Service Manual

Allied® WINCH

H6H

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

P/N 599040W Printed in U.S.A. 12/01/2022

Safety Precautions

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

Winch serial number _____

Date put into service _____

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

Safety Summary

General Safety Notices

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

NOTE: …

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

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

Safety Regulations

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

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

Operation, Inspection, and Maintenance Warnings

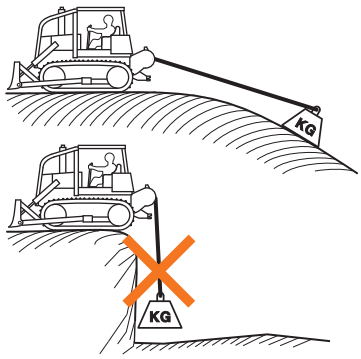
⚠ WARNING

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

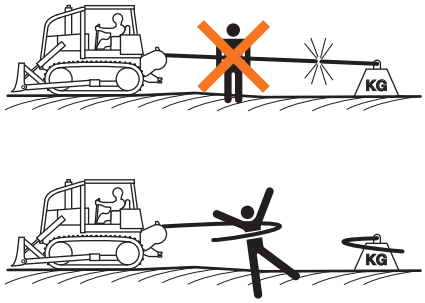
- Do not operate the winch unless your are authorized and trained to do so.
- Do not operate the winch unless the vehicle is equipped with a screen to protect the operator if the wire rope breaks.
- Read, understand, and follow the operating, inspection, and maintenance instructions in this manual.
- Do not use the control levers for hand holds when entering or leaving the vehicle.
- Do not permit other people near the control area when you inspect or repair a machine.
- Never inspect, repair, or perform maintenance on a machine that is in motion.
- Inspect the winch before each use:
  - » Make sure that the controls and instruments operate correctly.
  - » Report the need for repairs immediately.
  - » Do not work with a damaged or worn wire rope.
  - » Do not use a winch that needs repairs.

» If the wire rope and ferrule must be removed from the drum, make sure the end of the wire rope and ferrule are controlled when the ferrule is released. The end of the wire rope can suddenly move from the drum like a compressed spring when the ferrule is released, and cause an injury.

- Stay in the operator's seat when operating the winch.
- Do not stand on the vehicle when operating the winch.
- Avoid winch operation near people or other machines.
- Never stand nor permit others to stand in the bight (loop) of a wire rope.
- Do not stand nor permit others to be near the winch or wire rope when there is tension on the wire rope.
- Observe jobsite rules.
- Be in complete control at all times.
- Do not use the control levers as hangers for clothes, water bags, grease guns, lunch pails, etc.
- Do not leave the vehicle when the winch wire rope is under tension.
- Do not permit riders on the vehicle or load.
- Do not use the winch as an anchor for a double or two-part line.
- Do not pull the hook through the throat or over the drum, which will cause damage.
- When the winch is not in use, make sure the control lever is in **BRAKE-ON** position and the winch brake is applied.
- Do not use winch as a hoist. Tractor and skidder mounted winches are designed for towing.



- Always inspect wire rope, tail chain and other rigging components for wear, damage, broken strands or abuse before use.
- Never use wire rope, tail chain or other rigging that is worn-out, damaged or abused.
- Never overload wire rope, tail chain or rigging.
- Wire rope and tail chain will fail if worn-out, overloaded, misused, damaged, improperly maintained or abused. Wire rope or tail chain failure may cause serious injury or death!



- Do not terminate wire rope to tail chain by the use of a knot.
- Do not handle wire rope if the hook end is not free. A load could break away, suddenly tensioning the wire rope, resulting in serious injury or death.
- Stay clear of wire rope entry areas (fairlead or arch rollers, winch drum etc).

- Make sure ground personnel are in plain view of the operator, and at a distance of at least 1½ times the working length of the wire rope.
- Make sure that any hand signals used by ground personnel are clearly defined and understood by everyone involved.
- Do not attempt to "jerk" or "shock" a load free. Doing so can cause loads in excess of the rated capacity of the wire rope, winch, or mounting hardware.
- Replace any parts only with genuine Allied Winch parts. Refer to Parts Manual 599039W.
- Maintain **a minimum of three (3) complete wraps of wire rope** on the drum for normal operation. It may help to paint the last five wraps of wire rope a contrasting color, to serve as a visual indicator.
- Do not handle wire rope with bare hands. Wear leather gloves at all times.
- Align the tractor with the load to prevent side loading the winch, and to maintain even spooling of the wire rope.
- If applying tension to the wire rope manually during spooling:
  - » ensure that the operator is winching in slowly,
  - » keep your hands and clothing well clear of any rollers or the winch drum,
  - » do not maintain tension by letting the wire rope to slip through your hands,
  - » use a hand-over-hand technique to maintain tension.
- Be aware of the ground conditions, and make sure the ground and tractor are stable enough to pull the intended load.
- Do not attempt to pull loads in excess of the rated capacity of the winch.
- Keep yourself informed of any applicable codes, regulations and standards for the job.
- Your winch may have temperature shut-off system for protection of tractor and winch. Manual override of high temperature shut-off will cause damage to tractor and winch.
- This winch is neither intended, designed, nor rated for any application involved in the lifting or moving of personnel.
- Use only the lubricants listed in the Recommended Oil List. See page 1-4.
- Do not weld on any part of the winch. Contact Allied Systems if weld repairs are needed.
- The hydraulic system must be kept clean and free of contamination at all times.
- Be aware of the hazards of pressurized hydraulics:
  - » Wear personal protective equipment, such as gloves and safety glasses, whenever servicing or checking a hydraulic system.
  - » Assume that all hydraulic hoses and components are pressurized. Relieve all hydraulic pressure before disconnecting any hydraulic line.
  - » Never try to stop or check for a hydraulic leak with any part of your body; use a piece of cardboard to check for hydraulic leaks.
  - » Small hydraulic hose leaks are extremely dangerous, and can inject hydraulic oil under the skin, even through gloves.
  - » Infection and gangrene are possible when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.

Ordering Parts:

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

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

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

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

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

Contents

Contents

Notes

General

Introduction

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

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

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

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

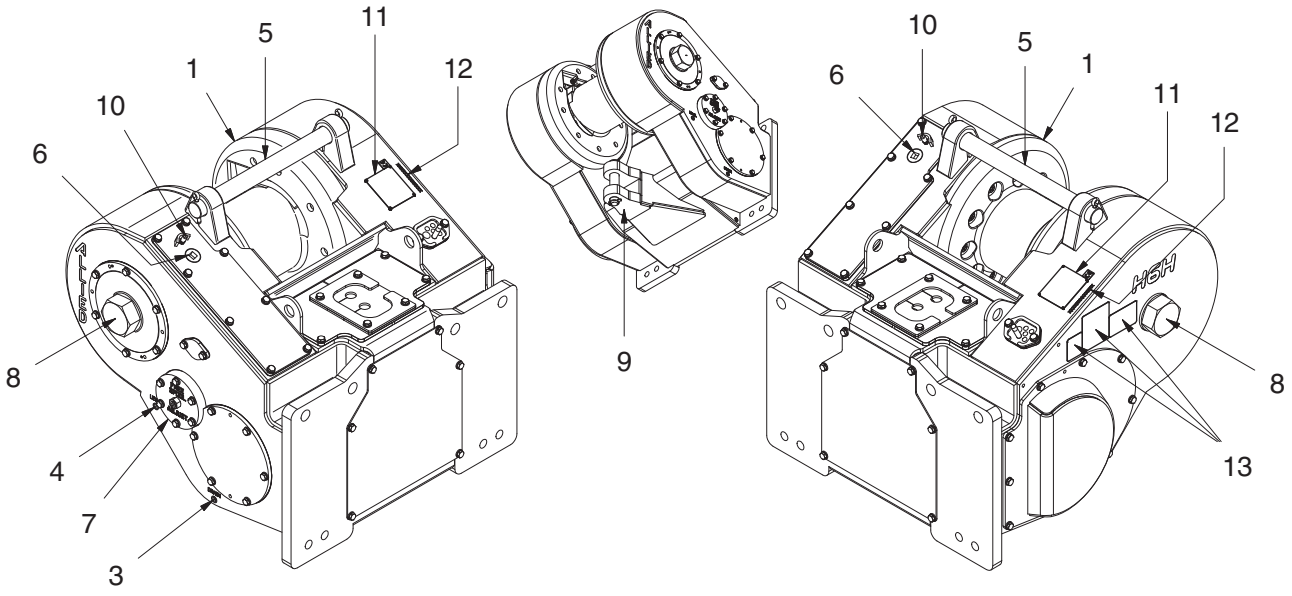
Section 4. Repairs describes the removal, disassembly, assembly, and installation of the winch.

Description

The H6H Winch is a Power Forward (**LINE-IN**) and Power Reverse (**LINE-OUT**) winch. The winch is powered by an internal hydraulic motor connected to the dozer 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 dozer mounted auxiliary pump circuit and utilizes oil, filtration and cooling provided by the dozer circuit. Flow to the winch is controlled by a control lever and electrical switches located at the dozer's control station.

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

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



1. Drum
2. Access Cover for Motor and Winch Hydraulics
3. Plug to Drain Oil
4. Plug to Check Oil Level
5. Tie Rod
6. Fill Plug
7. Bearing Retainer for Intermediate Shaft & Freespool Drag
8. Drum Shaft
9. Drawbar
10. Breather
11. Nameplate
12. Serial Number Stamp
13. Warning/Maintenance/Load & Wire Rope Safety Decals

Figure 1-1 H6H Winch

Unit Identification

Allied Winch S/N Nameplate Data For Tractor Mountings

H6H H 1 B 1001 K49

Winch Model
H6H = Standard
KH6H[3] = Special Design (Contact Factory)

Hydraulic Operation Type
H = High-Performance Hydrostatic or Hydraulic 2 Speed
T = Standard, Tractor Controls & Pump

Gear Ratio (Code #)
1 = 153:1
2 = 117:1
3 = 70:1
4 = 81:1
5 = 143:1
6 = 187:1
7 = 195:1
8 = 149:1

Vehicle Code
See Figure 1-3

Sequence Number

Internal Options
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.
2. Circled numbers in Figure 1 indicate possible gear ratios.
3. If your serial number begins with the letter "K", contact the factory for parts and service information.
4. If your serial number ends in the letter "M", contact the factory for parts and service information.

INTERNAL OPTION	FREESPOOL	BRAKE-OFF	OVERWIND	2-SPEED CONTROL	HI-SPEED DEFAULT
B	X	X	X		X
D	X	X	X	X	
E	X		X		
U	X	X			
BN		X	X		X
DN		X	X	X	
EN			X		
DE	X		X	X	
DU	X	X		X	
DL	X	X	X	X	X

Figure 1-2 Internal Winch Options

VEHICLE CODE	BRAND	MODEL	AVAILABLE GEAR RATIOS
C71	CATERPILLAR	DR Series II, III, D6T	⑥
C712		D6/D6XE BUILD 20A	⑥⑦
C805		D6K2 T4f	②③
C81		D6N	①
C811		D6N[1]	①⑧
C812		D5 BUILD 17 A/B	①
C963		963D Track Loader	①
E460	JOHN DEERE	750/850J & 750/850K	①
E465		750/850K with E/H Controls	①⑧
E466		750L w/Hi-Flow Pump	①⑥⑦⑧
E47		750/850J	①③
E470		850L	①⑦⑧
H39	DRESSTA	TD14/15/16S	①
K46	KOMATSU	D65-15	⑥
K471		D61-23, D61-24	②④⑧
K49		D65-16, D65-17 & D65-18	①⑥⑦
K71		D71-24	①⑦⑧
L39	LIEBHERR	PR716	⑤
L41		PR724	⑤⑥
L410		PR726	①
L42		PR734, PR736	①
L421		PR734, PR736	①
L44		PR734-4	⑥
P81	SEM	816/822	⑥⑦
R391	CASE	Steiger	⑥
R40		1650L	①
R42		1650M/2050M	①⑤⑧
U47	SHANTUI	DH17	⑥
Y44	TIGERCAT	635D	②

[1] Tractor serial numbers with prefixes GHS, MLW & LJR use vehicle code C811.

Figure 1-3 Dozer or Skidder Vehicle Codes and Available Gear Ratios

Serial Number Codes

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

Nameplate

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

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

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

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

Figure 1-4 Nameplate

Specifications

Drum Wire Rope Capacities (Drum: 10 Inch Diameter)

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

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

Figure 1-5 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 dozer implement hydraulic system. The winch gear case is filled with hydraulic transmission oil and is separate from the dozer 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. Never mix oil types. Thoroughly drain old oil before changing to a new oil.

Other hydraulic oils meeting this specification are:

ExxonMobil, **Mobiltrans HD-30**

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

Oil Capacity

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

Maintenance Decal

Hydraulic Winch Maintenance

Recommended Winch Service Intervals

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

Lube rollers and check oil level and filter light weekly.

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

* Inspect = disassemble and inspect for wear.

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

*** Follow tractor schedule if using tractor filter.

Recommended Gear Compartment Oil:

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

Allied WINCH

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

2310796 Rev D

Figure 1-7 Maintenance Decal

Torque Specifications

ITEM		TORQUE VALUES (Lubricated)		
		ft-lbs.	N-m	kg-m
Mounting Bracket	M24 x 3	700-735	949-997	97-102
	M33 x 3.5	1890-1980	2562-2685	261-274
Covers	M12 x 1.75	84-88	114-119	12
Drum Shaft Nut	2 1/2-16	400	542	55
Drum to Drum Adapter	5/8-18	220	298	30
Bearing Retainer Plate	1/2-20	108-113	146-153	15-16
Keeper	1/2-13	68-74	92-100	9-10
Motor Shaft Mounting	M12 x 1.75	84-88	114-119	12
Motor to Brake	3/4-10	340	461	47
Brake to Planetary Reducer	3/4-10	340	461	47
Planetary Reducer to Clutch Housing	3/8-16	40	54	6
Brake-Off Clutch Assembly (Clutch Plate)	M10 x 1.5	35-40	47-54	5-6

Figure 1-6 Torque Specifications

Gear Train (See Figure 1-9)

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

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

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

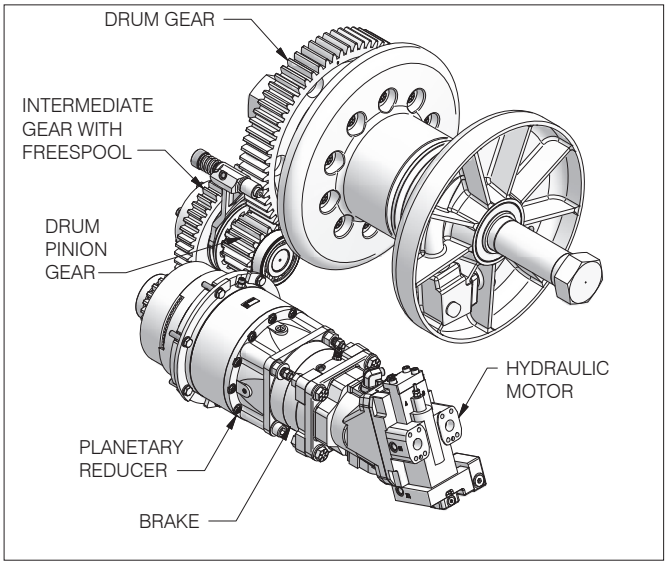


Figure 1-9 Gear Train

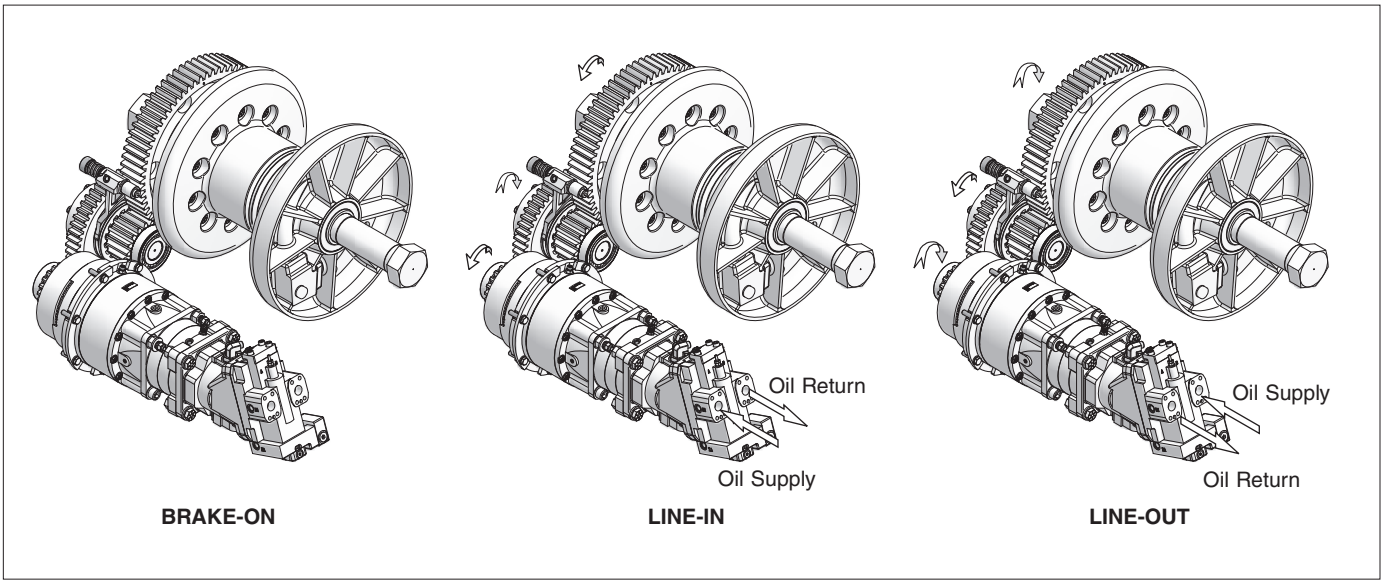


Figure 1-8 Rotation Torque Transfer

FREESPOOL Operation (See Figure 1-10 & Figure 1-11)

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

⚠ WARNING

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

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

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

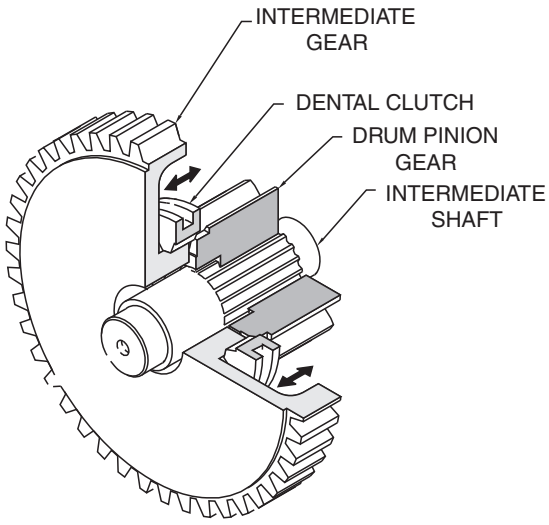
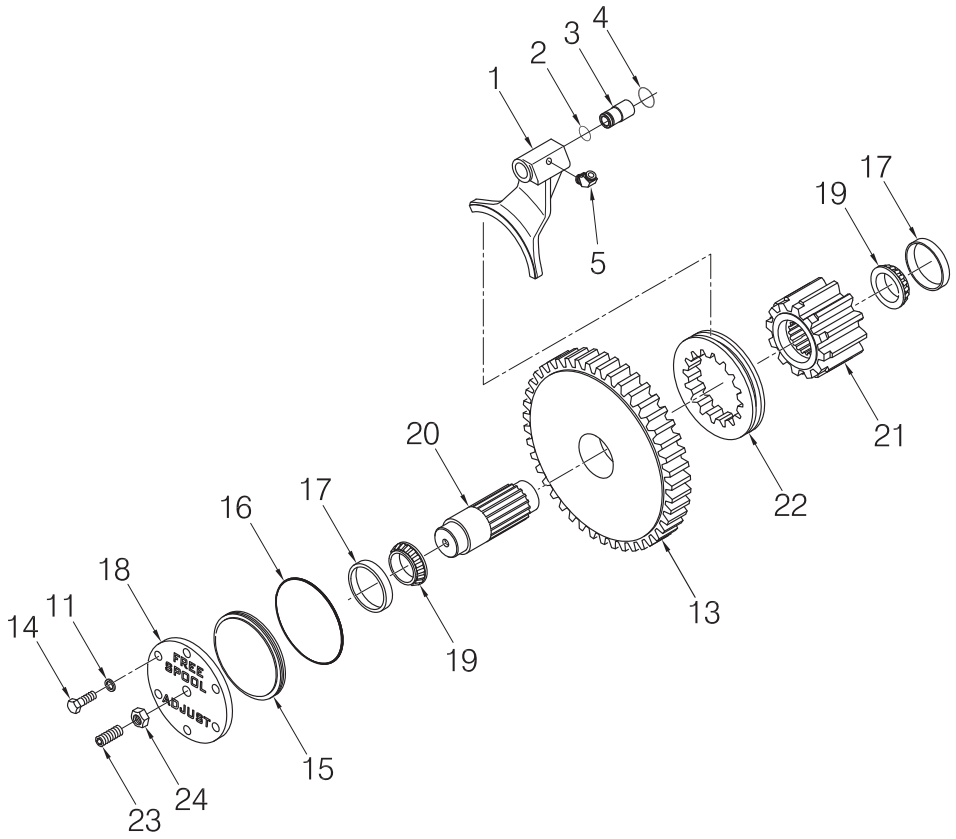


Figure 1-10 FREESPOOL Operation



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

Figure 1-11 FREESPOOL Arrangement

Operation & Control (See Figure 1-12)

The H6H winch is designed to operate on a load sense, pilot operated hydraulic system. When the dozer is running, the winch is ready to operate but no oil is flowing to the winch. Control (pilot) pressure is present at the winch.

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

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

The dozer must be running and the auxiliary hydraulic function switch, if equipped, must be on.

See Figure 1-12 for some examples of control levers and switches for the H6H. Your installation may vary.

Most installations have a single axis control lever; neutral position is **BRAKE-ON**, one direction is for **LINE-IN**, and the other is for **LINE-OUT**. See the decal next to your control lever for details. **BRAKE-OFF** and **FREESPOOL** are activated by rocker switches that incorporate a lock to prevent inadvertent actuation. The slide lock must be released before the switch can be turned on.

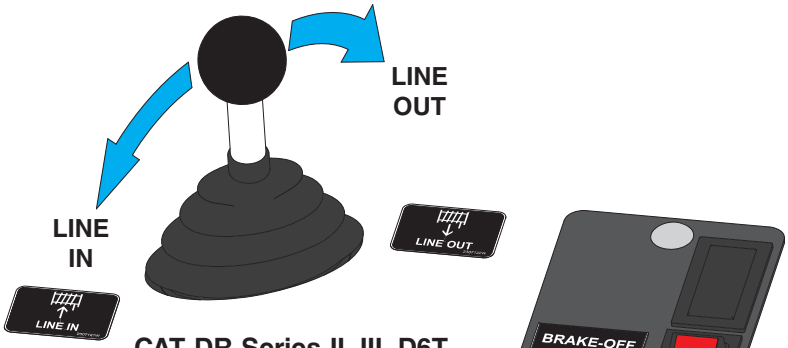
CAT DXE (C712) installations use a dual axis control lever; neutral position is **BRAKE-ON**, one axis is for **LINE-IN** and **LINE-OUT**. The other axis is for **BRAKE-OFF** and **FREESPOOL. HI-SPEED** is activated by pressing the button on the control lever. See the decal next to your control lever for details.

When the control lever is in the **BRAKE-ON** or centered position, the holding brake is automatically applied. Moving the control lever to the **LINE-OUT** position releases the brake, and reels the wire rope off the drum. Moving the control lever to the **LINE-IN** position releases the brake, and reels the wire rope onto the drum. 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.

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

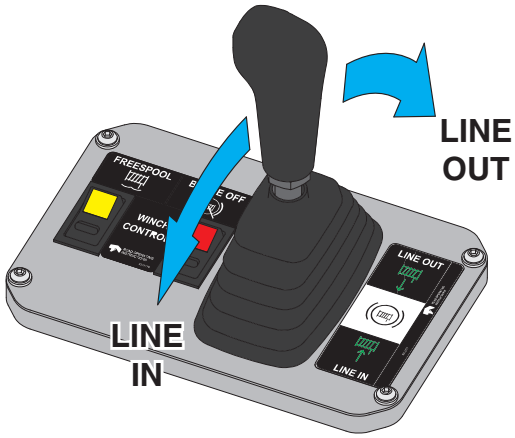
⚠ CAUTION

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

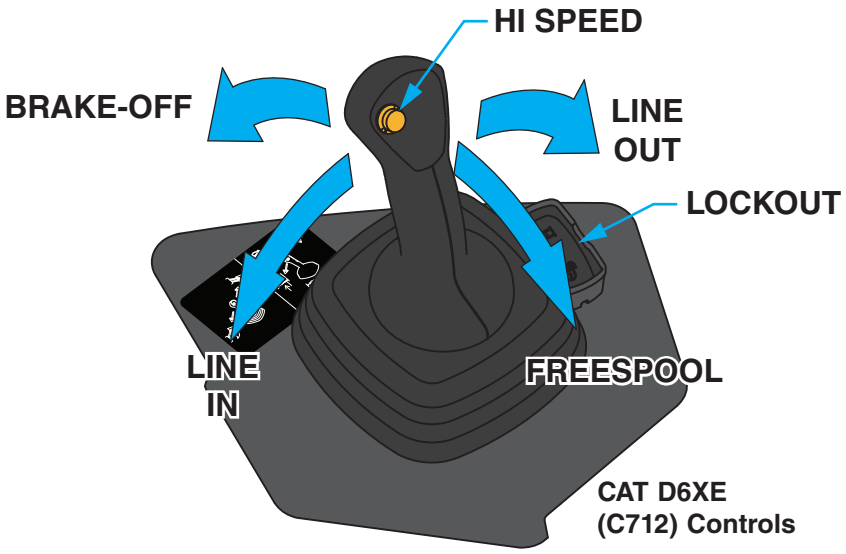


CAT DR Series II, III, D6T
(C71) Controls

Komatsu D61-23, D61-24
(K471) Controls



Komatsu D65-16, D65-17 & D65-18
(K49) Controls



CAT D6XE
(C712) Controls

Figure 1-12 Winch Controls Examples

Hydraulic System

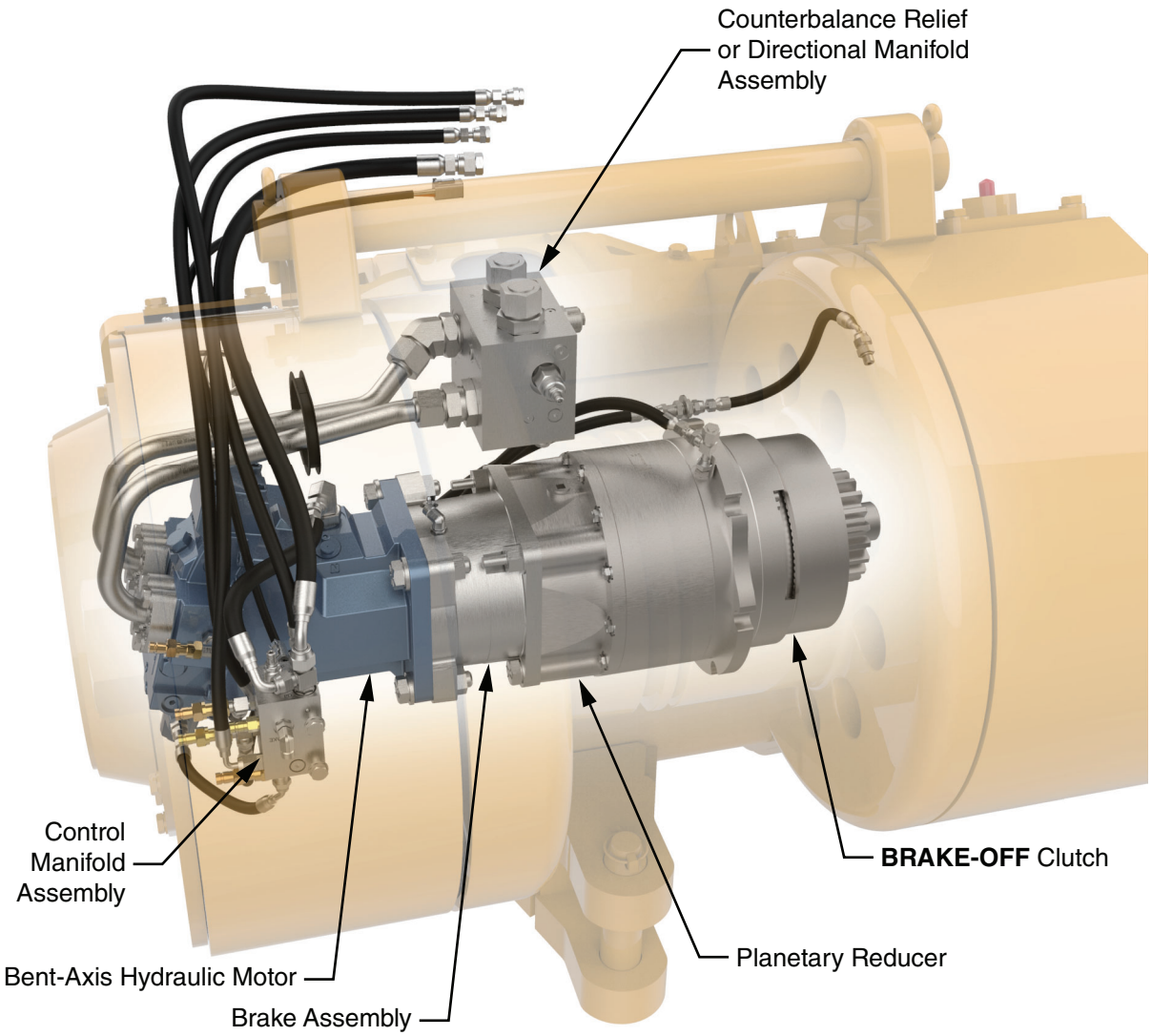


Figure 1-13 Major Components in Hydraulic System

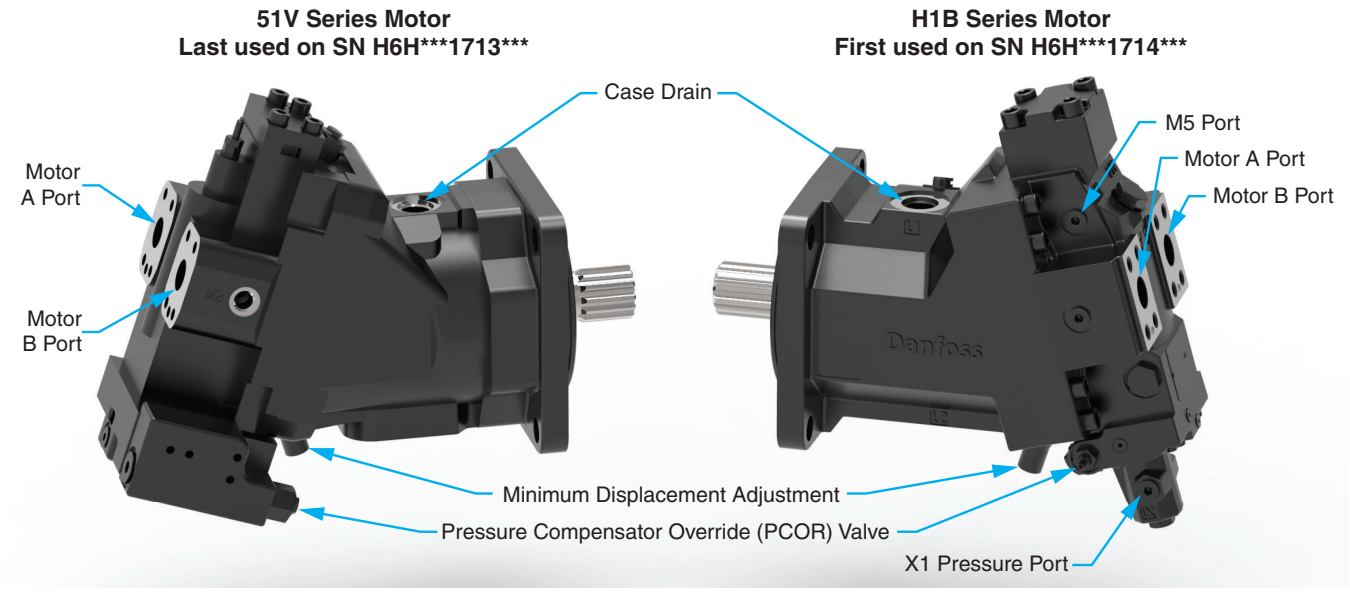


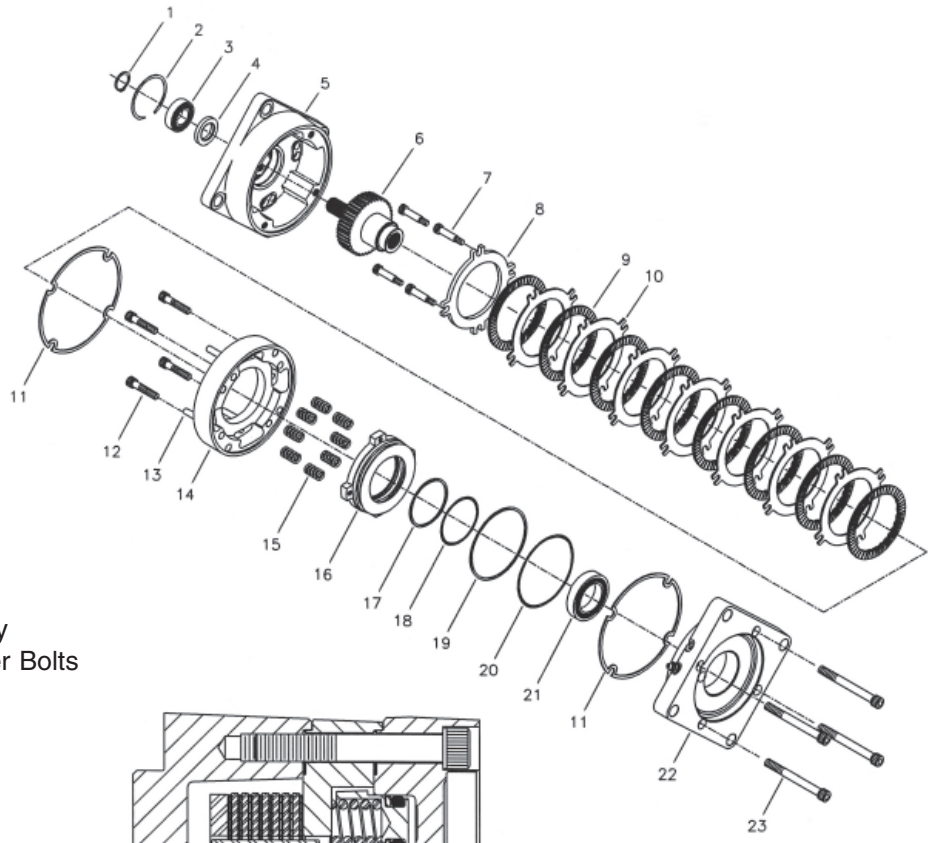
Figure 1-14 Bent Axis Variable Displacement Motor

Motor

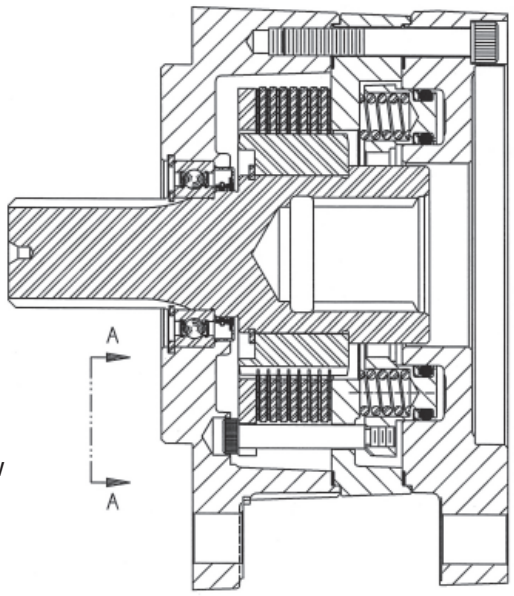
The hydraulic motor is a bent axis variable displacement motor. The default position of the motor is maximum displacement. Control pressure operates a servo that proportionally reduces motor displacement. At 261 psi control pressure, the motor begins to ramp to minimum displacement. At higher motor pressure,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

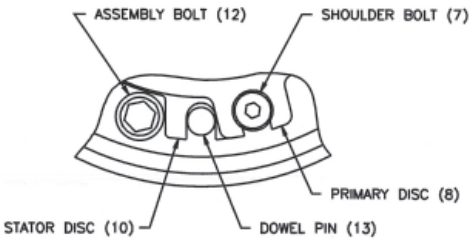
PCOR

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.



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



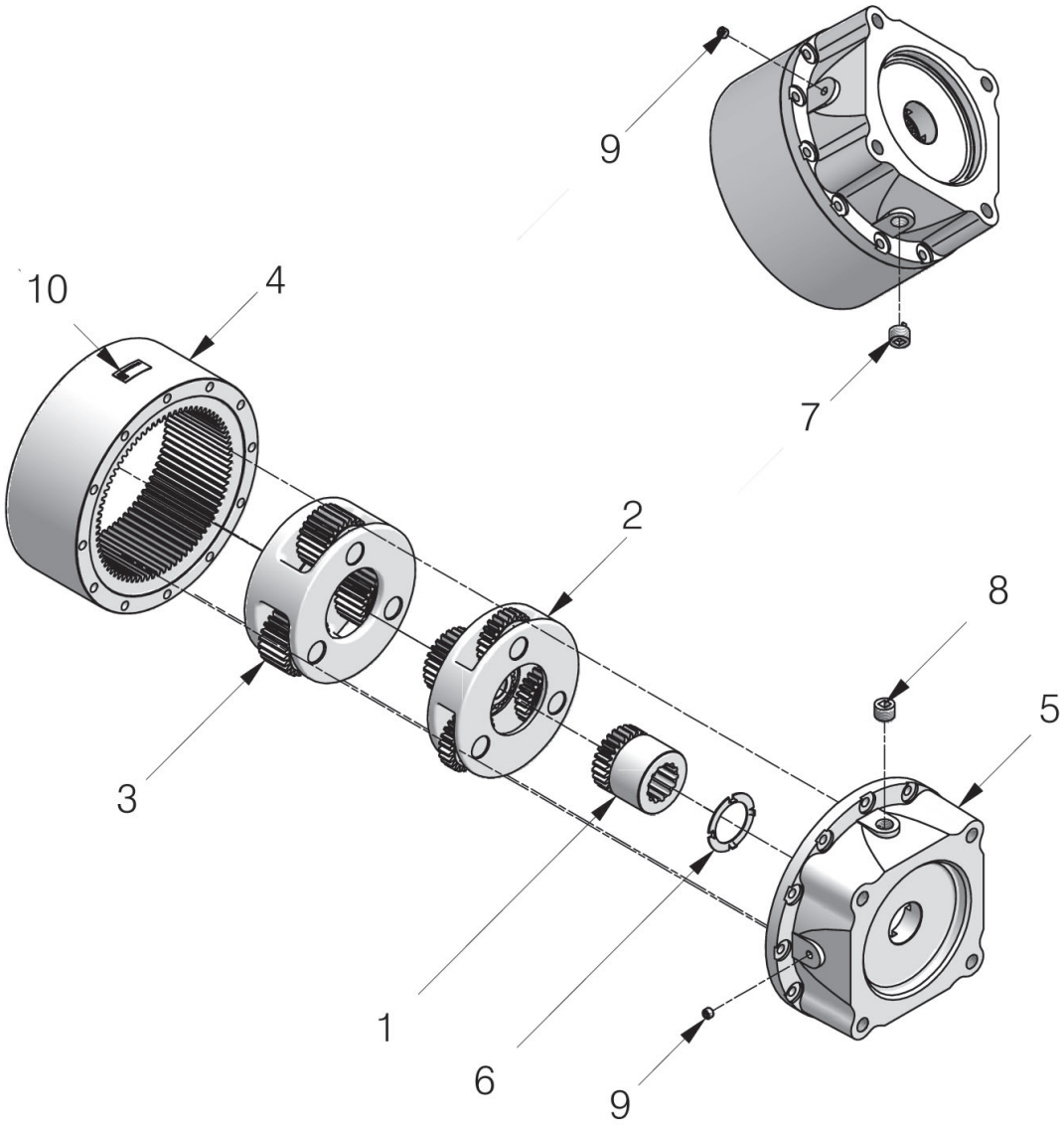


VIEW A-A
STACK ASSEMBLY
DETAIL

Figure 1-15 Brake

Brake (See Figure 1-15)

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

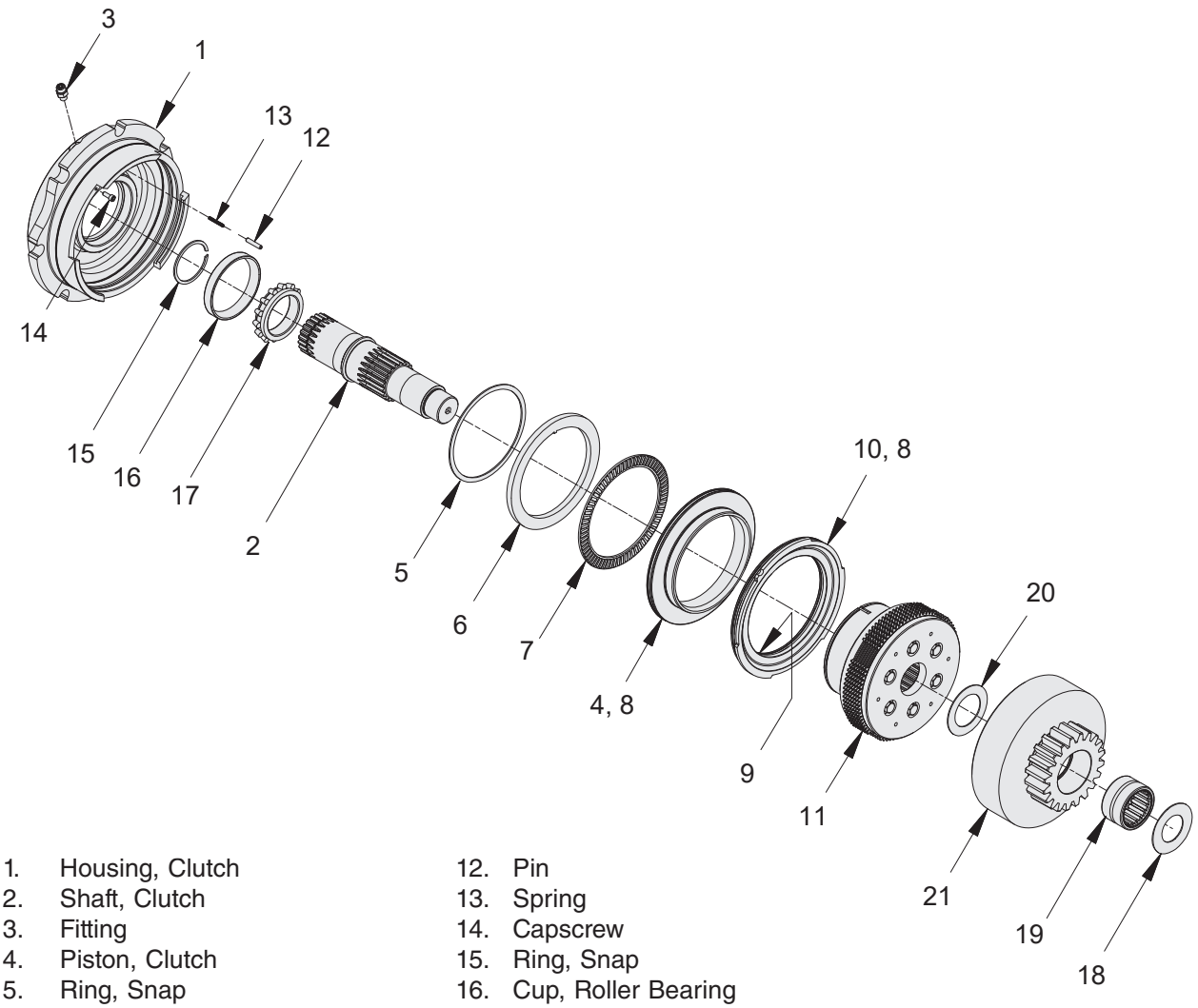


1. Sun Gear
2. Primary Carrier Assembly
3. Secondary Carrier Assembly
4. Ring Gear
5. Cover
6. Thrust Washer
7. Fitting
8. Fitting
9. Fitting
10. Label

Figure 1-16 Planetary Reducer

Planetary Reducer (See Figure 1-16)

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



1. Housing, Clutch
2. Shaft, Clutch
3. Fitting
4. Piston, Clutch
5. Ring, Snap
6. Ring, Thrust
7. Bearing, Thrust Needle Roller
8. O-Ring
9. O-Ring
10. Ring, Seal
11. Assy, Clutch
12. Pin
13. Spring
14. Capscrew
15. Ring, Snap
16. Cup, Roller Bearing
17. Cone, Roller Bearing
18. Shim .062”
19. Bearing
20. Shim .062”
21. Gear, Spider

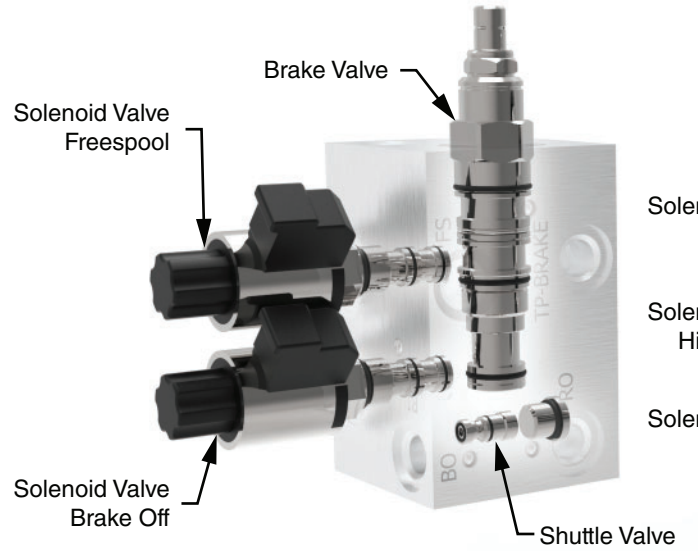
Figure 1-17 BRAKE-OFF Shaft

BRAKE-OFF Shaft (See Figure 1-17)

The **BRAKE-OFF** shaft includes a multi-disk clutch assembly with belleville spring washers. During normal operation, the belleville spring washers lock the multi-disk clutch assembly, and the clutch shaft is linked to the spider gear.

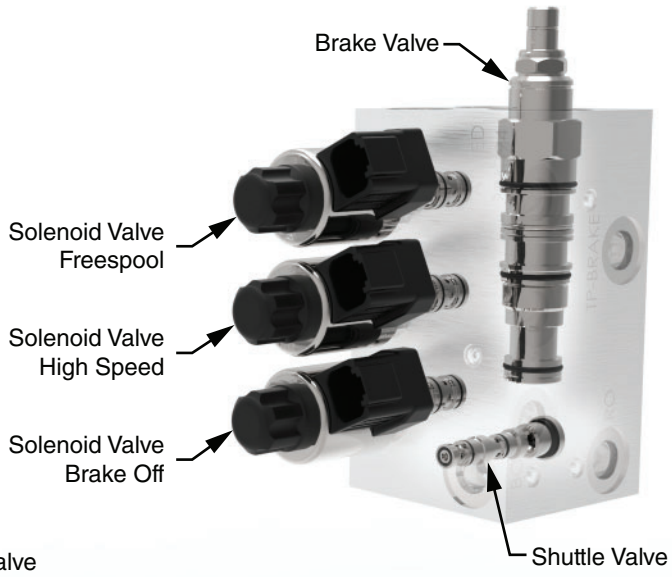
When **BRAKE-OFF** is engaged, pilot pressure to the clutch piston compresses the belleville spring washers, which allows the disks of the clutch to disengage. The spider gear can now turn independent of the clutch shaft. This disconnects the drivetrain from the winch motor, brake, and gear reducer assemblies, allowing the rope to be spooled from the drum while using the resistance of the gears to maintain tension in the rope.

Control Manifold 2311770 and 2313758



Used on winches with internal option codes **B, BN, U, E, DE**

Control Manifold 2313944



Used on winches with internal option codes **D, DL**

Figure 1-18 Control Manifolds

Control Manifold (See Figure 1-18)

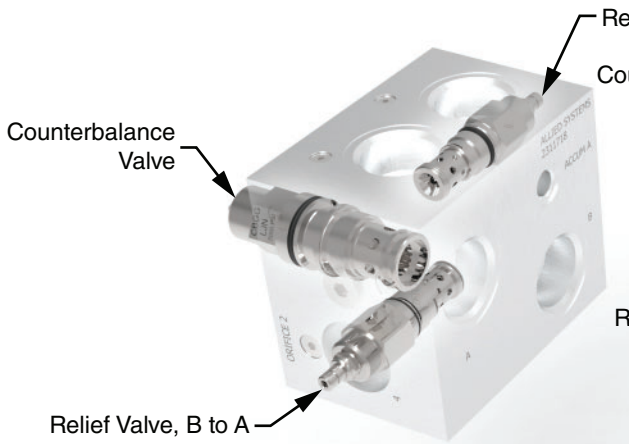
The control manifold assembly is used to direct pilot pressure to various functions (parking brake, **BRAKE-OFF**, **FREESPOOL**, and **HI-SPEED**).

The brake valve is actuated during **LINE-IN** or **LINE-OUT,** when hydraulic pressure is present at either port RI or RO (the shuttle valve shifts one way or the other), and directs pilot pressure to release the parking brake. Control manifolds 2311770 and 2313758 also send pilot pressure from port X1 on the manifold, to port X1 on the motor to put the winch into **HI-SPEED** by default.

Solenoid valves for **FREESPOOL** and **BRAKE-OFF** receive an electric signal from the operator's controls (toggle switches or joystick), and subsequently direct pilot pressure to the **FREESPOOL** fork or **BRAKE-OFF** clutch.

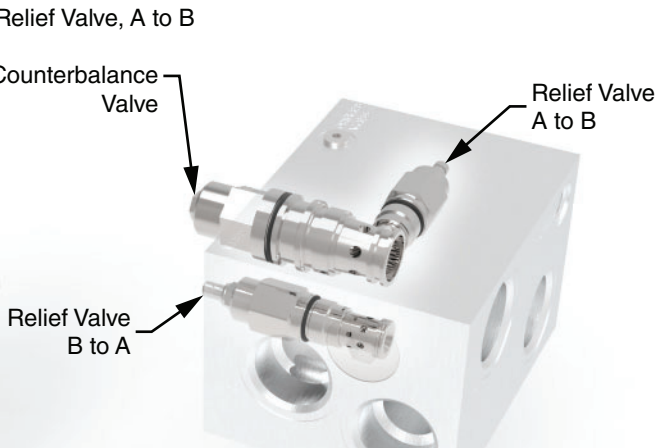
Control manifold 2313944 includes a third solenoid valve for the **HI-SPEED** function. When the valve receives an electric signal from the operator's controls (toggle switch or joystick), pilot pressure is directed from port X1 on the manifold, to port X1 on the motor to put the winch into **HI-SPEED.**

CBR Manifold 2311718



Used on winches with vehicle codes:
C71, C712, C81, C811, C812, E465, E470, H39, K46 K49, L39, L41, L410, L42, L421, L44, R40, Y44

CBR Manifold 2312941, 2314242



Used on winches with vehicle codes:
C805, C963, K71, K471, P81, R42, U47

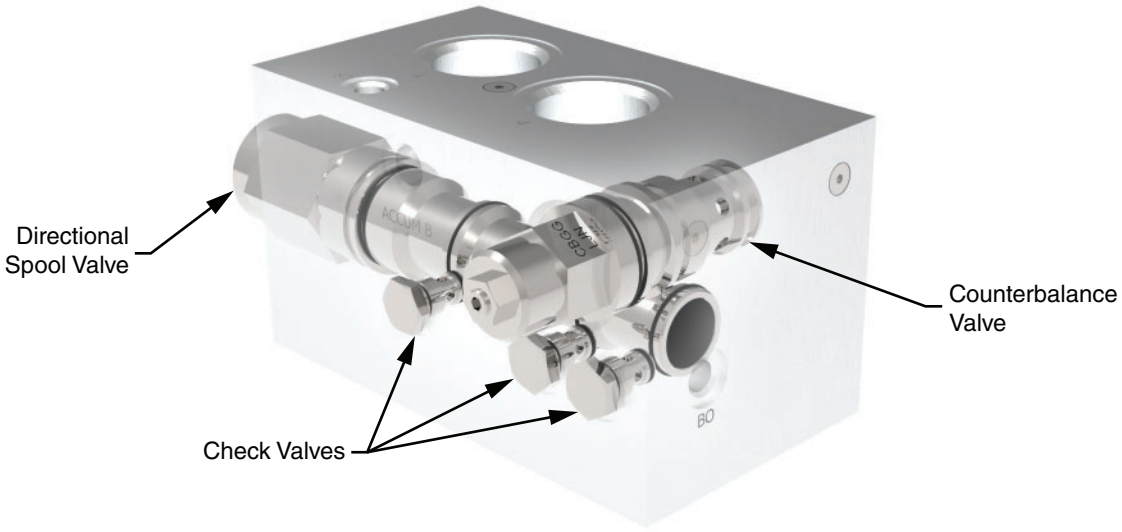
Figure 1-19 CBR Manifolds

CBR Manifolds (See Figure 1-19)

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.

Directional Manifold 2314687



Used on winches with vehicle codes:
E460, E47

Figure 1-20 Directional Manifold

Directional Manifold (See Figure 1-20)

The directional manifold houses the counterbalance valve and the directional spool valve. The counterbalance valve is a load holding valve that blocks return oil flow from the motor in the event supply pressure drops below a set point in **LINE-OUT** mode. The counterbalance valve allows oil to free flow in the **LINE-IN** mode through a check valve. The directional spool valve directs dozer supply oil to either motor port based on control pressure from the control lever. Supply oil is directed to motor port A in **LINE-IN** mode and to motor port B in **LINE-OUT** mode.

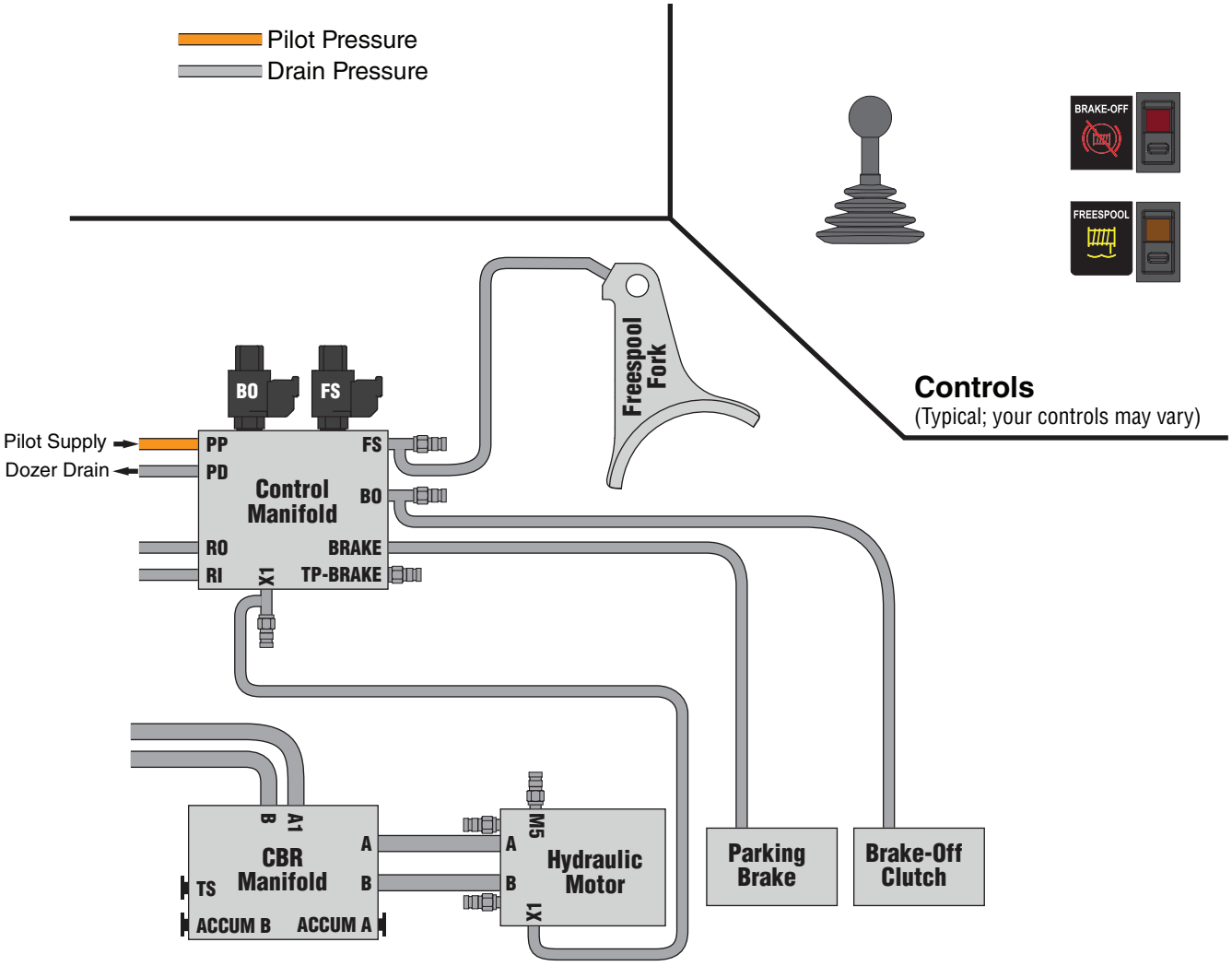


Figure 1-21 Sequence of Operation - BRAKE-ON, Group 1

Sequence of Operation - Group 1

This section is applicable to installations on dozers shown in Figure 1-22 with internal option code "B". Some installations may have accumulators or temperature sensors not shown in these illustrations, but the hydraulics shown are still correct.

Sequence of Operation - BRAKE-ON

See Figure 1-21. Pilot pressure is present at the control manifold. All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

Vehicle Code	Dozer Model
C71	CAT D6T-Tier 4i
C81	CAT D6N
K471	Komatsu D61-23
K49	Komatsu D65X-16/17/18
L39	Liebherr PR716
L41	Liebherr PR724
L410	Liebherr PR724L
L42	Liebherr PR726
L421	Liebherr PR736
L44	Liebherr PR734-4
U47	Shantui DH17

Figure 1-22 Group 1 Installations

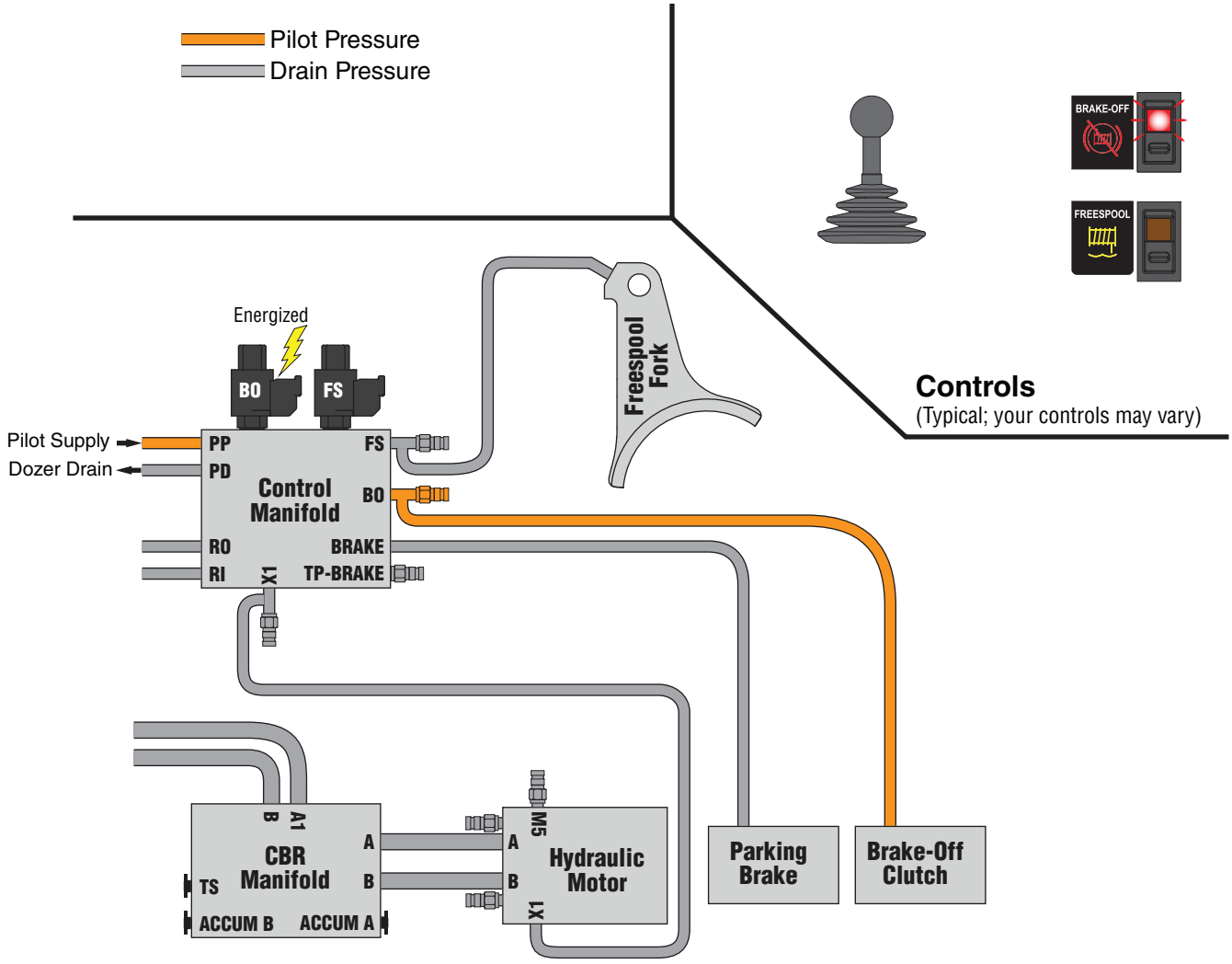


Figure 1-23 Sequence of Operation - BRAKE-OFF, Group 1

Sequence of Operation - BRAKE-OFF

See Figure 1-23. **BRAKE-OFF** is activated by the switch mounted on the right-hand console. An electric signal shifts the **BRAKE-OFF** solenoid valve directing pilot pressure to release the spring applied, brake-off clutch.

⚠ WARNING

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

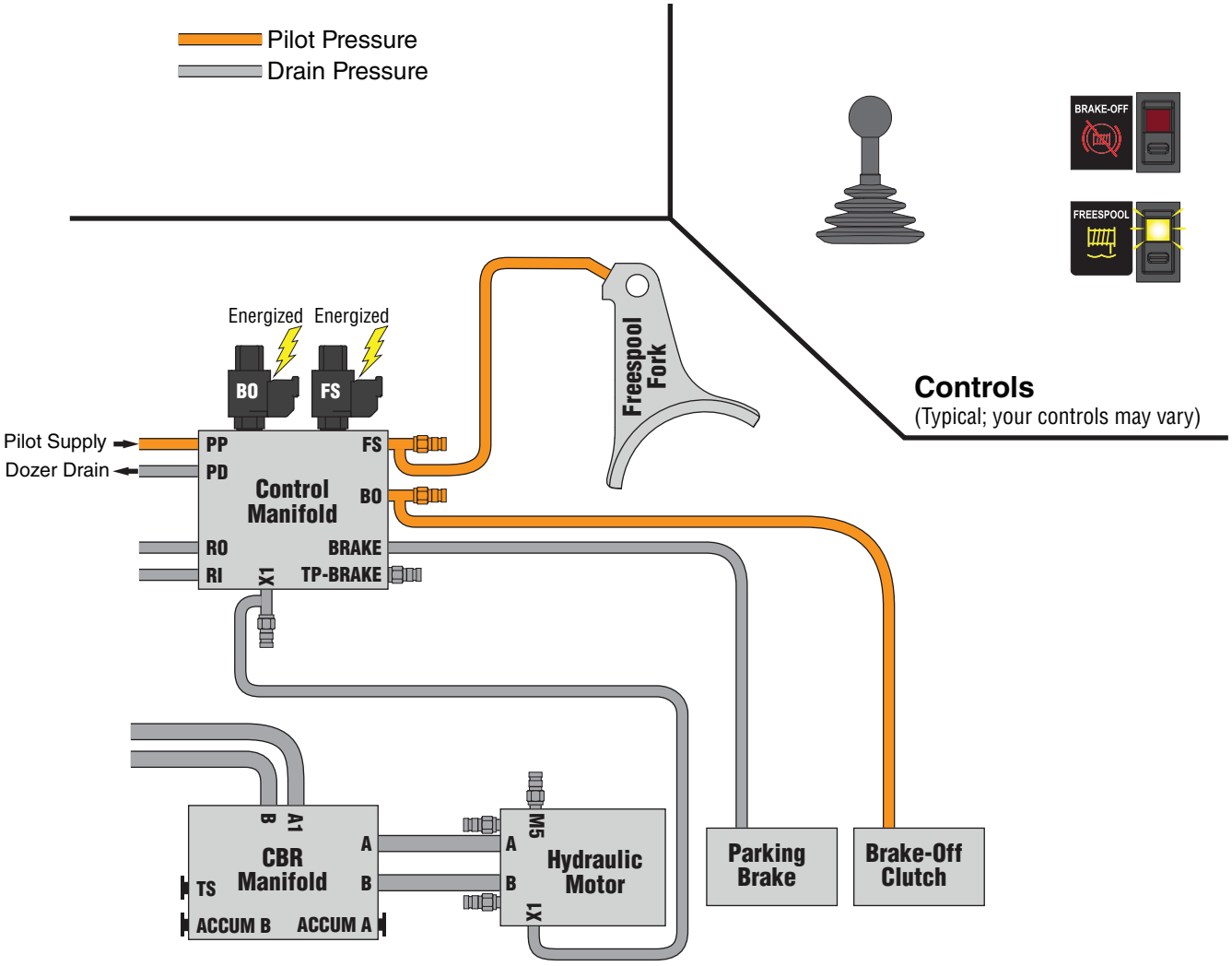


Figure 1-24 Sequence of Operation - FREESPOOL, Group 1

Sequence of Operation - FREESPOOL

See Figure 1-24. When **FREESPOOL** is activated, an electric signal is sent to both the **FREESPOOL** and the **BRAKE-OFF** solenoid valves. Pilot oil pressure is diverted to the **FREESPOOL** piston. Pilot control pressure moves the **FREESPOOL** shifter fork, allowing the dental clutch to disengage the drum pinion gear from the intermediate gear. The gear train is disengaged from the drum gear so the wire rope can be pulled from the drum by hand. At the same time, pilot pressure releases the spring applied, brake-off clutch.

The dental collar may not fully re-engage until the motor is powered in **LINE-IN** or **LINE-OUT**.

⚠ WARNING

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

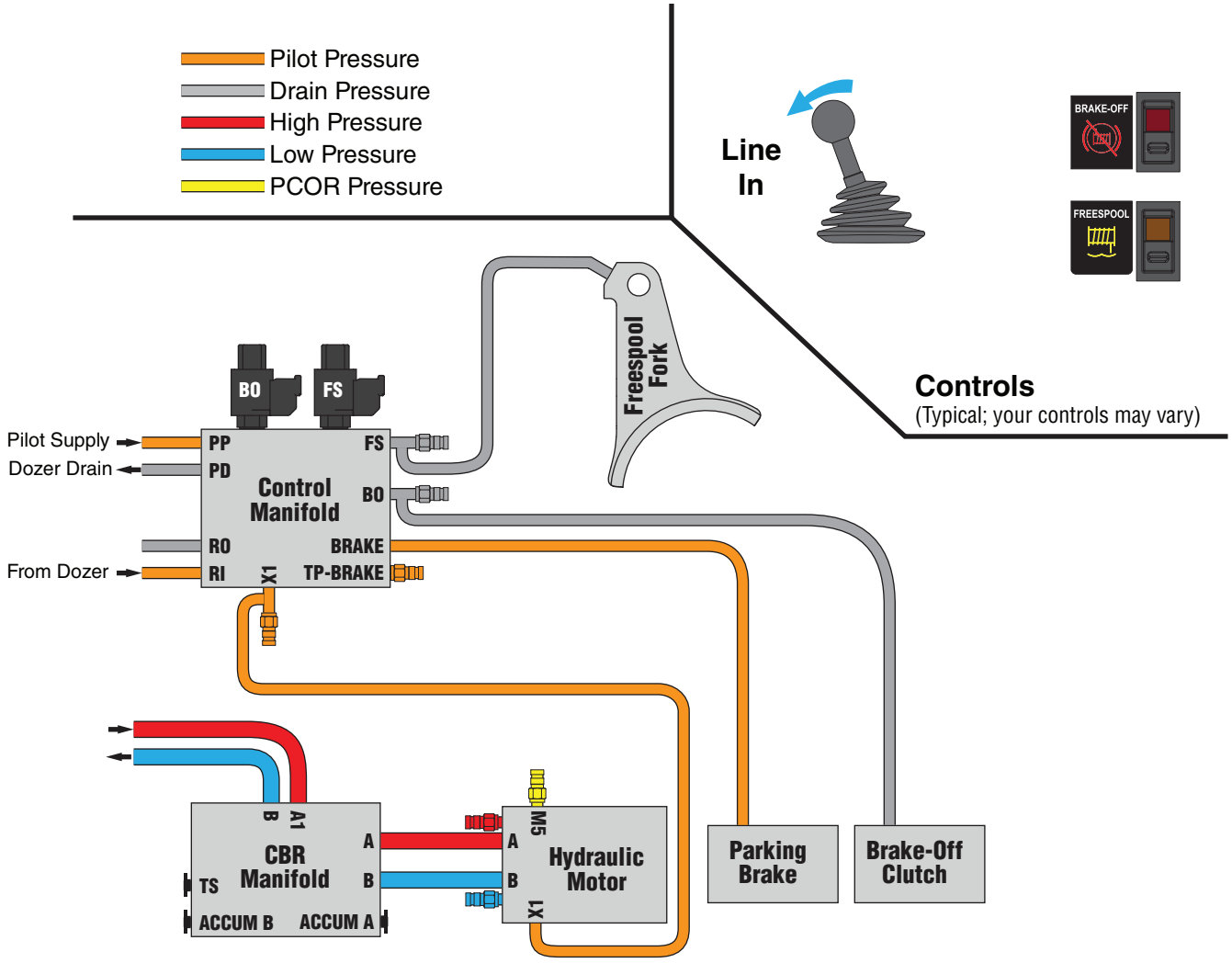


Figure 1-25 Sequence of Operation - LINE-IN, Group 1

Sequence of Operation - LINE-IN

See Figure 1-25. Pulling the control lever toward the operator sends full supply pressure to the CBR manifold port "A1". Oil flows through a check valve in the counterbalance valve cartridge, and continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch.

Simultaneously, full pilot pressure is sent to the control manifold port “RI,” which then sends pilot supply pressure to the brake release port, and the brake is fully released.

Full pilot pressure is also sent to the X1 port on the hydraulic motor. This reduces displacement in the motor to the minimum setting, increasing line speed.

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

Oil flows through the motor, back through the CBR manifold and to the tractor reservoir.

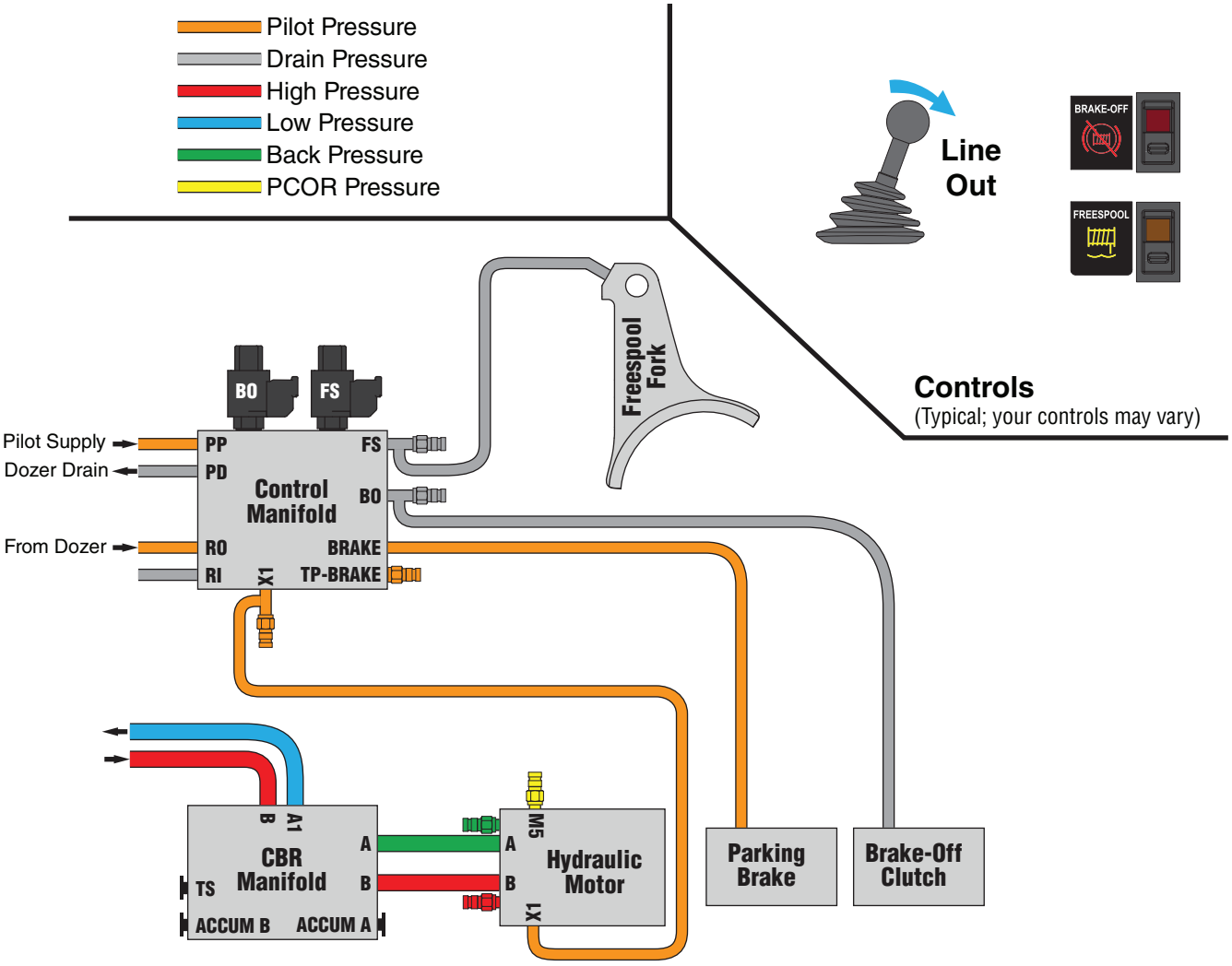


Figure 1-26 Sequence of Operation - LINE-OUT, Group 1

Sequence of Operation - LINE-OUT

See Figure 1-26. **LINE-OUT** operation is similar to **LINE-IN** except moving the control lever away from the operator directs full supply pressure is sent to motor "B" port, and returns through "A" port.

Full pilot pressure is sent to the control manifold port "RO", which releases the brake and sends pilot pressure to the X1 port of the motor, the same as in **LINE-IN** mode.

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

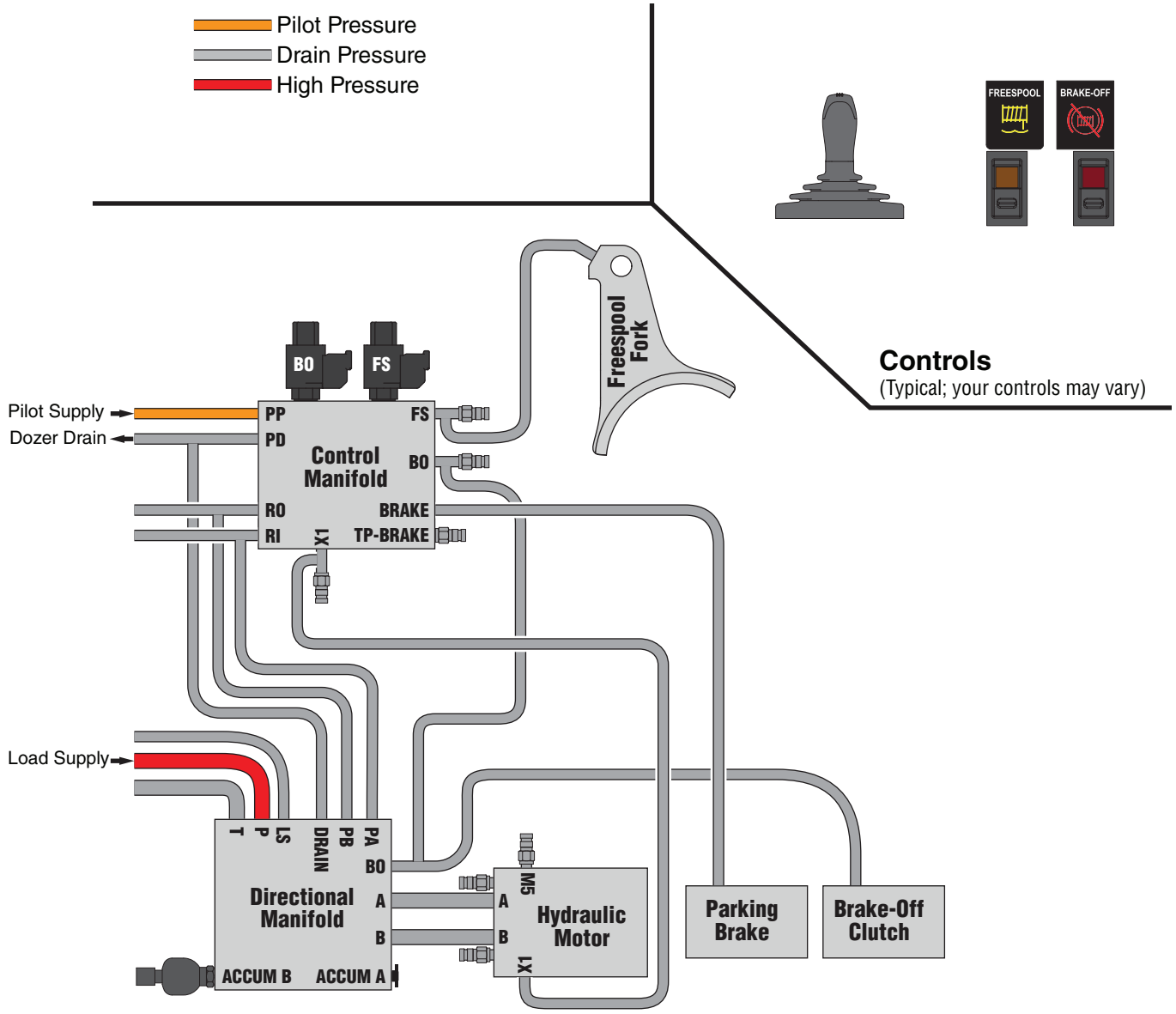


Figure 1-27 Sequence of Operation - BRAKE-ON, Group 2

Sequence of Operation - Group 2

This section is applicable to installations on dozers shown in Figure 1-28 with internal option code "B".

Vehicle Code	Dozer Model
E460	John Deere 750/850J, 750/850K

Figure 1-28 Group 2 Installations

Sequence of Operation - BRAKE-ON

See Figure 1-27. Pilot pressure is present at the control manifold port "PP". Load supply pressure is present at the directional manifold port "P". All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

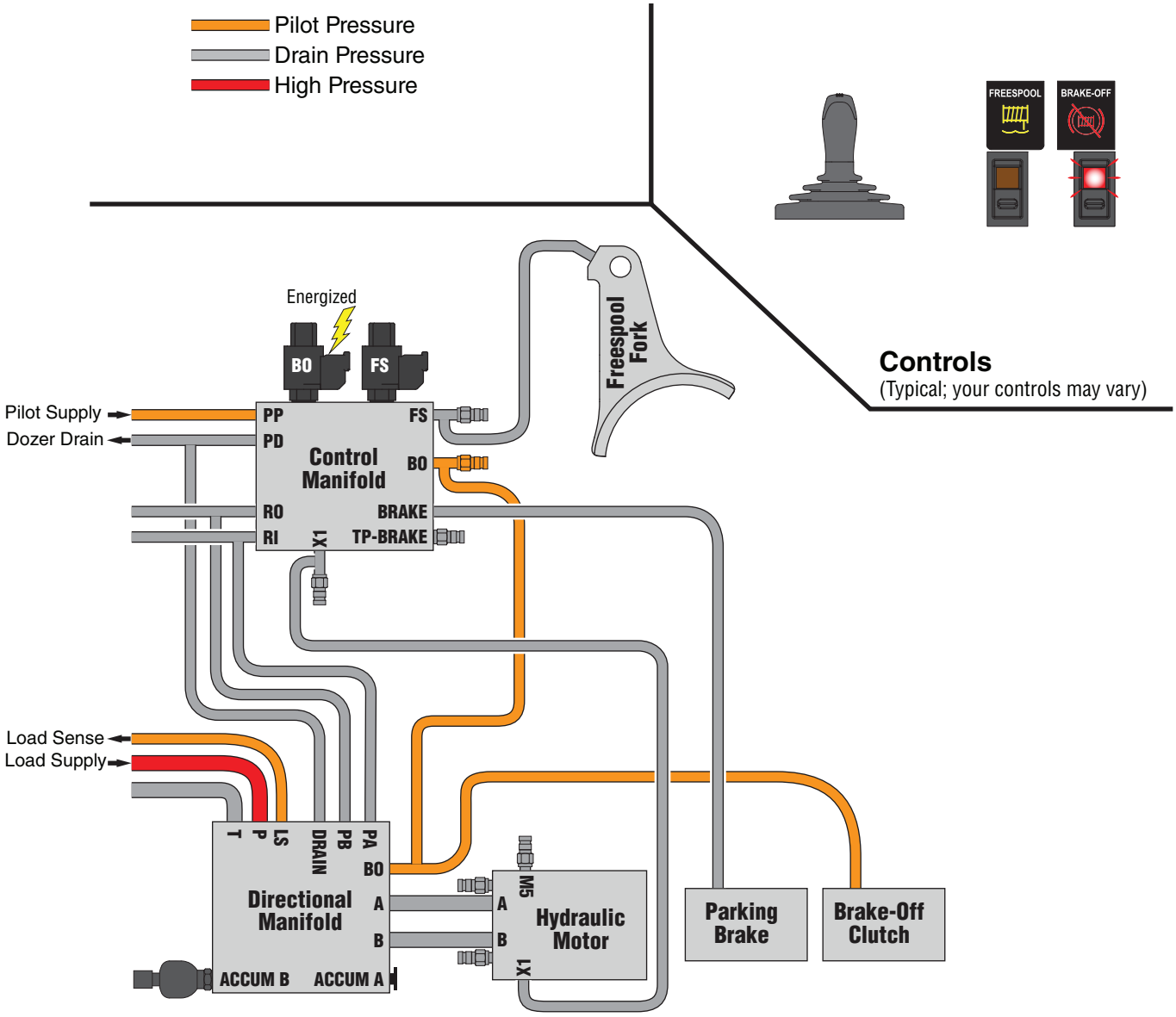


Figure 1-29 Sequence of Operation - BRAKE-OFF, Group 2

Sequence of Operation - BRAKE-OFF

See Figure 1-29. **BRAKE-OFF** is activated by the switch mounted on the right-hand console. An electric signal shifts the **BRAKE-OFF** solenoid valve directing pilot pressure to release the spring applied, brake-off clutch. Pilot pressure is also routed through the directional manifold, and back to the tractor pump load sense controller.

⚠ WARNING

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

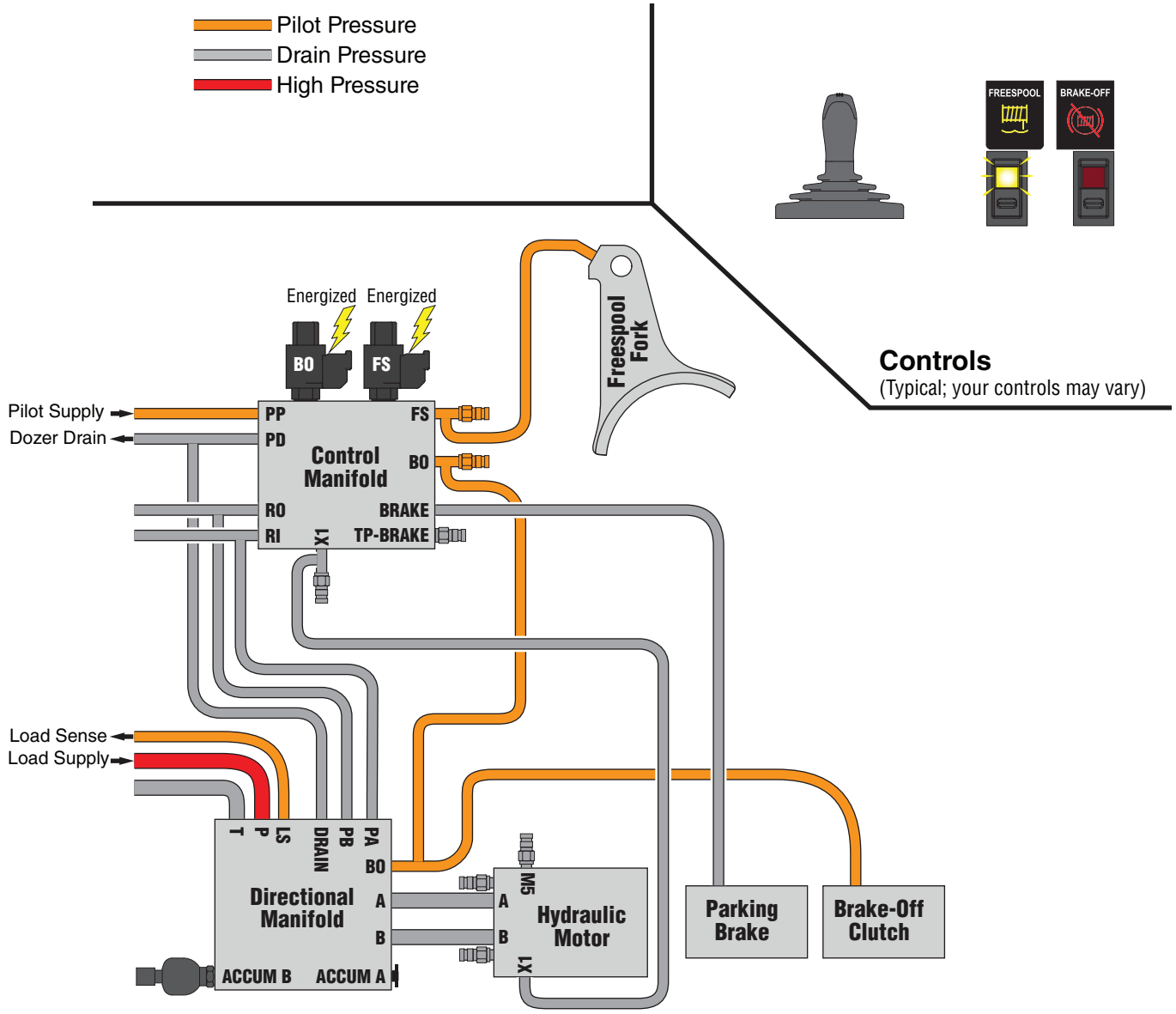


Figure 1-30 Sequence of Operation - FREESPOOL, Group 2

Sequence of Operation - FREESPOOL

See Figure 1-30. When **FREESPOOL** is activated, an electric signal is sent to both the **FREESPOOL** and the **BRAKE-OFF** solenoid valves. Pilot oil pressure is diverted to the **FREESPOOL** piston. Pilot control pressure moves the **FREESPOOL** shifter fork, allowing the dental clutch to disengage the drum pinion gear from the intermediate gear. The gear train is disengaged from the drum gear so the wire rope can be pulled from the drum by hand. At the same time, pilot pressure releases the spring applied, brake-off clutch. Pilot pressure is also routed through the directional manifold, and back to the tractor pump load sense controller.

The dental collar may not fully re-engage until the motor is powered in **LINE-IN** or **LINE-OUT**.

⚠ WARNING

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

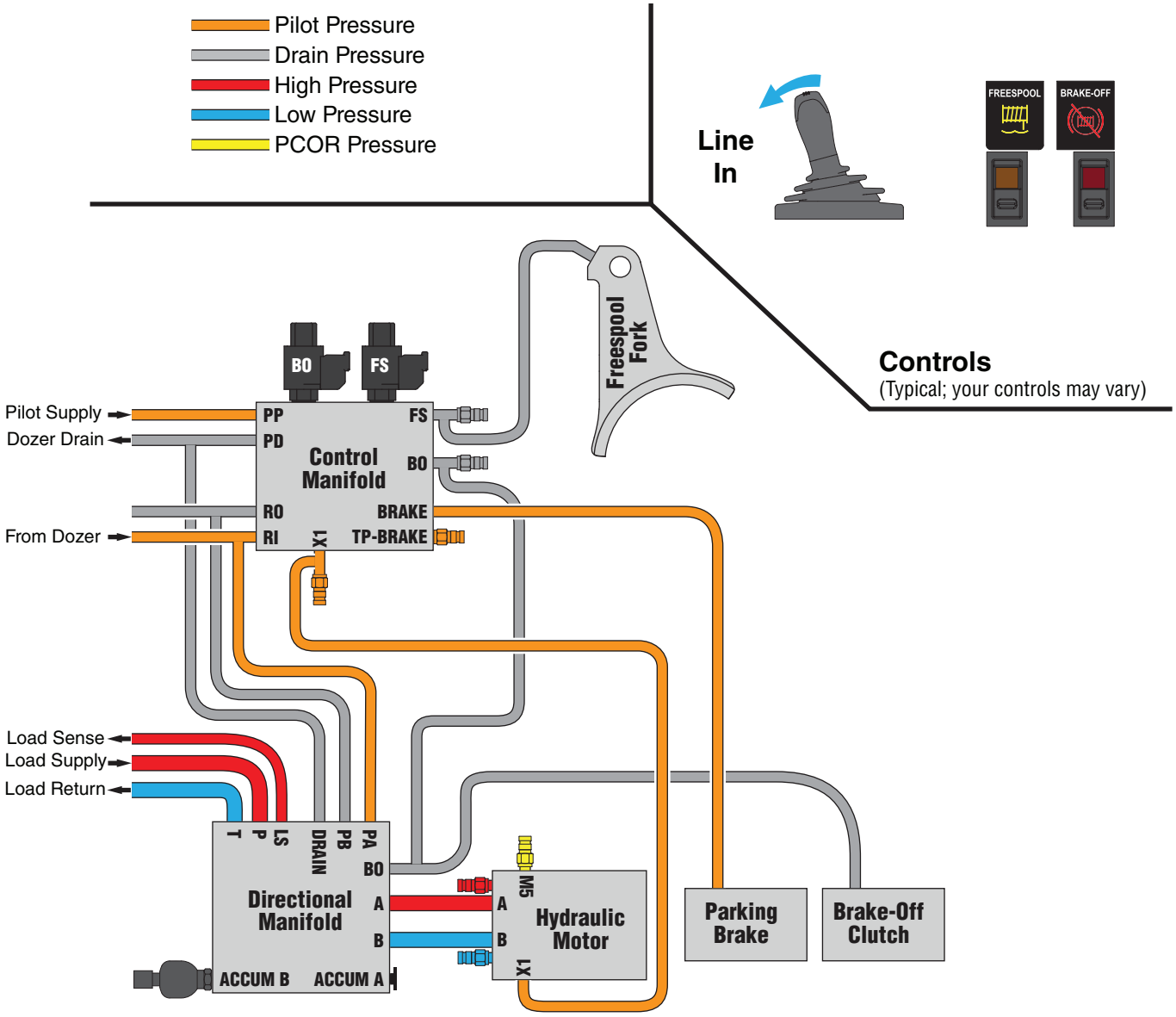


Figure 1-31 Sequence of Operation - LINE-IN, Group 2

Sequence of Operation - LINE-IN

See Figure 1-31. Pulling the control lever toward the operator sends pilot control pressure to the directional control manifold port “PA”, and to the “RI” port on the control manifold. Oil flows from the pump supply line into the directional control spool and through a check valve in the counterbalance valve cartridge. Oil flow continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch. This pressure is communicated to the tractor pump load sense controller, and the pump displacement is increased or decreased, depending on the load-induced pressure. Oil flows through the motor, back through the direction control spool and to the tractor reservoir. Simultaneously, pilot control pressure at the brake valve is connected to the brake release port, and the brake is fully released.

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

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

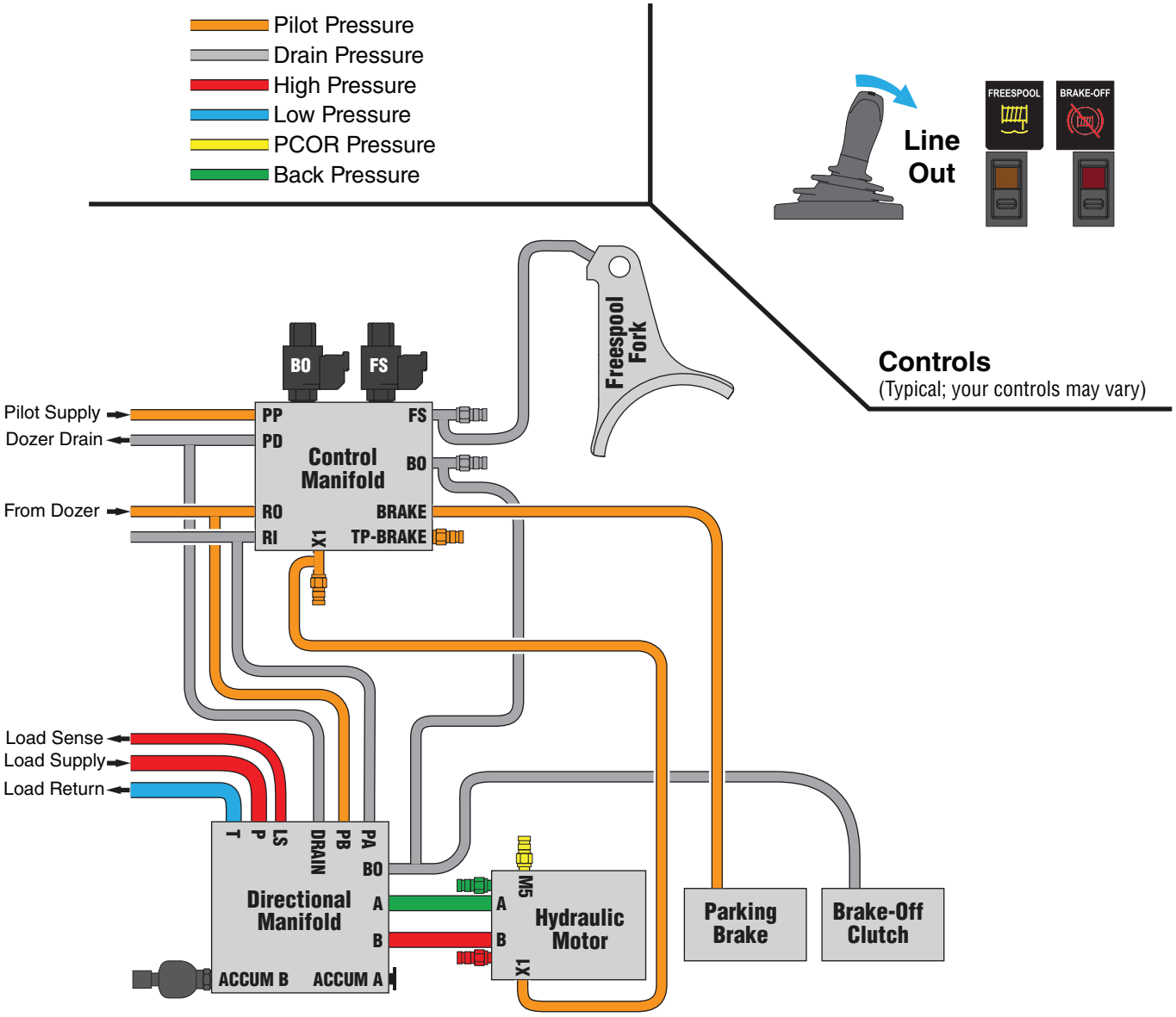


Figure 1-32 Sequence of Operation - LINE-OUT, Group 2

Sequence of Operation - LINE-OUT

See Figure 1-32. **LINE-OUT** operation is similar to **LINE-IN** except moving the control lever away from the operator directs pilot pressure to “PB” and shifts the directional valve so pump supply is sent to motor “B” port, and returns through “A” port. Brake release and motor speed control (X1) operate the same as in LINE-IN mode.

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

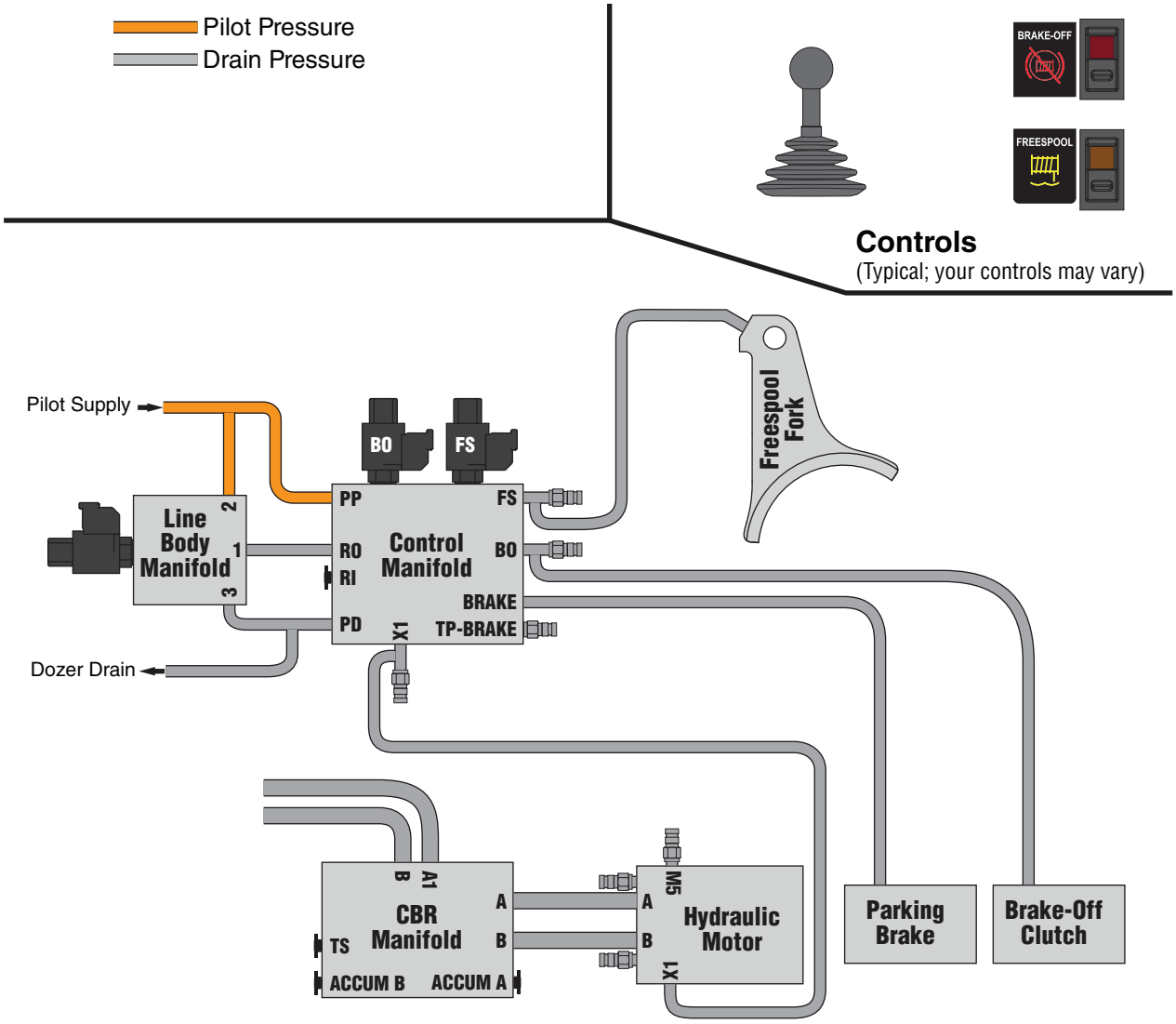


Figure 1-33 Sequence of Operation - BRAKE-ON, Group 3

Sequence of Operation - Group 3

This section is applicable to installations on dozers shown in Figure 1-34 with internal option code "B".

Vehicle Code	Dozer Model
R42	CNH 1650/2050M

Figure 1-34 Group 3 Installations

Sequence of Operation - BRAKE-ON

See Figure 1-33. Pilot pressure is present at the line body manifold at port "2", and at the control manifold port "PP". All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

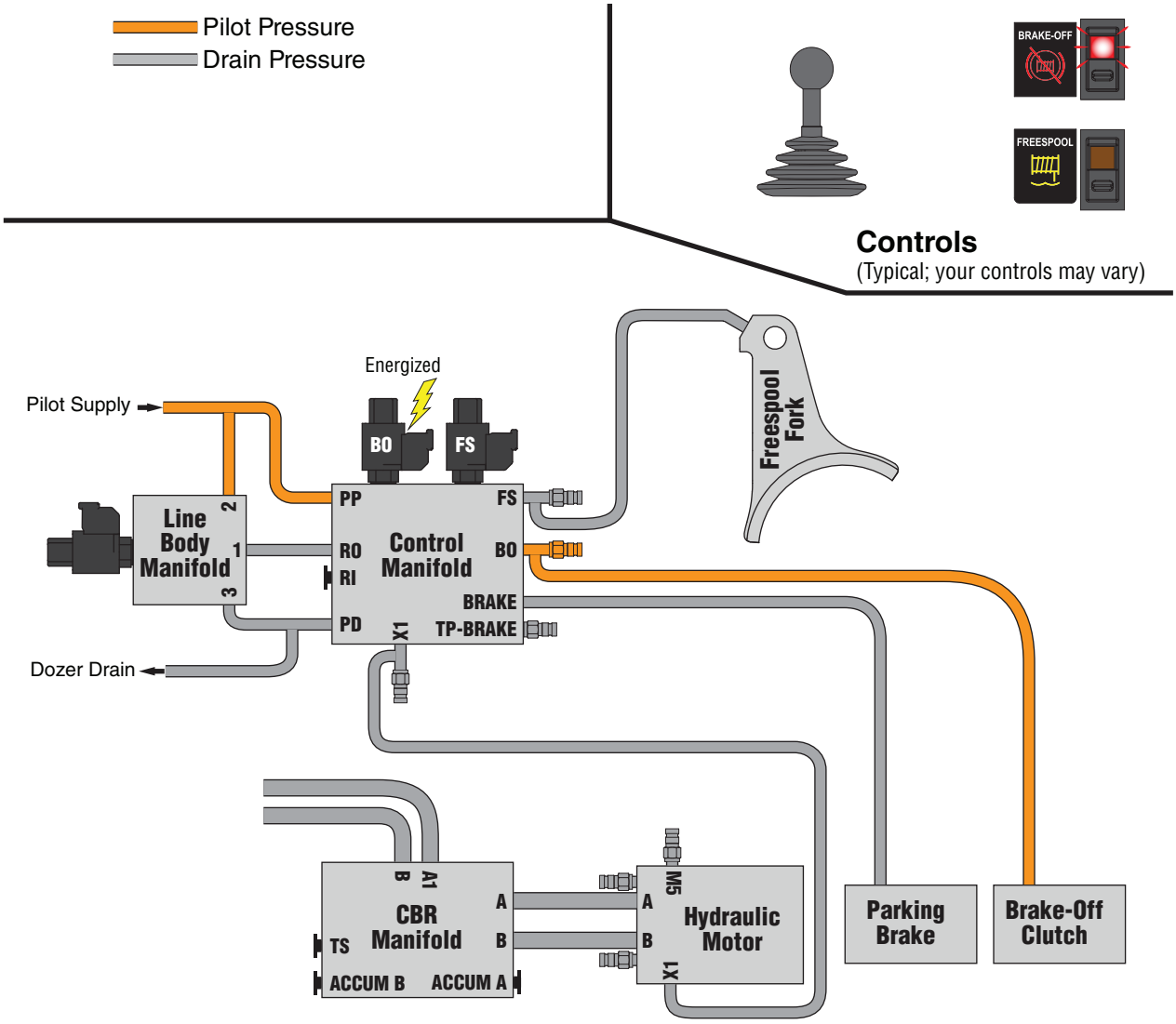


Figure 1-35 Sequence of Operation - BRAKE-OFF, Group 3

Sequence of Operation - BRAKE-OFF

See Figure 1-35. **BRAKE-OFF** is activated by the switch mounted on the right-hand console. An electric signal shifts the **BRAKE-OFF** solenoid valve directing pilot pressure to release the spring applied, brake-off clutch.

⚠ WARNING

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

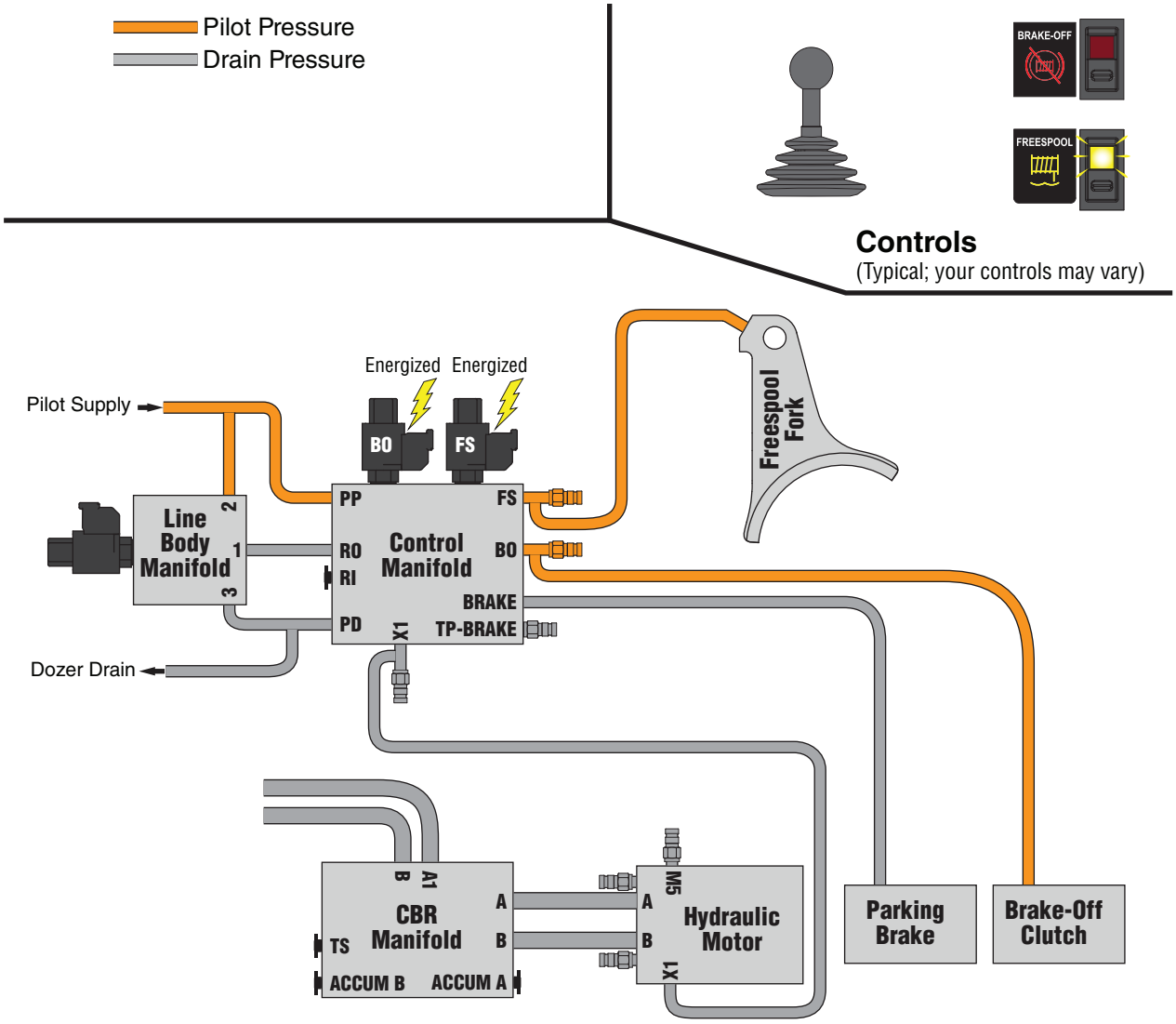


Figure 1-36 Sequence of Operation - FREESPOOL, Group 3

Sequence of Operation - FREESPOOL

See Figure 1-36. When **FREESPOOL** is activated, an electric signal is sent to both the **FREESPOOL** and the **BRAKE-OFF** solenoid valves. Pilot oil pressure is diverted to the **FREESPOOL** piston. Pilot control pressure moves the **FREESPOOL** shifter fork, allowing the dental clutch to disengage the drum pinion gear from the intermediate gear. The gear train is disengaged from the drum gear so the wire rope can be pulled from the drum by hand. At the same time, pilot pressure releases the spring applied, brake-off clutch.

The dental collar may not fully re-engage until the motor is powered in **LINE-IN** or **LINE-OUT**.

⚠ WARNING

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

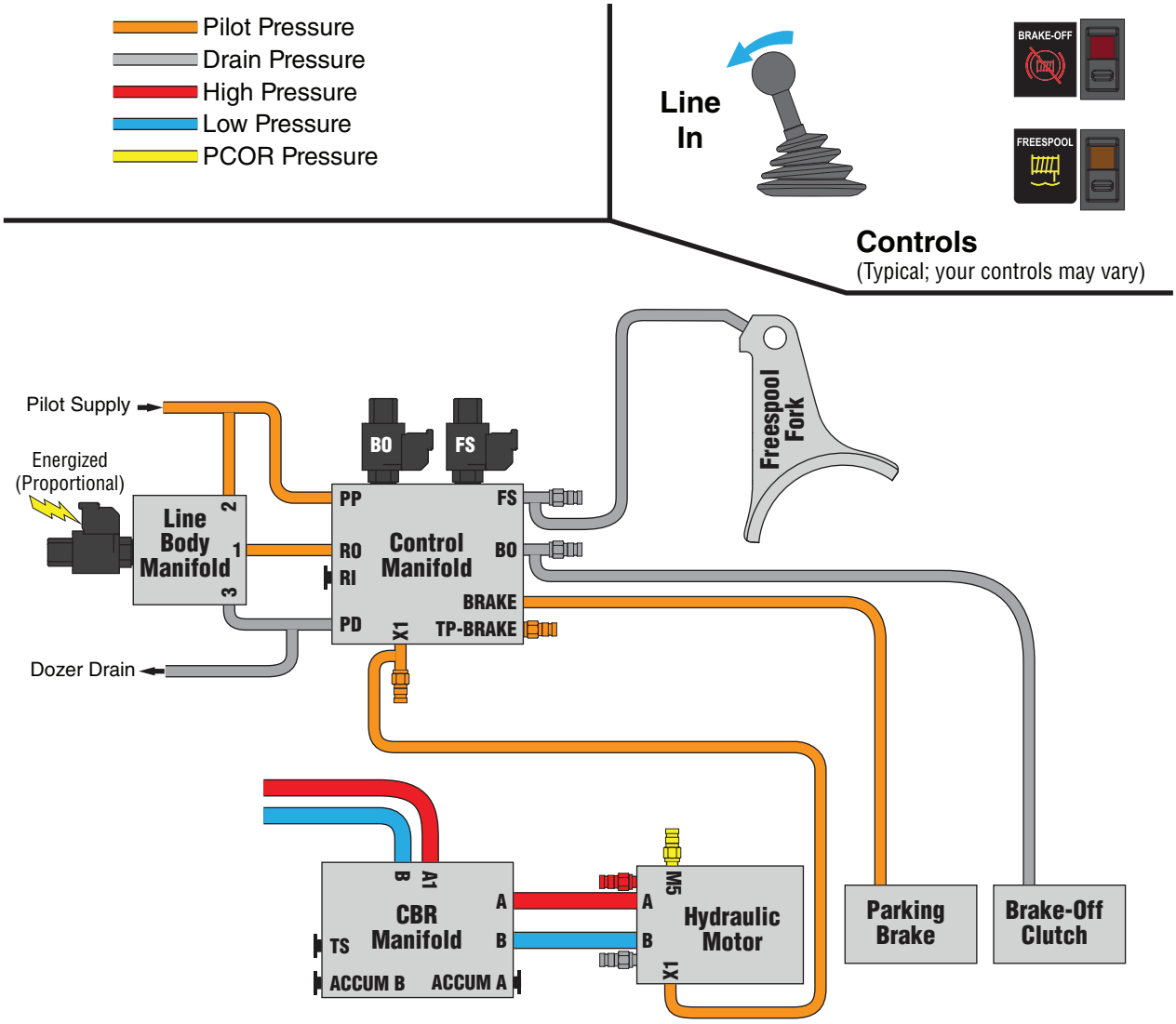


Figure 1-37 Sequence of Operation - LINE-IN, Group 3

Sequence of Operation - LINE-IN

See Figure 1-37. Pulling the control lever toward the operator sends full supply pressure to the CBR manifold port "A1". Oil flows through a check valve in the counterbalance valve cartridge, and continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch.

The solenoid valve in the line body manifold is energized (PWM signal), proportional to the control lever position. Proportional pilot pressure is sent to the control manifold port “RO”, which then sends pilot supply pressure to the brake release port, and the brake is fully released.

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

Oil flows through the motor, back through the CBR manifold and to the tractor reservoir.

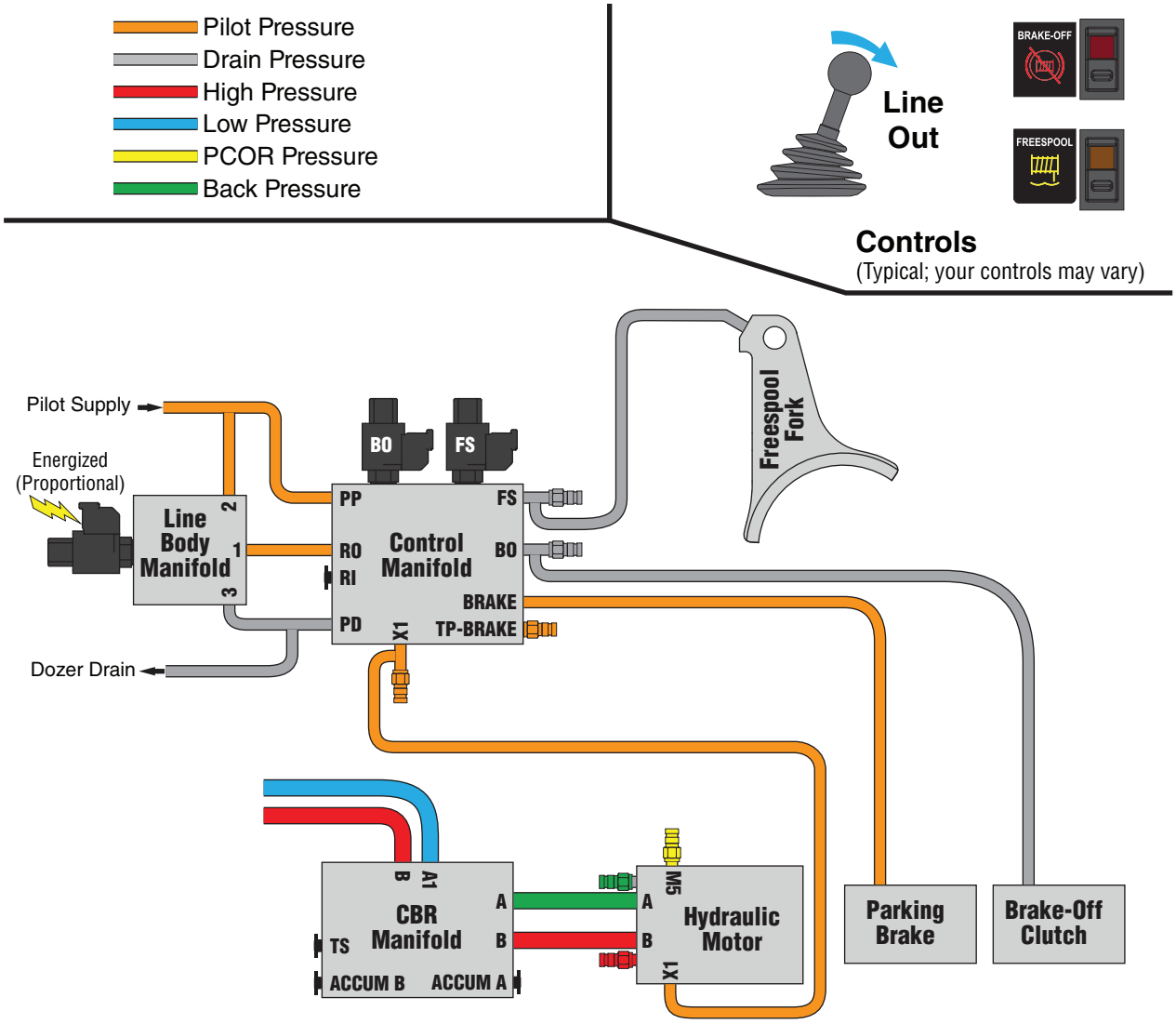


Figure 1-38 Sequence of Operation - LINE-OUT, Group 3

Sequence of Operation - LINE-OUT

See Figure 1-38. **LINE-OUT** operation is similar to **LINE-IN** except moving the control lever away from the operator directs full supply pressure is sent to motor "B" port, and returns through "A" port.

The pilot pressure at the line body manifold, control manifold, parking brake, and hydraulic motor port X1 function the same is in **LINE-IN**.

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

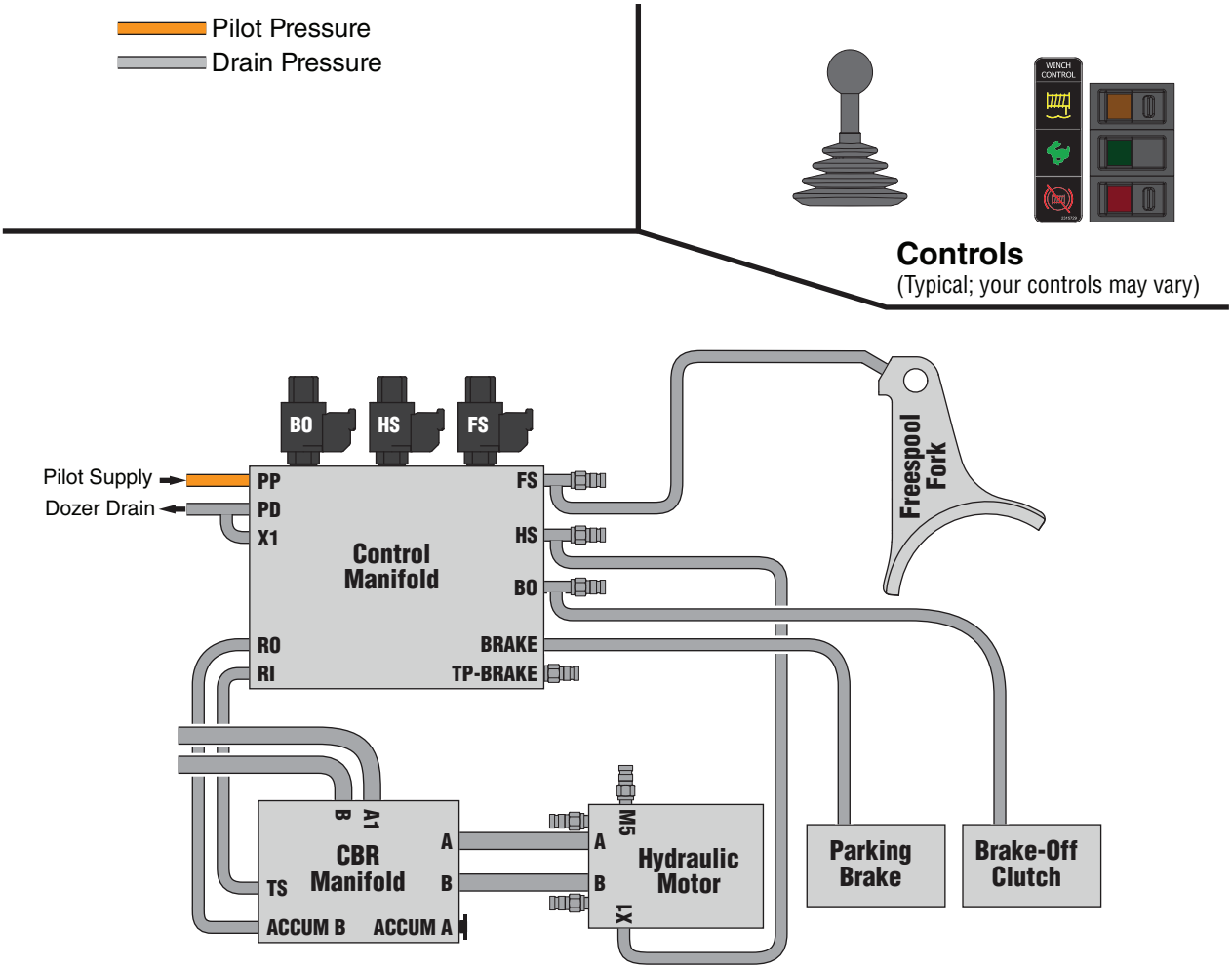


Figure 1-39 Sequence of Operation - BRAKE-ON, Group 4

Sequence of Operation - Group 4

This section is applicable to installations on dozers shown in Figure 1-40 with internal option code “D” or “DL” .

Sequence of Operation - BRAKE-ON

See Figure 1-39. Pilot pressure is present at the control manifold. All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

Vehicle Code	Dozer Model
C805	CAT D6K2 T4F
C811	CAT D6N with Electric/Hydraulic Controls First Used SN 1563
C812	CAT D5 Build 17
E465/E466/E470	John Deere 750K/850K/750L/850L
K71	Komatsu D71-24

Figure 1-40 Group 4 Installations

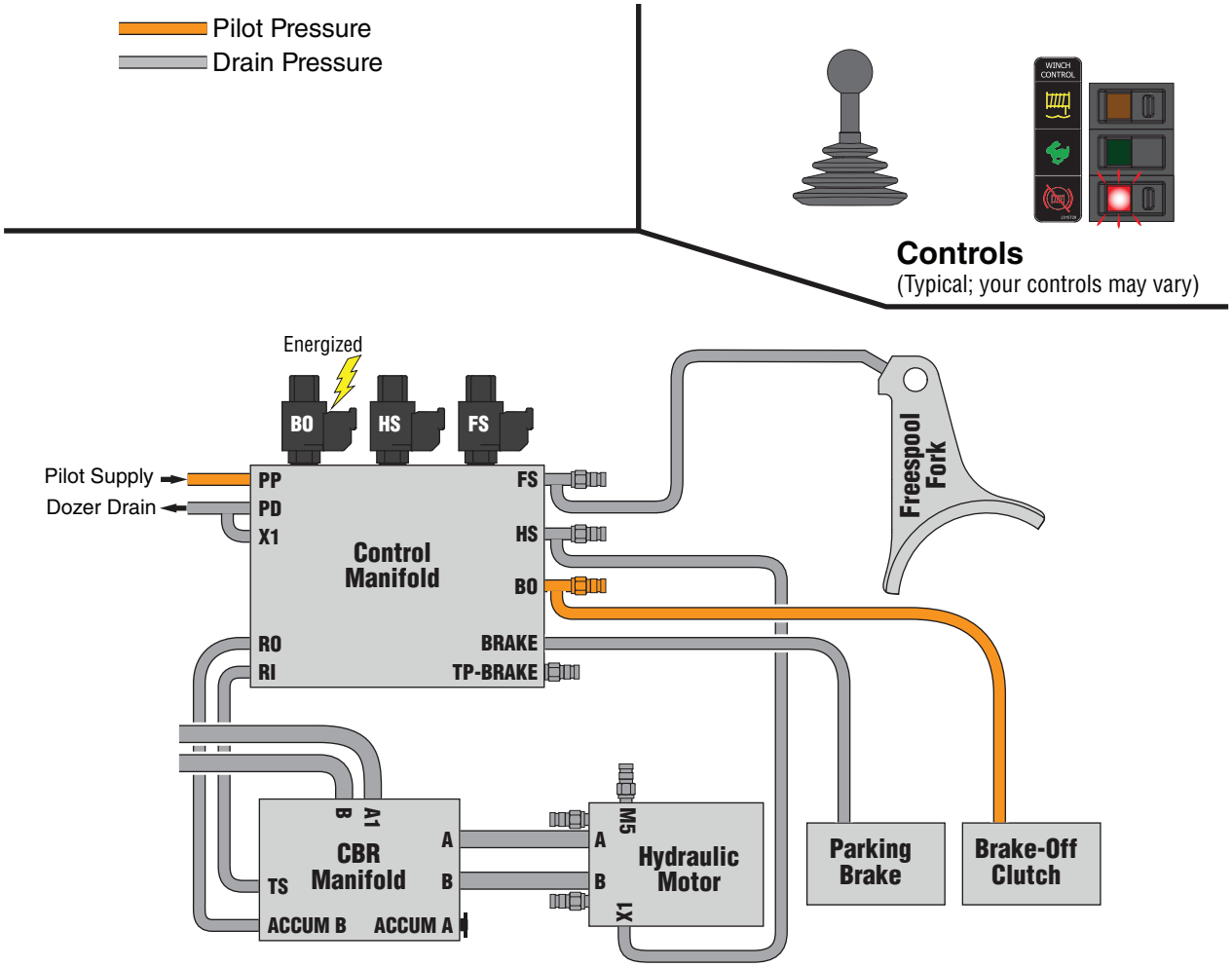


Figure 1-41 Sequence of Operation - BRAKE-OFF, Group 4

Sequence of Operation - BRAKE-OFF

See Figure 1-41. **BRAKE-OFF** is activated by the switch mounted on the right-hand console. An electric signal shifts the **BRAKE-OFF** solenoid valve directing pilot pressure to release the spring applied, brake-off clutch.

⚠ WARNING

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

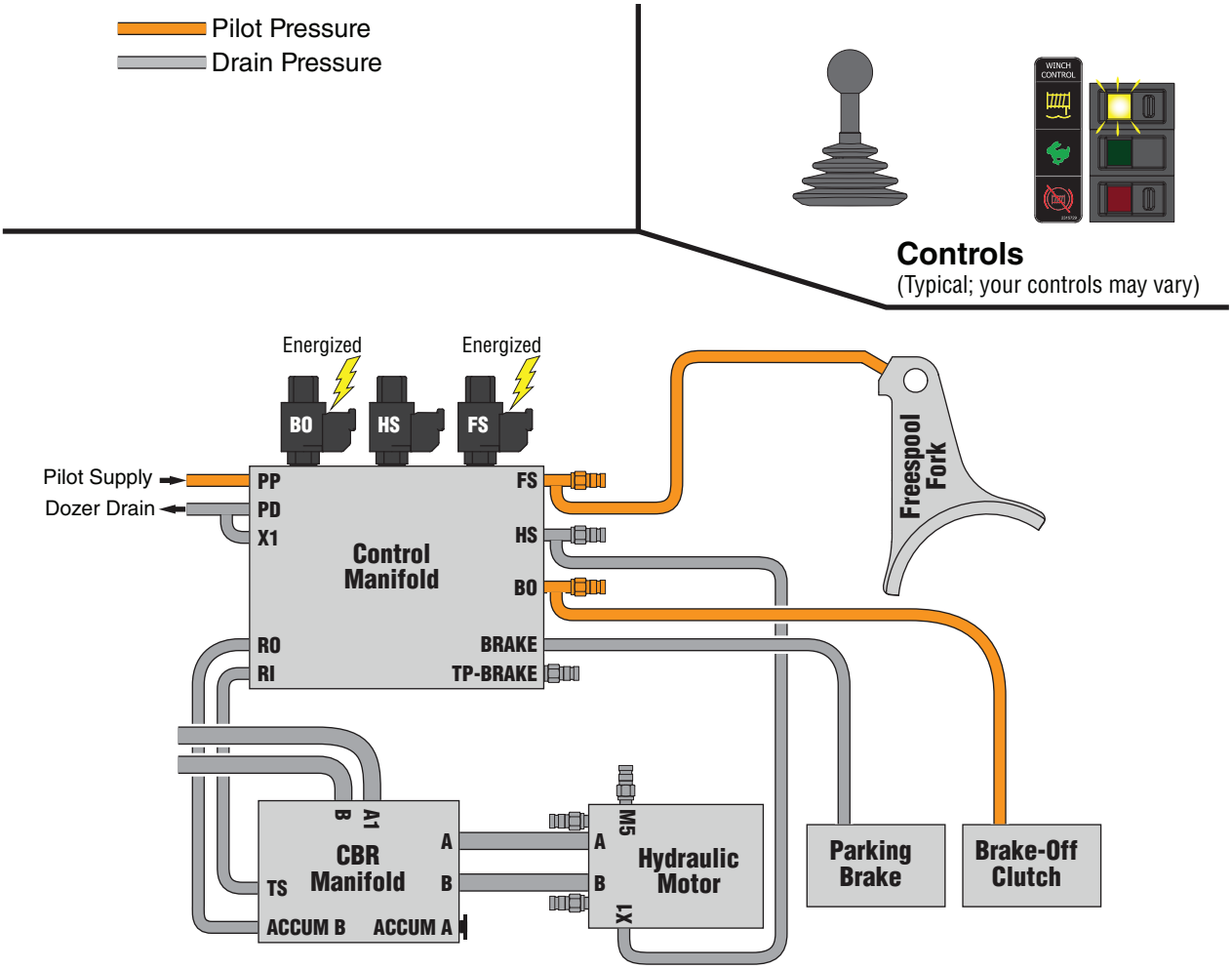


Figure 1-42 Sequence of Operation - FREESPOOL, Group 4

Sequence of Operation - FREESPOOL

See Figure 1-42. When **FREESPOOL** is activated, an electric signal is sent to both the **FREESPOOL** and the **BRAKE-OFF** solenoid valves. Pilot oil pressure is diverted to the **FREESPOOL** piston. Pilot control pressure moves the **FREESPOOL** shifter fork, allowing the dental clutch to disengage the drum pinion gear from the intermediate gear. The gear train is disengaged from the drum gear so the wire rope can be pulled from the drum by hand. At the same time, pilot pressure releases the spring applied, brake-off clutch.

The dental collar may not fully re-engage until the motor is powered in **LINE-IN** or **LINE-OUT**.

⚠ WARNING

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

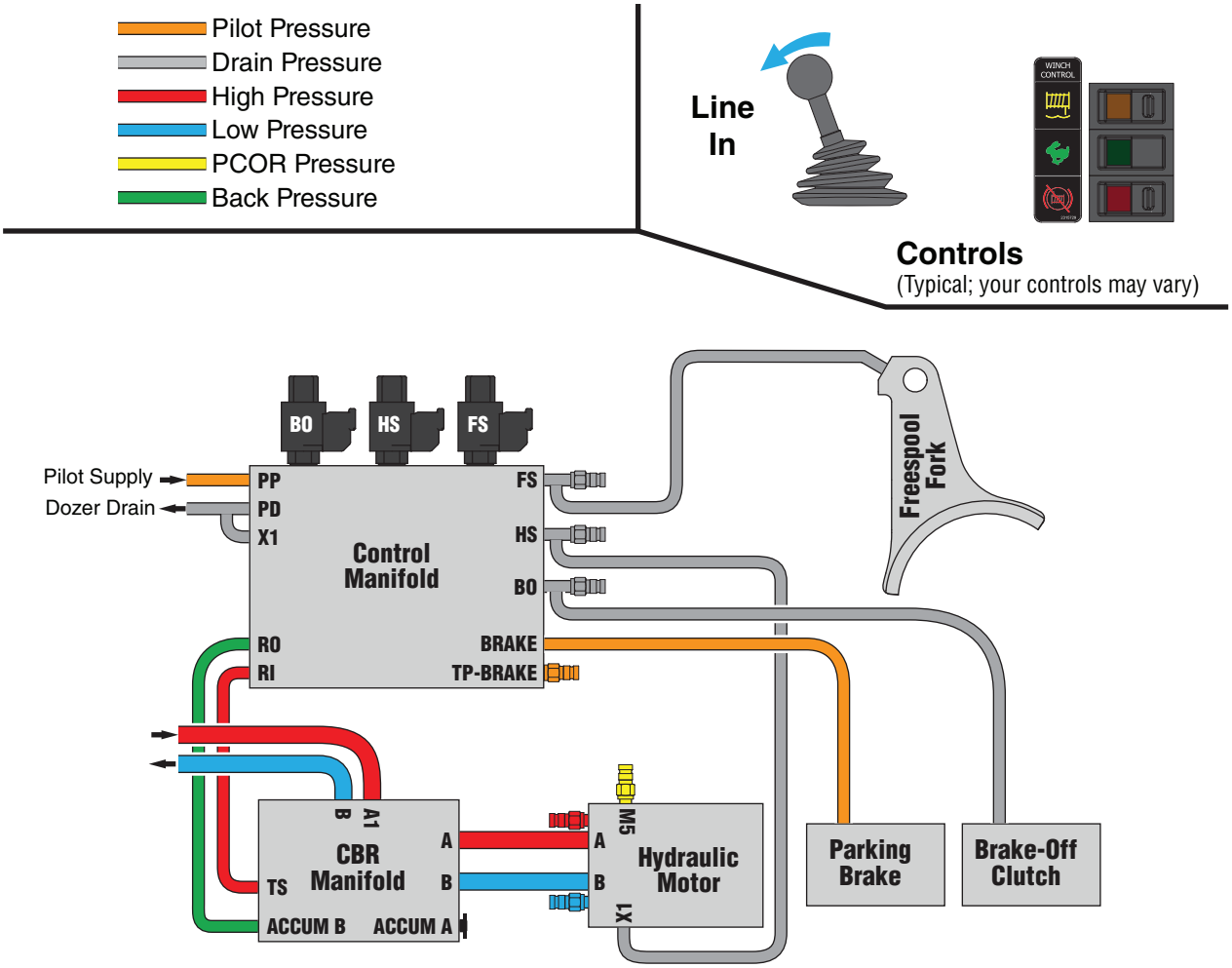


Figure 1-43 Sequence of Operation - LINE-IN, Group 4

Sequence of Operation - LINE-IN

See Figure 1-43. Pulling the control lever toward the operator sends full supply pressure to the CBR manifold port "A1". Oil flows through a check valve in the counterbalance valve cartridge, and continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch.

Simultaneously, full supply pressure is sent to the control manifold port “RI”, which then sends pilot supply pressure to the brake release port, and the brake is fully released.

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

Oil flows through the motor, back through the CBR manifold and to the tractor reservoir.

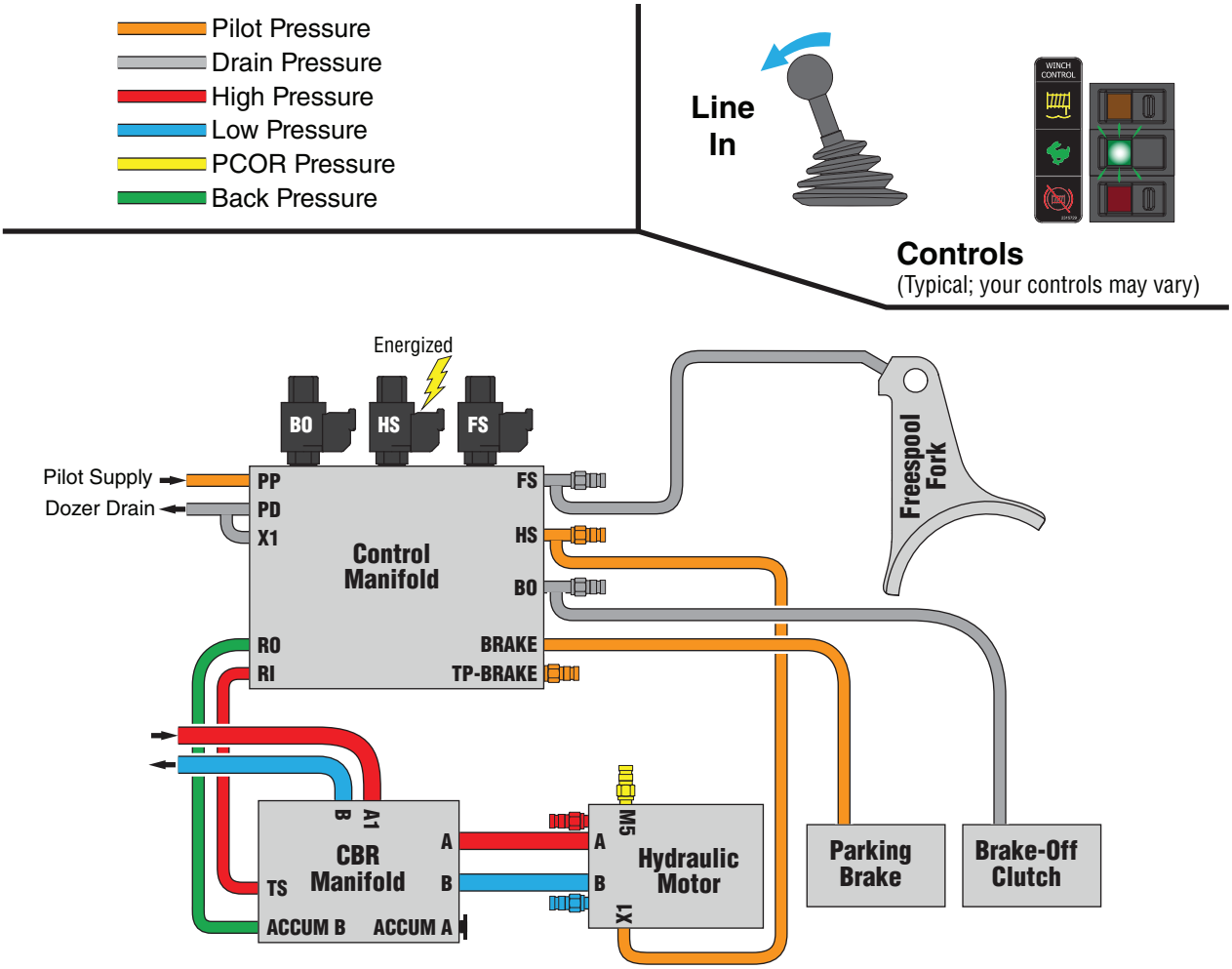


Figure 1-44 Sequence of Operation - LINE-IN with HI-SPEED, Group 4

Sequence of Operation - LINE-IN with HI-SPEED

See Figure 1-44. Pulling the control lever toward the operator sends full supply pressure to the CBR manifold port "A1". Oil flows through a check valve in the counterbalance valve cartridge, and continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch.

Simultaneously, full supply pressure is sent to the control manifold port “RI”, which then sends pilot supply pressure to the brake release port, and the brake is fully released.

When the **HI-SPEED** switch is activated, an electric signal shifts the **HI-SPEED** solenoid valve, directing pilot pressure to the X1 port on the hydraulic motor. This reduces displacement in the motor to the minimum setting, increasing line speed.

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

Oil flows through the motor, back through the CBR manifold and to the tractor reservoir.

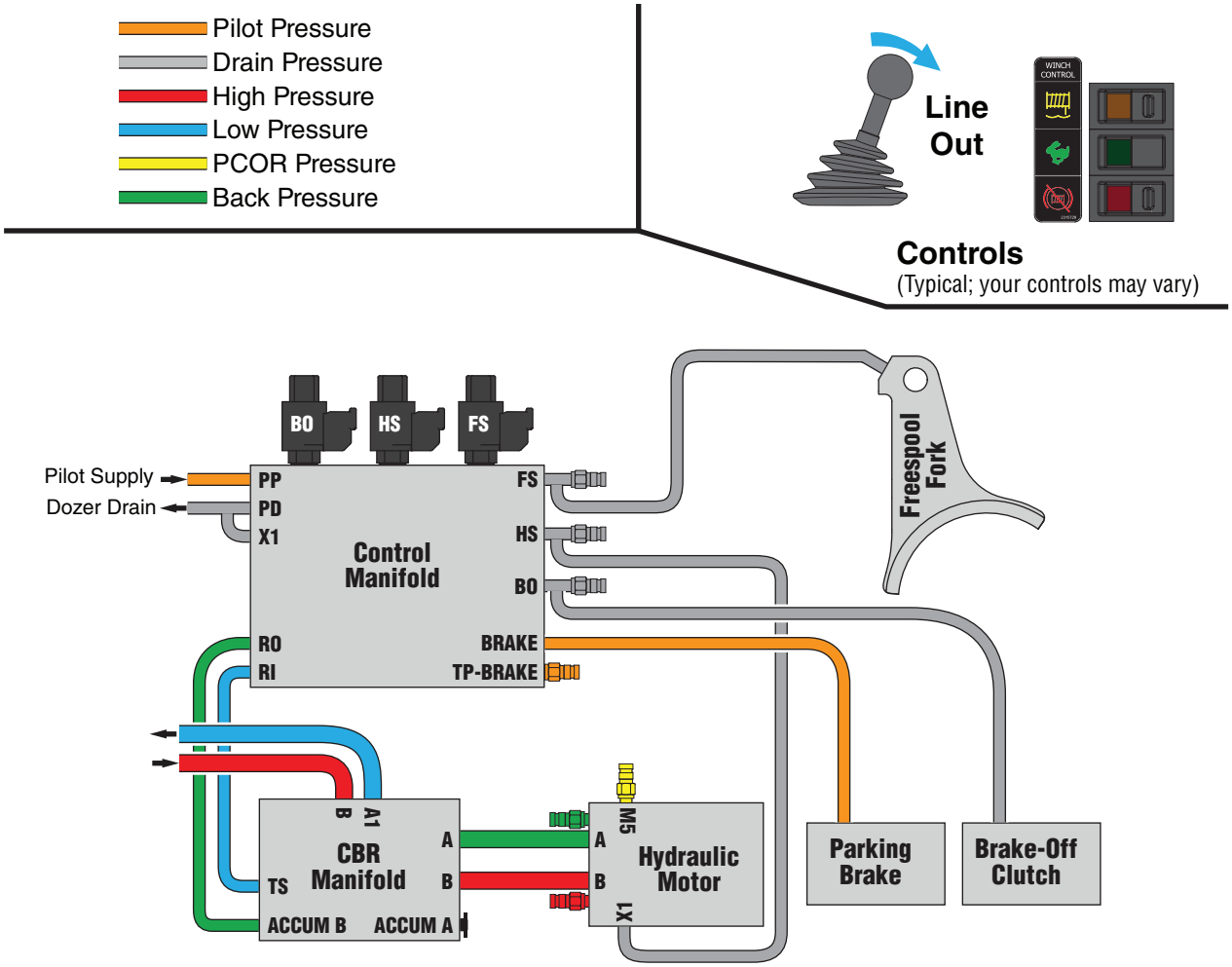


Figure 1-45 Sequence of Operation - LINE-OUT, Group 4

Sequence of Operation - LINE-OUT

See Figure 1-45. **LINE-OUT** operation is similar to **LINE-IN** except moving the control lever away from the operator directs full supply pressure is sent to motor "B" port, and returns through "A" port.

Back pressure is sent to the control manifold port "RO", which releases the brake, the same as in **LINE-IN** mode.

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

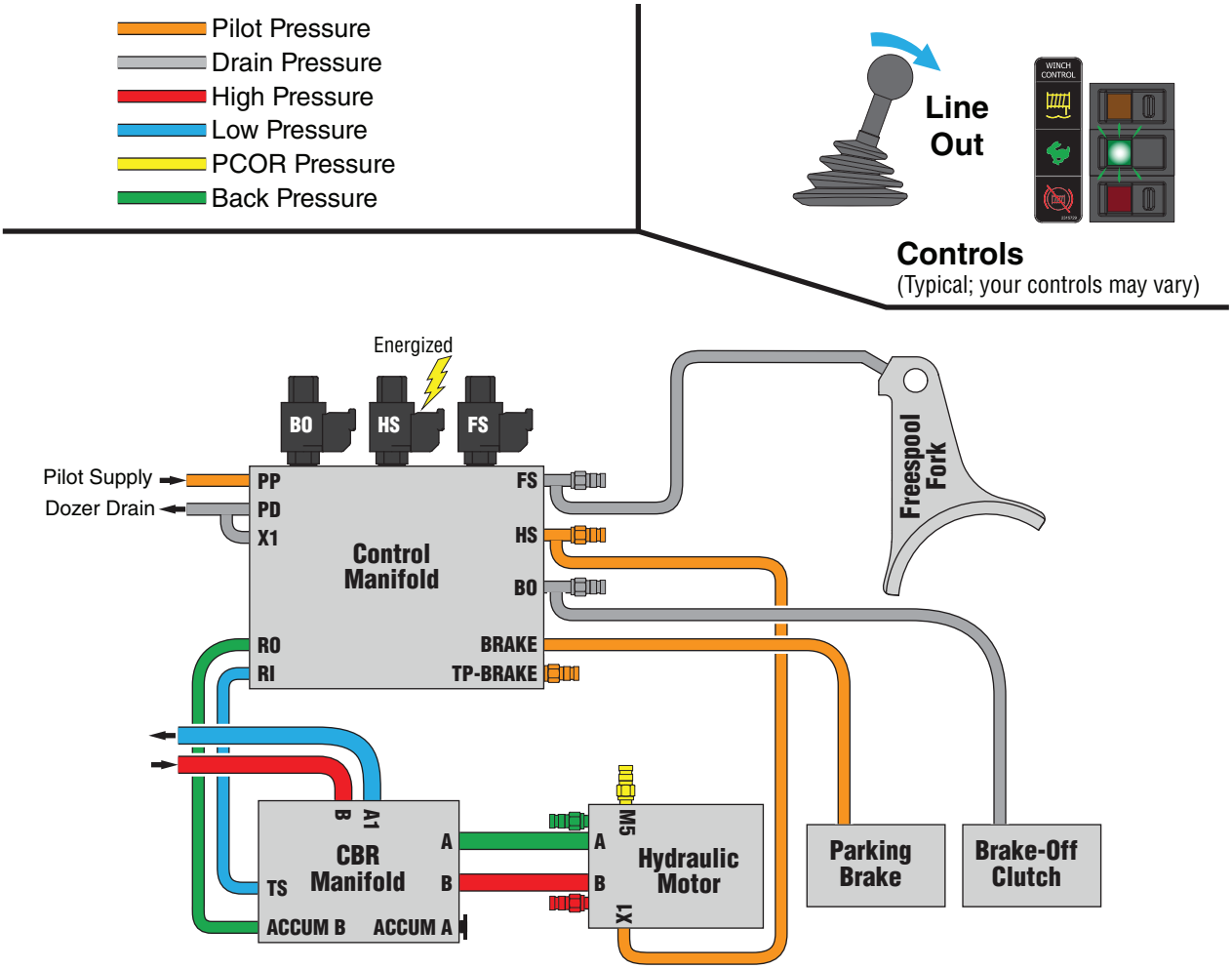


Figure 1-46 Sequence of Operation - LINE-OUT with HI-SPEED, Group 4

Sequence of Operation - LINE-OUT with HI-SPEED

See Figure 1-46. **LINE-OUT with HI-SPEED** operation is similar to **LINE-IN with HI-SPEED** except moving the control lever away from the operator directs full supply pressure is sent to motor "B" port, and returns through "A" port.

Back pressure is sent to the control manifold port "RO", which releases the brake, the same as in **LINE-IN** mode.

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

When the **HI-SPEED** switch is activated, an electric signal shifts the **HI-SPEED** solenoid valve, directing pilot pressure to the X1 port on the hydraulic motor. This reduces displacement in the motor to the minimum setting, increasing line speed.

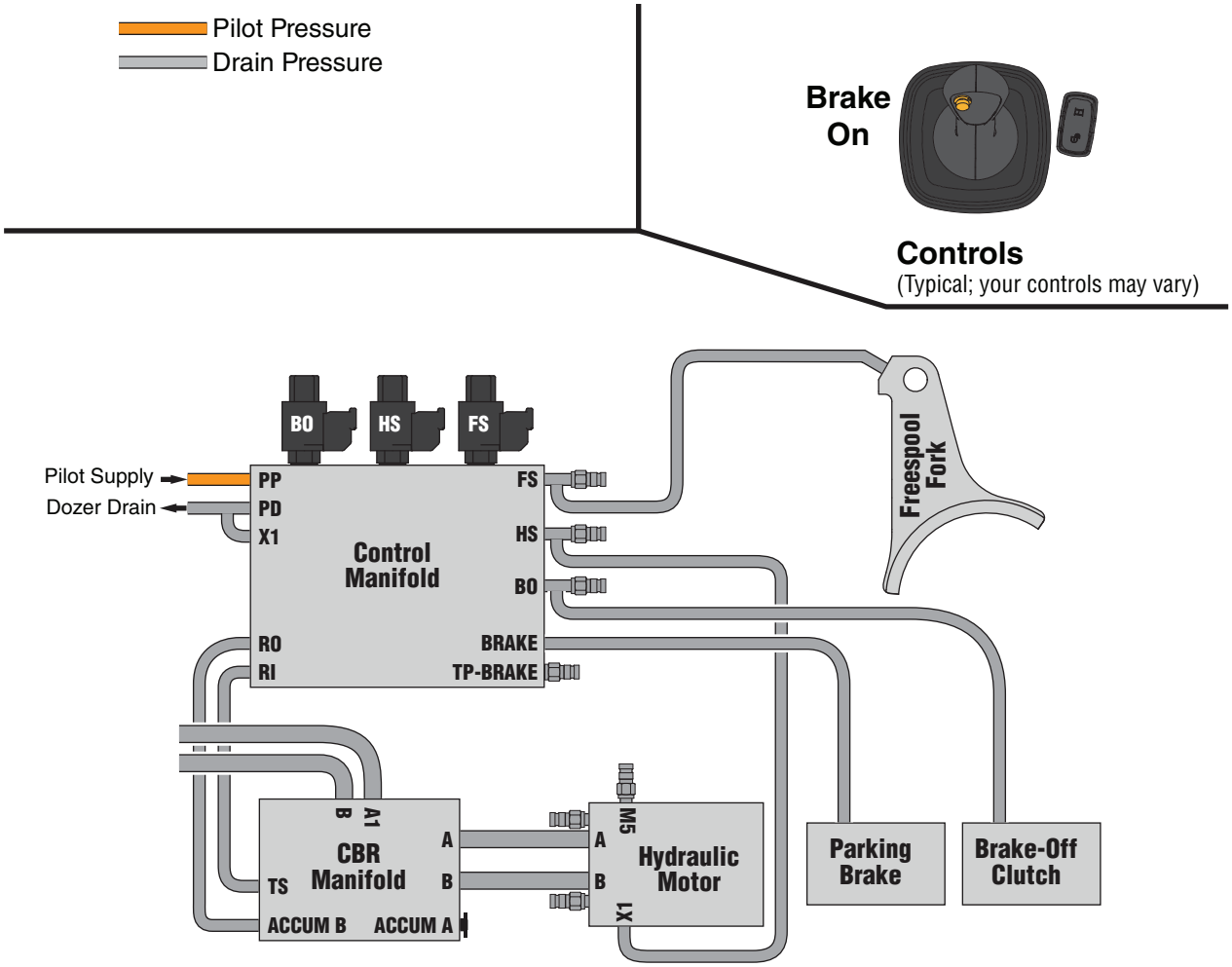


Figure 1-47 Sequence of Operation - BRAKE-ON, Group 5

Sequence of Operation - Group 5

This section is applicable to installations on dozers shown in Figure 1-48 with vehicle code “C712”, and using the CAT control lever.

Sequence of Operation - BRAKE-ON

See Figure 1-47. Pilot pressure is present at the control manifold. All other lines are open to tank. The spring-applied holding brake locks the motor shaft from rotating.

Vehicle Code	Dozer Model
C712	D6/D6XE BUILD 20A

Figure 1-48 Group 5 Installations

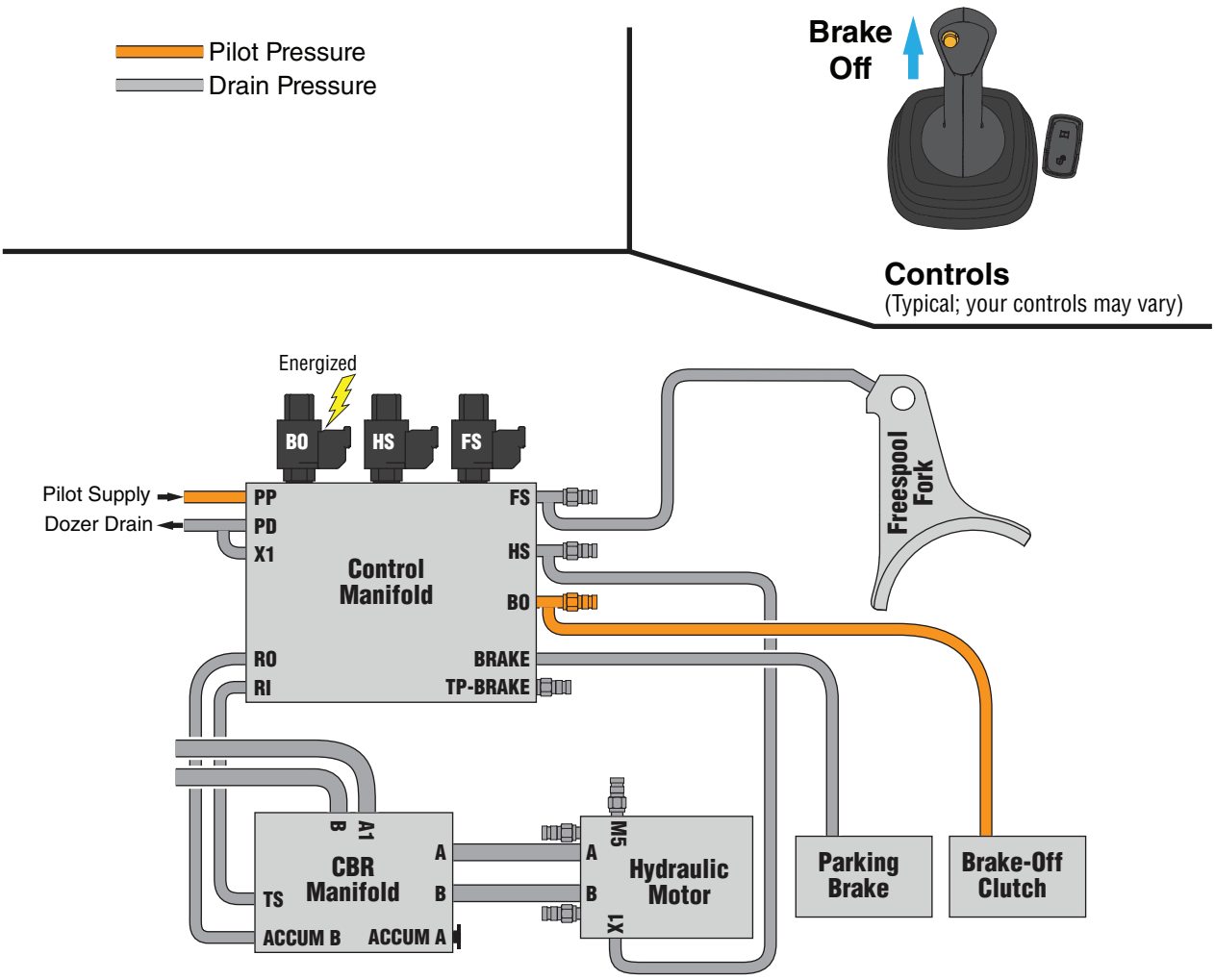


Figure 1-49 Sequence of Operation - BRAKE-OFF, Group 5

Sequence of Operation - BRAKE-OFF

See Figure 1-49. **BRAKE-OFF** is activated by pushing the control lever away from the operator. An electric signal shifts the **BRAKE-OFF** solenoid valve directing pilot pressure to release the spring applied, brake-off clutch.

BRAKE-OFF will remain activated when the control lever is returned to the neutral position, and is only deactivated by moving the control lever again away from the operator, or left or right to activate **LINE-IN** or **LINE-OUT**.

⚠ WARNING

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

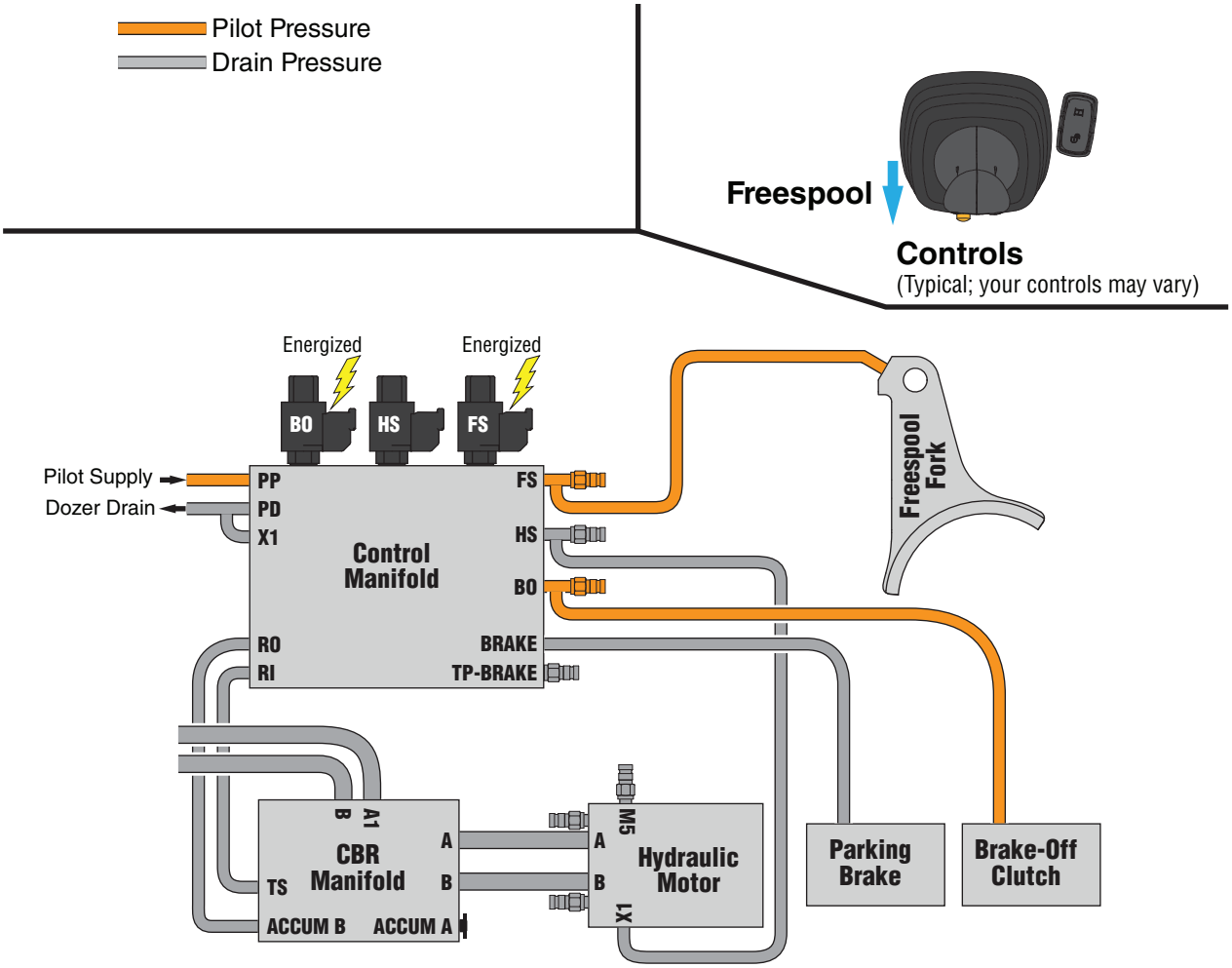


Figure 1-50 Sequence of Operation - FREESPOOL, Group 5

Sequence of Operation - FREESPOOL

See Figure 1-50. **FREESPOOL** is activated by pulling the control lever towards the operator. When **FREESPOOL** is activated, an electric signal is sent to both the **FREESPOOL** and the **BRAKE-OFF** solenoid valves. Pilot oil pressure is diverted to the **FREESPOOL** piston. Pilot control pressure moves the **FREESPOOL** shifter fork, allowing the dental clutch to disengage the drum pinion gear from the intermediate gear. The gear train is disengaged from the drum gear so the wire rope can be pulled from the drum by hand. At the same time, pilot pressure releases the spring applied, brake-off clutch.

FREESPOOL will remain activated when the control lever is returned to the neutral position, and is only deactivated by pulling the control lever again towards the operator, or left or right to activate **LINE-IN** or **LINE-OUT**.

The dental collar may not fully re-engage until the motor is powered in **LINE-IN** or **LINE-OUT**.

⚠ WARNING

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

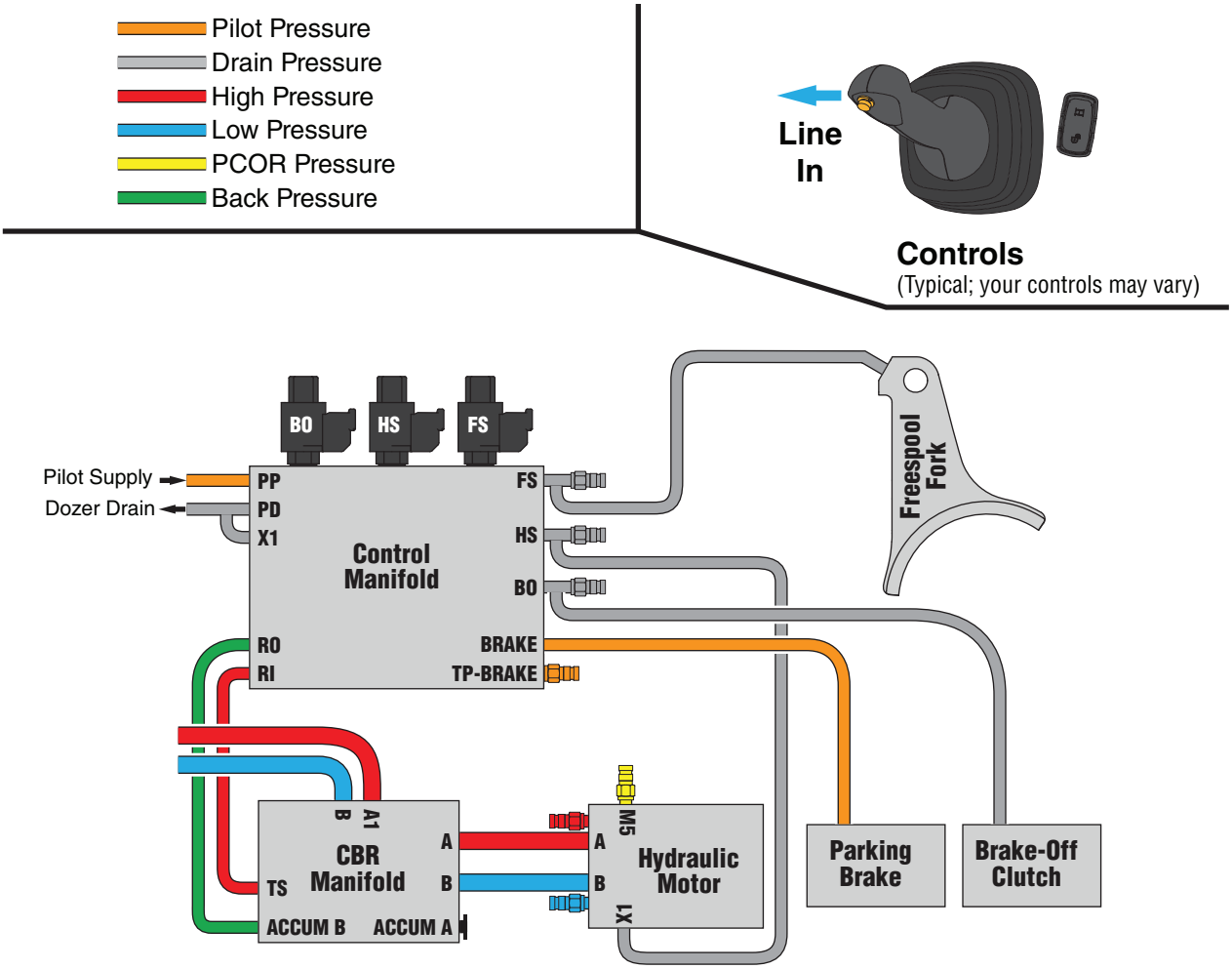


Figure 1-51 Sequence of Operation - LINE-IN, Group 5

Sequence of Operation - LINE-IN

See Figure 1-51. Pushing the control lever to the left sends full supply pressure to the CBR manifold port "A1". Oil flows through a check valve in the counterbalance valve cartridge, and continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch.

Simultaneously, full supply pressure is sent to the control manifold port “RI”, which then sends pilot supply pressure to the brake release port, and the brake is fully released.

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

Oil flows through the motor, back through the CBR manifold and to the tractor reservoir.

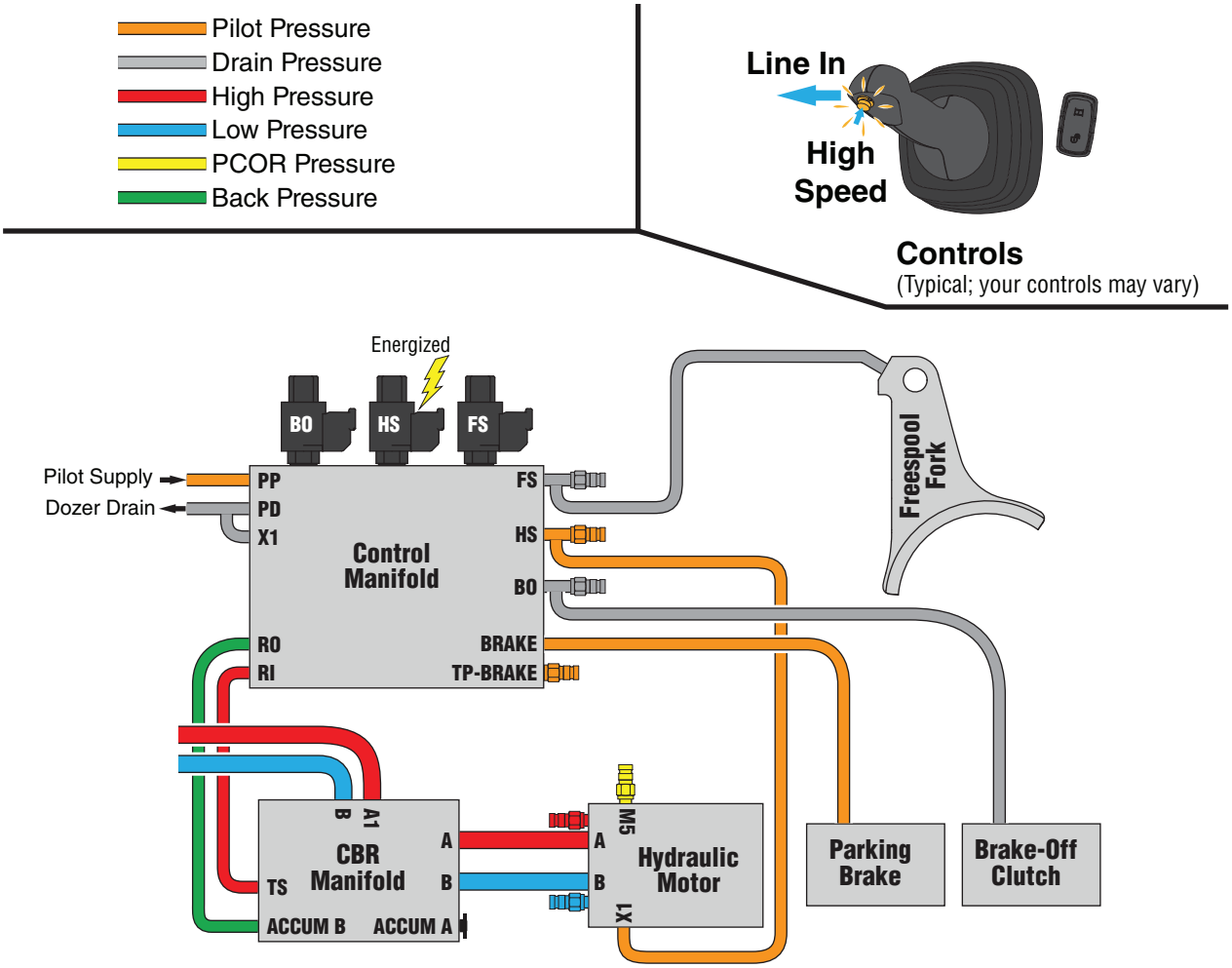


Figure 1-52 Sequence of Operation - LINE-IN with HI-SPEED, Group 5

Sequence of Operation - LINE-IN with HI-SPEED

See Figure 1-52. Pushing the control lever to the left sends full supply pressure to the CBR manifold port "A1". Oil flows through a check valve in the counterbalance valve cartridge, and continues through to the inlet A port of the hydraulic motor and builds pressure from the induced load on the winch.

Simultaneously, full supply pressure is sent to the control manifold port “RI”, which then sends pilot supply pressure to the brake release port, and the brake is fully released.

Press the button on the control lever once to activate **HI-SPEED** mode. When in **HI-SPEED** mode, an electric signal shifts the **HI-SPEED** solenoid valve, directing pilot pressure to the X1 port on the hydraulic motor. This reduces displacement in the motor to the minimum setting, increasing line speed. Press the button again to disable **HI-SPEED** mode.

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

Oil flows through the motor, back through the CBR manifold and to the tractor reservoir.

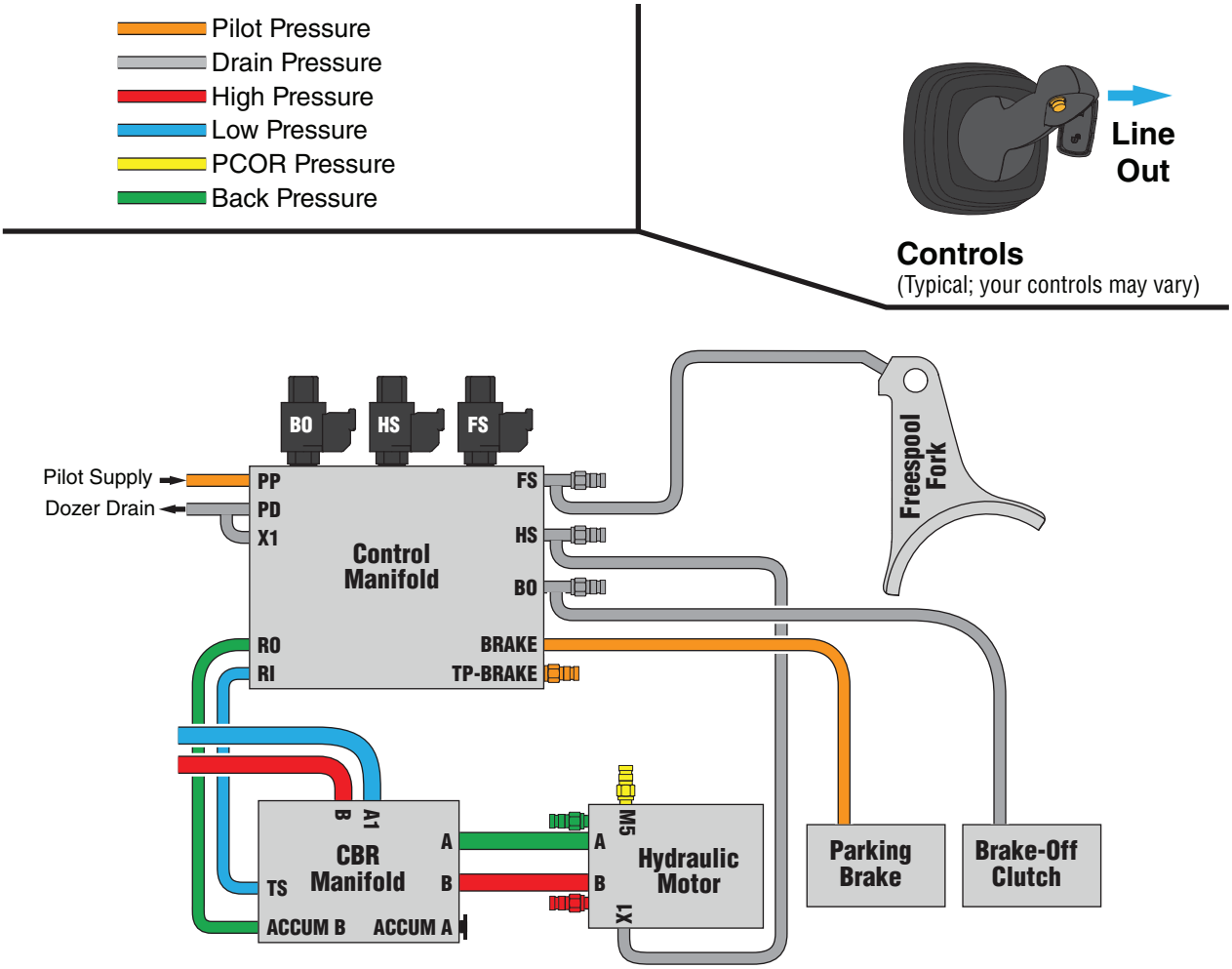


Figure 1-53 Sequence of Operation - LINE-OUT, Group 5

Sequence of Operation - LINE-OUT

See Figure 1-53. **LINE-OUT** operation is similar to **LINE-IN** except moving the control lever to the right directs full supply pressure is sent to motor "B" port, and returns through "A" port.

Back pressure is sent to the control manifold port "RO", which releases the brake, the same as in **LINE-IN** mode.

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

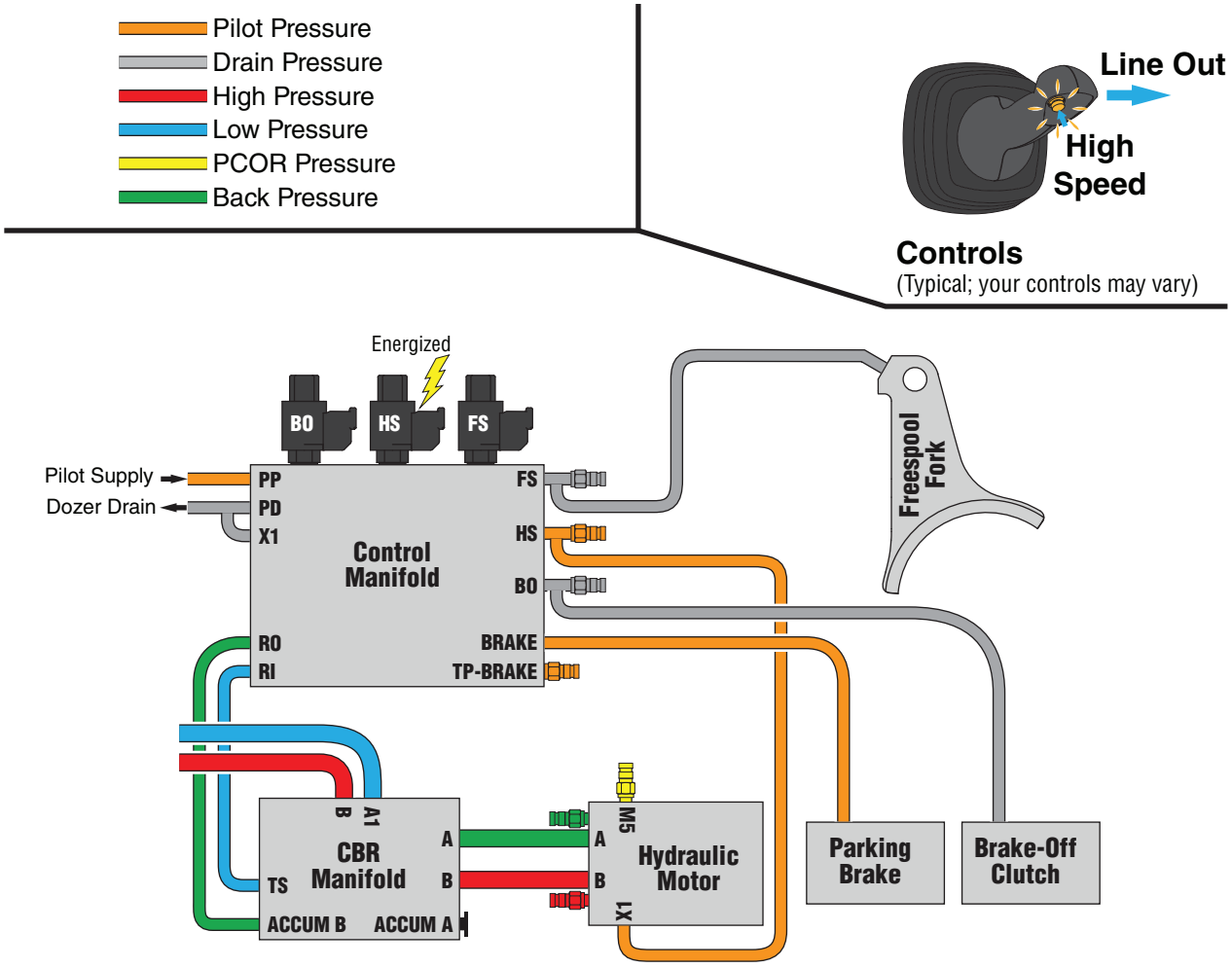


Figure 1-54 Sequence of Operation - LINE-OUT with HI-SPEED, Group 5

Sequence of Operation - LINE-OUT with HI-SPEED

See Figure 1-54. **LINE-OUT with HI-SPEED** operation is similar to **LINE-IN with HI-SPEED** except moving the control lever to the right directs full supply pressure is sent to motor "B" port, and returns through "A" port.

Back pressure is sent to the control manifold port "RO", which releases the brake, the same as in **LINE-IN** mode.

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

Press the button on the control lever once to activate **HI-SPEED** mode. When in **HI-SPEED** mode, an electric signal shifts the **HI-SPEED** solenoid valve, directing pilot pressure to the X1 port on the hydraulic motor. This reduces displacement in the motor to the minimum setting, increasing line speed. Press the button again to disable **HI-SPEED** mode.

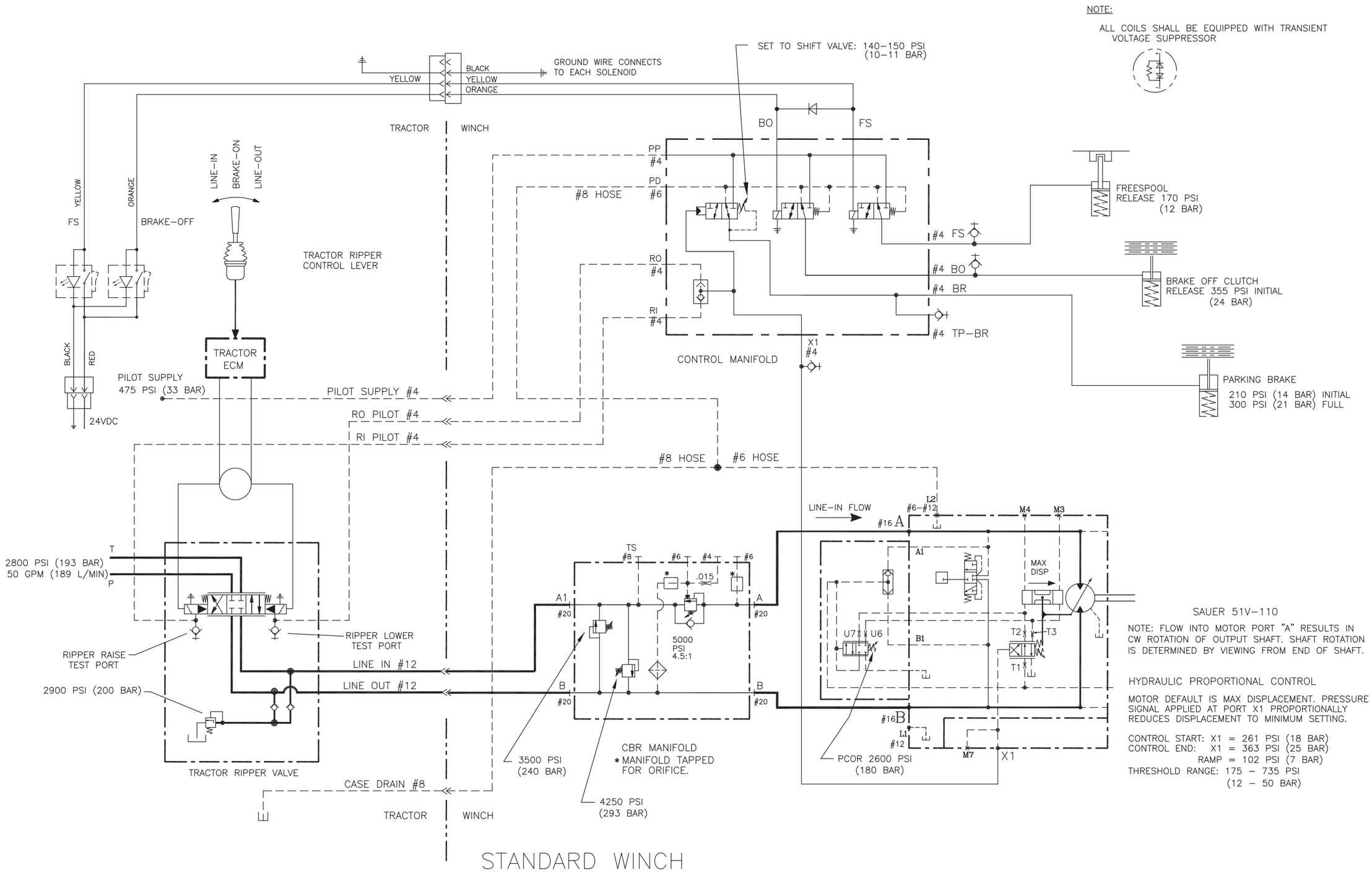
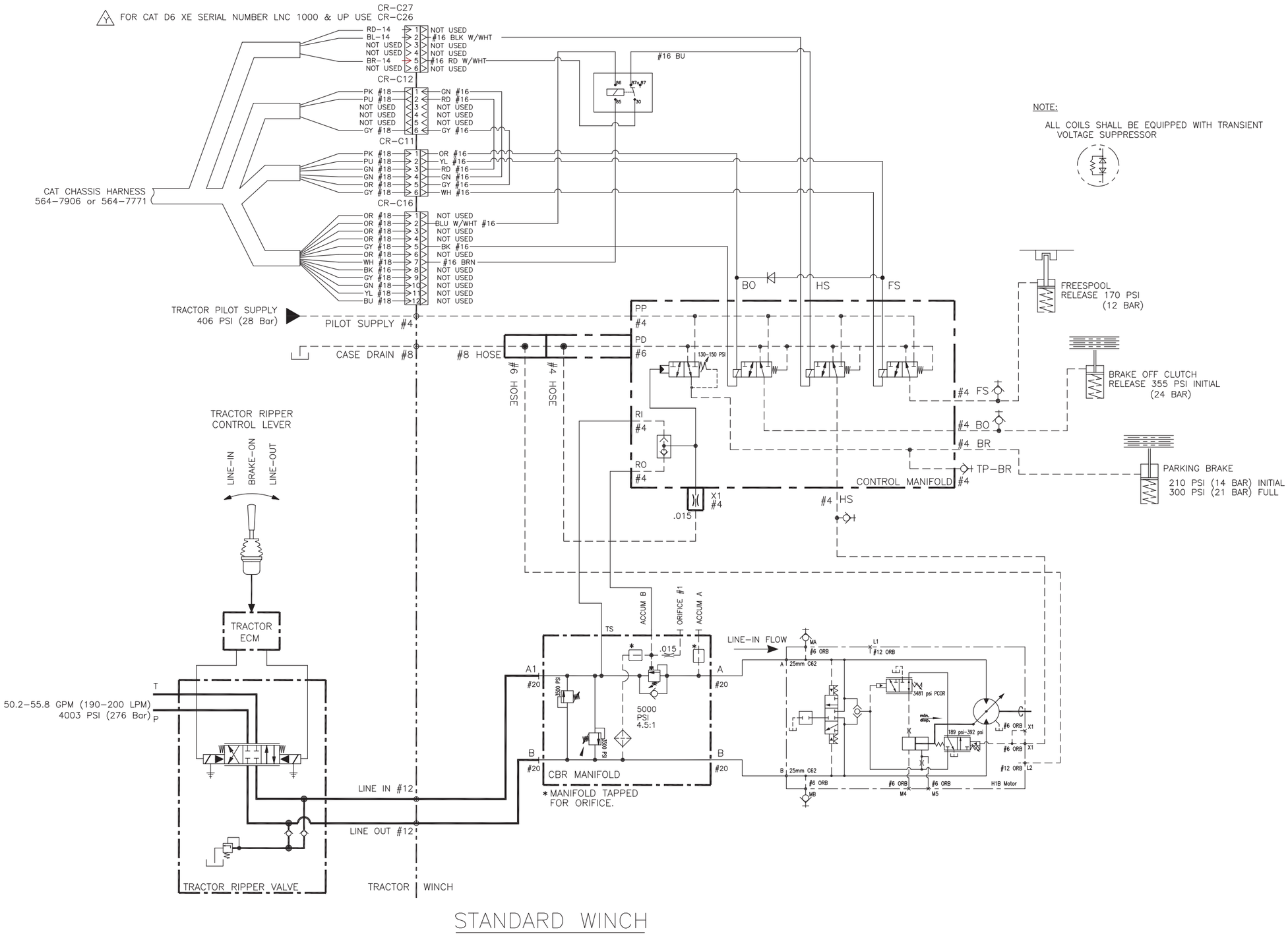


Figure 1-55 H6H Standard Hydraulic/Electrical Schematic, CAT D6T-Tier 4i (H6HT*B**C71)**



STANDARD WINCH

Figure 1-56 H6H Standard Hydraulic/Electrical Schematic, CAT D6 Build 20A (H6HT*DL**C712)**

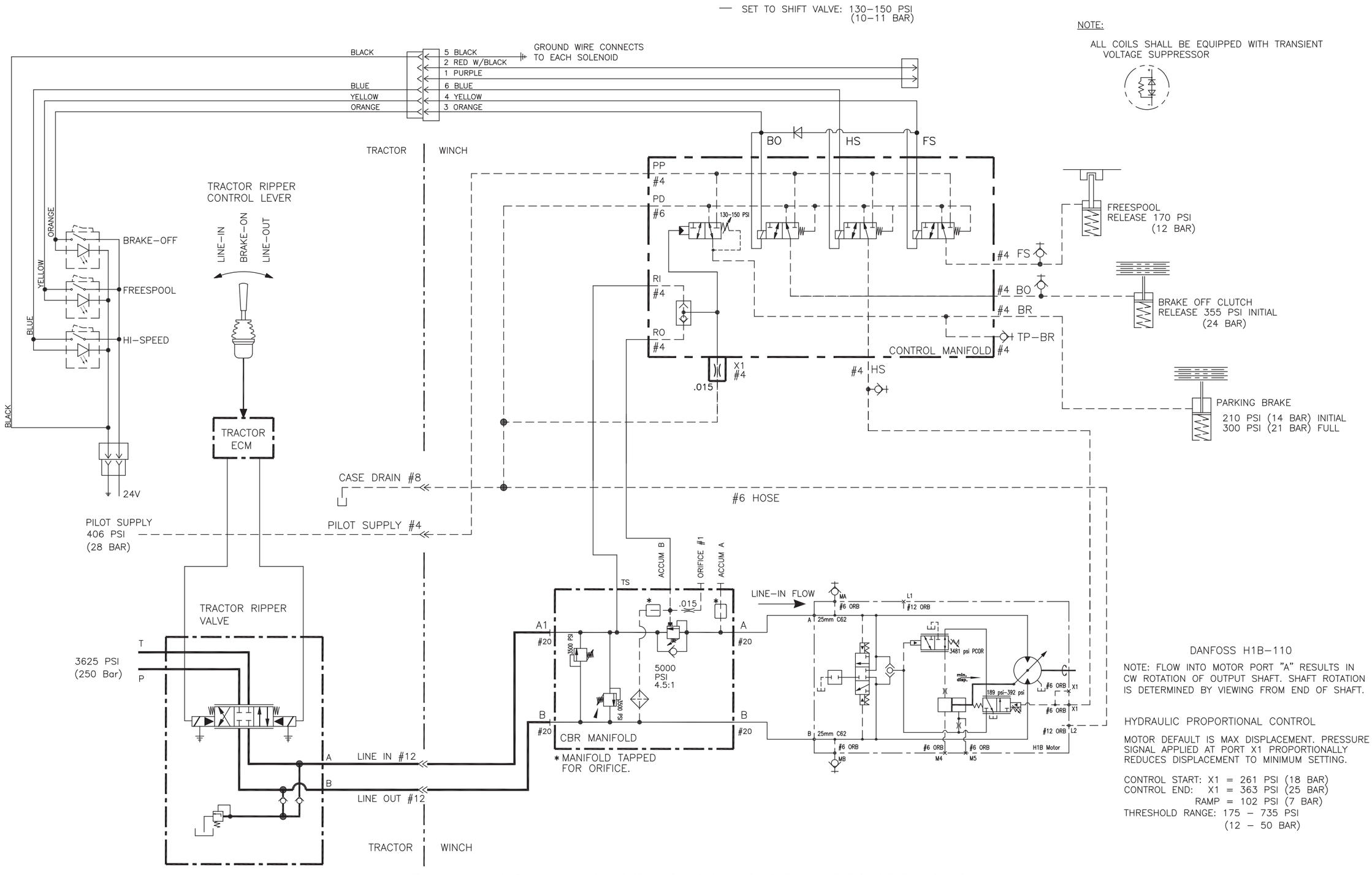


Figure 1-57 H6H Standard Hydraulic/Electrical Schematic, CAT D6K2 T4F (H6HT*D**C805)**

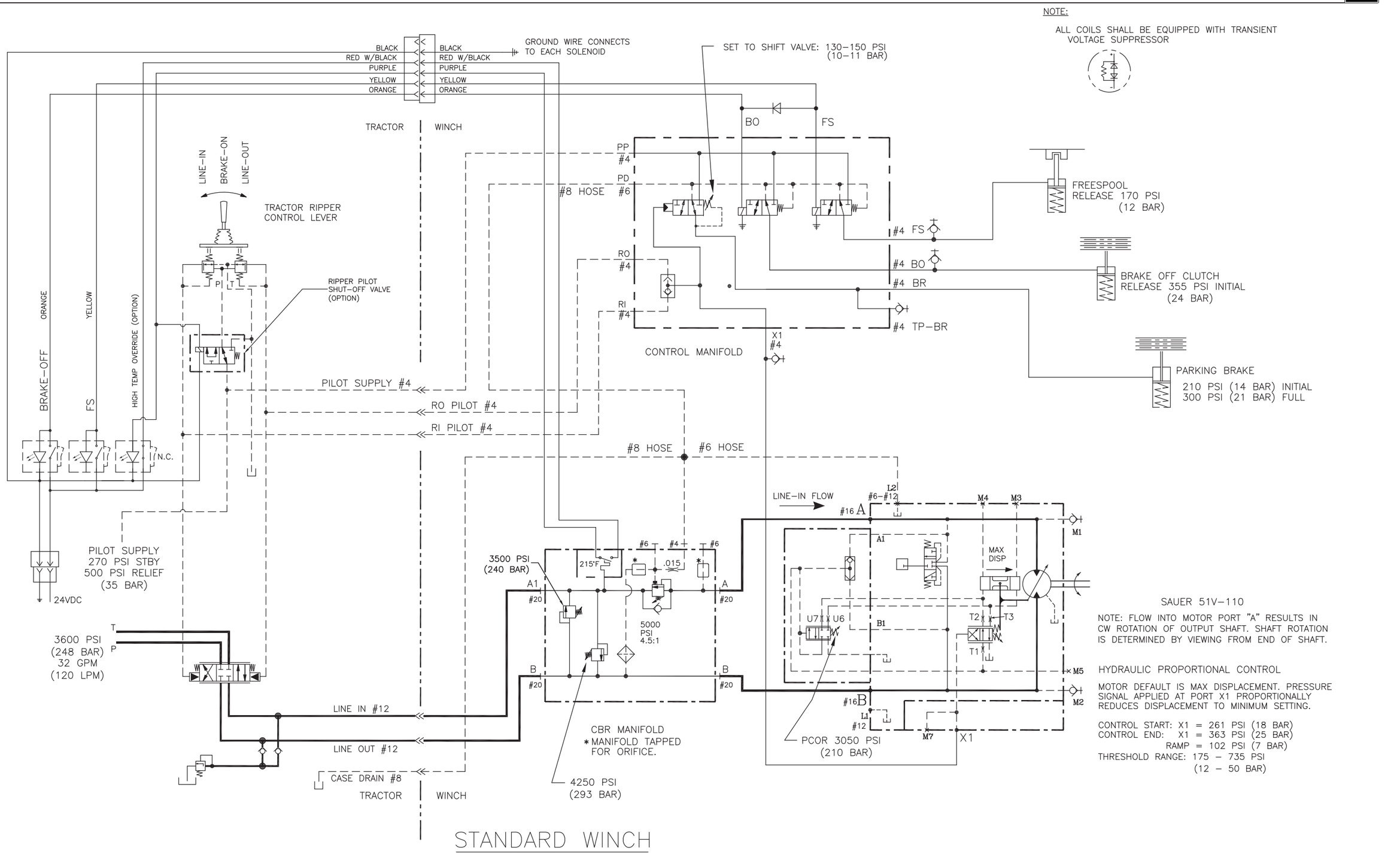
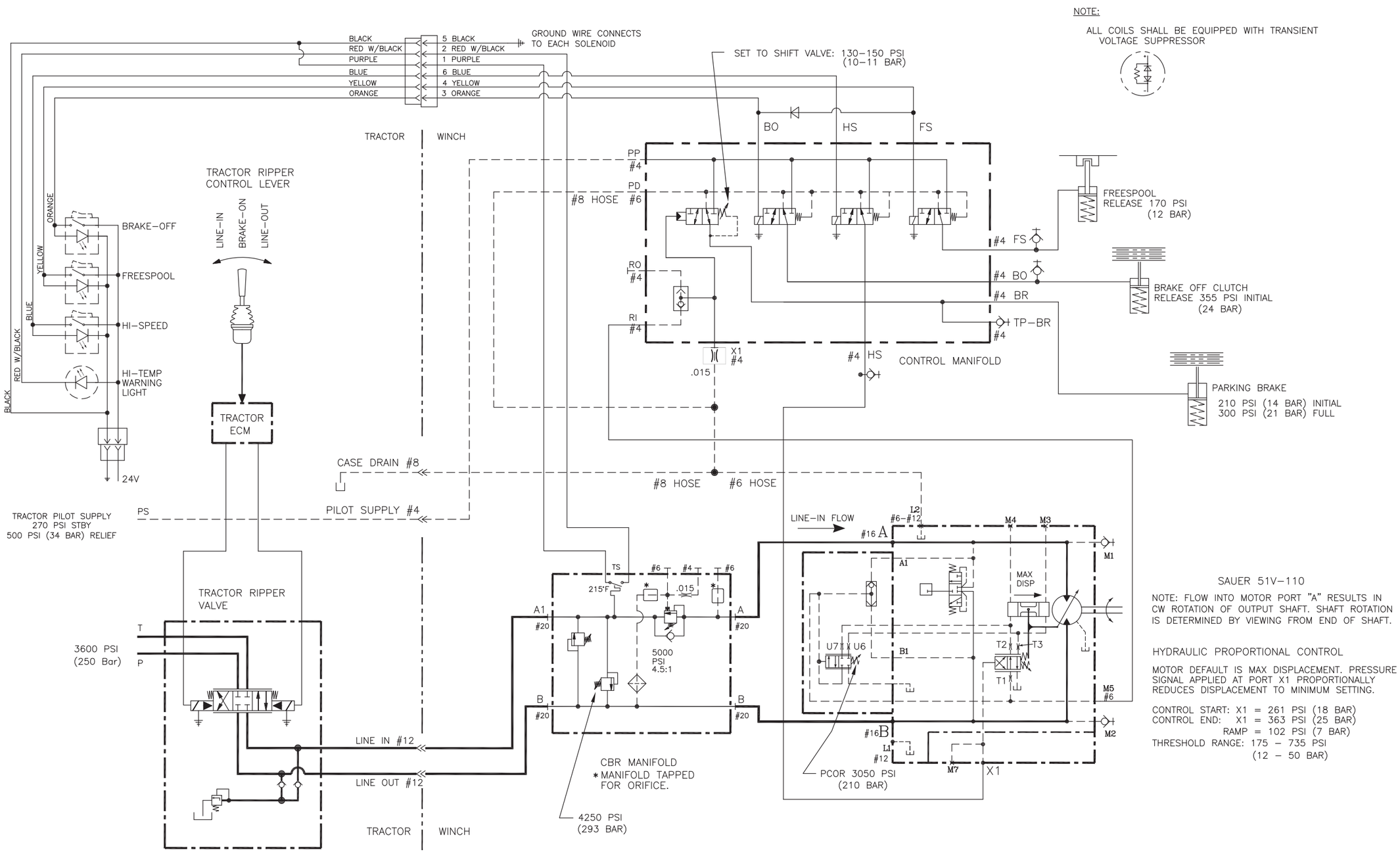


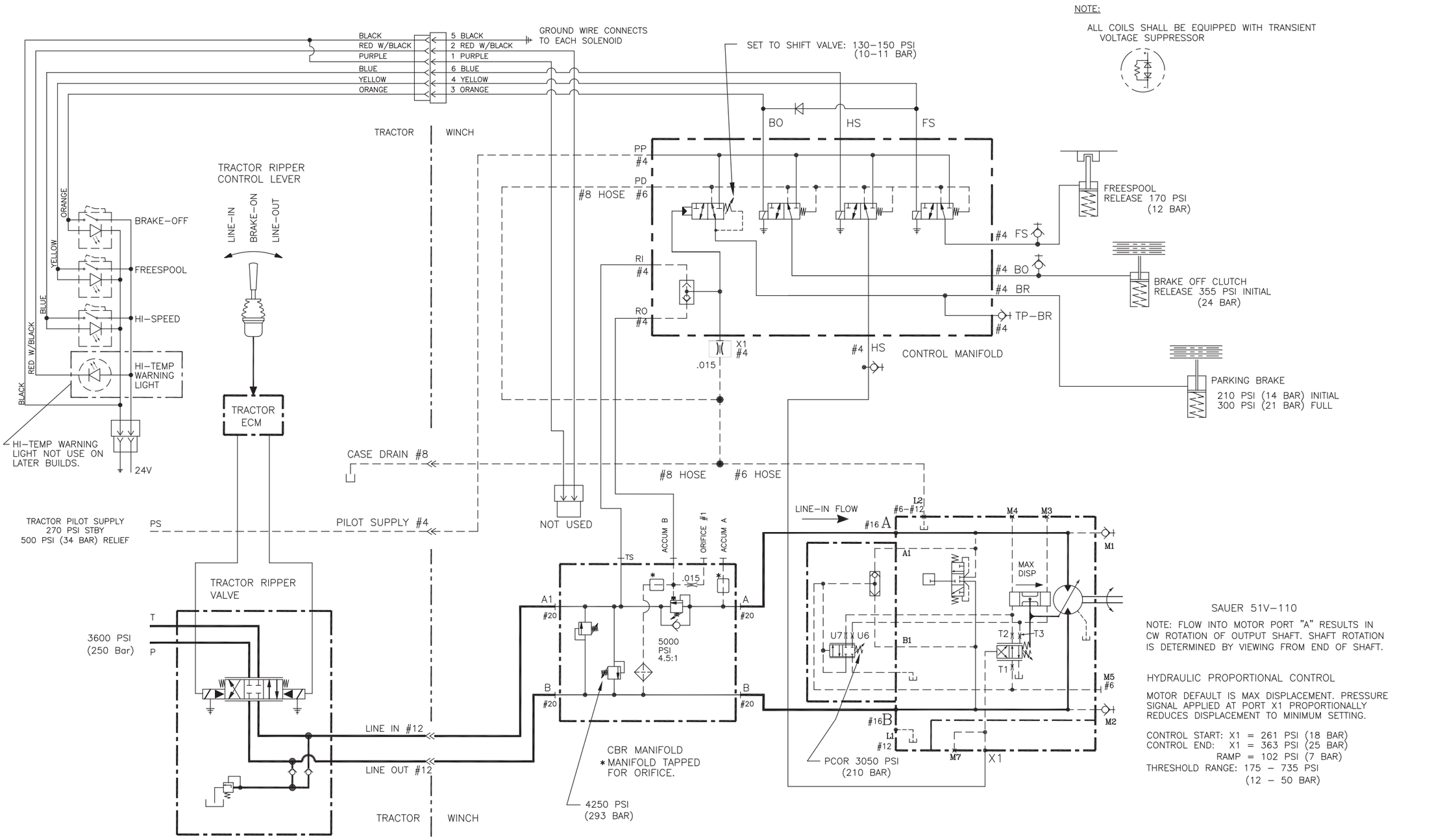
Figure 1-58 H6H Standard Hydraulic/Electrical Schematic, CAT D6N with Hydraulic Pilot Controls (H6HT*B**C81)**



STANDARD WINCH

LAST USED SER NO. 1562

Figure 1-59 H6H Standard Hydraulic/Electrical Schematic, CAT D6N with Electric/Hydraulic Controls (H6HT*D**C811) Last Used SN 1562**



STANDARD WINCH

FIRST USED SER NO. 1563

Figure 1-60 H6H Standard Hydraulic/Electrical Schematic, CAT D6N with Electric/Hydraulic Controls (H6HT*D**C811) First Used SN 1563**

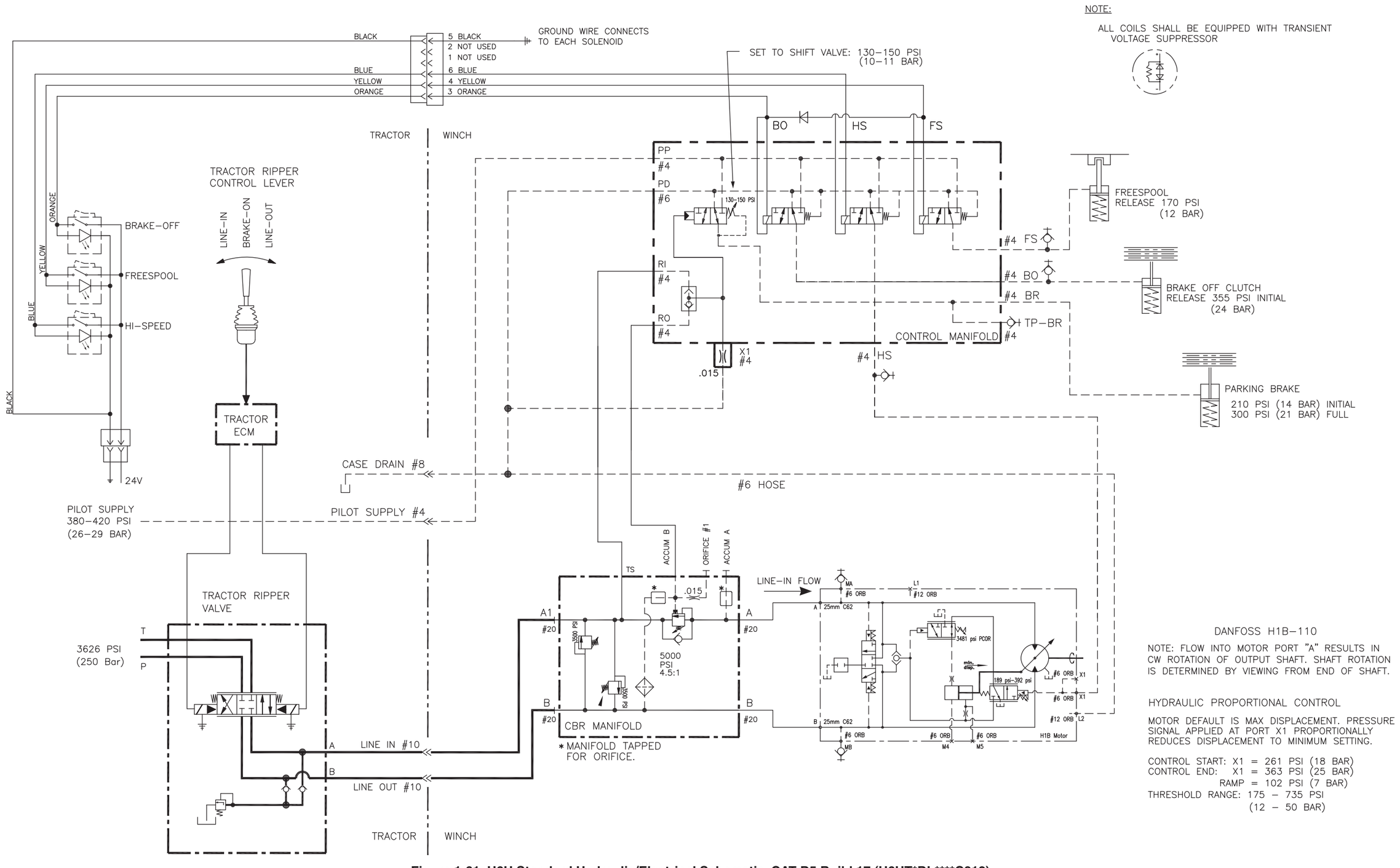
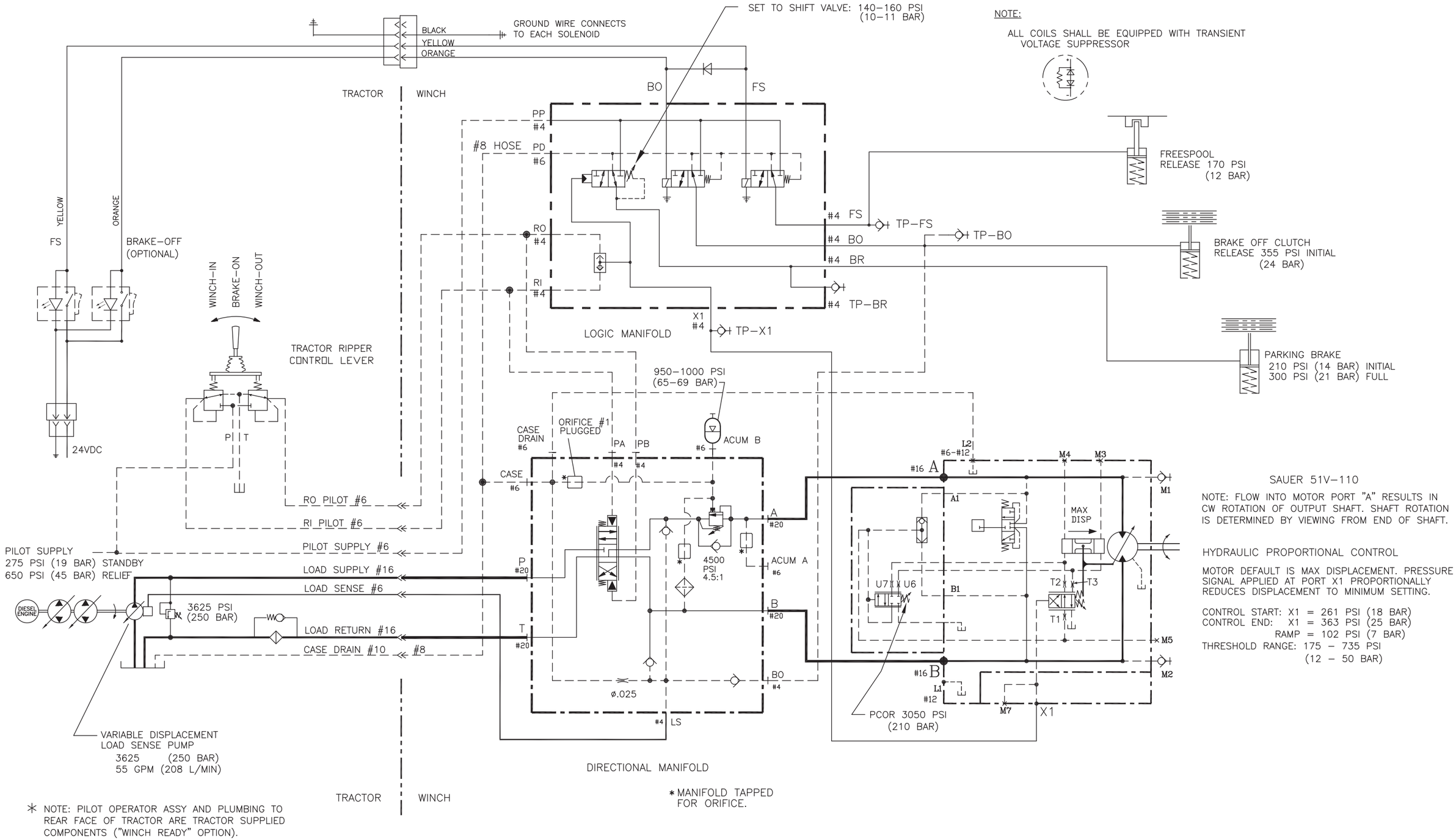


Figure 1-61 H6H Standard Hydraulic/Electrical Schematic, CAT D5 Build 17 (H6HT*DL**C812)**



SAUER 51V–110

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

HYDRAULIC PROPORTIONAL CONTROL

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

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

Figure 1-62 H6H High Performance Hydraulic/Electrical Schematic, John Deere 750/850J, 750/850K, Pilot Hydraulic Controls (H6HH*B**E460)**

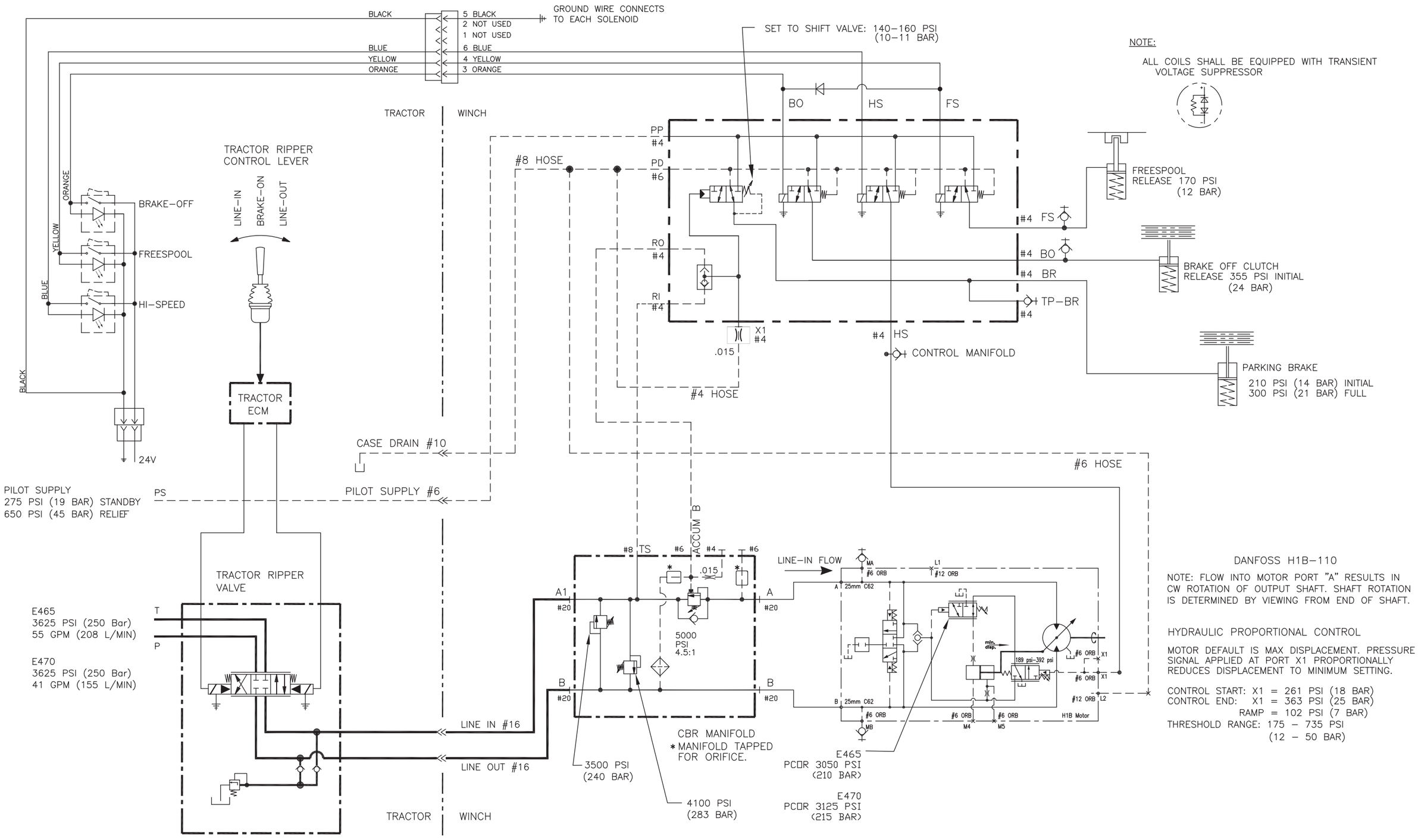


Figure 1-63 H6H High Performance Hydraulic/Electrical Schematic, John Deere 750K/850K/850L, Electric/Hydraulic Controls (H6HH*D**E465/E470)**

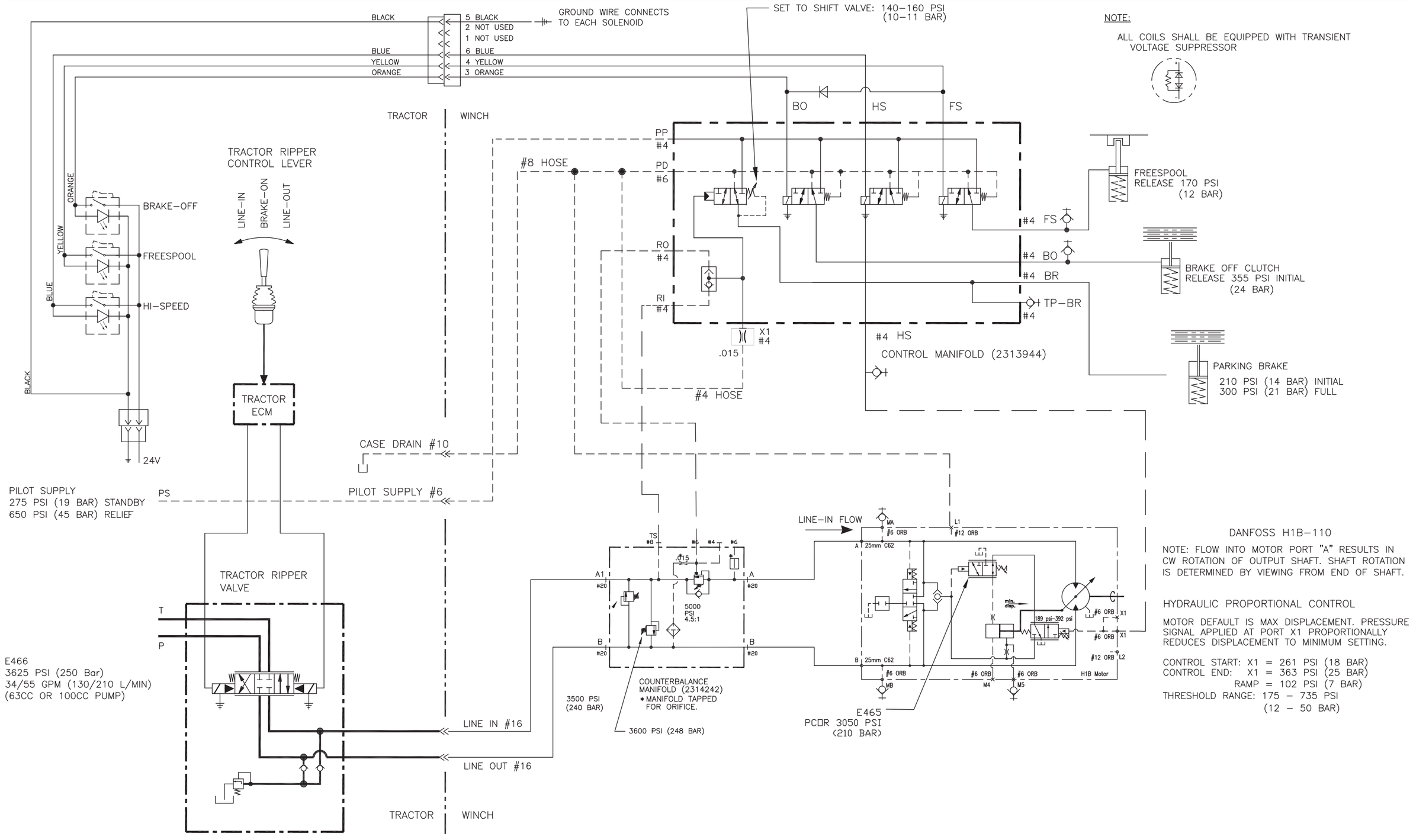


Figure 1-64 H6H High Performance Hydraulic/Electrical Schematic, John Deere 750L w/Hi-Flow Pump, Electric/Hydraulic Controls (H6HH*D**E466)**

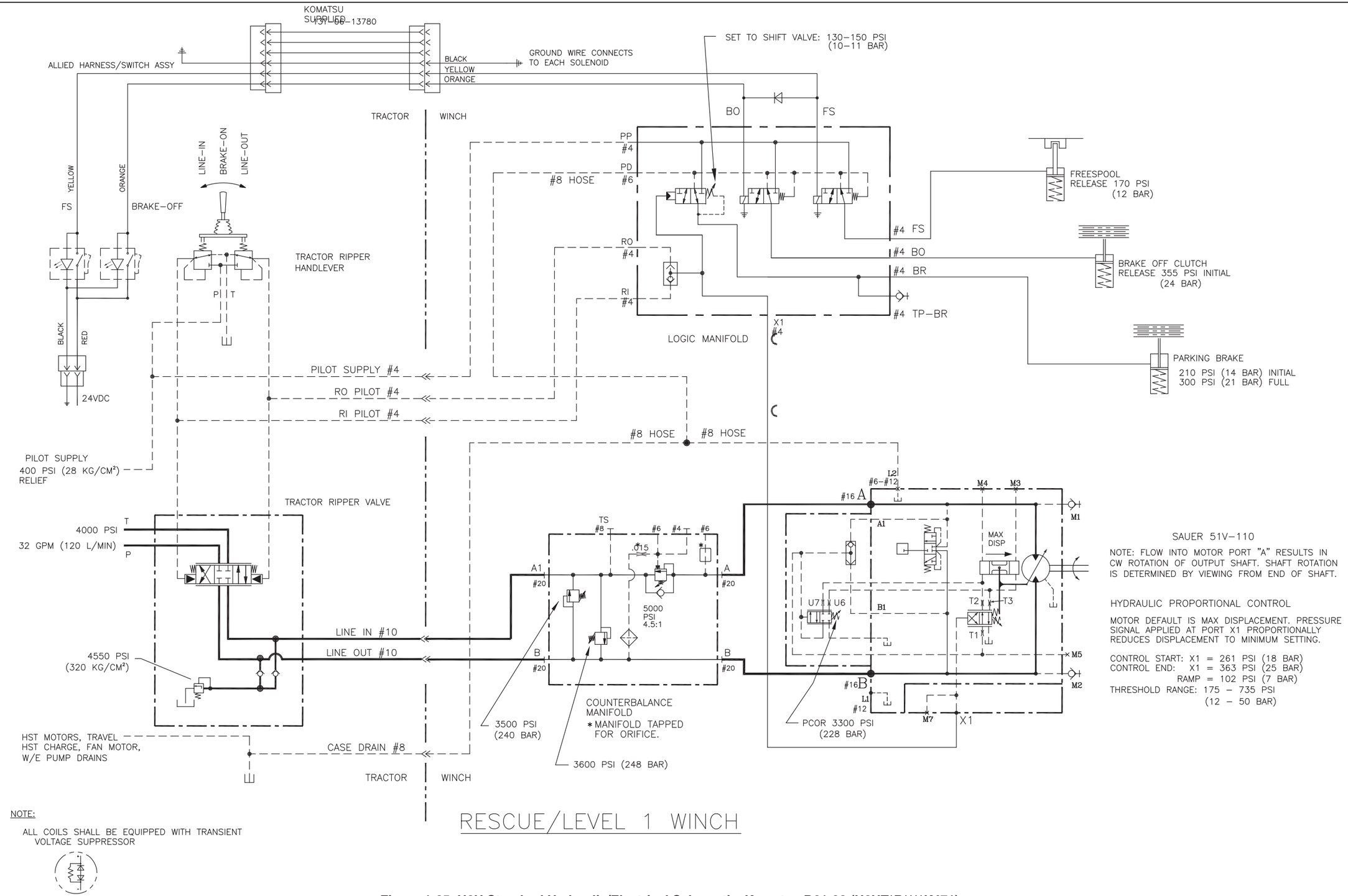
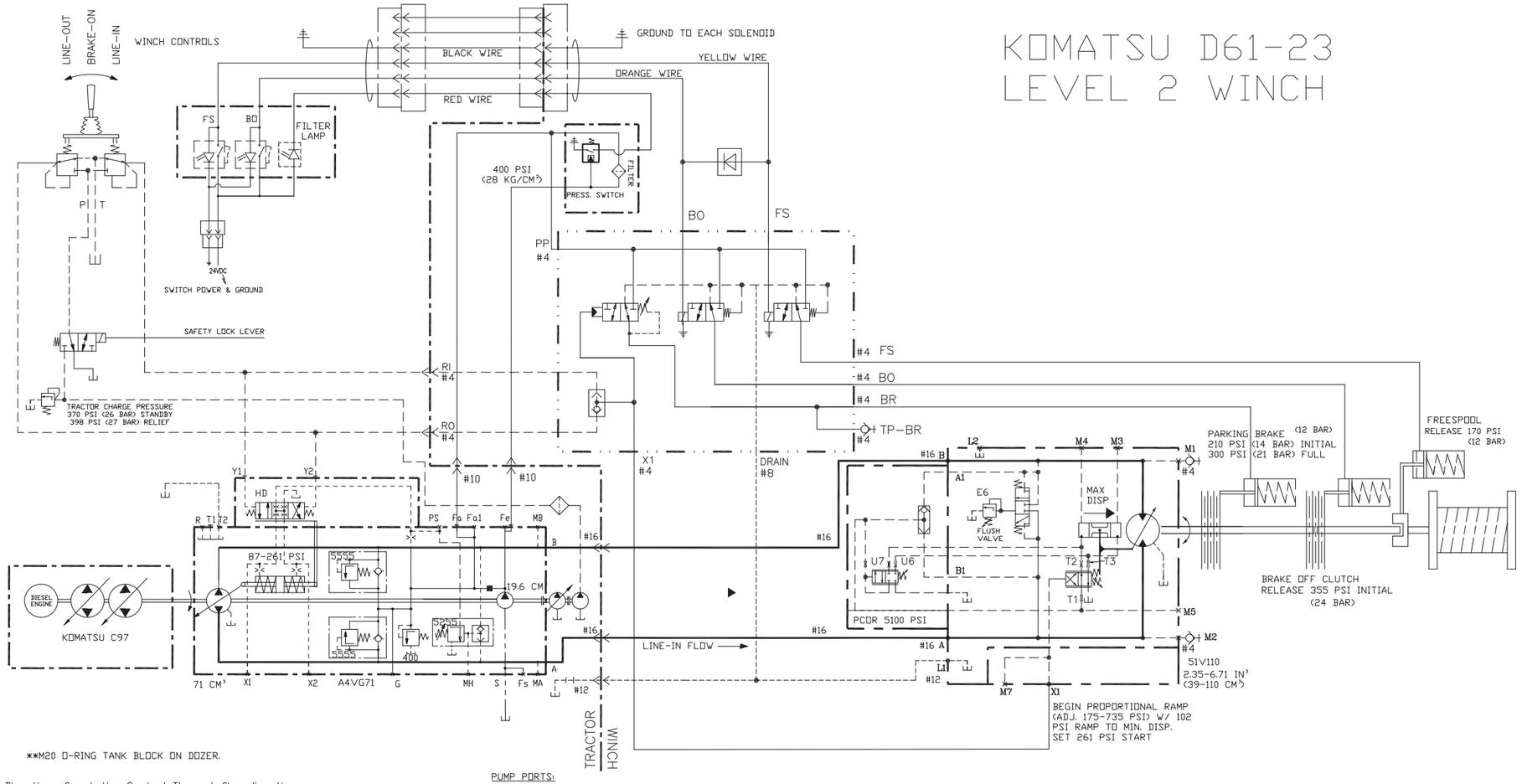


Figure 1-65 H6H Standard Hydraulic/Electrical Schematic, Komatsu D61-23 (H6HT*B**K471)**



**M20 O-RING TANK BLOCK ON DOZER.

Direction of rotation-Control-Thruput flow direction:
Clockwise rotation

Pilot pressure	Control pressure	Direction of flow	Operating pressure
Y1	X1	A to B	MB
Y2	X2	B to A	MA

CONTROL MANIFOLD PORTS

A,B	Main pressure lines
Y1/Y2	Control pressure to brake valve and motor displacement controller.
PS	Pilot pressure supply
DRAIN	Drain port for BR, FS, BO, and X1
TP-BR	Gauge port-Brake pressure
X1	Motor displacement control pressure port

NOTES:

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

PUMP PORTS:

A B	high pressure ports 3/4" SAE 420 bar (6000 psi-code 62)		
T_1	case drain or filling port	1 1/16-12UN-2B	20 deep
T_2	case drain port	1 1/16-12UN-2B	20 deep
M_A	gauge port-sys. pressure A	7/16-20UNF-2B	12 deep
M_B	gauge port-sys. pressure B	7/16-20UNF-2B	12 deep
R	case vent port	7/16-20UNF-2B	12 deep
S	charge suction port	1 5/8-12UN-2B	20 deep
X_1 X_2	stroking pressure ports	7/16-20UNF-2B	12 deep
G	charge pressure port	3/4-16UNF-2B	15 deep
F_{PR}	control pressure gauge port	9/16-18UNF-2B	13 deep
F_o	filter outlet	1 1/16-12UN-2B	20 deep
F_{o1}	filter outlet (filter assembly)	M22x1.5	14 deep
F_e	filter inlet	M22x1.5	14 deep
F_s	port from filter to suction line (cold start)	M22x1.5	14 deep
M_H	gauge port-high pressure	7/16-20UNF-2B	12 deep
Y Z	Remote control ports	9/16-18UNF-2B	13 deep

MOTOR PORTS:

A,B	Main pressure lines (max allowable 6960 psi)
L1,L2	Drain lines
M1,M2	Gauge port for port A & B
M3,M4	Gauge port-servo pressure
M5	Gauge port-servo supply
M7	Gauge port-control pressure
X1	Control pressure port

Flow to A for line-in.
Biased to max. displacement
Control end min. displacement
PCOR (w/o brake press. defeat)--Automatic shift to max. disp. @ 5400 psi.
Ramp from min. to max. disp. < 145 psi when PCOR activated.

Figure 1-66 H6H High Performance Hydraulic/Electrical Schematic, Komatsu D61-23 (H6HH*B**K471)**

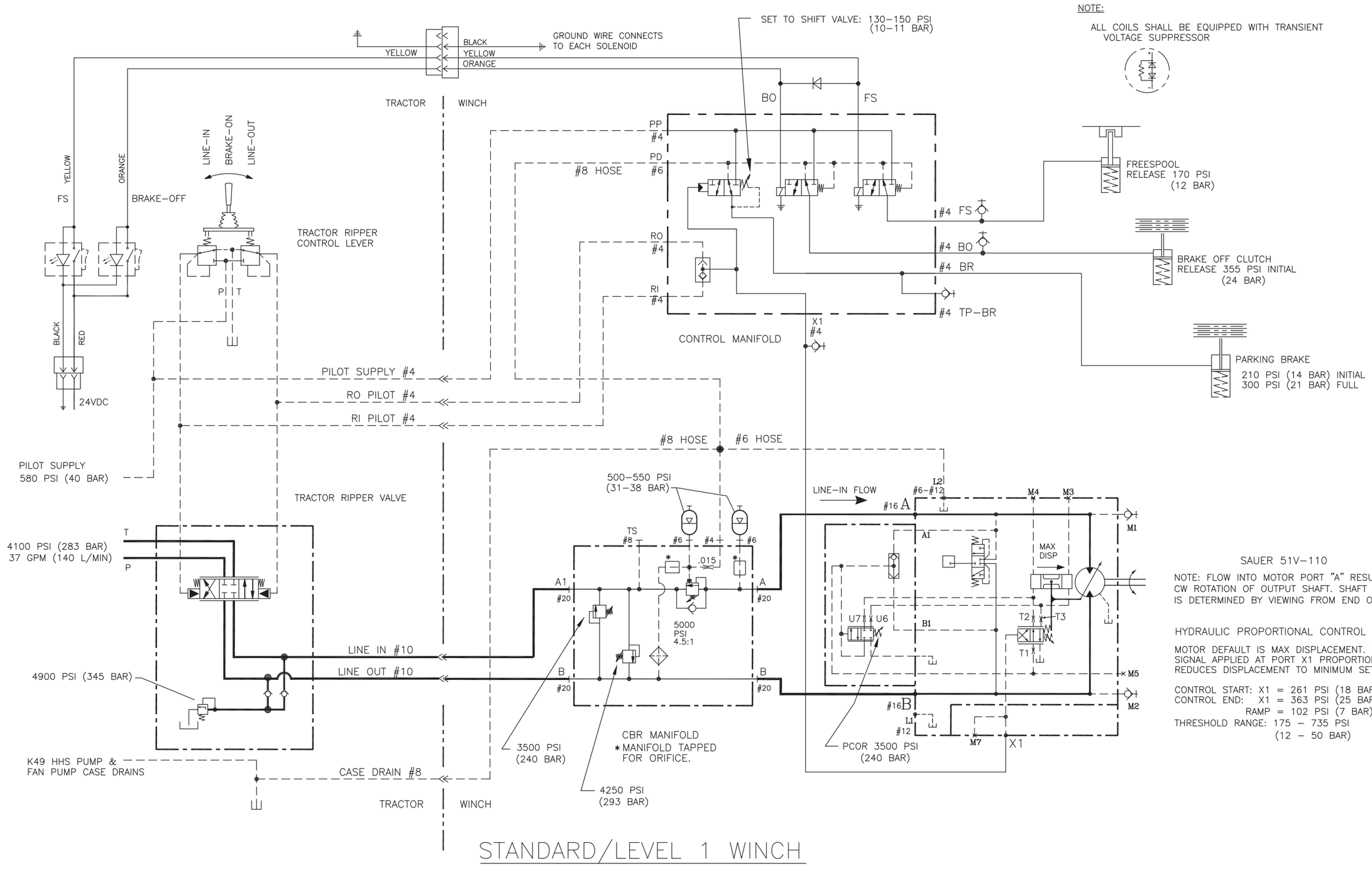


Figure 1-67 H6H Standard Hydraulic/Electrical Schematic, Komatsu D65X-16/17/18 (H6HT*B**K49)**

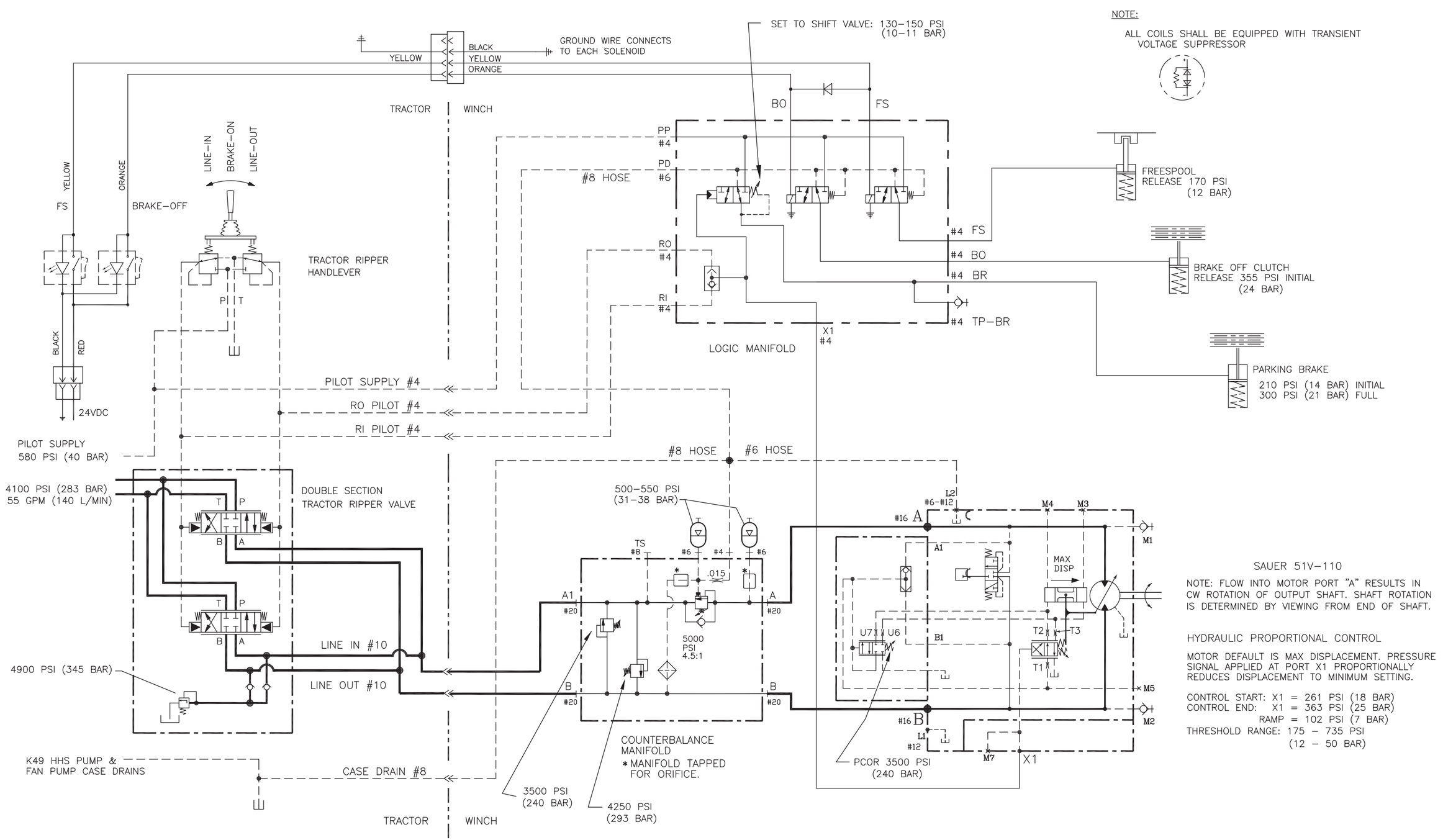


Figure 1-68 H6H High Performance Hydraulic/Electrical Schematic, Komatsu D65X-16/17/18 (H6HH****K49)**

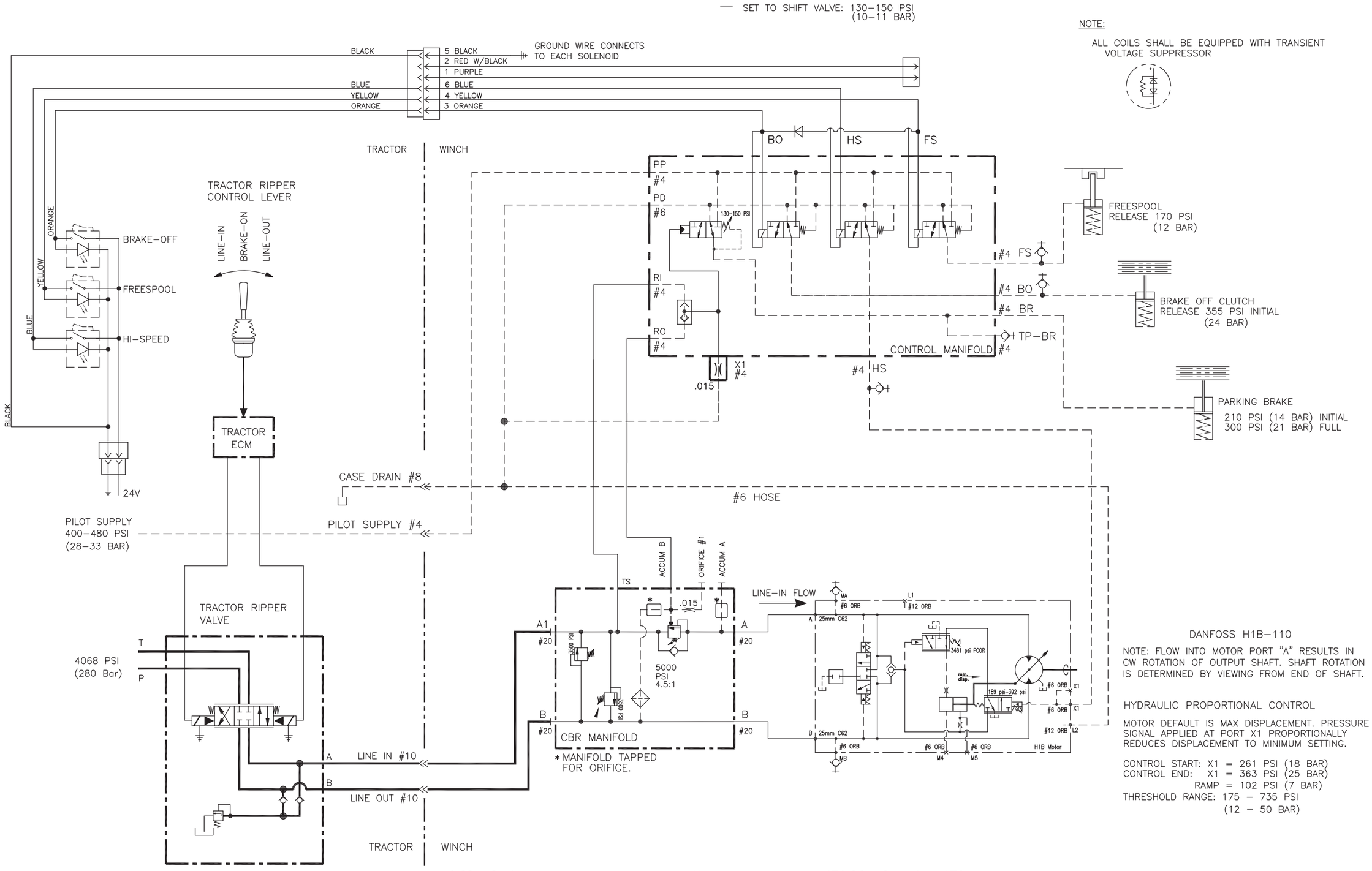


Figure 1-69 H6H Standard Hydraulic/Electrical Schematic, Komatsu D71-24 (H6HT*D**K71)**

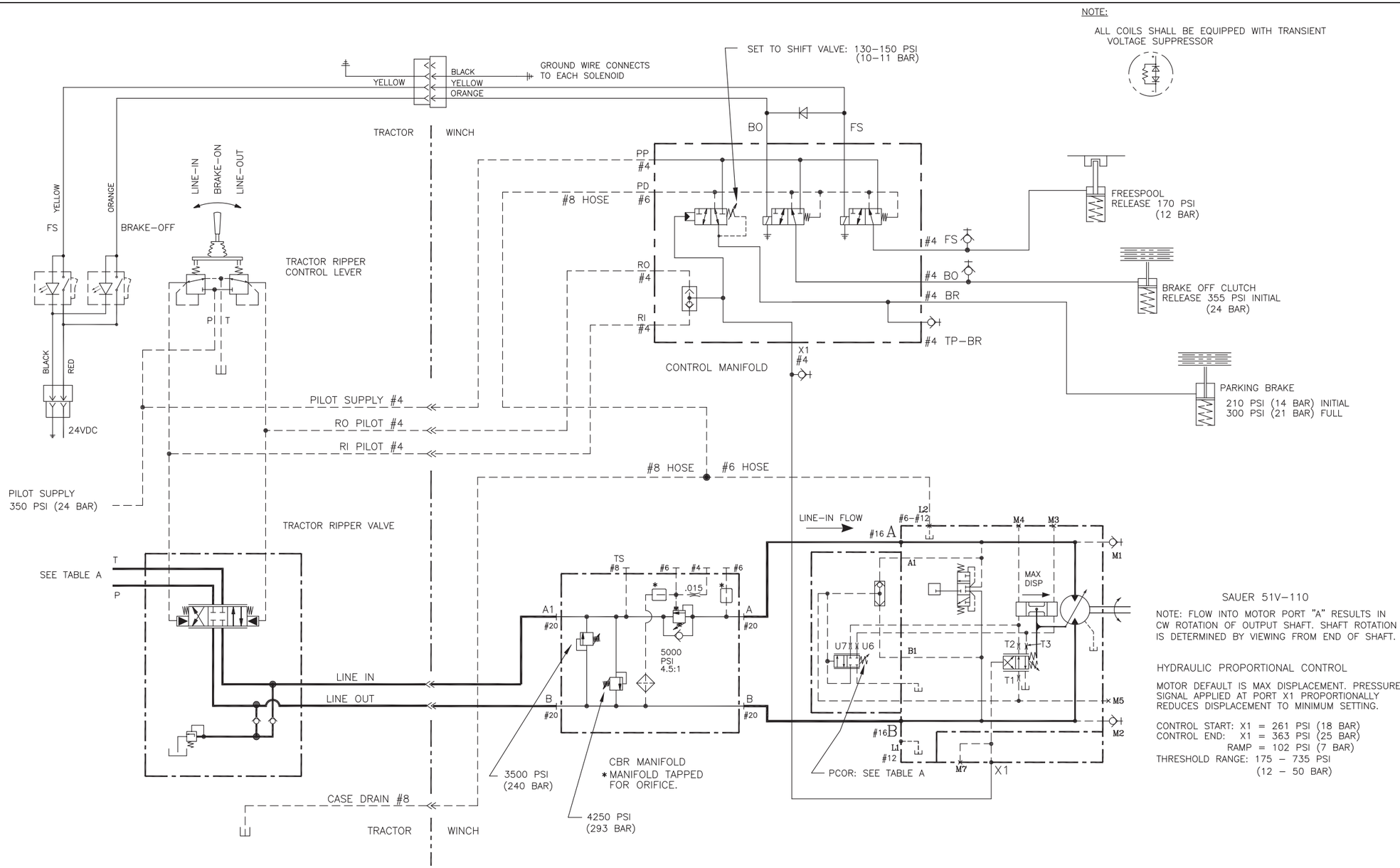


TABLE A			RIPPER CIRCUIT MAX PERFORMANCE				WINCH PCOR	
TRACTOR	CODE	VALVE SPOOL	PSI	BAR	GPM	LPM	PSI	BAR
PR716	L39	CYLINDER	3190	220	26	97	2610	180
PR724	L41	CYLINDER	2900	200	45	169	2610	180
PR726	L410	MOTOR	3770	260	39	148	3480	240
PR734–4	L44	CYLINDER	2900	200	59	222	2610	180
PR736	L42	CYLINDER	3770	260	55	207	3480	240
PR736(W)	L421	MOTOR	3770	260	55	207	3480	240

Figure 1-70 H6H Standard Hydraulic/Electrical Schematic, Liebherr PR716 / PR724 / PR724L / PR726 / PR736 / PR734-4 (H6HT*B**L39 / L41 / L410 / L42 / L421 / L44)**

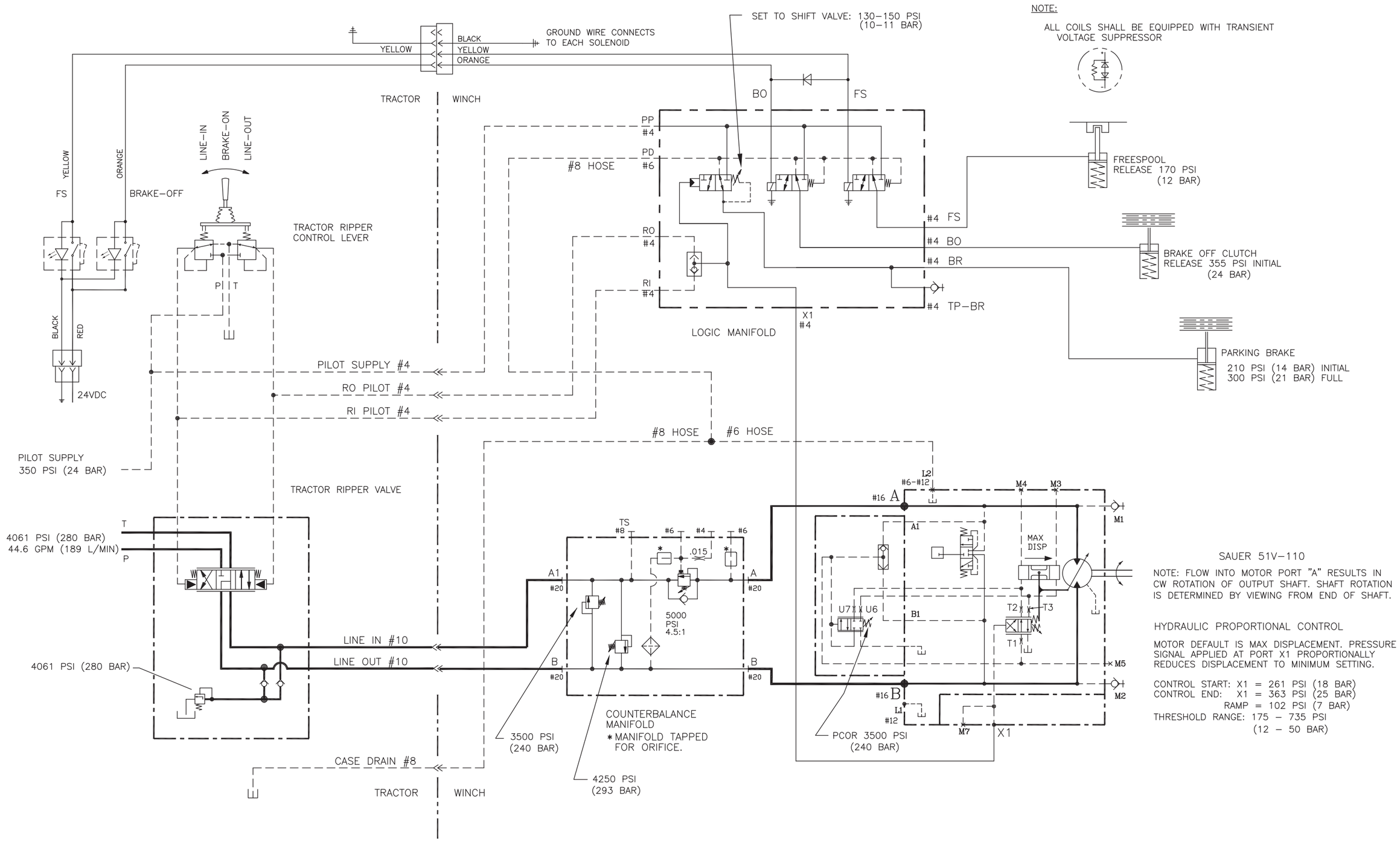


Figure 1-71 H6H High Performance Hydraulic/Electrical Schematic, Liebherr PR724 (H6HH*B**L41)**

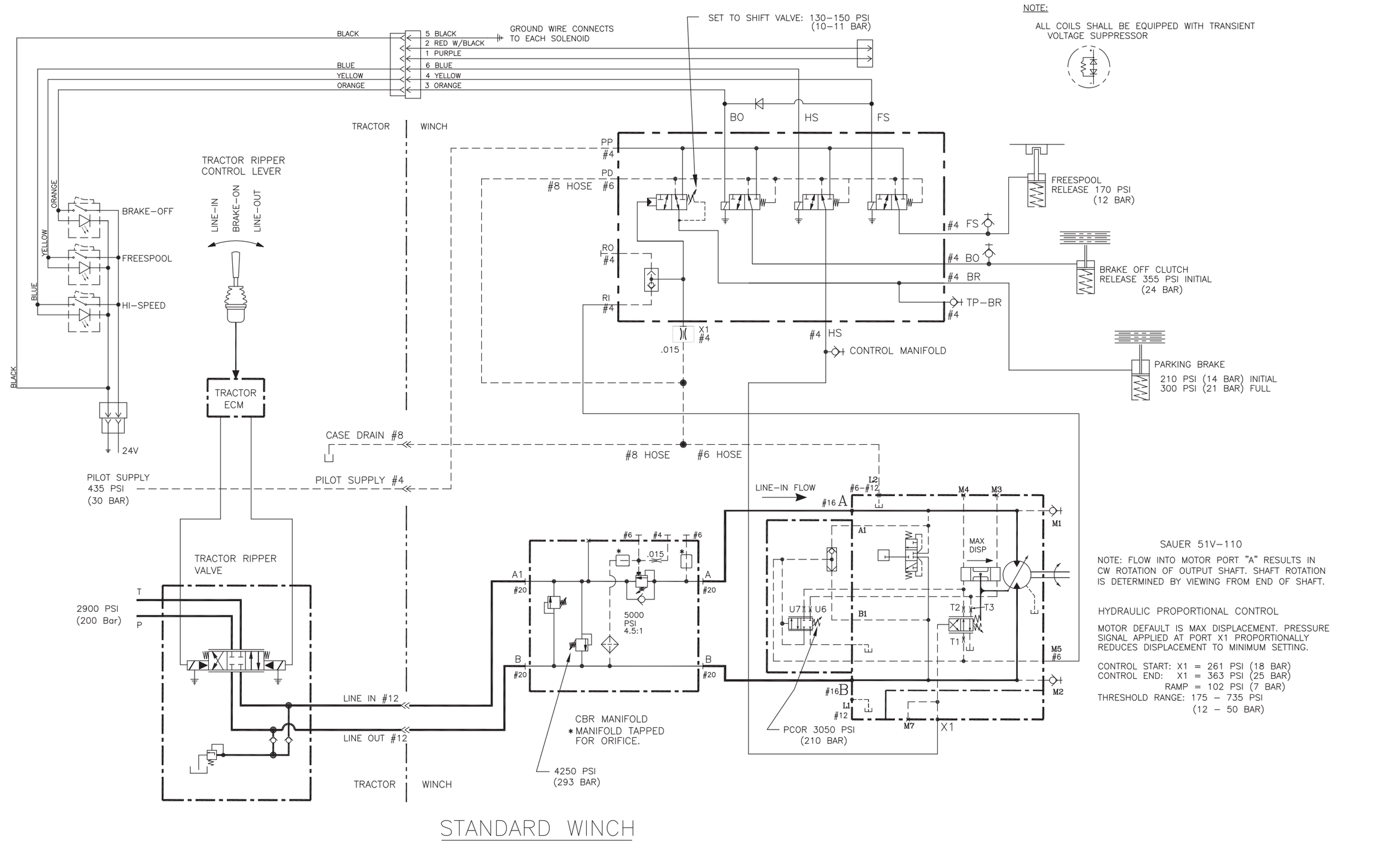
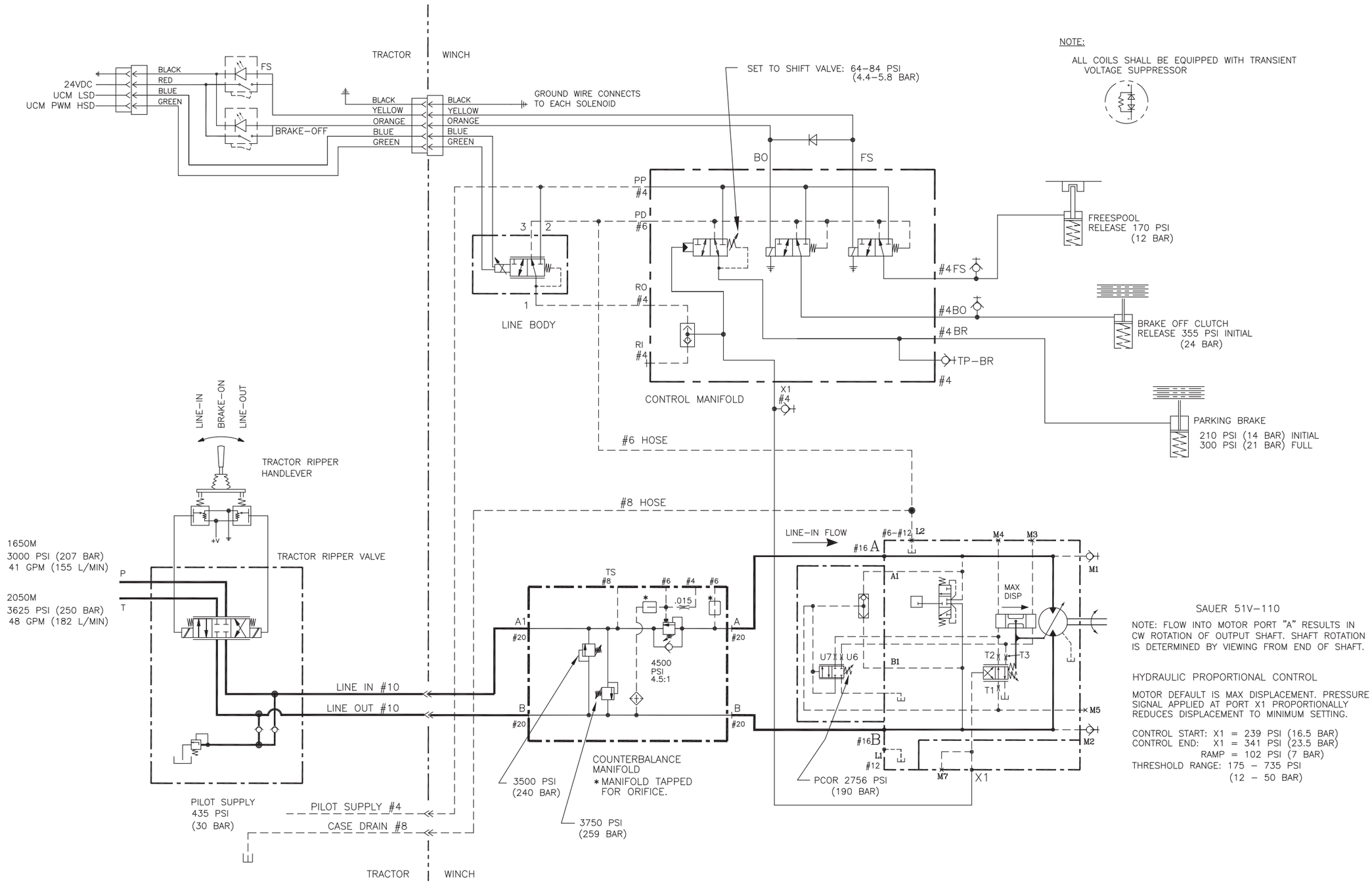


Figure 1-72 H6H Standard Hydraulic/Electrical Schematic, CNH 1650L (H6HT*D**R40)**



STANDARD WINCH

Figure 1-73 H6H Standard Hydraulic/Electrical Schematic, CNH 1650/2050M (H6HT****R42)**

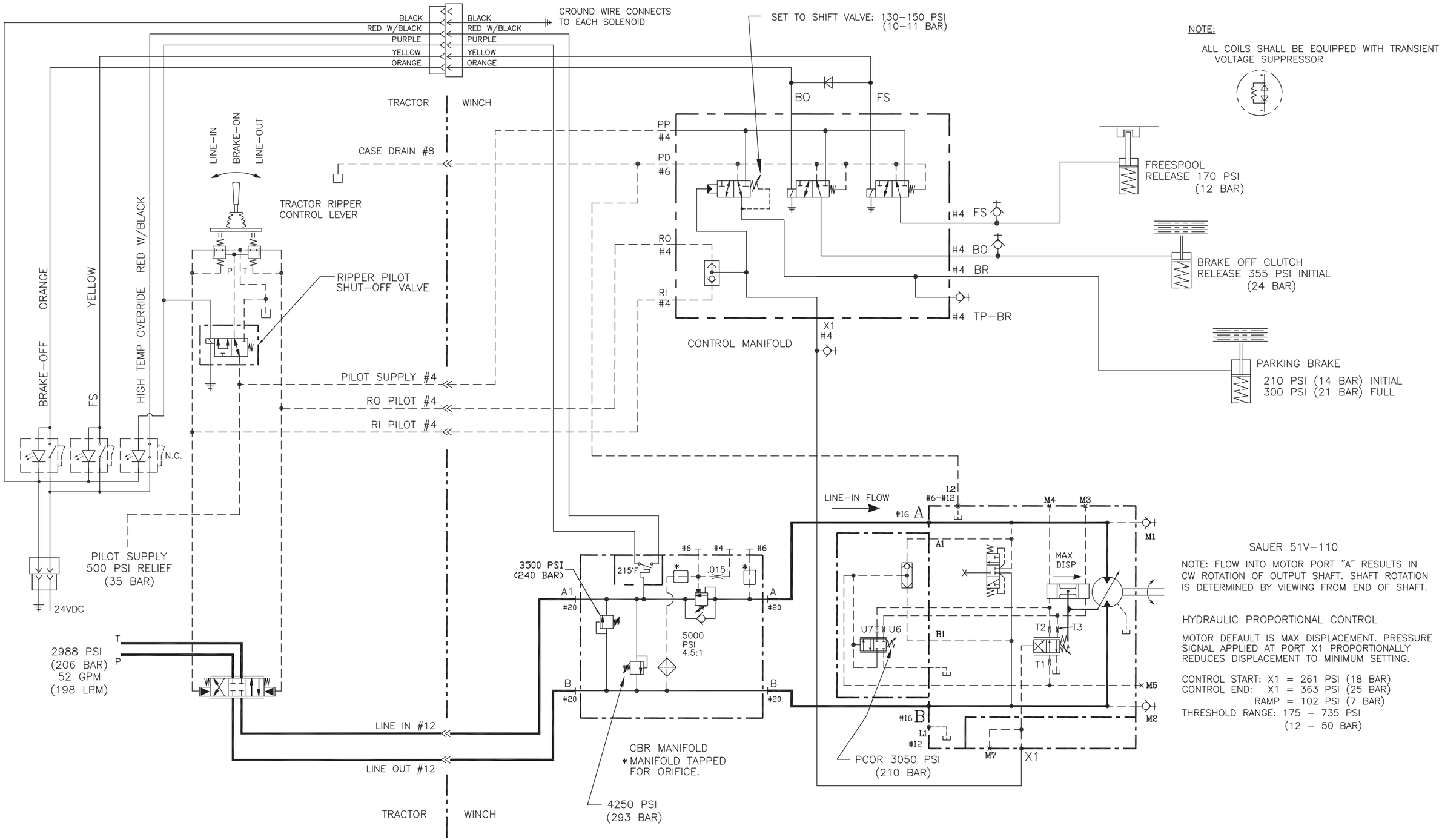


Figure 1-74 H6H Standard Hydraulic/Electrical Schematic, Shantui DH17 (H6HT*B**U47)**

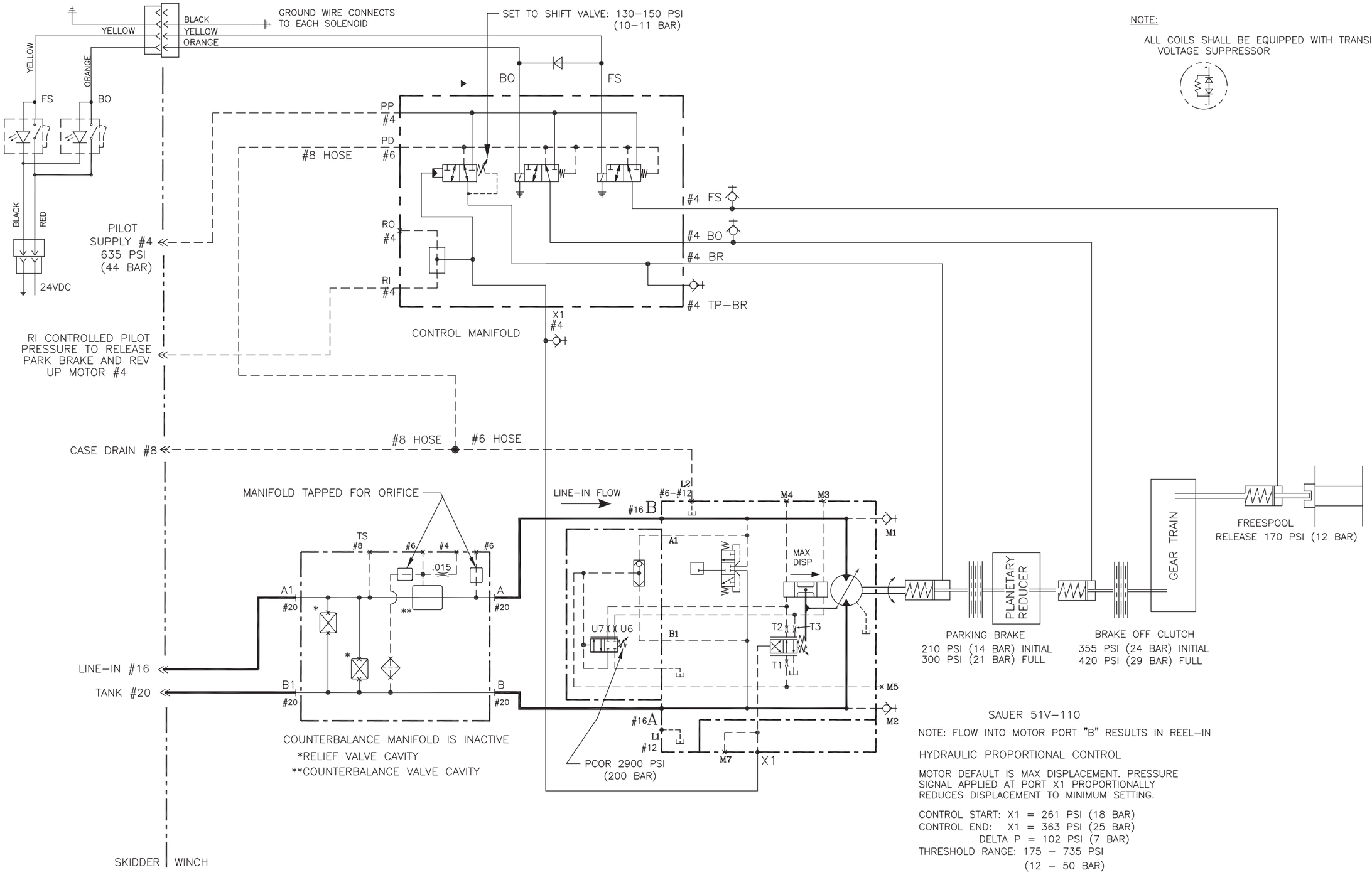


Figure 1-75 H6H Standard Hydraulic/Electrical Schematic, Tigercat 635D (H6HT*U**Y44)**

Troubleshooting

General

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

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

⚠ CAUTION

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

Step-by-Step Pump and Controller Troubleshooting

1. Winch does not operate with the tractor running.		
1.1 Is there oil in the reservoir?	No	Fill tractor reservoir.
	Yes	Proceed to step 1.2.
1.2 Is the winch in **FREESPOOL**?	No	Proceed to step 1.3.
	Yes	Shift winch out of **FREESPOOL** Function.
1.3 Is there a broken tube, loose fitting, or burst hose?	No	Proceed to step 1.4.
	Yes	Repair the fault.
1.4 Is the brake released?	No	Check brake release circuit or mechanism.
	Yes	Proceed to step 1.5.
1.5 Is the hydraulic hose routing in accordance with the hydraulic schematic?	No	Correct the routing. Refer to the Schematic & installation drawing.
	Yes	Proceed to step 1.6.
Winch Control		
1.6 Is control lever valve connected to pilot supply?	No	Connect control lever and check that control signal RI & RO is actually being supplied to the winch.
	Yes	Proceed to step 1.7.
1.7 Is drain pressure less than 44 (winch criteria) psi?	No	Check drain hoses for restriction.
	Yes	Proceed to step 1.8.
1.8 Operate control lever in both directions. Is pressure at RI & RO greater than the pilot pressure of 500-580 psi?	No	Verify that pilot pressure to direction spool will cause the pump to load sense. Return to step 1.6.
	Yes	Proceed to step 1.9.

(Continued on the next page)

1.9 Install gauges at motor ports A & B using 0-5000 psi gauges. Disconnect the brake line and move the control lever in **LINE-IN** and **LINE-OUT**. If pressure is below 4100 psi, is it possible to adjust the relief valve? (Refer to Section 3 for more details on pressure check procedures.)	No	Replace high pressure relief valve cartridge and return to step 1.6.
	Yes	Adjust high pressure relief valve to 4100 psi. Proceed to step 1.10.
1.10 Re-connect the brake line and put control lever in **LINE-IN** and **LINE-OUT** positions. Does winch operate?	No	Check for mechanical faults in the drive beyond the motor shaft.
	Yes	Operate the winch.
2. Winch is sluggish or erratic		
2.1 Is the control lever in good condition? Is there air in pilot lines?	No	Repair or replace the control lever. If there is air in the pilot lines, bleed them.
	Yes	Proceed to step 2.2.
2.2 Is the brake fully released?	No	Check brake release circuit or mechanism. See shuttle valve in 2312074 (logic control manifold) & valve 2311592 (brake valve).
	Yes	Operate the winch.
3. Winch drives in one direction only.		
3.1 With the control lines switched does the winch drive in opposite direction only?	No	Proceed to step 3.2.
	Yes	Control signal from one side of control lever does not work properly. Repair as necessary.
3.2 With control lines still switched does winch drive in initial direction only?	No	Proceed to step 3.3.
	Yes	Problem is one side of winch direction spool. Proceed to step 3.3.
3.3 Is there control pressure to the tractor direction spool as well as from from RI & RO? Winch begins to drive when the pressure at RI or RO is 130-150 psi.	No	Correct control signal problem.
	Yes	Operate the winch.

Troubleshooting Analysis Check Chart

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

Figure 2-1 Troubleshooting Analysis Check Chart -1

PROBLEM	POSSIBLE CAUSE	CORRECTION
Winch will not generate sufficient line pull or does not line in or line out (Continued from previous page)	Leak in hydraulic system other than brake assembly.	Plug brake line and check that pressure at motor port A is 4100 psi, and that pressure at motor port B is 3500 psi.
	Clogged filter.	Tractor filter indicator light will illuminate if filter is clogged. Replace filter. Refer to tractor specifications.
	Wrong oil.	Use correct oil grade; refer to tractor oil specifications.
	Low oil level in reservoir.	Add oil; refer to tractor oil specifications.
	Tractor pump not generating adequate pressure.	Hold blade over relief and measure supply pressure at right side of dozer. If pressure is below 4100 psi see tractor service manual for proper adjustment.
	Damaged freespool components may be causing winch to be stuck in **FREESPOOL** function.	Inspect freespool shaft for wear or damage, repair or replace as necessary.
	Motor damaged.	Repair or replace motor (refer to Section 4).
BRAKE-OFF function will not operate or is difficult to engage.	Brake-off solenoid is not energized.	Check resistance to ensure it's 35 ohms at the coil. Repair power supply or replace coil and/or solenoid.
	Insufficient control pressure from tractor pilot supply.	1. Measure control pressure to brake-off clutch (355 psi to shift). 2. Check for leaks at hydraulic connections. 3. See Pilot Supply Relief Adjustment.
FREESPOOL will not function or is difficult to engage.	Freespool shifter fork or collar stuck.	Remove top cover and inspect shifter fork & collar with **FREESPOOL** activated. Repair parts if damaged.
	Leakage at hydraulic connection or freespool shaft.	Remove top cover and inspect shifter fork with **FREESPOOL** activated. Replace seals if leaking.
	Insufficient control pressure from tractor pilot supply.	1. Measure control pressure at brake (BR) port and freespool (FS) hose (refer to Section 3). 2. Check for leaks at hydraulic connections.
	Freespool solenoid is not energized.	Repair power supply or replace coil and/or solenoid.
	Air in freespool piston.	Remove top cover, activate **FREESPOOL** and bleed air at shifter fork fitting.

Figure 2-1 Troubleshooting Analysis Check Chart - 2

PROBLEM	POSSIBLE CAUSE	CORRECTION
HI-SPEED function will not operate.	Insufficient pilot pressure.	Repair pilot supply.
	No pressure at X1 port	Diagnose controller or supply malfunction, and repair as needed.
Winch case oil level too high.	Too much oil added.	Drain oil until level at oil level plug.
Winch case oil level too high and tractor reservoir too low.	Oil leak from freespool hose or piston.	Visually inspect and repair as needed.
Control lever does not automatically return to **BRAKE-ON** position.	1. Plunger seal sticking in control lever. 2. Spring in control lever valve broken.	Remove and inspect control lever valve. Replace worn parts or entire assembly as necessary.
Winch does not respond to lever movement.	1. Leak in the control lever valve. 2. Control valve seized or blocked.	Check for leaks in control lever valve, and replace if necessary.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.
Line speed is abnormally slow for **LINE-IN**, **LINE-OUT** or both.	1. Poor pressure signal. 2. Leak in the control lever valve.	Visually inspect to check for wear on control lever valve. Check for leaks in control lever valve.
	Leak in hydraulic system, or loose hydraulic connections.	Visually inspect winch for leaks, and ensure hydraulic connections are secure.
Control lever handle turns.	Handle parts loose.	Tighten all control lever handle parts.
LEDs in switch panel do not illuminate.	Polarity backward.	Reverse plug connection.
	Faulty LED.	Replace LED.

Figure 2-1 Troubleshooting Analysis Check Chart - 3

Notes

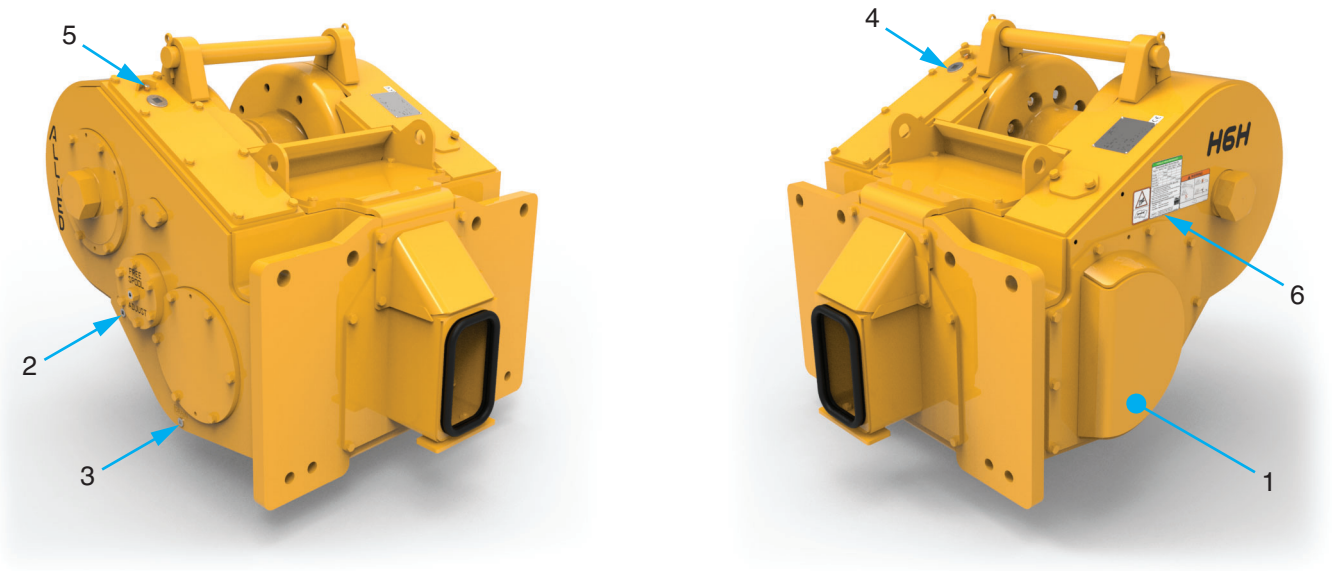
Service

General

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

Maintenance

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



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

Figure 3-1 H6H Winch Maintenance Points

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

Figure 3-2 H6H Winch Maintenance Schedule

Checks Before Operation

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

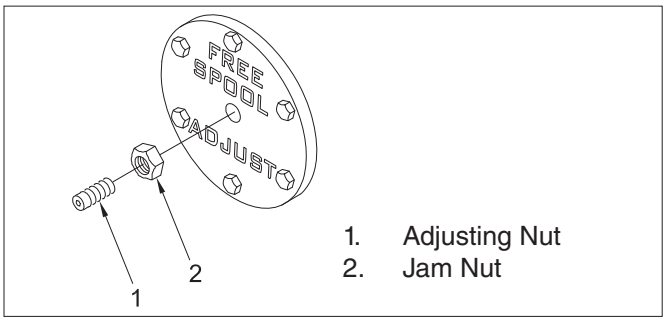
Checks During Operation

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

FREESPOOL Drag Adjustment (Fig. 3-3)

The preload on the bearings of the intermediate shaft controls the resistance to rotation of the drum during **FREESPOOL** operation. The resistance to rotation is correct when the drum can be rotated by hand, but will not rotate more than one-half revolution after the hand is removed.

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



1. Adjusting Nut
2. Jam Nut

Figure 3-3 FREESPOOL Adjustments

⚠ CAUTION

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

Hydraulic System Pressure Checks

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

Preparation

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

⚠ WARNING

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

⚠ WARNING

Always wear gloves when handling wire ropes.

2. Start the engine and place the winch in **LINE-OUT** to raise the oil temperature. Another way to elevate the reservoir temperature is to hold the tractor blade over relief. The oil temperature in the winch or tractor reservoir must be at least 70°F (20°C).

3. Remove any dirt from the left side of the winch. Remove control valve access plate.

4. Stabilize engine speed at idle RPM for all tests.

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

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

7. Install side covers and tighten capscrews.

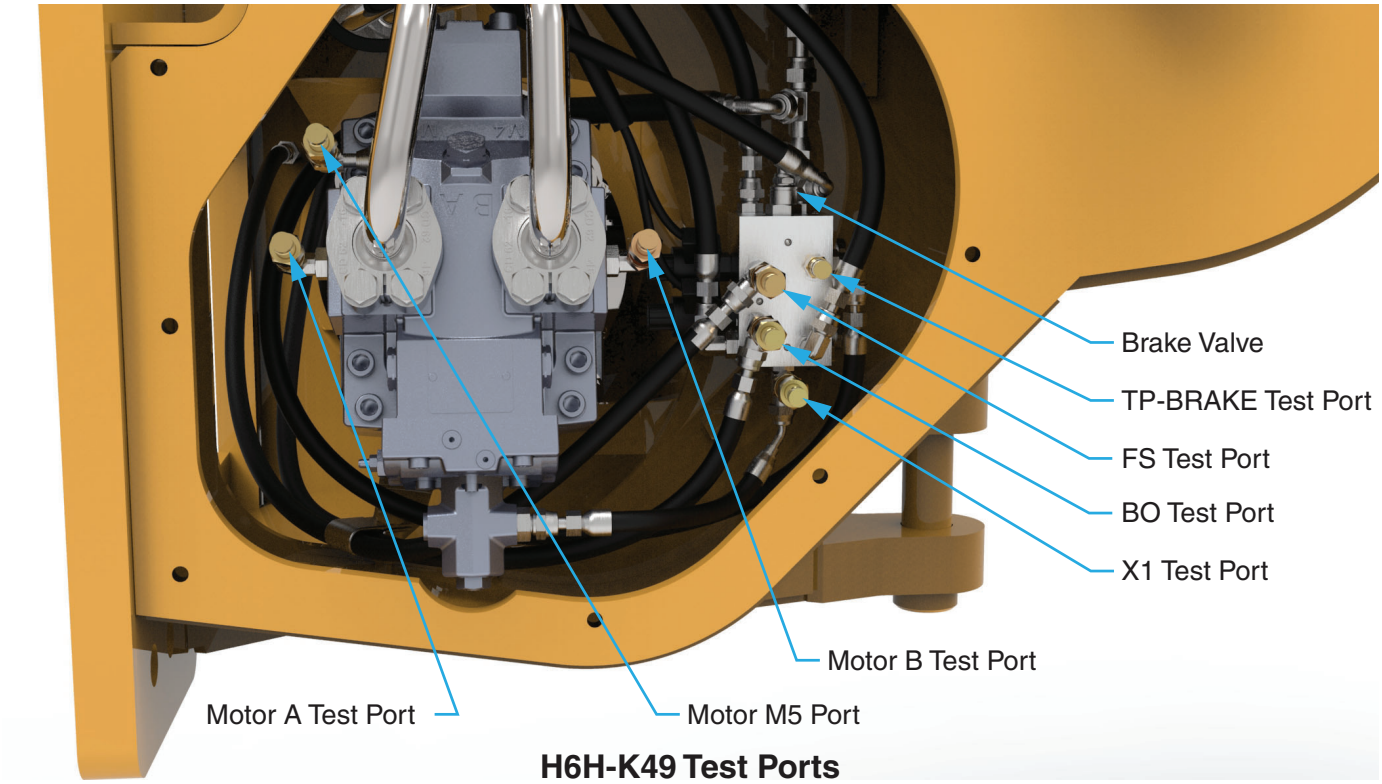
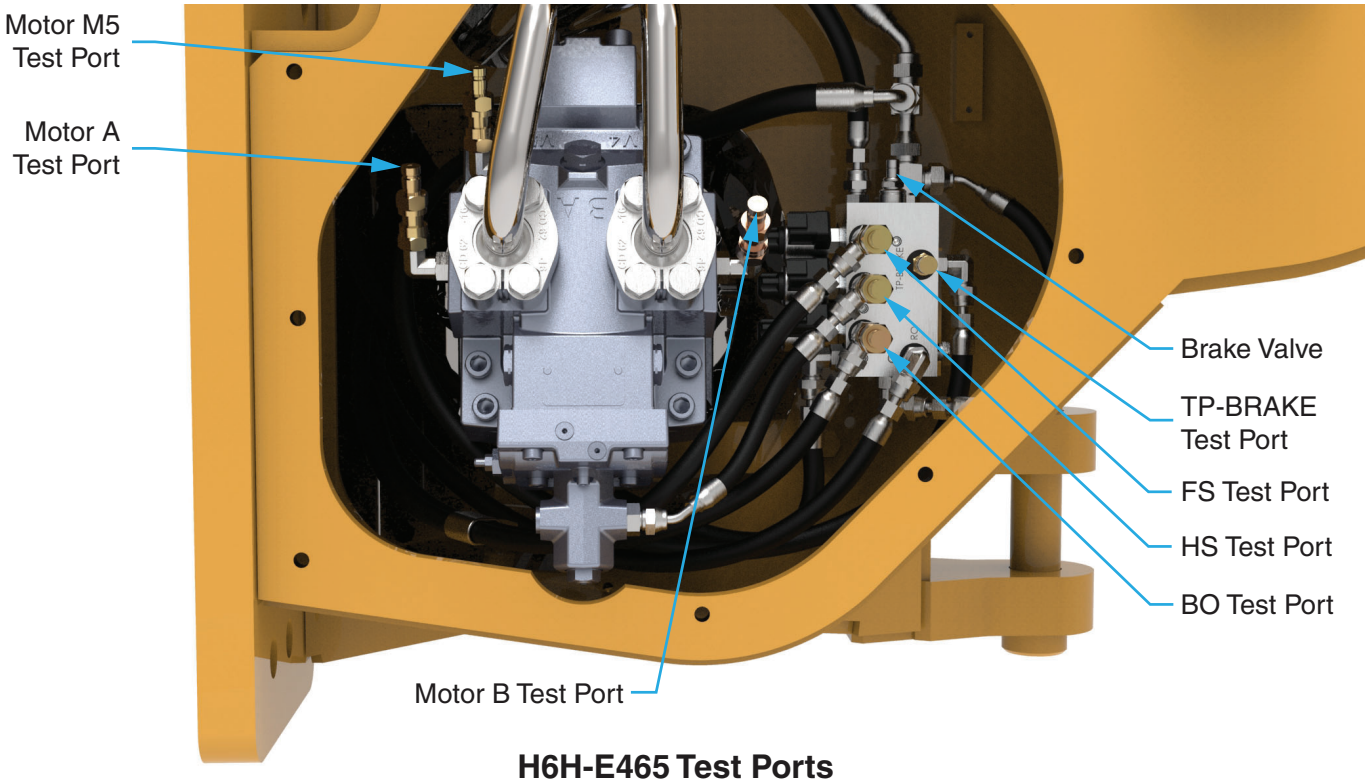


Figure 3-4 Komatsu D65-16 (K49) Installation Test Ports and Brake Valve Locations
(Typical for Installations with Internal Code B, E, BN, U)



H6H-E465 Test Ports

Figure 3-5 John Deere 750/850K(E/H) (E465) Installation Test Ports and Brake Valve Locations
(Typical for Installations with Internal Code D, DL, DE)

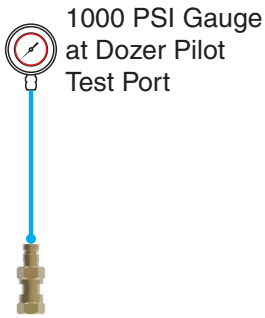
Make	Dozer Model	Dozer Code	Winch Option	Pressure in PSI [kPa]		
				Motor Port A	Motor Port B	M5 (PCOR)
CAT	D6T	C71	T	2750-2850 [18,961-19,650]	2750-2850 [18,961-19,650]	2550-2650 [17,582-18,271]
	D6 Build 20a	C712	T	3450-3550 [23,787-24,476]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
	D6K2	C805	T	3450-3550 [23,787-24,476]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
	D6N	C81	H	3500-3600 [24,132-24,821]	3450-3500 [23,787-24,132]	3000-3100 [20,684-21,374]
	D6N (E/H)	C811	T	3550-3650 [24,476-25,166]	3450-3550 [23,787-24,476]	3000-3100 [20,684-21,374]
	D5 BUILD 17	C812	T	3450-3550 [23,787-24,476]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
	963D	C963	T	3550-3650 [24,476-25,166]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
John Deere	750/850J/K	E460	H	3575-3675 [24,649-25,338]	3575-3675 [24,649-25,338]	3000-3100 [20,684-21,374]
	750/850K(E/H)	E465	H	3575-3675 [24,649-25,338]	3450-3550 [23,787-24,476]	3000-3100 [20,684-21,374]
	750/850J	E47	H	3575-3675 [24,649-25,338]	3575-3675 [24,649-25,338]	3000-3100 [20,684-21,374]
	750L	E466	H	3575-3675 [24,649-25,338]	3575-3675 [24,649-25,338]	3000-3100 [20,684-21,374]
	850L	E470	H	3575-3675 [24,649-25,338]	3450-3550 [23,787-24,476]	3075-3175 [21,201-21,891]
Dressta	TD14/15/16S	H39	T	3575-3675 [24,649-25,338]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
Komatsu	D65-15	K46	T	2950-3050 [20,340-21,029]	2950-3050 [20,340-21,029]	2400-2500 [16,547-17,237]
	D65-16	K49	T	3950-4150 [27,234-28,613]	3450-3550 [23,787-24,476]	3450-3550 [23,787-24,476]
	D61-23	K471	T	3550-3650 [24,476-25,166]	3450-3550 [23,787-24,476]	3250-3350 [22,408-23,097]
	D71-24	K71	T	3450-3550 [23,787-24,476]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
Liebherr	PR716	L39	T	3140-3240 [21,650-22,339]	3140-3240 [21,650-22,339]	2560/2660 [17,651-18,340]
	PR724	L41	T	2850-2950 [19,650-20,340]	2850-2950 [19,650-20,340]	2560/2660 [17,651-18,340]
	PR724	L41	H	4000-4100 [27,579-28,269]	3450-3550 [23,787-24,476]	3450-3550 [23,787-24,476]
	PR726	L410	T	3720-3820 [25,649-26,338]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
	PR736	L42	T	3720-3820 [25,649-26,338]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
	PR736	L421	T	3720-3820 [25,649-26,338]	3450-3550 [23,787-24,476]	3430-3530 [23,649-24,339]
	PR734-4	L44	T	2850-2950 [19,650-20,340]	2850-2950 [19,650-20,340]	2560-2660 [17,651-18,340]
SEM	816	P81	T	2700-2800 [18,616-19,305]	2700-2800 [18,616-19,305]	2450-2550 [16,892-17,582]
Case	Steiger (391)	R391	H	2750-2850 [18,961-19,650]	2750-2850 [18,961-19,650]	2450-2550 [16,892-17,582]
	1650L	R40	T	2850-2950 [19,650-20,340]	2850-2950 [19,650-20,340]	3000-3100 [20,684-21,374]
	1650	R42	T	2950-3050 [20,340-21,029]	2950-3050 [20,340-21,029]	2700-2800 [18,616-19,305]
	2050M	R42	T	3575-3675 [24,649-25,338]	3450-3550 [23,787-24,476]	2700-2800 [18,616-19,305]
Shantui	DH17	U47	T	2940-3040 [20,271-20,960]	2940-3040 [20,271-20,960]	2450-2550 [16,892-17,582]
Tigercat	635D	Y44	T	3250-3350 [22,408-23,097]	3250-3350 [22,408-23,097]	2850-2950 [19,650-20,340]

Table 3-1 Hydraulic Pressure Readings

Hydraulic Pressures

The values in Table 3-1 are referred to in some of the test that follow.

Pilot Supply Pressure Check



See dozer service manual for pilot test port location.

Figure 3-6 Test Equipment Setup

Test Equipment:

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

Connect pressure gauge to test port:

- Dozer pilot test port

General

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

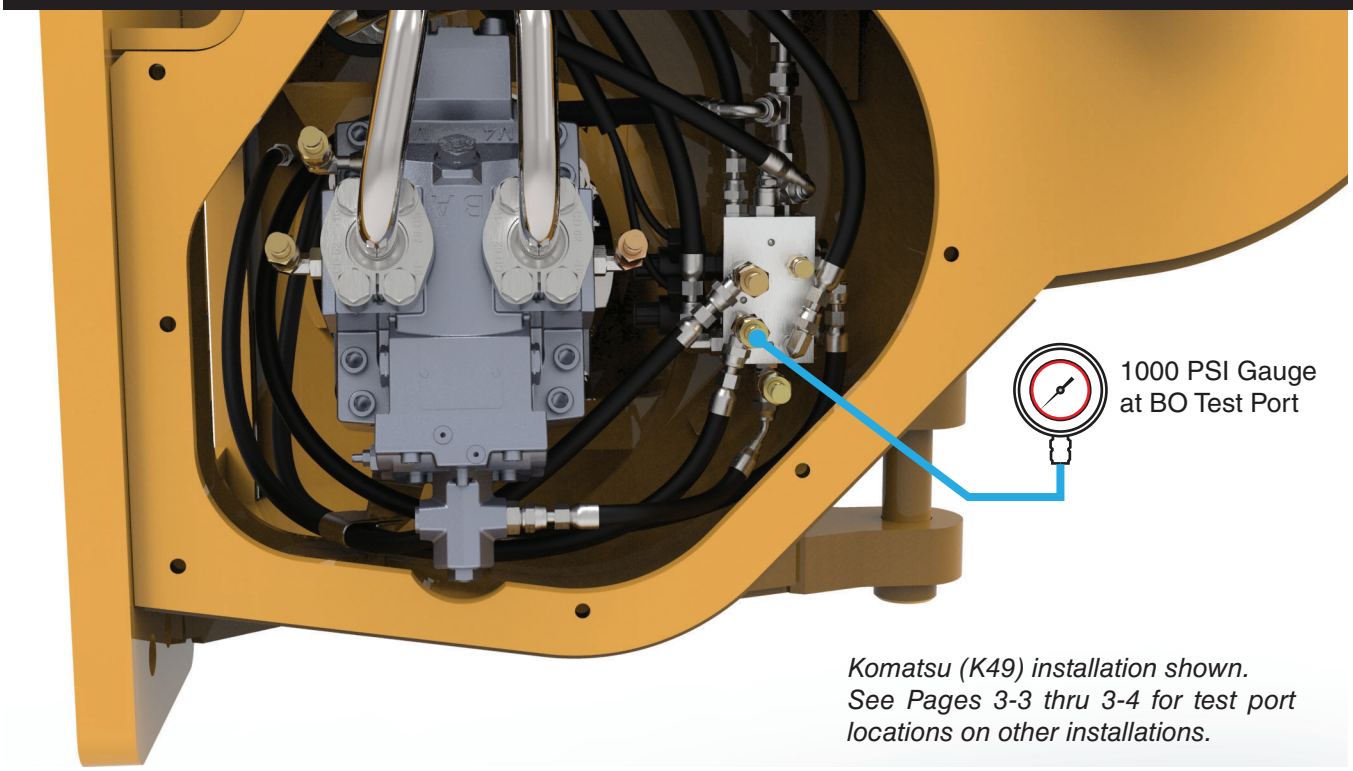
Instructions

1. Shut engine off but turn dozer key switch back on to provide electrical power to the winch.
2. Move dozer work equipment lever to unlock position to enable winch.
3. Move control switch from **BRAKE-ON** to **BRAKE-OFF** several times to de-energize the hydraulic system.
4. Move dozer work equipment lever to locked position.
5. Connect a 1000 psi gauge to the dozer pilot test port (see dozer Service Manual).
6. Start dozer and set to high-free idle.
7. The pressure on the gauge should be in the range described in the dozer Service Manual for pilot pressure.
8. Note that you winch requires a minimum of 290 psi supplied pilot pressure to function properly. If the dozer is unable to supply this, consult your dealer.
9. Record this pilot pressure. You will refer to it in later tests.

If the pressure is not adequate, or 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.

BRAKE-OFF Pressure Check



Komatsu (K49) installation shown.
See Pages 3-3 thru 3-4 for test port locations on other installations.

Figure 3-7 BRAKE-OFF Pressure Check (K49 shown)

Test Equipment:

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

Connect pressure gauges to test ports:

- **BO**

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge to the **BO** pressure test port.
2. Start dozer and set to high-free idle
3. Measure pressure with the **BRAKE-OFF** switch activated.
4. Minimum recommended pilot pressure is 350 psi (may be higher; consult your dozer service manual). Winch will still operate with pilot pressure as low as 290 psi, though Brake-Off function will experience increased drag and result in premature wear of the friction discs and added heat generation.

If pressure is not at least 290 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.

PCOR Pressure Check

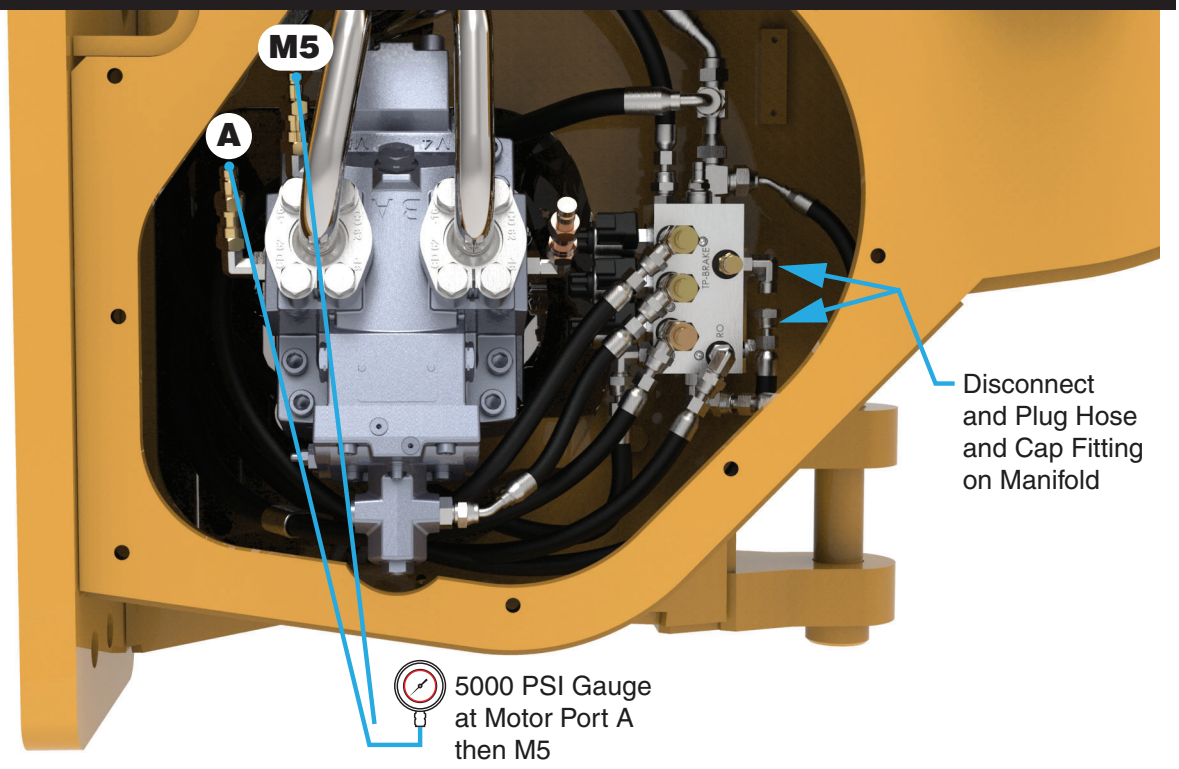


Figure 3-8 PCOR Pressure Check (E465 shown)

Test Equipment:

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

Connect pressure gauges to test ports:

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

General

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

Instructions

1. With the engine shut off, connect a 5000 psi pressure gauge to Motor Port A.
2. Disconnect and plug the brake release hose at the control manifold, and cap the fitting. Most installations will have that hose connected to the "BRAKE" port on the right side of the manifold, as shown in Figure 3-8. Start dozer and set to high-free idle.
3. Slowly move the joystick fully to the LINE-IN position.
4. The pressure at Motor Port A should be within the range shown in Table 3-1.

NOTICE

The values in Table 3-1 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.

5. Shut down the engine, and remove the gauge from Motor Port A.
6. Connect the 5000 psi pressure gauge to port M5. If there isn't a test fitting already installed at port M5, use fittings and hoses as available to connect your gauge. The port is 9/16 - 18UNF.
7. Start dozer and set to high-free idle.
8. Slowly move the joystick in the LINE-IN direction, noting pressures as they change with joystick position.
9. At some point, the pressure at M5 will stabilize. The stabilized pressure at M5 is the PCOR setting.
10. Check Table 3-1. 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.

Counterbalance Valve Pressure Check

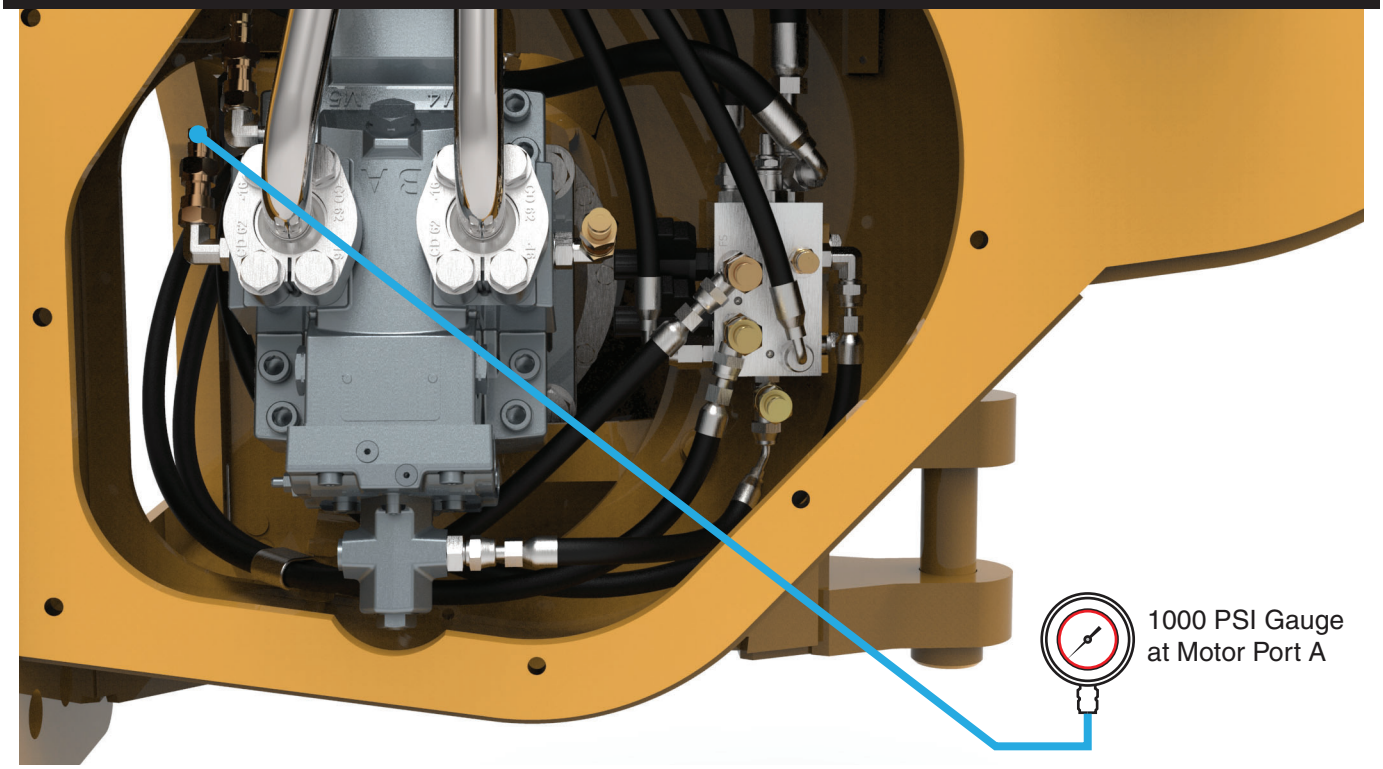


Figure 3-9 Counterbalance Valve Pressure Check (L39 shown)

Test Equipment:

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

Connect pressure gauge to test port:

- **Motor Port A**

General

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

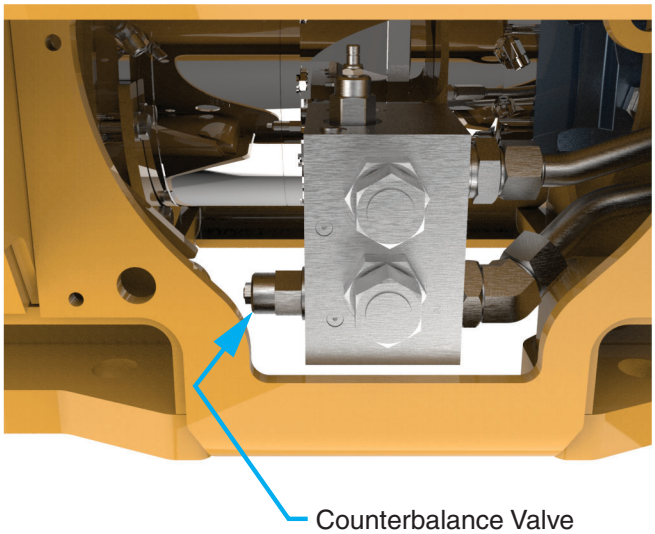


Figure 3-10 Counterbalance Valve (C71 Shown)

Instructions

1. With the engine shut off, connect a 1000 psi pressure gauge to Motor Port A.
2. Start dozer and set to high-free idle.
3. Place control lever in **LINE-OUT** to build pressure against the counterbalance valve
4. Check the pressure at Motor Port A. The pressure should be 600-1000 psi [4,137 - 6,895 kPa] .

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

To adjust the counterbalance valve:

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

Motor Supply Pressure Check

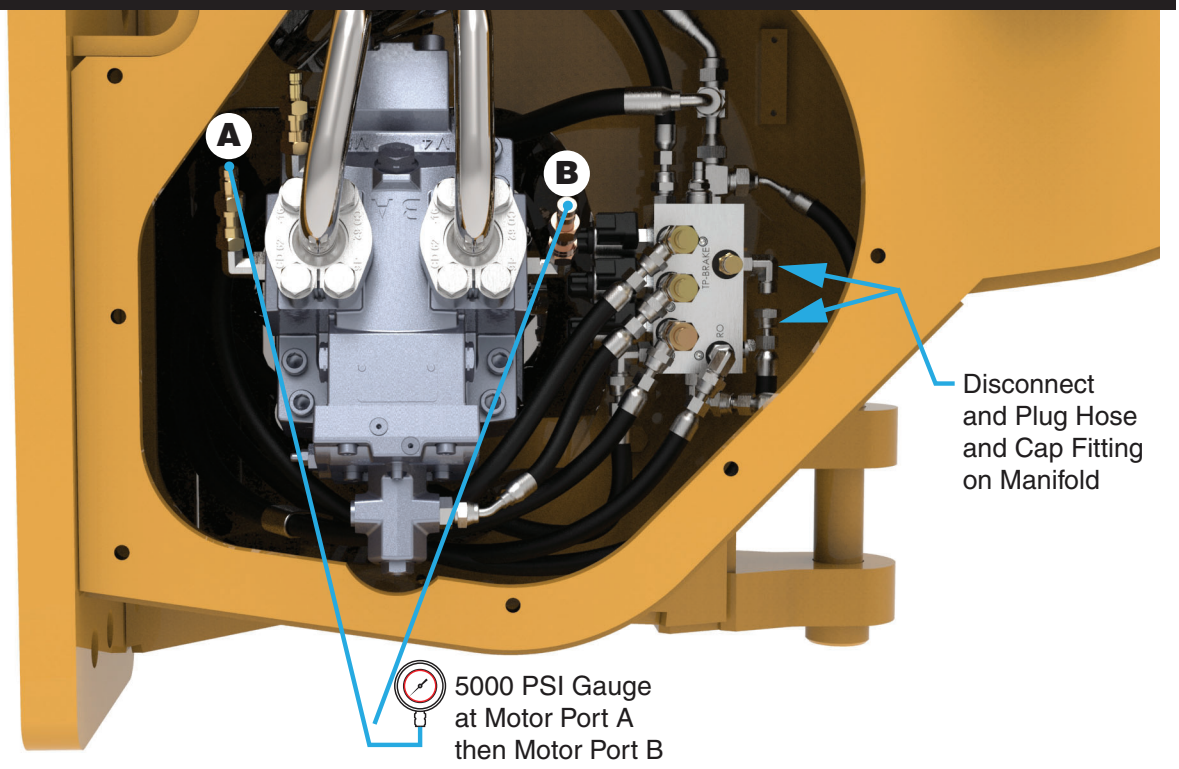


Figure 3-11 Motor Supply Pressure Check (E465 shown)

Test Equipment:

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

Connect pressure gauge to test ports:

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

General

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

Instructions

1. With the engine shut off, connect a 5000 psi pressure gauge to Motor Port A.
2. Find the brake release hose on the control manifold. Most installations will have that hose connected to the “BRAKE” port on the right side of the manifold, as shown in Figure 3-11.
3. Disconnect and plug the brake release hose at the control manifold, and cap the fitting. This will lock the winch brake to build pressure in the motor.
4. Start dozer and set to high-free idle.
5. Check the pressure at Motor Port A while operating in **LINE-IN**. Check the pressure at Motor Port B while operating in **LINE-OUT**. See Table 3-1.
6. 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 3-1, check for:

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

NOTICE

The values in Table 3-1 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.

Motor Speed Adjustment

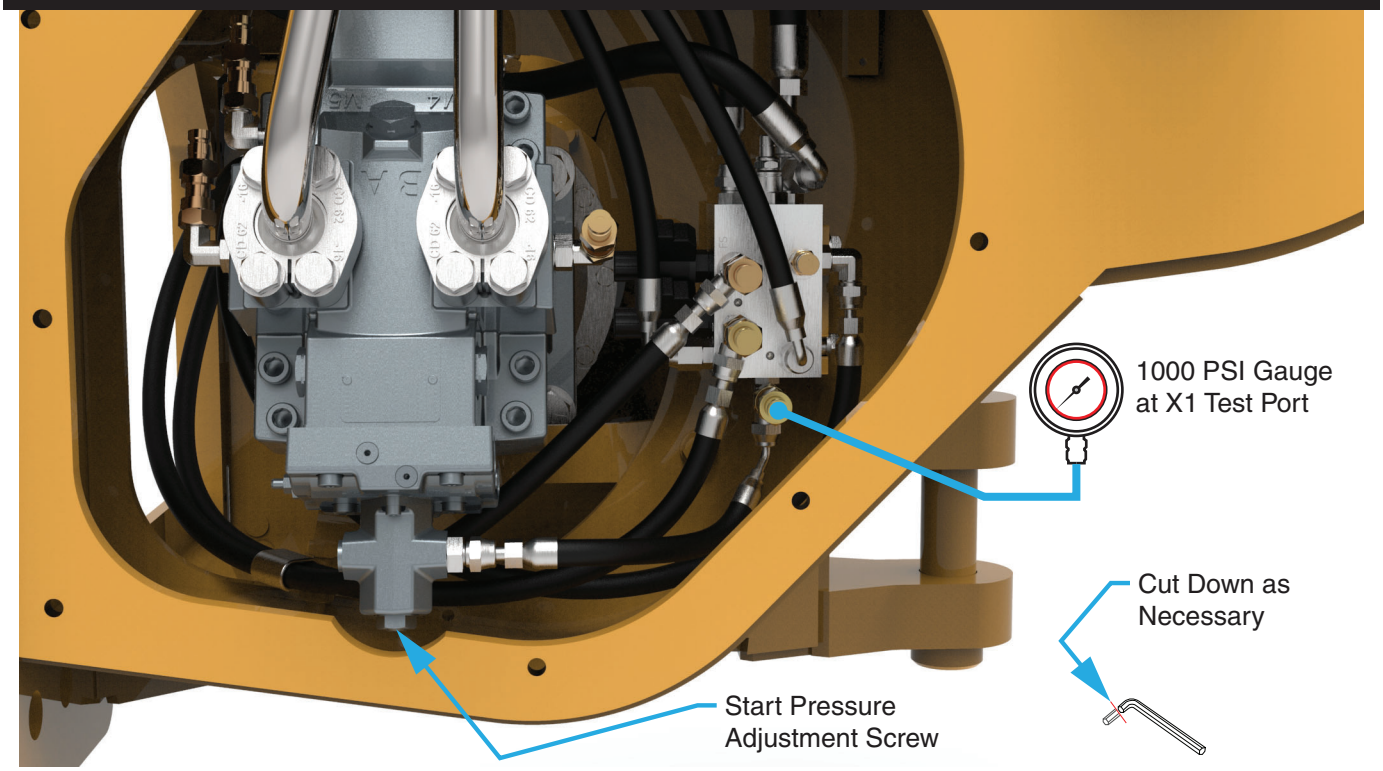


Figure 3-12 Motor Speed Adjustment (L39 shown)

Test Equipment:

- (1) 1,000 psi (6,895 kPa) Gauge
- (1) Modified Allen Wrench, 6 mm
- (1) 19 mm Box End Wrench

Connect pressure gauge to test ports:

- **X1**

General

If the winch is not able to achieve full speed, and your dozer has a normal pilot pressure lower than 350 psi, you may need to adjust the start pressure adjustment screw. This affects the winch speed relative to the pressure present at port X1.

NOTICE

The motor should be set correctly from the factory. This adjustment is only necessary if your winch is not able to achieve full speed.

Instructions

1. You will need to modify a standard 6 mm Allen Wrench as shown in Figure 3-12. Cut it down on the smaller end so that it can fit into the hex socket on the Start Pressure Adjustment Screw.
2. Remove the wire rope from the drum.
3. With the engine shut off, connect a 1000 psi pressure gauge to the X1 test port on the control manifold.
4. Loosen the locking nut at the Start Pressure Adjustment Screw with the 19 mm Box End Wrench.
5. Start dozer and set to high-free idle.
6. Move the joystick in the cab fully to the LINE-IN position, and observe the rate of rotation of the drum and the pressure present at the X1 test port. The pressure should be the same as observed during the pilot supply pressure test.
7. Using the modified Allen Wrench, turn the Start Pressure Adjustment Screw clockwise until the rotation of the drum begins to decrease.
8. Now turn the Start Pressure Adjustment Screw counter-clockwise until the rotation of the drum stabilizes to it's maximum speed.
9. Tighten the locking nut.
10. If your winch is still unable to achieve maximum line speed, contact Allied Systems Service Department.

Brake Pressure Check

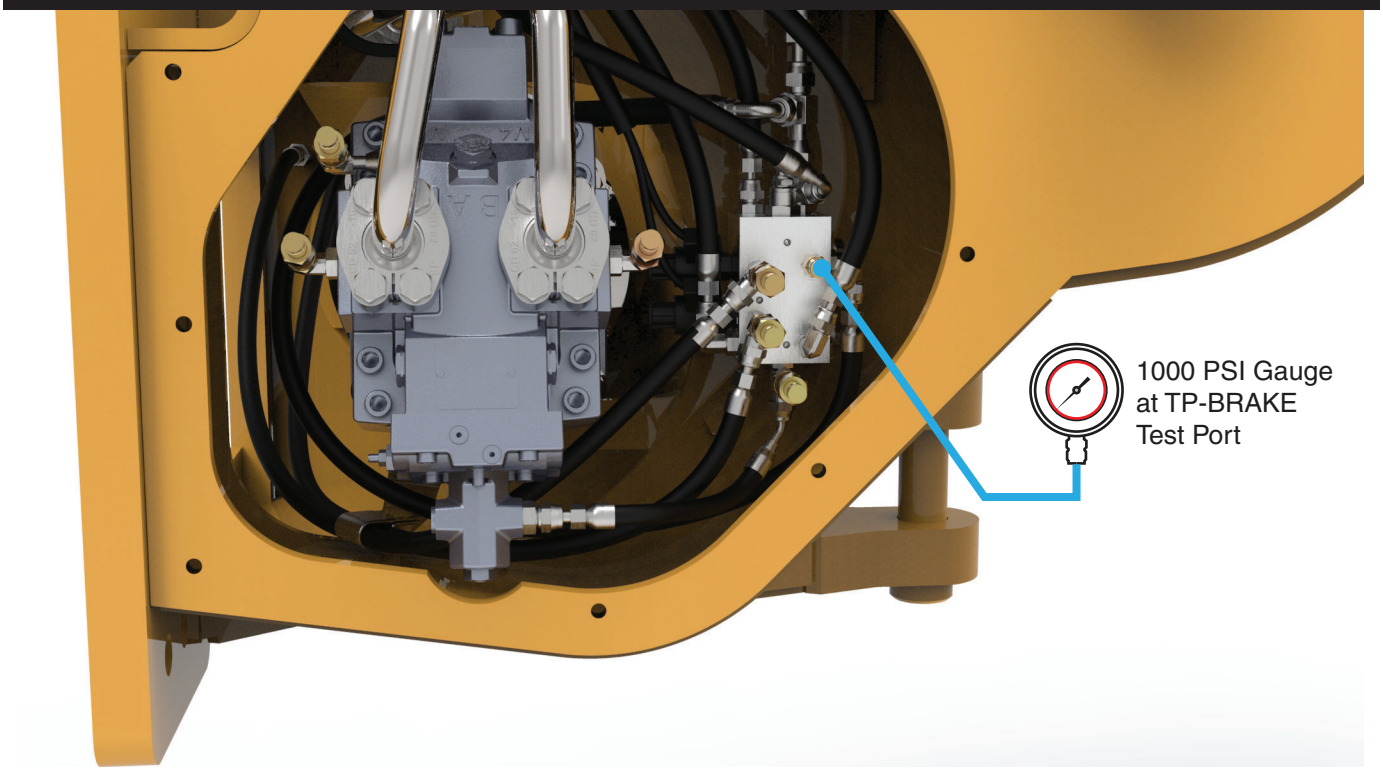


Figure 3-13 BRAKE Pressure Check (K49 shown)

Test Equipment:

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

Connect pressure gauge to test port:

- **TP-BRAKE**

Instructions

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

If the brake pressure is not at least 300 psi, check for:

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

Brake Valve Pressure Check and Adjustment

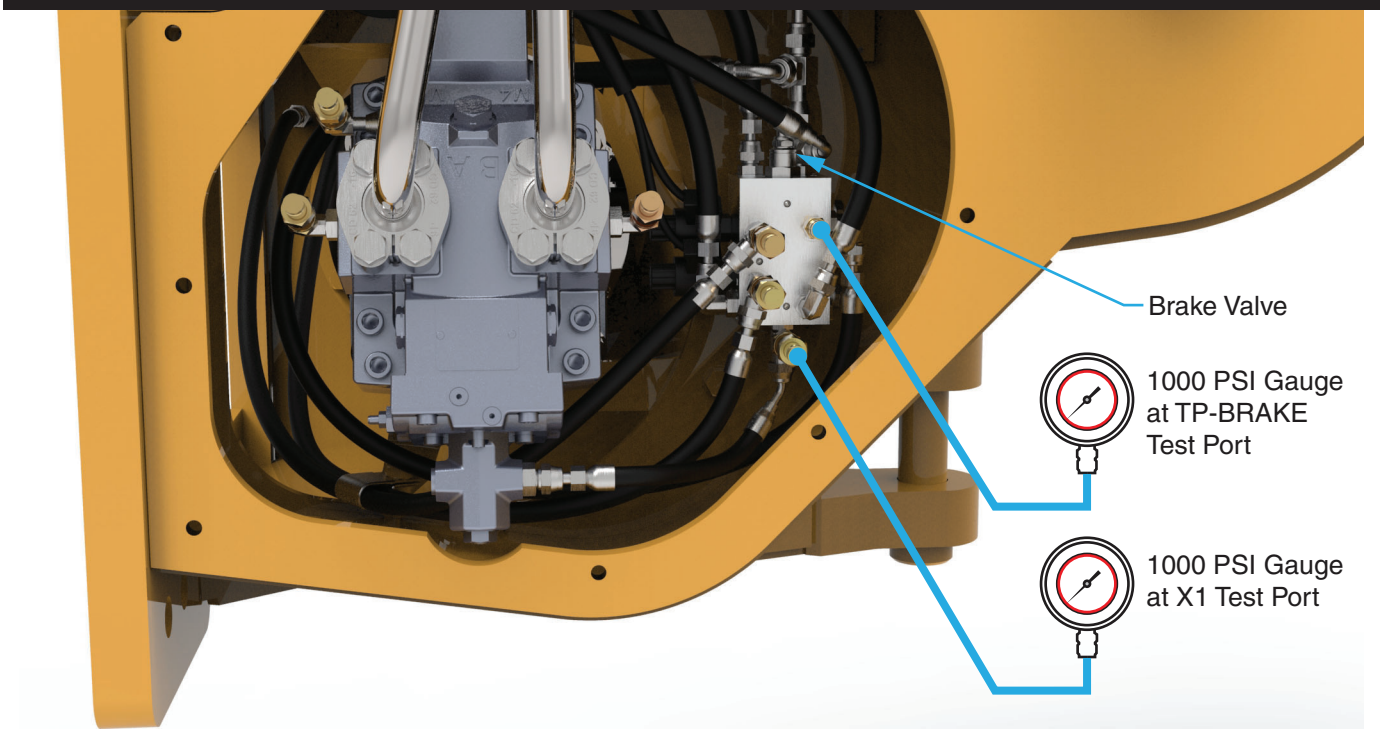


Figure 3-14 Brake Valve Pressure Check and Adjustment (K49 shown)

Test Equipment:

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

Connect pressure gauges to test ports:

- **TP-BRAKE**
- **X1 (Internal Code B, E, BN, U)**
- **HS (Internal Code D, DL, DE)**

General

This check determines if the brake valve is properly set.

Instructions

1. Shut down the engine.
2. Connect pressure gauges to the **TP-BRAKE** and **X1** or **HS** test ports.
3. Start the engine and set to high free idle.
4. Slowly meter the control lever into the **LINE-IN** position while monitoring both gauges.
5. **TP-BRAKE** pressure will jump to full pilot supply pressure when the pressure at **X1** or **HS** reaches the pilot setting of the brake valve. The pilot setting should be in the range shown in Table 3-2.
6. The brake valve sets the overlap between the hydraulic motor drive and brake release. A low setting on the brake release valve will release the brake before the motor begins driving. A high setting on the brake release valve will momentarily drive the motor against the brake before the brake releases.

Brake Valve Adjustment

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

Dozer Code	Pressure in PSI [kPa] X1 or HS Test Port
R42	64-84 [441-579]
E465/E470	115-135 [793-931]
C712, C805, C811, R40, U47	120-140 [827-965]
C81, C812, K471, K49, K71, L39, L41, L410, L42, L421, L44, Y44	130-150 [896-1,034]
C71	140-150 [965-1,034]
E460/E466	150-170 [1,034-1,172]

Table 3-2 Pilot Setting of Brake Valve

LINE-IN Pressure Check

Test Equipment:

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

Connect pressure gauge either inline with the hose at port RI or RO on the control manifold (see Figure 3-15 and Figure 3-16), or use the existing test port on the motor's M5 port. See Table 3-3 for the connection point for your dozer.

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 pilot pressure.

Instructions

1. With the engine shut off, connect a pressure gauge in line on the **LINE-IN** hose at the control manifold, at the location shown in Table 3-3.
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 3-3.

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

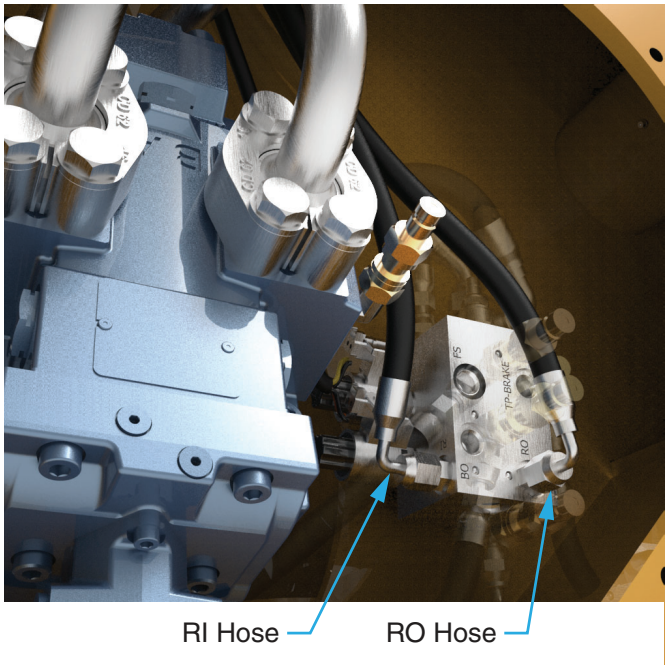


Figure 3-15 RI & RO Hoses
(Typical for Installations with Internal Code B, E, BN, U)

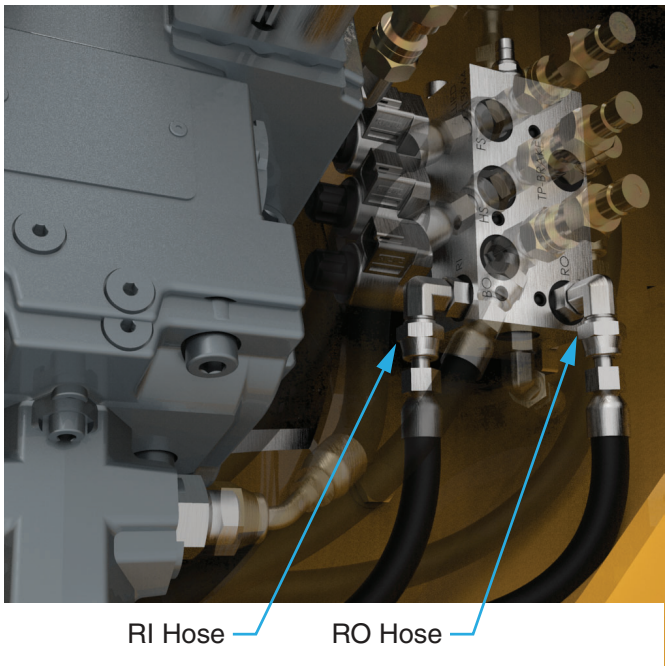


Figure 3-16 RI & RO Hoses
(Typical for Installations with Internal Code D, DL, DE)

LINE-IN Pressure Check (continued)

Make	Dozer Model	Dozer Code	Winch Option	Gauge at Port	Pressure in PSI [kPa]
CAT	D6T	C71	T	RI	Pilot Pressure
	D6 Build 20a	C712	T	RI	3450-3550 [23,787-24,476]
	D6K2	C805	T	RI	3450-3550 [23,787-24,476]
	D6N	C81	H	RI	Pilot Pressure
	D6N (E/H)	C811	T	RI	3550-3650 [24,476-25,166]
	D5 BUILD 17	C812	T	RI	3450-3550 [23,787-24,476]
John Deere	750/850J/K	E460	H	RI	Pilot Pressure
	750/850K(E/H)	E465	H	RI	3575-3675 [24,649-25,338]
	750L	E466	H	RI	3575-3675 [24,649-25,338]
	850L	E470	H	RI	3575-3675 [24,649-25,338]
Komatsu	D65-16	K49	T	RI	Pilot Pressure
	D61-23	K471	T	RI	Pilot Pressure
	D71-24	K71	T	RI	3450-3550 [23,787-24,476]
Liebherr	PR716	L39	T	RI	Pilot Pressure
	PR724	L41	T	RI	Pilot Pressure
	PR724	L41	H	RI	Pilot Pressure
	PR726	L410	T	RI	Pilot Pressure
	PR736	L42	T	RI	Pilot Pressure
	PR736	L421	T	RI	Pilot Pressure
	PR734-4	L44	T	RI	Pilot Pressure
Case	1650L	R40	T	M5	3000-3100 [20,684-21,374]
	1650	R42	T	RO	Pilot Pressure
	2050M	R42	T	RO	Pilot Pressure
Shantui	DH17	U47	T	RI	Pilot Pressure
Tigercat	635D	Y44	T	RI	Pilot Pressure

Table 3-3 LINE-IN Pressure Check Gauge Connection Port and Expected Pressure

LINE-OUT Pressure Check

Test Equipment:

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

Connect pressure gauge either inline with the hose at port RI or RO on the control manifold (see Figure 3-17 and Figure 3-18), or use the existing test port on the motor's M5 port. See Table 3-4 for the connection point for your dozer.

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.

Instructions

1. With the engine shut off, connect a pressure gauge in line on the **LINE-OUT** hose at the control manifold, at the location shown in Table 3-4
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 3-4.

If the **LINE-OUT** pressure is not as specified in Table 3-4, 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.

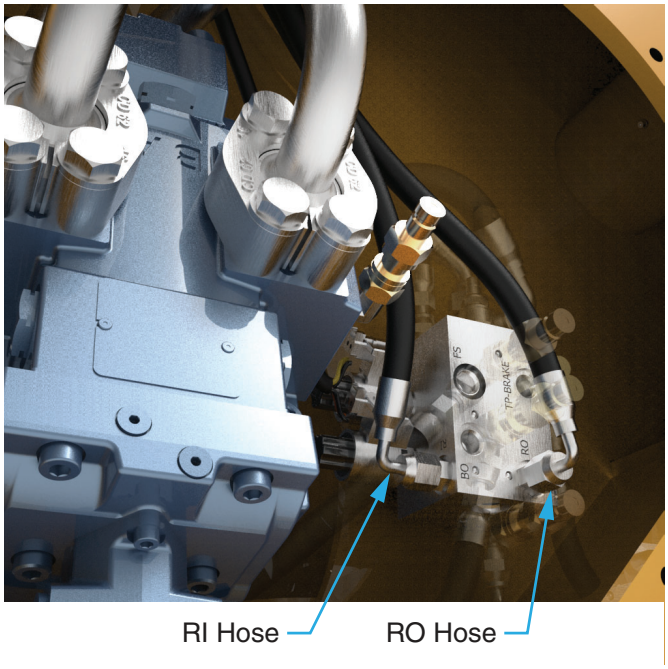


Figure 3-17 RI & RO Hoses
(Typical for Installations with Internal Code B, E, BN, U)

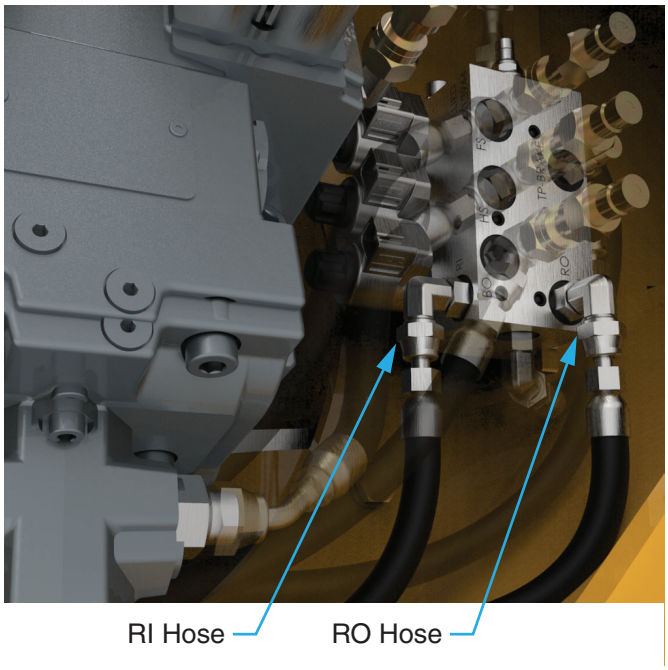


Figure 3-18 RI & RO Hoses
(Typical for Installations with Internal Code D, DL, DE)

LINE-OUT Pressure Check (continued)

Make	Dozer Model	Dozer Code	Winch Option	Gauge at Port	Pressure in PSI [kPa]
CAT	D6T	C71	T	RO	Pilot Pressure
	D6 Build 20a	C712	T	RO	3450-3550 [23,787-24,476]
	D6K2	C805	T	RO	3450-3550 [23,787-24,476]
	D6N	C81	H	RO	Pilot Pressure
	D6N (E/H)	C811	T	RO	3550-3650 [24,476-25,166]
	D5 BUILD 17	C812	T	RO	3450-3550 [23,787-24,476]
John Deere	750/850J/K	E460	H	RO	Pilot Pressure
	750/850K(E/H)	E465	H	RO	3575-3675 [24,649-25,338]
	750L	E466	H	RO	3575-3675 [24,649-25,338]
	850L	E470	H	RO	3575-3675 [24,649-25,338]
Komatsu	D65-16	K49	T	RO	Pilot Pressure
	D61-23	K471	T	RO	Pilot Pressure
	D71-24	K71	T	RO	3450-3550 [23,787-24,476]
Liebherr	PR716	L39	T	RO	Pilot Pressure
	PR724	L41	T	RO	Pilot Pressure
	PR724	L41	H	RO	Pilot Pressure
	PR726	L410	T	RO	Pilot Pressure
	PR736	L42	T	RO	Pilot Pressure
	PR736	L421	T	RO	Pilot Pressure
	PR734-4	L44	T	RO	Pilot Pressure
Case	1650L	R40	T	M5	3000-3100 [20,684-21,374]
	1650	R42	T	RO	Pilot Pressure
	2050M	R42	T	RO	Pilot Pressure
Shantui	DH17	U47	T	RO	Pilot Pressure
Tigercat	635D	Y44	T	RI	Pilot Pressure

Table 3-4 LINE-OUT Pressure Check Gauge Connection Port and Expected Pressure

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.

NOTE: Always use the troubleshooting procedures given in Section 2 to locate a malfunction before performing a major overhaul of the unit. Make all checks in a systematic manner. Haphazard checking wastes time and can cause further damage.

Review and perform any adjustments that may be the cause of a malfunction (refer to Section 3).

Use new seals, gaskets and O-rings when installing components.

⚠ CAUTION

Cleanliness is of extreme importance in the repair and overhaul of any hydraulic unit. Before attempting any repairs, the exterior of the winch must be thoroughly cleaned to prevent the possibility of contamination.

Winch Removal

1. Drain the oil from the winch.

2. Remove the arch or fairlead from the winch. If these accessories are left on the winch, the winch will not remain level when lifted from the tractor.

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

⚠ WARNING

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

4. Disconnect hoses and wire 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 1500 kg (3000 lb.).

6. Remove the mounting hardware securing winch to tractor.

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

Winch Disassembly

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

1. Freespool Shaft
2. Freespool Piston
3. Freespool Shifter Fork
4. O-Ring
5. O-Ring
6. Spring
7. Gear
8. Bushing
9. Freespool Adjust Piston
10. O-Ring
11. Freespool Adjust Housing
12. Intermediate Shaft
13. Pinion Gear
14. Dental Clutch
15. Screw
16. Nut
17. Roller Bearing Cone
18. Roller Bearing Cup
19. Capscrew
20. Washer
21. Gasket
22. Plate
23. Washer
24. Capscrew

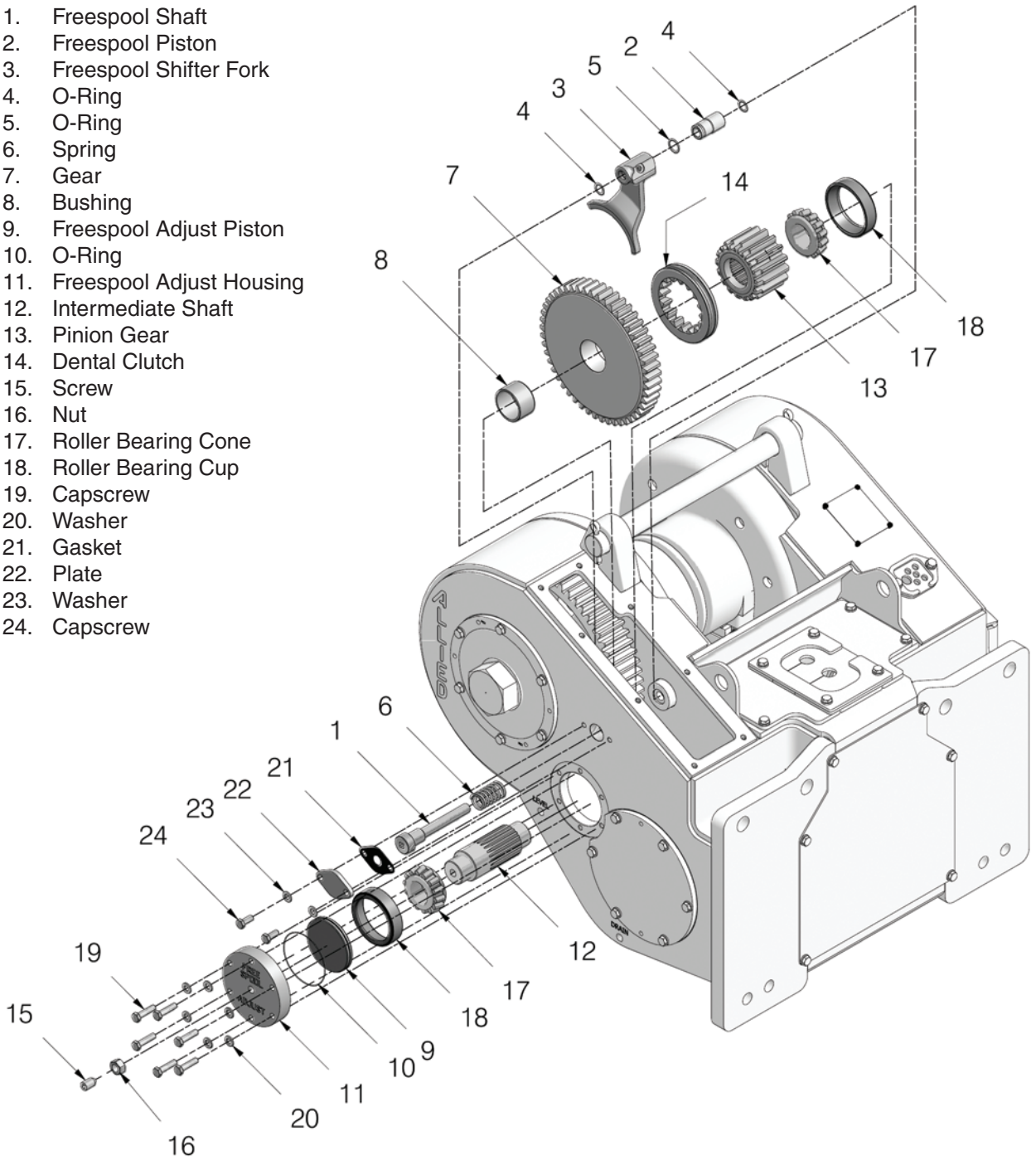
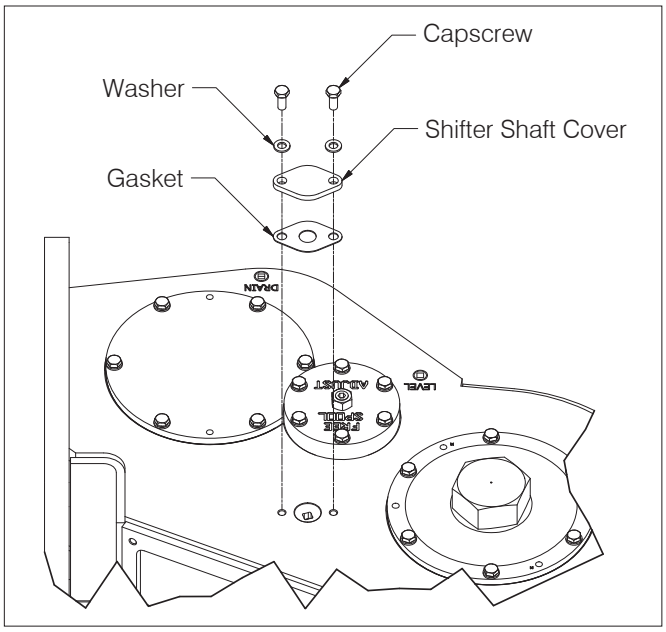


Figure 4-1 Location of Intermediate and FREESPOOL Shaft Components

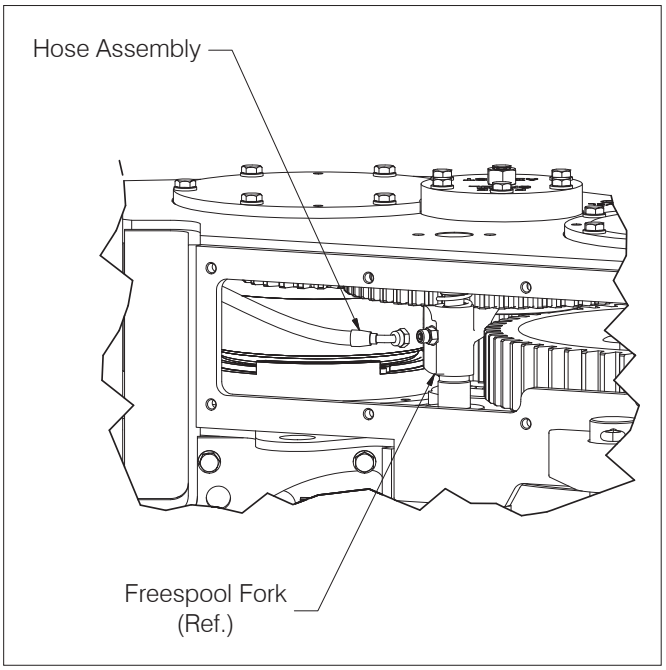
Intermediate and FREESPOOL Shaft Removal

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

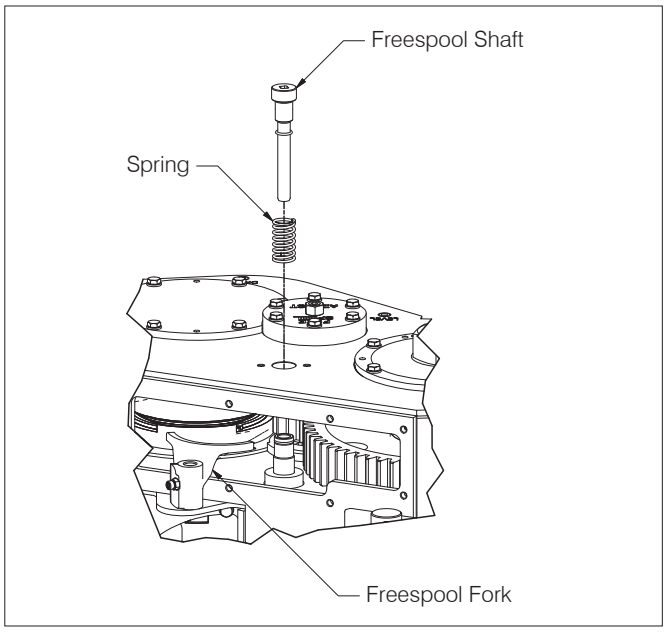
1. Remove the capscrews securing the shifter shaft cover and take the cover off.



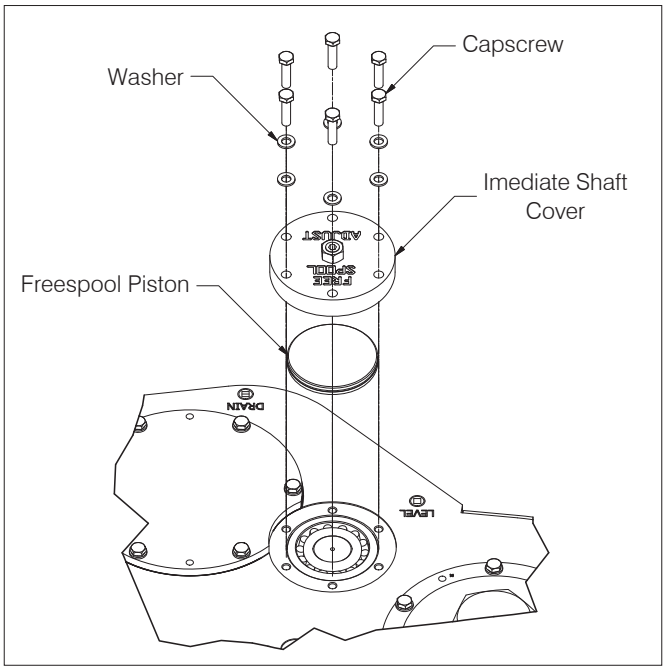
2. Disconnect the hose assembly.



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



4. Remove the intermediate shaft cover and FREESPOOL piston.



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

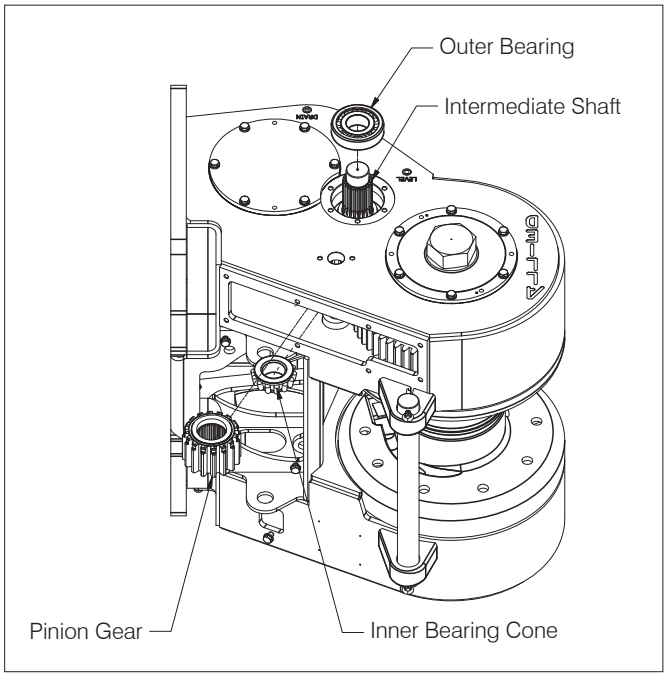
6. Screw a 3/4-16 UNF slide hammer into the end of the intermediate shaft and partially pull it out.

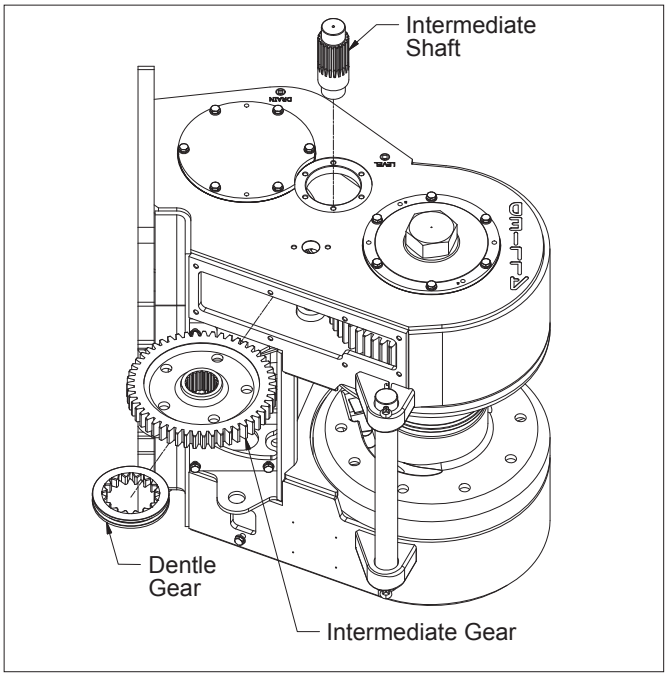
7. Remove the pinion gear and the inner bearing cone. Refer to Figure 4-1 for the location of components.

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

9. Remove intermediate gear.

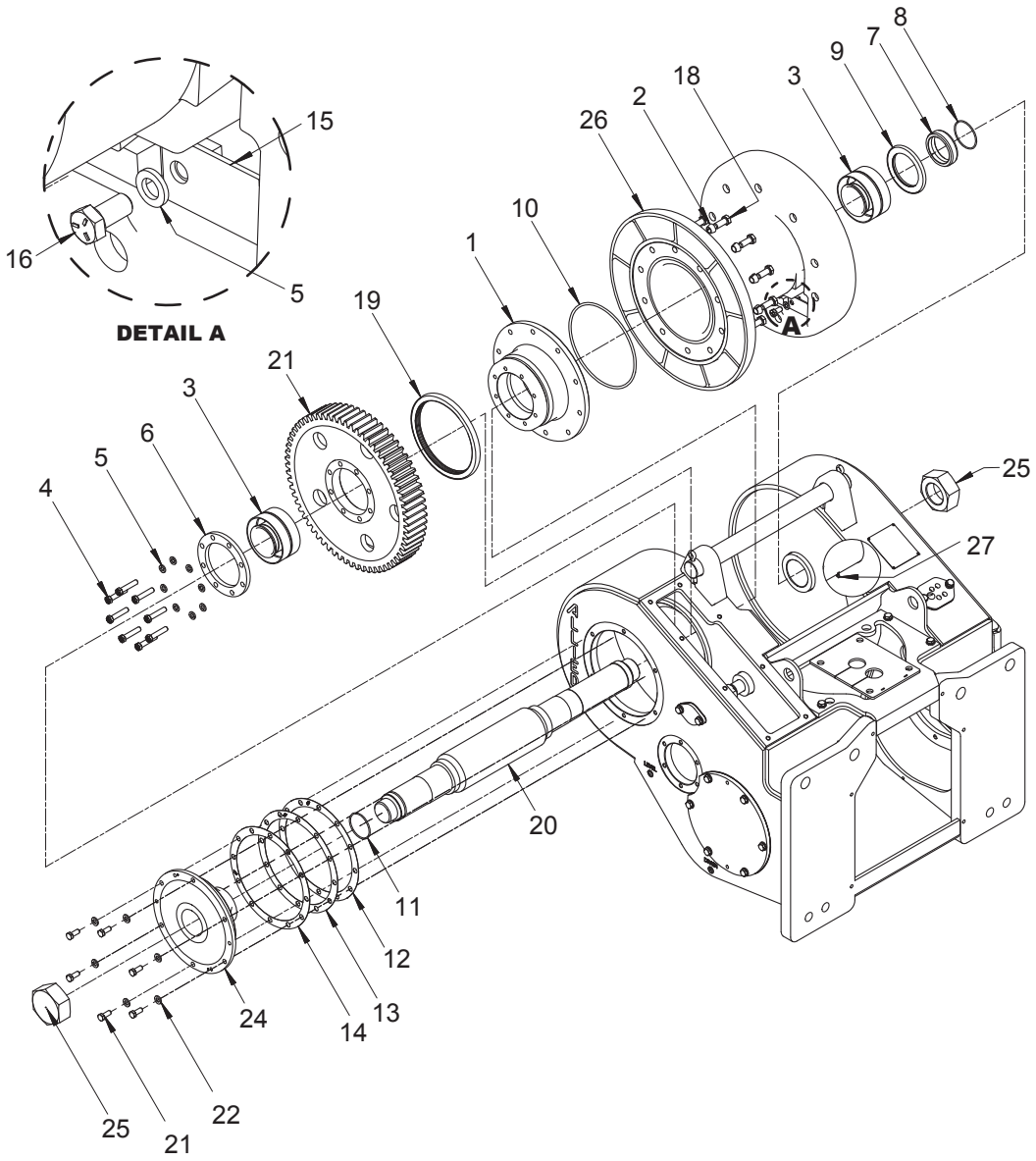
NOTE: Remove drum shaft retainer prior to removing intermediate gear. See Drum Shaft and Drum Removal section that follows.





Drum Shaft & Drum Removal

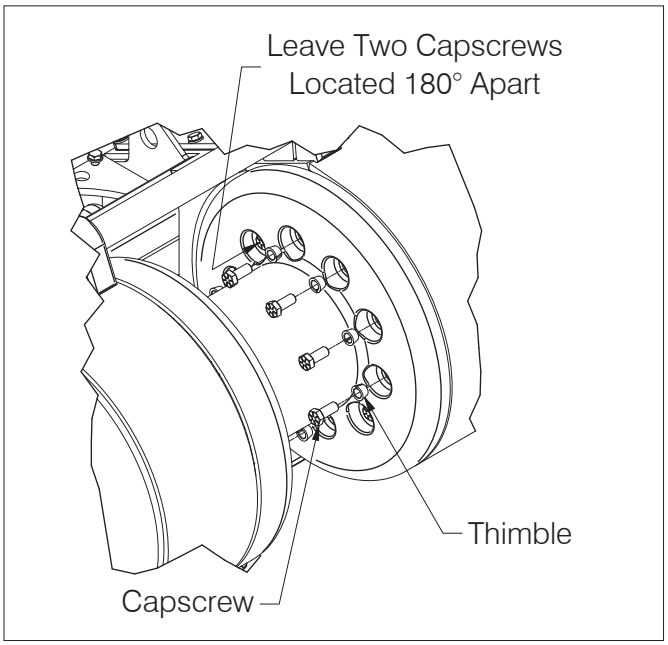
Figure 4-2 shows the location of drum and drum shaft components. Do not attempt to remove heavy components such as the drum or drum gear by hand. Always use a lifting device and the recommended attachments whenever possible. To remove the drum gear it will be necessary to first remove the intermediate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



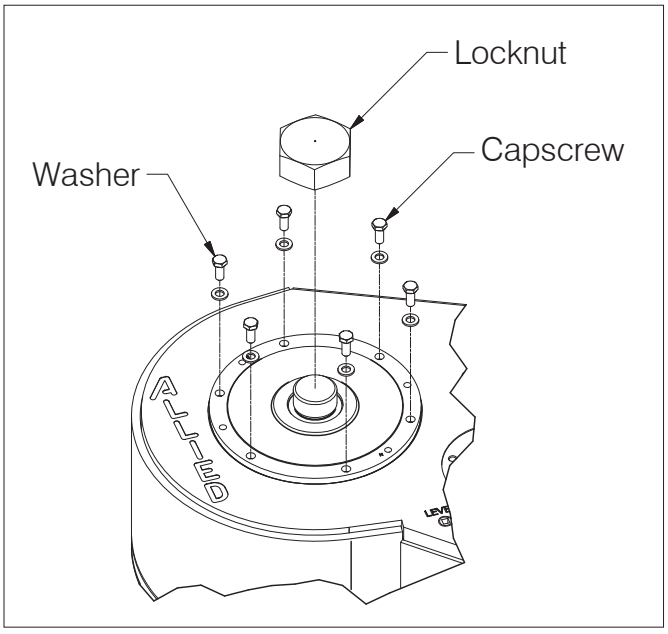
1. Adapter
2. Tapered Thimble
3. Roller Bearing
4. Capscrew
5. Washer
6. Retainer Plate
7. Spacer
8. O-Ring
9. Oil Seal
10. Piston Seal Ring
11. O-Ring
12. Shim .020
13. Shim .007
14. Shim .005
15. Ferrule Keeper
16. Capscrew
18. Capscrew
19. Oil Seal
20. Drum Shaft
21. Drum Gear
22. Washer
23. Capscrew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

Figure 4-2 Location of Drum and Drum Shaft Components

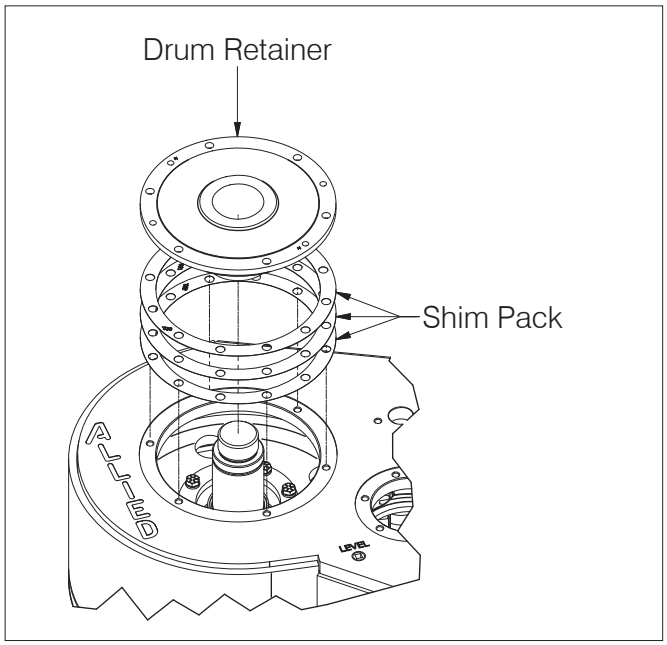
1. Loosen the drum capscrews, then remove capscrews with thimbles, leaving two located 180° apart.



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

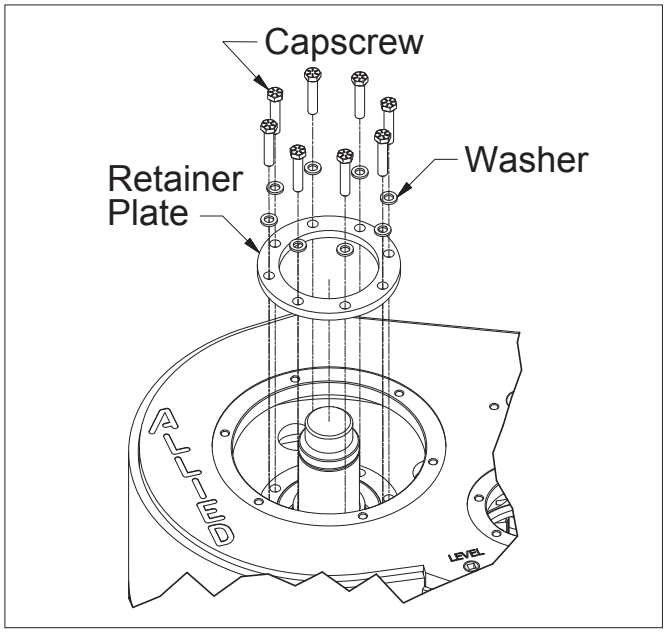


3. Remove bearing retainer and shim pack.



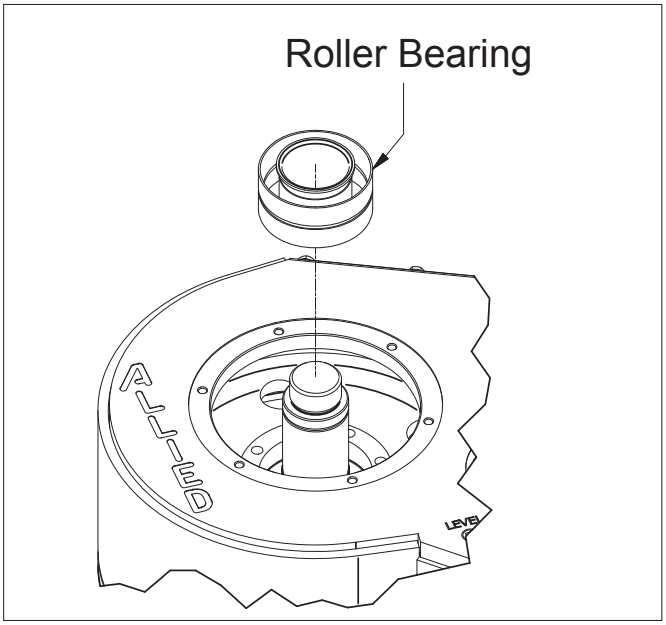
NOTE: Tag shim pack for reference during reassembly.

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

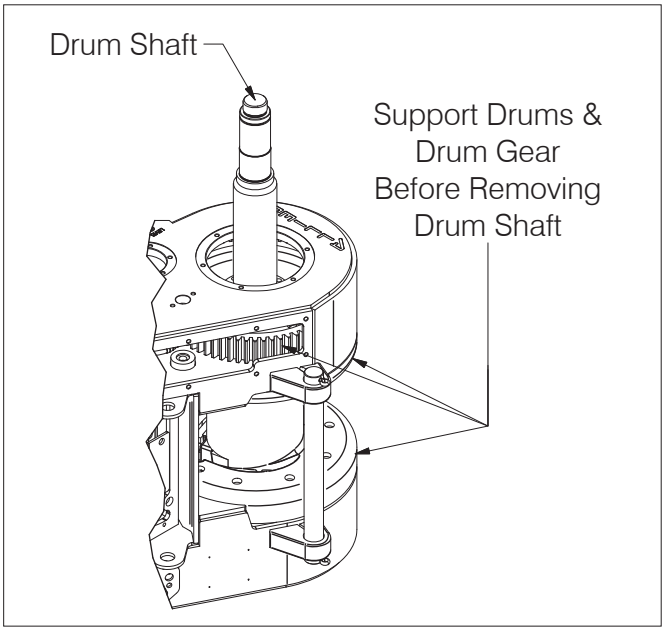


5. Remove roller bearing.

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



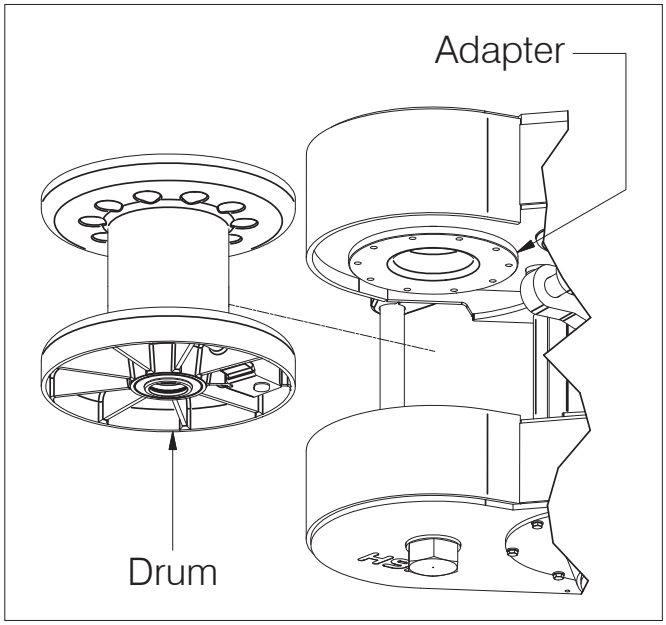
6. Attach a sling around the drum and hoist until there is no slack, then drive the shaft out the right hand side.



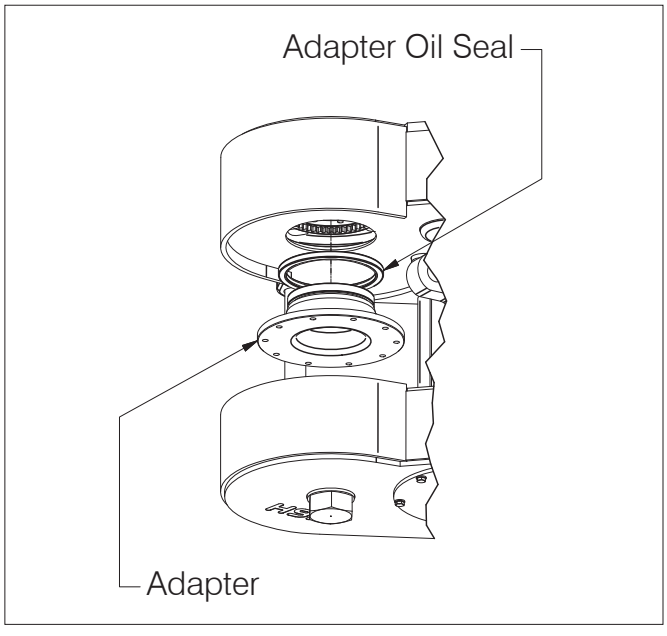
NOTE: Support or sling the drum gear so that it does not fall during shaft removal.

7. Remove two remaining drum capscrews.

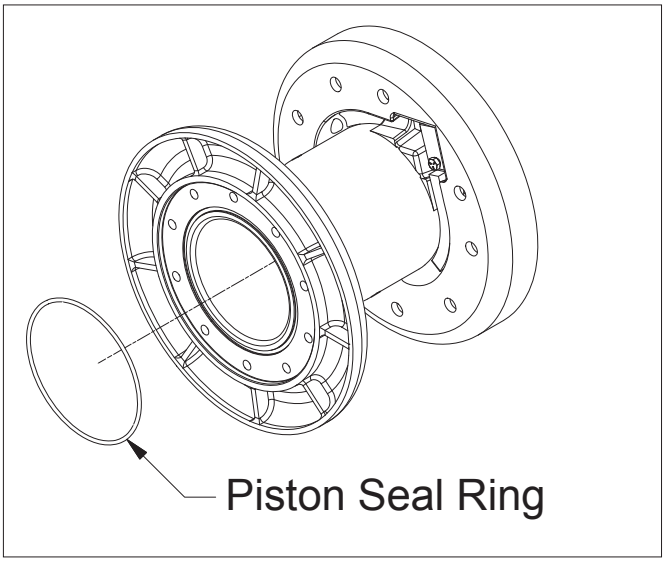
8. Carefully remove the drum from winch frame. Ensure that the adapter does not fall.



9. Remove adapter and oil seal. Discard the oil seal.



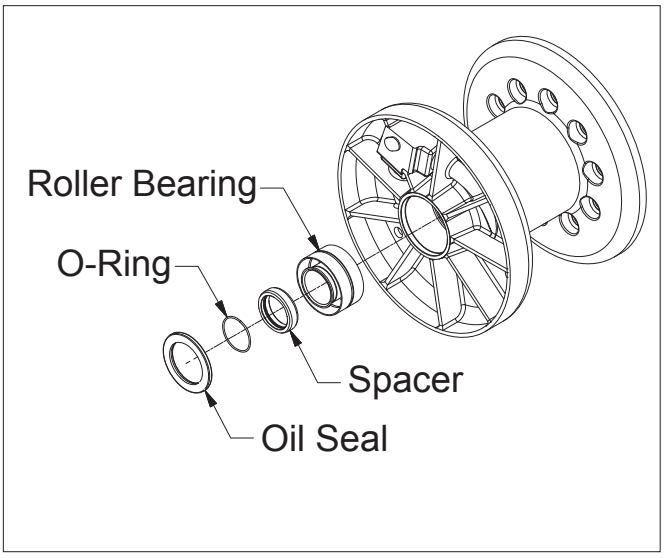
10. Remove and discard the piston seal ring from the right-hand side of the drum.



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

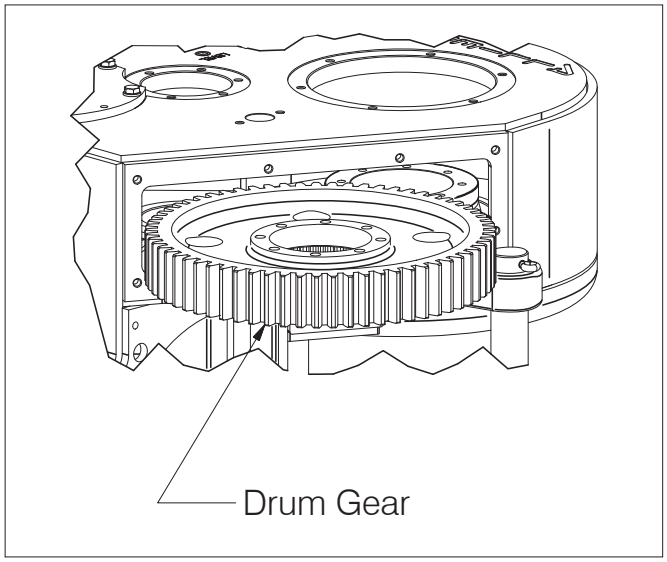
11. Remove double tapered roller bearing assembly, spacer with O-ring, and oil seal from the left-hand end of the drum. (Remember: Oil seal lip should be pointed in.)

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



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

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



Hydraulic System Disassembly

Disconnecting the hoses is necessary in order to remove the motor shaft assembly. Cap hose ends to prevent contamination and tag hose ends with their corresponding ports.

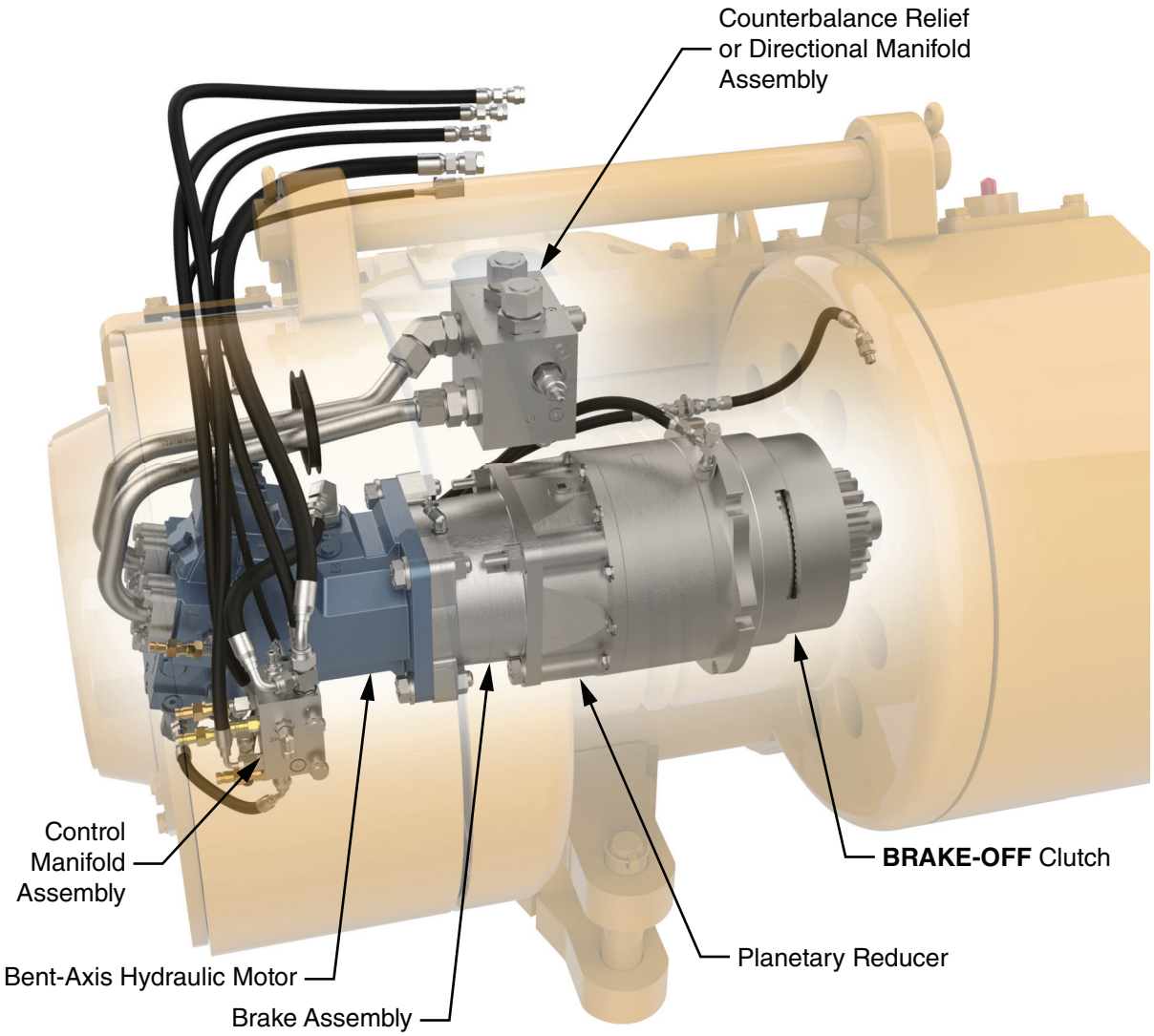
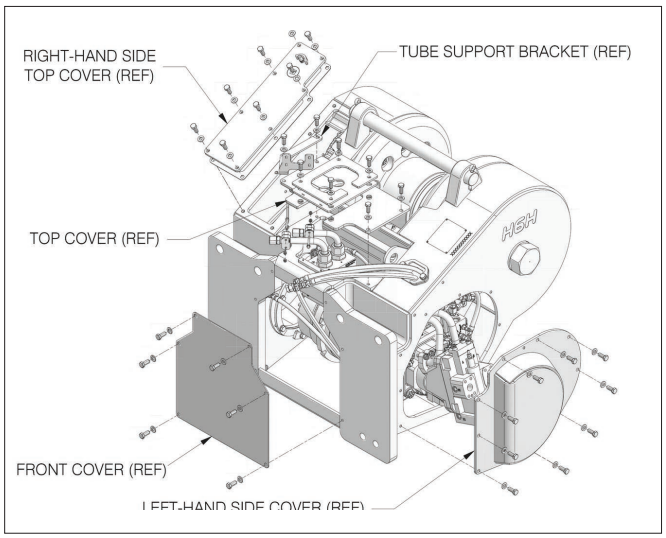
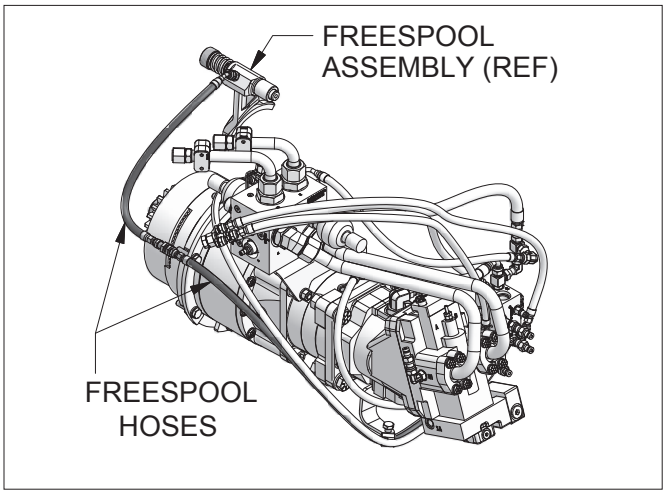


Figure 4-3 Hydraulic System Components

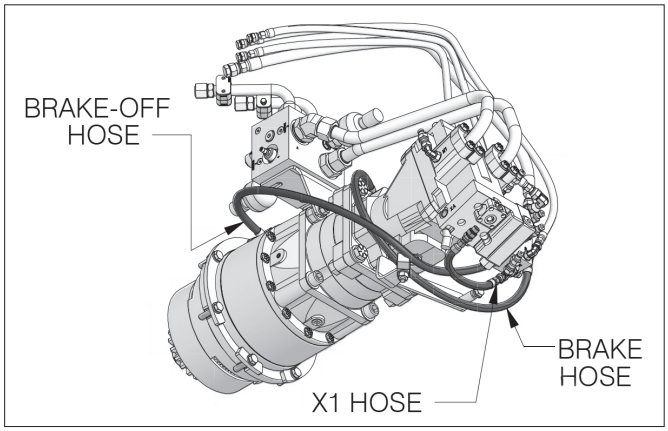
1. Drain oil from winch, remove tube support bracket, and covers as shown.



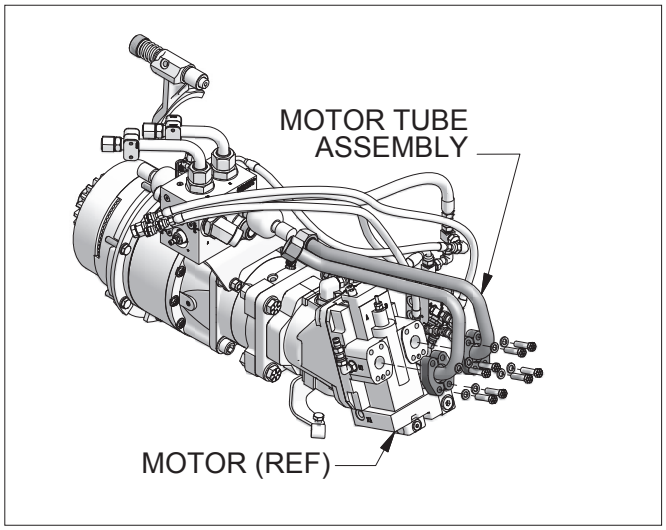
2. Remove the two freespool hoses. (Other parts not shown for view clarity.)



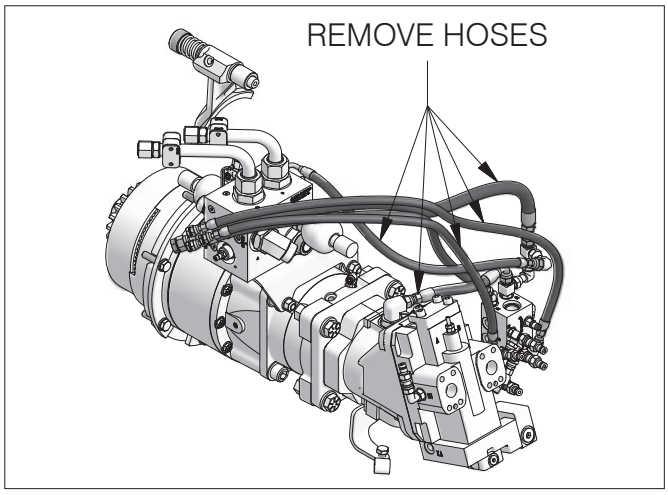
3. Remove BRAKE-OFF, BRAKE, and X1 hoses.



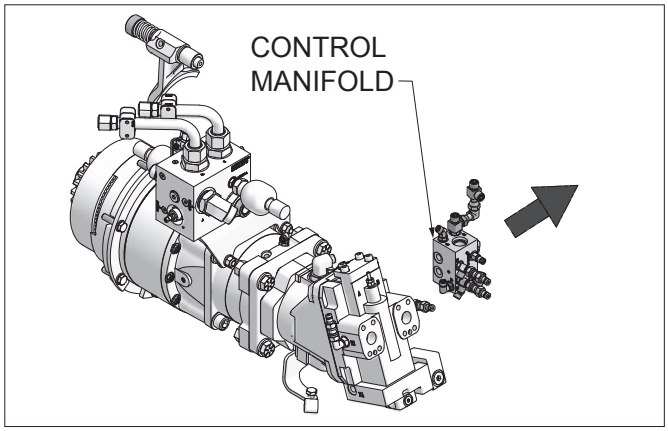
4. Remove motor tube assembly at Ports A and B on the motor.



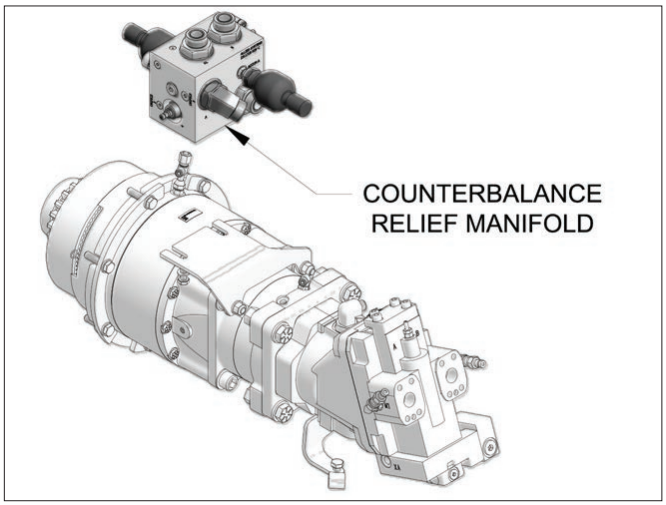
5. Remove remaining hoses.



6. Remove the control manifold.

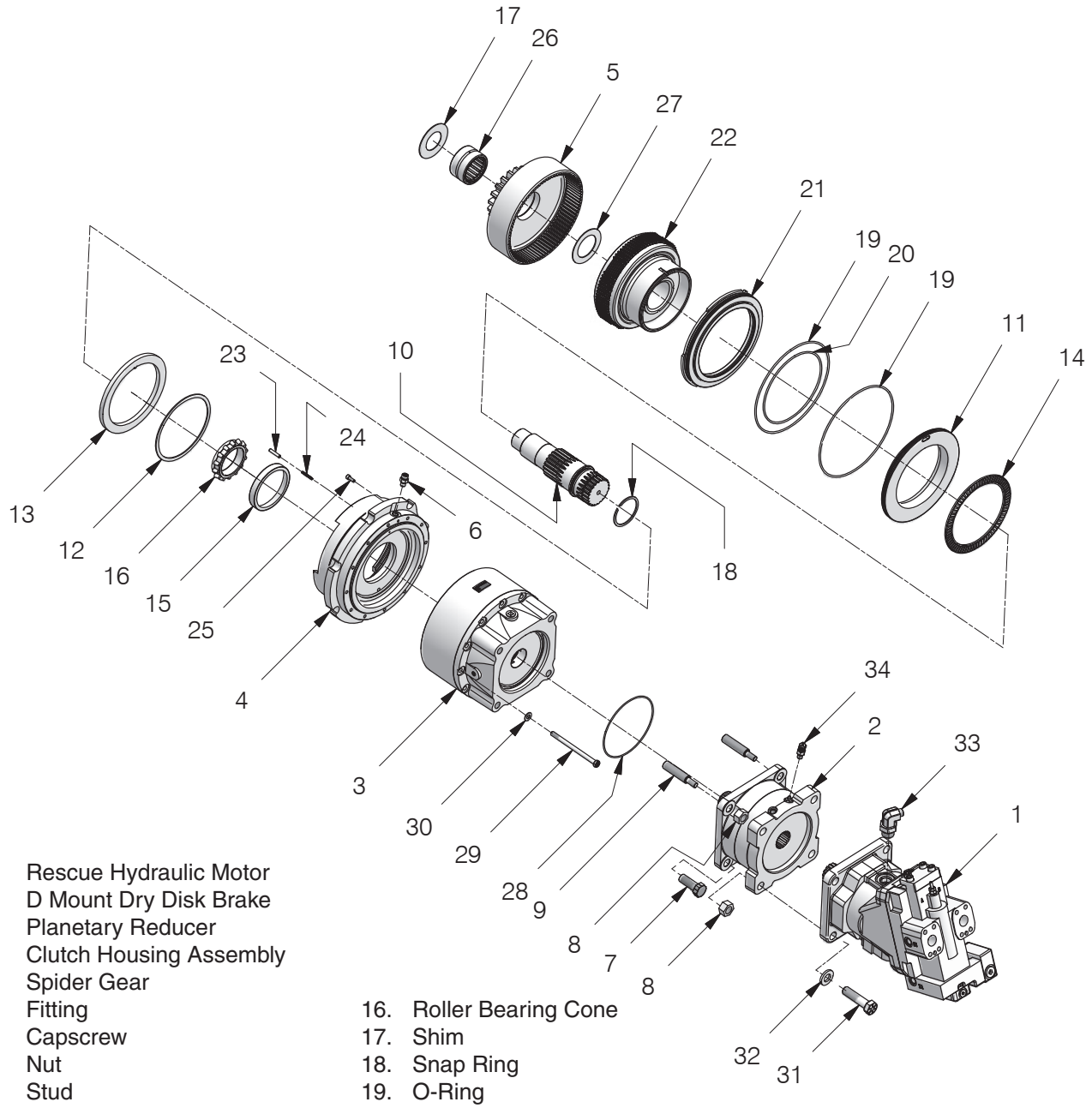


7. Remove the counterbalance relief manifold.



Motor Shaft Removal and Disassembly

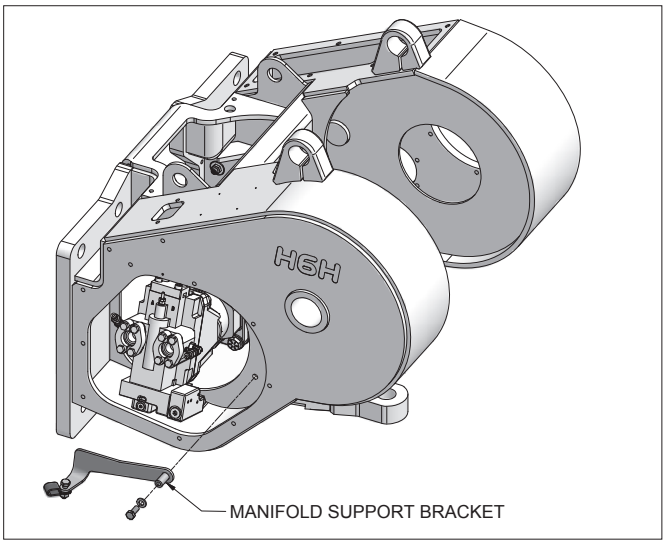
Removal and disassembly of the motor shaft assembly can be accomplished while the winch is mounted on the tractor. The motor and brake can be removed without removing any other components (other than various hoses and fittings), but taking out the planetary reducer and clutch housing requires removing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



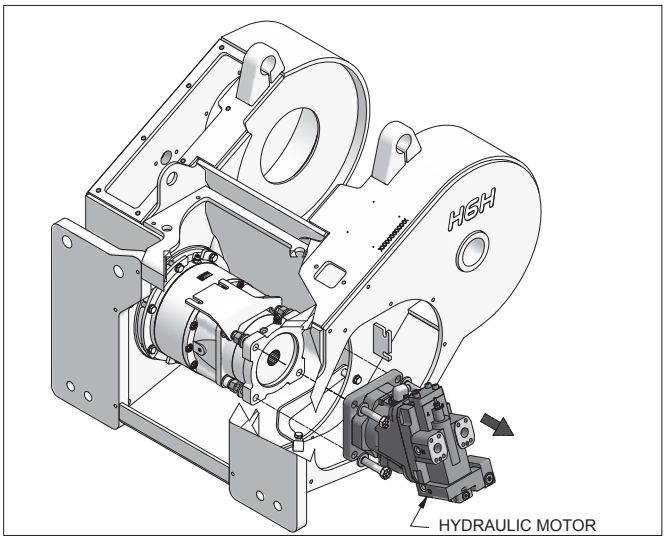
1. Rescue Hydraulic Motor
2. D Mount Dry Disk Brake
3. Planetary Reducer
4. Clutch Housing Assembly
5. Spider Gear
6. Fitting
7. Capscrew
8. Nut
9. Stud
10. Clutch Shaft
11. Clutch Piston
12. Snap Ring
13. Thrust Ring
14. Thrust Needle Roller Bearing
15. Roller Bearing Cup
16. Roller Bearing Cone
17.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

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

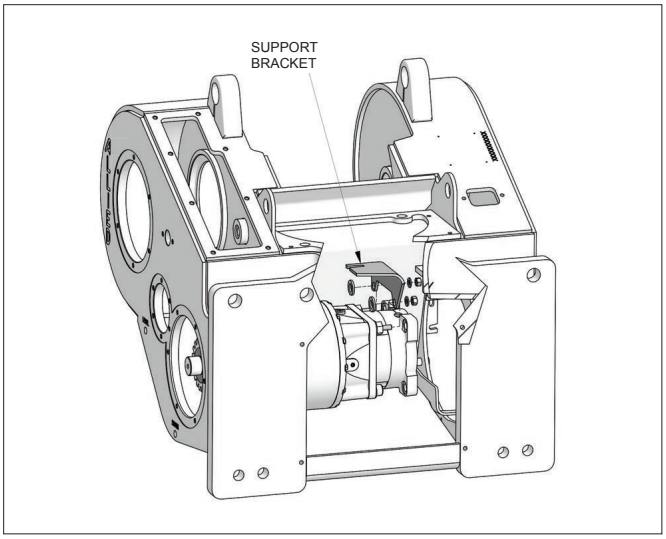
1. Remove the manifold support bracket from frame.



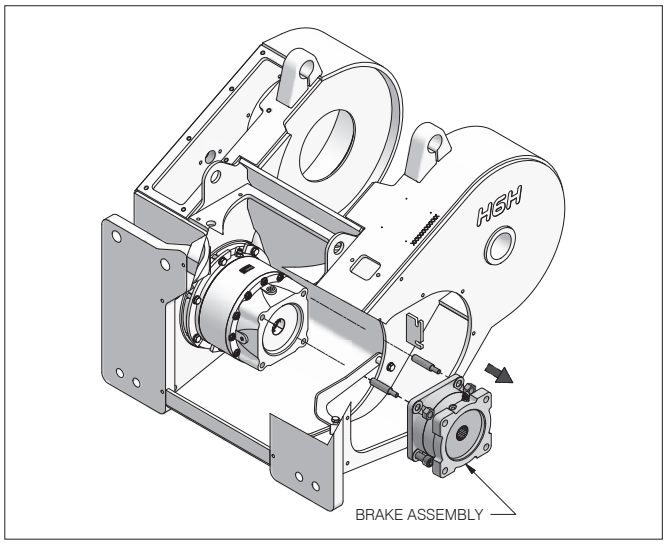
2. Remove the hydraulic motor.



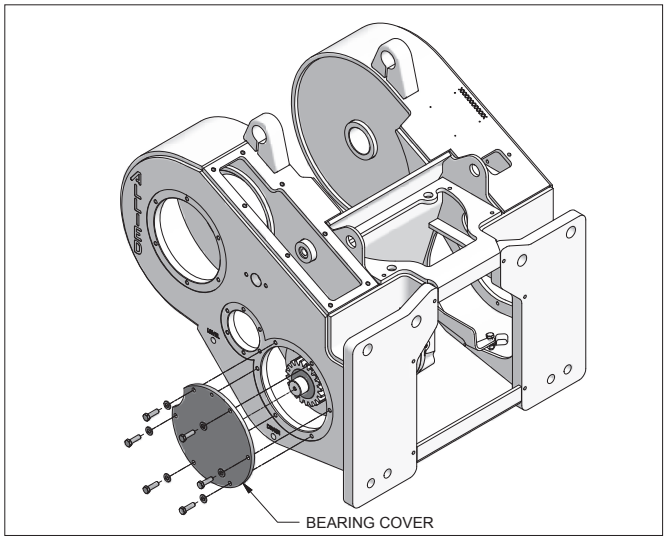
3. Remove the support bracket.



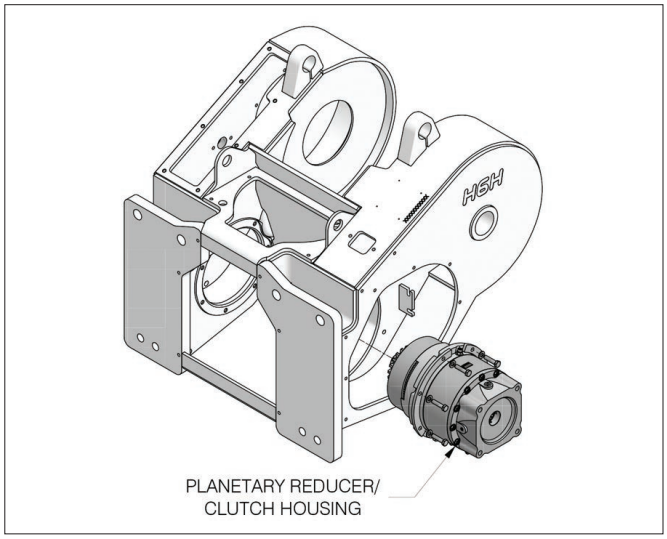
4. Remove the brake.



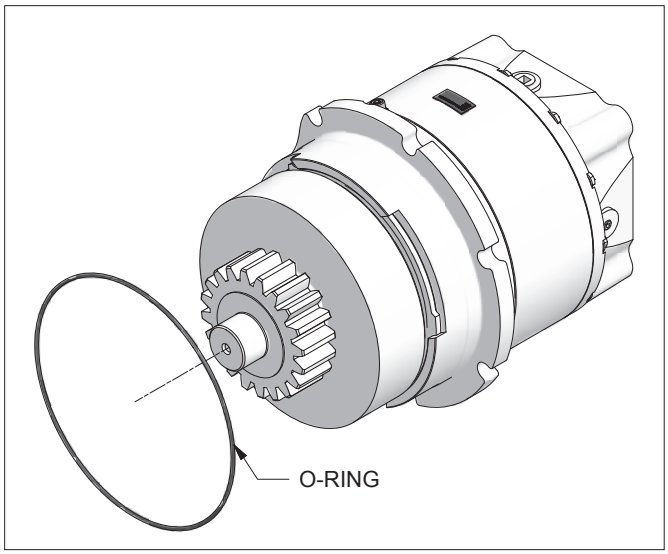
5. Remove the cover plate.



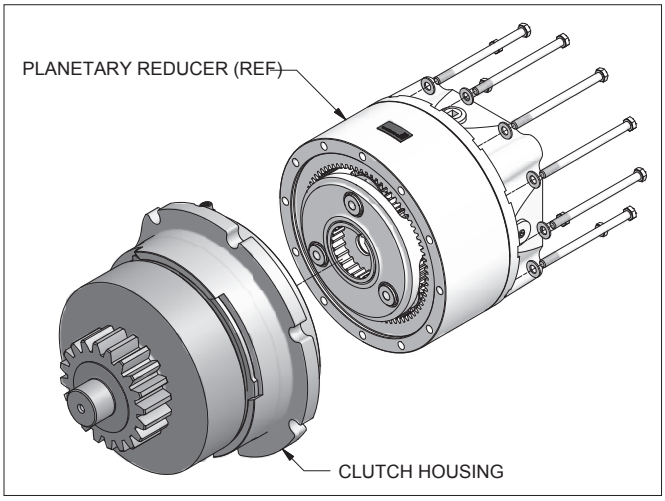
6. Remove planetary reducer/clutch housing assembly.



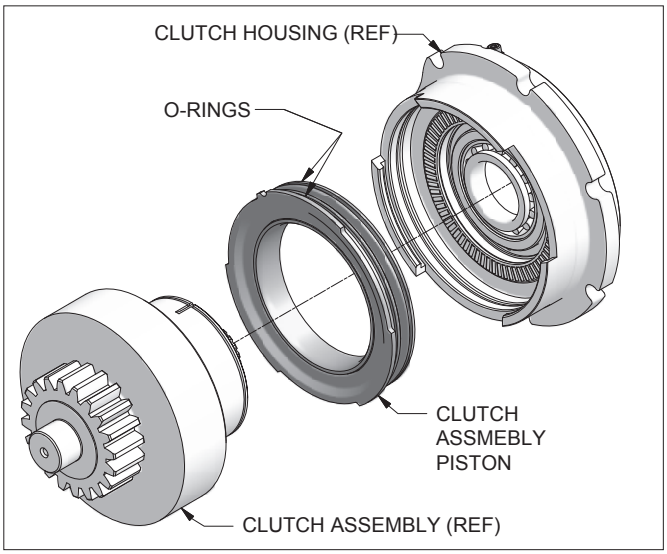
7. Remove and discard the O-ring.



8. Remove the clutch housing from the reducer.



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

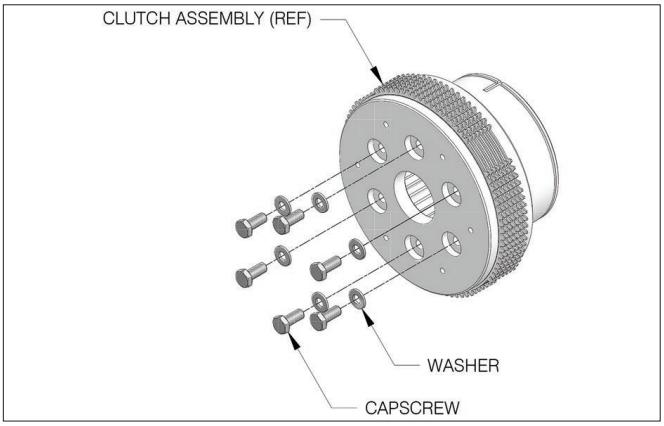


Intentionally Blank

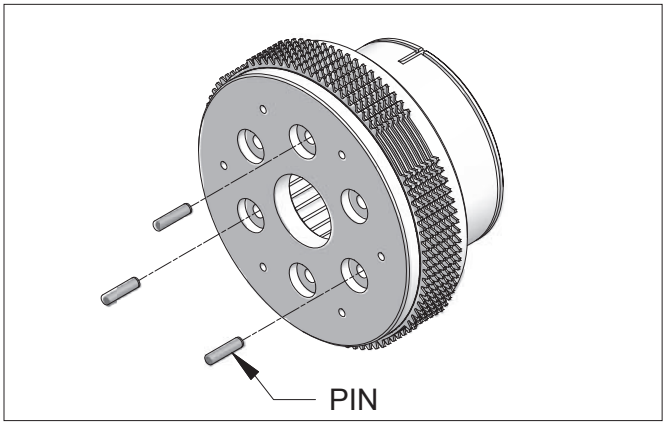
BRAKE-OFF Clutch Disassembly

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

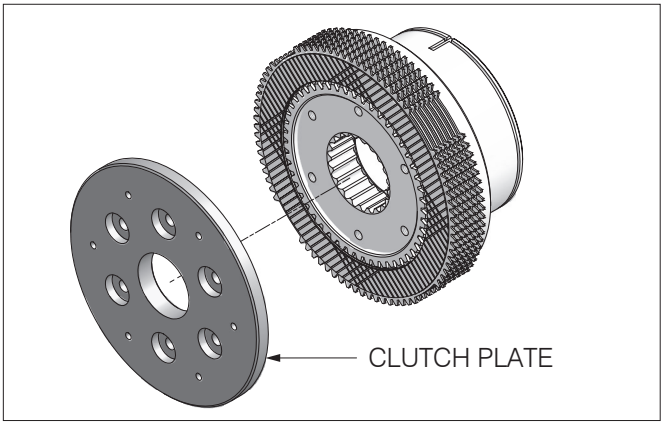
1. Remove capscrews and washers from the plate.



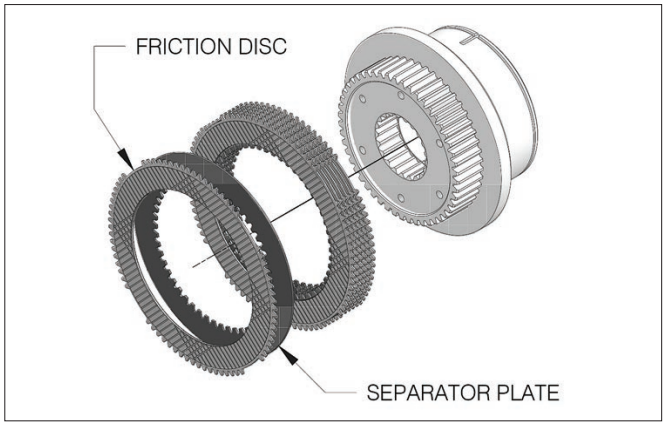
2. Remove pins from the clutch hub. Mark the holes where the pins stay for reference when reassembly.



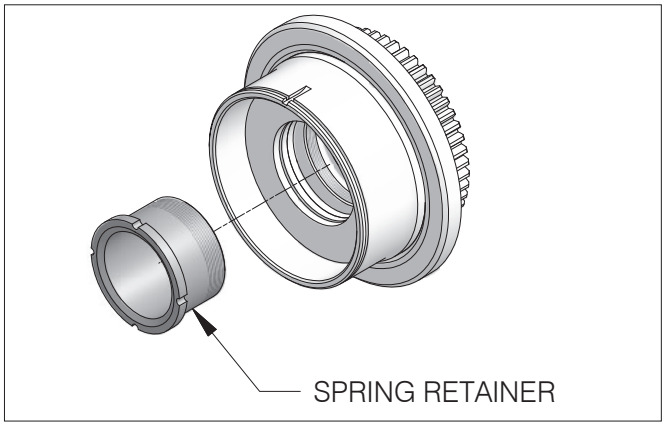
3. Remove the clutch plate.



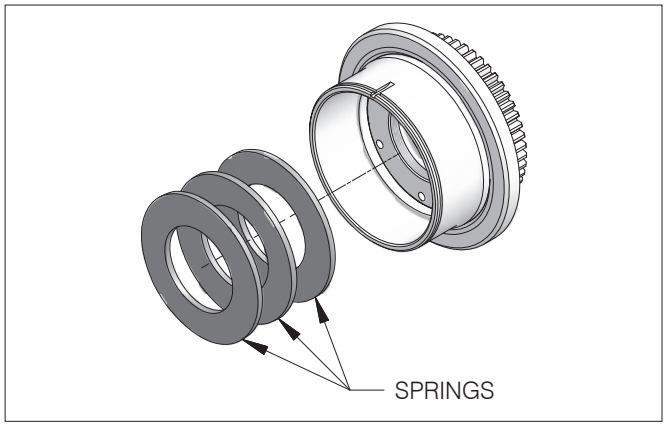
4. Remove separator plates and friction discs.



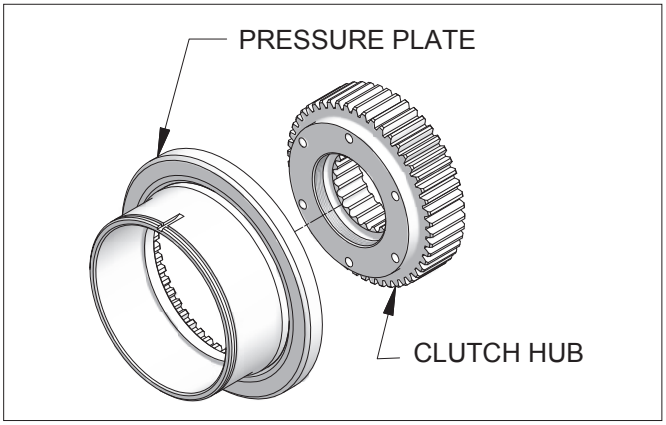
5. Remove the spring retainer from the clutch hub.



6. Remove springs for the pressure plate.

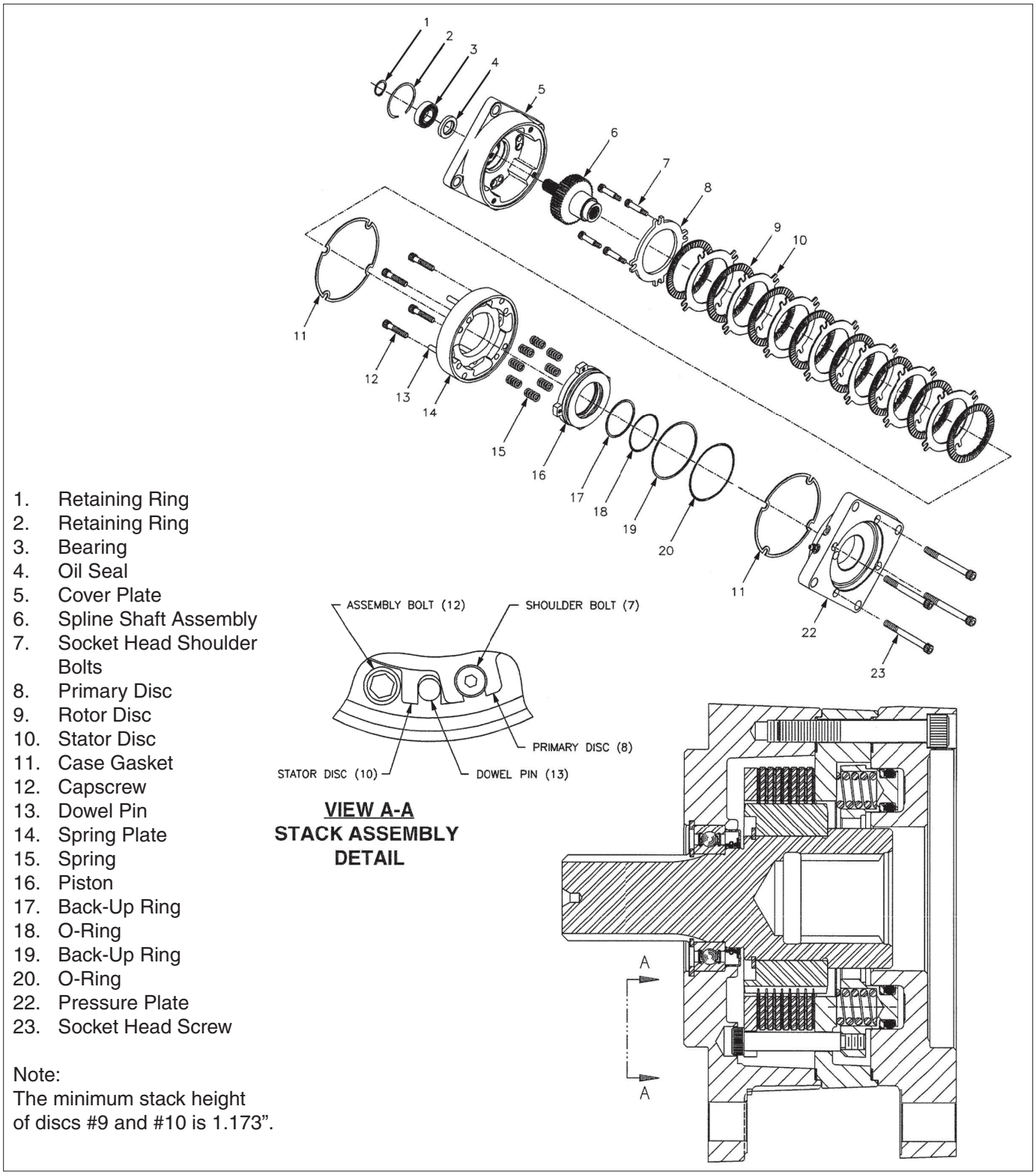


7. Separate the clutch hub and the pressure plate.



Brake Disassembly

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



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

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

Figure 4-5 Brake Assembly

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

2. Tap female end of spline shaft assembly (item 6) and spring plate (item 14) with a soft mallet to separate cover. If sections will not separate, use a screwdriver to carefully pry sections apart.

3. Remove retaining ring (item 1) from spline shaft assembly (item 6).

4. Remove spline shaft assembly (item 6) from cover plate (item 5) by tapping male end of spline shaft assembly with soft mallet.

5. Remove retaining ring (item 2) from cover plate (item 5) and press out oil seal (item 4) and bearing (item 3).

6. Remove four socket head shoulder bolts (item 7). A suitable holding fixture is useful to hold the brake in position.

⚠ CAUTION

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

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

NOTE:

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

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

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

9. Remove spring plate (item 14).

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

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

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

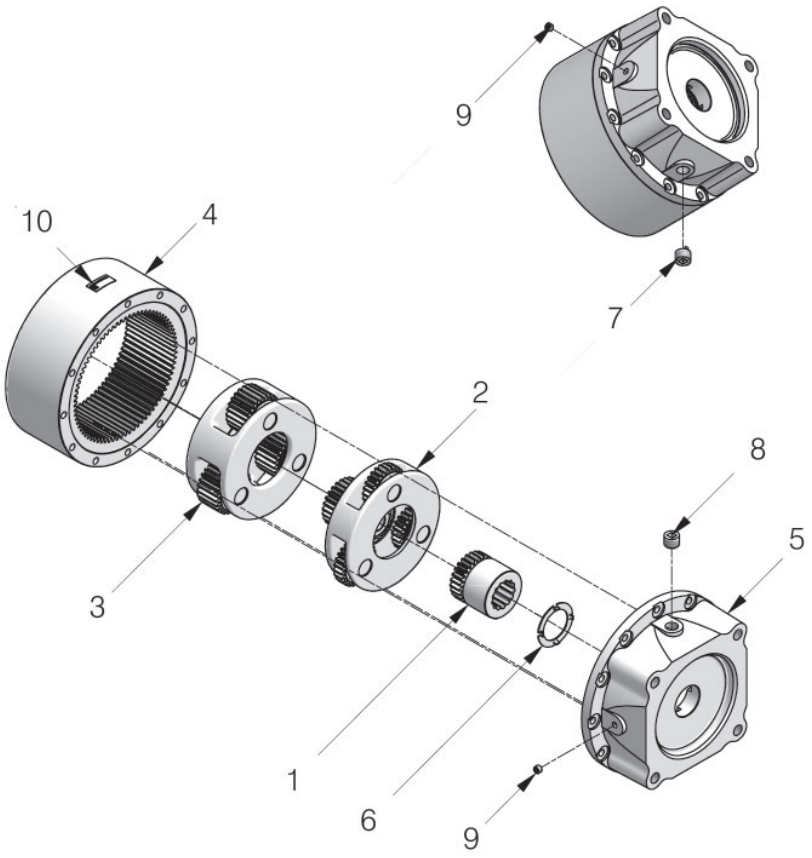
13. Remove O-rings (items 18 & 20) and back-up rings (items 17 & 19) from piston (item 16).

NOTE: Be careful not to scratch or mar piston.

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

Planetary Reducer Disassembly

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



1. Sun Gear
2. Primary Carrier Assembly
3. Secondary Carrier Assembly
4. Ring Gear
5. Cover
6. Thrust Washer
7. 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).

Intentionally Blank

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.

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

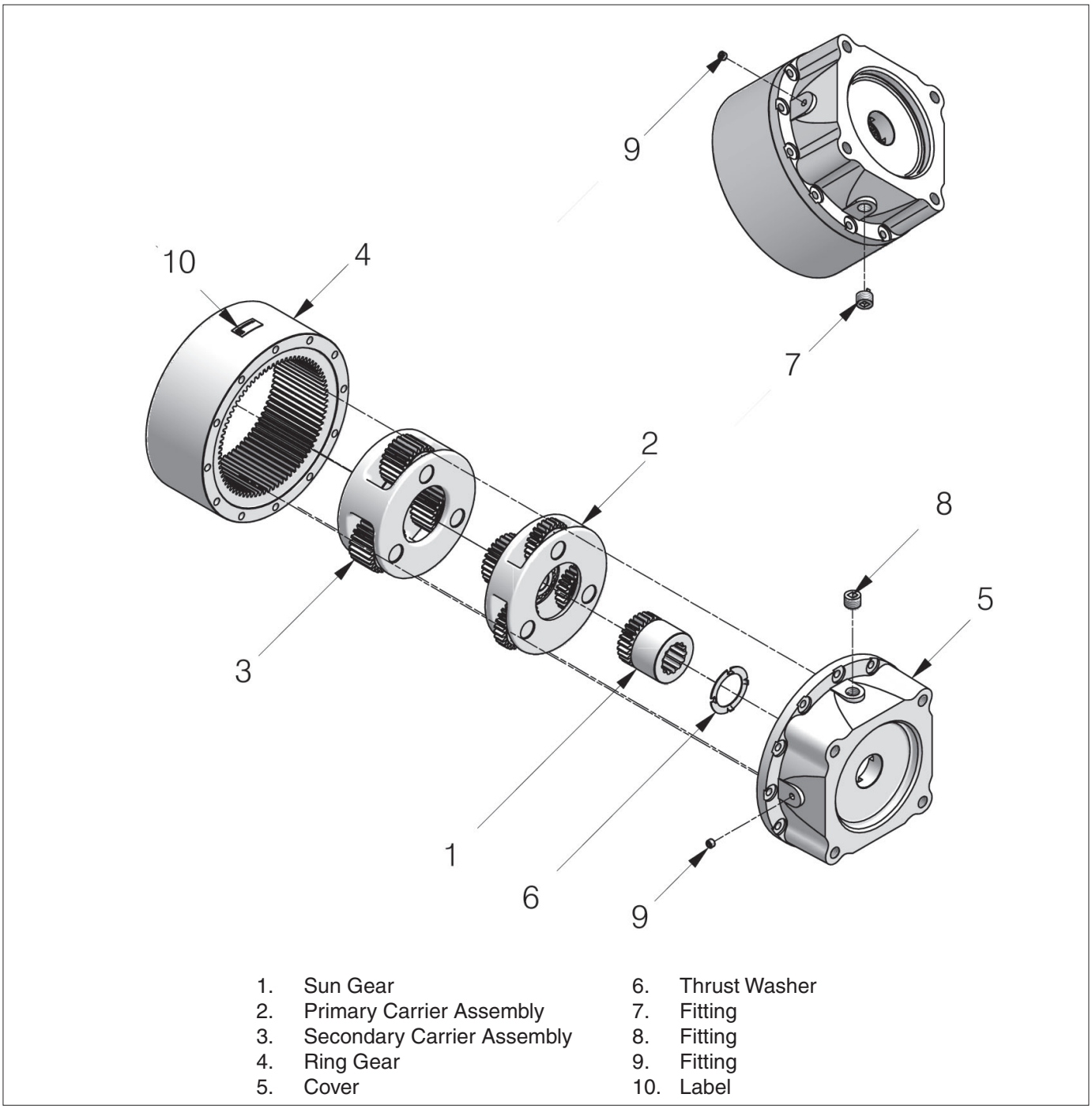
Figure 4-7 Visual Inspection -1

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

Figure 4-7 Visual Inspection - 2

Planetary Reducer Assembly

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



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

Figure 4-8 Planetary Reducer Assembly

1. Clean mating surfaces and apply a bead of silicone sealant to the face of the hub that mates with the ring gear (item 4). See instructions on sealant package.

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

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

4. Apply a bead of silicone sealant to cover face of ring gear (item 4).

5. Secure thrust washer (item 6) with tangs engaged in cover (item 5).

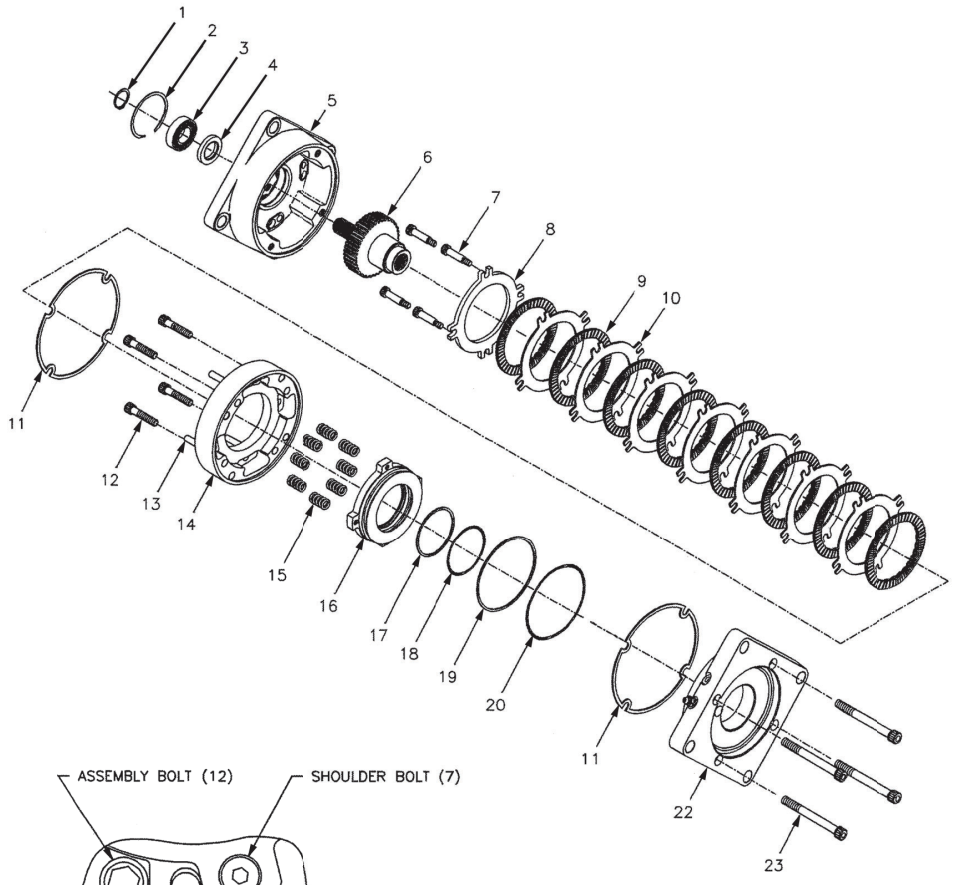
NOTE: Washer can be secured to cover with a small amount of grease or silicone sealant. Install the cover and align with hub such that pipe plug holes on cover align with mounting holes on hub.

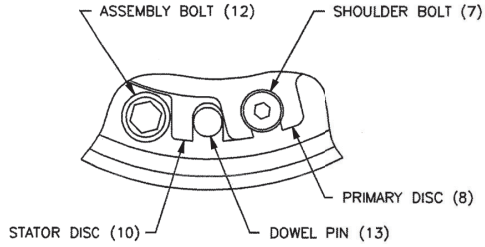
6. Install washers and capscrews (not shown) and torque to 40-45 lb. ft. (54-61 Nm) with dry threads. Lubed threads torque to 20-25 lb. ft (27-34 Nm).

7. Position filler opening horizontally and fill unit to oil level hole in cover. Install fittings (items 7, 8 & 9) in cover (item 5).

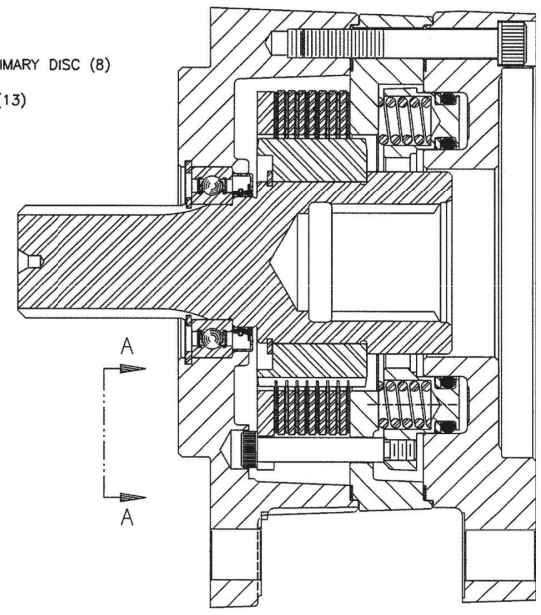
Brake Assembly

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





VIEW A-A
STACK ASSEMBLY DETAIL



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

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

Figure 4-9 Planetary Reducer Assembly

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

1. Clean all parts thoroughly before assembling.

2. Press oil seal (item 4) into cover plate (item 5) until flush with bearing shoulder. **NOTE: Oil seal must be installed with open side facing pilot end of cover.**

3. Press bearing (item 3) into position until it bottoms out on oil seal borestep.

4. Install retaining ring (item 2) into cover plate.

5. Press spline shaft assembly (item 6) into bearing (item 3) until shaft bottoms on shaft shoulder. Bearing inner race must be supported during this operation.

6. Install retaining ring (item 1) on spline shaft assembly (item 6).

7. Install back-up rings (items 17 & 19) on piston (item 16) toward spring pockets.

8. Install O-rings (items 18 & 20) on piston (item 16). Be sure O-rings are flat and all twists removed. **NOTE: Be careful not to mar or scratch piston.**

9. Lubricate piston (item 16) with clean hydraulic fluid. Carefully press piston into pressure plate (item 22). Be sure piston is positioned so threaded holes in piston are in alignment with through-holes in spring plate (item 14) when installed.

10. Install springs (item 15) according to pattern and color recorded during disassembly.

11. Affix case gaskets (item 11) to pressure plate (item 22) and spring plate (item 14).

12. Place unit on a press. Using a fixture, depress and install four socket head assembly bolts (item 12). **NOTE: Apply two drops of Loctite #242 to threads.**

13. Install stator discs (item 10) and rotor discs (item 9). Begin with a rotor disc and alternate with stator discs. **NOTE: The minimum stack height of discs item 9 and item 10 is 1.173".**

14. Install primary disc (item 8). Align tabs on primary disc with through-holes in spring plate (item 14) and partially screw in four socket head shoulder bolts (item 7). **NOTE: Apply two drops of Loctite #242 to threads.** Inspect for free movement of stack. Pressurize brake release port to approximately 400 psi to release discs. Torque shoulder bolts 15-18 lb. ft. (20.3-24.4 Nm) and release pressure. A suitable holding fixture is useful to hold brake in position.

15. Install cover plate (item 5) using four socket head assembly bolts (item 23). **NOTE: Apply two drops of Loctite #242 to threads.** Torque capscrews 55-60 lb. ft. (74.6-81.4 Nm).

BRAKE-OFF Clutch Assembly

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

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

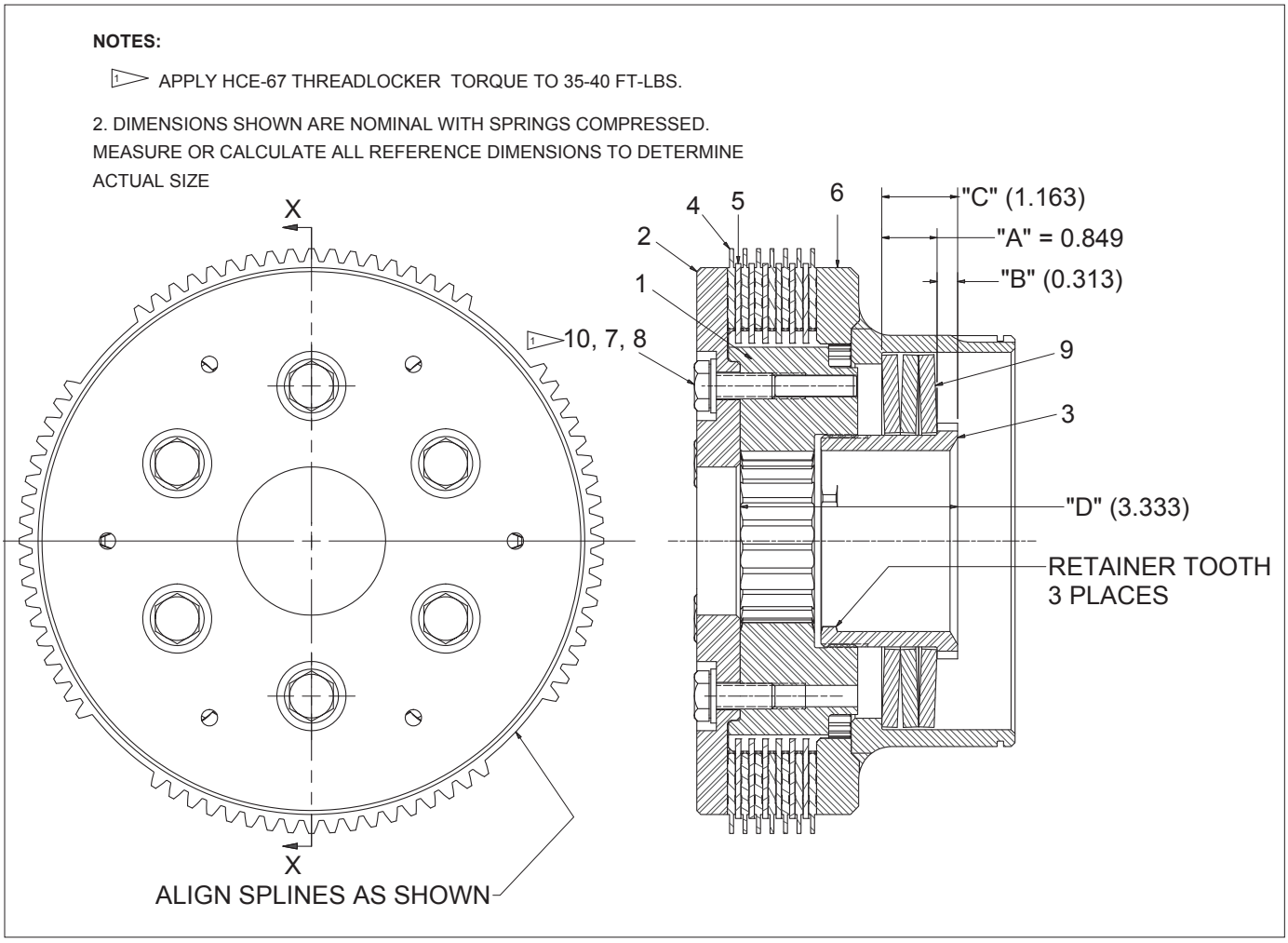
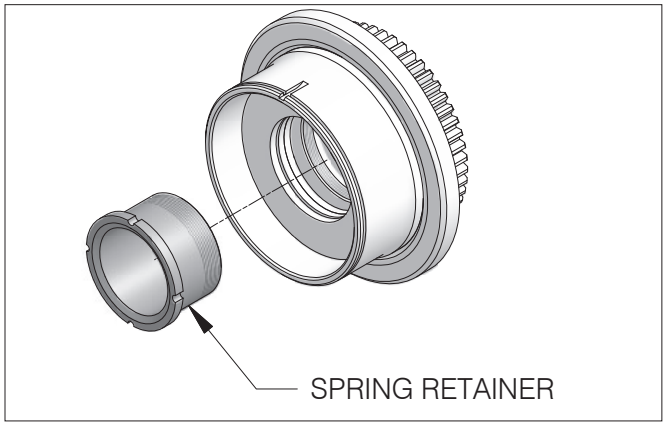


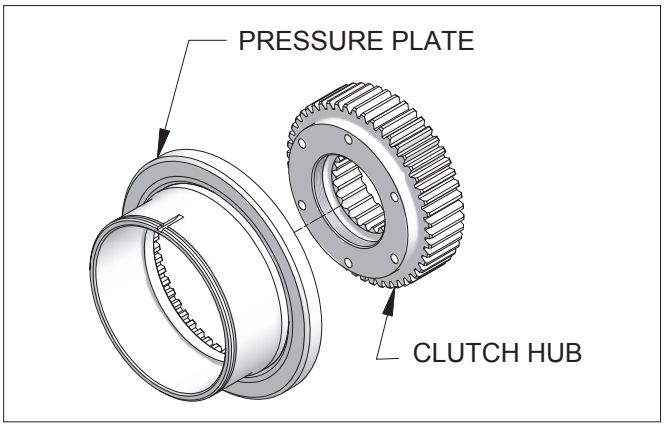
Figure 4-10 BRAKE-OFF Clutch Assembly

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

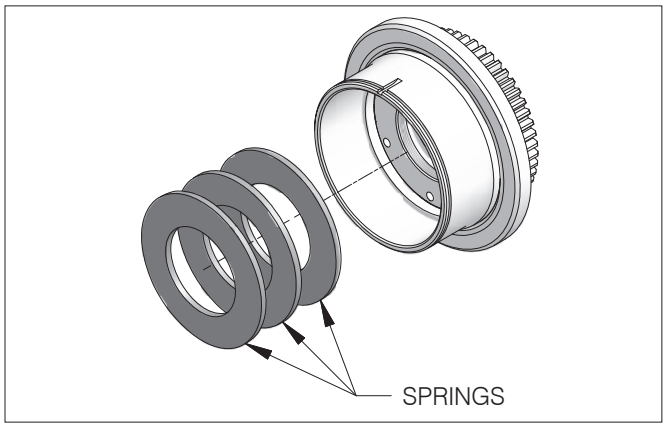


10. Disassemble clutch.

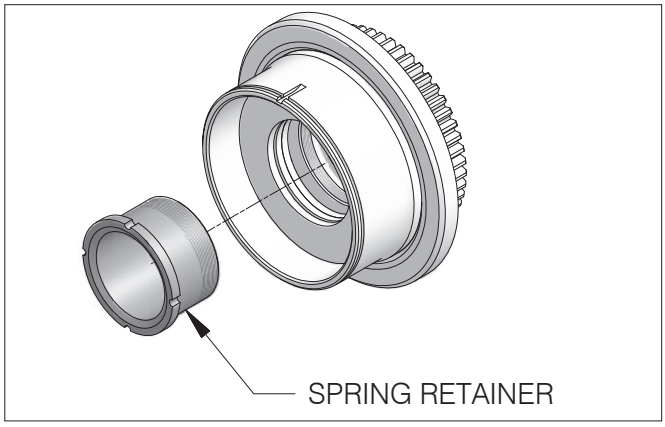
11. Assemble hub & pressure plate.



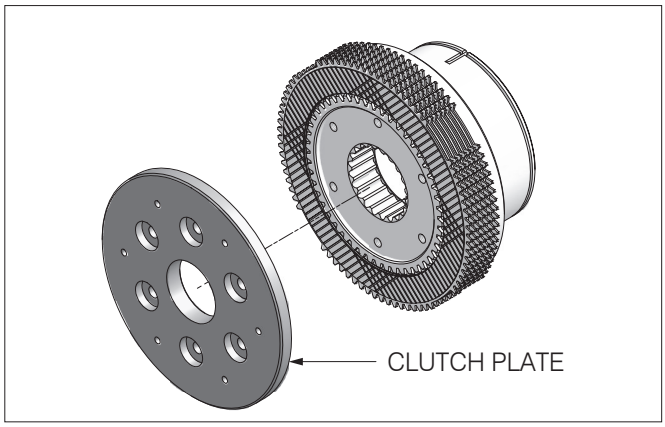
12. Install springs in series so that they oppose each other.



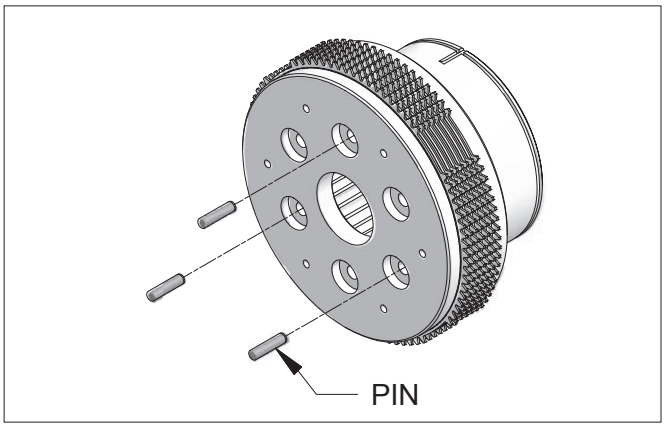
13. Install retainer to height “D”. (use the number of turns required for removal & align marks on teeth).



14. Install frictions, separators, & clutch plate.



15. Insert pins into three equally spaced holes.



16. Install 1.75” (45 mm) long or longer capscrews into holes with pins. (longer capscrews work better).

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

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.

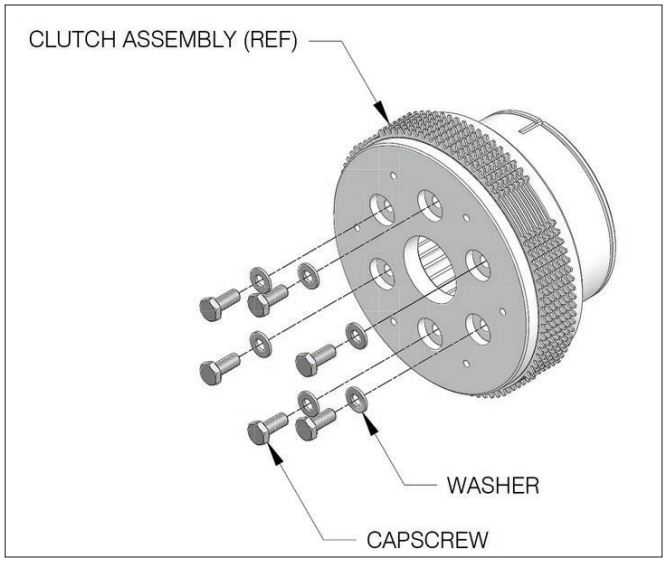
20. Apply HCE-67 threadlocker to six 1” (25 mm) long capscrews.

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

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

23. Install & torque the three remaining shorter capscrews.

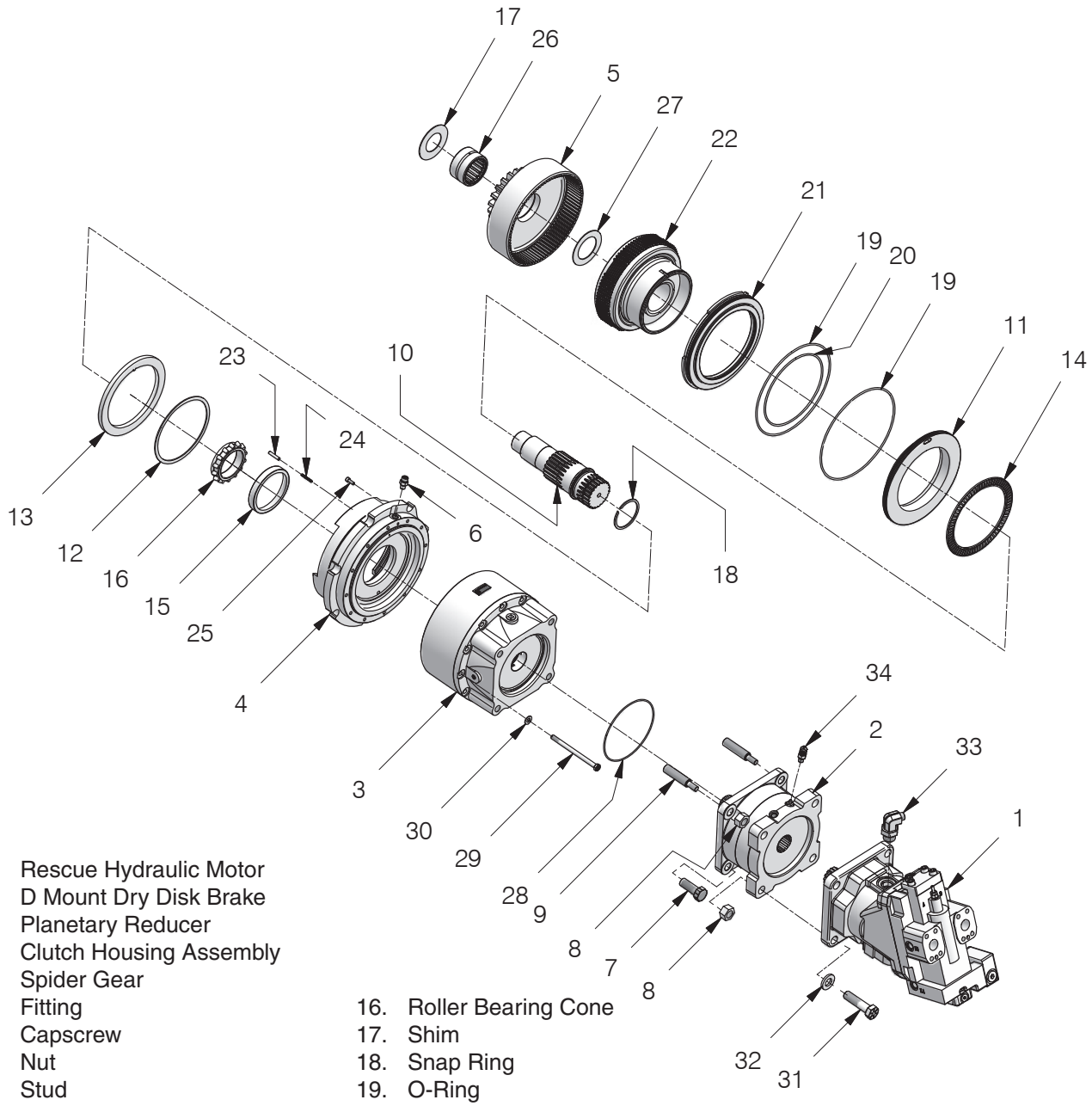
24. Check final height “D”. it should be +0.012/-0.000 of original height “D”.



Intentionally Blank

Motor Shaft Assembly and Installation

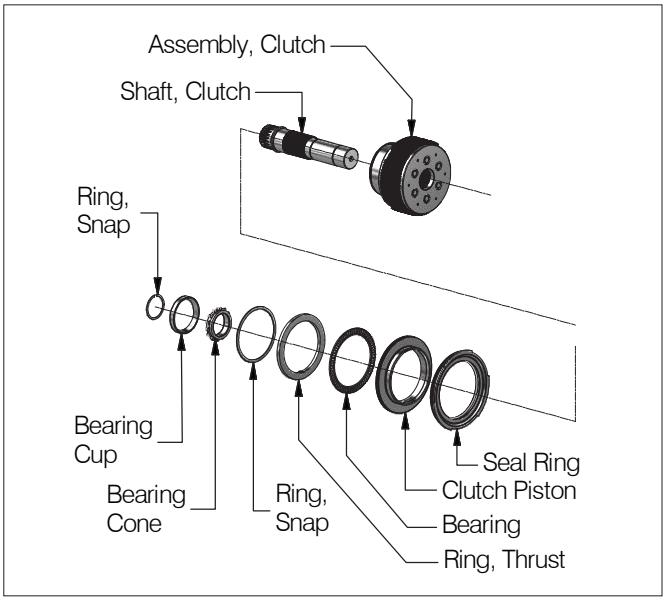
Assembly and installation of the motor shaft assembly can be accomplished while the winch is mounted on the tractor. The motor and brake can be installed independently of other components (other than various hoses and fittings), but taking out the planetary reducer and reducer housing must be installed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



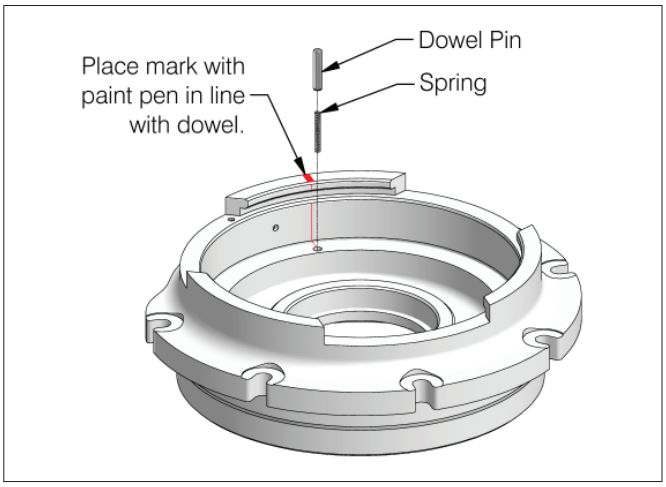
1. Rescue Hydraulic Motor
2. D Mount Dry Disk Brake
3. Planetary Reducer
4. Clutch Housing Assembly
5. Spider Gear
6. Fitting
7. Capscrew
8. Nut
9. Stud
10. Clutch Shaft
11. Clutch Piston
12. Snap Ring
13. Thrust Ring
14. Thrust Needle Roller Bearing
15. Roller Bearing Cup
16. Roller Bearing Cone
17.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

Figure 4-11 Motor Shaft Components

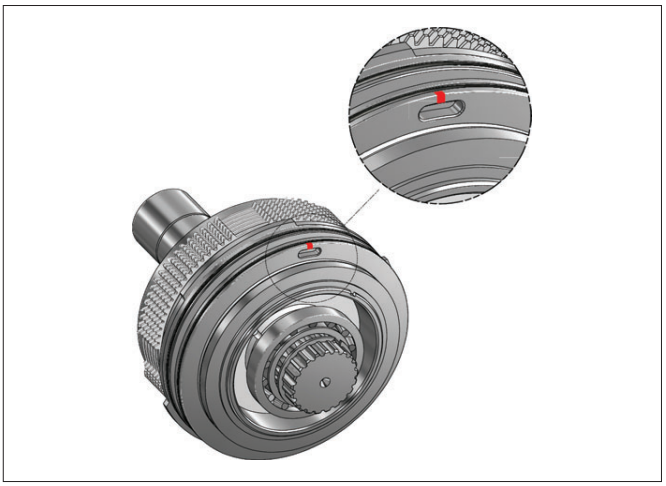
1. Install new O-rings on seal ring and clutch piston, then install thrust needle roller bearing, thrust ring, and snap ring.



2. Install spring and dowel pin in clutch housing.



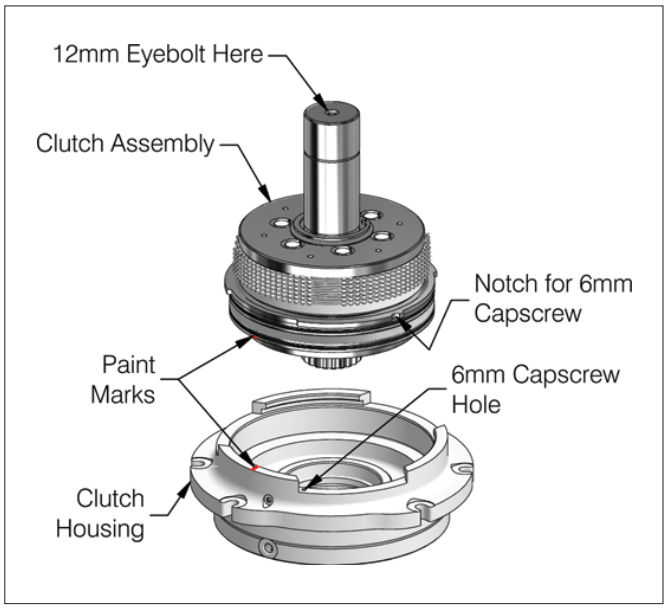
3. Paint pen mark on position in line with center of slot.



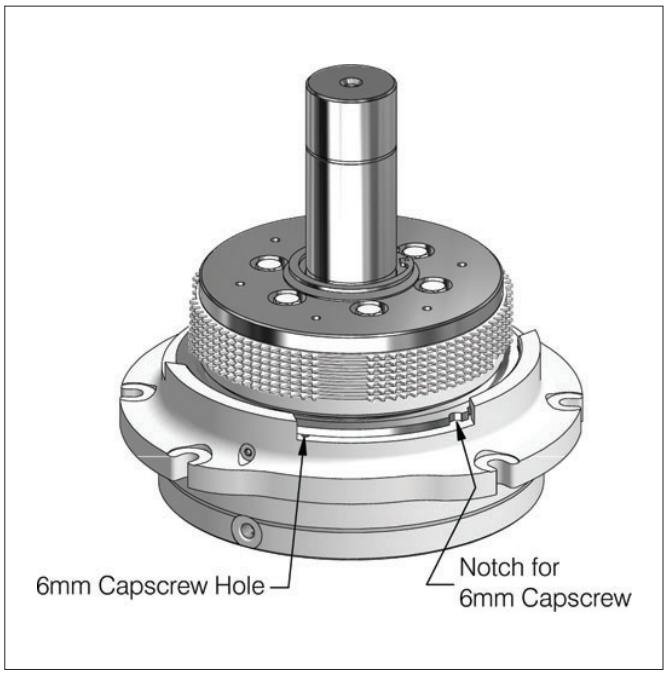
4. Lower clutch assembly vertically using jib hoist and M12x1.75 metric eyebolt.

   Align paint marks on piston and clutch housing.

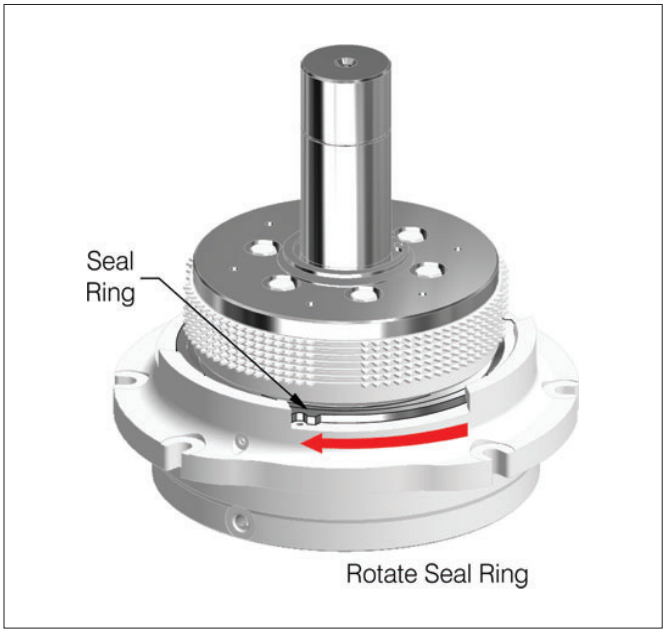
   Position seal ring so three locking tabs align with slots in clutch housing and notch will align with 6mm capscrew after rotating.



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;

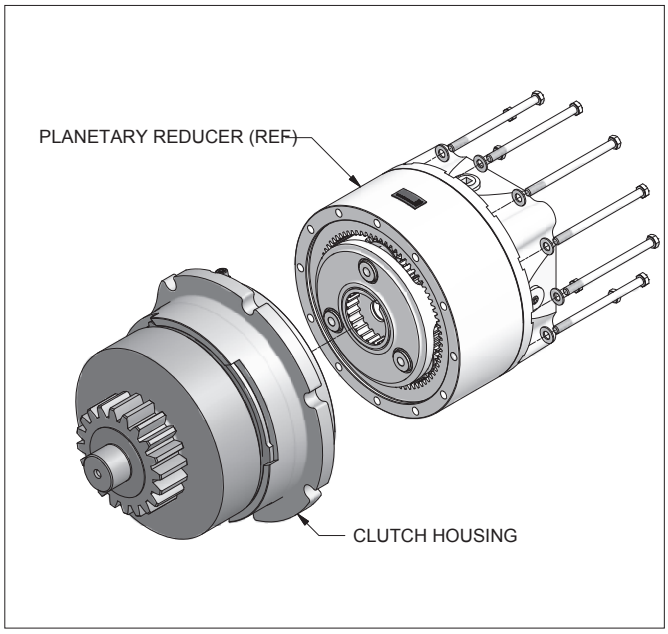
7.4 Increase pressure to 700 psi MAX and check for leaks.

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

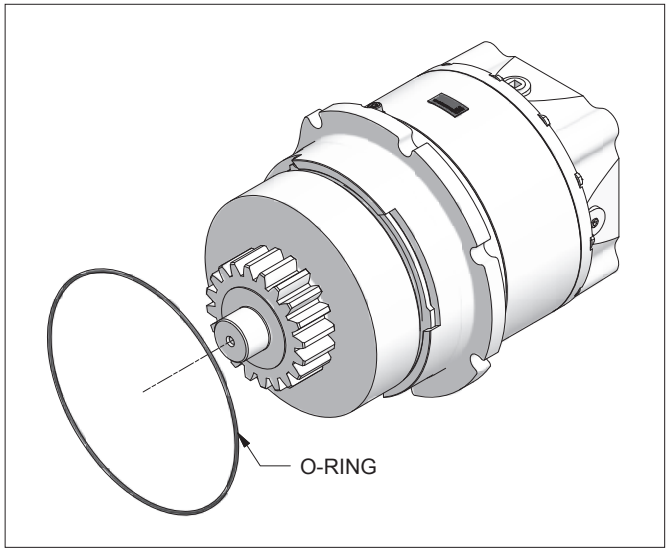
⚠ WARNING

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

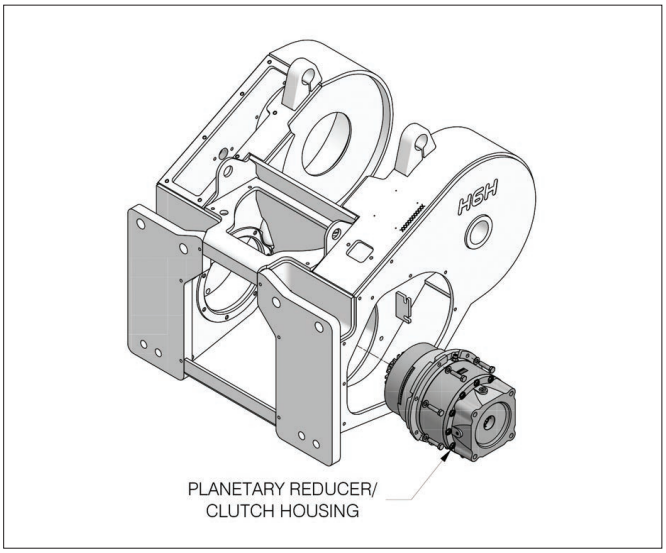
9. Install clutch housing assembly into reducer.



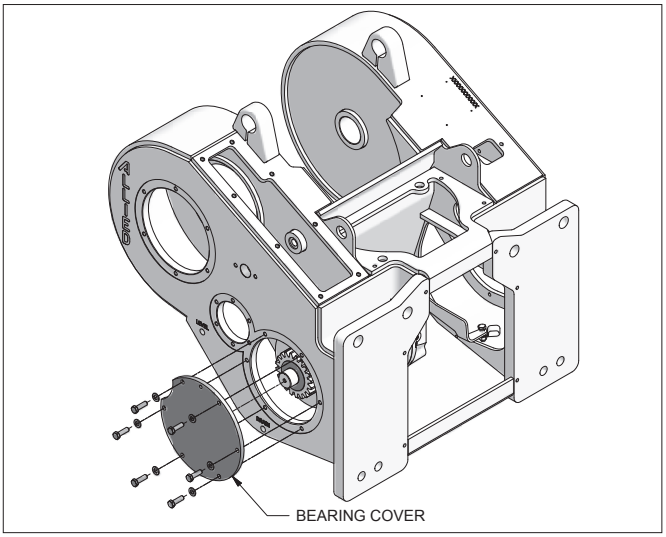
10. Install new O-ring on clutch housing.



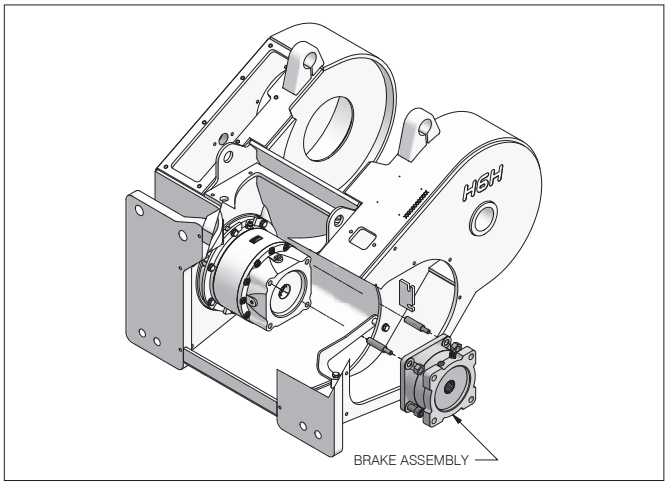
11. Install planetary reducer assembly into winch frame.



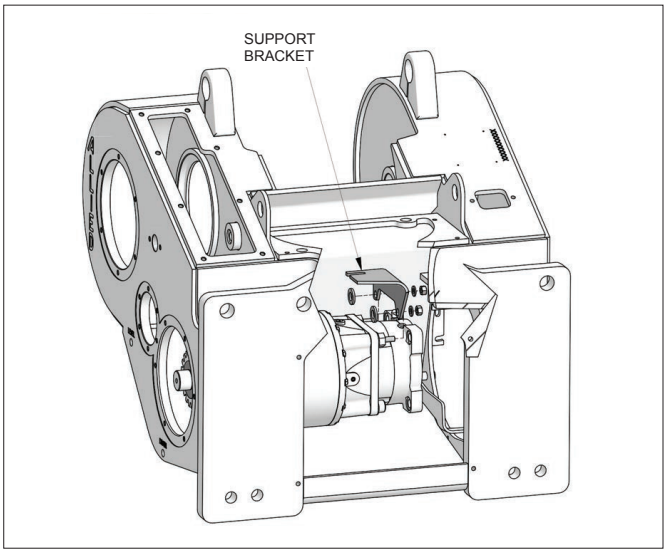
12. Reinstall cover plate.



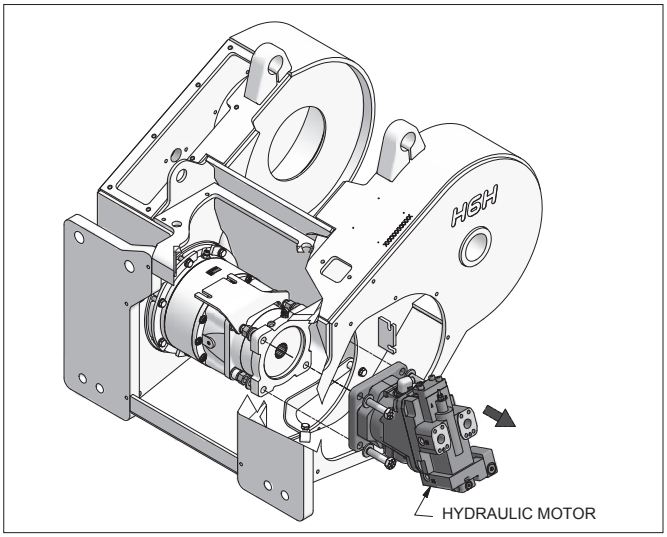
13. Reinstall the brake.



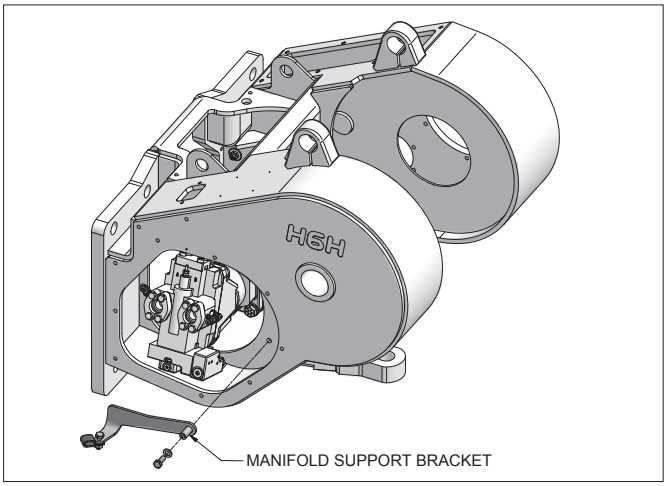
14. Install the brackets.



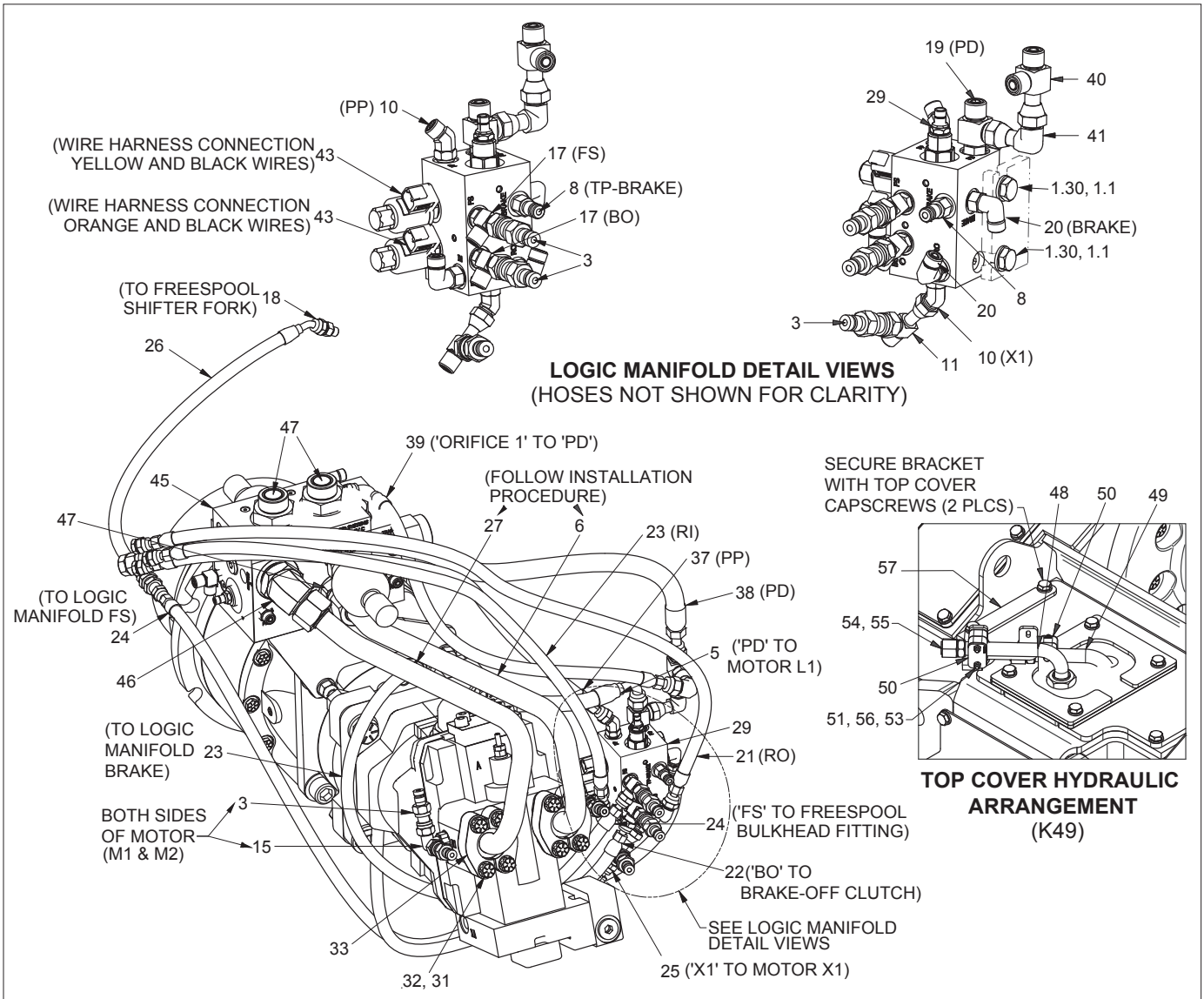
15. Install the hydraulic motor.



16. Install the manifold support bracket in frame.

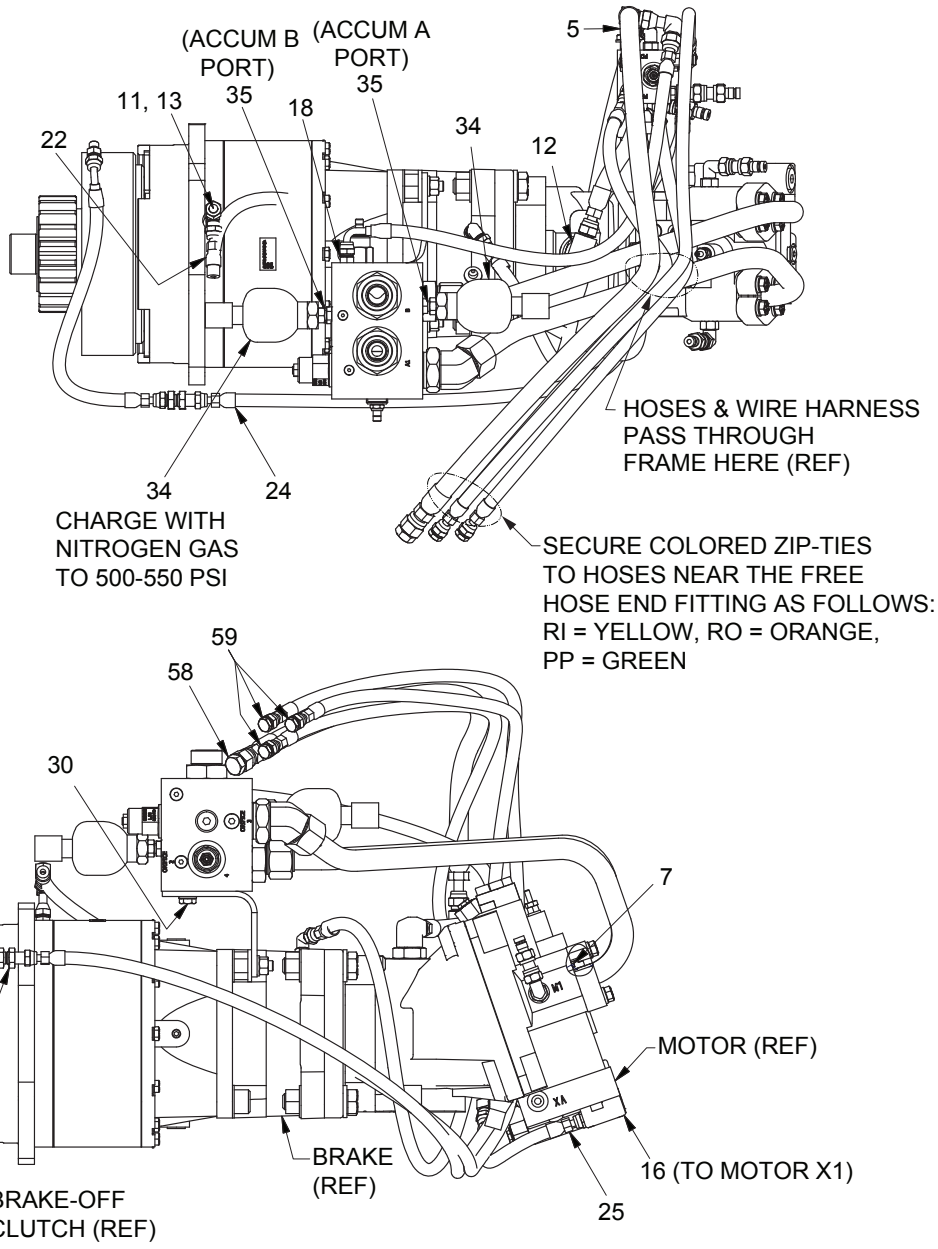


Hydraulic System Assembly



1. Washer
3. Coupler, Quick Male
5. Hose Assembly, Motor Drain
6. Tube Assembly, Motor B
7. O-Ring
8. Coupler, Male
9. O-Ring
10. Fitting, FF
11. Fitting, TE
12. Hose Assembly, Motor Drain
13. Fitting, MC
15. Fitting, EL
16. Fitting, ST
17. Fitting, TE
18. Fitting, ST
19. Fitting, TE
20. Fitting, EL
21. Hose Assembly
22. Hose Assembly, BO
23. Hose Assembly
24. Hose Assembly
25. Hose Assembly, X1
26. Hose Assembly, Freespool
27. Hose Assembly, Motor A
28. Fitting, ST
29. Logic Manifold Assembly

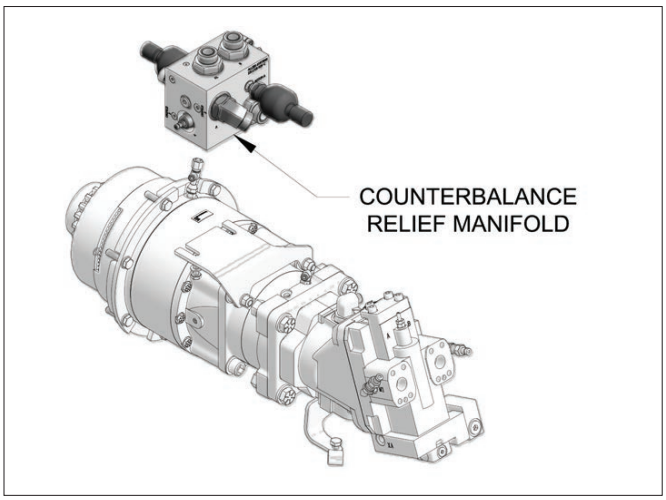
Figure 4-12 Hydraulic System Components, Standard Winch_1



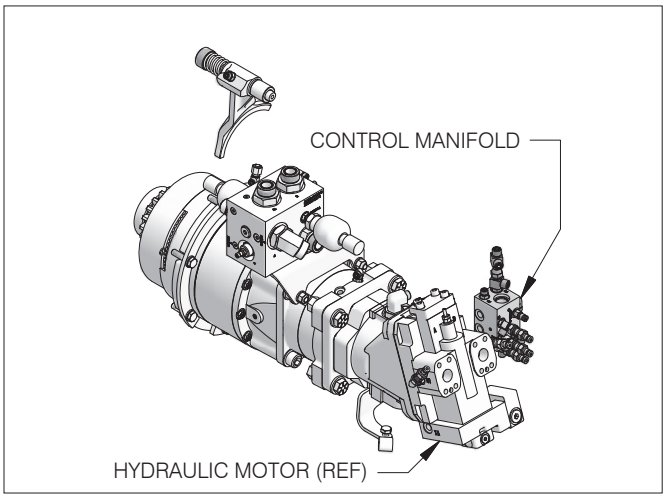
30. Capscrew
31. Washer
32. Capscrew
33. Clamp, Half
34. Accumulator
35. Fitting, ST
37. Hose Assembly, PP
38. Hose Assembly, PD
39. Hose Assembly, Accumulator Bleed
40. Fitting, TE
41. Fitting, EL
43. Winch Wire Harness
45. Counterbalance Relief Manifold Assembly
46. Fitting, FF
47. Fitting, ST
48. Tube Assembly, A
49. Tube Assembly, B
50. Cover Plate
51. Washer
52. Clamp Body, Tube
53. Capscrew
54. O-Ring
55. Fitting
56. Nut
57. Bracket, Tube Support
58. Fitting
59. Fitting

Figure 4-13 Hydraulic System Components, Standard Winch_2

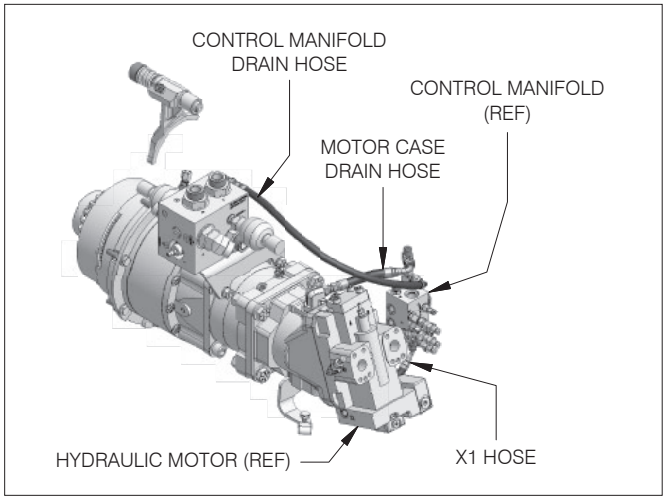
1. Install the counterbalance relief manifold. Leave mounting bolts loose until motor tubes are installed.



2. Install the control manifold.

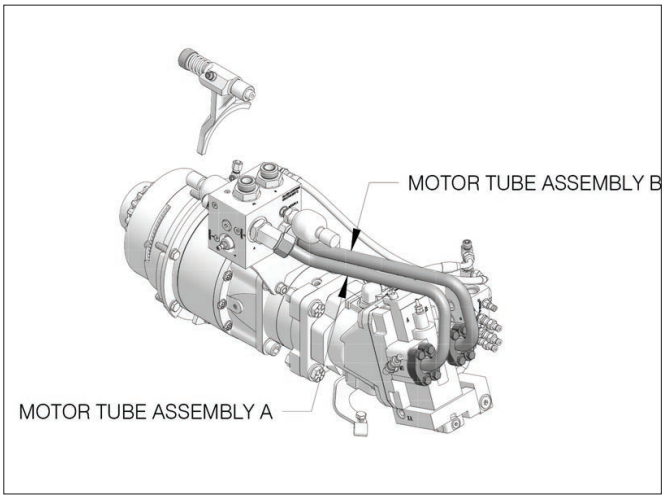


3. Connect the hoses between the control manifold and the motor.

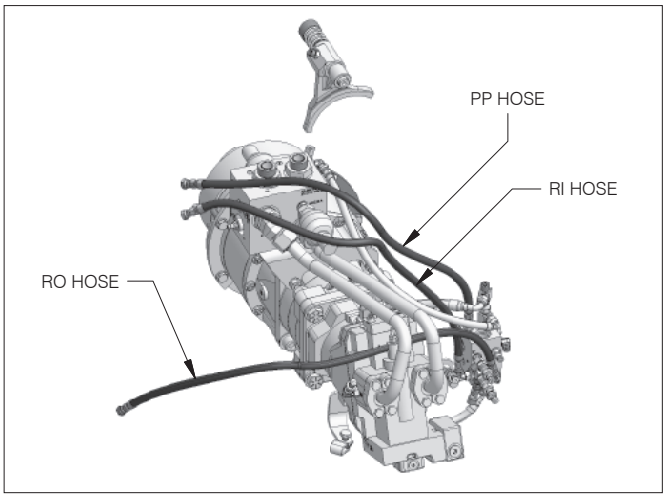


4. Follow the motor tube installation procedures below:

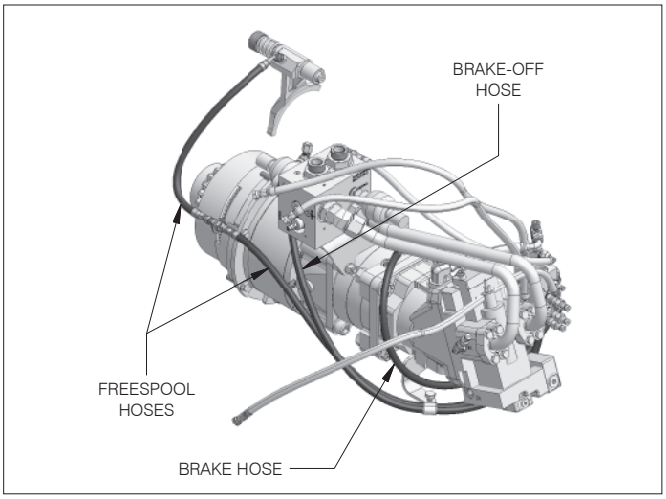
- Install motor tube assemblies, but do not tighten.
- Adjust the manifold fittings as needed.
- Alternately tighten connections to prevent placing motor tubes in a bind. Tighten motor tubes at the motor, then at the manifold.
- Tighten the manifold mounting bolts and manifold bracket bolts.



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

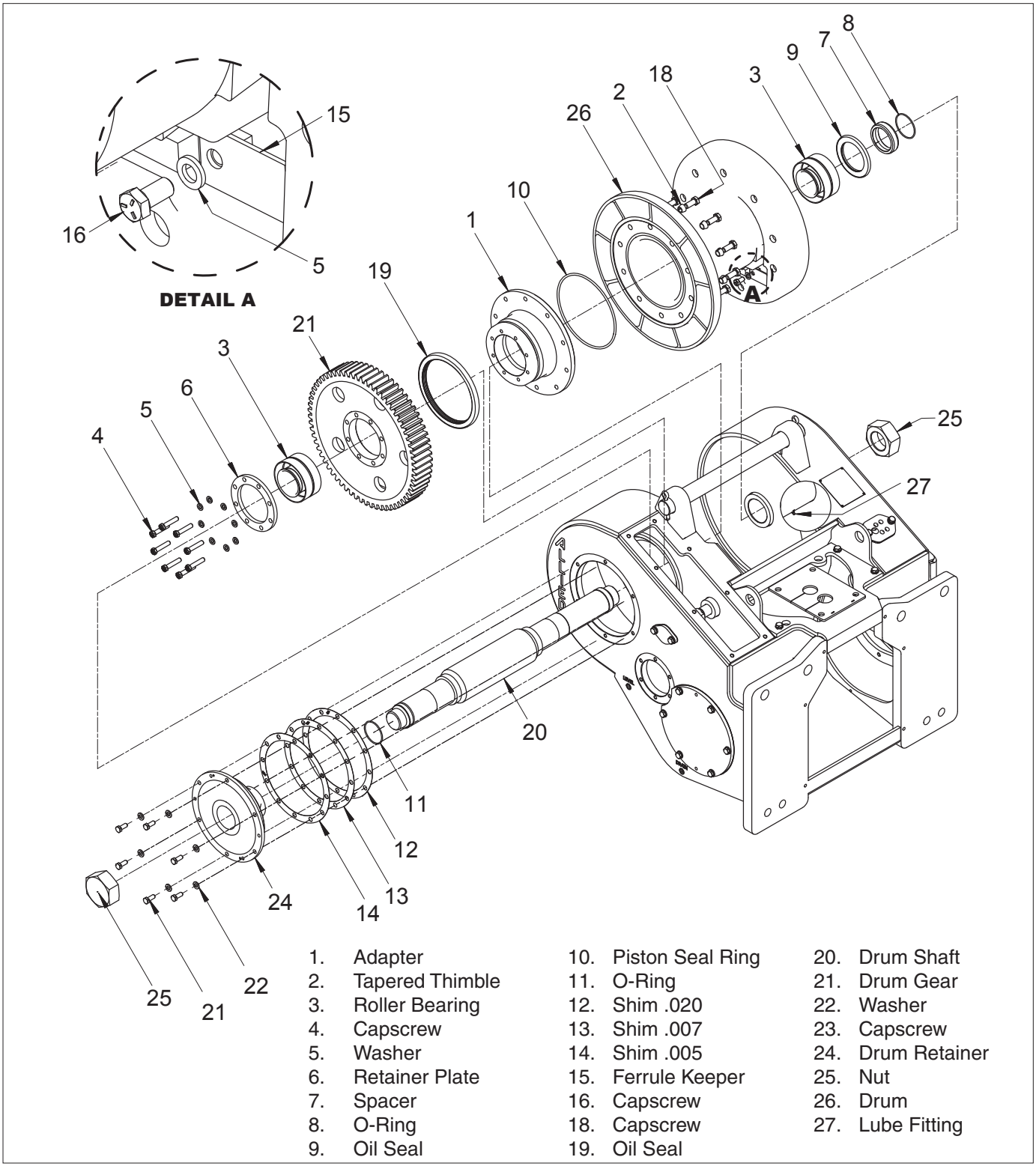


6. Install freespool, brake, and brake-off hoses.



Drum and Drum Shaft Installation

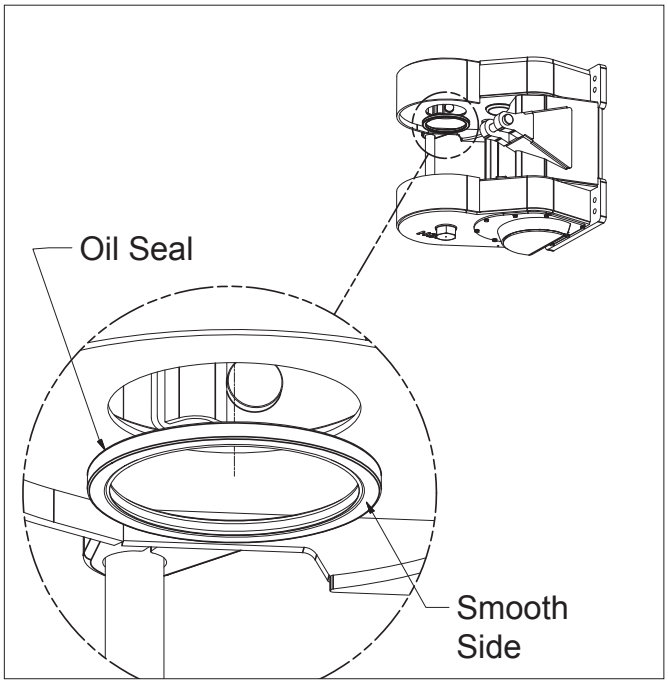
If the drum gear was removed, it must be installed prior to installation of the intermediate shaft and motor shaft assembly.



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

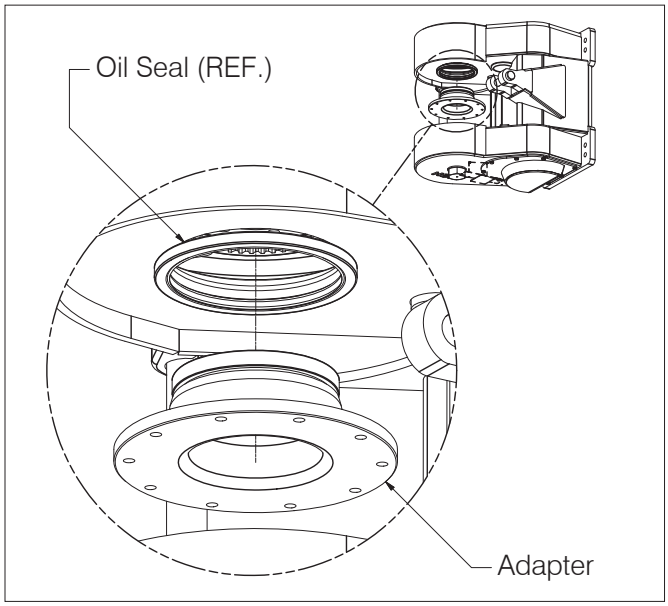
Figure 4-14 Location of Drum and Drum Shaft Components

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

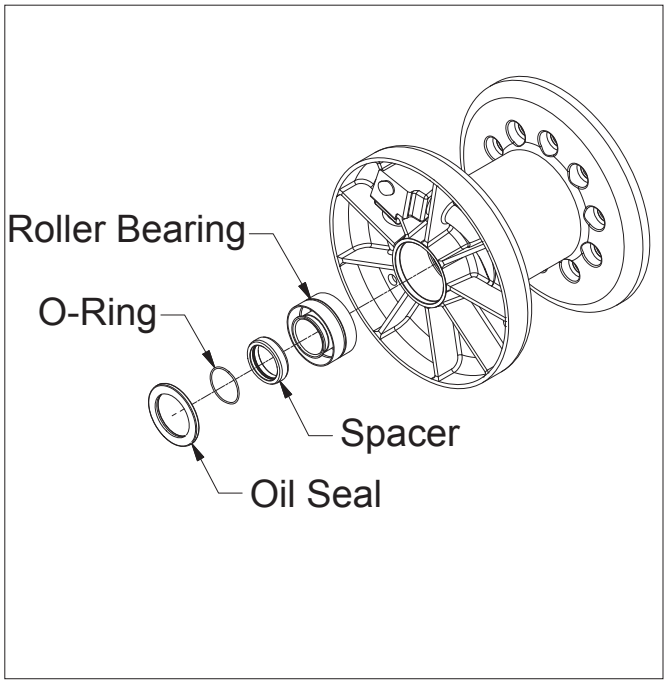


2. Install drum adapter by pushing it through the double-lip seal.

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

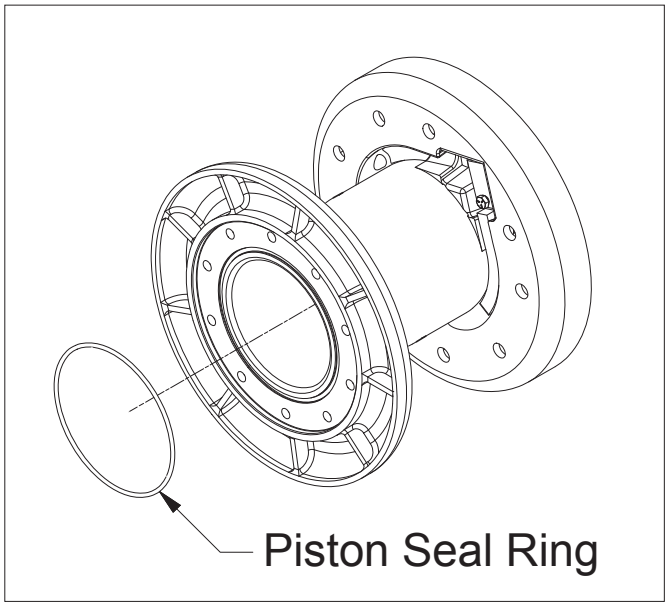


3. Replace the O-ring inside the spacer, and install roller bearing, spacer and oil seal into the left-hand side drum bore.

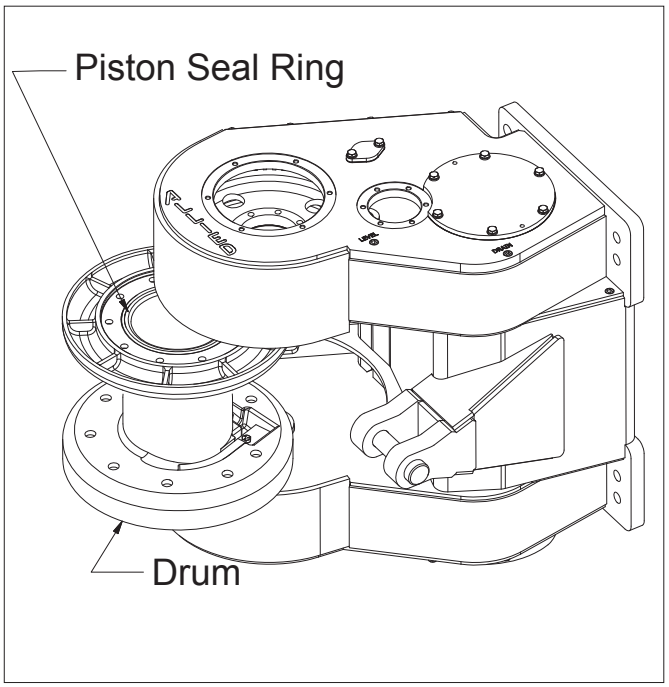


NOTE: Smooth side of seal must face outboard.

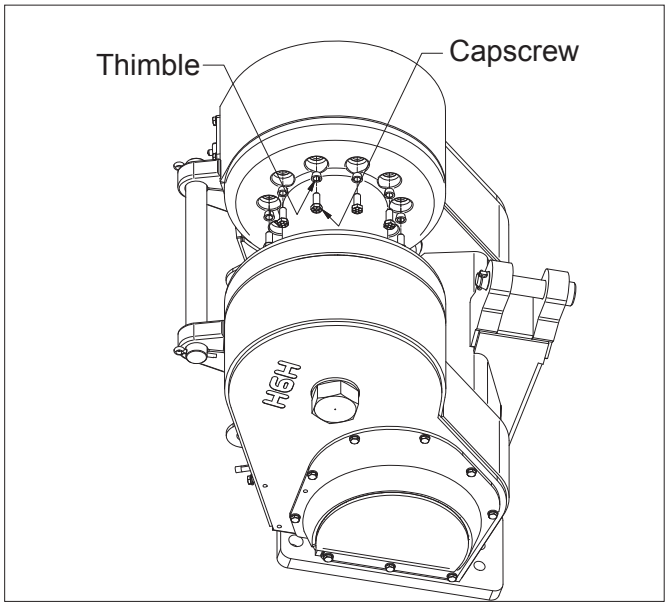
4. Coat O-ring groove and the new piston seal ring with O-ring lube. Install the piston seal ring into the groove.



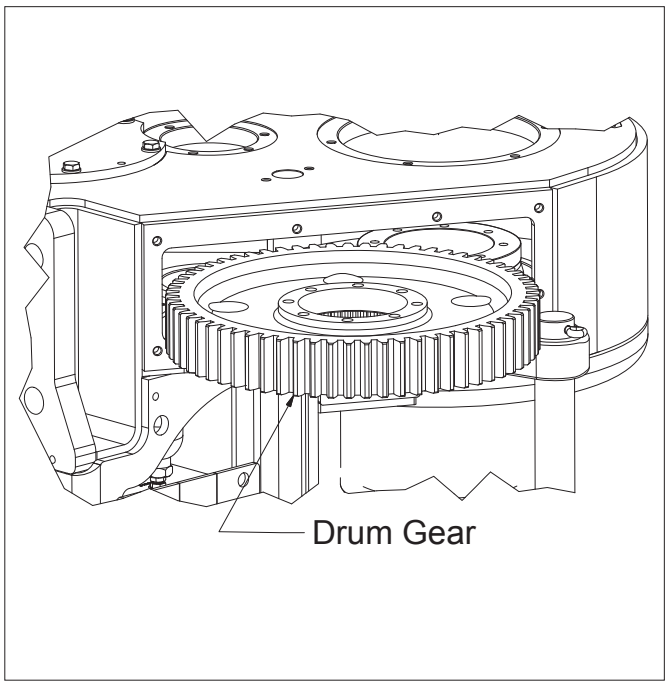
5. Move the drum into position while being careful not to loose the piston seal ring.



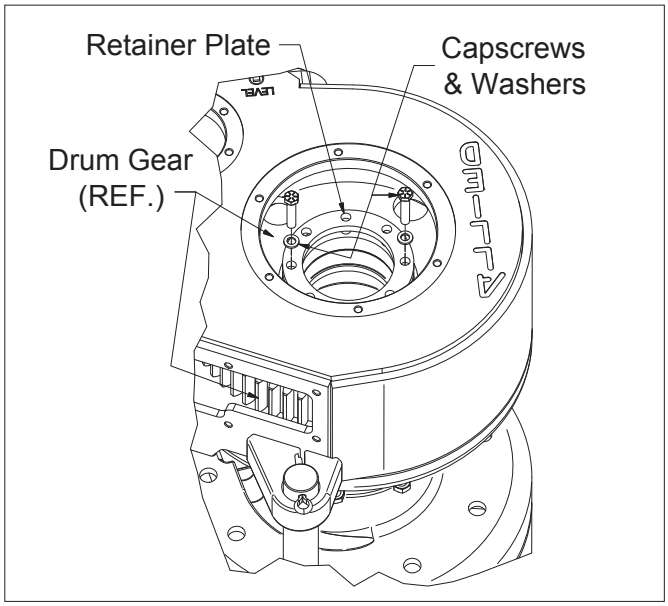
6. Align adapter and drum holes, then install the thimbles and screws. Tighten progressively and evenly to ensure uniform compression of seal ring. Do not tighten to final torque.



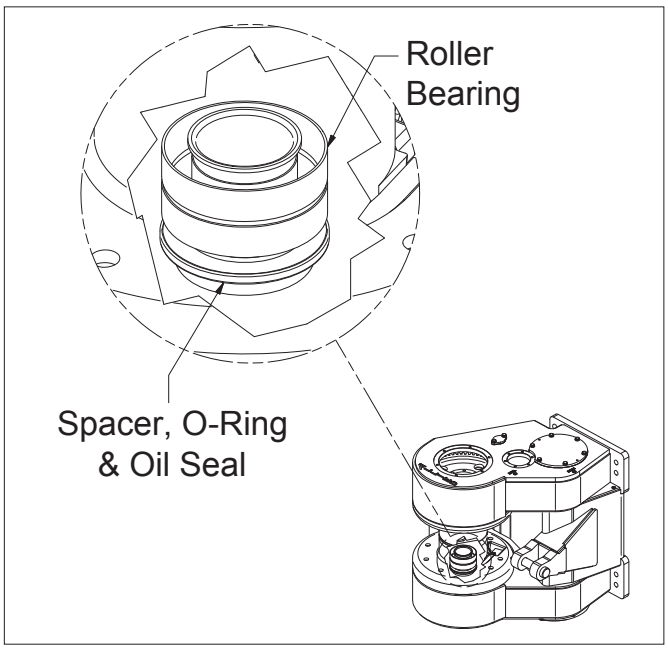
7. Install drum gear.



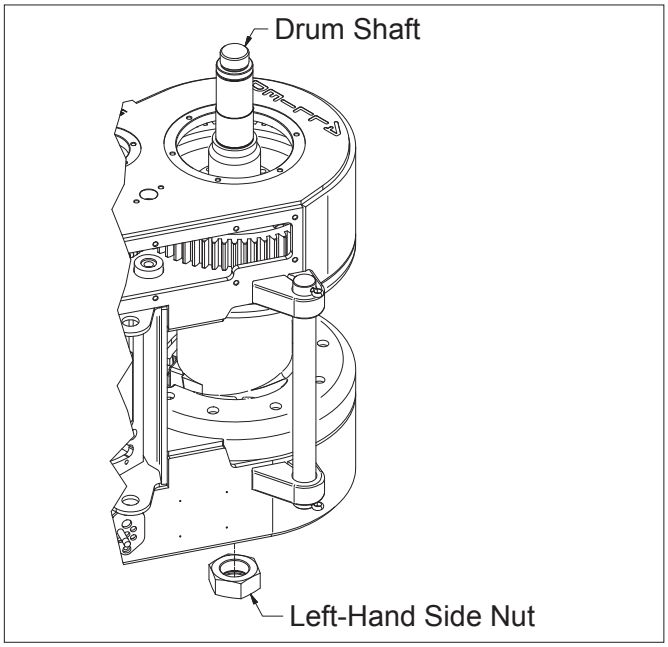
8. Align drum gear with adapter and temporarily secure the drum gear to the adapter, using the retainer plate and two capscrews. This will ensure that the drum gear will not fall during installation of the shaft.



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



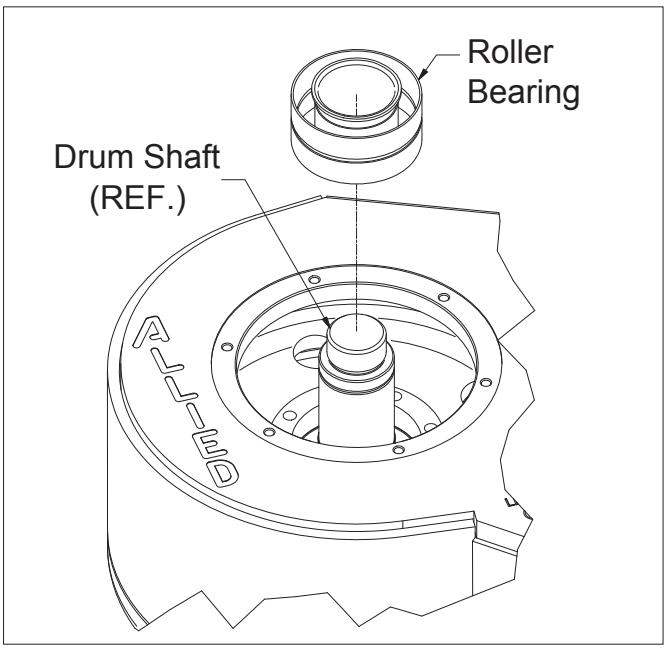
Next, install the shaft until it bottoms solidly against the left hand tapered roller bearing. Tighten left-hand side nut.



⚠ CAUTION

Do not hammer on drum shaft surface.

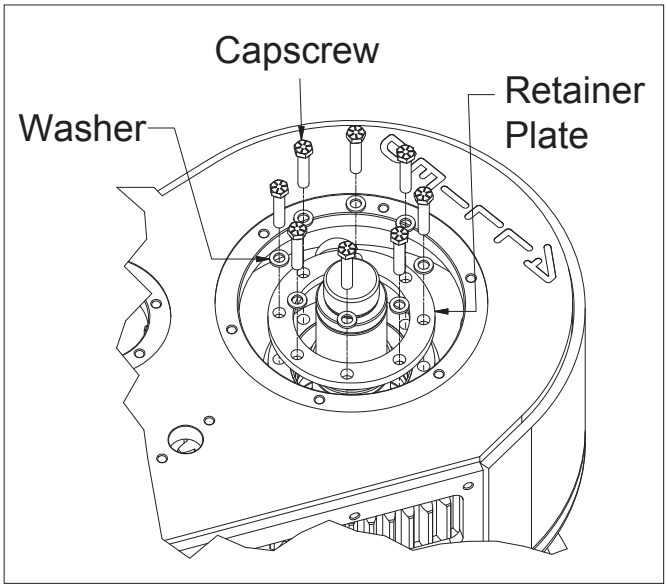
10. Remove the retainer plate and install the bearing assembly.



⚠ WARNING

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

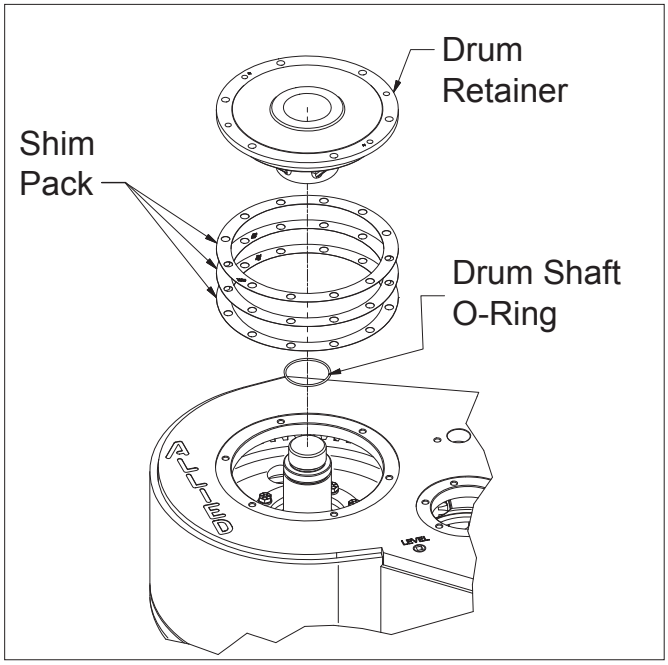
11. Install retainer plate using the eight special capscrews. Tighten capscrews to 90 ft-lbs (12 kg-m).



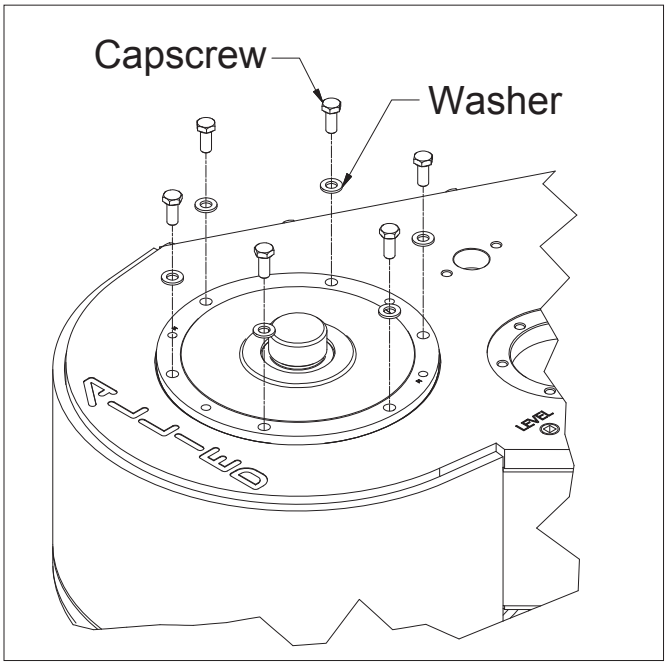
NOTE: Capscrews cannot be installed unless drum gear and drum adapter have been aligned as indicated in Step 6.

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

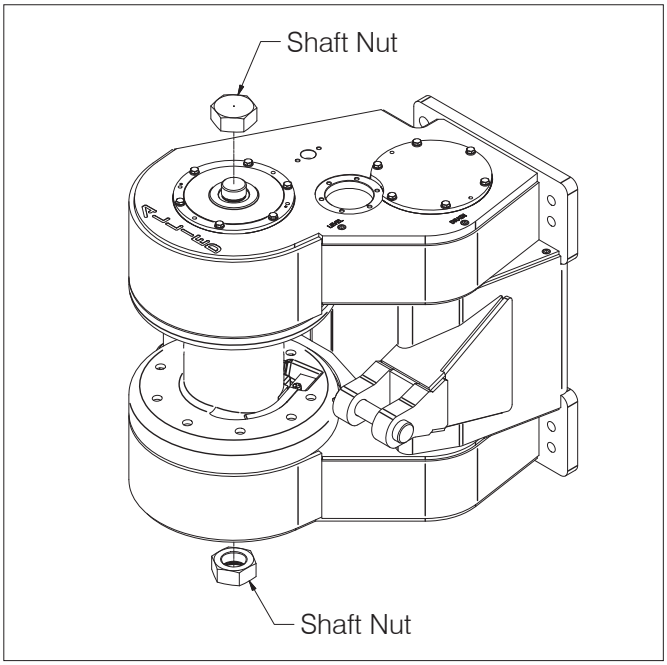
13. Coat winch frame and drum retainer with silicone. Install drum shaft O-ring. Install finalized shim pack (determined in step 13). If intermediate shaft assembly not installed, install before retainer.



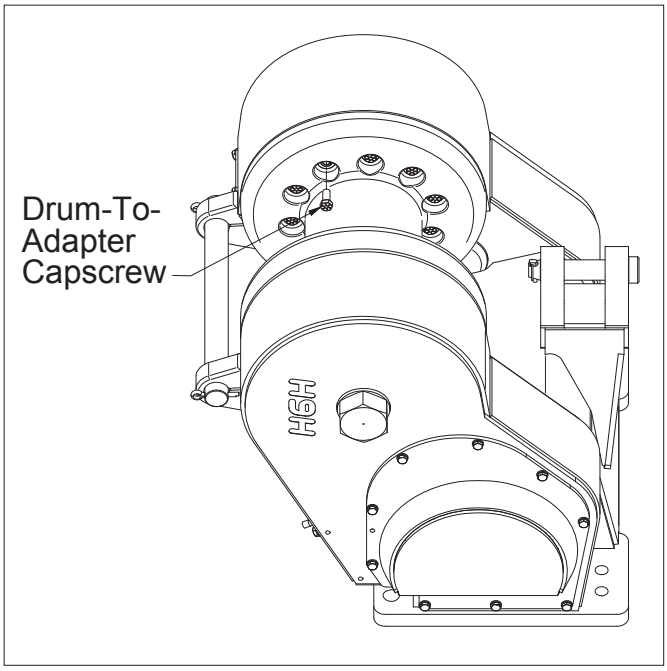
14. Secure retainer with capscrews and washers. Tighten capscrews to 75 ft-lbs (10 kg-m).



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



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



Intentionally Blank

Intermediate & FREESPOOL Shaft Installation

1. Freespool Shaft
2. Freespool Piston
3. Freespool Shifter Fork
4. O-Ring
5. O-Ring
6. Spring
7. Gear
8. Bushing
9. Freespool Adjust Piston
10. O-Ring
11. Freespool Adjust Housing
12. Intermediate Shaft
13. Pinion Gear
14. Dental Clutch
15. Screw
16. Nut
17. Roller Bearing Cone
18. Roller Bearing Cup
19. Capscrew
20. Washer
21. Gasket
22. Plate
23. Washer
24. Capscrew

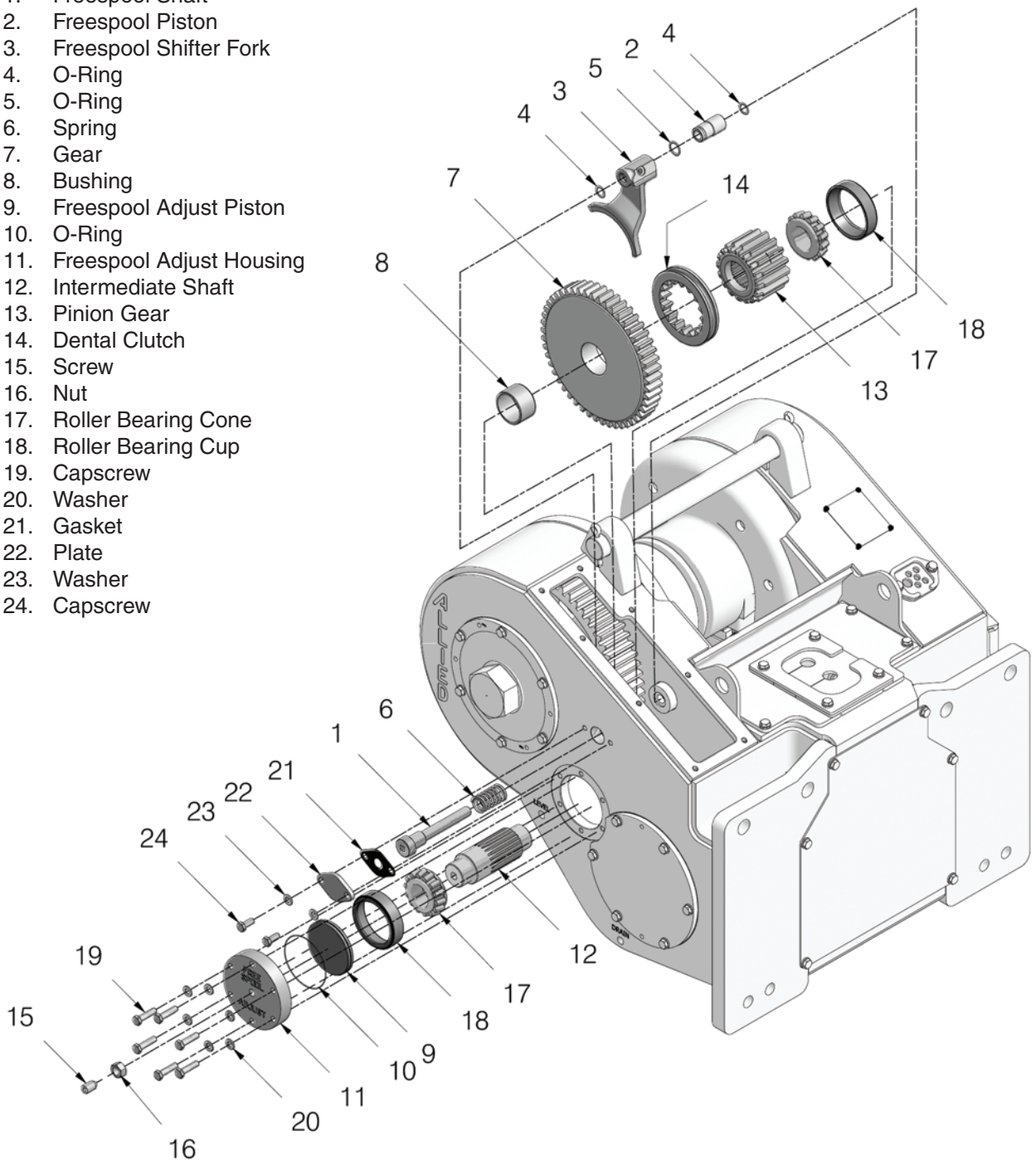
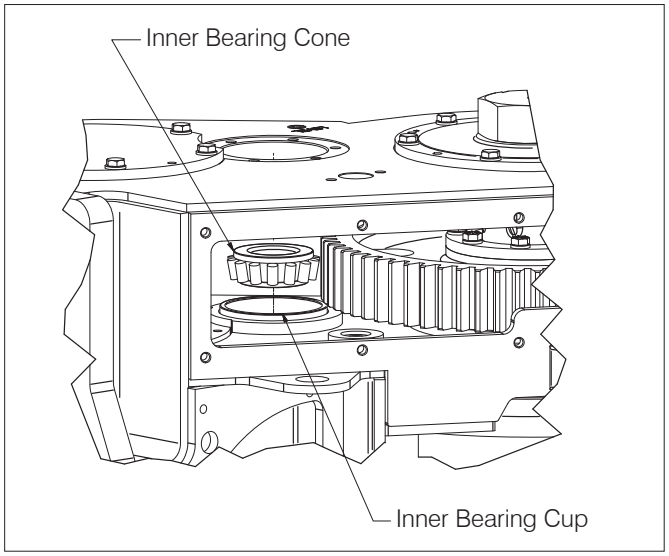


Figure 4-15 Location of Intermediate and Freespool Shaft Components

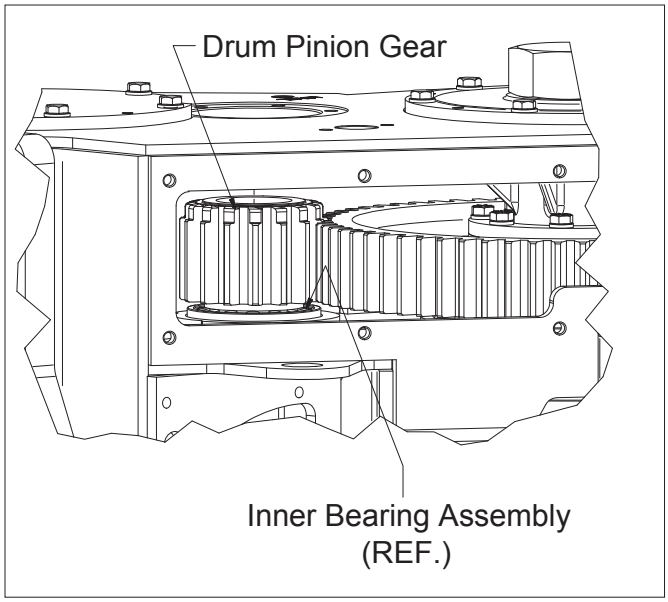
Intermediate & FREESPOOL Shaft Installation

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

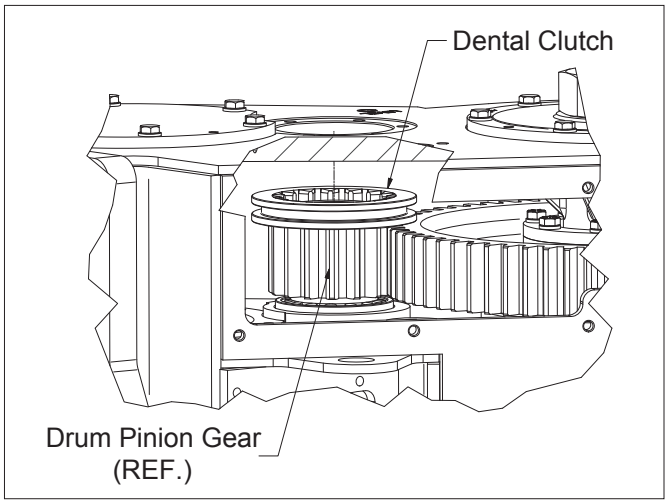
1. Install inner bearing assembly if previously removed. Use a liberal amount of lubriplate or other light lube grease to hold the inner bearing cone in place.



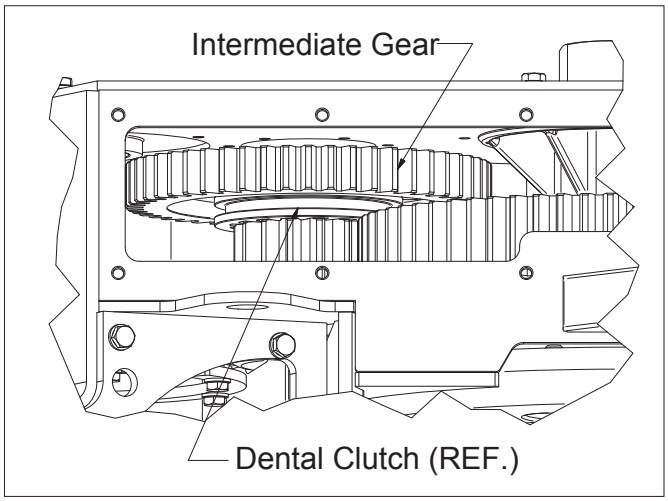
2. Position the FREESPOOL drum pinion in the housing.



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

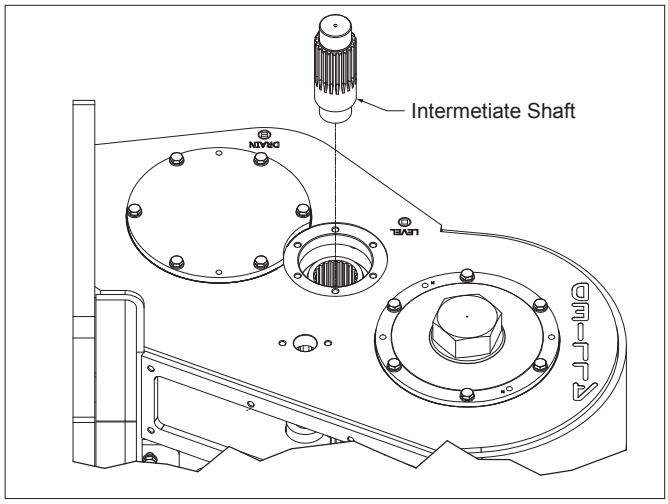


4. Position intermediate gear in housing.

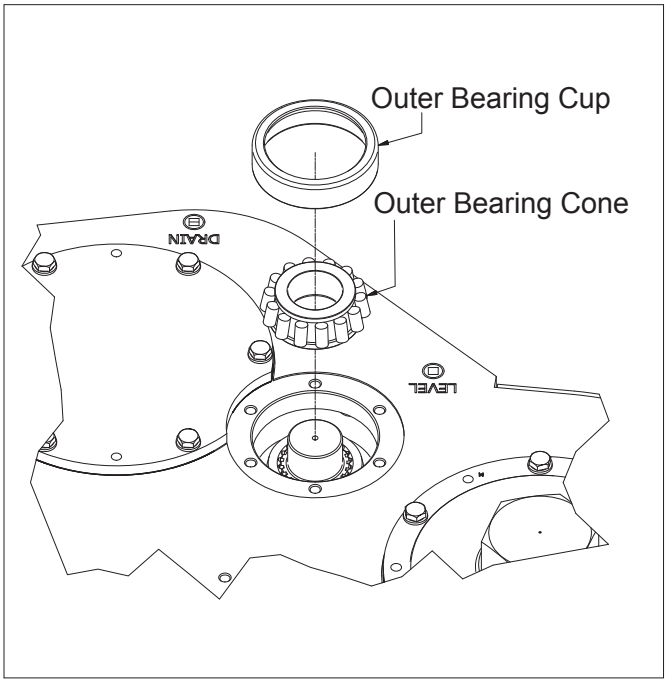


NOTE: Install intermediate gear with high shoulder down.

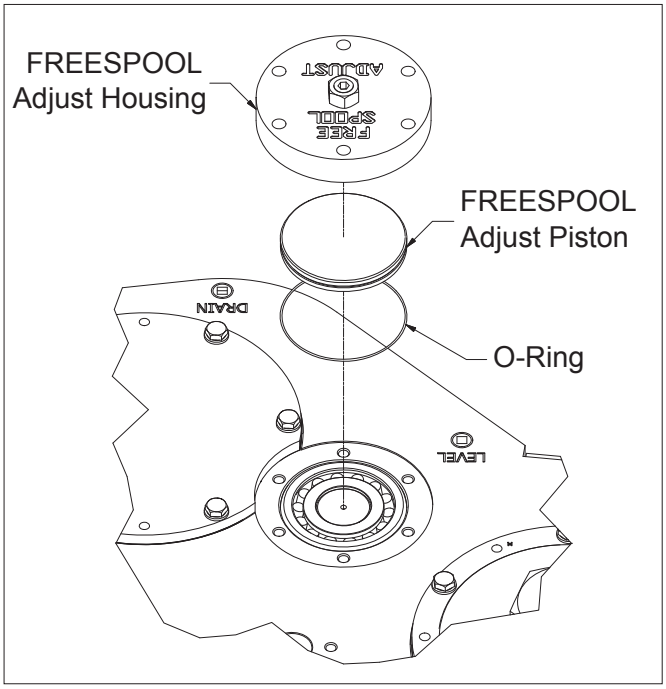
5. Install intermediate shaft.



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

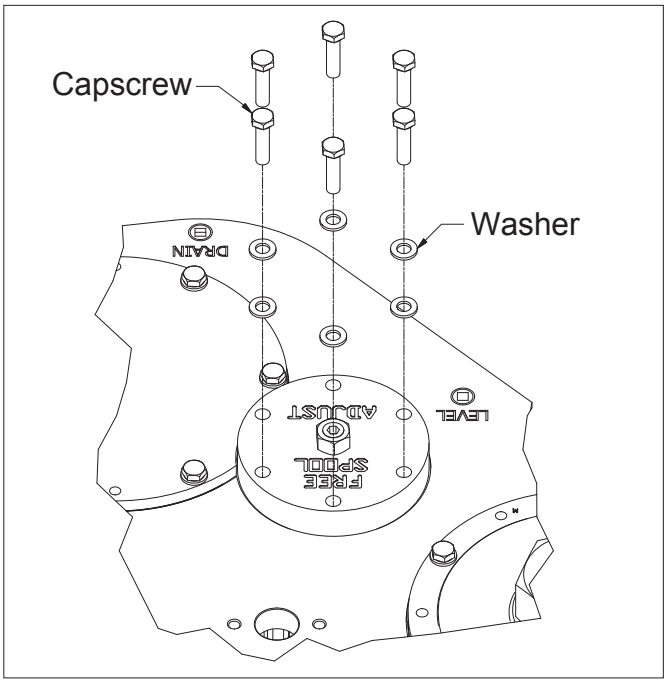


7. Install new O-ring on FREESPOOL adjust piston and install the piston in FREESPOOL adjust housing.

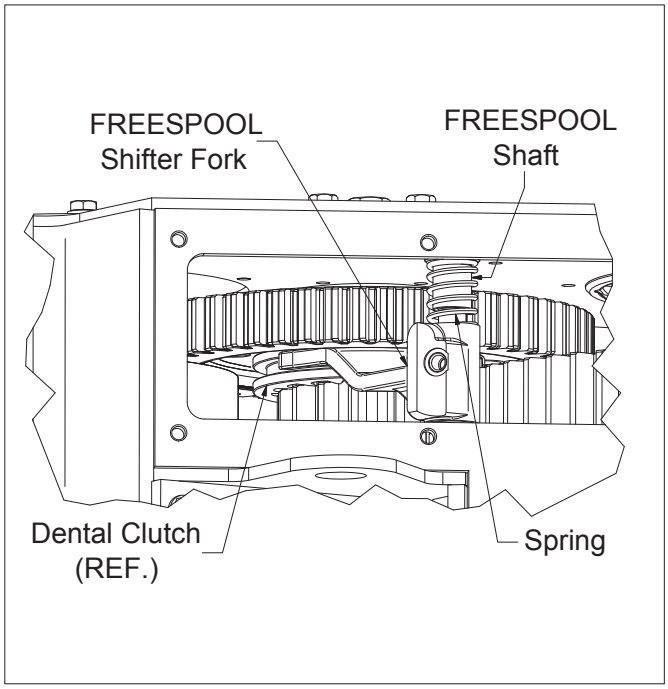


8. Coat the winch frame and retainer with silicone or other suitable sealing compound. Install shim pack (if necessary) and cover.

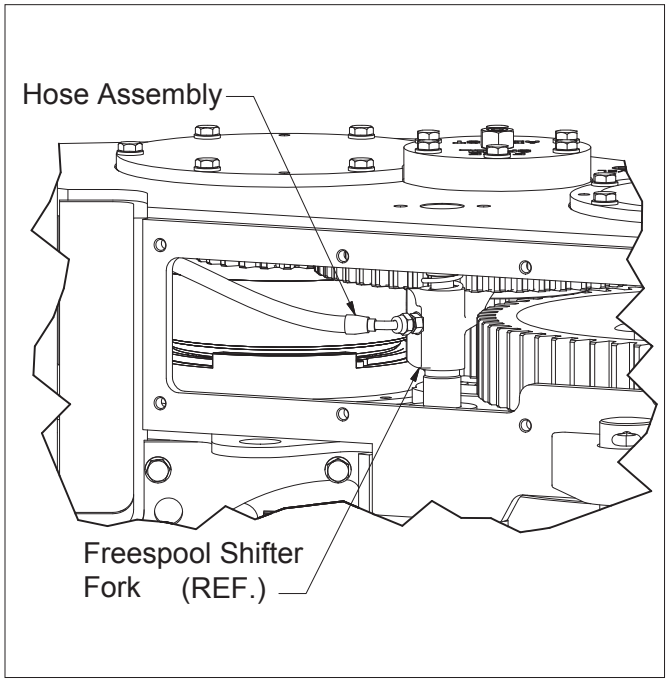
9. Tighten the six capscrews to 75 ft-lbs (10 kg-m).



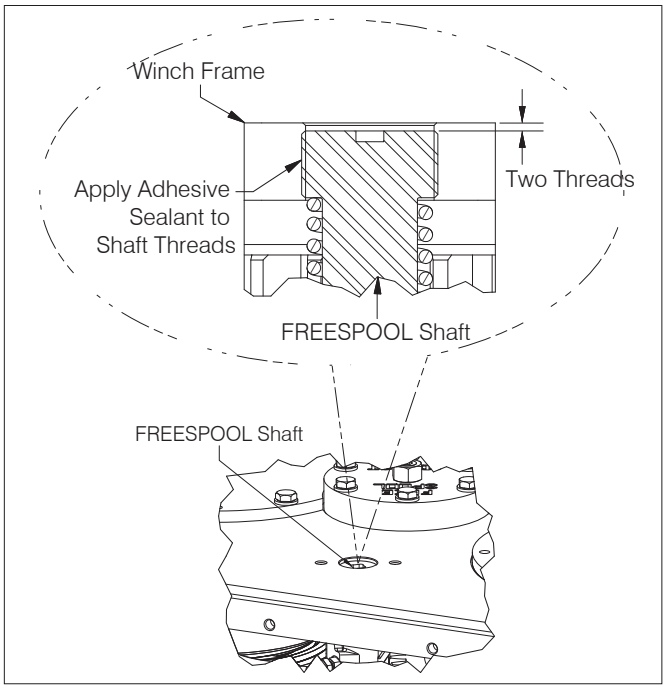
10. Position the FREESPOOL shifter fork on the dental clutch, and install the FREESPOOL shaft with spring by threading the shaft into the winch housing.



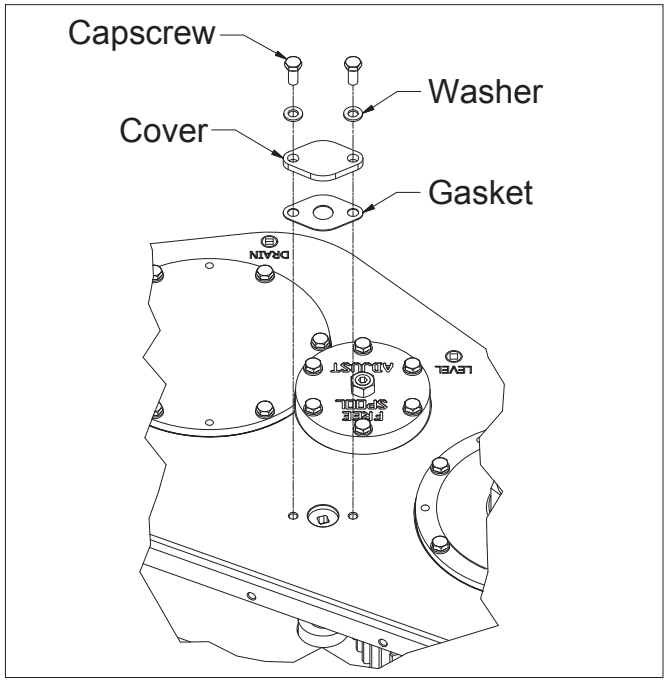
11. Install hose assembly.



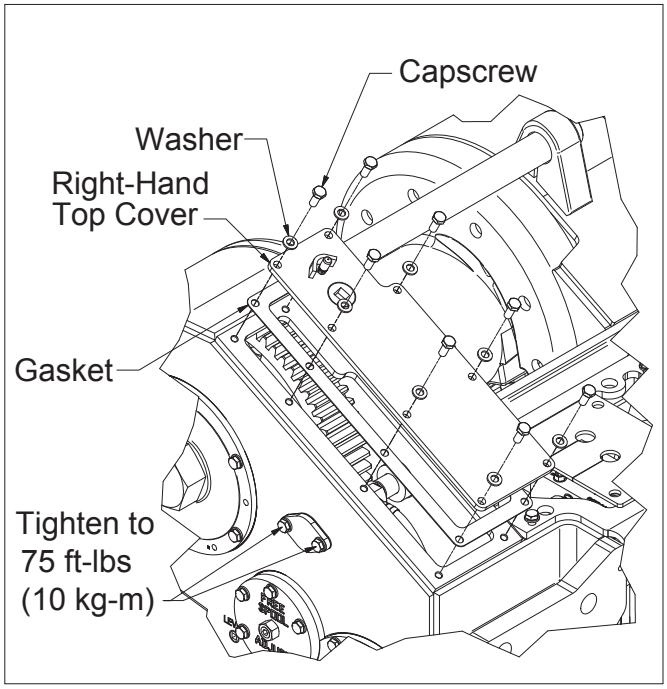
12. Apply adhesive-sealant to threads of FREESPOOL shaft. Adjust for proper engagement and disengagement of intermediate shaft gear. Nominal adjustment should be recessed so two frame threads are exposed in frame.



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



14. Install right-hand top cover with gasket, washers and capscrews. Tighten the two capscrews mentioned in Step 13 to 75 ft-lbs (10 kg-m).



Winch installation

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

2. Attach sling or chain fall to lift points.

3. Raise the winch.

⚠ WARNING

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

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

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

6. Secure the winch in place using the parts listed in the mounting kit instructions. Tighten the nuts/capscrews alternately at each side of the winch to pull the winch evenly against the tractor.

7. Install control lever assembly per mounting kit instructions.

Notes

Notes

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

599040W 12/2022 Printed in U.S.A.