

Atlas Copco Product Training



جهان کمپرسور
Jahan Compressor



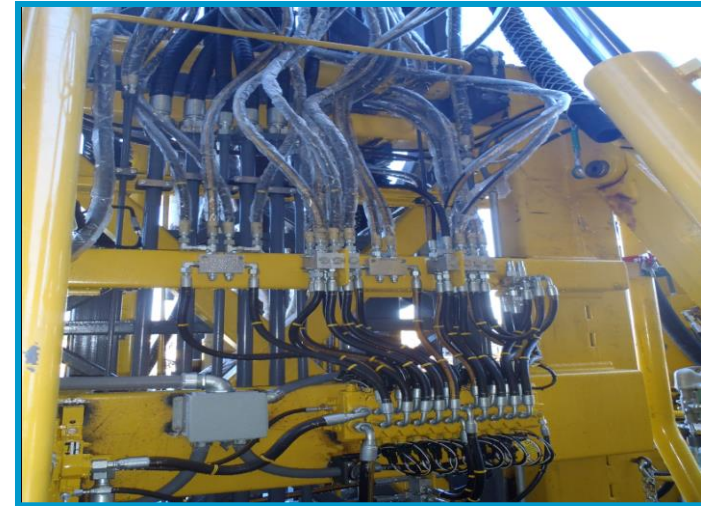
Pit Viper 270 Series RCS: Hydraulic System

Sustainable Productivity

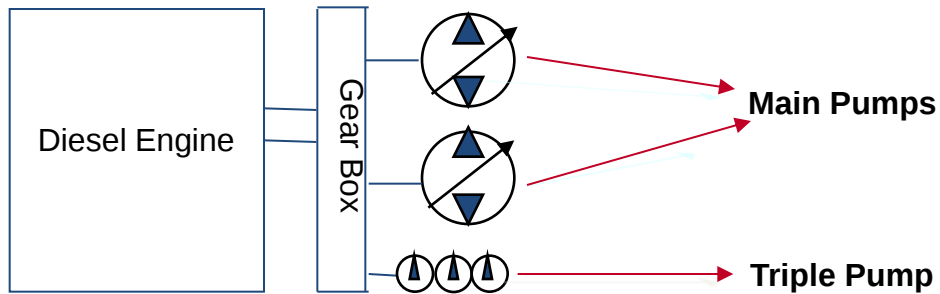
Atlas Copco

Efficient & Reliable Hydraulic System

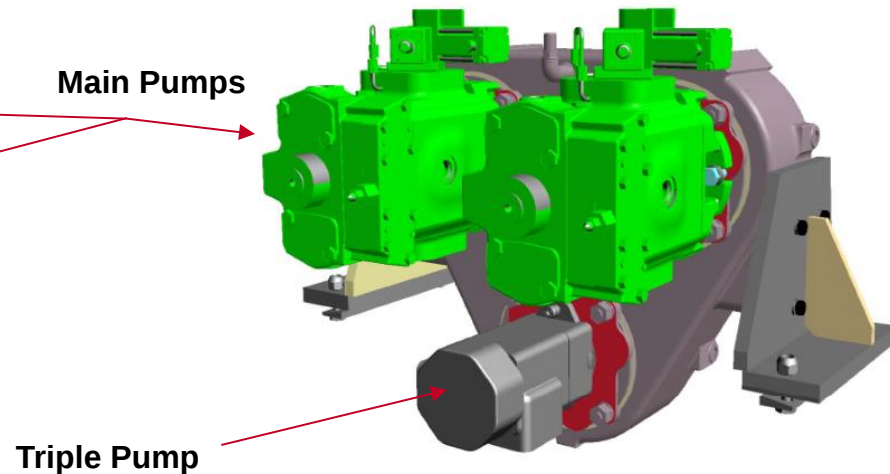
- Simple system
 - Single gearbox
 - Three pumps
 - Two main pumps for feed, rotation & propel
 - Double pump for auxiliary functions
 - Fewer components = lower operating cost
- Common components with DM-M3
 - Same gearbox, pumps and valves
- Leak-free piping
 - SAE o-ring face seal fittings
 - Hard piping used extensively
 - Stauff clamping keeps hoses secure
- Great maintenance access
 - Spool valves moved above deck
- Clean system
 - 3 micron filtration
 - 150 gallon hydraulic tank



PV270 Hydraulic System

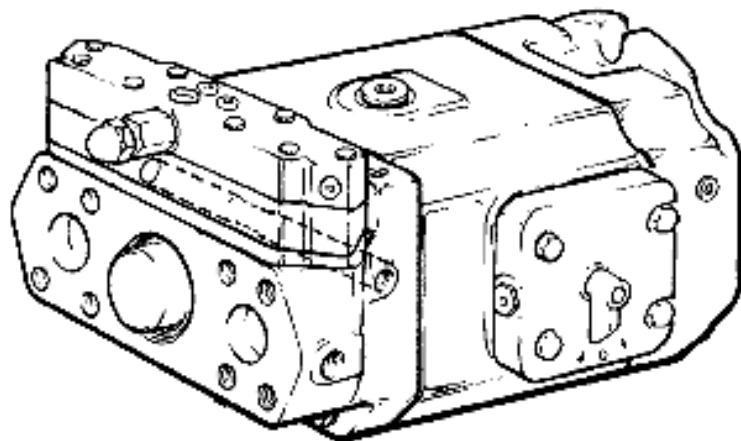


The PV 275 is a hydraulic driven, blast hole drill. Power to drive the hydraulic system is supplied by a Diesel Engine through a 3 – hole gear box. The hydraulic pumps convert the Diesel energy from the Engine to hydraulic energy that can be used by the various motors and cylinders to perform the necessary drilling and propelling tasks. The result is a simple and flexible drilling system. We will cover the training in four circuits: Propel, Feed, Rotation and auxiliary functions.



Main Hydraulic Pumps

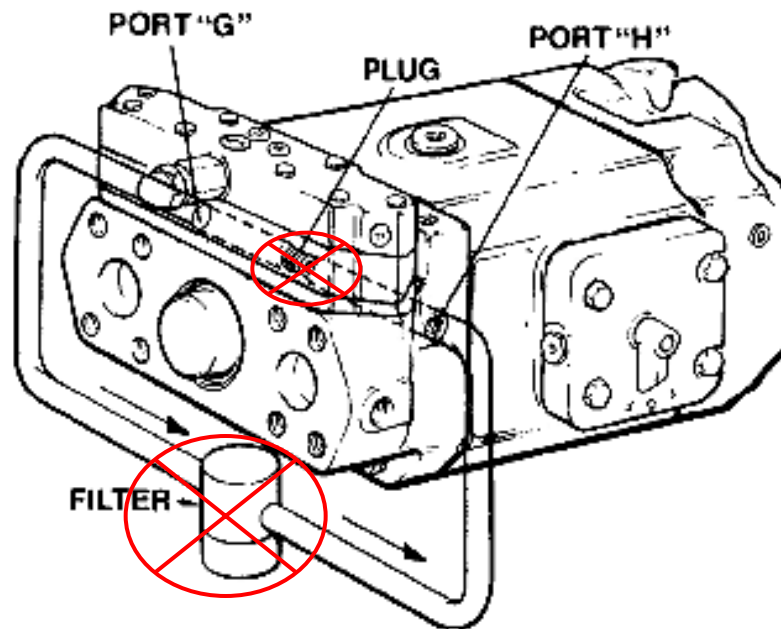
Main Hydraulic Pumps



**WITHOUT FILTER
NO PLUG**

Isolation Plug

When the external filter circuit IS NOT used discard the isolation plug



**EXTERNAL FILTER
WITH PLUG**

Hydraulic Tank



Hydraulic Tank RCS 4



Drain Filters

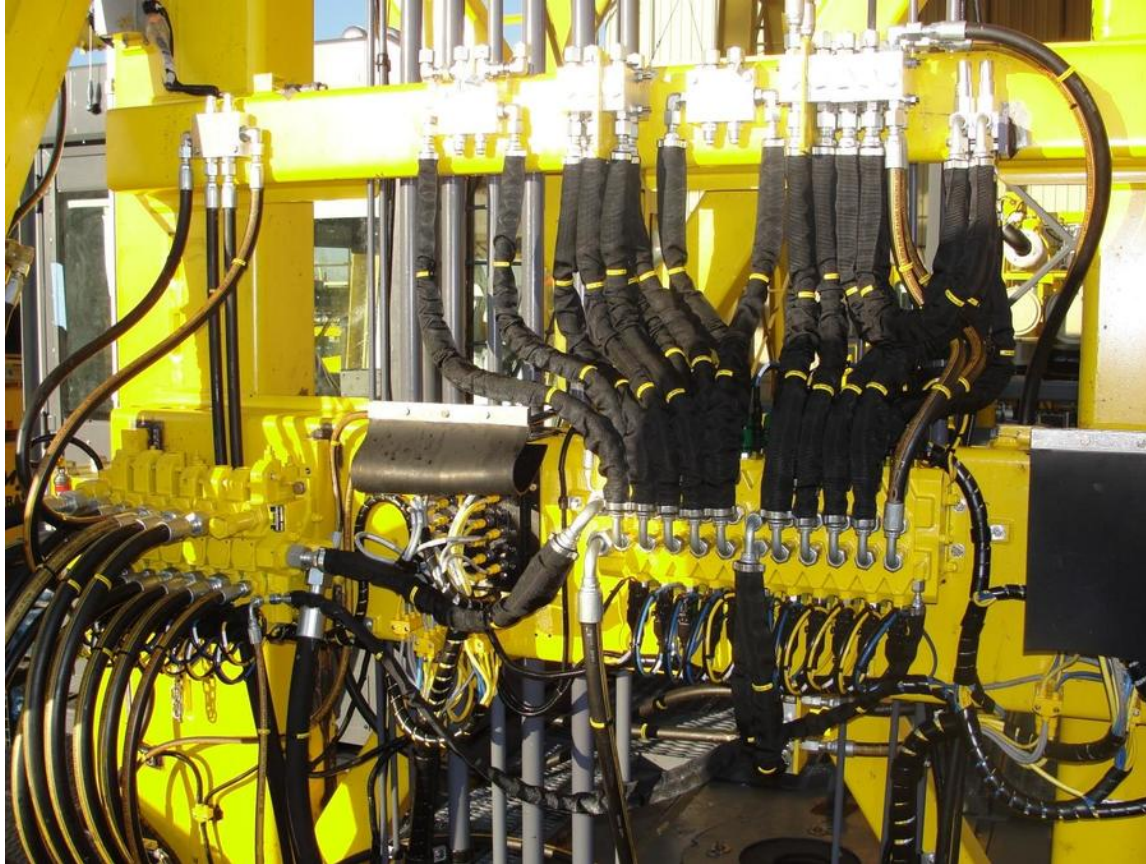


Return Filters

**Hydraulic Tank holds 150
gallons of fluid**

RCS 4 Auxiliary Functions Circuit

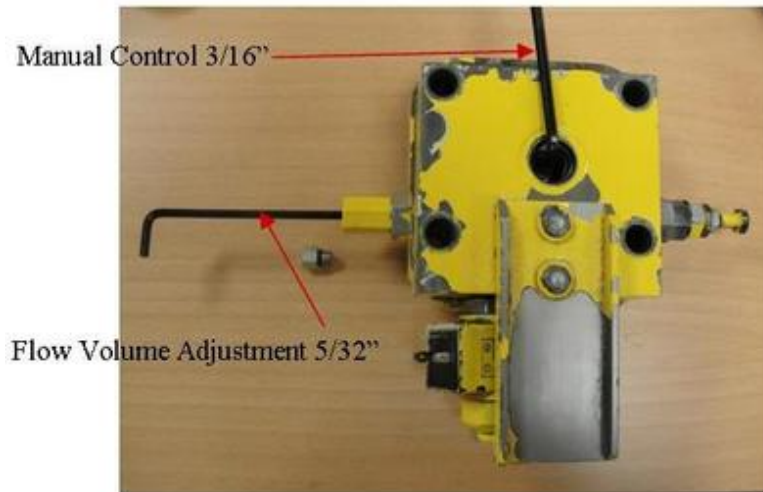
Spool Valves VPL



7 Spool Valve

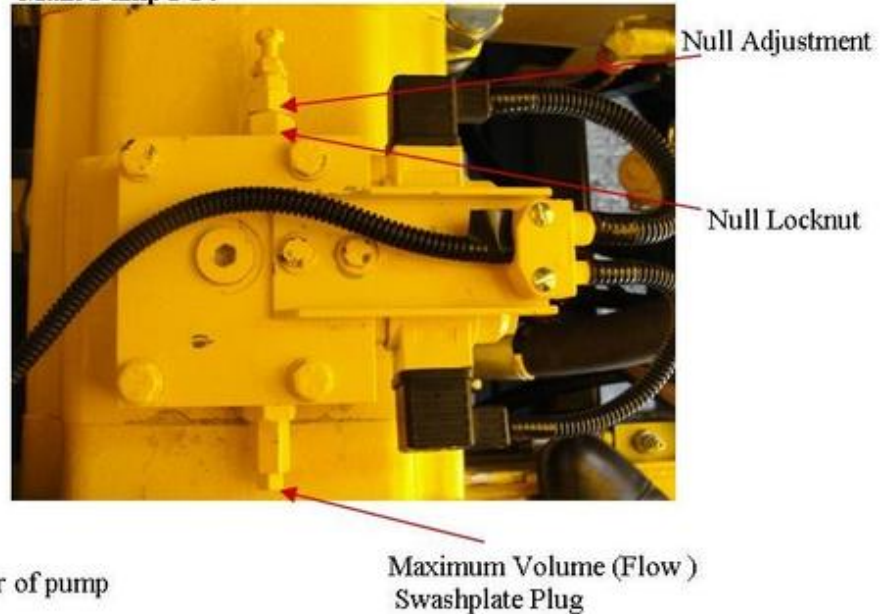
11 Spool Valve

Denison Pump Denison 9A Stroker

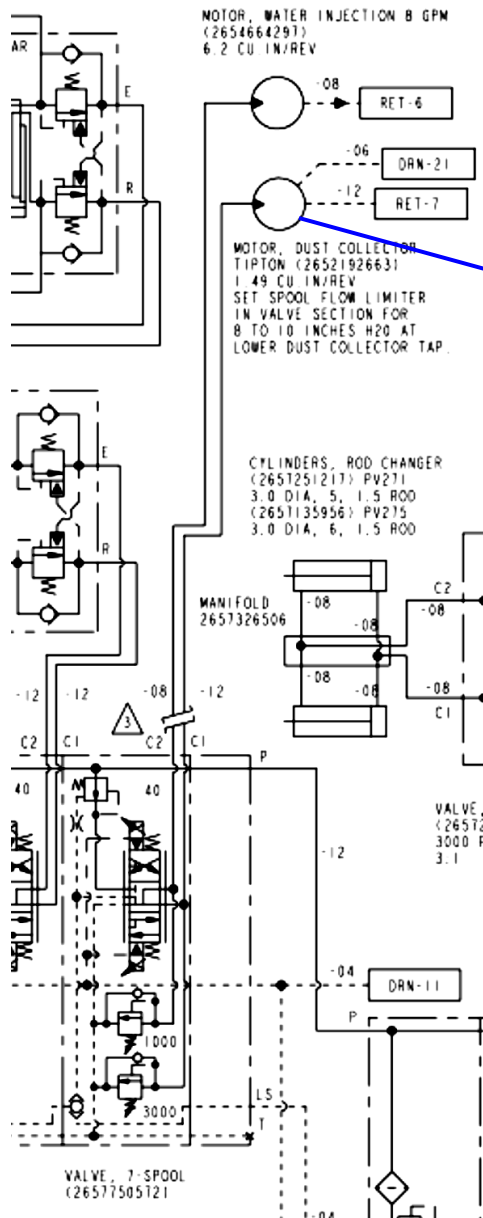


Null Adjustment adjusts true center of pump

Main Pump P14



Triple Pump - P2 Circuit – 7 Spool – Blower/Dust Collector Optional



Hydraulic Hose Identification

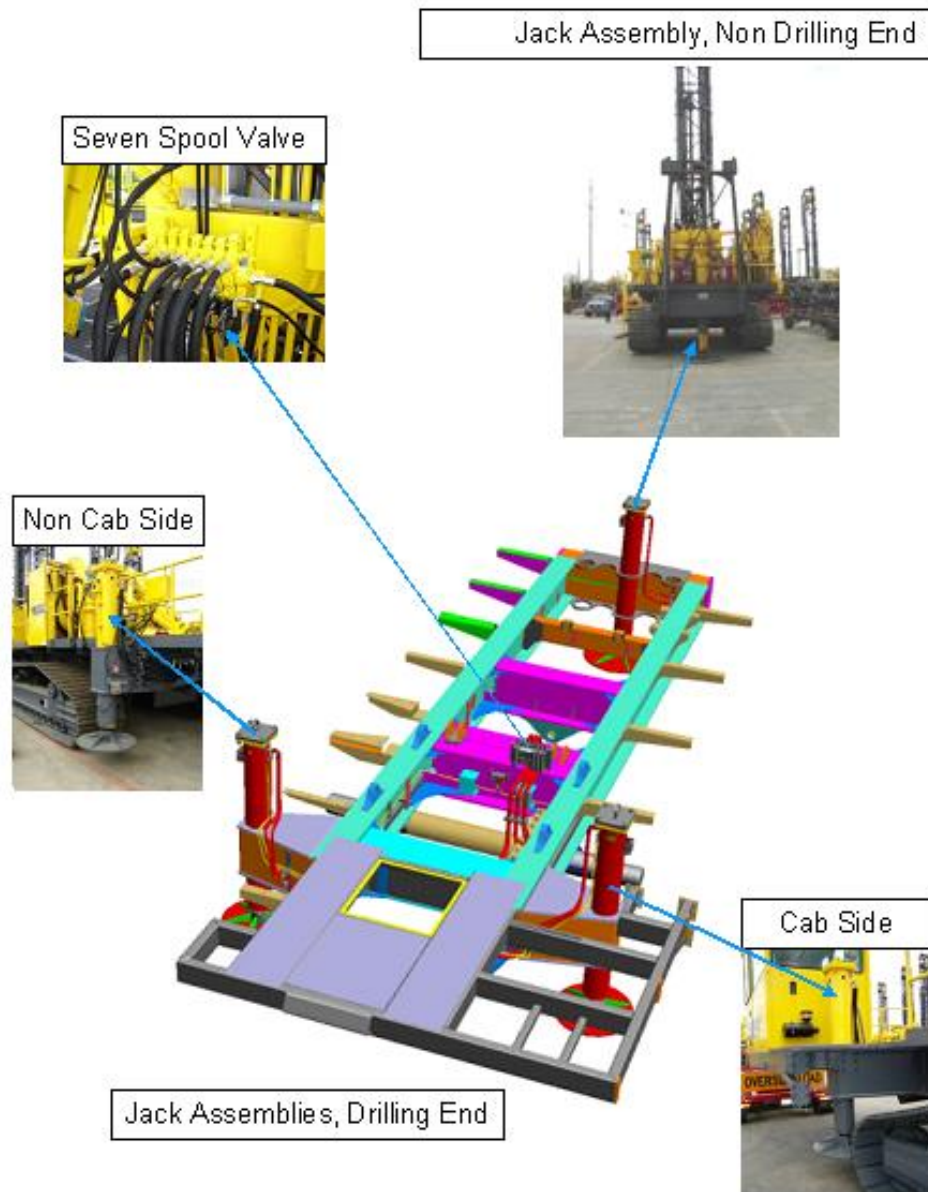


BOM 57584831

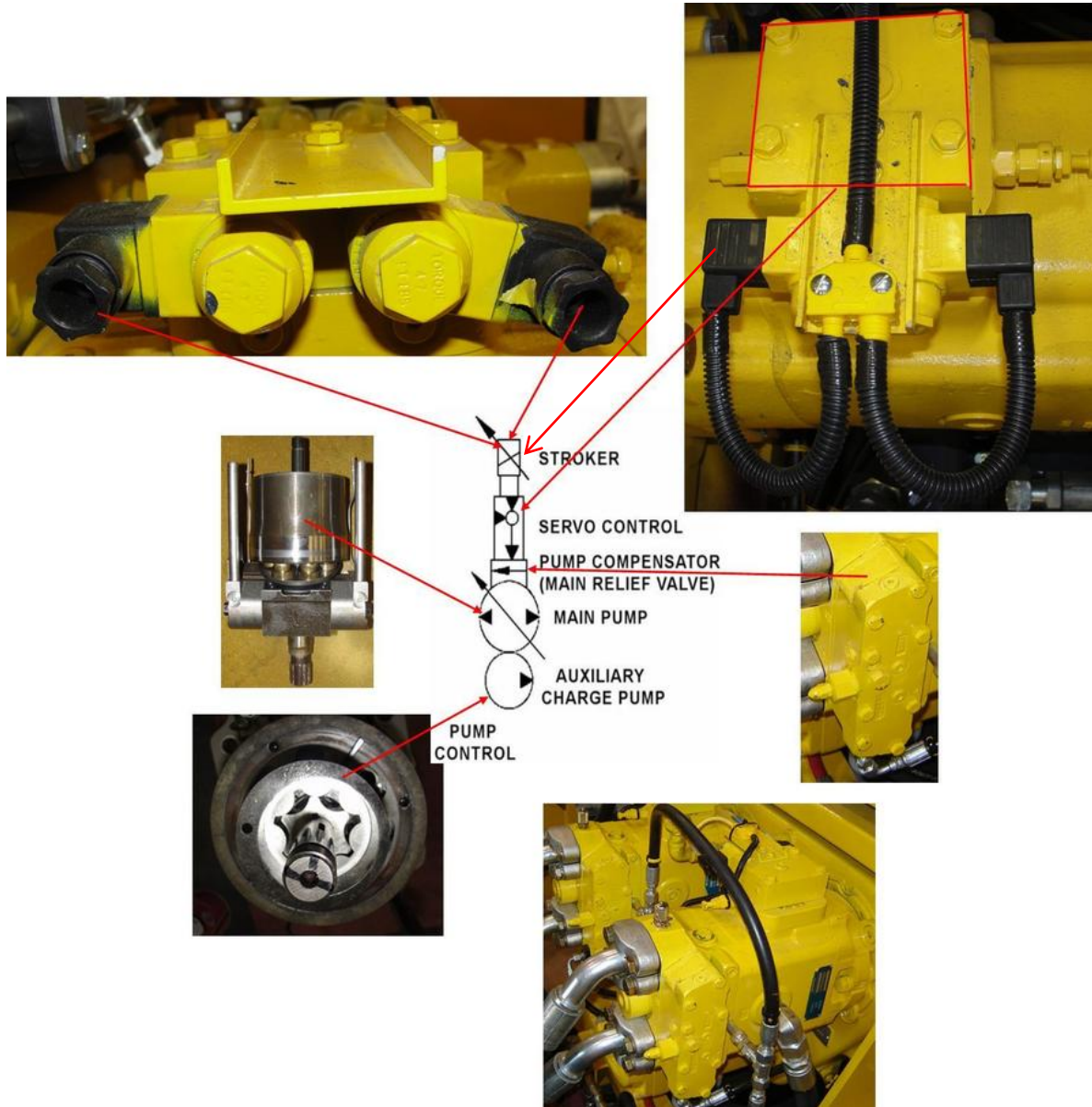
57584831 JACKS,PIPING-4,ELECT

REF.	PART NO.	QTY	UNIT	DESCRIPTION
001.0	57011306	2.0	EA	HOSE ASSY
002.0	57025991	4.0	EA	HOSE ASSY
003.0	51028710	2.0	EA	TEE-JIC RUN/NPT 8-8S
004.0	56919004	4.0	EA	FITTING, HYD
005.0	57776379	1.0	EA	PLATE,MOUNT-BULKHEAD
006.0	57044752	2.0	EA	HOSE ASSY
007.0	95679593	2.0	EA	FITTING,HYD
008.0	95302238	2.0	EA	ELBOW
009.0	95780599	4.0	EA	ADAPTER
010.0	57116758	4.0	EA	ADAPTER, JACK-LONG
011.0	57116766	4.0	EA	ADAPTER, JACK-SHORT
012.0	57116840	2.0	EA	HOSE ASSY
013.0	57445157	2.0	EA	HOSE ASSY
014.0	95209888	6.0	EA	O-RING,HYD

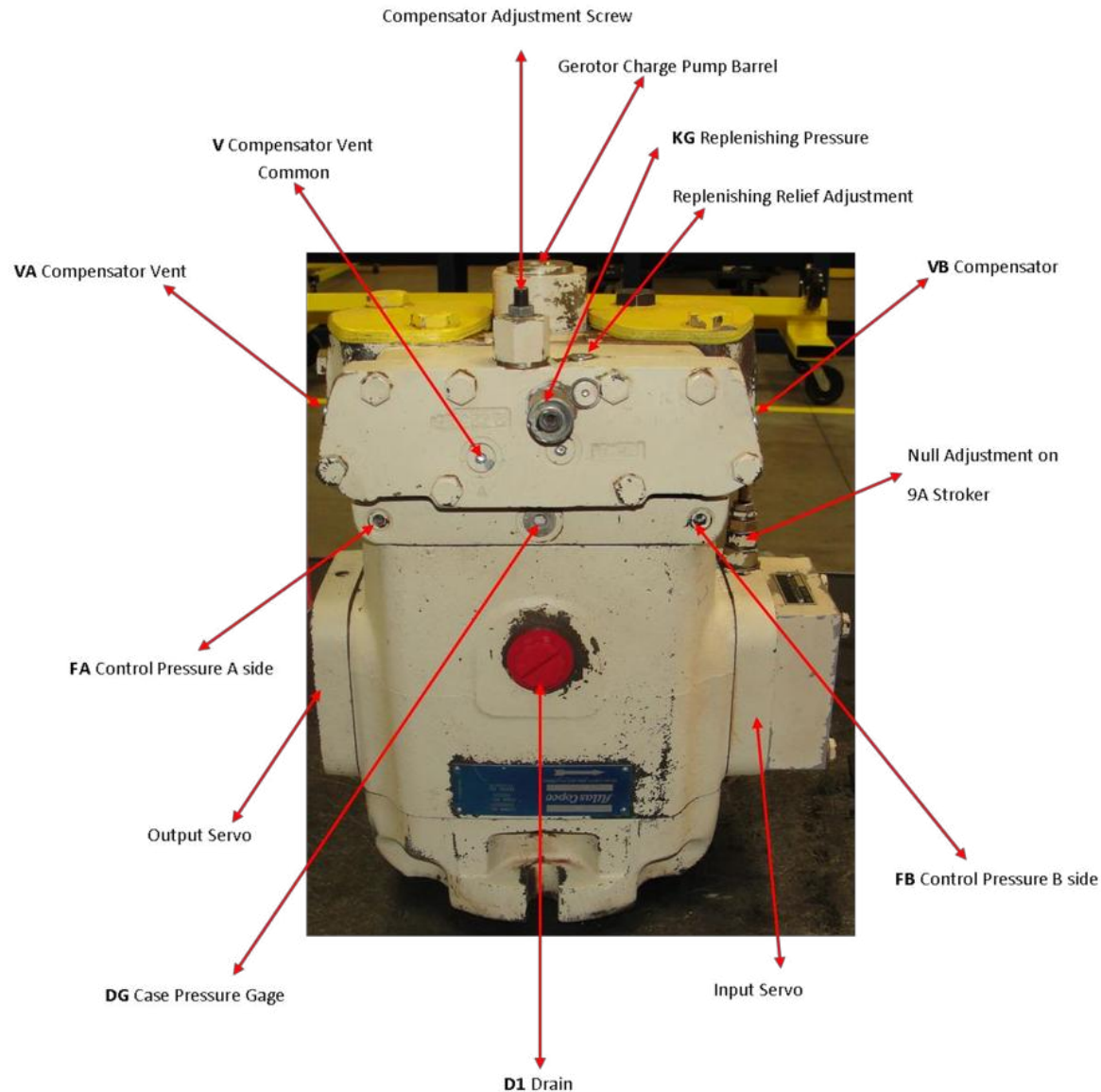
Triple Pump - P2 Circuit – Jacks Circuits



Main Hydraulic Piston Pumps-Closed Loop



P7 Denison Pump Overview



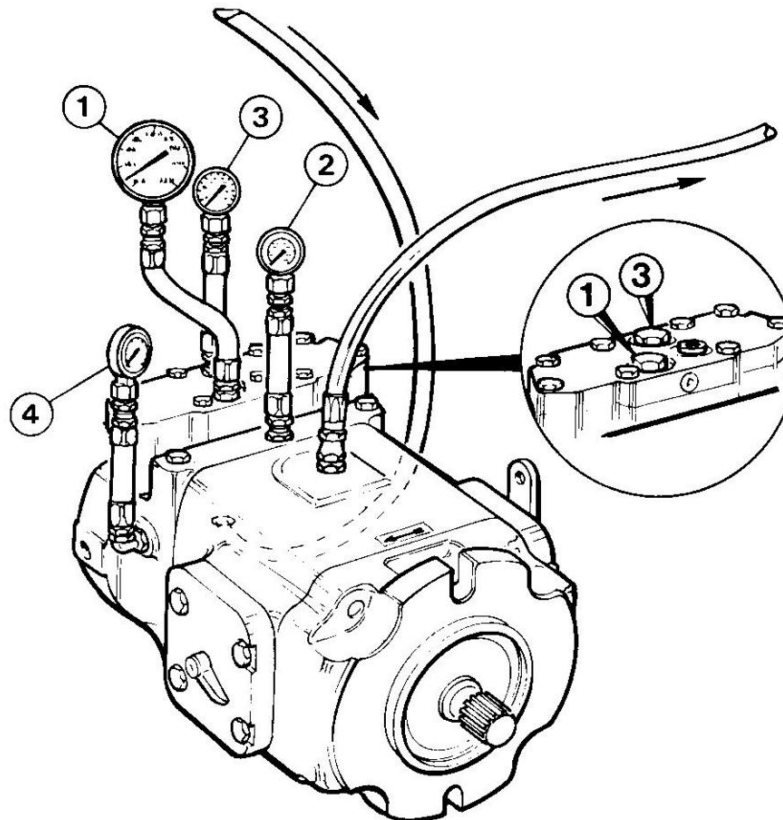
Denison Pump Test Ports

GAUGE PRESSURE RANGES:

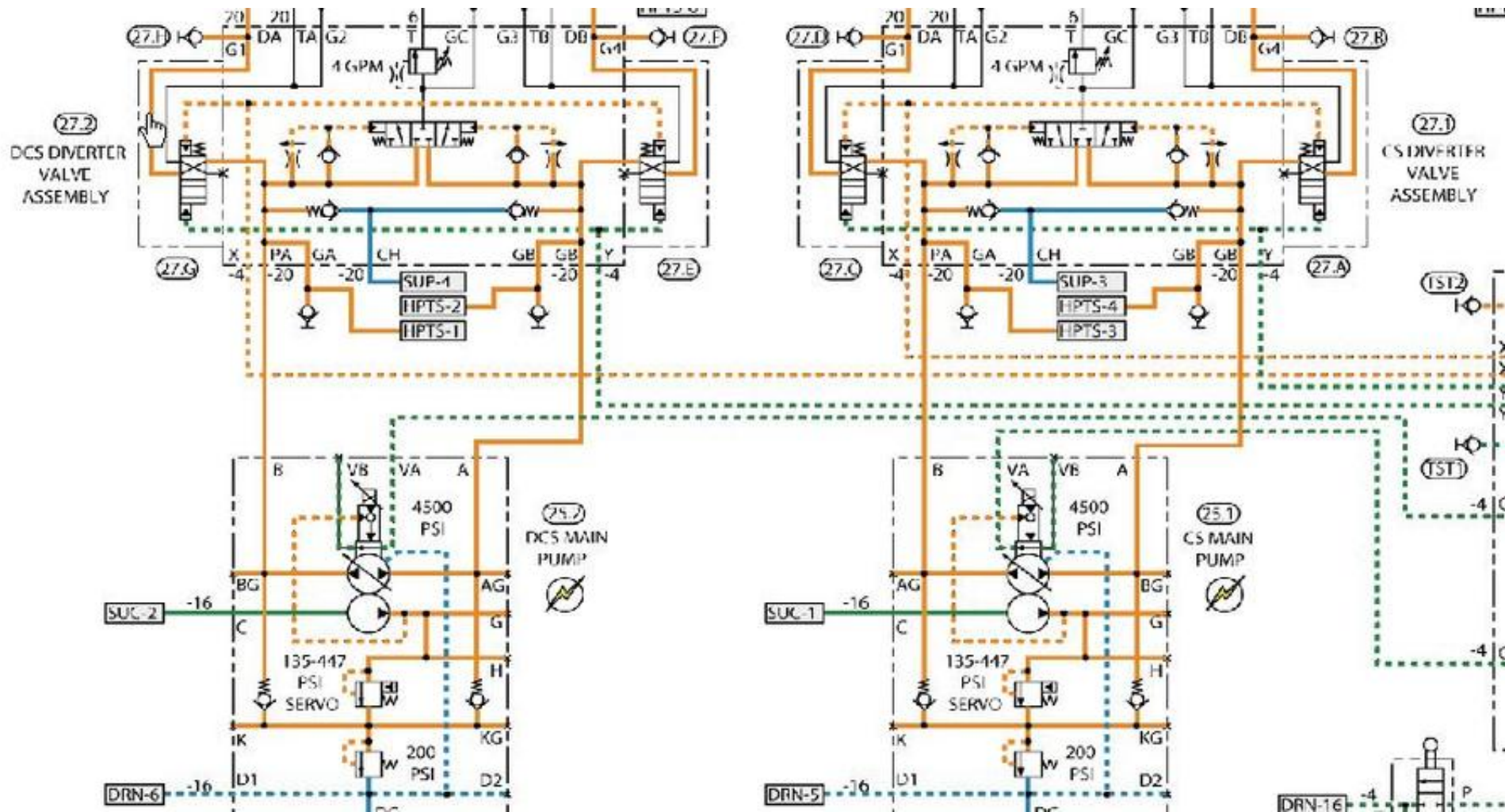
1. 6000PSI, 68,9 bar gage for A or B port -- V
2. 200 PSI, 13,7 bar gage for case port -- DG
3. 500 PSI, 35 bar gage for replenishment port -- K, KG
4. 1000 PSI, 68,9 bar gage for servo port -- G, H

TYPICAL PRESSURES

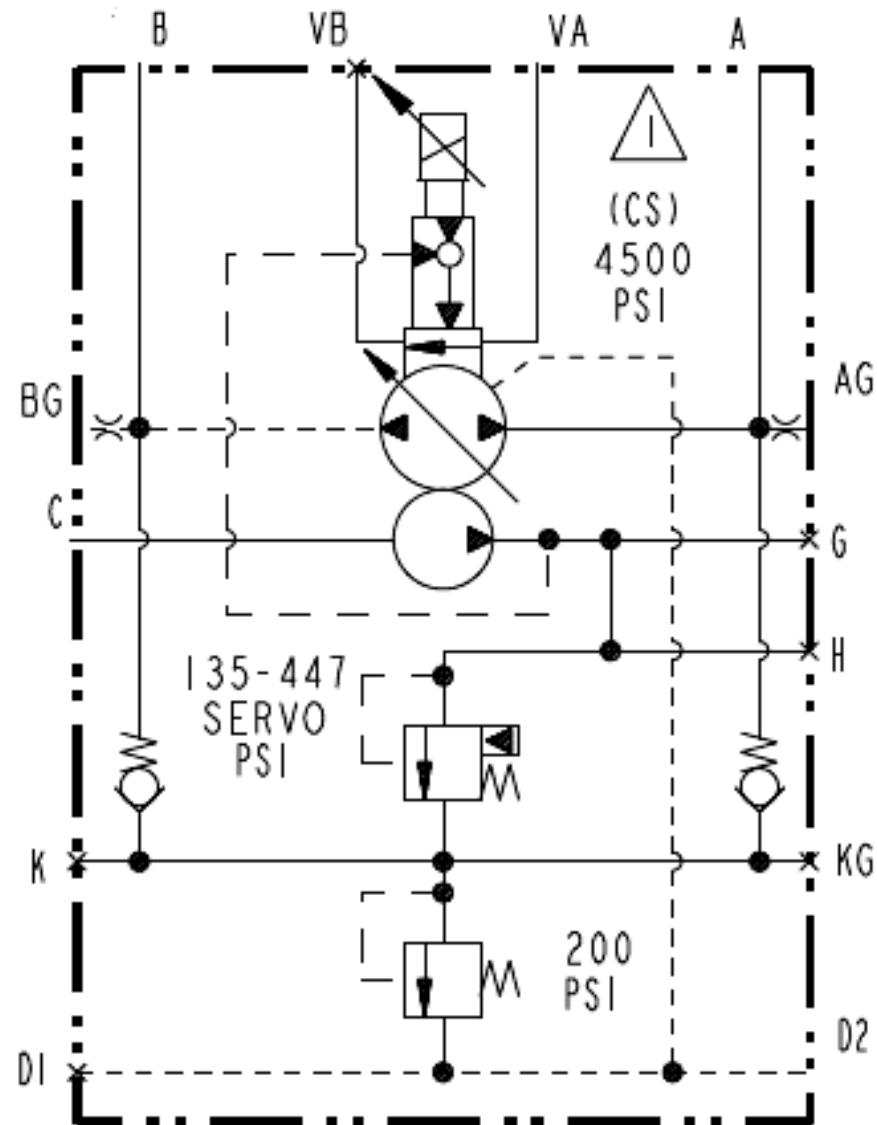
Replenishment 180-220 PSI
(12,4-15,0 bar) + case pressure
Servo: 300 PSI (20,6 bar) + case pressure + 40 PSI (2,8) bar per 1000 PSI (68,9) bar system pressure
Case: 75 PSI (5,2 bar) continuous 125 PSI (8,6) bar intermittent



Pump Drive P7's on PV270 series.

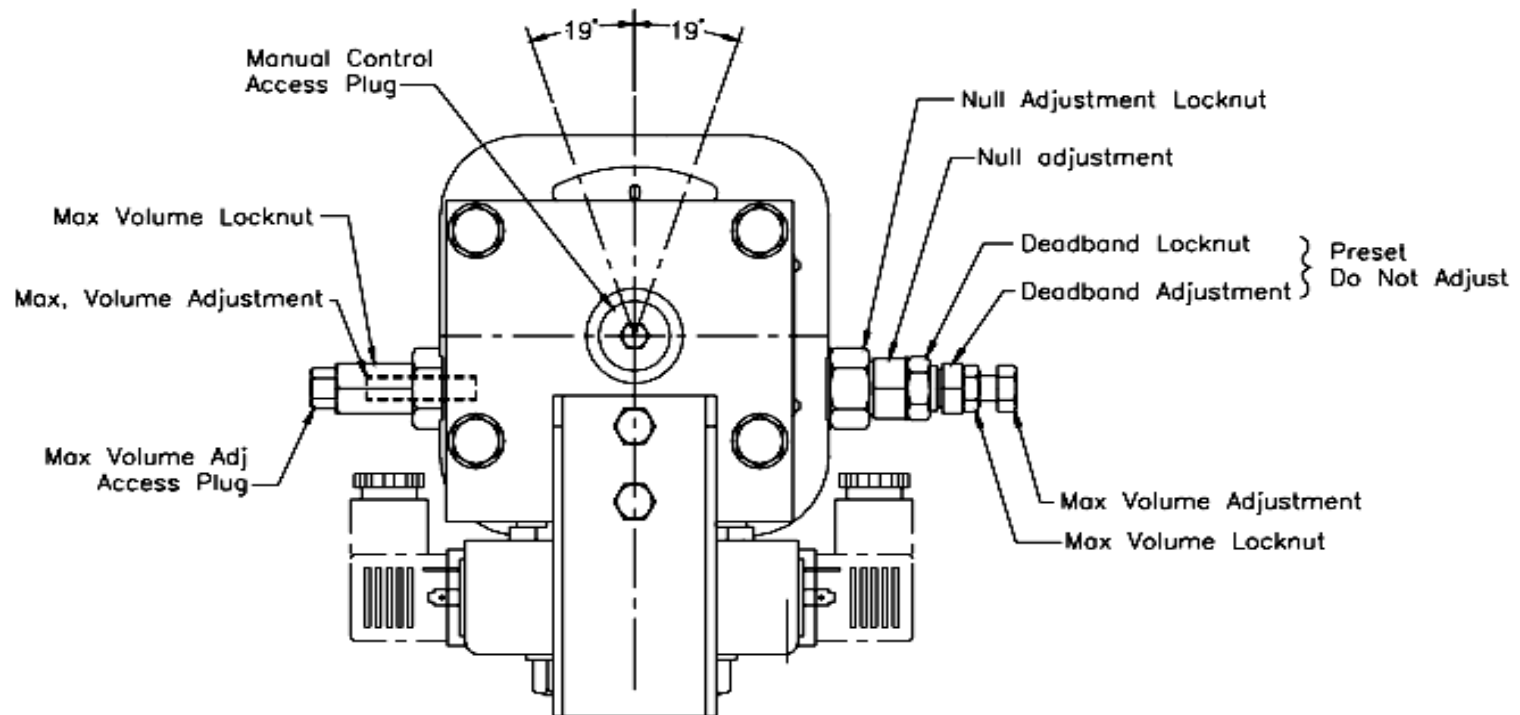


Main Hydraulic Pumps-Closed Loop



Denison 9A Stroker

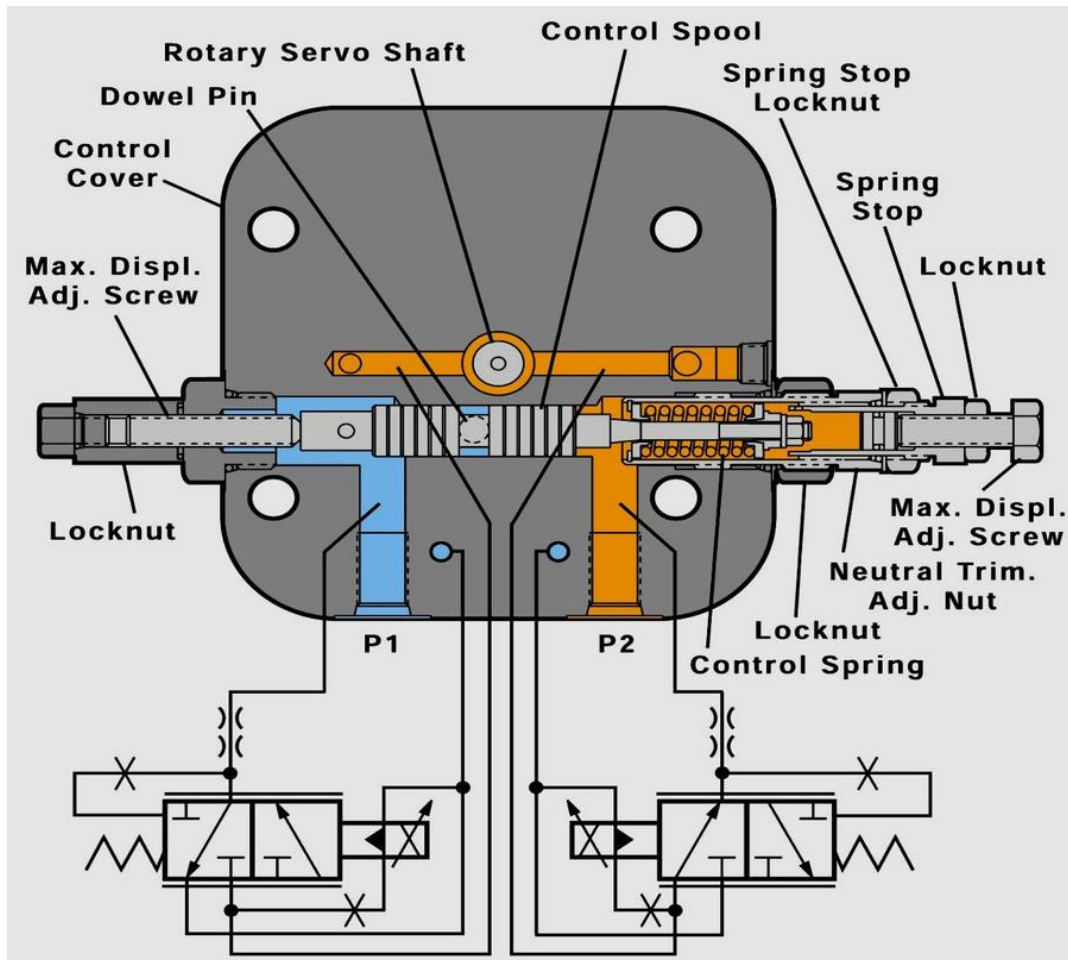
Adjustment Procedure



Insure that the machine is in a safe operating condition. Install Pressure gauges on each work port (AG and BG). With the control installed and the pump running the adjustments are as follows:

Denison 9A Stroker

Adjustment Procedure



If tracks rotate.

1. Lift machine so that tracks are clear of the ground.
 2. Select Tram mode.
 3. Remove wires connected to both coils.
- If tracks do not rotate no adjustment is required.

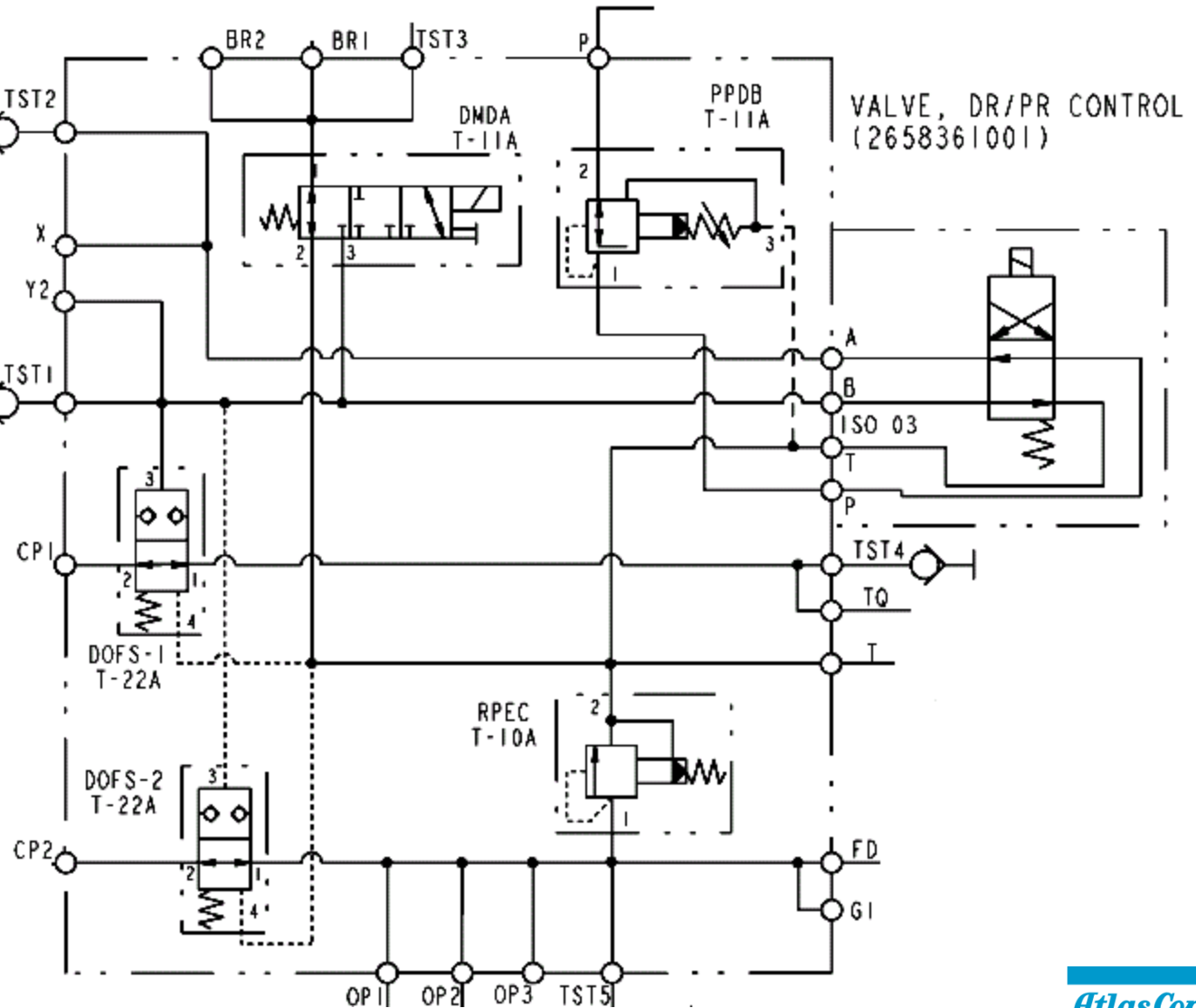
Mechanical adjustment.

1. Loosen "Null Adjustment" lock nut on appropriate pump.
2. Turn "Neutral Trim adj. nut clockwise and note if tracks stop rotating.
3. If tracks speed up stop, turn adj. nut counter clockwise until tracks stop rotating. This adjustment must be done slowly.

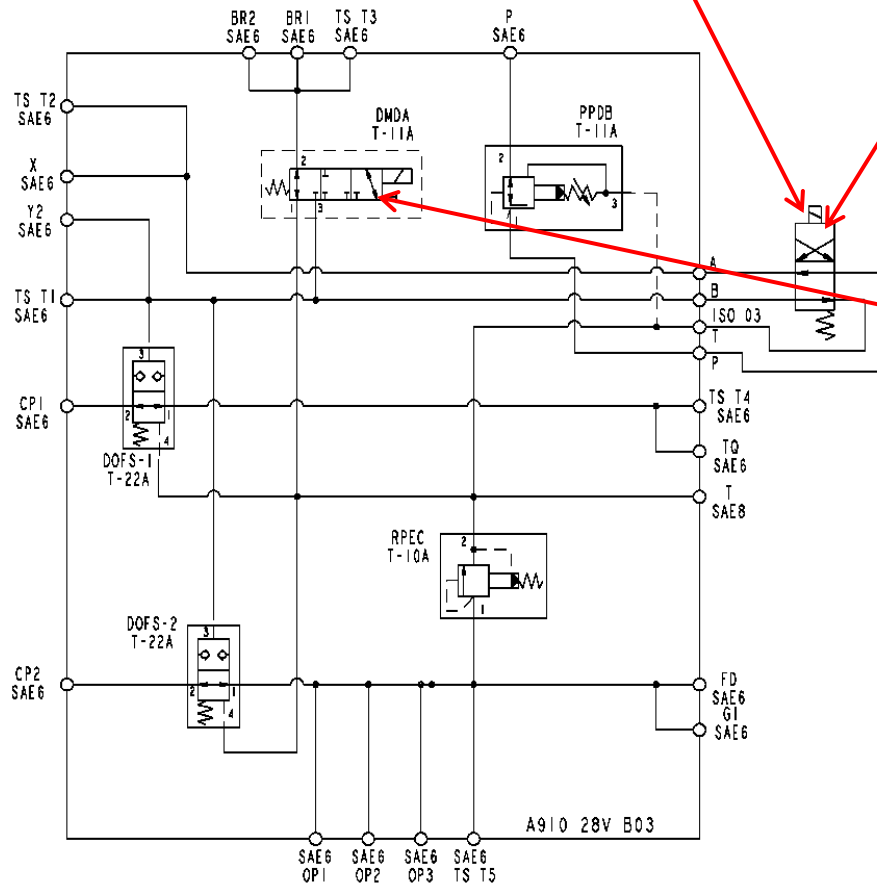
Drill Propel Valve

On AC Drillmasters, "X" port is always pressurized when in the Drill mode.

"Y" port is always pressurized when in the Propel mode.



Drill Propel (DR/PR) Valve



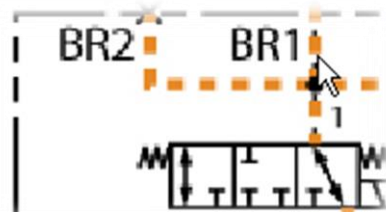
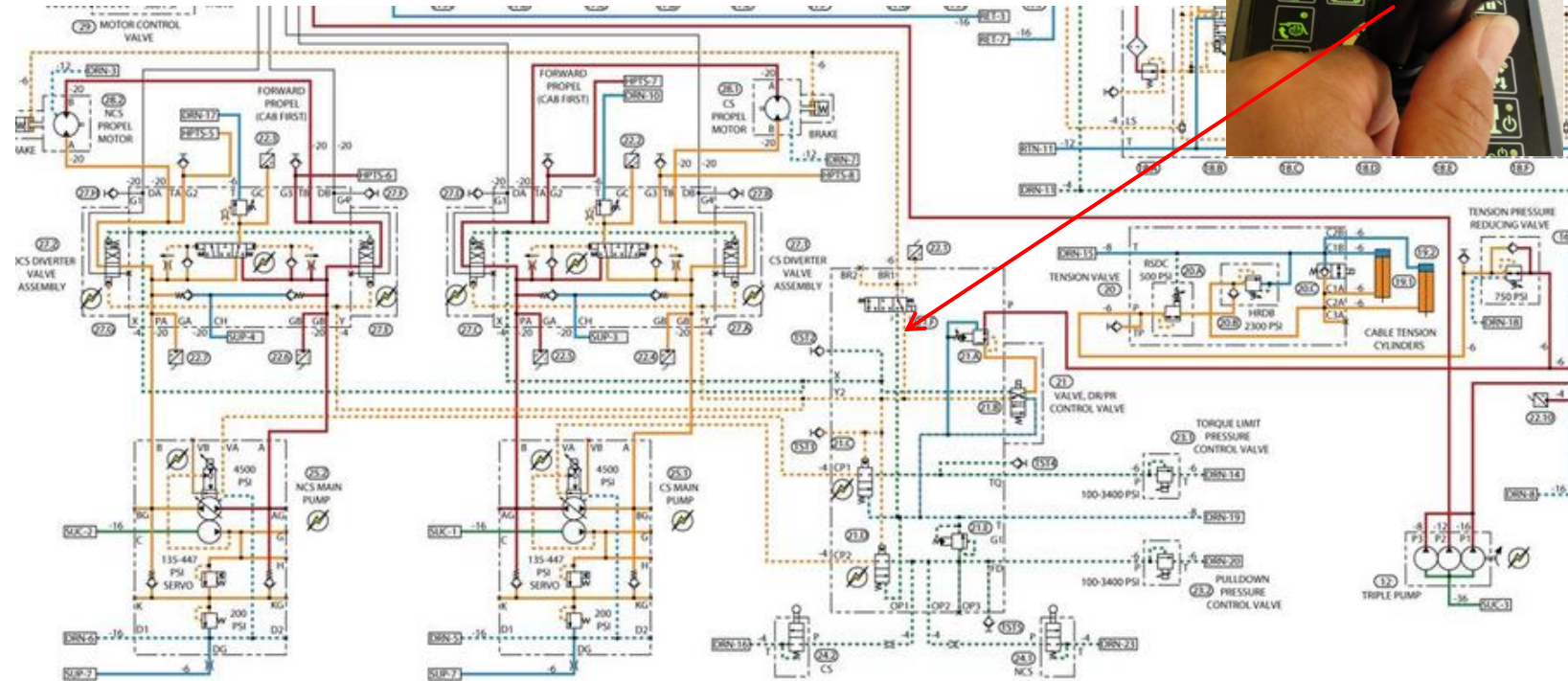
Schematic is in Drill mode



When valve is shifted to Propel mode and propel brake signal is sent (x4b D514) This 3 position directional control valve shifts.



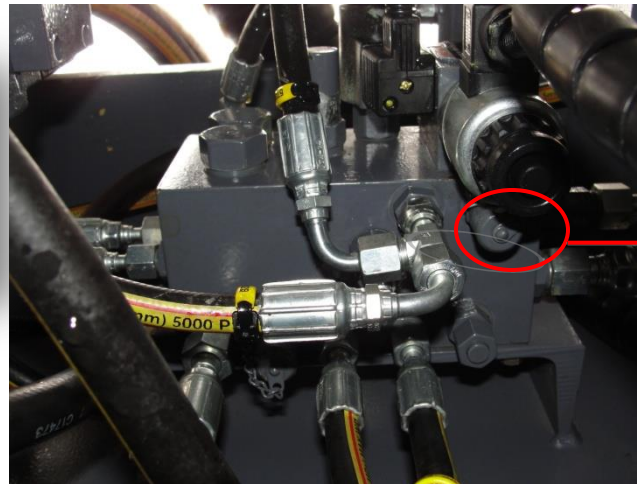
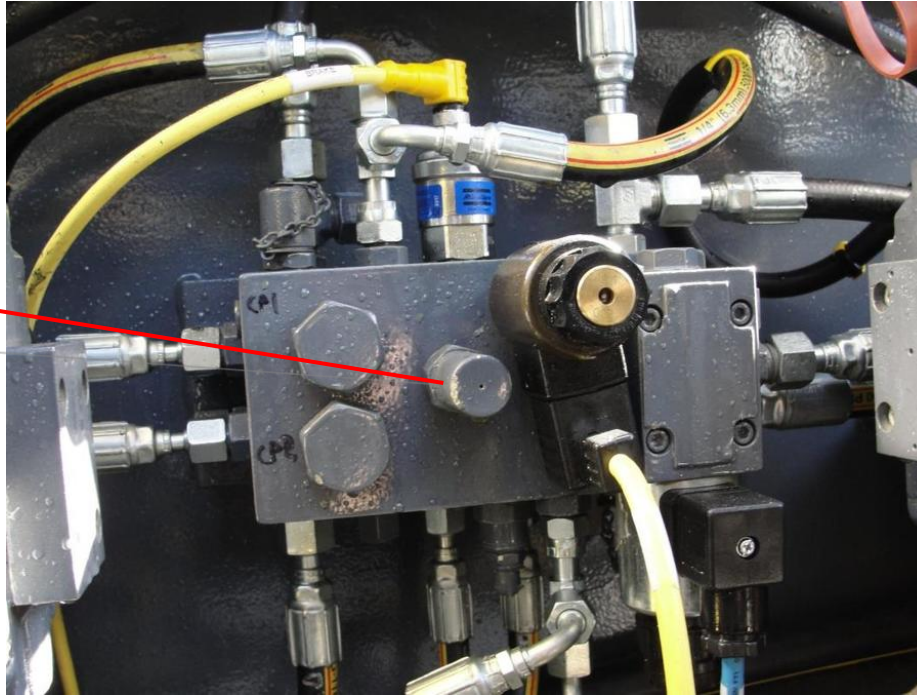
Drill Propel (DR/PR) Valve



Drill Propel Valve RCS 4 Feed Adjustment 3,400 PSI

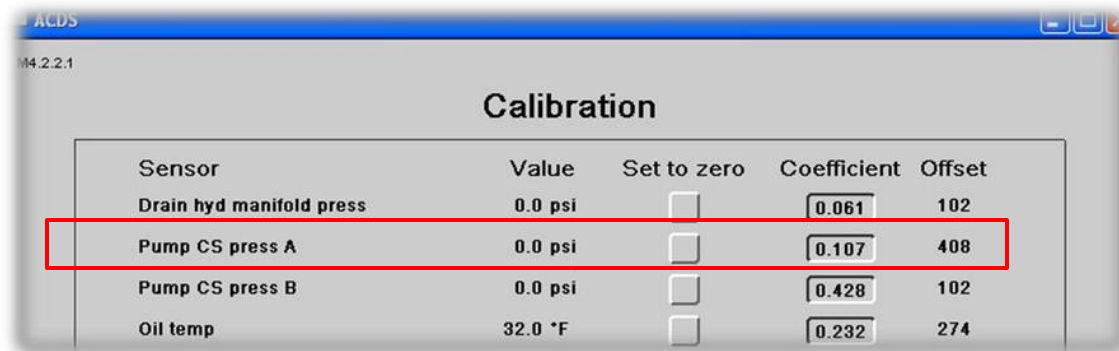


**Adjustment to
3,400 PSI here**



**Insert 5,000 PSI
Test gauge here**

Drill Propel Valve RCS 4 Feed Adjustment 3,400 PSI



ACDS
M4.2.2.1

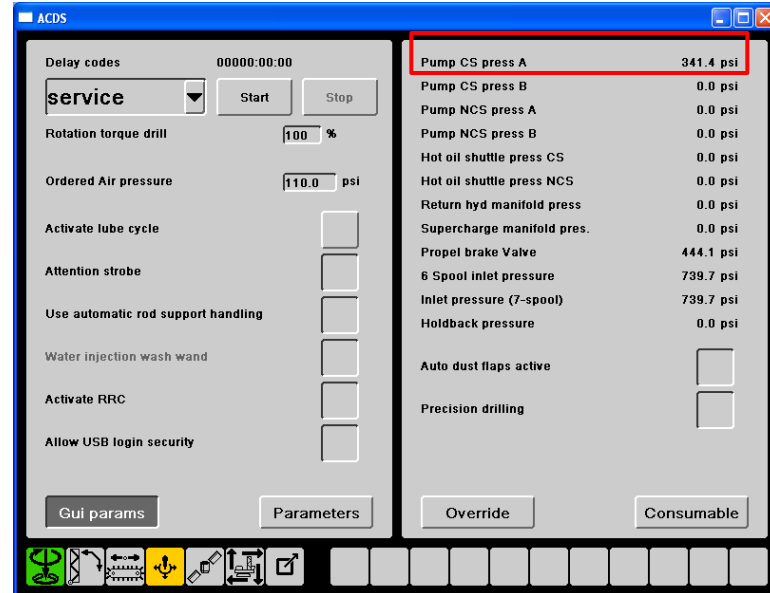
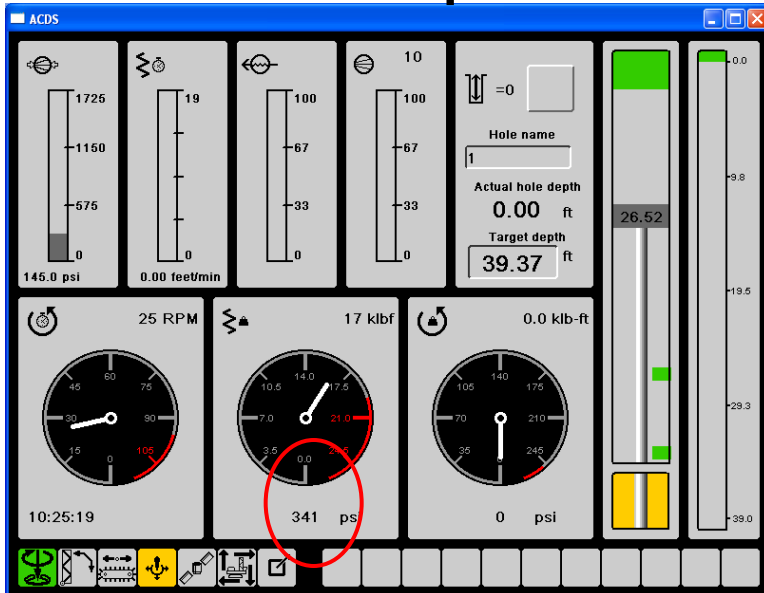
Calibration

Sensor	Value	Set to zero	Coefficient	Offset
Drain hyd manifold press	0.0 psi	☐	0.061	102
Pump CS press A	0.0 psi	☐	0.107	408
Pump CS press B	0.0 psi	☐	0.428	102
Oil temp	32.0 °F	☐	0.232	274

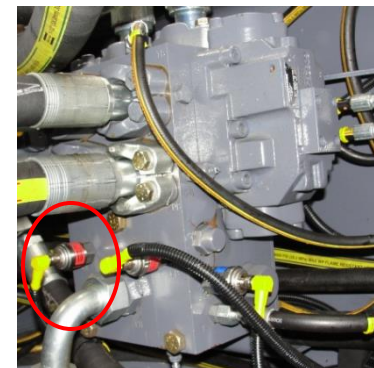
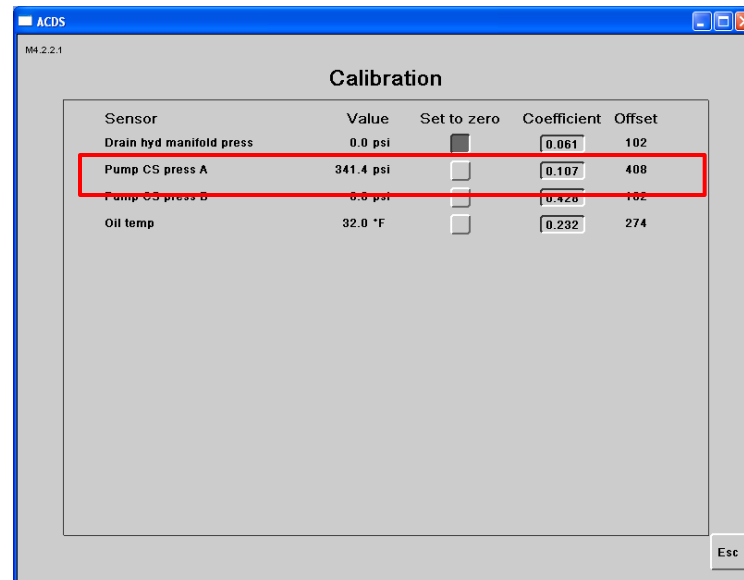
Steps to Set Feed Pressure on DR/PR Valve

- Sign in SE level or higher
- Screen M4.2.2.1 Make sure Value is 0.0 with drill not running if not set to zero.
- Insert 5,000 PSI gauge into bottom location of DR/PR Valve (previous slide).
- Remove cap from the Feed Relief Valve. Insert Allen wrench tool.
- Start Drill and move rotary head to bottom stop deadheading in stalled position (Right hand control panel joystick pull toward you).
- Always decrease (CCW) direction 1st not to lock up the brake system with Allen wrench. Adjust until gauge reads 3,400 PSI +/- 50.
- Check results on F1 Screen/F2/4.2.2.1
- If results vary adjust the Coefficient in small increments to meet digital gauge readings.

Drill Propel Valve RCS 4 Feed Adjustment 3,400 PSI



Forward Rotation CS Pump Pressure A

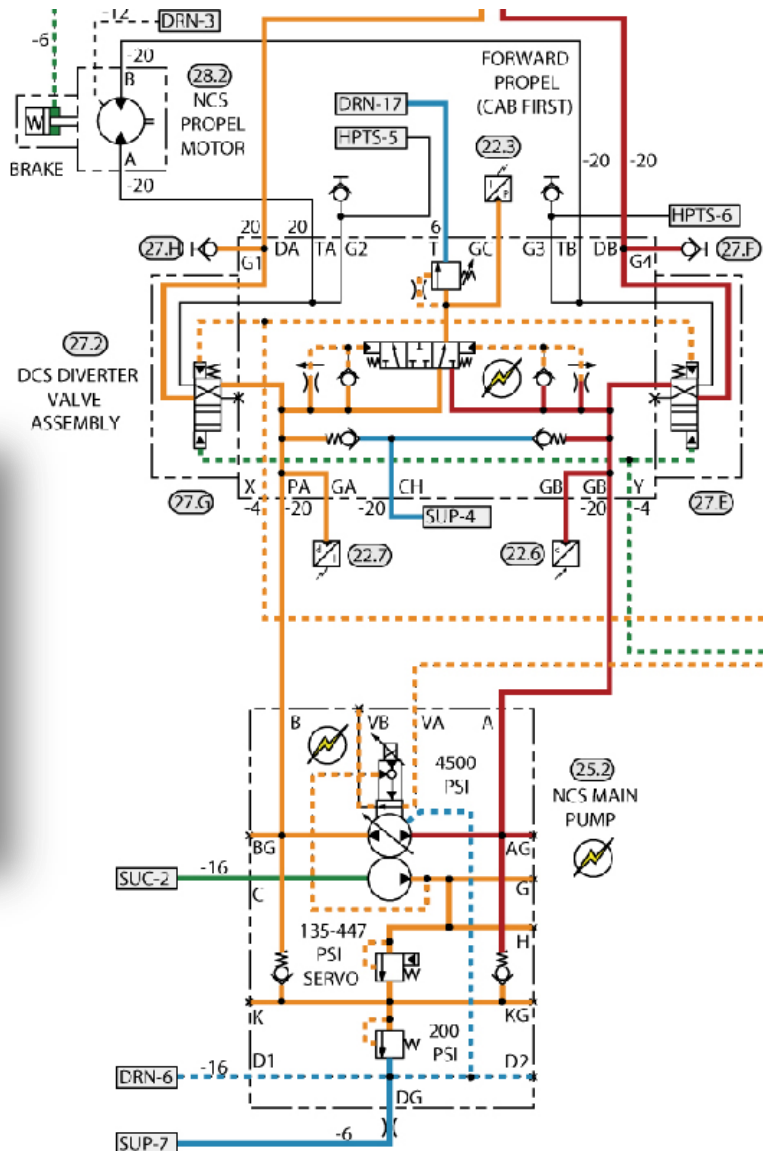


Diverter Manifolds-Hot Oil Shuttle (HOS)

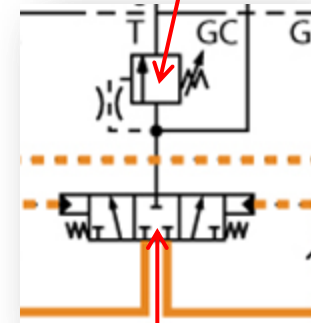
Drill Rotation Forward

Color Key/Legend:

- RED: System Pressure Flow
- BLUE: Exhaust Flow
- - - DASHED BLUE: Case Drain Flow
- GREEN: Intake Flow
- - - DASHED GREEN: Pilot Drain/Vent Flow
- YELLOW: Metered Flow
- ORANGE: Pilot Supply/Reduced Press. Flow
- - - DASHED ORANGE: Pilot Signal Flow
-  Solenoid Operation or Valve Actuation
- Sequence of Operation



Set HOS Relief to
150 psi

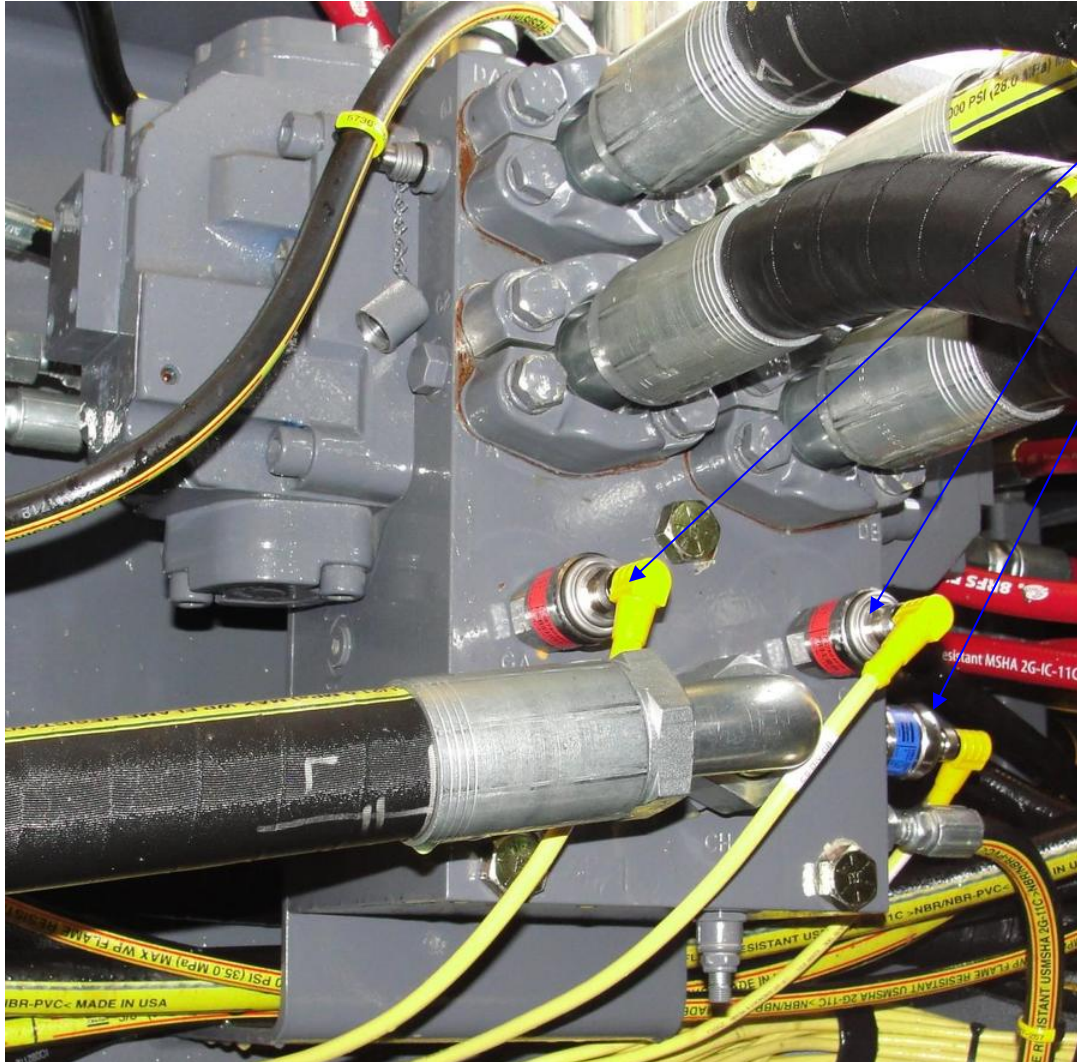


HOS Pilot
Controlled
Directional Control
Valve



Adjust HOS Relief
on bottom of
Diverter Manifolds

Hot Oil Shuttle Valve RCS 4 Sensors F2 Screen



Pump CS press A	0.0 bar
Pump CS press B	0.0 bar
Pump NCS press A	0.0 bar
Pump NCS press B	0.0 bar
Hot oil shuttle press CS	0.0 bar
Hot oil shuttle press NCS	0.0 bar
Return hyd manifold press	0.0 bar
Supercharge manifold pres.	0.0 bar
Propel brake Valve	30.6 bar
6 Spool inlet pressure	0.0 bar
Inlet pressure (7-spool)	51.0 bar
Holdback pressure	0.0 bar

Auto dust flaps active



Precision drilling



Override

Consumable

Hot Oil Shuttle/Diverter Valves

ACDS

M4.2.1

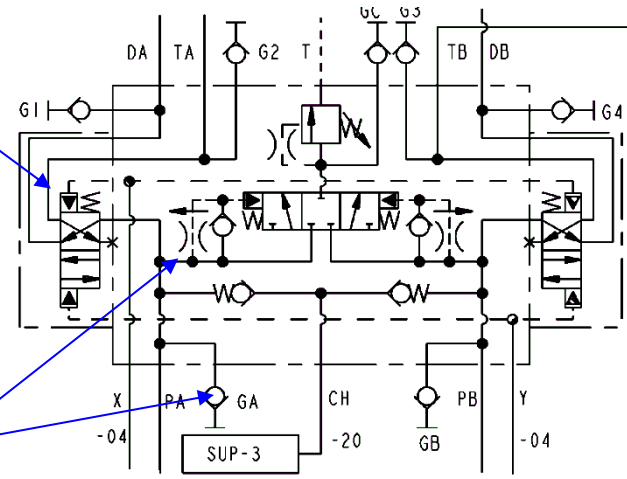
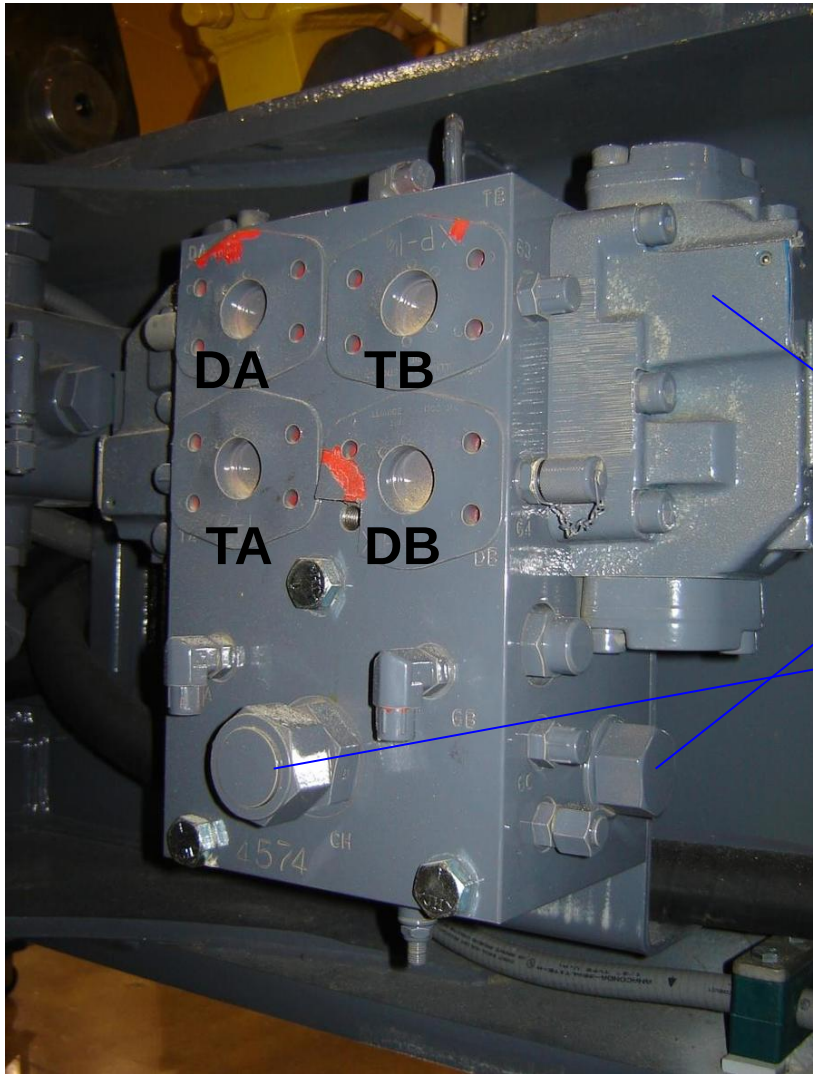
Calibration

Sensors 1

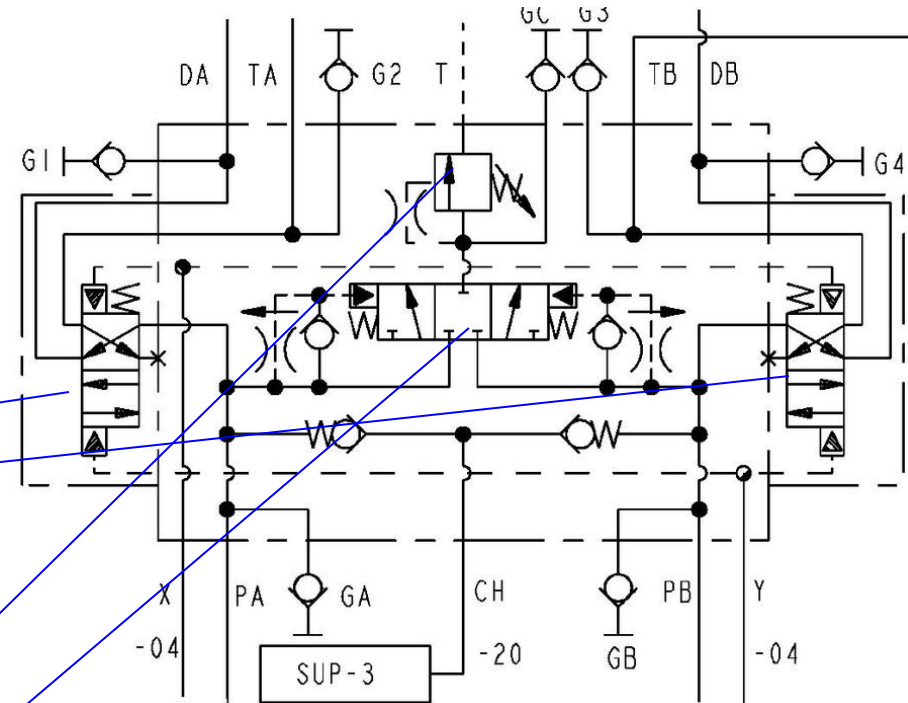
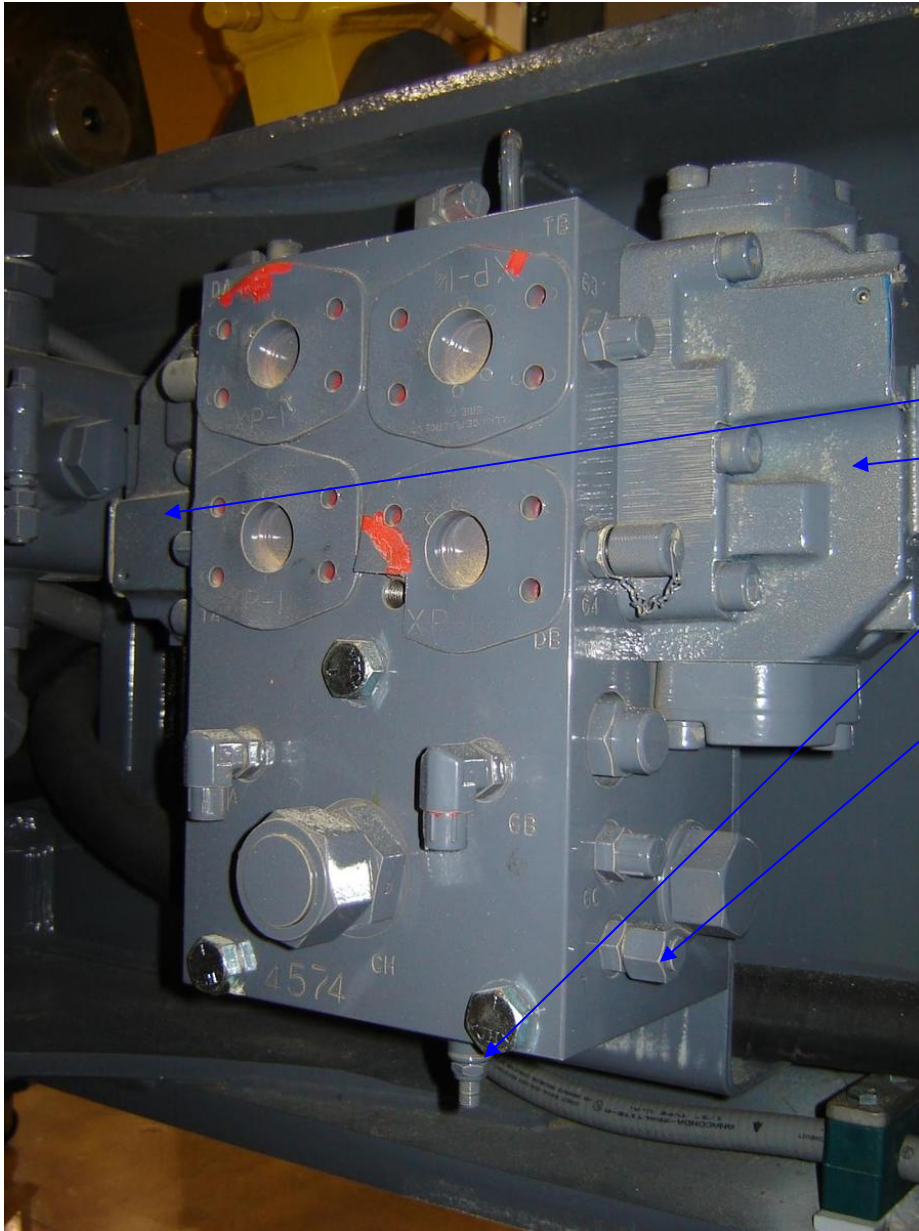
Sensor	Value	Module	Contact	Marking
Propel brake Valve	30.6 bar	D514	X4b	—
Pitch angle sensor	0.0 °	D511	X2a	—
Roll angle sensor	0.0 °	D511	X3a	—
Grease tank level	48.6 %	D512	X4b	—
Supercharge manifold pres.	0.0 bar	D512	X20b	—
Fuel tank level	11.8 %	D513	X20b	—
Pump NCS press A	0.0 bar	D514	X2b	—
Pump NCS press B	0.0 bar	D514	X3b	—
Hot oil shuttle press CS	0.0 bar	D511	X22b	—
Hot oil shuttle press NCS	0.0 bar	D514	X20b	—
Return hyd manifold press	0.0 bar	D514	X21b	—

Esc

Diverter Manifolds

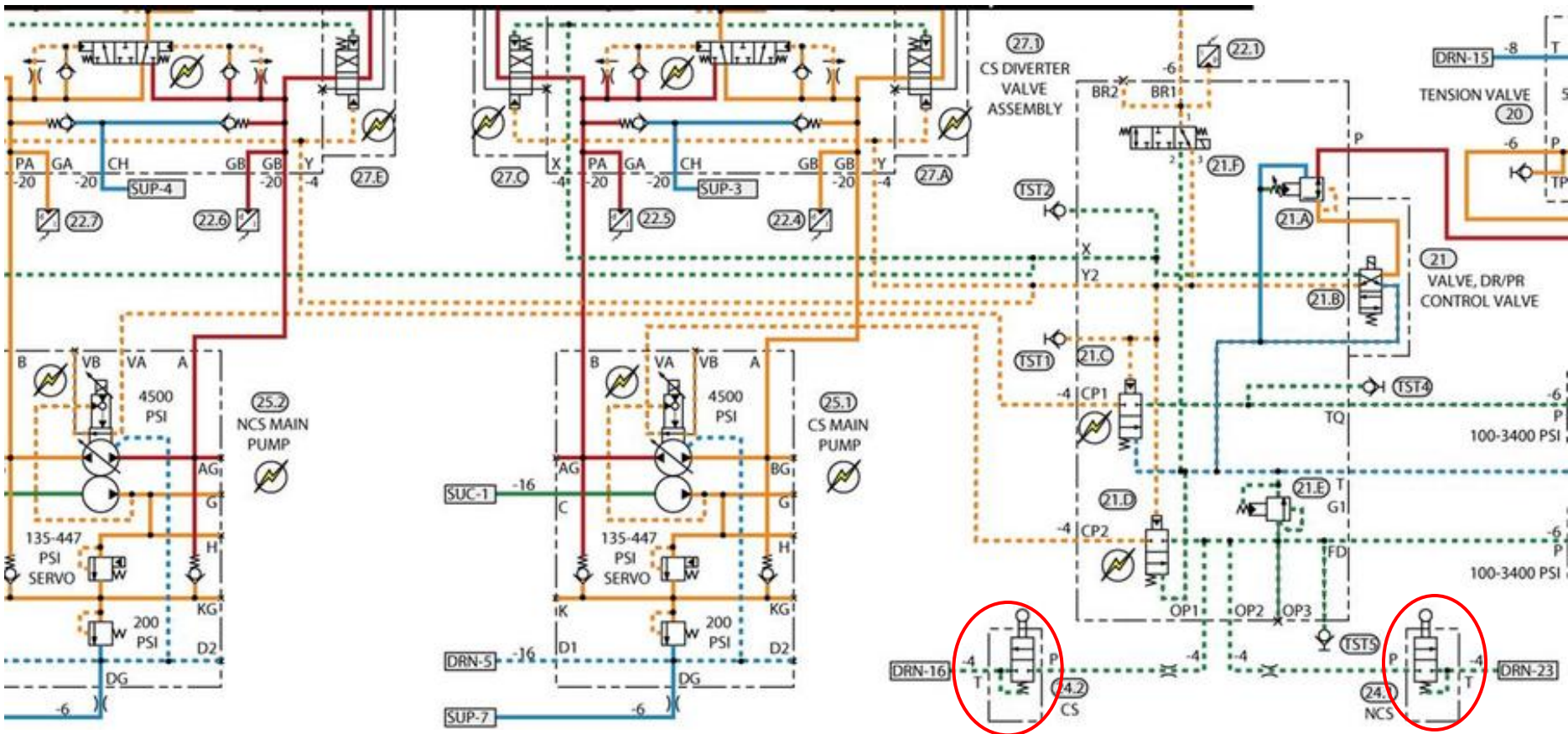


Hot Oil Shuttle/Diverter Valves

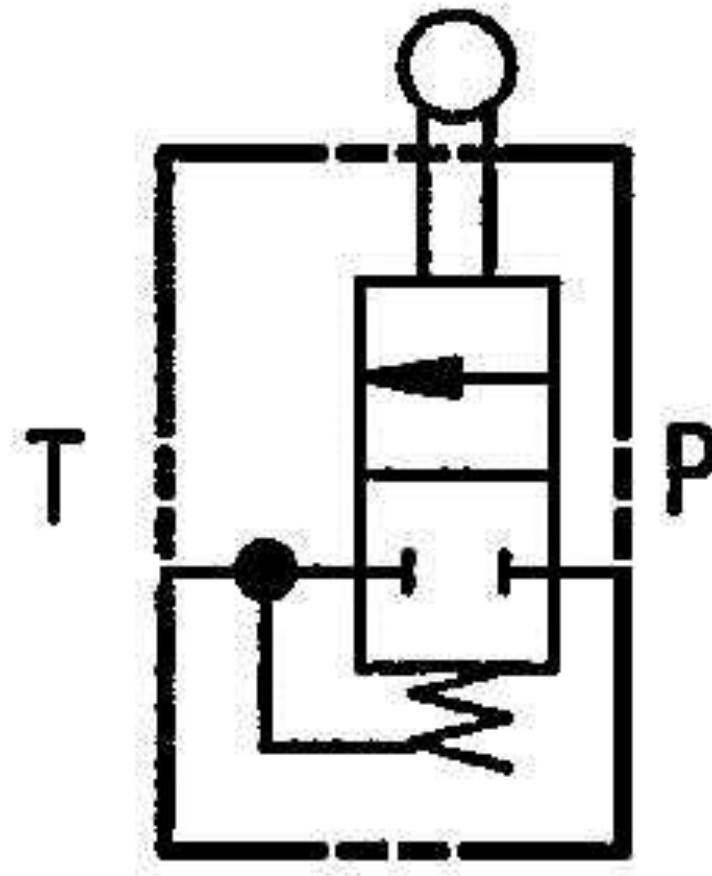


Install a calibrated gauge and set the relief valve close to 180 PSI. the minimum flow must be 4 GPM

Two Way Valve - Over Pressure Controls



Two Way Valve - Over Pressure Controls



Over Pressure System Test

**Do not test the Overpressure Control System with drill pipe or drill bit against the ground.
Only test the system with the rotary head against the lower tower stops.**

Step One:

Level the drill with the tracks about 1 – 2 inches off the ground. The drill weight must be fully supported by the leveling jacks.

Step Two:

Raise the tower and pin in vertical position.

Step Three:

Feed the rotary head down against the bottom stops of the tower.

Step Four:

Slowly increase pulldown pressure to 1200 psi.

Step Five:

Slowly lift the cab side leveling jack off the ground. Feed pressure must vent immediately when the jack pad is lifted.

The rotary head will normally travel upwards slightly when pressure vents.

If pressure vents immediately, go on to step six.

If feed pressure does not vent, reduces system pressure with the feed controls, re – level the drill and contact your supervisor for system repairs immediately.

Step Six:

Repeat steps 4 and 5, this time raising the DCS jack slightly. If pressure vents when jack pad is lifted slightly off the ground, the system is working.

Overpressure Control Valve



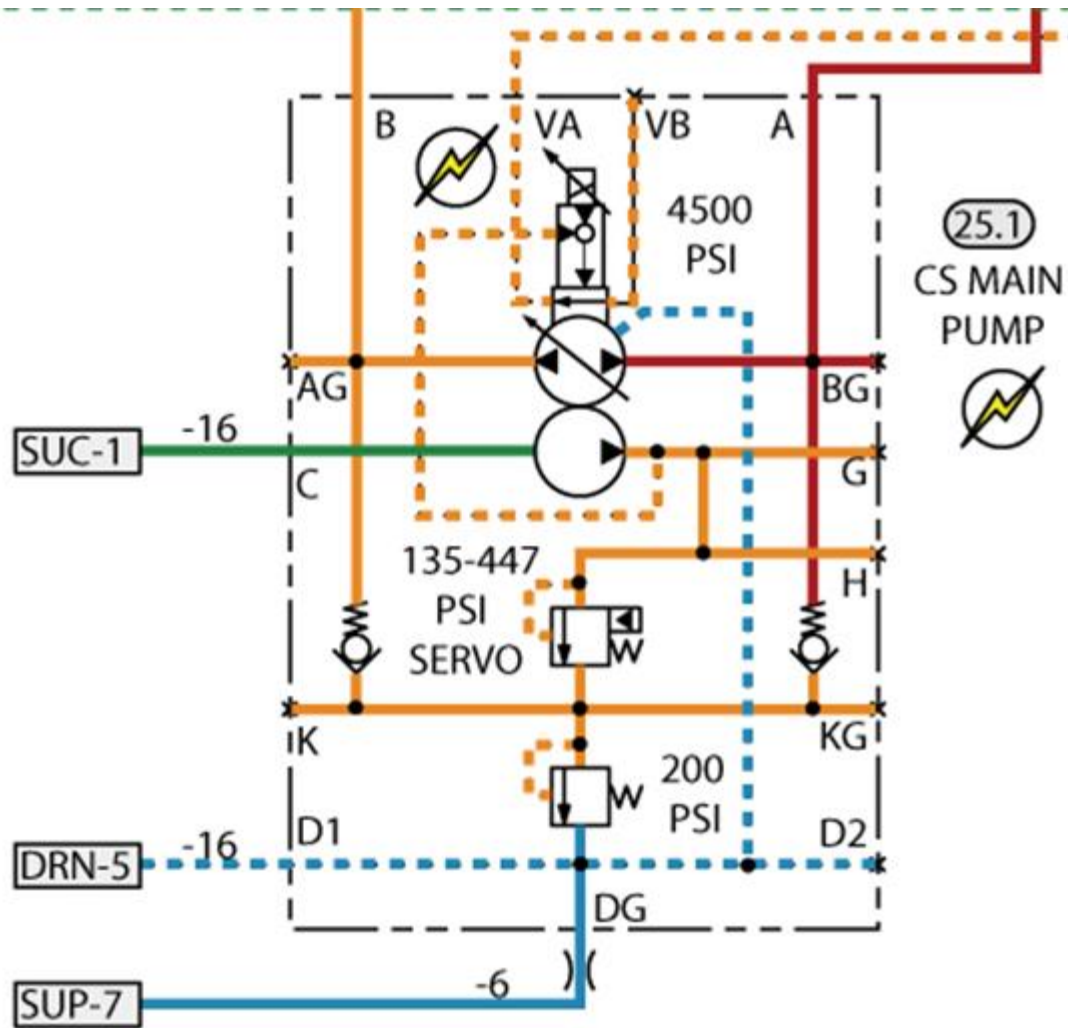
BOM 57501991

57501991 CONTROLS,OVERPRESS.ELEC

REF.	PART NO.	QTY	UNIT	DESCRIPTION
001.0	50429356	2.0	EA	VALVE,2-WAY
002.0	50429455	2.0	EA	BRACKET, VALVE
003.2	95365086	4.0	EA	CONNECTOR,STRT THRD
005.4	57036618	1.0	EA	HOSE ASSY
006.5	52225877	1.0	EA	HOSE ASSY
007.1	57020802	1.0	EA	HOSE ASSY
008.1	57020828	1.0	EA	HOSE ASSY

Atlas Copco

CS Hydraulic Main Pump



Feed Circuit

The feed system operator interface and remote controls consist of several components.

They are:

CS Main Pump (electrically actuated)

Drill/Propel Valve (electrically actuated)

Proportional Control Valve (electrically actuated)

Control pressure two way valves (hydraulically actuated)

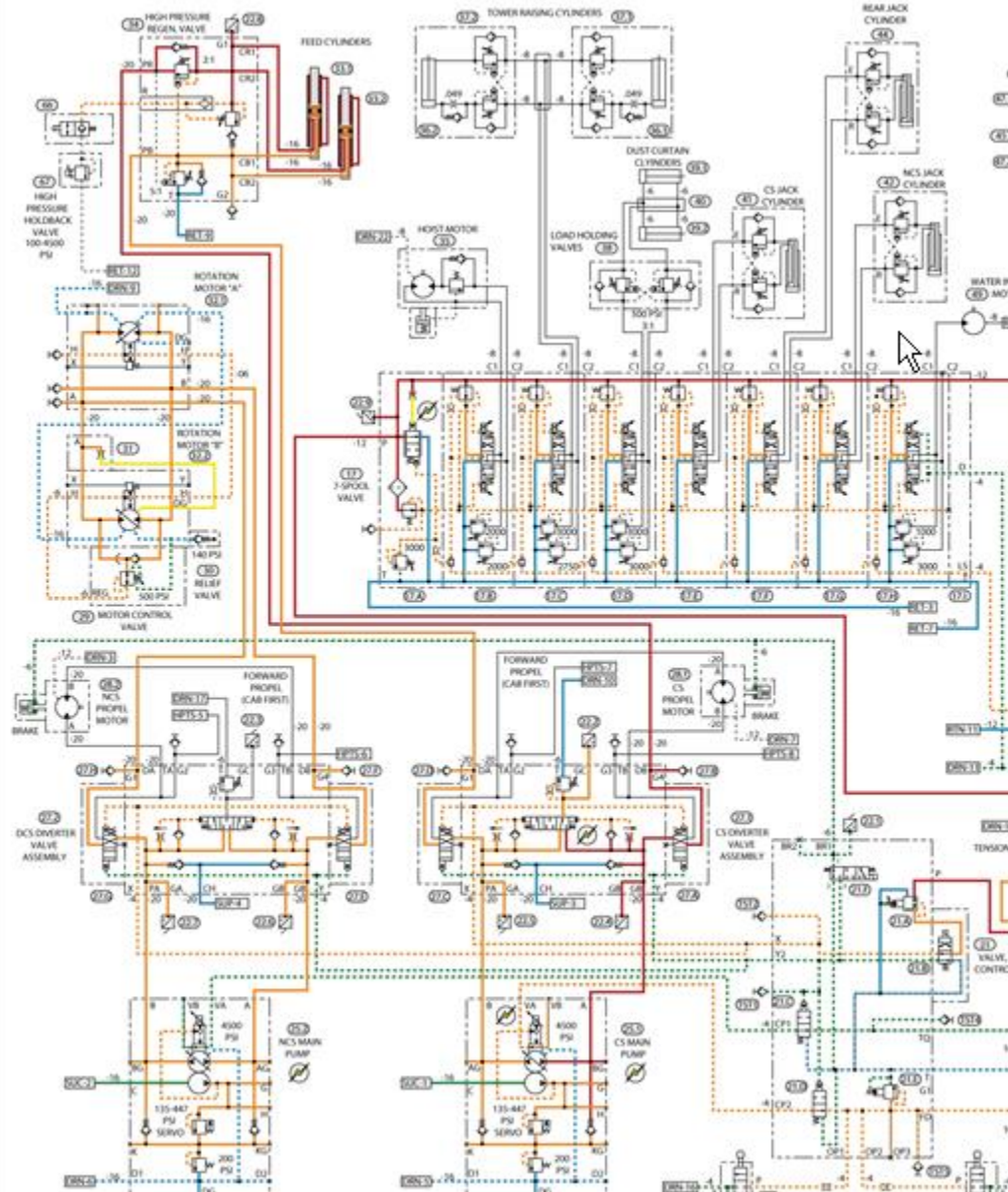
Overpressure Control valves (manually actuated)

Electrical controller on console (manually operated by driller, EOH) or right operator control panel for RCS drills (potentiometer).

We have already discussed the main pumps, Regen or Feed system control valve, and feed cylinders. Now we must cover the control devices that function at the command of the operator, as well as the devices that are independent of the operator and protect the system from overpressure.

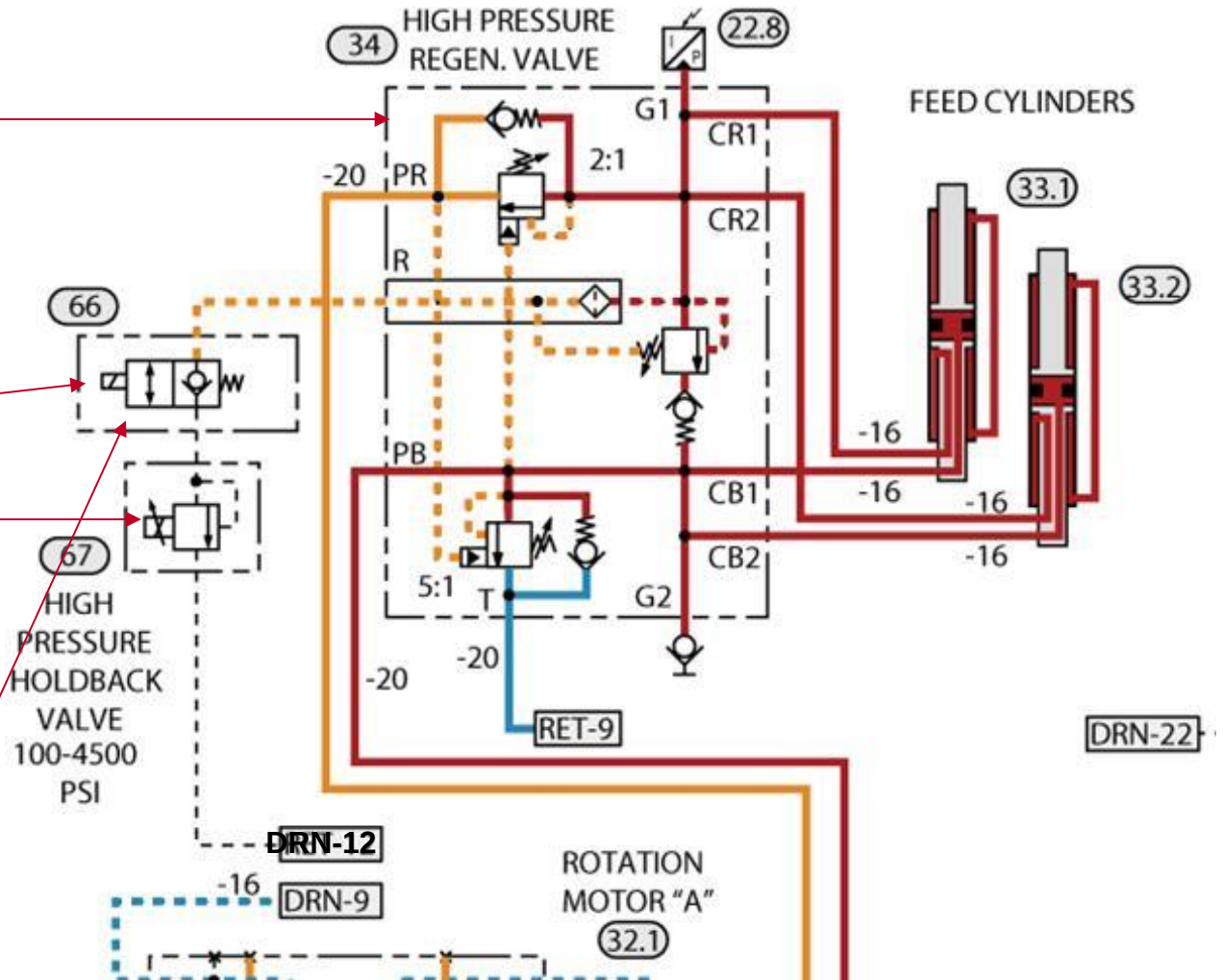
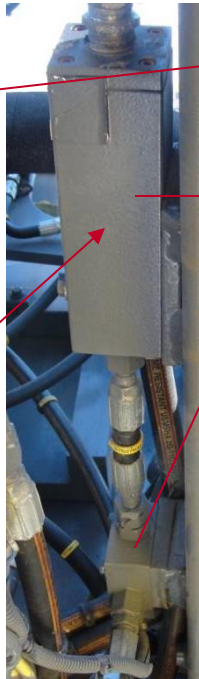
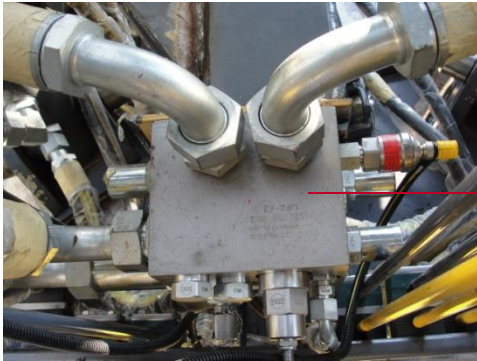
As stated earlier, the main pump has a hose connected to the “VA” port. This is the compensator vent port. This hose is used to connect a remotely located controller for the “A” side of the compensator. The remote device is the Proportional Pressure control valve. Often called the FEMA valve.

Feed Circuit



Feed Up Mode

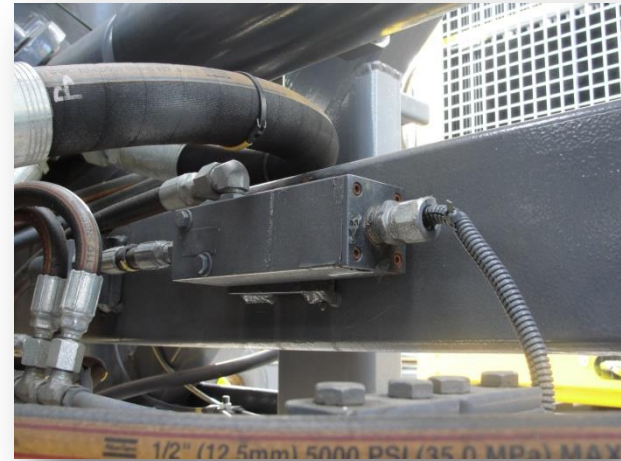
Feed Cylinders and Regen Valve HP



Holdback pressure

0.0 psi

FEMA Valve Settings



M5.3.2

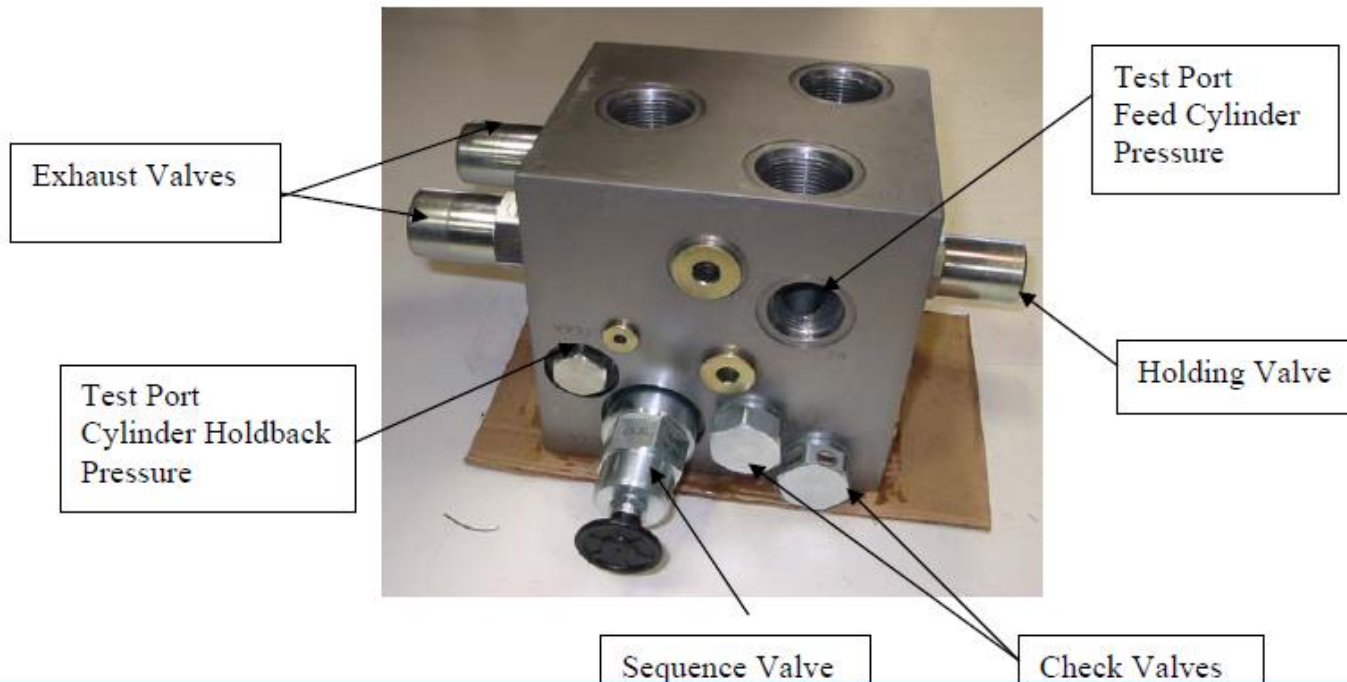
Feed pressure

Drill feed pressure DC, min	45 mA
Drill feed pressure DC, max	350 mA

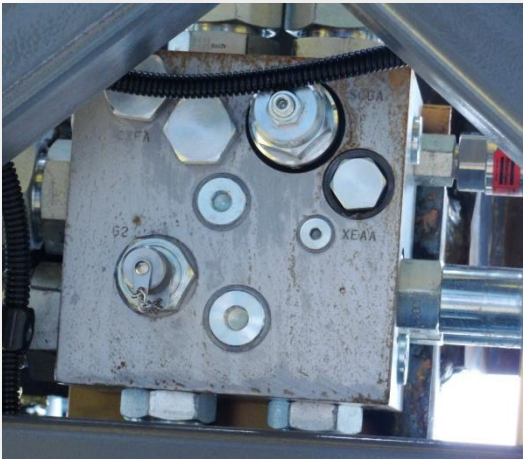
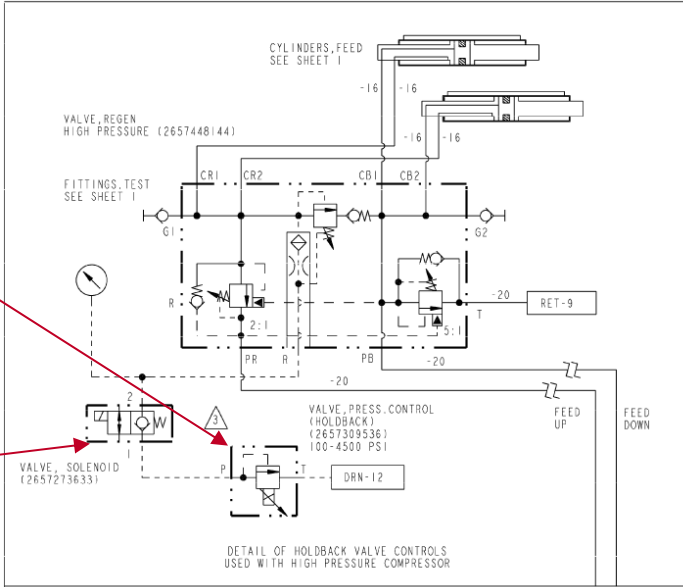
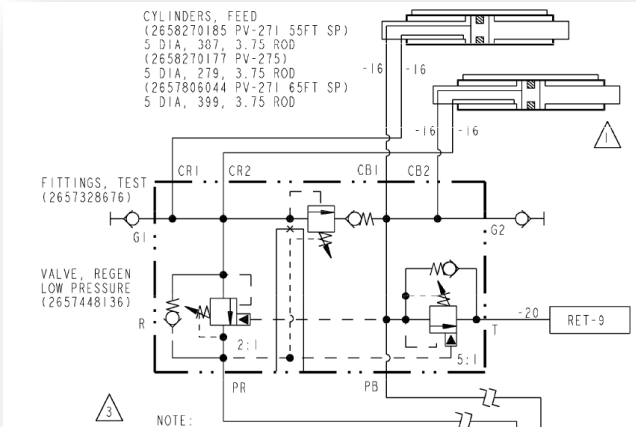
RCS 4 Screen M5.3.2

16.8. FEED SYSTEM CONTROL VALVE (For Low Pressure Units)

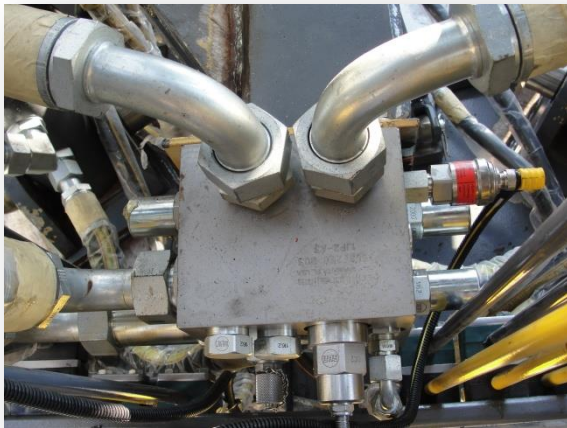
- ____ / ____ 1. Install a test gauge in the cylinder feed pressure test port. With the rotary head moving slowly down the tower (2 to 10 feet/min), adjust the sequence valve until the test gauge reads 700-psi. Lock the adjustment in place.
- ____ / ____ 2. Adjustment should not normally be required. Screw in as required on the sequence valve adjustment (1 turn at a time) only if the rotary head has a tendency to drift with the feed control lever in neutral.



Feed Cylinders and Regen Valve

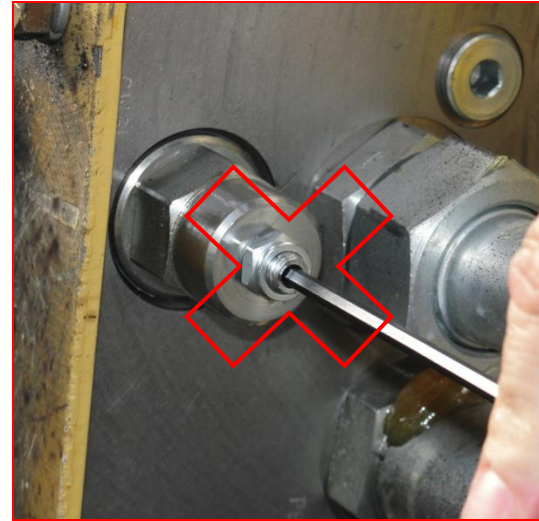
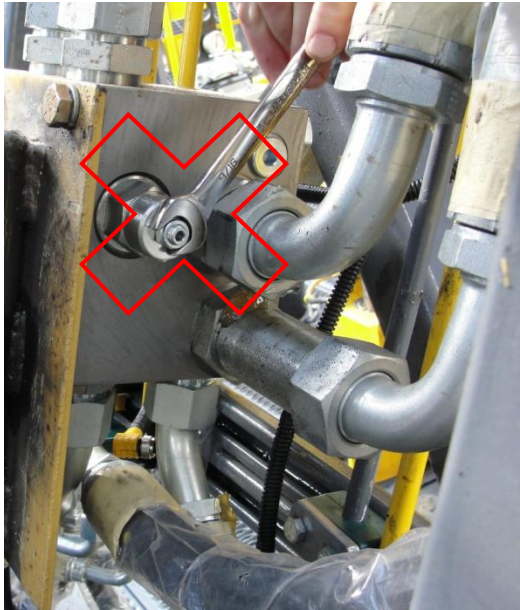


LP Regen Valve



HP Regen Valve

Feed Cylinders and Regen Valve HP Holding Valve Adjustment



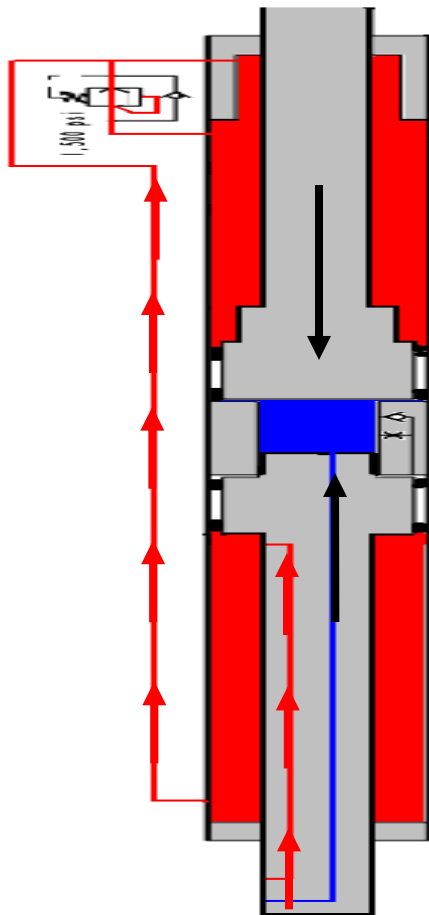
MS 1.1

Calibration

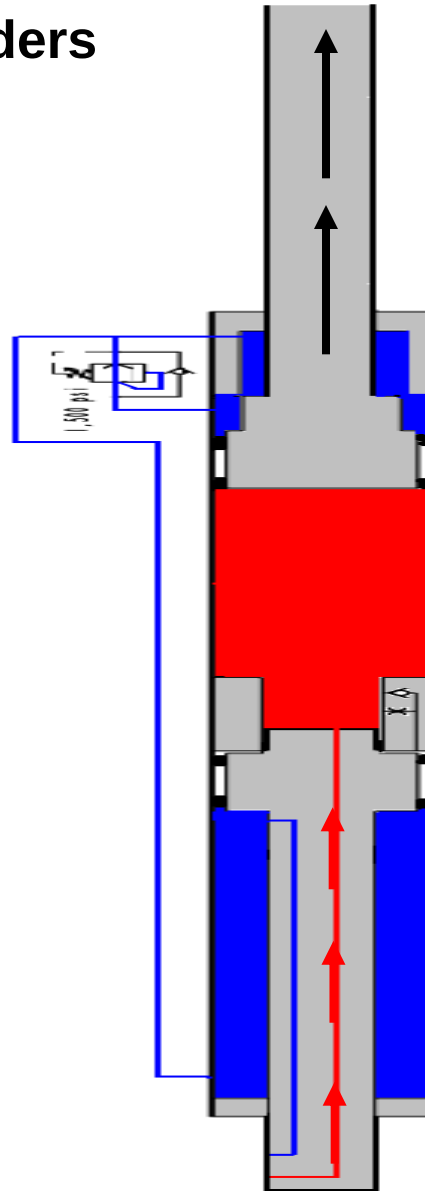
Sensor	Value	Set to zero	Coefficient	Offset
Head displ. encoder	34.08 ft	☐	-0.00178	28
Bit speed	0.0 RPM	☐	0.042	1689
Lower tower lateral vibr.	0.2	☐	0.122	266
Water tank level	0.0 %	☐	0.029	368
Holdback pressure	4899.2 psi	☐	0.415	102
Fan motor inlet pressure	3638.3 psi	☐	0.428	102
Inlet pressure (7-spool)	385.8 psi	☐	0.429	182
6 Spool inlet pressure	0.0 psi	☐	0.428	102



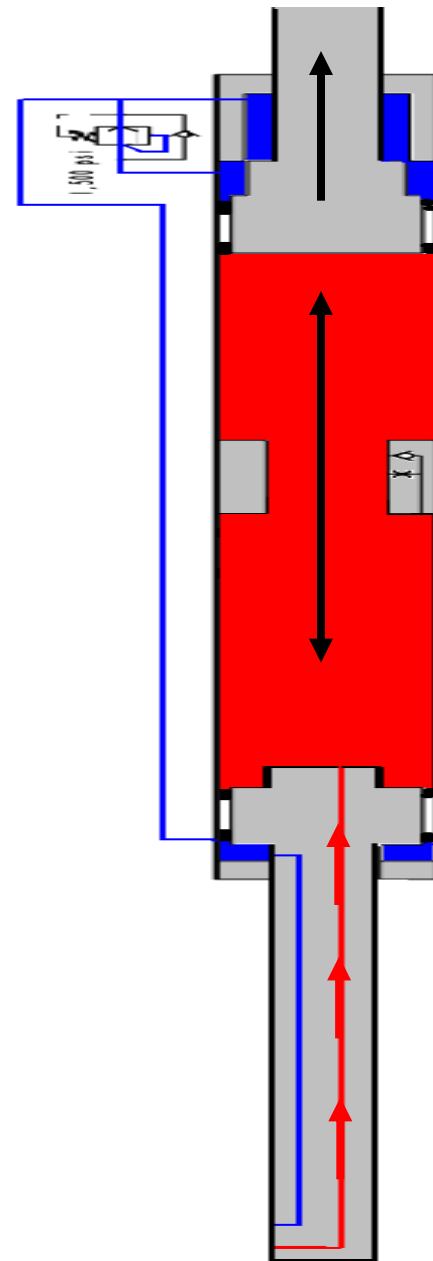
PV 275 Feed Cylinders



Retracted

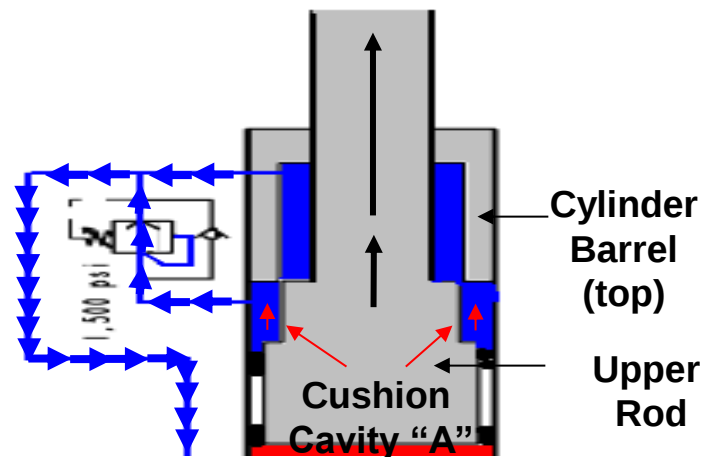


Upper rod extended



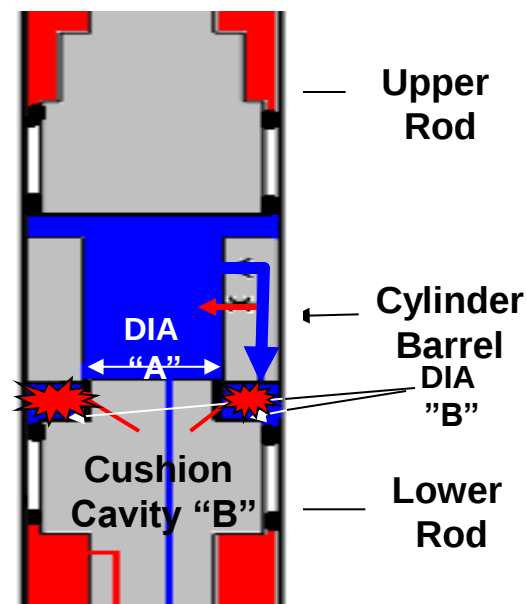
Upper rod and
cylinder extended

When upper rod piston reaches top of cylinder barrel/tube, oil is compressed in Cushion Cavity "A" and has to overcome the 1500 psi setting of the sequence valve and in so acting as a cushion valve.

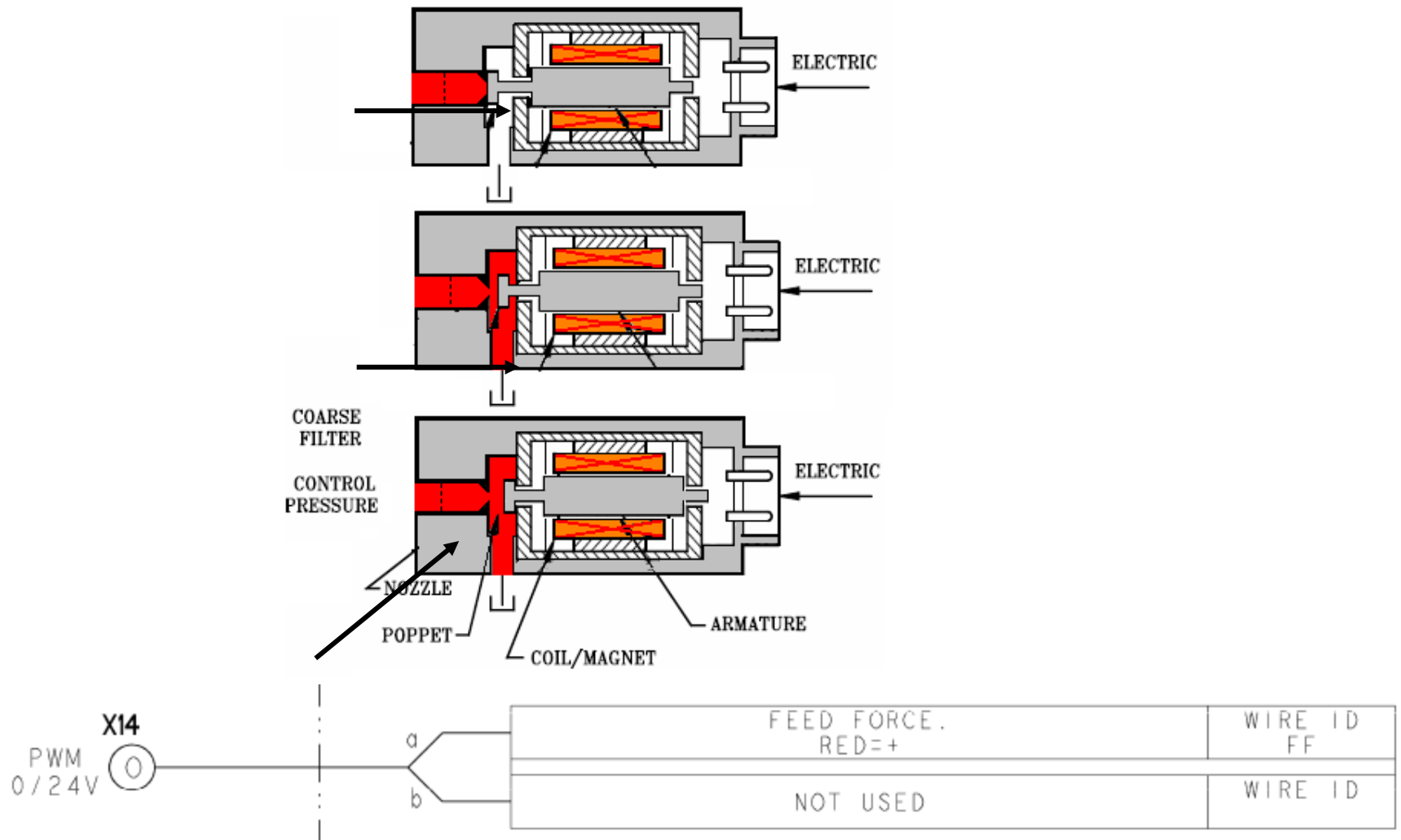


When fluid becomes trapped in "Cushion Cavity B" oil is forced through the orifice and acts as a cushion valve when the cylinder is in retracting.

When the cylinder starts extending and the top and bottom pistons are against the stops the initial flow now goes over the check valve and equalizes pressure/forces being applied on both faces of DIA "A" and DIA "B" of the bottom piston.

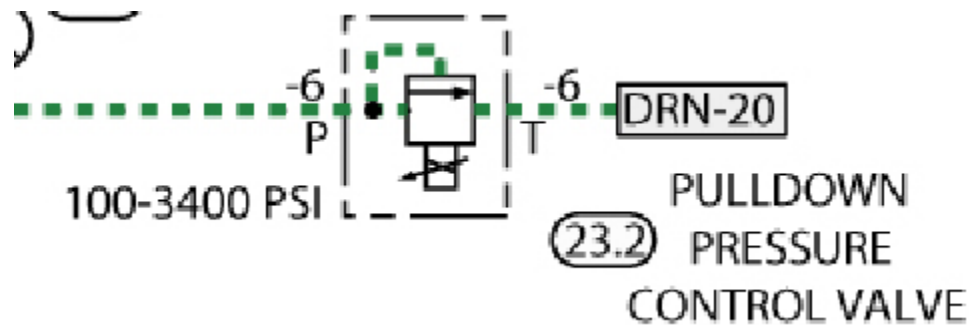
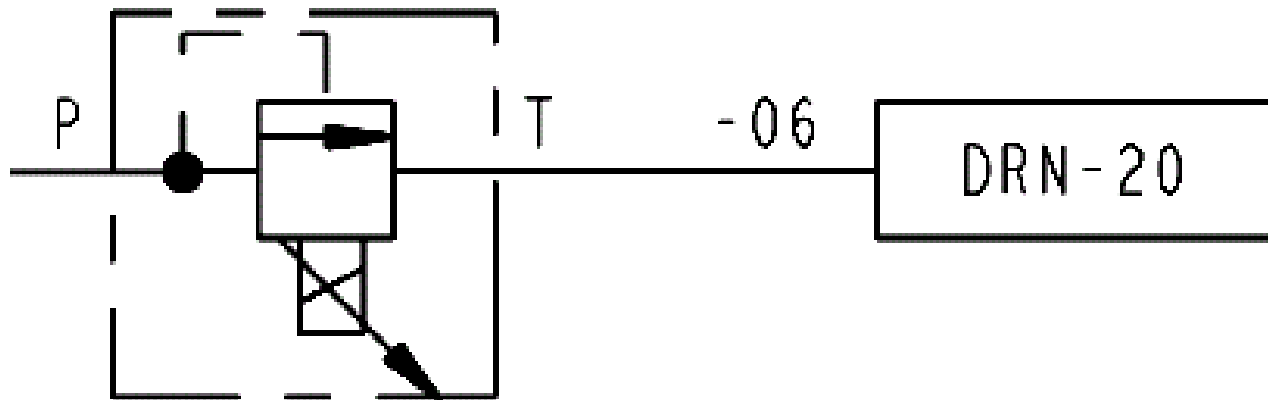


Proportional Remote Control Valve-Cross Section

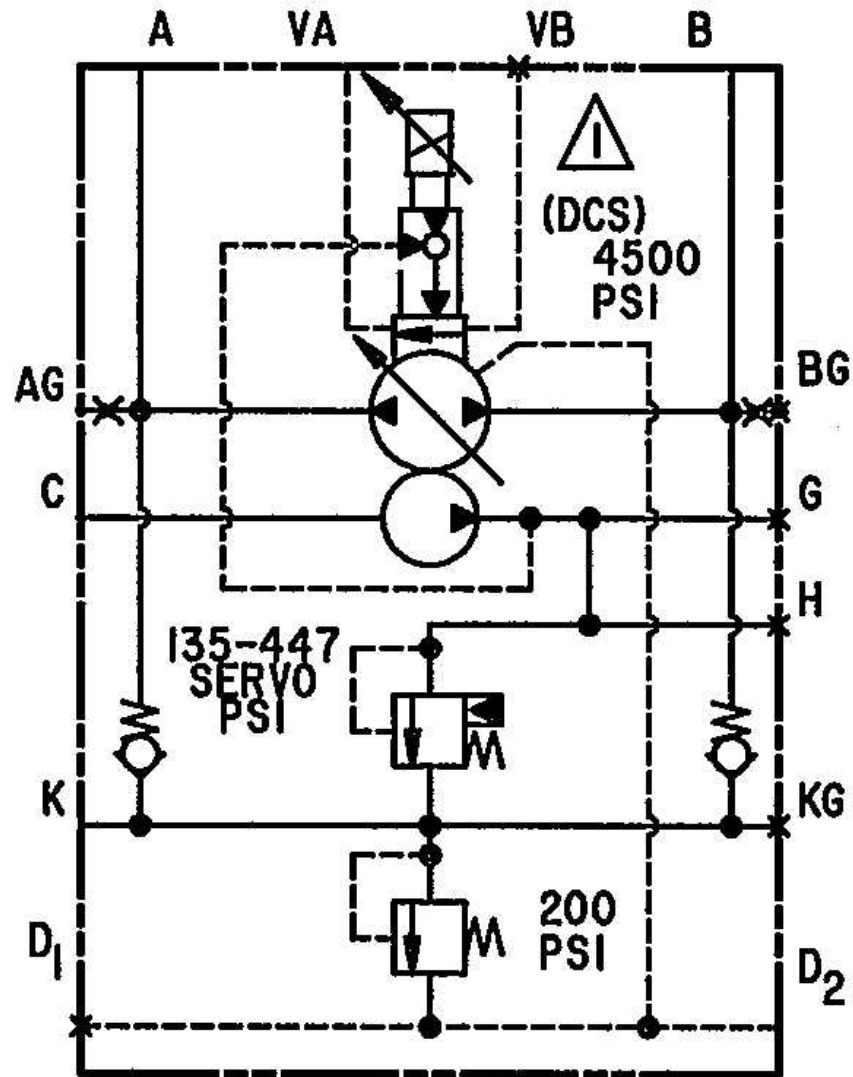


Pulldown Control Valve

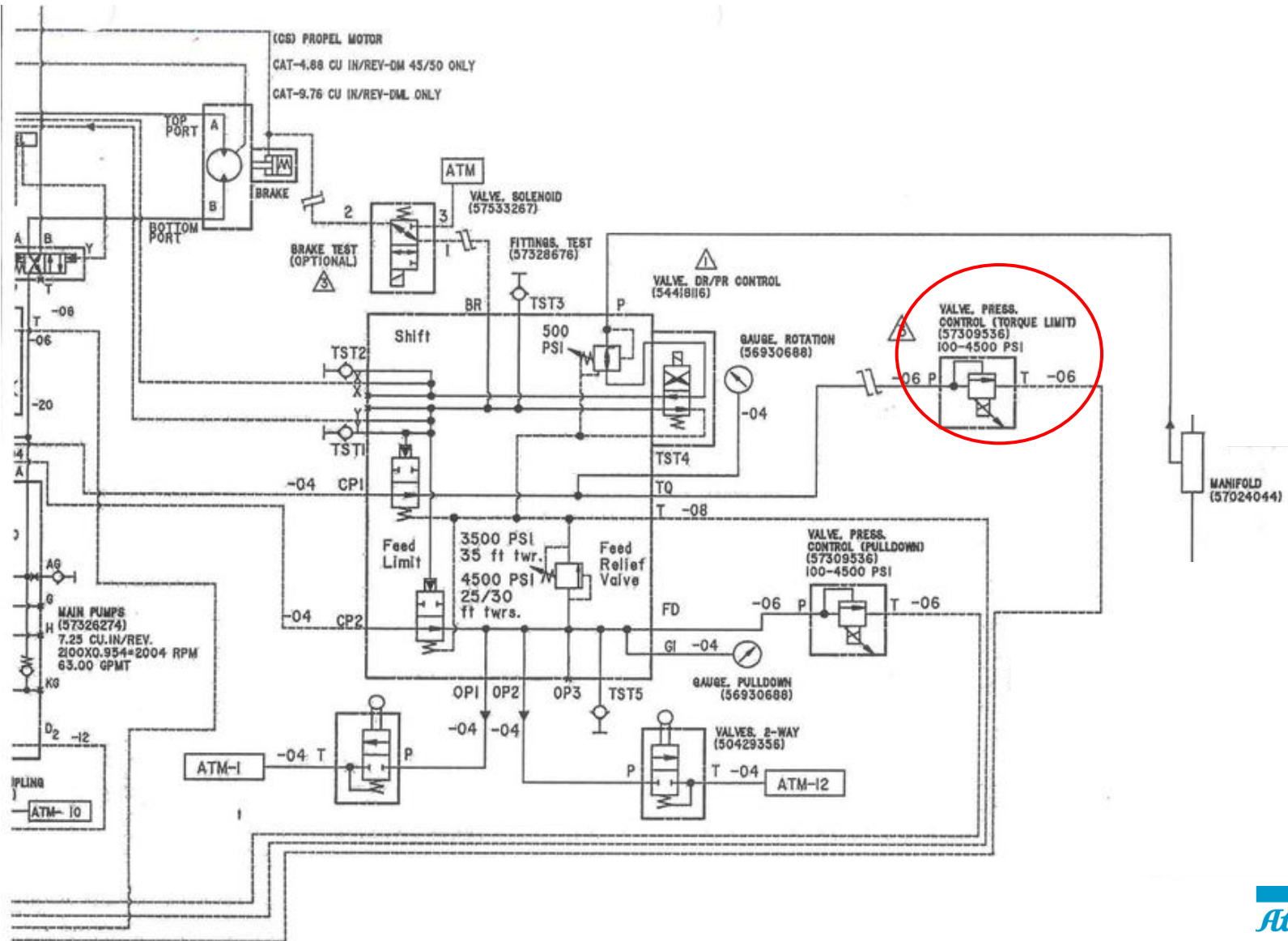
VALVE, PRESS. CONTROL (PULLDOWN)
(2657309536)
100-3400 PSI



DCS Hydraulic Main Pump



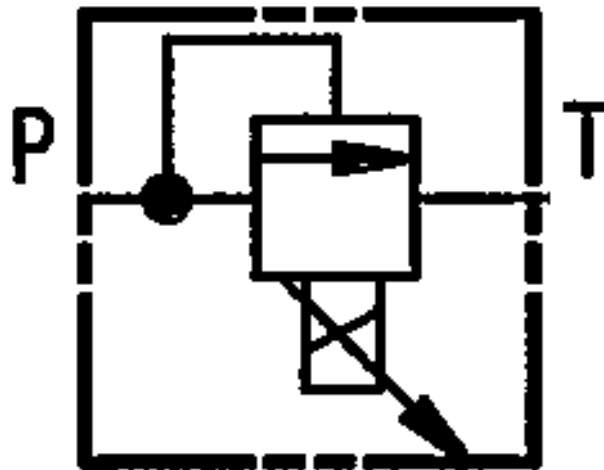
Drill/Propel Valve - Torque Limit Control



Torque Limit Control Valve

(FEMA VALVE)

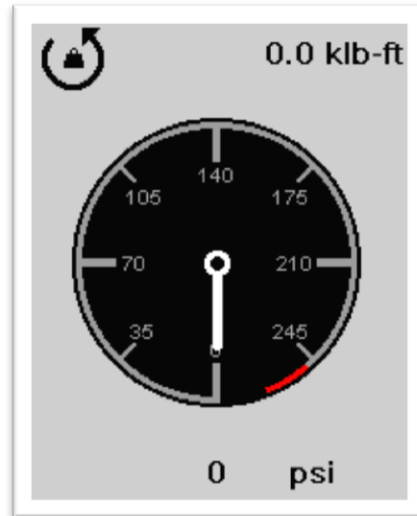
**VALVE, PRESS.
CONTROL TORQUE LIMIT
(57309536)
100-4500 PSI**





Rotation Torque Limit FEMA RCS 4

Proportional Rotational Pressure Control Valve

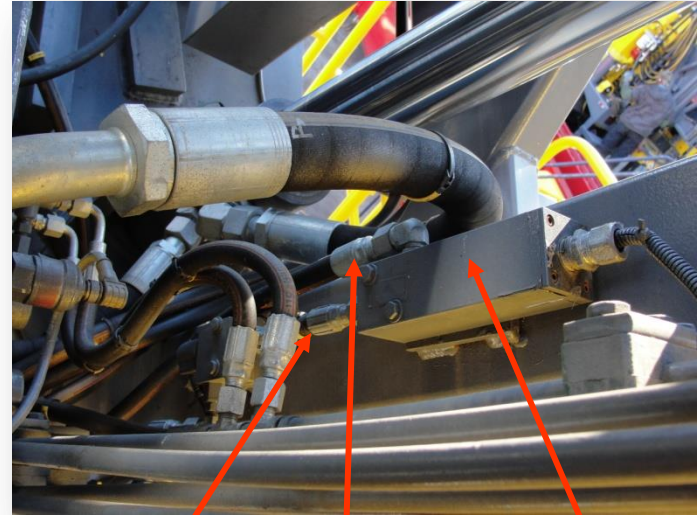
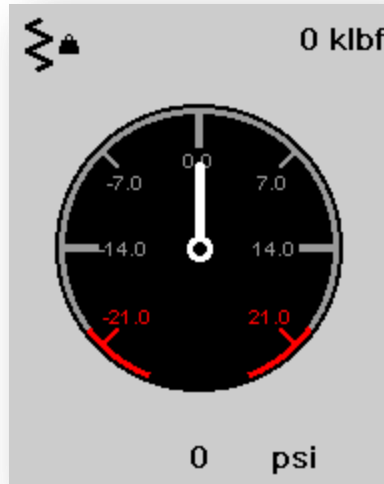


Torque Limit FEMA



Hold Back FEMA RCS 4

Proportional Rotational Pressure Control Valve



Pressure (C)

Hold Back FEMA

Drain-12 (T)

Holdback pressure

0.0 psi

D510

X3b

M5.3.2

Feed pressure

Drill feed pressure DC, min	45 mA
Drill feed pressure DC, max	350 mA
Hold back pressure DC, min	50 mA
Hold back pressure DC, max	500 mA

Gauge params

Rotation RPM red limit	95 RPM
Rotation speed max value	110 RPM
Bit air pressure max value	1726 psi
Feed rate max value	20 feet/min
Weight on bit red limit	20 klbf
Weight on bit max value	25 klbf
Use holdback gauge	☒
Rotation torque red limit	248 klb-ft
Rotation torque max value	268 klb-ft

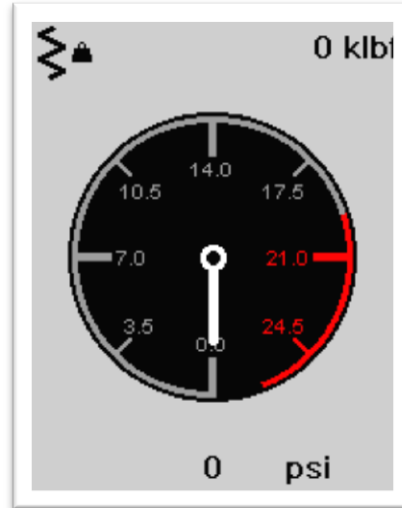
Gui params

Screen F2

Atlas Copco

Feed Pressure Pull Down FEMA RCS 4

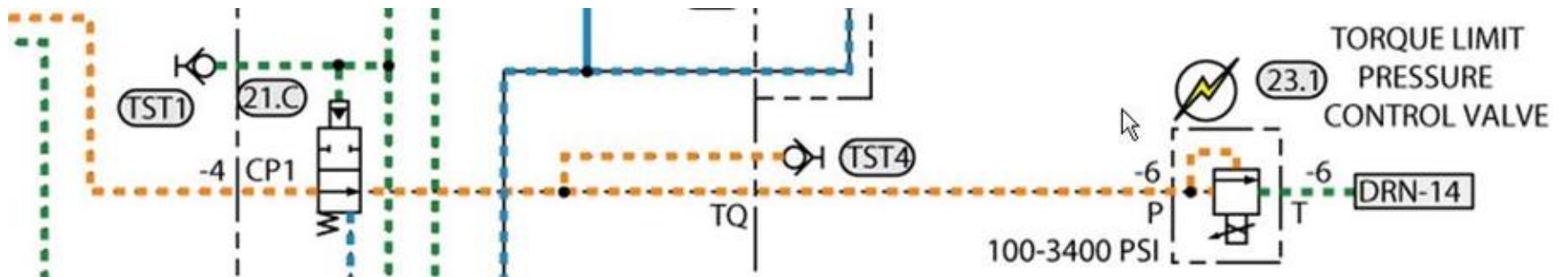
Proportional Rotational Pressure Control Valve



Pull Down FEMA

Rotation Torque Limit FEMA

Proportional Rotational Pressure Control Valve



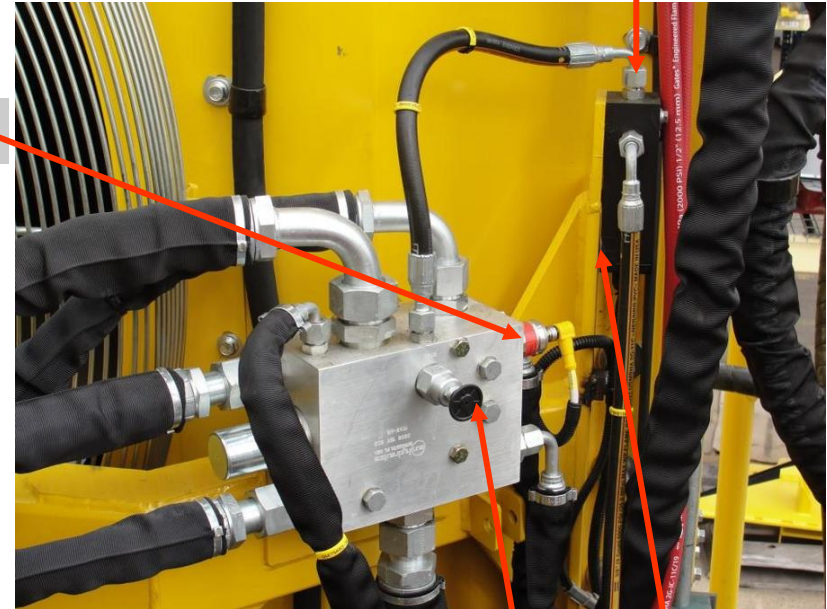
Fan FEMA RCS 4

Proportional Rotational Pressure Control Valve

Fan motor inlet pressure	0.0 psi	D513	X21b
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Screen M5.1

Compressor Type	Main Fan Speed ± 50 (RPM)
XL1900	1000
XL2600	1200
HP1450	1175



C Port

Fan FEMA

Fan RPM Relief Adjustment

M4.4.3.1

Fan Control

Min current cooling fan

50 mA

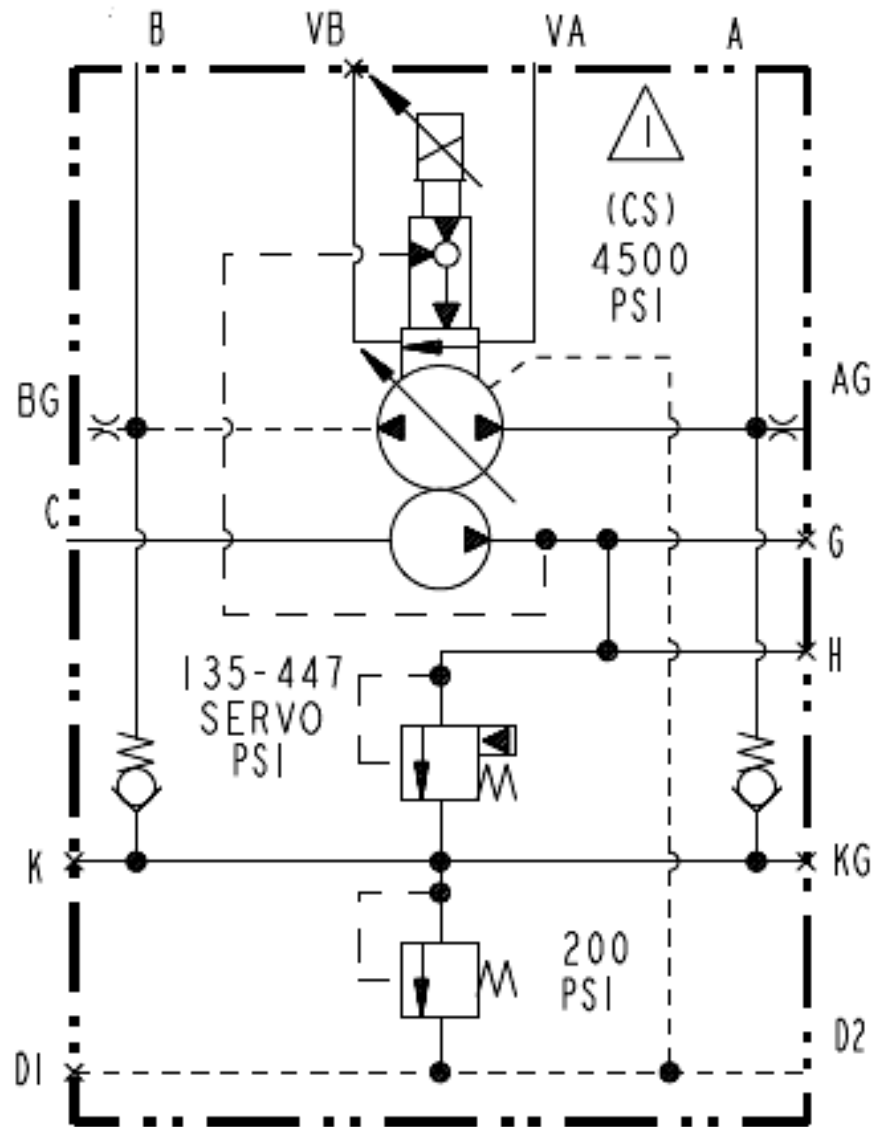
Max current cooling fan

510 mA

Filter Constant

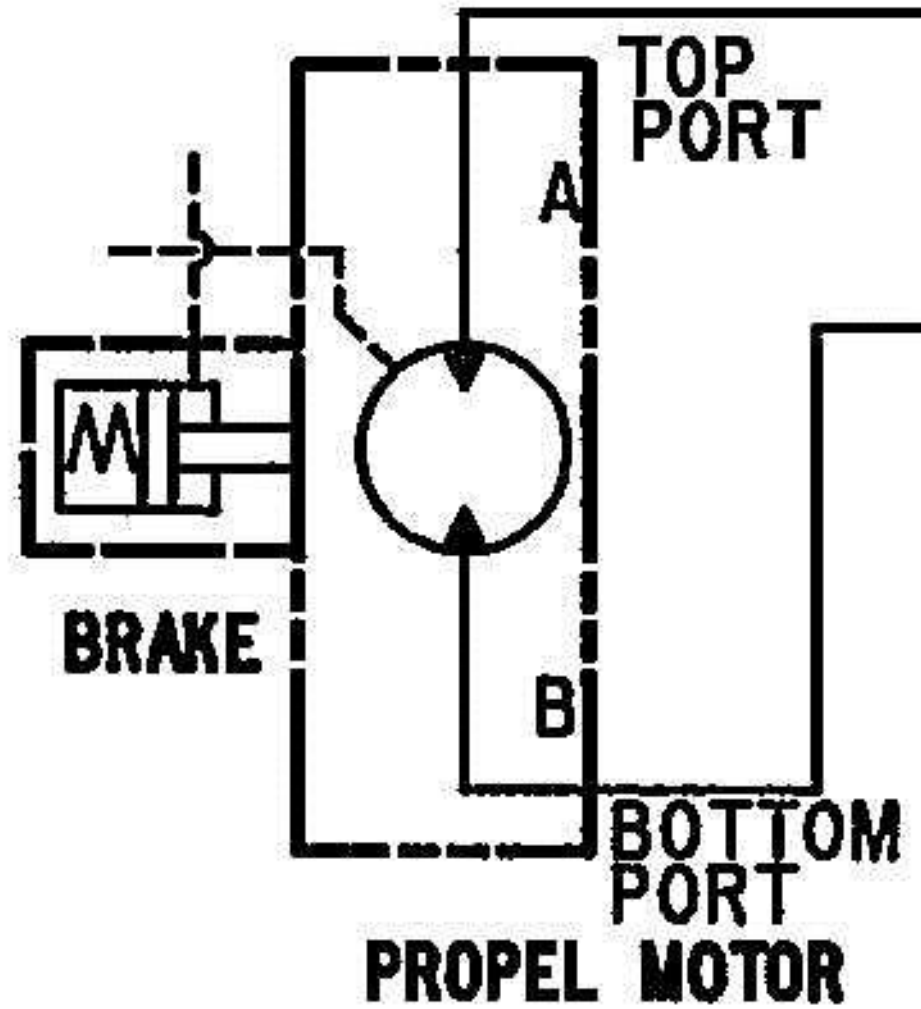
0.10

Main Hydraulic Pumps



Propel Circuit

Propel Motor



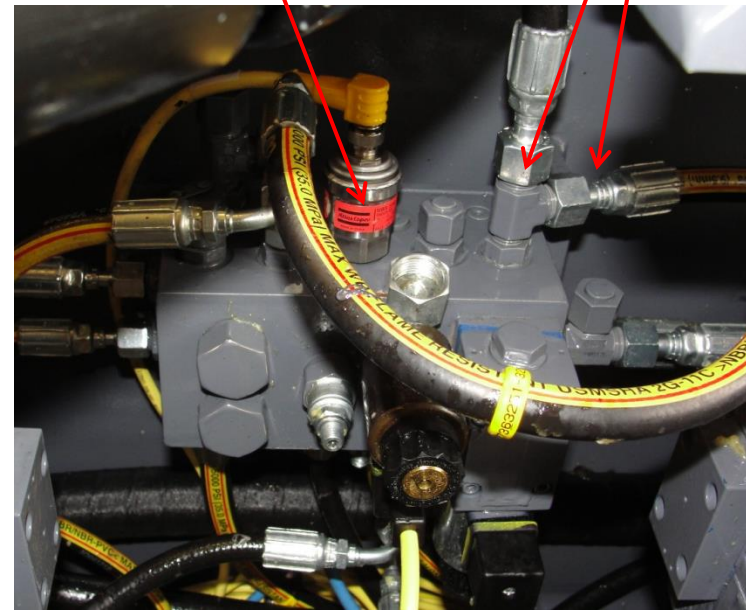
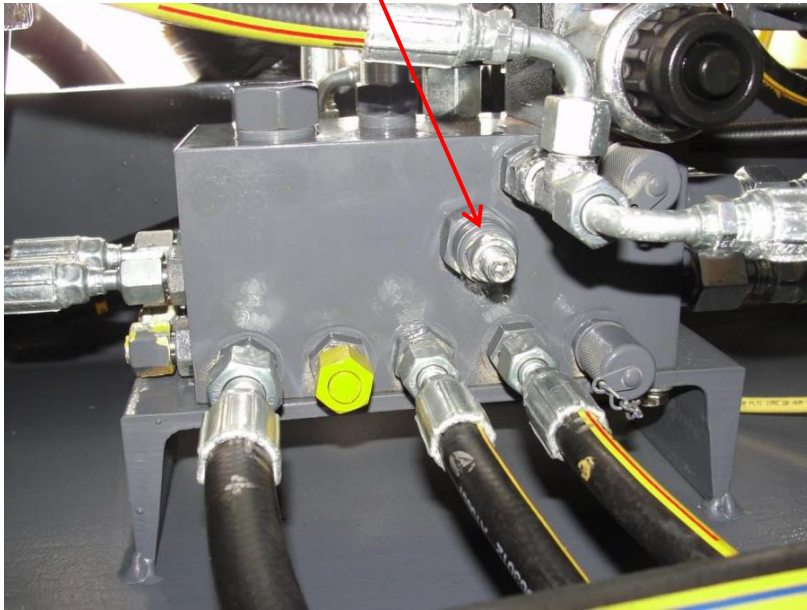
DR/PR Manifold Brake Adjustment Pressure Setting

Adjust with Allen
Wrench until
gauge reads to
500 psi here

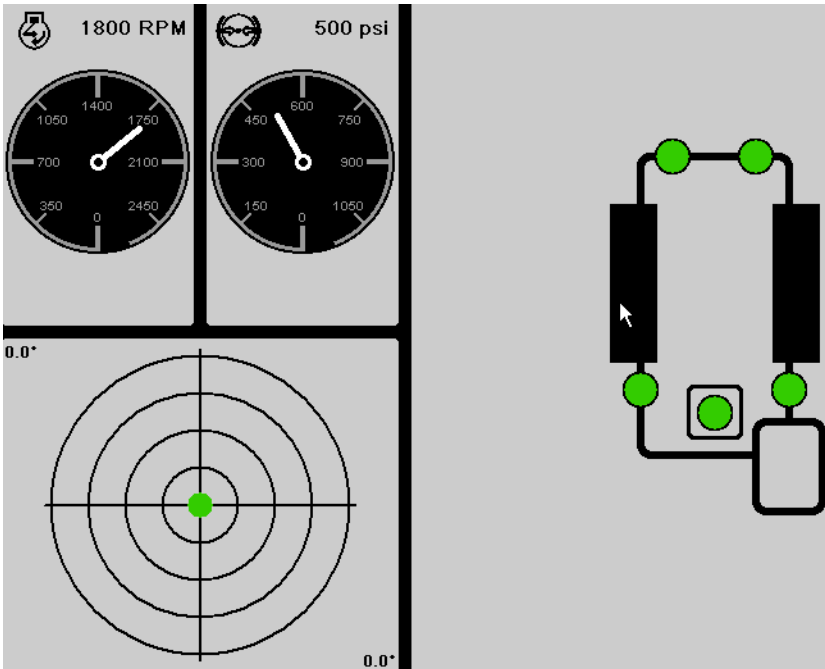


Remove Sensor
and Insert 600 psi
gauge

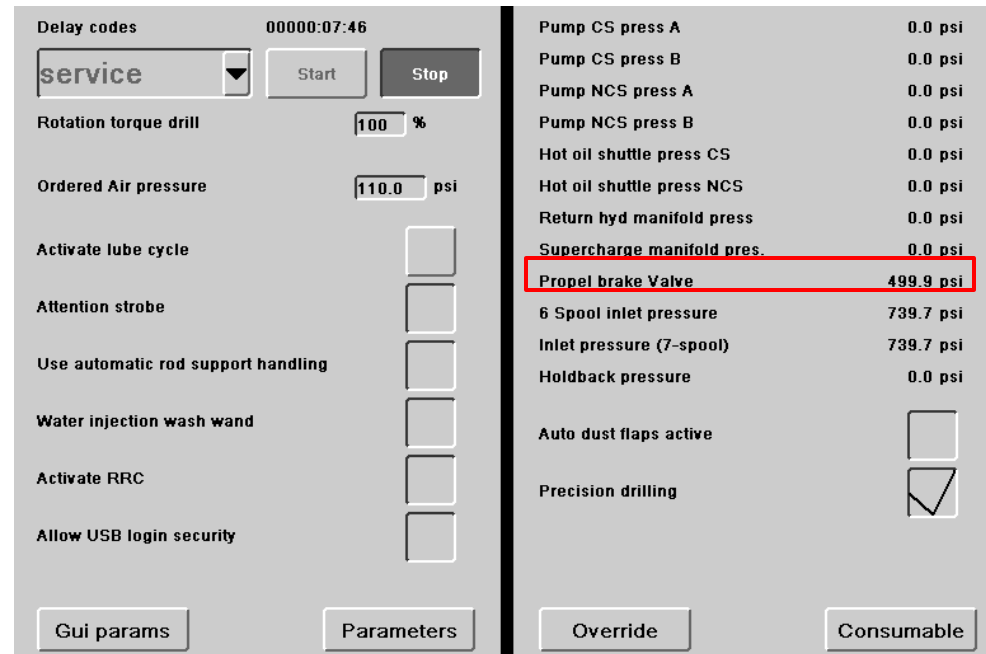
Plug and cap
lines/T ports here
or plug pilot lines
at propel motors



DR/PR Manifold Brake Adjustment Pressure Setting



Screen F1



Screen F2

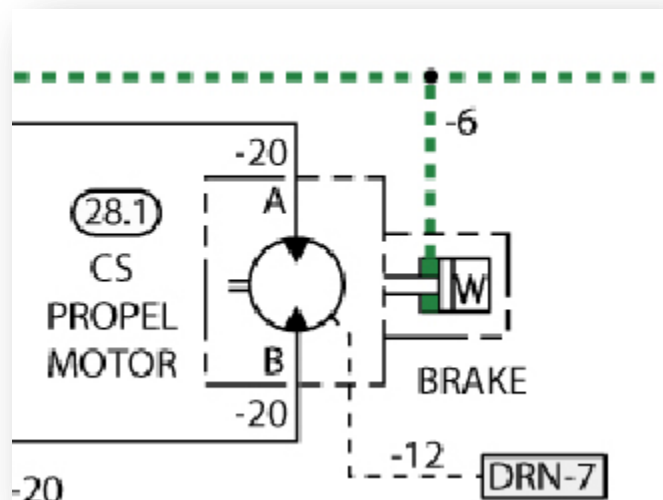
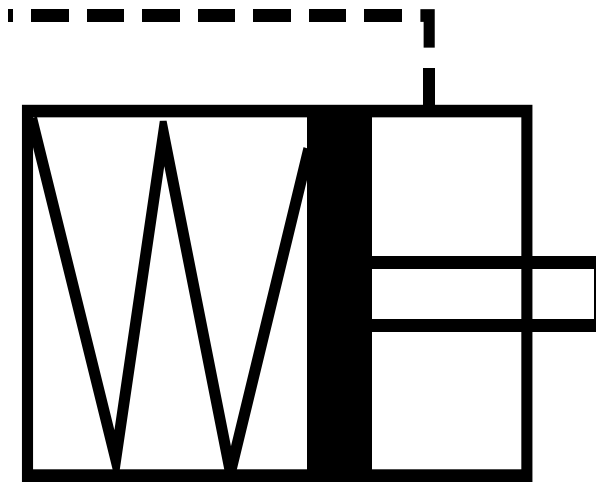
M4.2.1.1

Calibration				
Sensor	Value	Set to zero	Coefficient	Offset
Propel brake Valve	499.9 psi	☐	0.061	98

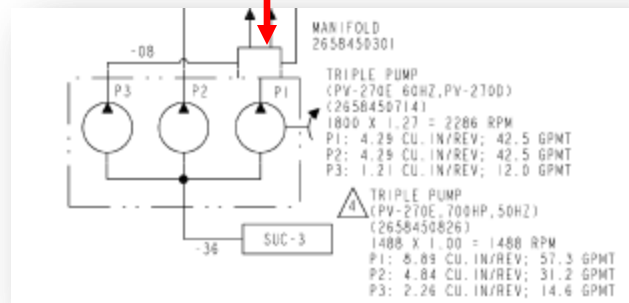
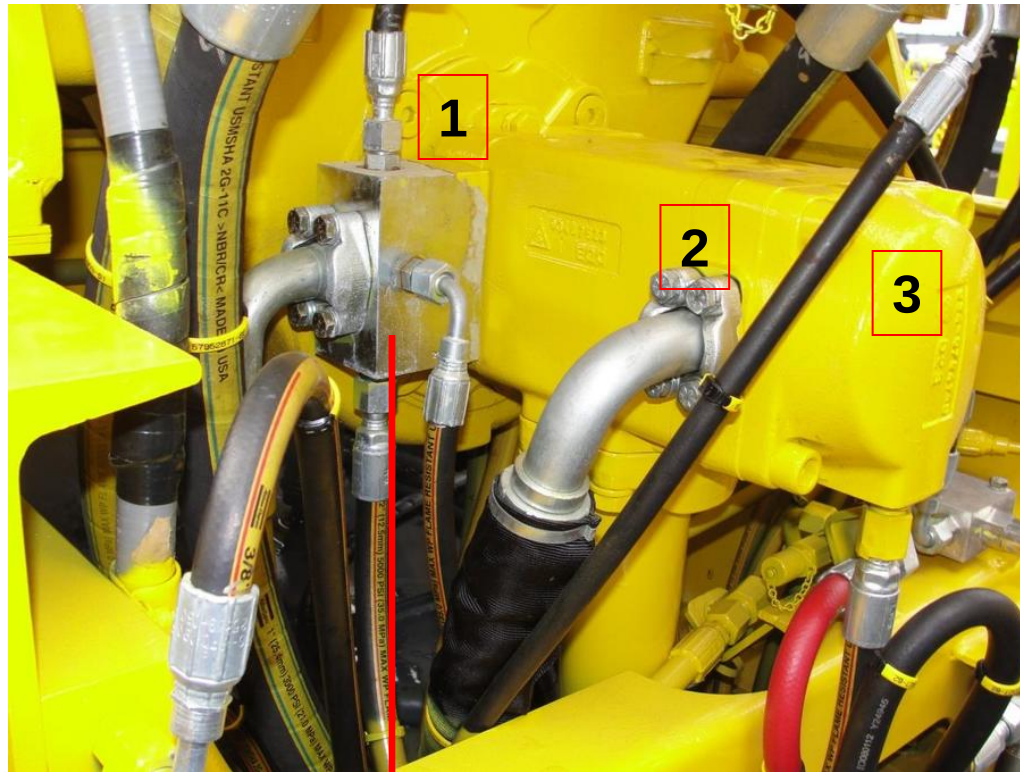
**Cap pilot
line CS, -06
line here
and on NCS**



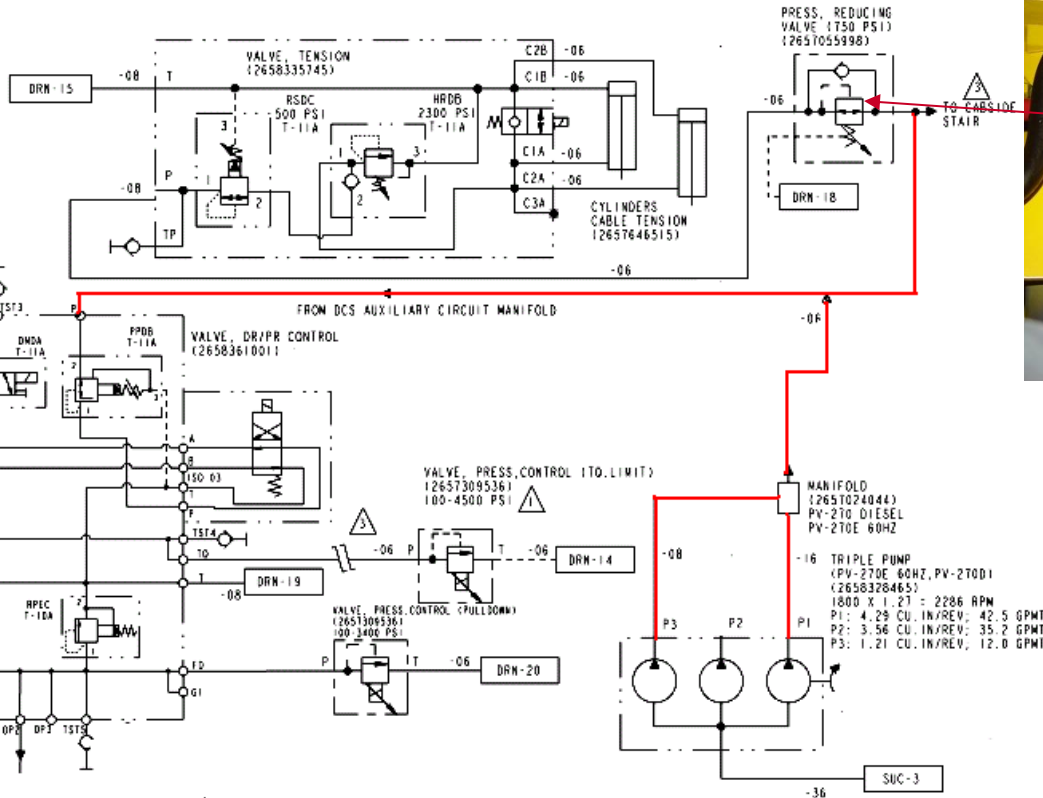
Propel Brake



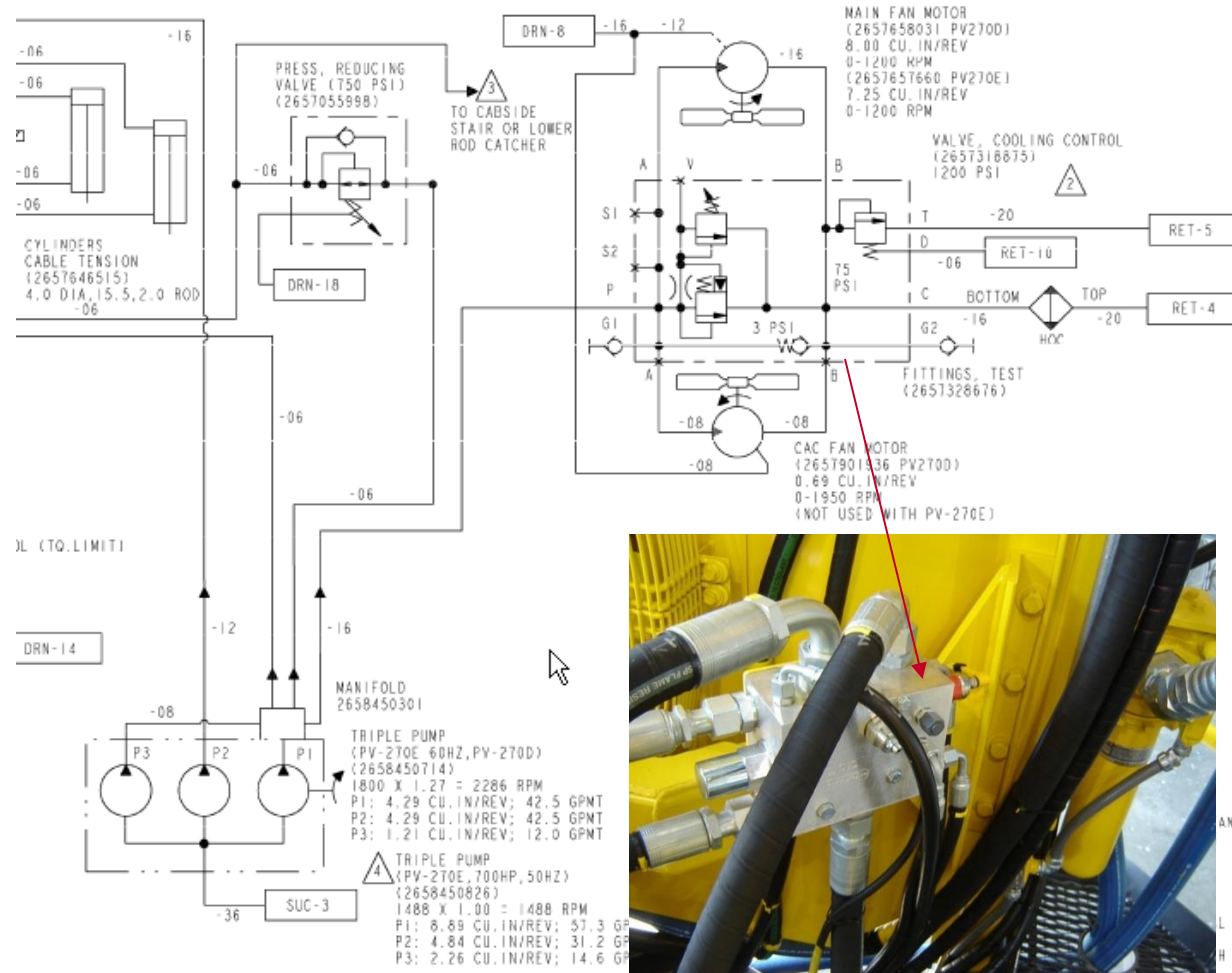
Triple Pump Circuit-Diesel/60 HZ



Cable Tension Pressure Reducing Valve



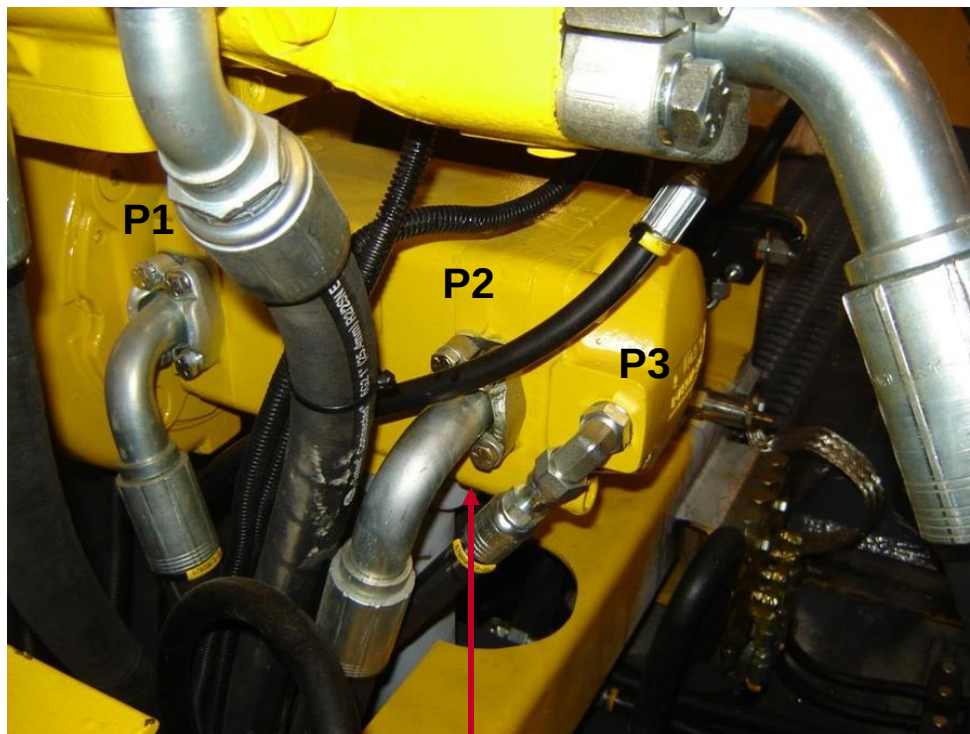
Triple Pump – P1 and P3 Circuit – Fan Motors



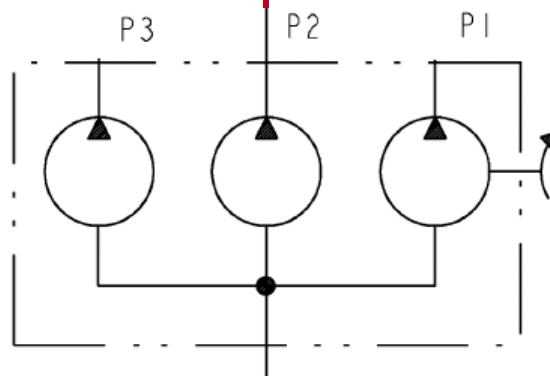
Triple Pump – P1 and P3 Circuit – Fan Motor



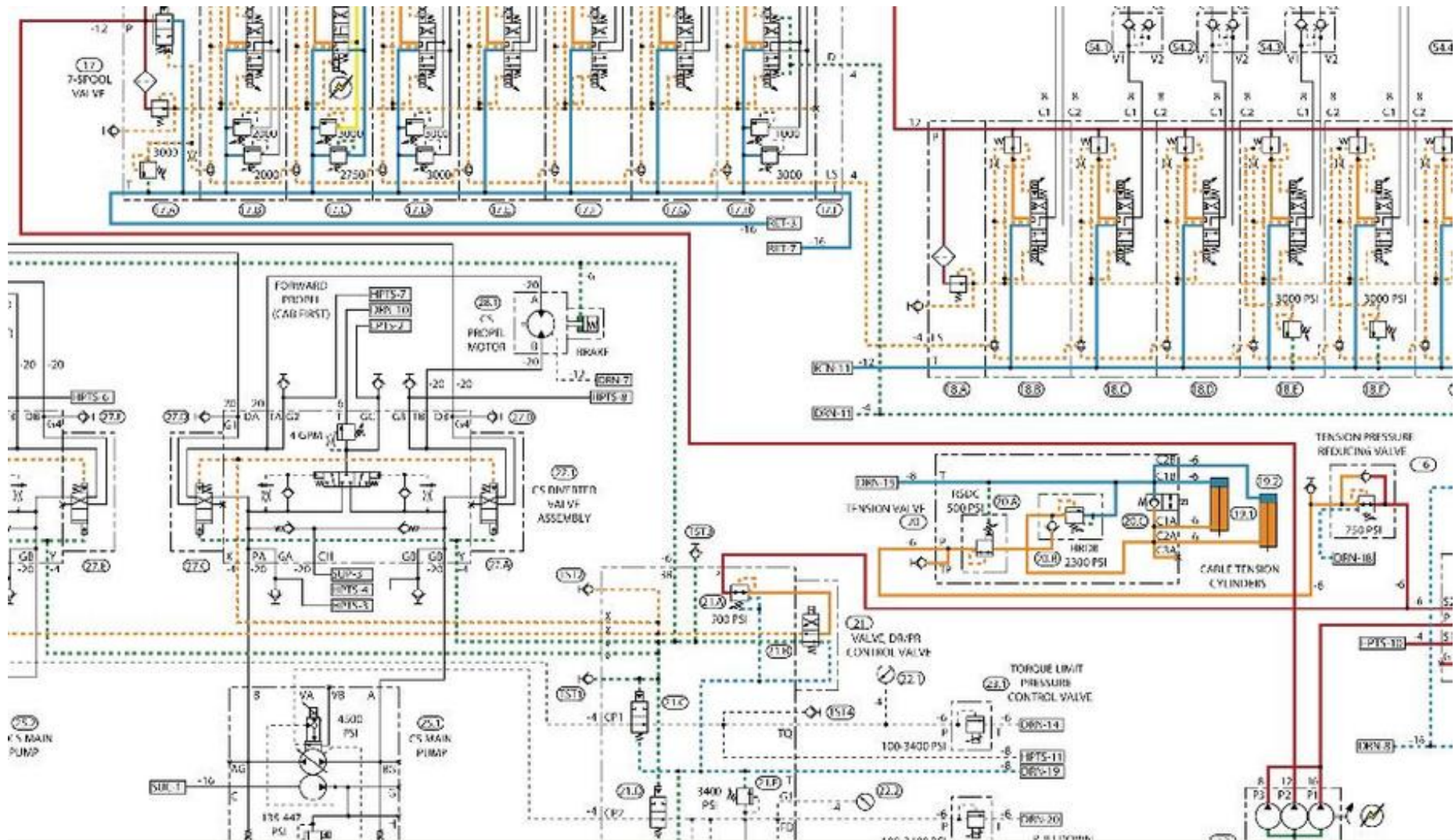
Triple Pump - P2 Circuit

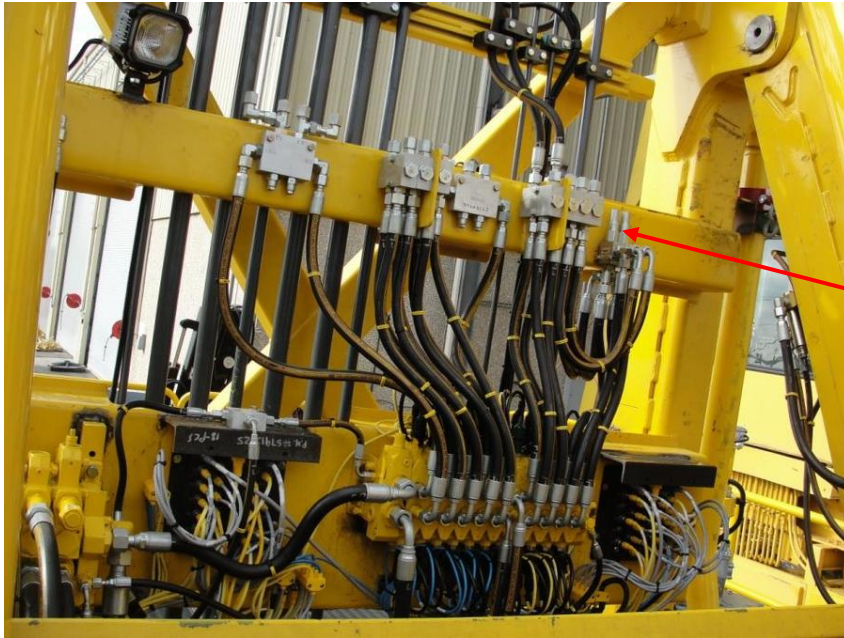


The P2 section of the triple pump provides 35 GPM of oil for the spool valve assemblies, these valves are used to perform all the necessary auxiliary functions while drilling.

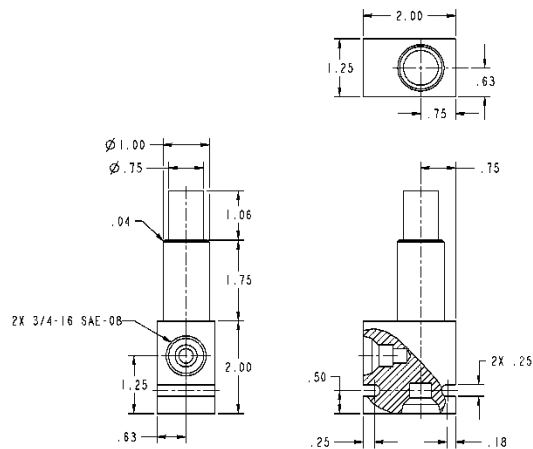
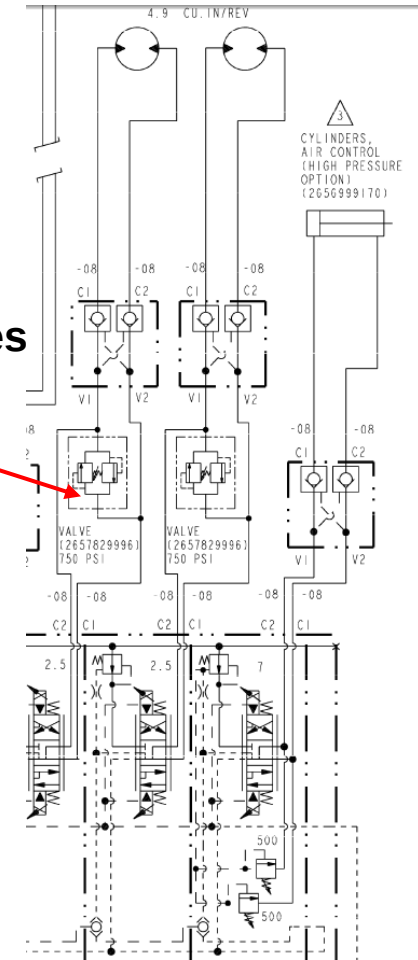


Auxiliary Functions Circuit



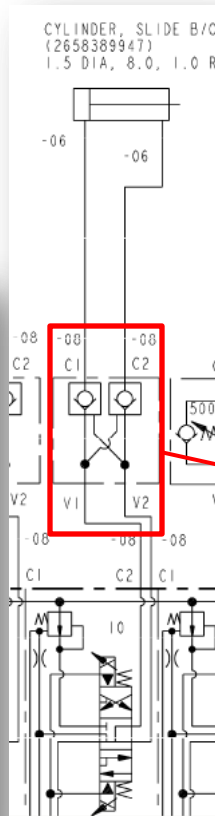
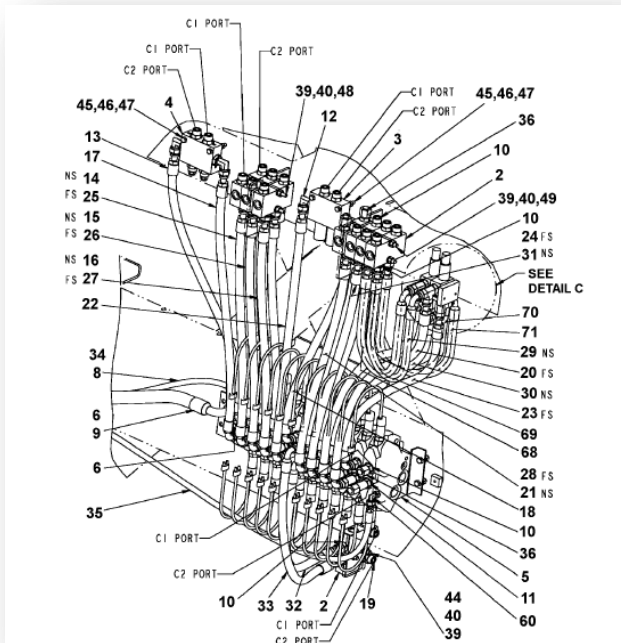
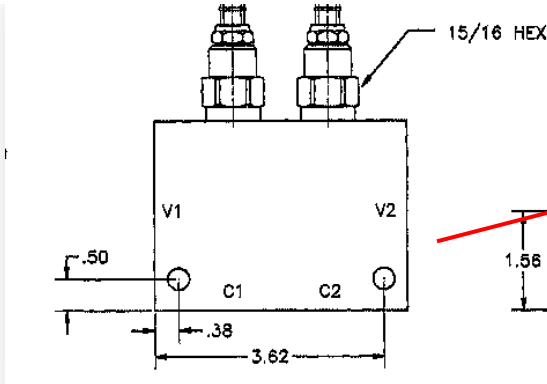


**Manifold Relief Valves
for Cable Tension**



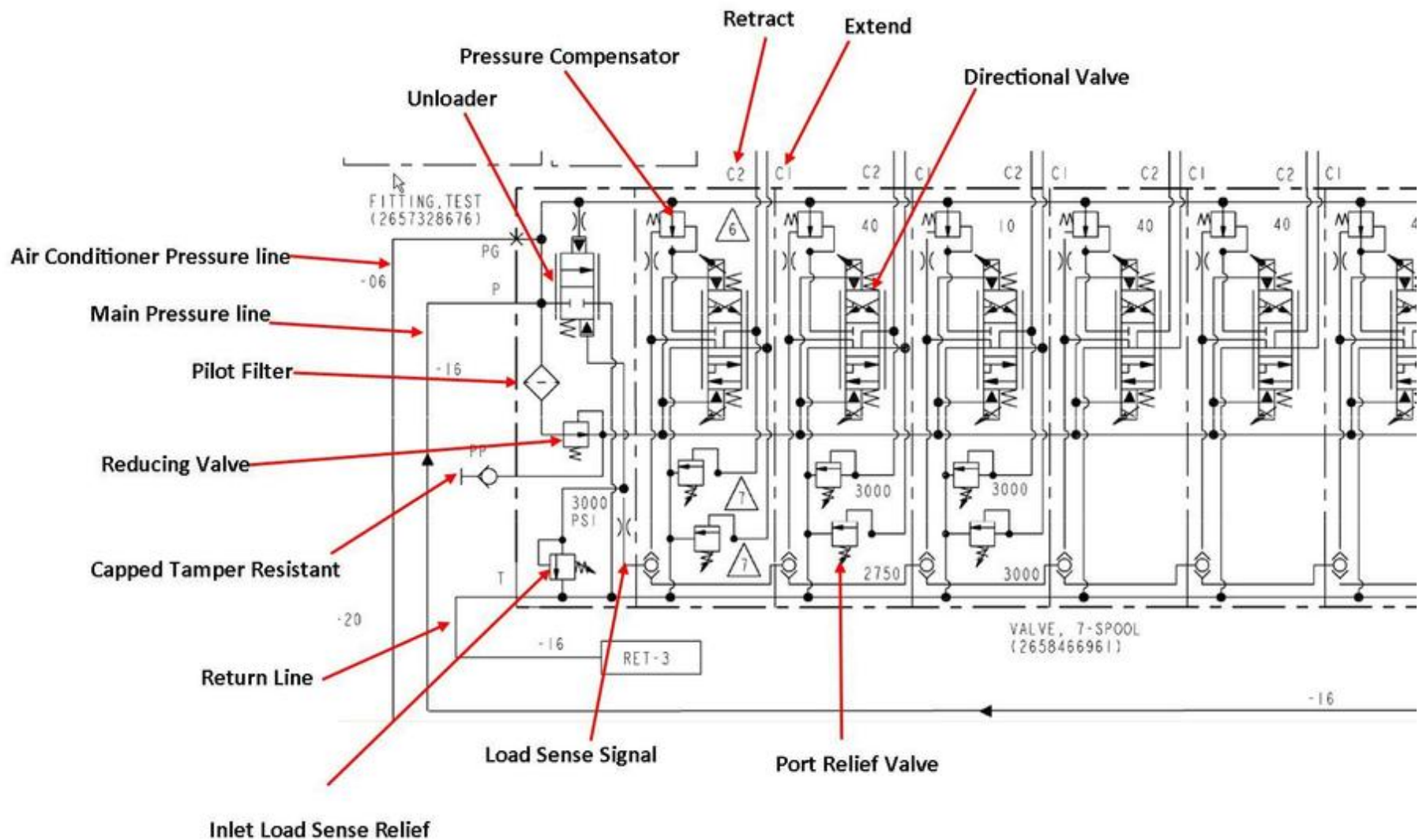
RCS 4 Auxiliary Functions Circuit

Spool Valves VPL

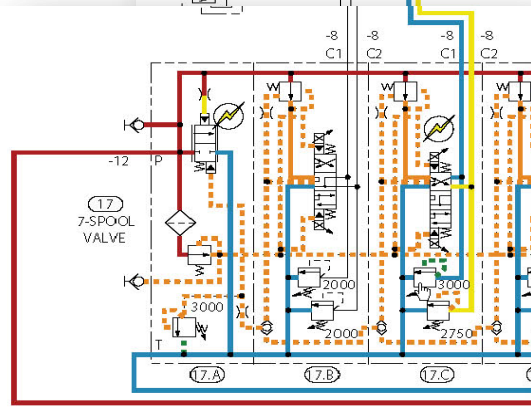
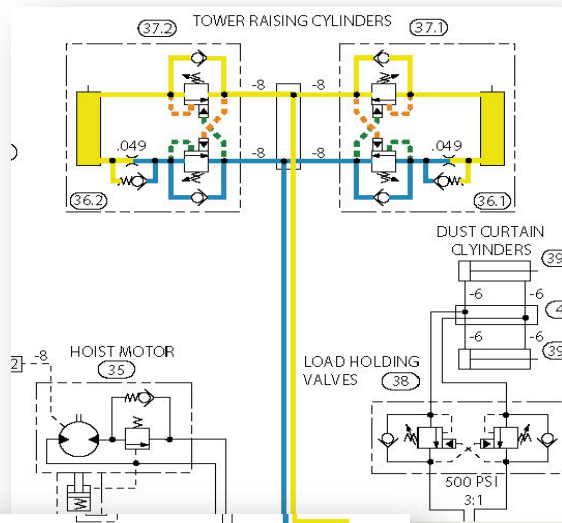


50462944 EA VALVE,CHECK-DBL
PILOTOP

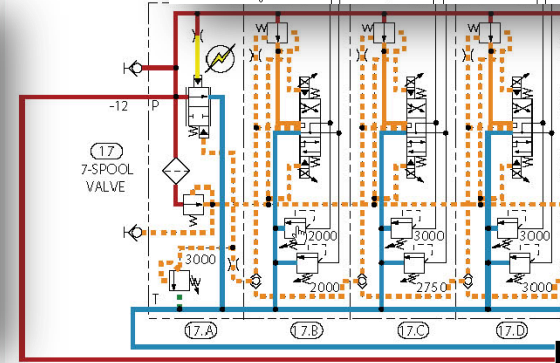
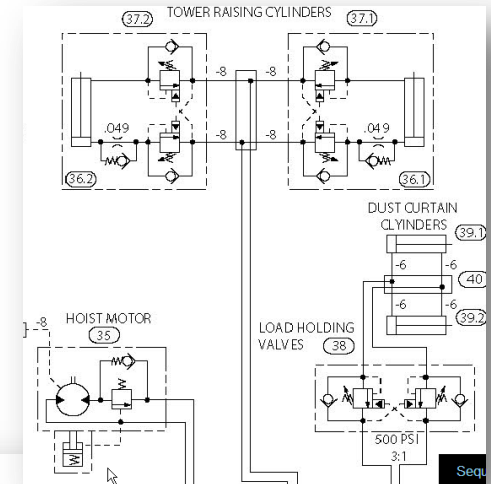
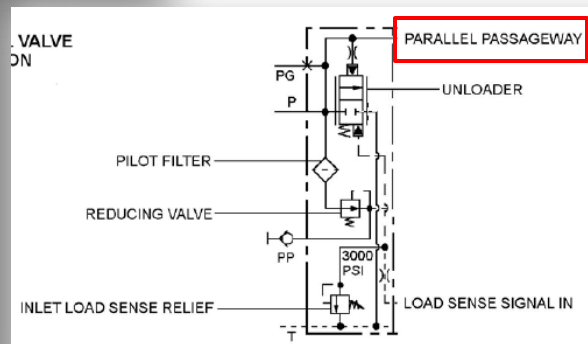
7 Spool Valve RCS 4



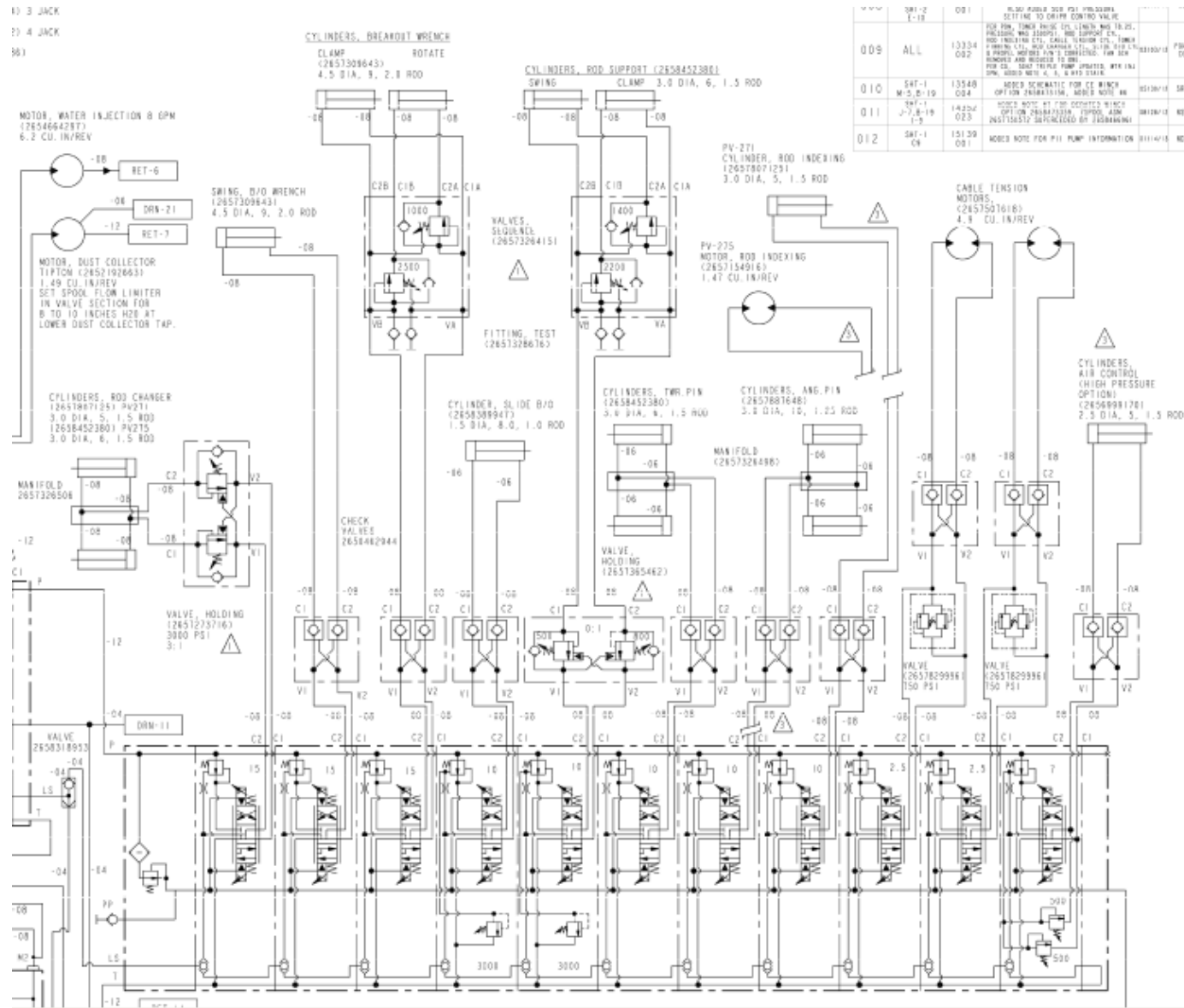
7/11 Spool Valves RCS 4



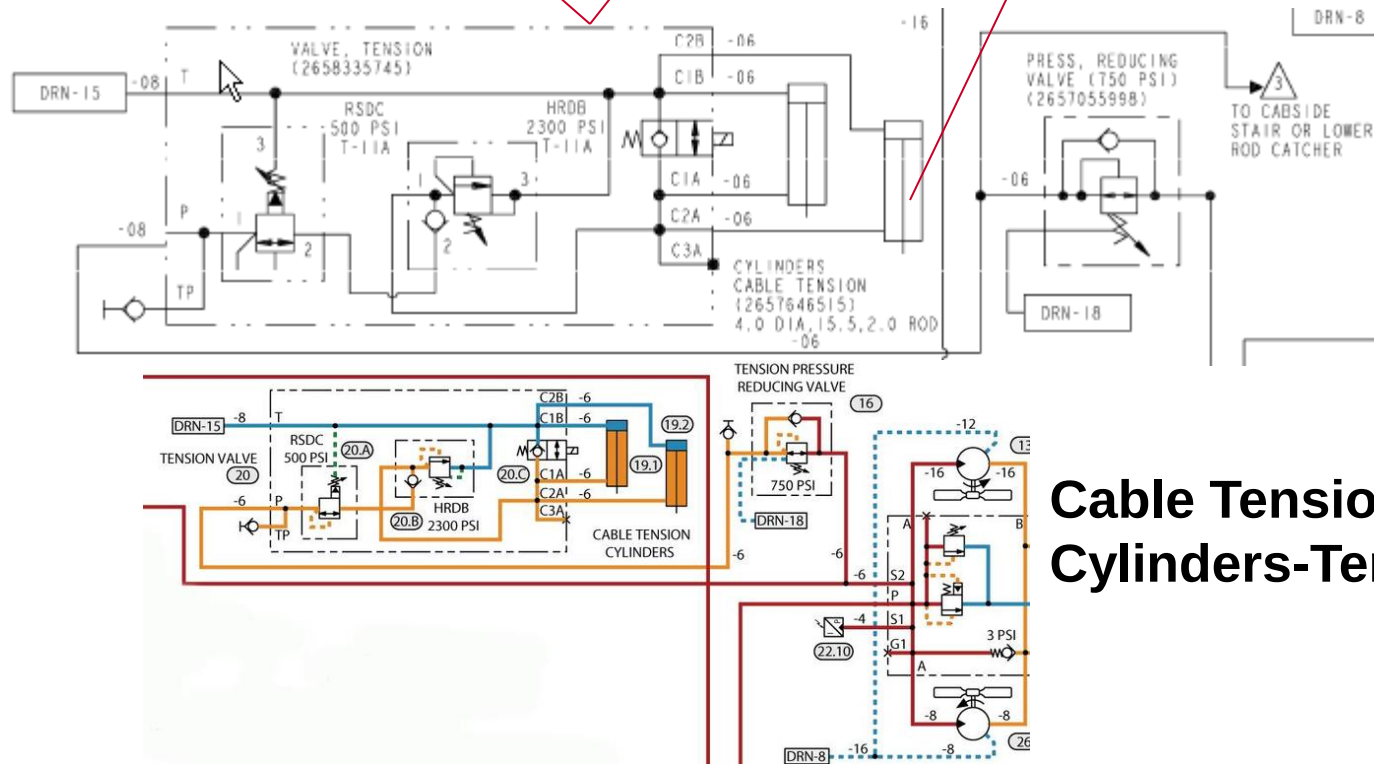
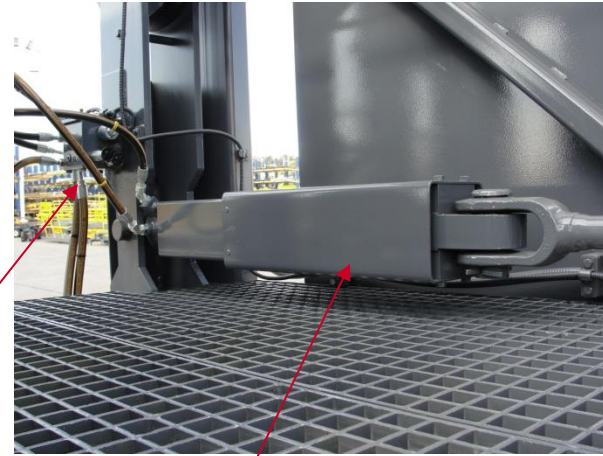
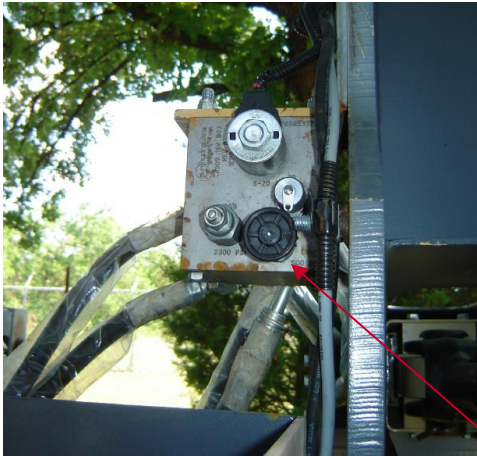
Parallel Passage is unblocked



Parallel Passage is blocked



Cable Tensioning Procedure for PV270 Series

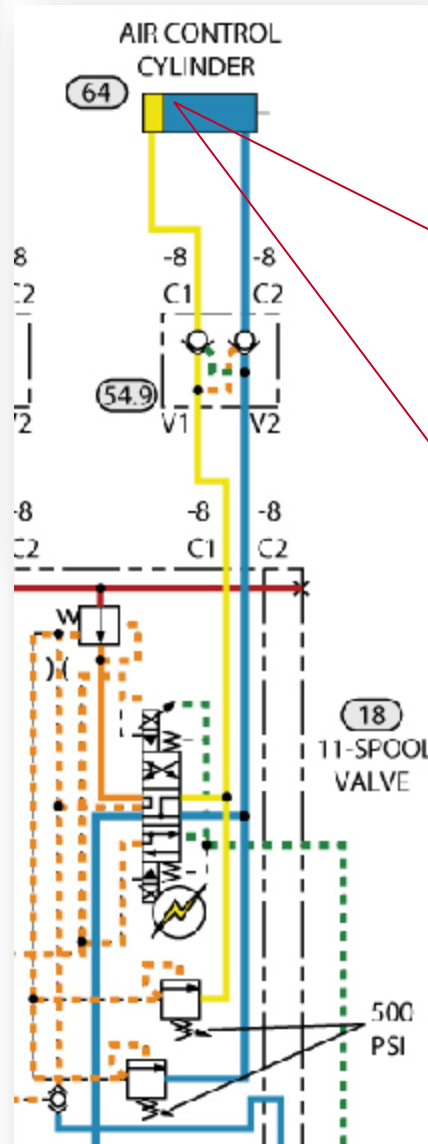


**Cable Tension
Cylinders-Tension**

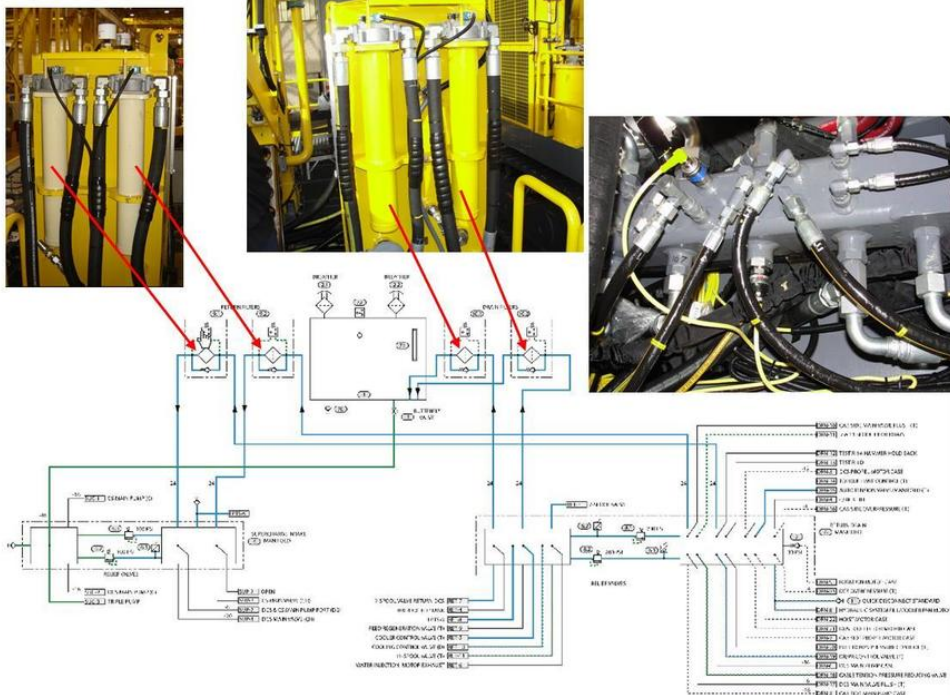
Air Throttle Valve RCS 4 – Spool Eleven



Air Control On



Hydraulic Tank/Filters RCS 4



Hydraulic drain filter #1 ok	1	D513	X12a
Hydraulic drain filter #2 ok	1	D513	X12b
Hydraulic return filter #1 ok	1	D513	X17a
Hydraulic return filter #2 ok	1	D513	X17b

RCS 4 Screen M4.2.2

M4.4.4.1

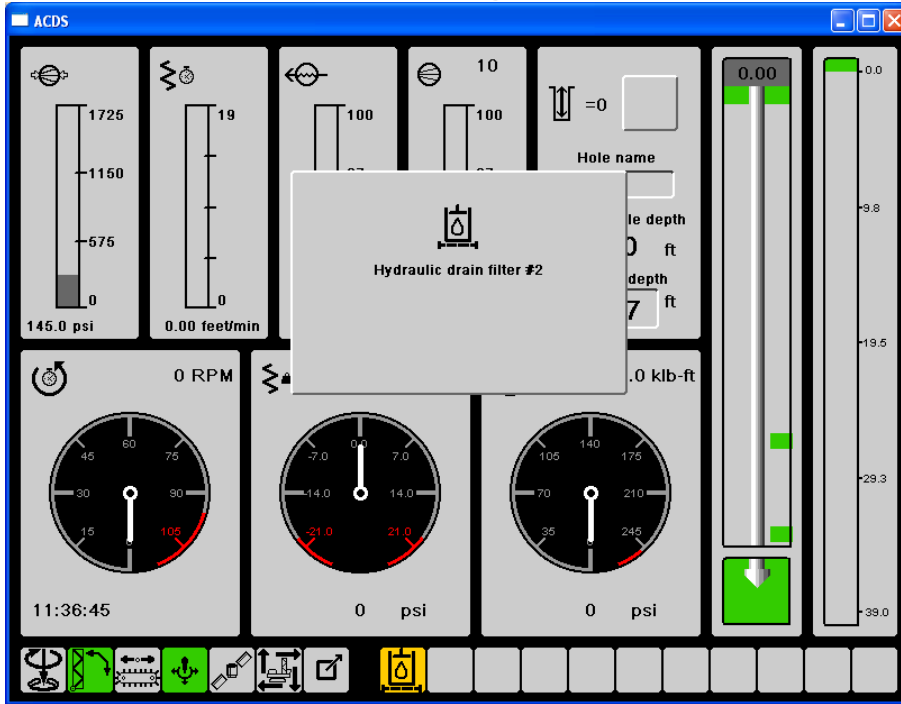
Other Params

Hyd drain filter #1 warning time	1 min
Hyd return filter #1 warning time	1 min
Hyd drain filter #2 warning time	1 min
Hyd return filter #2 warning time	1 min
Hydraulic oil temperature, warning	140 °F
Hydraulic oil temperature, shut down	158 °F

RCS 4 Screen M4.4.4.1



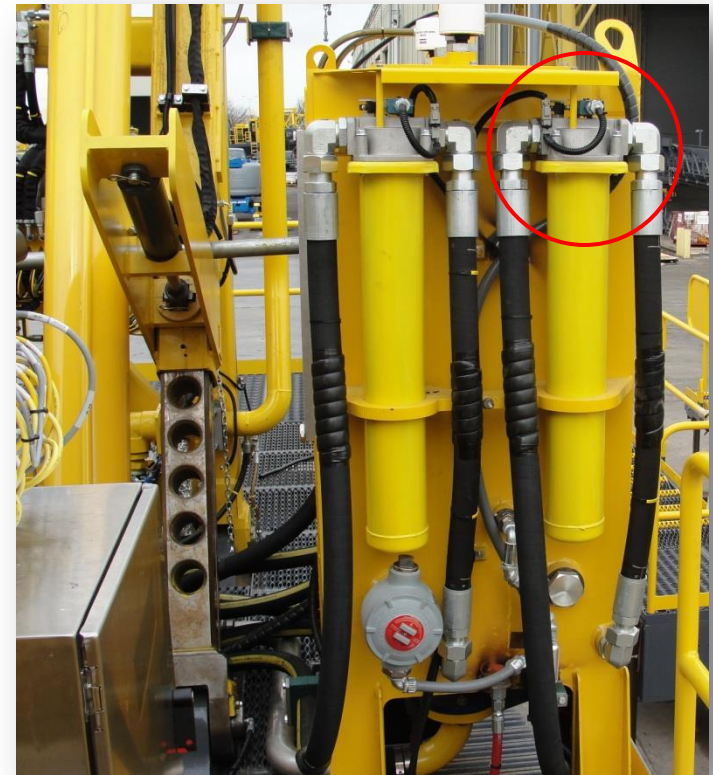
Hydraulic Tank/Filters RCS 4



RCS 4 Screen F1

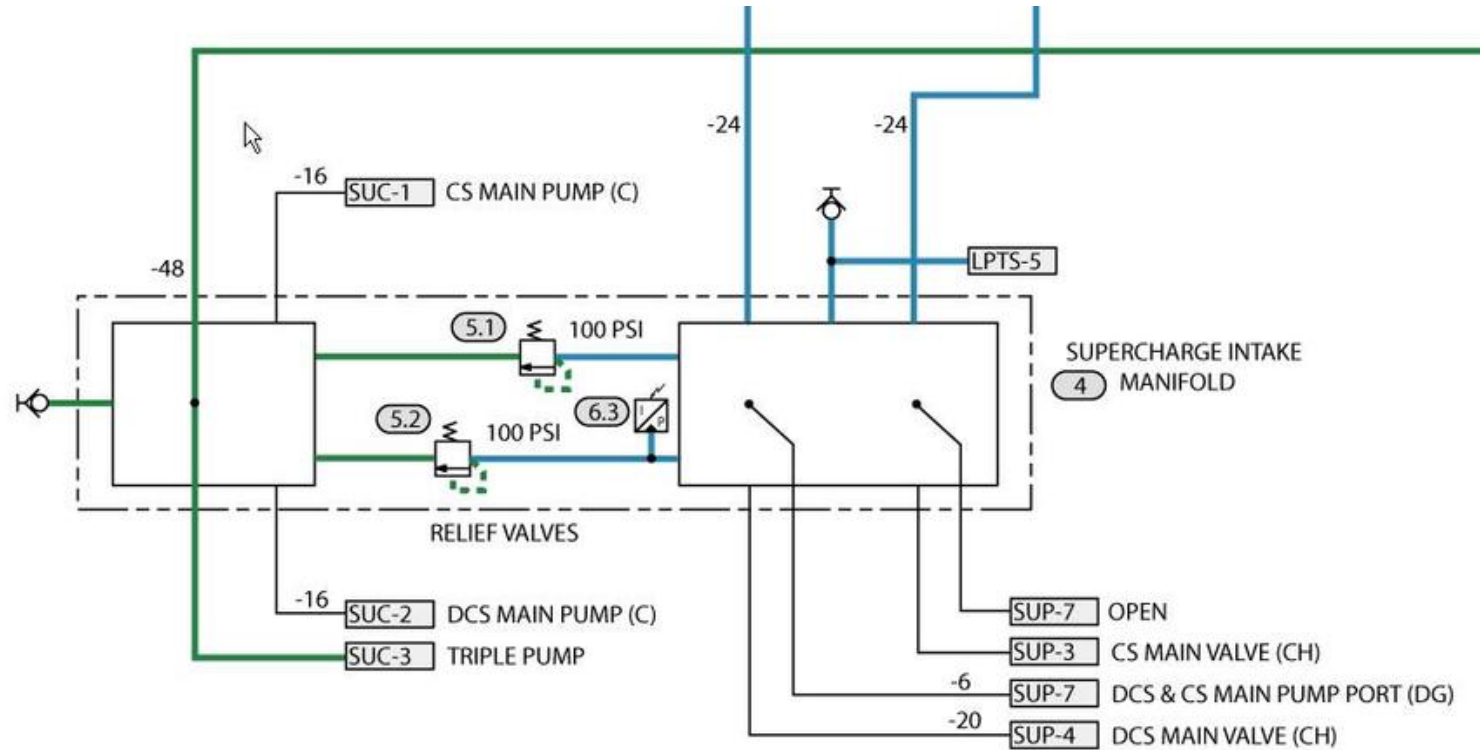
Hydraulic drain filter #1 ok	1	D513	X12a
Hydraulic drain filter #2 ok	0	D513	X12b
Hydraulic return filter #1 ok	1	D513	X17a
Hydraulic return filter #2 ok	1	D513	X17b

RCS 4 Screen M4.2.2



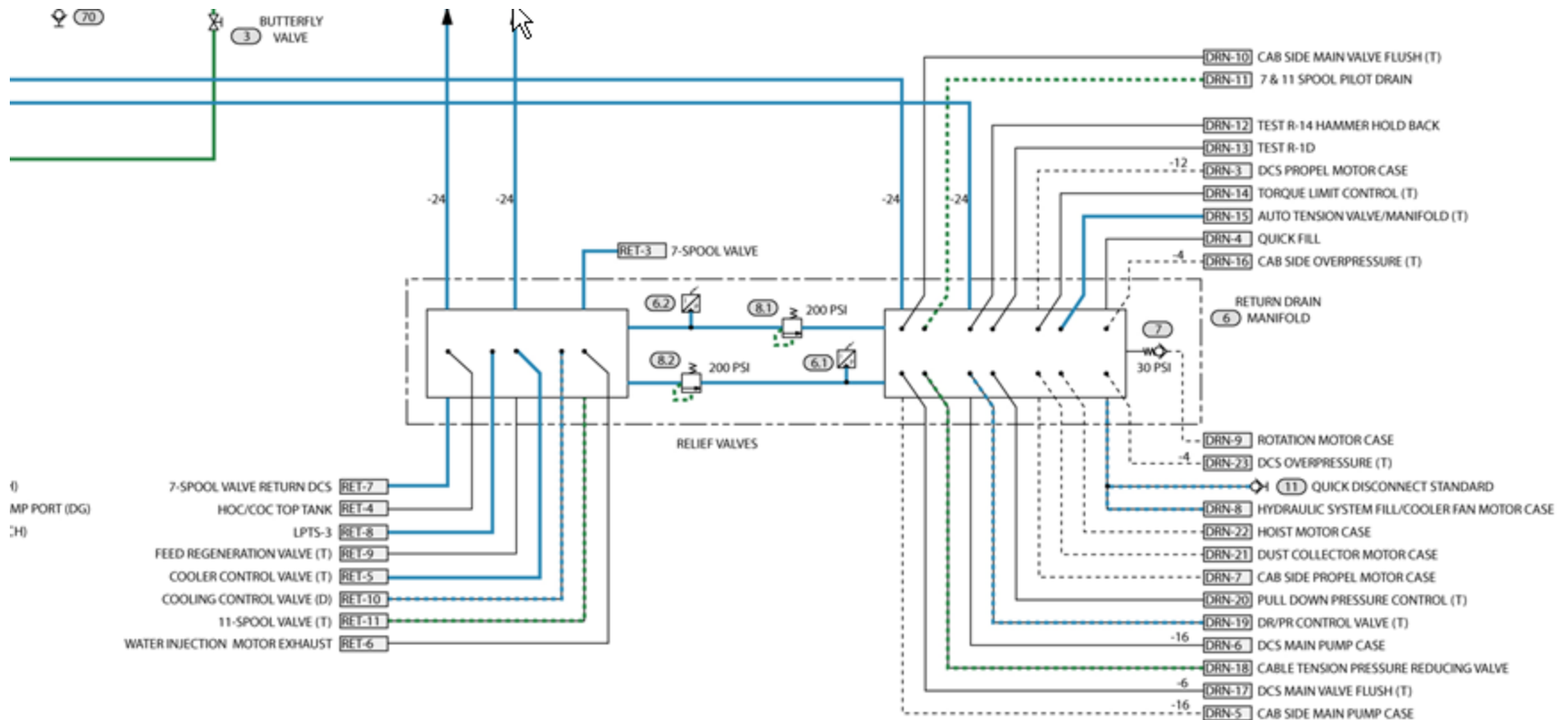
RCS 4 Drain Manifolds

Suction and Super Charge Manifolds



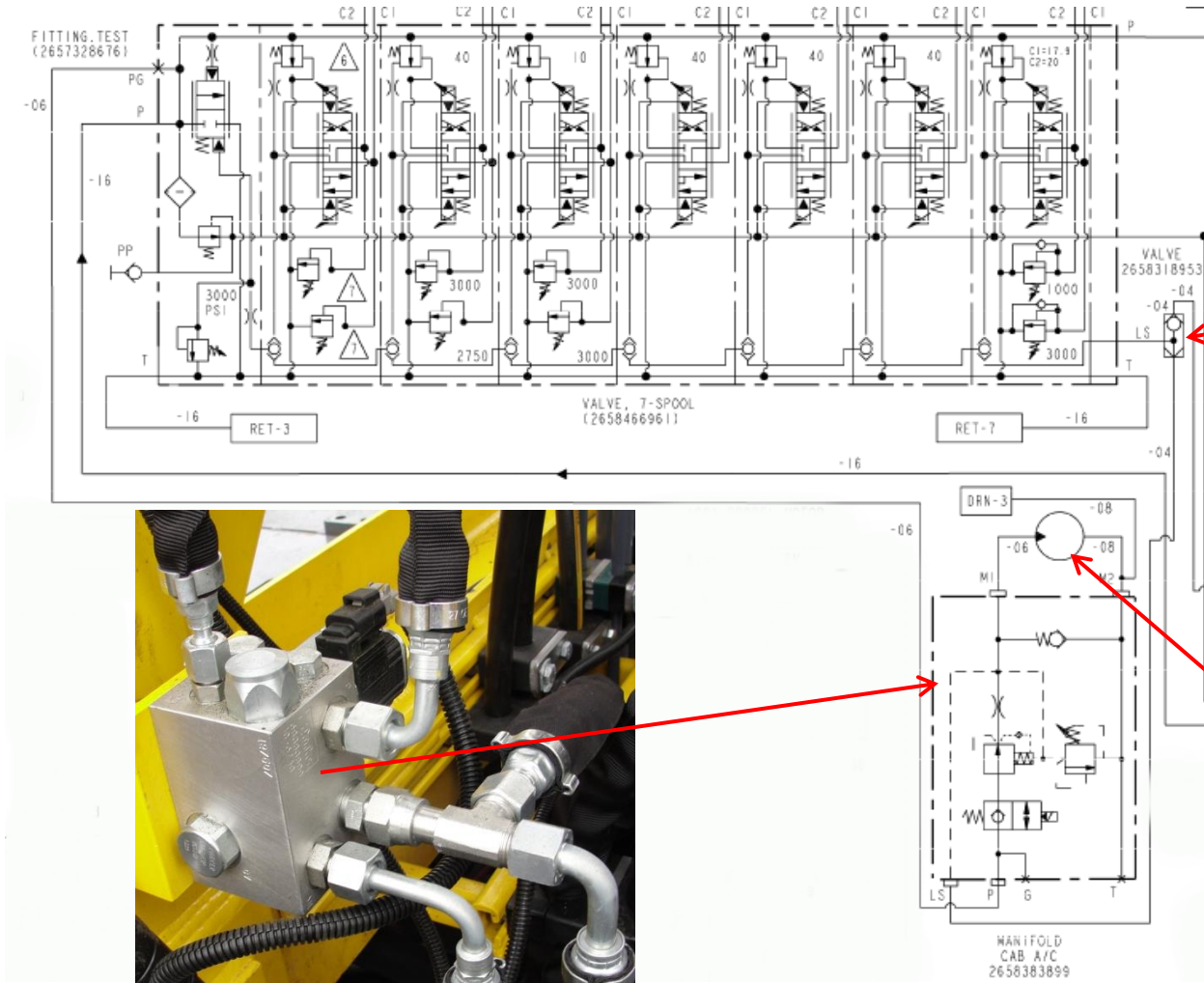
SUC=Suction Line
SUP=Supercharge Line

Return and Drain Manifolds



RET=Return Line
DRN=Drain Line

Air Conditioner RCS 4



**Committed to
sustainable productivity.**



Atlas Copco

