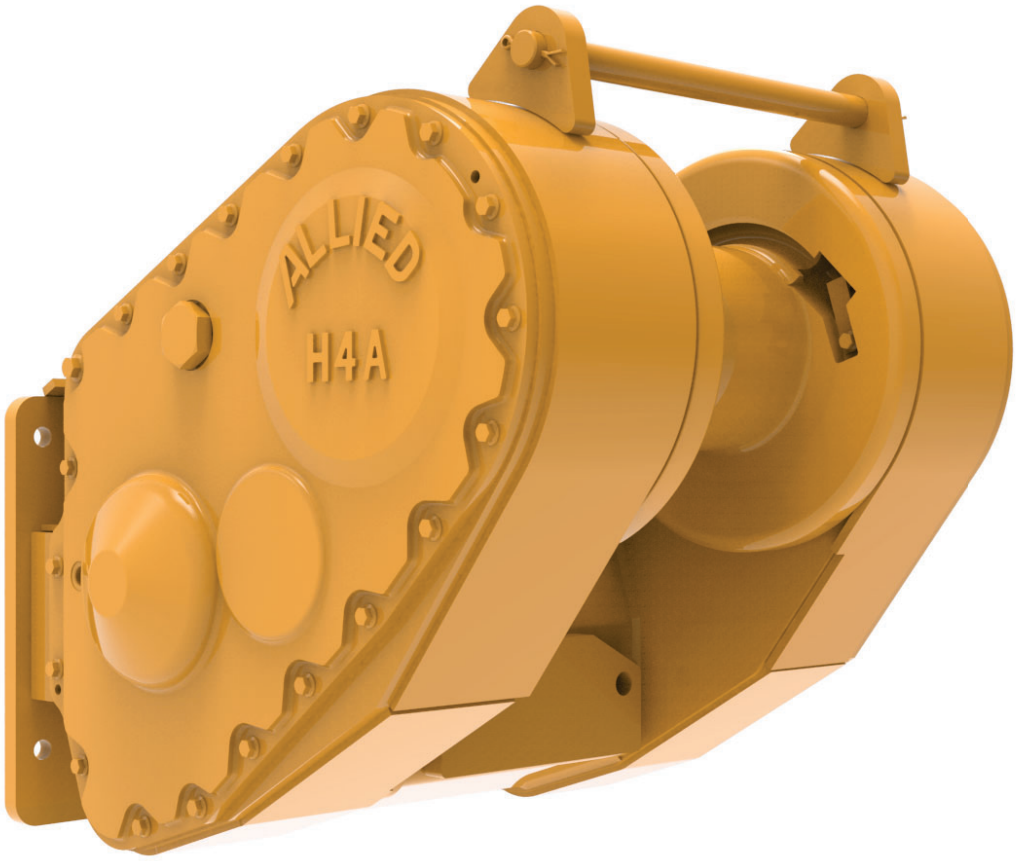
Service Manual



H4A

Hydraulic Towing Winch

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

A Product of
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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/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 death or serious injury. 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.

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 worksite.

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

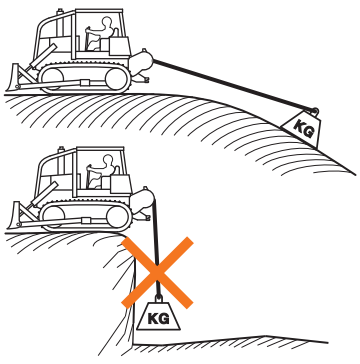
NOTE: All possible safety hazards cannot be foreseen so as to be included in this manual. Therefore, you must always be alert to potential hazards that could endanger personnel and/or damage the equipment.

Operation, Inspection, and Maintenance Warnings

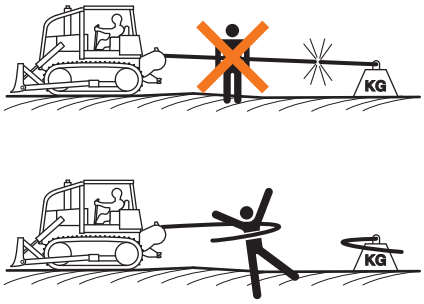
Obey the following cautions and warnings before using your winch to avoid equipment damage, personal injury or death.

- 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 jobsite 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 that 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 599015W.
- 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.
- Do not weld on any part of the winch. Contact Allied Systems 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.

Contents

General

Introduction

This service manual is for the H4A winch and includes the following information:

Section 1 General includes 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.

Description

A winch is normally installed on a skidder or a tractor to:

- increase the pulling power of the skidder or tractor
- reach into an area where a skidder or tractor cannot go
- make lift functions available when special attachments are installed

The H4A is a hydraulic winch with a maximum line pull of 45,000 lbs (21,319 kg) on the first layer of wire rope. The winch is powered by an internal hydraulic motor utilizing either tractor supplied hydraulic flow or a dedicated winch pump driven by the tractor engine. Motor torque is transmitted through a holding brake and three gear reductions to turn the winch drum. Hydraulic supply to the winch motor comes from one of the following configurations:

Standard Winch - The standard winch (serial numbers starting with **H4AT****), use the tractor implement pump and ripper controls to supply hydraulic power to operate the winch motor. Winch speed and direction are controlled by the ripper control lever.

High-Performance Winch - The high-performance winch, (serial numbers starting with **H4AH*Y**) is a hydrostatic winch using a tractor mounted pump connected directly to the winch motor. The winch shares hydraulic oil and cooling with the tractor's circuit. Winch speed and direction are controlled by a console mounted, hydraulic control lever supplied with the winch.

High-Performance, Self Contained Hydraulics (SCH) Winch - The SCH winch (serial numbers starting with **H4AH*R**) is a high-performance winch with the hydrostatic pump contained inside the winch and is driven by a PTO shaft connected to the tractor.

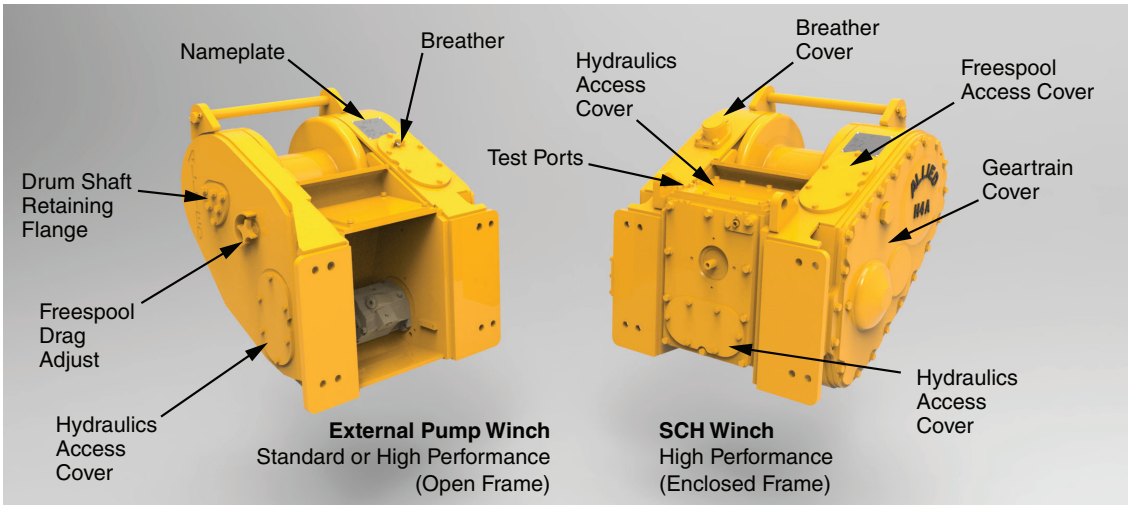


Figure 1-1 H4A Winch

Serial Number Codes

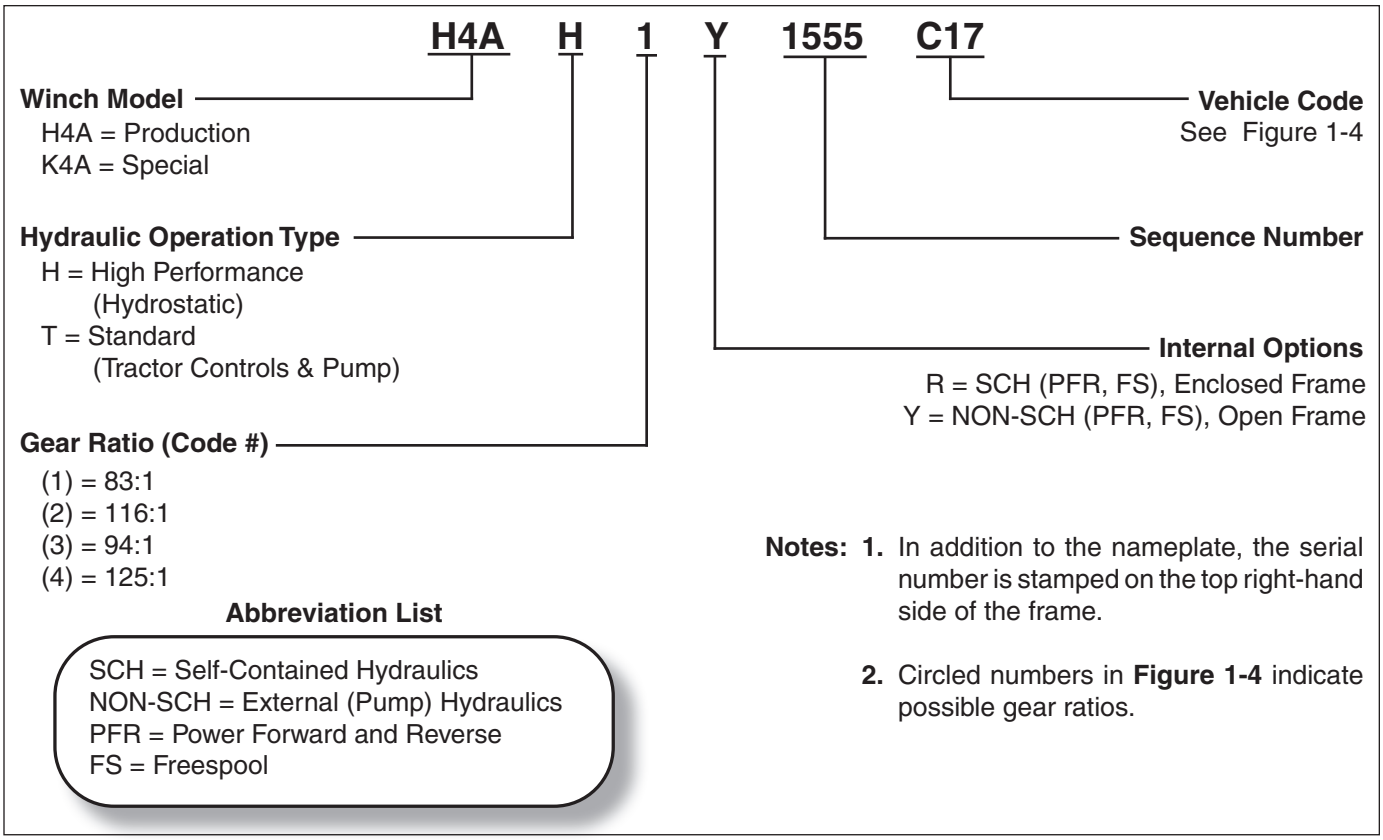


Figure 1-2 Serial Number Codes

Serial Number

The winch serial number is stamped into the nameplate, mounted on the winch case. It is also stamped into the winch frame.

The serial number is described in Figure 1-2. This serial number is important; always have the serial number of your winch ready when discussing the winch with your dealer or when ordering parts.

Nameplate

Each winch is shipped from the factory with a nameplate as shown in Figure 1. 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.

If the winch is equipped with an arch, the maximum cable size will be reduced. Refer to the nameplate for details.

Figure 1-3 Nameplate Detail

Tractor Codes

CODE	A New Holland & Fiat	C Caterpillar	E John Deere	H Dressta	K Komatsu	R Case	U Shantui
12					KOMSTAT D31/37/39X-21 & D31/37/39X-21A ②③		
13					D31/37/39X-22 ①②③		SD10 ④
14					D37/39X-23 D39X-24 ②		
15			450-650H/J ①②③	TD7S, TD8S ④		650/750/850K, 750/850L ①②③	
16		HYSTAT D3/4/5C ①②③	550-650K ①②③	TD9S ④		650L ①②③	
17		D3/4/5G *a ①②③				750/850M ①②③	
18		D4/5G *b ①②③					
19		D3/4/5K D3/4K2 T4i ①②③④					
191		D3/4/5K2 T4f *c ①②③④					
20		D5K & D5K2 T4i ①②③④					
201		D5K2 T4i With Fireplow ①②③④					
39			700H/J ①②③				
391			700K ①②③				

*a D3/4/5G with tractor s/n prefix CFC, CKA, CFF, CLB, CFN, FDC, FDH, CLF, FDW, CLW, JMH, ZDH, BYR, CXT
*b D4/5G with tractor s/n prefix HYD, TLX, WGB, DKT, RKG, RSC
*c With tractor s/n prefix D3K2: FT3, JPJ, KF2, KL2, LT3 D4K2: KM2, KR2, MT3, RT3 D5K2: KW2, KY2, RRE, WT3, YT3

Figure 1-4 Tractor Identification and Winch Gear Ratios

Tractor Make Model and Starting Tractor Serial Number Where Applicable

Controls

The H4A winch is controlled by either a single axis control lever and a rocker switch, or a dual axis control lever. The controls will vary based on whether the winch is a standard winch, or a high performance winch:

Standard Winch Installations

Standard winches use the tractor's implement circuit (usually ripper up/down function) and control lever to control the winch. The ripper function uses a single axis control lever.

Tractors may either use pilot hydraulic controls, or electric controls.

High Performance Winch Installations

High performance winches use either a single axis or dual axis control lever supplied with the winch. All high performance winch control levers are pilot hydraulic controls.

Single Axis Control Lever Installations

See Figure 1-5 for a typical single axis lever installation. Your installation may vary. The single axis control lever controls the following functions:

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

A spring on the control lever returns it from the **LINE-IN** and **LINE-OUT** positions to the **BRAKE-ON** position.

The **FREESPOOL** function is engaged or disengaged with a rocker switch next to the control lever.

Dual Axis Control Lever Installations (last used on H4A-1161)

See Figure 1-6 for a typical dual axis lever installation. Your installation may vary. The dual axis control lever controls all winch functions, including:

- **LINE-OUT**
- **BRAKE-ON**
- **LINE-IN**
- **FREESPOOL**

The **FREESPOOL** position on this control lever is a detented position; the operator must pull the control lever to release it from this position. A spring on the control lever returns it from the **LINE-IN** and **LINE-OUT** positions to the **BRAKE-ON** position.

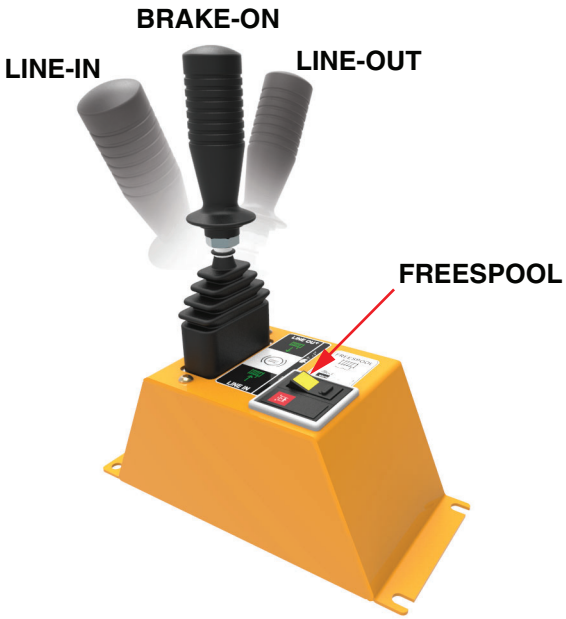


Figure 1-5 Typical Single Axis Control Lever

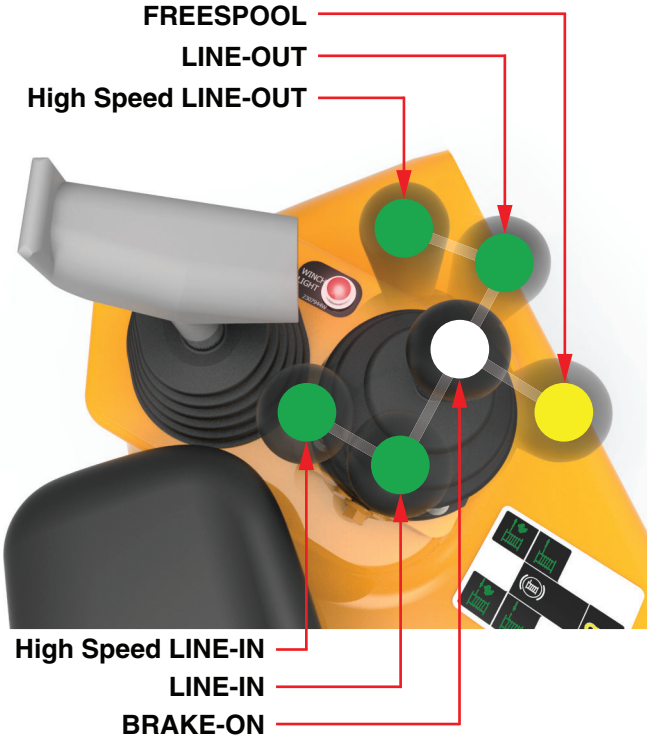


Figure 1-6 Typical Dual Axis Control Lever

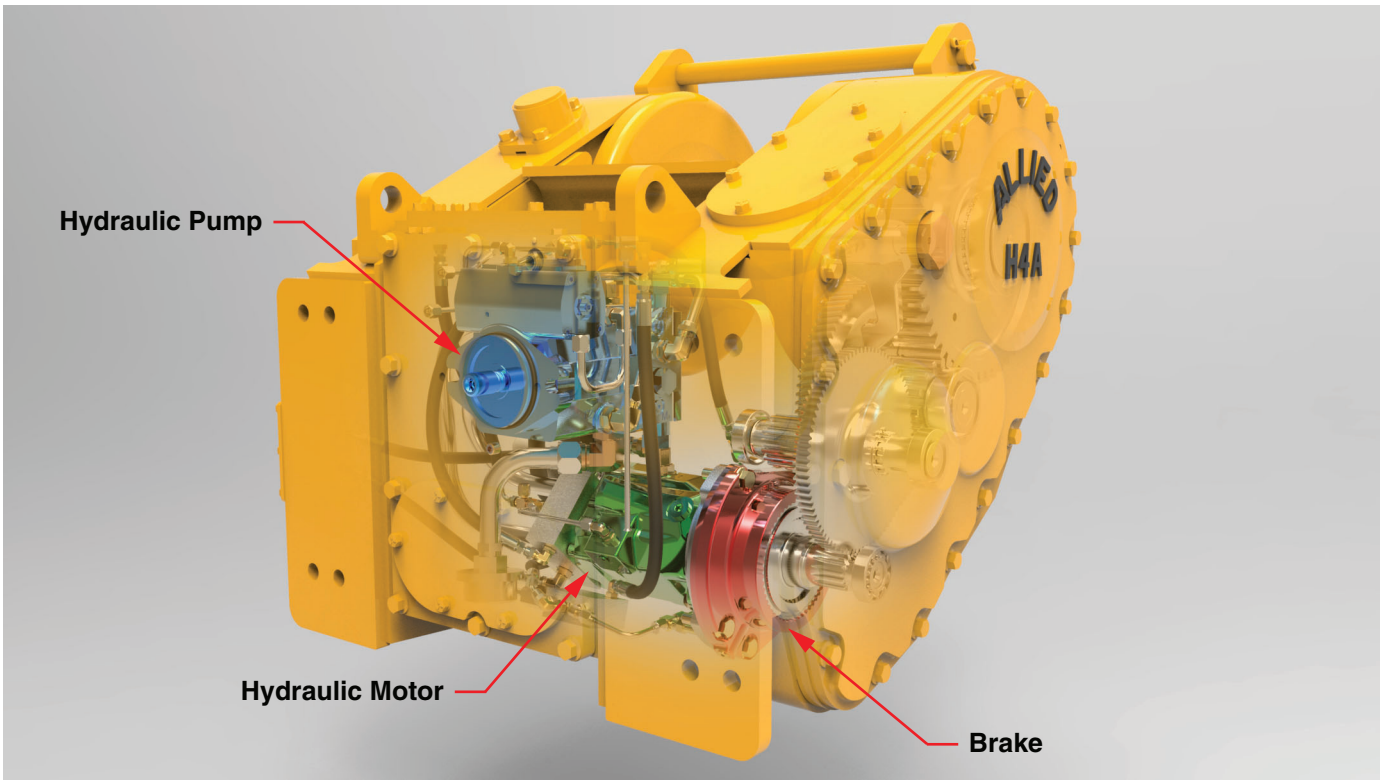


Figure 1-7 Hydraulic Components (SCH Winch shown)

Hydraulic Components

Pump

The pump is a variable displacement, axial piston swash plate design. Flow from the pump is proportional to the engine speed and pump displacement, and increases with the swash plate angle. Swiveling the pump swash plate over center smoothly reverses the direction of oil flow. The control pressure from the control lever assembly controls pump swash plate angle and oil flow direction. The pump incorporates a charge pump, a charge pressure relief valve, and two combination high-pressure relief and make-up check valves.

Motor

The motor is a dual displacement, axial piston, swash plate design. Output speed is proportional to input flow from the pump and inversely proportional to the motor displacement, which is controlled by a combination of motor pressure and a reducing valve.

Brake

The brake is applied by spring force from a belleville spring in the brake housing. The spring pushes against a ring, applying pressure to the friction discs and the separator plates. As pressurized oil is directed into the cavity between the piston and piston housing, the piston moves, compressing the belleville spring which releases the brake.

The separator plates have teeth that engage the splines inside the brake housing and are held stationary. Teeth in the friction discs engage the splines in the hub and rotate with the hub.

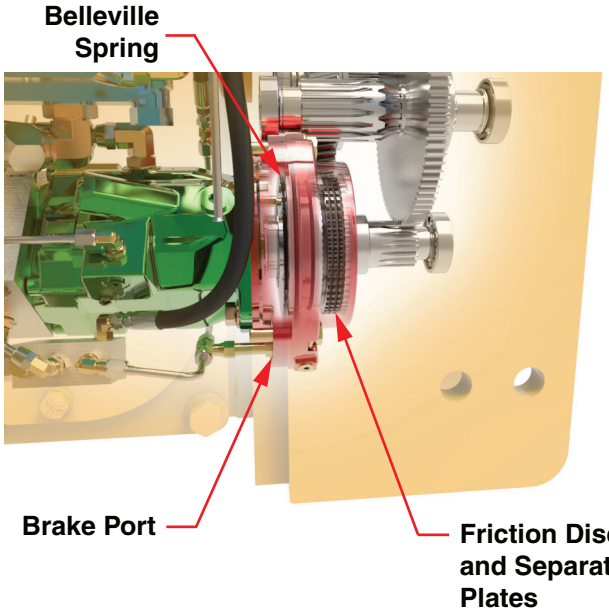


Figure 1-8 Brake Detail

Hydraulic System Theory

Standard Winch

A standard winch operates by directing flow to the motor from the ripper valve section by moving the ripper control lever. In **BRAKE-ON** position, the valve section is closed and no flow is sent to the winch and springs apply the brake so the drum will not rotate. When the control lever is moved away from the centered position, the valve proportionally sends flow to the winch motor causing it to spin in either **LINE-IN** or **LINE-OUT** direction.

For tractors with pilot hydraulic controls, a pilot signal is sent from the control lever to the brake release valve, which directs pilot pressure to release the brake. For tractors with electronic controls, pressure in the motor is sent to the brake release valve, which directs pilot pressure to release the brake.

High Performance Winch

A high performance winch operates by sending flow from a bi-directional, variable displacement pump to the motor.

In the Self-Contained Hydraulics (SCH) winch, the pump is contained inside the winch and the winch case is the sump for the hydraulic oil. The suction screen and filter remove contaminants from the oil.

Winches with tractor mounted pumps use the tractor hydraulic tank as the sump. Oil to the winch pump is continually filtered through a dedicated winch filter.

In **BRAKE-ON** position, the pump is not producing any flow and the springs apply the brake so the drum will not rotate. When the control lever is moved away from the **BRAKE-ON** position, it proportionally sends pilot pressure to increase the swash plate angle of the pump, causing pump flow causing the motor to spin in either **LINE-IN** or **LINE-OUT** direction. Additionally, the pilot signal from the control lever sends pressure to the brake release valve, which directs pilot pressure to release the brake.

The motor is linked to the drum by a gear train. The drum rpm is proportional to the motor rpm and winch gear ratio. By moving the control lever into the high-speed position (either **LINE-IN** or **LINE-OUT**), motor pressure actuates the motor swash plate to reduce motor displacement, thus increasing motor rpm. If pressure in the main circuit exceeds a factory set level, the motor will automatically reduce swash plate angle, increasing motor displacement to help prevent motor stall. However, motor stall will occur when the load exceeds winch capacity.

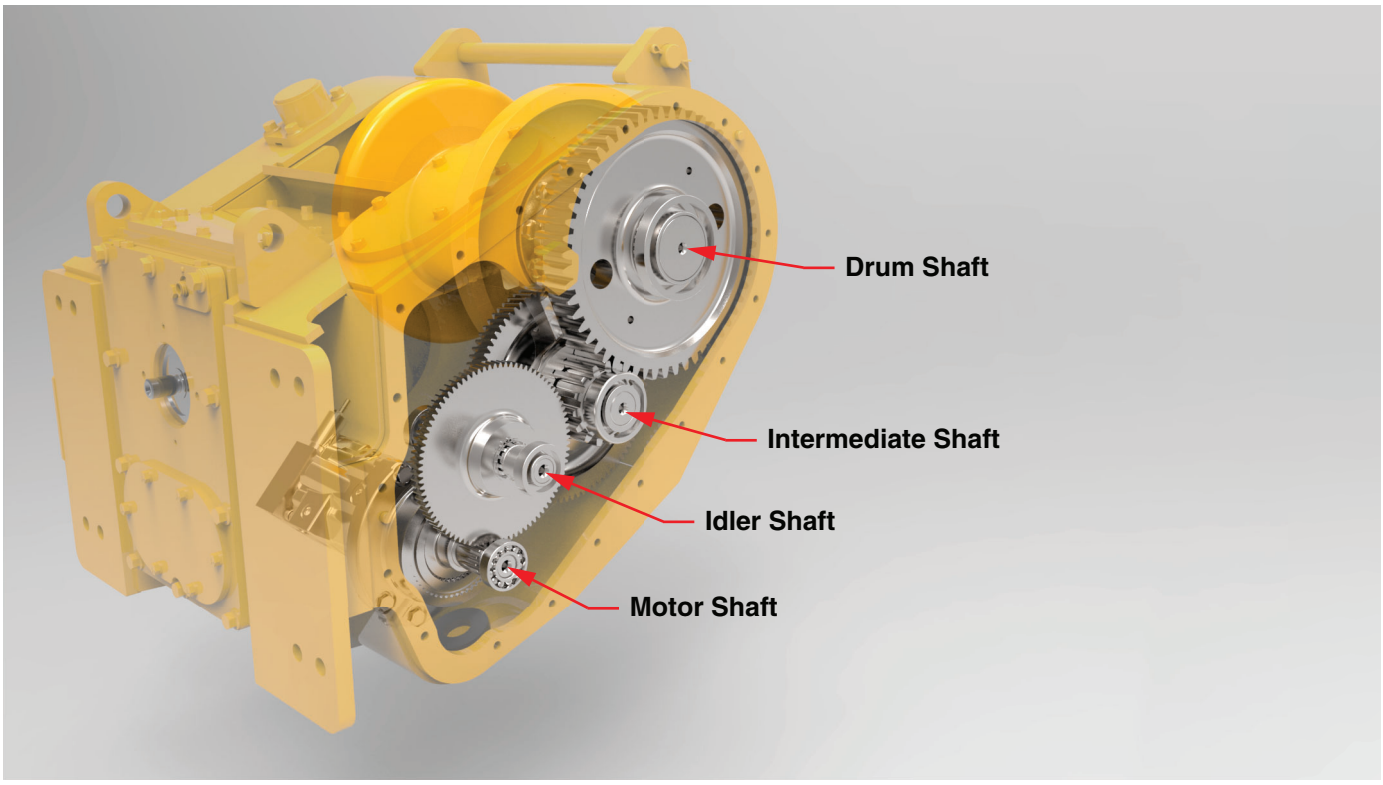


Figure 1-9 Gear Train

Gear Train

Torque from the hydraulic motor is transmitted through a holding brake, and three gear reductions to the drum.

The dental clutch has splines which locks the drum pinion gear to the intermediate gear. The operator can disengage the dental clutch by activating **FREESPOOL**.

The drum pinion engages the drum gear which is connected to the drum via the drum adapter. When power is applied to the gear train, the drum will rotate in the forward or reverse direction.

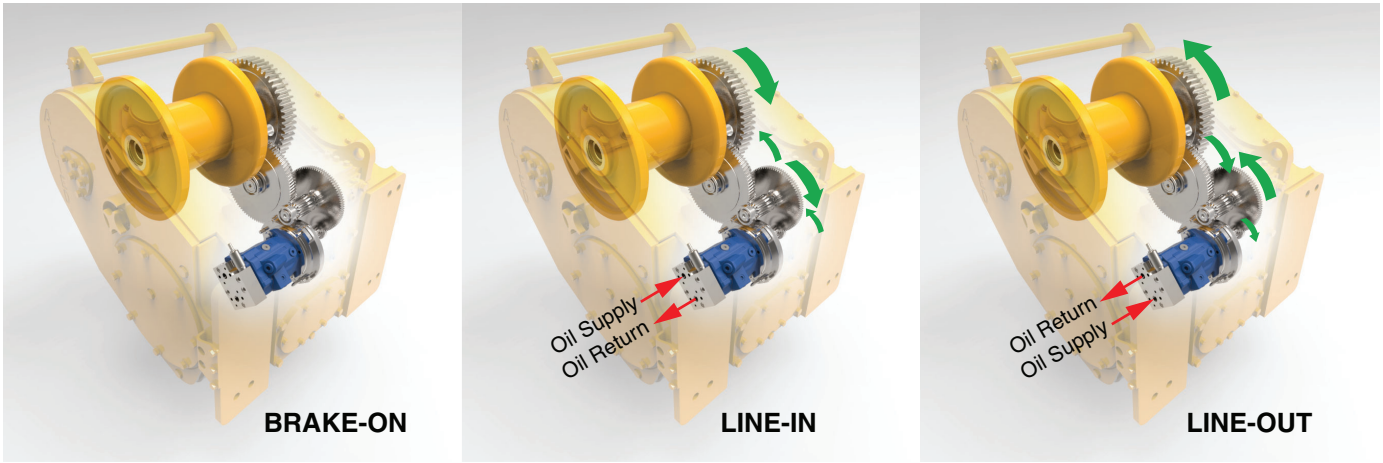


Figure 1-10 Rotation Torque Transfer

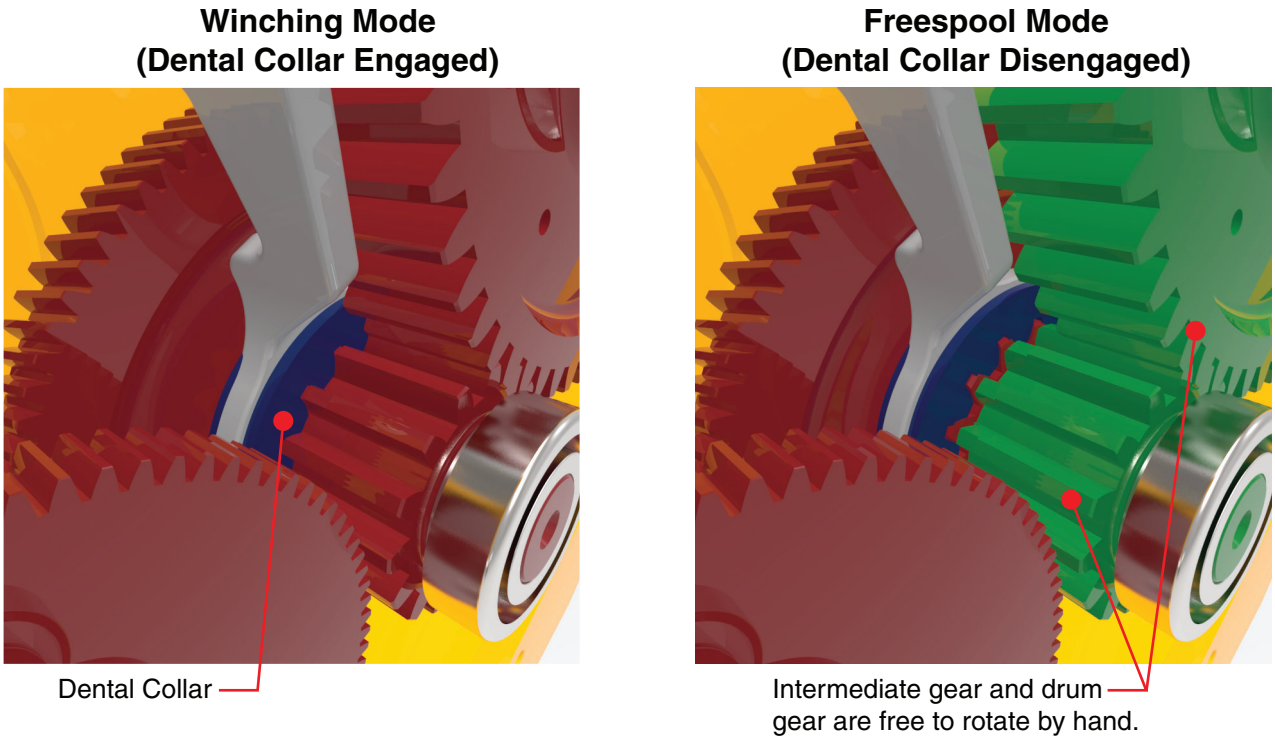


Figure 1-11 Freespool

Freespool

⚠ WARNING

When FREESPOOL is engaged, 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.

When the operator actives **FREESPOOL**, pressure is directed to the freespool piston. The freespool piston moves the shifter fork and dental collar at the intermediate shaft so that the drum pinion, drum gear and drum are free to rotate. Wire rope may be easily pulled by hand from the winch drum in this function.

The resistance to rotation by the drum during **FREESPOOL** is controlled by a hand knob with a spring-applied wear pad against the drum flange. See Section 4 for service.

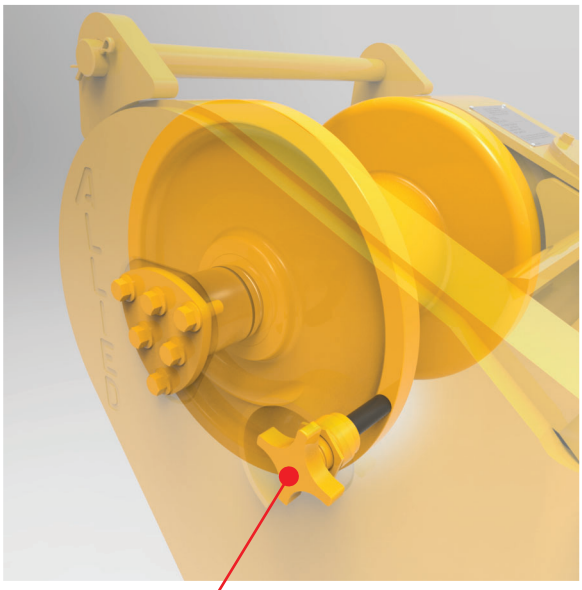
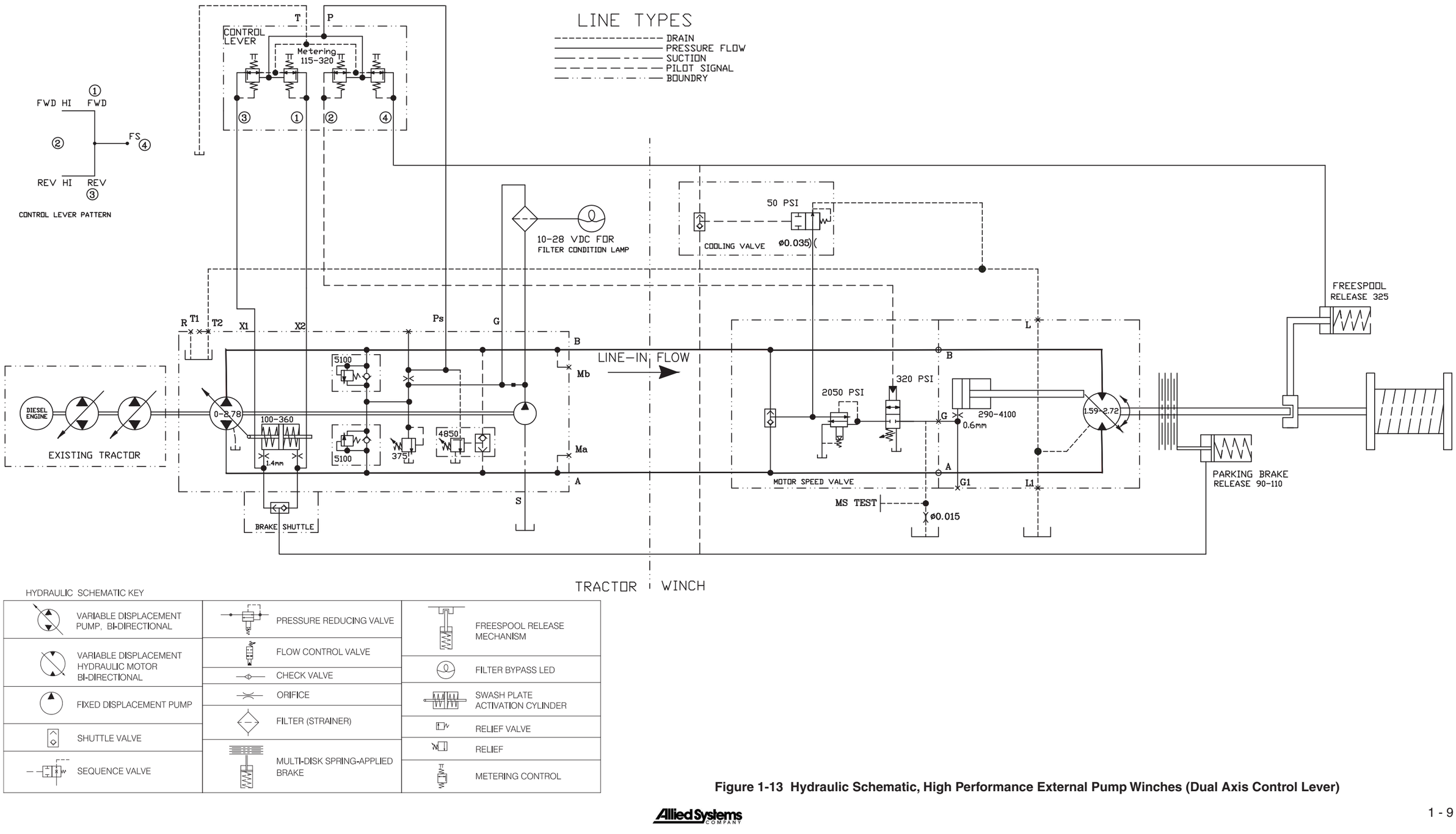


Figure 1-12 Freespool Adjust

CATERPILLAR D3/4/5G (C17)
D4/5G (C18)

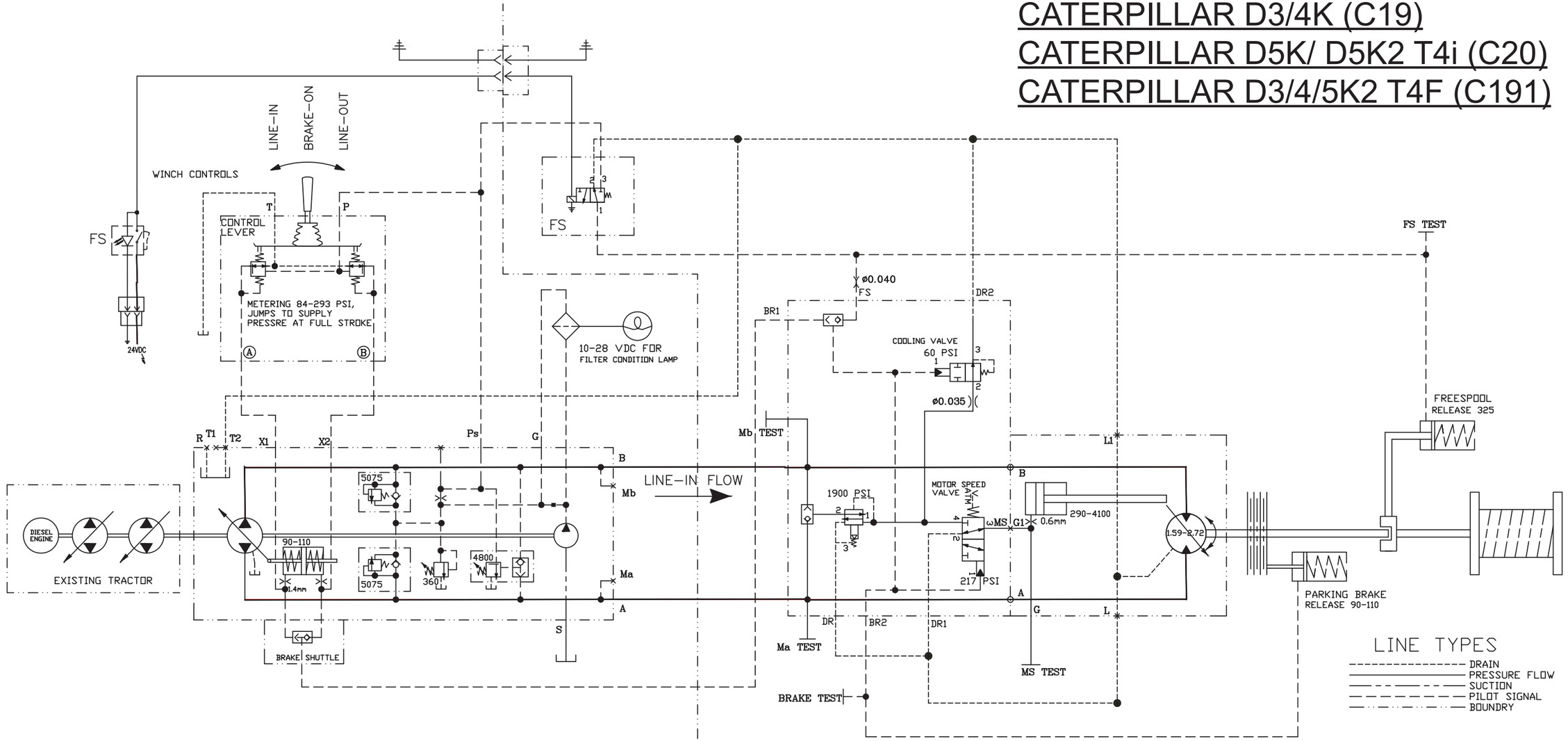


HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
FIXED DISPLACEMENT PUMP	CHECK VALVE	SWASH PLATE ACTIVATION CYLINDER
SHUTTLE VALVE	ORIFICE	RELIEF VALVE
SEQUENCE VALVE	FILTER (STRAINER)	RELIEF
	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

Figure 1-13 Hydraulic Schematic, High Performance External Pump Winches (Dual Axis Control Lever)

CATERPILLAR D3/4K (C19)
CATERPILLAR D5K/ D5K2 T4i (C20)
CATERPILLAR D3/4/5K2 T4F (C191)



HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
FIXED DISPLACEMENT PUMP	CHECK VALVE	SWASH PLATE ACTIVATION CYLINDER
SHUTTLE VALVE	ORIFICE	RELIEF VALVE
SEQUENCE VALVE	FILTER (STRAINER)	RELIEF
	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

NOTES:

1. DETAIL FOR COILS. ALL EQUIPPED WITH TRANSIENT VOLTAGE SUPPRESSOR

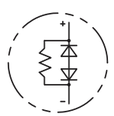
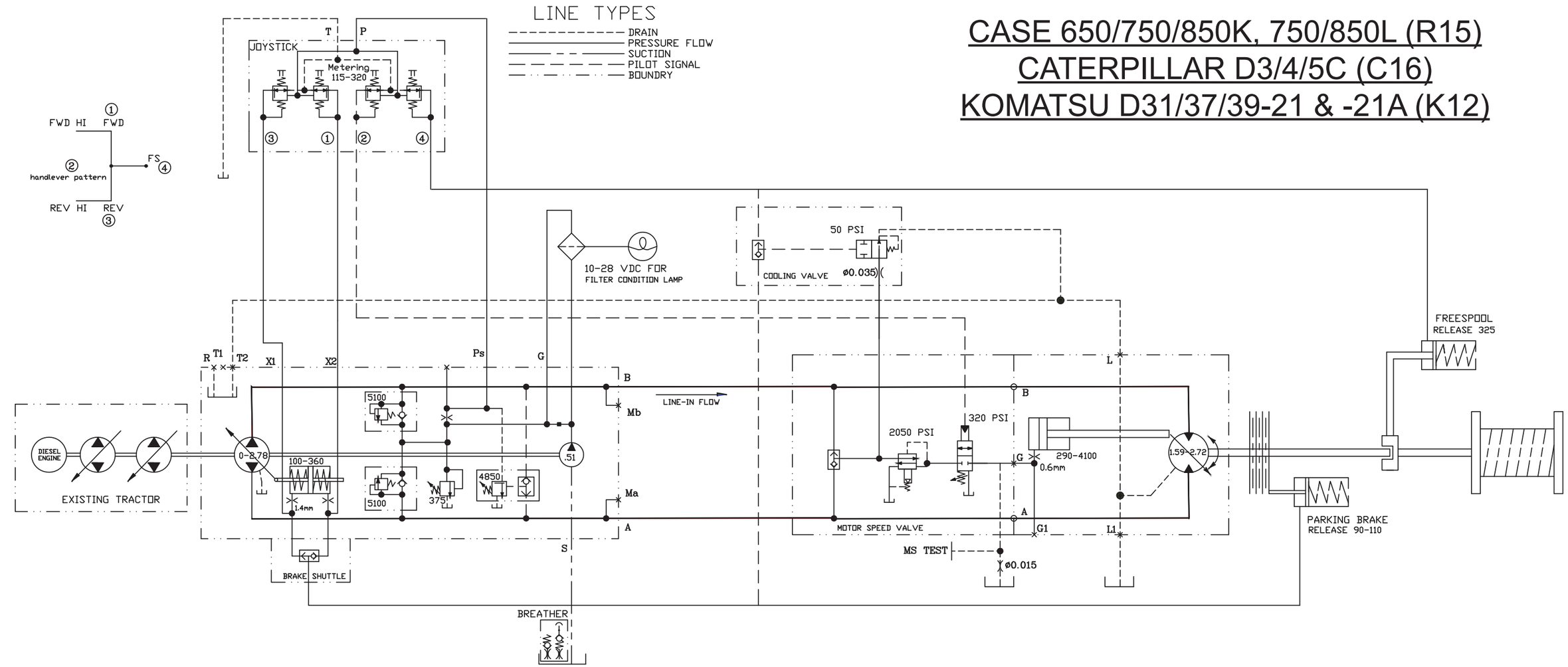


Figure 1-14 Hydraulic Schematic, High-Performance External Pump Winches (Single Axis Control Lever)

CASE 650/750/850K, 750/850L (R15)
CATERPILLAR D3/4/5C (C16)
KOMATSU D31/37/39-21 & -21A (K12)

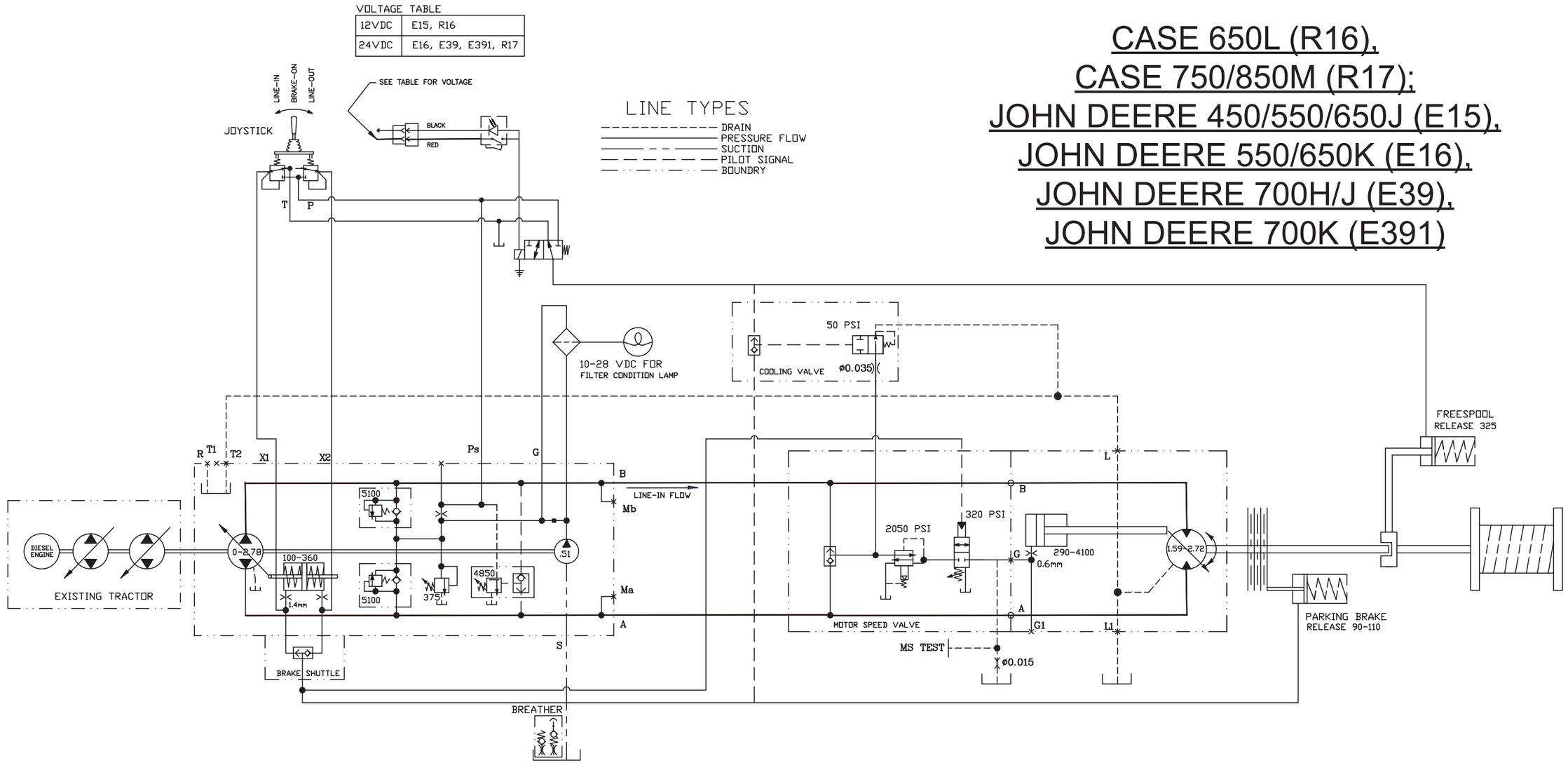


HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
FIXED DISPLACEMENT PUMP	CHECK VALVE	SWASH PLATE ACTIVATION CYLINDER
SHUTTLE VALVE	ORIFICE	RELIEF VALVE
SEQUENCE VALVE	FILTER (STRAINER)	RELIEF
	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

Figure 1-15 Hydraulic Schematic, High-Performance SCH Winches

CASE 650L (R16), CASE 750/850M (R17); JOHN DEERE 450/550/650J (E15), JOHN DEERE 550/650K (E16), JOHN DEERE 700H/J (E39), JOHN DEERE 700K (E391)



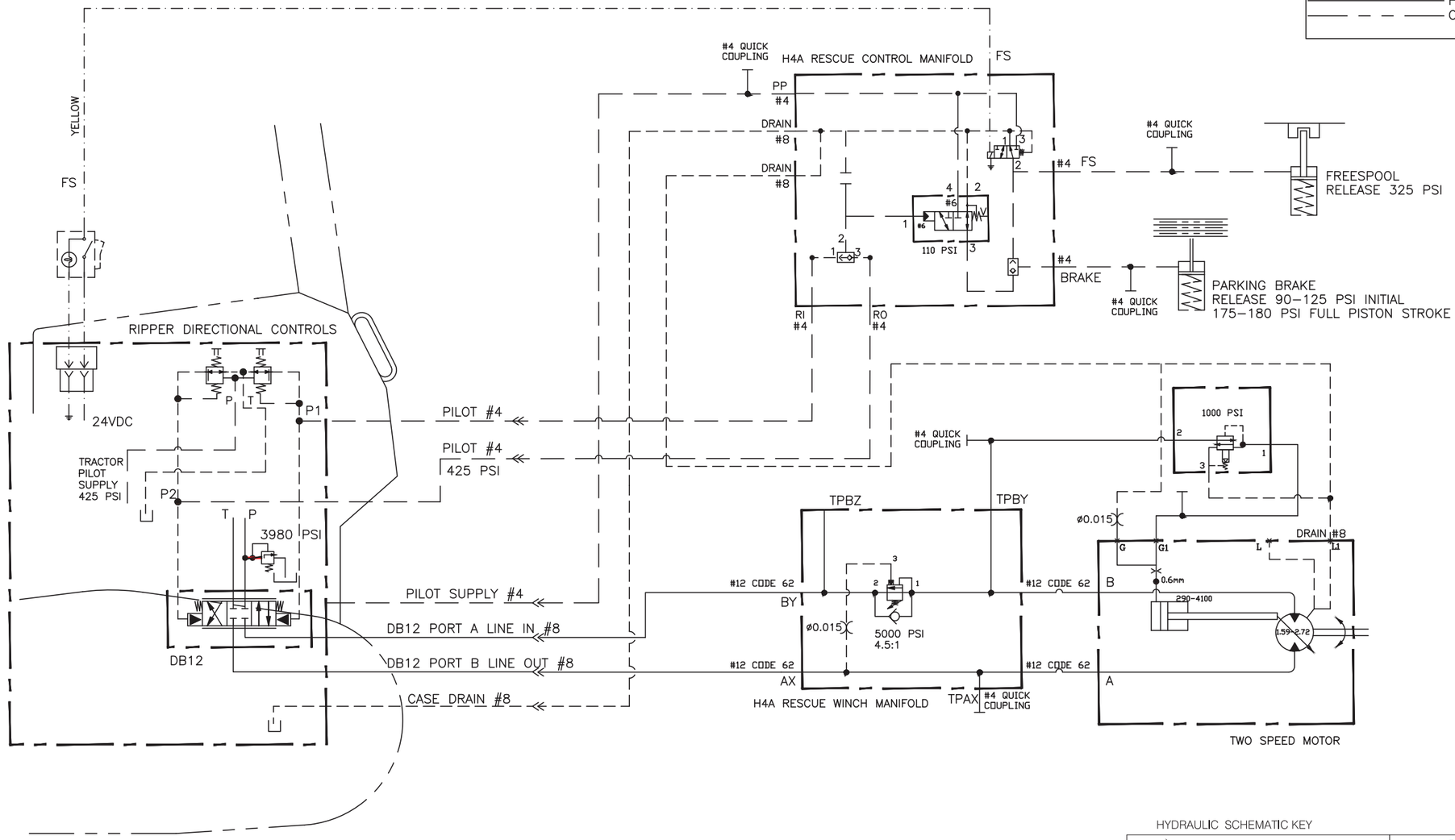
HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
FIXED DISPLACEMENT PUMP	CHECK VALVE	SWASH PLATE ACTIVATION CYLINDER
SHUTTLE VALVE	ORIFICE	RELIEF VALVE
SEQUENCE VALVE	FILTER (STRAINER)	RELIEF
	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

Figure 1-16 Hydraulic Schematic, High-Performance SCH Winches

KOMATSU D31/37/39-22 (K13)

SCHEMATIC LEGEND
- ELECTRICAL
- PILOT SUPPLY
- DRAIN
- HIGH PRESSURE LINES
- COMPONENT BOUNDARY



K13
TRACTOR RIPPER VALVE
RELIEF 3980 PSI
PILOT SUPPLY: 425 PSI
TRACTOR VOLTAGE: 24V
WINCH BRAKE VALVE SETTING: 110 PSI
WINCH REDUCING VAVEL SETTING: 1000 PSI
WINCH COUNTERBALANCE VALVE SETTING: 5000 PSI, 4.5:1 RATIO

NOTES:

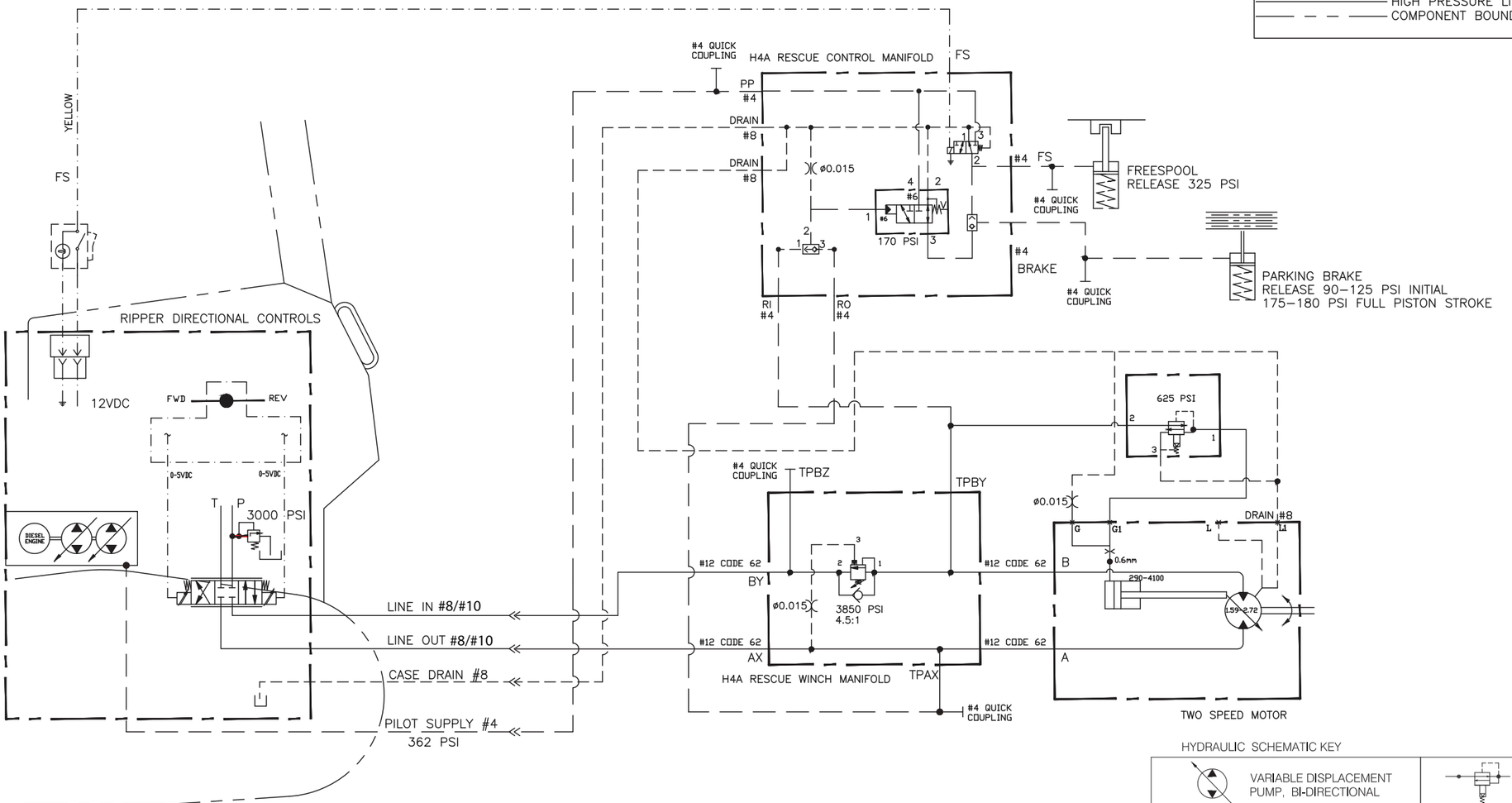
1. DETAIL FOR COILS. ALL EQUIPPED WITH TRANSIENT VOLTAGE SUPPRESSOR

HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
FIXED DISPLACEMENT PUMP	CHECK VALVE	SWASH PLATE ACTIVATION CYLINDER
SHUTTLE VALVE	ORIFICE	RELIEF VALVE
SEQUENCE VALVE	FILTER (STRAINER)	RELIEF
	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

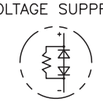
Figure 1-17 Hydraulic Schematic, Standard Winches with Pilot Hydraulic Controls

CATERPILLAR D3/4/5K (C19)
CATERPILLAR D5K/ D5K2 T4i (C20)
CATERPILLAR D3/4/5K2 T4F (C191)



NOTES:

1. DETAIL FOR COILS. ALL EQUIPPED WITH TRANSIENT VOLTAGE SUPPRESSOR



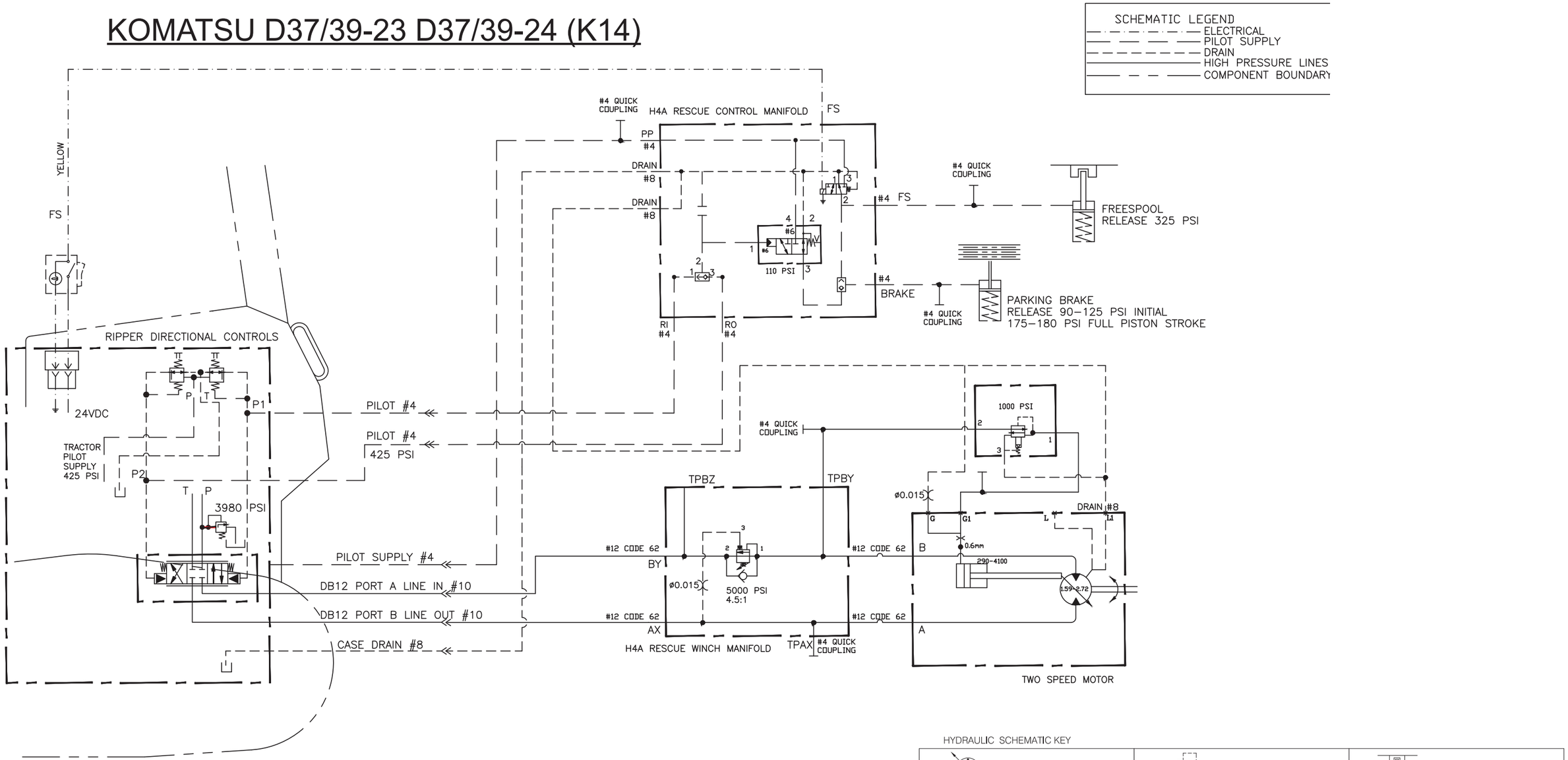
C19 & C20
TRACTOR PILOT SUPPLY: 362 PSI
TRACTOR VOLTAGE: 12VDC
WINCH BRAKE VALVE SETTING: 170 PSI
WINCH REDUCING VAVEL SETTING: 650 PSI
WINCH COUNTERBALANCE VALVE SETTING: 3800 PSI, 4.5:1 RATIO

HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
	CHECK VALVE	
FIXED DISPLACEMENT PUMP	ORIFICE	SWASH PLATE ACTIVATION CYLINDER
	FILTER (STRAINER)	RELIEF VALVE
SHUTTLE VALVE		RELIEF
SEQUENCE VALVE	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

Figure 1-18 Hydraulic Schematic, Standard Winches with Electronic Controls

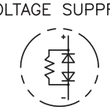
KOMATSU D37/39-23 D37/39-24 (K14)



K13
TRACTOR RIPPER VALVE
RELIEF 3980 PSI
PILOT SUPPLY: 425 PSI
MAX FLOW: 25 GPM
TRACTOR VOLTAGE: 24V
WINCH BRAKE VALVE SETTING: 110 PSI
WINCH REDUCING VAVEL SETTING: 1000 PSI
WINCH COUNTERBALANCE VALVE SETTING: 5000 PSI, 4.5:1 RATIO

NOTES:

1. DETAIL FOR COILS. ALL EQUIPPED WITH TRANSIENT VOLTAGE SUPPRESSOR

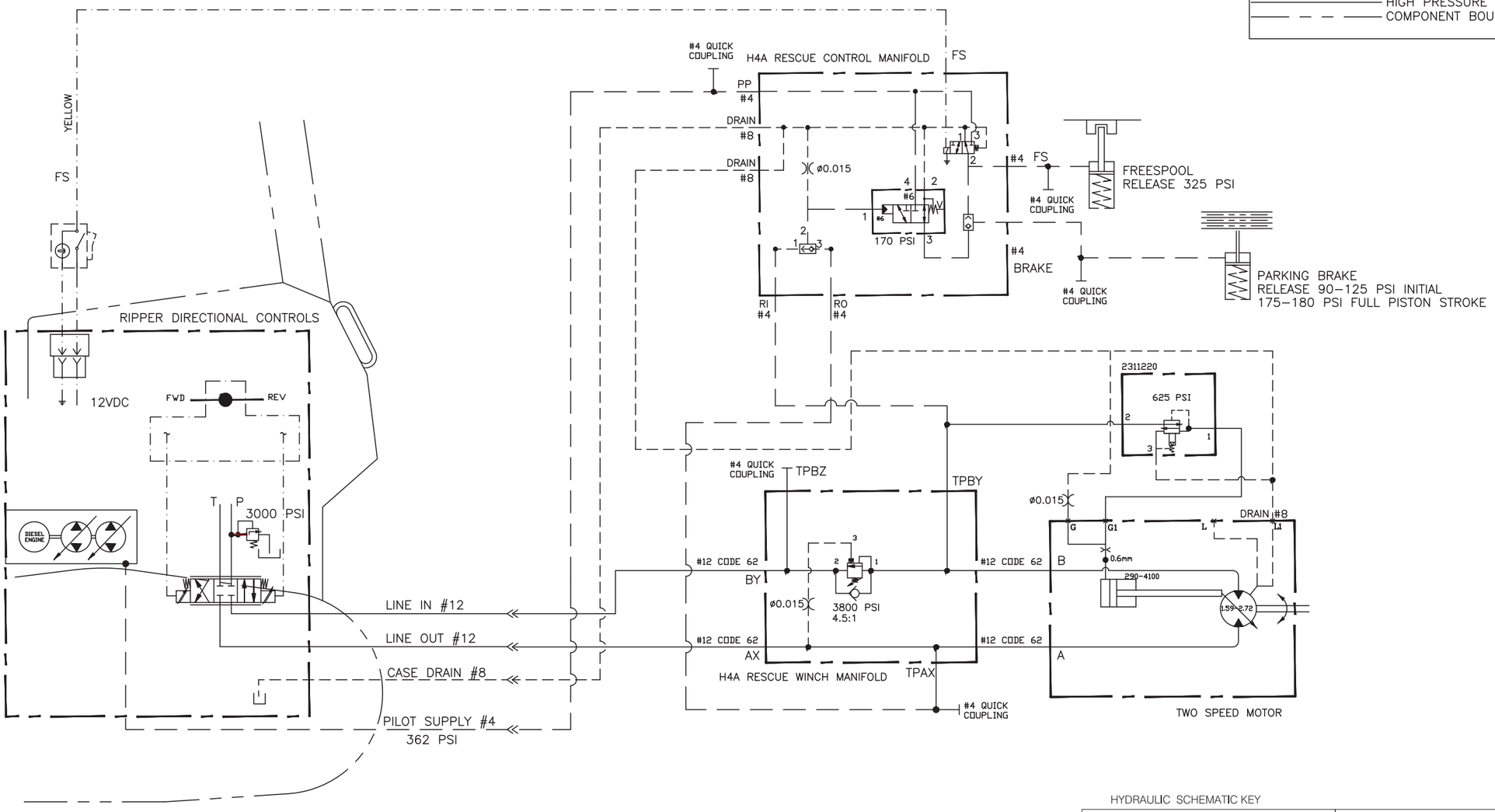


HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
FIXED DISPLACEMENT PUMP	CHECK VALVE	SWASH PLATE ACTIVATION CYLINDER
SHUTTLE VALVE	ORIFICE	RELIEF VALVE
SEQUENCE VALVE	FILTER (STRAINER)	RELIEF
	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

Figure 1-19 Hydraulic Schematic, Standard Winches with Pilot Hydraulic Controls

SHANTUI SD10 (U13)



NOTES:

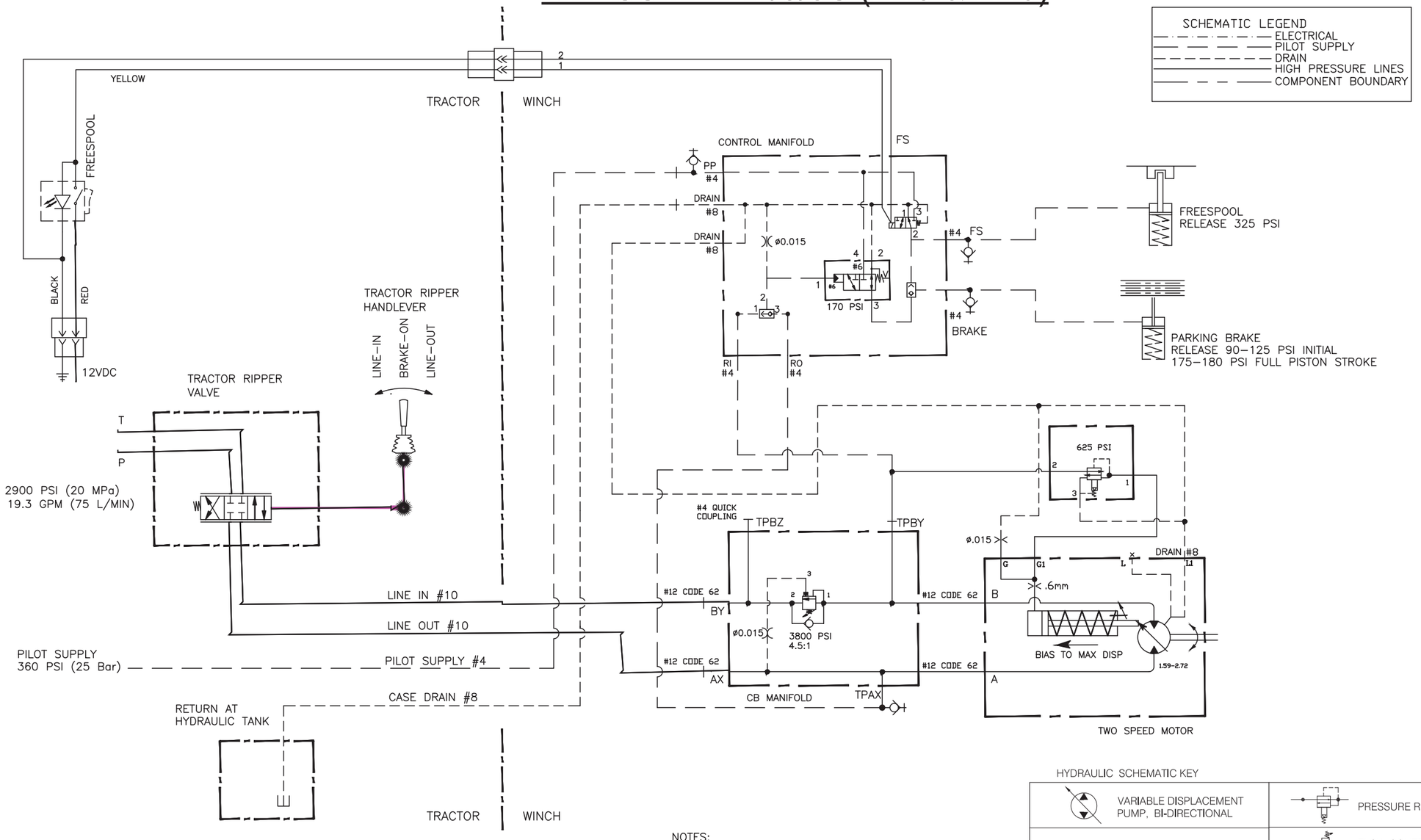
1. DETAIL FOR COILS. ALL EQUIPPED WITH TRANSIENT VOLTAGE SUPPRESSOR

HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
FIXED DISPLACEMENT PUMP	CHECK VALVE	SWASH PLATE ACTIVATION CYLINDER
SHUTTLE VALVE	ORIFICE	RELIEF VALVE
SEQUENCE VALVE	FILTER (STRAINER)	RELIEF
	MULTI-DISK SPRING-APPLIED BRAKE	METERING CONTROL

Figure 1-20 Hydraulic Schematic, Standard Winches with Electronic Controls

DRESSTA TD7/8/9S (H15 & H16)



NOTES:

1. DETAIL FOR COILS. ALL EQUIPPED WITH TRANSIENT VOLTAGE SUPPRESSOR

H15 & H16
TRACTOR PILOT SUPPLY: 360 PSI
TRACTOR VOLTAGE: 12VDC
WINCH BRAKE VALVE SETTING: 170 PSI
WINCH REDUCING VAVEL SETTING: 650 PSI
WINCH COUNTERBALANCE VALVE SETTING: 3800 PSI, 4.5:1 RATIO

HYDRAULIC SCHEMATIC KEY

VARIABLE DISPLACEMENT PUMP, BI-DIRECTIONAL	PRESSURE REDUCING VALVE	FREESPOOL RELEASE MECHANISM
VARIABLE DISPLACEMENT HYDRAULIC MOTOR BI-DIRECTIONAL	FLOW CONTROL VALVE	FILTER BYPASS LED
	CHECK VALVE	
FIXED DISPLACEMENT PUMP	ORIFICE	SWASH PLATE ACTIVATION CYLINDER
	FILTER (STRAINER)	
SHUTTLE VALVE		RELIEF VALVE
SEQUENCE VALVE	MULTI-DISK SPRING-APPLIED BRAKE	RELIEF
		METERING CONTROL

Figure 1-21 Hydraulic Schematic, Standard Winches with Electronic Controls

Troubleshooting

General

Winch problems generally fall into one of three categories: controls, hydraulic system, or mechanical system. Follow the troubleshooting steps below to isolate the probable location of the malfunction, then refer to Figure 2-1, Troubleshooting Chart.

1. Make sure the control lever assembly (including pilot controller unit) is functioning properly, with a full range of motion.
2. Check the oil level and type. Ensure the operating temperature range for the oil is suitable for the conditions. Check the filter indicator. See Specifications section in Section 3 for the recommended oil list.
3. Check winch hydraulic pressures. Start with control pressures, then check main system pressures. See Section 3 for hydraulic system pressure test information.
4. Inspect the winch gear train for problems.

⚠ CAUTION

The winch oil should never exceed the maximum operating temperature of 180°F (82°C), as overheating will cause winch damage.

Figure 2-1 Troubleshooting Analysis Check Chart

PROBLEM	POSSIBLE CAUSE	CORRECTION
Winch gets very hot (H4A will operate at 180°F).	Low oil level.	Add oil; refer to Oil Selection section in Section 3.
	Improper oil viscosity.	Use correct oil grade; refer to Oil Selection section in Section 3.
	Winch coated with dirt.	Clean winch.
	Clogged filter or strainer.	Replace filter and/or clean strainer.
	Charge pressure too high.	Normal pressure is 360 psi. Look for leaks in hydraulic system. If none are found, see Charge Pressure Relief Valve Adjustment section in Section 3.
	Winch usage very high.	Add oil cooler.
Operation is rough.	Low oil level.	Add oil; refer to Oil Selection section in Section 3.
	Low charge pressure.	Normal pressure is 360 psi. Look for leaks in hydraulic system. If none are found, see Charge Pressure Relief Valve Adjustment section in Section 3.
	Wire rope jumps layers on drum.	Spool wire rope more evenly.
	Motor hunting between high and low speed.	Motor speed orifice too large. Use correct size (0.6mm [0.024”]).
Operation is noisy.	Incorrect oil used.	Drain winch and re-fill with correct oil; refer to Oil Selection section in Section 3.
	Misaligned pump drive coupling.	Check and re-align coupling.
	Air in the hydraulic oil (indicated by foaming or milky-colored oil).	Replace oil and inspect for leaks and other sources of air induction.
	Pump or motor damage.	Some noise is normal, however, excessive clattering could indicate damage. Inspect pump and motor thoroughly and use Figure 4-5, Visual Inspection as a reference.

Figure 2-1 Troubleshooting Analysis Check Chart

PROBLEM	POSSIBLE CAUSE	CORRECTION
Drum continues to rotate after lever is returned to **BRAKE-ON.**	Pump staying on stroke too long.	1. Cold oil. Operate the tractor at low- to mid-throttle setting until filter indicator light goes off. 2. Wrong pump stroking orifice. Use larger size. 3. Pilot valve plunger sticking or leaking. Repair.
	Brake sticking/worn.	
Winch will not generate sufficient line pull or does not **LINE-IN** or **LINE-OUT** (Continued on next page).	Worn or damaged components in the gear train.	Refer to Figure 4-5, Visual Inspection in Section 4 to help identify damaged components. Repair and replace as necessary.
	Brake not releasing due to insufficient brake release pressure or leak in brake.	Check that brake release pilot pressure is more than 90 psi in **LINE-IN** and **LINE-OUT** functions. If pilot pressure is too low, check for leaks, faulty joystick, or insufficient charge pressure. See Step By Step Pump and Controller Troubleshooting section in this chapter. If brake is leaking, repair as needed.
	Motor is not shifting into maximum displacement.	1. If motor servo is stuck, clean or repair. 2. If motor speed valve is stuck, replace. 3. If control signal from lever is not present or too low, repair. 4. If pressure reducing valve is set too high, adjust to proper setting. 5. If clogged orifices are in motor port G, unclog orifices. 6. If shuttle valve in motor manifold is stuck, replace.
	Brake shuttle valve stuck.	Clean or replace as necessary. See Figure 2-3 for location.
	Leak in hydraulic system other than brake assembly.	1. Plug brake line and check that pressures at test ports Ma and Mb (see Figure 2-2) are 4785 ± 50 psi when operating the winch in line-in and line-out. 2. Open top covers and inspect for leaks. **FOR EXTERNAL PUMP WINCHES ONLY:** Drain winch case oil for this test. Repair leaks as needed.
	Leak in motor speed manifold.	Check that the pressures at test ports Ma & Mb are sufficient for operating the winch in **LINE-IN/LINE-OUT** with the brake line plugged. See Figure 2-2 and refer to Hydraulic System Pressure Tests in Section 2. If the pressure is low and registered simultaneously at Ma and Mb, leakage is occurring past the shuttle valve. Replace the valve. Refer to “Motor Removal & Disassembly” sections in Section 4 for details.

Figure 2-1 Troubleshooting Analysis Check Chart (continued)

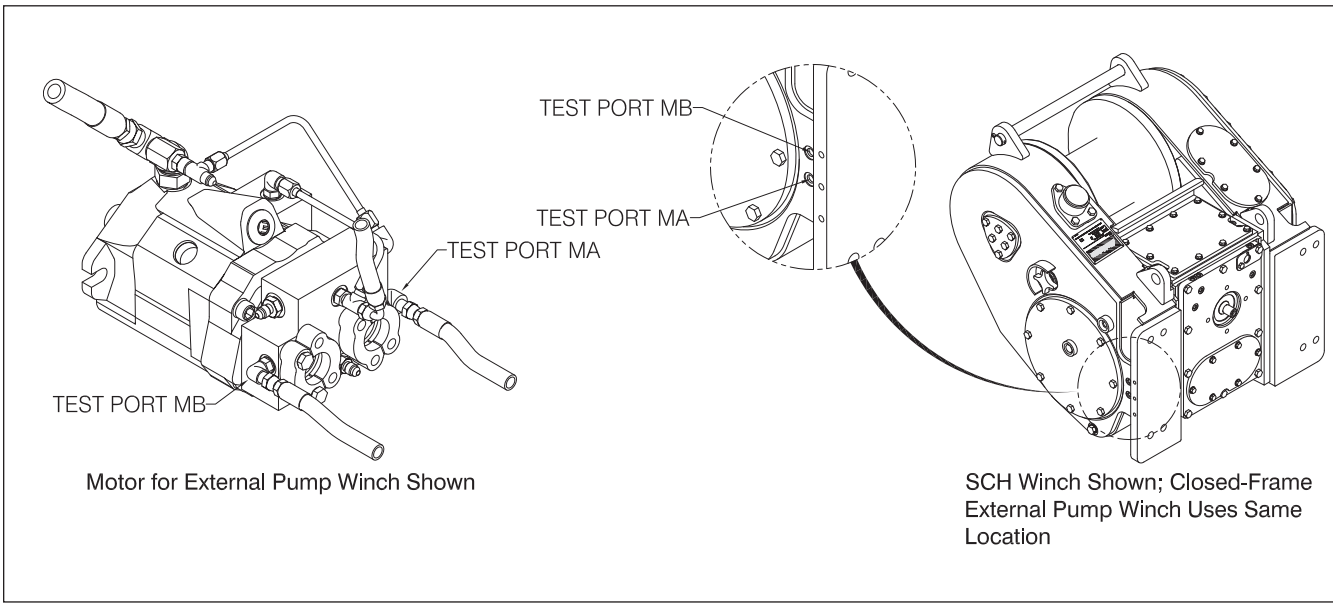
PROBLEM	POSSIBLE CAUSE	CORRECTION
Winch will not generate sufficient line pull or does not **LINE-IN** or **LINE-OUT** (Continued from previous page).	Clogged filter.	**On all SCH winches and external pump winches with S/N H4A-1014 and below**: Check filter indicator light near joystick control. If light is illuminated, replace filter. **On external pump winches with S/N H4A-1015 and above**: Tractor filter indicator light will illuminate if filter is clogged.
	Wrong oil.	Use correct oil grade; refer to "Oil Selection & Capacity" section in Section 3.
	Low oil level in reservoir.	Add oil; refer to "Oil Selection and Capacity" section in Section 3.
	Pump not generating adequate pressure.	Plug the brake line and check the pressure at test ports Ma & Mb. If pressure is low and no leaks are evident, refer to Step By Step Pump and Controller Troubleshooting section.
	Damaged **FREESPOOL** components may be causing winch to be stuck in **FREESPOOL**.	Inspect **FREESPOOL** shaft for wear or damage, repair or replace as necessary. See Section 4.
	BRAKE-OFF clutch slipping. **NOTE: Refer also to Parts Service Bulletin A1-C-17.**	1. Remove top cover and see if **BRAKE-OFF** clutch is slipping during **LINE-IN** operation. 2. Inspect **BRAKE-OFF** clutch for wear or damage. Repair or replace as necessary. See Section 4. 3. Check that **BRAKE-OFF** pilot pressure is 0 psi in **LINE-IN/LINE-OUT** functions. 4. Check plumbing connections. 5. Check for faulty joystick; refer to control lever assembly troubleshooting items in this table.

Figure 2-1 Troubleshooting Analysis Check Chart (continued)

PROBLEM	POSSIBLE CAUSE	CORRECTION
FREESPOOL will not function or is difficult to engage.	**FREESPOOL** shifter fork or collar stuck.	Remove top covers and inspect shifter fork & collar with control lever in **FREESPOOL** position. Repair parts if damaged.
	Leakage at hydraulic connection or **FREESPOOL** shaft.	Remove top covers and inspect shifter fork with control lever in **FREESPOOL** position. Replace seals if leaking.
	Insufficient control pressure from control lever due to leakage in assembly or insufficient charge pressure.	Measure control pressure to **FREESPOOL** shifter. Pressure should be 320-375 psi. Check for leaks at hydraulic connections and in control lever. Pressure should not be registered at control lever ports X1, X2, and motor speed when in **FREESPOOL** function. See Step By Step Pump and Controller Troubleshooting section below.
	Dual Axis Control lever not actuated fully.	Check that control lever is secure in the operator's console and fully detented in the **FREESPOOL** position. Secure control lever and adjust detent pin as needed. Check that the detent ring is secured to the control lever with Loctite.
	Air trapped in **FREESPOOL** line.	Remove **FREESPOOL** cover, break **FREESPOOL** hose loose, and bleed air out.
	Faulty wire harness, switch or solenoid coil	Inspect components and replace as needed.
Winch case oil level too high.	Too much oil added.	Drain oil until level at level port.
EXTERNAL PUMP MODELS ONLY: Winch case oil level too high and tractor reservoir too low.	Internal oil leak in winch.	Plug brake line, remove top covers and operate winch in all functions. Visually inspect for leaks. May need to drain winch case oil for this test. Repair leaks as needed.
Control lever won't stay in **FREESPOOL** (Dual axis models only).	Low detent force.	Screw in ball plunger to increase force; see "Control Lever Assembly Detend Force Adjustment" instructions in Section 3 for details.
Control lever does not automatically return to **BRAKE-ON** position.	Control lever is in **FREESPOOL**, which is a detented position.	Manually return control lever to **BRAKE-ON** position.
	1. Plunger seal sticking in control lever. 2. Spring in pilot controller unit broken. 3. Plate in pilot controller unit broken.	Remove and inspect pilot controller unit on control lever assembly. Replace worn parts or entire assembly as necessary.
Winch does not respond to control lever movement.	1. Leak in the pilot controller unit on control lever assembly. 2. Control valve seized or blocked.	Refer to Visual Inspection Table in Section 4 to check for wear on control lever assembly. Check for leaks in pilot controller unit on control lever assembly and replace if necessary.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.

Figure 2-1 Troubleshooting Analysis Check Chart

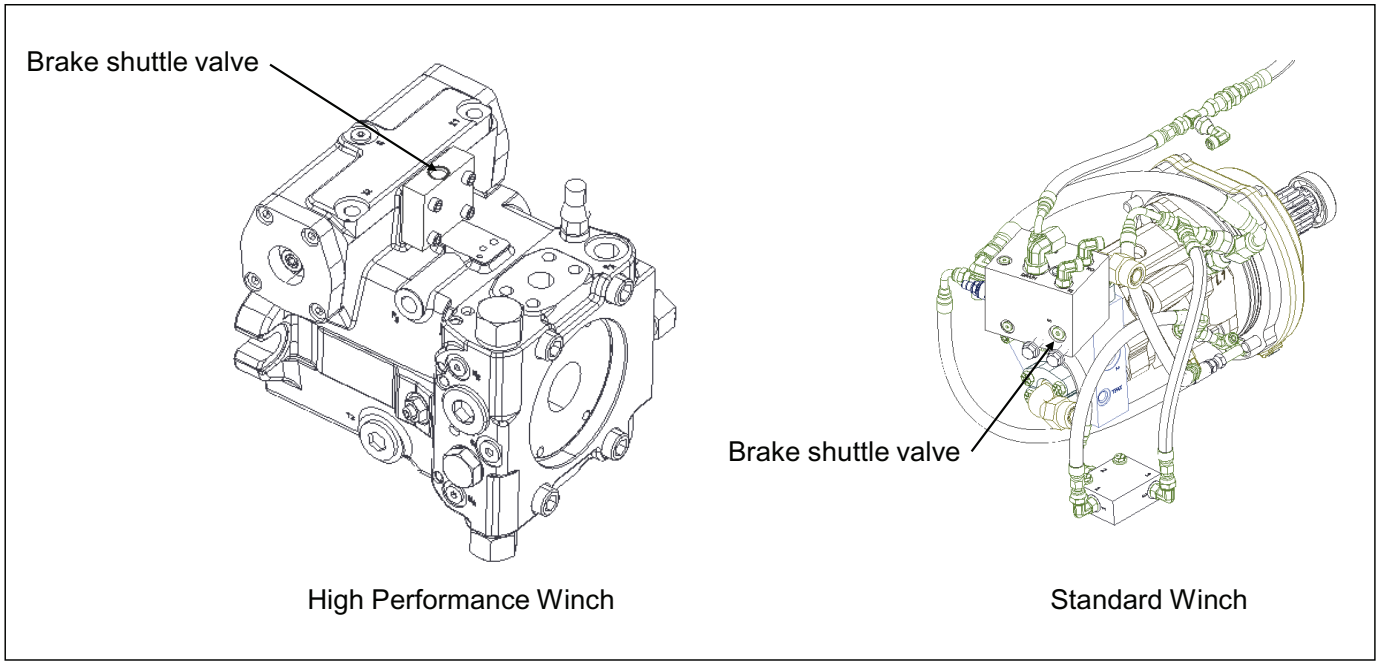
PROBLEM	POSSIBLE CAUSE	CORRECTION
Line speed is abnormally slow for **LINE-IN**, **LINE-OUT** or both.	1. Poor pressure signal. 2. Leak in the pilot controller unit in the control lever assembly.	Refer to Visual Inspection Table in Section 4 to check for wear on control lever assembly. Check for leaks in pilot controller unit and replace if necessary.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.



Motor for External Pump Winch Shown

SCH Winch Shown; Closed-Frame External Pump Winch Uses Same Location

Figure 2-2 Location of Pressure Test Ports MA and MB



High Performance Winch

Standard Winch

Figure 2-3 Location of Brake Shuttle Valve

Step-by-Step Pump and Controller Troubleshooting

1. Winch does not operate with the tractor running.

1.1	Is there oil in the reservoir?	No	Fill reservoir.
		Yes	Proceed to step 1.2.
1.2	Is the hydraulic hose routing in accordance with the hydraulic schematic?	No	Correct the routing. Refer to the Installation drawing.
		Yes	Proceed to step 1.3.
1.3	Is the pump direction of rotation correct? (High Performance winches only)	No	Install pump with correct rotation. Check pump model code to find the correct orientation: AXXXXXXXXX/XX**R** R = Clockwise L = Counter-clockwise
		Yes	Proceed to step 1.4.
1.4	Is there a broken tube, loose fitting, or burst hose?	No	Proceed to step 1.5.
		Yes	Repair the fault.
1.5	Is the brake released?	No	Check brake release circuit or mechanism.
		Yes	Proceed to step 1.6.
1.6	Is the winch in **FREESPOOL**?	No	Proceed to step 1.7.
		Yes	Deactivate **FREESPOOL**.

Charge pump/relief valve: (High Performance Winches Only)

1.7	Is there any charge pressure at port G on pump (port P on the pilot controller unit)?	No	Proceed to step 1.10.
		Yes	Proceed to step 1.8.
1.8	Is the charge pressure at least 360 psi while the pump is running at normal operating speed?	No	Proceed to step 1.9.
		Yes	Proceed to step 1.19.
1.9	Can charge pressure be adjusted by adding or removing relief valve spring shims or by adjusting charge pressure relief valve setting screw? (Refer to Section 3 for Charge Pressure Relief Valve Adjustment procedures.)	No	Proceed to step 1.12.
		Yes	Adjust charge pressure to 375 psi and proceed to step 1.19.
1.12	Is the suction strainer element plugged?	No	Proceed to step 1.13.
		Yes	Clean the strainer.
1.13	Is the reservoir air breather blocked?	No	Proceed to step 1.14
		Yes	Clean or replace air breather.

1.14 Remove charge pressure relief valve cartridge and inspect. Is it damaged?

No — Refit cartridge and proceed to step 1.15.

Yes — Replace cartridge and return to step 1.7.

1.15 Remove and inspect charge pump assembly. Is it damaged?

No — Proceed to step 1.16.

Yes — Repair or replace damaged components and return to step 1.7.

1.16 Is the charge pump installed for correct direction of rotation? Determine correct orientation by removing the pump and referring to the winch installation drawing, and checking the pump wear plate and pump gear configuration.

No — Refit charge pump. Return to step 1.7.

Yes — With proper charge pressure, and winch still does not operate, proceed to step 1.17.

Pump Control (High Performance Winches Only)

1.17 Is control lever connected to pump control (pilot pressure)?

No — Connect control lever and check that control signal is actually being applied to the pump control valve.

Yes — Proceed to step 1.18.

1.18 Put the control lever in **LINE-IN** and **LINE-OUT** positions. Does pump stroke? Does it go to full stroke?

No — Service pump control head and then proceed to step 1.22.

Yes — Operate the Winch.

To determine if a pump goes full stroke:

With pump RPM @ 2000 and handlever in high speed, drum RPM should be values according to the following Figure 2-4.

Winch Drum RPM		
	45CC Pump	56CC Pump
Ratio 1 (83:1)	24	30
Ratio 2 (116:1)	17	22
Ratio 3 (94:1)	21	27
Ratio 4 (125:1)	16	20

Figure 2-4 Winch Drum RPM

1.19 Remove stroking orifices X1 & X2. Stroke the pump in both directions. Do the pressures at X1 & X2 alternate between 0 and 375 psi during cycle?

No — Remove control lever and replace it with a new unit. Repeat step 1.18.

Yes — Proceed to step 1.20.

1.20 Is the pressure at port R less than 30 psi?	No	Repipe pump case drain line so that case pressure at port R is less than 30 psi. Return to step 1.21.
	Yes	Proceed to step 1.21.
1.21 Stroke pump in both directions. Does any pressure greater than 50 psi alternate between ports Ma & Mb?	No	Verify that loading of the pump will cause system pressure to increase above charge pressure. Return to step 1.17.
	Yes	Proceed to step 1.22.
1.22 Is it possible to adjust high pressure relief valves using 0-10,000 psi gauges at Ma & Mb to monitor pressure? (Refer to Hydraulic System Pressure Tests in Section 3.)	No	Replace high pressure relief valve cartridges and return to step 1.18.
	Yes	Adjust high pressure relief valves to required pressure. Proceed to step 1.23.
1.23 Put control lever in **LINE-IN** and **LINE-OUT** positions. Does winch operate?	No	Check for mechanical faults in the gear train beyond the motor shaft.
	Yes	Operate the winch.
2. Winch is sluggish or erratic		
2.1 Is the control lever assembly in good condition? Is there air in pilot lines?	No	Repair or replace the control lever. If there is air in the pilot lines, bleed them.
	Yes	Proceed to step 2.2.
2.2 Is the brake fully released?	No	Check brake release circuit or mechanism.
	Yes	Operate the winch.
3. Winch drives in one direction only.		
3.1 With the control lines switched does the pump drive in opposite direction only?	No	Proceed to step 3.2.
	Yes	Control signal from one side does not work properly. Repair as necessary.
3.2 With control lines still switched does pump drive in initial direction only?	No	Proceed to step 3.3.
	Yes	Problem is one side of control module or the pump. Proceed to step 3.3.
3.3 Is there control pressure?	No	Correct control signal problem.
	Yes	Proceed to step 3.4.

3.4	**HIGH PERFORMANCE WINCHES ONLY:** Check the cooling valve. Is the spool stuck in one position or appear to be damaged?	No	Proceed to step 3.5.
		Yes	Remove cooling valve and clean or replace.
3.5	Switch relief valves. Does winch drive in other direction only?	No	Proceed to step 3.6.
		Yes	Repair or replace relief valve on nondriving side.

Notes

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.

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.

⚠ WARNING

The temperature of the oil and winch may reach 220°F (105°C). Let the winch cool down before performing maintenance. Severe burns can occur from hot oil.

NOTE: As with any hydraulic system, cleanliness is extremely important. Ensure all surfaces are clean before performing maintenance tasks to prevent contamination.

On external pump winches with S/N H4A-1014 and below and all SCH winches, a filter bypass indicator light is supplied with the H4A. External pump winches with S/N H4A-1015 and above use the tractor's filter indicator light. The indicator light will illuminate when the filter becomes too dirty or if the oil viscosity is too thick. If the light is illuminated because the oil viscosity is too high, it will go out when the oil has reached a high enough temperature. Use oil with the proper viscosity for the operating temperature to avoid the filter bypass condition. See the Oil Selection and Specifications section in this chapter.

⚠ CAUTION

Operating the winch with the filter indicator light illuminated may cause pump and motor damage.

Hydrostatic pumps and motors are relatively low-maintenance. The only regular maintenance tasks are oil and filter element changes. Both of these measures promote system cleanliness. Monitoring and periodic maintenance of the systems can prevent premature breakdowns and repairs. Under normal application conditions, the maintenance intervals in Figure 3-2 are suggested. Under dusty conditions or in situations with severe temperature fluctuations, the oil change interval should be shortened accordingly.

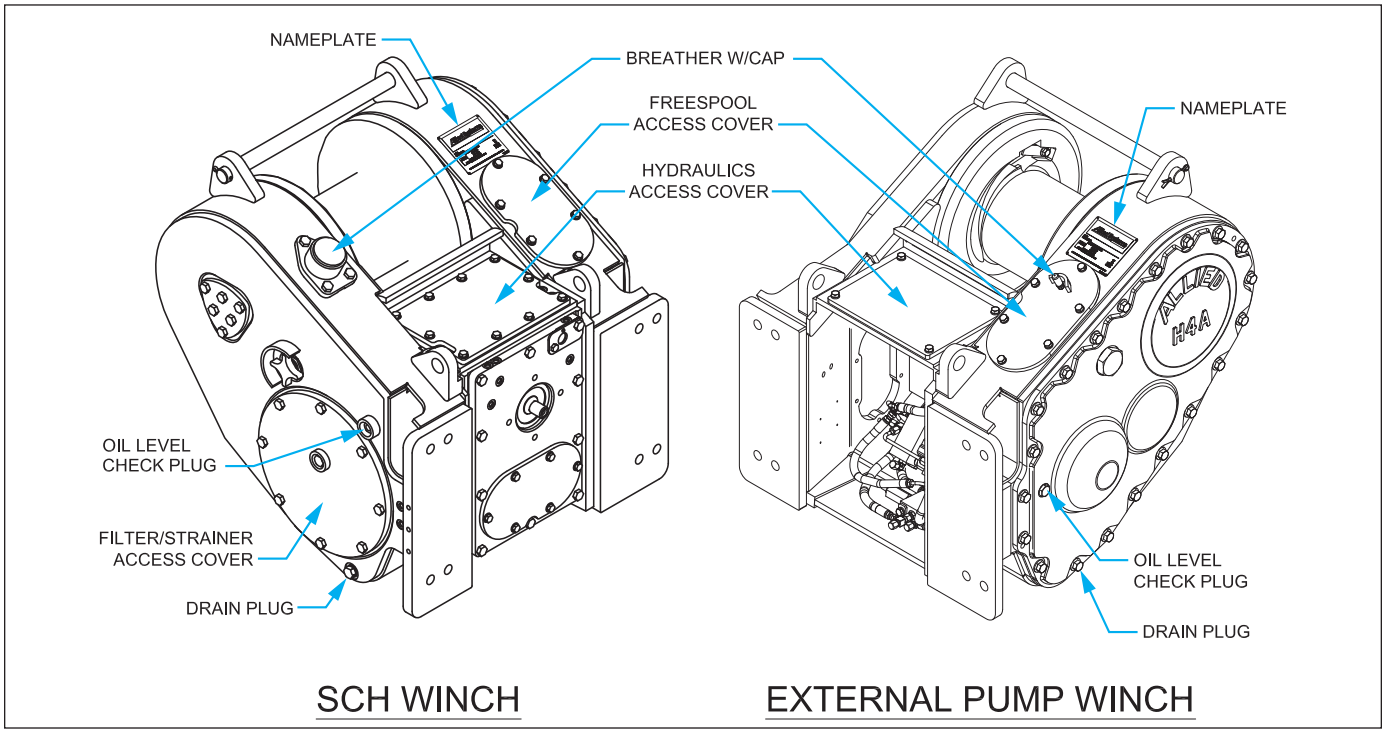


Figure 3-1 H4A Maintenance Points

INTERVAL	PROCEDURE	SPECIFICATION & QUANTITY
Daily	Clean the area around the breather. [1]	
	Check the oil level at the oil level check plug.	See the Specifications section later in this chapter for approved oils.
	Check the oil filter warning light.	Change the filter if the light remains lit after the warming-up period.
50 hours or weekly	Lubricate the arch and fairlead rollers.	Use multi-purpose grease
500 hours or when filter indicator shows element needs changing	Check **FREESPOOL** drag pad.	Replace pad if worn.
	Change oil filter.	See Parts Manual, P/N 599013W for appropriate filter.
	Lubricate driveline (if so equipped)	Mobilith SHC 220 Grease
2000 hours or annually	Change hydraulic oil.[2]	See the Specifications section later in this chapter for approved oils.
	Clean magnet and strainer.	SCH winch needs approximately 19 gallons (72 liters) of oil. External pump winch with “closed-style” frame requires 12 gallons (45 liters) of oil. External pump winch with “open-style” frame (internal option Y in serial number code) requires 5 gallons (19 liters) of oil See Specifications section later in this chapter for approved oils. Change oil more frequently if the winch runs above 180°F or if there are large fluctuations in ambient temperature.
	Clean reservoir of dirt and sludge.	
	Check filter bypass indicator light.[3]	See Filter Bypass Indicator LED Check section later in this chapter for instructions.

[1] See “Breather” description below.
[2] Change oil more frequently for extreme-duty applications such as continuous high line pull.
[3] For SCH winches and external pump winches with S/N H4A-1014 and below only.

Figure 3-2 Maintenance Schedule

Breather

The H4A breather cap assembly allows air to circulate through the winch case.

On SCH winches, the entire breather cap assembly consists of 3 individual breather caps. Cap 1 is a bi-directional breather and caps 2 & 3 are each single-direction. Air enters the winch case via breather cap 1. Once the pressure of the air outside of the winch case becomes 1/8 psi greater than within the winch case, breather cap 2 opens and allows air to enter the winch case. In order for the air within the winch case to exit, it must pass through breather cap 3. Air can exit only through this breather, which is set at 1.5 psi. Therefore, the maximum pressure that will build within the winch case is 1.5 psi.

Non-SCH winches use a single breather fitting that is open to atmosphere.

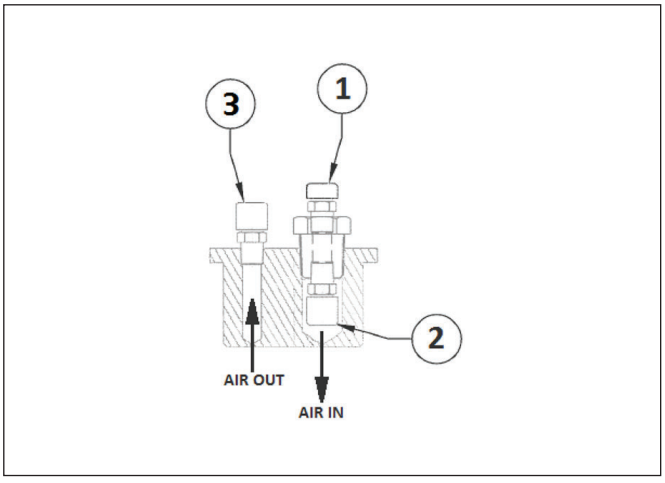


Figure 3-3 Breather (SCH winches)

Dual Axis Control Lever Assembly Detent Force Adjustment (Non-Current)

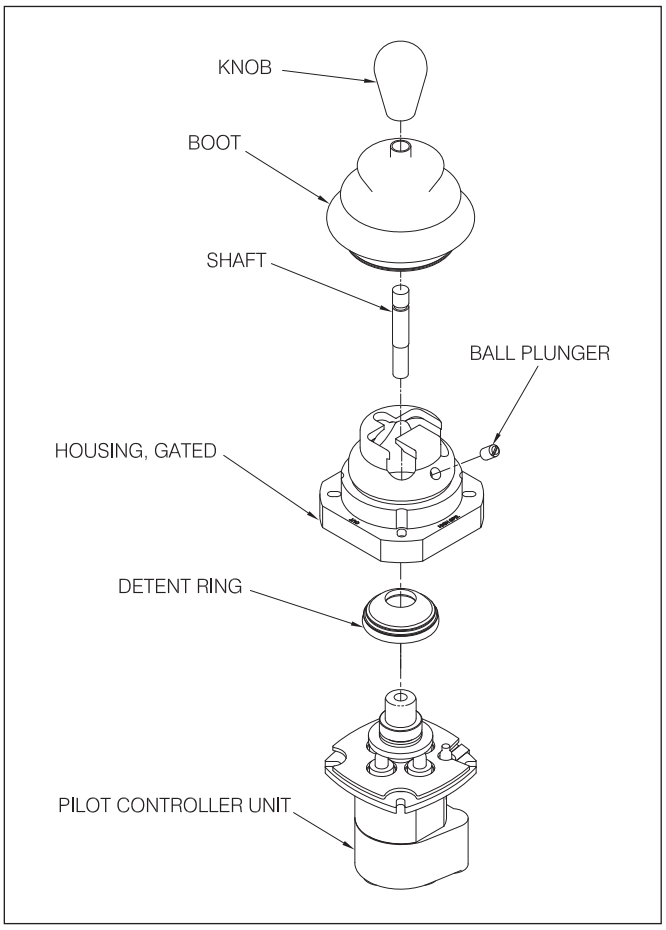


Figure 3-4 Dual Axis Control Lever Assembly

⚠ CAUTION

Make sure vehicle engine is OFF before performing any of these procedures.

Adjusting Control Lever Detent Force

1. Unscrew knob and lift boot from control lever.
2. Using a flat head screwdriver, turn the ball plunger inwards to increase detent force, or outwards to decrease detent force.
3. Move control lever from **BRAKE-ON** to **FREESPOOL** and back again. If detent force is still unsatisfactory, adjust ball plunger again.
4. Place boot over control lever assembly, ensuring it is securely installed, then screw knob back on control lever.

FREESPOOL Drag Adjustment

The resistance to rotation by the drum during **FREESPOOL** is controlled by a hand knob with a spring-applied wear pad against the drum flange. The resistance to rotation is correct when the drum can be rotated by hand, but will not rotate more than one-half revolution after the hand is removed.

An adjusting knob is located on the right side of the winch; see Figure 3-4. This knob can be screwed in to increase the resistance to rotation, or screwed out to decrease the resistance.

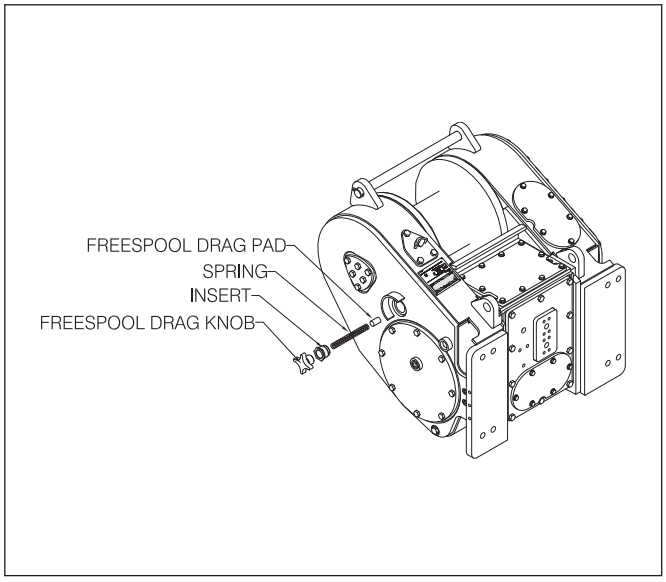


Figure 3-5 FREESPOOL Drag Adjust

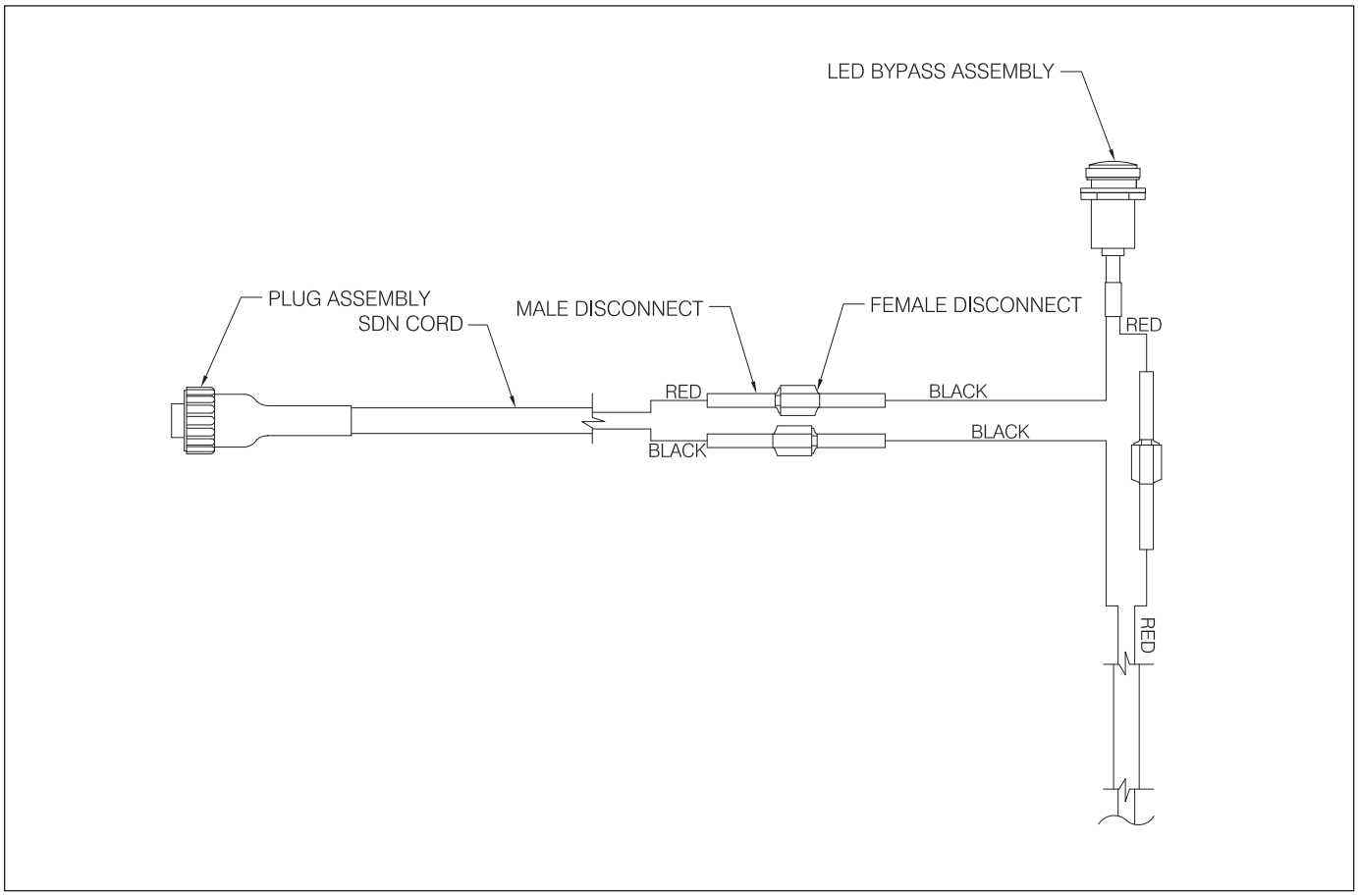


Figure 3-6 Filter Bypass Indicator LED Check

Filter Bypass LED Check

NOTE: This check applies only to SCH winches and to external pump winches with S/N H4A-1014 and below. External pump winches with S/N H4A-1015 and above share the same filter indicator light as the tractor.

Check to ensure the indicator LED on the filter bypass assembly is still functional at least once a year. To make this check, simply disconnect the female disconnect plug indicated in Figure 3-5 and ground it. Turn the tractor keyswitch on. If the LED is not burned out, it should illuminate. If it does not illuminate, replace the LED. See the H4A Parts Manual, P/N 599015W, for the part number.

Hydraulic System Pressure Checks

The hydraulic oil, filter & strainer should be maintained as indicated in the Maintenance Schedule. If any problems are found, they should be corrected before operating the winch. Refer to Figures 3-7 through 3-9 for pressure check ports. See Figures 3-10 and 3-11 for hydraulic pressure check procedures and details.

NOTE: It is essential that all hydraulic components are cleaned thoroughly when serviced. Precautions should be taken to keep the hydraulic system free of contamination.

Preparation

1. These tests should be performed with a bare drum (no wire rope) since the drum will rotate during the tests.

⚠ 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.

⚠ WARNING

Always wear gloves when handling wire rope.

2. Start the engine and operate the winch in **LINE-IN** and **LINE-OUT** to raise the oil temperature. The oil temperature in the winch must be at least 20°C (70°F).

3. Remove any dirt from the top of the winch. Remove necessary access covers.

4. Leave test plugs securely installed unless testing that port.

5. After completing all pressure checks and making the necessary adjustments ensure that all plugs and hoses are securely installed.

6. Reinstall pump/hydraulics access cover and tighten capscrews.

Pressure gauges

To perform the hydraulic pressure checks calibrated pressure test gauges will be required. The number and type of gauges required will vary from test to test. Please refer to Figures 3-10 and 3-11 for details.

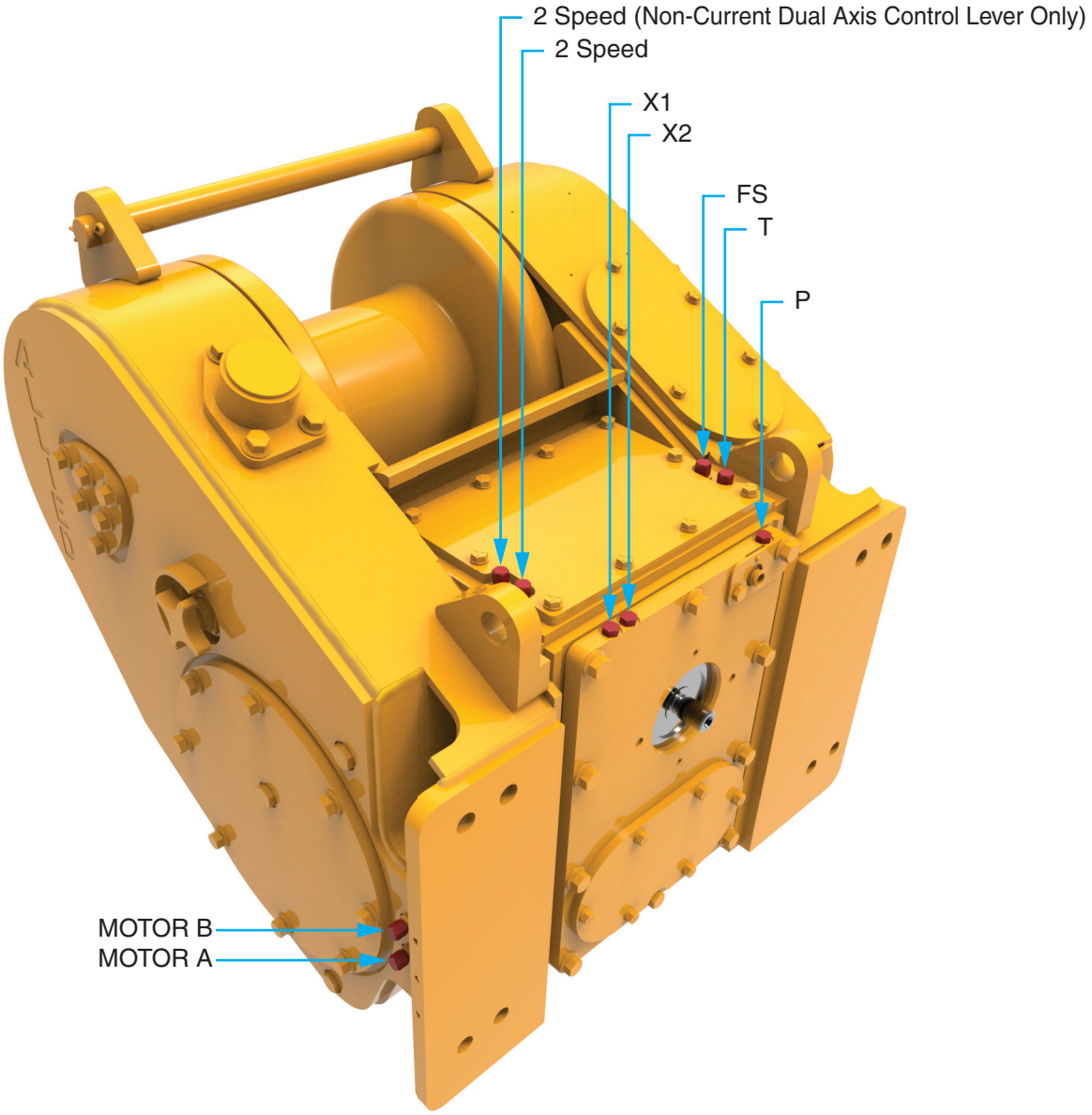


Figure 3-7 Hydraulic Test Ports, SCH Winch

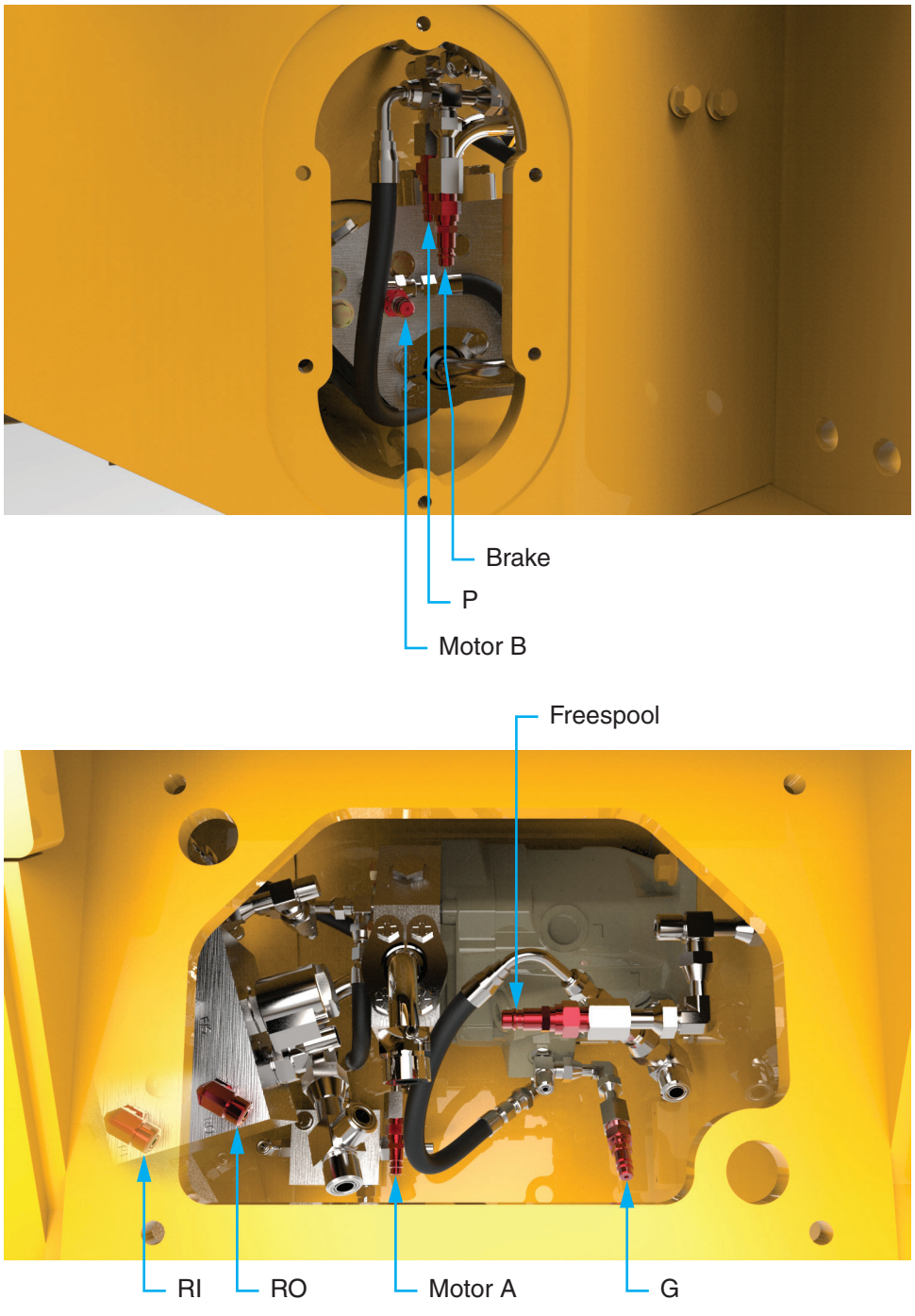


Figure 3-8 Hydraulic Test Ports, Non-SCH Standard Winch

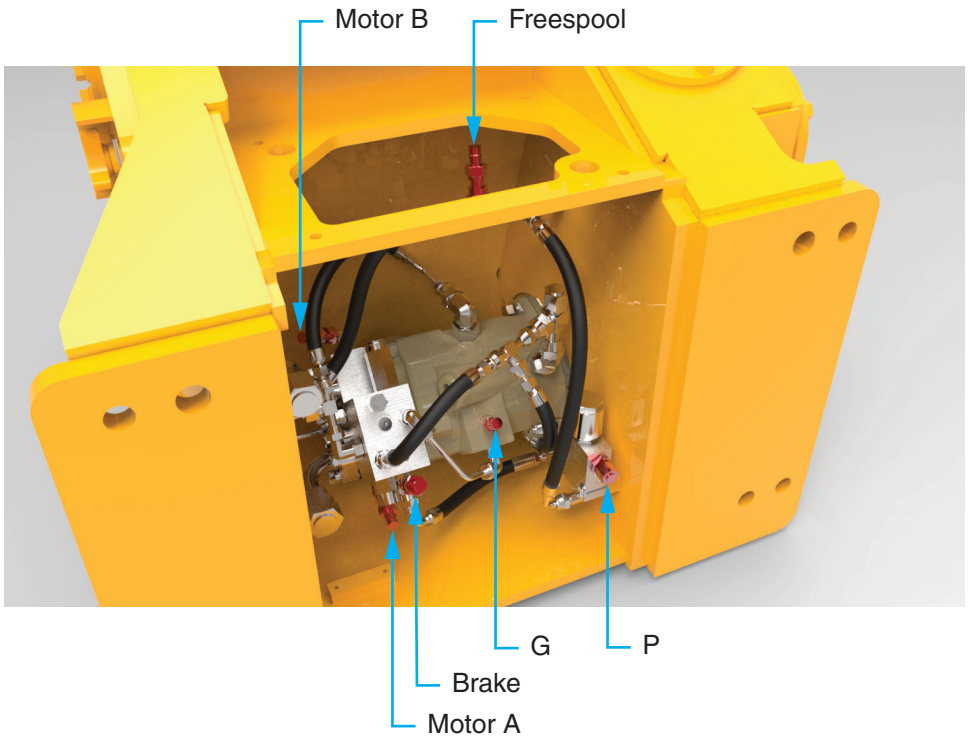


Figure 3-9 Hydraulic Test Ports, Non-SCH Hi-Performance Winch

PROCEDURE	CONTROL LEVER POSITION	CHECK PORTS	PRESSURE	
			Vehicle Codes C19, C20, C191, H15, H16, U13	Vehicle Codes K13 & K14
TEST 1: Disconnect and plug hose going to the brake. Momentarily operate winch in LINE-IN to load the system with brake applied. Drum should not spin.	LINE-IN	P	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		RI	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		RO	0	0
		Motor A	0	0
		Motor B	2850-3100 psi (19700-21400 kPa)	3930-4030 psi (27100-27800 kPa)
		G	575-675 psi (3960-4650 kPa)	950-1050 psi (6550-7240 kPa)
TEST 2: Disconnect and plug hose going to the brake. Momentarily operate winch in LINE-OUT to load the system with brake applied. Reconnect the brake line after this test.	LINE-OUT	P	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		RI	0	0
		RO	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		Motor A	2850-3100 psi (19700-21400 kPa)	3930-4030 psi (27100-27800 kPa)
		Motor B	0	0
		G	575-675 psi (3960-4650 kPa)	950-1050 psi (6550-7240 kPa)
TEST 3: Set tractor engine to high idle and operate winch in LINE-IN. Drum should rotate.	LINE-IN	P	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		RI	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		RO	0	0
		Motor A	200-250 psi (1380-1720 kPa)	200-250 psi (1380-1720 kPa)
		Motor B	900-1100 psi (6200-7600 kPa)	900-1100 psi (6200-7600 kPa)
		G	575-675 psi (3960-4650 kPa)	950-1050 psi (6550-7240 kPa)
		BRAKE	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
TEST 3: Set tractor engine to high idle and operate winch in LINE-OUT. Drum should rotate.	LINE-OUT	P	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		RI	0	0
		RO	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		Motor A	1100-1200 psi (7580-8270 kPa)	1500-1600 psi (10300 kPa)
		Motor B	200-300 psi (1380-2070 kPa)	800-900 psi (5500-6200 kPa)
		G	575-675 psi (3960-4650 kPa)	950-1050 psi (6550-7240 kPa)
		BRAKE	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
TEST 4: Activate FREESPOOL switch. The LED in the switch should illuminate.	BRAKE-ON	FREESPOOL	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)
		BRAKE	350-370 psi (2410-2550 kPa)	400-500 psi (2760-3450 kPa)

Figure 3-10 Hydraulic System Pressure Tests, Standard Winches

PROCEDURE	CONTROL LEVER POSITION	CHECK PORTS	PRESSURE
TEST 1: Disconnect and plug hose going to the brake. Momentarily operate winch in LINE-IN to load the system with brake applied. Drum should not spin.	LINE-IN	P	360-375 psi (2480-2590 kPa)
		X1	360-375 psi (2480-2590 kPa)
		X2	0
		Motor A	360-375 psi (2480-2590 kPa)
		Motor B	4785±50 psi (33,000±345 kPa)
		G	1850-2100 psi (12800-14500 kPa)
TEST 2: Disconnect and plug hose going to the brake. Momentarily operate winch in LINE-OUT to load the system with brake applied. Reconnect the brake line after this test.	LINE-OUT	P	360-375 psi (2480-2590 kPa)
		X1	0
		X2	360-375 psi (2480-2590 kPa)
		Motor A	4785±50 psi (33,000±345 kPa)
		Motor B	360-375 psi (2480-2590 kPa)
		G	1850-2100 psi (12800-14500 kPa)
TEST 3: Set tractor engine to high idle and operate winch in LINE-IN. Drum should rotate.	LINE-IN	P	360-375 psi (2480-2590 kPa)
		X1	360-375 psi (2480-2590 kPa)
		X2	0
		Motor A	360-375 psi (2480-2590 kPa)
		Motor B	800 psi (5520 kPa)
		G	800 psi (5520 kPa)
		BRAKE	360-375 psi (2480-2590 kPa)
TEST 3: Set tractor engine to high idle and operate winch in LINE-OUT. Drum should rotate.	LINE-OUT	P	360-375 psi (2480-2590 kPa)
		X1	0
		X2	360-375 psi (2480-2590 kPa)
		Motor A	800 psi (5520 kPa)
		Motor B	360-375 psi (2480-2590 kPa)
		G	800 psi (5520 kPa)
		BRAKE	360-375 psi (2480-2590 kPa)
TEST 4: Activate FREESPOOL switch. The LED in the switch should illuminate.	BRAKE-ON	FREESPOOL	360-375 psi (2480-2590 kPa)
		BRAKE	All SCH and C17/C18: 0
			C19/C20/C191/C201: 360-375 psi (2480-2590 kPa)

Figure 3-11 Hydraulic System Pressure Tests, Hi-Performance Winches

Charge Pressure Relief Valve Adjustment

To check the pressure on the pump's charge pressure relief valve, install a 500-psi pressure gauge as shown to Port G OR at Port P on the pilot control lever. Run the winch at normal operating speed and temperature. The pressure should be 360-375 psi. To adjust the pressure, remove the relief valve assembly. If pressure is too high, remove shims to decrease. If pressure is too low, add shims to increase. 1 mm (0.040") represents approximately 56.5 psi. Consult the Parts Manual, P/N 599015W for the size of shims available and the appropriate part numbers.

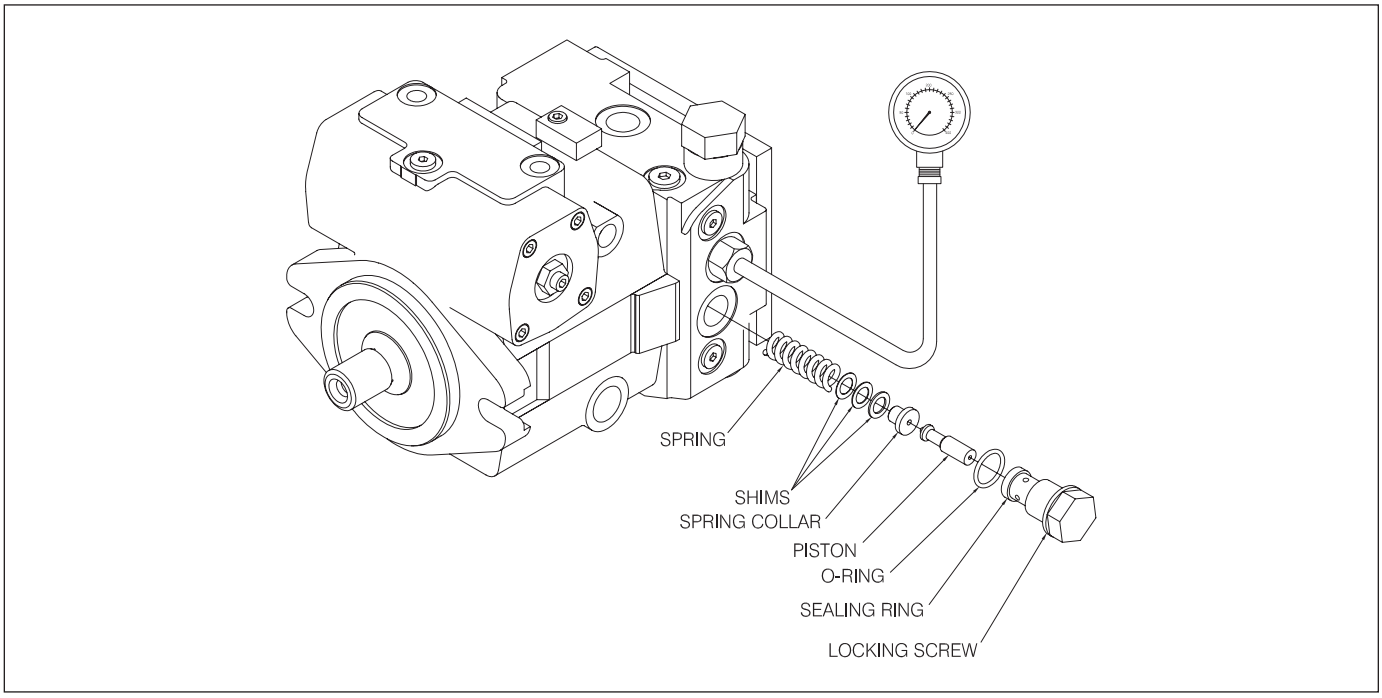


Figure 3-12 Charge Pressure Relief Valve Adjustment

Specifications

Drum Line Capacities

Wire Rope Diameter	Capacity
1/2 in. (13mm)	422 ft. (129m)
5/8 in. (16mm)	277 ft. (84m)
3/4 in. (19mm)	195 ft. (59m)
NOTE: Loosely or unevenly spooled line will reduce capacities. Wire rope made from Extra Improved Plow Steel (EIPS) with Independent Wire Rope Core (IWRC) is recommended.	

Figure 3-13 Drum Wire Rope Capacities

Hydraulic Specifications

Pump .... Axial Piston, 27 GPM (102 l/min) at 2400 RPM

Motor ..... Axial Piston, 2.72 in^3/rev (44.5 cc/rev)

Maximum operating pressure .....5075 psi (34,990 kPa)

Filters.....Full-Flow Screen Strainer, 841 microns
Charge Pressure Filter with Bypass and
16-micron Fiberglass Element

Oil Capacity, SCH Winch
(Internal Option R).....20 gal (76 L)

Oil Capacity, External Pump Winch with Closed Frame
(Internal Options B, E, & Z) .....10 gal (38 L)

Oil Capacity, External Pump Winch with Open Frame
(Internal Option Y) .....4 gal (15 L)

NOTE: **Oil required on gear side only of this winch.**

Recommended Oil List

Recommended Oils* - General Conditions			
Manufacturer	**Oil Type**	**Ambient Temperature Range**	
		°F	**°C**
ExxonMobil	Mobil Fluid 424 (Factory fill)	-13 to 104	-25 to 40
John Deere	Hy-Gard™	-13 to 122	-25 to 50
Chevron	1000 THF	-13 to 104	-25 to 40
Caterpillar	Multipurpose Tractor Oil (MTO)	-13 to 104	-25 to 40
Case	Hy-Tran Ultra	-20 to 122	-29 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 a non-recommended oil may void warranty.

** For winches using tractor-supplied hydraulics for winch operation, recommended oil is used only in the winch gear case.

Figure 3-14 Recommended Oil List

Torque Specifications

Description		Size	ft-lbs	Nm	Kg-m
Housing Covers		1/2-13 Grade 8 with Epoxy seal	113	153	16
Small Covers		3/8 UNC, ASC-508 W/Epoxy seal	37	50	5
Filter mounting		3/8 UNC Grade 5	28	38	4
Drum Adapter		1/2-13 Grade 8 with Epoxy seal	113	153	16
RH Bearing Retainer		1/2-13 Grade 8 with Epoxy seal	113	153	16
LH Bearing Retainer		1/2-13 Grade 8 with Epoxy seal	113	153	16
Motor Mounting		1/2-13 Grade 8 with Epoxy seal	113	153	16
Brake Mounting		1/2-13 Grade 8	96	130	13
Motor Manifold		3/8-16 UNC, ASC-503	46	62	6
Tube Flanges		3/8-16 UNC, ASC-509	40	54	6
Pump Mounting	All SCH, C17 & C18	1/2-13 Grade 8 with Epoxy seal	113	153	16
	C19, C20, C201	M16x2 x 50 HX HD, ASC-1001	210	285	29
	C191	M12 x 1.75, ASC-1001	84	114	12

Figure 3-15 Torque Specifications

Notes

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 4-4 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 will 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. Disconnect control lever assembly from winch.

4. Disconnect all hoses to the winch. Tag the hose ends for reassembly.

⚠ CAUTION

Disconnected hydraulic lines must be covered to prevent hydraulic system contamination. Make sure that open ports on hydraulic components are either capped or plugged during installation, service and repair procedures.

5. Connect slings and a crane or lifting device to the winch.

⚠ WARNING

The slings and crane used to lift the winch must have a minimum lifting capacity of 3,500 lbs. (1,500 kg).

6. Remove mounting nuts or capscrews and lockwashers securing winch to tractor.

Disassembly of the Winch

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.

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

Winch General Arrangement

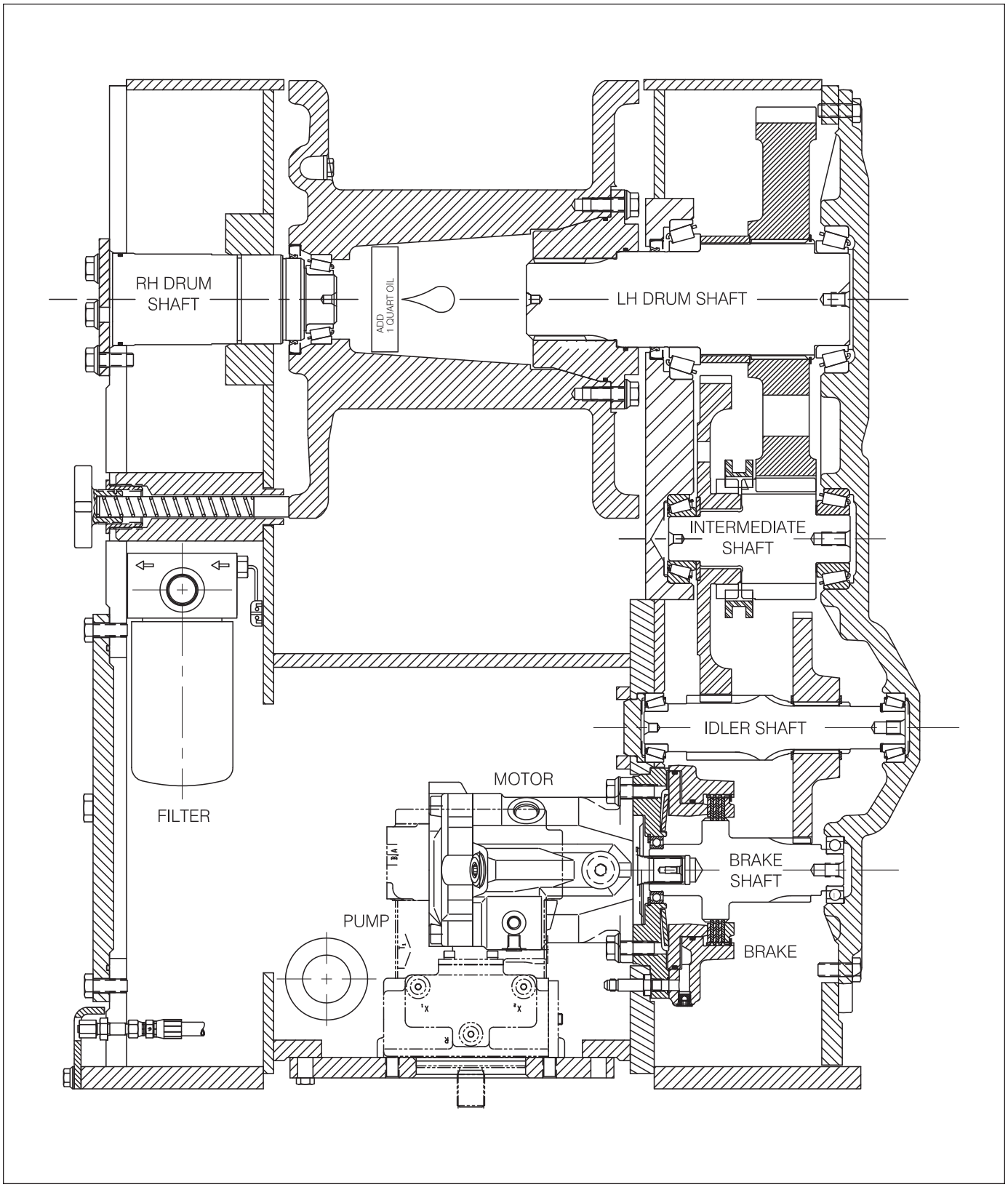


Figure 4-1 General Arrangement, H4AH*R Winch

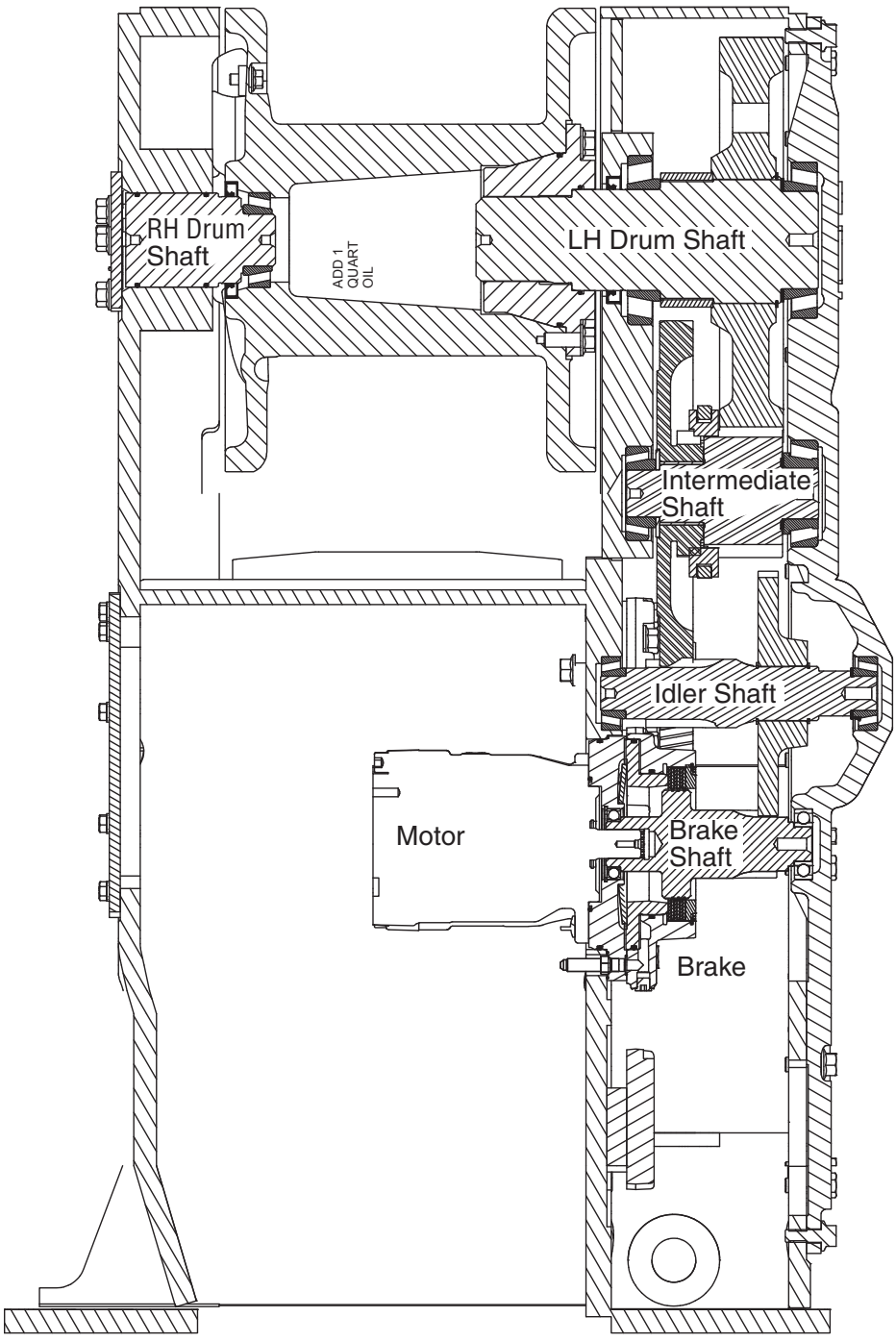


Figure 4-2 General Arrangement, H4AH*Y Winch

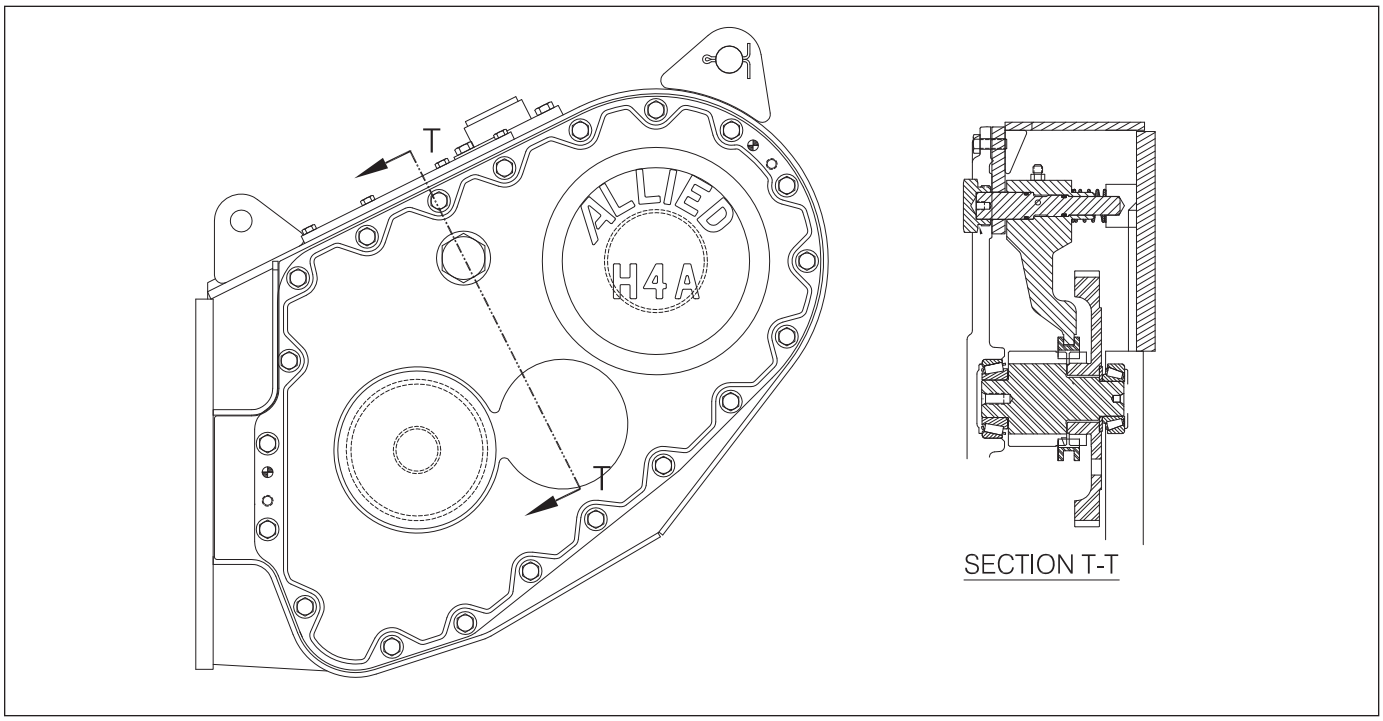


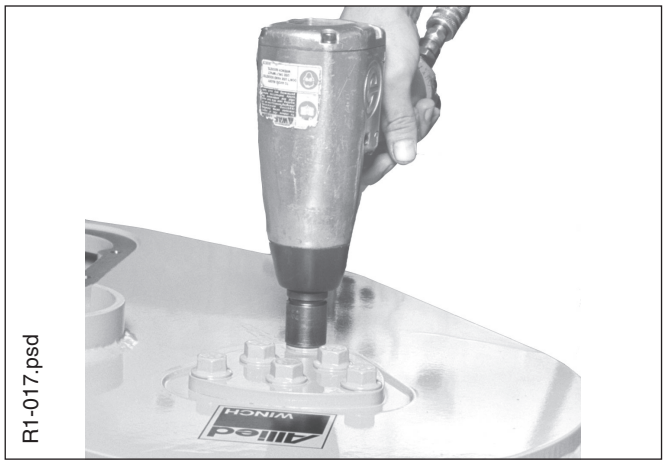
Figure 4-3 FREESPOOL Arrangement

NOTE: Unless otherwise noted, the photographs in the following sections show the disassembly and reassembly of the external pump model of the H4A winch with the "open" frame (option "Y" in the serial number code). Service procedures for SCH models and external pump models with the old frame are similar but may differ significantly for certain components.

RH Drum Shaft Removal

Before removing the covers and the drum shaft, the winch must be removed from the tractor as explained in **Winch Removal**.

1. Remove the RH drum shaft cover.



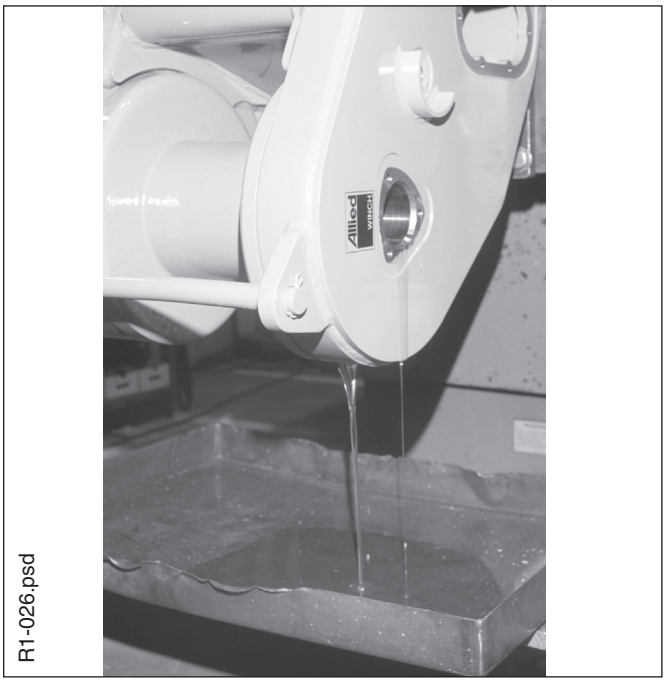
2. Remove drum shaft shim pack.

3. Remove RH drum shaft with an eyebolt and hoist.

4. Remove O-rings from RH drum shaft and discard.

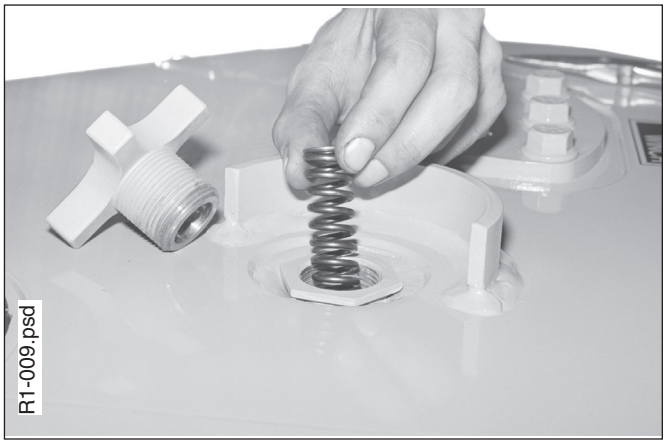
5. Remove the drum bearing cone.

6. Drain oil from winch gear case and drum.

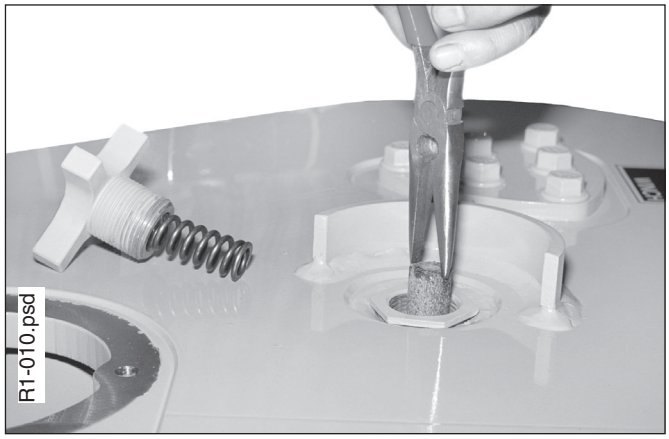


FREESPOOL Drag Adjust Service

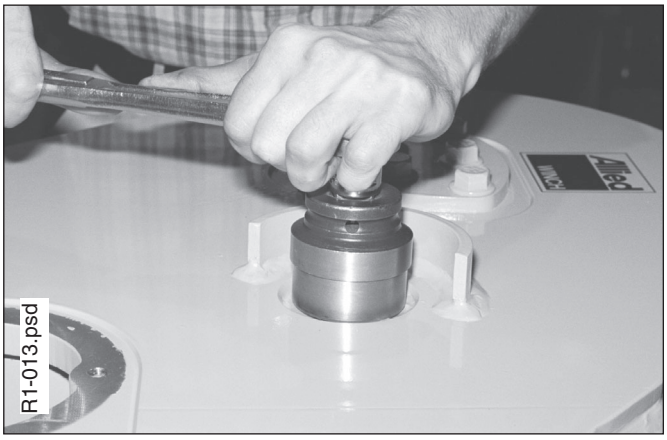
1. Remove **FREESPOOL** drag adjust knob and spring.



2. Remove the **FREESPOOL** drag pad using pliers.

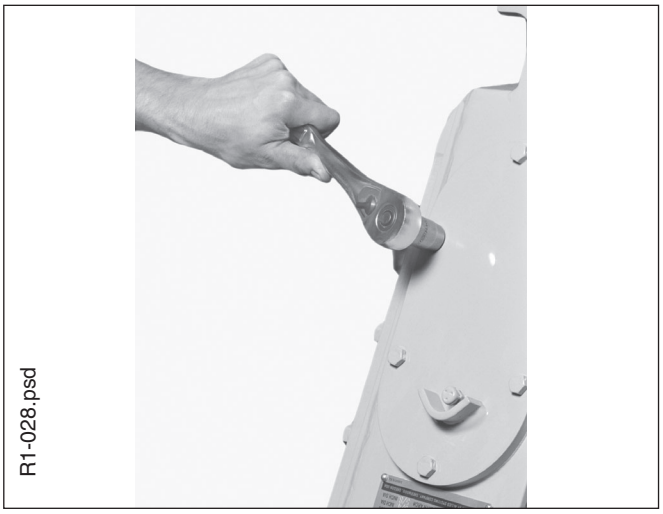


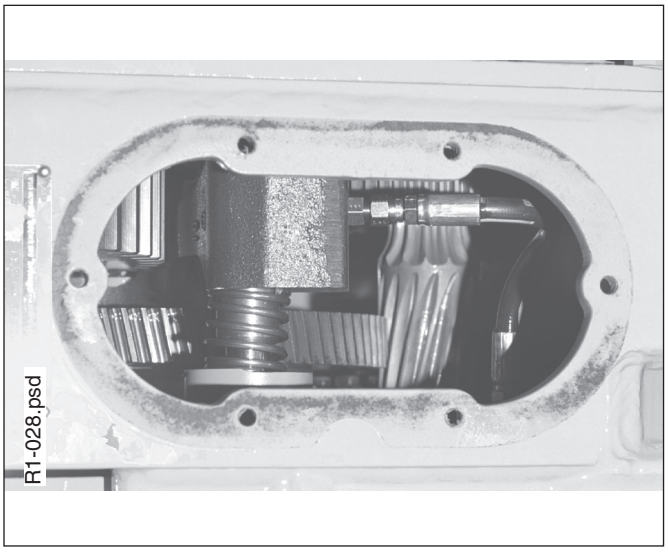
3. Remove insert using a 1-11/16” hex socket.



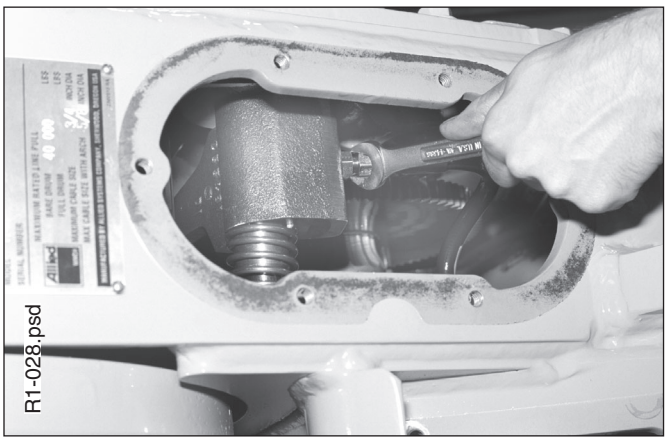
FREESPOOL Shaft Removal Without Removing RH Access Cover and Idler Shaft

1. Remove capscrews from **FREESPOOL** access cover and pry cover off.

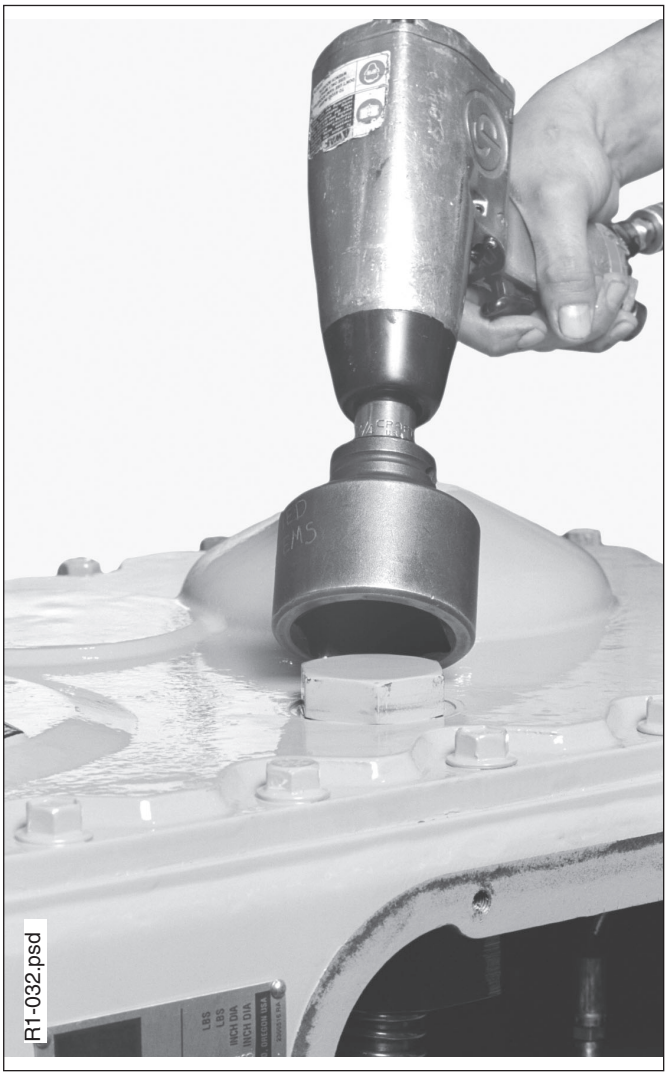




2. Remove hose from **FREESPOOL** shifter fork.

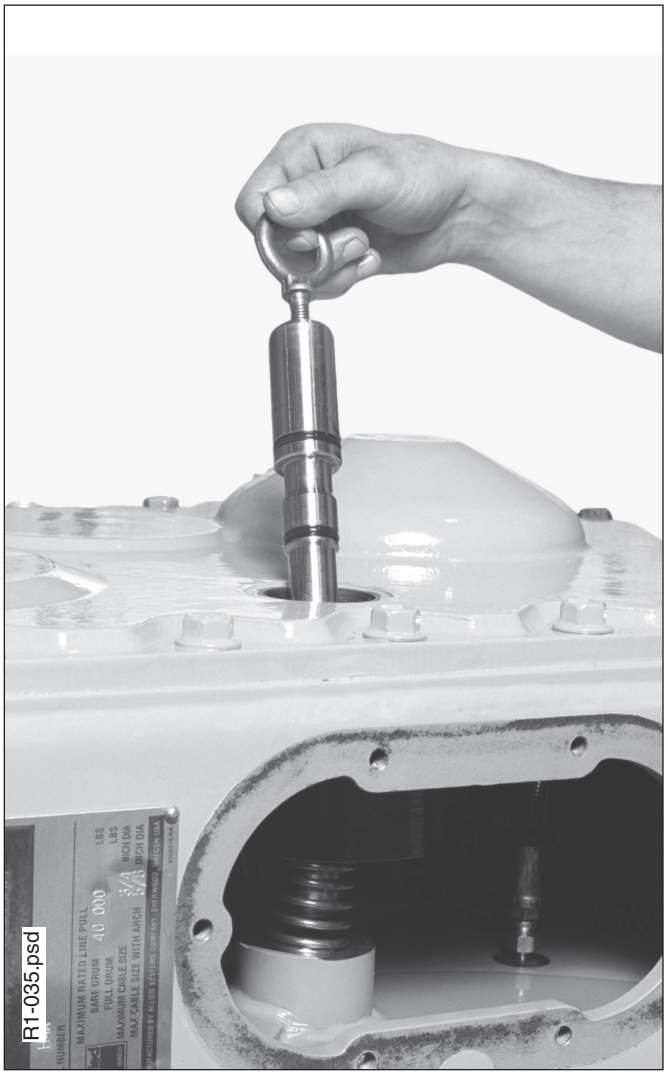


3. Remove **FREESPOOL** shifter plug.

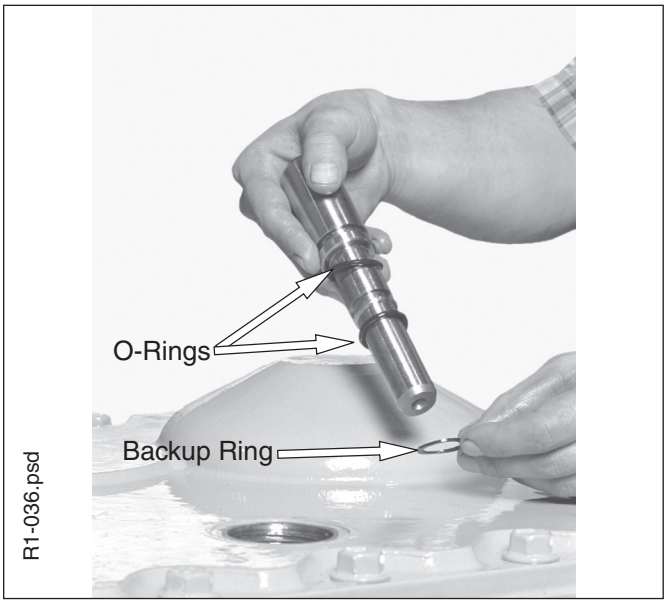


4. Remove the O-ring from the plug and discard.

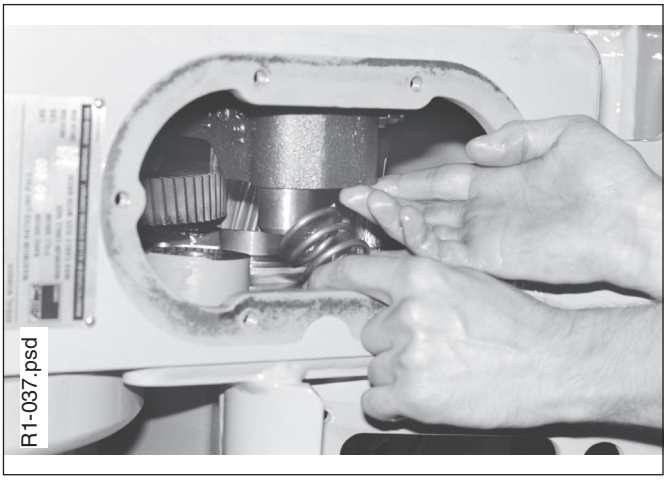
5. Using an eyebolt, remove **FREESPOOL** shaft.



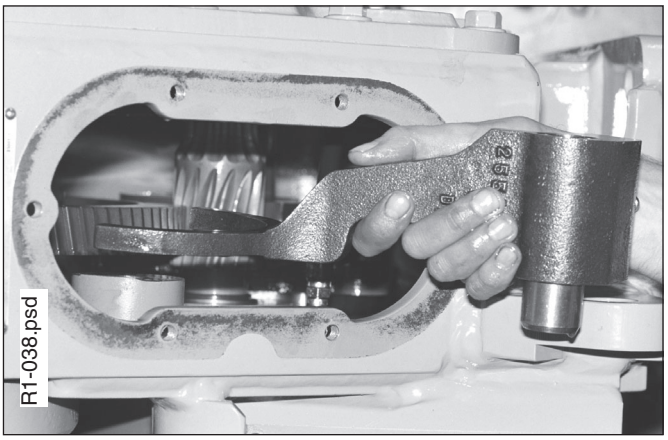
6. Remove two O-rings and backup ring from shaft and discard.



7. Pull the **FREESPOOL** shifter fork towards the front of the winch and remove the spring from the gear cavity.



8. Remove shifter fork from gear cavity.

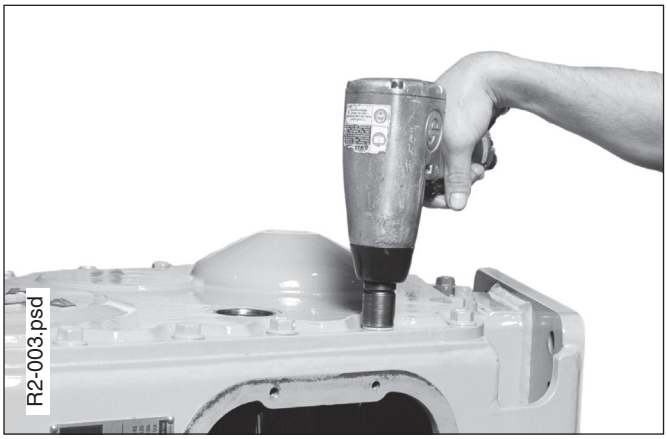


9. Remove fitting from shifter fork.

Idler Shaft Removal & Disassembly

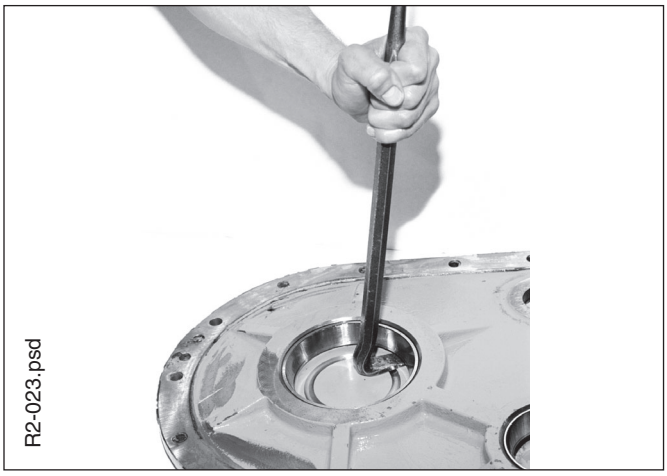
These instructions apply only to winches without the **BRAKE-OFF** option. For winches with **BRAKE-OFF**, see "**BRAKE-OFF** Shaft Removal & Disassembly" instructions.

1. Remove capscrews on RH access cover on winch.

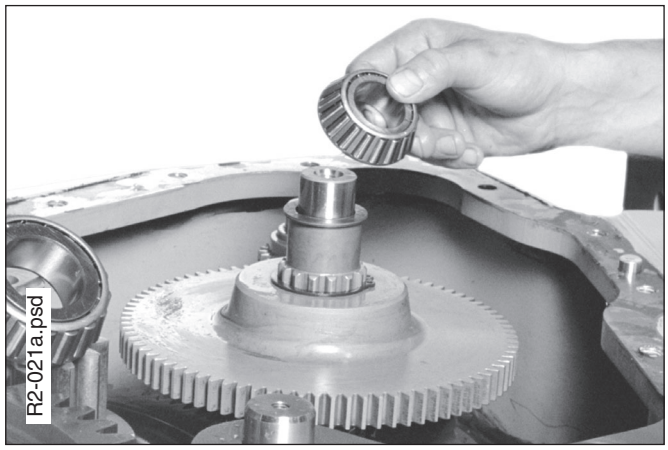


2. Use eyebolts to loosen the seal on the cover and lift cover off with a hoist. Use mallet to pound drum side of cover to lift off brake shaft bearing.

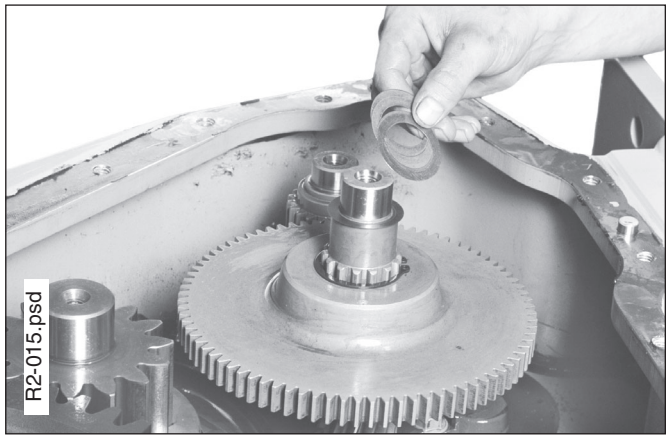
3. Remove bearing races from cover.



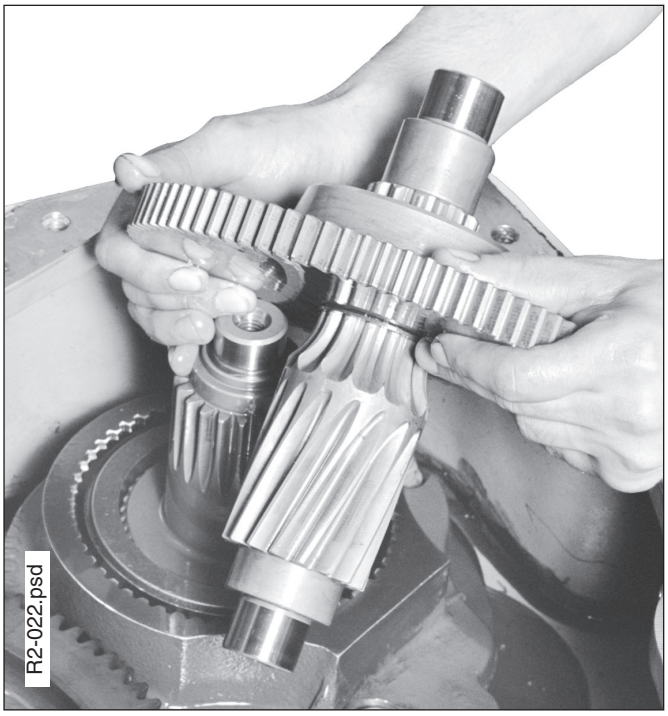
4. Remove bearing from the idler shaft.



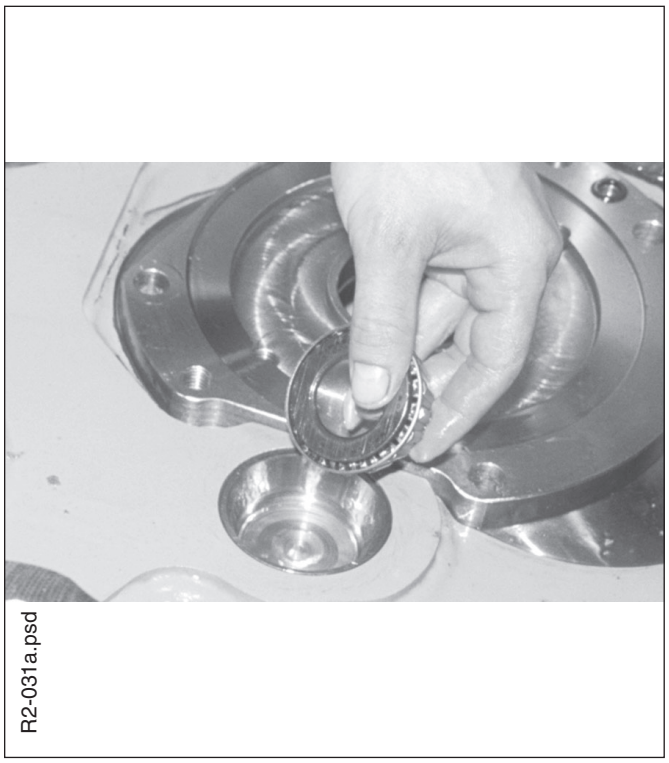
5. Remove shims from idler shaft.



6. Remove idler shaft assembly from winch.



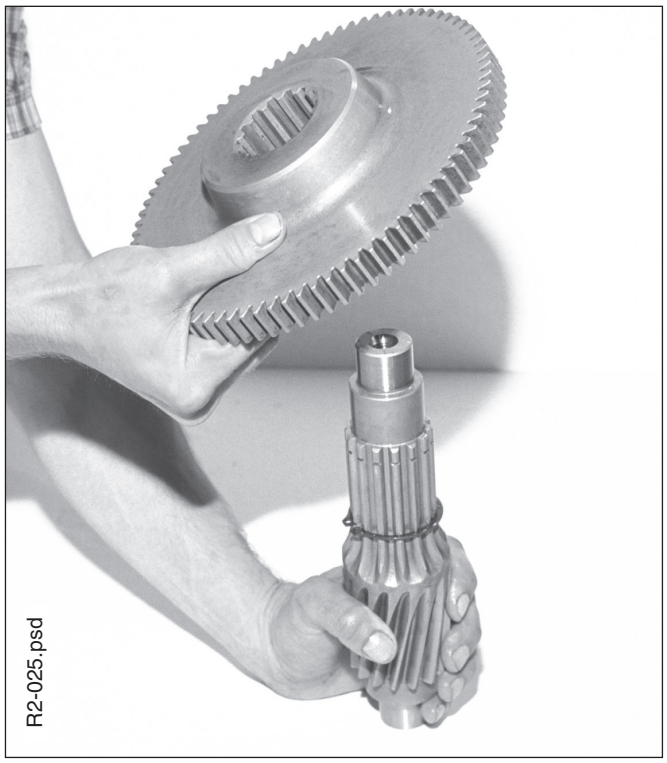
7. Remove bearing and bearing cup. Use pry-bar to loosen race if necessary.


R2-031a.psd

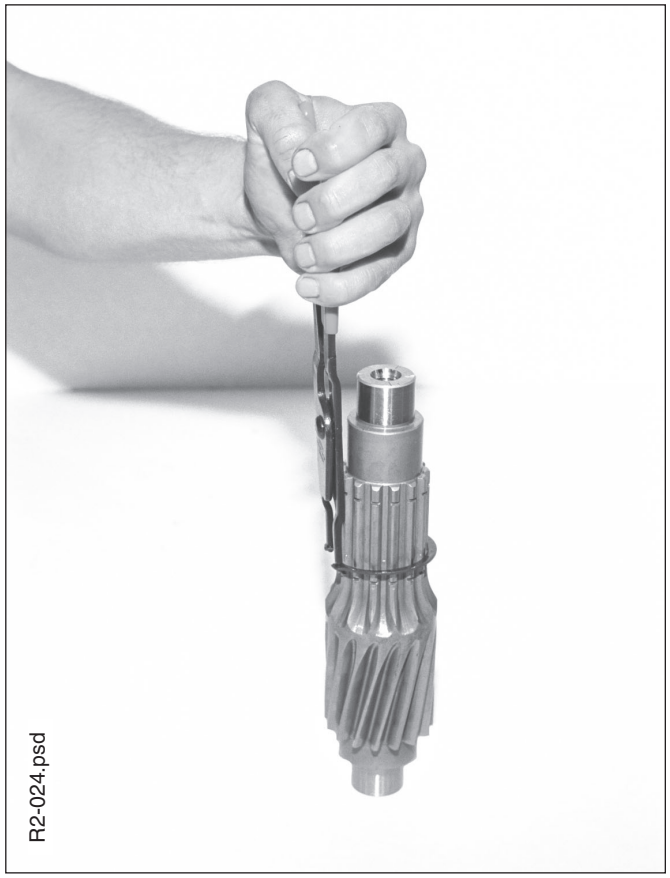
8. Remove snap ring from idler shaft assembly.


R2-026.psd

9. Remove idler gear from idler shaft.

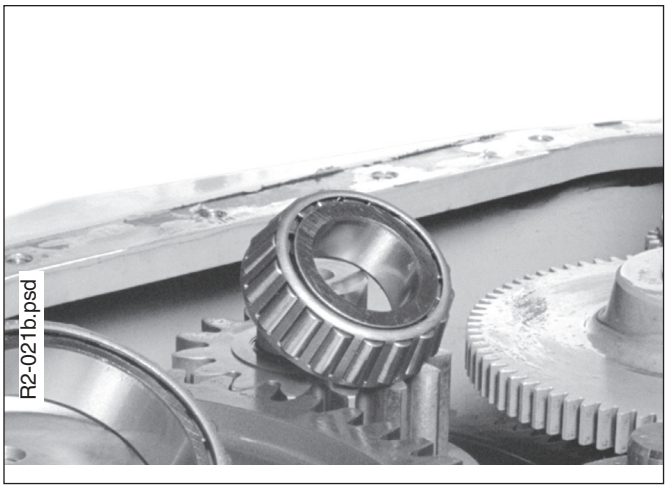

R2-025.psd

10. Remove snap ring from shaft.

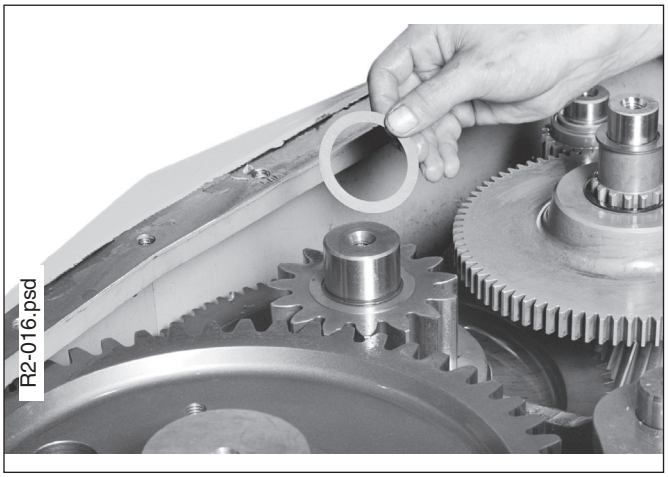

R2-024.psd

Intermediate & FREESPOOL Shaft Removal & Disassembly

1. Remove bearing from intermediate shaft.

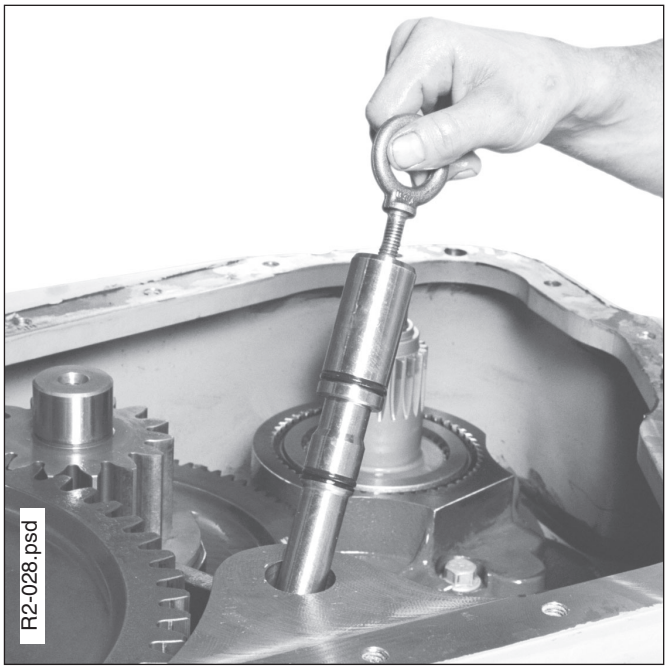


2. Remove shims from intermediate shaft

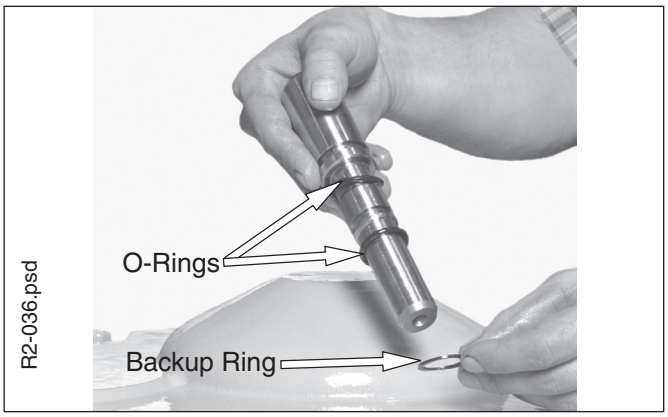


3. Disconnect hose from **FREESPOOL** shifter fork.

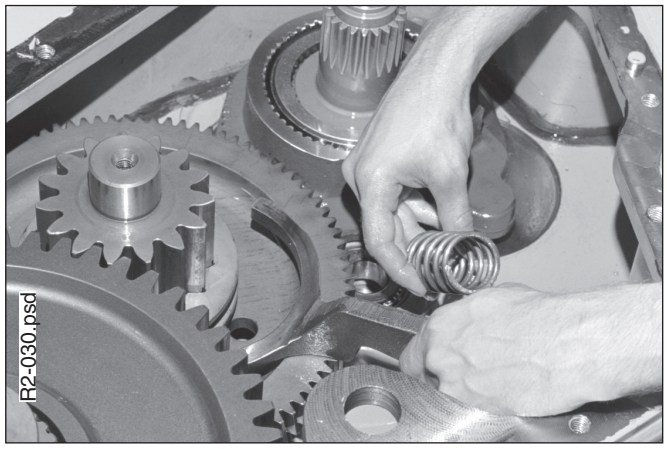
4. Using an eyebolt, remove **FREESPOOL** shaft.



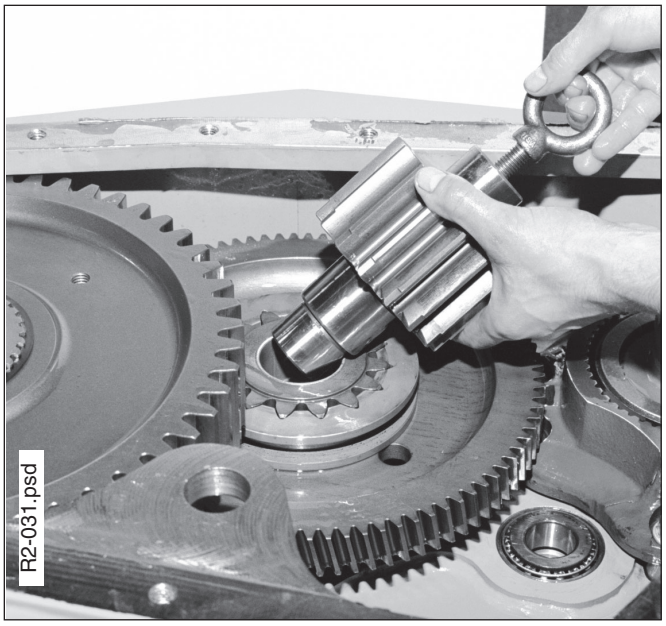
5. Remove and discard O-rings and backup ring on shaft.



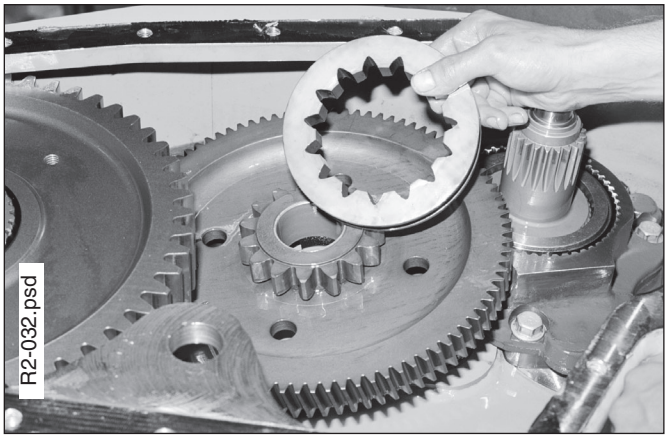
6. Pull **FREESPOOL** shifter fork to one side and remove spring. Remove shifter fork.



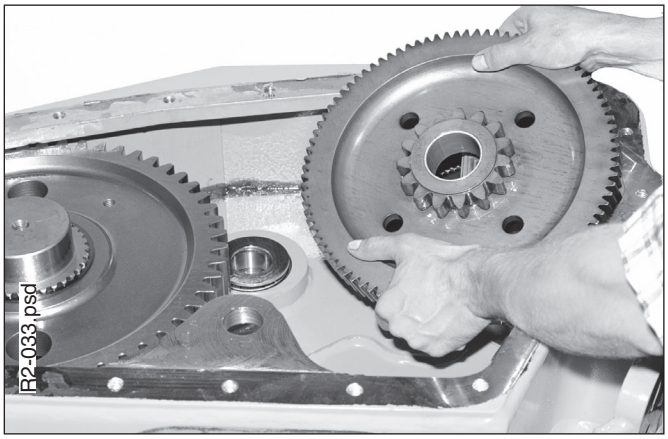
7. Remove intermediate shaft using eyebolt.



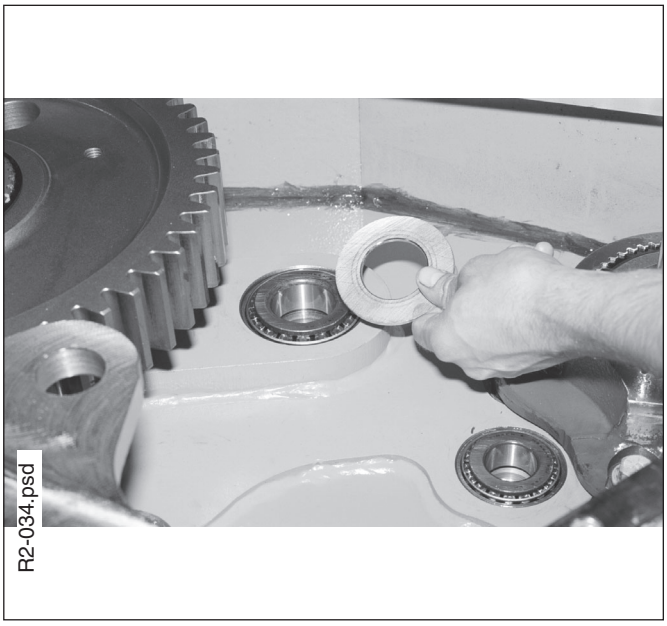
8. Remove dental collar.



9. Remove intermediate gear.



10. Remove intermediate shaft spacer.

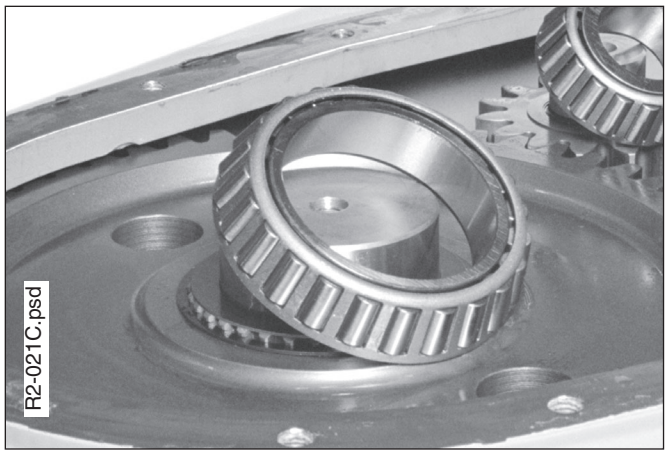


11. Remove bearing and bearing cup. Use prybar on bearing cup if necessary.

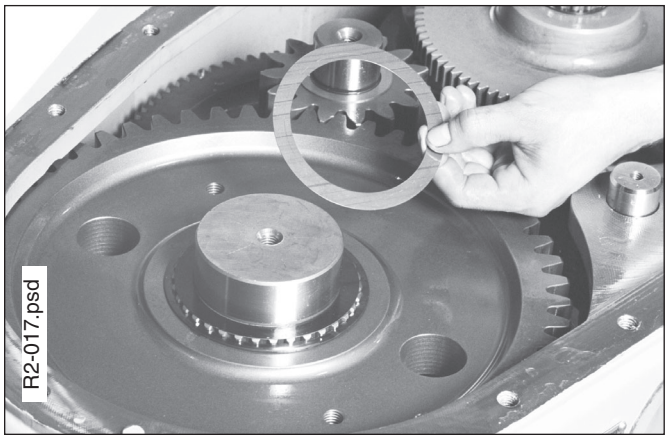
12. Remove bushing in intermediate gear.

LH Drum Shaft Removal & Disassembly

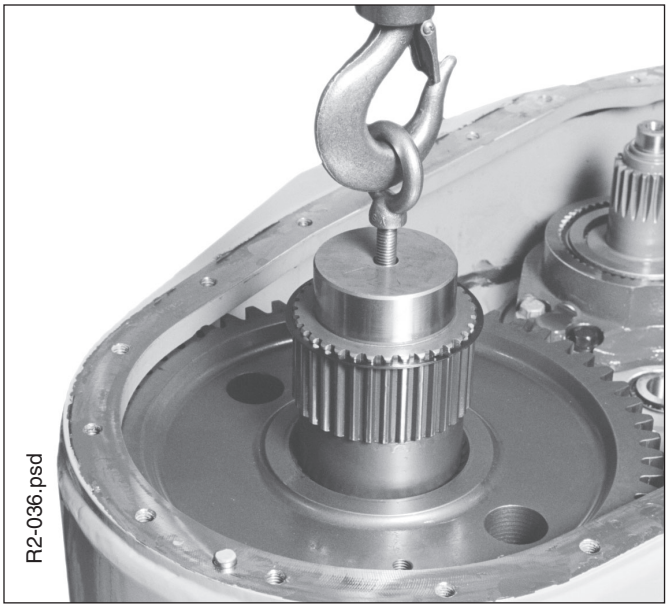
1. Remove drum shaft bearing.



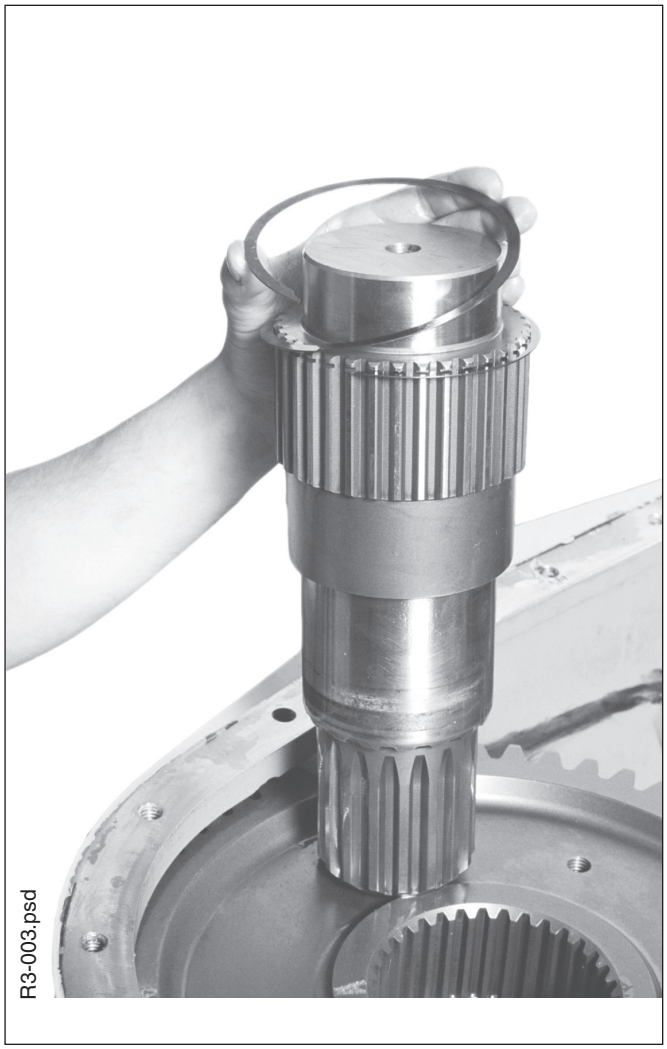
2. Remove shim from drum shaft.



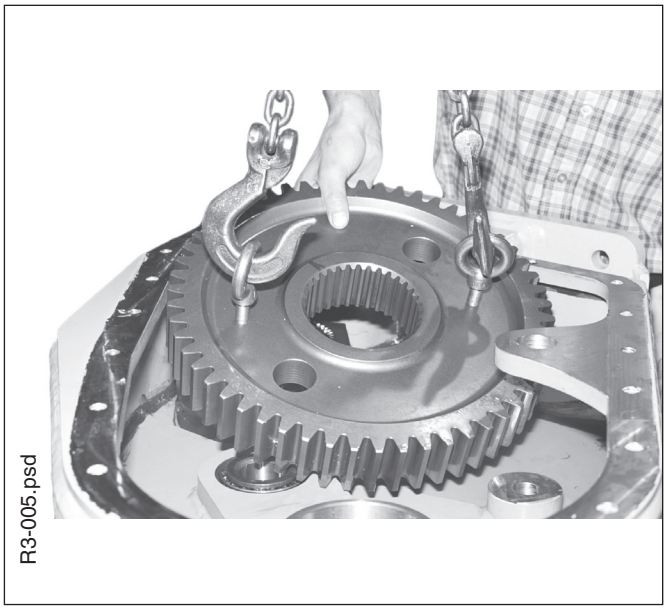
3. Using an eyebolt and hoist, remove RH drum shaft.



4. Remove spiral ring from drum shaft.

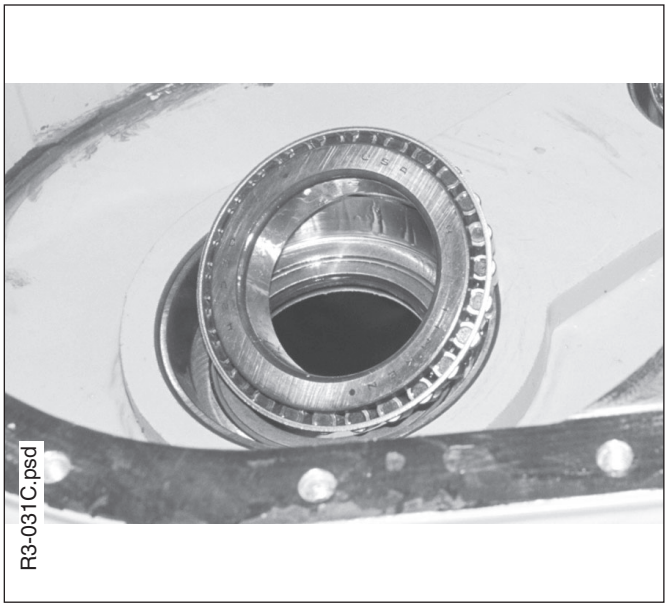


5. Remove drum gear using eyebolts and a hoist.

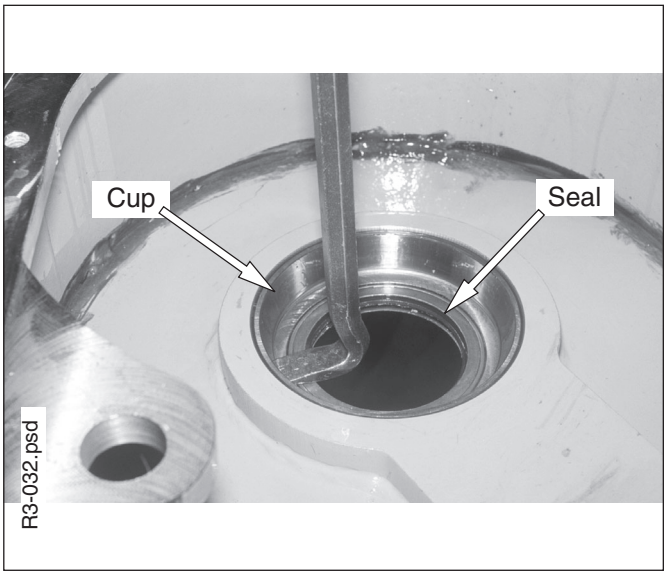


6. Remove drum gear spacer.

7. Remove bearing.



8. Remove bearing cup with prybar.



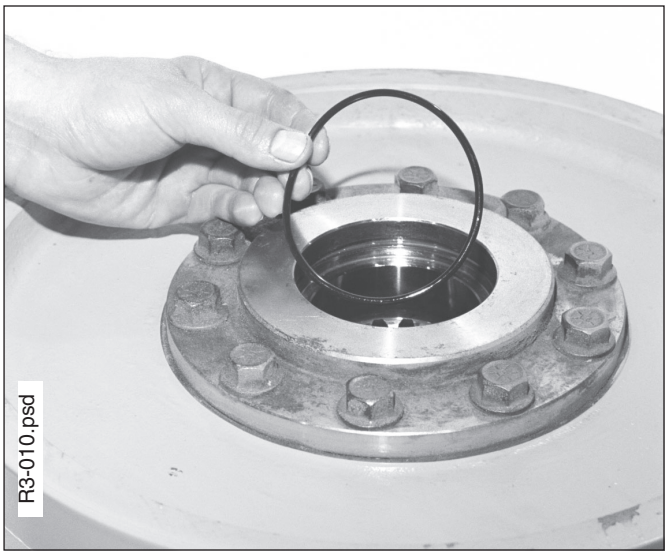
NOTE: To remove seal, drum must be removed from frame. See step 9 in "Drum Removal & Disassembly" section below.

Drum Removal and Disassembly

1. Orient drum so ferrule pocket lines up with recess on frame.

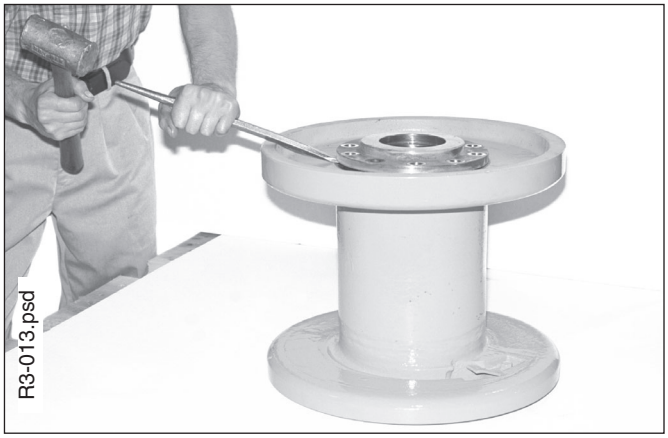
2. Remove drum from winch.

3. Remove O-ring from drum adapter and discard.



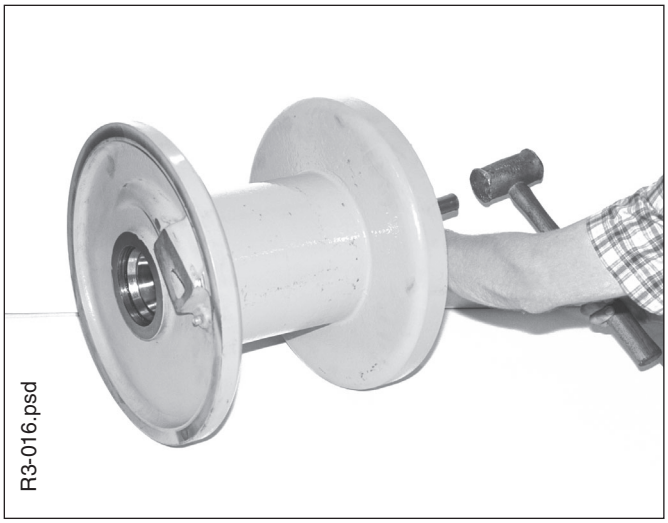
4. Remove capscrews from drum adapter.

5. Use prybar and mallet to loosen adapter.

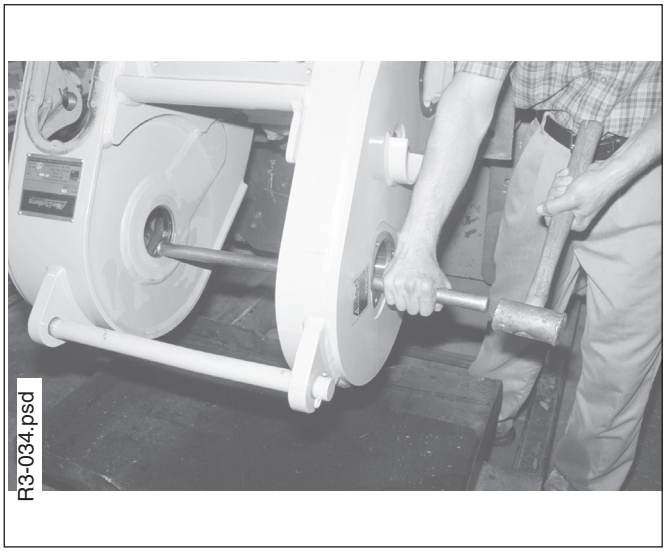


6. Pry drum seal loose using a prybar and mallet.

7. Using drift punch, remove drum bearing race from other side.



8. Remove seal from frame as shown and discard.



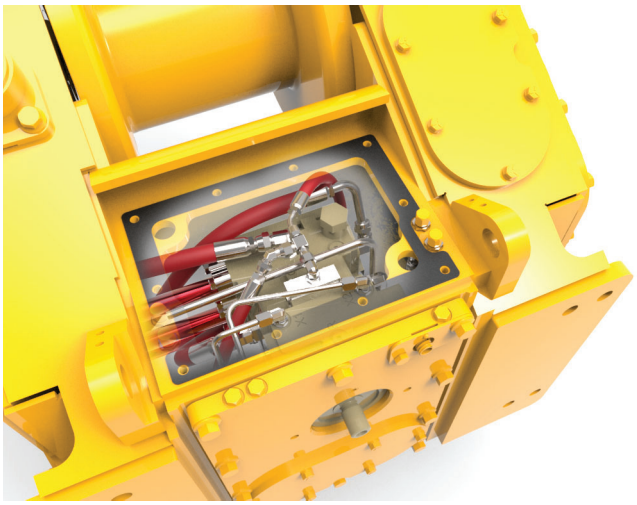
Motor Removal & Disassembly, SCH Winch

The instructions in this section apply only to SCH winches (internal option R on the serial number code). For motor removal and disassembly for winches with the "open-style" frame, see "Motor Removal & Disassembly, Open-Frame Winch".

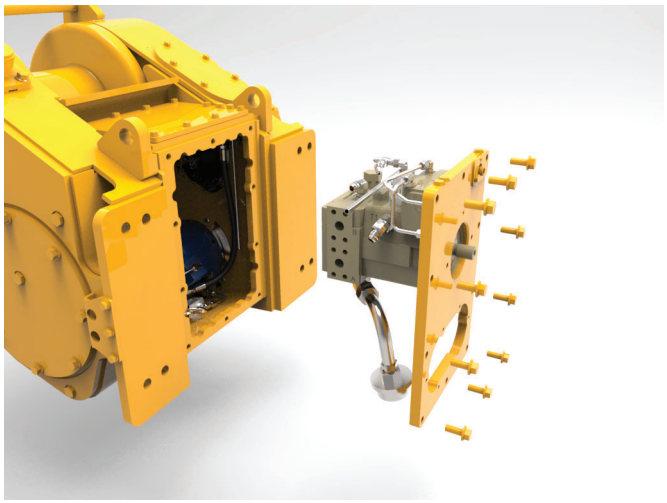
1. Remove top hydraulics access cover.
2. Disconnect the 5 hose assemblies and the 2 tube assemblies (shown in red below for illustrative purposes only) from the pump. Tag the hose ends for reassembly.

⚠ CAUTION

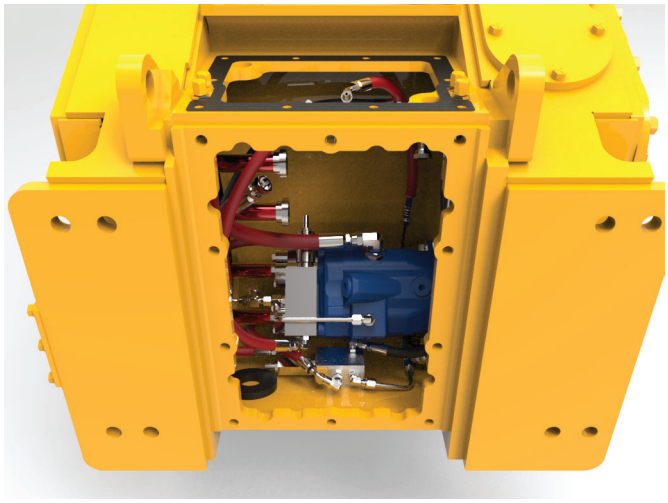
Disconnected hydraulic lines must be covered to prevent hydraulic system contamination. Make sure that open ports on hydraulic components are either capped or plugged during installation, service and repair procedures.



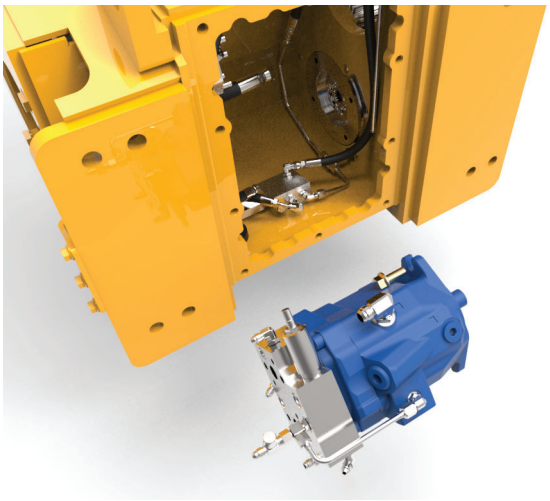
3. Remove the 10 capscrews from the front cover assembly, and carefully remove the cover, pump, and strainer assembly from the winch case.



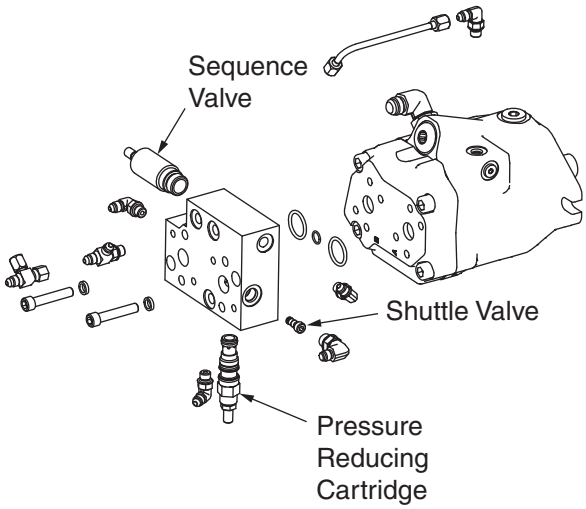
4. Remove all hose assemblies and tube assemblies (shown in red below for illustrative purposes only) connected to the motor and the motor speed manifold. Tag the hose ends for reassembly.



5. Support the motor, and remove the 2 capscrews securing it to the case. Carefully remove the motor/manifold assembly, being careful not damage any tube or hose assemblies.



6. Move the motor/manifold assembly to a clean working area. Clean all components thoroughly, and disassemble as necessary. Discard all seals and replace with new.



Motor Removal & Disassembly, Open-Frame Winch

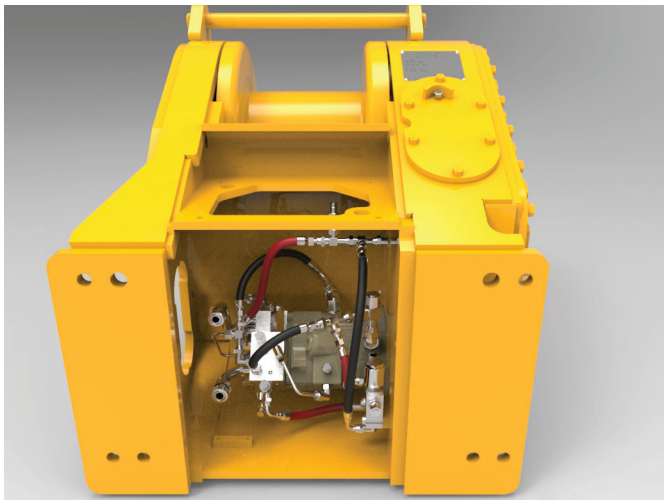
The instructions in this section apply only to Open-Frame winches (internal option Y on the serial number code). For motor removal and disassembly for SCH winches, see “Motor Removal & Disassembly, SCH Winch”.

1. Remove top hydraulics access cover.

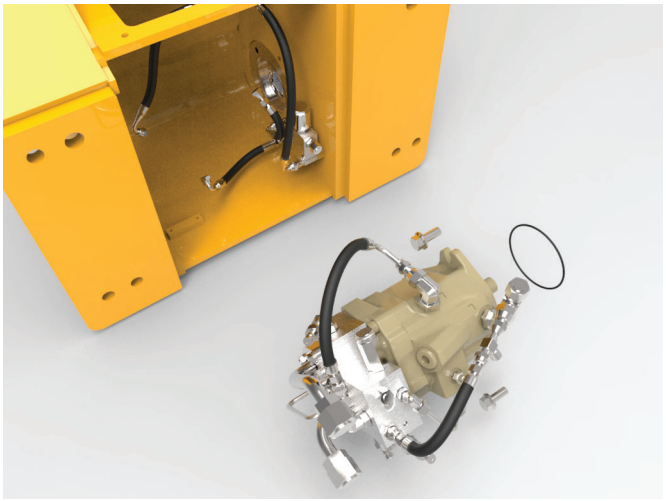
2. Disconnect any hose assemblies (shown in red below for illustrative purposes only; your winch may vary) from the motor. Tag the hose ends for reassembly.

⚠ CAUTION

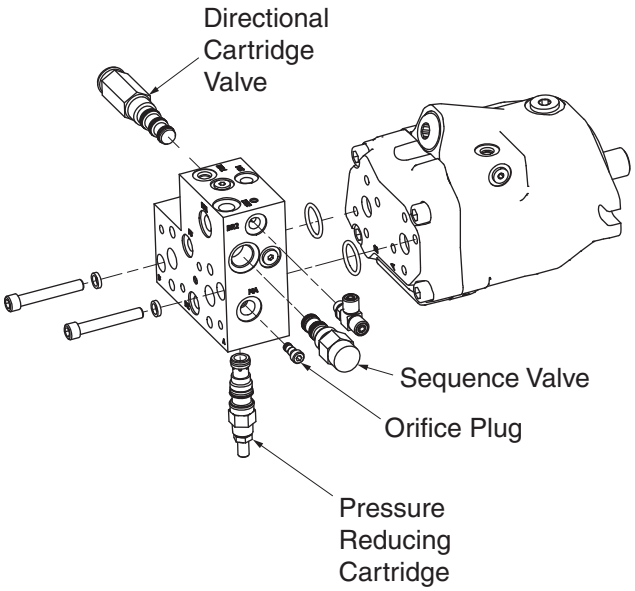
Disconnected hydraulic lines must be covered to prevent hydraulic system contamination. Make sure that open ports on hydraulic components are either capped or plugged during installation, service and repair procedures.



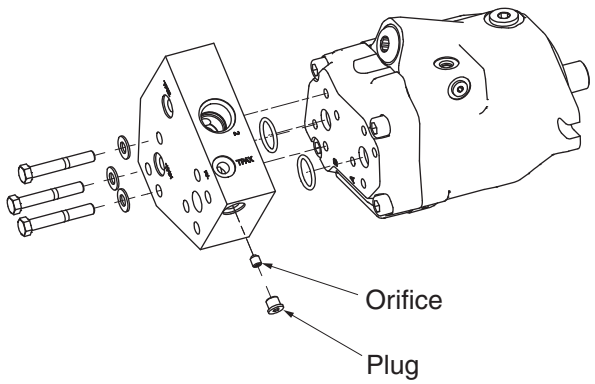
3. Support the motor, and remove the 2 capscrews securing it to the case. Carefully remove the motor/manifold assembly, being careful not damage any tube or hose assemblies. Remove and discard the O-ring.



4. Move the motor/manifold assembly to a clean working area. Clean all components thoroughly, and disassemble as necessary. Discard all seals and replace with new.



Motor/Manifold Assembly
Hi-Performance Winces

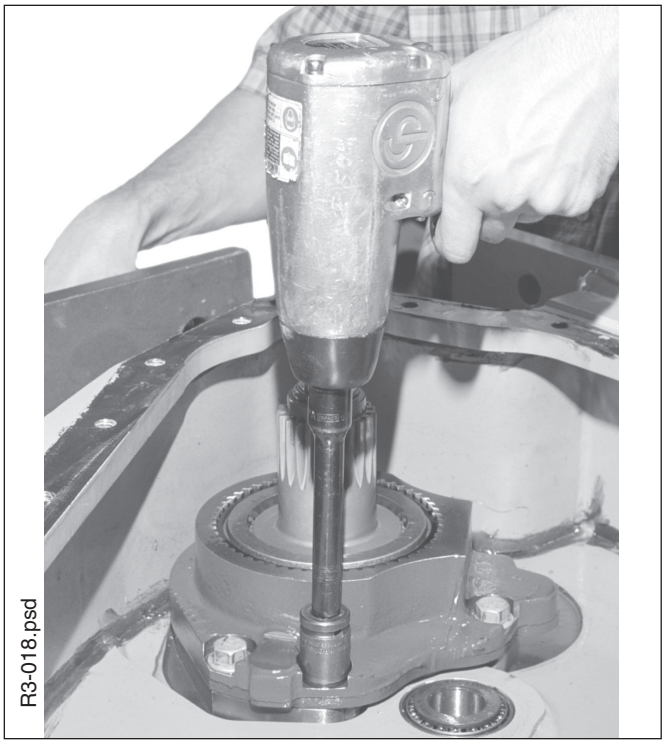


Motor/Manifold Assembly
Standard Winces

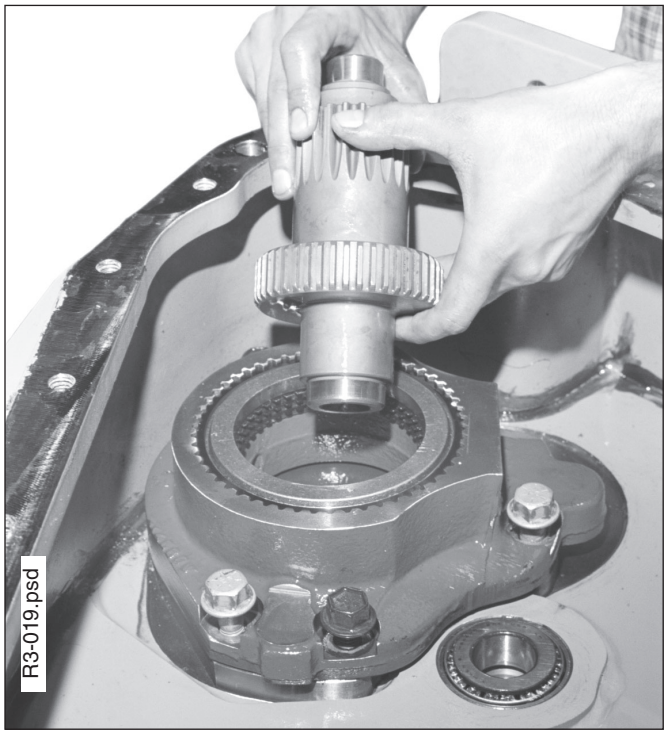
Brake Shaft & Brake Removal

NOTE: Motor assembly needs to be removed before removing brake shaft and brake. See "Motor Removal & Disassembly" section.

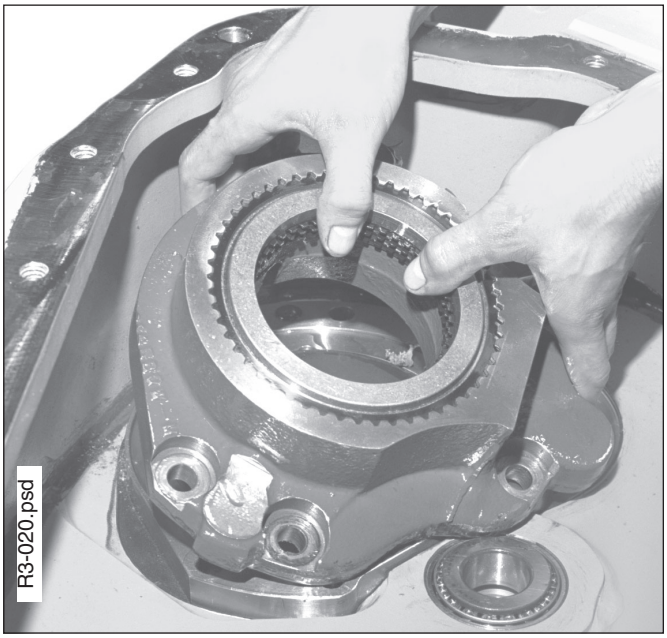
1. Remove capscrews on brake assembly.



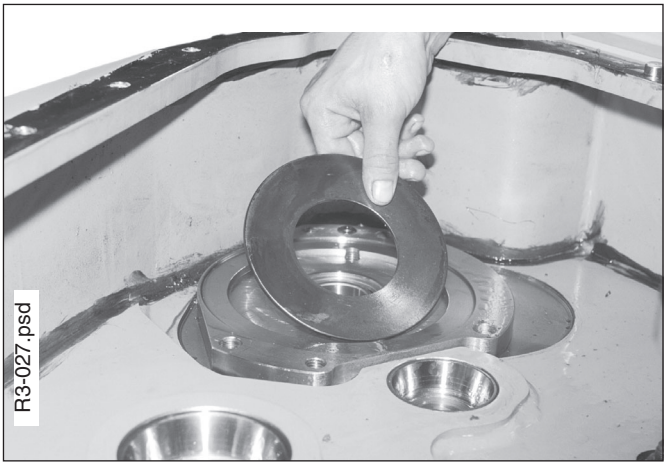
2. Remove the brake shaft.



3. Remove brake assembly.



4. Remove Belleville Spring from motor mounting plate.



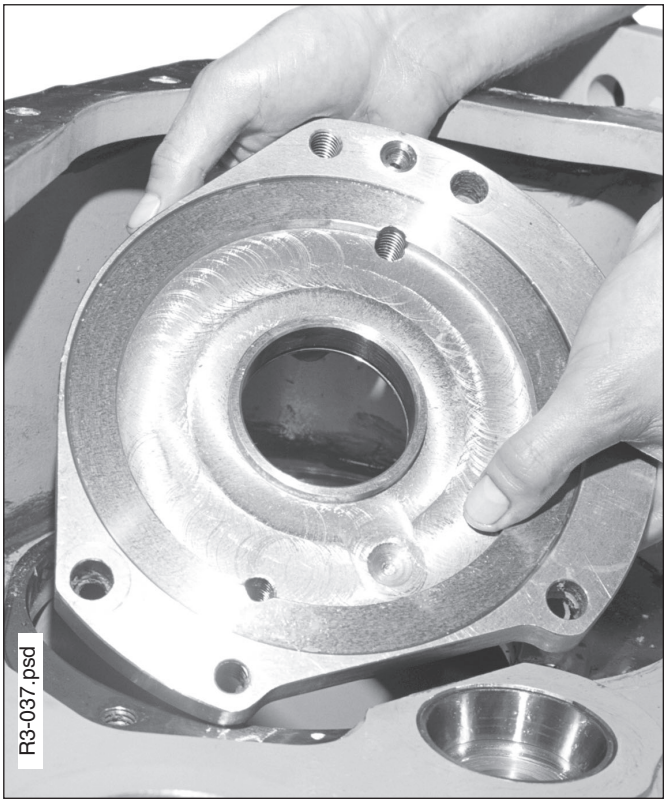
5. Remove shims.

6. Remove roller bearing.

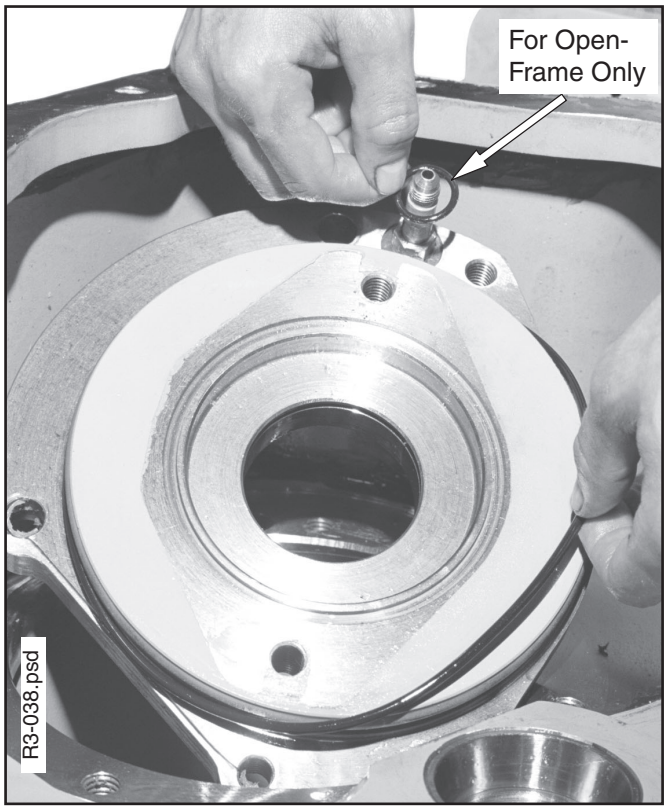
7. Remove snap ring.

8. Remove O-ring from motor mounting plate and discard.

9. Remove motor mounting plate.

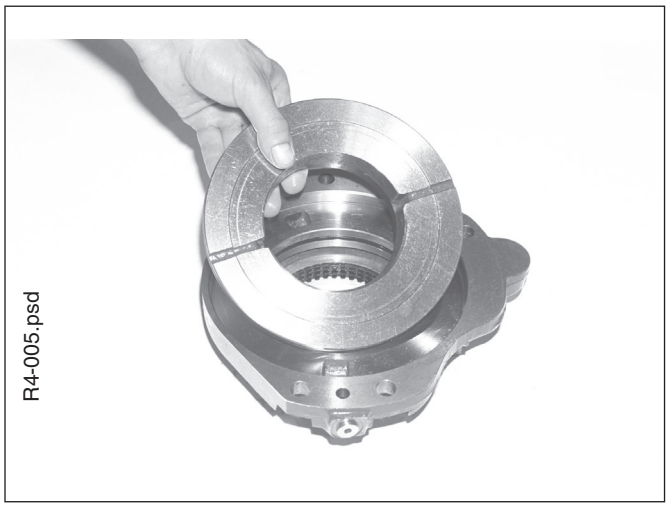


10. Turn motor mounting plate over. Remove and discard O-rings.



Brake Disassembly

1. Using pressurized air, remove brake piston.


R4-005.psd

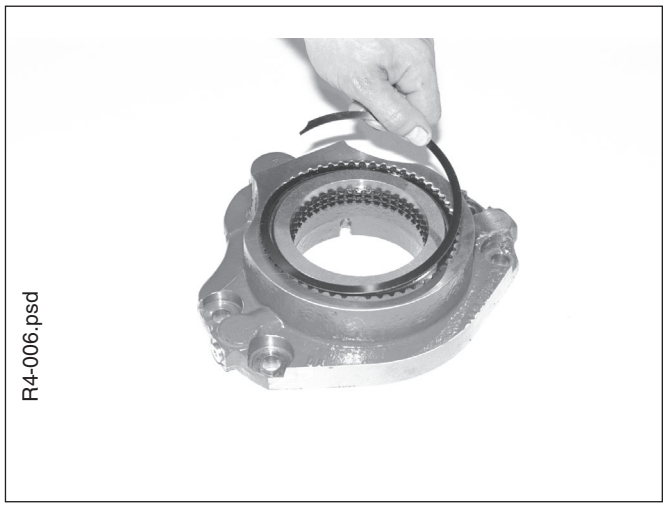
2. Remove and discard piston O-ring.


R4-003.psd

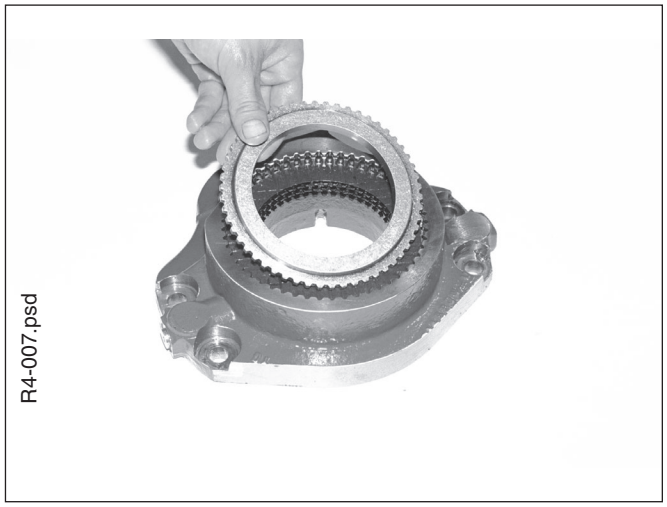
3. Remove O-ring from housing cavity and discard.


R4-004.psd

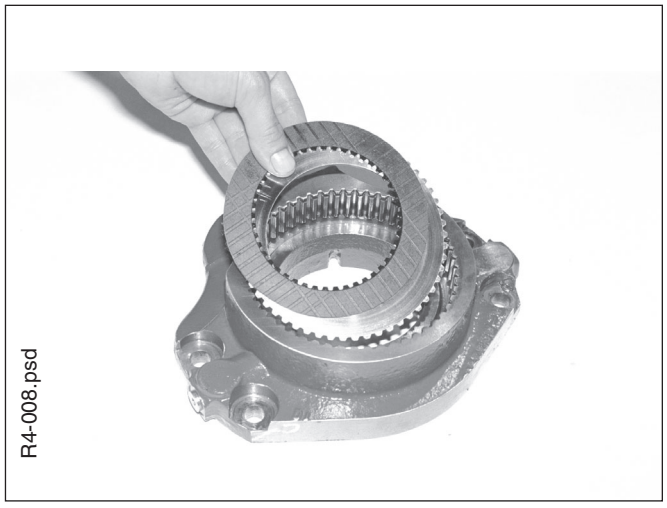
4. Turn brake assembly over, and remove spiral ring.


R4-006.psd

5. Remove pressure plate.


R4-007.psd

6. Remove frictions and separator plates.


R4-008.psd

Assembly of the Winch

All components should be inspected for wear or damage as they are removed. Refer to Figure 4-4, 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 4-4 Visual Inspection

ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Brake Assembly	Check for cracked or broken belleville spring.	Replace spring if cracked or broken.
	Carefully inspect friction discs for facing wear, distortion and damaged teeth.	Replace friction discs if oil grooves are worn from facing or distorted or distorted in any way. Replace if brake release pressure is low.
	Carefully inspect separator plates to verify that surfaces are free of large blue areas (caused by overheating) and/or not worn excessively or unevenly.	Replace separator plates if surfaces are warped or scored.
	Inspect piston for cracks and damage. Ensure O-ring grooves and sealing surfaces are undamaged.	Replace piston if damaged. Always replace piston seals (O-rings) when brake is repaired.
	Inspect brake housing for wear, scoring, burrs and cracks.	Replace housing if splines are notched or cage is cracked.
	Check capscrews for tightness and depth in frame.	Tighten if loose.
Motor	Check housing for wear, scoring, burrs and cracks.	Replace motor if excessively damaged.
	Check shuttle valve and pressure reducing valve for excessive wear or damage.	Replace valves if worn or damaged.
	Check manifold for scoring, burrs, cracks or other damage.	Replace manifold if excessively worn or damaged.
Idler Shaft	Check for scratches or scoring on bearing surfaces.	Dress surface or replace shaft if severely worn.
	Check for broken, deform or severely worn splines.	Replace if splines are broken or severely worn.
Idler Gear	Inspect gear for broken or severely worn 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 Gear	Inspect gear for broken or severely worn teeth. Pay particular attention to leading edges of straight-cut gear teeth.	Replace gear if teeth are broken or severely worn.
FREESPOOL Dental Collar	Check for broken or worn teeth.	Replace dental collar if teeth are broken or severely worn.

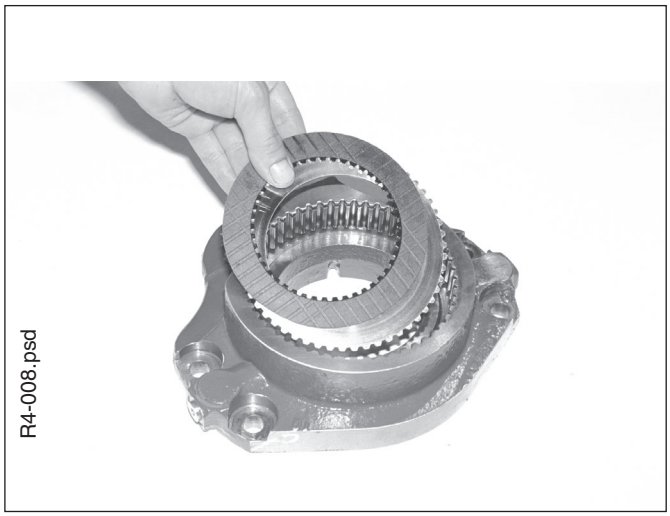
(Continued on next page)

Figure 4-4 Visual Inspection (continued)

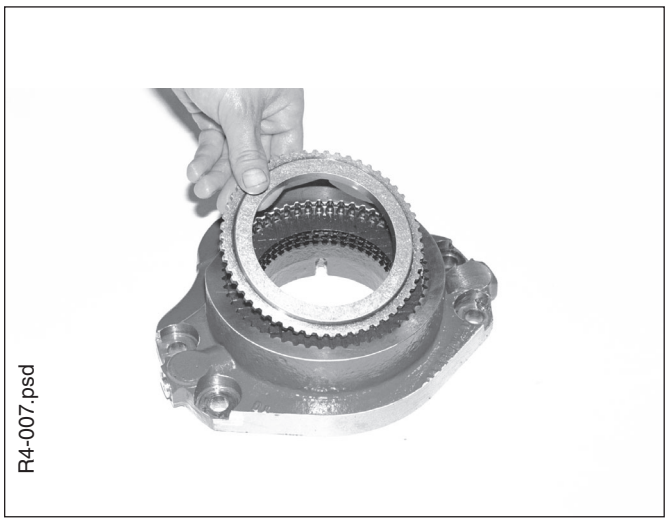
ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Drum Shafts	Check for deep scratches or scoring on bearing surfaces.	Dress surface or replace shaft if severely worn.
	Check O-ring grooves and seal surfaces.	Dress grooves or replace shafts if severely worn.
Drum Gear	Check for broken or severely worn gear teeth. Pay particular attention to leading edges of straight-cut gear teeth.	Replace gear if teeth are broken or severely worn.
Drum	Inspect seal groove for burrs, scoring and rust.	Replace drum or rebuild drum groove if a new seal will not seat properly.
Drum Adapter	Carefully inspect 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.

Brake Assembly

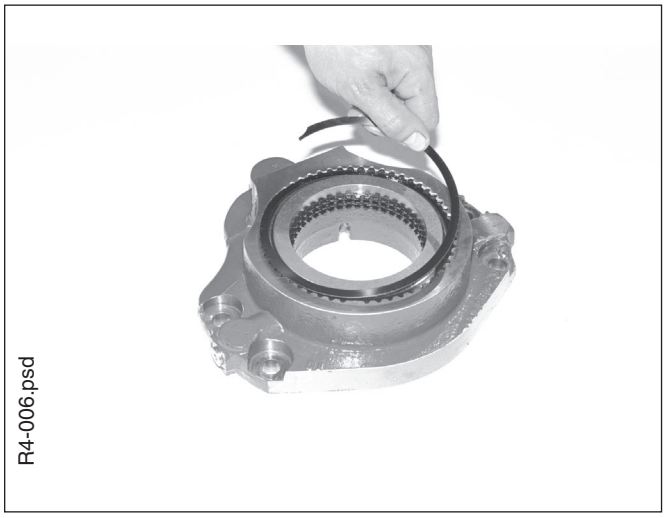
1. Insert frictions and separator plates alternately in brake housing, starting with separator plates.



2. Install pressure plate.



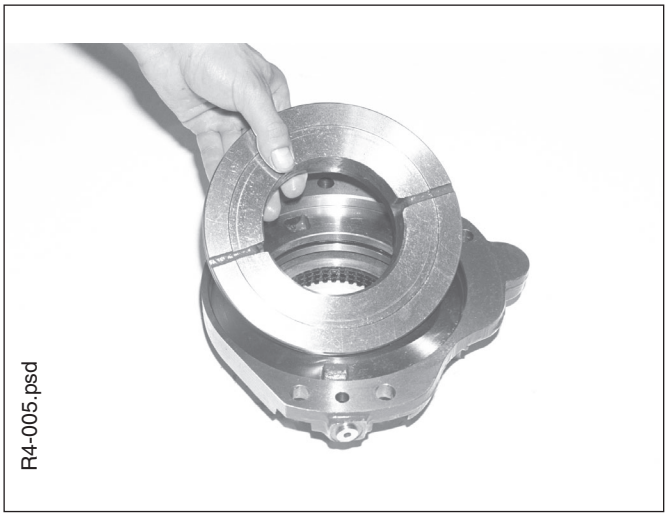
3. Insert spiral ring.



4. Turn brake assembly over and install new O-ring in housing .

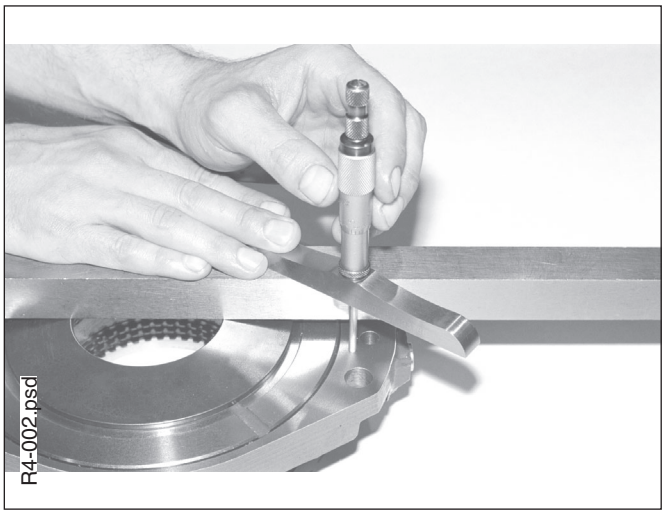
5. Install new O-ring on piston.

6. Insert piston in brake housing.



7. Brake shimming procedure:

a) Place belleville spring on top of brake. Using a flat bar, measure distance between spring and brake housing with depth gauge as shown. Note the measurement and make sure to subtract the thickness of the flat bar from the figure. Check the measurement in three different places, average the results and call it distance “A”.

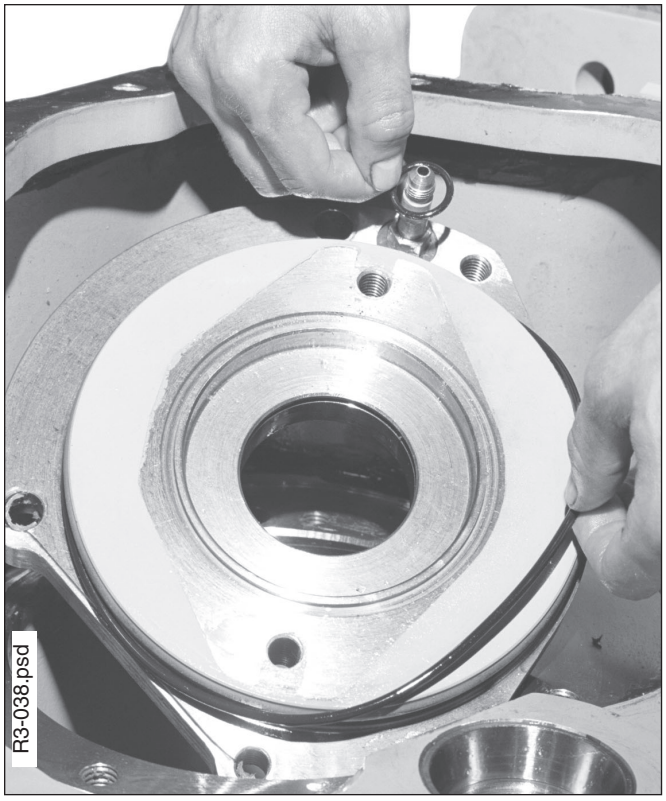


b) Remove the belleville spring. Using a flat bar, measure motor mounting plate depth. Subtract the flat bar heigh from the figure. Check the measurement in three different places, average the results and call this distance “B”. If A minus B is less than .046”, add shims until A minus B is between .046” to .068”. See step 6 of the “Brake Shaft and Brake Installation” section.

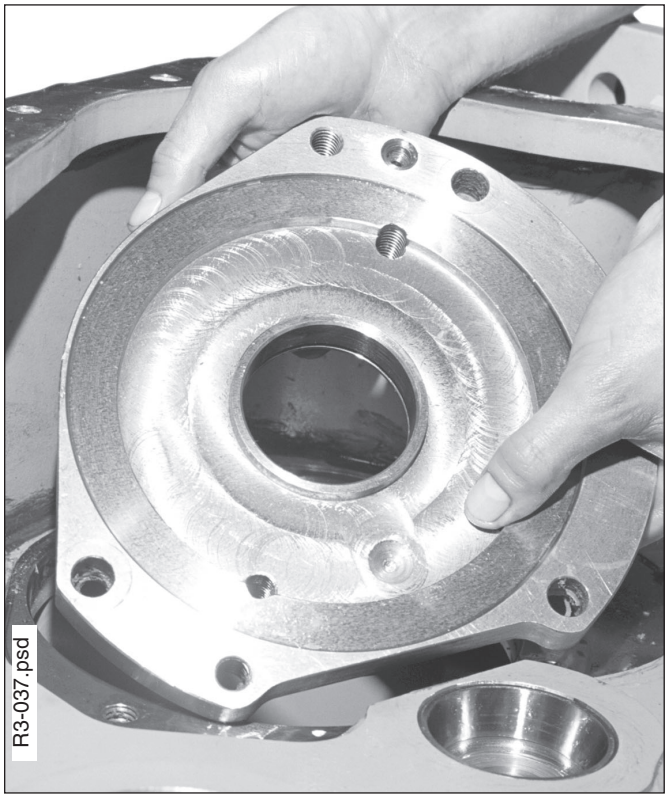
NOTE: Be sure to replace belleville spring after measurements are completed.

Brake Shaft & Brake Installation

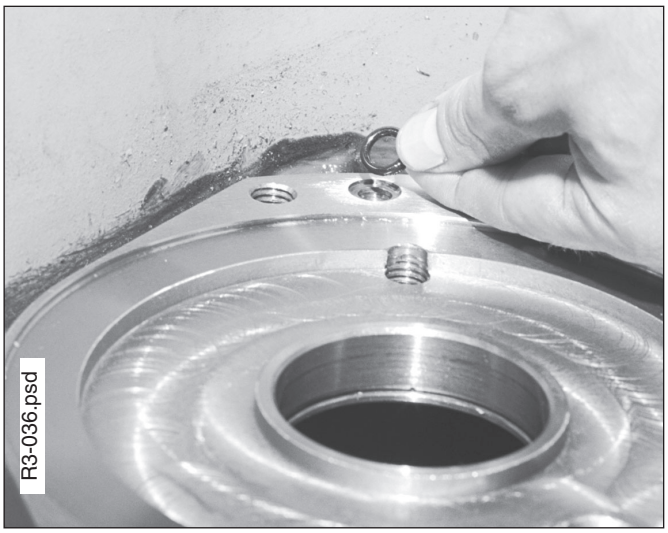
1. Install new O-rings on motor mounting plate.



2. Turn motor mounting plate over and install.



3. Install new O-ring in motor mounting plate.

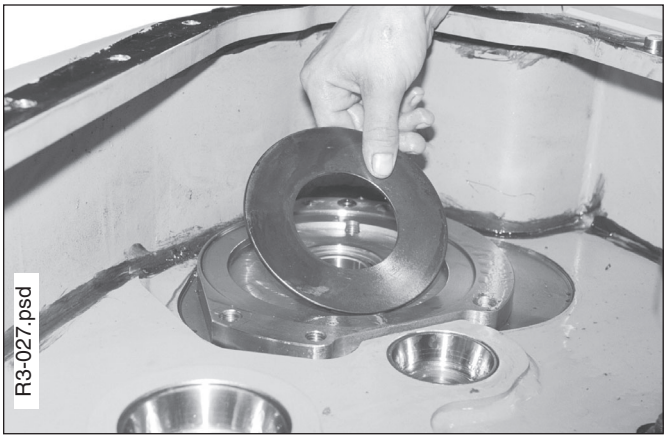


4. Insert snap ring.

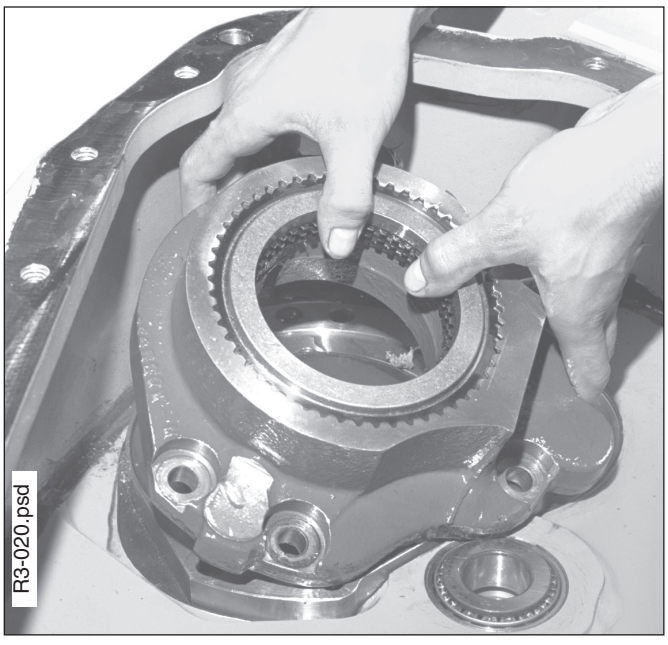
5. Insert roller bearing.

6. Add shims as required. See step 7, “Brake Shimming Procedure” in the “Brake Assembly” section above.

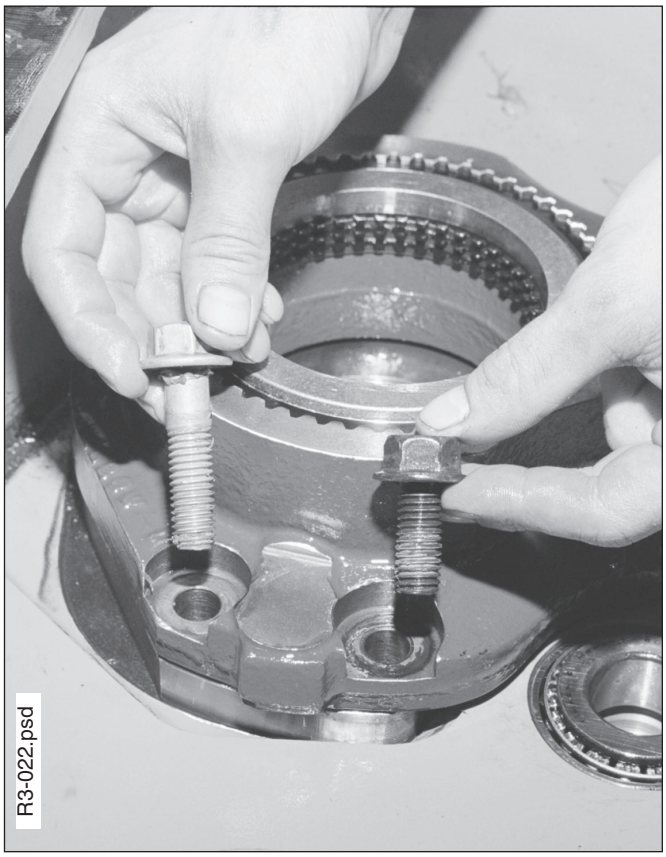
7. Place belleville spring on top of motor mounting plate.



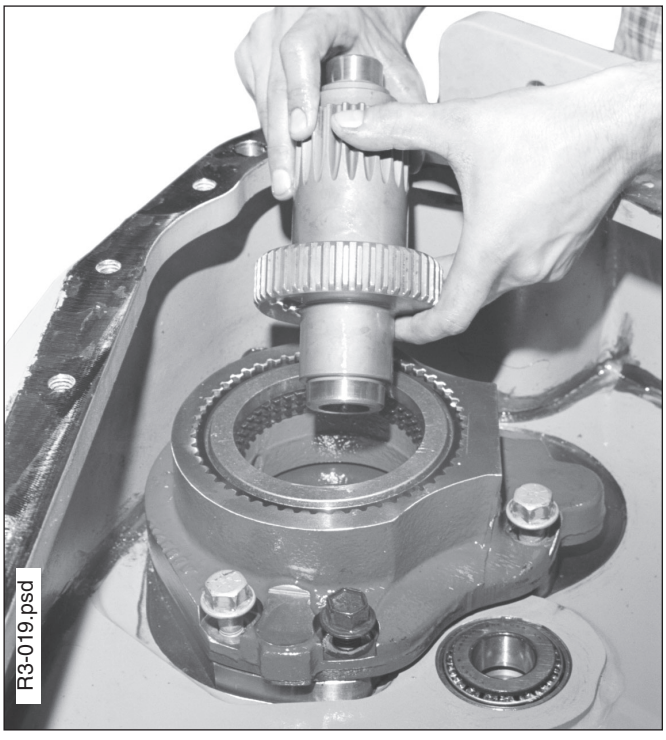
8. Place brake assembly on top of belleville spring.



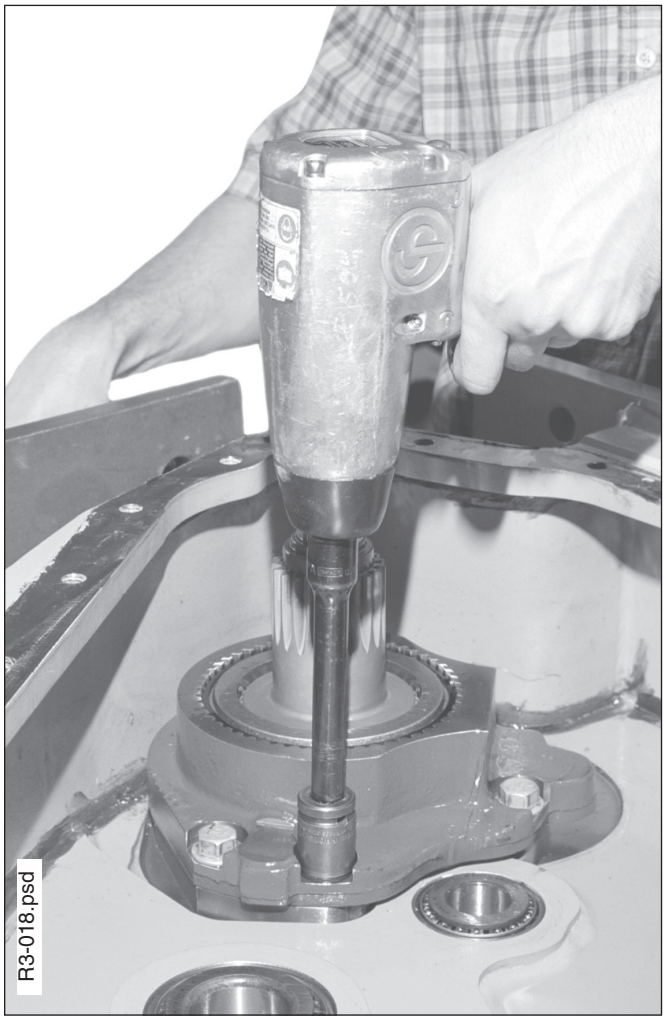
9. Loosely install capscrews as shown. Note that the longer, lighter-colored capscrew goes through the frame.



10. Install the brake shaft.



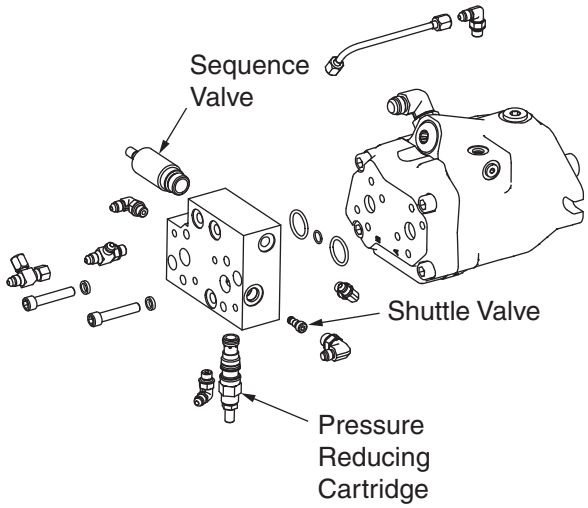
11. Tighten capscrews on brake assembly.



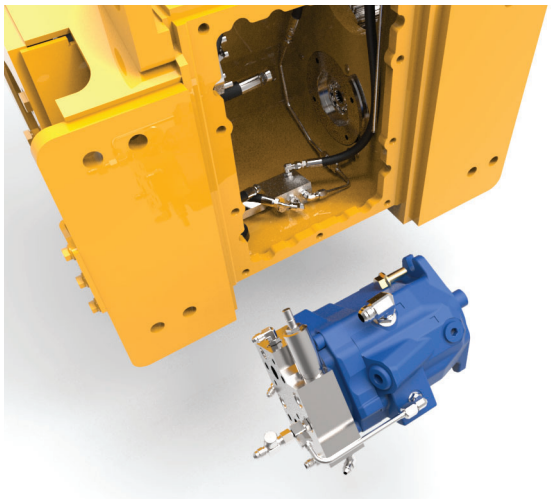
Motor Assembly & Installation, SCH Winch

The instructions in this section apply only to SCH winches (internal option R on the serial number code). For motor assembly and installation for the open-frame winch, see "Motor Assembly & Installation, Open-Frame Winch" below.

1. Install new O-rings in motor speed manifold. Install manifold on motor. Replace seals on pressure reducing cartridge and install in manifold. Install shuttle valve and fittings. Replace seals on sequence valve and install in manifold. Re-attach tube assembly.



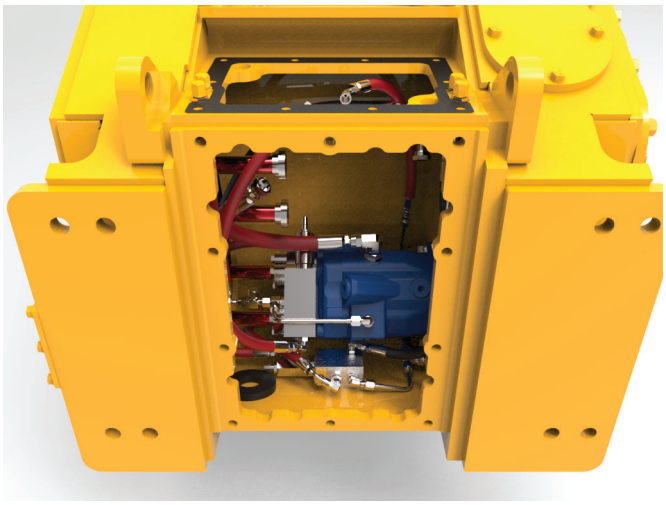
2. Install motor/manifold assembly and tighten capscrews.



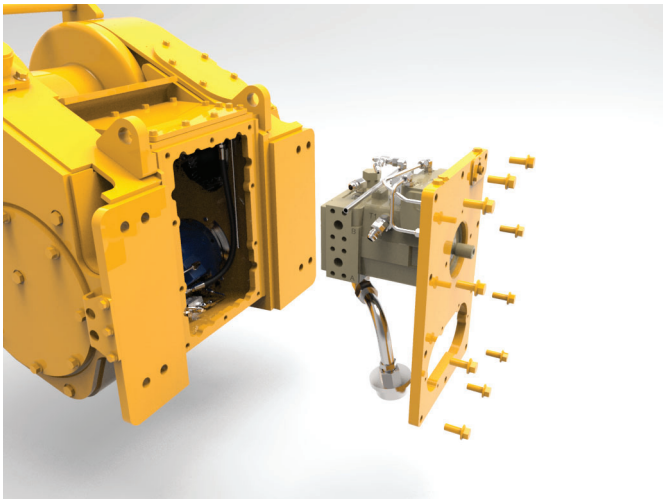
3. Reattach the hoses at the motor. Ensure that all hydraulic connections are correct before using the winch. Refer to tags applied during removal and to the hydraulic schematic.

⚠ CAUTION

Incorrect hydraulic connections, (reversed hoses, for example) may result in damage to hydraulic components.



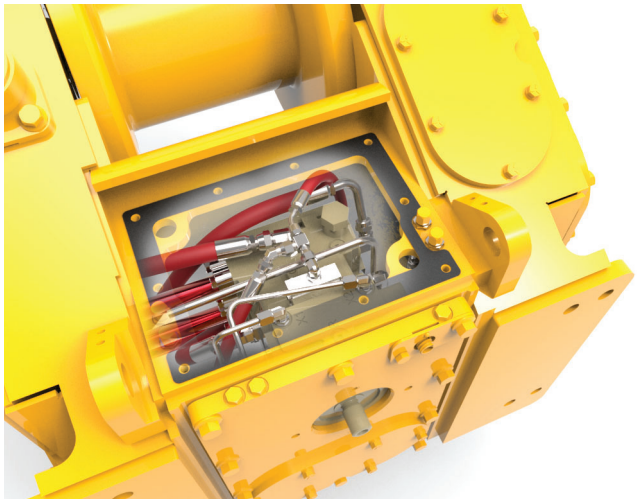
4. Reinstall the pump/cover assembly. As the assembly is being inserted into the frame, make sure that hoses and tube assemblies are not damaged.



5. Reattach the hoses at the pump. Ensure that all hydraulic connections are correct before using the winch. Refer to tags applied during removal and to the hydraulic schematic.

⚠ CAUTION

Incorrect hydraulic connections, (reversed hoses, for example) may result in damage to hydraulic components.

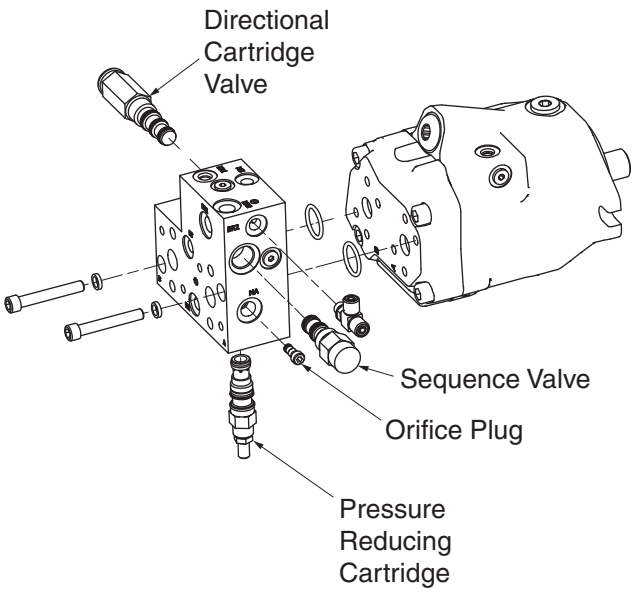


6. Re-install hydraulics access covers. Use new O-rings and gaskets.

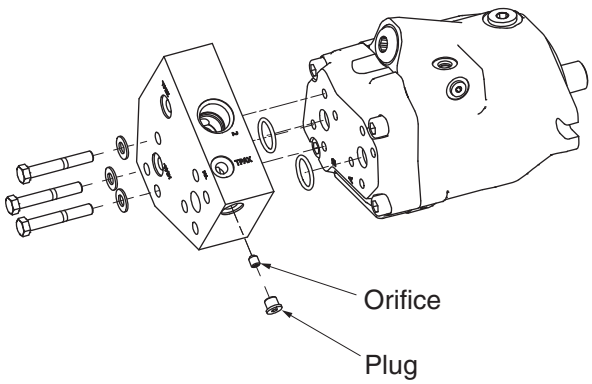
Motor Assembly & Installation, Open-Frame Winch

The instructions in this section apply only to Open-Frame winches (internal option Y on the serial number code). For motor assembly and installation for SCH winches, see “Motor Assembly & Installation, SCH Winch”.

1. Install new O-rings in motor speed manifold. Install manifold on motor. Reassemble the motor speed manifold assembly Replace all seals as required.

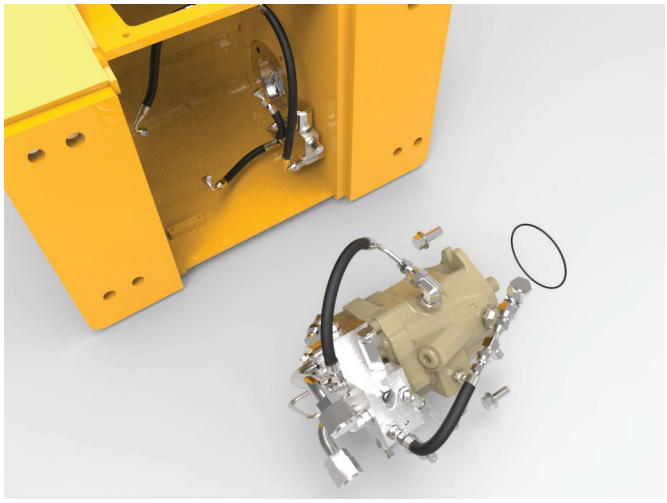


Motor/Manifold Assembly
Hi-Performance Winces



Motor/Manifold Assembly
Standard Winces

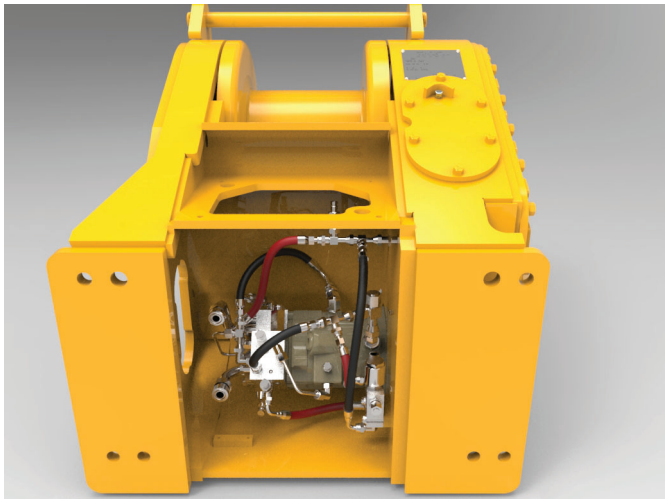
2. Install a new O-ring, and install the motor/manifold assembly and tighten capscrews.



3. Reattach the hoses at the motor. Ensure that all hydraulic connections are correct before using the winch. Refer to tags applied during removal and to the hydraulic schematic.

⚠ CAUTION

Incorrect hydraulic connections, (reversed hoses, for example) may result in damage to hydraulic components.

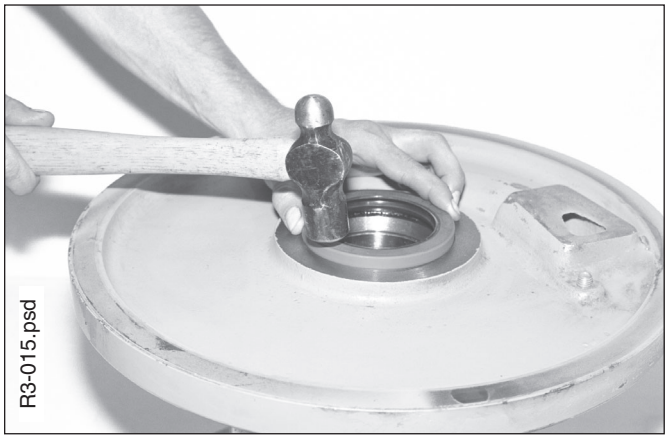


4. Re-install hydraulics access covers.

Drum Assembly and Installation

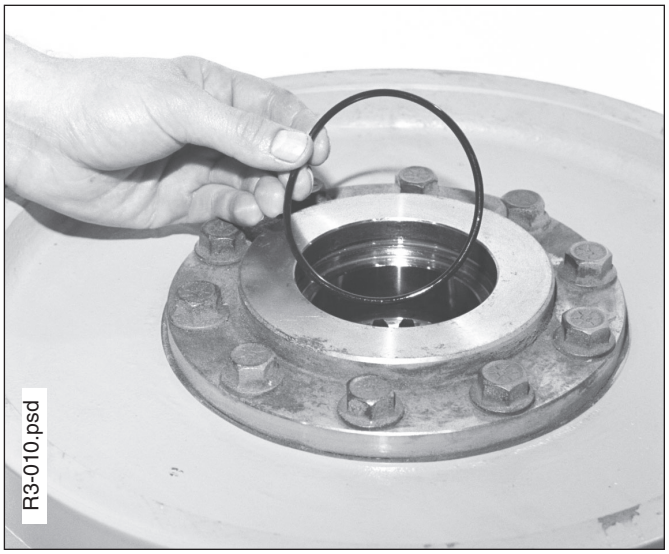
1. Drive in bearing race in drum.

2. Install drum seal.



3. Install adapter.

4. Install new O-ring in adapter.



5. Install drum. Make sure to orient drum so the ferrule pocket lines up with recess on frame.

LH Drum Shaft Installation

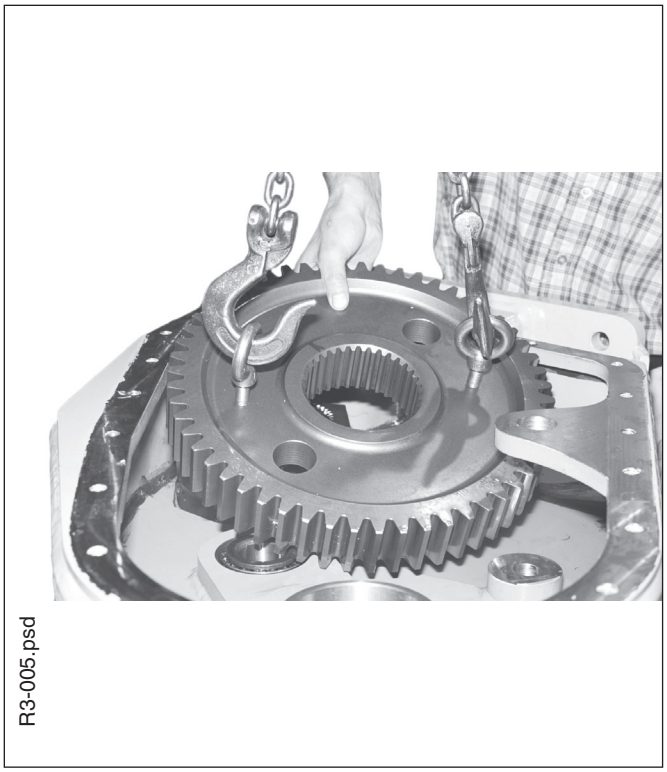
1. Install new seal. Tap into place gently with hammer or driver.

2. Drive in new race.

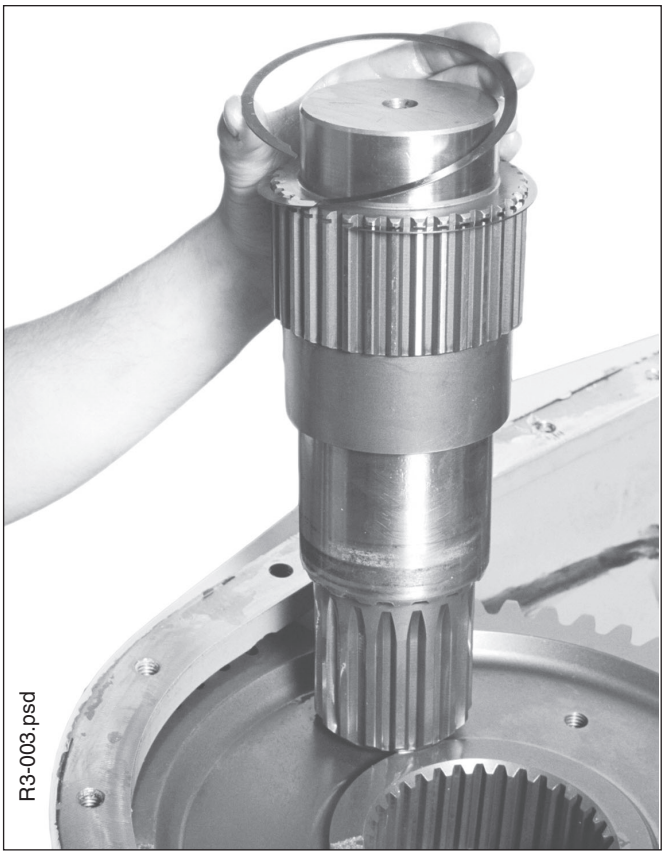
3. Install bearing.

4. Place drum gear spacer on top of bearing.

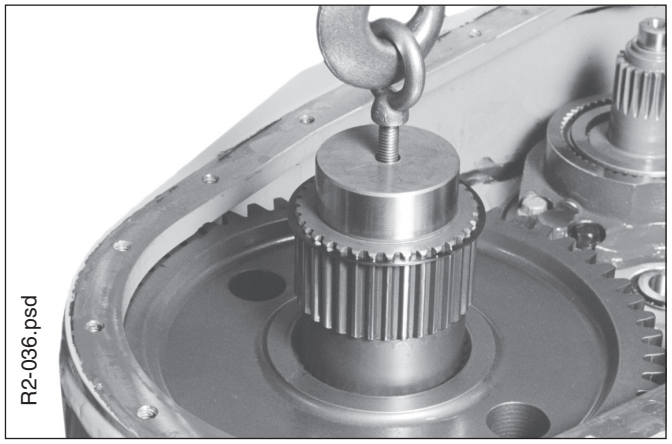
5. Install drum gear.


R3-005.psd

6. Place spiral ring on drum shaft.

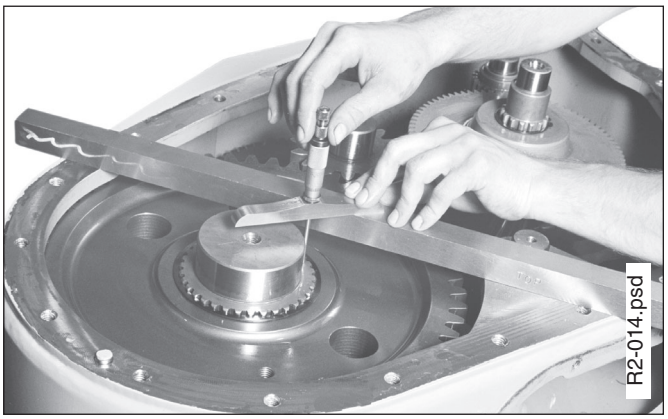

R3-003.psd

7. Install drum shaft.

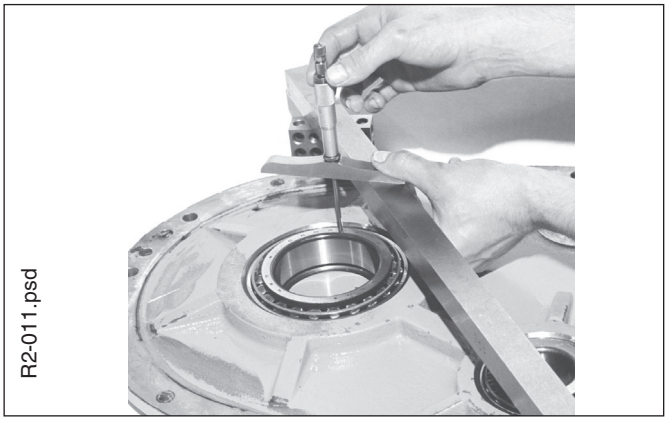

R2-036.psd

8. Drum Shaft Shimming Procedure:

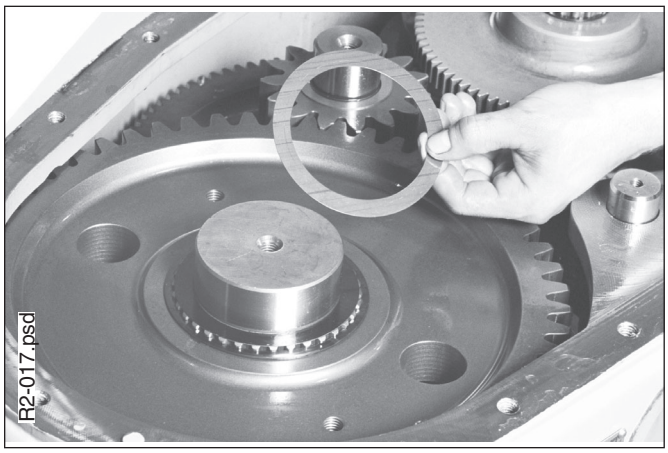
a) Measure distance from frame to drum shaft bearing shoulder using a flat bar and depth gauge as shown. Subtract height of flat bar from resulting figure. Perform this procedure two more times from different spots and average the result. Call this number “C”.


R2-014.psd

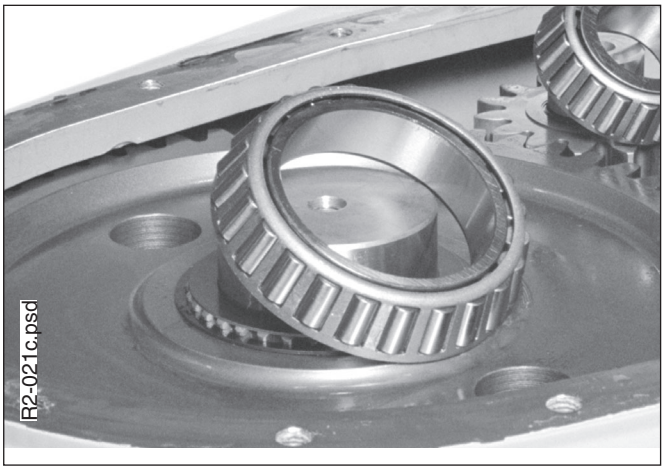
b) Measure distance from frame to inner race on drum bearing. Use riser blocks, flat bar and depth gauge. Subtract the height of the risers and flat bar from the resulting figure. Perform this procedure two more times from different spots and average the result. Call this number “D”.


R2-011.psd

c) Subtract C from D. Add enough shims to reduce gap and produce .002” to .005” bearing endplay.

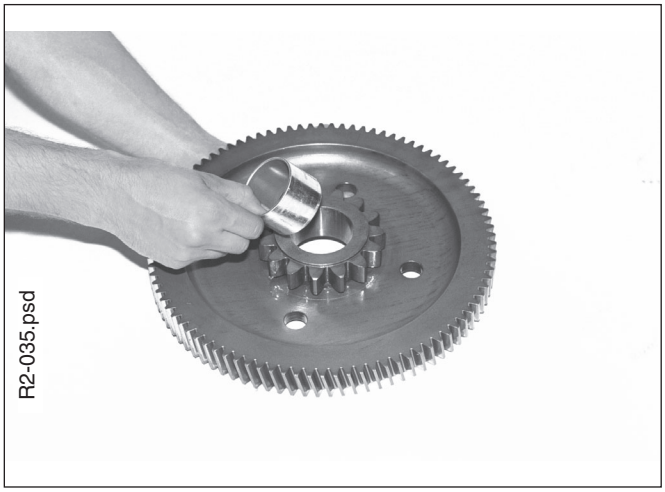


9. Install drum shaft bearing.



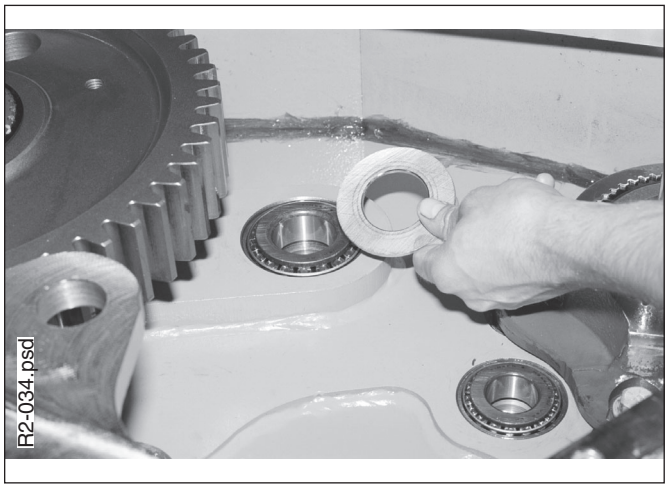
Intermediate & FREESPOOL Shaft Assembly and Installation

1. Install bushing in intermediate gear.

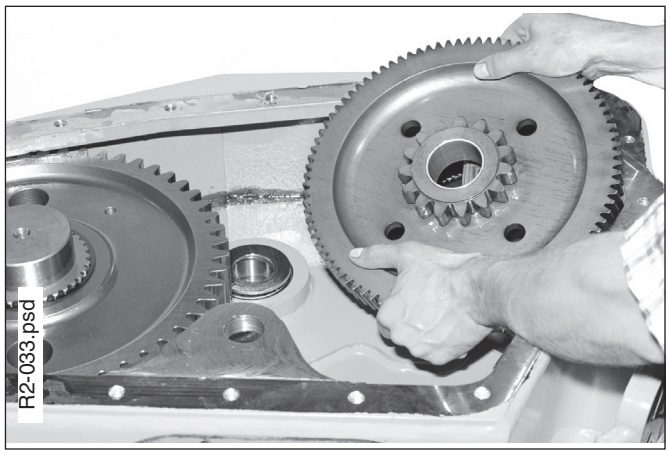


2. Drive in bearing race and install bearing.

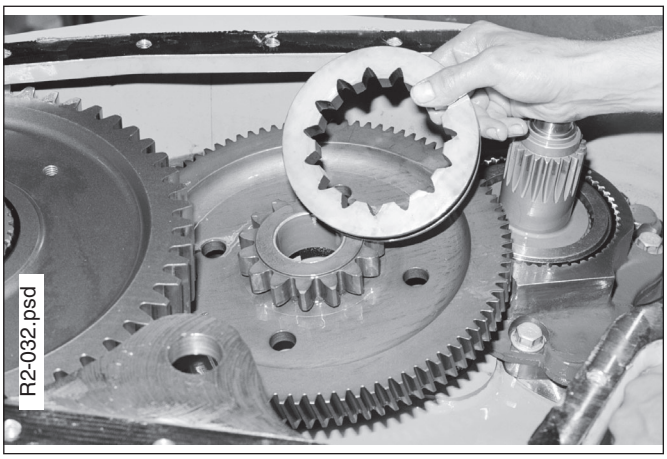
3. Place intermediate shaft spacer on top of bearing.



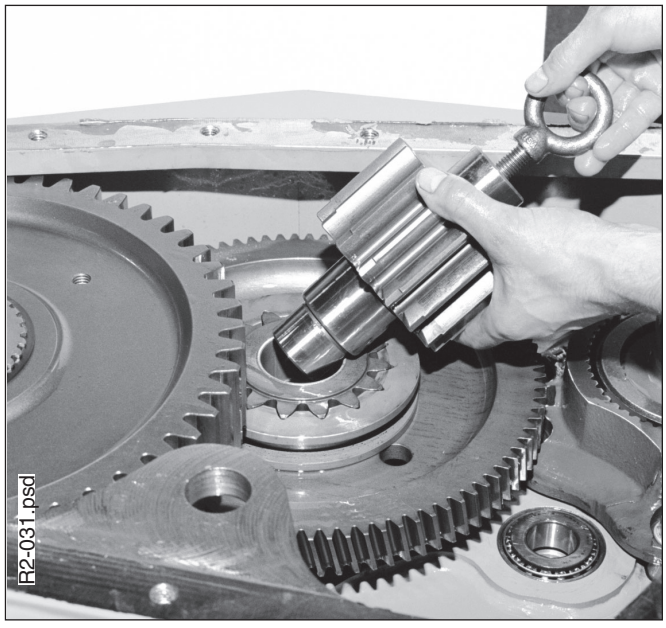
4. Install intermediate gear.



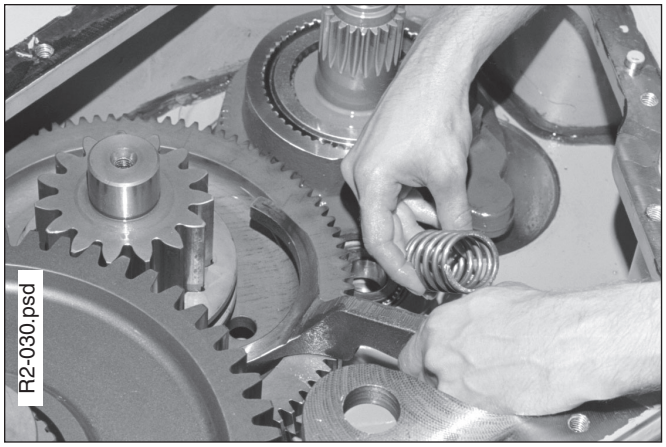
5. Install dental collar.



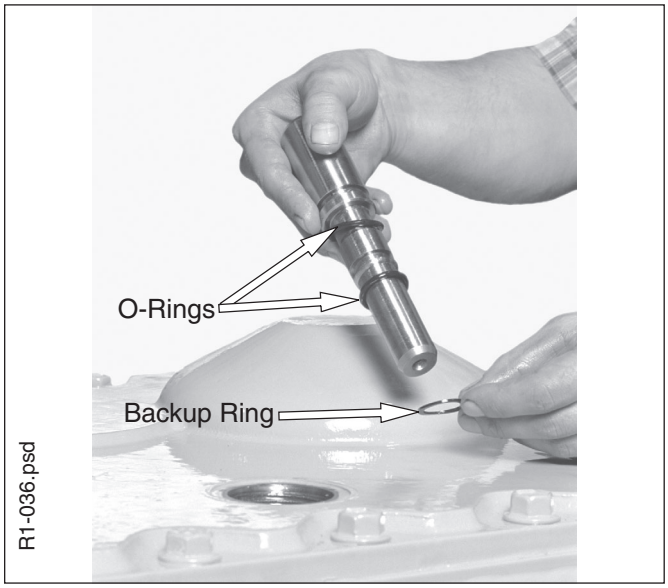
6. Install intermediate shaft.



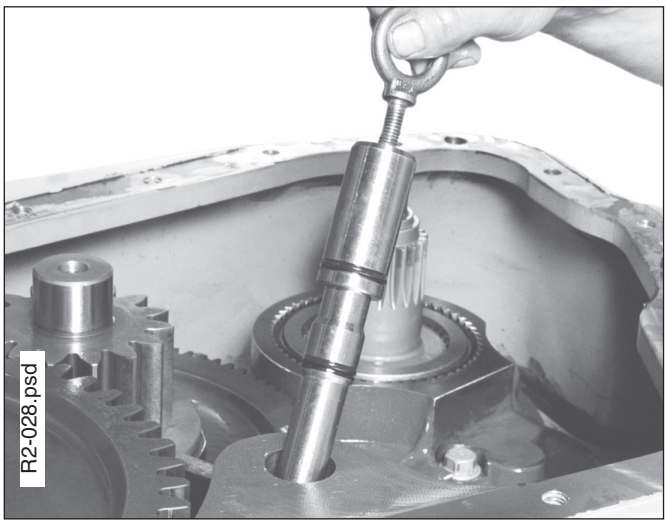
7. Iinstall spring and **FREESPOOL** shifter fork.



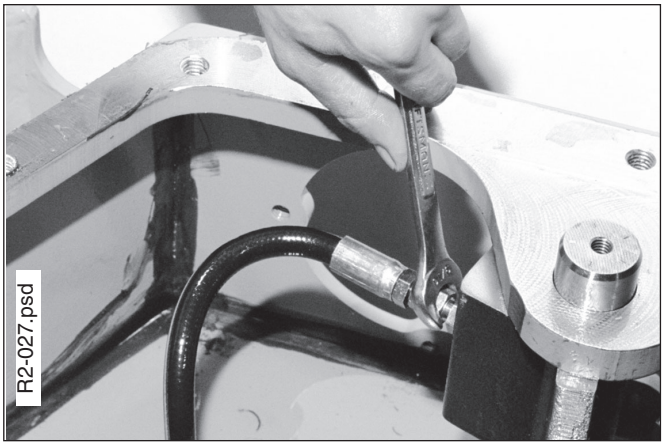
8. Install new O-rings and backup ring on **FREESPOOL** shaft in the order shown.



9. Install **FREESPOOL** shaft.

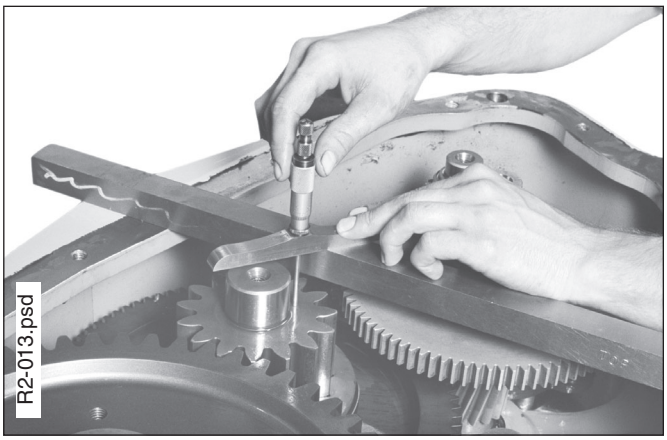


10. Re-connect hose to **FREESPOOL** shifter fork.

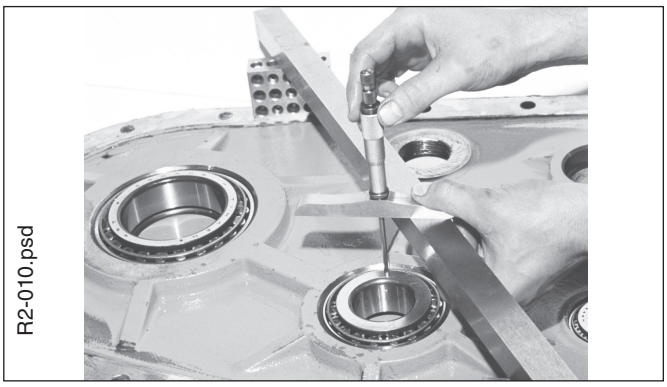


11. Intermediate Shaft Shimming Procedure:

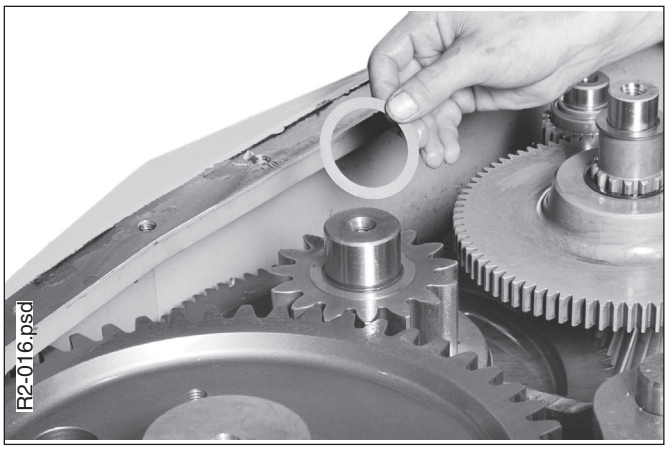
a) Measure distance from frame to the bearing shoulder on the intermediate shaft using a flat bar and depth gauge as shown. Subtract the height of the flat bar from from resulting figure. Perform this procedure in two more spots and average the figure. Call this number “E”.



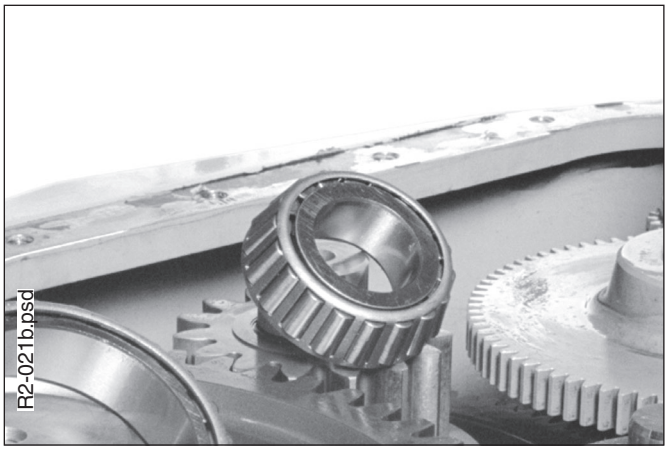
b) Measure distance from frame to inner race on bearing. Use riser blocks, flat bar and depth gauge. Subtract resulting figure from height of flat bar and riser blocks. Perform this procedure in two more spots and average the figure. Call this number “F”.



c) Subtract E from F. Add enough shims to reduce gap and produce .002” to .005” bearing endplay.



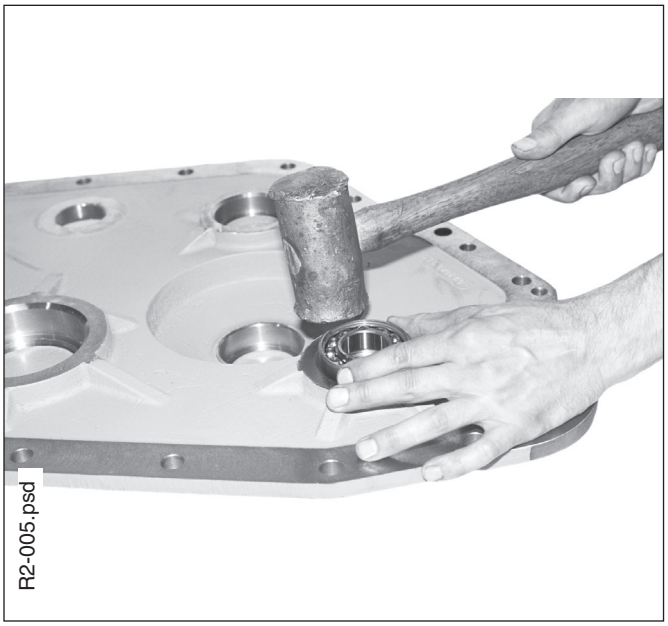
12. Install bearing on intermediate shaft.



Idler Shaft Assembly & Installation

These instructions apply only to winches without the **BRAKE-OFF** option. For winches with **BRAKE-OFF**, see "**BRAKE-OFF** Shaft Assembly & Installation" instructions.

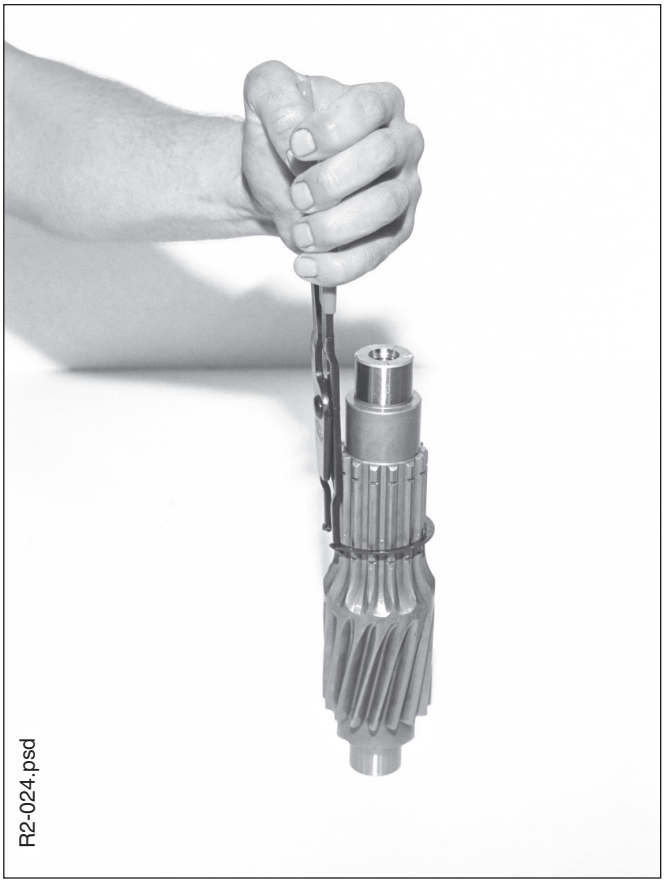
1. Install bearing in frame and seat firmly using soft hammer.


R2-005.psd

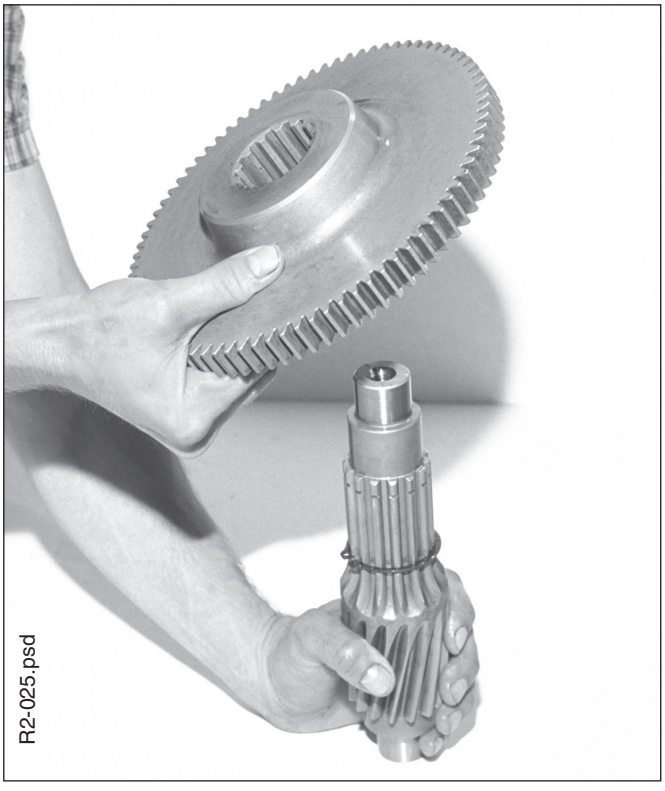
2. Drive in bearing races.


R2-006.psd

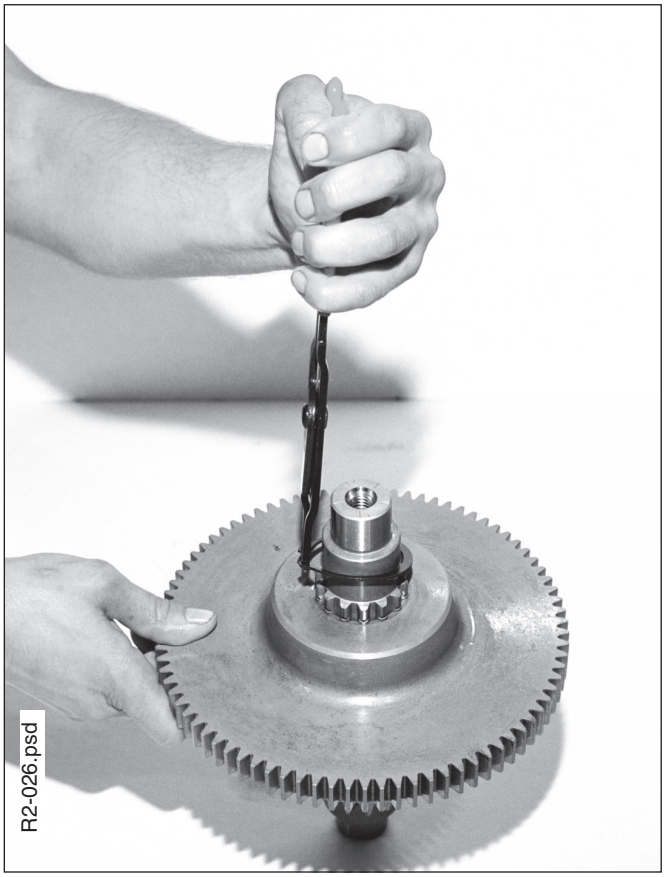
3. Insert snap ring on shaft.


R2-024.psd

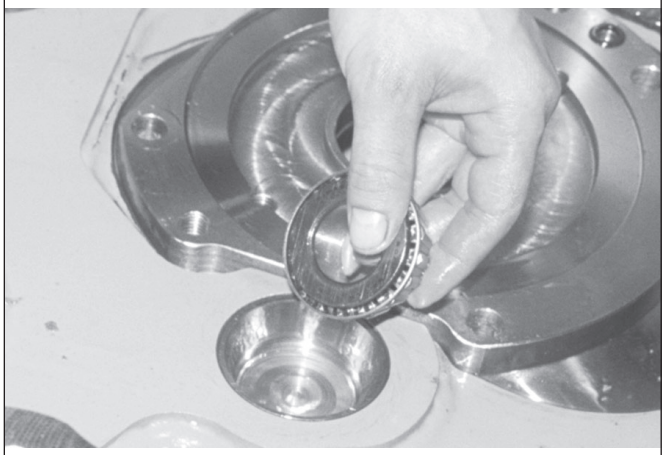
4. Install idler gear on shaft.


R2-025.psd

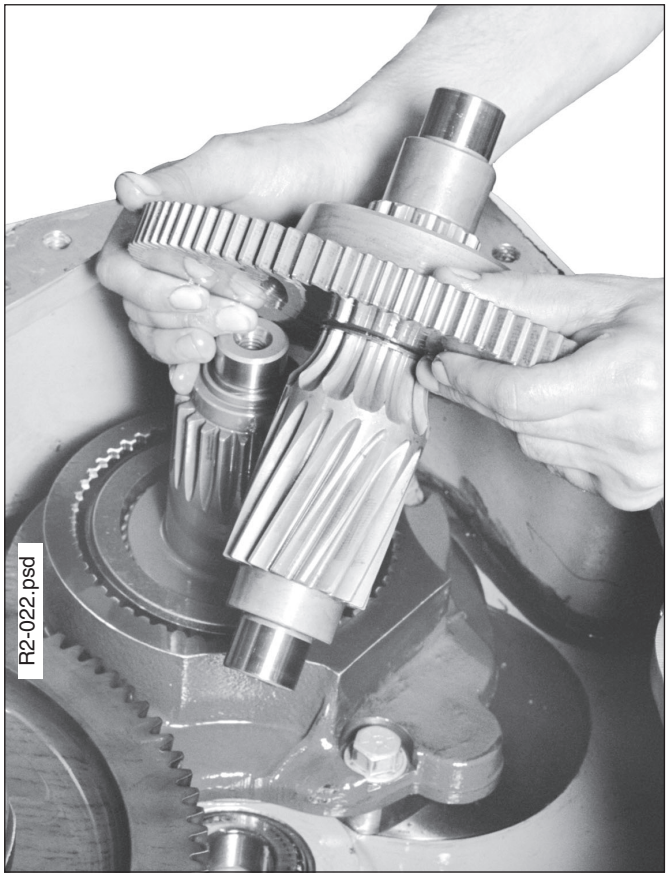
5. Install snap ring.


R2-026.psd

6. Install bearing race and bearing.

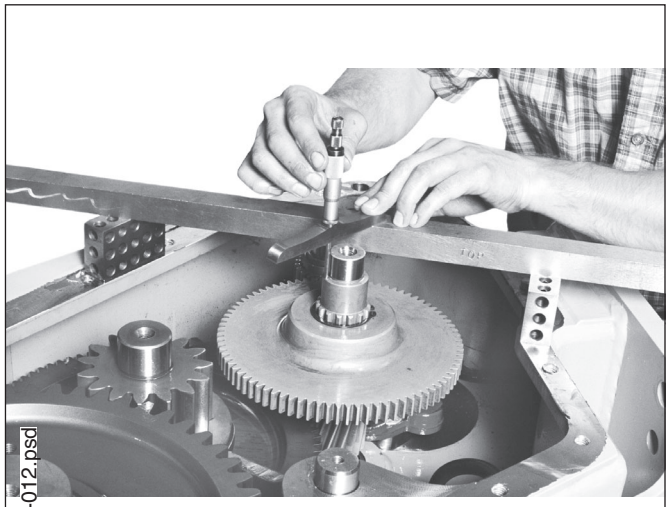

R3-031a.psd

7. Install idler shaft assembly on winch.

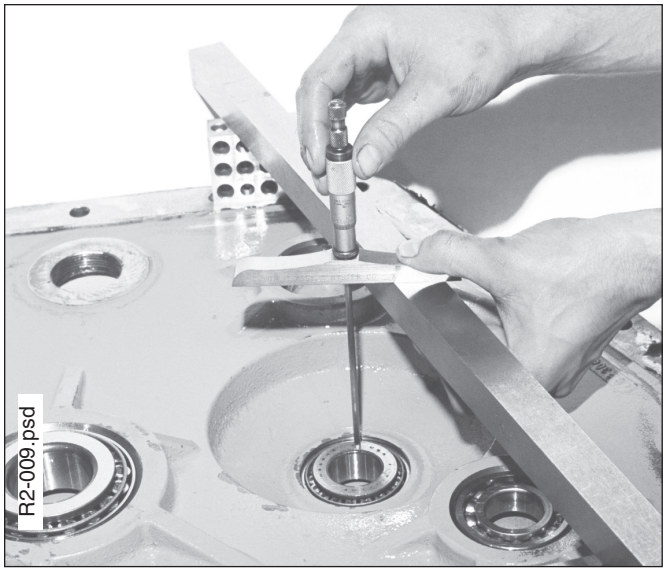

R2-022.psd

8. Idler Shaft Shimming Procedure:

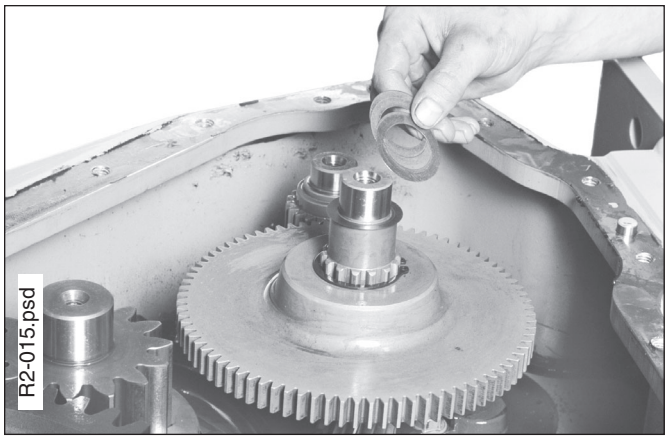
a) Measure distance from frame to the bearing shoulder on the idler shaft using a flat bar and depth gauge as shown. Subtract resulting figure from height of flat bar and risers. Perform this procedure in two more spots and average the figure. Call this number “G”.


R2-012.psd

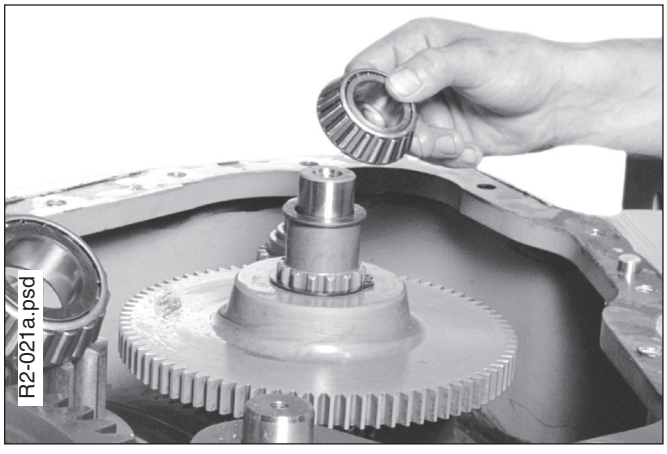
b) Measure distance from frame to inner race on bearing. Use riser blocks, flat bar and depth gauge. Subtract the height of the flat bar and riser blocks from resulting figure. Perform this procedure in two more spots and average the figure. Call this number “H”.



c) Subtract G from H. Add enough shims to reduce gap and produce .002” to .005” bearing endplay.

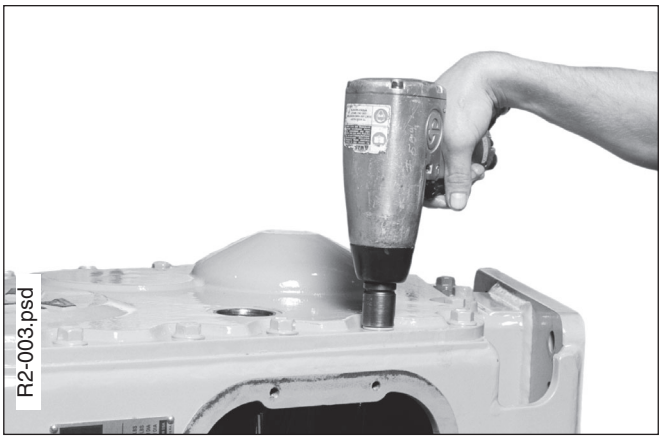


9. Install bearing on top of idler shaft assembly.



10. Apply gasket eliminator to cover and re-install cover on winch.

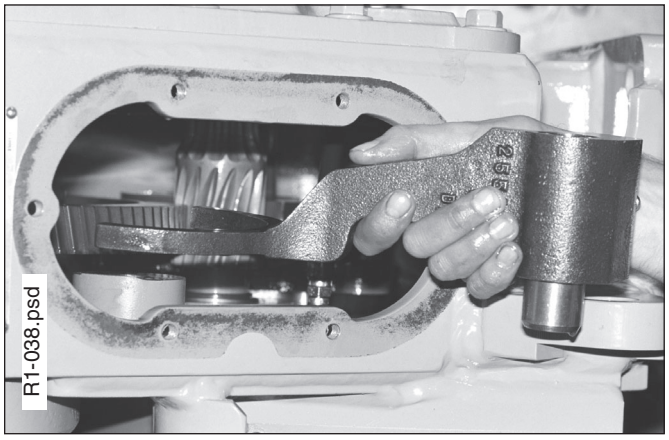
11. Tighten capscrews on cover.



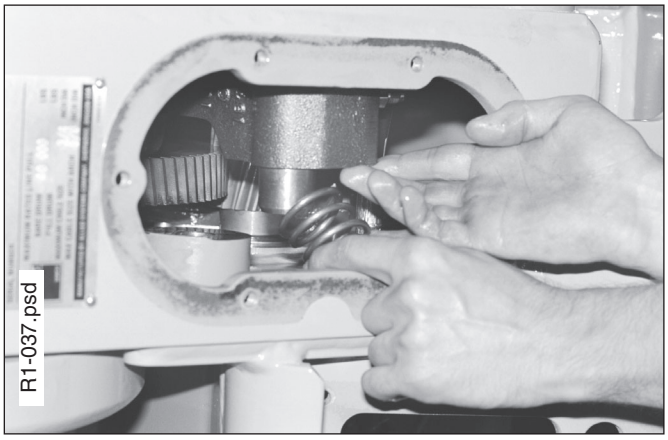
Installing FREESPOOL Shaft Without Removing RH Access Cover and Idler Shaft

1. Install fitting on **FREEPOOL** shifter fork.

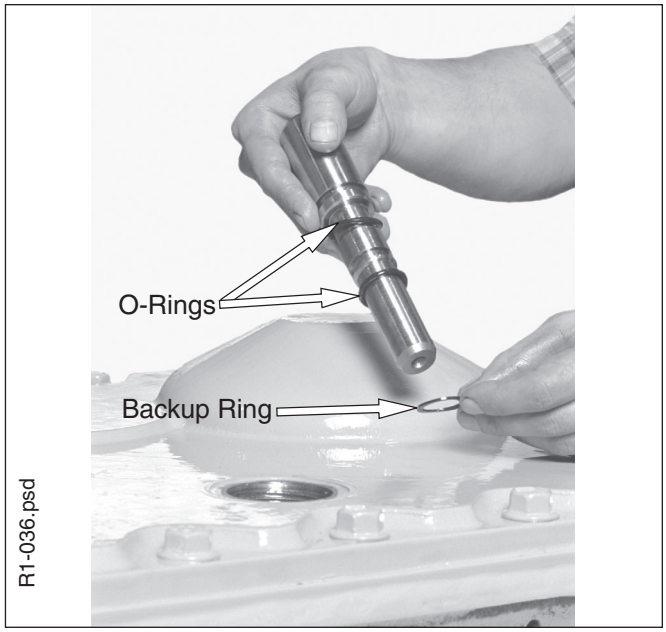
2. Insert shifter fork in gear cavity.



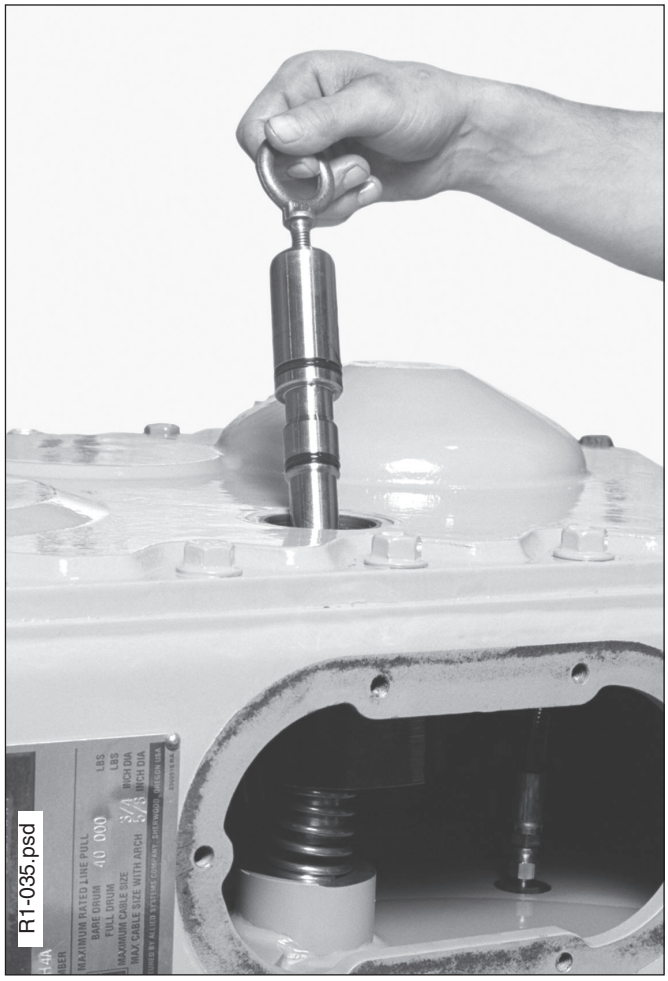
3. Install spring.



4. Install new O-rings and back-up ring on **FREESPOOL** shaft.

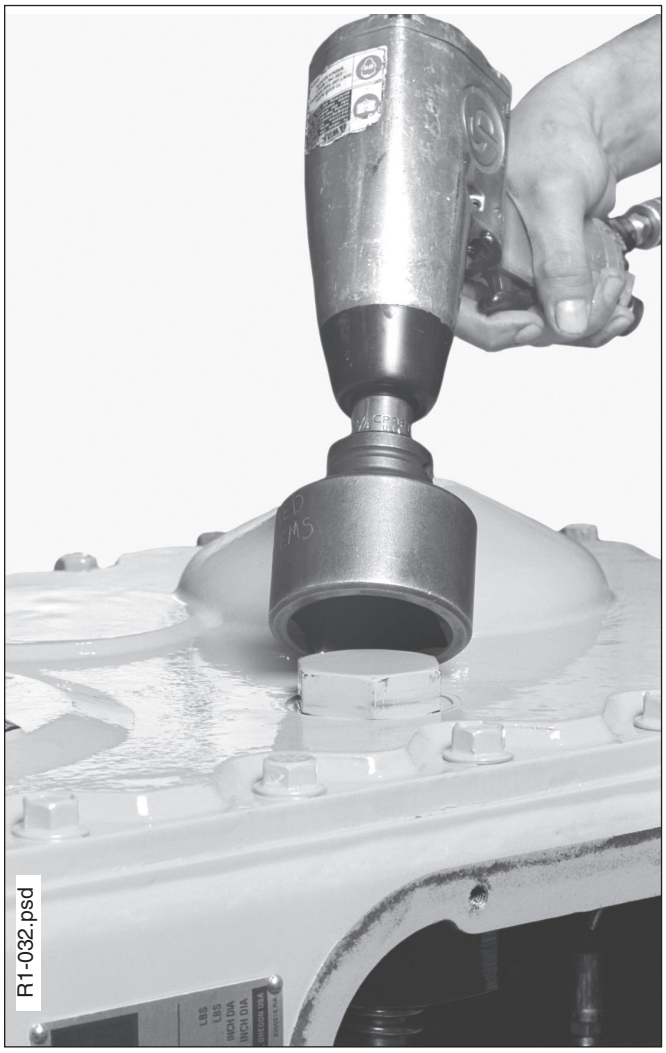


5. Install **FREESPOOL** shaft.



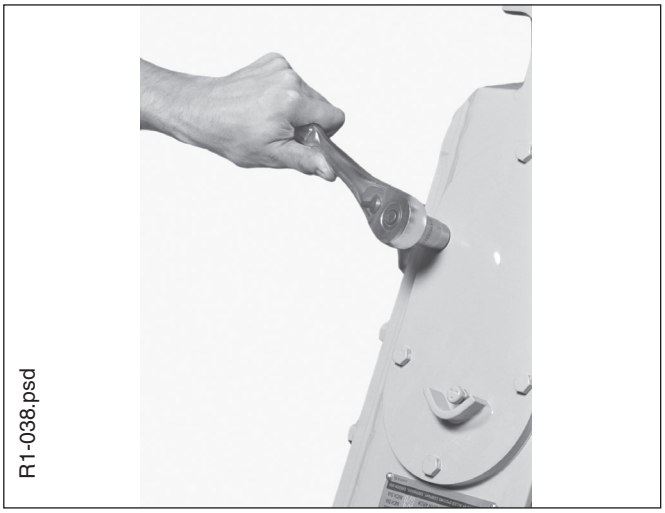
6. Install new O-ring on plug. Coat threads with anti-seize.

7. Install **FREESPOOL** shifter plug.

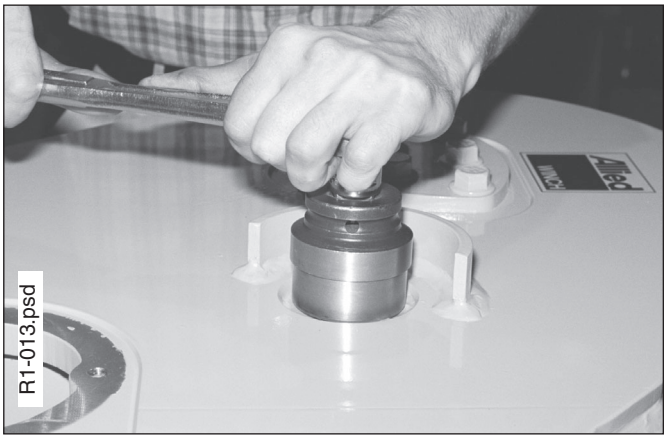


8. Re-connect hose to **FREESPOOL** shifter fork.

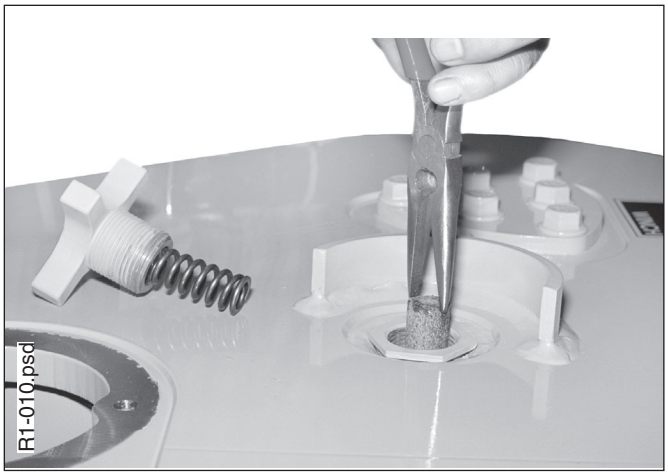
9. Replace gasket on **FREESPOOL** access cover and install cover on winch.



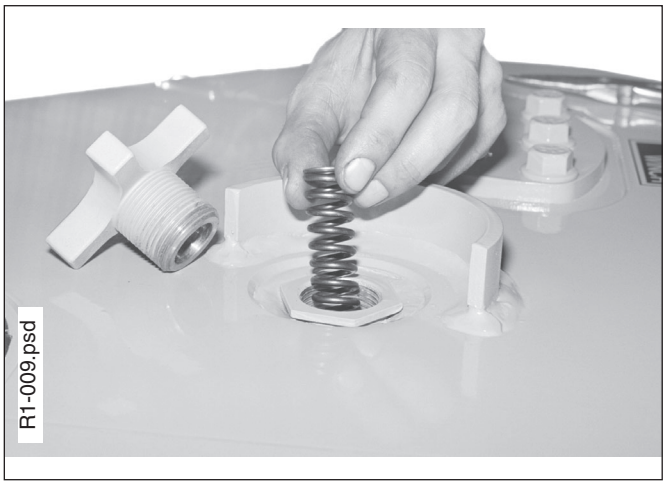
10. Install insert on winch.



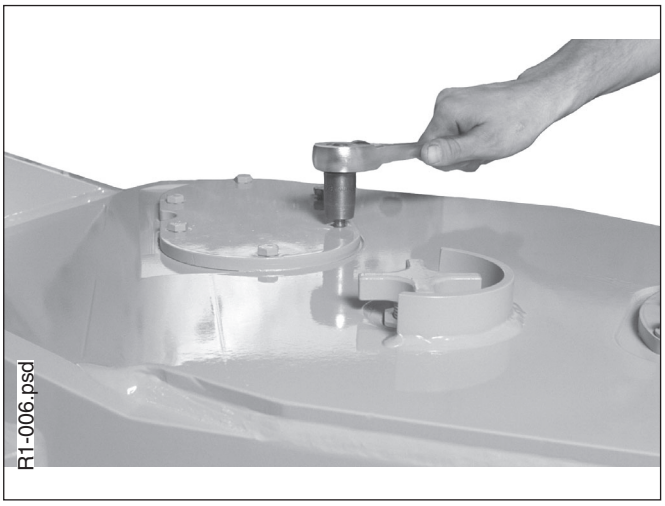
11. Insert **FREESPOOL** drag pad.



12. Insert spring and install **FREESPOOL** drag adjust knob.



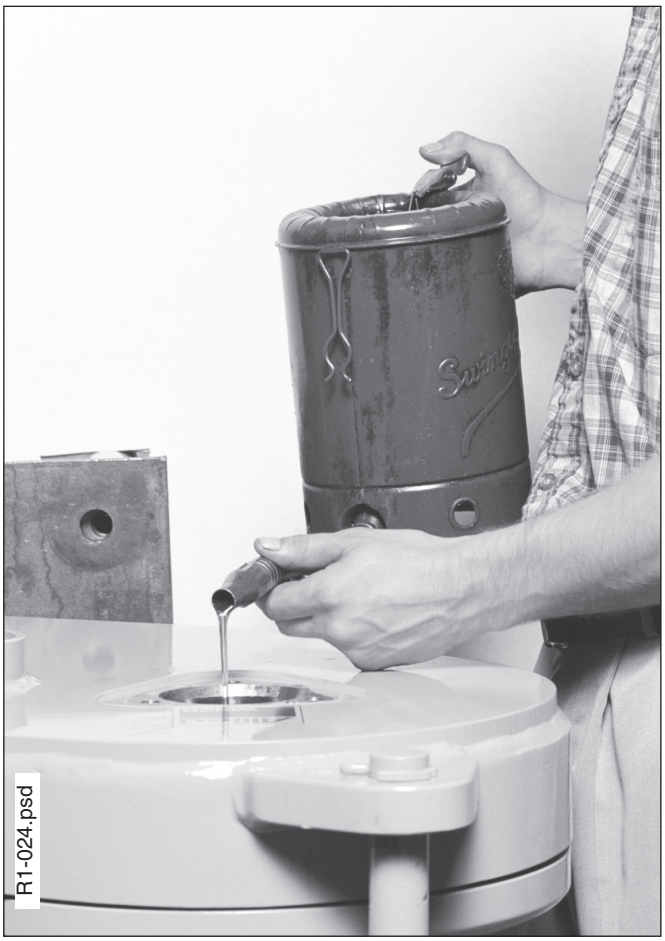
13. Install the RH access cover.



RH Drum Shaft Installation

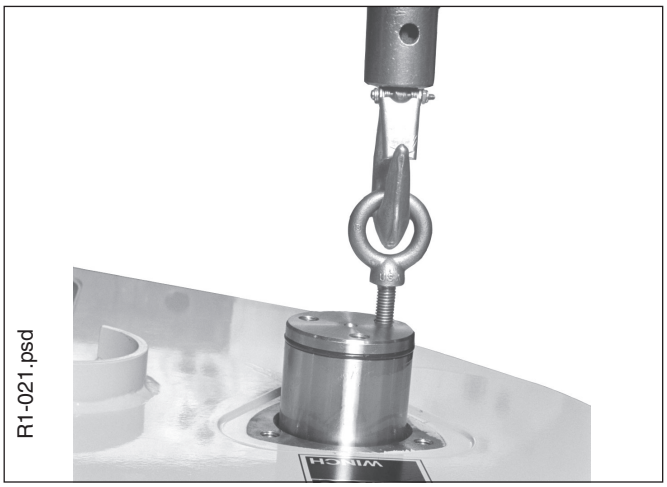
1. Install drum bearing cone.

2. Fill winch with oil. Refer to Section 3 for oil specifications and winch fill capacities.



3. Install new O-rings on RH drum shaft.

4. Install RH drum shaft.

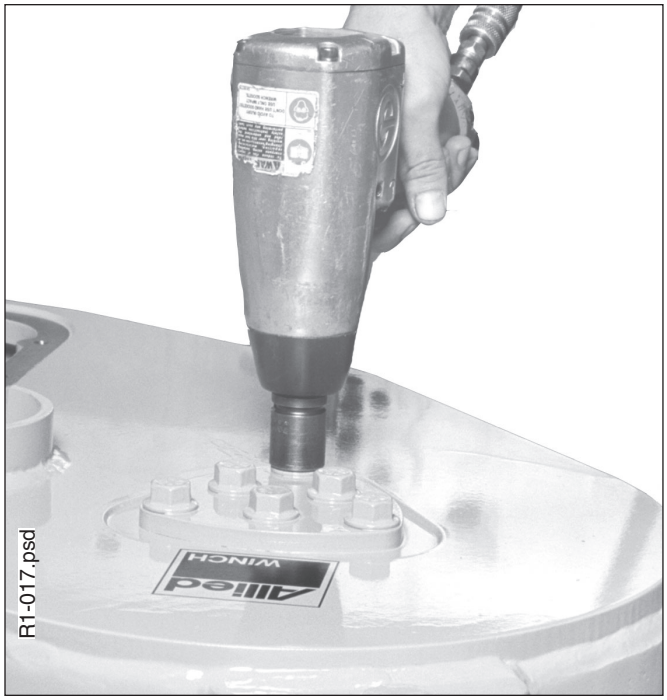


5. RH Drum Shaft Shimming Procedure:

a) Using depth gauge, measure the distance from the machined surface of the frame to the end of the drum shaft.

b) Add shims as necessary to create .000” to .003” endplay.

6. Install RH drum shaft cover.



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. Attach sling or chain fall to lift points.

3. Raise the winch. On SCH winches, align the splines on the tractor PTO with the splines of the pump.

⚠ WARNING

Make sure the lifting device has a minimum rated capacity of 3,500 lbs. (1,500 kg) before lifting the winch.

4. Align the studs with the mounting holes to prevent thread damage.

5. Loosely install the two top nuts or capscrews before the winch is fully seated against the tractor.

6. 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.

7. Install control lever assembly per mounting kit instructions.

8. Reattach hoses. Ensure that all hydraulic connections are correct before using the winch. Refer to tags applied during removal and to the hydraulic schematic.

⚠ CAUTION

Incorrect hydraulic connections, (reversed hoses, for example) may result in damage to hydraulic components.

Notes

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

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