MEP 002A/003A Auto / Remote Starter Kit

Manual Supplement
for
Generator
004A/005A/006A
Sets

This Manual Supplements the MEP 002/003 Auto Starter Manual.
This supplement will show only the wiring and the DIP Switch Functions
for the
004A, 005A and 006A
Generator-sets

Rev 3.0 June/2014

The Autostarter Board KIT for the 004A/005A/006A is the same as for the 002A/003A

Except that the 004A/005A/006A version has a different Software loaded!

The 004A/005A/006A Software affects/changes the following functions / Terminal Nomenclature:

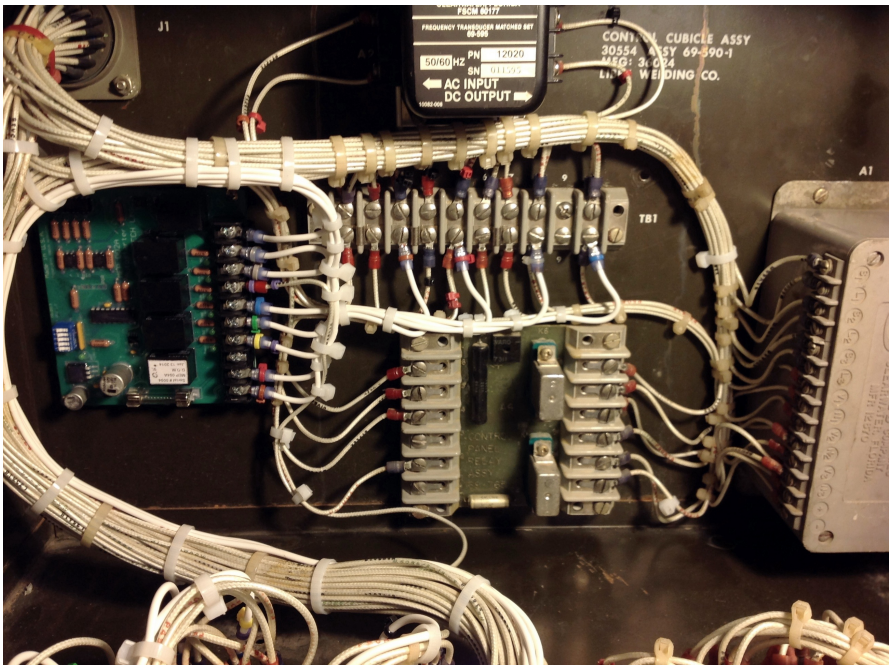
1. Dip Switch Functions, Settings and Timing
2. Different Connections between the Board and the Cubicle
3. No external Contactor needed [utilizing internal CB2, see pages 10 and 11 for details]
4. No Pre Heat - Pre Heat Output is used for Ether Injection instead
5. Ether Injection selectable On/Off with 5 sec or 15 sec of injection time
   Select Ether Injection only if your Ether system is working correctly!
6. No ambient temperature dependent timing
7. The Aux Fuel Output is now used to fill the Day Tank for 30 or 60 seconds and to pressurize the fuel system
8. The RUN/PRIME Output is now only a RUN OUTPUT
9. The Oil P / TEMP Input will now additionally monitor Over Voltage and Low Fuel, besides Oil Pressure and Over Temperature
10. When the Software goes from START to RUN Cycle and the Engine Starts up properly and the Oil Pressure is over 20 PSI then both **LED's OIL P and AUX FUEL** will illuminate and stay **On** until the Unit shuts off!

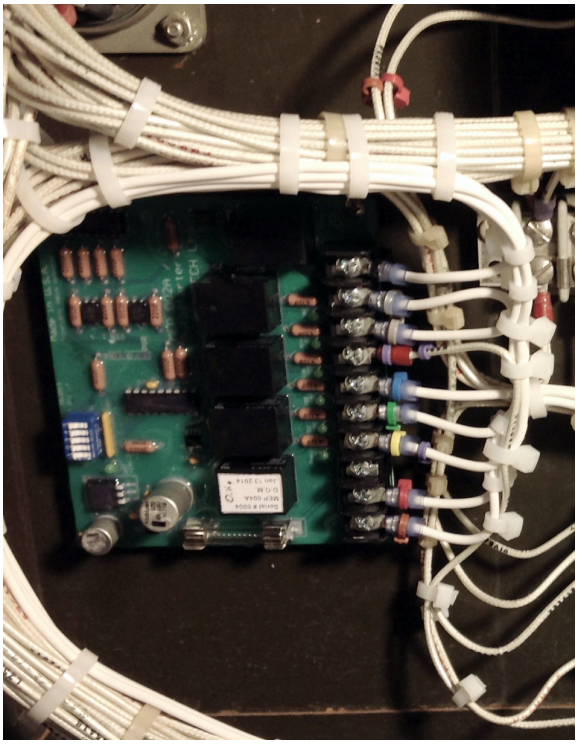
All other instructions from the MEP 002A/003A Manual apply for these Gen Sets as well

DIP Switch Settings 004A/005A/006A			
DIP SWITCH	**Function**	**DIP SWITCH ON POSITION**	**DIP SWITCH OFF POSITION**
1	**DAY TANK FILL (Prime)**	1 min (60 sec)	30 sec
2	**Warm Up**	5 min (300 sec)	1 min (60 sec)
3	**Cool Down**	DIP2 OFF 06 min (360 sec) DIP2 ON 10 min (600 sec)	DIP2 OFF 02 min (120 sec) DIP2 ON 06 min (360 sec)
4	**Ether Injection**	YES	NO
5	**Ether Injection Time**	15 sec	5 sec

Connections (I/O Descriptions) 004A/005A/006A	
I/O Terminal Block	**Function**
TB #1 OV Supply:	Ground (0V)
TB #2 +24 VDC Supply :	+ 24 VDC Supply
TB #3 Remote Start INPUT:	Remote Start [Active High]
TB #4 Oil Pressure / Heat INPUT:	Oil Pressure / Over Heat / Over Voltage / Low Fuel [Active High]
TB #5 Pre Heat RELAYS OUTPUT:	Ether Injection [Active High +24 VDC]
TB #6 RUN / PRIME RELAYS OUTPUT:	Run [Active High +24 VDC]
TB #7 AUX FUEL RELAYS OUTPUT:	Fill Day Tank / Prime [Active High +24 VDC]
TB #8 START RELAYS OUTPUT:	Start [Active High +24 VDC]
TB #9 Power On COM RELAYS OUTPUT:	COM contact of Relay
TB #10 Power On N/O RELAYS OUTPUT:	Normally Open contact of Relay

Suggested mounting Location for the Auto Starter PCB in Control Cubicle



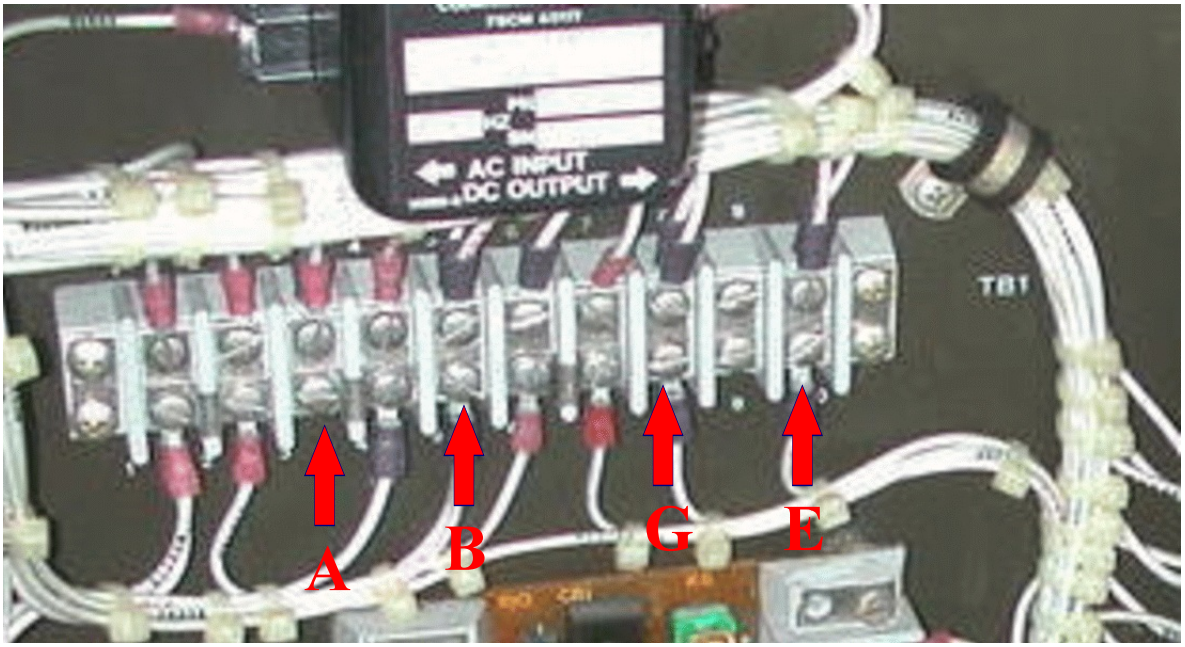


Please see the MEP 002/003 Auto Starter Manual for mounting instructions

Wiring Connections between Control Cubicle TB 1 and Switch S1, S2, S3 and Auto Starter TB
MEP 004A/005A/006A

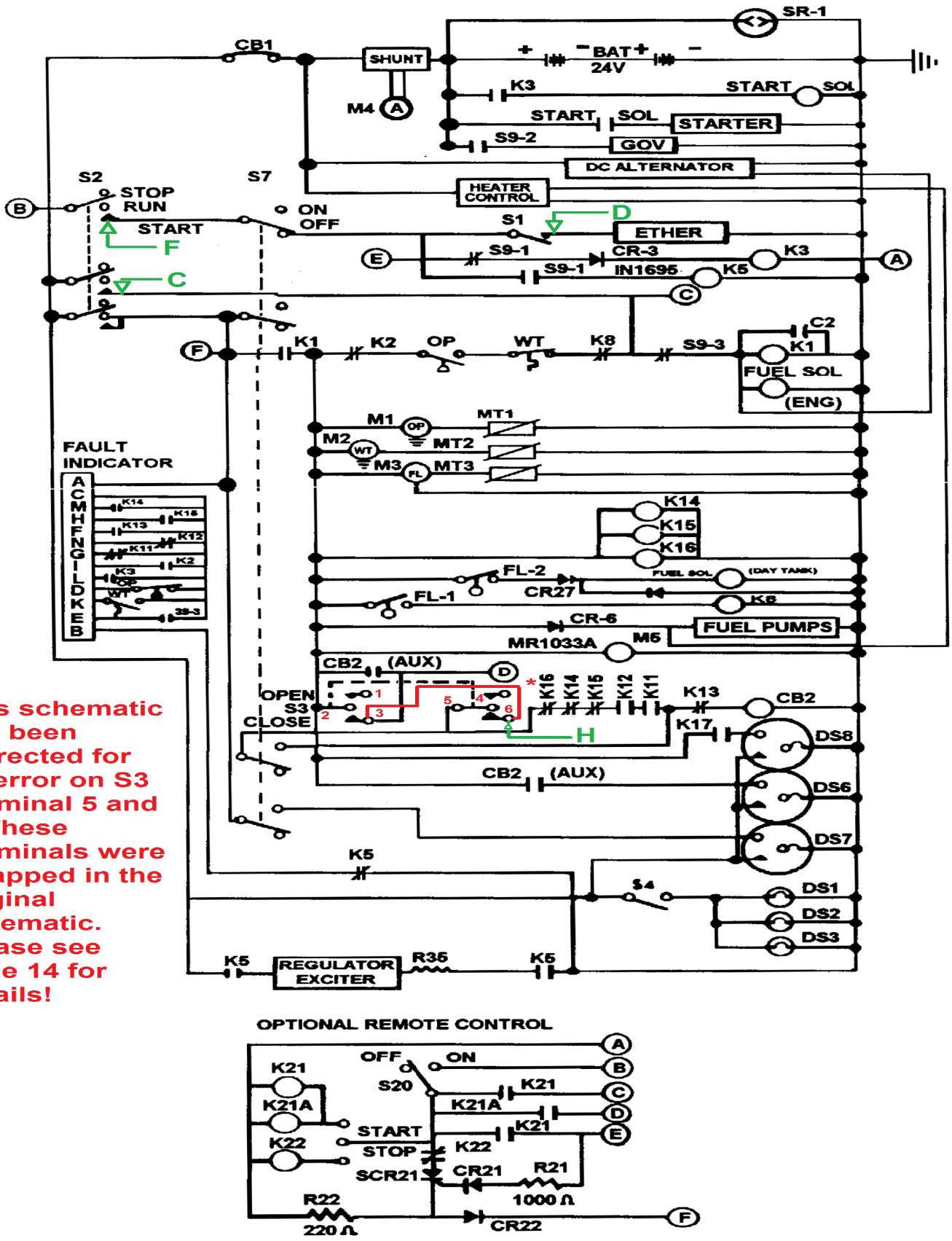
From	To
Control Cubicle Terminal Block [TB 1] and Switch S1, S2, S3	Autostarter TB Label, Number
A: TB 1 - 3	0V / GND TB# 1
B: TB 1 - 5	+24 VDC TB# 2
C: Switch S 2 Terminal 6	Oil P / Temp TB# 4
D: Switch S 1 Terminal 2	Ether Injection [Pre Heat] TB# 5
E: TB 1 - 10	Run / Prime TB# 6
Wire to Relay Box Instructions are on Page 6, 7, 8 and 9 in this document: Connecting the Diode Pack for L2 according to Diagram F07	AUX Fuel TB# 7
F: Switch S 2 Terminal 12	Start TB# 8
G: TB 1 - 8	Power On TB# 9
H: Switch S 3 Terminal 6 Please see Page 10, 11 and 12 for details of the operation of CB2 and installation on Relay K ext. and to determine if you need Relay K ext.	Power On TB# 10

Switch S1 = Engine Primer [Ether] Switch; Switch S2 = Start - Run - Stop Switch; Switch S3 = Contactor Switch
All 3 switches are located on the front panel of the control cubicle



ARMY TM 9-6115-464-12
AIR FORCE TO 35C2-3-445-1
NAW NAVFAC P-8-624-12

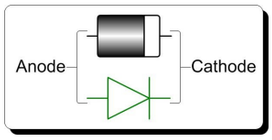
FO-6. DC Schematic
FP-17/(FP-18 blank)



*
This schematic has been corrected for an error on S3 Terminal 5 and 6. These Terminals were swapped in the original schematic. Please see page 14 for details!

Connecting the Diode Pack for L2 according to Diagram F07

(see Pages 7, 8 and 9 for Wiring Diagrams)



Supplied Diode Pack Markings:

Anode = Red Marking TB 101 - 5

Cathode = Black Marking TB 101 - 7

The Diode Pack connects to the following Terminal Block:

***TB 101 located in the Special Relay Box*!**

Locate TB 101 - 7. TB 101 - 7 is a empty connection.

The Anode (red cable tie marking) connects to TB 101 - 5 (3, 4 and 5 are bridged / jumpered)

The Cathode (black cable tie marking) connects to TB 101 - 7

Locate and Move the two wires labelled P50L and P50M from Terminal TB101 - 3,4,5 TO TB 101 - 7

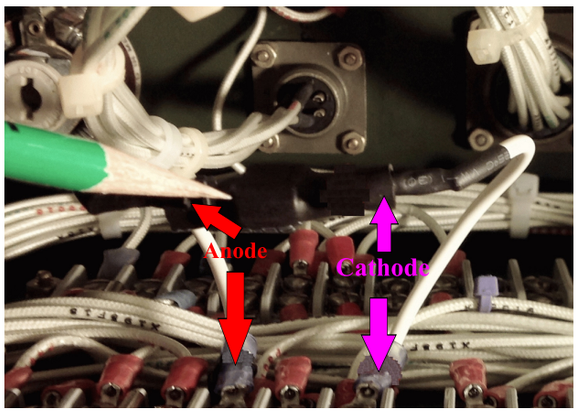
Locate the J2 receptacle in the *Special Relay Box* and locate either pins/wires M, N and T. Reroute one of the wires to TB 101 - 7 (see picture below and next page for wiring diagram)

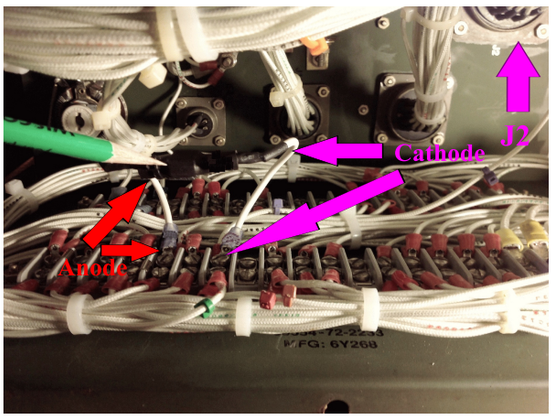
J2 - J1 connects the Special Relay Box with the Control Cubicle.

Connect the corresponding J1 Wire M or N or T in the Control Cubicle to TB# 7 on the Auto Start PCB terminal

The J1 wires M, N, T are used for a Frequency Adjust Rheostat R1 which is supplied with the Tactical Precise and Utility Version. However this Rheostat is not used in the Utility Version and the wires M, N, T can be disconnected and rerouted from the Rheostat to Terminal TB#7. In our example we used Wire M K32A / K32B / K32C.

Please contact us if you have a Tactical Precise MEP 103A/104A/105A Genset.

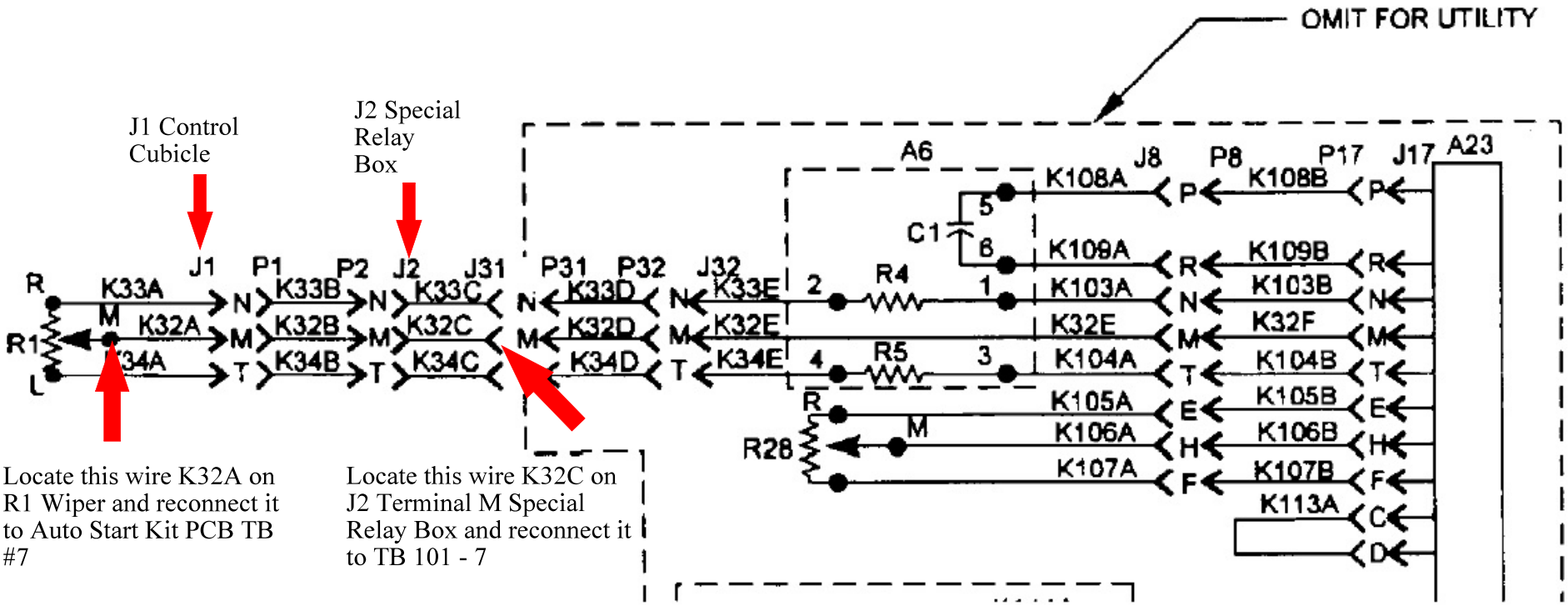




Frequency Adjust Rheostat R1 with one wire M K32A18 (Wiper) disconnected, marked with a purple wire tie and rerouted to Auto Start Kit PCB Terminal #7

Pictures are courtesy of Mr. Al Heidemann AC9FR, Wisconsin

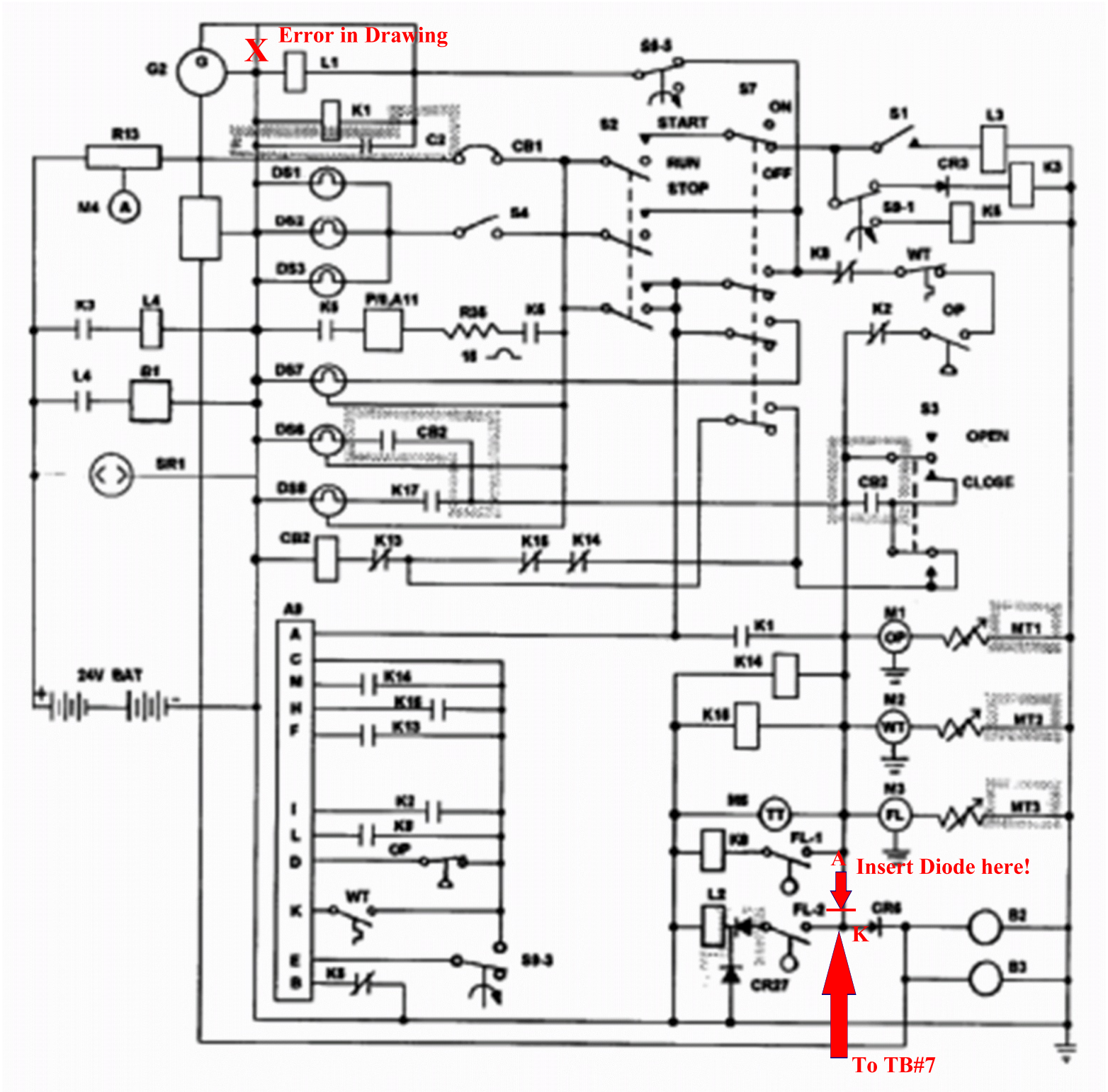
Wiring Diagram Detail for Rheostat R1 with Terminals N, M, T J1 / J2 from **FO-8. AC Troubleshooting Diagram FP-21/(FP-22 blank)**



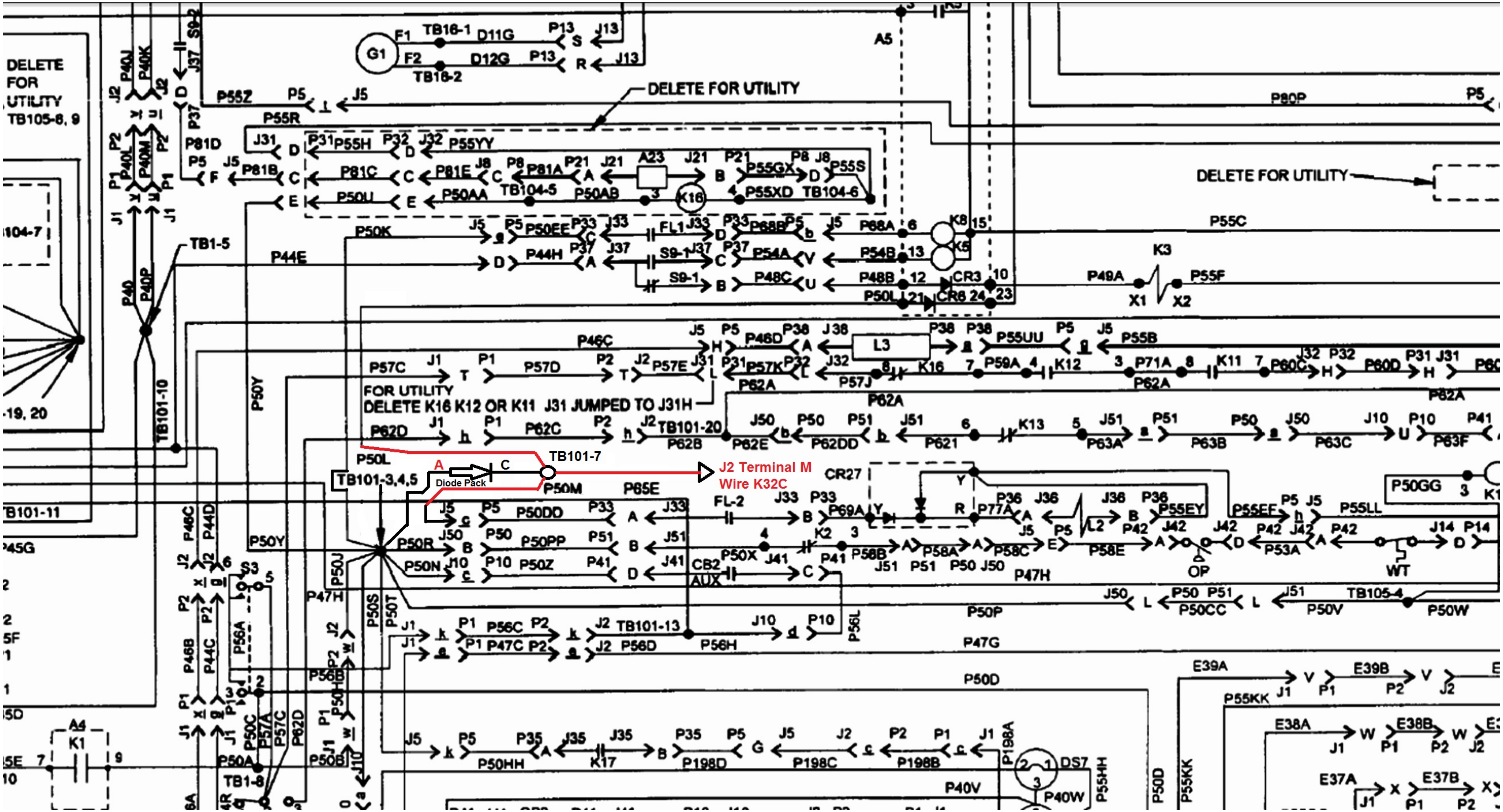
NOTE:

This wiring scheme is the same on all three MEP 004A / 005A / 006A UTILITY Versions!

If you have something different from this wiring diagram in your unit, please contact INOVA HIGHTECH Ltd. via e-mail: sales@inovahightech.com for further instructions before proceeding! Thank you.

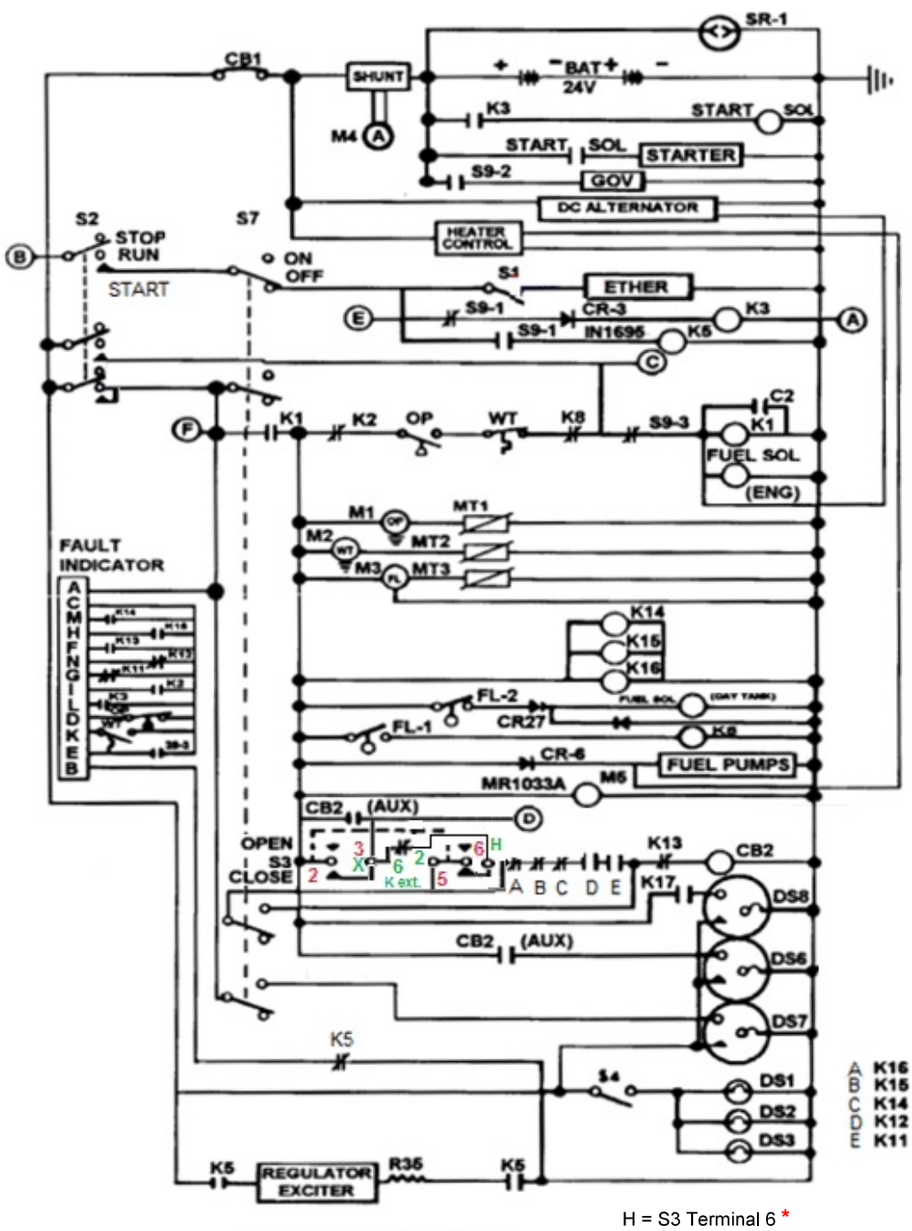


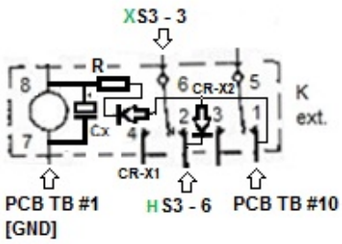
The supplied Diode Pack consists of 4 pcs 5 Amp General Purpose Diodes which are soldered together with a wire lead on each terminal for Anode and Cathode. This Diode Pack is oversized. The current draw of L2 and K1 is app. 3.5 Amps max.


DELETE FOR UTILITY TB105-8, 9
DELETE FOR UTILITY
DELETE FOR UTILITY
FOR UTILITY
DELETE K16 K12 OR K11 J31 JUMPED TO J31H
TB101-7
A
C
Diode Pack
J2 Terminal M
Wire K32C
TB101-3,4,5
P50L
P50M
CR27
TB101-20
TB101-13
TB101-10
TB1-5
TB1-8
TB105-4
TB104-5
TB104-6
G1
A23
K16
L3
L2
OP
WT
DS7
A5
A4
K1
S3
CB2 AUX
FL-2
P55C
P80P
P50D
P47G
P50P
P50W
P40V

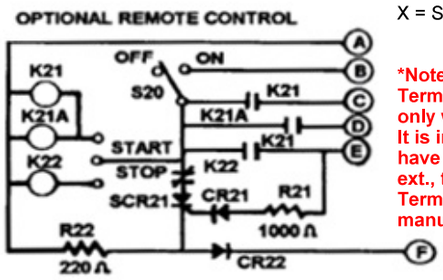
MEP 004A / 005A / 006A Realy K ext. KIT for CB2 Control Circuit to disable self holding Contact CB2 AUX

This additional Relay K ext. Kit is only needed if you don't have an Automatic Transfer Switch, which disconnects the load from your Generator Set when the main power comes back on and turns off the Remote Start Input to allow for a Cool Down without Load.





H = S3 Terminal 6 *
X = S3 Terminal 3



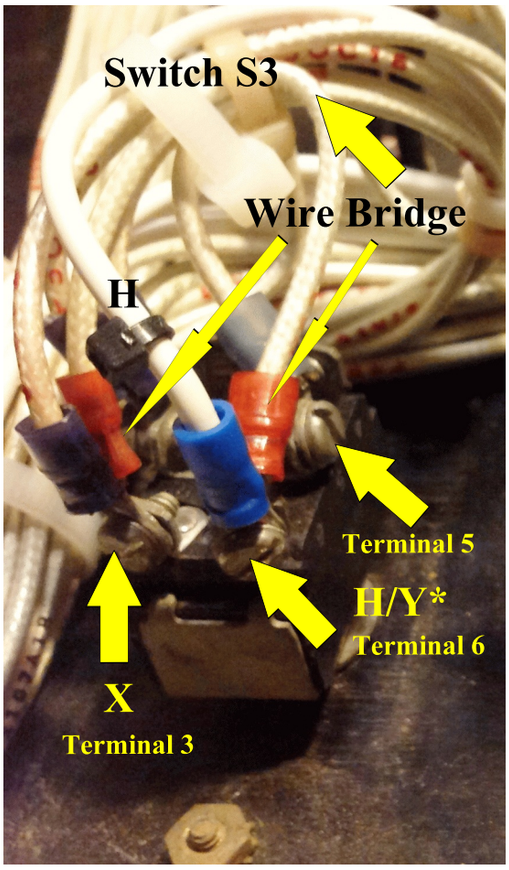
***Note:**
Terminal 5 and 6 are a Normally Closed Contact of Switch S3 and is open only when S3 is held (pushed down) in "OPEN" Position.
It is important that you make your connection for H/Y on Terminal 6! If you have previously installed the Auto Start Kit and are adding this Relay K ext., then you need to move your Connection H from Terminal 5 to Terminal 6! Otherwise S3 will not turn off your CB2 when operated manually as you are bypassing the N/C Contact of S3!

CR-X1, CR-X2: 5 Amp General Purpose Diode
Cx: Electrolytic Capacitor (Values see table below)
R: 10 Ohm
K ext.: General Purpose Relay 24 VDC

Cx Capacitor Value	DC 24 Volt (Normal Battery Voltage)		DC 27 Volt (Alternator Voltage)	
	normal release time	min. release time	normal release time	min. release time
4,700 uF / 50V (standard)	4.0 sec	0.45 sec	6.5 sec	0.63 sec
6,800 uF / 50V (upon request)	6.0 sec	0.43 sec	9.0 sec	0.90 sec
10,000 uF / 50V (upon request)	8.0 sec	0.63 sec	12 sec	1.34 sec
15,000 uF / 50V (upon request)	12 sec	0.95 sec	18 sec	2.0 sec

The Capacitor Cx will keep the Relay K ext. energized for the amount of time specified in the table above after TB #10 has been turned off.
This will allow sufficient time for the Relay CB2 to turn off (app 250 ms to 400 ms) and therefor to open CB2 AUX contact, preventing CB 2 from self holding.

Wiring Instructions:



New Installation Auto Start Kit and Relay K ext.

1. Locate Switch S3 on the front Panel

2. Disconnect the Wire Bridge from both switch Terminals #3 and #6.
   Leave all other connections on each Terminal in its place.
   Do not remove the wire bridge in the case you need it in the future!

3. Mount and wire Relay K ext. as shown in the wiring diagram on the previous page.

4. Run the two wires X and H/Y from your Relay K ext. in the main wiring harness to the two terminals #3 and #6 and connect them as shown in the picture on the left.

Adding Relay K ext. only

you should have a wire **"H"** connecting Point H/Y (S3-6*) with Terminal #10 on the PCB. In this case:

1. Disconnect the Wire Bridge from both switch Terminals #3 and #6.
   Leave all other connections on each Terminal in its place.
   Do not remove the wire bridge in the case you need it in the future!

2. add one wire between Point X (S3-3) and Terminal 6 on Relay K ext.

3. Add a wire between Relay K ext. Terminal 2 and Terminal #10 on the PCB.

4. Add a wire between Relay K ext. Terminal 7 and Terminal #1 on the PCB.

***Note:**
The wire "H" with the black cable tie indicator can either be connected to Terminal 5 or Terminal 6. This is a Normally Closed Contact of Switch S3 in the Position "CLOSE" and when the Switch S3 is in it's neutral Position [Center]. This contact opens when S3 is pushed down into the "OPEN" position.
It is important that you make your connection for H/Y on Terminal 6! If you have previously installed the Auto Start Kit and are adding this Relay K ext., then you need to move your original Connection H from Terminal 5 to Terminal 6! Otherwise S3 will not turn off your CB2 when operated manually as you are bypassing the N/C Contact of S3!

Theory of operation:

With the standard wiring setup as outlined in the Manual "Manual Supplement for Generator 004A/005A/006A Sets", Terminal TB #10 will apply power [+ 24V] to the Relay CB2 on your Generator Set after the warm up phase. Time of warm up is dependent upon the DIP Switch Settings selected.

However, CB2 has a self holding contact which is labelled "CB2 Aux" and applies +24V to Point X in the picture above once the Relay has been activated.

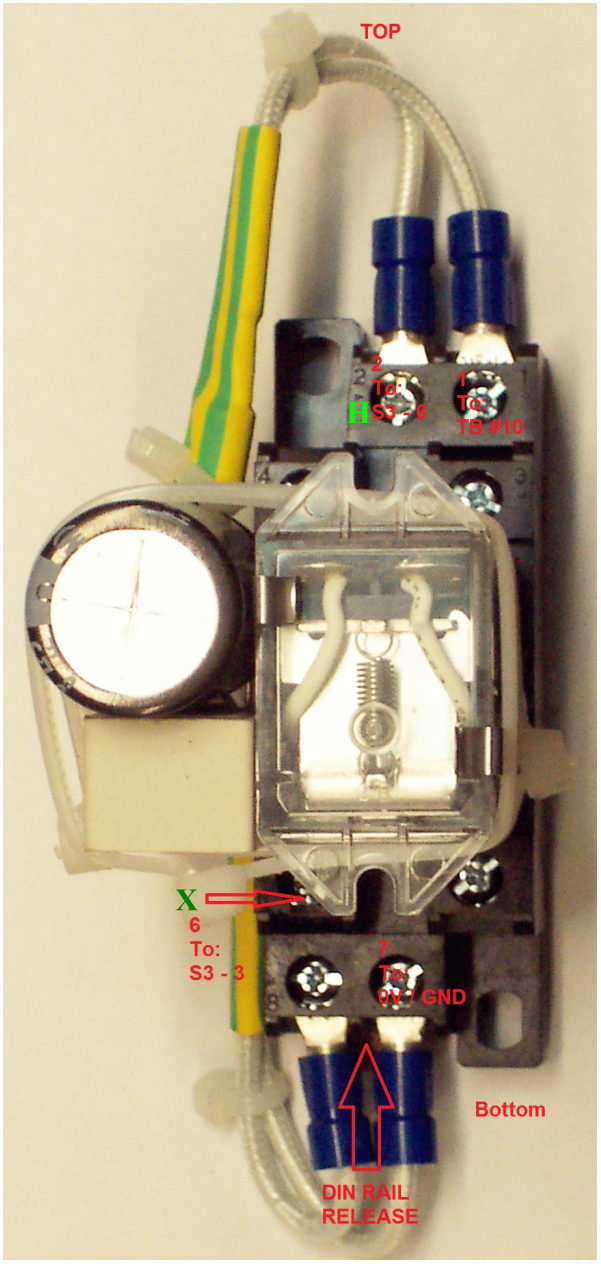
This contact "CB2 AUX" will keep the output activated even when Terminal #10 has been turned off by the Auto Starter Circuit. The Output Terminal #10 usually is turned off as soon as the Input Terminal #3 "REMOTE START" is turned off and the unit goes into cool down phase. Because of the self holding contact "CB2 AUX", the Relay CB2 will stay on until the circuit board turns Output Terminal #6 "RUN" off and the Generator stops as intended. This poses no problem with an Automatic Transfer Switch, as the Automatic Transfer Switch transfers the load to the Main Line and therefor disconnects the load from the Generator when the Main Line Power is sensed. The cool down is now proceeding as planned without a load even though CB2 is still ON.

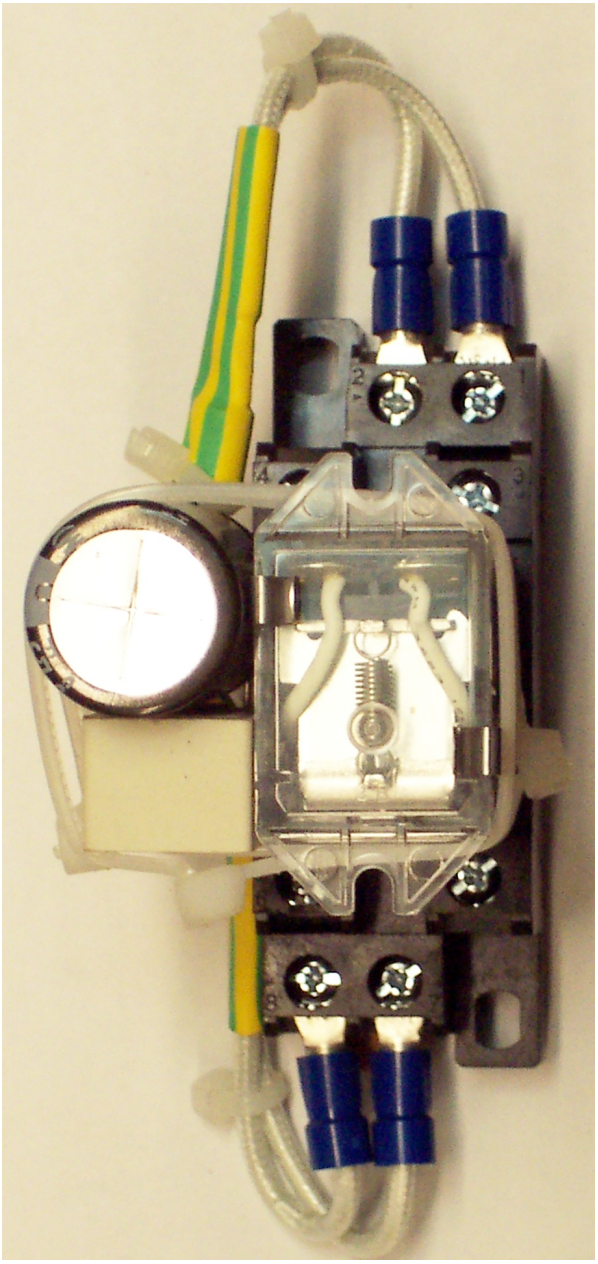
There may be situations, i.e. operating the unit with a Remote Start Switch etc., where you wish to have full control over CB2 and have CB2 turned off when the Remote Start Input Terminal #3 is turned off to allow for cool down.

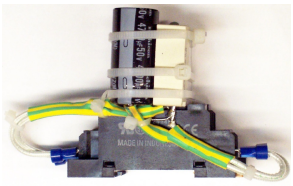
In this case you may wish to purchase our Time Delayed Relay **"Relay K ext. Kit"**, as shown here in the wiring diagram. The Diode CR-X and the Electrolytic Capacitor with the standard Value of 4,700uf / 50 are included and already pre-wired and ready for use.

The Time Delayed Relay K ext. simply adds a Normally Closed Contact in Series with the Normally Open Contact CB2 AUX and replace the "Wire Bridge" in the picture above. When Output Terminal #10 is ON then Relay K ext. turns on, disconnecting the contact CB AUX and preventing CB2 from self holding. Once Output Terminal #10 turns off, then CB2 will lose power and turn off, disconnecting any load. Relay K ext. with Electrolytic Capacitor Cx and Diode CR-X will stay on for the amount of time outlined on the previous page, depending upon the capacitance used, and preventing Contact CB2 AUX from being prematurely reconnected and therefor reenergizing
CB2. Once Relay K ext. is turned off all functions associated with Switch S3 are now in it's normal original condition for manual start and stop operation

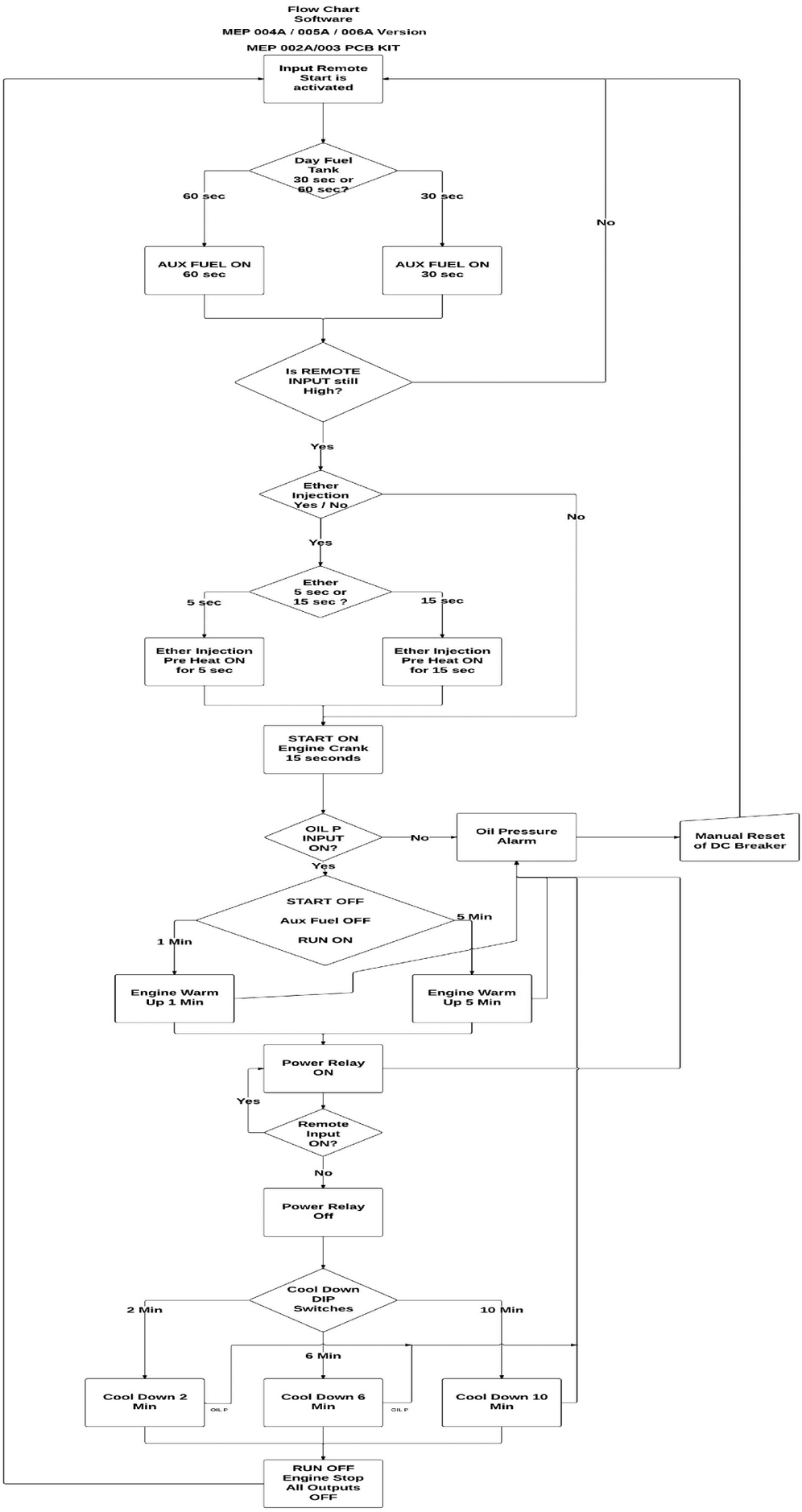
Details of Relay K ext.





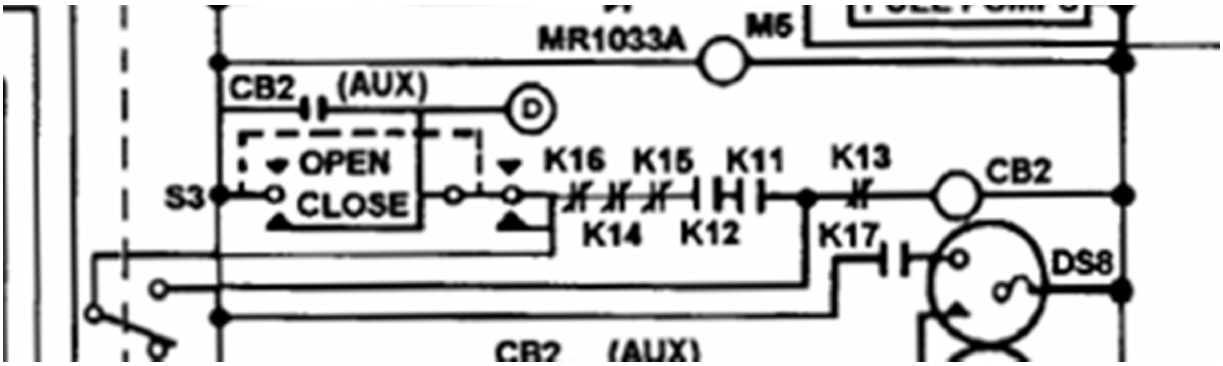


Please note: The Relay K ext. can be mounted on a panel with Stainless Steel Machine Screws and K Lock Nuts or DIN RAIL!
Please purchase this Kit if needed on our Website http://www.inovahightech.com


Flow Chart
Software
MEP 004A / 005A / 006A Version
MEP 002A/003 PCB KIT
Input Remote Start is activated
Day Fuel Tank 30 sec or 60 sec?
60 sec
30 sec
AUX FUEL ON 60 sec
AUX FUEL ON 30 sec
Is REMOTE INPUT still High?
No
Yes
Ether Injection Yes / No
No
Yes
Ether 5 sec or 15 sec ?
5 sec
15 sec
Ether Injection Pre Heat ON for 5 sec
Ether Injection Pre Heat ON for 15 sec
START ON Engine Crank 15 seconds
OIL P INPUT ON?
No
Oil Pressure Alarm
Manual Reset of DC Breaker
Yes
START OFF
Aux Fuel OFF
RUN ON
1 Min
5 Min
Engine Warm Up 1 Min
Engine Warm Up 5 Min
Power Relay ON
Yes
Remote Input ON?
No
Power Relay Off
Cool Down DIP Switches
2 Min
6 Min
10 Min
Cool Down 2 Min
Cool Down 6 Min
Cool Down 10 Min
OIL P
OIL P
RUN OFF Engine Stop All Outputs OFF

Corrected Schematic S3 in FO6 - DC Schematic MEP 005A / 006A / 007A

Original S3 Schematic:



Corrected S3 Schematic: