Service Manual

H8L

Hydraulic Winch

A Product of

Allied Systems COMPANY

Sherwood, OR USA

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

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Safety Precautions

Read, understand and observe the Safety Summary on pages 0-3 through 0-5 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

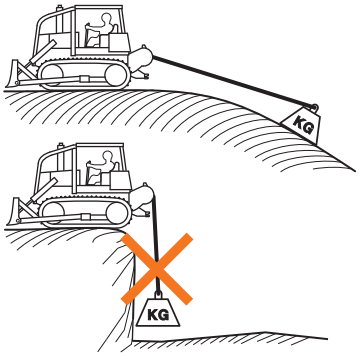
⚠ WARNING

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 599044W.

- 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.

Ordering Parts:

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

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

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

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

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

Contents

Notes

General

Introduction

This service manual is for the H8L hydraulic winch. The following information is included in this manual:

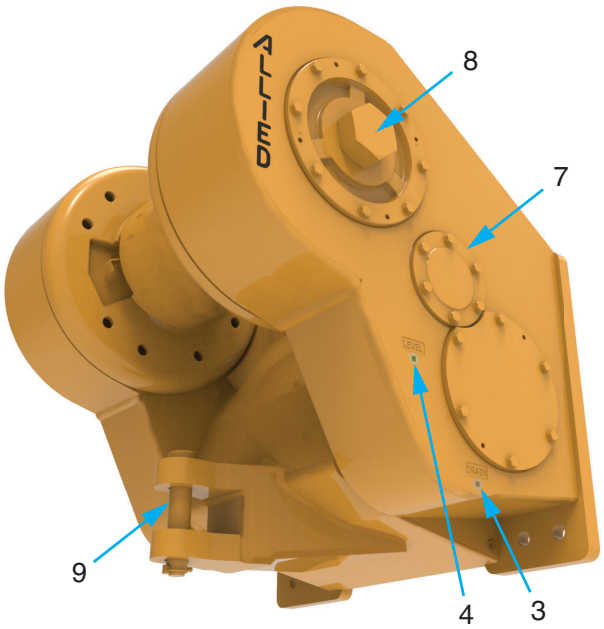
Section 1. General includes operation descriptions of systems and components as an aid for troubleshooting and repair.
Section 2. Troubleshooting lists common problems and the possible causes and corrections.
Section 3. Maintenance provides a guide for periodic maintenance, checks and adjustments.
Section 4. Repairs describes the removal, disassembly, assembly, and installation of the winch.

Description

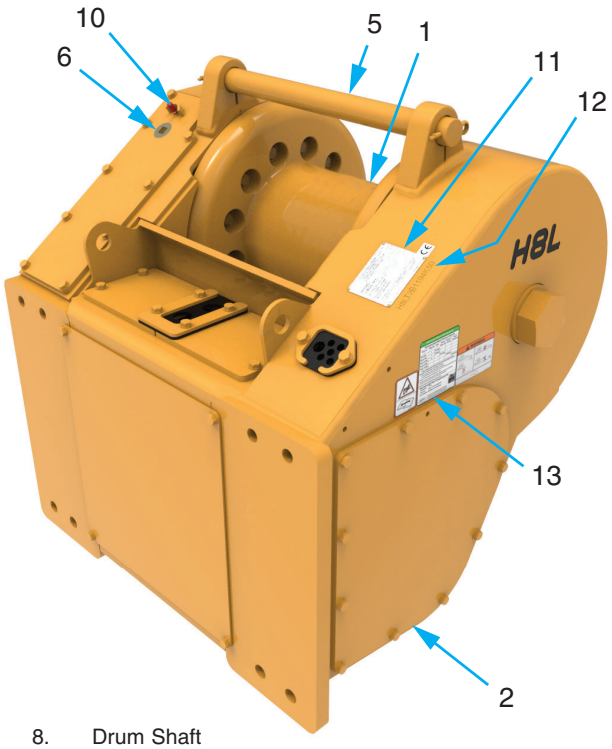
The H8L Winch is a Power Forward (**LINE-IN**) and Power Reverse (**LINE-OUT**) winch. The winch is powered by an internal hydraulic motor connected to the tractor hydraulic system. Oil flow and pressure are converted to rotational energy by the winch motor. Motor torque is transmitted through a holding brake, a planetary speed reducer and two gear reductions to the drum. Hydraulic oil is supplied by the tractor mounted pump. The tractor provides hydraulic power, filtration and cooling. Operation of the winch is controlled by a control lever and a winch lockout switch located at the tractor's control station.

The H8L winch **BRAKE-OFF** function permits the wire rope to be pulled from the drum under increased resistance.

The H8L winch has a maximum rated line pull capacity of 125,800 lb (57,100 kg) when there is one layer of wire rope on the drum. When there is more than one layer of wire rope on the drum, the 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
5. Tie Rod
6. Fill Plug
7. Bearing Retainer for Intermediate Shaft



8. Drum Shaft
9. Drawbar
10. Breather
11. Nameplate
12. Serial Number Stamp
13. Maintenance & Warning Decals

Figure 1-1 H8L Winch

Unit Identification

Allied Winch S/N Nameplate Data For Tractor Mountings

H8L H 1 B 1001 C511

Winch Model
H8L = Standard
KH8L = Special Design (Contact Factory)

Hydraulic Operation Type
H = High Performance, Direction Control in Winch
T = Standard, Tractor Controls & Pump

Gear Ratio (Code #)
1 = 207:1
2 = 259:1

Vehicle Code
See Figure 1-2

Sequence Number

Internal Options
B = PFPR, BRAKE-OFF Clutch
D = PFPR, BRAKE-OFF Clutch & 2-Speed Control

Notes: 1. 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.)

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

Tractor Make Model and Starting Tractor Serial Number Where Applicable

CODE	A New Holland & Fiat	C Caterpillar	E John Deere	H Dressta	K Komatsu	R Case
42						1650M 2050M ①②
460			750K 850K ①②			
470			850L ①②			
50					D85X-15 ①②	
511		D7E ①②				
973		973D ①②				

Figure 1-2 Tractor Identification Codes and Available Gear Ratios for H8L Winch

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.

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 1-3. 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.

Figure 1-3 Nameplate

Specifications

Drum Wire Rope Capacities (Drum: 10 Inch Diameter)

Wire Rope Diameter	Wire Rope Capacities	
	2/3 Length*	Full Length**
7/8” (22 mm)	287’ (87 m)	430’ (131 m)
1” (25 mm)	222’ (68 m)	334’ (102 m)
1-1/8” (28 mm)	178’ (54 m)	267’ (81 m)

Notes: * Recommended length to fill drum up to 2/3 capacity to leave room for uneven spooling.
** Length to fill drum to full capacity. Will have no room for uneven spooling. Not recommended.
1. Wire Rope: IWRC 6 X 19, extra improved plow steel, with ferrule, tail chain and hook.
2. Loosely or unevenly spooled wire rope will change capacities. Use flexible wire rope with independent wire rope center.
3. Ferrule: Junior (2-3/8” long x 2-1/4” diameter)

Figure 1-4 Drum Wire Rope Capacities

Hydraulic Specifications

Motor ..... Bent axis variable displacement

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

Oil Specifications

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

Other hydraulic oils meeting this specification are:

ExxonMobil, **Mobiltrans HD-30**

Chevron, **Chevron Drive Train Fluid HD SAE 30**.

Oil Capacity

The oil capacity for the H8L gear case is 4 gallons (15 liters).

Torque Specifications

ITEM	TORQUE VALUES		
	ft-lbs.	N-m	kg-m
Housing Covers & Motor Shaft Mounting (M12x1.75 Class 10.9)	90	122	12
Drum Shaft Assembly			
Drum Adapter to Drum Capscrews (5/8-UNF Gr. 8)	180	244	25
Bearing Retainer Capscrews (1/2-UNF Gr. 8)	90	122	12
Motor Shaft Planetary Housing Capscrews (3/8-UNC Gr. 8)	33	44	4
Motor & Bracket Mounting (3/4-UNC Gr.8)	280	380	40
Manifold Mounting Capscrews (M10x1.5 Gr. 8.8)	28	38	4

Figure 1-5 Torque Specifications

Gear Train (See Figure 1-6)

A tractor mounted pump provides hydraulic flow to drive the winch motor. The flow is controlled in the winch by the hydraulic directional manifold and a control manifold. The motor is mounted to a multi-disc, spring applied holding brake. The brake is applied when the motor comes to a complete stop and is used to prevent drum rotation due to hydraulic leakage internal to the motor.

A planetary gear assembly provides a 18.8:1 or 23.59:1 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 a reduced speed.

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

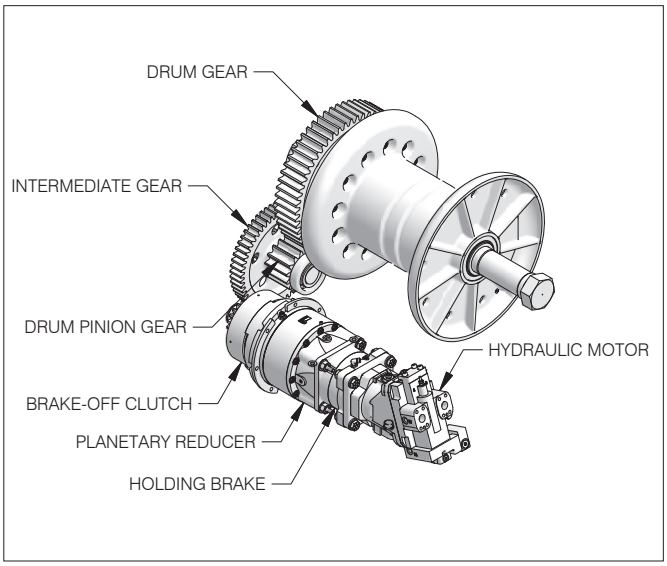


Figure 1-6 Gear Train

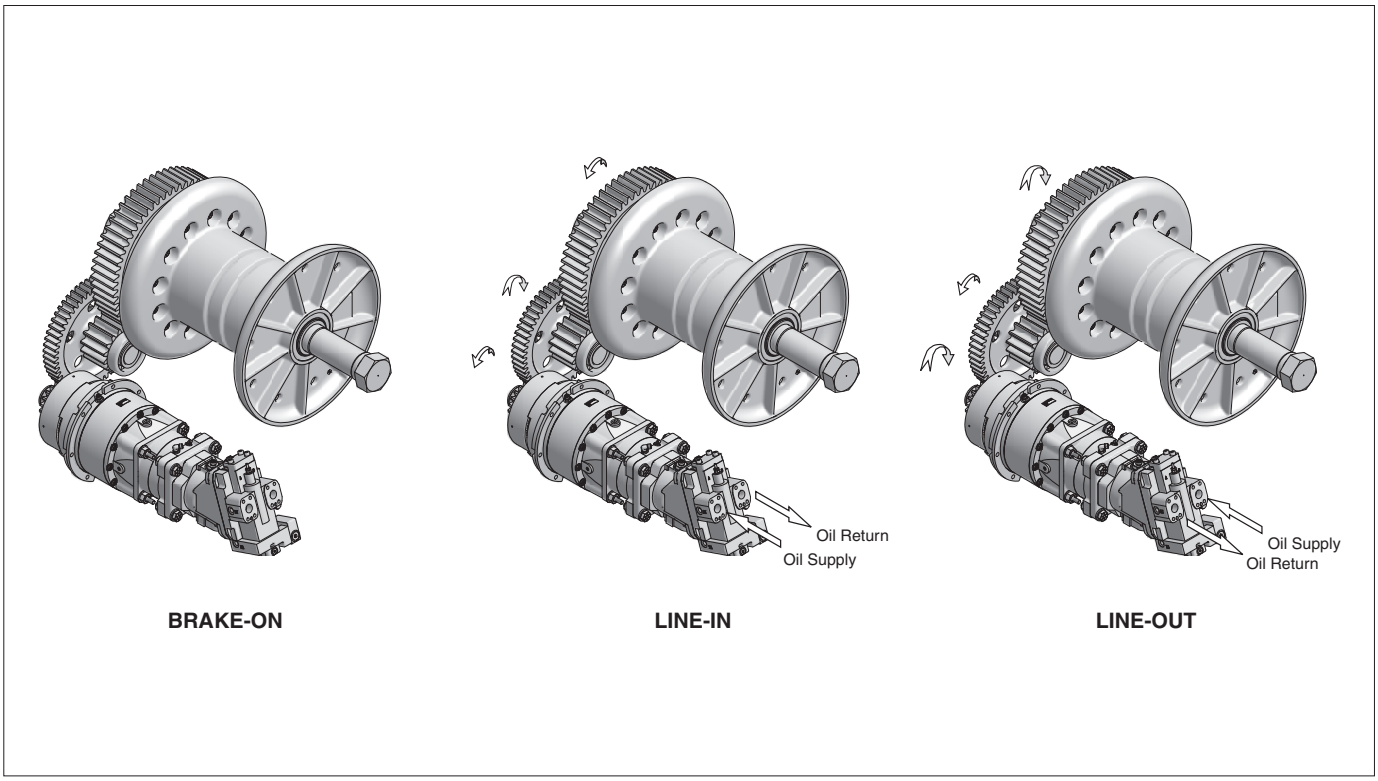


Figure 1-7 Rotation Torque Transfer

Operation & Control

Caterpillar D7E (C511)

To operate the winch, the tractor must be running, the implement lockout switch unlocked and the winch lockout switch unlocked. (See Figure 1-8). **LINE-IN**, **LINE-OUT, BRAKE-ON** and **BRAKE-OFF** 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 control lever away from the operator releases the brake and reels wire rope off the drum (**LINE-OUT**). Pulling the control lever towards the operator releases the brake and reels wire rope onto the drum (**LINE-IN**). Releasing the control lever causes it to return to the **BRAKE-ON** position, which stops the drum rotation and applies the holding brake. Moving the control lever a small amount results in slow wire rope movement for inching control. Line speed increases proportionally as the control lever is moved farther.

By moving the control lever to full stroke, high speed is activated. Control pressure actuates the motor swash plate to reduce motor displacement and increase motor rpm. If pressure in the main circuit exceeds a factory set level, the motor will automatically increase displacement to prevent motor stall. Motor stall will occur when the load exceeds winch capacity. When the control lever is returned to the **BRAKE-ON** position, the brake is automatically applied.

BRAKE-OFF is controlled by moving the control lever to the left. This function is spring centered to **BRAKE-ON** position, but if the control lever is moved far enough, it locks into a detented position.

BRAKE-OFF is used when there is a load attached to the winch wire rope and the operator wants to move the tractor away from the load with wire rope spooling off the drum in a controlled manner.

In **BRAKE-OFF**, hydraulic pressure is applied to release the brake-off clutch. As wire rope is pulled from the winch, the turning drum back-drives the winch gear train to the brake-off clutch. The winch motor, brake, and planetary reducer remain stationary. Mechanical drag through the gear train and viscous drag in the brake-off clutch keep the wire rope from bird-nesting as it is spooled off the drum.

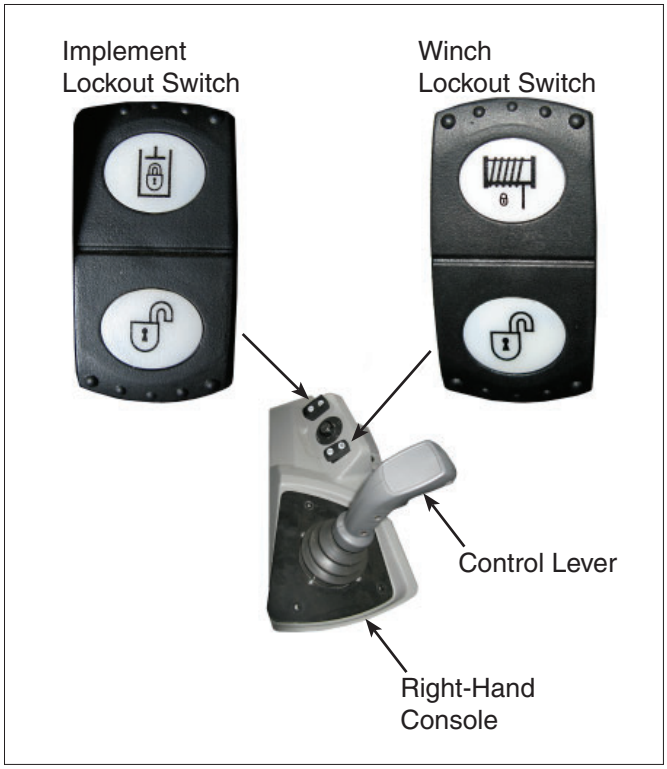


Figure 1-8 Control Lever & Switches
Caterpillar D7E

⚠ WARNING

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

Komatsu D85X-15 (K50)
Case 1650/2050M (R42)
John Deere 750K/850K (E460), 850L (E470)

To operate the winch, the tractor must be running and the equipment lockout lever unlocked. **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 control lever away from the operator releases the brake and reels wire rope off the drum (**LINE-OUT**). Pulling the control lever towards the operator releases the brake and reels wire rope onto the drum (**LINE-IN**). Releasing the control lever causes it to return to the **BRAKE-ON** position, which stops the drum rotation and applies the holding brake. Moving the control lever a small amount results in slow wire rope movement for inching control. Line speed increases proportionally as the control lever is moved farther.

By moving the control lever to full stroke, high speed is activated. Control pressure actuates the motor swash plate to reduce motor displacement and increase motor rpm. If pressure in the main circuit exceeds a factory set level, the motor will automatically increase displacement to prevent motor stall. Motor stall will occur when the load exceeds winch capacity. When the control lever is returned to the **BRAKE-ON** position, the brake is automatically applied.

BRAKE-OFF is controlled by a switch located on the operator console and directs hydraulic pressure to release the brake-off clutch.

BRAKE-OFF is used when there is a load attached to the winch wire rope and the operator wants to move the tractor away from the load with wire rope spooling off the drum in a controlled manner.

In **BRAKE-OFF**, hydraulic pressure is applied to release the brake-off clutch. As wire rope is pulled from the winch, the turning drum back-drives the winch gear train to the brake-off clutch. The winch motor, brake, and planetary reducer remain stationary. Mechanical drag through the gear train and viscous drag in the brake-off clutch keep the wire rope from bird-nesting as it is spooled off the drum.

⚠ WARNING

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

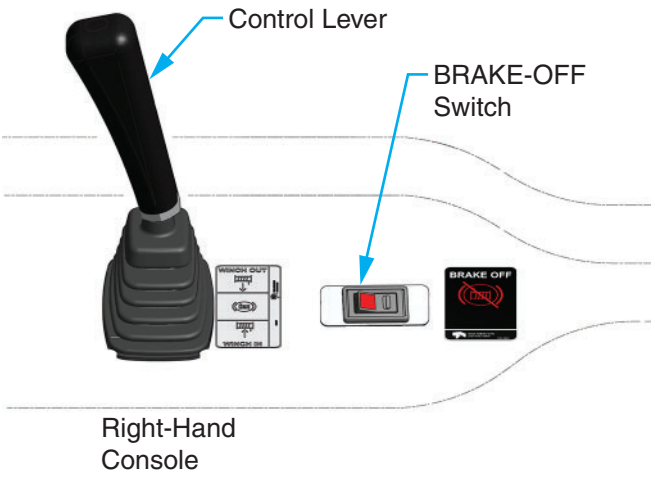


Figure 1-9 Control Lever & Switch
Komatsu D85X-15

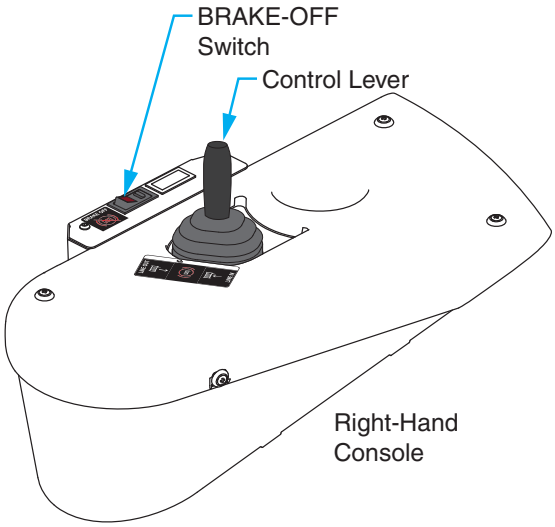


Figure 1-10 Control Lever & Switch
Case 1650M/2050M

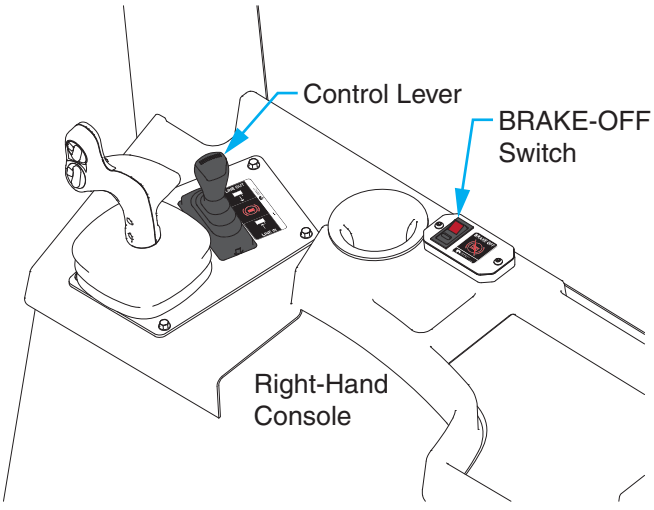


Figure 1-11 Control Lever & Switch
John Deere 750K/850K

Winches with option Code D have a **HI-SPEED** switch to override automatic motor displacement control.

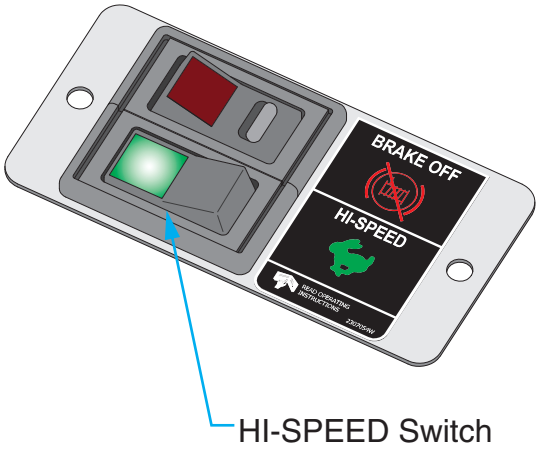


Figure 1-12 HI-SPEED Switch (Option Code D)

Hydraulic System

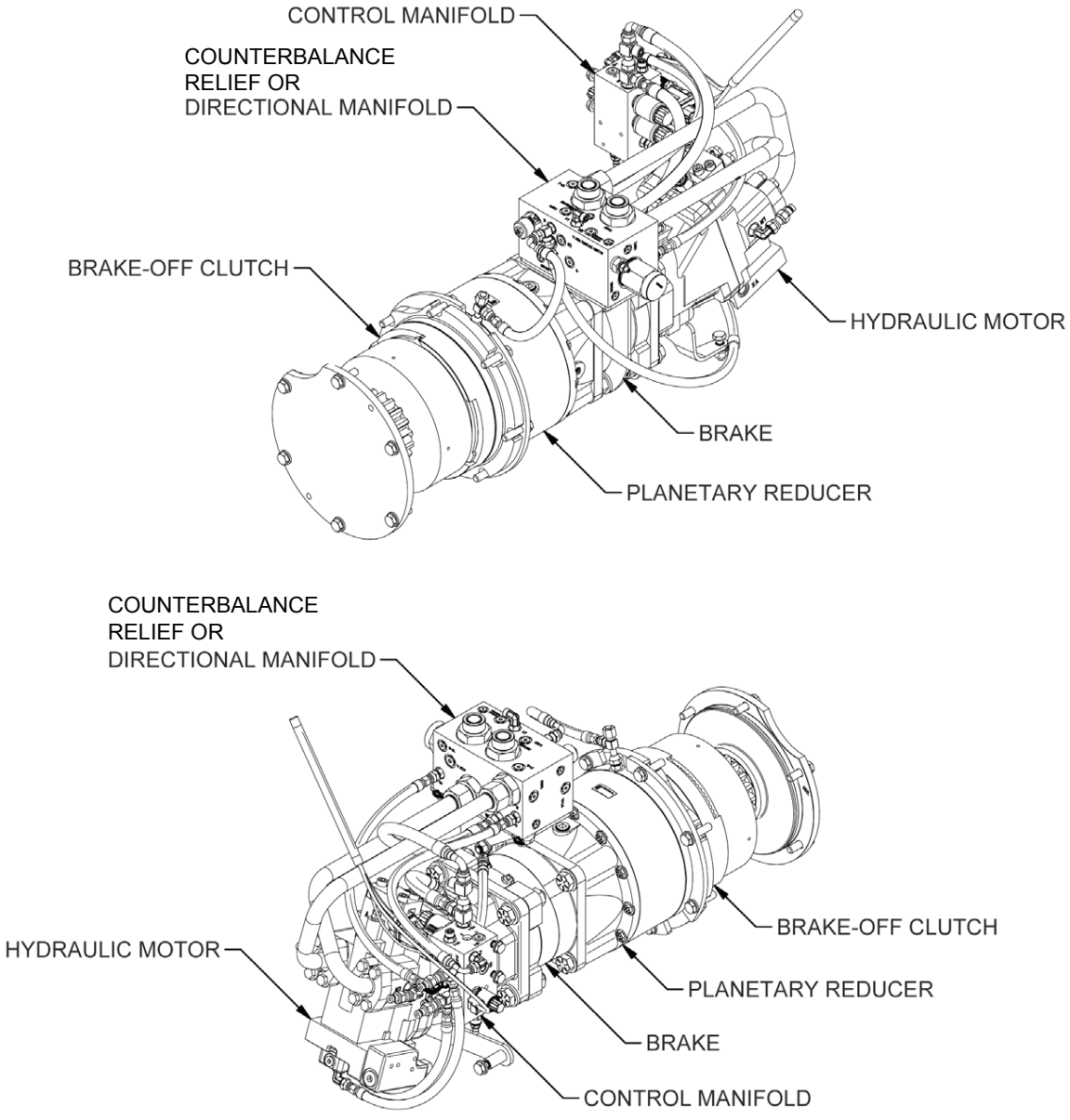


Figure 1-13 Major Components

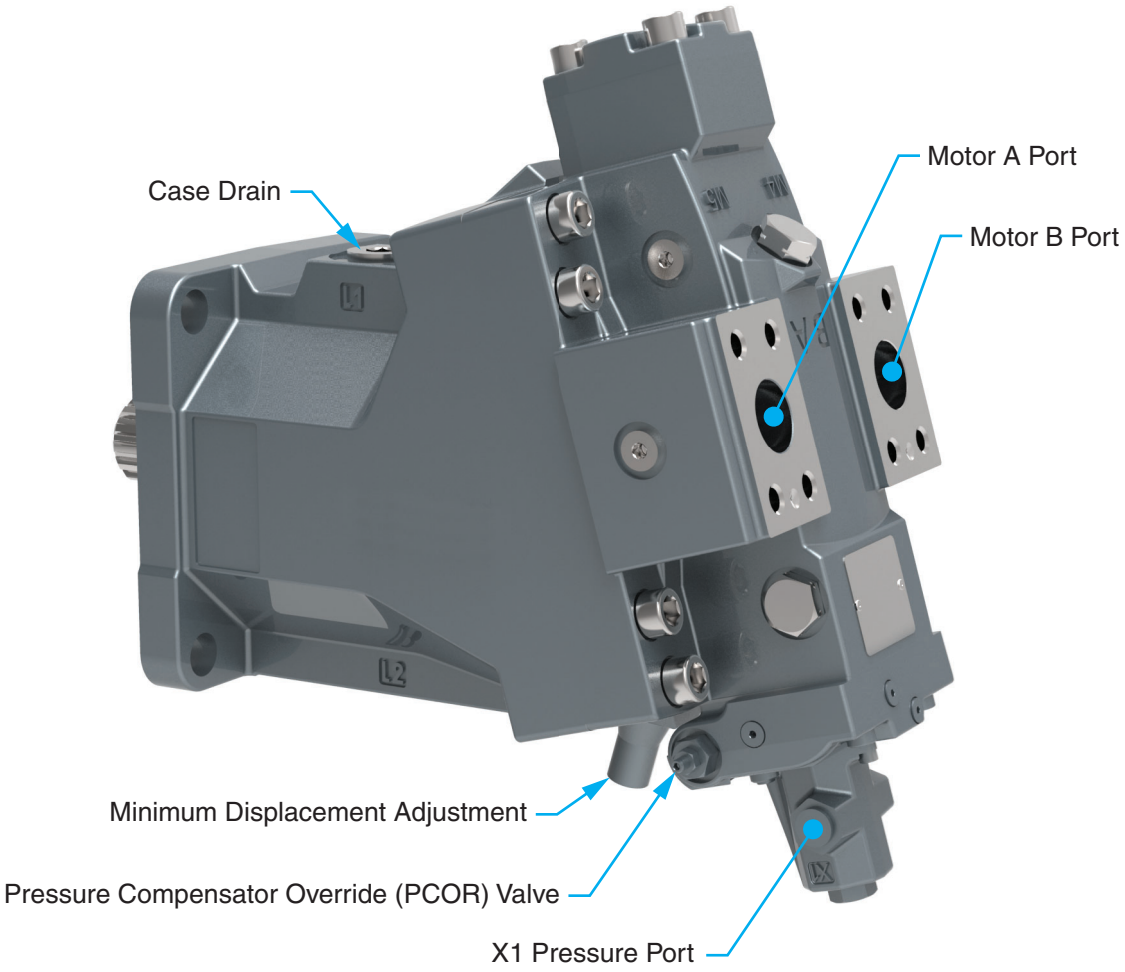
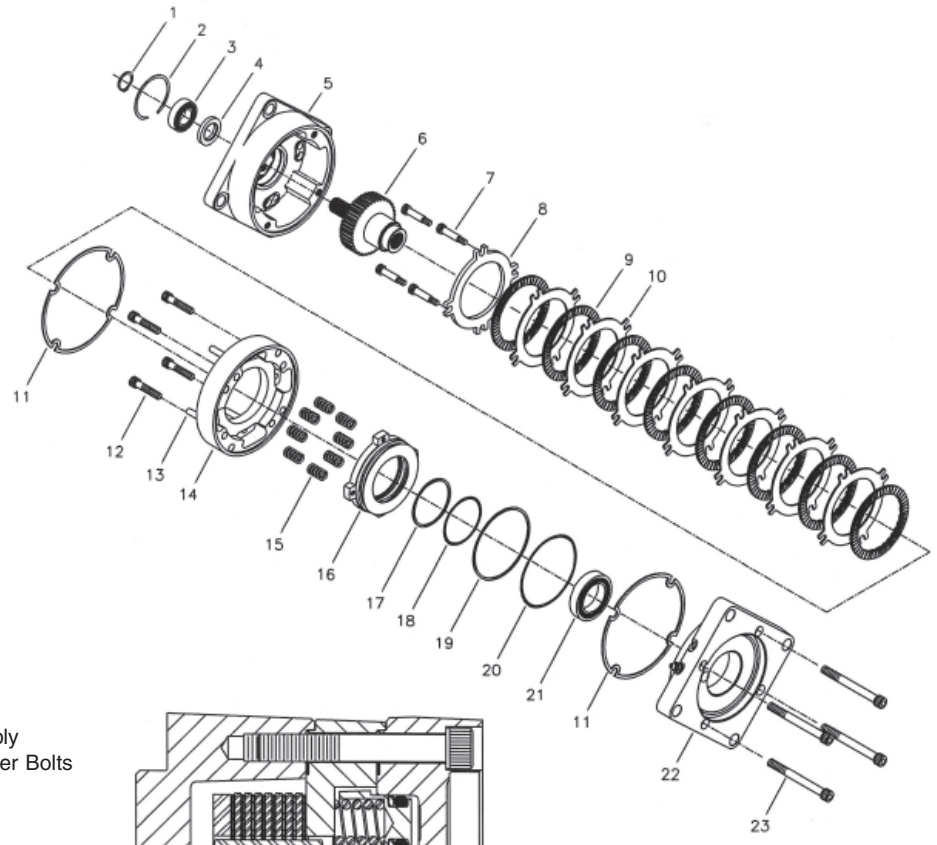


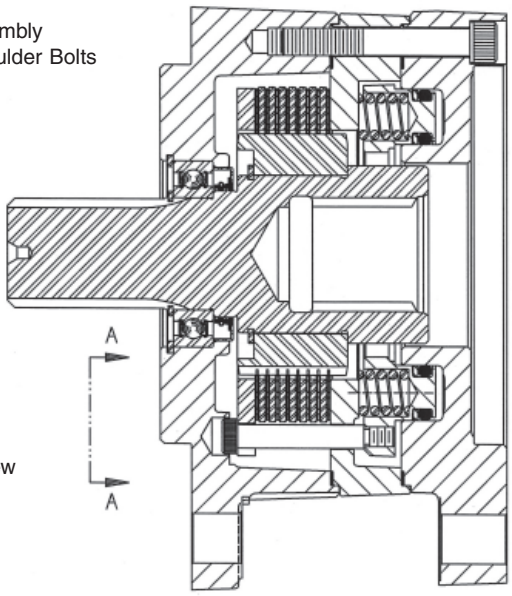
Figure 1-14 Hydraulic Motor

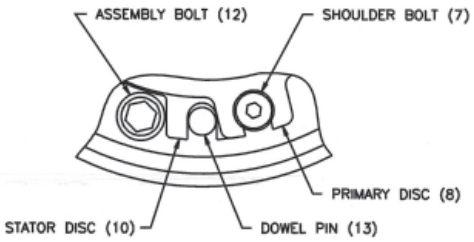
Motor (See Figure 1-14)

The hydraulic motor is a bent axis variable displacement motor. The default position of the motor is maximum displacement. Control pressure operates a servo that proportionally reduces motor displacement. At higher motor pressure, a pressure compensator override (PCOR) valve will shift the motor back to maximum displacement.



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. Pressure Plate
23. Socket Head Screw



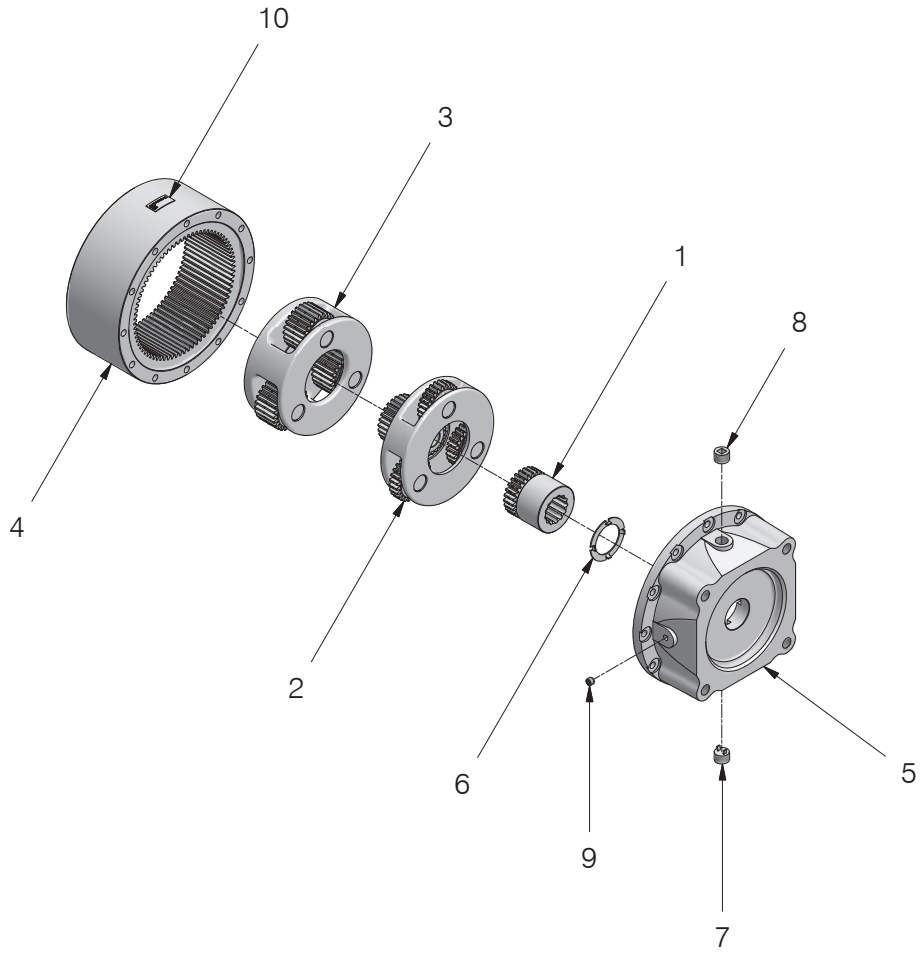


VIEW A-A
STACK ASSEMBLY
DETAIL

Figure 1-15 Brake

Brake (See Figure 1-15)

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 shaft.



1. Sun Gear
2. Primary Carrier Assembly
3. Secondary Carrier Assembly
4. Ring Gear
5. Cover
6. Thrust Washer
7. Fitting
8. Fitting
9. Fitting
10. Label

Figure 1-16 Planetary Reducer

Planetary Reducer (See Figure 1-16)

A two-stage planetary 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. Output shaft rotation is the same as input shaft rotation at a reduced speed.

Directional Manifold
Used on:
CAT D7E (C511)
John Deere 750/850K (E460)

CBR Manifold
Used on:
Komatsu D85X-15 (K50)

CBR Manifold
Used on:
Case 1650M/2050M (R42)
CAT 973D (C973)
John Deere 850L (E470)

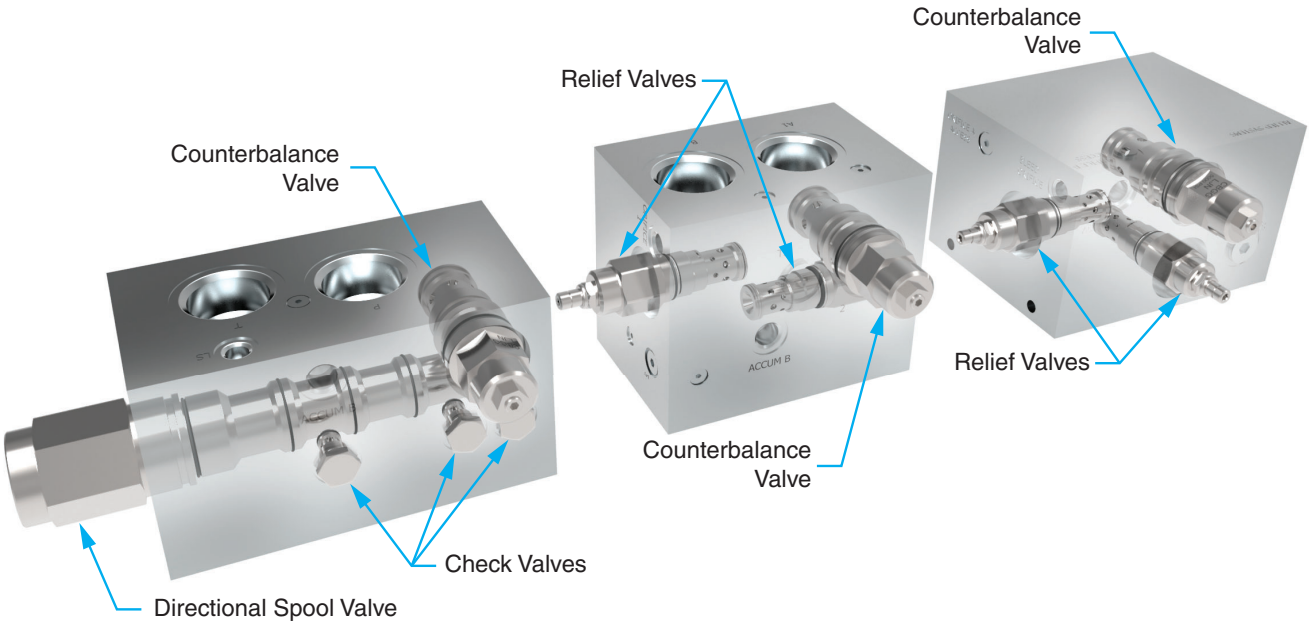


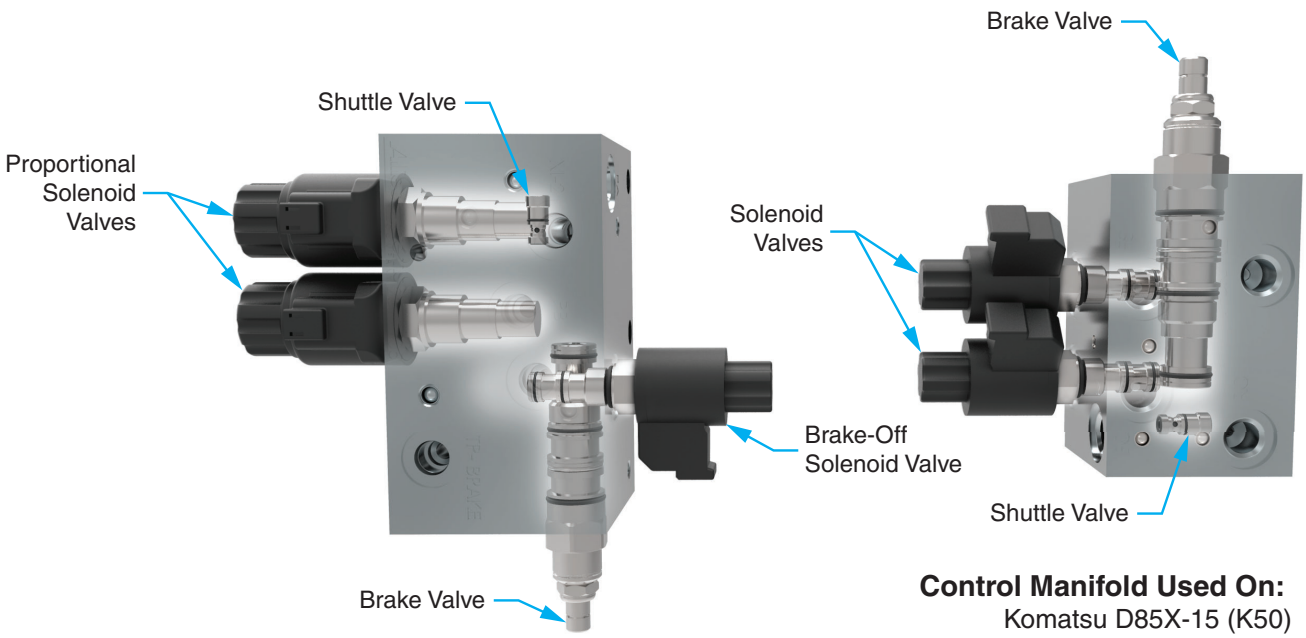
Figure 1-17 Directional and CBR Manifolds

Directional or CBR Manifold (See Figure 1-17)

Hydraulic oil between the dozer and the winch motor is directed through either a directional manifold, or a counterbalance relief (CBR) manifold.

The directional manifold houses the counterbalance valve and the direction control valve. 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. The counterbalance valve allows oil to free flow in the **LINE-IN** mode through a check valve. The directional control valve directs dozer supply oil to either motor port based on control pressure from either the control manifold or the control lever. Supply oil is directed to motor port A in **LINE-IN** mode and to motor port B in **LINE-OUT** mode.

The counterbalance relief (CBR) manifolds house a counterbalance valve and two high pressure relief 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. The counterbalance valve allows oil to free flow in the **LINE-IN** mode through a check valve. The high pressure relief valves act as an overload relief when supply pressure exceeds the setting of the valve.



Control Manifold Used On:
CAT D7E (C511)

Control Manifold Used On:
Komatsu D85X-15 (K50)
Case 1650M/2050M (R42)
John Deere 750/850K (E460)
John Deere 850L (E470)
CAT 973D (C973)

Figure 1-18 Control Manifolds

Control Manifold (See Figure 1-18)

The control manifold receives either electrical and/or pilot pressure signals from the operator's controls, and directs pilot pressure as necessary.

The CAT D7E control manifold uses proportional solenoid valves to direct pilot pressure to the directional manifold, to the control pressure port (**X1**) on the hydraulic motor, and to the parking brake. The **BRAKE-OFF** solenoid valve receives a signal from the control lever. When engaged, it directs pilot pressure to the **BRAKE-OFF** clutch.

The control manifold used on other applications receives pilot pressure signals from the ripper control lever, and subsequently directs pilot pressure to the control pressure port (**X1**) on the hydraulic motor and to the parking brake. The **BRAKE-OFF** solenoid valve receives a signal from a rocker switch, and when activated, directs pilot pressure to the **BRAKE-OFF** clutch. On units with 2-speed control, another switch activates the other solenoid valve to direct full pilot pressure to the control pressure port (**X1**) on the hydraulic motor.

Sequence of Operation

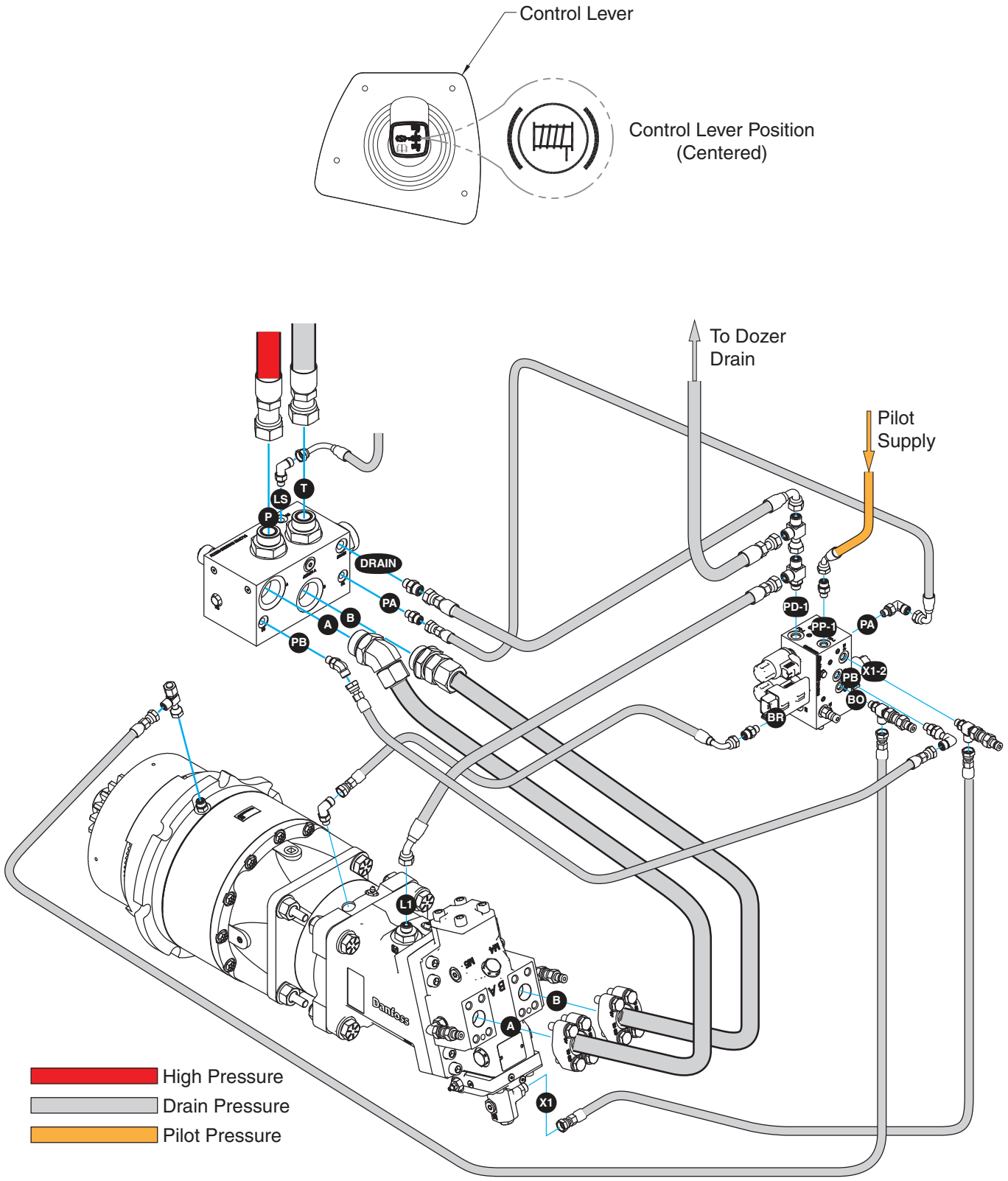


Figure 1-19 Sequence of Operation - BRAKE-ON, CAT D7E (C511)

Sequence of Operation - BRAKE-ON
CAT D7E (C511)

The directional control valve, inside the control manifold, is spring centered. In this position pump supply is blocked while motor ports A and B are open to tank. Pilot pressure is present at the control manifold. All control lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

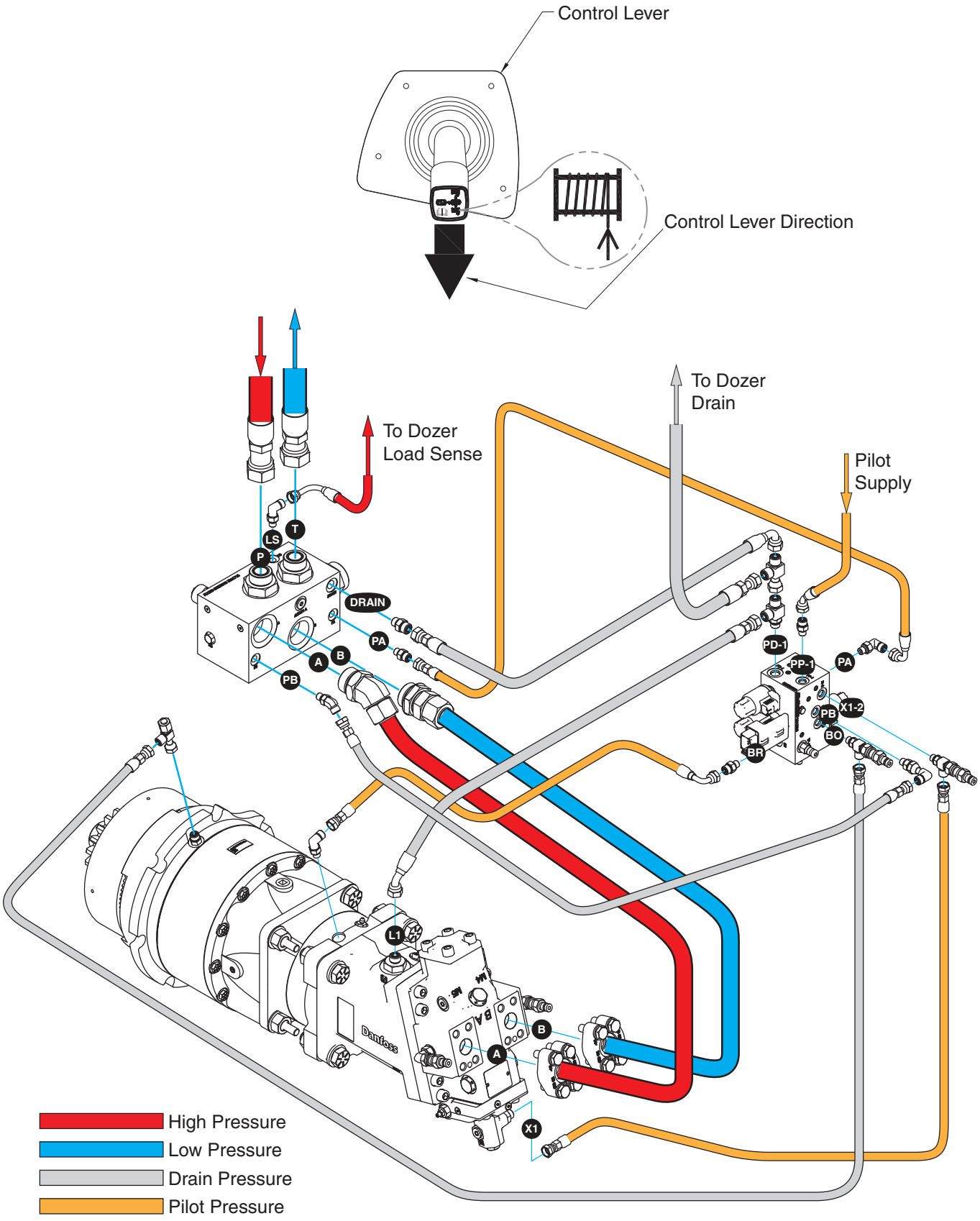


Figure 1-20 Sequence of Operation - LINE-IN, CAT D7E (C511)

Sequence of Operation - LINE-IN
CAT D7E (C511)

Pulling the control lever toward the operator commands the proportional solenoid to send control pressure to the directional control valve (PA), the brake release valve and the motor port X1. 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 direction 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.

Pilot pressure at motor X1 port is proportional to control lever position. When the pressure at X1 reaches a preset level, the motor servo reduces motor displacement to increase line speed. If working pressure increases to PCOR setting, the motor servo begins to increase displacement to prevent motor stall.

Maximum pressure to the winch is limited by the load sense relief valve in the directional manifold.

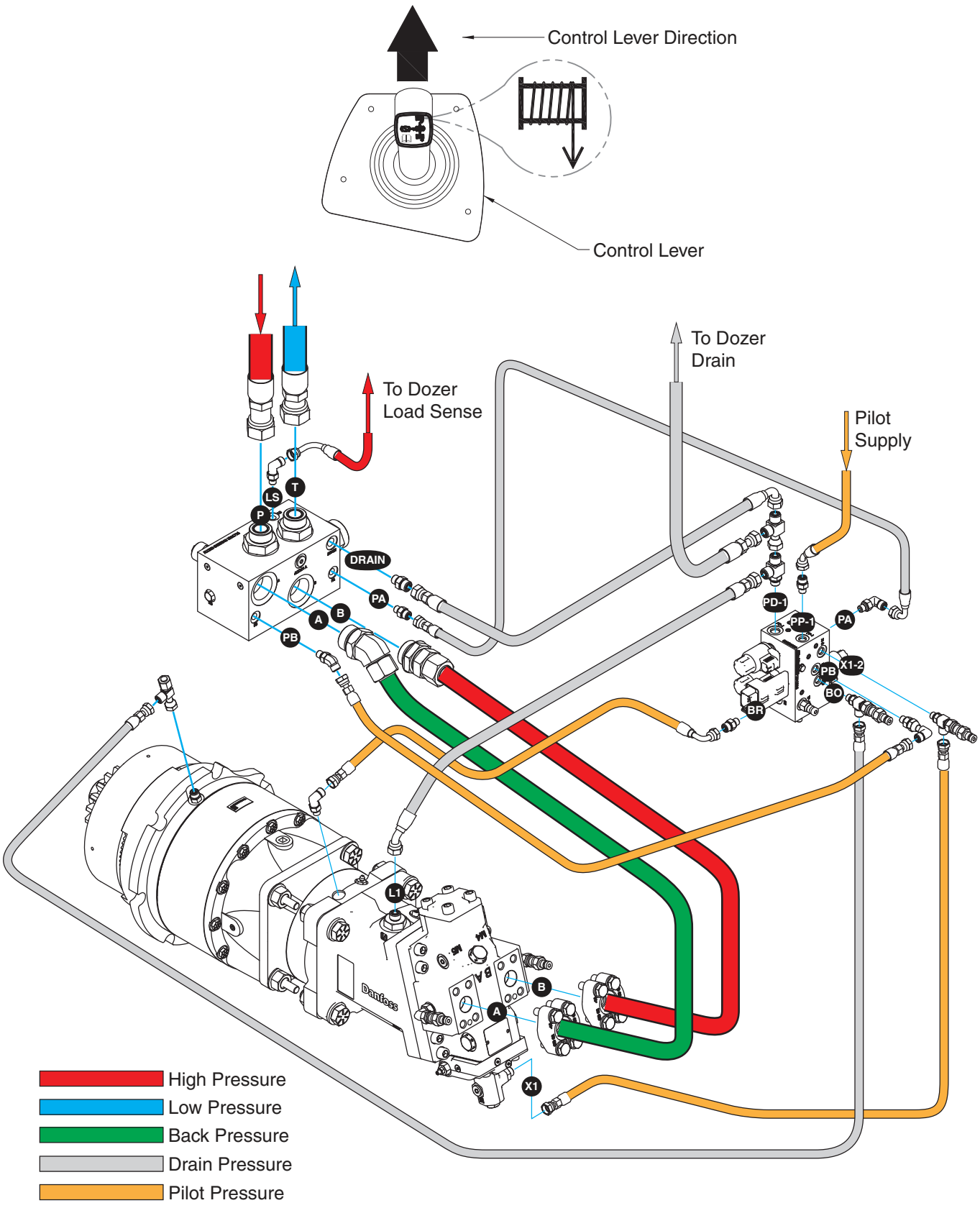


Figure 1-21 Sequence of Operation - LINE-OUT, CAT D7E (C511)

Sequence of Operation - LINE-OUT
CAT D7E (C511)

LINE-OUT operation is similar to **LINE-IN** except moving the control lever away from the operator directs pilot pressure to “PB” and shifts the directional valve so pump supply is sent to motor “B” port, and returns through “A” port. Brake release and motor speed control (X1) operate the same as in LINE-IN mode.

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

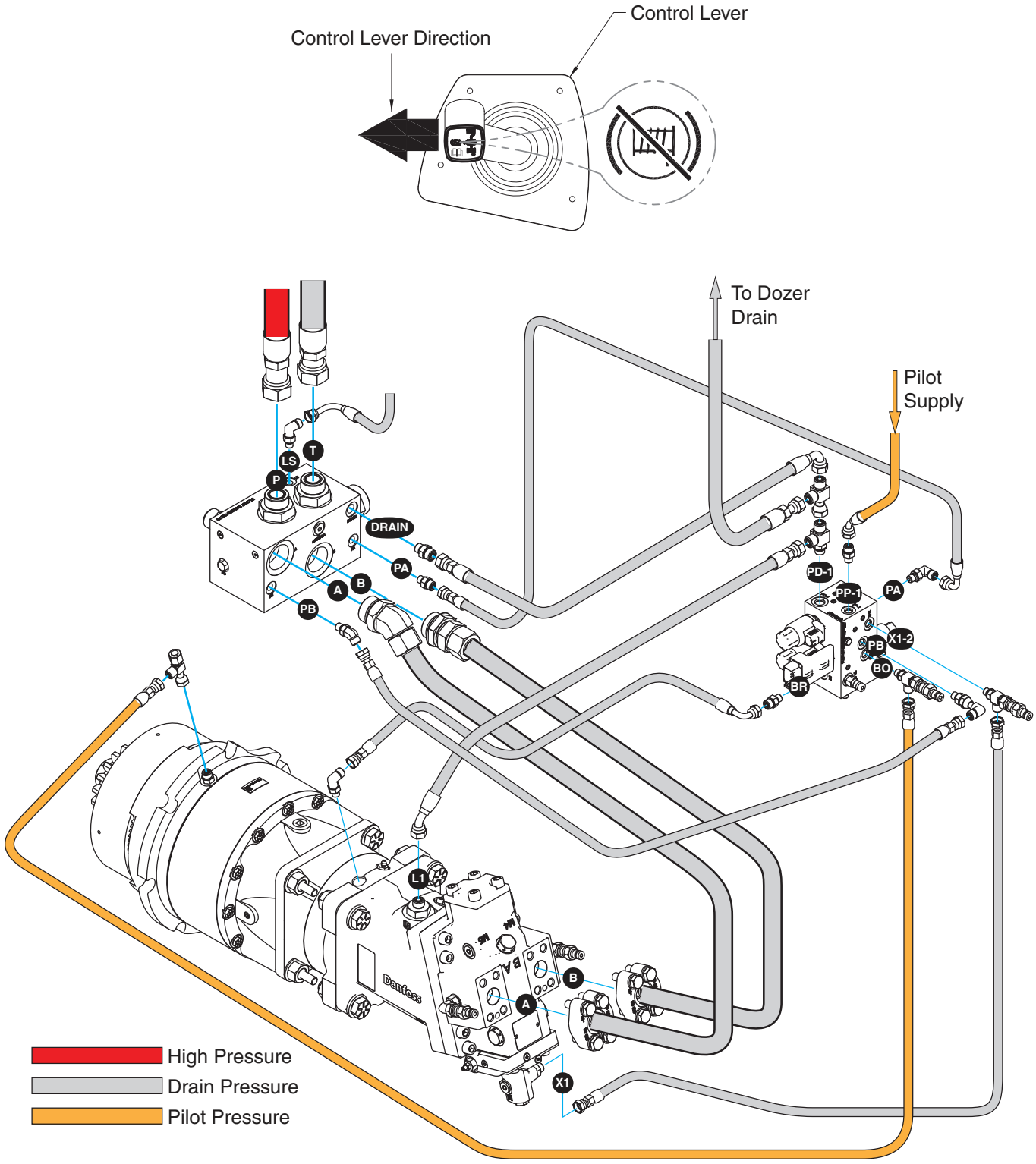


Figure 1-22 Sequence of Operation - BRAKE-OFF, CAT D7E (C511)

Sequence of Operation - BRAKE-OFF
CAT D7E (C511)

BRAKE-OFF is activated by moving the control lever to the left. An electric signal shifts the **BRAKE-OFF** solenoid valve directing pilot pressure to release the spring applied, brake-off clutch.

⚠ WARNING

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

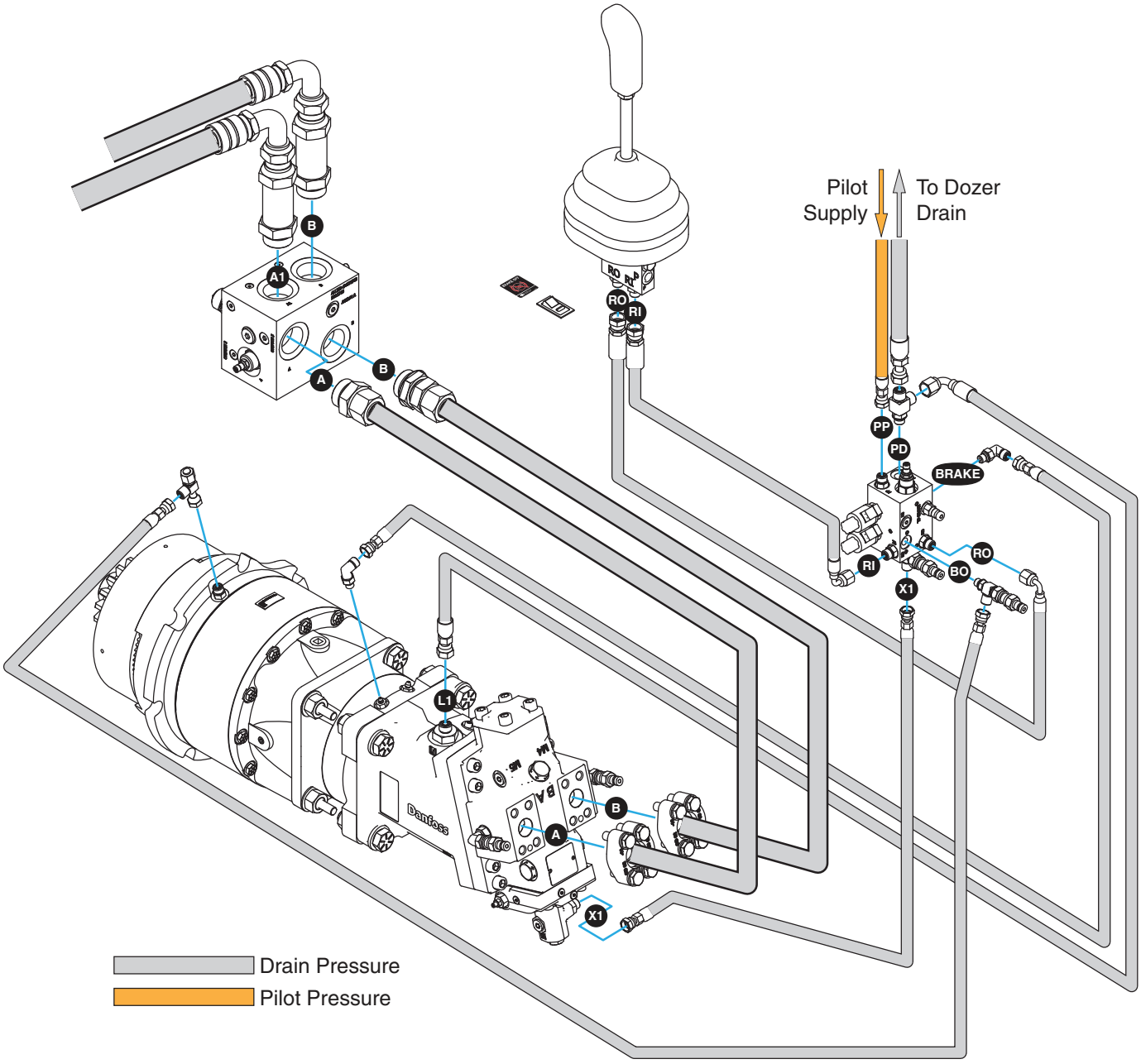


Figure 1-23 Sequence of Operation - BRAKE-ON, Komatsu D85X-15 (K50)

Sequence of Operation - BRAKE-ON Komatsu D85X-15 (K50)

Pilot pressure is present at the control manifold. All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

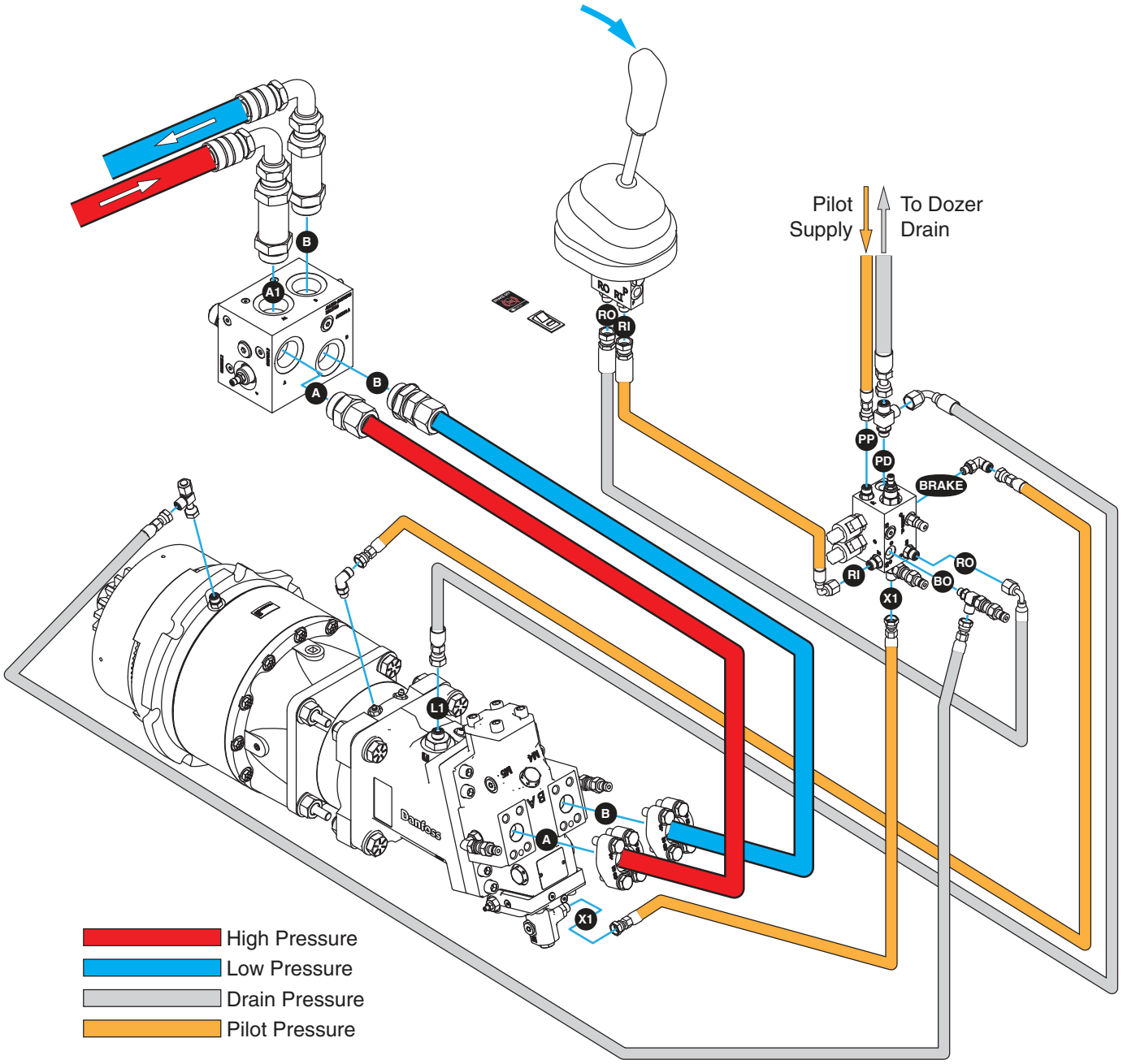


Figure 1-24 Sequence of Operation - LINE-IN, Komatsu D85X-15 (K50)

Sequence of Operation - LINE-IN Komatsu D85X-15 (K50)

Pulling the control lever toward the operator sends pilot control pressure to the directional control valve in the tractor ripper valve, and to the "RI" port on the control manifold.

Oil flows from the pump supply to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch. Oil flows through the motor, back 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.

Pilot pressure at motor X1 port is proportional to control lever position. When the pressure at X1 reaches a preset level, the motor servo reduces motor displacement to increase line speed. If working pressure increases to PCOR setting, the motor servo begins to increase displacement to prevent motor stall.

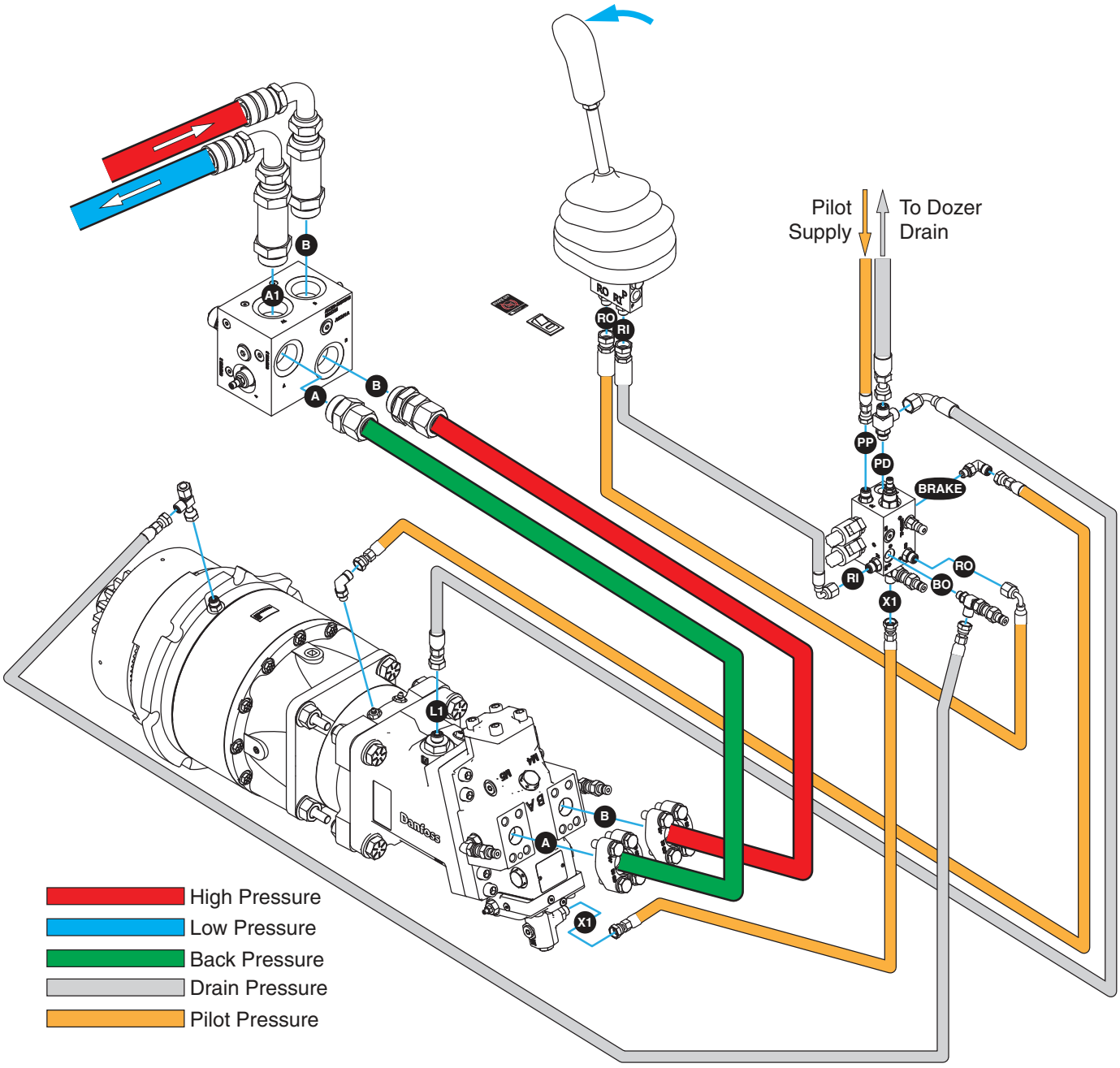


Figure 1-25 Sequence of Operation - LINE-OUT, Komatsu D85X-15 (K50)

Sequence of Operation - LINE-OUT
Komatsu D85X-15 (K50)

LINE-OUT operation is similar to **LINE-IN** except moving the control lever away from the operator directs pilot pressure to “RO” and shifts the directional valve so pump supply is sent to motor “B” port, and returns through “A” port. Brake release and motor speed control (X1) operate the same as in LINE-IN mode.

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

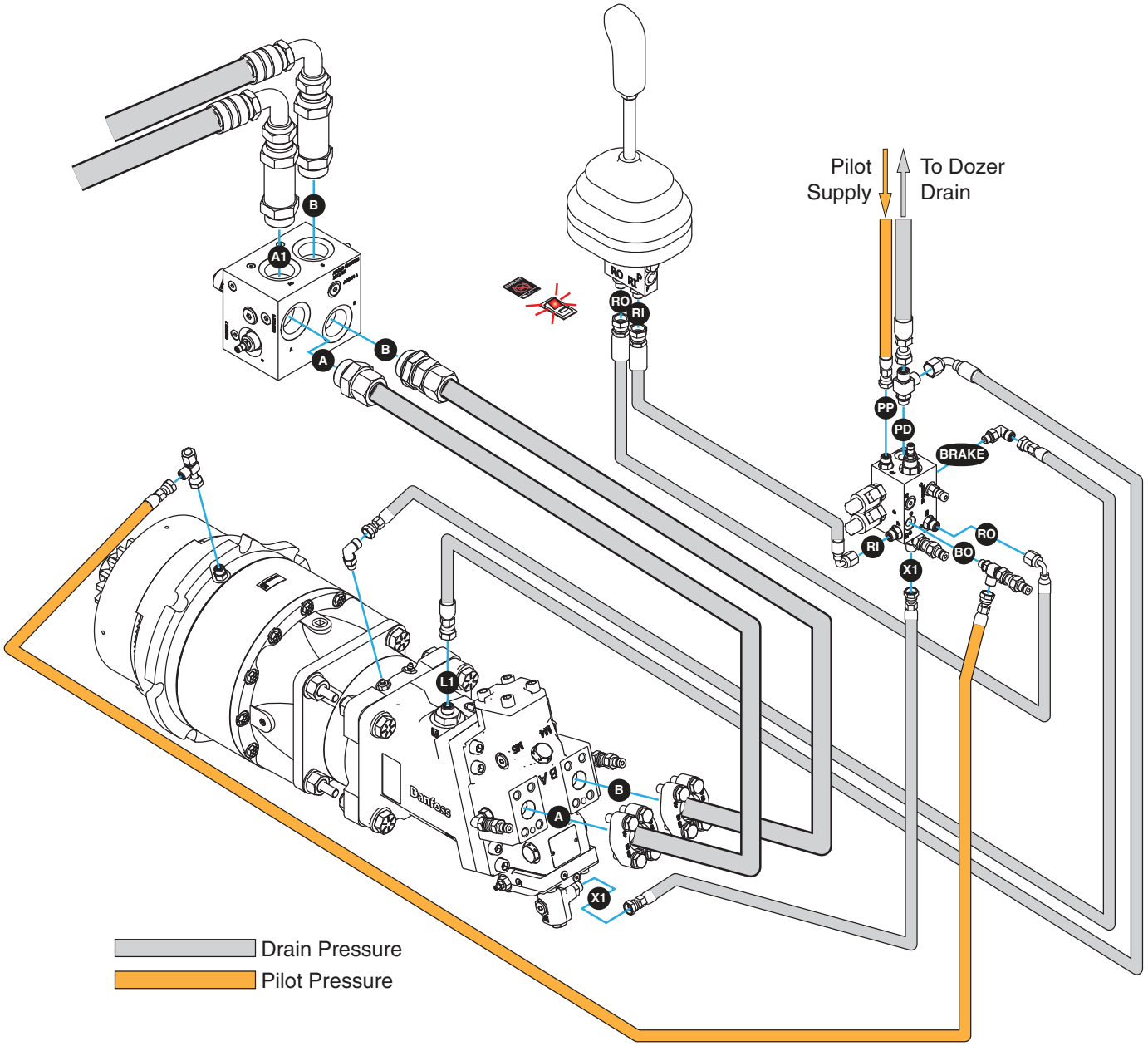


Figure 1-26 Sequence of Operation - BRAKE-OFF, Komatsu D85X-15 (K50)

Sequence of Operation - BRAKE-OFF Komatsu D85X-15 (K50)

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

⚠ WARNING

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

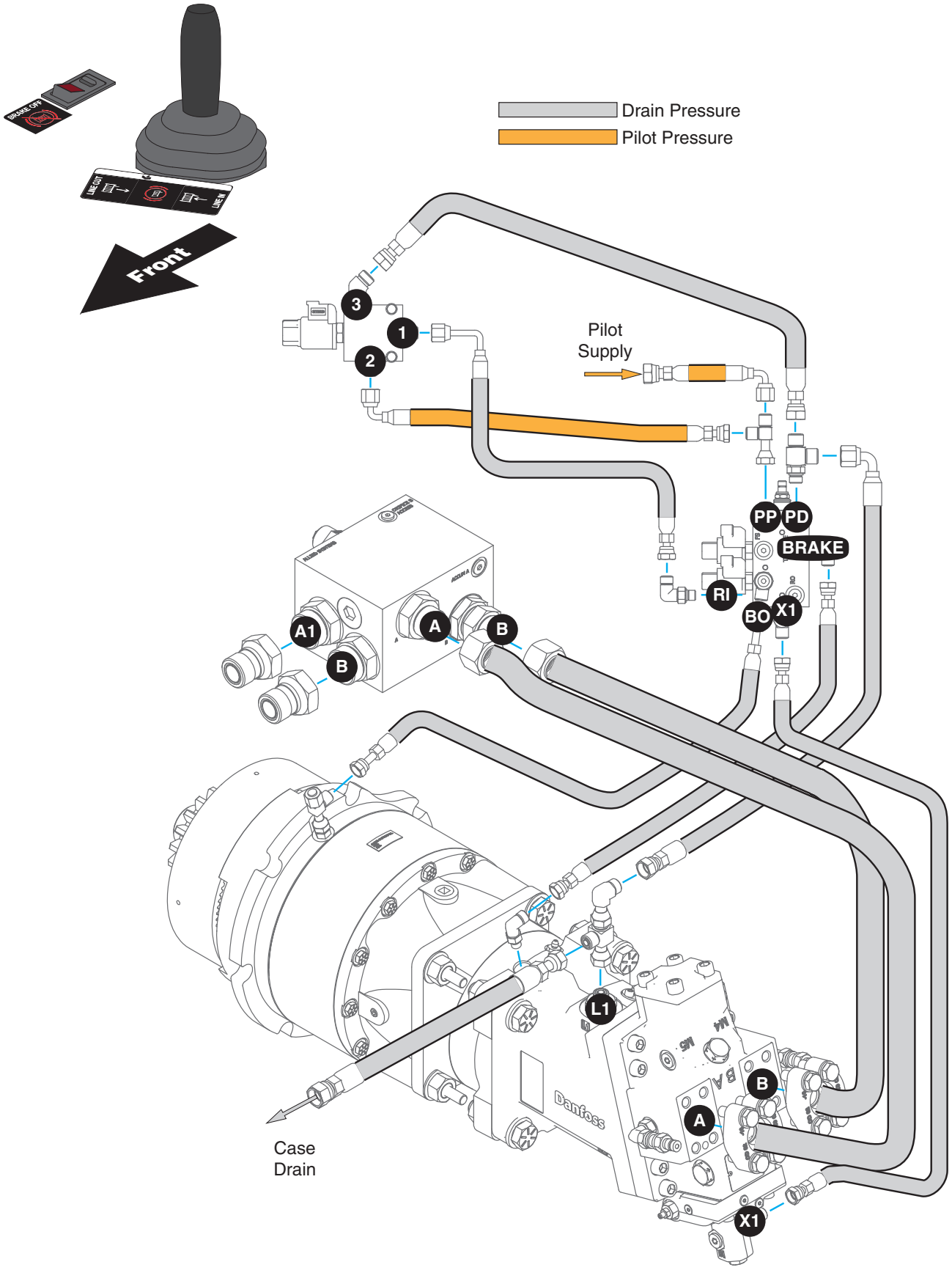


Figure 1-27 Sequence of Operation - BRAKE-ON, Case 1650M/2050M (R42)

Sequence of Operation - BRAKE-ON
Case 1650M/2050M (R42)

Pilot pressure is present at the control manifold. All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

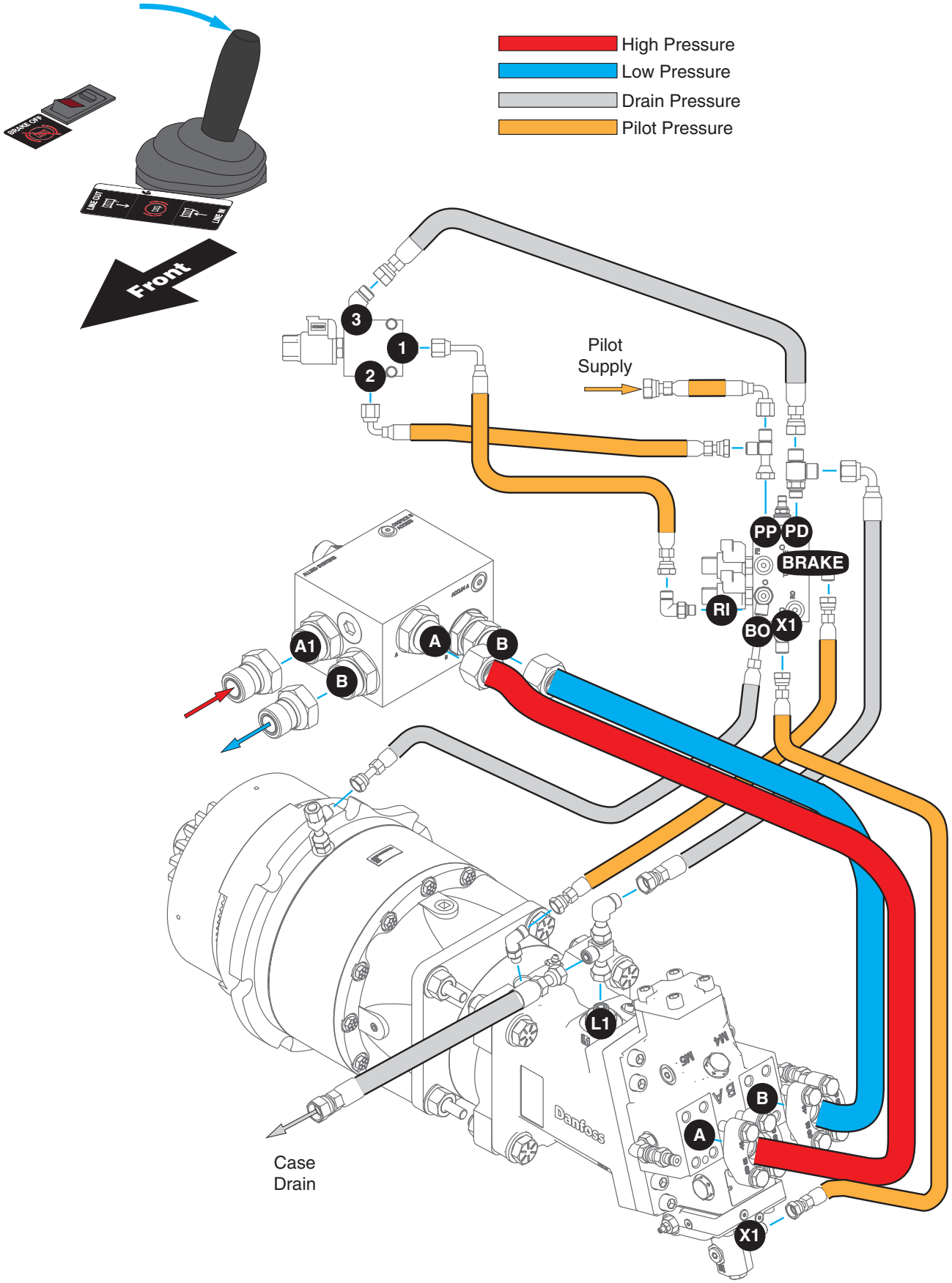


Figure 1-28 Sequence of Operation - LINE-IN, Case 1650M/2050M (R42)

Sequence of Operation - LINE-IN
Case 1650M/2050M (R42)

Pulling the control lever toward the operator sends pilot control pressure to the directional control valve in the tractor ripper valve, and to the "RI" port on the control manifold.

Oil flows from the pump supply to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch. Oil flows through the motor, back 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.

Pilot pressure at motor X1 port is proportional to control lever position. When the pressure at X1 reaches a preset level, the motor servo reduces motor displacement to increase line speed. If working pressure increases to PCOR setting, the motor servo begins to increase displacement to prevent motor stall.

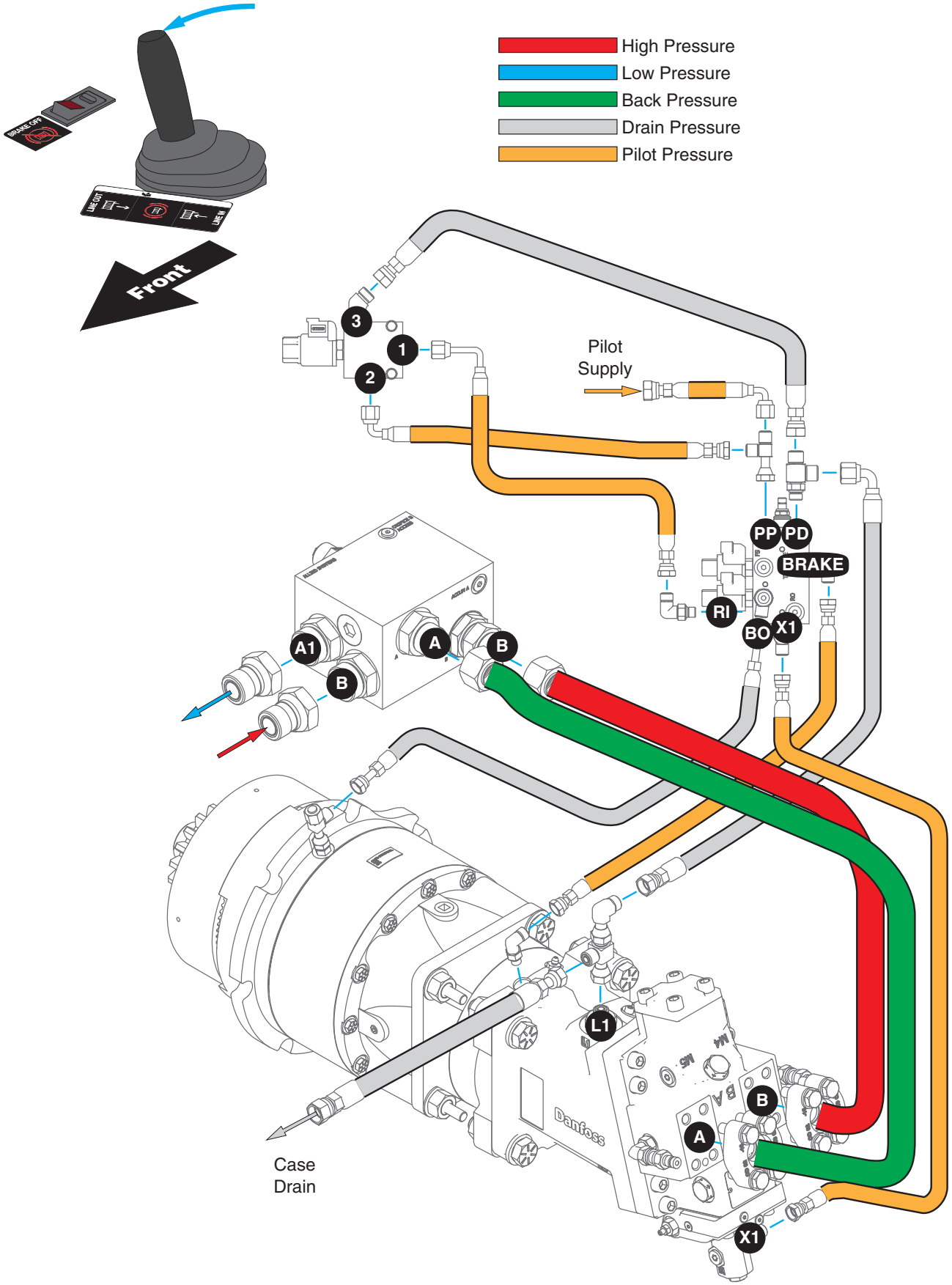


Figure 1-29 Sequence of Operation - LINE-OUT, Case 1650M/2050M (R42)

Sequence of Operation - LINE-OUT
Case 1650M/2050M (R42)

LINE-OUT operation is similar to **LINE-IN** except moving the control lever away from the operator shifts the directional valve so pump supply is sent to motor “B” port, and returns through “A” port. Brake release and motor speed control (X1) operate the same as in LINE-IN mode.

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

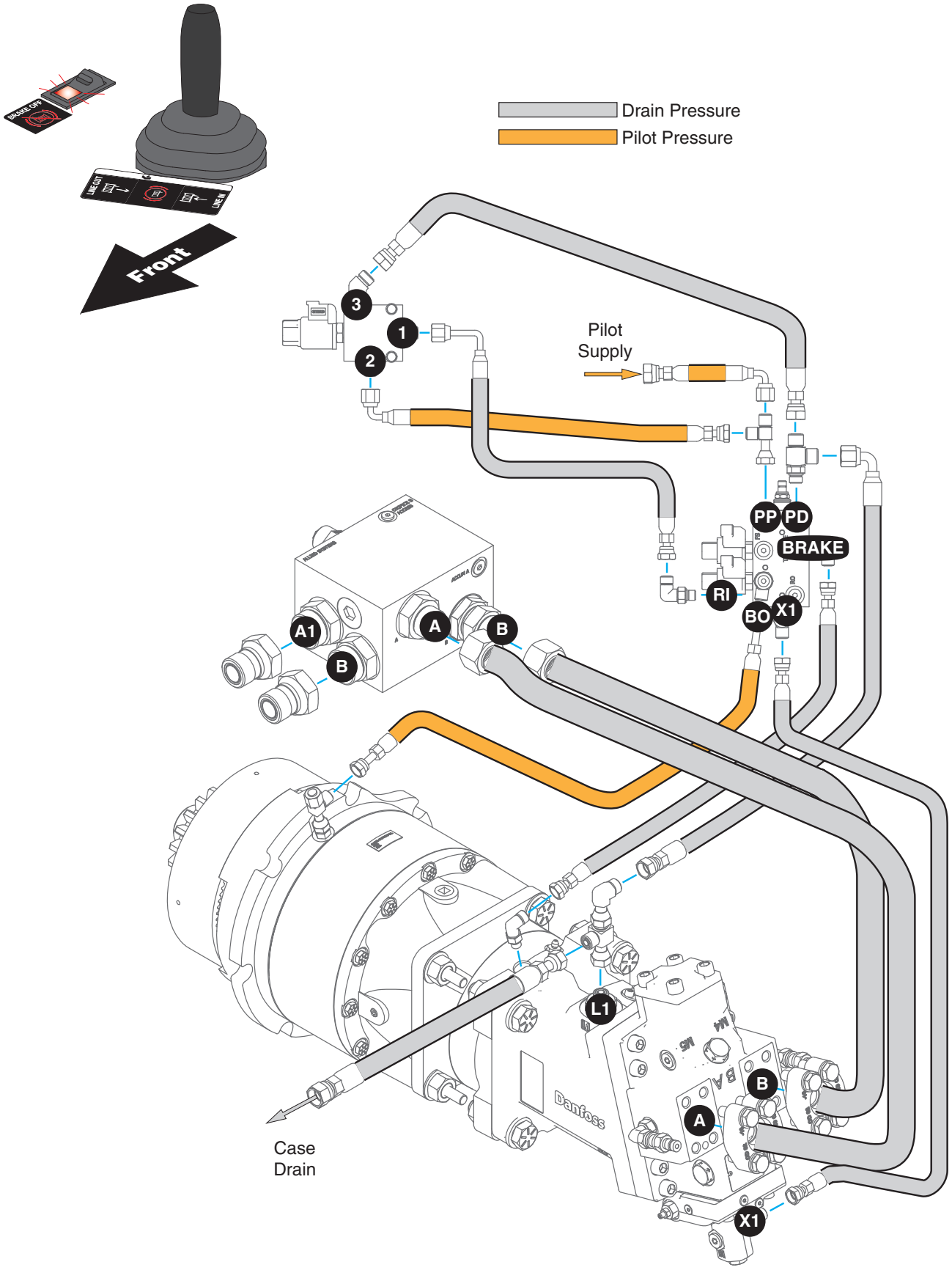


Figure 1-30 Sequence of Operation - BRAKE-OFF, Case 1650M/2050M (R42)

Sequence of Operation - BRAKE-OFF
Case 1650M/2050M (R42)

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

⚠ WARNING

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

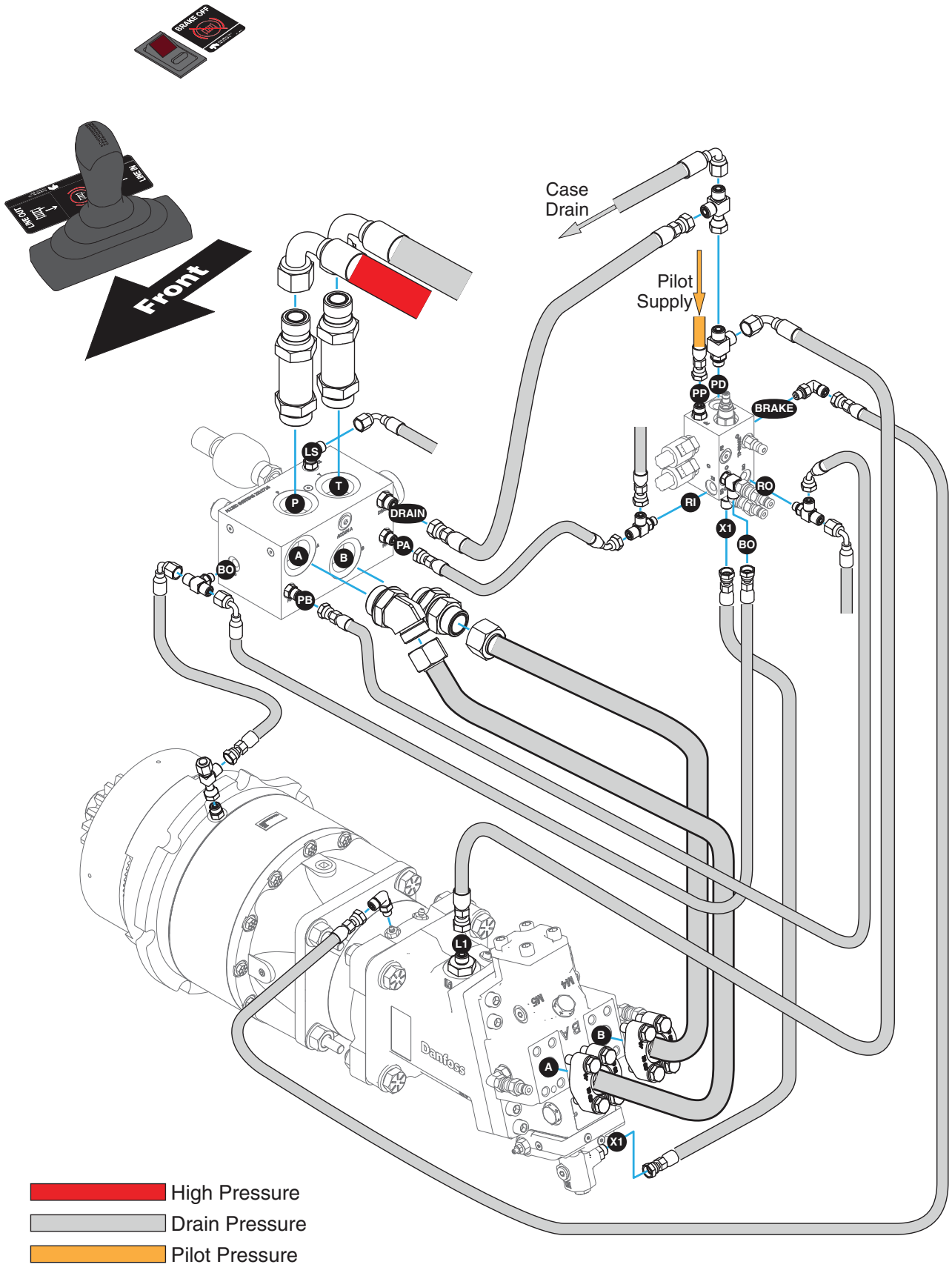


Figure 1-31 Sequence of Operation - BRAKE-ON, John Deere 750K/850K (E460)

Sequence of Operation - BRAKE-ON
John Deere 750K/850K (E460)

Pilot pressure is present at the control manifold. All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

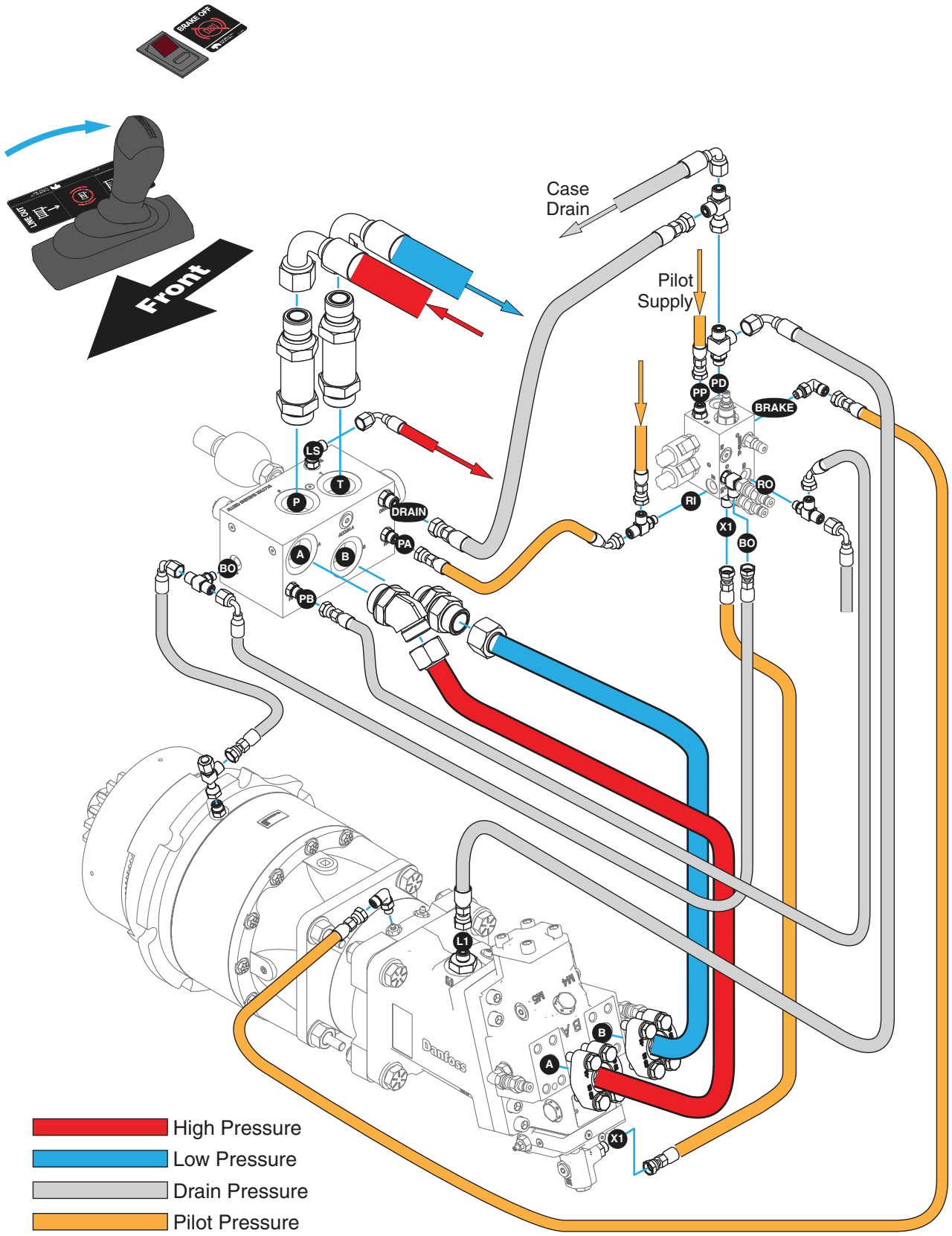


Figure 1-32 Sequence of Operation - LINE-IN, John Deere 750K/850K (E460)

Sequence of Operation - LINE-IN
John Deere 750K/850K (E460)

Pulling the control lever toward the operator sends pilot control pressure to the directional control manifold port "PA", and to the "RI" port on the control manifold. 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 direction 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.

Pilot pressure at motor X1 port is proportional to control lever position. When the pressure at X1 reaches a preset level, the motor servo reduces motor displacement to increase line speed. If working pressure increases to PCOR setting, the motor servo begins to increase displacement to prevent motor stall.

Maximum pressure to the winch is limited by the load sense relief valve in the directional manifold.

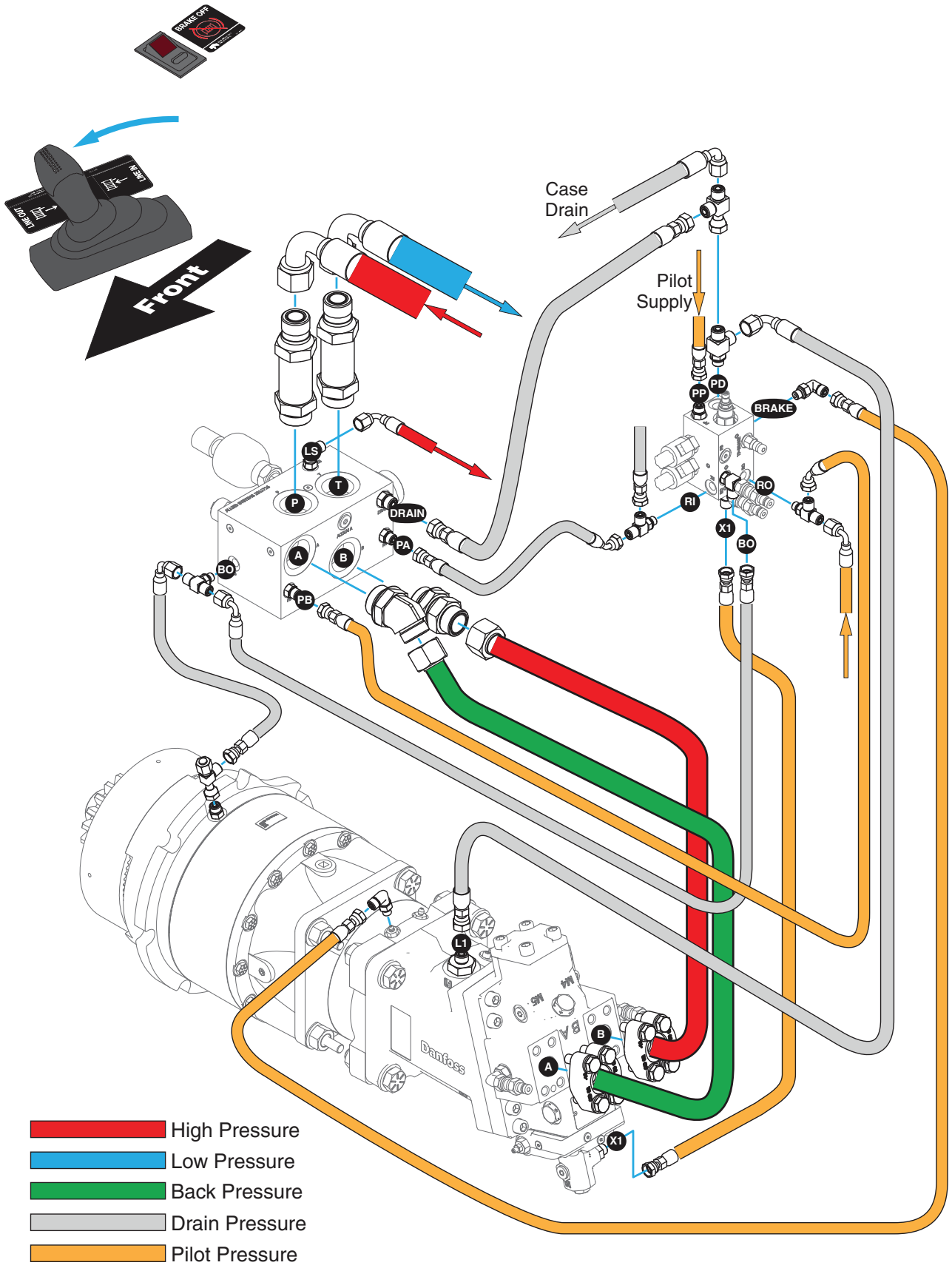


Figure 1-33 Sequence of Operation - LINE-OUT, John Deere 750K/850K (E460)

Sequence of Operation - LINE-OUT
John Deere 750K/850K (E460)

LINE-OUT operation is similar to **LINE-IN** except moving the control lever away from the operator directs pilot pressure to “PB” and shifts the directional valve so pump supply is sent to motor “B” port, and returns through “A” port. Brake release and motor speed control (X1) operate the same as in LINE-IN mode.

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

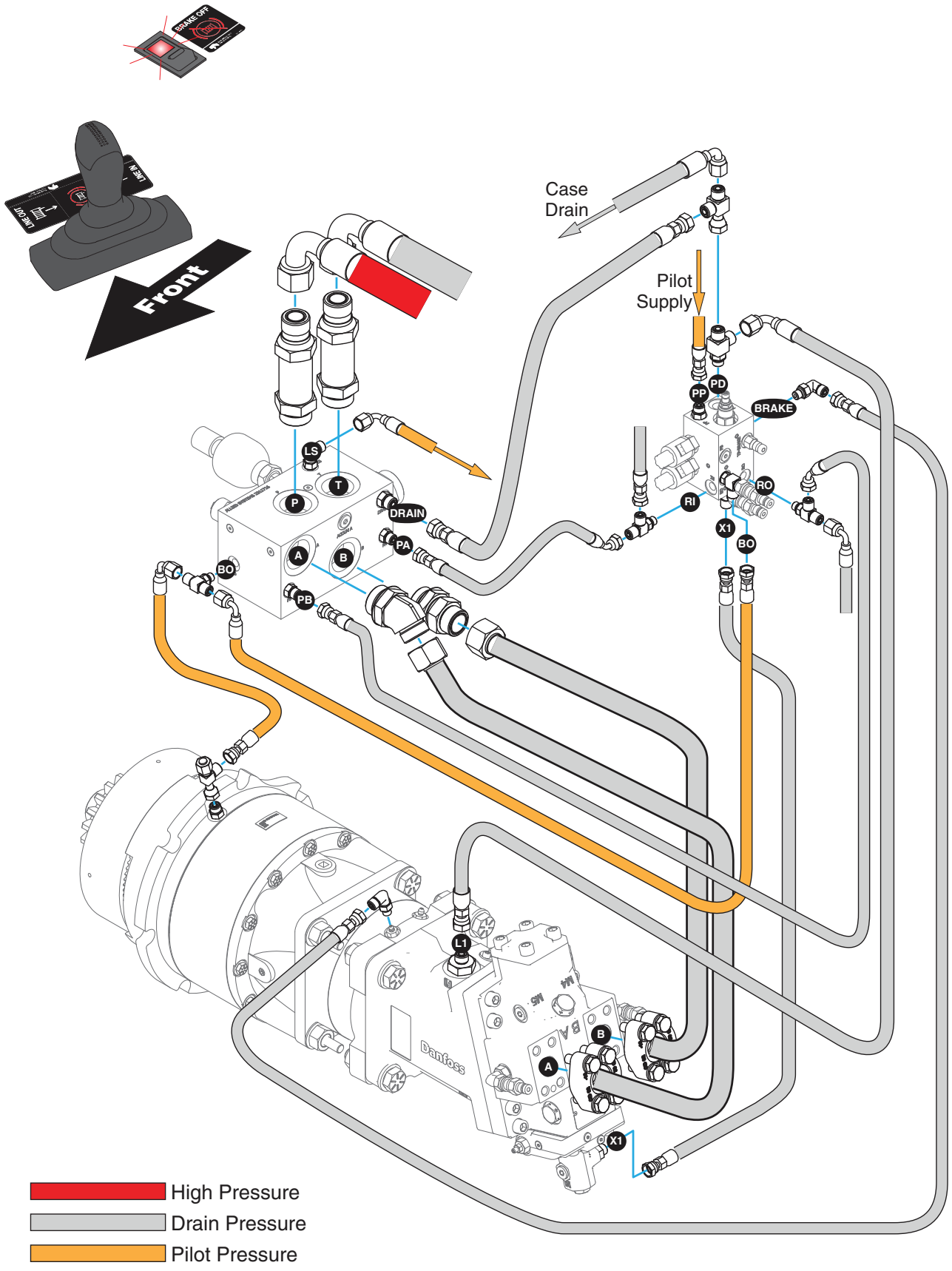


Figure 1-34 Sequence of Operation - BRAKE-OFF, John Deere 750K/850K (E460)

Sequence of Operation - BRAKE-OFF
John Deere 750K/850K (E460)

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

⚠ WARNING

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

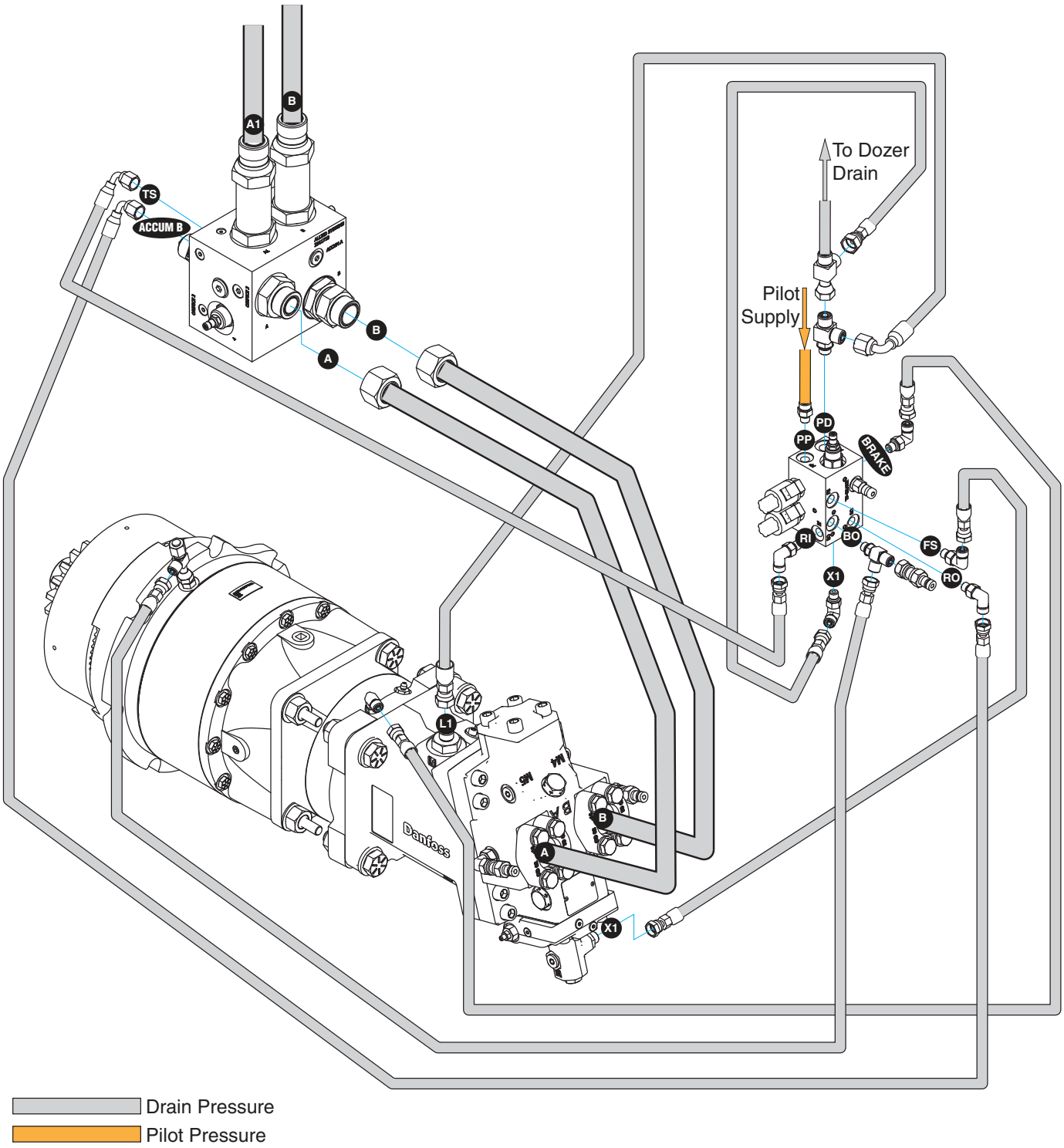


Figure 1-35 Sequence of Operation - BRAKE-ON John Deere 850L (E470)

Sequence of Operation - BRAKE-ON
John Deere 850L (E470)

Pilot pressure is present at the control manifold. All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

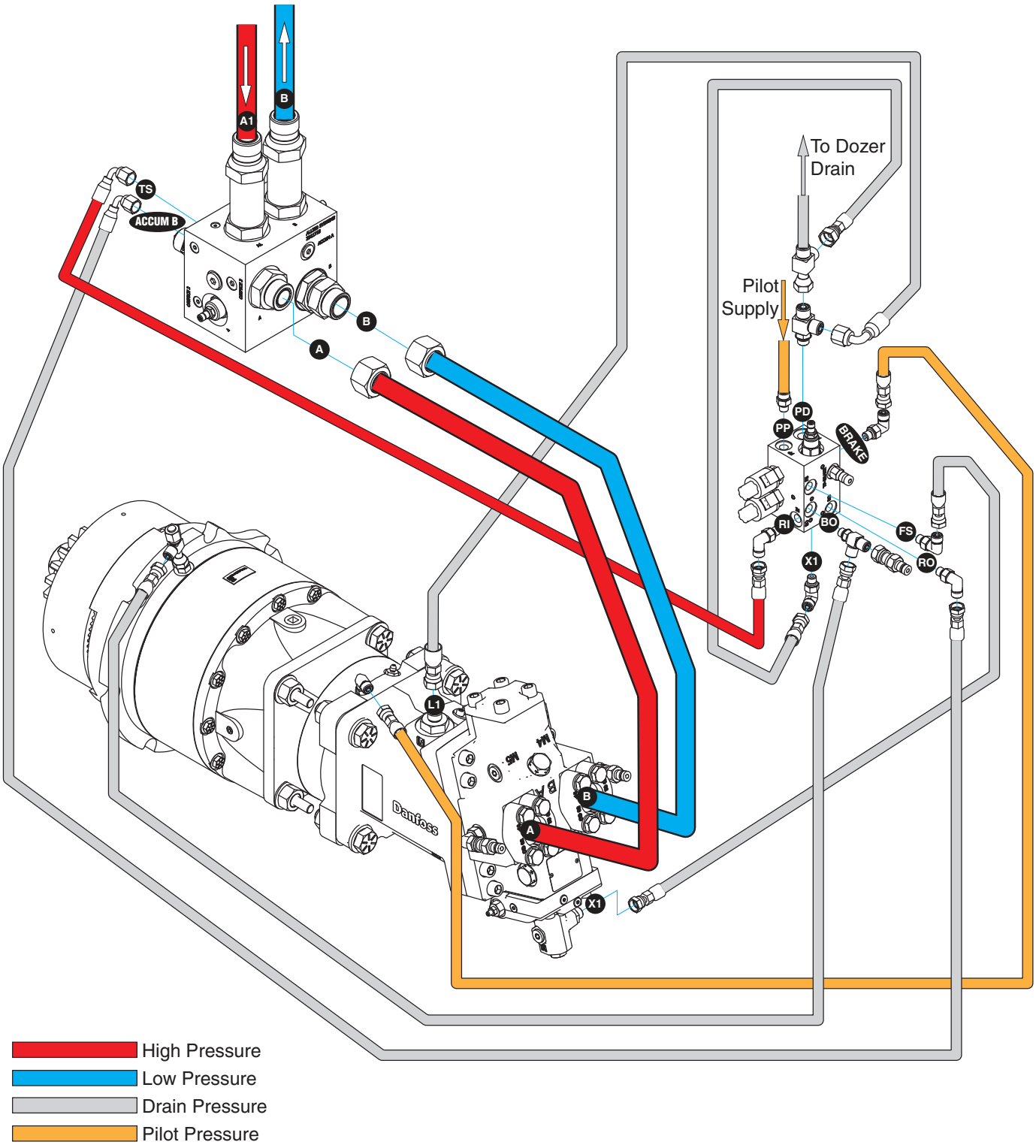


Figure 1-36 Sequence of Operation - LINE-IN, John Deere 850L (E470)

Sequence of Operation - LINE-IN
John Deere 850L (E470)

Pulling the control lever toward the operator sends full supply pressure to the CBR manifold port "A1". Oil flows through a check valve in the counterbalance valve cartridge, and continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch. Simultaneously, full supply pressure is sent to the control manifold, which then sends pilot supply pressure to the brake release port, and the brake is fully released. Oil flows through the motor, back through the CBR manifold and to the tractor reservoir.

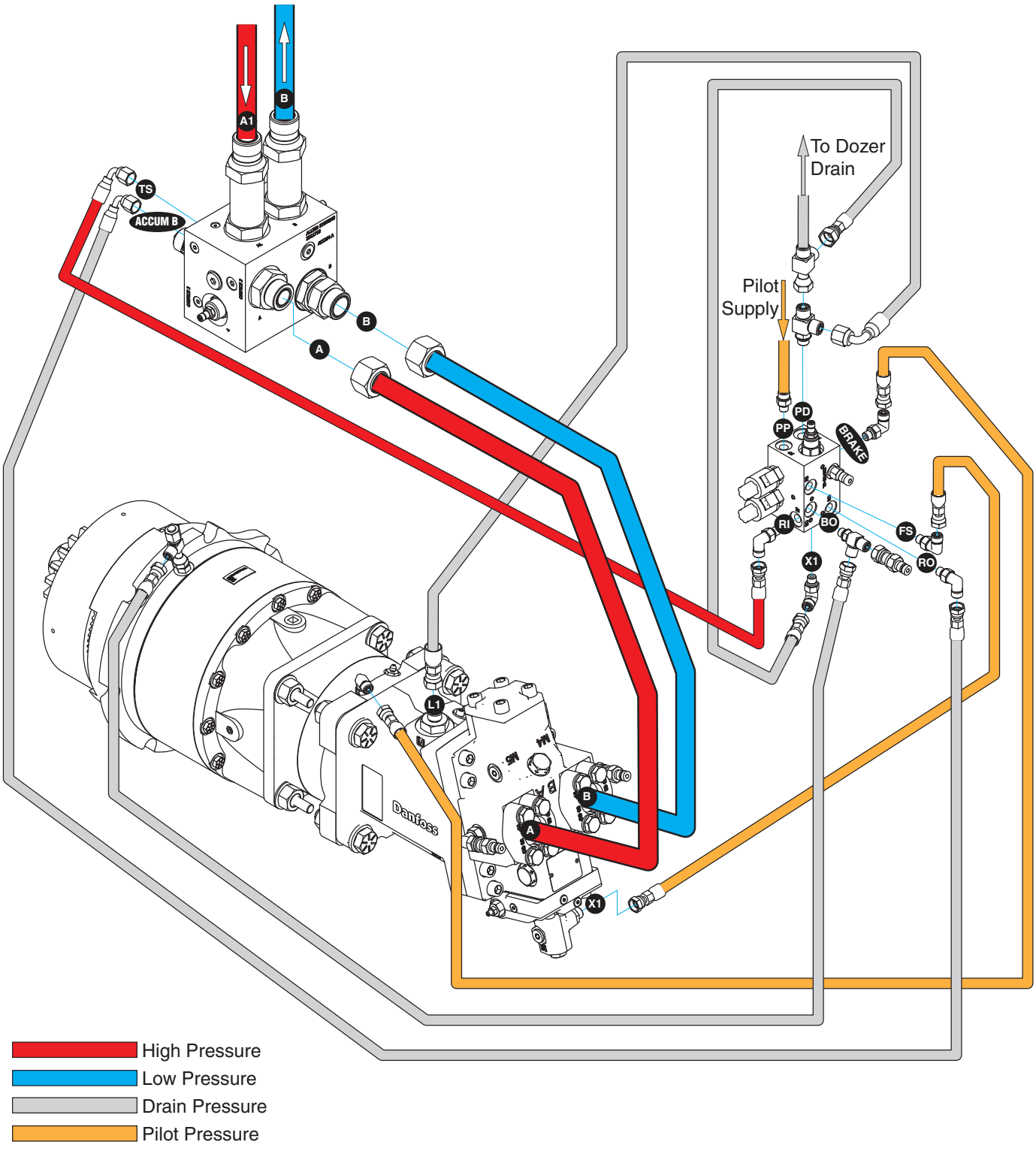


Figure 1-37 Sequence of Operation - LINE-IN with HI-SPEED, John Deere 850L (E470)

Sequence of Operation - LINE-IN with HI-SPEED
John Deere 850L (E470)

If the **HI-SPEED** switch is activated during **LINE-IN**, full pilot pressure is sent to the X1 port on the hydraulic motor. This reduces displacement in the motor to the minimum setting, increasing line speed.

If working pressure increases to the PCOR setting, the motor servo begins to increase displacement to prevent motor stall.

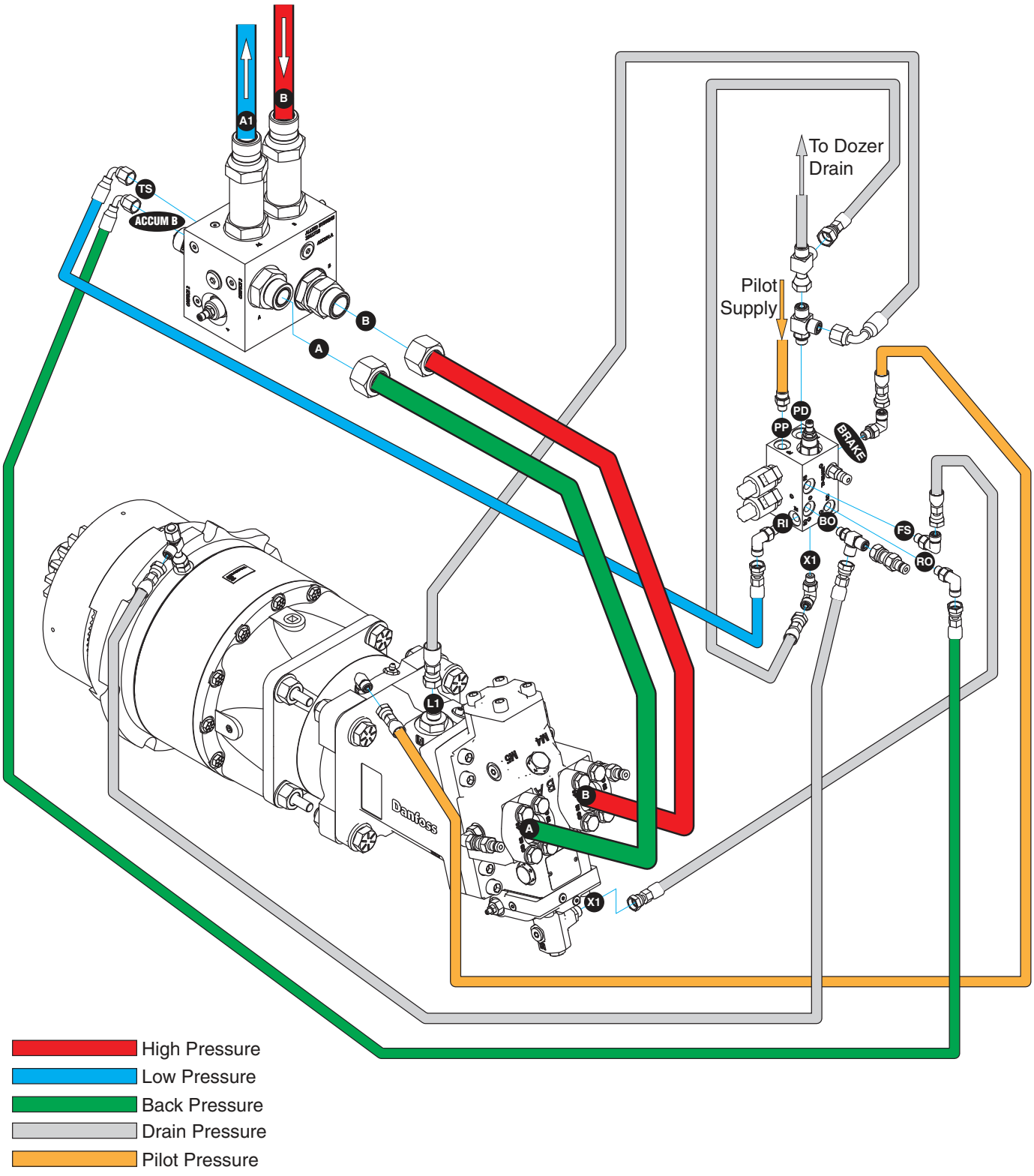


Figure 1-38 Sequence of Operation - LINE-OUT, John Deere 850L (E470)

Sequence of Operation - LINE-OUT
John Deere 850L (E470)

LINE-OUT operation is similar to **LINE-IN** except moving the control lever away from the operator directs back pressure to “RO” and full supply pressure is sent to motor “B” port, and returns through “A” port. Brake release operates the same as in LINE-IN mode.

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

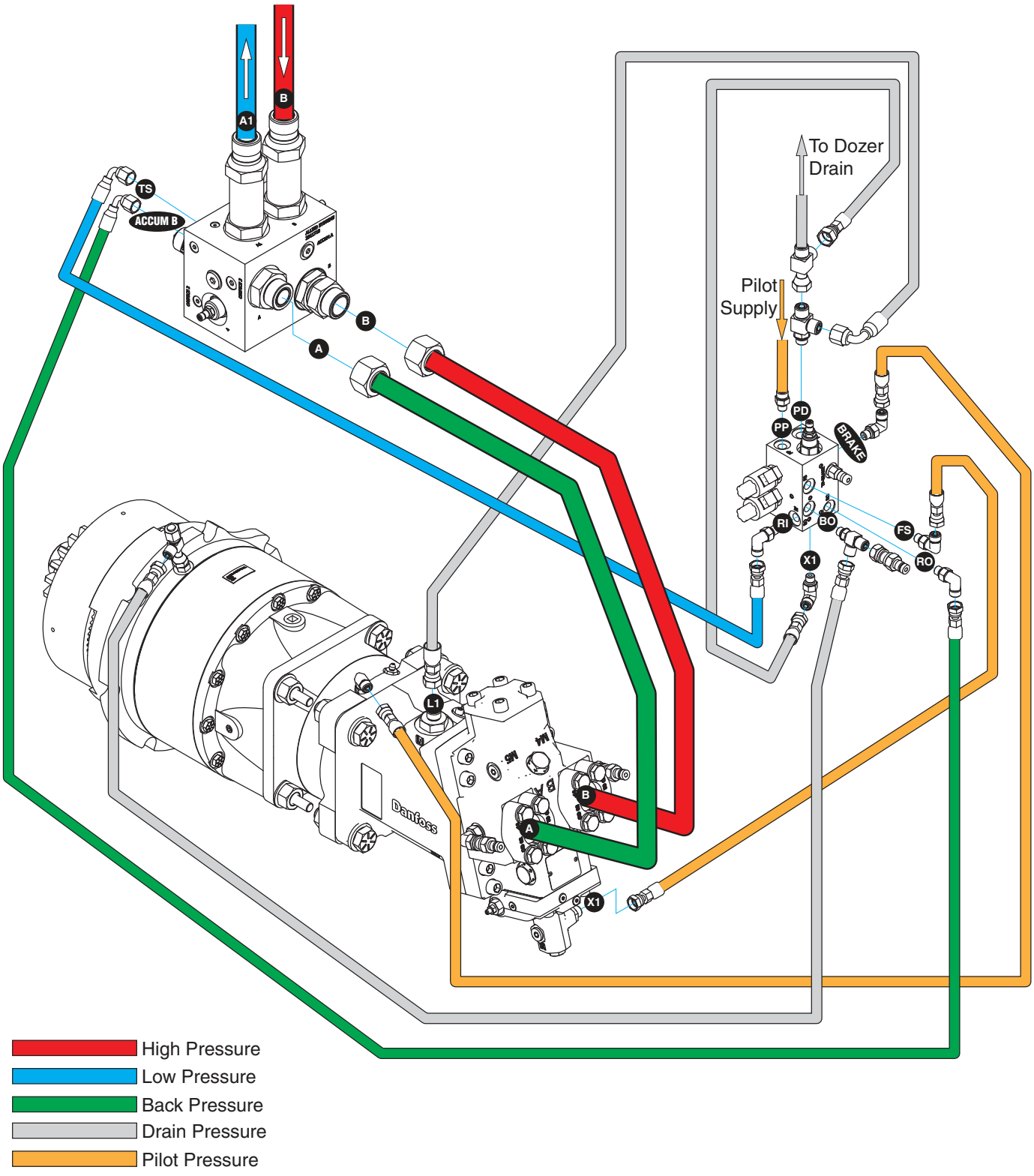


Figure 1-39 Sequence of Operation - LINE-OUT with HI-SPEED, John Deere 850L (E470)

Sequence of Operation - LINE-OUT with HI-SPEED John Deere 850L (E470)

If the **HI-SPEED** switch is activated during **LINE-OUT**, full pilot pressure is sent to the X1 port on the hydraulic motor. This reduces displacement in the motor to the minimum setting, increasing line speed.

If working pressure increases to the PCOR setting, the motor servo begins to increase displacement to prevent motor stall.

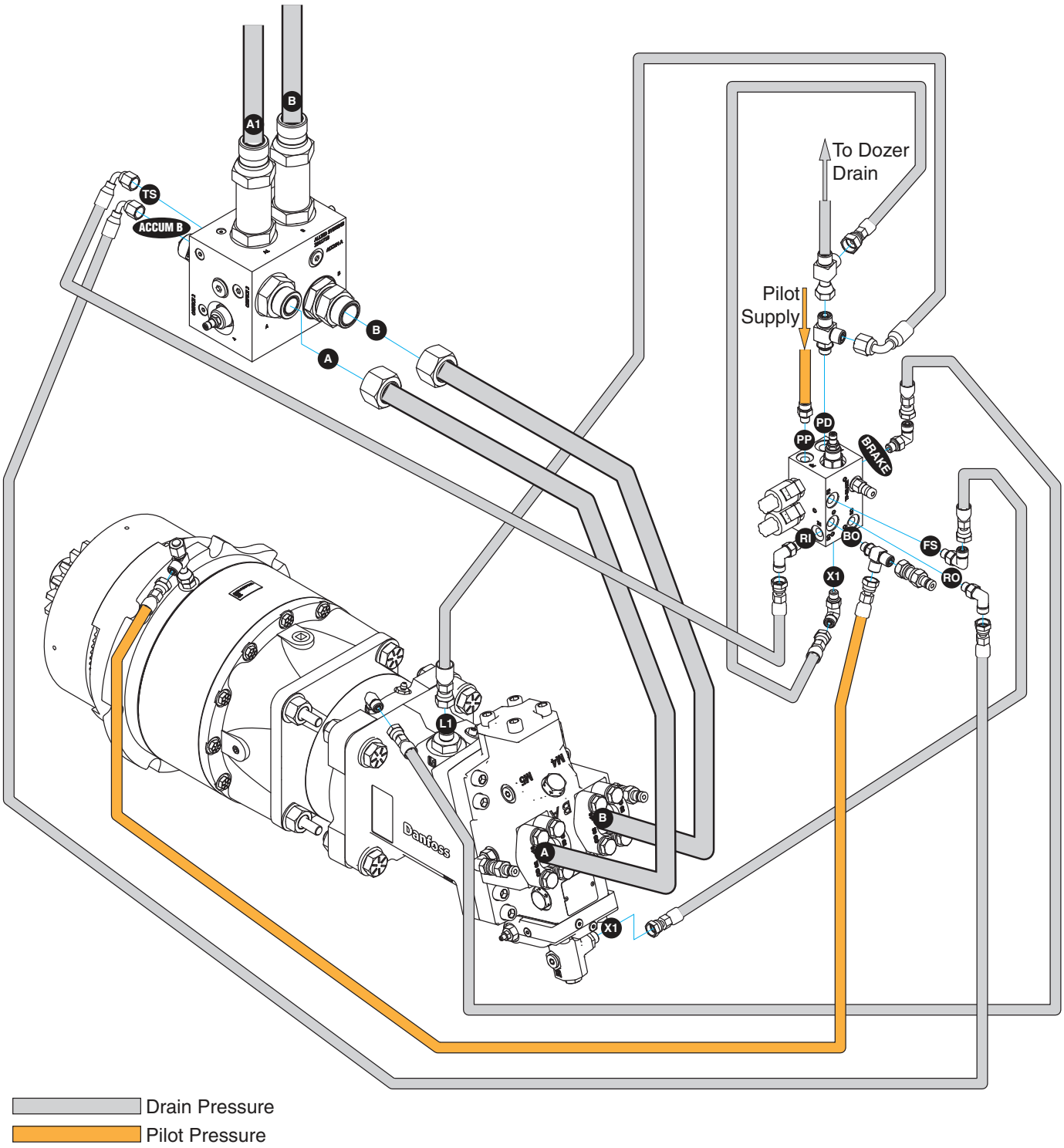


Figure 1-40 Sequence of Operation - BRAKE-OFF, John Deere 850L (E470)

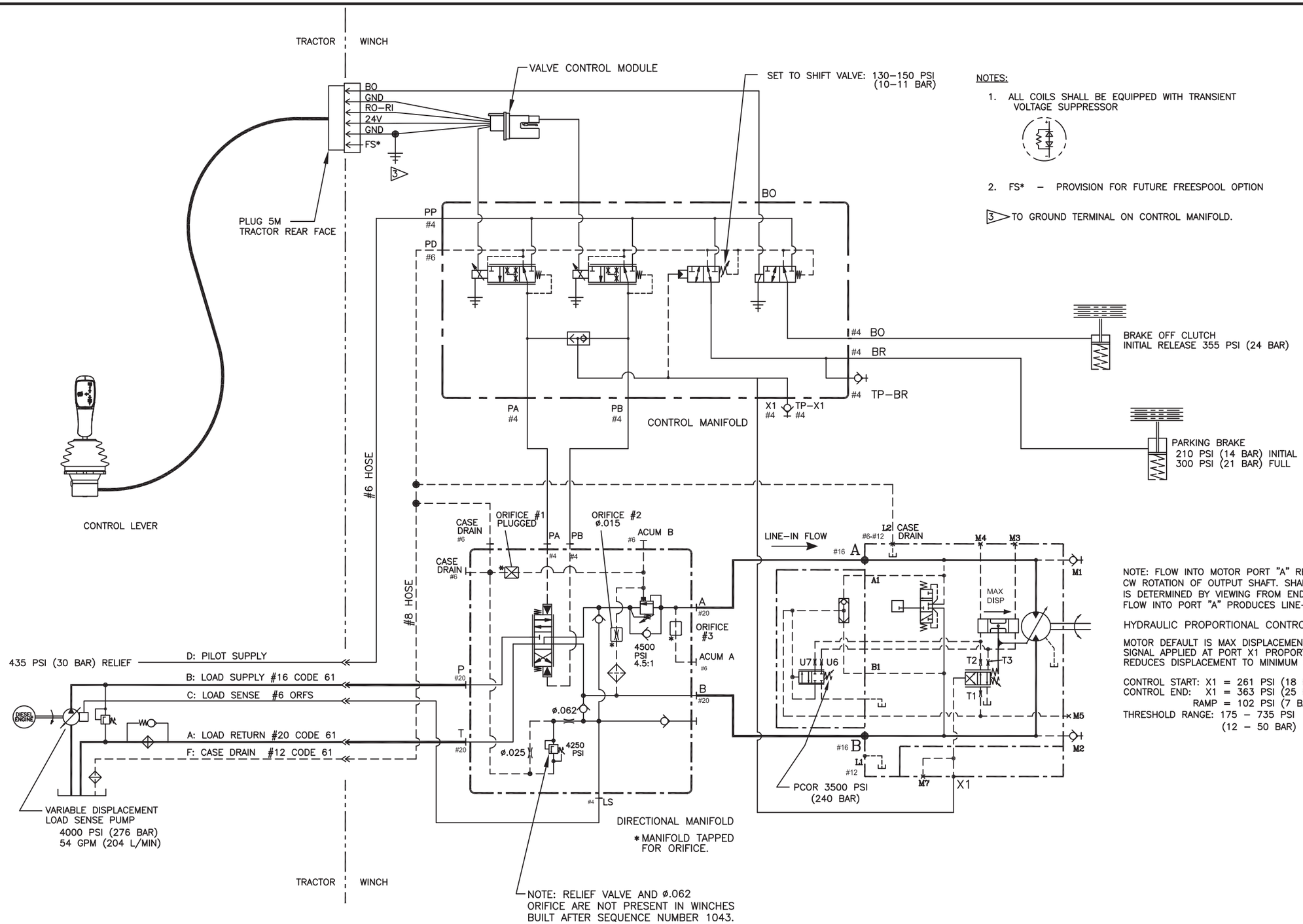
Sequence of Operation - BRAKE-OFF
John Deere 850L (E470)

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

⚠ WARNING

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

Notes



NOTES:

1. ALL COILS SHALL BE EQUIPPED WITH TRANSIENT VOLTAGE SUPPRESSOR

2. FS* – PROVISION FOR FUTURE FREESPOOL OPTION

3 TO GROUND TERMINAL ON CONTROL MANIFOLD.

NOTE: FLOW INTO MOTOR PORT "A" RESULTS IN CW ROTATION OF OUTPUT SHAFT. SHAFT ROTATION IS DETERMINED BY VIEWING FROM END OF SHAFT. FLOW INTO PORT "A" PRODUCES LINE–IN FUNCTION.

HYDRAULIC PROPORTIONAL CONTROL

MOTOR DEFAULT IS MAX DISPLACEMENT. PRESSURE SIGNAL APPLIED AT PORT X1 PROPORTIONALLY REDUCES DISPLACEMENT TO MINIMUM SETTING.

CONTROL START: X1 = 261 PSI (18 BAR)
CONTROL END: X1 = 363 PSI (25 BAR)
RAMP = 102 PSI (7 BAR)
THRESHOLD RANGE: 175 – 735 PSI
(12 – 50 BAR)

Figure 1-41 H8L Hydraulic/Electrical Schematic CAT D7E (C511) Page 1 of 2

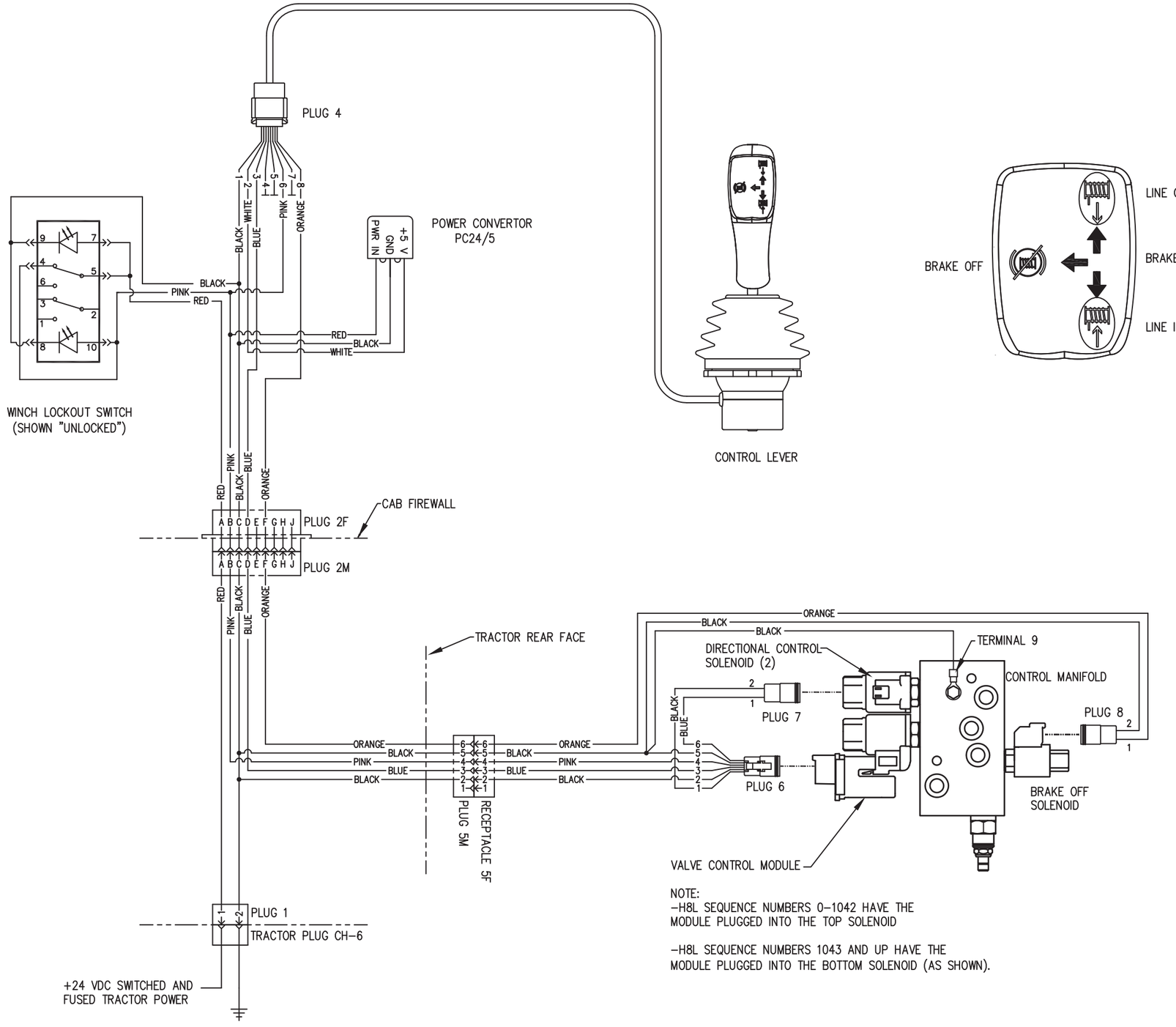


Figure 1-42 H8L Hydraulic/Electrical Schematic CAT D7E (C511) Page 2 of 2

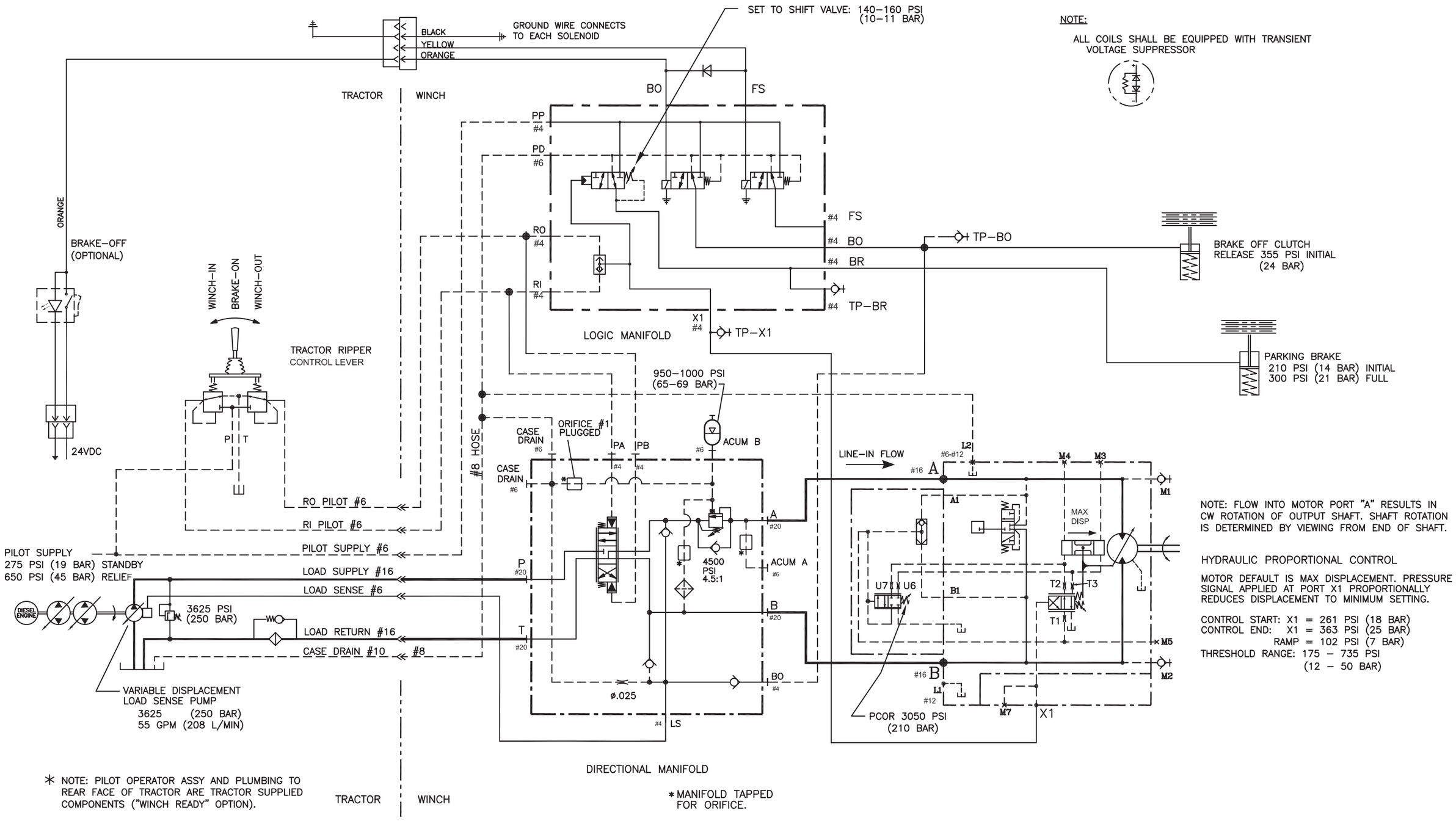
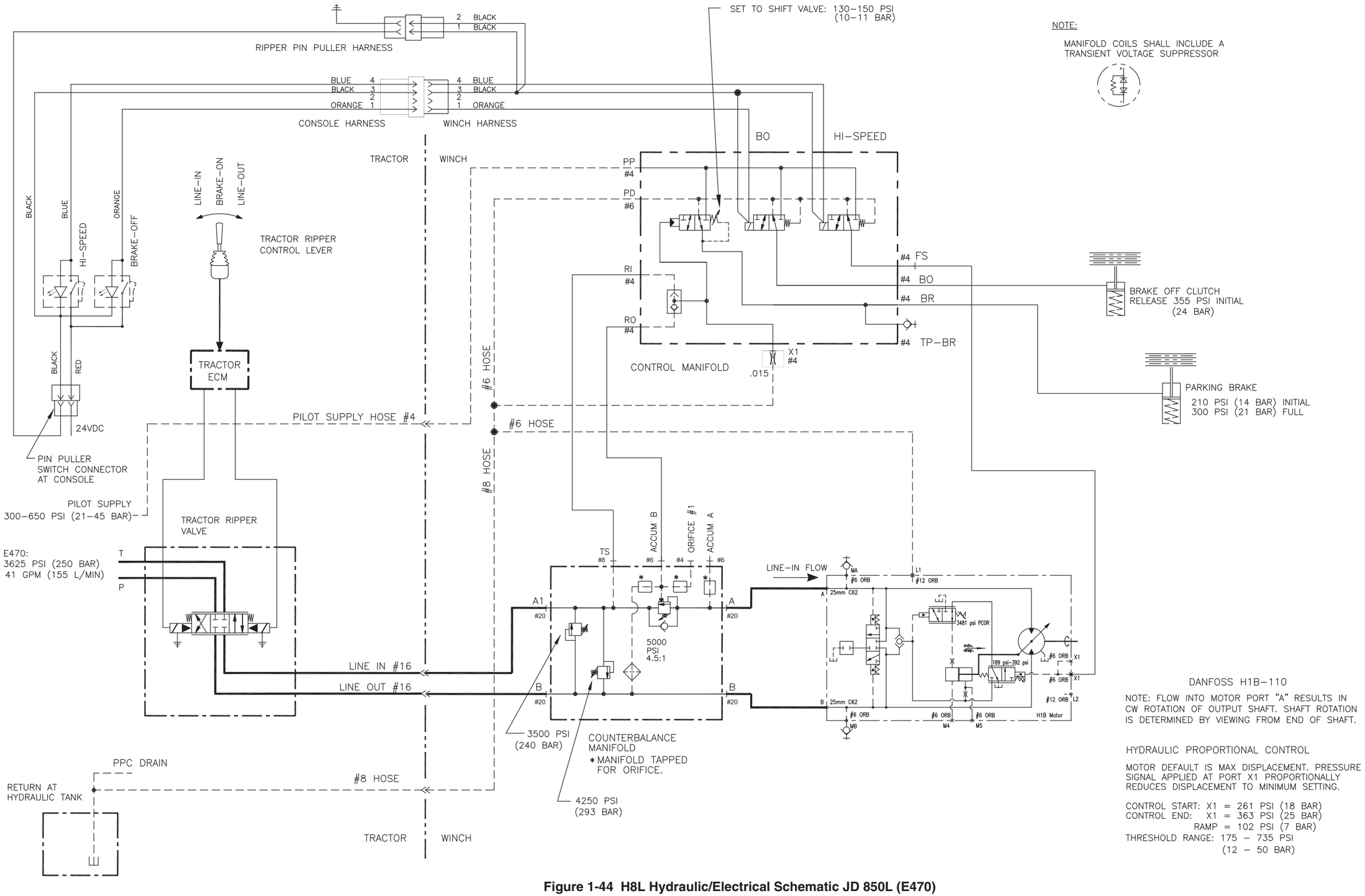


Figure 1-43 H8L Hydraulic/Electrical Schematic JD 750K/850K (E460)



DANFOSS H1B–110

NOTE: FLOW INTO MOTOR PORT "A" RESULTS IN CW ROTATION OF OUTPUT SHAFT. SHAFT ROTATION IS DETERMINED BY VIEWING FROM END OF SHAFT.

HYDRAULIC PROPORTIONAL CONTROL

MOTOR DEFAULT IS MAX DISPLACEMENT. PRESSURE SIGNAL APPLIED AT PORT X1 PROPORTIONALLY REDUCES DISPLACEMENT TO MINIMUM SETTING.

CONTROL START: X1 = 261 PSI (18 BAR)
CONTROL END: X1 = 363 PSI (25 BAR)
RAMP = 102 PSI (7 BAR)
THRESHOLD RANGE: 175 – 735 PSI
(12 – 50 BAR)

Figure 1-44 H8L Hydraulic/Electrical Schematic JD 850L (E470)

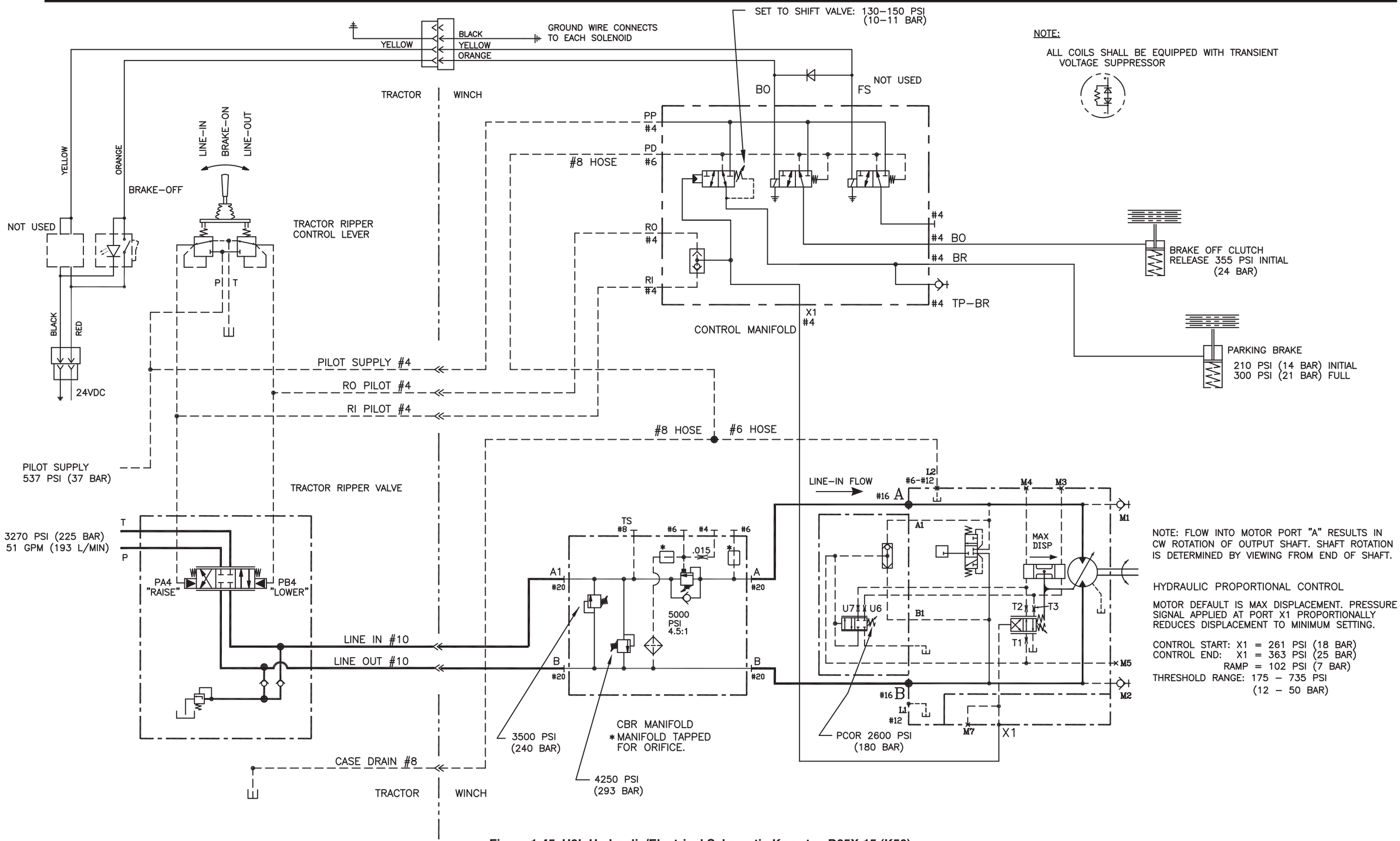


Figure 1-45 H8L Hydraulic/Electrical Schematic Komatsu D85X-15 (K50)

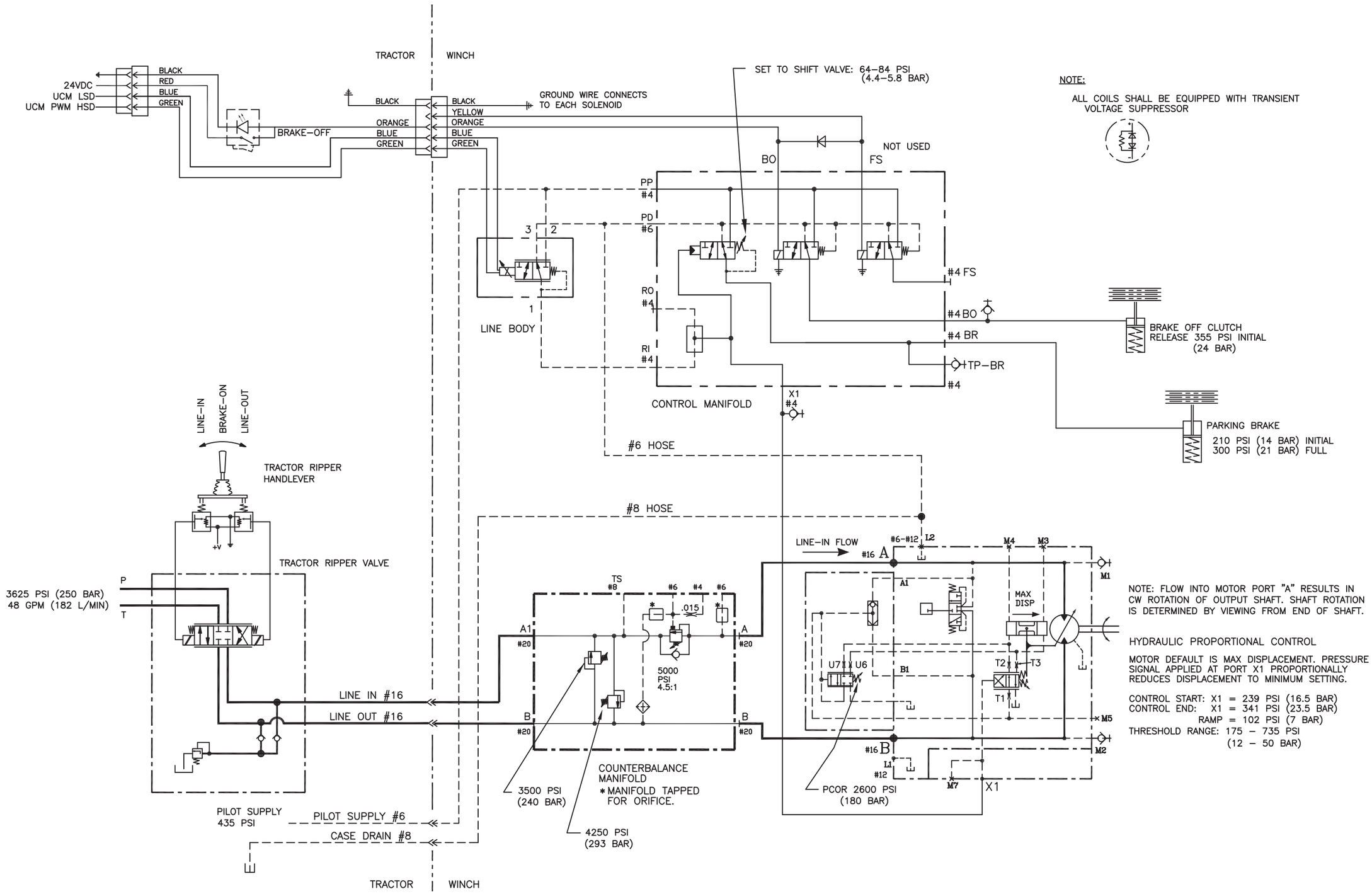


Figure 1-46 H8L Hydraulic/Electrical Schematic Case 1650M/2050M (R42)

Troubleshooting

General

Winch problems fall into one of three categories: control system, hydraulic system or mechanical system. Follow the troubleshooting steps below to isolate the problem area.

1. Be sure the tractor hydraulic system is working properly. Verify that other implements, such as blade functions, are operating properly.

2. Make sure the winch electronic control system is functioning properly. See Electronic Troubleshooting section of this manual.
3. Check winch hydraulic pressures. See Service section of this manual to perform Hydraulic System Pressure Checks.

4. Inspect the winch gear train for mechanical problems.

Mechanical/Hydraulic Troubleshooting

These steps assume that electronic control system is operating correctly as determined by performing steps outlined in the Electronic Troubleshooting section of this manual.

For proper hydraulic troubleshooting, the winch oil operating temperature should not exceed 180°F (82°C). Oil reservoir temperature is monitored at the dozer.

PROBLEM	POSSIBLE CAUSE	CORRECTION ACTION
Winch Does Not Operate with the Tractor Running		
Hydraulic power not being supplied to winch.	Tractor implement lockout switch is locked.	Unlock tractor implement lockout switch.
	Improper winch hose routing.	Verify hose connections are in accordance with hydraulic schematic and installation instructions for specific application.
	Low oil.	Check for proper oil lever.
No pilot pressure (PS).	Tractor implement lockout switch is locked.	Unlock tractor implement lockout switch.
	Improper winch hose routing.	Verify hose connections are in accordance with hydraulic schematic and installation instructions for specific application.
Low pilot pressure (PS).	Improper tractor pilot supply setting or malfunction.	Refer to tractor pilot system troubleshooting.
Brake not releasing.	No or low brake release pressure.	Check pilot pressure. Check hoses for leaks.
	Brake valve out of adjustment or damaged.	Perform brake valve pressure checks and adjust as specified. Remove valve and inspect for debris or damage. Replace valve as necessary.
	Improper winch hose routing.	Verify hose connections are in accordance with hydraulic schematic and installation instructions for specific application.
	Brake mechanical damage.	Repair or replace brake.

Figure 2-1 Mechanical/Hydraulic Troubleshooting Chart -1

PROBLEM	POSSIBLE CAUSE	CORRECTION ACTION
Winch Operates But Exhibits The Following Problems		
Winch operates in **LINE-IN** only.	Brake shuttle stuck.	Check for debris.
	Counterbalance valve pilot signal blocked or connected to drain.	Check for plugged control manifold passage or missing manifold plug.
	Counterbalance valve damaged or set incorrectly.	Adjust or replace counterbalance valve.
	Malfunction in the ripper control circuit.	Troubleshoot circuit per tractor service manual.
Winch operates in **LINE-OUT** only.	Brake shuttle stuck.	Check for debris.
	Malfunction in the ripper control circuit.	Troubleshoot circuit per tractor service manual.
Winch will not generate sufficient line pull.	Tractor implement pump relief set too low.	Check tractor hydraulic system settings.
	Load sense relief valve set low.	Adjust load sense valve.
	Check valve in directional manifold not seating.	Inspect for damage or debris.
	Motor damaged.	Repair or replace motor.
	BRAKE-OFF clutch slipping.	See Troubleshooting for "**BRAKE-OFF** Clutch Slipping".
BRAKE-OFF clutch will not operate.	No **BRAKE-OFF** release pressure. Control system malfunction. Valve not working.	See "**BRAKE-OFF** does not function" in Electronic Troubleshooting section of this manual.
	Low **BRAKE-OFF** release pressure.	Check for low pilot supply pressure. Check for leaks in supply lines or clutch piston leak.
	Mechanical damage to **BRAKE-OFF** clutch.	Repair **BRAKE-OFF** clutch.
BRAKE-OFF clutch slipping.	Clutch release pressure is present in other than **BRAKE-OFF** control position.	Check electronic control system. Check for high pilot drain pressure. Check valve in directional manifold not seating.
	Clutch damaged or worn.	Repair **BRAKE-OFF** clutch.

Figure 2-1 Mechanical/Hydraulic Troubleshooting Chart - 2

PROBLEM	POSSIBLE CAUSE	CORRECTION ACTION
Winch Operates But Exhibits The Following Problems		
Operation is rough.	Low oil level.	Add oil; refer to tractor oil specifications.
	Low pilot pressure.	Refer to tractor pilot system troubleshooting.
	Wire rope jumps layers on drum.	Spool cable more evenly.
Operation is noisy.	Air in the hydraulic oil (indicated by foaming or milky-colored oil).	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 and repair as needed.
Drum continues to rotate after lever is returned to **BRAKE-ON**.	Direction spool not shifting to centered position.	If Direction spool sticking, clean or replace.
	Counterbalance valve stuck open.	Repair or replace valve.
	Brake not engaged or worn.	Repair brake.
Oil level too high in gear-side cavity.	Too much oil added.	Drain excessive oil. Check level to “LEVEL” plug on winch case.
	Oil leaking from hydraulic supply into gear-side cavity.	Locate leak. Repair or replace faulty component.
Winch stalls during operation.	Incorrect PCOR setting on hydraulic motor.	Check PCOR and dozer supply pressures (see Section 3). If either is incorrect, contact Allied Service Department.
	Insufficient hydraulic pressure supplied by dozer.	

Figure 2-1 Mechanical/Hydraulic Troubleshooting Chart - 3

Electronic Troubleshooting

⚠ WARNING

These tests should only be performed on a tractor with the engine not running and any stored hydraulic pressure relieved.

NOTE: These steps are done to diagnose potential electronic problems. Winch malfunction may also be hydraulic or mechanical, and are covered in a separate section of this manual.

NOTE: The tractor key-switch must be in the "On" position and the tractor electrical system in good order for proper troubleshooting of the H8L control system.

PROBLEM	POSSIBLE CAUSE	CORRECTION ACTION
Winch lockout Switch Troubleshooting		
Neither the upper nor the lower LED's on winch lockout switch are lit. 	Input power not properly connected or tractor ignition off.	Check power connection. Verify integrity of connection and wire polarity.
	Blown or damaged fuse.	Inspect fuse. Replace if fuse is bad. (Fuse F30-10A on CAT D7E).
	Switch not properly connected.	Check switch connection.
	Damaged switch.	Inspect switch. Replace if bad.
Upper winch lockout switch LED is illuminated. Lower LED does not illuminate when switch is "On".	Switch not properly connected.	Check switch connection.
	Damaged switch.	Inspect switch. Replace if bad.
	Damaged harness.	Inspect harness outputs at switch plug.
Control Lever Troubleshooting		

Control lever outputs can be tested at plug 5M which is located at the back of the tractor and is accessible through the inspection plate.

A properly functioning control lever will demonstrate the following states at plug 5M when the tractor key switch is "On" and the winch lockout switch is "On" or "Unlocked":

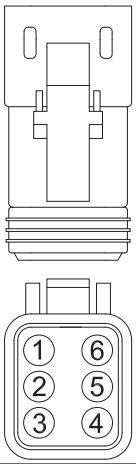


Table 1

	Control Lever Position & Pin Output with Activation Switch "Un-Locked"			
Pin #	Centered	Fully in **LINE-IN**	Fully in **LINE-OUT**	Latched in **BRAKE-OFF**
1	Not Used	Not Used	Not Used	Not Used
2	Ground	Ground	Ground	Ground
3	+ 2.4 - 2.55 VDC	+ 0.3 - 0.7 VDC	+ 4.3 - 4.7 VDC	+ 2.45 - 2.55 VDC
4	+ 24 VDC	+ 24 VDC	+ 24 VDC	+ 24 VDC
5	Ground	Ground	Ground	Ground
6	0 - 0.1 VDC	0 - 0.1 VDC	0 - 0.1 VDC	+ 24 VDC

(See the illustration of the plug on the left for Pin # positions)

Figure 2-2 Electronic Troubleshooting Chart - 1

PROBLEM	POSSIBLE CAUSE	CORRECTION ACTION
Control Lever Troubleshooting		
Pin #2 and Pin #5 are not grounded.	Wiring not properly connected or harness damaged.	Verify connections and harness integrity.
Voltage at Pin #3 measures 0 VDC.	Wiring not properly connected or harness damaged.	Verify connections and harness integrity.
	Control lever not receiving +5 VDC power from the PC 24/5 power converter.	Inspect PC 24/5 power converter on console harness near control lever. The green LED should by lit to indicate +5 VDC power present. If the green LED is not lit or +5 VDC cannot be measured at plug 4 Pin #2, replace the PC 24/5 converter. (Plug #4 is located under the control lever). If the control lever is receiving +5 VDC and presents no output to Plug 5M Pin #3, replace the control lever.
Measured voltage on Pin #3 is outside the limits shown in Table 1.	Wiring not properly connected or harness damaged.	Verify connections and harness integrity.
	Damaged control lever.	Replace control lever.
Voltage at Pin #4 measures less than 24 VDC.	Wiring not properly connected or harness damaged.	Verify connections and harness integrity.
	Tractor voltage low.	Verify tractor voltage.
Measured voltage on Pin #6 is outside the limits shown in Table 1.	Wiring not properly connected or harness damaged.	Verify connections and harness integrity.
	Damaged control lever.	Replace control lever.
Pin #6 shows + 0 - 0.1 VDC when detented in **BRAKE-OFF**.	Wiring not properly connected or harness damaged.	Verify connections and harness integrity.
	Damaged control lever.	Replace control lever.
Winch EVDR1 Control Module Troubleshooting		
Drum does not rotate.	Winch harness not properly connected.	Verify connections to the control module and directional solenoids per the wiring diagram.
	EVDR1 control module not functioning.	Remove coils and verify that they are being energized.
	Solenoid coil is shorted or open.	Verify solenoid resistance. H8L directional solenoids should measure 8.8 Ohms +/- 2 Ohms. Note the Tech Tips for removing a control module from the solenoid.
BRAKE-OFF does not function.	Winch harness not properly connected.	Verify connections to the **BRAKE-OFF** solenoid per the wiring diagram.
	Solenoid coil is shorted or open.	Verify solenoid resistance. H8L **BRAKE-OFF** solenoid should measure 48 Ohms +/-5 Ohms.

Figure 2-2 Electronic Troubleshooting Chart - 2

Technical Tips

1. Any open circuit in the directional solenoid will cause the EVDR1 control module to turn off. The module cannot be unplugged from either solenoid to check for control output.

   An easy method to check whether or not a solenoid is being energized is to obtain a simple magnetic compass to use specifically for the purpose of checking electronic solenoids (Note: This can damage the compass). Place the compass on the de-energized solenoid and note the needle position. When the solenoid is energized, the compass needle will be deflected. If the compass needle does not deflect, the solenoid is not energizing.

2. The EVDR1 control module can be difficult to remove from the solenoid. If the solenoid must be checked, take care to gently depress the locking tab and wiggle the EVDR1 control module out of the solenoid socket.

3. When checking the PC 24/5 power converter LEDs, it can be difficult to see the LED in bright light. Shading the power converter will help determine if the LEDs are both lit.

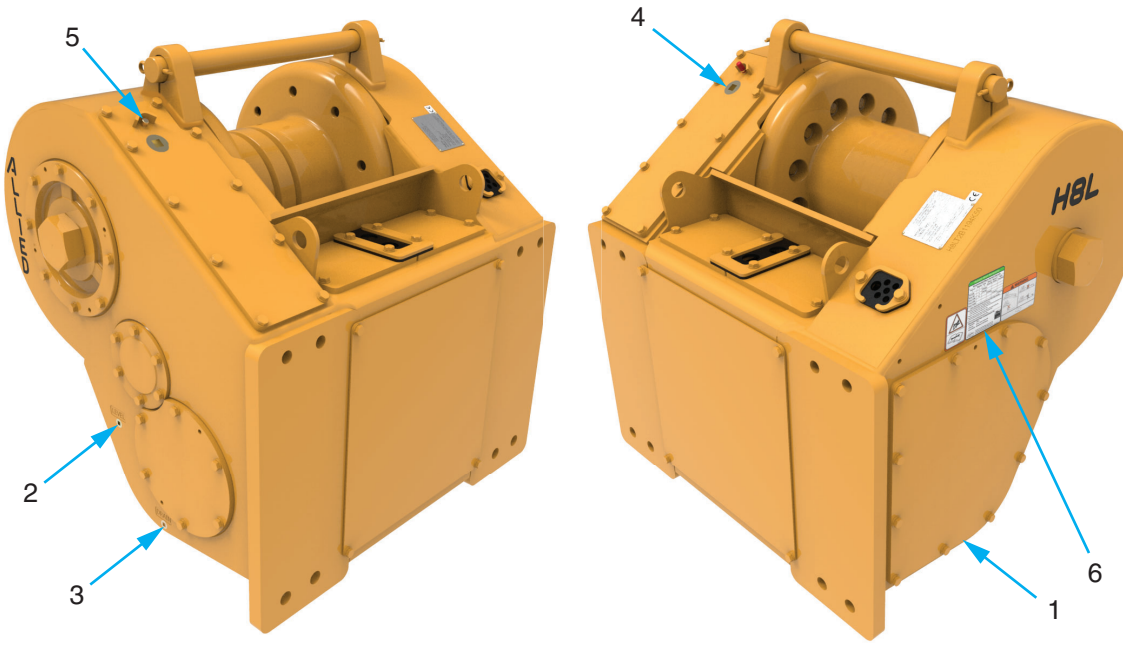
Service

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. Oil Level Check Plug
3. Oil Drain Plug
4. Oil Fill Plug
5. Breather
6. Maintenance & Warning Decals

Figure 3-1 H8L Winch Maintenance Points

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

Figure 3-2 H8L Winch Maintenance Schedule

Checks Before Operation

Check that the wire rope and hook are not worn or damaged beyond serviceable condition. Check that the periodic inspection and maintenance have been done at the recommended operating hours. See Figure 3-2, 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.

Hydraulic System Pressure Checks

The hydraulic oil and filter(s) should be maintained as indicated in the dozer 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

Always wear gloves when handling wire rope.

⚠ WARNING

Dozer 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.

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 dozer blade over relief. The oil temperature in the winch or dozer reservoir must be at least 70°F (20°C).
3. Remove any dirt from the left side of the winch. Remove access plate.
4. Stabilize engine speed at high free idle 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.

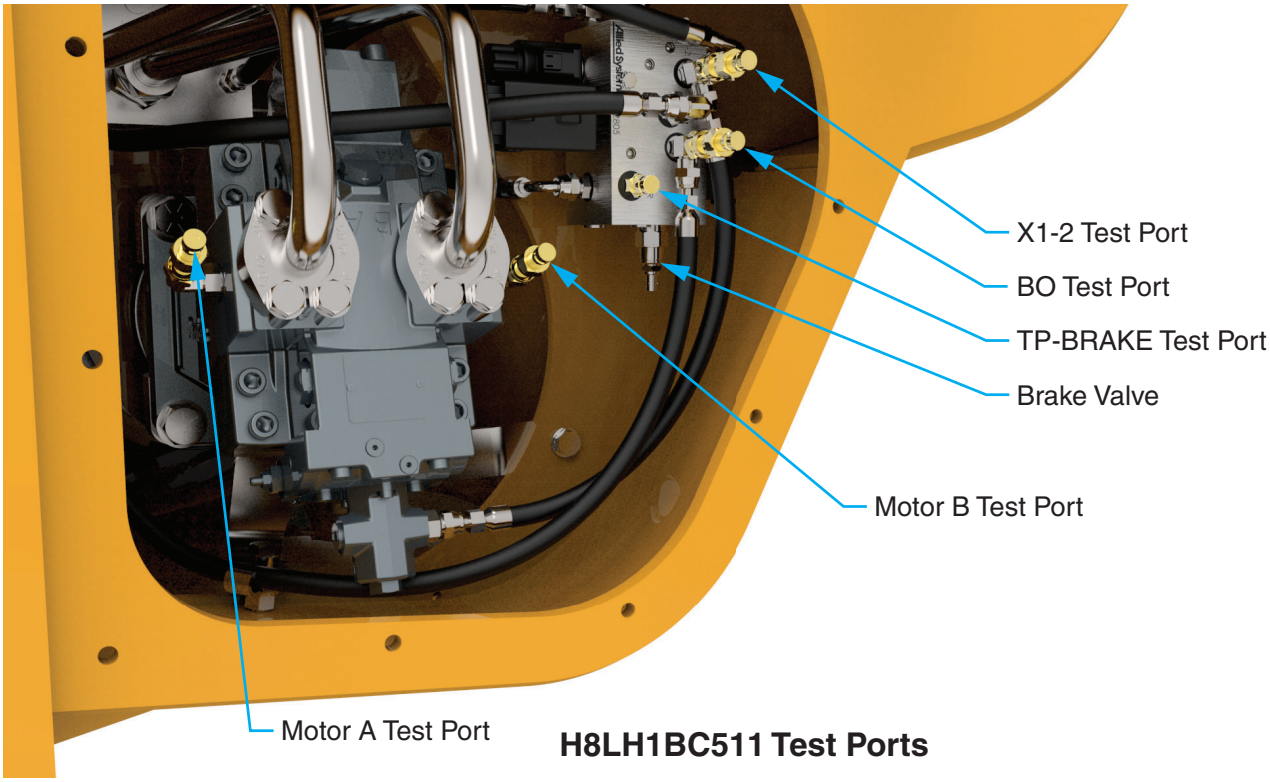


Figure 3-3 Caterpillar D7E (C511) Installation Test Ports and Brake Valve Locations

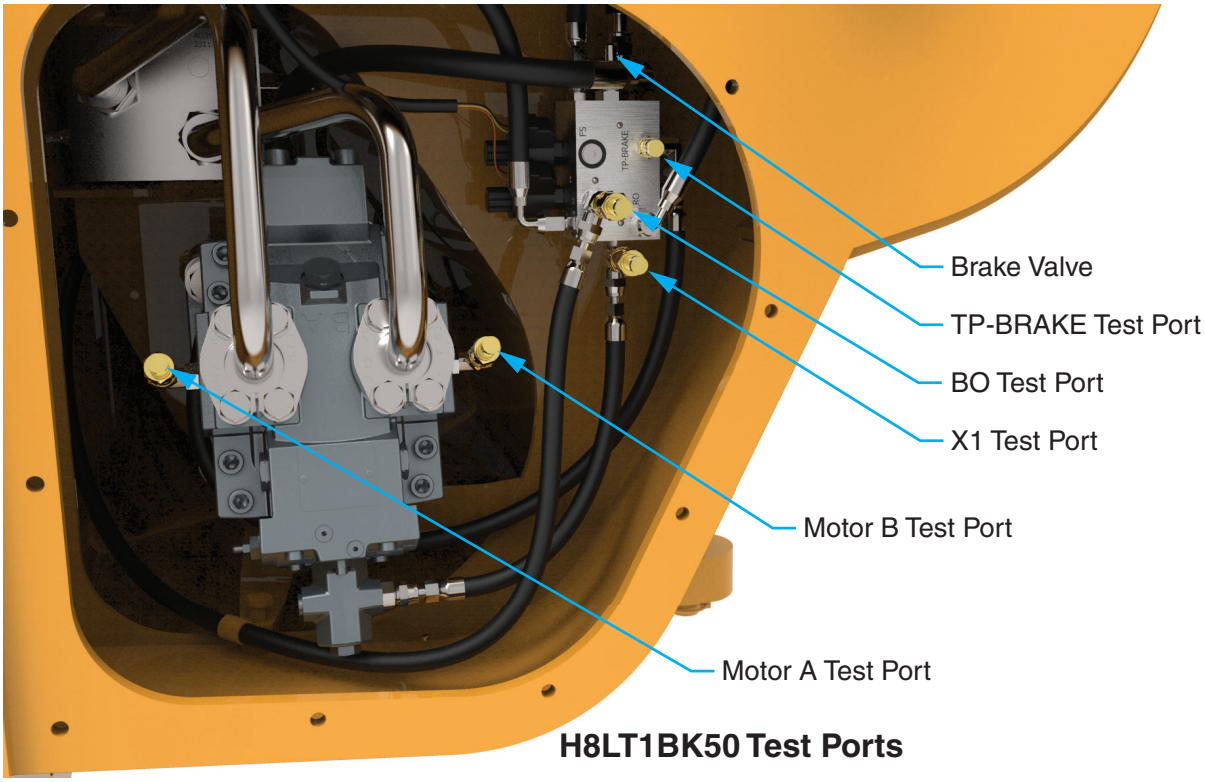


Figure 3-4 Komatsu D85X-15 (K50) Installation Test Ports and Brake Valve Locations

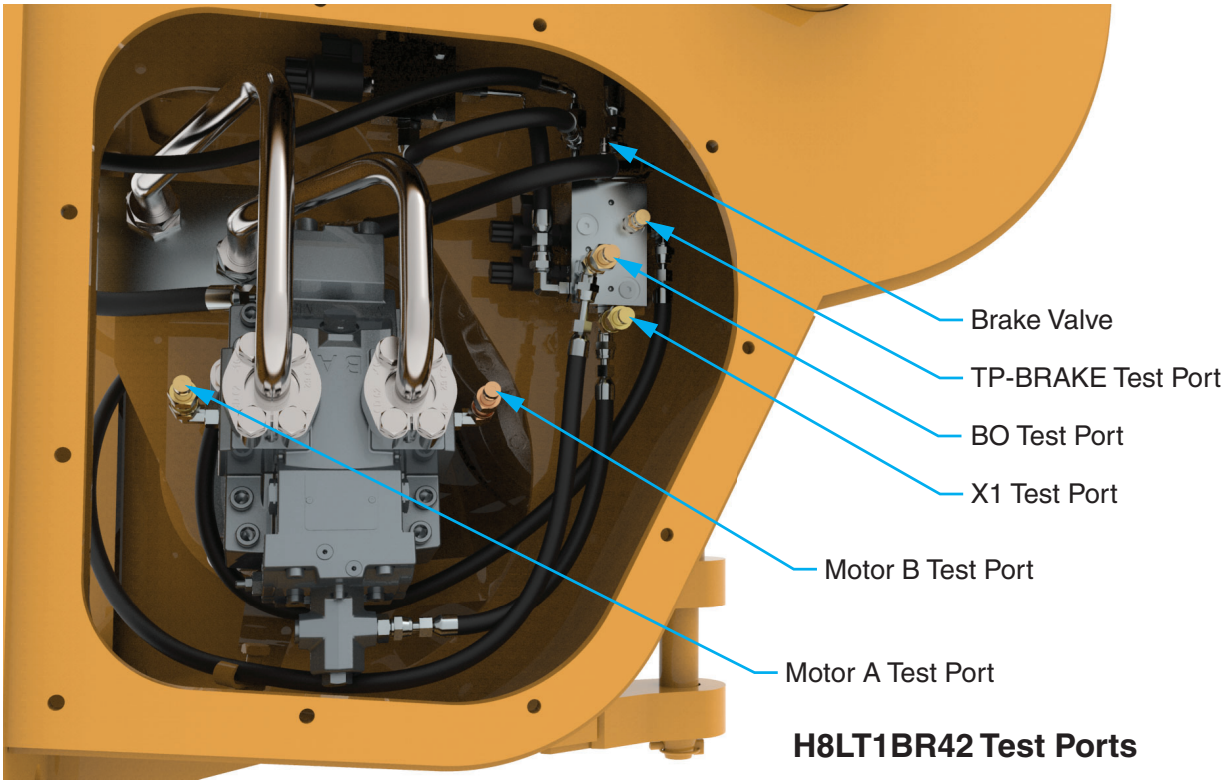


Figure 3-5 Case 1650M/2050M (R42) Installation Test Ports and Brake Valve Locations

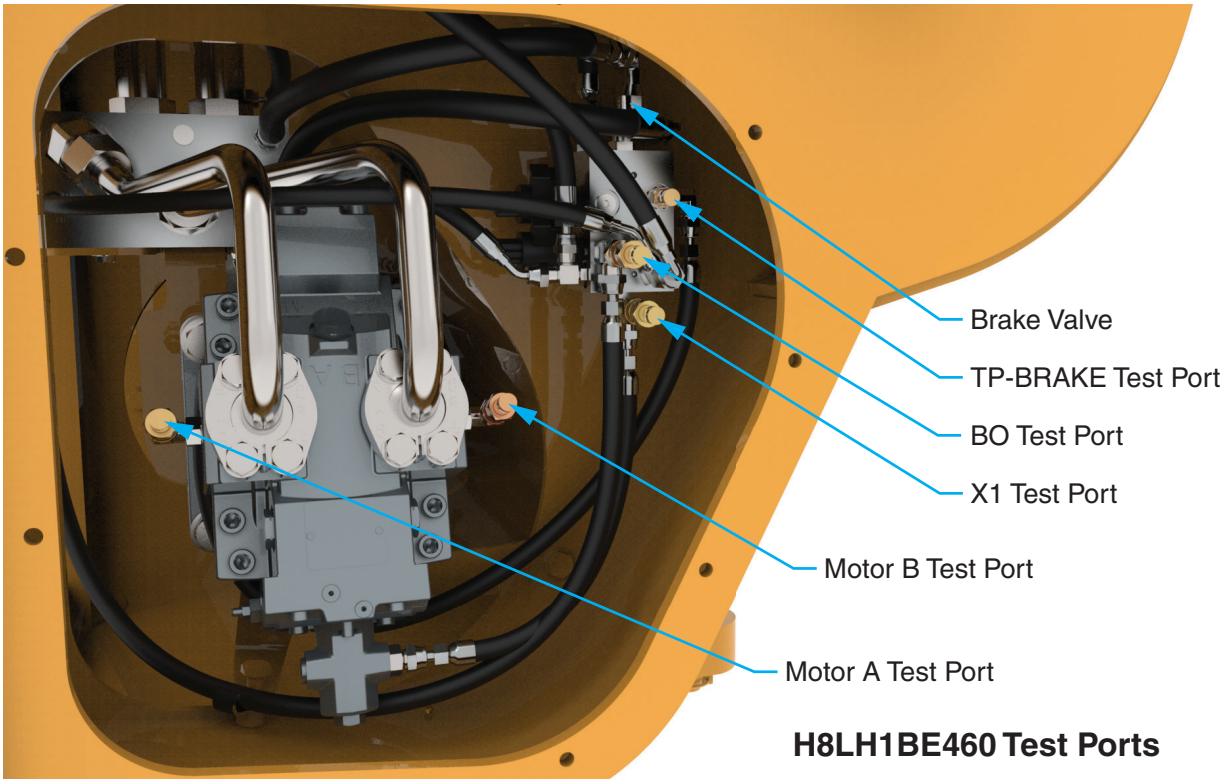


Figure 3-6 John Deere 750K/850K (E460) Installation Test Ports and Brake Valve Locations

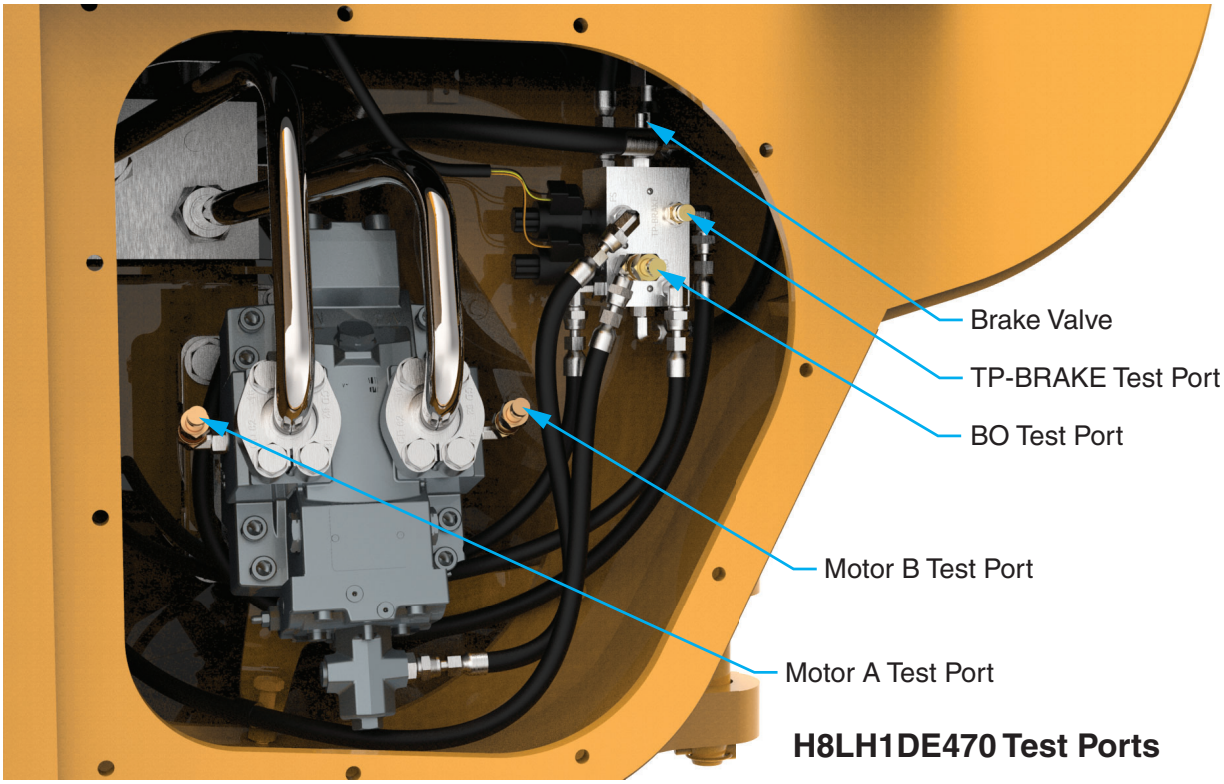


Figure 3-7 John Deere 850L (E470) Installation Test Ports and Brake Valve Locations

Pilot Supply Pressure Check

See dozer service manual for pilot test port location.

Figure 3-8 Test Equipment Setup

Test Equipment:

- (1) 1,000 psi (6,895 kPa) Gauge

Connect pressure gauge to test port:

- Dozer pilot test port

General

Adequate standby pilot supply is required for both dozer and winch functions.

Instructions

1. Shut engine off but turn dozer key switch back on to provide electrical power to the winch.
2. Move dozer work equipment lever to unlock position to enable winch.
3. Move control switch from **BRAKE-ON** to **BRAKE-OFF** several times to de-energize the hydraulic system.
4. Move dozer work equipment lever to locked position.
5. Connect a 1000 psi gauge to the dozer pilot test port (see dozer Service Manual).
6. Start dozer and set to high-free idle.
7. Check that the pressure reading is within the range shown for your dozer in Table 3-1.

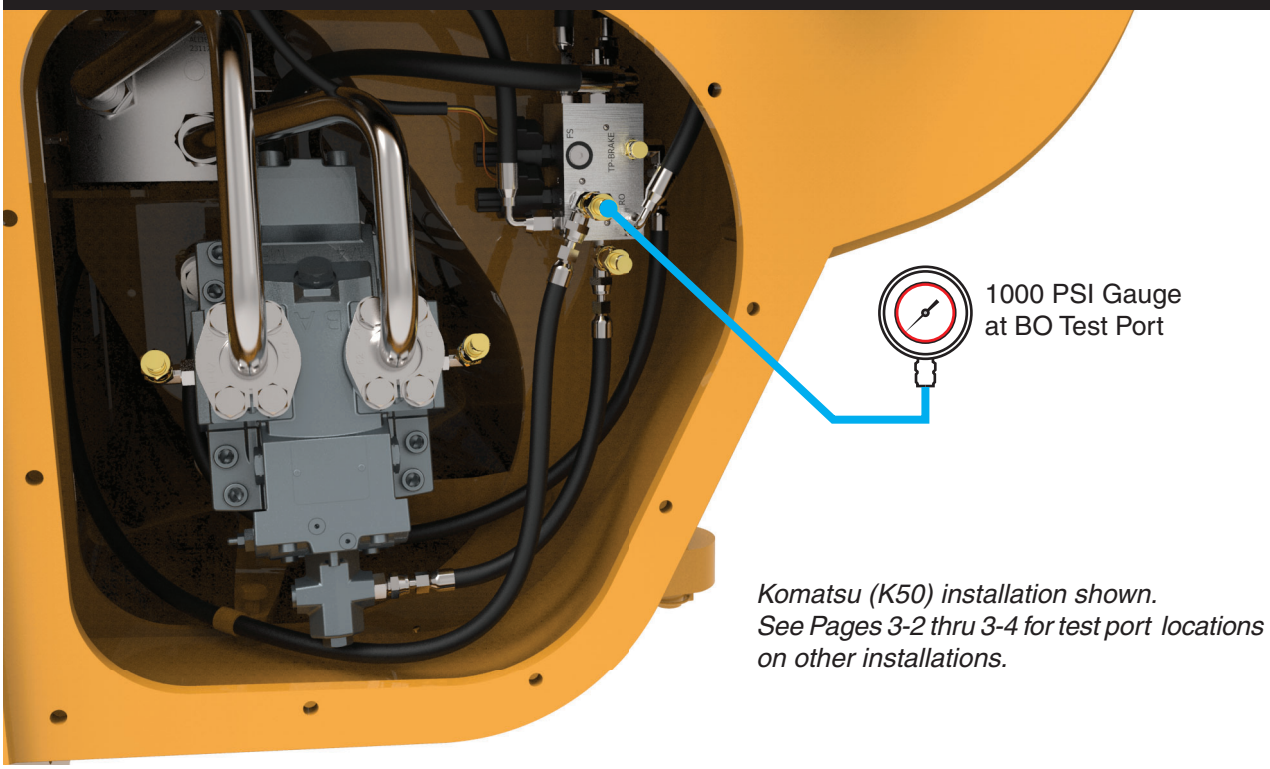
If the pressure is not as specified, check for:

1. Improper pilot supply valve setting or malfunction (See dozer Service Manual).
2. Pump pressure setting incorrect (See dozer Service Manual).
3. Leaking pressure hoses or fittings.
4. Correct pilot supply location from dozer.

Dozer	Pilot Pressure in PSI [kPa]
	Dozer Pilot Test Port
CAT D7E (C511)	435 - 465 [2,999 - 3,206]
CAT 973D (C973)	525 - 575 [3,620 - 3,964]
Komatsu D85-15 (K50)	575 - 600 [3,964 - 4,137]
Case 1650M/2050M (R42)	420 - 450 [2,896 - 3,103]
John Deere JD 750K/850K (E460) JD 850L (E470)	300 - 650 [2,068 - 4,482]

Table 3-1 Hydraulic Pressure Readings

BRAKE-OFF Pressure Check



Komatsu (K50) installation shown.
See Pages 3-2 thru 3-4 for test port locations on other installations.

Figure 3-9 Test Gauge Location (K50 shown)

Test Equipment:

- (1) 1,000 psi (6,895 kPa) Gauges

Connect pressure gauges to test ports:

- **BO**

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge to the **BO** pressure test port.
2. Start dozer and set to high-free idle
3. Measure pressure with the **BRAKE-OFF** switch activated.
4. The brake-off clutch requires 355 psi to release. Low pressure will result in premature wear of the friction discs and added heat generation

If pressure is not at least 355 psi, 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.

Counterbalance Valve Pressure Check

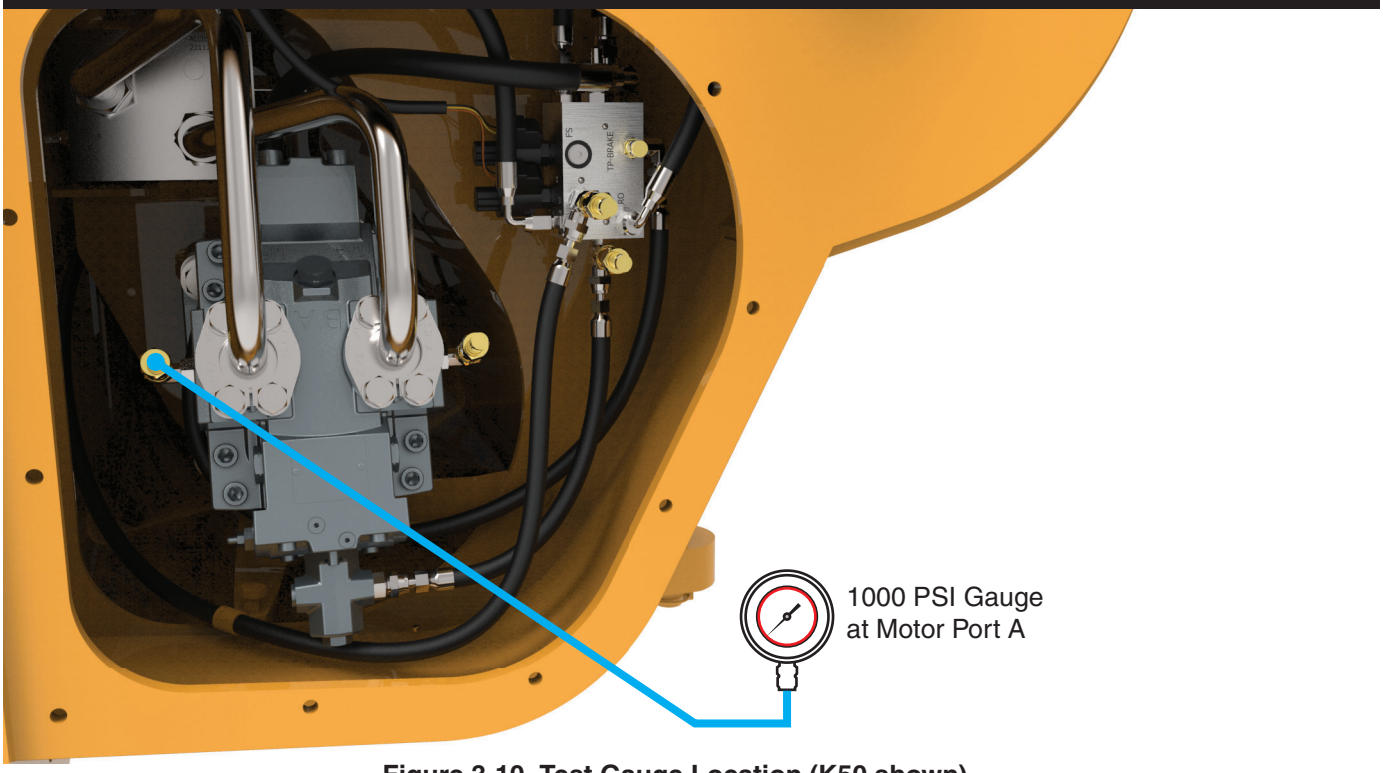


Figure 3-10 Test Gauge Location (K50 shown)

Test Equipment:

- (1) 1,000 psi (6,895 kPa) Gauge

Connect pressure gauge to test port:

- **Motor Port A**

General

This test ensures that the counterbalance valve in the CBR or Directional manifold is building back pressure during **LINE-OUT**.

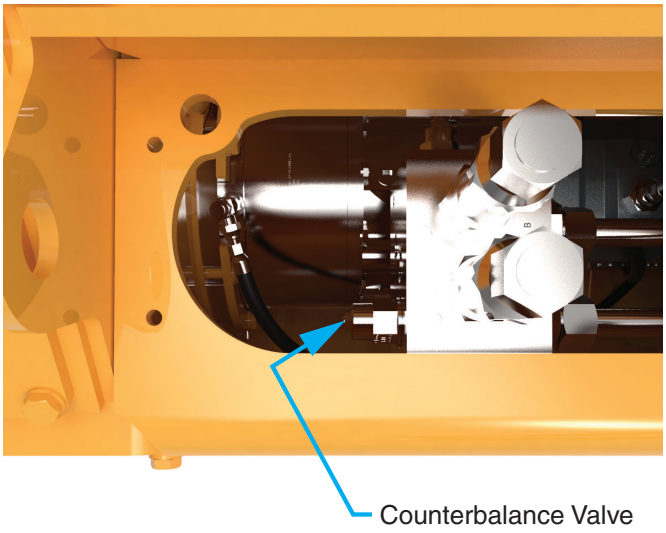


Figure 3-11 Counterbalance Valve (K50 Shown)

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge to Motor Port A.
2. Start dozer and set to high-free idle.
3. Place control lever in **LINE-OUT** to build pressure against the counterbalance valve
4. Check the pressure at Motor Port A. The pressure should be 800-900 psi [5,516 - 6,205 kPa] .

If the motor supply pressure is not as specified above, do not adjust valve until remaining pressure diagnostics are performed and other problems are identified.

To adjust the counterbalance valve:

1. Remove the top cover. The counterbalance valve is on the side of the CBR or Directional valve opposite of the motor.
2. Loosen counterbalance valve locknut. Turn counterbalance valve adjusting capscrew IN to decrease pressure and OUT to increase pressure. Adjust until the pressure is in the range above.

PCOR Pressure Check

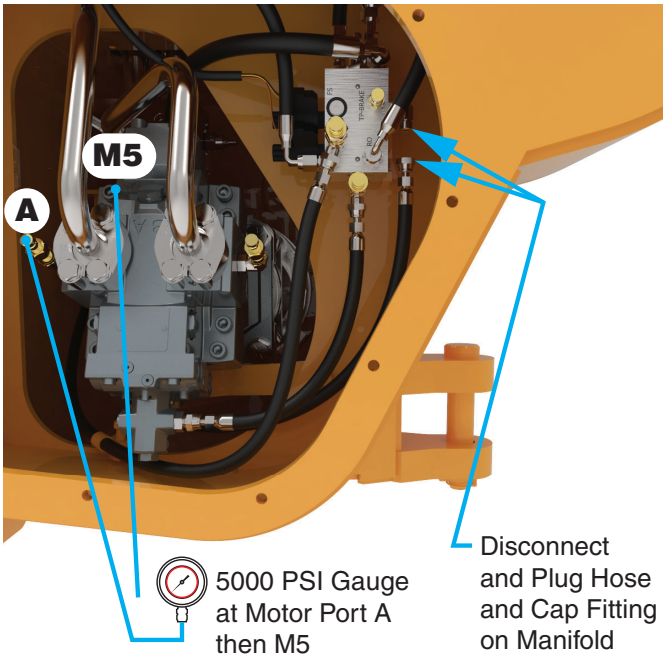


Figure 3-12 Test Equipment Setup
K50 Installation Shown

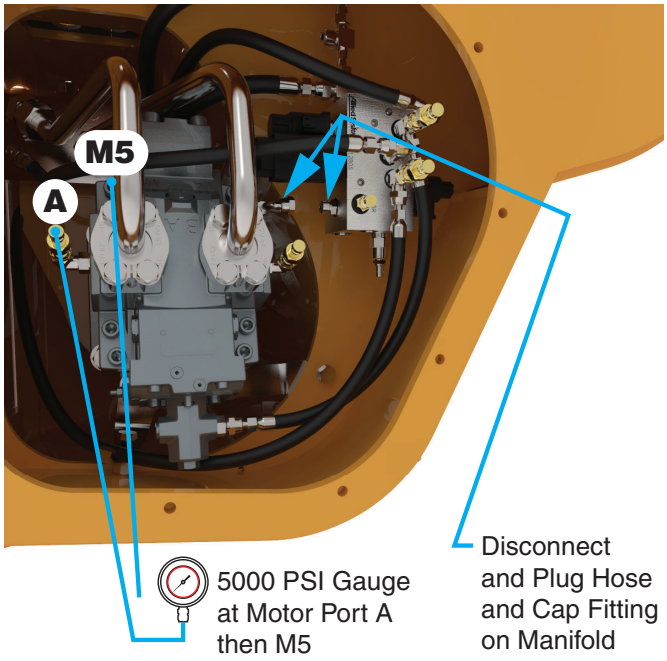


Figure 3-13 Test Equipment Setup
C511 Installation Shown

Test Equipment:

- (1) 5,000 psi (34,474 kPa) Gauge

Connect pressure gauges to test ports:

- **Motor Port A**
- **M5**

General

This test ensures that the PCOR setting on the motor is set correctly relative to the dozer supply pressure.

PCOR Pressure Check (continued)

Instructions

1. With the engine shut off, connect a 5000 psi pressure gauge to Motor Port A.
2. Disconnect and plug the brake release hose at the control manifold, and cap the fitting. Most installations will have that hose connected to the “BRAKE” port on the right side of the manifold, as shown in Figure 3-12. On C511 installations, that hose will be connected to the “BR” port on the left side of the manifold, as shown in Figure 3-13. This will lock the winch brake to build pressure in the motor.
3. Start dozer and set to high-free idle.
4. Slowly move the joystick fully to the LINE-IN position.
5. The pressure at Motor Port A should be within the range shown in Table 3-2.

NOTICE

The values in Table 3-2 are based on information available at time of publishing. Refer to the service/maintenance manual supplied with your dozer to verify the available supply pressure.

6. Shut down the engine, and remove the gauge from Motor Port A.
7. Connect the 5000 psi pressure gauge to port M5. Note that port M5 is plugged, and you will need to use fittings and hoses as available to connect your gauge. The port is 9/16 - 18UNF.
8. Start dozer and set to high-free idle.
9. Slowly move the joystick in the LINE-IN direction, noting pressures as they change with joystick position.
10. At some point, the pressure at M5 will stabilize. The stabilized pressure at M5 is the PCOR setting.
11. Check Table 3-2 below. If the PCOR setting is not within tolerance, or if the pressure read at M5 doesn’t stabilize as described above, contact Allied Systems Service Department.

Dozer	Full Supply Pressure in PSI [kPa]	
	Motor Port A	M5
CAT D7E (C511)	3,850 - 4,000 [26,545 - 27,579]	3,381 - 3,481 [23,311 - 24,001]
CAT 973D (C973)	3,839 - 3,989 [26,469 - 27,503]	3,381 - 3,481 [23,311 - 24,001]
Komatsu D85-15 (K50)	3,120 - 3,270 [21,512 - 22,546]	2,511 - 2,611 [17,313 - 18002]
Case 1650M/2050M (R42)	3,475 - 3,625 [23,959 - 24,994]	2,511 - 2,611 [17,313 - 18002]
John Deere JD 750K/850K (E460) JD 850L (E470)	3,475 - 3,625 [23,959 - 24,994]	2,946 - 3,046 [20,312 - 21,001]

Table 3-2 Hydraulic Pressure Readings

Motor Supply Pressure Check

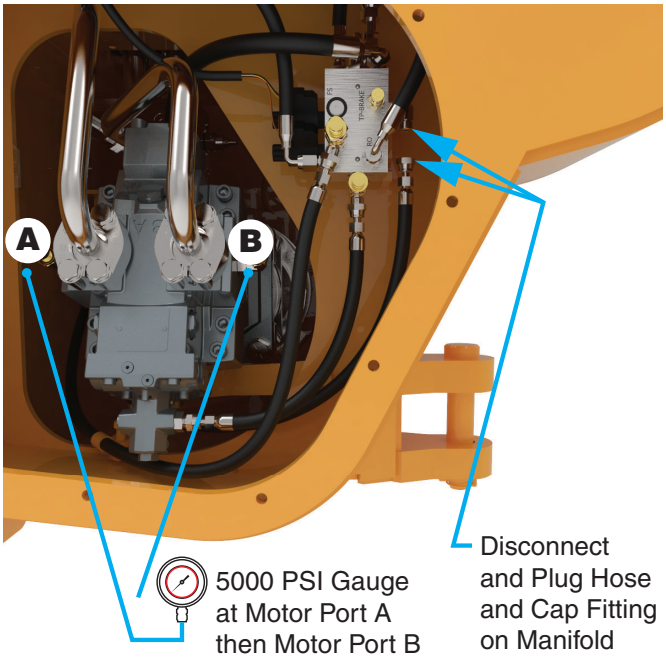


Figure 3-14 Test Equipment Setup
K50 Installation Shown

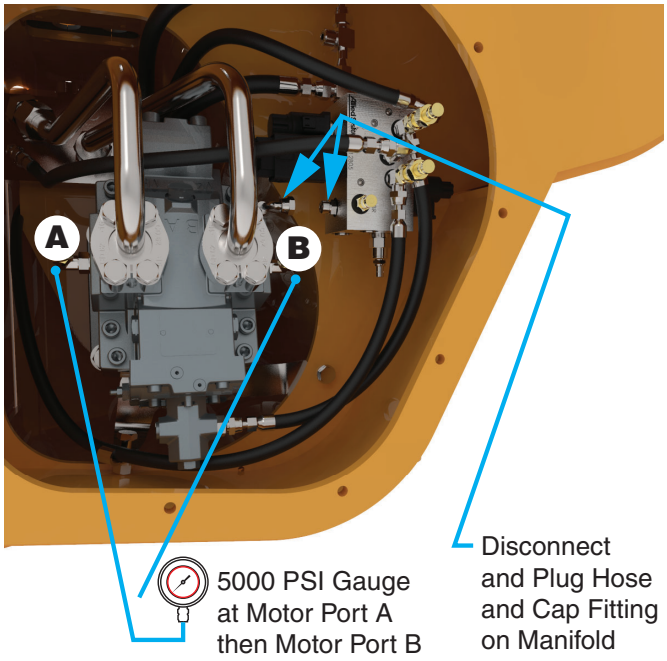


Figure 3-15 Test Equipment Setup
C511 Installation Shown

Test Equipment:

- (1) 5,000 psi (34,474 kPa) Gauge

Connect pressure gauge to test ports:

- **Motor Port A**
- **Motor Port B**

General

This test ensures that the motor is receiving the intended hydraulic supply at both ports.

Instructions

1. With the engine shut off, connect a 5000 psi pressure gauge to Motor Port A.
2. Find the brake release hose on the control manifold. Most installations will have that hose connected to the “BRAKE” port on the right side of the manifold, as shown in Figure 3-14. On C511 installations, that hose will be connected to the “BR” port on the left side of the manifold, as shown in Figure 3-15.
3. Disconnect and plug the brake release hose at the control manifold, and cap the fitting. This will lock the winch brake to build pressure in the motor.
4. Start dozer and set to high-free idle.
5. Check the pressure at Motor Port A while operating in **LINE-IN**. Check the pressure at Motor Port B while operating in **LINE-OUT**. See Table 3-3.
6. When motor supply pressure check is complete, remove gauge and reconnect brake release hose.

Motor Supply Pressure Check (continued)

If the motor supply pressure is not as specified in Table 3-3, check for:

1. If pressure is too high, check dozer hydraulic system.
2. If it is too low, proceed with troubleshooting to identify other possible problems, including a possibly damaged motor or pump.

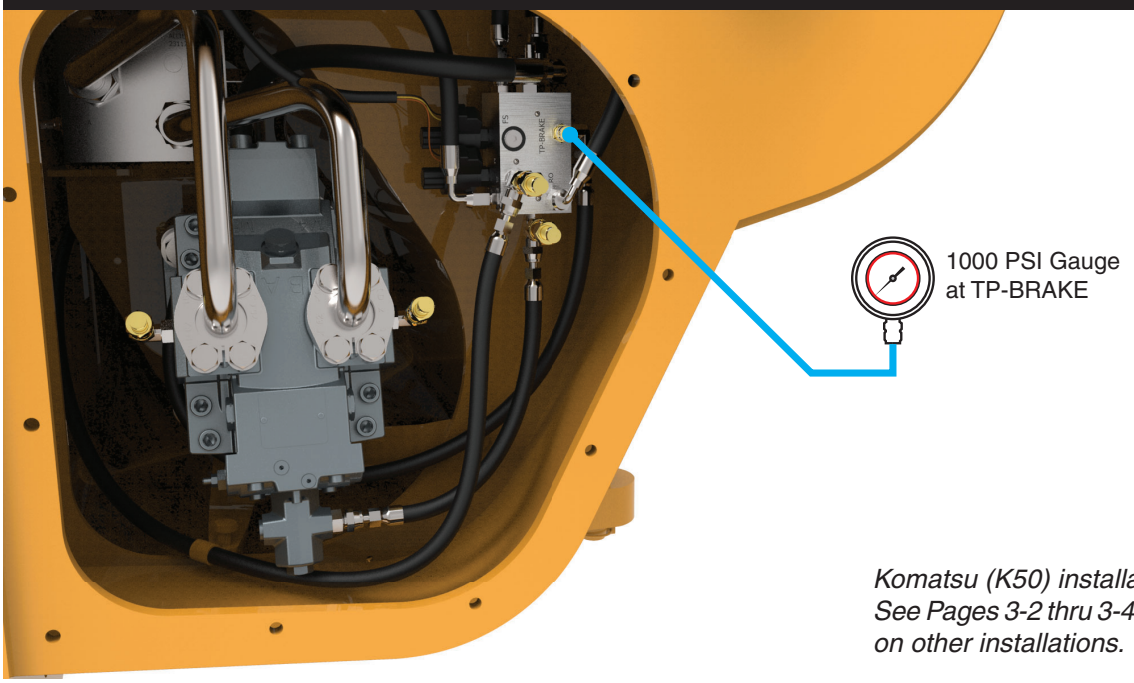
NOTICE

The values in Table 3-3 are based on information available at time of publishing. Refer to the service/maintenance manual supplied with your dozer to verify the available supply pressure.

Dozer	Full Supply Pressure in PSI [kPa]	
	Motor Port A	Motor Port B
CAT D7E (C511)	3,850 - 4,000 [26,545 - 27,579]	3,850 - 4,000 [26,545 - 27,579]
CAT 973D (C973)	3,839 - 3,989 [26,469 - 27,503]	3,839 - 3,989 [26,469 - 27,503]
Komatsu D85-15 (K50)	3,120 - 3,270 [21,512 - 22,546]	3,120 - 3,270 [21,512 - 22,546]
Case 1650M/2050M (R42)	3,475 - 3,625 [23,959 - 24,994]	3,475 - 3,625 [23,959 - 24,994]
John Deere JD 750K/850K (E460) JD 850L (E470)	3,475 - 3,625 [23,959 - 24,994]	3,475 - 3,625 [23,959 - 24,994]

Table 3-3 Hydraulic Pressure Readings

Brake Pressure Check



Komatsu (K50) installation shown.
See Pages 3-2 thru 3-4 for test port locations on other installations.

Figure 3-16 Test Gauge Location (K50 shown)

Test Equipment:

- (1) 1,000 psi (6,895 kPa) Gauge

Connect pressure gauge to test port:

- **TP-BRAKE**

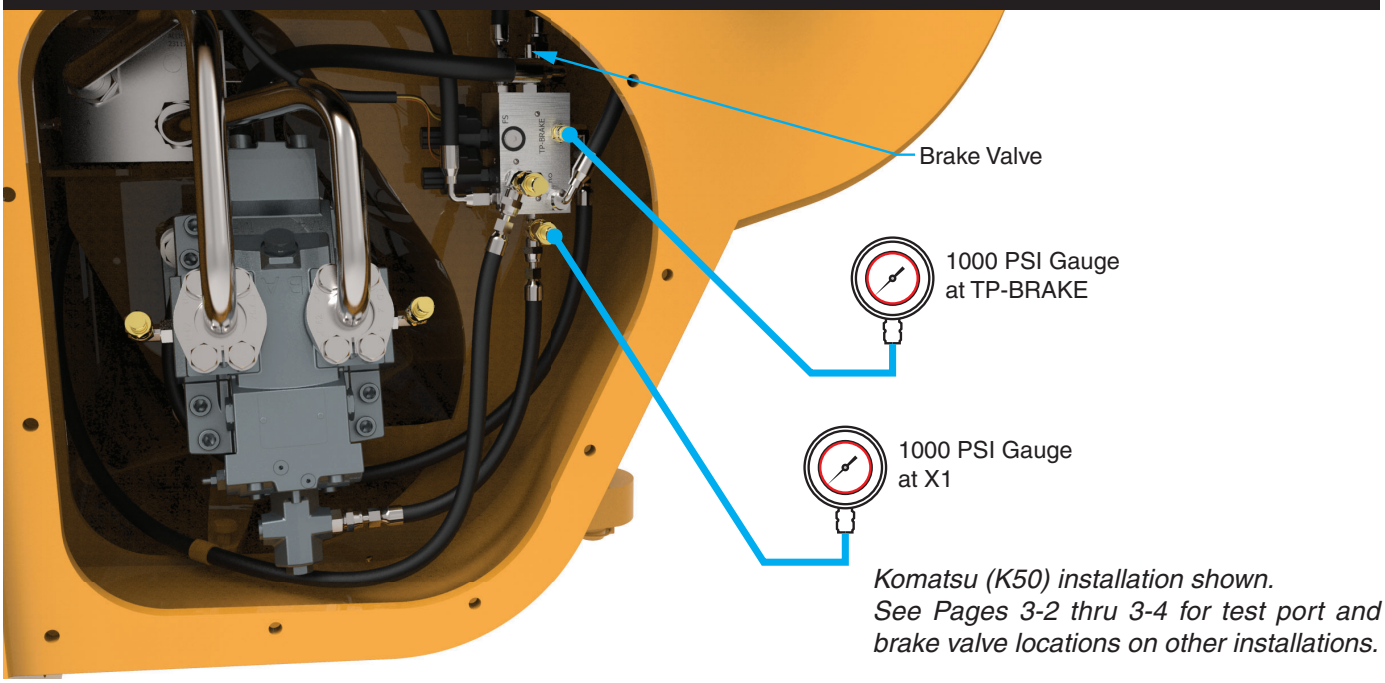
Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge to the **TP-BRAKE** pressure test port on the control manifold.
2. Start dozer and set to high-free idle
3. Operate the winch in **LINE-IN** and **LINE-OUT**.
4. Check pressure. The brake requires 300 psi to release. Low pressure will result in premature wear of the friction discs and added heat generation.

If the brake pressure is not at least 300 psi, 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 and Adjustment



Komatsu (K50) installation shown.
See Pages 3-2 thru 3-4 for test port and brake valve locations on other installations.

Figure 3-17 Test Gauge and Brake Valve Locations (K50 shown)

Test Equipment:
- (2) 1,000 psi (6,895 kPa) Gauges

Connect pressure gauges to test ports:
- **TP-BRAKE**
- **X1 or X1-2**

General

This check determines if the brake valve is properly set.

Instructions

1. Shut down the engine.
2. Connect pressure gauges to the **TP-BR** and **X1** or **X1-2** test ports.
3. Start the engine and set to high free idle.
4. Slowly meter the control lever into the **LINE-IN** position while monitoring both gauges.
5. **TP-BR** pressure will jump to full pilot supply pressure when **X1** or **X1-2** reaches the pilot setting of the brake valve.
6. 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.

Brake Valve Adjustment

1. Slowly meter the control lever into the **LINE-IN** position.
2. Measure pressure at **TP-BR** and **X1** or **X1-2** test ports.
3. Loosen brake valve locknut. Turn adjusting capscrew OUT to decrease pressure and IN to increase pressure. Adjust pressures as shown in Table 3-4.

Dozer	Pressure in PSI [kPa]	
	TP-BRAKE	X1 or X1-2
CAT D7E (C511)	435 - 465 [2,999 - 3,206]	150 - 170 [1,034 - 1,172]
CAT 973D (C973)	525 - 575 [3,620 - 3,964]	140 - 160 [965 - 1,103]
Komatsu D85-15 (K50)	575 - 600 [3,964 - 4,137]	130 - 150 [896 - 1,034]
Case 1650M/2050M (R42)	420 - 450 [2,896 - 3,103]	64 - 84 [441 - 579]
John Deere JD 750K/850K (E460) JD 850L (E470)	300 - 650 [2,068 - 4,482]	150 - 170 [1,034 - 1,172]

Table 3-4 Hydraulic Pressure Readings

LINE-IN Pressure Check

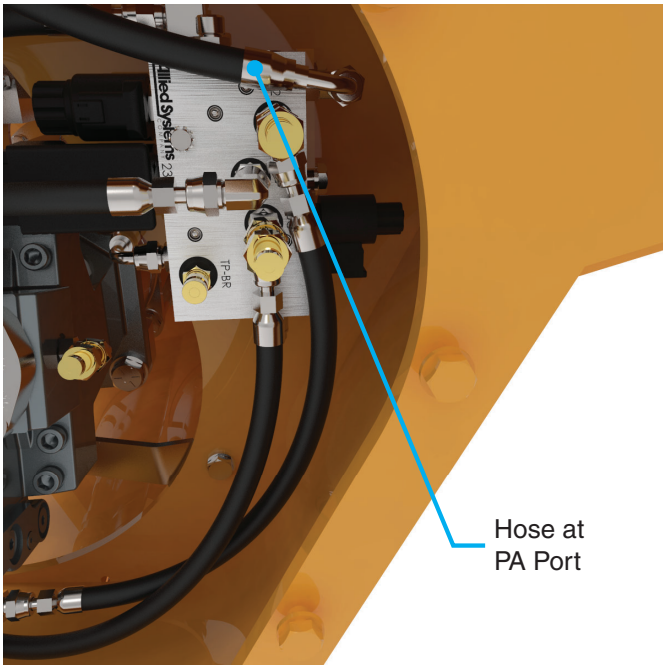


Figure 3-18 Test Equipment Setup
C511 Installation Shown

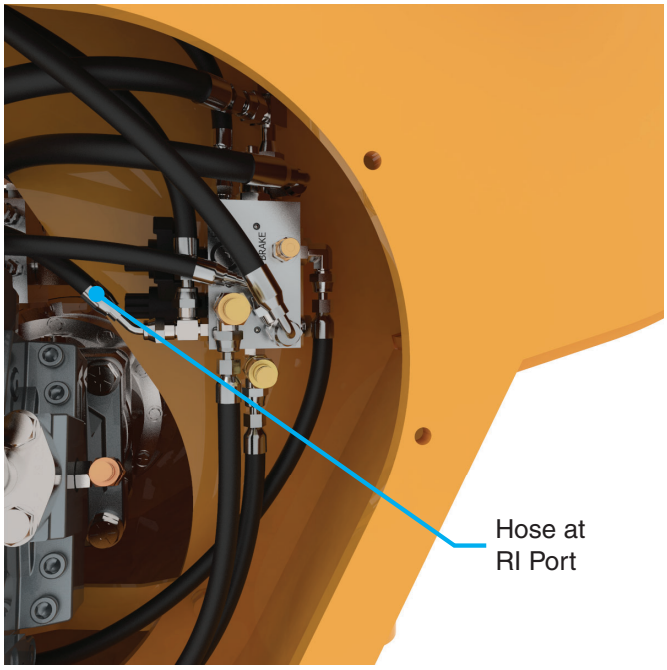


Figure 3-20 Test Equipment Setup
E460 Installation Shown

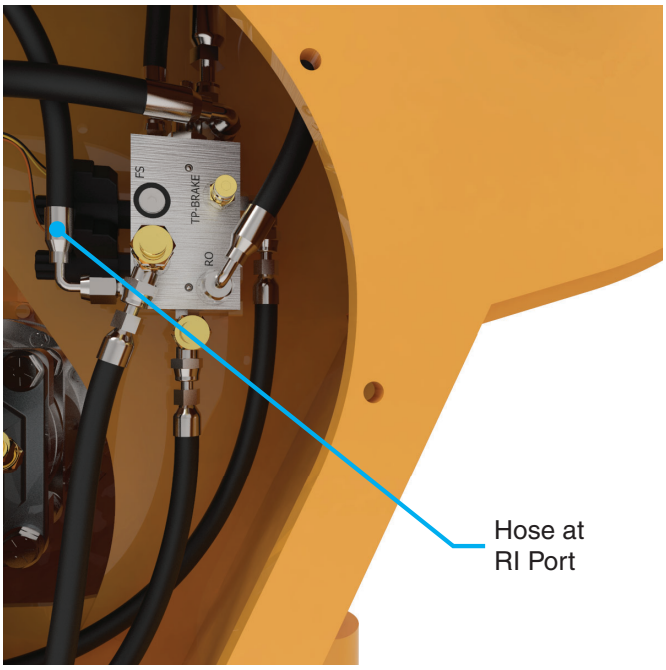


Figure 3-19 Test Equipment Setup
K50 Installation Shown

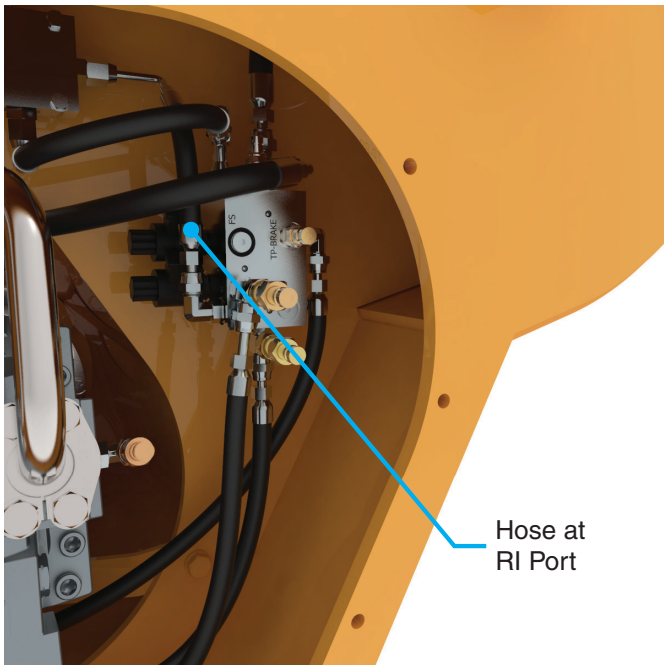


Figure 3-21 Test Equipment Setup
R42 Installation Shown

LINE-IN Pressure Check (continued)

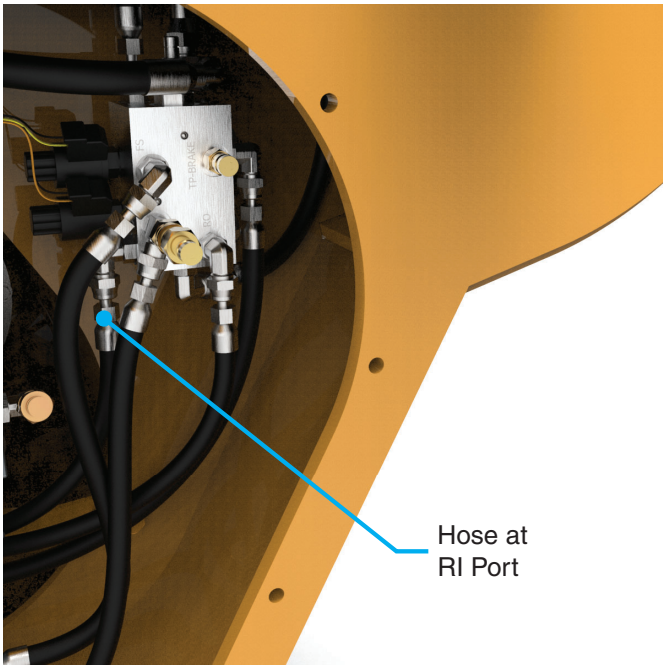


Figure 3-22 Test Equipment Setup
E470 Installation Shown

Instructions

1. With the engine shut off, connect a pressure gauge in line on the **LINE-IN** (RI or PA Port) hose at the control manifold.
2. Start dozer and set to high-free idle.
3. Measure pressure with the control lever in the **LINE-IN** position.
4. Pressure should be as specified in Table 3-5.

If the **LINE-IN** pressure is not as specified in Table 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.

Test Equipment:

- (1) 1,000 psi (6,895 kPa) Gauge
- (1) 5,000 psi (34,474 kPa) Gauge (E470 only)

Connect pressure gauge to test port:

- **RI (K50, E460, E470, and R42)**
- **PA (C511)**

NOTICE

The values in Table 3-5 are based on information available at time of publishing. Refer to the service/maintenance manual supplied with your dozer to verify the available pilot pressure.

Dozer	Pressure in PSI [kPa] LINE-IN Hose	
CAT D7E (C511)	435 - 465 [2,999 - 3,206]	Pilot Pressure
CAT 973D (C973)	525 - 575 [3,620 - 3,964]	Pilot Pressure
Komatsu D85-15 (K50)	575 - 600 [3,964 - 4,137]	Pilot Pressure
Case 1650M/2050M (R42)	420 - 450 [2,896 - 3,103]	Pilot Pressure
John Deere JD 750K/850K (E460)	300 - 650 [2,068 - 4,482]	Pilot Pressure
John Deere JD 850L (E470)	3,475 - 3,625 [23,959 - 24,994]	Full Supply Pressure

Table 3-5 Hydraulic Pressure Readings

LINE-OUT Pressure Check

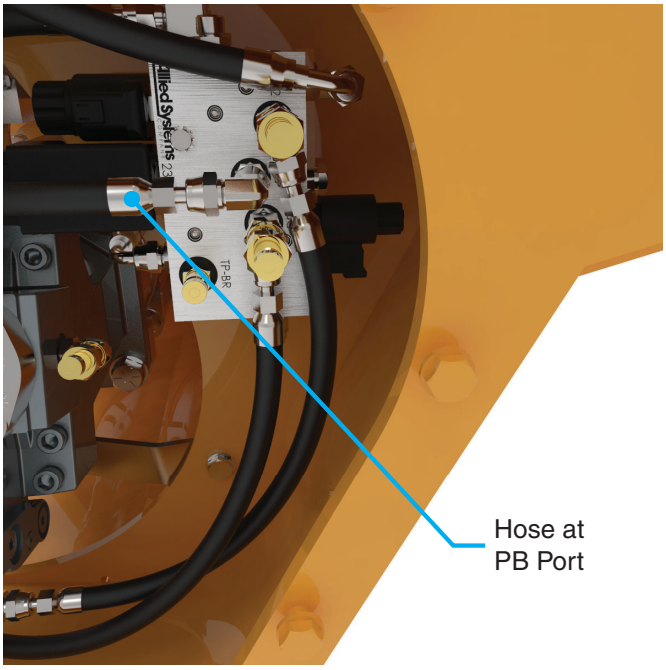


Figure 3-23 Test Equipment Setup
C511 Installation Shown

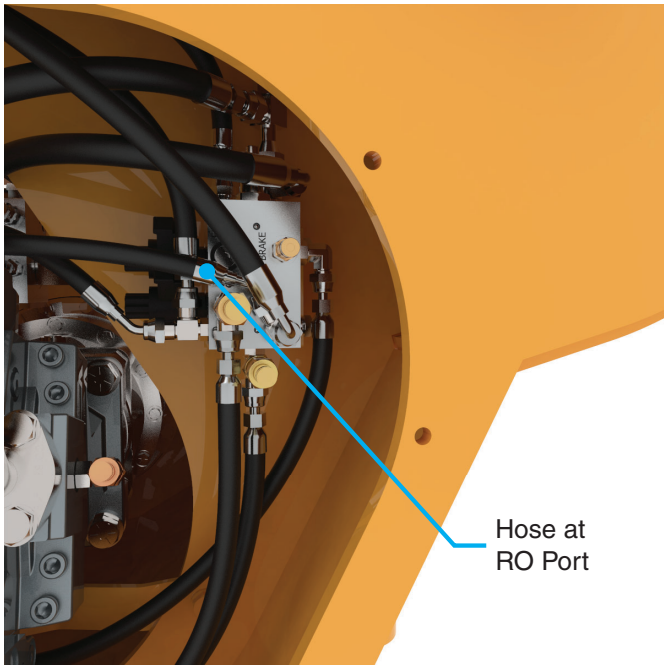


Figure 3-25 Test Equipment Setup
E460 Installation Shown

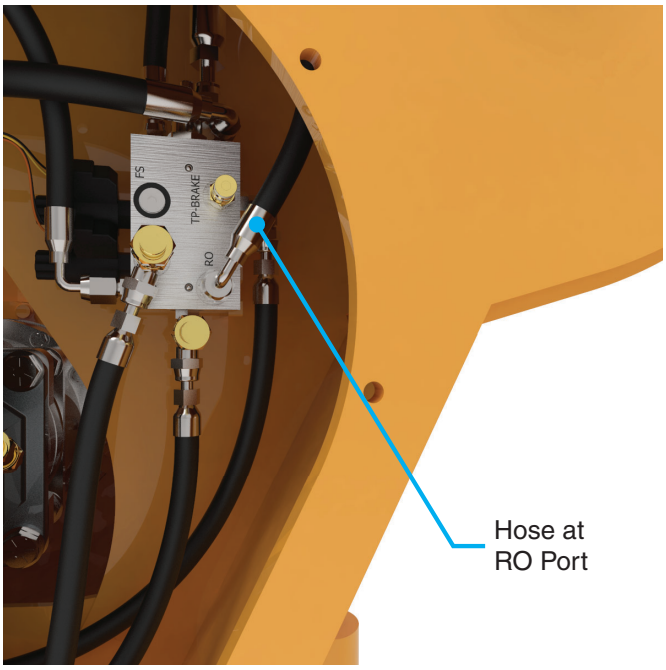


Figure 3-24 Test Equipment Setup
K50 Installation Shown

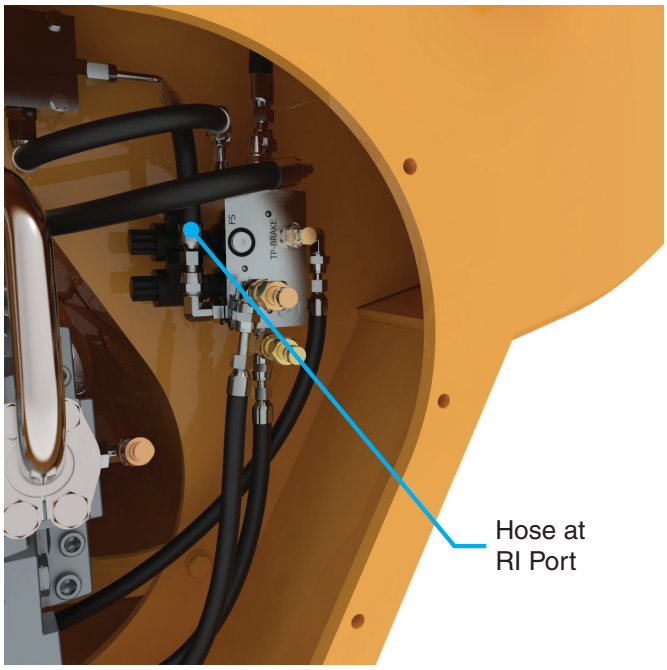


Figure 3-26 Test Equipment Setup
R42 Installation Shown

LINE-OUT Pressure Check (continued)

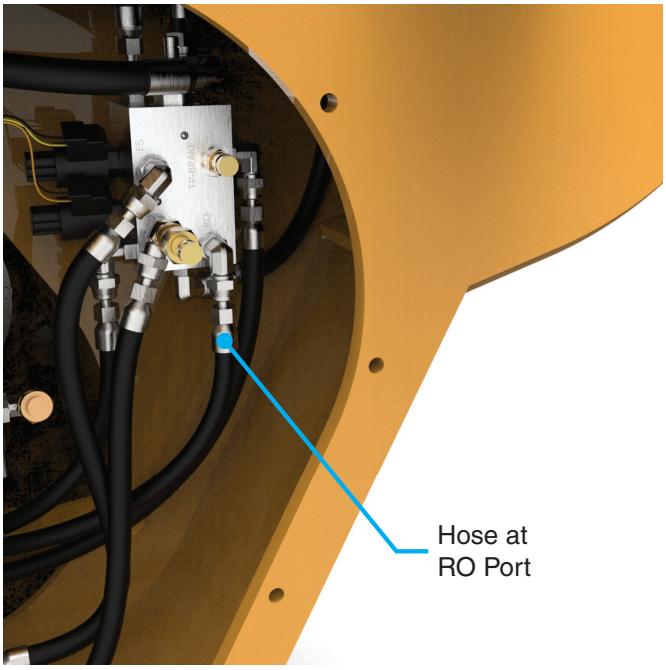


Figure 3-27 Test Equipment Setup
E470 Installation Shown

Instructions

1. With thse engine shut off, connect a 1000 psi pressure gauge in line on the **LINE-OUT** (RO, RI, or PB Port) hose at the control manifold.
2. Start dozer and set to high-free idle.
3. Measure pressure with the control lever in the **LINE-OUT** position.
4. Pressure should be as specified in Table 3-6.

If the **LINE-OUT** pressure is not as specified in Table 3-6, 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.

Test Equipment:

- (1) 1,000 psi (6,895 kPa) Gauge

Connect pressure gauge to test port:

- **RO (K50, E460, and E470)**
- **RI (R42)**
- **PB (C511)**

NOTICE

The values in Table 3-6 are based on information available at time of publishing. Refer to the service/maintenance manual supplied with your dozer to verify the available pilot pressure.

Dozer	Pressure in PSI [kPa] LINE-OUT Hose	
CAT D7E (C511)	435 - 465 [2,999 - 3,206]	Pilot Pressure
CAT 973D (C973)	525 - 575 [3,620 - 3,964]	Pilot Pressure
Komatsu D85-15 (K50)	575 - 600 [3,964 - 4,137]	Pilot Pressure
Case 1650M/2050M (R42)	420 - 450 [2,896 - 3,103]	Pilot Pressure
John Deere JD 750K/850K (E460)	300 - 650 [2,068 - 4,482]	Pilot Pressure
John Deere JD 850L (E470)	800 - 900 [5,516 - 6,205]	Back Pressure

Table 3-6 Hydraulic Pressure Readings

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 4-7 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.

NOTICE

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.

NOTICE

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 reduce the possibility of contamination.

Disconnected hoses should be plugged, and open manifold fittings should be capped.

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.

Winch Removal

1. 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.

1. Drain the gear oil from the winch.
2. Remove the fairlead from the winch. If left on the winch, the winch will not remain level when lifted from the tractor.
3. Disconnect hoses and wire harness from tractor.
4. Connect slings and a crane or lifting device to the winch.

⚠ WARNING

The slings and crane used to lift the winch must have a minimum lifting capacity of 4,500 lb (2,000 kg).

5. Remove the mounting hardware securing winch to tractor.

Intermediate Shaft Removal

1. Intermediate Gear
2. Intermediate Shaft
3. Intermediate Shaft Cover
4. Shim, .020
5. Shim, .005
6. Shim, .007
7. Drum Pinion Gear
8. Roller Bearing Cup
9. Roller Bearing Cone
10. Capscrew
11. Washer

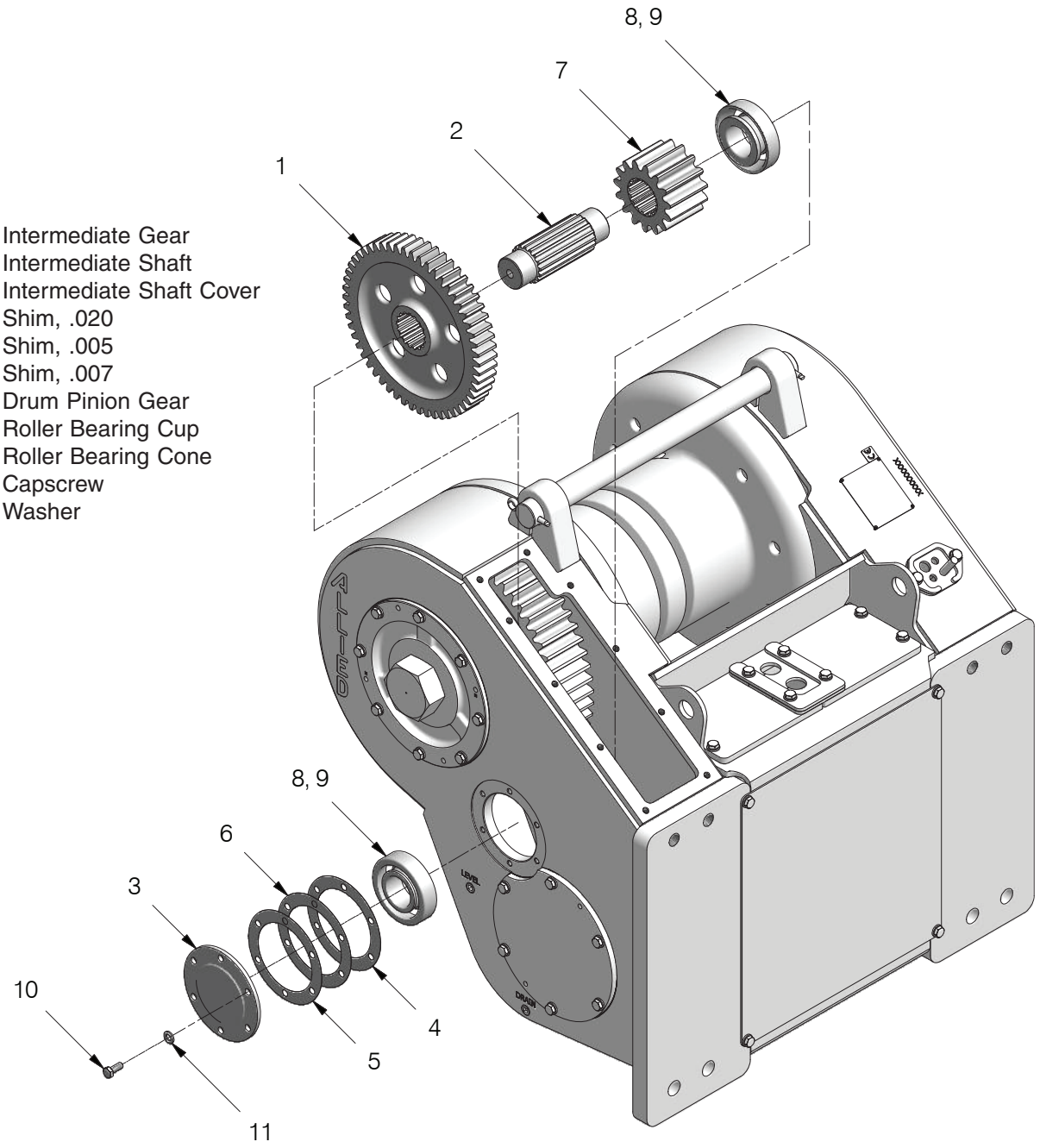
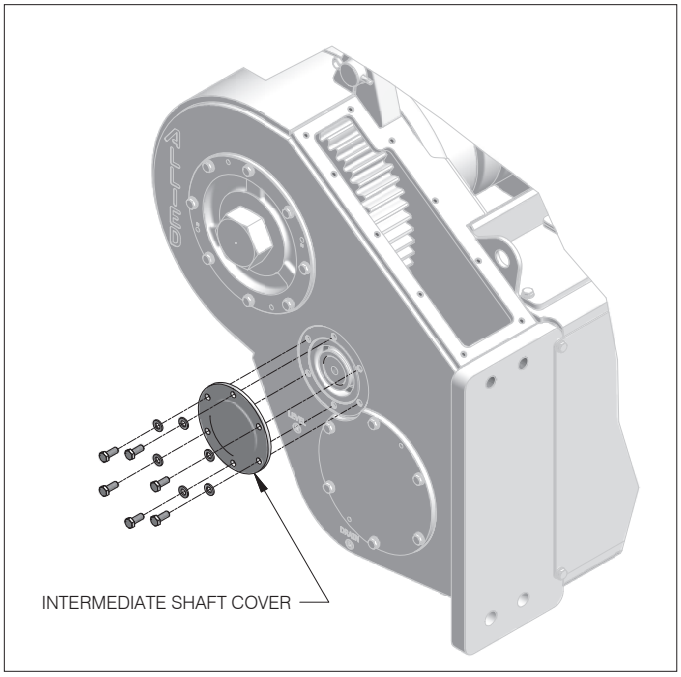


Figure 4-1 Location of Intermediate Shaft Components

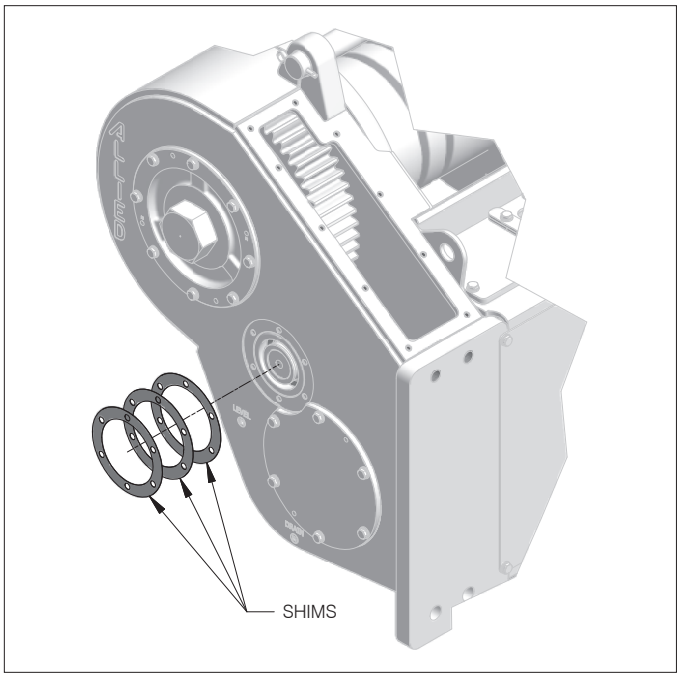
Intermediate Shaft Removal

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

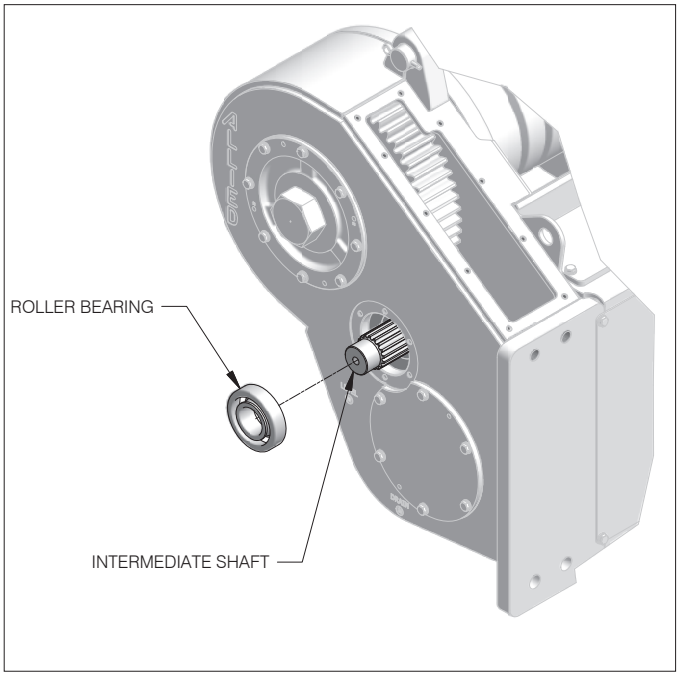
1. Remove the intermediate shaft cover.



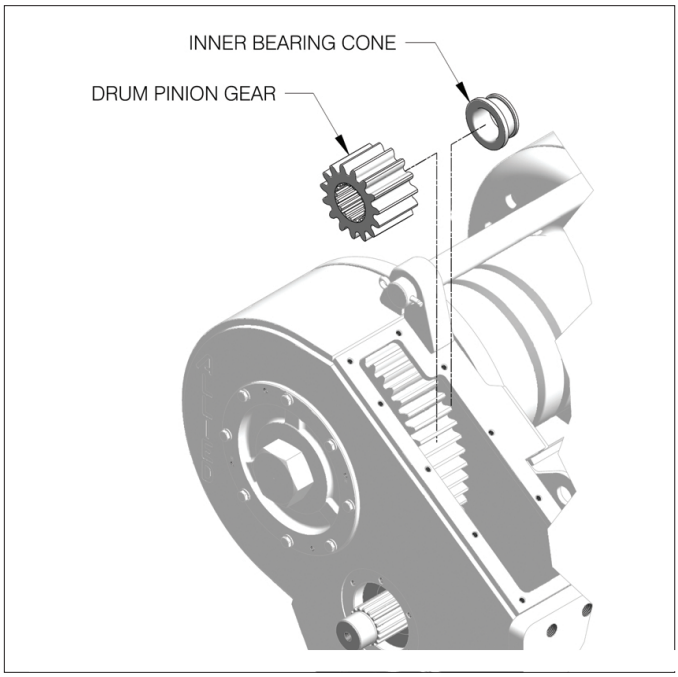
2. Remove shims and tag them for reference during reassembly.



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

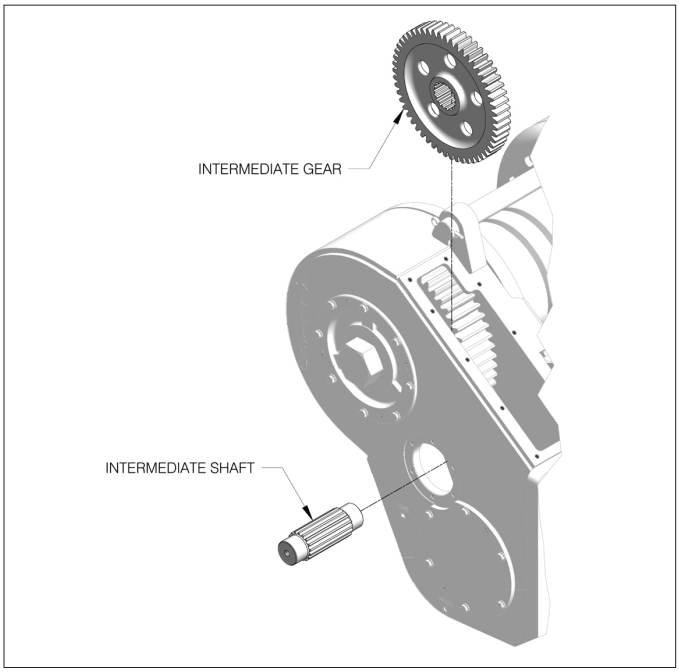


4. Remove the drum pinion gear and the inner bearing cone. Refer to Figure 4-1 for the location of components.



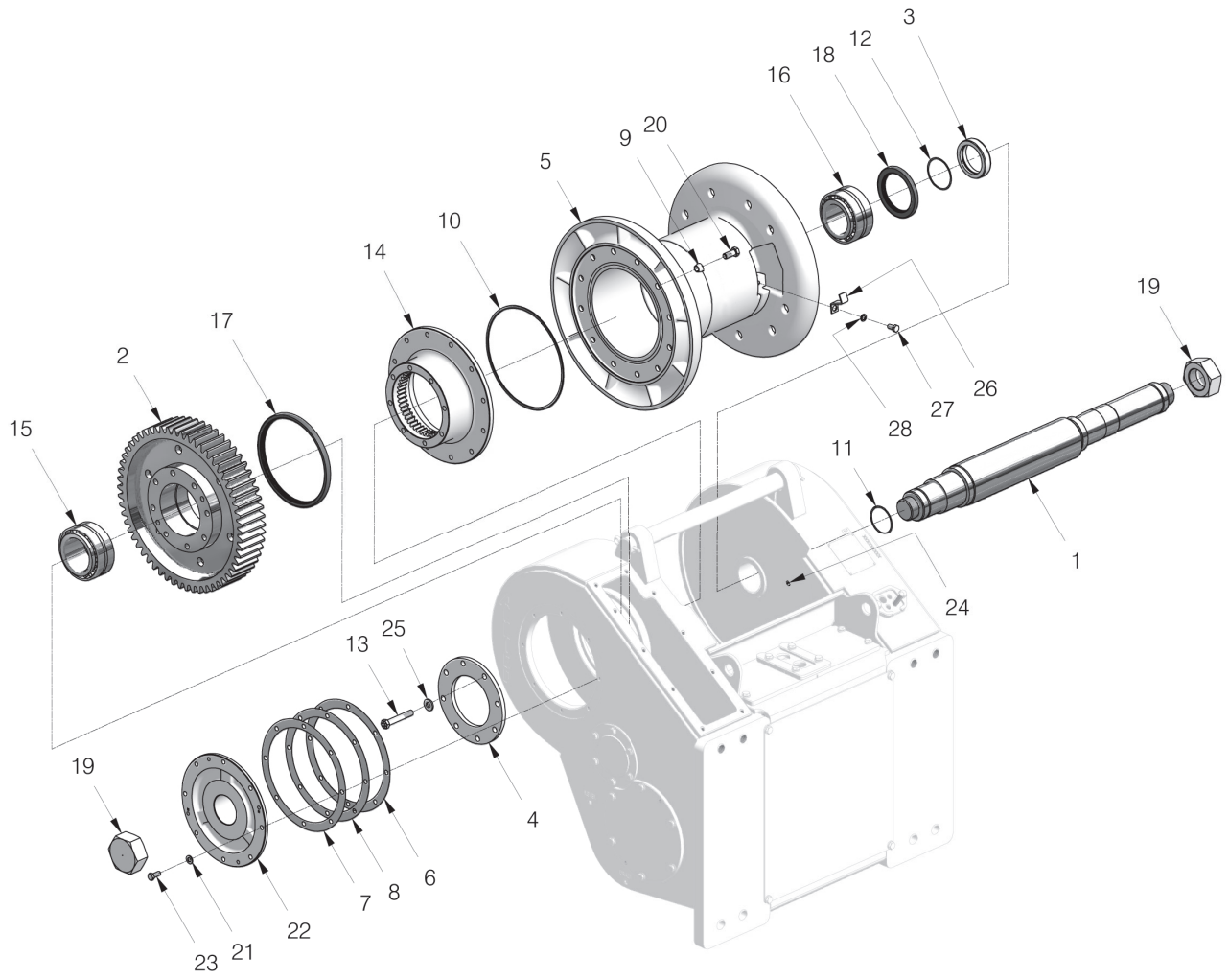
5. Remove the intermediate shaft, while ensuring that the intermediate gear does not fall. Remove intermediate gear.

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 Shaft Removal** section).

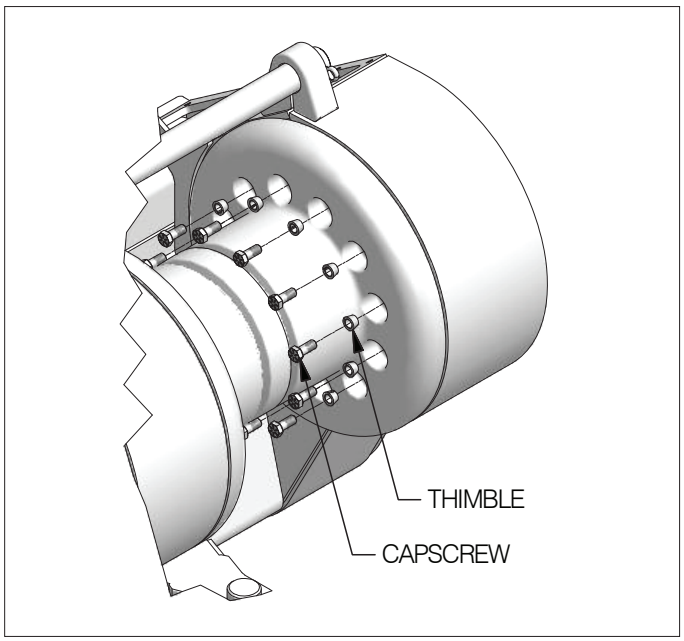


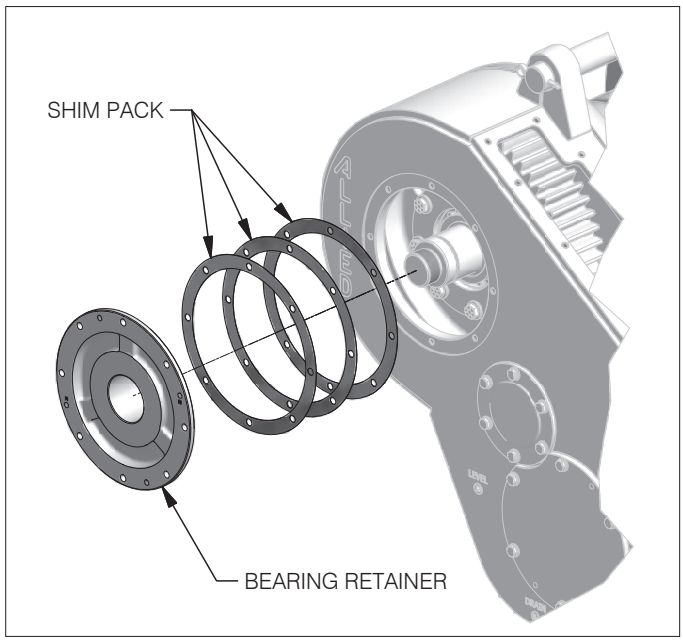
1. Drum Shaft
2. Drum Gear
3. Spacer
4. Retainer Plate
5. Drum
6. Shim, .020
7. Shim, .005
8. Shim, .007
9. Tapered Thimble
10. Ring
11. O-Ring
12. O-Ring
13. Capscrew
14. Adapter
15. Roller Bearing
16. Roller Bearing
17. Oil Seal
18. Oil Seal
19. Nut
20. Capscrew
21. Washer
22. Bearing Retainer
23. Capscrew
24. Fitting
25. Washer
26. Ferrule Keeper
27. Capscrew
28. Washer

Figure 4-2 Location of Drum and Drum Shaft Components

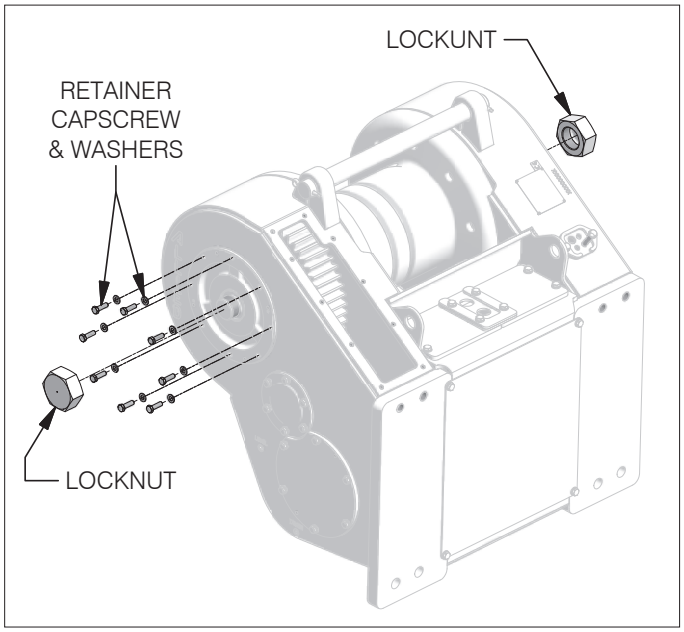
1. Loosen the drum capscrews, then remove capscrews with thimbles, leaving two located 180° apart.

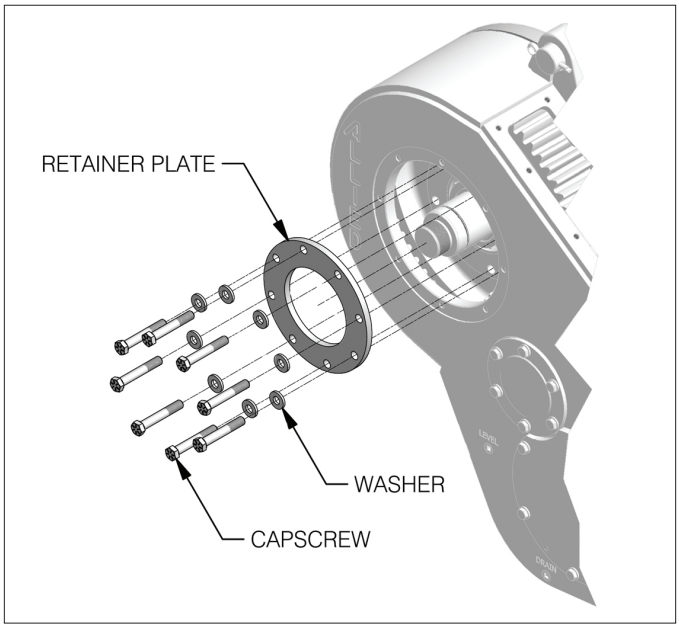
NOTE: Tag shim pack for reference during reassembly.



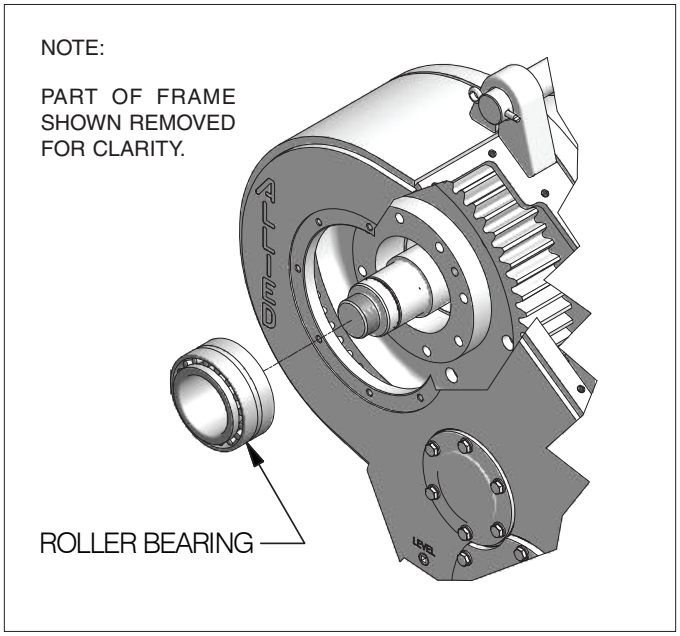


2. Remove drum shaft locknuts, the retainer capscrews and washers.
3. Remove bearing retainer and shim pack.
4. Remove retainer plate by removing retainer capscrews and washers.
5. Remove roller bearing.



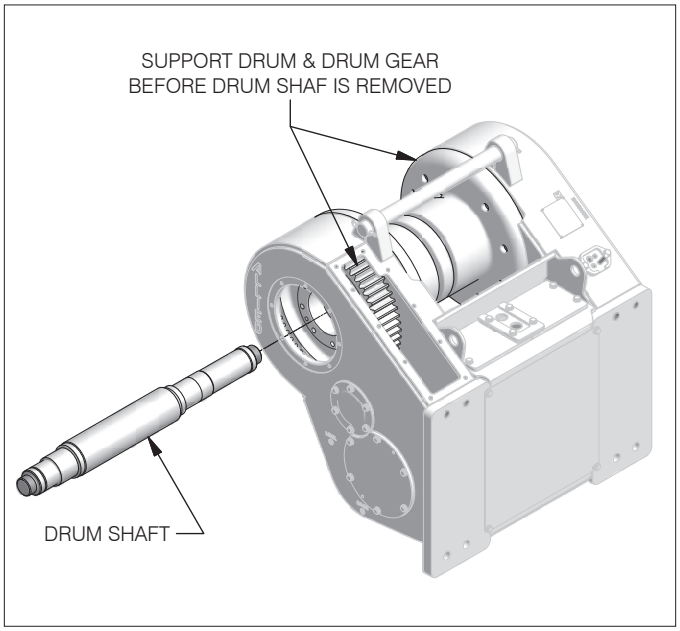


NOTE: Bearing, cups and spacers are a matched set, and must not be interchanged with other bearing set components.



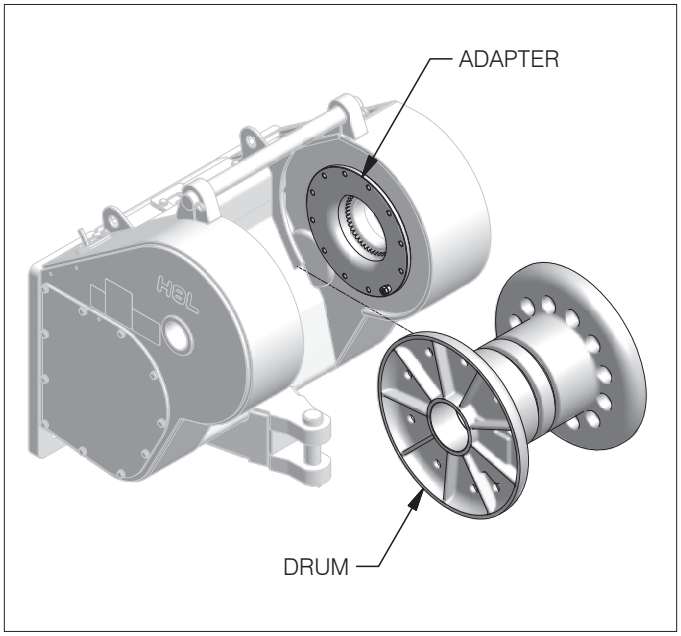
6. Attach a sling around the drum and hoist until there is no slack, then drive the shaft out the right hand side.

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



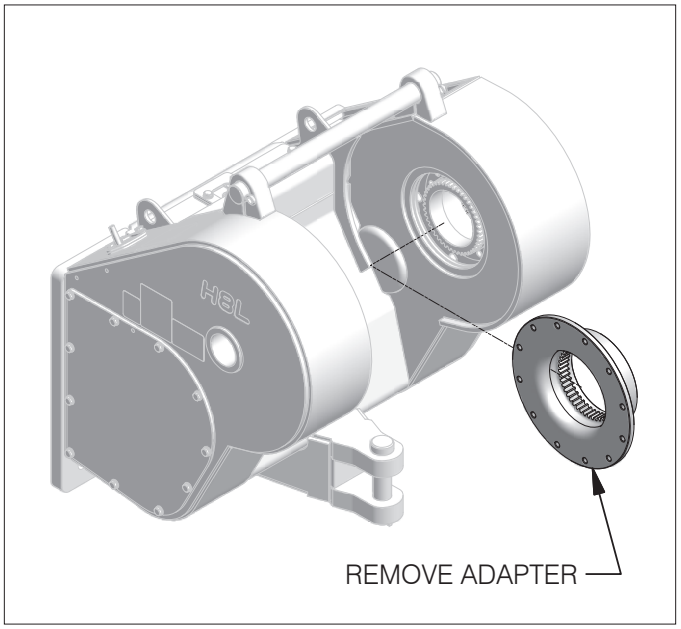
7. Remove two remaining drum capscrews mentioned in Step 1.

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

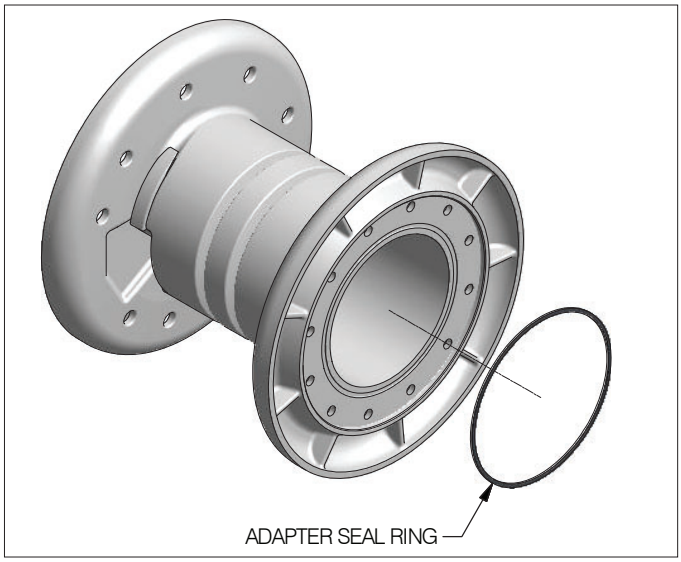


9. Remove adapter.

10. Remove and discard adapter seal from the right -hand end of the drum.



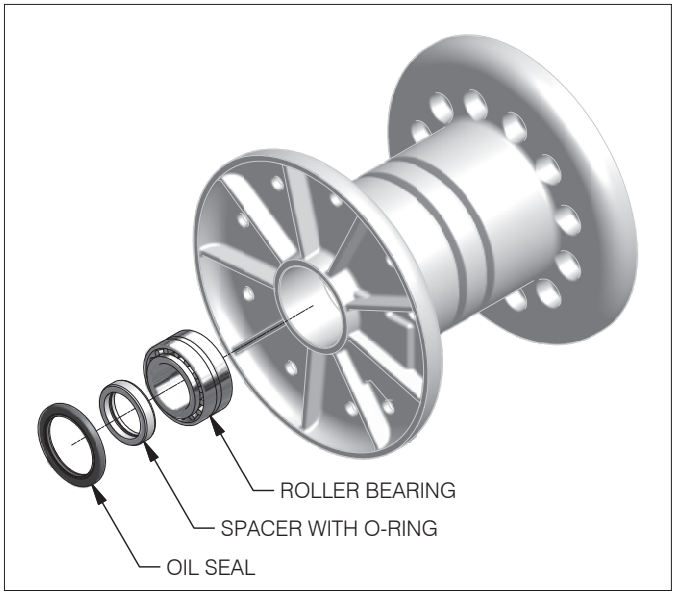
NOTE: This seal must be replaced with a new Allied Systems Company-approved seal during reassembly.



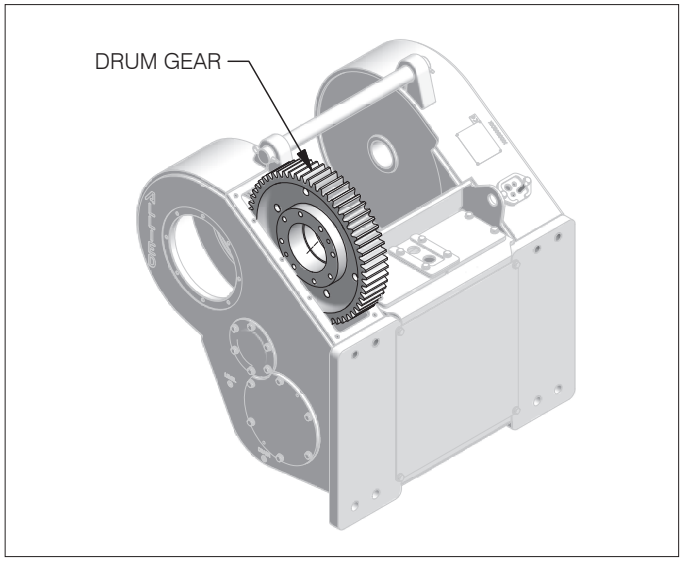
11. Remove oil seal, seal spacer with o-ring, and double tapered roller bearing assembly from the left-hand end of the drum. Discard the oil seal (seal lip should be pointed in).

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

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

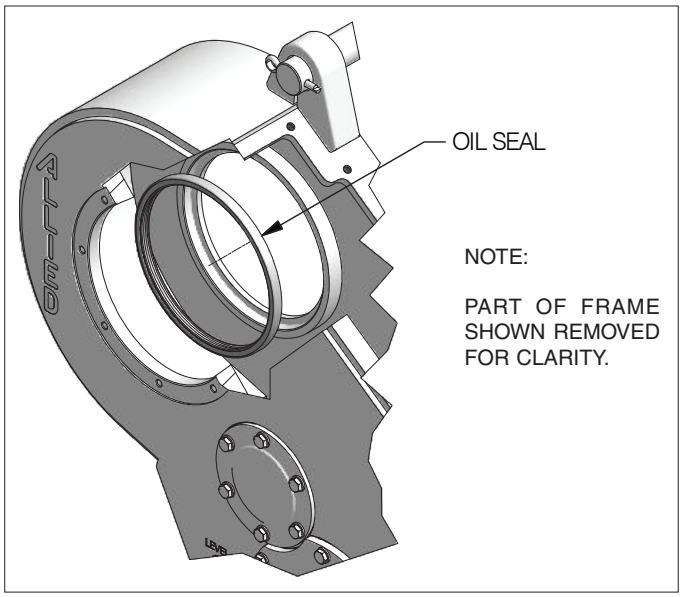


12. Using a suitable lifting device, the drum gear can now be removed.



13. Remove and discard the oil seal from the right-hand side of winch housing.

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



Hydraulic System Disassembly

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

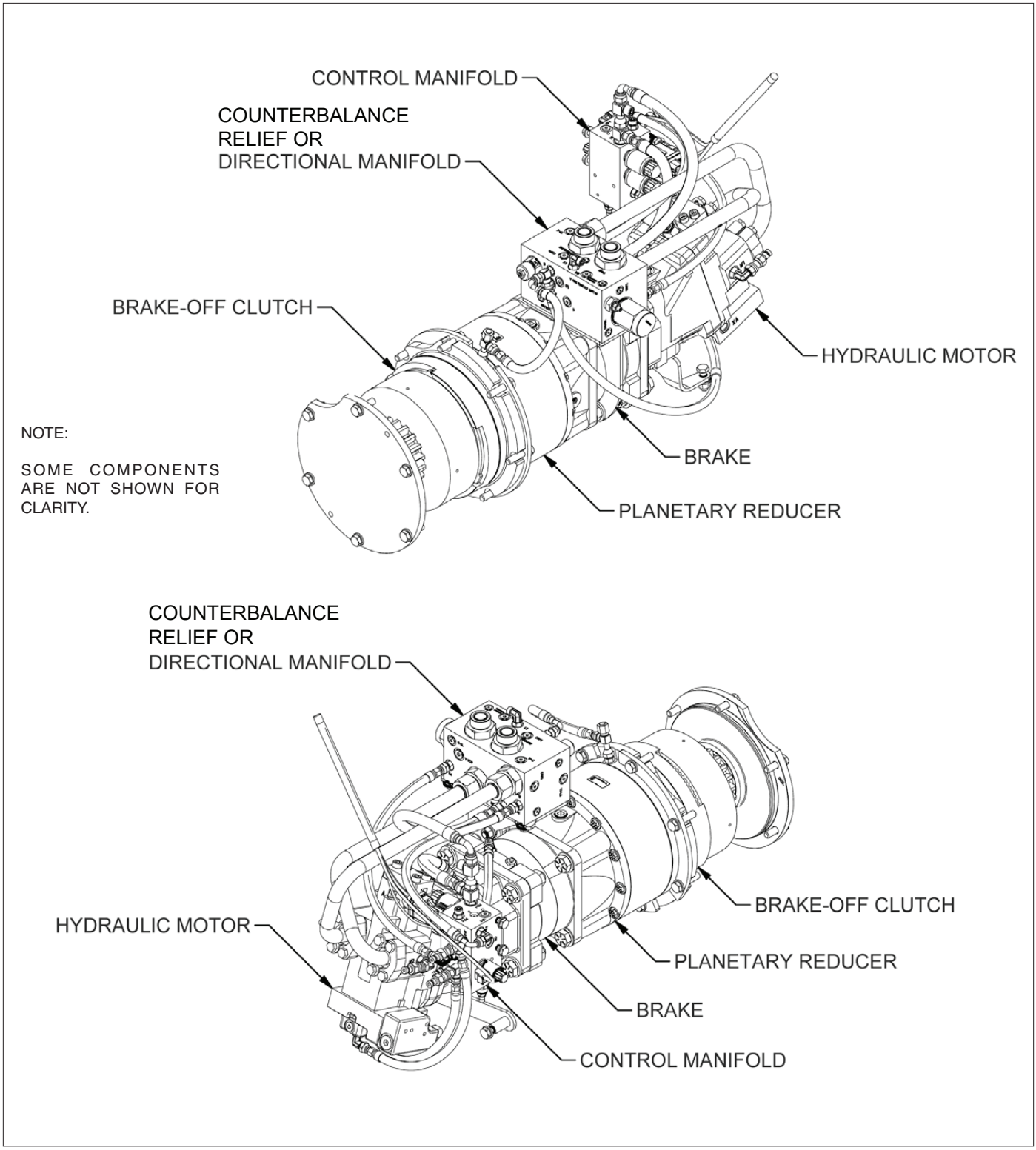
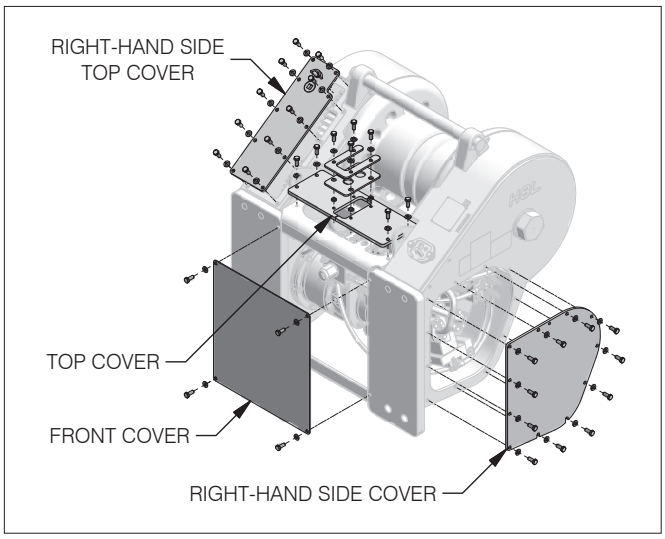
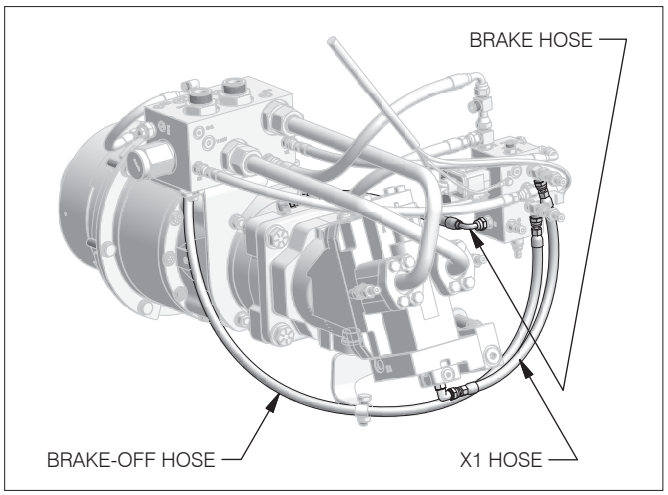


Figure 4-3 Hydraulic System Components

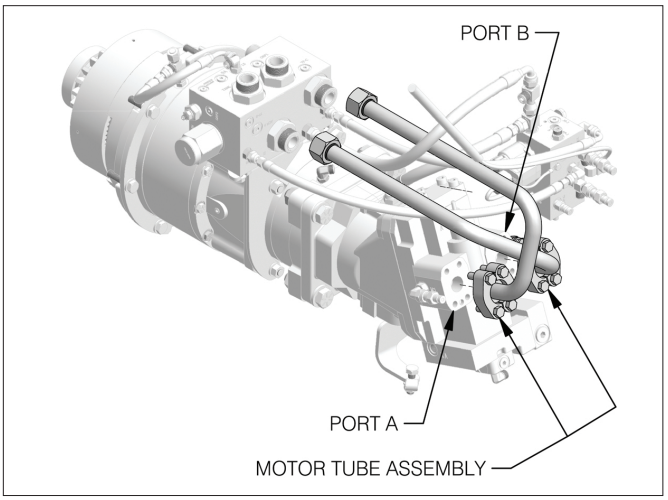
1. Drain oil from winch, and remove covers as shown.



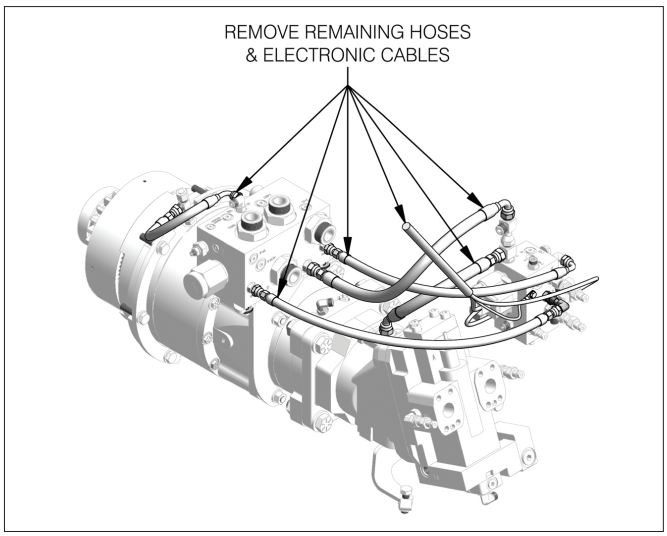
2. Remove BRAKE-OFF, BRAKE, and X1 hoses. (Other parts or components are not shown for view clarity.)



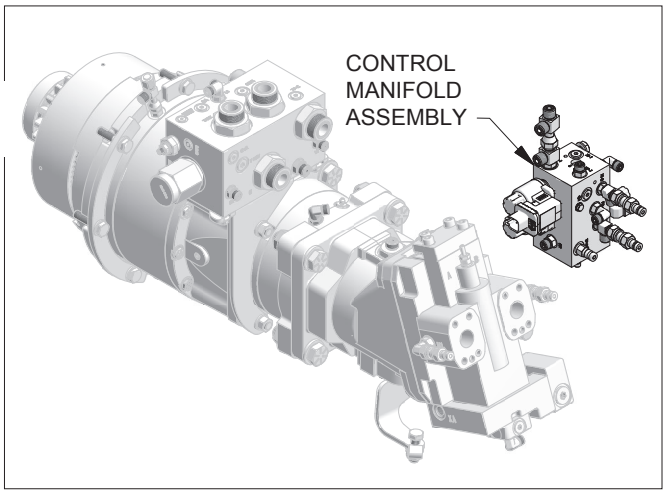
3. Remove motor tube assembly at Ports A and B on the motor.



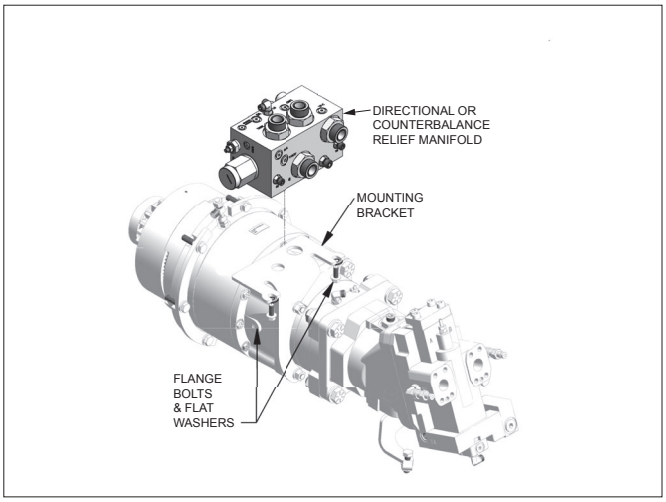
4. Remove remaining hoses.



5. Remove the control manifold assembly.

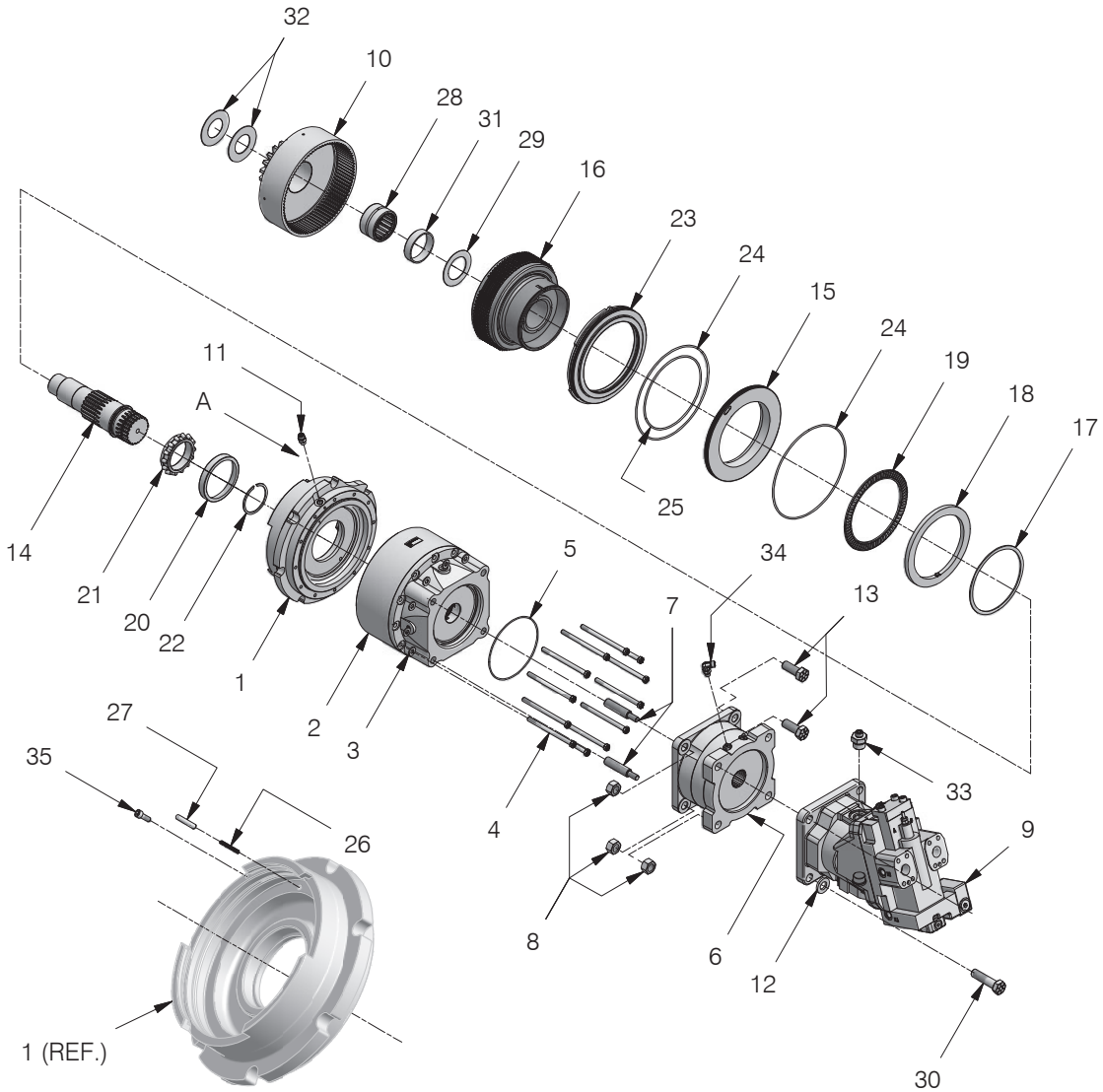


6. Loosen the capscrews, and remove the directional manifold assembly from the mounting bracket.



Motor Shaft Removal and Disassembly

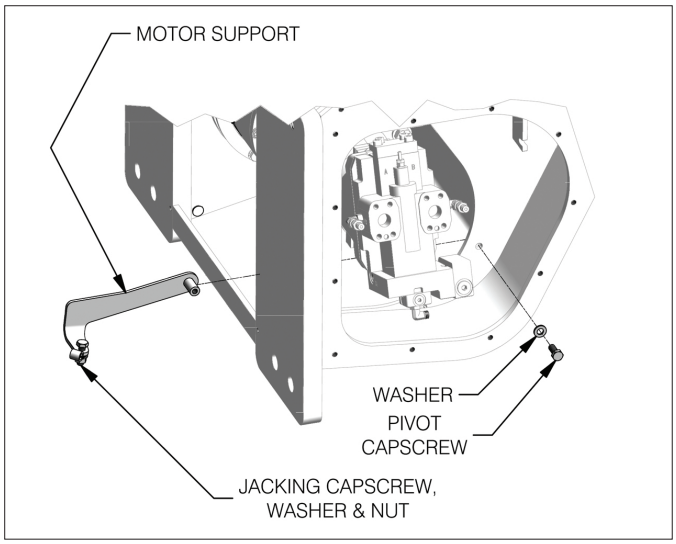
Removal and disassembly of certain motor shaft components can be accomplished while the winch is mounted on the tractor. The motor and brake can be removed without removing any other components (other than various hoses and fittings), but taking out the planetary reducer and clutch housing requires removing the Intermediate Shaft and Gear first (see **Intermediate Shaft Removal** section). Inspect all parts for damage and wear as specified in Figure 4-7.



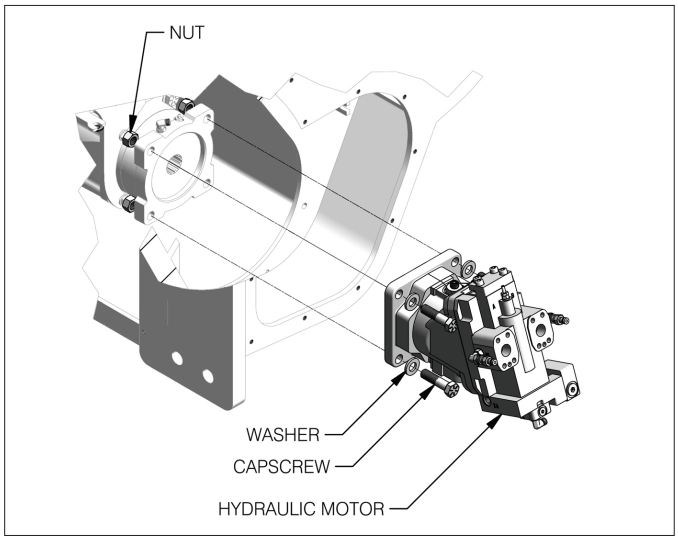
1. Clutch Housing
2. Planetary Reducer Kit
3. Washer
4. Capscrew
5. O-Ring
6. D Mount Dry Disk Brake
7. Stud
8. Nut
9. Hydraulic Motor
10. Spider Reverse Gear
11. Fitting
12. Washer
13. Capscrew
14. Clutch Shaft
15. Clutch Piston
16. Clutch Assembly
17. Snap Ring
18. Thrust Ring
19. Thrust Needle Roller Bearing
20. Bearing Cup
21. Bearing Cone
22. Snap Ring
23. Seal Ring
24. O-Ring
25. O-Ring
26. Spring
27. Pin
28. Bearing
29. Shim, .062
30. Capscrew
31. Bearing Spacer
32. Shim, .062
33. Fitting
34. Fitting
35. Capscrew

Figure 4-4 Motor Shaft Components

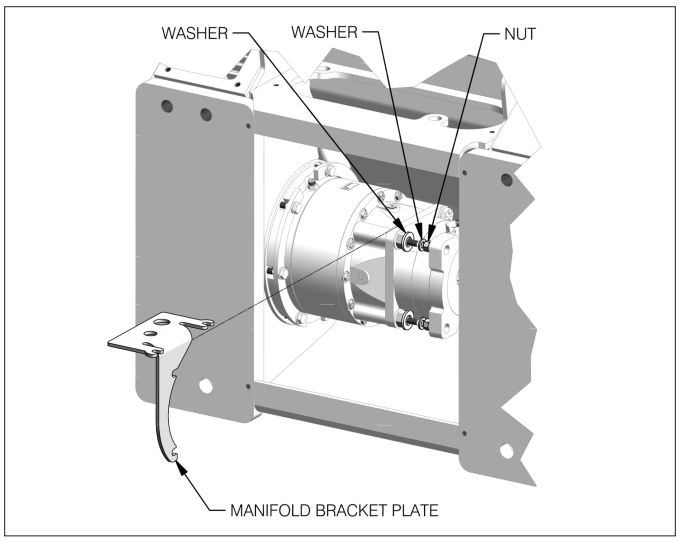
1. Remove the motor support from winch frame.



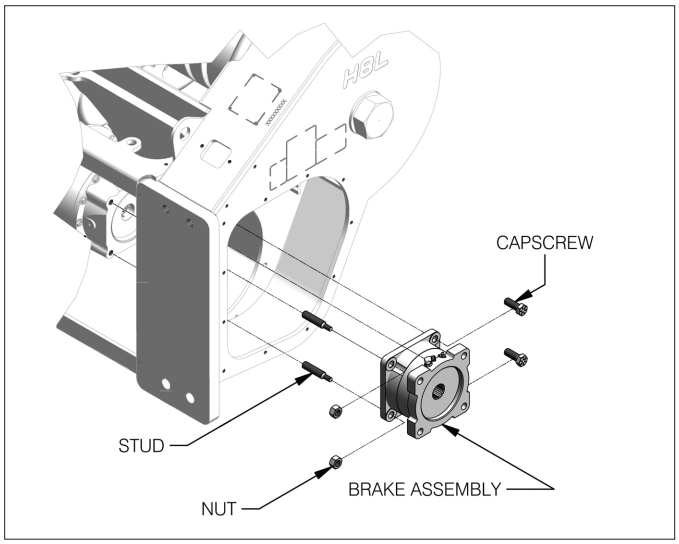
2. Remove the hydraulic motor.



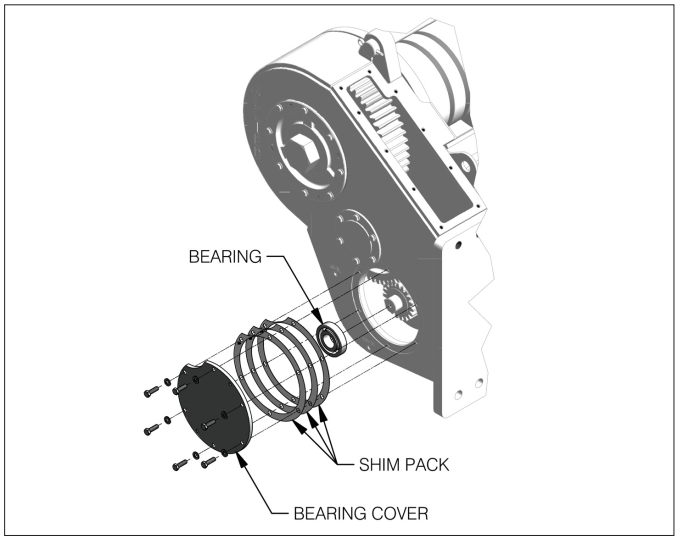
3. Remove the manifold bracket plate.



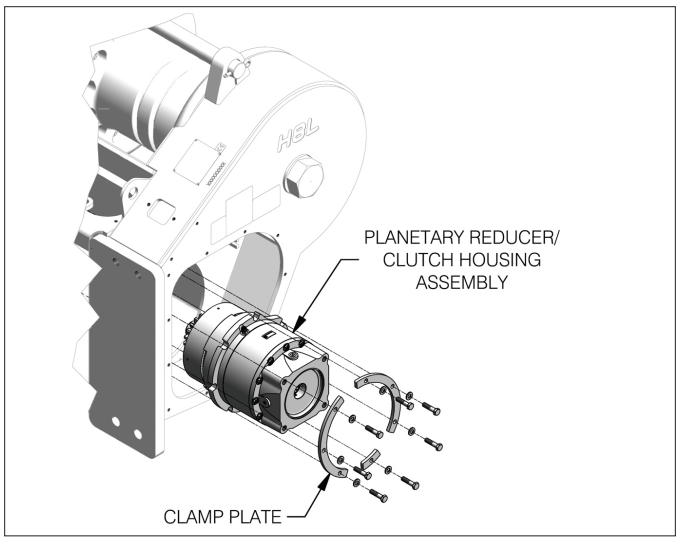
4. Remove the brake.



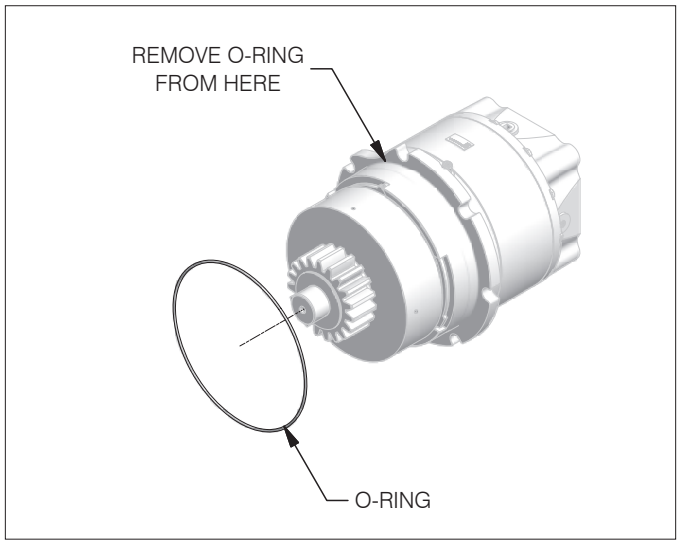
5. Remove the bearing cover, shims and the bearing.



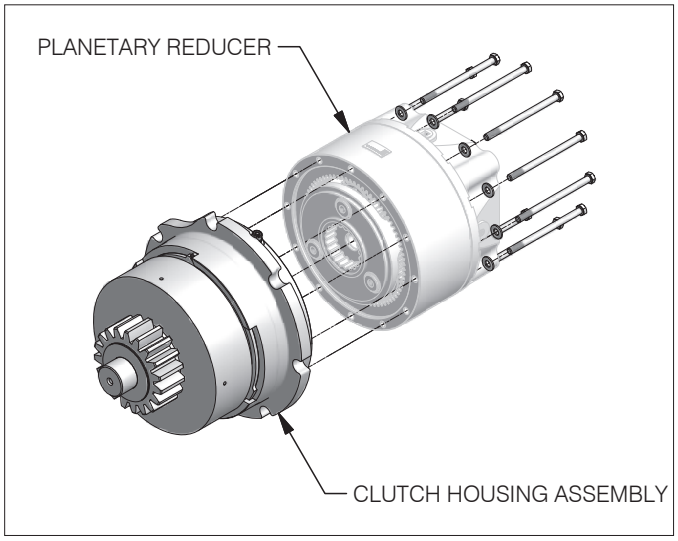
6. Remove planetary reducer/clutch housing assembly.



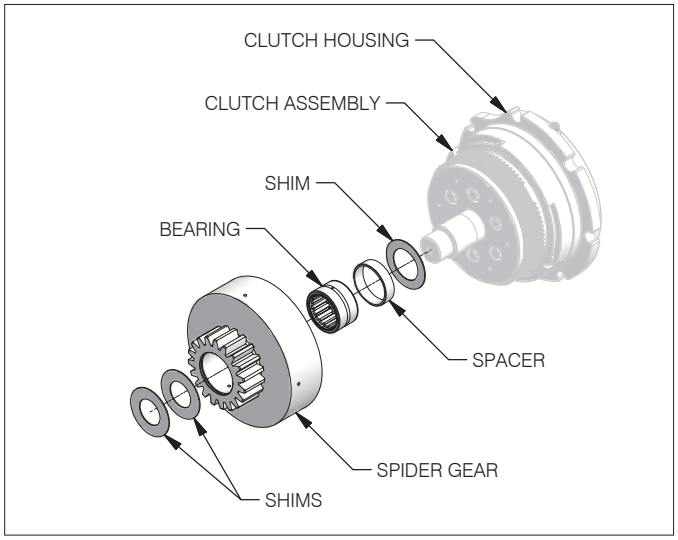
7. Remove and discard the O-ring.



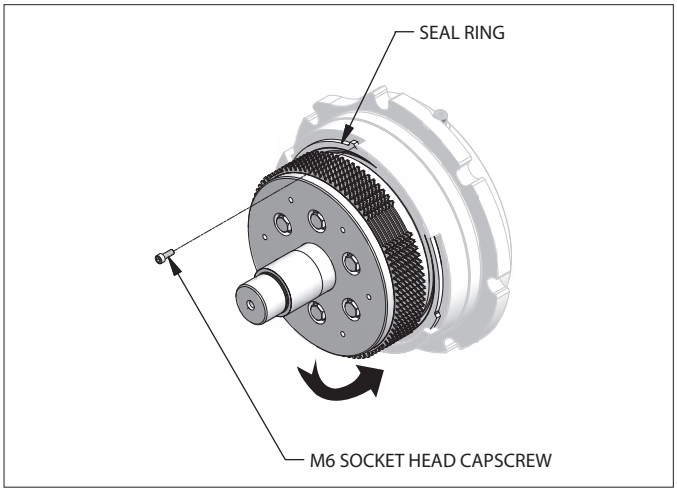
8. Remove the clutch housing from the reducer.



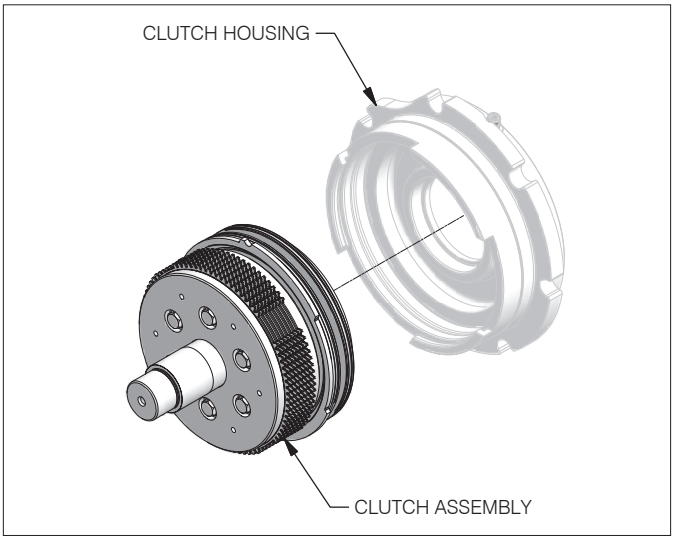
9. Remove spider gear, shims, bearing and spacer.



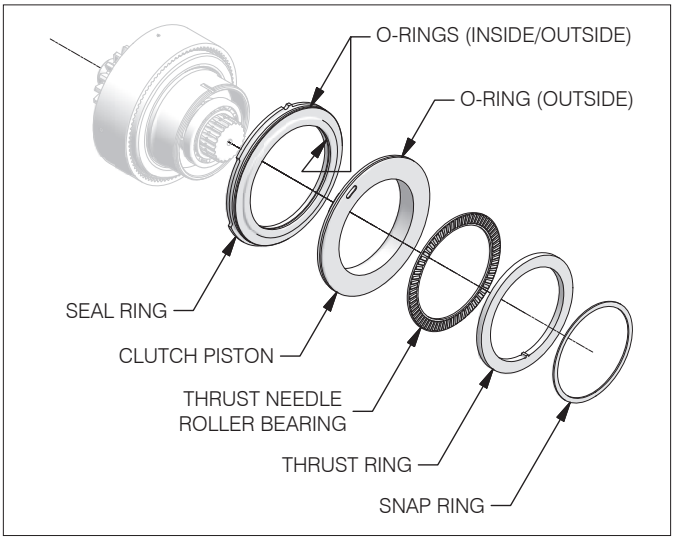
10. Remove 6mm socket head capscrew. Drive seal ring approximately 60 degrees counterclockwise with a brass drift.



11. Pull the clutch assembly from clutch housing.



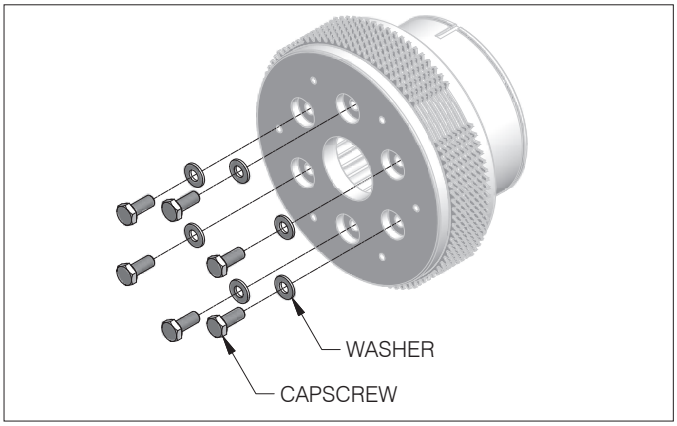
12. Remove clutch piston, seal ring and other parts.



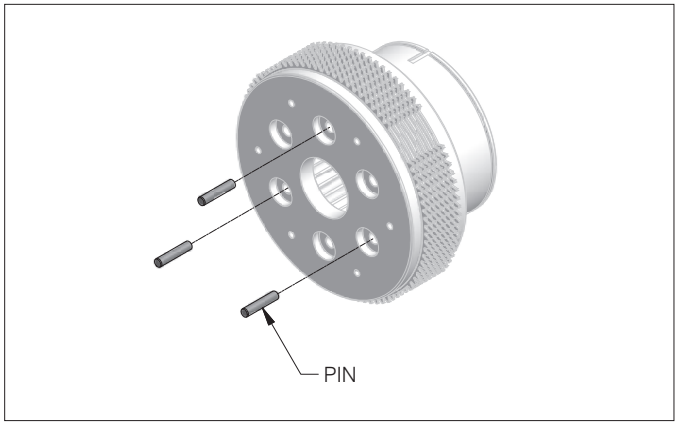
BRAKE-OFF Clutch Disassembly

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

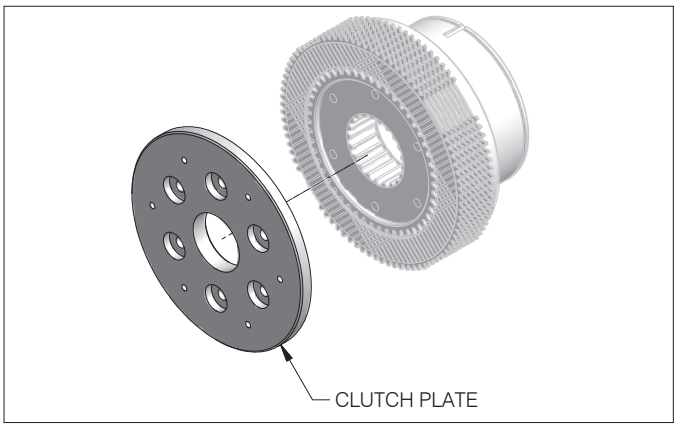
1. Remove capscrews and washers from the plate.



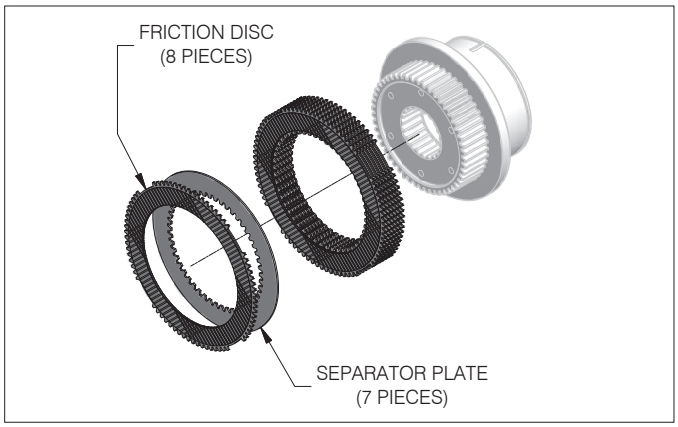
2. Remove pins from the clutch hub. Mark the holes where the pins stay for reference when reassembly.



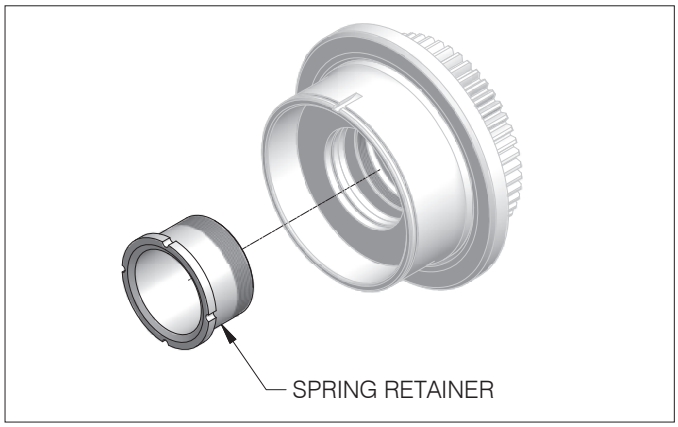
3. Remove the clutch plate.



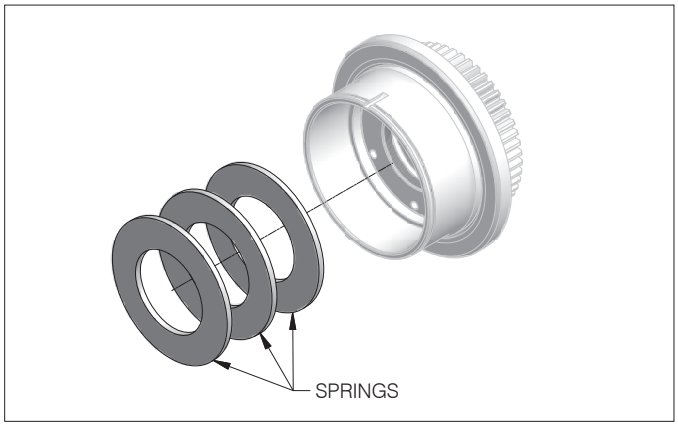
4. Remove separator plates and friction discs.



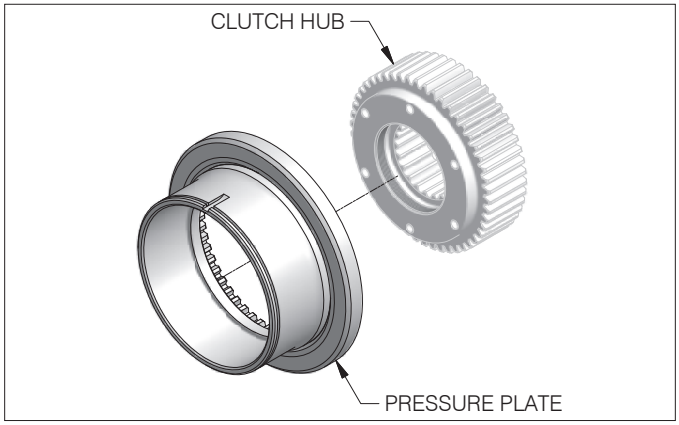
5. Remove the spring retainer from the clutch hub.



6. Remove springs for the pressure plate.

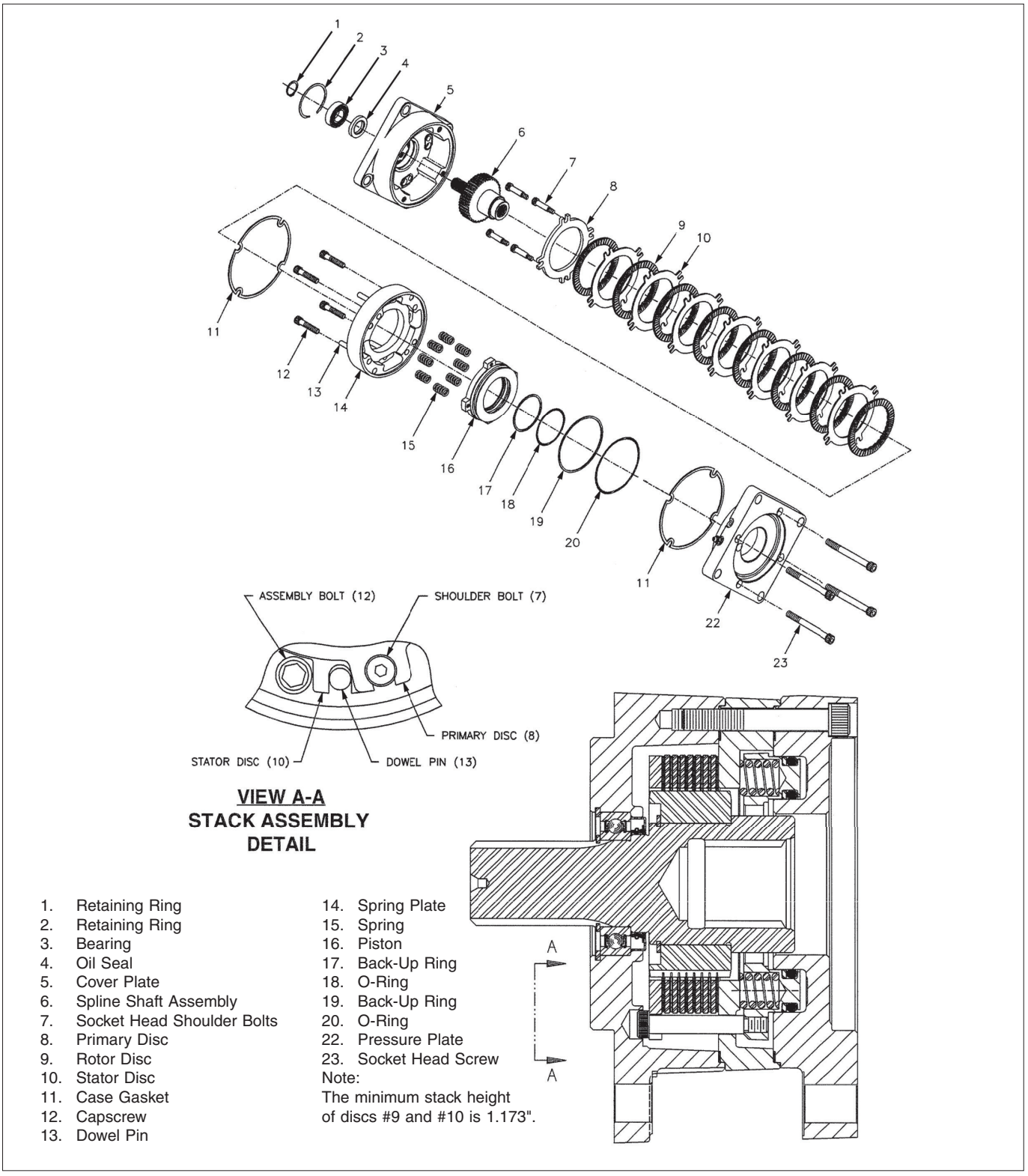


7. Separate the clutch hub and the pressure plate.



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.



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
22. Pressure Plate
23. Socket Head Screw

Note:
The minimum stack height of discs #9 and #10 is 1.173".

Figure 4-5 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:

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

2. The minimum stack height of discs item 9 and item 10 is 1.173".

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

9. Remove spring plate (item 14).

10. Remove case gasket (item 11) from spring plate (item 14).

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

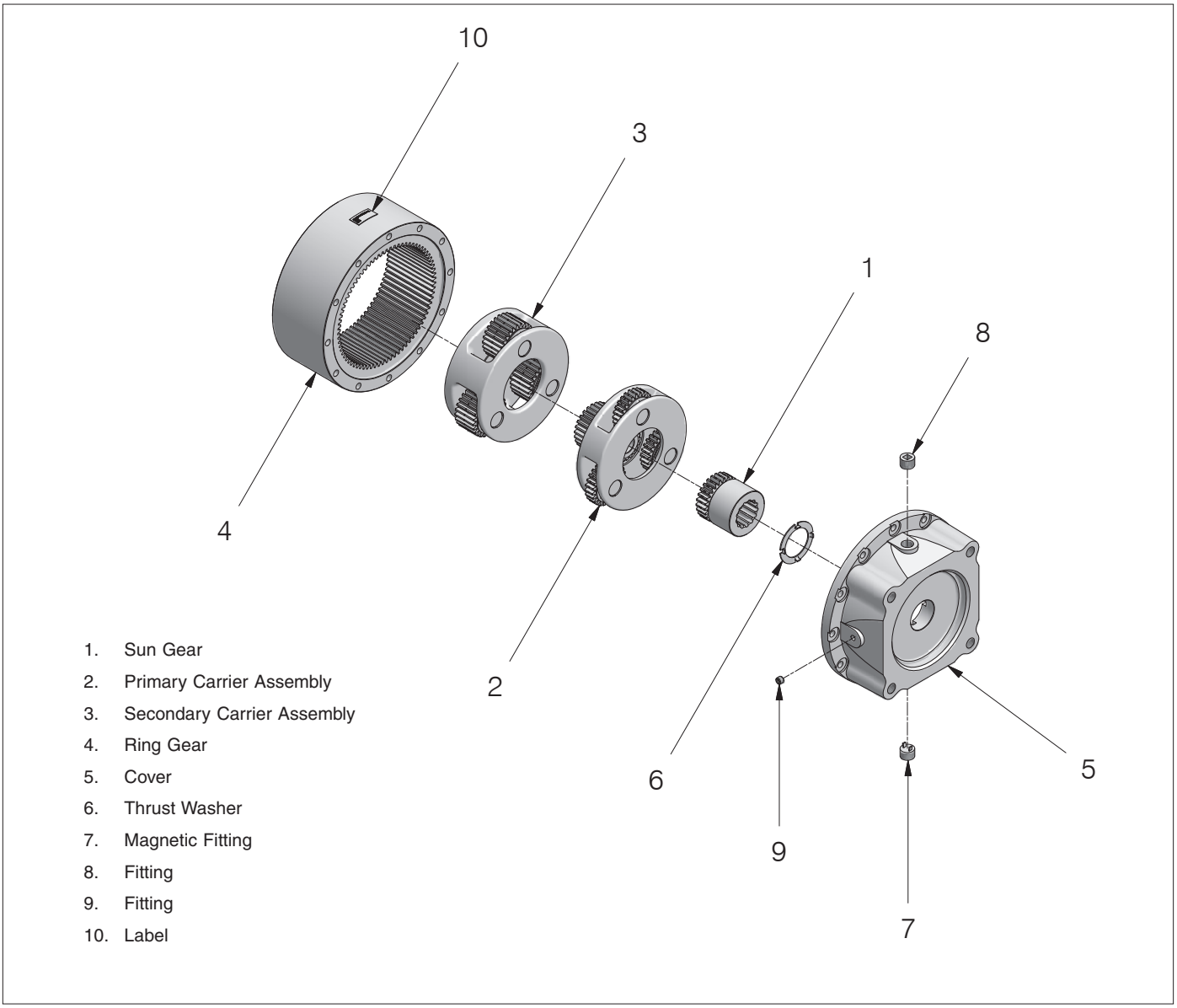
12. Remove piston (item 16) by carefully applying hydraulic pressure to the brake release port in the pressure plate (item 22).

13. Remove O-rings (items 18 & 20) and back-up rings (items 17 & 19) from piston (item 16). **NOTE: Be careful not to scratch or mar piston.**

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

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. Sun Gear
2. Primary Carrier Assembly
3. Secondary Carrier Assembly
4. Ring Gear
5. Cover
6. Thrust Washer
7. Magnetic Fitting
8. Fitting
9. Fitting
10. Label

Figure 4-6 Planetary Reducer Assembly

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

Winch Assembly

All components should be inspected for wear or damage as they are removed. Refer to Figure 4-7, 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.

NOTE: Refer to Figure 1-5, Torque Specifications on page 1-5, for torque values.

Figure 4-7 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 rotor discs for wear, distortion, or damage. The discs should be free of hydraulic oil.	Replace the rotor discs if the wear grooves are worn away, the discs are burned, damaged, warped, or exposed to oil. Brake cleaner may be used to clean dust from the discs but will not remove impregnated oil.
	Check the brake/motor shaft seals for leakage into the brake housing.	Replace damaged seals.
	Inspect the brake/motor shaft for wear or damage.	Replace a damaged shaft.
	Check that the stator discs are flat, free of damaged surfaces.	Replace damaged stator discs.
	Inspect the piston for damage. Make sure the seal groove and sealing surfaces are in good condition.	Replace a damaged piston. Always replace the piston seals when the brake is repaired.
Planetary Speed Reducer	Check the housing for leakage or damage.	Repair or replace assembly.
	Check output shaft bearing end play.	End play is 0.000-0.006". End play is adjusted using the appropriate thickness retaining ring. See parts manual.
	Inspect sun gear and carrier assembly for damage or wear. Sun gear should spin freely in carrier assembly.	Replace assembly.
Winch Motor	Inspect motor shaft seal for wear or damage.	Note: A leaky motor shaft seal will contaminate the brake with oil and the brake will likely require service. Replace seal.
Direction Control Manifold	Check that all passages and cartridge valves are free of contaminants.	Clean or replace cartridge valves. Clean all hydraulic passages.
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.

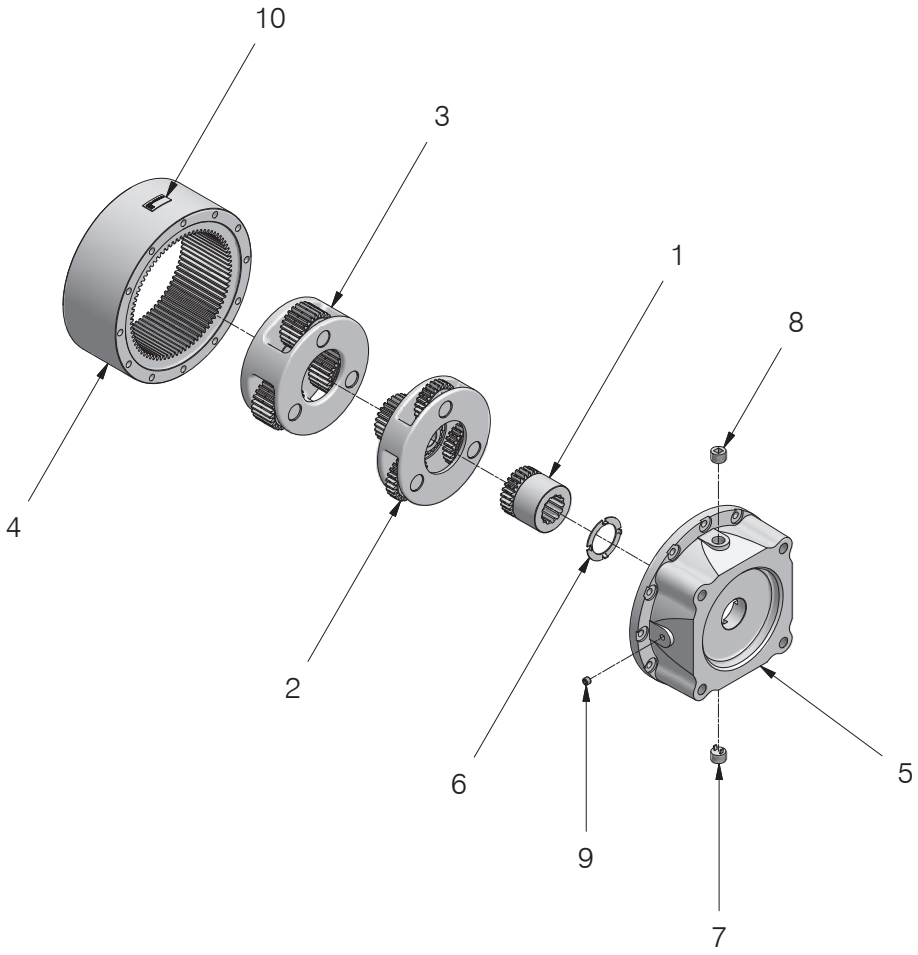
(continued on next page)

Figure 4-7 Visual Inspection (continued)

ITEM	INSPECTION REQUIREMENTS	CORRECTIVE ACTION
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. Inspect frame for damage and or cracking at weld joints	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.



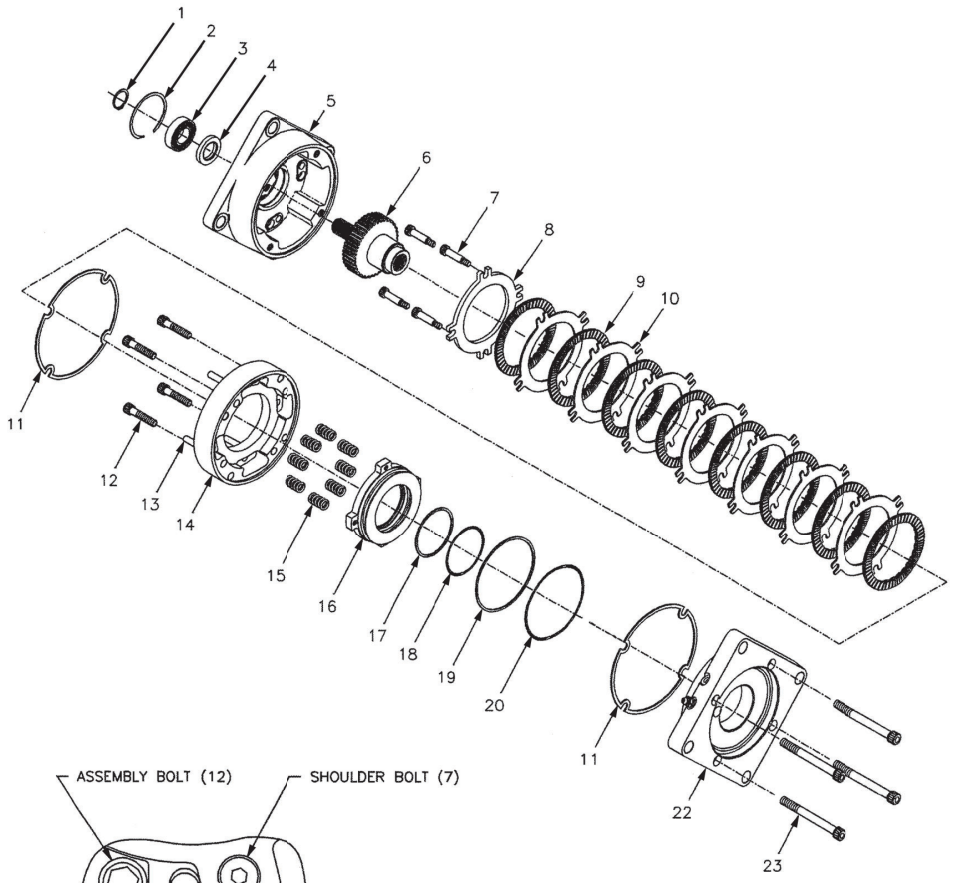
1. Sun Gear
2. Primary Carrier Assembly
3. Secondary Carrier Assembly
4. Ring Gear
5. Cover
6. Thrust Washer
7. Magnetic Fitting
8. Fitting
9. Fitting
10. Label

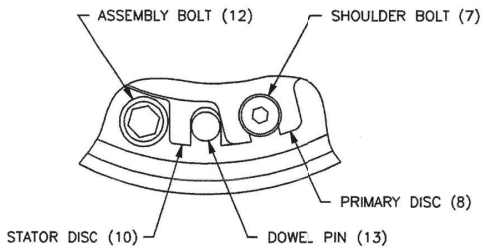
Figure 4-8 Planetary Reducer Assembly

1. Clean mating surfaces and apply a bead of silicone sealant to the face of the hub that mates with the ring gear (item 4). See instructions on sealant package.
2. Place the gear of primary carrier assembly (item 2) into secondary carrier assembly, and place both assembly into ring gear (item 4) while aligning gear teeth.
3. Place sun gear (item 1) into primary carrier assembly (item 2). Sun gear should turn freely by hand.
4. Apply a bead of silicone sealant to cover face of ring gear (item 4).
5. Secure thrust washer (item 6) with tangs engaged in cover (item 5). **NOTE: Washer can be secured to cover with a small amount of grease or silicone sealant. Install the cover and align with hub such that pipe plug holes on cover align with mounting holes on hub.**
6. Install washers and capscrews (not shown) and torque to 40-45 lb. ft. (54-61 Nm) with dry threads. Lubed threads torque to 20-25 lb. ft (27-34 Nm).
7. Position filler opening horizontally and fill unit to oil level hole in cover. Install fittings (items 7, 8 & 9) in cover (item 5).

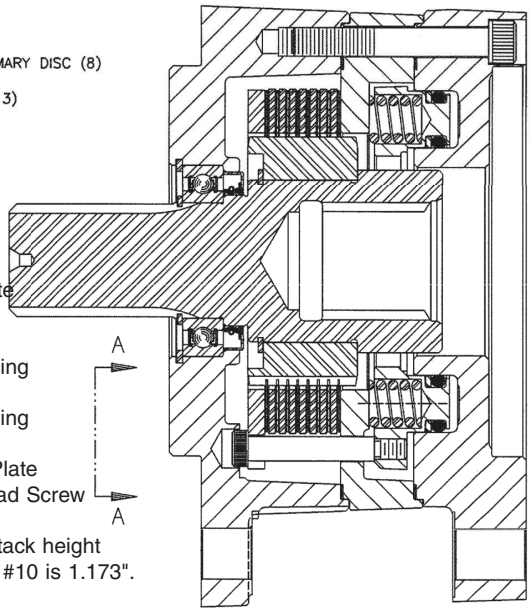
Brake Assembly

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.





VIEW A-A
STACK ASSEMBLY DETAIL



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
22. Pressure Plate
23. Socket Head Screw

Note:
The minimum stack height of discs #9 and #10 is 1.173".

Figure 4-9 Planetary Reducer Assembly

NOTE: Lubricate all rubber components with clean hydraulic fluid 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. Carefully press piston into pressure plate (item 22). Be sure piston is positioned so threaded holes in piston are in alignment with through-holes in spring plate (item 14) when installed.
10. Install springs (item 15) according to pattern and color recorded during disassembly.
11. Affix case gaskets (item 11) to pressure plate (item 22) and spring plate (item 14).
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. **NOTE: The minimum stack height of discs item 9 and item 10 is 1.173".**
14. Install primary disc (item 8). Align tabs on primary disc with through-holes in spring plate (item 14) and partially screw in four socket head shoulder bolts (item 7). **NOTE: Apply two drops of Loctite #242 to threads.** Inspect for free movement of stack. Pressurize brake release port to approximately 400 psi to release discs. Torque shoulder bolts 15-18 lb. ft. (20.3-24.4 N-m) 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 N-m).

BRAKE-OFF Clutch Assembly

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

1. Assemble clutch without springs & retainer.
2. Use clamps to compress frictions & separators between pressure & reaction plates.
3. Measure thickness "B".
4. Add height "A" to thickness "B". this is height "C".
5. Install retainer to height "C". (advancing retainer one tooth, decreases height 0.004).
6. Advance retainer three additional teeth & align with hub splines.
7. Draw a line across adjacent teeth with marker.
8. Measure height "D".
9. Remove retainer noting the number of turns required for removal.

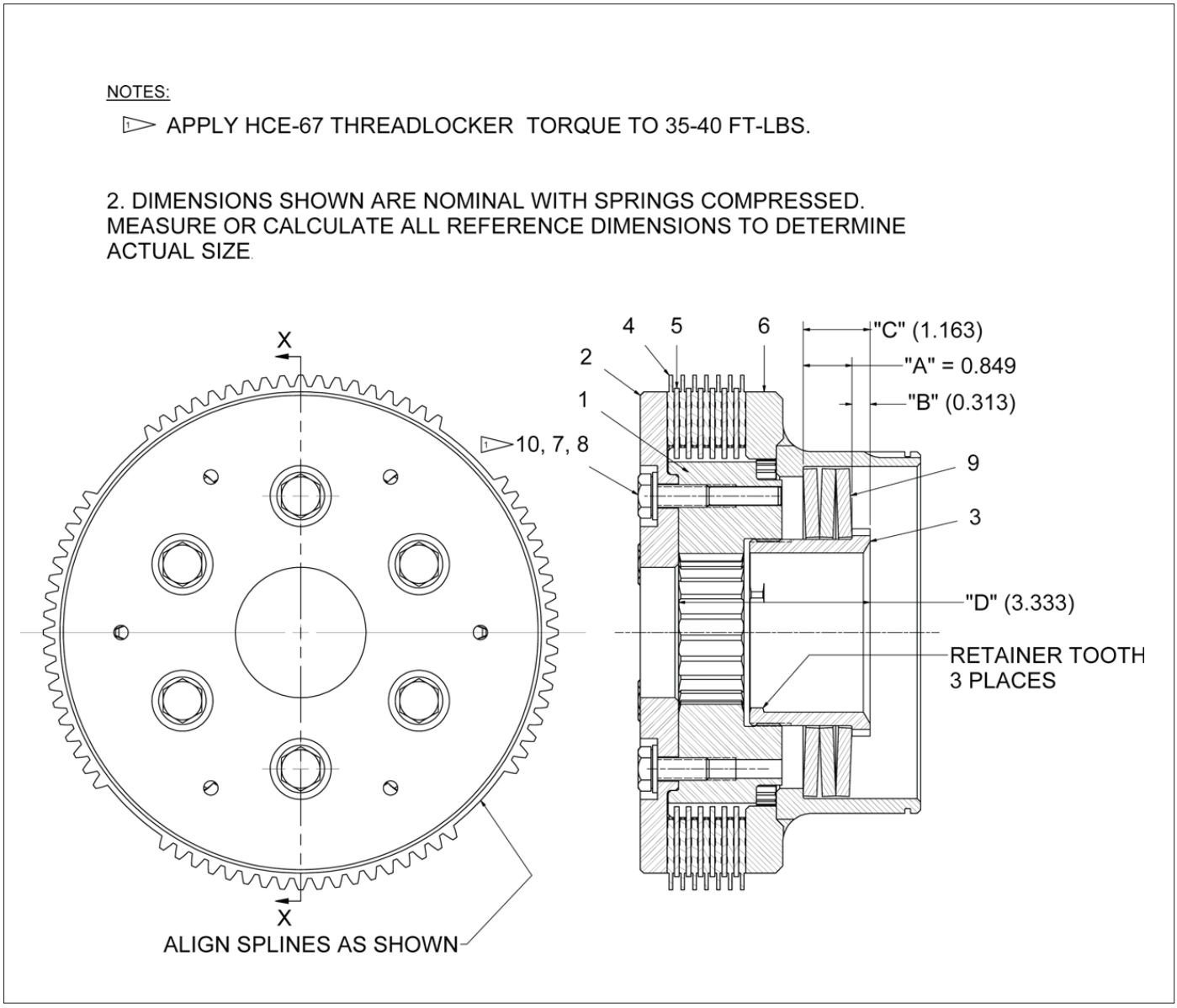
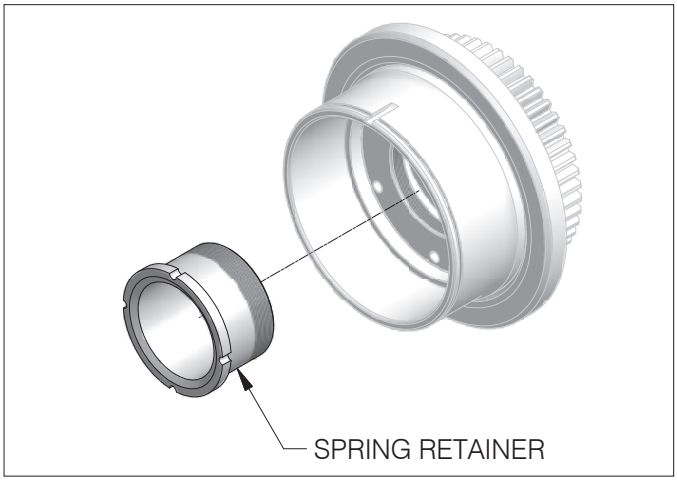
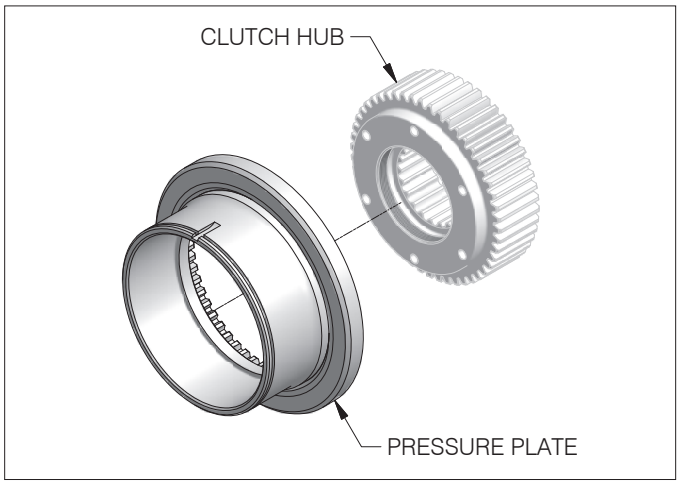


Figure 4-10 BRAKE-OFF Clutch Assembly

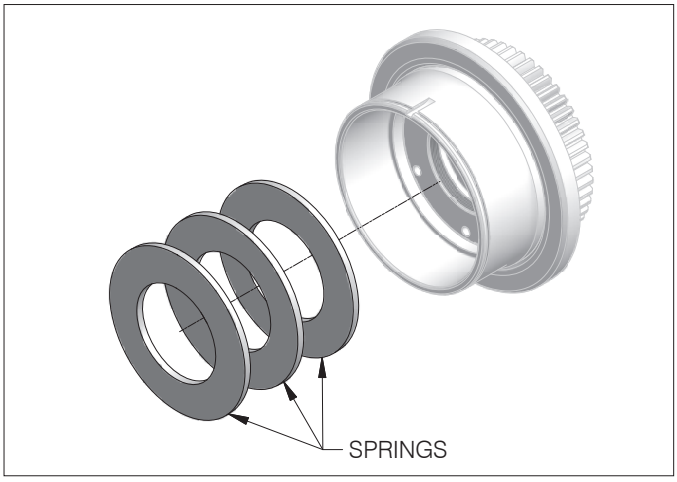
10. Disassemble clutch.



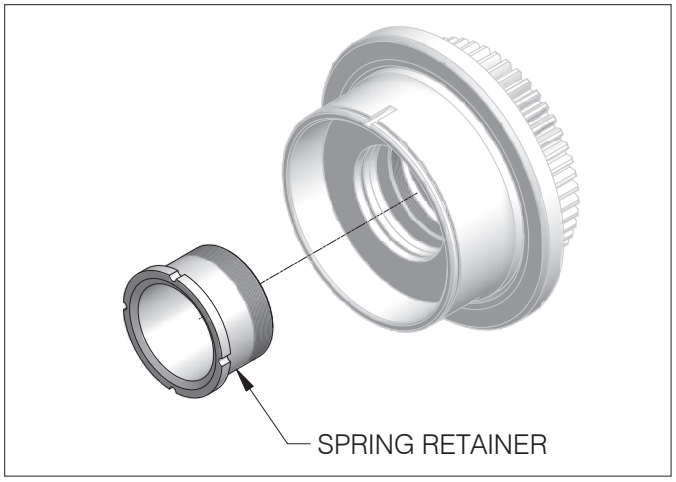
11. Assemble hub & pressure plate.



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

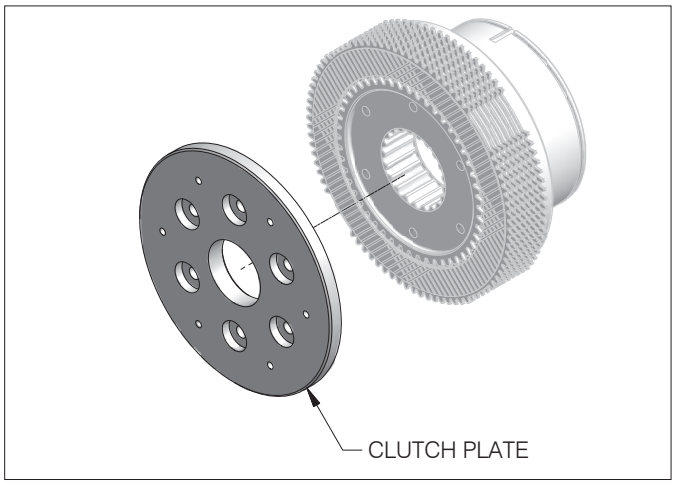


13. Install retainer to height "D". (use the number of turns required for removal & align marks on teeth).

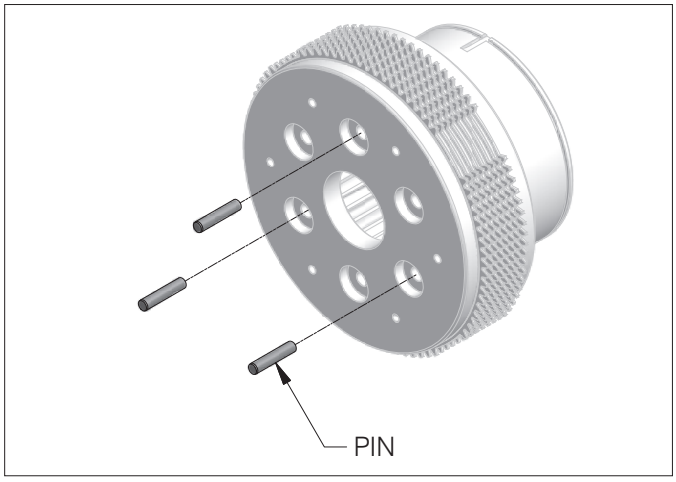


14. Install frictions, separators, & clutch plate.

15. Insert pins into three equally spaced holes.



16. Install 1.75" (45mm) long or longer capscrews into holes with pins. (Longer, fully threaded capscrews work better).



17. Place block underneath retainer so that pressure plate is suspended in the air.

18. Alternately tighten capscrews to compress springs until reaction plate rests on hub. While tightening, align internal splines of friction stack with hub splines.

19. Align external splines/tabs of friction stack.

NOTE: Without special fixturing, external splines cannot be aligned precisely enough for spider gear to assemble. This can be overcome by bench pressurizing fully assembled clutch and housing. This will be described later.

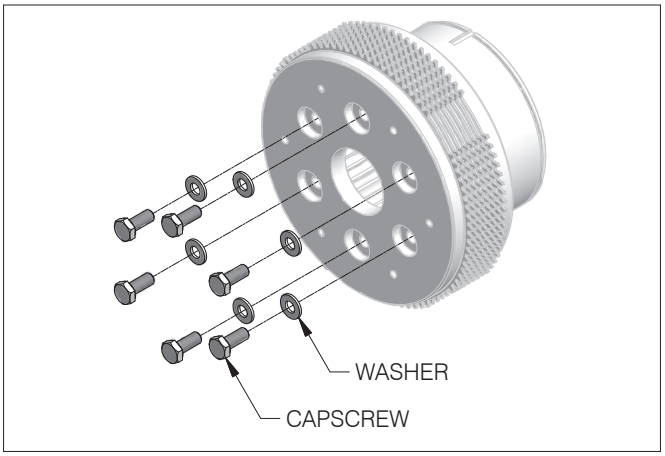
20. Apply HCE-67 threadlocker to six 1" (25mm) long capscrews.

21. Install & torque three of these shorter capscrews in the open holes.

22. Alternately loosen the three longer capscrews & remove them but leave the pins in place.

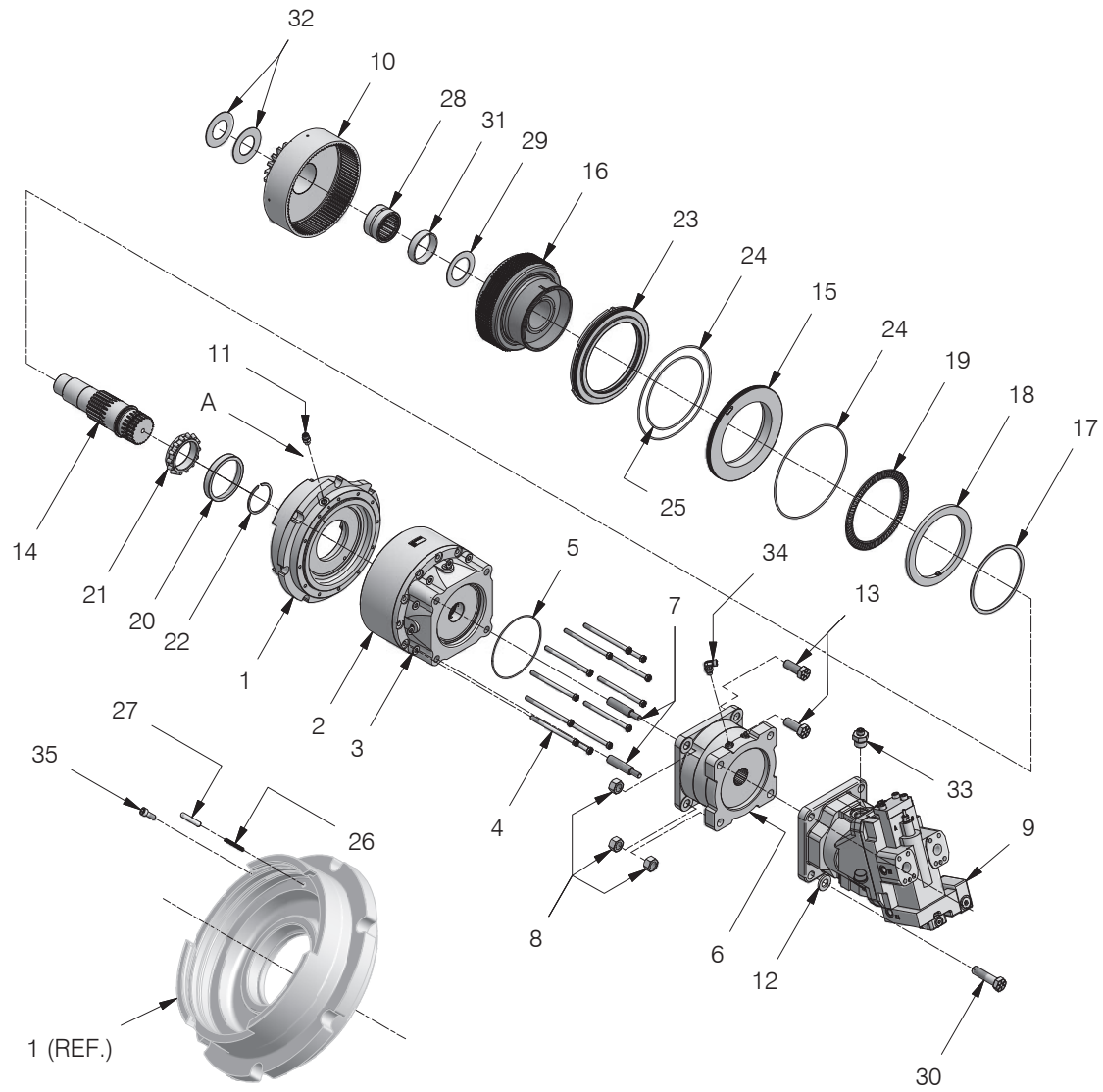
23. Install & torque the three remaining shorter capscrews.

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



Motor Shaft Assembly and Installation

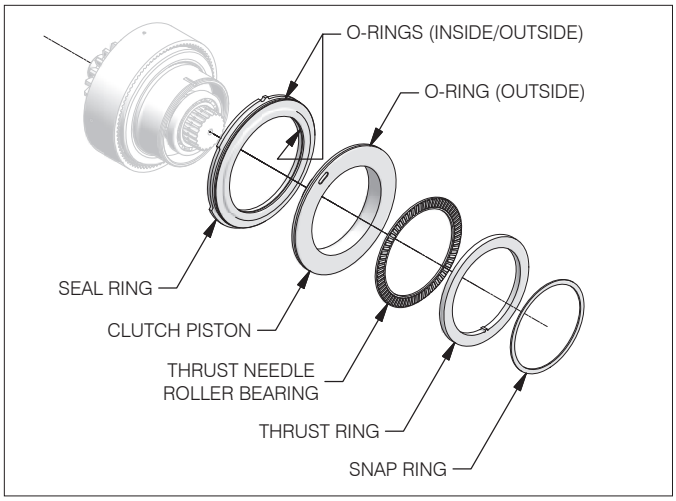
Assembly and installation of the motor shaft assembly can be accomplished while the winch is mounted on the tractor. The motor and brake can be installed independently of other components (other than various hoses and fittings), but taking out the planetary reducer and reducer housing must be installed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



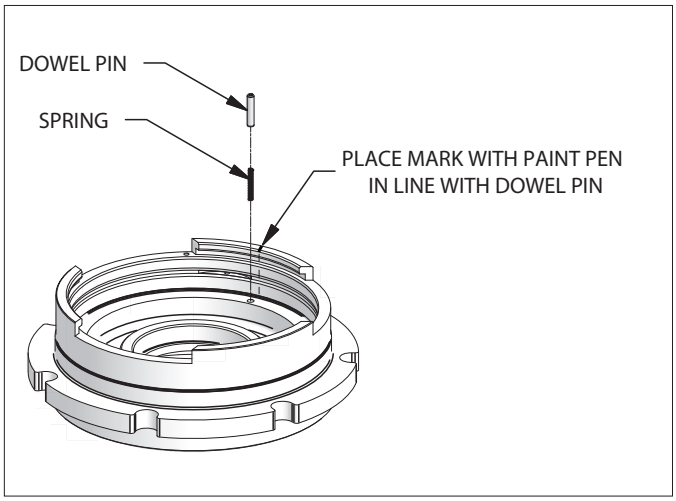
1. Clutch Housing
2. Planetary Reducer Kit
3. Washer
4. Capscrew
5. O-Ring
6. D Mount Dry Disk Brake
7. Stud
8. Nut
9. Hydraulic Motor
10. Spider Reverse Gear
11. Fitting
12. Washer
13. Capscrew
14. Clutch Shaft
15. Clutch Piston
16. Clutch Assembly
17. Snap Ring
18. Thrust Ring
19. Thrust Needle Roller Bearing
20. Bearing Cup
21. Bearing Cone
22. Snap Ring
23. Seal Ring
24. O-Ring
25. O-Ring
26. Spring
27. Pin
28. Bearing
29. Shim, .062
30. Capscrew
31. Bearing Spacer
32. Shim, .062
33. Fitting
34. Fitting
35. Capscrew

Figure 4-11 Motor Shaft Components

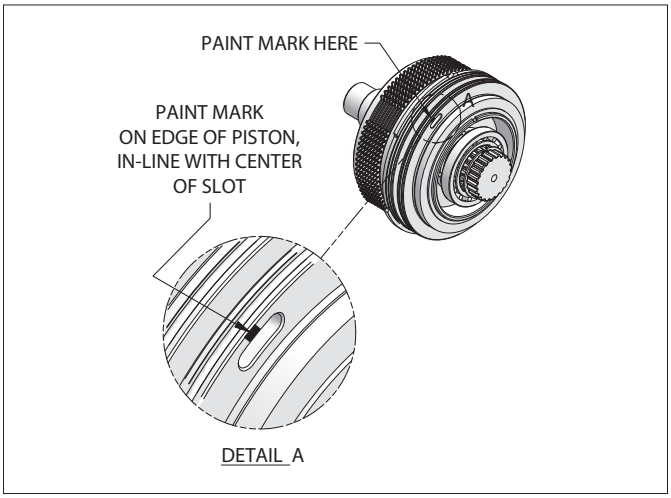
1. Install new O-rings on seal ring and clutch piston, then install thrust needle roller bearing, thrust ring, and snap ring.



2. Install spring and dowel pin in clutch housing.



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



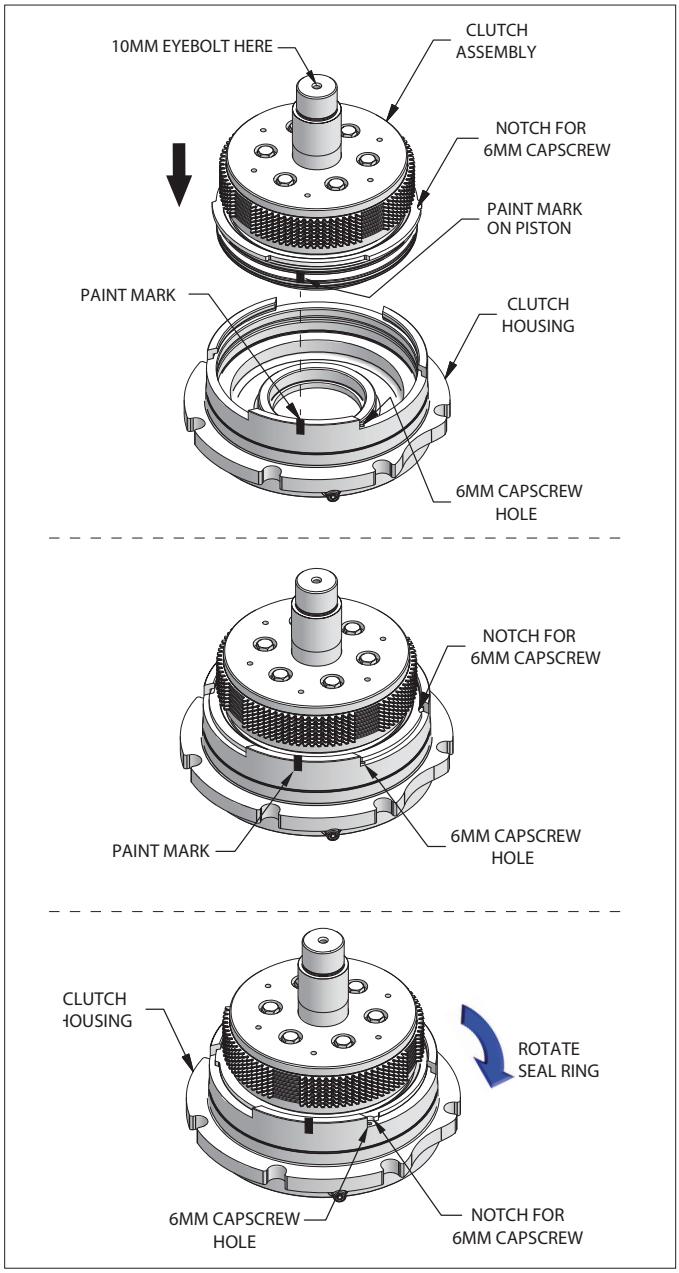
4. Lower clutch assembly vertically using jib hoist and M10x1.5 metric eyebolt.

   Align paint marks on piston and clutch housing.

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

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

   Rotate seal ring clockwise with brass drift and hammer until lock bolt notch aligns with bolt hole.

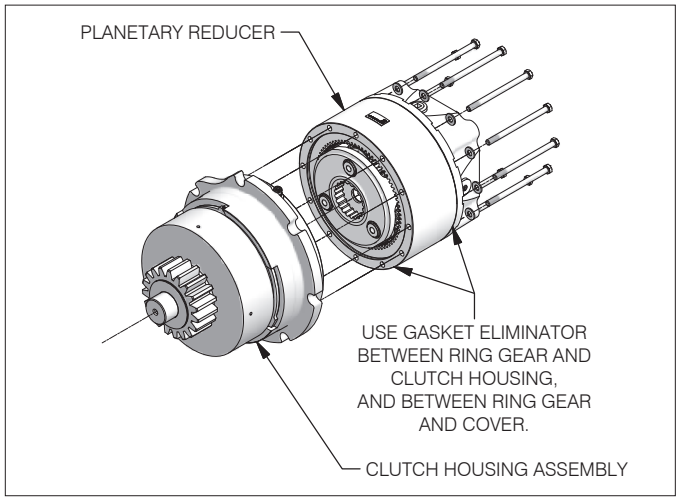


5. Apply hydraulics pressure to port on clutch housing;
6. Steadily increase pressure. Gear should begin to rotate by hand at about 360 psi;
7. Increase pressure further, clutch should reach full release at 420 psi;
8. Increase pressure to 700 psi MAX and check for leaks.
9. While clutch is released,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

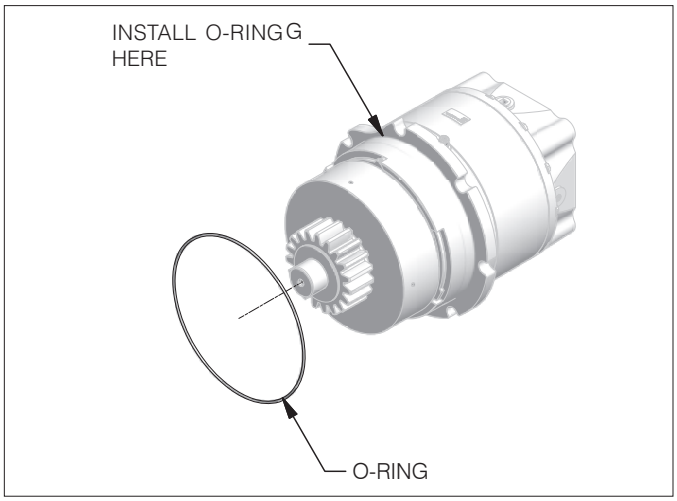
⚠ WARNING

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

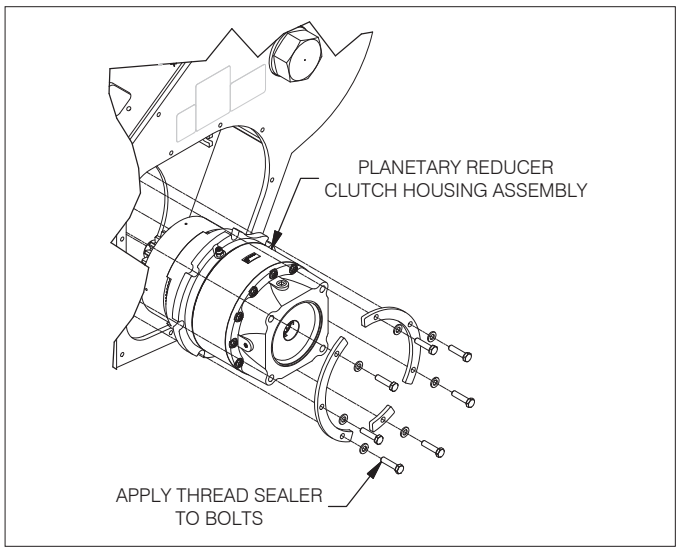
10. Install clutch housing assembly into reducer.



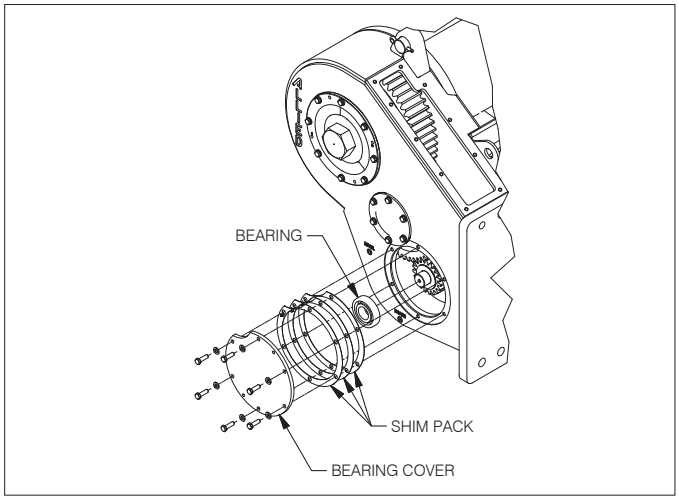
11. Install new O-ring on clutch housing.



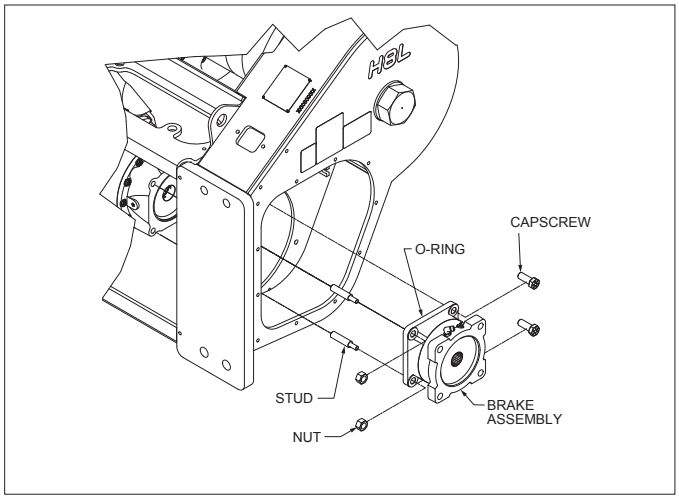
12. Install planetary reducer assembly.



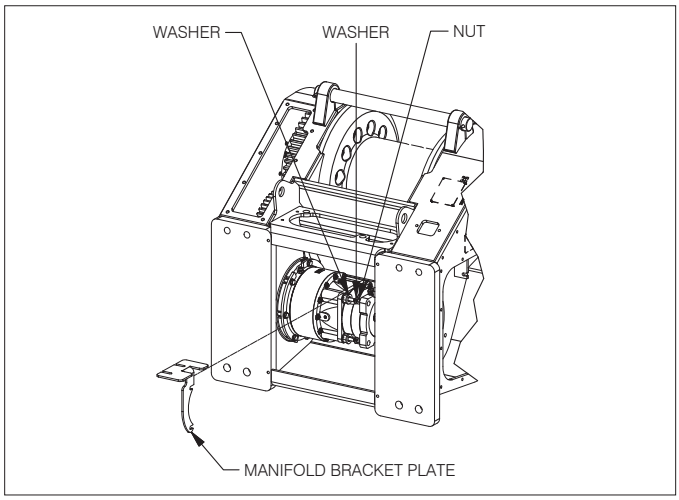
13. Install shim pack, bearing, and cover.



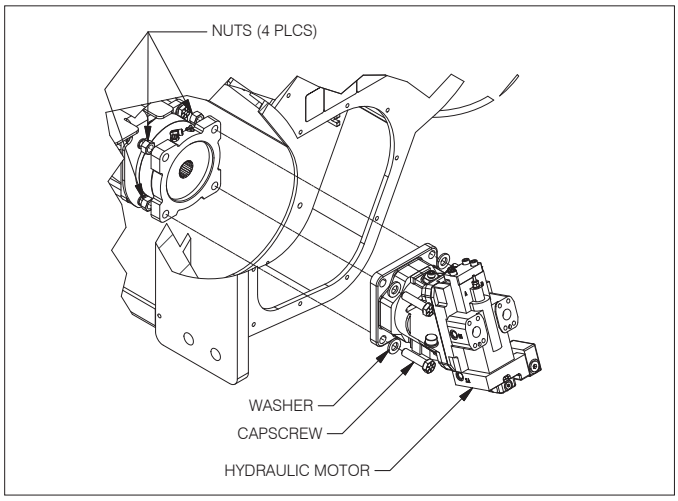
14. Install the brake assembly.



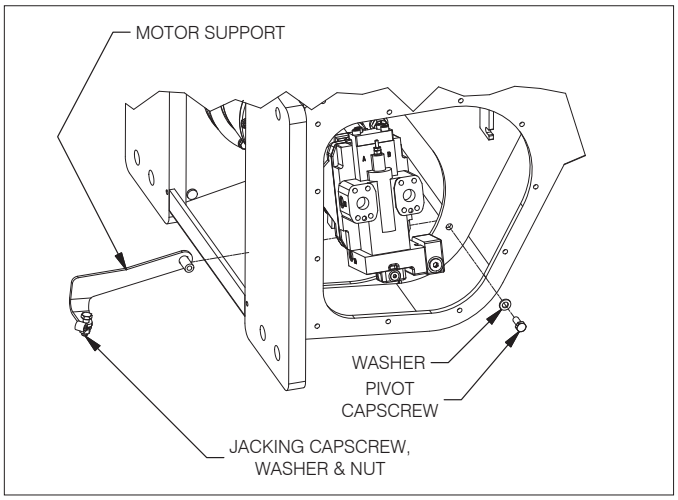
15. Install the manifold bracket plate.



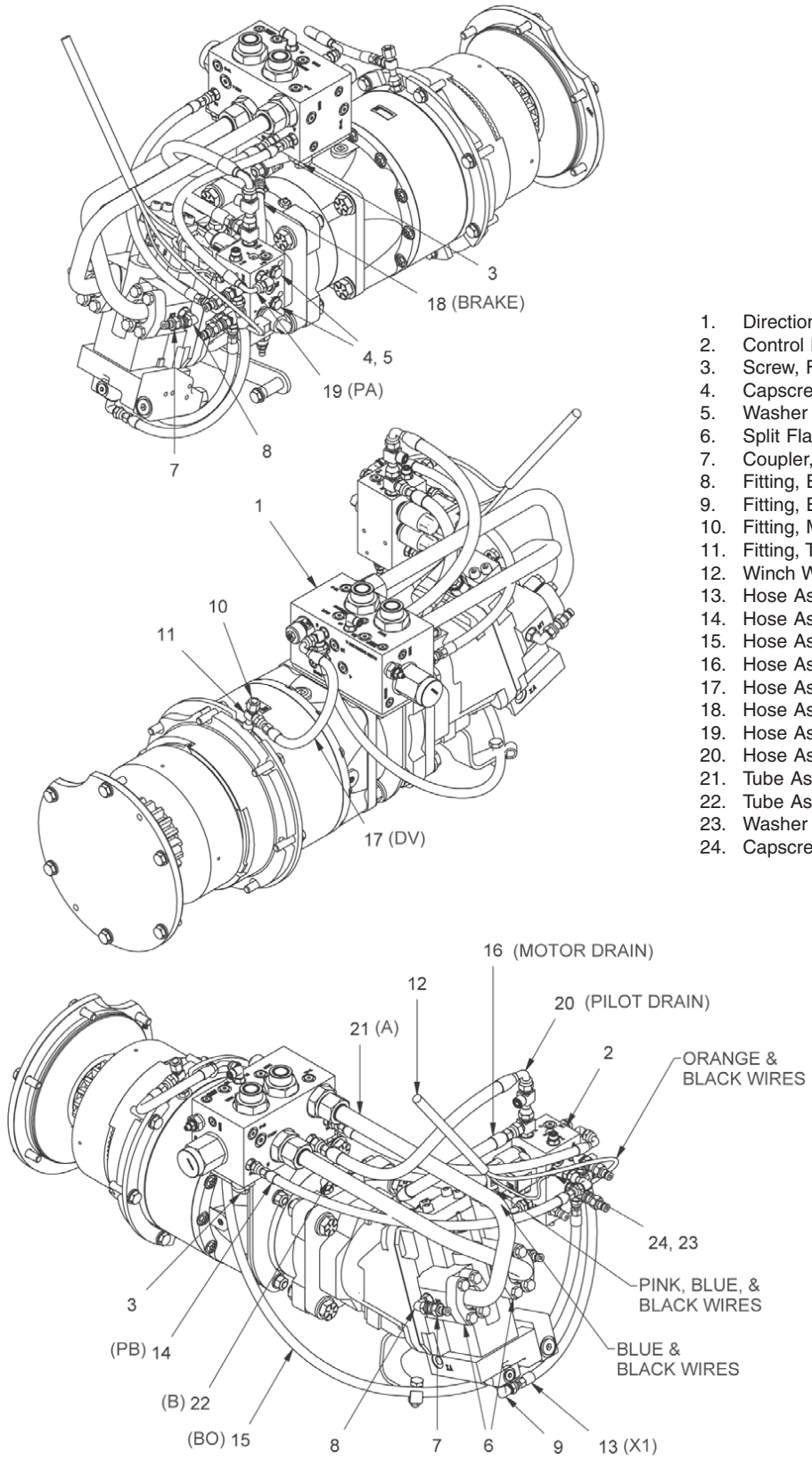
16. Install the hydraulic motor.



17. Install the motor support in frame.



Hydraulic System Assembly



1. Directional Manifold Assemby
2. Control Manifold Assembly
3. Screw, Flanged
4. Capscrew
5. Washer
6. Split Flange Kit
7. Coupler, Quick Male
8. Fitting, EL
9. Fitting, EL
10. Fitting, MC
11. Fitting, TE
12. Winch Wire Harness
13. Hose Assembly, X1
14. Hose Assembly, PB
15. Hose Assembly, BO
16. Hose Assembly, DRAIN
17. Hose Assembly
18. Hose Assembly, BRAKE
19. Hose Assembly, PA
20. Hose Assembly, PILOT DRAIN
21. Tube Assembly, Motor A
22. Tube Assembly, Motor B
23. Washer
24. Capscrew

Figure 4-12 Hydraulic System Components

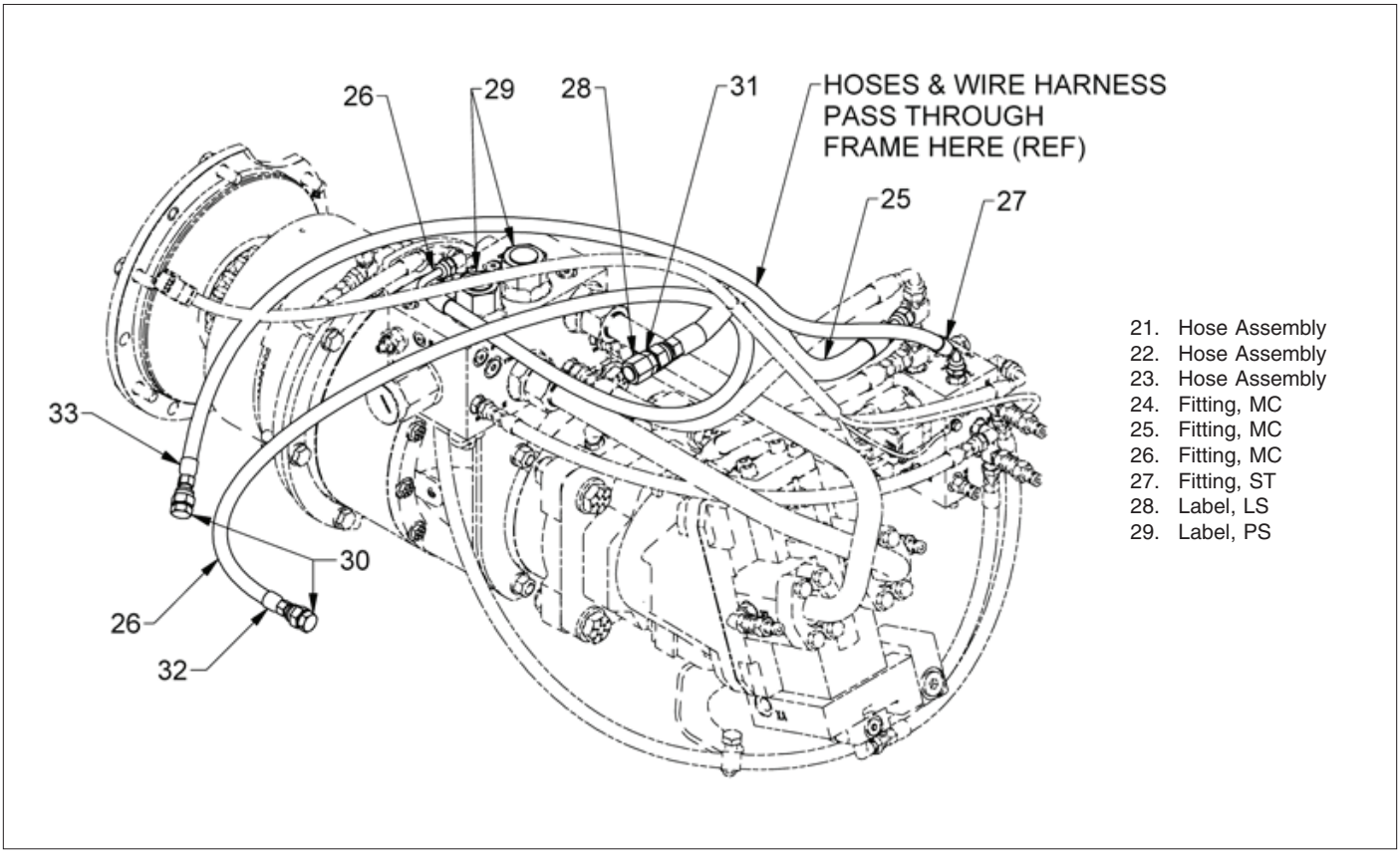
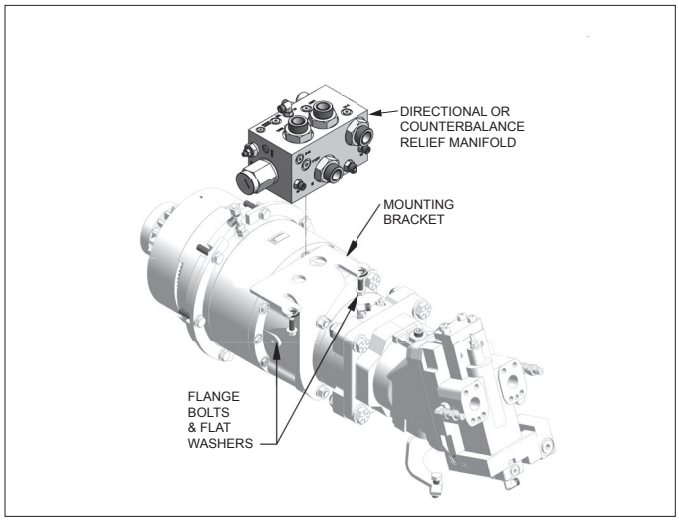
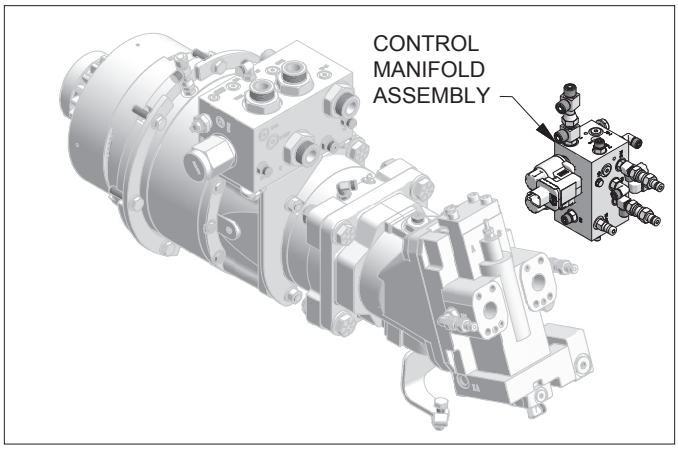


Figure 4-13 Hydraulic System Components

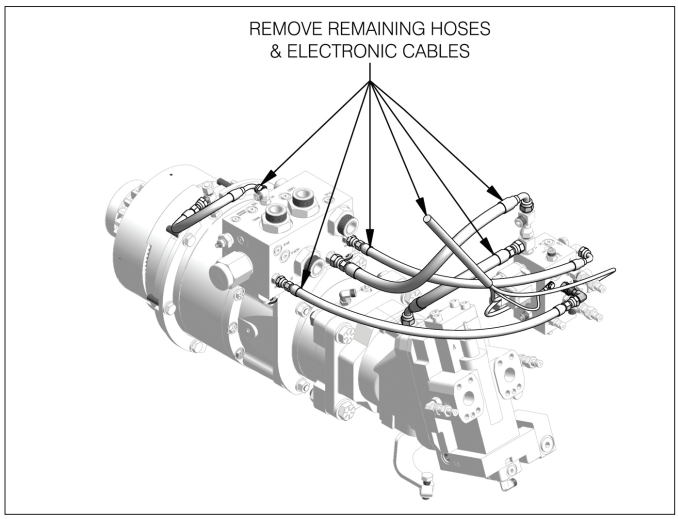
1. Install the directional manifold on the mounting bracket. Leave mounting bolts loose.



2. Install the control manifold.



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

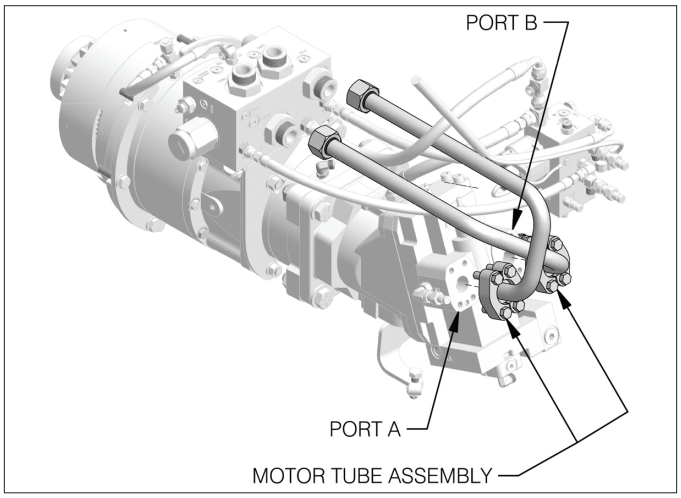


4.1 Install motor tube assemblies A and B on the motor.

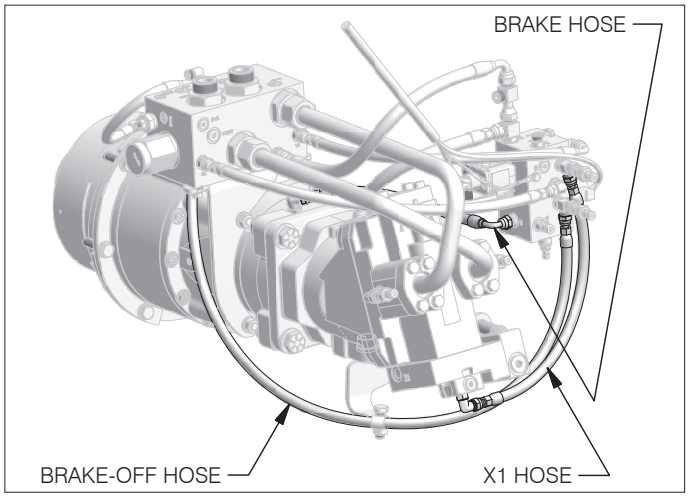
4.2 Alternately tighten connections to prevent placing motor tubes in a bind.

Adjust mounting bracket as necessary to align with manifold.

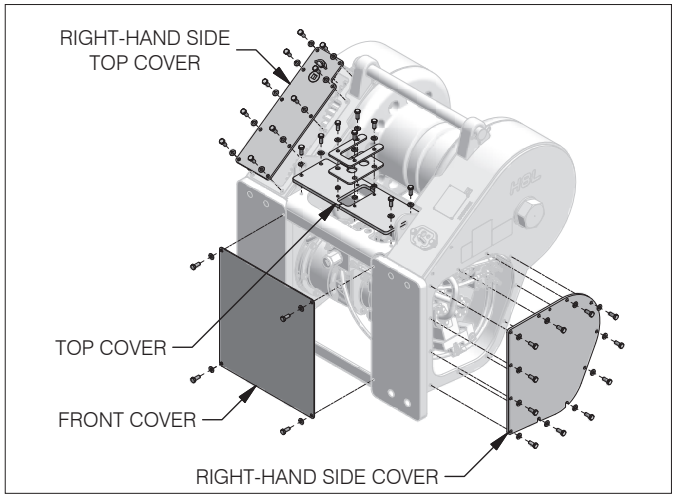
4.3 Tighten directional manifold bolts last.



5. Install BRAKE-OFF, X1 and brake hoses.

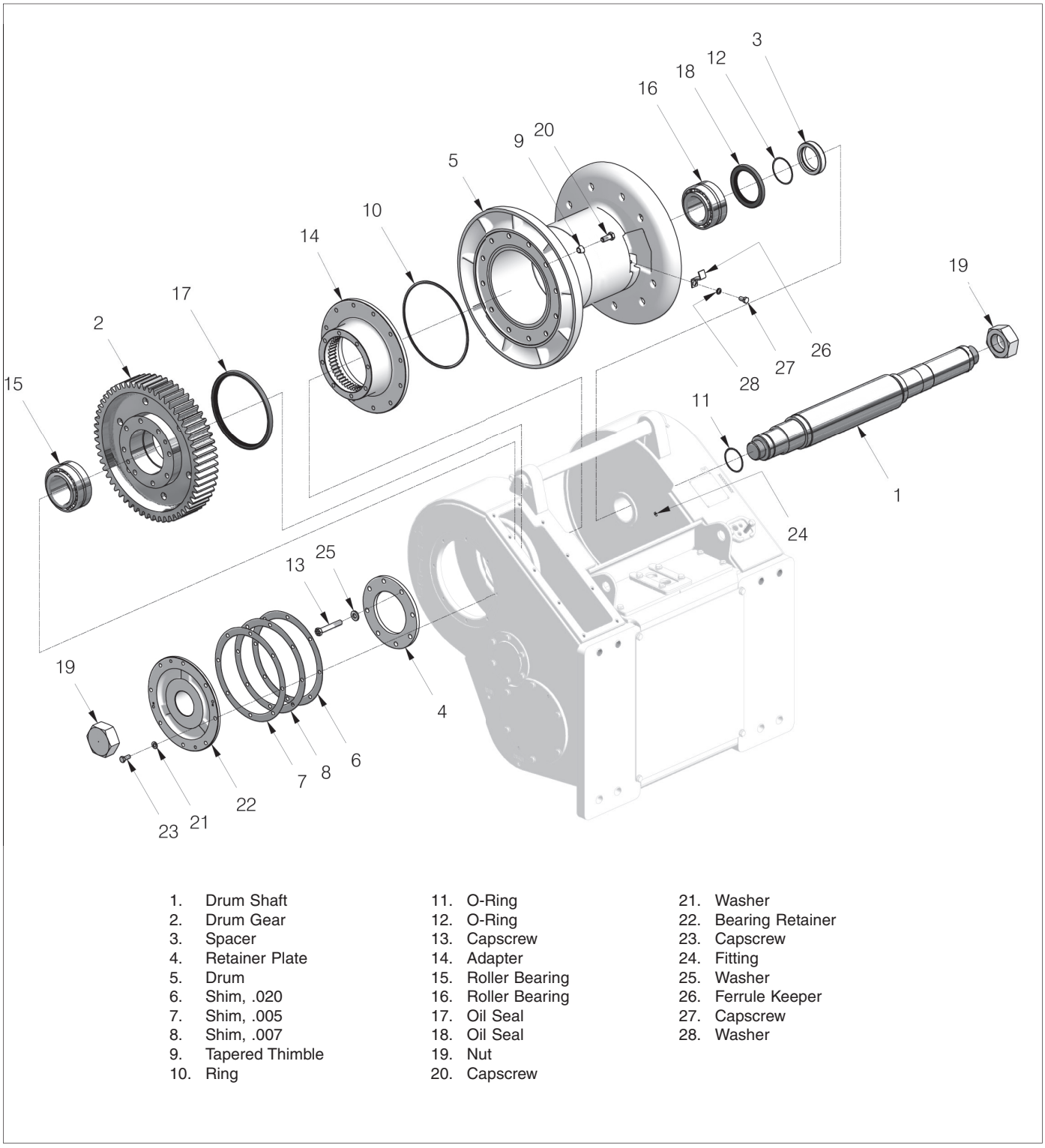


6. Install covers as shown.



Drum and Drum Shaft Installation

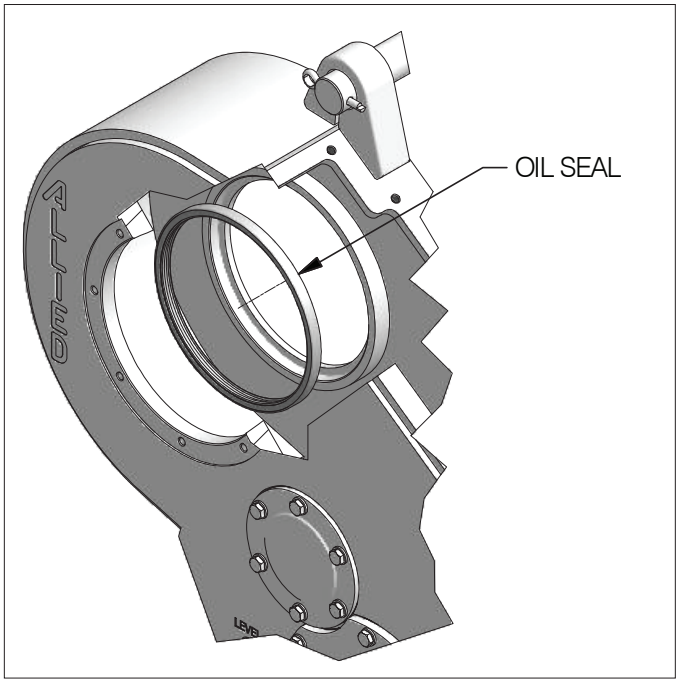
If the drum gear was removed, it must be installed prior to installation of the intermediate shaft and motor shaft assembly.

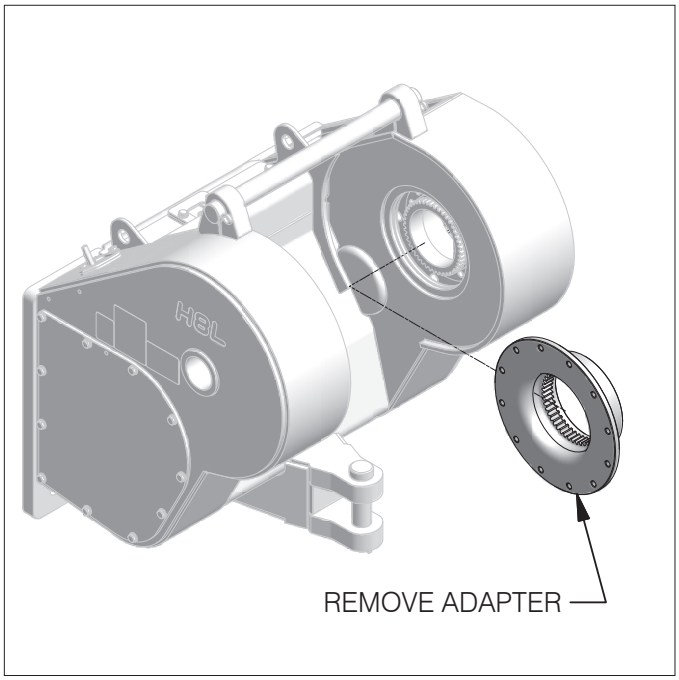


1. Drum Shaft
2. Drum Gear
3. Spacer
4. Retainer Plate
5. Drum
6. Shim, .020
7. Shim, .005
8. Shim, .007
9. Tapered Thimble
10. Ring
11. O-Ring
12. O-Ring
13. Capscrew
14. Adapter
15. Roller Bearing
16. Roller Bearing
17. Oil Seal
18. Oil Seal
19. Nut
20. Capscrew
21. Washer
22. Bearing Retainer
23. Capscrew
24. Fitting
25. Washer
26. Ferrule Keeper
27. Capscrew
28. Washer

Figure 4-14 Drum and Drum Shaft Components

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



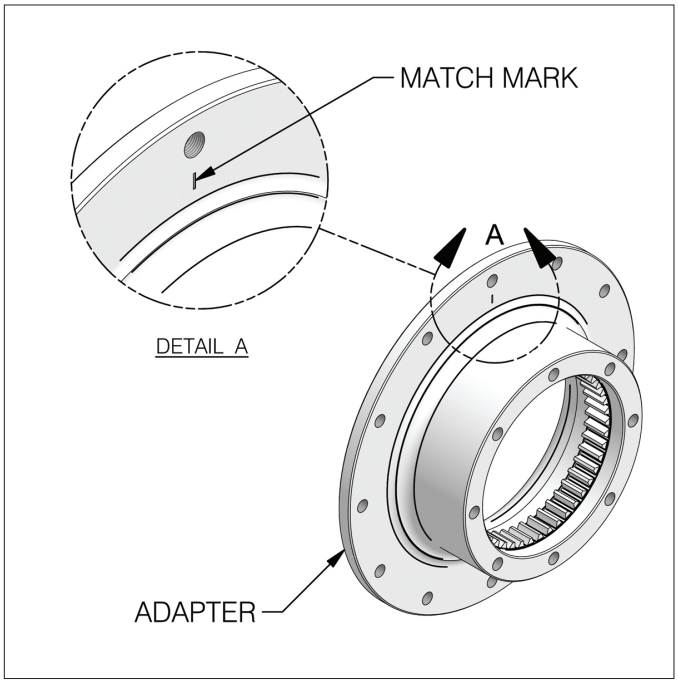


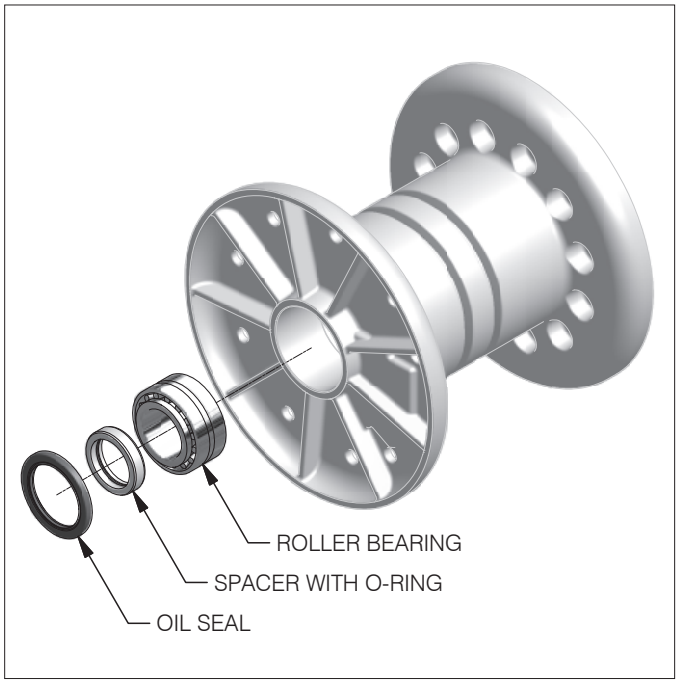
2. Install drum adapter by pushing it through the double-lip seal.

NOTE: To prevent drum adapter from falling out, insert eyebolt in the hole above the match mark as shown, then slip metal bar through eyebolt.

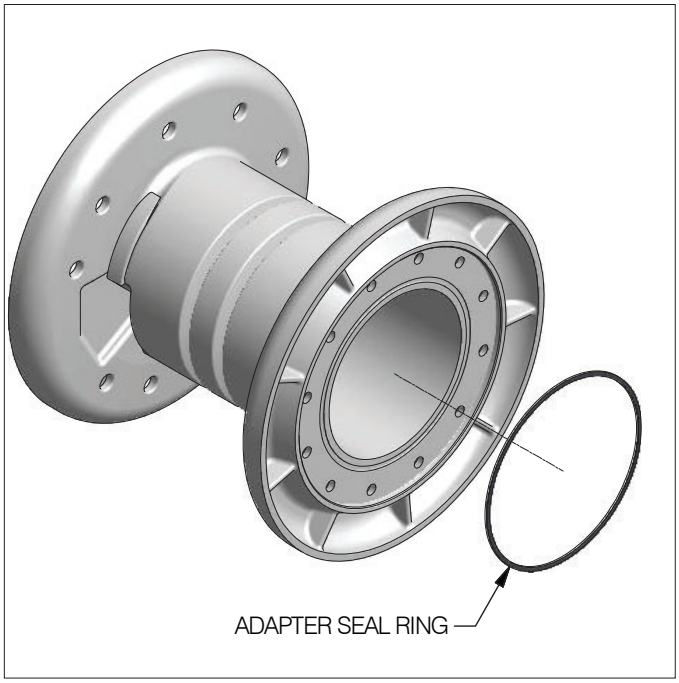
3. Replace drum spacer O-ring and install spacer in drum bore. Install drum oil seal.

NOTE: Smooth side of seal must face outboard.

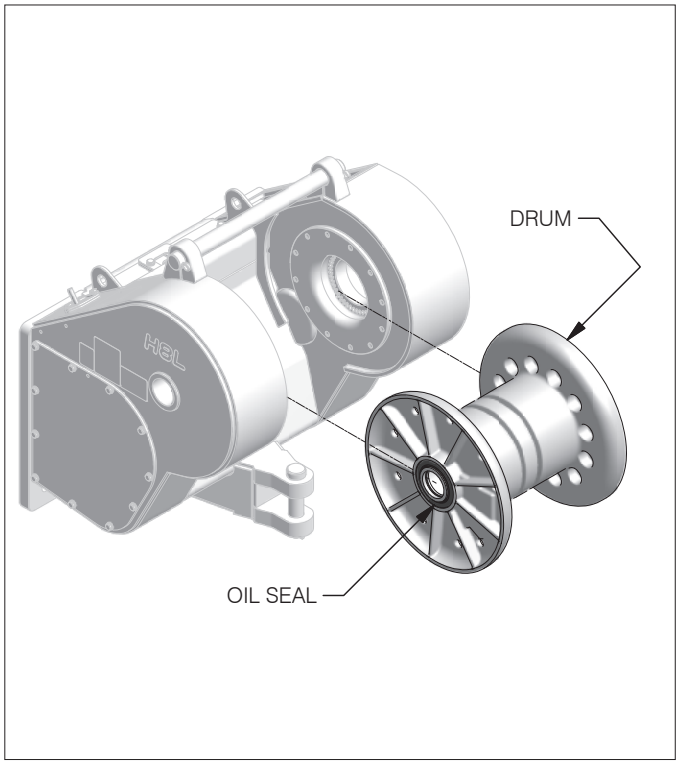




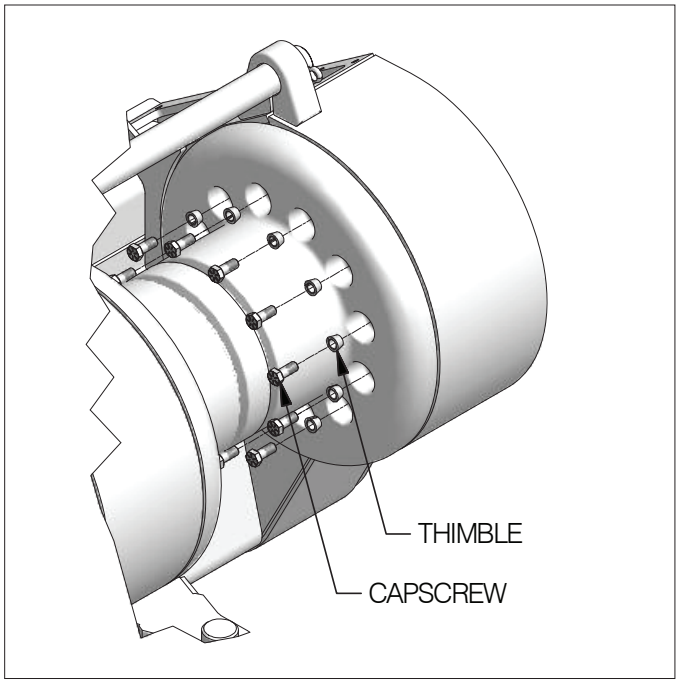
4. Lubricate right-hand drum bore. Coat right-hand seal ring and groove with O-ring lube. Install new seal ring.



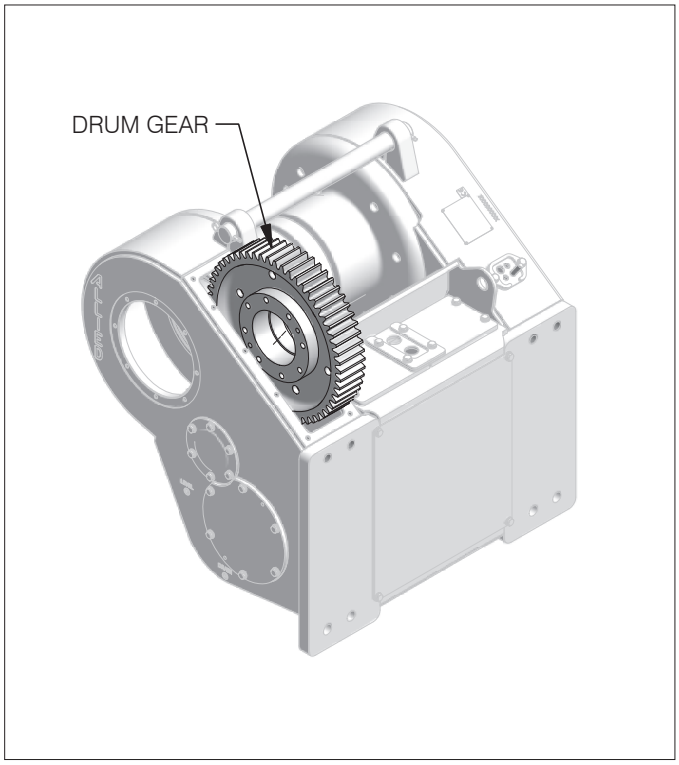
5. Move the drum into position while being careful not to move the oil seal ring.



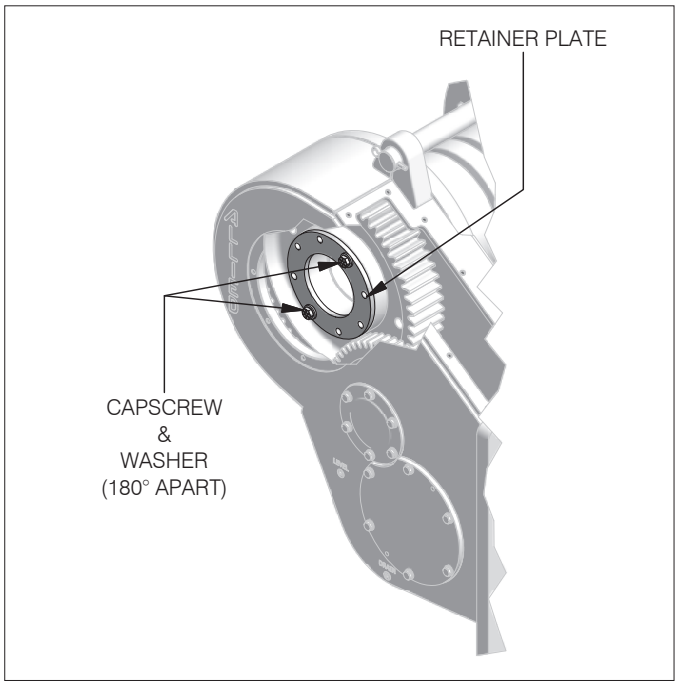
6. Align adapter and drum holes, then install the thimbles and screws. Tighten progressively and evenly to ensure uniform compression of seal ring. Do not tighten to final torque.



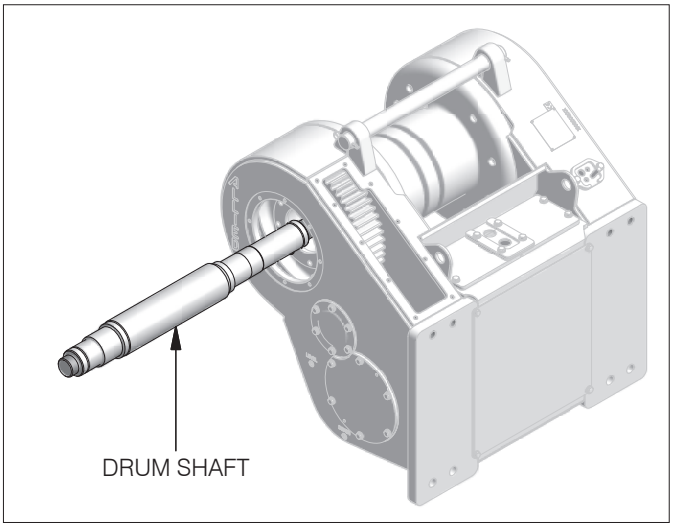
7. Install drum gear.



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



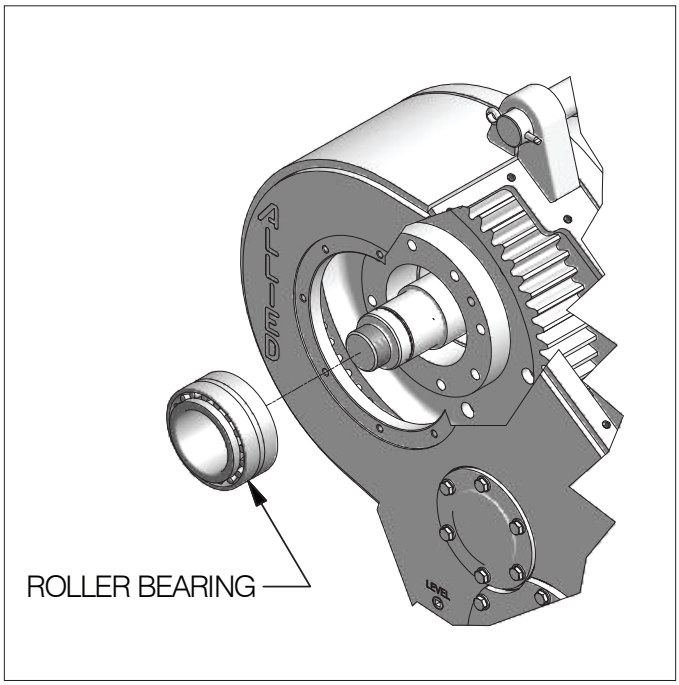
9. Make sure that double-tapered roller bearing, seal and spacer are properly seated in the left-hand side of the drum. Then install the shaft until it bottoms solidly against the left hand tapered roller bearing. Tighten left hand nut.



⚠ CAUTION

Do not hammer on drum shaft surface.

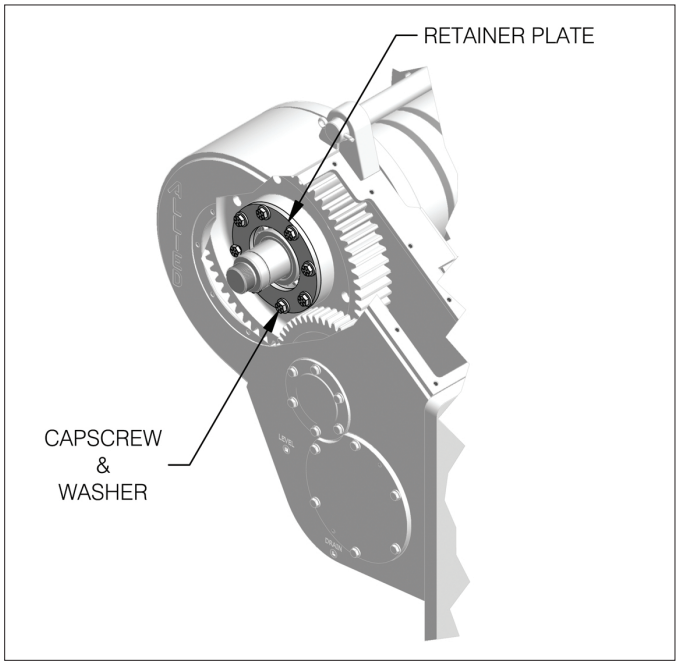
10. Remove the retainer plate and install the bearing assembly. Lubricate the left-hand drum bore with Lubriplate or other light lube grease, then install double tapered roller bearing assembly.



⚠ WARNING

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

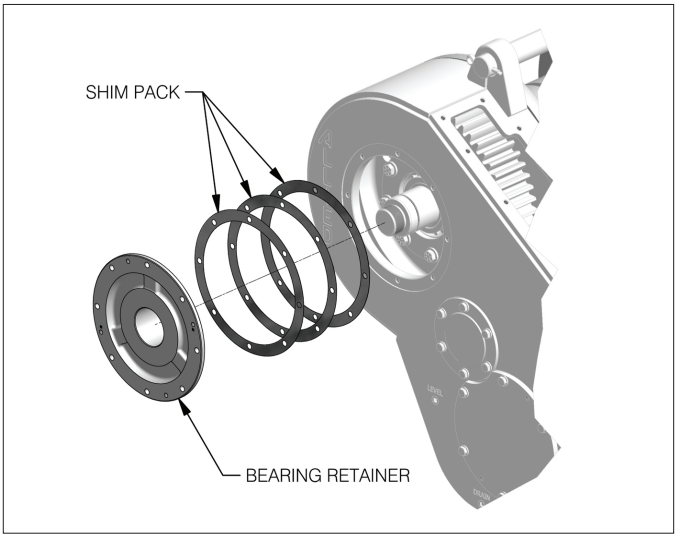
11. Reinstall retainer plate using the eight special capscrews. Tighten capscrews to 90 ft-lbs (124 N-m).



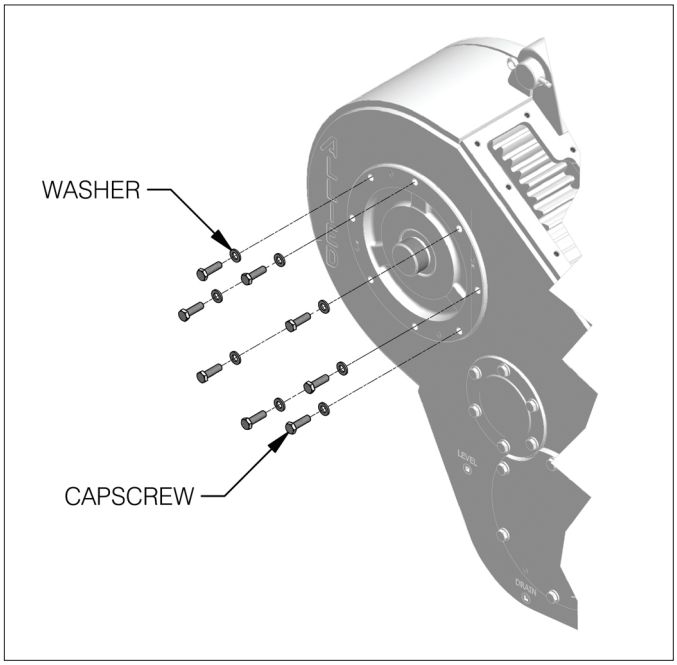
NOTE: Capscrews cannot be installed unless drum gear and drum adapter have been aligned as indicated in Step 8.

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

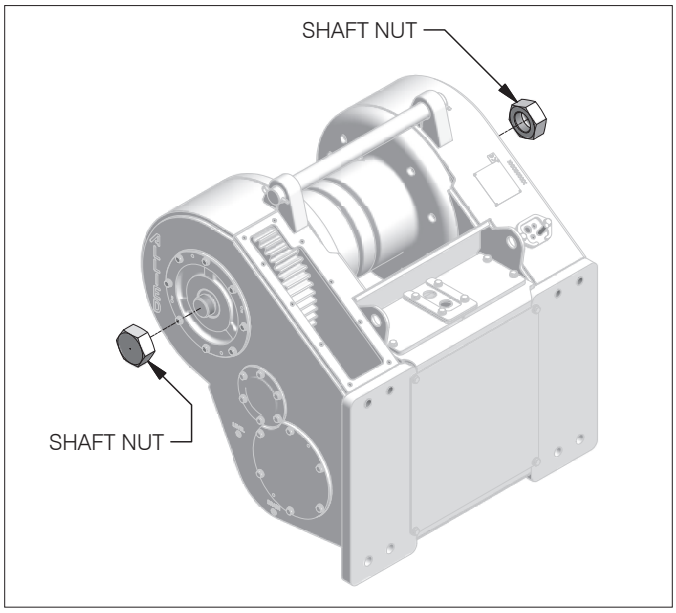
13. Coat winch frame and bearing retainer with silicone. Install drum shaft O-ring. Install finalized shim pack (determined in step 15). If intermediate shaft assembly not installed, install before retainer.



14. Secure retainer with capscrews and lockwashers. Tighten capscrews to 75 ft-lbs (103 N-m).



15. Coat shaft nut threads with anti-seize. Apply silicone between the left drum nut and frame, and between the right drum nut and drum retainer. Install both shaft nuts and torque to 400 ft-lbs (550 N-m).



16. Tighten drum-to-adapter capscrews to 155 ft-lbs (213 N-m) torque.

Intermediate Shaft Installation

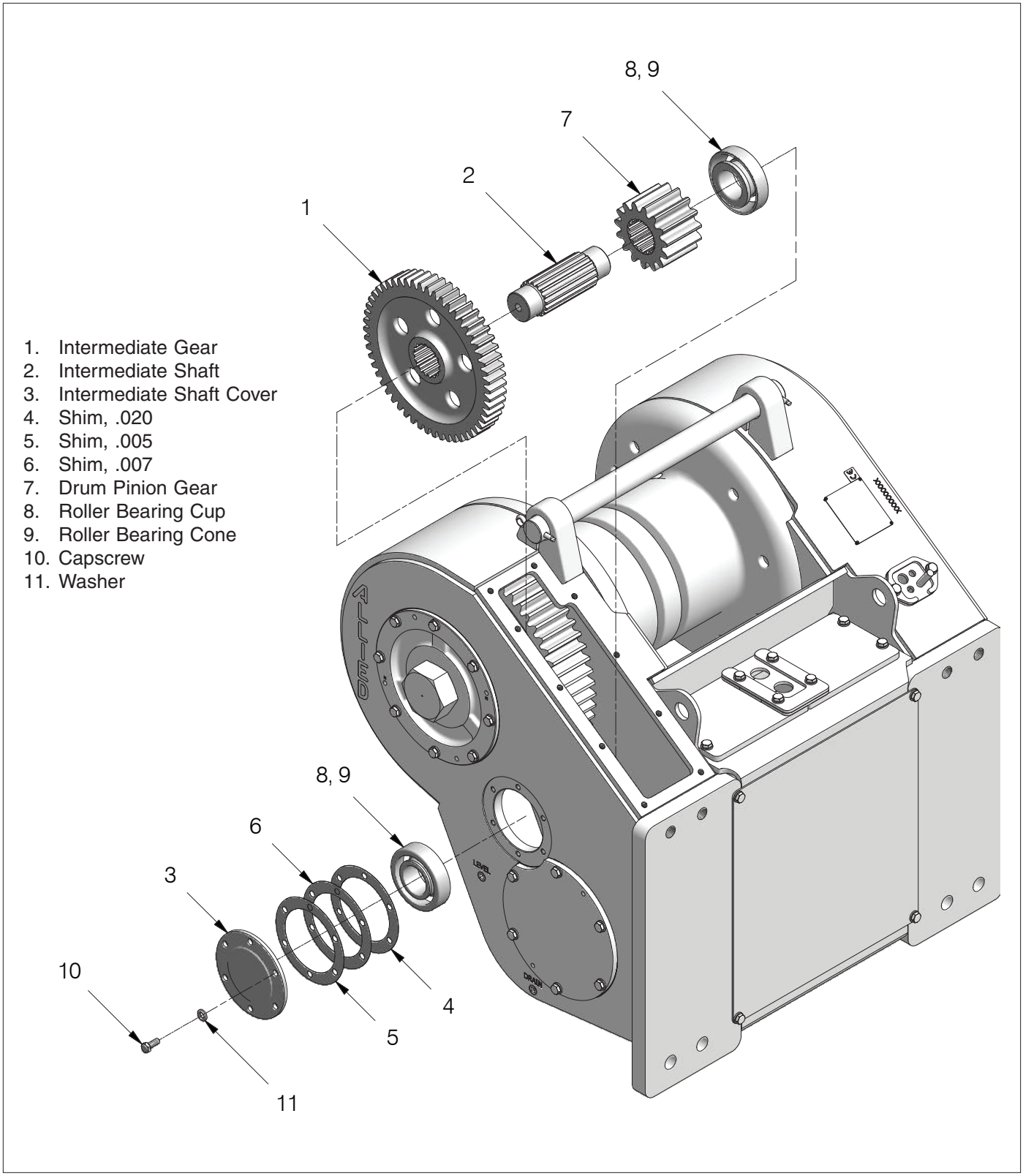
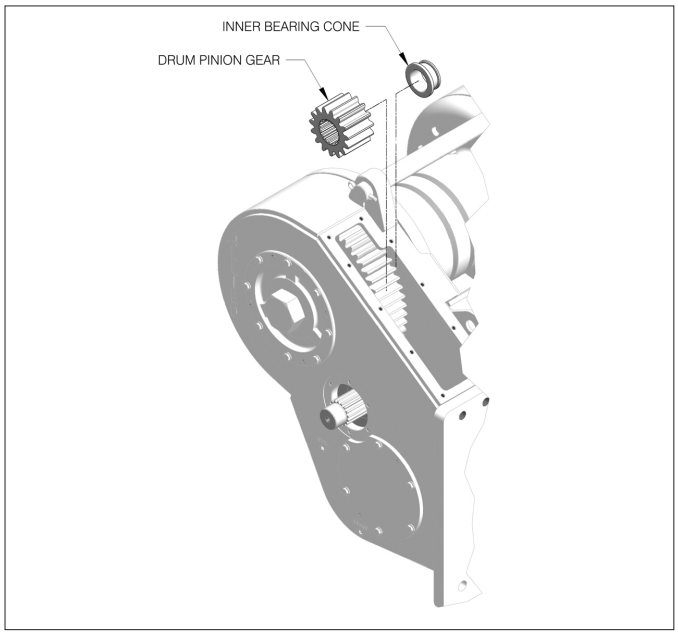


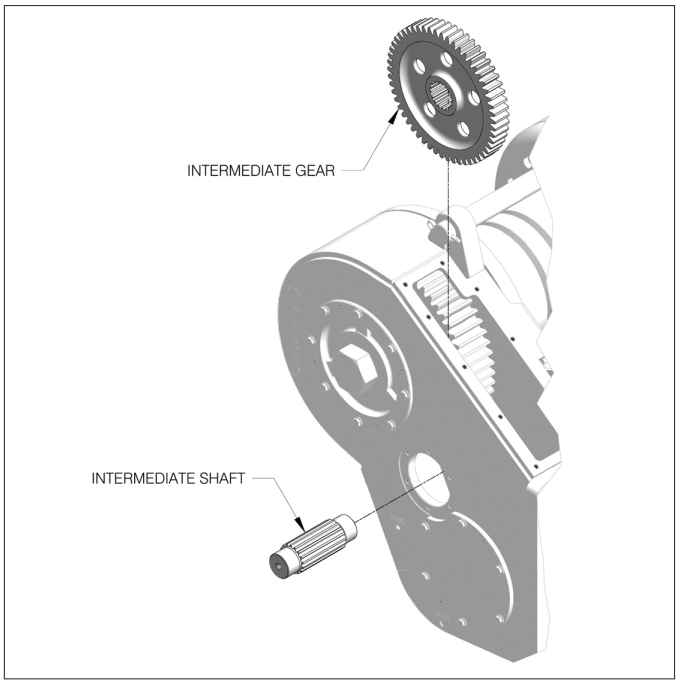
Figure 4-15 Location of Intermediate Shaft Components

Intermediate Shaft Installation

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

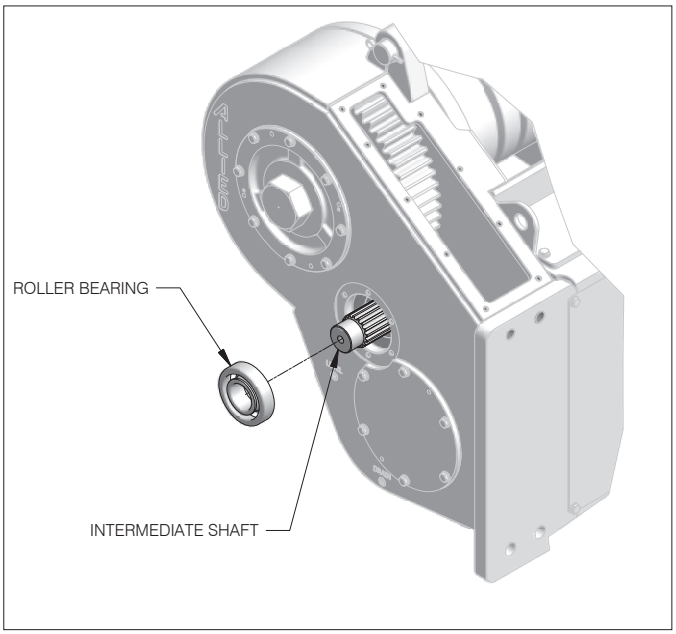


2. Position intermediate gear in housing, and then install intermediate shaft.

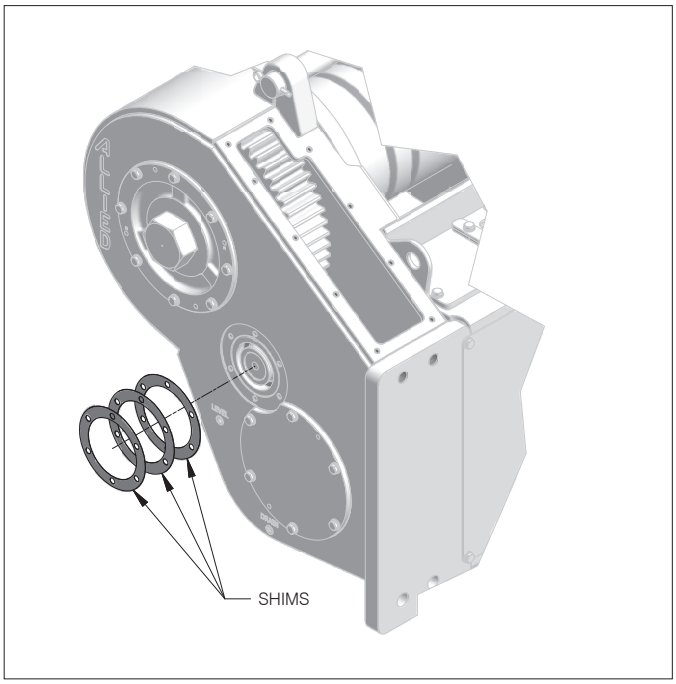


NOTE: Install intermediate gear with high shoulder down.

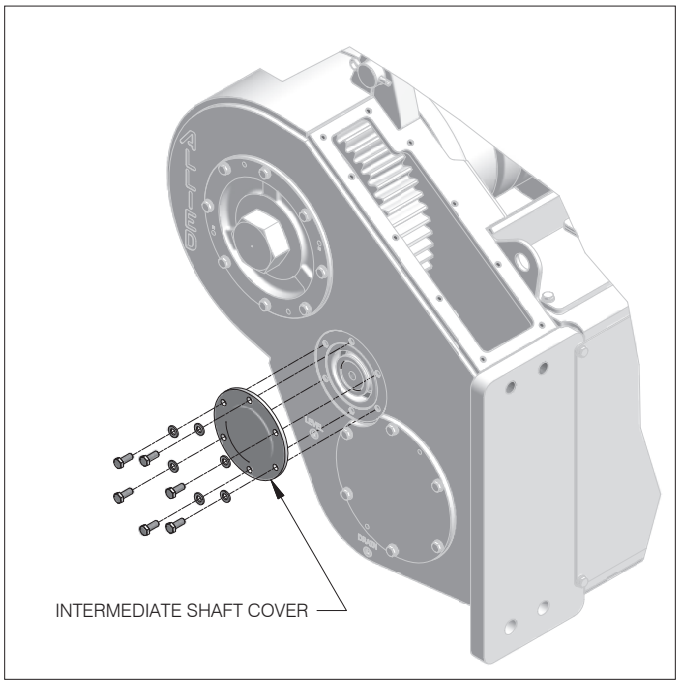
3. Install the outer bearing cup and cone. Make sure that the cup is firmly seated against the bearing cone.



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



5. Install intermediate shaft cover, then tighten the six capscrews to 75 ft-lbs (103 N-m).



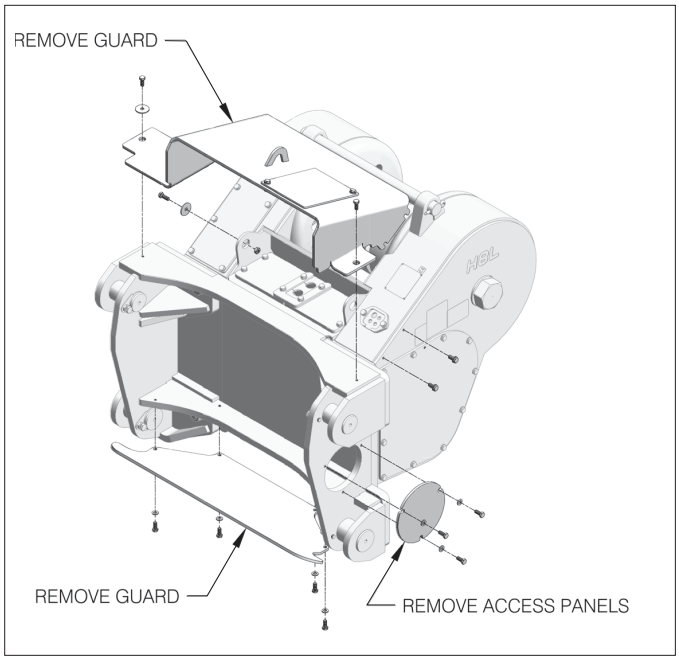
Winch Installation for Caterpillar D7E

⚠ WARNING

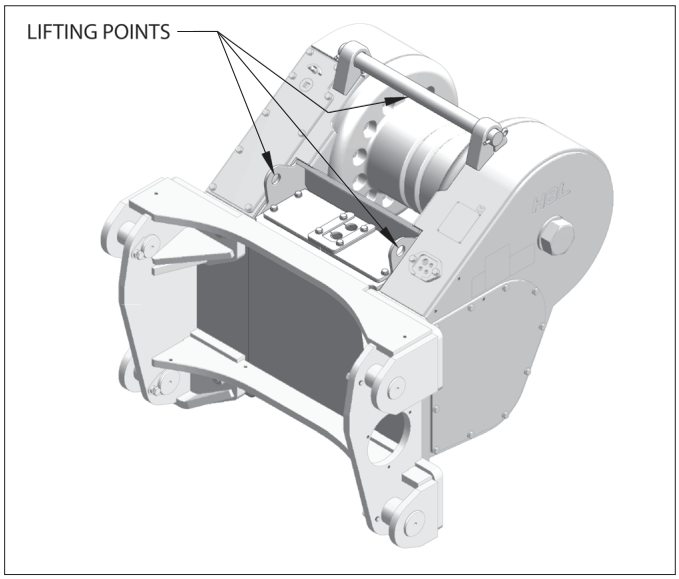
Do not begin with installation until you have read and understand tractor manufacturer's disassembly and assembly instructions.

1. Thoroughly clean the mounting surfaces on the winch and the tractor. Clean the mounting holes and hardware of dirt, grit and oil.

2. Remove guards and access panels.



3. Attach sling or chain fall to lifting points.

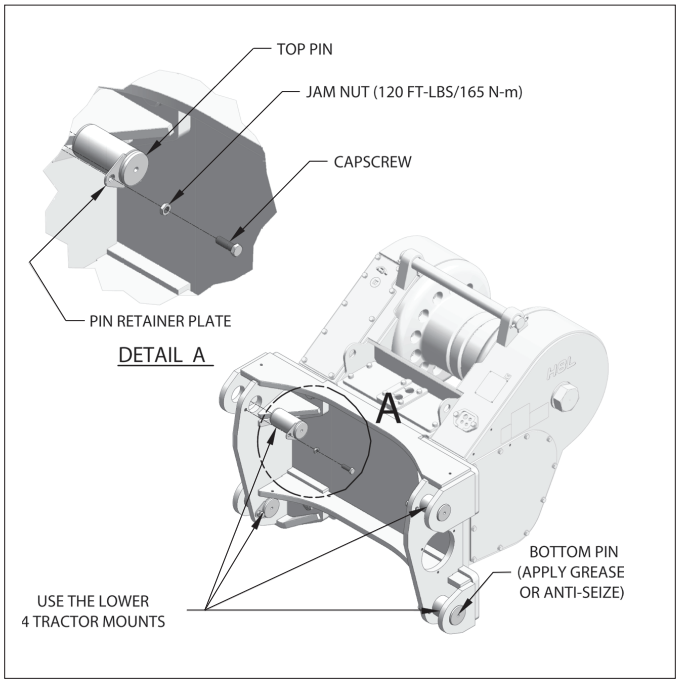


⚠ WARNING

Make sure the lifting device has a minimum rated capacity of 4,500 lbs (2,000 kg) before lifting the winch.

4. Capscrew and jam nut are used to center winch on tractor and to hold pin retainer plates.

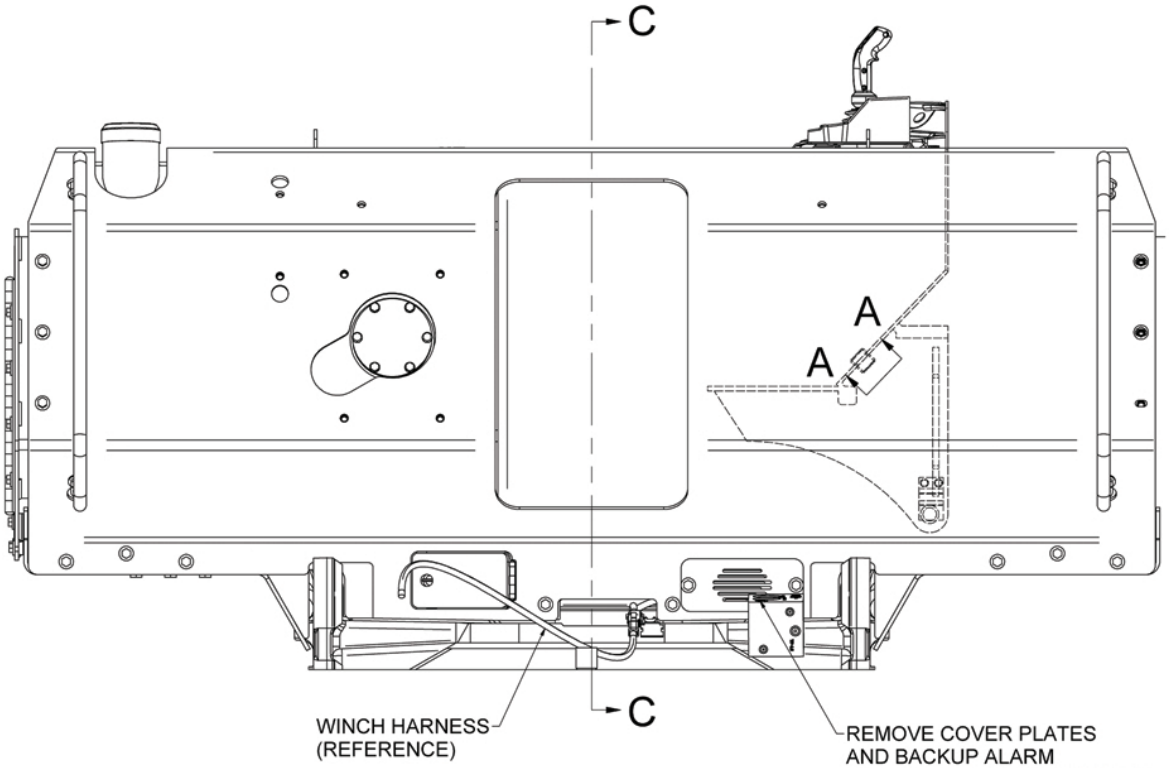
   - Screw jam nut fully on capscrew.
   - Insert the capscrew through pin retainer plate and into the threaded hole.
   - Tighten the capscrew to contact the tractor mounting lugs.
   - While holding the head of the capscrew, tighten the locknut to clamp the pin retainer plate.



5. Electrical installation steps:

   IN CAB:

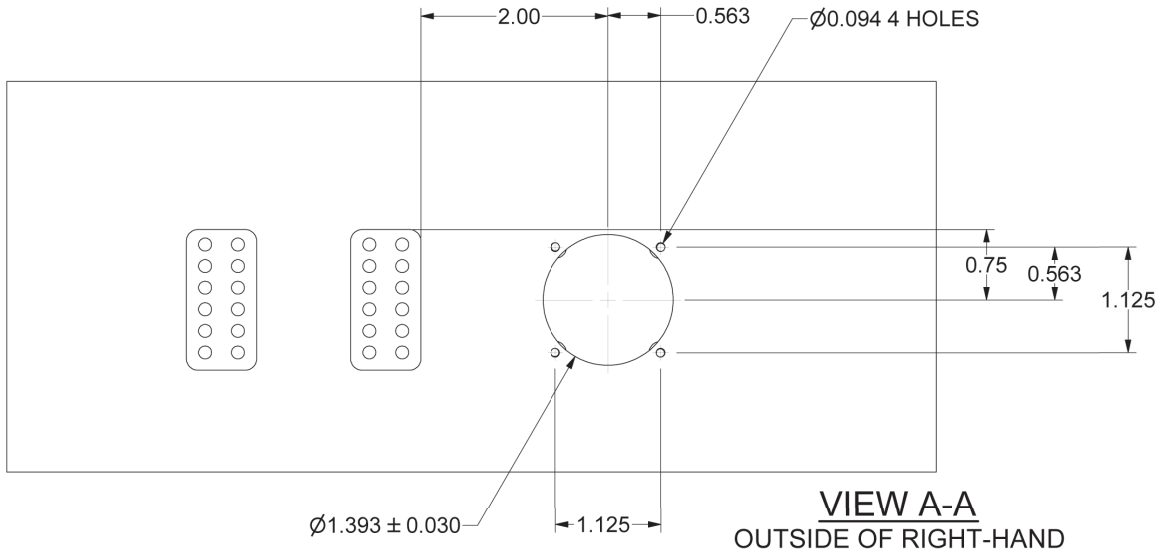
   - Disconnect electrical power with battery disconnect switch located behind left hand quick access panel.
   - Remove the cupholder on the right side of the cab. Keep hardware for later use.



ELECTRICAL INSTALLATION

(VIEW LOOKING AT REAR FACE OF TRACTOR)

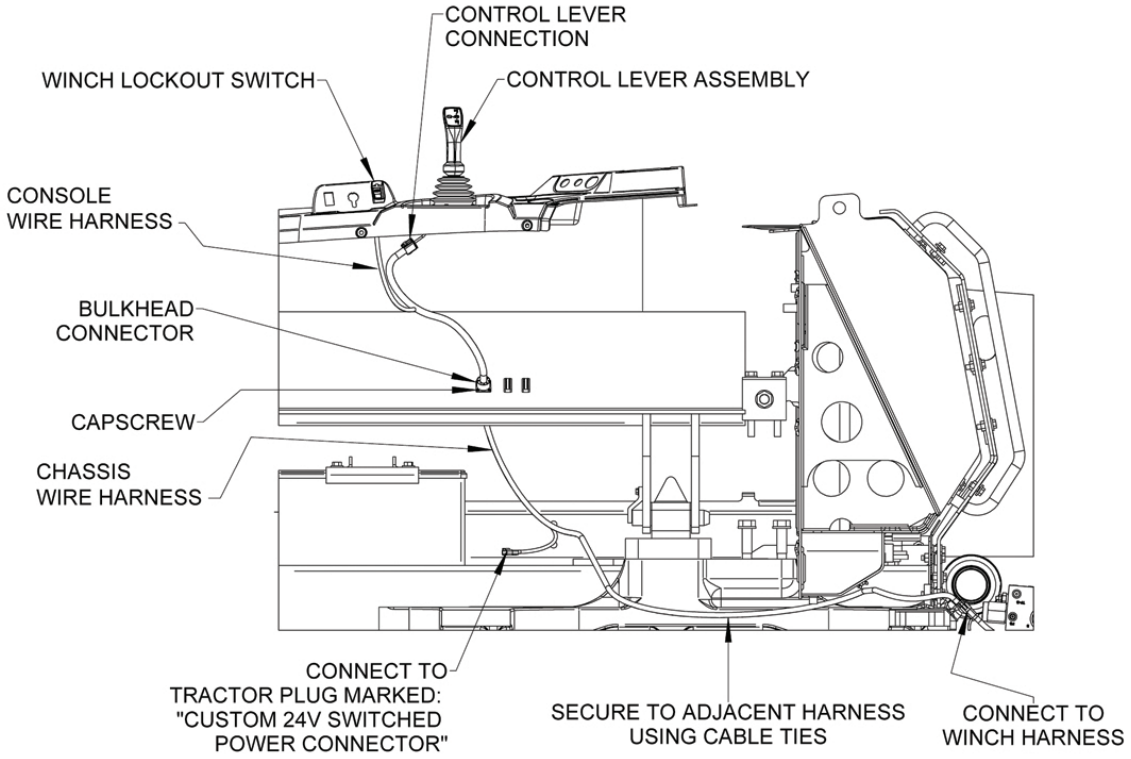
- Examine area immediately to the left of the cab electrical connectors. Temporarily move any wires, prepare for drilling.
- Open tractor right-hand enclosure to expose cab electrical bulkheads (View A-A).



VIEW A-A

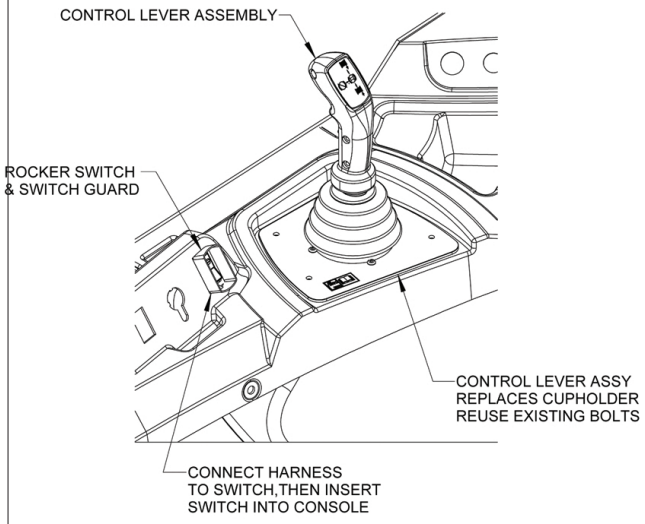
OUTSIDE OF RIGHT-HAND
CAB PLATFORM

MOUNTING HOLE FOR
ELECTRICAL BULKHEAD CONNECTOR



SECTION C-C

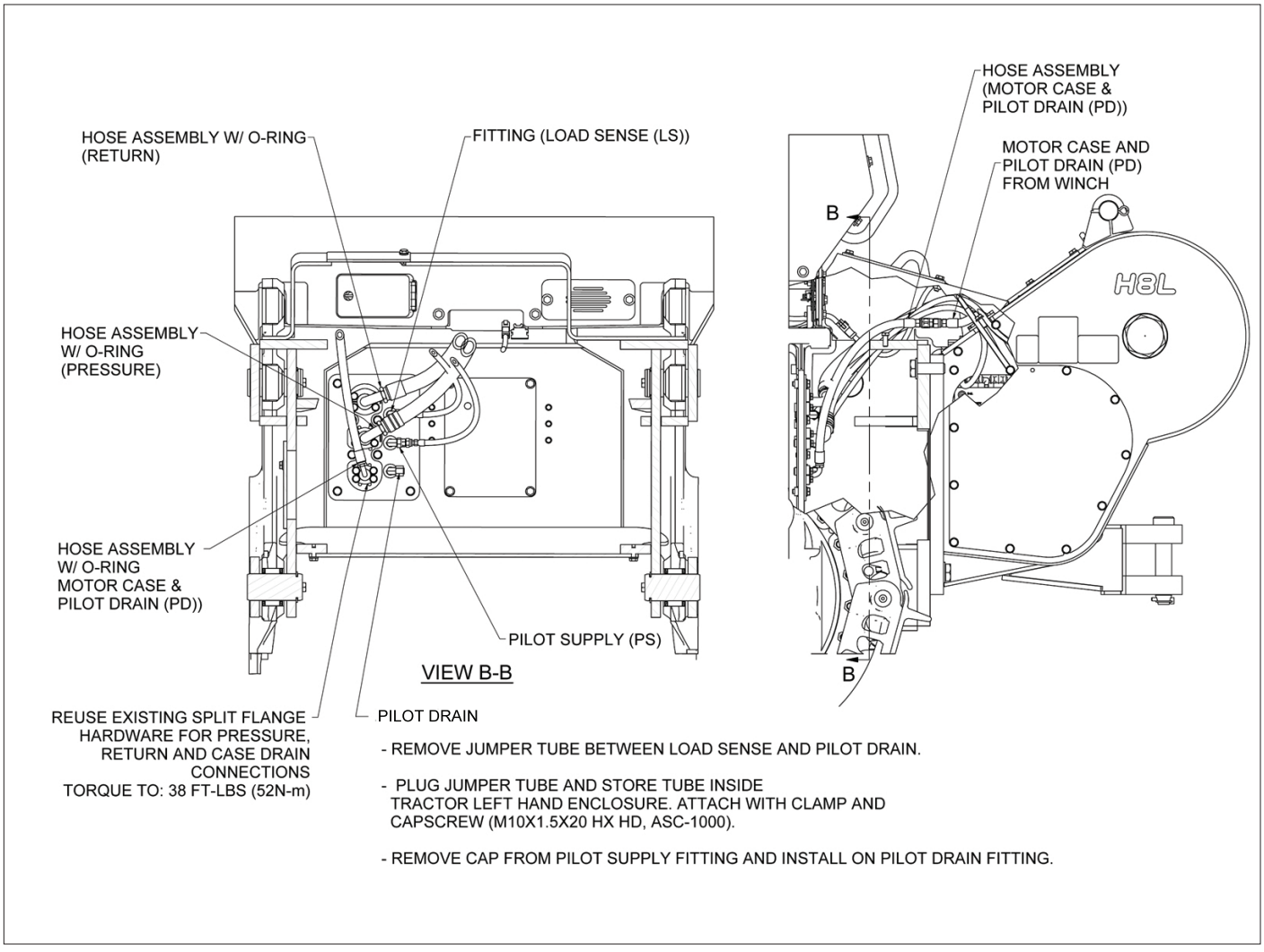
- Drill holes shown in View A-A. Cover the area below the bulkheads to catch chips. The bulkhead connector may be used as a template for the position of the 4 smaller holes for the self-tapping screws.
- Install bulkhead connector of console harness from the inside of the cab. To install the self-tapping screws, it may be easier to fully thread them into the platform from the outside of the cab, to form the threads. Then remove them and install the bulkhead connector from the inside of the cab.
- Remove panel plug where winch lockout switch needs to install. Reattach panel plug to existing tractor harness and secure below the console. Assemble winch lockout switch and guard.
- Connect console harness to winch lockout switch and insert switch into console.
- Connect remaining plug on console harness to control lever assembly and install control lever using hardware from step 1.



CONTROL LEVER INSTALL DETAIL

CHASSIS:

- Remove guarding covering the backup alarm and the alarm itself.
- Starting at the connector into the cab, route the 8 pin connector through the chassis as shown in views.
- Use cable ties to secure the chassis harness to the tractor harnesses. Avoid the bright orange cables, they may cause electrical interference.
- Secure the 8-pin connector to the existing factory plug.
- Connect the round plug to the console harness.
- Connect the 2-pin plug to the switched 24V supply near the batteries.
- Reinstall all tractor guarding.



Pilot hydraulic installation and connection

Notes

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

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