Service Manual

H12E

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.

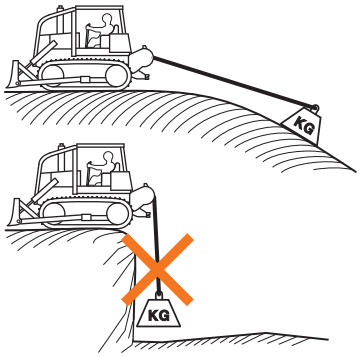
Operation, Inspection, and Maintenance Warnings

⚠ 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 599048W.
- 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 H12E 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.

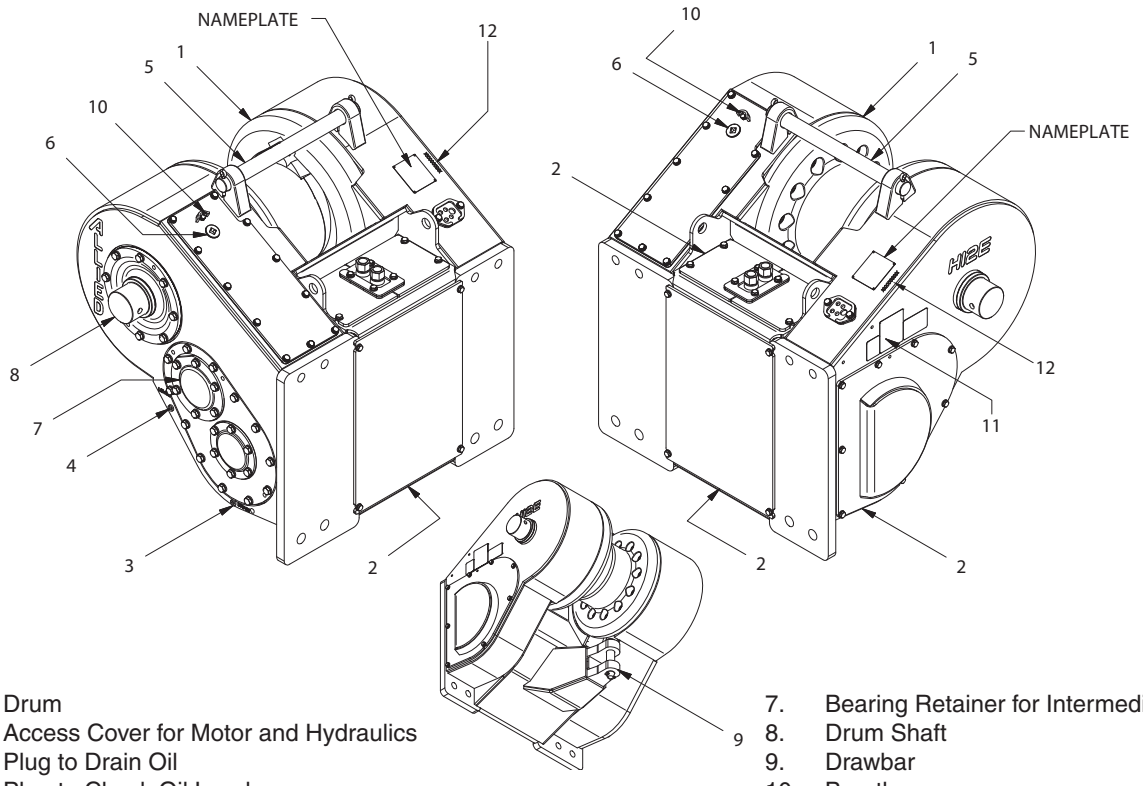
Section 4. Repairs describes the removal, disassembly and assembly of the winch.

Description

The H12E 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 **BRAKE-OFF** switch located at the tractor's control station.

The H12E winch **BRAKE-OFF** function permits the wire rope to be pulled from the drum under increased resistance.

The H12E winch has a maximum rated line pull capacity of 150,000 lbs. (68,000 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 Hydraulics
3. Plug to Drain Oil
4. Plug to Check Oil Level
5. Tie Bar
6. Fill Plug
7. Bearing Retainer for Intermediate Shaft
8. Drum Shaft
9. Drawbar
10. Breather
11. Maintenance & Warning Decals
12. Serial Number Stamp

Figure 1-1 H12E Winch

Unit Identification

Allied Winch S/N Nameplate Data For Tractor Mountings

H12E H 1 B 1001 K65

Winch Model

H12E = Standard
KH12E = Special

Hydraulic Operation Type

H = High Performance
Direction Control in Winch
T = Standard
Tractor Controls & Pump

Gear Ratio (Code #)

1 = 209:1
2 = 262:1

Internal Options

B = External Pump, PFR & BRAKE-OFF Clutch
D = External Pump, PFR, BRAKE-OFF Clutch and Hi-Speed Control

Sequence Number

Vehicle Code

See Figure 1-2

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	C Caterpillar	E John Deere	K Komatsu	L Liebherr	U Shantui
50			D85-15 ①②		
54				PR754 ①②	
56				PR756 ①②	
561				RL56 ①	
59	D8R Series II ①②				
64			D155AX-6/-7 ①②		SD32DQ ②
65			D275AX-5 ①②		
74	D8T Tier 4 ①②				
75		1050K ①②			

Figure 1-2 Tractor Identification Codes and Available Gear Ratios for H12E 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.

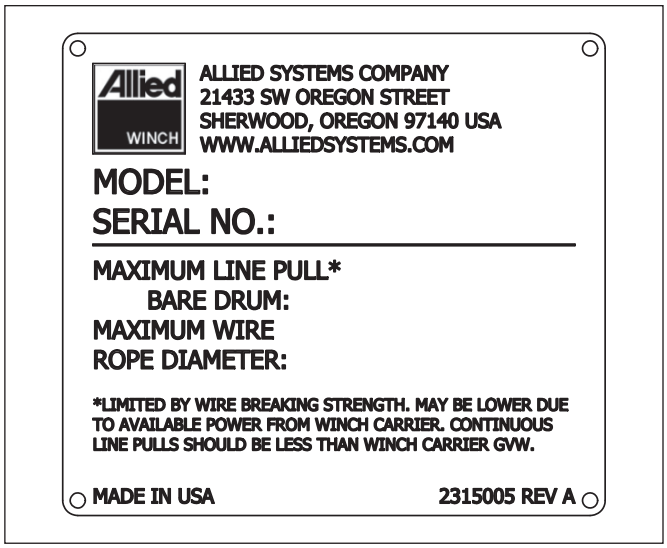


Figure 1-3 Nameplate

Specifications

Drum Wire Rope Capacities (Drum: 14 Inch Diameter)

WIRE ROPE DIAMETER	Length (2/3 Drum Capacity)	Length (Full Drum Capacity)
25 mm (1 in)	57 m (188 ft.)	87 m (286 ft.)
28 mm (1 1/8 in)	46 m (150 ft.)	70 m (229 ft.)
32 mm (1 1/4 in)	36 m (119 ft.)	55 m (182 ft.)

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 H12E winch is approximately 7 gallons (26.5 liters).

Maintenance Decal

Hydraulic Winch Maintenance

Recommended Winch Service Intervals

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

Lube rollers and check oil level and filter light weekly.

* Evaluate = Service based on average winch use;
  - if used more than once a day, perform overhaul.
  - if used less than once a day, remove covers and check to determine need.

* Inspect = disassemble and inspect for wear.

** Service winch using the tractor's hour meter or the length of time the winch is mounted to the tractor, whichever occurs first.

*** Follow tractor schedule if using tractor filter.

Recommended Gear Compartment Oil:

Caterpillar -TO-4
Chevron -Drive Train Fluids HD
ExxonMobil -Mobiltrans HD Series

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

2310796 Rev D

Figure 1-5 Maintenance Decal

Torque Specifications

ITEM		TORQUE VALUES (Lubed)		
		ft-lbs.	N-m	kg-m
Control Manifold	Solenoid Cartridge	12-15	16-20	5-6
	Solenoid Cartridge Retaining Nut	1-2	1.4-2.7	0.45-0.9
	Control Manifold to Bracket	28	38	12.7
Planetary Reducer to Clutch Housing		33	44	14.9
Brake Assembly	Primary Disc to Spring Plate	15-18	20.3-24.4	6.8-8.16
	Cover Plate	55-60	74.6-81.4	24.94-27.2
Brake-Off Clutch Assembly (Clutch Plate)		35-40	48-54	15.8-18.1
Clutch Housing to Planetary Reducer		33	44	14.9
Keeper		80	108	11
Drum Adapter to Drum Bearing Retainer Plate		180	244	25
Motor to Brake Brake Manifold Bracket		280	379	38
Bearing Cover Clutch Housing Planetary Reducer to Frame Cover Top, Clamp Gasket Frame to Top Guard Top Guard to Tractor Mount		66	90	9
Bearing Retainer Drum Shaft Intermediate Shaft Cover RH Cover Plate		165	225	23
Shaft Nut		400	550	181.4
Mounting Bracket (From Winch Side)		1105	1500	153
Mounting Bracket (From Tractor Side)		1900	2620	267

Figure 1-6 Torque Specifications

Gear Train (See Fig. 1-8)

A tractor mounted pump provides hydraulic flow to drive the winch motor. The flow is controlled in the winch by the hydraulic counterbalance relief 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 internal hydraulic leakage to the motor.

A planetary gear assembly provides a 18.8:1 gear reduction between the hydraulic motor and the planetary output gear. The planetary output gear rotates at the same direction as the hydraulic motor.

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

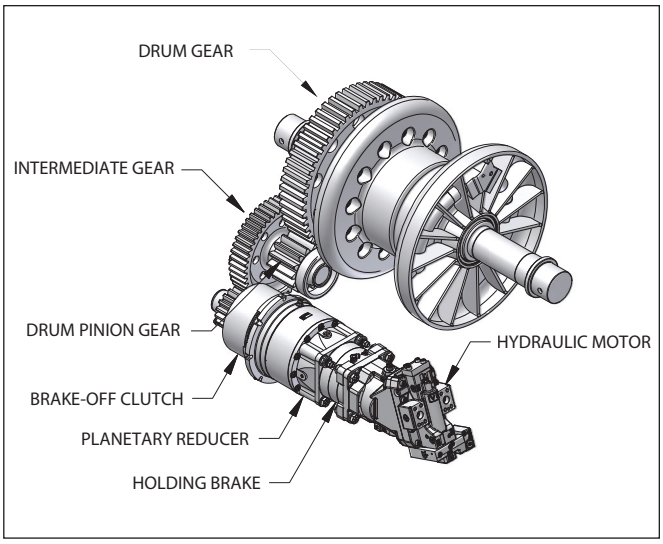


Figure 1-7 Gear Train

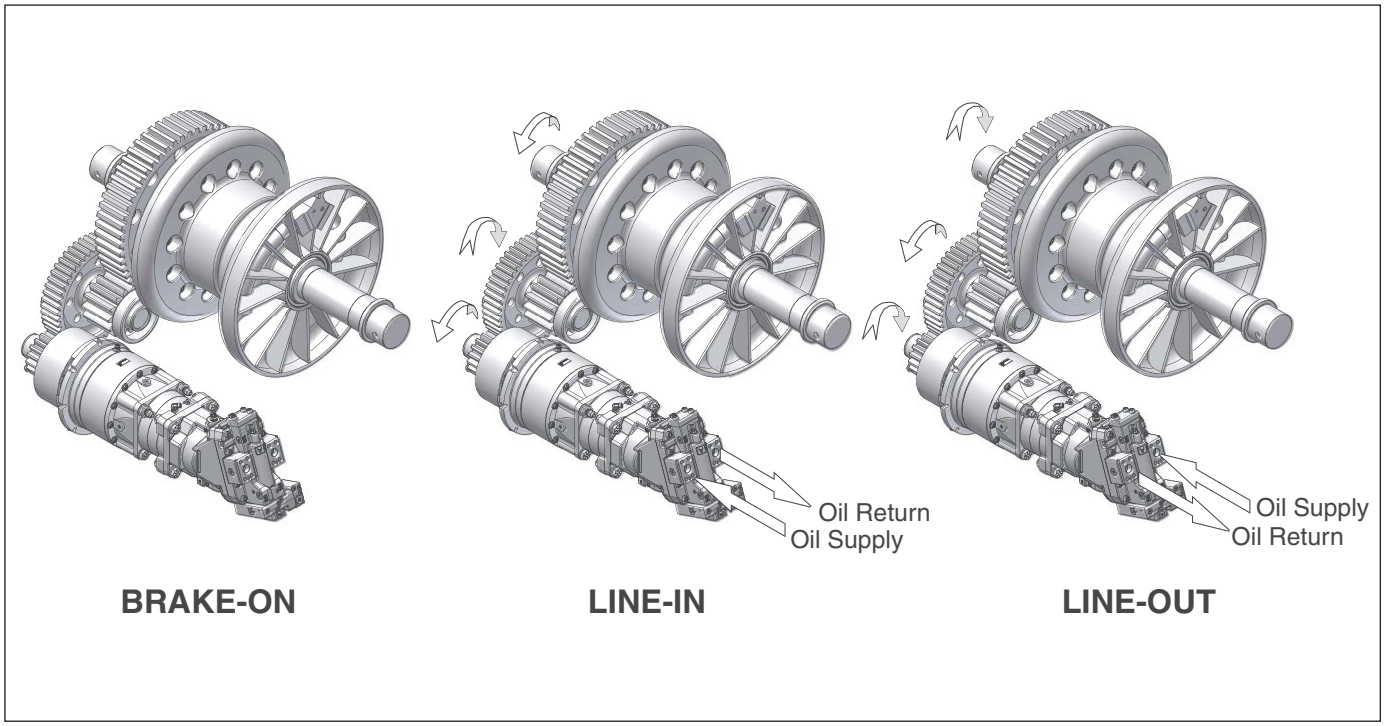


Figure 1-8 Rotation Torque Transfer

Operation & Control

There are two types of internal operation option codes: Internal Operation Option Code B and Code D (see Figures 1-9 and 1-10).

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

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.

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

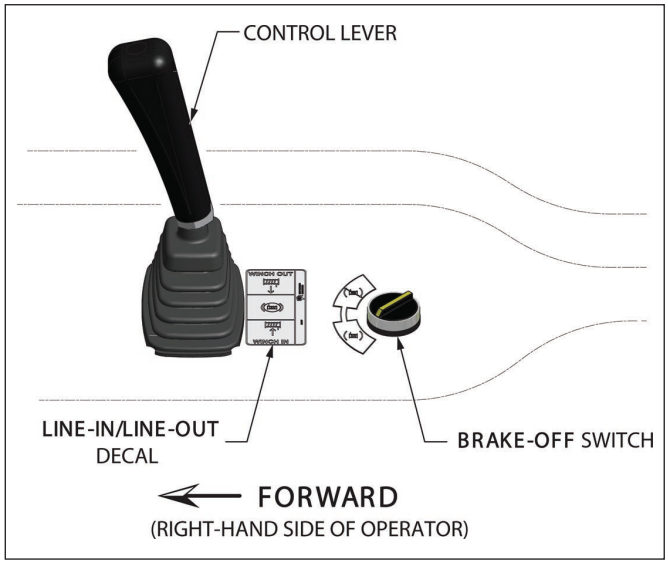


Figure 1-9 Control Levers & Switch (Option Code B)

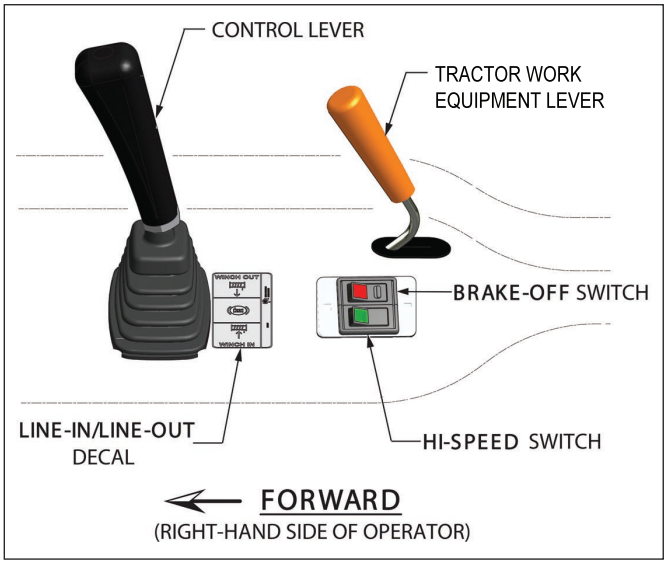


Figure 1-10 Control Levers & Switch (Option Code D)

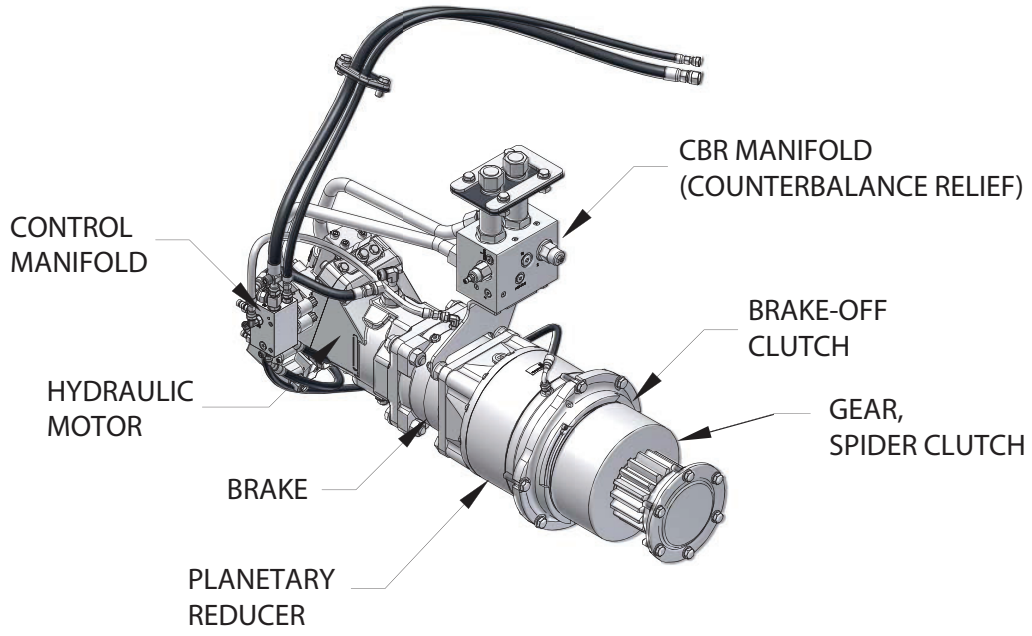
- Internal Option Code B

Operation of the winch is controlled by a control lever, and a **BRAKE-OFF** switch at the tractor's control station.

- Internal Option Code D

Operation of the winch is controlled by a control lever, a **BRAKE-OFF** switch and a **HI-SPEED** switch at the tractor's control station.

Hydraulic System



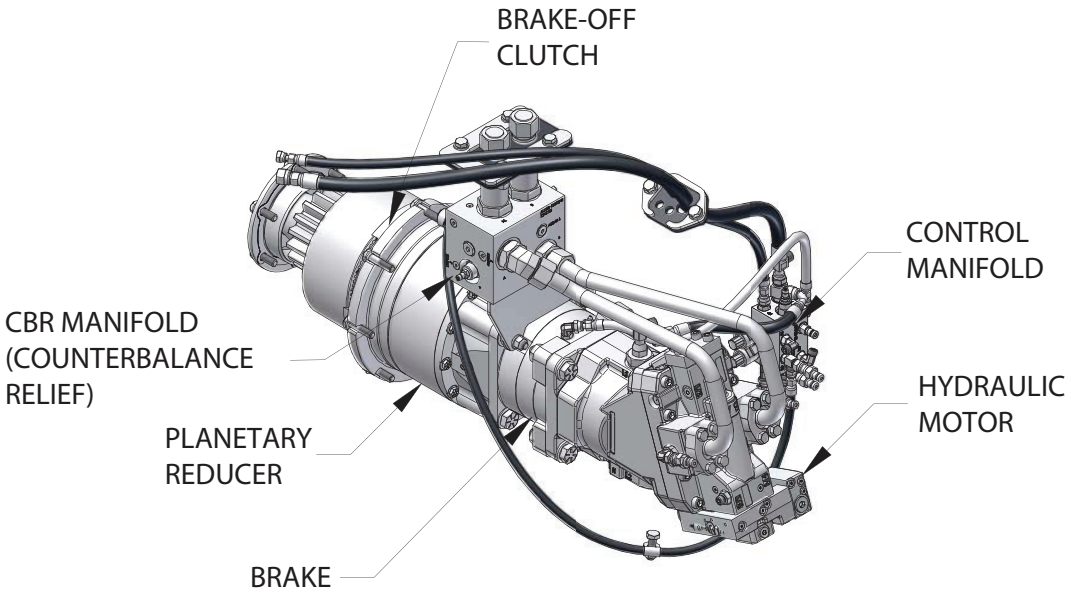


Figure 1-11 Major Components

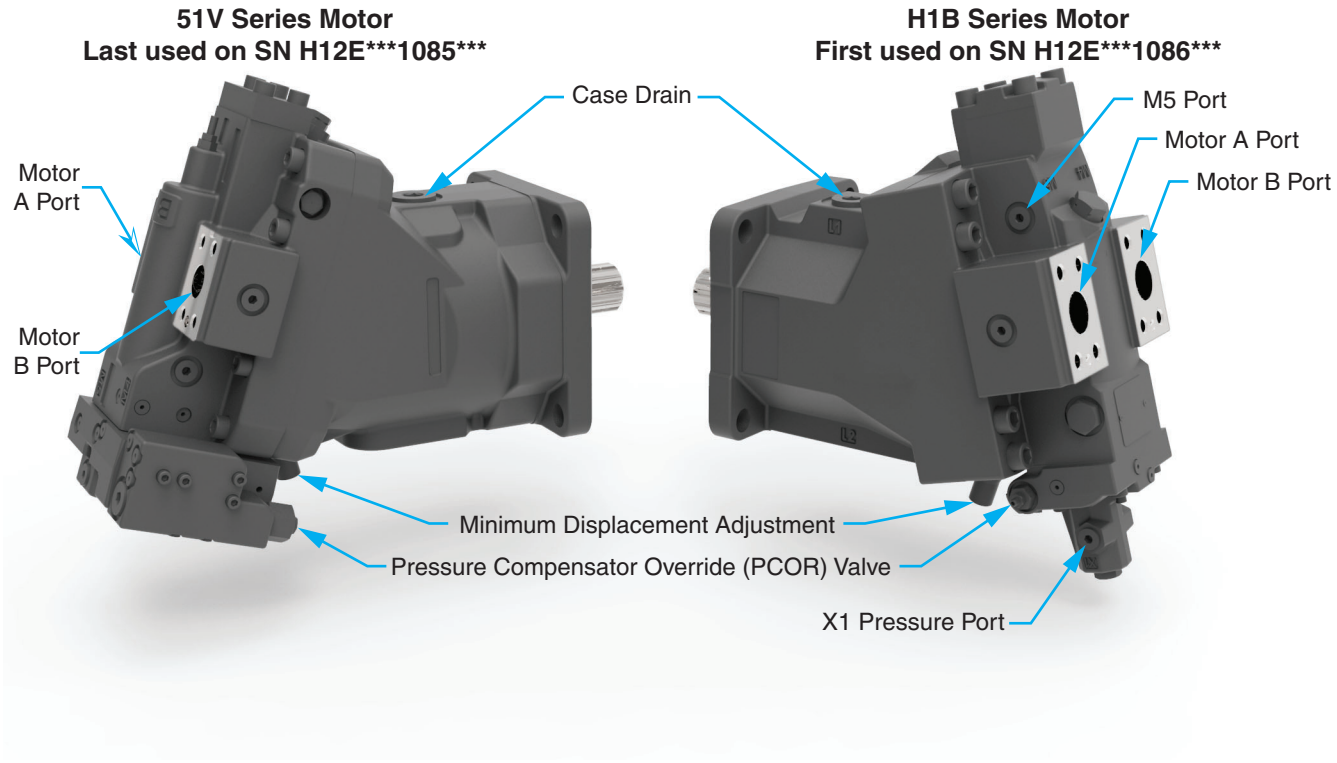


Figure 1-12 Hydraulic Motors

Motor (See Fig. 1-12)

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.

PCOR

The Pressure Compensator OverRide (PCOR) allows the motor to shift between maximum and minimum displacement depending on pressure. If the PCOR pressure is set incorrectly, the winch may not be able to shift to maximum displacement, causing a stall in the motor. If the PCOR is set higher than the system pressure of the machine hydraulics, the PCOR will never be allowed to shift causing the winch to be stuck in high speed. See Section 3 for testing procedures to evaluate if the PCOR is set correctly for your application.

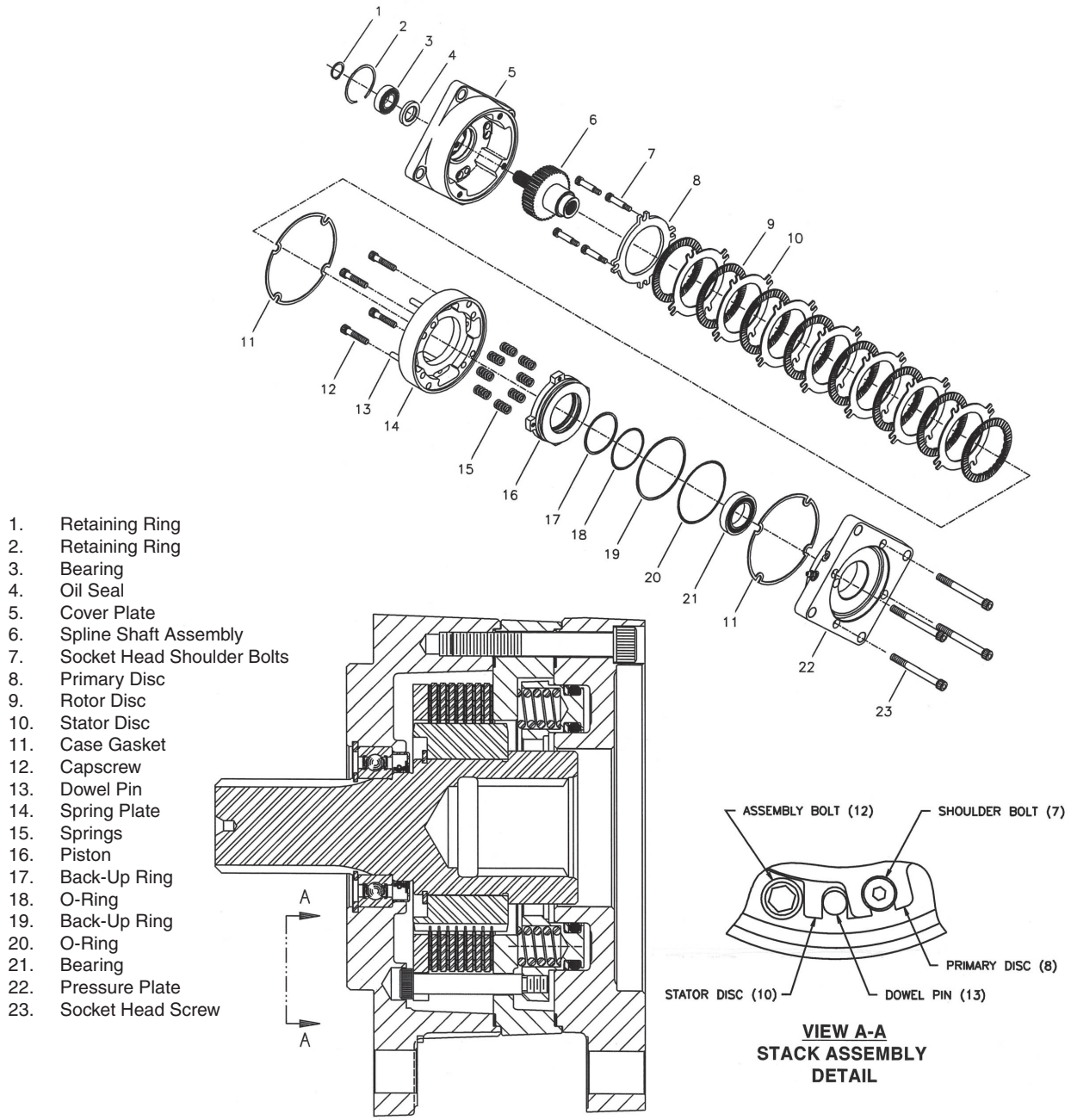
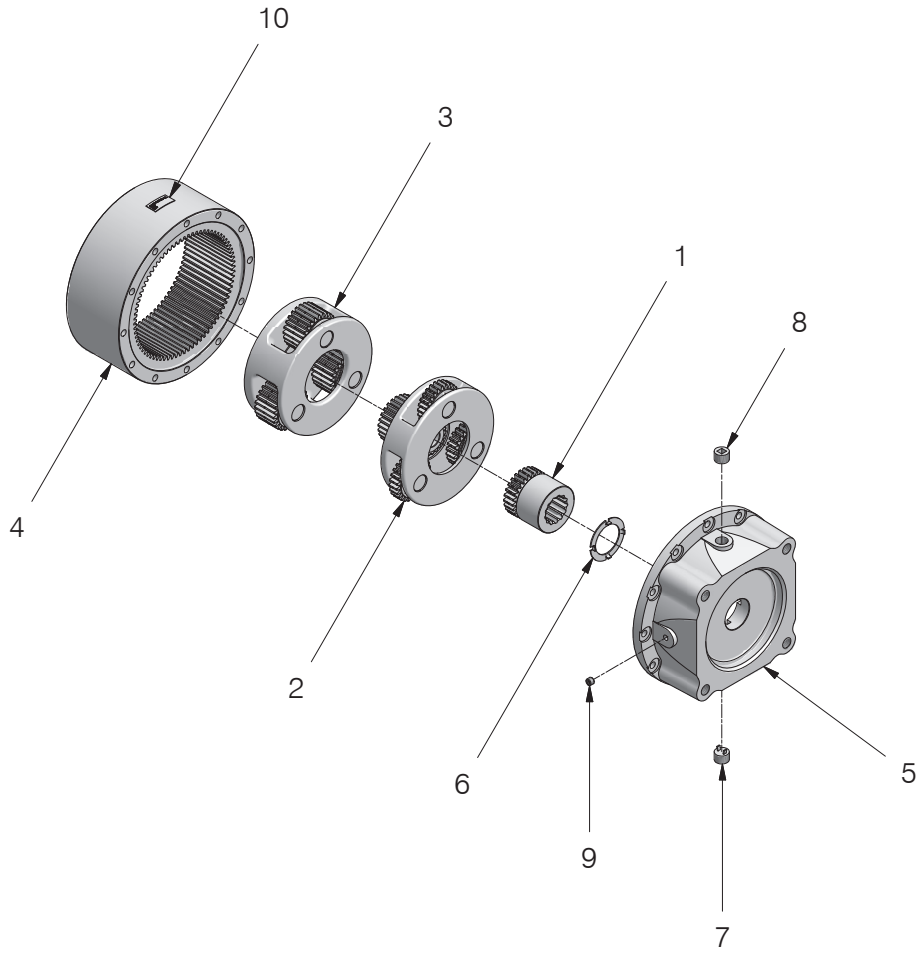


Figure 1-13 Brake

Brake (See Fig. 1-13)

The brake is a dry multi-disc spring applied design. The springs push against a piston that applies force to the friction discs and separator plates. The brake valve directs pressurized oil to the piston and pushes back on the brake springs to release the brake. The separator plates have teeth that engage the splines inside the brake housing and are held stationary. Teeth in the friction discs engage the splines on the motor shaft and rotate with the 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 1-14 Planetary Reducer

Planetary Reducer (See Fig. 1-14)

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.

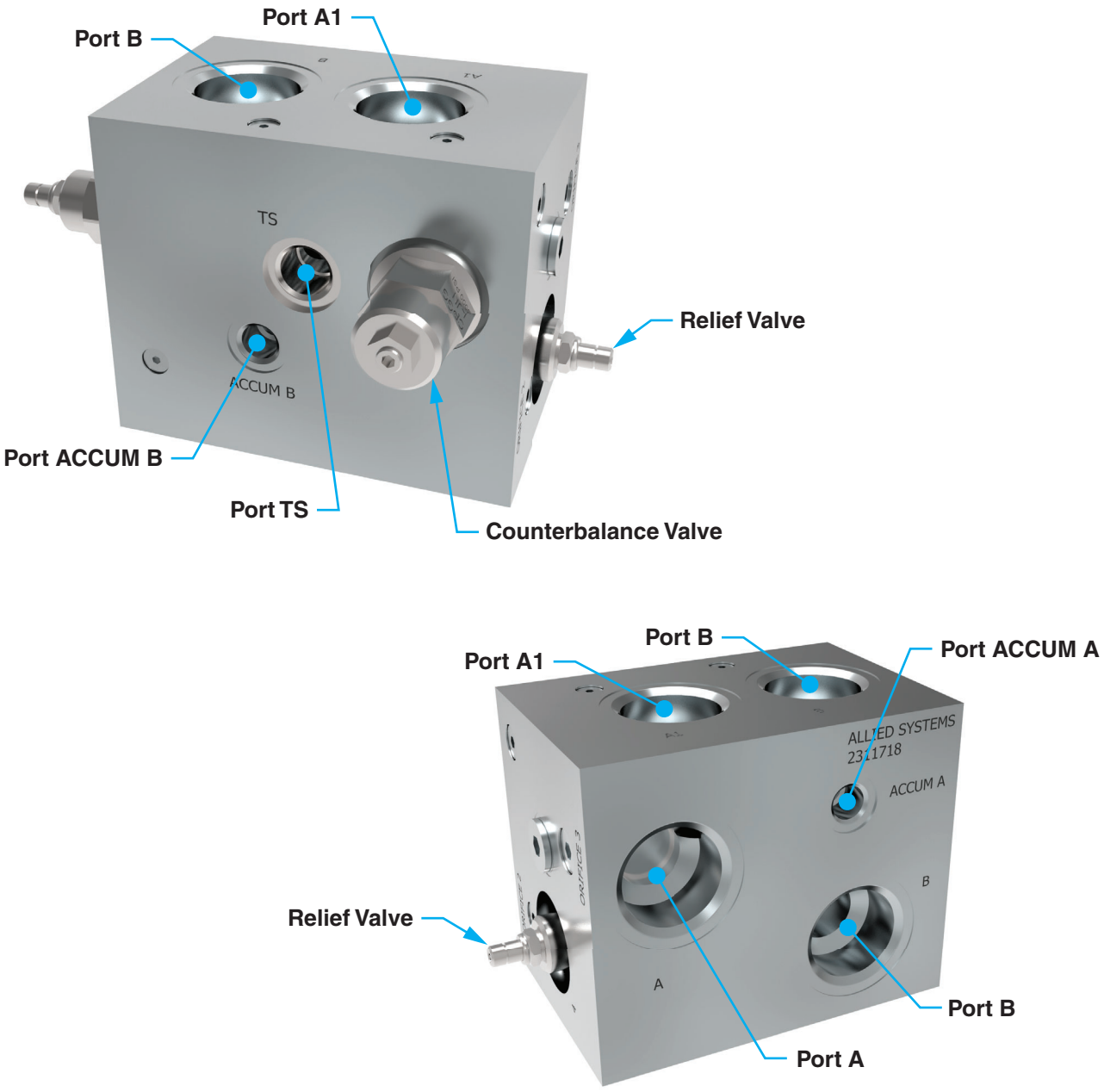


Figure 1-15 Counterbalance Relief Manifold

Counterbalance Relief Manifold (See Fig. 1-15)

The counterbalance relief (CBR) manifold houses the counterbalance valve and the 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.

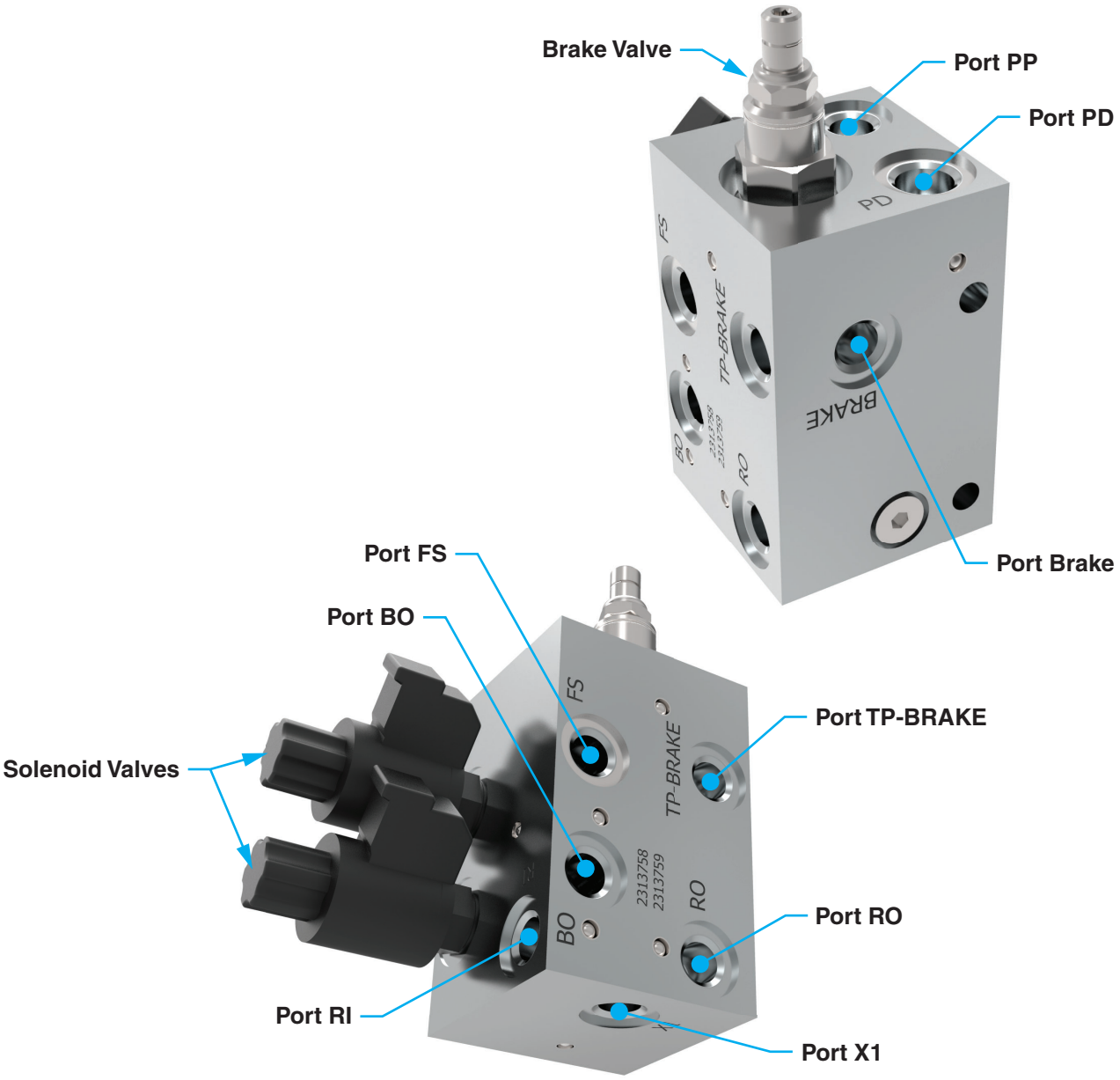


Figure 1-16 Control Manifold

Control Manifold (See Fig. 1-16)

The control manifold contains the brake valve, two solenoid valves and a shuttle valve to direct pilot pressure to release the **BRAKE**, the **BRAKE-OFF CLUTCH** and control hydraulic motor displacement. The shuttle is used to send pressure from either **LINE-IN** or **LINE-OUT** to the brake valve. When control pressure rises to the brake release pressure setting, the brake valve sends pilot pressure to release the brake. One solenoid valve is used to send pilot pressure to release the **BRAKE-OFF CLUTCH**. The solenoid receives an electrical signal from a switch on the operator console. The second solenoid is used on Option Code “D” winches to command high speed operation.

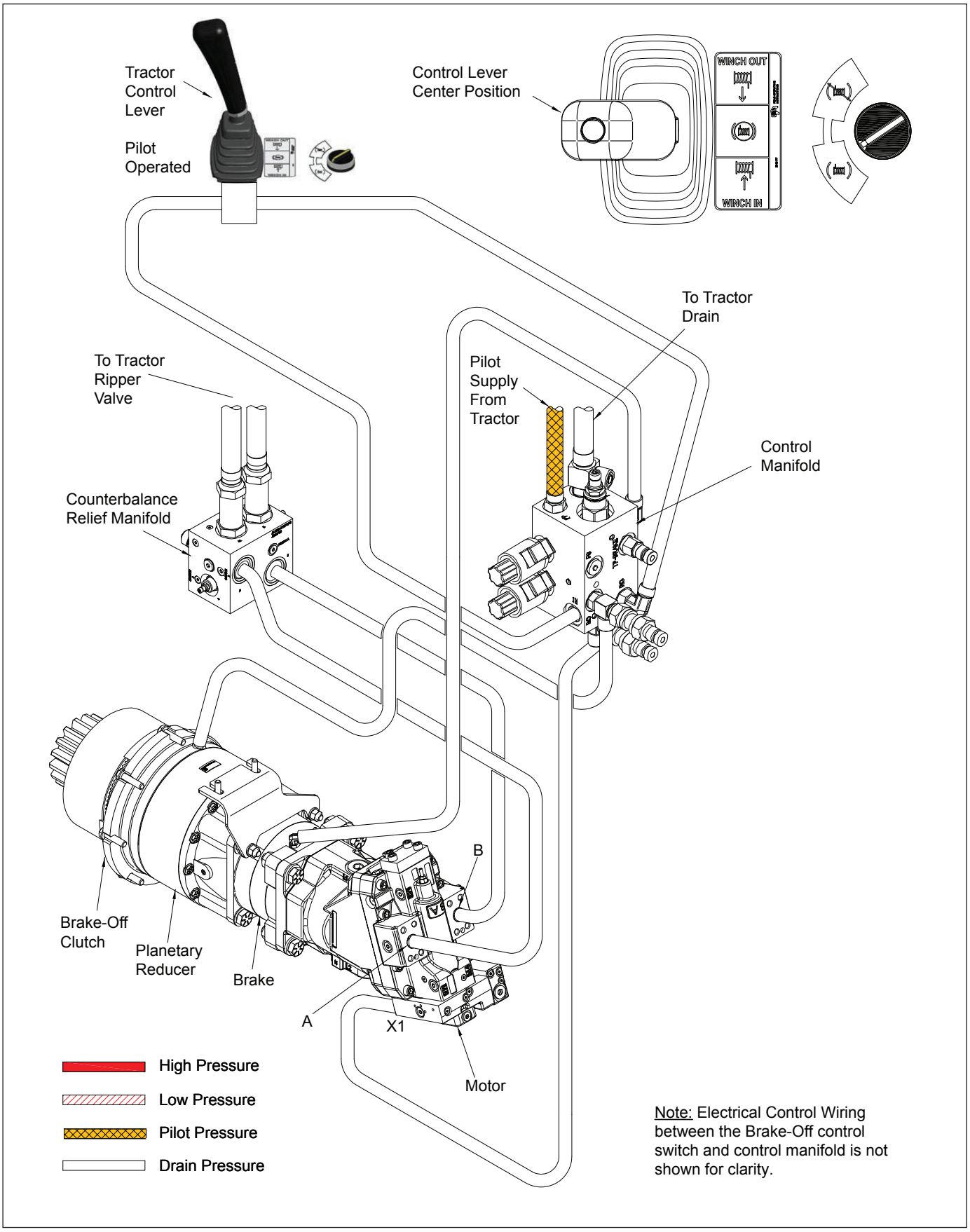


Figure 1-17 Sequence of Operation - BRAKE-ON, Option Code B

Sequence of Operation - BRAKE-ON, Option Code B

With control lever centered, the tractor ripper valve blocks flow to the winch.

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.

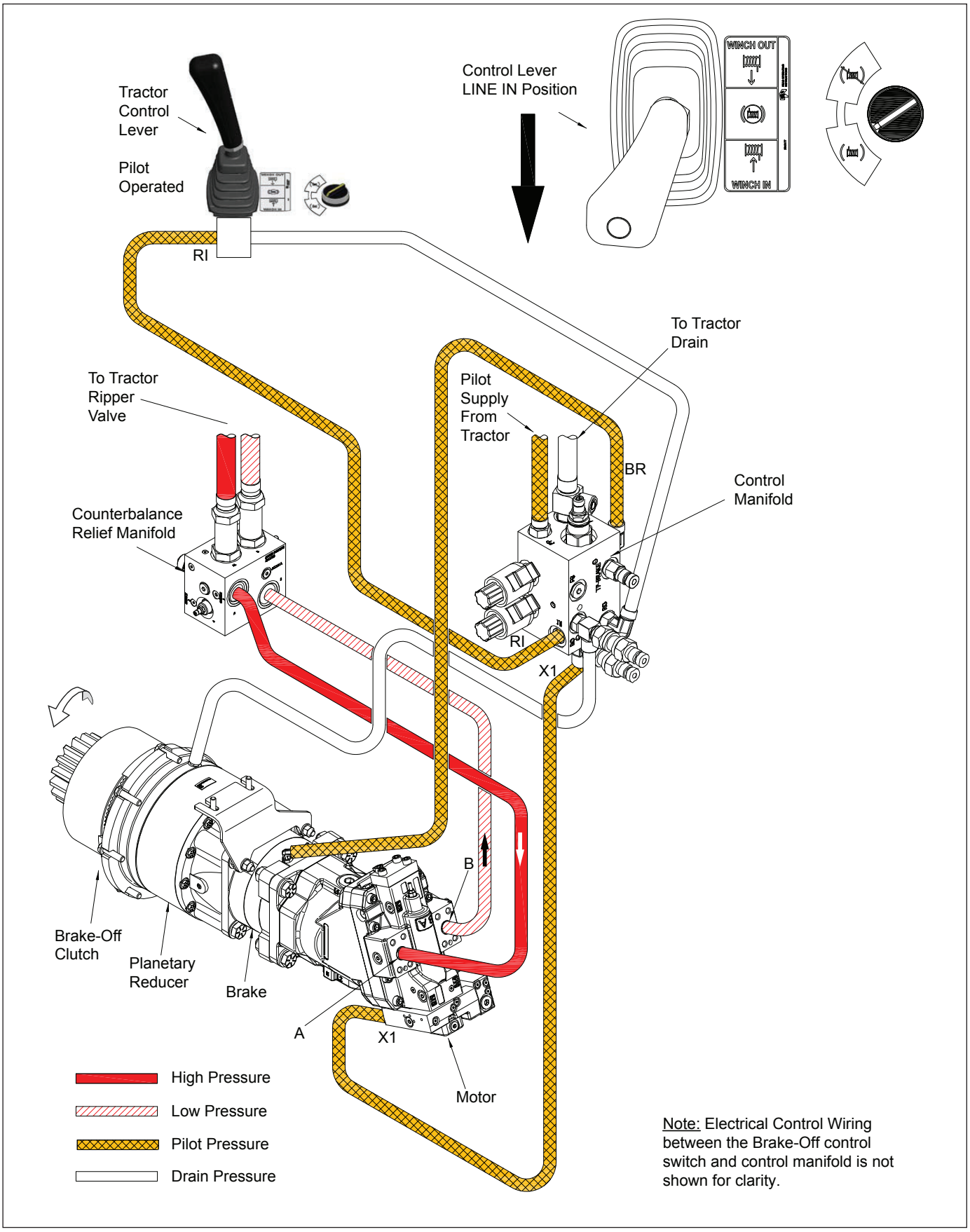


Figure 1-18 Sequence of Operation - LINE-IN, Option Code B

Sequence of Operation - LINE-IN, Option Code B

Pulling the control lever toward the operator commands the tractor ripper valve to send oil flowing to the winch, through the counterbalance relief manifold and to the motor “A” port. At the same time, control pressure from the control lever applies pressure to the RI port, through the shuttle valve, to the brake valve. At the set pressure, the brake valve directs pilot flow to release the brake.

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 increase line pull.

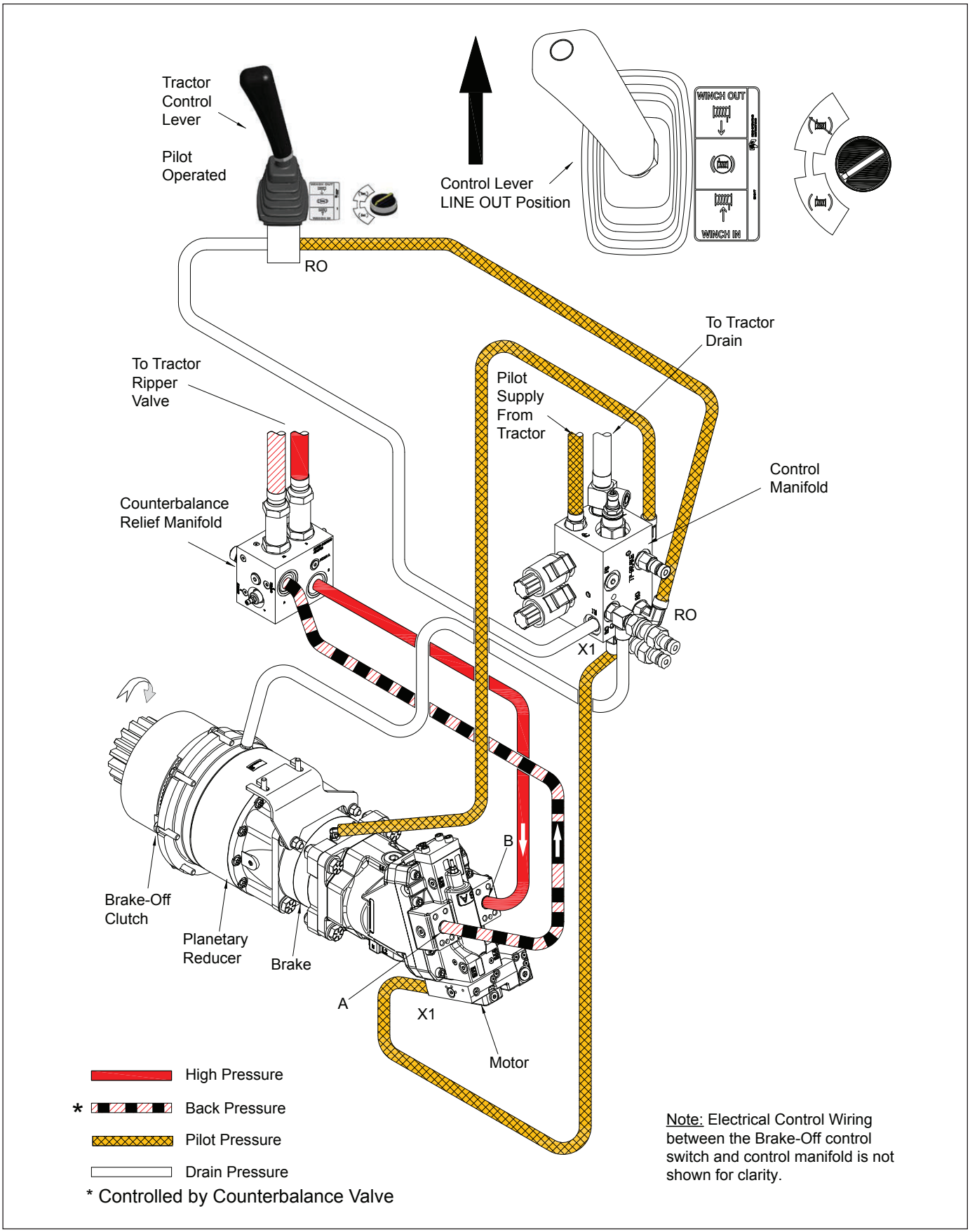


Figure 1-19 Sequence of Operation - LINE-OUT, Option Code B

Sequence of Operation - LINE-OUT, Option Code B

LINE-OUT operation is similar to **LINE-IN** except moving the control lever away from the operator reverses flow at the tractor ripper valve and directs flow through the counterbalance relief manifold to the “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 counterbalance relief 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.

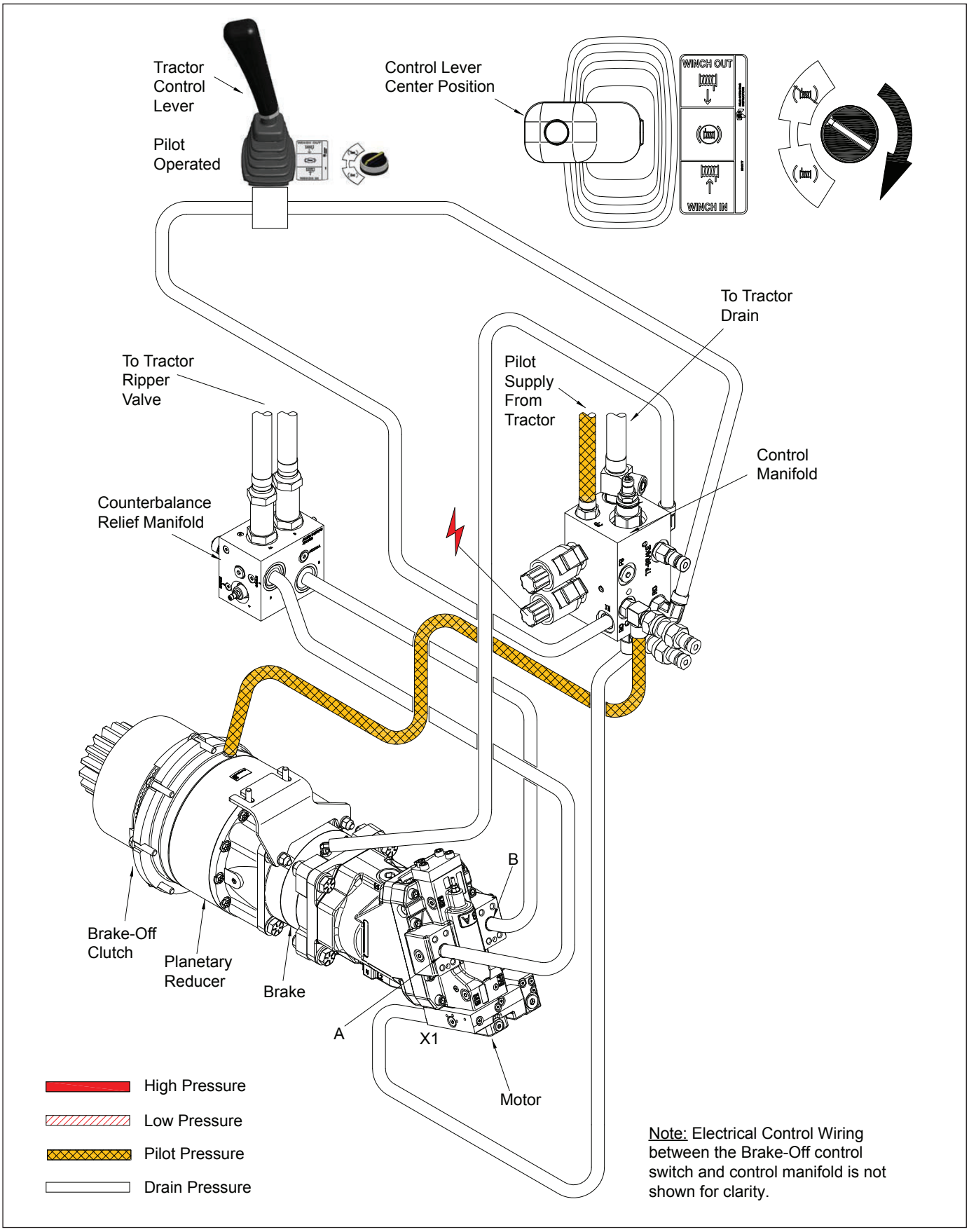


Figure 1-20 Sequence of Operation - BRAKE-OFF, Option Code B

Sequence of Operation - BRAKE-OFF, Option Code B

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

⚠ WARNING

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

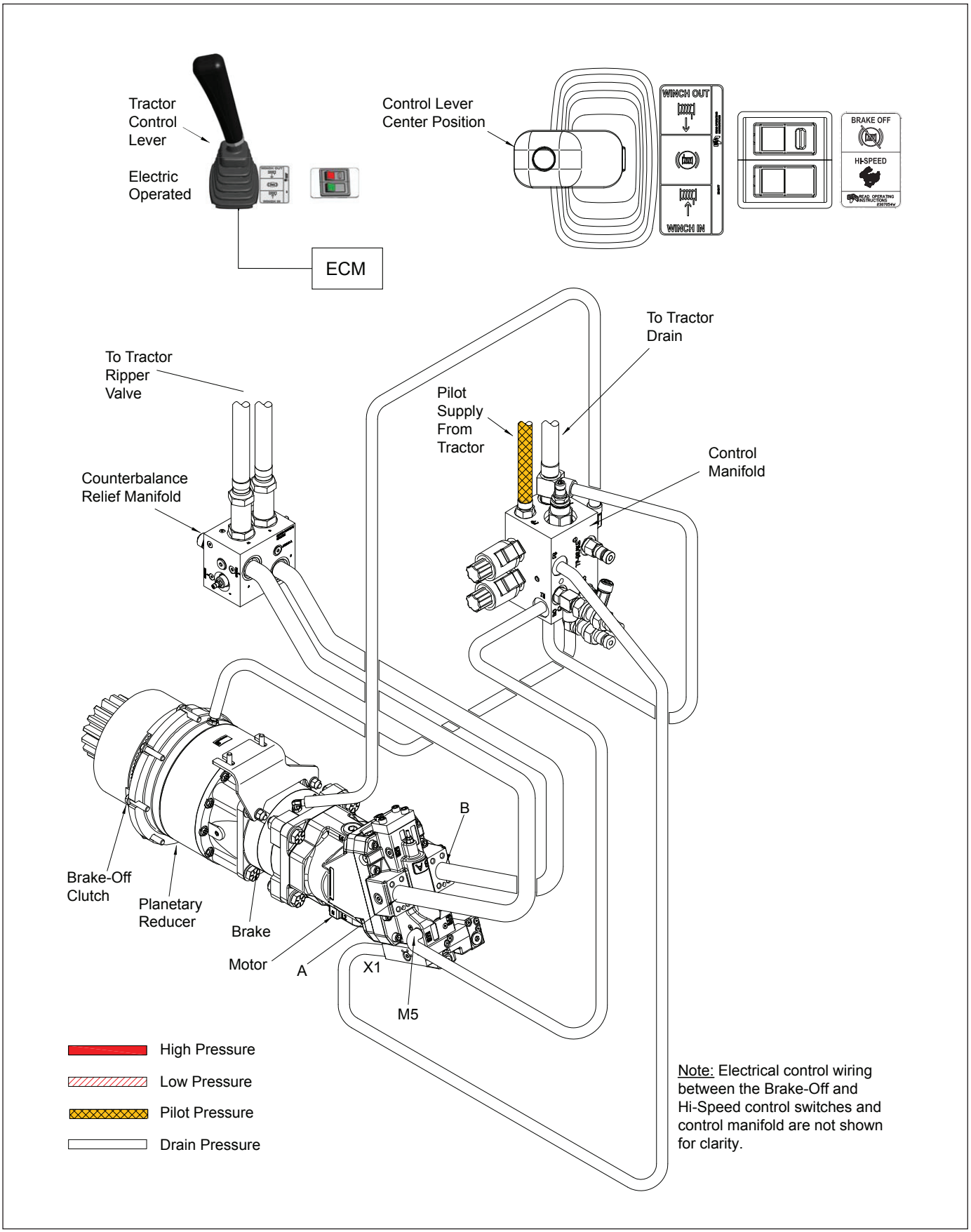


Figure 1-21 Sequence of Operation - BRAKE-ON, Option Code D

Sequence of Operation - BRAKE-ON, Option Code D

With control lever centered, the tractor ripper valve blocks flow so hot oil is flowing to the winch counterbalance relief manifold.

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

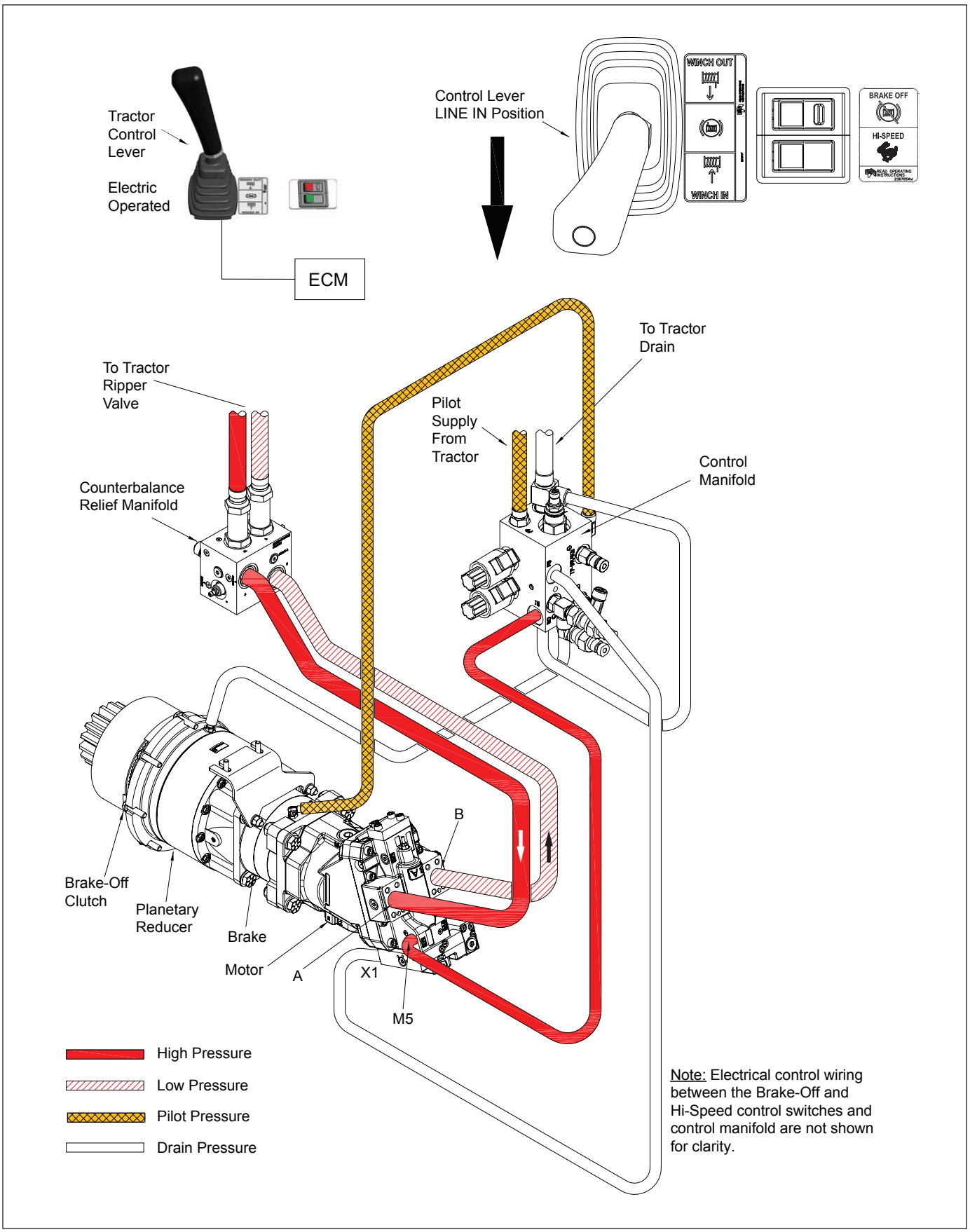


Figure 1-22 Sequence of Operation - LINE-IN, Option Code D

Sequence of Operation - LINE-IN, Option Code D

Pulling the control lever toward the operator commands the tractor ripper valve to send oil flowing to the winch, through the counterbalance relief manifold and to the motor “A” port. Motor pressure from motor port M5 is directed to the control manifold RO port through the shuttle valve, to the brake valve. At the set pressure, the brake valve directs pilot flow to release the brake.

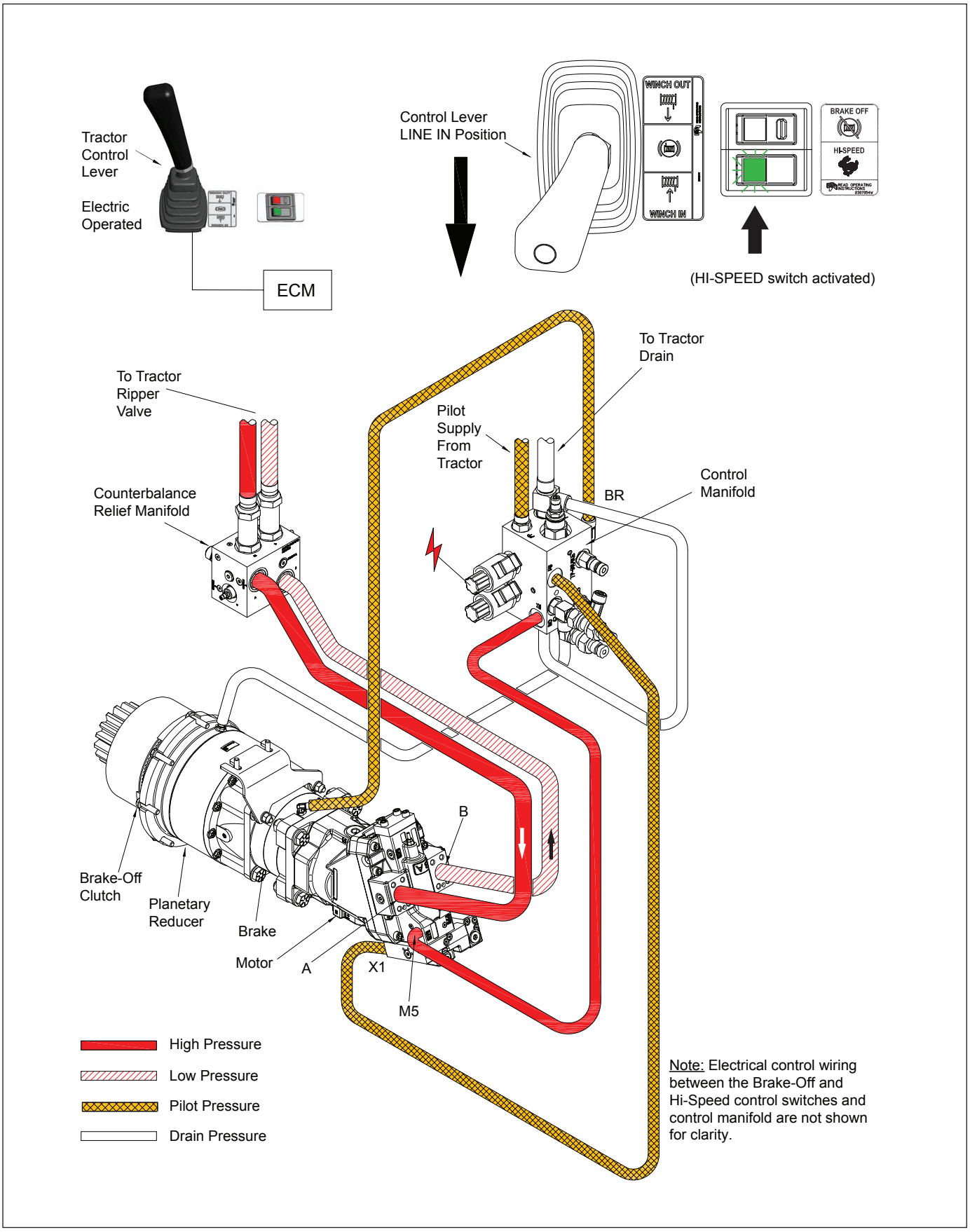


Figure 1-23 Sequence of Operation - LINE-IN HI-SPEED, Option Code D

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

If the operator selects **HI-SPEED** mode by the rocker switch on the control panel, an electric solenoid valve on the control manifold sends pilot pressure to the X1 port on the motor. Pressure commands the servo to reduce motor displacement to increase line speed. If working pressure increases to PCOR setting, the motor servo begins to increase displacement to increase line pull.

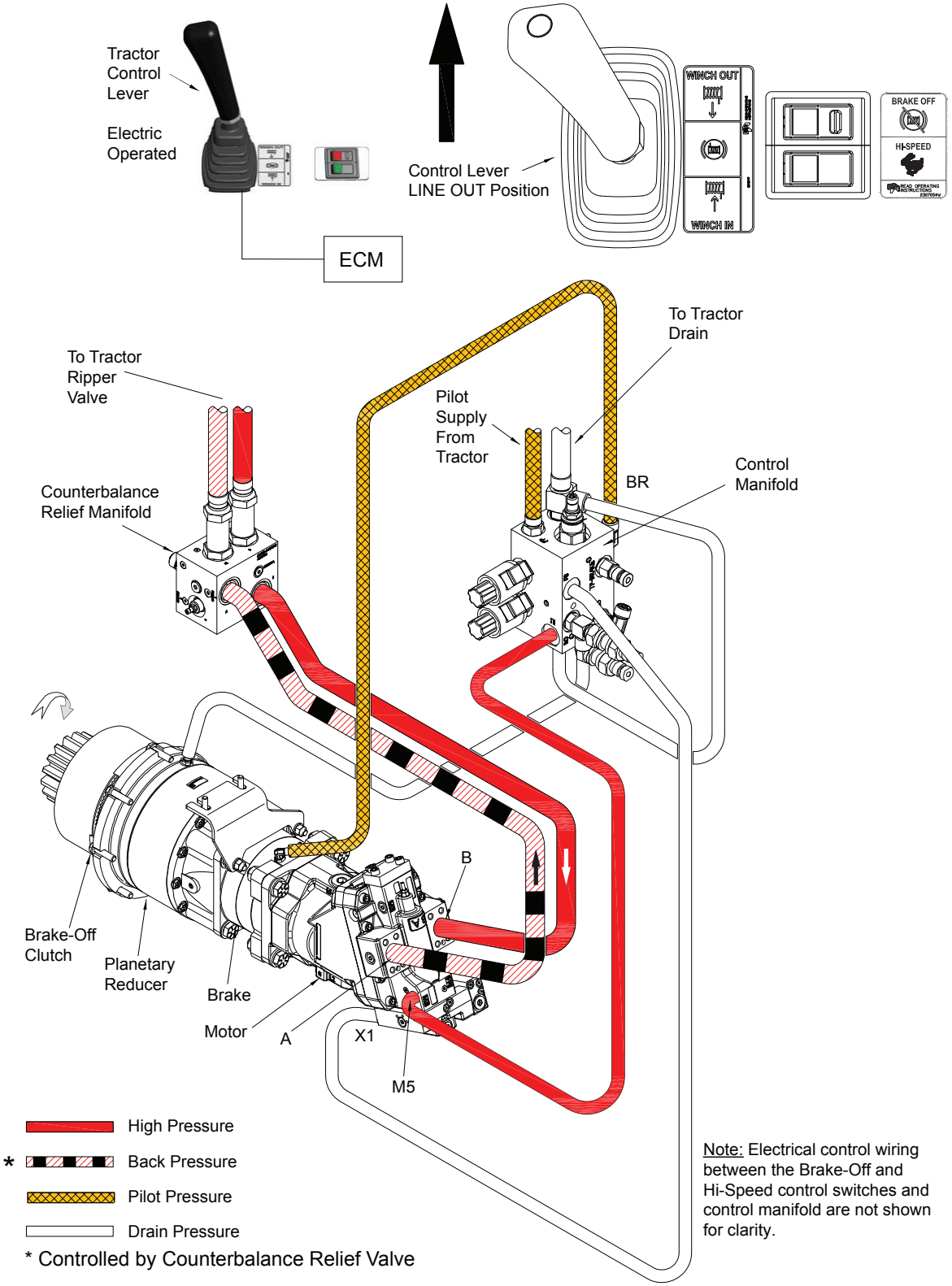


Figure 1-24 Sequence of Operation - LINE-OUT, Option Code D

Sequence of Operation - LINE-OUT, Option Code D

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

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

If **HI-SPEED** is selected by the operator, pilot pressure is sent to the X1 motor port to control motor displacement (See **LINE-IN, HI-SPEED** Option Code D, Figure 1-23).

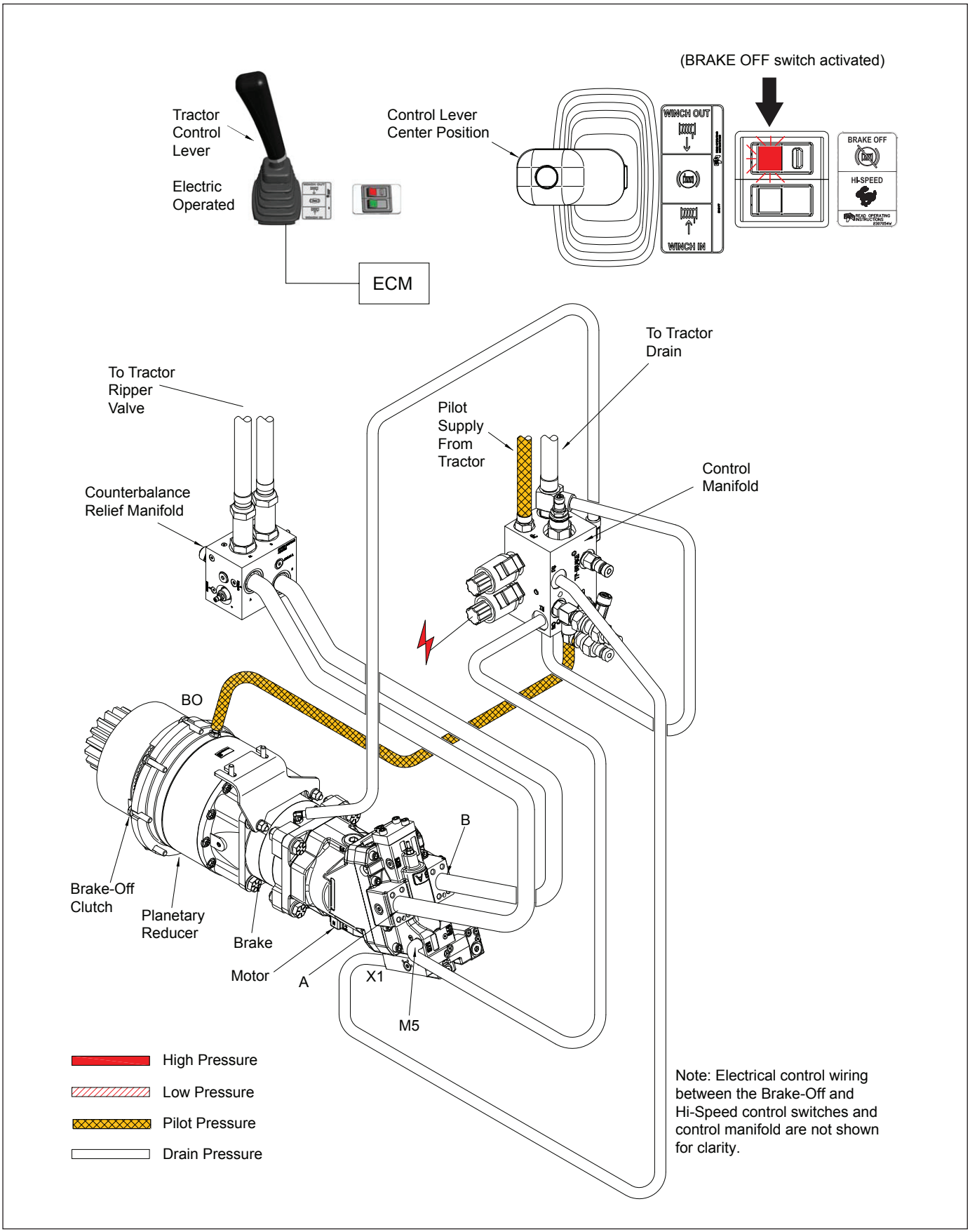


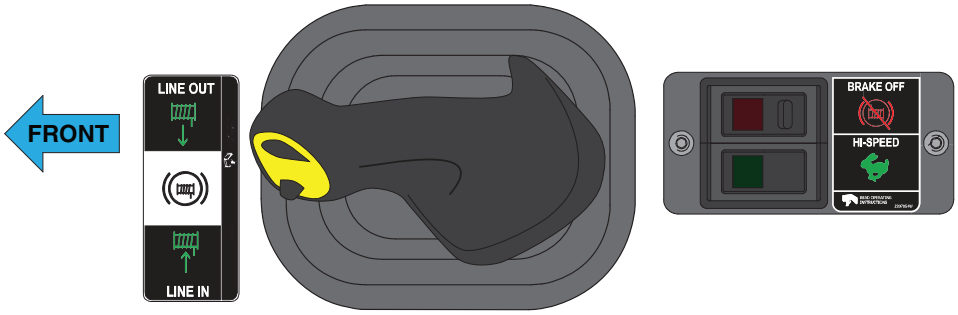
Figure 1-25 Sequence of Operation - BRAKE-OFF, Option Code D

Sequence of Operation - BRAKE-OFF, Option Code D

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

⚠ WARNING

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



Brake-On

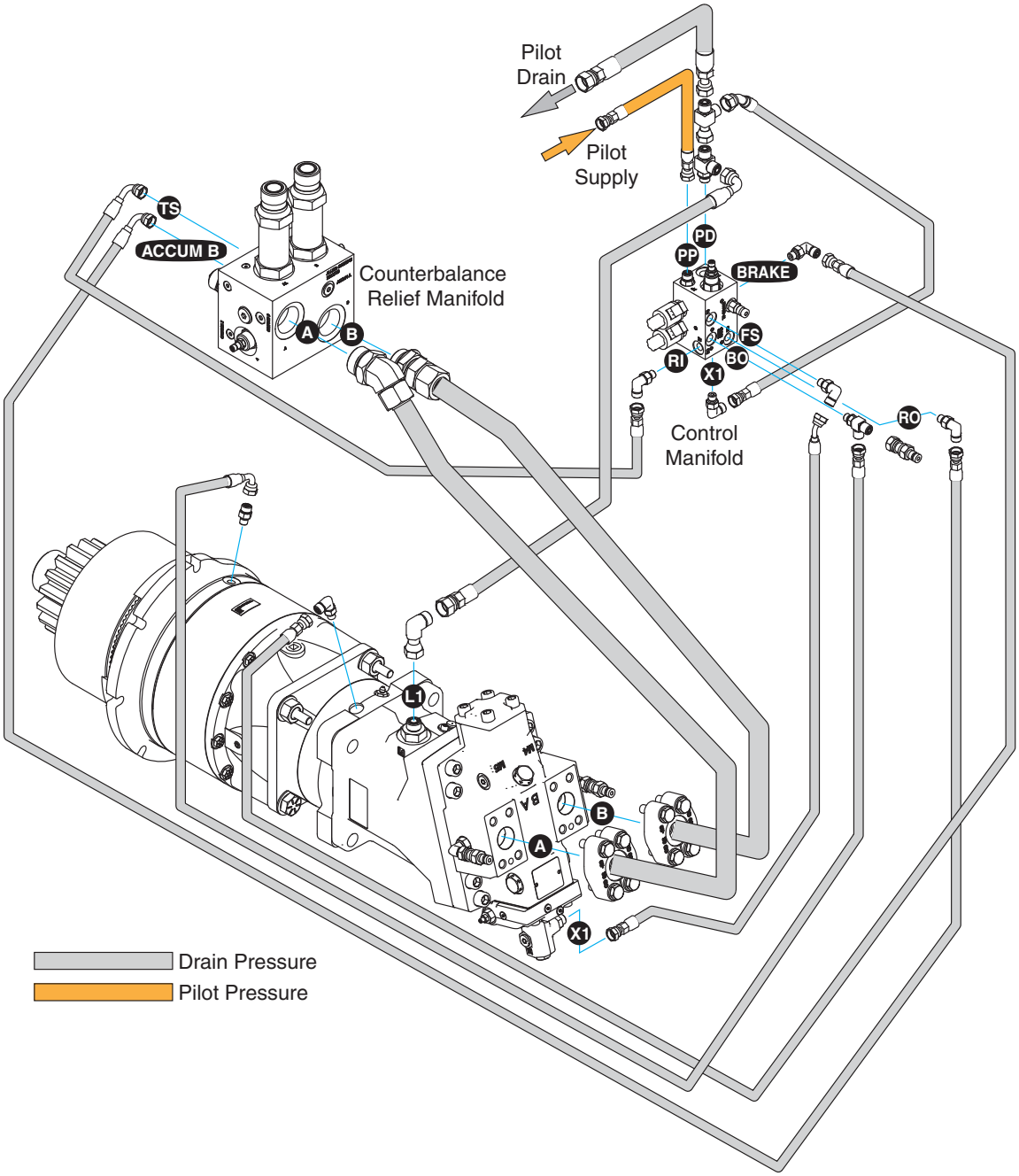
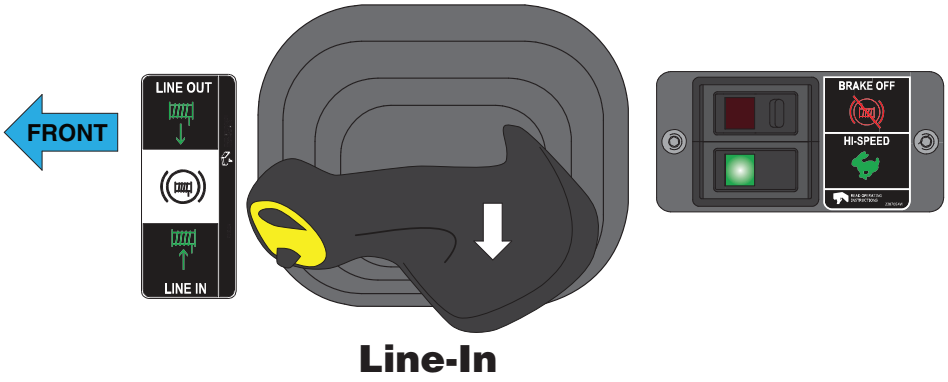


Figure 1-26 Sequence of Operation - BRAKE-ON, Komatsu D155AX-6/-7 (K64)

Sequence of Operation - BRAKE-ON (K64)

With control lever centered, the tractor ripper valve blocks flow to the winch.

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.



Line-In

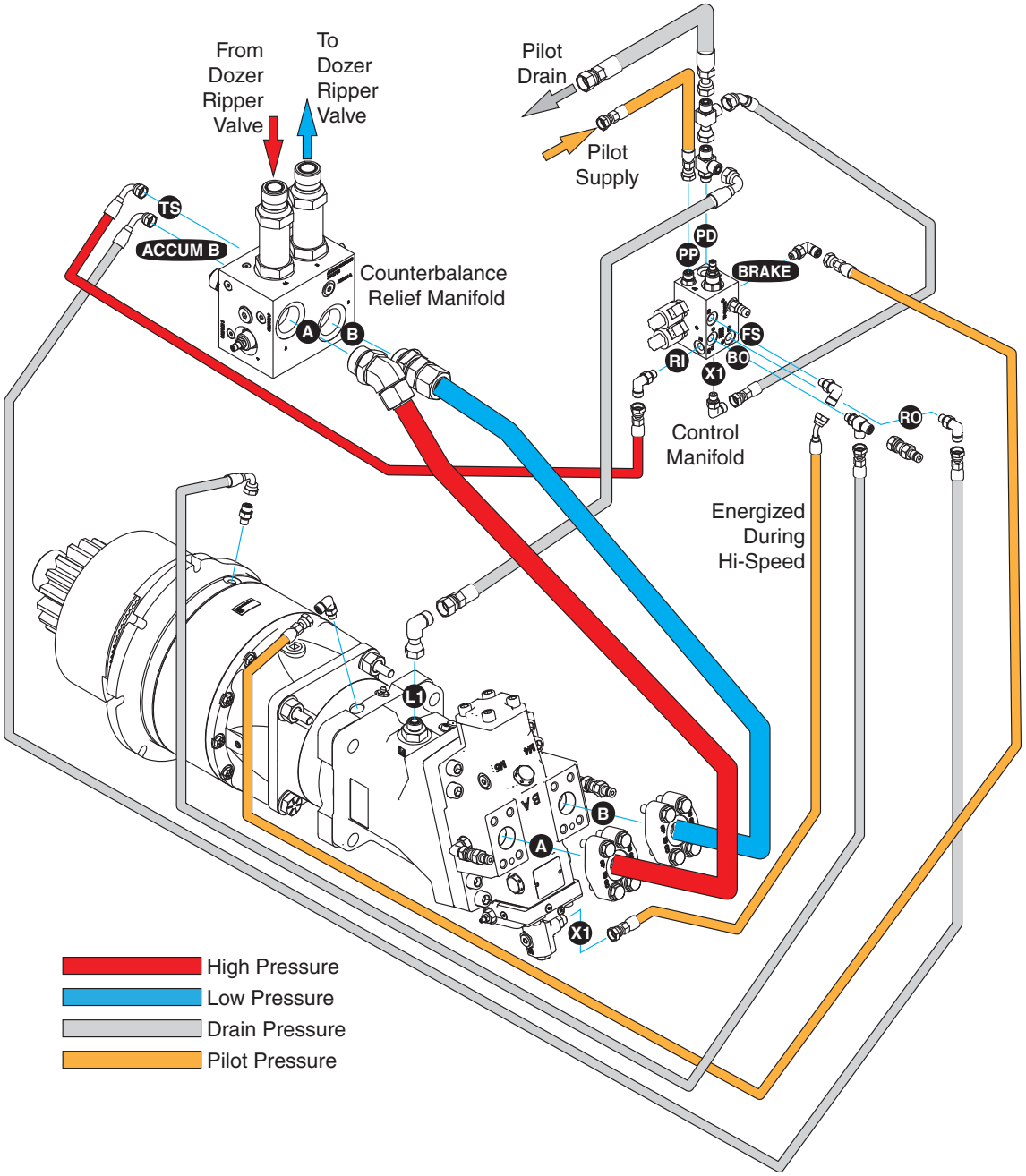
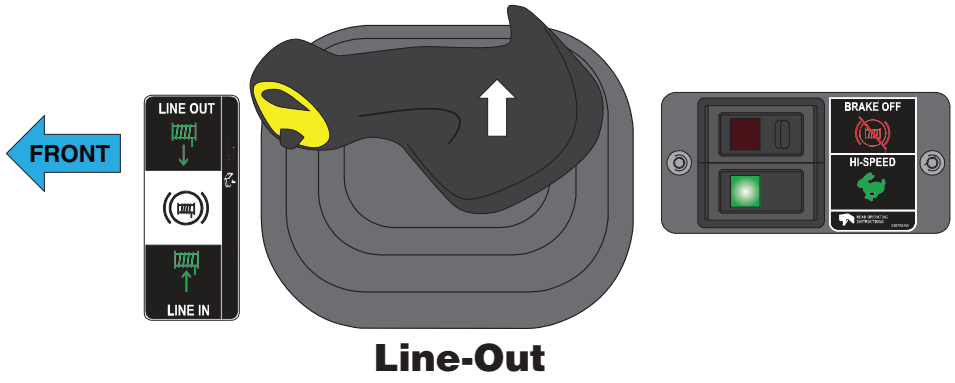


Figure 1-27 Sequence of Operation - LINE-IN, Komatsu D155AX-6/-7 (K64)

Sequence of Operation - LINE-IN HI-SPEED (K64)

Pulling the control lever toward the operator commands the tractor ripper valve to send oil flowing to the winch, through the counterbalance relief manifold to the motor “A” port and to the RI port on the control manifold. The brake valve directs pilot flow to release the brake.

If the operator selects **HI-SPEED** mode by the rocker switch on the control panel, an electric solenoid valve on the control manifold sends pilot pressure to the X1 port on the motor. Pressure commands the servo to reduce motor displacement to increase line speed. If working pressure increases to PCOR setting, the motor servo begins to increase displacement to increase line pull.



Line-Out

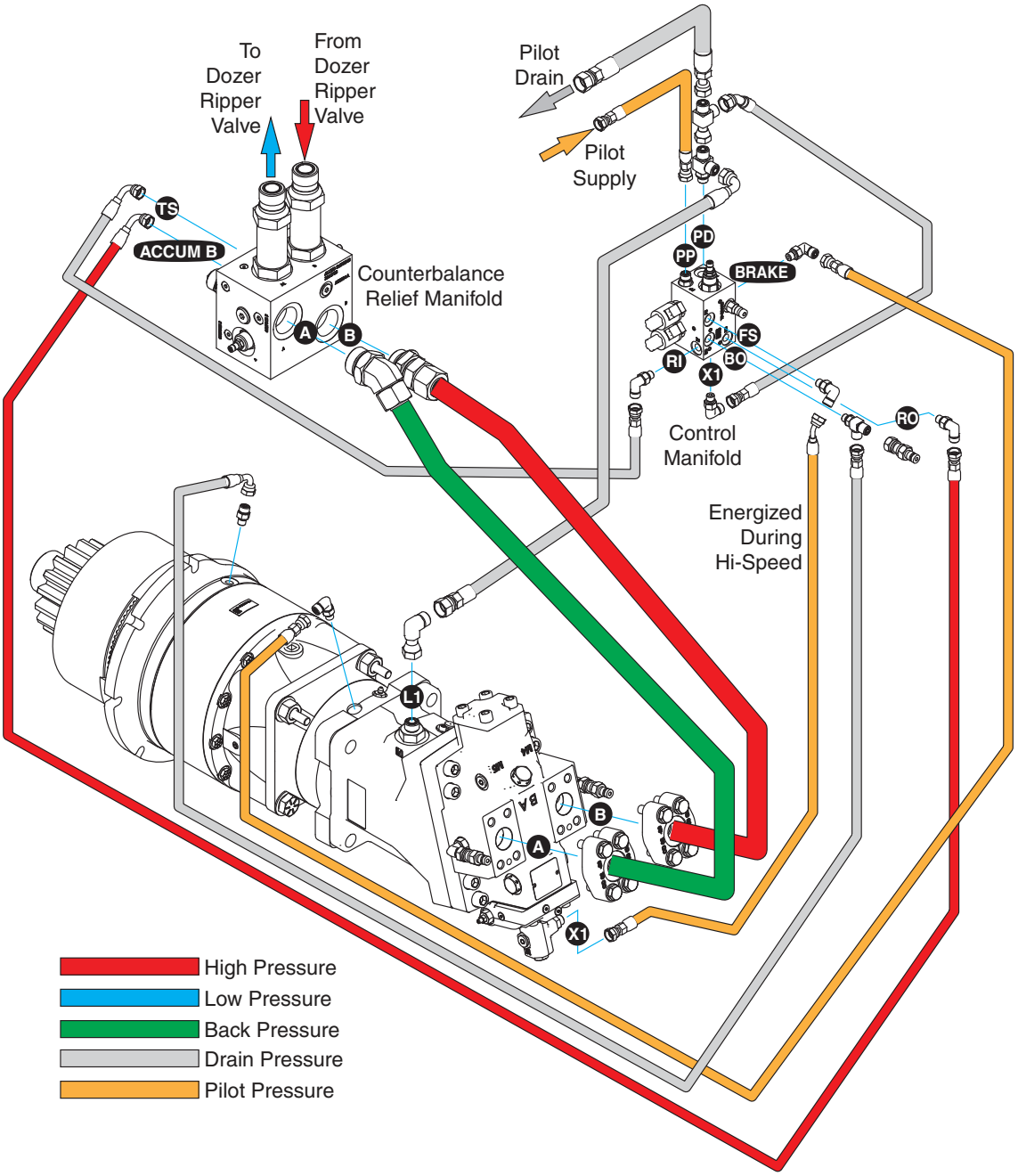


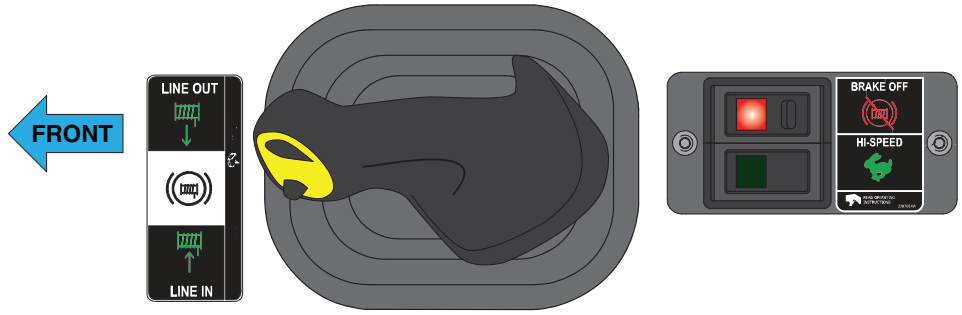
Figure 1-28 Sequence of Operation - LINE-OUT, Komatsu D155AX-6/-7 (K64)

Sequence of Operation - LINE-OUT HI-SPEED (K64)

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

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

If **HI-SPEED** is selected by the operator, pilot pressure is sent to the X1 motor port to control motor displacement.



Brake-Off

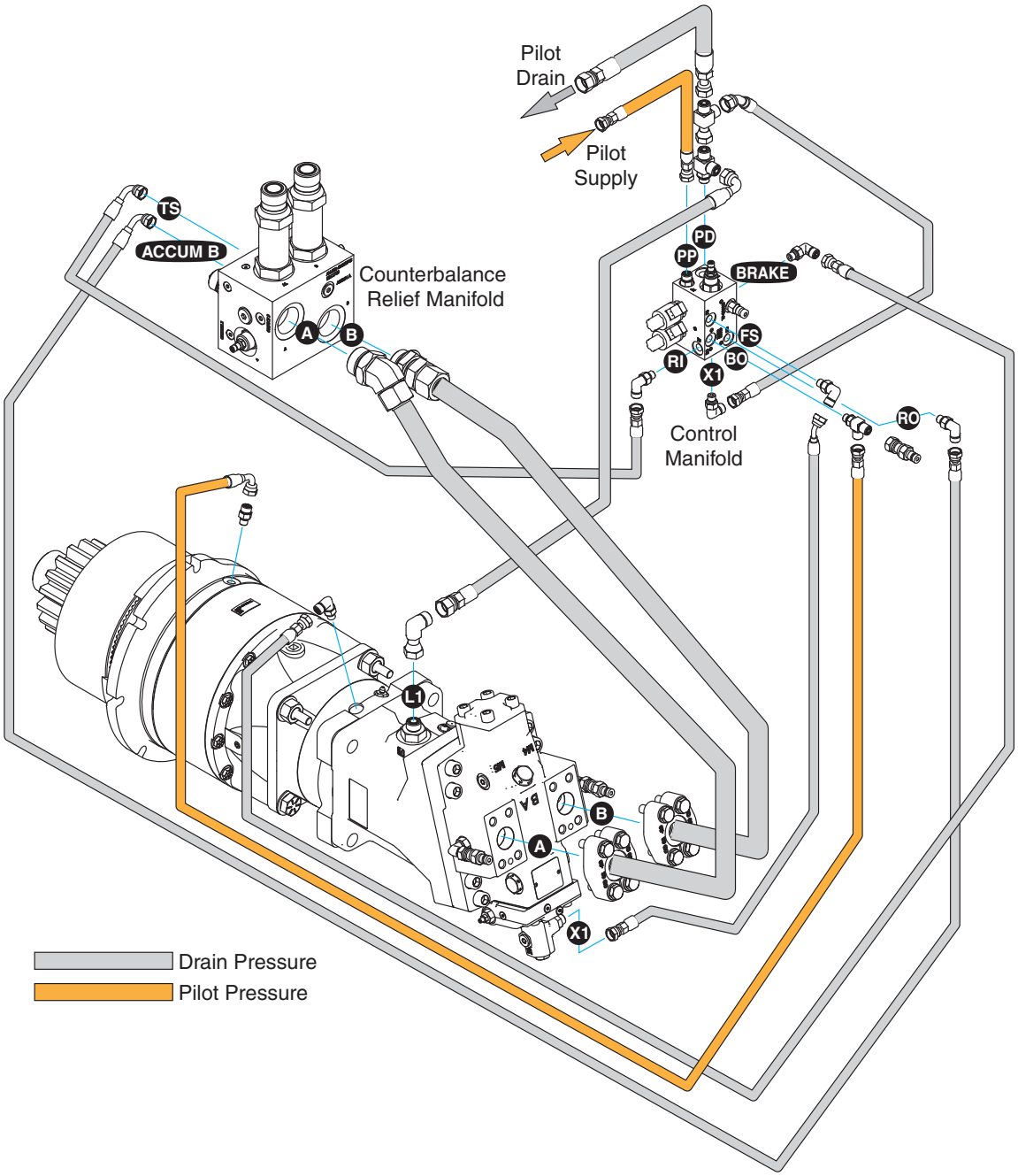


Figure 1-29 Sequence of Operation - BRAKE-OFF, Komatsu D155AX-6/-7 (K64)

Sequence of Operation - BRAKE-OFF, HI-SPEED (K64)

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

⚠ WARNING

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

Notes

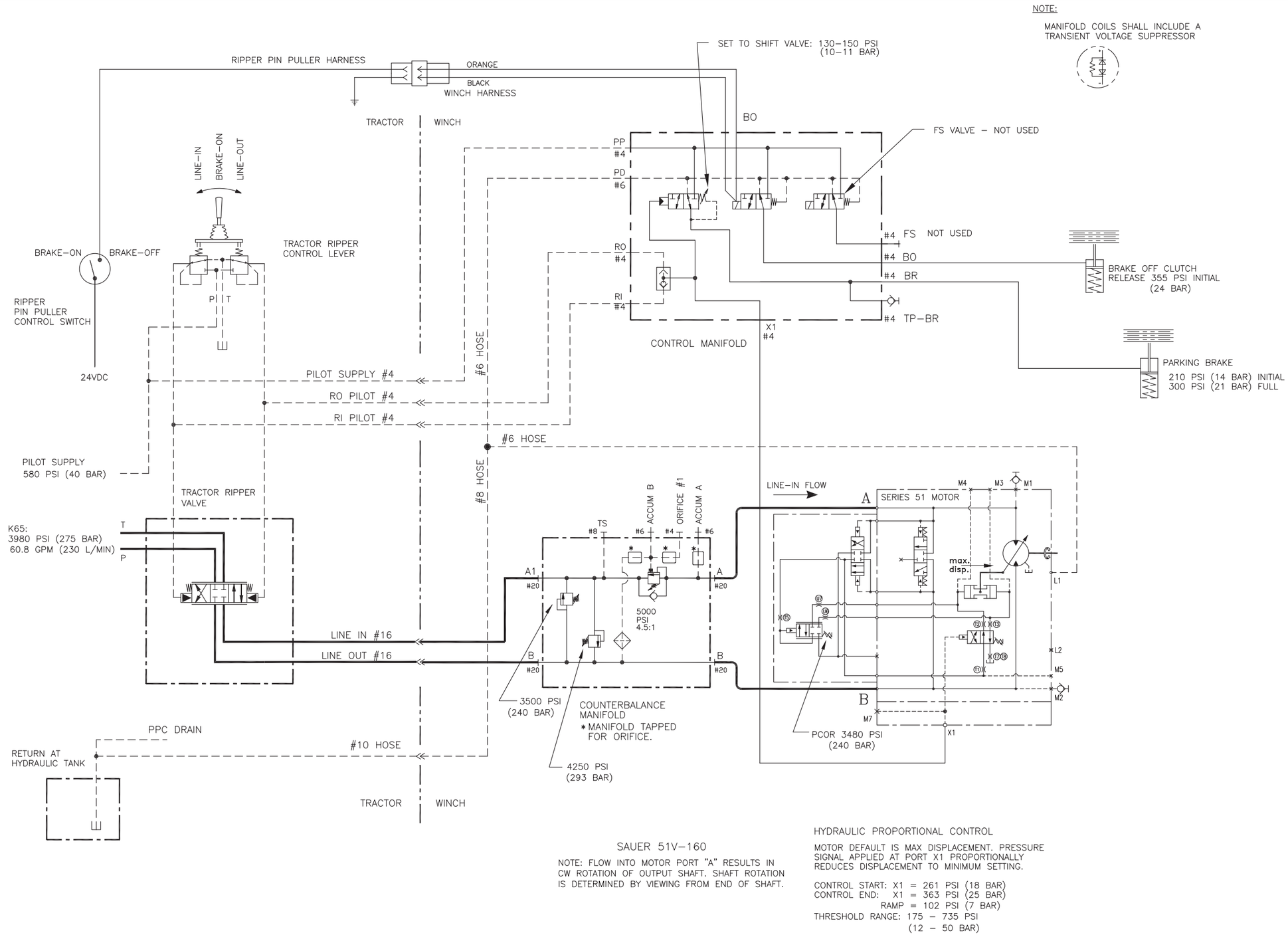


Figure 1-30 H12E Hydraulic/Electrical Schematic, Option Code B - Komatsu D275AX-5 (K65)

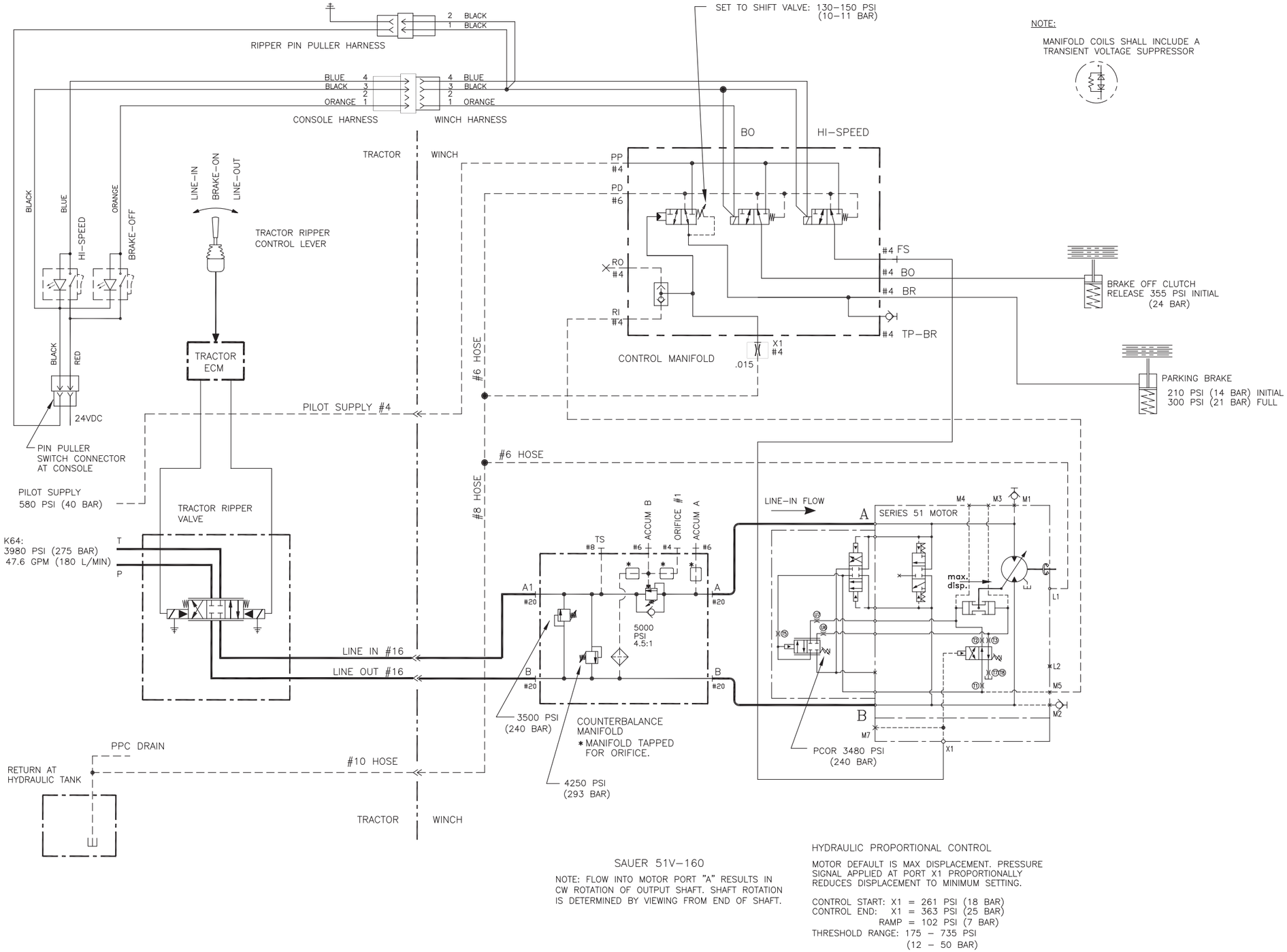


Figure 1-31 H12E Hydraulic/Electrical Schematic, Option Code D - Komatsu D155AX-6/7 (K64) Last Used on SN 1044

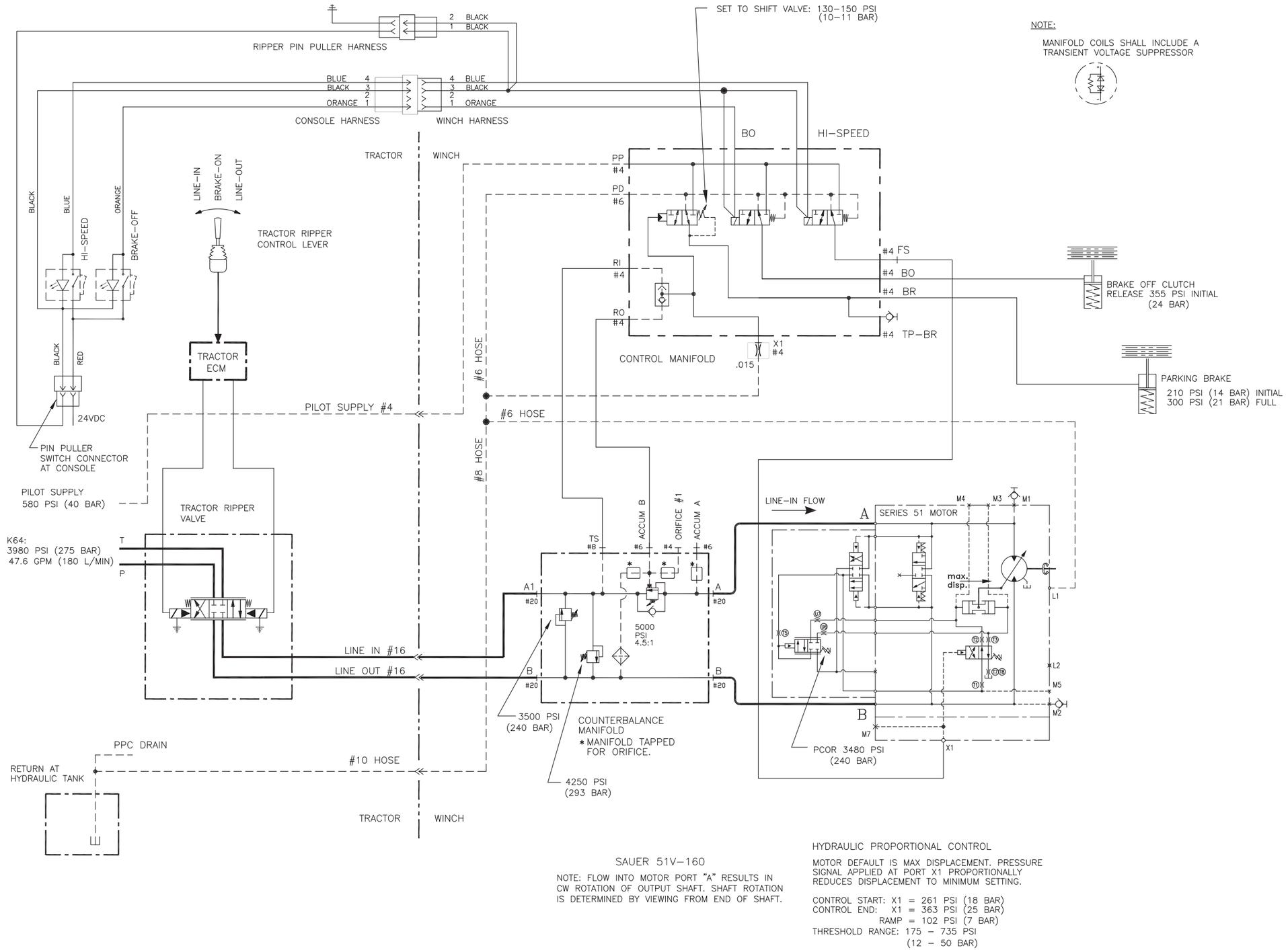


Figure 1-32 H12E Hydraulic/Electrical Schematic, Option Code D - Komatsu D155AX-7/8 (K64) First Used on SN 1045

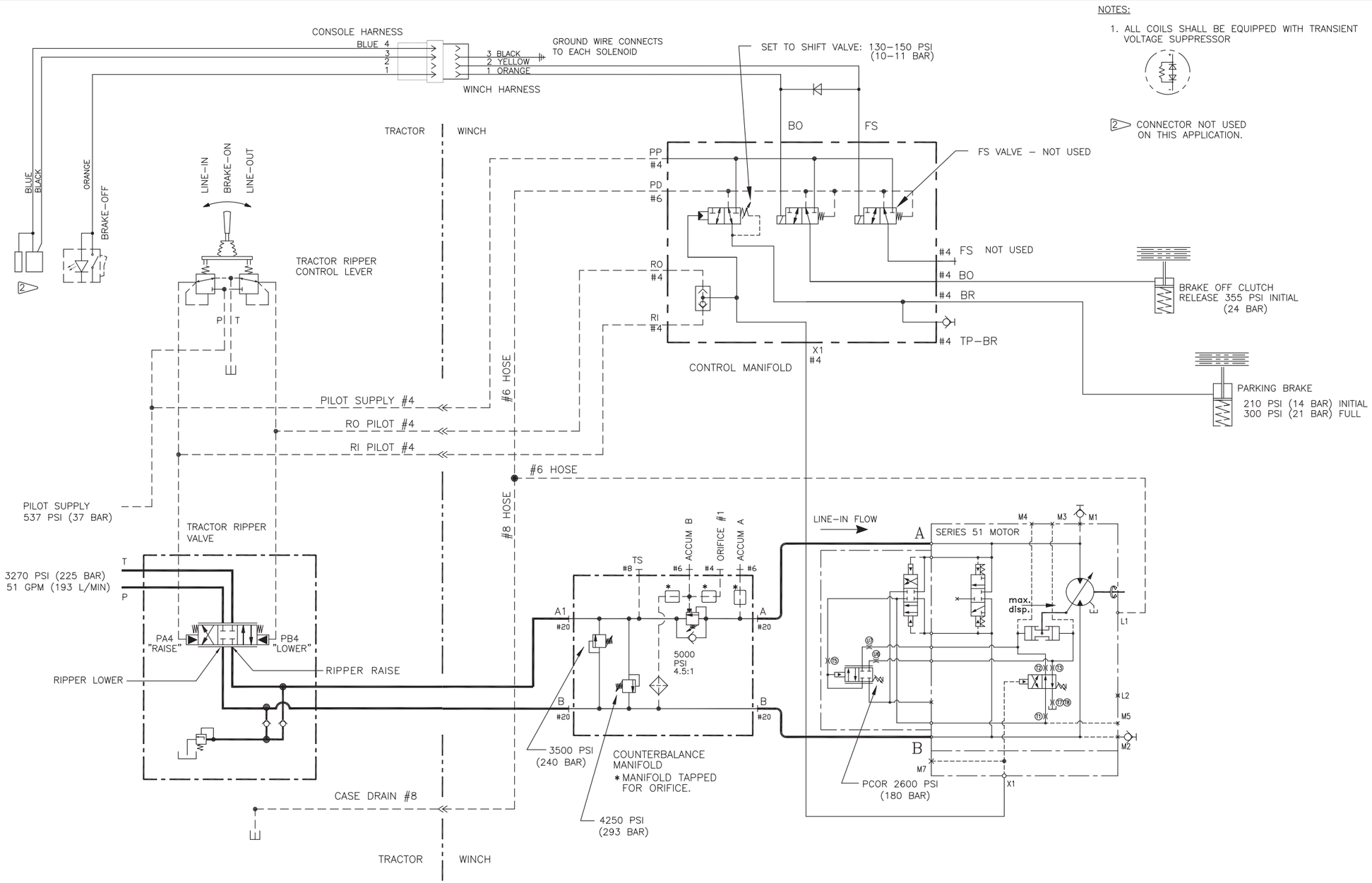


Figure 1-33 H12E Hydraulic/Electrical Schematic, Option Code B - Komatsu D85-15 (K50)

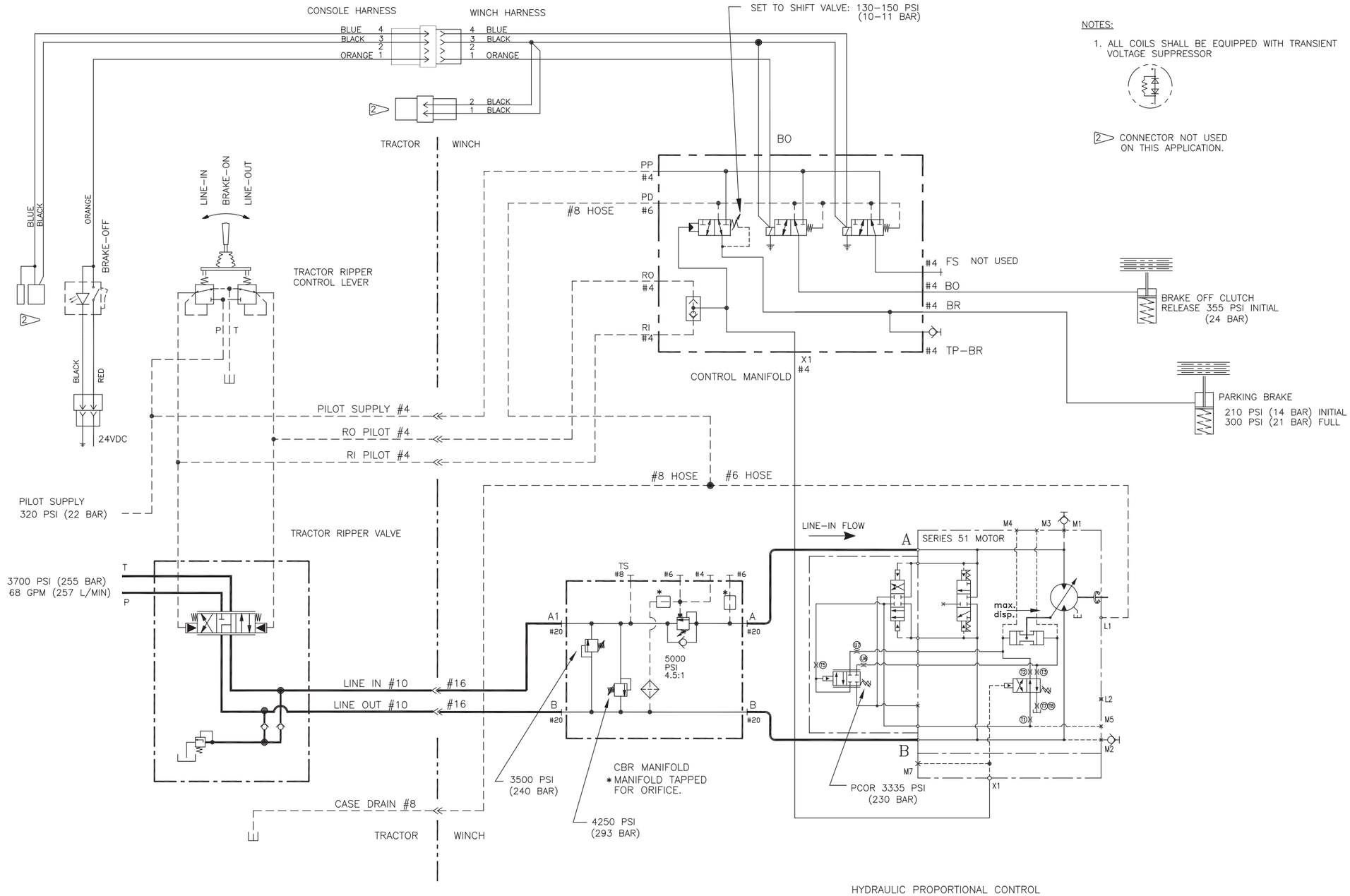


Figure 1-34 H12E Hydraulic/Electrical Schematic, Option Code B - Liebherr PR754 (L54)

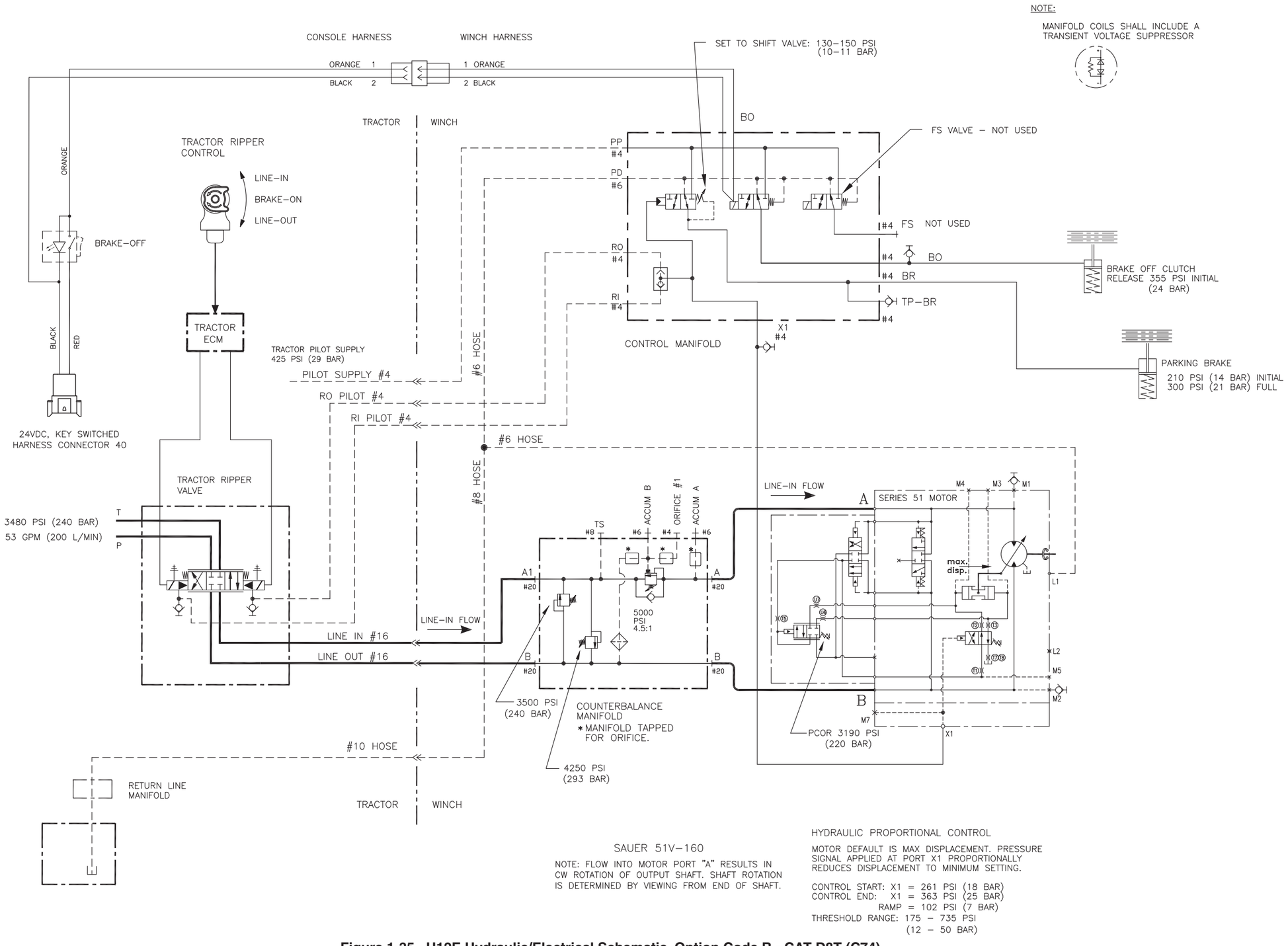


Figure 1-35 H12E Hydraulic/Electrical Schematic, Option Code B - CAT D8T (C74)

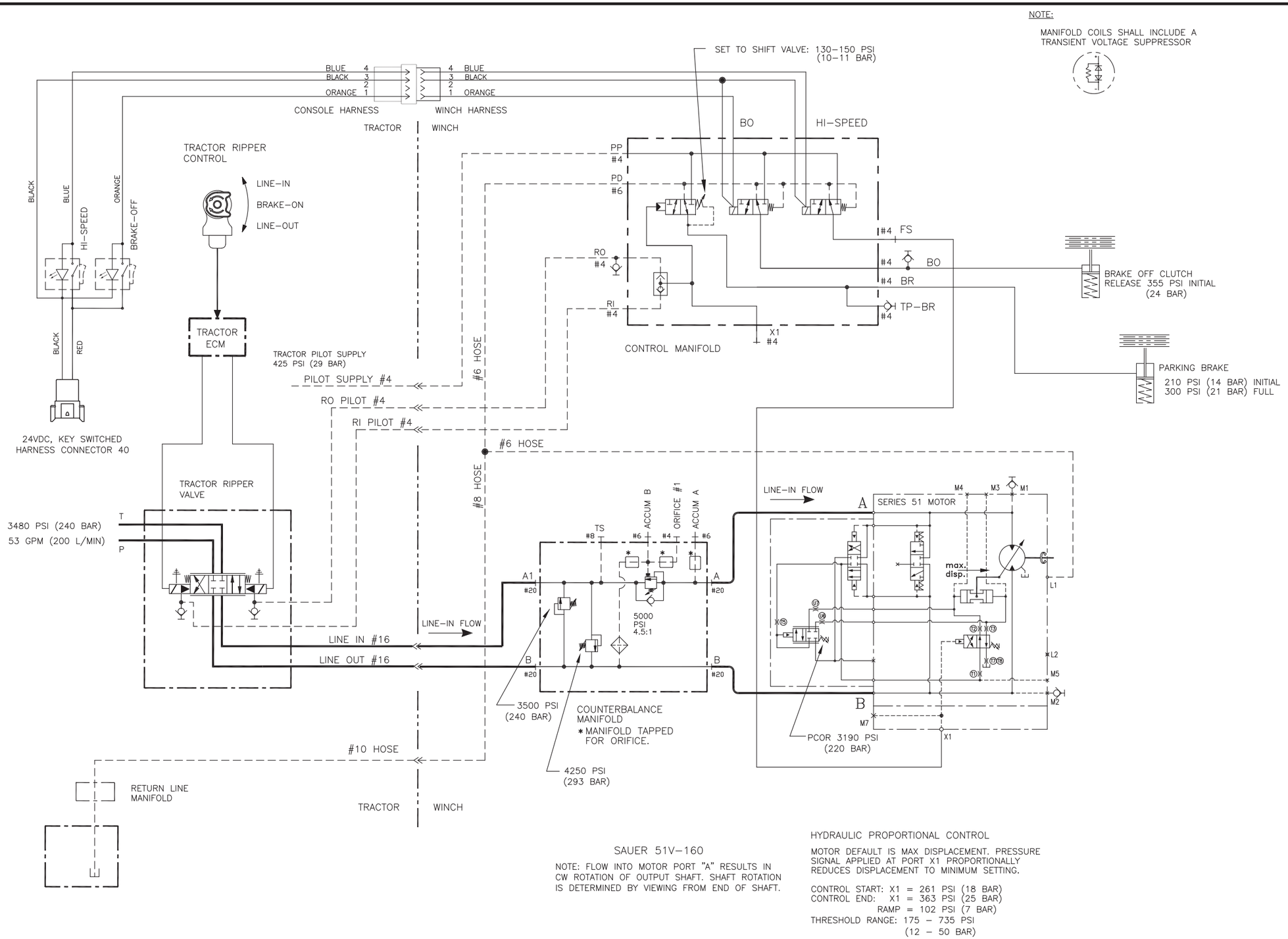


Figure 1-36 H12E Hydraulic/Electrical Schematic, Option Code D - CAT D8T (C74)

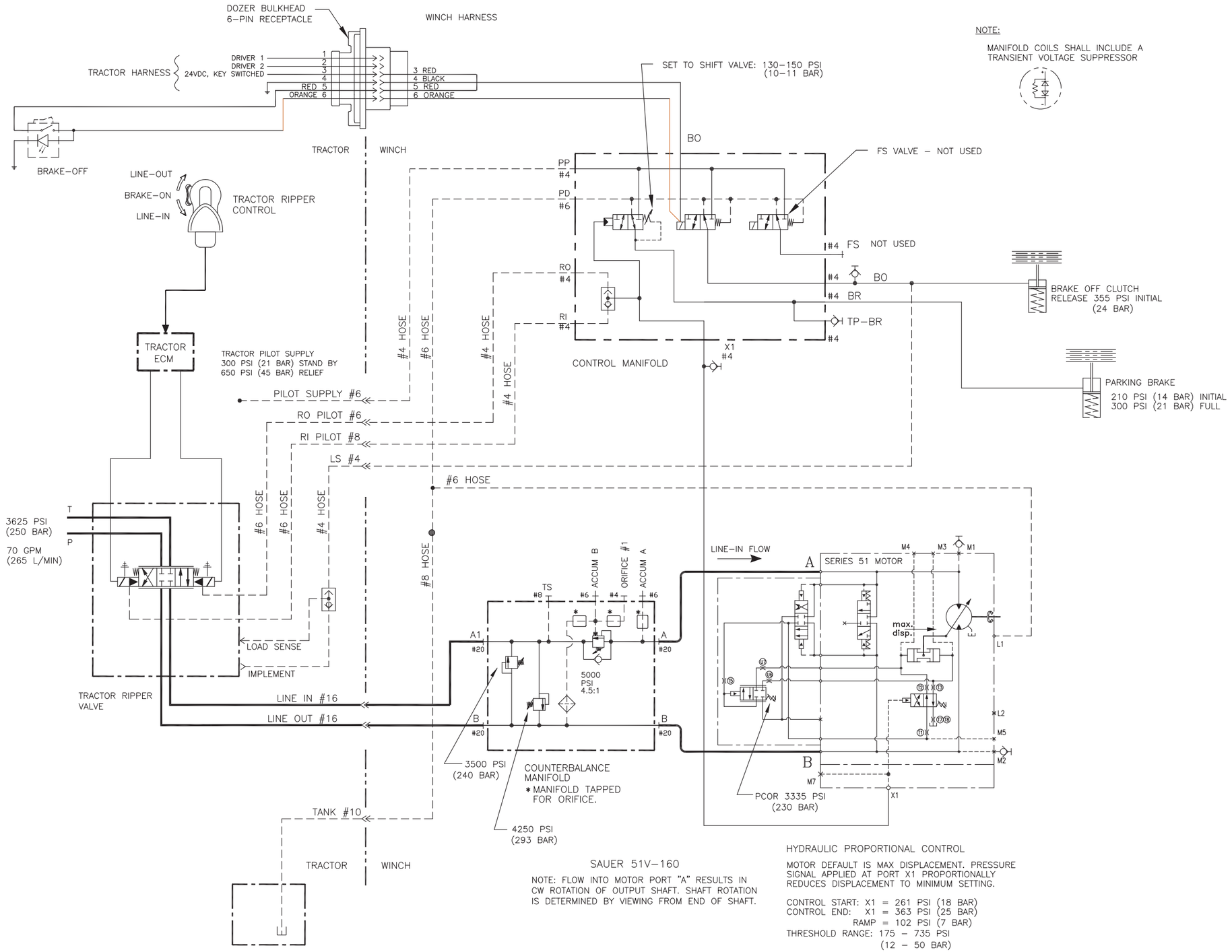


Figure 1-37 H12E Hydraulic/Electrical Schematic, Option Code B - John Deere JD-1050K (E75)

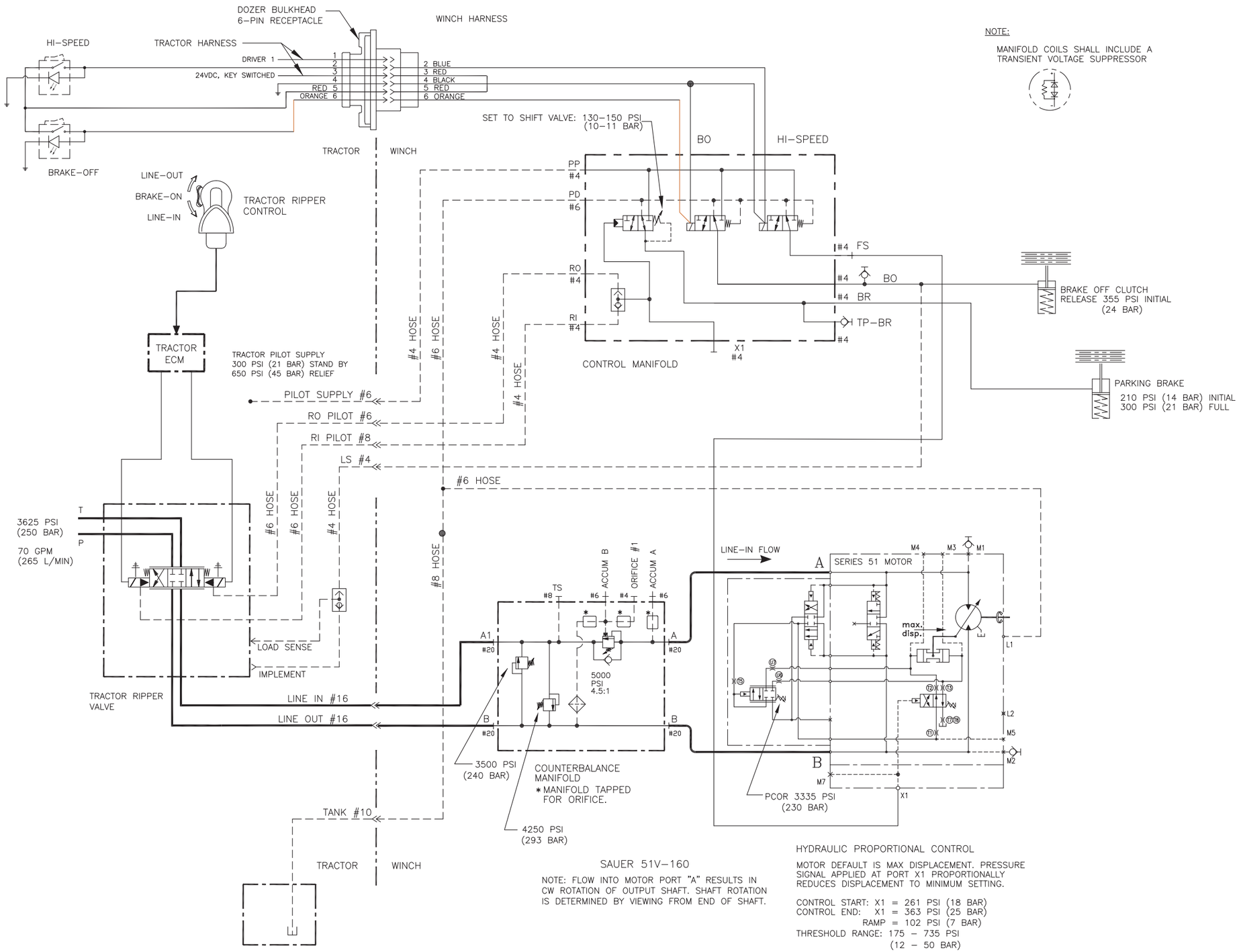


Figure 1-38 H12E Hydraulic/Electrical Schematic, Option Code D - John Deere JD-1050K (E75)

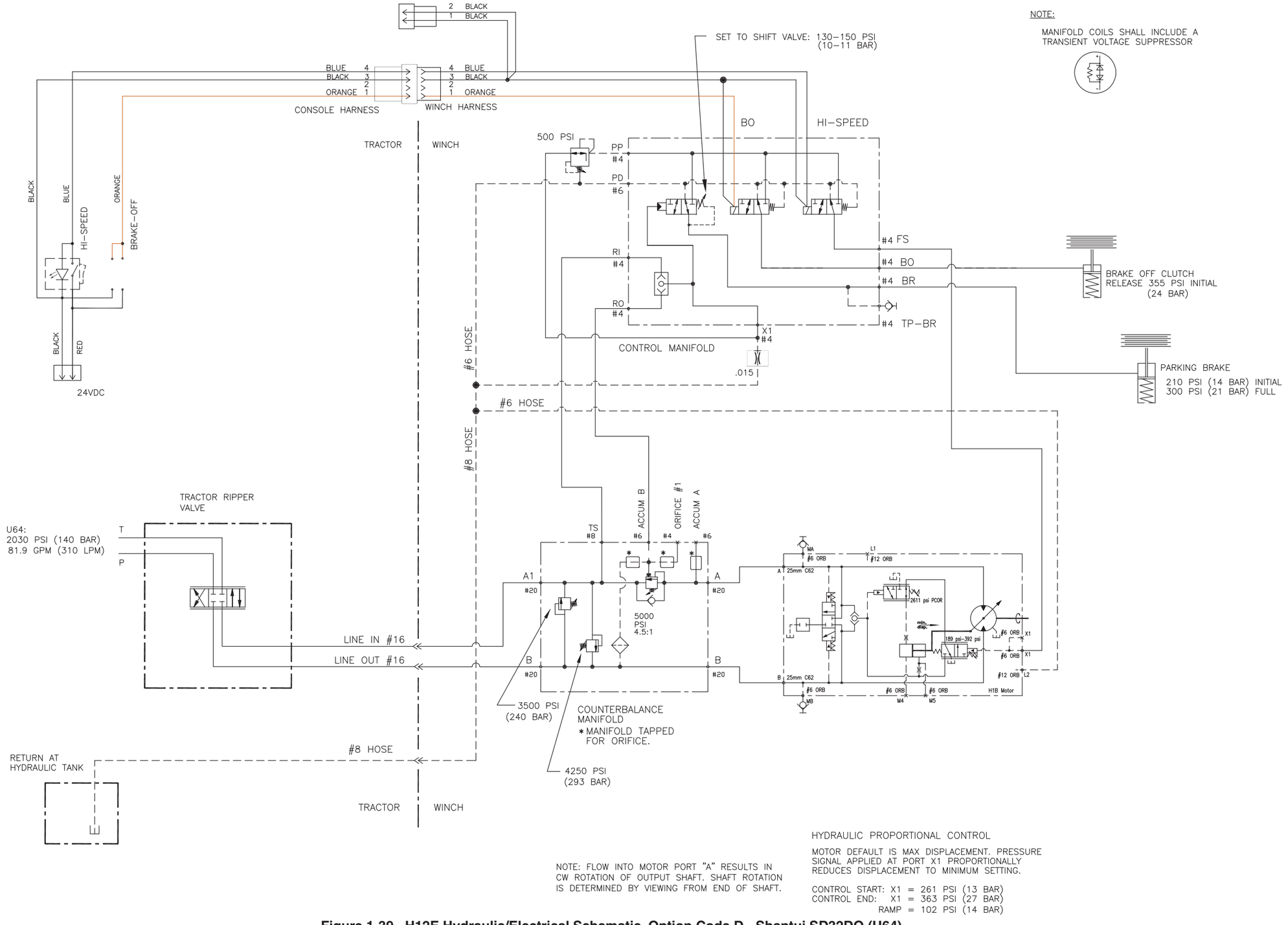


Figure 1-39 H12E Hydraulic/Electrical Schematic, Option Code D - Shantui SD32DQ (U64)

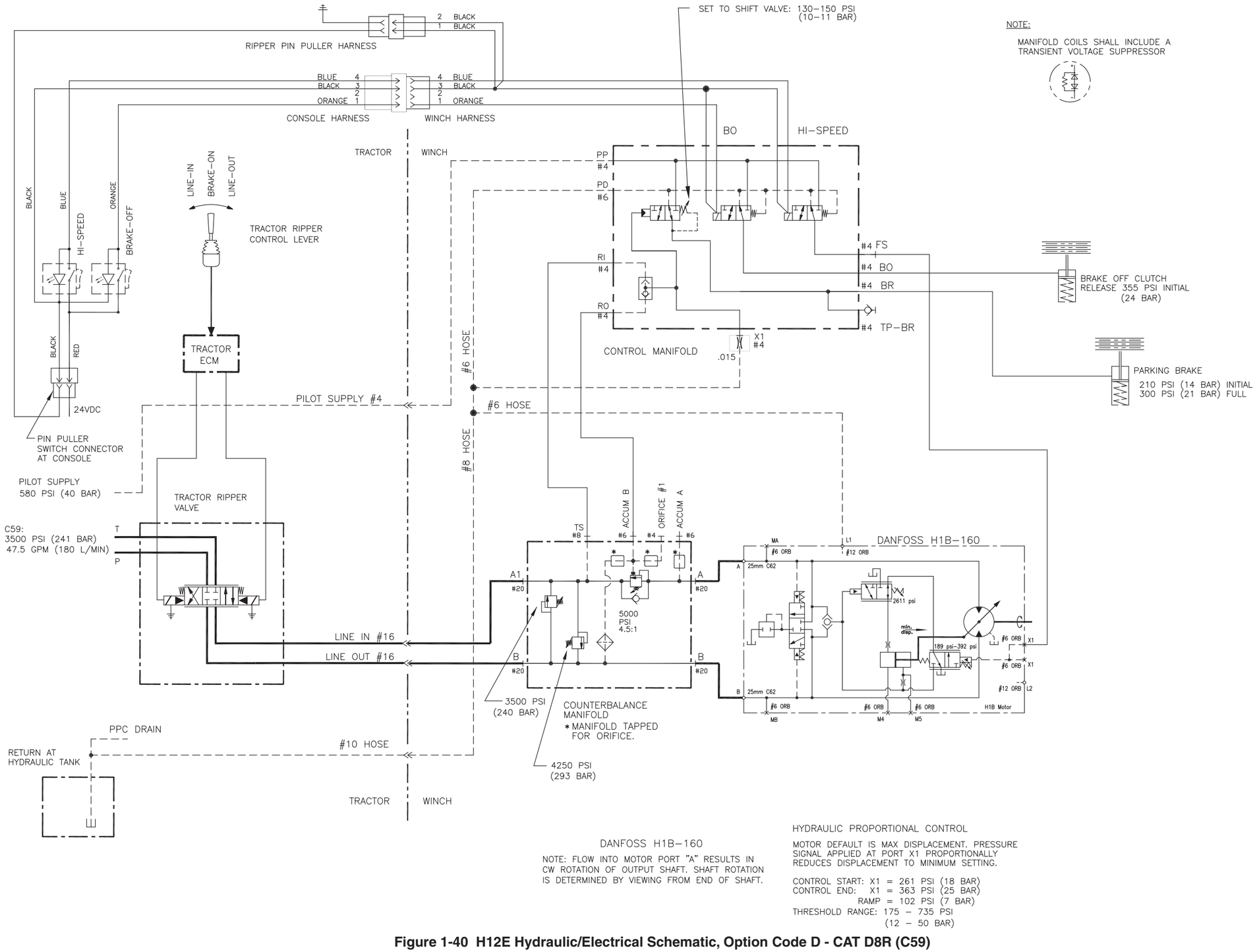


Figure 1-40 H12E Hydraulic/Electrical Schematic, Option Code D - CAT D8R (C59)

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 electrical system is functioning properly.
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

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

NOTE: Please refer to the Safety Summary before performing any troubleshooting or maintenance on the winch.

PROBLEM	POSSIBLE CAUSE	CORRECTION ACTION
Winch Does Not Operate with the Tractor Running		
Hydraulic power not being supplied to winch.	Tractor work equipment lever is in locked position.	Unlock tractor work equipment lever.
	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 level.
No pilot pressure (PS).	Tractor work equipment lever is locked.	Unlock tractor work equipment lever.
	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.
	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 malfunction. Valve not working.	Check solenoid valve operation. Check electrical signal to solenoid valve. Check electrical console switch.
	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 control system. Check for high pilot drain pressure.
	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 wire rope 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**.	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.
No **HI-SPEED** mode (Option Code D) (X1 pressure not present at test port)	**HI-SPEED** switch malfunction.	Replace switch.
	Wire harness.	Check connections and continuity or wire damage - repair or replace harness.
	Solenoid malfunction.	Check solenoid coil resistance and replace if measurement is not between 46-51 Ohms.
	Improper hose connection.	Inspect hydraulic lines and condition.
	Motor servo problem.	Contact Allied Service Department.
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

Notes

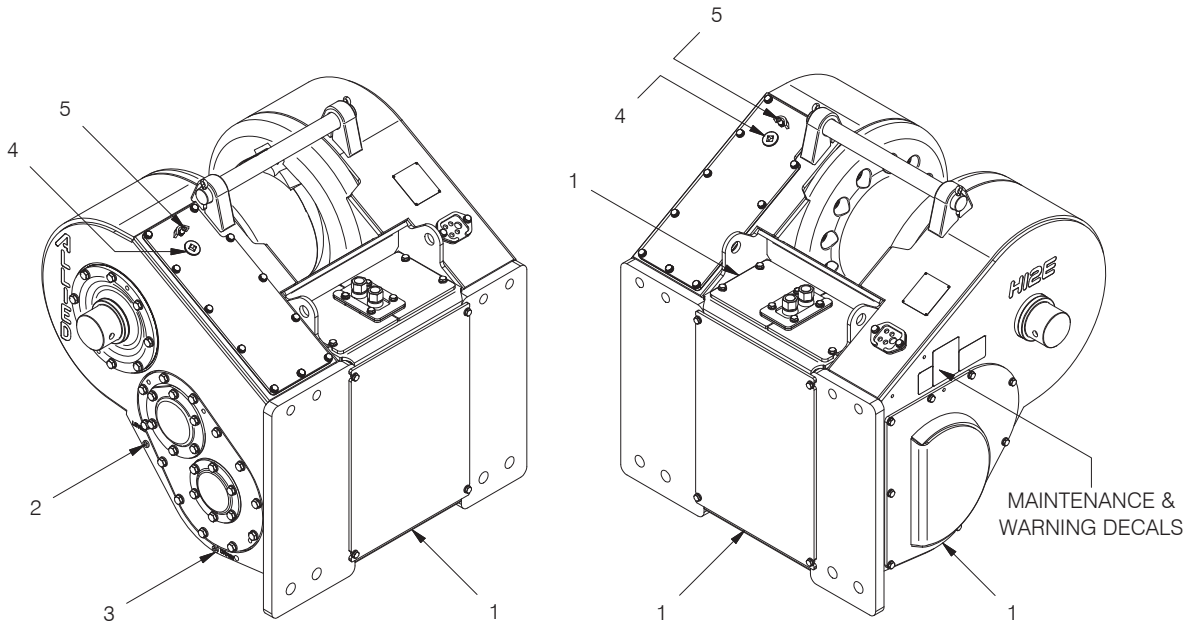
Service

General

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

Maintenance

The Maintenance Schedule is a program that includes periodic inspection and lubrication. Use the operating time on the hour meter of the dozer 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

Figure 3-1 H12E 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 dozer 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 fairlead assembly, if the winch is so equipped.	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.

Table 3-1 H12E Winch Maintenance Schedule

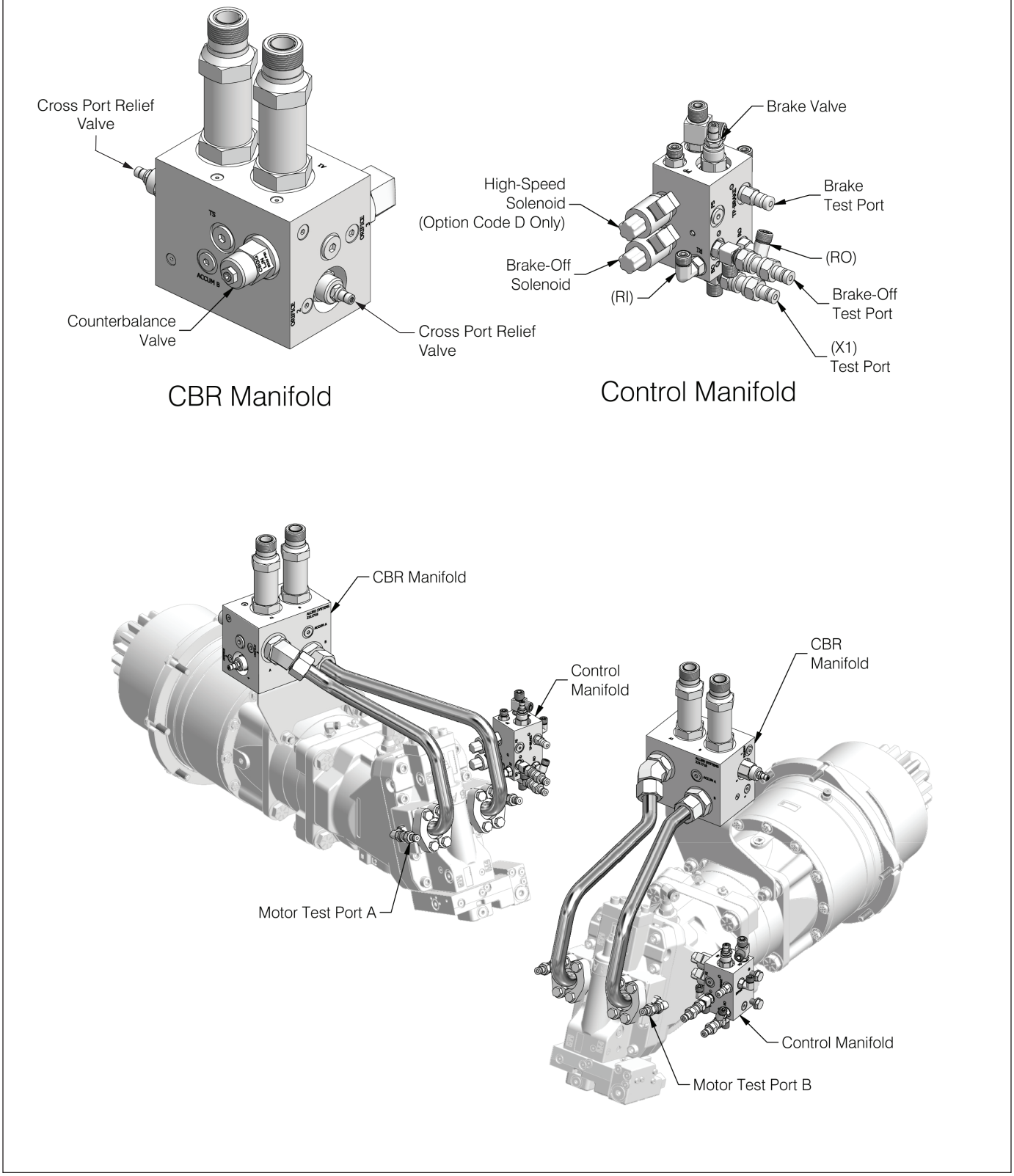


Figure 3-2 Hydraulic Pressure Test Ports (some items removed for clarity)

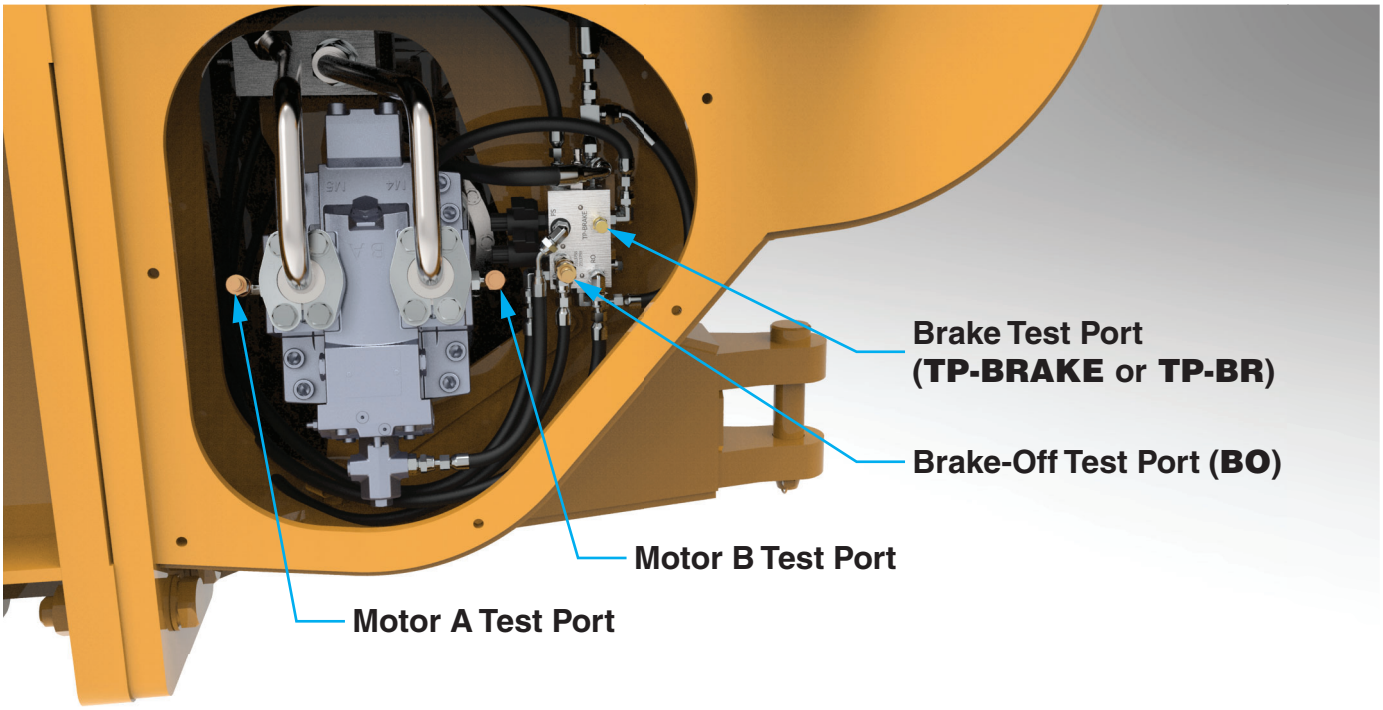


Figure 3-3 Hydraulic Pressure Test Ports (Installation on Komatsu D155AX-8 (K64) Shown

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 Table 3-1, 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.

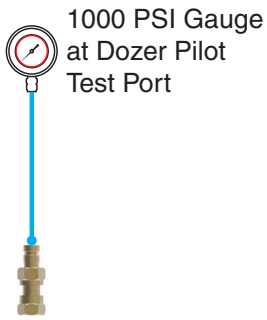
⚠ WARNING

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.

Pilot Supply Pressure Check

All except installation on SD32DQ (U64)



See dozer service manual for pilot test port location.

Figure 3-4 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.

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 pilot pressure.

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 3-2.

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
Komatsu D155AX-6/-7 (K64)	575 - 647 [3,964 - 4,461]
Komatsu D275AX-5 (K65)	500 - 570 [3,447 - 3,930]
Komatsu D85-15 (K50)	534 - 618 [3,682 - 4,261]
Liebherr PR754 (L54)	290 - 350 [1,999 - 2,413]
Liebherr PR756 (L56)	290 - 350 [1,999 - 2,413]
Liebherr RL56 (L561)	335 - 365 [2,310 - 2,517]
CAT D8R Series II (C59)	400 - 450 [2,758 - 3,103]
CAT D8T Tier 4 (C74)	400 - 450 [2,758 - 3,103]
John Deere JD1050K (E75)	620 - 650 [4,275 - 4,482]

Table 3-2 Hydraulic Pressure Readings

Motor Supply Pressure Check

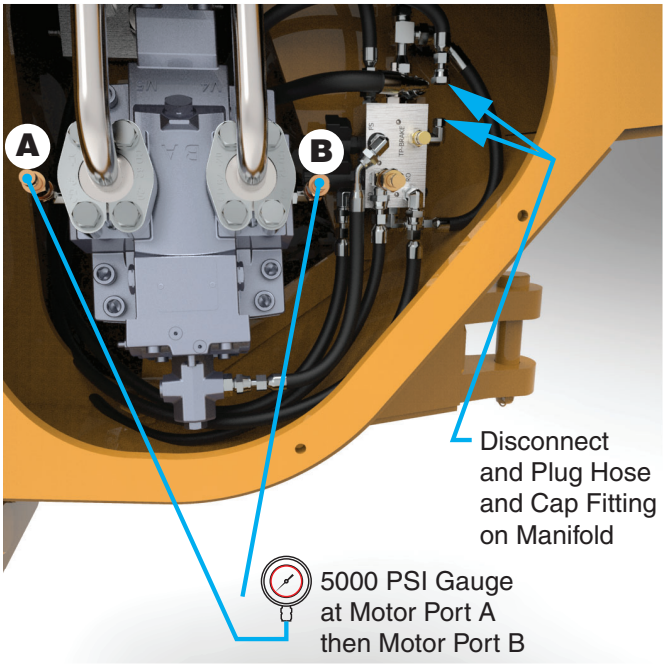


Figure 3-5 Test Equipment Setup

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. Disconnect and plug the brake release hose at the control manifold, and cap the fitting. See Figure 3-5. This will lock the winch brake to build pressure in the motor.
3. Start dozer and set to high-free idle.
4. 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.
5. When motor supply pressure check is complete, remove gauge and reconnect brake release hose.

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.
3. If the pressure is too low, and your tractor is a D85-15, check that the dozer work equipment LS pressure has been set according to Komatsu News Bulletin FN18050.

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
Komatsu D155AX-6/-7 (K64)	3,771 - 4,207 [26,000 - 29,006]	3,771 - 4,207 [26,000 - 29,006]
Komatsu D275AX-5 (K65)	3,781 - 4,179 [26,069 - 28,813]	3,781 - 4,179 [26,069 - 28,813]
Komatsu D85-15 (K50)	3,070 - 3,270 [21,167 - 22,546]	3,070 - 3,270 [21,167 - 22,546]
Liebherr PR754 (L54)	3,700 - 3,840 [25,511 - 26,476]	3,700 - 3,840 [25,511 - 26,476]
Liebherr PR756 (L56)	3,500 - 3,700 [24,132 - 25,511]	3,500 - 3,700 [24,132 - 25,511]
Liebherr RL56 (L561)	3,860 - 4,060 [26,614 - 27,993]	3,860 - 4,060 [26,614 - 27,993]
CAT D8R Series II (C59)	3,300 - 3,500 [22,753 - 24,132]	3,300 - 3,500 [22,753 - 24,132]
CAT D8T Tier 4 (C74)	3,430 - 3,532 [23,649 - 24,352]	3,430 - 3,532 [23,649 - 24,352]
John Deere JD1050K (E75)	3,425 - 3,625 [23,615 - 24,994]	3,425 - 3,625 [23,615 - 24,994]
Shantui SD32DQ (U64)	1,830 - 2,030 [12,617 - 13,996]	1,830 - 2,030 [12,617 - 13,996]

Table 3-3 Hydraulic Pressure Readings

Brake Pressure Check

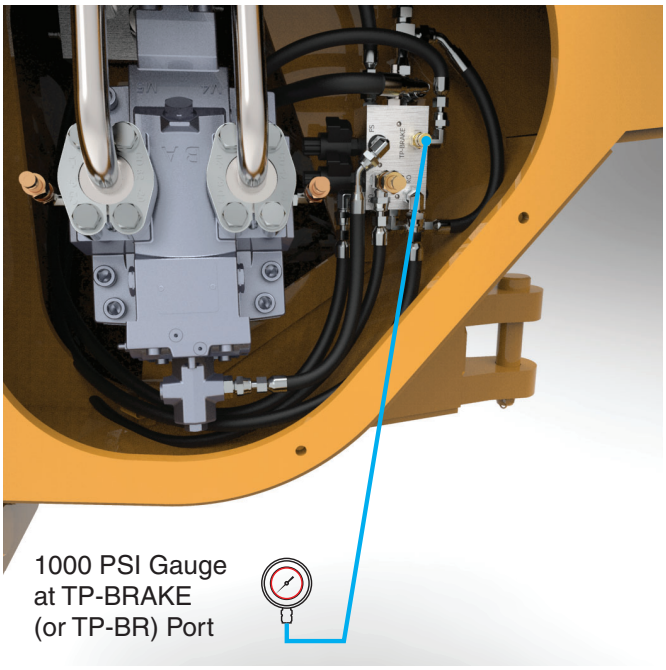


Figure 3-6 Test Equipment Setup

Test Equipment:

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

Connect pressure gauge to test port:

- **TP-BRAKE (or TP-BR)**

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge to the **TP-BRAKE** (or **TP-BR**) 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-OFF Pressure Check

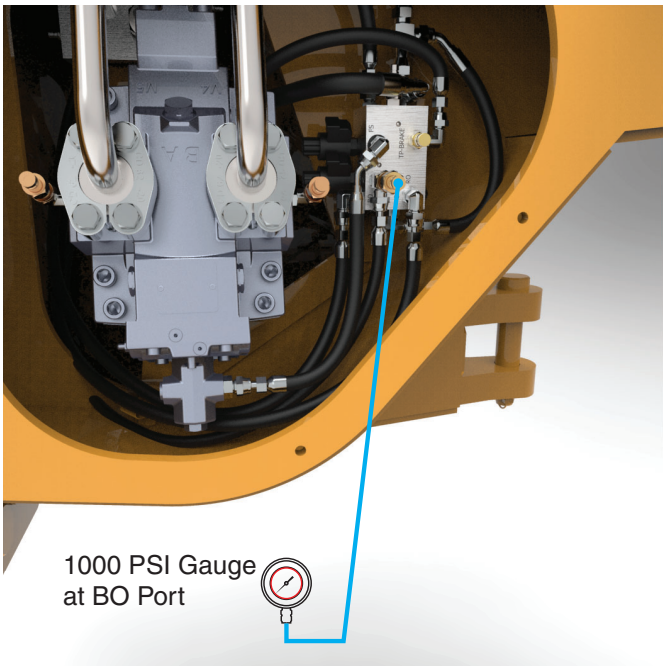


Figure 3-7 Test Equipment Setup

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.

Brake Valve Pressure Check and Adjustment

All except installations with 2 speed control

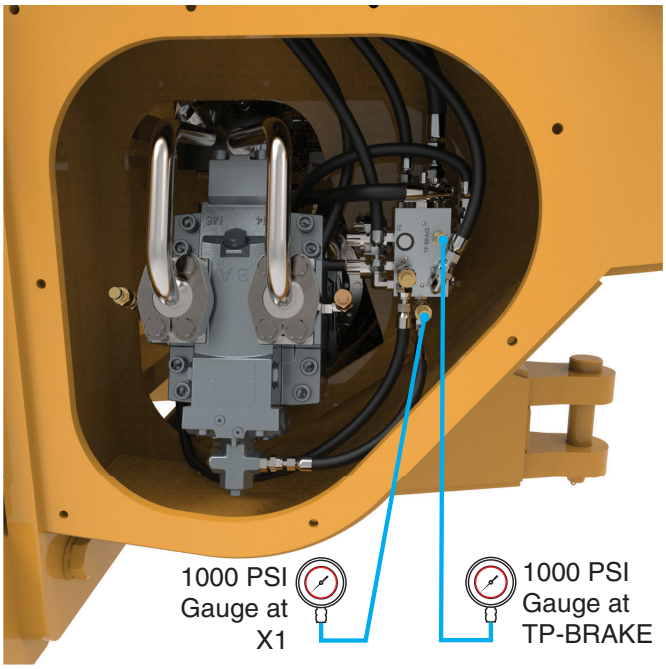


Figure 3-8 Test Equipment Setup

Test Equipment:

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

Connect pressure gauges to test ports:

- **X1**
- **TP-BRAKE (or TP-BR)**

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge to the **TP-BRAKE (or TP-BR)** pressure test port and one 1000 psi pressure gauge to the **X1** pressure test port on the control manifold.
2. Start dozer and set to high-free idle.
3. Slowly meter the control lever into the **LINE-IN** position while monitoring both gauges.
4. **TP-BRAKE** pressure will jump to full pilot supply pressure when **X1** reaches the pilot setting of the brake valve.
5. Check pressure as indicated in Table 3-4. The brake valve sets the overlap between the hydraulic motor drive and brake release.
6. 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-BRAKE** and **XI** pressure 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.

NOTICE

The values in Table 3-4 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]	
	X1 BRAKE RELEASE PRESSURE	**TP-BRAKE** PILOT PRESSURE
Komatsu D275AX-5 (K65)	130 - 150 [896 - 1,034]	500 - 570 [3,447 - 3,930]
Komatsu D85-15 (K50)		534 - 618 [3,682 - 4,261]
Liebherr PR754 (L54)		290 - 350 [1,999 - 2,413]
Liebherr PR756 (L56)		290 - 350 [1,999 - 2,413]
Liebherr RL56 (L561)		335 - 365 [2,310 - 2,517]
CAT D8T Tier 4 (C74)		400 - 450 [2,758 - 3,103]
John Deere JD1050K (E75)		620 - 680 [4,275 - 4,688]

Table 3-4 Hydraulic Pressure Readings

LINE-IN Pressure Check

All except installation on D155AX-6/-7 (K64), D8R Series II (C59), SD32DQ (U64)

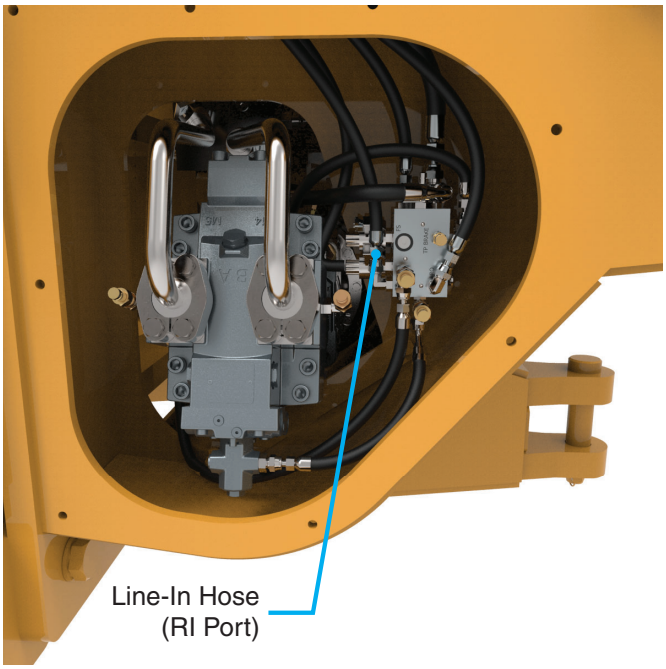


Figure 3-9 Test Equipment Setup

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge in line on the RI 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

Connect pressure gauge to test port:

- **RI**

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	Pilot Pressure in PSI [kPa] Test Port RI
Komatsu D275AX-5 (K65)	500 - 570 [3,447 - 3,930]
Komatsu D85-15 (K50)	534 - 618 [3,682 - 4,261]
Liebherr PR754 (L54)	290 - 350 [1,999 - 2,413]
Liebherr PR756 (L56)	290 - 350 [1,999 - 2,413]
Liebherr RL56 (L561)	335 - 365 [2,310 - 2,517]
CAT D8T Tier 4 (C74)	400 - 450 [2,758 - 3,103]
John Deere JD1050K (E75)	620 - 680 [4,275 - 4,688]

Table 3-5 Hydraulic Pressure Readings

LINE-OUT Pressure Check

All except installation on D155AX-6/-7 (K64), D8R Series II (C59), SD32DQ (U64)

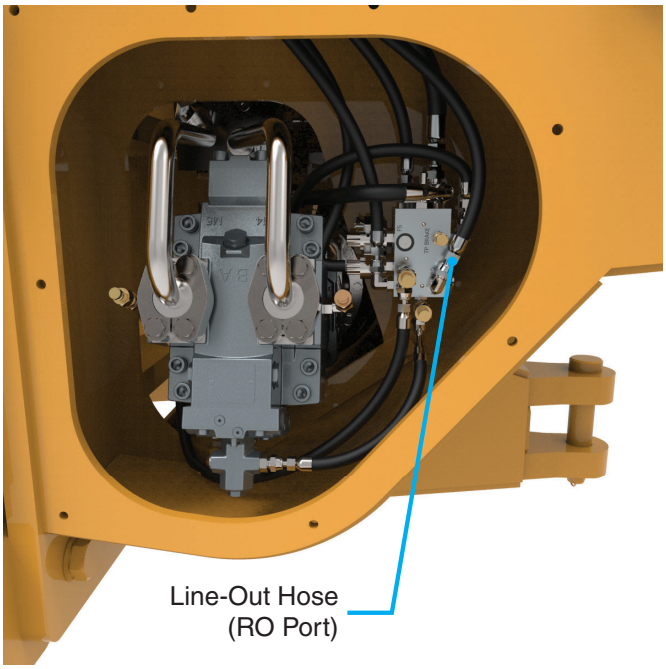


Figure 3-10 Test Equipment Setup

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge in line on the RO 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**

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	Pilot Pressure in PSI [kPa] Test Port RO
Komatsu D275AX-5 (K65)	500 - 570 [3,447 - 3,930]
Komatsu D85-15 (K50)	534 - 618 [3,682 - 4,261]
Liebherr PR754 (L54)	290 - 350 [1,999 - 2,413]
Liebherr PR756 (L56)	290 - 350 [1,999 - 2,413]
Liebherr RL56 (L561)	335 - 365 [2,310 - 2,517]
CAT D8T Tier 4 (C74)	400 - 450 [2,758 - 3,103]
John Deere JD1050K (E75)	620 - 680 [4,275 - 4,688]

Table 3-6 Pilot Pressure Readings

PCOR Pressure Check

All except installation on SD32DQ (U64)

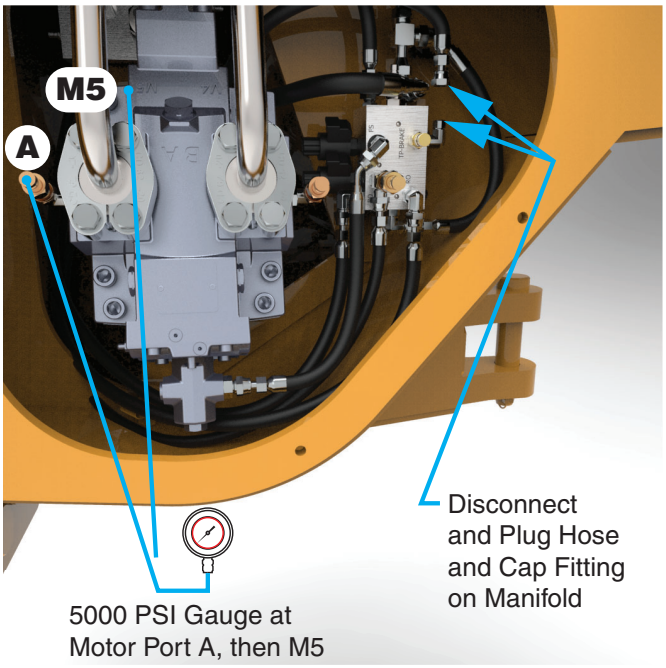


Figure 3-11 Test Equipment Setup

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.

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. See Figure 3-11. This will lock the winch brake to build pressure in the motor.
3. Start dozer and set to high-free idle.
4. For installations with the “HI-SPEED” option, set the switch to “HI-SPEED”.
5. Slowly move the joystick fully to the LINE-IN position.
6. The pressure at Motor Port A should be within the range shown in Table 3-7.

NOTICE

The values in Table 3-7 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.

7. Shut down the engine, and remove the gauge from Motor Port A.
8. 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.
9. Start dozer and set to high-free idle.
10. Slowly move the joystick in the LINE-IN direction, noting pressures as they change with joystick position.
11. At some point, the pressure at M5 will stabilize. The stabilized pressure at M5 is the PCOR setting.
12. Check Table 3-7 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	PCOR Pressure in PSI [kPa]	
	Motor Port A	M5 (PCOR)
Komatsu D155AX-6/-7 (K64)	3,771 - 4,207 [26,000 - 29,006]	3,280 - 3,480 [22,615 - 23,994]
Komatsu D275AX-5 (K65)	3,781 - 4,179 [26,069 - 28,813]	3,280 - 3,480 [22,615 - 23,994]
Komatsu D85-15 (K50)	3,070 - 3,270 [21,167 - 22,546]	2,400 - 2,600 [16,547 - 17,926]
Liebherr PR754 (L54)	3,700 - 3,840 [25,511 - 26,476]	3,135 - 3,335 [21,615 - 22,994]
Liebherr PR756 (L56)	3,500 - 3,700 [24,132 - 25,511]	3,135 - 3,335 [21,615 - 22,994]
Liebherr RL56 (L561)	3,860 - 4,060 [26,614 - 27,993]	2,990 - 3,190 [20,615 - 21,994]
CAT D8R Series II (C59)	3,300 - 3,500 [22,753 - 24,132]	2,990 - 3,190 [20,615 - 21,994]
CAT D8T Tier 4 (C74)	3,430 - 3,532 [23,649 - 24,352]	2,990 - 3,190 [20,615 - 21,994]
John Deere JD1050K (E75)	3,425 - 3,625 [23,615 - 24,994]	3,135 - 3,335 [21,615 - 22,994]

Table 3-7 PCOR 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.

2. Drain the gear oil from the winch. Dispose of used oil in accordance with local regulations.
3. Remove the fairlead from the winch. If left on the winch, the winch will not remain level when lifted from the tractor.
4. Disconnect hoses and wire harness from tractor.
5. Connect slings and a crane or lifting device to the winch.

⚠ WARNING

The slings and crane used to lift the winch must have a minimum lifting capacity of 5,000 lb (2,268 kg).

6. Remove the mounting hardware securing winch to tractor.

Intermediate Shaft Removal

The intermediate shaft can be removed with the winch mounted on the tractor. Winch is shown on its side in these illustrations.

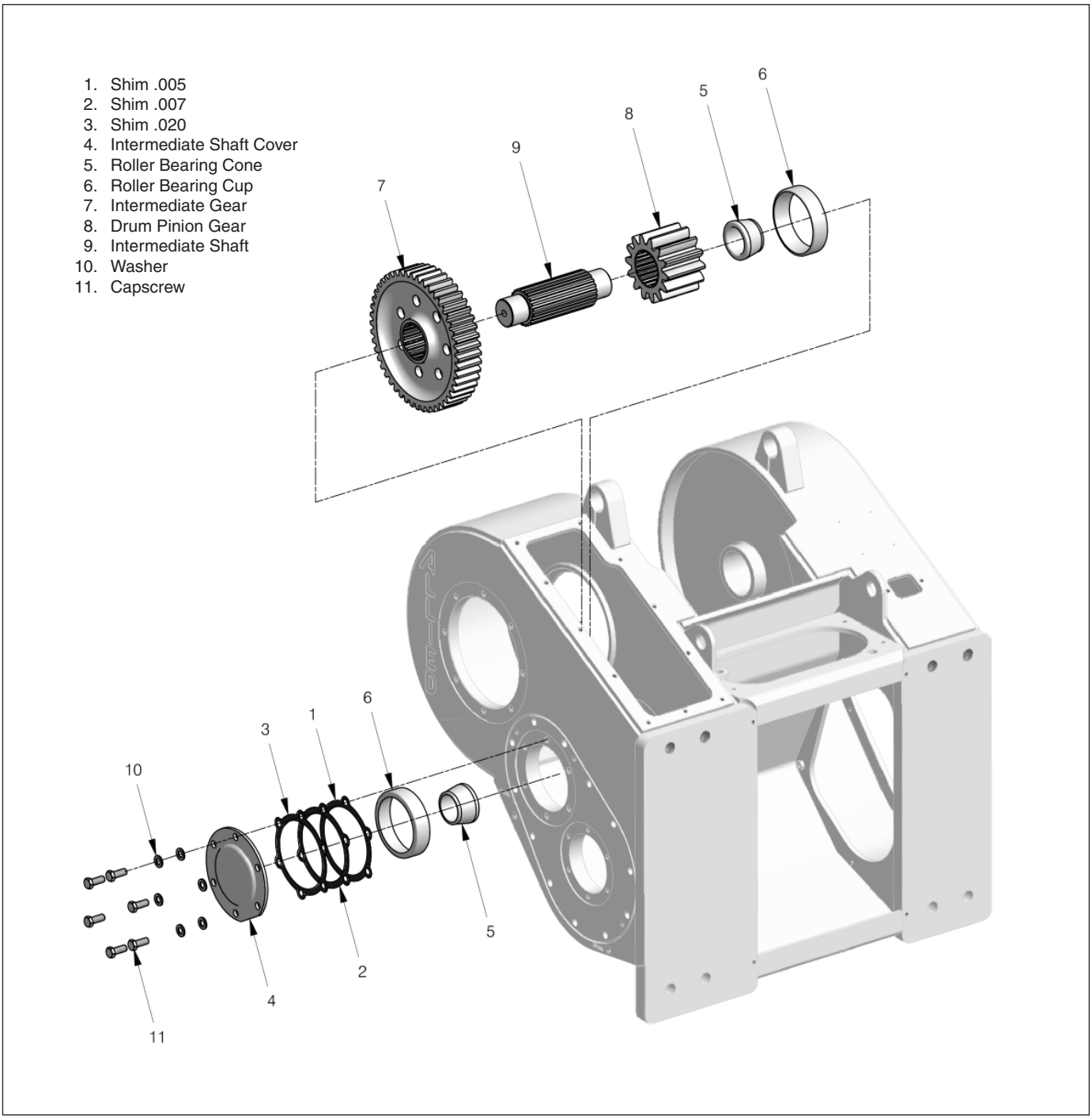
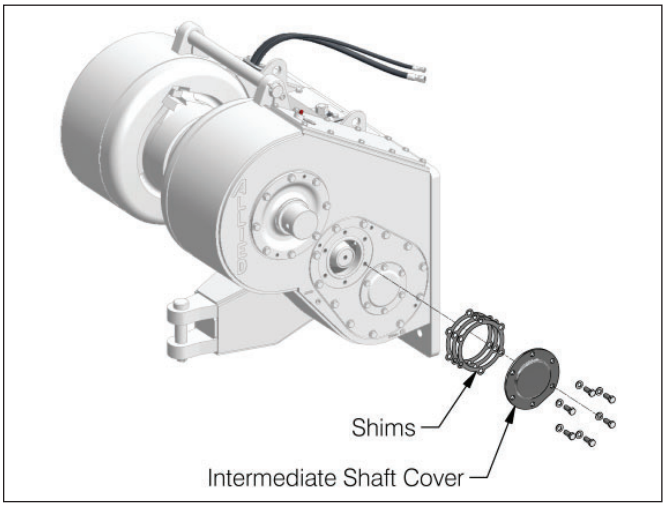


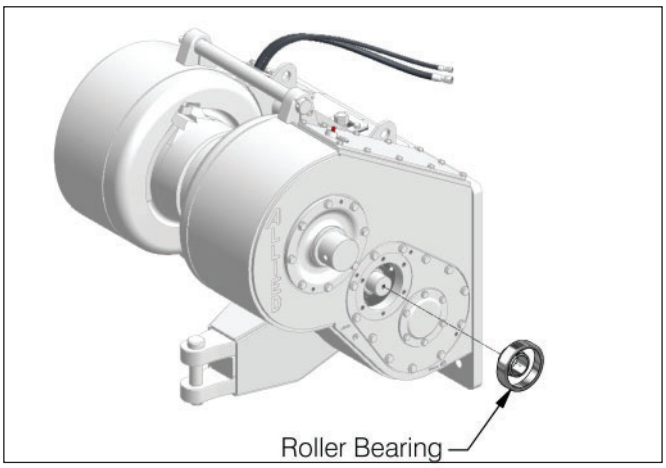
Figure 4-1 Location of Intermediate Shaft Components

1. Remove the intermediate shaft cover.
2. Remove shims and tag them for reference during reassembly.

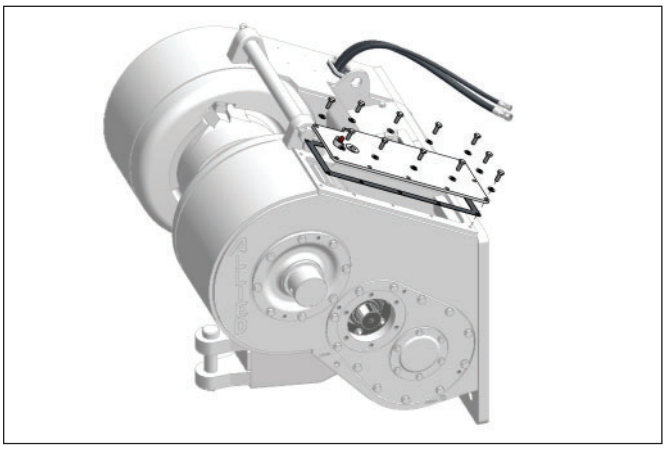


NOTE: If the shaft or bearing are replaced, the shim height may change.

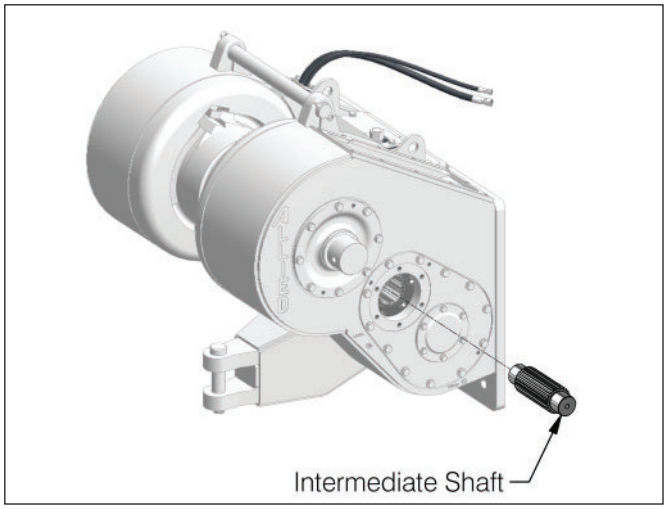
3. Screw a 3/4-10 UNC slide hammer into the end of the intermediate shaft and partially pull it out. Remove outer bearing cup and cone.



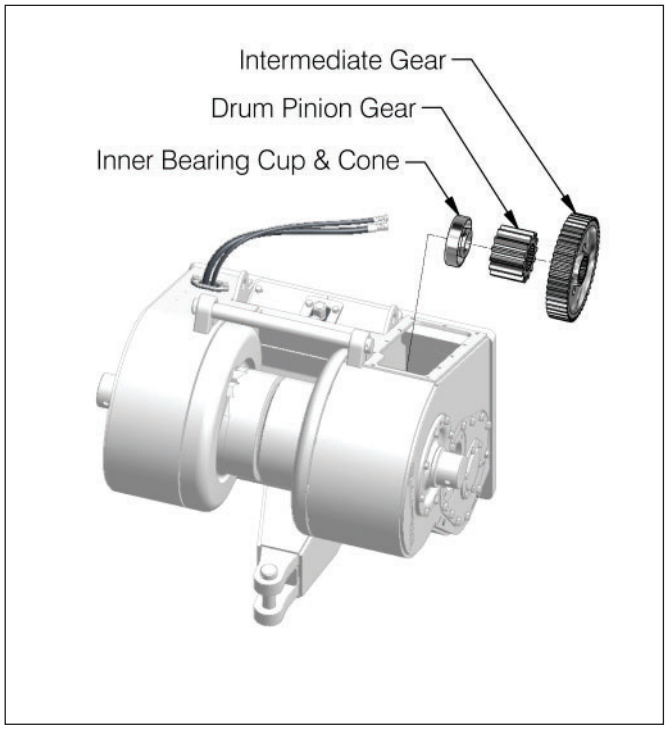
4. Remove the cover and gasket. Discard the gasket.



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



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

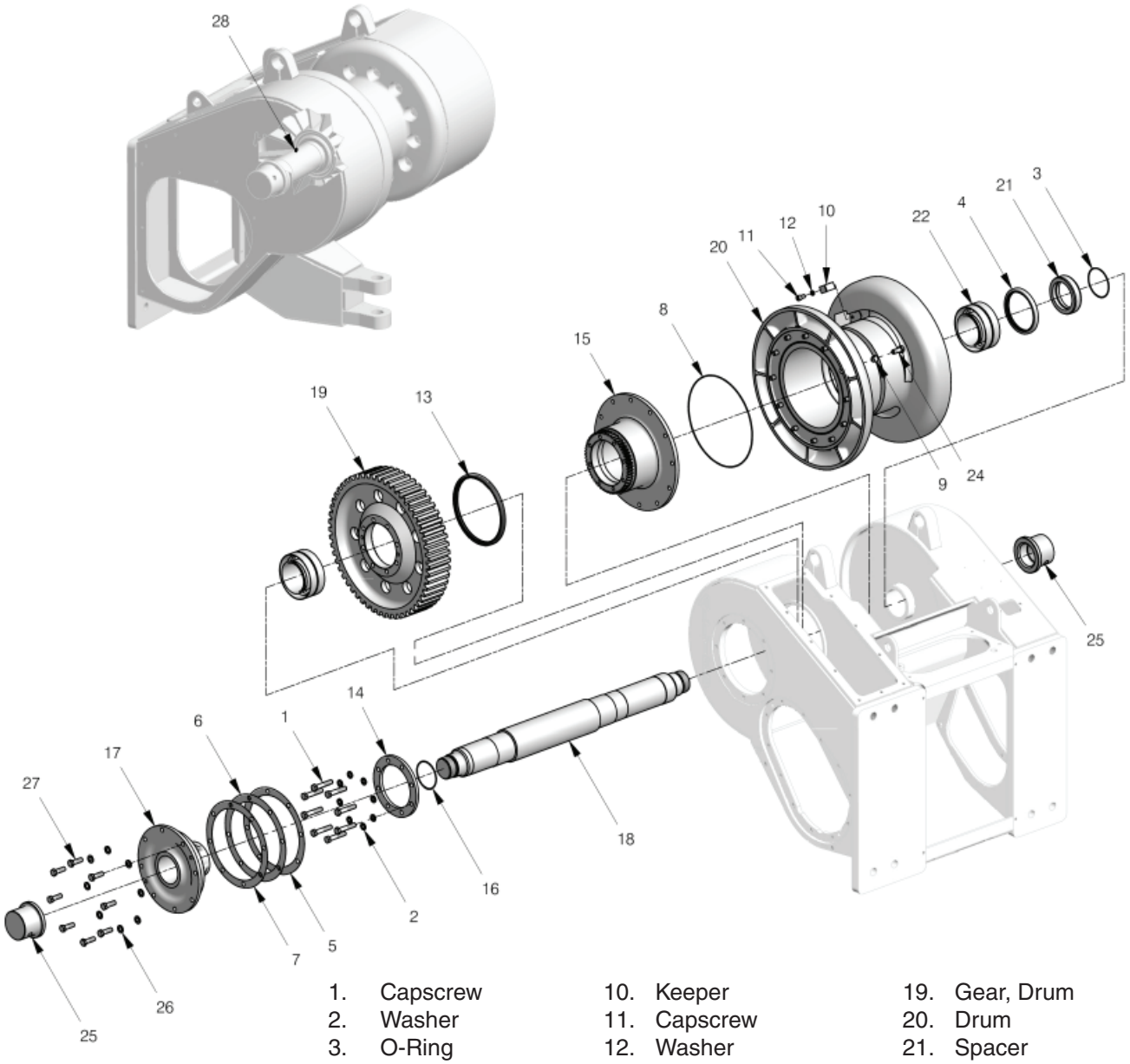


Drum Shaft and Drum Removal

Figure 4-2 shows the location of drum and drum shaft components. To remove the drum gear, it will be necessary to first remove the intermediate shaft (see **Intermediate Shaft Removal** section).

⚠ WARNING

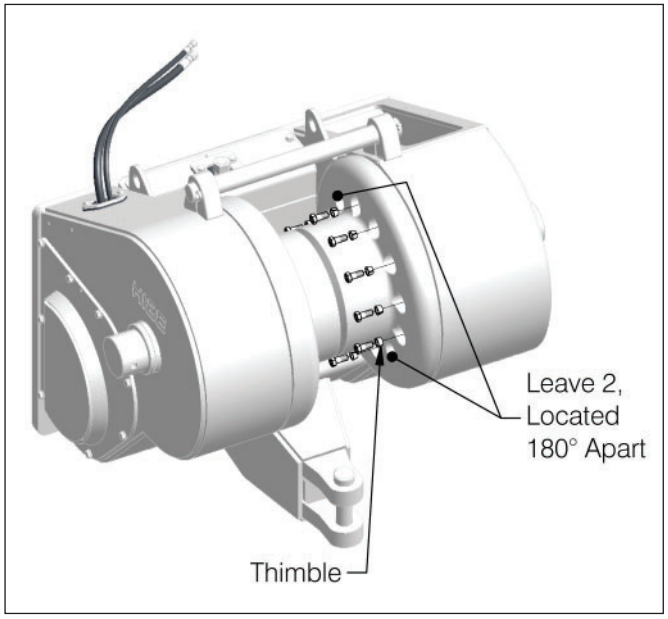
Do not attempt to remove heavy components such as the drum or drum gear by hand. Always use a lifting device and the recommended attachments whenever possible.



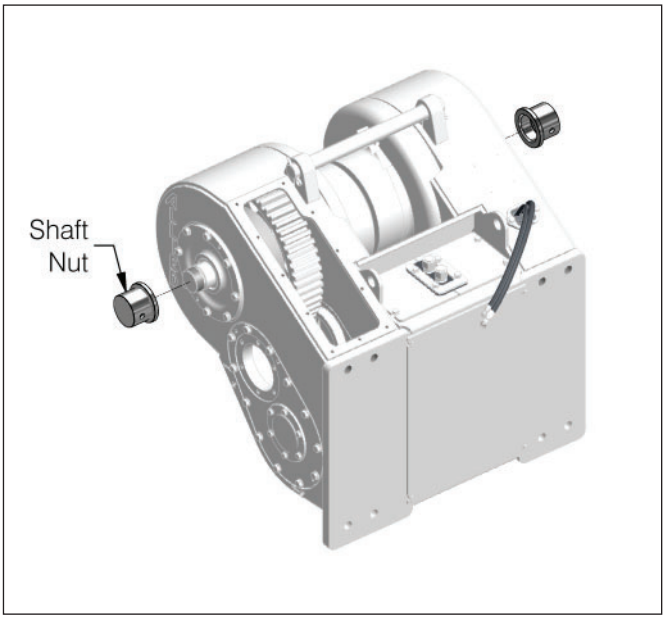
1.	Capscrew	10.	Keeper	19.	Gear, Drum
2.	Washer	11.	Capscrew	20.	Drum
3.	O-Ring	12.	Washer	21.	Spacer
4.	Seal, Oil	13.	Seal, Oil	22.	Bearing, Roller
5.	Shim .005	14.	Retainer, Ring	24.	Capscrew
6.	Shim .007	15.	Adapter	25.	Nut, Blind
7.	Shim .020	16.	O-Ring	26.	Washer
8.	O-Ring	17.	Retainer, Drum Shaft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

Figure 4-2 Location of Drum and Drum Shaft Components

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

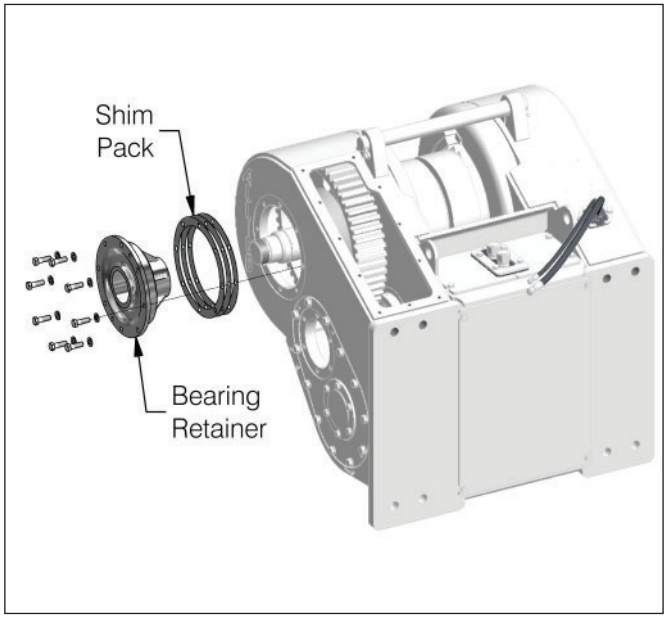


2. Remove drum shaft locknuts.

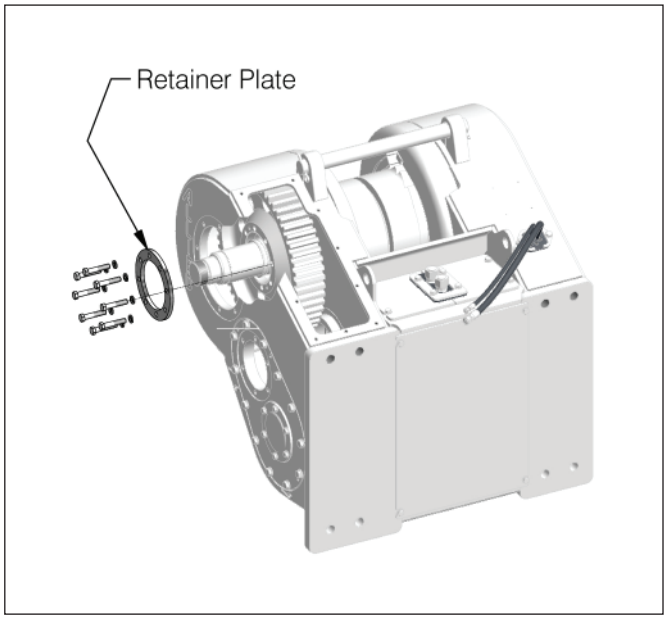


3. Remove bearing retainer and shim pack.

NOTE: Tag shim pack for reference during reassembly.

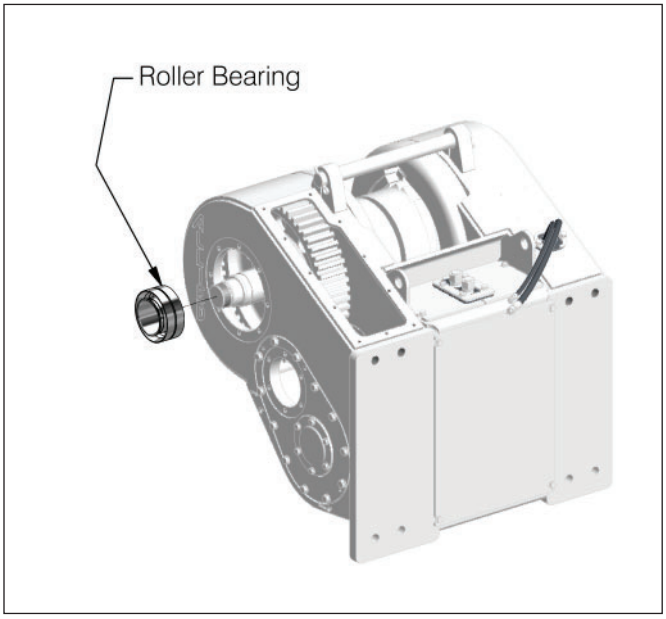


4. Remove retainer plate by removing retainer capscrews and washers.

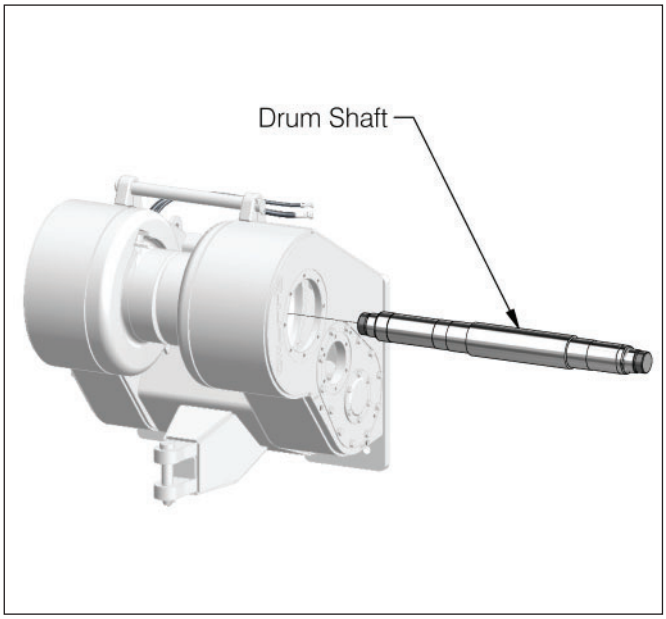


5. Remove roller bearing.

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.

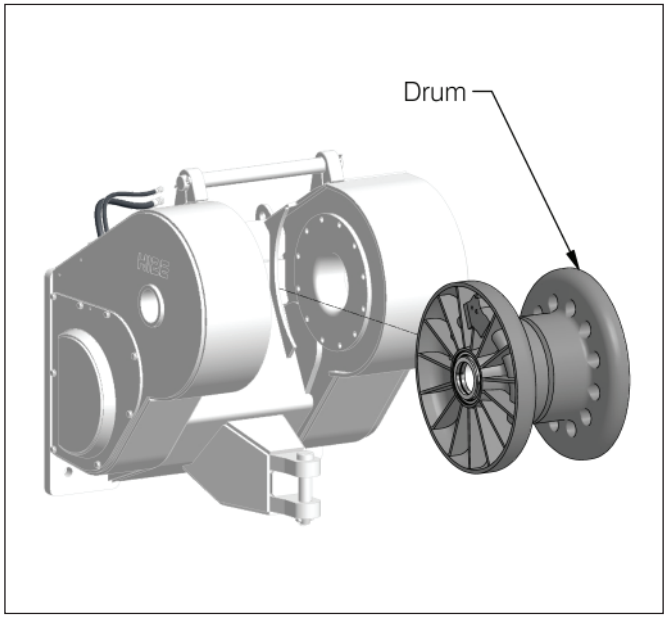


⚠ WARNING

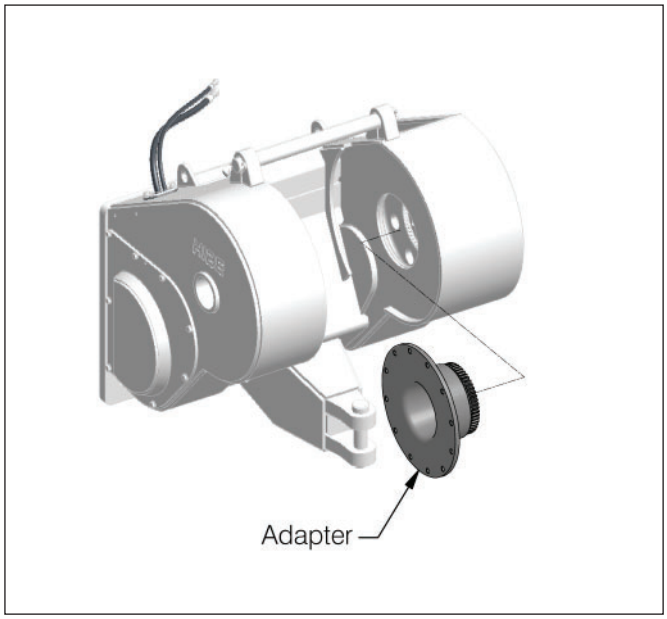
Support or sling the drum gear so that it does not fall during shaft removal.

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

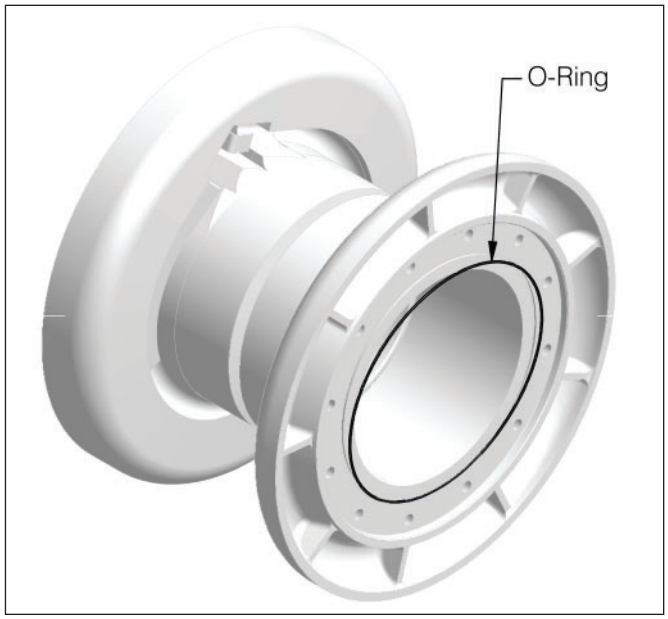
8. Carefully remove the drum from winch frame. Ensure that the adapter does not fall.



9. Remove adapter.



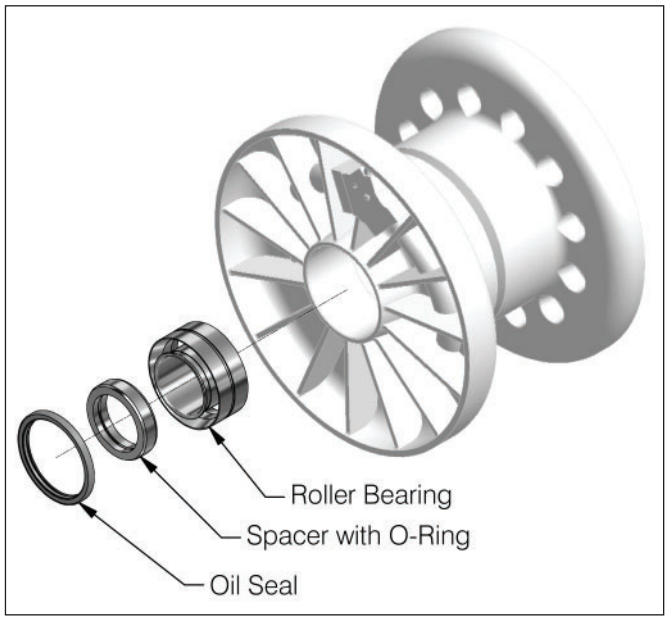
10. Remove and discard O-ring from the right-hand end of the drum.



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

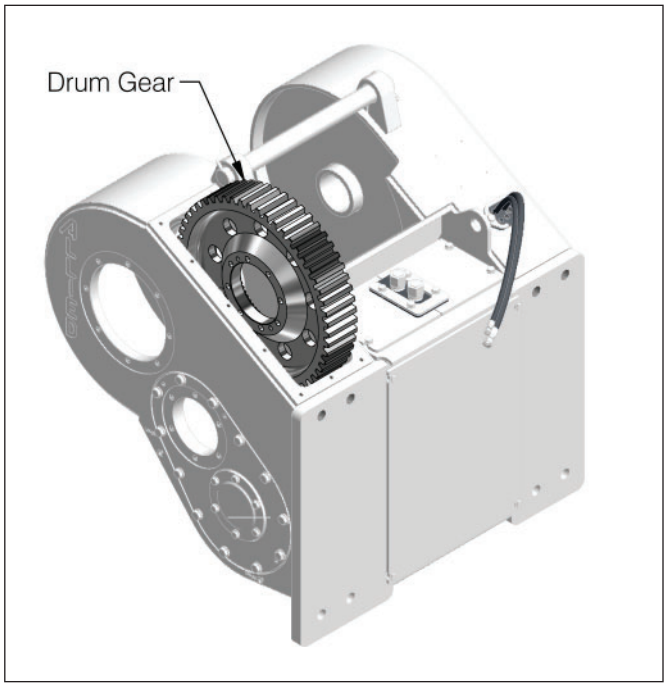
11. Remove oil seal (note the orientation of the seal lip for replacement), seal spacer with O-ring, and double tapered roller bearing assembly from the left-hand end of the drum. Discard the oil seal.

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.

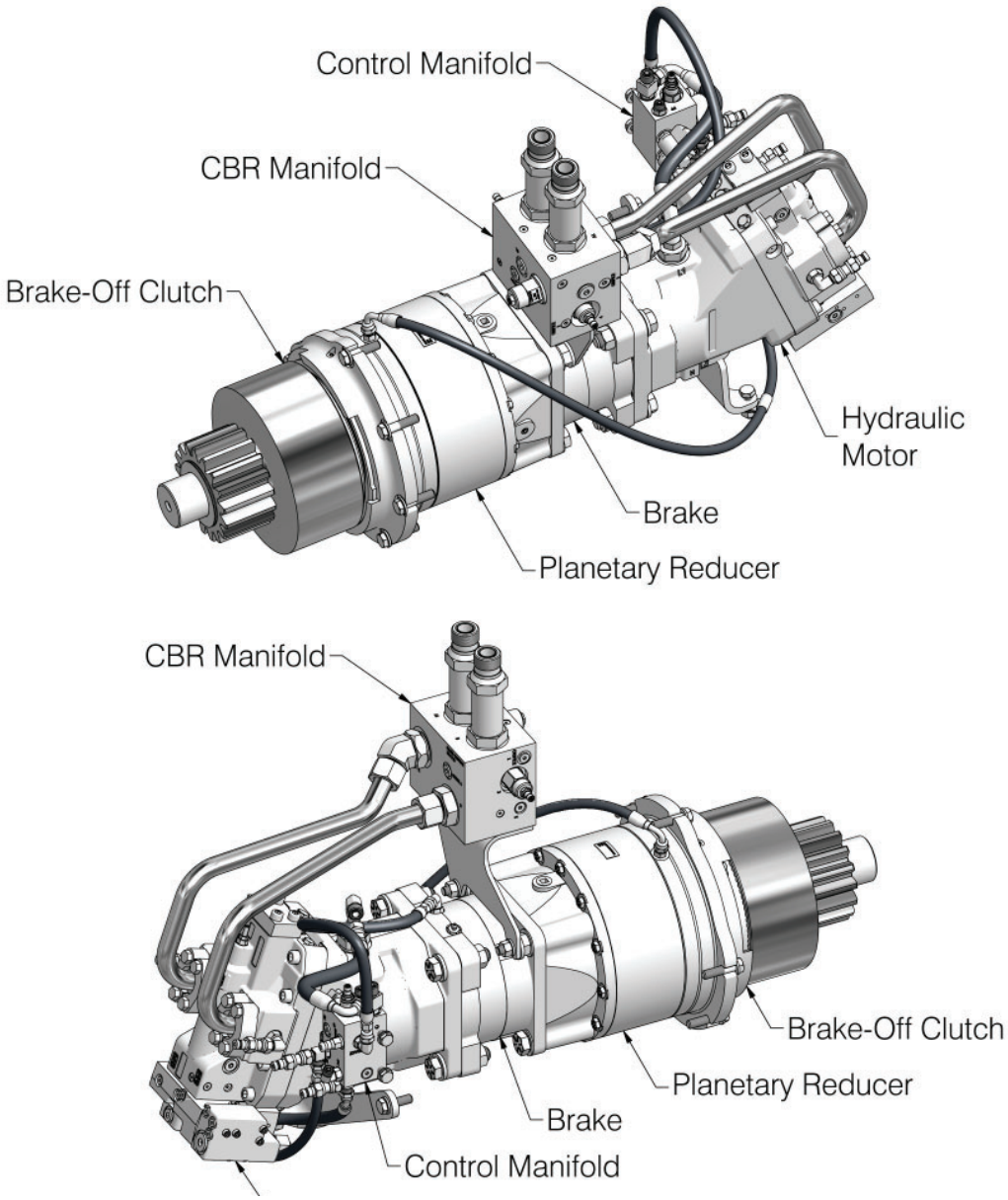
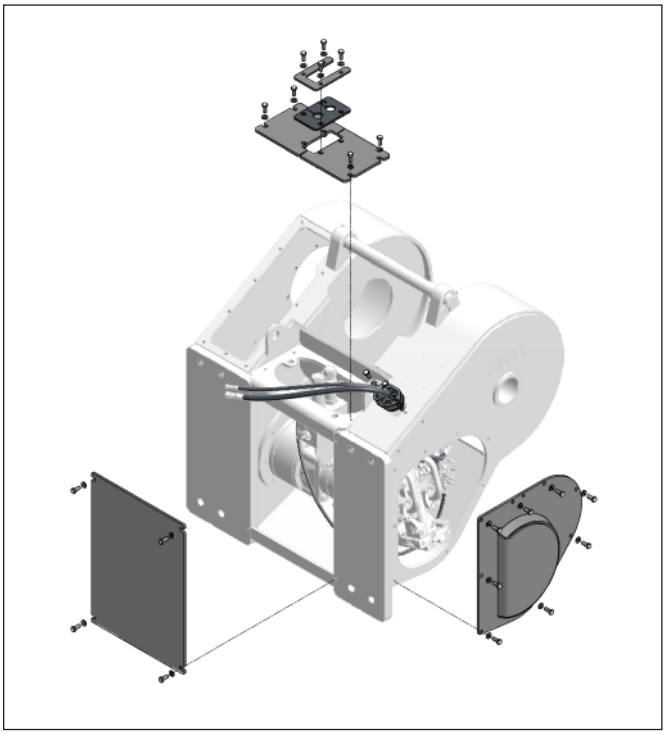
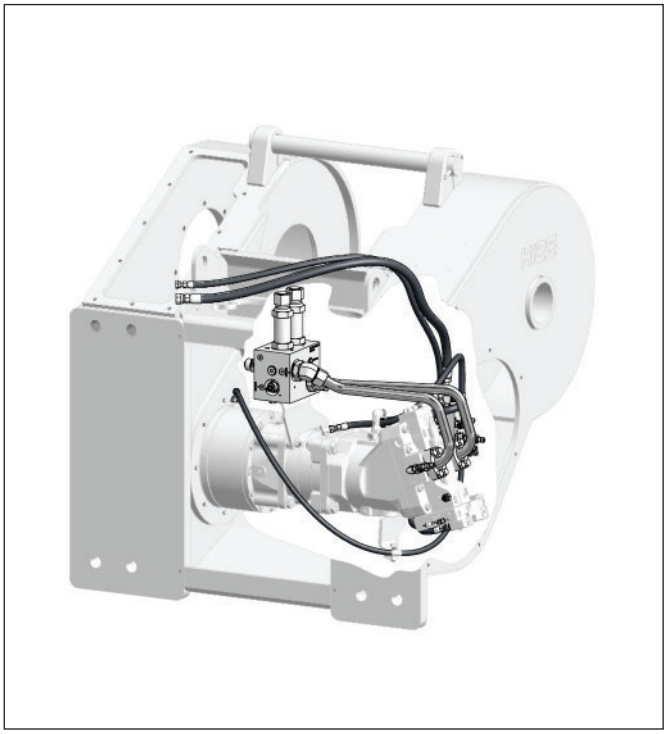


Figure 4-3 Hydraulic System Components

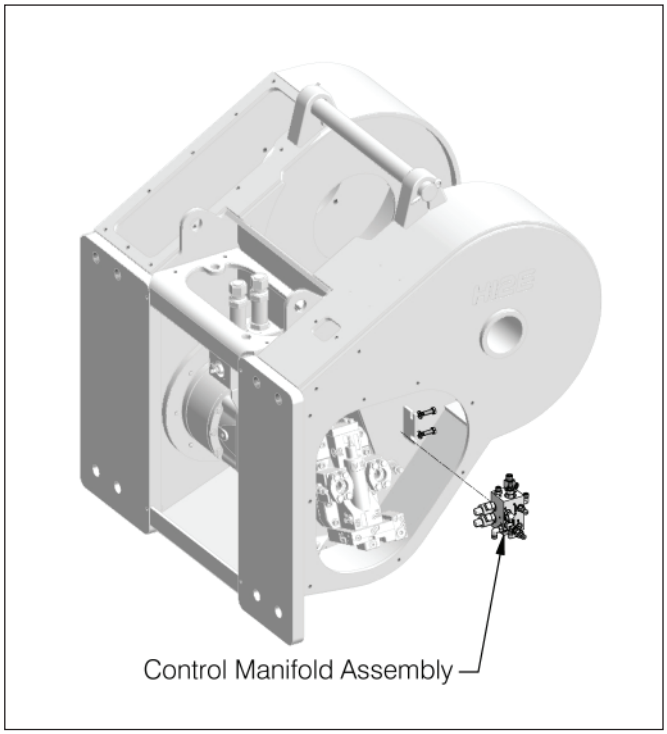
1. Drain oil from winch, and remove covers as shown.



2. Remove the hoses and tube assemblies shown below. Tag hose ends and ports for reassembly.



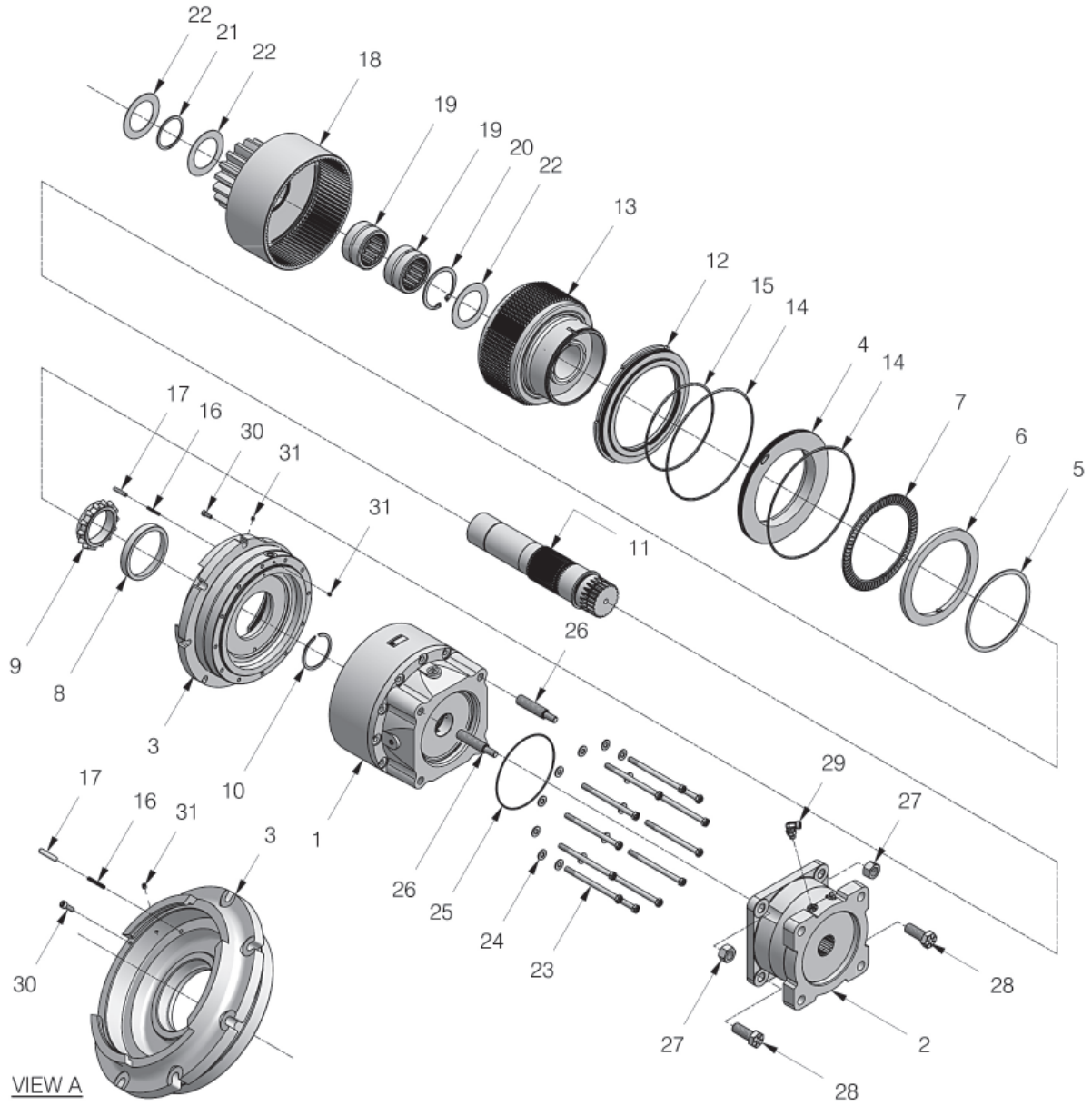
3. Remove the control manifold assembly.



4. Loosen the capscrews, and remove the counterbalance relief (CBR) manifold assembly from the mounting bracket.

Motor Shaft Removal and Disassembly

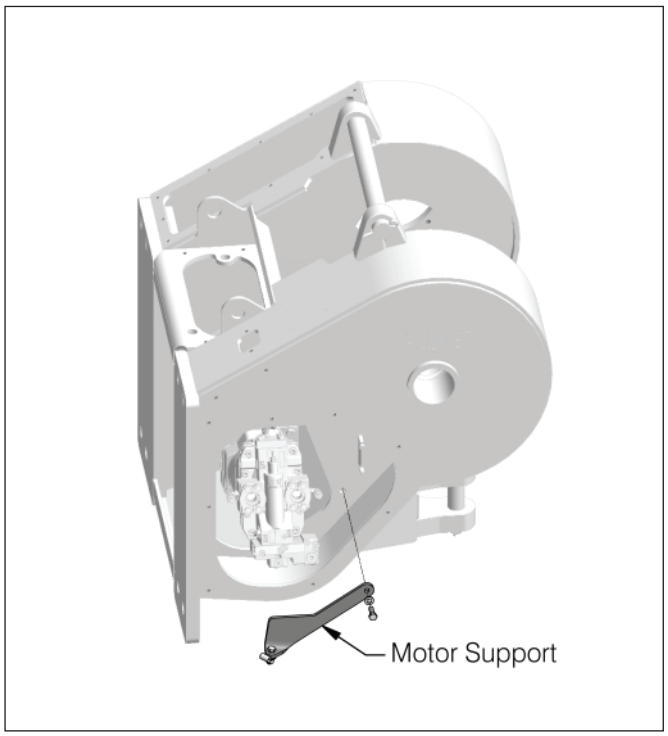
Removal and disassembly of certain motor shaft components can be accomplished while the winch is mounted on the tractor. The motor and brake can be removed without removing any other components (other than various hoses and fittings), but taking out the planetary reducer and clutch housing requires removing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



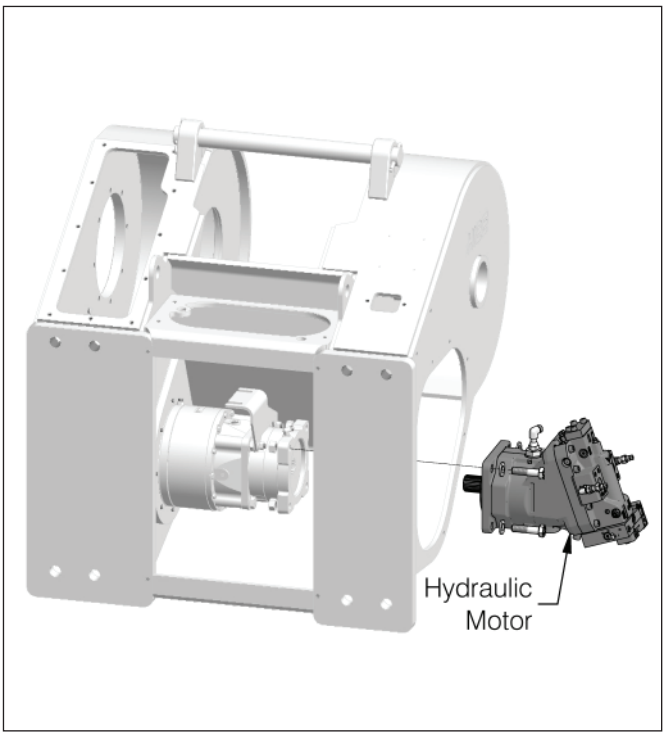
1.	Planetary Reducer Kit	9.	Cone - Roller Bearing	17.	Pin	25.	O-Ring
2.	Brake - Dry Disc, D Mount	10.	Snap Ring	18.	Gear - Spider, Clutch	26.	Stud
3.	Housing - Clutch	11.	Shaft - Clutch	19.	Bearing - Needle, Heavy Duty	27.	Hex Nut
4.	Piston - Clutch	12.	Ring - Seal	20.	Snap Ring - Int	28.	Capscrew
5.	Snap Ring	13.	Assembly - Clutch	21.	Ring, Retaining	29.	Fitting
6.	Ring - Thrust	14.	O-Ring	22.	Shim .048	30.	Capscrew
7.	Bearing - Thrust Needle Roller	15.	O-Ring	23.	Capscrew	31.	Plate - Expansion
8.	Cup - Roller Bearing	16.	Spring	24.	Washer		

Figure 4-4 Motor Shaft Components

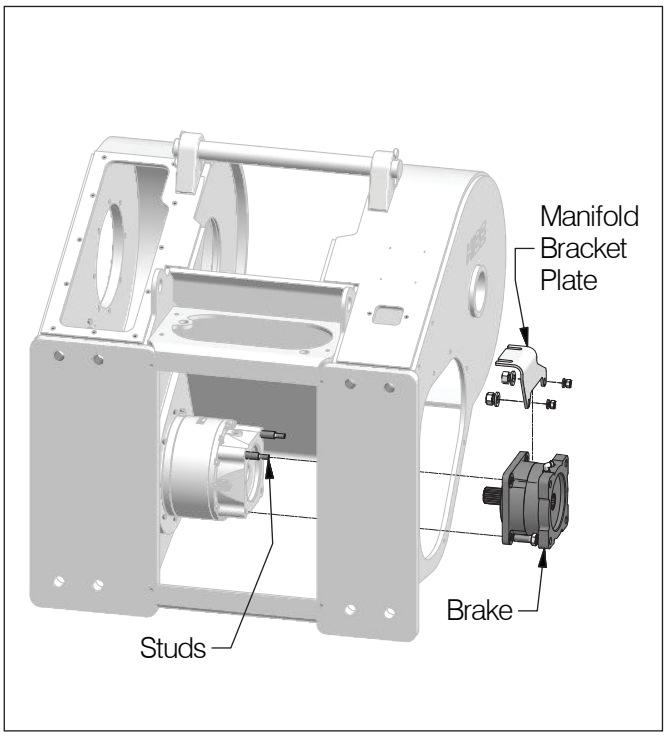
1. Remove the motor support from winch frame.



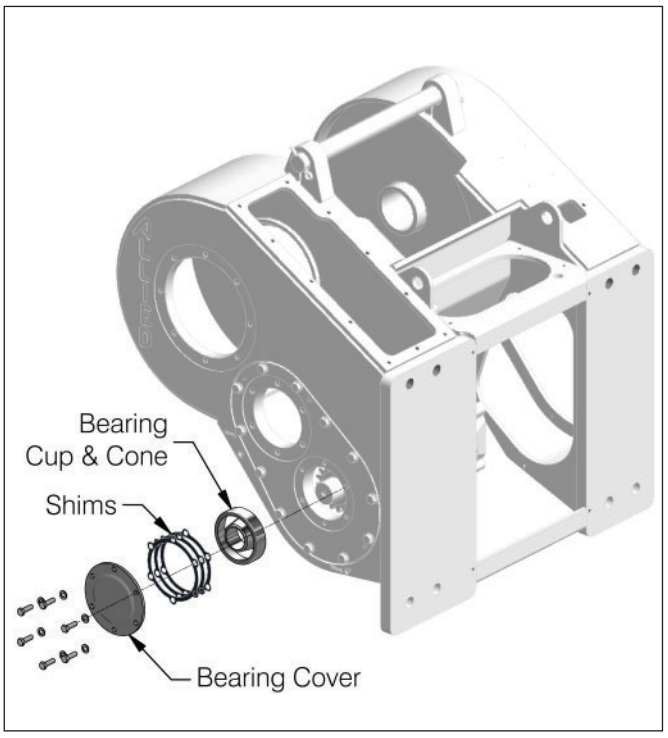
2. Remove the hydraulic motor.



3. Remove the manifold bracket plate and brake. Remove Studs if damaged.

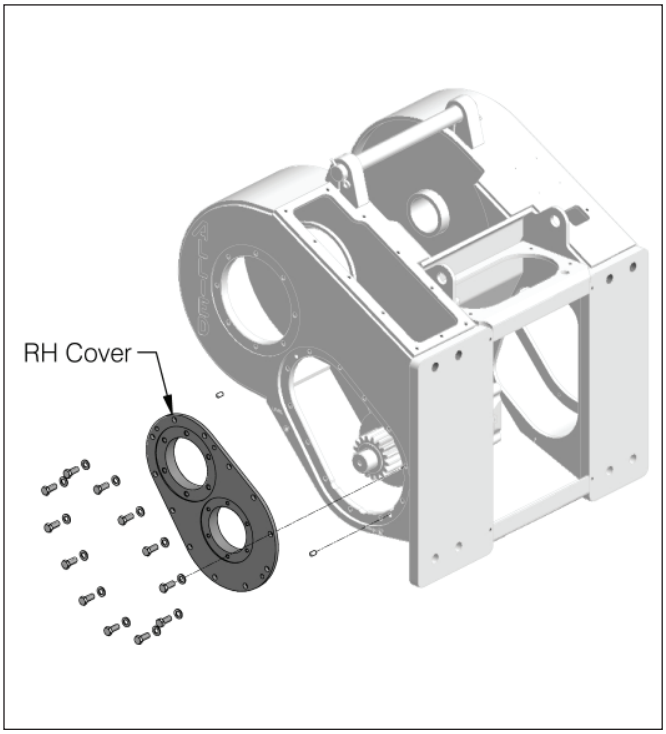


4. Remove the bearing cover, shims and the bearing.

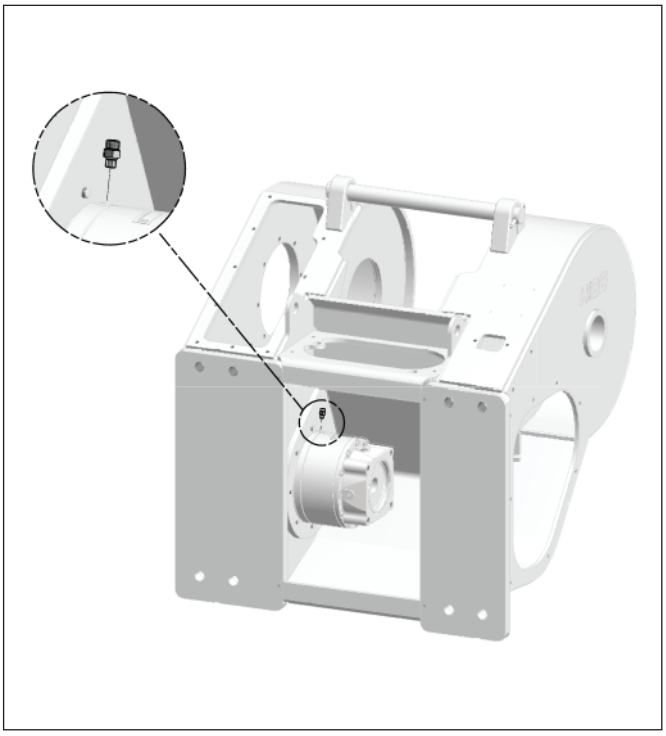


NOTE: Tag shim pack for reference during reassembly.

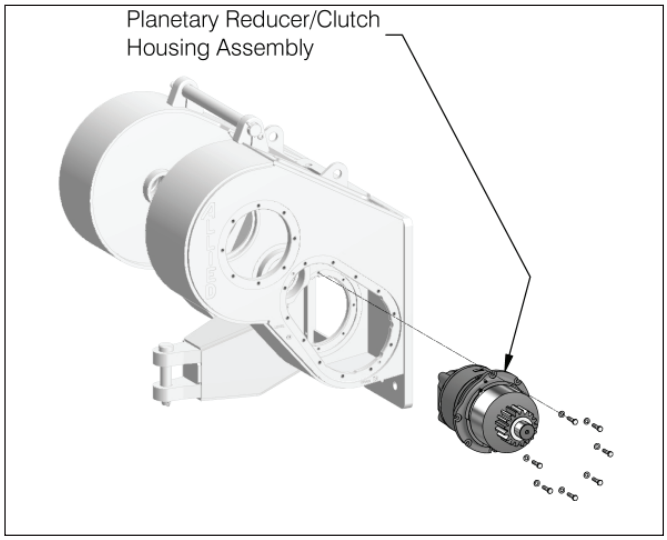
5. Remove the RH cover.



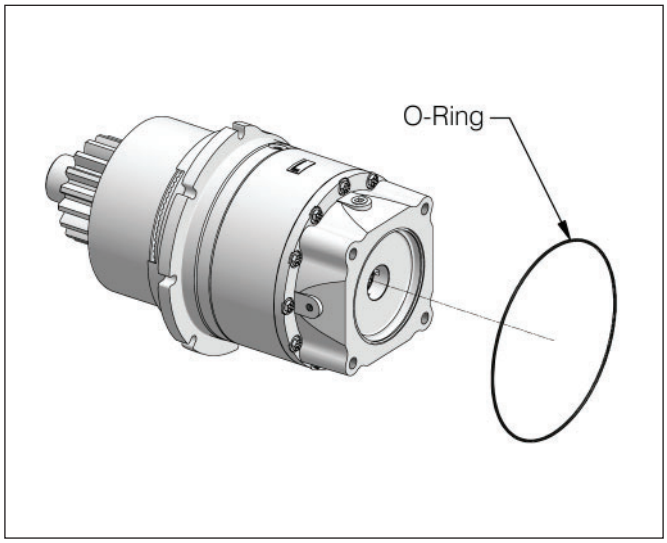
6. Remove any fittings that would prevent the reducer/clutch housing assembly from being removed.



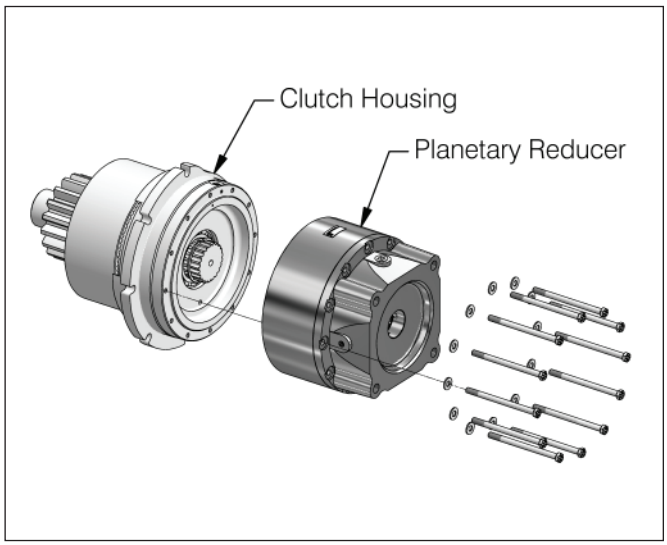
7. Remove planetary reducer/clutch housing assembly.



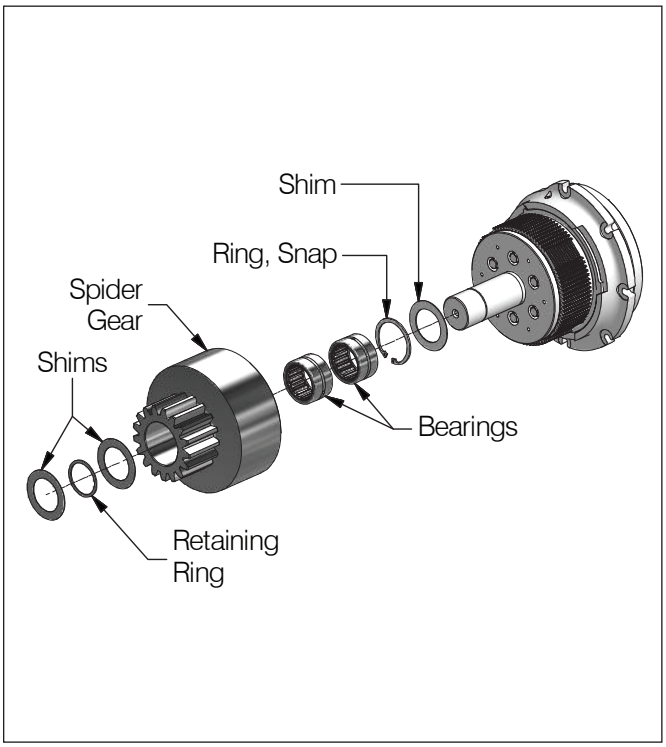
8. Remove and discard the O-ring.



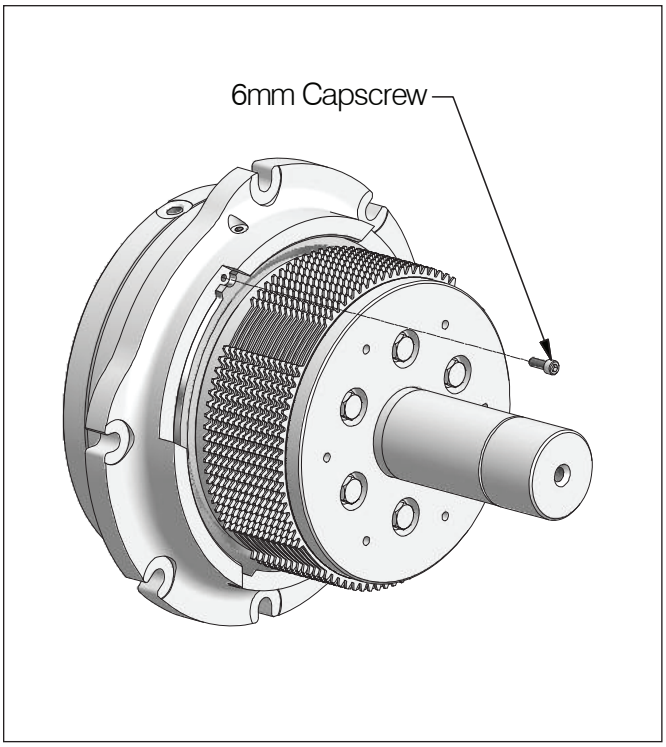
9. Remove the clutch housing from the reducer.



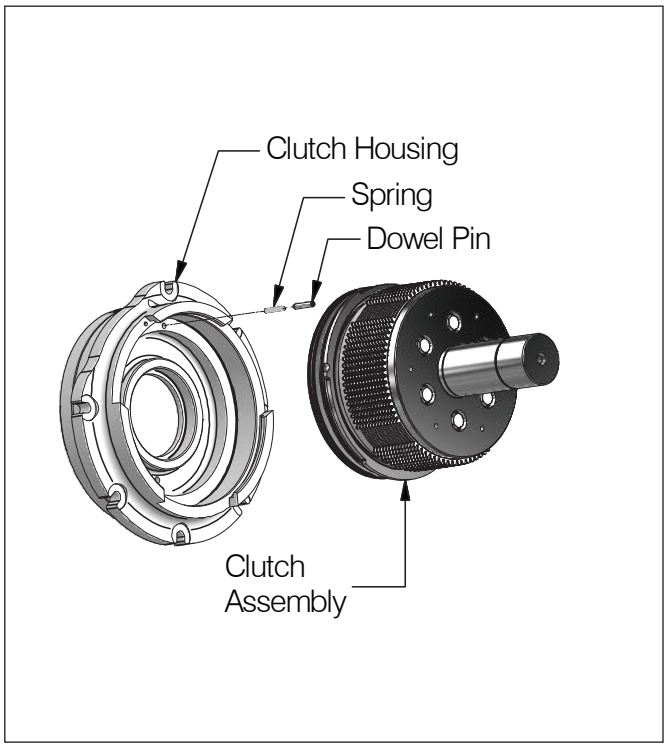
10. Remove spider gear, shims, bearings and spacer.



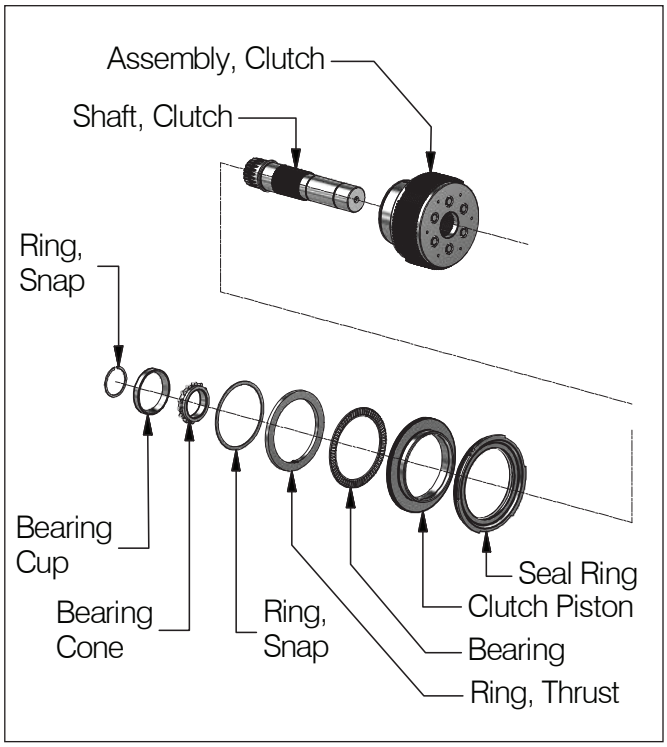
11. Remove 6mm socket head capscrew. Drive seal ring approximately 60 degrees counterclockwise with a brass drift and remove clutch assembly.



12. Pull the clutch assembly from clutch housing.



13. 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.

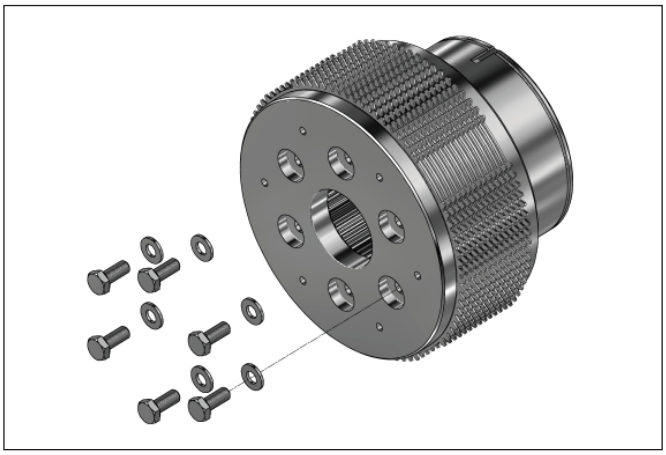
⚠ CAUTION

BRAKE-OFF Clutch is under pressure. Follow disassembly instructions below to prevent injury or damage to parts.

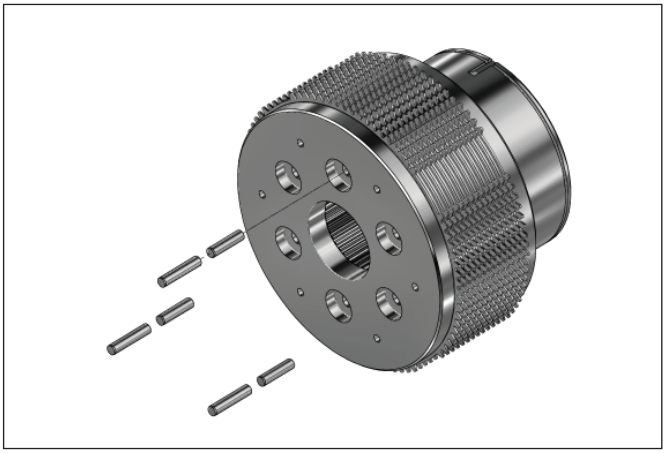
1. Remove three capscrews in a even cross pattern and replace with three M10 X 45MM long or longer capscrews and tighten alternately to compress spring.

1.2 Remove the remaining smaller capscrews evenly. Clutch will expand.

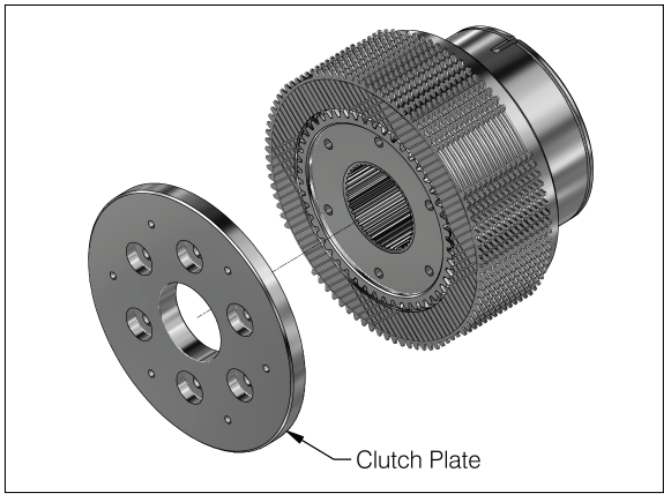
1.3 Once the clutch has fully expanded, remove all capscrews and lock washers.



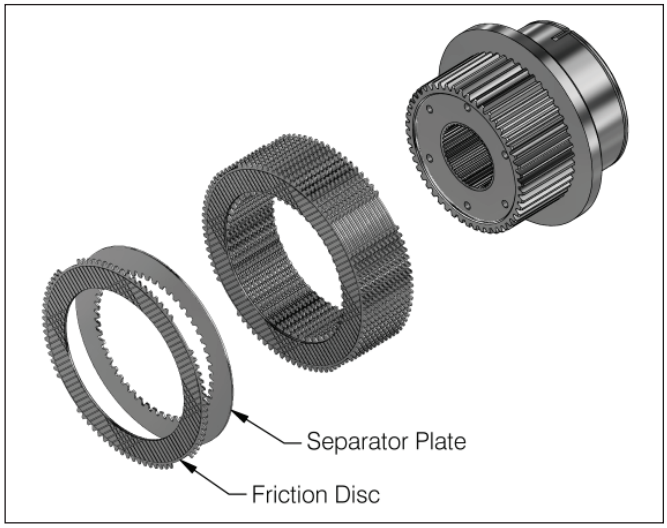
2. Remove pins from the clutch hub. Mark the holes where the pins stay for reference when reassembly.



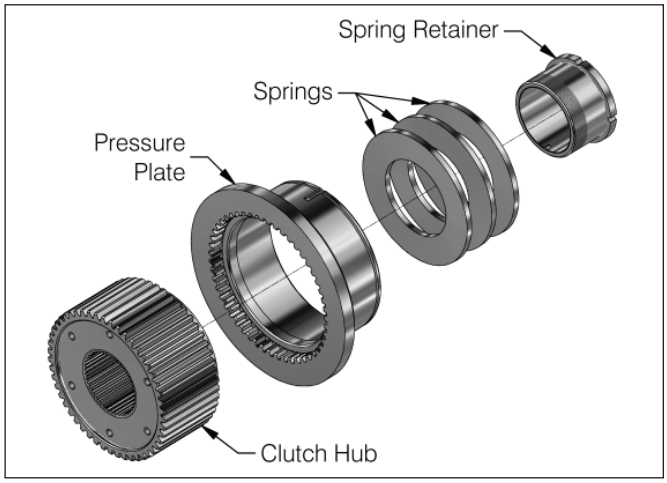
3. Remove the clutch plate.



4. Remove separator plates and friction discs.



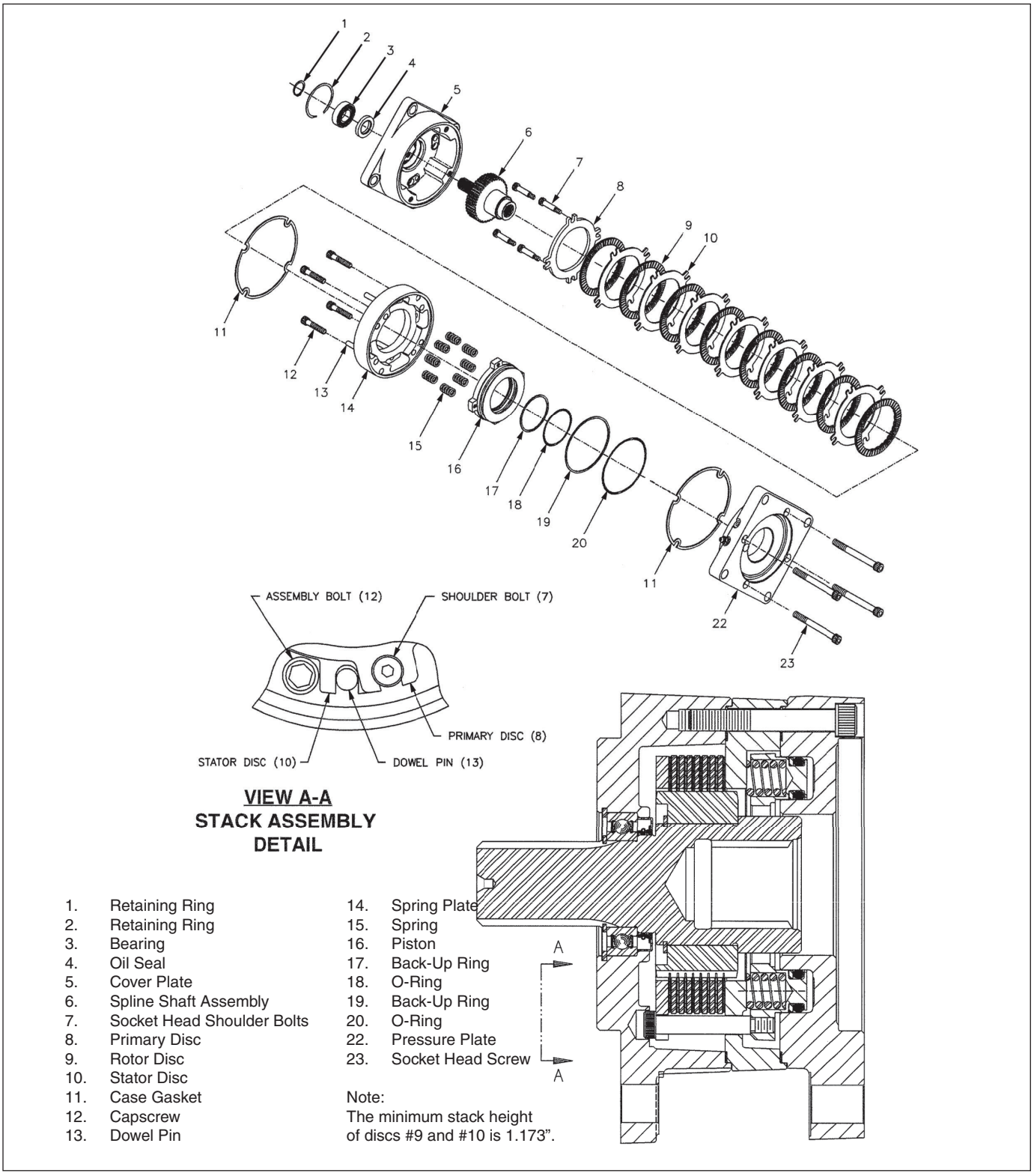
5. Remove the spring retainer from the clutch hub. Remove springs for the pressure plate. Separate the clutch hub and the pressure plate.



Intentionally Blank

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 screws (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).

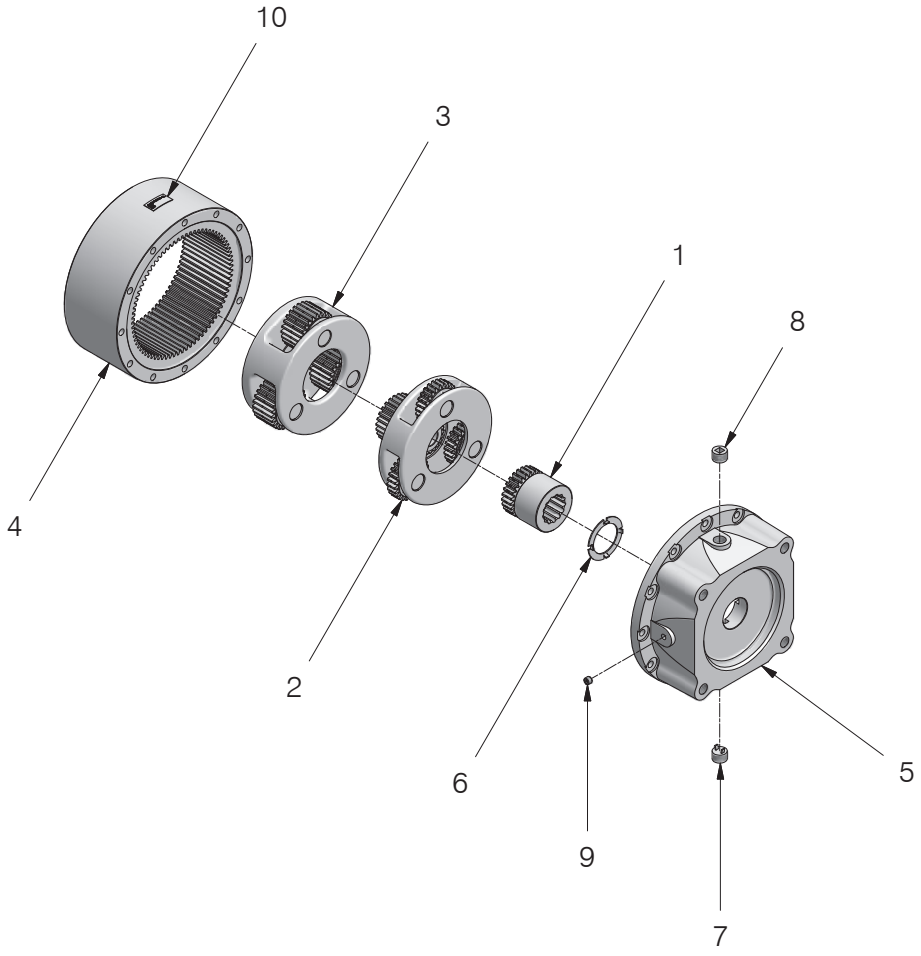
NOTICE

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 1-6, Torque Specifications on page 1-5, for torque values.

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 Reducer Assembly	Check the cover 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 12-15 ft-lbs. Torque for coil retaining nut is 1-2 ft-lbs.

Figure 4-7 Visual Inspection

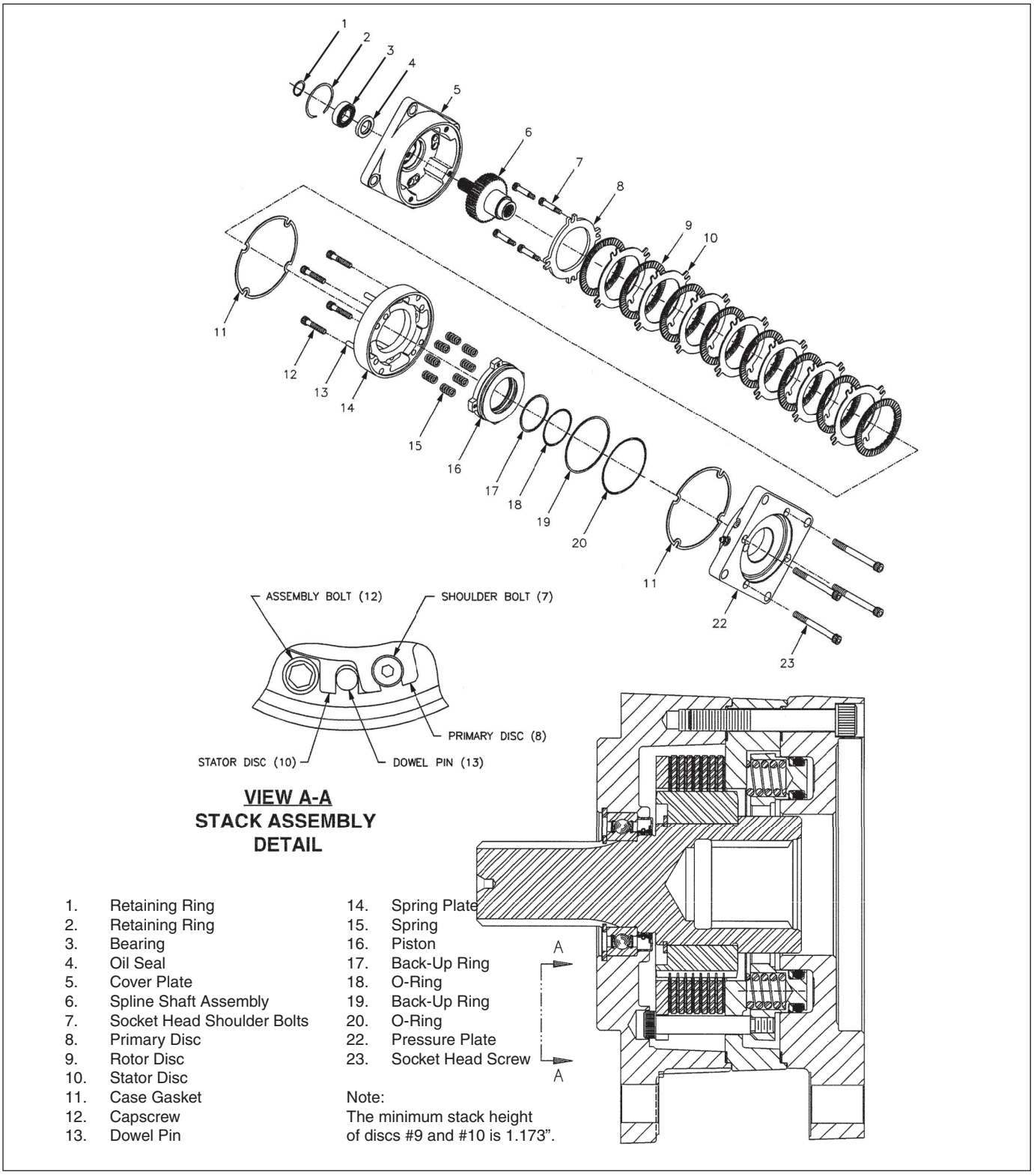
(continued on next page)

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.

Figure 4-7 Visual Inspection (continued)

Brake Assembly

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



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

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

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

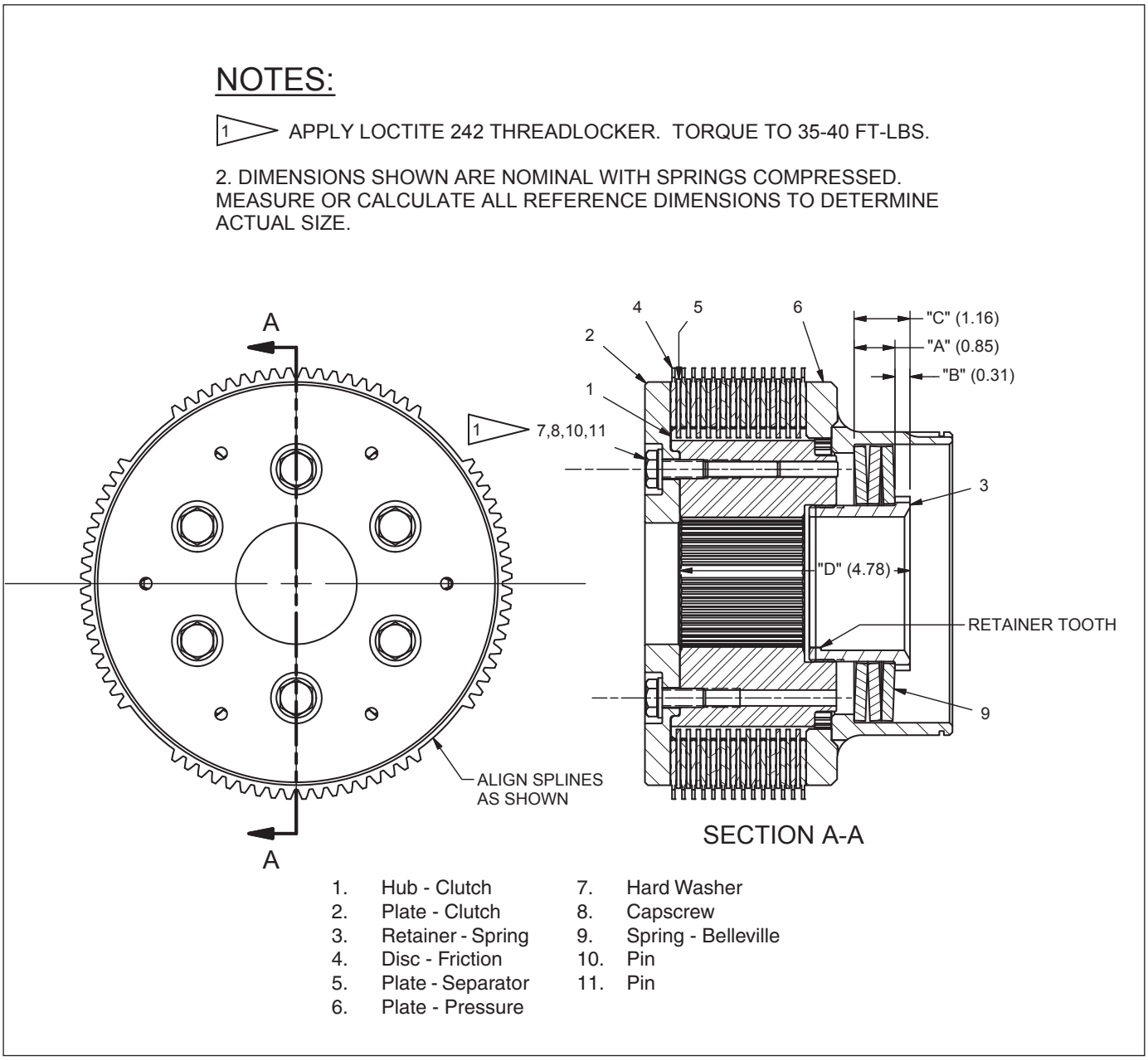
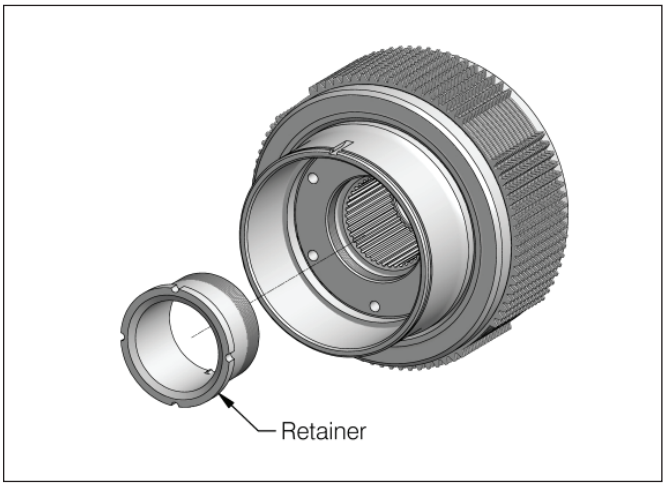


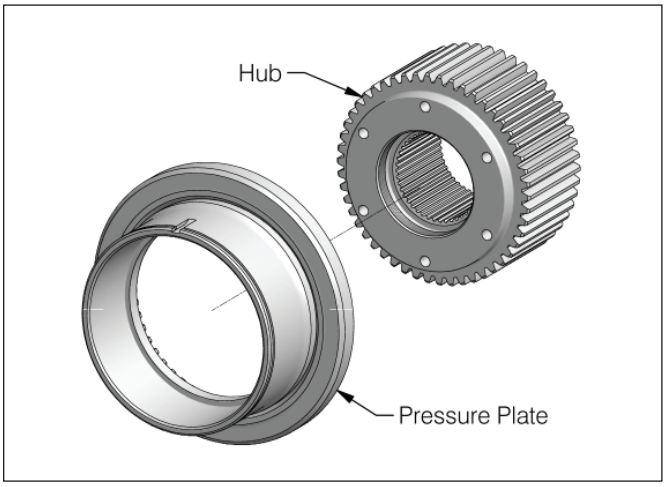
Figure 4-9 BRAKE-OFF Clutch Assembly

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

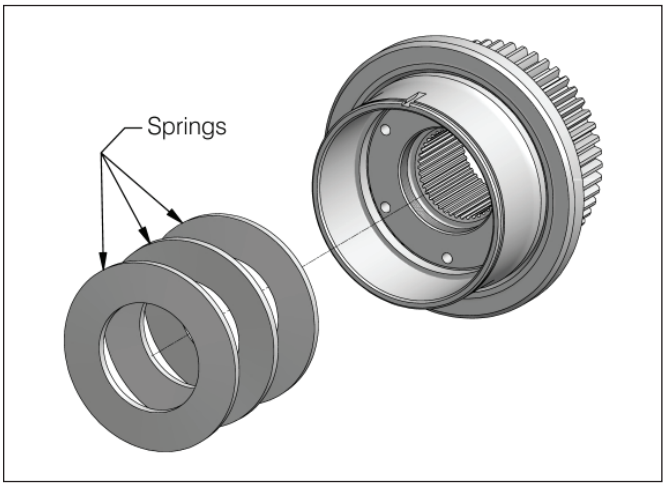


10. Disassemble clutch.

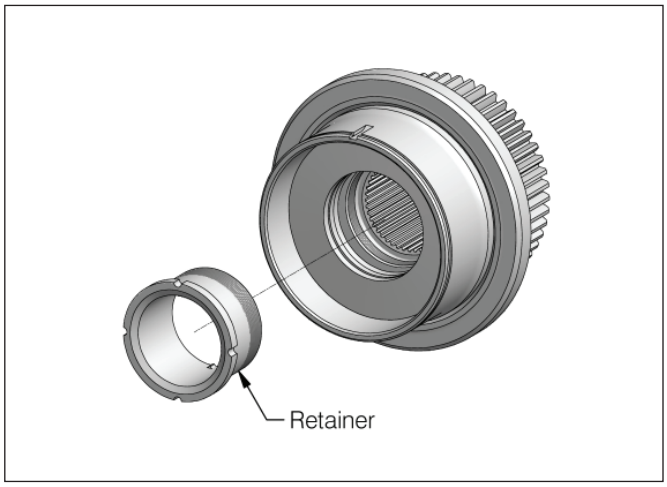
11. Assemble hub & pressure plate.



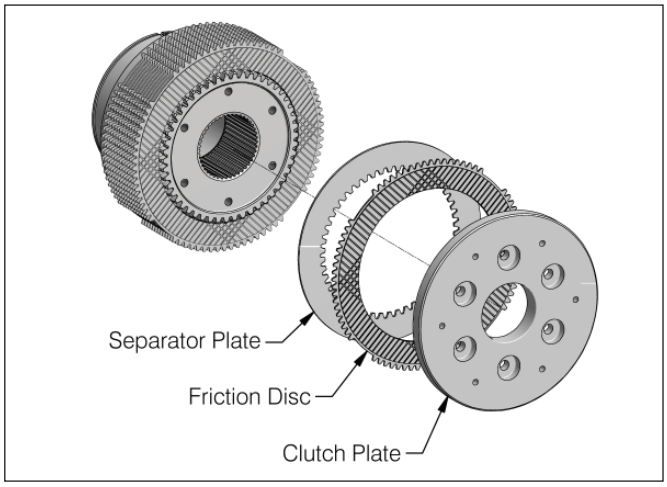
12. Install springs in series so that they oppose each other.



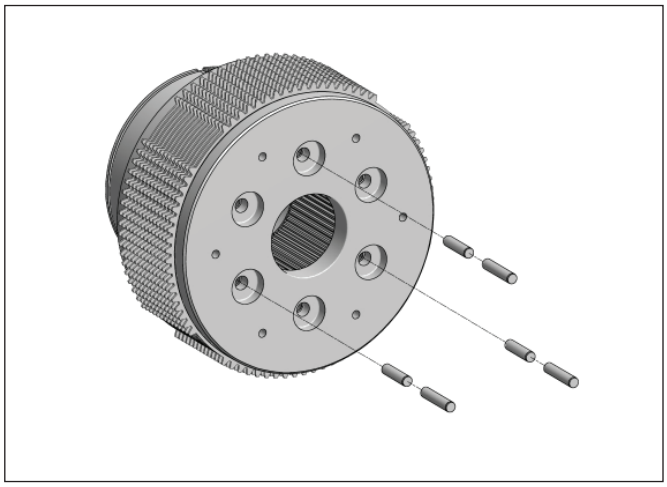
13. Install retainer to height “D”. (use the number of turns required for removal & align marks on teeth).



14. Install frictions, separators, & clutch plate.



15. Insert pins into three equally spaced holes.



16. Install 1.75” (45mm) long or longer M10 x 1.5 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.

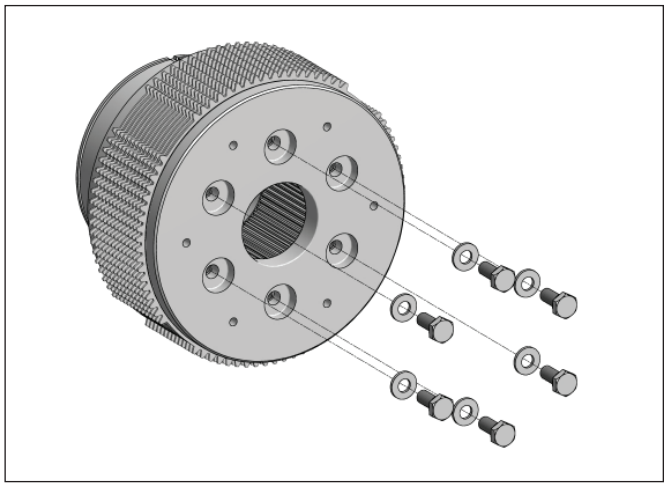
NOTE: Without special fixturing, external splines cannot be aligned precisely enough for spider gear to assemble. This can be overcome by bench pressurizing fully assembled clutch and housing. This will be described later.

20. Apply Loctite 242 threadlocker to six 1” (25mm) long capscrews.

21. Install three of these shorter capscrews in the open holes. Torque to 35-40 ft-lbs (48-54 N-m).

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

23. Install the three remaining shorter capscrews. Torque to 35-40 ft-lbs (48-54 N-m).



24. Check final height “D” (see Figure 4-10). It should be +0.012/-0.000 of original height “D”.

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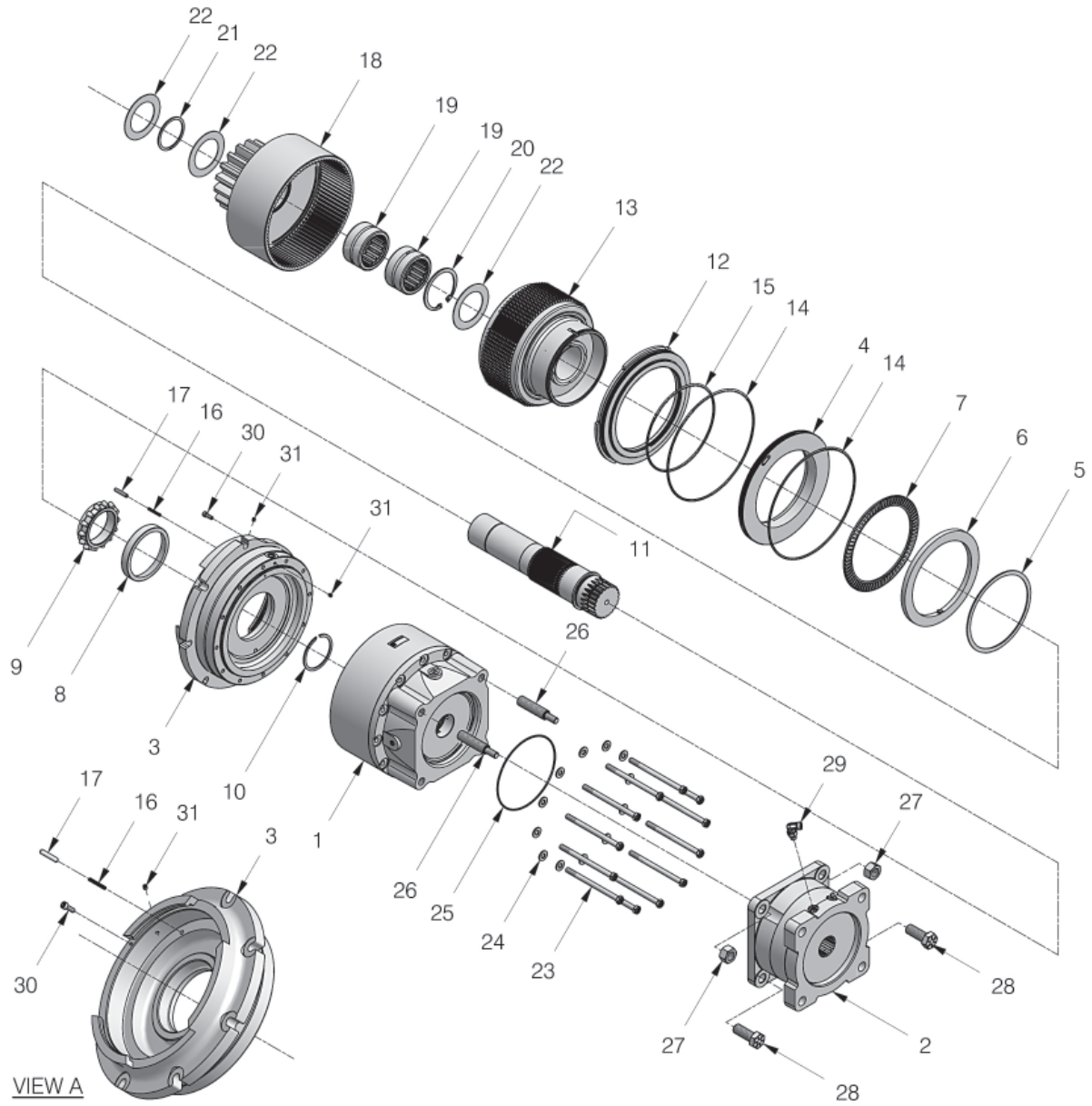
Motor Shaft Assembly and Installation

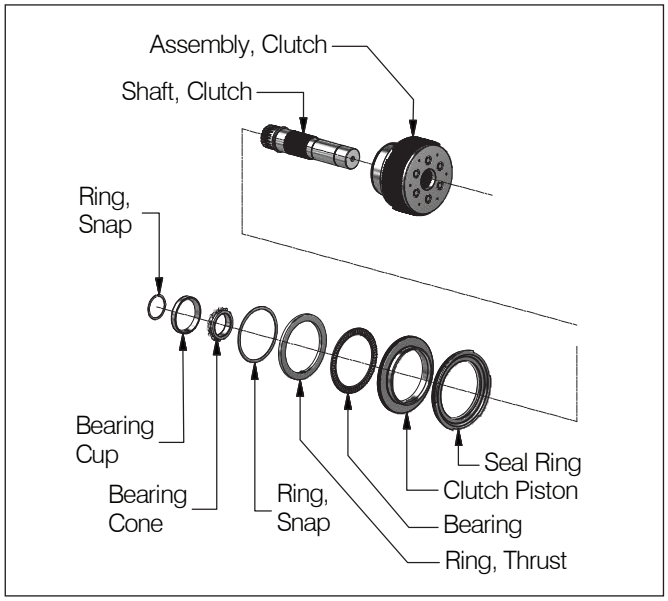
Assembly and installation of the motor shaft assembly can be accomplished while the winch is mounted on the tractor. The motor and brake can be installed independently of other components (other than various hoses and fittings), but the planetary reducer and reducer housing must be installed before the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



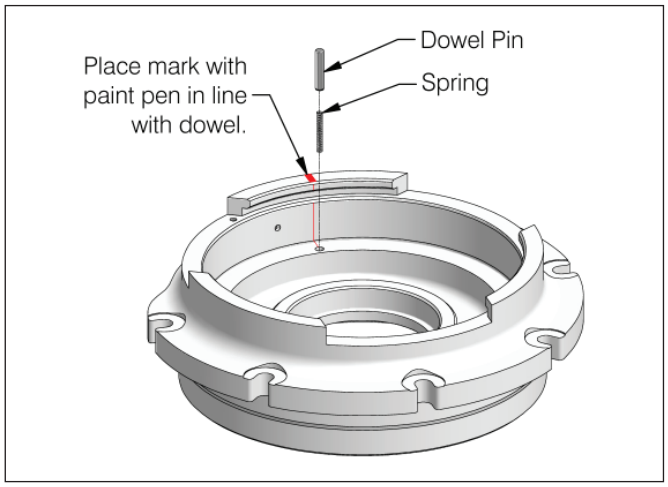
1.	Planetary Reducer Kit	9.	Cone - Roller Bearing	17.	Pin	25.	O-Ring
2.	Brake - Dry Disc, D Mount	10.	Snap Ring	18.	Gear - Spider, Clutch	26.	Stud
3.	Housing - Clutch	11.	Shaft - Clutch	19.	Bearing - Needle, Heavy Duty	27.	Hex Nut
4.	Piston - Clutch	12.	Ring - Seal	20.	Snap Ring - Int	28.	Capscrew
5.	Snap Ring	13.	Assembly - Clutch	21.	Ring, Retaining	29.	Fitting
6.	Ring - Thrust	14.	O-Ring	22.	Shim .048	30.	Capscrew
7.	Bearing - Thrust Needle Roller	15.	O-Ring	23.	Capscrew	31.	Plate - Expansion
8.	Cup - Roller Bearing	16.	Spring	24.	Washer		

Figure 4-10 Motor Shaft Components

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



2. Install spring and dowel pin in clutch housing.

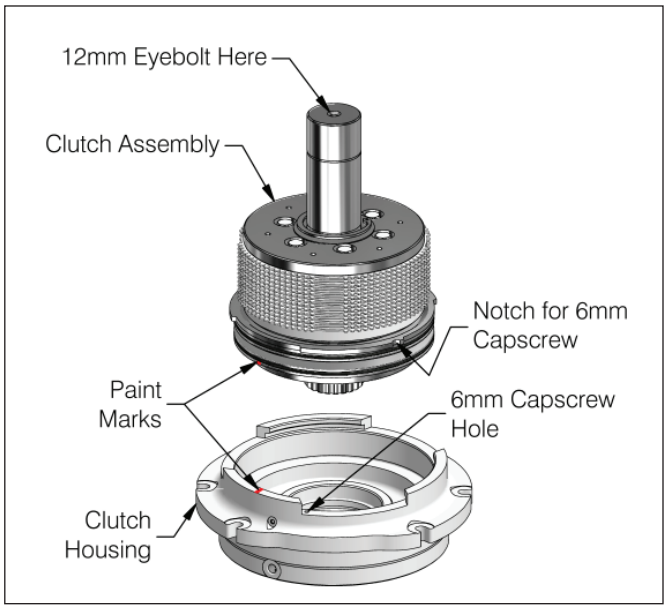


3. Paint pen mark on position in line with center of slot.

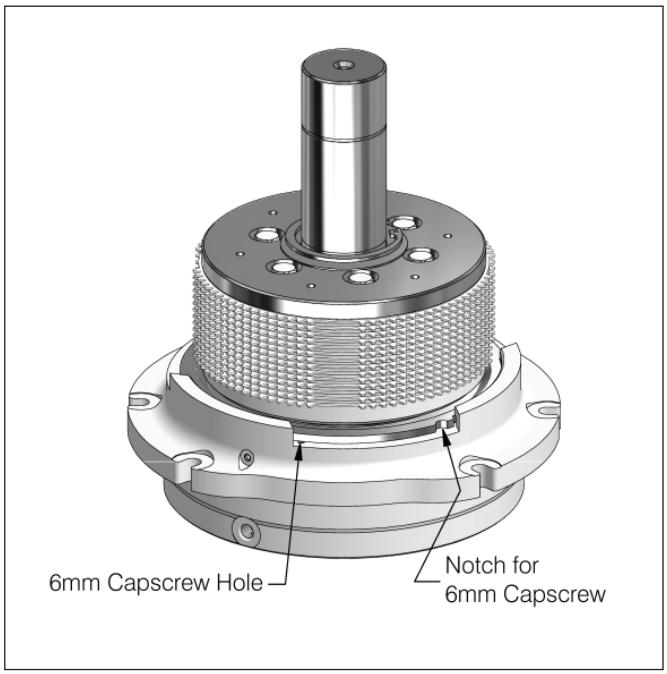
4. Lower clutch assembly vertically using jib hoist and M12x1.75 metric eyebolt.

   Align paint marks on piston and clutch housing.

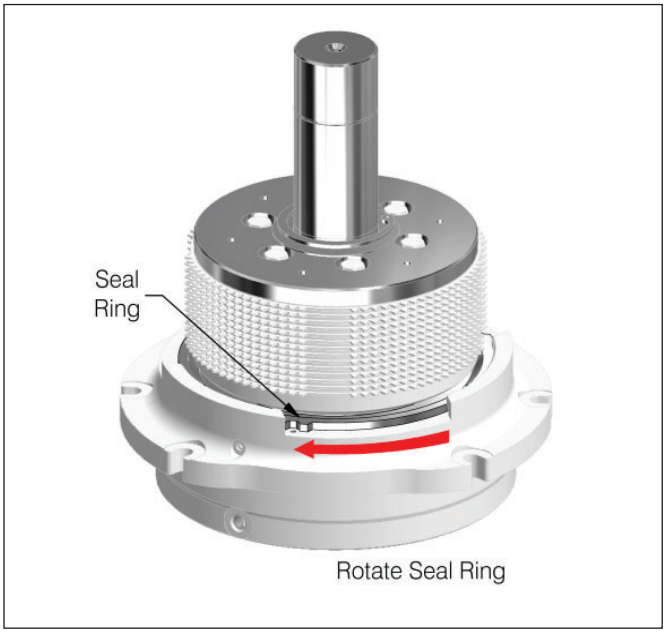
   Position seal ring so three locking tabs align with slots in clutch housing and notch will align with 6mm capscrew after rotating.



5. 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.



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



7. Testing clutch

⚠ WARNING

Wear safety glasses whenever working around pressurized hydraulics.

7.1 Apply hydraulic pressure to port on clutch housing;

7.2 Steadily increase pressure. Gear should begin to rotate by hand at about 360 psi;

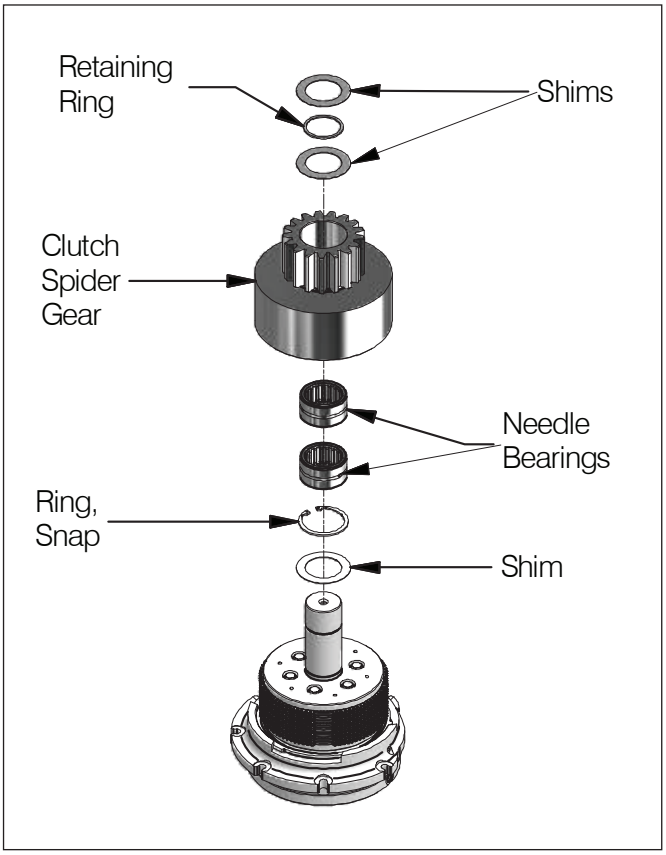
7.3 Increase pressure further, clutch should reach full release at 420 psi;

7.4 Increase pressure to 700 psi MAX and check for leaks.

8. While clutch is released, friction disks can be aligned by carefully assembling spider gear and aligning splines.

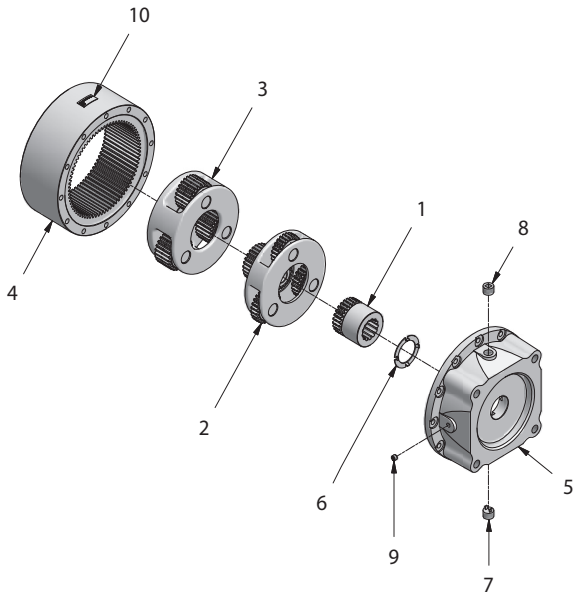
⚠ WARNING

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



9. Planetary Reducer

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

9.1 Place the gear of primary carrier assembly (item 2) into secondary carrier assembly (item 3), and place both assemblies into ring gear (item 4) while aligning gear teeth.

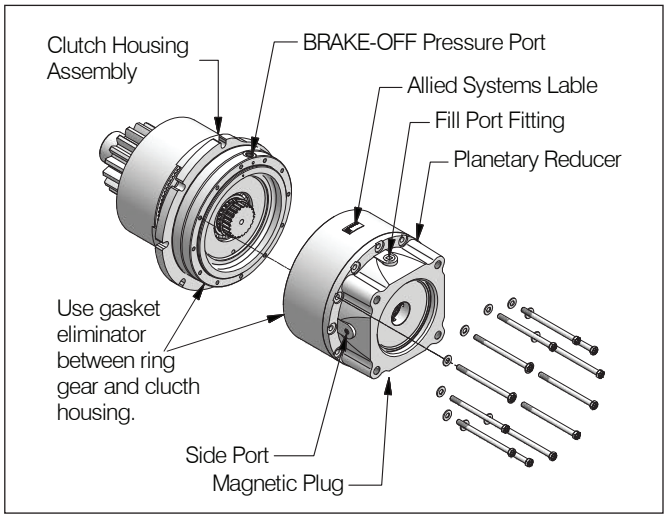
9.2 Place sun gear (item 1) into primary carrier assembly (item 2). Sun gear should turn freely by hand.

9.3 Clean mating surfaces and apply a bead of gasket eliminator to the face of the cover (Item 5) that mates with the ring gear (item 4). See instructions on sealant package.

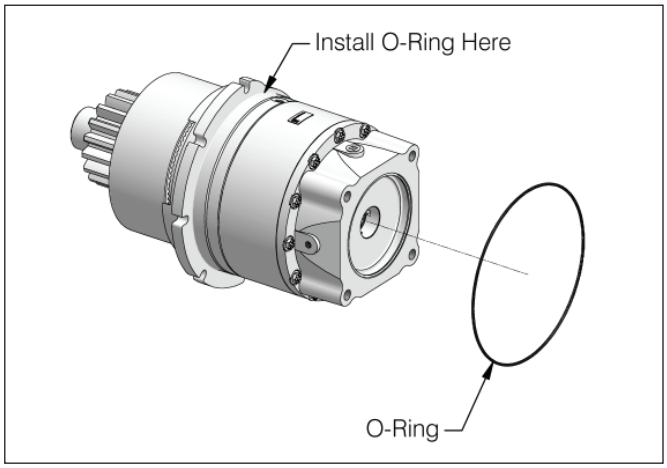
9.5 Secure thrust washer (item 6) with tangs engaged in cover (item 5). **NOTE: Washer can be secured to cover with a small amount of grease or silicone sealant. Install the cover and align with hub such that pipe plug holes on cover align with mounting holes on hub.**

9.6 Place cover (item 5) on ring gear (item 4) as shown above.

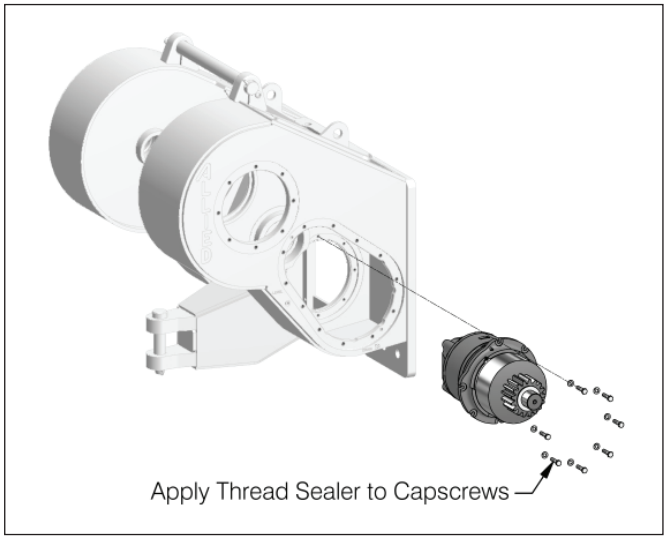
10. Install clutch housing assembly into planetary reducer by the same orientation as shown in the view below. Torque capscrews to 33 ft-lbs (44 N-m).



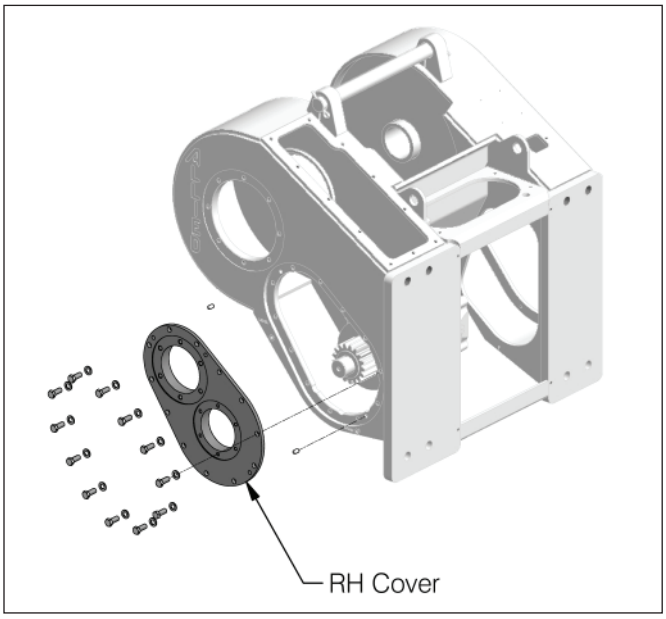
11. Install new O-ring on clutch housing.



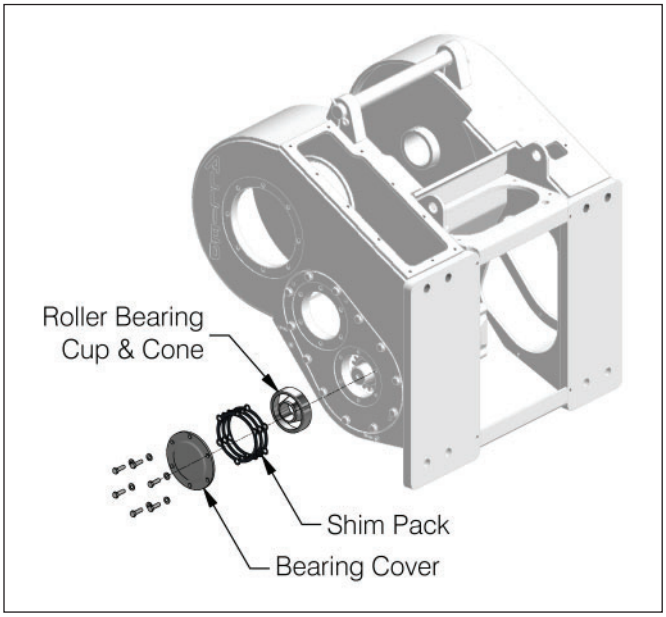
12. Install planetary reducer assembly. Torque capscrews to 66 ft-lbs (90 N-m).



13. Apply bead of anaerobic sealant (e.g., Loctite 515) to the RH cover plate. Reinstall RH cover plate. Torque capscrews to 165 ft-lbs (225 N-m).



14. Apply 1/8" bead of RTV sealant (e.g., Loctite 593 RTV) to the bearing cover. Reinstall bearing, shim pack, and cover plate. Torque capscrews to 66 ft-lbs (90 N-m).

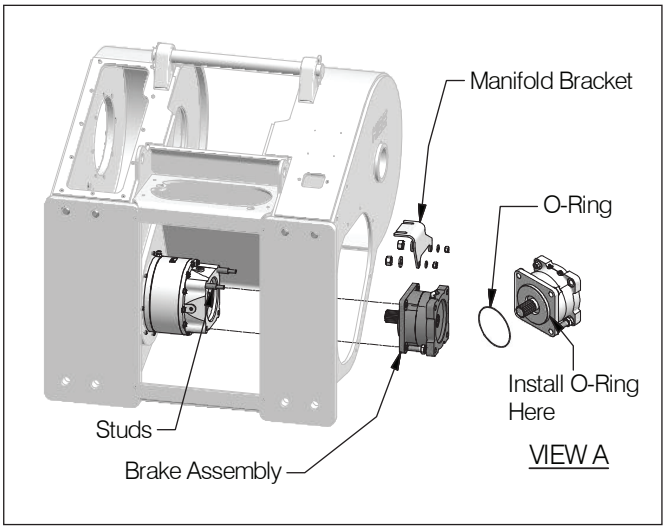


15. Install new O-ring on brake.

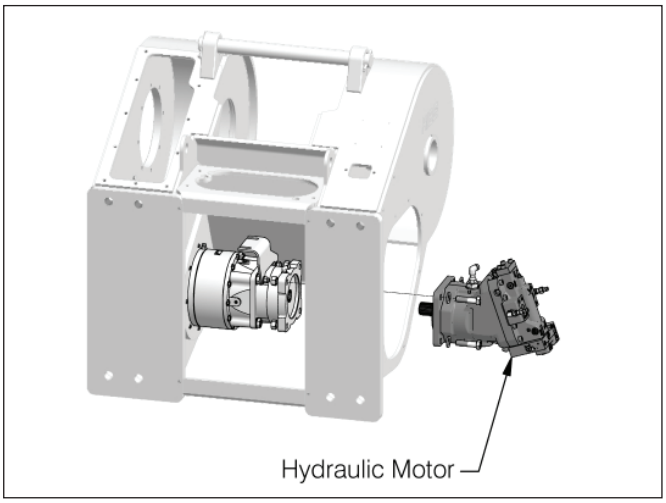
15.1 Install brake to reducer.

15.2 Install manifold bracket to brake.

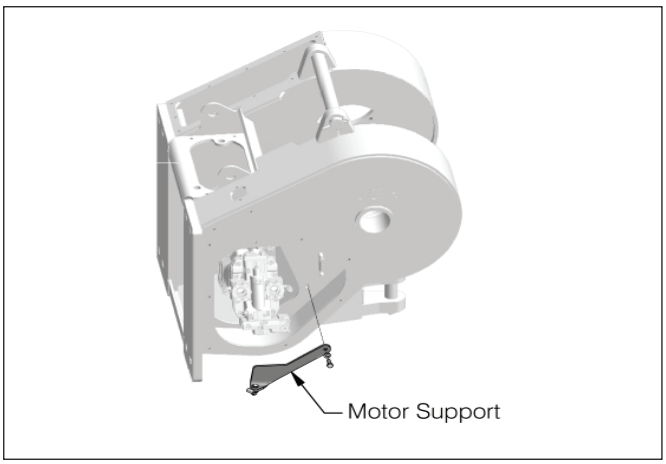
15.3 Torque 3/4" hardware to 280 ft-lbs (380 N-m). Torque M12 hardware to 66 ft-lbs (90 N-m).



16. Install the hydraulic motor. Torque capscrews to 280 ft-lbs (380 N-m).



17. Install the motor support in frame.



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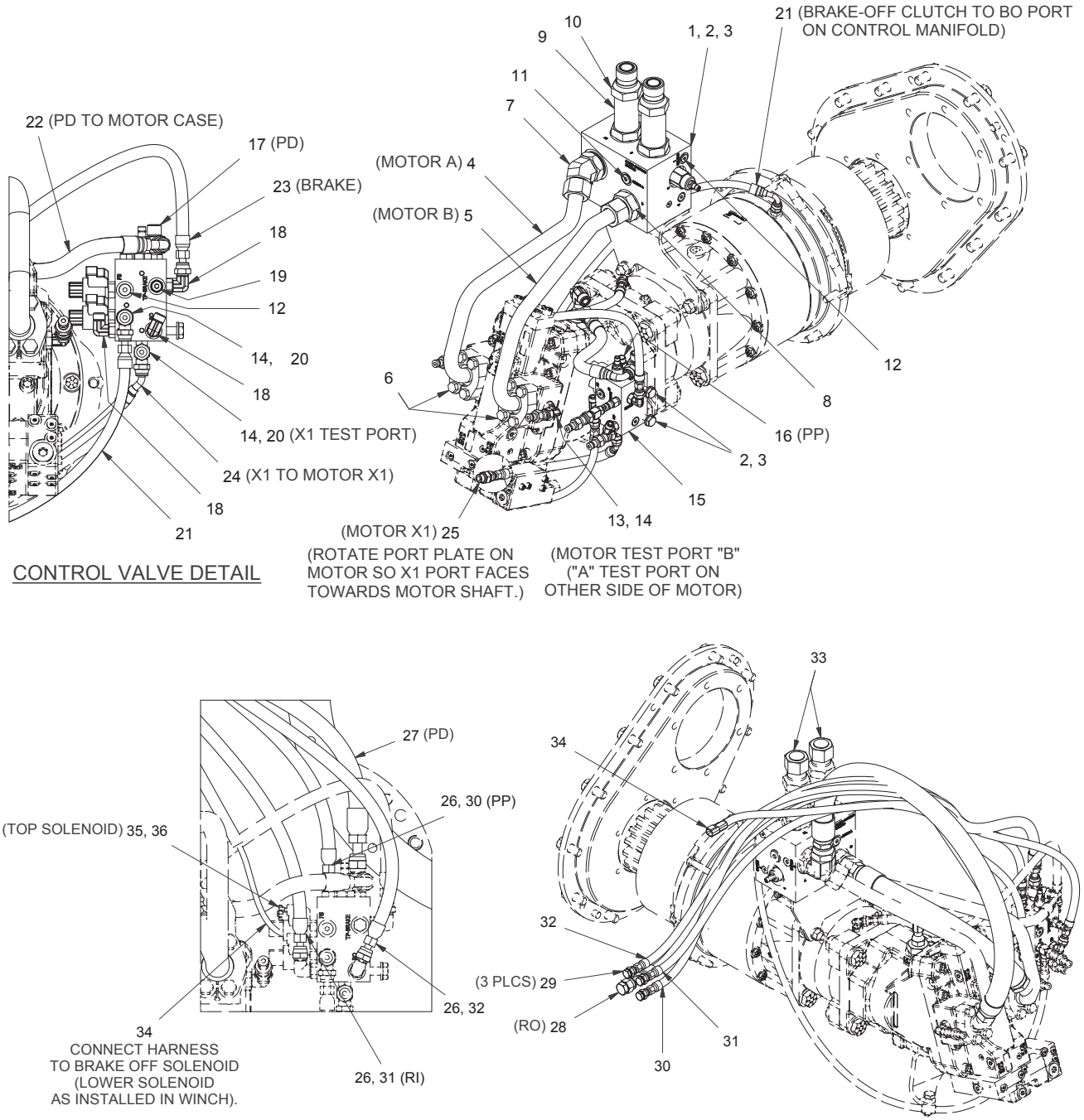
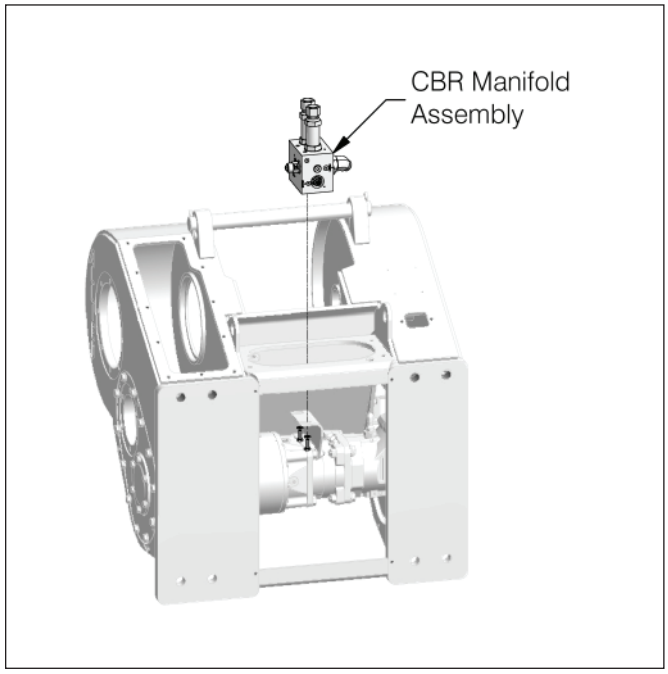
Hydraulic System Assembly



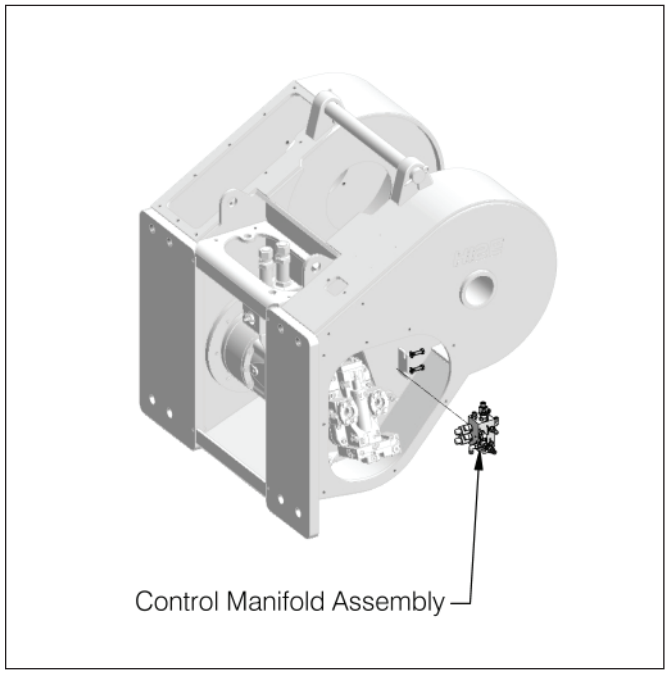
1.	Assembly, CBR Manifold	10.	Fitting	19.	Coupler, Q.D. Male	28.	Fitting
2.	Capscrew	11.	Fitting	20.	Fitting	29.	Fitting
3.	Washer	12.	Fitting	21.	Hose Assembly	30.	Cable Tie (Green)
4.	Assembly, Tube Motor A	13.	Fitting	22.	Hose Assembly	31.	Cable Tie (Yellow)
5.	Assembly, Tube Motor B	14.	Coupler, Quick Male	23.	Hose Assembly	32.	Cable Tie (Orange)
6.	Kit, Split Flange	15.	Assembly, Control Manifold	24.	Hose Assembly	33.	Fitting
7.	Fitting	16.	Fitting	25.	Fitting	34.	Harness, Winch Wire
8.	Fitting	17.	Fitting	26.	Hose Assembly	35.	Pin, Sealing
9.	Fitting	18.	Fitting	27.	Hose Assembly	36.	Plug

Figure 4-11 Hydraulic System Components (Option Code B Shown)

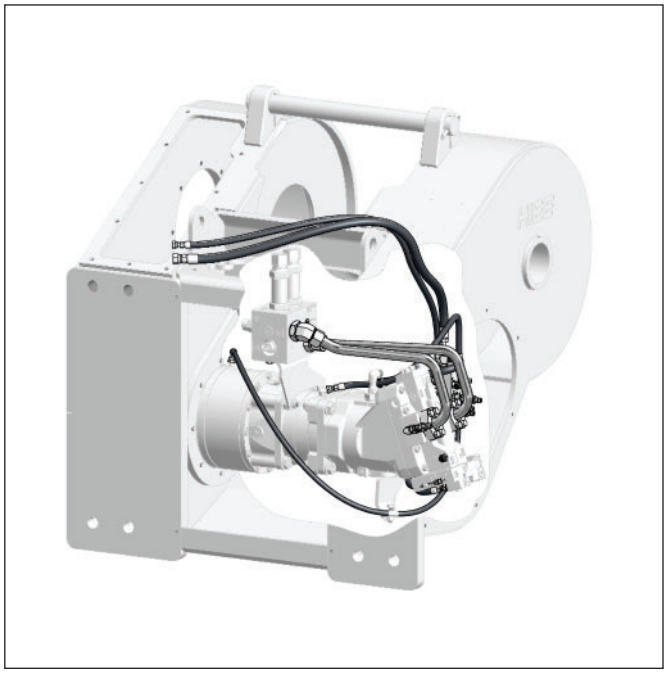
1. Install the counterbalance relief (CBR) manifold on the mounting bracket. Leave mounting bolts loose.



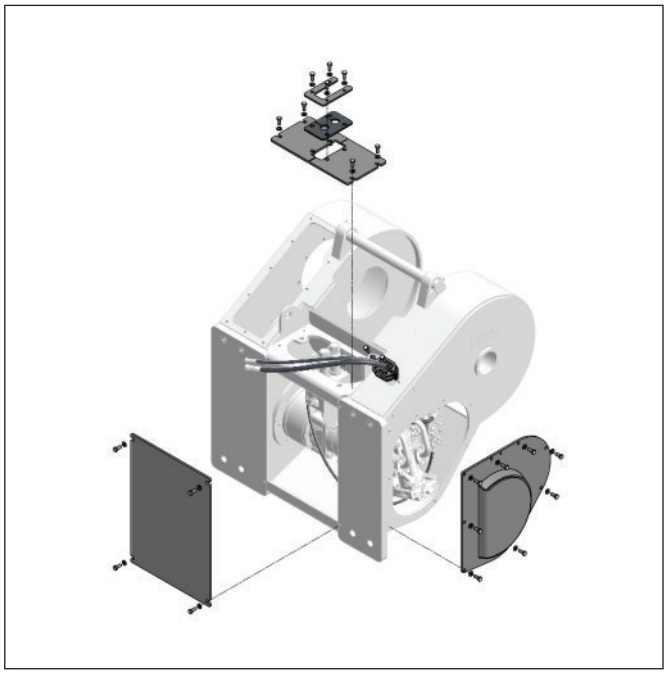
2. Install the control manifold. Torque capscrews to 28 ft-lbs (38 N-m).



3. Reinstall hose and tube assemblies. Alternately tighten connections to prevent placing motor tubes in a bind. Adjust mounting bracket as necessary to align with manifold.

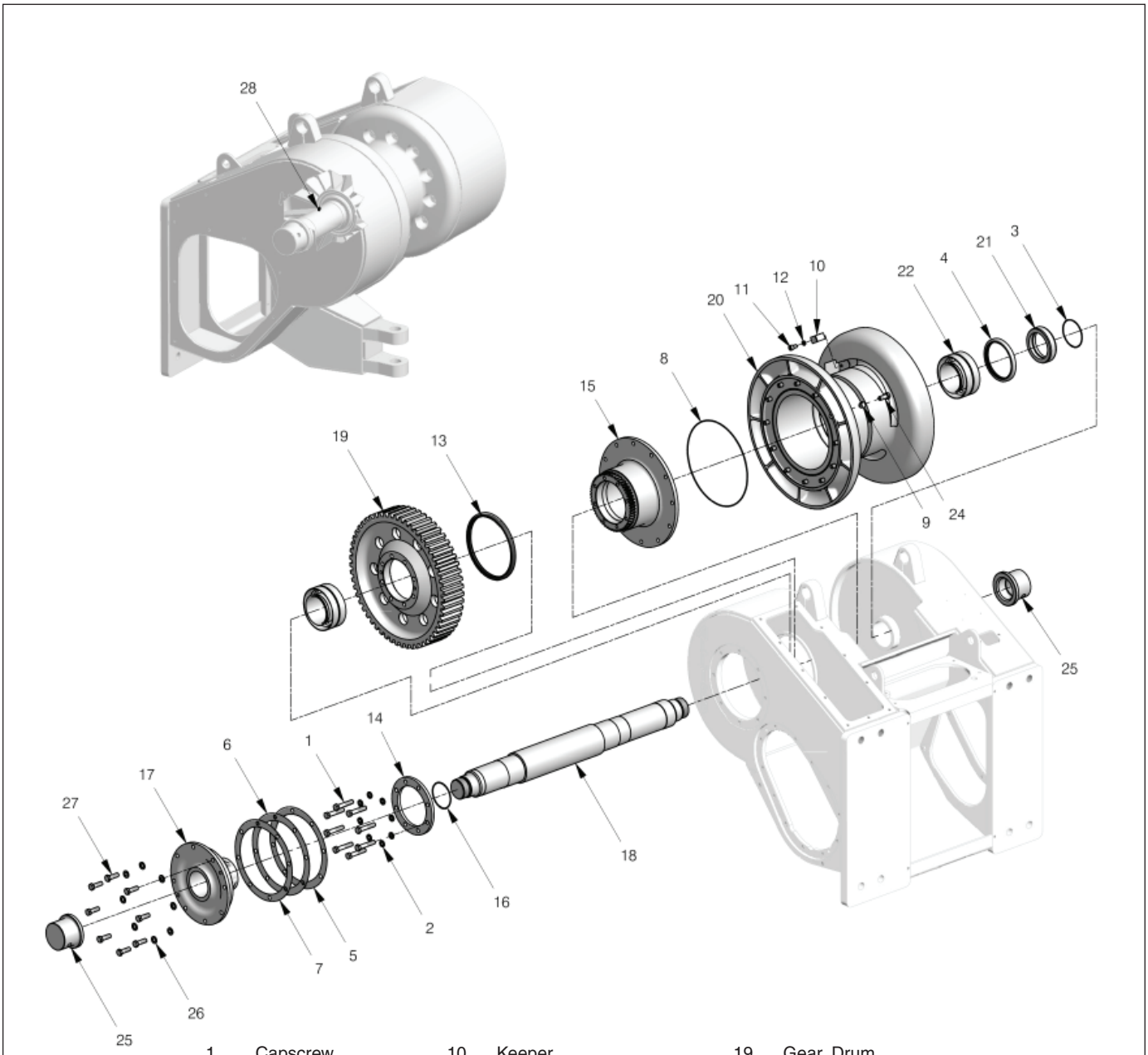


4. Reinstall covers as shown. Torque M12 hardware to 66 ft-lbs (90 N-m). Torque M16 hardware to 165 ft-lbs (225 N-m).



Drum and Drum Shaft Installation

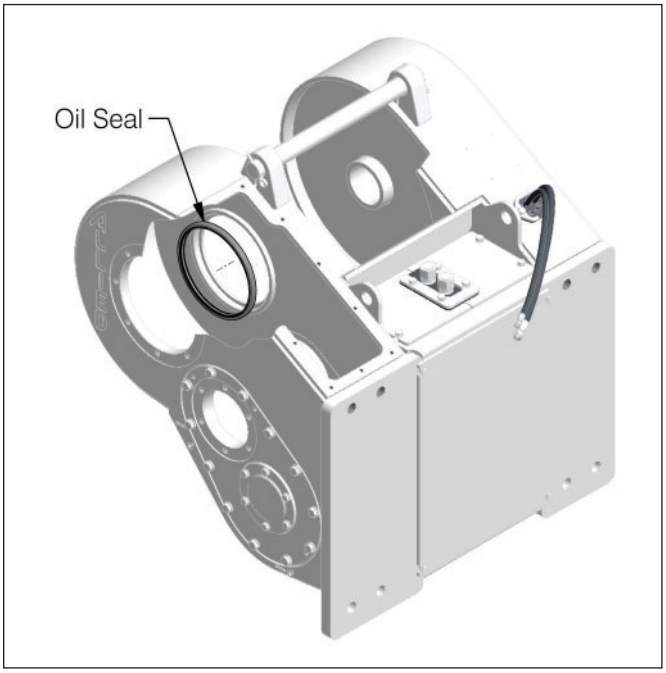
If the drum gear was removed, it must be installed prior to installation of the intermediate shaft and motor shaft assembly.



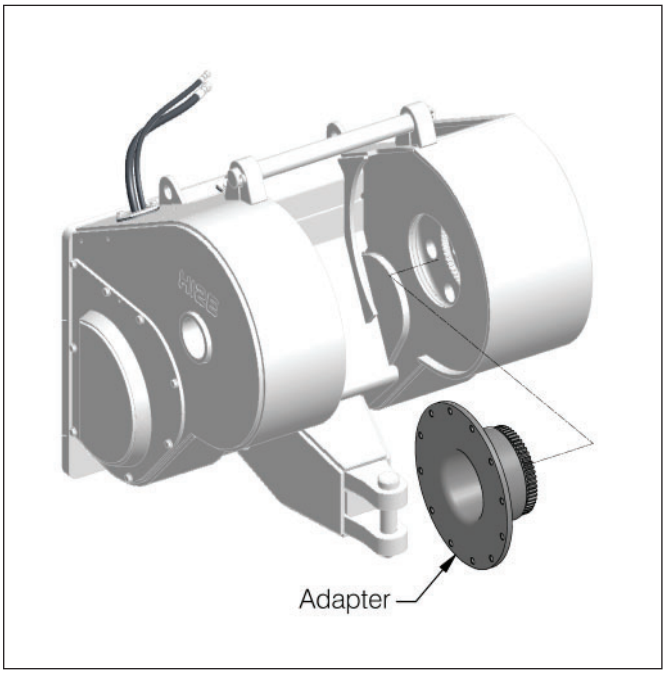
1.	Capscrew	10.	Keeper	19.	Gear, Drum
2.	Washer	11.	Capscrew	20.	Drum
3.	O-Ring	12.	Washer	21.	Spacer
4.	Seal, Oil	13.	Seal, Oil	22.	Bearing, Roller
5.	Shim .005	14.	Retainer, Ring	24.	Capscrew
6.	Shim .007	15.	Adapter	25.	Nut, Blind
7.	Shim .020	16.	O-Ring	26.	Washer
8.	O-Ring	17.	Retainer, Drum Shaft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

Figure 4-12 Drum and Drum Shaft Components

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

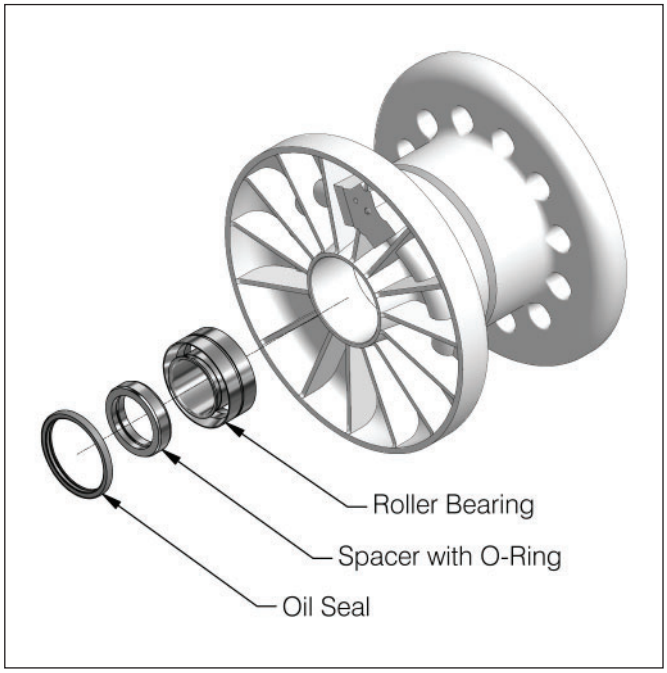


2. Install drum adapter by pushing it through the double-lip seal.



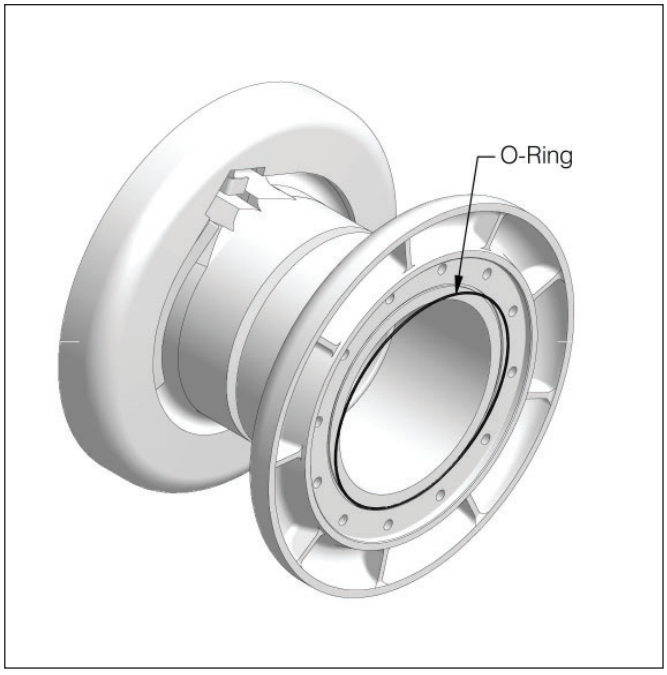
NOTE: To prevent drum adapter from falling out, insert eyebolt in one of the threaded holes, then slip metal bar through eyebolt.

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

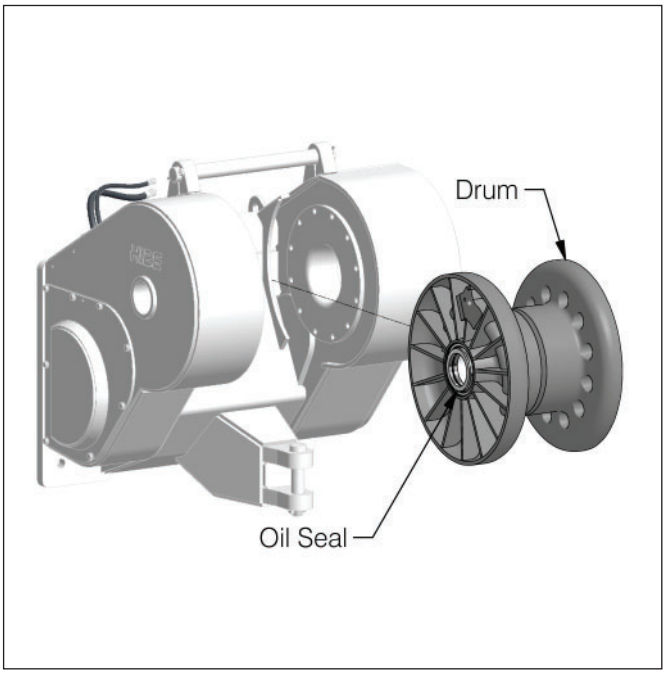


NOTE: Smooth side of seal must face outboard.

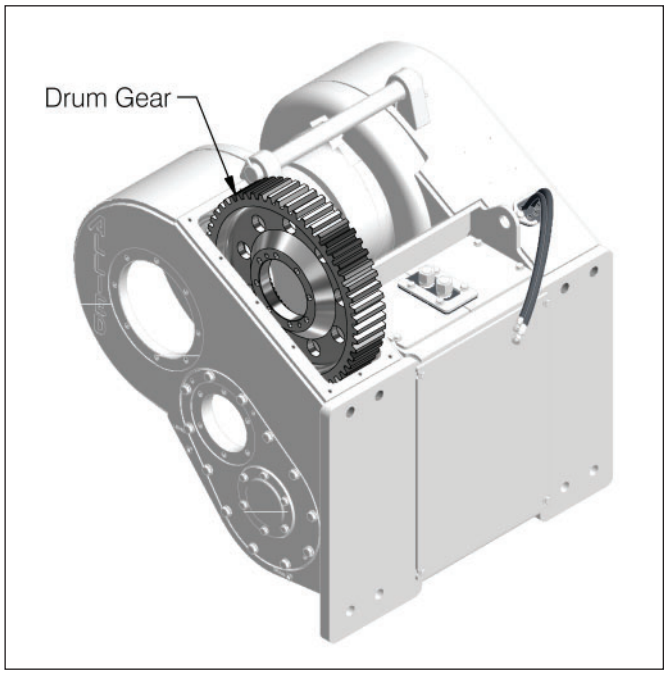
4. Lubricate right-hand drum bore. Coat right-hand seal ring and groove with O-ring lube. Install new O-ring.



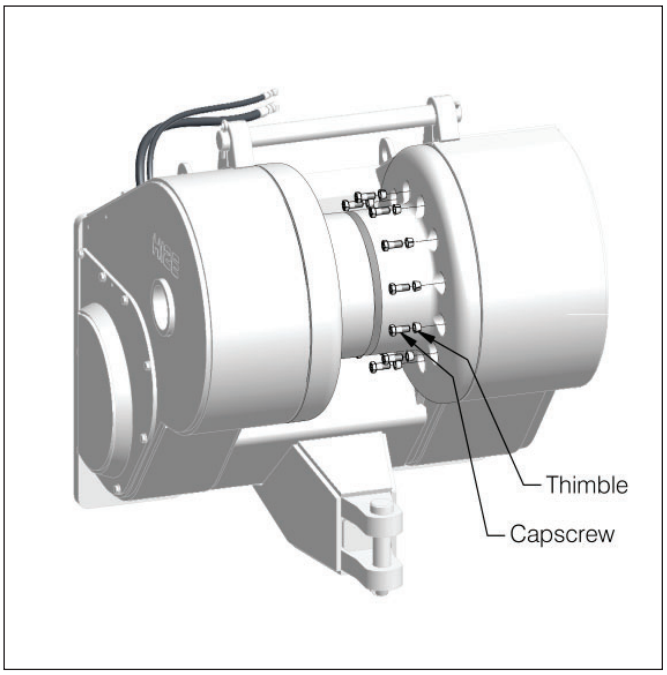
5. Move the drum into position while being careful not to move the oil seal or O-ring.



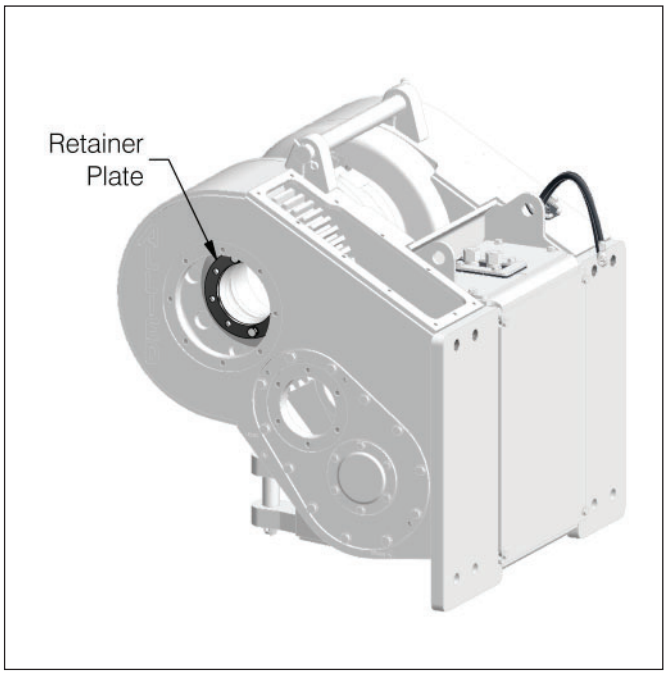
7. Install drum gear.



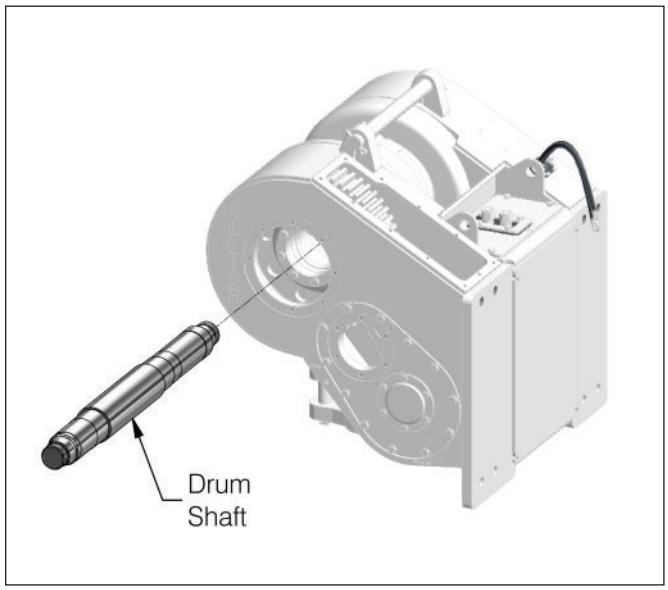
6. Align adapter and drum holes, then install the thimbles and screws. Tighten progressively and evenly to ensure uniform compression of O-ring. Do not tighten to final torque until step 16.



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.



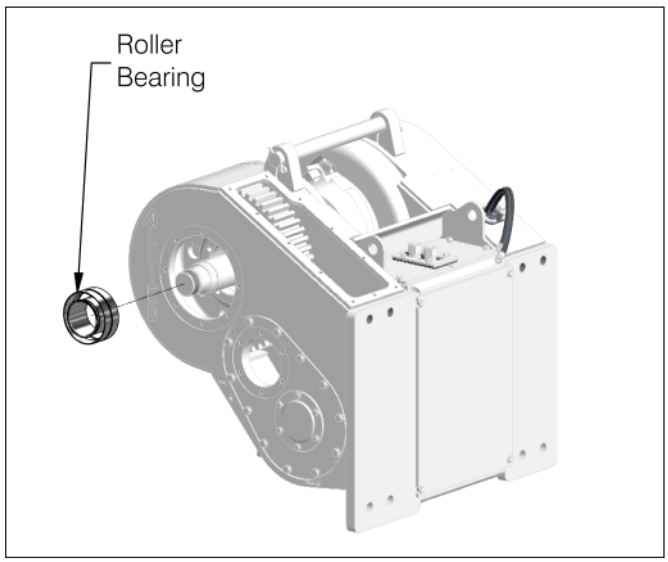
9. Make sure that double-tapered roller bearing, seal and spacer are properly seated in the left-hand side of the drum. Then install the shaft until it bottoms solidly against the left-hand tapered roller bearing. Tighten left hand nut.



NOTICE

Do not hammer on drum shaft surface.

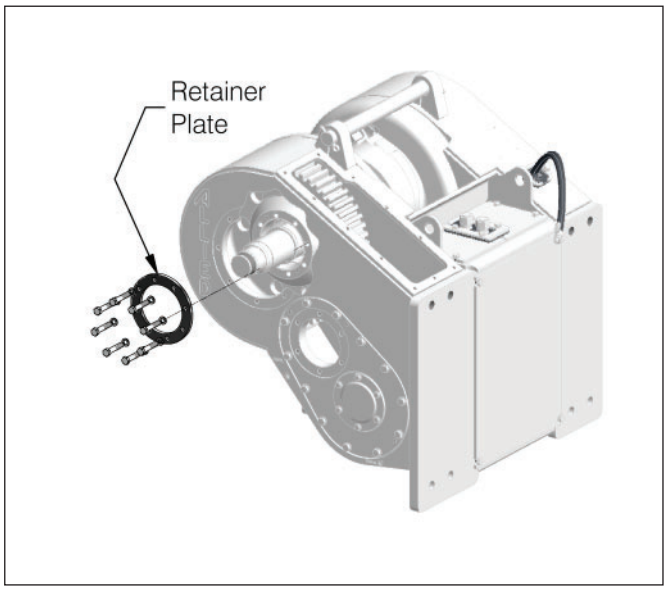
10. Remove the retainer plate and install the bearing assembly. Lubricate the left-hand drum bore with Lubriplate or other light lube grease, then install double tapered roller bearing assembly.



⚠ WARNING

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

11. Reinstall retainer plate using the eight special capscrews. Tighten capscrews to 180 ft-lbs (244 N-m).



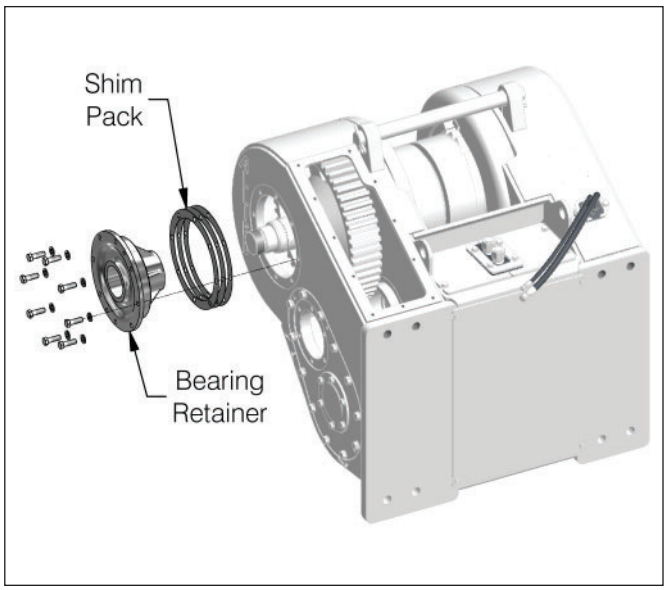
NOTE: Capscrews cannot be installed unless drum gear and drum adapter have been aligned as indicated in Step 8.

12. Set bearing 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 12). If intermediate shaft assembly not installed, install before retainer.

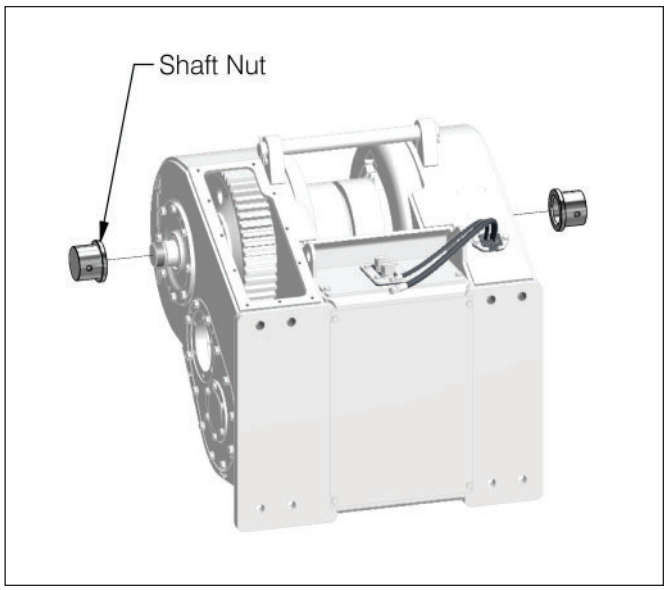
(continued on next page)

14. Secure retainer with capscrews and lockwashers. Tighten capscrews to 165 ft-lbs (225 N-m).



15. Coat shaft nut threads with anti-seize. Apply RTV sealant (e.g., Loctite 593 RTV) 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 180 ft-lbs (244 N-m) torque.



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Intermediate Shaft Installation

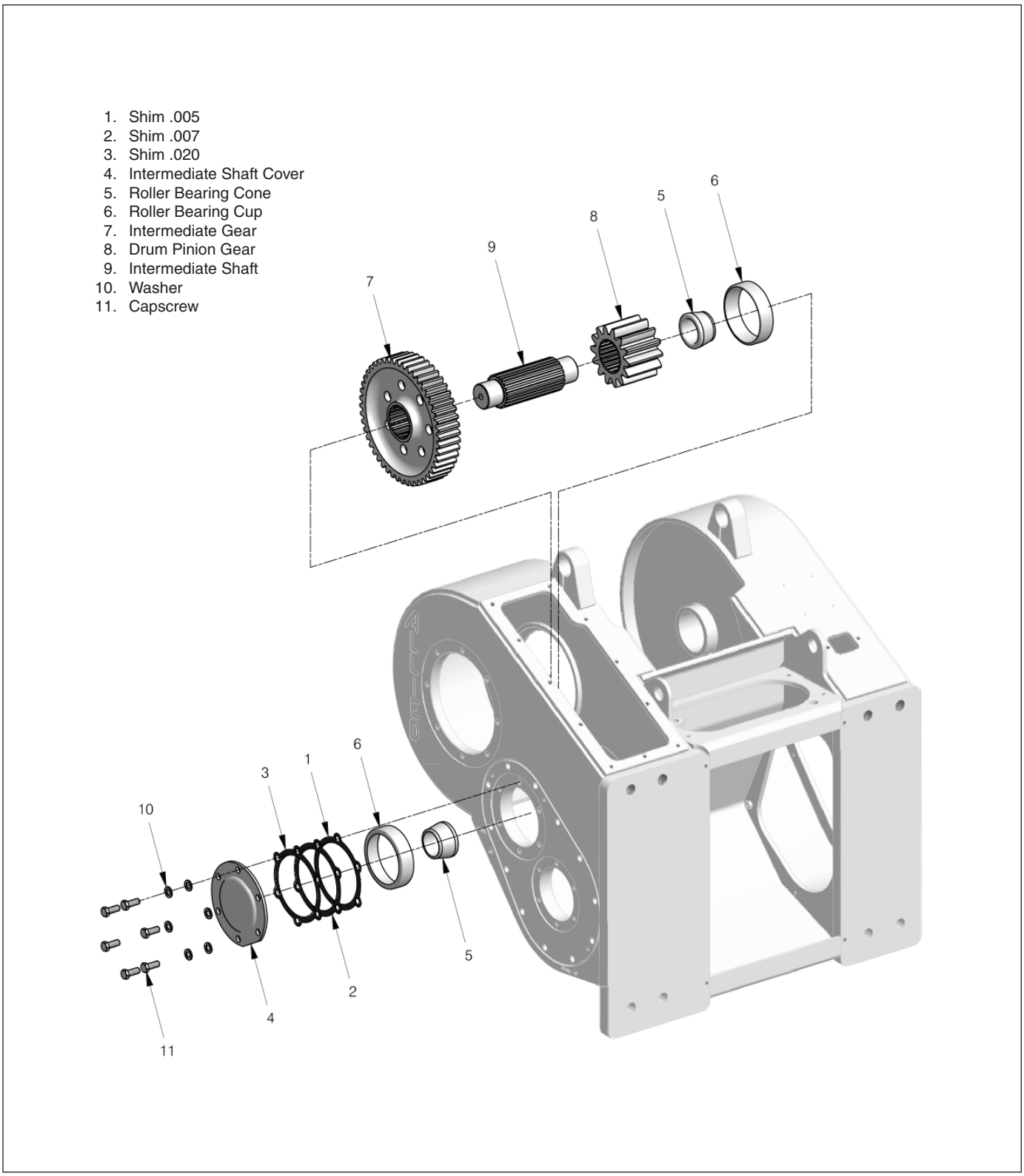
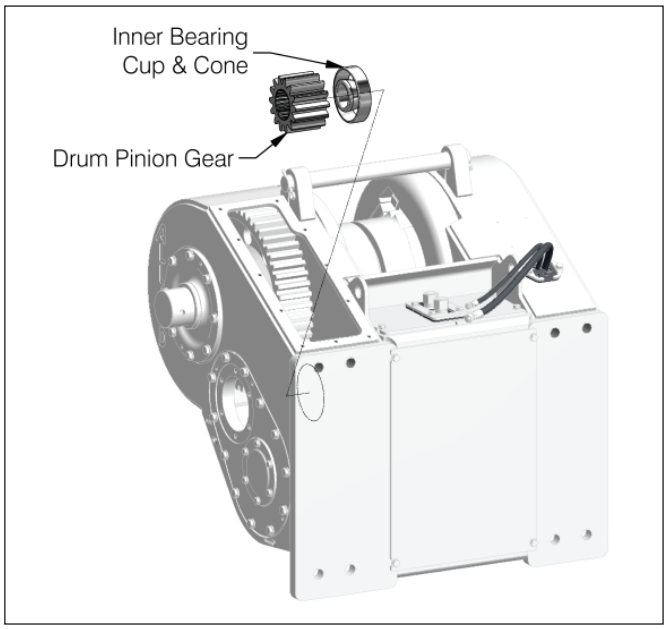
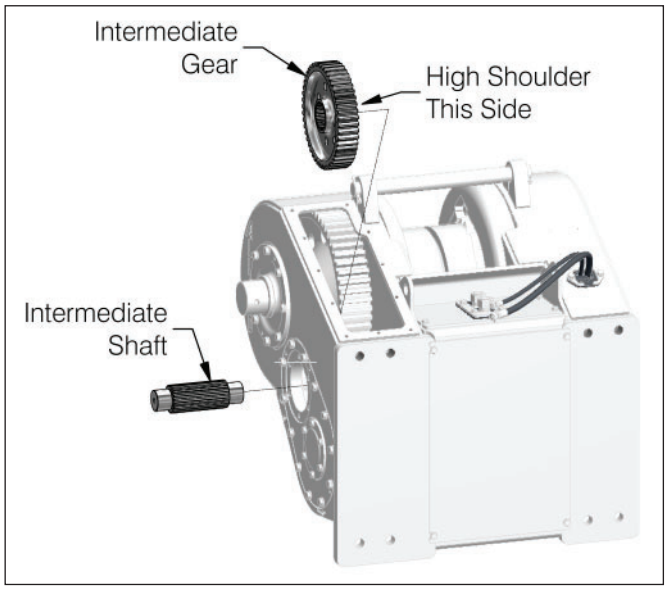


Figure 4-13 Location of Intermediate Shaft Components

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.

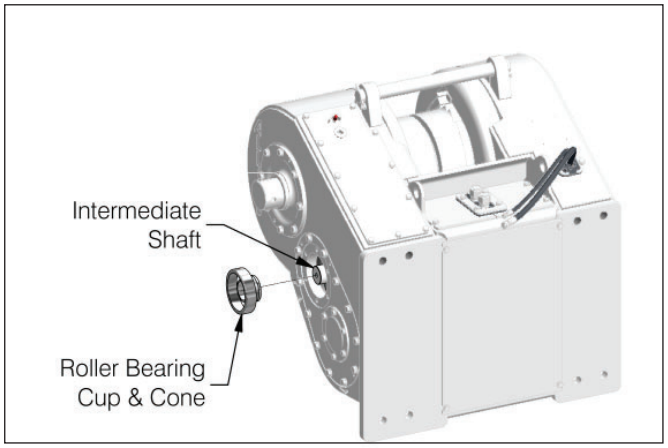


2. Position intermediate gear in housing, and then install intermediate shaft.

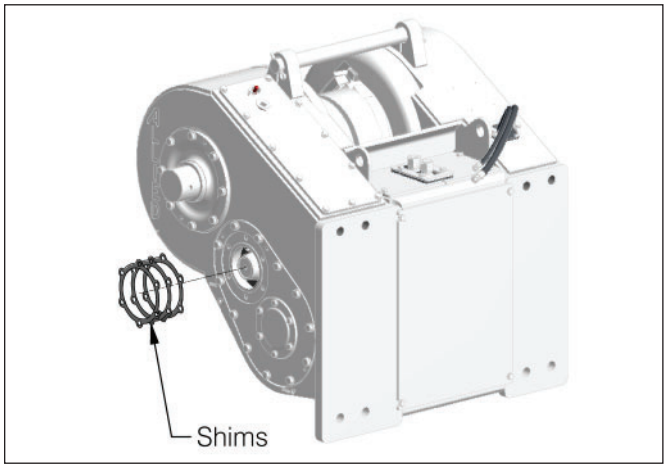


NOTE: Install intermediate gear with high shoulder as shown above.

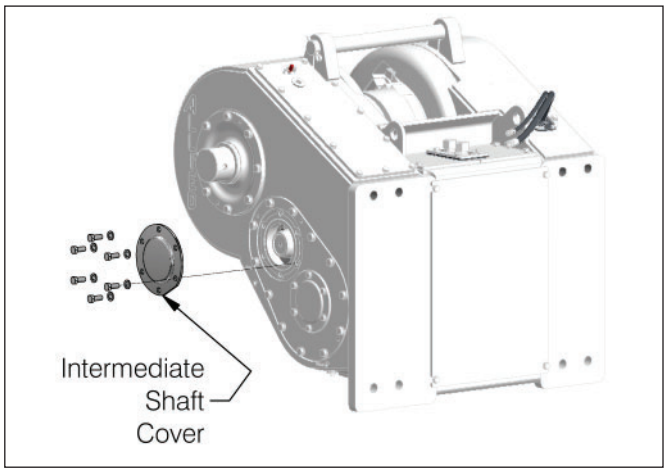
3. Install the outer bearing cup and cone. Make sure that the cup is firmly seated against the bearing cone.



4. Apply 1/8" bead of RTV sealant (e.g., Loctite 593 RTV) to the winch frame. Install shim pack (if necessary).



5. Apply 1/8" bead of RTV sealant (e.g., Loctite 593 RTV) to the intermediate shaft cover. Install intermediate shaft cover, then tighten the six capscrews to 165 ft-lbs (225 N-m).



Notes

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