



LeTourneau
TECHNOLOGIES™

MINING
PRODUCTS

Built On Experience. Driven By Vision.

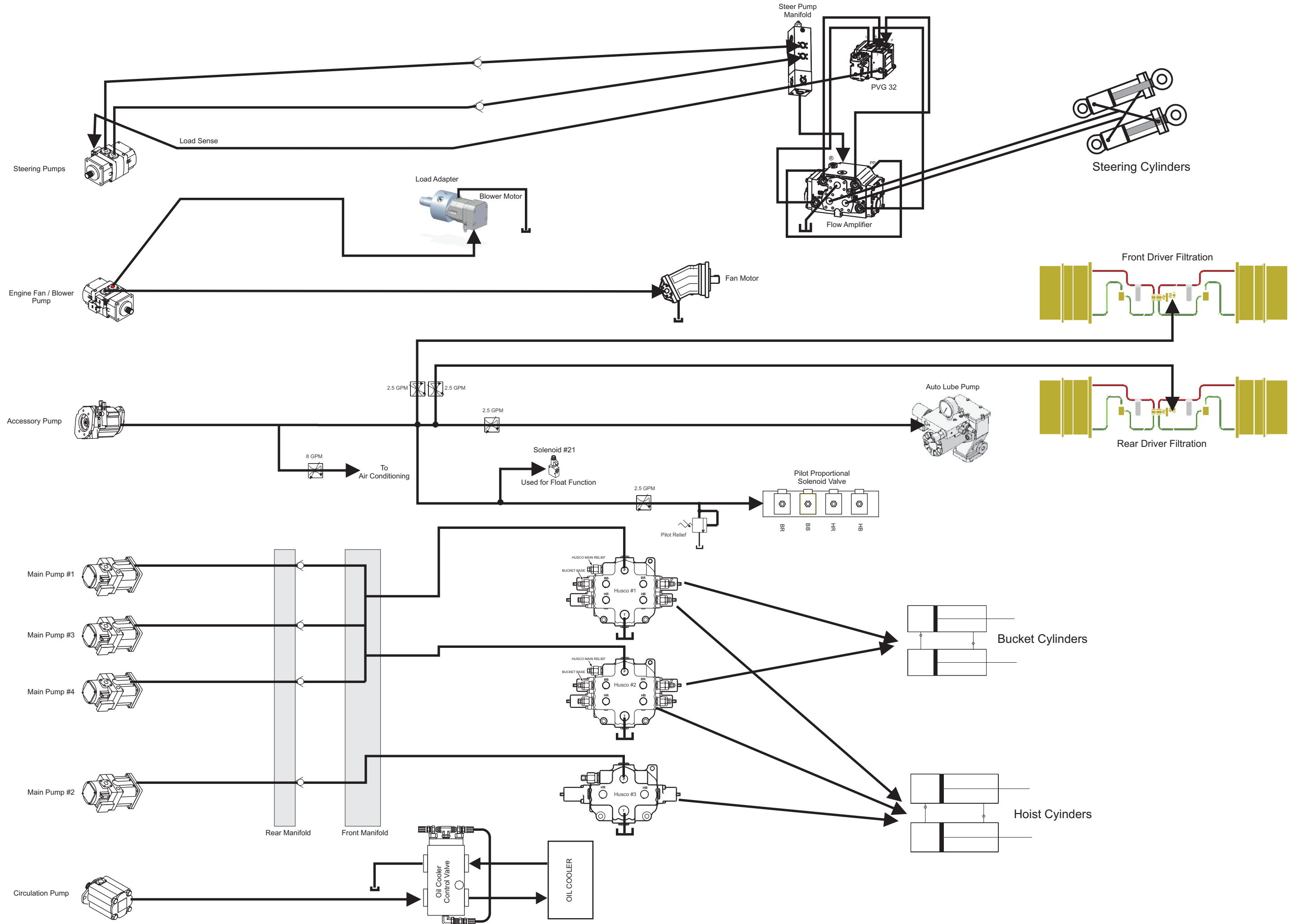


Hydraulic System

HYDRAULICS

- Theory of Operation
- Component Descriptions
- Circuit Descriptions
- Settings and Adjustments
- Troubleshooting
- Removal and Installation

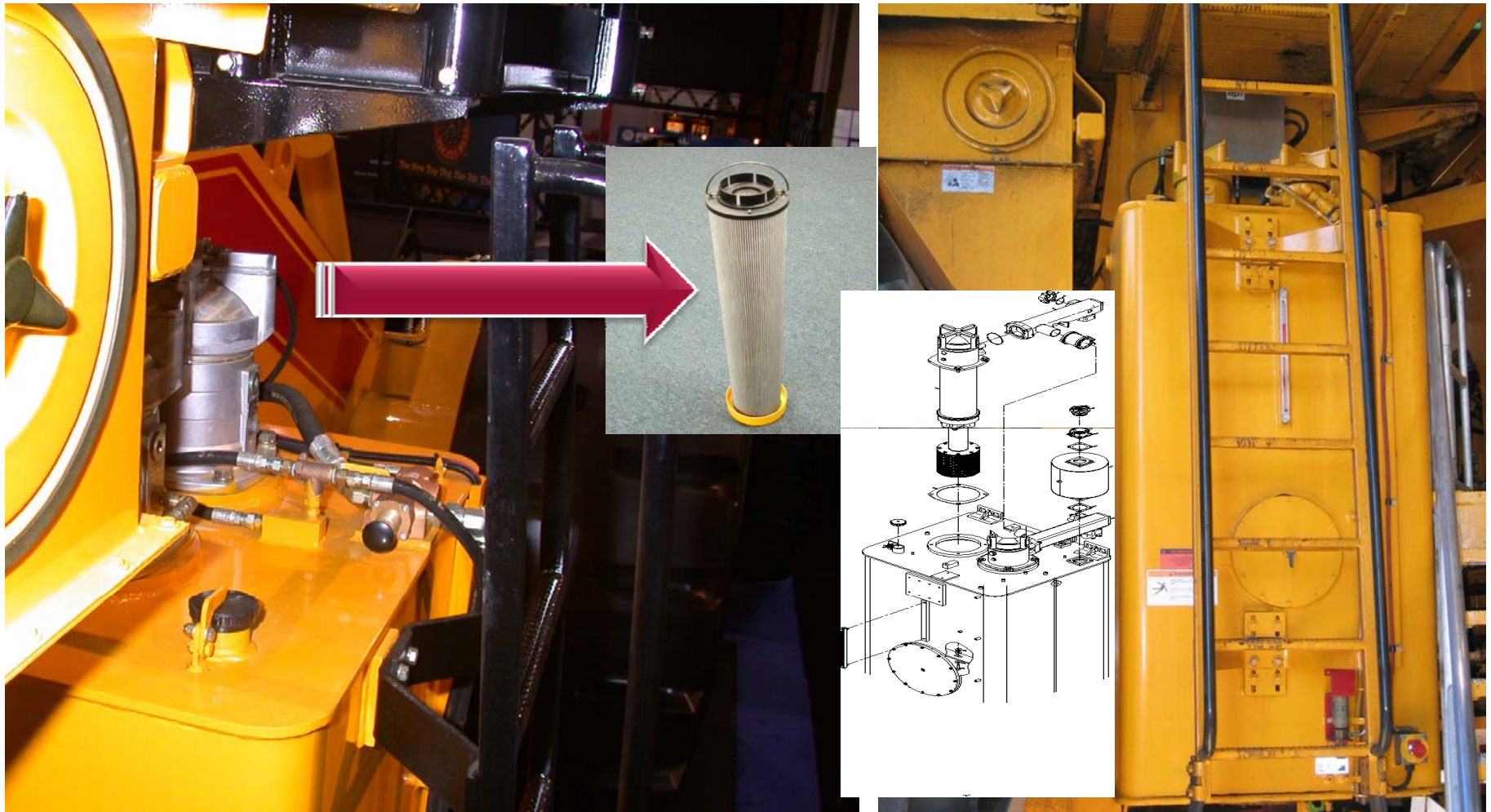




COMPONENT DESCRIPTIONS

- **Hydraulic Tank**
- **Pumps**
- **Gearbox**
- **Main Hoist and Bucket Control Valves [Husco]**
- **Multi-Port Distribution Manifolds**
- **Float Valves**
- **Old-Style Pilot System**
- **Current Pilot System**
- **Steering Main Valves**
- **Motors**
- **Driver Oil Filtration System**
- **Oil Cooler Control Valves**
- **Auxiliary Oil Cooler (Optional) Fan Speed Control**
- **Cylinders**
- **Warnings and Cautions**



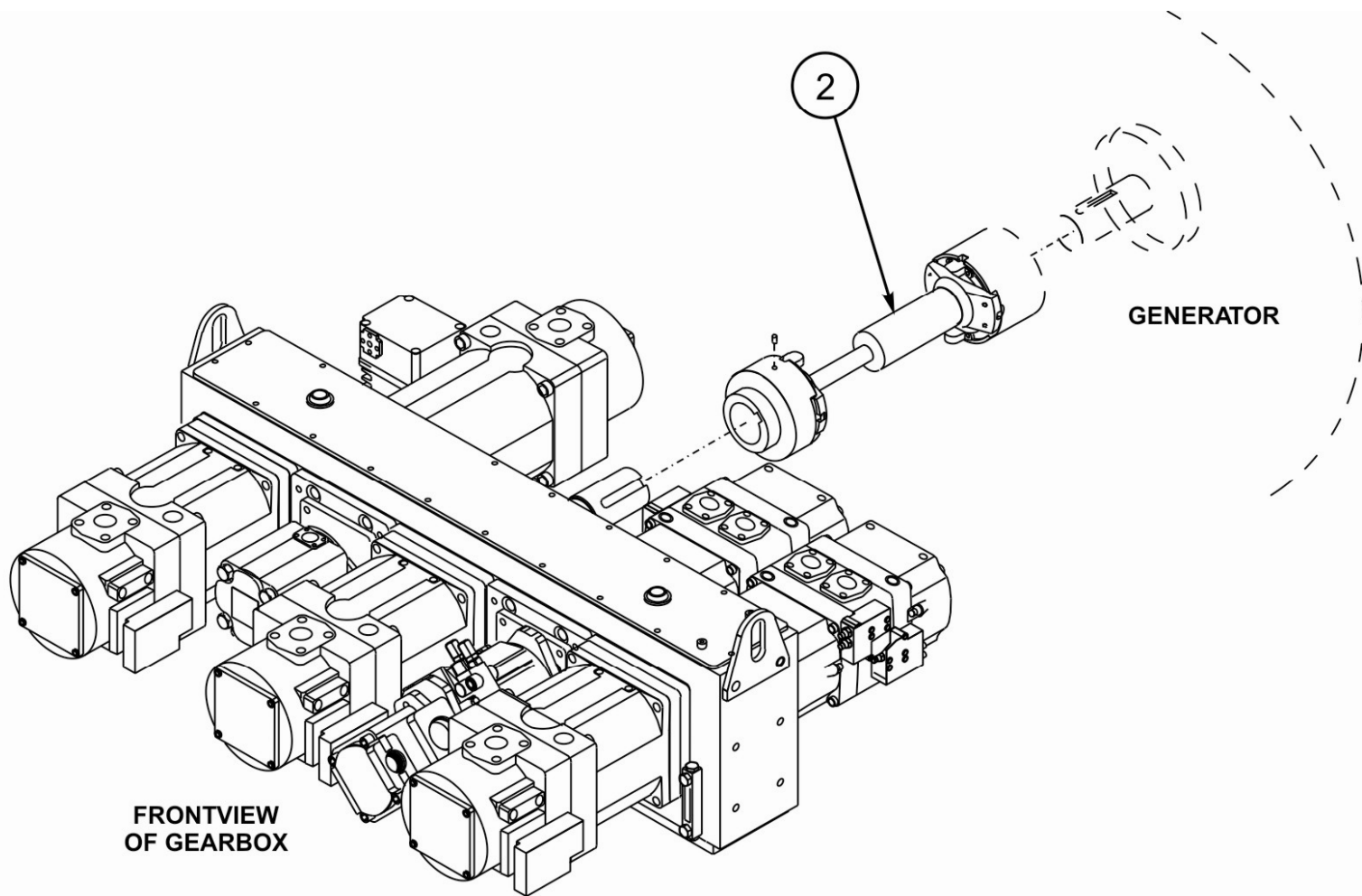


Hydraulic Tank

Component Descriptions

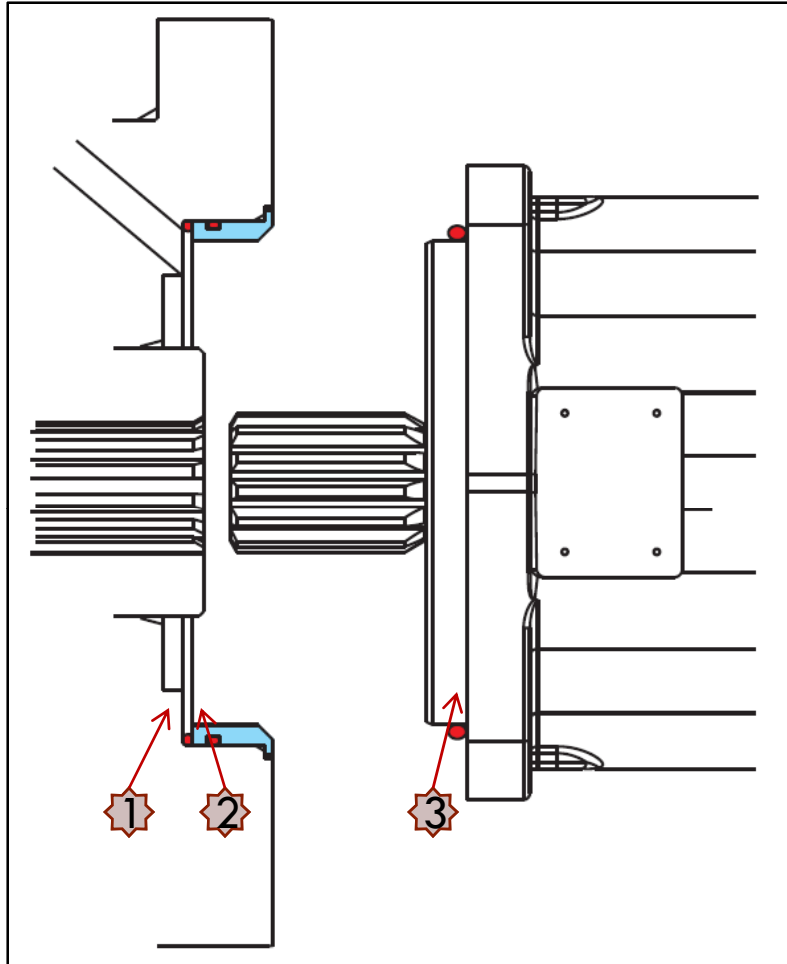
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Gearbox

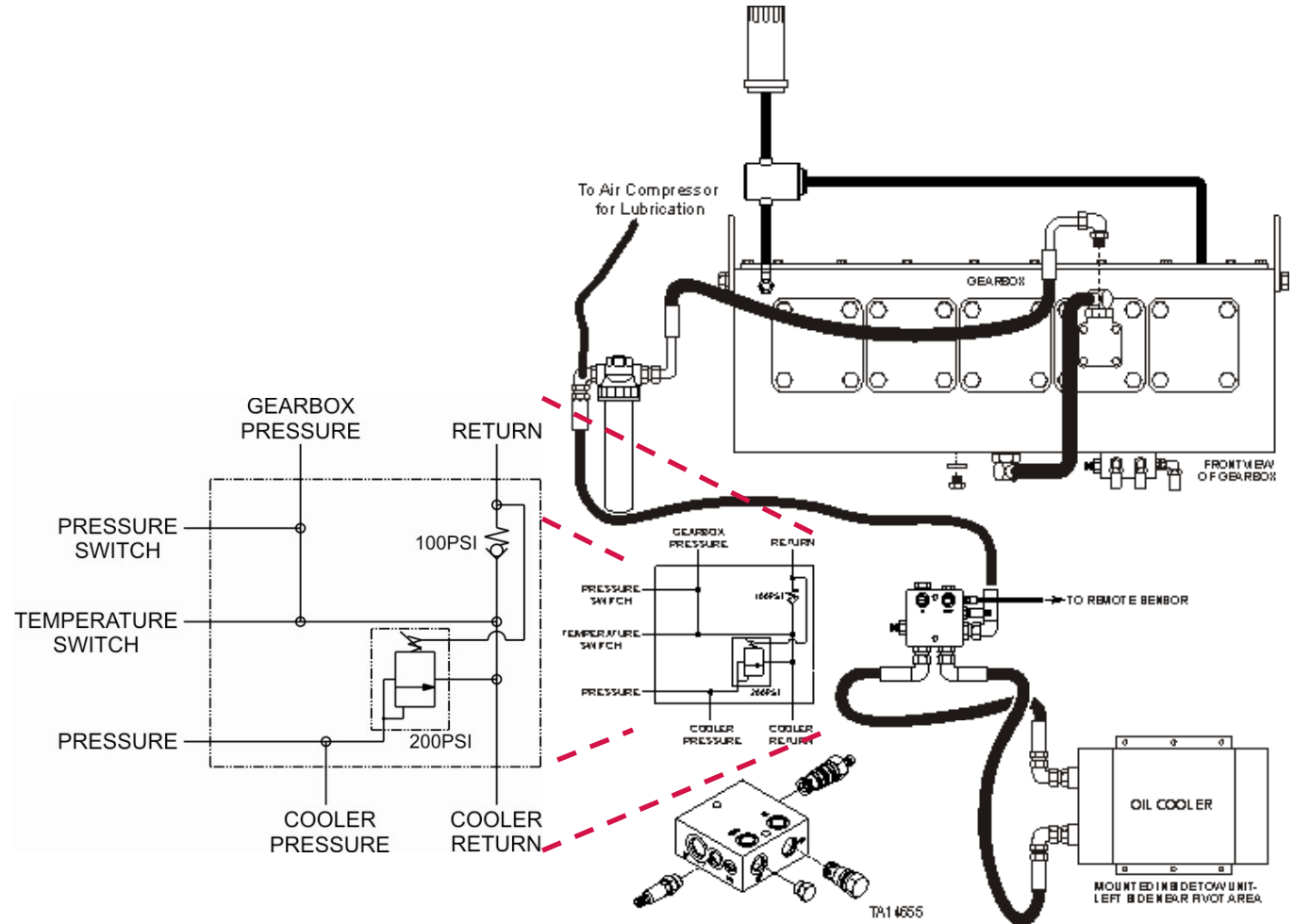




1. Spacer O-ring
2. Pump Adapter for Tandem Pump
3. Pump Housing O-ring

Gearbox Adapter



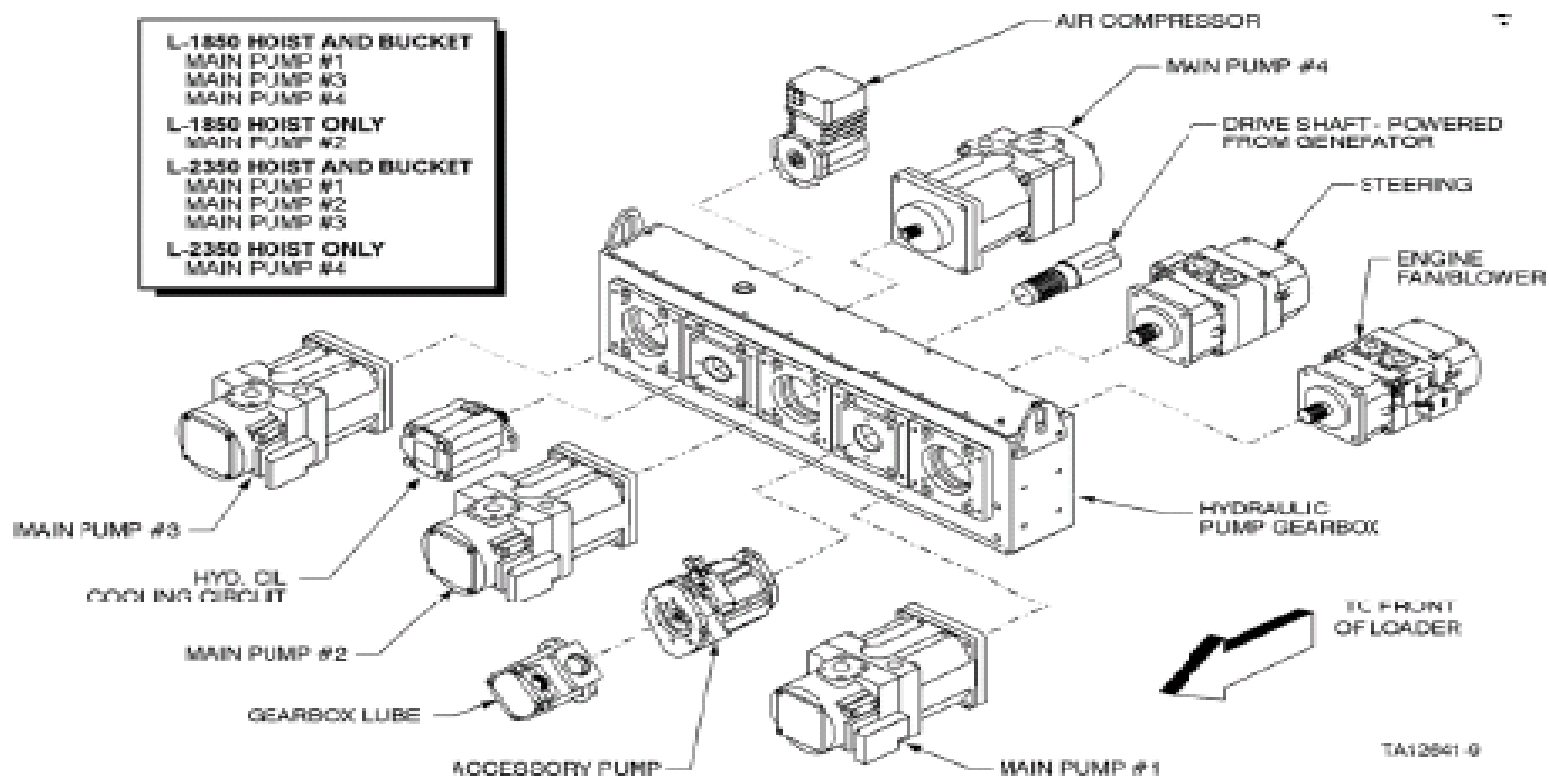


Gearbox monitoring

Component Descriptions

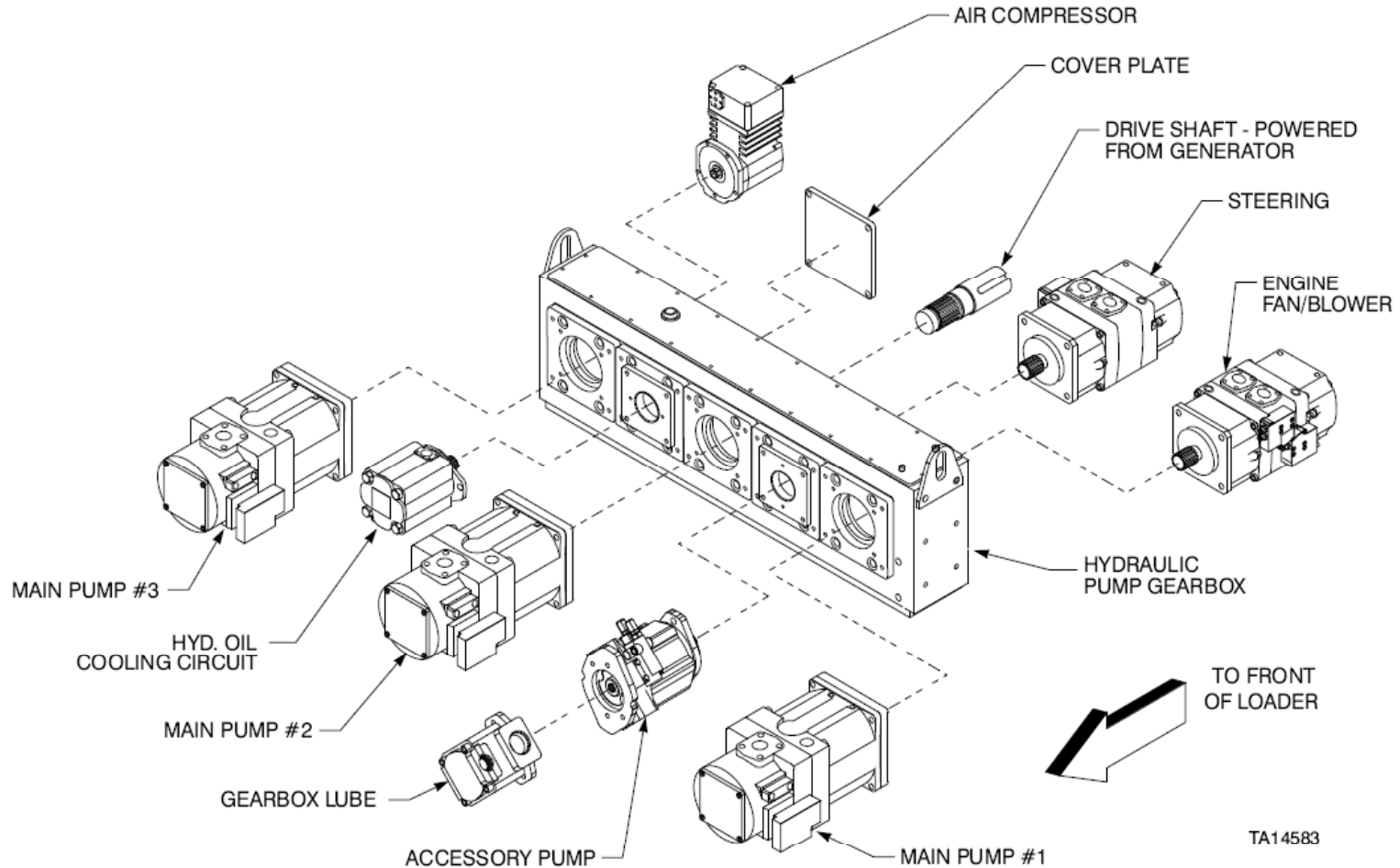
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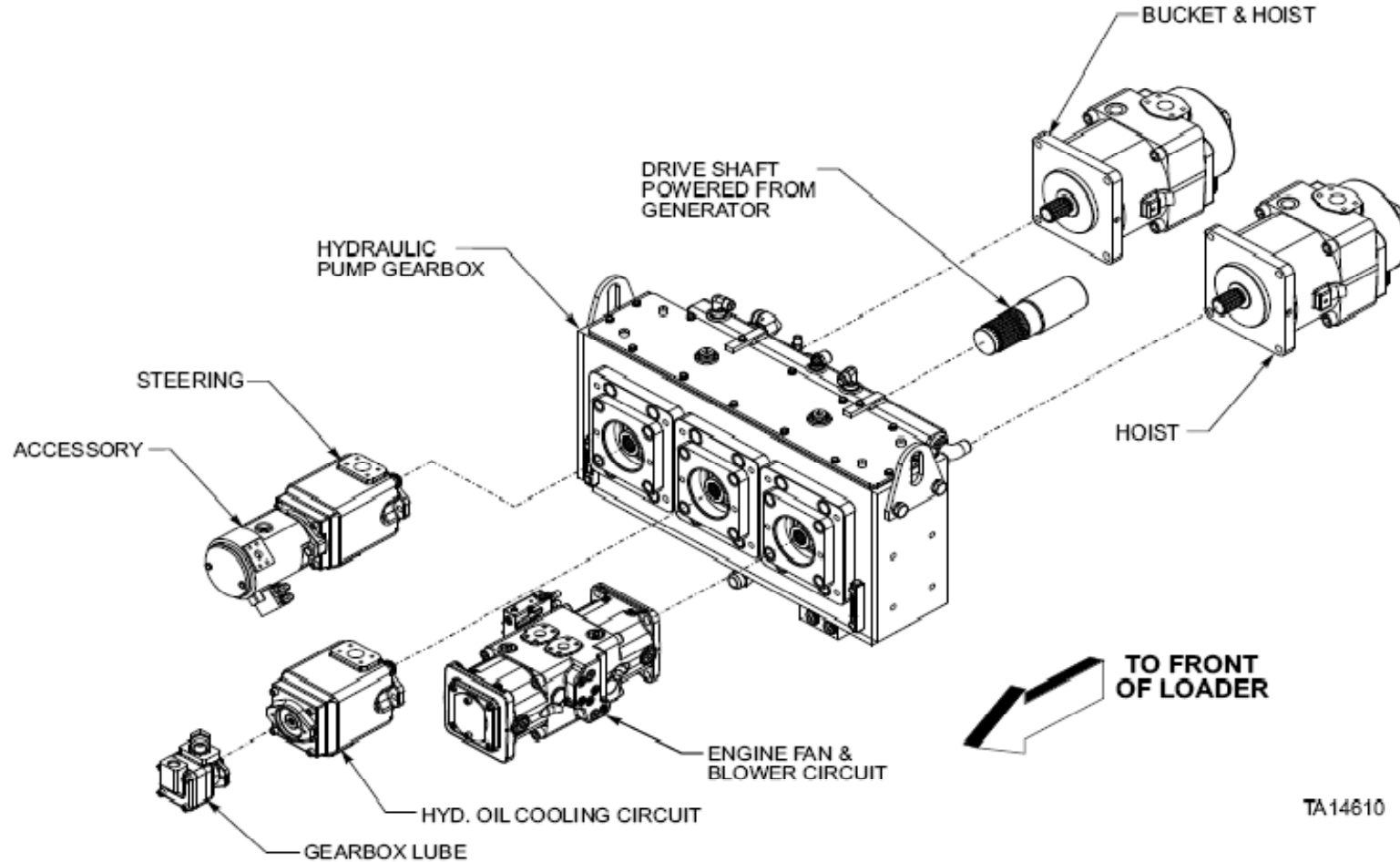
Pump arrangement – L-2350 & L-1850





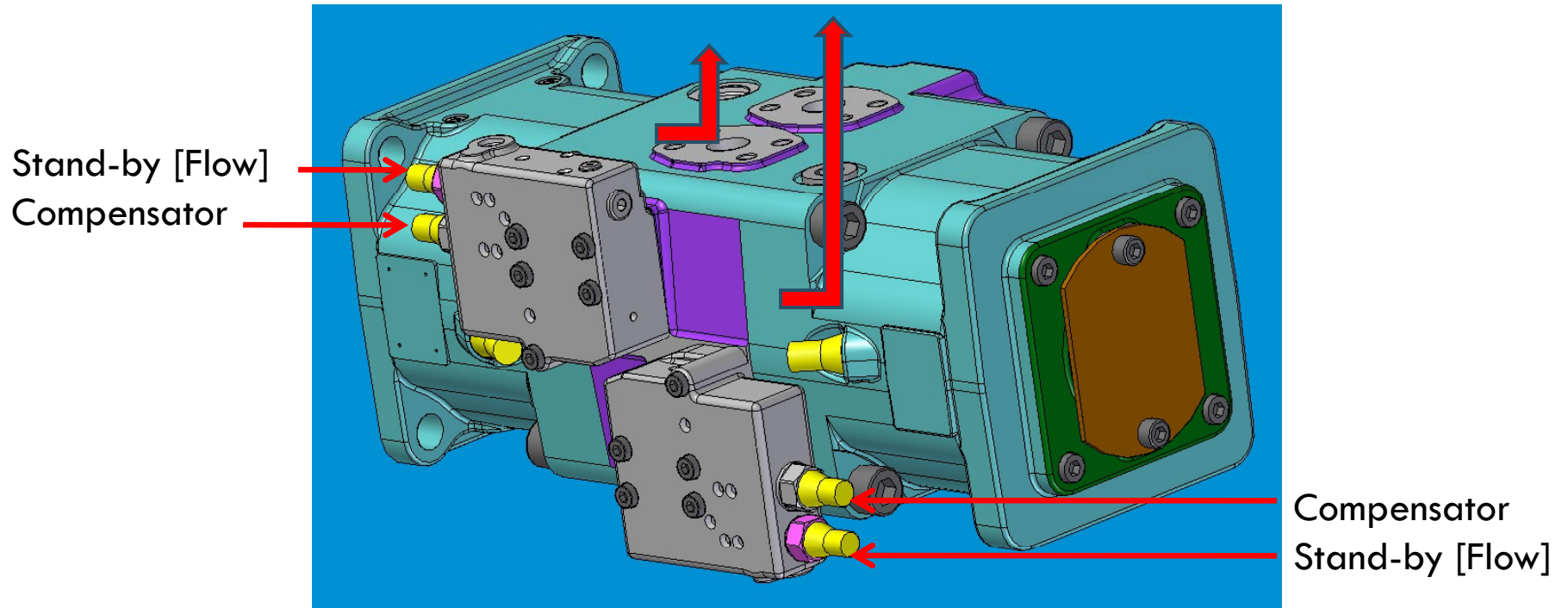
Pump arrangement – L-1350





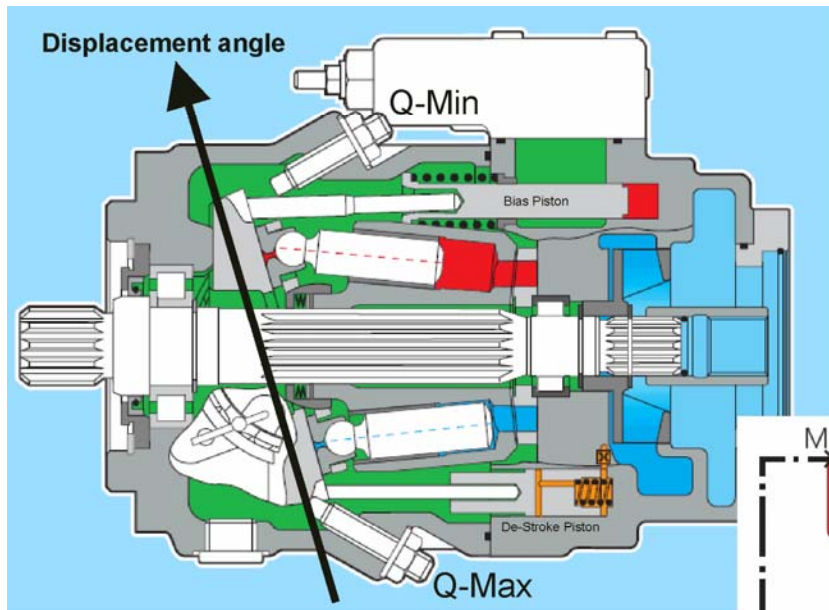
Pump arrangement – L-950





Tandem Pump

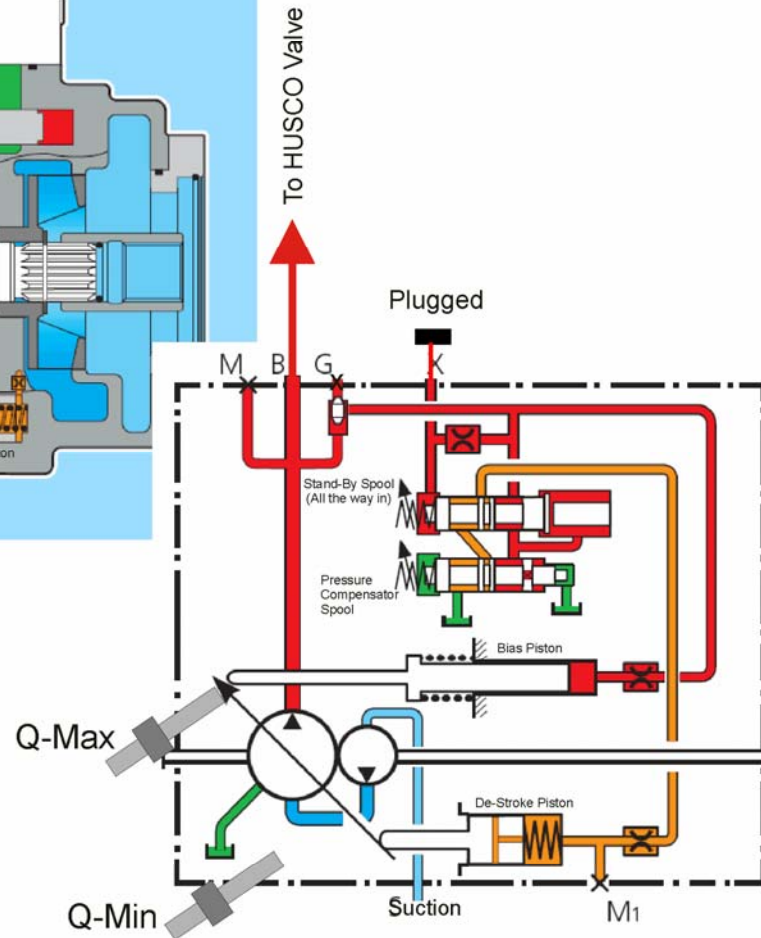




DRG Control (Hoist / Bucket)

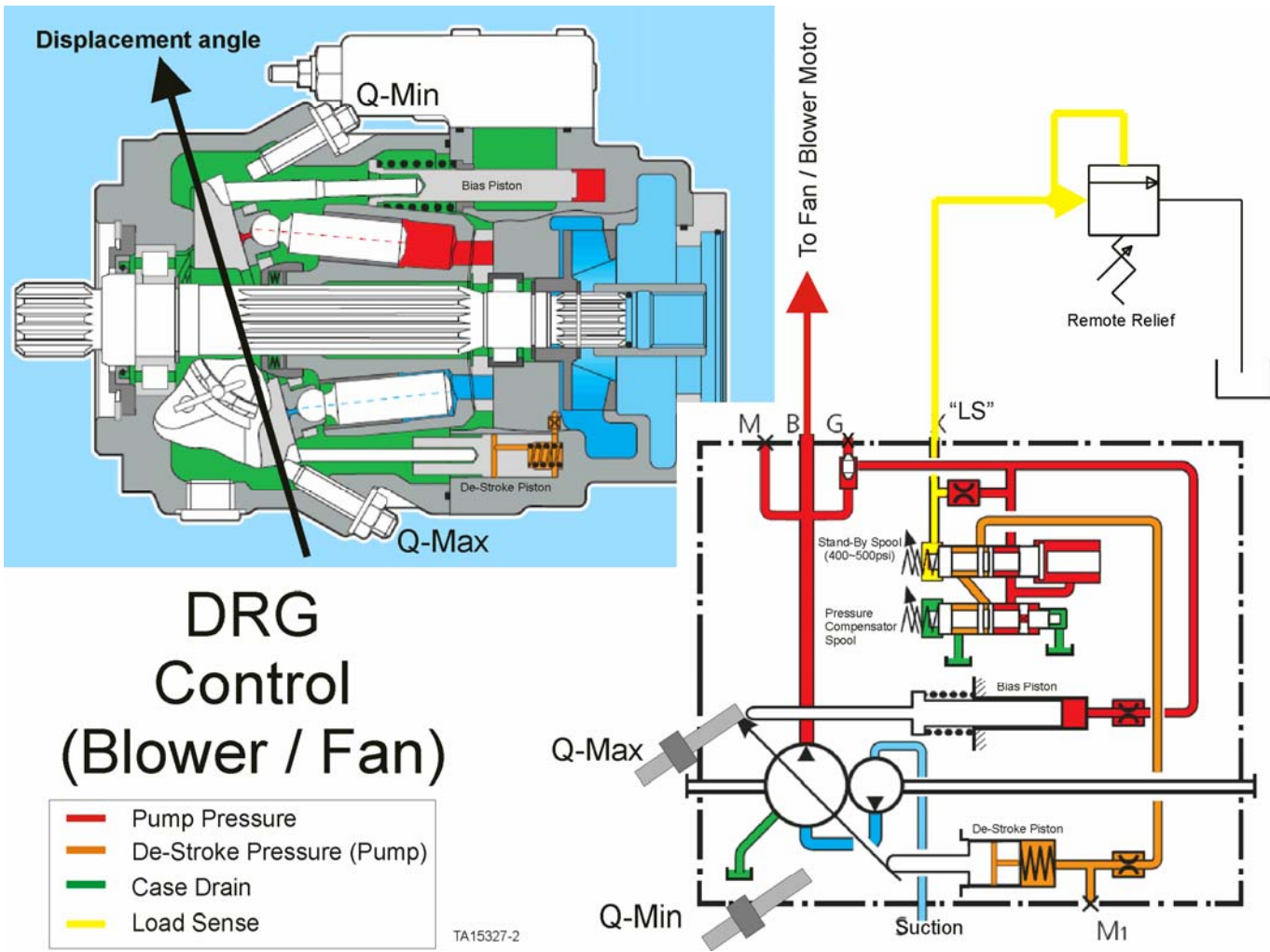
- Pump Pressure
- De-Stroke Pressure (Pump)
- Case Drain

TA15327-1



Hoist/bucket pump



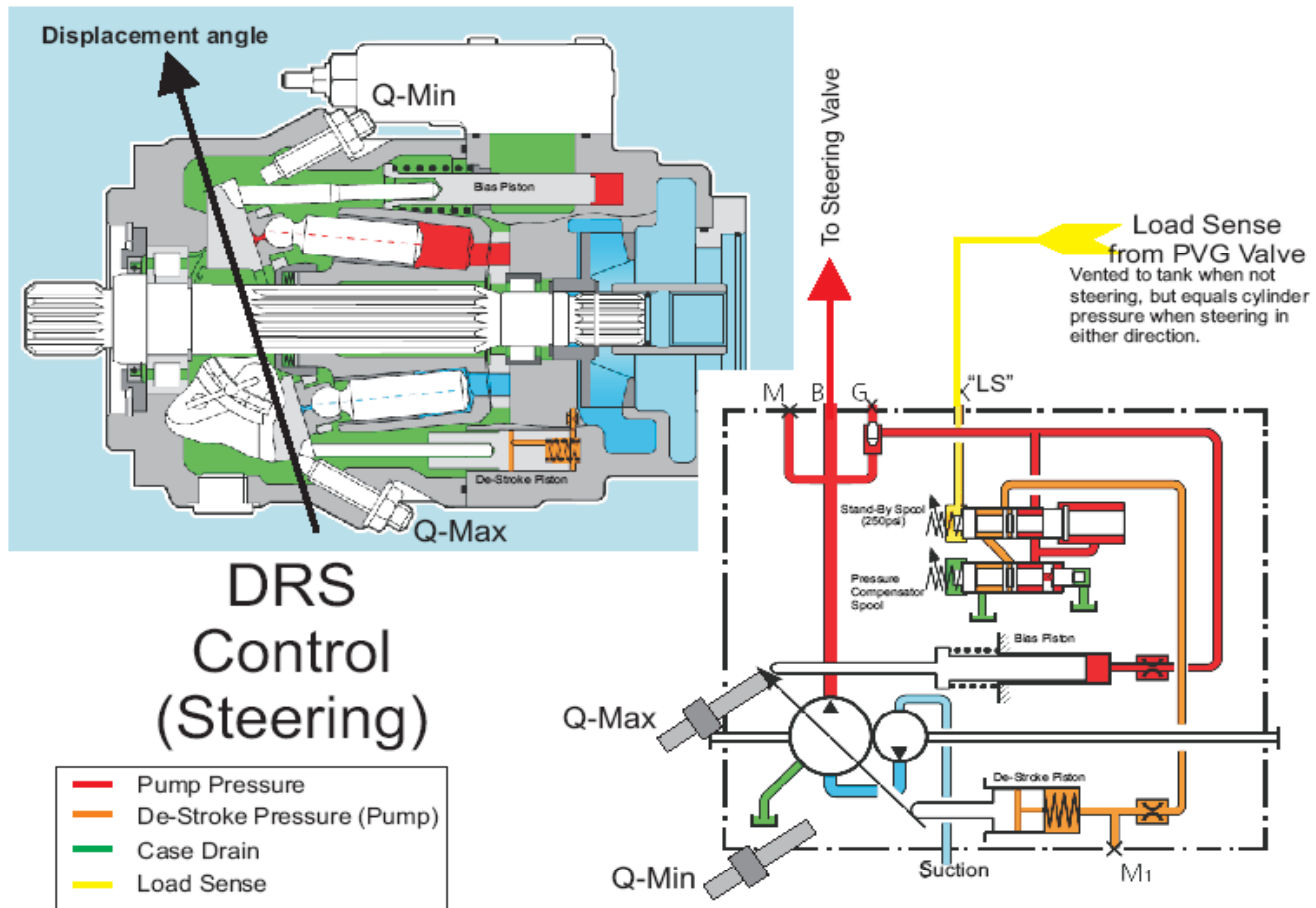


DRG Control (Blower / Fan)

- Pump Pressure
- De-Stroke Pressure (Pump)
- Case Drain
- Load Sense

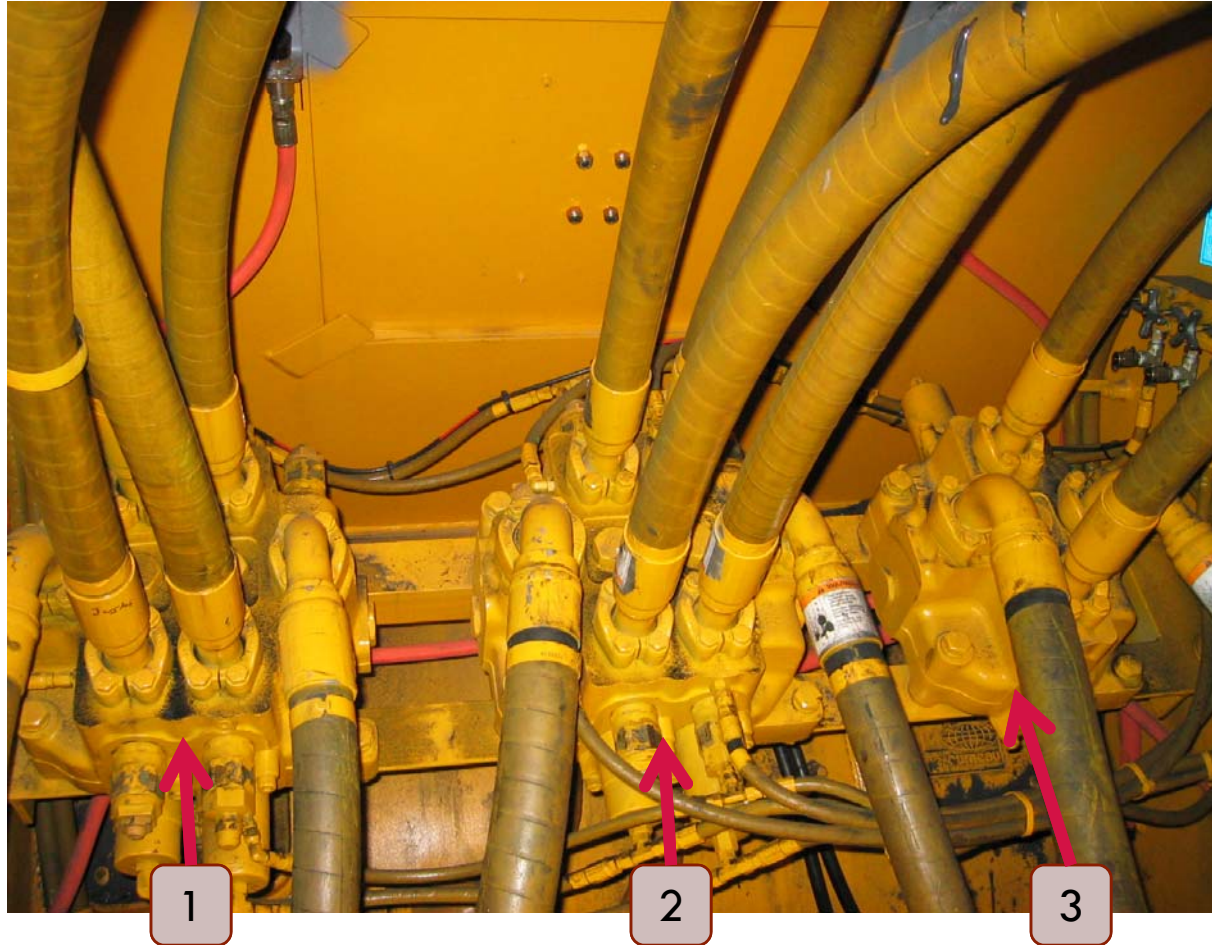
TA15327-2

Blower/fan pump



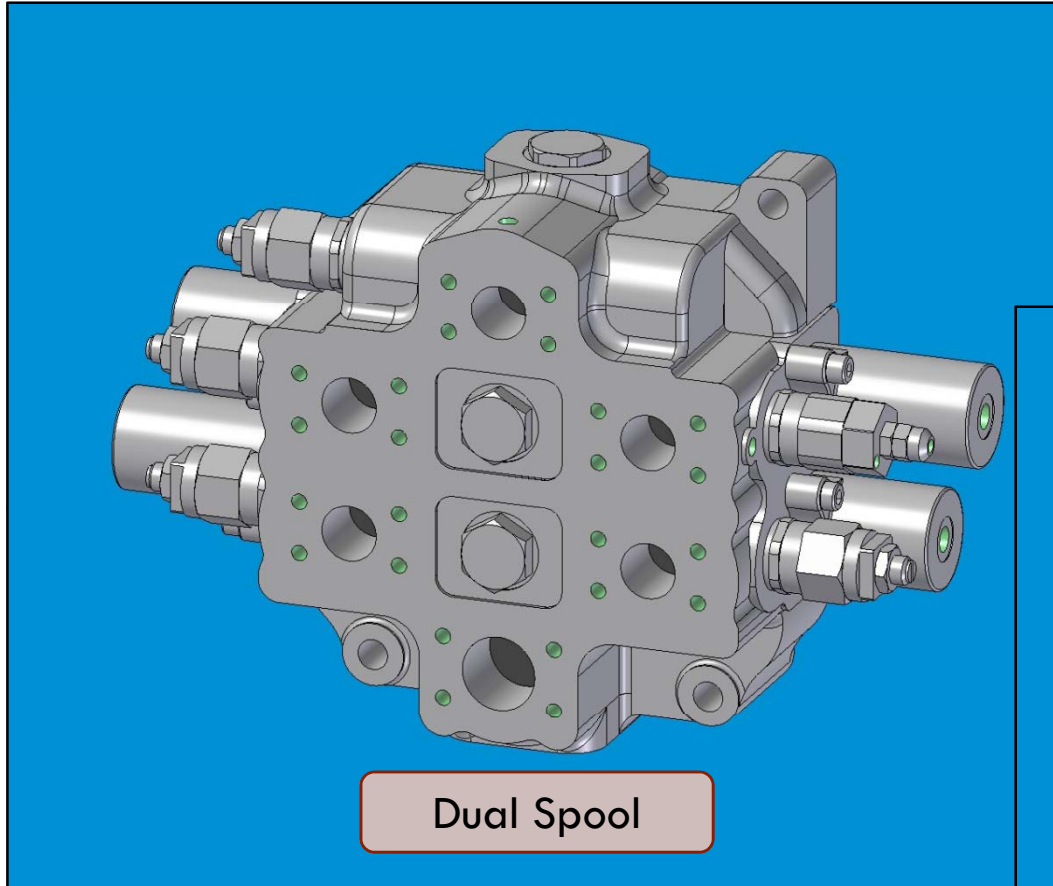
Steering pump



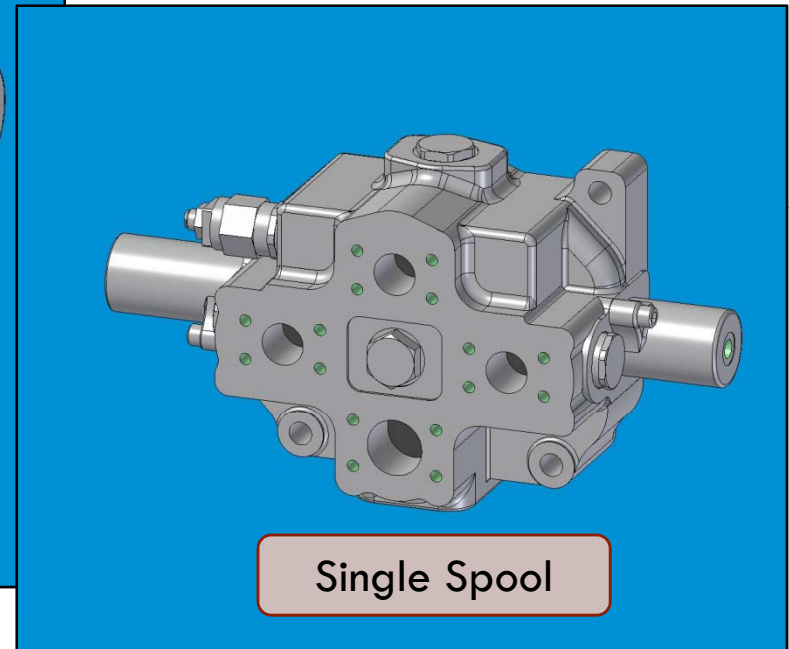


Main hoist and bucket control valves [husco]





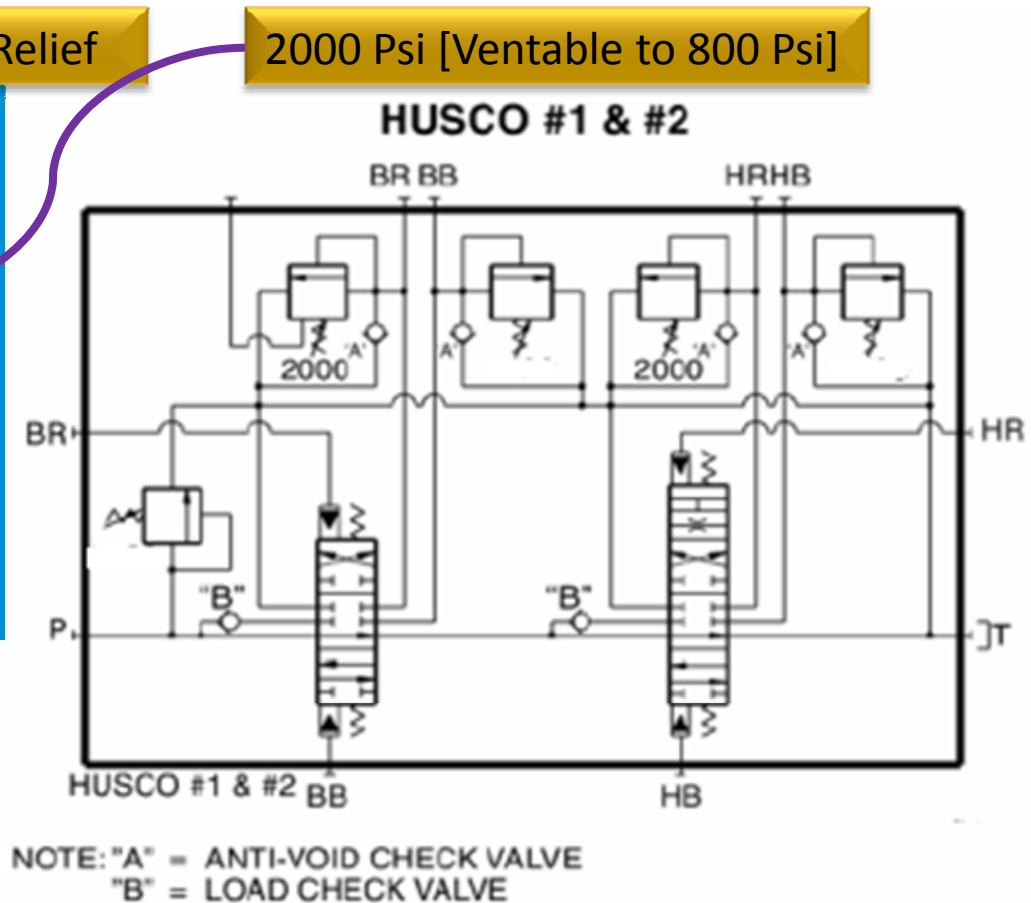
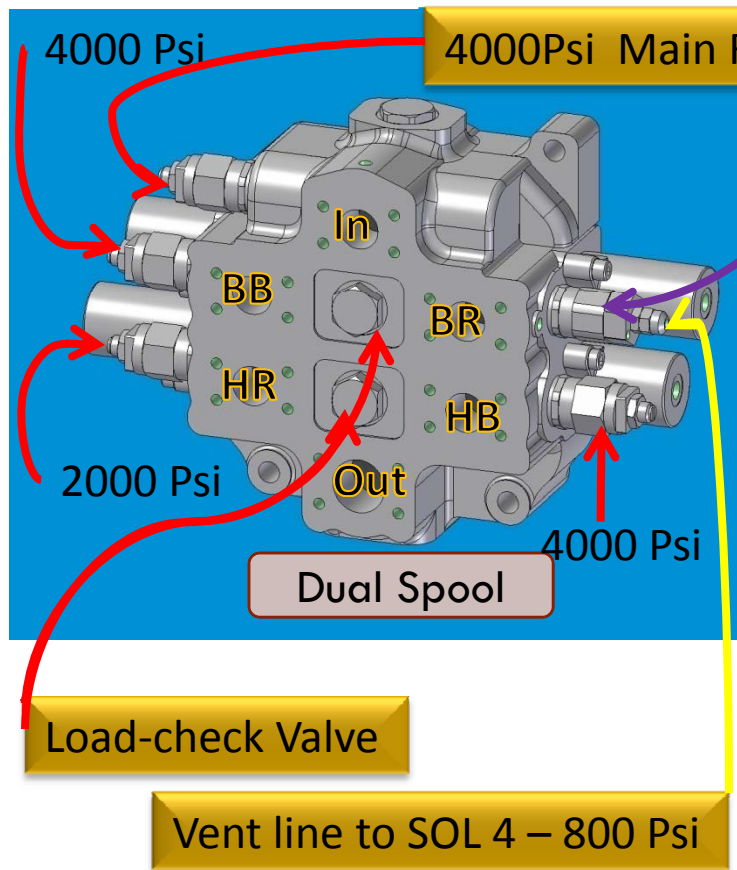
Dual Spool



Single Spool

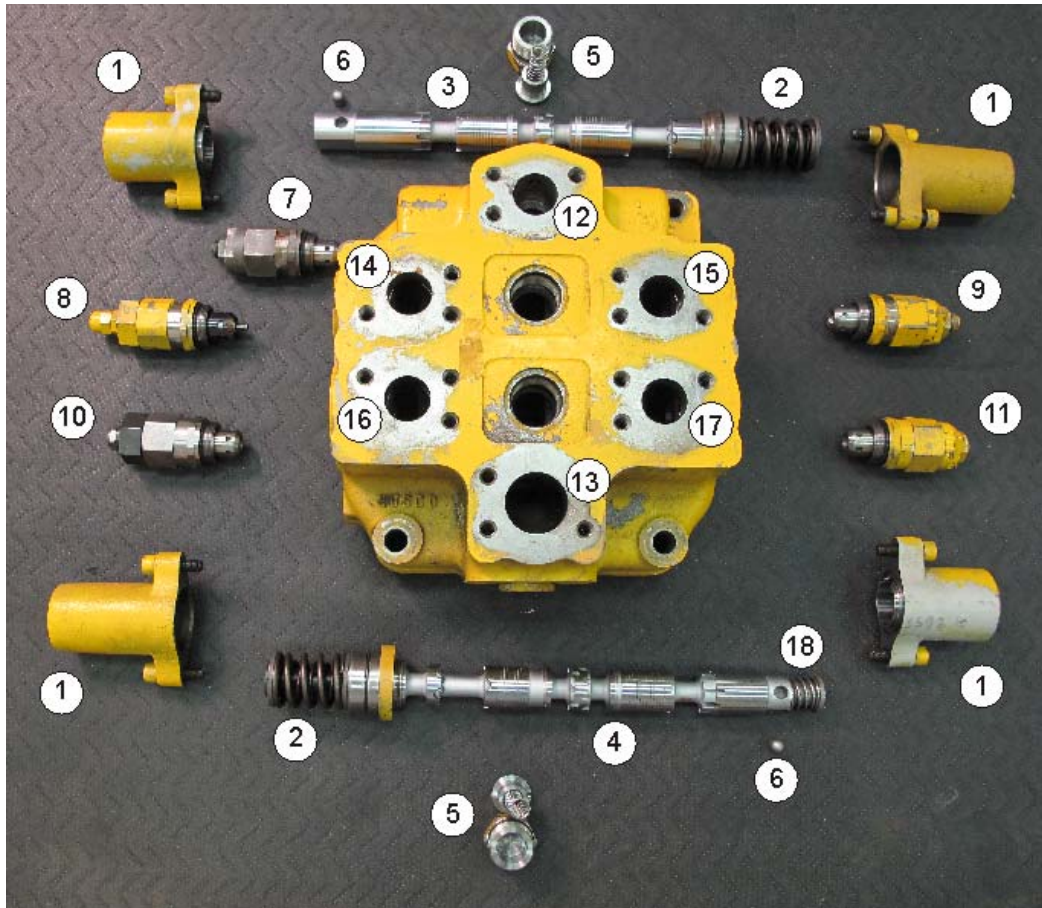
Main hoist and bucket control valves [husco]





Dual spool husco valve





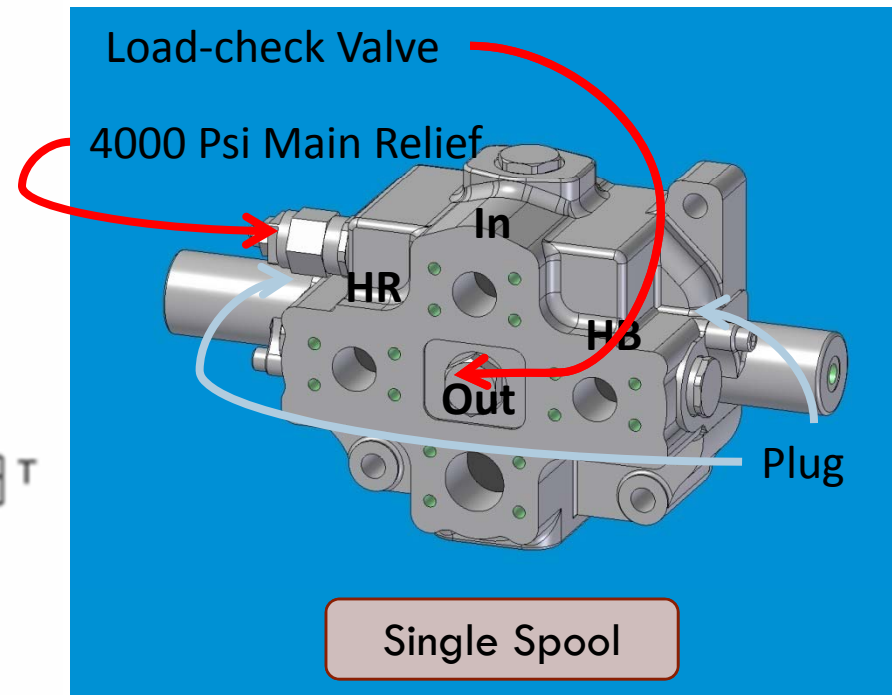
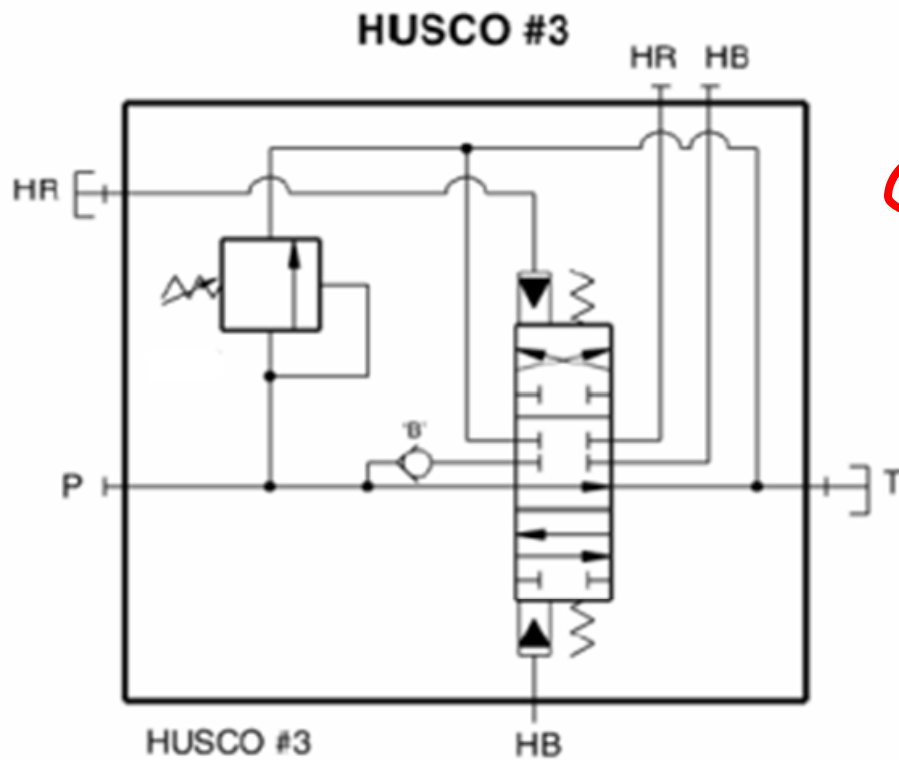
1. End Cap
2. Centering Spring
3. Bucket Spool
4. Hoist Spool
5. Load Check Valve
6. Anti-Rotation Pin
7. Main Relief
8. Bucket Relief
9. Bucket Relief – Vented
10. Hoist Rod Relief
11. Hoist Base Relief
12. Inlet
13. Return
14. Bucket Base
15. Bucket Rod
16. Hoist Rod
17. Hoist Base
18. Float Spring

Dual spool husco valve

Component Descriptions

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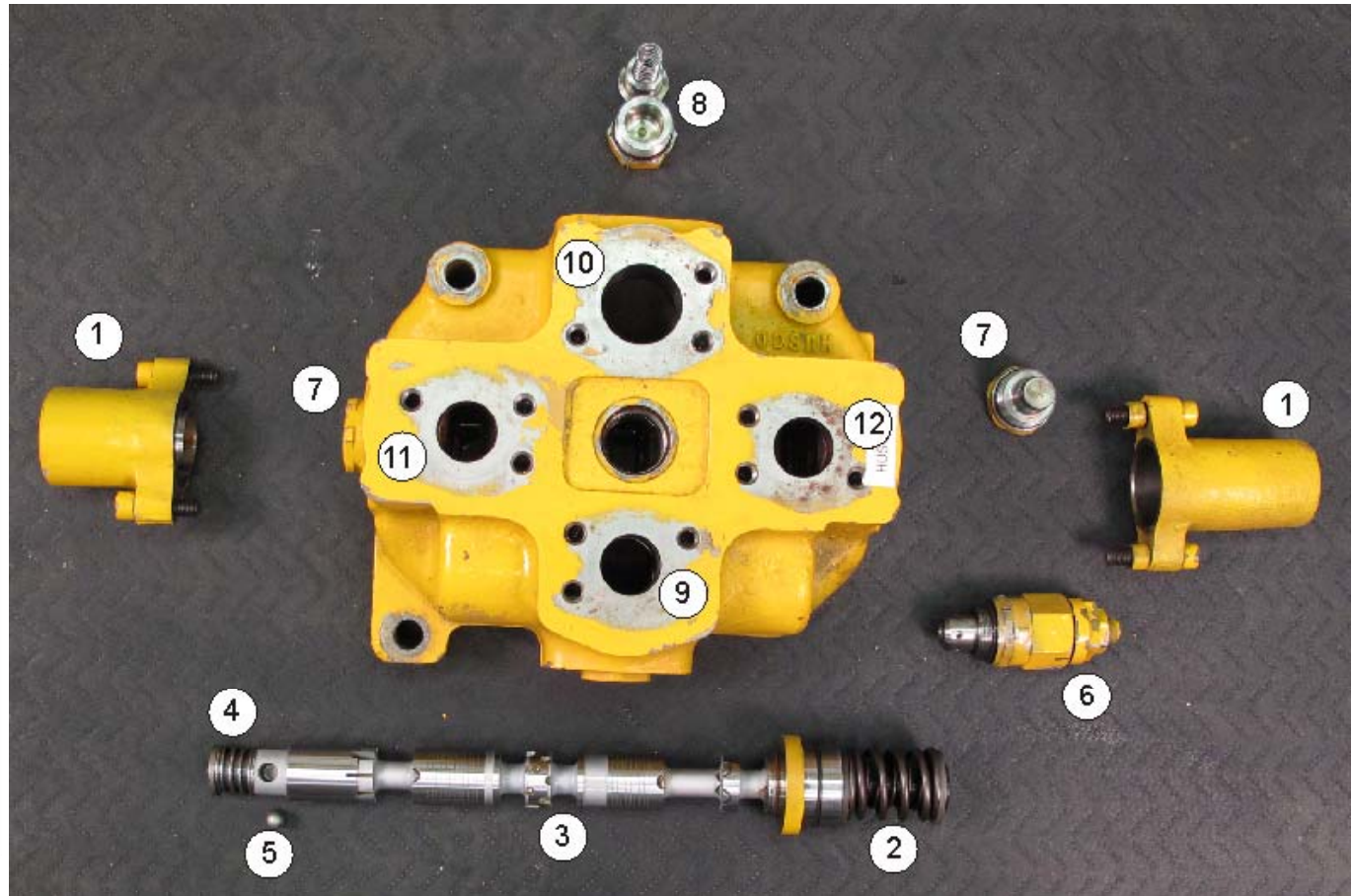




Single spool husco valve



1. End Cap
2. Centering Spring
3. Hoist Spool
4. Float Spring [Not Used]
5. Anti-Rotation Pin
6. Main Relief
7. Plug [Circuit Relief]
8. Load Check Valve
9. Inlet
10. Return
11. Hoist Base
12. Hoist Rod

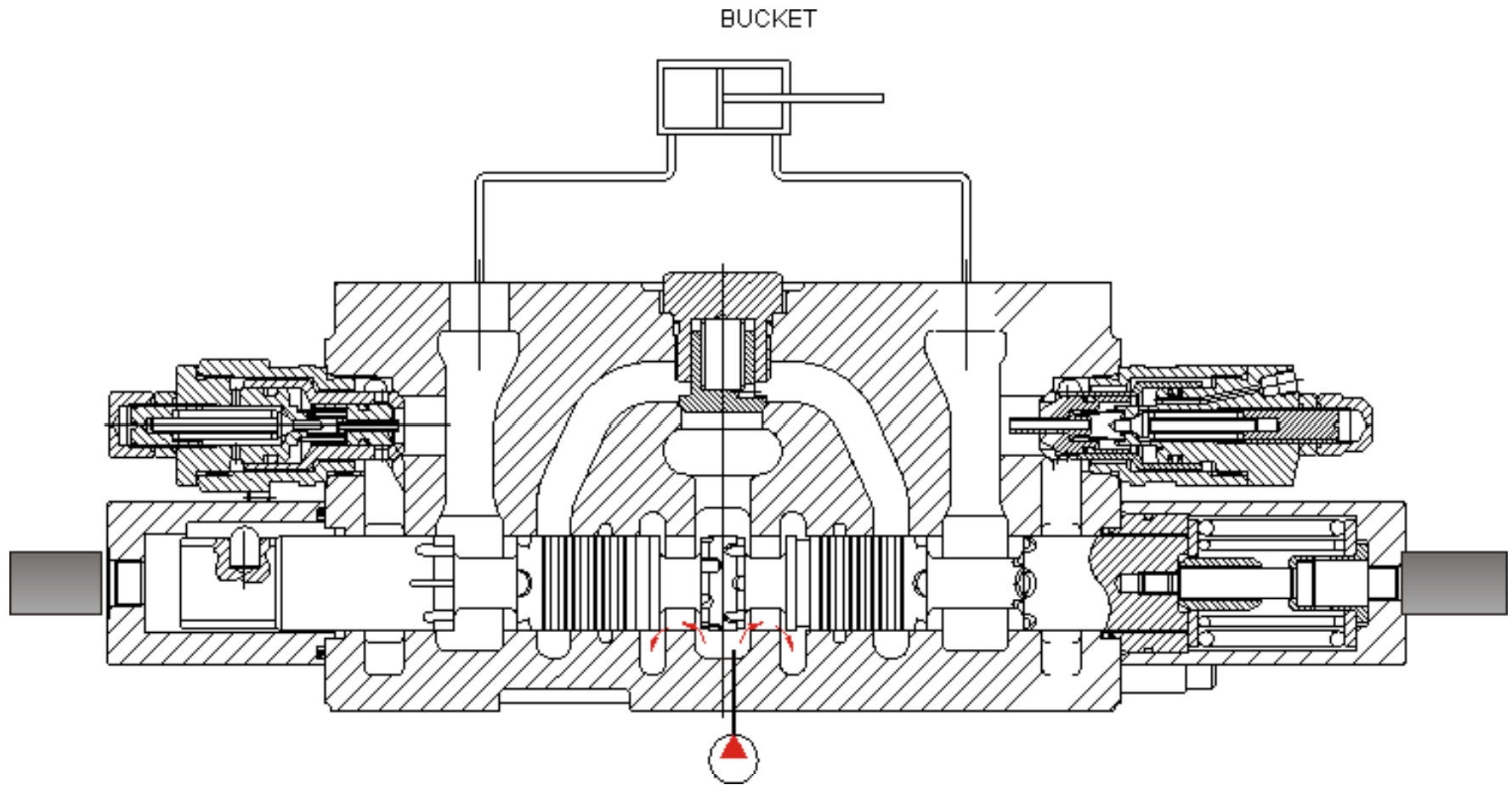


SINGLE spool husco valve

Component Descriptions

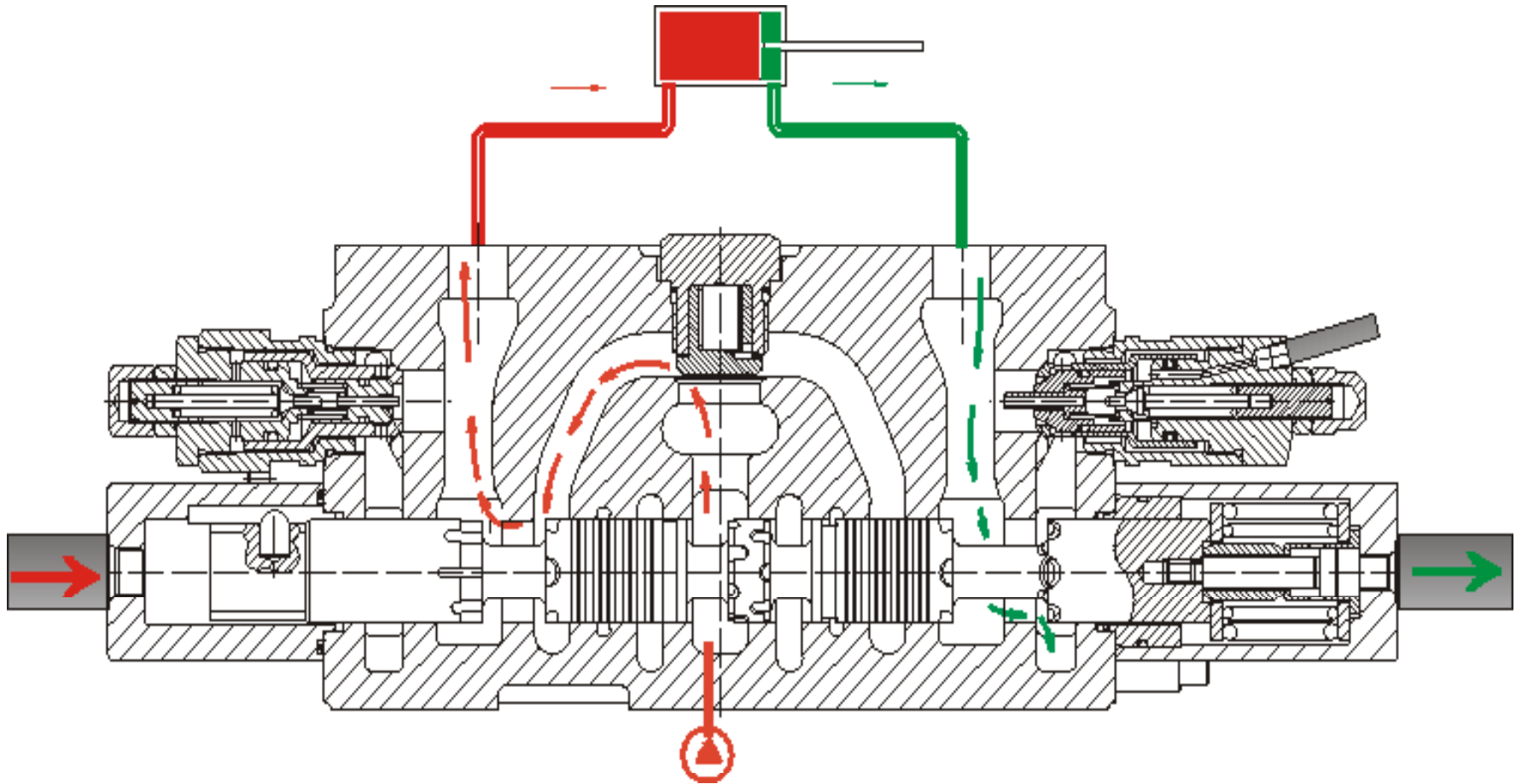
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Bucket neutral



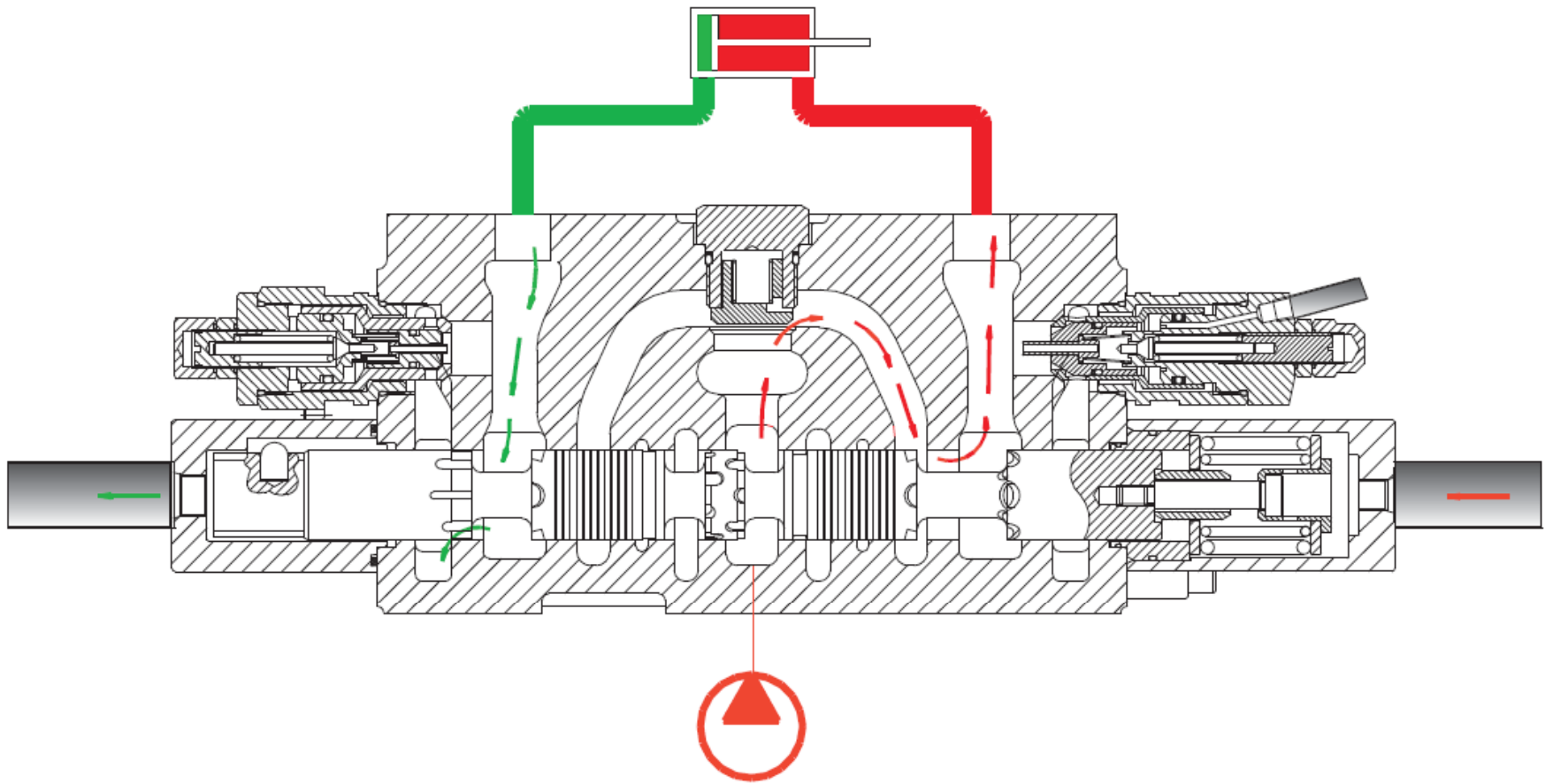


Bucket rollback

Component Descriptions

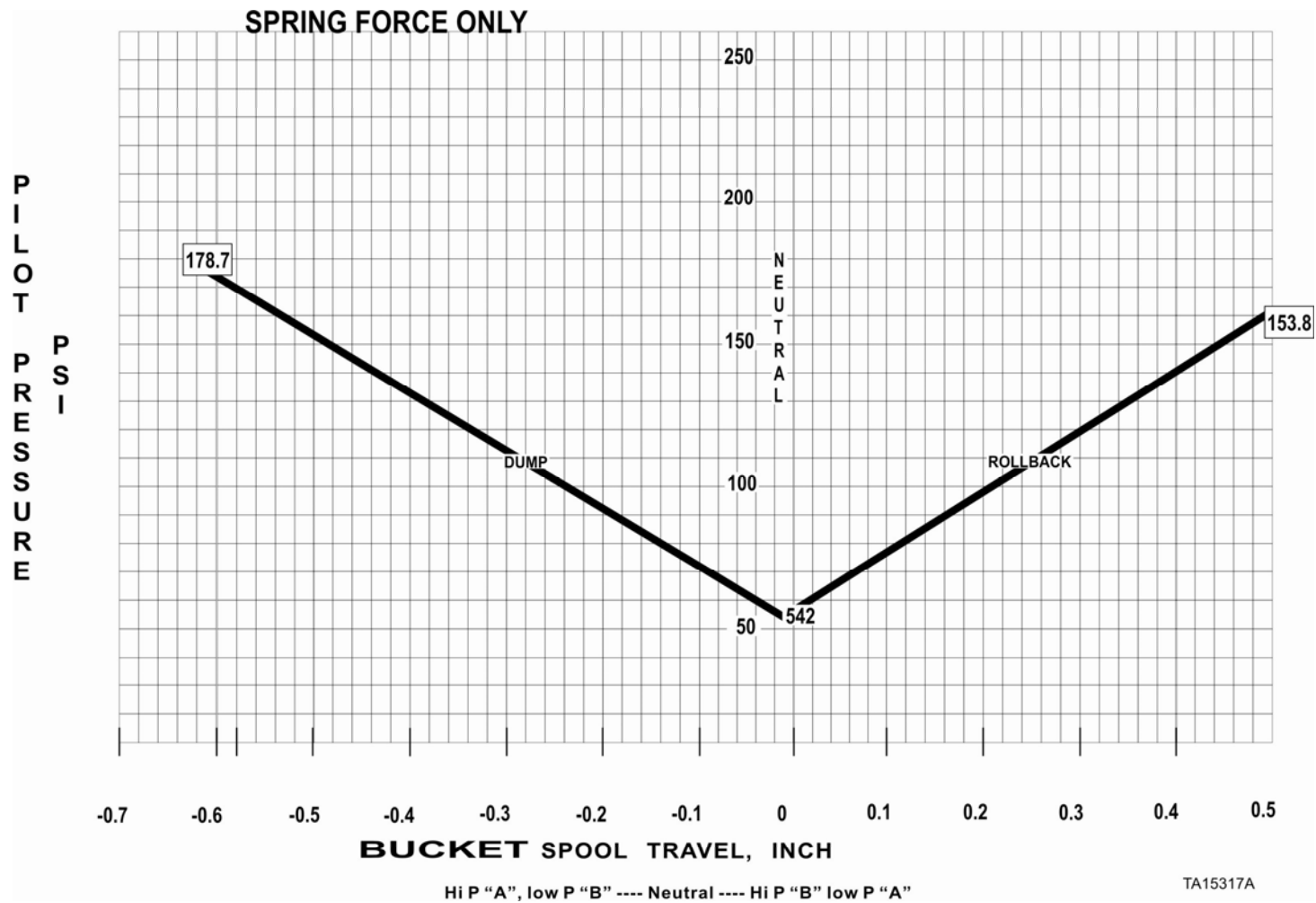
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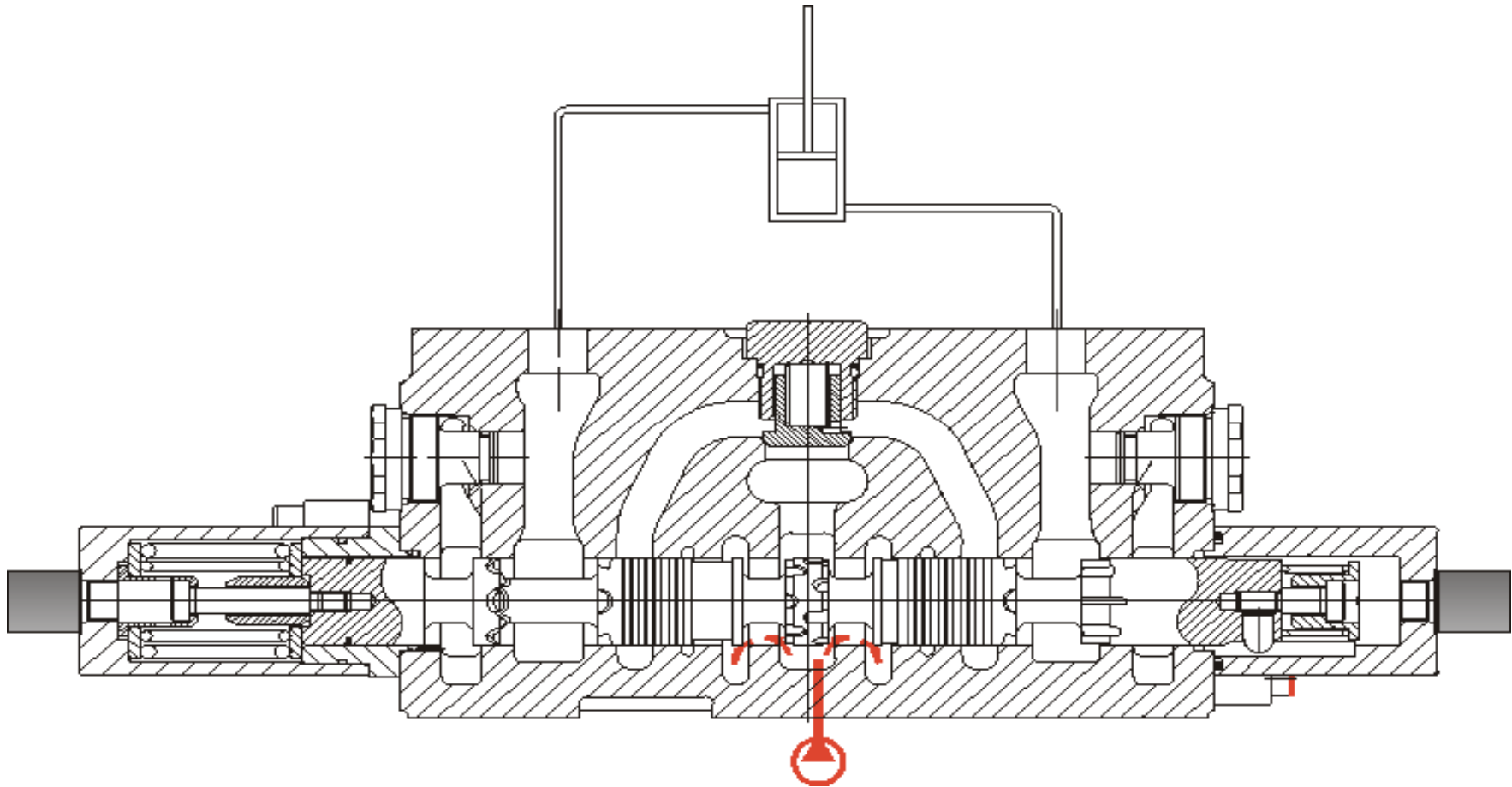
Bucket dump





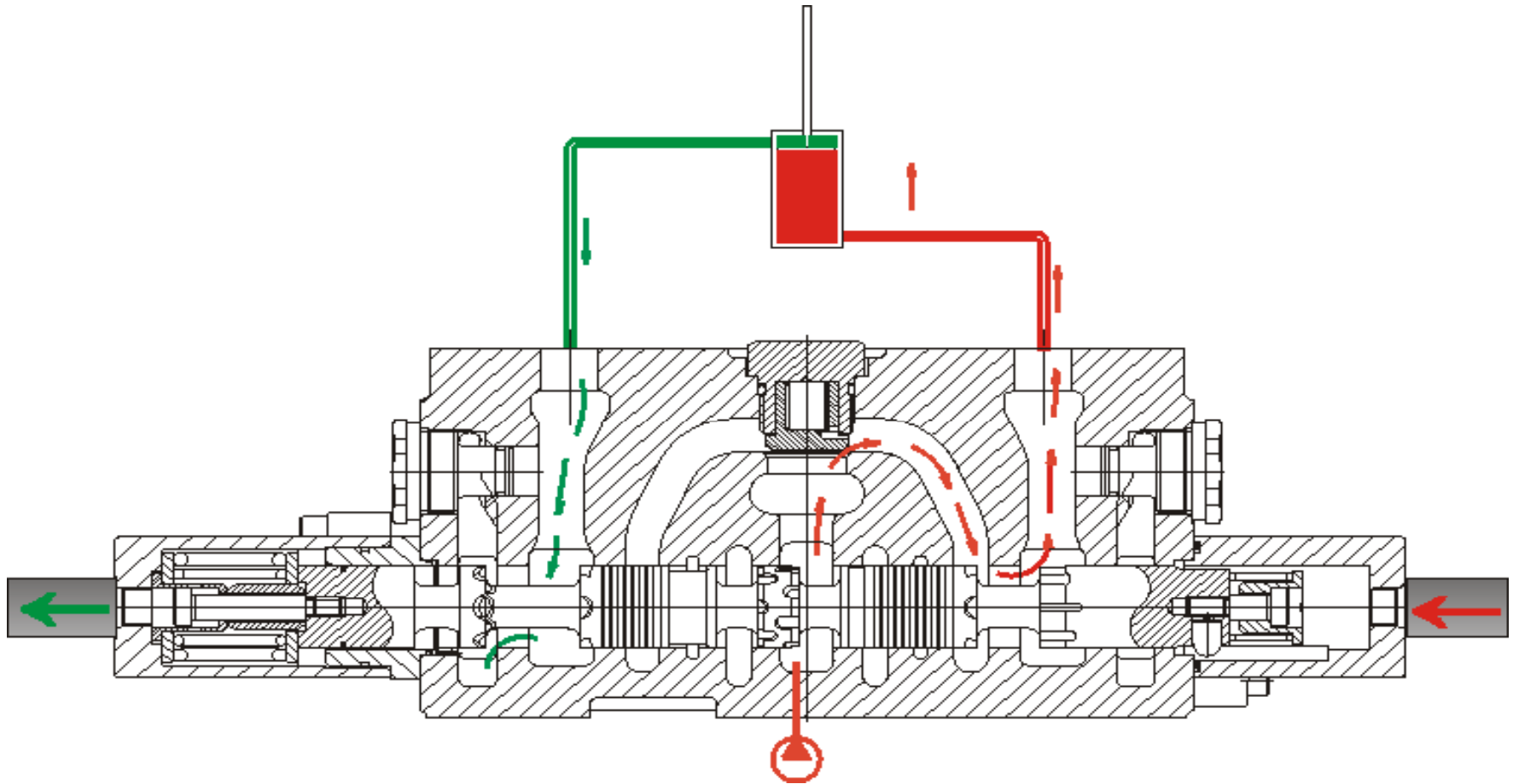
Spool movement [normal]





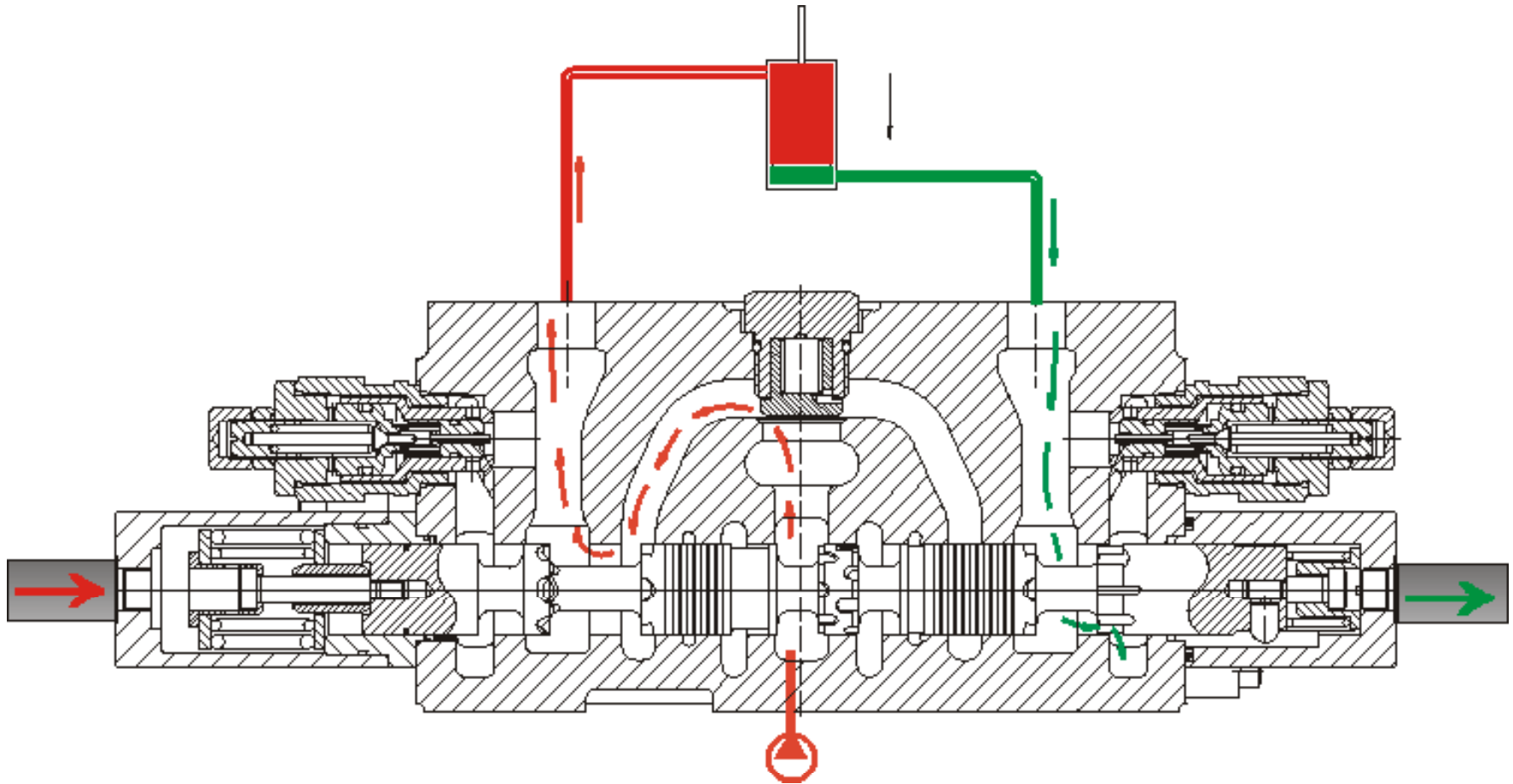
Hoist neutral





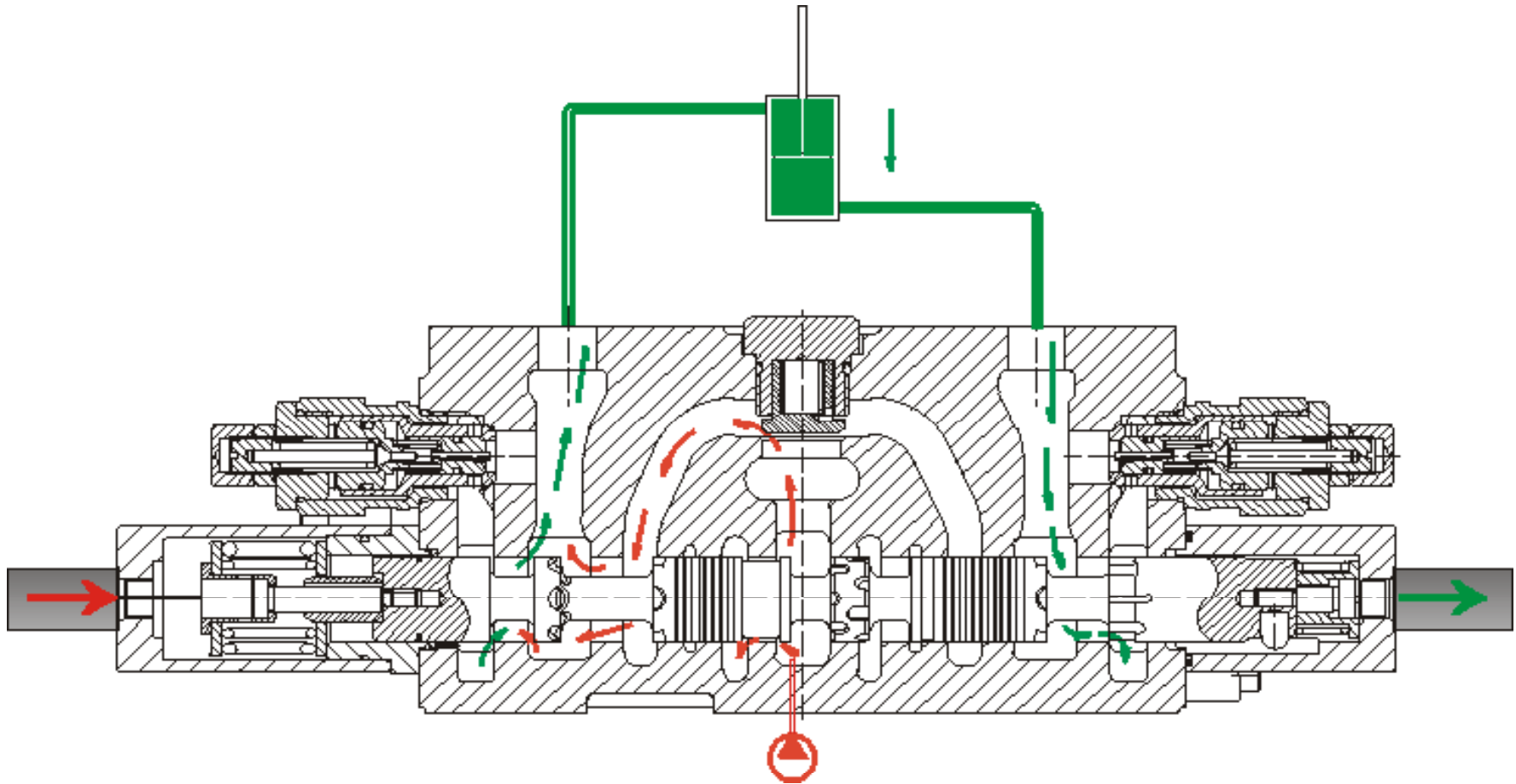
Hoist up





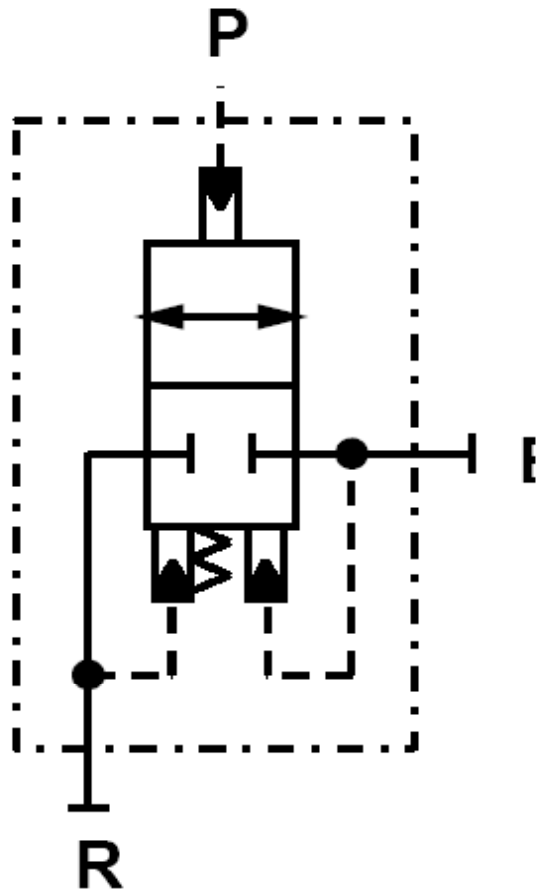
Power down





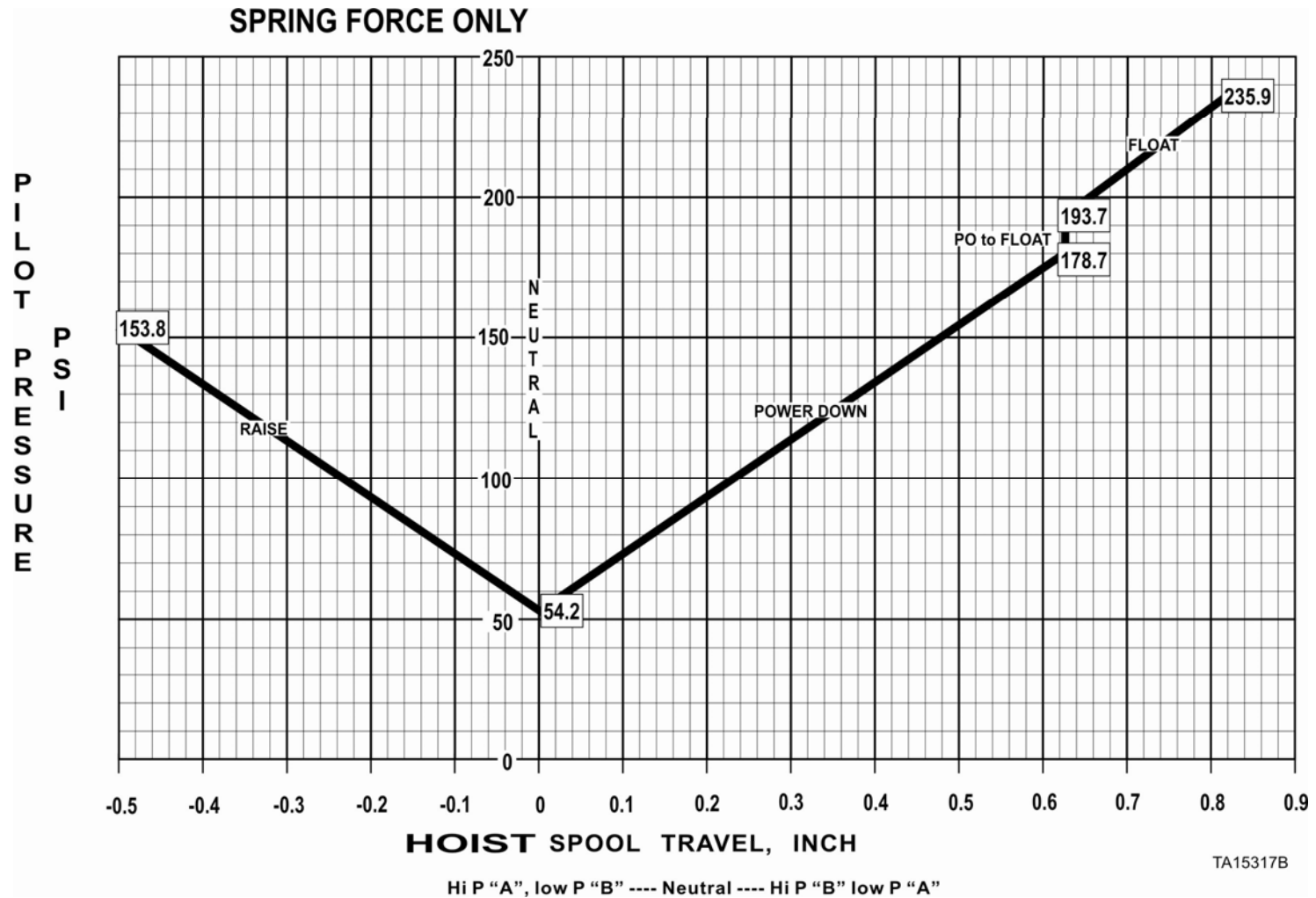
Float





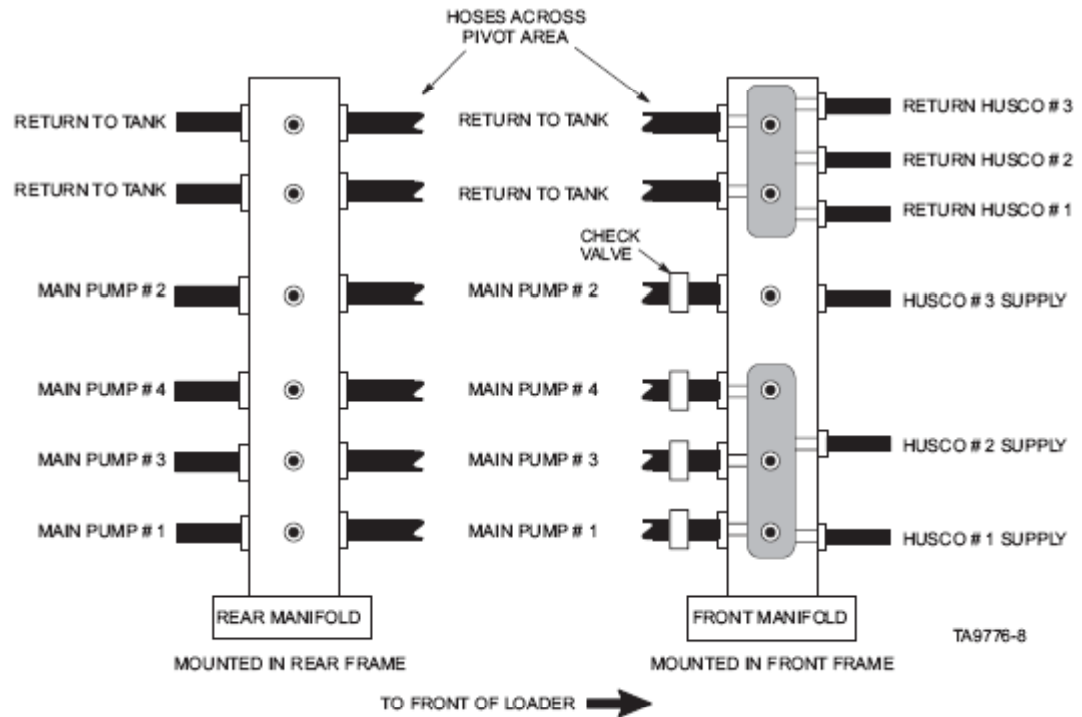
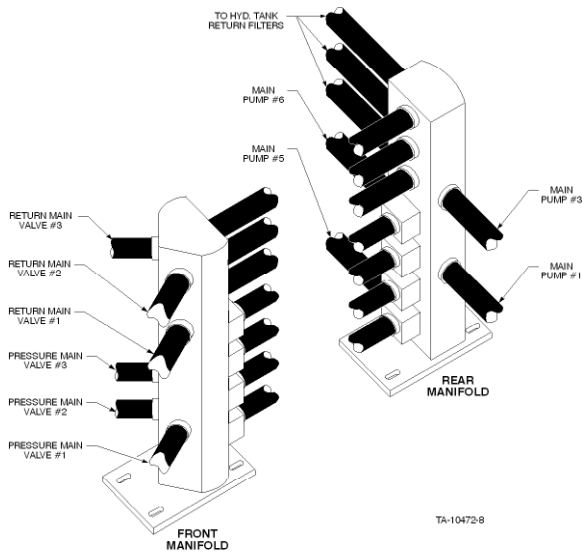
Float valves





Spool movement [Float]





Multi-port distribution manifolds



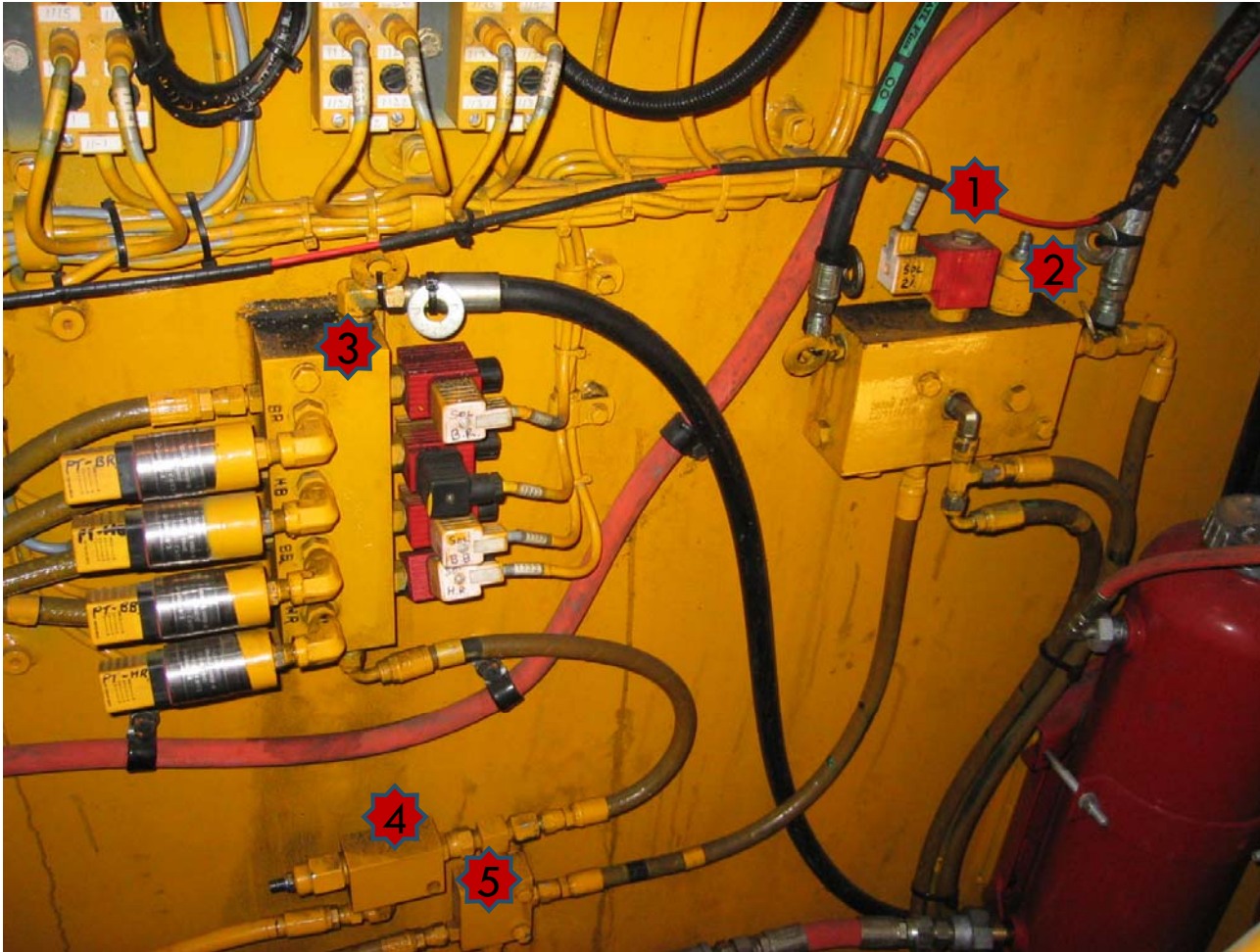


Manual bleed valves

Component Descriptions

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1. Solenoid 21
2. Not Used
3. Solenoid Manifold
4. 600 PSI Relief
5. 450 PSI Reducing Valve

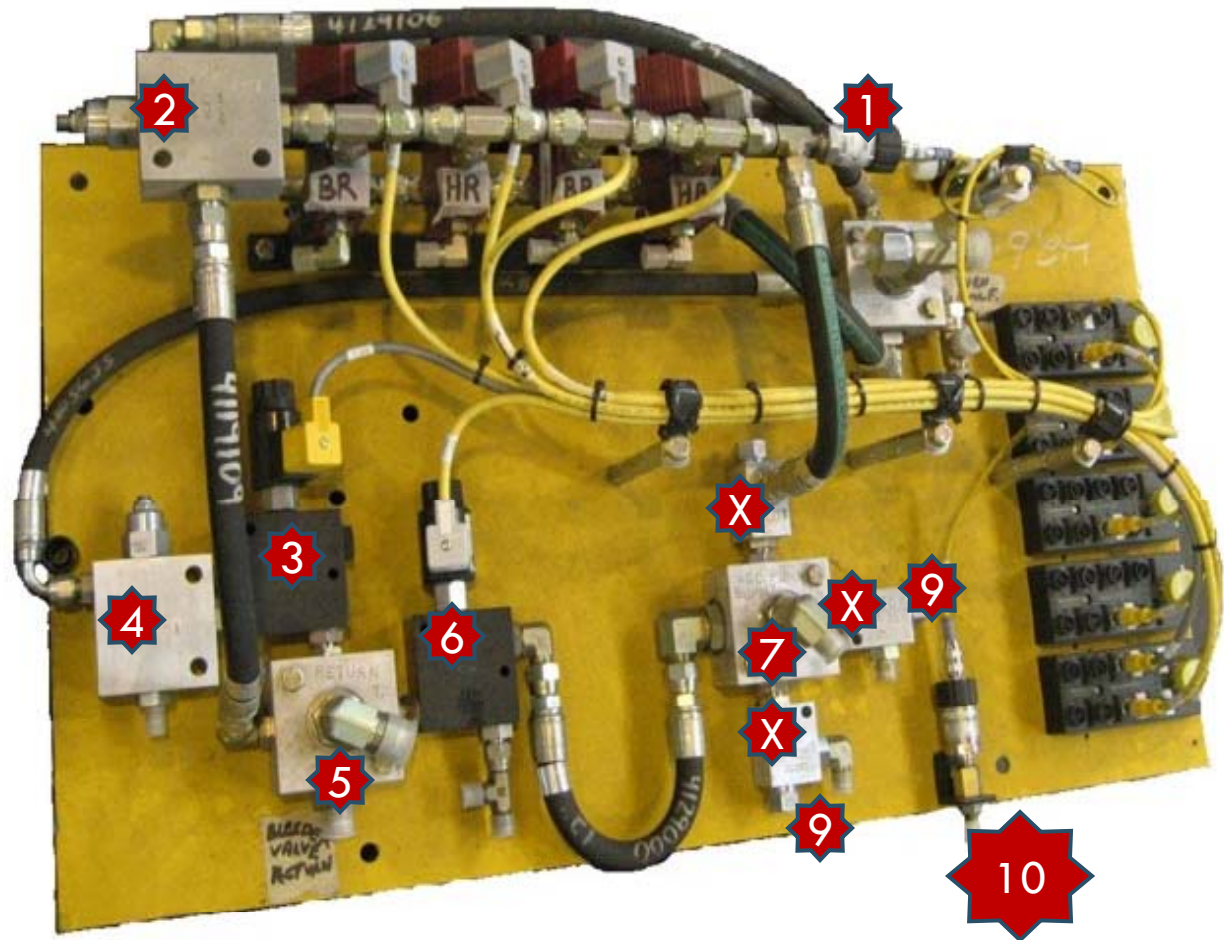
Old-style pilot system

Component Descriptions

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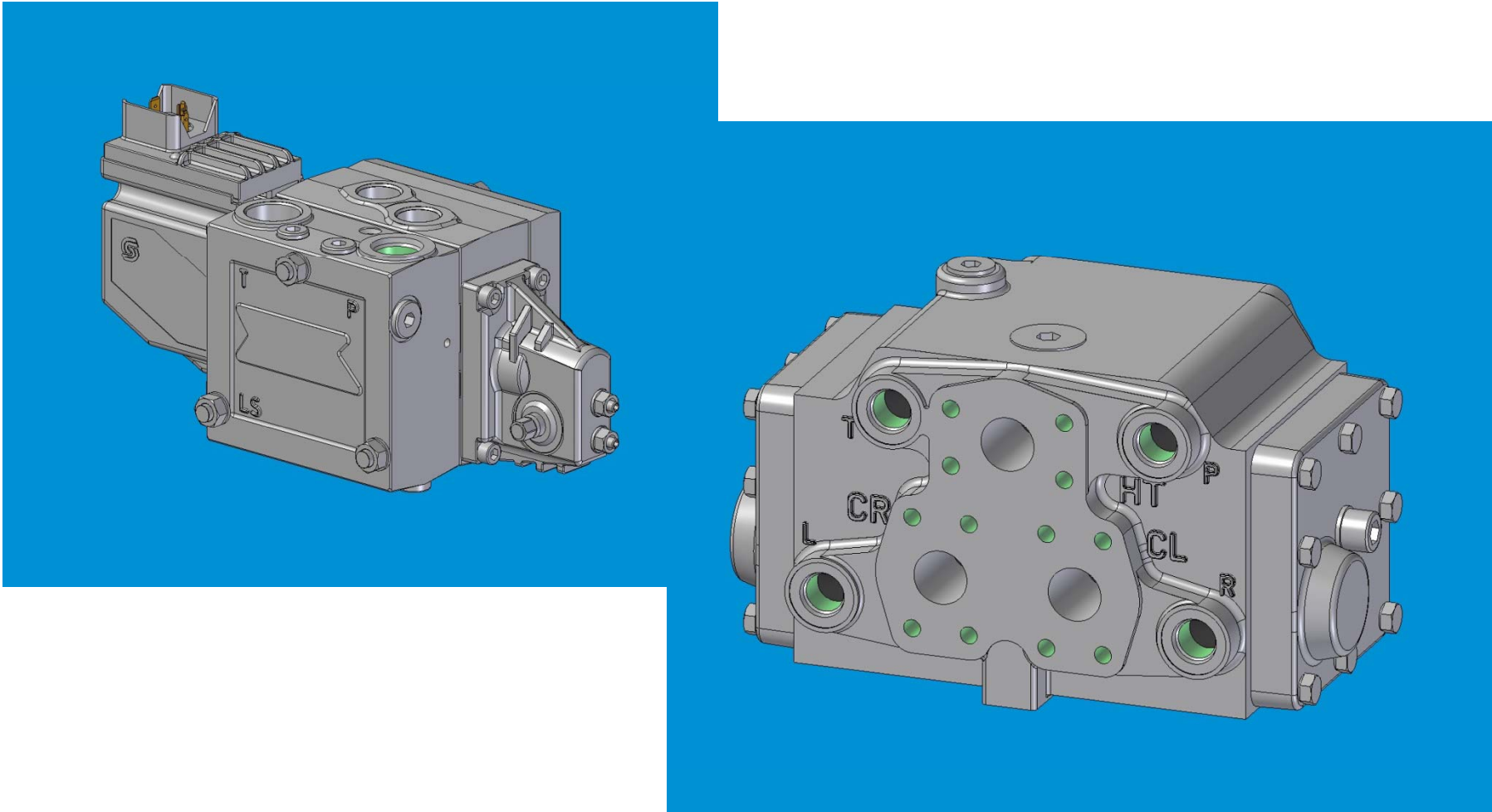


1. Pilot Supply Transducer
 2. 450 PSI Relief
 3. Solenoid 4
 4. 800 PSI Relief
 5. To Tank
 6. Solenoid 21
 7. From Accessory Pump
 8. To Auto Lube
 9. To Driver Filtration
 10. Pilot Command
- X. 2.5 GPM Flow Controls



Current pilot system



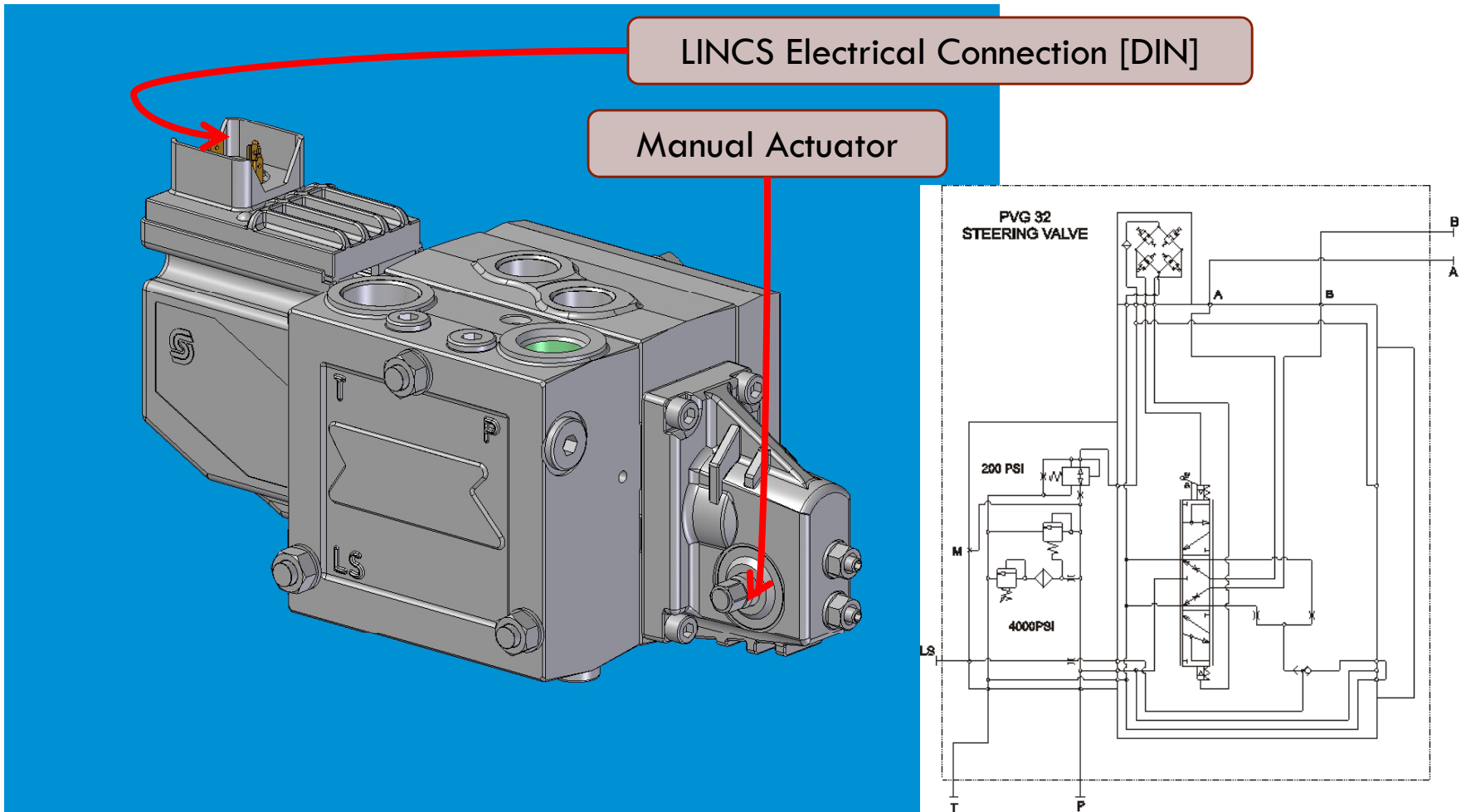


Steering main valves

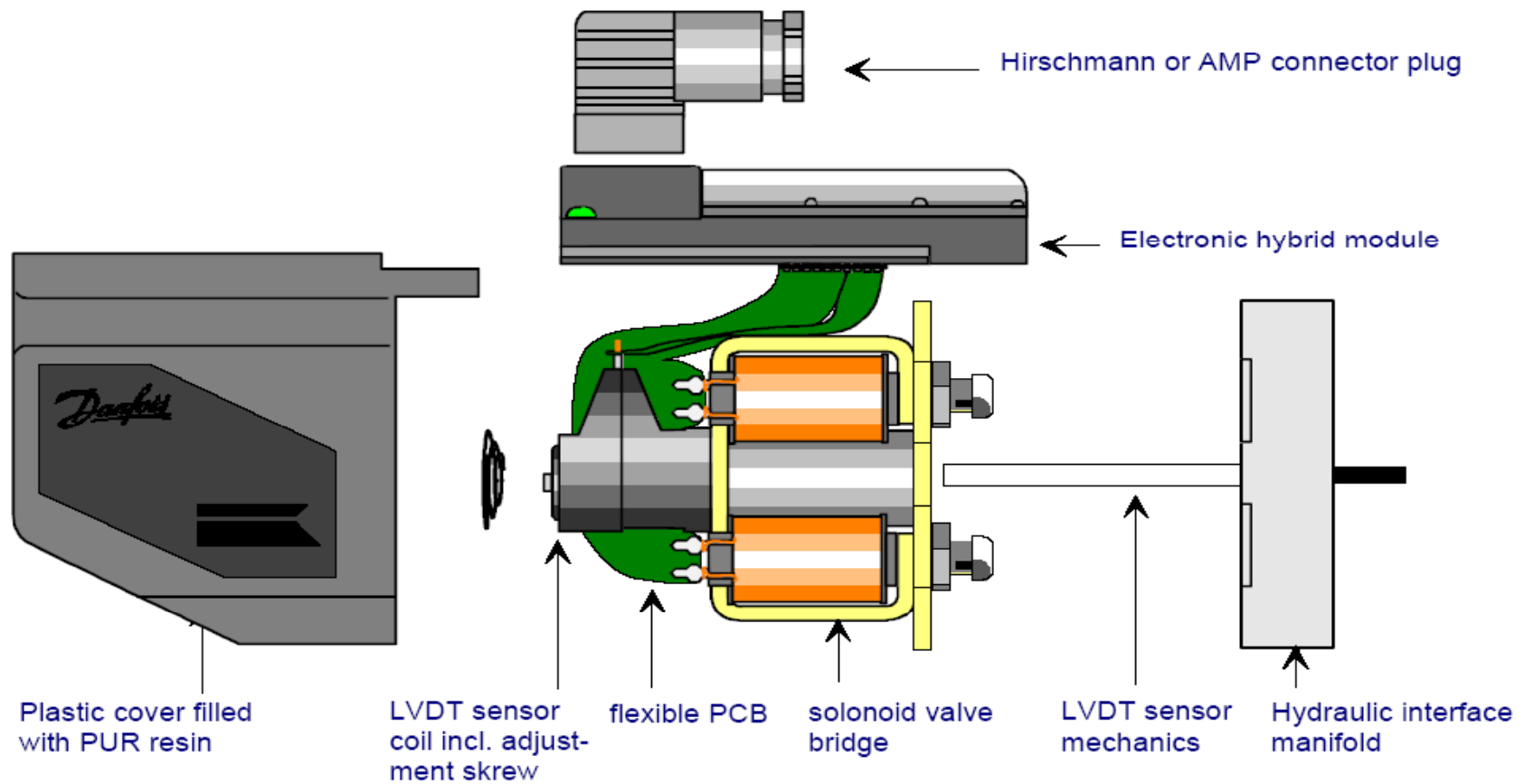
Component Descriptions

LeTourneau Technologies, Inc



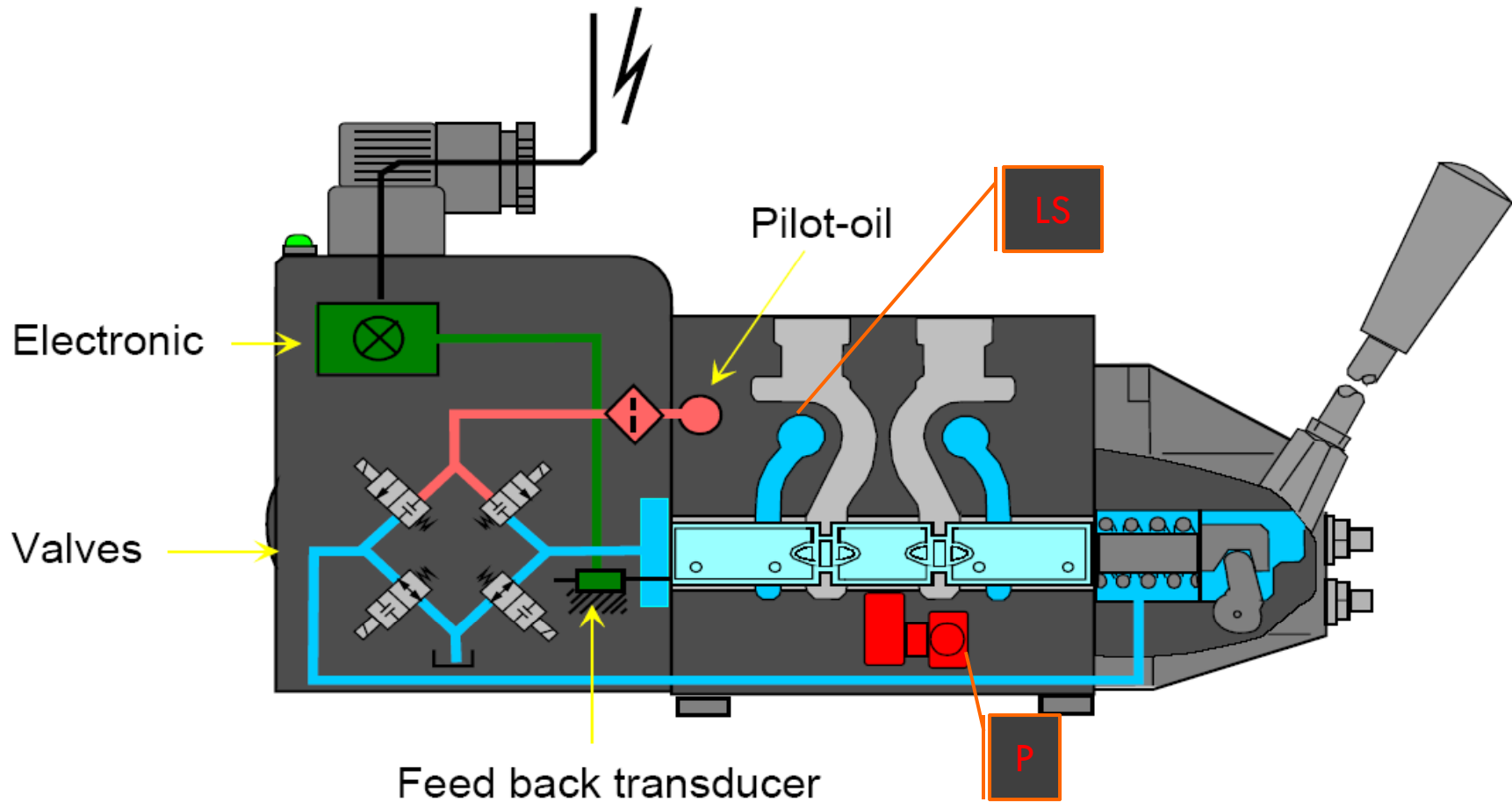


Pvg 32



Coil components



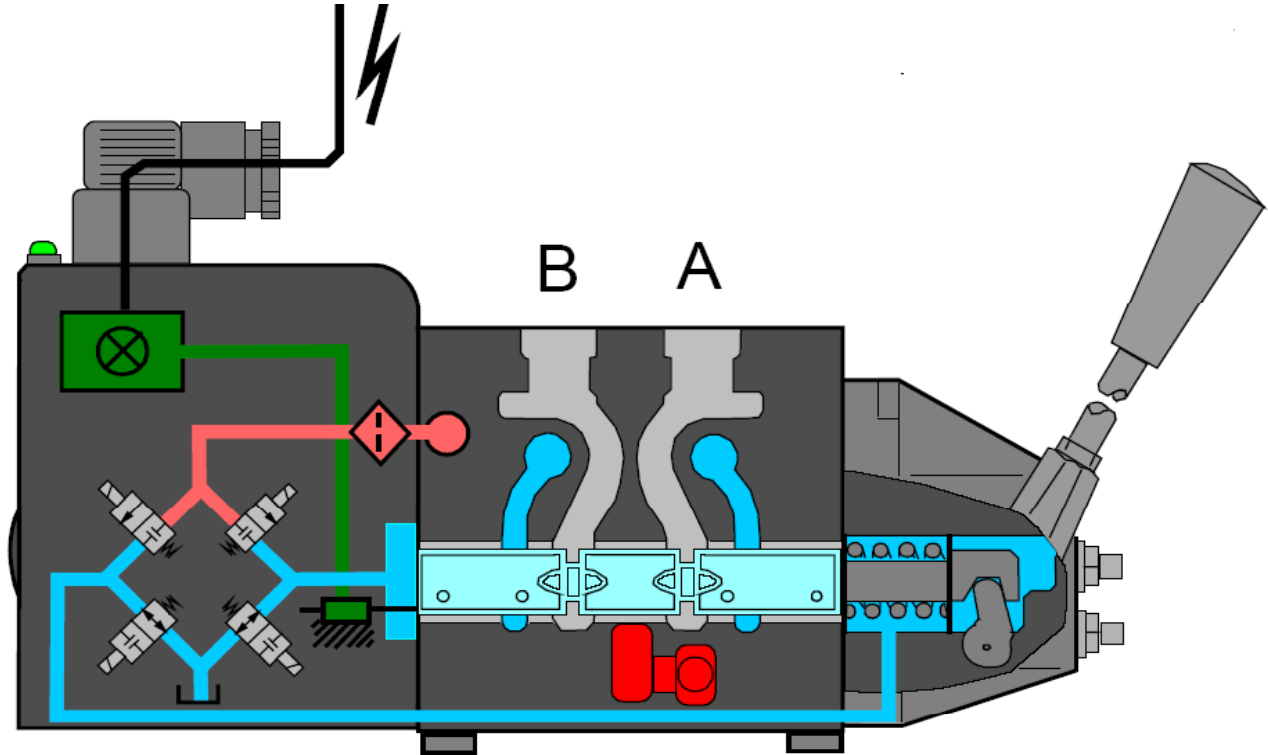


Pvg components



Poppet valves
vent both sides of
spool to tank.

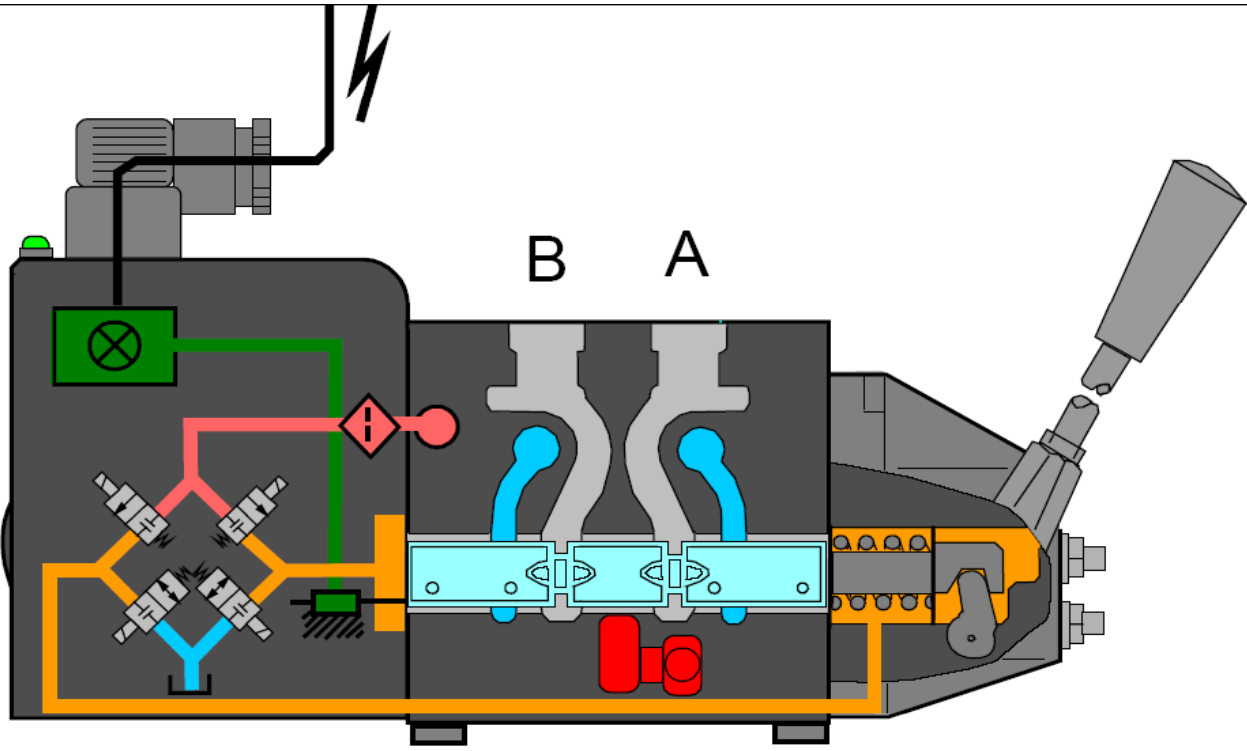
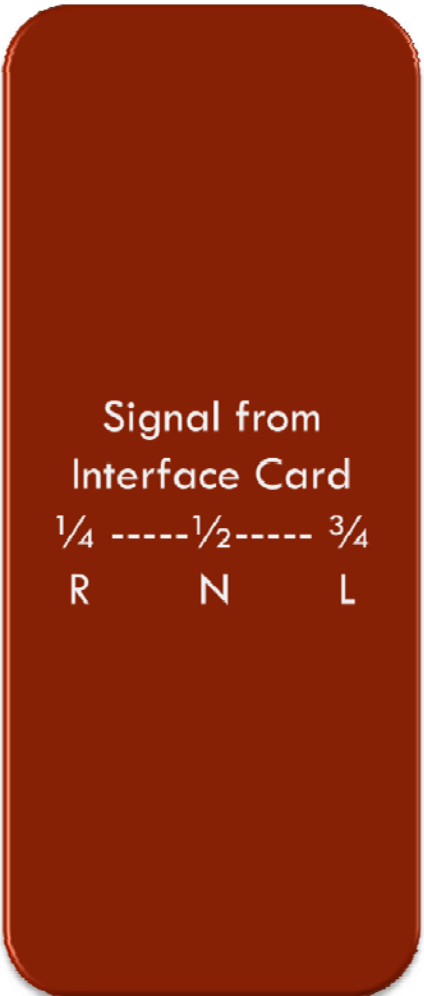
Remove connector
to manually move
the spool with a
9mm wrench.



Electrical power disconnected. Spring center
to neutral.

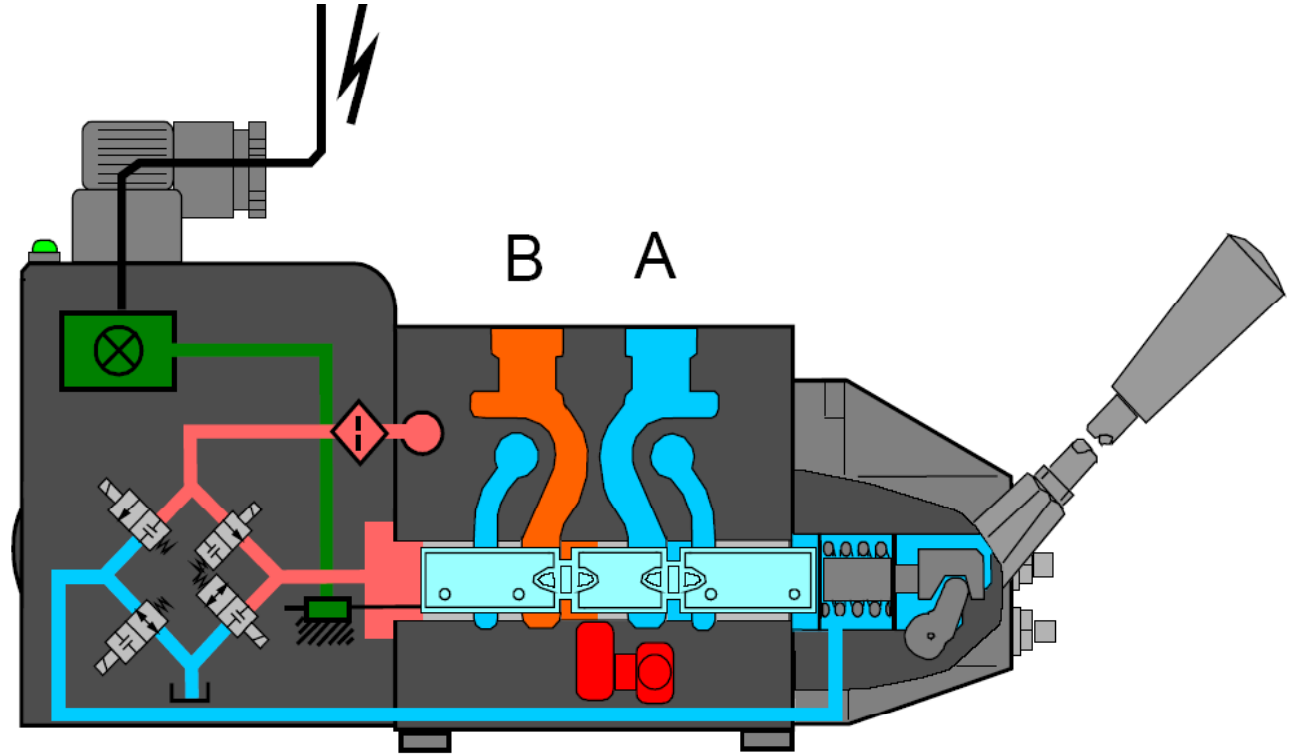
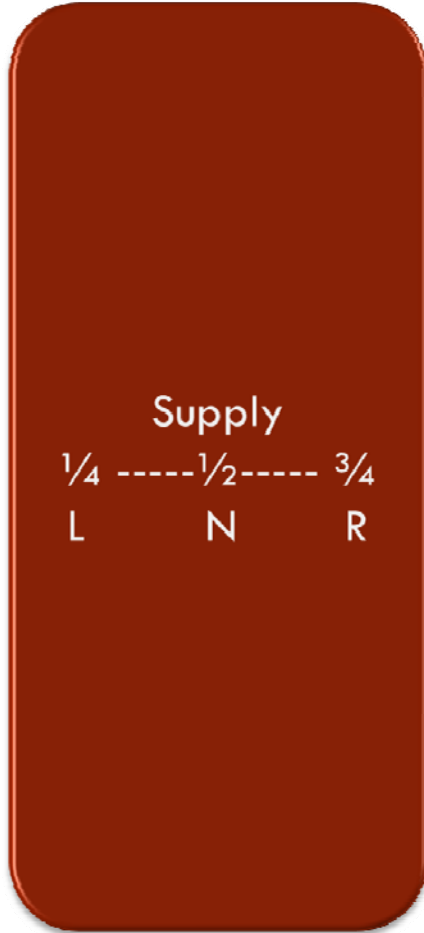
Off/neutral





Electrical power connected. Neutral signal from joystick. Spool held in neutral by pilot pressure.

On/neutral



As joystick signal requests flow to B port, spool moved in B direction by pilot pressure.

Commanded



Input signal monitoring

The input voltage is continuously monitored. The acceptable signal range is between 15% and 85% of the supply voltage. If signal voltage goes outside of this range, the system will switch into an error state.

Transducer supervision

If one of the wires to the LVDT sensor, or inside the sensor, is broken or shorted, the system will switch into an error state.

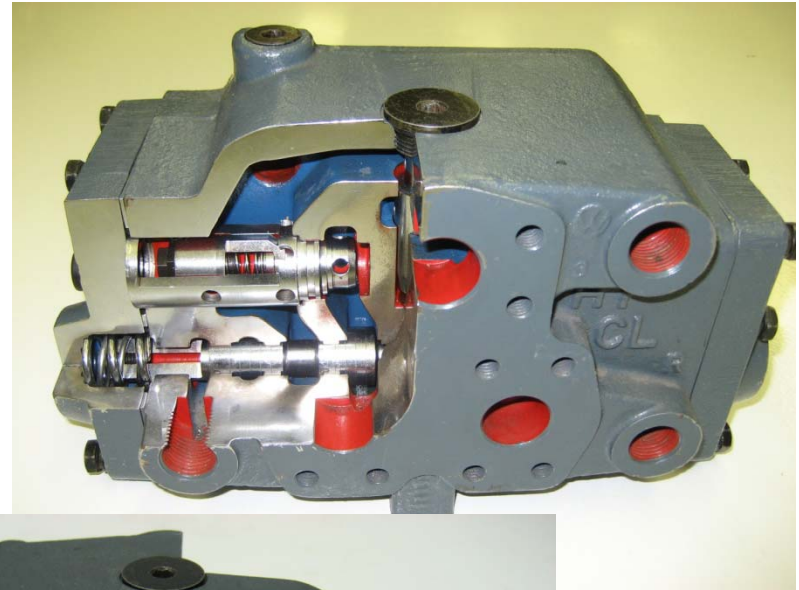
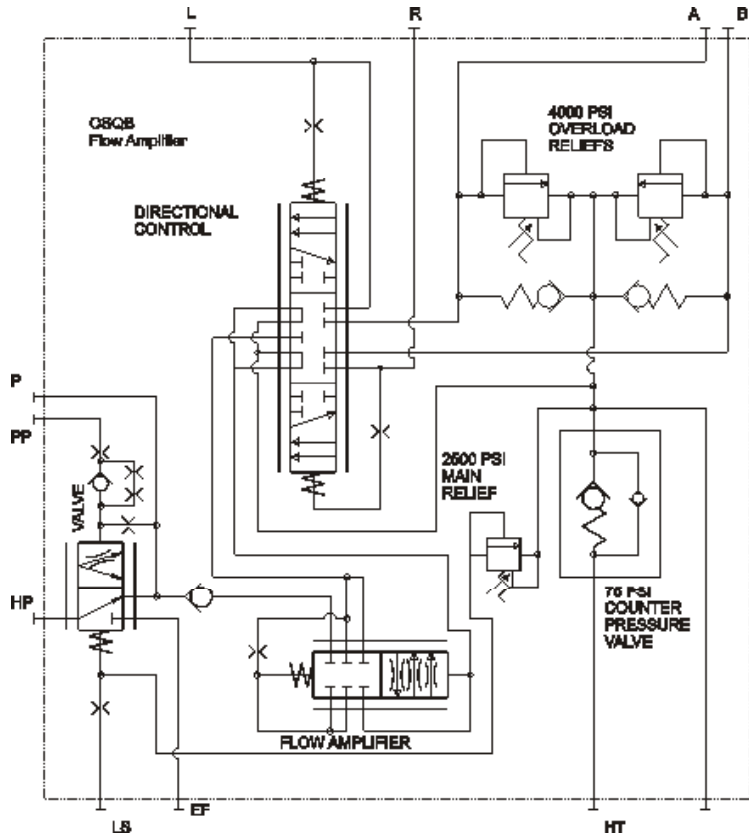
Supervision of the closed loop

The spool position must always correspond to the position requested by the input signal. If the spool is 15% farther from neutral (providing more flow) than requested, the system detects an error and will switch into an error state.

Fault Monitoring

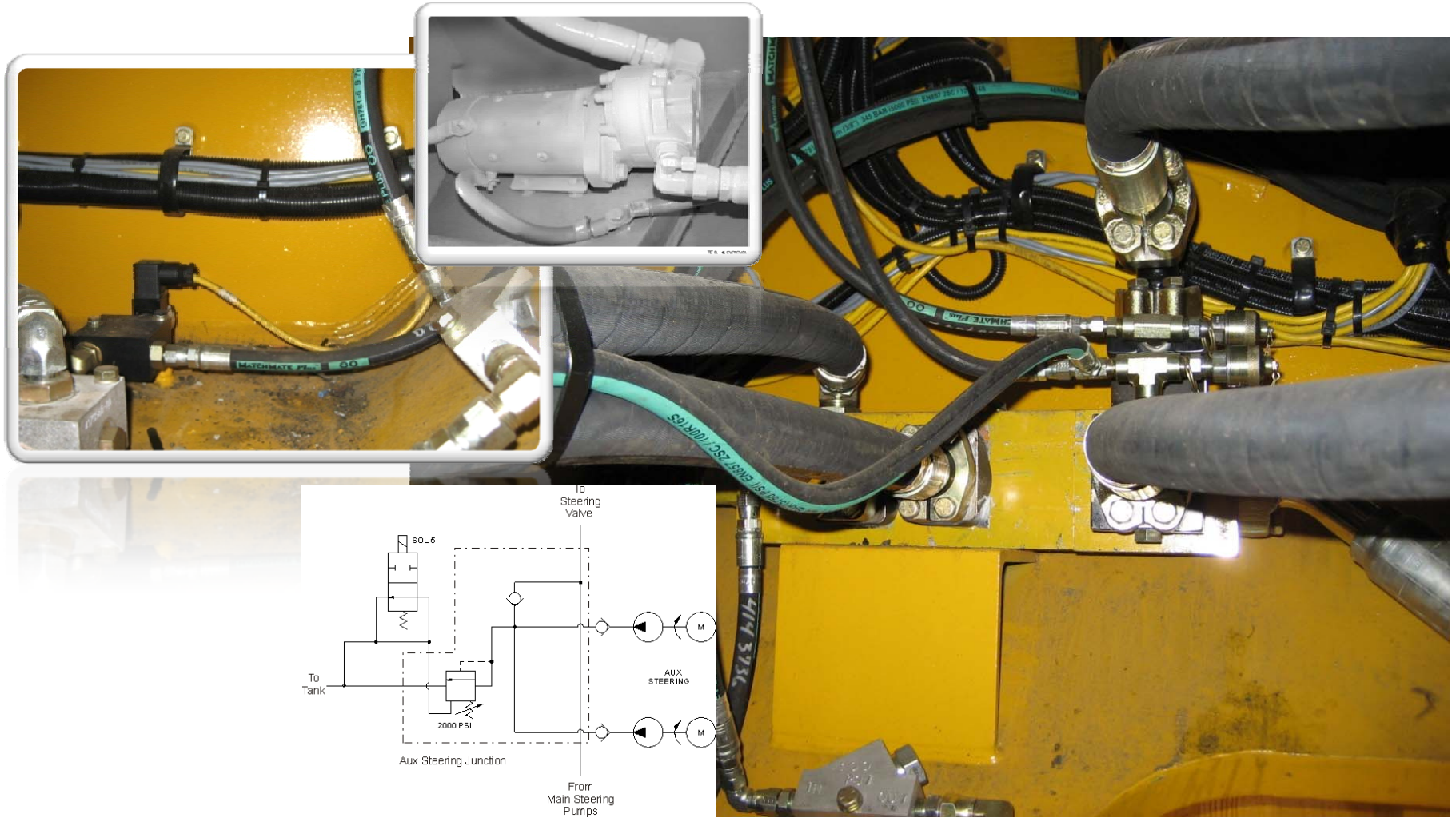


Amplification Ratio: 10:1



Steering flow amplifier



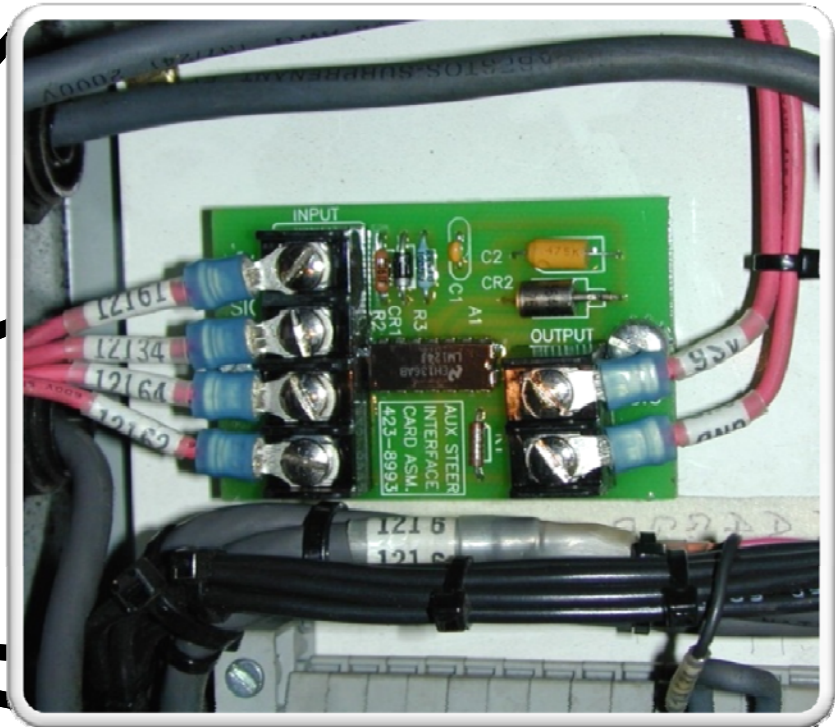
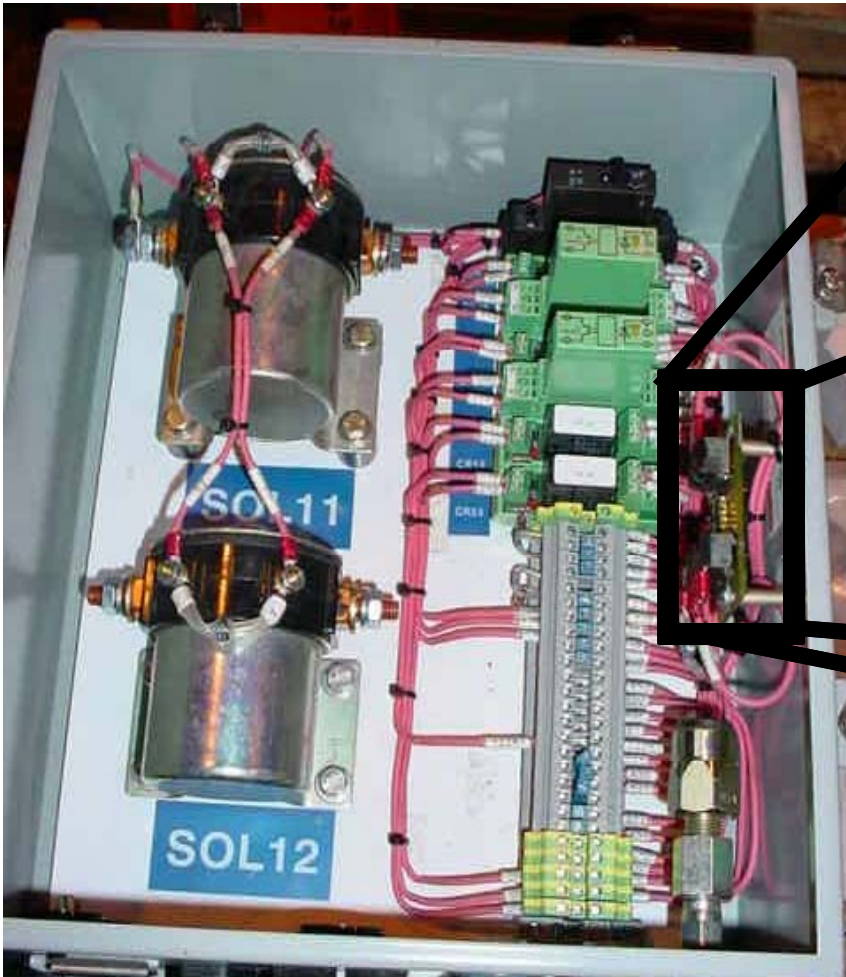


Auxiliary steering

Component Descriptions

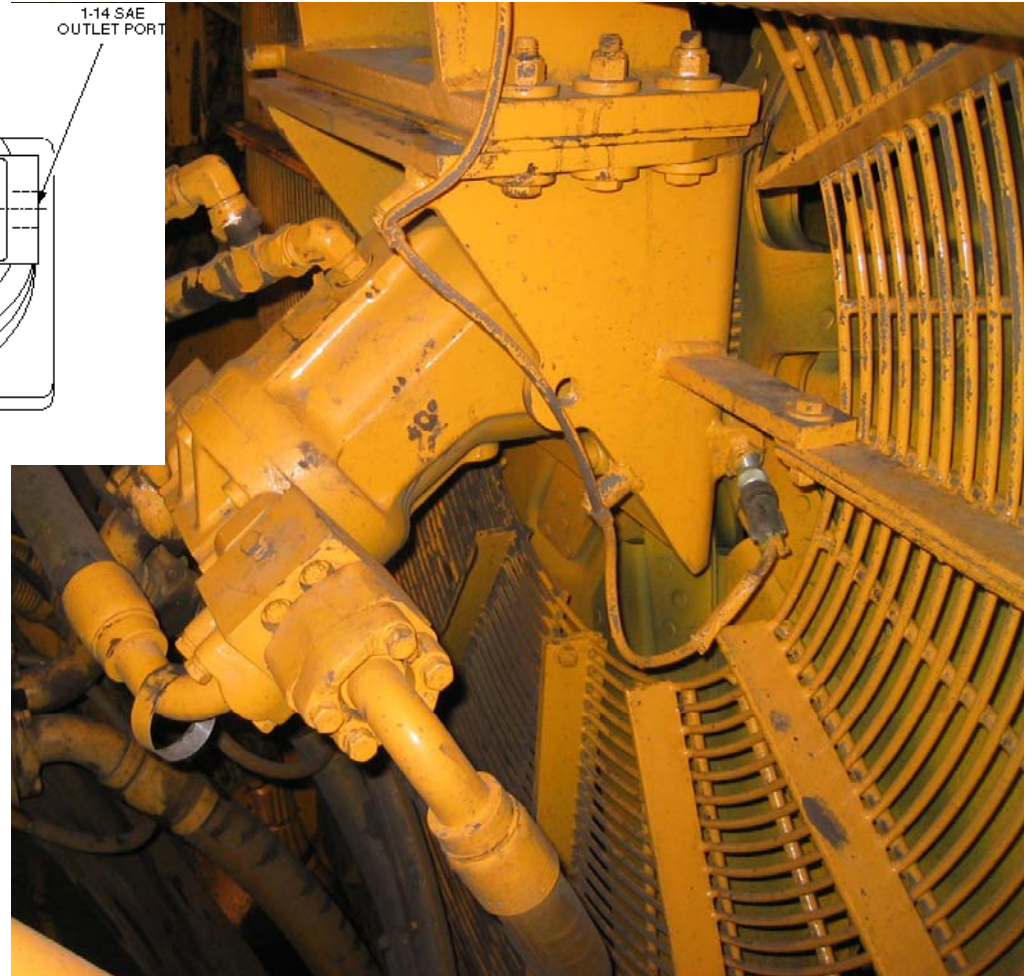
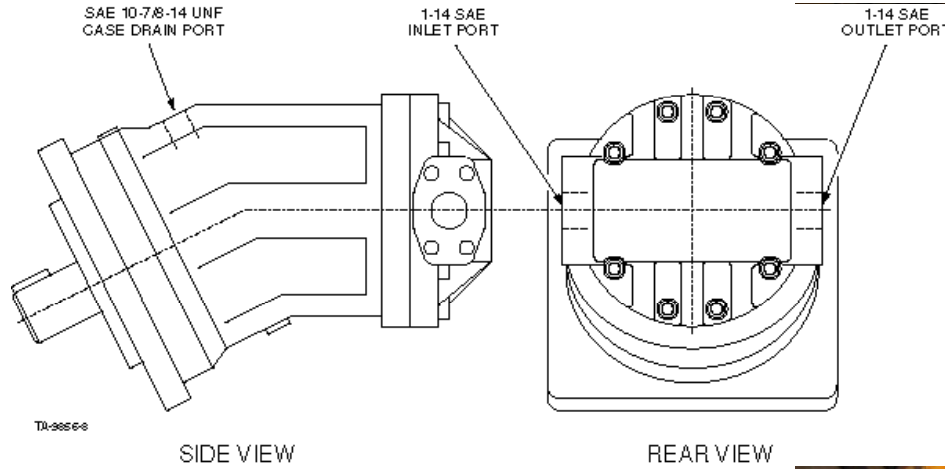
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Auxiliary steering





Engine fan motor



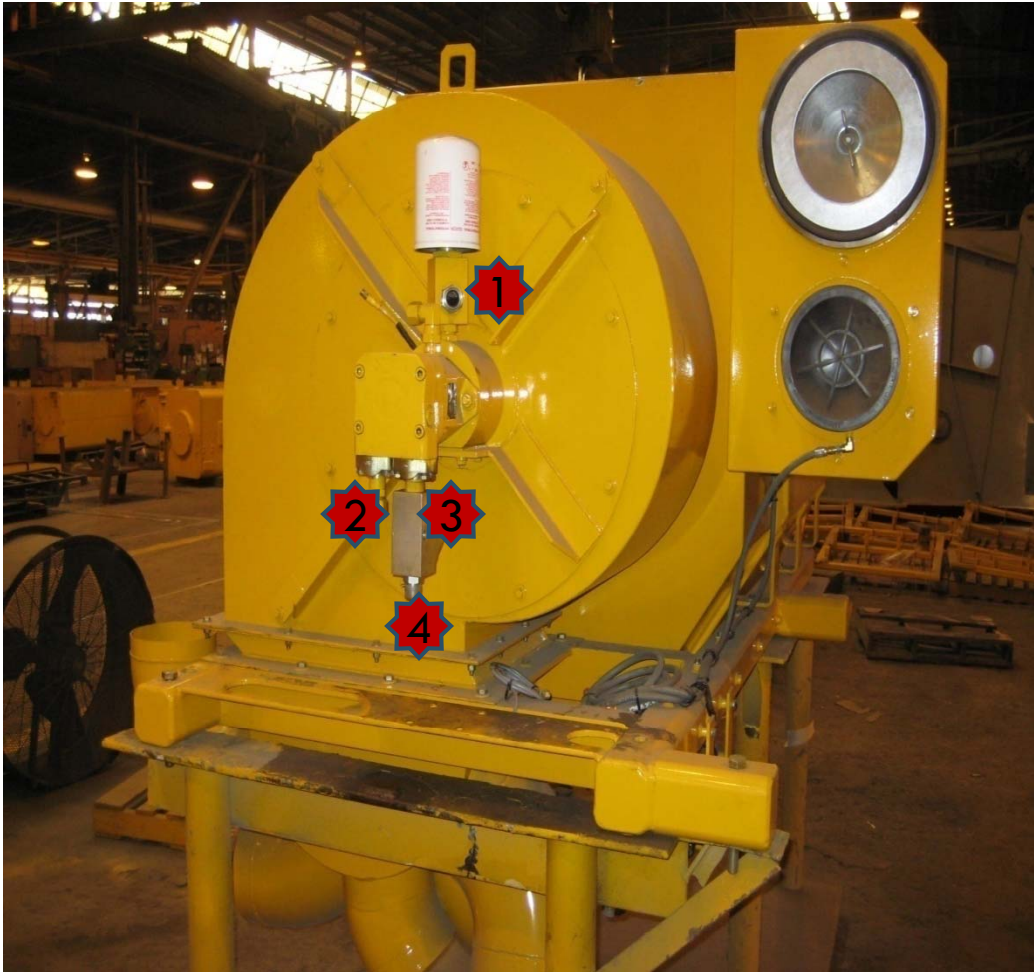


Engine fan control solenoid [old]

Component Descriptions

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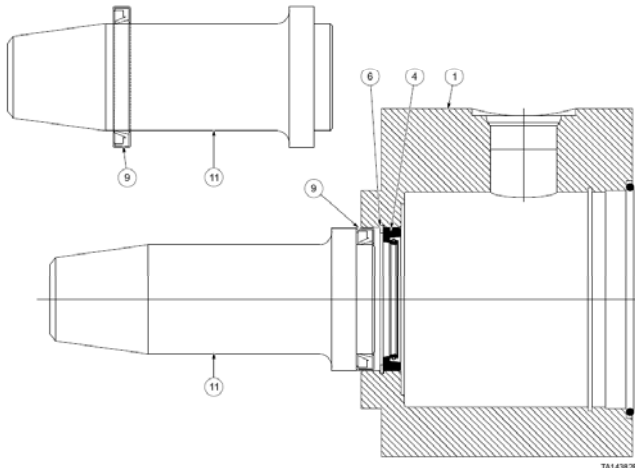




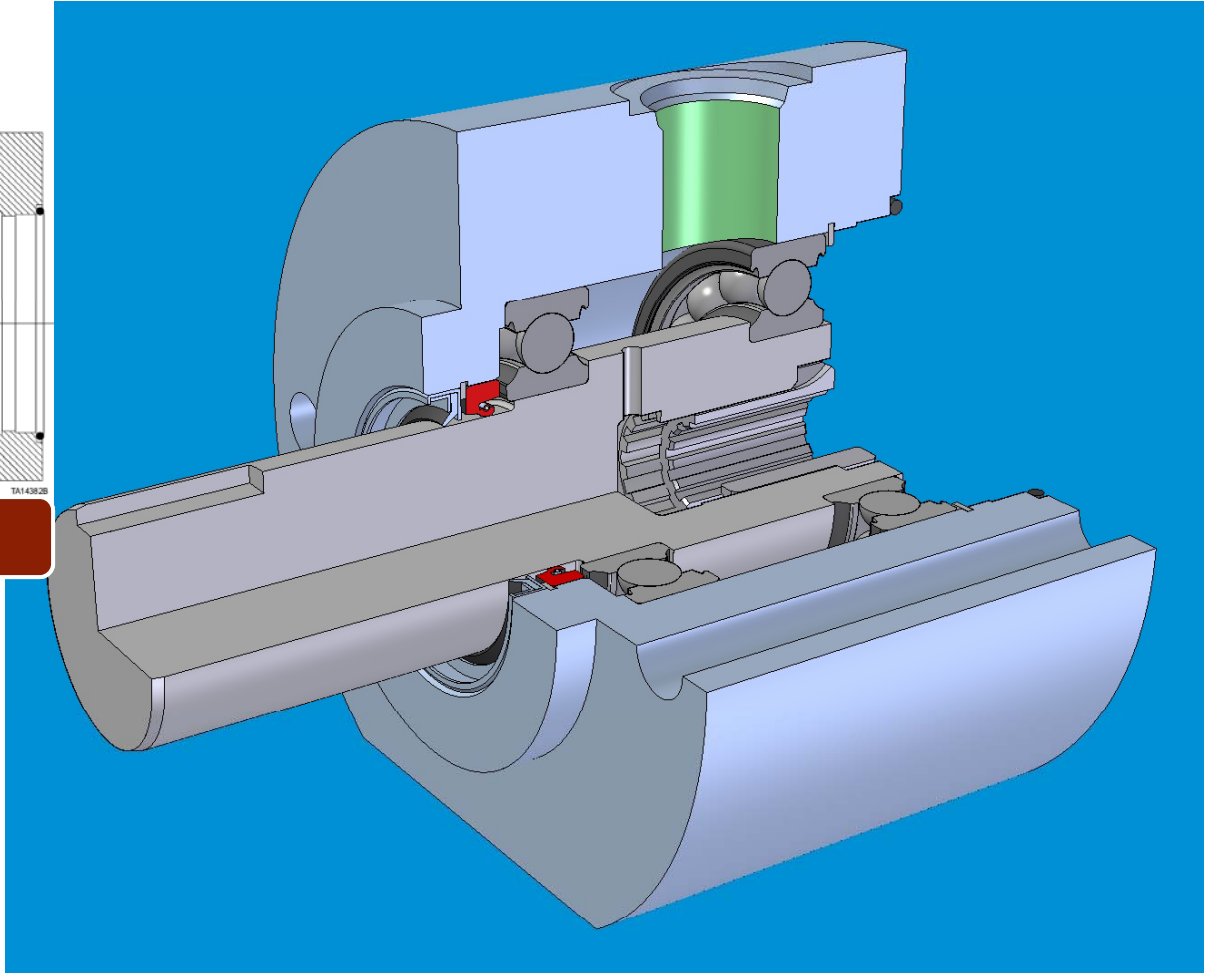
1. Oil Reservoir for Load Adapter
2. Supply Inlet
3. 100 PSI Check Valve
4. To Tank

Blower motor





Installation Tool

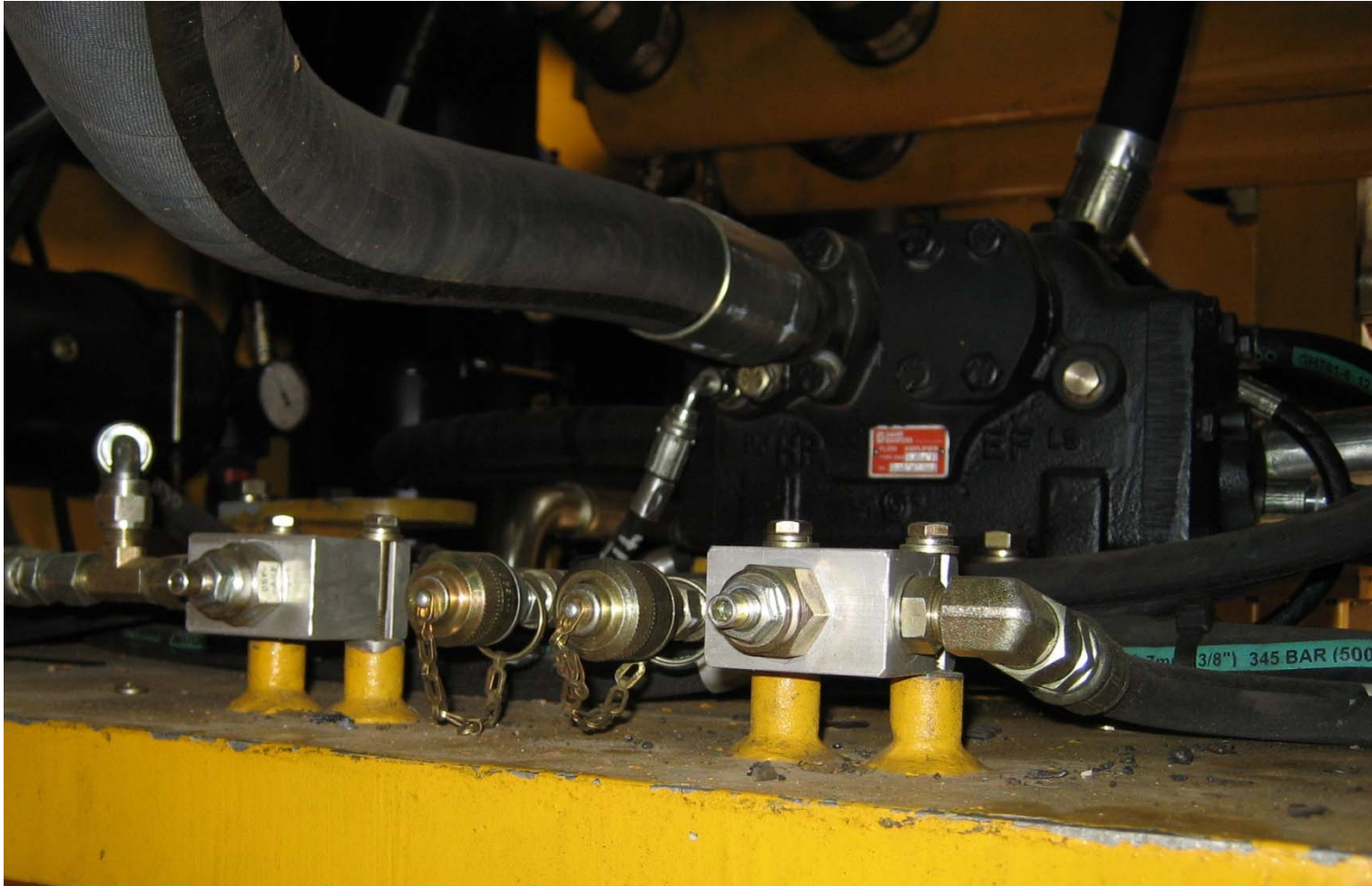


Blower motor load adapter

Component Descriptions

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Blower/fan remote relief

Component Descriptions

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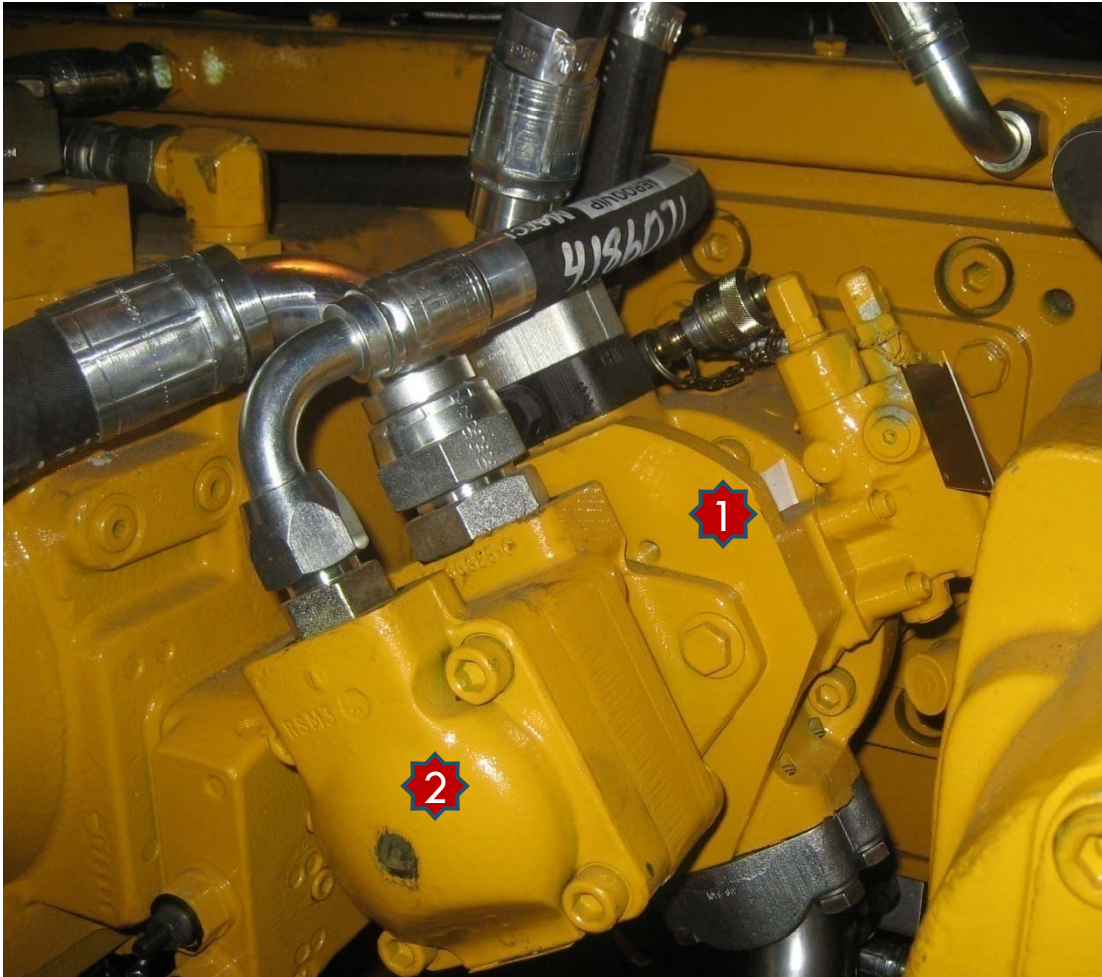


Blower back pressure

Component Descriptions

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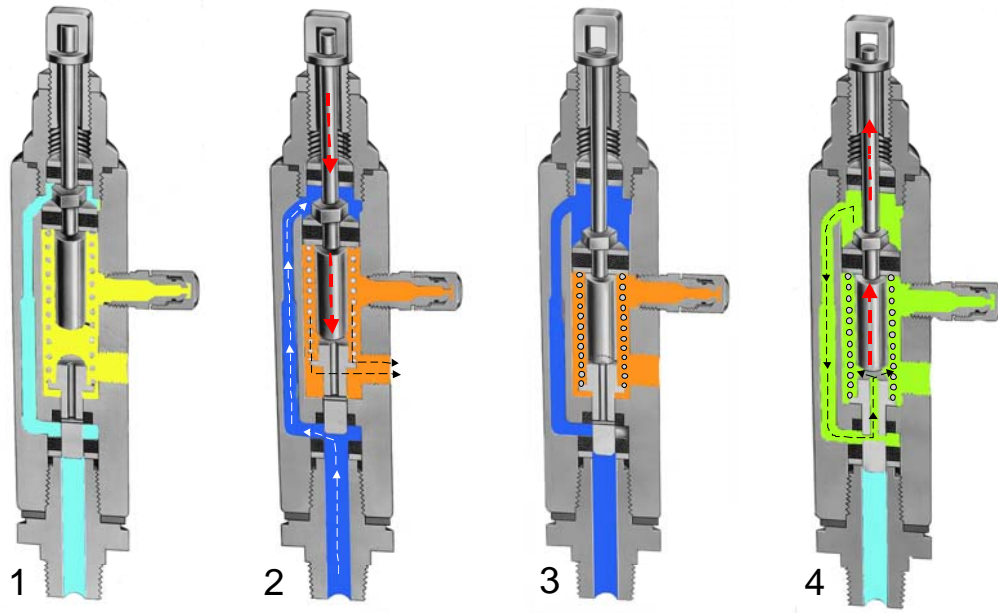




1. Accessory Pump
2. Gearbox Lube Pump

Accessory/gearbox lube pump



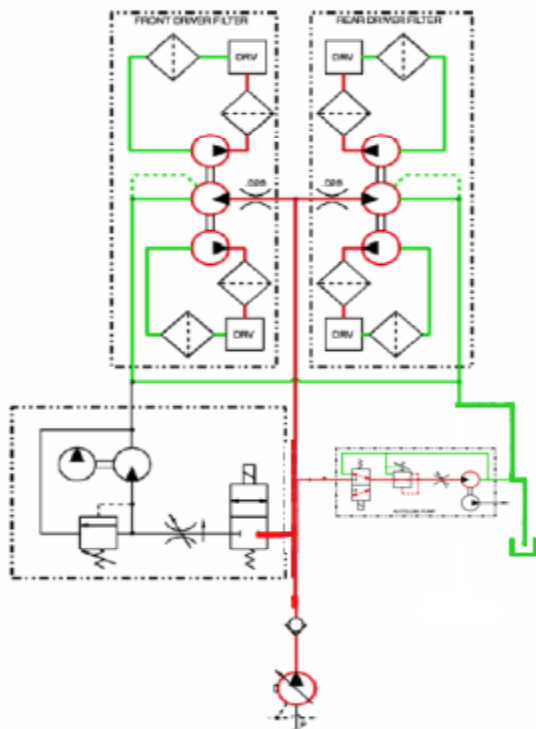


- █ GREASE SUPPLY (PRESSURIZED)
- █ GREASE SUPPLY (NO PRESSURE)
- █ GREASE (PRESSURIZED) TO LUBRICATION POINT
- █ GREASE (NO PRESSURE) TO LUBRICATION POINT
- █ GREASE MOVING FROM MEASURING CHAMBER TO DISCHARGE CHAMBER

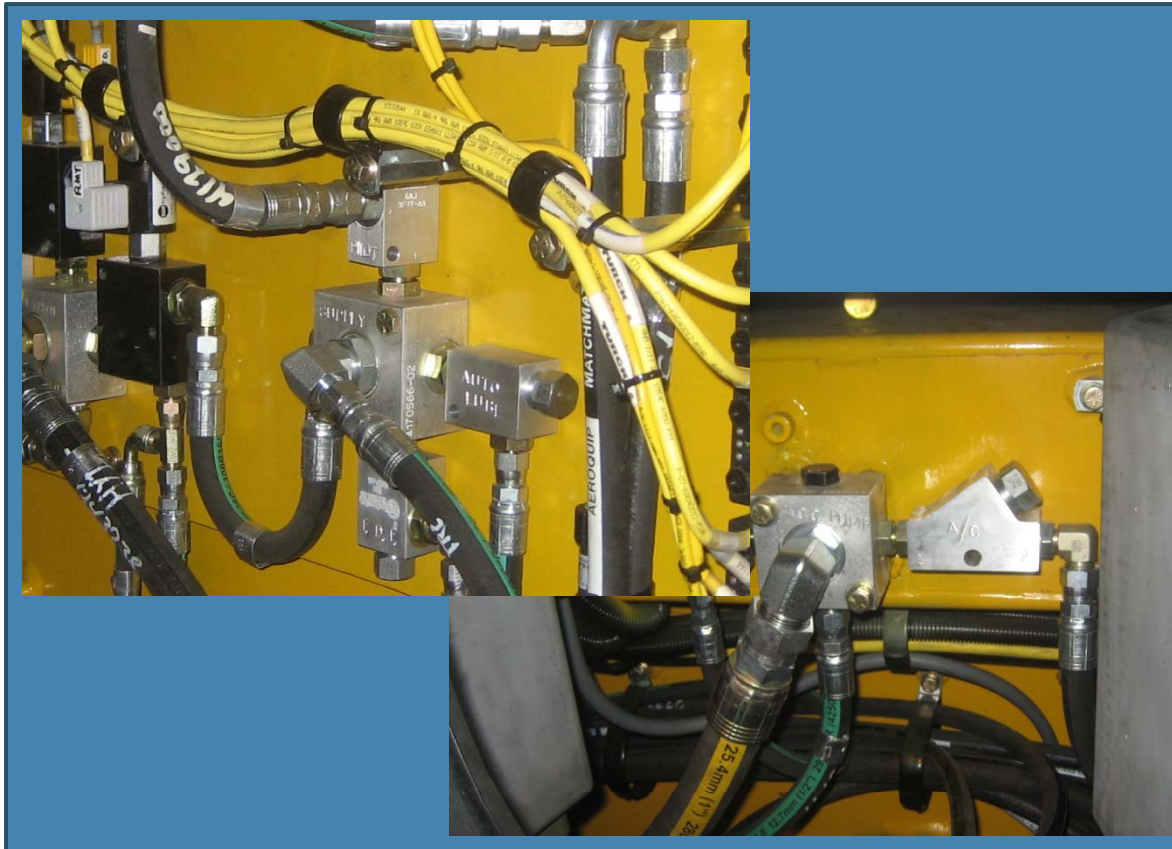


Auto lube

Old Accessory Pump Circuit



New Accessory Pump

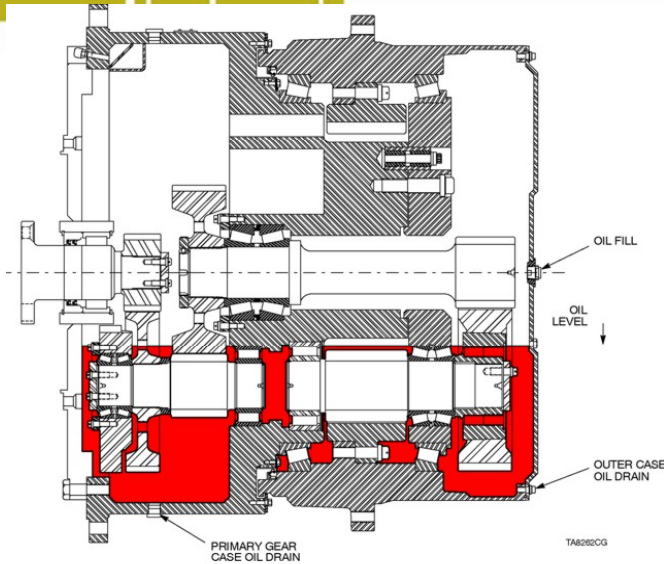
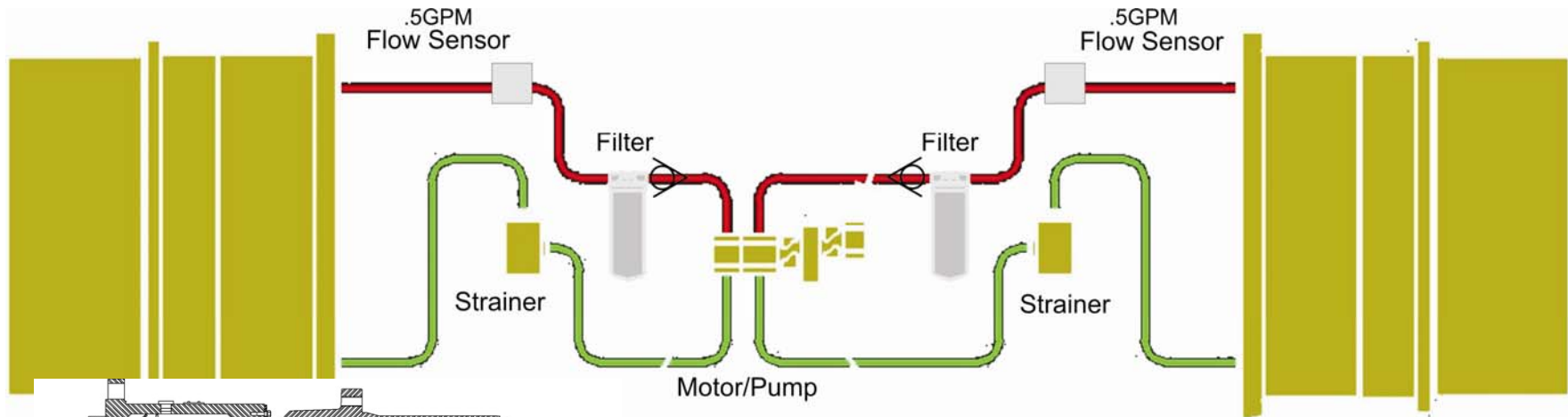


Accessory Pump

Component Descriptions

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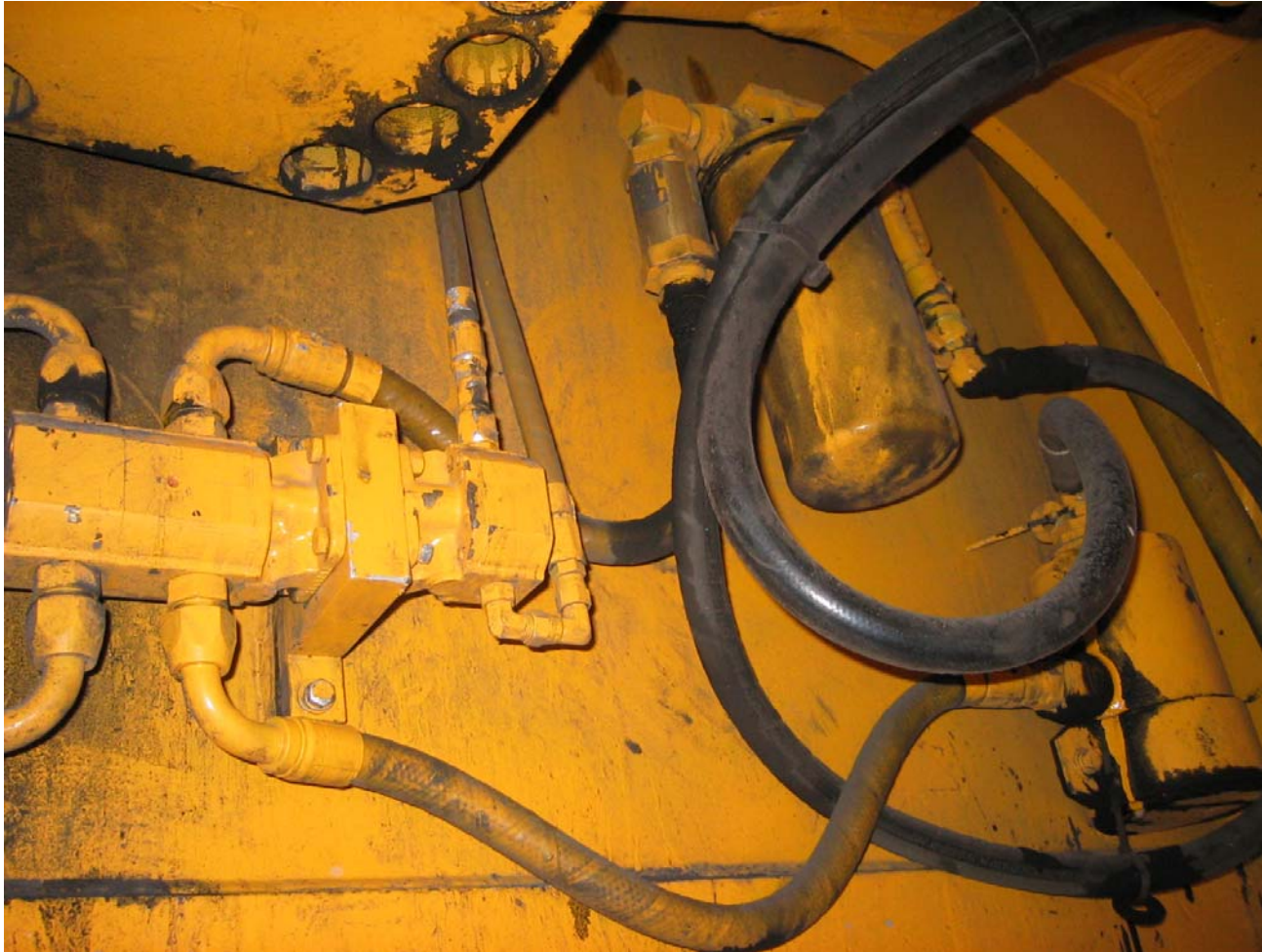




- 57" Driver
- Mobilgear SHC 460, 25 gallons each
- Continuous Filtration
- Filtered at 10 micron absolute

Driver filtration





Driver filtration [old]

Component Descriptions

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1. Strainer
(x4, 1 ea driver)
2. Cannister Filter
(x4, 1 ea driver)
3. Pump/Motor
(x2, 1 ea front/rear)
4. Rear Frame
(picture reference only)

Driver filtration [new]



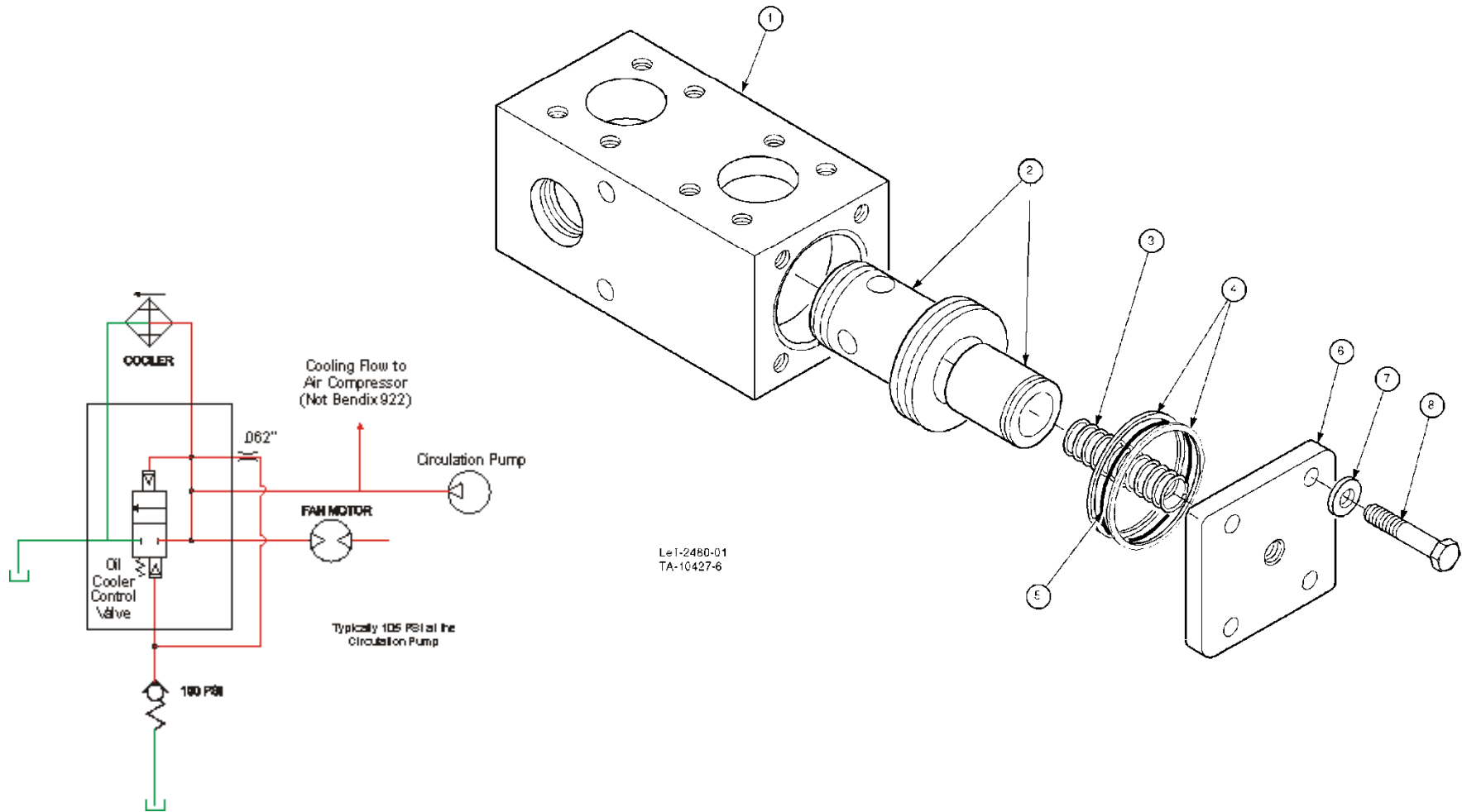


Solenoid
39

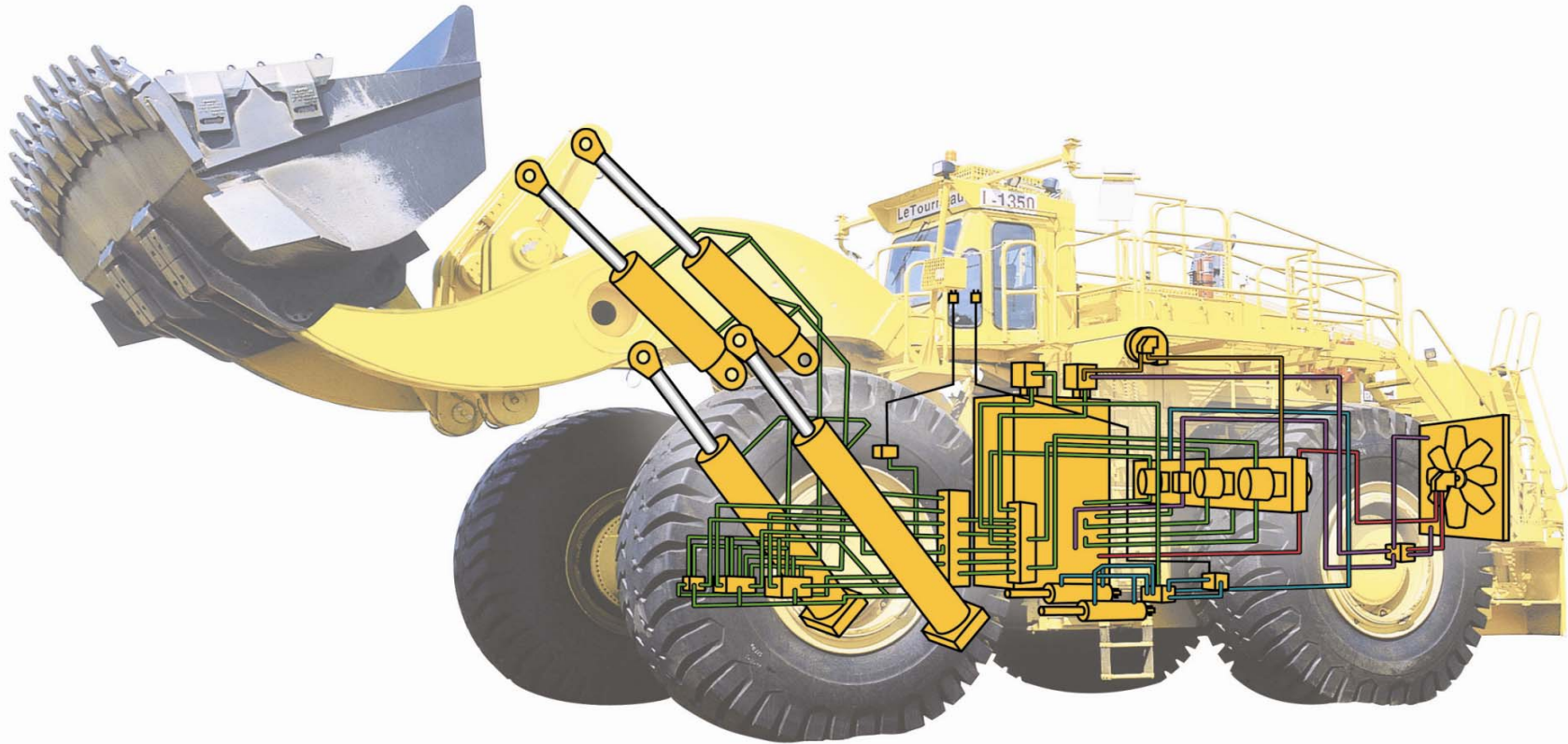


Auxiliary oil cooler





Oil cooler control valve



Cylinders

Component Descriptions



































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CIRCUIT DESCRIPTIONS

































TYPICAL HYDRAULIC GRAPHIC SYMBOLS

LINES AND LINE FUNCTIONS		MOTOR, VARIABLE DISPLACEMENT, REVERSIBLE	
LINE, WORKING		CYLINDER - SINGLE ACTING	
LINE, PILOT			
LINE, DRAIN			
CONNECTOR		CYLINDER - DOUBLE ACTING DIFFERENTIAL	
LINE, FLEXIBLE			
LINES JOINING		NON-DIFFERENTIAL	
LINES PASSING			
VALVES			
DIRECTION OF FLOW		CHECK	
LINE TO RESERVOIR		ON-OFF (MANUAL SHUT-OFF)	
	ABOVE FLUID LEVEL	PRESSURE RELIEF	
BELOW FLUID LEVEL			
LINE TO VENTED MANIFOLD		PRESSURE REDUCING	
PLUG OR PLUGGED CONNECTION		FLOW CONTROL ADJUSTABLE NON-COMPENSATED	
RESTRICTION, FIXED		FLOW CONTROL ADJUSTABLE (PRESSURE COMPENSATED)	
RESTRICTION, VARIABLE			
PUMPS			
SINGLE, FIXED DISPLACEMENT		TWO POSITION TWO CONNECTION	
SINGLE, VARIABLE DISPLACEMENT		TWO POSITION THREE CONNECTION	
ACTUATORS			
MOTOR, FIXED DISPLACEMENT REVERSIBLE		TWO POSITION FOUR CONNECTION	
		THREE POSITION FOUR CONNECTION	
MOTOR, FIXED DISPLACEMENT NON-REVERSIBLE		TWO POSITION IN TRANSITION	

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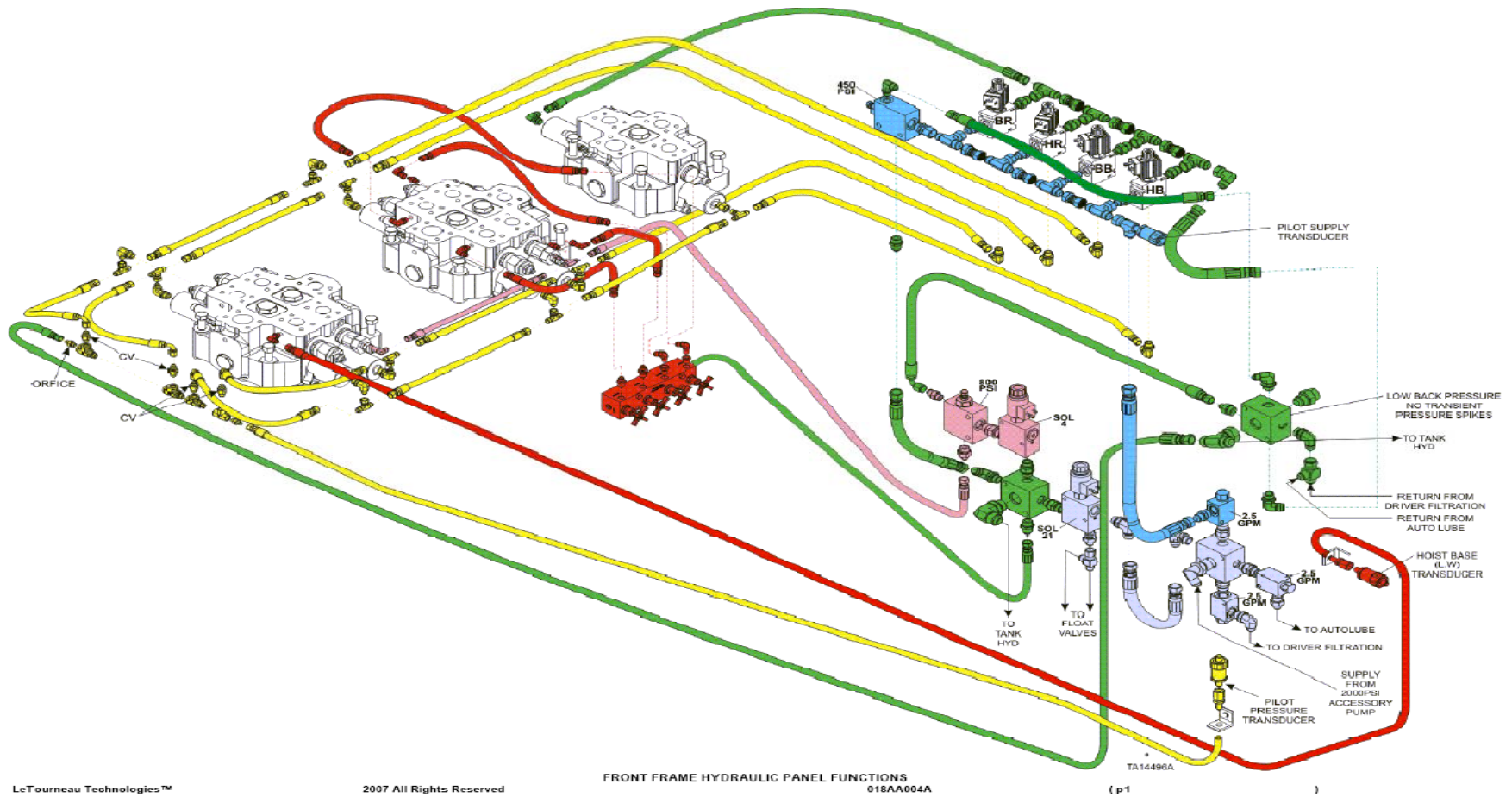
Typical Hydraulic Graphic Symbols cont'd.

VALVES		ELECTRICAL SYMBOLS	
VALVES CAPABLE OF INFINITE POSITIONING (HORIZONTAL BARS INDICATE INFINITE POSITIONING ABILITY)		LIMIT SWITCH (LS)	
		TOGGLE SWITCH (TGS)	
METHODS OF OPERATION		TEMPERATURE SWITCH (TAS)	
SPRING		CONTROL RELAY (CR)	
MANUAL		MISCELLANEOUS	
PUSH BUTTON		ROTATING SHAFT	
PUSH-PULL LEVER		ENCLOSURE	
PEDAL OR TREADLE		RESERVOIR VENTED	
MECHANICAL		RESERVOIR PRESSURIZED	
		PRESSURE GAUGE	
DETENT		ELECTRIC MOTOR	
PRESSURE COMPENSATED		ACCUMULATOR, SPRING LOADED	
SOLENOID, SINGLE WINDING		ACCUMULATOR, GAS CHARGED	
REVERSING MOTOR		HEATER	
PILOT PRESSURE		COOLER	
		TEMPERATURE CONTROLLER	
		FILTER, STRAINER	
REMOTE SUPPLY			
INTERNAL SUPPLY			

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Hydraulic graphic symbols





Current pilot circuits

Circuit Descriptions

LeTourneau Technologies, Inc



Insert Machine Specific

(L-950, L-1350, or

L-1850 & L-2350)

**CIRCUIT DESCRIPTION PAGES
(11" x 17") BEFORE THIS PAGE.**

Hydraulics

50 Series Specifications

All pressures with Engine at High Throttle		Procedure paragraph number	L-950	L-1150	L-1350	L-1850	L-2350	
Hyd Tank Air	Air pressure regulator	A	4 to 6 PSI	4 to 6 PSI	4 to 6 PSI	4 to 6 PSI	4 to 6 PSI	
Gear Box Circuit	Gearbox	Not adjustable	50 to 125 psi at High Throttle	50 to 125 psi at High Throttle	50 to 125 psi at High Throttle	50 to 125 psi at High Throttle	50 to 125 psi at High Throttle	
Pilot Circuit	Pressure relief valve (new)	B	450 psi ±10	450 psi ±50	450 psi ±10	450 psi ±10	450 psi ±10	
	Pressure Reducing Valve (old)	C	450 psi ±10	N/A	450 psi ±10	450 psi ±10	450 psi ±10	
	Pilot Overpressure Relief (old)	C	800 psi +0 -50	N/A	800 psi +0 -50	800 psi +0 -50	800 psi +0 -50	
See note #1	Hoist Up Responsiveness	D	0 ~200 psi (JS) 220 psi (Detent)	N/A	0 ~200 psi (JS) 220 psi (Detent)	0 ~200 psi (JS) 220 psi (Detent)	0 ~200 psi (JS) 220 psi (Detent)	
See note #1	Hoist Down Responsiveness	H	0 ~ 179 psi (JS) 280 psi (Float)	N/A	0 ~ 179 psi (JS) 280 psi (Float)	0 ~ 179 psi (JS) 280 psi (Float)	0 ~ 179 psi (JS) 236 psi (Float)	
See note #1	Bucket Back Responsiveness	P	0 ~ 196 psi	N/A	0 ~ 196 psi	0 ~ 196 psi	0 ~ 196 psi	
See note #1	Bucket Forward Responsiveness	U	0 ~ 220 psi	N/A	0 ~ 220 psi	0 ~ 220 psi	0 ~ 220 psi	
See note #1	Solenoid Drive	V		N/A				
Hoist / Bucket Circuit	Hoist & Bucket Pump Compensators	E	3700 psi ± 50	4000 psi ± 50	3300 psi ± 50	3300 psi ± 50	4000 psi ± 50	
	Main Valve Relief	F	4000 psi +50 -0	4500 psi +50 -0	3800 psi +50 -0	3800 psi +50 -0	4500 psi +50 -0	
	Hoist Base Circuit Relief	F	4000 psi +50 -0	4500 psi ± 50	3800 psi ± 50	4500 psi ± 50	4500 psi ± 50	
	Hoist Rod Circuit Relief	F	2000 psi ± 50	2000 psi ± 50	2000 to 2400 psi ± 50	2000 psi ± 50	2000 psi ± 50	
	Bucket Base Circuit Relief	F	4000 psi +50 -0	4500 psi ± 50	3800 psi ± 50	3800 psi ± 50	4500 psi ± 50	
	Bucket Rod Circuit Relief	F	2000 psi ± 50	2000 psi ± 50	2000 psi ± 50	2000 psi ± 50	2000 psi ± 50	
	Secondary Dump Relief	G	800 psi ± 50	800 psi ± 50	800 psi ± 50	800 psi ± 50	800 psi ± 50	
Steer Circuit	Steering Pump (Stand By)	I	N/A	N/A 250psi (Reference Only)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	
	Steering Pump (Compensator)	I	N/A	N/A	3400 psi ± 50	3400 psi ± 50	3400 psi ± 50	
	Steering Main Relief (Flow Amp)	J	Turn in Full	Turn in Full	N/A (see note #2)	N/A (see note #2)	N/A (see note #2)	
	Steering Overload Relief (Flow Amp)	K	4000 psi ± 50	4000 psi ± 50	4000 psi ± 50	4000 psi ± 50	4000 psi ± 50	
	Relief (PVG)	L	4000 psi	4000 psi	4000 psi	4000 psi	4000 psi	
	Steering Remote Relief (new)	Z	2500 psi ± 50	2500 psi ± 50	N/A	N/A	N/A	
	Aux. Steering Relief	M	1600 psi +50 -0	1600 psi +50 -0	2000 psi +50 -0	2000 psi +50 -0	2000 psi +50 -0	
See note #1	Steer Left Responsiveness	W		N/A				
See note #1	Steer Right Responsiveness	X		N/A				
Blower Circuit	Blower Pump (Stand by)	N	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	
	Blower Pump (Compensator)	N	3100 RPM	2800 RPM	3300 RPM	3300 RPM	3300 RPM	
	Blower Remote Relief	N	2800~3000 RPM	2500 RPM	3000 RPM	3000 RPM	3000 RPM	
Engine Fan Circuit	Fan Pump (Stand by) - Idle	O	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	450 - 500 psi (Stand-by)	
	Fan Pump (Compensator) - High	O	950 RPM (High)	1150 RPM (High)	950 RPM (Max)	950 RPM (Max)	950 RPM (Max)	
	Fan Remote Relief - High	O	850 RPM (Max)	950 RPM (Max)	850 RPM (Max)	850 RPM (Max)	850 RPM (Max)	
Aux Oil Cooler Circuit	Idle Speed	Not adjustable	N/A Fixed Flow Control	120psi psi (0 RPM)	165 psi (275 RPM)	165 psi (275 RPM)	165 psi (275 RPM)	
	High Speed	Y	N/A Fixed Flow Control	1700psi (1600 RPM)	1100 psi (1400 RPM)	1100 psi (1400 RPM)	1100 psi (1400 RPM)	
Accessory Pump	Accessory Pump Compensator	Q	2000psi	2000psi	2500psi	2500psi	2500psi	
AutoLube Circuit	Pressure Reducing Valve	R	3500 psi ± 100 (Grease Pressure)	3500 psi ± 100 (Grease Pressure)	3500 psi ± 100 (Grease Pressure)	3500 psi ± 100 (Grease Pressure)	3500 psi ± 100 (Grease Pressure)	
	Flow Control	R	1.5 to 2 strokes per second	1.5 to 2 strokes per second	1.5 to 2 strokes per second	1.5 to 2 strokes per second	1.5 to 2 strokes per second	
Air Conditioning Circuit	Relief Setting (Sigma)	S	2300 psi +50 -0		2300 psi +50 -0	2300 psi +50 -0	2300 psi +50 -0	
	Reducing valve setting (Sigma)	S	2000 psi +50 -0		2000 psi +50 -0	2000 psi +50 -0	2000 psi +50 -0	
	Flow Setting	T	8GPM (1800 to 1950rpm)	8GPM (1800 to 1950rpm)	8GPM (1800 to 1950rpm)	8GPM (1800 to 1950rpm)	8GPM (1800 to 1950rpm)	
	High Side Refrigerant		175 psi @ 90°F / 32°C	275 psi @ 90°F / 32°C	175 psi @ 90°F / 32°C	175 psi @ 90°F / 32°C	175 psi @ 90°F / 32°C	
Cycle Times	Hoist Up	Not adjustable	9-11 Sec	10-12 Sec	12-14 Sec	12-14 Sec	16-18 Sec	
	Hoist Down	Not adjustable	9-11 Sec	9-11 Sec	9-11 Sec	9-11 Sec	12-14 Sec	
	Float	Not adjustable	4-6 Sec	6-8 Sec	6-8 Sec	6-8 Sec	6-8 Sec	
	Bucket Rollback	Not adjustable	3-5 Sec	4-6 Sec	3-5 Sec	3-5 Sec	3-5 Sec	
	Bucket Dump	Not adjustable	3-5 Sec	3-5 Sec	3-5 Sec	3-5 Sec	3-5 Sec	
	Steer Lock to Lock	Not adjustable	6 Sec	7 Sec	6 Sec	6 Sec	6 Sec	
Notes			1) Can be adjusted at Service Level in LINC5					
			2) Maximum steering pressure set at the pump compensator. Screw Dan Foss main relief in completely.					

50 Series Setting and Adjustment Specifications

Settings and adjustments



50 Series Diagnostic Tool

Troubleshooting



REMOVAL AND INSTALLATION

