

## JUMP STARTING A REGULATOR WITH A TEMPORARY CAPACITOR

If a regulator will not run in auto or manual, first check motor fuse. If fuse is good, place control in manual and connect a voltmeter between neutral and the raise output connection ( NN27 on a GE, R1 on a Cooper, or J on a Siemens.) Set switch to raise, you should see nominal 120V on voltmeter. Next place voltmeter between neutral and lower output connection (NN28 on a GE, L1 on a Cooper, or K on a Siemens.) Set switch to lower, you should see 120V on voltmeter. If these tests fail, you most likely have a control problem.

If not a control problem, leaving your voltmeter on the lower output connection, change the manual switch to raise. If you see 60-90VAC on the meter, the capacitor is not open. Move the voltmeter to the raise connection, change the manual switch to lower. Again, if you see 60-90VAC on the meter, the capacitor is not open. These values are approximate, depending on the mfd value of the capacitor.

If the capacitor is open, it will need to be replaced. Newer regulators have this capacitor mounted inside the control cabinet. Power down the cabinet and replace the defective capacitor.

Older regulators have this capacitor mounted inside the tank and the regulator must be removed from service to replace. However, your regulator is unlikely to already be on neutral. In order to get it back to neutral, jumper a temporary replacement capacitor across the raise and lower terminals (NN27-NN28 on GE, L1 -L2 on a Cooper, or J - K on a Siemens).

Run the regulator to Neutral Position, and shut it off so you can bypass and replace the regulator.

If the regulator still cannot be taken to neutral position, you will need to kill the line and replace the regulator.

**DO NOT CONNECT ANOTHER CAPACITOR WHEN THE ORIGINAL IS NOT OPEN!** Doing so will boost your motor voltage to a level that will fire the MOV's in the control panel...letting out its precious smoke and possibly destroying the control beyond repair.

Newer regulators have the capacitor in the control housing, so why not leave the jumpered capacitor in place on the older ones? The factory capacitor is on the load side of the limit switches. Your jumpered capacitor is on the line side. If your regulator happens to run to full raise or full lower, one of the limit switches will open, taking the temporary capacitor out of circuit. You will no longer be able to get to neutral position, and will have to shut down the line to replace the regulator.

# Cross Reference Chart

Function		GE	Siemens	Cooper	Howard
Panel Source		NN9	P2	Vs	PS
Motor Source		NN9	U2	Vm	MS
Ground		NN10 & NN26	E	G	G
CT Low		NN24	E1	C1	C0
CT High (Pol)		NN23	C2	C3	C
Drag Hand Reset		NN29	U11	DHR	DHR
Lower		NN28	K	L3	L
Raise		NN27	J	R3	R
Neutral Switch		NN31	U12	NL	NS
Operations Counter		NN30	U10	N/A	OC
Holding Switch		N/A	N/A	Hs	N/A