

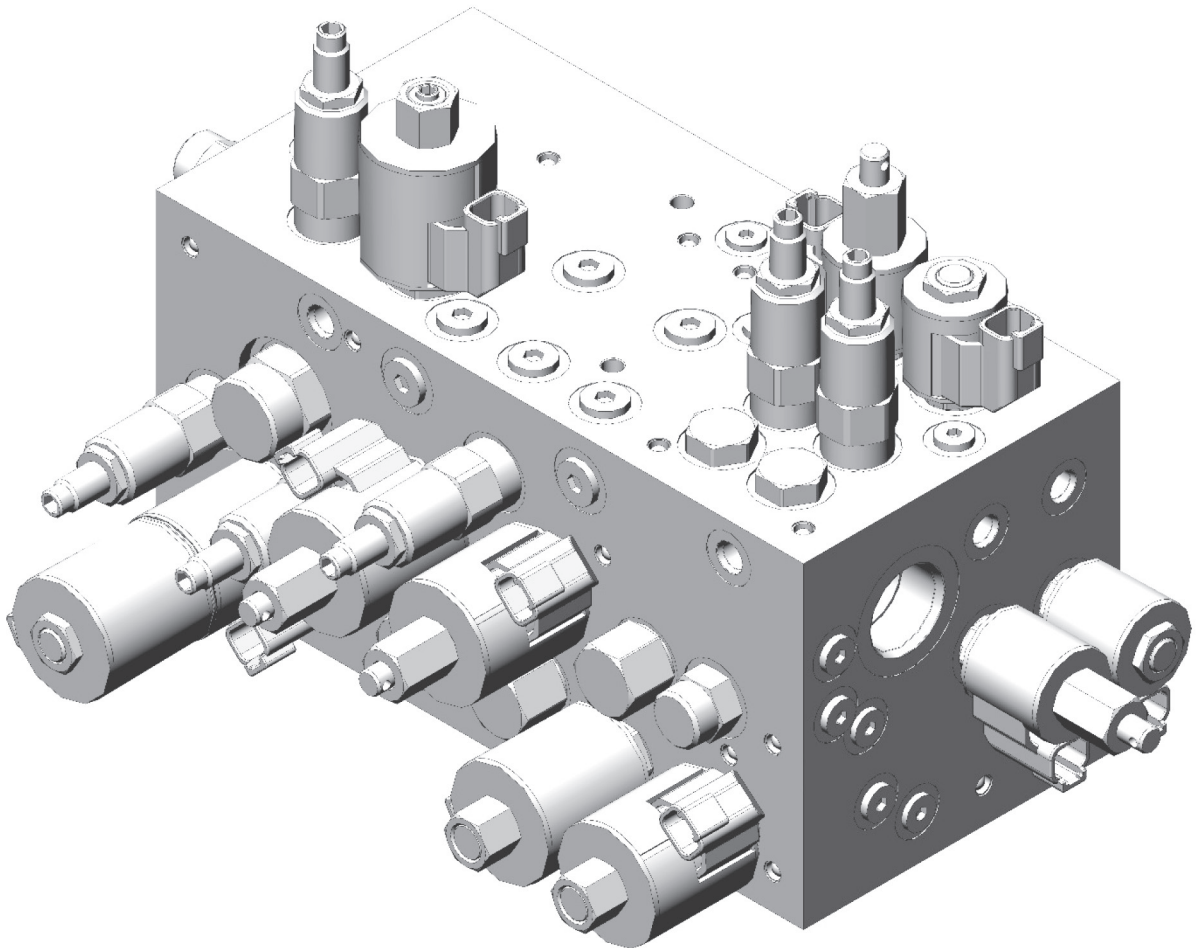


# ADVANTAGE + SD

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PARTS LIST AND SERVICE MANUAL - REV 1

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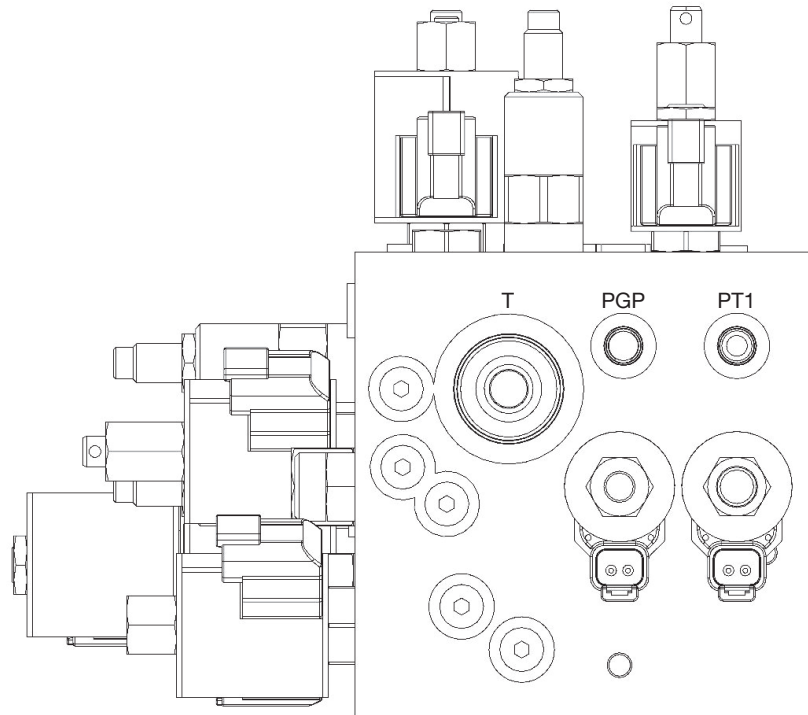
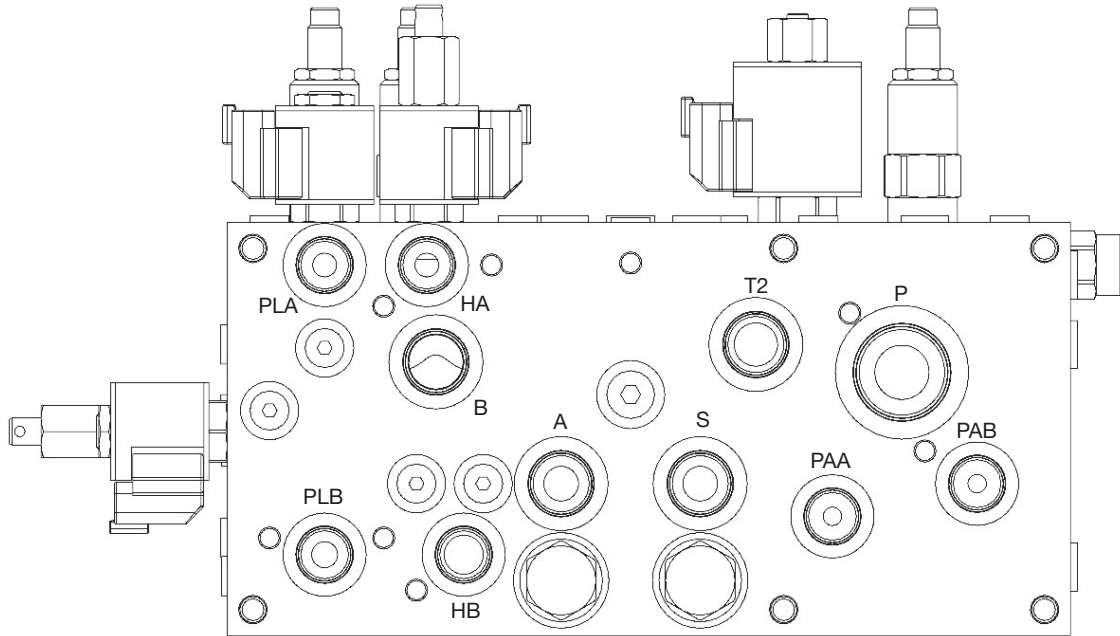
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# HYDRAULIC SPECIFICATIONS

HYDRAULIC PRESSURE SETTINGS				
FUNCTION	DESIGNATION	PSI*	RANGE - PSI	ADJUSTED
Main Relief	TS3	2,000	1,500 - 3,600	Electrically
Boost	RV1	200	0 - 500	Mechanically
Spreader	RV3	1,600	300 - 3,500	Mechanically
Plow Up	RV5	1,300	300 - 3,600	Mechanically
Plow Down	TS2	600	0 - 1,700	Electrically
Hoist Up	RV4	2,300	300 - 3,600	Mechanically
Hoist Down	TS1	600	0 - 3,000	Electrically

FUNCTION	MAX FLOW RATES**	DIFFERENTIAL PSI
Inlet Flow	40 GPM	200
Plow Up	15 GPM	200
Plow Down	15 GPM	200
Plow Angle	06 GPM	200
Hoist Up	14 GPM	200
Hoist Down	14 GPM	200
Spinner	15 GPM	200
Auger	15 GPM	200

# HYDRAULIC PORT DESIGNATIONS

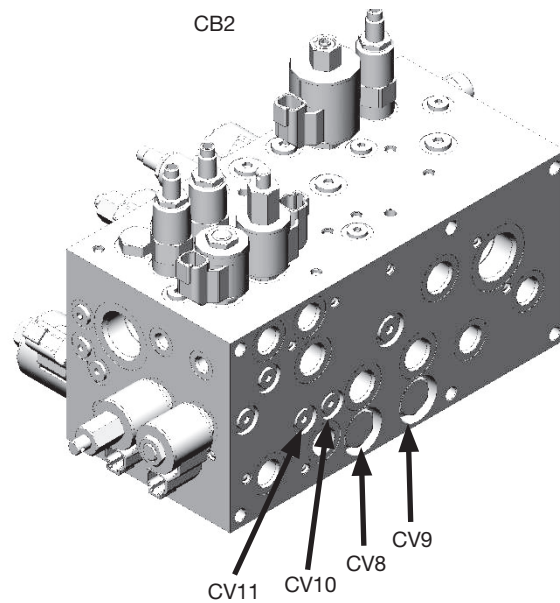
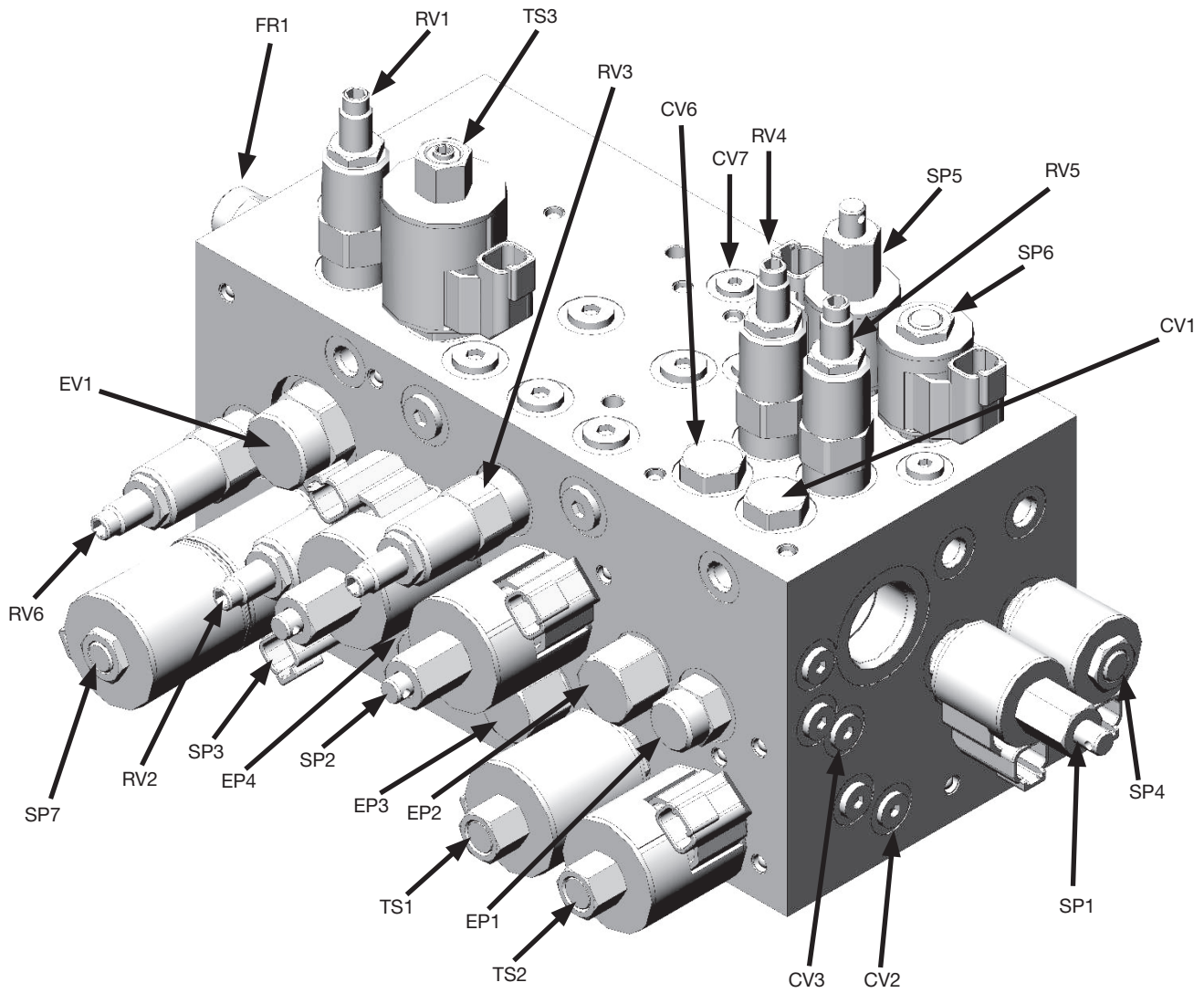


DESIGNATION	FUNCTION	SIZE (SAE)
P	Pump	16
T	Tank	16
T2	Tank 2	10
A	Auger	10
B	Auger reverse/Spreader Return	10
S	Spinner	10
PLA	Plow Up	08
PLB	Plow Down	08

DESIGNATION	FUNCTION	SIZE (SAE)
HA	Hoist Raise	08
HB	Hoist Lower	08
PAA	Angle Left	08
PAB	Angle Right	08
PGP	Pump Gauge Port	04
PT1	Pump Pressure Transducer	04 Modified
PT2	Load Sense Pressure Transducer	04 Modified
PT3	Plow Raise Pressure Transducer	04

# HYDRAULIC

## CARTRIDGE DESIGNATIONS, FUNCTIONS, AND PART NUMBERS

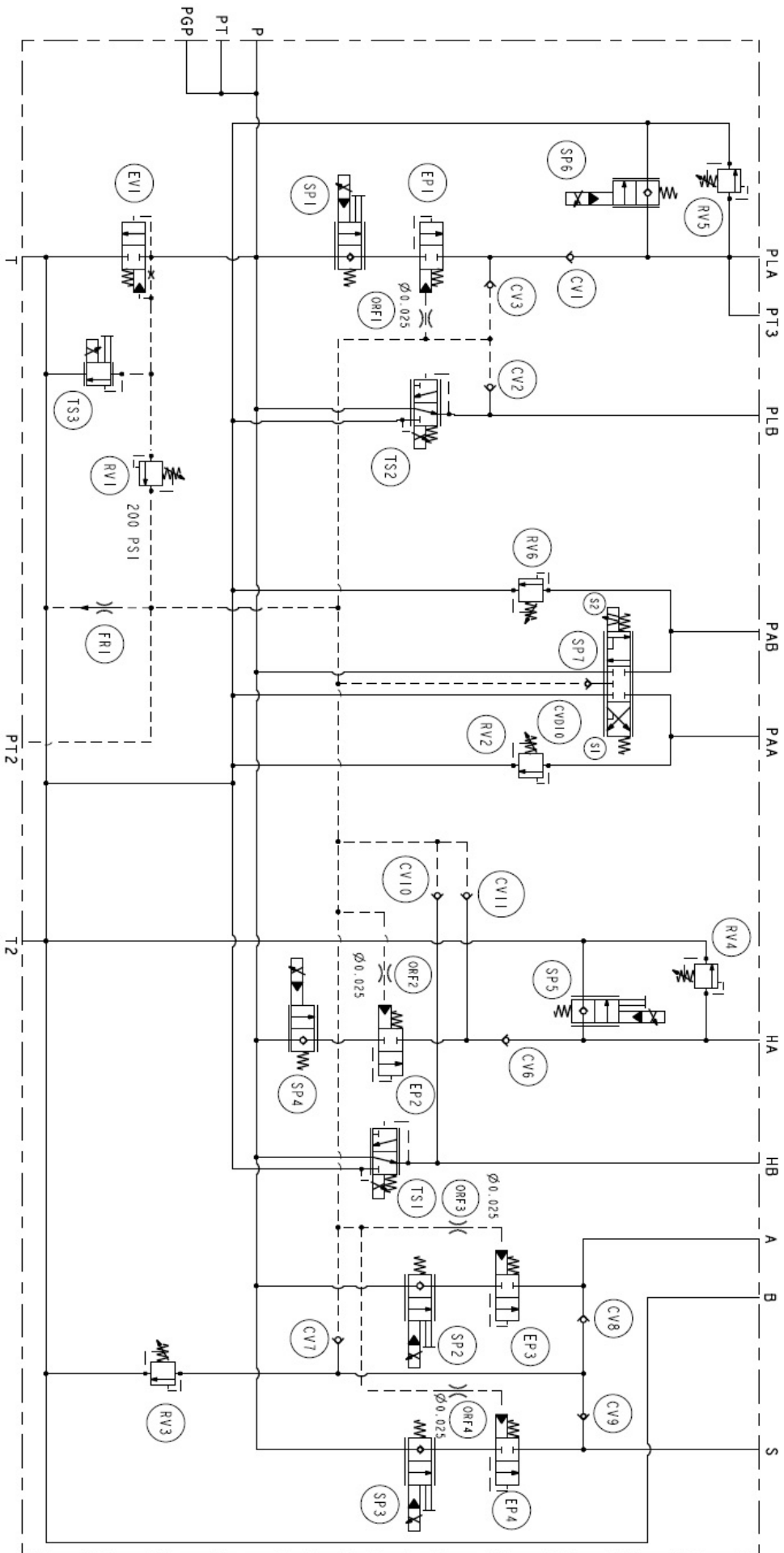


# HYDRAULIC

## CARTRIDGE DESIGNATIONS, FUNCTIONS, AND PART NUMBERS

DESIG	PART NUMBER	FUNCTION	LOC.
RV1	NXRVO820A0NC05/02	Boost Pressure	Top
RV2	NXRVO822A0N26	Plow Angle Left Relief	Front
RV3	NXRV1022A0N35	Spreader Relief	Front
RV4	NXRVO822A0N26	Hoist Raise Relief	Top
RV5	NXRVO822A0N13	Plow Raise Relief	Top
RV6	NNXRVO822A0N26	Plow Angle Right Relief	Front
TS1	NXTS1036A0N00	Hoise Lower CTRL	Front
TS2	NXTS1036C0N0	Plow Lower CTRL	Front
TS3	NXTS3820AM0N00	Main Relief	Top
CV1	NXCV08200N10	Plow Lift Check Valve	Top
CV2	NXCV04200N05	Plow Lower Check Valve	Right
CV3	NXCV04200N05	Plow Check Valve	Right
CV6	NXCV08200N25	Body Check Valve	Top
CV7	NXCV04200N05	LS Check Valve	Top
CV8	NXCV10200N15	Auger Check valve	Back
CV9	NXCV10200N15	Spinner Check Valve	Back
CV10	NXCV04200N05	Hoist Lower Check Valve	Back
CV11	NXCV04200N05	Hoist Raise Check Valve	Back
CVD10	NXCVD10	Check Valve Disc	Front
SP1	NXSP0820M0N00	Plow Raise	Right

DESIG	PART NUMBER	FUNCTION	LOC.
SP2	NXSP1020AM0N00	Auger	Front
SP3	NXSP1020M0N00	Spinner CTRL	Front
SP4	NXSP08200N00	Hoist Raise	Right
SP5	NXSP0820M0N00	Hoist Lower	Top
SP6	NXSP08200N00	Plow Lower	Top
SP7	NXSP1057C0N00	Plow Angle	Front
ORF1	NX6101025	Orifice Plugs	Right
ORF2	NX6101025	Orifice Plugs	Right
ORF3	NX6101025	Orifice Plugs	Front
ORF4	NX6101025	Orifice Plugs	Front
EP1	NXEP08350N10	Plow Compensator	Front
EP2	NXEP10S350N10	Hoist Compensator	Front
EP3	NXEP10S350N10	Auger Compensator	Front
EP4	NXEP10S350N10	Spinner Compensator	Front
FR1	NXFR0820F0N/0.20	LS Drain Cartridge	Left
EV1	NXEV12S340N010	Unloader	Front
CL1	COIL 4303612	Coil 1	
CL2	COIL 4303712	Coil 2	
BLK	BLOCK 7620110		
Not Shown	NX6108080		





# HYDRAULIC

## EXPLANATION OF PRESSURES

**Pump PSI** – The pump pressure Indicates the inlet pressure from the pump. This pressure will always be approximately 200 PSI higher than the load sense pressure. This pressure will never exceed the main relief setting.

**Load Sense PSI** – The Load Sense PSI indicates the pressure communicated from the hydraulic load. With no functions operating, the LS pressure should be 0 PSI. There will only be a LS pressure if a function is operating.

**Boost / Differential Pressure** – The boost or differential (pressure) is the difference between the Pump and the Load Sense Pressures. Typical load sense hydraulic systems require a boost between 200 and 300 PSI. The boost pressure is required to overcome the pressure drop across the valves. Using a gear pump, the boost pressure is set using the boost pressure cartridge. Using a Piston Pump, the boost pressure is adjusted at the pump.

SOLENOID SHIFT SEQUENCE	
Spinner	SP3, TS3
Auger	SP2, TS3
Plow Raise	SP1, TS3
Plow Lower (DA)	TS2, SP6, TS3
Plow Lower (SA)	SP6, TS3
Plow Left	SP7, TS3
Plow Right	SP7, TS3
Dump Raise	SP4, TS3
Dump Lower (DA)	TS2, SP5, TS3
Dump Lower (SA)	SP5, TS3

# HYDRAULIC

## EXPLANATION OF UNLOADING CIRCUIT

**Pump Gage Port (PGP)** – Indicates the inlet pressure from the pump. This pressure will be approximately 200 to 300 PSI higher than the Load Sense pressure.

**Load Sense (LS2)** – Indicates the pressure of the load. If more than one function is operating, the higher load pressure will be observed. There will only be a pressure from the LS port if a function is operating. Remember, the Pump Gauge will display a pressure approximately 200 PSI higher than the LS Gauge while a function is operating.

**EV1 (Plugged when used with a piston pump)** – unloading pressure compensating cartridge. EV1 is a normally closed -two position - two way -pilot cartridge. It can provide a low pressure path for pump flow to escape to tank This is its primary function when the pump is bypassing (no functions operating). The bypass pressure of the pump in this state will vary from about 20-60 PSI depending upon the pump flow. This pressure will show at PGP. The path to tank is opened by pump pressure being applied to the left side pilot of EV1 which forces the valve open. The right side pilot line of EV1 is drained to tank through the TS3 when not engaged (Electrically Actuated Main Relief Valve) to allow the EV1 valve to open fully.

**TS3** – Electrically Actuated Main Relief Valve. TS3 is a normally open two position - two way solenoid operated relief valve. When its solenoid is not energized it provides a drain path for the pilot pressure on the right side of EV1. This allows for pilot pressure on the left side of EV1 to push it open and expose a low pressure path for the pump flow to escape to tank.

**TS3** - Will energize whenever any function of the Advantage Plus is operating. This closes the pilot drain on the right side of EV1 and that in-turn causes EV1 to begin shutting off the pump flow escape to tank. Pump flow is now forced to move toward the actuators as required. If TS3 was energized by itself or manually overridden without any other system valves functioning, the pressure at PGP would be approximately 200 PSI to 300 PSI. The L.S. port would not show pressure.

In addition, the TS3 valve is used as the main relief. It is an electrically adjustable relief that can be adjusted up to a maximum setting of 3600 PSI.

**RV1 (Plugged when used with a piston pump)** – Boost Pressure Relief Valve. RV1's purpose is to raise the differential or boost pressure between PGP and LS by a margin of approximately 200 to 300 PSI. It comes into play when TS1 is energized. At that point the pilot pressure on the right side of EV1 can only drain through RV1. RV1's internal bias spring is set for 200 PSI. That means the pressure of EV1's pilots (both sides) must build to at least 200 PSI before the right side pilot can drain through RV1 and allow EV1 to begin to open. This boost pressure is required to allow flow to get through other cartridge valves in the system to operate functions.

When RV1 has a load-sense pressure applied to its right side, which is communicated from the array of LS check valves (CV2, CV3, CVD10, CV7, CV10, CV11, etc) this will add to the pressure required for EV1 to drain its right side pilot and open. For example, if the load-sense pressure for a spreader motor is 1000 PSI, this will be added to the (200 PSI) spring bias pressure of RV1. Now EV1 cannot begin to open its path to tank until the pump pressure has achieved something slightly higher than 1200 PSI. PGP would display 1200 PSI and L.S. port would display 1,000 PSI. In this way the system will always attempt to sustain a differential or boost pressure of approximately 200 PSI.

**FR1**– Load sense drain orifice. FR1 provides a controlled drain for the load-sense pilot line. Its function is to ensure that the pressure cannot be trapped in this pilot and result in EV1 not being able to fully open at low pressure when required.

**Post Compensators (EP1, EP2, EP3, and EP4)** – The post compensators ensure that all functions will operate simultaneously during low pump flow situations (when the circuit requires more oil than the pump can provide). The pilots of the post compensators are directly tied to the LS pressure network. Each compensator will modulate flow by restricting or allowing flow to pass to achieve a constant differential. This differential across all of the compensators allows all of the functions to work with each other to prevent any one function from coming to a complete stop.

# HYDRAULIC

## EXPLANATION OF SPREADER CIRCUIT

**Proportional Valve (SP3)** – Spinner flow control valve. SP3 is a proportional solenoid flow control valve.

In its un-energized state it provides a blocked path between the pump flow and the spinner work port. When it is energized it provides an increasing orifice opening to flow as a result of increasing electric current to its solenoid coil.

**Proportional Valve (SP2)** – Auger/Conveyor flow control valve. SP2 is a proportional solenoid flow control valve. In its non-energized state it provides a blocked path between the pump flow and the auger/conveyor work port. When it is energized it provides an increasing orifice opening to flow as a result of increasing electric current to its solenoid coil.

**Relief Valve (RV3)** – Spreader Pressure Relief. RV3 limits the pressure of the spreader motor circuits. It is located in the pilot load-sense line of the spreader work ports. It ultimately limits the pressure at the RV1 and therefore EV1 which opens to dump pump flow to tank. RV3 is adjustable. Its pressure setting will be displayed at the LSGP if a spreader motor load exceeds the relief setting or a blockage of a spreader work port occurs.

**CV8 & CV9** – CV8 and CV9 are back-to-back check valves. Their purpose is to communicate the higher of the two spreader motor pressures of the hoist circuit back to the RV1 boost pressure relief.

# HYDRAULIC

## EXPLANATION OF PLOW CIRCUIT

**SP7** – Plow Angle Directional Control Valve – SP7 has a neutral position and two actuated positions. The actuated positions alternately switch the tank and pressure lines connected to the cylinders to provide opposing angle directions. This valve is known as a motor spool, therefore in its normal position it blocks the pump flow from passing. However, it allows the pressure from the counterbalance valves to drain back to tank.

**CVD10 – Check Valve** – This valve allows the LS signal from the plow angle circuit to be relayed back to the RV1. However, it will prevent the LS signal from back feeding. It only allows oil to travel in one direction.

**Plow Raise Flow Control (SP1)** – SP1 is an electrically actuated proportional two position/two way valve. During its non-energized state, it blocks pump flow from reaching the plow lift cylinder. When energized, it provides an increasing orifice opening to flow as a result of increasing electric current to its solenoid coil. When this valve opens, it allows oil to flow from the pump to the cap side of the cylinder.

**Plow Lower Flow Control (SP6)** – SP6 is an electrically actuated proportional two position/two way valve. During its non-energized state, it blocks the oil from draining from the cap end of the cylinder back to tank. When energized, it provides an increasing orifice opening to flow as a result of increasing electric current to its solenoid coil.

# HYDRAULIC

## EXPLANATION OF PLOW DOWN CIRCUIT

**Plow Down Relief** – The TS2 valve is a two position/three way proportional pressure valve. It serves multiple functions. In its non-energized state, it provides a constant 100 PSI of down force on the rod side of the cylinder. When the plow is raising, the oil from the rod side of the cylinder is drained back through this valve.

This valve is energized when lowering a DA cylinder. Its purpose is to provide an adjustable pressure to the rod-side of the cylinder. The pressure setting of this valve is adjustable as a function of electrical current.

**RV5 – Upside Pressure Relief** – This is an adjustable relief valve that protects the cap side of the plow cylinder. This is set at the factory at 1,300 PSI. The valve will only open if the pressure at the cylinder reaches 2,000 PSI.

**CV1 – Load Holding Check** – The purpose of CV1 is to hold the plow in the up position after oil has passed through the SP1 cartridge. It will not allow oil to back feedback through the SP1.

**CV3 & CV2** – CV3 and CV2 are back-to-back check valves. Their purpose is to communicate load sense pressures of the plow circuit back to the RV1 boost pressure relief.

## EXPLANATION OF HOIST CIRCUIT

**SP4 – Hoist Down Relief** – SP4 is an electrically actuated proportional two position/two way valve. During its non-energized state, it blocks pump flow from reaching the hoist cylinder. When energized, it provides an increasing orifice opening to flow as a result of increasing electric current to its solenoid coil. Its function is to raise the hoist. When this valve opens, it allows oil to flow from the pump to the cap side of the cylinder.

**SP5 – Hoist Lower Flow Control** – SP5 is an electrically actuated proportional two position/two way valve. Its function is to lower the hoist. During its non-energized state, it blocks the oil from draining from the cap end of the cylinder back to tank. When energized, it provides an increasing orifice opening to flow as a result of increasing electric current to its solenoid coil.

**RV4 - Upside Hoist Pressure Relief** – This is an adjustable relief valve that protects the cap side of the Hoist cylinder. This is set at the factory at 2,600 PSI. The only time it will allow oil to drain back to tank is if the pressure reaches 2,500 PSI.

# HYDRAULIC

## EXPLANATION OF HOIST DOWN CIRCUIT

**Hoist Down Relief** – The TS1 valve is a two position/three way proportional pressure valve. It serves multiple functions. In its non-energized state, it provides a constant 100 PSI of down force on the rod side of the hoist cylinder. When the hoist is raising, the oil from the rod side of the cylinder is drained back through this valve.

This valve is energized when lowering a DA hoist cylinder. Its purpose is to provide an adjustable pressure/down force to the rod-side of the cylinder. The pressure setting of this valve is adjustable as a function of electrical current (Maximum setting = 1,000 PSI).

**CV10 and CV11** – CV10 and CV11 are back-to-back check valves. Their purpose is to communicate the higher of the two hoist pressures back to the RV1 boost pressure relief.

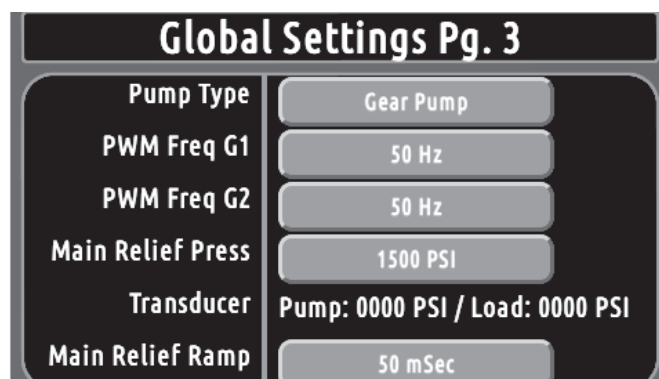
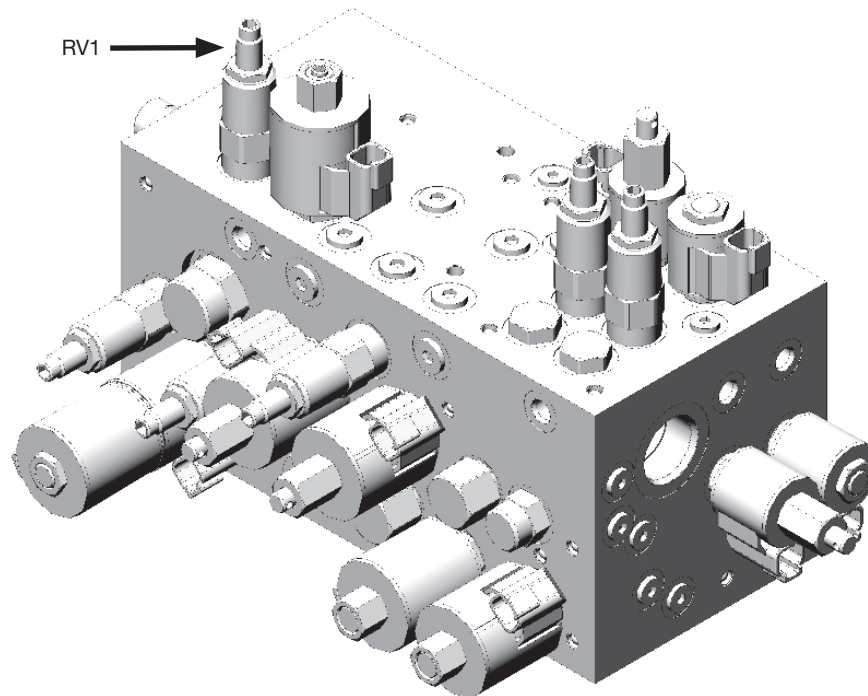
**CV6– Hoist Shuttle Cartridge** – Load Holding Check – The purpose of this valve is to hold the hoist suspended in the air after oil has passed through the SP4.

# HYDRAULIC

## CONFIGURING SYSTEM FROM OPEN TO CLOSED CENTER

### Instructions:

1. Locate the RV1 cavity and remove (Hydraforce P/N: RV08-20A-0-NC-05-02)
2. Replace with NXCP08-20-N
3. Within the control panel configuration menu:
  - a. Locate the Pump Type Selection in the Global Settings Menu
  - b. Toggle the box and change from gear to piston pump



# HYDRAULIC

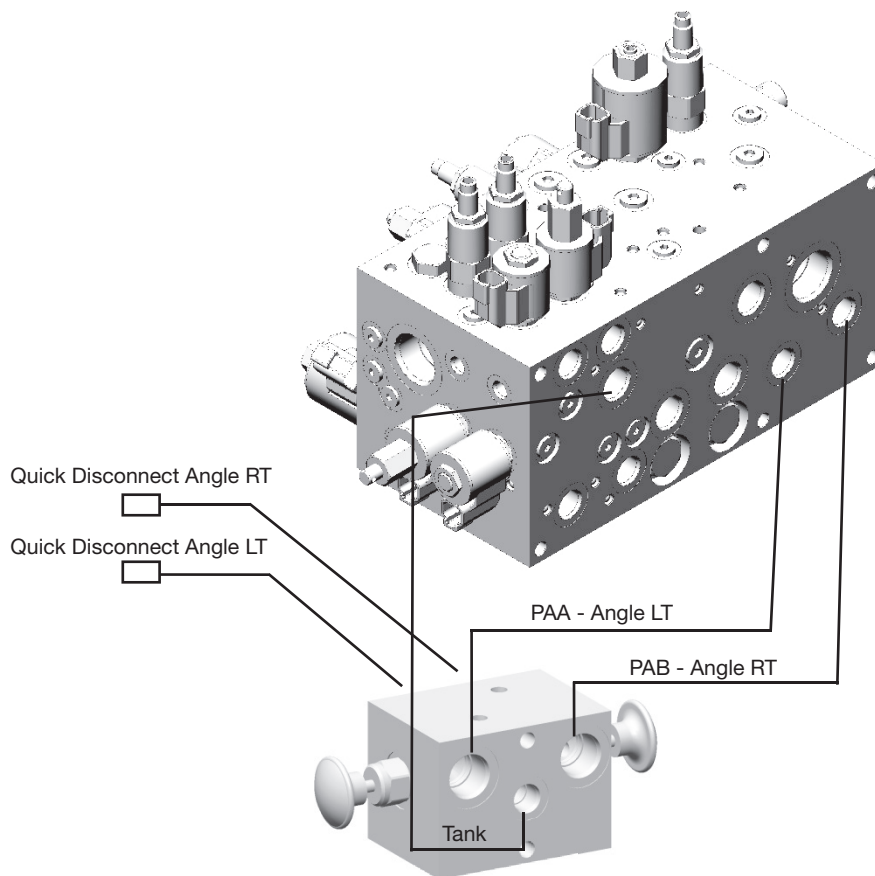
## PLOW PRESSURE RELEASE MANIFOLD INSTALLATION

**Purpose:** This manifold is intended to relieve pressure within the plow angle lines. It allows easier connection between quick disconnect fittings.

**Operation Instruction:** Pull actuators to relieve pressure within the plow angle circuit

### Installation Instructions:

1. Locate the T Port – Route back to port T2 or the “B” port
2. Locate the PAA Port – Route to the PAA port on the Main Hydraulic Manifold
3. Locate the PAB Port – Route to the PAB port on the Main Hydraulic Manifold
4. Locate the PAA1 Port – Route to the plow left cylinder
5. Locate the PAB1 Port – Route to the plow right cylinder





# ELECTRICAL GUIDE

## WIRING ASSIGNMENTS

**Gray Jacketed Cable** – This cable supplies the controller with power, ground, and CAN connection.

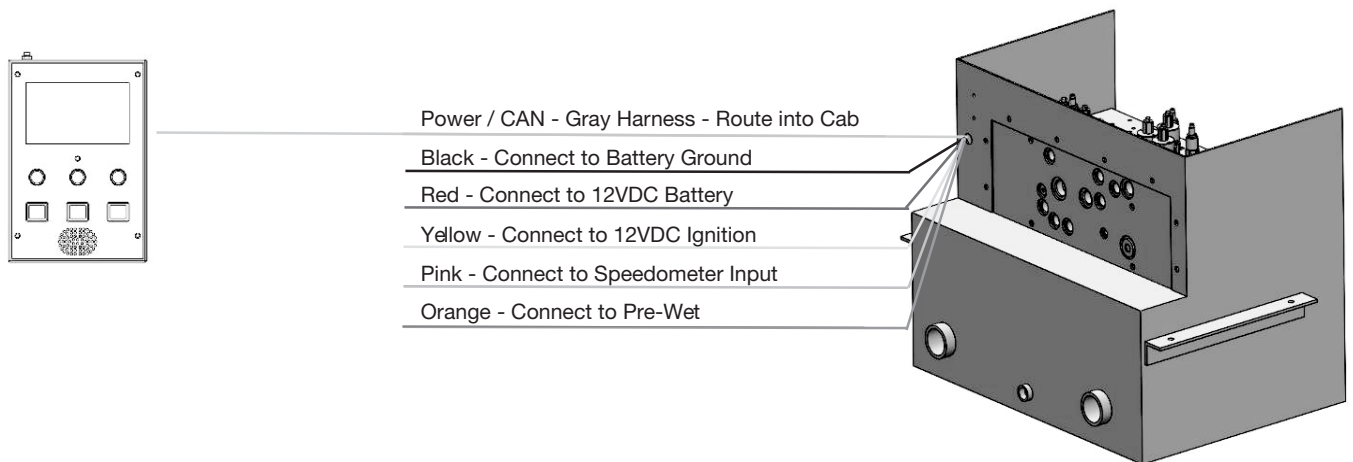
**Red Wire** – Connect to 12VDC (Battery) with a 20A fused connection.

**Yellow Wire** – Ignition Power: Connect to a fused ignition power source.

**Black Wire** – Connect to Battery Ground

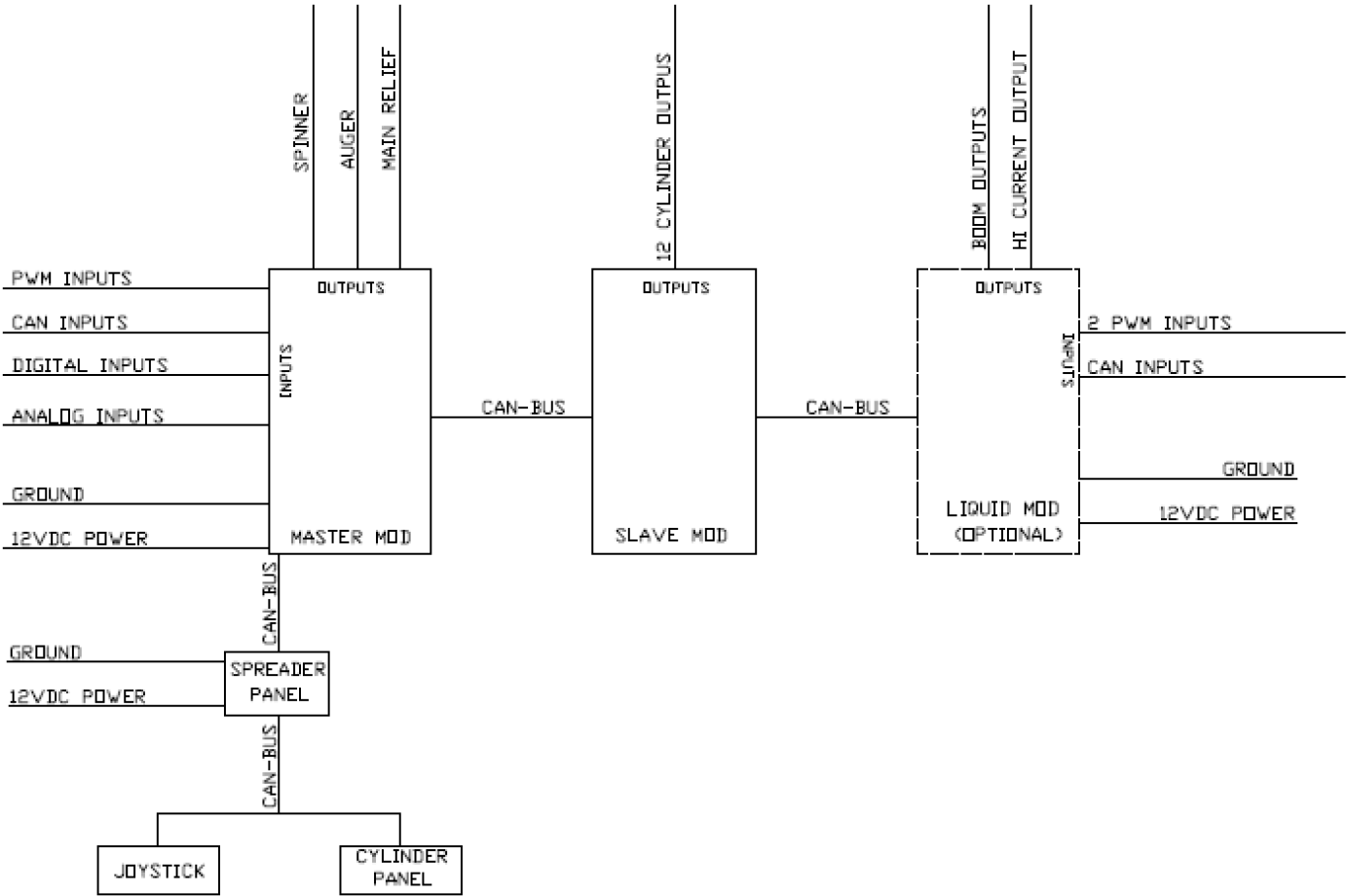
**Pink Wire** – Connect to Speedometer Input

**Orange Wire (When applicable)** – Connect to pre-wet valve or pump (Source Current)



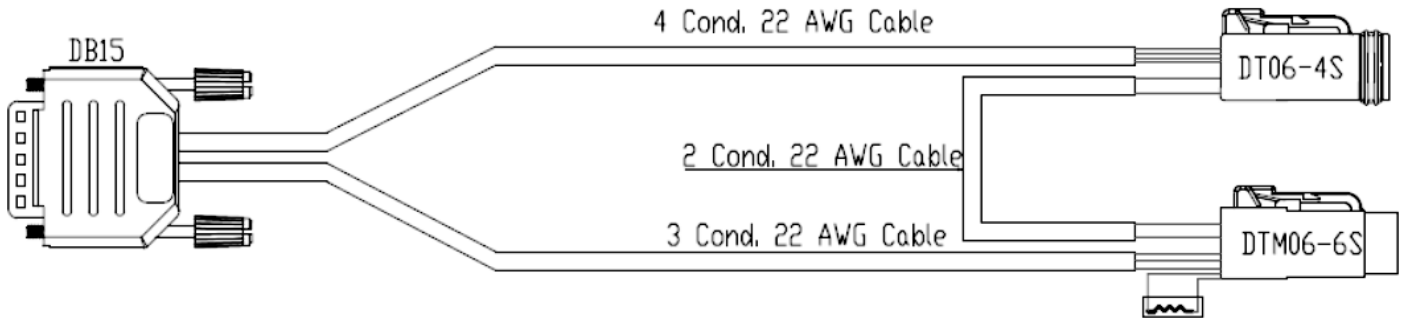
# ELECTRICAL GUIDE

## BLOCK DIAGRAM



# ELECTRICAL GUIDE

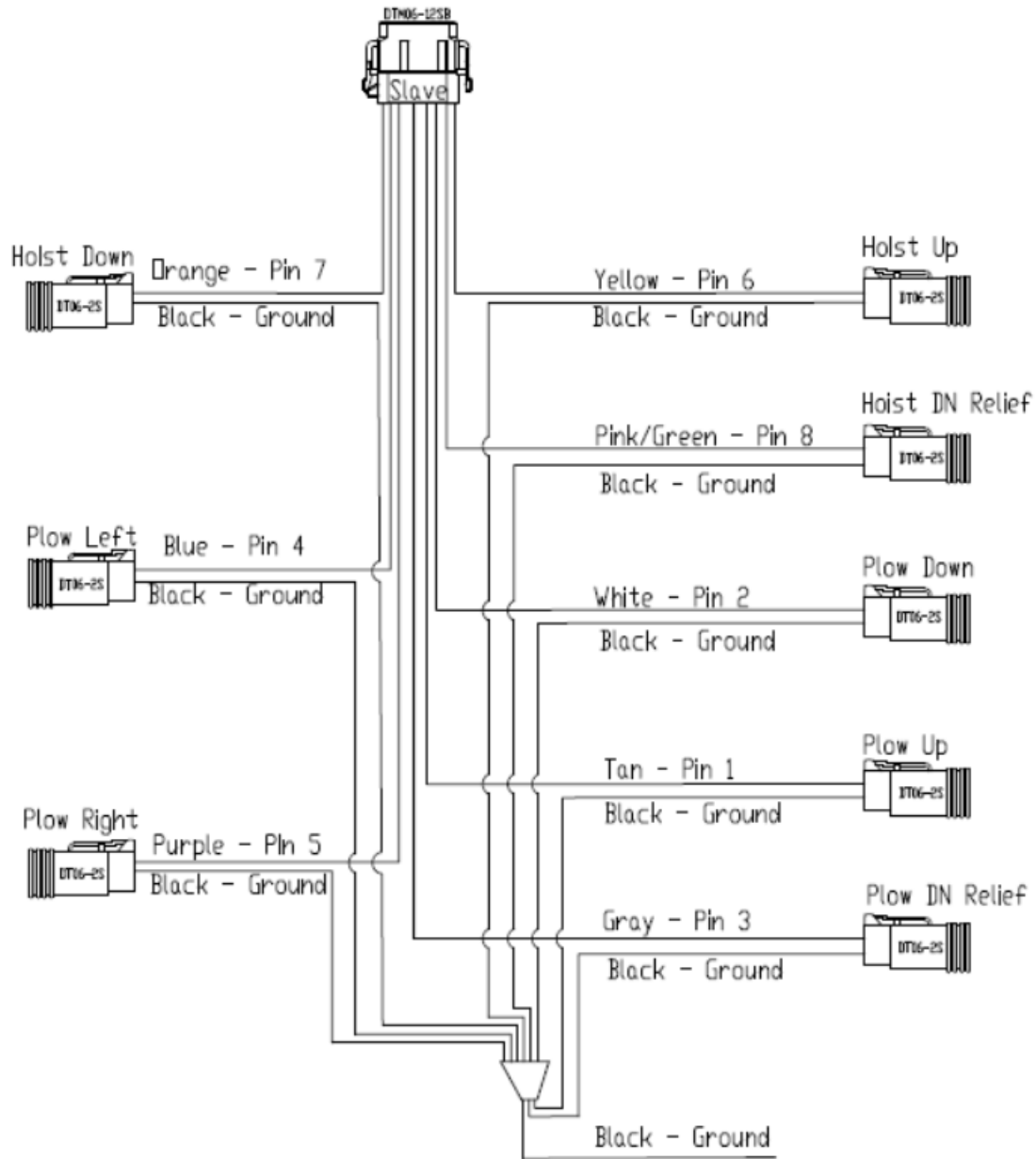
## JOYSTICK HARNESS



DB15 PIN ASSIGNMENTS			DTM06-6S PIN ASSIGNMENTS		
PIN NUMBER	WIRE CONNECTION	WIRE COLOR	PIN NUMBER	WIRE CONNECTION	WIRE COLOR
1	—	—	1	DB15 Pin 8	Green (3 Cond)
2	DTM06-6S Pin 2	Red (3 Cond)	2	DB15 Pin 2	Red (3 Cond)
3	—	—	3	DT06-4S Pin 3/Resistor	Red (2 Cond)/Red (Resistor)
4	DT06-4S Pin 1	Red (4 Cond)	4	DT06-4S/Resistor	Black (2 Cond) /Black (Resistor)
5	—	—	5	DB15 Pin7	Black (3 Cond)
6	—	—	6	—	—
7	DTM06-6S Pin 4	Black (3 Cond)	DT06-4S PIN ASSIGNMENTS		
8	DTM06-6S Pin 1	Green (3 Cond)	PIN NUMBER	WIRE CONNECTION	WIRE COLOR
9	DT06-4S Pin 3	Green (4 Cond)	1	DB15 Pin 4	Red (4 Cond)
10	DT06-4S Pin 4	White (4 Cond)	2	DB15 Pin 11	Black (4 Cond)
11	DT06-4S Pin 2	Black (4 Cond)	3	DB15 Pin 9/DTM06-6S Pin 3	Green (4 Cond)/Red (2 Cond)
12	—	—	4	DB15 Pin 10/DTM06-6S Pin 2	White (4 Cond)/Black (2 Cond)
13	—	—	CABLE LENGTHS		
14	—	—	CABLE TYPE	LENGTH (INCHES)	
15	—	—	4 Cond	23	
			2 Cond	9	
			3 Cond	26	

# ELECTRICAL GUIDE

## SLAVE HARNESS



SLAVE 12 POS. PLUG		
PIN	FUNCTION	WIRE COLOR
B.1	Plow Up	Tan
B.2	Pump Down	White
B.3	Plow Down Relief	Gray
B.4	Plow Left	Blue
B.5	Plow Right	Purple
B.6	Hoist Up	Yellow
B.7	Hoist Down	Orange
B.8	Hoist Down Relief	Pink/Green
B.9	—	Plug
B.10	—	Plug
B.11	—	Plug
B.12	—	Plug

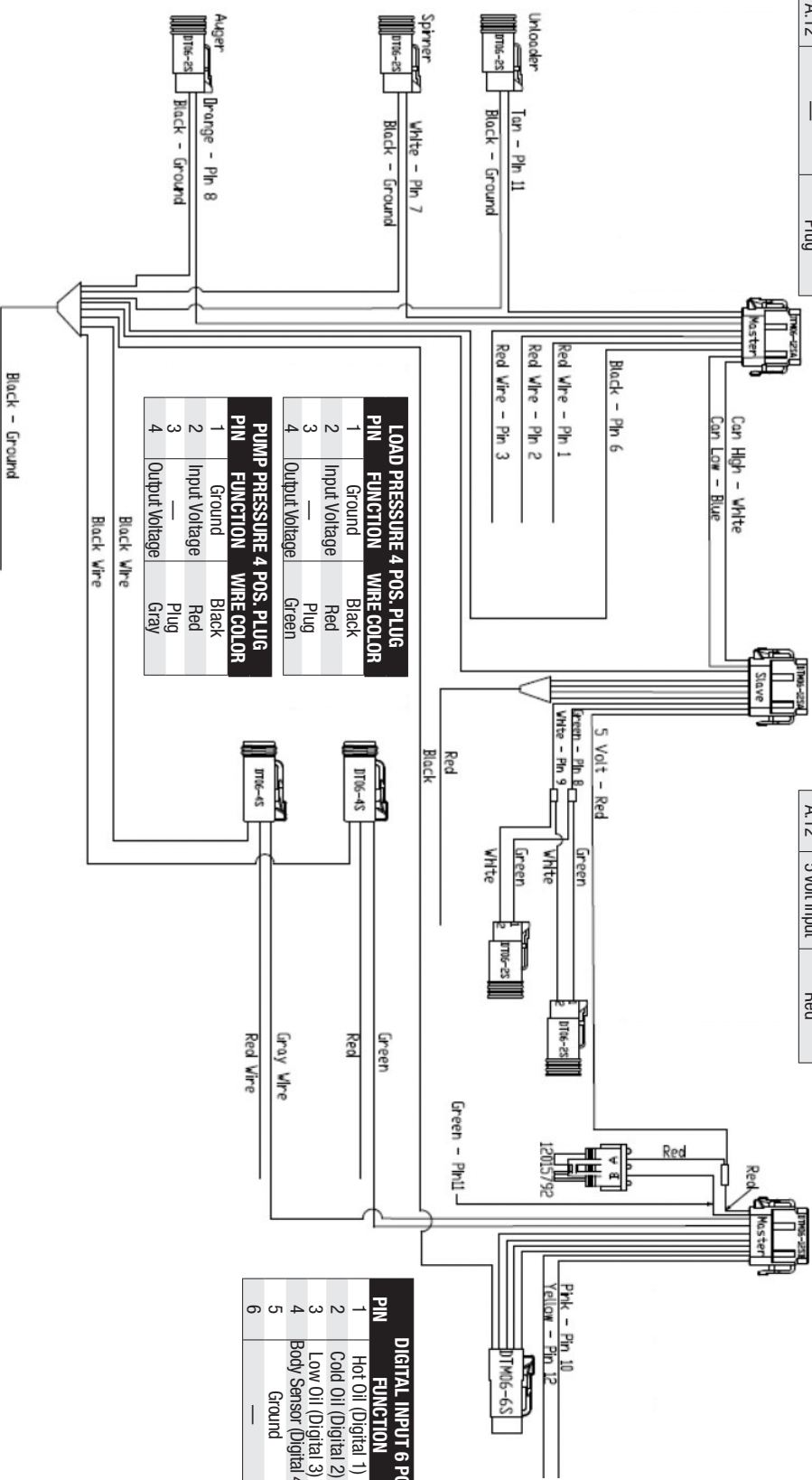
# ELECTRICAL GUIDE

## MASTER/SLAVE HARNESS

PIN	FUNCTION	WIRE COLOR
A.1	Battery Power	Red
A.2	To Power Stud	Red
A.3	Relay Control	Red
A.4	Can High	White
A.5	Can Low	Blue
A.6	Ground	Black
A.7	Spinner	White
A.8	Auger	Orange
A.9	—	Plug
A.10	—	Plug
A.11	Unloader	Tan
A.12	—	Plug

PIN	FUNCTION	WIRE COLOR
A.1	Power	Red
A.2	Power	Red
A.3	Power	Red
A.4	Can High	White
A.5	Can Low	Blue
A.6	Ground	Black
A.7	Power	Red
A.8	Can High	Green
A.9	Can Low	White
A.10	—	Plug
A.11	—	Plug
A.12	5 Volt Input	Red

PIN	FUNCTION	WIRE COLOR
B.1	Hot Oil	White
B.2	Cold Oil	Green
B.3	Low	Red
B.4	Body Sensor	Brown
B.5	5 Volt Output	Red
B.6	Pump Pressure	Gray
B.7	Load Pressure	Green
B.8	—	—
B.9	—	—
B.10	Ground Speed	Pink
B.11	Temperature Sensor	Green
B.12	Ignition	Yellow



PIN	FUNCTION	WIRE COLOR
1	Ground	Black
2	Input Voltage	Red
3	—	Plug
4	Output Voltage	Green

PIN	FUNCTION	WIRE COLOR
1	Ground	Black
2	Input Voltage	Red
3	—	Plug
4	Output Voltage	Gray

PIN	FUNCTION	WIRE COLOR
1	Hot Oil (Digital 1)	White
2	Cold Oil (Digital 2)	Green
3	Low Oil (Digital 3)	Red
4	Body Sensor (Digital 4)	Brown
5	Ground	Black
6	—	Plug

# ELECTRICAL GUIDE

## CONTROLLER ERRORS

System Errors and messages will appear in the message bar. These messages will include open circuits, short circuits, controller errors, sensor warnings, and more. Resolve the issue and depress the “ok” button to clear the message. Consult factory for assistance.



### Operation Messages:

**Hot Oil** – This indicates the hydraulic oil has exceeded 186 degrees Fahrenheit. Allow system to cool and take corrective action to eliminate source of over-heating.

**Cold Oil** – This indicates the hydraulic oil is below 34 degrees Fahrenheit. Cold oil can be very viscous and cause performance issues. Muncie recommends actuating a motor function and allowing the system to warm before performing any rigorous functions.

**Low Oil** – This indicates the oil level is low. Replenish oil level as needed.

**Filter Bypass** – This indicates that the filter bypass switch has been tripped. Change the filter element.

**Filter Bypass** – This indicates that the filter bypass switch has been tripped. Change the filter element.

**Body Up** – This indicates that the body up switch has engaged.

**Open Circuit Detected** – This indicates that a wire or connector has disconnected creating an open circuit condition. Inspect wiring and correct.

**Short Circuit Detected** – This indicates that an output wire is shorted to ground. Please inspect wiring and correct.

**Switched to GPS fallback groundspeed** – This message indicates that the groundspeed signal from the truck was lost. Therefore, the GPS signal will be used to calculate the speed of the truck.

# ELECTRICAL GUIDE

## CONTROLLER ERRORS

### Hardware Related Messages:

**No Master Module Found** – Master Module not detected upon startup. Check wiring and correct.

**Master Lost** – Master Module disconnected after startup. Check wiring and correct.

**Slave Lost** – Slave Module disconnected after startup. Check wiring and correct.

**Motor Mod Lost** – Motor Module disconnected after startup. Check wiring and correct.

**Panel Lost** – Cylinder Panel disconnected after startup. Check wiring and correct.

**Liquid Feedback Sensor Failure** –flow turbine not detected. Check wiring and correct. If not utilizing flow turbine, switch to open loop setting in calibration menu.

**Lost auger feedback** – feedback sensor not detected. Check wiring and correct. If not utilizing feedback sensor, switch to open loop setting in calibration menu.

### Panel Faults:

**Found Configuration Display Corruption** – Configuration file corrupted. Please contact Muncie and check wiring on controller so that it is connected to ignition triggered shutdown.

**Processor was reset forcibly** – This error indicates an unexpected system crash. If problem persists, please contact Muncie.

**Panel Comm Fault** – This message indicates a processor communication error. Try resetting the controller. If problem persists, contact Muncie.

# GLOSSARY OF TERMS

**Post Compensation:** Post compensation is synonymous with flow sharing. This feature allows all of the hydraulic functions to operate simultaneously during low pump flow scenarios.

Remember that without post compensation, oil takes the path of least resistance. Flow sharing modulates downstream pressures in order to keep everything operating. During low flow scenarios, all of the functions may reduce their speeds equally, but all functions should stay operating.

**Pre-Compensation:** This feature does not allow for flow sharing. Simply put, this feature provides stable Flow as pressure fluctuates in a system. However, during low pump flow scenarios, an output may completely stop since the flow will take the path of least resistance.

**Voltage Compensation:** This is a method to control the electrical outputs from the controller. Essentially, the controller maintains a constant voltage at the output on the controller. This is the most cost effective method at controlling a proportional solenoid, however it is not the most precise method. As the solenoid coil heats, it's resistance increases which changes the performance of the valve.

**Current Compensation:** This is another method to control the electrical output from a controller. Although this is a more expensive method, it is the most precise method. As the coil heats and the resistance changes, the controller allows the output to increase the voltage to compensate and keep the output current consistent.

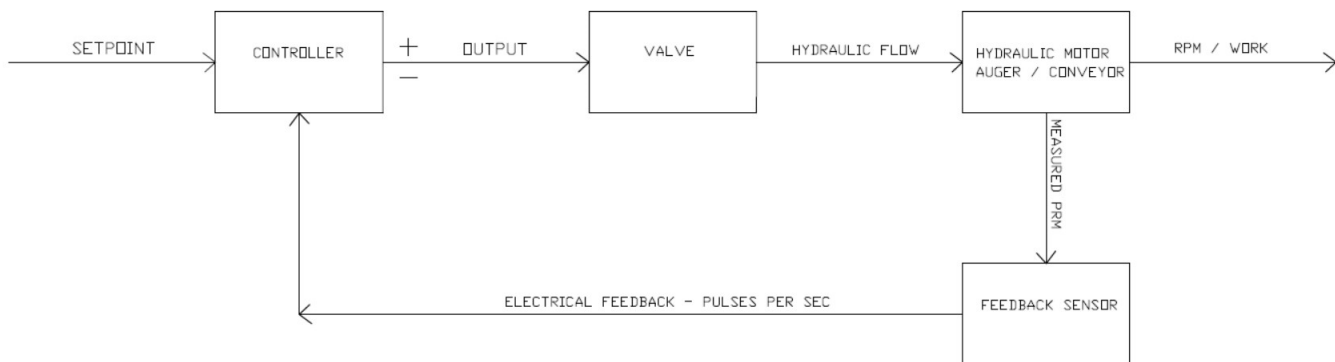
**Load Sense:** Load sensing was developed to improve the efficiency of a circuit. All of our manifolds incorporate LS sensing technology. Load sensing allows the system to build the pressure that the circuit requires, allowing us to draw less horsepower.

**Open Center:** Open center refers to valve types. Open center valves are used with fixed displacement pumps (gear) and allow the flow to dump back to tank during system bypass. Without a designated passage to tank, the flow would constantly bleed over relief.

**Closed Center:** Closed center refers to valve types. Closed center valves are used with variable displacement pumps (piston). These valves do not offer a passage to tank. Instead, the variable displacement pump de-strokes preventing it from generating flow. Keep in mind that the piston pump destrokes when the LS signal is at 0 PSI.

**Closed Loop:** Closed loop is typically referencing the functionality of the conveyor or pre-wet function. Years before the use of cartridge valves and current control, closed loop control was required to achieve consistent hydraulic performance. Specifically, stack valves have excessive hysteresis and overshoot.

By placing a feedback sensor on the auger shaft, we can measure how many revolutions per minute the shaft spins. Knowing the RPM, we can then modulate our current to achieve our desired output. Simply put, if we dial in 200 Lbs./mile and the valve opens up too much, the feedback sensor will recognize the inconsistency and readjust the signal to the valve to limit the flow to accomplish the desired setpoint.



**Open Loop:** Open loop typically refers to the conveyor or pre-wet function. Open loop simply means that electrical feedback isn't required. Today with the use of cartridge valves and current control, feedback sensors really aren't required however they can provide more precision. The advantage plus has the capability to do either open or closed loop.

**Open Circuit Detection:** The Advantage Plus Controller has built in diagnostics that detect when a solenoid is unplugged. When this occurs, the controller will generate an error code on the screen and a button (cylinder function) or display (spreader function) will flash.

Many of our competitors have test lights at the valve to indicate that the electrical connection is connected and firing. However, our buttons provide real time feedback by turning from green to red to indicate that an output is connected and actuated.

**Digital Input** – Digital inputs are simply on or off switches that are connected to the system. Digital inputs include oil level float switches, body up switches, hot oil switches, cold oil temperature switches, and filter bypass switches.

**Analog Input** – These are inputs that generate a proportional 0-5 volt signal. In the Advantage Plus, analog inputs include the pressure transducers that measure the hydraulic pressures.

**PWM input** – These inputs provide a pulsed signal (either square or sine). Examples of PWM signals include speedometer sensors, IR temperature sensors, and feedback sensors.

**CAN inputs** – These are inputs that are connected to our CAN-BUS network. Typically, these will have a power, ground, CAN-Hi, and CAN-Lo connections. Examples of these connections include: IR temperature sensors.



# ADVANTAGE PLUS SYSTEM TROUBLESHOOTING

## HF96083-14

ISSUE	POTENTIAL PROBLEMS
<b>System Powered, but nothing operated hydraulically</b>	Verify that the PTO is engaged/Is Pump Producing Flow
	Contamination in Unloader Compensator (EV1)
	Contamination In Boost Relief (RV1)
	Contamination in Main Relief (TS3)
	Boost Pressure Relief is set too low (RV1)
	If using piston pump, check stand-by settings on pump
	If using piston pump, make sure LS line is routed back to appropriate port
	Check to see if modules are recognized - If not, check CAN connection
	Verify that Modules are Plugged into harness
Verify that Controller has been programmed with system profile	
<b>Electronics do not power</b>	Check to see if ignition input is connected to 12VDC
	Check Power and Ground Connections
	Check Fuse
	Check to make sure the master module is plugged in
	If applicable, check the ignition source fuse on the truck
	Check the relay and connections located within the enclosure

## PLOW LIFT ISSUES

ISSUE	POTENTIAL PROBLEMS
<b>Plow Does Not Raise</b>	Check the Controllers Speed Settings
	Check the Plow Down Manual Override (SP6)
	Check the Plow Down Flow Control for Contamination (SP6)
	Check the Plumbing (are the PLA and PLB ports plumbed backwards)
	Check the Plow Down Relief for Contamination (RV5)
	Check if the Plow Cylinder is leaking internally
	Check CV3 for Contamination blocking LS signal
	Check Cylinder Panel Harness - Buttons should change from green to red when pushed
	Sync Truck Profile
<b>Plow Raises Slowly and Drifts Back Down</b>	Check for Contamination in the plow down flow control (SP6)
	Check for Contamination in the Plow Up Relief (RV5)
	Check Load Holding Valve for Contamination (CV1)
	Check if the plow cylinder is leaking internally
<b>Plow Slams Down</b>	Decrease the maximum plow speed settings

# TROUBLESHOOTING

## PLOW ANGLE ISSUES

ISSUE	POTENTIAL PROBLEMS
<b>Plow Does Not Angle (left or right)</b>	Check the plow angle speeds in the controller
	Check the electrical circuit for opens and shorts (Look for error messages)
	Check crossover relief "on Plow"
	Check to see if quick disconnects are seated properly
	Check to see if quick disconnect manifold is held open (debris)
	Check EHPR1 (Plow Right Pilot) or EHPR2 (Plow Left Pilot)
	Check PE2 fo Contamination
	Check CV4 or CV5 for contamination
	Do the cylinder panel buttons change from green to red - If not, check the harness
	Sync Truck Profile
<b>Plow Angles Slow</b>	Check the Controller Speed Settings
	Make sure plumbing is not restricting flow
	Is Pump Undersized (need more displacement)
	Check Boost Pressure Setting
	Sync Truck Profile

## HOIST ISSUES

ISSUE	POTENTIAL PROBLEMS
<b>Hoist Does Not Raise</b>	Check the Controller Speed Settings
	Check the Hoist Down Manual Override (SP5 or Additional SP)
	Check the Hoist Down Flow Control for Contamination (SP5 or additional SP)
	Check the Plumbing (are the HA and HB ports plumbed backwards)
	Check the Hoist up Relief for Contamination (RV4)
	Check if the Plow Cylinder is leaking internally
<b>Hoist Raises, but drifts down slowly</b>	Check the flow control for contamination (SP5 or Additional SP)
	Check the hoist upside relief (RV4) for contamination
	Check the load holding check valve for contamination (CV6)
<b>Hoist Raises Slowly</b>	Check the Controllers Speed Settings
	Check the pump displacement - May need larger displacement pump
	Check Boost Pressure Relief Setting - Should be set at 200 PSI
<b>SA Telescopic Hoist Lowers Slowly</b>	Did we check the controller speed settings
	Verify that hoist isolation plug is installed? Is T2 routed directly to the Reservoir
	Did we install a second SP16 in the CP2 cavity to lower the hoist
<b>Hoist Slams Down When Lowering</b>	Turn the Hoist Max Speeds Down on the controller

# TROUBLESHOOTING

## SPREADER ISSUES

ISSUE	POTENTIAL PROBLEMS
<b>Spinner Does Not Operate</b>	Check the Controllers Speed Settings
	Check the Plumbing - Are we deadheading the function
	Check the quick disconnects
	If the function operates when switch motors, could have faulty motor
	Check the Spreader Relief Valve for contamination
	Check CV9 - is LS signal being relayed back to boost pressure valve
	Check CV7 - is the LS signal being relayed back to boost pressure valve
<b>Auger/Conveyor Does Not Operate</b>	Check the controllers speed settings
	Check the Plumbing - Are we deadheading the function
	Check the quick Disconnects
	Swapping supply to spinner, could have faulty motor
	Check the Spreader Relief Valve for contamination
	Check CV8 - is LS signal being relayed back to boost pressure valve
	Check CV7 - is LS signal being relayed back to boost pressure valve

## SYSTEM IS OVERHEATING

ISSUE	POTENTIAL PROBLEMS
<b>System is Getting Hot</b>	1. Check the standby pressure - Contamination in LS Drain
	2. Check pressure with motors engaged - Bad Quick Disconnect
	3. Verify that we do not have excess pump flow
	4. Verify that the low oil/cold oil sensor isn't plugged into the wrong input

## CONTROLLER ERROR MESSAGES

ISSUE	POTENTIAL PROBLEMS
<b>Air/Road Temp Sensor Not Functioning</b>	1. Verify that a sensor is installed and wired correctly
	2. Make sure that the system is configured for this sensor (must be factory configured)
	3. Check the Power and Ground Connections of the sensor
	4. Verify that all of the pins are in the correct locations and seated correctly in their housing
	5. Verify that the lens cover was removed after installation
<b>Air/Road Temp Sensors are Incorrect</b>	1. Try Calibrating the Sensor to the Controller
	2. Verify the Air/Road Temp Sensor is mounted in an appropriate location and not reading temperatures from the exhaust.
	3. Contact Muncie for Lens replacement
<b>PSI Not Displayed on Controller</b>	1. Verify that the appropriate connector is plugged into the transducer receptacle
	2. Verify that the pin of the connector are seated properly.
<b>Incorrect PSI Shown on Controller</b>	1. Replace the Pressure Transducer



*Member of the Interpump Group*

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