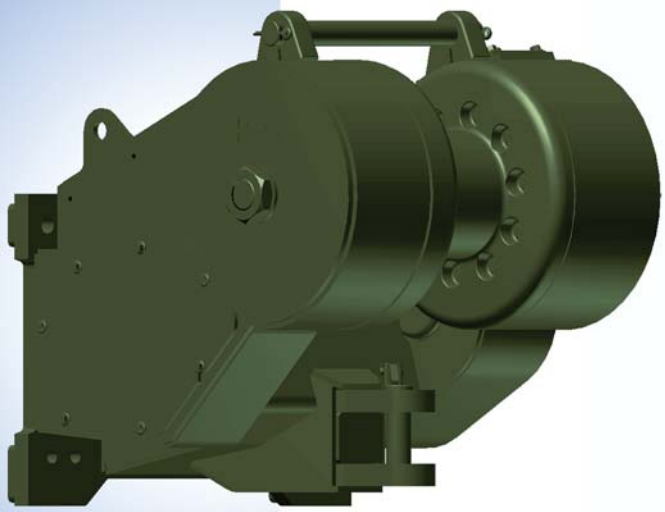
Service Manual



Allied H6G

Hydraulic Towing Winch For 850JR Tractor

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

CUSTOMER EDITION

A PRODUCT OF Allied Systems COMPANY
SHERWOOD, OREGON USA

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Safety Precautions

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

Winch serial number _____

Date put into service _____

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

Safety Summary

General Safety Notices

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

NOTE: …

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

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

Safety Regulations

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

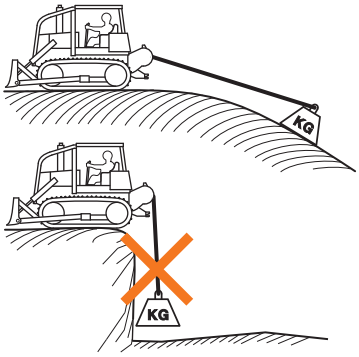
⚠ WARNING

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

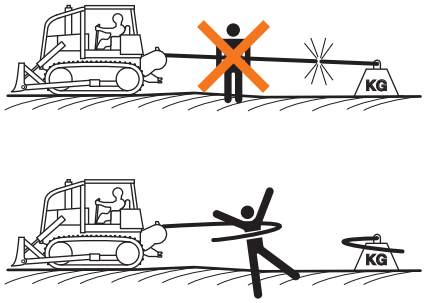
- Do not operate the winch unless your are authorized and trained to do so.
- Do not operate the winch unless the vehicle is equipped with a screen to protect the operator if the wire rope breaks.
- Read, understand, and follow the operating, inspection, and maintenance instructions in this manual.
- 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).

- 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 599027W-H6GH1JE47.
- 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 pages 1-4 and 1-5.
- 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.

Notes

Contents

Notes

General

Introduction

This service manual is for the H6G 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.

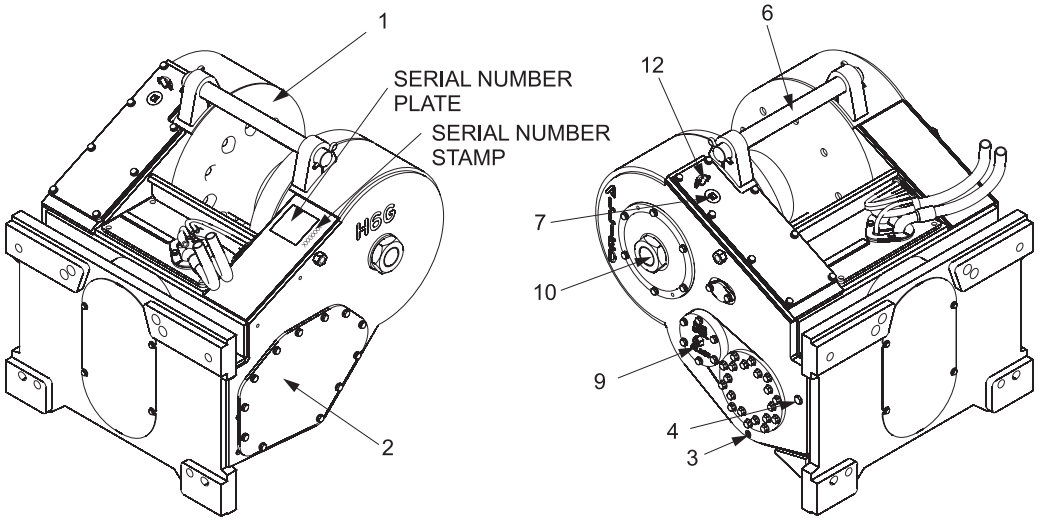
Section 4. Repairs describes the removal, disassembly, assembly, and installation of the winch.

Description

The H6G 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. On the H6G, 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 H6G winch has a **FREESPOOL** function. The **FREESPOOL** function permits the wire rope to be pulled from the drum.

The H6G winch has a maximum rated line pull capacity of 266,880N (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 maximum rated line pull is reduced.



1. Drum
2. Access Cover for Motor and Winch Hydraulics
3. Plug to Drain Oil
4. Plug to Check Oil Level
6. Tie Rod
7. Fill Plug
9. Bearing Retainer for Intermediate Shaft & Freespool drag Adjuster
10. Right Side Drum Shaft
11. Drawbar (Not Shown)
12. Breather

Figure 1-1 H6G Winch

Unit Identification

Allied Winch S/N Nameplate Data For Tractor Mountings

H6G H 1 J 1501 E47

Winch Model
H6G was previously known as WH6G.
The "W" designation has been dropped for simplicity.

Hydraulic Operation Type
H = High Performance
(Hydraulic or Hydrostatic with 2-Speed)

Gear Ratio Code
1 = 60:1

Internal Options
J = External Pump, PFR, FS
with CARC Green Paint & 50mm Dia Pin Special Drawbar;
without Tractor Side Installation Parts

Sequence Number

John Deere 850JR Tractor

Note: In Addition to the serial number plate, the serial number is stamped on the top left-hand side of the frame. See Figure 1-1 on page 1-1.

Serial Number Codes

The serial number codes are described on page 1-2 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. See Figure 1-1 on page 1-1.

Nameplate

The rated capacity for the winch, as it is equipped, is shown on the nameplate. Each winch is shipped from the factory with a nameplate as shown in Figure 1-2. If the nameplate is missing, or the wire rope does not match the information on the nameplate, do not operate the winch until its capacity is known and a new nameplate is installed. Each winch must be operated within its rated capacity as shown on the nameplate.

If the winch is equipped with a log arch, the maximum wire rope size is reduced. Refer to the nameplate for details.

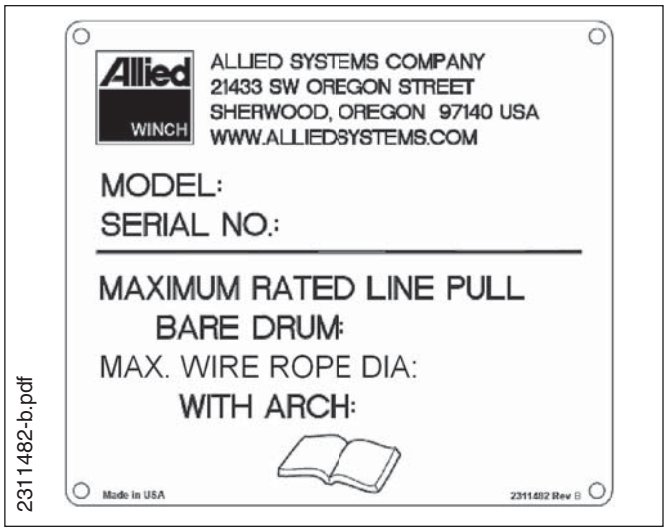


Figure 1-2 Nameplate

Specifications

Drum Wire Rope Capacities (Drum: 10 Inch Dia)

Wire Rope Diameter	H6G Capacity
29 mm (1 1/8 in.)	51 m (167 ft)

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

Figure 1-3 Drum Wire Rope Capacities

	Ferrule Size & Type
H6G	Light Ferrule 2 1/4" x 2.0" Dia.

Figure 1-4 Ferrule Size and Type for H6G

Oil Specifications

For inside winch housing, use the following oils:

Hydraulic System (Pump):	Use Tractor Fluid (Gear Oil MIL-PRF-2105E)
Winch Case (Gear Train):	

Figure 1-5 Recommended Oil List

Oil Capacity

The oil capacity for the H6G winch is 8.5 quarts (8 liters).

Hydraulic Specifications

Motor ..... Dual displacement vane-type

Brake ..... Dry multi-disc spring applied

Torque Specifications

ITEM	TORQUE VALUES		
	ft-lbs.	N-m	kg-m
Housing Covers (1/2 UNC Gr. 8)	80	108	11
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 Gear Retainer Capscrews (3/8 UNC Gr. 8)	33	44	4
3-Port Manifold to Motor Capscrews (7/16 UNC Gr. 8)	52	71	7
Directional Manifold Mounting Capscrews (3/8 UNC Gr. 8)	33	44	4

Figure 1-6 Torque Specifications

Gear Train (See Fig. 1-7 & 1-8)

The tractor pump drives the hydraulic motor with hydraulic oil supply. Pressure in the hydraulic motor is load induced through the winch gear train. The motor shaft rotates to give **LINE-IN** or **LINE-OUT** with supply oil and return oil is directed back to the tractor reservoir. The motor is attached to a multi-disc spring applied brake that holds the winch drum in a fixed position when no power operation occurs. If oil is supplied to the hydraulic motor, the brake is simultaneously released with pilot control pressure. When oil is not supplied to the motor, a spring applies the brake.

The hydraulic motor can operate at half displacement when the operator selects the **HI-SPEED** switch. At half displacement the gear train rotates at roughly twice the speed.

A planetary gear assembly gives a 1:6 gear reduction between the hydraulic motor and the planetary output gear. Motor shaft direction of rotation is the same as the planetary output gear at 1/6th the speed.

An intermediate gear assembly gives further gear reduction to increase torque at the winch 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.

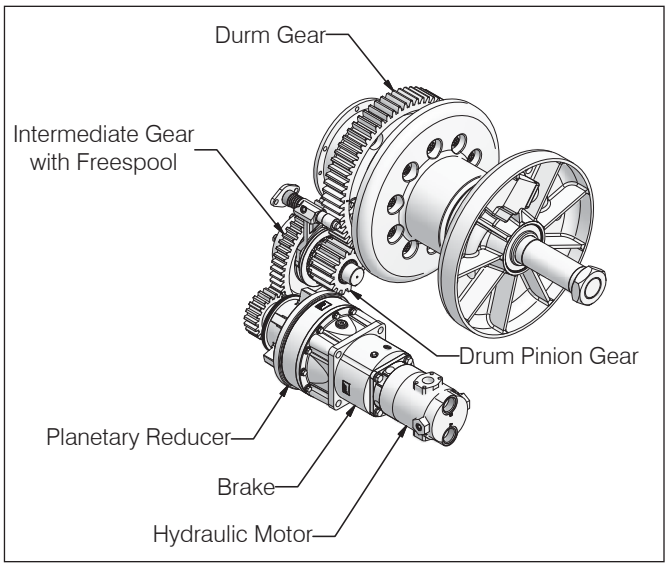


Figure 1-7 Gear Train

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.

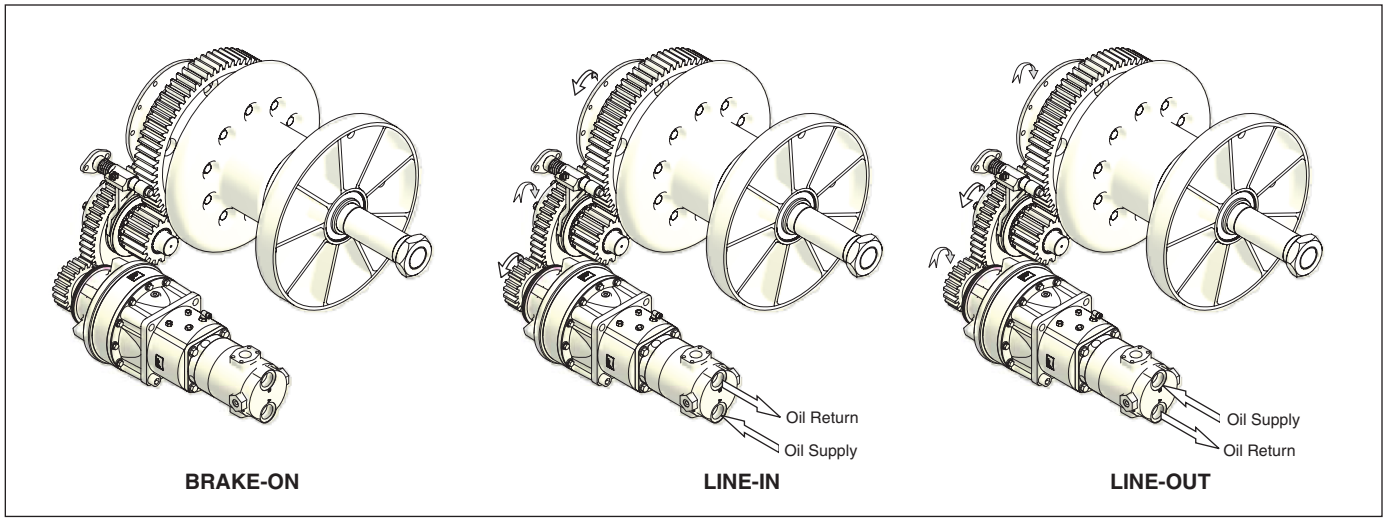


Figure 1-8 Rotation Torque Transfer

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**.

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

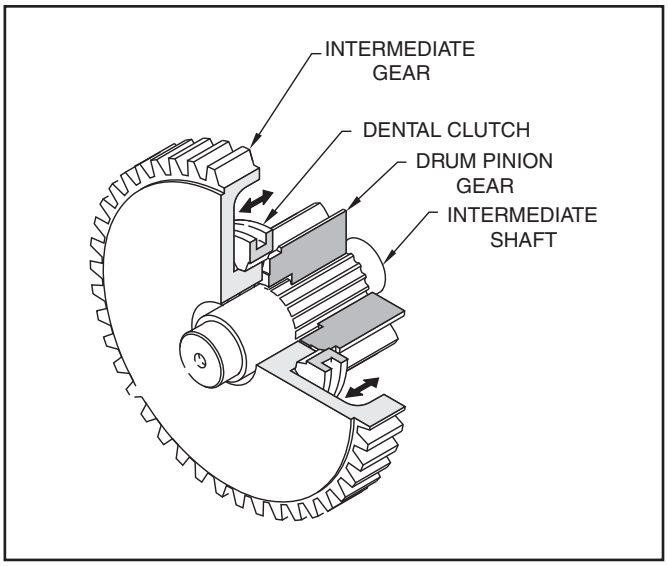
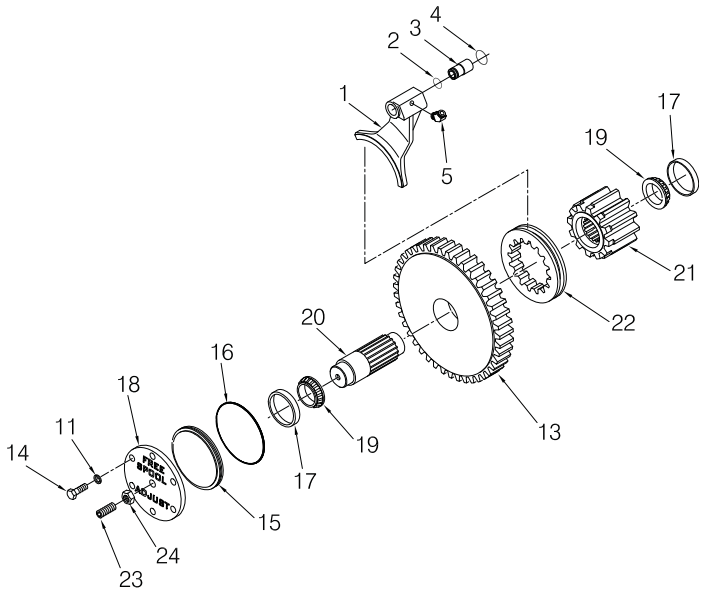


Figure 1-9 FREESPOOL Operation



1	Shifter	17	Bearing, Cup
2	O-Ring	18	Cover
3	FREESPOOL Piston	19	Bearing. Cone
4	O-Ring	20	Shaft, Intermediate
5	Fitting	21	Gear, Pinion
11	Washer	21	Gear, Pinion
13	Gear	22	Clutch
14	Capscrew	23	Setscrew
15	Piston, FREESPOOL Adjust	24	Nut
16	O-Ring		

Figure 1-10 FREESPOOL Arrangement

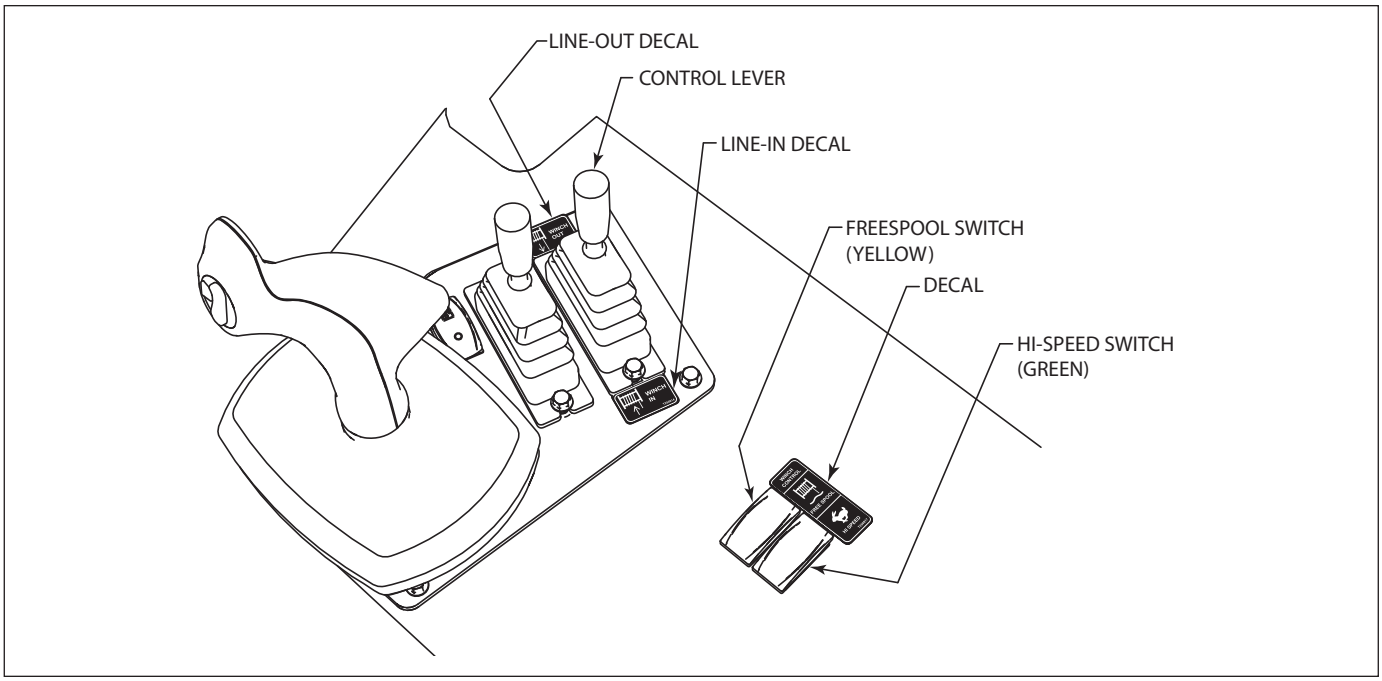


Figure 1-11 Winch Controls

Operation & Control (See Fig. 1-11)

The H6G 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:

- **BRAKE-ON** (spring-centered position)
- **LINE-IN**
- **LINE-OUT**
- **FREESPOOL**
- **HI-SPEED (**either **LINE-IN** or **LINE-OUT)**

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 wire rope off the drum (**LINE-OUT**). Pulling the lever towards the operator releases the brake and reels 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 **HI-SPEED**. The tractor must be running to supply hydraulic power to operate these functions. A light shows when a switch is on.

The **FREESPOOL** switch incorporates a lock to prevent inadvertent actuation. The slide lock must be released before the switch can be turned on.

⚠ CAUTION

Before operating the winch in LINE-IN or LINE-OUT mode, ensure the FREESPOOL light is not illuminated. Doing so may result in loss of load.

The **HI-SPEED** switch is a dual-action momentary switch. Pushing it towards the operator allows the winch to operate at low speed, while pushing the switch away from the operator activates **HI-SPEED**. When in **HI-SPEED** mode, the winch will automatically shift to low speed when the load exceeds a certain percentage of the rated load. For heavy loads or when better control is desired, the winch should be operated in low speed. For light loads and faster wire rope speed, operate the winch in **HI-SPEED** mode. The green light in the speed selector switch indicates **HI-SPEED** operation.

Hydraulic System

Planetary Reducer (See Fig. 1-12)

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 1/6th the speed.

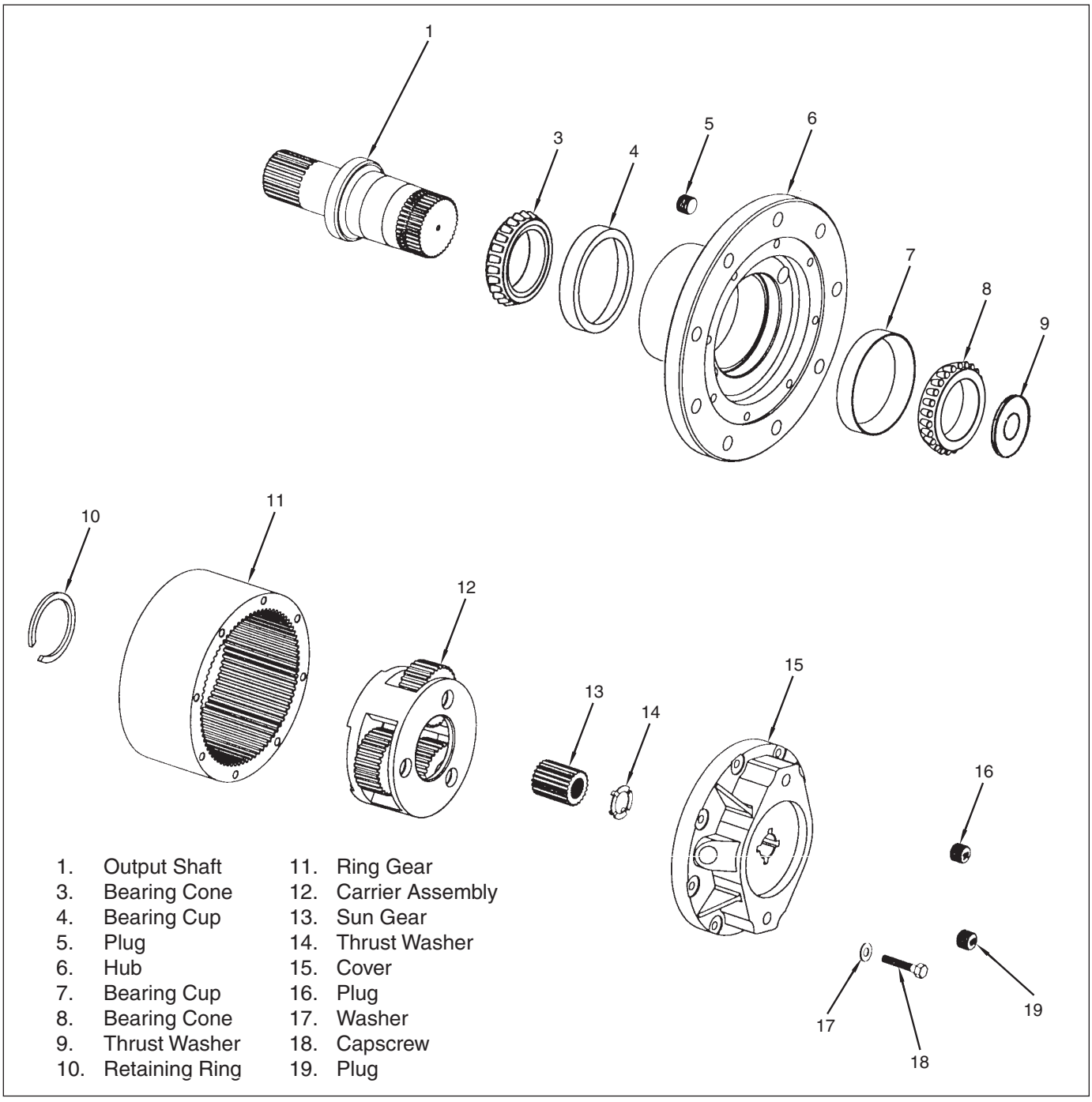
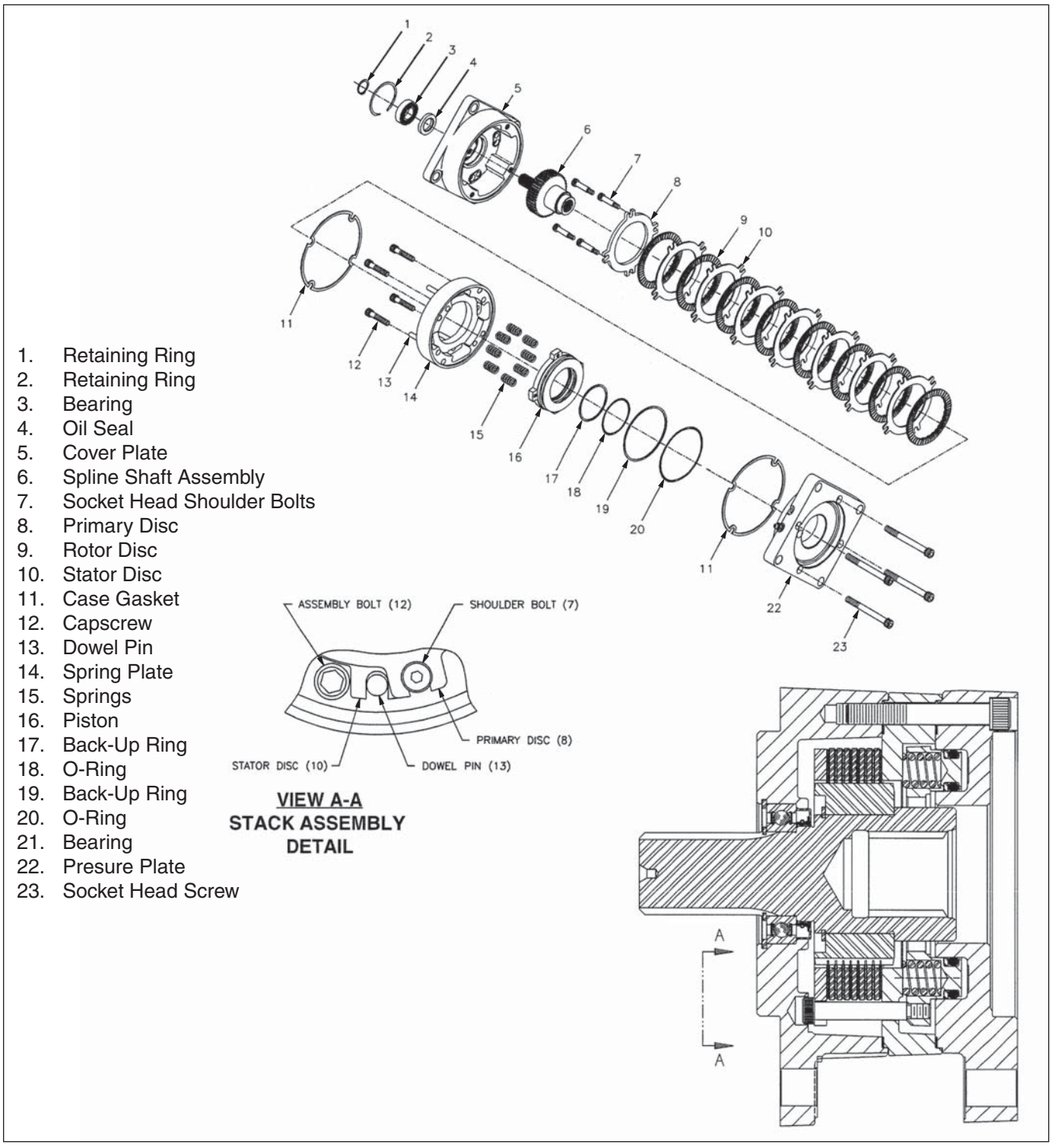


Figure 1-12 Planetary Reducer



1. Retaining Ring
2. Retaining Ring
3. Bearing
4. Oil Seal
5. Cover Plate
6. Spline Shaft Assembly
7. Socket Head Shoulder Bolts
8. Primary Disc
9. Rotor Disc
10. Stator Disc
11. Case Gasket
12. Capscrew
13. Dowel Pin
14. Spring Plate
15. Springs
16. Piston
17. Back-Up Ring
18. O-Ring
19. Back-Up Ring
20. O-Ring
21. Bearing
22. Presure Plate
23. Socket Head Screw

Figure 1-13 Brake

Brake (See Fig. 1-13)

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.

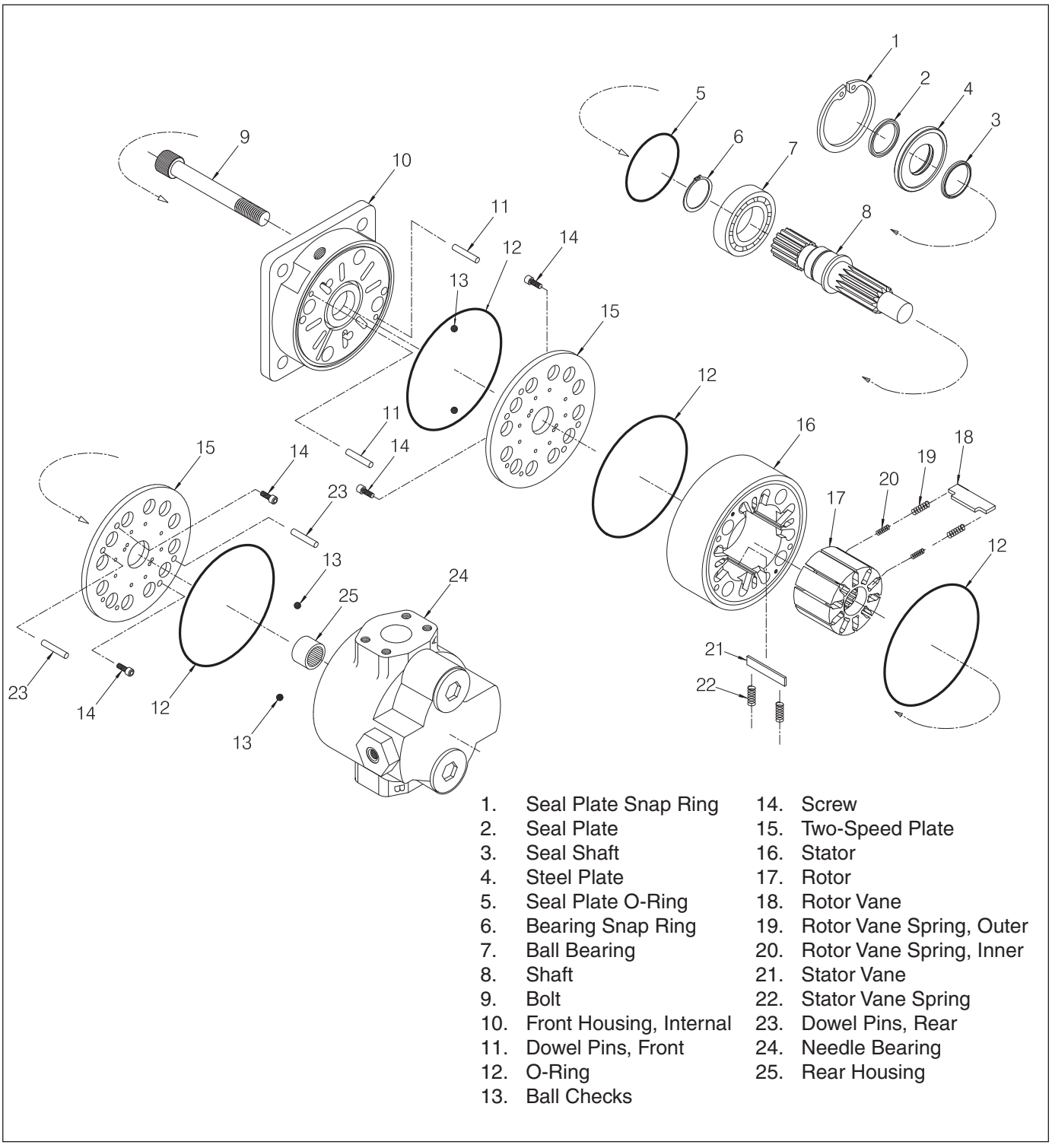


Figure 1-14 Motor

Motor (See Fig. 1-14)

The hydraulic motor is a dual displacement vane-type motor for high-performance winches. Full or half displacement is selected at the motor by shifting an integral two position spool. The default position is full displacement when pressure is not signaled by the winch to the spool. Output speed is proportional to input flow from the pump and inversely proportional to the motor displacement.

Directional Control Manifold

The directional control manifold controls the direction of hydraulic flow to the winch motor. When the operator moves the control lever into the **LINE-IN** or **LINE-OUT** position, a pressure response is signaled to one side of the directional control valve, and oil flow is delivered to the motor. The directional control manifold also houses several other winch control features including the counterbalance valve, load sense relief valve, and load sense check valves. The counterbalance 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. This valve also acts as an overload relief valve when supply pressure exceeds the setting of the valve. The counterbalance valve allows oil to free flow in the **LINE-IN** mode through a check valve. The load-sense relief valve limits the winch load signal to the tractor pump to limit the winch hydraulic system pressure. The load sense check valves are used to communicate winch motor pressure to the pump load sense controller. See Figure 1-22 for schematics on page 25.

Logic Control Manifold

The logic control manifold is used to communicate pressure signals that control the **BRAKE-ON**, **HI-SPEED**, and **FREESPOOL**. The manifold contains a series of shuttle valves, a directional valve, and three solenoid valves. One shuttle is used to send a pressure response to the brake when the winch is shifted to **LINE-IN** or **LINE-OUT**. The two other shuttle valves allow communication between **HI-SPEED** and **FREESPOOL** functions. The brake valve provides pressure to the brake when the **LINE-IN** or **LINE-OUT** control pressure exceeds the pilot setting of the valve. The **HI-SPEED** and **FREESPOOL** valves are 3-way electric over hydraulic valves that communicate pressure responses to respective functions when activated.

HI-SPEED Limit Switch

The **HI-SPEED** limit mechanism is comprised of a pressure switch and electric relay. When the **HI-SPEED** function is activated, the solenoid valve in the logic control manifold directs oil to the motor speed spool in the motor. If the system pressure exceeds a certain percentage of the rated load, the pressure switch sends a signal to the relay, which then opens and deactivates **HI-SPEED**. The motor speed will not reactivate until you re-initialize the switch.

Electronic Control Panel

Depending on the options on the winch, the electronic control panel contains two electric rocker switches to operate **HI-SPEED** and **FREESPOOL** functions. Each switch is equipped with integral LED indicator to show if the function is active. The **FREESPOOL** switch incorporates a lock to prevent the switch from being accidentally turned on. To operate, slide the locking tab first, then push the rocker switch. The **HI-SPEED** switch is a three position switch on momentary rocker. High speed is deactivated by pulling a load that generates pressure beyond the setting of the **HI-SPEED** limit switch or manually by rocking the switch back.

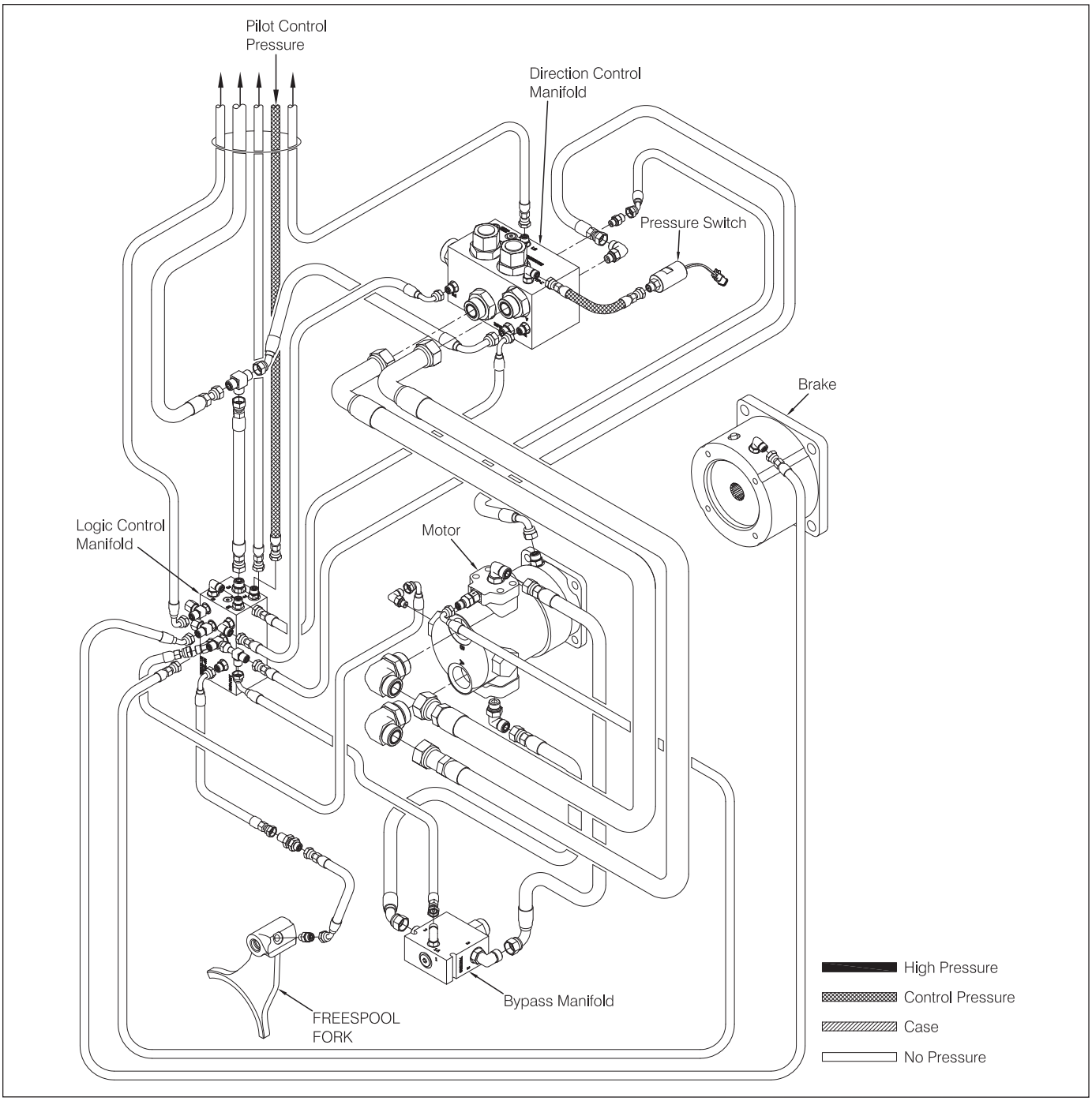


Figure 1-15 Sequence of Operation - BRAKE-ON

Sequence of Operation, BRAKE-ON

The directional control valve spool is spring centered to neutral. In this position, the motor work ports are open to the tractor reservoir and pump standby supply pressure is blocked. Pilot control pressure is available at the logic control manifold and the control lever. There is no pressure on the control lines which are open to the tractor reservoir. Similarly, there is no pressure in the load sense line as it is vented back to the tractor reservoir through an orifice.

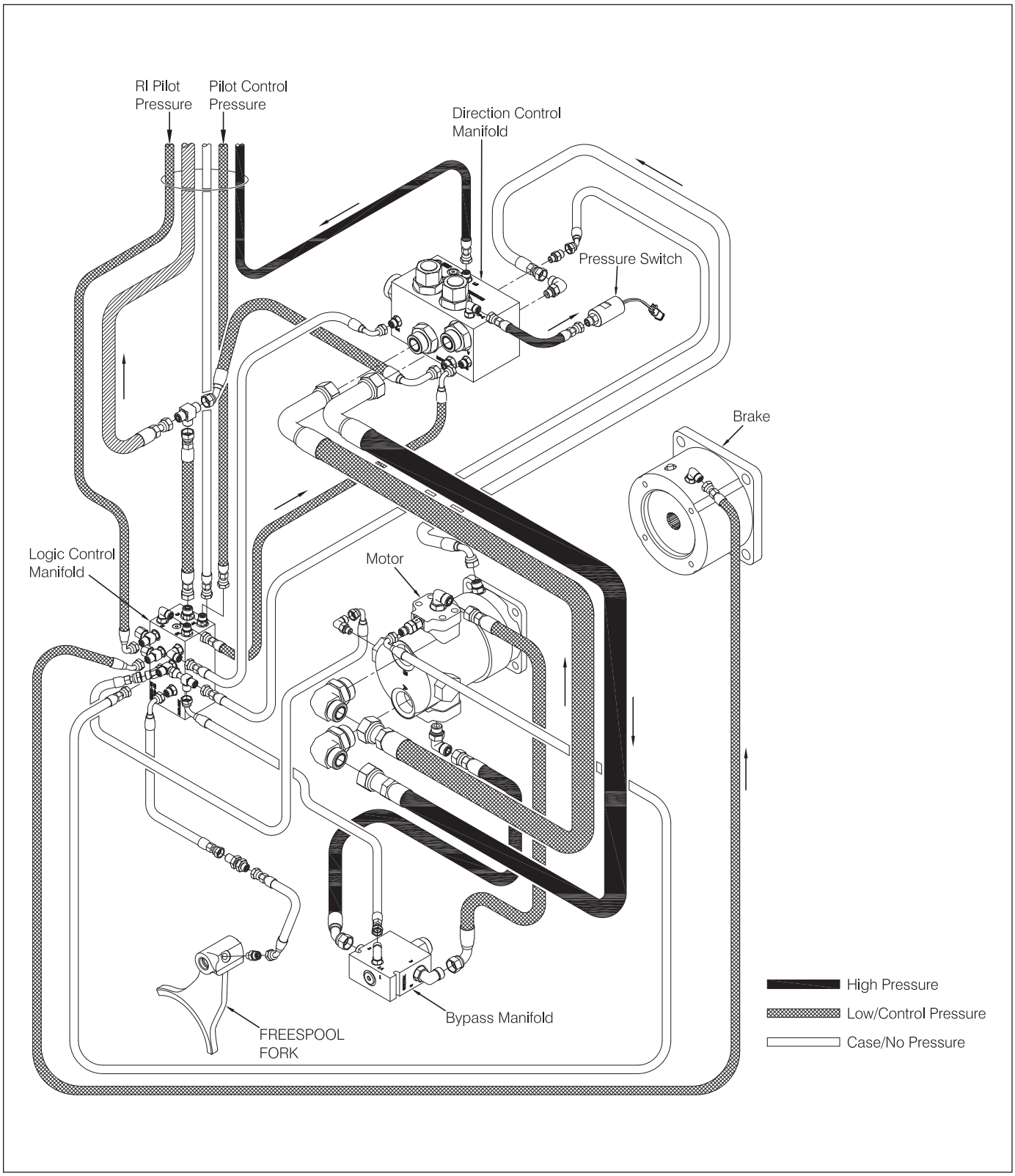


Figure 1-16 Hydraulic System - LINE-IN

Sequence of Operation, LINE-IN

The operator pulls back the control lever which sends pilot control pressure to the directional control valve and the brake release valve. Oil flows from the pump supply line into the directional control spool and through a check valve in the counterbalance valve cartridge. Oil flow continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch. This pressure is communicated to the tractor pump load sense controller, and the pump displacement is increased or decreased depending on the load induced pressure. Oil flows through the motor back through the directional control spool and to the tractor reservoir. Simultaneously, pilot control pressure at the brake valve is connected to the brake release port and the brake is fully released. Low pressure case drain oil flows from the hydraulic motor back to the tractor reservoir.

When pressure on the inlet A port of the motor exceeds 3500 psi, the load sense relief valve opens. The load sense pressure signal decreases, and the tractor pump strokes back reducing displacement so pressure at the hydraulic motor decreases a corresponding amount.

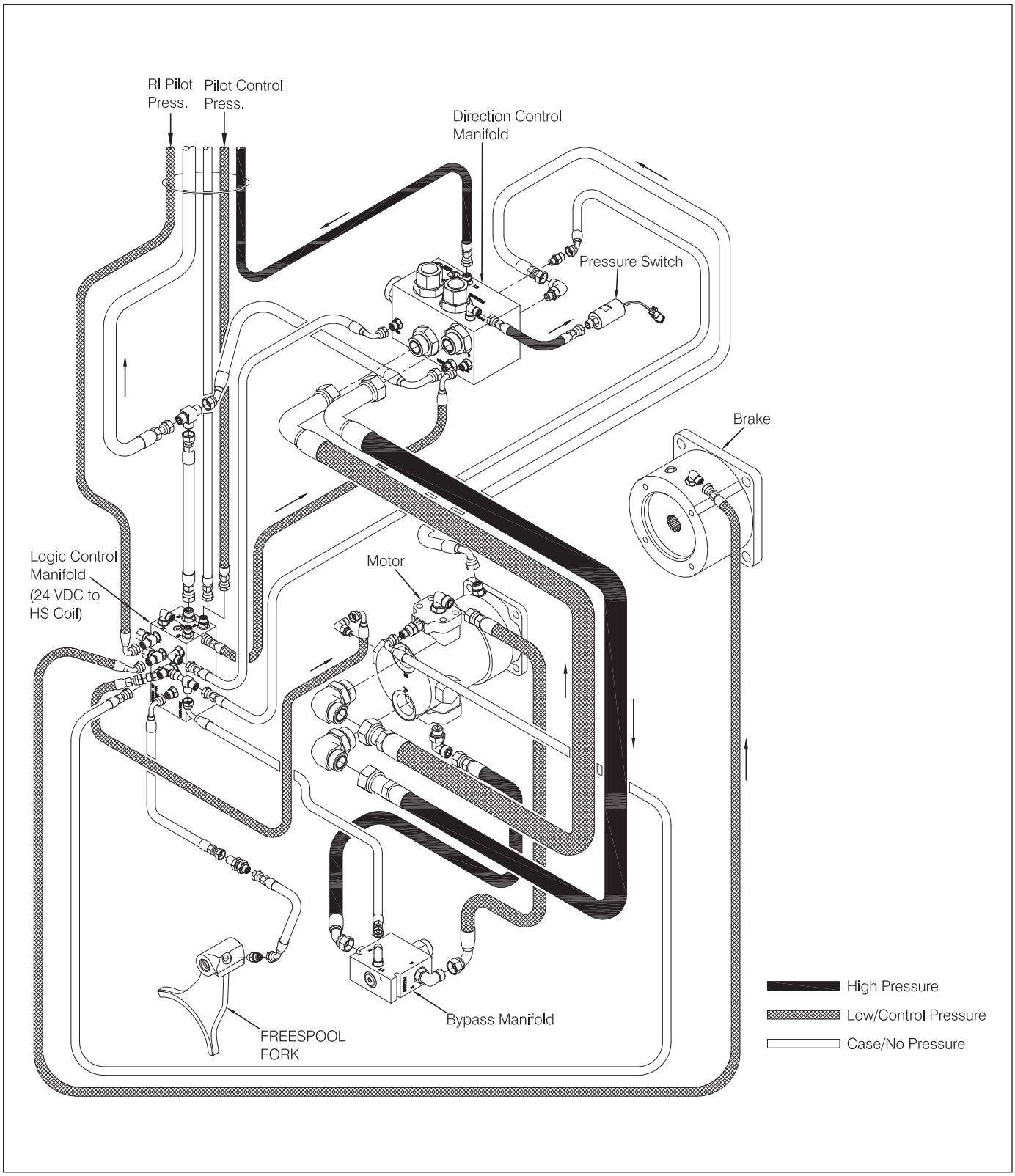


Figure 1-17 Hydraulic System - HI-SPEED LINE-IN

Sequence of Operation, HI-SPEED LINE-IN

The operator pulls back the control lever which sends pilot control pressure to the directional control valve and the brake release valve. Oil flows from the pump supply line into the directional control spool and through a check valve in the counterbalance valve cartridge. Oil flow continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch. This pressure is communicated to the tractor pump load sense controller, and the pump displacement is increased or decreased depending on the load induced pressure. Oil flows through the motor back through the directional control spool and to the tractor reservoir. Simultaneously, pilot control pressure at the brake valve is connected to the brake release port, and the brake is fully released. Low pressure case drain oil flows from the hydraulic motor back to the tractor reservoir.

When pressure on the inlet A port of the motor exceeds 3500 psi, the load sense relief valve opens. The load sense pressure signal decreases and the tractor pump strokes back reducing displacement so pressure at the hydraulic motor decreases a corresponding amount.

When the operator depresses the **HI-SPEED** switch the **HI-SPEED** solenoid valve in the logic manifold opens and pilot control pressure is communicated to the **HI-SPEED** spool in the hydraulic motor. The spool shifts to close half of the vein ports in the motor. Full pump flow now flows through the motor at half displacement thus increasing the output rpm.

Inlet pressure to the hydraulic motor is sensed by a pressure switch in the directional control manifold. When pressure at the switch reaches 1750 psi, the switch opens and the circuit to the **HI-SPEED** solenoid valve is deactivated. Pressure at the **HI-SPEED** spool in the hydraulic motor is vented back to the reservoir, and the spool spring biases back to the standard speed position. The winch remains in standard speed until the operator depresses the **HI-SPEED** switch again and load induced pressure on the motor remains below 1750 psi.

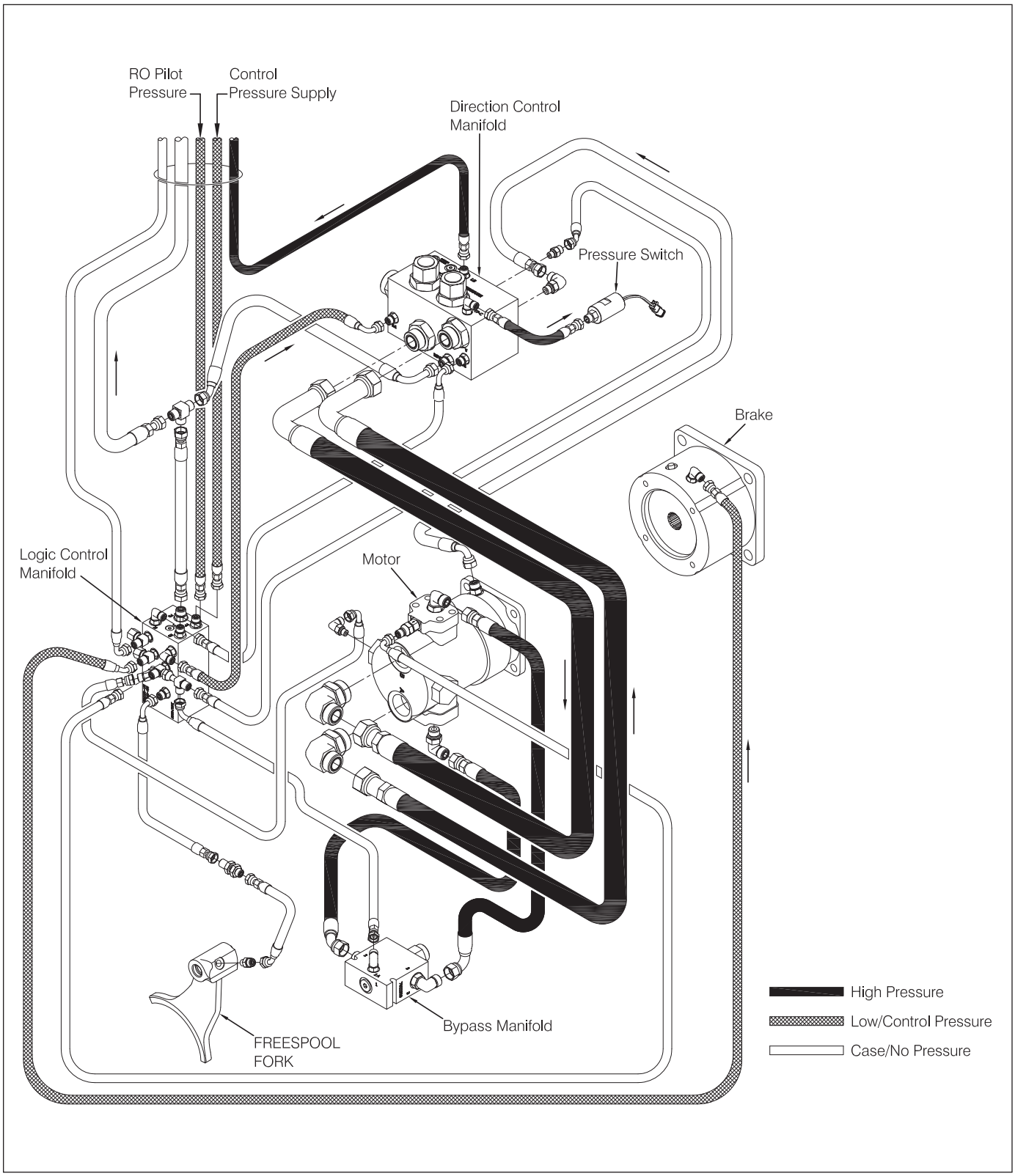


Figure 1-18 Hydraulic System - LINE-OUT

Sequence of Operation, LINE-OUT

The operator pushes the control lever forward, which sends pilot control pressure to the directional control valve and the brake release valve. Oil flows from the pump supply line into the directional control spool cartridge and continue to the inlet B port of the hydraulic motor. Pressure builds from resistance against the counterbalance valve, mechanical, and volumetric resistance. This pressure supply communicates through a check valve to pilot the counterbalance valve open until the inlet pressure falls below a set value, and the counterbalance valve closes. Similarly, the same pressure is communicated to the tractor pump load sense controller and the pump displacement is increased or decreased depending on the load induced pressure. Oil flows through the motor back through the directional control spool and to the tractor reservoir. Simultaneously, pilot control pressure at the brake valve is connected to the brake release port and the brake is fully released. Low pressure case drain oil flows from the hydraulic motor back to the tractor reservoir. This condition drives the winch drum in **LINE-OUT**.

When the winch is operated in **LINE-OUT** and a load pulls line from the winch, pressure builds on the A port of the motor up to the load sense relief setting. When pressure on the A port of the motor exceeds 3500 psi, the load sense relief valve opens. The load sense pressure signal decreases, and the tractor pump strokes back reducing displacement so pressure at the hydraulic motor decreases a corresponding amount. If pressure on the inlet B side of the hydraulic motor drops below the pilot setting of the counterbalance valve, the counterbalance valve closes and acts as a relief valve on the A port of the hydraulic motor. The valve relieves when pressure on the A port reaches 4500 psi.

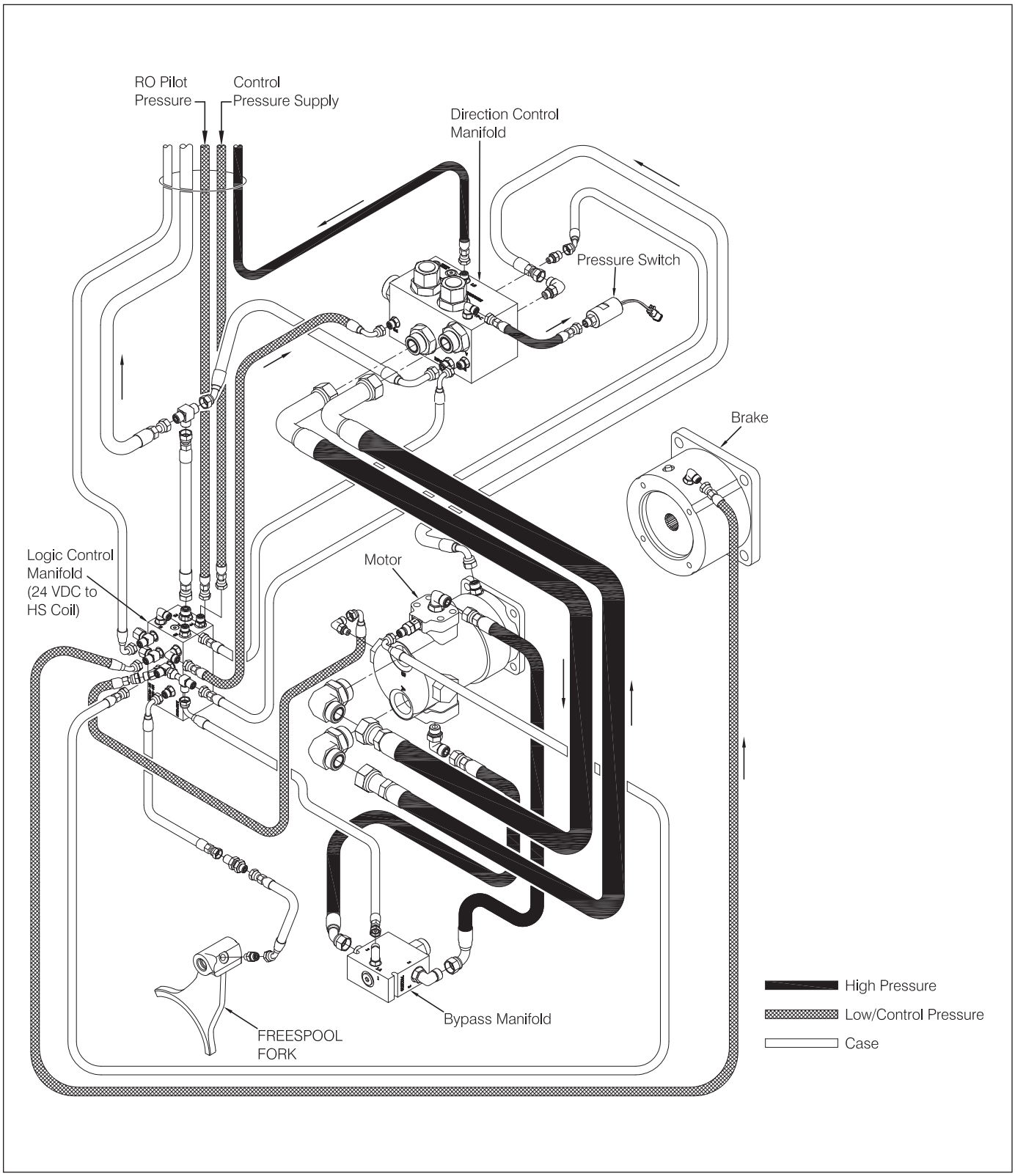


Figure 1-19 Hydraulic System - HI-SPEED LINE-OUT

Sequence of Operation, HI-SPEED LINE-OUT

The operator pushes the control lever forward, which sends pilot control pressure to the directional control valve and the brake release valve. Oil flows from the pump supply line into the directional control spool cartridge and continue to the inlet B port of the hydraulic motor. Pressure builds from resistance against the counterbalance valve, mechanical, and volumetric resistance. This pressure supply communicates through a check valve to pilot the counterbalance valve open until the inlet pressure falls below a set value, and the counterbalance valve closes. Similarly, the same pressure is communicated to the tractor pump load sense controller, and the pump displacement is increased or decreased depending on the load induced pressure. Oil flows through the motor back through the directional control spool and to the tractor reservoir. Simultaneously, pilot control pressure at the brake valve is connected to the brake release port, and the brake is fully released. Low pressure case drain oil flows from the hydraulic motor back to the tractor reservoir. This condition drives the winch drum in LINE-OUT.

When the winch is operated in LINE-OUT and a load pulls line from the winch pressure builds on the A port of the motor up to the load sense relief setting. When pressure on the A port of the motor exceeds 3500 psi, the load sense relief valve opens. The load sense pressure signal decreases, and the tractor pump strokes back reducing displacement so pressure at the hydraulic motor decreases a corresponding amount. If pressure on the inlet B side of the hydraulic motor drops below the pilot setting of the counterbalance valve, the counterbalance valve closes and acts as a relief valve on the A port of the hydraulic motor. The valve relieves when pressure on the A port reaches 4500 psi.

When the winch is operated in LINE-OUT and a load pulls line from the winch pressure builds on the A port of the motor up to the load sense relief setting. When pressure on the A port of the motor exceeds 3500 psi, the load sense relief valve opens. The load sense pressure signal decreases and the tractor pump strokes back reducing displacement so pressure at the hydraulic motor decreases a corresponding amount. If pressure on the inlet B side of the hydraulic motor drops below the pilot setting of the counterbalance valve, the counterbalance valve closes and acts as a relief valve on the A port of the hydraulic motor. The valve relieves when pressure on the A port reaches 4500 psi.

When the operator depresses the HI-SPEED switch the HI-SPEED solenoid valve in the logic manifold opens and pilot control pressure is communicated to the HI-SPEED spool in the hydraulic motor. The spool shifts to close half of the vein ports in the motor. Full pump flow now flows through the motor at half displacement thus increasing the output rpm.

Pressure on the A port of the hydraulic motor is sensed by a pressure switch in the directional control manifold. When pressure at the switch reaches 1750 psi the switch opens and the circuit to the HI-SPEED solenoid valve is broken. Pressure at the HI-SPEED spool in the hydraulic motor is vented back to the reservoir, and the spool spring biases back to the standard speed position. The winch remains in standard speed until the operator depresses the HI-SPEED switch again and load induced pressure on the motor remains below 1750 psi.

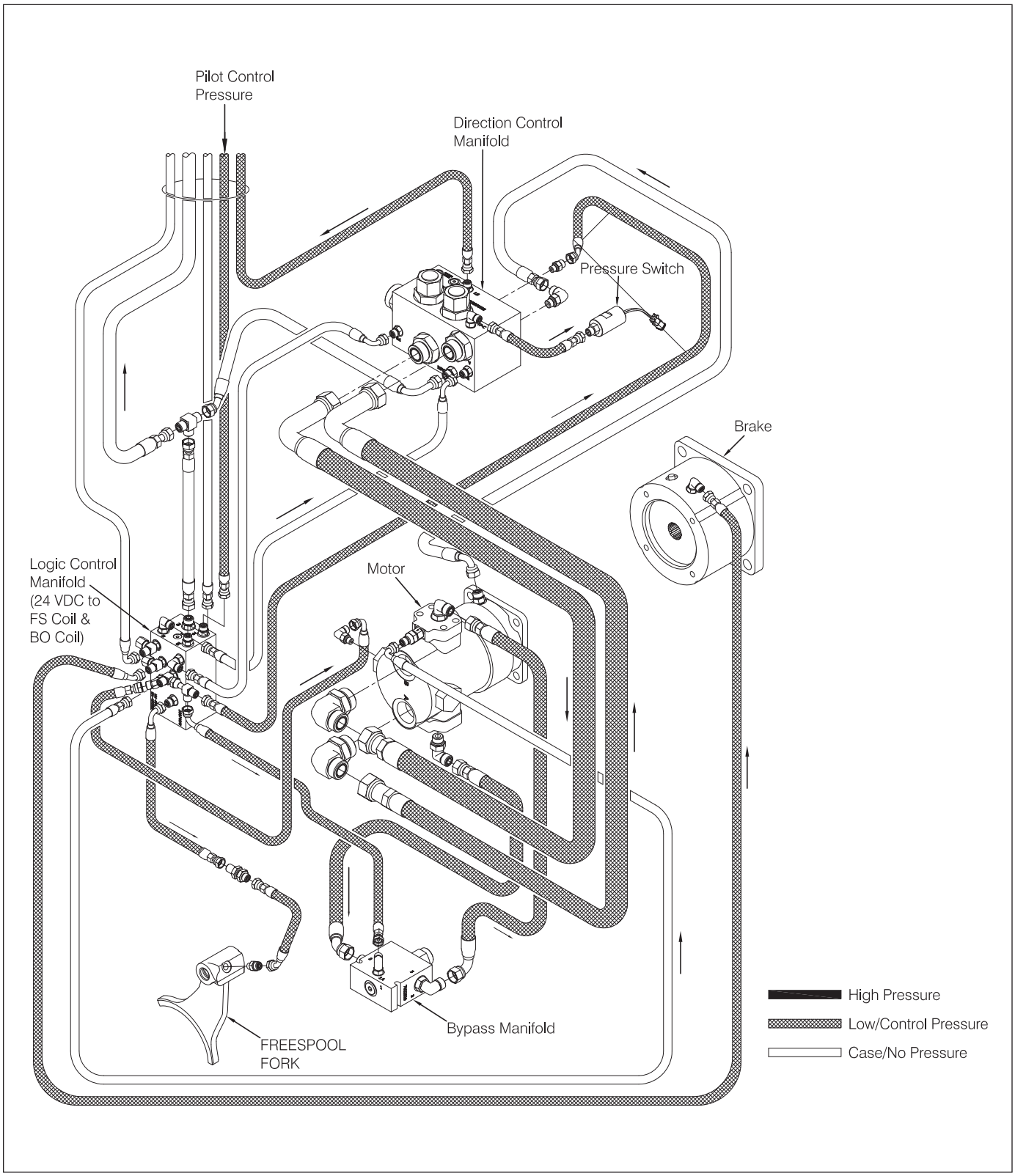


Figure 1-20 Hydraulic System - FREESPOOL

Sequence of Operation, FREESPOOL

The operator depresses the **FREESPOOL** switch. Electronic circuitry also releases the brake and activates a bypass for the hydraulic motor. This allows the operator to achieve **FREESPOOL** mode when the gear train is loaded. Pilot control pressure communicates in the logic control manifold to release the brake, open the bypass valve, and shift the hydraulic motor to **HI-SPEED** displacement. Pilot control oil flow also saturates the inlet B port of the motor.

Pilot control pressure communicates to the **FREESPOOL** shifter fork, allowing the dental clutch to disengage the drum pinion gear from the intermediate gear. The gear train is disengaged from the drum gear so wire rope can be pulled from the drum by hand.

Notes

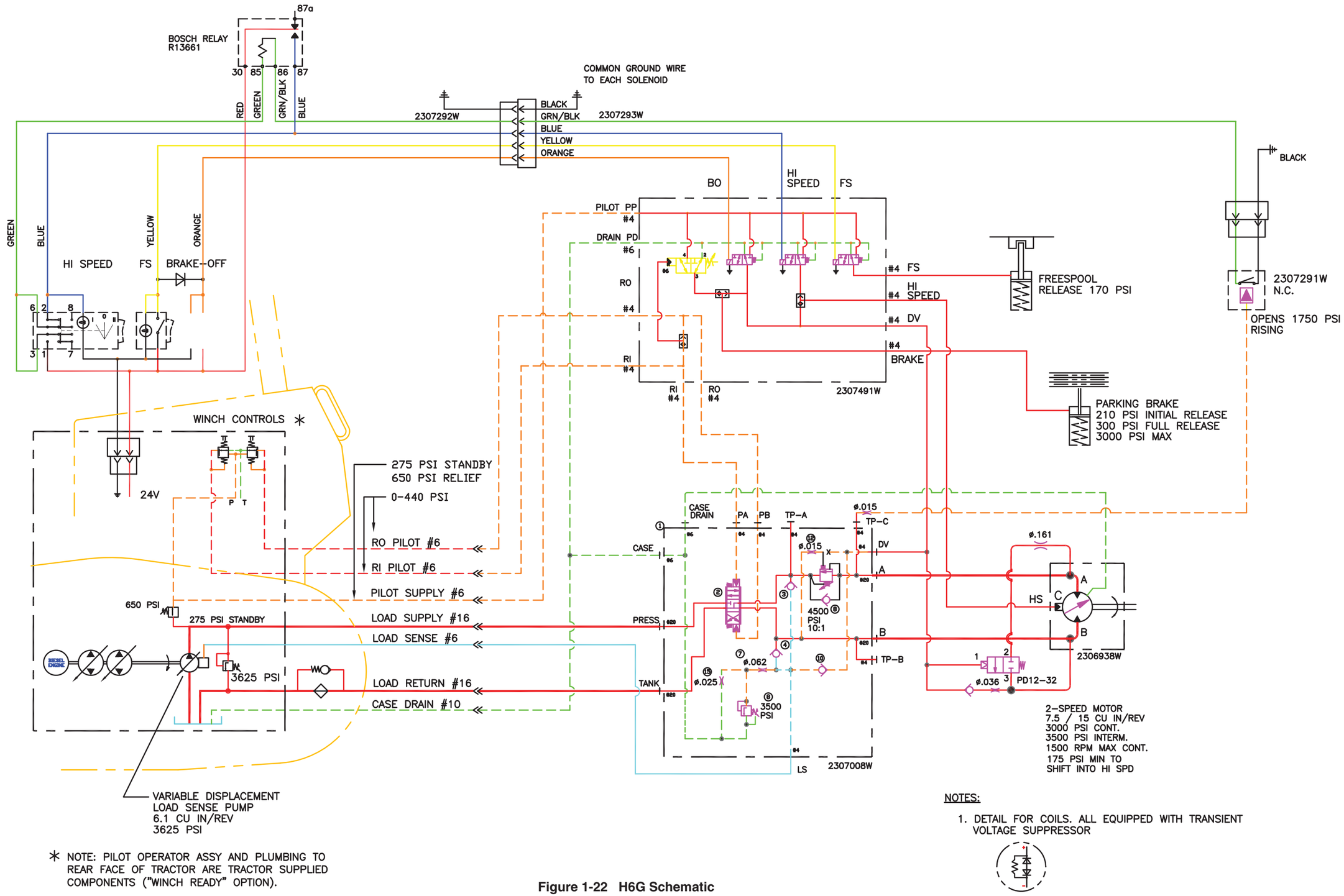


Figure 1-22 H6G Schematic

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Troubleshooting

General

Winch problems generally fall into one of three categories: controls, hydraulic system, or mechanical system. Follow the troubleshooting steps below to isolate the probable location of the malfunction.

1. Make sure the control lever assembly (including pilot controller unit) is functioning properly, with a full range of motion.
2. Check the oil level and type. Ensure the operating temperature range for the oil is suitable for the conditions. Check the filter indicator.
3. Check winch hydraulic pressures. Start with control pressures (see Figure 2-1), 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). Winch oil reservoir temperature is monitored at the dozer. The John Deere 850JR warning light will come on at 200°F (93°C).

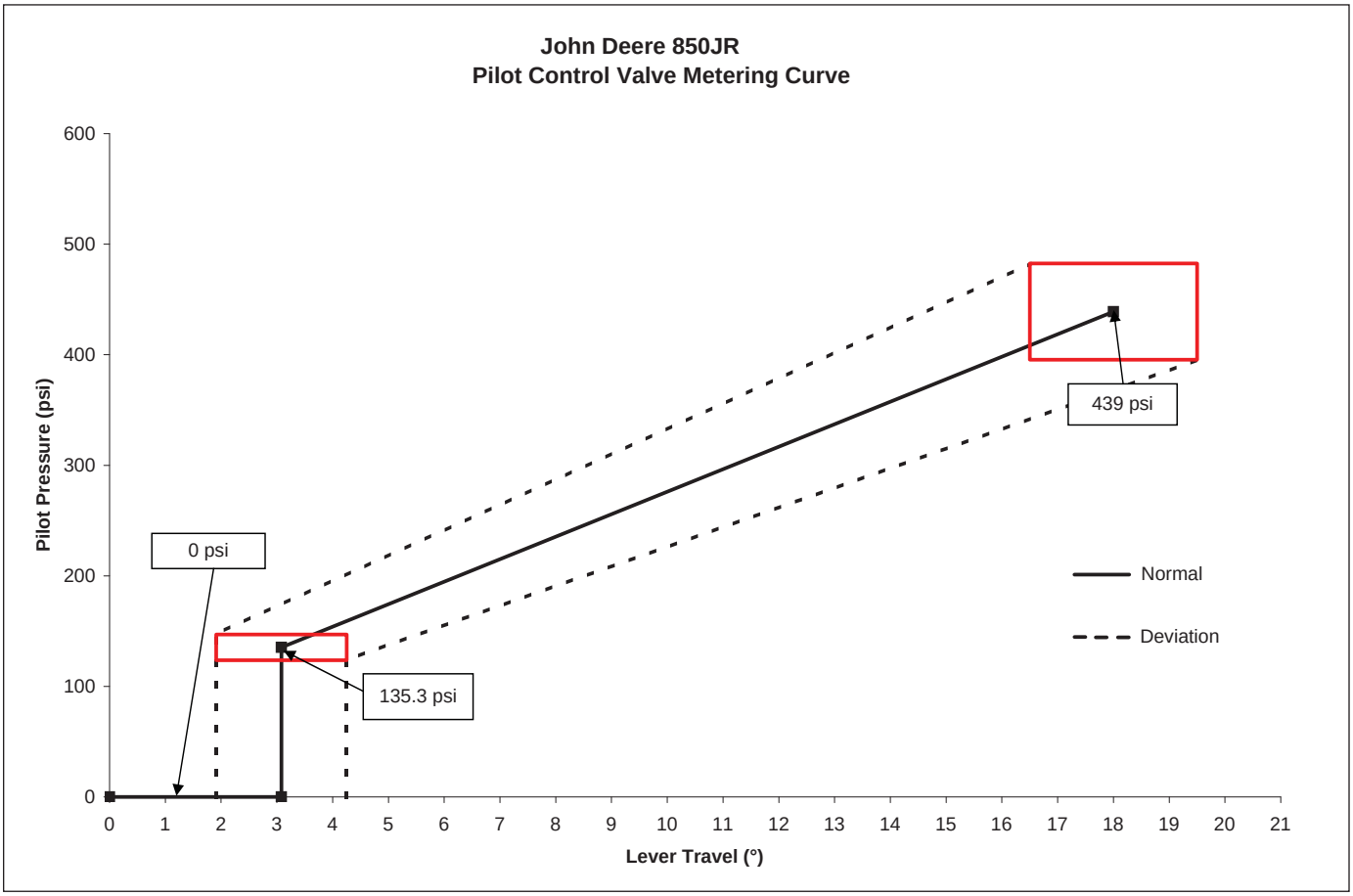


Figure 2-1 Output Pressures from Pilot Controller Unit on Control Lever vs. Angle of Lever Deflection

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.
Pilot Reducing Valve		
1.6 Is there any pilot pressure from the tractor (port P at tractor interface or pilot check port right side of dozer)?	No	Proceed to step 1.12.
	Yes	Proceed to step 1.7.
1.7 Is the pilot standby pressure at least 275±15 psi while the dozer is running at slow idle?	No	Proceed to step 1.8.
	Yes	Proceed to step 1.10.
1.8 Is the pilot pressure 650 psi when the dozer blade is held over relief?	No	Proceed to step 1.10.
	Yes	Proceed to step 1.12.
1.10 Can the pilot pressure be increased by adjusting the tractor pilot reducing valve?	No	Proceed to step 1.11
	Yes	Adjust to 650 psi. Proceed to 1.12.
1.11 Remove pilot reducing cartridge valve and inspect. Is it damaged?	No	Refit cartridge and proceed to step 1.12.
	Yes	Replace cartridge and return to step 1.6.
Winch Control		
1.12 Is control lever unit 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 1.13.
1.13 Is case pressure less than 35 psi?	No	Check drain hoses for restriction.
	Yes	Proceed to step 1.14.

1.14 Operate control lever in both directions. Is pressure at RI & RO greater than the standby pilot pressure of 275±15 psi?	No	Verify that pilot pressure to directional spool PA & PB will cause the pump to load sense & cause pilot pressure to increase. Return to step 1.12.
	Yes	Proceed to step 1.15.
1.15 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**. If pressure is below 3500 psi, is it possible to adjust the load sense relief valve? (Refer to Section 3 for more details on pressure check procedures.)	No	Replace load sense high pressure relief valve cartridge and return to step 1.12.
	Yes	Adjust load sense high pressure relief valve to 3500 psi. Proceed to step 1.16.
1.16 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 assembly in good condition? Is there air in pilot lines?	No	Repair or replace the control lever assembly. 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 logic control manifold & 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 direction only?	No	Proceed to step 3.2.
	Yes	Control signal from one side of control lever assembly 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 Is there control pressure to PA & PB as well as from from RI & RO? Winch begins to drive when the pressure at RI or RO is 150 psi.	No	Correct control signal problem.
	Yes	Operate the winch.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Winch gets very hot	Low oil level.	Add oil (MIL-PRF-2105E); refer to tractor oil specifications.
	Improper oil viscosity.	Use correct oil grade (MIL-PRF-2105E); 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 (MIL-PRF-2105E); refer to tractor oil specifications.
	Low pilot pressure.	Normal pressure is above 260 psi. Look for leaks in hydraulic system. If none are found, see Pilot Supply Reducing Valve Adjustment.
	Wire rope jumps layers on drum.	Spool wire rope more evenly.
	Motor hunting between high and low speed.	2-speed solenoid is malfunctioning, motor speed spool sticking, shuttle valve not selecting priority pilot signal to 2-speed, pressure switch or relay malfunctioning.
Operation is noisy (**NOTE: motor is significantly noisier in HI-SPEED mode**)	Incorrect oil used.	Drain reservoir and re-fill with correct oil (MIL-PRF-2105E); refer to tractor oil specifications.
	Air in the hydraulic oil (indicated by foaming or milky-colored oil).	Replace oil (MIL-PRF-2105E) 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.
Drum continues to rotate after control lever is returned to **BRAKE-ON**	Direction spool not shifting to centered position.	Direction spool sticking. Clean or replace. Control lever assembly valve plunger sticking. Repair.
	Brake not engaged or worn.	Repair brake.
	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 200 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.
	Leak in hydraulic system other than brake assembly.	Plug brake line and check that pressure at motor ports A & B are 3500 psi.

Figure 2-2 Troubleshooting 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 motor speed spool relief cartridge (**HI-SPEED** only).	Check that the pressures at motor test ports A & B are sufficient for operating the winch in **LINE-IN/OUT** with the brake line plugged. If the pressure is low and registered simultaneously at A and B, leakage is occurring past the relief valve. Remove and repair the valve.
	Clogged filter.	Tractor filter indicator light will illuminate if filter is clogged. Replace filter. Refer to tractor specifications.
	Wrong oil.	Use correct oil grade (MIL-PRF-2105E); refer to tractor oil specifications.
	Low oil level in reservoir.	Add oil (MIL-PRF-2105E); 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 3625 psi see tractor service manual for proper adjustment.
	Damaged **FREESPOOL** components may be causing winch to be stuck in **FREESPOOL**.	Inspect **FREESPOOL** shaft for wear or damage, repair or replace as necessary.
	Motor damaged.	Repair or replace motor (refer to Section 4).
FREESPOOL will not function or is difficult to engage.	**FREESPOOL** shifter fork or collar stuck.	Remove top covers and inspect shifter fork & collar with control lever in **FREESPOOL** position. Repair parts if damaged.
	Leakage at hydraulic connection or **FREESPOOL** shaft.	Remove top covers and inspect shifter fork with control lever in **FREESPOOL** position. Replace seals if leaking.
	Insufficient control pressure from tractor pilot supply.	1. Measure control pressure at brake (BR) port and **FREESPOOL** (FS) hose (refer to Section 3). 2. Check for leaks at hydraulic connections.
	FREESPOOL solenoid is not energized.	Repair power supply or replace coil and/or solenoid.
	Load on wire rope.	Move lever to **LINE-OUT** to release load.
HI-SPEED function will not operate.	2-speed spool in motor stuck.	Clean and/or repair 2-speed spool.
	2-speed pressure switch malfunctioning (normally closed.)	Repair or replace 2-speed pressure switch.
	2-speed relay malfunctioning.	Repair or replace relay.
	2-speed solenoid is not energized.	Repair power supply or replace coil and/or solenoid.
Winch case oil level too high.	Too much oil added.	Drain oil (MIL-PRF-2105E) 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.

Figure 2-2 Troubleshooting Chart - 2

PROBLEM	POSSIBLE CAUSE	CORRECTION
Control lever does not automatically return to **BRAKE-ON** position.	1. Plunger seal sticking in control lever. 2. Spring in pilot controller unit broken.	Remove and inspect pilot controller unit on control lever assembly. Replace worn parts or entire assembly as necessary.
Winch does not respond to control lever movement.	1. Leak in the pilot controller unit on control lever assembly. 2. Control valve seized or blocked.	Check for leaks in control lever assembly and replace if necessary.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.
Line speed is abnormally slow for **LINE-IN**, **LINE-OUT** or both.	1. Poor pressure signal. 2. Leak in the pilot controller unit in the control lever assembly.	Visually inspect to check for wear on control lever assembly. Check for leaks in pilot controller unit and replace if necessary.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.
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 2-2 Troubleshooting Chart - 3

Notes

Notes

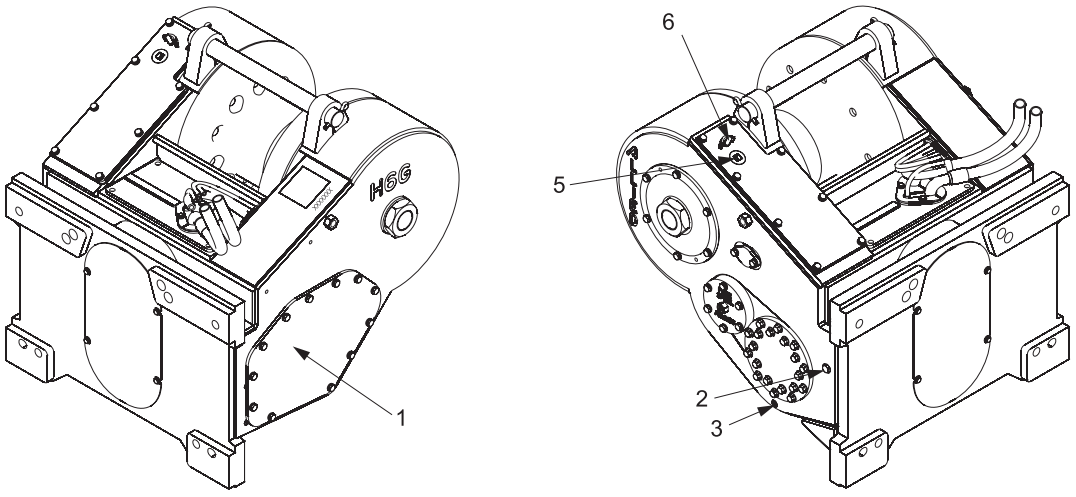
Service

General

This section provides the instructions for performing maintenance and making checks and adjustments. Standard shop tools are used in doing the work described in this section.

Maintenance

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



1. Access Cover for Motor and Winch Hydraulics
2. Plug to Check Oil Level
3. Plug to Drain Oil
5. Fill Plug
6. Breather

Figure 3-1 H6G Winch Maintenance Points

INTERVAL	PROCEDURE OR QUANTITY	SPECIFICATION
50 hours or weekly	Check oil level at plug (item 2). Add oil (MIL-PRF-2105E) as necessary through fill plug (item 5). **Do not operate tractor when checking the oil level.**	See Oil Selection 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. (MIL-G-10924F)
2000 hours or every 12 months	Change the gear oil. Drain oil from plug (item 3). Add 8 liters (8.5 quarts) of Gear Oil MIL-PRF-2105E through fill plug (item 5). Check the oil level at oil level check plug (item 2).	See Oil Selection in Section 1.

Figure 3-2 H6G 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.

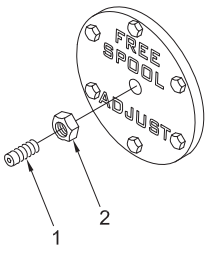
Checks During Operation

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.



1. Adjusting Nut
2. Jam Nut

Figure 3-3 FREESPOOL Adjustments

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

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

⚠ WARNING

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.

⚠ WARNING

Always wear gloves when handling wire rope.

2. 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 20°C (70°F).

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.

6. 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.

Standby Pilot Supply Pressure Check

With the engine shut off, connect a 1000 psi gauge to the tractor pilot test port. This is behind the battery access panel and is the quick-connect port on the pilot reducing manifold (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:

1. Improper pilot supply reducing valve setting or malfunction (See tractor Service Manual)

2. Pump standby pressure setting incorrect (See tractor Service Manual)

3. Leaking pressure hoses or fittings

Maximum Pilot Supply Pressure Check

With the same gauge installed from the Standby Pilot Pressure Check, bottom tractor blade cylinders and measure Relief Pilot Supply Pressure. When the tractor pump senses a load, the maximum pilot supply pressure is reduced to the setting of the tractor pilot reducing valve. Excessive pilot supply pressure may cause damage to tractor and winch components.

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

1. Improper pilot supply reducing valve setting or malfunction (See tractor Service Manual)

2. Leaking pressure hoses or fittings

Counterbalance Valve Pressure Check

With the engine shut off, connect one 5000 psi pressure gauge to Motor Port B. Start the engine and place control lever in **LINE-OUT** to build pressure against the counterbalance 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 counterbalance valve. If pressure is not as specified in Figure 3-5, do not adjust valve until remaining pressure diagnostics are performed and other problems are identified.

Counterbalance Valve Adjustment:

1. Start engine and place control lever in **LINE-OUT** position until drum just being rotating.

2. Measure pressure at Motor Port B.

3. Loosen counterbalance valve locknut. Turn counterbalance 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 one 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 load sense 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.

Load Sense Valve Adjustment:

1. Leave the brake pressure supply disconnected.

2. Start the engine and operate the winch in **LINE-IN** or **LINE-OUT**.

3. Measure the pressure at Motor Port A for **LINE-IN** or Port B for **LINE-OUT**.

4. Loosen load sense valve locknut. Turn adjusting capscrew OUT to decrease pressure and IN to increase pressure. Adjust pressures as shown in Figure 3-5.

5. Reconnect brake pressure supply hose.

NOTE: Port B pressure may be lower than Port A, but it will not affect winch performance.

Brake Pressure Check

With the engine shut off, connect one 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 Figure 3-5. The brake requires a minimum of 200 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.

2. 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 one 1000 psi pressure gauge to the BR pressure test port and one 1000 psi pressure gauge to the RI 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 RI reaches the RI pilot setting of the valve. Check pressure as indicated 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.

Note: Some brake valves are not adjustable.

FREESPOOL Pressure Check

With the engine shut off, connect 1000 psi pressure gauges in line on the FS hose at the logic control manifold, BR pressure test port, in line on the HS hose, and in line on the DV hose. Start the engine and measure pressure at each respective gauge with the **FREESPOOL** switch activated. **FREESPOOL** mode simultaneously sends pilot pressures to the **FREESPOOL** shifter fork, the brake, the motor speed spool, and the bypass manifold. This includes a pilot pressure signal that load senses the pump and elevates the pilot pressure to each respective port. Therefore, pressures will be greater than the standby pilot setting. The **FREESPOOL** shift fork will shift at a minimum of 170 psi. 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
5. Loose DV lube orifice in B motor port block fitting.

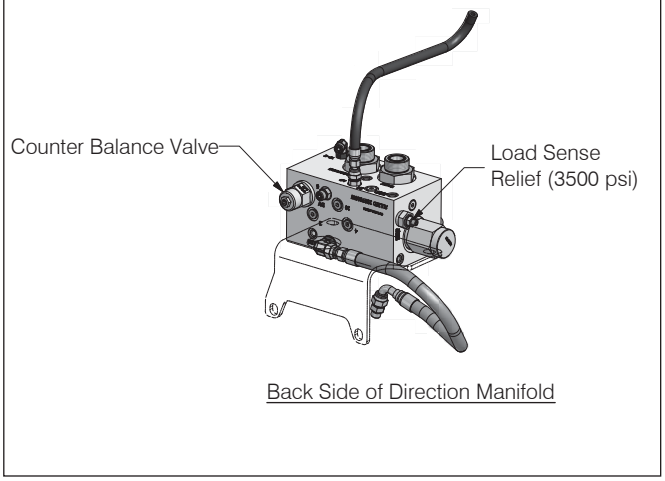


Figure 3-4 Hydraulic Pressure Test Ports (2) (some items removed for clarity)

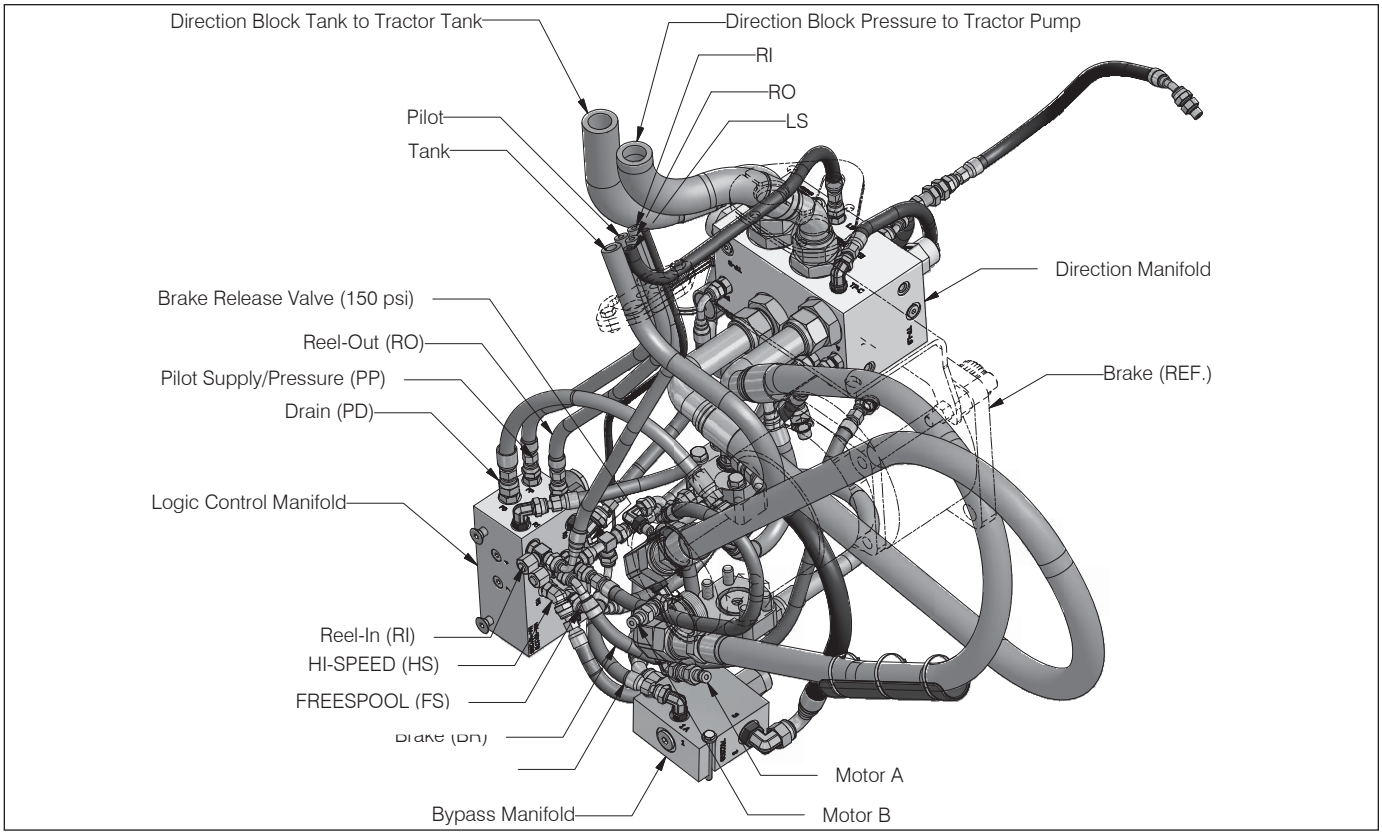


Figure 3-4 Hydraulic Pressure Test Ports (1) (some items removed for clarity)

HI-SPEED Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge in line on the HS hose at the logic control manifold. Start the engine and measure pressure with the **HI-SPEED** switch activated. Pressure should be as specified in Figure 3-5. The **HI-SPEED** mechanism also incorporates a pressure switch and electric relay. The pressure switch opens at a set load on the winch when the winch is operated in **HI-SPEED**. The **HI-SPEED** electric signal is opened when the relay opens and the winch automatically shifts to the slow speed mode. To check that this feature is functioning properly without wire rope on the drum disconnect and plug the brake pressure hose. Activate the **HI-SPEED** switch and operate the winch in **LINE-IN**. Pressure at the HS gauge should decrease to a low value equal to case pressure, and the LED light in the **HI-SPEED** switch will deactivate.

If the **HI-SPEED** pressure is 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

If the **HI-SPEED** automatic shift down does not function, check for:

1. Faulty pressure switch or relay.
2. Stuck motor speed spool.

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 will be greater than the standby pilot pressure due to mechanical drag and if there is resistance on the winch such as a high **FREESPOOL** drag setting. 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 will be greater than the standby pilot pressure due to mechanical drag and if there is resistance on the winch, such as a high **FREESPOOL** drag setting. 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

Load sense relief valve

Disconnect brake hose from logic control manifold. Plug manifold brake port. Connect a 5000-psi gauge to motor test port A. At engine idle, hold winch control lever in **LINE-IN** position for 5 seconds while monitoring gauge. Adjust valve IN to increase, OUT to decrease. Setting is 3450-3600 psi.

Pilot supply reducing valve

See tractor service manual.

Figure 3-5 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	650 psi (4482 kPa)	Adjust tractor pilot reducing valve. See tractor service manual.
Counter-balance Valve	Motor Port B	5000 psi (34,474 kPa)	**LINE-OUT** (Inching)	700-1000 psi	Adjust counterbalance valve.
Motor Supply	Motor Ports A & B	5000 psi (34,474 kPa)	**LINE-IN/OUT** with brake pressure port blocked.	3500 psi (24,132 kPa)	Adjust Load Sense Relief Valve.
Brake	BR: Brake	1000 psi (6895 kPa) gauge	**LINE-IN**	275-650 psi	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)	BR = 275-650 psi; RI: 140-160 psi	Adjust brake valve.
FREESPOOL	FS: **FREESPOOL** BR: Brake HS: **HI-SPEED** DV: Pilot, lube, & load sense	1000 psi (6895 kPa) gauge	**FREESPOOL**	275-650 psi	Check plumbing for leakage. Check DV lube orifice. Check respective solenoid valves.
HI-SPEED	HS: **HI-SPEED**	1000 psi (6895 kPa) gauge	**HI-SPEED**	275-650 psi	Check **HI-SPEED** spool in motor. Check solenoid valve.
LINE-IN	RI: **LINE-IN**	1000 psi (6895 kPa) gauge	**LINE-IN**	275-650 psi	Check control lever.
LINE-OUT	RO: **LINE-OUT**	1000 psi (6895 kPa) gauge	**LINE-OUT**	275-650 psi	Check control lever.

Notes

Notes

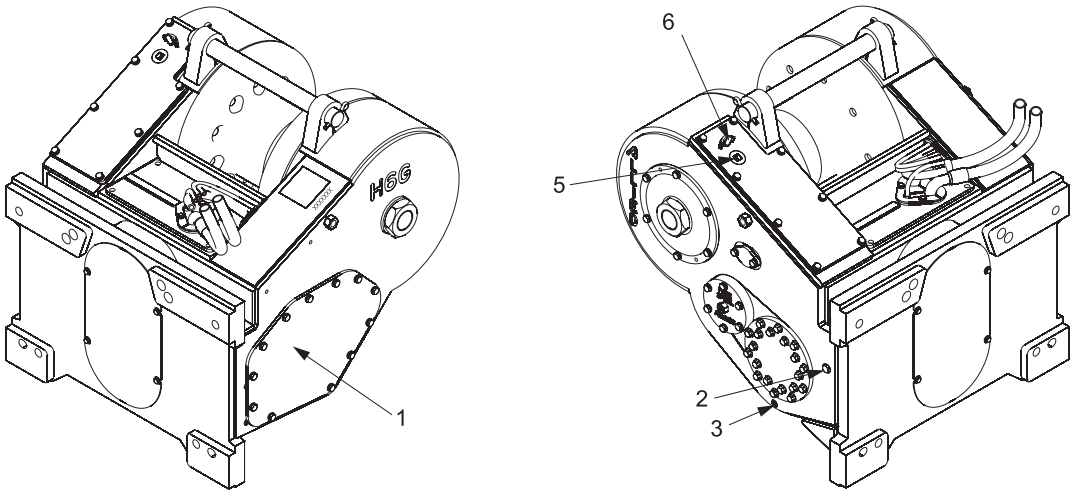
Service

General

This section provides the instructions for performing maintenance and making checks and adjustments. Standard shop tools are used in doing the work described in this section.

Maintenance

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



1. Access Cover for Motor and Winch Hydraulics
2. Plug to Check Oil Level
3. Plug to Drain Oil
5. Fill Plug
6. Breather

Figure 3-1 H6G Winch Maintenance Points

INTERVAL	PROCEDURE OR QUANTITY	SPECIFICATION
50 hours or weekly	Check oil level at plug (item 2). Add oil (MIL-PRF-2105E) as necessary through fill plug (item 5). **Do not operate tractor when checking the oil level.**	See Oil Selection 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. (MIL-G-10924F)
2000 hours or every 12 months	Change the gear oil. Drain oil from plug (item 3). Add 8 liters (8.5 quarts) of Gear Oil MIL-PRF-2105E through fill plug (item 5). Check the oil level at oil level check plug (item 2).	See Oil Selection in Section 1.

Figure 3-2 H6G 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.

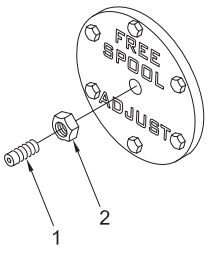
Checks During Operation

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.



1. Adjusting Nut
2. Jam Nut

Figure 3-3 FREESPOOL Adjustments

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

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

⚠ WARNING

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.

⚠ WARNING

Always wear gloves when handling wire rope.

2. 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 20°C (70°F).

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.

6. 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.

Standby Pilot Supply Pressure Check

With the engine shut off, connect a 1000 psi gauge to the tractor pilot test port. This is behind the battery access panel and is the quick-connect port on the pilot reducing manifold (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:

1. Improper pilot supply reducing valve setting or malfunction (See tractor Service Manual)

2. Pump standby pressure setting incorrect (See tractor Service Manual)

3. Leaking pressure hoses or fittings

Maximum Pilot Supply Pressure Check

With the same gauge installed from the Standby Pilot Pressure Check, bottom tractor blade cylinders and measure Relief Pilot Supply Pressure. When the tractor pump senses a load, the maximum pilot supply pressure is reduced to the setting of the tractor pilot reducing valve. Excessive pilot supply pressure may cause damage to tractor and winch components.

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

1. Improper pilot supply reducing valve setting or malfunction (See tractor Service Manual)

2. Leaking pressure hoses or fittings

Counterbalance Valve Pressure Check

With the engine shut off, connect one 5000 psi pressure gauge to Motor Port B. Start the engine and place control lever in **LINE-OUT** to build pressure against the counterbalance 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 counterbalance valve. If pressure is not as specified in Figure 3-5, do not adjust valve until remaining pressure diagnostics are performed and other problems are identified.

Counterbalance Valve Adjustment:

1. Start engine and place control lever in **LINE-OUT** position until drum just being rotating.

2. Measure pressure at Motor Port B.

3. Loosen counterbalance valve locknut. Turn counterbalance 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 one 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 load sense 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.

Load Sense Valve Adjustment:

1. Leave the brake pressure supply disconnected.

2. Start the engine and operate the winch in **LINE-IN** or **LINE-OUT**.

3. Measure the pressure at Motor Port A for **LINE-IN** or Port B for **LINE-OUT**.

4. Loosen load sense valve locknut. Turn adjusting capscrew OUT to decrease pressure and IN to increase pressure. Adjust pressures as shown in Figure 3-5.

5. Reconnect brake pressure supply hose.

NOTE: Port B pressure may be lower than Port A, but it will not affect winch performance.

Brake Pressure Check

With the engine shut off, connect one 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 Figure 3-5. The brake requires a minimum of 200 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.

2. 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 one 1000 psi pressure gauge to the BR pressure test port and one 1000 psi pressure gauge to the RI 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 RI reaches the RI pilot setting of the valve. Check pressure as indicated 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.

Note: Some brake valves are not adjustable.

FREESPOOL Pressure Check

With the engine shut off, connect 1000 psi pressure gauges in line on the FS hose at the logic control manifold, BR pressure test port, in line on the HS hose, and in line on the DV hose. Start the engine and measure pressure at each respective gauge with the **FREESPOOL** switch activated. **FREESPOOL** mode simultaneously sends pilot pressures to the **FREESPOOL** shifter fork, the brake, the motor speed spool, and the bypass manifold. This includes a pilot pressure signal that load senses the pump and elevates the pilot pressure to each respective port. Therefore, pressures will be greater than the standby pilot setting. The **FREESPOOL** shift fork will shift at a minimum of 170 psi. 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
5. Loose DV lube orifice in B motor port block fitting.

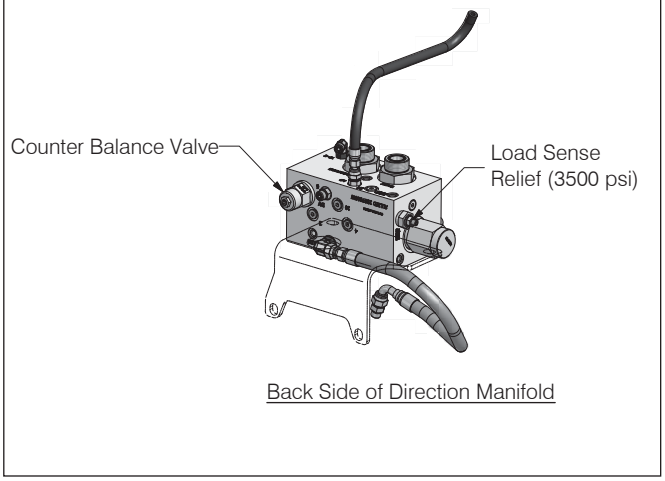


Figure 3-4 Hydraulic Pressure Test Ports (2) (some items removed for clarity)

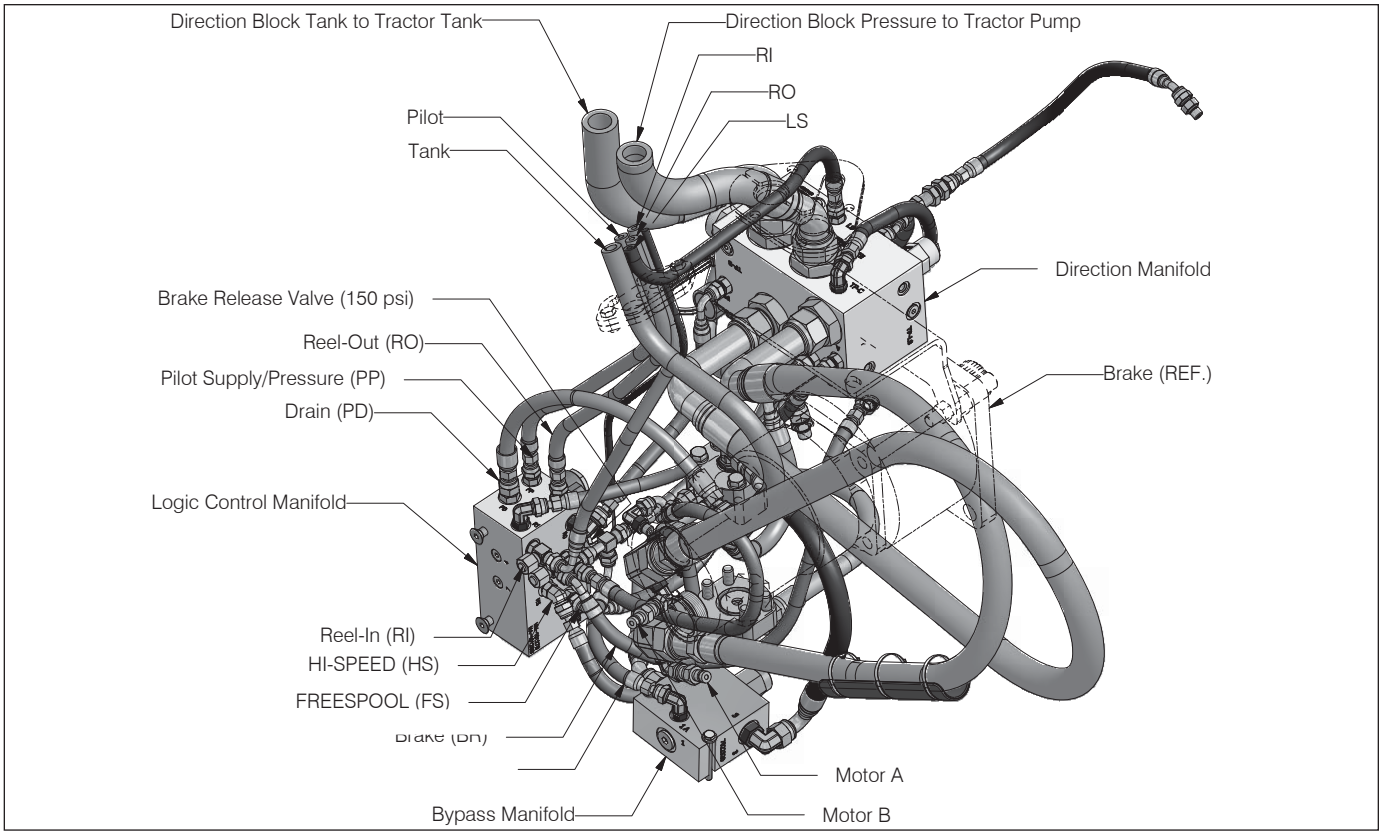


Figure 3-4 Hydraulic Pressure Test Ports (1) (some items removed for clarity)

HI-SPEED Pressure Check

With the engine shut off, connect a 1000 psi pressure gauge in line on the HS hose at the logic control manifold. Start the engine and measure pressure with the **HI-SPEED** switch activated. Pressure should be as specified in Figure 3-5. The **HI-SPEED** mechanism also incorporates a pressure switch and electric relay. The pressure switch opens at a set load on the winch when the winch is operated in **HI-SPEED**. The **HI-SPEED** electric signal is opened when the relay opens and the winch automatically shifts to the slow speed mode. To check that this feature is functioning properly without wire rope on the drum disconnect and plug the brake pressure hose. Activate the **HI-SPEED** switch and operate the winch in **LINE-IN**. Pressure at the HS gauge should decrease to a low value equal to case pressure, and the LED light in the **HI-SPEED** switch will deactivate.

If the **HI-SPEED** pressure is 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

If the **HI-SPEED** automatic shift down does not function, check for:

1. Faulty pressure switch or relay.
2. Stuck motor speed spool.

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 will be greater than the standby pilot pressure due to mechanical drag and if there is resistance on the winch such as a high **FREESPOOL** drag setting. 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 will be greater than the standby pilot pressure due to mechanical drag and if there is resistance on the winch, such as a high **FREESPOOL** drag setting. 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

Load sense relief valve

Disconnect brake hose from logic control manifold. Plug manifold brake port. Connect a 5000-psi gauge to motor test port A. At engine idle, hold winch control lever in **LINE-IN** position for 5 seconds while monitoring gauge. Adjust valve IN to increase, OUT to decrease. Setting is 3450-3600 psi.

Pilot supply reducing valve

See tractor service manual.

Figure 3-5 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	650 psi (4482 kPa)	Adjust tractor pilot reducing valve. See tractor service manual.
Counter-balance Valve	Motor Port B	5000 psi (34,474 kPa)	**LINE-OUT** (Inching)	700-1000 psi	Adjust counterbalance valve.
Motor Supply	Motor Ports A & B	5000 psi (34,474 kPa)	**LINE-IN/OUT** with brake pressure port blocked.	3500 psi (24,132 kPa)	Adjust Load Sense Relief Valve.
Brake	BR: Brake	1000 psi (6895 kPa) gauge	**LINE-IN**	275-650 psi	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)	BR = 275-650 psi; RI: 140-160 psi	Adjust brake valve.
FREESPOOL	FS: **FREESPOOL** BR: Brake HS: **HI-SPEED** DV: Pilot, lube, & load sense	1000 psi (6895 kPa) gauge	**FREESPOOL**	275-650 psi	Check plumbing for leakage. Check DV lube orifice. Check respective solenoid valves.
HI-SPEED	HS: **HI-SPEED**	1000 psi (6895 kPa) gauge	**HI-SPEED**	275-650 psi	Check **HI-SPEED** spool in motor. Check solenoid valve.
LINE-IN	RI: **LINE-IN**	1000 psi (6895 kPa) gauge	**LINE-IN**	275-650 psi	Check control lever.
LINE-OUT	RO: **LINE-OUT**	1000 psi (6895 kPa) gauge	**LINE-OUT**	275-650 psi	Check control lever.

Notes

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 (MIL-PRF-2105E) from the winch.

2. 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.

3. Remove the wire rope from the drum. Clean the outside of the winch and the area where the winch contacts the tractor.

⚠ WARNING

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

4. Disconnect hoses and wire rope harness from tractor.

5. Connect slings and a crane or lifting device to the winch. Install lifting eyes into the lifting holes provided in the frame.

⚠ WARNING

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

6. Remove 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.

1. Capscrew
2. FREESPOOL Piston
3. O-ring
4. Cover
5. Intermediate Shaft
6. Drum Pinion Gear
7. Dental Clutch
8. Washer
9. Setscrew
10. Nut
11. Bearing Cup
12. Bearing Cone
13. FREESPOOL Shaft
14. Spring
15. FREESPOOL Piston
16. FREESPOOL Shifter Fork
17. O-Ring
18. O-Ring
19. Intermediate Gear
20. Spacer
21. Capscrew
22. Shifter Shaft Cover
23. Gasket

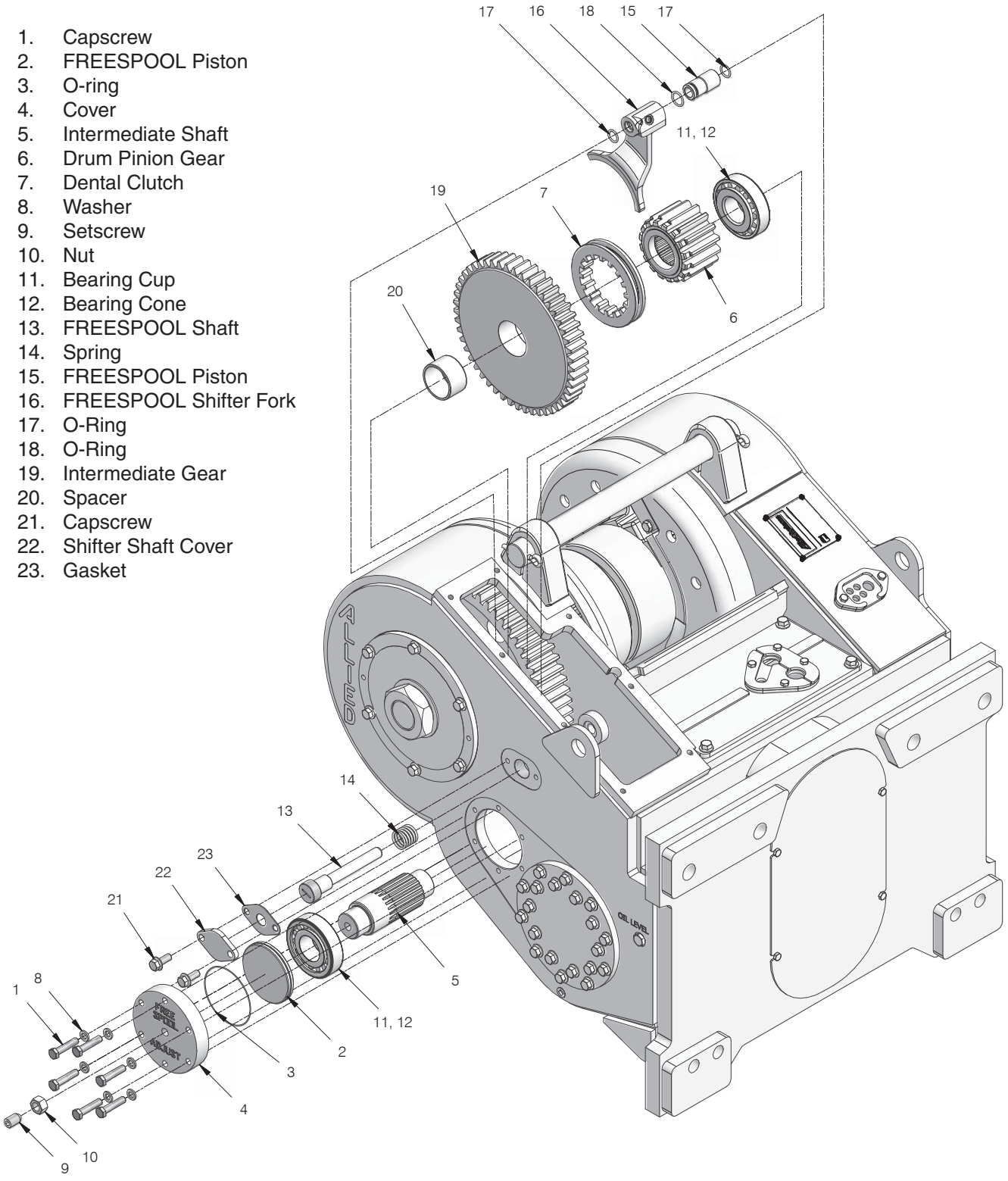
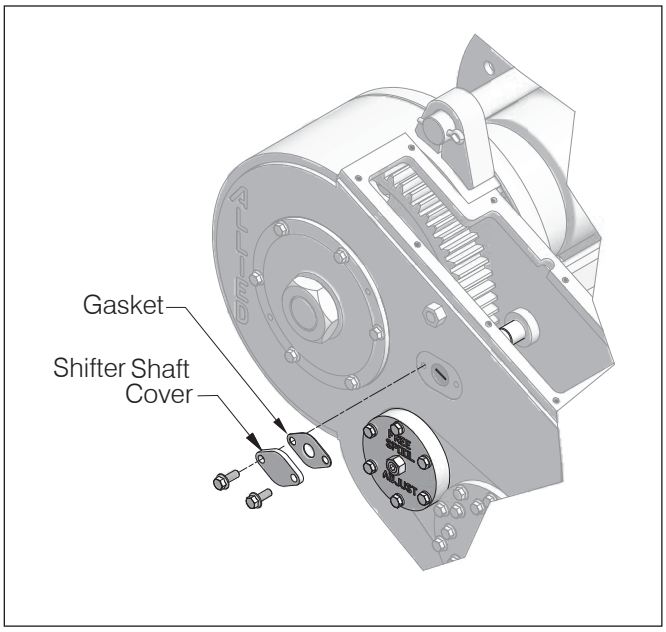


Figure 4-1 Location of Intermediate and FREESPOOL Shaft Components

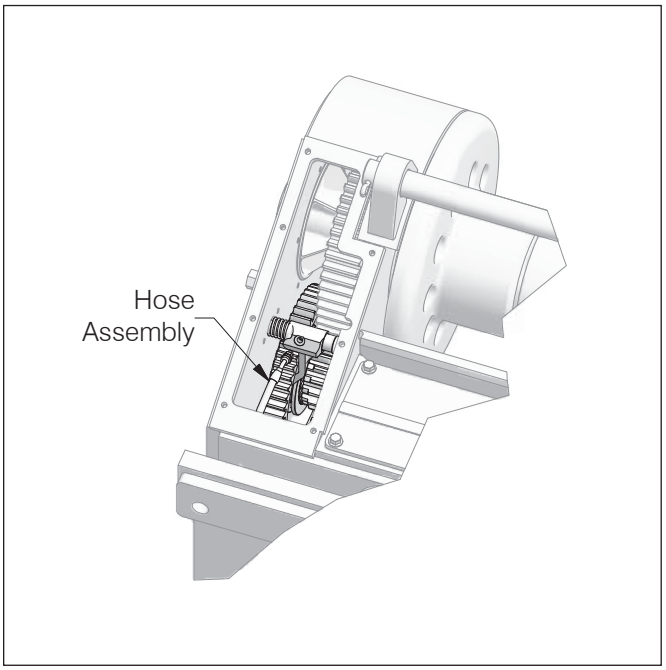
Intermediate and FREESPOOL Shaft Removal

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

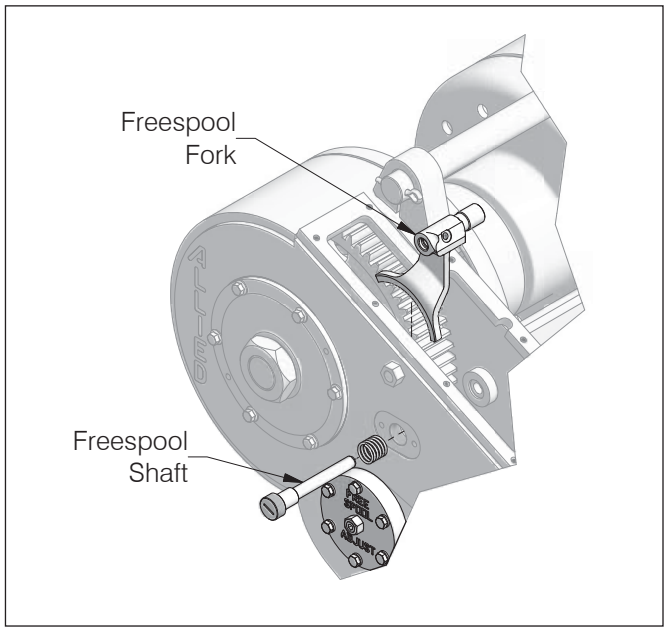
1. Remove the capscrews securing the shifter shaft cover and take the cover off.



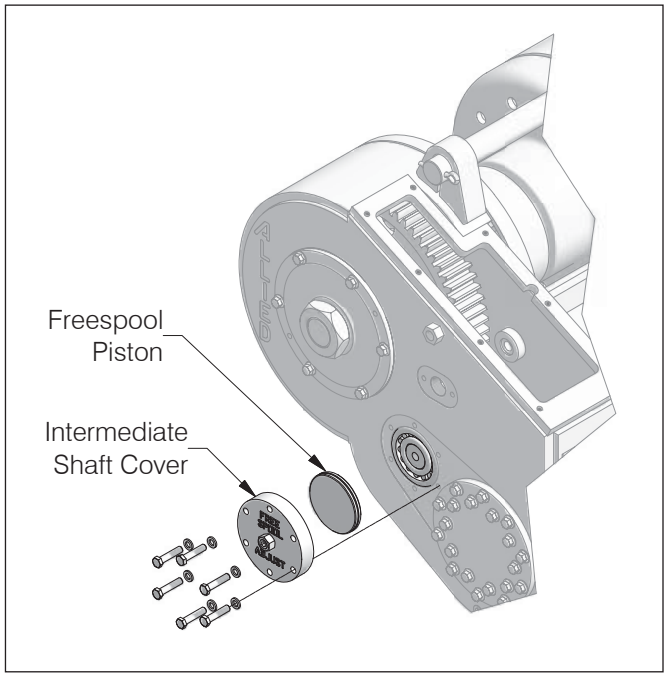
2. Disconnect the hose assembly.



3. Withdraw the shaft and remove the fork.



4. Remove the intermediate shaft cover and **FREESPOOL** piston.



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

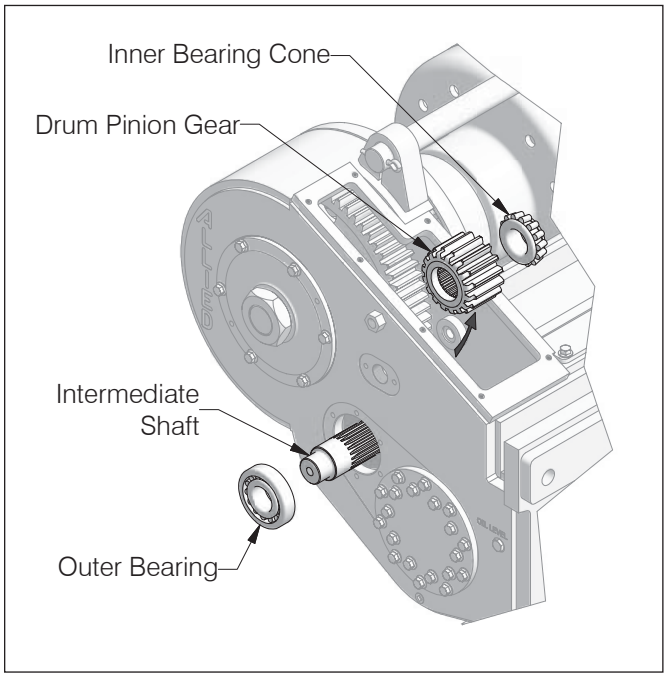
6. Screw a 3/4-16 UNF slide hammer into the end of the intermediate shaft and partially pull it out.

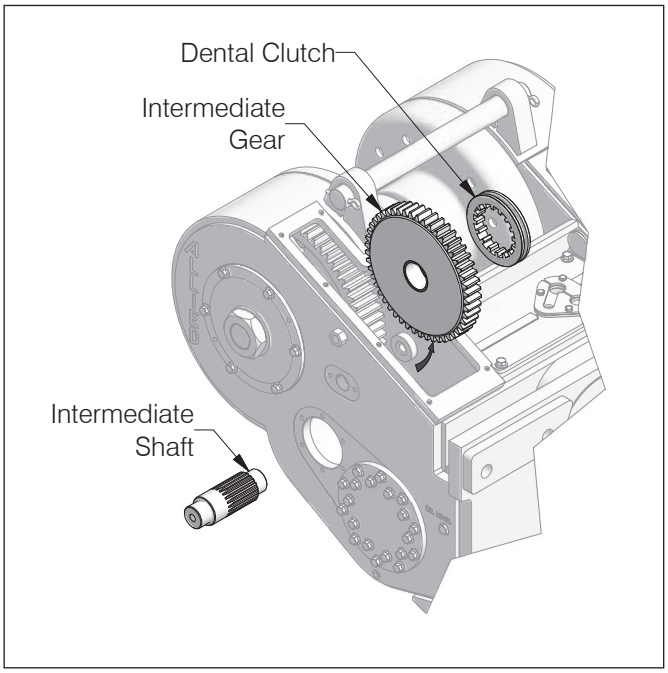
7. Remove the drum pinion gear and the inner bearing cone. Refer to Figure 4-1 for the location of components.

8. Remove bearing cup and cone and the intermediate shaft, while ensuring that the intermediate gear does not fall.

9. Remove intermediate gear.

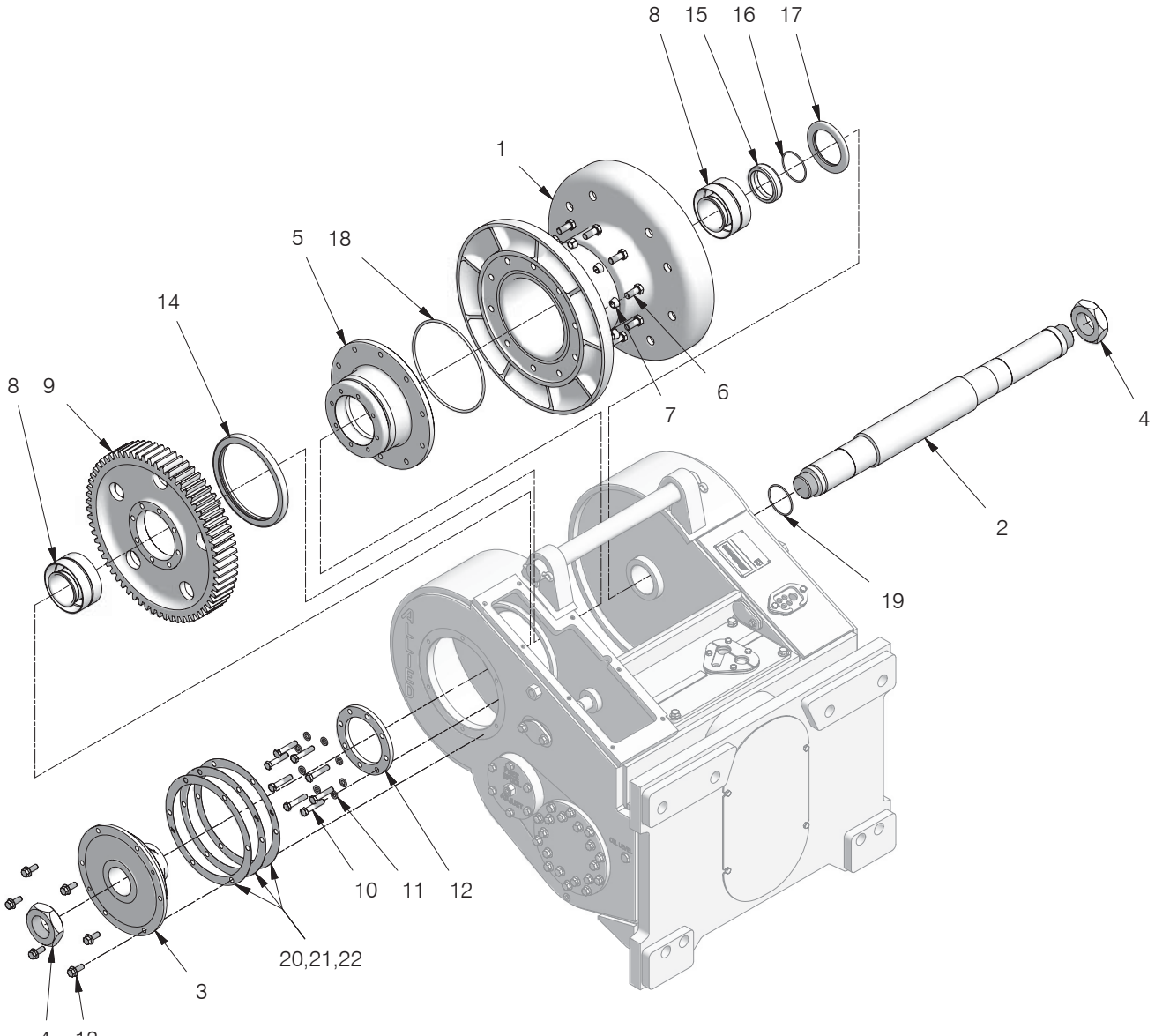
NOTE: Remove drum shaft retainer prior to removing intermediate gear. See Drum Shaft and Drum Removal section that follows.





Drum Shaft & Drum Removal

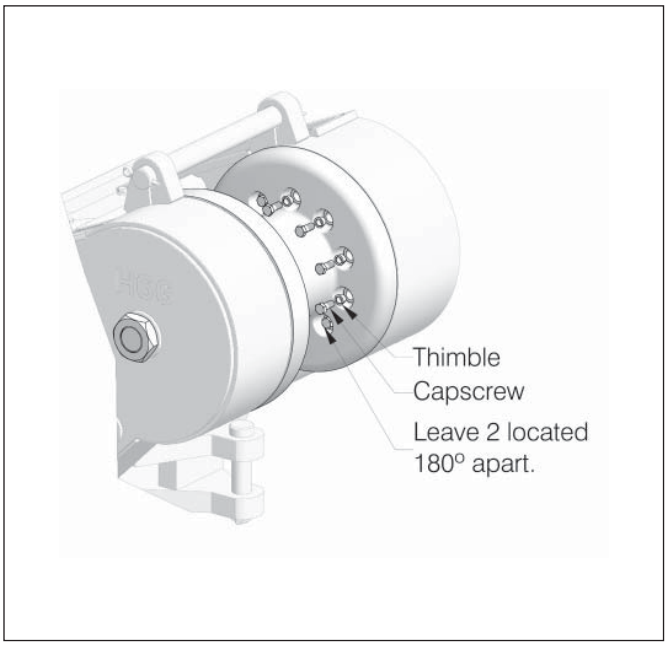
Figure 4-2 shows the location of drum and drum shaft components. Do not attempt to remove heavy components such as the drum or drum gear by hand. Always use a lifting device and the recommended attachments whenever possible. To remove the drum gear it will be necessary to first remove the intermediate shaft (see **Intermediate & FREESPOOL Shaft Removal** section).



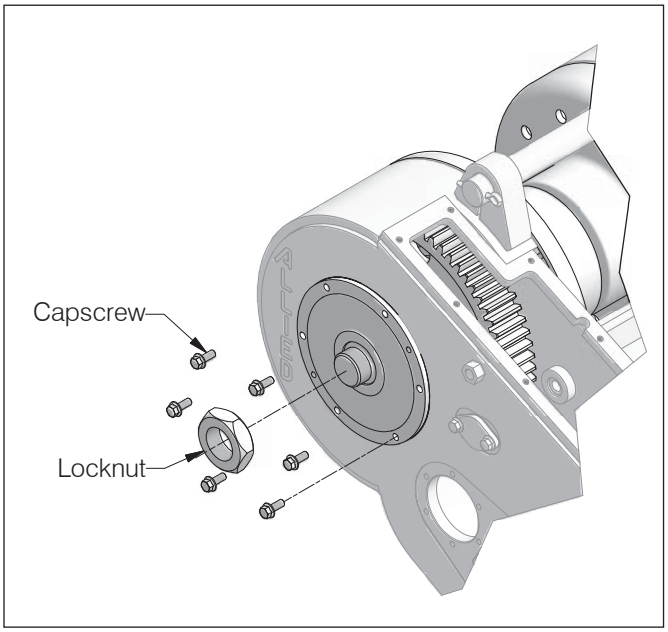
1. Drum
2. Drum Shaft
3. Bearing Retainer
4. Locknut
5. Adapter
6. Capscrew
7. Thimble
8. Roller Bearing
9. Drum Gear
10. Capscrew
11. Washer
12. Retainer Plate
13. Capscrew
14. Oil Seal
15. Oil Seal
16. O-Ring
17. Oil Seal
18. O-Ring
19. O-Ring
20. Shim
21. Shim
22. Shim

Figure 4-2 Location of Drum and Drum Shaft Components

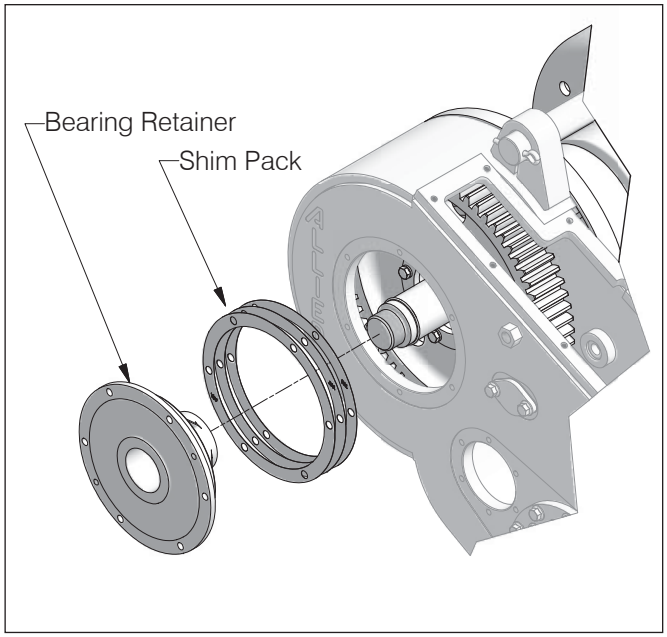
1. Loosen the drum capscrews, then remove capscrews with thimbles, leaving two located 180° apart.



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

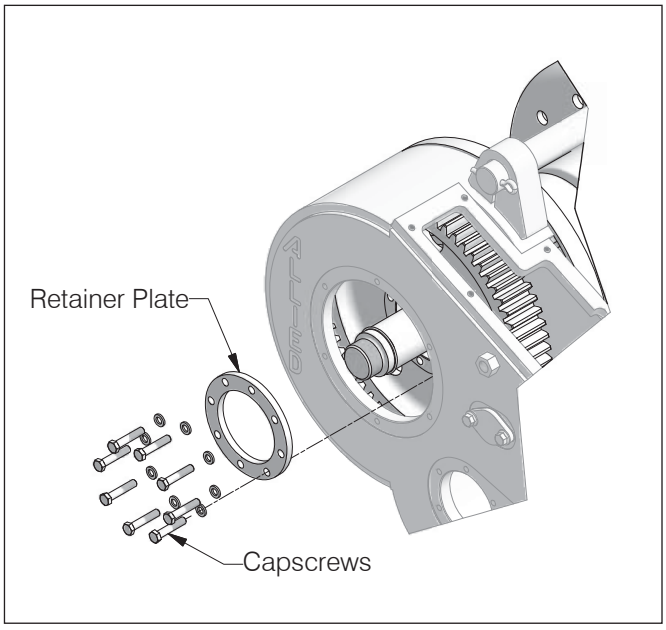


3. Remove bearing retainer and shim pack.



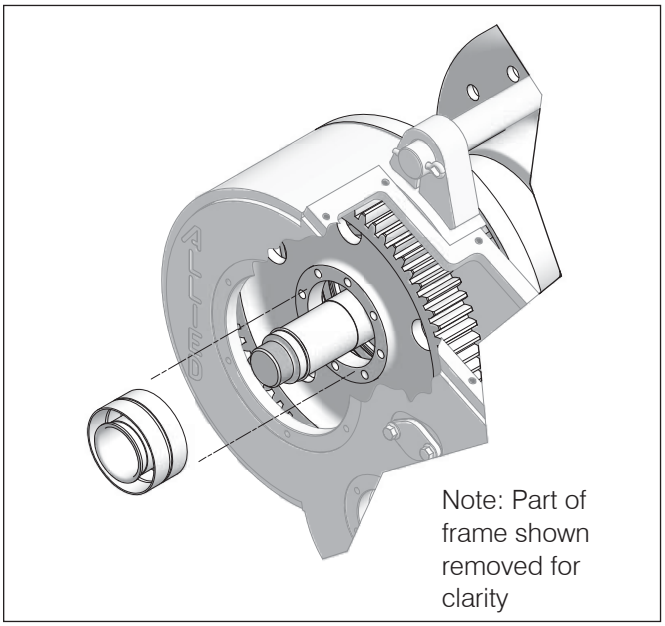
NOTE: Tag shim pack for reference during reassembly.

4. Remove retainer ring by removing retainer capscrews.

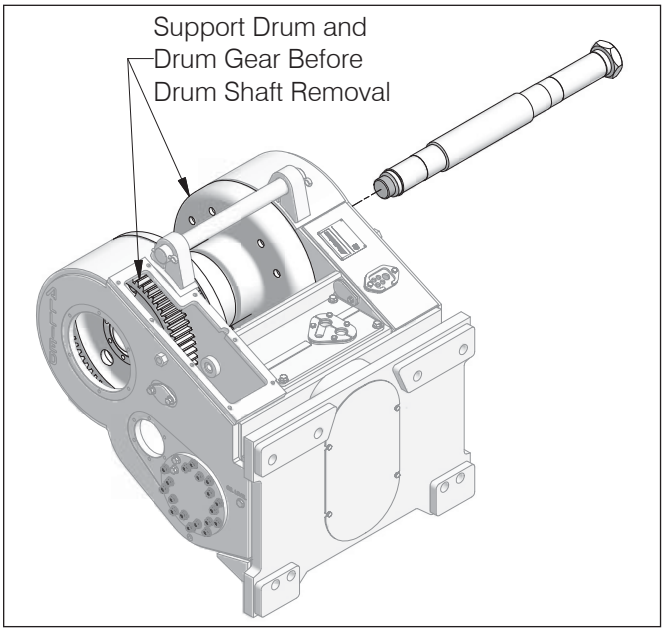


5. Remove roller bearing.

NOTE: Bearing cones, cups and spacer are matched set.



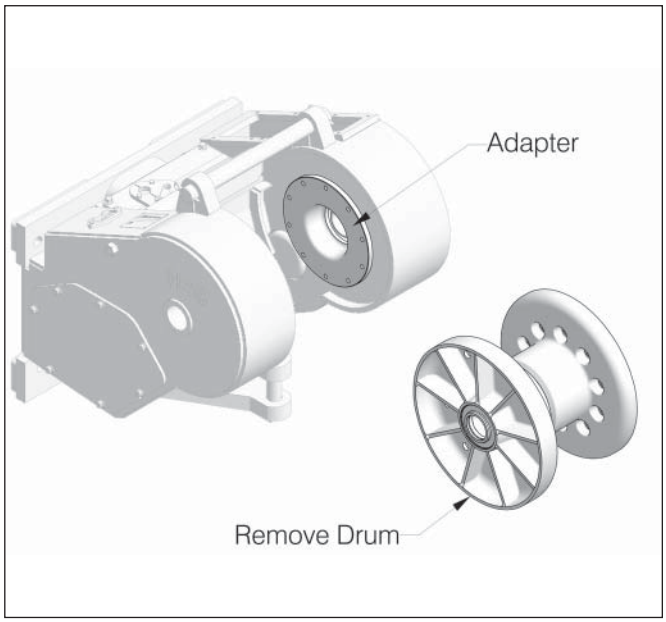
6. Attach a sling around the drum and hoist until there is no slack, then drive the shaft out the right hand side.



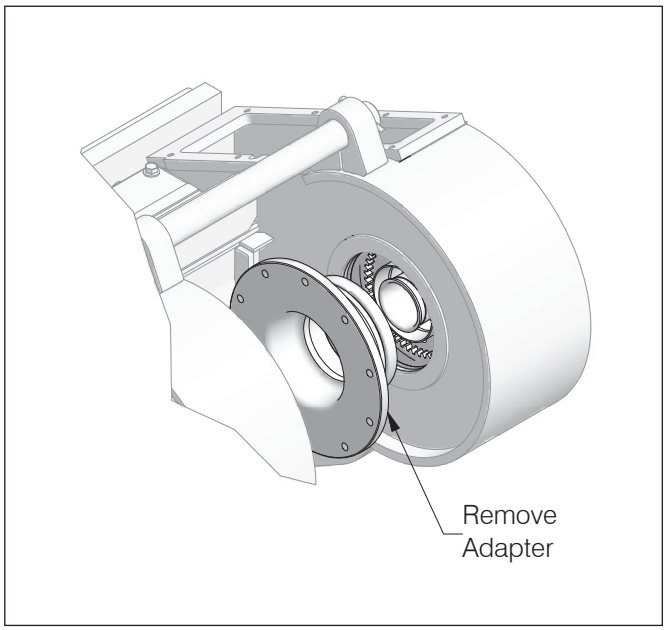
NOTE: Support or sling the drum gear so that it does not fall during shaft removal.

7. Remove two remaining drum capscrews.

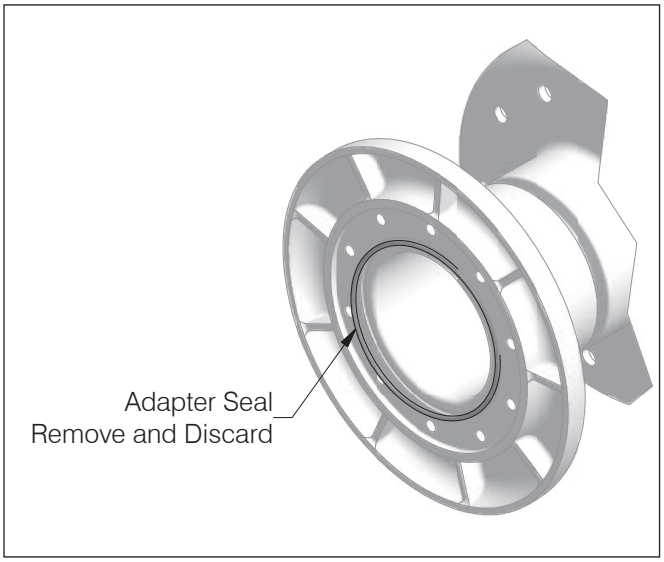
8. Carefully remove the drum from winch frame. Ensure that the adapter does not fall.



9. Remove adapter.

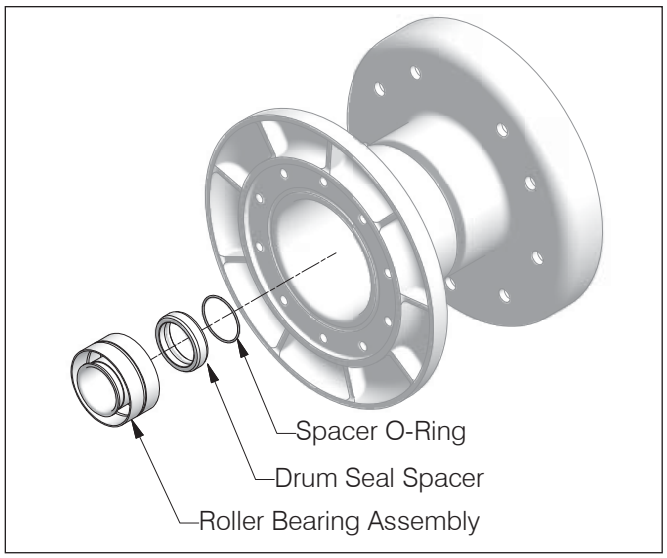


10. Remove and discard adapter seal.



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

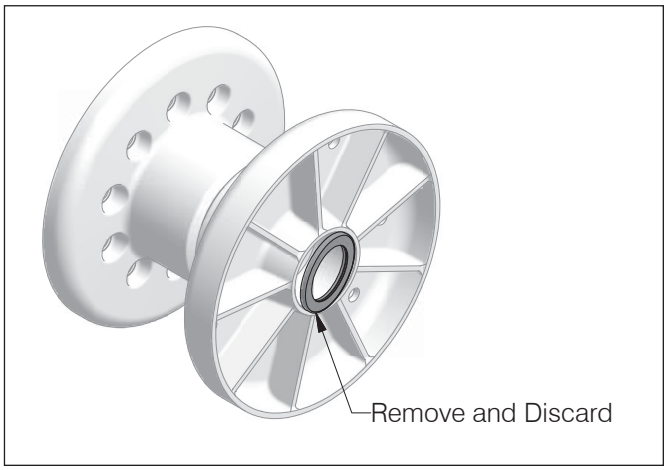
11. Remove double tapered roller bearing assembly and drum seal spacer from the left-hand end of the drum.



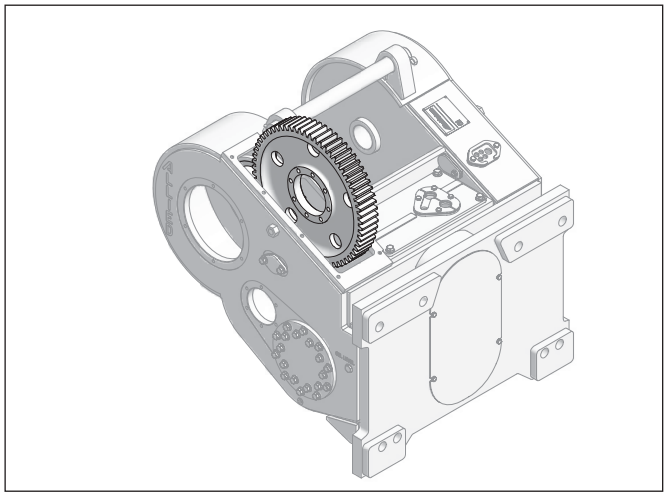
NOTE: Refer to Figure 4-2 for location of components.

NOTE: Bearing cones, cups and spacer are matched set.

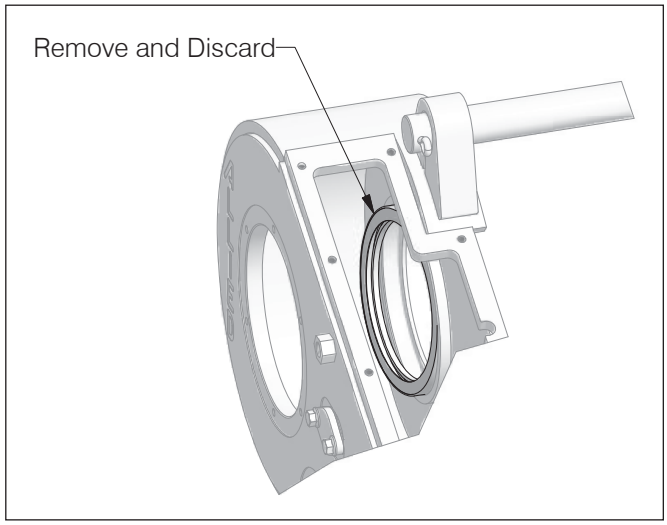
12. Remove and discard shaft seal from drum. (Seal lip should normally be pointed in.)



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

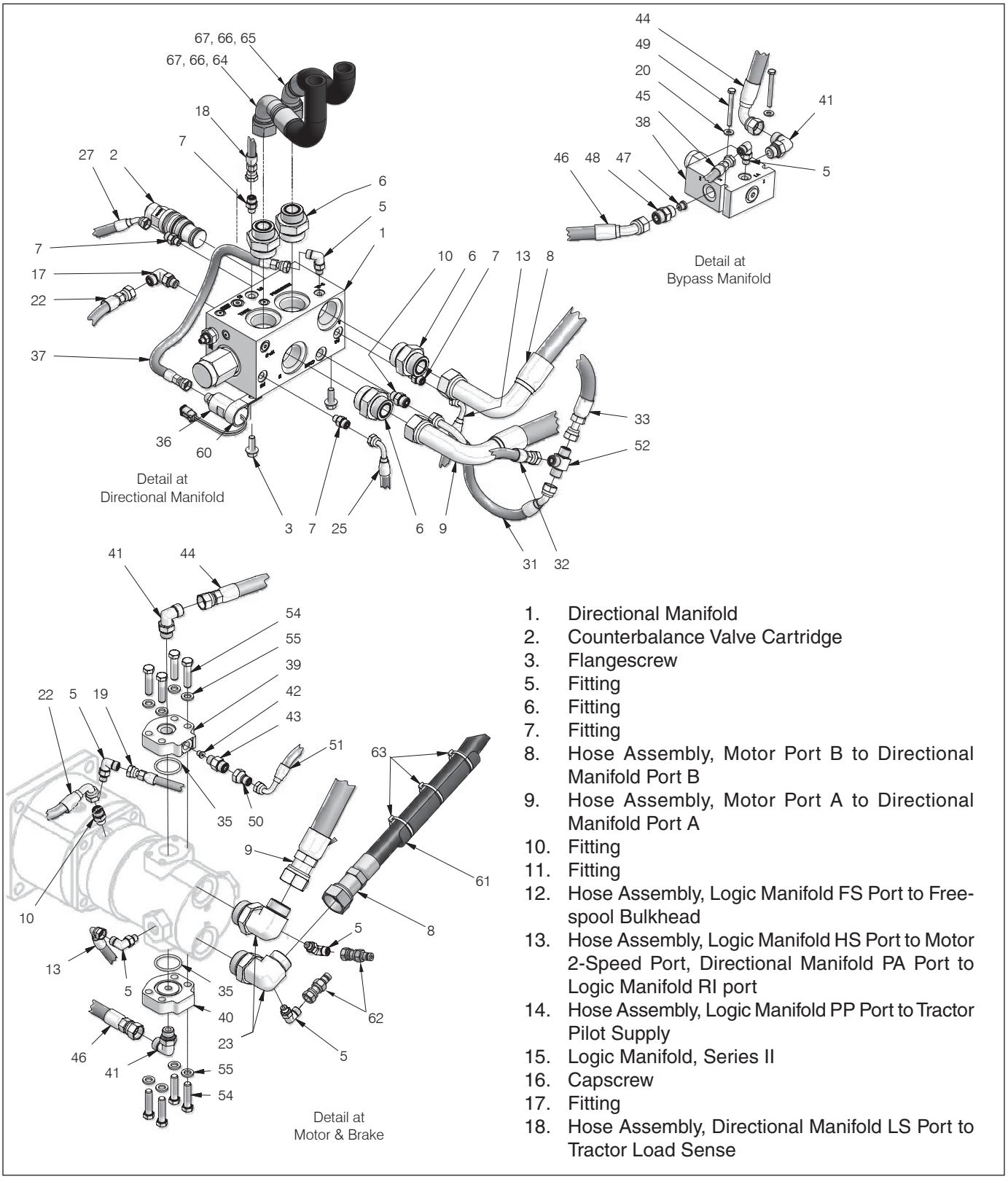


14. Remove and discard adapter seal from winch housing.



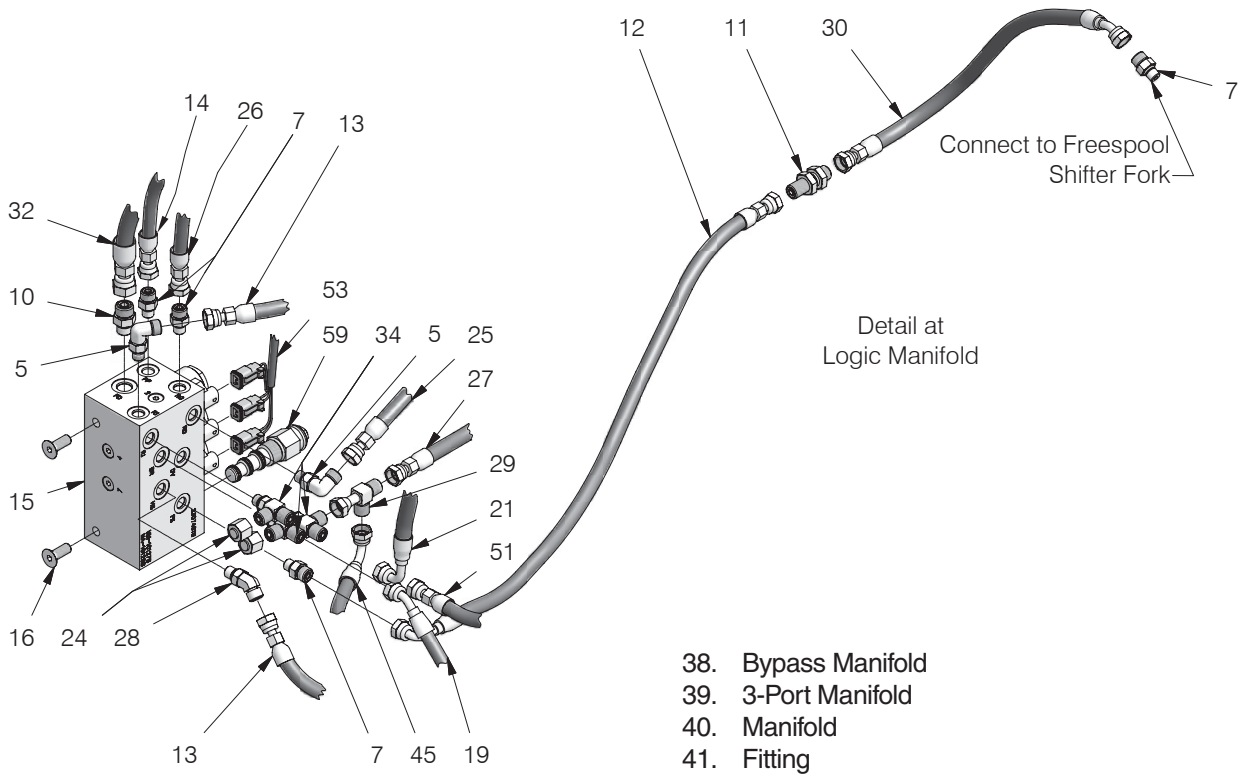
Hydraulic System Disassembly

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.



1. Directional Manifold
2. Counterbalance Valve Cartridge
3. Flangescrew
5. Fitting
6. Fitting
7. Fitting
8. Hose Assembly, Motor Port B to Directional Manifold Port B
9. Hose Assembly, Motor Port A to Directional Manifold Port A
10. Fitting
11. Fitting
12. Hose Assembly, Logic Manifold FS Port to Free-spool Bulkhead
13. Hose Assembly, Logic Manifold HS Port to Motor 2-Speed Port, Directional Manifold PA Port to Logic Manifold RI port
14. Hose Assembly, Logic Manifold PP Port to Tractor Pilot Supply
15. Logic Manifold, Series II
16. Capscrew
17. Fitting
18. Hose Assembly, Directional Manifold LS Port to Tractor Load Sense

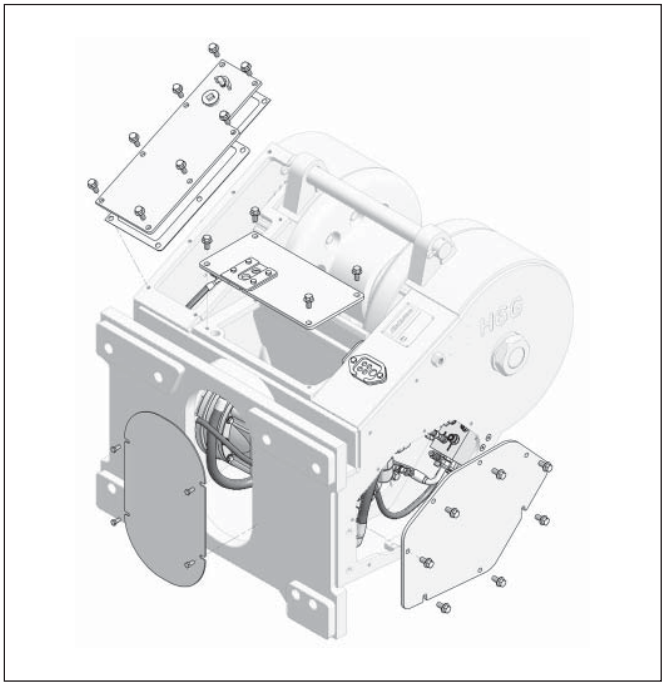
Figure 4-3 Hydraulic System Components, High-Performance Winch



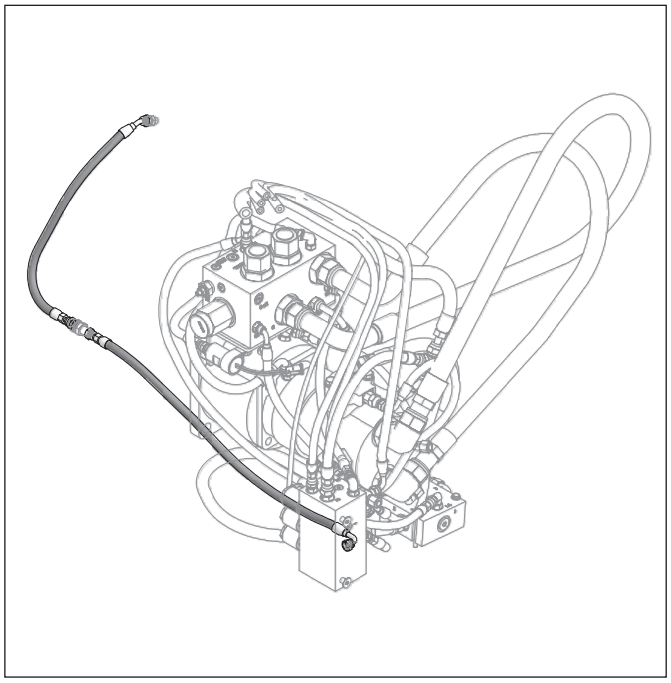
19. Hose Assembly, Brake to Logic Manifold BR Port
20. Washer
21. Hose Assembly, Logic Manifold RI Port to Tractor RI Port
22. Hose Assembly, Directional Manifold Case to Motor Case
23. Fitting
24. Fitting
25. Hose Assembly, Logic Manifold RO Port to Directional Manifold PB Port
26. Hose Assembly, Logic Manifold RO Port to Tractor RO Port
27. Hose Assembly, Directional Manifold DV Port to Logic Manifold DV Port
28. Fitting
29. Fitting
30. Hose Assembly, Freespool Bulkhead to Freespool Shifter Fork
31. Hose Assembly, Directional Manifold Case to Tee-Fitting (item 52)
32. Hose Assembly, Logic Manifold PD Port to Tee-Fitting (item 52)
33. Hose Assembly, Tee-Fitting (item 52) to Tractor Case
34. Fitting
35. O-Ring
36. Pressure Switch
37. Hose Assembly, Directional Manifold TPC Port to Pressure Switch
38. Bypass Manifold
39. 3-Port Manifold
40. Manifold
41. Fitting
42. Fitting (Orifice)
43. Check Valve
44. Hose Assembly, Bypass Valve #3 to Bypass Motor Port B
45. Hose Assembly, Bypass Valve #1A to Logic Manifold DV Port
46. Hose Assembly, Bypass Valve #2 to Bypass Motor Port A
47. Fitting (Orifice)
48. Fitting
49. Capscrew
50. Fitting
51. Hose Assembly, Bypass Motor Port B to Logic Manifold DV Port
52. Fitting
53. Wire Harness
54. Capscrew
55. Washer
59. Directional Valve Cartridge Assembly
60. Clip
61. Hose Protector
62. Quick Coupler
63. Tie Strap
64. Hose Assembly, Direction Block Tank to Tractor Tank
65. Hose Assembly, Direction Block Pressure to Tractor Pump
66. Sleeve
67. Clamp

Figure 4-4 Hydraulic System Components, High-Performance Winch

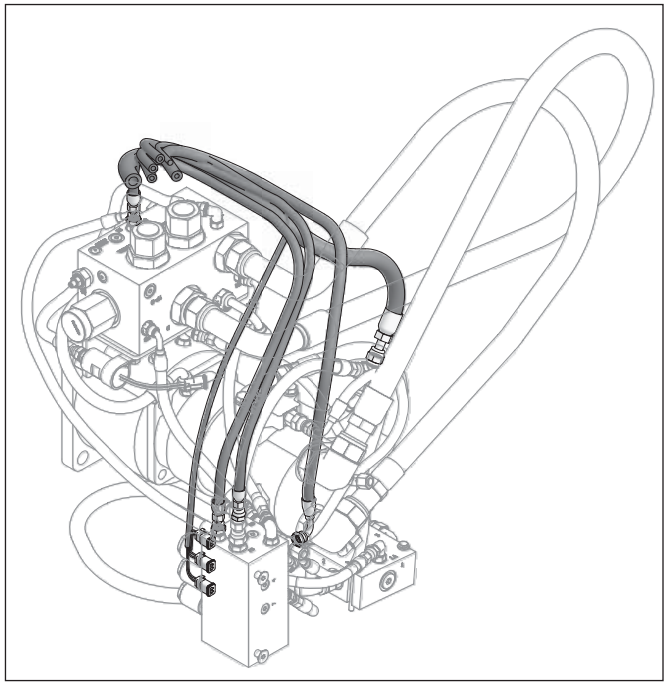
1. Drain oil (MIL-PRF-2105E) from winch. Remove cover plates as shown.



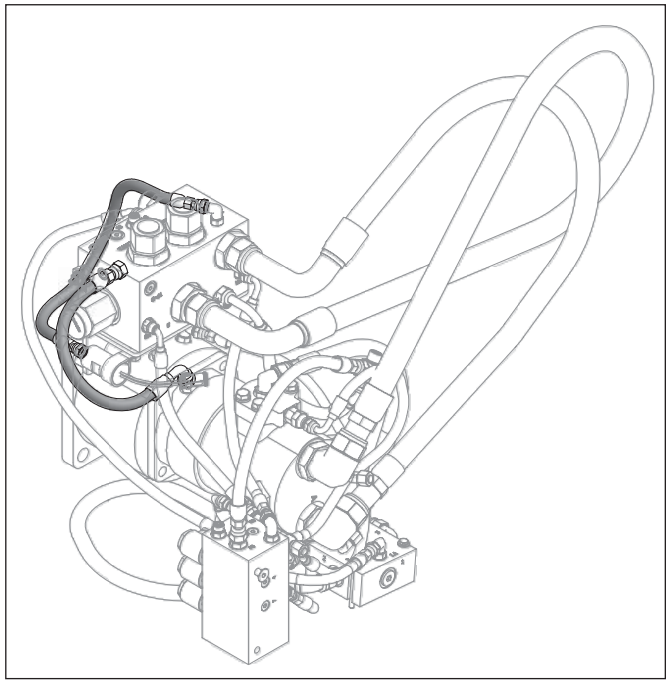
2. Remove the **FREESPOOL** hoses.



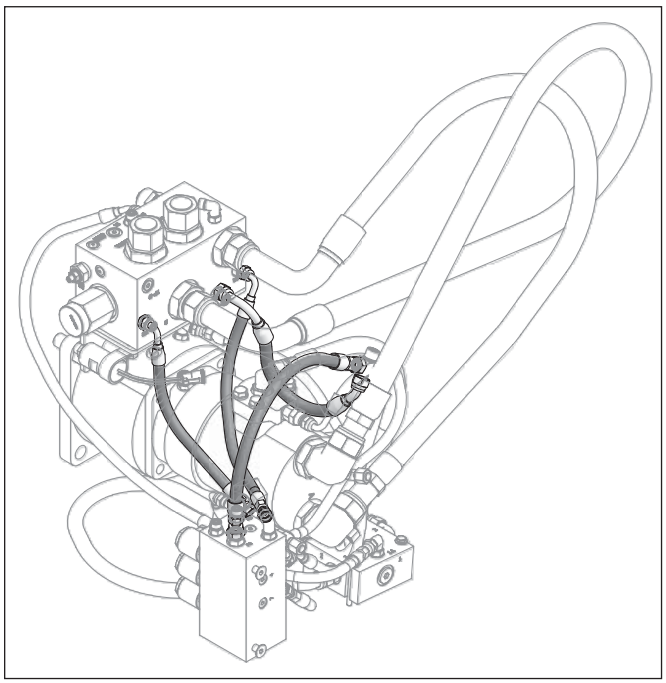
3. Remove the five hoses and wire harness that exit through the frame.



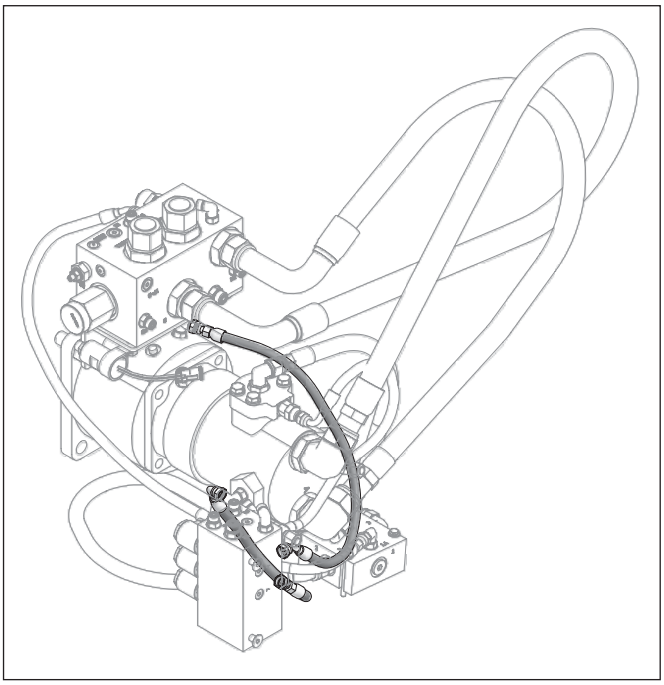
4. Remove both hoses at the directional manifold.



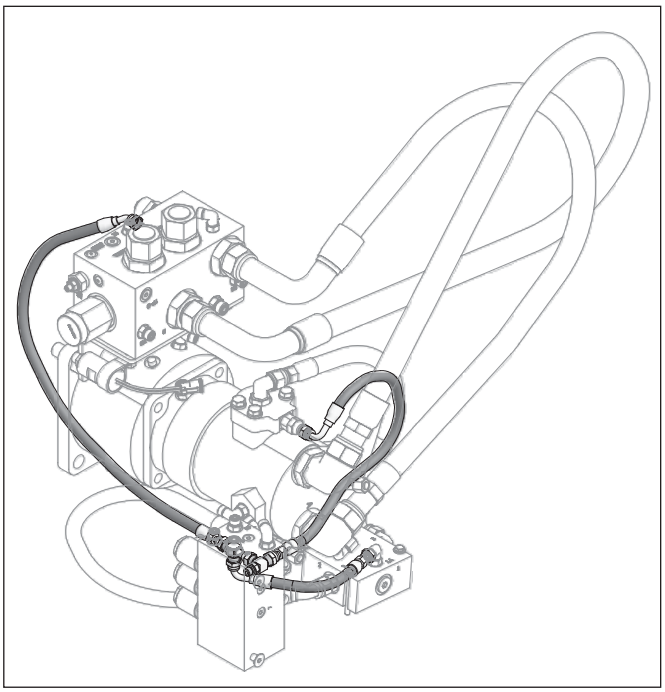
5. Remove the four hoses connecting the directional manifold to the logic manifold.



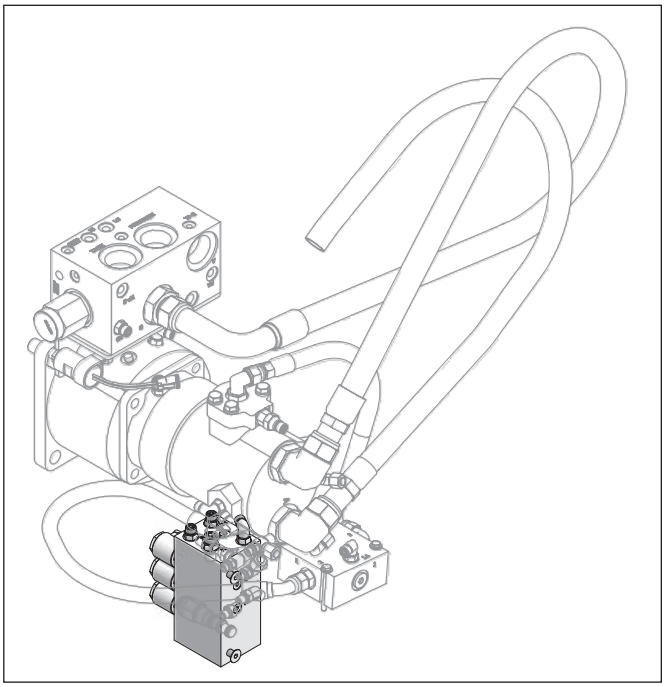
6. Remove the two hoses connecting the logic manifold to the motor and brake.



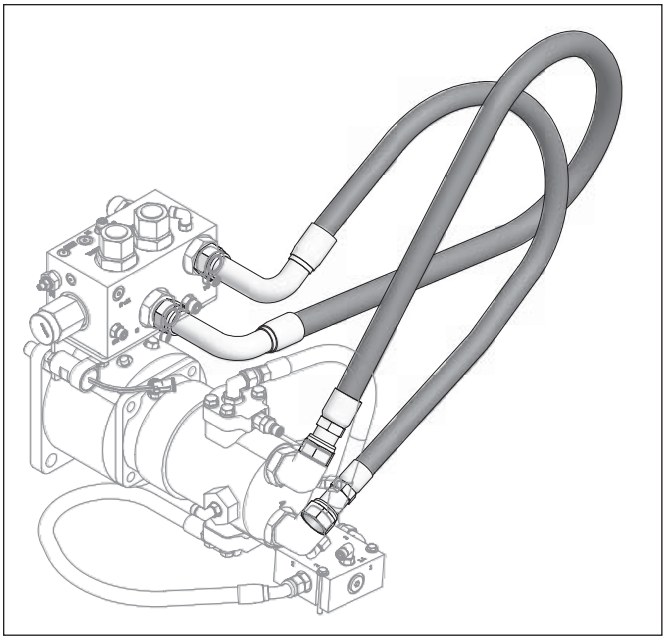
7. Remove the three hoses off the DV port on the logic manifold.



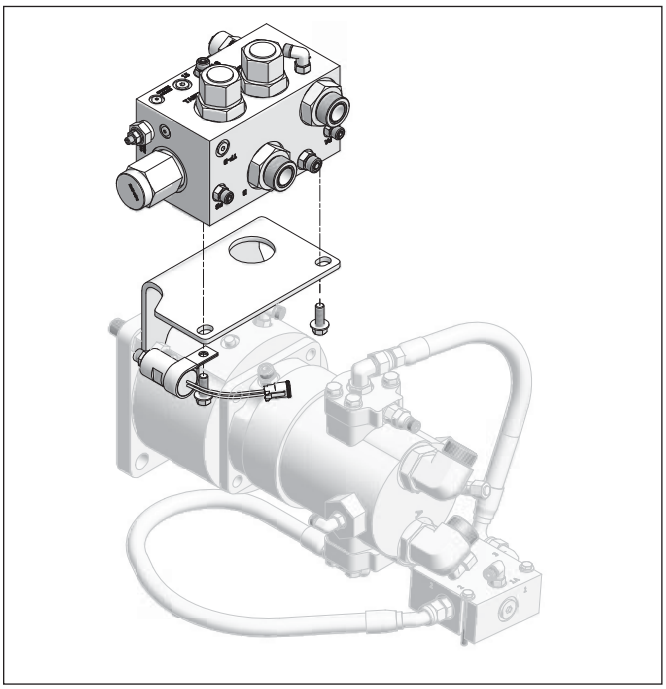
8. Remove the logic manifold.



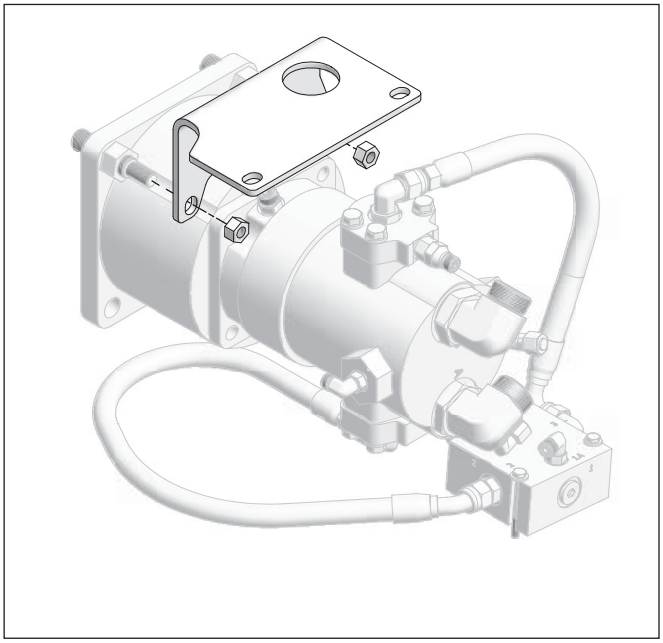
9. Remove the hoses between the high-pressure A and B ports on the motor and the direction manifold assembly.



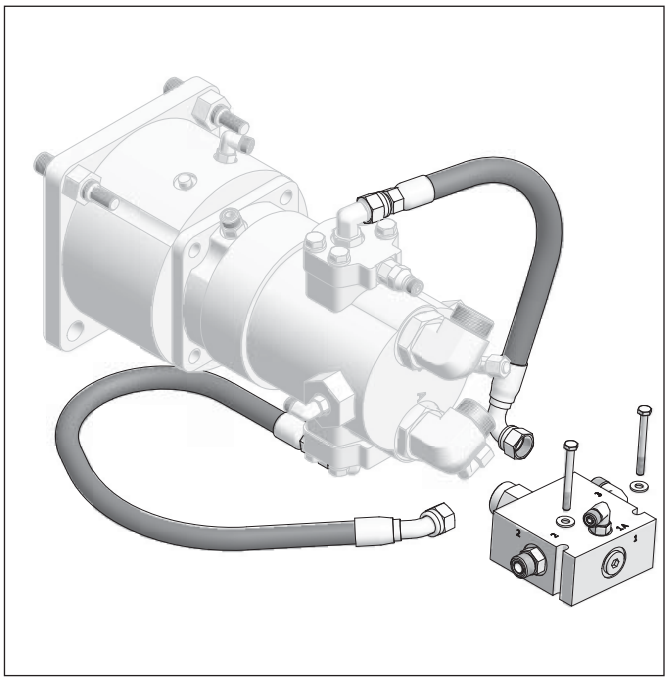
10. Remove the directional manifold assembly.



11. Remove the directional manifold bracket from the motor.



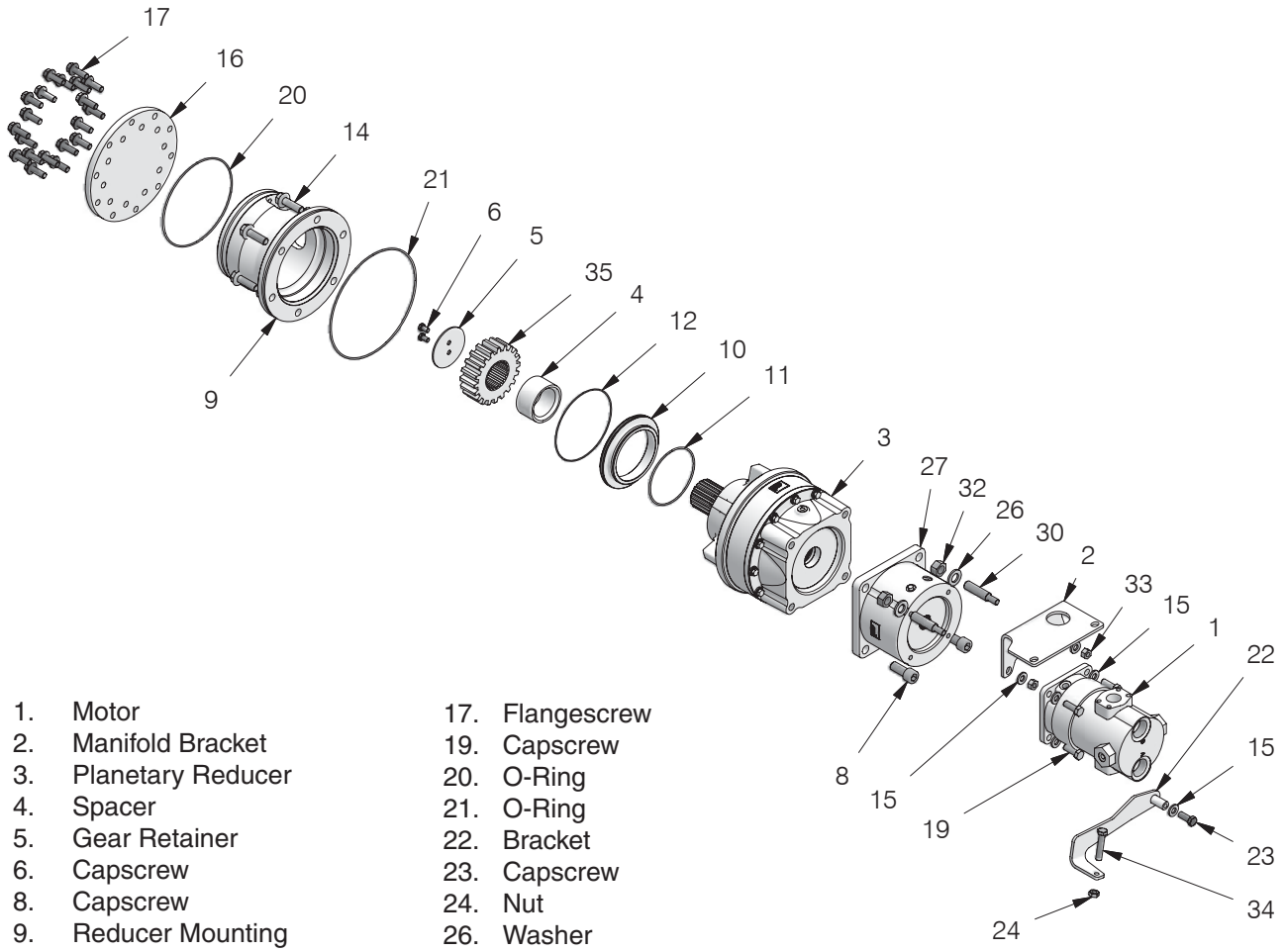
12. Remove the bypass manifold assembly from frame.



NOTE: Port A and Port B bypass hoses can remain on motor during motor shaft removal procedures.

Motor Shaft Removal and Disassembly

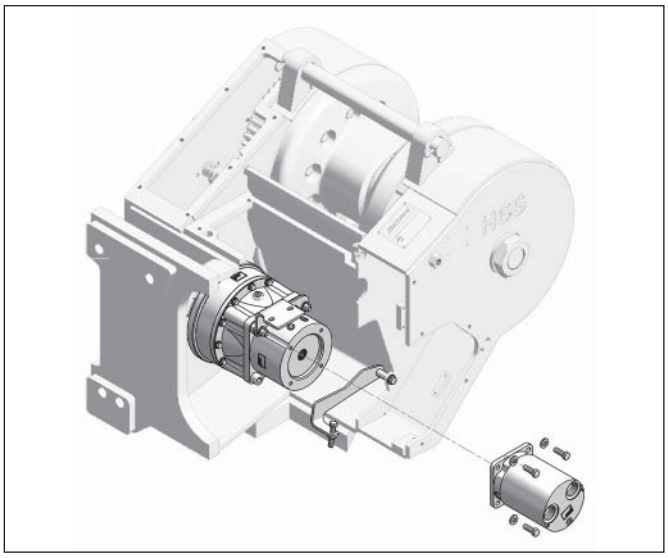
Removal and disassembly of the motor shaft assembly can be accomplished while the winch is mounted on the tractor. The motor and brake can be removed without removing any other components (other than various hoses and fittings), but taking out the planetary reducer and reducer housing requires removing 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.



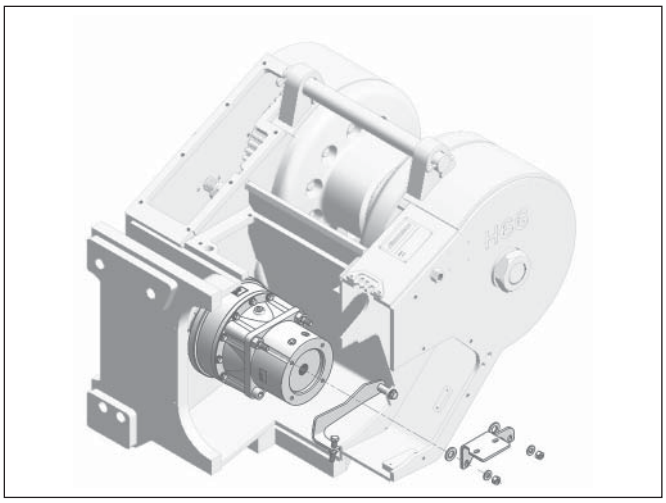
1. Motor
2. Manifold Bracket
3. Planetary Reducer
4. Spacer
5. Gear Retainer
6. Capscrew
8. Capscrew
9. Reducer Mounting
10. Seal Ring
11. O-ring
12. O-Ring
14. Flangescrew
15. Washer
16. Motor Shaft Mounting Plate
17. Flangescrew
19. Capscrew
20. O-Ring
21. O-Ring
22. Bracket
23. Capscrew
24. Nut
26. Washer
29. BRake
30. Stud
32. Nut
33. Nut
34. Capscrew

Figure 4-5 Motor Shaft Components

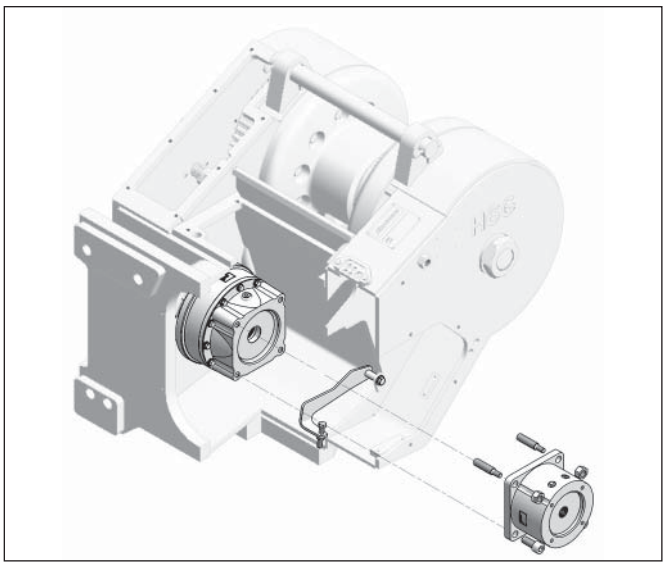
1. Remove the hydraulic motor.



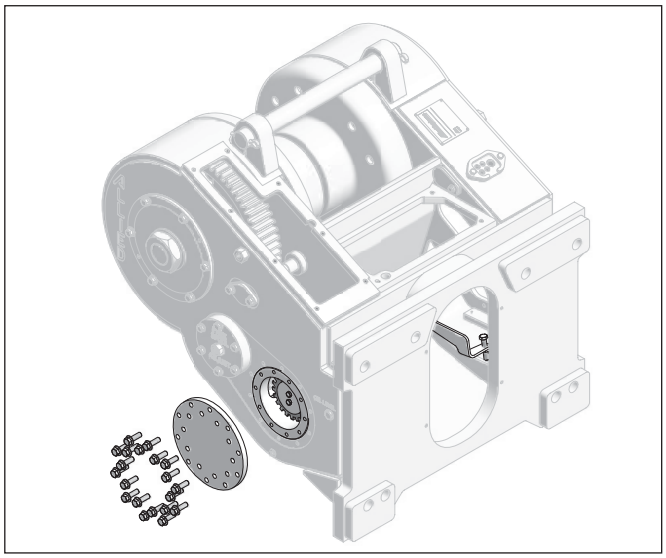
2. Remove the support brackets.



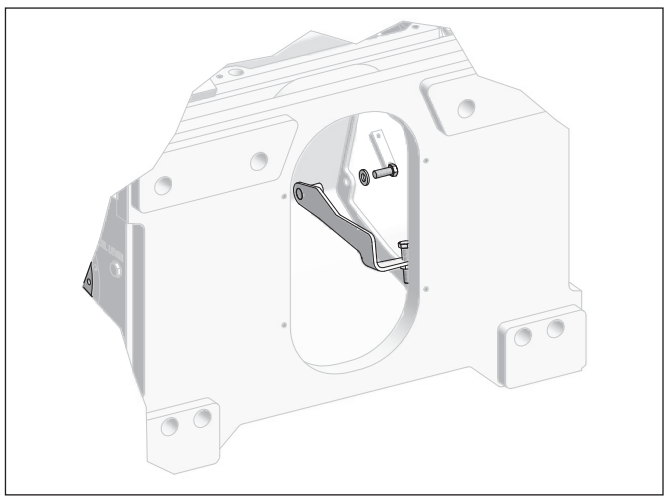
3. Remove the brake.



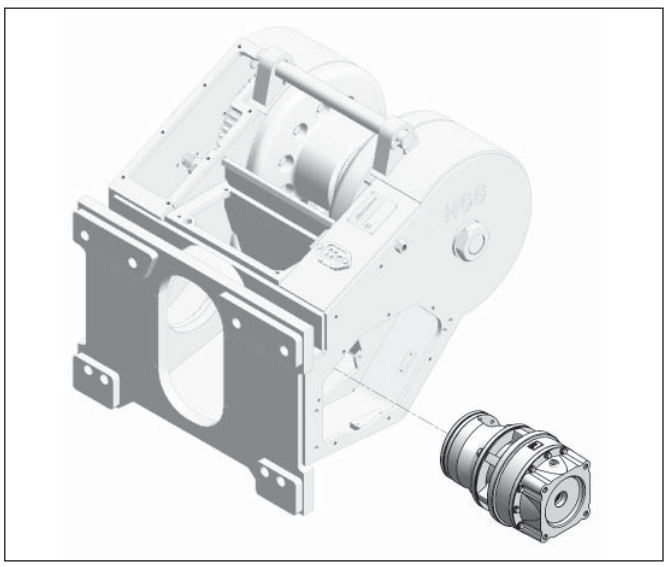
4. Remove cover plate.



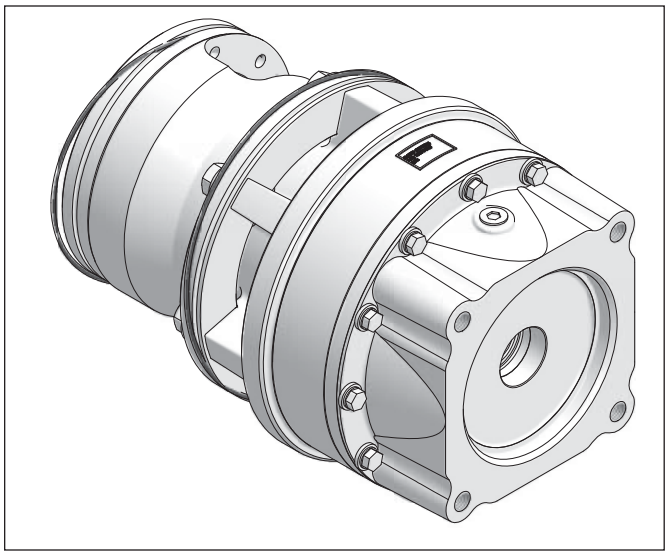
5. Remove manifold support bracket from frame.



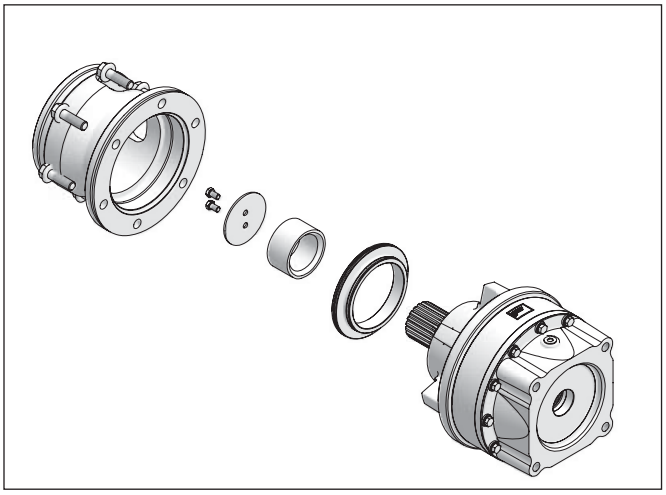
6. Remove planetary reducer assembly.



7. Remove and discard O-rings.



8. Remove reducer mounting, gear retainer, spacer and seal ring from reducer.

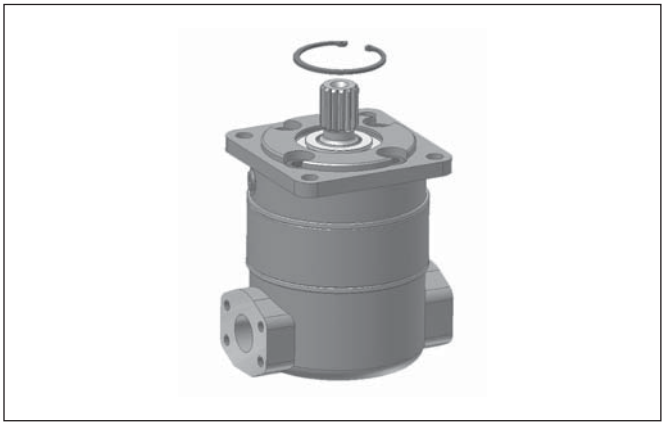


9. Remove and discard O-rings from seal ring.

Motor Disassembly

NOTE: Disassembling the motor 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.

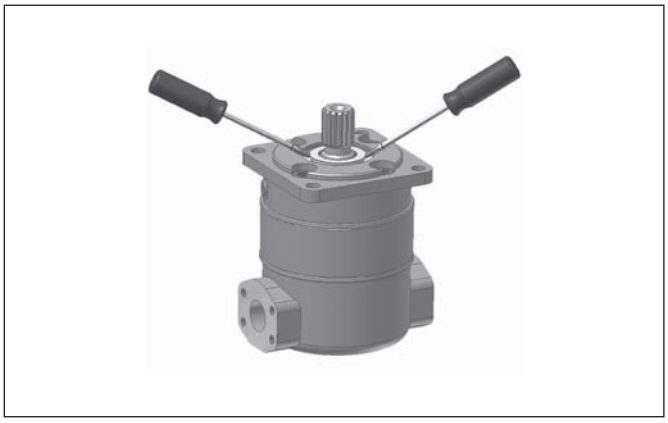
1. Remove snap ring.



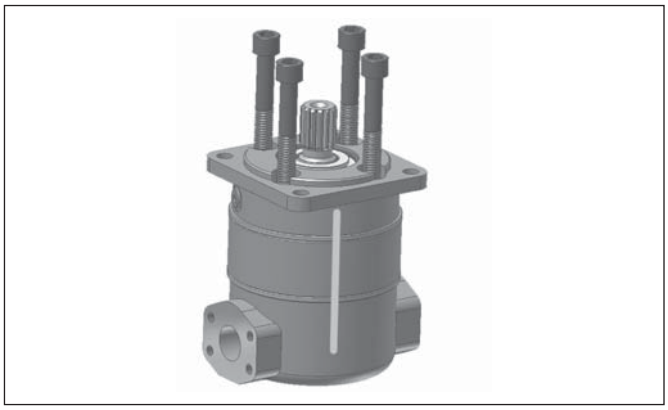
⚠ CAUTION

Use caution when removing snap ring. If released accidentally, it can become an airborne hazard.

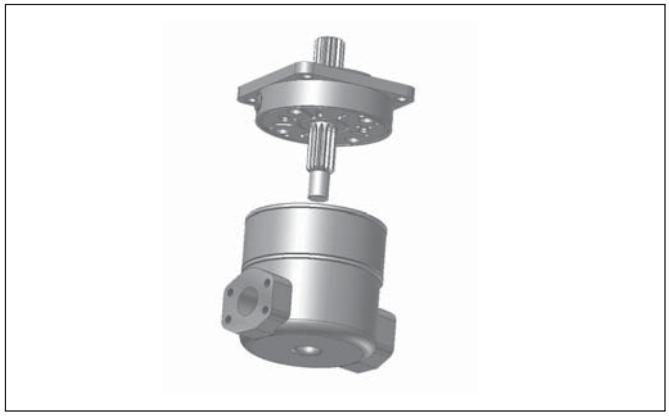
2. Pry out shaft seal plate with two screwdrivers. Remove seal plate O-ring from groove in bearing bore.



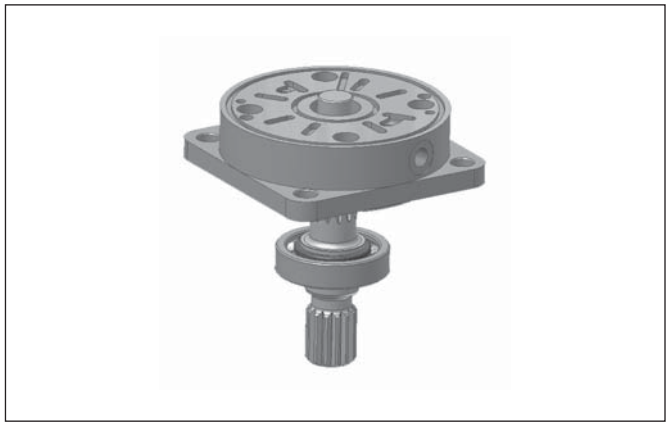
3. Mark one side of the motor for proper assembly, paying careful attention that the cartridge will not be installed upside down. Secure the motor prior to loosening the 5/8-11 bolts.



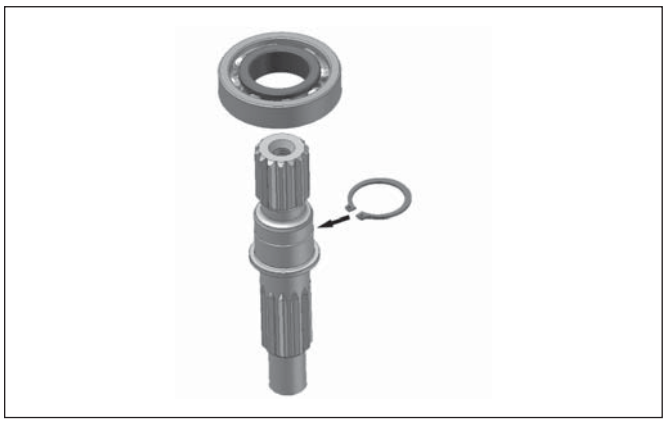
4. Remove front housing. **NOTE: Two 5/16" ball checks and one main body O-ring may be dislodged and fall free.**



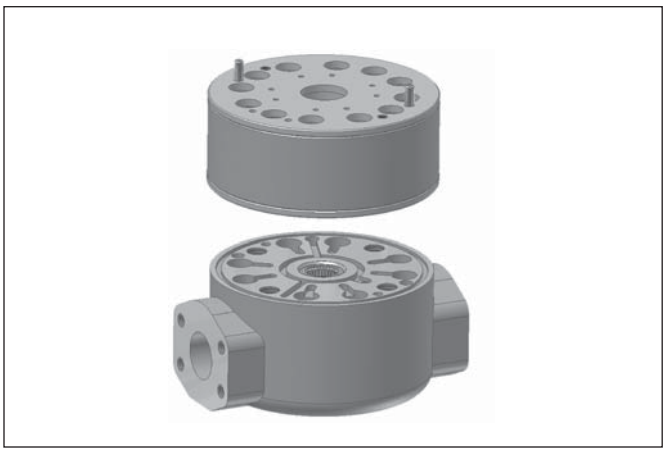
5. With the seal plate removed, press shaft and ball bearing out of front housing.



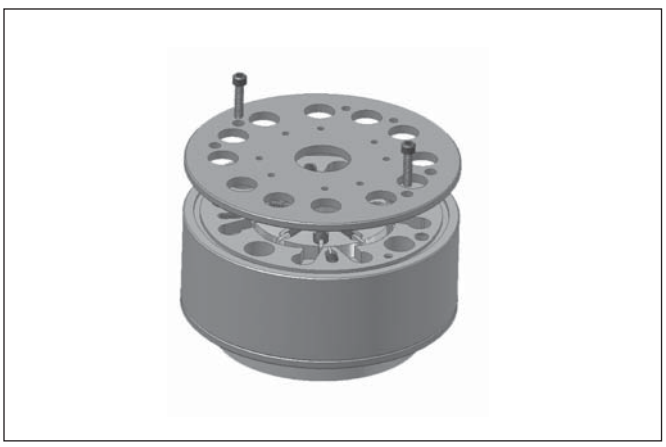
6. Remove snap ring from shaft. Press shaft out of bearing.



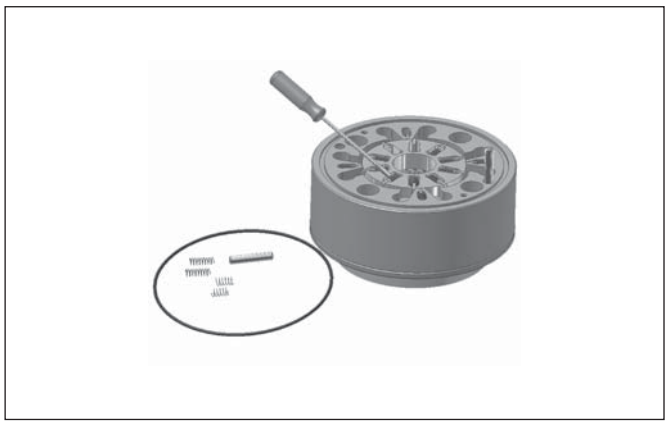
7. Lift up rotor/stator cartridge and remove from the rear housing.



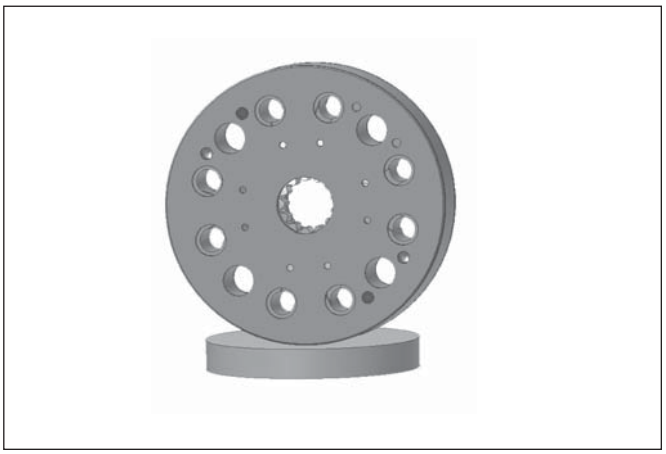
8. Place cartridge on any object which will hold it off the table. Remove screws and timing plate.



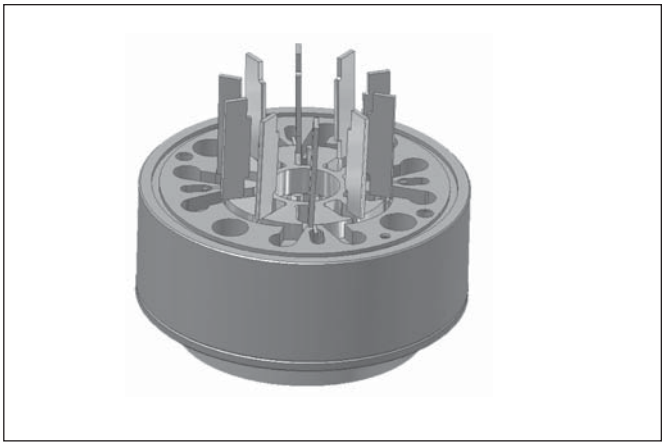
9. Remove O-ring and springs with a small screwdriver. Remove dowels pins.



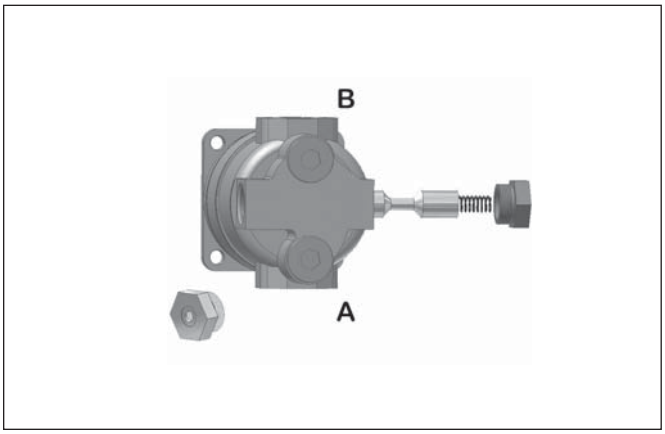
10. Replace plate on rotor/stator cartridge. Turn rotor/stator cartridge over. Repeat steps 11 & 12.



11. Remove the rotor. Remove both the rotor and stator vanes.



12. Remove the spool assembly.



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.

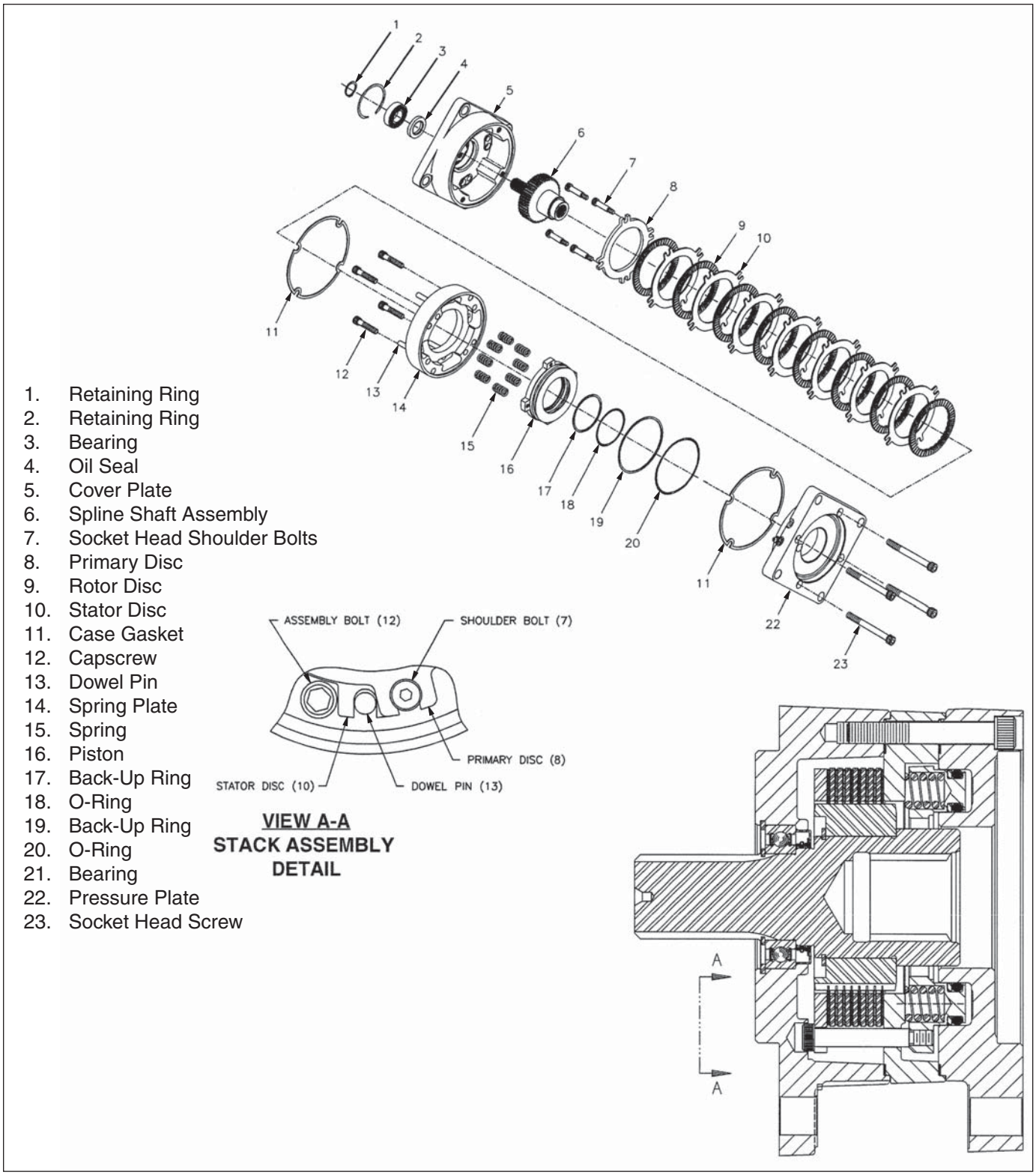


Figure 4-6 Brake Assembly

1. Remove the four socket head capscrews (item 23). A suitable holding fixture is useful to keep brake in position.

2. 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).

4. 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 (item 5) and press out oil seal (item 4) and bearing (item 3).

6. 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: Primary disc is positioned by shoulder bolts (item 7) and stator discs are positioned on dowel pins (item 13).**

8. Release pressure to brake before removing four socket head capscrews (item 12).

9. Remove spring plate (item 14).

10. Remove case gasket (item 1) from spring plate (item 14).

11. Before removing springs (item 15), record the pattern and color for reassembly purposes.

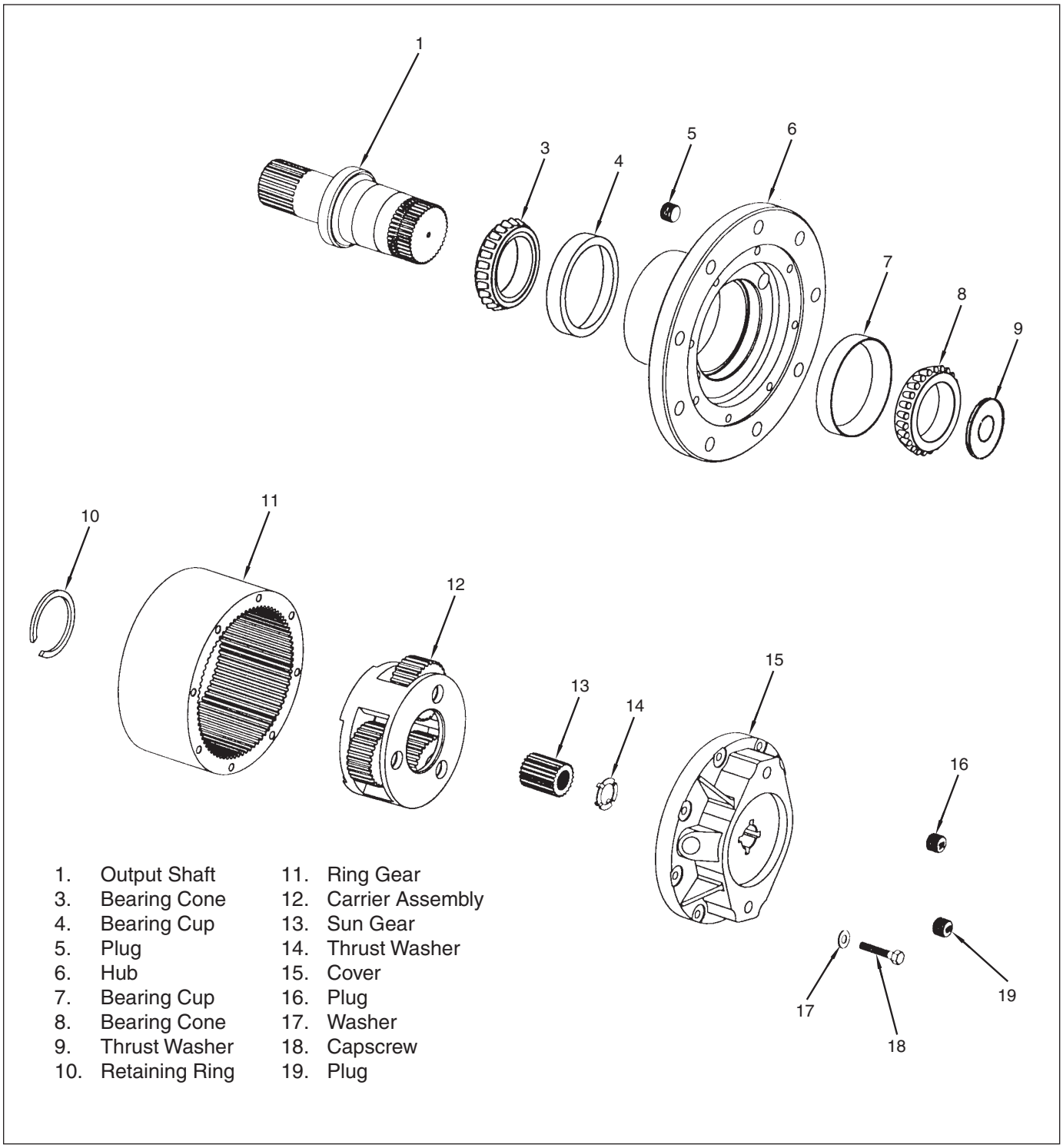
12. Remove piston (item 16) by carefully applying hydraulic pressure to the brake release port in the pressure plate (item 22).

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)

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.



1. Output Shaft
3. Bearing Cone
4. Bearing Cup
5. Plug
6. Hub
7. Bearing Cup
8. Bearing Cone
9. Thrust Washer
10. Retaining Ring
11. Ring Gear
12. Carrier Assembly
13. Sun Gear
14. Thrust Washer
15. Cover
16. Plug
17. Washer
18. Capscrew
19. Plug

Figure 4-7 Planetary Reducer Assembly

1. Remove capscrews (item 18) and washers (item 17) from cover (item 15). Thrust washer (item 14) usually remains with cover (item 15).

2. Lift sun gear (item 13) from carrier assembly (item 12).

3. Remove carrier assembly (item 12) from ring gear (item 11).

4. Pull ring gear (item 11) from remaining assembly. **NOTE: It may be necessary to strike ring gear with a rubber mallet to loose from hub.**

5. Remove retaining ring (item 10) from groove in output shaft (item 1). Lift thrust washer (item 9) from assembly. Pull output shaft (item 1) from hub (item 6).
NOTE: To remove retaining ring, use retaining ring expander tool.

6. Remove oil seal (item 2) and bearing cones (items 3 & 8) from hub (item 6). Inspect bearing cups (items 4 & 7) in hub (item 6) and remove only if replacement is required.

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

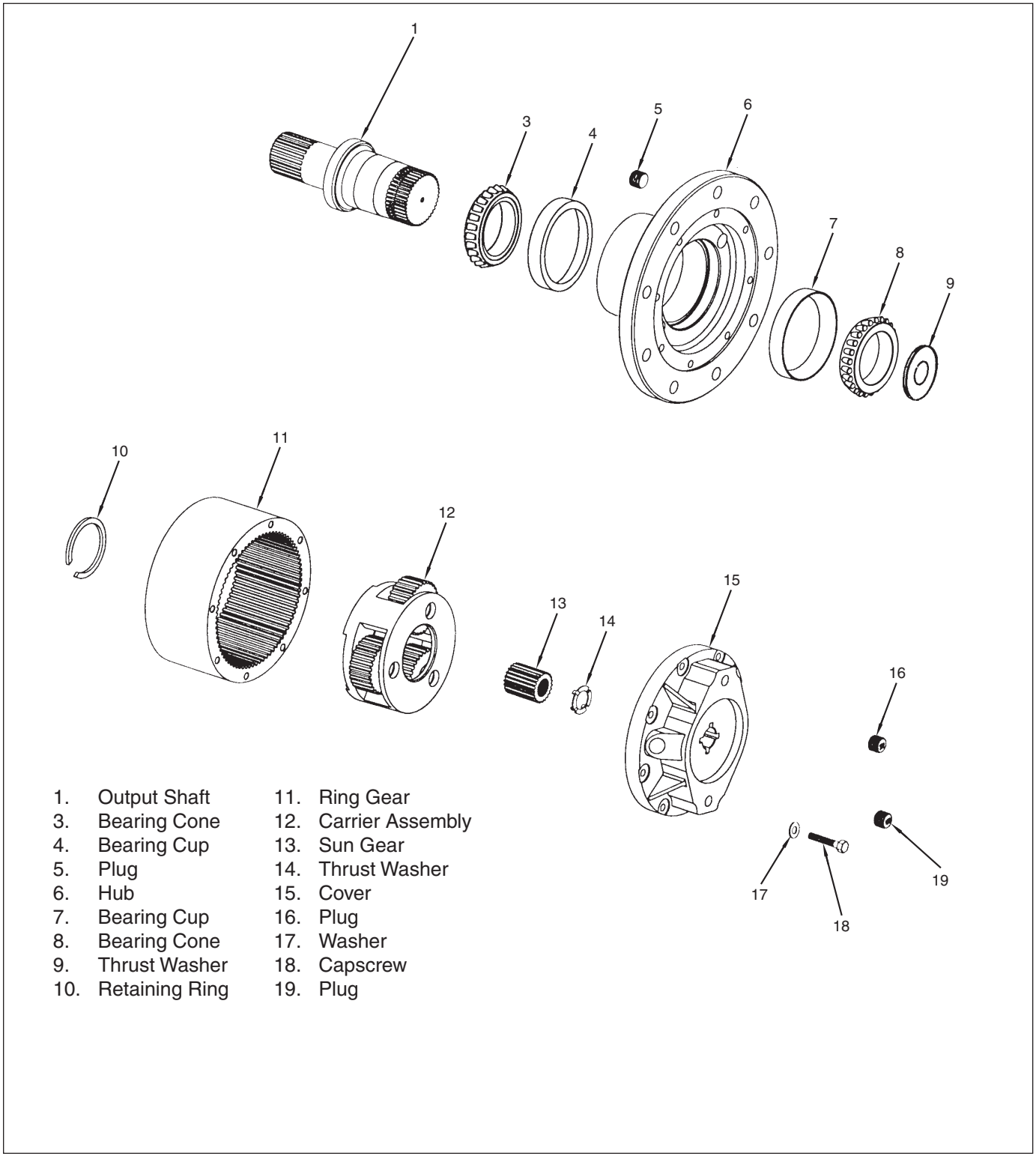
ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Brake Assembly	Check for cracked or broken belleville/coil springs.	Replace springs if cracked or broken.
	Inspect housing and covers for leakage or damage.	Replace component if sealing surfaces or splines are damaged.
	Check the friction discs for wear, distortion, or damage. The discs should be free of hydraulic oil.	Replace the friction 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 separator plates are flat, free of large blue areas (caused by overheating) or damaged surfaces.	Replace damaged separator plates.
	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.
	Inspect vanes for wear or damage.	Normal wear results in slight flattening of vane tips, which does not impair motor performance. Replace vanes if radius is reduced by 50%.
	Inspect plates for wear or damage.	Normal wear results in marking of timing plates which does not impair motor performance. Replacement of the timing plate is required if any smearing, galling, or heat cracks are present.

Figure 4-8 Visual Inspection (continued)

ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
Winch Motor (Cont.)	Inspect stator for wear or damage.	Normal wear results in polishing of cam form which does not impair motor performance. Noticeable wear may be apparent along the corner of one side of the vane slot. This does not require replacement of the stator, but may slightly affect volumetric efficiency.
Directional 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 quad-ring will not seat properly.
Drum Adapter	Carefully inspect double seal contact surface for deep scratches, burrs and rust.	Replace if damaged.
Winch Frame	Check area around drum and drum adapter for damage if wire rope has slipped between wire rope guard and winch frame.	Consult the factory.

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.



1. Output Shaft
3. Bearing Cone
4. Bearing Cup
5. Plug
6. Hub
7. Bearing Cup
8. Bearing Cone
9. Thrust Washer
10. Retaining Ring
11. Ring Gear
12. Carrier Assembly
13. Sun Gear
14. Thrust Washer
15. Cover
16. Plug
17. Washer
18. Capscrew
19. Plug

Figure 4-9 Planetary Reducer Assembly

1. Press bearing cups (items 4 & 7) into each side of hub (item 6). It is recommended that bearing cups and cones (items 3 & 8) be replaced in sets.

2. Assemble bearing cone (item 3) into cup (item 4) at seal end of hub (item 6). Press a new seal (item 2) in until flush with face of hub.

3. Lubricate lips of oil seal (item 2) and lower hub onto output shaft (item 1). Keep hub centered to prevent damage to oil seal.

4. Assemble bearing cone (item 8) over output shaft (item 1) and into bearing cup (item 7). Install thrust washer (item 9) over output shaft (item 1). If bearings, hub or output shaft are replaced, a new retaining ring (item 10) is required for proper bearing setting. Select the thickest retaining ring that can be assembled in ring groove of the splined end of output shaft and above bearing cone (item 8). Bearing should have from .000 to .006 (.00 to .15 mm) end play when proper retaining ring is installed.

5. Clean mating surfaces and apply a bead of silicone sealant to the face of the hub that mates with the ring gear (item 11). See instructions on sealant package.

6. Assemble ring gear (item 11) to hub. Be sure to align all bolt holes.

7. Place carrier assembly (item 12) into ring gear while aligning gear teeth. Carrier splines mesh with splines on output shaft (item 1).

8. Place sun gear (item 13) into carrier assembly (item 12). Sun gear should turn freely by hand.

9. Apply a bead of silicone sealant to cover face of ring gear (item 11).

10. Secure thrust washer (item 14) with tangs engaged in cover (item 15).
NOTE: Washer can be secured to cover with a small amount of grease (MIL-G-10924F). Install the cover and align with hub such that pipe plug holes on cover align with mounting holes on hub.

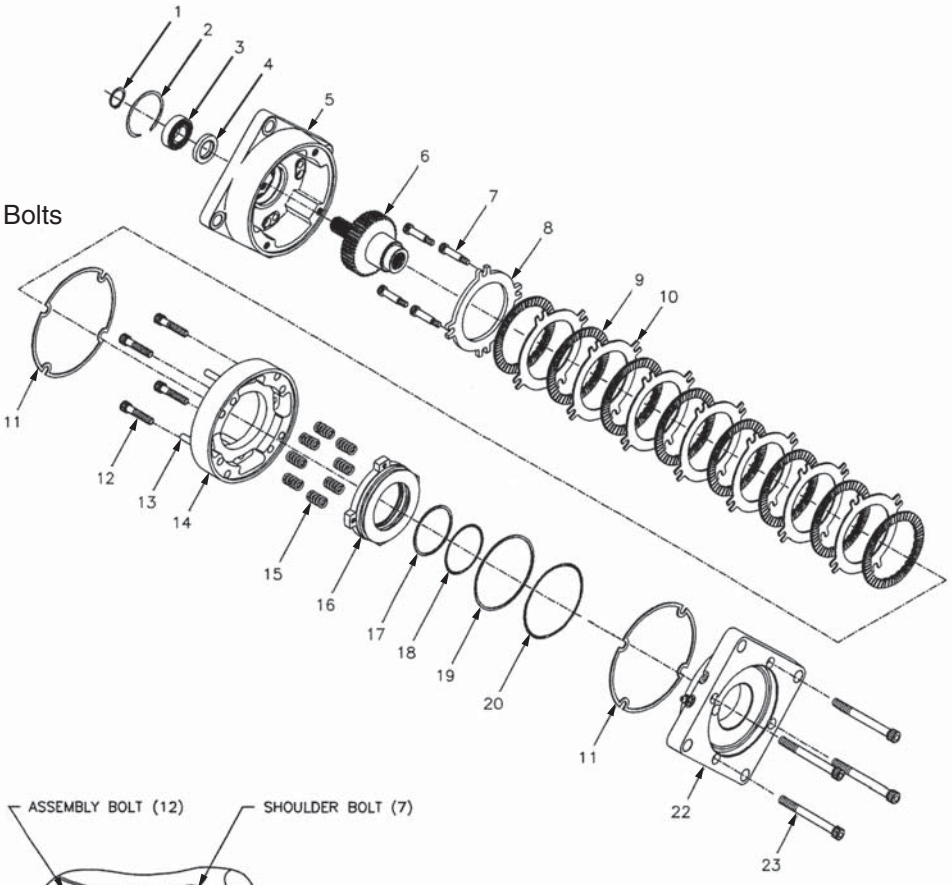
11. Install washers (item 17) and capscrews (item 18) and torque to 40-45 lb. ft. (54-61 Nm) with dry threads. Lubed threads torque to 20-25 lb. ft (27-34 Nm).

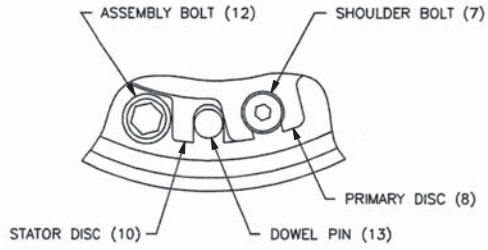
12. Position filler opening horizontally and fill unit to oil level hole in cover. Install pipe plugs (items 16 & 19) in cover and pipe plug (item 5) in hub.

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.

1. Retaining Ring
2. Retaining Ring
3. Bearing
4. Oil Seal
5. Cover Plate
6. Spline Shaft Assembly
7. Socket Head Shoulder Bolts
8. Primary Disc
9. Rotor Disc
10. Stator Disc
11. Case Gasket
12. Capscrew
13. Dowel Pin
14. Spring Plate
15. Spring
16. Piston
17. Back-Up Ring
18. O-Ring
19. Back-Up Ring
20. O-Ring
21. Bearing
22. Pressure Plate
23. Socket Head Screw





VIEW A-A
STACK ASSEMBLY DETAIL

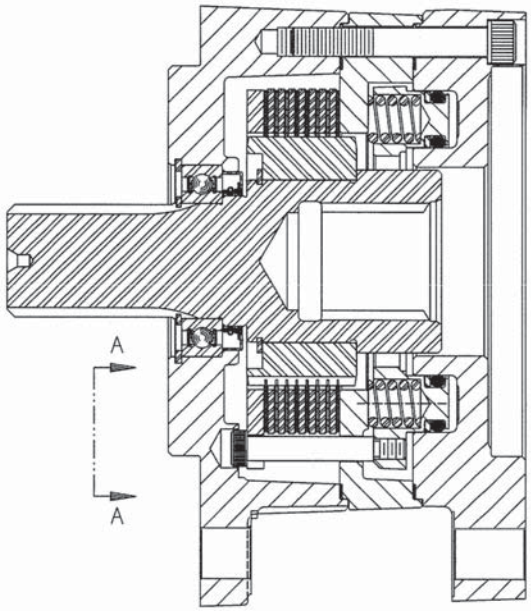


Figure 4-10 Planetary Reducer Assembly

NOTE: Lubricate all rubber components from repair kit with clean hydraulic fluid (MIL-PRF-2105E) before reassembly.

1. Clean all parts thoroughly before assembling.

2. 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.

5. 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.

8. 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.

9. Lubricate piston (item 16) with clean hydraulic fluid (MIL-PRF-2105E). 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 plate (item 14).

12. 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.

13. Install stator discs (item 10) and rotor discs (item 9). Begin with a rotor disc and alternate with stator discs.

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.

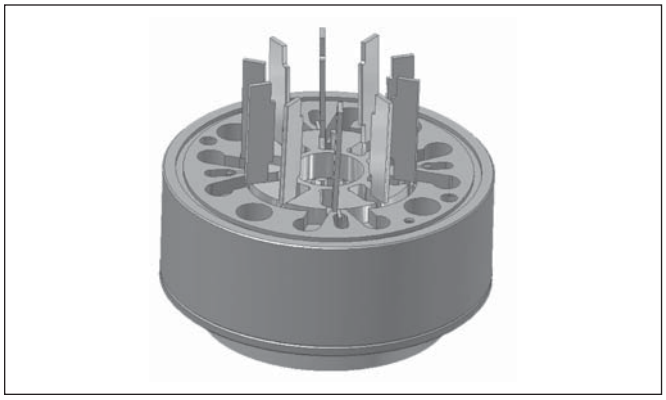
15. Install cover plate (item 5) using four socket head assembly bolts (item 23).
    NOTE: Apply two drops of Loctite #242 to threads.

    Torque capscrews 55-60 lb. ft. (74.6-81.4 Nm).

Motor Assembly

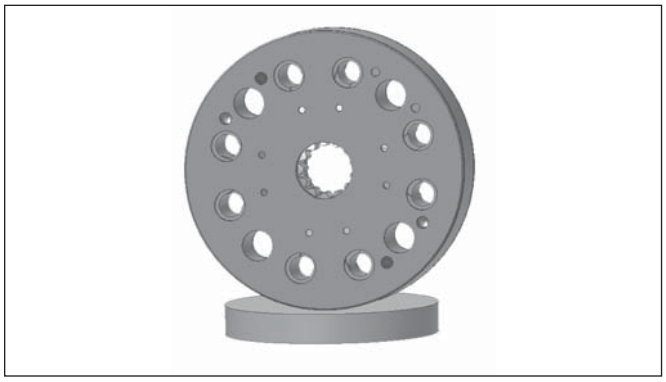
NOTE: Disassembling the motor while it's still under its warranty period immediately invalidates the warranty. If the motor malfunctions before its warranty period expires, please contact Allied Systems Company first before attempting to repair it.

1. Install the rotor and stator vanes. Install the rotor.



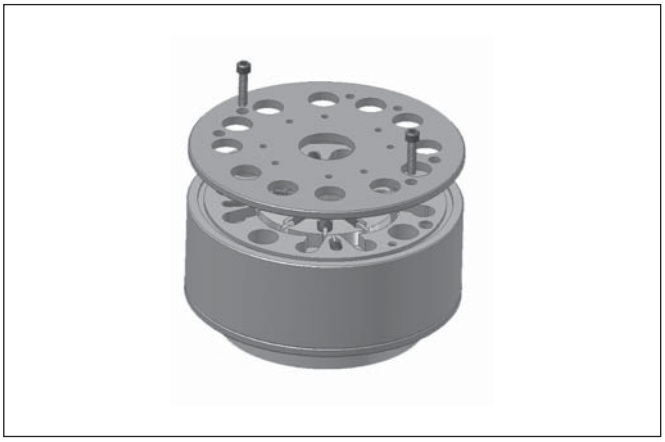
NOTE: Make sure that the radiused edge of each stator vane points to the rotor and the radiused edge of each rotor vane points to the stator.

2. Replace timing plate on rotor/stator cartridge. Install O-ring and springs, and install dowels pins. Turn plate over and repeat.

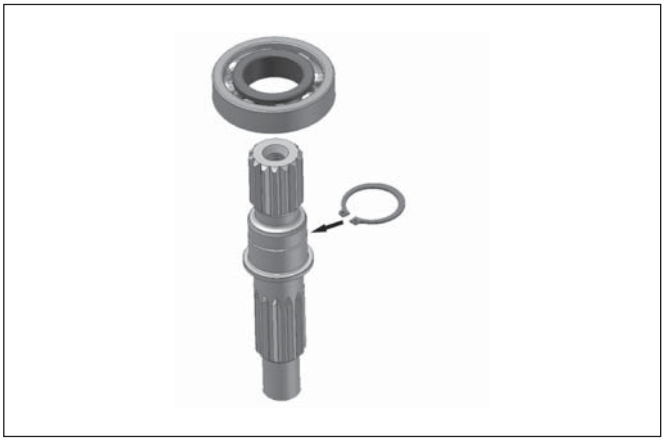


NOTE: Make sure springs are seated in the bottom of the spring pocket in both the rotor and stator.

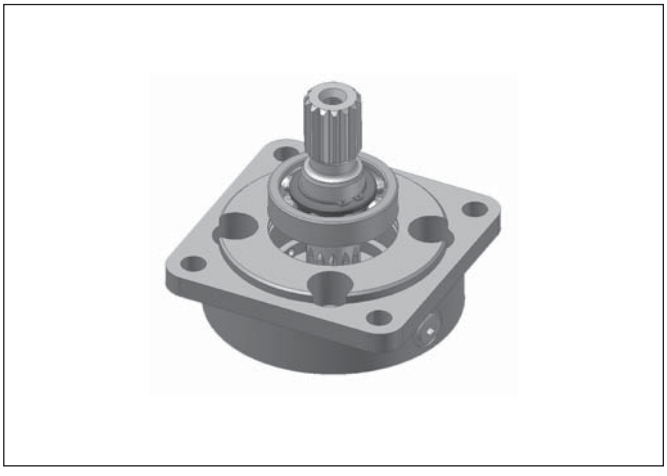
3. Place cartridge on any object which will hold it off the table. Install screws and timing plate.



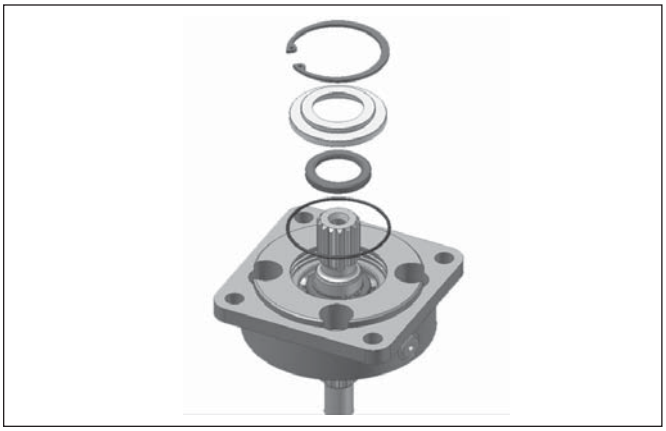
4. Press bearing onto shaft. Install snap ring.



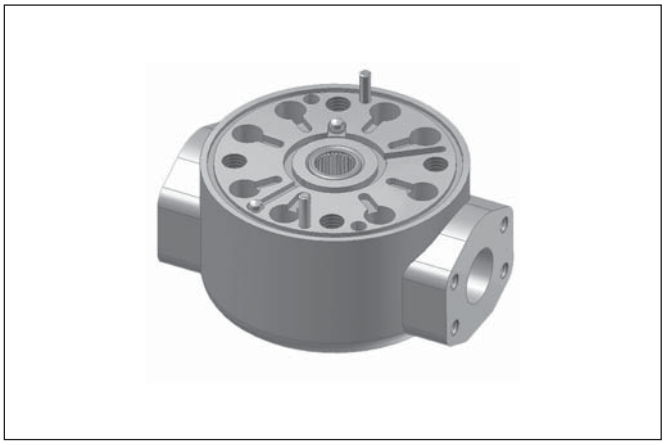
5. Press shaft and bearing assembly into front housing by pressing on the outer race of bearing.



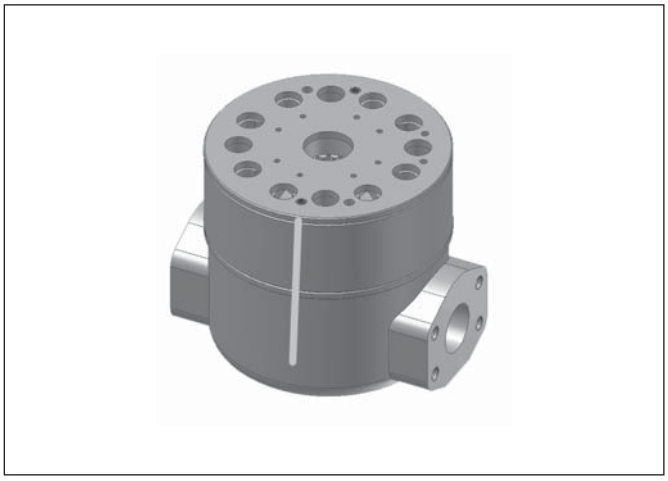
6. Place seal in seal plate. Place O-ring into groove in the front housing, then press seal plate into housing. Install snap ring.



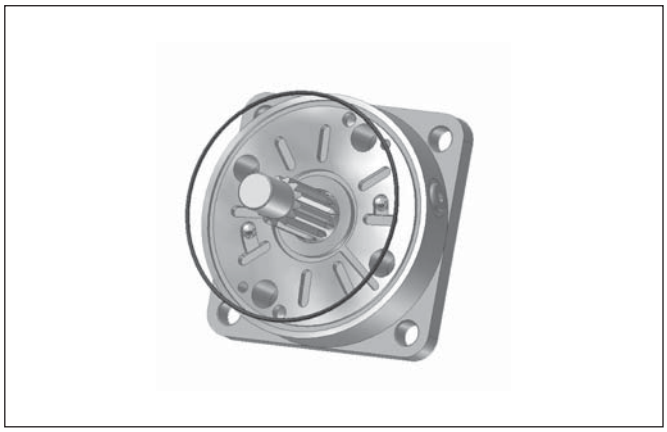
7. Install dowel pins and ballchecks into rear housing. Install main body O-ring.



8. Place rotor/stator cartridge onto rear housing. **NOTE: Make sure assembly marks from step 3 in the Motor Assembly section are lined up.**

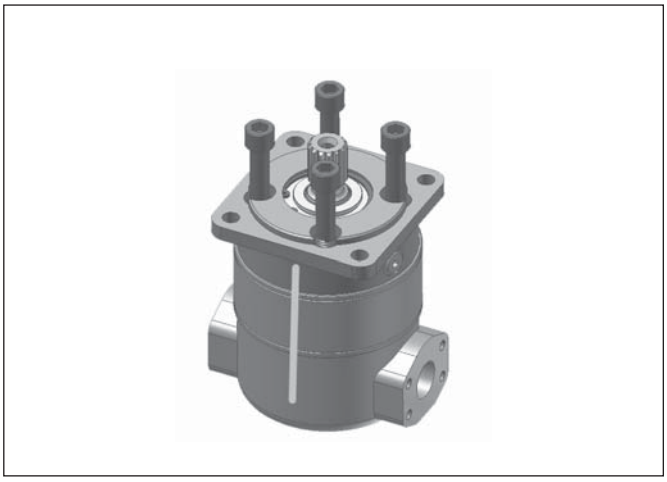


9. Install main body O-ring and ball checks into front housing. Place a small amount of grease (MIL-G-10924F) over ball checks and O-ring, then wipe off excess grease (MIL-G-10924F).

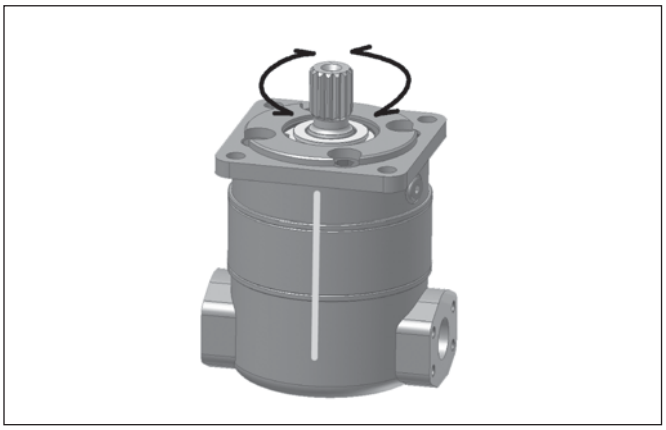


10. Install dowel pins into rotor/stator cartridge. Pour a small amount of clean oil (MIL-PRF-2105E) into the cartridge, then install front housing. Make sure alignment marks are lined up.

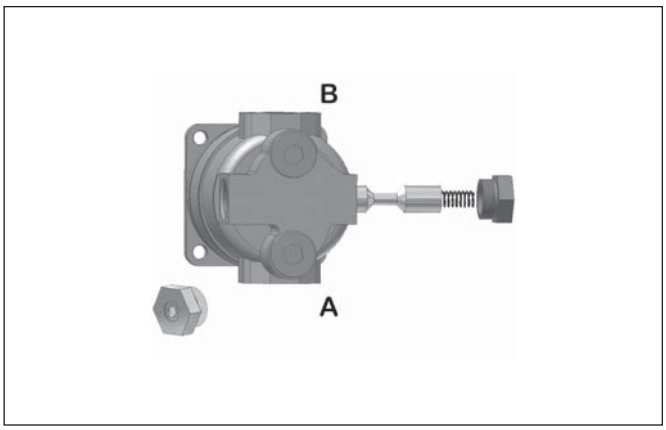
11. Install 5/8-11 bolts. Torque bolts to 50 ft. lbs.



12. Rotate shaft in both directions to assure that the shaft turns smoothly. Torque motor to 190 ft. lbs. Rotate shaft again in both directions to assure that the shaft turns smoothly.

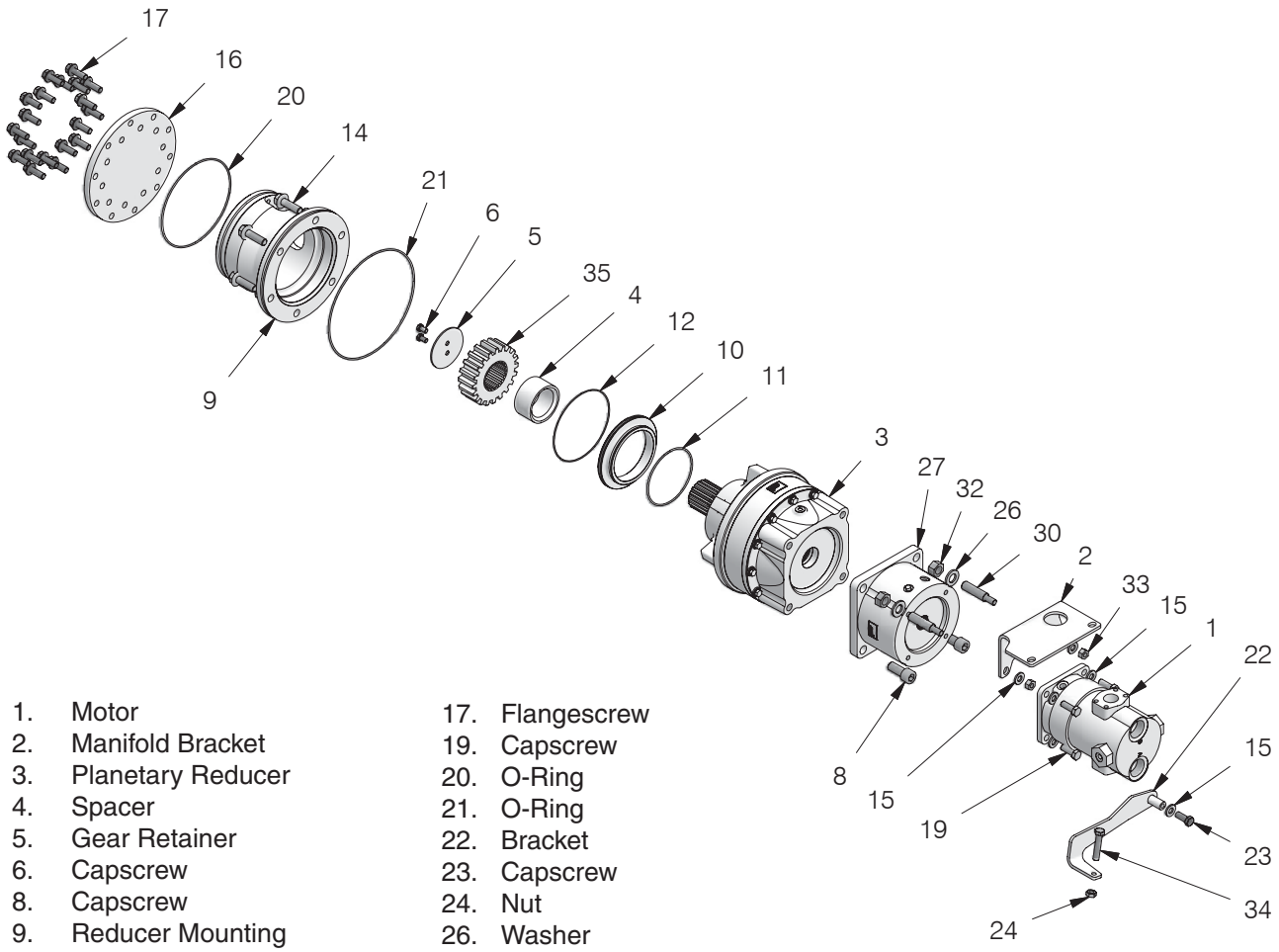


13. Reassemble the spool assembly. Ensure spool, spring and plug are oriented as shown.



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).

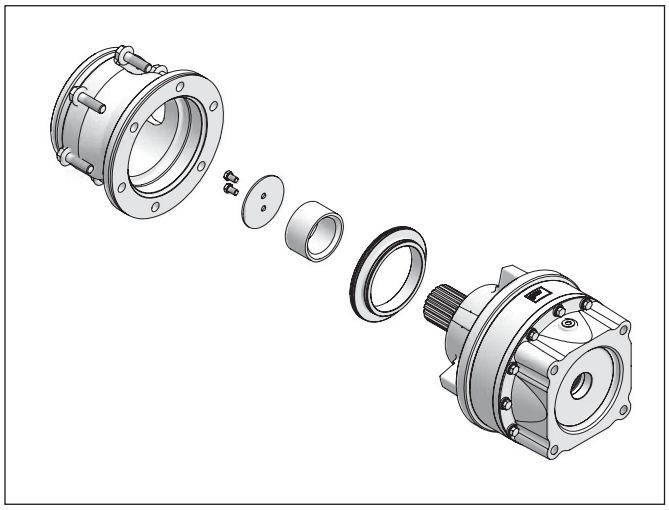


1. Motor
2. Manifold Bracket
3. Planetary Reducer
4. Spacer
5. Gear Retainer
6. Capscrew
8. Capscrew
9. Reducer Mounting
10. Seal Ring
11. O-ring
12. O-Ring
14. Flangescrew
15. Washer
16. Motor Shaft Mounting Plate
17. Flangescrew
19. Capscrew
20. O-Ring
21. O-Ring
22. Bracket
23. Capscrew
24. Nut
26. Washer
29. BRake
30. Stud
32. Nut
33. Nut
34. Capscrew

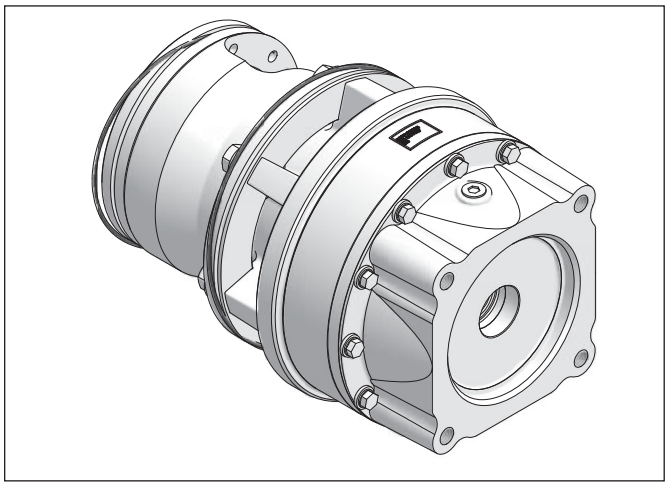
Figure 4-11 Motor Shaft Components

1. Install new O-rings on seal ring.

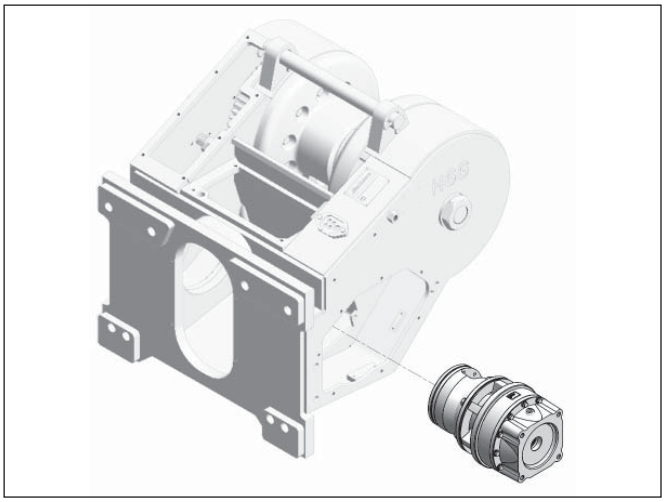
2. Install the reducer mounting, gear retainer, spacer and seal ring in the reducer.



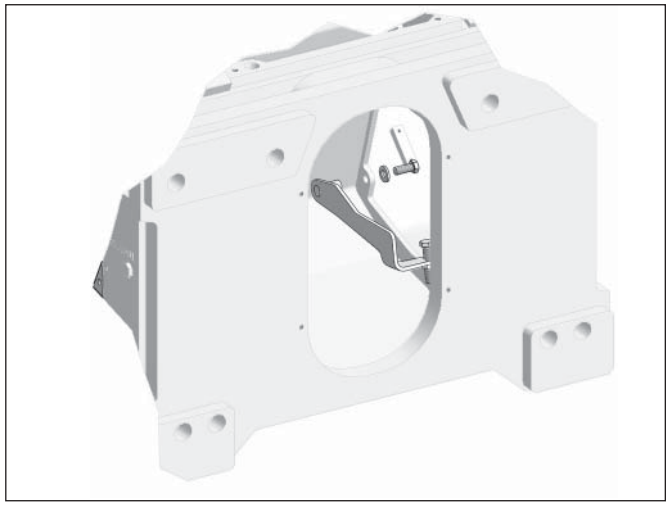
3. Install new O-rings on reducer mounting.



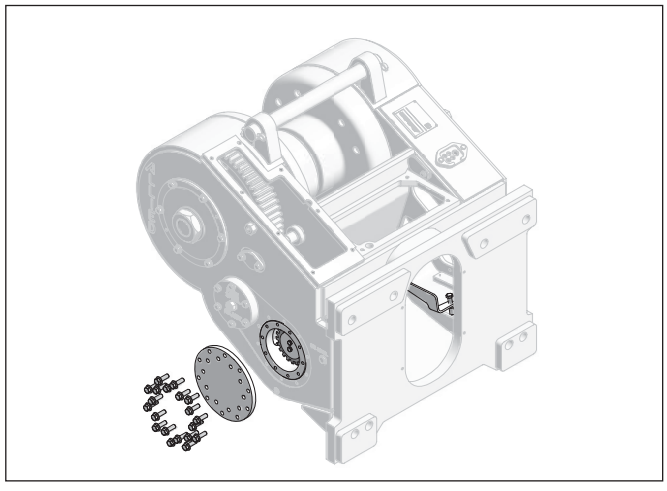
4. Install planetary reducer assembly.



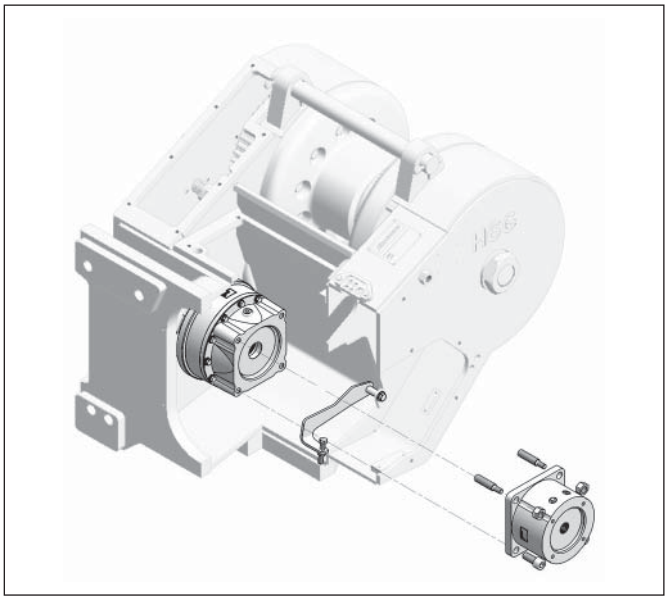
5. Install manifold support bracket in frame.



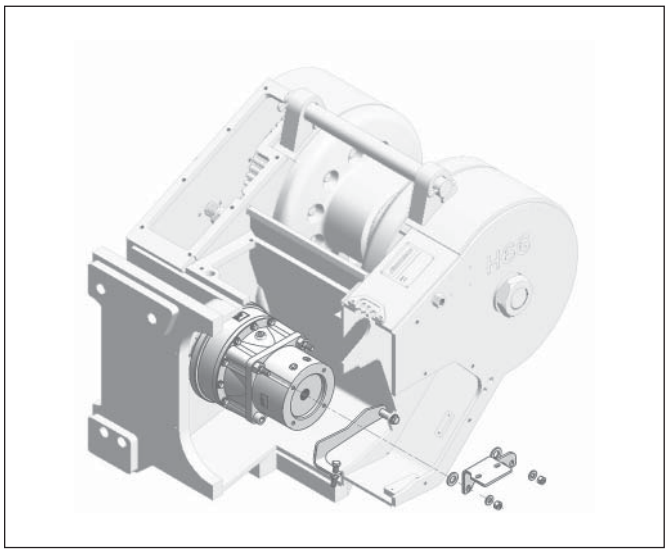
6. Reinstall cover plate.



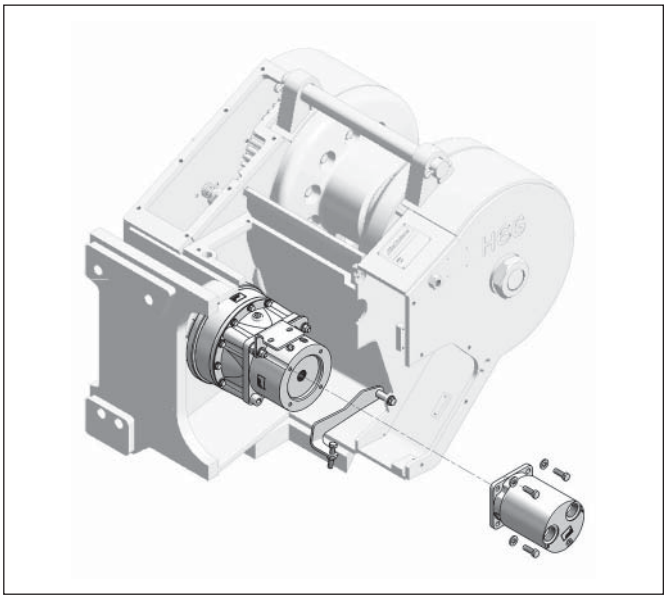
7. Reinstall the brake.



8. Install the brackets.

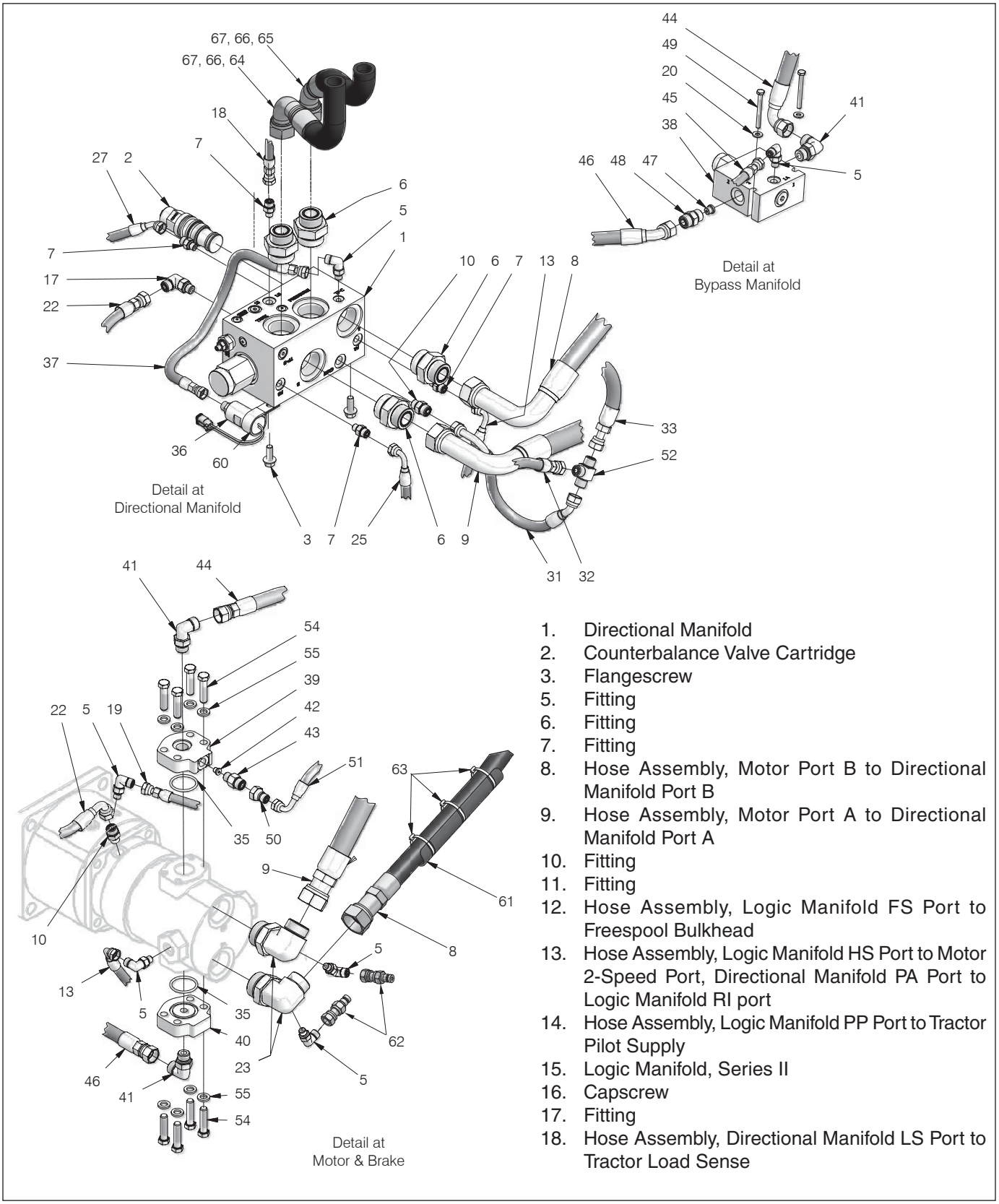


9. Install the hydraulic motor.



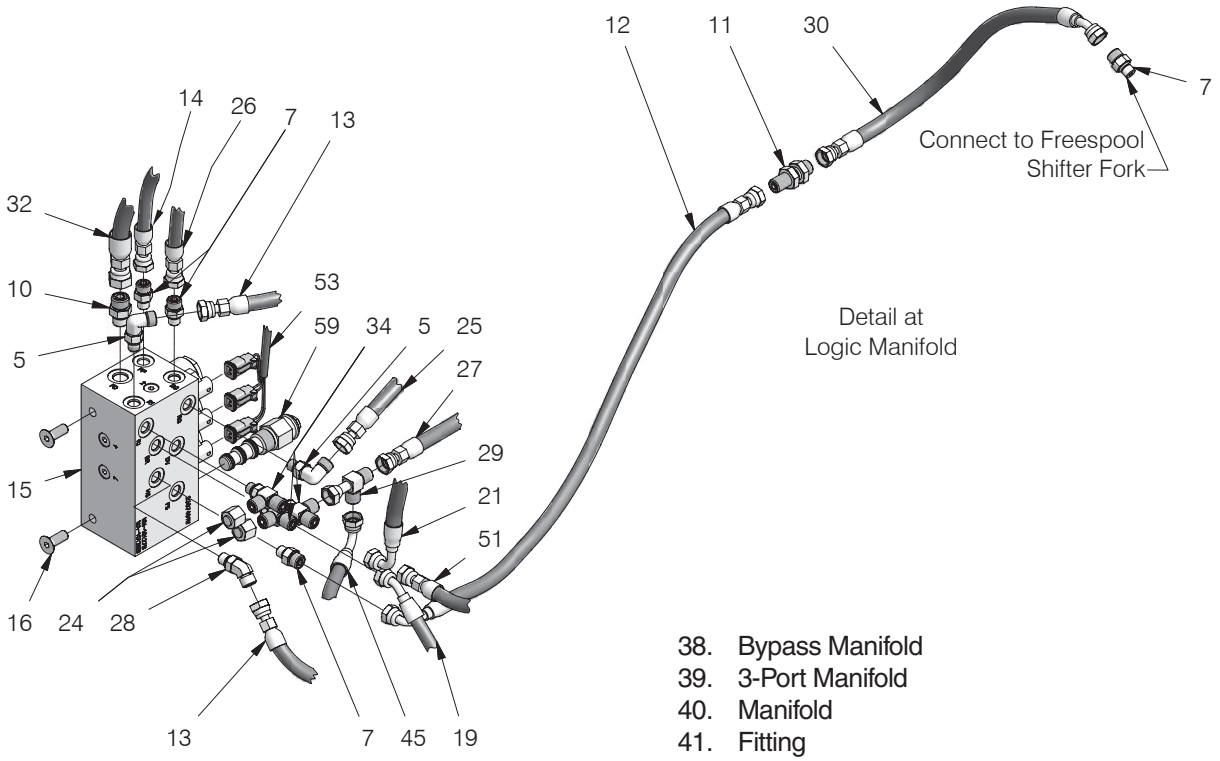
NOTE: Port A and Port B bypass hoses must be installed before placing motor in winch frame.

Hydraulic System Assembly



1. Directional Manifold
2. Counterbalance Valve Cartridge
3. Flangescrew
5. Fitting
6. Fitting
7. Fitting
8. Hose Assembly, Motor Port B to Directional Manifold Port B
9. Hose Assembly, Motor Port A to Directional Manifold Port A
10. Fitting
11. Fitting
12. Hose Assembly, Logic Manifold FS Port to Freespool Bulkhead
13. Hose Assembly, Logic Manifold HS Port to Motor 2-Speed Port, Directional Manifold PA Port to Logic Manifold RI port
14. Hose Assembly, Logic Manifold PP Port to Tractor Pilot Supply
15. Logic Manifold, Series II
16. Capscrew
17. Fitting
18. Hose Assembly, Directional Manifold LS Port to Tractor Load Sense

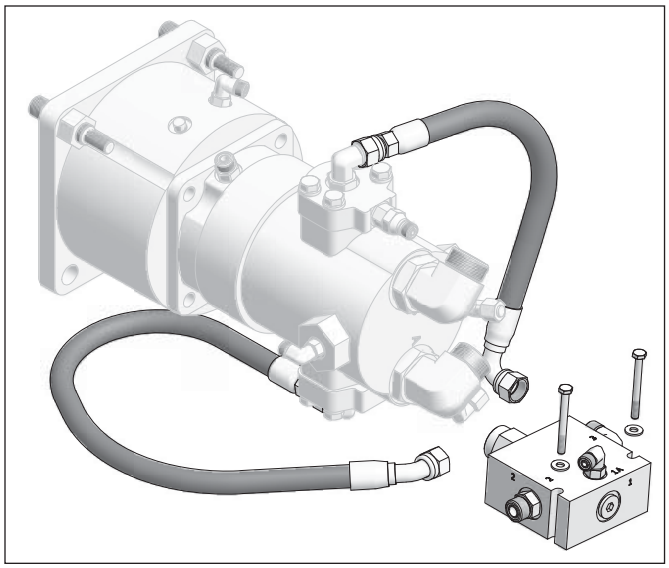
Figure 4-12 Hydraulic System Components, High-Performance



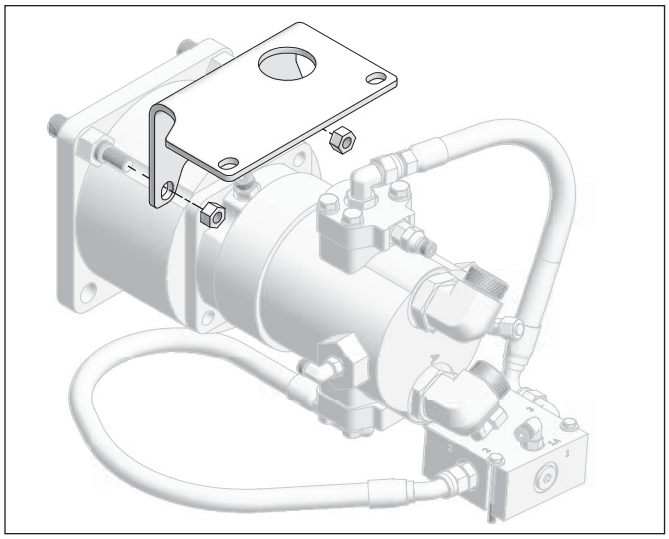
19. Hose Assembly, Brake to Logic Manifold BR Port
20. Washer
21. Hose Assembly, Logic Manifold RI Port to Tractor RI Port
22. Hose Assembly, Directional Manifold Case to Motor Case
23. Fitting
24. Fitting
25. Hose Assembly, Logic Manifold RO Port to Directional Manifold PB Port
26. Hose Assembly, Logic Manifold RO Port to Tractor RO Port
27. Hose Assembly, Directional Manifold DV Port to Logic Manifold DV Port
28. Fitting
29. Fitting
30. Hose Assembly, Freespool Bulkhead to Freespool Shifter Fork
31. Hose Assembly, Directional Manifold Case to Tee-Fitting (item 52)
32. Hose Assembly, Logic Manifold PD Port to Tee-Fitting (item 52)
33. Hose Assembly, Tee-Fitting (item 52) to Tractor Case
34. Fitting
35. O-Ring
36. Pressure Switch
37. Hose Assembly, Directional Manifold TPC Port to Pressure Switch
38. Bypass Manifold
39. 3-Port Manifold
40. Manifold
41. Fitting
42. Fitting (Orifice)
43. Check Valve
44. Hose Assembly, Bypass Valve #3 to Bypass Motor Port B
45. Hose Assembly, Bypass Valve #1A to Logic Manifold DV Port
46. Hose Assembly, Bypass Valve #2 to Bypass Motor Port A
47. Fitting (Orifice)
48. Fitting
49. Capscrew
50. Fitting
51. Hose Assembly, Bypass Motor Port B to Logic Manifold DV Port
52. Fitting
53. Wire Harness
54. Capscrew
55. Washer
59. Directional Valve Cartridge Assembly
60. Clip
61. Hose Protector
62. Quick Coupler
63. Tie Strap
64. Hose Assembly, Direction Block Tank to Tractor Tank
65. Hose Assembly, Direction Block Pressure to Tractor Pump
66. Sleeve
67. Clamp

Figure 4-12 Hydraulic System Components, High-Performance

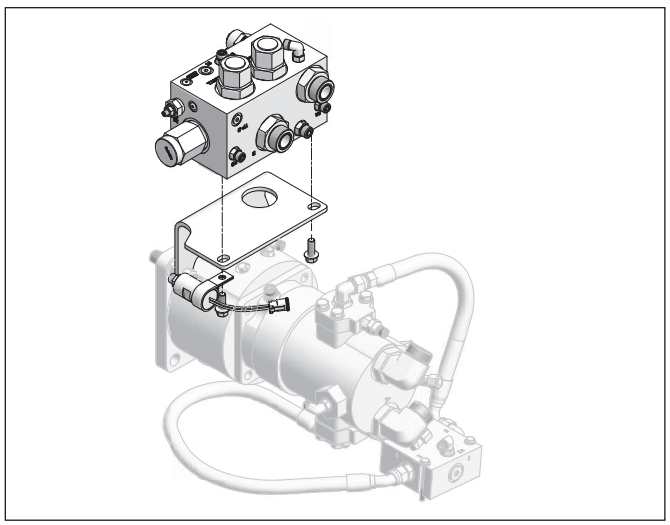
1. Install the bypass manifold assembly.



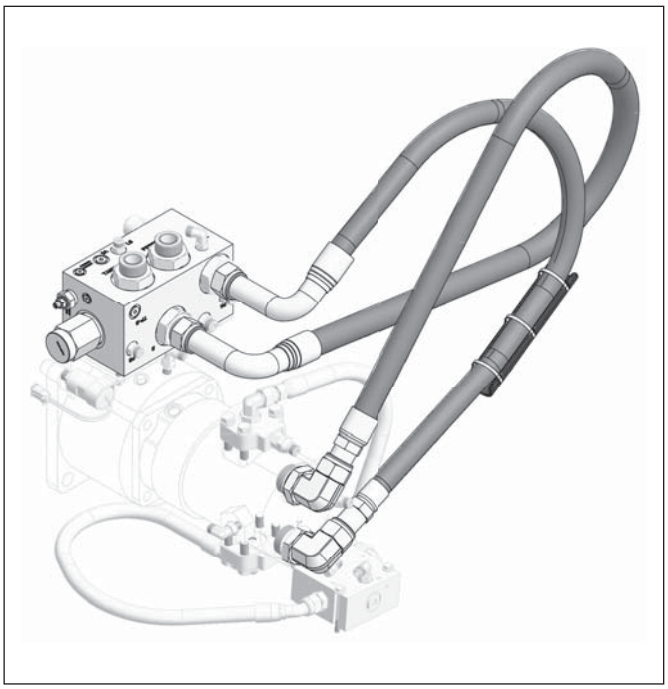
2. Install the directional manifold bracket.



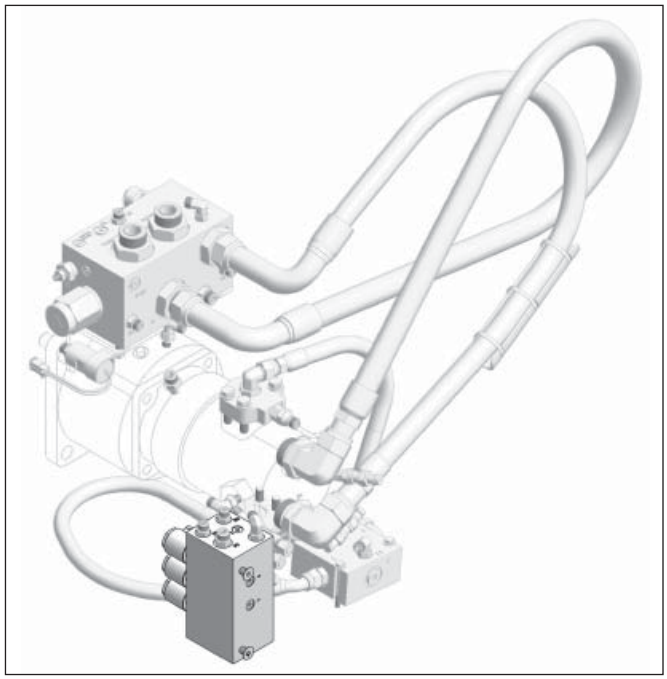
3. Install the directional manifold assembly.



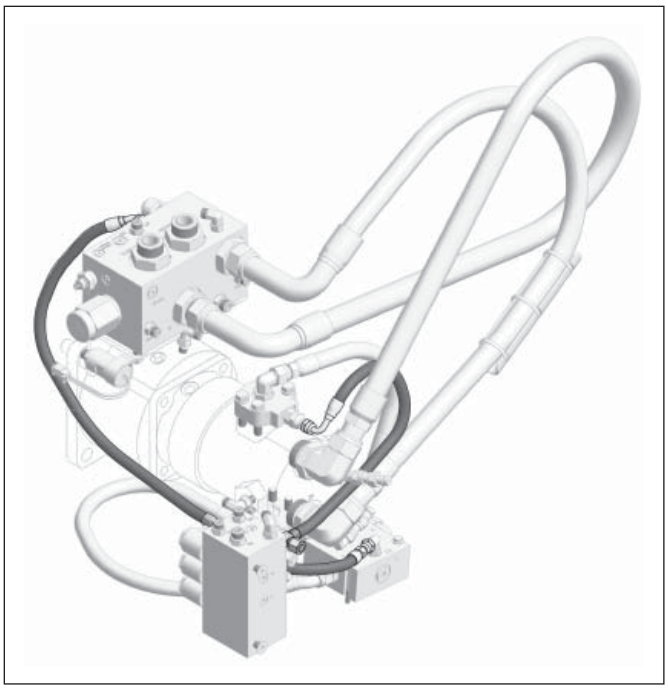
4. Install the hoses between the high-pressure A and B ports on the motor and the directional manifold assembly.



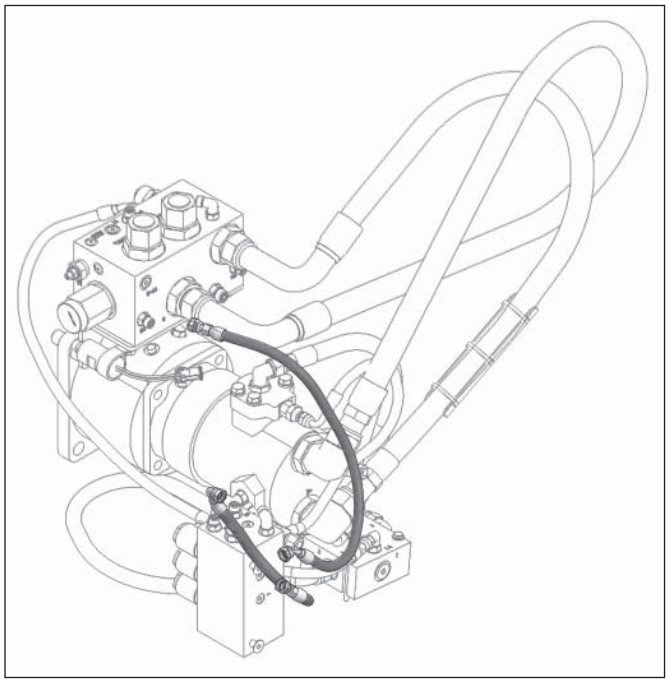
5. Install the logic manifold.



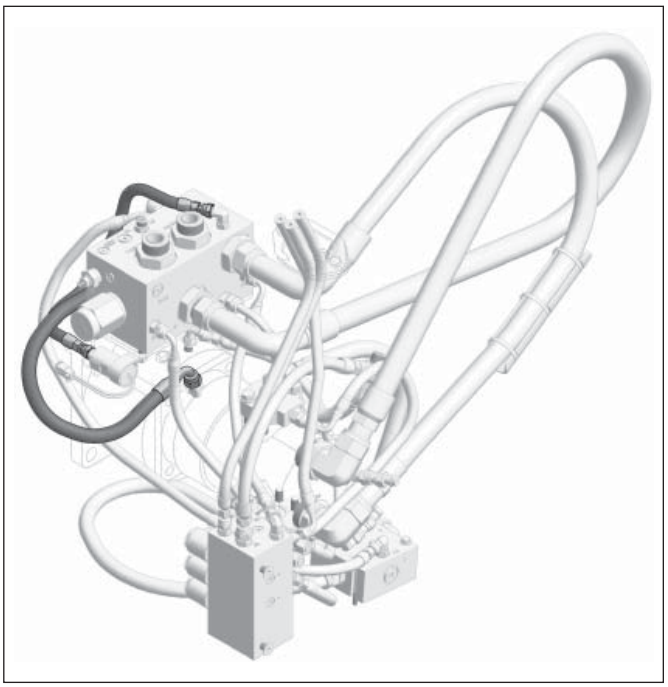
6. Install the hoses to the DV port on the logic manifold.



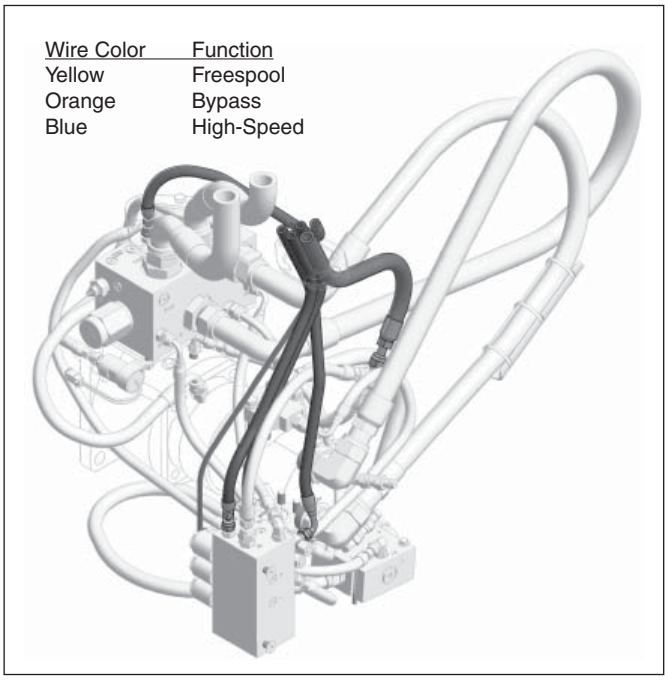
7. Connect the hoses from the logic manifold to the motor and the brake.



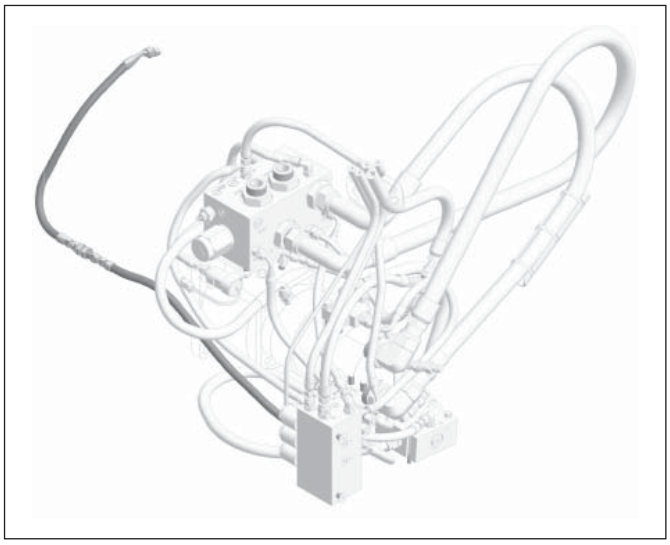
8. Install the hoses connecting the directional manifold to the logic manifold.



9. Connect the hoses that exit through the frame and the wire harness.



10. Connect the freespool hoses.



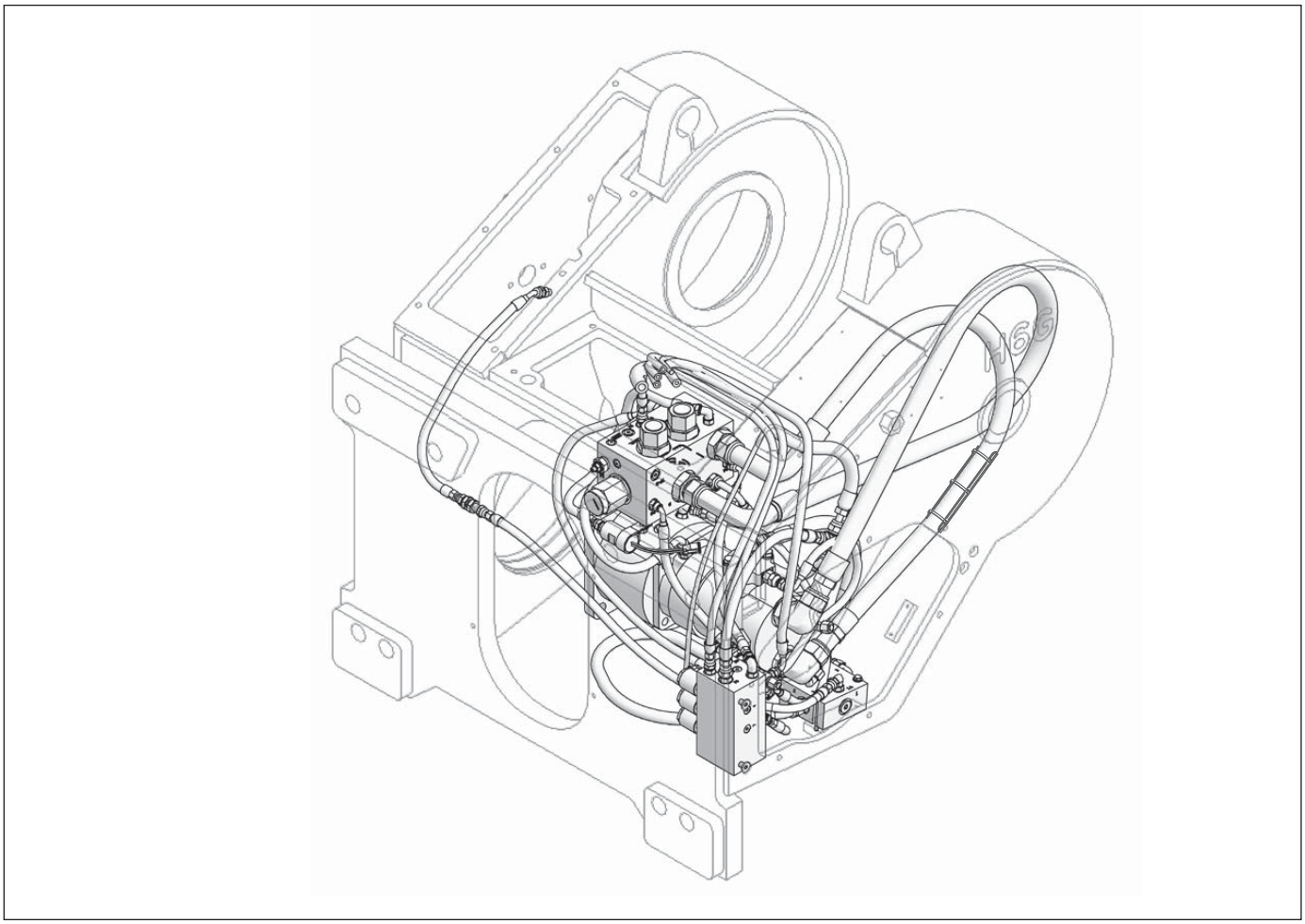
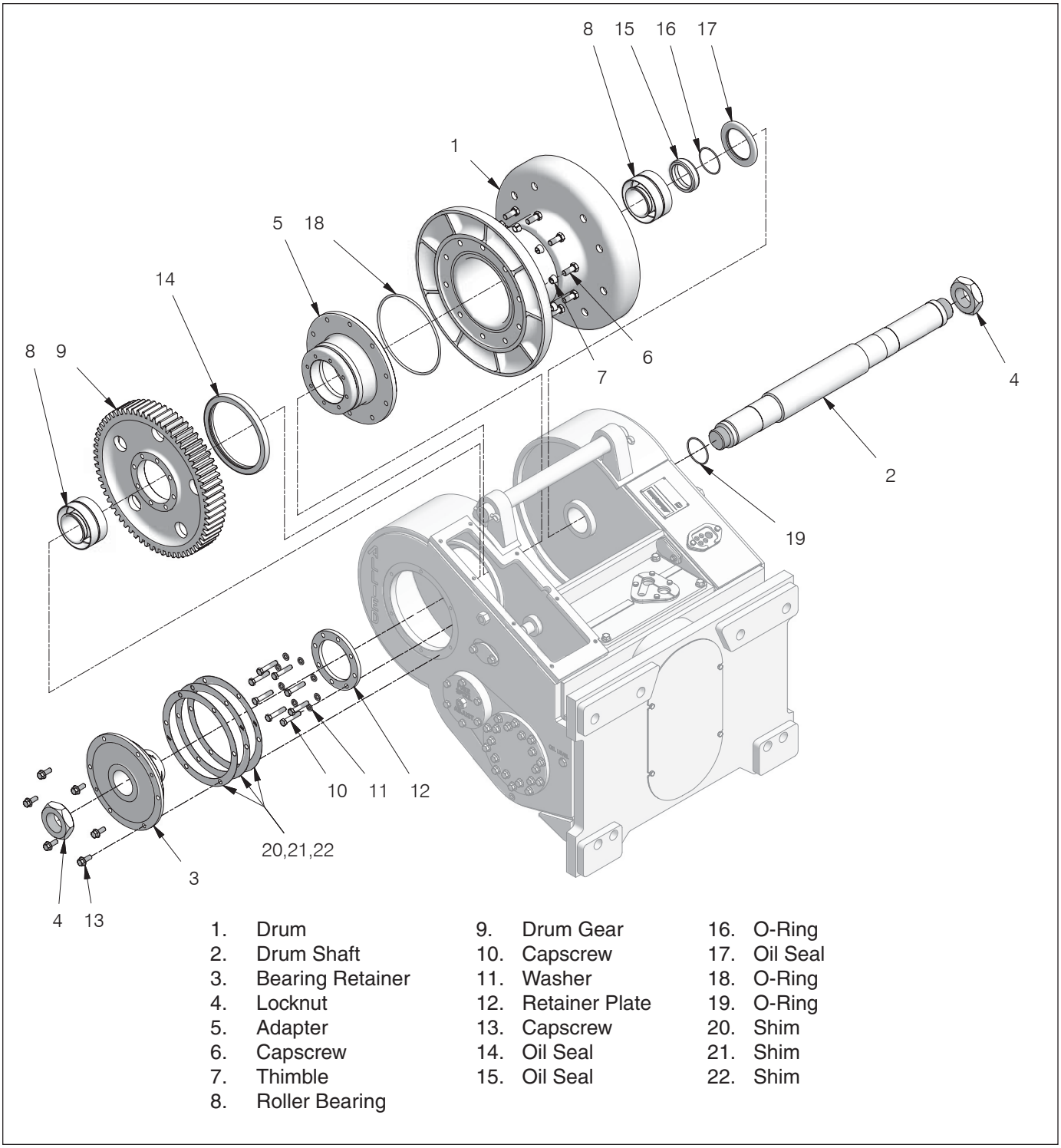


Figure 4-13 Hydraulic System

Drum and Drum Shaft Installation

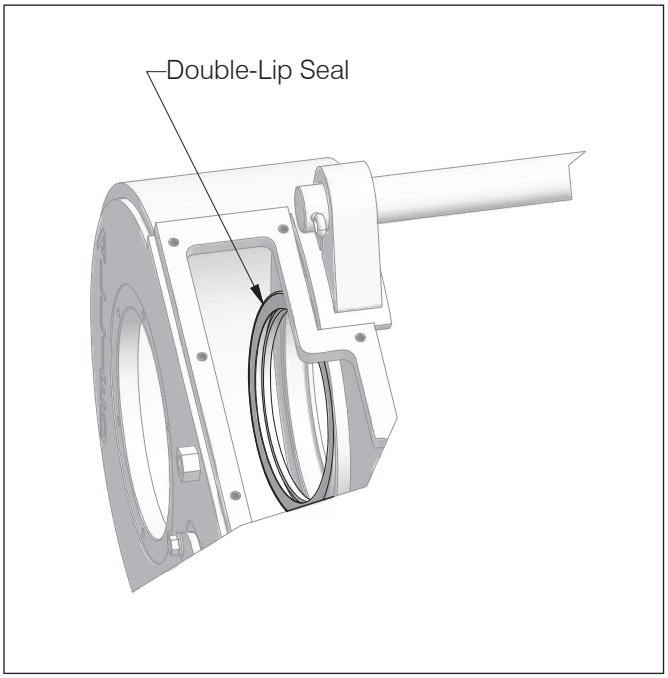
If the drum gear was removed, it must be installed prior to installation of the intermediate shaft and motor shaft assembly.



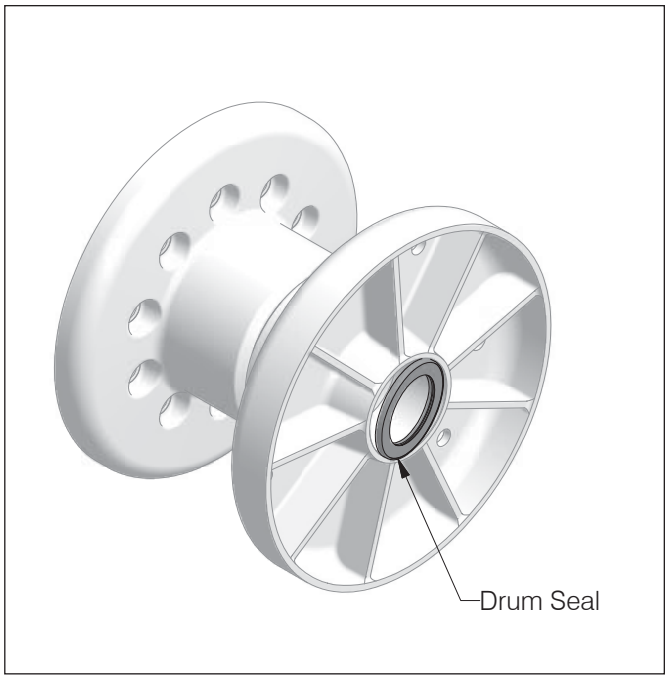
1. Drum
2. Drum Shaft
3. Bearing Retainer
4. Locknut
5. Adapter
6. Capscrew
7. Thimble
8. Roller Bearing
9. Drum Gear
10. Capscrew
11. Washer
12. Retainer Plate
13. Capscrew
14. Oil Seal
15. Oil Seal
16. O-Ring
17. Oil Seal
18. O-Ring
19. O-Ring
20. Shim
21. Shim
22. Shim

Figure 4-14 Location of Drum and Drum Shaft Components

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

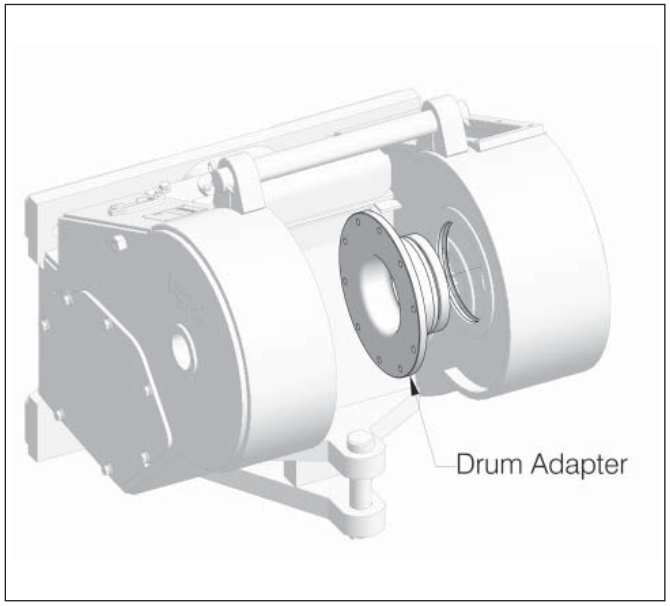


3. Install drum seal.



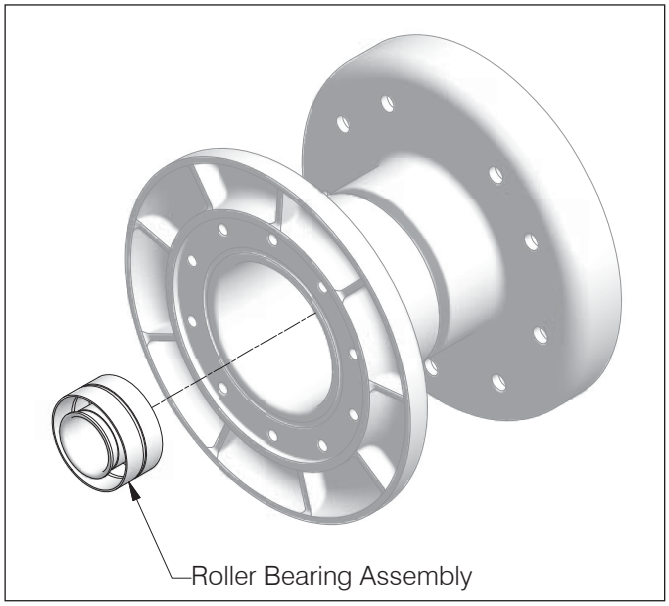
NOTE: Smooth side of seal must face outboard.

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



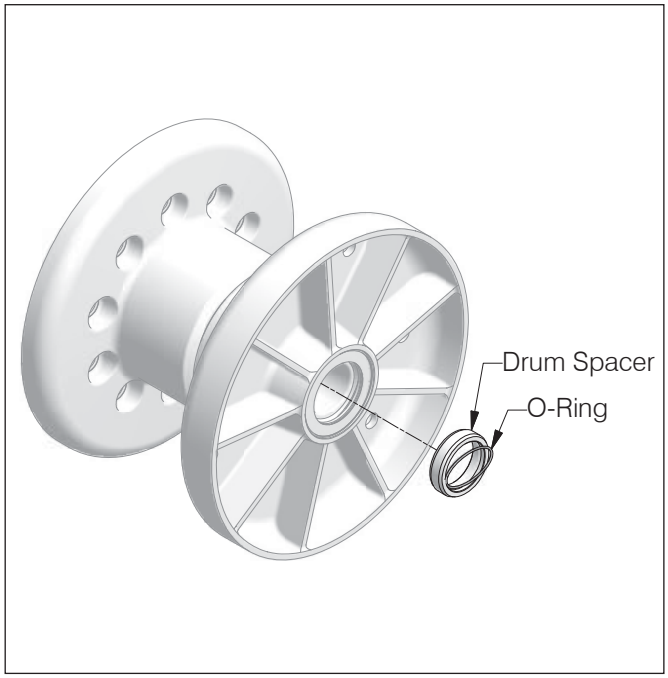
NOTE: To prevent drum adapter from falling out, insert eyebolt on marked hole, then slip metal bar through eyebolt.

4. Lubricate the left-hand drum bore with grease (MIL-G-10924F), then install double tapered roller bearing assembly.

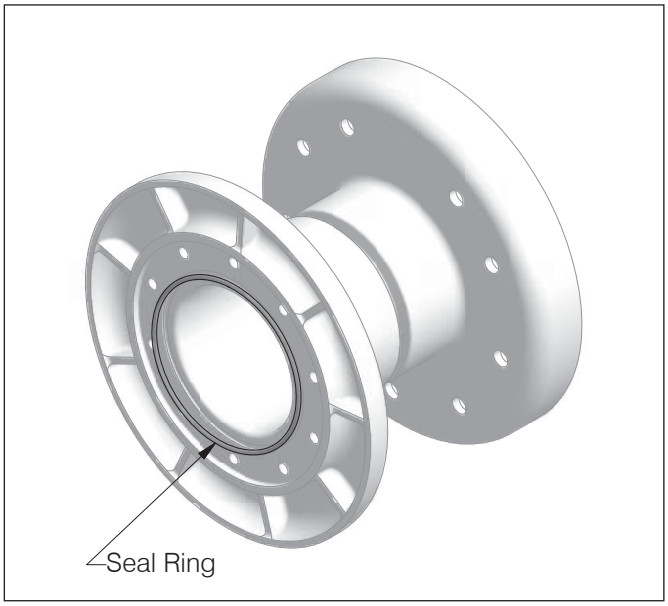


NOTE: Bearing cones, cups and spacer are matched set.

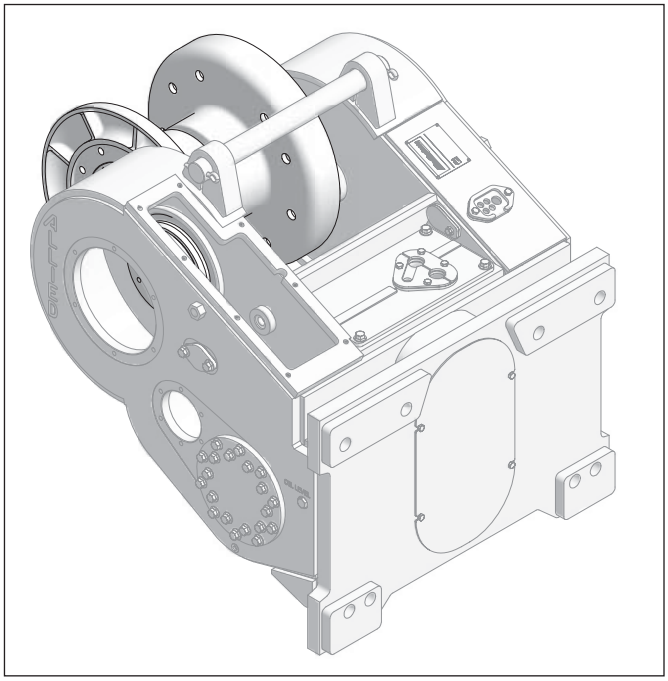
5. Replace drum spacer O-ring and install spacer in drum bore.



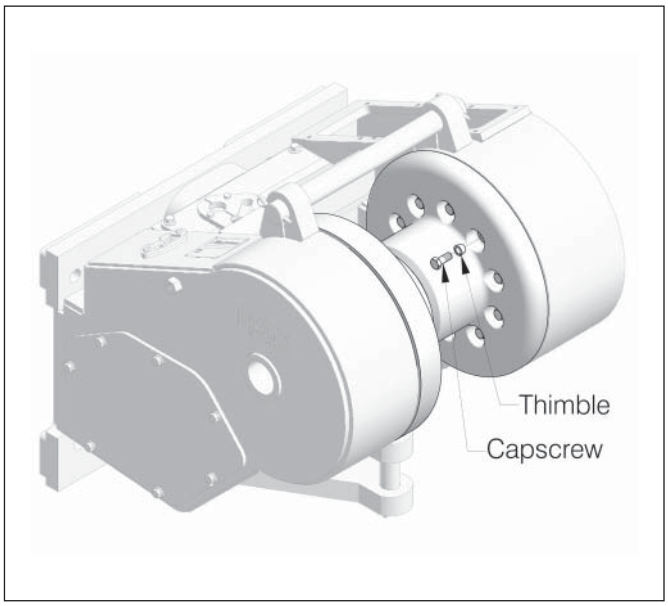
6. Lubricate right-hand drum bore. Coat right-hand seal ring and groove with O-ring lube. Install new seal ring.



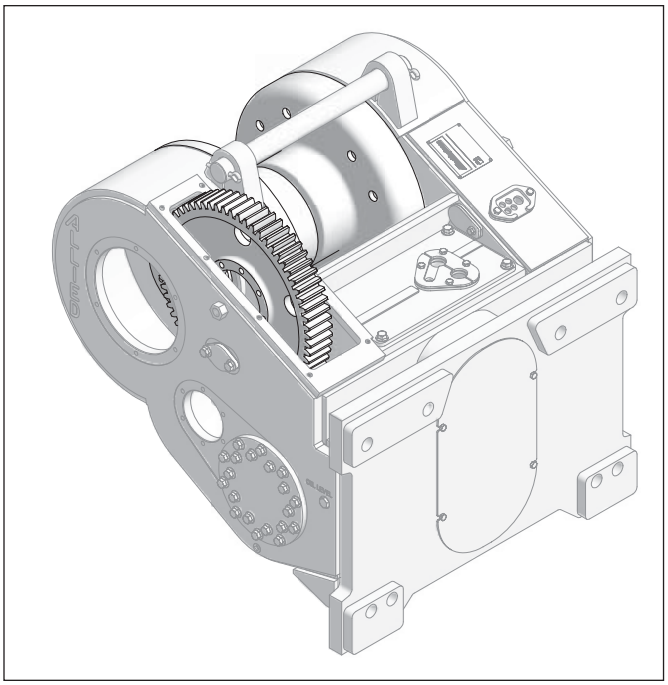
7. Move the drum into position while being careful not to move the seal ring.



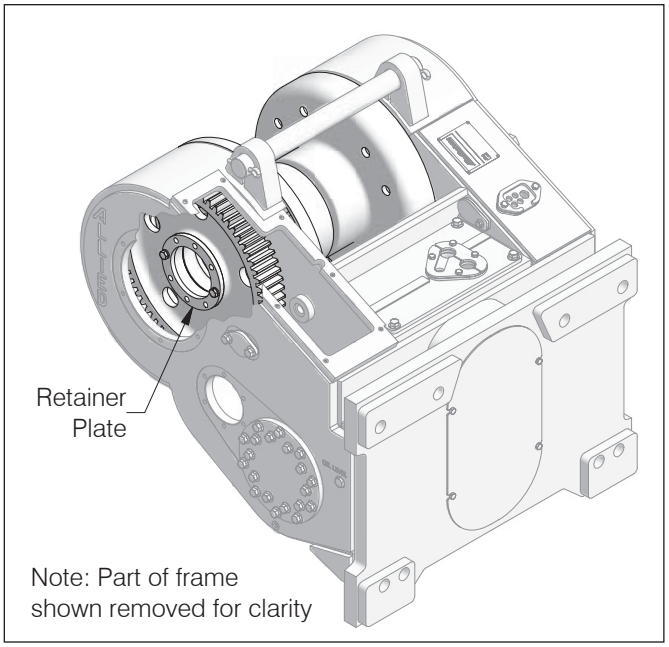
8. Align adapter and drum holes, then install the thimbles and screws. Tighten progressively and evenly to ensure uniform compression of seal ring. Do not tighten to final torque.



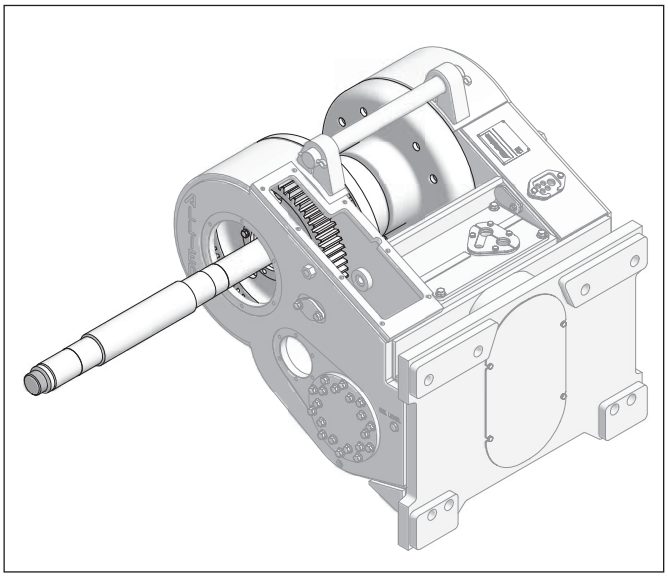
9. Install drum gear.



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



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

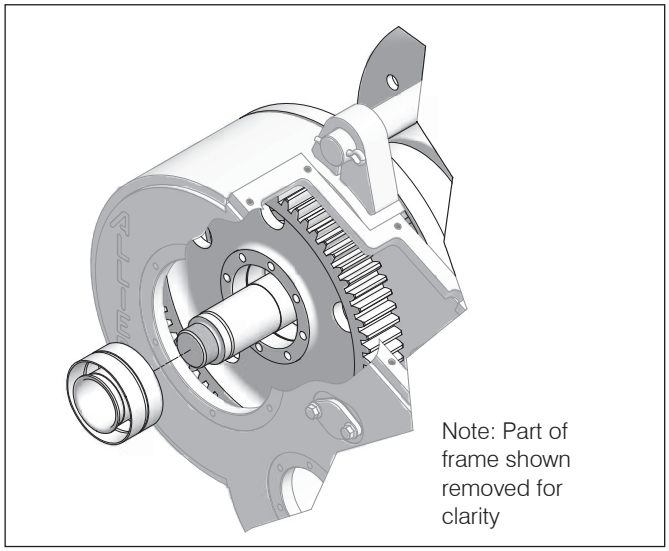


⚠ CAUTION

Do not hammer on drum shaft surface.

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

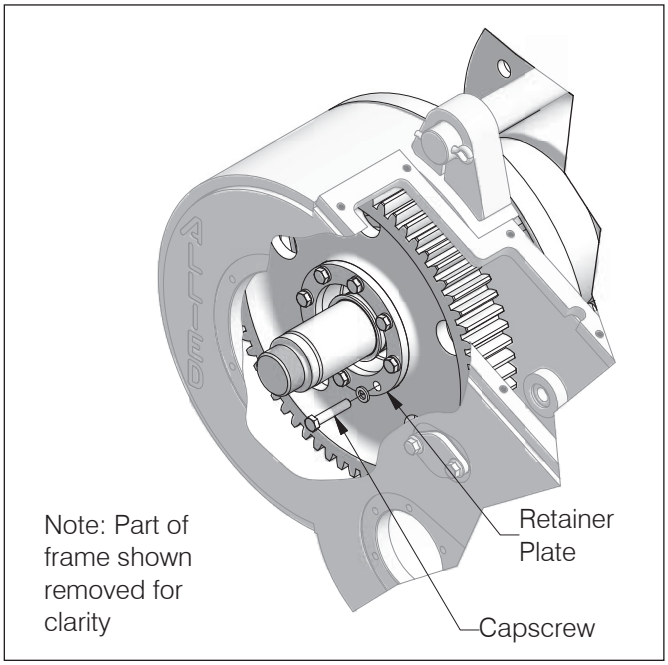
NOTE: Bearing cones, cups and spacer are matched set.



⚠ WARNING

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

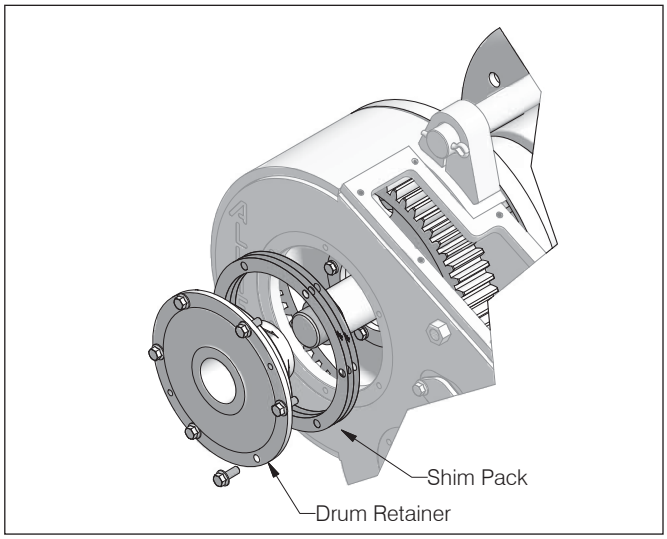
13. Install retainer plate using the eight special capscrews. Tighten capscrews to 90 ft-lbs (12 kg-m).



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

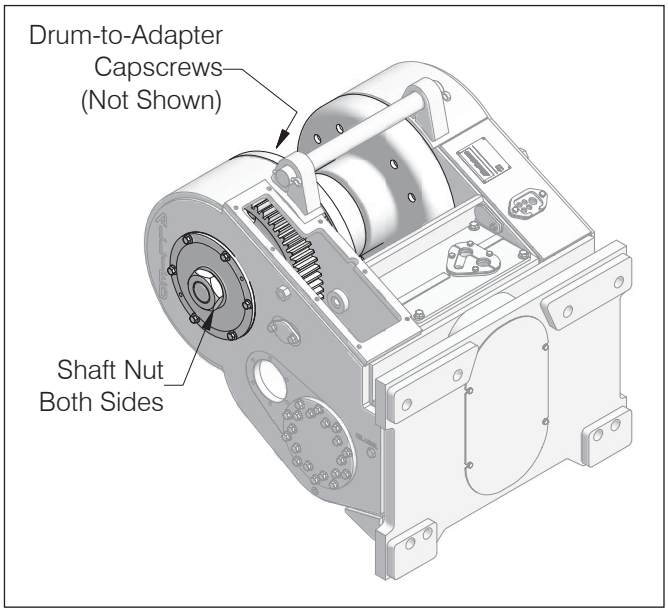
14. Set drum retainer into place and tighten capscrews (do not tighten to final torque). Measure gap between retainer and winch frame in three places around the retainer. Add the three indications and divide by three to add obtain the average gap. Assemble shim pack to provide a net fit with ± 0.005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

15. Coat winch frame and bearing retainer with silicone. Install drum shaft O-ring. Install finalized shim pack (determined in step 15). If intermediate shaft assembly not installed, install before retainer.



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

17. Coat shaft nut threads with anti-seize. Install both shaft nuts and torque to 400 ft-lbs (55 kg-m).



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

1. Capscrew
2. Freespool Piston
3. O-ring
4. Cover
5. Intermediate Shaft
6. Drum Pinion Gear
7. Dental Clutch
8. Washer
9. Setscrew
10. Nut
11. Bearing Cup
12. Bearing Cone
13. Freespool Shaft
14. Spring
15. Freespool Piston
16. Freespool Shifter Fork
17. O-Ring
18. O-Ring
19. Intermediate Gear
20. Spacer
21. Capscrew
22. Shifter Shaft Cover
23. Gasket

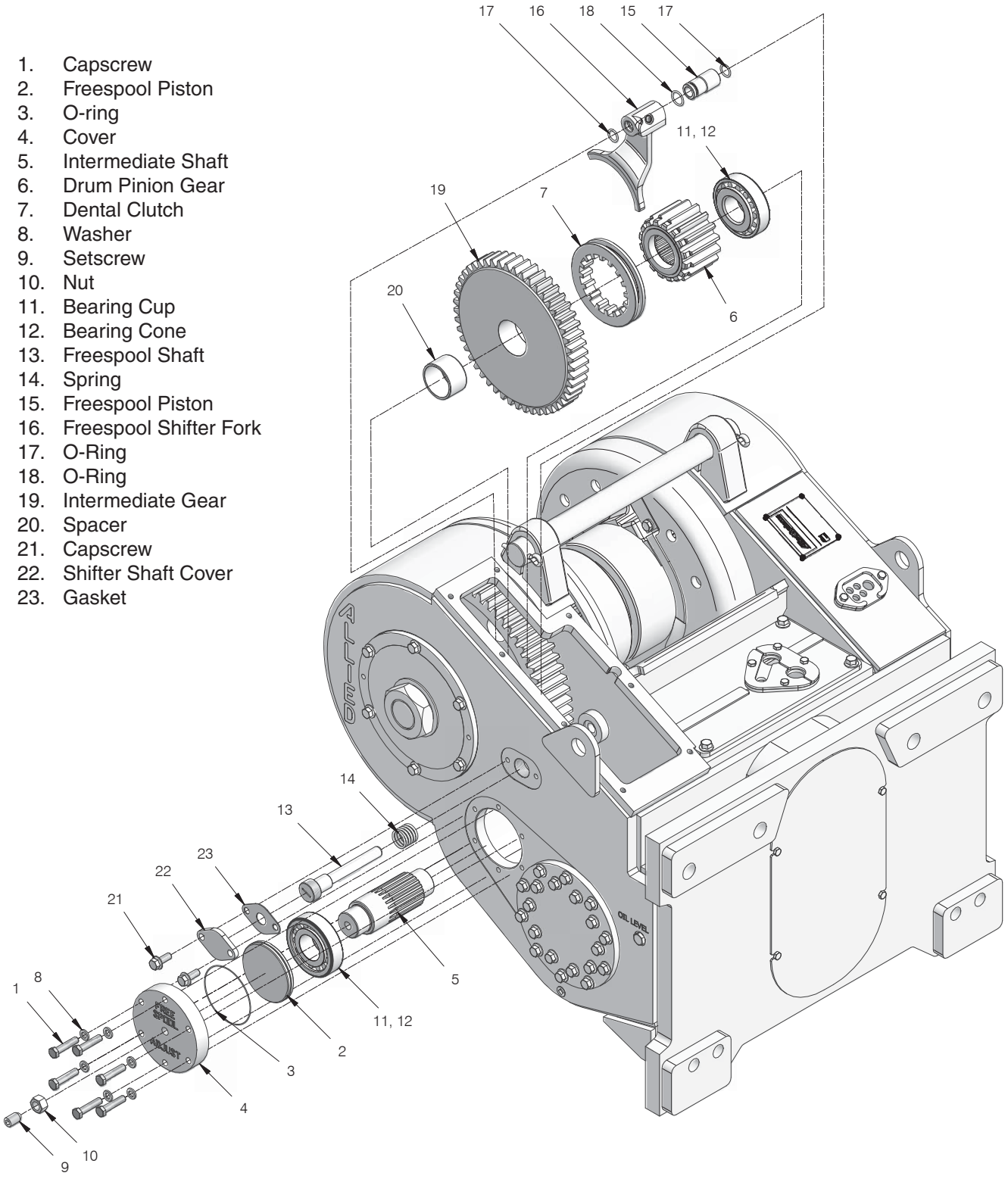
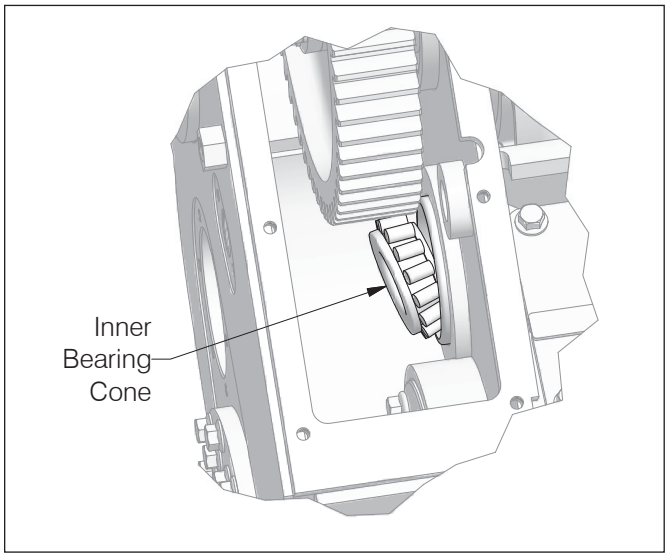


Figure 4-15 Location of Intermediate and Freespool Shaft Components

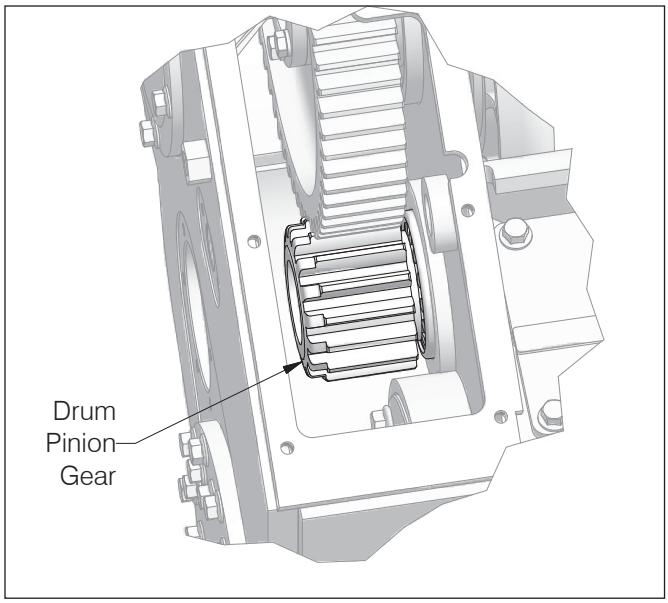
Intermediate & FREESPOOL Shaft Installation

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

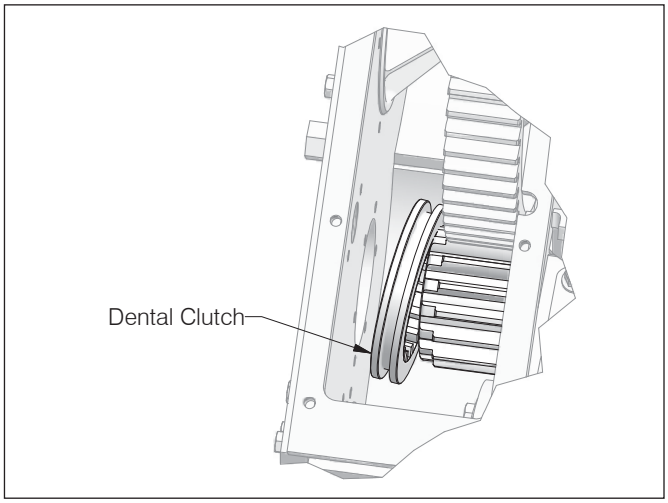
1. Install inner bearing assembly if previously removed. Use a liberal amount of grease (MIL-G-10924F) to hold the inner bearing cone in place.



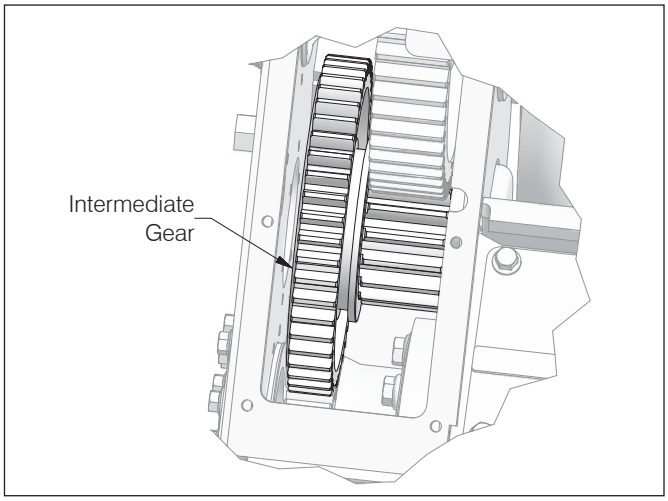
2. Position the FREESPOOL drum pinion in the housing.



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

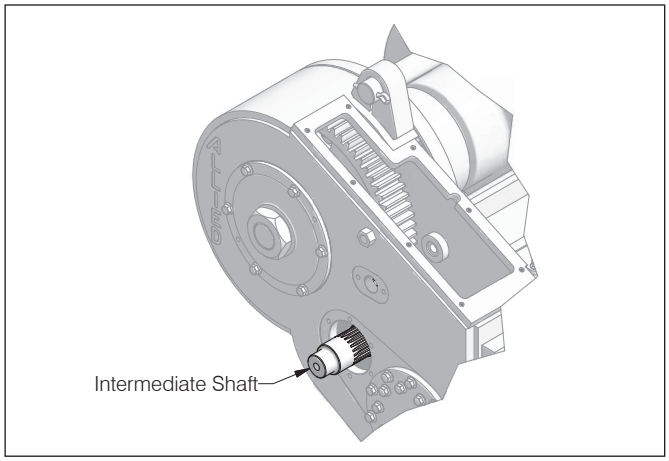


4. Position intermediate gear in housing.

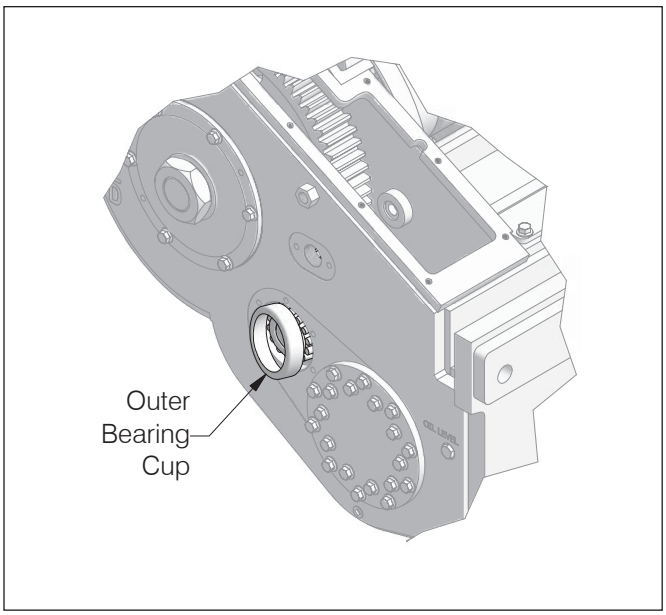


NOTE: Install intermediate gear with high shoulder down.

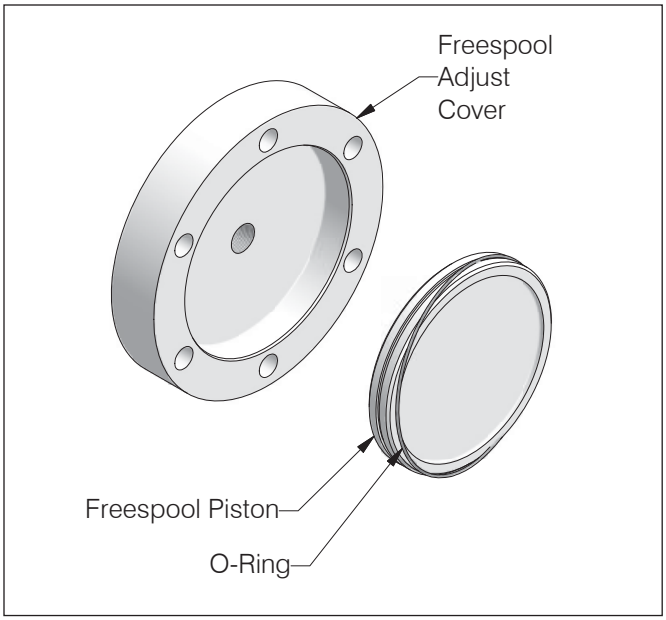
5. Install intermediate shaft.



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

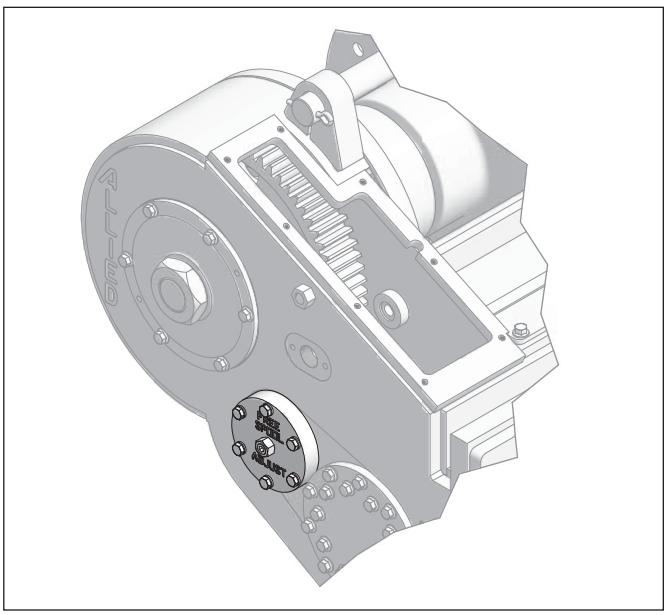


7. Install new O-ring on FREESPOOL piston and install piston in FREESPOOL adjust cover.

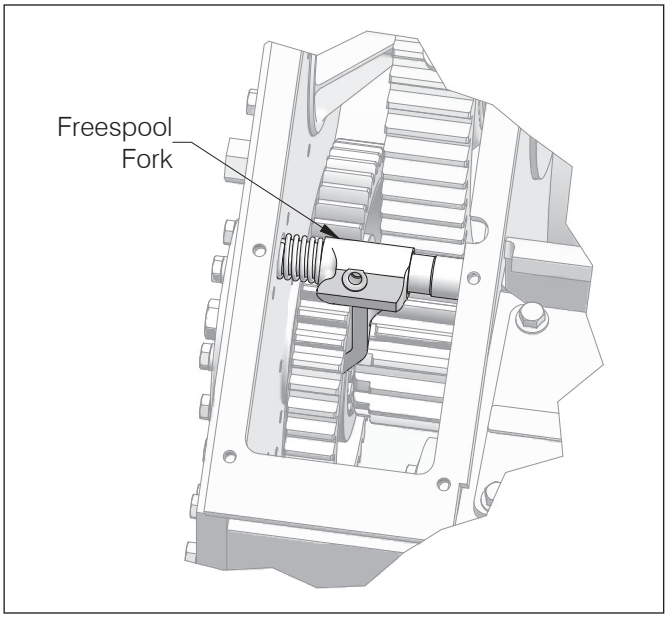


8. Coat the winch frame and retainer with silicone or other suitable sealing compound. Install shim pack (if necessary) and cover.

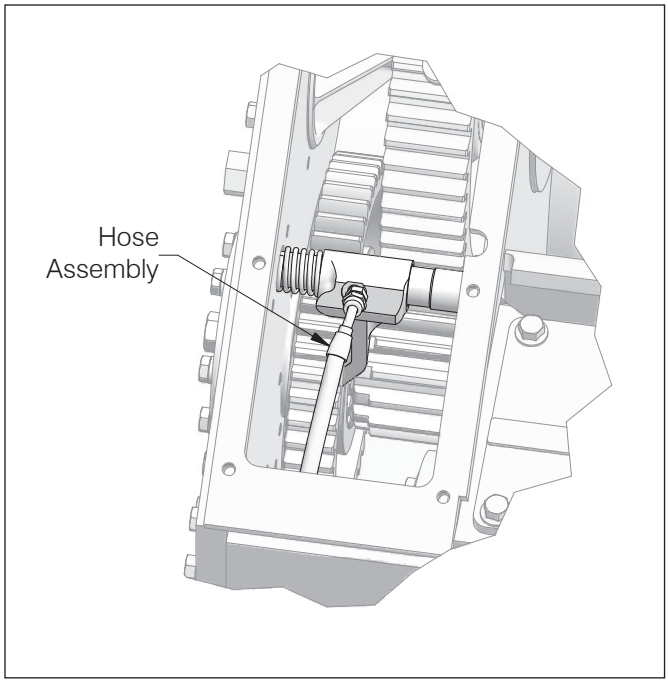
9. Tighten the six capscrews to 75 ft-lbs (10 kg-m).



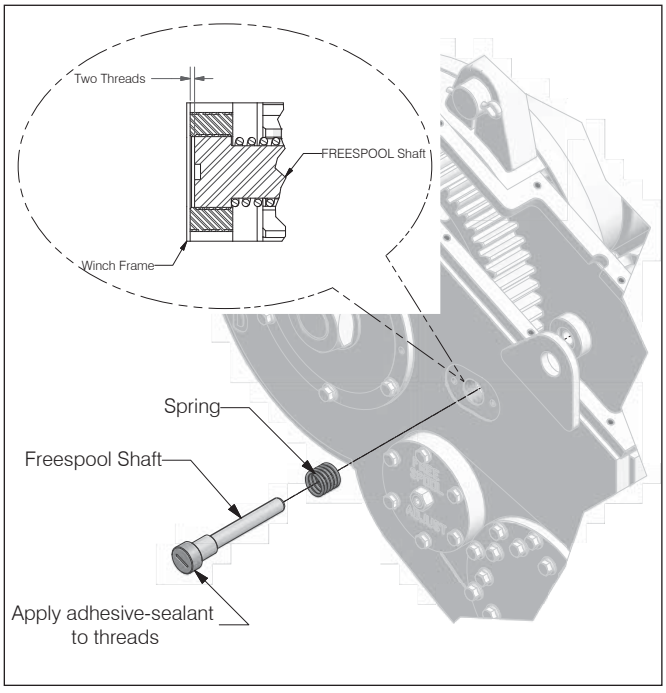
10. Position the FREESPOOL shifter fork on the dental clutch and install the shifter shaft.



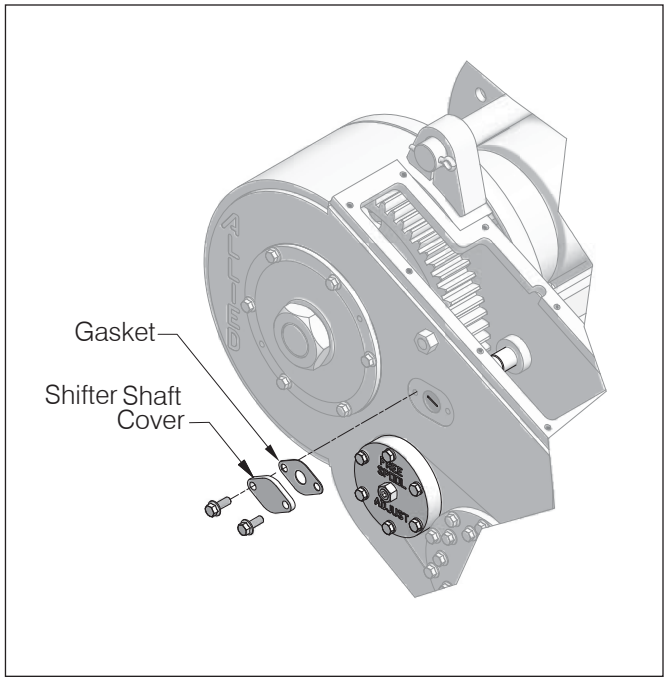
11. Install hose assembly.



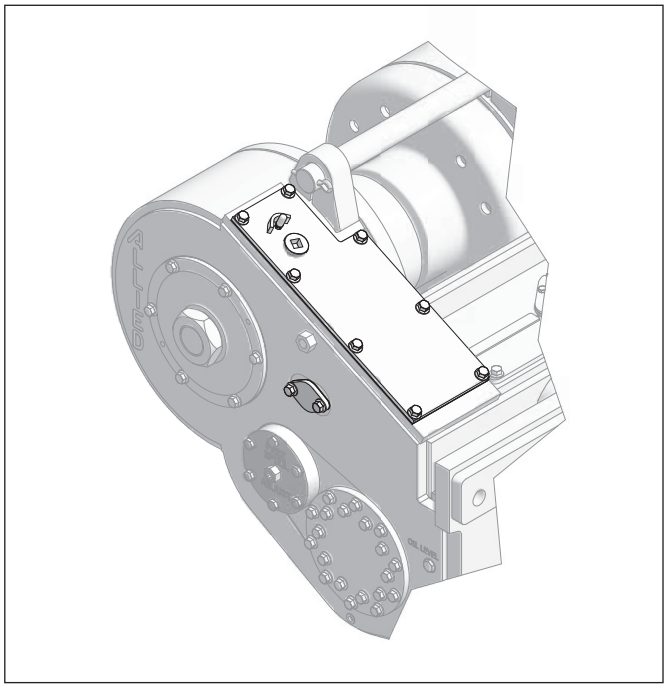
12. Apply adhesive-sealant to threads of FREESPOOL shaft. Adjust for proper engagement and disengagement of intermediate shaft gear. Nominal adjustment should be recessed so two frame threads are exposed in frame.



13. Secure the shifter shaft cover and the gasket with capscrews.



14. Install cover. Tighten capscrews on shifter shaft to 75 ft-lbs (10 kg-m).



Winch Installation

1. Thoroughly clean the mounting surfaces on the winch and the tractor. Clean the mounting holes and hardware of dirt, grit and oil.
2. Attach sling or chain fall to lift points.
3. Raise the winch.

⚠ WARNING

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.
7. Install control lever assembly per mounting kit instructions.

Notes

Notes

Allied® WINCH

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