

PALFINGER

 *Liftgates*

Model ILFP Underslider Liftgate Maintenance and Troubleshooting





ALL MODELS OF PALFINGER LIFTGATES

Installation, Operator(Owner) and Parts Manuals, troubleshooting guides, hydraulic and electrical schematics are available for download or viewing on our website at <https://www.palfinger.com/en-US/usa/products/lift-gates>.

Diagrams of decal placement are in the Installation and Operator Manuals. Decals are furnished at no cost to our customers.

REPLACE MISSING AND/OR DEFACED DECALS!

All Models of Liftgate Operator Manuals have diagrams of pivot points needing Lubrication in the Preventive Maintenance Section.




Basic Flooded Battery Conditions and Testing

State of Charge Vs. Voltage

<u>State of Charge</u>	<u>Open Circuit Voltage</u>
100%	12.70 V
90%	12.60 V
80%	12.50 V
70%	12.35 V
60%	12.25 V
50%	12.10 V
40%	11.95 V
30%	11.85 V
20%	11.70 V
10%	11.55 V

Charge
Before
Testing



BEFORE YOU START TROUBLESHOOTING

10-10 TEST
CHECK BATTERY VOLTAGE

Using a multimeter set on DC Voltage:

Place Negative lead on Negative Post on Motor.

Place Positive lead on Positive Post on Motor.

Using the Lift Switch raise the platform to bed level.

Keeping the switch activated. Deadhead the Motor.

Keep switch activated for ten(10) seconds and observe the multimeter readings.

Ten(10) Volts for Ten(10) Seconds is the desired result.

If the reading is less than Eight(8) Volts the batteries are low and need to be charged.

Retest after charging. Replace batteries and check all connections and grounds if you cannot get 10-10.

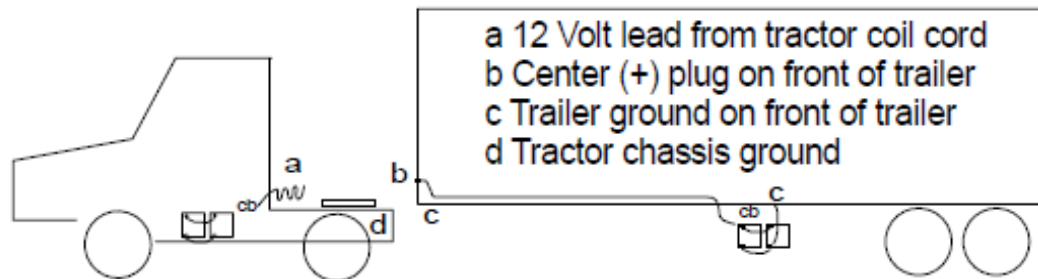
FLOODED LEAD ACID BATTERY INFORMATION

- A flooded lead acid battery reading 12.0V is at less than half charged
- Flooded lead acid batteries work best at 90 degrees F. Performance is reduced as temperatures increase or decrease above or below 90 degrees F
- Flooded lead acid batteries should be recharged immediately after discharge
- Flooded lead acid batteries that are drawn down to full discharge will not return to full capacity and will have to be replaced if multiple complete discharges occur
- Flooded lead acid batteries lose approximately 1% per day when not in use
- New flooded lead acid batteries are not fully charged and must be fully charged prior to installation.

STATE OF CHARGE-vs-FREEZING TEMPERATURE

<u>IF BATTERY IS</u>	<u>BATTERY WILL FREEZE AT</u>
100% Charged =	-75 degrees F
75% Charged =	-34 degrees F
50% Charged =	+ 5 degrees F
00% Charged =	+27 degrees F

CROSS TEST ON ENTIRE CHARGE SYSTEM



Testing of full system using a battery load tester:

Tractor Test:

1. Ground battery load tester on tractor chassis point (d)
Hook up positive load tester cable on positive pole of single pole plug at end of tractor coil cord (a)
Run load test- This will test entire circuit on tractor including ground from batteries to tractor chassis

Trailer Test:

2. Ground battery load tester on trailer chassis (c)
Hook up positive cable on positive pole of single pole plug receptacle on trailer (b)
Run load test - This will test entire circuit on trailer including ground between trailer batteries and trailer chassis.

Tractor and Trailer charging system Test

3. Ground battery load tester on tractor chassis (d)
Hook up positive cable on positive pole of single pole plug receptacle on trailer (b)
Run load test- This will test entire circuit on tractor - trailer including ground between tractor and trailer and circuit breaker on trailer.

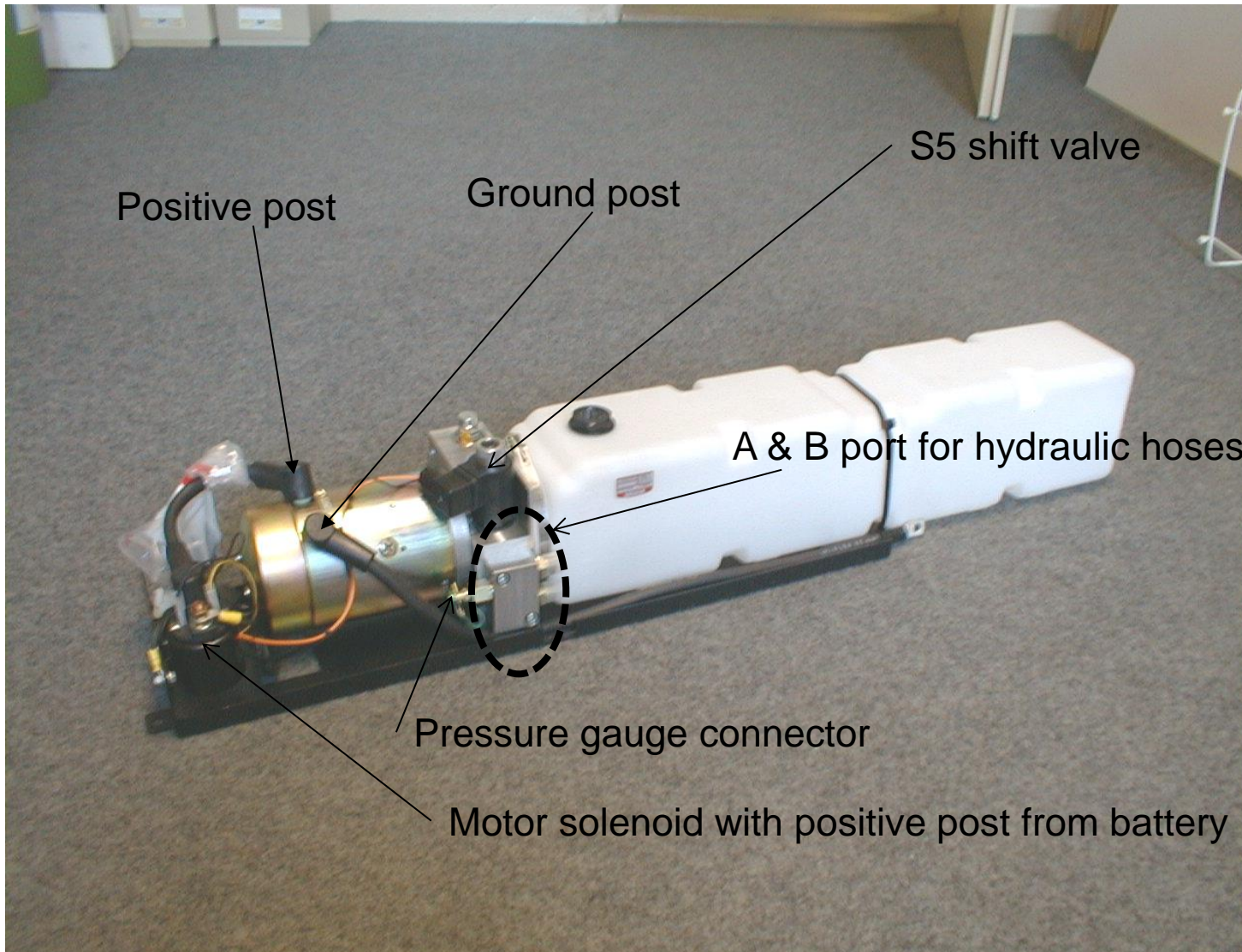
A simple low amp voltage test at the front of the trailer or at the tractor will not show insufficient connections or ground problems

Does Fifth Wheel have a ground strap to the tractor chassis?

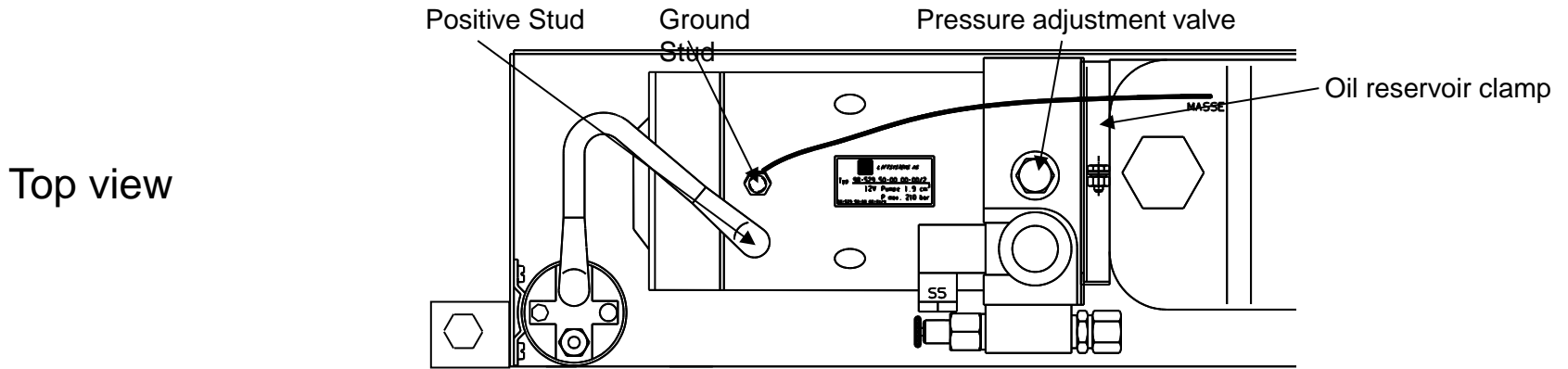
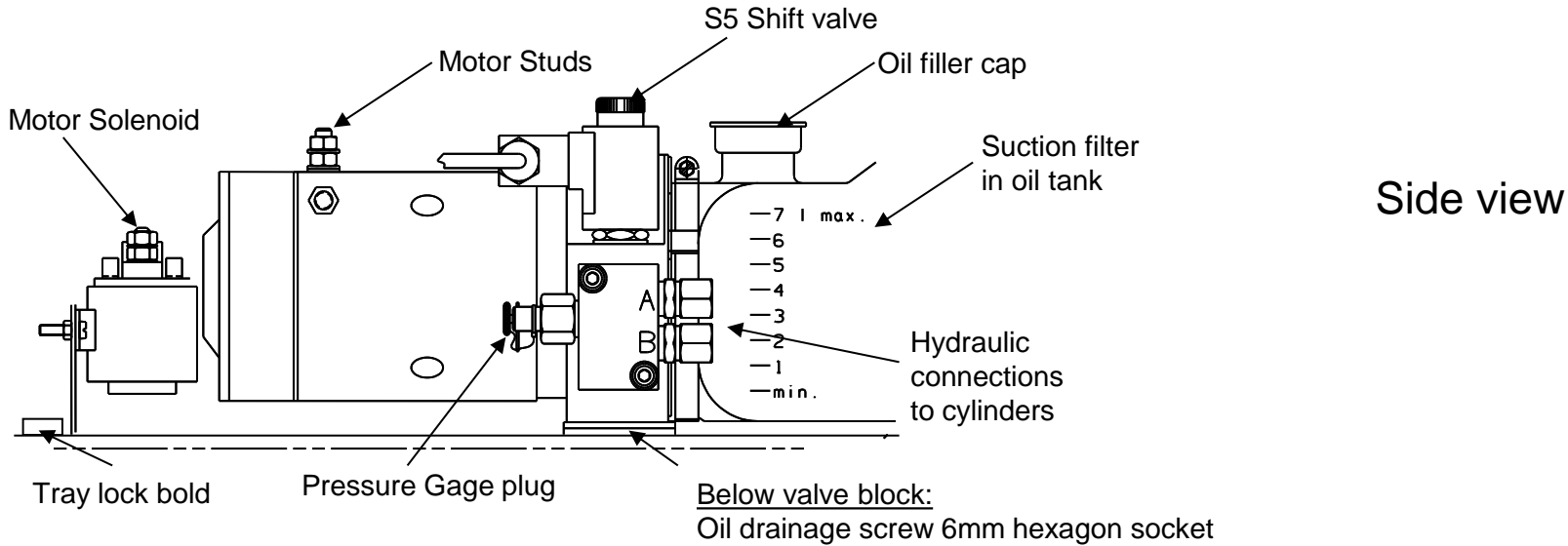
Make sure King Pin Plate is grounded to side rail.



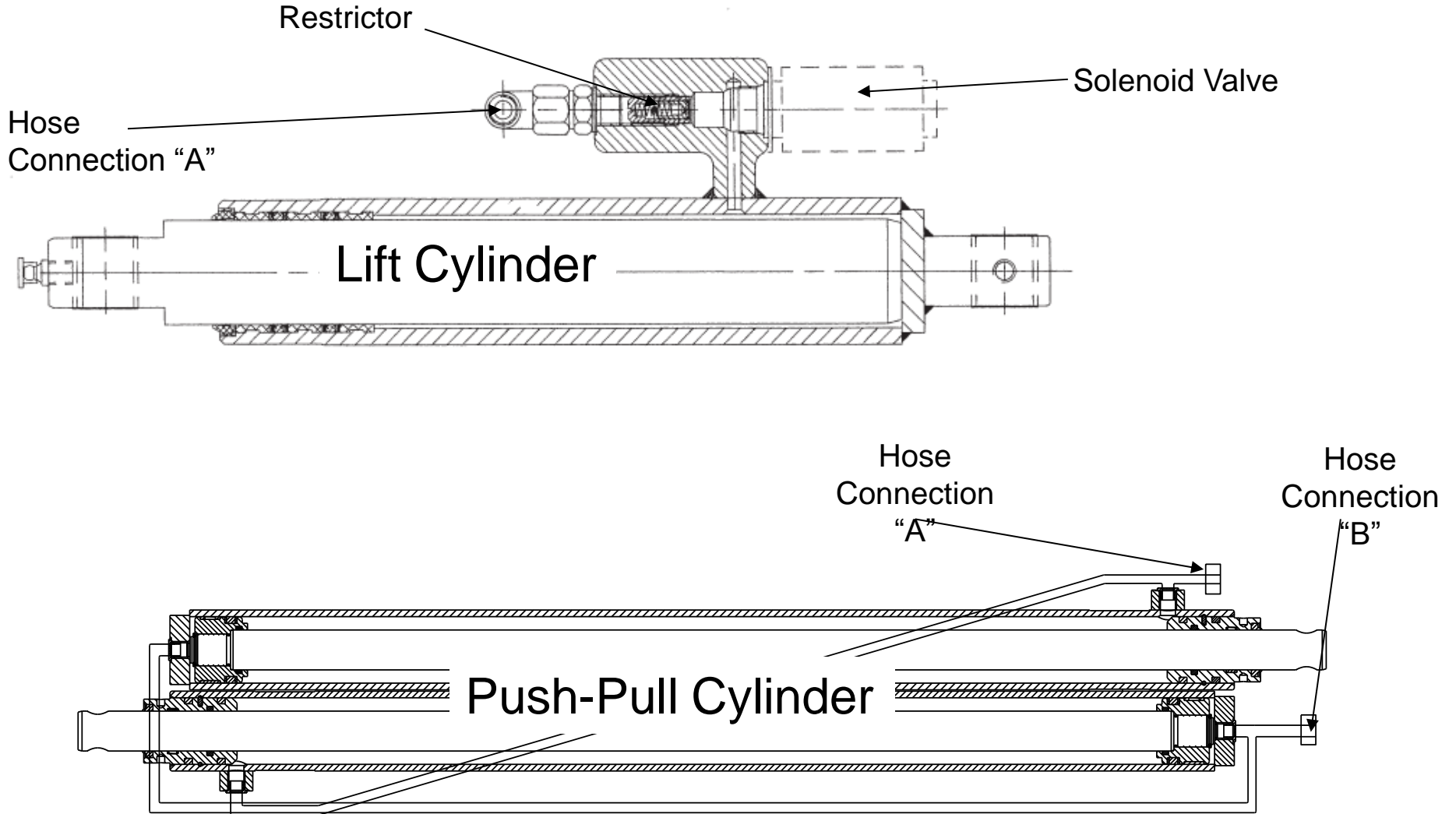
Power-pack and components



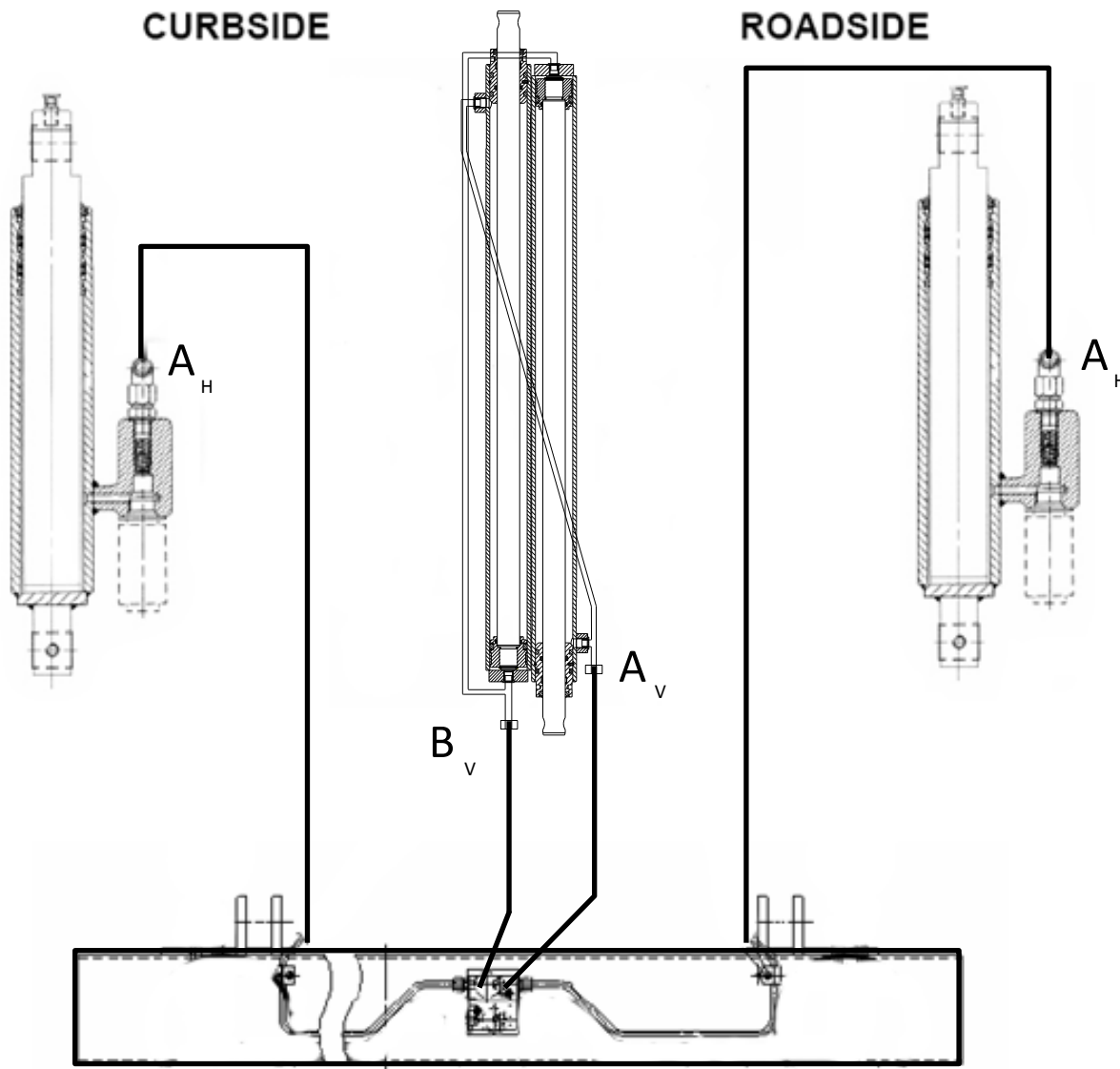
Power-pack and components



Lift and Push-Pull cylinders



Lift and Push-Pull cylinder connection



Valve Block connections

3-Valve Part Numbers

S-8 & S-7
Double Locking
P-1284466

S-11
Single Locking
P-67282345
S-11 Opens When
Lowering, Lift
Cylinder Return Line

Hydraulic Ports

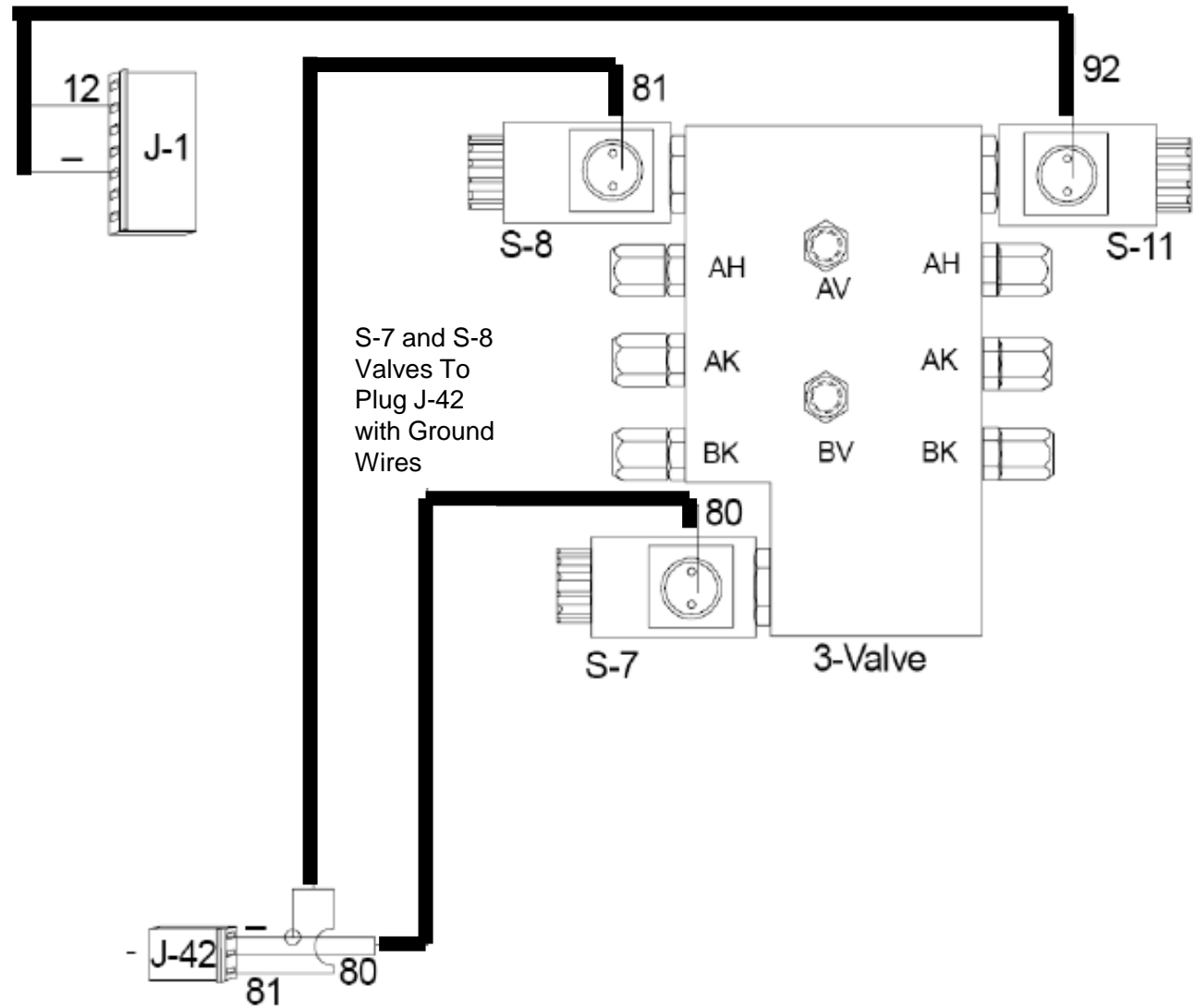
AV-Push/Pull In
BV-Push/Pull Out
AH-Lift Cylinder

Push/Pull Cylinder Out

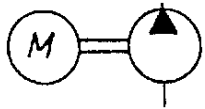
S-7 - Closed
S-8 - Open

Push/Pull Cylinder In

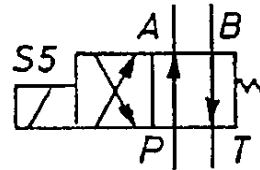
S-7 - Open
S-8 - Closed



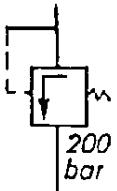
Hydraulic symbols in schematics



Motor with Pump



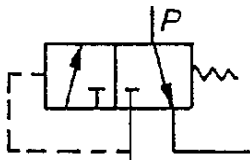
Shift valve S5



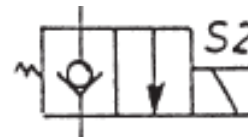
Pressure relief valve



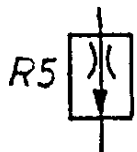
Pressure gauge



Shuttle valve / (Flow divider)



Single locking valve



Restrictor valve

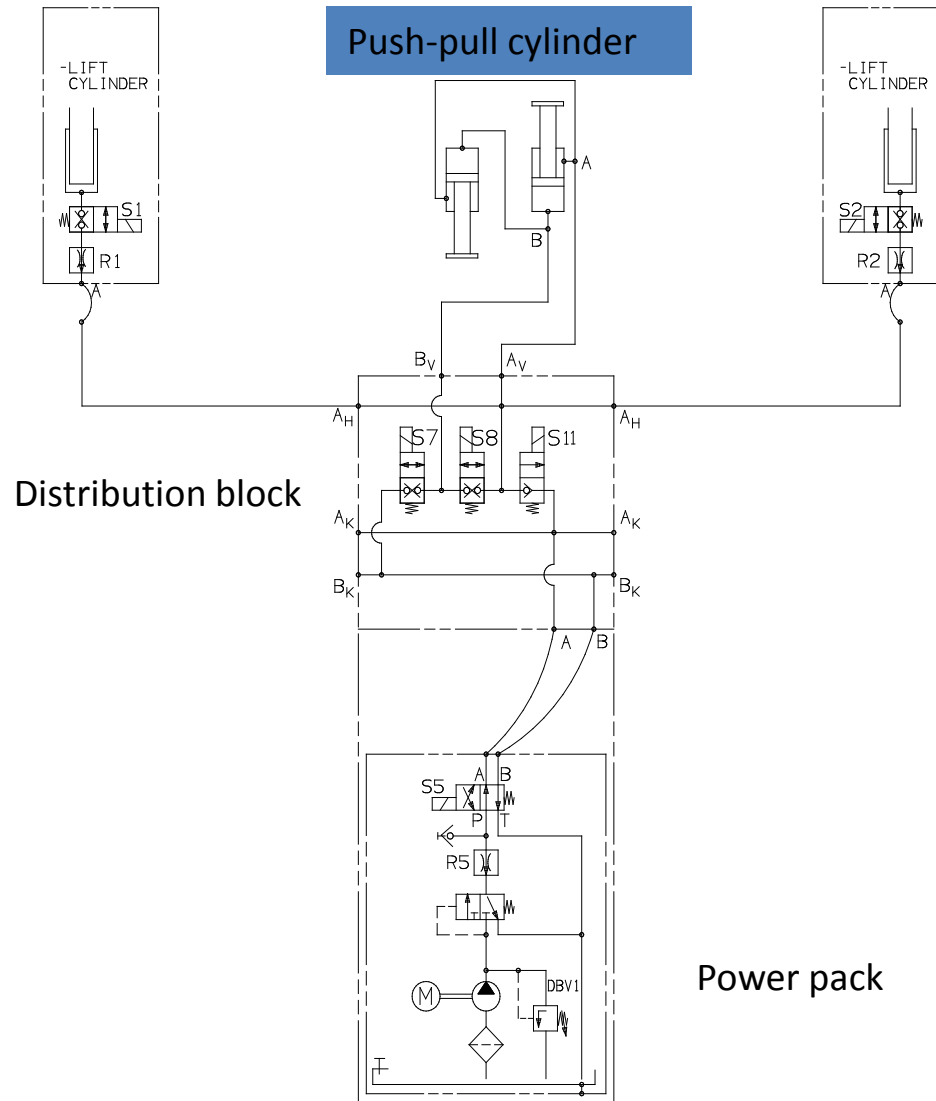


Double locking valve

Hydraulics

Hydraulic components of the Underslider unit:

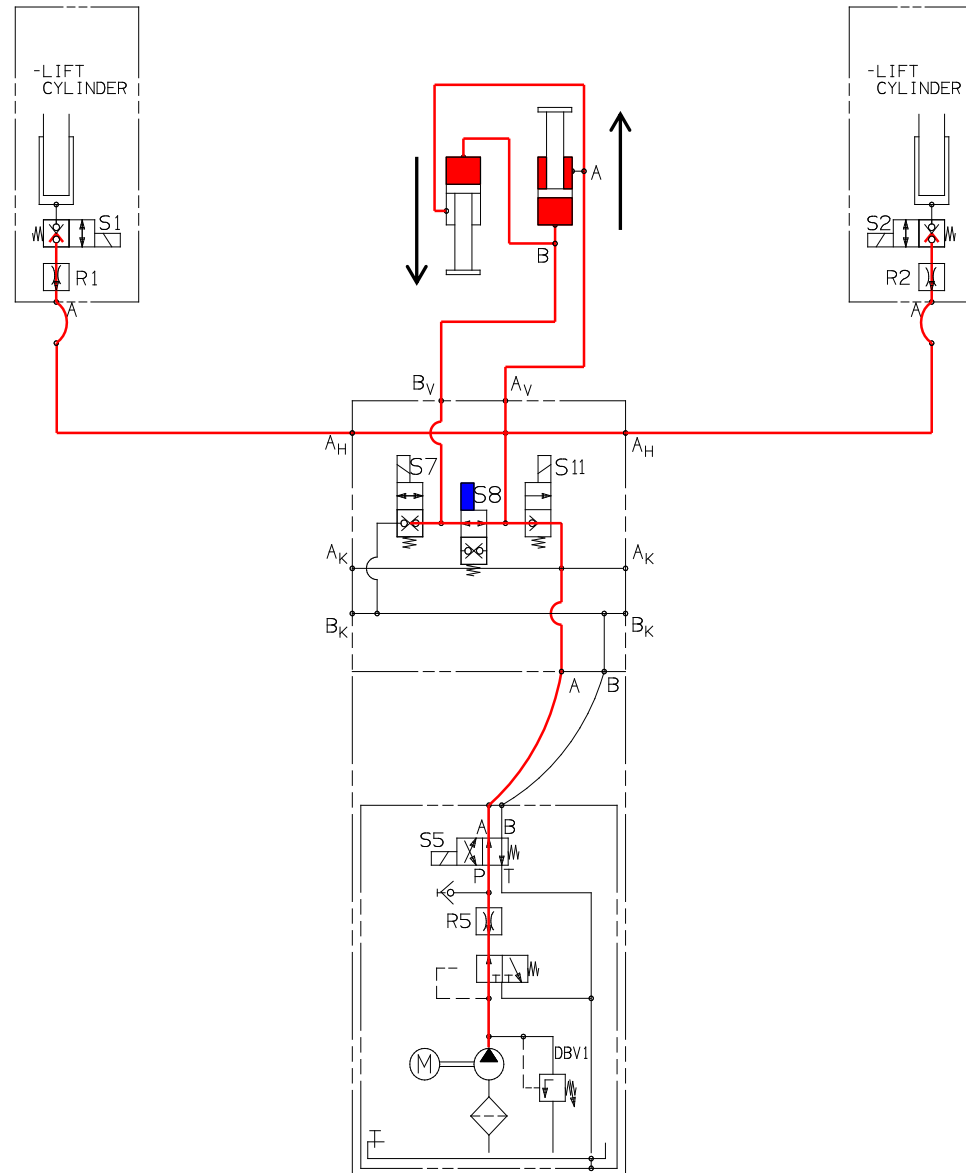
- Powerpack with pump & motor and shift valve S5
- Distribution block on back of main tube with lock valve and Slide valves S7 & S8
- Push-pull cylinder assembly centered in tray on main frame
- (2) lift cylinder installed onto lift arm assembly



Hydraulic action – sliding out

Motor starts running and S8 valve is energized.

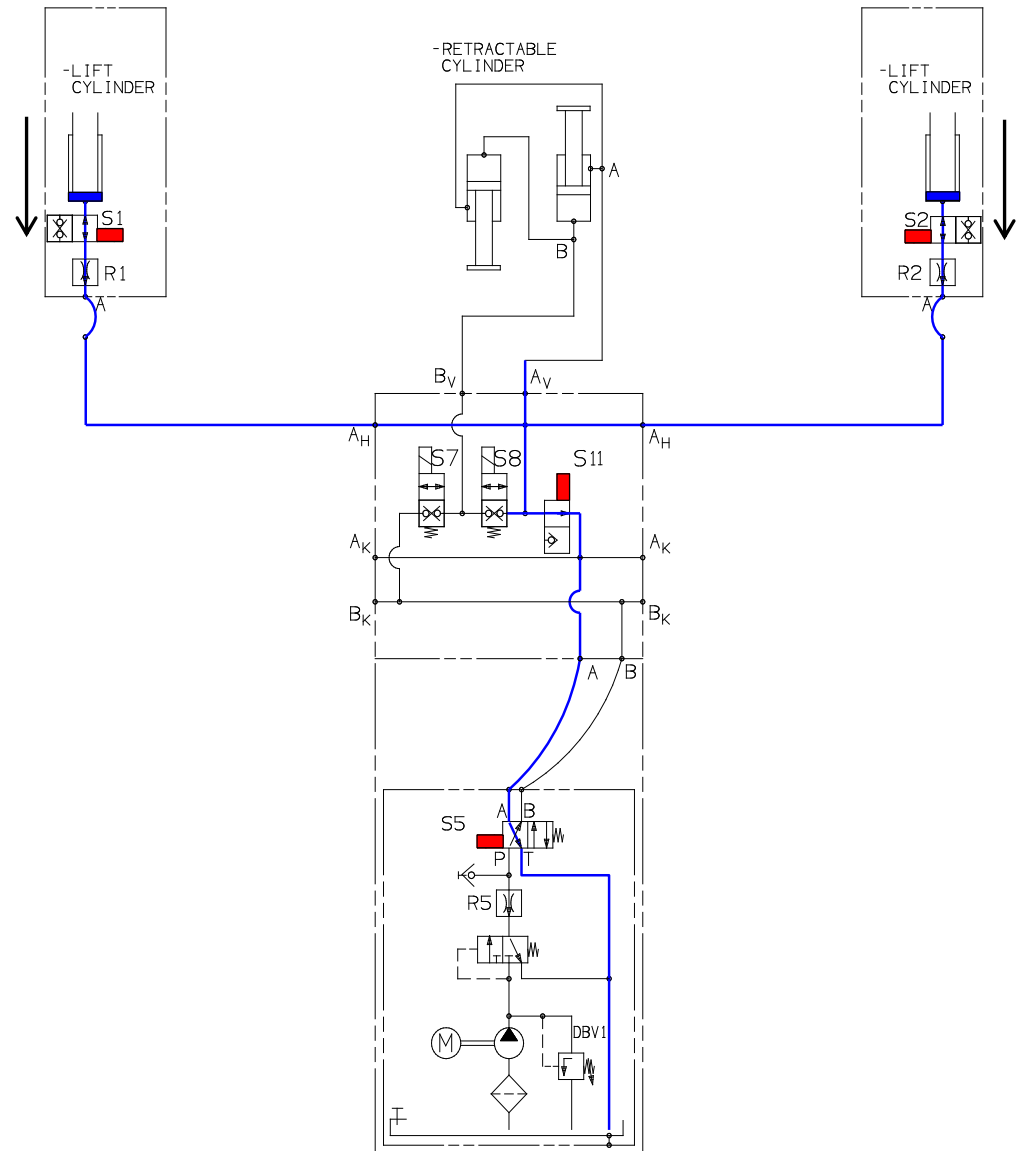
- Oil pressure on input “A” sets exits “Av” and Bv” at the valve block under pressure.
- The surface at the piston rod on input “B” is larger than on the shaft at input “A”
- This creates a stronger force at the piston rod (“B”) than at the shaft (“A”)
- This factor forces the cylinder to move out.
- The liftgate will slide out to the end of the rails.
- Hydraulic pressure on “A” port at lift cylinder has no effect due to lock valves not activated



Hydraulic action – lowering

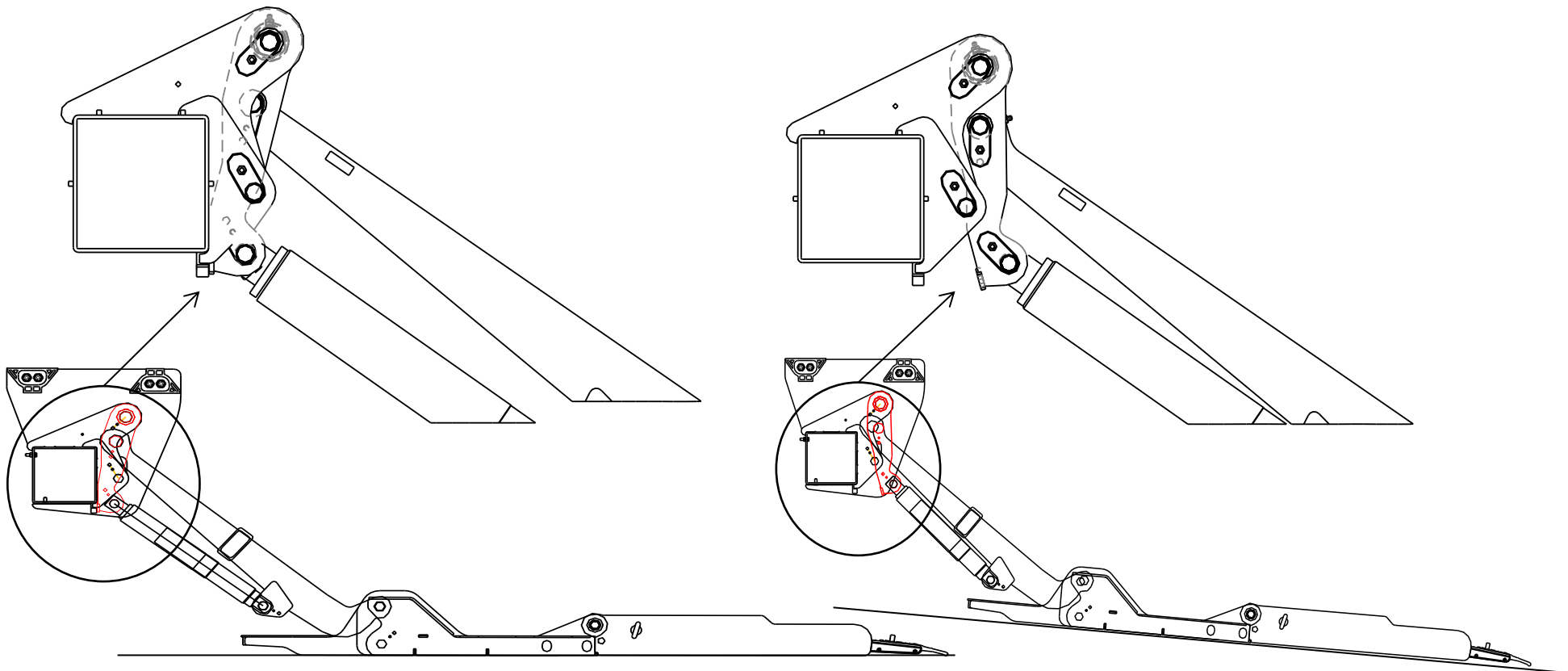
The shift valve S5 at the pump and the solenoid release valves S1 and S2 at the cylinders will get energized. In addition the leaking down stop valve S11 in the back of the mount frame is also energized.

- The gate is designed to lower down by gravity. It will push the hydraulic oil out of the lift cylinder into the reservoir.
- The oil passes the activated solenoid release valves S1 and S2.
- It also passes the energized S11 valve in the back of the mount frame and the shift valve S5 at the pump.



Action – auto tilt down

The automatic tilt function is based on a mechanical swing fixture which is swinging away from the main tube to tilt the platform down. This allows the gate to always sit flat on the ground for an easy loading and unloading.

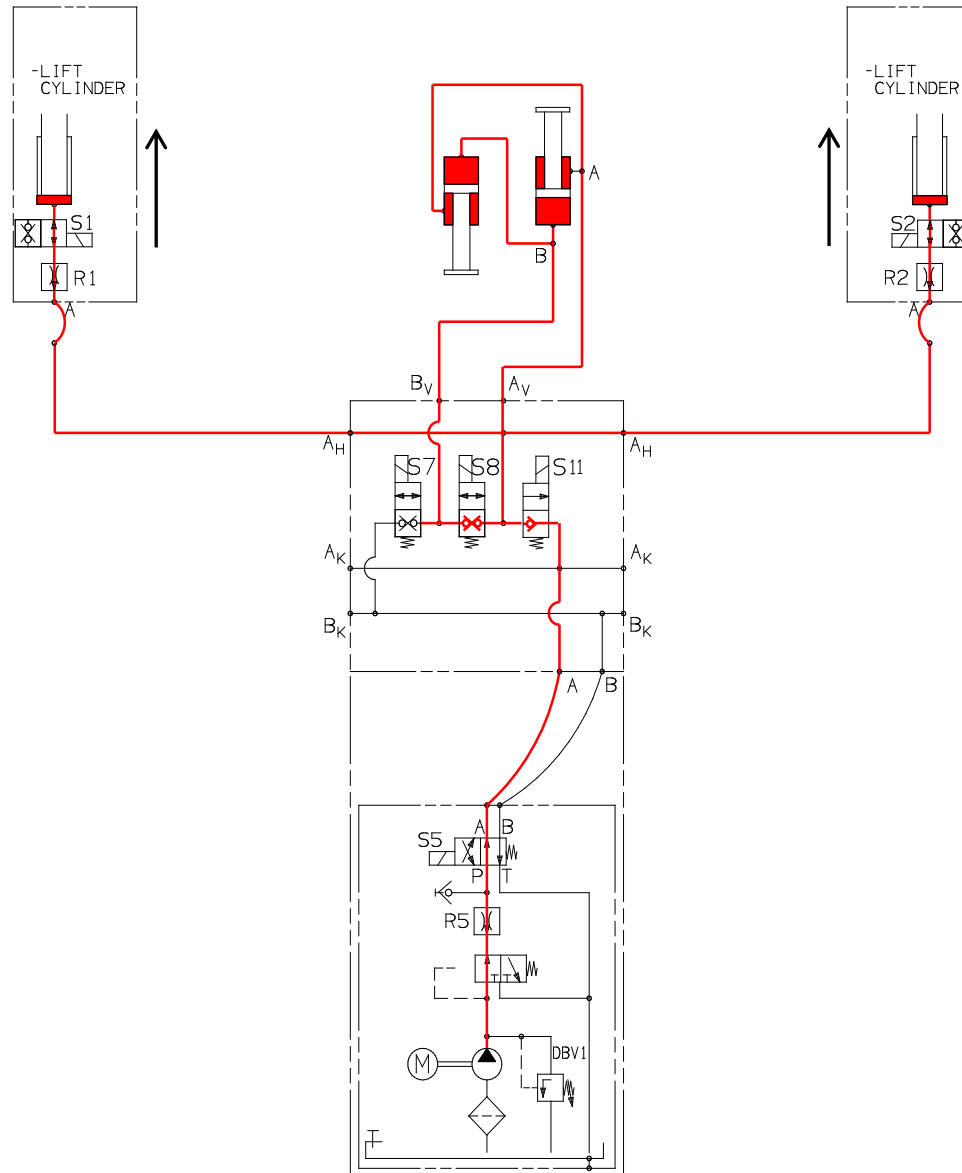


Hydraulic action – lifting

Motor starts running and double locking release valves S1 and S2 are energized.

- The pressure is on input “A” at the valve block. The oil passes the S11 valve and sets pressure on exit “AH”.

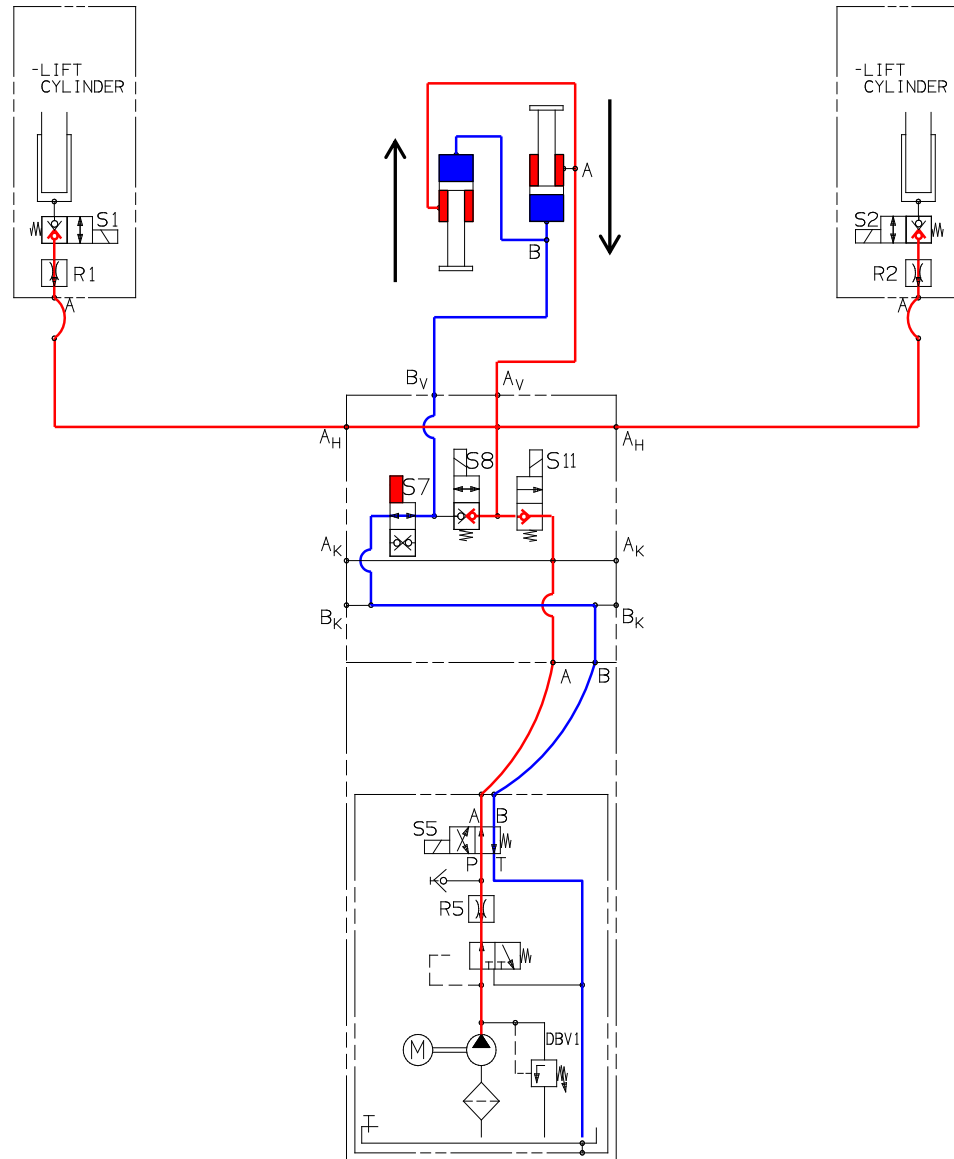
- The energized double locking release valves S1 and S2 allow the fluid to push the lift cylinder to extend. The platform raises up.



Hydraulic action – sliding in

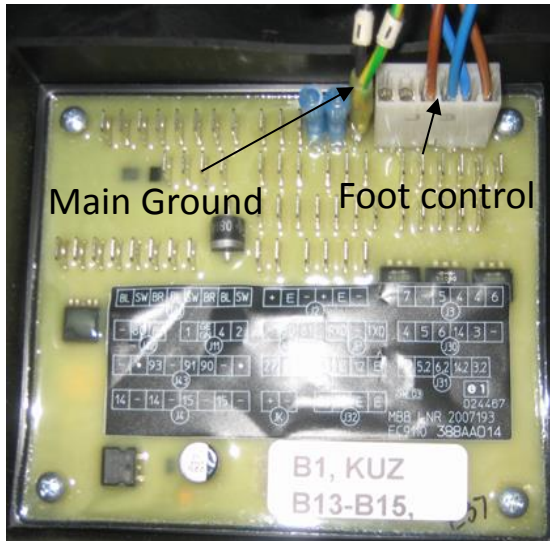
Motor starts running and S7 valve is energized.

- Oil pressure on input “A” sets pressure on exits “Av” at the valve block.
- The Oil pressure on exit “Av” at the valve block sets pressure on input “A” at the cylinder
- The energized valve S7 is allowing the oil at the bottom of the piston rod to get back through the S5 into the reservoir.
- The pressure on the shaft will force the piston rod to retract.
- The lift gate will slide in under the body.
- The locked S1 and S2 valve avoid a movement of the lift cylinders

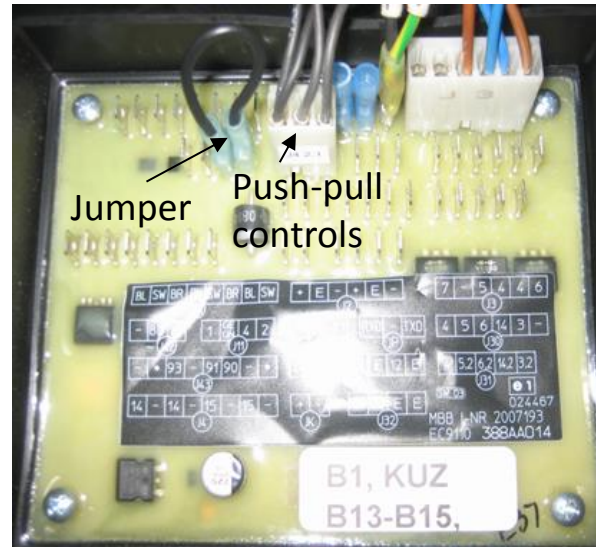


Electric controls – board connectors by row

Row 1



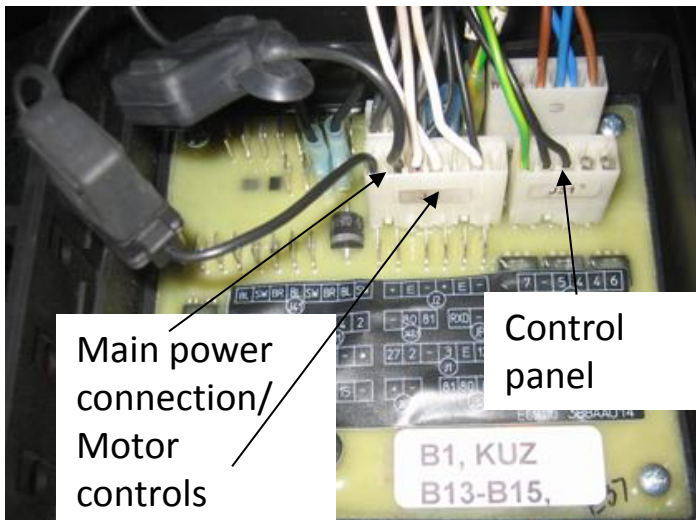
Row 2



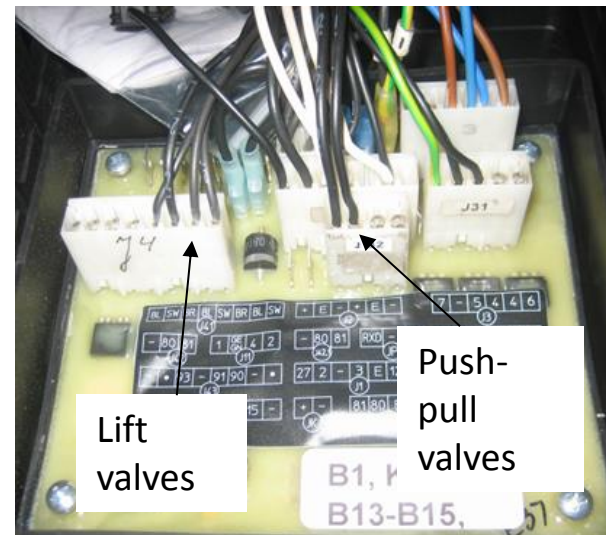
J-3 foot controls & w/lights

J-11 cab on/off switch

J-42.1 Push-Pull valves



Row 3



Row 4

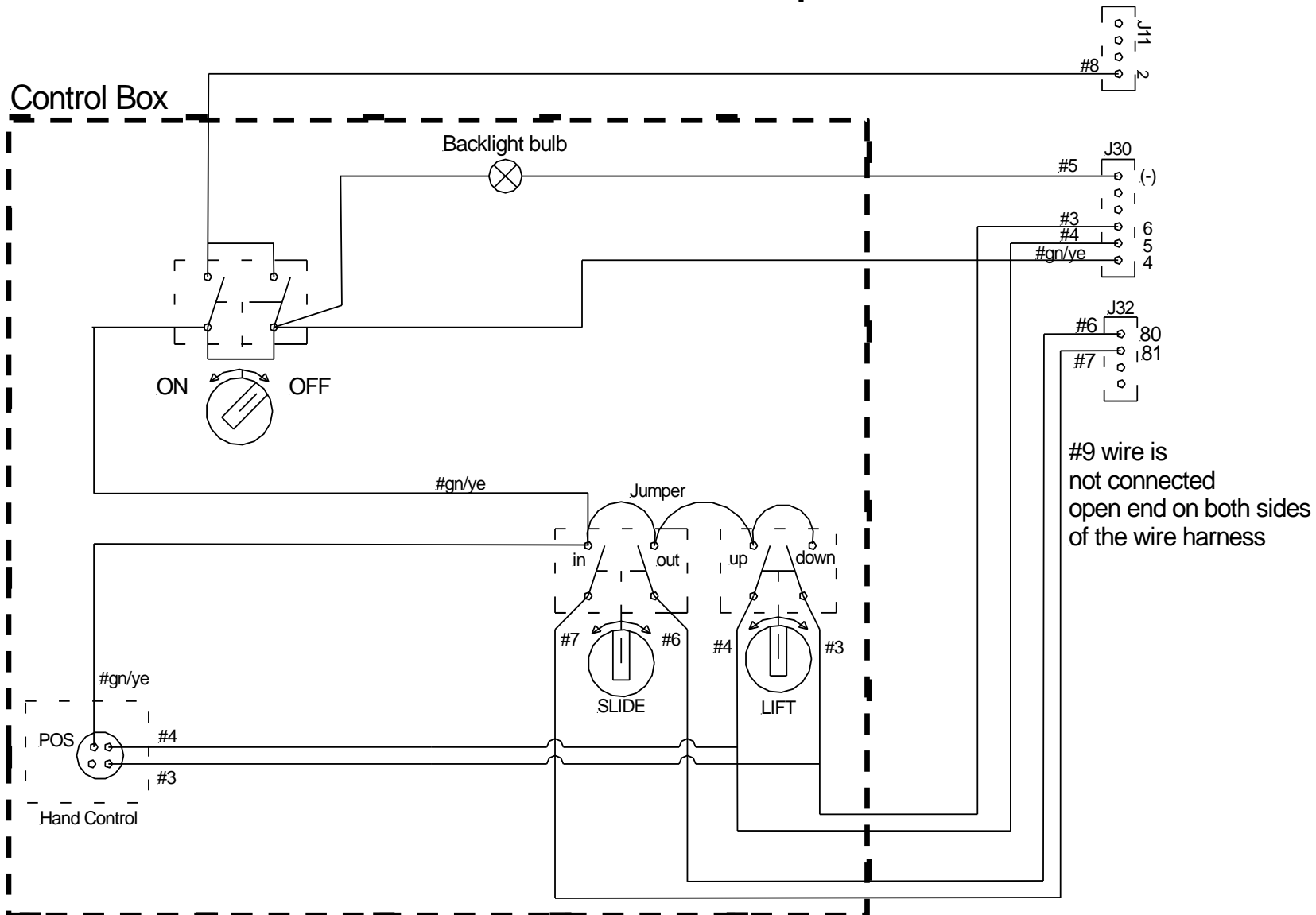
J-1 main battery power
motor solenoid &
shift valve at block

J-30 main control cox

J-4 lift cylinder valves

J-32 Push-Pull control signals

Electric controls – control box setup



Electric controls – control cable wiring

SIGNAL	PC-BOARD	CABLE #
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Control box wire setup

J-30	12 V HOT	- 4	# GREEN/YELLOW
	UP	-5	# 4
	DOWN	-6	# 3
	GROUND	- (-)	# 5
J-11	MAIN POWER	- 2	# 8
J-32	SLIDE OUT	- 80	# 6
	SLIDE IN	- 81	# 7

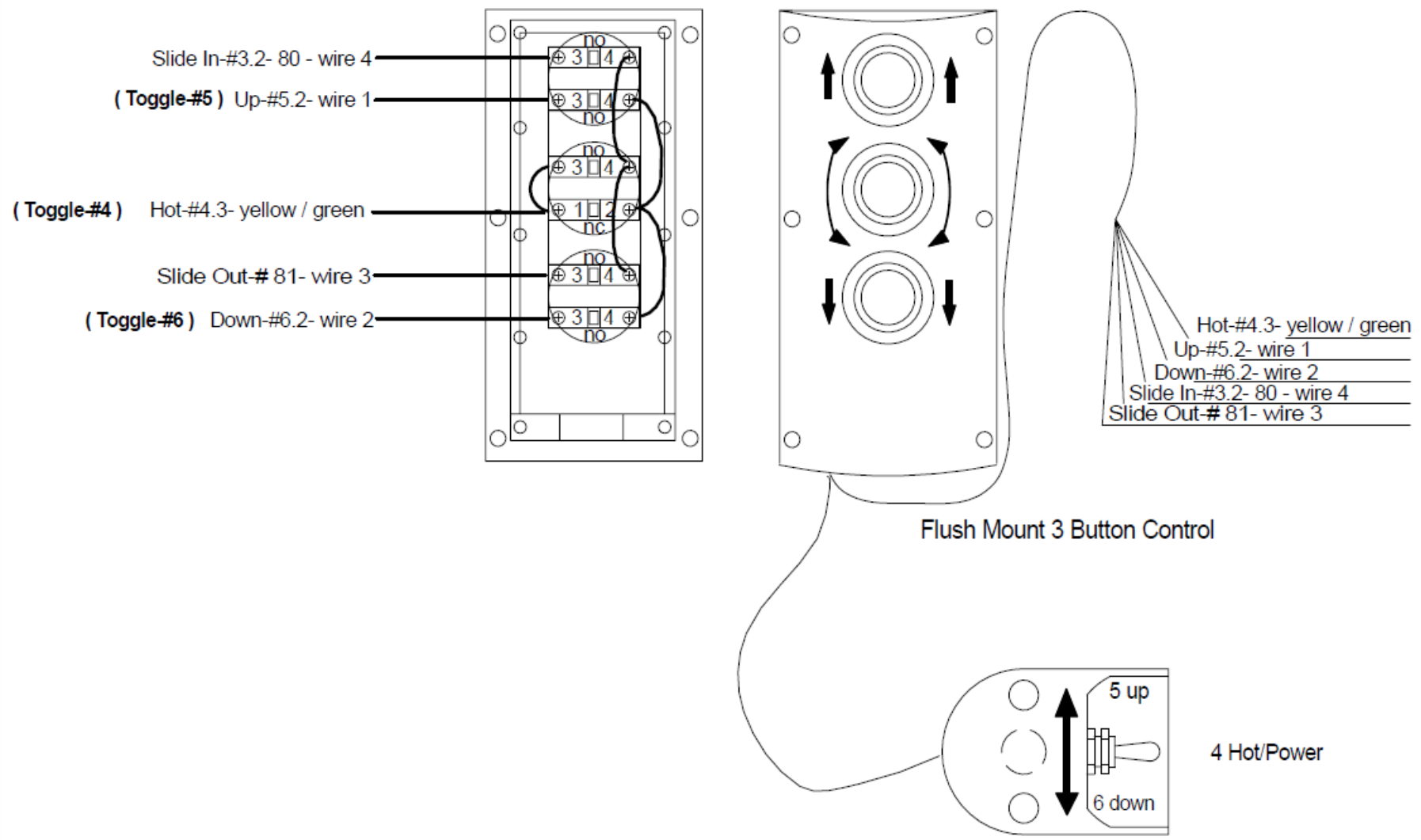


Hand control wire setup

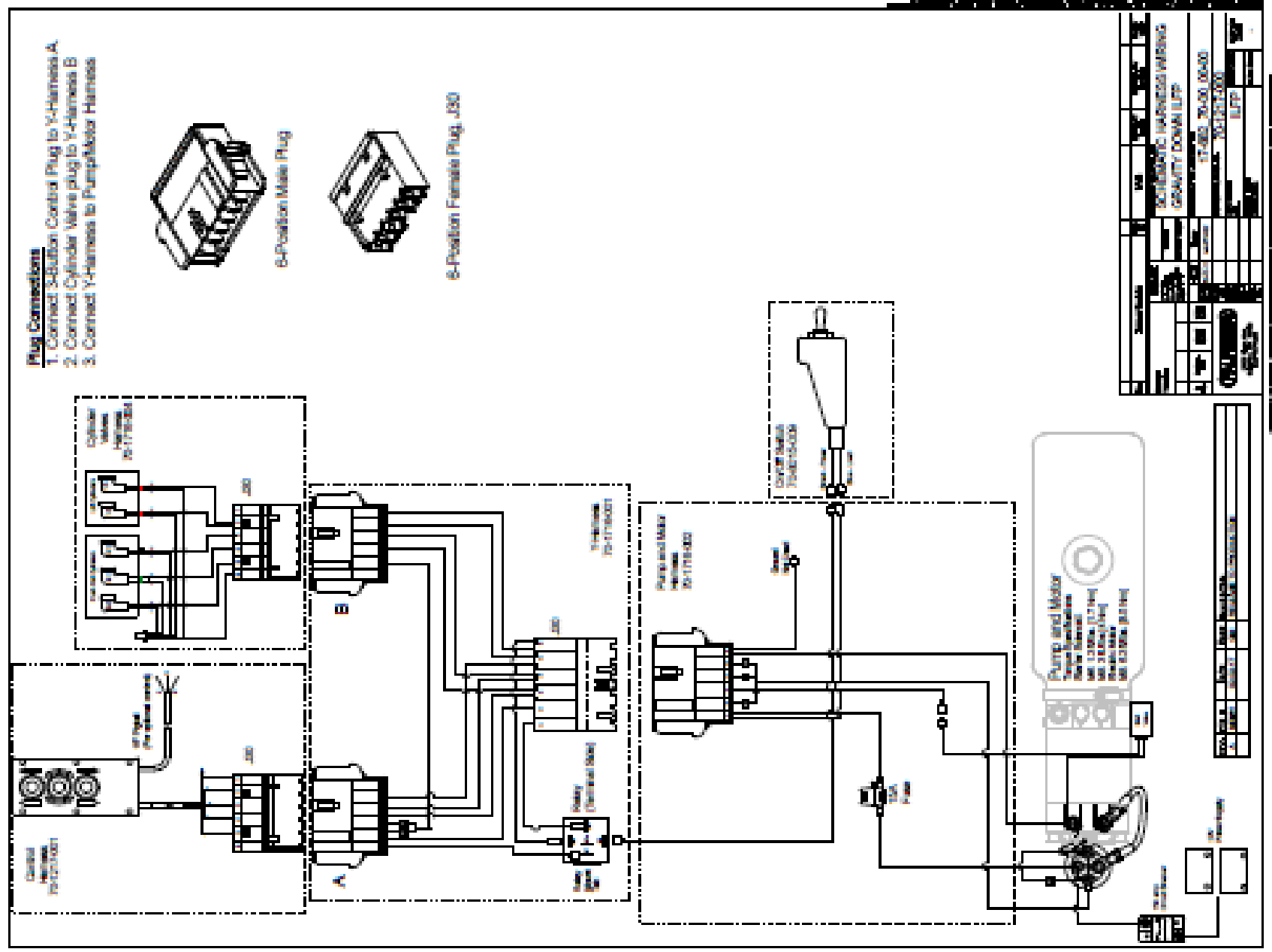
J-31	UP	-5.2	# YELLOW
	DOWN	-6.2	# BROWN
	12V HOT	-4.3	# RED



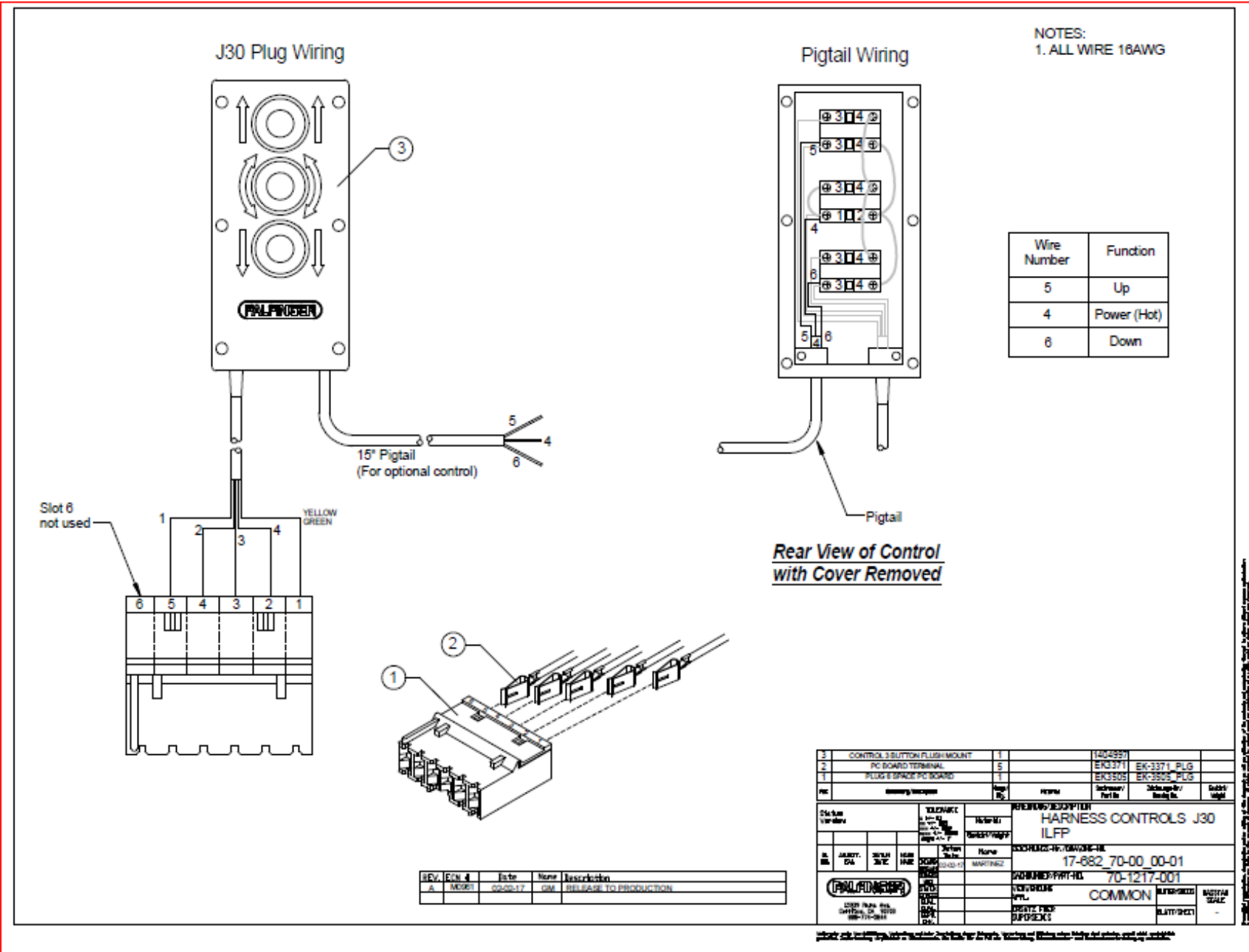
ILFP - Dollar General



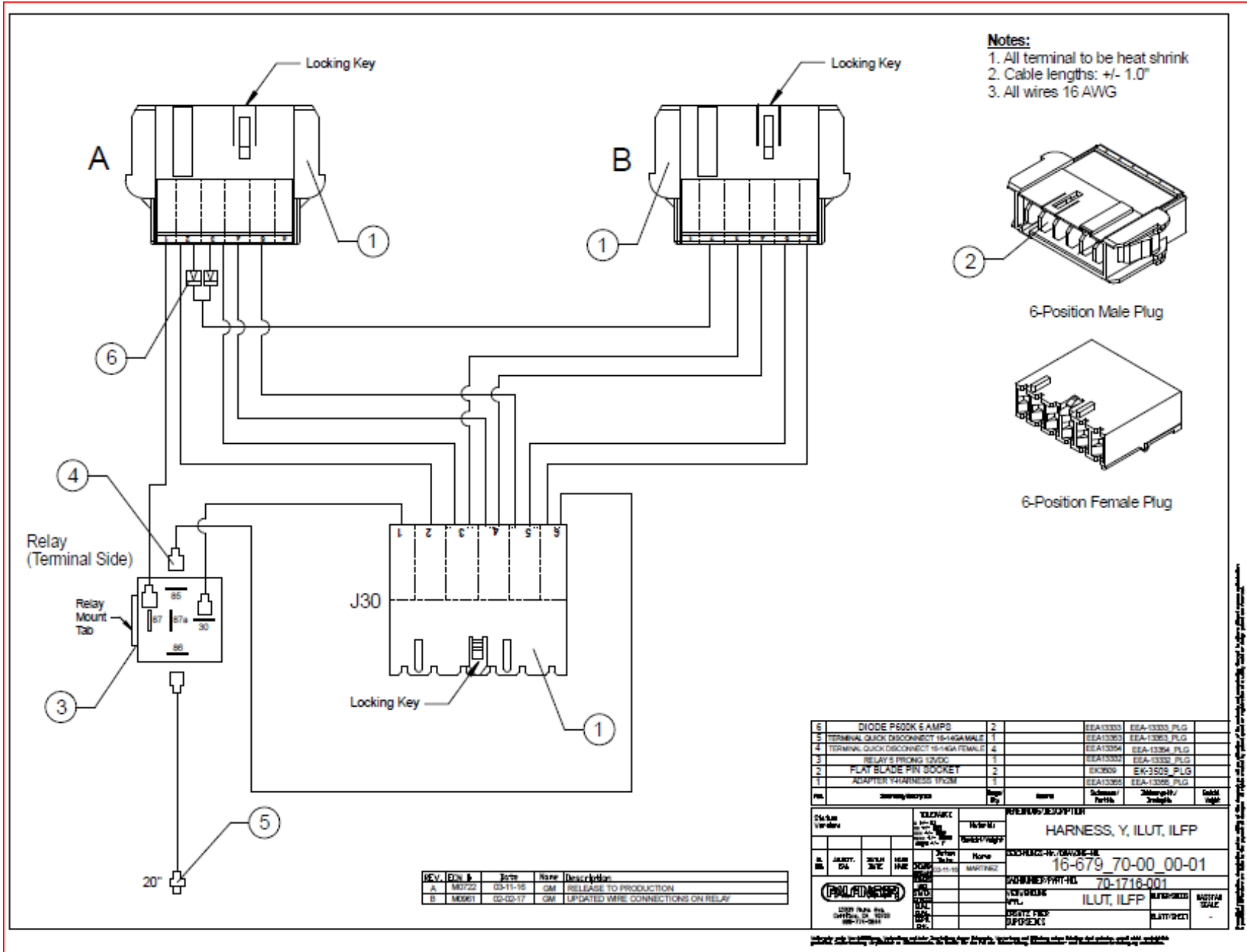
Electric controls – Liftgate with no Circuit Board



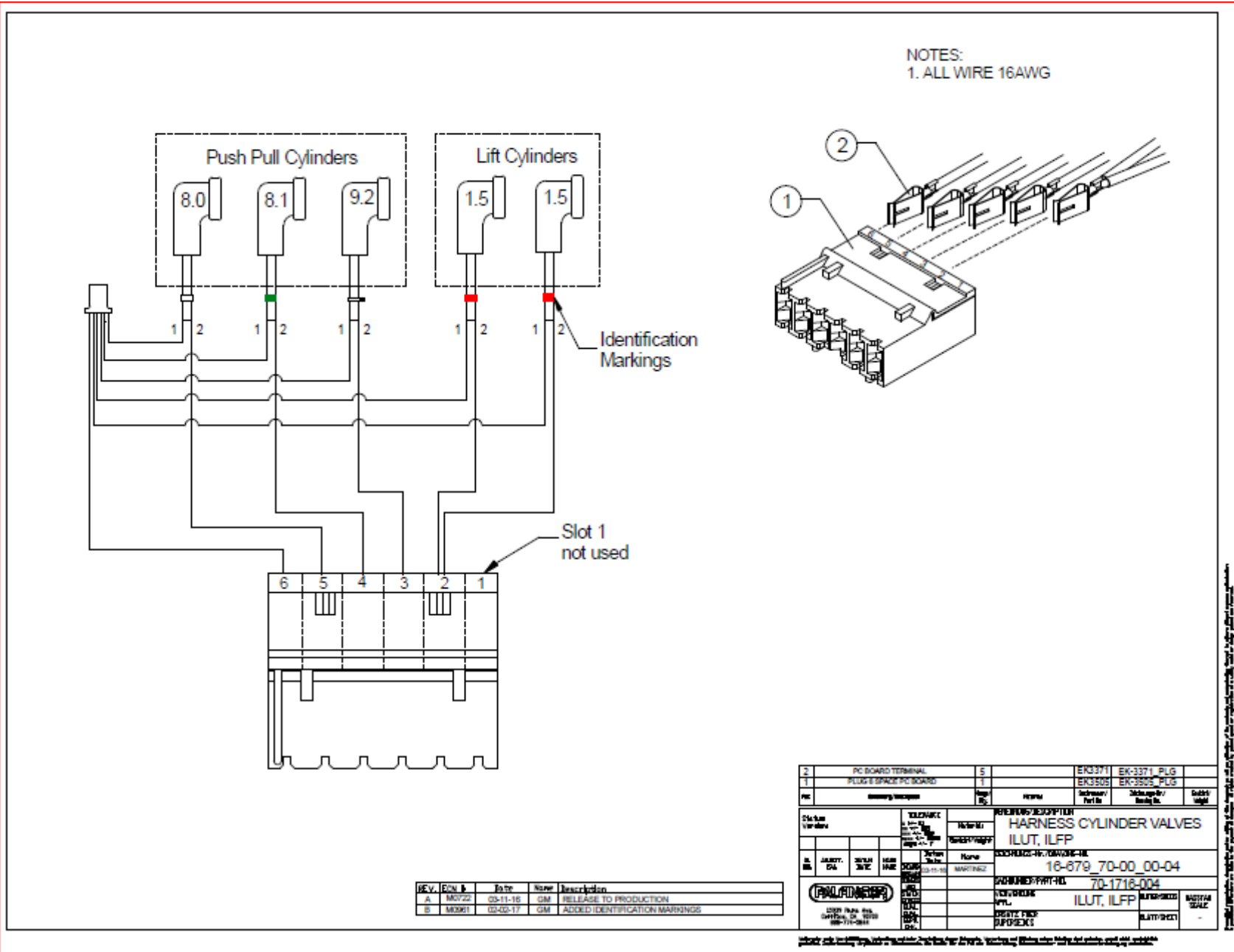
Electric controls – Liftgate with no Circuit Board



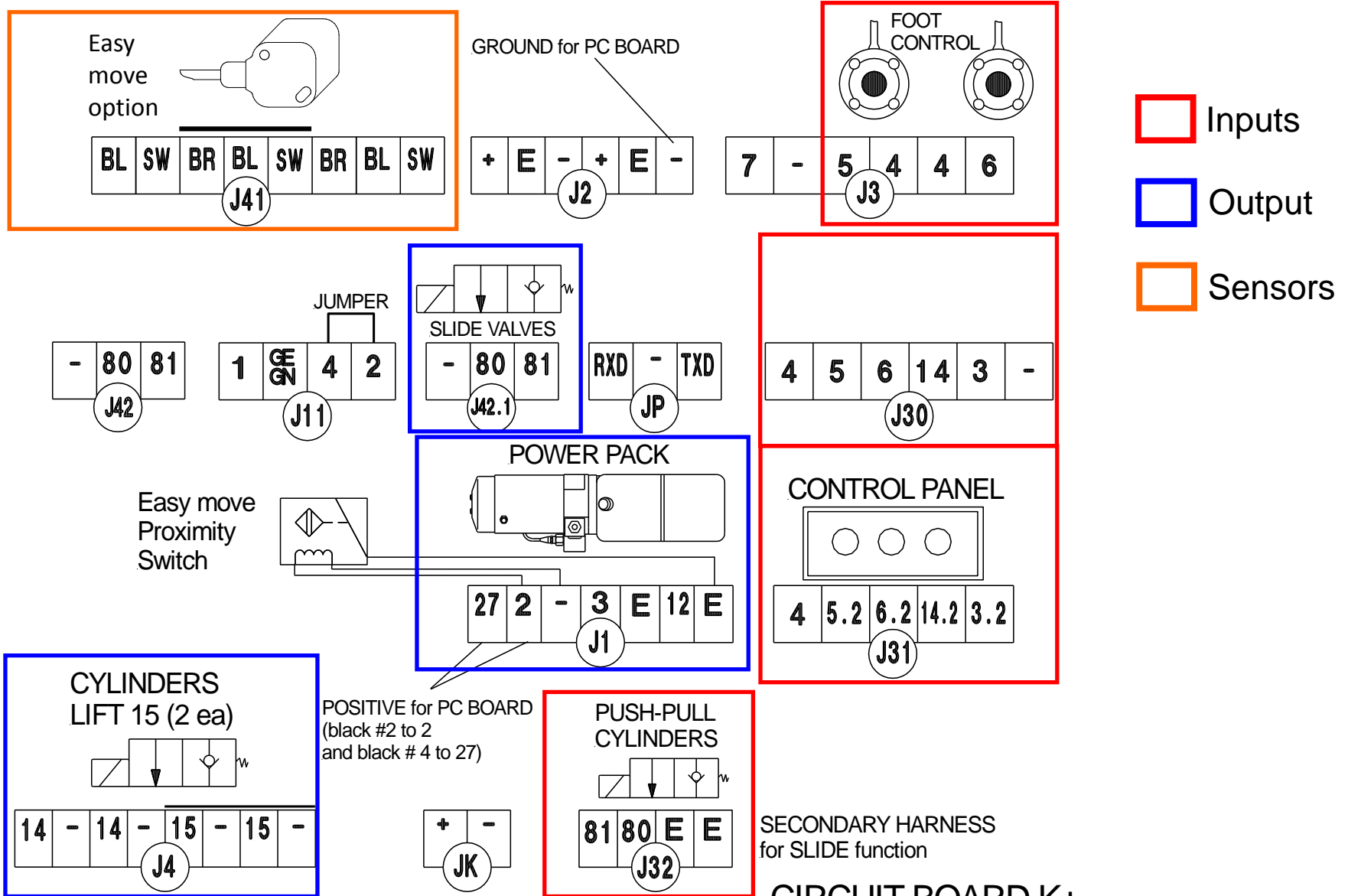
Electric controls – Liftgate with no Circuit Board



Electric controls – Liftgate with no Circuit Board

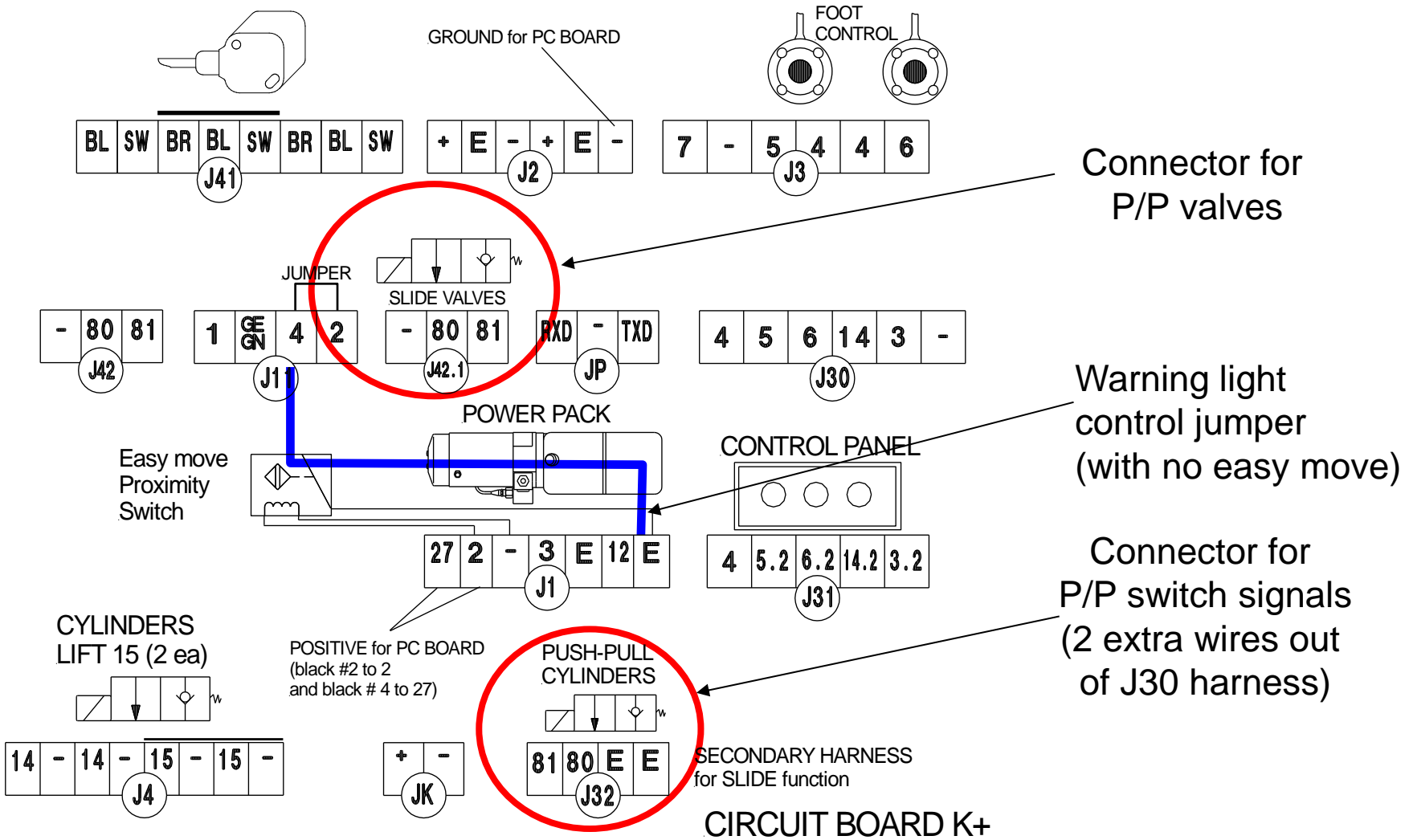


Electric controls – board overview

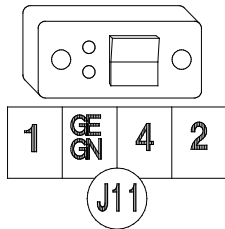


CIRCUIT BOARD K+

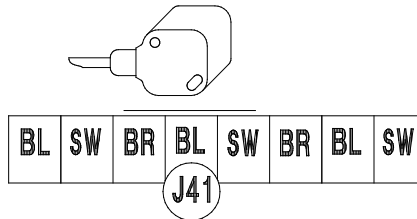
Electric controls – slider specialties



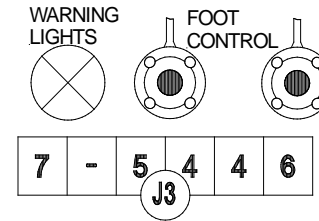
Electric controls – connector overview



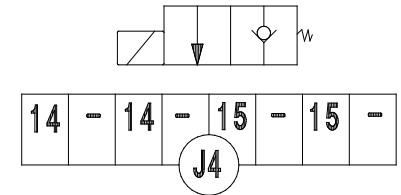
- Cab Switch J11**
- 2 Permanent Hot
 - 4 Control Power
 - (-) Ground
 - 1 LED Signal



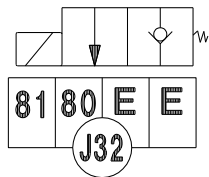
- Sensor J41**
- B15 -> Brown, Blue, Black



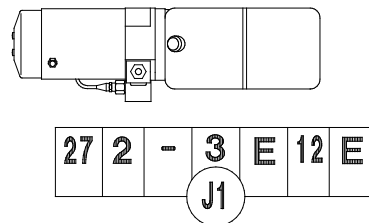
- Platform cable J3**
- 7 Signal f. Lights
 - 5 lift
 - 6 lower
 - 4 Control power



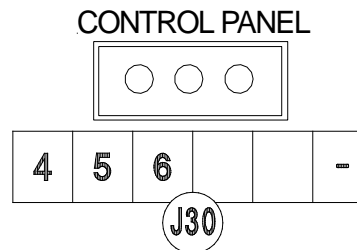
- Valves J4**
- 15 Lift cylinder



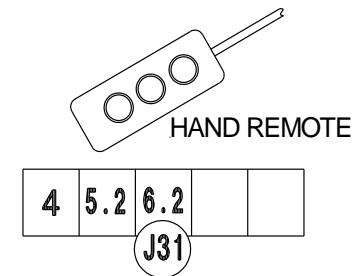
- Slide Valves J32**
- 80 Slide in
 - 81 Slide out



- Main Power J1**
- 27 Power for processor
 - 2 Permanent Hot
 - (-) Ground
 - 3 Motor Solenoid
 - E Special input
 - 12 Shift Valve
 - E Special input

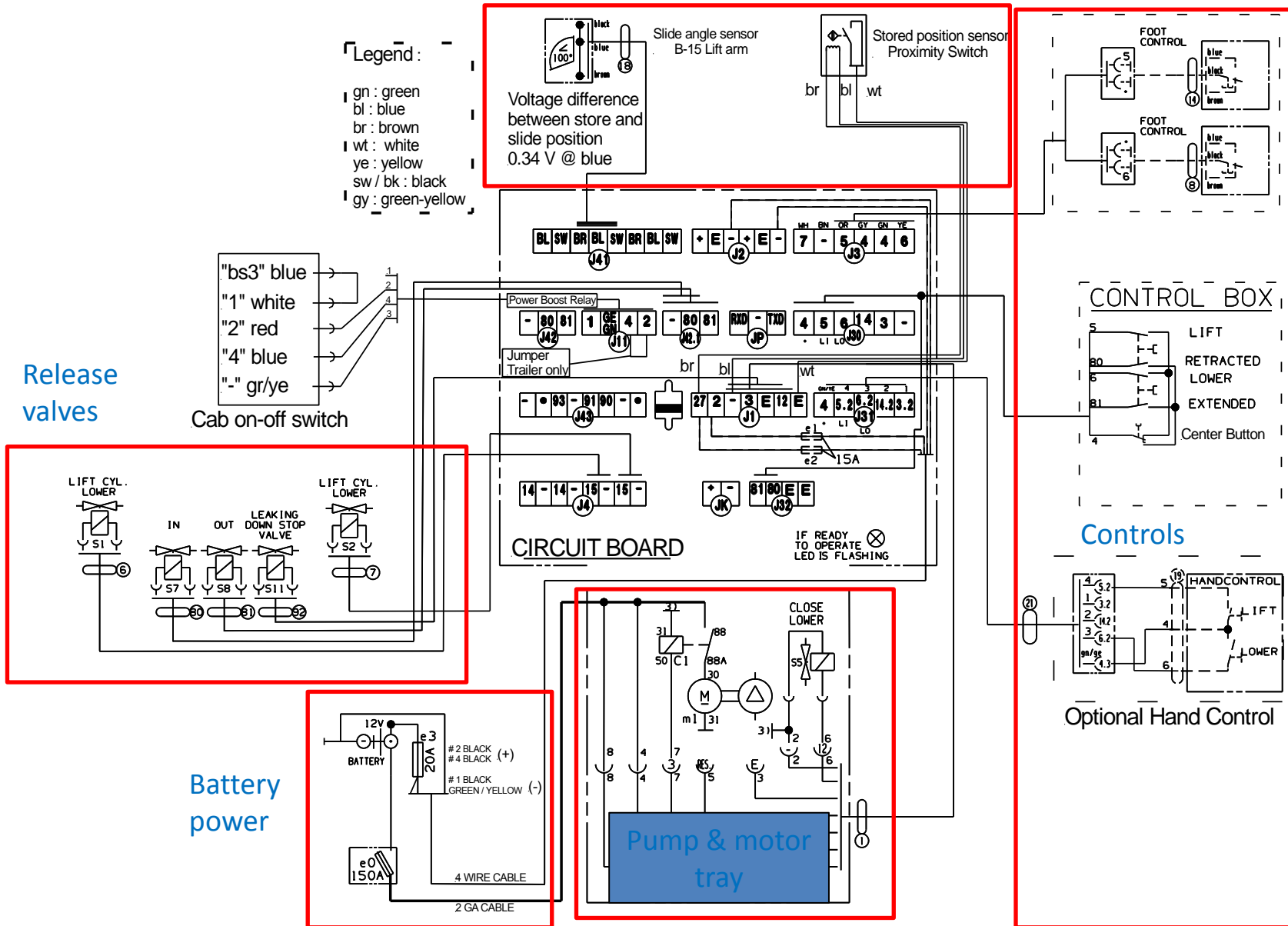


- Control Box J30**
- 4 Control Power
 - 5 lift
 - 6 lower
 - (-) Ground



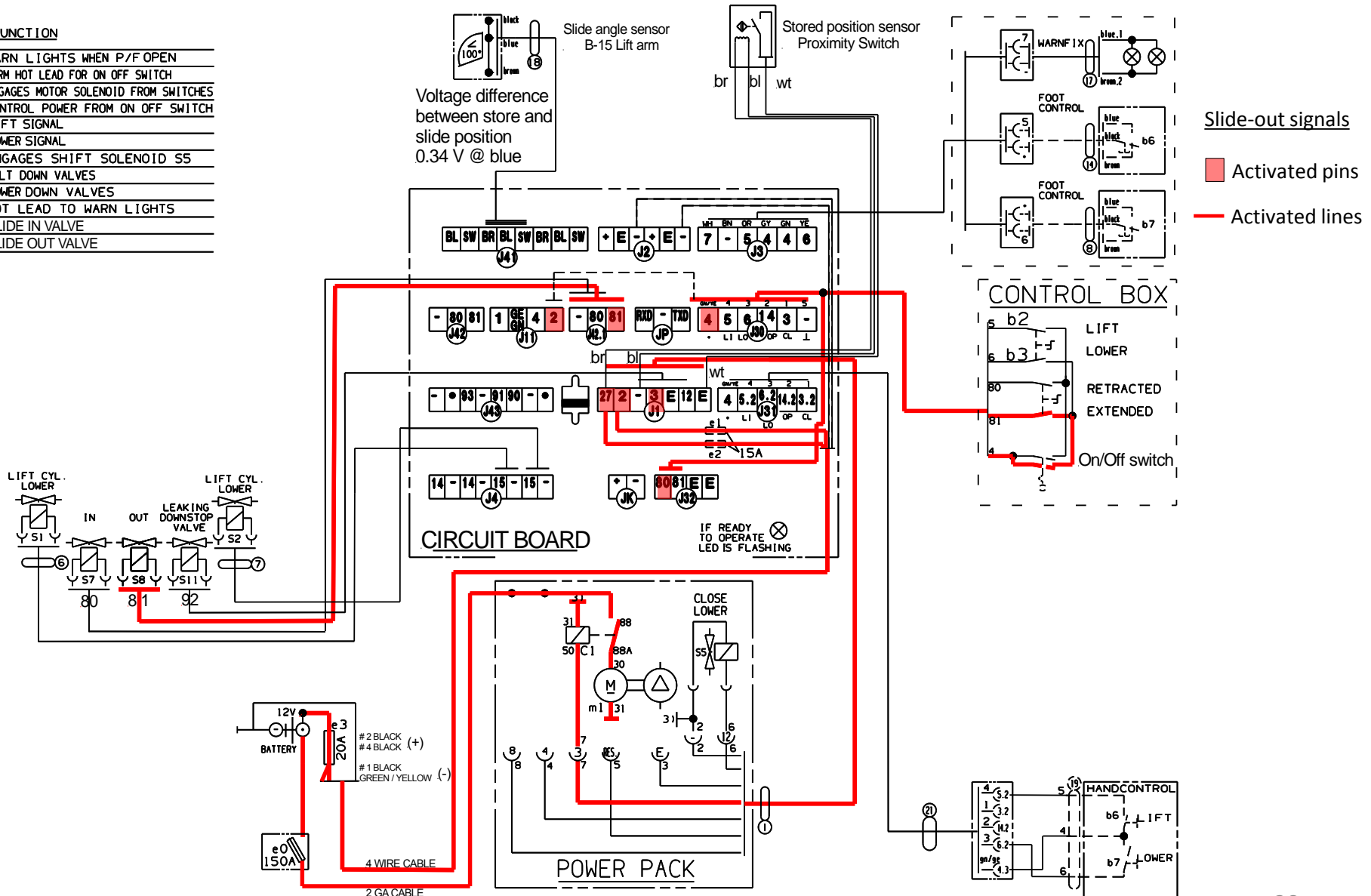
- Hand control J31**
- 4 Control Power
 - 5.2 lift
 - 6.2 lower
 - (-) Ground

Wiring schematic – control overview



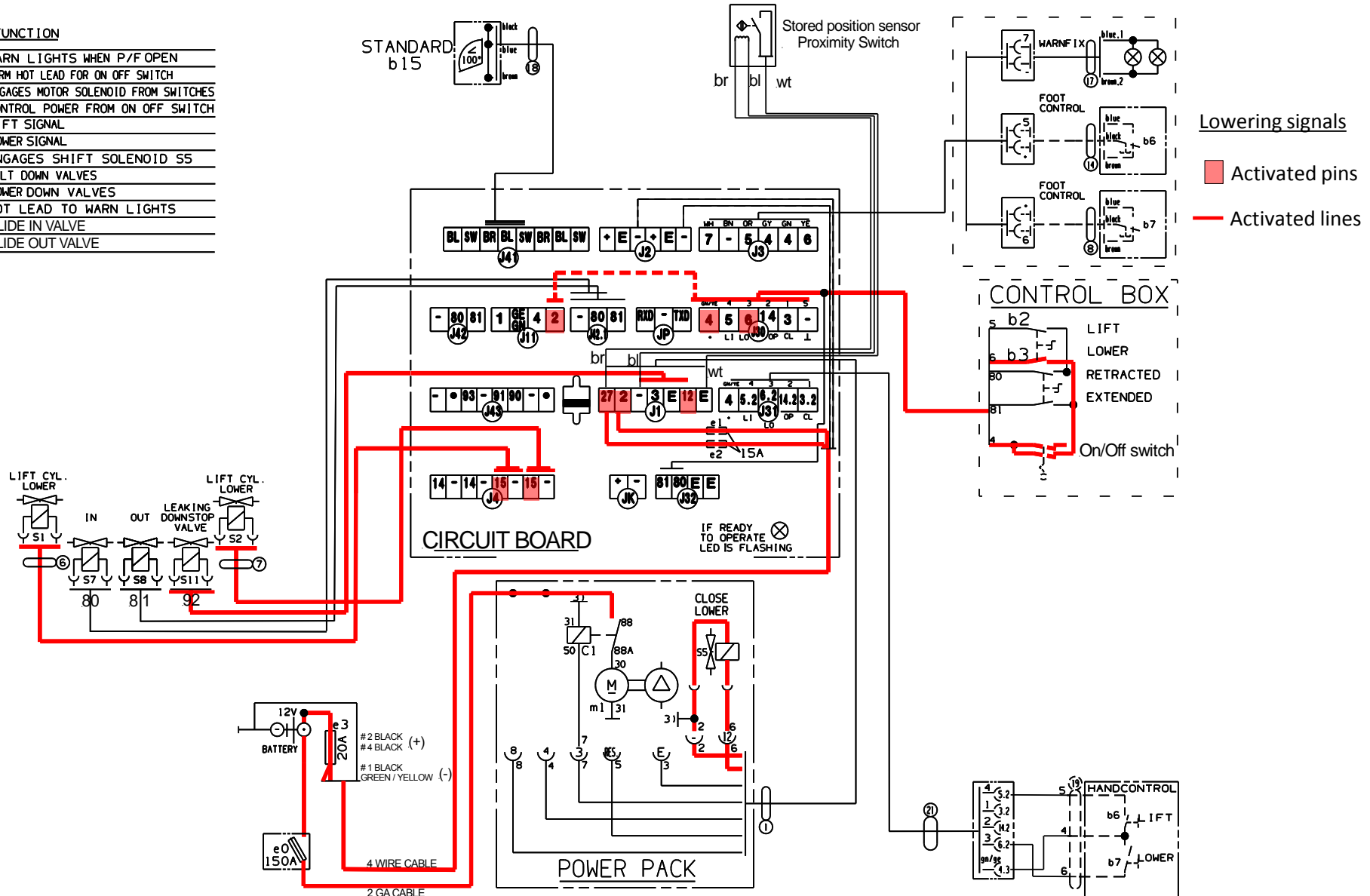
Wiring schematic – sliding out activities

PIN IDENT.	FUNCTION
1	WARN LIGHTS WHEN P/F OPEN
2/27	PERM HOT LEAD FOR ON OFF SWITCH
3	ENGAGES MOTOR SOLENOID FROM SWITCHES
4	CONTROL POWER FROM ON OFF SWITCH
5	LIFT SIGNAL
6	LOWER SIGNAL
12	ENGAGES SHIFT SOLENOID S5
14	TILT DOWN VALVES
15	LOWER DOWN VALVES
7	HOT LEAD TO WARN LIGHTS
80	SLIDE IN VALVE
81	SLIDE OUT VALVE



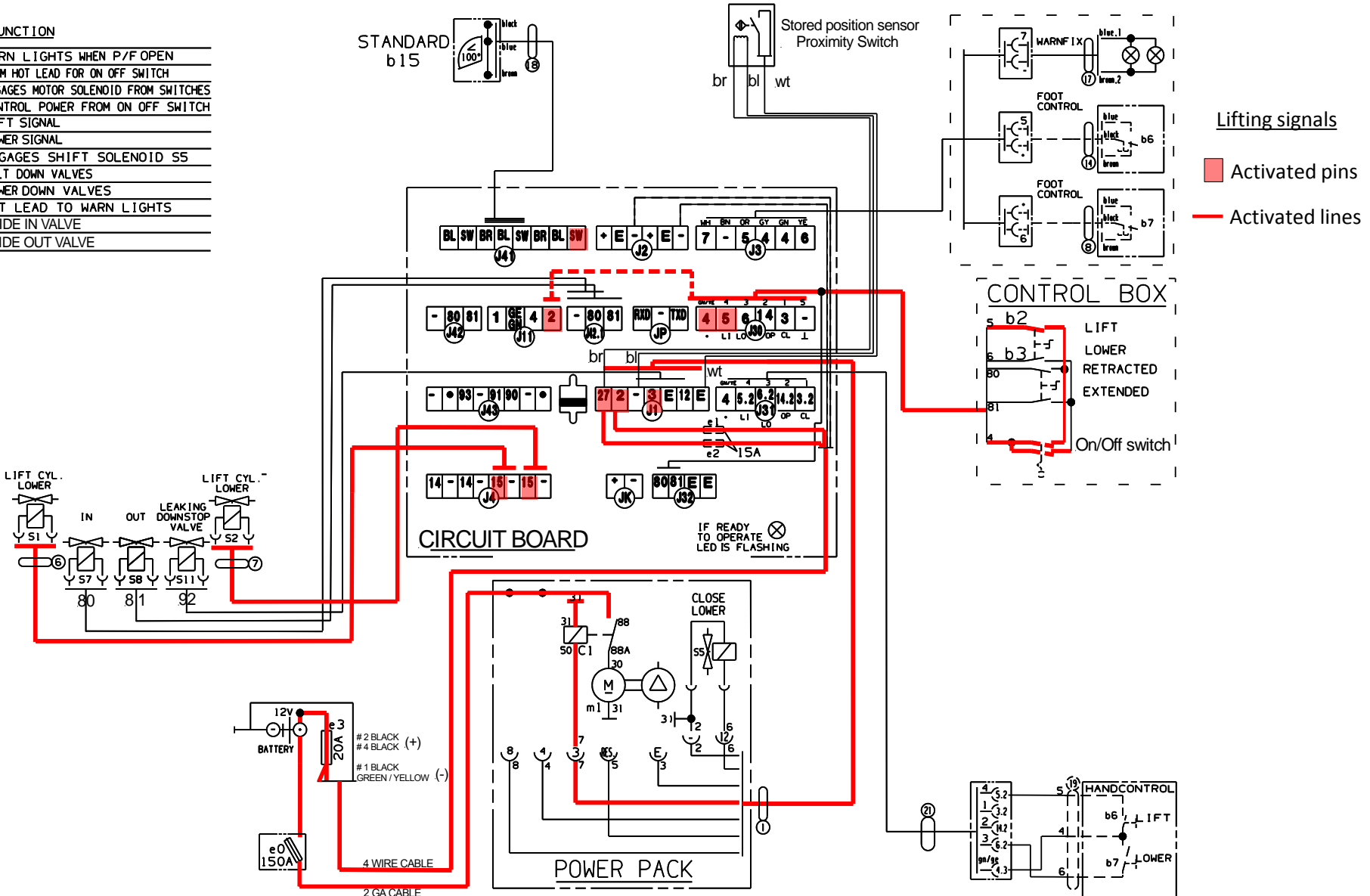
Wiring schematic – lowering

PIN IDENT.	FUNCTION
1	WARN LIGHTS WHEN P/F OPEN
2/27	PERM HOT LEAD FOR ON OFF SWITCH
3	ENGAGES MOTOR SOLENOID FROM SWITCHES
4	CONTROL POWER FROM ON OFF SWITCH
5	LIFT SIGNAL
6	LOWER SIGNAL
12	ENGAGES SHIFT SOLENOID S5
14	TILT DOWN VALVES
15	LOWER DOWN VALVES
7	HOT LEAD TO WARN LIGHTS
80	SLIDE IN VALVE
81	SLIDE OUT VALVE



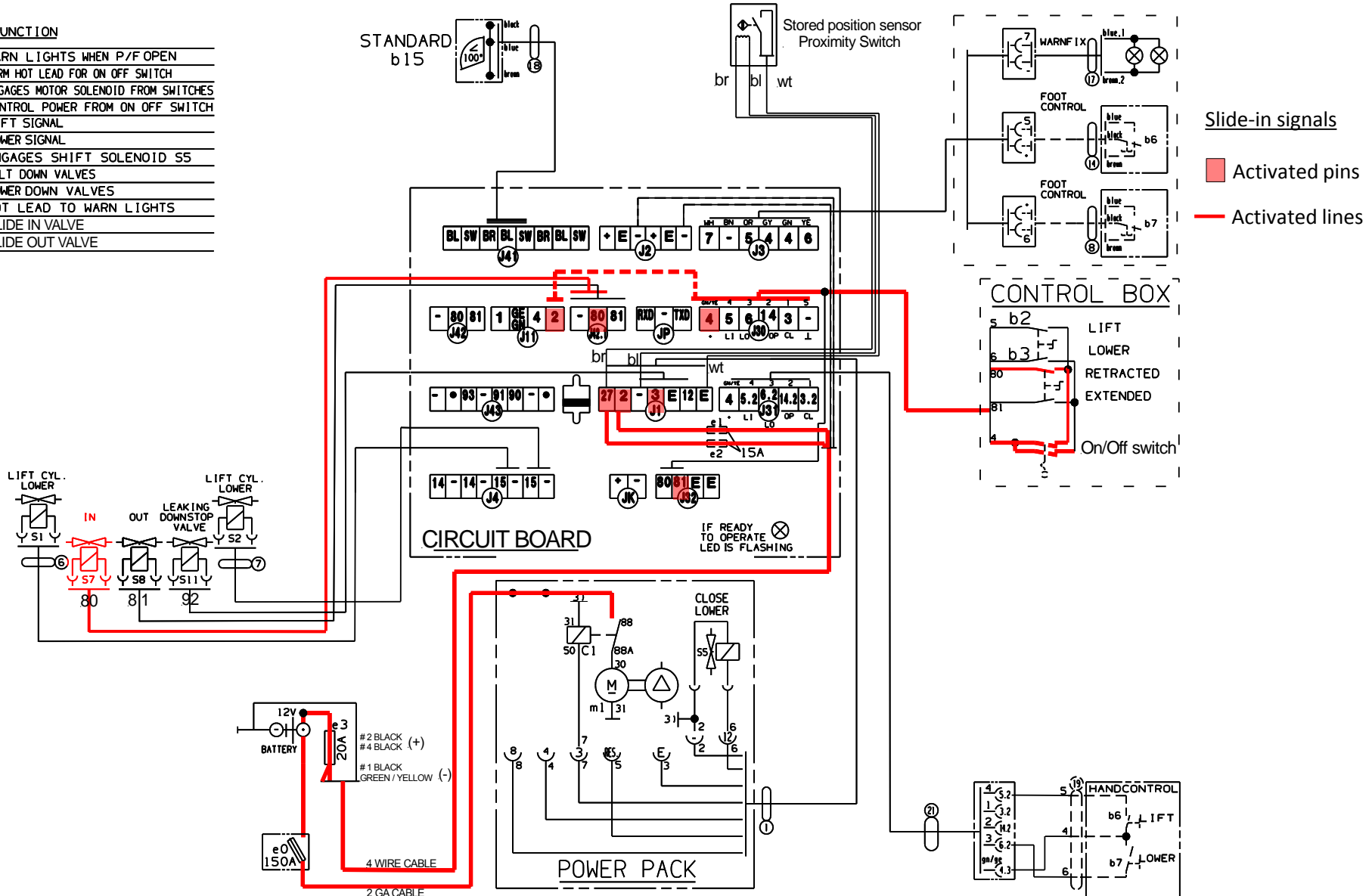
Wiring schematic – lifting activities

PIN IDENT.	FUNCTION
1	WARN LIGHTS WHEN P/F OPEN
2/27	PERM HOT LEAD FOR ON OFF SWITCH
3	ENGAGES MOTOR SOLENOID FROM SWITCHES
4	CONTROL POWER FROM ON OFF SWITCH
5	LIFT SIGNAL
6	LOWER SIGNAL
12	ENGAGES SHIFT SOLENOID SS
14	TILT DOWN VALVES
15	LOWER DOWN VALVES
7	HOT LEAD TO WARN LIGHTS
80	SLIDE IN VALVE
81	SLIDE OUT VALVE



Wiring schematic – sliding in activities

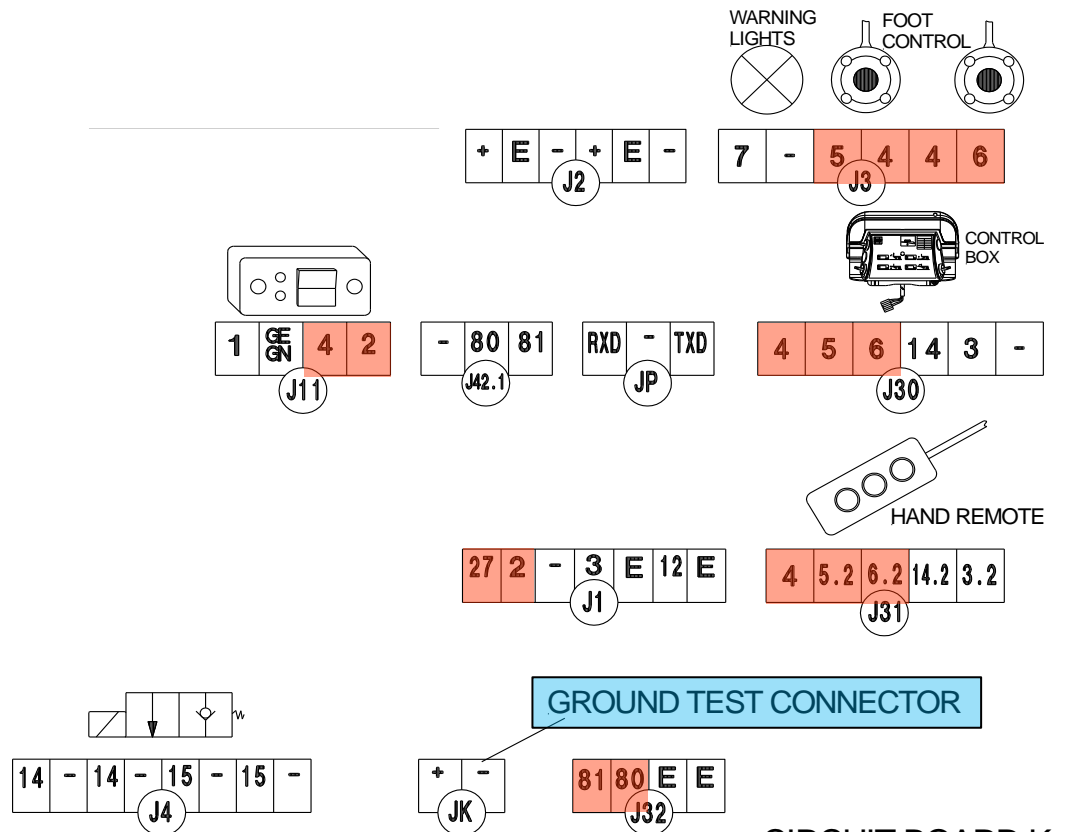
PIN IDENT.	FUNCTION
1	WARN LIGHTS WHEN P/F OPEN
2/27	PERM HOT LEAD FOR ON OFF SWITCH
3	ENGAGES MOTOR SOLENOID FROM SWITCHES
4	CONTROL POWER FROM ON OFF SWITCH
5	LIFT SIGNAL
6	LOWER SIGNAL
12	ENGAGES SHIFT SOLENOID S5
14	TILT DOWN VALVES
15	LOWER DOWN VALVES
7	HOT LEAD TO WARN LIGHTS
80	SLIDE IN VALVE
81	SLIDE OUT VALVE



Lift gate operating diagnostics – Input signals

How to check input signals on circuit board (J-3;J-30;J-31;J-32):

- Main power = terminals #2 & #27
- Switched 12 V power = terminals #4
- Slide out signal = terminal #81
- Slide in signal = terminal #80
- Lift signal = terminals #5.x
- Lower signal= terminals #6.x



CIRCUIT BOARD K+

Lift gate operating diagnostics – Output signals

How to check output signals on circuit board (J-4;J-1;J-41;J-42)

Slide-out gate:

Motor solenoid = terminal J1 - #3
Release valves S8 P-P cylinder = terminal J42 - #81

Motor is running
Valves open to release fluid out of cylinder
Warning lights start flashing

Lower gate:

Shift valve S5 & lock valve S-11 = terminal J1 - #12
Release valves lift cylinder = terminal J-4 #15

Vales open – release fluid out of cylinder
Shift vales direct fluid directly into tank

Lift gate:

Motor solenoid = terminal J1 - #3
Release valves lift cylinder = terminal J-4 #15

Motor is running
Valves open to allow fluid into cylinder

Slide-in gate:

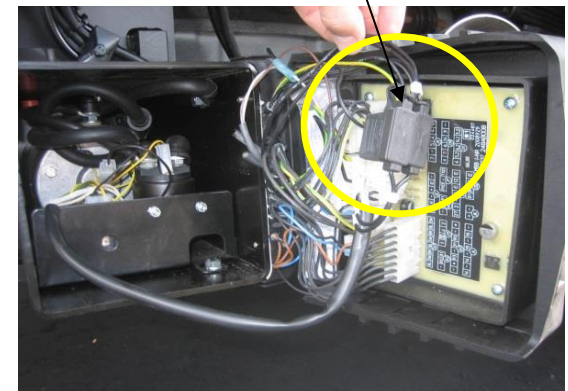
Motor solenoid = terminal J1 - #3
Release valves S7 P-P cylinder = terminal J42 - #80

Motor is running – pushes fluid into system
Shift valve directs fluid into tank

On-site troubleshooting

- 1) Check 150 Amp circuit breaker and 20 Amp fuse at batteries and fuses on J1 plug at PC board
- 2) Unplug not necessary equipment to eliminate possible problems
 - J-31 - hand control
 - J-3 - warning light & foot controls
 - J-41 - B-15 Sensor (If equipped with Easy Move Sensor)
- **!!! Unplug J-1 after unplugging each plug and reattach to reset board !!!**
- 3) Start truck and run engine in fast idle to engage alternator
 - if gate starts working → check battery conditions and truck/trailer charging system
- 4) Check voltage supply at J-11 #4 and JK #(-) while deadhead*
 - 10 V is necessary for proper use of lift gate

Fuses on J-1 plug



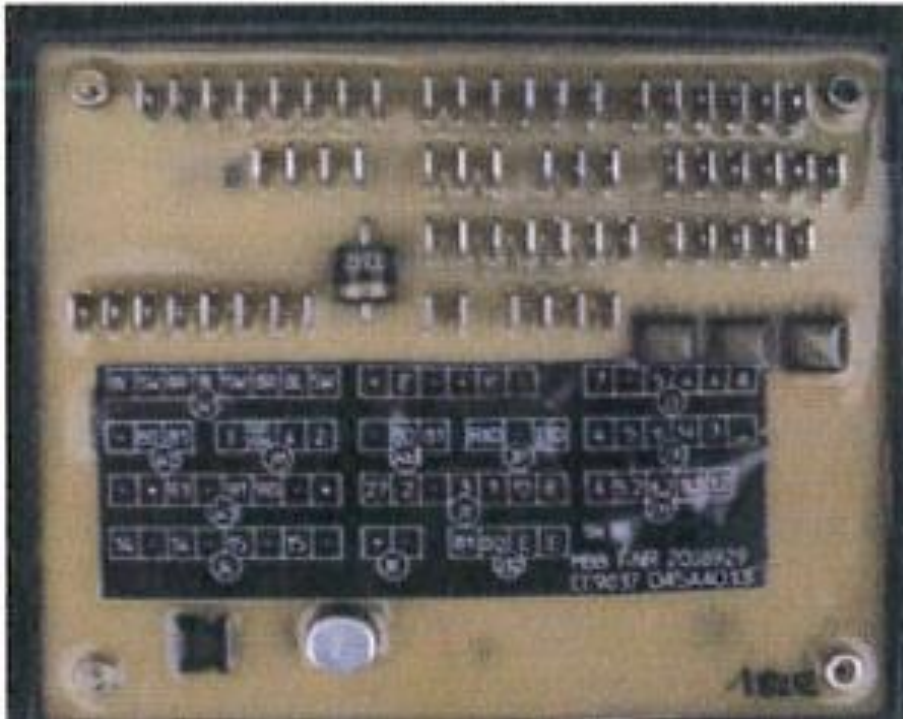
*deadhead: with gate all the way out, stay on button for 10 seconds for system bypass and read voltage

ILFP Electrical Control

Overview of Circuit Board, Connectors and Electrical Schematic

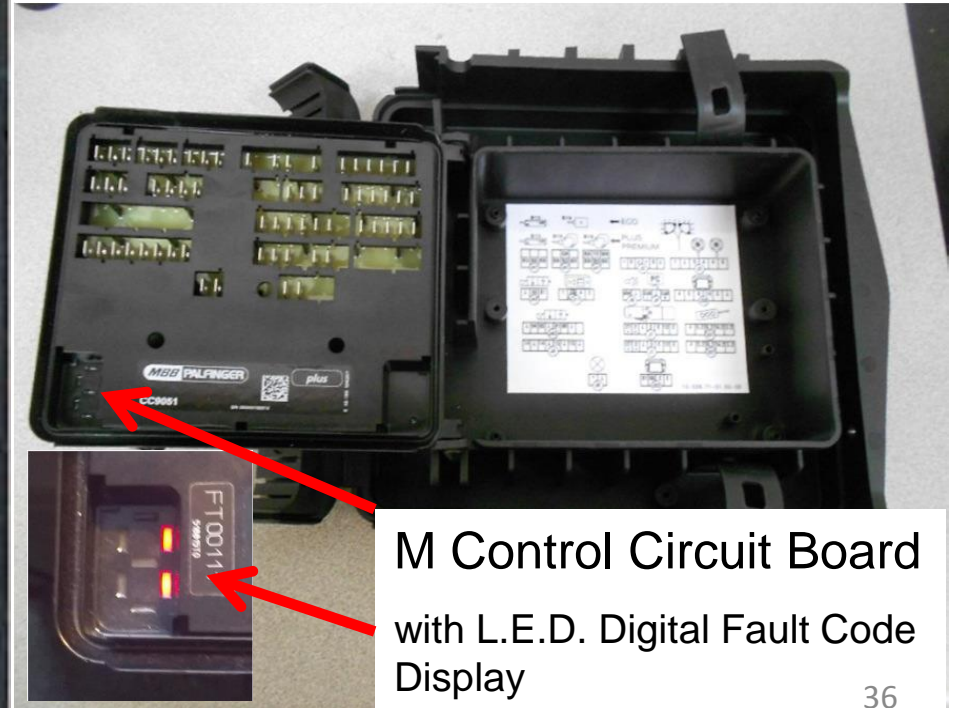
K plus Circuit Board

2005 to August 2013

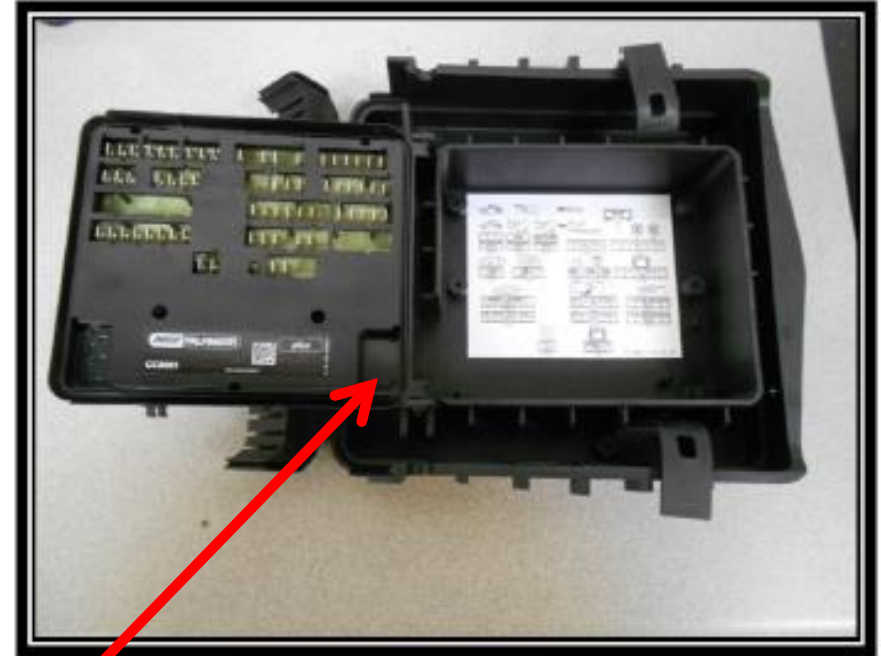
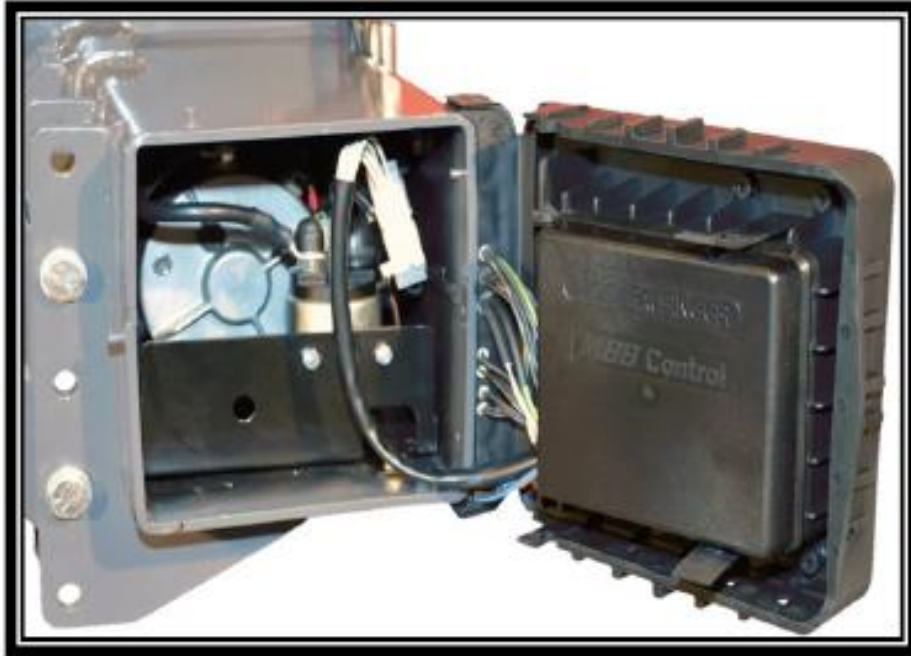


M Control Circuit Board

August 2013 and newer



New Style Circuit Board – M Control



Protective Cover

Slots sized for specific plugs

Prevent plugs from being plugged in wrong

LED flashes green when OK
LED flashes red when a fault exists

LED in lower left corner shows code for fault

Circuit Board – M Control Fault Codes

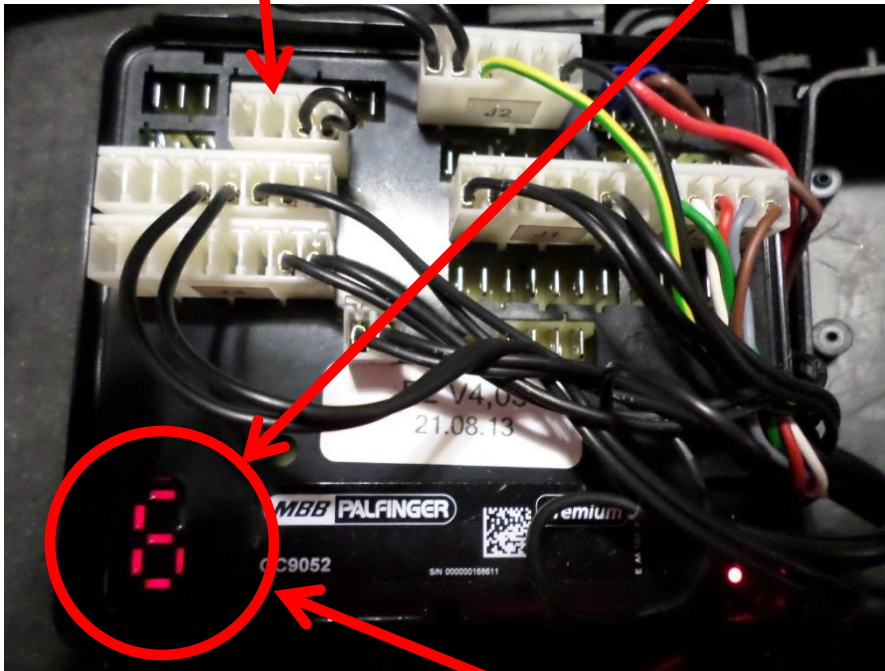
Fault code	Description	Reset
0	System ok / Cab switch off, (or missing bridge J11/2<->4)	
1	System ok / Cab switch on, (or bridge J11/2<->4)	
2	Low voltage – start truck engine, charge battery	Cab switch: off/on (or disconnect bridge J11/2<->4)
3	Defective or missing tilt switch B13 at lift arm	Automatically when the valves are back to normal
4	Defective or missing tilt angle sensor B15 at lift arm	Automatically when the valves are back to normal
5	Defective or missing tilt angle sensor B15 at platform	Automatically when the valves are back to normal
6	Warning lights shorted	Cab switch: off/on (or disconnect bridge J11/2<->4) or close tail lift
7	Short in cab switch / on-off-switch or aux port	Cab switch: off/on (or disconnect bridge J11/2<->4) or close tail lift
8	General short in electric wiring	Cab switch: off/on (or disconnect bridge J11/2<->4) or voltage interruption MBB control
9	Defect at motor solenoid detected during lifting	Automatically when the valves are back to normal
A	Voltage V02 (J1 pin 2) is missing, defective fuse?	Replace the fuse
b	Defect at opening, valve (S3/S4) or motor relay detected during opening	Automatically when the valves are back to normal
c	Defect at motor solenoid or S5 valve detected during closing	Automatically when the valves are back to normal
d	Defect at lowering valve (S1/S2) or S5 valve detected	Automatically when the valves are back to normal
E	Emergency program (all sensors are bypassed). Activation by: Press Open + Lower > 10 seconds	Cab switch: off/on (or disconnect bridge J11/2<->4)
P	Diagnosis mode activated	Removing service connector



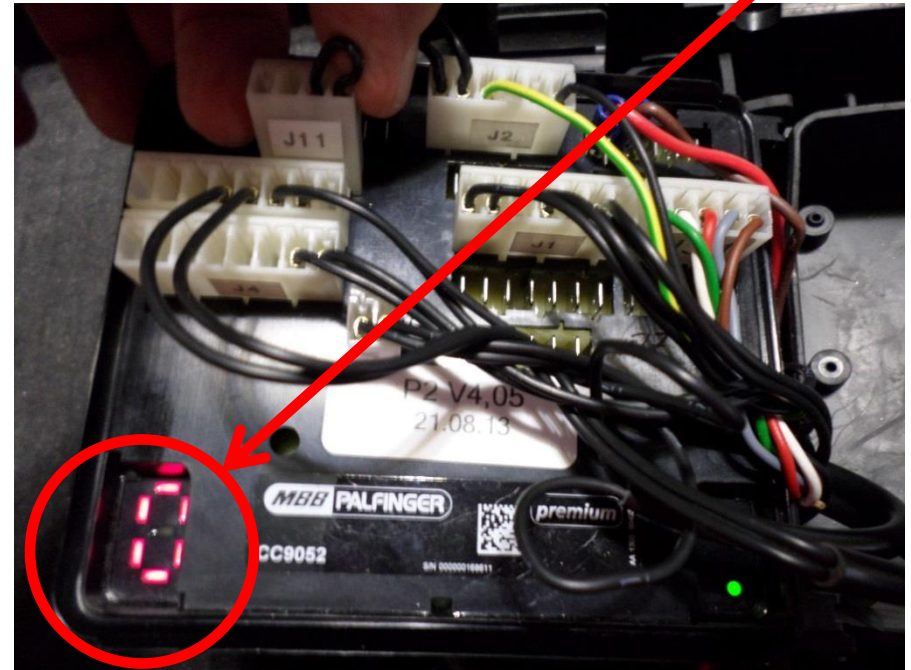
← Digital Fault Code Display located in lower left corner of M Control Circuit Board

Clear Fault Code on MBB Control Circuit Board

Remove J-11 Plug from Circuit Board for 10 seconds to clear fault code.



Plug in J-11 on Circuit Board. Digital display should read 0 or 1.



If fault code is still displayed after plugging in the J-11 plug, a fault still exists in the system. Continue corrective action to determine fault.

Power Cable to Solenoid Coil Test

Check for broken power wire in solenoid cable:

- Unplug connector at valve.
- Set multimeter to read DC voltage.
- Put positive lead of multimeter in plug.
- Put negative lead of multimeter in other hole of plug.
- Activate down function on gate.
- Preferred reading should be 10V or higher.



Check for broken wire in solenoid cable:

- Set multimeter to OHM function.
- Place a test lead of the multimeter at each end of the wire.
- If there is resistance in the wire, then the continuity test is positive and will show a value on the multimeter.
- If the amount of resistance shows zero (0), then the wire is broken.

Solenoid Coil Test

If one or both release valves on lift cylinders are not opening up, low voltage may be the cause. A *minimum* of **9V** is necessary to properly energize each of the solenoid coils.

If the minimum voltage is present at both coils, the coil may not be generating the magnetism needed to open the solenoid valve.

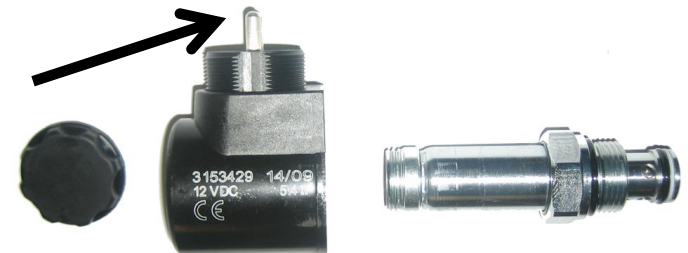
How to check coils for resistance

Multimeter set OHM function.
Place test leads on coil nodes.

Reading shows 5.5 to 7.0 Ω → Coil is good

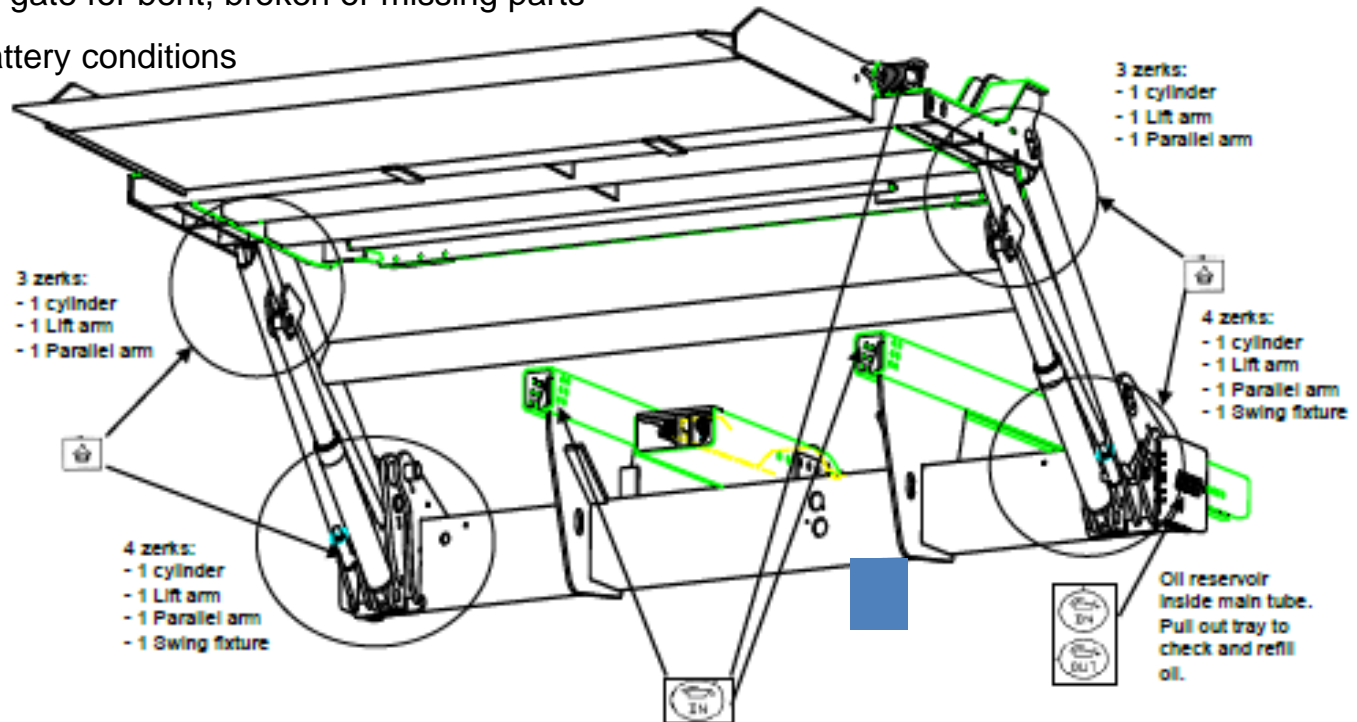
Reading shows 0 Ω → Coil is shorted out

Reading shows Overload → Coil is destroyed by burn or physical damage



Preventive maintenance

- Lubrication: 12 grease points (6 grease points each side; 3 at mount frame, 3 at platform)
- Hydraulic oil: filler cap on top of reservoir, outlet at bottom of tray underneath alum block
- Hydraulic System: Check for hydraulic leaks at hose fittings and cylinders shafts
- Power Supply: Check battery power supply (above 10V) at J11 #4 and JK(-) at deadhead*
- Pins: Tighten up all lock bolts at every pin
- Pump pressure: Correct setup →2850psi at deadhead*
- Visual check: Check lift gate for bent, broken or missing parts
- Battery: Check battery conditions



*deadhead: with gate all the way out, stay on button for 10 seconds for system bypass and read voltage

TECHNICAL SUPPORT and SERVICE CONTACTS



LIFTGATES

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