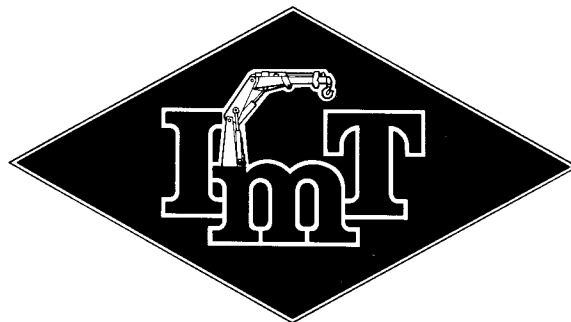


99900256  
PROPORTIONAL REMOTE CONTROL  
(NO. IA ELECTRONICS)

# Proportional Remote Control



**IOWA MOLD TOOLING CO., INC.**  
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515-923-3711

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# Section 1. CONTROL DESCRIPTION

## 1-1. GENERAL

This manual is provided to help the operator and the installer become familiar with proportional remote controls. It is divided into sections to first, discuss the theory of operation, second, installation, and finally, troubleshooting.

## 1-2. OPERATION

The speed at which a crane operates is directly related to the amount of oil supplied to its main control valve. The proportional remote control feature regulates the amount of oil that is made available to the main control valve, thereby controlling the speed of operation. This is accomplished by means of an electrically controlled hydraulic system consisting of a remote control, an amp driver, and a flow control. The remote control provides a signal voltage to the amp driver. The amp driver, in turn provides a signal to the solenoid on the flow control. An increase in signal voltage to the amp driver causes it to provide higher signal voltage to the flow control solenoid. Higher signal voltage at the flow control solenoid causes it to limit the flow of oil allowed to bypass to the reservoir. Limiting the amount of oil that is bypassed forces more oil downstream, thus increasing the speed of operation.

## 1-3. REMOTE CONTROL

The remote control allows the operator to control the crane remotely. It provides the housing for the switches that control which crane function, or functions, are to be activated. It also houses the potentiometer and trigger

assembly that actually provide the signal voltage to the amp driver. It is connected to the main control valve and the amp driver through a 30 foot cable. The function switches in the remote control are simple on/off switches and have no effect on the speed of that function. The speed of the function selected is controlled only by the trigger, therefore, if two functions are selected at the same time, when the trigger is pulled, the speed of both functions will increase.

## 1-4. AMP DRIVER

The amp driver is an electronic device used to take the signal that it receives from the trigger in the remote control, and subsequently provide a signal voltage to the flow control solenoid. It is often mounted to the mast of the crane, but may be mounted in an alternate location.

## 1-5. FLOW CONTROL

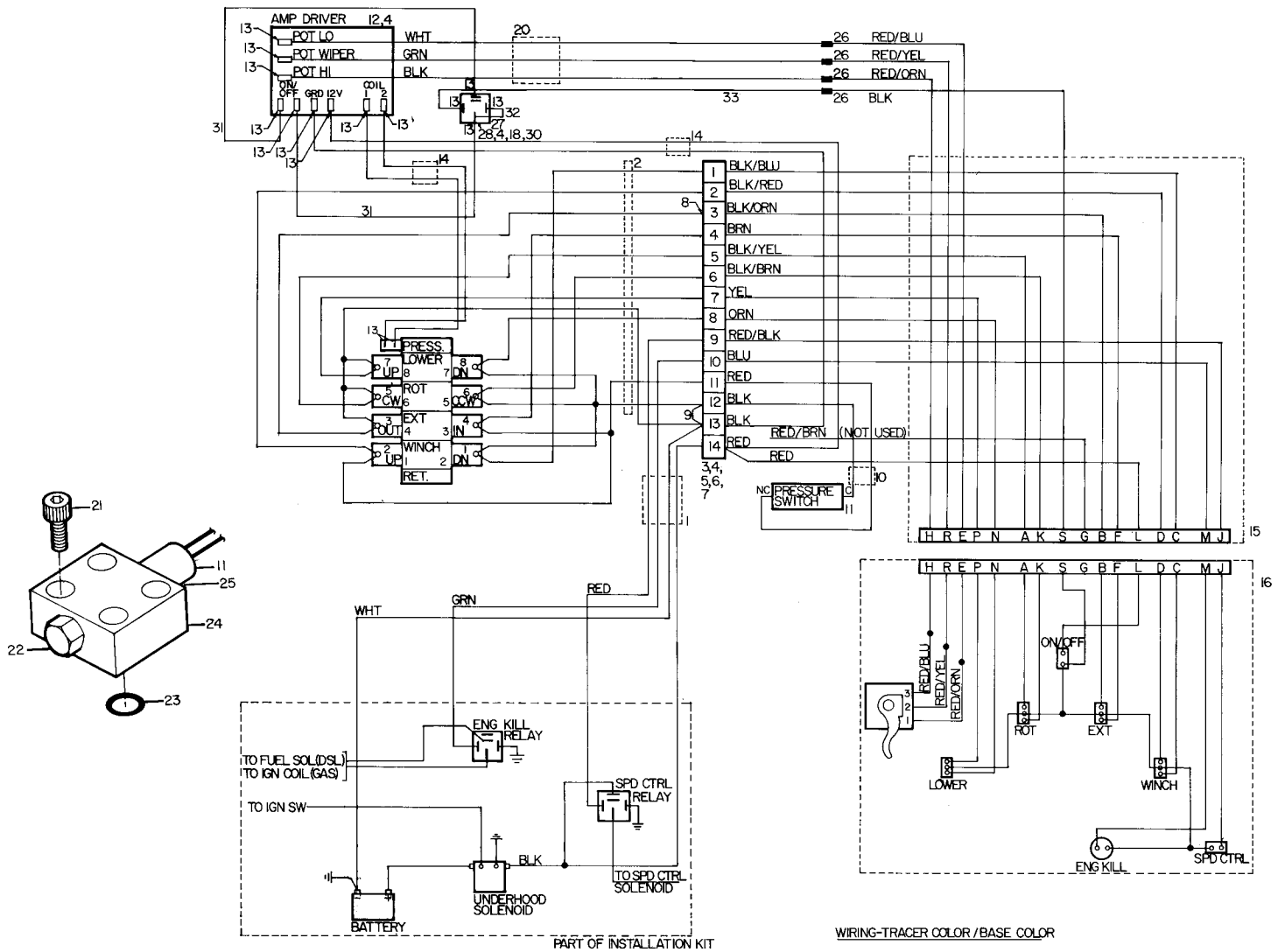
The flow control may either be an integral part of the inlet on the main control valve, or a separate valve body, depending on the crane model. Its' purpose is to regulate the amount of oil flow to the main control valve. In the normal state, the flow control will direct the flow of oil to the reservoir. Its' operation is completely dependent on a variation in signal voltage from the amp driver. As the signal voltage from the amp driver increases, the flow control begins to limit the flow of oil being bypassed, which causes a greater flow directed upstream to the main control valve. Inversely, when the signal voltage from the amp driver begins to drop, the flow control will let more oil bypass to the reservoir, resulting in lesser flow upstream to the main control valve.

# Section 2. INSTALLATION

## 2-1. GENERAL

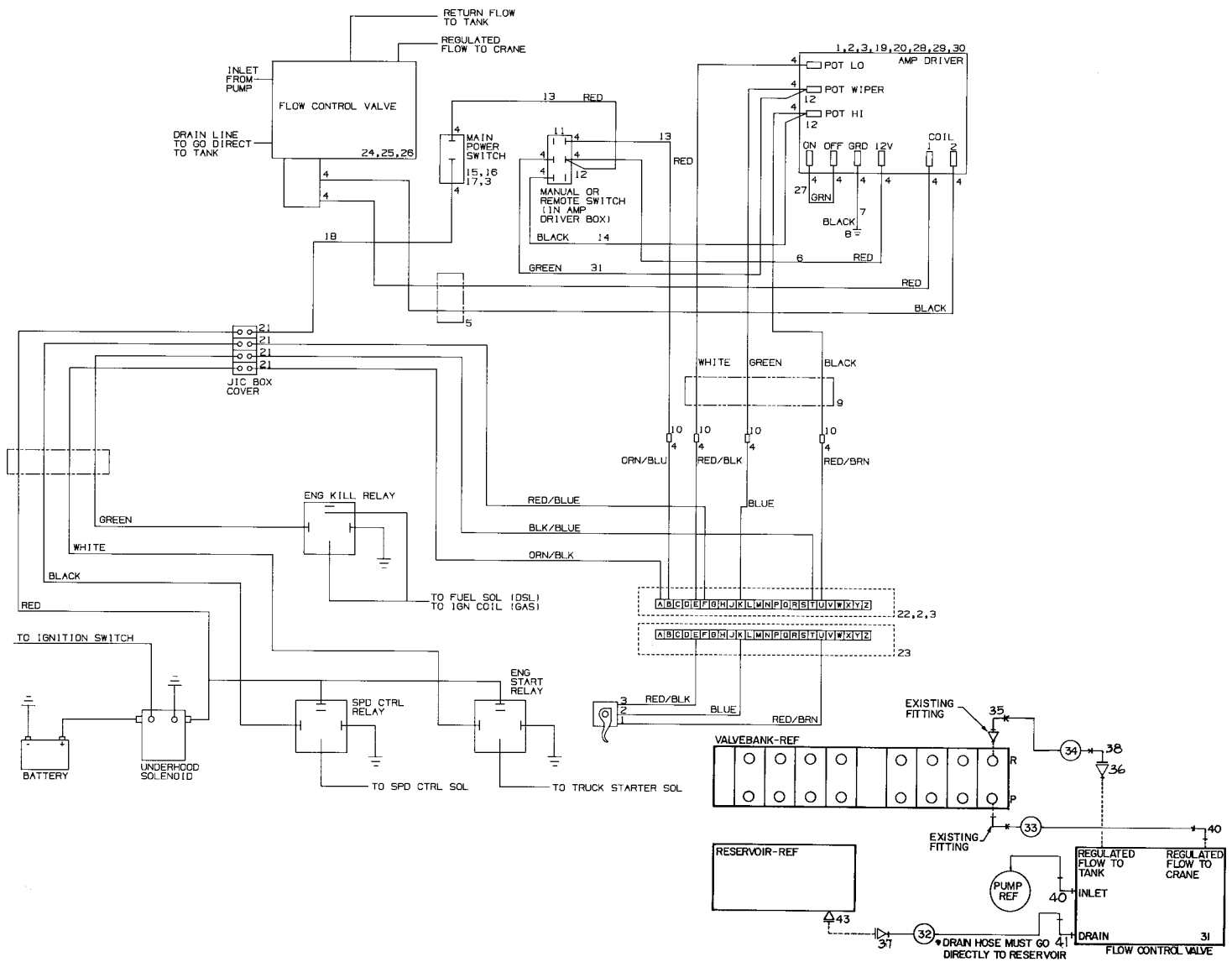
This section contains installation schematics and hydraulic diagrams for proportional remote control systems. The installer must be familiar with the information relating to the IMT crane that is to be installed, before attempting to

make that installation. Electrical contacts must be clean and free of oil or other contaminants. Proper ground must be established. This will be accomplished by connecting a 12 gauge (minimum) wire from the ground points of the electrical system to a 5/16 self tapping screw installed in the truck frame.



Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	60045019	Cable, 4-wire, 16ga. x 300	1	18.	72063001	Washer, 1/4	3
2.	70034060	Tie, Plastic	4	19.			
3.	60105825	Mounting, Terminal block	1	20.			
4.	72060002	Cap screw, 1/4 x 3/4 gr5	6	21.	72060731	Cap screw, 5/16 x 3/4	4
5.	72066525	Clamp, Hose	1	22.	72532140	Plug, 9/16	1
6.	72061009	Screw, #6 x 3/4	2	23.	7Q072015	O-ring	1
7.	77044309	Block, Term., 14 contact	1	24.	60025221	Manifold, Capacity alert	1
8.	77040051	Terminal	17	25.	7Q073906	O-ring	1
9.	77040130	Jumper	1	26.	77040047	Terminal, 1/4 tab	4
10.	51704788	Cable, 2-wire, 14ga. x 43	1	27.	77040282	Terminal	1
11.	77041258	Switch, Pressure	1	28.	77041251	Relay	1
12.	77041329	Amp driver	1	29.			
13.	77040186	Terminal	15	30.	72062104	Nut, Self locking, 1/4	1
14.	60045074	Cable, 2-wire, 14ga. x 46	2	31.	89044231	Wire, 14 ga., Green	6"
15.	51707511	Cable	1	32.	89044231	Wire, 14 ga., Green	1"
16.	51707752	Assembly, Remote control	1	33.	89044274	Wire, 14 ga., Green	36"
17.							

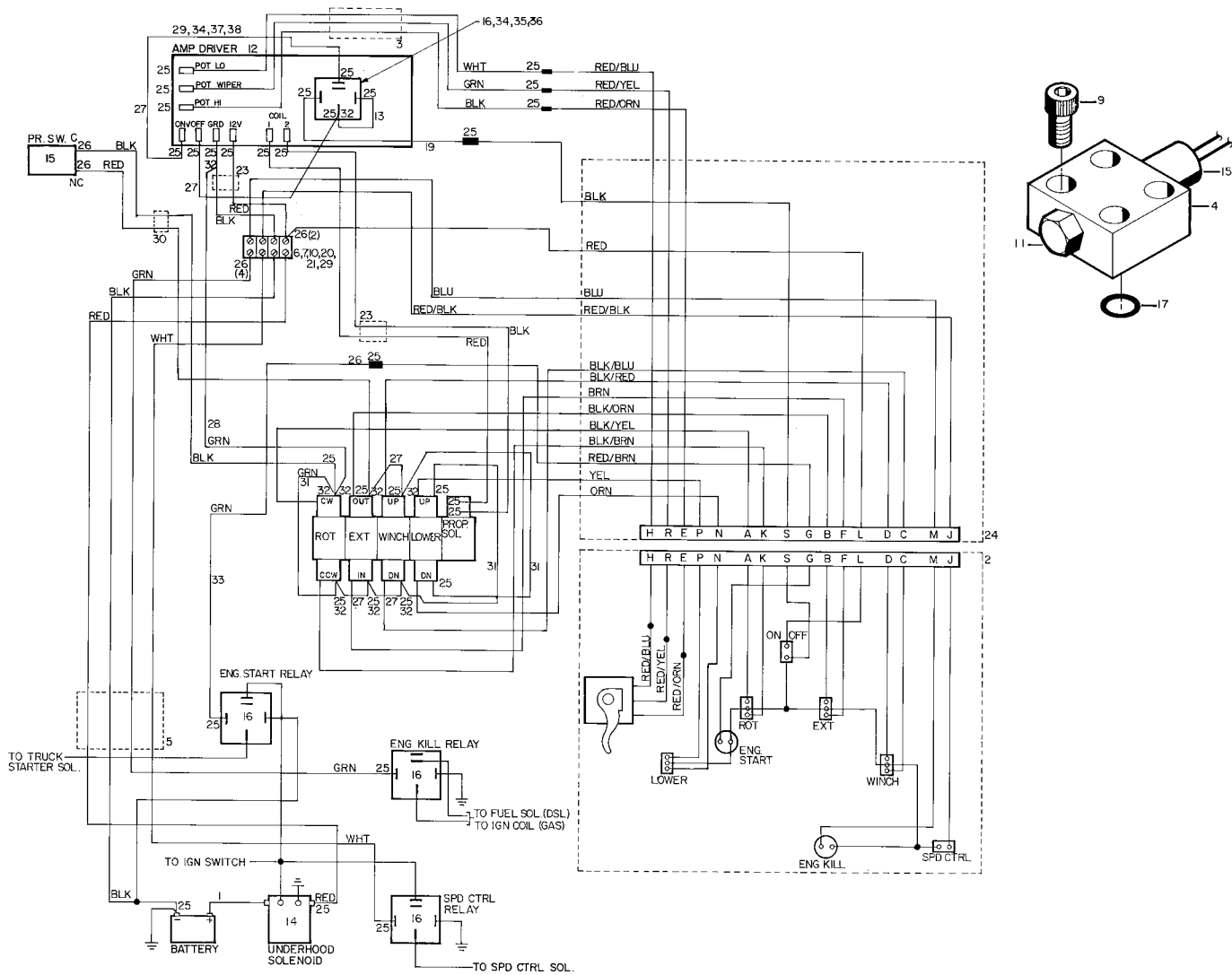
Figure D-1. Control Kit-315A/320H (Part Number 90707905)



Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	77041329	Amp driver	1	26.	72062103	Nut, Self locking, 3/8	2
2.	72060004	Cap screw, 1/4 x 1 gr5	6	27.	89044231	Wire, Green, 14ga. x 1	1
3.	72062104	Nut, Self locking, 1/4	8	28.	60112887	Plate, Mounting, Amp driver	1
4.	77040186	Terminal, 1/4 tab	21	29.	72060025	Cap screw, 5/16 x 1 gr5	1
5.	89044188	Cable, 2-wire, 14ga. x 12	1	30.	72062109	Nut, Self locking, 5/16	1
6.	89044232	Wire, Red, 14ga. x 8	1	31.	89044231	Wire, Green, 14ga. x 8	1
7.	89044274	Wire, Black, 14ga. x 36	1	32.	51703596	Hose, 1/4 x 120	1
8.	77040052	Terminal	1	33.	51705642	Hose, 1/2 x 34	1
9.	89044039	Cable, 3-wire, 14ga. x 36	1	34.	51708744	Hose, 3/4 x 34	1
10.	77040047	Terminal, 1/4 tab	4	35.	72053767	Adapter, 1 1/16 str. thd. (m) x 1 1/6 JIC (m), 90 deg.	1
11.	77041354	Switch, Toggle, DT	1	36.	72532365	Adapter, 7/8 str. thd. (m) x 1 1/16 JIC (m)	1
12.	77040282	Terminal, 1/4 tab	3	37.	72053499	Adapter, 1/4 npt (m) x 7/16 JIC (m)	1
13.	89044232	Wire, Red, 14ga. x 24	2	38.	72532696	Adapter, 1 1/16 JIC (m) x 1 1/16 JIC (f), 90 deg., Swivel	1
14.	89044274	Wire, Black, 14ga. x 8	1	39.			
15.	77041345	Switch, Toggle, ST	1	40.	72053764	Adapter, 7/8 str. thd. (m) x 3/4 JIC (m), 90 deg.	2
16.	60103535	Switch, Bracket, Switch	1	41.	72053758	Adapter, 7/16 str. thd. (m) x 9/16 JIC (m), 90 deg.	1
17.	72060002	Cap screw, 1/4 x 3/4 gr5	2	42.			
18.	77041056	Fuse, In-line, 20 amp	1	43.	72053527	Bushing, Reducer 3/4 npt (m) x 1/4 npt (f)	1
19.	77044018	Connector, Strain relief, 1/2	1				
20.	77044201	Nut, Strain relief, Lock, 1/2	1				
21.	77040051	Terminal	4				
22.	51703243	Cable, 50	1				
23.	51708491	Handle, Remote control	1				
24.	73054584	Valve, Flow control	1				
25.	70260051	Cap screw, 3/8 x 2 1/4 gr5	2				

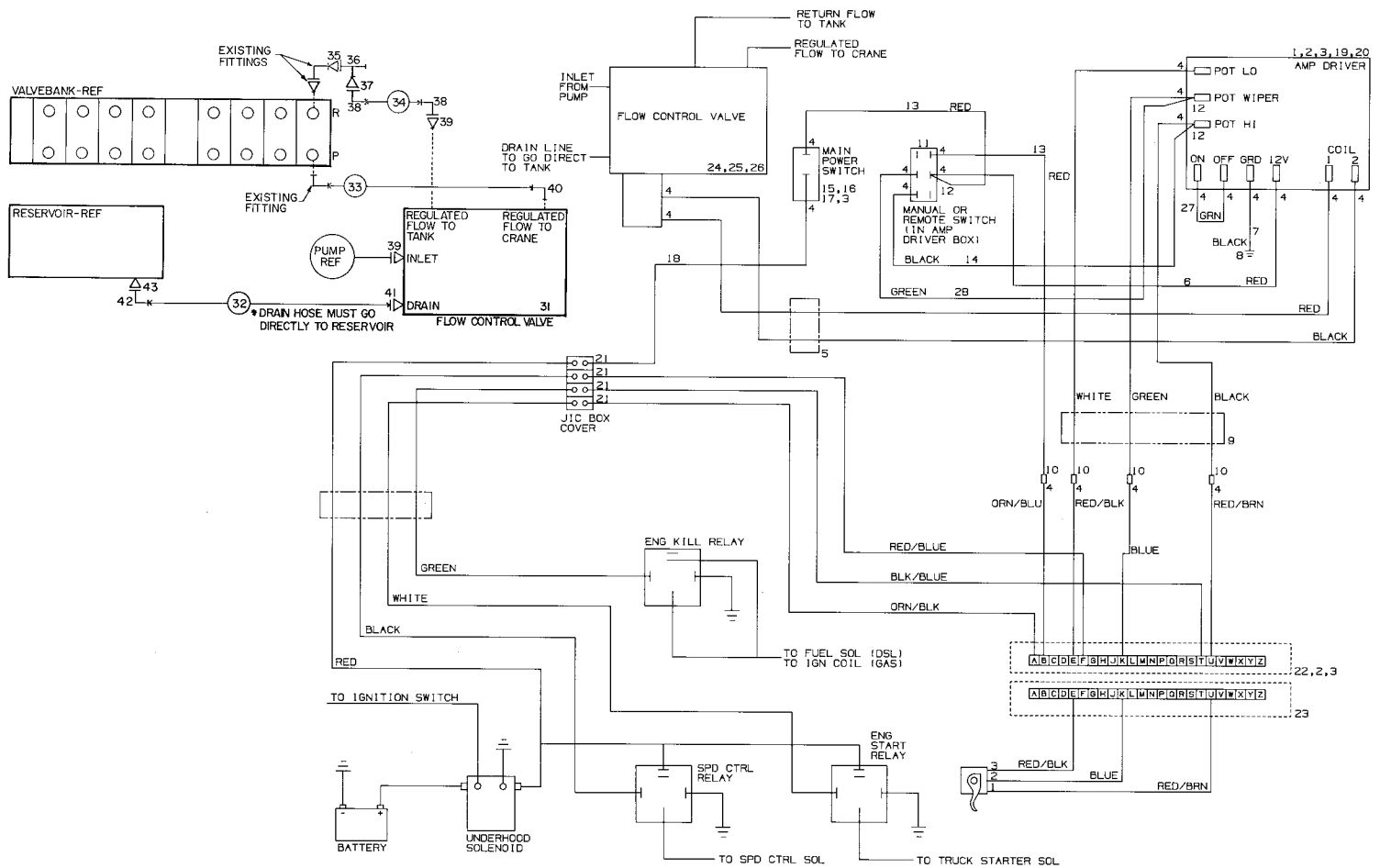
Figure D-2. Control Kit-425 (Part Number 90708745)





Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	51704784	Cable, 1-wire x 6	1	20.	60111833	Spacer, 3/8 x 1	2
2.	51707981	Handle, Remote control	1	21.	72060006	Cap screw, 1/4 x 1 1/2 gr5	2
3.	89044039	Cable, 3-wire, 14ga. x 25	1	22.			
4.	60025221	Manifold, Capacity alert	1	23.	89044188	Cable, 2-wire, 14ga. x 36	2
5.	89044034	Cable, 4-wire, 14ga. x 35 ft.	1	24.	51707980	Cable, 16-wire, 18ga. x 60	1
6.	77044341	Block, Terminal, 4 contact	1	25.	77040186	Terminal, 1/4 tab	33
7.	60111832	Plate, Term. strip mounting	1	26.	77040051	Terminal	9
8.	70034060	Tie, Plastic	10	27.	89044231	Wire, Green, 14ga. x 3	5
9.	72060731	Cap screw, 5/16 x 3/4	4	28.	89044231	Wire, Green, 14ga. x 36	1
10.	72061009	Screw, #6 x 3/4	2	29.	72063049	Washer, 1/4	6
11.	72532140	Plug, 9/16	1	30.	89044188	Cable, 2-wire, 14ga. x 33	1
12.	77041329	Amp driver	1	31.	89044231	Wire, Green, 14ga. x 10	3
13.	89044231	Wire, Green, 14ga. x 1	1	32.	77040282	Terminal, 1/4 tab	9
14.	77041003	Solenoid, 12 VDC	1	33.	72060002	Cap screw, 1/4 x 3/4 gr5	5
15.	77041283	Switch, Pressure, 2800 psi	1	34.	72063001	Washer, 1/4	1
16.	77041251	Relay	4	35.	72062104	Nut, Self locking, 1/4	1
17.	7Q072015	O-ring	1	36.	77044201	Nut, Lock, Elec., 1/2	1
18.				37.	77044018	Connector, Strain relief, 1/2	1
19.	89044231	Wire, Green, 14ga.	25"				

Figure D-4. Control Kit-3016/5016 (Part Number 90707982) With Engine Start

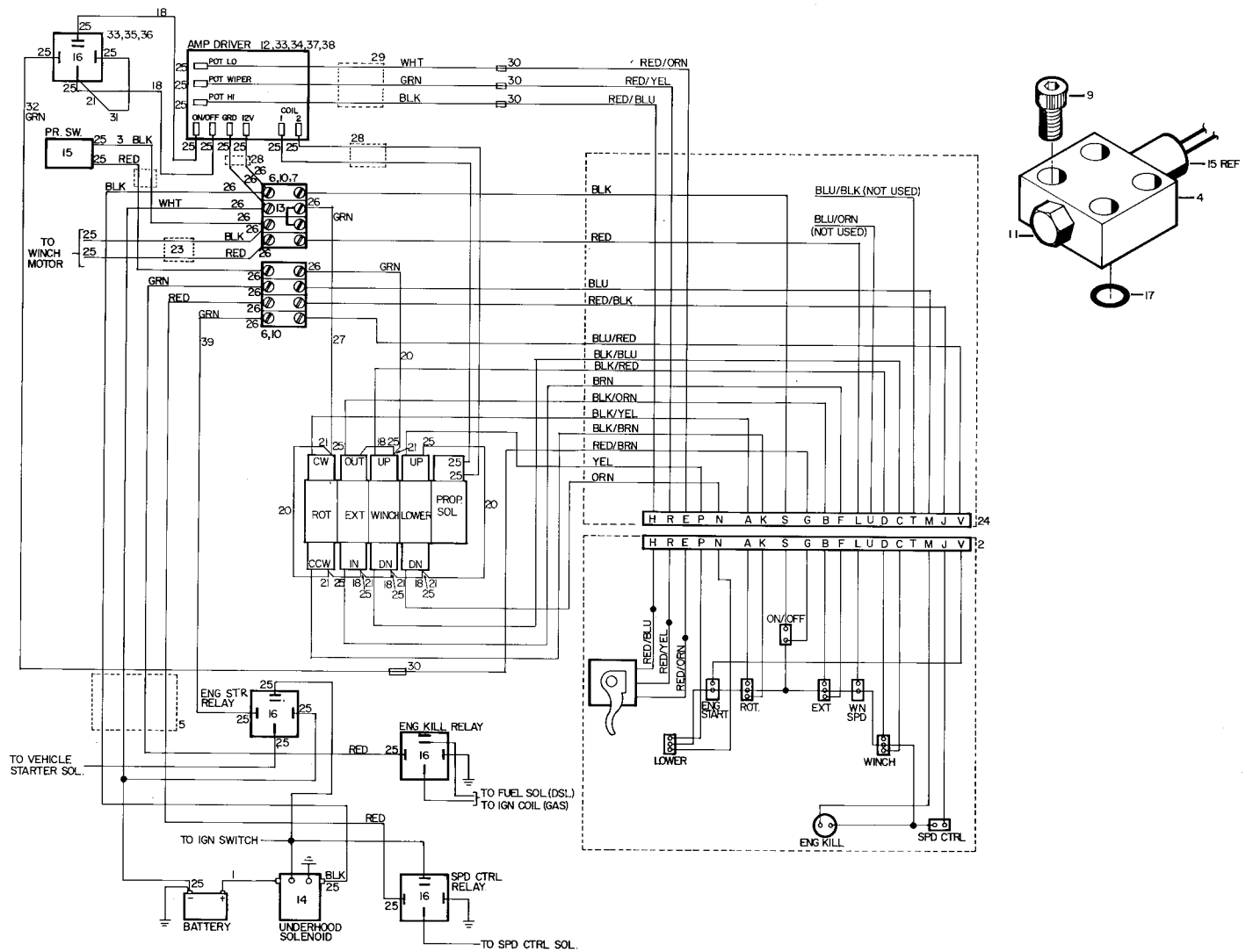


Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	77041329	Amp Driver	1	26.	72062103	Nut, Self locking, 3/8	2
2.	72060004	Cap screw, 1/4 x 1 gr5	6	27.	89044231	Wire, Green, 14ga. x 1	1
3.	72062104	Nut, Self locking, 1/4	8	28.	89044231	Wire, Green, 14ga. x 8	1
4.	77040186	Terminal, 1/4 tab	21	29.			
5.	89044188	Cable, 2-wire, 14ga. x 84	1	30.			
6.	89044232	Wire, Red, 14ga. x 8	1	31.			
7.	89044274	Wire, Black, 14ga. x 36	1	32.	51706054	Hose, 1/4 x 72	1
8.	77040052	Terminal	1	33.	51704959	Hose, 1/2 x 16	1
9.	89044039	Cable, 3-wire, 14ga. x 84	1	34.	51704311	Hose, 1/2 x 25	1
10.	77040047	Terminal, 1/4 tab	4	35.	72053676	Adapter, 3/4 npt (f) x 1 1/16 JIC (m)	1
11.	77041354	Switch, Toggle, DT	1	36.	72532950	Tee, 1 1/16 JIC, Swivel nut	1
12.	77040282	Terminal, 1/4 tab	3	37.	72532972	Adapter, 3/4 JIC (m) x 1 1/16 JIC (f)	1
13.	89044232	Wire, Red, 14ga. x 24	2	38.	72532658	Adapter, 3/4 JIC (m) x 3/4 JIC (f) swivel, 90 deg.	2
14.	89044274	Wire, Black, 14ga. x 8	1	39.	72532359	Adapter, 7/8 str. thd. (m) x 3/4 JIC (m)	2
15.	77401345	Switch, Toggle, ST	1	40.	72053764	Adapter, 7/8 str. thd. (m) x 3/4 JIC (m), 90 deg.	1
16.	60103535	Bracket, Switch	1	41.	72532351	Adapter, 7/16 str. thd. (m) x 7/16 JIC (m)	1
17.	72060002	Cap screw, 1/4 x 3/4 gr5	2	42.	72531412	Adapter, 1/4 npt (m) x 7/16 JIC (m), 90 deg.	1
18.	77041056	Fuse, In-line, 20 amp	1	43.	72532138	Reducer bushing, 3/8 npt (m) x 1/4 npt (f)	1
19.	77044018	Connector, Strain relief, 1/2	1				
20.	77044201	Nut, Strain relief, Lock, 1/2	1				
21.	77040051	Terminal	4				
22.	51706365	Cable, 94	1				
23.	51708491	Handle, Remote control	1				
24.	73054584	Valve, Flow control	1				
25.	72060051	Cap screw, 3/8 x 2 1/4 gr5	2				

Figure D-5. Control Kit-6425 (Part Number 90708740)



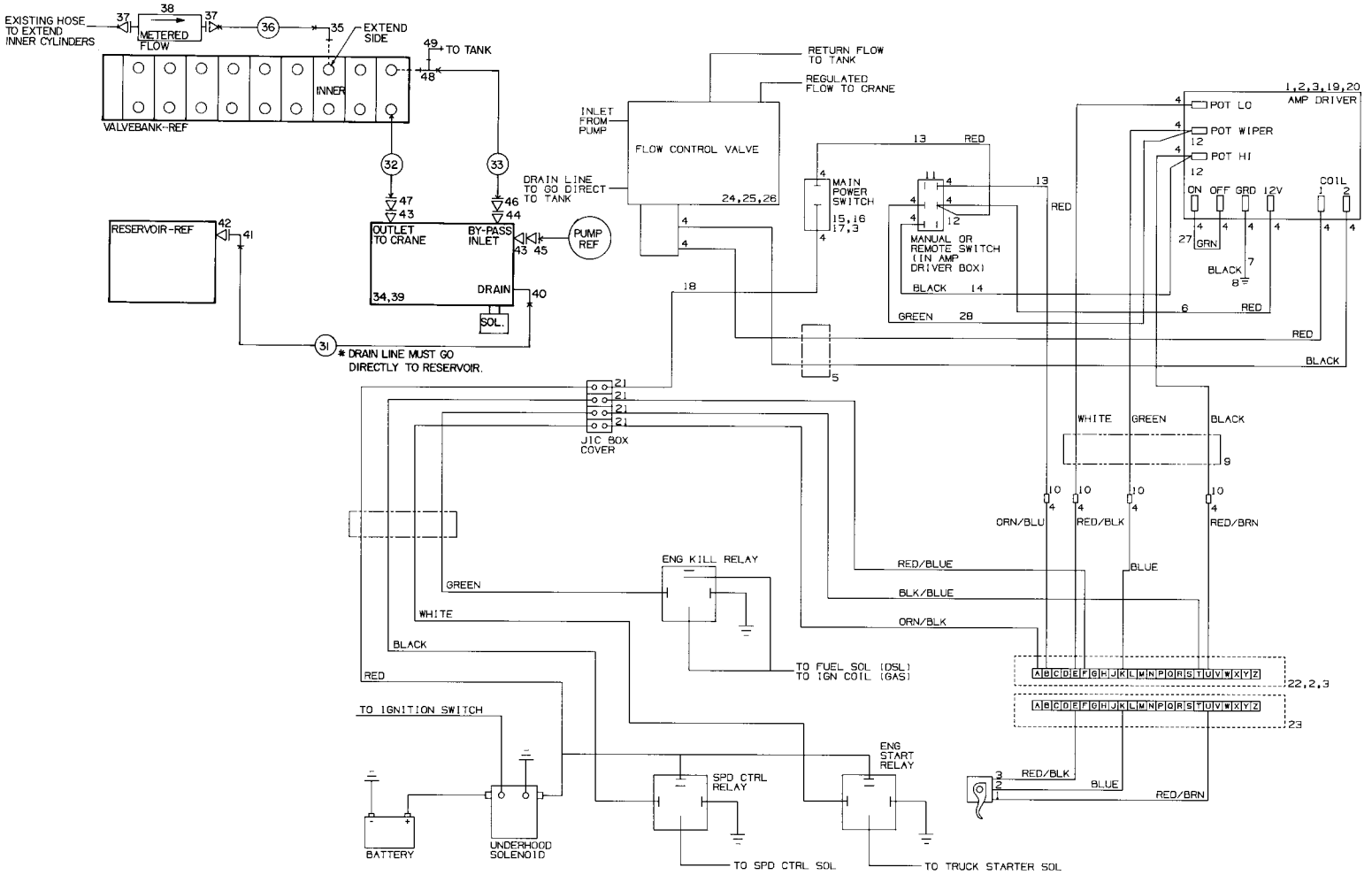




Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	51704784	Cable, 1-wire x 6	1	20.	89044231	Wire, Green, 14ga. x 10	3
2.	51708355	Assembly, Handle/cable	1	21.	77040282	Terminal, 1/4 tab	7
3.	89044188	Cable, 2-wire, 14ga. x 55	1	22.			
4.	60025221	Manifold, Capacity alert	1	23.	89044188	Cable, 2-wire, 14ga. x 65	1
5.	89044034	Cable, 4-wire, 14ga. x 420	1	24.	51708354	Cable, 19-wire, 18ga. x 72	1
6.	77044341	Block, Terminal, 4 contact	2	25.	77040186	Terminal	29
7.	60110131	Mounting, Terminal bolck	1	26.	77040051	Terminal	12
8.	70034060	Tie, Plastic	5	27.	89044231	Wire, Green, 14ga. x 6	1
9.	72060731	Cap screw, 5/16 x 3/4	4	28.	89044188	Cable, 2-wire, 14ga. x 25	2
10.	72061009	Screw, #6 x 3/4	4	29.	89044039	Cable, 3-wire, 14ga. x 25	1
11.	72532140	Plug, 9/16	1	30.	77040047	Terminal	4
12.	77041329	Amp driver	1	31.	89044231	Wire, Green, 14ga. x 1	1
13.	77040130	Bar Jumper	1	32.	89044231	Wire, Green, 14ga. x 25	1
14.	77041003	Solenoid, 12 VDC	1	33.	72060002	Cap screw, 1/4 x 3/4 gr5	5
15.	77041258	Switch, Pressure, 3000 psi	1	34.	72063049	Washer, Lock, 1/4	4
16.	77041251	Relay	3	35.	72063001	Washer, 1/4	1
17.	7Q072015	O-ring	1	36.	72062104	Nut, Lock, 1/4	1
18.	89044231	Wire, Green, 14ga. x 3	6	37.	77044201	Nut, Lock, Elec. 1/2	1
19.				38.	77044018	Connector, Strain relief, 1/2	1

Figure D-7. Control Kit-7020/7025 (Part Number 90709117)  
With Engine Start





Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	77041329	Amp Driver	1	31.	51703770	Hose, 1/4 x 60	1
2.	7206004	Cap screw, 1/4 x 1 gr5	6	32.	51704959	Hose, 1/2 x 16	1
3.	72062104	Nut, Self locking, 1/4	8	33.	51703945	Hose, 3/4 x 17	1
4.	77040186	Terminal, 1/4 tab	21	34.			
5.	89044188	Cable, 2-wire, 14ga. x 84	1	35.			
6.	89044232	Wire, Red, 14ga. x 8	1	36.	51708692	Hose, 3/8 x 4	1
7.	89044274	Wire, Black, 14ga. x 36	1	37.	72053670	Adapter, 3/8 npt (m) x 3/4 JIC (m)	1
8.	77040052	Terminal	1	38.	73054139	Valve, Flow	1
9.	89044039	Cable, 3-wire, 14ga. x 84	1	39.	60112774	Plate, Mounting, Flow Ctrl.	1
10.	77040047	Terminal, 1/4 tab	4	40.	72053758	Adapter, 7/16 str. thd. (m) x 7/16 JIC (m), 90 deg.	1
11.	77041354	Switch, Toggle, DT	1	41.	72531412	Adapter, 1/4 npt (m) x 7/16 JIC (m), 90 deg.	1
12.	77040282	Terminal, 1/4 tab	3	42.	72531831	Reducer bushing, 3/4 npt (m) x 1/4 npt (f)	1
13.	89044232	Wire, Red, 14ga. x 24	2	43.	72532963	Adapter, 1 5/16 str. thd. (m) x 3/4 str. thd. (f)	2
14.	89044274	Wire, Black, 14ga. x 8	1	44.	72532948	Adapter, 1 5/16 str. thd. (m) x 1 1/16 str. thd. (f)	1
15.	77401345	Switch, Toggle, ST	1	45.	72053763	Adapter, 3/4 str. thd. (m) x 3/4 JIC (m), 90 deg.	1
16.	60103535	Bracket, Switch	1	46.	72532366	Adapter, 1 1/16 str. thd. (m) x 1 1/16 JIC (m)	1
17.	72060002	Cap screw, 1/4 x 3/4 gr5	2	47.	72532358	Adapter, 3/4 str. thd. (m) x 3/4 JIC (m)	1
18.	77041056	Fuse, In-line, 20 amp	1	48.	72532950	Tee, 1 1/16 JIC, Swivel nut	1
19.	77044018	Connector, Strain relief, 1/2	1	49.	72532696	Adapter, 1 1/16 JIC (m) x 1 1/16 JIC (f) swivel	1
20.	77044201	Nut, Strain relief, Lock, 1/2	1				
21.	77040051	Terminal	4				
22.	51706365	Cable, 94	1				
23.	51708491	Handle, Remote control	1				
24.	73054641	Valve, Flow control	1				
25.	72060051	Cap screw, 3/8 x 2 1/4 gr5	2				
26.	72062103	Nut, Self locking, 3/8	2				
27.	89044231	Wire, Green, 14ga. x 1	1				
28.	89044231	Wire, Green, 14ga. x 8	1				
29.							
30.							

Figure D-9. Control Kit-9825 (Part Number 90708669)

## Section 3. TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
Crane will not function.	<p>No power to remote control.</p> <p>No power to flow control.</p> <p>Flow control malfunction.</p> <p>Valve spool not shifting.</p> <p>Pump failure.</p>	<p>Check connections to 12 vdc source. Check fuse in power wire.</p> <p>Check connections between amp driver and flow control. Check polarity of amp driver power leads. Check fuse in amp driver.</p> <p>Check torque on flow control solenoid. Remove flow control and test. Replace as needed.</p> <p>Check tie bolt torque. Replace as needed.</p> <p>Check flow/pressure. Replace as needed.</p>
Crane not proportional.	<p>Flow control malfunction.</p> <p>Trigger potentiometer adjusted incorrectly.</p>	<p>Check torque on flow control solenoid. Remove flow control and test. Replace as needed. Check voltage variance to solenoid.</p> <p>Set engine at high speed control setting. Set on rotation function. Adjust trigger pot CCW until crane begins to rotate.</p>
Crane operation is not smooth.	Air in the system.	Bleed hydraulics as needed. Cranes having in-line flow controls must be bled at valve.
Trigger function is reversed.	Wiring at amp driver is reversed.	Reverse the wiring to the Pot Hi and Pot Lo at the trigger, in the remote control.
Amp driver blows fuses.	Faulty ground connection.	Connect ground points of electrical system through a 12 gauge wire to a 5/16 self tapping screw installed in the truck frame.
Amp driver output will not vary.	Improper wiring.	Check connection to Pot Wiper. Check connections to Pot Lo and Wiper, correct if reversed. Check connections to Pot Hi and Wiper, correct if reversed.
Amp driver output is 0.	Improper wiring.	Check Pot Lo connection. Check connection to Coil 1 and 12 v, reverse if incorrect. Check power to amp driver.
Amp driver output is 12 and will not vary.	Improper wiring.	Check connections to 12 volt and Gnd, and reverse if incorrect. Check connection to Pot Hi. Check connections to Pot Lo, reverse if incorrect.
Amp driver output is adjustable, 2-6 volts.	Improper wiring.	Check wiring to Pot Hi and Wiper, correct if reversed.
Amp driver output is variable to 6-8 volts.	Moisture in amp driver.	Remove cover and dry with air hose.
Diode D2 failed.	12v connected to Coil 2.	Replace amp driver. Correct wiring.