EMERGENCY TRANSFER CONTROLS
DESIGNS · CONTROLS · APPLICATIONS

251 Nuthatch Court Three Bridges, New Jersey 08887 Office: 908-782-1794 Fax: 908-782-0749

Revised: December 18, 2009

USER'S MANUAL

This User Manual shall define the standard operation and connections of the Programmable Microcomputer Control Panel (PMCP) and the Mini Controller. Both controllers are designed to monitor and control automatic transfer schemes like breaker pairs, contactors, and automatic transfer switches with solenoid or motor operators.

Please visit the website @ www.etccontrols.com for additional information and application notes.

Static pre-caution MUST BE OBSERVED when handling printed circuit boards with electronic components. Static wrist straps, properly grounded, are required to avoid causing severe damage to electronic components.

Note: The user MUST have some knowledge of transfer switches and AC power before proceeding to use the PMCP and Mini Controllers.

All Products are made in the USA

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1.1 PMCP Controller:

The Programmable Microcomputer Control Panel (**PMCP**) is an industrial controller designed to control and monitor automatic transfer schemes. The transfer scheme could be a solenoid or motorized operated ATS or a breaker pair transfer scheme.
The PMCP maintains power to the load when an acceptable normal or emergency source is available. The frequency and voltage on both sources are monitored for acceptability. The frequency can be programmed for 50 or 60 Hz operation and the voltage sensing can be programmed for single or three phase operation (120-600 volts).
The PMCP contains three relays: the Engine Start Relay (ESR), the Normal Select Relay (NS), and the Emergency Select Relay (ES). The normally closed contacts of the ESR provide the engine start signal. These contacts are also referred to as the Engine Start Signal (ESS).
The NS and ES relays control the transferring of the load to an acceptable normal or emergency source.

The PMCP contains four connectors and a 26 position terminal block as shown in Figure 1.

- The J1 Connector contains the 3 -phase voltage sensing of the Normal and Emergency sources and the transfer switch control contacts from the NS and ES transfer control relays.

- The J2 Connector contains the transfer switch position (they are Form C dry contacts from the transfer switch). J2 also contains the ESS contacts for the engine start (Form B contacts) and inputs from the CT output.

- The J3 Connector is a standard ribbon cable connector used to interface to the ETC Add-On Panel accessory. The J4 connector is a RS232 serial communication port used to interface to a laptop, the ETC Display Panel, and the ETC Handheld Programmer. These signals are standard RS232 signals.

- A 26 position terminal block is provided for accessing the features within the PMCP Controller. These features are inputs and outputs. The inputs are activated by connecting the input to 24 Vdc ground and the outputs drive 24 Vdc leds and 24 Vdc relays.

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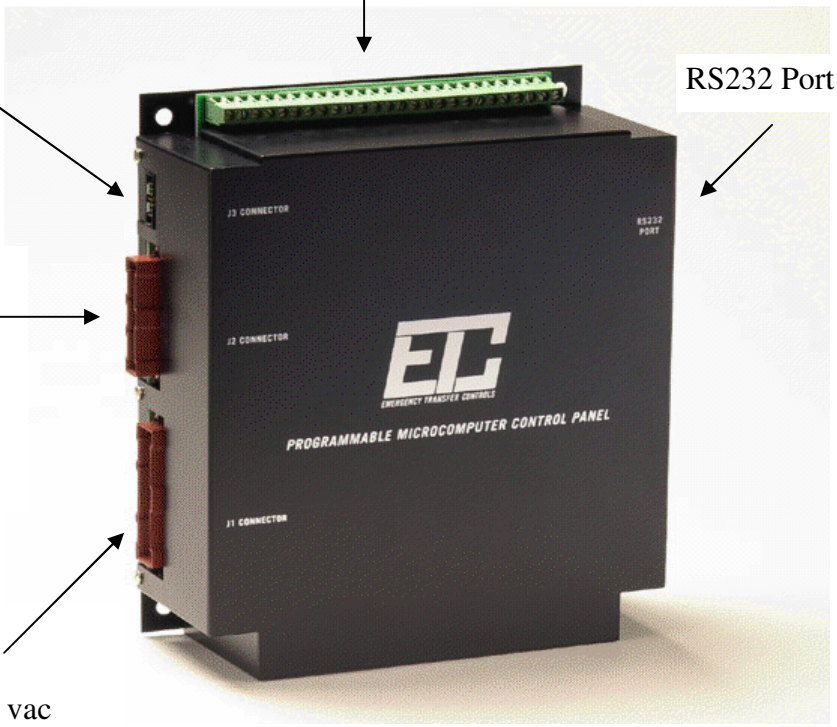
Terminal Block (26 positions): used for accessing input and output accessories within the PMCP. Only 24 Vdc signals are present.

J3 - Connector: ribbon cable connector for interfacing to the Add-On Panel accessory. Only 24 Vdc signals are present.

RS232 Port



J2 -Connector: connector contains the

- Engine Start Signal (ESS) contact
- Transfer switch position contacts
- Three phase current input (5 amp max.)

J1-Connector – connector contains the

- Utility 3-Phase voltage sensing (600 vac max..)
- Generator 3-Phase voltage sensing (600 vac max.)
- The NS & ES transfer control contacts

Figure 1 The PMCP Controller

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1.2 Sequence of Operation

The PMCP monitors the normal source at the transfer switch for acceptability. If the normal source fails for more than a predetermined time (Momentary Outage Delay), the PMCP shall signal for the engine generator to start by closing the ESS contacts. The PMCP shall sense the emergency source for acceptability. Once the emergency source has reached acceptable voltage and frequency and is maintained for a predetermined time (Transfer to Emergency Delay), the PMCP shall signal for the transfer switch to connect the load to the emergency source of the transfer switch.
The PMCP shall keep the load on the emergency source until the normal source returns. Once the normal source has restored back to acceptability and is maintained for a predetermined time (Transfer to Normal Delay), the PMCP shall signal for the transfer switch to connect the load back to the normal source of the transfer switch.
After the load has been reconnected back to the normal source, the engine generator is allowed to run for a predetermined time (Engine Cool Down Delay). Once the delay has expired, the PMCP energizes the ESR relay to shut down the engine.

1.3 Specifications

Operating temperature:	-20 to 60 C
Operating voltage range:	120 – 600 VAC (3 phase on both sources)
Operating Frequency:	50 or 60 Hz

Meets EIA standards RS232 and RS485

Controller dimensions:	9.0 x 10.5 x 3.75 inches
Controller Weight:	11 pounds
Power consumption:	50 VA
External 24 Vdc current draw:	100 MA

NS & ES contact ratings:	600 VAC @ 3 amps 3/4 HP
	120 VAC @ 13 amps 1/3 HP
	277 VAC @ 13 amps 1.2 HP
ESR contact ratings (ESS):	24 VDC/240 VAC @ 5 amps

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1.4 Standard Features:

The PMCP provides the following features as standard:

1.4.1 True RMS voltage sensing on Normal source

1.4.2 True RMS voltage sensing on Emergency source

1.4.3 Single or three phase voltage sensing on Normal and Emergency sources

1.4.4 Frequency sensing on both Normal and Emergency sources

1.4.5 Programmable pickup, dropout and over voltage settings on Normal and Emergency sources

1.4.6 Programmable pickup, dropout and over frequency settings on Normal and Emergency sources

1.4.7 Programmable time delays: transfer delays, engine start and engine cool down delays

1.4.8 Load disconnect: Programmable delay before and after transfer

1.4.9 In-phase sensor

1.4.10 Programmable engine exerciser

1.4.11 Transfer logging

1.4.12 Event logging

14.11 Phase Rotation detection

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1.4.13 **Sensing and control logic** for Closed, Soft, Delayed and Load dump transfer schemes

OPEN: Standard transfer (break before make)
CTTS: Closed Transition transfer (make before make)
STTS: Soft Load Transition transfer (make before make)
DTTS: Delayed Transition transfer (break before make)
Load Dump: Load Shed/Add
Main Tie Main transfer scheme

1.4.13 Sensing and control logic for a **Main Tie Main** transfer in Open or Closed mode

1.4.14 **No dip switches to program**

1.4.15 PCB connector on PMCP for Serial Communication option plug-in board

1.4.16 PCB connector on PMCP for the **Power option plug-in board**

1.4.17 Metal enclosure

1.4.18 26 position terminal block for accessing input/output accessories

1.4.19 An RS232 port for accessing and programming PMCP settings

1.4.20 Operating voltage 120 – 600 VAC

1.4.21 Engine start contacts (ESS): 1-form C in J2 Connector

1.4.22 Phase rotation sensing on Normal and Emergency sources

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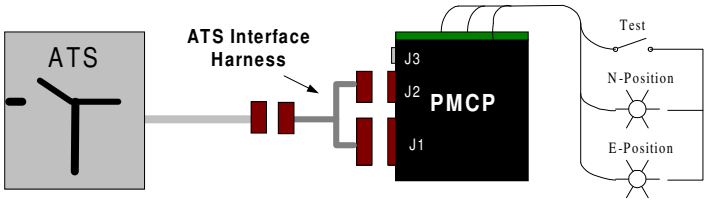
1.5 Applications

Transfer Schemes:

Open Transition
Closed Transition
SoftLoad Transition
Delayed Transition
Load Dump
Load Disconnect
Custom Schemes

ATS Manufacturers:

ASCO
Zenith
Kohler
Generac
Russel
Onan
Hubbel



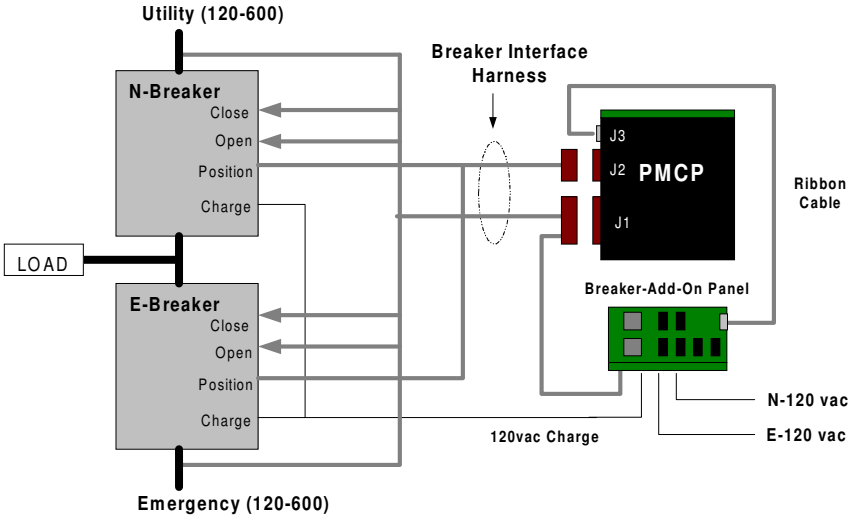
PMCP operating an ATS

Manufacturers

ABB
Siemens
Cutler Hammer
Square-D
GE
Westinghouse

Transfer Schemes:

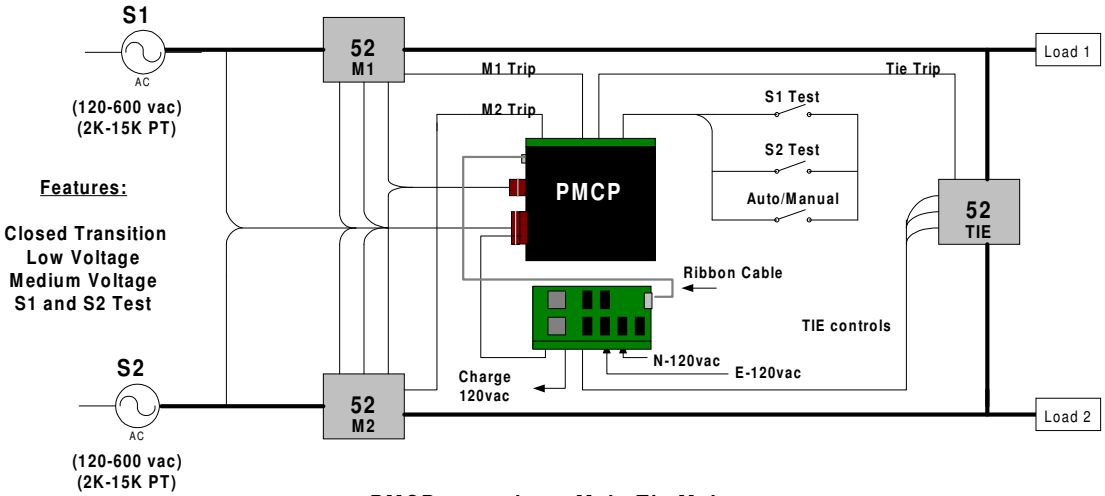
Open Transition
Closed Transition
SoftLoad Transition
Delayed Transition
Load Dump
Load Disconnect



PMCP operating a Breaker Pair Transfer Scheme

Features:

Closed Transition
Low Voltage
Medium Voltage
S1 and S2 Test



PMCP operating a Main-Tie-Main

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1.6 Monitoring Transfer Switch position:

The PMCP Controller is position sensitive. A Form C configuration must be provided to the J2 Connector of the PMCP as shown in Figure 2.

If the position is incorrect, the PMCP shall activate a transfer switch failure alarm and then go into a shutdown or sleep mode. The controller will remain in the sleep mode until the alarm reset feature is activated. The alarm reset feature can be performed by applying a momentary short across terminals 21 and 22 on the Terminal Block. The user may also reset the alarm from the Laptop, Display, Scada, and Handheld.

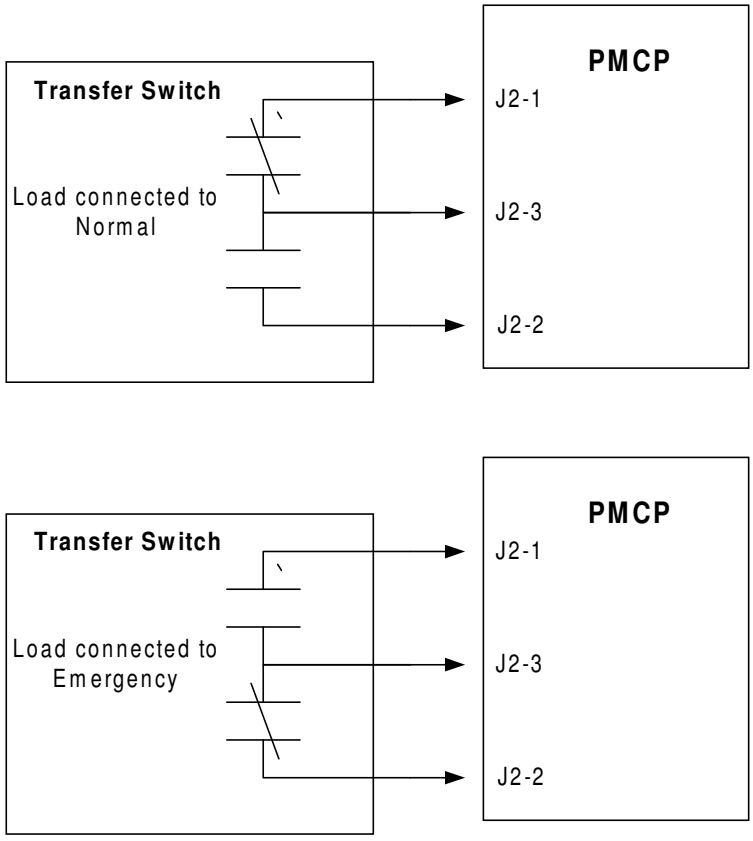

Figure 2

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1.7 Engine Start Signal (ESS):

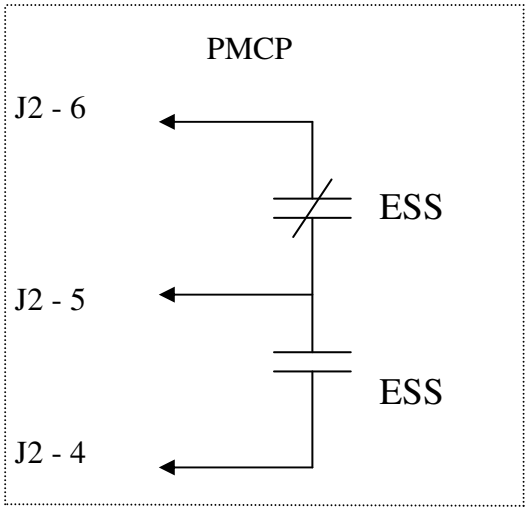

Figure 3A Call for engine start using J2-5 & J2-6
(ESS contacts are closed)

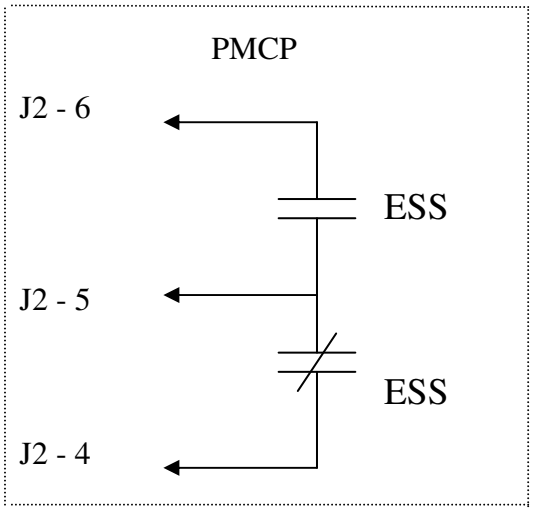

Figure 3B Shut down engine using J2-5 & J2-6
(ESS contacts are opened)

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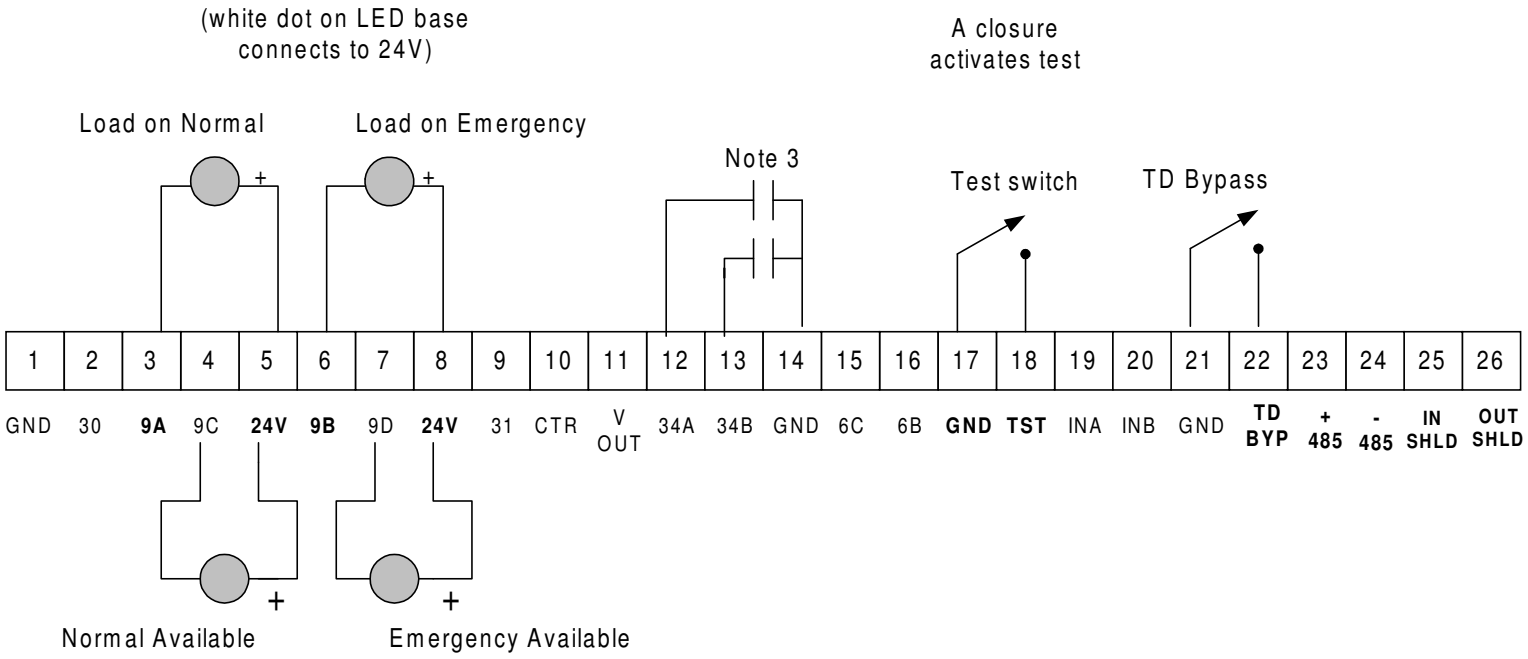
1.8 Terminal Block Features:

The PMCP provides a 26 position terminal block for accessing customer accessories. Shown below in Figure 4 is a basic illustration of connecting the LED lamps and switches. Figure 5 and Table 1 define the functions on the terminal block.

PMCP TERMINAL BLOCK CONNECTIOS



1.0 The last ATS on the line requires a 120 ohm resistor across terminals 23 & 24
2.0 The LEDS for position of ATS are polarized: the white dot on the base connects to 24V
3.0 A closure across 34A will inhibit transfer to Normal
4.0 A closure across 34B will inhibit transfer to Emergency

Figure 4

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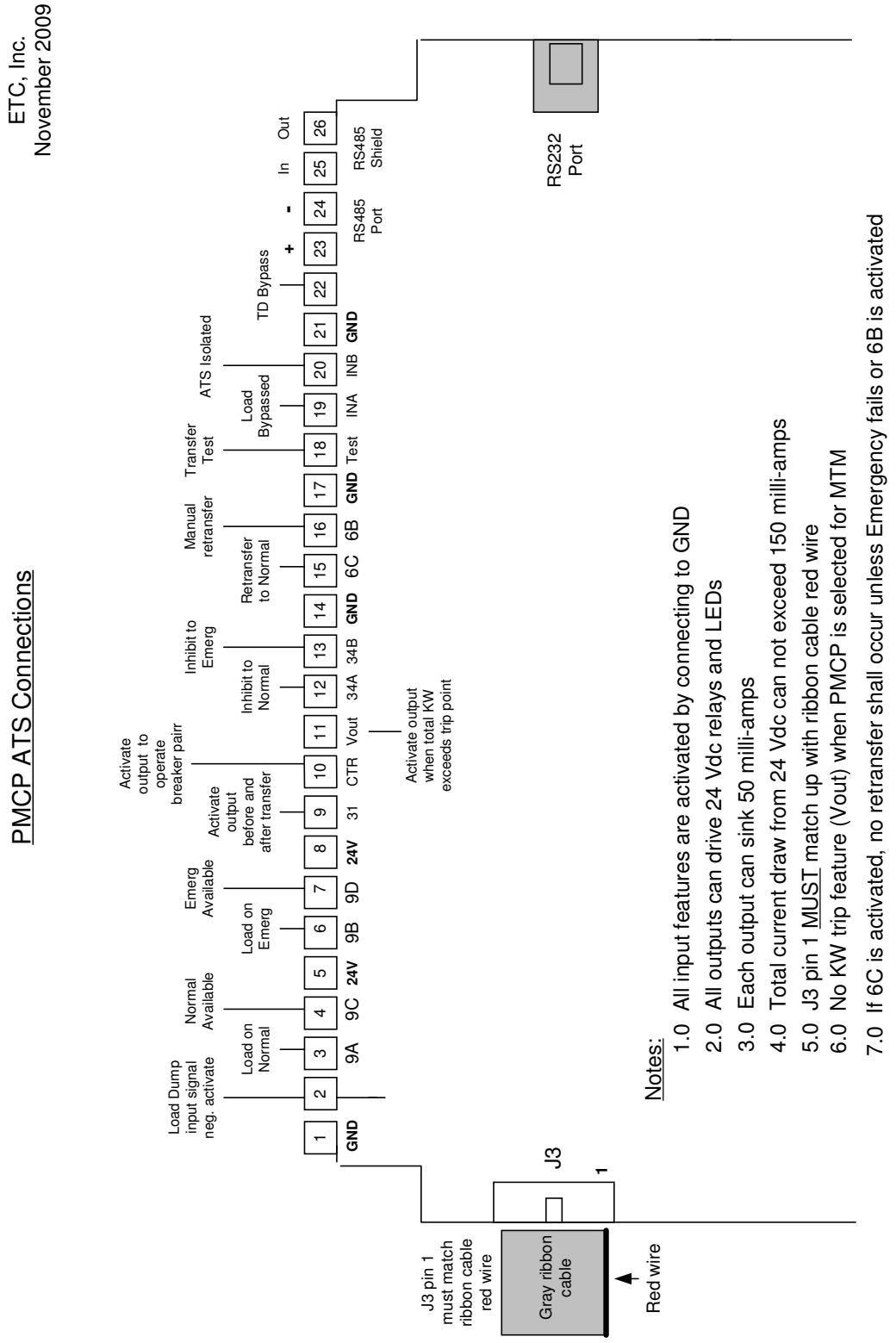

Figure 5

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PMCP Terminal Block (TB)

TB #	*Function*	*Description*
1	**Ground**	**Ground**
2	Load Dump	Load Dump
3	9A	Load on Normal
4	9C	Normal Available
5	24V	**24 Volts**
6	9B	Load on Emergency
7	9D	Emergency Available
8	24V	**24 Volts**
9	31	Load Disconnect
10	CTR	CTR output
11	VOUT	VOUT: KW trip feature & MTM
12	34A	Inhibit to Normal
13	34B	Inhibit to Emergency
14	GND	**Ground**
15	6C FLT2	Retransfer back to Normal
16	6B	Manual Retransfer/ATS LO Reset
17	GND	**Ground**
18	TEST	Transfer Test
19	INA SL	Gen Input A/Soft Load/Load Bypass
20	INB FLT1	Gen Input B/Fault 1/ATS Isolated
21	GND	**Ground**
22	TD BYPASS	Time Delay Bypass/ATS LO Reset
23	+RS485	+RS485
24	-RS485	-RS485
25	SHIELD IN	Shield In
26	SHIELD OUT	Shield Out

Table 1

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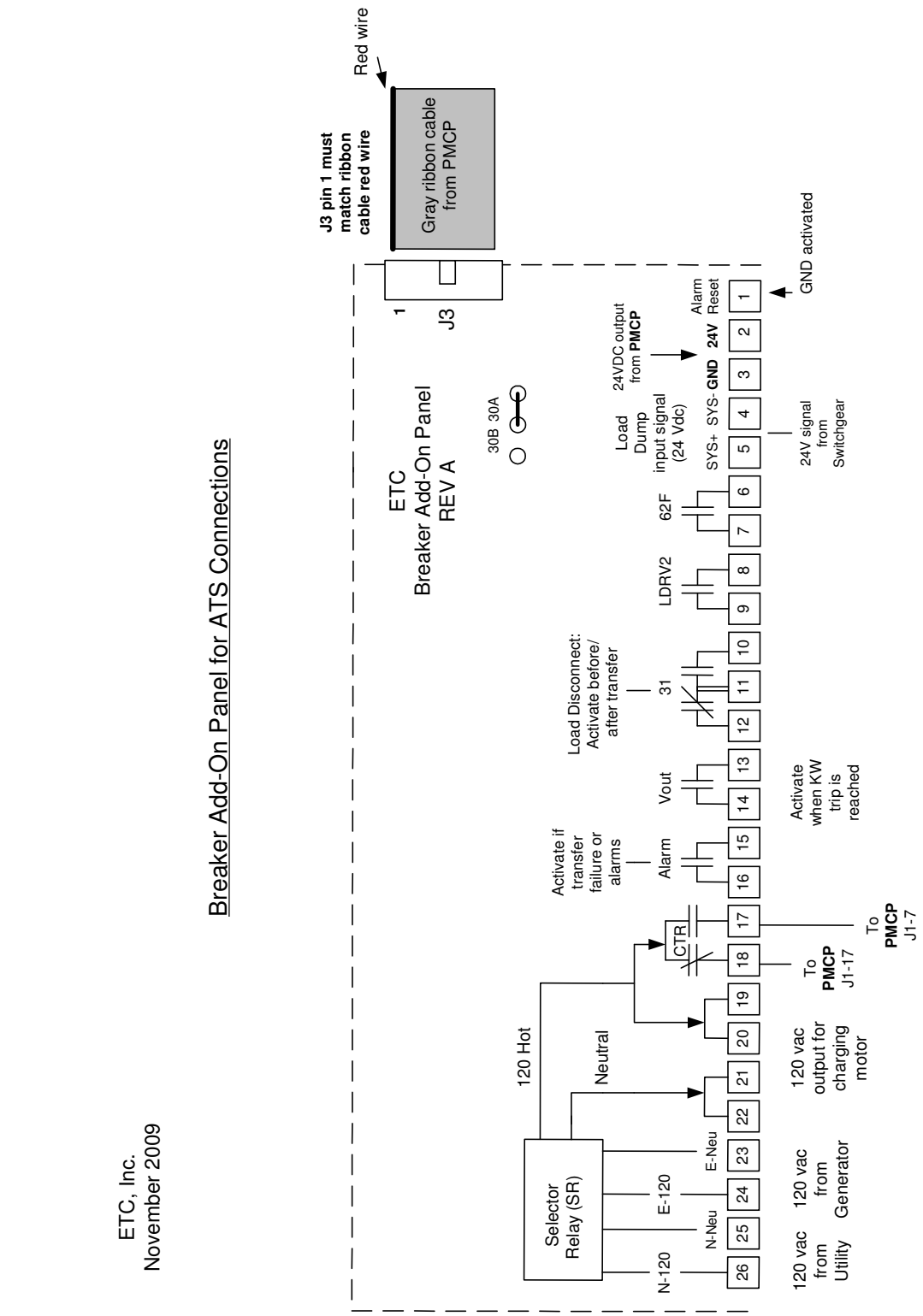

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1.9 Programming the PMCP: voltage selector

The PMCP Controller can operate from 120-600 vac by selecting the proper voltage selector range. The range is selected by configuring the jumpers in one of two configurations as shown in Figure 6A and 6B.

For 120-240 vac operation, arrange the jumpers as shown in Figure 6A

For 208-600 vac operation, arrange the jumpers as shown in Figure 6B

Note: The voltage range select jumpers are located between the sensing Transformers (T3 and T5) at the bottom of the PCB.

Install 4 jumpers for selecting 120-240 VAC operation

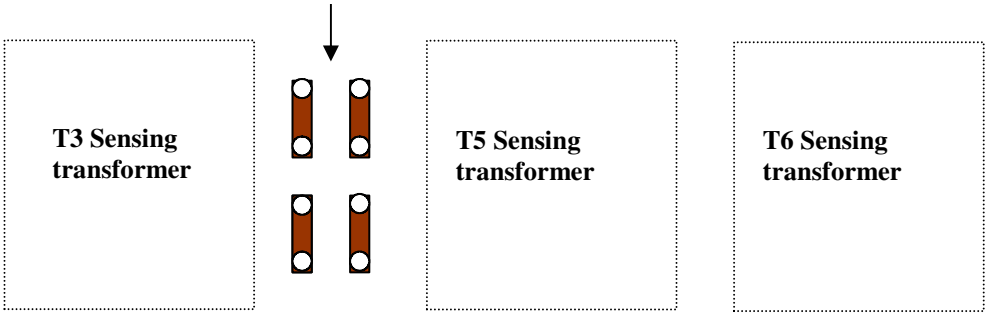
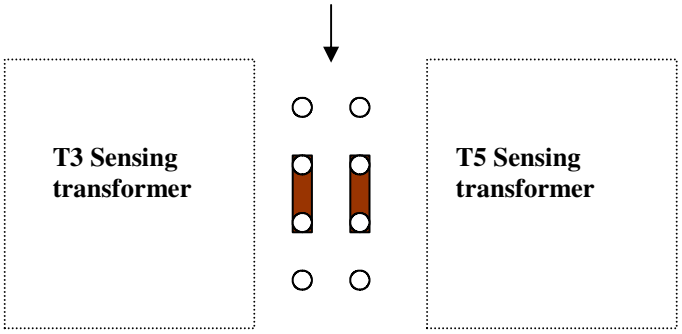
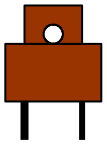


Figure 6A Low voltage range selection

Install 2 jumpers for selecting 208-600 VAC operation





Picture of jumper (color may vary)

Figure 6B High voltage range selected

Note: The PMCP is shipped for 208-600 vac operation (Figure 6B)

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1.10 Programming the PMCP: operating parameters and settings:

The PMCP's operating parameters, settings, and features are programmed via RS232 or RS485 Serial Ports. The user may use one of the following ETC products to program the PMCP:

1.10.1 Display Panel (RS232)
1.10.2 MTM Display Panel (RS232)
1.10.3 Handheld Programmer (RS232)
1.10.4 Network Supervisor (RS485)
1.10.5 A Laptop (loaded with ETC software: RS232)

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1.11 Factory Default Settings:

Normal source operating parameters:

480 VAC 3 phase 60 Hz

% of nominal	Pickup	Dropout	Over
Voltage:	90	85	110
Frequency:	90	85	110

Emergency source operating parameters:

480 VAC 3 phase 60 Hz

% of nominal	Pickup	Dropout	Over
Voltage:	90	85	110
Frequency:	90	85	110

Delay Settings:

Engine Cool down (ECTD):	1 minute	Engine Start (ESTD:	2 seconds
Transfer to Normal (XNTD):	30 minutes	Transfer to Emergency (XETD):	0.1 second
Failed to Synchronize (SYNC):	1 minute	Load Disconnect (LDTD):	3 seconds
Emergency Dropout (EDTD):	2 seconds	Delayed Transfer (DXTD):	3 seconds

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Features:

Inphase-sensor:	off
Inphase delay:	off
CT input current:	5000 Amps
Commit	off
ATS scheme:	standard open
Transfer type:	solenoid ATS
Voltage type:	low voltage (120-600vac)
CP Address:	0

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1.12 Types of Transfer schemes:

The PMCP shall provide all the necessary sensing and control logic to implement the various transfer schemes. Listed below are the types of transfer schemes:

1.12.1 Standard Open: with or without inphase sensing
1.12.2 Closed Transition Transfer (CTTS): with synchronization sensing between both sources: 5% voltage differential, 0.25 frequency difference, and 5 electrical degrees detection. The PMCP also provides the extended overlap alarm and recovery features
1.12.3 Soft Load Transition transfer (STTS): with related alarms and input control features
1.12.4 Delayed Transition Transfer (DTTS): with programmable off time
1.12.5 Load Disconnect: this feature shall activate a relay before transfer and de-activate after transfer. The time delay before and after transfer is programmable.
1.12.6 Load Dump: this feature will transfer the load back to normal regardless of the condition of the Normal source (Load Shed). This feature can also be used to keep the ATS from transferring to emergency until the Load Dump input is de-activated (Load Add).
1.12.7 By-Pass Isolation ATS: The PMCP provides inhibit inputs to prevent the ATS from transferring when racking it out.

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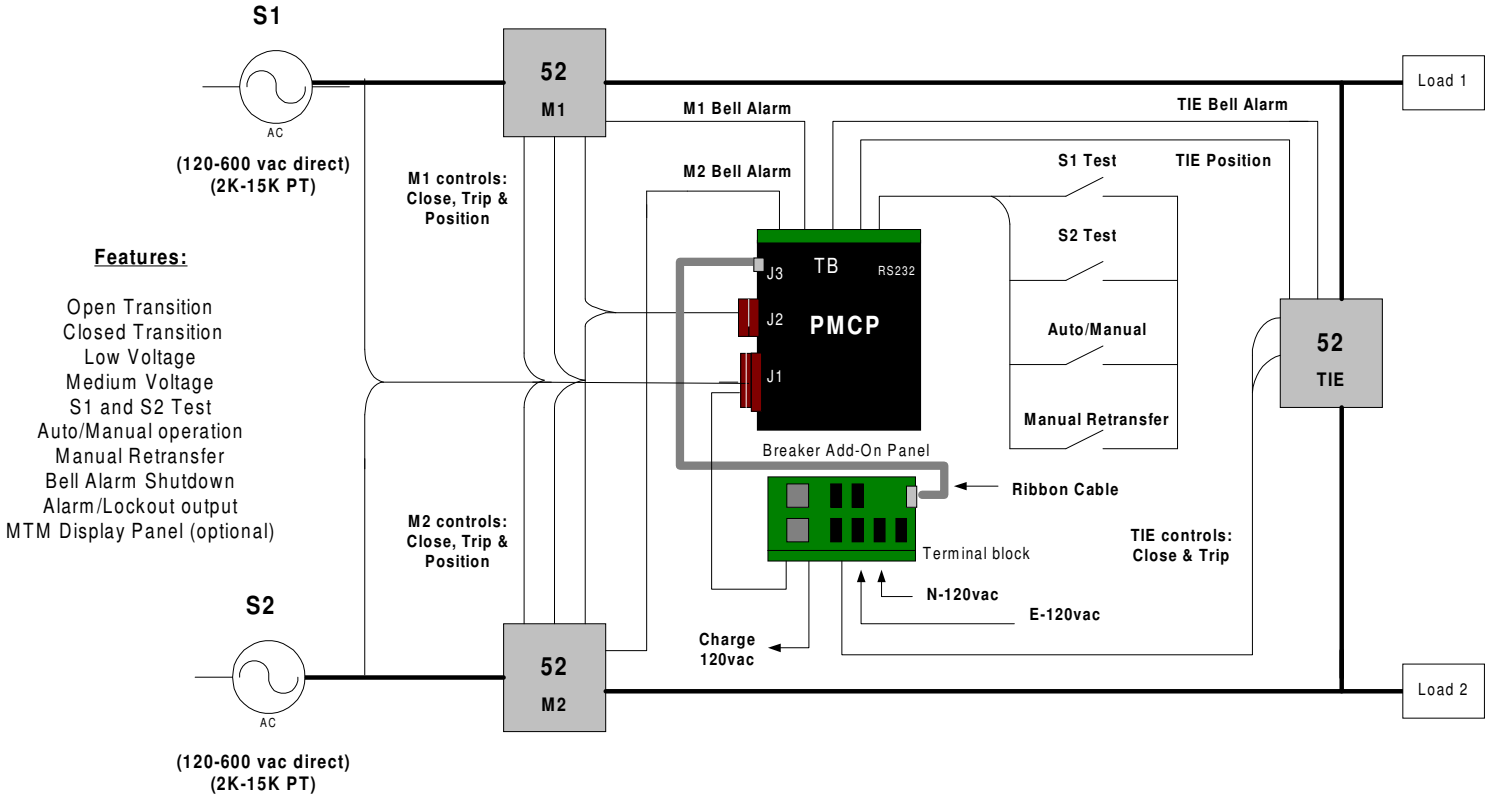
1.13 Main Tie Main transfer scheme (MTM):

The PMCP Controller is designed to operate a Main Tie Main transfer scheme. There is no software programming or any port configuration required. The PMCP Controller and the Breaker Add-On Panel are the only two components required to operate a MTM scheme: refer to Diagram 1.

Typical application:



PMCP and Breaker Add-On Panel operating a Main-Tie-Main

Diagram 1

Main Tie Main standard features:

- The PMCP Controller accepts 120-600 vac direct: single or three phase
- Select for Low or Medium voltage operation: 120-600 vac or 2K-15K volts
- Operate breaker coils of 120, 240 vac and 125 Vdc directly: no slave relays required
- Select for OPEN or CLOSED Transition Transfer
- Sync check (25)
- No external AC or DC power supply required to operate the PMCP Controller
- No software programming or port configuration required
- Program operating parameters or change settings within 60 seconds
- Test 1 Feature: simulate Source 1 failure for system testing
- Test 2 Feature: simulate Source 2 failure for system testing
- Select pickup, dropout, and over voltage settings on S1 and S2
- Select pickup, dropout, and over frequency settings on S1 and S2
- Phase Rotation detection on S1 & S2 sources
- Programmable momentary outage, transfer, and retransfer delays
- Time Delay Bypass: cancel transfer or retransfer delays
- Select operating time between breakers
- Automatic or Manual Mode Operation selection (43M)
- Feature 86: upon a current fault, this feature is activated and latched. The dry contacts of Feature 86 are used to prevent all breakers from being closed electrically.
- Feature 83: automatically selects control power from S2 transformer if S1 fails
- Manual Retransfer Feature: inhibit retransferring back when feature is activated
- Breaker failure detection with system lockout: if a breaker fails to operate, the Alarm Feature is activated and the PMCP Controller shall shutdown
- Tie Closure Inhibit (software interlock): controller shall not signal to close Tie if both Mains are closed
- Tie Recovery Feature: if the Tie closes while both Mains are closed, the Tie shall re-open immediately
- Overlap Recovery Feature: Re-open the last Main that closed if the Tie fails to open during a Closed Transition retransfer
- Bell Alarm Detection: if a current fault should occur from a breaker, the Alarm Feature and Feature 86 are activated and the PMCP Controller shall shutdown
- Alarm Output: a dry contact closure when a failure or fault has occurred
- Alarm Reset Feature: reset Alarm Feature/Output and Feature 86
- Customized transfer schemes are available
- MTM Display Panel (optional): program operating parameters/setting, metering for volt/frequency/current/PF/KW and real time status info. Large LED indicators for S1 & S2 availability, position of breakers, operating mode, and alarms.

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Safety Features:

ETC controls shall provide the following safety features for a MTM operation:

1.0 Whenever the PMCP Controller signals a breaker to operate, close or open, and that breaker fails to move within a specific time, the PMCP shall activate the Alarm Feature and shutdown any further automatic operation immediately. The state of the breakers is unchanged. The user must activate the Alarm Reset button on the front of the cabinet door to clear the Alarm Feature and restore automatic operation.

Note: Once the PMCP Controller has activated the Alarm Feature, it immediately goes into an idle state (sleep mode) and remains in this state until the Alarm Reset button is activated.

2.0 If a current fault should occur from any breaker, the PMCP Controller shall activate the Alarm Feature which also activates the Feature 86. The PMCP shall shutdown any further automatic operation immediately and the Feature 86 shall inhibit all breakers from being closed electrically from the circuit breaker control switches. The user must activate the Alarm Reset button on the front of the cabinet door to clear the Alarm Feature, reset the Feature 86, and restore automatic operation.

Note: Feature 86 places a normally closed contact in the closing circuit of each breaker. Once a current fault has occurred and the Feature 86 is activated, the normally closed contact opens which prevents the breakers from being closed electrically from the circuit breaker control switches. Feature 86, once activated, is latched and remains in this state until the Alarm Reset button is activated.

3.0 As part of the ETC safety features, ONLY two breakers are allowed be closed at any given time. The control logic and external hardware shall prevent all three breakers from being closed at the same time. This safety feature is only available when performing an OPEN Transition transfer.

4.0 The ETC controls provide a Feature 43M: Automatic or Manual mode operation. When the Automatic Mode is selected, the PMCP Controller operates the MTM scheme normally. While in the Automatic Mode, the breakers can not be operated from the circuit breaker control switches located on the front of the cabinet door. When the Manual Mode is selected, the PMCP Controller shall shutdown automatic operation. The breakers can now be operated from the circuit breaker control switches on the front door.

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5.0 Tie Closure Inhibit: Before signaling the Tie to close, the PMCP Controller monitors the position of the Mains. If both mains are closed, the PMCP will not signal to close the Tie.

6.0 Tie Recovery: When both Mains are closed, the Tie is inhibited from closing by the controller. If the Tie should close from some other means, the controller shall re-open the Tie immediately.

7.0 Overlap Recovery: During a non-interruption of power (Closed Transition) on retransfer, all three breakers are closed for about 150 msec until the PMCP Controller signals for the Tie to open. If the Tie fails to open, the controller shall re-open the last Main that closed. The controller shall activate the Alarm Feature and end automatic operation.

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1.14 Sequence of Operation of a Main-Tie-Main

The following is a sequence of operation of how the PMCP Controller operates a MAIN TIE MAIN transfer scheme. Only 2 ETC products are required to operate this transfer scheme: the **PMCP Controller** and the **Breaker Add-On Panel**: Refer to Diagram 1 on the previous page.

Definitions:

- Normal state = S1 and S2 are available, both Mains are closed and TIE opened
- S1 = Source #1
- S2 = Source #2
- M1 = S1 feeder breaker
- M2 = S2 feeder breaker
- PMCP Controller: ETC controller operating and monitoring a MTM transfer
- AP = Breaker Add-On Panel
- Breaker Add-On Panel = PCB containing control relays
- Manual Re-transfer feature: inhibit re-closing Mains until feature is deactivated
- Auto Manual Mode operation: no breaker operation when Manual Mode is selected
- Test 1 feature: activated to simulate a S1 failure
- Test 2 feature: activated to simulate a S2 failure
- OPEN transfer: load power is interrupted during retransfer
- CLOSED transfer: NO interruption of load power during retransfer
- 86 = Fault Lockout Relay: prevent closure of breakers after an overload fault or alarm
- 43M = Manual Mode selected: controller is disabled and breakers can be operated from the circuit breaker control switches mounted on the front door.
- 83 = Control Voltage Select: if S1 is present then S1 shall power the control voltage. If S1 fails, S2 shall power the control voltage.
- M1ax, M2ax, and TIEax = extra external contacts created by the breaker contacts
- 101, 201, & BT01 = circuit breaker control switches on the front cabinet door
- Main Tie Main standard features: refer to page 6

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Sequence of Operation:

Start in Normal State: S1 & S2 available, M1 & M2 closed, and TIE is open

1.0 S1 Failure:

1.1 If S1 fails, the momentary outage delay shall start. If S1 should restore before the delay has expired, the state of the breakers shall remain unchanged. If the delay expires and S1 is unacceptable then M1 opens and TIE closes.

1.2 S2 powers all the selected load(s)

2.0 S1 Returns:

Selected for Open Transfer:

2.1 If the controller is selected for OPEN transfer and S1 restores, a retransfer delay shall start. If S1 should fail again before the delay has expired, the state of the breakers shall remain unchanged. If the delay expires and S1 is acceptable and the Manual re-transfer feature is de-activated then the TIE opens and M1 re-closes. The MTM is restored to the normal state.
If the Manual Re-transfer feature is activated, the controller will not return the MTM to the normal state until this feature is de-activated.

Selected for Closed Transfer:

2.2 If controller is selected for CLOSED transfer, the PMCP controller senses both S1 and S2 sources for proper synchronization before retransferring back to the normal state. Once both sources have meet the synchronization requirements (5% voltage difference, 0.2 HZ frequency difference, and within 5 electrical degrees of each other) then M1 closes and the TIE opens (no interruption of power to the load(s) shall occur.
If the manual re-transfer feature is activated, the controller will not close M1 or open TIE. The manual re-transfer feature is bypassed if the S2 source fails and an OPEN transfer shall occur.

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Notes: If a breaker fails to operate properly or a Bell Alarm input is activated, the PMCP shall activate the alarm output contact on the Breaker Add-On Panel and then go into a sleep mode until the Alarm Reset feature is activated: activated by a momentary closure across terminals #1 and #3 on the Breaker Add-On Panel.

.

3.0 S2 Failure:

3.1 If S2 fails, the momentary outage delay shall start. If S2 should restore before the delay has expired, the state of the breakers shall remain unchanged. If the delay expires and S2 is unacceptable then M2 opens and TIE closes

3.2 S1 powers the selected load(s)

4.0 S2 Returns:

Selected for Open Transfer:

4.1 If the controller is selected for OPEN transfer and S2 restores, a retransfer delay shall start. If S2 should fail again before the delay has expired, the state of the breakers shall remain unchanged. If the delay expires and S2 is acceptable then the TIE opens and M2 re-closes. The MTM is the normal state.
If the manual re-transfer feature is activated, the controller will not return the MTM to the normal state until the Manual Re-transfer feature is deactivated. The Manual Re-transfer feature is bypassed if the S1 source fails.

Selected for Closed Transfer:

4.2 If controller is selected for CLOSED transfer, the PMCP controller senses both S1 and S2 sources for proper synchronization before retransferring. Once both sources have meet the synchronization requirements (5% voltage difference, 0.2 HZ frequency difference, and within 5 electrical degrees of each other) then M2 closes and the TIE opens. Load power is not interrupted.
f the manual re-transfer feature is activated, the controller will not close M2 or open TIE. The manual re-transfer feature is bypassed if the S1 source fails.

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Notes: If a breaker fails to operate properly or a Bell Alarm input is activated, the PMCP shall activate the alarm output contact on the Breaker Add-On Panel and then go into a sleep mode until the Alarm Reset feature is activated: activated by a momentary closure across terminals #1 and #3 on the Breaker Add-On Panel.

5.0 S1 and S2 Failure:

5.1 M1, M2 and TIE shall remain in their present state. There is no power to the PMCP Controller once S1 and S2 fails.

5.2 The PMCP shall operate again when either source returns:

6.0 S1 and/or S2 Returns:

6.1 S1 and S2 Returns:

6.1.1 If both sources return simultaneously, PMCP checks TIE for open position and then close both M1 & M2. Restored to Normal State

6.2 S1 Returns ONLY:

6.2.1 If S1 returns, The PMCP will close M1 and TIE
6.2.2 S1 powers selected load(s)
6.2.3 Once S2 returns, follow the sequence in Section 4.0

6.3 S2 Returns ONLY:

6.3.1 If S2 returns, the PMCP will close M2 and TIE
6.3.2 S2 powers selected load(s)
6.3.3 Once S1 returns, follow the sequence in Section 2.0

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Note: If a breaker fails to operate properly or a Bell Alarm input is activated, the PMCP shall activate the alarm output contact on the Breaker Add-On Panel and then go into a sleep mode until the Alarm Reset feature is activated: activated by a momentary closure across terminals #1 and #3 on the Breaker Add-On Panel.

7.0 System Test Feature:

7.1 The PMCP Controller provides 2 inputs to simulate a S1 and S2 failure: Refer to Diagram 1
7.2 Activate Test 1 to simulate a S1 failure will follow sequence in Section 1.0
7.3 Activate Test 2 to simulate a S2 failure will follow sequence in Section 3.0

Note: Test 1 and Test 2 Features are used to perform a full system test of the Main Tie Main transfer scheme.

8.0 Input Features:

8.1 The PMCP Controller monitors the breaker position of M1, M2 and TIE
8.2 The PMCP Controller monitors the Bell Alarms of M1, M2 and TIE
8.3 The PMCP Controller monitors both S1 & S2 for acceptability

9.0 Manual/Auto Mode Feature:

An input is provided on the PMCP Controller Terminal Block to put the Main Tie Main into a Manual or Automatic Mode of operation. In Automatic Mode, the PMCP shall operate as normal. If the Manual Mode of operation is selected, the PMCP shall enter into a sleep mode and no operation of the breakers are performed from the PMCP. In the Manual Mode, the breakers can be tripped or closed from the circuit breaker control switches on the front door.

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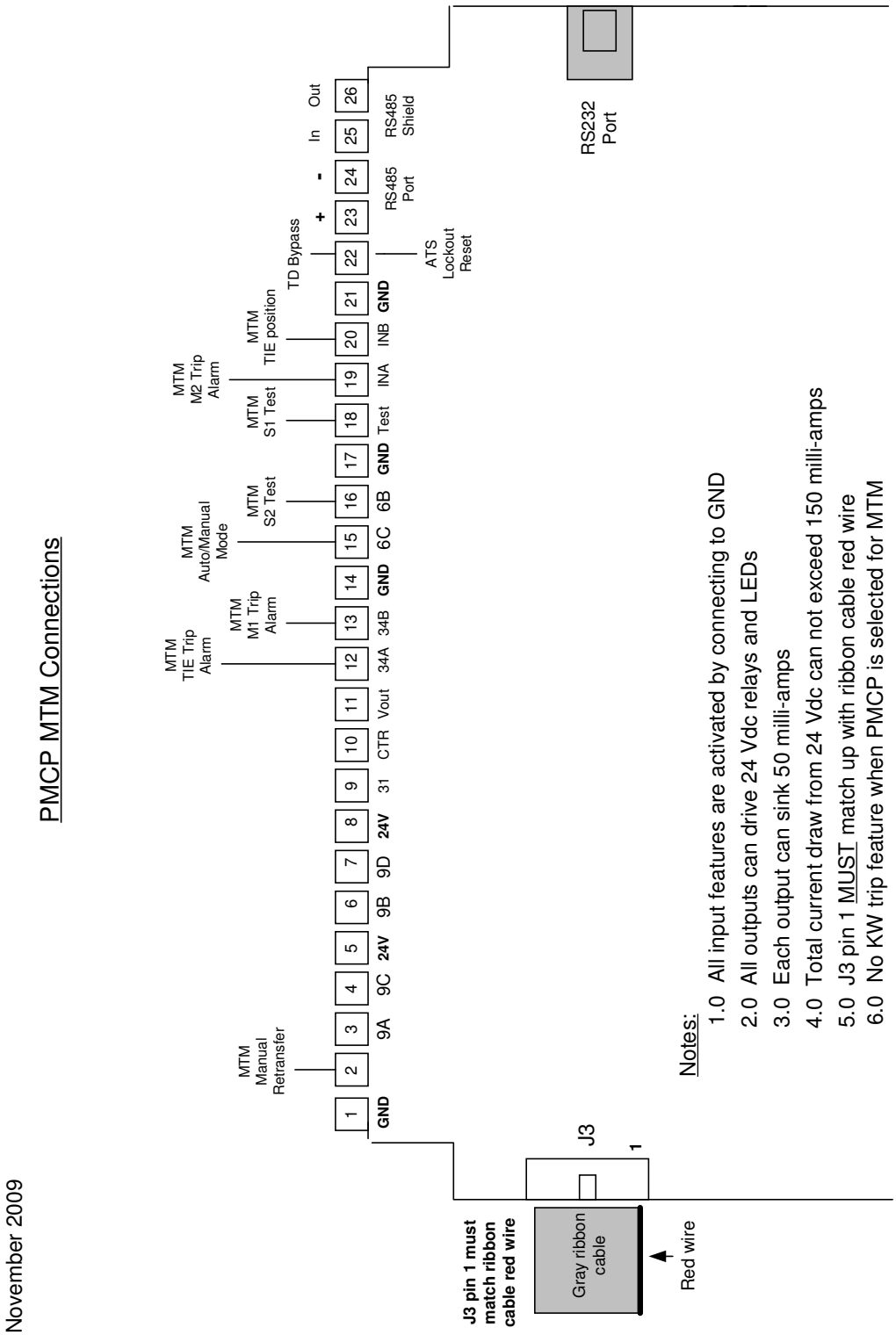

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1.15 MTM breaker connections for control and position

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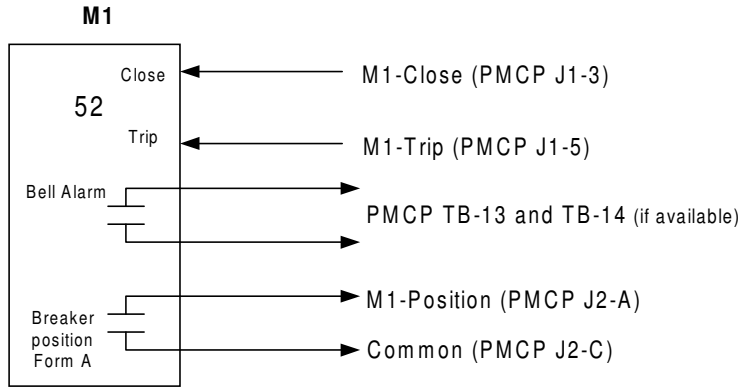
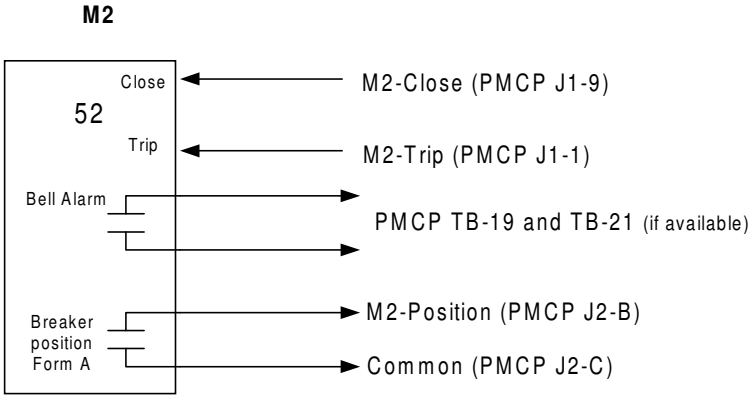
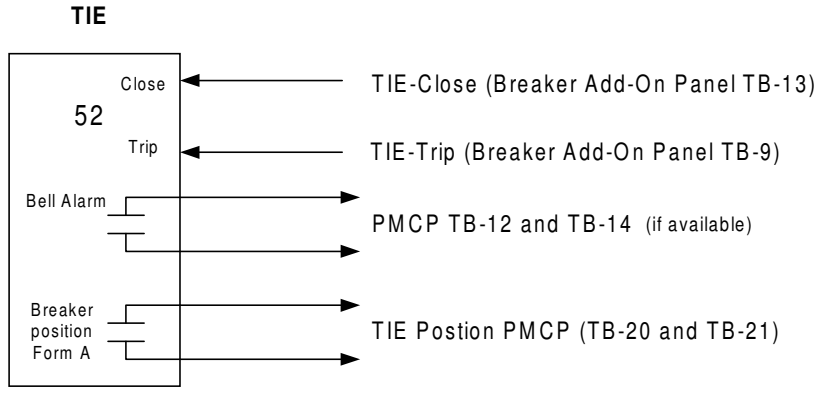
MTM Breaker Interface







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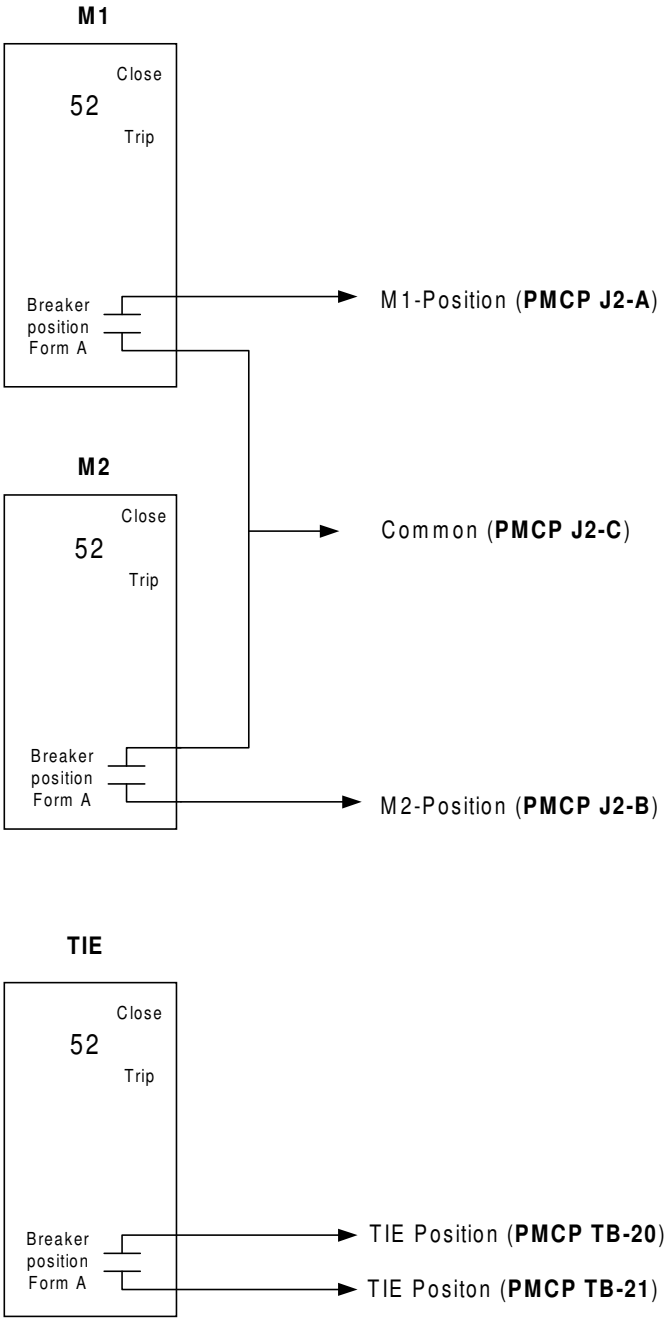
Breaker Position connections



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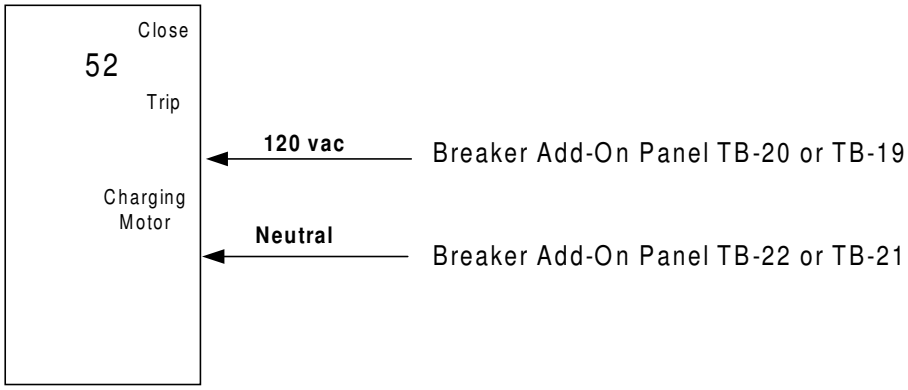
Charging circuit connections for M1,M2 & TIE



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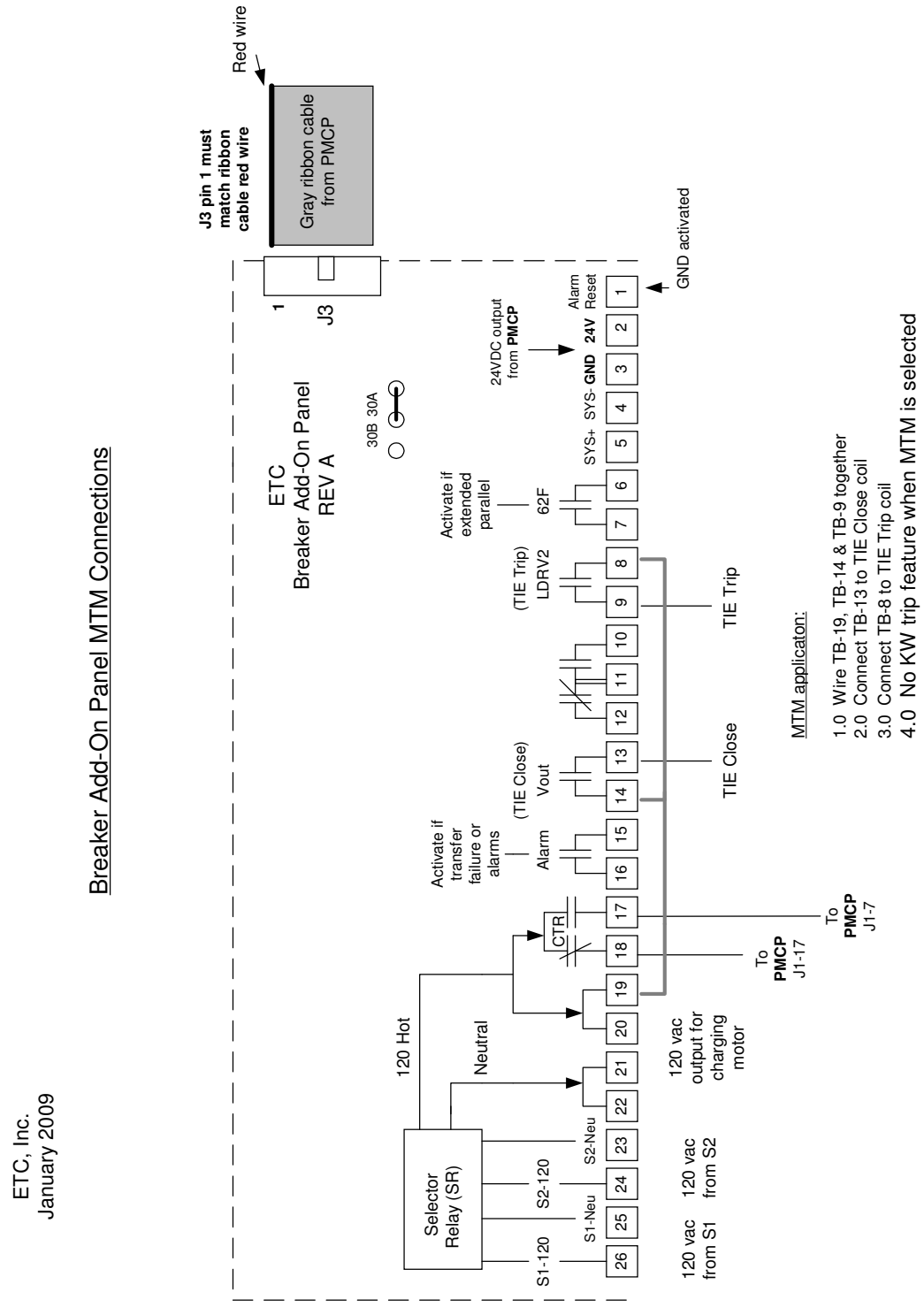

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PMCP Breaker Interface (J1)

J1 pin#/label ID	*Function*	*Description*
1		E-Trip
2		--------
3		N-Close
4		-------
5		N-Trip
6		--------
7		Add-On Panel… TB-17
8		**------**
9		E-Close
10		EC
11		NA
12		NC
13		NB
14		**------**
15		EA
16		-----
17		Add-On Panel… TB-18
18		------
19		EB

Table 2

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PMCP Breaker Interface (J2)

J2 pin#	*Label ID*	*Description*
1	A	N-Position (Normal Breaker)
2	B	E-Position (Emergency Breaker)
3	C	Position Common
4		------
5	E	Engine Start Signal (ESS)
6	F	Engine Start Signal (ESS)
7	G	CT Common
8	H	IA
9	I	IB
10	J	IC

Table 3

EMERGENCY TRANSFER CONTROLS
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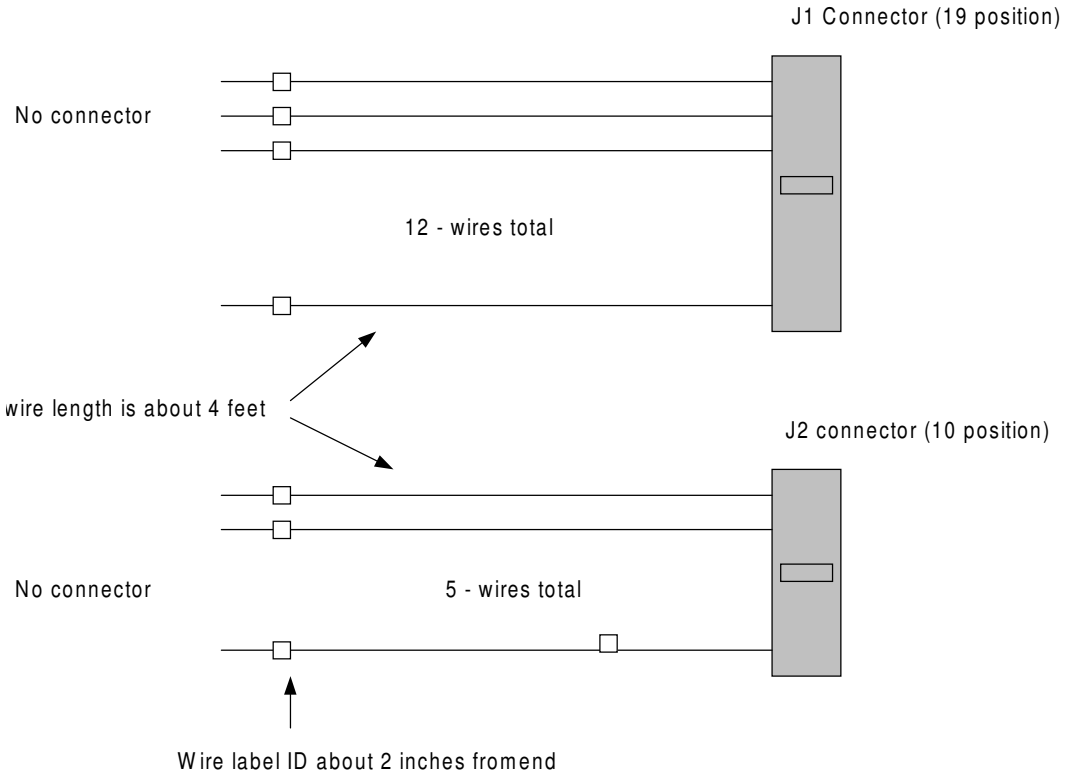
Reference to: Breaker Harness sketch



Note: Add label ID on each wire as per drawing

Figure 13

EMERGENCY TRANSFER CONTROLS
DESIGNS · CONTROLS · APPLICATIONS

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PMCP/Asco Harness Interface (std 24 pin plug)

Asco pin #		*PMCP J2*	*PMCP J1*
1	TS-8		5
2	COIL A		17
3	TS-6		3
4	NC		12
5	COIL B		7
6	EC		10
7	EA		15
8	FEA 7 COMM	5	
9	FEA 7	6	
10	14 COMM	3	
11	NB		13
12	NA		11
13	14B	2	
14	14A	1	
15	TS-70		1
16	TS-72		9
17	FEA 8	4	
18	EB		19
19			
20			
21			
22			
23			
24			

Table 4

EMERGENCY TRANSFER CONTROLS
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PMCP/Asco Harness Interface (std 24 pin w/30)

Asco pin #		*PMCP J2*	*UAP J1*
1	TS-8		9
2	COIL A		5
3	TS-6		3
4	NC		11
5	COIL B		15
6	EC		7
7	EA		10
8	FEA 7 COMM	5	
9	FEA 7	6	
10	14 COMM	3	
11	NB		14
12	NA		1
13	14B	2	
14	14A	1	
15	TS-70		13
16	TS-72		17
17	FEA 8	4	
18	EB		19
19	TS-7		2
20	TS-69		12
	21		
	22		
	23		
	24		

Table 5

EMERGENCY TRANSFER CONTROLS
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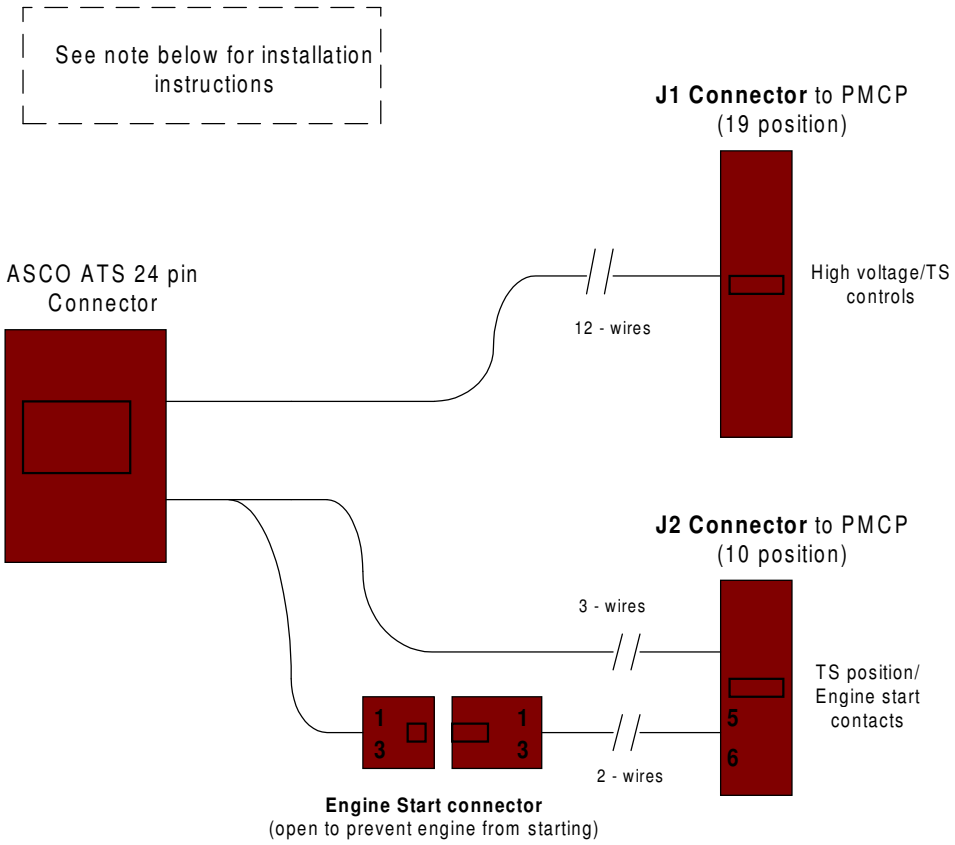
October 24, 2008

ASCO ATS Interface Harness
(Interface PMCP Controller to ASCO ATS)



NOTE:

1.0 Install harness in this order:

- 1.1 Disconnect Engine Start Connector. This prevents engine from starting
- 1.2 Connect ASCO ATS connector first
- 1.3 J2 Connector second
- 1.4 J1 Connector third
- 1.5 Connect Engine Start connector last: engine should not start

2.0 Always disconnect J1 Connector before disconnecting J2 Connector when removing harness

Figure 14

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1.20 Retrofit for ASCO's 300 Series controller:

The PMCP will easily replace the ASCO 300 Series Controller. Follow these simple steps:

A) Unplug the J1 and J2 harness to the Asco controller
B) Unplug the ribbon connector at the membrane
C) Remove controller
D) Install the PMCP Controller
E) Insert the 300 Series interface harness (supplied with retrofit)
F) Connect the membrane interface cable
G) Connect the open ended wires to the points on the PMCP terminal block as specified in Diagram XX

1.21 Retrofit for ASCO's 4000/7000 Series controller:

The PMCP will easily replace the ASCO Group 5 Controller. Follow these simple steps:

A) Unplug the 24 pin harness connector
B) Unplug the top connector on the Group 5 controller
C) Remove controller
D) Remove the control station (contain status lights and test switch
E) Install the PMCP Controller
F) Install the ETC Display Panel and plug in phone interface cable
G) Insert the PMCP ATS Interface Harness (supplied with retrofit)
H) Refer to Diagram VV

1.22 Retrofit for ASCO's Group 8/9 and 7/7A old controllers:

The PMCP will easily replace ASCO's old controllers. Follow these simple steps:

A) Unplug the 24 pin harness connector
B) Unplug the LED and test switch wires from the old controller
C) Remove the old controller
D) Install the PMCP Controller
E) Insert the PMCP ATS Interface Harness (Figure 14)
F) Reconnect the status LEDs and test switch as shown in Figure 4

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2.1 Mini Controller

The Mini Controller is an industrial controller designed to control and monitor automatic transfer schemes. The transfer scheme could be a solenoid or motorized operated ATS or a breaker pair transfer scheme.
The Mini Controller shall maintain power to the load when an acceptable normal or emergency source is available. The frequency and voltage on both sources are monitored for acceptability. The Mini Controller can be ordered for 208, 480, or 600 vac operating systems. This must be specified when ordering. The Mini Controller senses three phase on the normal source and single phase on the emergency source.

The Mini contains four relays: the Engine Start Relay (ESR), the Normal Select Relay (NS), the Emergency Select Relay (ES), and the CTR relay. The normally closed contacts of the ESR Relay provide the signal to start the emergency generator. These contacts are referred to as the Engine Start Signal (ESS).
The NS and ES relays control the transferring of a solenoid operated transfer switch. The CTR relay, in conjunction with the NS & ES, controls a breaker pair transfer switch.
The Mini Controller has limited features unlike the PMCP Controller. It is meant to operate a standard Open transfer scheme without any accessories. The Mini is not programmable and only contains a 4-position dip switch to setup three operating parameters: refer to Figure 8.

The Mini Controller contains three connectors and two terminal blocks as shown in Figure 7.

- The J1 Connector contains the 3 -phase voltage sensing for Normal and single phase sensing for Emergency source. It also contains the transfer switch control contacts from the NS and ES transfer control relays.

- The J2 Connector contains the transfer switch position (they are Form C dry contacts from the transfer switch). J2 also contains the ESS contacts for the engine start (Form B contacts).

- The J4 connector is a RS232 serial communication port used to interface to a laptop, the ETC Display Panel, and the ETC Handheld Programmer. These signals are standard RS232 signals.

- A 10 position terminal block is provided for accessing the features within the Mini Controller. These features are inputs and outputs. The inputs are activated by connecting the input to 24 Vdc ground and the outputs drive 24 Vdc leds and 24 Vdc relays: refer to Figure 8 and Table 6.

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2.2 Sequence of Operation

The Mini Controller monitors the normal source at the transfer switch for acceptability. If the normal source fails for more than a predetermined time (Momentary Outage Delay), the Mini shall signal for the engine generator to start by closing the ESS contacts to start the engine. The Mini shall sense the emergency source for acceptability and once the emergency source is acceptable and is maintained for a predetermined time (Transfer to Emergency Delay), the Mini shall signal for the transfer switch to connect the load to the emergency side of the transfer switch.
The Mini shall keep the load on the emergency source until the normal source returns. Once the Normal source has restored back to acceptability and is maintained for a predetermined time (Transfer to Normal Delay), the Mini shall signal for the transfer switch to connect the load back to the normal side of the transfer switch.
After the load has been reconnected back to the normal source, the engine generator is allowed to run for a predetermined time (Engine Cool Down Delay). Once the delay has expired, the Mini energizes the ESR relay to shut down the engine.

2.3 Specifications

Operating temperature:	-20 to 70 C
Operating voltage ranges:	208, 480, and 600 VAC (must specify operating voltage when ordering)
Operating Frequency:	50 or 60 Hz
Meets EIA standards RS232	
Controller dimensions:	9.0 x 6.5 x 3.25 inches
Controller Weight:	7 pounds
Power consumption:	10 VA
External 24 Vdc draw:	100 MA
NS & ES contact ratings:	600 VAC @ 3 amps 3/4 HP 120 VAC @ 13 amps 1/3 HP 277 VAC @ 13 amps 1.2 HP
ESR contact ratings (ESS):	24 VDC/240 VAC @ 5 amps

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2.4 Mini Controller Features

Mini Controller features

1.0 Operate a solenoid ATS or breaker pair ATS via dip switch
2.0 Designed for 480 vac or 208 vac operation (must specify during order)
3.0 Select for fast or slow operating ATS via dip switch
4.0 Operating frequency: 60 HZ (contact factory for 50 HZ operation)
5.0 Voltage and frequency settings are fixed
6.0 Operate an ATS in OPEN transition only
7.0 3-Phase sensing on Utility and 1-Phase on Emergency
8.0 Automatic engine start when Utility is unacceptable
9.0 Time delays are fixed:

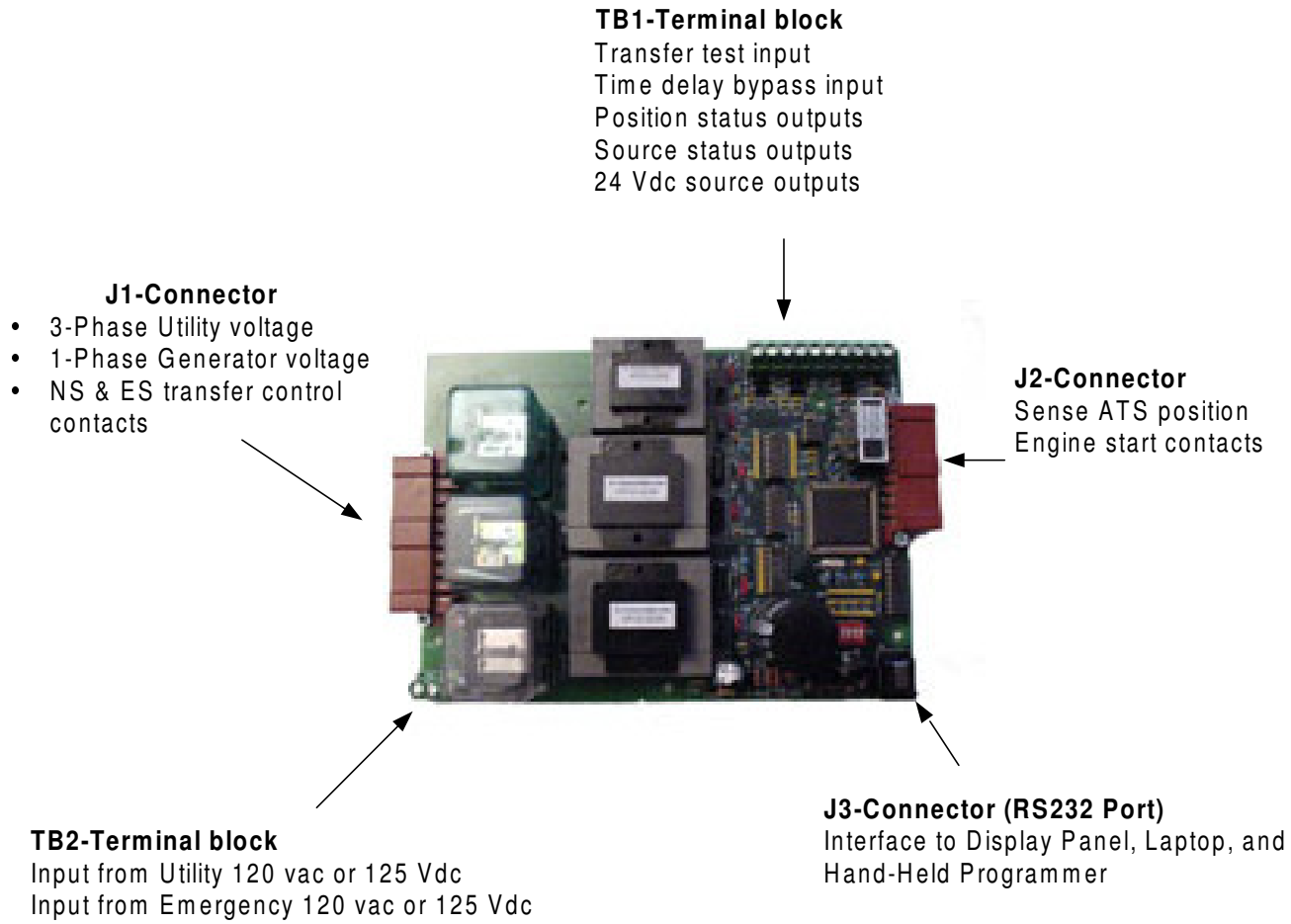

Figure 7

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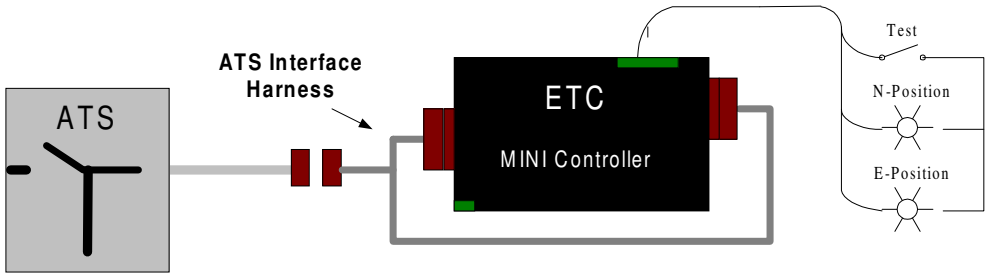
2.5 Application

ATS Manufacturers:

ASCO
Zenith
Kohler
Generac
Russel
Onan
Hubbel

Transfer Schemes:

Open Transition



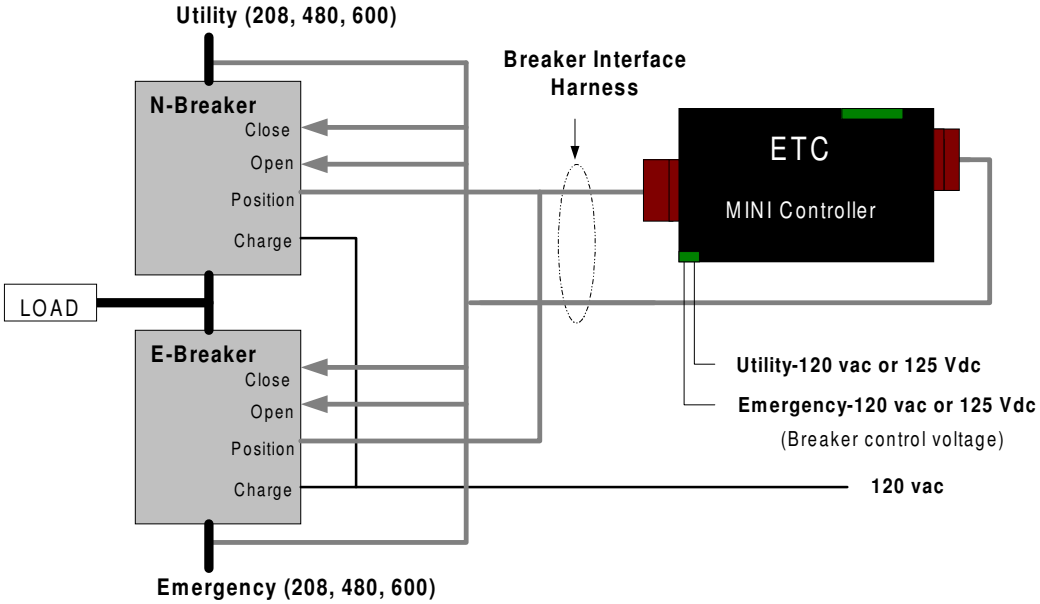
Mini Controller operating an ATS

Manufacturers

ABB
Siemens
Cutler Hammer
Square-D
GE
Westinghouse

Transfer Schemes:

Open Transition



Mini Controller operating a Breaker Pair Transfer Scheme

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2.6 Monitor transfer switch position: refer to PMCP Section 1.6

2.7 Engine Start Signal (ESS): refer to PMCP Section 1.7

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2.8 Terminal Block features:

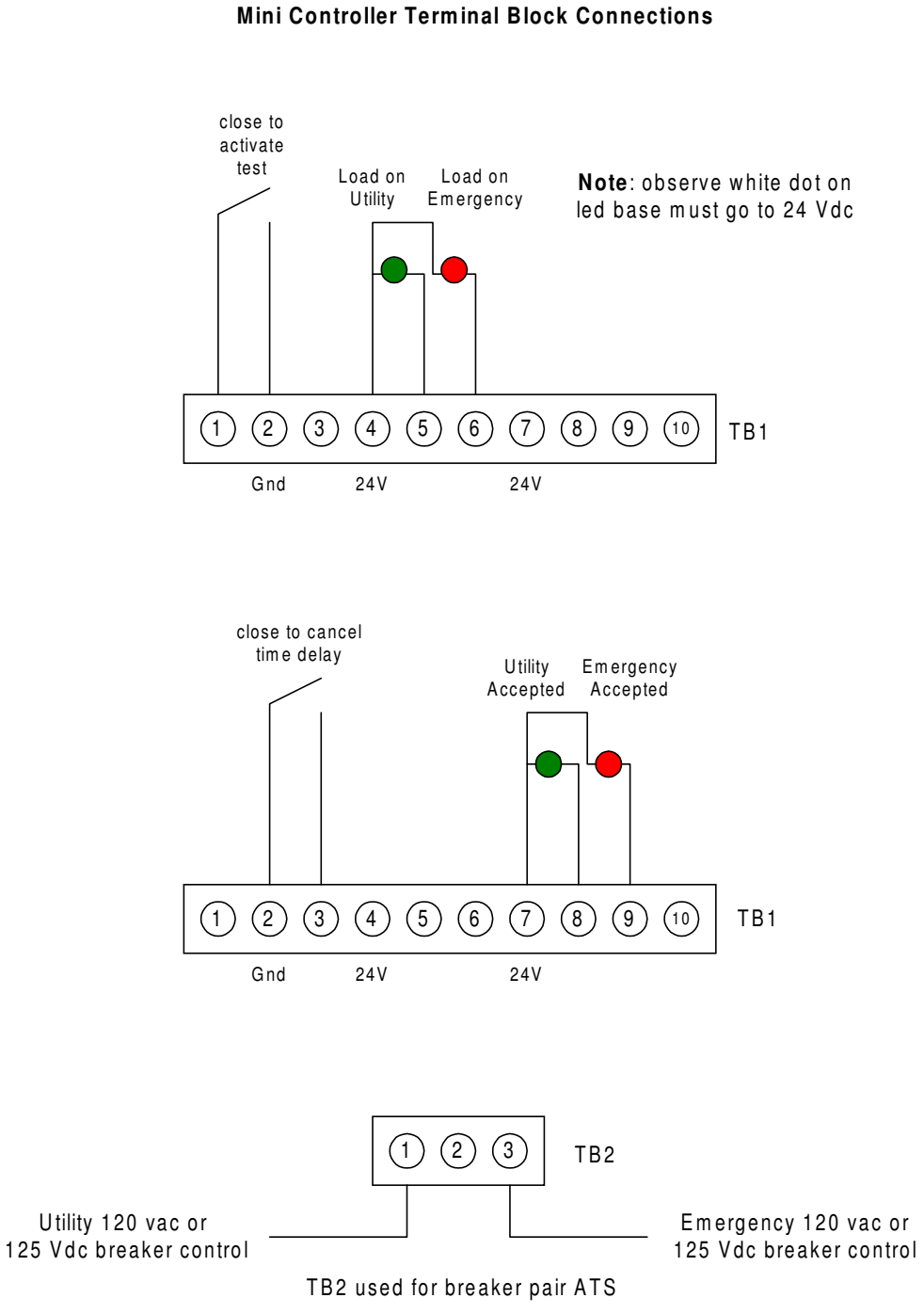

Figure 8

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MINI Terminal Block (TB)

TB #	*Function*	*Description*
1	TEST	Transfer Test
2	GND	**Ground**
3	TD BYPASS	Time Delay Bypass
4	24V	**24 Volts**
5	9A	Load on Normal
6	9B	Load on Emergency
7	24V	**24 Volts**
8	9C	Normal Available
9	9D	Emergency Available
10		

Table 6

EMERGENCY TRANSFER CONTROLS
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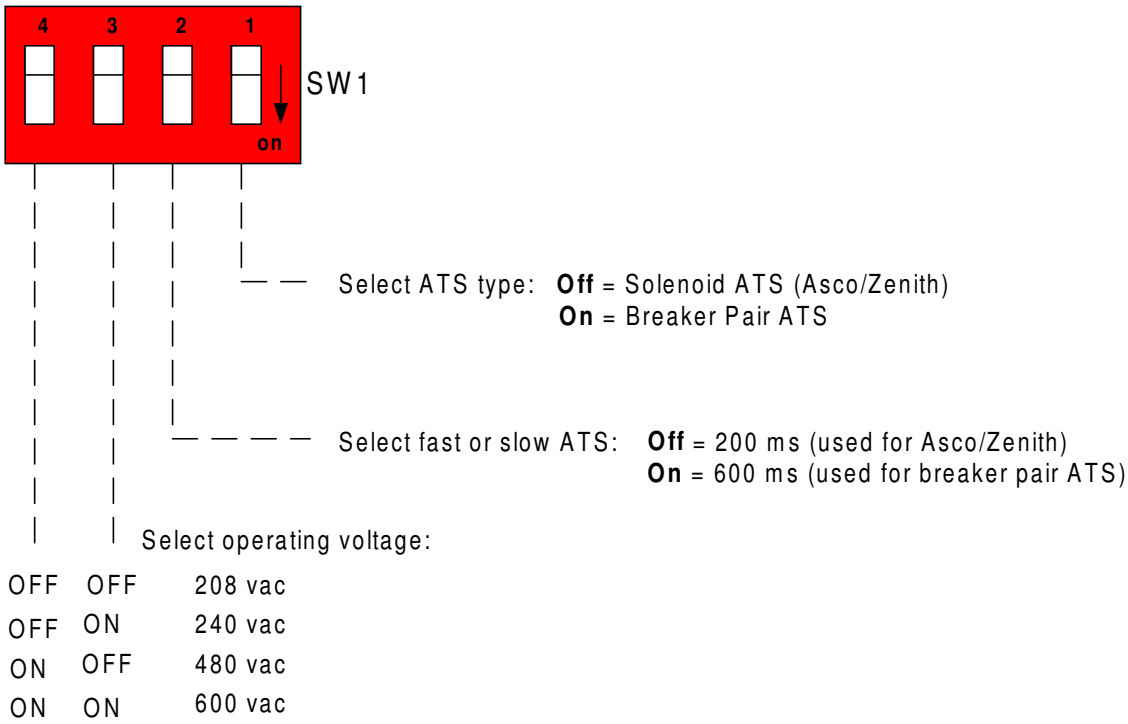
2.9 Programming the Mini Controller:

The Mini Controller is not fully programmable like the PMCP Controller. Only three operating parameters are selectable via 4 position dip switch as shown in Figure 9. The system operating voltage MUST BE SPECIFIED when ordering the Mini Controller from the factory. The time delays and settings are all fixed: refer to Section 2.10.

Mini Controller Dip Switch functions



(Select operating voltage before powering up)

Figure 9

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2.10 Factory Default Settings:

Normal source operating parameters:

3 phase 60 Hz sensing on Normal source

% of nominal	Pickup	Dropout	Over
Voltage:	90	85	110
Frequency:	90	85	110

Emergency source operating parameters:

1 phase 60 Hz on Emergency source

% of nominal	Pickup	Dropout	Over
Voltage:	90	85	110
Frequency:	90	85	110

Delay Settings:

Engine Cool down (ECTD):	1 minute	Engine Start (ESTD:	2 seconds
Transfer to Normal (XNTD):	30 minutes	Transfer to Emergency (XETD):	0.1 second
Failed to Synchronize (SYNC):	1 minute		
Emergency Dropout (EDTD):	2 seconds		

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2.11 Types of Transfer

The Mini Controller will only operate the transfer switch in an OPEN transition mode only.

2.12 Breaker interface harness: refer to Table 2 & 3 and Figure 13

2.13 ASCO interface harness: refer to Table 4 & 5 and Figure 14

2.14 Interface the 300 Series membrane to the ETC Controllers: (refer to Table 7 for connections)

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MINI/ ASCO 300 Series ATS Interface

ASCO function		300 J2	PMCP J2	300 J1	PMCP J1
1	TS-8			8	5
2	COIL A			15	17
3	TS-6			2	3
4	NC			4	12
5	COIL B			17	7
6	EC			12	10
7	EA			7	15
8	FEA 7 COMM	3	5		
9	FEA 7	2	6		
10	14 COMM	8	3		
11	NB			10	13
12	NA			1	11
13	14B	9	2		
14	14A	10	1		
15	TS-70			5	1
16	TS-72			13	9
17	FEA 8		4		
18	EB				19
	19				
	20				
	21				
	22				
	23				
	24				

TABLE 7

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3.0 ACCESSORIES AND OPTIONS

3.1 Display Panel

The Display Panel shall provide the user with a way to access the PMCP. The user can monitor, control and program settings within the PMCP. The Display Panel interfaces to the PMCP via a phone cable interface into the RS232 COM port of the PMCP. The Display Panel provides large status indicators, buttons and a large character font LCD display. The user can move in and out of the screens very easily.

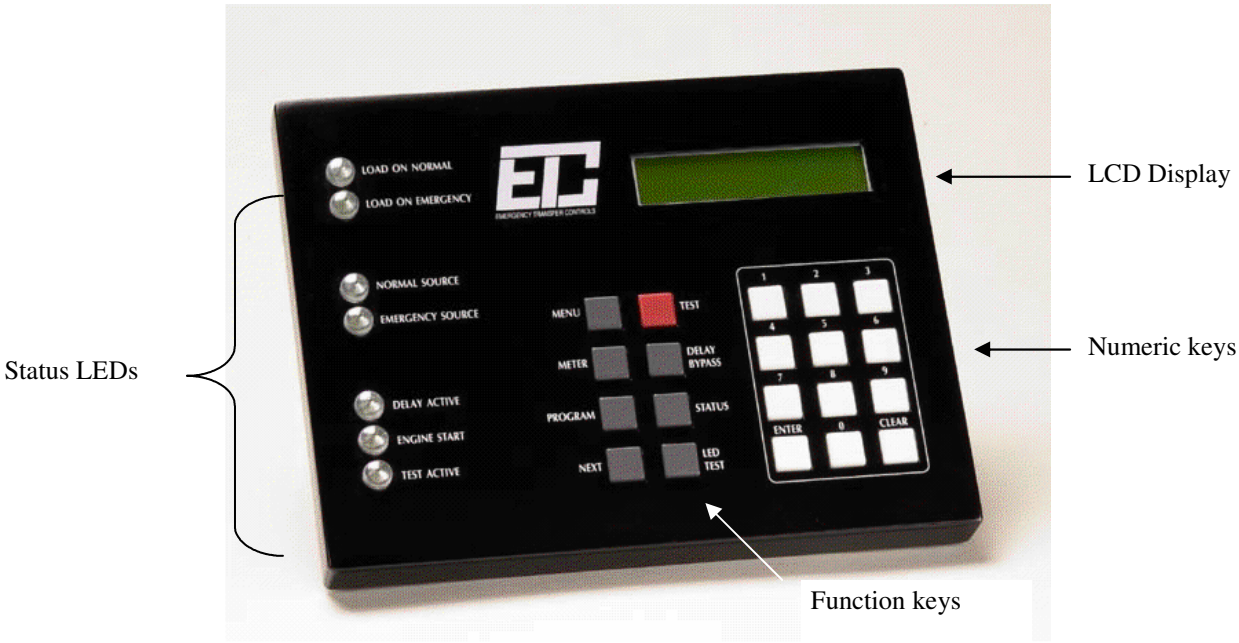

Figure 9 Display Panel

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Standard features:

A large character LCD display, 2 x 16 characters (with backlight w/auto shut down)

Numeric keys (0-9) for selecting/programming

Function keys (8) are used for monitoring, controlling and programming the PMCP.

11.1 Display Panel (Continued):

Keys	Function
MENU:	select settings and accessories
METER:	to display volts, amps, frequency, current, PF, KW
PROGRAM:	program operating parameters/settings
NEXT:	key used to advance to the next field or screen
TEST:	activate a transfer test
DELAY BYPASS:	cancel active running time delay
STATUS:	view real time activities
LED TEST:	turn on status LED's for testing

High intensity lamps to indicate the following:

- Load on Normal
- Load on Emergency
- Normal Source Available
- Emergency Source Available
- Delay Active
- Engine Start
- Test Active

Display Operation:

Press **MENU** button and then enter Select # to bring up the desired screen (Table 2 shows the available screens with their select #).

Press **NEXT** button to advance to the next screen within that selection.

Press **PROGRAM** button if you wish to change a value within that screen:
flashing cursor indicates program mode.

Press **ENTER** button to store new programmed values.

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Press **CLEAR** button to cancel program mode.

Press **TEST** button to activate a test to emergency: activate test enter 1, cancel test enter 0.

Press **METER** button to view voltages, current, frequency, power related values and inphase window (in degrees).

Press **DELAY BYPASS** button to cancel/bypass the active running time delay.

11.1 Display Panel (Continued):

Press **STATUS** button to view transfer status info.

- ATS Status
- Time delay running
- Transfer Inhibit Status
- Load Dump Status
- Sync parameters
- Phase Rotation

Press **LED TEST** button to turn on all status LEDs for testing proper operation.

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Selecting features via MENU button:

Press the MENU button and then hit NEXT button to scroll through features. Select number corresponding to the desired feature.

Select #	Function
1	**Operating Parameters -** Select between Normal and Emergency parameters
2	**Voltage Settings** - Select between Normal and Emergency settings
3	**Frequency Setting** - Select between Normal and Emergency settings
4	**Time Delays -** Use the NEXT key to scroll through the various time delays
5	**Accessories -** Use the NEXT key to scroll through the various accessories (some function keys within Accessories are programmable)
8	**Engine Exerciser** - Use the NEXT key to scroll Settings
9	**Real Time/Date** - Use the NEXT key to scroll **Time** and **Date**
10	**Type of Transfer** - Select transfer scheme: OPEN, CTTS, STTS, DELAYED
9	**Run Engine Only** - Enter 1 to run engine and 0 to shut down
01	**Program Version** - Displays the PMCP software version
02	**Future Use Only**
03	**Transfer Log** - Displays number or transfers / last transfer
04	**Reset Alarms** - Clear Alarm Output and restores normal operation
05	**Enter Password** - Press 05 and then enter 1234. An acceptance message will display. You must press a key within 15 seconds or the programming mode will cancel

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Programming example: program exerciser

- Press MENU button and them press 05 to enter in password. Enter 1234 and acceptance message shall display.
- Press MENU button and then press 6 to select engine exercise feature.
- Program exerciser with or without transfer by pressing PROGRAM button and flashing cursor shall appear. Press NEXT button to switch between the two selections.
- Press ENTER button to program the selection.
- Press NEXT button as instructed and programmed selection shall be displayed.
- Press NEXT button to move to next selection which is on and off times. Press PROGRAM button and curser shall flash. Enter in both on the off times using military time format only. Press ENTER button once both times are completed.
- Press NEXT button to select run day. Press PROGRAM button and curser shall flash. Press the NEXT button to select the desire run day. Press the ENTER button when done.
- Press NEXT button to select schedule. Press the PROGRAM button and curser shall flash. Press NEXT to scroll until selected schedule is reached. Press the ENTER button when done.

NOTE: The user may exit from any screen or mode by pressing either one of the 5 function buttons: MENU, METER, TEST, DELAY BYPASS AND STATUS.

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Note: The Display Panel was designed to be retrofitted in the field on the existing cabinet door within a few minutes. *No large square hole cutout is required.*

The requirements for mounting the Display Panel are:

1.0 Make **5 holes**: 4 holes (3/16 in. diameter) and a 1 inch. dia. Hole using a 1.0 inch hole punch. 22mm – 25.4mm

2.0 Use the mounting template sheet supplied. DO NOT REMOVE THE REAR FIBER GLASS COVER.

3.0 Remove the #10 nuts from the rear of the display. Mount display thru 4 holes: force should not be required. **When installing the #10 nuts, only tighten down slightly to a snug.**

4.0 Repeat….only snug tighten the nuts.

Specifications:

Display measures 9.0 in. x 7.0 in. x 0.75 in.
Operating temperature: -20 to 70 degrees C
Meets EIA RS232 standards
4 – mounting holes (#10-24) and a 1 inch hole (hole punch)

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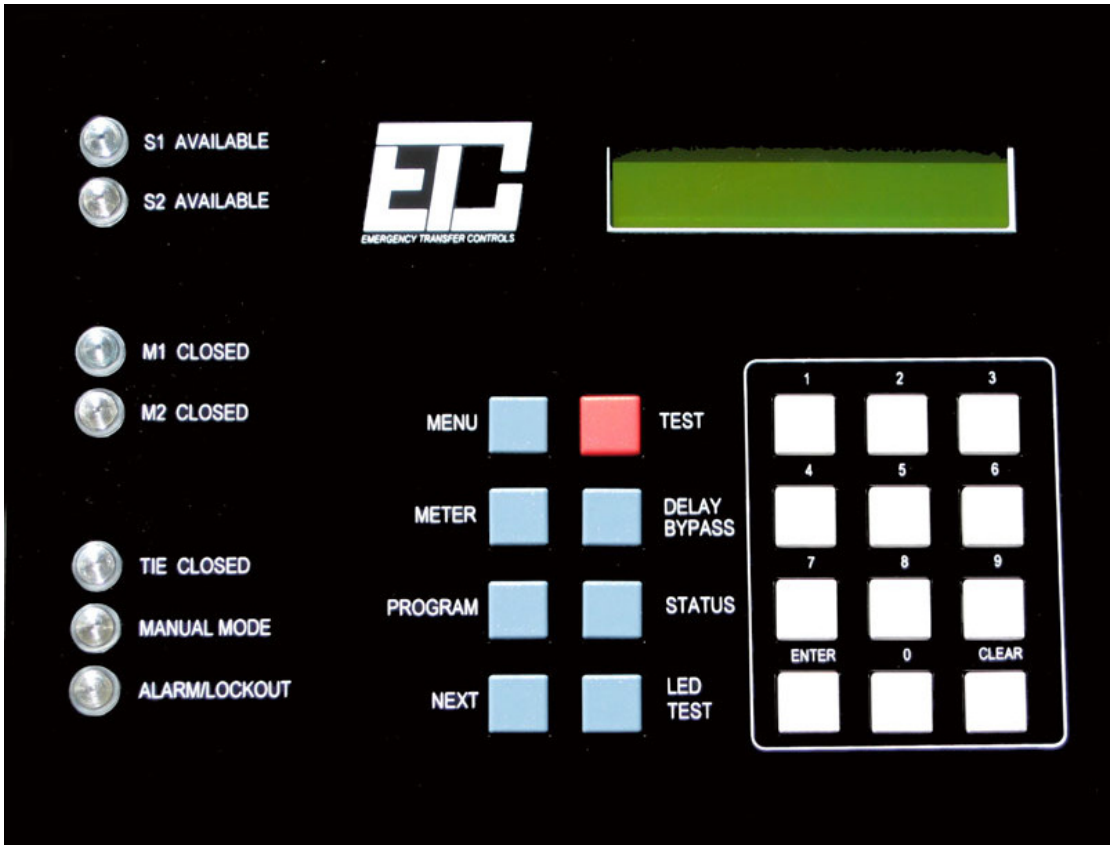
3.2 The MTM Display Panel

The MTM Display Panel operates in the same manner as the ATS Display excet for the status indicators:

High intensity lamps to indicate the following:

- S1 Available
- S2 Available
- M1 Closed
- M2 Closed
- Tie Closed
- Manual Mode
- Alarm/Lockout



Follow the same operating procedure as the Display Panel in Section 3.1

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Specifications:

Display measures 9.0 in. x 7.0 in. x 0.75 in.
Operating temperature: -20 to 70 degrees C
Meets EIA RS232 standards
4 – mounting holes (#10-24) and a 1 inch hole: 3/8 in. starter hole is required
Metal cover

Mounting types: MTM Display Panel comes in surface mount or flash mount.

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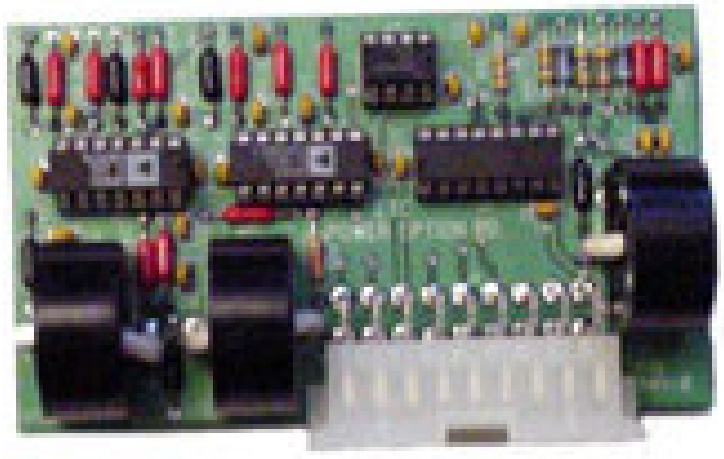
3.3 Power Option Board

The Power Option board provides the PMCP with the capability to measure and monitor load power at the ATS or breaker. The board plugs directly into a connector on the PMCP. *It's that simple (refer to Figure 10)*. Once installed in the PMCP, the user has the following features available:

Three phase or single phase **TRUE RMS** current sensing
Three phase or single phase **Power Factor** sensing
Three phase or single phase power sensing**: Real Power** (Kilowatt)
Total power sensing: **Real Power** (Kilowatt)
Automatic phase rotation operation for *ABC* or *CBA*

Note: To view these features, the user will require one of the following:

- Display Panel
- Hand Held programmer
- Laptop
- Network Supervisor



The Power Option PCB

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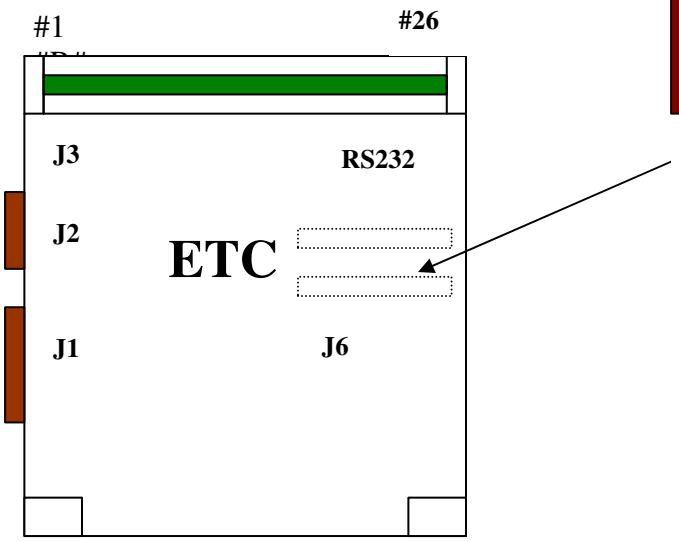
11.2 Power Option Board (continued):



Static strap (supplied) MUST BE WORN when handling PC boards

Power Option board plugs into J6 connector on the PMCP

Note:

The PMCP must be powered down before installing Power board (disconnect J1 connector and wait 10 seconds before installing the Power board).

Figure 10 **Installing Power Option board**

Ordering:

The Power Option Board shall come in a kit which shall contain the following:

- The Power Option Board
- Pre-crimped 18-gauge wires (4) for installing into J2 connector
- CT shorting block (optional)

Measuring load current:

Figure 11 illustrates how to interface the PMCP J2 power connector for measuring the load current at the transfer switch. The following items must be followed:

1.0 The maximum CT output current is 5 amperes (standard).
1.1 The interface wire gauge should be 18 AWG stranded minimum.
1.2 A **CT shorting block must be used**
1.3 The Power Option Board **MUST BE INSTALLED** in the PMCP before applying current into the J2 connector.
1.4 The CT current must be programmed in the PMCP.

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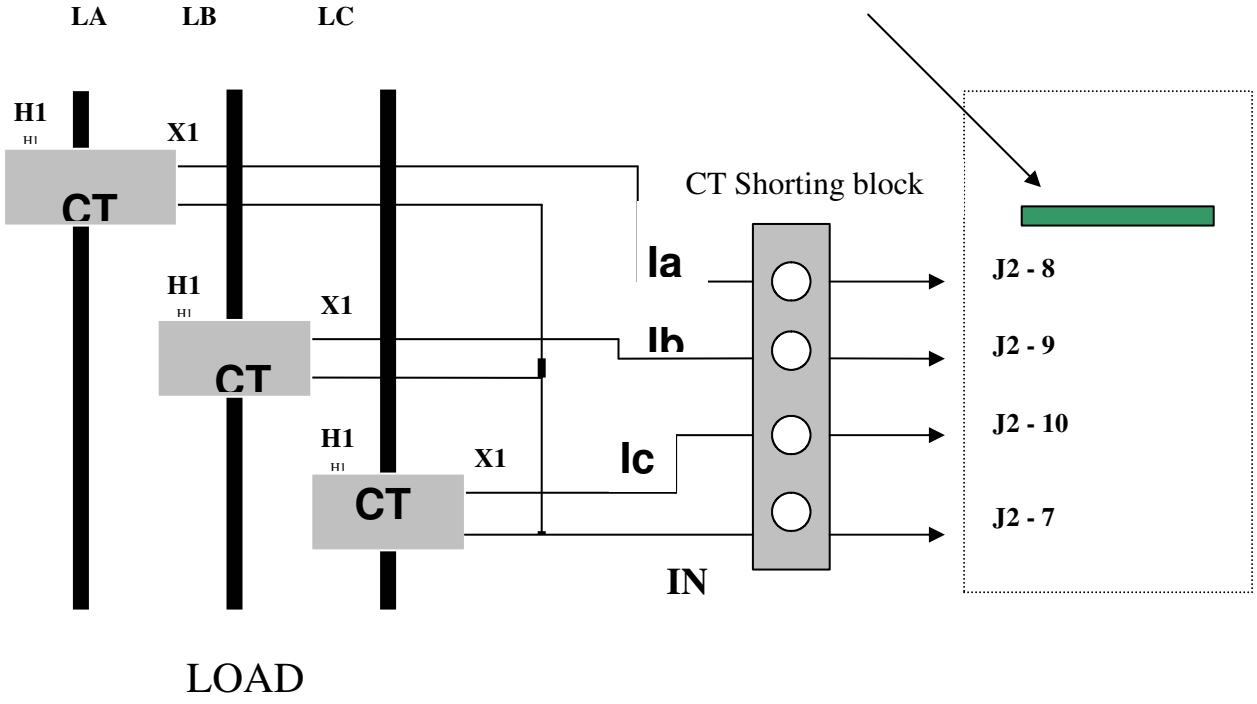
Note: H1 marking on CT must face load lugs on ATS for proper operation.
(Refer to Figure 11)

11.2 Power Option Board (continued)

IMPORTANT: **DO NOT** ATTEMPT TO REMOVE J2 CONNECTOR OR POWER OPTION BOARD FROM PMCP UNLESS SHORTING PINS ARE INSTALLED ON THE CT SHORTING BLOCK (**CT OUTPUTS MUST BE SHORTED**)

The plug-in Power Option PCB



Monitoring load current

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Specifications:

The board measures 2.25 in. x 3.87 in.
Directly accepts the CT output of 5 amperes max.
Current sensing is 1% of reading.
Operating temperature: -20 to 70 degrees C

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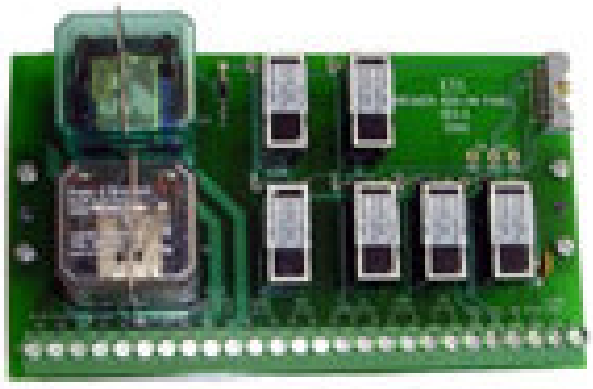
3.4 **Breaker Add-On Panel:** for Breaker Pair applications

The Breaker Add-On Panel is required when operating a Breaker Pair Transfer Scheme or a MAIN-TIE-MAIN control scheme. It works with the PMCP Controller to provide the necessary controls and alarms required for OPEN, CLOSED, SOFT LOAD, DELAYED, LOAD DUMP, and Load Disconnect transfer schemes. The Breaker Add-On Panel will work with 120 vac and 125 Vdc breaker control circuits.



Breaker Add-On Panel

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Breaker Add-Panel standard features:

Input for 120 vac from Utility

Input for 120 vac from Emergency

Selector Relay (SR) for selecting Utility or Emergency 120 vac

Selectable Load Dump activation logic: 30A or 30B

Transfer failure alarm contacts

Load Disconnect connects

Alarm Reset input

AC outputs for charging motor drive (120 vac)

Extended overlap contacts

Contacts for Main Tie Main control (TIE control contacts)

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Breaker Add-On Panel (TB)

TB #	*Function*	*Description*
1	**Alarm**	Input to reset all alarm functions
2	24 VDC	24 VDC
3	Ground	Ground
4	SYS-	LDCR pickup negative
5	SYS+	LDCR pickup positive
6	62F	Overlap Form A contact
7	62F	Overlap Form A contact
8	LDRV2	Form A contact (call factory)
9	LDRV2	Form A contact
10	Load Disconnect	Form A
11	“	Common (Load disconnect)
12	“	Form B Load Disconnect
13	VOUT	Form A (KW trip feature)
14	VOUT	Form A (KW trip feature)
15	ALARM	Form A (any alarm features active)
16	ALARM	Form A (any alarm features active)
17	CTR	Hot Normally opened
18	CTR	Hot Normally closed
19	120 HOT	120 vac
20	120 HOT	120 vac
21	NEUTRAL	Neutral (120)
22	NEUTRAL	Neutral (120)
23	E-NEU	Neutral from Emergency transformer
24	E-120	120 vac from Emergency transformer
25	N-NEU	Neutral from Normal transformer
26	N-120	120 vac from Normal transformer

Table 8

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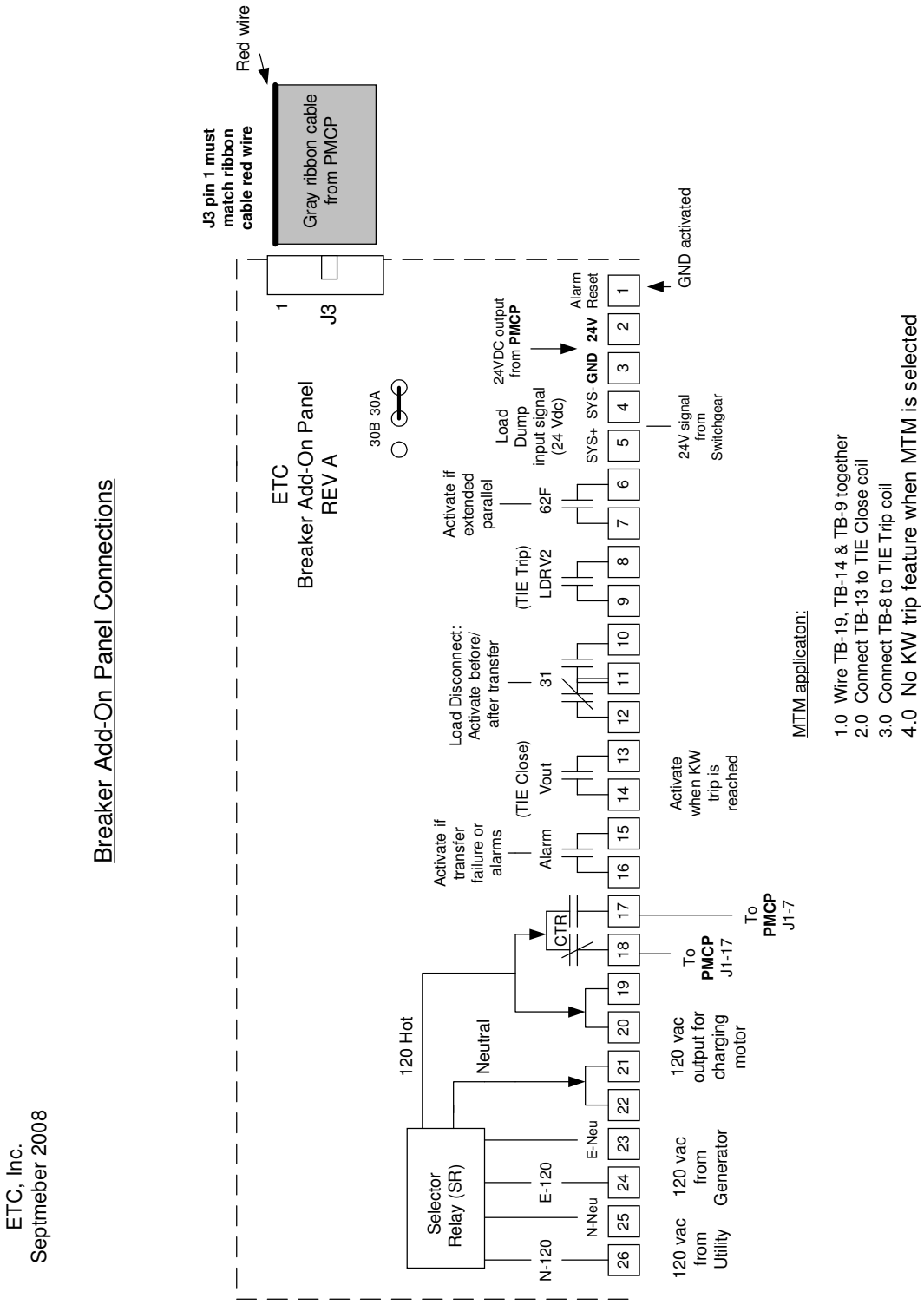

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3.5 Universal Add-on Panel – *UAP*

The UAP (Figure 14) was designed to give the user the **flexibility to configure** the transfer switch or breaker scheme in 1 of 5 transfer modes with or without accessories. Additionally, the user has the ability to add accessories with little or no additional hardware. The 5 transfer modes are:

OPEN:	Open Transition Transfer w/Load Dump (break before make)
CTTS:	Closed Transition Transfer (make before break)
STTS:	Soft Load Transition Transfer (make before break)
DTTS:	Delay Transition Transfer (break before make)

LOAD DUMP:

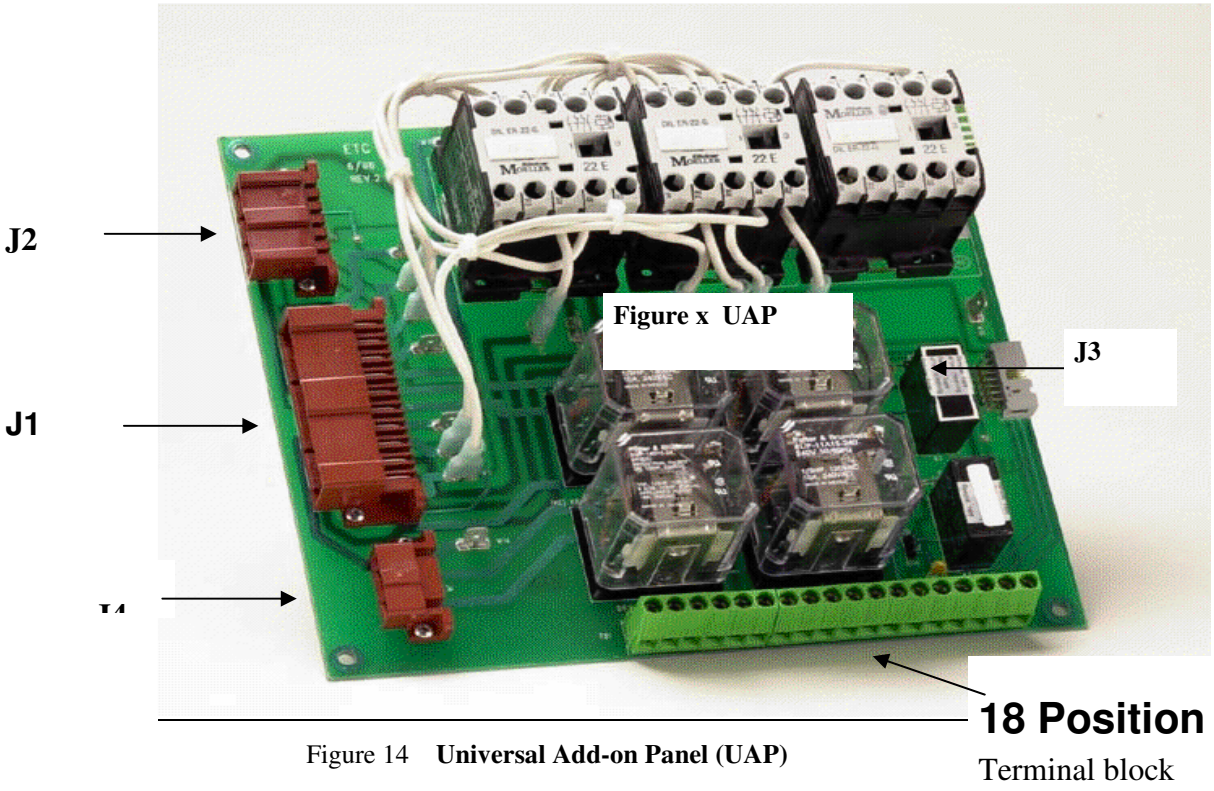

Figure 14 **Universal Add-on Panel (UAP)**

Note: The UAP is controlled and powered by the PMCP via ribbon cable connected between J3 of the PMCP and J3 of the UAP (refer to Figure 15).

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Universal Add-on Panel – *UAP* (Continued):

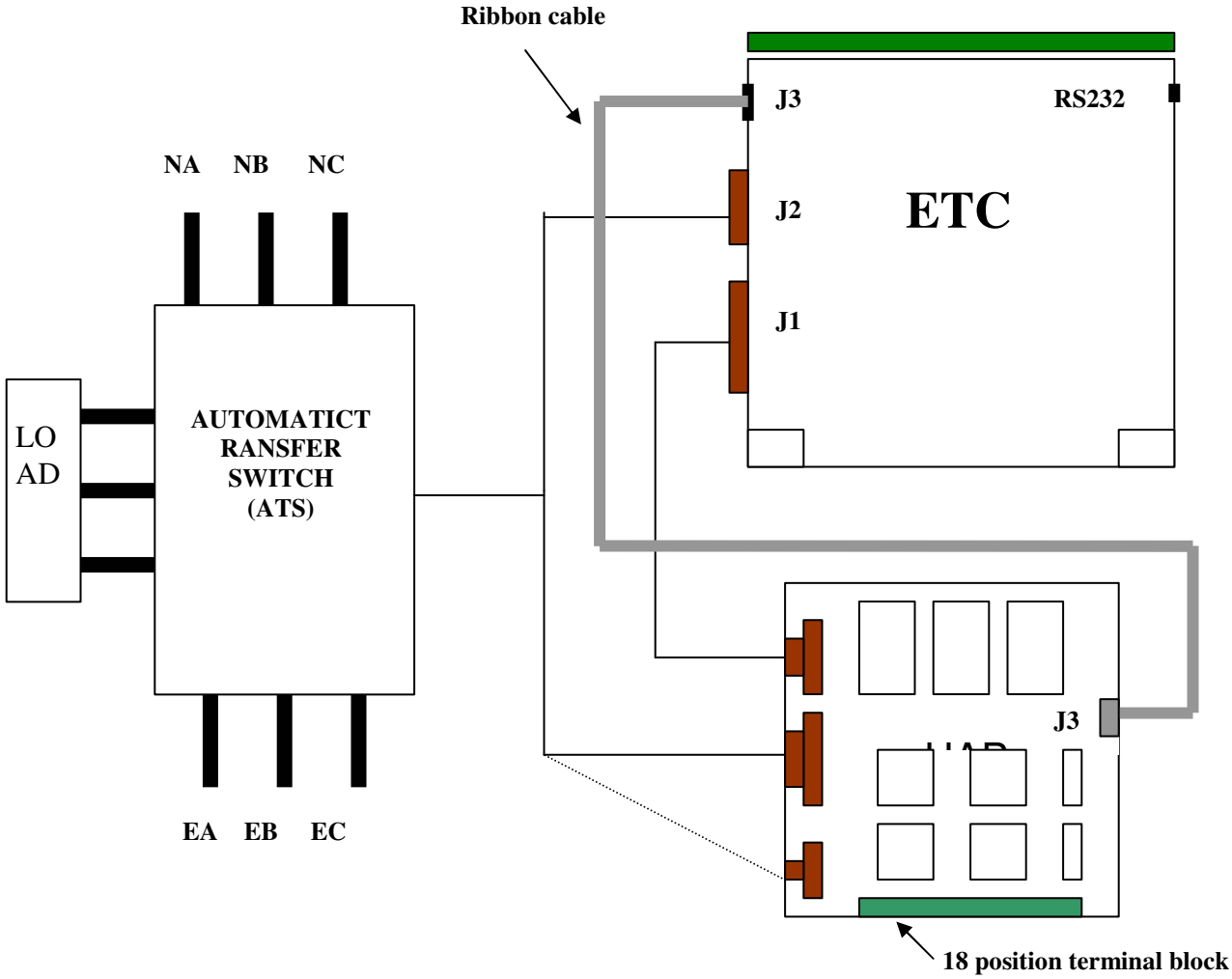

Figure 15 **UAP and PMCP interface**

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UAP Standard features:

* Load Disconnect dry contacts
* Breaker trip dry contacts (transfer failure fault)
* Selectable Load Dump activation logic
* Alarm output (transfer failure occurred)
* Alarm reset input
* Initiate synchronization output
* Power relays and contactors for controlling transfer
* Quick disconnects used for easily configuring transfer mode
* An 18 position terminal block with the following inputs and outputs (Table 3)

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UAP Terminal Block

TB #	*Description*
1	Alarm Reset
2	Alarm Output
3	24 Volt DC Ground
4	24 Volt DC
5	Input 24 Volts Dc
6	2F Contacts (N.O)
7	2F Contacts (N.O)
8	31 Common Contact
9	31 Normally Open
10	31 Normally Closed
11	31 Normally Open
12	31 Common
13	31 Normally Closed
14	CTR Normally Open
15	CTR Common
16	CTR Normally Closed
17	24 DC Ground
18	Spare

Table 3

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Universal Add-on Panel – *UAP* (Continued):

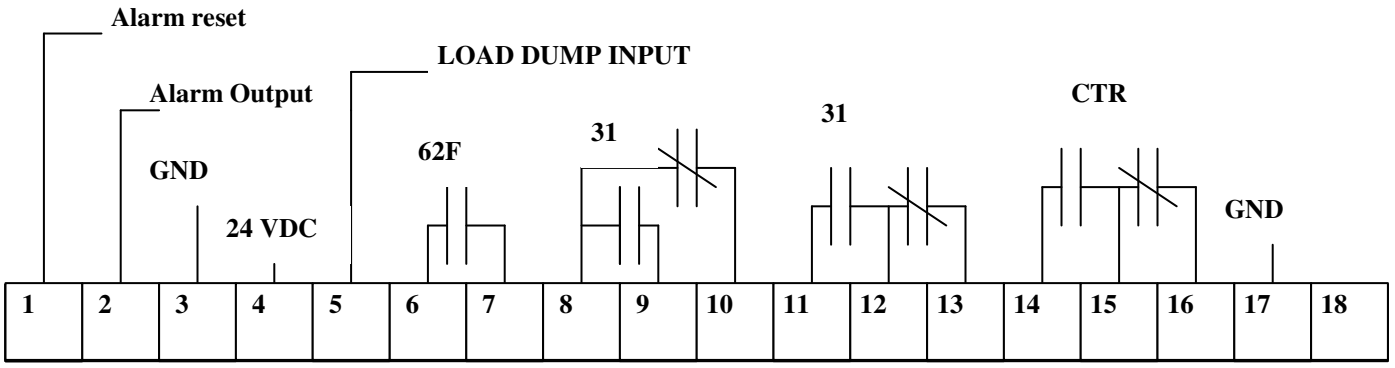

Figure 16 **UAP Terminal Block (TB)**

Initialization:

1.0 The user must connect the ribbon cable from the UAP J3 connector to the PMCP J3 connector as shown in Figure 15.

2.0 The select jumpers on the UAP board must be in the proper position for the transfer scheme to operate properly:

2.1 When using the LOAD DUMP scheme, the user must select which control logic is desired: 30A or 30B. If the select jumper is in the 30A position, LOAD DUMP input will be activated when 24VDC is applied to TB-5. If 30B position is selected, LOAD DUMP input is activated when GND or no voltage is present at TB-5.

Note: Factory default for 30A position

2.2 If Load Disconnect (31) is desired in your application, put select jumper on UAP board in the ACC31 position.

2.3 If Soft Load or Delayed transfer schemes is desired, put select jumper on UAP board in the SL/DX position.

Note: Factory default for ACC31 position

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Universal Add-on Panel – *UAP* (Continued):

Terminal Block Functions:

TB#	Description
1	Alarm Reset - An input when activated (grounded) will reset the Alarm Output (TB #2), cancel ATS Lockout feature and restore the PMCP back to normal operation.
2	Alarm Output - An output will activate if an ATS failure should occur or a CTTS overlap failure.
3	24 VDC Ground
4	24 VDC Positive
5	Load Dump - An input used to signal the PMCP to transfer the ATS back to normal if on the emergency or inhibit ATS from transferring from normal to emergency. The activation mode of this feature is determined by the positioning of the 30A/30B select jumper on the UAP board.
6,7	62F - Contacts (Form A) shall close if an CTTS overlap failure should occur.
8,9,10	31 - Contacts (Form C) shall change state during Load Disconnect feature operation (refer to 10.5) and Section 7.1 TB #9)
11,12,13	Additional spare contacts for 31 feature.
14,15,16	CTR - Contacts (Form C) shall change state whenever a CTTS or STTS is initiated. The user may use the contacts to signal for the synchronizer to start.
17	24 VDC Ground
18	Not used

Specifications:

UAP measures 8.5 in. x 8.0 in. x 2.0 in.

Operating Temperature: -20 to 70 degrees C

Contact ratings: CTR and 31 are rated for 240 VAC@10 amps. 62F rated 240 VAC @ 5 amps

Terminal Block rating: 300 volts @ 10 amps

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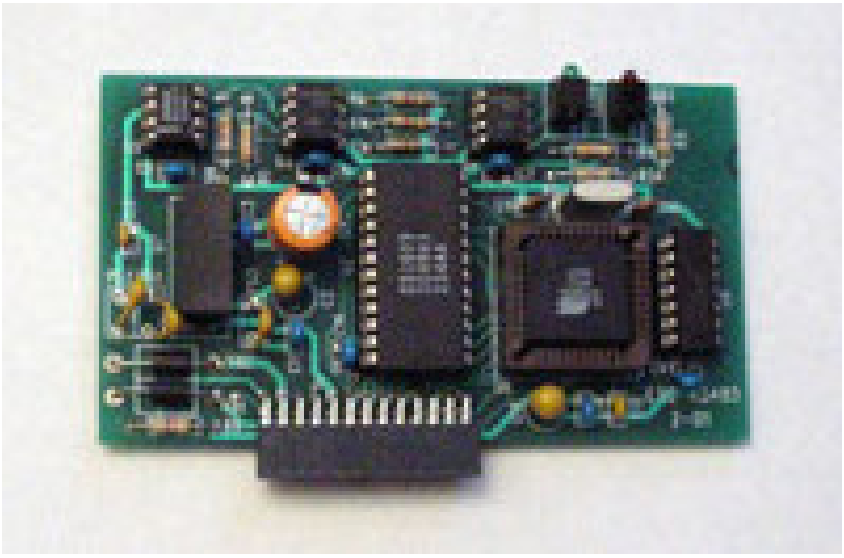
3.6 Serial Communication Board

The Serial Communication Board makes it possible for the PMCP to communicate up to 4000 feet over a 2-wire communication line to a remote PC called the Network Supervisor. The serial board plugs into a connector on the PMCP (refer to Figure 12) and once installed, the following features are available:

Opto-Isolated RS485 COM port
Communication up to 4000 feet over a 2-wire communication cable

Indicator LED's to show transmitting and receiving status



RS485 Serial Communication PCB

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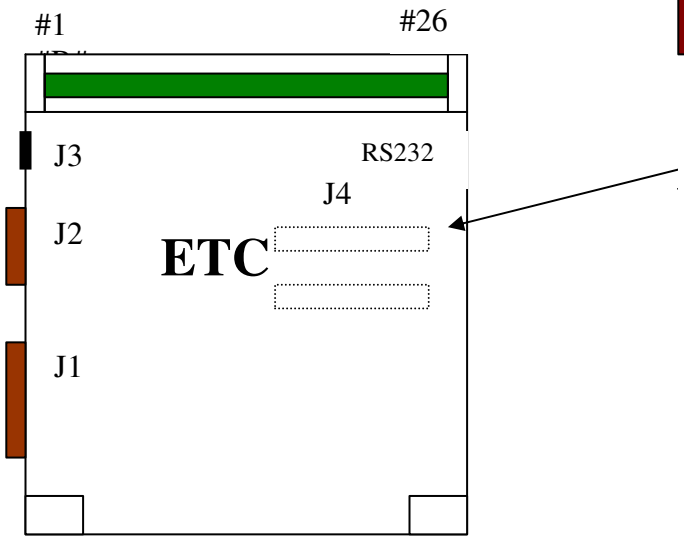
The option of communicating 5,000 feet over a fiber optic line (the Network Repeater will be required).



Static strap MUST BE WORN when handling PC boards

Serial Communication board plugs into J4 connector on the PMCP.

Note:

The PMCP must be powered down before installing Serial board (disconnect J1 connector and wait 10 seconds before installing the Serial board.).

Figure 12 Installing Serial Communication board

Specifications:

The board measures 2.25 in. x 3.87 in.
Operating temperature: -20 to 70 degrees C
Meets EIA RS485 standards

NOTE: A serial address must be programmed in the PMCP. The factory default address is 0. A serial address must be programmed in the PMCP before the serial communication can be established: 001 – 128 address range.

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Serial Communication Board (Continued):

Communication cable spec:

Communication cable type for RS485 must be low capacitance, single-pair twisted, 24 AWG, overall stranded shield, foil shield around conductors with drain wire.

Manufacturer	Part #
Alpha Wire	#6412
Belden/Cooper	#9841

Figure 13 illustrates how to wire the serial communication line to the RS485 COM port on the PMCP. The color code matching on TB #25 and #26 must be maintained throughout the network using ETC devices. The shield drain wire(s) must be connected as shown also. *TB #24 is tied to earth ground internally.*

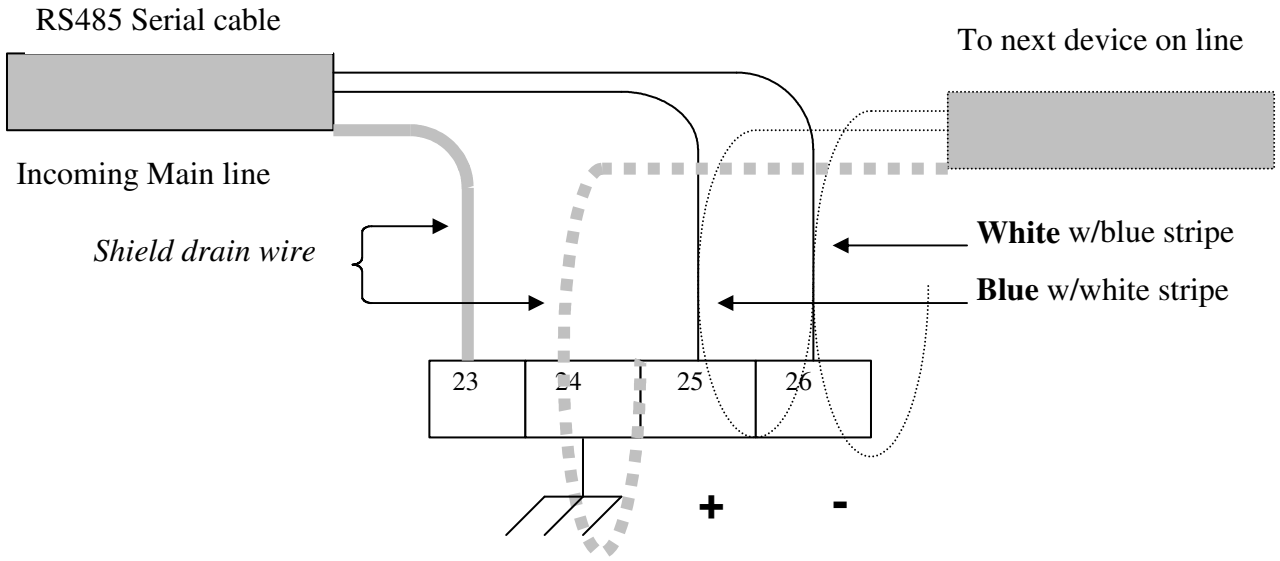

Figure 13 **Serial cable wired to**

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3.7 Network Supervisor

The Network Supervisor is a PC located in a remote location which gives the user the ability to **monitor**, **control and program up to 128 devices** over a 2 wire RS485 serial communication line and/or a RS455 fiber optic line. The devices can be a combination of PMCPs and I/O Modules (Sec. 11.8)

The Supervisor is a standard Pentium PC loaded with the ETC network software which provides 4 easy to read screens. Three screens are related to information from the PMCP and the other is related to the IO Module information. Custom screens are available.

Once the ETC network software has been loaded into the PC, the standard COM port of the PC must be connected to a device called the Network Module (Sec. 11.6). The PC is now a Network Supervisor and is ready to send/obtain information from the devices over the communication line.

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Features:

Ability to monitor/control up to 128 devices on a single communication line.

Ability to **control/program** parameters within the PMCP

Ability to monitor inputs and control outputs on the I/O Module

Ability to move in and out of screens with ease

Easy to read screens and completely user friendly

A global engine start indicator

Fast polling times of devices

Provides 4 easy-to-read data screens.

1.0 Status Overview screen
2.0 Metering Screen
3.0 Setting screen
4.0 Engine Status screen (screen data from I/O Module)

NOTE: To view a sample of the screen, refer to the website and select Network Supervisor (www.etccontrols.com).

NO need to install any internal hardware or modify your PC
NO expensive run time key required
NO extensive wiring or connections required

Specifications:

A standard Pentium with Windows, 32 MEG RAM (minimum)
A serial COM 1 or COM 2 port

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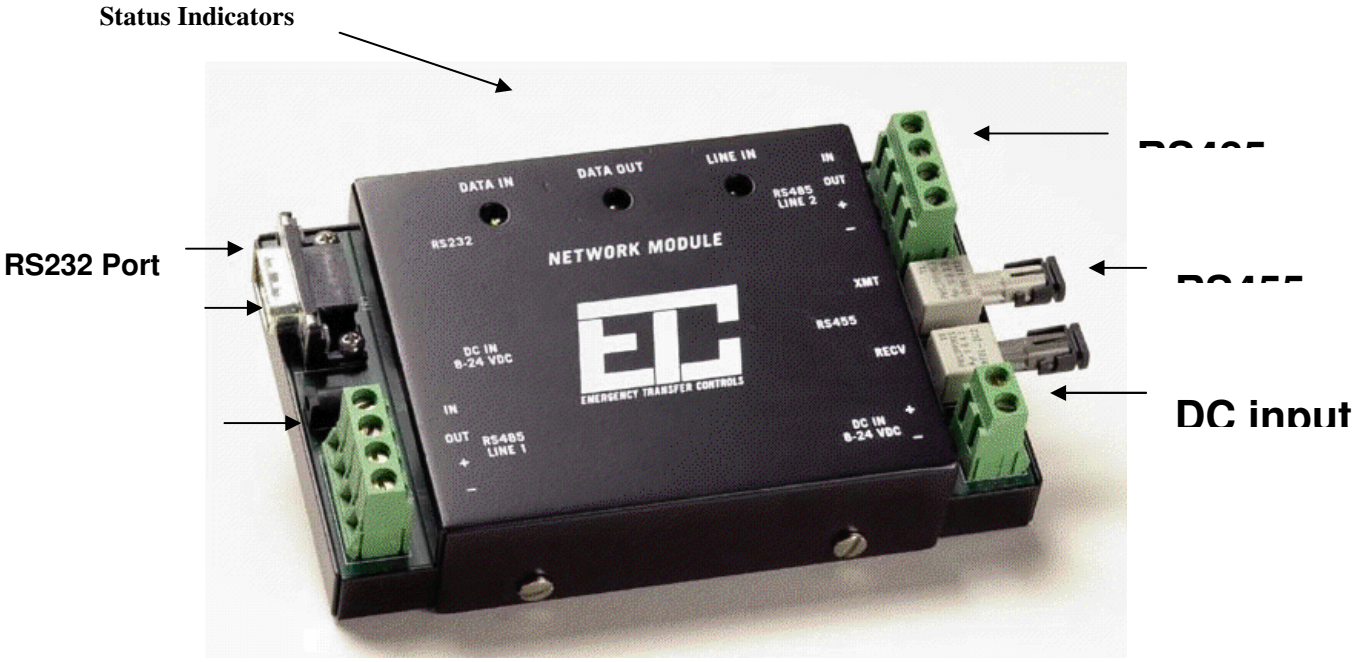
3.8 Network Module

The Network Module (Figure 17) was developed to work exclusively with the Network Supervisor. It provides the serial interfacing between the Network Supervisor and the devices on the communication line. The Network Module connects to any standard RS232 serial COM port on the PC and converts these signals to RS485 signals which are recognized by the PMCP and I/O module. The Network Module has the following features.

An RS232 converter to **2 - RS485** outputs
An RS232 converter to **RS455** output: fiber optics
An RS485 converter to RS232 output
An RS455 converter to RS232 outputs
Opto-Isolation between RS232 and RS485 ports
Ground terminals are provided for the RS485 shielded wire
Powered by a 120 VAC wall transformer or a DC supply (8 – 35 VDC)
DIN rail mountable



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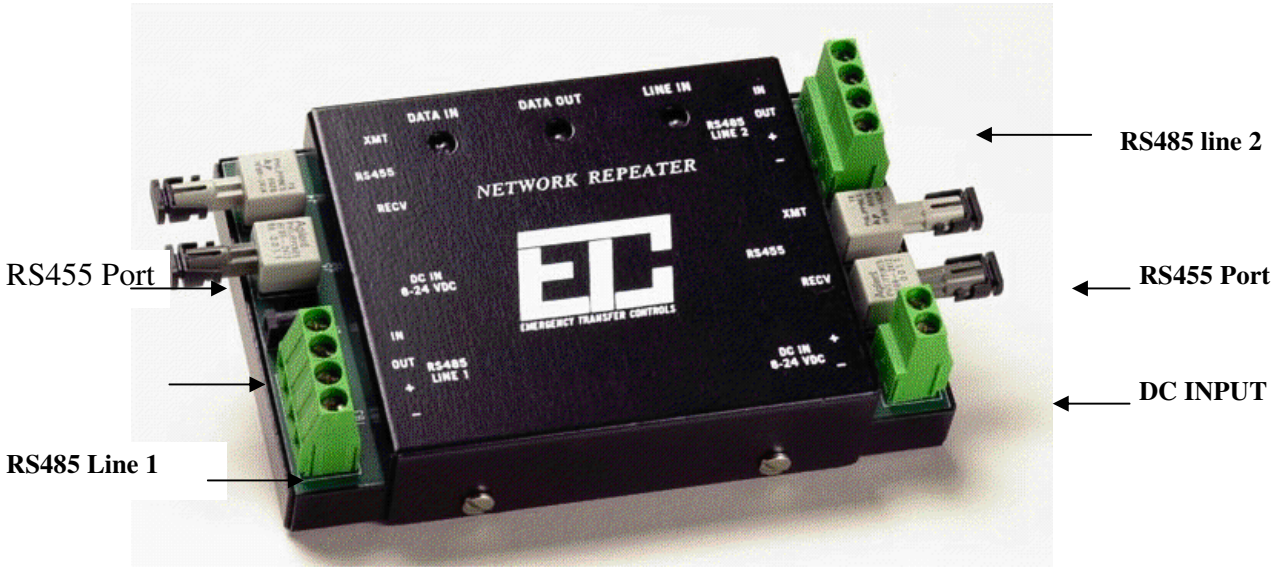
3.9 Network Repeater

The Network Repeater was developed to give the user the ability to extend beyond the standard maximum line run. The Repeater contains an RS485 repeater that will extend communication on the 2-wire line by an additional 4,000 feet. It also contains a RS455 repeater that will extend the communication on the fiber optic cable pair by an additional



5,000 feet. **The Network Repeater may also serve as a converter**: RS485 to RS455 and visa versa.

Figure 20 **Network**

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Standard features:

- An RS485 Repeater: RS485 ports are Opto-isolated
- An RS455 Repeater
- An RS485 to RS455 converter
- An RS455 to RS485 converter
- Opto-Isolation between RS232 and RS485 ports
- Ground terminals are provided for the RS485 shielded wire
- Powered by a 120 VAC wall transformer or DC supply (8 – 35 VDC)
- May be powered from the PMCP 24VDC
- Din rail mount
- Status indicator: 3 – LED's to show communication flow

Status indicators: rep

Data In:	On when data is being received from the RS232 (Supervisor)
Data Out:	On when data is being transmitted out to the RS485 and RS455 ports
Line In:	On when data is being received from the RS485 and RS455 ports

Connections:

- The network repeater may be powered from an AC adapter plug or an external DC supply.
- All ports are bi-directional and the user may select any port for communicating with the Network Supervisor (via Network Module), the PMCP and the I/O module.
- The user may require a Network Repeater per PMCP to convert from RS455 back to RS485 if a fiber optic link is used: the repeater shall serve as a converter from RS485 and visa versa.

NOTE: Please refer to the Network Module for RS455 and RS485 for wiring (Section 11.6).

Specifications:

Network Module measures 6.5 in. x 3.5 inv. X 1.0 in.

Meets EIA RS485, and RS455 standards

A 120 VAC wall transformer

Din Rail mount

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3.10 Input and Output Module (I/O Module)

The I/O Module (Figure 21) provides 8 general inputs and 3 outputs for monitoring/controlling other devices or products and communicates the status to the Network Supervisor. The general inputs may be used **to monitor engine status points, a transfer switch or breaker status**. The general outputs may be used to control or activate a particular function. The Network Supervisor shall monitor the 8 inputs and control the 3 outputs via serial communication line.

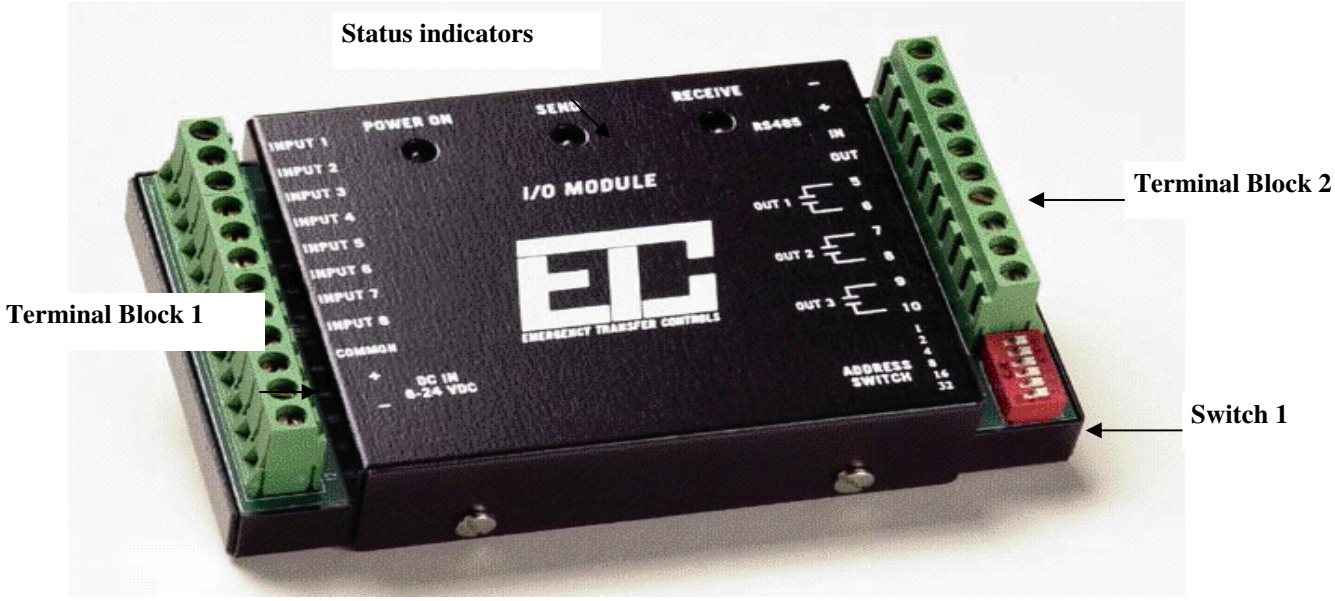

Figure 21 **Input Output Module**

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Standard I/O Module features:

2 – Terminal blocks for customer connections
Inputs configured for positive or negative input control logic
8 - Opto-isolated inputs
3 - Form A contacts
Dip switch for programming the serial address (63 devices may be addressed)
Opto-isolated RS485 port (communicate up to 4000 feet)
Powered by an external DC supply: 8 – 35 VDC (can be powered from the PMCP)
Inputs and outputs are monitored and controlled by the Network Supervisor
DIN rail mount
Status indicator: 3 – LED's to show communication flow

Status indicators:

Power On:	On when DC voltage is applied to the module
Send:	On when data is being transmitted out to the RS485 port
Receive:	On when data is being received through the RS485 port

Input and Output Module (I/O Module)

INPUTS: Connecting common terminal (TB1-9) to 24 VDC will cause the inputs to be activated with a ground signal (negative activation) is applied
Connecting the common terminal to 24 VDC ground will cause the inputs to activate when a 24 VDC signal (positive activation) is applied.

OUTPUTS: 3 – Form A contacts are provided for general use by the user. The outputs can only be activated/de-activated from the Network Supervisor over the communication line.

Serial connection:

NOTE: Please refer to the Network Module for RS485 wiring (Section 11.6).

Specifications:

Network Module measures 6.5 in. x 3.5 in. x 1.0 in.
Meets EIA RS485 standard
Powered by an external DC supply: 8 – 35 VDC
Contacts ratings: 1 amp @ 30 VDC or 0.5 amps @ 125 VAC

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3.11 Fiber Optics (RS455)

There are locations in the industry where noise can be a serious problem especially where standard RS485 communication lines are located. The wires may experience noise pickup that may interfere and corrupt the digital signals being transferred between the Network Supervisor and the devices on the line: PMCPs and I/O Modules. The best way to combat this problem is by using fiber optic technology. Fiber optic lines are immune to noise pickup. This fiber optic technology can easily be incorporated into the ETC network when using the Network Module and/or Network Repeater Module. Fiber Optic terminals are provided on these modules as a standard feature. Please refer to the website (www.etccontrols.com) to view the application notes.

Specifications:

Meet EIA RS455 Standard
Multi-mode operation
ST style connectors

Fiber optic cable:

Duplex cable
Zip cord style (dual cable)
62.5/125 um FDD1 orange (soft)
Diameter: 2.9 mm x 2
Duplex cable

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3.12 ETC Laptop operating Software

The **ETC Laptop Software** installs on a standard laptop and converts the laptop into a portable Scada for accessing data and programming settings within the controllers via RS232 Port or the USB port. Run the Laptop Demo to view screens.

Laptop Software instructions:

1.0 The file MScomm32.ocx must be put in the following directory:

1.0 Windows\Systems
1.2 The Laptop software can be put in C drive or desktop
1.3 Click on the Laptop Software and the file should open
1.4 Push the ATS button on the bottom and the ATS status Screen should open. There are two other screens: the setting and meter screen you can view.

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3.13 Handheld Programmer

The **Handheld Programmer** displays settings, voltages, currents, KW, PF, and status within the controllers. It also programs features, settings, and operating parameters within the PMCP Controller and monitors settings within the Mini Controller.

3.14 ETC Demo CD for Laptop and SCADA

ETC offers a free demo disk to run and sample the laptop operation and the Scada. Please contact factory.