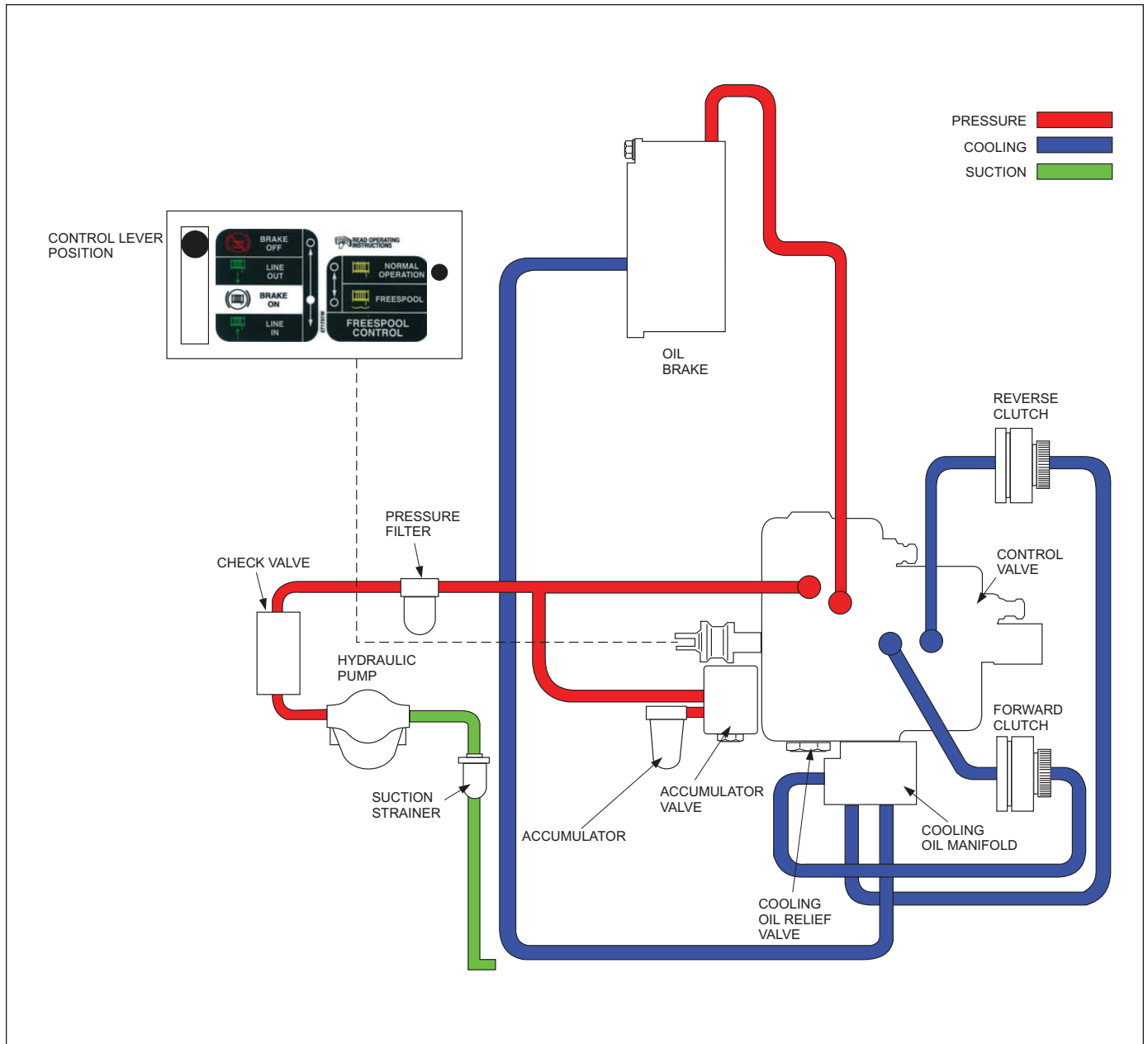


Figure 1-24 Hydraulic System - BRAKE-OFF

Sequence of Operation - BRAKE-OFF

BRAKE-OFF is achieved by pushing the control lever to the **BRAKE-OFF** position. The lever must be pushed past **LINE-OUT**; it will take slightly more force. This position is detented and the control lever must be moved manually

to return it to the **BRAKE-ON** position. With the control spool in **BRAKE-OFF** position, oil flow to the clutches is blocked and high pressure oil flows directly to the brake port to fully release the brake.

Troubleshooting

General

This section includes several troubleshooting analysis check charts. The charts list the most common troubles that may be encountered. A possible cause and recommended corrective action are listed to restore the

winch to normal operating condition. Figure 2-1 applies to W6F winch, and Figure 2-2 applies W6F winch equipped with **FREESPOOL**.

Figure 2-1 Troubleshooting Analysis Check Chart_1

PROBLEM	POSSIBLE CAUSE	CORRECTION
Overheating	Plugged pressure filter.	Replace filter.
	Plugged suction filter.	Remove suction filter, clean and replace.
	One or both clutches dragging.	Check by placing control lever in BRAKE-OFF . Normally drum will rotate slowly in the LINE-IN direction. If the reverse clutch is dragging, the drum will rotate in the LINE-OUT direction. If forward clutch is dragging, the drum will rotate positively in the LINE-IN direction and it will take more than 100 lbs. of line pull to prevent drum rotation.
	Low pressure.	Check for leaks, then adjust accordingly.
	Bevel shaft bearings set too tight.	Adjust accordingly.
	Control cable binding causing winch valve to not return to BRAKE-ON .	Make sure that there are no tight bends in the control cable (minimum bend radii 5.00"), or replace cable.
	Winch control left in BRAKE-OFF .	Return lever to BRAKE-ON .
	Excessive inching.	Avoid continuous operation in the inching zone.
Operation is rough	Hydraulic oil is too cold.	Put the control lever in the BRAKE-OFF position. Run the engine at 1000 rpm to warm the oil before operating the winch.
	Low oil level.	Add hydraulic oil to the correct level.
	Low system pressure.	See item on troubleshooting low oil pressure directly below.
	Wrong oil.	Drain oil and replace with correct grade. Refer to the Recommended Oil List, Figure 1-4, in Section 1.
	Accumulator malfunction.	Check accumulator and recharge/replace as necessary.
	Tractor engine idling too low, or PTO stalled.	Increase tractor idle speed.
	Hydraulic system suction leaks. Observe oil exiting lube valve while tractor is operating. Suction leaks will cause oil to foam.	Check the following for air leaks: 1. Suction hose to pump connection. 2. Pump shaft seal. 3. Suction filter cover and gasket. 4. Suction hose for cracks or collapsed sections.
	Control lever/Control cables need adjustment.	Check for correct adjustment as outlined in Section 3. Make sure the ends of the cables are fastened correctly. Double-check push-pull cable housing to ensure it is securely anchored on both ends. Be sure control lever has full movement and is not hitting housing.

(Continued on the next page)

Figure 2-1 Troubleshooting Analysis Check Chart_2

PROBLEM	POSSIBLE CAUSE	CORRECTION
Low oil pressure	Leaking pressure hoses and fittings.	Check for leaks and replace components where necessary. Be sure hoses are not rubbing on any gears or winch components.
	Defective or improperly adjusted oil relief valve; poppet may be stuck open.	Clean relief valve if no pressure, then adjust. Check relief valve with pressure gauge. Replace if defective.
	Clogged suction filter.	Check and clean or replace suction filter.
	Oil brake leaking internally (indicated by low brake pressure).	Repair as required.
	Defective hydraulic pump.	Check pump pressure output only after all other checks have been made. Worn pump indicated by pressure variation with engine RPM. If pump is at fault, replace.
	Valve spool is not moving far enough	Check to verify the control valve spool travel (refer to Control Valve Spool Travel Check on pages 3-7 and 3-8).
Brake does not release or winch stalls during low RPM shift	Low oil pressure.	Refer to "Low Oil Pressure" troubleshooting item above.
	Pressure modulator set too low.	Turn modulator screw IN for earlier brake release. Increase sequence differential.
	Accumulator system malfunction.	Check for: 1. Correct leakdown time as described in Section 3. 2. Leaking accumulator valve. 3. Leak in accumulator lines. 4. Damaged or defective accumulators.
	Damaged brake piston, piston housing or seal rings.	Check piston and piston housing cavity for damage. Replace if scored or broken. Always replace both seals when brake is repaired.
	Low clutch pressure or low oil pump volume.	Refer to "Low Forward or Reverse Clutch Pressure" troubleshooting item below.
Oil brake slipping or drum backspin on fast shift from neutral to forward	Worn brake plates.	Check the required pressure to release the brake. Replace friction discs and separator plates if pressure is too low.
	Broken belleville spring.	Replace. Refer to Section 4.

(Continued on the next page)

Figure 2-1 Troubleshooting Analysis Check Chart_3

PROBLEM	POSSIBLE CAUSE	CORRECTION
Brake releases before forward clutch engagement	Modulator valve in control valve not functioning.	Check forward modulator valve.
	Low brake release pressure (same as the above).	See “Oil Brake Slipping” troubleshooting item above.
Brake releases before reverse clutch engagement	Modulator valve in control valve not functioning.	Check forward modulator valve. Adjust or replace as necessary.
Low forward or reverse clutch	Broken seal rings on the bevel gear shaft.	Replace seal rings. NOTE: A broken seal ring is the most common cause of a pressure differential between the two clutches. Check preload on clutch/brake shaft and adjust it if necessary to prevent additional breakage of seal rings; refer to Section 4.
	Damaged bevel gear shaft seal ring grooves.	Check grooves for taper, scoring and rust. Replace or rebuild shaft if surfaces between the inner side of groove and seal ring are not flat.
	Damaged bevel gear shaft bearing retainers.	Check retainer for grooves. Replace retainer if defective, or re-sleeve.
	Damaged clutch piston, piston retainer or O-rings.	Check piston and piston retainer cavity for damage. Always repair both O-rings when clutch is repaired. Refer to Section 4.
	Reverse pressure hose damaged by bevel gear.	Remove cover and inspect.
	Leaky clutch circuit.	Perform clutch bleed-down test on clutch circuit.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.
Winch will not operate while tracks are turning	Accumulator system malfunction.	Check for: 1. Correct leakdown time as described in Section 3. 2. Leaking accumulator valve. 3. Leak in accumulator lines. 4. Damaged or defective accumulators.
	Low oil pressure.	Refer to “Low Oil Pressure” troubleshooting item above.
	Defective PTO shaft.	Inspect PTO shaft and coupling, clutch shaft bevel ring gear and PTO shaft pinion gear for wear or damage. Inspect magnetic suction screen.
Forward or reverse oil clutch not engaging	Low oil pressure.	See “Low Oil Pressure” troubleshooting item above.
	Low forward or reverse clutch pressure.	See troubleshooting for “Low Forward or Reverse Clutch Pressure” item above.
	Inadequate piston travel.	Remove the access cover and place the winch in gear while visually checking the clutch for piston movement.
	Worn friction discs and separator plates.	Replace the friction discs and separator plates if too thin, scored or distorted. Refer to Section 4.

(Continued on the next page)

Figure 2-1 Troubleshooting Analysis Check Chart_4

PROBLEM	POSSIBLE CAUSE	CORRECTION
Forward or reverse oil clutch not releasing	Broken or weak release springs.	Check springs and replace as necessary.
	Warped frictions or separators.	Replace as necessary.
	Lube pressure high.	Test and re-set cooling oil relief valve.
Forward clutch engaging or releasing slowly	Improper orientation of forward clutch and clutch shaft.	Remove and reinstall shaft with proper alignment. Refer to Section 4.

Figure 2-2 Troubleshooting Analysis Check Chart for FREESPOOL Option

PROBLEM	POSSIBLE CAUSE	CORRECTION
Hard to shift	Linkage binding or rusted.	Repair.
	Shifting collar too tight on splines or splines rough.	Remove shifting collar, dress splines with fine stone, and replace parts if necessary.
	Dental clutch installed backwards.	Install clutch so that chamfered ramp faces drum pinion gear.
	Ball detent spring load too much.	Back off on spring plug.
Jumps out of gear	Control linkage improperly adjusted.	Check and adjust as necessary.
	Worn shifter fork.	Replace shifter fork and related parts as necessary.
	Worn drum pinion gear bushing.	Replace bushing and related parts as necessary.
	Detent ball and spring loose, damaged or sticking.	Clean or replace as necessary.
Winch will not freespool	Linkage improperly adjusted.	Check and adjust as necessary.
	Intermediate shaft assembly damaged, rusted or preloaded.	Adjust or repair as necessary. Refer to Section 4.
	Drum shaft assembly damaged, rusted or binding.	Adjust or repair as necessary.
Winch freespools too easily	Insufficient preload on intermediate shaft.	On winches with exterior Freespool Drag Adjust: Tighten preload on the intermediate shaft. On winches without exterior Freespool Drag Adjust: Remove shims as required to preload shaft. Refer to Section 4.
Winch freespools too hard	Too much preload on intermediate shaft.	On winches with exterior Freespool Drag Adjust: Loosen preload on the intermediate shaft. On winches without exterior Freespool Drag Adjust: Add shims as required to preload shaft. Refer to Section 4. NOTE: It may be necessary to use a slide hammer on the shaft to unload the bearing race because of the fit in the bore.

Service

General

This section provides the instructions for performing maintenance and making checks and adjustments. Standard shop tools are used in doing the work described in this section, except where noted (See Fig. 4-23 and 4-24).

Maintenance

The Maintenance Schedule is a program that includes periodic inspection and lubrication. Use the operating time on the hour meter of the tractor to determine the maintenance time for the winch.

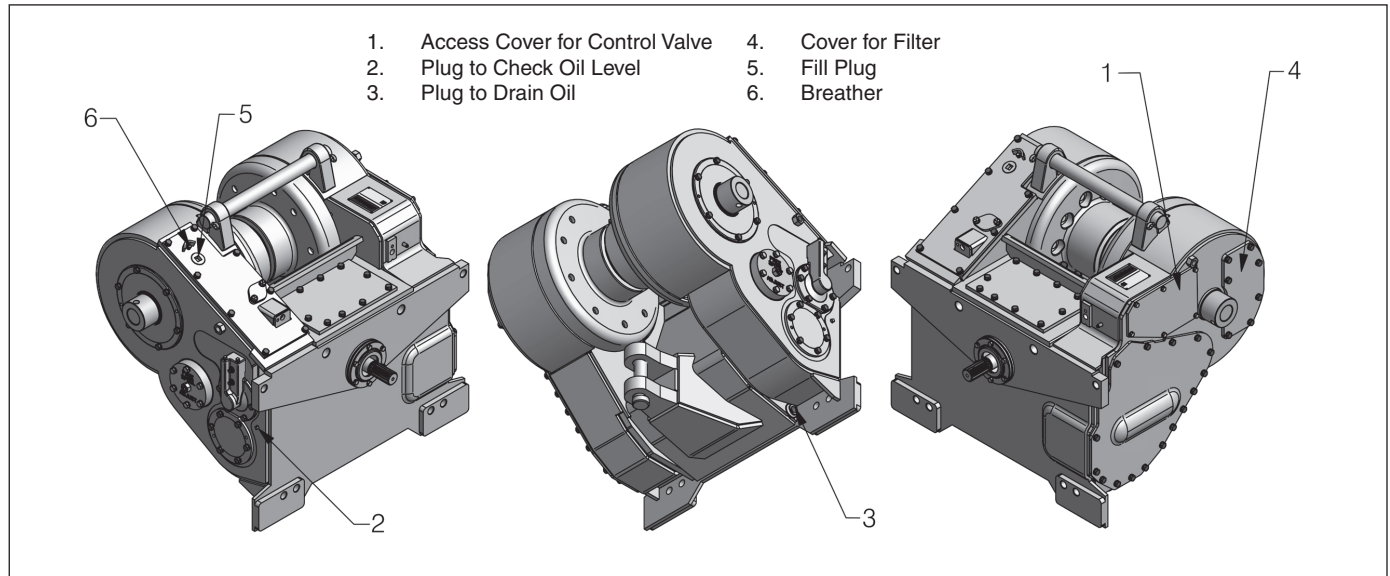


Figure 3-1 W6F Maintenance Points

INTERVAL	PROCEDURE OR QUANTITY	SPECIFICATION
50 hours or weekly	Check oil level at plug (item 2). Add oil as necessary through fill plug (item 5). Do not operate tractor when checking the oil level.	See Figure 1-4, the Recommended Oil List, in Section 1.
	Check winch control lever, and the FREESPOOL control lever. See Figures 3-3 and 3-4.	Use SAE 30 oil on the linkage as needed. Check that the control cable and control housing are fastened correctly. Tighten U-bolts if required.
	Clean the breather (item 6).	Remove debris around breather.
	Lubricate the rollers on the fairlead assembly, if the winch is so equipped.	Use multi-purpose grease with 2-4% molybdenum disulfide.
500 hours or every 3 months	Clean the oil suction screen and magnets.*	Use a new gasket between the cover and the suction tube.
	Clean the breather.	Remove debris around the breather.
	Replace the filter.*	See the Parts Manual for filter element and cover gasket. When replacing, be sure to lubricate filter seal ring between element and filter head.
1000 hours or every 6 months	Change the hydraulic oil. Drain oil from plug (item 3). Clean the oil strainer. Through fill plug (item 5), add 16.5 gallons (62.5 liters)†. Check the oil level at item 2.	See Figure 1-4, the Recommended Oil List, in Section 1.

* NOTE: Clean the oil strainer screen and change the oil filter after the first 250 hours on new and rebuilt winches.
† Amount of oil may vary slightly with tractor.

Figure 3-2 Maintenance Schedule

Checks Before Operation

Check that the cable and hook are not worn or damaged. Check that the periodic inspection and maintenance has been done at the recommended operating hours. See Figure 3-2, Maintenance Schedule.

Checks During Operation

The Troubleshooting Chart in Section 2 can be used by the operator to identify a problem with the winch operation. A trained service person is needed for additional troubleshooting and repair that requires disassembly of parts of the winch.

Checks and Adjustments

The checks and adjustments for the cable controls winch are as follows:

- Control Cable Adjustments
- Freespool Cable Adjustment

Control Cable Adjustments

A single control cable connects the power lever to the hydraulic control valve spool. Check the operation of the power control lever to make sure it moves smoothly and will return to the **BRAKE-ON** position. The power control lever will stay in **BRAKE-OFF** when pushed into DETENTED position. Cable adjustment is not necessary except to ensure full spool travel. To adjust control levers depicted in Figures 3-3 through 3-4, proceed as follows:

1. Ensure that the cable bracket at winch end of control cable is securely attached to the winch housing.
2. Check the position of the control lever with control valve in **BRAKE-ON**. The lever should be approximately vertical. If not, loosen nuts on U-Bolt that clamps the control cable to the control lever housing. Move U-Bolt up or down the elongated slots to improve position of control lever. Tighten nuts securely.
3. Move control lever to **LINE-IN** and **BRAKE-OFF** positions and ensure that the lever holds in the **BRAKE-OFF** position. Check to ensure that the control lever does not hit the housing in either position. If interference is found, repeat step 2.

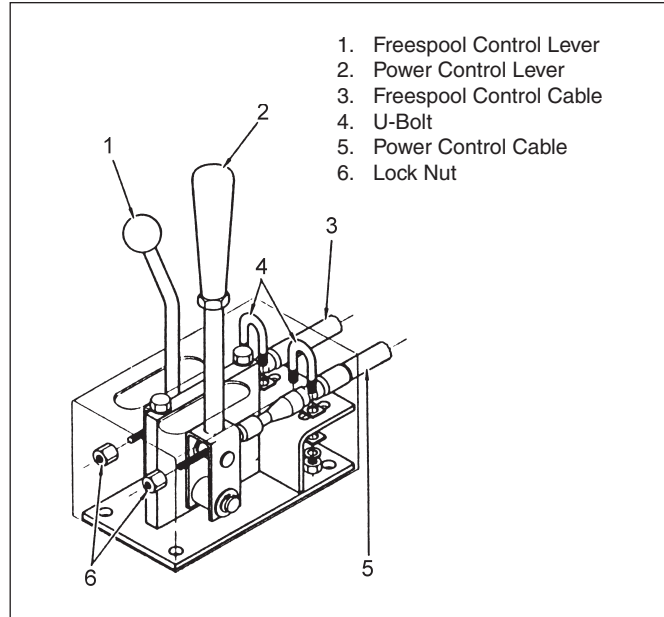


Figure 3-3 Control Cable Adjustments

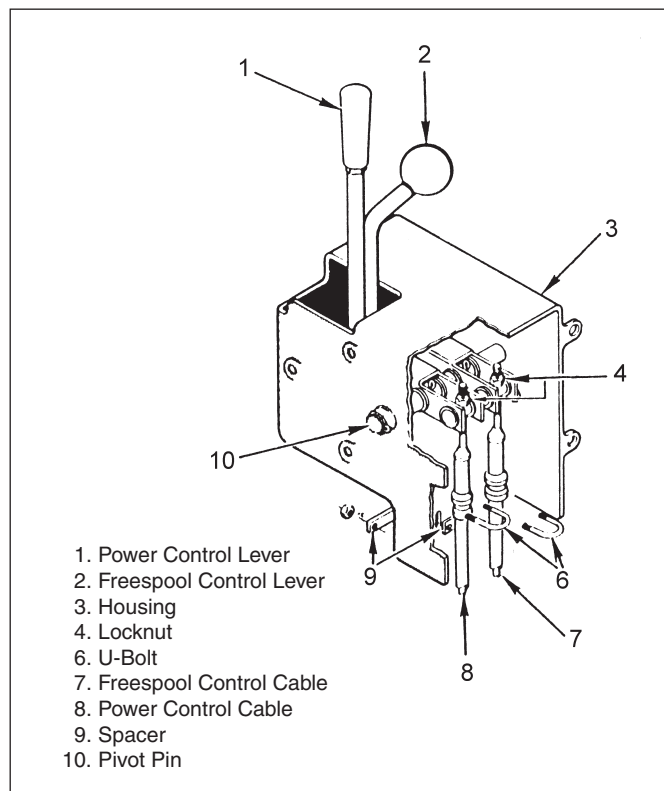


Figure 3-4 Control Cable Adjustments (this configuration last used in 1993)

To adjust the control lever depicted in Figure 3-5, proceed as follows:

1. Make sure the positions of the power control lever are the same as the position indicators on the decal.
2. Remove the access cover (Item 1) on the housing to make adjustments.

3. Loosen the jam nut (Item 8) that keeps the tall nut (Item 3) from turning.
4. Remove the cotter pin and link pin (Item 4) from the clevis (Item 2). Turn the tall nut and clevis to adjust the length of the control cable (Item 5).
5. Use the link pin and cotter pin to connect the clevis to the control handle again and check the operation.
6. When the adjustment is complete, tighten the jam nut and install the access cover.

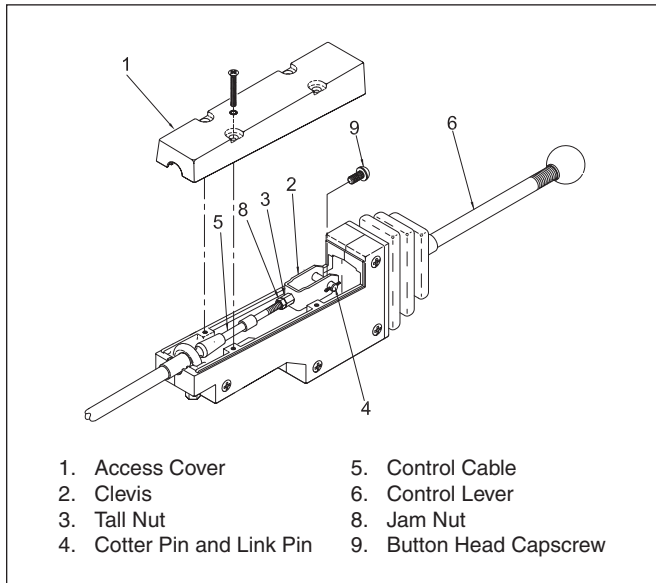


Figure 3-5 Control Cable Adjustments

FREESPOOL Cable Adjustment

The only adjustment necessary is to position the handle lever so that it allows the linkage to shift the **FREESPOOL** mechanism to normal and **FREESPOOL** positions. Check the operation of the **FREESPOOL** lever for smooth operation. Each of the two positions has a detent.

Check that the positions of the **FREESPOOL** lever are the same as the position indicators on the control housing. Loosen the U-bolt that holds the control cable in the housing to adjust the control lever. Make sure the control lever does not hit the housing at the end of its travel. The linkage and cable must be adjusted so that the **FREESPOOL** shifter mechanism will slide the drum pinion gear to both detent positions.

FREESPOOL Drag Adjustment for S/N AW6F-4061 and prior, without Exterior Drag Adjust

The preload on the bearings of the intermediate shaft controls the resistance to rotation of the drum during the

FREESPOOL operation. The resistance to rotation is correct when the drum can be rotated by hand, but the drum will not rotate more than one-half revolution freely.

The addition or removal of shims for the preload on the bearings of the intermediate shaft requires the removal of the cover for the intermediate shaft. This adjustment is normally only necessary if the winch has had an overhaul. See Section 4 if this adjustment is required.

FREESPOOL Drag Adjustment for S/N AW6F-4062 and after, with Exterior Drag Adjust (See Figure 3-5)

The preload on the bearings of the intermediate shaft controls the resistance to rotation of the drum during the **FREESPOOL** operation. The resistance to rotation is correct when the drum can be rotated by hand, but the drum will not rotate more than one-half revolution freely.

On W6F winches S/N 4062 and above, an adjusting screw is located in the center of the bearing retainer for the intermediate shaft; please refer to Figure 3-6. This screw can be tightened or loosened to adjust the preload on the intermediate shaft. The jam nut will maintain the **FREESPOOL** setting.

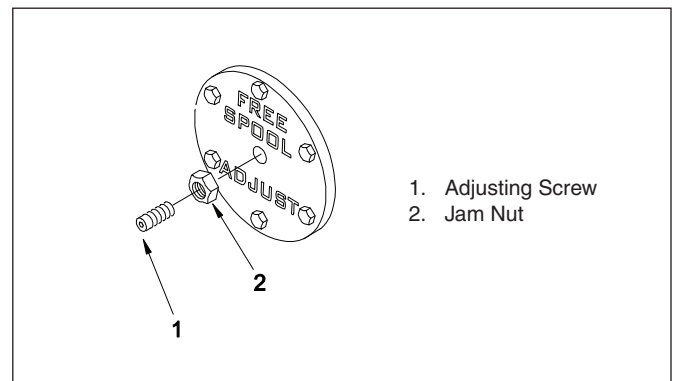


Figure 3-6 FREESPOOL Adjustments

⚠ CAUTION

Setting the preload on the intermediate shaft too tight will cause bearing overload. Setting the preload too loose will allow shaft to not be parallel. Use caution when adjusting. Determine the correct preload by starting with the preload too loose, and gradually increase the preload until the correct resistance to rotation is achieved (see Page 16). Increase the preload by turning the adjusting screw by a maximum of 1/6 rotation (60 degrees), and striking the housing with a mallet to make sure the bearing is sliding. Check resistance to rotation after each adjustment.

Hydraulic System Pressure Checks (Fig. 3-7)

The hydraulic oil and filter(s) should be maintained as indicated in the Maintenance Schedule. If any problems are found, they should be corrected before operating the winch.

Preparation

Prior to checking the hydraulic pressures, perform the following:

1. Check oil level.
2. Remove wire rope from drum to prevent entanglement during pressure checks since the drum will rotate during the tests.



WARNING

Vehicle engine must be shut OFF before disconnecting drum wire rope. Be careful when you remove the wire rope from the drum. The end of the wire rope can move like a compressed spring, possibly causing an injury when the ferrule is released from the drum.



WARNING

Always wear gloves when handling wire rope.

3. Start the engine and place the winch in **BRAKE-OFF** to raise the oil temperature to at least 20°C (70°F).
4. Remove any dirt from the left side of the winch. Remove control valve access plate.
5. Stabilize engine speed at 1000 RPM for all tests unless otherwise specified.
6. Conduct tests in order outlined below.
7. When complete, install control valve access cover and gasket, and tighten capscrews. (Capscrews must have sealant and locking patch.)

Pressure gauges

Two 400 psi (28 kg/cm²) and one 30 psi (2 kg/cm²) calibrated pressure test gauges are required to perform the hydraulic pressure checks.

NOTE: Shut off the tractor engine when connecting and disconnecting test gauges.



WARNING

Place control lever in BRAKE-ON to prevent accidental discharge of pressurized oil stored in the accumulators.

Brake Pressure Check

With the engine shut off, connect one high pressure gauge to Brake Port D with a ¼" JIC (37° flare) female adapter. Start the engine and refer to Figure 3-8. Adequate brake pressure is required to fully release the brake. If the pressure is not as specified, check for:

1. Improper relief valve setting or malfunction
2. Suction or pressure filter malfunction
3. Leaking pressure hoses or fittings
4. A defective hydraulic pump. A defective pump is usually indicated by low pressure and pressure increases with increased engine RPMs.

Cooling Oil Pressure Check

With the engine shut off, connect one low pressure gauge to Port C. Start the engine and see the Cooling section in Figure 3-8. If the cooling oil pressure is too high, it can stroke the clutch piston and drag the clutch pack. The result is overheating. Low cooling oil pressure will not produce enough cooling oil flow and cause overheating. Check for a defective cooling oil relief valve.

Adjust relief valve as follows:

1. Start engine and place control lever in **BRAKE-OFF**.
2. Loosen relief valve locknut. Turn relief valve adjusting capscrew IN to increase pressure and OUT to decrease pressure. Adjust pressures as shown in Figure 3-8.
3. Tighten locknut after adjustment is completed.
4. Recheck pressure reading and repeat steps 2 and 3 if necessary.

Accumulator Pressure Check

With the engine shut off, connect one low pressure gauge to Port D. This check determines if the accumulators are functioning and have the correct nitrogen charge. Observe the following while referring to the accumulator section in Figure 3-8.

1. With engine running, place control lever in **BRAKE-OFF** and rev engine to maintain 220 psi (1520 kPa) for one minute. This will ensure that the accumulators will have a full supply of oil.
2. Return handlever to **BRAKE-ON**.
3. Shut the engine off and wait one minute.
4. Place the handlever in the **BRAKE-OFF** position. This will release the oil in the accumulators. Observe the initial pressure reading and the time for the pressure to drop below that specified in Figure 3-8.

If the leak down time is less than specified in Figure 3-8, repeat steps 1 through 4, but do not delay in placing the handlever in **BRAKE-OFF** after the engine is shut down. If the leak down time is greater than that measured when waiting one minute, then there is either a leak in the lines between the accumulators and the accumulator valve or a leaking accumulator check valve. Low accumulator gas pressures will tend to stall the winch on a low engine rpm shift. To determine if accumulators have any gas pressure, remove valve stem protective cover and push gently on valve stem. A ruptured bladder will emit oil. Accumulators are not rebuildable.

Forward Clutch Pressure Check and Forward Modulator Valve Check

With the engine shut off, connect one low pressure gauge to Port B. Start the engine and place handlever in **BRAKE-OFF** to build up the accumulator system pressure. Place handlever in **LINE-IN** position and check FORWARD (**LINE-IN**) clutch and **LINE-IN INCHING** pressures as indicated in Figure 3-8. On a fast shift the clutch pressure should come up with the brake pressure. In **LINE-IN INCHING** the clutch pressure should lag the brake release pressure as shown in Figure 3-8. If the pressure differential is too low the brake will not release soon enough and cause it to stall. If the pressure differential is too high the brake will release too soon and cause backspinning of the drum.

If the forward clutch pressure is not as specified in Figure 3-8, check for:

1. Leaking pressure hoses or fittings
2. Damaged or worn clutch piston seals
3. Improper control valve spool movement

4. Broken seal rings on clutch shaft
5. Damaged O-rings on clutch shaft. Troubleshooting information is given in Section 2.

If the **LINE-IN INCHING** pressure differential is not as specified in Figure 3-8, remove the forward modulator valve and check for defective or dirty parts. To adjust the modulator valve, proceed as follows:

1. Loosen the forward modulator adjustment locknut. With engine running move the handlever toward **LINE-IN** until the brake pressure reads 140 PSI (9.5 kg/cm²). Use 180 PSI (12.7 kg/cm²) for Komatsu D65.
2. Turn the adjusting capscrew IN to decrease Forward Clutch Pressure, or OUT to increase pressure until the Forward Clutch Pressure is less than the brake pressure by the amount specified in Figure 3-8.
3. Tighten locknut and recheck pressure. Repeat steps 1 and 2 if necessary.

Reverse Clutch Pressure Check and Reverse Modulator Valve Adjustment

Shut off the engine and connect the high pressure gauge to Reverse Clutch Port C. Start the engine. Place the handlever in **LINE-OUT** and check reverse clutch and **LINE-OUT INCHING** pressures as indicated in Figure 3-8. On a fast **LINE-OUT** shift the clutch pressure should come up with the brake pressure. In **LINE-OUT INCHING** the clutch pressure should lag the brake release pressure as shown in Figure 3-8. If the pressure differential is too low the brake will not release soon enough and cause drag. If the pressure differential is too high the brake will release too soon and cause backspinning of the drum.

If the reverse clutch pressure is not as specified in Figure 3-8, check for:

1. Leaking pressure hoses or fittings
2. Damaged or worn clutch piston seals
3. Improper control valve spool movement
4. Broken seal rings on clutch shaft
5. Damaged O-rings on clutch shaft. Troubleshooting information is given in Section 2.

Figure 3-7 Hydraulic System Pressure Checks

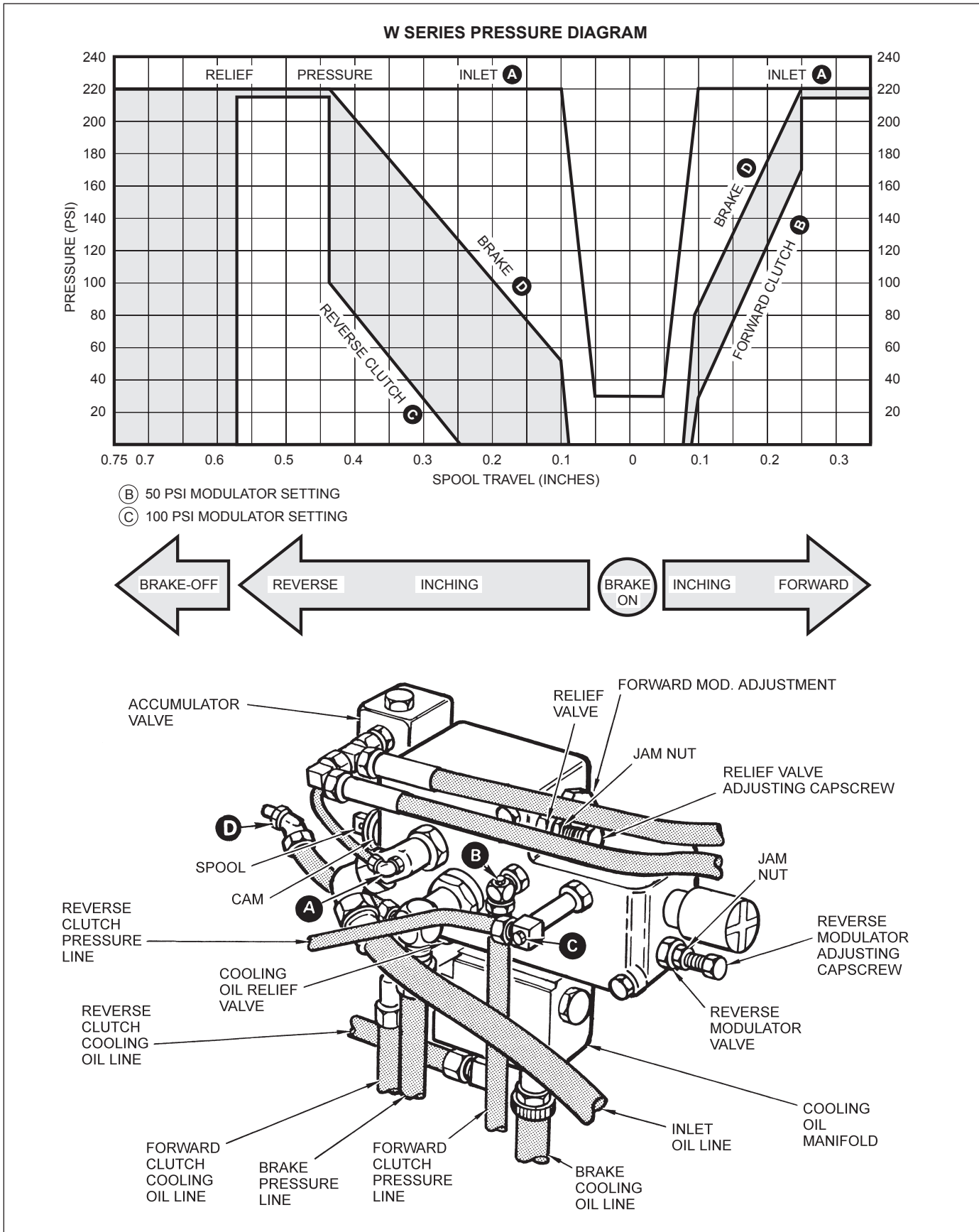


Figure 3-8 Hydraulic System Pressure Tests

ITEM FUNCTION	CHECK PORT	TEST EQUIPMENT REQUIRED	CONTROL POSITION	PRESSURE	CORRECTIVE ACTION
Brake	D – Brake	1 – 400 psi (25 kg/cm ²) gauge	BRAKE-OFF	220 psi (15.5 kg/cm ²) Pressure not to exceed 250 psi at high idle	Adjust relief valve
Cooling	C – Cooling	1 – 30 psi gauge	BRAKE-ON	8-11 psi at full throttle (0.57-0.61 kg/cm ²)	Check or replace cooling oil relief valve
Accumulator	D – Brake	1 – 400 psi (25 kg/cm ²) gauge	<ol style="list-style-type: none"> 1. BRAKE-OFF 2. BRAKE-ON 3. Stop Engine 4. BRAKE-OFF 5. Repeat if required 	220 psi (15.5 kg/cm ²) None None—wait 1 minute 175 psi (12.8 kg/cm ²) minimum immediately & 100 psi (7 kg/cm ²) minimum after 30 seconds	<ol style="list-style-type: none"> 1. Check hydraulic lines for leaks 2. Replace accumulator valve 3. Check for defective accumulators
LINE-IN (Forward)	B – Forward	1 – 400 psi (25 kg/cm ²) gauge	LINE-IN	220 psi (15.5 kg/cm ²)	Refer to Section 2, Figure 2-1 for Low Forward or Reverse Clutch Pressure troubleshooting procedures
LINE-IN (Inching)	B – Forward D – Brake	2 – 400 psi (25 kg/cm ²) gauge	Vary between BRAKE-ON and LINE-IN	Port B 50 psi (3.5 kg/cm ²) less than Port D* (Deere 750/755 & Komatsu use 90 psi [6.3 kg/cm ²])	Check or replace forward modulator valve
LINE-OUT (Reverse)	C – Reverse	1 – 400 psi (25 kg/cm ²) gauge	LINE-OUT	220 psi (15.5 kg/cm ²)	Refer to Section 2, Figure 2-1 for Low Forward or Reverse Clutch Pressure troubleshooting procedures
LINE-OUT (Inching)	C – Reverse D – Brake	2 – 400 psi (25 kg/cm ²) gauge	Vary between BRAKE-ON and LINE-OUT	Port C 120 psi (8.4 kg/cm ²) less than Port D	Adjust reverse modulator

* The pressures specified are based on winches equipped with paper-type friction materials in the brake and clutches. The W6F models used metal friction materials in early models, which require different modulator pressure adjustments as follows:

FRICTION MATERIAL TYPE		PRESURE DIFFERENTIAL BETWEEN BRAKE & CLUTCH		SERIAL NUMBER SEQUENCE BREAKS
Clutch	Brake	LINE-IN INCHING	LINE-OUT INCHING	W6F
Metal	Metal	20 psi (1.4 kg/cm ²)	80 psi (5.6 kg/cm ²)	Prior to 1689
Metal	Paper	20 psi (1.4 kg/cm ²)	100 psi (7.0 kg/cm ²)	1689 - 1999
Paper	Paper	50 psi (3.5 kg/cm ²)	120 psi (8.4 kg/cm ²)	2000 - up

Pressure readings may vary +/- 5 psi (0.4 kg/cm²).

NOTE: All John Deere Mountings use paper frictions in clutches and brake regardless of serial number.

If the **LINE-OUT INCHING** pressure differential is not as specified in Figure 3-9, proceed as follows:

1. Loosen the reverse modulator adjustment locknut and start engine. Move the control lever towards **LINE-OUT** until the brake pressure reads 140 PSI (9.8 kg/cm²). Use 180 PSI for Komatsu D65.
2. Turn the adjusting capscrew IN to decrease Reverse Clutch Pressure, or OUT to increase pressure until Reverse Clutch Pressure is less than the brake pressure by the amount shown in Figure 3-8.
3. Tighten locknut and recheck pressure. Repeat steps 1 and 2 if necessary.

Control Valve Spool Travel Check (See Fig. 3-9)

It may be necessary to check spool travel when control valve pressures do not meet specifications. Figure 3-7 shows the correct travel for the various spool positions. The control valve spool is self-positioned to **BRAKE-ON**. The three other travel positions are determined by spool assembly internal stops and a detent assembly in the spool end cap. If spool travel is found to be out of adjustment, the spool assembly or complete control valve assembly should be replaced. Ensure that the spool end cap is installed securely, then perform the check for smooth return of control lever to neutral from any other position. Any binding or sticking should be investigated by removing the spool cap and examining parts for wear.

NOTE: The spool is detented in BRAKE-OFF. If spool does not hold in this position, examine the detent parts inside the spool end cap and repair or replace as necessary.

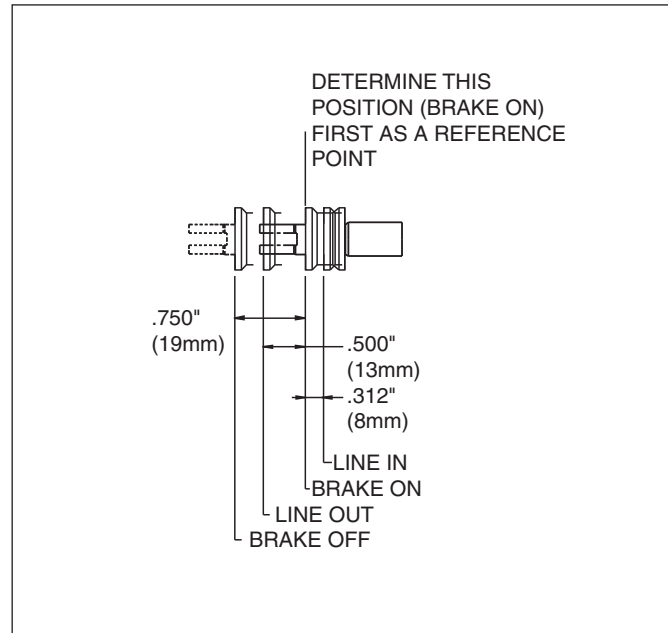


Figure 3-9 Control Valve Spool Travel

Decal, Nameplate and Service Plate Installation

The unit nameplate, a Warning Decal and a Maintenance Instructions Decal are located on the winch. If the nameplate has been damaged, obtain a new one and install the new nameplate in the location shown in Figure 3-10. If the Warning Decal or Maintenance Instructions

Decal have been damaged, install a new one in the location shown.

The model decals are used on both sides of the winch frame as shown. Replace as necessary.

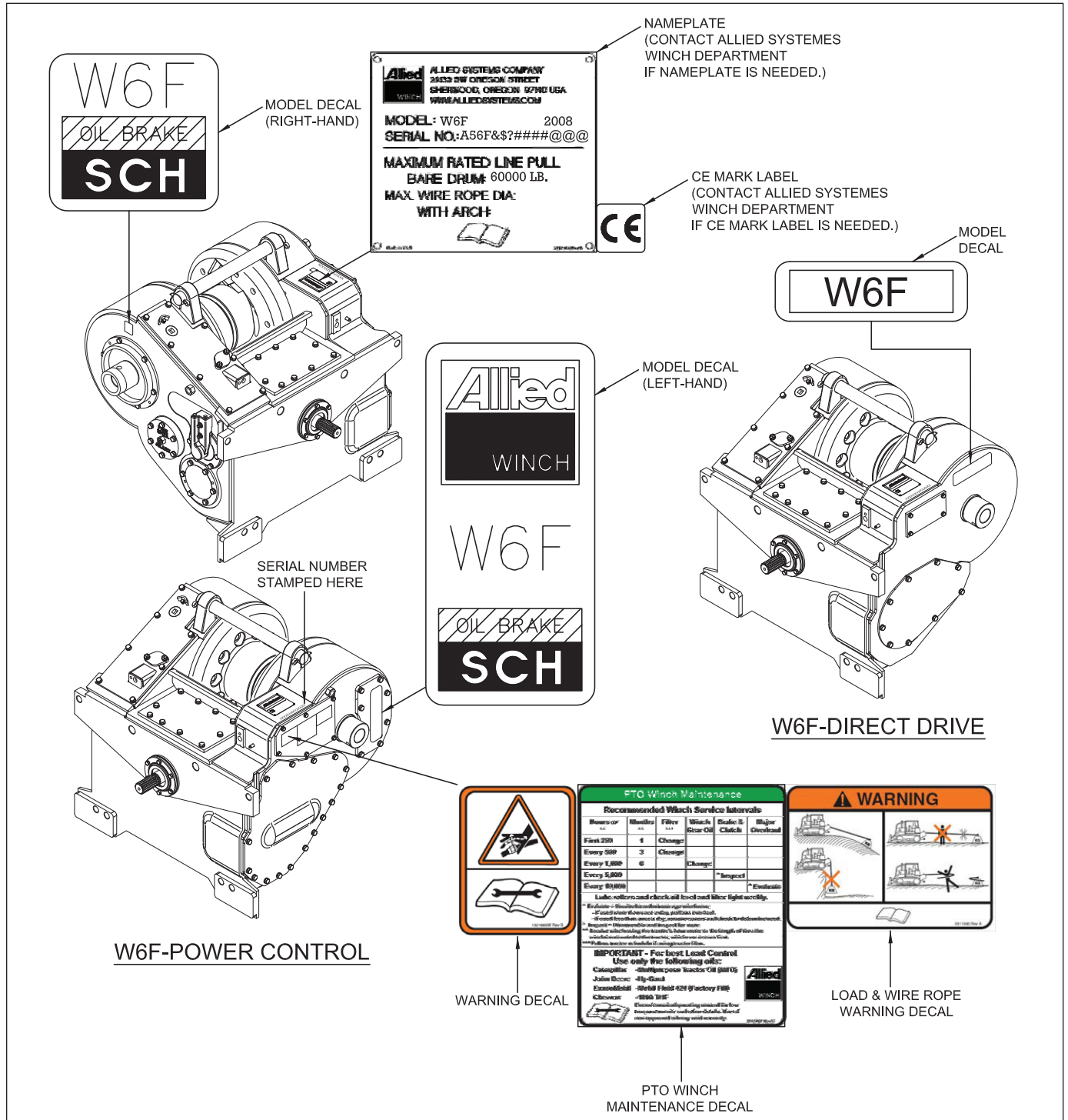


Figure 3-10 Decal Installation

Repairs

General

This section includes the removal and disassembly of all major shaft assemblies, inspection of components, and reassembly and installation. The wear points detailed in Figure 4-13 should be inspected at the time of disassembly so that worn parts may be ordered and replaced prior to reassembly. If the winch is to be completely overhauled, perform the removal, disassembly, inspection and reassembly procedures in the sequence of the following paragraphs.

NOTE: Always use the troubleshooting procedures given in Section 2 to locate a malfunction before performing a major overhaul of the unit. Make all checks in a systematic manner. Haphazard checking wastes time and can cause further damage.

Review and perform any adjustments that may be the cause of a malfunction (refer to Section 3).

Use new seals, gaskets and O-rings when installing components.

CAUTION

Cleanliness is of extreme importance in the repair and overhaul of any hydraulic unit. Before attempting any repairs, the exterior of the winch must be thoroughly cleaned to prevent the possibility of contamination.

Winch Removal

1. Remove the arch or fairlead from the winch. If these accessories are left on the winch, the winch may not remain level when lifted from the tractor.
2. Remove the wire rope from the drum. Clean the outside of the winch and the area where the winch contacts the tractor.

WARNING

Be careful when you remove the wire rope from the drum. The end of the wire rope can move like a compressed spring, causing an injury when the ferrule is released from the drum.

3. Move the control lever to the **LINE-IN** or **LINE-OUT** position at least three times to discharge the pressure in the accumulator.
4. Disconnect control cable and freespool cable from winch.
5. Connect slings and a crane or lifting device to the winch. Install lifting eyes into the lifting holes provided in the frame.

WARNING

The slings and crane used to lift the winch must have a minimum lifting capacity of 1500 kg (3000 lb.).

6. Remove transmission cover, if necessary, to remove center mounting nuts.
7. Remove mounting nuts or capscrews securing winch to tractor with the following steps:
 - a. Remove all but two top outer nuts;
 - b. Loosen the two top outer nuts to end of studs;
 - c. Pry winch loose;
 - d. Remove the two top outer nuts;
 - e. Remove winch.

Winch Disassembly

Most repairs require disassembly of the winch, although many major assemblies can be removed from the winch with the winch still on the tractor. The procedures in this section describe a complete unit overhaul with the winch removed from the tractor. However, winch removal is not necessary for removal of individual shaft assemblies. Disassemble the winch as necessary to make repairs.

Figures 4-1 and 4-2 show the gears and components contained within the winch housing.

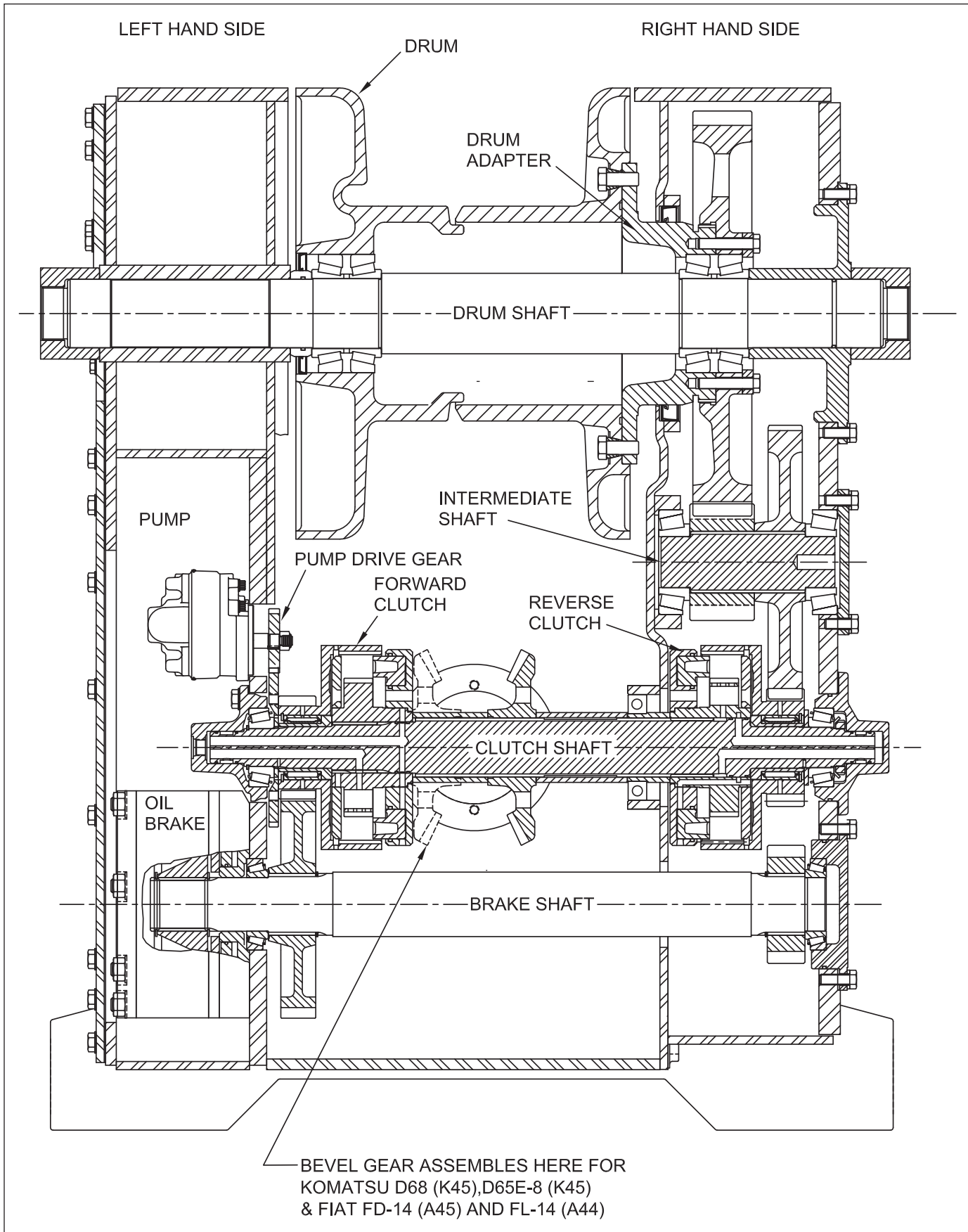


Figure 4-1 General Arrangement, Non-Freespool

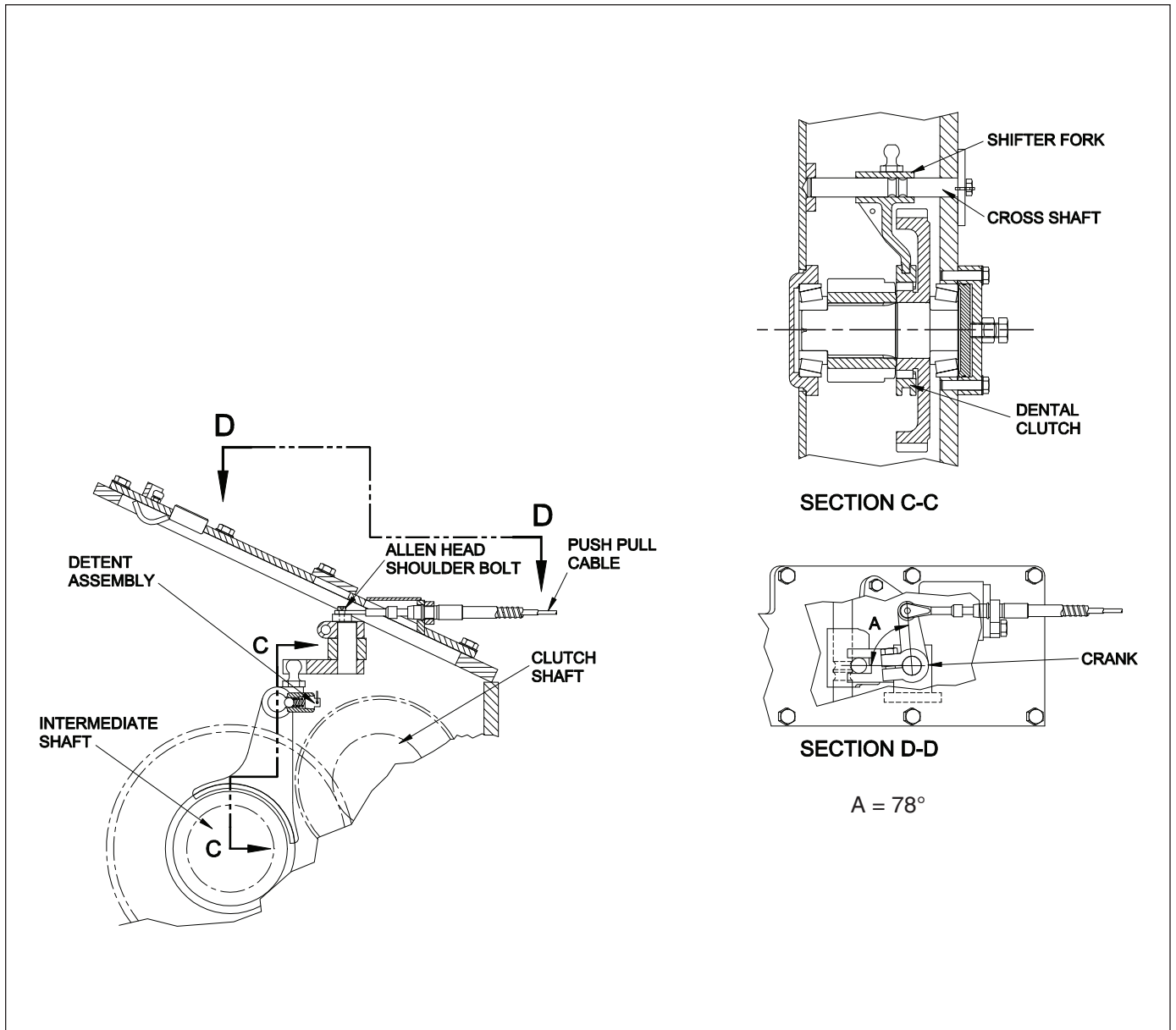


Figure 4 -2 Freespool Arrangement

PTO Shaft Removal and Disassembly

Please refer to Fig. 4-3 through Fig. 4-6. Before removing the PTO shaft assembly, the winch must be removed from the tractor as explained above in **Winch Removal**.

1. Remove sealing capscrews. If winch is equipped with a drive adapter, refer to Step 4.
2. Pull PTO shaft assembly straight out.

CAUTION

Tag the shim pack so that the exact number of shims are re-installed.

3. Disassemble and inspect PTO shaft (refer to Fig. 4-3 through Fig. 4-6).
4. If equipped with a drive adapter, remove the drive adapter box first (refer to Fig. 4-7 through Fig. 4-10), then the bevel pinion gear and carrier. Disassemble and inspect as required.

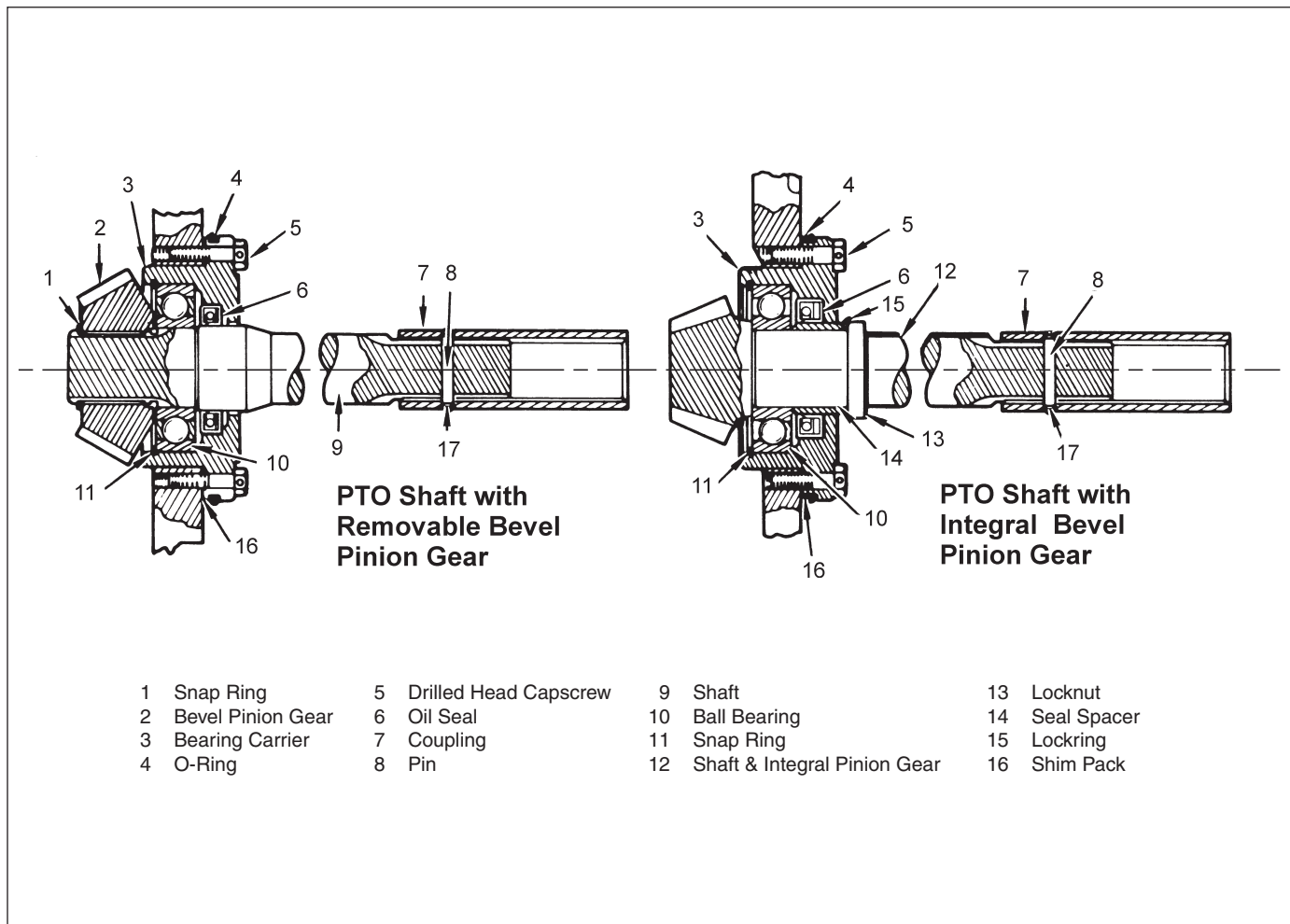


Figure 4-3 PTO Shafts - Last Used on W6FP-3699, W6FX-3699 & AW6F-1000

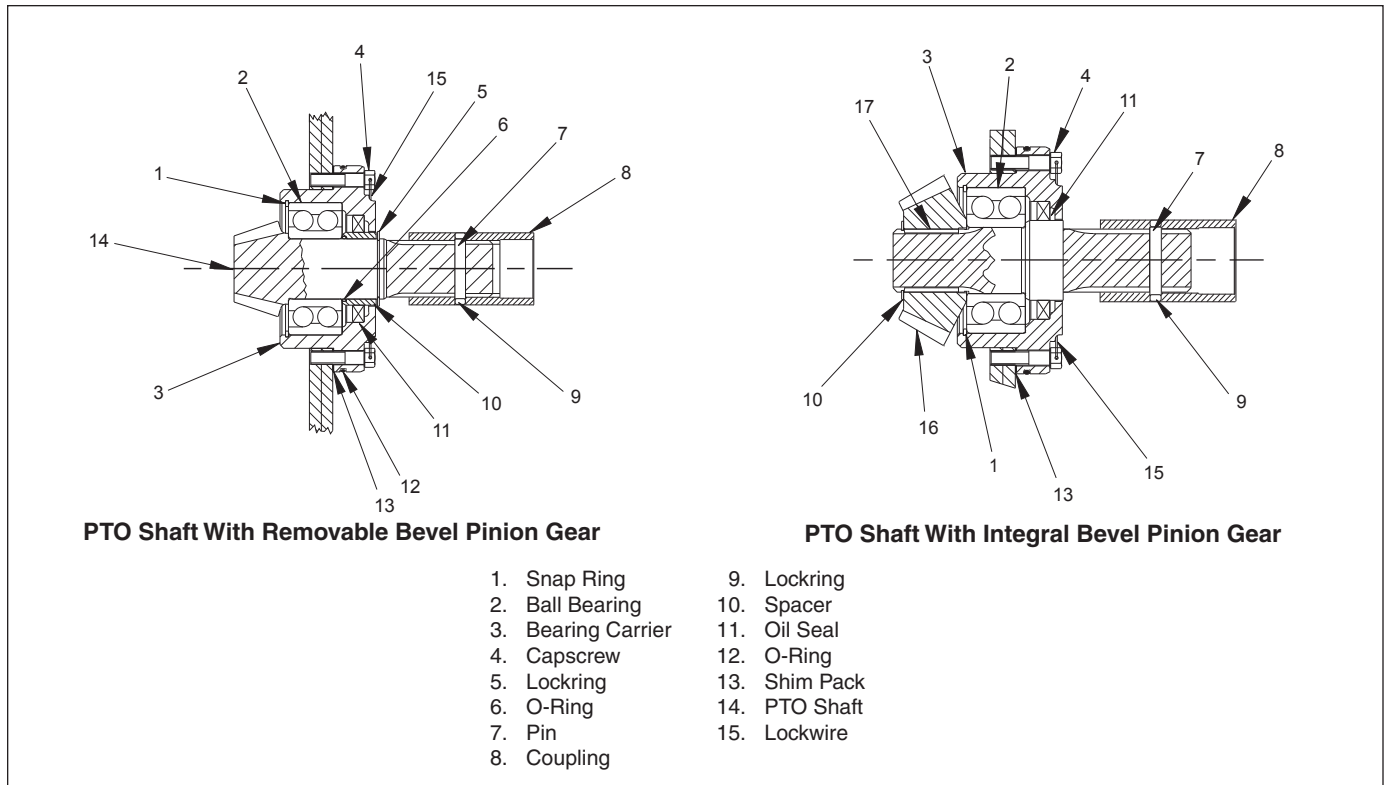


Figure 4-4 PTO Shafts, First Used on AW6F-1001

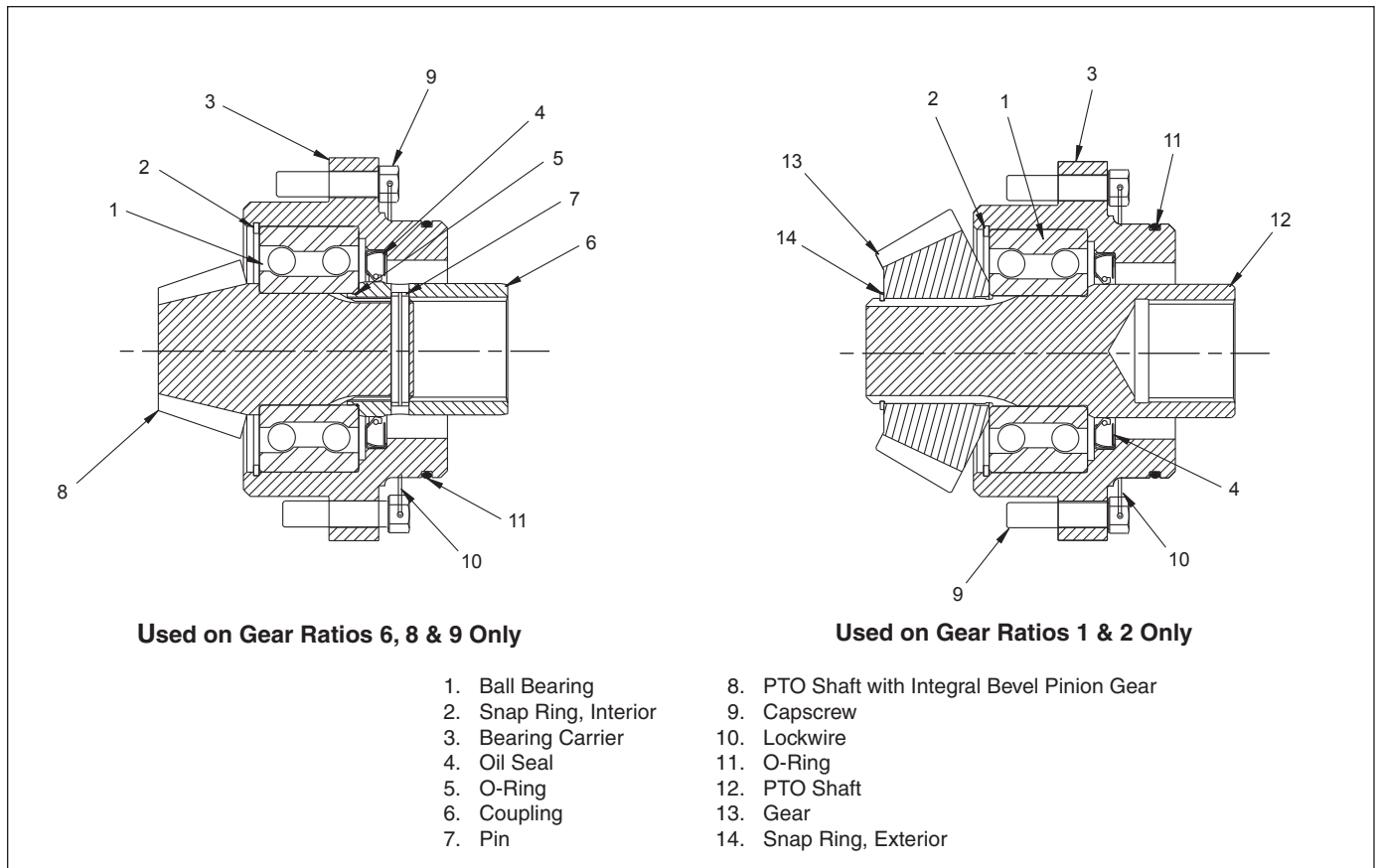
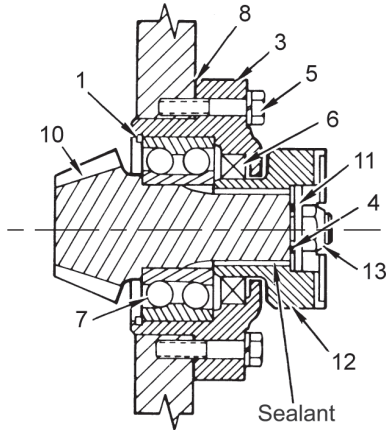


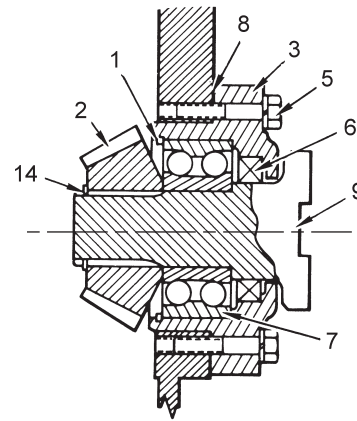
Figure 4-5 PTO Shaft on W6F for Caterpillar 527

Repairs - PTO Shaft Removal and Disassembly



**John Deere 755 (E32)
John Deere 750 (E32)**

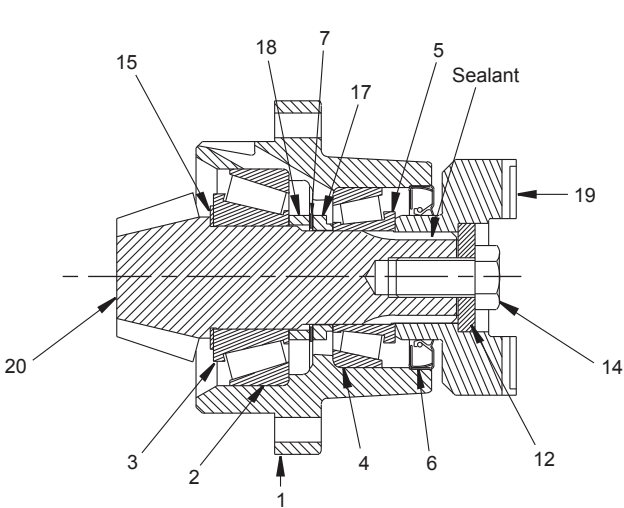
- Last Used on W6F-7143 & AW6F-1000



**John Deere 855 (E42)
John Deere 850 (E42)**

- Last Used on W6F-7143 & AW6F-1000

- | | |
|----------------------|--------------------------------|
| 1. Snap Ring | 8. Shim Pack |
| 2. Bevel Pinion Gear | 9. Shaft |
| 3. Bearing Carrier | 10. Shaft with Integral Pinion |
| 4. O-Ring | 11. Washer |
| 5. Capscrew & Washer | 12. Yoke |
| 6. Oil Seal | 13. Nut |
| 7. Ball Bearings | 14. Snap Ring |



John Deere 750 (E32, E41) / 850 (E42, E43)

- First Used on S/N W6F-7144 & AW6F-1001

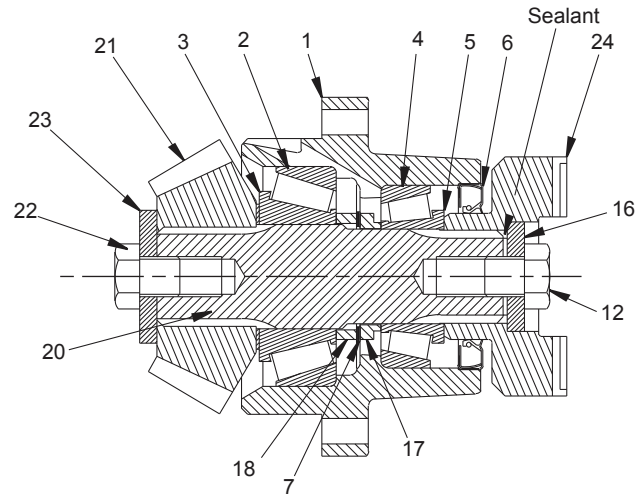
John Deere 750A (E32, E41) / 850A (E42, E43)

John Deere 750B (E32, E41) / 850B (E42, E43)

- First Used on S/N W6F-7144 & AW6F-1001,
Gear Ratios 3, 4, 6, 8 & 9 Only

John Deere 750C (E45) / 850C (E46),

Gear Ratios 6, 8 & 9 Only



John Deere 750B (E32, E41) / 850B (E42, E43)

& 750C (E45) / 850C (E46),

Gear Ratios 1 & 2 Only

- | | |
|--------------------|-------------------|
| 1. Bearing Carrier | 15. Thrust Washer |
| 2. Bearing Cup | 17. Spacer |
| 3. Bearing Cone | 18. Spacer |
| 4. Bearing Cup | 19. Yoke |
| 5. Bearing Cone | 20. Shaft |
| 6. Seal | 21. PTO Shaft |
| 7. Shim Pack | 22. Gear |
| 12. Washer | 23. Capscrew |
| 14. Capscrew | 24. Washer |

Figure 4-6 W6F John Deere PTO Shafts

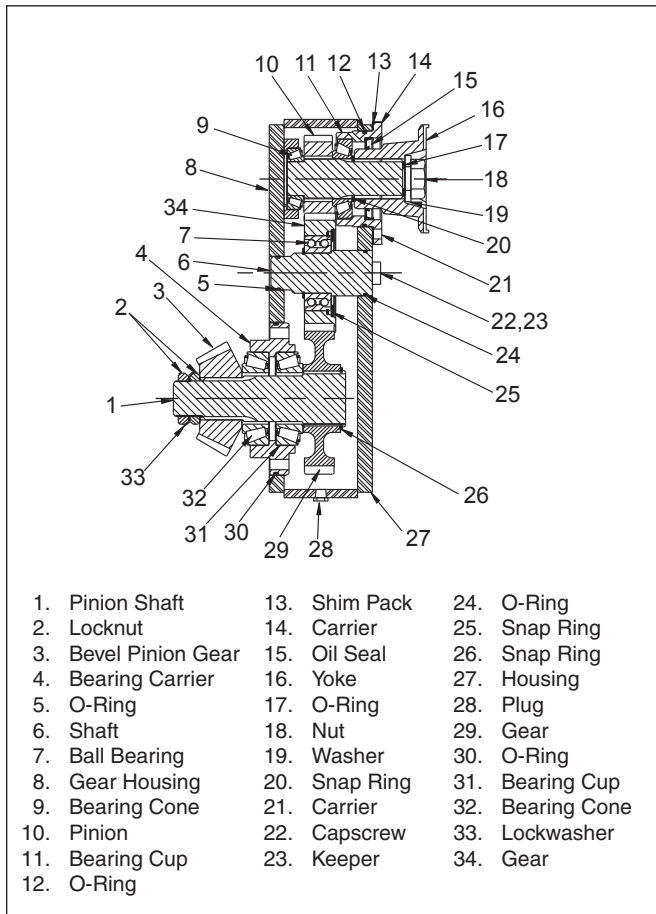


Figure 4-7 Gearbox on W6F for Komatsu D61EX-12 (K47) & D65EX-12 (K46)

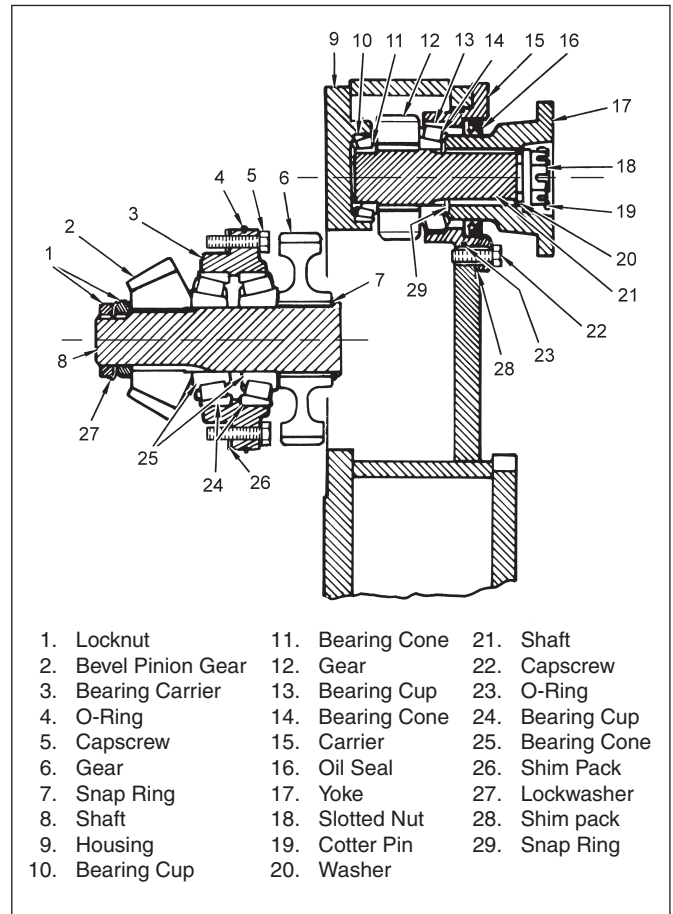


Figure 4-9 Gearbox on W6F for Komatsu D65E-6, D65E-7, D65E-8 (K41) & D68E-1 (K45)

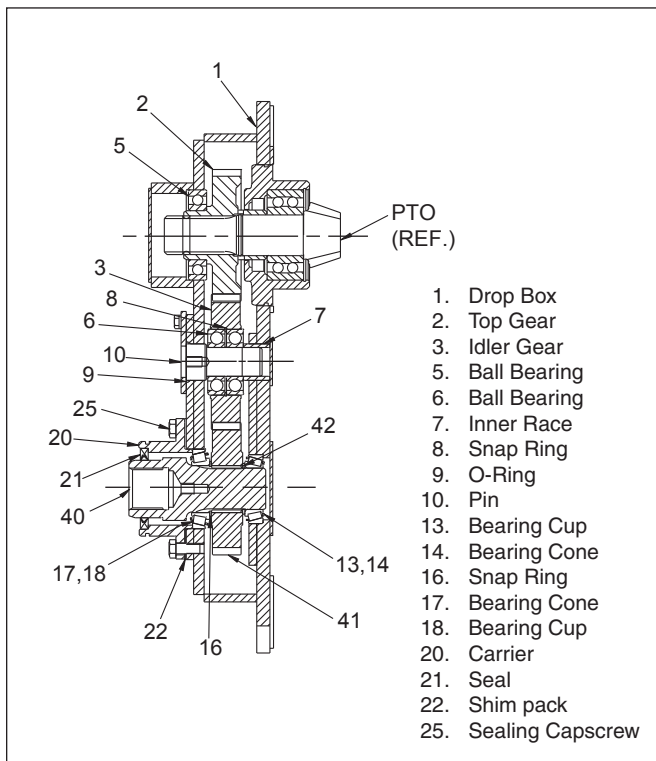


Figure 4-8 Gearbox on W6F for Caterpillar D6H/R (C480)

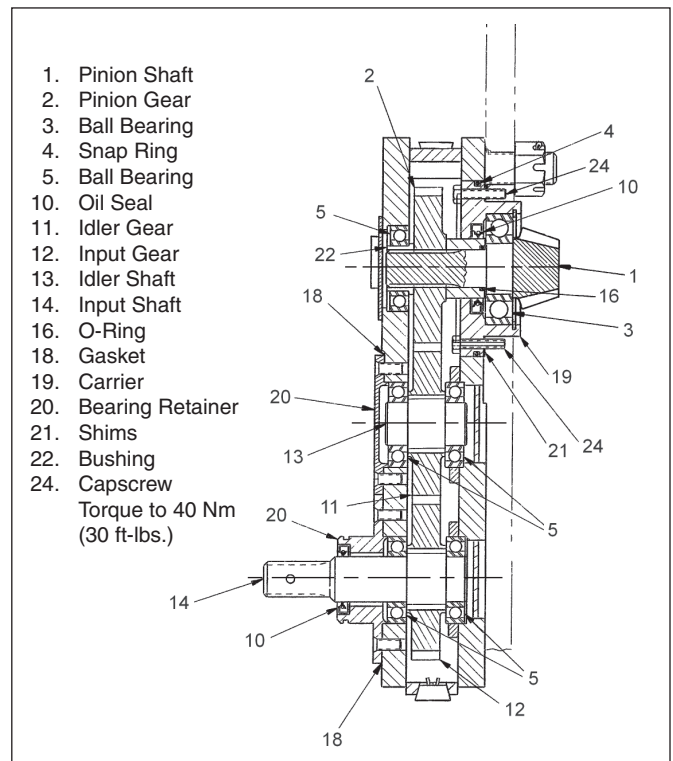
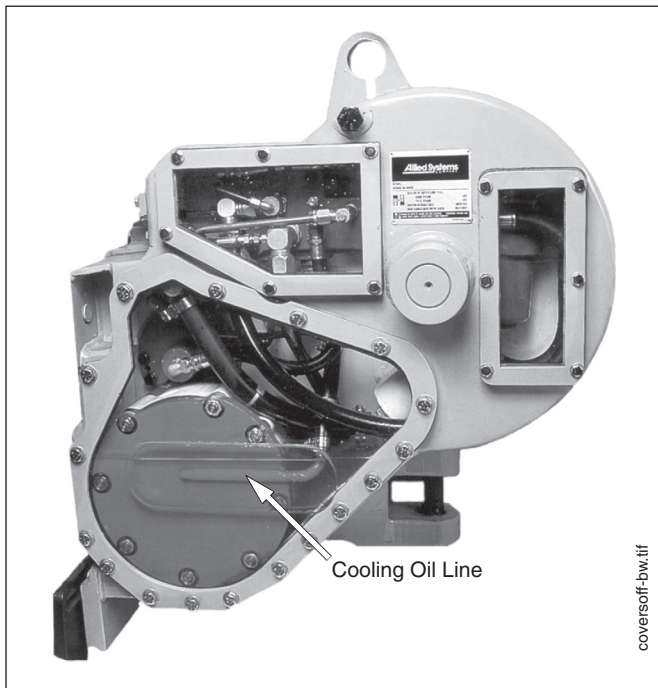


Figure 4-10 Gearbox on W6F for New Holland Construction 10C (A47), 14B & 14C (A45), FD14E (A48)

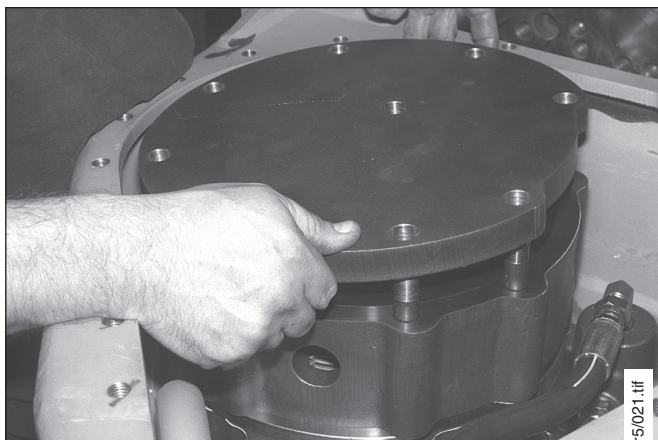
Oil Brake Removal & Disassembly

Removal and disassembly of the brake can be accomplished while the winch is mounted on the tractor. During disassembly, place all parts in a clean container to protect them from dust, dirt and moisture. Inspect all parts for damage and wear as specified in Figure 4-13.

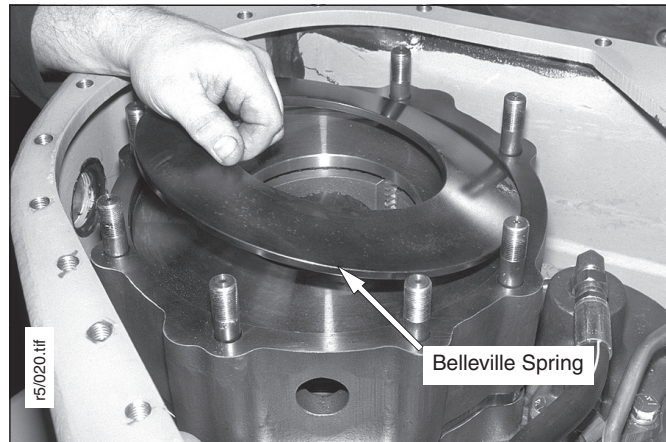
1. Drain oil from winch or position winch with left-hand side up. Remove brake assembly cover. Remove cooling oil hose line.



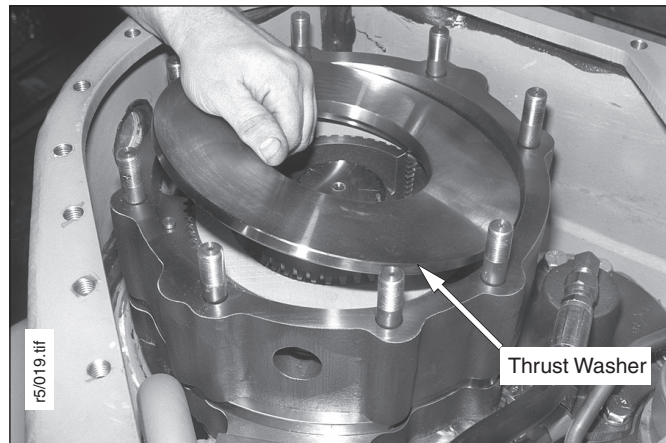
2. Loosen the locknuts evenly, then remove the brake assembly cover.



3. Remove belleville springs from cage assembly.

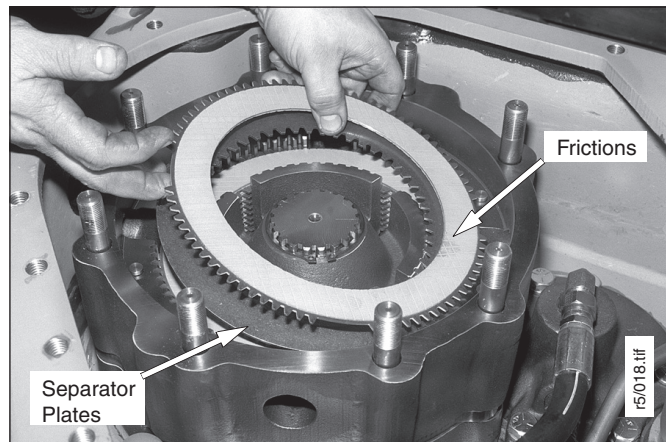


4. Remove the thrust washer.



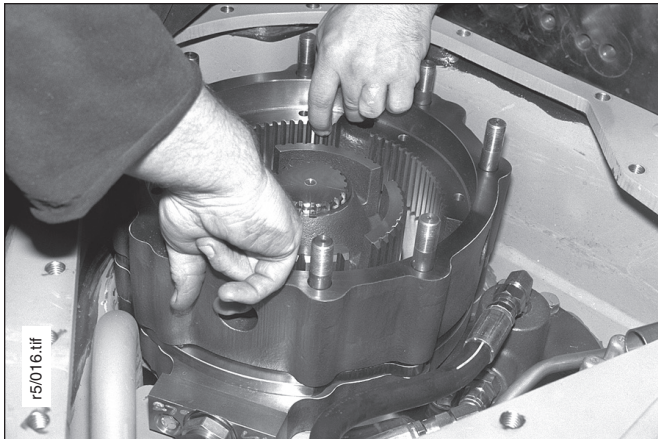
NOTE: A spacer ring (not shown) is used on W6F winch with metallic frictions.

5. Remove friction discs and separator plates from the hub.

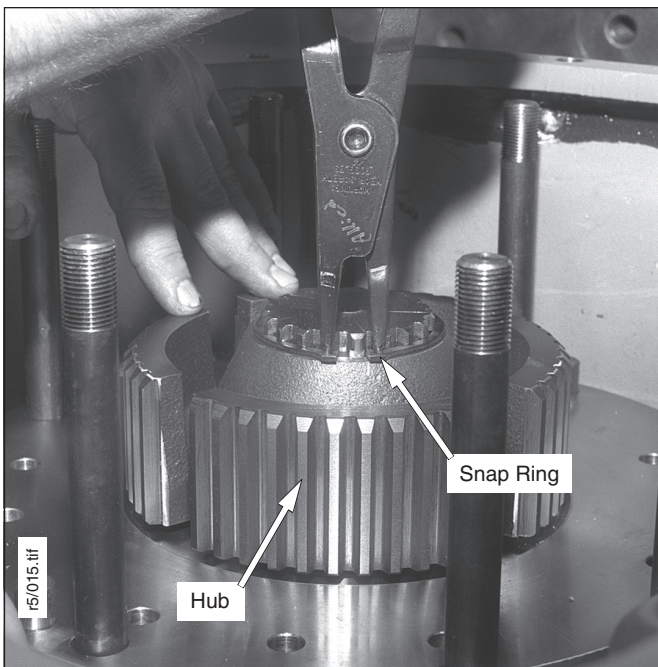


NOTE: Paper frictions are shown. Earlier W6F models use metallic frictions.

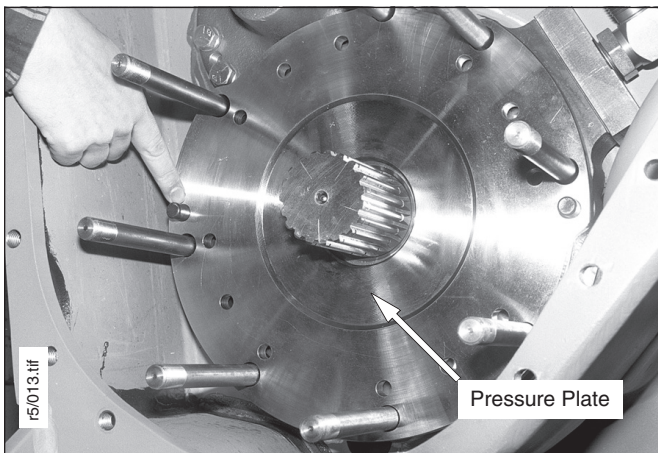
6. Remove cage from studs. It may be necessary to tap cage with a soft hammer to loosen it.



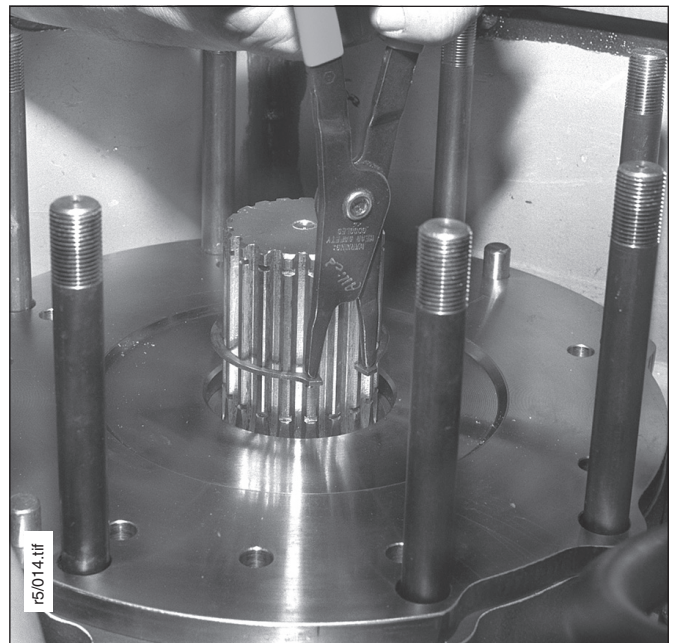
7. Remove snap ring from brake shaft and pull hub off brakeshaft.



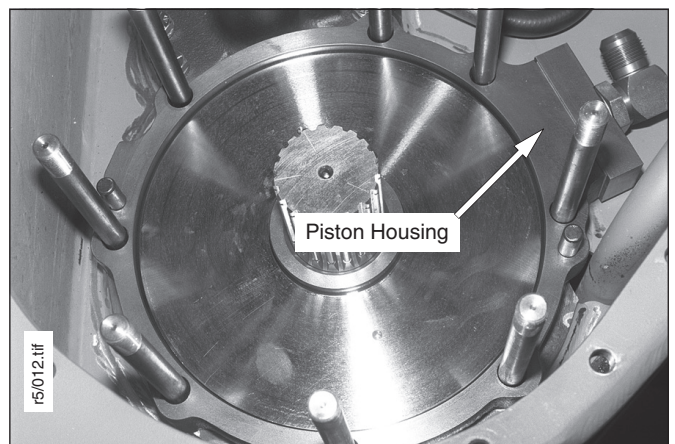
8. Remove pressure plate from studs.



9. Remove snap ring from brake shaft.



10. Slide the piston housing forward no more than one inch if only the clutch shaft bearing retainer is to be removed. To service the piston housing or brake shaft, remove the piston housing.

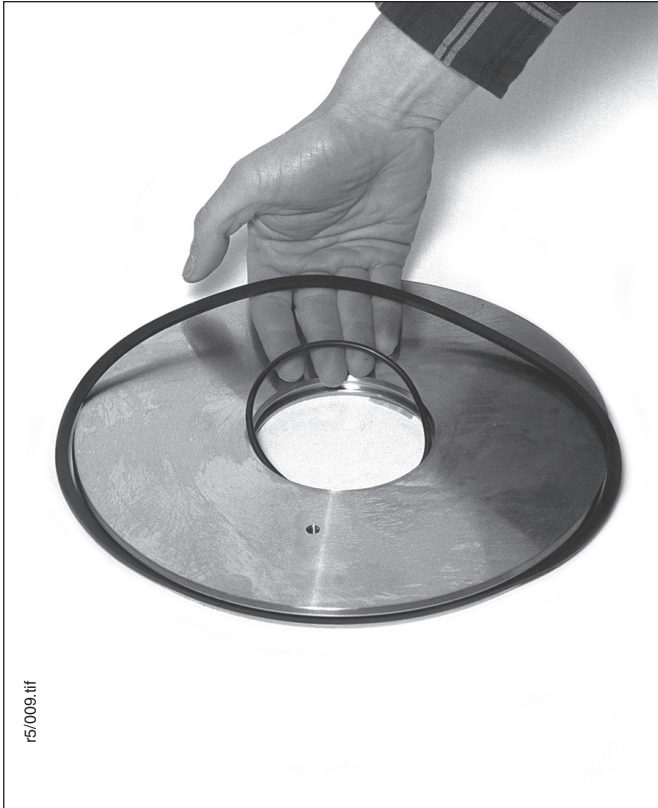


⚠ CAUTION

If the brake shaft is not to be removed, ensure that the bearing cup behind the piston housing remains in the winch case bore. If the cup falls out, the shaft will drop down and the right-hand bearing will drop out of its cup.

11. Pull the piston out of the housing using two 1/4-inch capscrews, or pressurize housing with low-pressure air.

12. Remove two O-rings from the piston. Discard O-rings.



NOTE: Inspect all oil brake components as specified in Figure 4-13.

Intentionally Blank

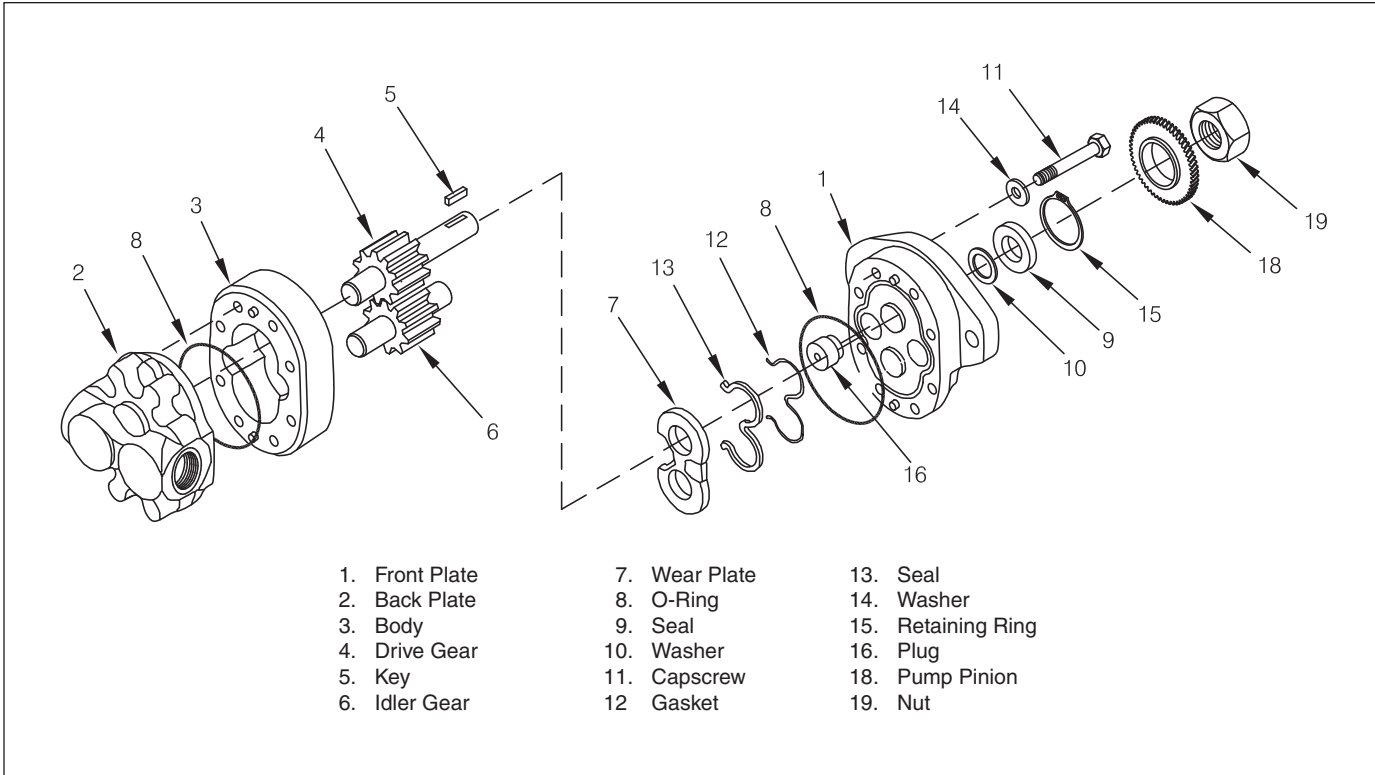
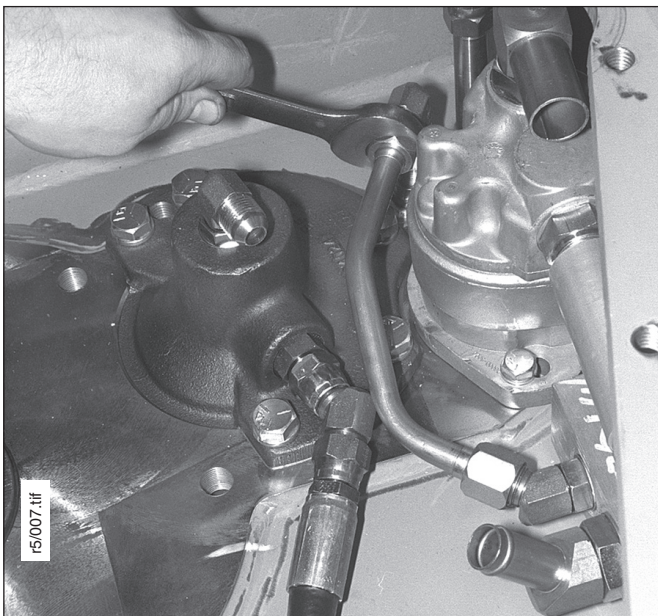


Figure 4-11 Hydraulic Pump

Hydraulic Pump Removal & Disassembly

To remove the hydraulic pump, the winch must be removed from the tractor and the input carrier must be removed. Cleanliness is extremely important when repairing these pumps. Work in a clean area.

1. Loosen suction hose at suction manifold. Remove steel tube from valve to RH side of brake housing.



2. Loosen pressure hose from pump check valve. Remove the two capscrews securing the pump, then remove the pump. See Figure 4-11 for an exploded view of the pump.

Pump Disassembly

1. Clean the pump thoroughly with solvent, kerosene, or other non-corrosive cleaning fluid which will not affect rubber components.
2. Clamp pump in vise, shaft down.
3. Scribe a line across the three sections of the pump to act as a guide in reassembly.
4. Remove capscrews.
5. Remove from vise. Hold pump in hands and bump shaft against wooden block to separate front plate (1) from backplate (2). Body (3) will remain with either front plate or backplate.
6. To separate body from section that remains, place drive gear (4) in bearing and tap protruding end with plastic hammer.

7. Remove O-Ring (8) from backplate assembly.
8. Remove wear plate (7) from front plate by prying with O-Ring pick.
9. Remove plug (16) from the front plate.
10. Remove gasket (12) and seal (13) from front plate.

Pump Inspection

1. Clean and dry all parts.
2. Remove nicks and burrs from all parts.

Pump Gear

1. Inspect drive gear (4) for broken keyway.
2. Inspect all bearing points for excessive wear and rough surfaces.
3. Replace gear assembly if shafts measure less than .6580 in (17.40 mm) in bearing area.
4. Inspect gear face for scoring and excessive wear.
5. Assure that snap rings are in grooves on either side of drive and idler gears.
6. If edge of gear teeth are sharp, dull with emery cloth.

Pump Front and Backplates

1. Oil grooves in bearings should line up with dowel pin holes.
2. Replace plate if inner diameter of bearings exceed .691 in. (17.55 mm).
3. Bearings in front plate should be flush with island in groove pattern.
4. Check for scoring on face of backplate, replace if wear exceeds .0015 in (.038 mm).

Pump Body

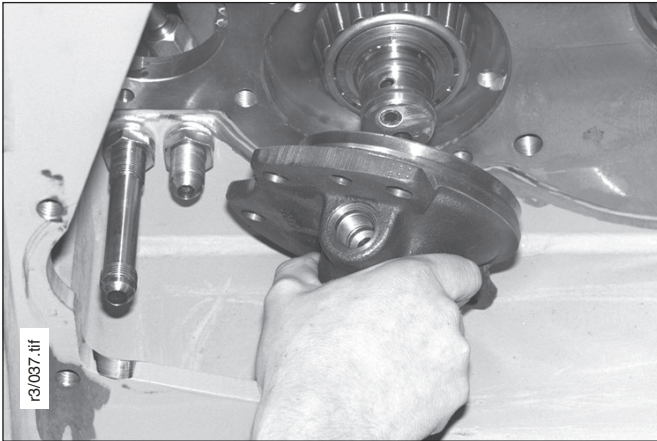
1. Check inside gear pockets for excessive scoring or wear of body.
2. Replace body if inner diameter of gear pocket exceeds 1.719 in. (43.66 mm).

Note: Do not repair the pump if gear or housing is worn. Replace with a new pump.

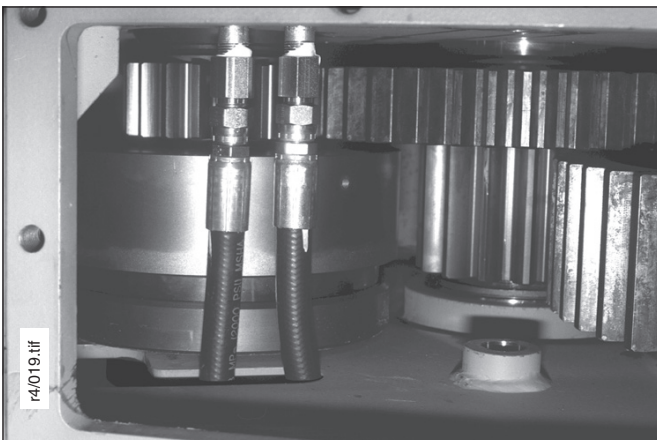
Clutch Shaft Removal & Disassembly

Figure 4-1 shows the location of clutch shaft components. Removal of the clutch shaft and associated parts can usually be accomplished with the winch mounted on the tractor. Prior to removal of the clutch shaft, perform the following:

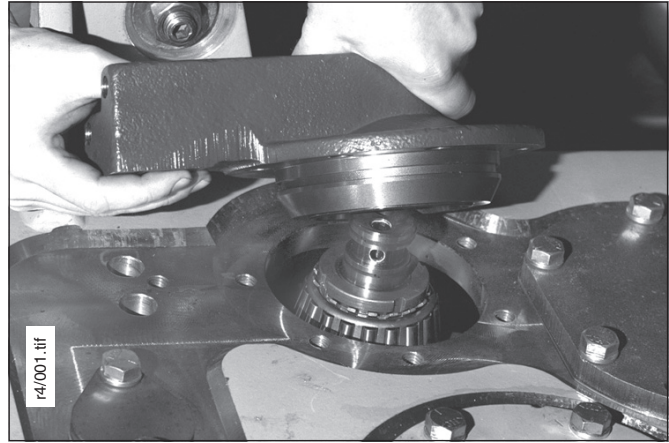
- a) Drain oil from winch.
 - b) Remove all brake components as shown in the **Oil Brake Removal and Disassembly** section, steps 1 through 10.
 - c) If equipped with freespool option remove freespool shifter shaft and fork.
1. Disconnect hydraulic lines from the left-hand bearing retainer.
 2. Remove left-hand bearing retainer and shim pack. Tag shims to aid in reassembly. Check for grooves in bore.



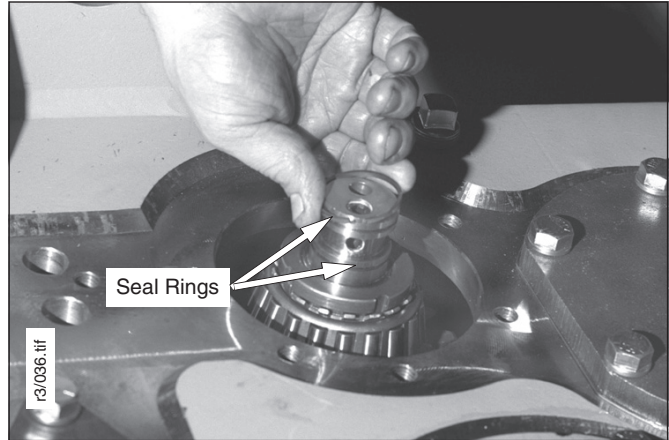
3. Remove hydraulic lines and fittings from the right hand bearing retainer.



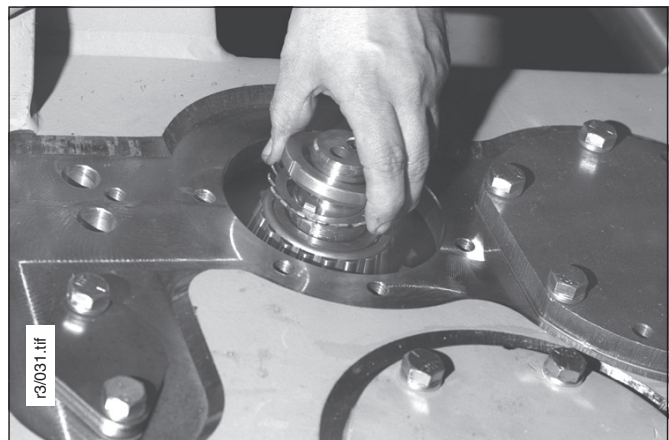
4. Remove right-hand bearing retainer and shim pack. Tag shims to aid in reassembly. Check for grooves in bore.



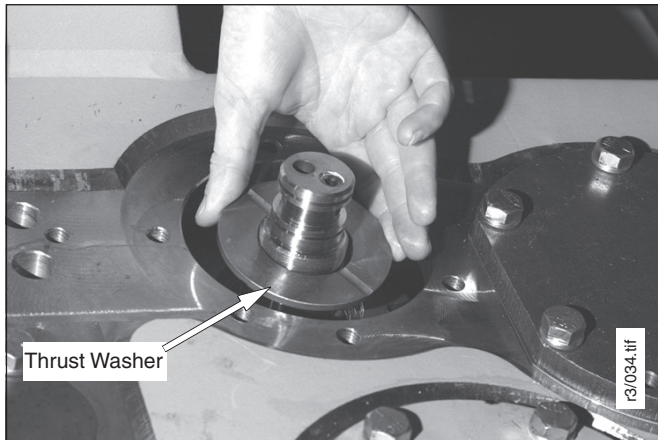
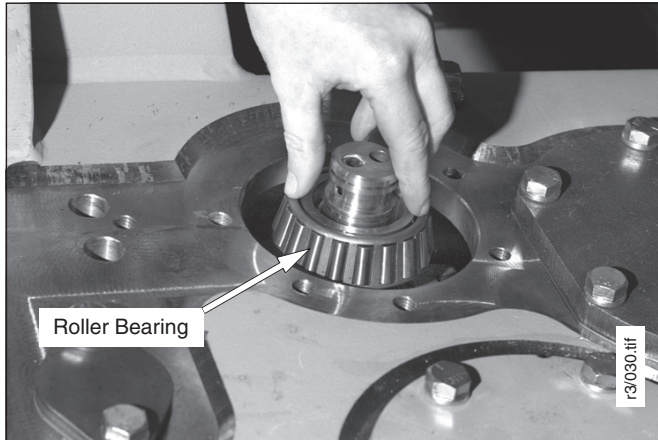
5. Remove the two seal rings from each end of the clutch shaft. Expand the seal rings just enough to slip over the end of the shaft.



6. Straighten the lockwasher tang securing the locknut. Use special tool illustrated in Fig. 4-23 on page 72 to remove the locknut.
7. Remove the locknut and lockwashers.

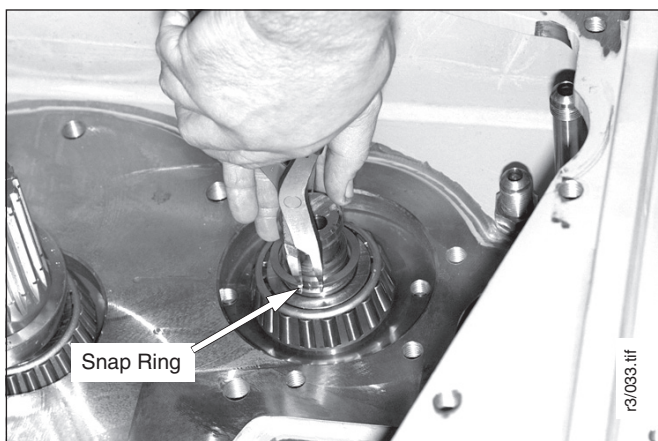


8. Remove the tapered roller bearing and thrust washer.

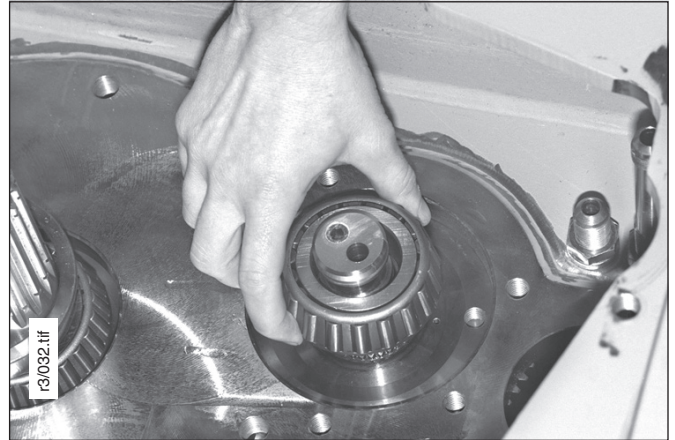


9. Remove the internal snap ring from the reverse spider gear bore.

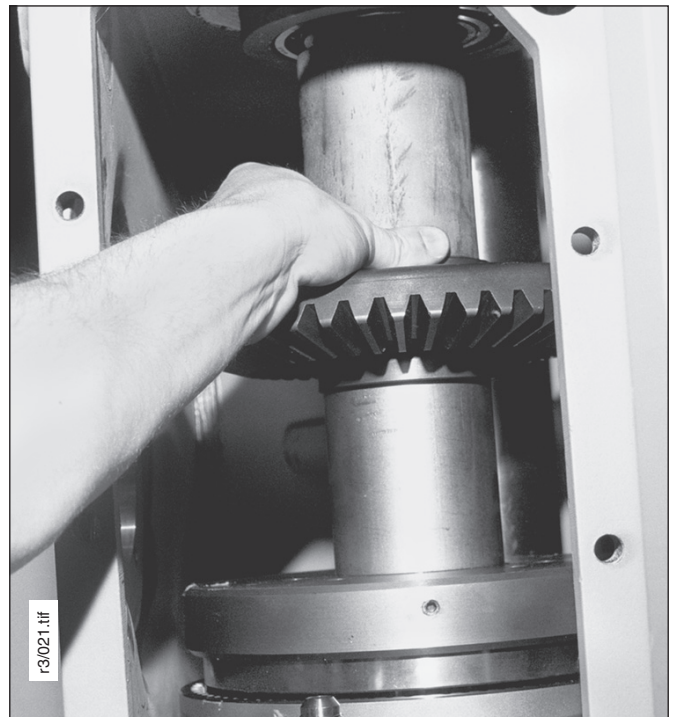
10. Remove the external snap ring from the left-hand end of the clutch shaft.



11. Remove the left-hand tapered roller bearing. Wrap end of shaft with tin or cardboard so gear will slide off end of shaft.



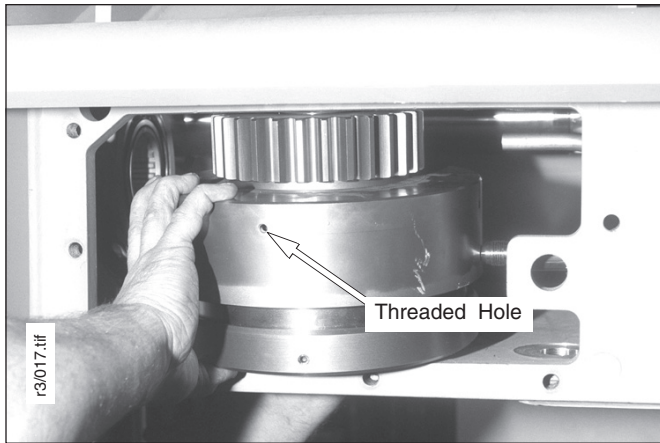
12. Using special clutch shaft driver (Figure 4-24 on page 4-72) from the left side to drive the clutch shaft out far enough to remove the spacer between the bevel ring gear and the forward clutch assembly.



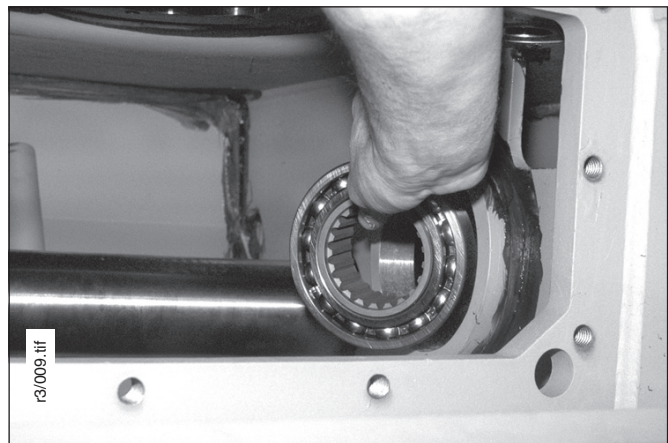
13. Remove the bevel ring gear and RH spacer. Remove the PTO pinion gear (if splined gear) or remove PTO before removing clutch assembly.

Repairs - Clutch Shaft Removal & Disassembly

14. Install a 1/4"-20 eyebolt in the threaded hole of the forward clutch pack and lift out.



16. Remove the ball bearing and carrier.

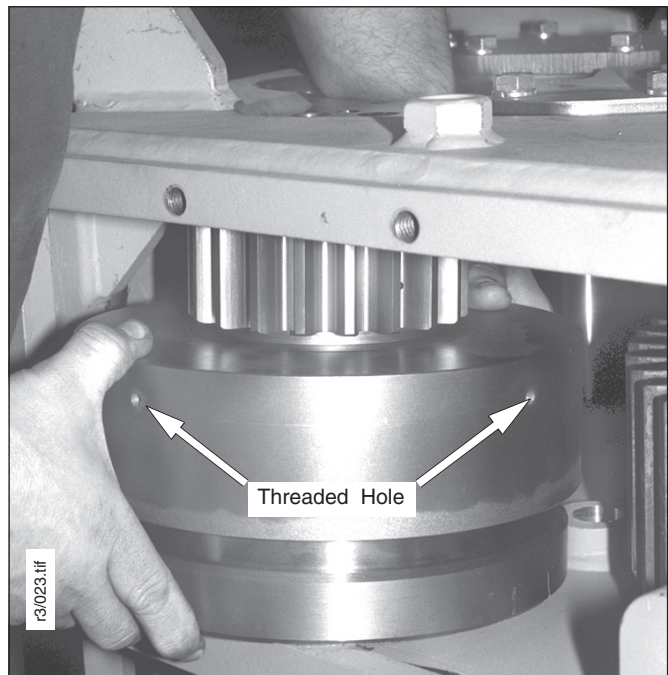


15. Secure the reverse clutch pack with heavy wire or a lifting eye. Then carefully withdraw the shaft.



17. Install a 1/4"-20 eyebolt in the threaded hole of the reverse clutch pack, and remove the reverse clutch assembly.

NOTE: If the winch is equipped with freespool, the freespool shifter assembly must be removed prior to removing the reverse clutch assembly. Refer to steps 1 to 4 in the Intermediate Shaft Removal, Freespool section.



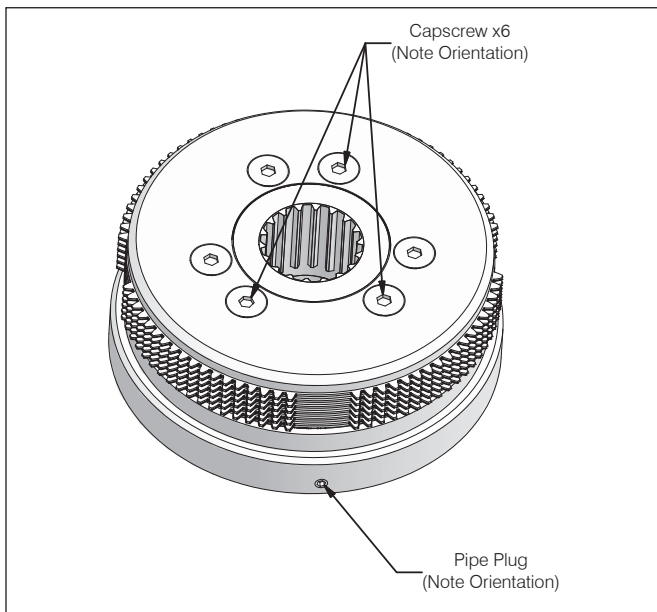
Intentionally Blank

Oil Clutch Disassembly

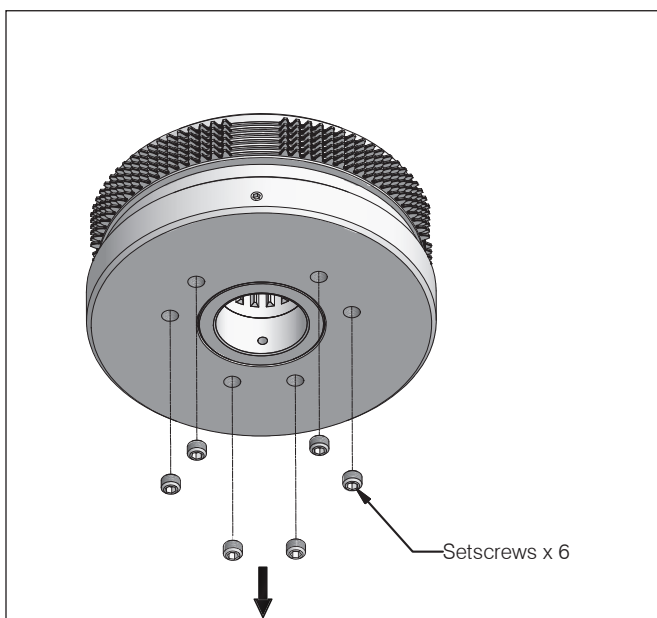
This section details the disassembly of the oil clutches. Removal of the clutch assemblies is shown in the **Clutch Shaft Removal & Disassembly** section.

NOTE: Disassembly is essentially the same for both the forward and reverse clutches. The forward clutch is shown below.

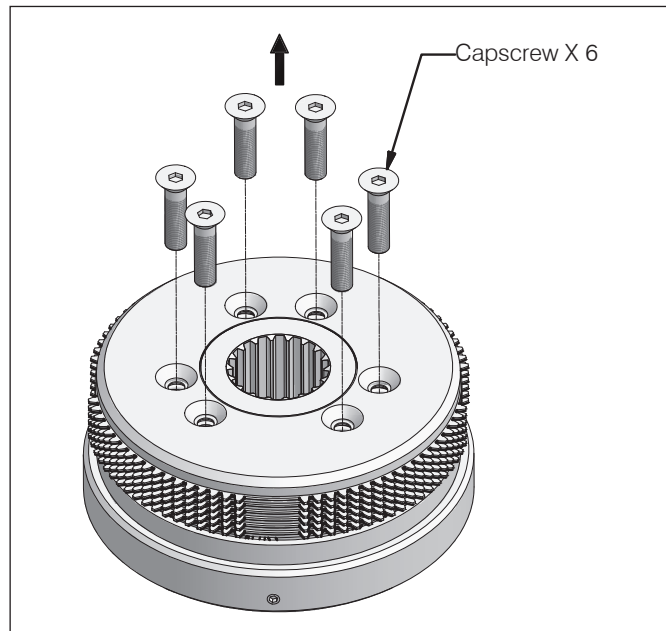
1. Before disassembling clutches, note and mark the orientation for reference during reassembly.



2. Remove setscrews from the piston housing.

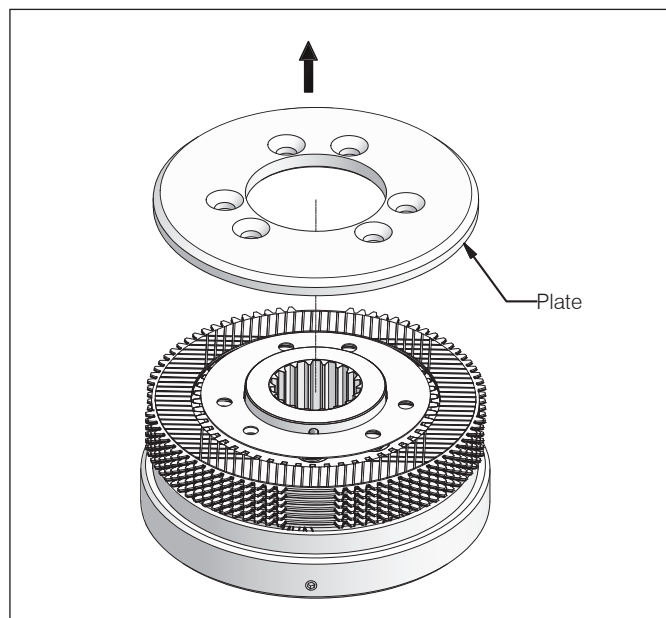


3. Remove the capscrews using hand impact driver initially. Hold firmly so as not to damage the clutch pack.

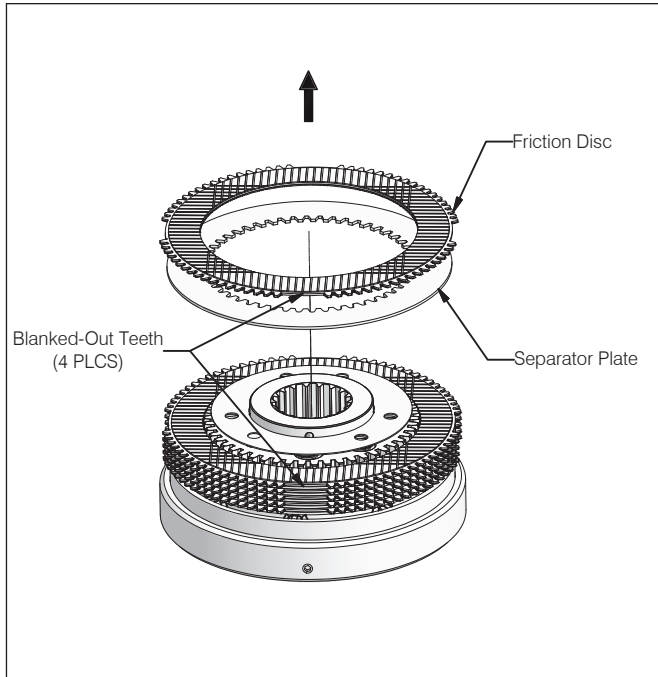


NOTE: Using a C-clamp to compress the clutch pack will make removing capscrews easier if they are too tight in the assembly.

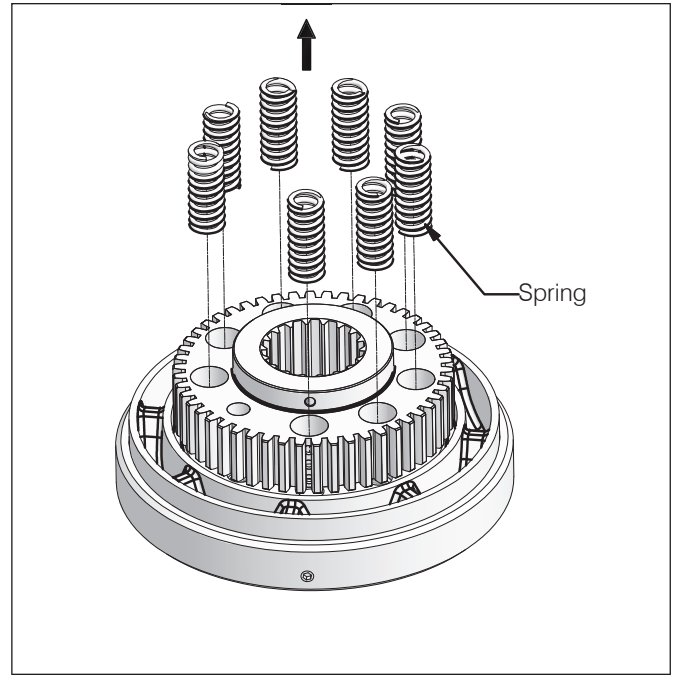
4. Note the orientation, and mark position on cover plate and hub to aid in reassembly. Lift the plate from clutch assembly.



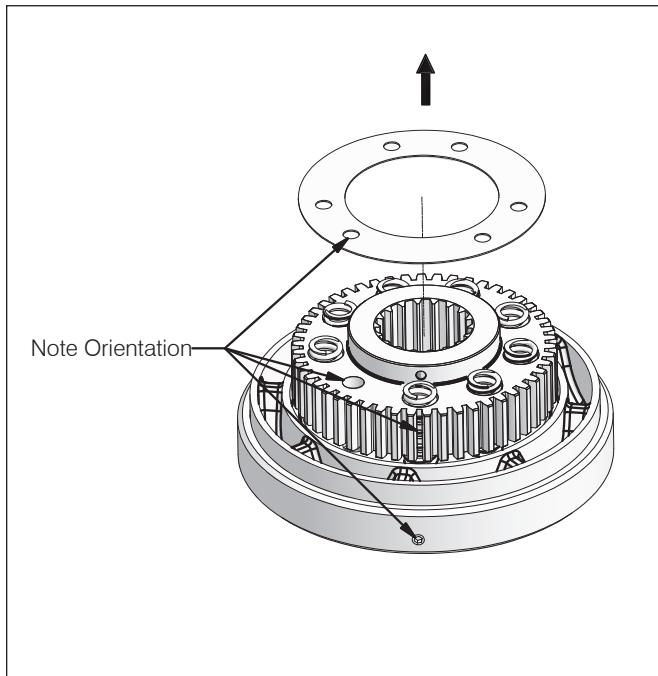
5. Remove the separator plates and friction discs from the hub. Inspect them as described in Figure 4-13, Visual Inspection chart.



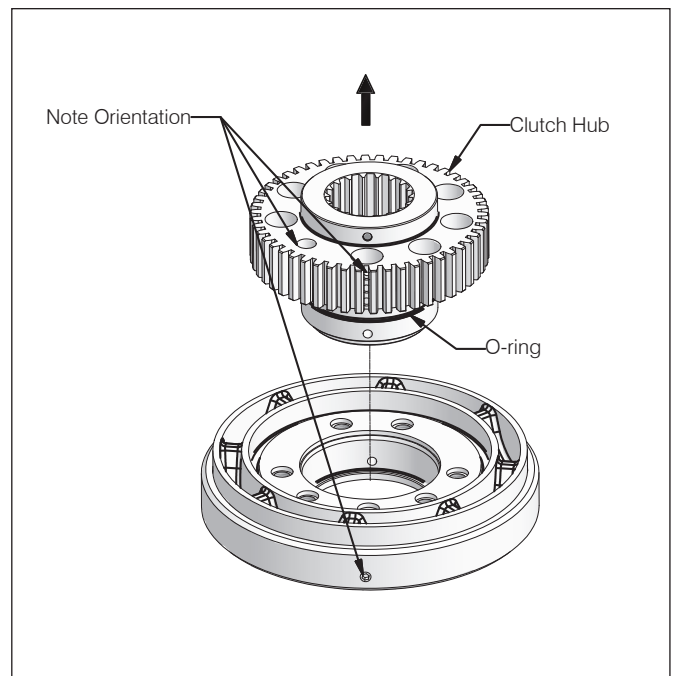
7. Remove and inspect the release springs. Refer to Figure 4-13, Visual Inspection chart.



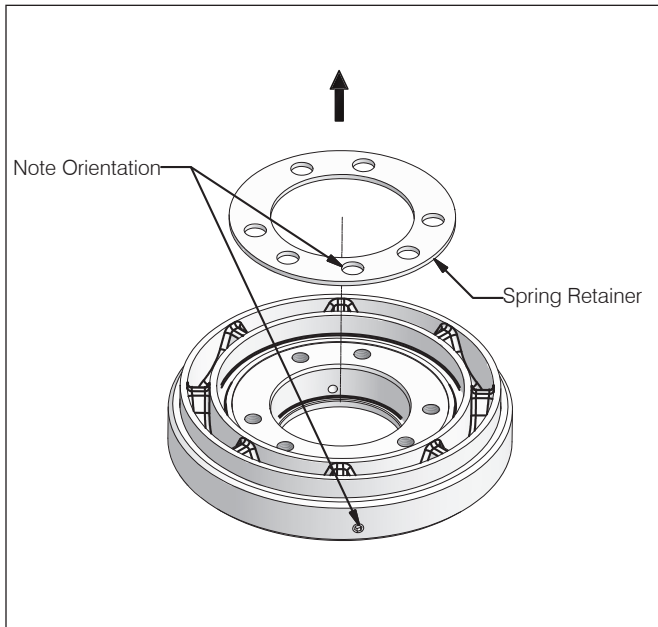
6. Remove shim(s). Pay attention to the orientation, and note that if the shim is reassembled upside down, the holes will almost align, but not enough to reassemble properly.



8. Remove the clutch hub from the piston housing. Remove and discard the O-ring.

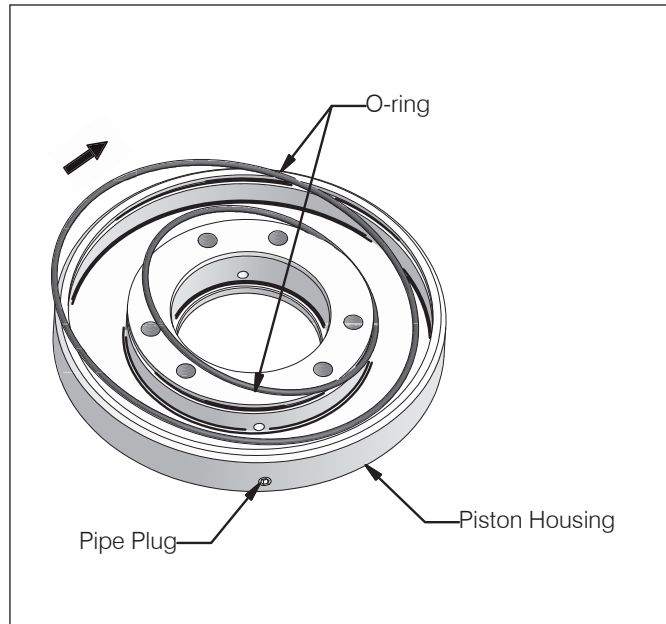


9. Remove spring retainer. Inspect for wear. Pay attention to the orientation, and note that if the retainer is reassembled upside down, the holes will almost align, but not enough to reassemble properly.

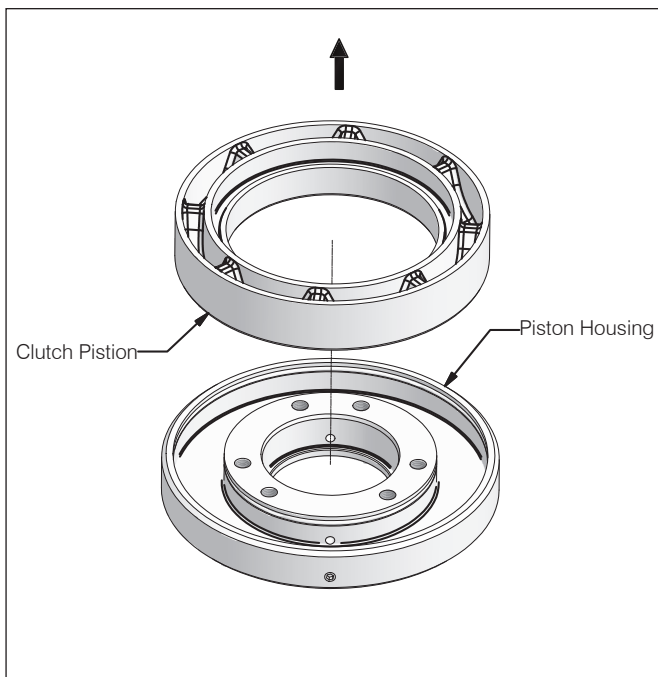


11. Remove and discard the two O-rings.

NOTE: Do not remove the pipe plug from the piston housing.



10. Remove the piston assembly from the piston housing. Inspect for wear.



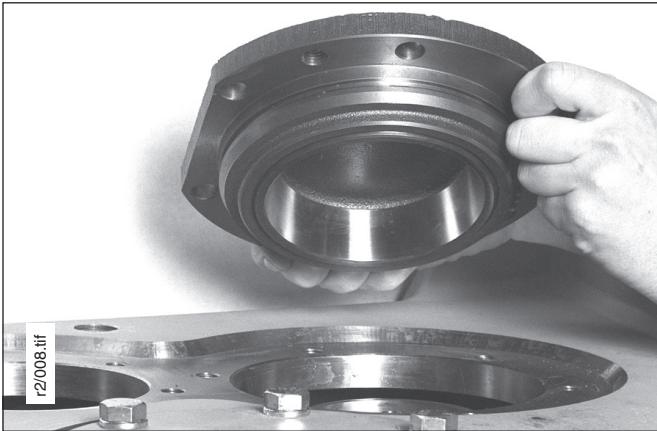
Intentionally Blank

Brake Shaft Removal

The brake shaft may not always be removed from the winch when mounted on the tractor. Prior to removal of the brake shaft assembly, perform the following:

- a) Remove the winch from the tractor (see **Winch Removal** section at the beginning of this chapter).
- b) Drain oil from winch.
- c) Remove all brake components as shown in the **Oil Brake Removal and Disassembly** section.
- d) Remove the brake shaft as shown in the following steps.

1. Remove right-hand bearing retainer. Tag shims for reference during reassembly.



2. Pull brake shaft partially out of winch housing.

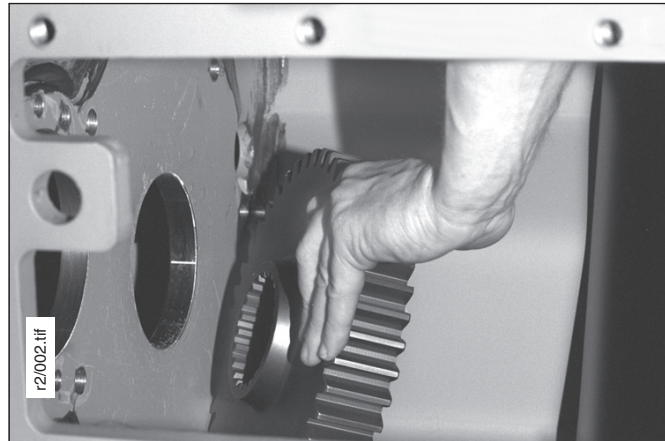
3. Tap the left-hand bearing off of shaft using reduction gear as driver.



4. Withdraw shaft from housing.



5. Remove gear from winch housing.



Intentionally Blank

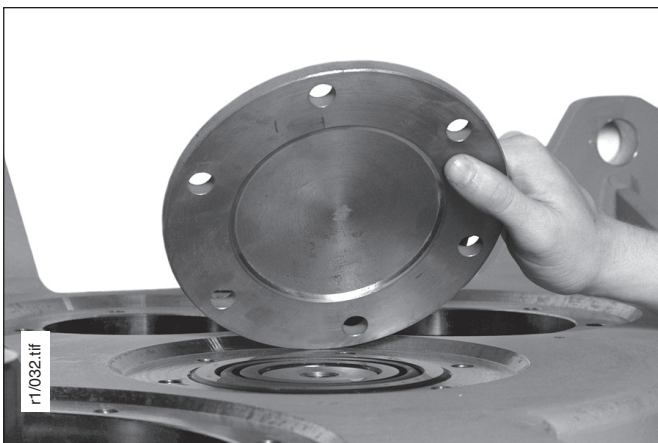
Intermediate Shaft Removal, Non Freespool

The intermediate shaft can be removed with the winch mounted on the tractor.

NOTE: The following steps show the winch removed from the tractor with the clutch shaft and brake shaft removed. This is the normal sequence for complete unit overhaul but it is not necessary for the removal of the intermediate shaft only.

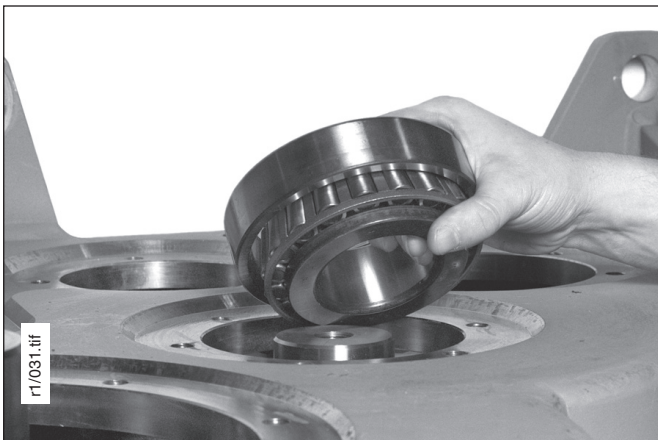
NOTE: The instructions below apply only to a winch NOT equipped with the optional freespool arrangement. Refer to the next section, Intermediate Shaft Removal, Freespool, for instructions relevant to winches equipped with the freespool option.

1. Remove the intermediate shaft cover.

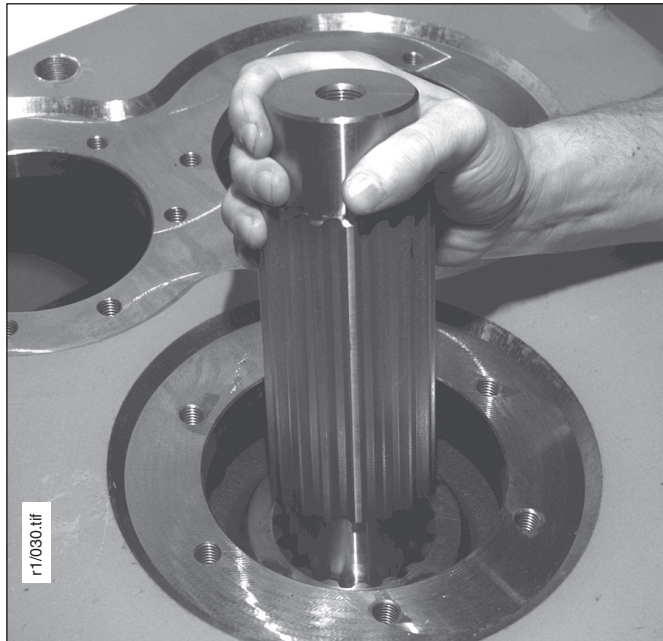


2. Screw a 3/4-16 UNF slide hammer into the end of the intermediate shaft and partially pull it out.

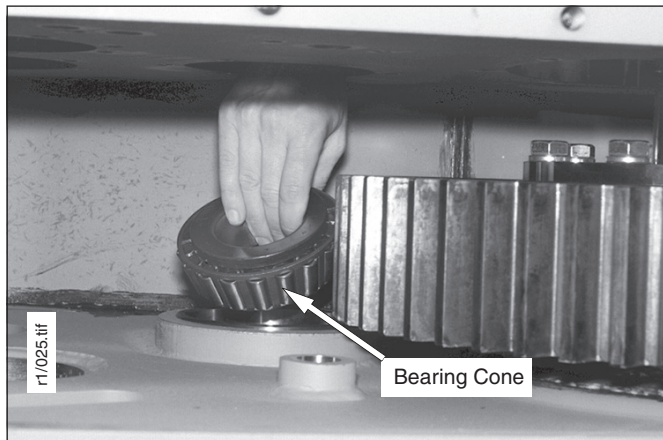
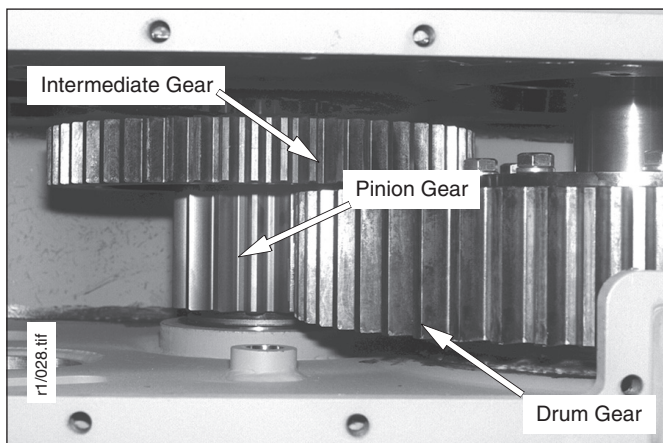
3. Remove bearing cup and cone.



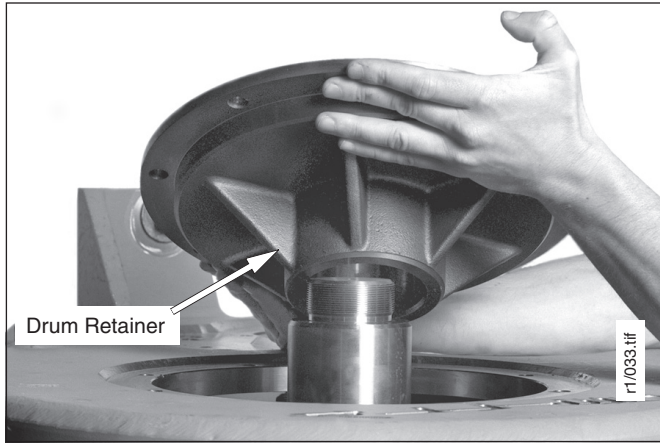
4. Remove the intermediate shaft, while ensuring that the intermediate gear does not fall.



5. Remove the drum pinion gear and the inner bearing cone.



6. Remove drum shaft retainer prior to removing intermediate gear. See **Drum Shaft and Drum Removal** section that follows.



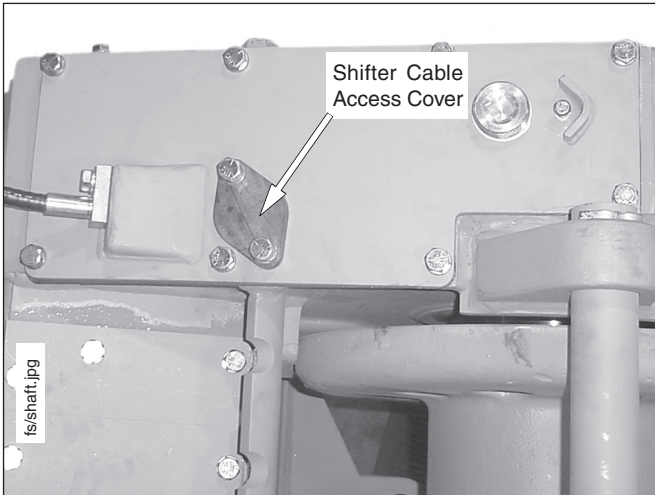
Intermediate Shaft Removal, Freespool

The intermediate shaft can be removed with the winch mounted on the tractor.

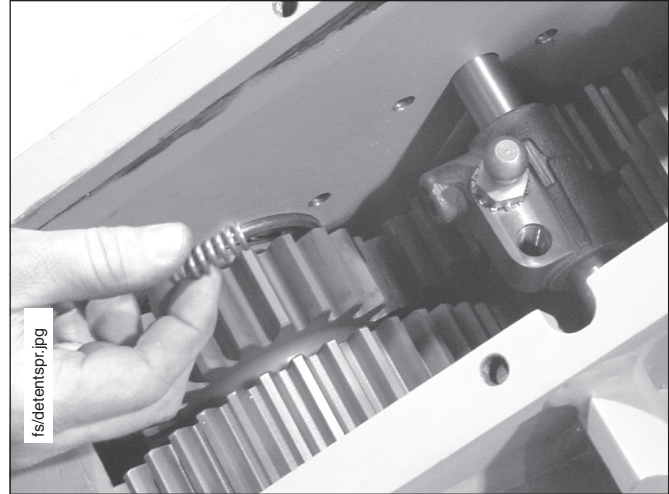
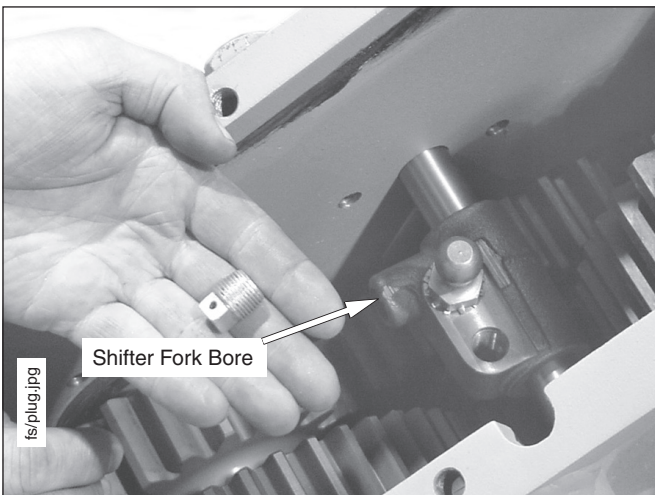
NOTE: The following steps show the winch removed from the tractor with the clutch shaft and brake shaft removed. This is the normal sequence for complete unit overhaul, but it is not necessary for the removal of the intermediate shaft only.

NOTE: The instructions below apply only to a winch equipped with the optional freespool arrangement. Refer to the previous section, Intermediate Shaft Removal, Non Freespool, for instructions relevant to winches without the freespool option.

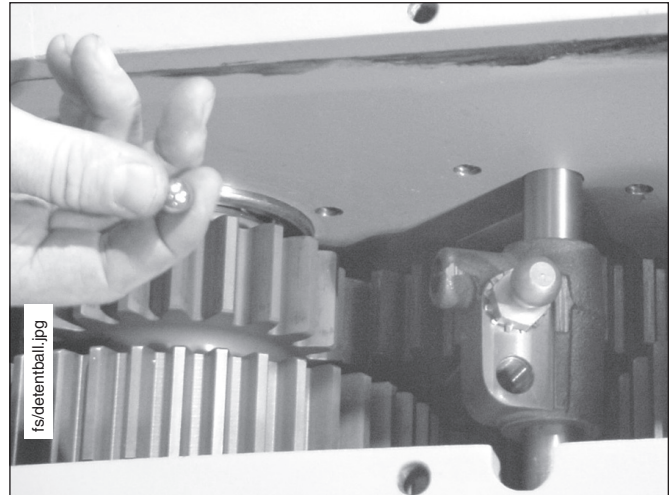
1. Remove the capscrews securing the shifter cable access cover.



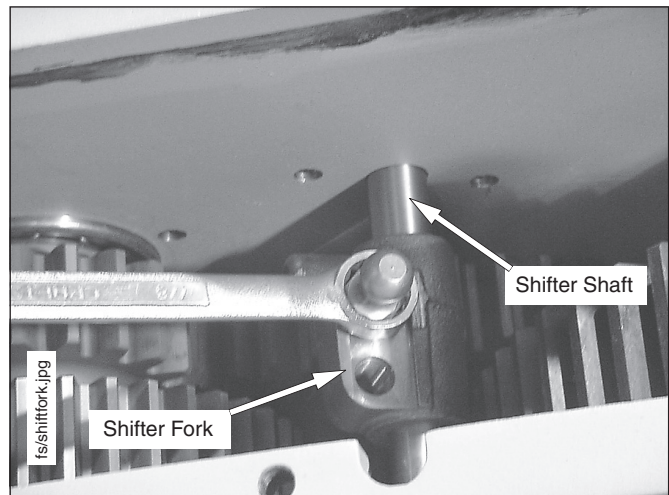
2. Remove the plug and spring from the freespool shifter fork.



3. Use a magnet to remove the detent ball.



4. Withdraw the shaft and remove the fork.



5. Remove the intermediate shaft cover.

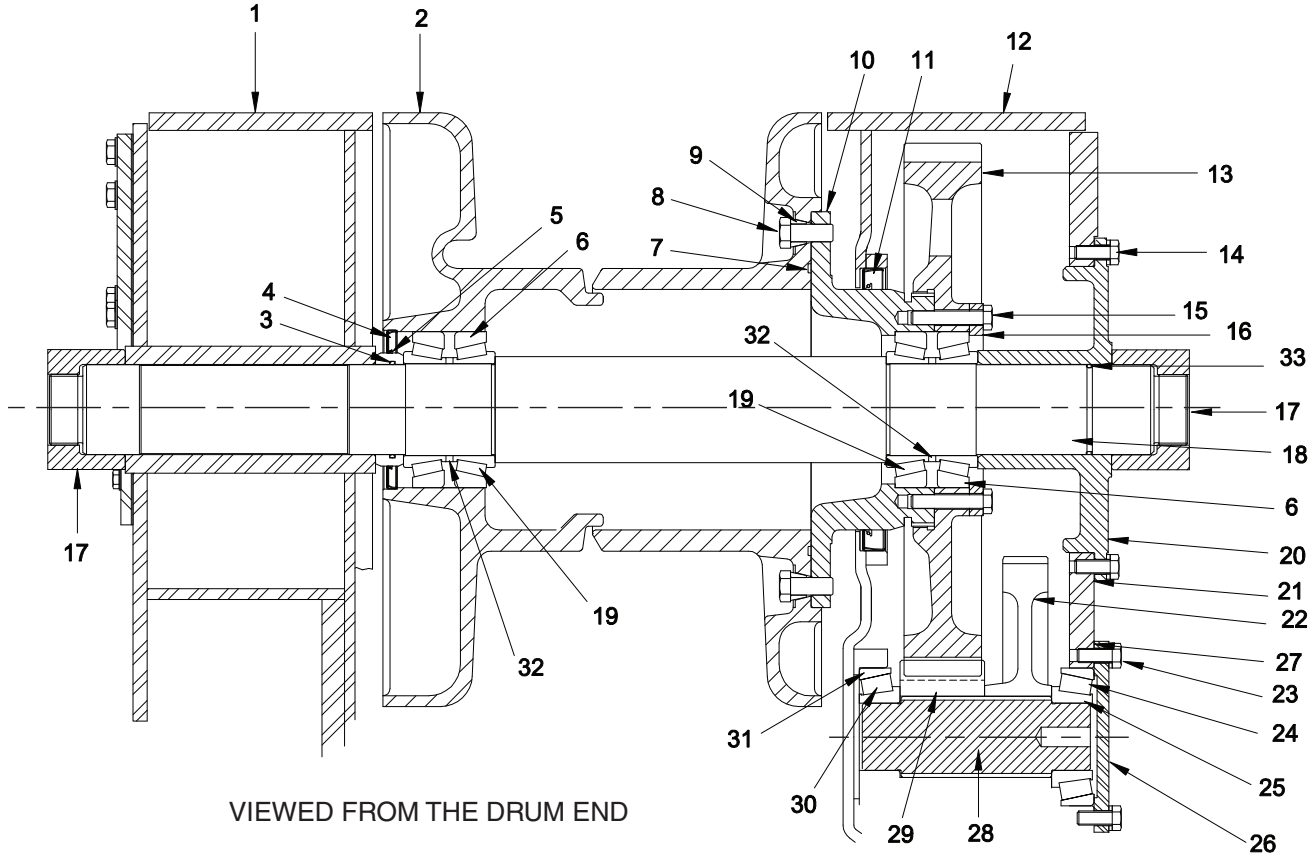


6. Tag shims for reference during reassembly (not shown).

NOTE: The above step is relevant only to S/N AW6F-4061 and prior without exterior freespool drag adjust. Exterior freespool adjust covers do not require shims.

7. Screw a 3/4-16 UNF slide hammer into the end of the intermediate shaft and partially pull it out.
8. Remove the drum pinion gear and the inner bearing cone. Refer to Figure 4-2 for the location of components.
9. Remove bearing cup and cone and the intermediate shaft, while ensuring that the intermediate gear does not fall.
10. Remove intermediate gear.

NOTE: Remove drum shaft retainer prior to removing intermediate gear. See Drum Shaft and Drum Removal section that follows.



NOTE: Intermediate Shaft Assembly Shown Is Not Equipped with Freespool

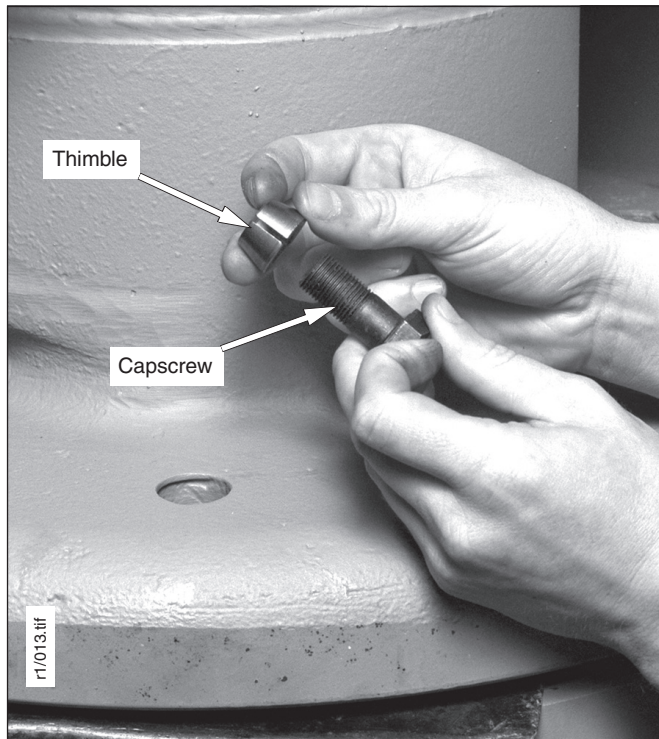
- | | |
|--------------------------------|---------------------------|
| 1. LH Winch Housing | 18. Drum Shaft |
| 2. Drum | 19. Bearing Cone (Qty. 4) |
| 3. O-Ring | 20. Drum Retainer |
| 4. Spacer | 21. Shims |
| 5. Oil Seal | 22. Intermediate Gear |
| 6. Double Bearing Cup (Qty. 2) | 23. Capscrew & Washer |
| 7. Seal Ring | 24. Bearing Cup |
| 8. Capscrew (Qty. 10) | 25. Retaining Plate |
| 9. Thimble (Qty. 10) | 26. Bearing Cone |
| 10. Drum Adapter | 27. shims |
| 11. Oil Seal | 28. Intermediate Shaft |
| 12. RH Winch Housing | 29. Drum Pinion Gear |
| 13. Drum Gear | 30. Bearing Cone |
| 14. Sealing Capscrew & Washer | 31. Bearing Cup |
| 15. Capscrew | 32. Spacer (Qty. 2) |
| 16. Retainer Plate | 33. O-Ring |
| 17. Shaft Nut | |

Figure 4-12 Location of Drum and Drum Shaft Components

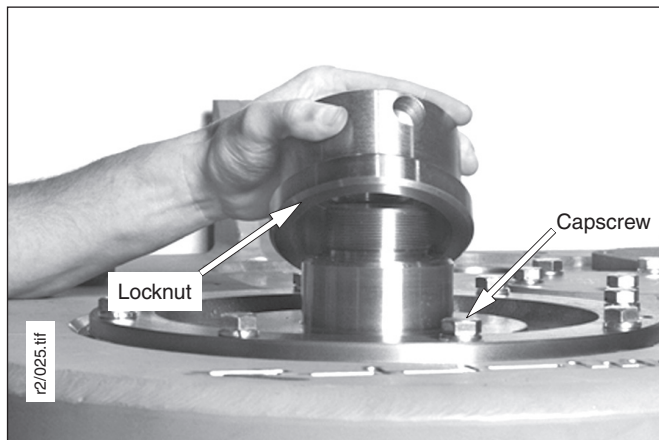
Drum Shaft & Drum Removal

Figure 4-12 shows the location of drum and drum shaft components. Do not attempt to remove heavy components such as the drum or drum gear by hand. Always use a lifting device and the recommended attachments whenever possible. Removal of the drum and drum shaft can be accomplished with the winch on the tractor. To remove the drum gear, it will be necessary to first remove the intermediate shaft (see **Intermediate Shaft Assembly Removal** section) and the clutch assembly (see **Clutch Shaft Removal and Disassembly** section).

1. Loosen the drum capscrews, then remove capscrews with thimbles, leaving two located 180° apart.



2. Remove both drum shaft locknut and the retainer capscrews.

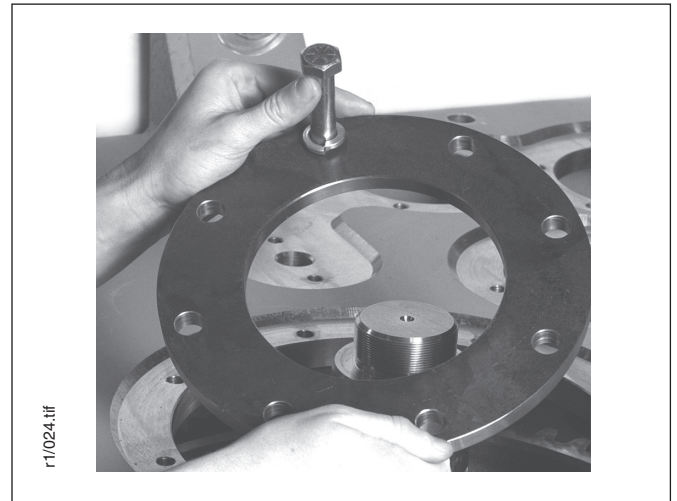


3. Remove bearing retainer and shim pack.

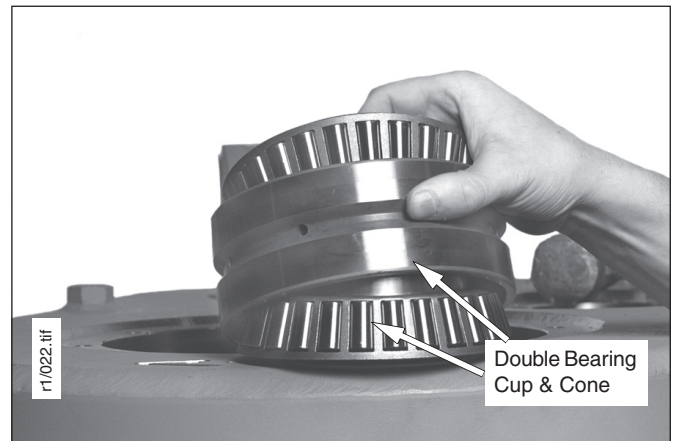


NOTE: Tag shim pack for reference during reassembly.

4. Remove retainer ring by removing retainer capscrews.



5. Remove the first tapered roller bearing cone, then the double bearing cup, spacer and second cone.



Repairs - Drum Shaft & Drum Removal



NOTE: Bearing assembly may be removed with the drum shaft if it is seized to the shaft.

6. Attach a sling around the drum and hoist until there is no slack, then drive the shaft out the right hand side.

NOTE: Support or sling the drum gear so that it does not fall during shaft removal.

7. Remove two remaining drum capscrews.

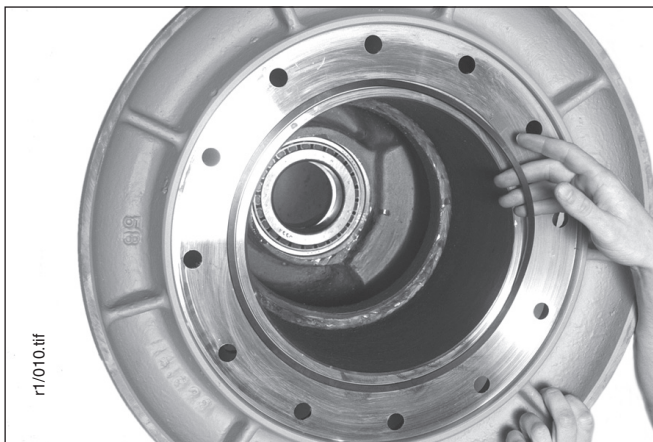
8. Carefully remove the drum from winch frame. Ensure that the adapter does not fall.

NOTE: The drum weights approximately 540 lbs.

9. Remove adapter.



10. Remove and discard adapter seal.



NOTE: This seal must be replaced with a new Allied Systems Company-approved seal during reassembly.

11. Remove double tapered roller bearing assembly and seal spacer from the left-hand end of the drum.

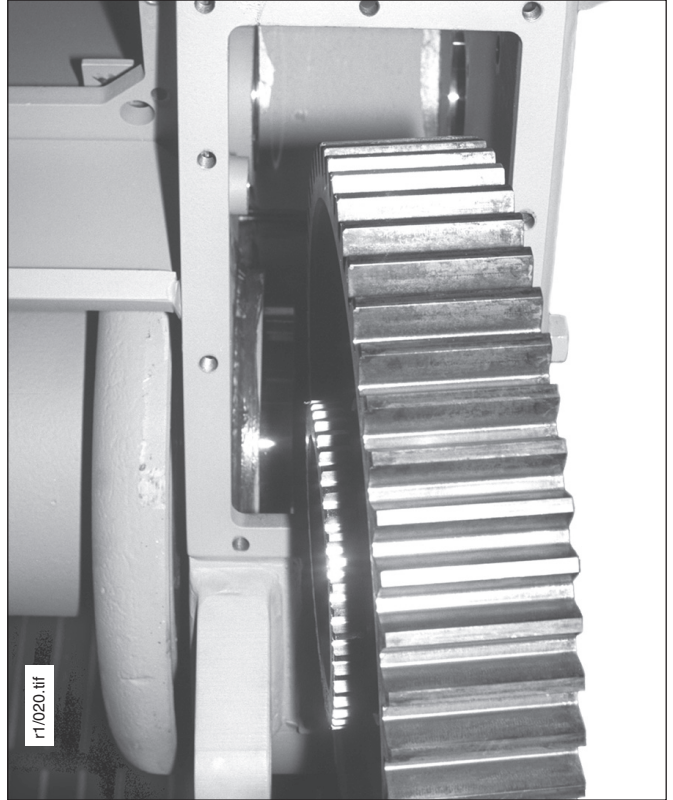


NOTE: Refer to Figure 4-1 for location of components.

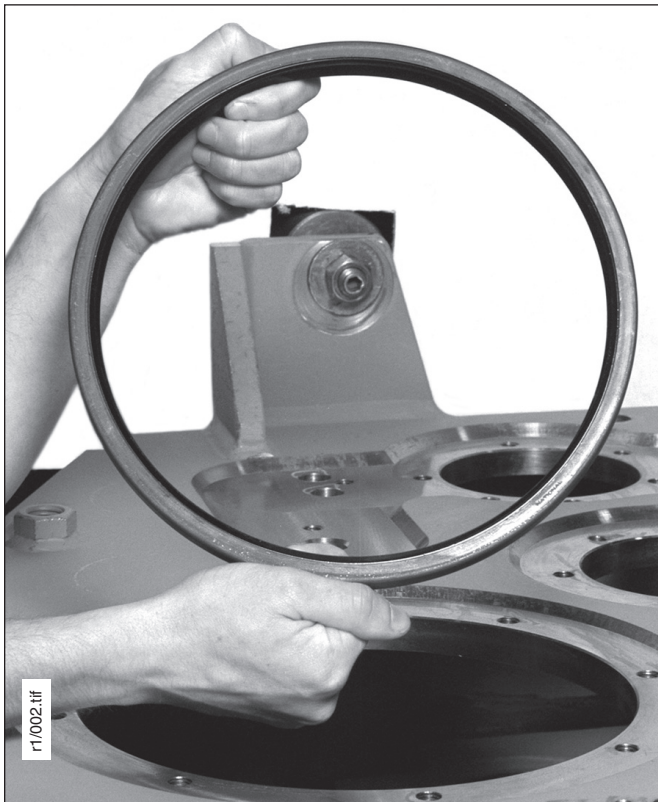
12. Remove and discard shaft seal from drum. (Seal lip should normally be pointed in.)



14. Using a suitable lifting device, the drum gear can now be removed.



13. Remove and discard adapter seal from winch housing.



Winch Assembly

All components should be inspected for wear or damage as they are removed. Refer to Figure 4-13, Visual Inspection. All seals that were removed should be replaced during assembly. Carefully inspect all bearings that have been removed. Used bearings often appear satisfactory, but

may fail when placed under a load. When in doubt, it is recommended to install a new bearing. Any component that indicates excessive wear or damage should be replaced. The following reassembly and installation sequence assumes a complete winch overhaul.

Figure 4-13 Visual Inspection_1

ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
PTO Shaft with Integral Bevel Pinion	Check for broken or severely worn bevel gear teeth. Also check splines for wear or twisting. Observe tooth contact wear pattern.	Replace shaft if gear teeth are broken or severely worn, or if splines are not true.
PTO Shaft with Removable Bevel Pinion	Check splines for wear or twisting.	Replace shaft if splines are severely worn or twisted.
Bevel Pinion (Removable)	Check for broken or severely worn gear teeth.	Replace bevel pinion if teeth are broken or severely worn.
Clutch Shaft	Check for broken or severely worn gear teeth.	Replace bevel pinion if teeth are broken or severely worn.
	Check for deep scratches or scoring on bearing surfaces at each end of shaft.	Dress surface or replace shaft if severely worn.
	Inspect clutch shaft O-ring grooves for taper, scoring, burrs and corrosion.	Replace or repair shaft if surfaces of the seal groove are not damaged.
	Check for broken, scored, pitted and corroded cast iron seal rings.	Replace seal rings if worn or damaged slightly.
	Check threads on right-hand end of clutch shaft for scoring or distortion of plugholes (internal threads) or locknut (external threads).	Dress threads with a thread chaser.
	Check for broken or severely worn splines.	Replace shaft if splines are broken or severely worn.
	Inspect cast iron seal ring grooves for damage.	Dress grooves or replace shaft if seal will not seat properly.
	Check for damage on enlarged plugs in the shaft ends.	Replace plugs if damaged.
Clutch Shaft Bearing Retainers	Check retainer seal ring bore for grooves, scoring and rust.	Replace if scored or rusted. May be bushed if scored.
Clutch Shaft Spacers	Inspect spacer ends for scoring or corrosion.	Replace if damaged in any way.
Bevel Gear	Check for broken or worn teeth.	Replace if teeth are broken or severely worn.
	Inspect gear hub faces for scoring, wear or corrosion. Check rivets between gear and hub for tightness.	The gear should be replaced if the hub faces are defective in any way.

(Continued on the next page)

Figure 4-13 Visual Inspection_2

ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Forward and Reverse Clutch Assemblies	Check for plugged oil holes in clutch hub.	Clean oil holes as necessary.
	Carefully inspect friction discs for facing wear, distortion and damaged teeth.	Replace friction disc(s) if oil grooves are worn from facing, or if distorted in any way.
	Carefully inspect separator plates to verify that surfaces are not worn excessively or unevenly.	Replace separator plates if surfaces are warped or scored. Paper friction separators are flat. Bronze friction separators are dished.
	Inspect piston retainer plate, O-ring grooves, piston cavity and center bore for scoring, burrs and corrosion. Look for any internal cracks.	Replace piston retainer plate if damaged.
	Check for wear or collapsed release springs.	Replace spring(s) if distorted or damaged in any way.
	Inspect spider gear for broken or worn gear teeth. Be sure pinion gear is secured to spider gear. Inspect bearing bore for scoring or galling.	Replace gear if teeth are broken or severely worn, or if pinion gear has broken free from spider gear. Replace gear if bearing bore is badly scored.
Brake Assembly	Check for cracked or broken belleville spring(s).	Replace spring(s) if cracked or broken.
	Inspect oil brake cover for scoring, burrs, cracks or warping.	Replace cover if damage affects sealing or proper contact with belleville spring.
	Carefully inspect friction discs for facing wear, distortion and damaged teeth.	Replace friction discs if oil grooves are worn from facing or distorted in any way. Replace if brake release pressure is low.
	Carefully inspect separator plates to verify that surfaces are not worn excessively or unevenly.	Replace separator plates if surfaces are warped or scored.
	Inspect piston housing O-ring grooves and center bore for scoring, burrs and corrosion.	Replace piston housing if damaged.
	Inspect brake cage for wear, scoring, burrs and cracks.	Replace cage if splines are notched or cage is cracked.
	Inspect brake hub for wear, scoring, burrs and cracks.	Replace hub if splines are notched or hub is cracked.
	Check push rods for straightness, mushrooming and end faces out of square.	Replace if damaged enough to cause binding or if diameter, length or end squareness is distorted.
	Check studs for tightness and depth in frame.	Tighten if loose.
Carefully check aligning dowels for grooves and distortion.	Replace if damaged sufficiently to cause binding or misalignment.	

(Continued on the next page)

Repairs - Winch Assembly



Figure 4-13 Visual Inspection_3

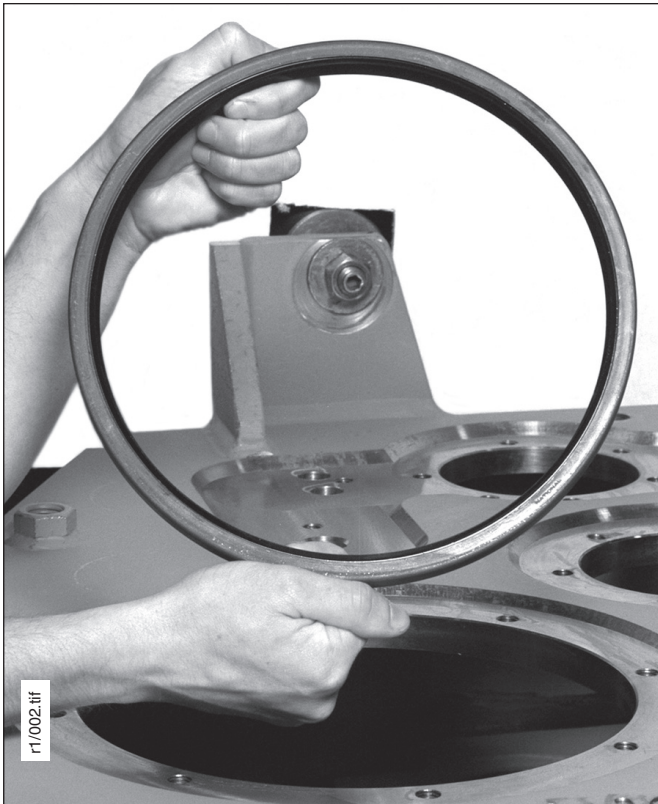
ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Brake Shaft	Check for deep scratches or scoring on bearing surfaces at each end of shaft.	Dress surface or replace shaft if severely worn.
	Check for broken or severely worn splines. Check for spline straightness.	Replace if splines are twisted or severely worn.
Brake Shaft Gears	Check for broken or worn teeth. Pay particular attention to leading edges of straight-cut gear teeth.	Replace gear if teeth are broken or severely worn.
Intermediate Shaft	Check for deep scratches or scoring on bearing surfaces at each end of shaft.	Dress surface or replace shaft if severely worn.
	Check for broken or severely worn splines.	Replace if splines are broken or severely worn.
Intermediate Gears	Inspect both gears for broken or severely worn teeth. Pay particular attention to leading edges of straight-cut gear teeth.	Replace gears if teeth are broken or severely worn.
Freespool Dental Clutch	Check for broken or worn teeth.	Replace dental clutch if teeth are broken or severely worn.
Drum Shaft	Check for deep scratches or scoring on bearing surfaces.	Dress surface or replace shaft if severely worn.
	Check O-ring groove and seal surface.	Dress groove or replace shaft if severely worn.
	Check for crossthreaded or damaged threads.	Dress threads with thread chaser.
Drum Gear	Check for broken or severely worn gear teeth. Pay particular attention to leading edges of straight-cut gear teeth.	Replace gear if teeth are broken or severely worn.
Drum	Inspect quad-ring groove for burrs, scoring and rust.	Replace drum or rebuild drum groove if a new quad-ring will not seat properly.
Drum Adapter	Carefully inspect double seal contact surface for deep scratches, burrs and rust.	Replace if damaged.
Winch Frame	Check area around drum and drum adapter for damage if cable has slipped between cable guard and winch frame.	Consult the factory.

Intentionally Blank

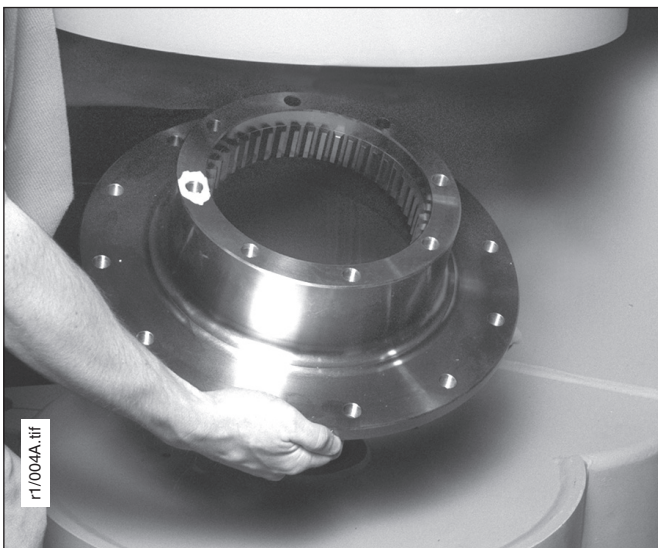
Drum and Drum Shaft Installation

If the drum gear was removed, it must be installed prior to installation of the intermediate shaft and reverse clutch assembly.

1. Lubricate seal bore with Lubriplate or other light lube grease. Install double-lip seal with smooth side toward the drum in the right hand side of the frame.



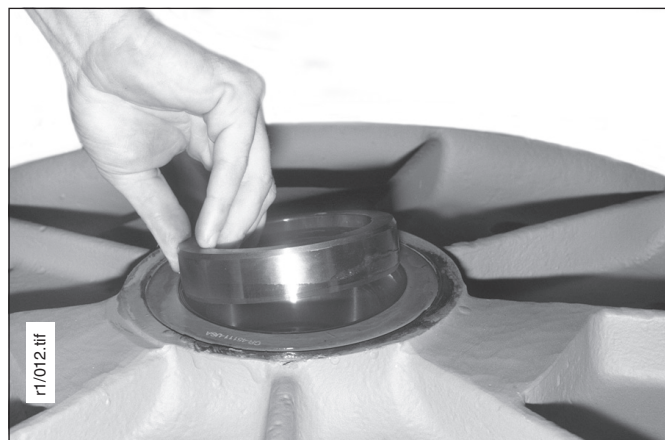
2. Install drum adapter by pushing it through the double-lip seal.



3. Lubricate the left-hand drum bore with Lubriplate or other light lube grease, then install double tapered roller bearing assembly.



4. Replace drum spacer O-ring and install spacer in drum bore.

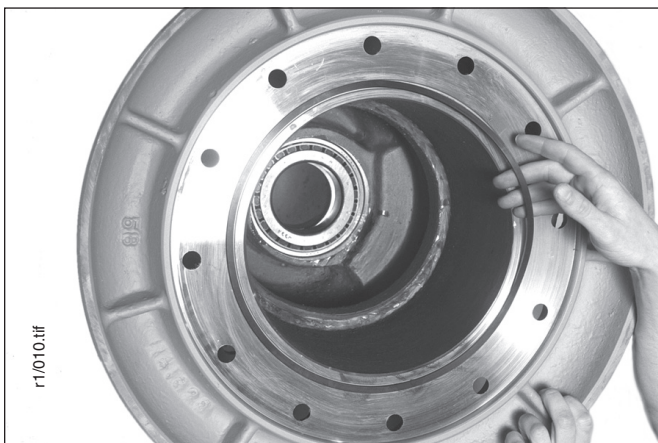


5. Install drum seal.



NOTE: Smooth side of seal must face outboard.

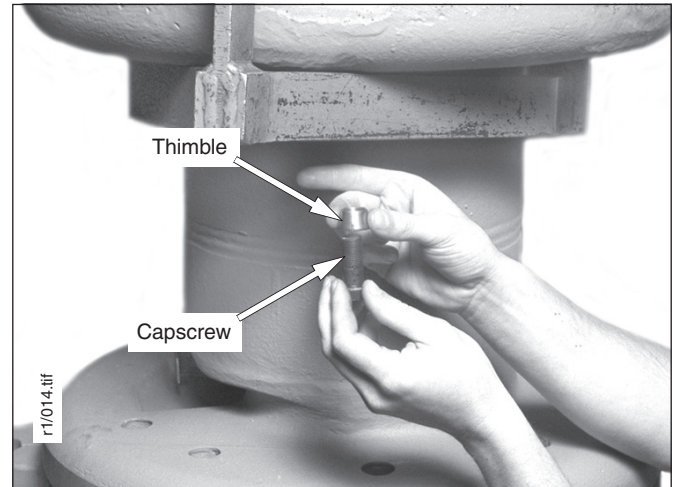
6. Lubricate right-hand drum bore. Coat right-hand seal ring and groove with O-ring lube. Install new seal ring.



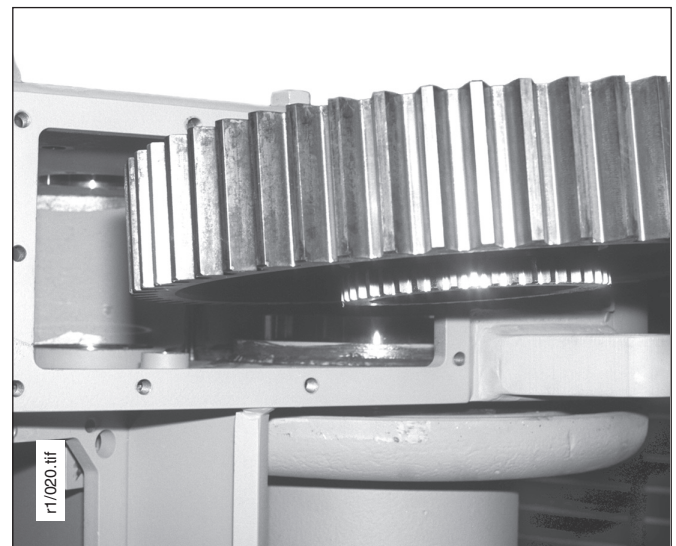
7. Move the drum into position while being careful not to move the seal ring.

NOTE: The drum weights approximately 540 lbs.

8. Align adapter and drum holes, then install the thimbles and screws. Tighten progressively and evenly to ensure uniform compression of seal ring. Do not tighten to final torque.



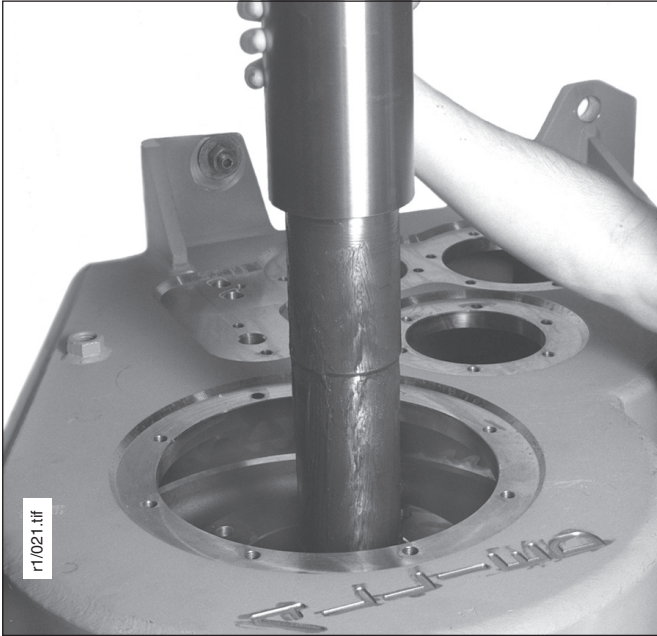
9. Install drum gear.



10. Align drum gear with adapter and temporarily secure the drum gear to the adapter, using the retainer plate and two capscrews. This will ensure that the gear will not fall during installation of the shaft.

11. Coat bearings in the drum with the recommended oil (see Figure 1-5) to ensure initial bearing lubrication.

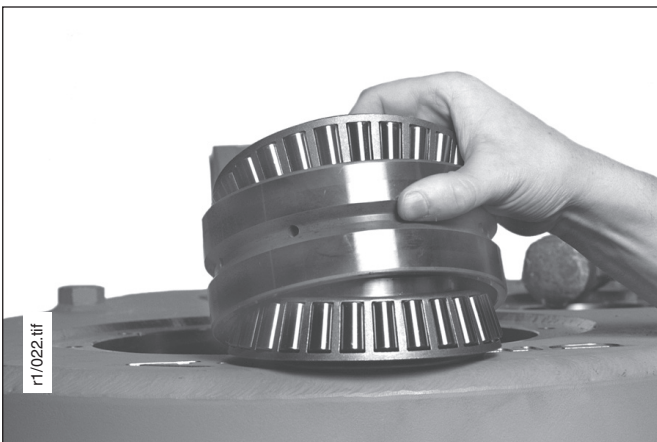
12. Make sure that double-tapered roller bearing, seal and spacer are properly seated in the left-hand side of the drum. Then install the shaft until it bottoms solidly against the left hand tapered roller bearing. Tighten left-hand nut.



CAUTION

Do not hammer on drum shaft surface.

13. Remove the retainer plate and install the bearing assembly.

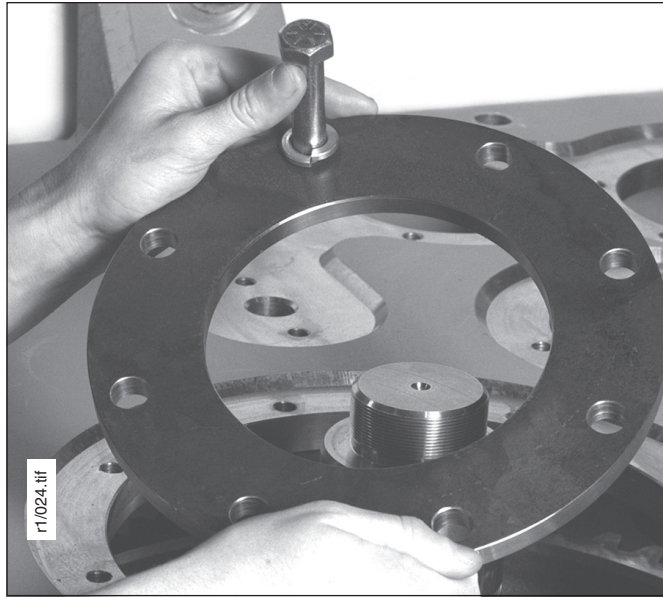


NOTE: Bearings go in reverse order from that shown above.

WARNING

Make sure the drum gear does not fall off the adapter.

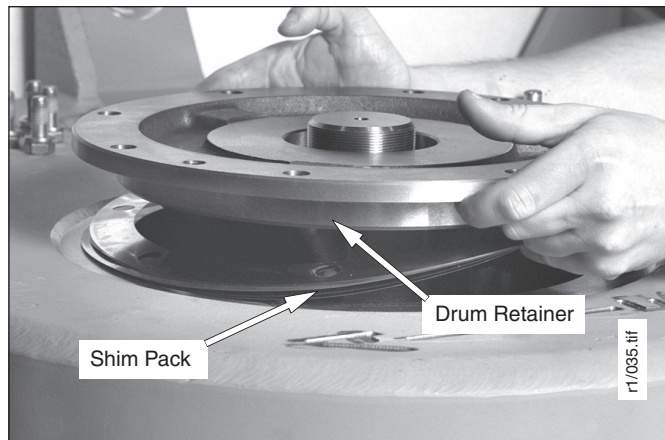
14. Install retainer plate using the eight special capscrews. Tighten capscrews to 90 ft-lbs (12 kg-m).



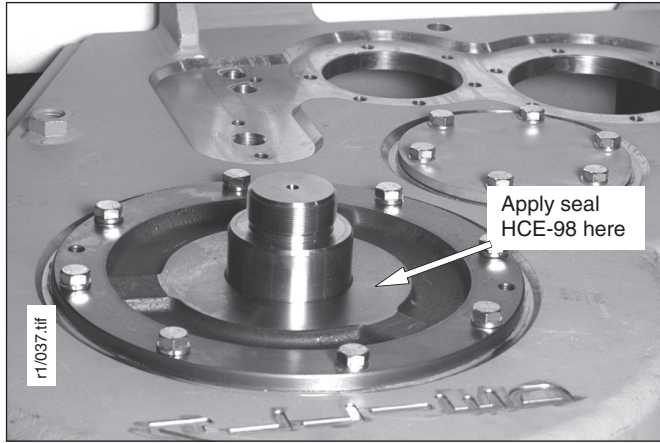
NOTE: Capscrews cannot be installed unless drum gear and drum adapter have been aligned as indicated in Step 8.

15. Set bearing retainer into place and securely tighten capscrews (do not tighten to final torque). Measure gap between retainer and winch frame in three places around the retainer. Add the three indications and divide by three to add obtain the average gap. Assemble shim pack to provide a net fit with ± 0.005 inch (0.1288 mm) tolerance.

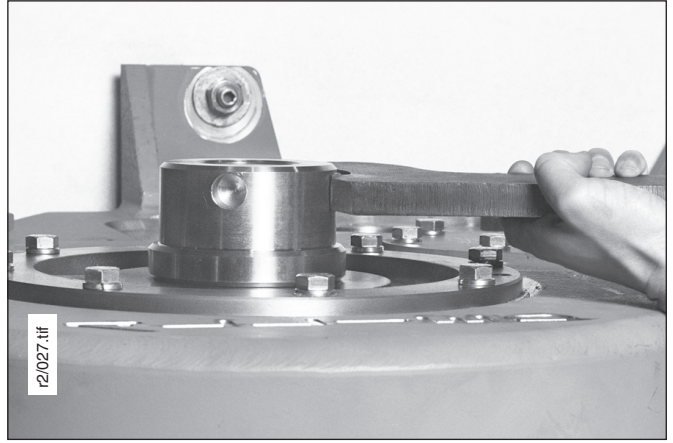
16. Coat winch frame and bearing retainer with Loctite. Install finalized shim pack (determined in step 15). If intermediate shaft assembly not installed, install before retainer.



17. Secure retainer with capscrews and lockwashers. Tighten capscrews to 75 ft-lbs.



18. Coat shaft nut threads with anti-seize or other suitable sealing compound. Install both shaft nuts and torque to 400 ft-lbs (55 kg-m).

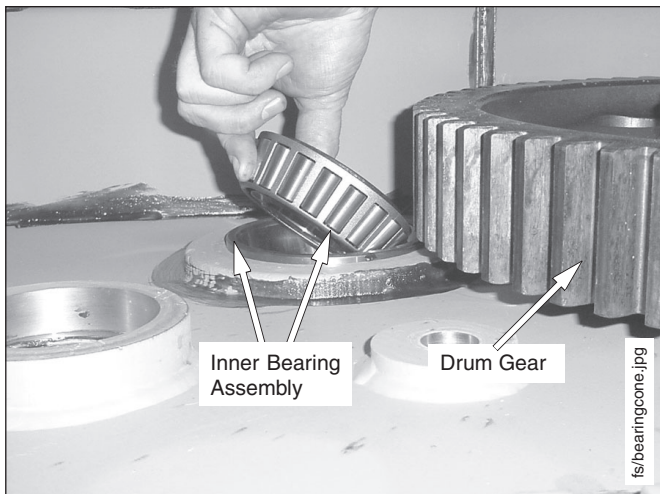


19. Tighten drum-to-adapter capscrews to 220 ft-lbs (30 kg-m) torque.

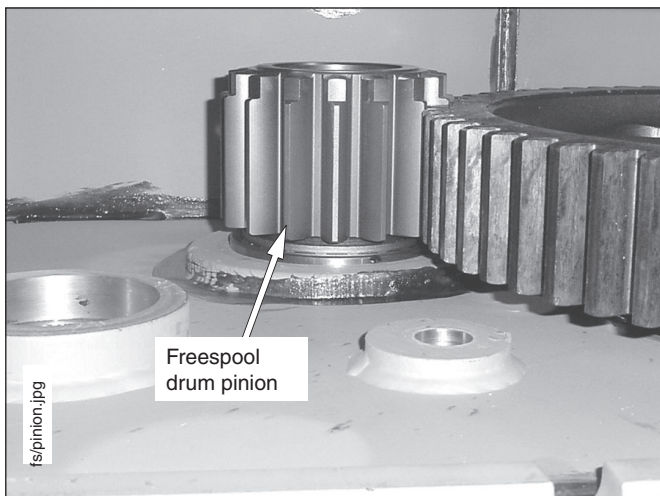
Intermediate Shaft Installation, Freespool

These figures show the winch removed from the tractor with the clutch shaft and brake shaft removed.

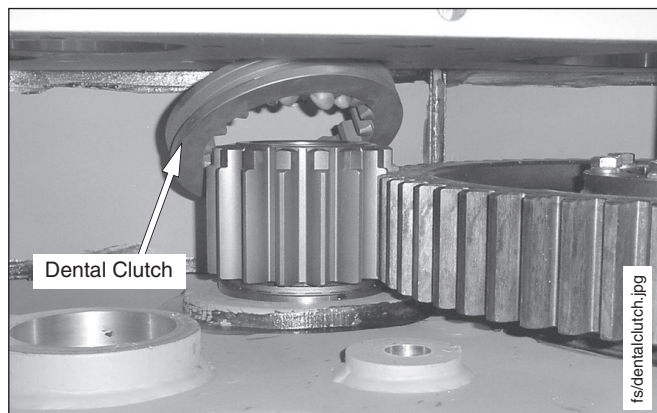
1. Install inner bearing assembly if previously removed. Use a liberal amount of lubriplate or other light lube grease to hold the inner bearing cone in place.



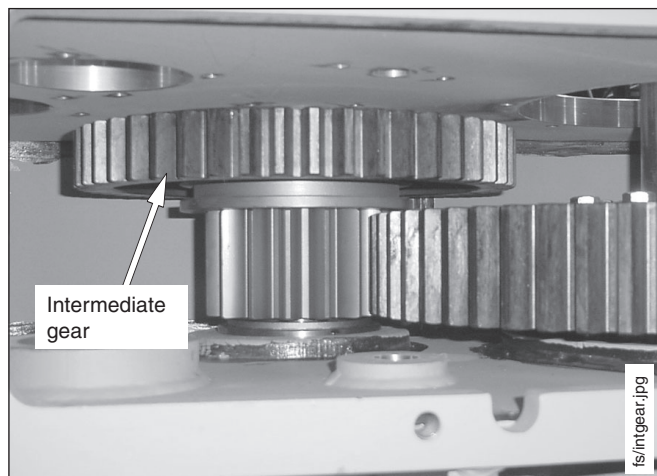
2. Position the freespool drum pinion in the housing.



3. Place dental clutch on pinion gear. Ensure chamfered ramp faces pinion.

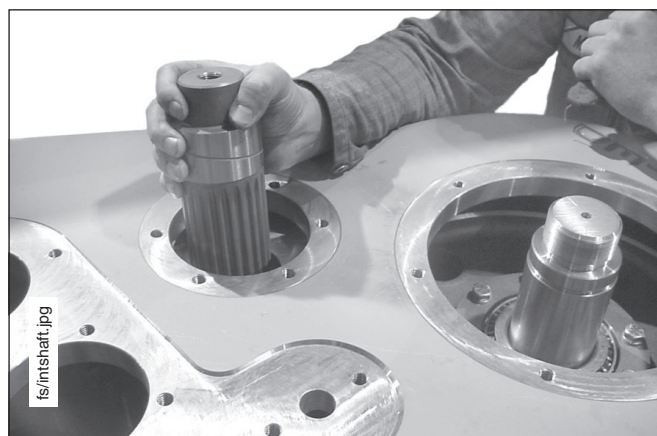


4. Position intermediate gear in housing.

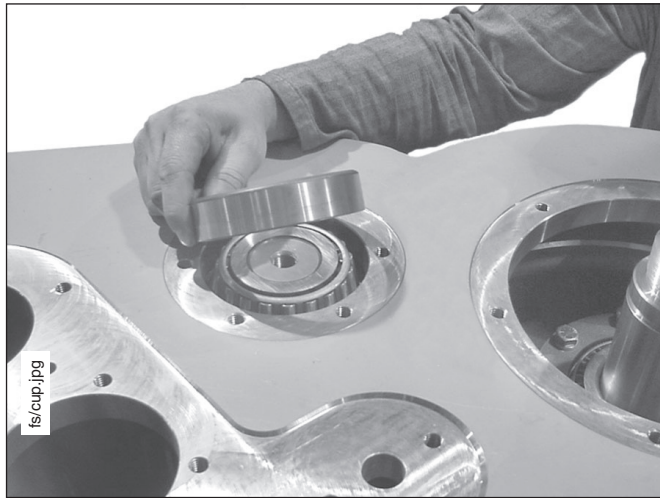


NOTE: Install intermediate gear with high shoulder down.

5. Install intermediate shaft.



6. Install the outer bearing cup and cone. Make sure that the cup is firmly seated against the bearing cone.



NOTE: The following step only applies to S/N AW6F-4061 and prior without exterior freespool drag adjust.

7. To adjust the freespool drag, loosen the bearing slightly as detailed in Step 6 of the **Intermediate Shaft Removal, Freespool** section. Place the winch in freespool and measure the rolling torque of the drum by placing 25 ft-lb (3.5 kg-m) torque wrench on one of the eight drum nuts. Keep the wrench handle pointed straight out from the drum center. The torque should be 12-15 ft-lbs (1.7-2.0 kg-m). Add or remove shims from the intermediate shaft retainer to reduce or increase torque respectively.

NOTE: The following step only applies to S/N AW6F-4062 and after with exterior freespool drag adjust.

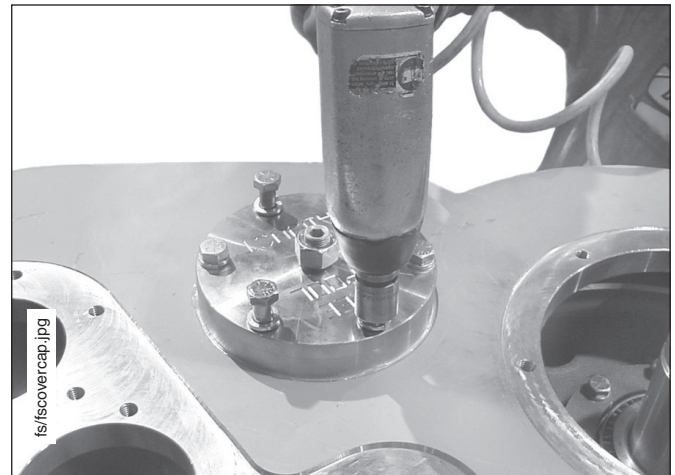
8. Install new O-ring on freespool piston and install piston in freespool adjust cover.



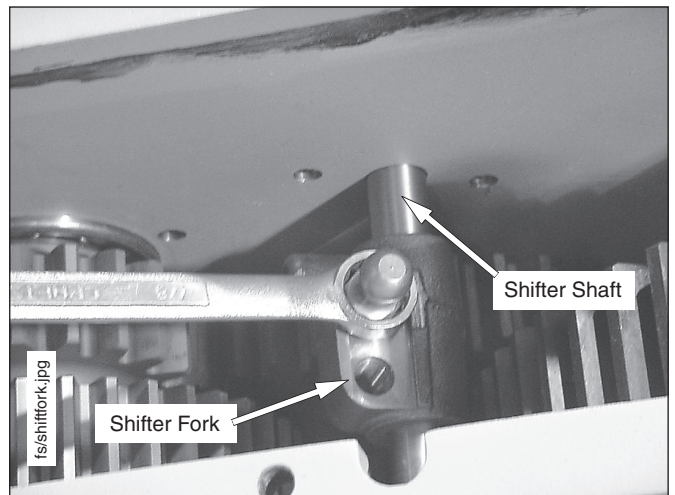
9. Coat the winch frame and retainer with loctite or other suitable sealing compound. Install shim pack (if necessary) and cover.



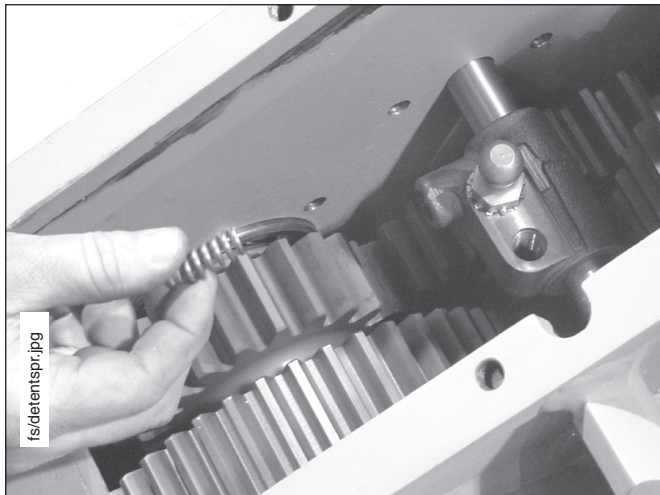
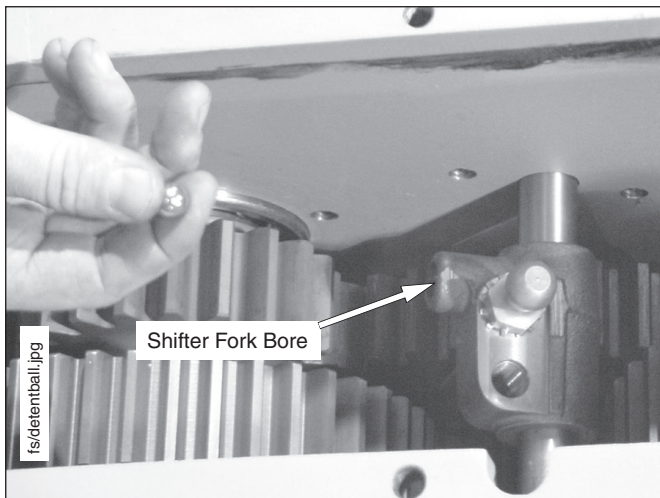
10. Tighten the six capscrews to 75 ft-lbs (10 kg-m).



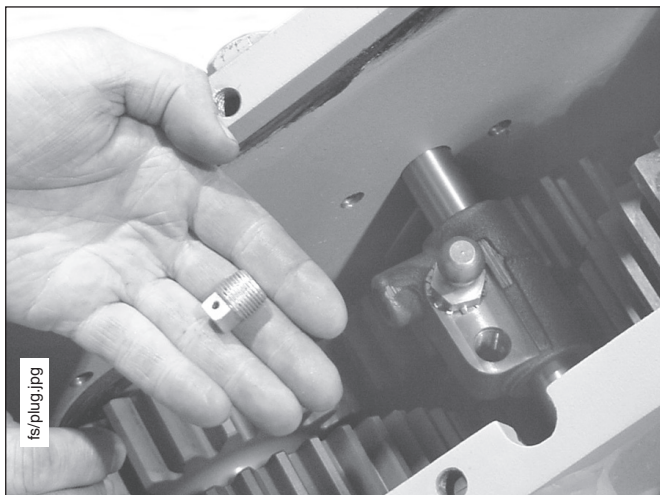
11. Position the freespool shifter fork on the dental clutch and install the shifter shaft.



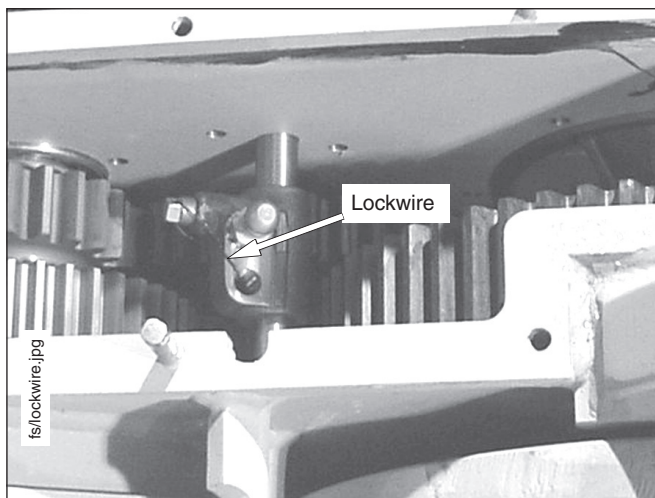
12. Install detent ball and spring into bore of the shifter fork.



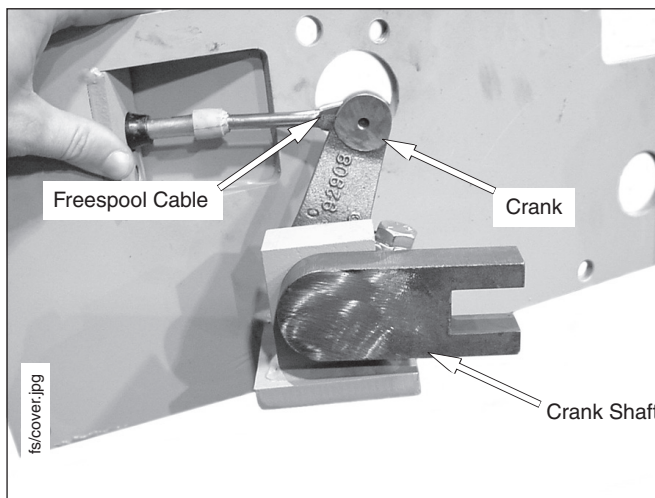
13. Install plug securely.



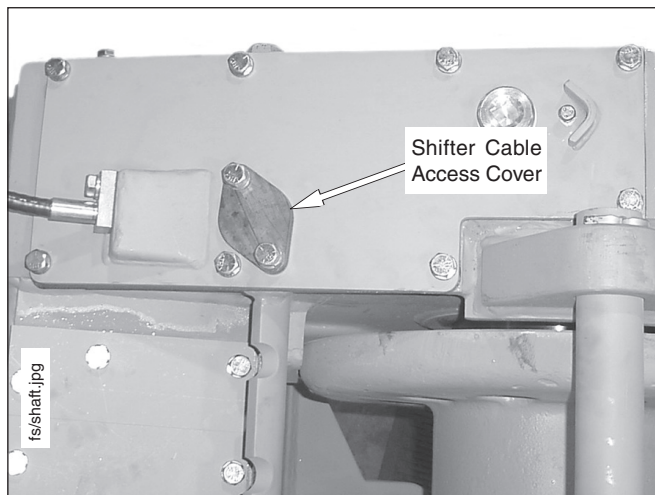
14. Lockwire as shown.



15. Assemble crank shaft, crank and freespool cable on cover as shown.



16. Install cover. Tighten capscrews on shifter cable access cover to 75 ft-lbs (10 kg-m).



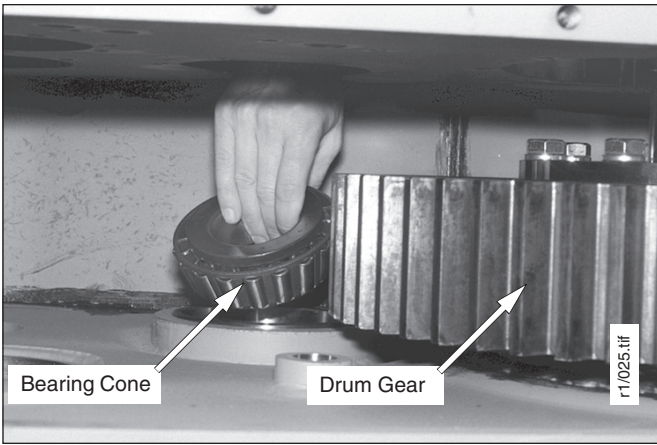
Intentionally Blank

Intermediate Shaft Installation, Non Freespool

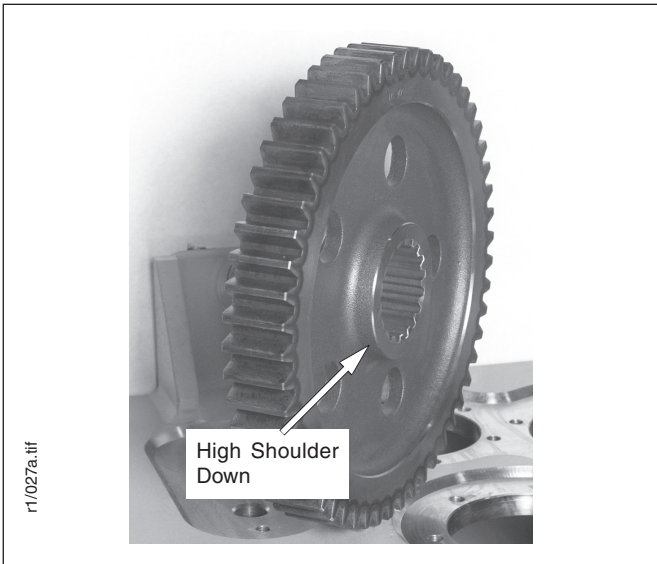
These figures show the winch removed from the tractor with the clutch shaft and brake shaft removed.

NOTE: The winch is shown equipped without the optional freespool arrangement. For instructions on how to install an intermediate shaft on a freespool winch, refer to the next section, Intermediate Shaft Installation, Freespool.

1. Install inner bearing assembly if previously removed. Use a liberal amount of lubriplate or other light lube grease to hold the inner bearing cone in place.

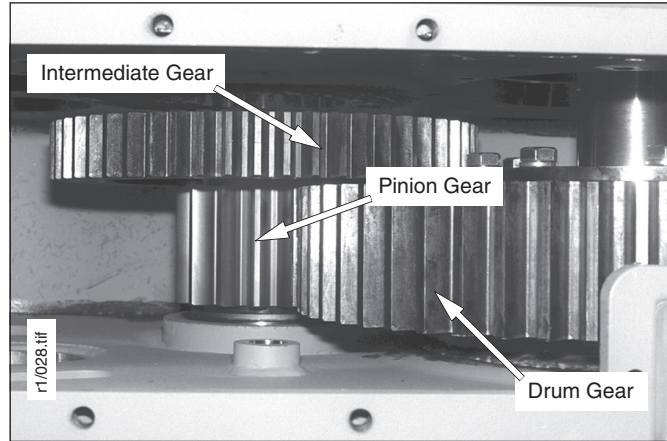


2. Position intermediate gear in housing. Install intermediate shaft far enough to support the gear.

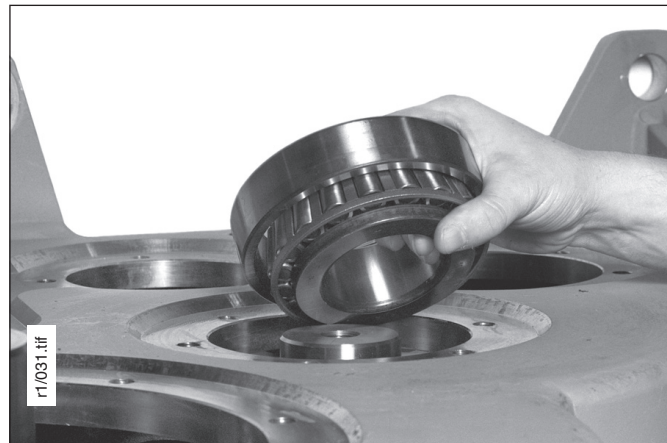


NOTE: Install intermediate gear with high shoulder down, towards the drum gear, to set enough clearance between the intermediate gear and the drum gear.

3. Position the pinion gear so that the teeth are splined to the intermediate shaft.



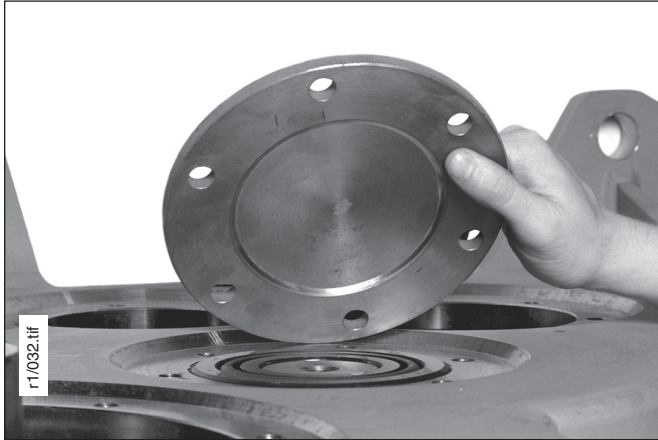
4. Install the outer bearing assembly. Make sure that the cup is firmly seated against the bearing cone.



5. Using a depth gauge measure the distance from the face of the bearing cup to the winch housing. Add a shim pack of 0.004 to 0.007 in. (0.102-0.178 mm) greater than the measured distance. For example, if the measured distance is 0.004 in. (0.102 mm), add a shim pack with a total thickness of 0.008 to 0.011 in. (0.203-0.279 mm). This will allow 0.004 to 0.007 in. (0.102 to 0.178 mm) endplay of the shaft.



NOTE: Shafts requiring a finalized shim pack of 0.020 in. (0.510 mm) are not uncommon.

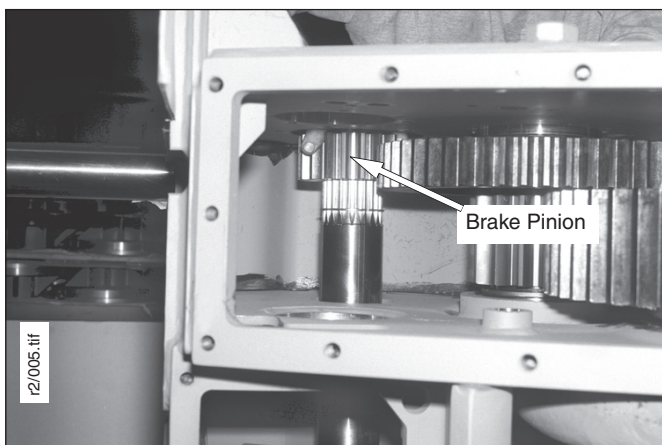
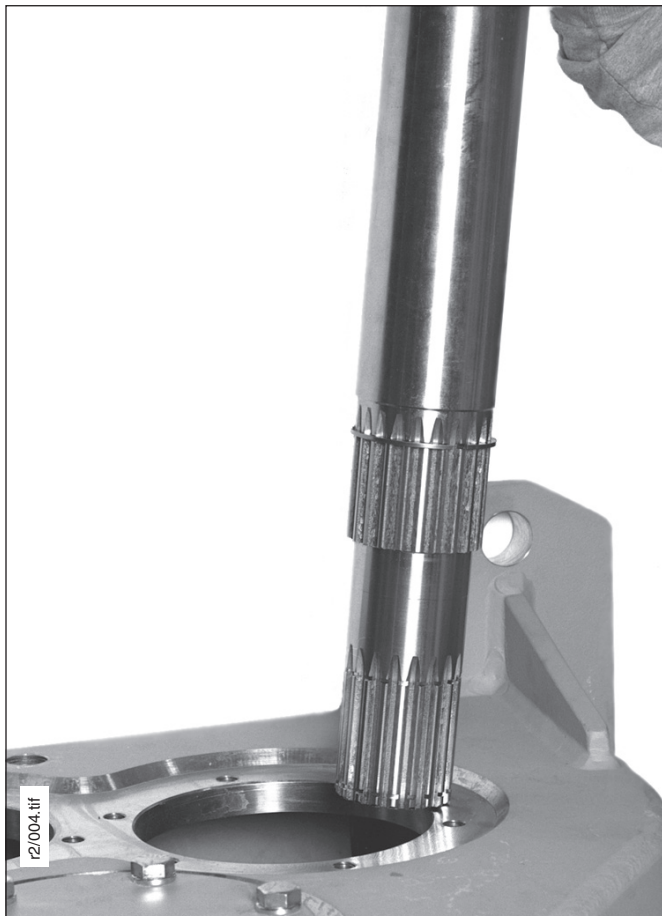


6. Coat the winch frame and retainer with Loctite or other suitable sealing compound. Install finalized shim pack and retainer.
7. Tighten the six capscrews to 75 ft-lbs (10 kg-m).

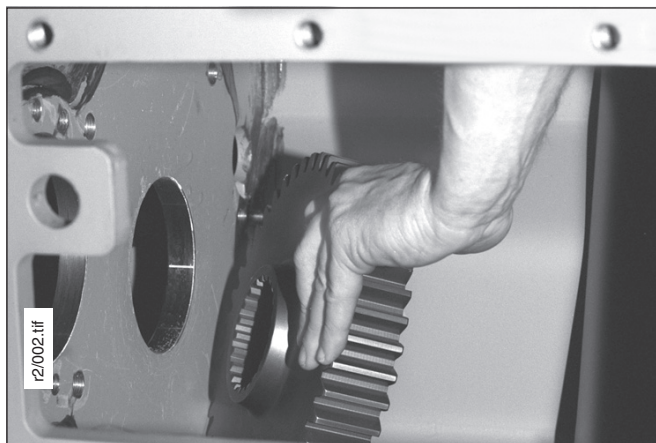
Brake Shaft Installation

The brake shaft and reduction gear must be installed before installation of the clutch shaft assembly.

1. Place shaft into winch housing and press pinion and bearing cone on right-hand end of brake shaft.



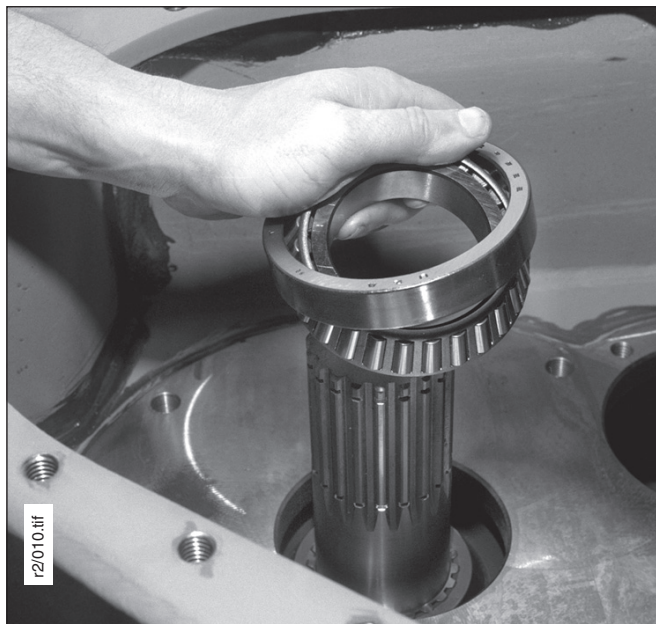
2. Install reduction gear and bearing cone on the left-hand end of the shaft.



CAUTION

Install gear with the long hub side towards the left-hand end of the shaft.

3. Install left-hand bearing cup into housing.



NOTE: Be careful not to bump shaft or cup will come out of bore.

4. Install right-hand bearing assembly and retainer without shim pack and tighten capscrews securely. Do not tighten to final torque at this time. Leave O-ring off retainer at this time.



5. Adjust shaft endplay as follows:
 - a. Using moderate pressure tap RH bearing retainer to seat brake shaft components.
 - b. Loosen the capscrews previously installed in Step 4 above. Tighten capscrews finger tight only.
 - c. Measure gap between retainer and winch frame in three places around retainer. Add the three measurements and divide by 3 to obtain the average gap. Assemble shim pack 0.000 to 0.004 in. (0.000-0.102 mm) less than the average gap. This will place the desired preload on the brake shaft bearings.

NOTE: The clutch shaft and brake assembly must be installed prior to adjusting the brake shaft endplay. See the following Oil Brake Reassembly and Installation section.

6. Coat winch frame and retainer with sealing compound. Replace RH bearing retainer complete with final shim packs and O-rings. Use loctite between shims for sealing in place. Tighten six capscrews to 75 ft-lbs (10 kg-m) torque.

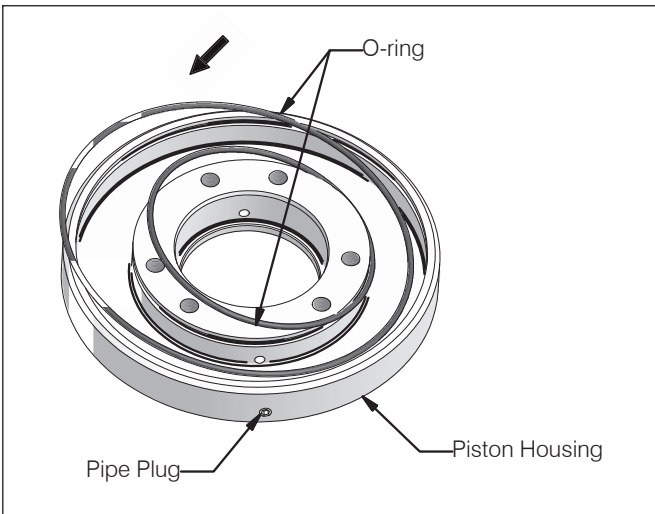
Oil Clutch Reassembly

CAUTION

Make certain all parts have been thoroughly cleaned prior to reassembly. Dirt particles will seriously affect operation of the clutch assembly.

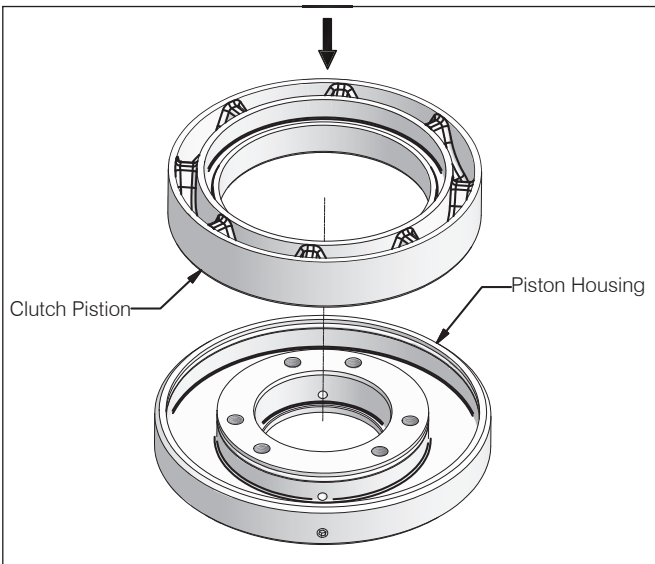
NOTE: Reassembly is essentially the same for both the forward and reverse clutches. The forward clutch is shown below.

1. Install two new O-rings in piston housing. Lubricate piston cavity with O-ring lube.

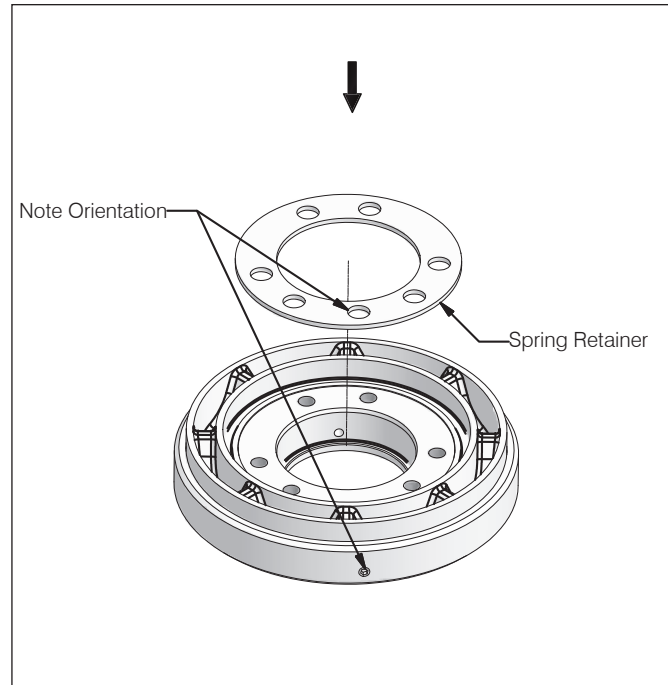


NOTE: It may be necessary to stretch both O-rings so that it will stay in its groove during installation of the piston.

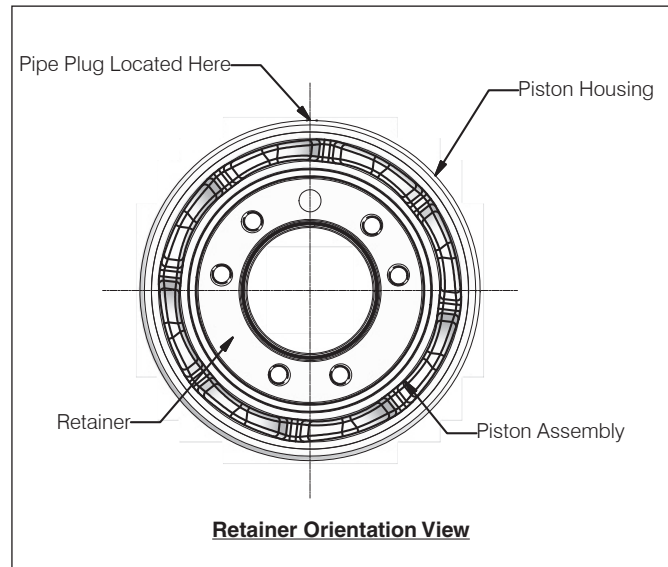
2. Carefully install the piston in the housing.



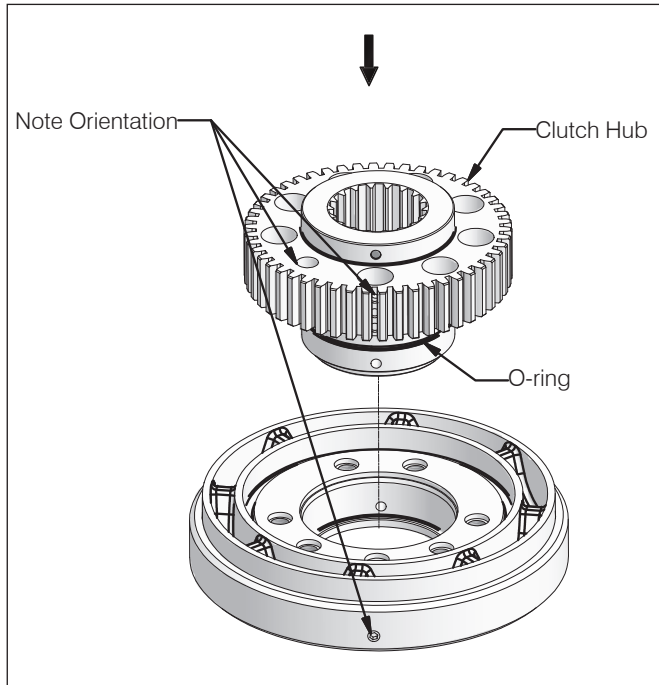
3. Install the spring retainer so holes are properly sequenced. Refer to the Retainer Orientation View below.



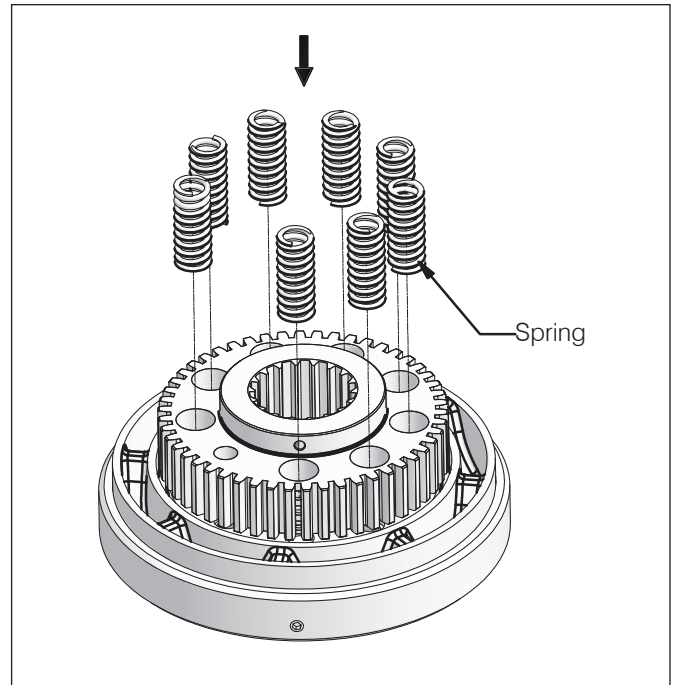
NOTE: If the retainer is reassembled upside down, the holes will almost align, but not enough to reassemble properly.



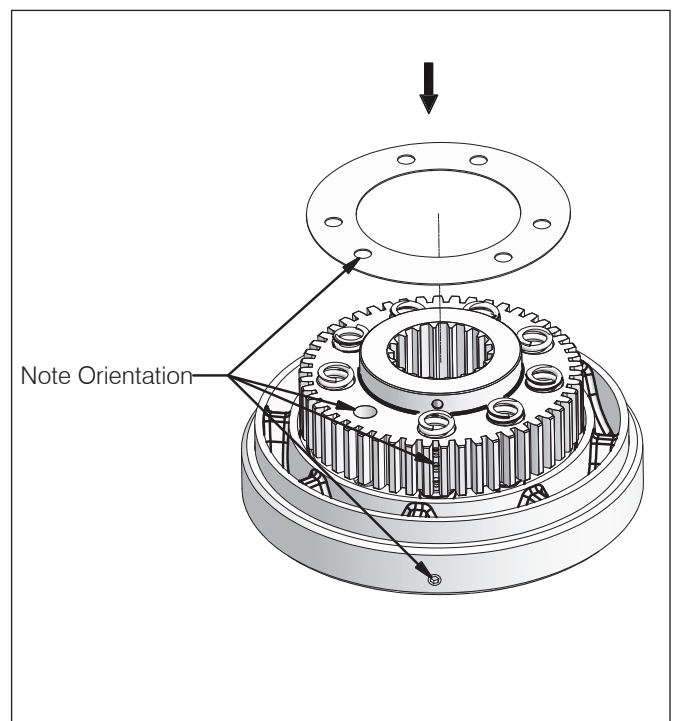
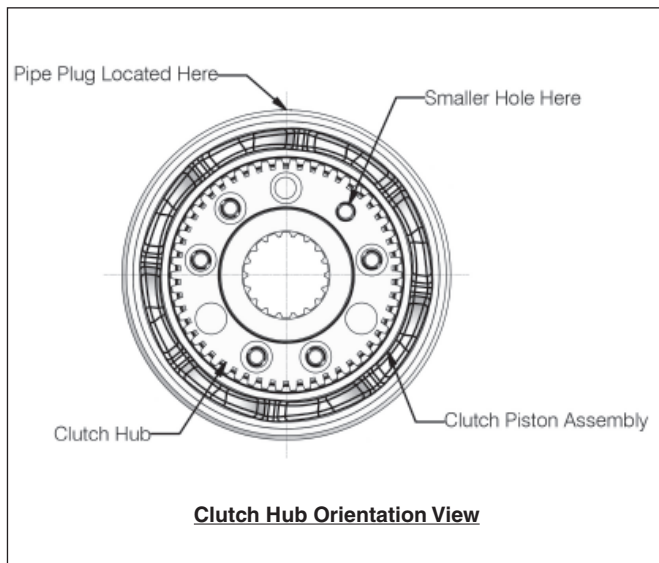
4. Install new O-ring on the hub. Lubricate with O-ring lube. Install hub in piston housing. Ensure that the holes are properly sequenced with those in the piston housing. Refer to the Clutch Hub Orientation View below.



5. Install the release springs into the clutch hub.



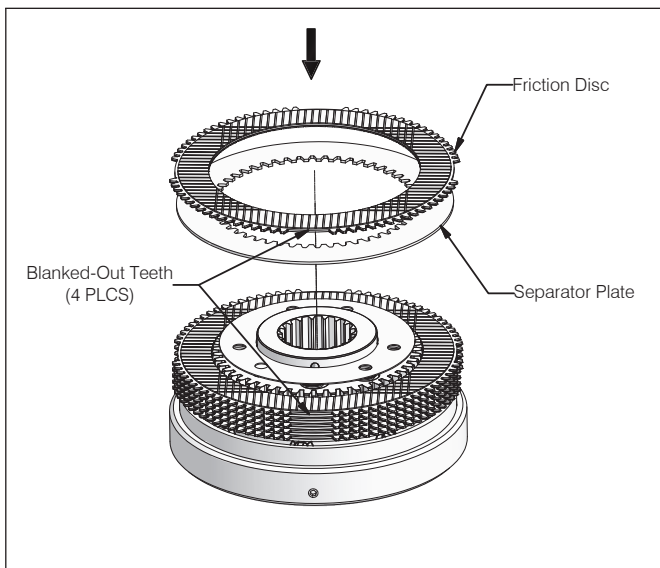
6. Install the shim(s) as tagged during removal. Pay attention to the orientation, and note that if the shim is reassembled upside down, the holes will almost align, but not enough to assemble properly.



Repairs - Oil Clutch Reassembly

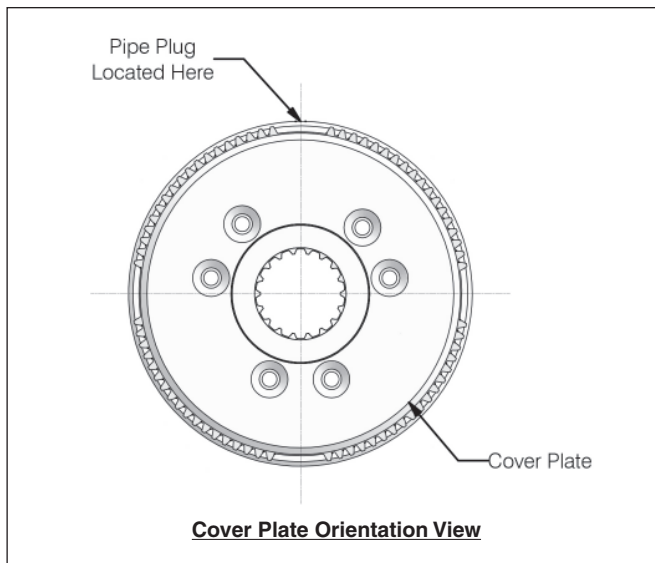
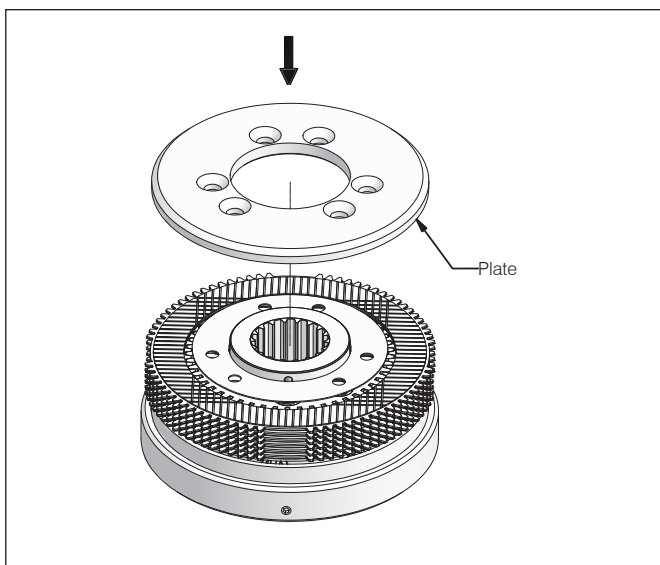
7. Starting with a separator plate on the hub, alternately place the separator plates and the friction discs on the clutch hub. The W6F uses 6 friction discs and separator plates.

NOTE: For W6F winches equipped with metallic friction discs, separator plates are slightly conical (dished). All the plates must be installed facing the same direction.

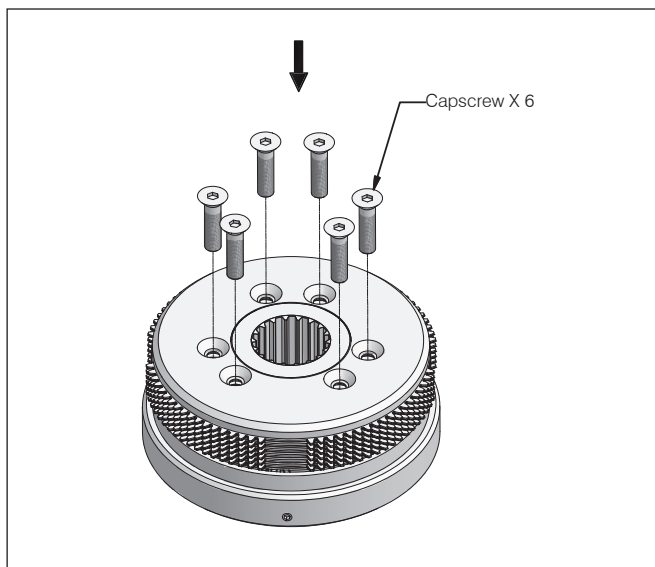


NOTE: Blanked-out teeth in friction discs must be assembled in line.

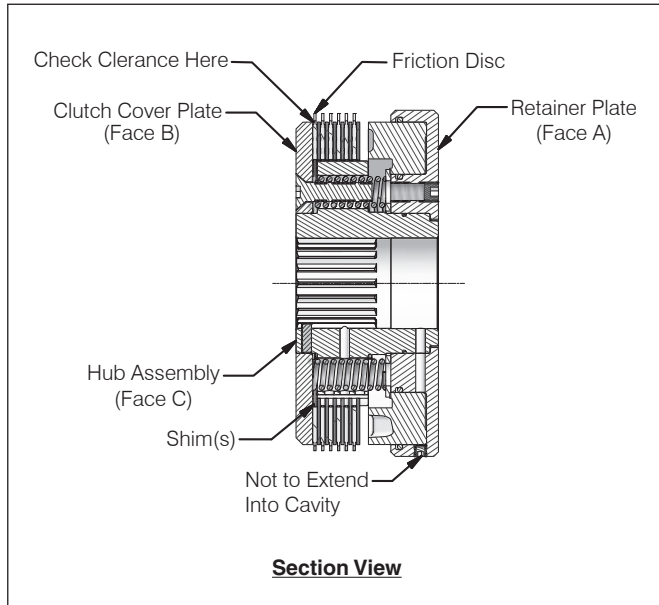
8. Install the cover plate as marked during disassembly. Pay attention to the orientation as shown in Cover Plate Orientation View below.



9. Install capscrews by torquing them to 70 ft-lbs (10 kg-m).



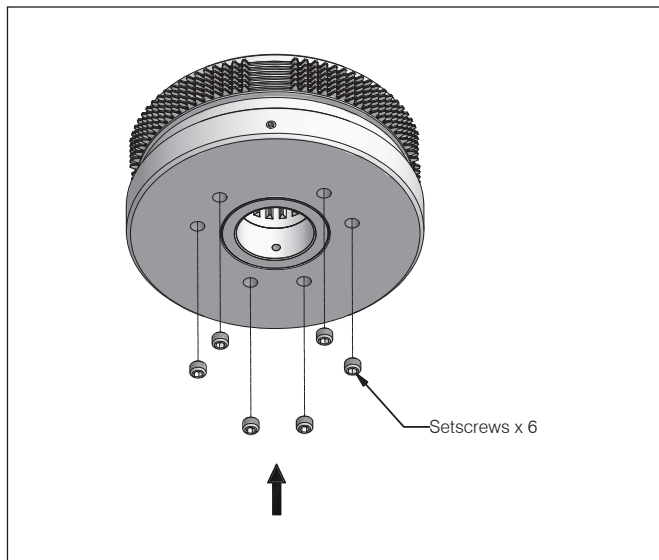
10. Check clearance between the cover plate and friction discs in two places. Use and adjust shim(s) (refer to Step 6) only as necessary to produce a clearance of 0.140-0.180 (3.6-4.6 mm) for all winches with paper frictions. For W6F models with metallic frictions, the clearance should be 0.085-0.125 inches (2.2-3.2 mm).



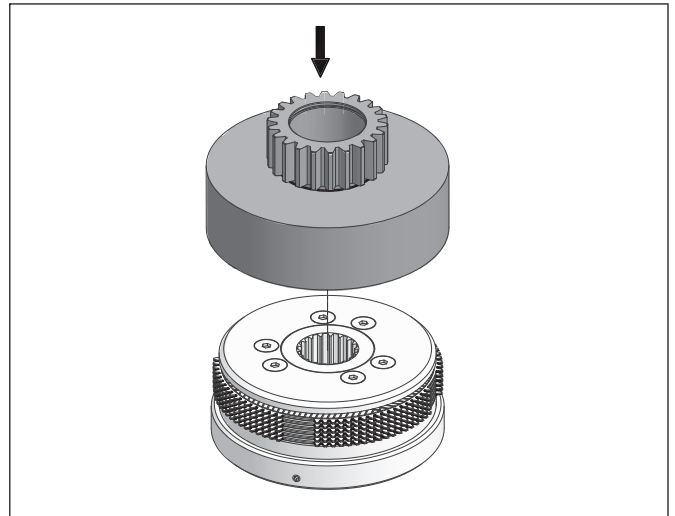
CAUTION

Cover plate (Face B) must NOT extend above the face of hub (Face C) regardless of specified clearance. Recheck clutch for proper assembly if this should occur. Refer to Section View shown above.

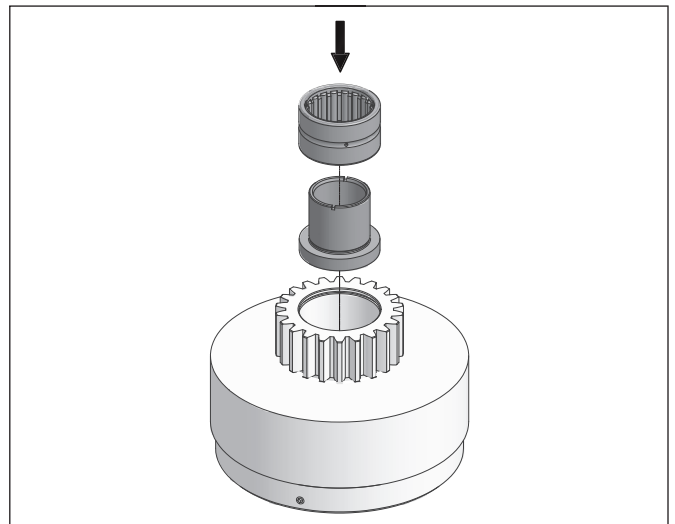
11. Tighten setscrews to 40 ft-lbs (6 kg-m).



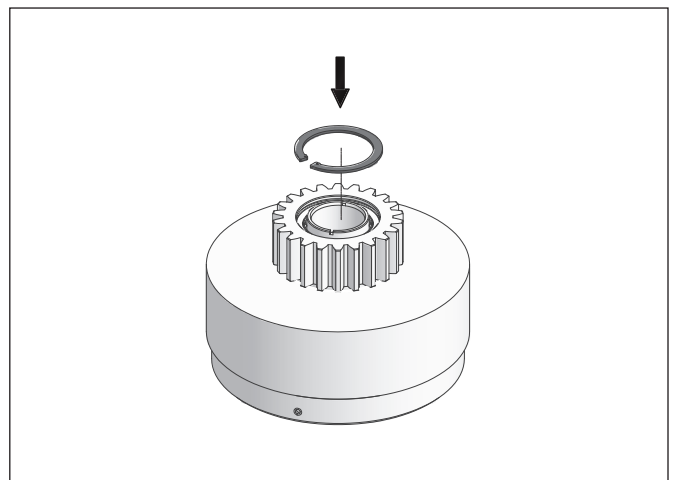
12. Carefully place spider/pinion assembly over clutch pack. Ensure the friction discs do not move out of alignment. Align blanked out teeth.



13. **This step applies to the forward clutch only.** Install roller bearing and carrier as tagged during removal.



14. Secure with snap ring in the pinion bore.

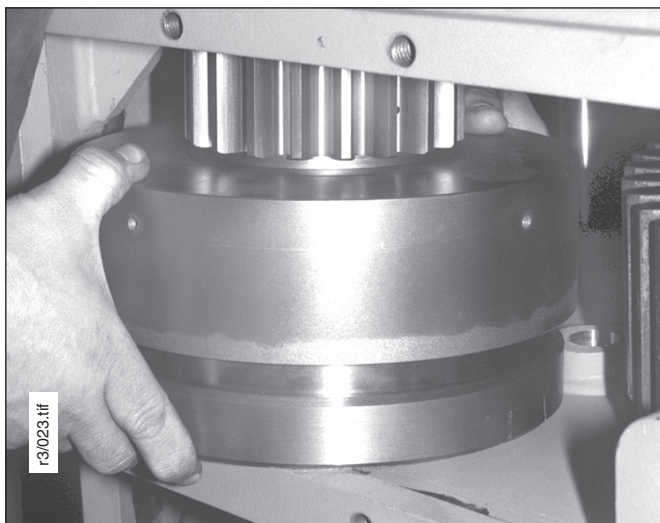


Clutch Shaft Reassembly and Installation

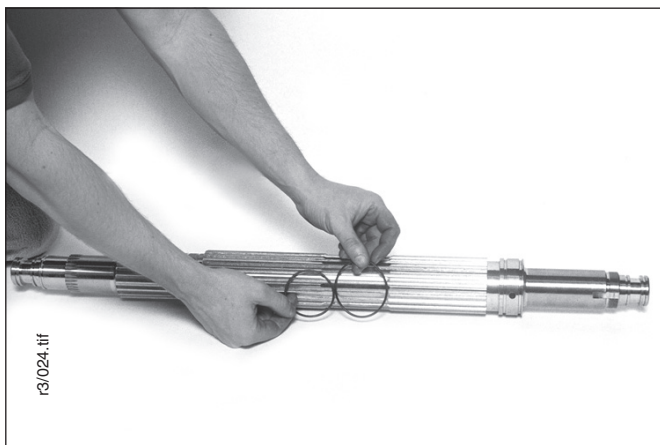
See Figure 4-1 for the location of clutch shaft components.

NOTE: The reduction gear (see Brake Shaft Installation, Step 2) must be installed before installation of the clutch shaft assembly. This is due to insufficient clearance for installing the reduction gear when the bevel gear shaft is installed.

1. Using a 1/4"-20 eyebolt installed in the spider to lower the reverse clutch assembly into the housing.

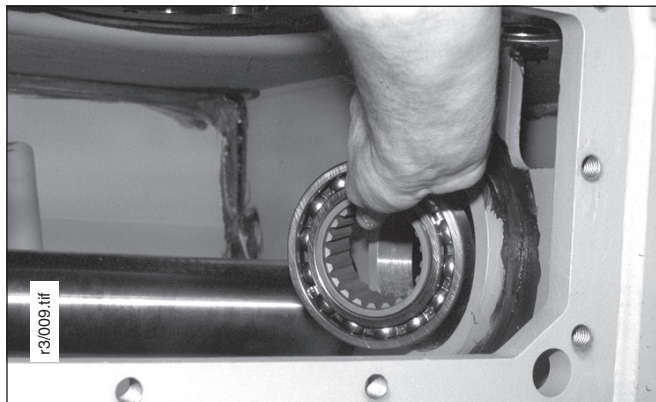


2. Install new O-rings on the clutch shaft and lubricate the entire shaft.

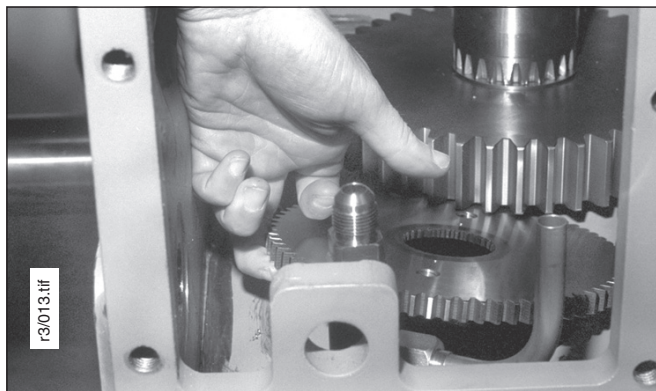


3. Position the clutch shaft so the blanked-out tooth is up. The pipe plug in the RH end of the shaft will be down.

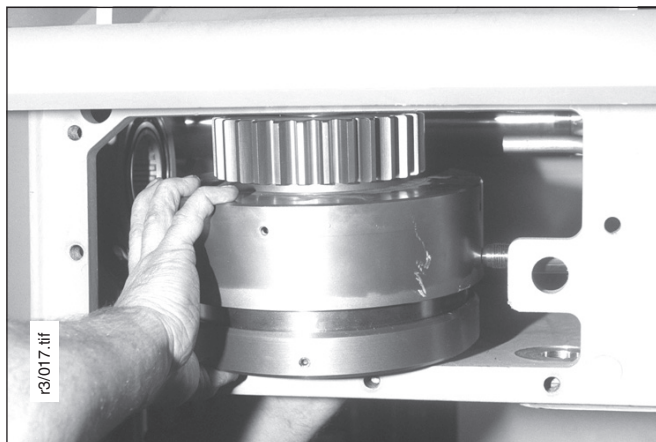
4. Install ball bearing and bearing carrier.



5. Place the pump drive gear in the housing as shown. The drive gear can be held in position by temporarily installing capscrews from the RH clutch shaft retainer into the two threaded holes provided in the gear. Ensure that the dished side of the gear faces toward the brake compartment.



6. Install forward clutch assembly into the housing.



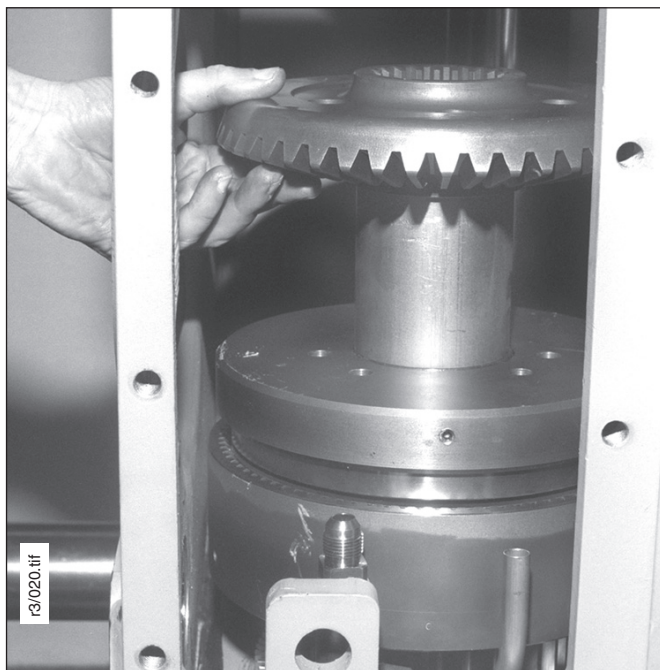
NOTE: Keep the oil hole plug in the piston housing on top. Scribe a vertical line on the housing for alignment with blanked-out spline on shaft.

NOTE: Ensure that the bearing and bearing carrier are installed as shown in the Oil Clutch Reassembly section, Step 14.

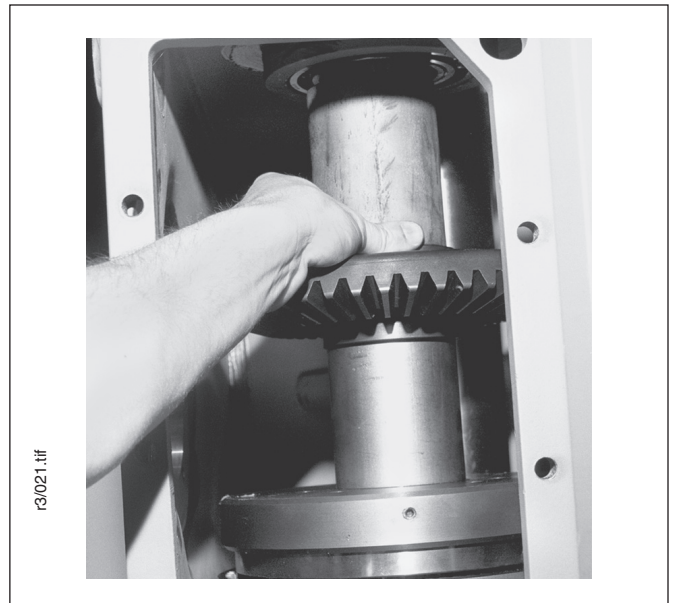
7. Install spacer next to forward clutch.



8. Insert the ring gear.

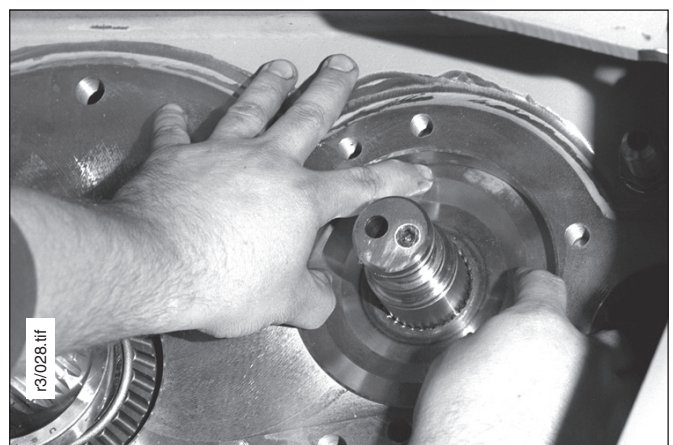


9. Insert clutch shaft far enough to install spacer between bevel gear and bearing and carrier.



NOTE: Bevel gear and spacers are shown for most common PTO shaft rotation. See Figure 4-1, for other specific locations.

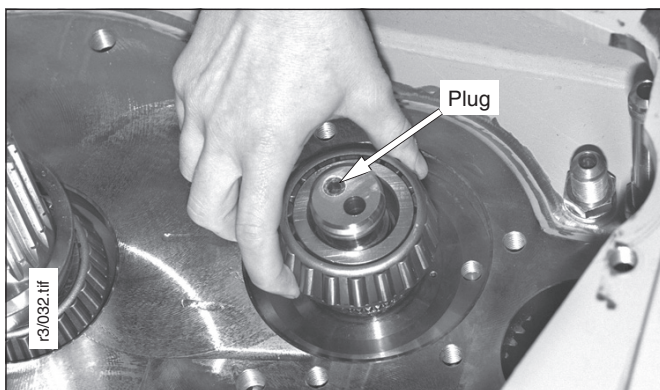
10. To install the clutch shaft in the forward clutch assembly, the blanked-out tooth on the shaft spline must engage the alignment dowel in the forward clutch hub. Mark the right-hand end of the shaft to indicate the position of the blanked-out tooth. Rotate the clutch shaft so that the blanked-out tooth on the shaft is facing up and therefore in alignment with the oil plug hole in the clutch piston housing (refer to Step 6). Using the capscrew in the pump drive gear, position the gear so that the shaft can be pushed through the clutch assembly and gear. Use a pry bar to hold the forward clutch to the right so that the shaft can be pushed through far enough to facilitate lining the pump gear up on the shaft.



CAUTION

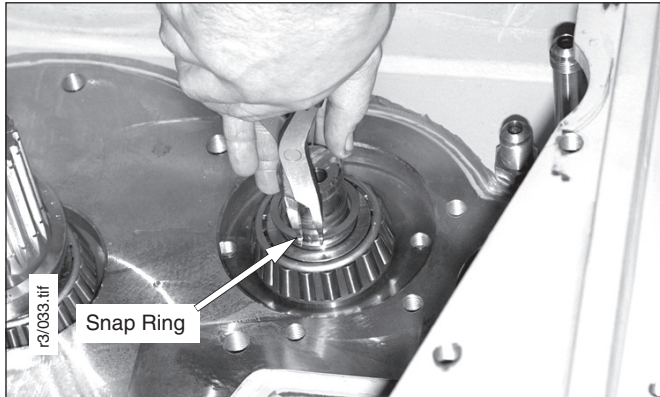
Be sure to replace the pipe plug if it is removed from piston housing oil hole in order to install the lifting eye.

11. Remove capscrews from pump drive gear and install tapered roller bearing cone on left-hand end of the clutch shaft. Replace the plug.

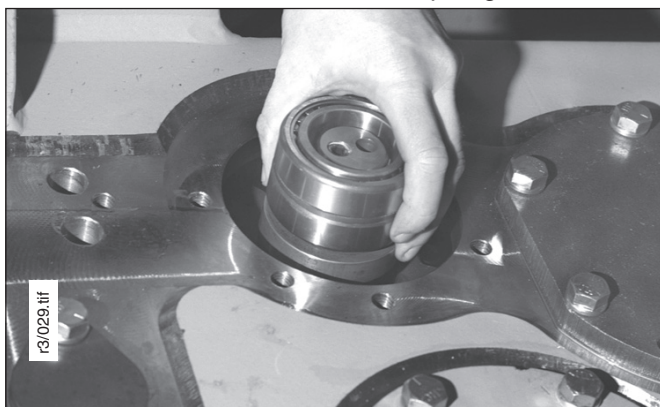


NOTE: Pipe plug to be flush or recessed to end of clutch shaft without obstructing cross port.

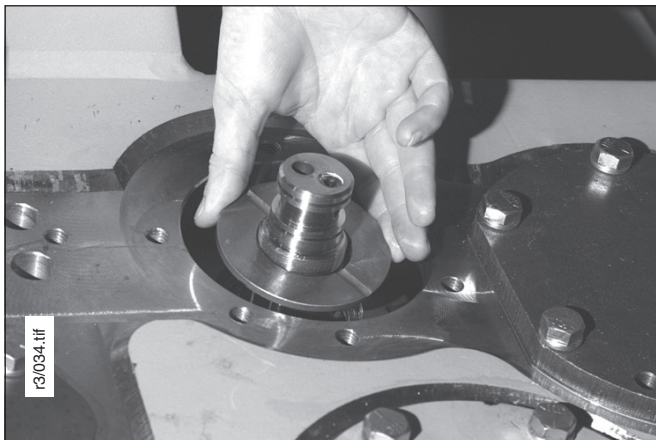
12. Secure the bearing with the snap ring.



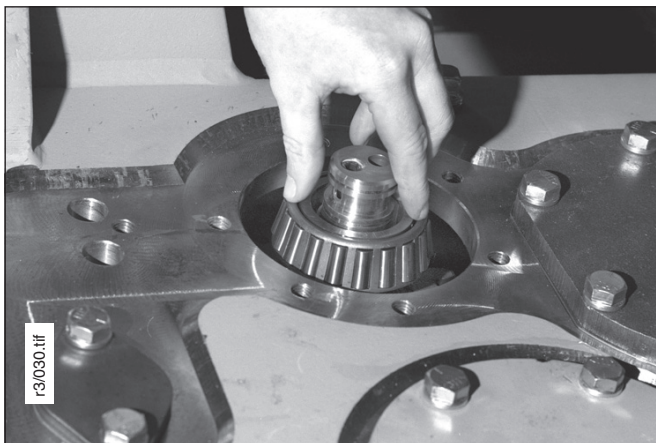
13. Pull shaft back towards the right. Install the roller bearing and carrier in the reverse clutch assembly and secure with the internal snap ring.



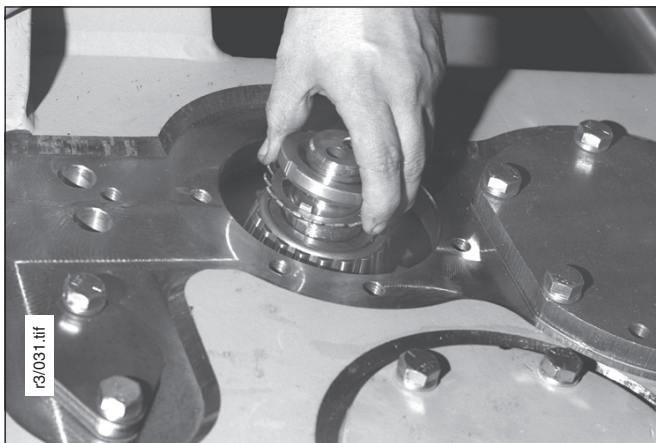
14. Install the thrust washer over the right-hand end of the shaft.



15. Install the tapered roller bearing.



16. Install the lock ring and special nut as shown.

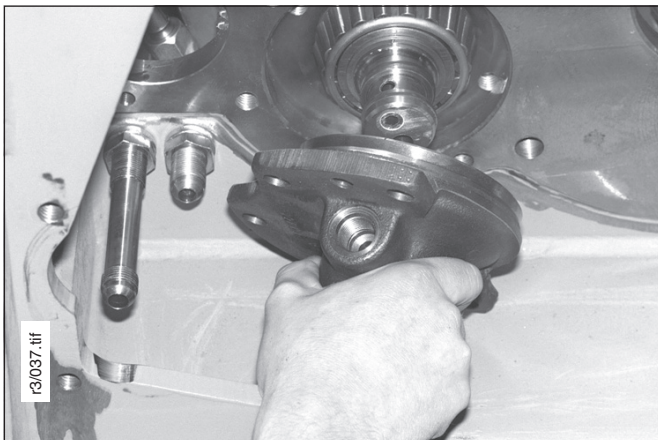


17. Use special tool specified in Fig. 4-23 on page 4-72 to tighten the locknut to 200 ft-lbs (28 kg-m). Bend two locking tangs over flats of locknut.

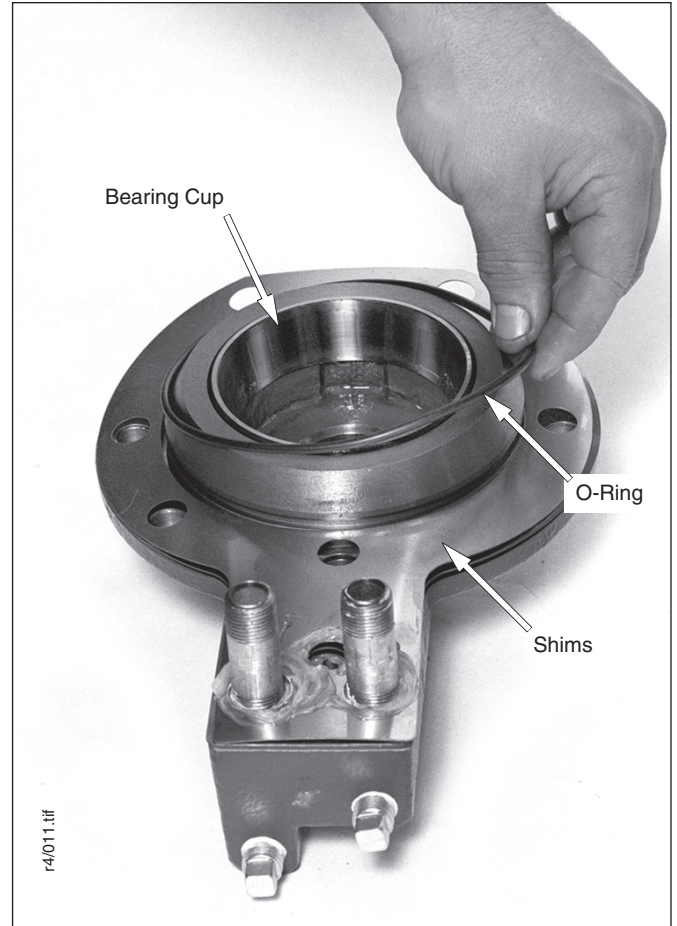


Apply air pressure to oil port on each end of the shaft and check clutch piston for movement. When air pressure is applied piston should move approximately 1/8 inch (3 mm) to 3/16 inch (5 mm).

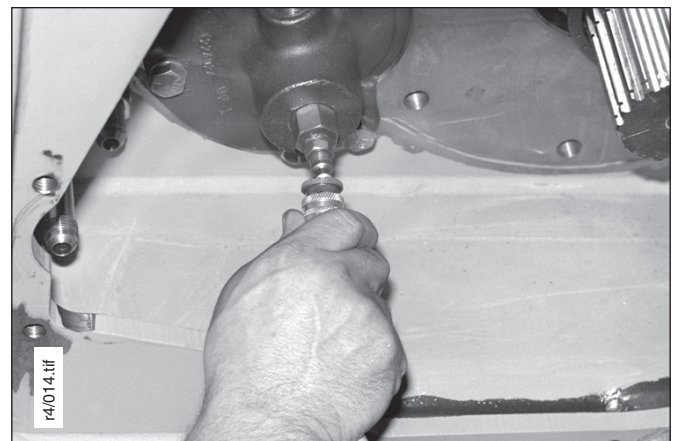
18. If removed, install bearing cup in the left-hand retainer. Assemble an approximately 0.025 in. (0.635 mm) shim pack on the left-hand bearing retainer, then install retainer. Tighten capscrews securely. Do not tighten to final torque or install cast-iron seal rings at this time.



19. If removed, install bearing cup and O-ring in the right-hand retainer. Assemble a shim pack approximately 0.040 in. (1.02 mm) thick on the right-hand bearing retainer and install retainer. Do not install cast iron seals. Tighten capscrews securely. Do not tighten to final torque at this time.



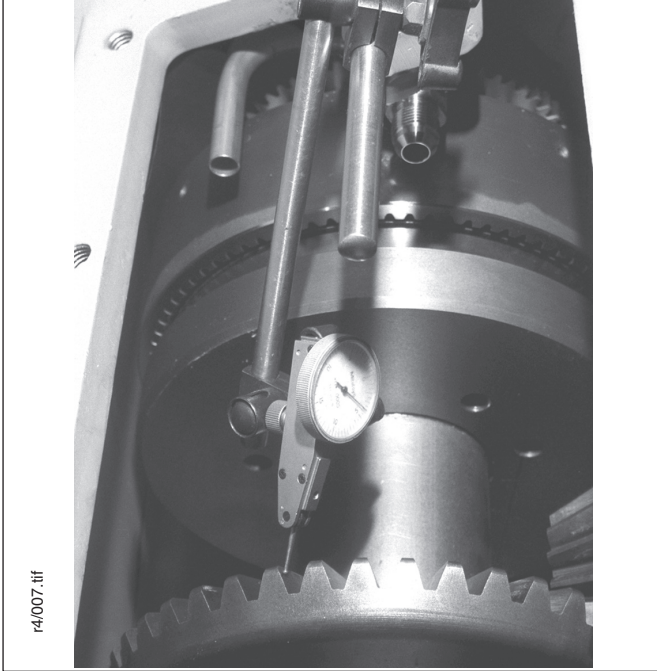
20. Apply air pressure to oil port on each end of the shaft and check clutch piston for movement. When air pressure is applied, piston should move approximately 1/8 inch (3 mm) to 3/16 inch (5 mm).



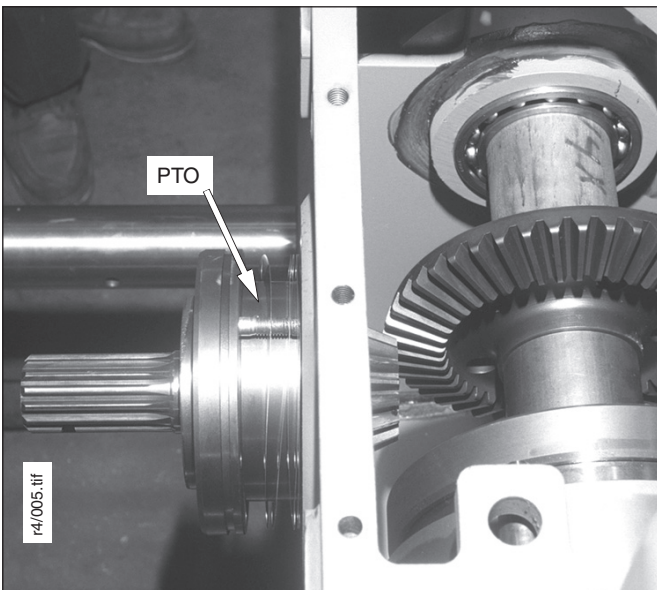
Repairs - Clutch Shaft Reassembly & Installation



21. Connect dial indicator as shown. Add or subtract shims from the two clutch shaft bearing retainers to obtain zero endplay. When zero endplay is obtained, subtract 0.000 to 0.004 in. (0.00 to 0.10 mm) of shim(s) from the retainers. This will provide the desired preload on the clutch shaft.

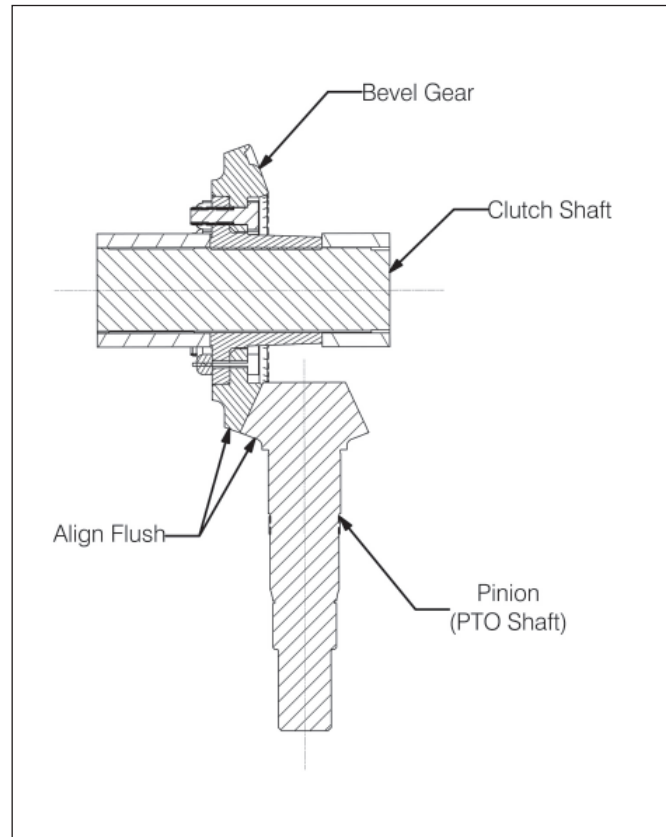


22. Assemble PTO shaft as described in the **PTO Shaft Reassembly and Installation** section, if previously disassembled. Install PTO and add or subtract shims to get heel to heel contact. Tighten capscrews to 75 ft-lbs (10 kg-m). Lockwire capscrews upon completion of shimming.



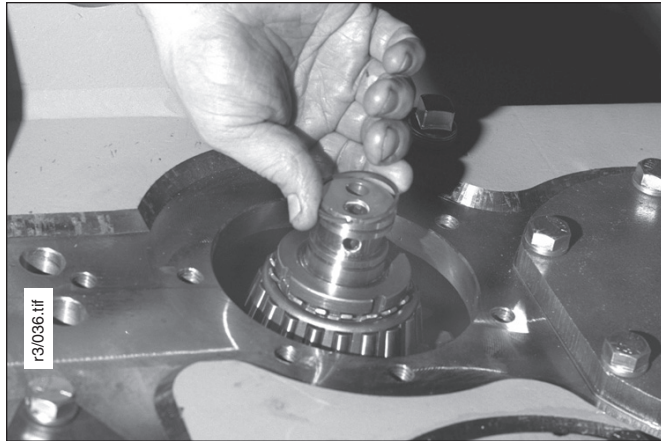
NOTE: Adding or subtracting shims from these retainers will affect pinion-to-bevel gear backlash. See step 23.

23. Use dial indicator to check pinion-to-bevel gear backlash. Backlash should be 0.006-0.014 in. (0.152-0.356 mm). If the backlash is not within this range either the pinion or the ring gear will need to be moved. A gear contact pattern check will determine which gear needs to be moved. Moving the ring gear 0.0014" (0.036 mm) will change the backlash 0.001" (0.025 mm). Moving the pinion 0.004" (0.102 mm) will change the backlash 0.001" (0.025 mm). Add or subtract shims from each side in equal amounts to change the backlash without affecting the bearing preload setting.

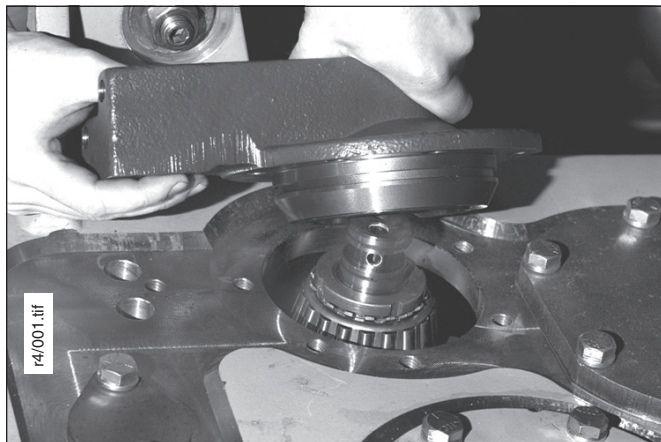


NOTE: Prior to checking pinion-to-bevel gear backlash place the clutch shaft in a normal operating position by forcing the ring gear away from the pinion gear laterally along the clutch shaft. Check the gear contact as shown in PTO Shaft Reassembly and Installation section section, step 5.

24. Remove both bearing retainers and install the cast iron seal rings.

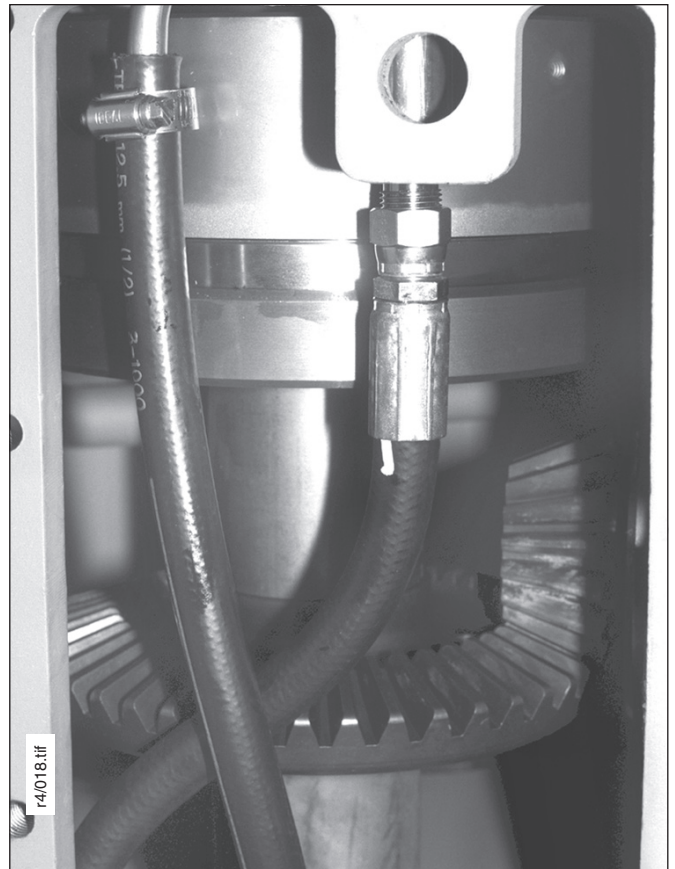


25. Install a new O-ring on the bearing retainer. Lube bore and O-ring. Coat the shim packs with Loctite. Carefully install both bearing retainers with their finalized shim packs.



26. Tighten capscrews on both bearing retainers to 75 ft-lbs (10 kg-m).

27. Install clutch crossover hoses as shown and tighten securely. Twist pressure hose to route away from bevel gear. Lock in rotated position.



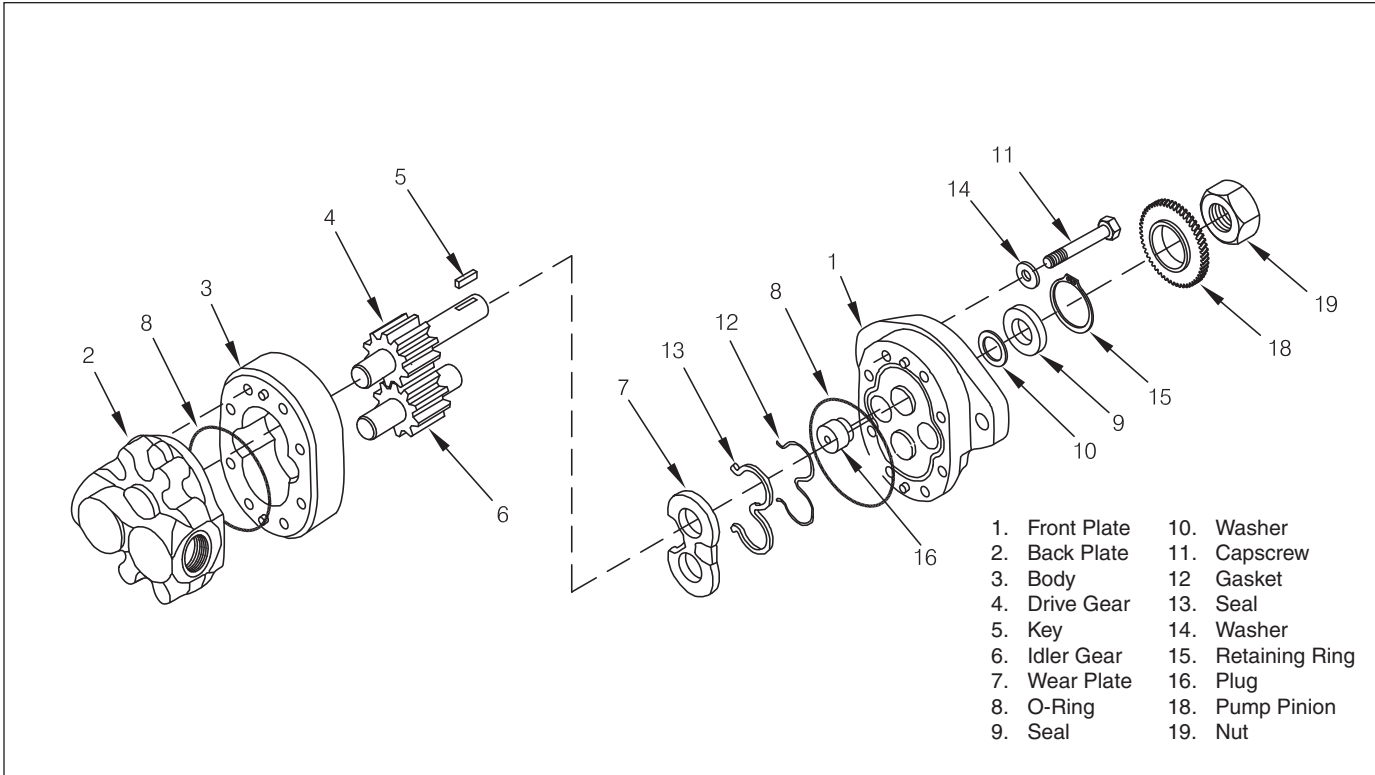


Figure 4-14 Hydraulic Pump

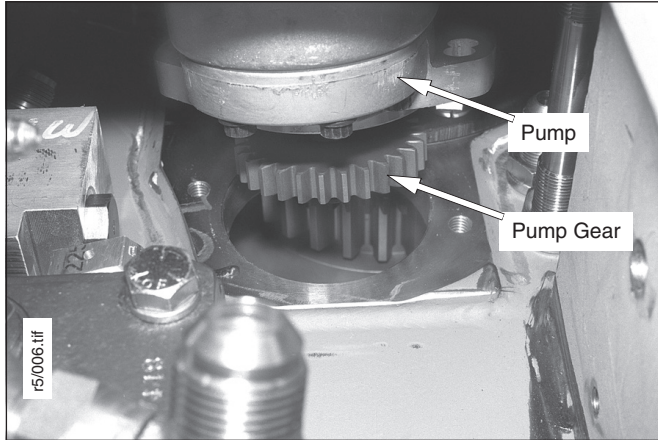
Hydraulic Pump Reassembly

1. Replace as new parts seal kit (7, 12, 13), O-Ring (8), and shaft seal (9).
2. Press protector gasket (12) and back-up seal (13) into wear plate (7).
3. Drop plug (16) into right-side hole in the front plate (1) as shown in Figure 4-13 above.
4. Place wear plate (7), along with gasket (12) and seal (13), on top of the inside face of the front plate - bronze face up.
5. Install O-ring (8) in the groove of front plate.
6. Dip gear assembly into oil.
7. Apply a thin coat of petroleum jelly to both milled gear pockets of body. Slip body over gears onto front plate with half moon port cavities in body facing backplate. Check if scribed location mark lines up.
8. Install O-Ring (3) in groove of backplate.
9. Slide back plate over gear shafts. Line up scribed location mark.
10. Place pump in vise, shaft down, and install capscrew (11) with washer (14). Torque evenly 25 to 28 lb/ft. (33.9 to 38.0 Nm).
11. Oil shaft seal (9) with petroleum jelly and work shaft seal over drive gear shaft taking care not to cut rubber sealing lip.
14. Seat shaft seal carefully by tapping with plastic hammer.
15. Add a generous portion of clean oil to both ports to ensure that the pump is adequately lubricated. Rotate pump shaft by hand. Pump will have small amount of drag but should turn freely after short period of use.
16. Replace the driveshaft key (5).

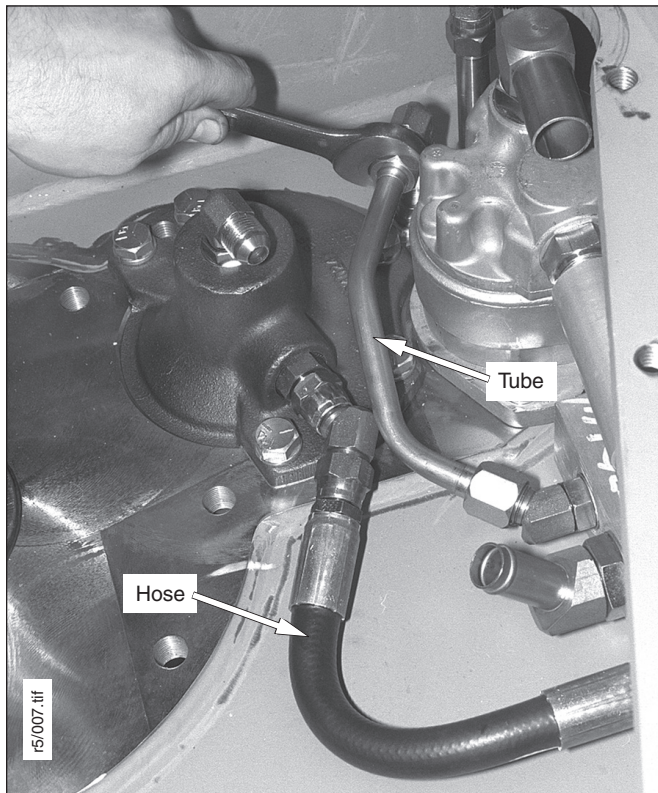
NOTE: Fill the pump with the same oil used in the winch prior to installation. This is important to protect the pump from aeration during initial operation.

Pump Installation

1. Position pump in winch housing and secure with the two capscrews. Tighten capscrews to 25 ft-lbs (4 kg-m).



2. Install hoses and tube. Ensure they are tightened securely.

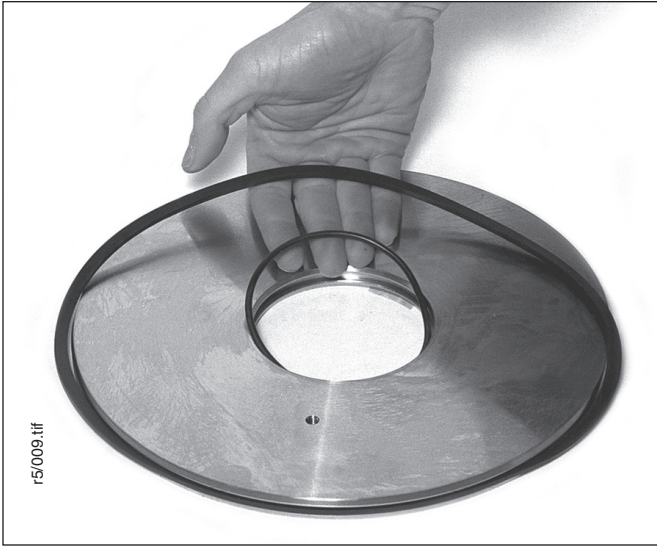


NOTE: Install hose before installing tube.

Oil Brake Reassembly and Installation

Make sure the clutch shaft has been installed prior to installation of the brake assembly.

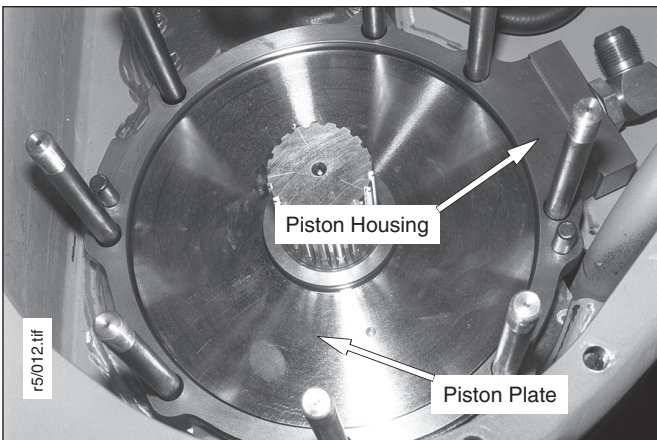
1. Lubricate and install two new O-rings in piston. It may be necessary to stretch inner O-ring to hold it in place until piston is installed in piston housing.



CAUTION

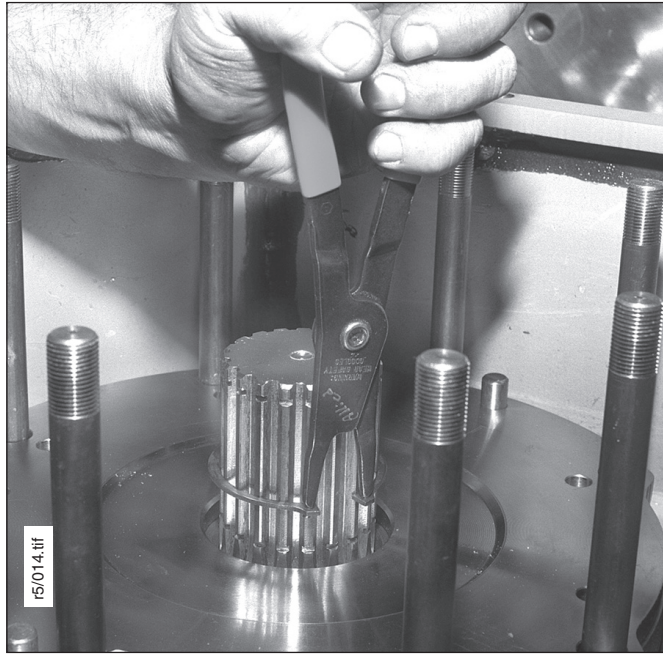
Use only Allied Systems Company-approved O-rings to ensure proper sealing.

2. Install piston in housing.
3. Ensure that the left-hand bearing is securely installed over the brake shaft.
4. Slide assembled piston and piston housing in place on studs.



NOTE: Make sure that bearing on brake shaft is properly positioned before installing housing.

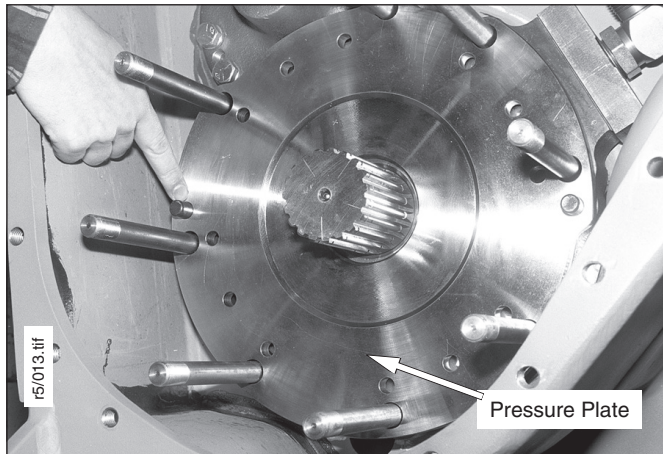
5. Install snap ring on the shaft.



CAUTION

Make sure that snap ring is securely positioned in brake shaft groove.

6. Install pressure plate. Push plate against piston housing. Then install dowel pins.

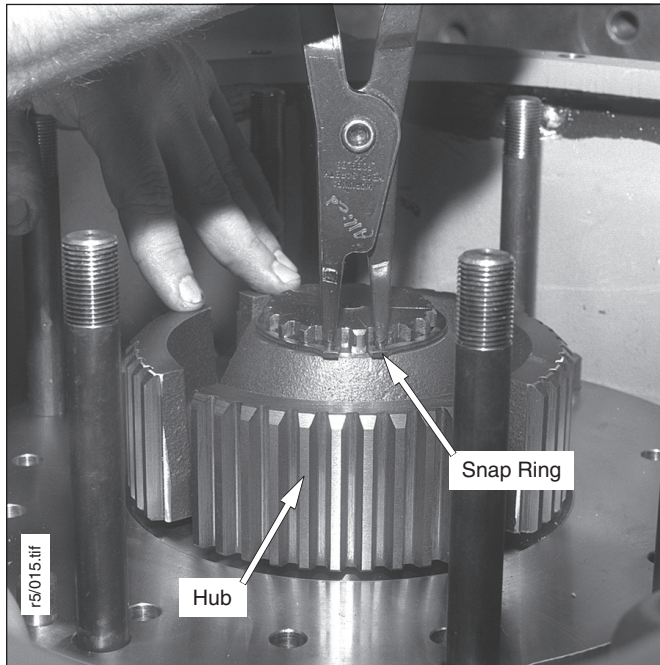


7. Install hub.

CAUTION

Do not reverse hub. Dish must face out.

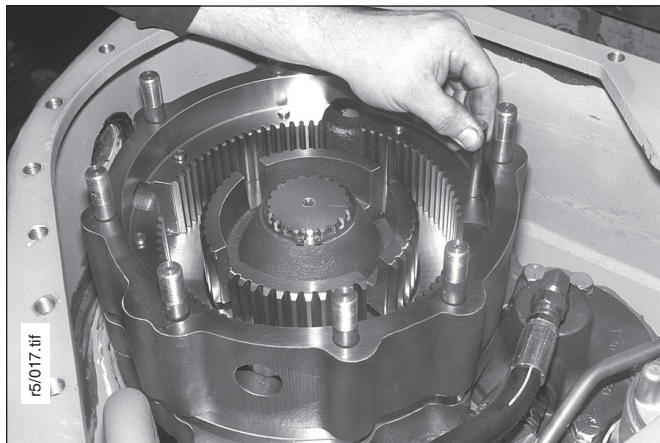
8. Install snap ring.



⚠ CAUTION

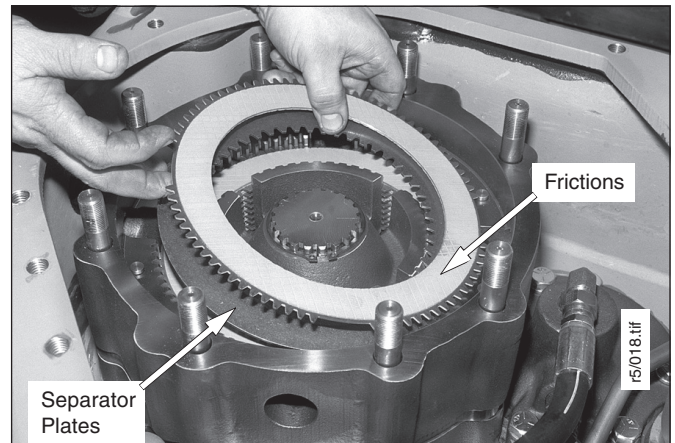
Make sure that snap ring is securely positioned in brake shaft groove.

9. Install cage against pressure plate. Then install 8 push pins.



NOTE: Holes in cage are sequenced so that cage can only be installed as shown.

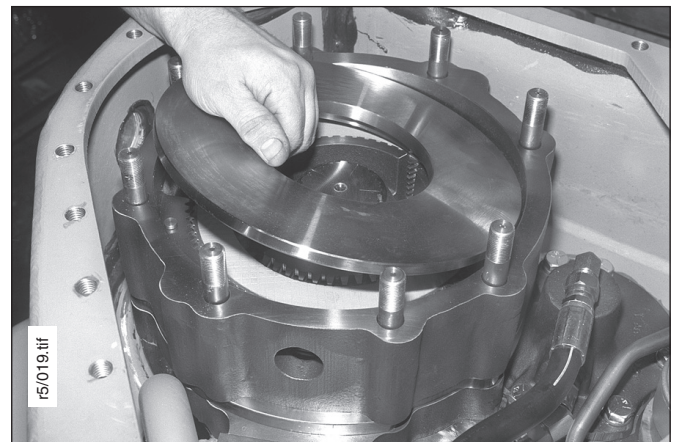
10. Install the friction discs and separator plates alternately starting with a friction disc. Align blanked-out teeth on all friction discs. 10 friction discs and 9 separator plates are used.



⚠ CAUTION

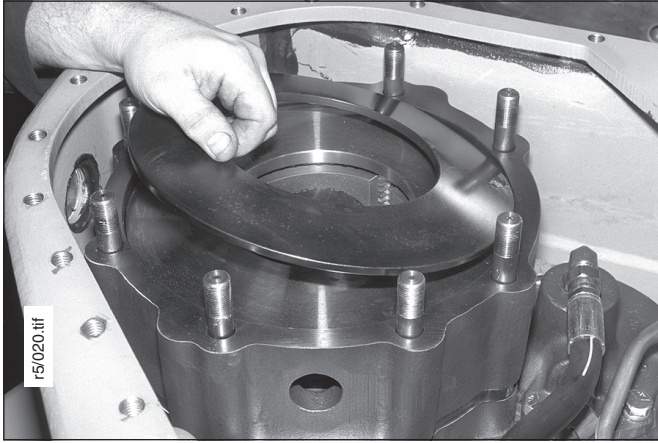
For W6F winches prior to S/N W6F-1689 equipped with 7 metallic friction discs, the 6 separator plates are conical (dished). Face all separator plates in the same direction. All dished sides must face either inward or outward.

11. Install spacer in early W6F winches only (not shown).
12. Install thrust ring, smooth side out.

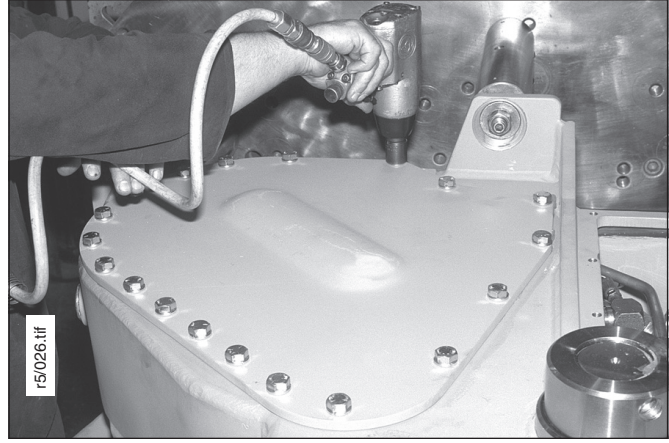


Repairs - Oil Brake Reassembly & Installation

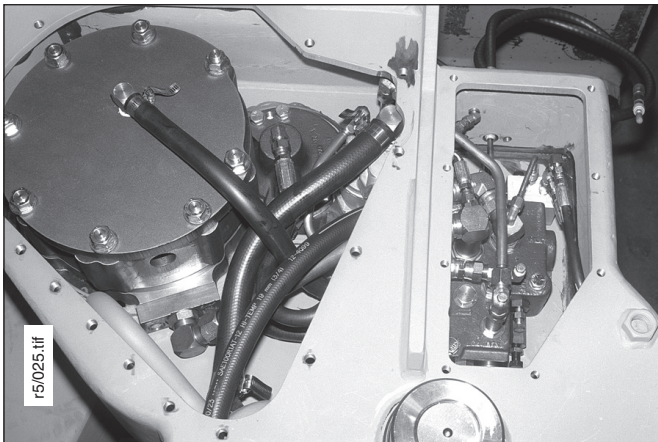
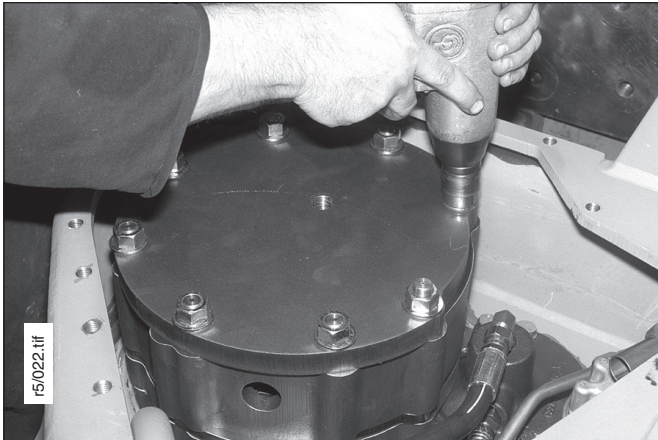
13. Install belleville spring with curved side pointing outward. W6F winch uses one belleville spring.



15. Install winch covers.



14. Install cover and secure with 8 nuts and washers. Tighten nuts alternately to 200 ft-lbs (28 kg-m). Install the brake pressure and cooling lines removed during disassembly.



Intentionally Blank

PTO Shaft Reassembly and Installation

NOTE: If equipped with a dropbox refer to Fig. 4-19 through Fig. 4-22 for location of components. Assembly of the PTO shaft is essentially the same for most tractors as shown in steps 1 through 5.

1. Install new oil seal in the bearing carrier.
2. Install bearing and secure with snap ring.
3. Place the carrier on the shaft, taking care not to damage the seal.
4. Place bevel pinion on shaft and secure with snap ring.
5. Assemble shim pack and install PTO shaft as described in the Clutch Shaft Reassembly and Installation section, steps 21 through 23. Coat the ring gear teeth with Prussian Blue and rotate the PTO shaft to check the gear contact.

NOTE: If equipped with a dropbox, the PTO shaft assembly should be assembled and installed as described in the Clutch Shaft Reassembly and Installation subsection, step 22. After the PTO shaft is installed the adapter box can be placed over the PTO shaft assembly and secured with the winch.

Correct/Incorrect tooth contact:

A high contact indicates pinion is too far out. Set the pinion to the correct depth by removing shims from the carrier.

A low contact indicates pinion is too deep. Set the pinion to the correct depth by adding shims to the carrier.

6. Install PTO coupling on shaft and secure with lockpin and spiral snap ring. Ensure that the snap ring is installed securely.

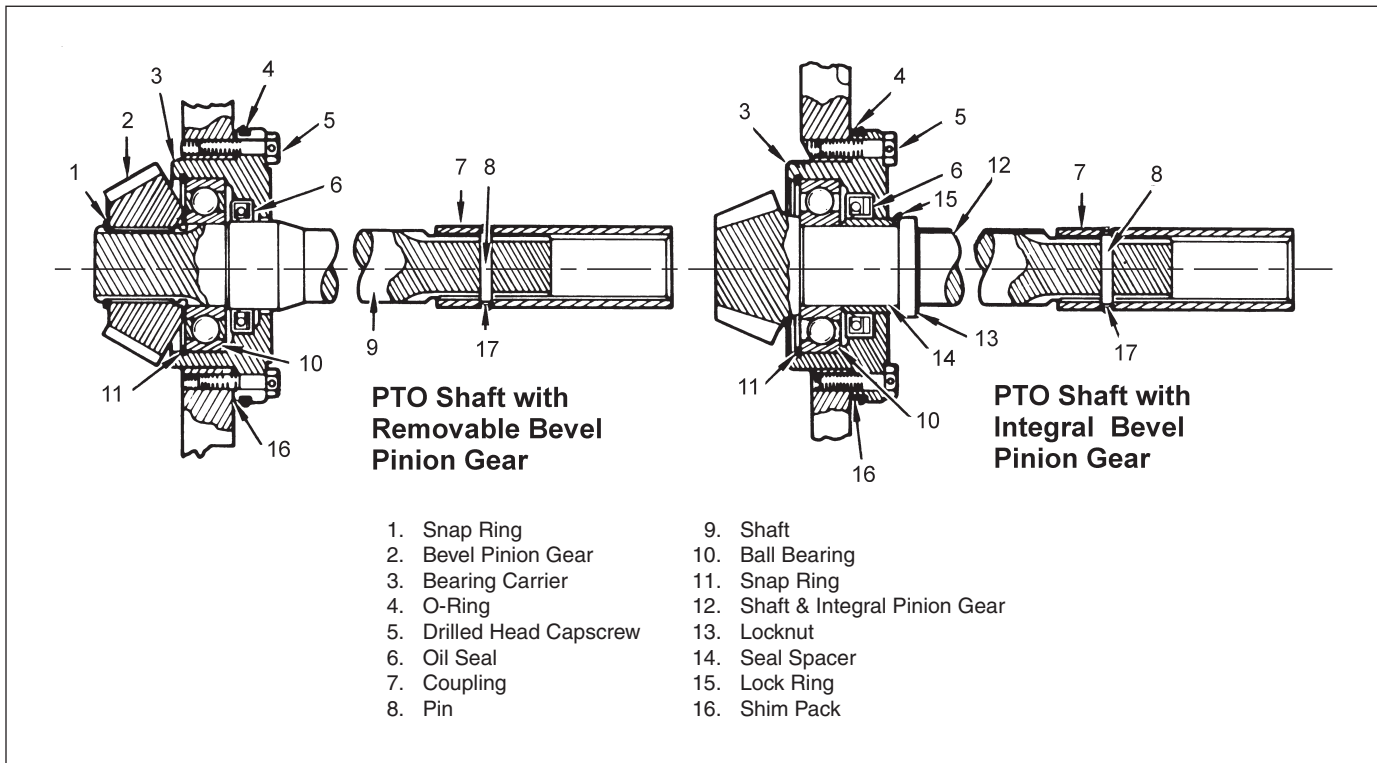
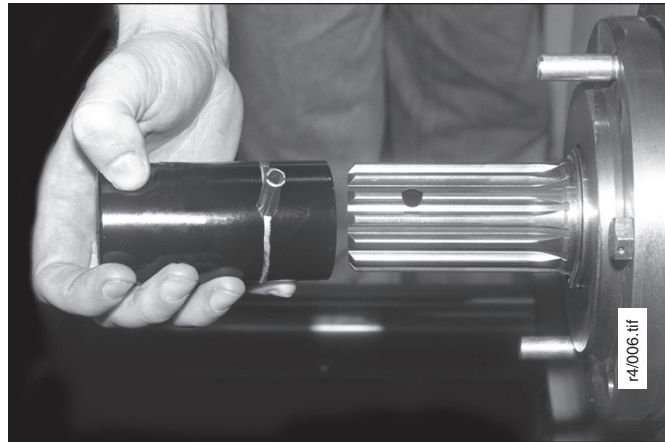


Figure 4 -15 PTO Shafts - Last Used on W6FP-3699, W6FX-3699 & AW6F-1000

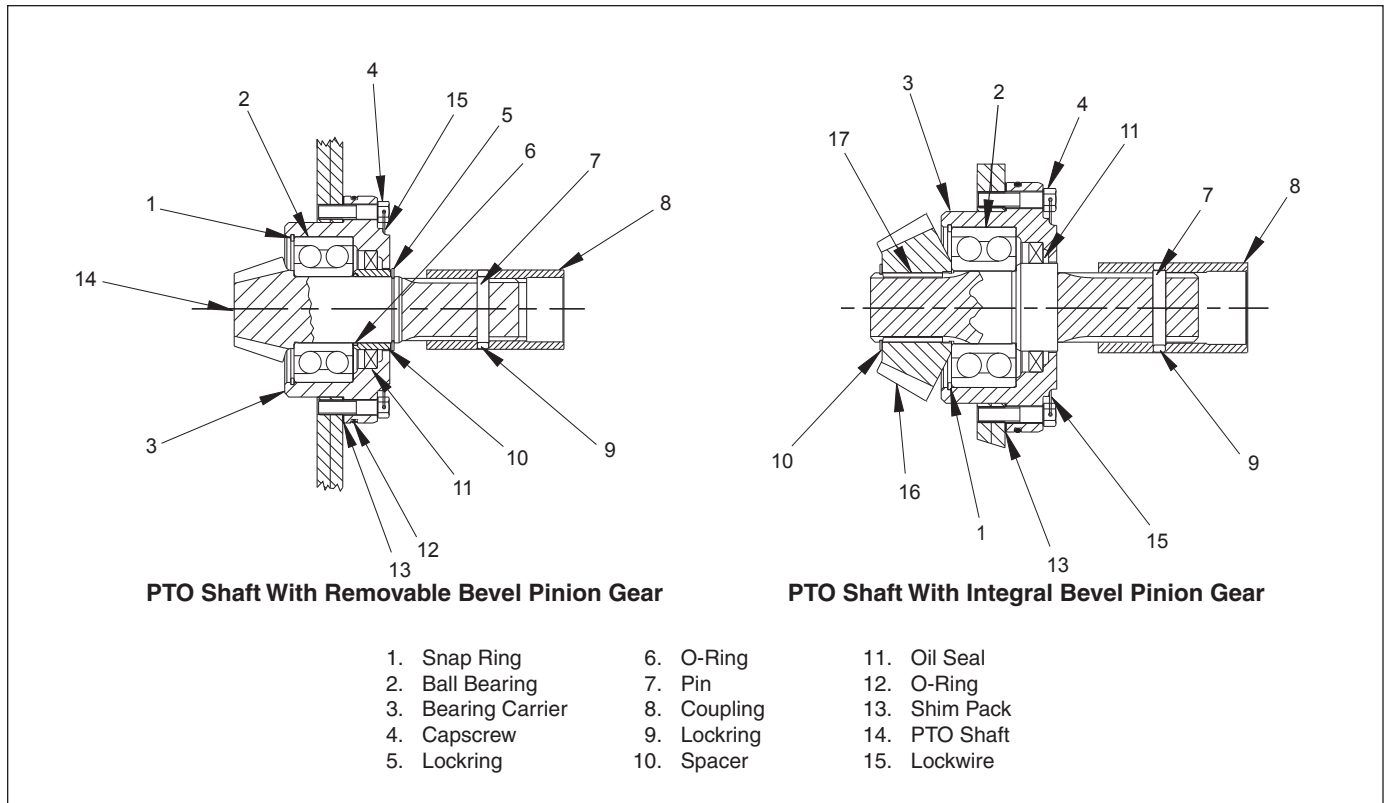


Figure 4-16 PTO Shafts, First Used on AW6F-1001

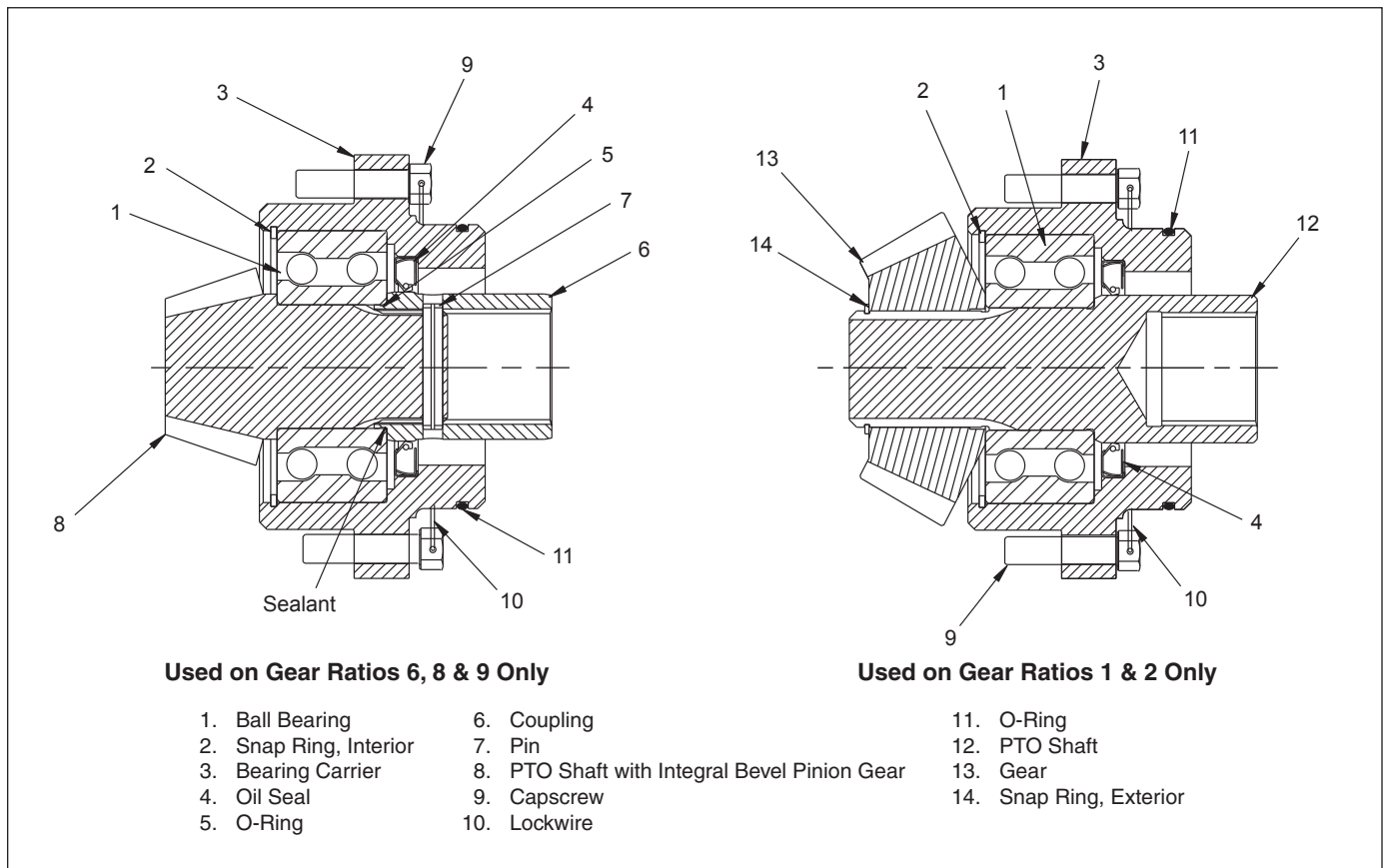
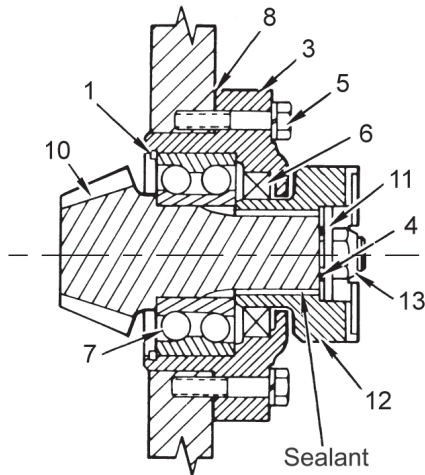


Figure 4-17 PTO Shaft on W6F for Caterpillar 527 (C40)

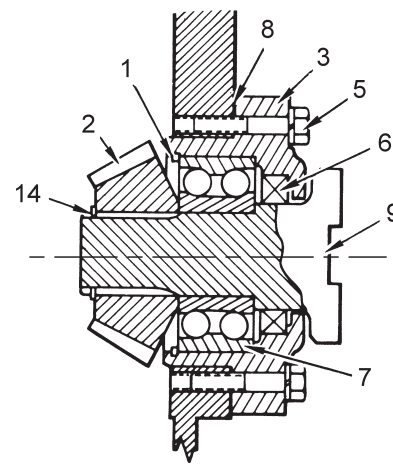
Repairs - PTO Shaft Reassembly & Installation



John Deere 755 (E32)

John Deere 750 (E32)

- Last Used on W6F-7143 & AW6F-1000

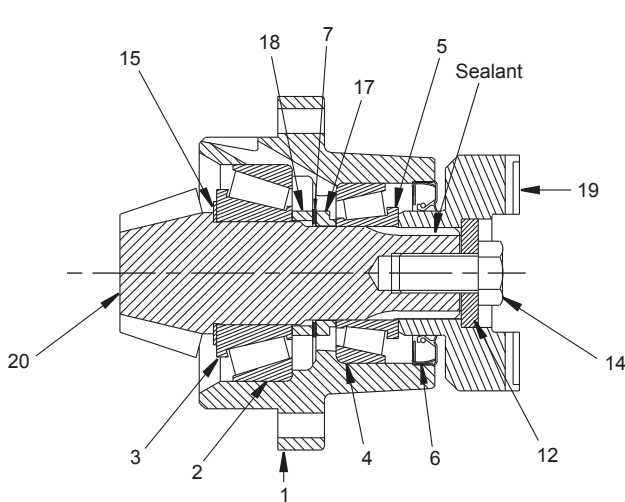


John Deere 855 (E42)

John Deere 850 (E42)

- Last Used on W6F-7143 & AW6F-1000

1. Snap Ring
2. Bevel Pinion Gear
3. Bearing Carrier
4. O-Ring
5. Capscrew & Washer
6. Oil Seal
7. Ball Bearings
8. Shim Pack
9. Shaft
10. Shaft with Integral Pinion
11. Washer
12. Yoke
13. Nut
14. Snap Ring



John Deere 750 (E32, E41) / 850 (E42, E43)

- First Used on S/N W6F-7144 & AW6F-1001

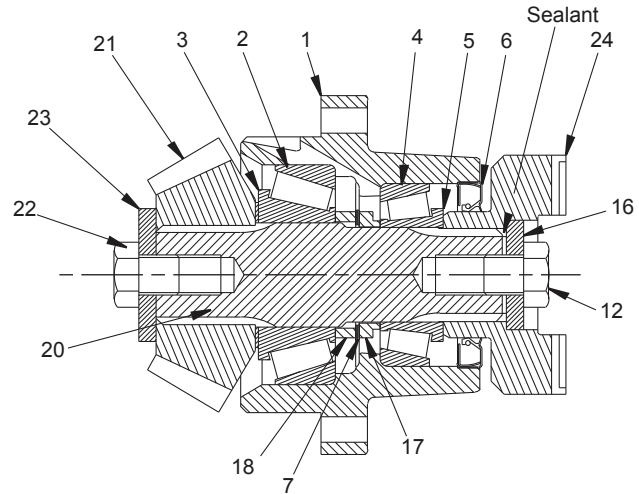
John Deere 750A (E32, E41) / 850A (E42, E43)

John Deere 750B (E32, E41) / 850B (E42, E43)

- First Used on S/N W6F-7144 & AW6F-1001,
Gear Ratios 3, 4, 6, 8 & 9 Only

John Deere 750C (E45) / 850C (E46),

Gear Ratios 6, 8 & 9 Only



John Deere 750B (E32, E41) / 850B (E42, E43)

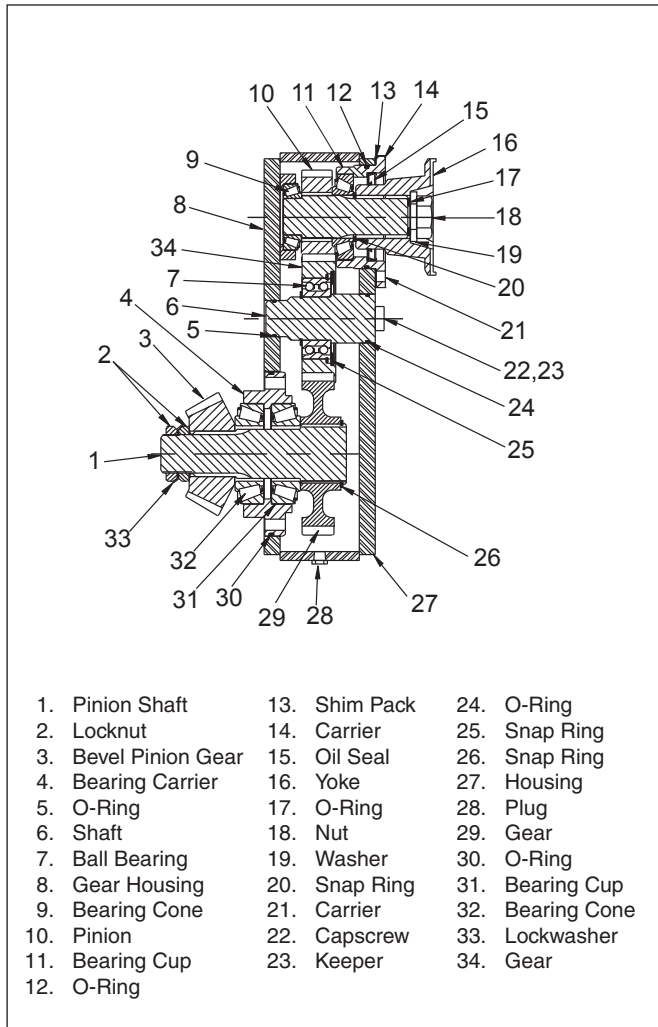
& 750C (E45) / 850C (E46),

Gear Ratios 1 & 2 Only

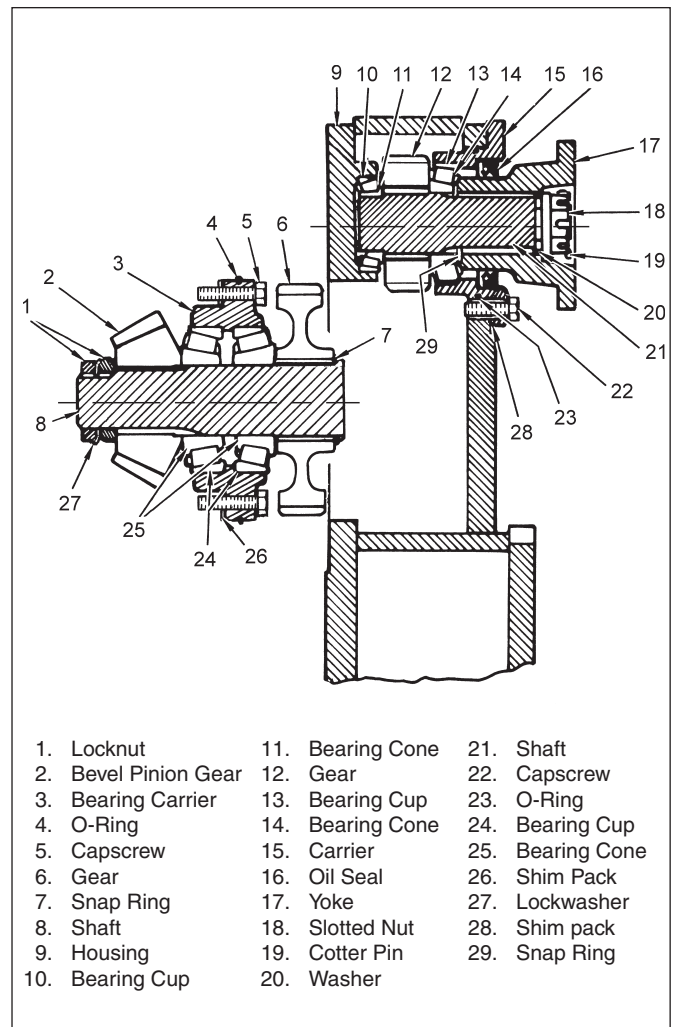
- | | | |
|--------------------|-------------------|---------------|
| 1. Bearing Carrier | 7. Shim Pack* | 19. Yoke |
| 2. Bearing Cup | 12. Washer | 20. Shaft |
| 3. Bearing Cone | 14. Capscrew | 21. PTO Shaft |
| 4. Bearing Cup | 15. Thrust Washer | 22. Gear |
| 5. Bearing Cone | 17. Spacer | 23. Capscrew |
| 6. Seal | 18. Spacer | 24. Washer |

* Note: Add shims to achieve end play of .002" - .005".

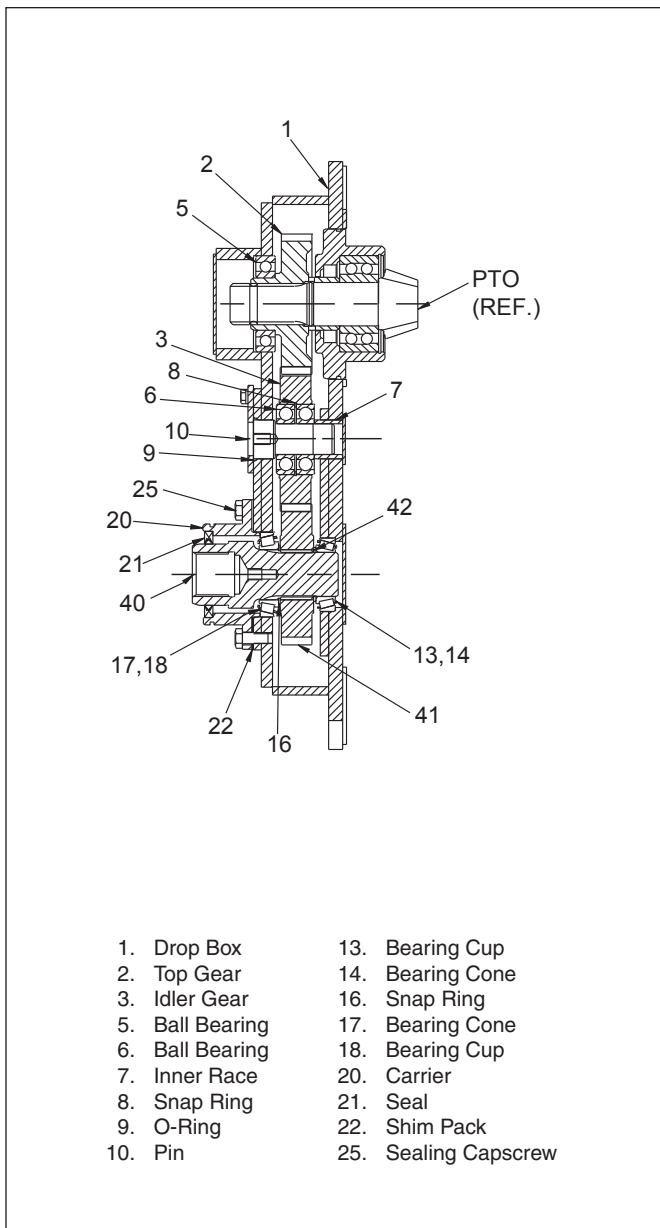
Figure 4-18 W6F John Deere PTO Shafts



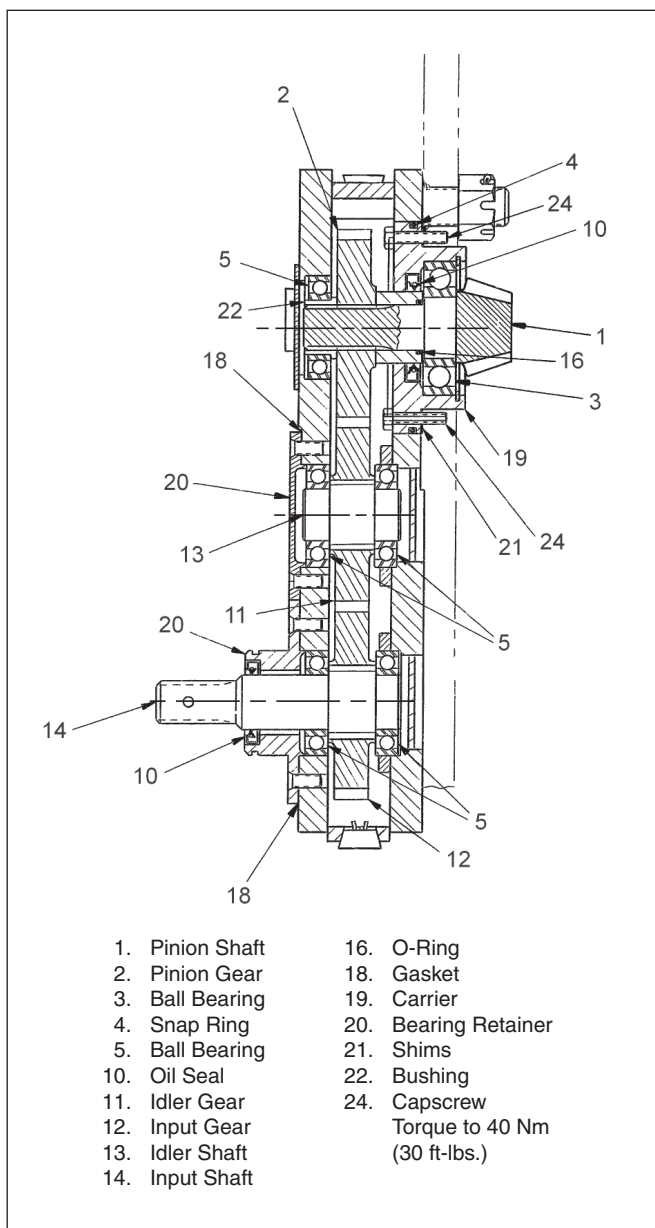
**Figure 4-19 Gearbox on W6F
for Komatsu D61EX-12 (K47) & D65EX-12 (K46)**



**Figure 4-20 Dropbox on W6F
for Komatsu D65E-6, D65E-7 (K42), D65E-8 & D68E-1 (K45)**



**Figure 4-21 Gearbox on W6F
for Caterpillar D6H/R (C480),
D7H PS (C55), D8N (C55), D7R (C57) & D8R (C58)**



**Figure 4-22 Gearbox on W6F
for New Holland Construction 10C (A47),
14B & 14C (A45), FD14E (A48)**

Intentionally Blank

Winch Installation

1. Thoroughly clean the mounting surfaces on the winch and the tractor. Clean the mounting holes and hardware of dirt, grit and oil.
2. Lubricate the PTO shaft splines with grease, where applicable.
3. Check the condition of the mounting studs on the vehicle. Ensure that all studs are tight. Replace any studs that are loose, bent or otherwise damaged. Minor thread damage may be dressed with a thread chaser.
4. Loctite all studs.
5. Install mounting adapter, if required.
6. Attach sling or chain fall to lift points.
7. Raise the winch and align the splines on the tractor PTO with the splines of the PTO coupling.

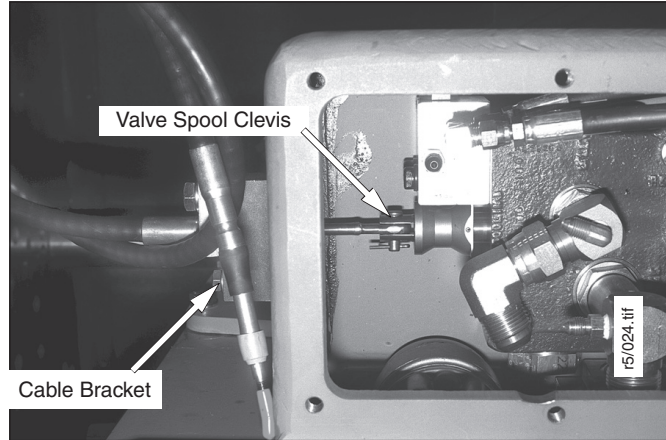


WARNING

Make sure the lifting device has a minimum rated capacity of 6,000 lbs. (3,000 kg) before lifting the winch.

8. Align the studs with the mounting holes to prevent thread damage.
9. Loosely install the two top nuts or capscrews before the winch is fully seated against the tractor.
10. Secure the winch in place using the parts listed in the mounting kit instructions. Tighten the nuts/capscrews alternately at each side of the winch to pull the winch evenly against the tractor. The two top inboard nuts should be snug then turned on to the next slot so that the cotter pin can be installed. All outboard nuts should be tightened as specified on installation drawing, not less than 500 ft-lbs. Torque all nuts and capscrews as specified in Figure 1-8 in Section 1.

11. Install control lever assembly per mounting kit instructions.
12. Attach push-pull cable(s) to control lever assembly.
13. Attach cable bracket(s) to winch. Do not tighten fasteners at this time.
14. Attach push-pull cable(s) to control valve clevis and freespool, then tighten cable bracket(s) to winch.



15. Fill unit with oil.
16. Adjust control cable and check hydraulic pressure settings as described in Section 3.
17. After winch installation, remove top cover and pry pinion towards tractor with a prybar to ensure the pinion is not jammed against the ring gear. This avoids excessive noise during winch operation.

NOTE: Pressure checks in accordance to Figure 3-8 should be taken with hydraulic oil at operating temperature.

Intentionally Blank

Special Tools

The following are special tools that may be fabricated to facilitate the execution of the overhaul procedures.

NOTE: All dimensions in the following drawings are in inches, with dimensions in millimeters enclosed by parantheses.

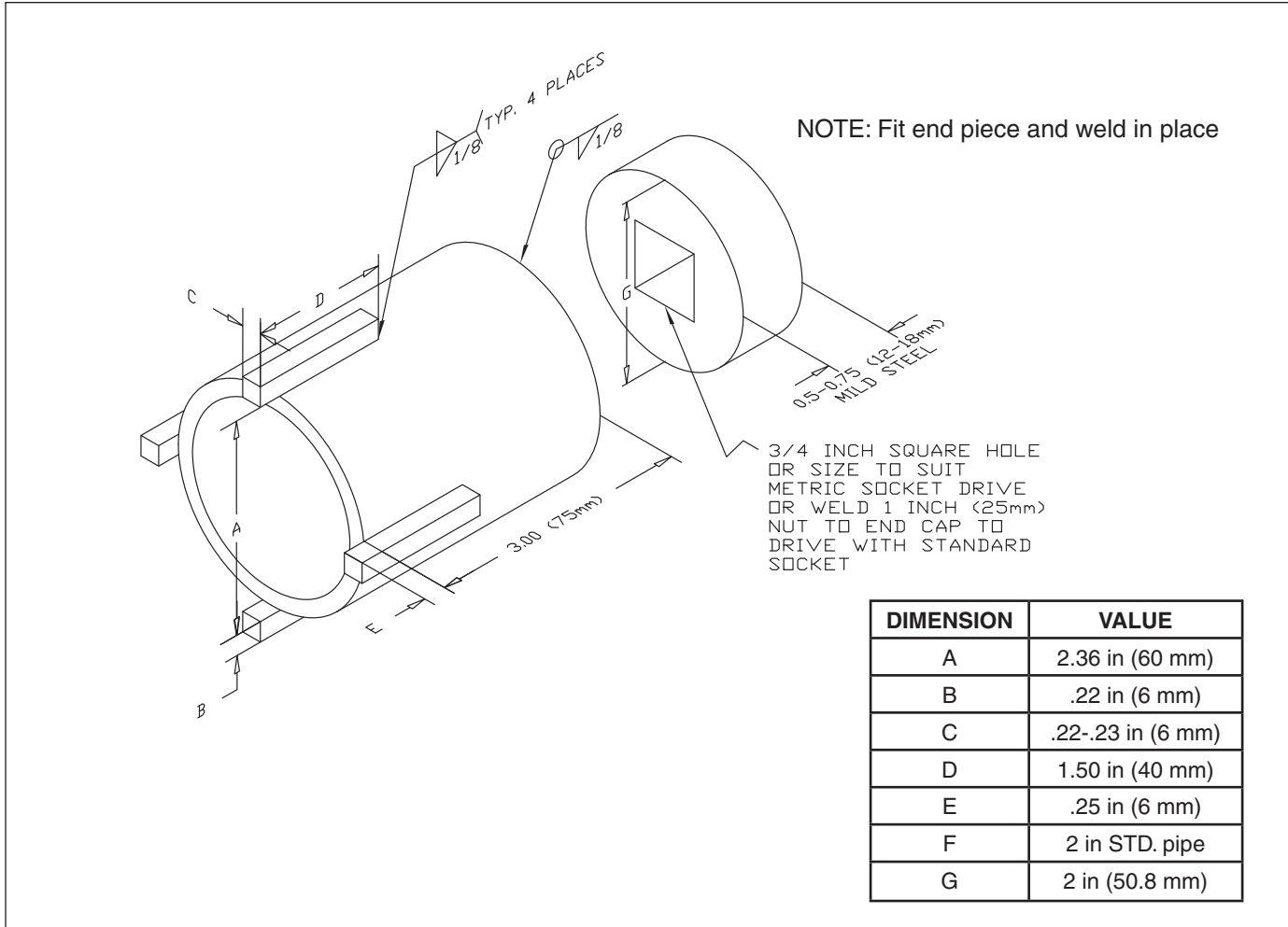


Figure 4-23 Clutch Shaft Locknut Socket

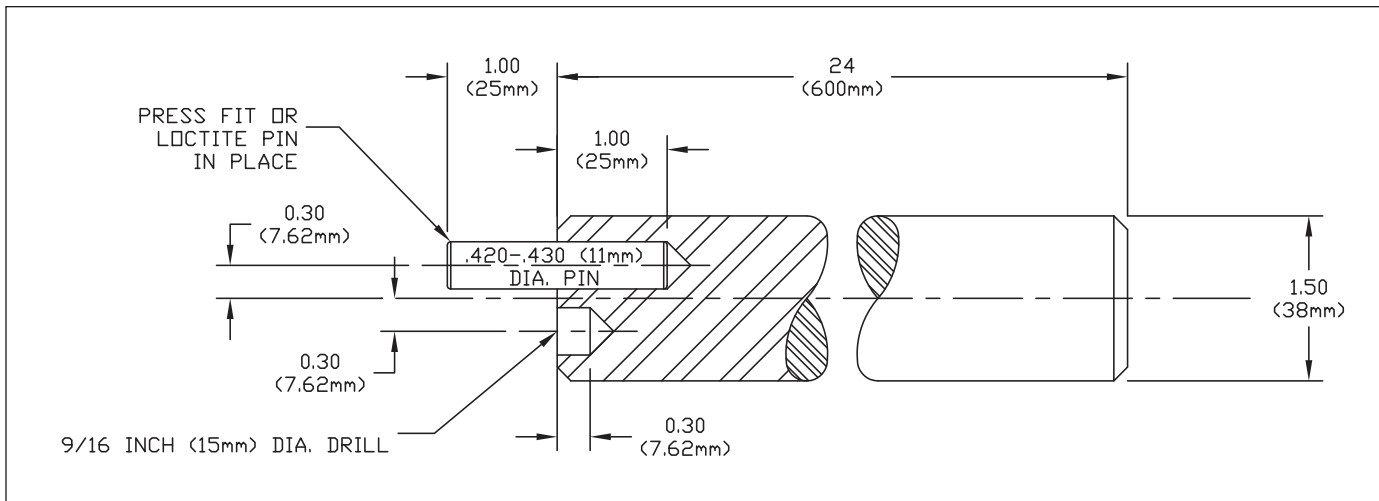


Figure 4-24 Clutch Shaft Driver



To find a dealer in your area,
Call: (503) 625-2560,
Fax: (503) 625-7269 , or
Email: marketing@alliedsystems.com, or
Visit our website: <http://www.alliedsystems.com>

The logo for Allied Systems Company, featuring the words "Allied Systems" in a bold, italicized font above the word "COMPANY" in a smaller, bold, sans-serif font, all contained within a black rectangular border.

Allied Systems
COMPANY

599032W 06/15/2016 Printed in U.S.A.