

Service Manual



Allied H6H

Hydraulic Winch

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



Safety Precautions

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

Winch serial number	
Date put into service	

NOTE: This publication may be translated to different languages for sole purpose of easy reference in non-English speaking locations.

Should there be differences in interpretations to the text, please refer to the English language edition published by Allied Systems Company as the controlling document.



Safety Summary

General Safety Notices

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

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

A DANGER

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

A WARNING

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

! CAUTION

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

NOTICE

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

NOTE: ...

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

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

Safety Regulations

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

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

Operation, Inspection, and Maintenance Warnings

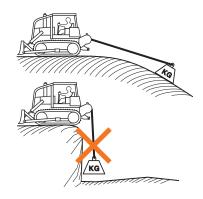
WARNING

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

- Do not operate the winch unless your 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).

Safety Summary



- Make sure ground personnel are in plain view of the operator, and at a distance of at least 1½ times the working length of the wire rope.
- Make sure that any hand signals used by ground personnel are clearly defined and understood by everyone involved.
- Do not attempt to "jerk" or "shock" a load free. Doing so can cause loads in excess of the rated capacity of the wire rope, winch, or mounting hardware.
- Replace any parts only with genuine Allied Winch parts. Refer to Parts Manual 599039W.
- 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 wraps of wire rope a contrasting color, to serve as a visual indicator.
- Do not handle wire rope with bare hands. Wear leather gloves at all times.
- Align the tractor with the load to prevent side loading the winch, and to maintain even spooling of the wire rope.
- If applying tension to the wire rope manually during spooling:
 - » ensure that the operator is winching in slowly,
 - » keep your hands and clothing well clear of any rollers or the winch drum,
 - » do not maintain tension by letting the wire rope to slip through your hands,
 - » use a hand-over-hand technique to maintain tension.
- Be aware of the ground conditions, and make sure the ground and tractor are stable enough to pull the intended load.
- Do not attempt to pull loads in excess of the rated capacity of the winch.
- Keep yourself informed of any applicable codes, regulations and standards for the job.

- Your winch may have temperature shut-off system for protection of tractor and winch. Manual override of high temperature shut-off will cause damage to tractor and winch.
- This winch is neither intended, designed, nor rated for any application involved in the lifting or moving of personnel.
- Use only the lubricants listed in the Recommended Oil List. See page 1-4.
- 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.





Ordering Parts:

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

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

Allied Systems Company 21433 SW Oregon Street Sherwood, OR 97140 USA

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

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





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Notes



General

Introduction

This service manual is for the H6H winch. The following information is included in this manual:

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

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

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

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

Description

The H6H Winch is a Power Forward (**LINE-IN**) and Power Reverse (**LINE-OUT**) winch. The winch is powered by an internal hydraulic motor connected to the tractor hydraulic system. Oil flow and pressure are converted to rotational energy by the winch motor. Motor torque is transmitted through a holding brake, a planetary speed reducer and two gear reductions to the drum. Hydraulic oil is supplied by the tractor mounted auxiliary pump circuit and utilizes oil, filtration and cooling provided by the tractor circuit. Flow to the winch is controlled by a control lever and electrical switches located at the tractor's control station.

The **FREESPOOL** function permits the wire rope to be pulled from the drum. The **BRAKE-OFF** function, as an option, permits the wire rope to be pulled from the drum under increased resistance.

The H6H winch has a maximum rated line pull capacity of 27,200 kg (60,000 lb.) when there is one layer or less of wire rope on the drum. When there is more than one layer of wire rope on the drum, the line pull is reduced.

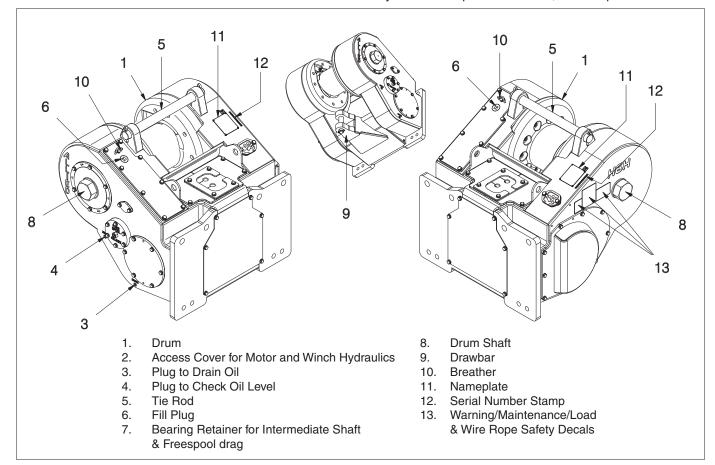
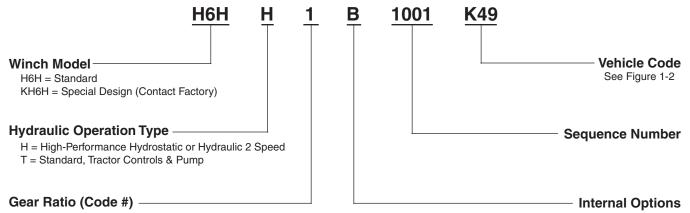


Figure 1-1 H6H Winch



Unit Identification

Allied Winch S/N Nameplate Data For Tractor Mountings



1 = 153:1

2 = 117:1

3 = 70:1

4 = 81:1

5 = 144:1

6 = 187:1

	PFR	FREESPOOL	BRAKE-OFF	OVERWIND	2-SPEED CONTROL
В	Х	Х	Х	Х	
D	Х	X	Х	Х	Х
E	Х	Х		Х	
U	Х	Х	Х		
BN	Х		Х	Х	
DN	Х		Х	Х	Х
EN	Х			Х	
DE	Х	Х		Х	Х
BE	Х	Х	Х	Х	Х
DU	Х	Х	Х		Х

Notes: 1. In Addition to the serial number plate, the serial number is stamped on the top left-hand side of the winch frame.

2. Circled numbers in Figure 1-2 indicate possible gear ratios.



Figure 1-2 Tractor or Skidder Identification Codes and Available Gear Ratios

O D E	Caterpillar	E John Deere	H Dressta	K Komatsu	L Liebherr	P Caterpillar- SEM	R Case	U Shantui	Y Tigercat
39			TD14/15/16S		PR716 ⑤⑥				
391							Steiger ⑥		
40							1650L ①		
41					PR724 ⑤⑥				
410					PR726 ⑤⑥				
42					PR736 ①		1650M/ 2050M ①		
421					PR736 ①				
44					PR734-4 ⑥				635D ②
46				D65-15 ⑥					
460		750/850J & 750/850K ①							
465		750/850K with E/H Controls ①							
47		Replaced by E460						DH17 ⑥	
471				D61-23 ②					
48		Replaced by E460							
49				D65-16, D65-17 & D65-18					
71	D6T ⑥								
81	D6N ①					816/822 ⑥			
811	D6N*								
963	963D Track Loader ①								
973									

[&]quot; Seriai numbers with prefixes GHS, MLW & LJR: _

General



Serial Number Codes

The serial number codes are described on pages 1-2 and 1-3 of this manual. The nameplate with the serial number code is found on the top left hand side of the winch case. The serial number code is also stamped on the left hand side of the winch frame.

Nameplate

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

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

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

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



Figure 1-3 Nameplate



Specifications

Drum Wire Rope Capacities (Drum: 10 Inch Diameter)

Wire Rope Diameter	Wire Rope Capacities			
	2/3 Length*	Full Length**		
3/4" (19 mm)	271' (82 m)	413' (126 m)		
7/8" (22 mm)	195' (59 m)	297' (91 m)		
1" (25 mm)	152' (45 m)	230' (70 m)		

Notes: * Recommended length to fill drum up to 2/3 capacity to leave room for uneven spooling.

- ** Length to fill drum to full capacity. Will have no room for uneven spooling. Not recommended.
- 1. Wire Rope: IWRC 6 X 19, extra improved plow steel, with ferrule, tail chain and hook.
- 2. Loosely or unevenly spooled wire rope will change capacities. Use flexible wire rope with independent wire rope center.
- 3. Ferrule: Light (2-1/4" Long X 2" Diameter)

Figure 1-4 Drum Wire Rope Capacities

Hydraulic Specifications

Motor Bent axis variable displacement

Brake Dry multi-disc spring applied

Oil Specifications

The hydraulic winch motor and control system operate off of the tractor implement hydraulic system. The winch gear case is filled with hydraulic transmission oil and is separate from the tractor hydraulic system. Factory fill for the gear case is oil meeting Caterpillar TO-4 specification SAE 30 weight. For proper operation of the BRAKE-OFF clutch, only oils meeting this specification should be used in the winch gear case.

Other hydraulic oils meeting this specification are: ExxonMobil, **Mobiltrans HD-30**Chevron, **Chevron Drive Train Fluid HD SAE 30**.

Oil Capacity

The oil capacity for the H6H winch is 4 gallons (15 liters).

Maintenance Decal

Hydraulic Winch Maintenance							
Recommended Winch Service Intervals							
Hours or	Months **	Filter	Winch Gear Oil	Brake & Clutch	Major Overhaul		
First 250	1	Change					
Every 500	3	Change					
Every 2,000	12		Change				
Every 5,000				* Inspect			
Every 10,000					* Evaluate		

Lube rollers and check oil level and filter light weekly.

- * Evaluate = Service based on average winch use;
 - if used more than once a day, perform overhaul.
- if used less than once a day, remove covers and check to determine need.
- * Inspect = disassemble and inspect for wear.
- ** Service winch using the tractor's hour meter or the length of time the winch is mounted to the tractor, whichever occurs first.
- *** Follow tractor schedule if using tractor filter.

Recommended Gear Compartment Oil:

Caterpillar -TO-4

Chevron -Drive Train Fluids HD ExxonMobil -Mobiltrans HD Series



Consult service/operating manual for low temperature oils and other details. Use of non-recommended oil may void warranty.

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WINCH

Figure 1-5 Maintenance Decal



General



Torque Specifications

ITEM	TORQUE VALUES			
ITEM	ft-lbs.	N-m	kg-m	
Housing Covers & Motor Shaft Mounting (M12x1.75 Gr.9)	90	122	12	
Drum Shaft Assembly				
Drum Adapter to Drum Capscrews (5/8-UNF Gr. 8)	155	210	22	
Bearing Retainer Capscrews (1/2-UNF Gr. 8)	90	122	12	
Motor Shaft Planetary Housing Capscrews (3/8-UNC Gr. 8)	33	44	4	
Motor & Bracket Mounting (3/4-UNC Gr.8)	280	380	39	
Manifold Mounting Capscrews (M10x1.5 Gr. 8.8)	28	38	4	

Figure 1-6 Torque Specifications



Gear Train (See Fig. 1-7)

The tractor pump drives the hydraulic motor. Torque from the hydraulic motor is transmitted through a holding brake, planetary speed reducer and two gear reductions to the drum.

A dental clutch with splines engages the drum pinion gear and the intermediate gear. The operator can disengage the dental clutch with an electric switch to engage the FREESPOOL feature.

A drum gear engages the drum pinion gear and is connected to the drum. When power is applied to the gear train, the drum will rotate in the forward or reverse direction. The drum adapter connects the drum to the drum gear. The other side of the drum runs on roller bearings held by the drum shaft. The drum shaft is connected to the winch case.

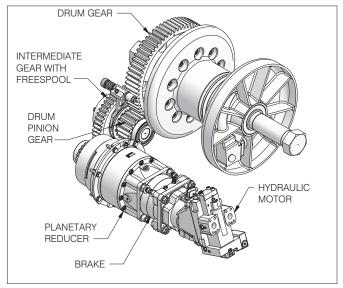


Figure 1-7 Gear Train

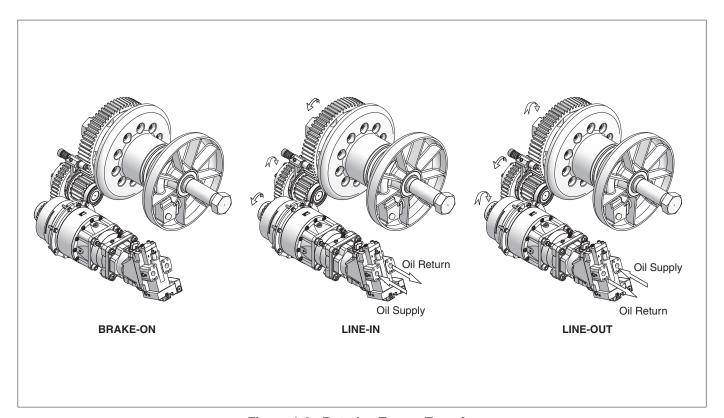


Figure 1-8 Rotation Torque Transfer



FREESPOOL Operation (See Fig. 1-9 & 1-10)

The **FREESPOOL** arrangement allows mechanical disengagement of the drum gear from the remainder of the gear train. When **FREESPOOL** is selected, a hydraulically-actuated sleeve disengages the dental clutch from the intermediate shaft. The drum is now disconnected from the brake, and the winch cannot support a load.

WARNING

FREESPOOL should not be used if there is a load on the wire rope. An uncontrolled release of the load will occur. Loss of the load can result in injury and/or equipment damage.

The yellow indicator panel on the selector switch lights when the winch is in **FREESPOOL**. If equipped with **BRAKE-OFF**, the red indicator in the **BRAKE-OFF** switch will also light even though that switch is in the off position.

NOTE: The dental clutch may not disengage if there is a load on the wire rope.

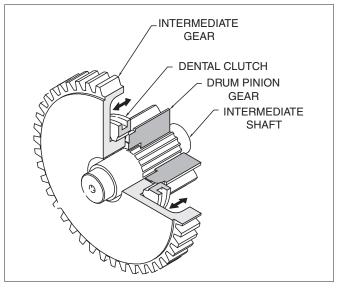


Figure 1-9 FREESPOOL Operation

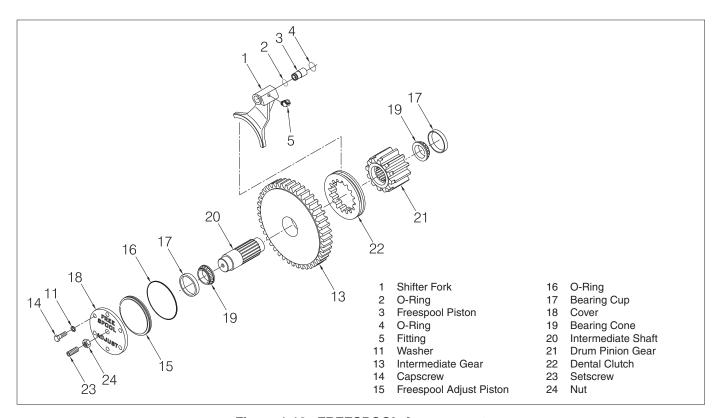


Figure 1-10 FREESPOOL Arrangement



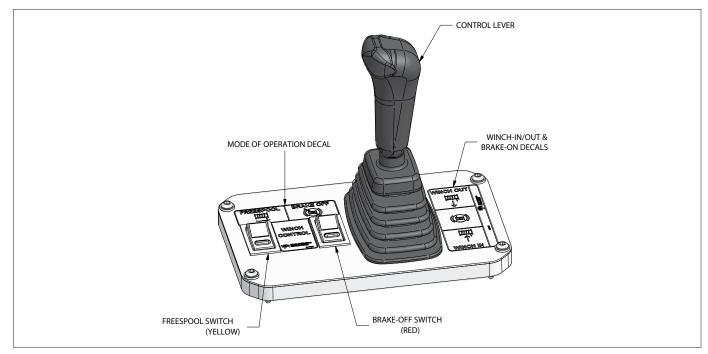


Figure 1-11 Winch Controls (K49 Shown)

Operation & Control (See Fig. 1-11)

The H6HT winch is designed to operate on a load sense, pilot operated hydraulic system. When the tractor is running, the winch is ready to operate but no oil is flowing to the winch. Control (pilot) pressure is present at the winch.

The control lever and electrical switches are used to select the following operations (not all winches are equipped with all options):

- BRAKE-ON (spring-centered position)
- LINE-IN
- LINE-OUT
- BRAKE-OFF (optional)
- FREESPOOL

The tractor must be running and the auxiliary hydraulic function switch, if equipped, must be on. LINE-IN, LINE-OUT and BRAKE-ON are controlled by a proportional control lever.

When the control lever is in the **BRAKE-ON** or centered position, the holding brake is automatically applied. Pushing the lever away from the operator releases the brake, and reels the wire rope off the drum (**LINE-OUT**). Pulling the lever towards the operator releases the brake, and reels the wire rope onto the drum (**LINE-IN**). Releasing the lever causes it to return to the **BRAKE-ON** position, which stops the drum rotation and applies the holding brake. Moving the lever a small amount results in slow wire rope movement for inching control. Line speed increases proportionally as the lever is moved farther.

The switch panel contains two rocker switches to control **FREESPOOL** and **BRAKE-OFF**. The tractor must be running to supply hydraulic power to operate these functions. A light shows when a switch is on.

The FREESPOOL and BRAKE-OFF switches incorporate a lock to prevent inadvertent actuation. The slide lock must be released before the switch can be turned on. In BRAKE-OFF, hydraulic pressure is applied to release the brake-off clutch. As wire rope is pulled from the winch, the turning drum back-drives the winch gear train to the brake-off clutch. The winch motor, brake, and planetary reducer remain stationary. Mechanical drag through the gear train and viscous drag in the brake-off clutch keep the wire rope from bird-nesting as it is spooled off the drum.

! CAUTION

Before operating the winch in LINE-IN or LINE-OUT mode, ensure the FREESPOOL and BRAKE-OFF lights are not illuminated. The winch will not operate.

⚠ WARNING

BRAKE-OFF should not be used to lower a suspended load or a load that can slide down a slope.





Hydraulic System

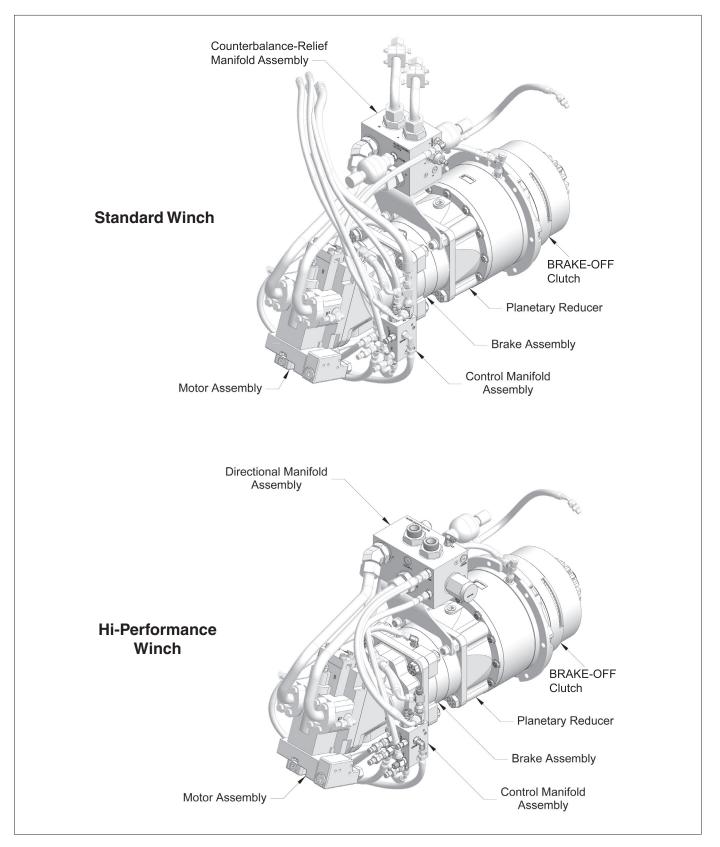


Figure 1-12 Major Components in Hydraulic System



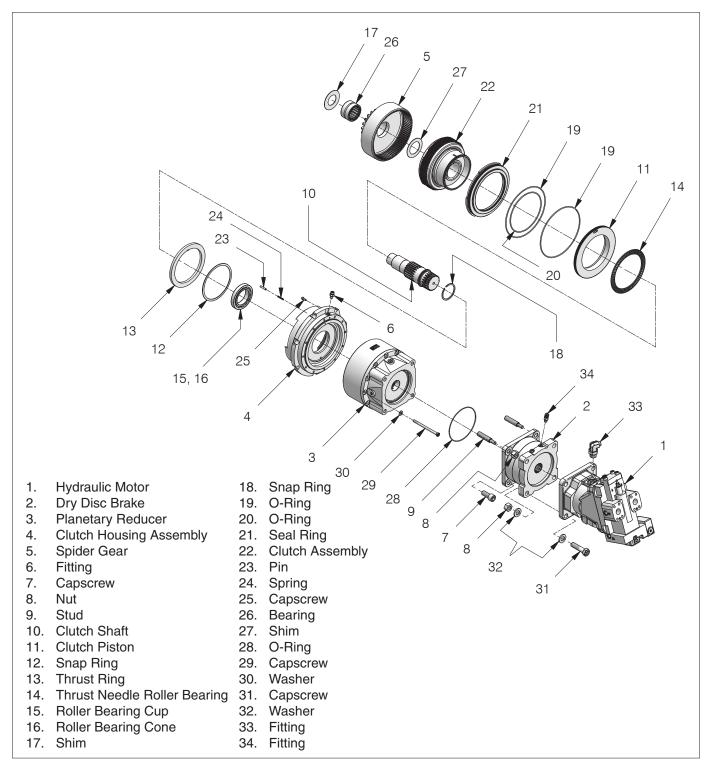


Figure 1-13 Motor Shaft Assembly (Shown with BRAKE-OFF Option)

Motor (See Fig. 1-13)

The hydraulic motor is a bent axis variable displacement motor. The default position of the motor is maximum displacement. Control pressure operates a servo that proportionally reduces motor displacement. At 261 psi control pressure, the motor begins to ramp to minimum displacement. At higher motor pressure, a pressure compensator will shift the motor back to maximum displacement.



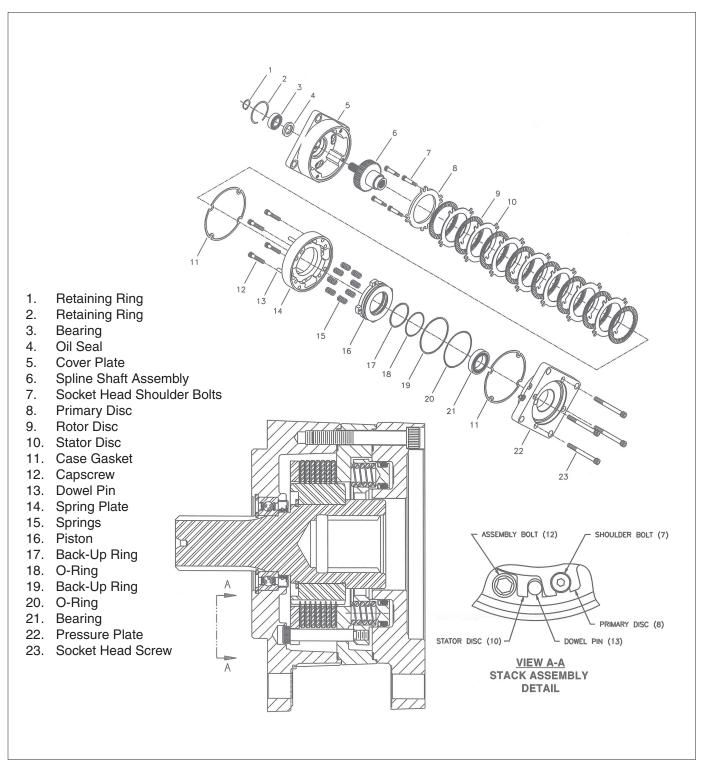


Figure 1-14 Brake

Brake (See Fig. 1-14)

The brake is a dry multi-disc spring applied design. The springs push against a piston that applies force to the friction discs and separator plates. The brake valve directs pressurized oil to the piston and pushes back on the brake

springs to release 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 on the motor shaft and rotate with the hub.



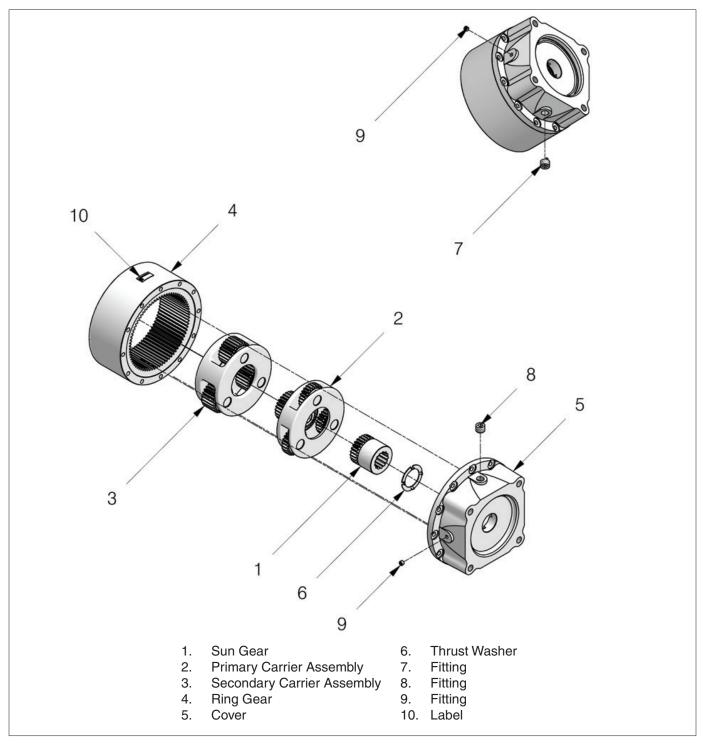


Figure 1-15 Planetary Reducer

Planetary Reducer (See Fig. 1-15)

The planetary speed reducer is the first gear reduction between the brake and the gear side of the winch. Oil in this housing is common to the gear side of the winch and output shaft rotation is the same as input shaft rotation at a reduced speed.



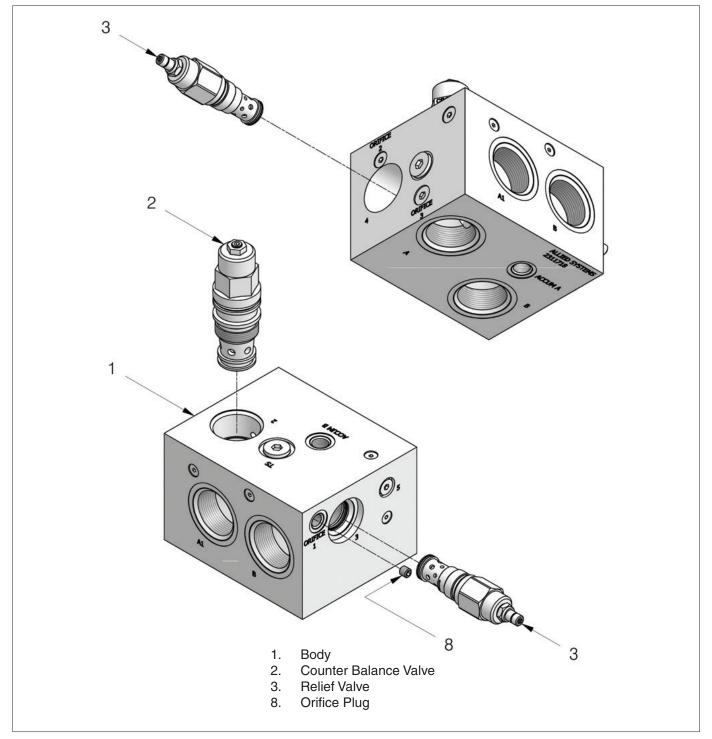


Figure 1-16 Counterbalance Relief Manifold

Counterbalance Relief Manifold (See Fig. 1-16)

The counterbalance relief manifold houses the counterbalance valve and the high pressure relief valves. The counter-balance valve is a load holding valve that blocks return oil flow from the motor in the event supply pressure drops below a set point in **LINE-OUT** mode. The

counter balance valve allows oil to free flow in the **LINE-IN** mode through a check valve. The high pressure relief valves act as an overload relief when supply pressure exceeds the setting of the valve.



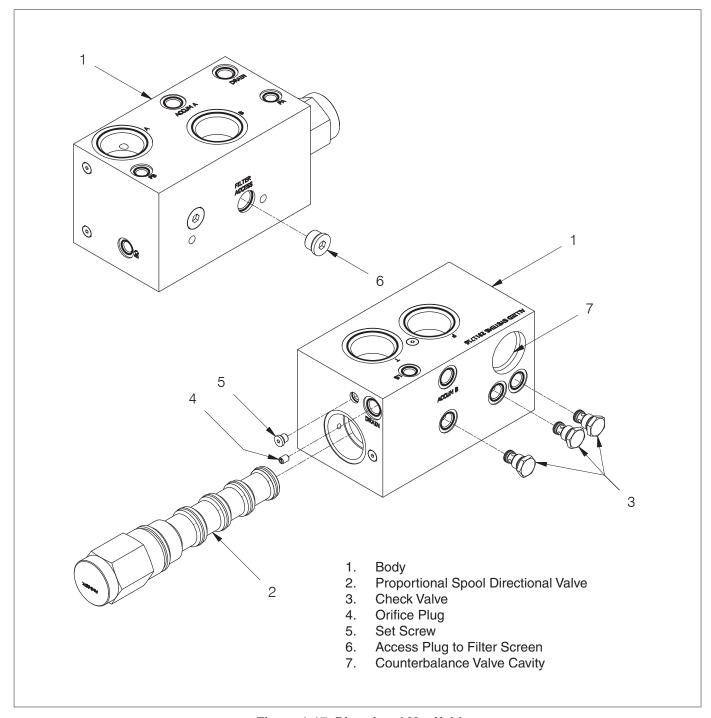


Figure 1-17 Directional Manifold

Directional Manifold (See Fig. 1-17)

The directional manifold houses the counterbalance valve and the direction control valve. The counter-balance valve is a load holding valve that blocks return oil flow from the motor in the event supply pressure drops below a set point in **LINE-OUT** mode. The counter balance valve allows oil to free flow in the **LINE-IN** mode through a check

valve. The direction control valve directs tractor supply oil to either motor port based on control pressure from the control lever. Supply oil is directed to motor port A in **LINE-IN** mode and to motor port B in **LINE-OUT** mode.





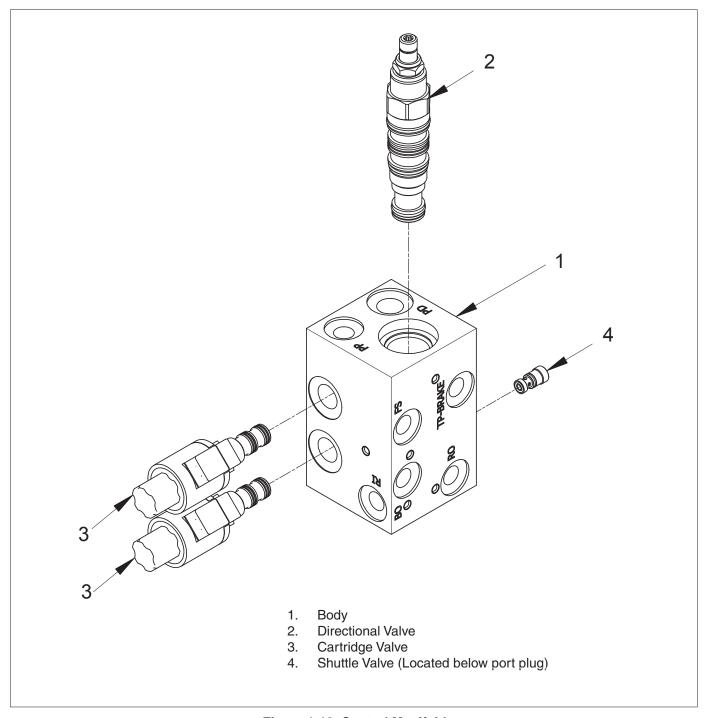


Figure 1-18 Control Manifold

Control Manifold (See Fig. 1-18)

The control manifold is used to communicate pressure signals that control the **BRAKE-ON**, **BRAKE-OFF**, and **FREESPOOL**. The manifold contains a shuttle valve, a directional valve, and two solenoid valves. The shuttle is used to send a pressure response to the brake when the winch is shifted to **LINE-IN** or **LINE-OUT**. The brake valve

provides release pressure to the brake when the **LINE-IN** or **LINE-OUT** control pressure exceeds the pilot setting of the valve. The **BRAKE-OFF**, and **FREESPOOL** valves are 2 position, 3-way electric over hydraulic valves that communicate pressure responses to respective functions when activated.



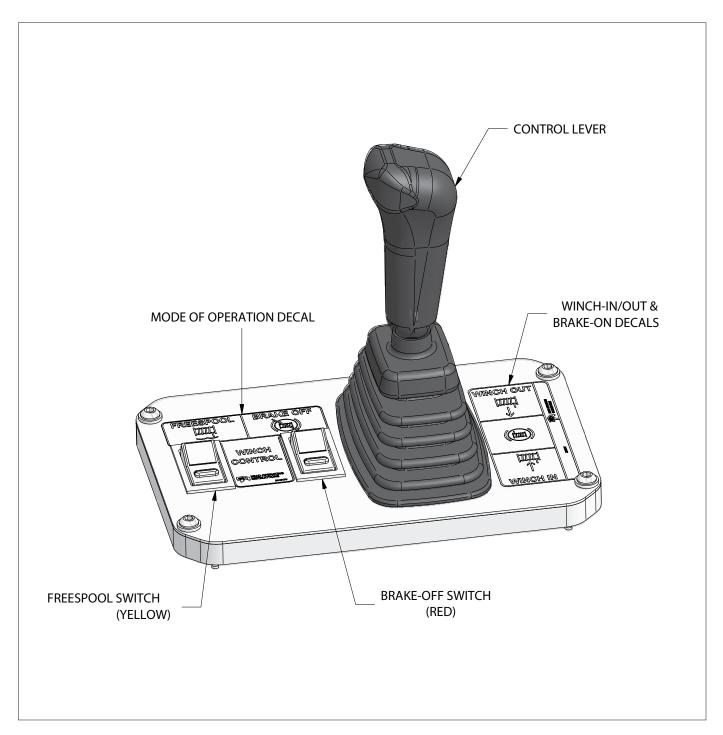


Figure 1-19 Winch Controls (K49 Shown)

Operator Control Panel (See Fig. 1-19)

Depending on the options on the winch, the control panel contains up to two electric rocker switches to operate **BRAKE-OFF** and **FREESPOOL** functions. Each switch is equipped with an integral LED indicator to show if the

function is active. The switches incorporate locks to prevent them from being accidentally turned on. To operate, slide the locking tab first, then push the rocker switch.





Sequence of Operation, Option Code B

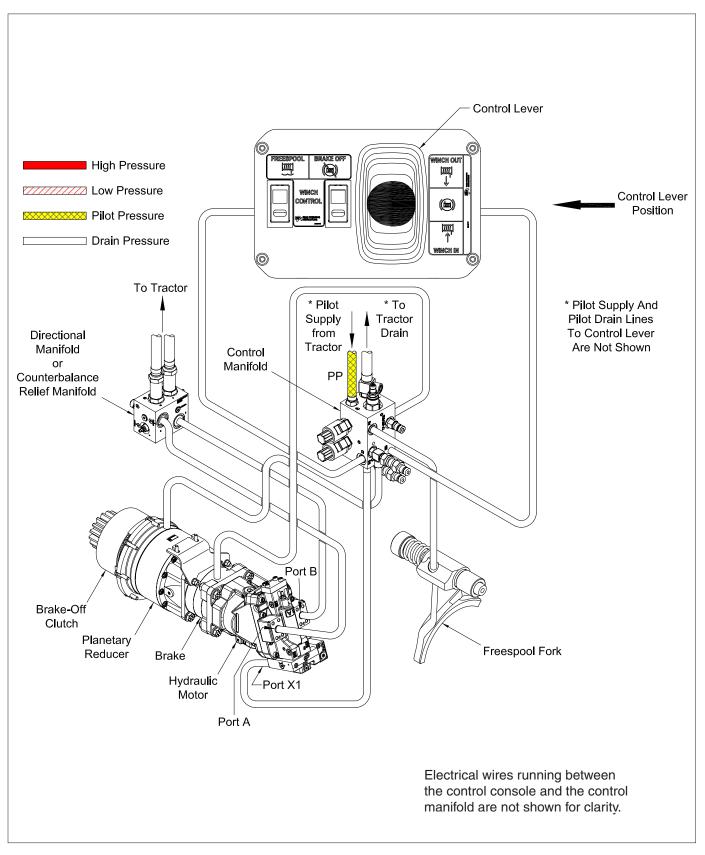


Figure 1-20 Sequence of Operation - BRAKE-ON, Option Code B



Sequence of Operation - BRAKE-ON

Option Code B, Standard Winch

On standard winches, hydraulic flow to the winch and direction of flow are controlled by the tractor ripper control valve. When the console mounted control lever is centered, hydraulic flow is blocked at the ripper control valve and no oil is flowing to the winch counterbalance relief manifold. Pilot pressure is present at the winch control manifold. There is no pressure on the control lines as they are open to the tractor reservoir.

Option Code B, Hi-Performance Winch

Hi-performance winches are hydraulically connected directly to the tractor implement pump supply circuit. Hydraulic flow and direction are controlled at the winch directional control manifold. When the console mounted control lever is centered, hydraulic flow is blocked at the directional manifold. The motor ports are open to the tractor tank line. Pilot pressure is present at the winch control manifold. There is no pressure on the control lines as they are open to the tractor reservoir.

NOTE: Hi-Performance winches have additional control lines connecting the RO and RI signals to the directional manifold. These additional lines have been omitted from these schematics for clarity since they illustrate both standard and Hi-Performance winches.





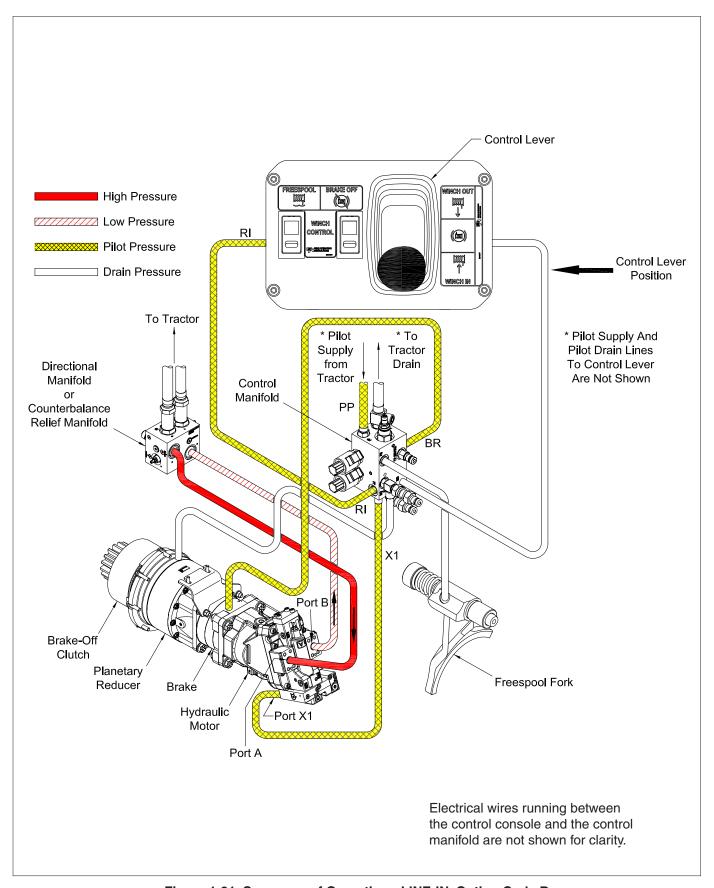


Figure 1-21 Sequence of Operation - LINE-IN, Option Code B



Sequence of Operation - LINE-IN

Option Code B, Standard Winch

Pulling the control lever toward the operator commands the tractor ripper valve to meter oil flow to the winch, through the counterbalance relief manifold (CBR) and to motor port "A". Oil flow rotates the winch motor and flows back to the CBR manifold and back through the ripper valve to the tractor hydraulic reservoir.

Simultaneously, the control lever sends proportionately controlled pilot pressure to the RI port on the control manifold. The control manifold directs the pilot signal to the brake release valve and the motor port "X1". At the set pressure, the brake release valve sends full pilot pressure to release the brake.

Pilot pressure at motor port "X1" is proportional to control lever position. When the pressure at motor port "X1" reaches a set level, the motor servo reduces motor displacement to increase line speed. If working pressure increases to PCOR (Pressure Compensator Override) setting, the servo begins to increase motor displacement to prevent stalling.

Releasing the spring centered control lever causes the ripper valve to block flow to the winch and stop the motor. The decaying RI signal closes the brake release valve which in turn applies the brake.

Option Code B, Hi-Performance Winch

The Hi-Performance winch operates similarly to the standard winch except oil flow and direction are controlled at the winch. The RI control lever signal also commands the directional manifold in the winch to send oil flow from the tractor implement circuit to the winch motor. The brake release and motor speed control (X1) are the same as the standard winch.





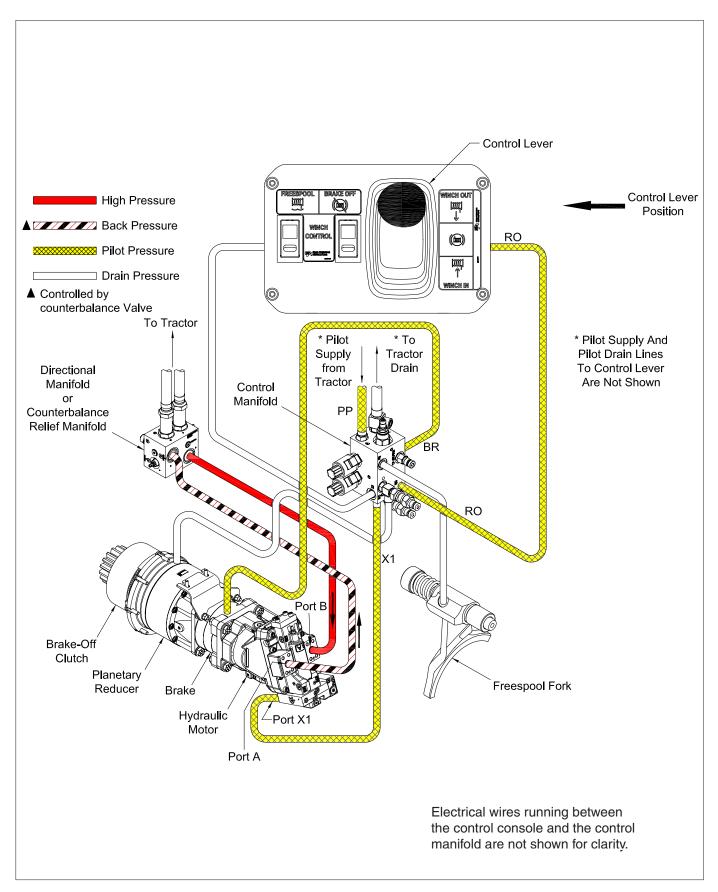


Figure 1-22 Sequence of Operation - LINE-OUT, Option Code B



Sequence of Operation - LINE-OUT

Option Code B, Standard Winch

LINE-OUT operation is similar to LINE-IN except pushing the control lever away from the operator reverses ripper valve flow through the counterbalance relief (CBR) manifold and supplies motor port "B". Oil rotates the winch motor and flows back to the CBR manifold where its flow is restricted by the counterbalance valve. The counterbalance valve maintains sufficient pressure at motor port "A" to prevent uncontrolled load lowering. From the CBR manifold, oil flows back through the ripper valve to the tractor hydraulic reservoir.

Simultaneously, the control lever sends proportionately controlled pilot pressure to the RO port on the control manifold. The control manifold directs the pilot signal to the brake release valve and the motor port "X1". At the set pressure, the brake release valve sends full pilot pressure to release the brake.

Pilot pressure at motor port "X1" is proportional to control lever position. When the pressure at motor port "X1" reaches a set level, the motor servo reduces motor displacement to increase line speed. If working pressure increases to PCOR (Pressure Compensator Override) setting, the servo begins to increase motor displacement to prevent stalling.

Releasing the spring centered control lever causes the ripper valve to block flow to the winch and stop the motor. The decaying RO signal closes the brake release valve which in turn applies the brake.

Option Code B, Hi-Performance Winch

The Hi-Performance winch operates similarly to the standard winch except oil flow and direction are controlled at the winch. The RO control lever signal also commands the directional manifold in the winch to send oil flow from the tractor implement circuit to the winch motor. The brake release and motor speed control (X1) are the same as the standard winch.





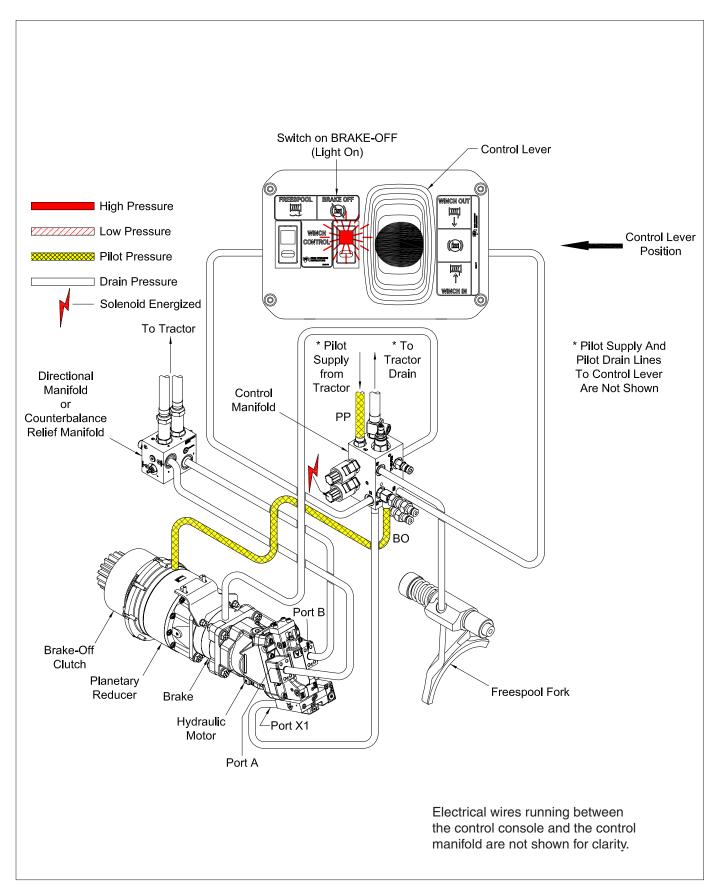


Figure 1-23 Sequence of Operation - BRAKE-OFF, Option Code B



Sequence of Operation - BRAKE-OFF

Option Code B

BRAKE-OFF is activated by a switch located on the operator console. An electric signal shifts the brake-off solenoid valve, directing pilot pressure to release the spring-applied brake-off clutch.

MARNING

BRAKE-OFF should not be used to lower a suspended load or a load that can slide down a slope.





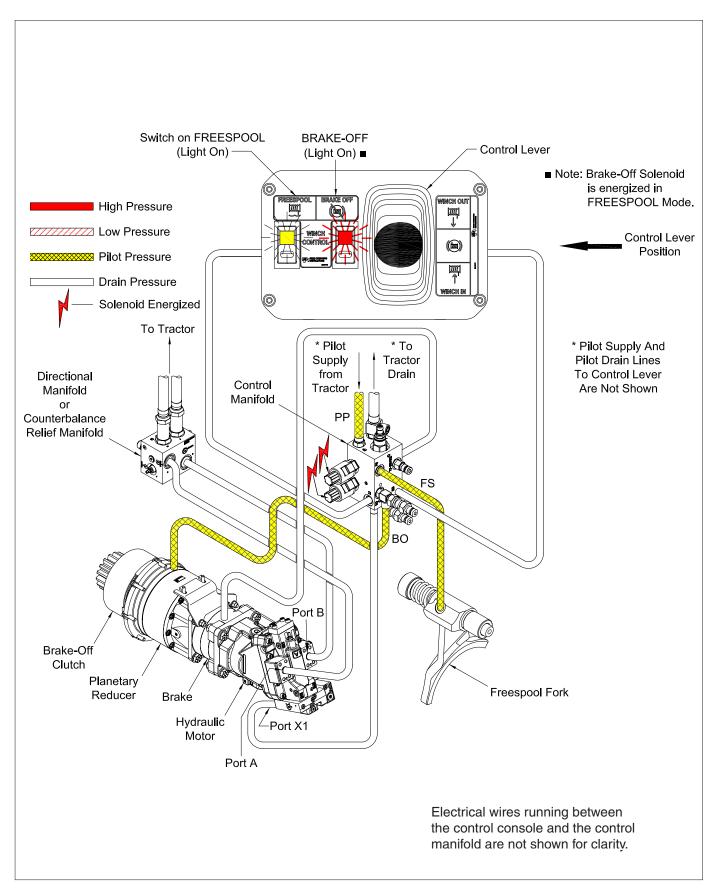


Figure 1-24 Sequence of Operation - FREESPOOL, Option Code B



Sequence of Operation - FEESPOOL

Option Code B

FREESPOOL is actuated by a switch located on the operator console. An electric signal shifts the freespool solenoid sending pilot pressure to the freespool shifter fork. The shifter fork disengages the drum pinion gear from the intermediate gear disengaging the drum from the gear train so wire rope can be pulled off the drum by hand.

In FREESPOOL mode, electronic circuitry also commands BRAKE-OFF operation. This turns on the red brake-off light on the console even though the switch is in the off position. By commanding BRAKE-OFF during FREESPOOL operation, any load on the wire rope is relaxed and allows the shifter fork to disengage the gear train.



Sequence of Operation, Option Code D

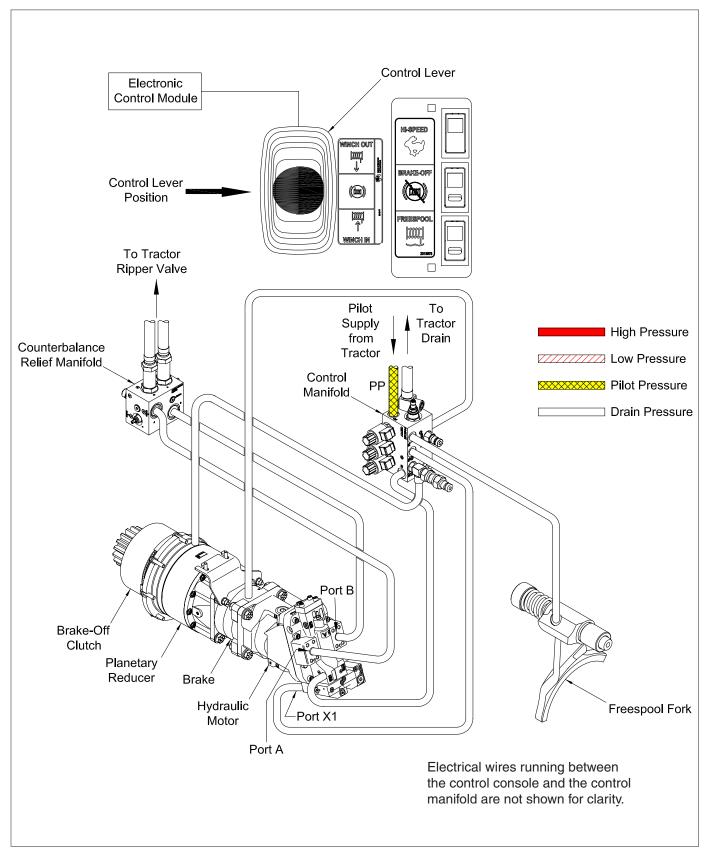


Figure 1-25 Sequence of Operation - BRAKE-ON, Option Code D



Sequence of Operation - BRAKE-ON

Option Code D

With control lever centered, the tractor ripper valve blocks flow so no oil is flowing to the winch counterbalance relief manifold. Pilot pressure is present at the control manifold. All control lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.



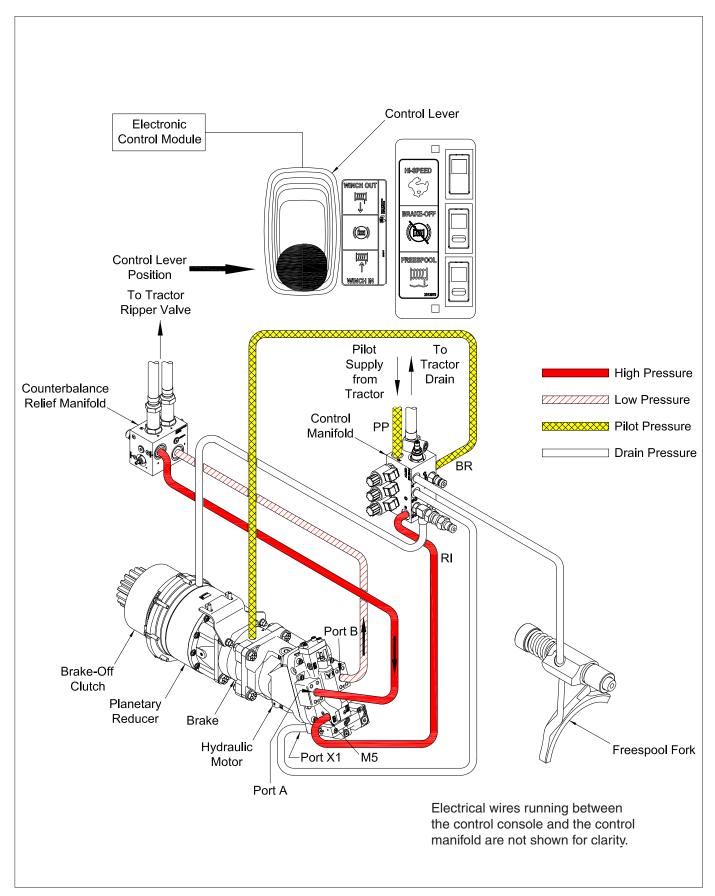


Figure 1-26 Sequence of Operation - LINE-IN, Option Code D



Sequence of Operation - LINE-IN

Option Code D

Pulling the control lever toward the operator commands the tractor ripper valve to send oil flowing to the winch, through the counterbalance relief (CBR) manifold and to the motor port "A". Oil flows through the motor, back to the CBR manifold and back through the tractor ripper control

valve to the reservoir. Motor pressure from motor port "M5" is directed to the control manifold RI port, through the shuttle valve and to the brake release valve. At the set pressure, the brake release valve directs full pilot pressure to release the brake.





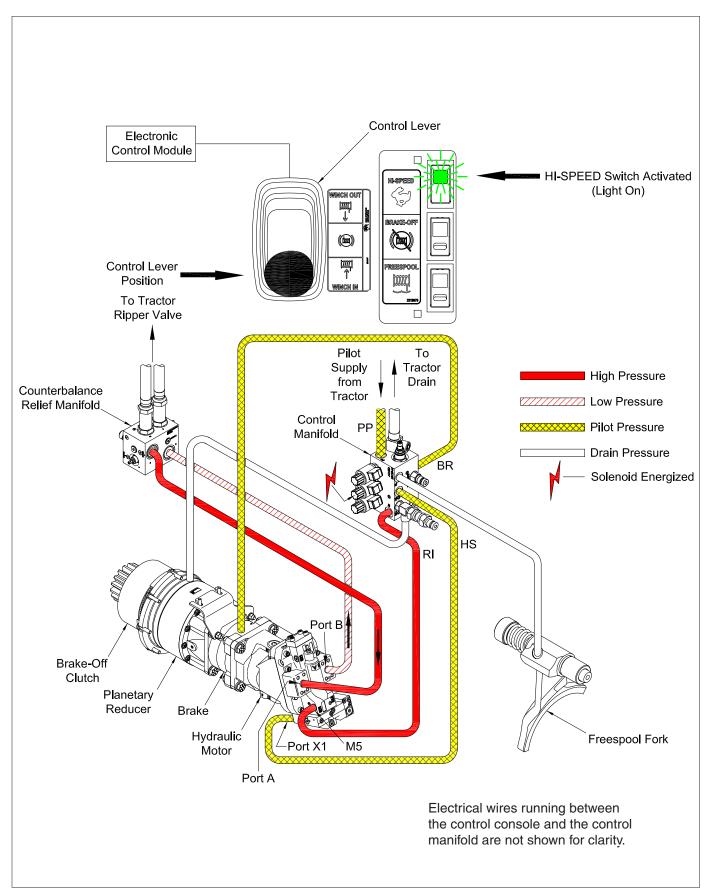


Figure 1-27 Sequence of Operation - LINE-IN HI-SPEED, Option Code D



Sequence of Operation - LINE-IN HI-SPEED

Option Code D

If the operator selects **HI-SPEED** mode by the rocker switch on the control panel, an electric solenoid valve on the control manifold sends pilot pressure to the motor port "X1". Pressure commands the servo to reduce motor displacement to increase line speed. If working pressure increases to PCOR (Pressure Compensator Override) setting, the motor servo begins to increase displacement to prevent motor stall. A green LED on the control switch is lighted in **HI-SPEED** mode.



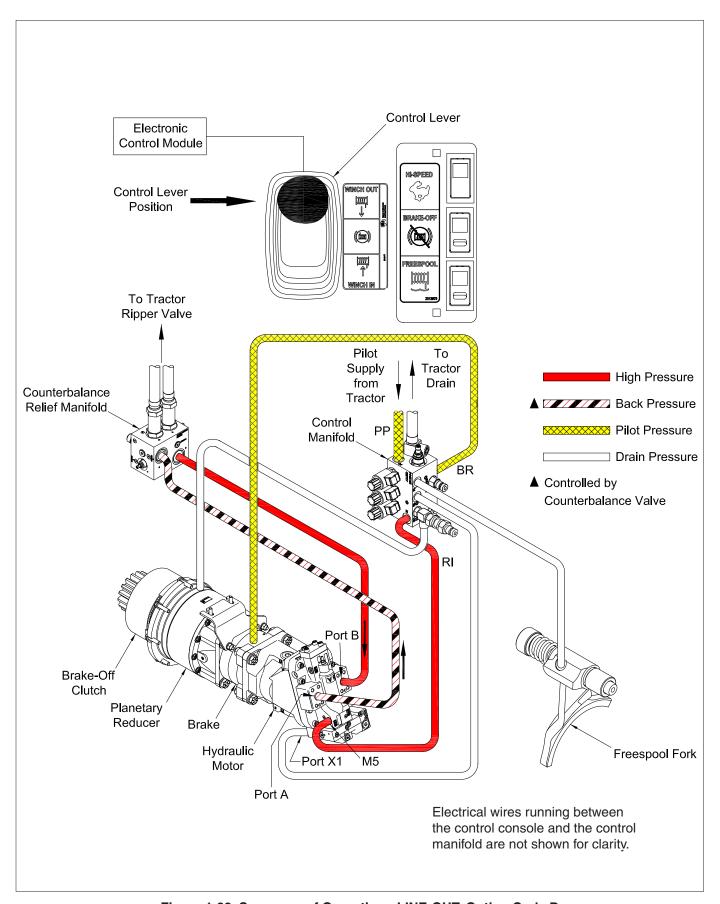


Figure 1-28 Sequence of Operation - LINE-OUT, Option Code D



Sequence of Operation - LINE-OUT

Option Code D

LINE-OUT operation is similar to **LINE-IN** except moving the control lever away from the operator reverses flow at the tractor ripper valve and directs flow through the counterbalance relief manifold to the motor port "B", and returns through motor port "A". Brake release operates the same as **LINE-IN** mode.

In **LINE-OUT** operation, oil flowing from motor port "A" to the counterbalance relief manifold is controlled by the counterbalance valve. The counterbalance valve maintains sufficient pressure in the motor port "A" line to prevent uncontrolled lowering of a load.

If **HI-SPEED** is selected by the operator, pilot pressure is sent to the motor port "X1" to control motor displacement (See **LINE-IN HI-SPEED**, Option Code D, Figure 1-27).





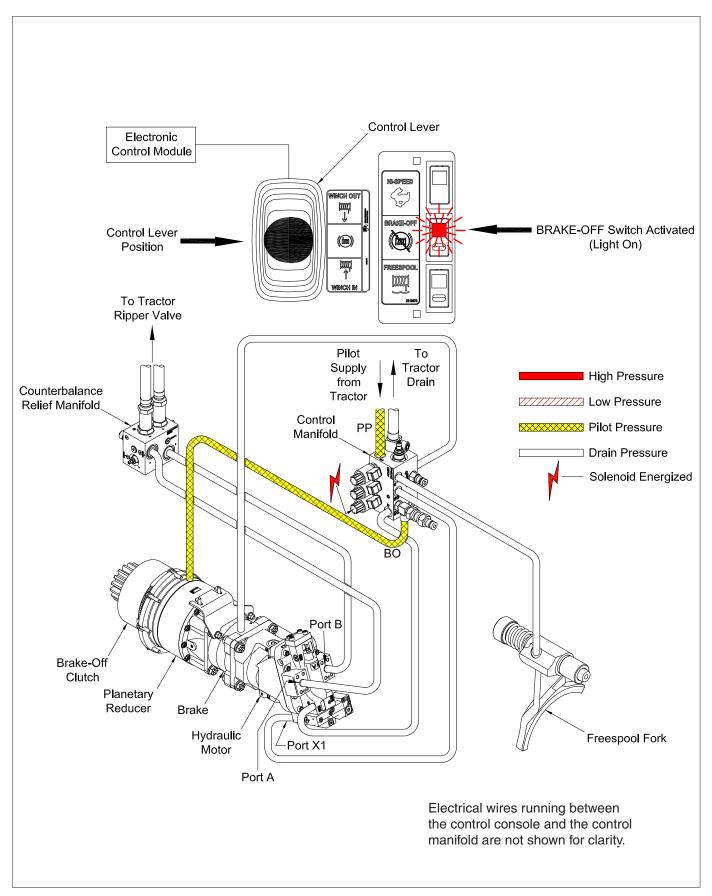


Figure 1-29 Sequence of Operation - BRAKE-OFF, Option Code D



Sequence of Operation - BRAKE-OFF

Option Code D

BRAKE-OFF is activated by a switch located on the operator console. An electric signal shifts the brake-off solenoid valve, directing pilot pressure to release the spring-applied brake-off clutch.

MARNING

BRAKE-OFF should not be used to lower a suspended load or a load that can slide down a slope.





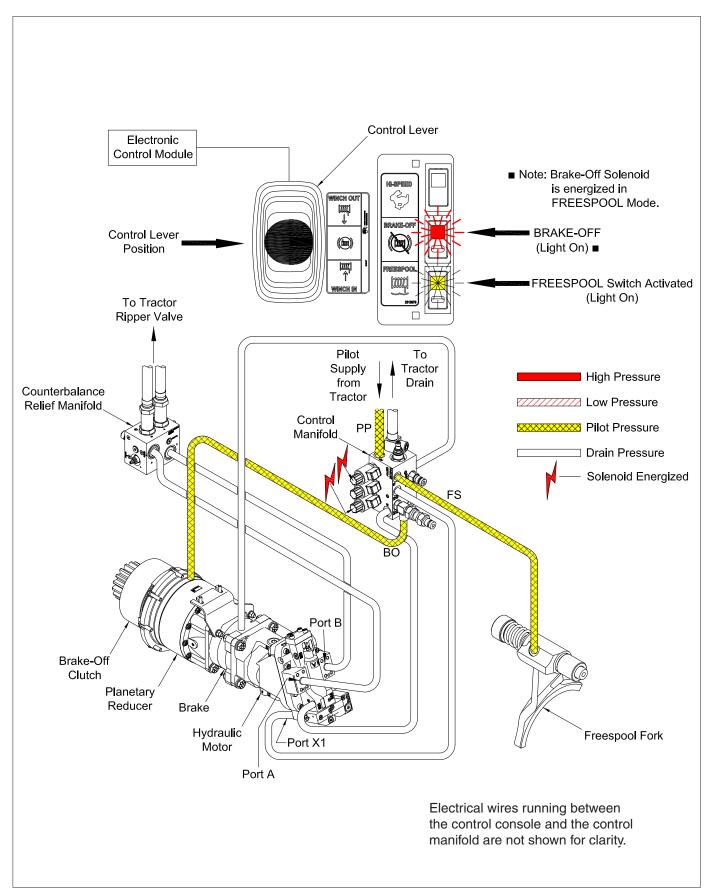


Figure 1-30 Sequence of Operation - FREESPOOL, Option Code D



Sequence of Operation - FREESPOOL

Option Code D

FREESPOOL is actuated by a switch located on the operator console. An electric signal shifts the freespool solenoid sending pilot pressure to the freespool shifter fork. The shifter fork disengages the drum pinion gear from the intermediate gear disengaging the drum from the gear train so wire rope can be pulled off the drum by hand.

In FREESPOOL mode, electronic circuitry also commands BRAKE-OFF operation. This turns on the red brake-off light on the console even though the switch is in the off position. By commanding BRAKE-OFF during FREESPOOL operation, any load on the wire rope is relaxed and allows the shifter fork to disengage the gear train.

General



Notes



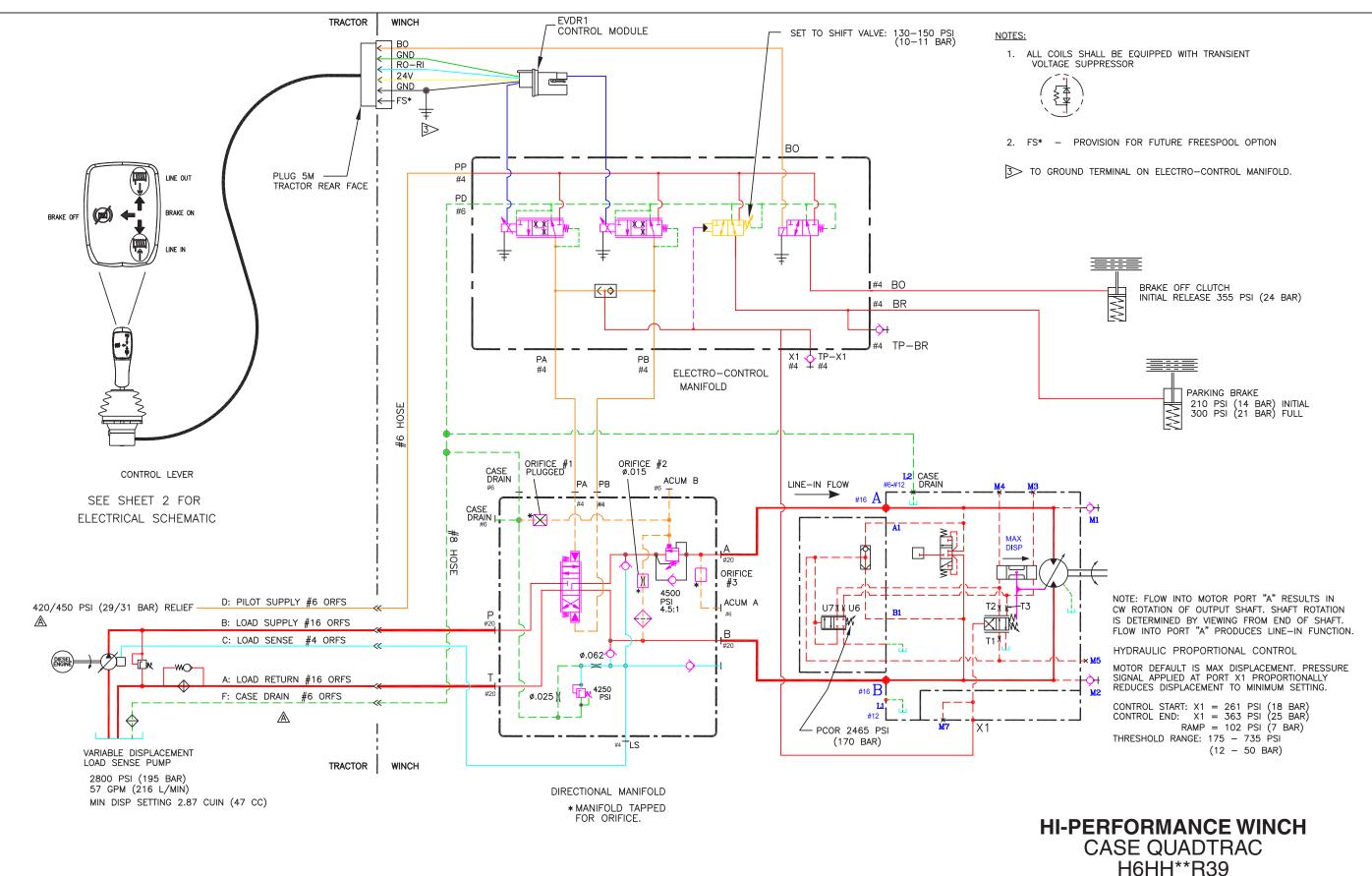


Figure 1-31 Hydraulic/Electrical Schematic (Rev. A), H6HH (Hi-Performance) Winch_1



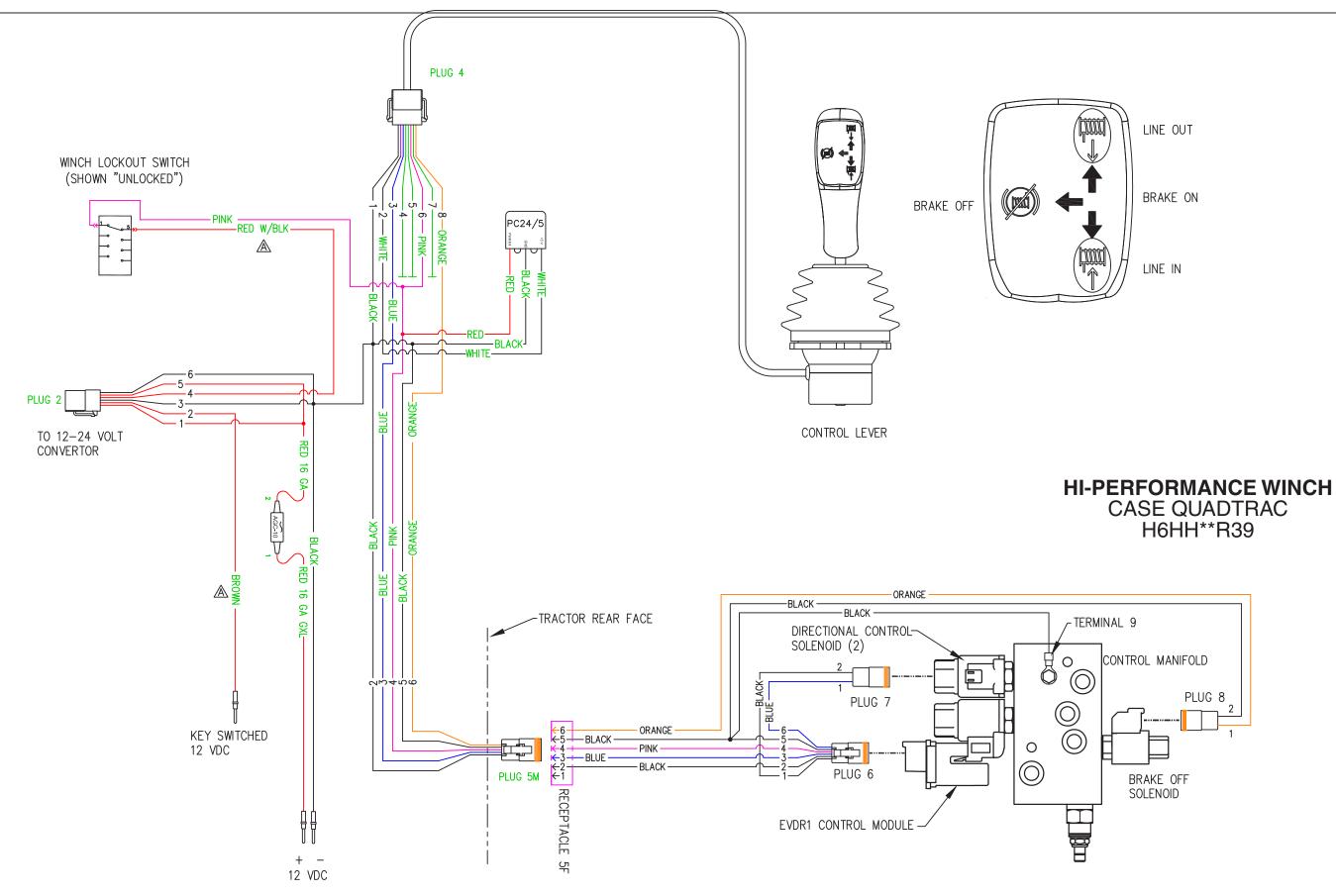


Figure 1-31 Hydraulic/Electrical Schematic (Rev A), H6HH (Hi-Performance) Winch_2



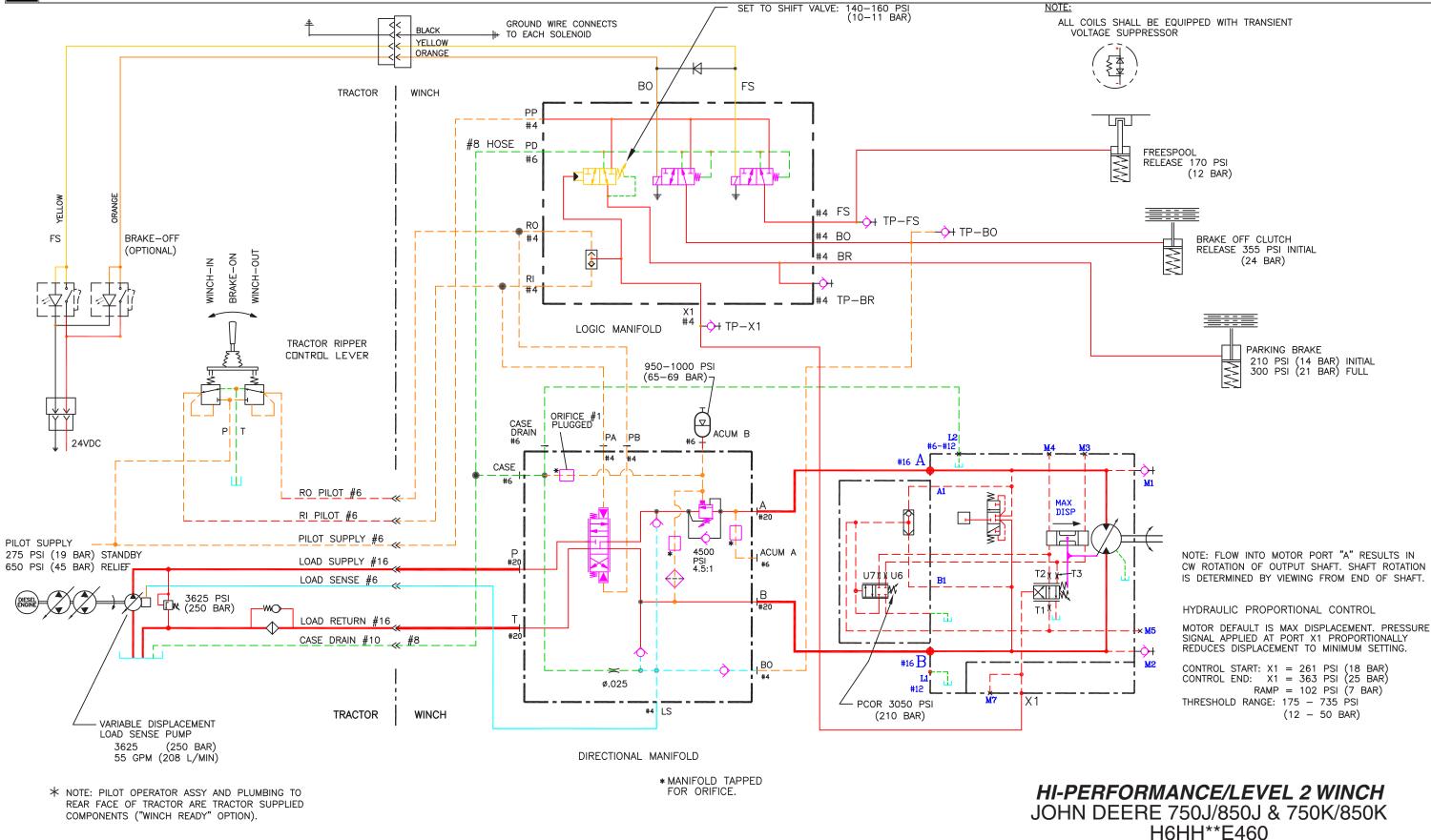


Figure 1-32 Hydraulic/Electrical Schematic (Rev. F), H6HH (Hi-Performance) Winch



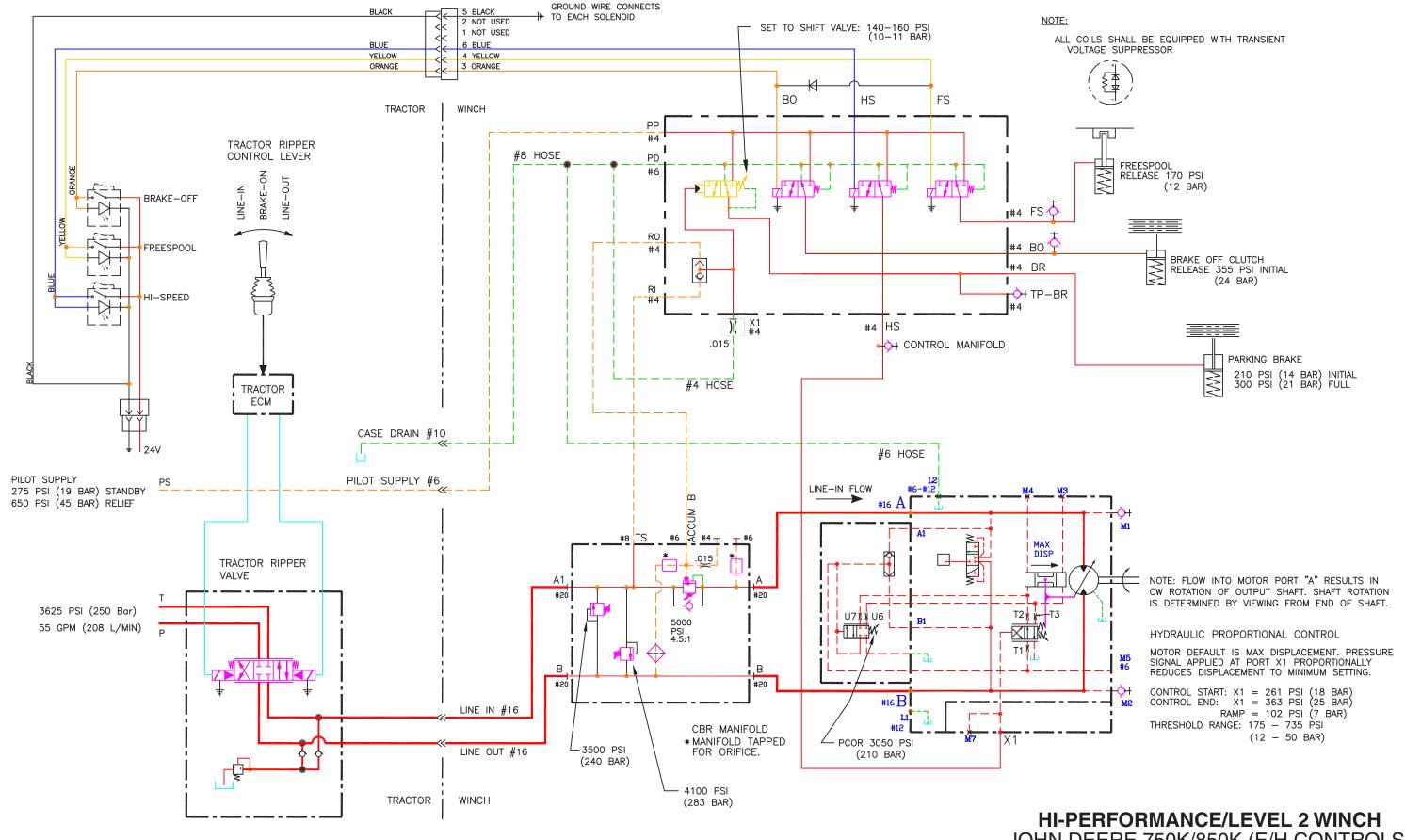


Figure 1-33 Hydraulic/Electrical Schematic (Rev. F), H6HH (Hi-Performance) Winch

JOHN DEERE 750K/850K (E/H CONTROLS) H6HH**E465



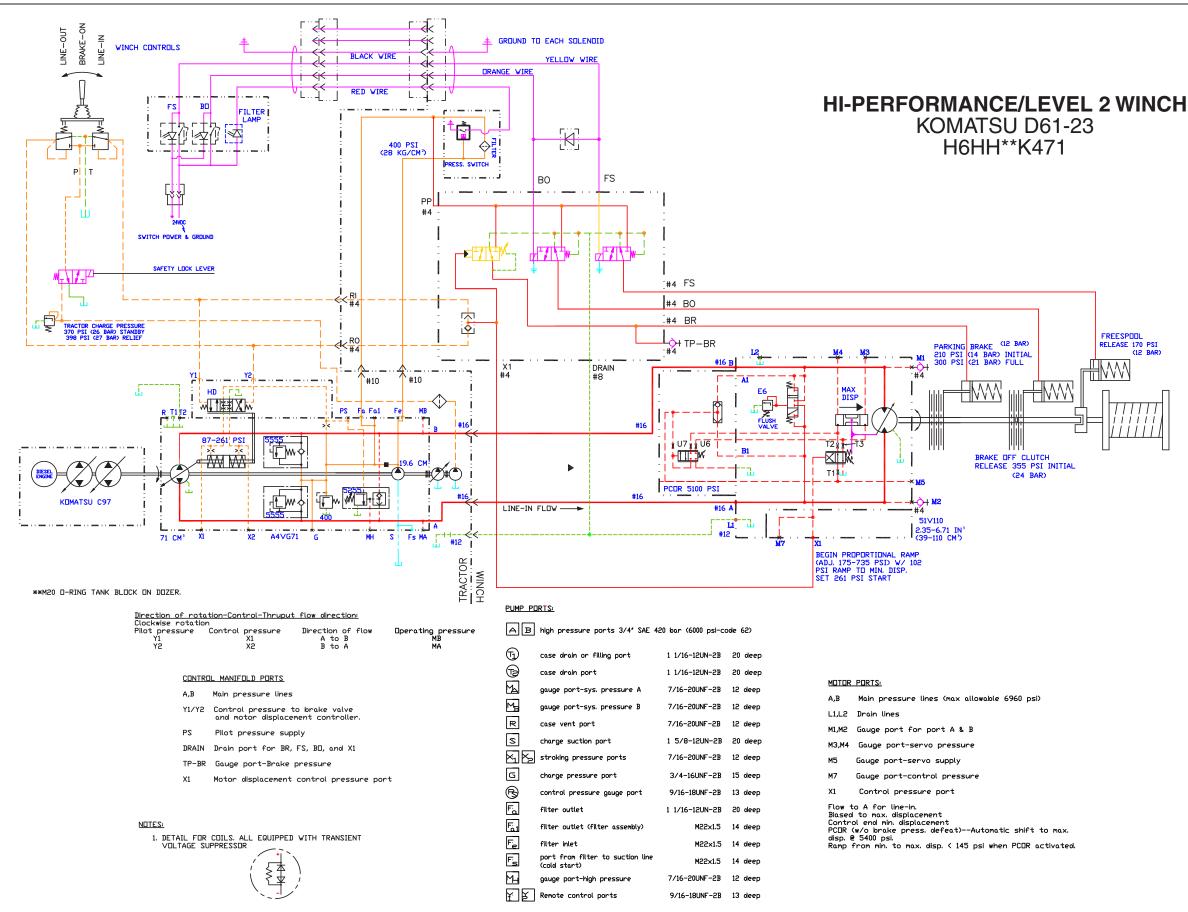


Figure 1-34 Hydraulic/Electrical Schematic (Rev. A), H6HH (Hi-Performance) Winch





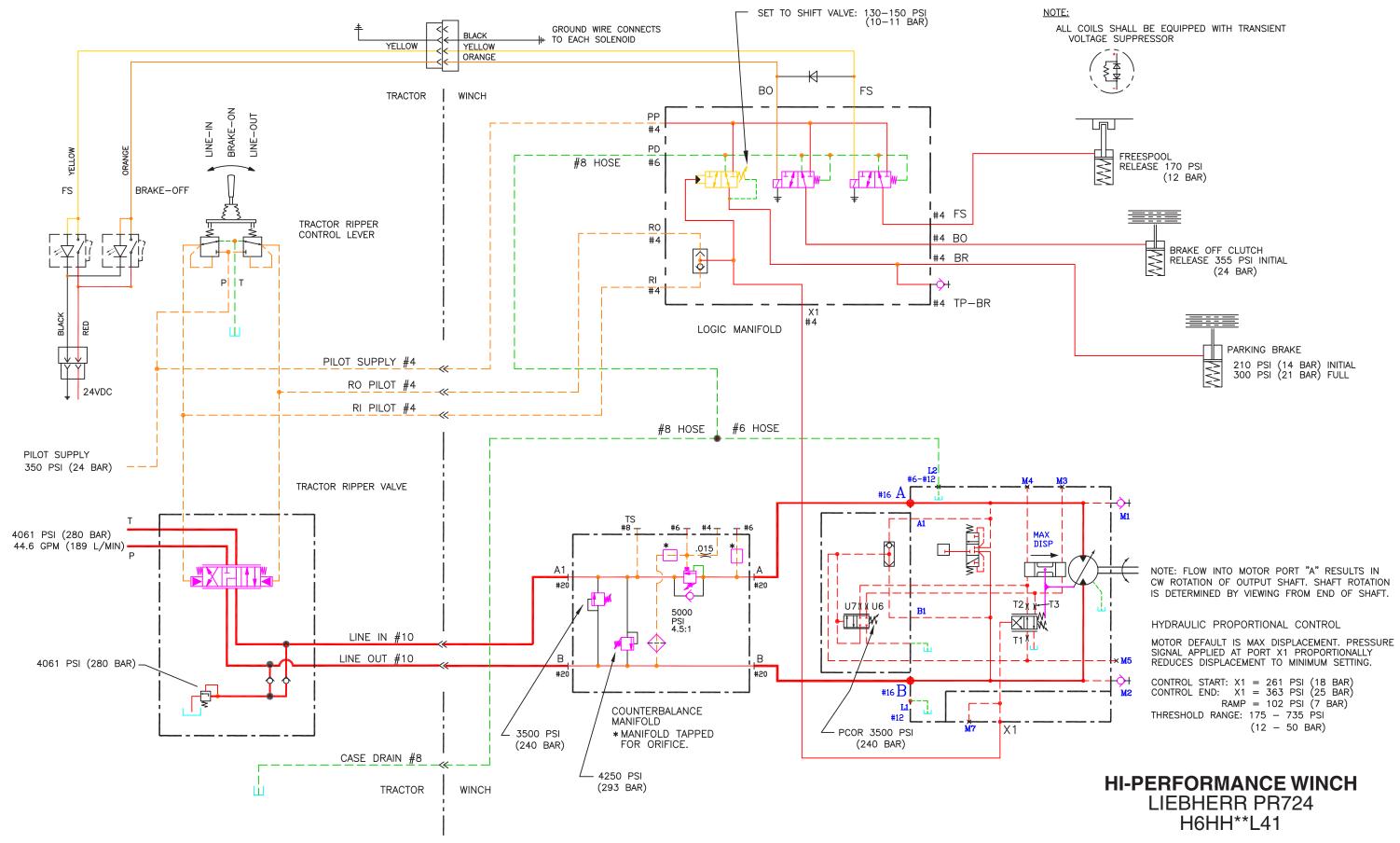
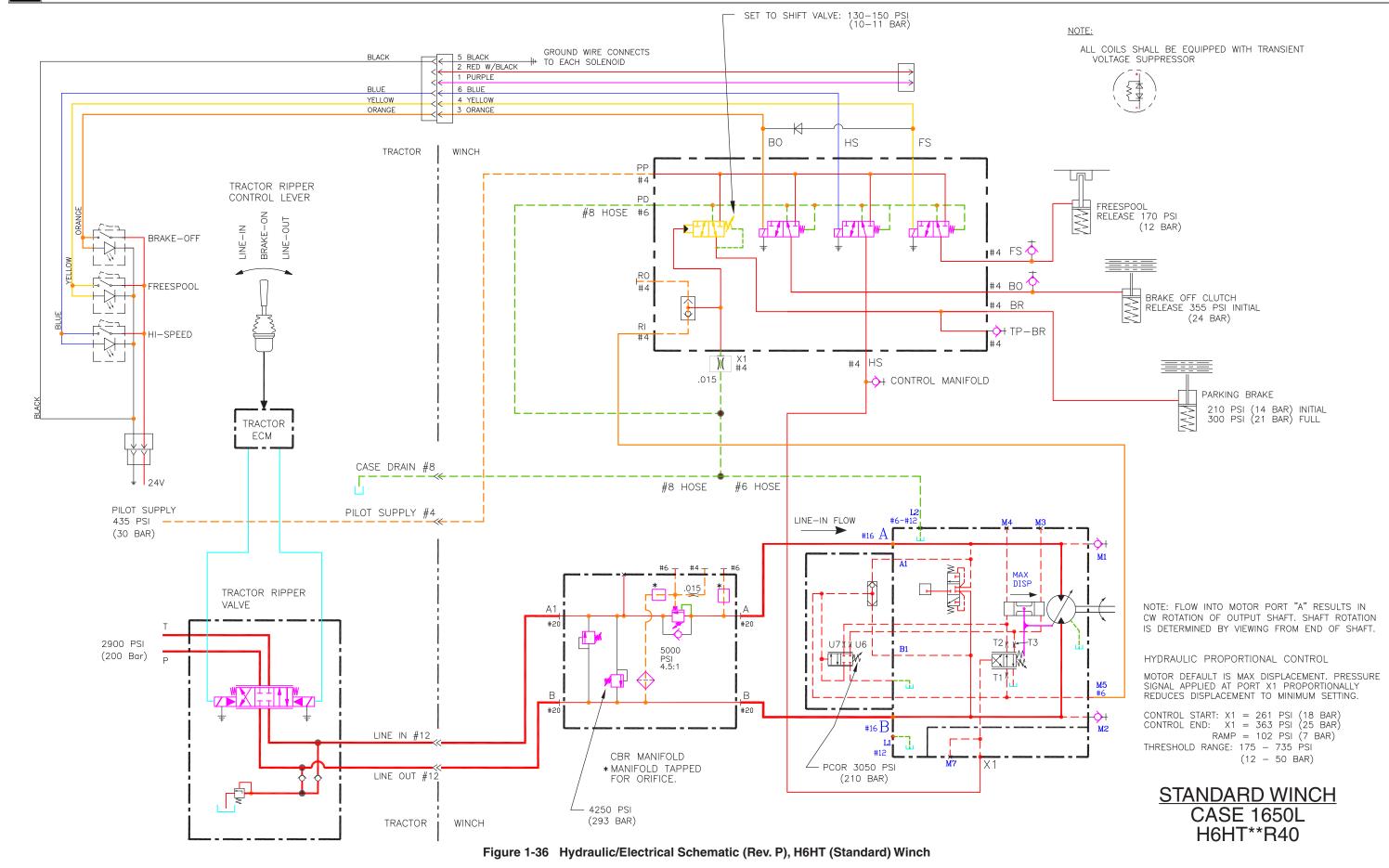


Figure 1-35 Hydraulic/Electrical Schematic (Rev. F), H6HH (Hi-Performance) Winch







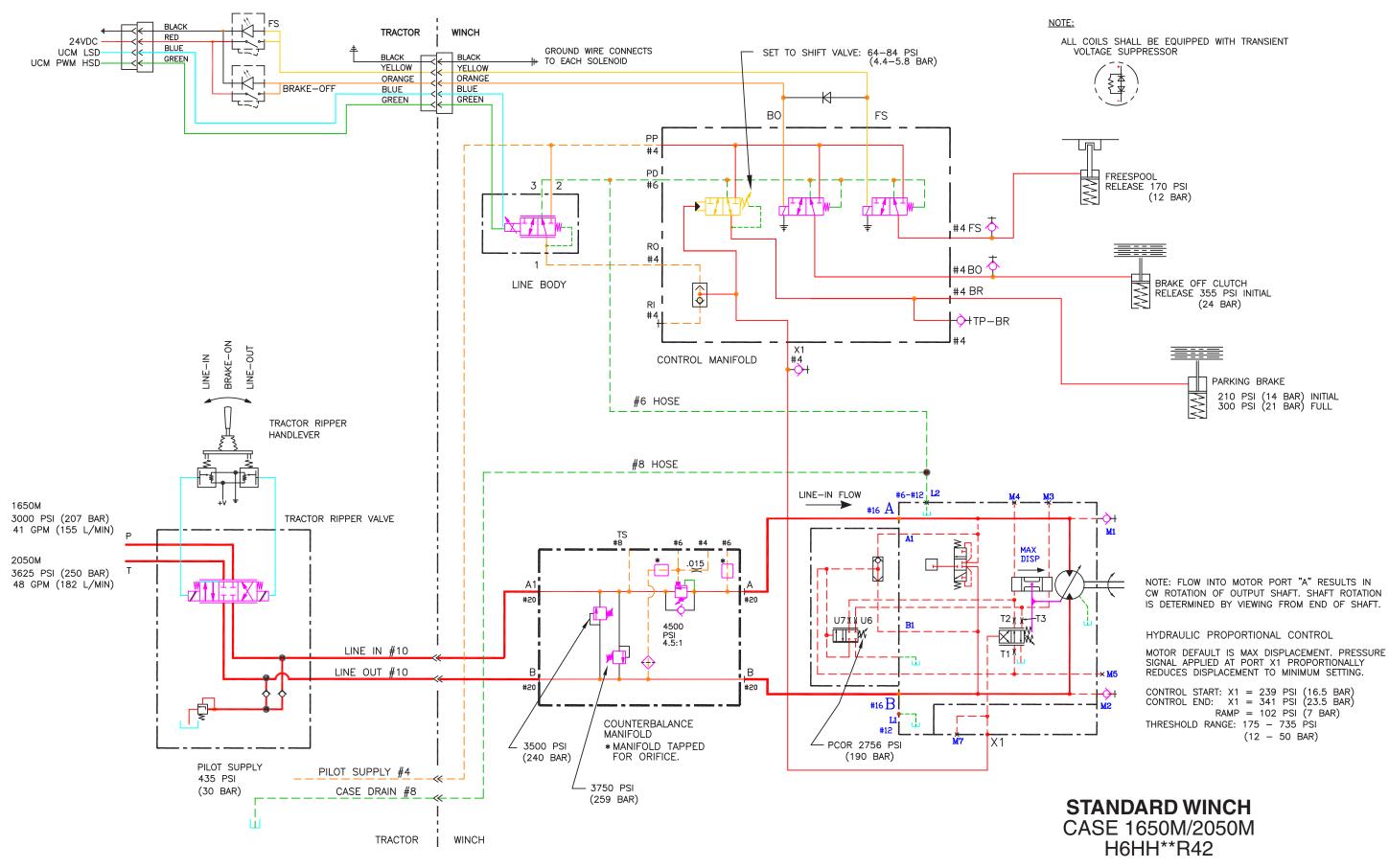


Figure 1-37 Hydraulic/Electrical Schematic (Rev. P), H6HT (Standard) Winch



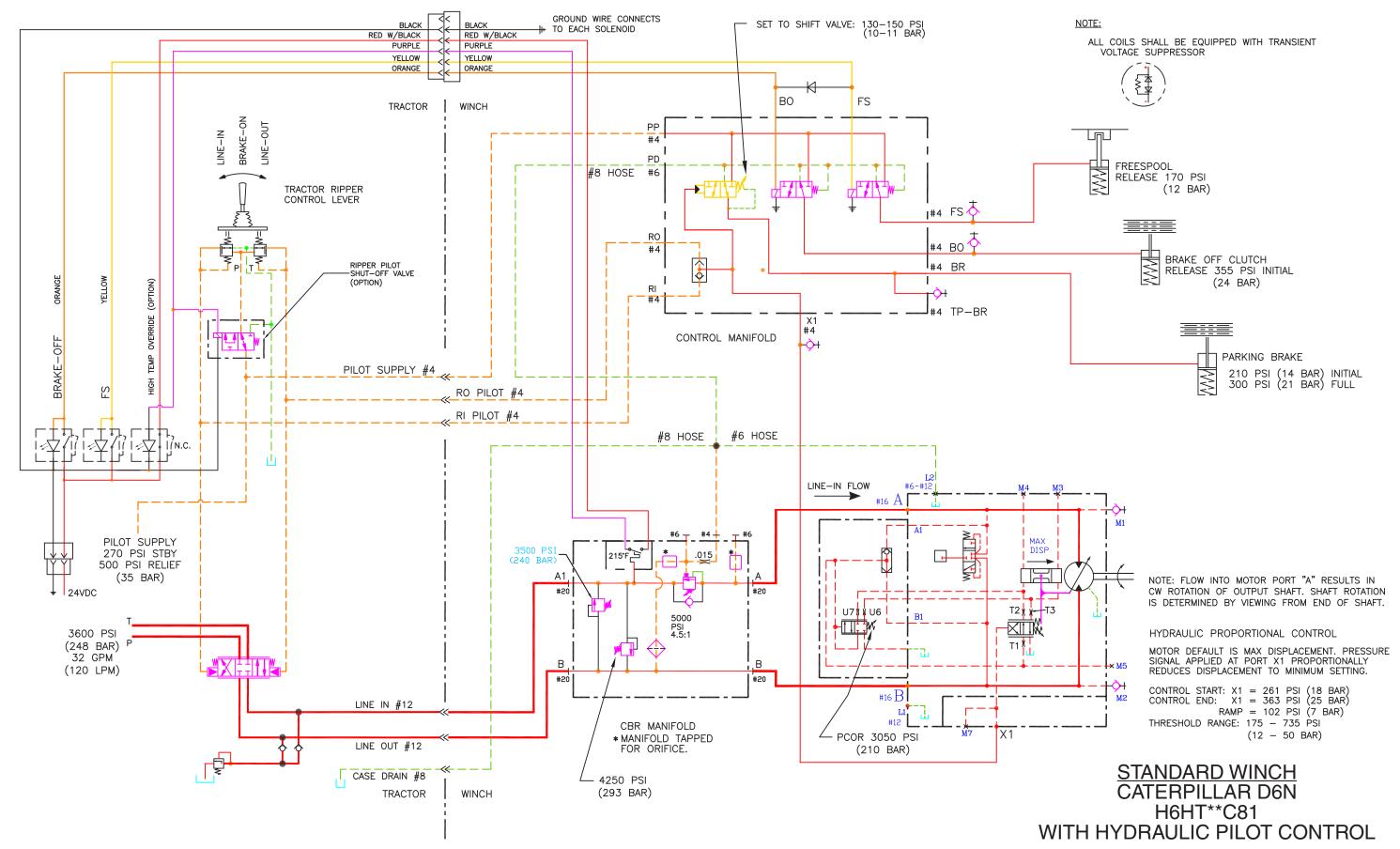
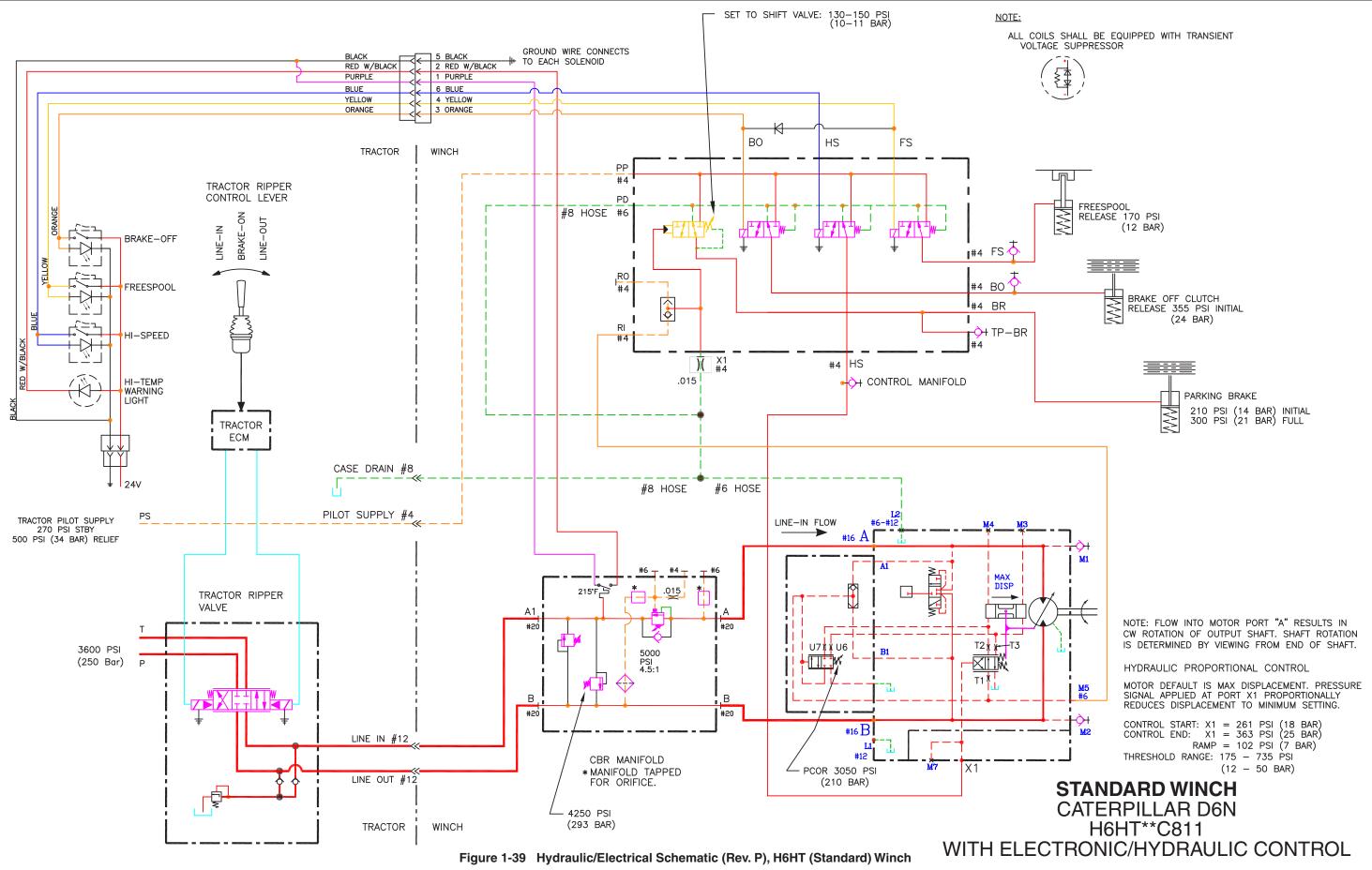


Figure 1-38 Hydraulic/Electrical Schematic (Rev. P), H6HT (Standard) Winch







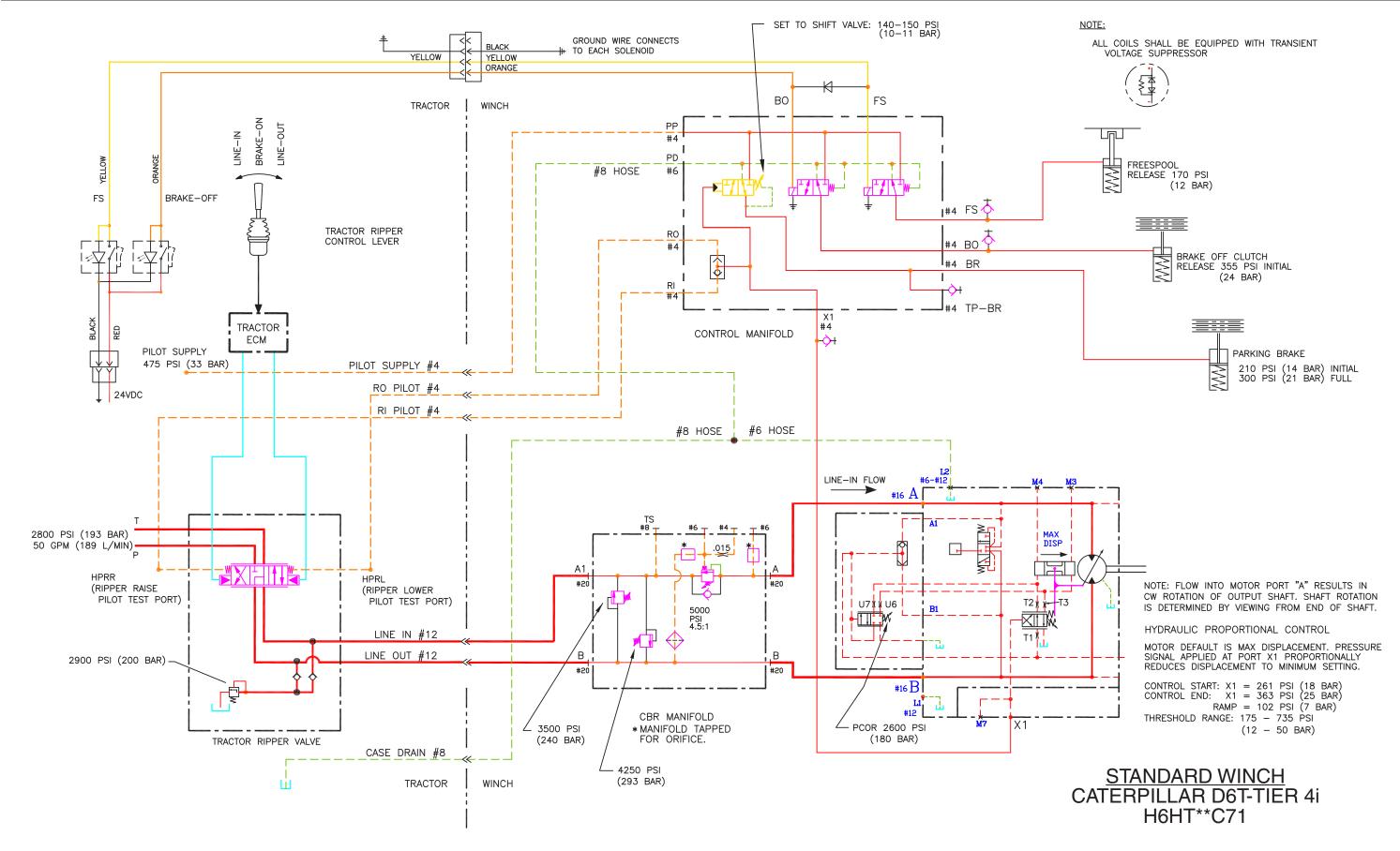
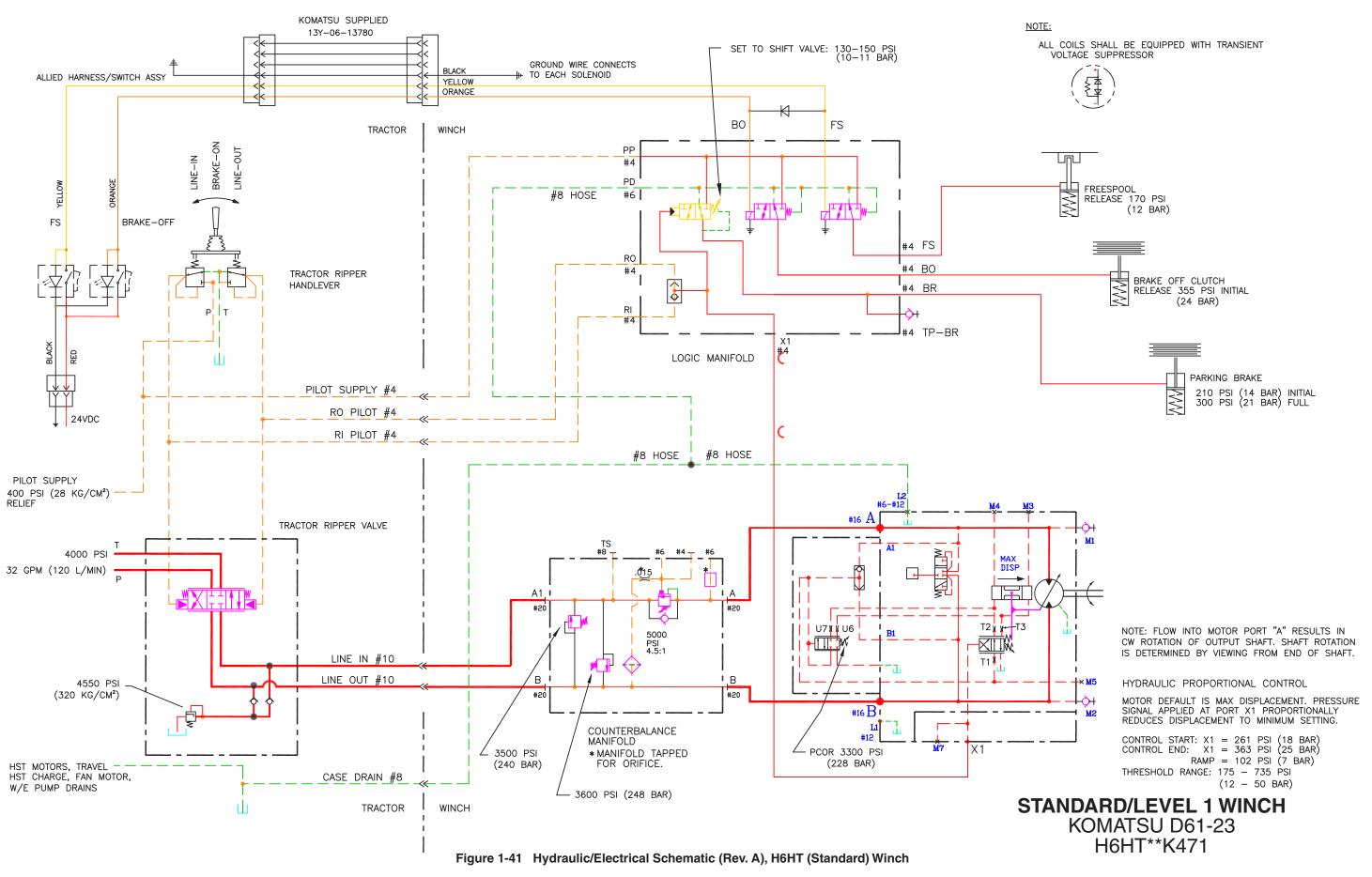


Figure 1-40 Hydraulic/Electrical Schematic (Rev. P), H6HT (Standard) Winch







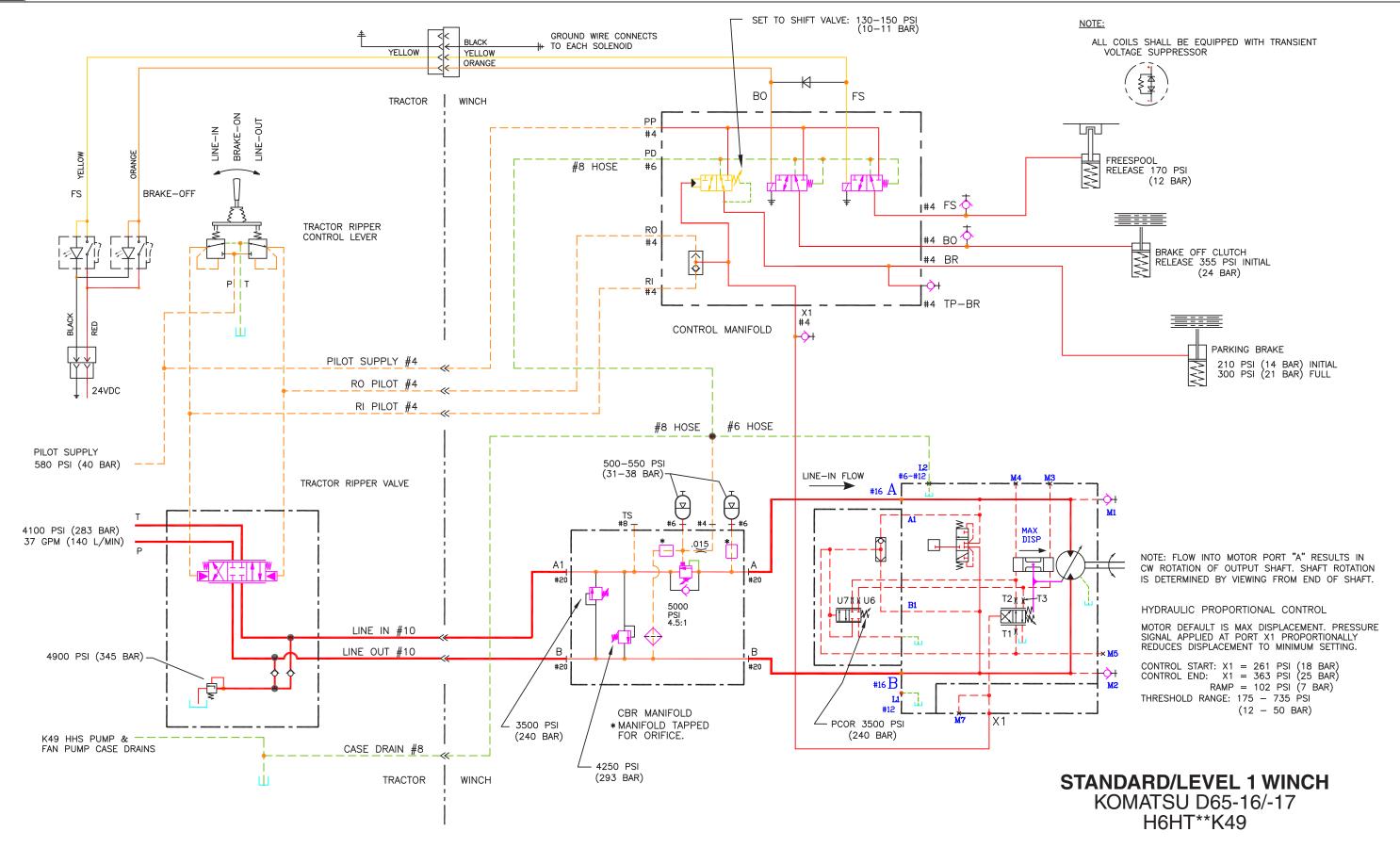


Figure 1-42 Hydraulic/Electrical Schematic (Rev. P), H6HT (Standard) Winch



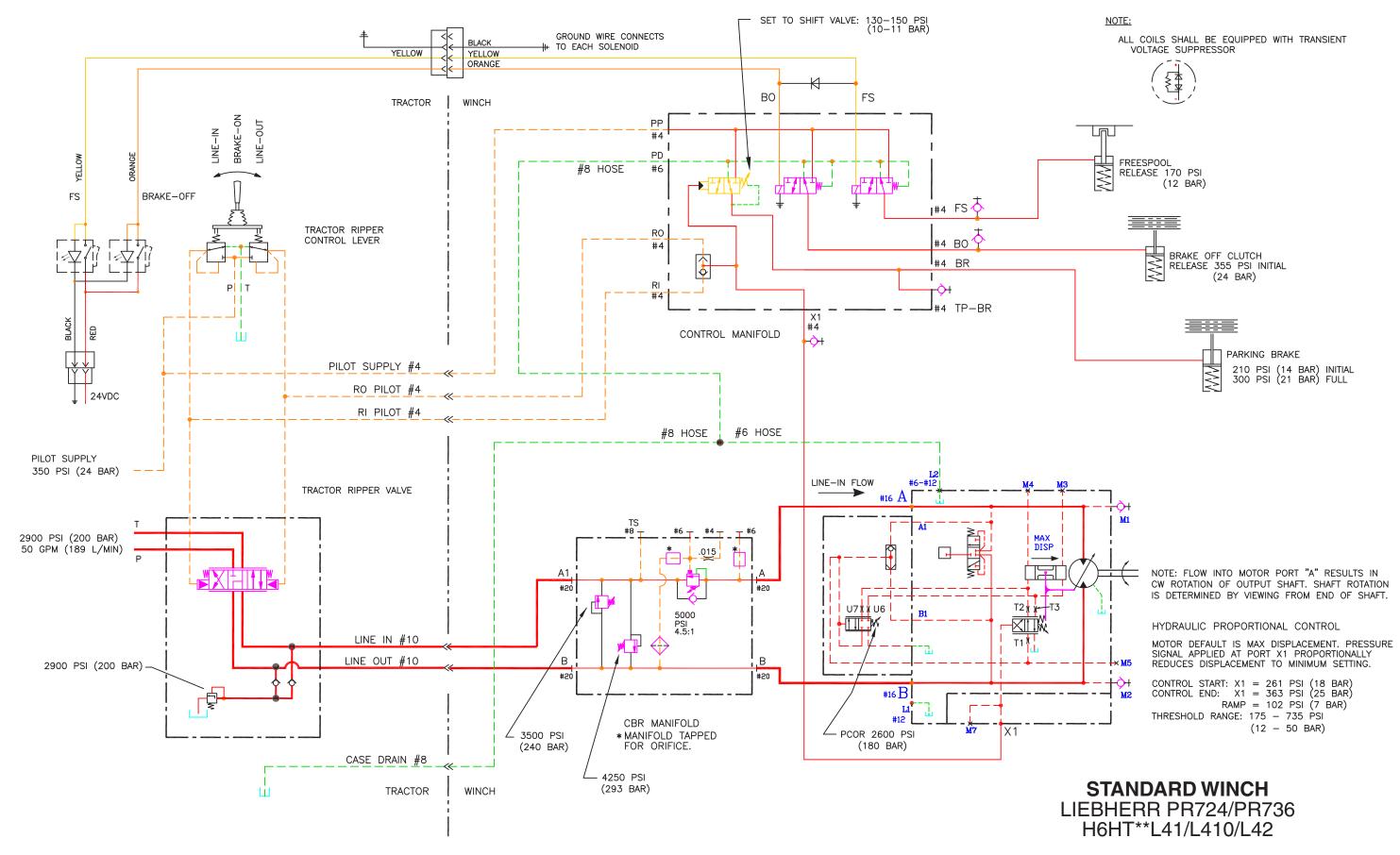


Figure 1-43 Hydraulic/Electrical Schematic (Rev. P), H6HT (Standard) Winch



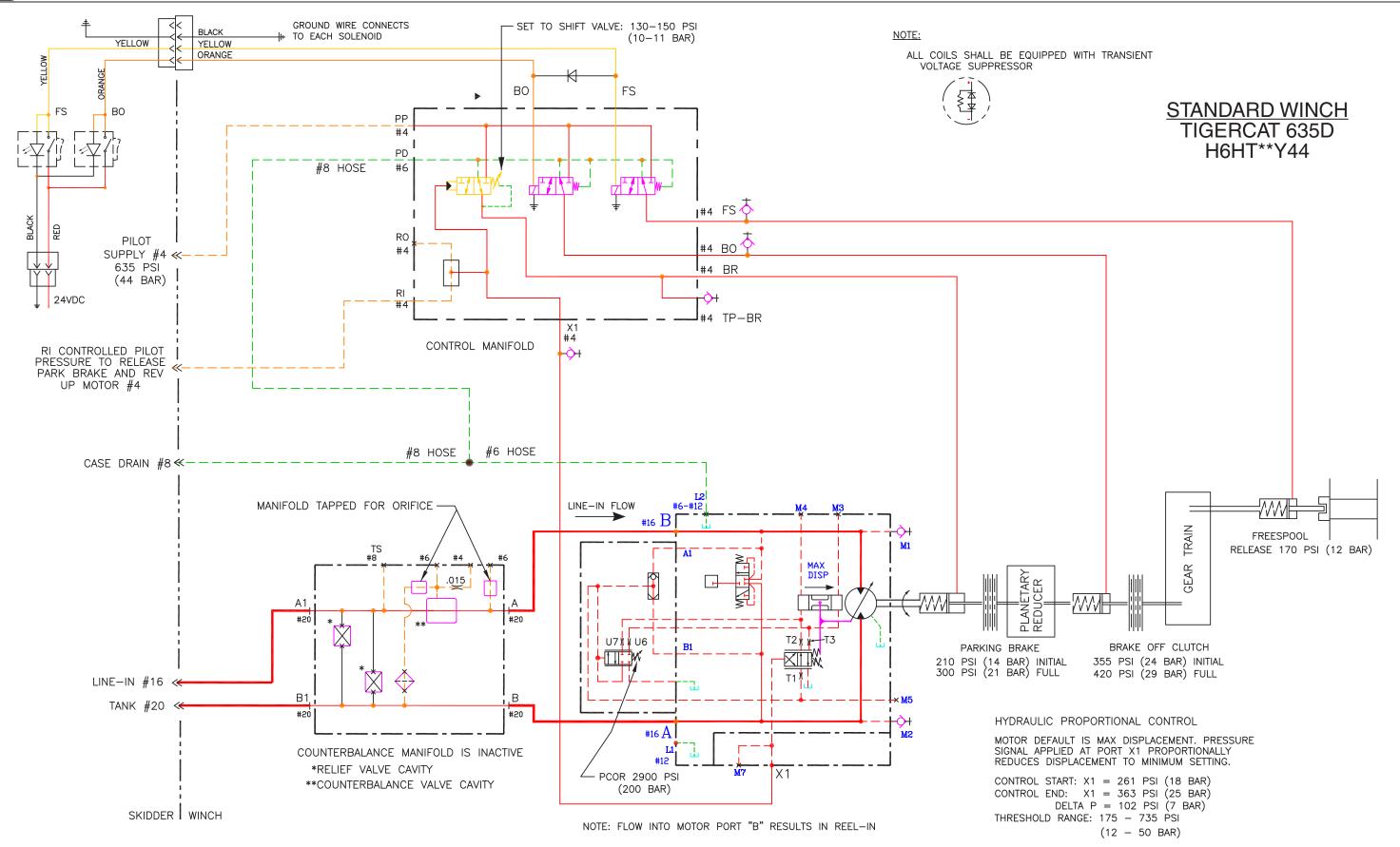


Figure 1-44 Hydraulic/Electrical Schematic (Rev. P), H6HT (Standard) Winch



Notes	Notes	
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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.

- Make sure the control lever (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.
- 3. Check winch hydraulic pressures. Start with control pressures, then check main system pressures.
- 4. Inspect the winch gear train for problems.

CAUTION

For best operation and life, the winch oil operating temperature should not exceed 180°F (82°C). Oil reservoir temperature is monitored at the dozer.

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 tractor reservoir.	
		Yes	Proceed to step 1.2.
1.2	Is the winch in FREESPOOL?	No	Proceed to step 1.3.
		Yes	Shift winch out of FREESPOOL Function.
1.3	Is there a broken tube, loose fitting, or burst hose?	No	Proceed to step 1.4.
		Yes	Repair the fault.
1.4	Is the brake released?	No	Check brake release circuit or mechanism.
		Yes	Proceed to step 1.5.
1.5	Is the hydraulic hose routing in accordance with the hydraulic schematic?	No	Correct the routing. Refer to the Schematic & installation drawing.
		Yes	Proceed to step 1.6.
Win	ch Control		
1.6	Is control lever valve connected to pilot supply?	No	Connect control lever and check that control signal RI & RO is actually being supplied to the winch.
		Yes	Proceed to step 1.7.
1.7	Is drain pressure less than 44 (winch criteria) psi?	No	Check drain hoses for restriction.
		Yes	Proceed to step 1.8.
1.8	Operate control lever in both directions. Is pressure at RI & RO greater than the pilot pressure of 500-580 psi?	No	Verify that pilot pressure to direction spool will cause the pump to load sense. Return to step 1.6.
		Yes	Proceed to step 1.9.

(Continued on the next page)





1.9 Install gauges at motor ports A & B using 0-5000 psi gauges. Disconnect the brake line and move the control lever in LINE-IN and LINE-OUT .	No	Replace high pressure relief valve cartridge and return to step 1.6.	
	If pressure is below 4100 psi, is it possible to adjust the relief valve? (Refer to Section 3 for more details on pressure check procedures.)	Yes	Adjust high pressure relief valve to 4100 psi. Proceed to step 1.10.
1.10	Re-connect the brake line and put control lever in LINE-IN and LINE-OUT positions. Does winch operate?	No	Check for mechanical faults in the drive beyond the motor shaft.
		Yes	Operate the winch.
2.	Winch is sluggish or erratic		
2.1	Is the control lever 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. See shuttle valve in 2312074 (logic control manifold) & valve 2311592 (brake valve).
		Yes	Operate the winch.
3.	Winch drives in one direction only.		
3.1	With the control lines switched does the winch drive in opposite	No	Proceed to step 3.2.
	direction only?		Control signal from one side of control lever does not work properly. Repair as necessary.
3.2	With control lines still switched does winch drive in initial direction only?	No	Proceed to step 3.3.
		Yes	Problem is one side of winch direction spool. Proceed to step 3.3.
3.3	3.3 Is there control pressure to the tractor direction spool as well as from from RI & RO? Winch begins to drive when the pressure at RI or RO is 130-150 psi.	No	Correct control signal problem.
		Yes	Operate the winch.



Troubleshooting Analysis Check Chart

PROBLEM	POSSIBLE CAUSE	CORRECTION
Winch gets very hot	Low oil level.	Add oil; refer to tractor oil specifications.
	Improper oil viscosity.	Use correct oil grade; refer to tractor oil specifications.
	Winch coated with dirt.	Clean winch.
	Clogged filter or strainer.	Replace tractor filter.
	Clogged cooler.	Clean cooler.
Operation is rough	Low oil level.	Add oil; refer to tractor oil specifications.
	Low pilot pressure.	Normal pressure is above 500 psi. Look for leaks in hydraulic system. If none are found, see Pilot Supply Reducing Valve Adjustment.
	Wire rope jumps layers on drum.	Spool cable more evenly.
Winch chatters in LINE-OUT operation (lightly loaded or no load)	Incorrect accumulator charge.	Check charge pressure.
Operation is noisy	Incorrect oil used.	Drain reservoir and re-fill with correct oil; refer to tractor oil specifications.
	Air in the hydraulic oil (indicated by foaming or milky-colored oil).	Replace oil and inspect for leaks and other sources of air induction.
	Motor damaged.	Some noise is normal. However, excessive clattering could indicate damage. Inspect pump and motor thoroughly.
	Gear or bearing damage.	Visually inspect & repair as needed.
Winch chatters in LINE-OUT operation (lightly loaded or no load)	Incorrect accumulator charge.	Check charge pressure.
Drum continues to rotate after lever is returned to BRAKE-ON	Direction spool not shifting to centered position.	Direction spool sticking. Clean or replace. Control lever valve plunger sticking. Repair.
	Brake not engaged or worn.	Brake release pressure is not venting. Check for trapped pressure.
	Counterbalance valve stuck open.	Repair or replace valve.
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.	Visually Inspect to 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 300 psi in LINE-IN and LINE-OUT functions. If pilot pressure is too low, check for leaks, faulty control lever, or insufficient pilot supply pressure. See Step By Step Pump and Controller Troubleshooting section in this chapter. If brake is leaking, repair as needed.
	Brake shuttle valve stuck.	Clean or replace as necessary.

Figure 2-1 Troubleshooting Analysis Check Chart -1





PROBLEM	POSSIBLE CAUSE	CORRECTION
Winch will not generate sufficient line pull or does not line in or line out (Continued from previous page)	Leak in hydraulic system other than brake assembly.	Plug brake line and check that pressure at motor port A is 4100 psi, and that pressure at motor port B is 3500 psi.
	Clogged filter.	Tractor filter indicator light will illuminate if filter is clogged. Replace filter. Refer to tractor specifications.
	Wrong oil.	Use correct oil grade; refer to tractor oil specifications.
	Low oil level in reservoir.	Add oil; refer to tractor oil specifications.
	Tractor pump not generating adequate pressure.	Hold blade over relief and measure supply pressure at right side of dozer. If pressure is below 4100 psi see tractor service manual for proper adjustment.
	Damaged freespool components may be causing winch to be stuck in FREESPOOL function.	Inspect freespool shaft for wear or damage, repair or replace as necessary.
	Motor damaged.	Repair or replace motor (refer to Section 4).
BRAKE-OFF function will not operate or is difficult to engage.	Brake-off solenoid is not energized.	Check resistance to ensure it's 35 ohms at the coil. Repair power supply or replace coil and/or solenoid.
	Insufficient control pressure from tractor pilot supply.	 Measure control pressure to brake- off clutch (355 psi to shift). Check for leaks at hydraulic connections. See Pilot Supply Relief Adjustment.
FREESPOOL will not function or is difficult to engage.	Freespool shifter fork or collar stuck.	Remove top cover and inspect shifter fork & collar with FREESPOOL activated. Repair parts if damaged.
	Leakage at hydraulic connection or freespool shaft.	Remove top cover and inspect shifter fork with FREESPOOL activated. Replace seals if leaking.
	Insufficient control pressure from tractor pilot supply.	 Measure control pressure at brake (BR) port and freespool (FS) hose (refer to Section 3). Check for leaks at hydraulic connections.
	Freespool solenoid is not energized.	Repair power supply or replace coil and/or solenoid.
	Air in freespool piston.	Remove top cover, activate FREESPOOL and bleed air at shifter fork fitting.

Figure 2-1 Troubleshooting Analysis Check Chart - 2



PROBLEM	POSSIBLE CAUSE	CORRECTION
HI-SPEED function will not operate.	Insufficient pilot pressure.	Repair pilot supply.
	No pressure at X1 port	Diagnose controller or supply malfunction, and repair as needed.
Winch case oil level too high.	Too much oil added.	Drain oil until level at oil level plug.
Winch case oil level too high and tractor reservoir too low.	Oil leak from freespool hose or piston.	Visually inspect and repair as needed.
Control lever does not automatically return to BRAKE-ON position.	 Plunger seal sticking in control lever. Spring in control lever valve broken. 	Remove and inspect control lever valve. Replace worn parts or entire assembly as necessary.
Winch does not respond to lever movement.	 Leak in the control lever valve. Control valve seized or blocked. 	Check for leaks in control lever valve, and replace if necessary.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.
Line speed is abnormally slow for LINE-IN, LINE-OUT or both.	 Poor pressure signal. Leak in the control lever valve. 	Visually inspect to check for wear on control lever valve. Check for leaks in control lever valve.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.
Control lever handle turns.	Handle parts loose.	Tighten all control lever handle parts.
LEDs in switch panel do not illuminate.	Polarity backward.	Reverse plug connection.
	Faulty LED.	Replace LED.

Figure 2-1 Troubleshooting Analysis Check Chart - 3



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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.

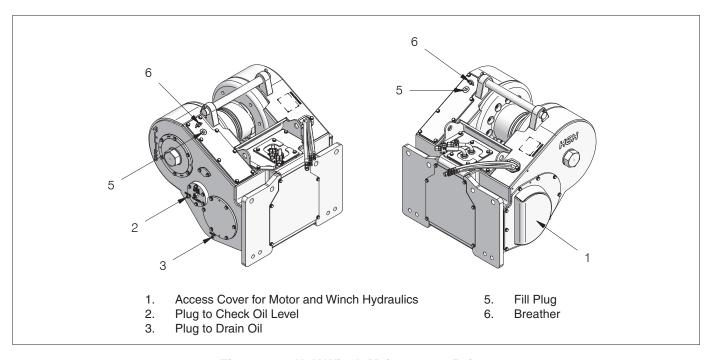


Figure 3-1 H6H Winch Maintenance Points

INTERVAL	PROCEDURE OR QUANTITY	SPECIFICATION
50 hours or weekly	Check oil level at plug (item 2). Add oil as necessary through fill plug (item 5). Do not operate tractor when checking the oil level.	See Oil Specifications in Section 1.
	Clean the breather (item 6).	Remove debris around breather. Clean the breather with solvent if necessary.
	Lubricate the rollers on the integral arch or the fairlead assembly, if the winch is equipped with either of these options.	Use multi-purpose grease with 2-4% molybdenum disulfide.
2000 hours or every 12 months	Change the gear oil. Drain oil from plug (item 3). Add 4 gallons (15 liters) through fill plug (item 5). Check the oil level at oil level check plug (item 2).	See Oil Specifications in Section 1.

Figure 3-2 H6H Winch Maintenance Schedule



Checks Before Operation

Check that the wire rope and hook are not worn or damaged. Check that the periodic inspection and maintenance have been done at the recommended operating hours. See the Maintenance Schedule.

Checks During Operation

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

FREESPOOL Drag Adjustment (Fig. 3-3)

The preload on the bearings of the intermediate shaft controls the resistance to rotation of the drum during **FREESPOOL** operation. 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 setscrew is located in the center of the cover for the intermediate shaft. This screw can be tightened or loosened to adjust the preload on the intermediate shaft. The jam nut will maintain the **FREESPOOL** setting. This adjustment is normally only necessary if the winch has had an overhaul.

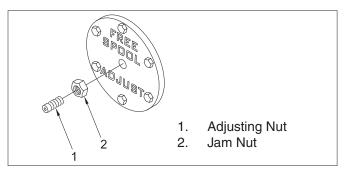


Figure 3-3 FREESPOOL Adjustments

⚠ CAUTION

Setting the preload on the intermediate shaft too tight will cause bearing overload. Setting the preload too loose will allow shaft to not be parallel. Extreme care must be used when adjusting FREESPOOL drag. Determine the correct preload by starting with the preload too loose, and gradually increase the preload until the correct resistance to rotation is achieved. Increase the preload by turning the adjusting screw by a maximum of 1/6 rotation (60 degrees), and striking

the housing with a hammer to make sure the bearing is sliding. Check resistance to rotation after each adjustment.

Hydraulic System Pressure Checks

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

Preparation

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

MARNING

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

MARNING

Always wear gloves when handling wire ropes.

- Start the engine and place the winch in LINE-OUT to raise the oil temperature. Another way to elevate the reservoir temperature is to hold the tractor blade over relief. The oil temperature in the winch or tractor reservoir must be at least 70°F (20°C).
- 3. Remove any dirt from the left side of the winch. Remove control valve access plate.
- 4. Stabilize engine speed at idle RPM for all tests.
- 5. Leave test plugs securely installed unless testing that port.
- After completing all pressure checks and making the necessary adjustments ensure that all plugs and hoses are securely installed.
- 7. Install side covers and tighten capscrews.

Pressure gauges

Six calibrated pressure test gauges are required to perform the hydraulic pressure checks: four 1000 psi



(6895 kPa) and two 5000 psi (34,474 kPa) test gauges.

Pilot Supply Pressure Check

With the engine shut off, connect a 1000 psi gauge to the tractor pilot test port (see tractor Service Manual). Start the engine and follow procedure in Figure 3-5. Adequate standby pilot supply is required for both tractor and winch functions.

If the pressure is not as specified, check for:

- Improper pilot supply valve setting or malfunction (See tractor Service Manual)
- 2. Pump pressure setting incorrect (See tractor Service Manual)
- 3. Leaking pressure hoses or fittings

Directional Valve Pressure Check

With the engine shut off, connect a 5000 psi pressure gauge to Motor Port B. Start the engine and place control lever in **LINE-OUT** to build pressure against the directional valve. Check pressure as indicated in Figure 3-5. Pressure on the B side of the motor is a ratio of the relief setting of the directional valve. If pressure is not to specification, do not adjust valve until remaining pressure diagnostics are performed and other problems are identified.

directional Valve Adjustment:

- Start engine and place control lever in LINE-OUT position.
- Measure pressure at Motor Port B.
- Loosen directional Valve locknut. Turn directional valve adjusting capscrew IN to decrease pressure and OUT to increase pressure. Adjust pressures as shown in Figure 3-5.

Motor Supply Pressure Check

With the engine shut off, connect a 5000 psi pressure gauge to Motor Port A and one 5000 psi gauge to Motor Port B. Disconnect and plug the brake release hose from the brake. This will lock the winch brake to build pressure in the motor. Check pressure as indicated Figure 3-5. If pressure is too high, adjust the relief valve. If it is too low, proceed with pressure diagnostics to identify other possible problems. A damaged motor or pump can cause low pressure at the motor.

Relief Valve Adjustment:

- Leave the brake pressure supply disconnected.
- Start the engine and operate the winch in LINE-IN or LINE-OUT.
- Measure the pressure at Motor Port A for LINE-IN or Port B for LINE-OUT.
- Loosen relief valve locknut. Turn adjusting capscrew OUT to decrease pressure and IN to increase pressure. Adjust pressures as shown in Figure 3-5. When relief A is set at 4100 psi, adjust set screw in additional 1/5 turn and lock in place.
- 5. Reconnect brake pressure supply hose.

Brake Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge to the BR pressure test port on the logic control manifold. Start the engine and operate the winch in **LINE-IN** and **LINE-OUT**. Check pressure as indicated in Figure 3-5. The brake requires 300 psi to release. Low pressure will result in premature wear of the friction discs and added heat generation.

If the brake pressure is not as specified in Figure 3-5, check for:

- 1. Improper pilot supply pressure.
- Malfunctioning control lever; low RI and/or RO pressure.
- 3. Leaking pressure hoses or fittings.
- 4. Restriction in pressure hose or manifold port.

Brake Valve Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge to the BR pressure test port and one 1000 psi pressure gauge to the XI pressure test port on the logic control manifold. Start the engine and slowly meter the control lever into the **LINE-IN** position while monitoring both gauges. BR pressure will jump to full pilot supply pressure when XI reaches the pilot setting of the brake valve. Check pressure as indicated in Figure 3-5. The brake valve sets the overlap between the hydraulic motor drive and brake release. A low setting on the brake release valve will release the brake before the motor begins driving. A high setting on the brake release valve will momentarily drive the motor against the brake before the brake releases.



Service



Brake Valve Adjustment:

- Slowly meter the control lever into the LINE-IN position.
- 2. Measure pressure at BR and XI pressure test ports.
- Loosen brake valve locknut. Turn adjusting capscrew OUT to decrease pressure and IN to increase pressure. Adjust pressures as shown in Figure 3-5.

FREESPOOL Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge on the FREESPOOL pressure and BRAKE-OFF test ports. Start the engine and measure pressures with the FREESPOOL switch activated. FREESPOOL mode simultaneously sends pilot pressures to the FREESPOOL shifter fork and the BRAKE-OFF clutch. The FREESPOOL shift fork will shift at a minimum of 170 psi. However, the added features of BRAKE-OFF mode

will not be active at this pressure. All pressures should be as specified in Figure 3-5.

If pressures are not as specified in Figure 3-5, check for:

- 1. Improper pilot supply pressure
- 2. Malfunctioning solenoid valve.
- 3. Leaking pressure hoses or fittings
- 4. Restriction in pressure hose or manifold port

BRAKE-OFF Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge to the **BRAKE-OFF** pressure test port. Start the engine and measure pressure with the **BRAKE-OFF** switch activated. All pressures should be as specified in Figure 3-5.

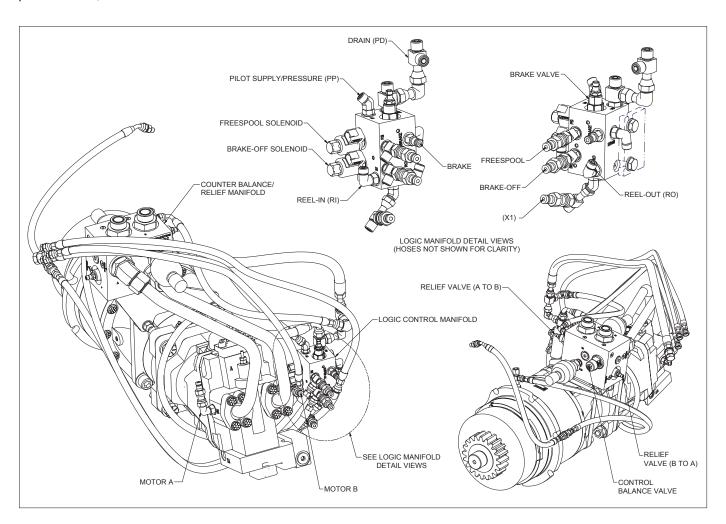


Figure 3-4 Hydraulic Pressure Test Ports (some items removed for clarity)



If pressures are not as specified in Figure 3-5, check for:

- 1. Improper pilot supply pressure.
- 2. Malfunctioning solenoid valve.
- 3. Leaking pressure hoses or fittings.
- 4. Restriction in pressure hose or manifold port.

LINE-IN Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge in line on the RI hose at the logic control manifold. Start the engine and measure pressure with the control lever in the **LINE-IN** position. Pressure should be as specified in Figure 3-5.

If the line in pressure is not as specified in Figure 3-5, check for:

- 1. Improper pilot supply pressure.
- 2. Malfunctioning control lever.
- 3. Leaking pressure hoses or fittings
- 4. Restriction in pressure hose or manifold port

LINE-OUT Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge in line on the RO hose at the logic control manifold. Start the engine and measure pressure with the control lever in the **LINE-OUT** position. Pressure should be as specified in Figure 3-5.

If the line out pressure is not as specified in Figure 3-5, check for:

- 1. Improper pilot supply pressure.
- 2. Malfunctioning control lever.
- 3. Leaking pressure hoses or fittings.
- 4. Restriction in pressure hose or manifold port.

Valve Setting Procedures

Brake release valve

Connect a 1000-psi gauge at the brake test port and another 1000-psi gauge at the RI (reel-in) test port. At engine idle, slowly meter control lever into the reel-in position while monitoring both gauges. Increase control lever stroke until the RI gauge reaches 130-150 psi; brake pressure should jump to full pilot supply pressure (275-650 psi) at this point. If the brake pressure jumps up before the pressure at RI reaches 130-150 psi, adjust valve in until the increase occurs at 130-150 psi. Similarly, if the spike does not occur until the pressure at RI is more than 130-150 psi, adjust valve out until it occurs at 130-150 psi.

Pilot supply reducing valve

See tractor Service Manual.



Hydraulic System Pressure Tests

TEST ITEM	CHECK PORT	TEST EQUIPMENT REQUIRED	CONTROL POSITION	PRESSURE	CORRECTIVE ACTION
Pilot Supply	Tractor Pilot Test Port	1000 psi (6895 kPa) gauge	Tractor blade over relief	See Figure 3-6 below for details.	Adjust tractor pilot reducing valve. See tractor Service Manual.
Counter- balance Valve	Motor Port B	5000 psi (34,474 kPa)	LINE-OUT	700-1000 psi (4827 kPa - 6895 kPa)	Adjust Counterbalance Valve.
Motor Supply	Motor Ports A & B	5000 psi (34,474 kPa)	with brake pressure port blocked.	See Figure 3-6 below for details.	Adjust Load Sense Relief Valve.
Brake	BR: Brake	1000 psi (6895 kPa) gauge	LINE-IN	See Figure 3-6 below for details.	Check plumbing for leakage. Check brake for leakage.
Brake Valve	BR: Brake RI: LINE-IN	1000 psi (6895 kPa) gauge	LINE-IN (see Brake Valve Setting Procedure)	See Figure 3-6 below for details.	Adjust Brake Valve.
FREESPOOL	FS: FREESPOOL BO: BRAKE- OFF	1000 psi (6895 kPa) gauge	FREESPOOL	See Figure 3-6 below for details.	Check plumbing for leakage. Check respective solenoid valves.
BRAKE-OFF	BO: BRAKE- OFF	1000 psi (6895 kPa) gauge	BRAKE-OFF	See Figure 3-6 below for details.	Check plumbing for leakage. Check solenoid valve.
LINE-IN	RI: LINE-IN	1000 psi (6895 kPa) gauge	LINE-IN	See Figure 3-6 below for details.	Check handlever.
LINE-OUT	RO: LINE-OUT	1000 psi (6895 kPa) gauge	LINE-OUT	See Figure 3-6 below for details.	Check handlever.

Figure 3-5 Hydraulic System Pressure Tests

TR	ACTOR CODE	Option	Motor Supply Pressure (S) psi	RI start (psi)	Tractor Pilot (P) psi
C71	CAT D6T	Т	2800	140-150	420-500
C81/811	CAT D6N	Т	3600	120-140	420-500
E460	JD 750/850J/K	Н	3500	140-160	300-650
E460	JD 750/850J/K	Т	3500	140-160	300-650
K49	Kom D65-16/17	Т	4050	130-150	500-580
K471	Kom D61-23	Т	3974	130-150	370-400
K471	Kom D61-23	Н	5555	80-100	370-400
L41	Liebherr PR724	Т	2900	130-150	290-350
L41	Liebherr PR724	Н	4061	130-150	360-420
R40	CNH 1650L	Т	2870	120-140	420-450
R42	CNH 1650M/2050M	Т	3000/3625	64-84	420-450

Figure 3-6 Hydraulic System Pressure Values





Notes

Service



Notes



Repairs

General

This section includes the removal and disassembly of all major assemblies, inspection of components, and reassembly and installation. The wear points detailed in Figure 4-8 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. Drain the oil from the winch.
- 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.
- Remove the wire rope from the drum. Clean the outside of the winch and the area where the winch contacts the tractor.

MARNING

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.

- 4. Disconnect hoses and wire harness from tractor.
- 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 1500 kg (3000 lb.).

6. Remove the mounting hardware securing winch to tractor.

NOTE: When removing the mounting nuts or capscrews, loosen all nuts slightly, then pry winch away from mounting pad. Loosen all nuts again and pry winch again. Continue this sequence until winch can be removed.

Winch Disassembly

Most repairs require disassembly of the winch, although many major assemblies can be removed from the winch with the winch still on the tractor. The procedures in this section describe a complete unit overhaul with the winch removed from the tractor.



Repairs - Intermediate & FREESPOOL Shaft Removal



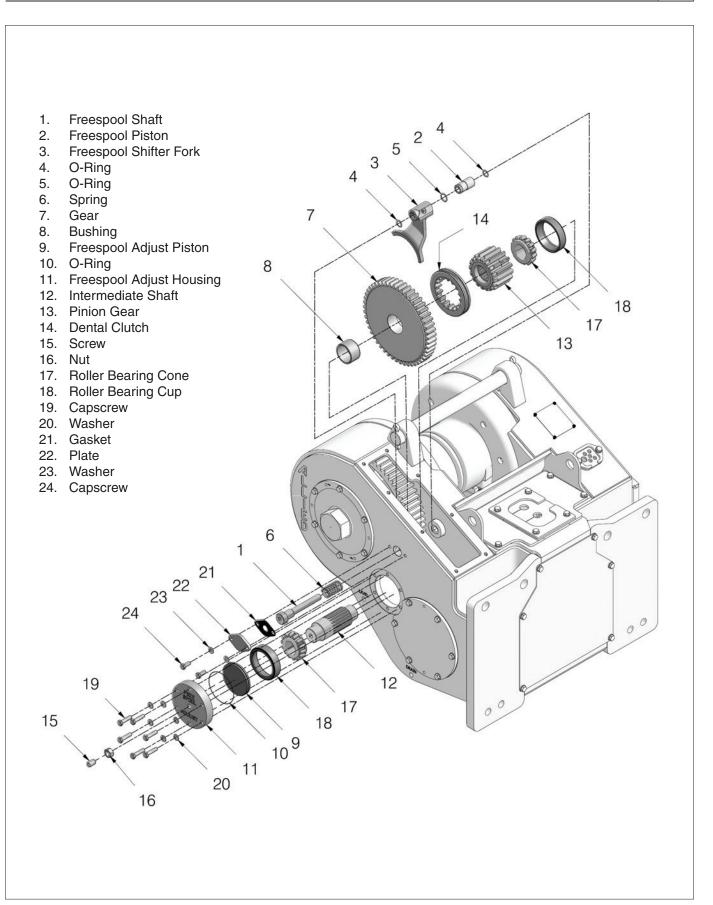


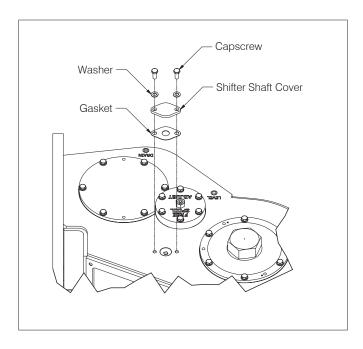
Figure 4-1 Location of Intermediate and FREESPOOL Shaft Components



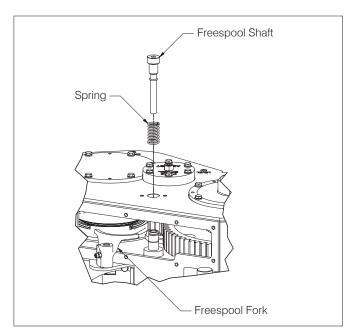
Intermediate and FREESPOOL Shaft Removal

The intermediate and FREESPOOL shafts can be removed with the winch mounted on the tractor.

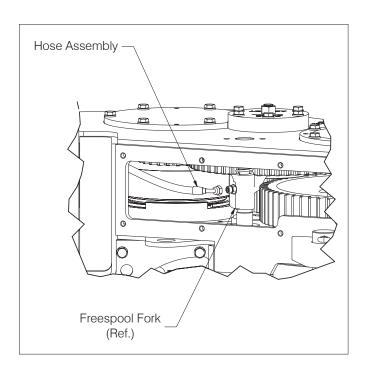
1. Remove the capscrews securing the shifter shaft cover and take the cover off.



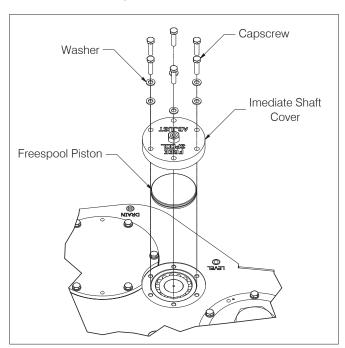
3. Withdraw the shaft by rotating counter clockwise and remove the fork.



2. Disconnect the hose assembly.



4. Remove the intermediate shaft cover and FREESPOOL piston.

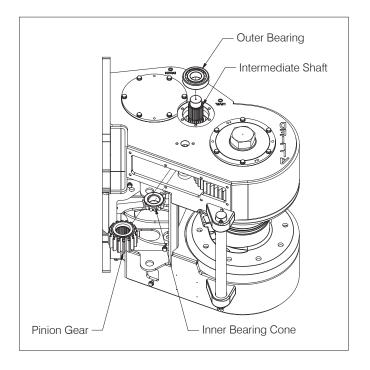


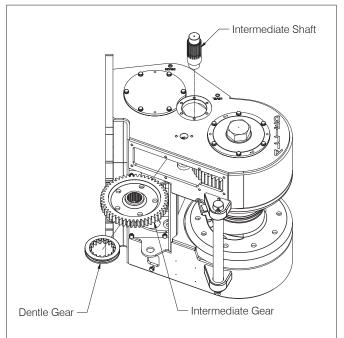
Repairs - Intermediate & FREESPOOL Shaft Removal



- 5. Tag shims for reference during reassembly (not shown).
- 6. Screw a 3/4-16 UNF slide hammer into the end of the intermediate shaft and partially pull it out.
- 7. Remove the pinion gear and the inner bearing cone. Refer to Figure 4-1 for the location of components.
- 8. Remove bearing cup and cone and the intermediate shaft, while ensuring that the intermediate gear does not fall.
- 9. Remove intermediate gear.

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







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Repairs - Drum Shaft & Drum Removal



Drum Shaft & Drum Removal

Figure 4-2 shows the location of drum and drum shaft components. Do not attempt to remove heavy components such as the drum or drum gear by hand. Always use a lifting device and the recommended attachments

whenever possible. To remove the drum gear it will be necessary to first remove the intermediate shaft (see Intermediate & FREESPOOL Shaft Removal section).

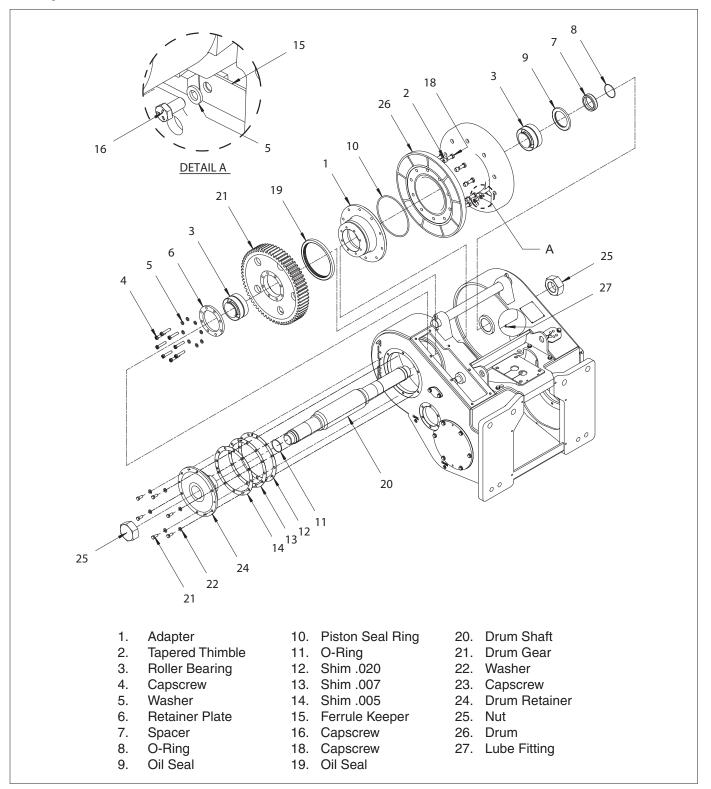
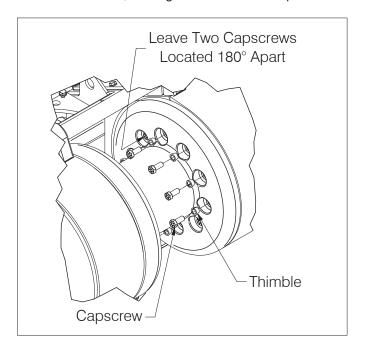


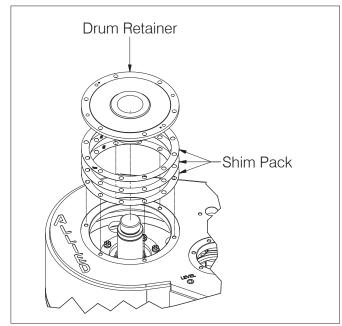
Figure 4-2 Location of Drum and Drum Shaft Components



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

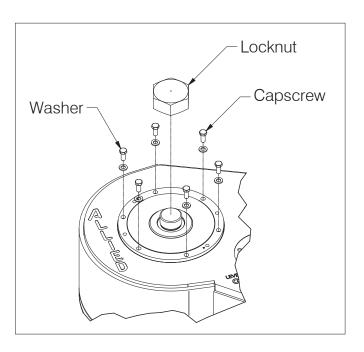


3. Remove bearing retainer and shim pack.

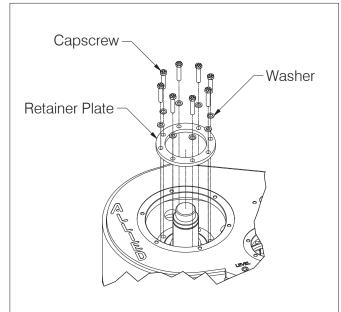


NOTE: Tag shim pack for reference during reassembly.

2. Remove drum shaft locknut, the retainer capscrews and washers.



4. Remove retainer ring by removing retainer capscrews and washers.

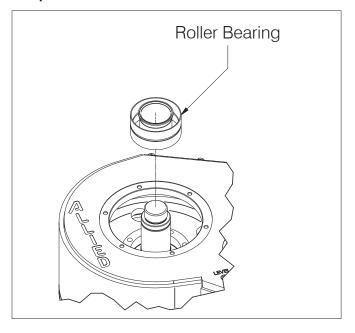


Repairs - Drum Shaft & Drum Removal

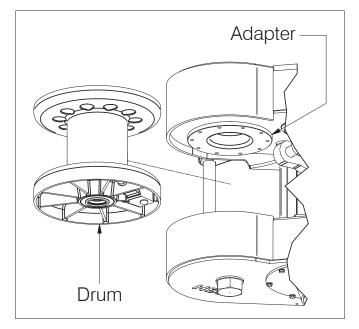


5. Remove roller bearing.

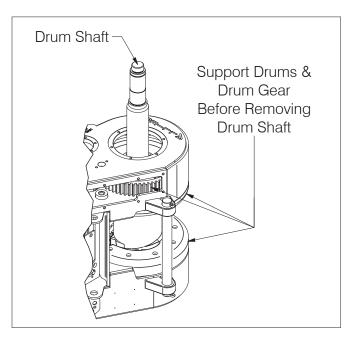
NOTE: Bearing, cups and spacers are a matched set, and must not be interchanged with other bearing set components.



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



- 6. Attach a sling around the drum and hoist until there is no slack, then drive the shaft out the right hand side.
- 9. Remove adapter and oil seal. Discard the oil seal.



Adapter Oil Seal

Adapter

Adapter

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

7. Remove two remaining drum capscrews.



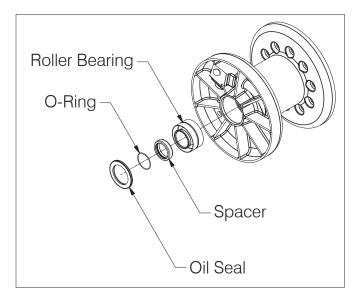
10. Remove and discard the piston seal ring from the right-hand side of the drum.



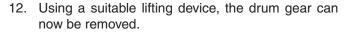
NOTE: This seal must be replaced with a new Allied Systems Company-approved seal during reassembly.

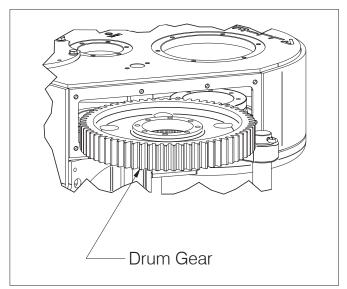
 Remove double tapered roller bearing assembly, spacer with O-ring, and oil seal from the left-hand end of the drum. (Remember: Oil seal lip should be pointed in.)

NOTE: Bearing, cups and spacers are a matched set, and must not be interchanged with other bearing set components.



NOTE: Refer to Figure 4-2 on page 4-5 for location of components.





Repairs - Hydraulic System Disassembly



Hydraulic System Disassembly

Disconnecting the hoses is necessary in order to remove the motor shaft assembly. For easier re-installation, be sure to clearly mark the hose ends of any hoses removed with their corresponding ports.

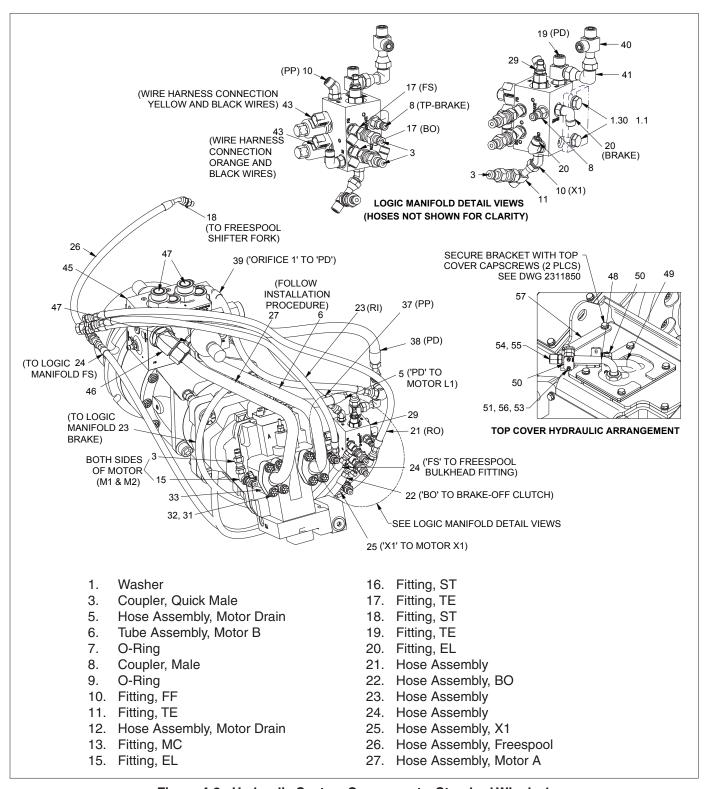


Figure 4-3 Hydraulic System Components, Standard Winch_1



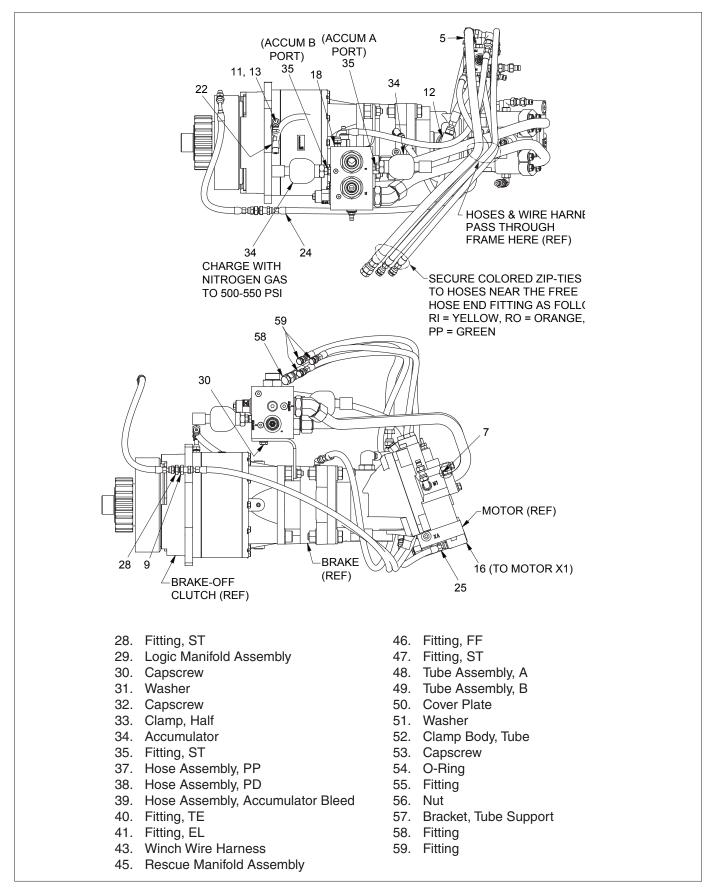
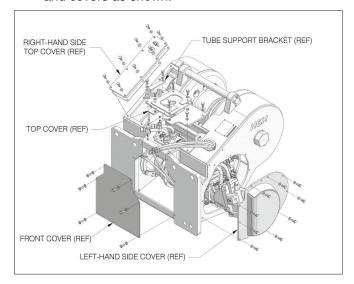


Figure 4-4 Hydraulic System Components, Standard Winch_2

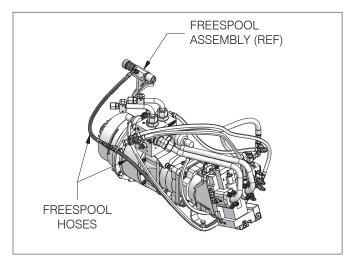
Repairs - Hydraulic System Disassembly



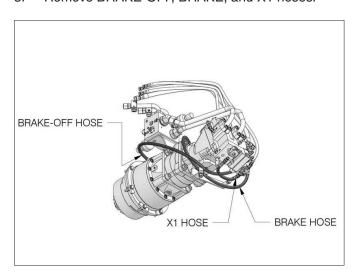
1. Drain oil from winch, remove tube support bracket, and covers as shown.



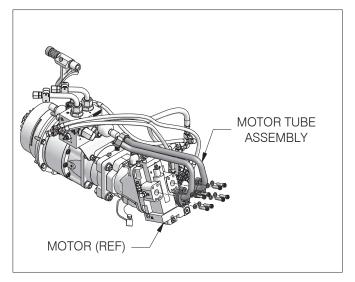
2. Remove the two freespool hoses. (Other parts not shown for view clarity.)



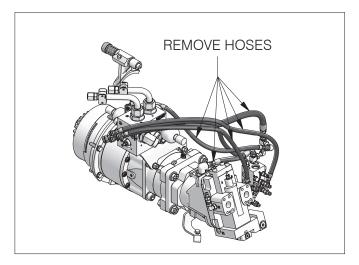
3. Remove BRAKE-OFF, BRAKE, and X1 hoses.



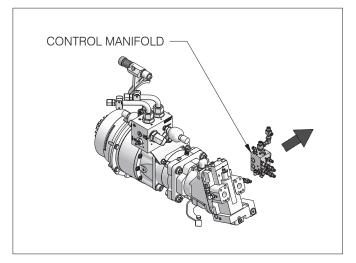
4. Remove motor tube assembly at Ports A and B on the motor.



5. Remove remaining hoses.

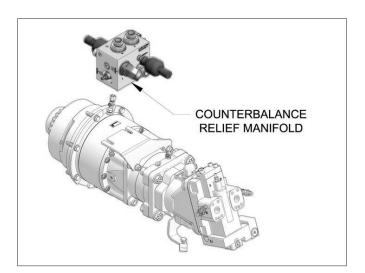


6. Remove the control manifold.





7. Remove the counterbalance relief manifold.



Repairs - Motor Shaft Removal & Disassembly



Motor Shaft Removal and Disassembly

Removal and disassembly of the motor shaft assembly can be accomplished while the winch is mounted on the tractor. The motor and brake can be removed without removing any other components (other than various hoses and fittings), but taking out the planetary reducer and clutch housing requires removing the Freespool Shifter Fork and Intermediate Shaft and Gear first (see Intermediate & FREESPOOL Shaft Removal section). Inspect all parts for damage and wear as specified in Figure 4-8.

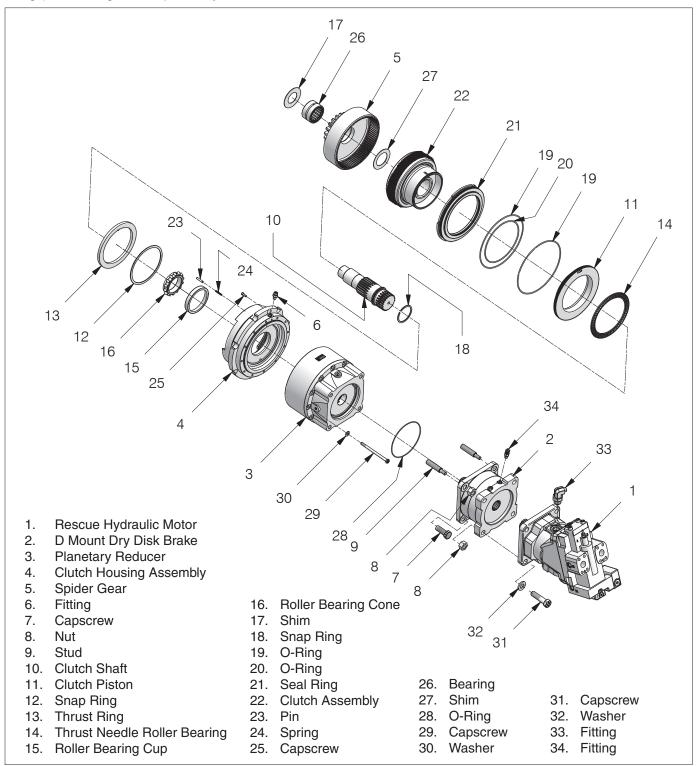
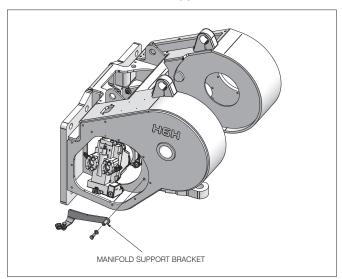


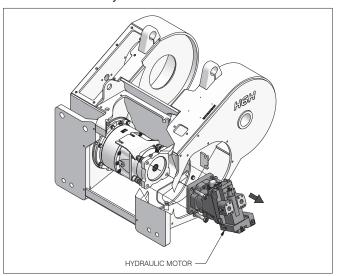
Figure 4-5 Motor Shaft Components (Shown with BRAKE-OFF Option)



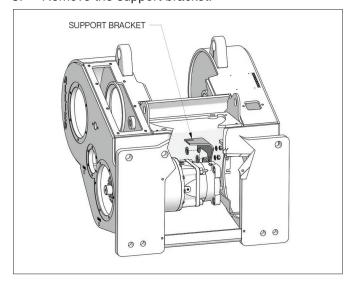
1. Remove the manifold support bracket from frame.



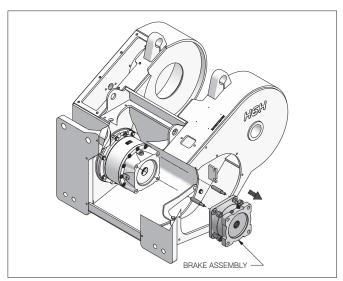
2. Remove the hydraulic motor.



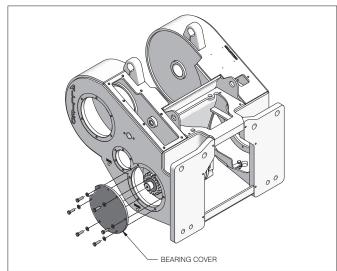
3. Remove the support bracket.



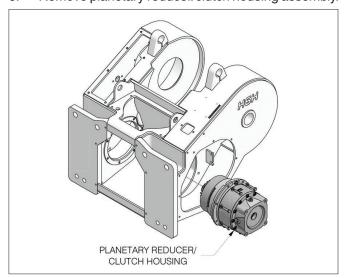
4. Remove the brake.



5. Remove the cover plate.



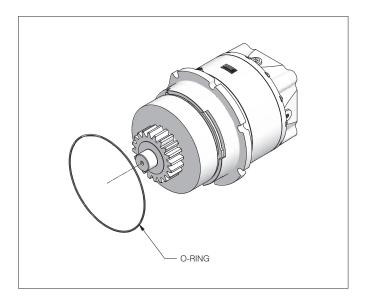
6. Remove planetary reducer/clutch housing assembly.



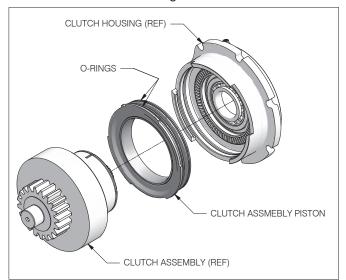
Repairs - Motor Shaft Removal & Disassembly



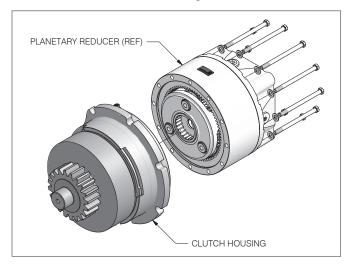
7. Remove and discard the O-ring.



9. Remove the clutch assembly piston and seal ring from the clutch housing.



8. Remove the clutch housing from the reducer.





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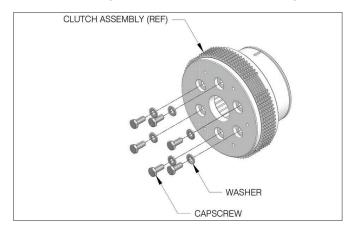
Repairs - BRAKE-OFF Clutch Disassembly



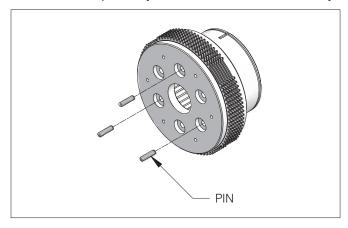
BRAKE-OFF Clutch Disassembly

NOTE: Disassembling the clutch while it's still under its warranty period immediately invalidates the warranty. If the clutch malfunctions before its warranty period expires, please contact Allied Systems Company first before attempting to repair it.

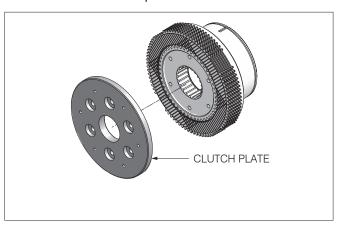
1. Remove capscrews and washers from the plate.



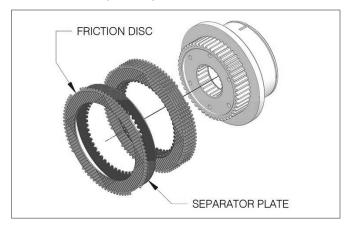
2. Remove pins from the clutch hub. Mark the holes where the pins stay for reference when reassembly.



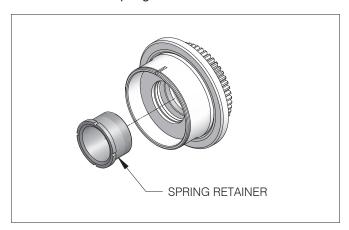
3. Remove the clutch plate.



4. Remove separator plates and friction discs.



5. Remove the spring retainer from the clutch hub.

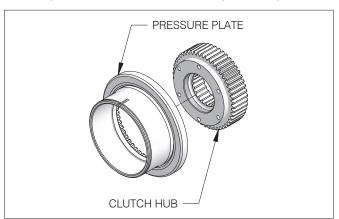


6. Remove springs for the pressure plate.





7. Separate the clutch hub and the pressure plate.



Repairs - Brake Disassembly



Brake Disassembly

NOTE: Disassembling the brake while it's still under its warranty period immediately invalidates the warranty. If the brake malfunctions before its warranty period

expires, please contact Allied Systems Company first before attempting to repair it.

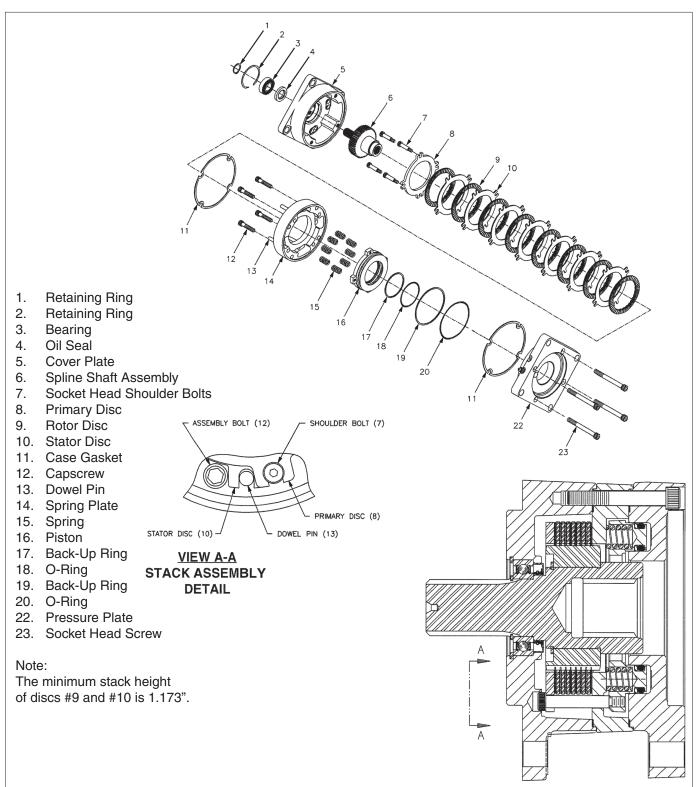


Figure 4-6 Brake Assembly



- Remove the four socket head capscrews (item 23). A suitable holding fixture is useful to keep brake in position.
- Tap female end of spline shaft assembly (item 6) and spring plate (item 14) with a soft mallet to separate cover. If sections will not separate, use a screwdriver to carefully pry sections apart.
- 3. Remove retaining ring (item 1) from spline shaft assembly (item 6).
- Remove spline shaft assembly (item 6) from cover plate (item 5) by tapping male end of spline shaft assembly with soft mallet.
- 5. Remove retaining ring (item 2) from cover plate (item5) and press out oil seal (item 4) and bearing (item3).
- Remove four socket head shoulder bolts (item 7). A suitable holding fixture is useful to hold the brake in position.

! CAUTION

Do not remove shoulder bolts without pressurizing brake to approximately 300 psi, or damage may result.

7. Remove primary disc (item 8), rotor discs (item 9) and stator discs (item 10).

NOTE:

- 1. Primary disc is positioned by shoulder bolts (item 7) and stator discs are positioned on dowel pins (item 13).
- 2. The minimum stack height of discs item 9 and item 10 is 1.173".
- 8. Release pressure to brake before removing four socket head capscrews (item 12).
- 9. Remove spring plate (item 14).
- 10. Remove case gasket (item 11) from spring plate (item 14).
- 11. Before removing springs (item 15), record the pattern and color for reassembly purposes.
- 12. Remove piston (item 16) by carefully applying hydraulic pressure to the brake release port in the pressure plate (item 22).
- 13. Remove O-rings (items 18 & 20) and back-up rings (items 17 & 19) from piston (item 16).

NOTE: Be careful not to scratch or mar piston.

14. Remove case gasket (item 11) from pressure plate (item 22)

Repairs - Planetary Reducer Disassembly



Planetary Reducer Disassembly

NOTE: Disassembling the reducer while it's still under its warranty period immediately invalidates the warranty. If the reducer malfunctions before

its warranty period expires, please contact Allied Systems Company first before attempting to repair it.

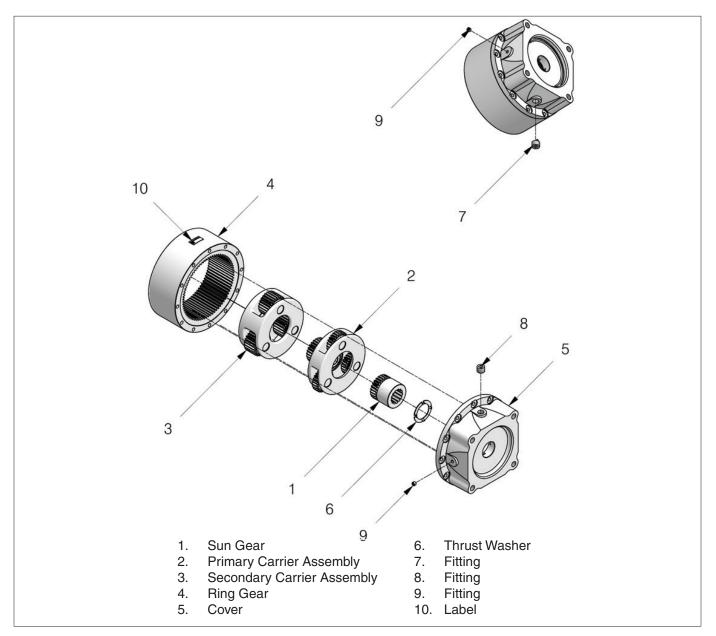


Figure 4-7 Planetary Reducer Assembly

- 1. Remove capscrews and washers (not shown) from cover (item 5). Thrust washer (item 6) usually remains with cover (item 5).
- Lift sun gear (item 1) from primary carrier assembly (item 2).
- 3. Remove primary carrier assembly (item 2) and secondary carrier assembly (item 3) from ring gear (item 4).
- 4. Remove fittings (items 7, 8 & 9) from the cover (item 5).



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Repairs - Winch Assembly



Winch Assembly

All components should be inspected for wear or damage as they are removed. Refer to Figure 4-8, 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 4-8 Visual Inspection -1

ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Brake Assembly	Check for cracked or broken belleville/coil springs.	Replace springs if cracked or broken.
	Inspect housing and covers for leakage or damage.	Replace component if sealing surfaces or splines are damaged.
	Check the rotor discs for wear, distortion, or damage. The discs should be free of hydraulic oil.	Replace the rotor discs if the wear grooves are worn away, the discs are burned, damaged, warped, or exposed to oil. Brake cleaner may be used to clean dust from the discs but will not remove impregnated oil.
	Check the brake/motor shaft seals for leakage into the brake housing.	Replace damaged seals.
	Inspect the brake/motor shaft for wear or damage.	Replace a damaged shaft.
	Check that the stator discs are flat, free of large blue areas (caused by overheating) or damaged surfaces.	Replace damaged stator discs.
	Inspect the piston for damage. Make sure the seal groove and sealing surfaces are in good condition.	Replace a damaged piston. Always replace the piston seals when the brake is repaired.
Planetary Speed Reducer	Check the housing for leakage or damage.	Repair or replace assembly.
	Check output shaft bearing end play.	End play is 0.000-0.006". End play is adjusted using the appropriate thickness retaining ring. See parts manual.
	Inspect sun gear and carrier assembly for damage or wear. Sun gear should spin freely in carrier assembly.	Replace assembly.
Winch Motor	Inspect motor shaft seal for wear or damage.	Note: A leaky motor shaft seal will contaminate the brake with oil and the brake will likely require service. Replace seal.



Figure 4-8 Visual Inspection - 2

ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Direction Control Manifold	Check that all passages and cartridge valves are free of contaminants.	Clean or replace cartridge valves. Clean all hydraulic passages.
Logic Control Manifold	Check that all passages and cartridge valves are free of contaminants.	Clean or replace cartridge valves. Clean all hydraulic passages.
	Check torque on solenoid coils. Do not over-tighten.	Check that solenoid spool moves freely. Replace cartridge if stiction is present. Torque for solenoid cartridge is 20 ft-lbs. Torque for coil retaining nut is 5 ft-lbs.
FREESPOOL Shifter	Check oil level in winch is not over full. This is an indication that the FREESPOOL hose or piston seals are leaking.	Tighten or replace FREESPOOL shifter hose. Replace piston seals.
FREESPOOL Dental Clutch	Check for broken or worn teeth.	Replace dental clutch if teeth are broken or severely worn.
Intermediate Shaft	Check for deep scratches or scoring on bearing surfaces at each end of shaft.	Dress surface or replace shaft if severely worn.
	Check for broken or severely worn splines.	Replace if splines are broken or severely worn.
Intermediate Gears	Inspect both gears for broken or severely worn teeth. Pay particular attention to leading edges of straight-cut gear teeth.	Replace gears if teeth are broken or severely worn.
Drum Shaft	Check for deep scratches or scoring on bearing surfaces.	Dress surface or replace shaft if severely worn.
	Check O-ring groove and seal surface.	Dress groove or replace shaft if severely worn.
	Check for crossthread or damaged threads.	Dress threads with thread chaser.
Drum Gear	Check for broken or severely worn gear teeth. Pay particular attention to leading edges of straight-cut gear teeth.	Replace gear if teeth are broken or severely worn.
Drum	Inspect quad-ring groove for burrs, scoring and rust.	Replace drum or rebuild drum groove if a new quadring will not seat properly.
Drum Adapter	Carefully inspect double seal contact surface for deep scratches, burrs and rust.	Replace if damaged.
Winch Frame	Check area around drum and drum adapter for damage if cable has slipped between cable guard and winch frame.	Consult the factory.



Repairs - Planetary Reducer Assembly



Planetary Reducer Assembly

NOTE: Disassembling the reducer while it's still under its warranty period immediately invalidates the warranty. If the reducer malfunctions before

its warranty period expires, please contact Allied Systems Company first before attempting to repair it.

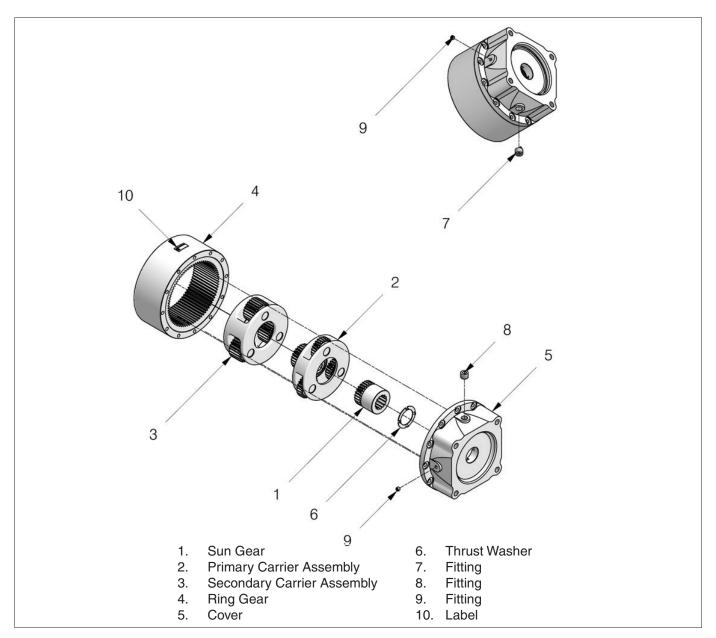


Figure 4-9 Planetary Reducer Assembly



- Clean mating surfaces and apply a bead of silicone sealant to the face of the hub that mates with the ring gear (item 4). See instructions on sealant package.
- Place the gear of primary carrier assembly (item 2) into secondary carrier assembly, and place both assembly into ring gear (item 4) while aligning gear teeth.
- 3. Place sun gear (item 1) into primary carrier assembly (item 2). Sun gear should turn freely by hand.
- 4. Apply a bead of silicone sealant to cover face of ring gear (item 4).
- 5. Secure thrust washer (item 6) with tangs engaged in cover (item 5).

NOTE: Washer can be secured to cover with a small amount of grease or silicone sealant. Install the cover and align with hub such that pipe plug holes on cover align with mounting holes on hub.

- 6. Install washers and capscrews (not shown) and torque to 40-45 lb. ft. (54-61 Nm) with dry threads. Lubed threads torque to 20-25 lb. ft (27-34 Nm).
- 7. Position filler opening horizontally and fill unit to oil level hole in cover. Install fittings (items 7, 8 & 9) in cover (item 5).

Repairs - Brake Assembly



Brake Assembly

NOTE: Disassembling the brake while it's still under its warranty period immediately invalidates the warranty. If the brake malfunctions before its warranty period

expires, please contact Allied Systems Company first before attempting to repair it.

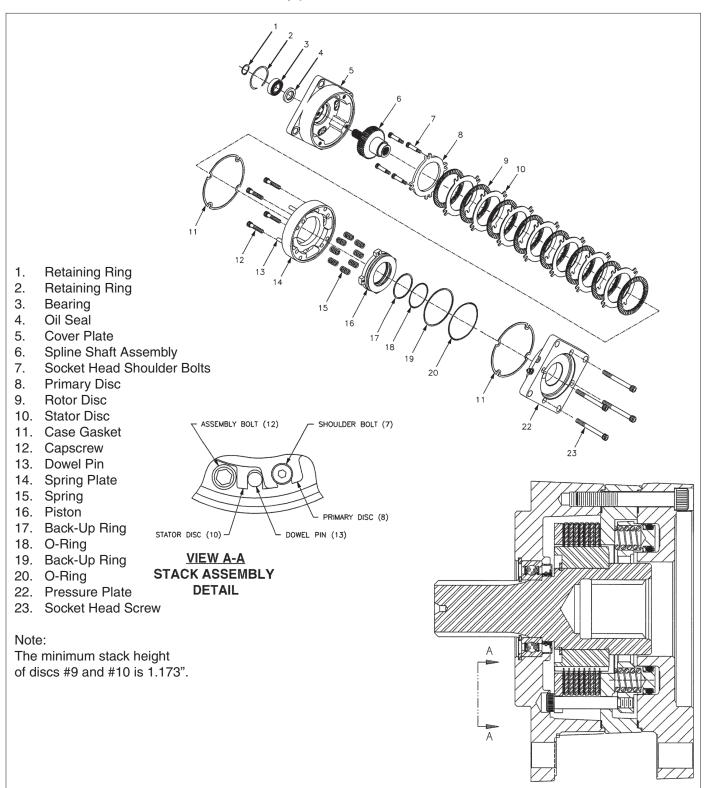


Figure 4-10 Planetary Reducer Assembly



NOTE: Lubricate all rubber components with clean hydraulic fluid before reassembly.

- 1. Clean all parts thoroughly before assembling.
- Press oil seal (item 4) into cover plate (item 5) until flush with bearing shoulder. NOTE: Oil seal must be installed with open side facing pilot end of cover.
- 3. Press bearing (item 3) into position until it bottoms out on oil seal borestep.
- 4. Install retaining ring (item 2) into cover plate.
- Press spline shaft assembly (item 6) into bearing (item 3) until shaft bottoms on shaft shoulder. Bearing inner race must be supported during this operation.
- 6. Install retaining ring (item 1) on spline shaft assembly (item 6).
- 7. Install back-up rings (items 17 & 19) on piston (item 16) toward spring pockets.
- Install O-rings (items 18 & 20) on piston (item 16). Be sure O-rings are flat and all twists removed. NOTE: Be careful not to mar or scratch piston.
- Lubricate piston (item 16) with clean hydraulic fluid. Carefully press piston into pressure plate (item 22).
 Be sure piston is positioned so threaded holes in piston are in alignment with through-holes in spring plate (item 14) when installed.

- 10. Install springs (item 15) according to pattern and color recorded during disassembly.
- 11. Affix case gaskets (item 11) to pressure plate (item 22) and spring plate (item 14).
- Place unit on a press. Using a fixture, depress and install four socket head assembly bolts (item 12). NOTE: Apply two drops of Loctite #242 to threads.
- Install stator discs (item 10) and rotor discs (item 9). Begin with a rotor disc and alternate with stator discs. NOTE: The minimum stack height of discs item 9 and item 10 is 1.173".
- 14. Install primary disc (item 8). Align tabs on primary disc with through-holes in spring plate (item 14) and partially screw in four socket head shoulder bolts (item 7). NOTE: Apply two drops of Loctite #242 to threads. Inspect for free movement of stack. Pressurize brake release port to approximately 400 psi to release discs. Torque shoulder bolts 15-18 lb. ft. (20.3-24.4 Nm) and release pressure. A suitable holding fixture is useful to hold brake in position.
- 15. Install cover plate (item 5) using four socket head assembly bolts (item 23). **NOTE: Apply two drops of Loctite #242 to threads.** Torque capscrews 55-60 lb. ft. (74.6-81.4 Nm).

Repairs - BRAKE-OFF Clutch Assembly



BRAKE-OFF Clutch Assembly

NOTE: Disassembling the clutch while it's still under its warranty period immediately invalidates the warranty. If the motor malfunctions before its warranty period expires, please contact Allied Systems Company first before attempting to repair it.

- Assemble clutch without springs & retainer.
- 2. Use clamps to compress frictions & separators between pressure & reaction plates.
- 3. Measure thickness "B".

- 4. Add height "A" to thickness "B". this is height "C".
- 5. Install retainer to height "C". (advancing retainer one tooth, decreases height 0.004).
- 6. Advance retainer three additional teeth & align with hub splines.
- 7. Draw a line across adjacent teeth with marker.
- 8. Measure height "D".

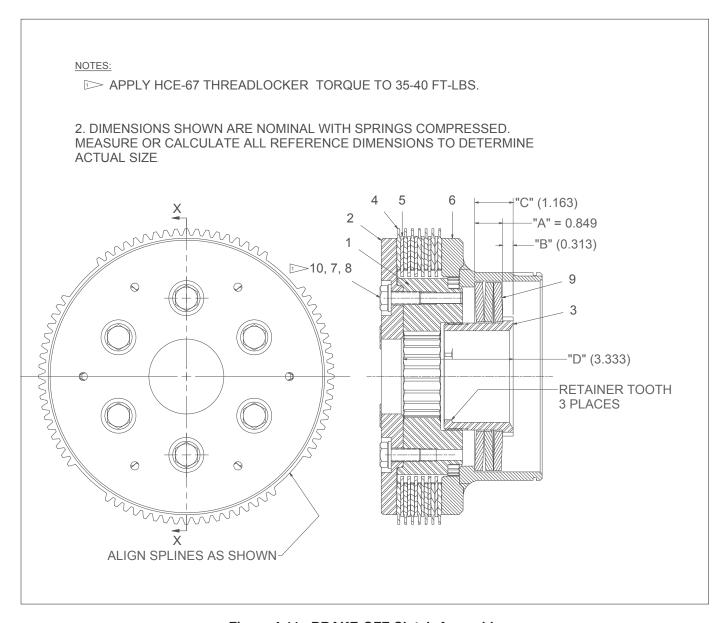
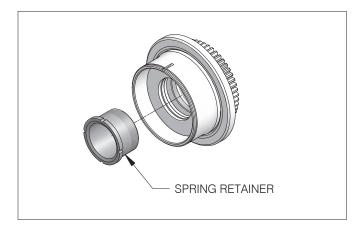


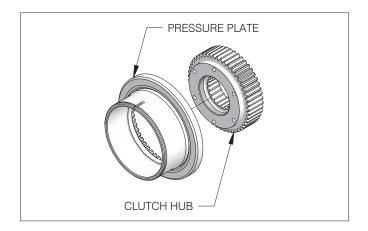
Figure 4-11 BRAKE-OFF Clutch Assembly



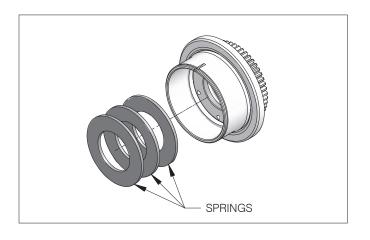
9. Remove retainer noting the number of turns required for removal.



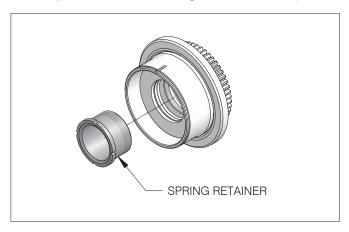
- 10. Disassemble clutch.
- 11. Assemble hub & pressure plate.



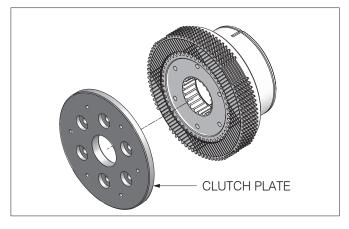
12. Install springs in series so that they oppose each other.



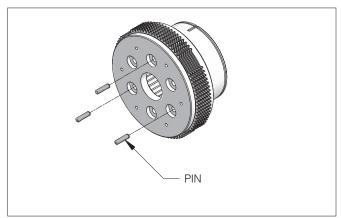
13. Install retainer to height "D". (use the number of turns required for removal & align marks on teeth).



14. Install frictions, separators, & clutch plate.



15. Insert pins into three equally spaced holes.

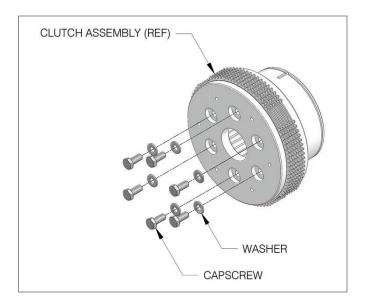


Repairs - BRAKE-OFF Clutch Assembly



- 16. Install 1.75" (45 mm) long or longer capscrews into holes with pins. (longer capscrews work better).
- 17. Place block underneath retainer so that pressure plate is suspended in the air.
- Alternately tighten capscrews to compress springs until reaction plate rests on hub. While tightening, align internal splines of friction stack with hub splines.
- 19. Align external splines/tabs of friction stack.
- 20. Apply HCE-67 threadlocker to six 1" (25 mm) long capscrews.
- 21. Install & torque three of these shorter capscrews in the open holes.
- 22. Alternately loosen the three longer capscrews & remove them but leave the pins in place.
- 23. Install & torque the three remaining shorter capscrews.

24. Check final height "D". it should be +0.012/-0.000 of original height "D".





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Repairs - Motor Shaft Assembly & Installation



Motor Shaft Assembly and Installation

Assembly and installation of the motor shaft assembly can be accomplished while the winch is mounted on the tractor. The motor and brake can be installed independently of other components (other than various hoses and fittings), but taking out the planetary reducer and reducer housing must be installed before the Freespool Shifter Fork and Intermediate Shaft and Gear (see **Intermediate Shaft Installation** section).

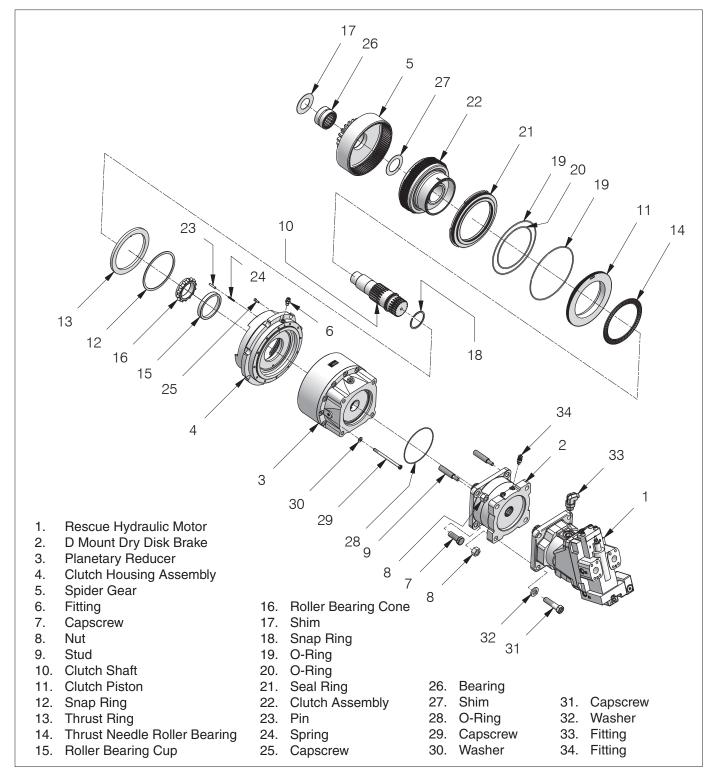
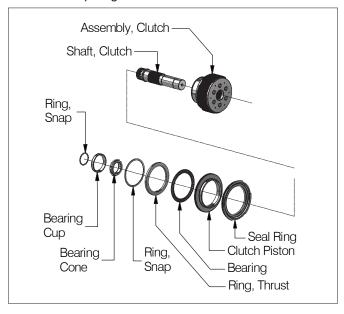


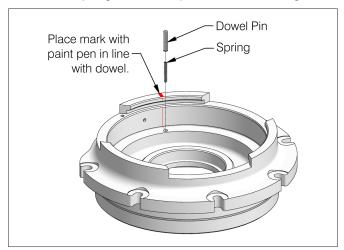
Figure 4-12 Motor Shaft Components



1. Install new O-rings on seal ring and clutch piston, then install thrust needle roller bearing, thrust ring, and snap ring.



2. Install spring and dowel pin in clutch housing.



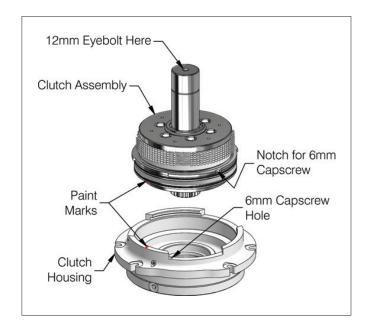
3. Paint pen mark on position in line with center of slot.



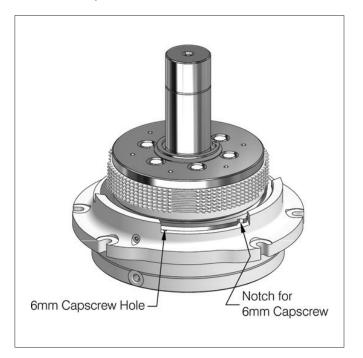
4. Lower clutch assembly vertically using jib hoist and M12x1.75 metric eyebolt.

Align paint marks on piston and clutch housing.

Position seal ring so three locking tabs align with slots in clutch housing and notch will align with 6mm capscrew after rotating.



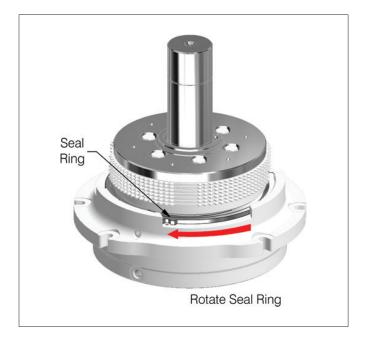
 Slowly lower assembly taking care that O-rings stay in grooves, and don't get pinched as piston and seal ring engage housing. Gently tap with mallet to seat assembly.

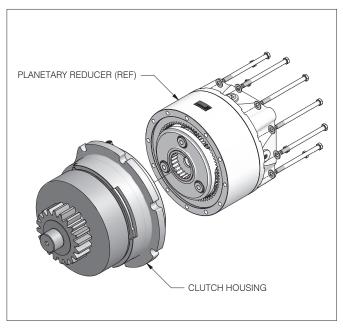


Repairs - Motor Shaft Assembly & Installation



- 6. Rotate seal ring clockwise with brass drift and hammer until lock bolt notch aligns with bolt hole.
- 9. Install clutch housing assembly into reducer.





7. Testing clutch

MARNING

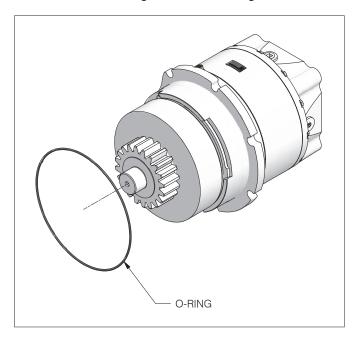
Wear safety glasses whenever working around pressurized hydraulics.

- 7.1 Apply hydraulic pressure to port on clutch housing;
- 7.2 Steadily increase pressure. Gear should begin to rotate by hand at about 360 psi;
- 7.3 Increase pressure further, clutch should reach full release at 420 psi;
- 7.4 Increase pressure to 700 psi MAX and check for leaks.
- 8. While clutch is released, friction disks can be aligned by carefully assembling spider gear and aligning splines.

⚠ WARNING

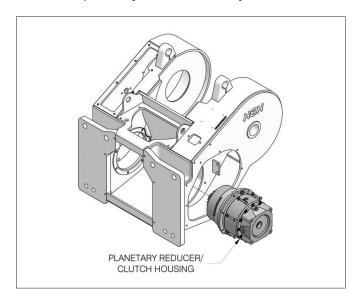
Use caution to prevent pinching fingers during spider installation - splines are sharp and can cut.

10. Install new O-ring on clutch housing.

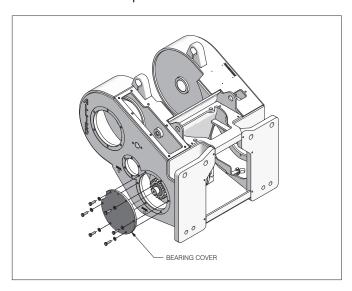




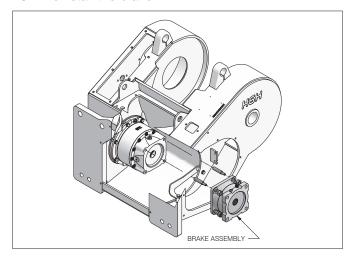
11. Install planetary reducer assembly into winch frame.



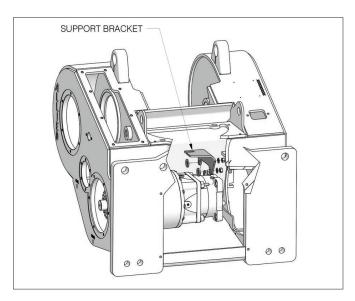
12. Reinstall cover plate.



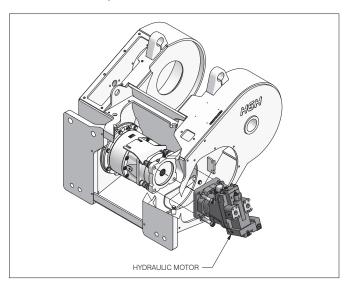
13. Reinstall the brake.



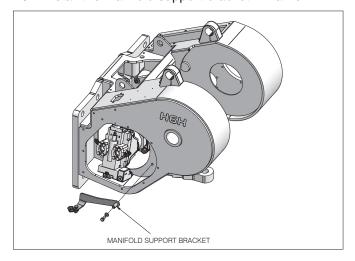
14. Install the brackets.



15. Install the hydraulic motor.



16. Install the manifold support bracket in frame.



Repairs - Hydraulic System Assembly



Hydraulic System Assembly

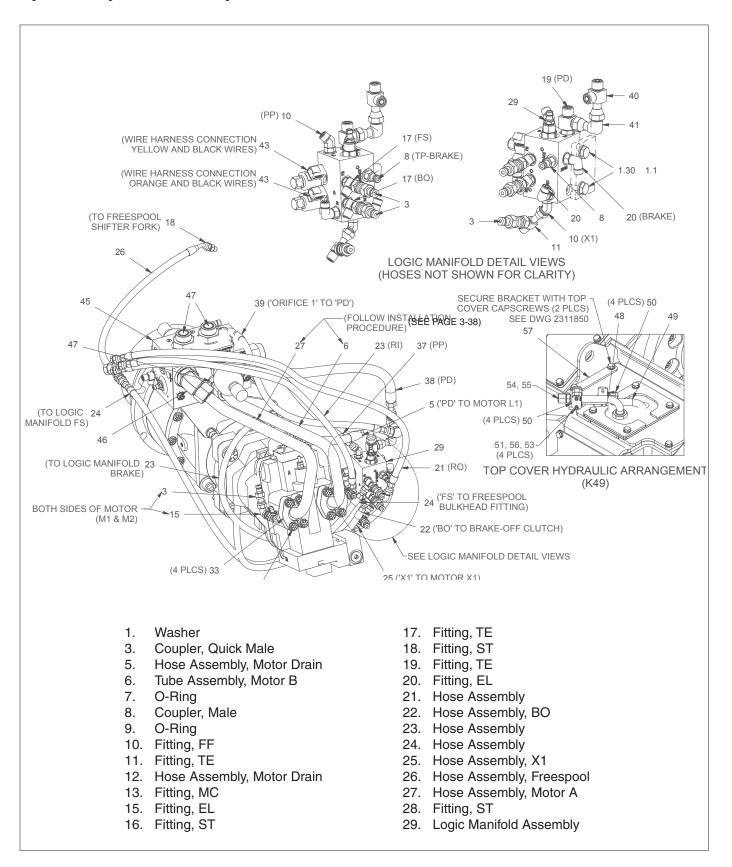


Figure 4-13 Hydraulic System Components, Standard Winch_1



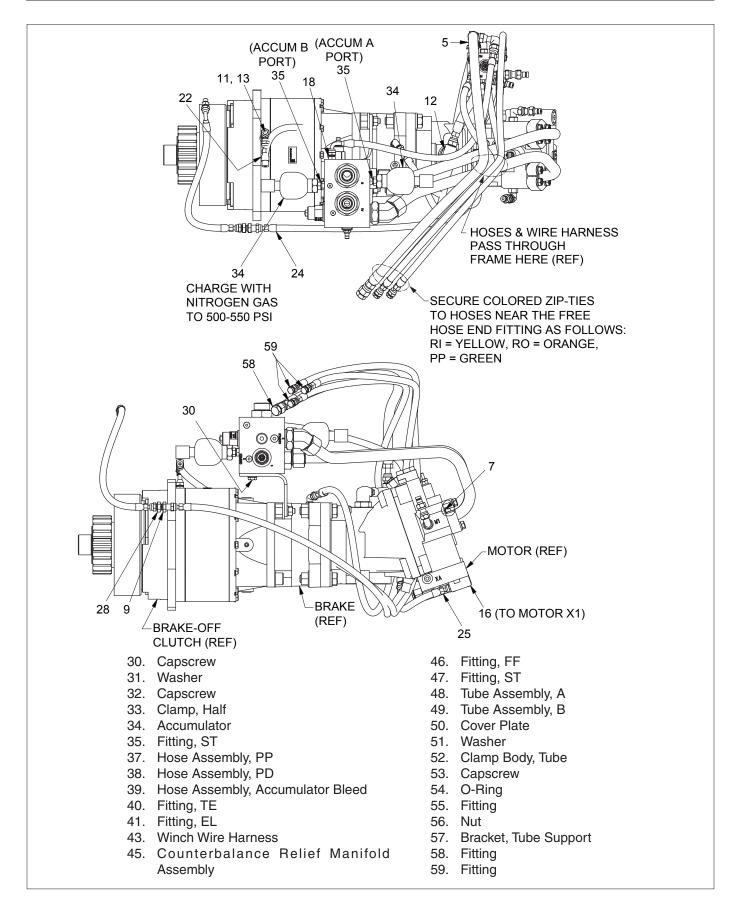
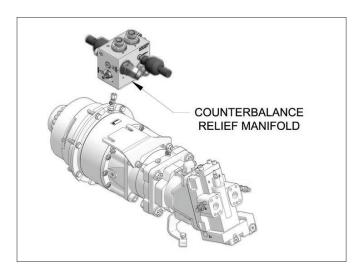


Figure 4-14 Hydraulic System Components, Standard Winch_2

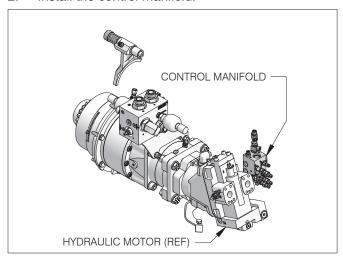
Repairs - Hydraulic System Assembly



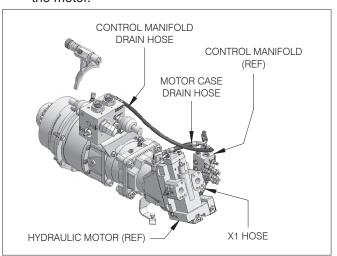
 Install the counterbalance relief manifold. Leave mounting bolts loose until motor tubes are installed.



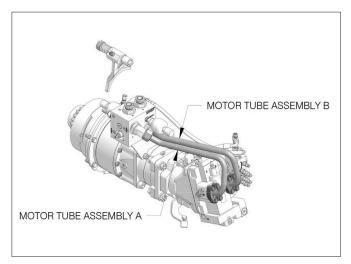
2. Install the control manifold.



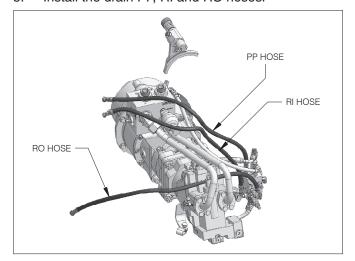
3. Connect the hoses between the control manifold and the motor.



- 4. Follow the motor tube installation procedures below:
 - Install motor tube assemblies, but do not tighten.
 - Adjust the manifold fittings as needed.
 - Alternately tighten connections to prevent placing motor tubes in a bind. Tighten motor tubes at the motor, then at the manifold.
 - Tighten the manifold mounting bolts and manifold bracket bolts.

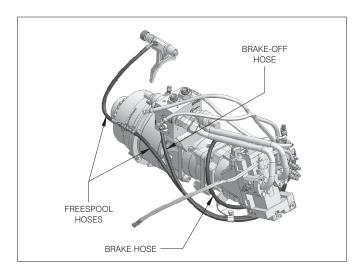


5. Install the drain PP, RI and RO hoses.





6. Install freespool, brake, and brake-off hoses.



Repairs - Drum & Drum Shaft Installation



Drum and Drum Shaft Installation

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

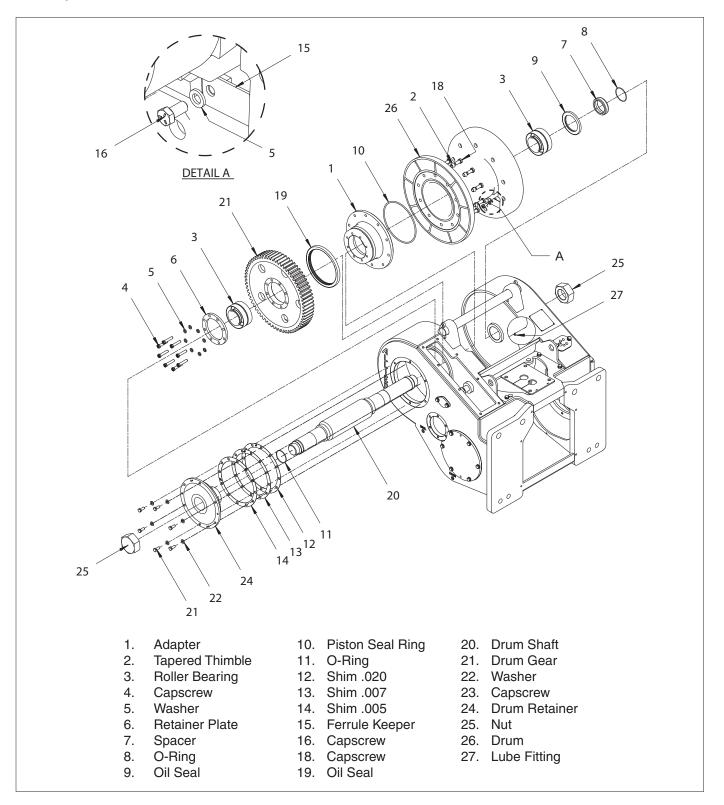
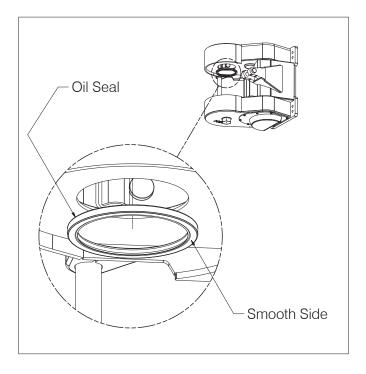


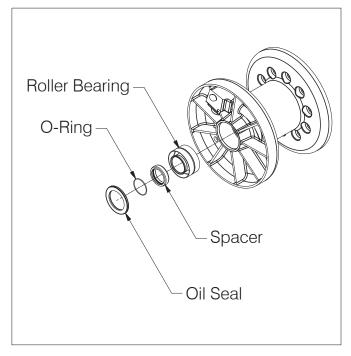
Figure 4-15 Location of Drum and Drum Shaft Components



 Coat seal bore with sealant. Install double-lip oil seal with smooth side towards the drum in the right-hand side of the frame.



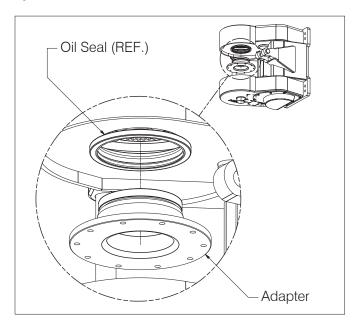
 Replace the O-ring inside the spacer, and install roller bearing, spacer and oil seal into the left-hand side drum bore.



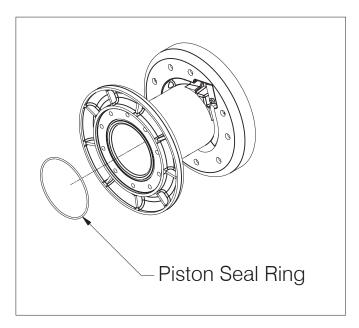
NOTE: Smooth side of seal must face outboard.

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

NOTE:To prevent drum adapter from falling out, insert eyebolt on marked hole, then slip metal bar through eyebolt.



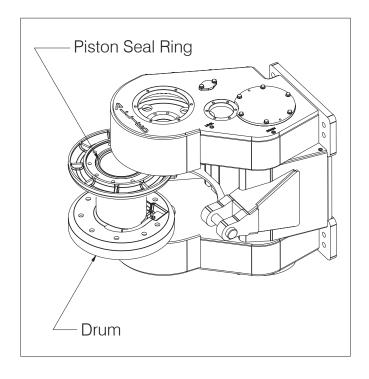
4. Coat O-ring groove and the new piston seal ring with O-ring lube. Install the piston seal ring into the groove.

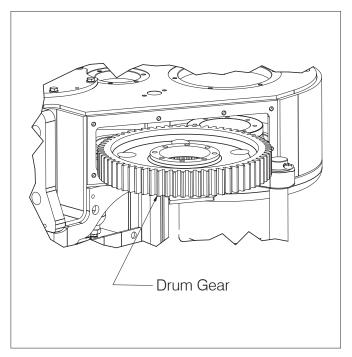


Repairs - Drum & Drum Shaft Installation

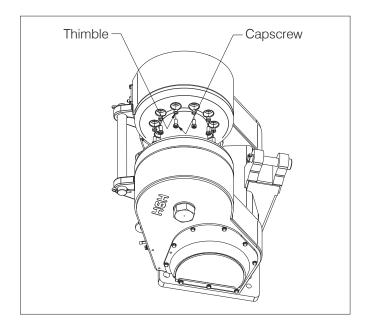


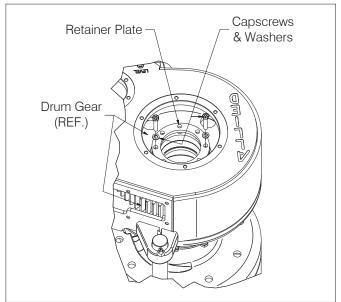
- 5. Move the drum into position while being careful not to loose the piston seal ring.
- 7. Install drum gear.





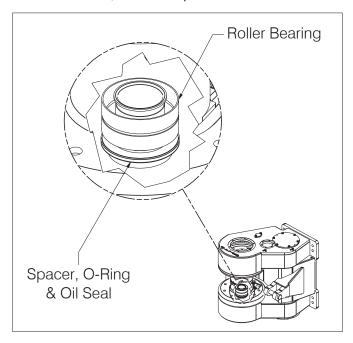
- 6. Align adapter and drum holes, then install the thimbles and screws. Tighten progressively and evenly to ensure uniform compression of seal ring. Do not tighten to final torque.
- 8. Align drum gear with adapter and temporarily secure the drum gear to the adapter, using the retainer plate and two capscrews. This will ensure that the drum gear will not fall during installation of the shaft.



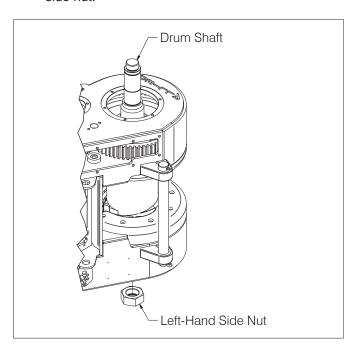




9. Make sure that double-tapered roller bearing, seal and spacer are properly seated in the left-hand side of the drum, refer to Step 3.



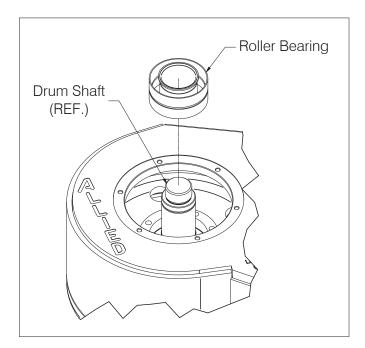
Next, install the shaft until it bottoms solidly against the left hand tapered roller bearing. Tighten left-hand side nut.



! CAUTION

Do not hammer on drum shaft surface.

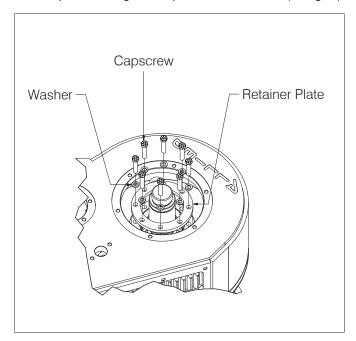
 Remove the retainer plate and install the bearing assembly.



! WARNING

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

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

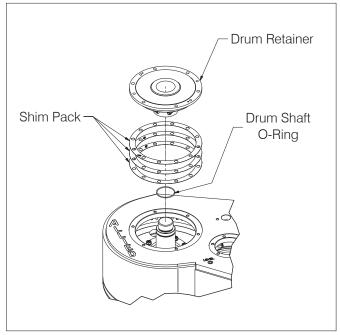


NOTE: Capscrews cannot be installed unless drum gear and drum adapter have been aligned as indicated in Step 6.

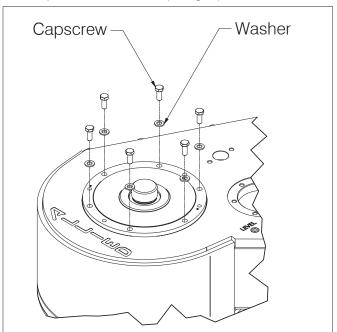
Repairs - Drum & Drum Shaft Installation



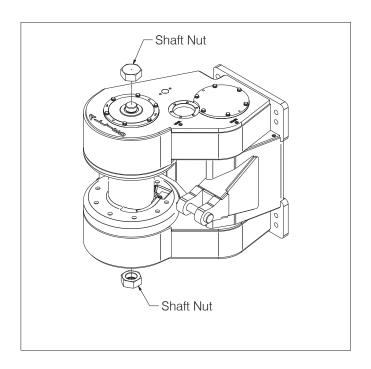
- 12. Set drum retainer into place and tighten capscrews (do not tighten to final torque). Measure gap between retainer and winch frame in three places around the retainer. Add the three indications and divide by three to obtain the average gap. Assemble shim pack to provide a net fit with ± 0.005 inch (0.1288 mm) tolerance.
- Coat winch frame and drum retainer with silicone. Install drum shaft O-ring. Install finalized shim pack (determined in step 13). If intermediate shaft assembly not installed, install before retainer.



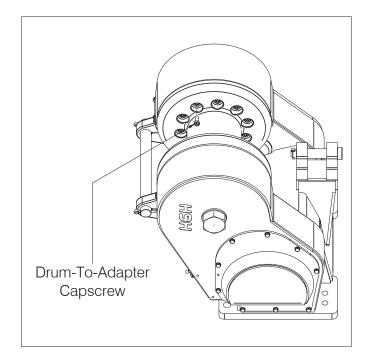
14. Secure retainer with capscrews and washers. Tighten capscrews to 75 ft-lbs (10 kg-m).



15. Coat shaft nut threads with anti-seize. Apply silicone between the left drum nut and frame, and between the right drum nut and drum retainer. Install both shaft nuts and torque to 400 ft-lbs (55 kg-m).



16. Tighten drum-to-adapter capscrews to 155 ft-lbs (21 kg-m) torque.





Intentionally Blank

Repairs - Intermediate & FREESPOOL Shaft Installation



Intermediate & FREESPOOL Shaft Installation

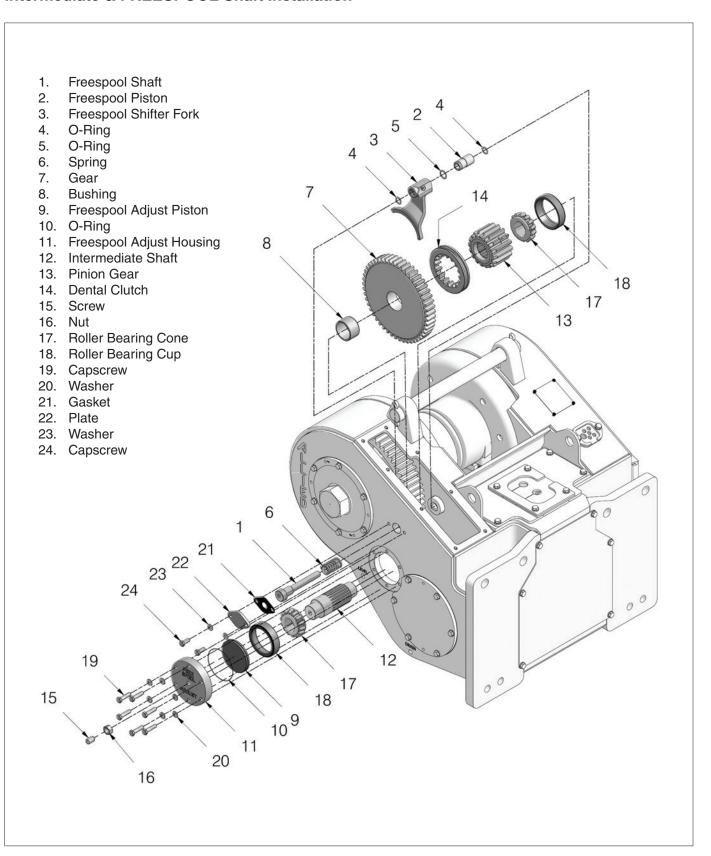


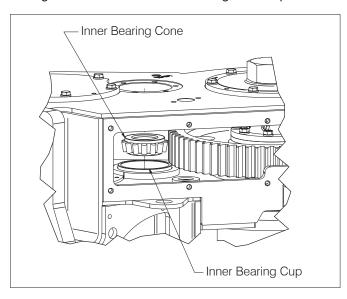
Figure 4-16 Location of Intermediate and Freespool Shaft Components



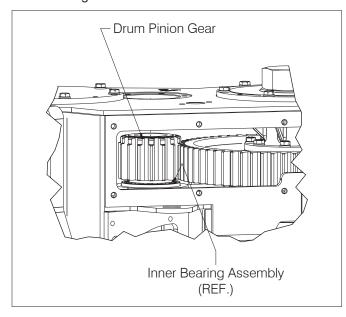
Intermediate & FREESPOOL Shaft Installation

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

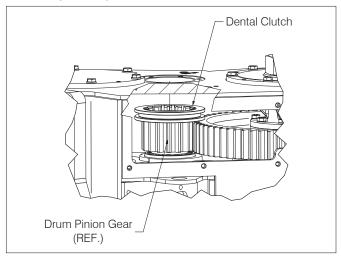
Install inner bearing assembly if previously removed.
 Use a liberal amount of lubriplate or other light lube grease to hold the inner bearing cone in place.



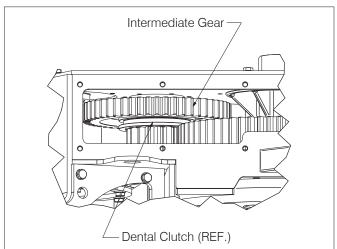
2. Position the FREESPOOL drum pinion in the housing.



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

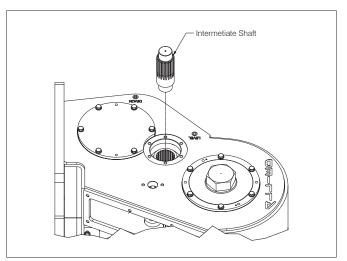


4. Position intermediate gear in housing.



NOTE: Install intermediate gear with high shoulder down.

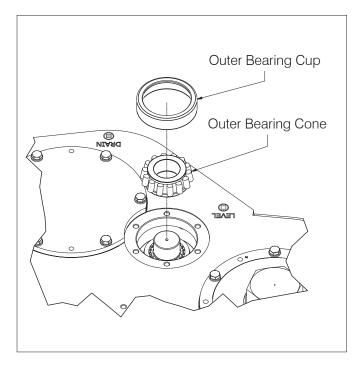
5. Install intermediate shaft.

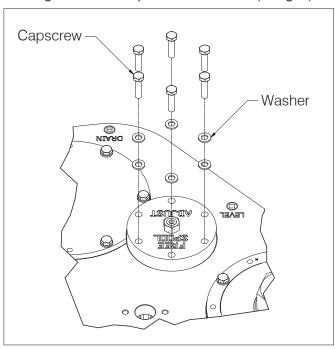


Repairs - Intermediate & FREESPOOL Shaft Installation

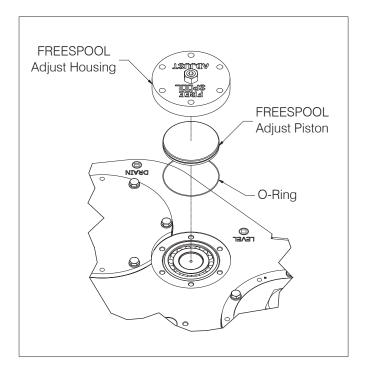


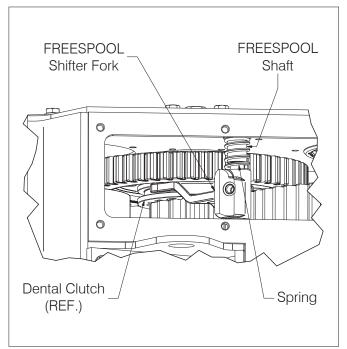
- 6. Install the outer bearing cup and cone. Make sure that the cup is firmly seated against the bearing cone.
- Coat the winch frame and retainer with silicone or other suitable sealing compound. Install shim pack (if necessary) and cover.
- 9. Tighten the six capscrews to 75 ft-lbs (10 kg-m).





- 7. Install new O-ring on FREESPOOL adjust piston and install the piston in FREESPOOL adjust housing.
- 10. Position the FREESPOOL shifter fork on the dental clutch, and install the FREESPOOL shaft with spring by threading the shaft into the winch housing.

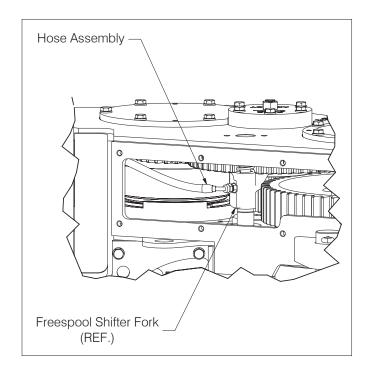


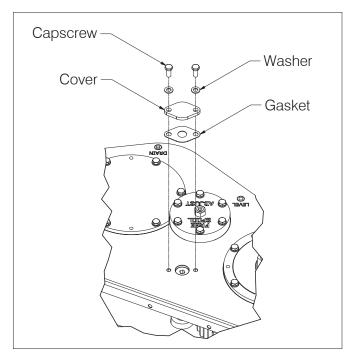




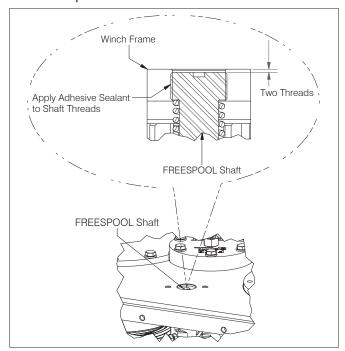
11. Install hose assembly.

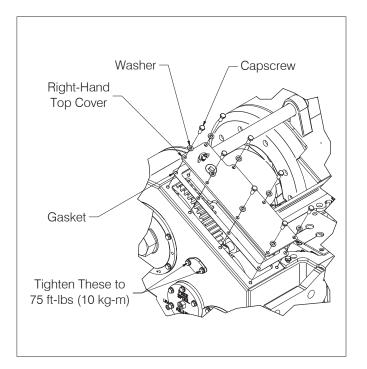
13. Secure the cover and the gasket with washers and capscrews.





- 12. Apply adhesive-sealant to threads of FREESPOOL shaft. Adjust for proper engagement and disengagement of intermediate shaft gear. Nominal adjustment should be recessed so two frame threads are exposed in frame.
- 14. Install right-hand top cover with gasket, washers and capscrews. Tighten the two capscrews mentioned in Step 13 to 75 ft-lbs (10 kg-m).





Repairs - Winch Installation



Winch installation

- 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.

MARNING

Make sure the lifting device has a minimum rated capacity of 1,500 kg (3,500 lbs.) 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.
- Install control lever assembly per mounting kit instructions.



Section 4

Notes



To find a dealer in your area,
Call: (503) 625-2560,
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