



**NETMACS II
MONITOR, ALARM, & CONTROL
SYSTEM**

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Engineer: T. W.
Approved: T. W.

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Foreword

This manual is intended to help the user of the NETMACS II to install, test, troubleshoot, and understand the system. If you should have any questions or problems, please contact one of the following sources:

SERVICE - If for any reason further assistance is needed on any power equipment, complete engineering and field service groups are available in Galion, Ohio, to assist you in any way possible.

CALL: 419.468.7700 Field Service OR 419.468.7600 and ask for Field Service

PARTS ORDERING - Replacement parts for power equipment may be obtained by forwarding a Purchase Order to:

PECO II, Inc OR Fax to: 419.462.8180
 P. O. Box 910
 Galion, Ohio 44833

Include the following information:

- A. PECO II part number and engineering level of equipment
- B. If part is electrical, give circuit reference numbers and PECO II part numbers.
- C. If part is mechanical in nature, give description as to where it is used.

RETURN & REPAIR - Equipment may be returned to the Factory for repair. In order to do this, the procedure must be as follows:

- A. Call: 419.468.7700 Field Service OR 419.468.7600 and ask for Field Service
- B. Request a Returned Material Authorization (RMA) number for the defective equipment.
- C. Return material prepaid to:

PECO II, Inc
 1376 State Route 598
 Galion, Ohio 44833

Attn: Field Service Dept

Product Information

Please take a moment when the product is new to fill in this information. This data will allow faster service when calling PECO II to order accessories, spare parts, or request field service.

First, locate the product information label. This is typically located on the upper front of the equipment frame, or on the rear of the frame. Fill in the part number, as it appears on the label, in the space below.

PART NUMBER	DATE CODE:
SERIAL NUMBER	ECN Level: 860 _ _ _ _ P

Warnings

1. Electrical shock hazard. Do not attempt to remove, maintain, or install this equipment with power applied. Personnel that attempt to work on this equipment with the power applied may subject themselves or others to electrical shock that may cause serious injury or death.
2. The use of this equipment by unauthorized or untrained personnel should not be attempted. Personnel that work on this equipment without the proper training may subject themselves or others to electrical shock that may cause serious injury or death.
3. Do not attempt to work on this equipment if it is, or has been, exposed to a high moisture condition. It is recommended the equipment be returned to PECO II to be properly tested. Working on this equipment during a high moisture condition subjects the user to electrical shock that may cause serious injury or death.
4. Use of an attachment other than one approved by PECO II will void any and all warranties, implied or other, and will increase risk of fire, or may possibly cause electrical shock, injury, or death to personnel.
5. Do not operate this equipment if it has been dropped or otherwise damaged. Trying to operate this equipment if it has been damaged subjects yourself or others to electrical shock that may cause serious injury or death.
6. Before you proceed, ensure the input source is not live and the input circuit breaker(s)/fuse(s) has been tripped or removed. If these procedures have not been followed and the input/output power is live, serious personnel injury or death may occur.
7. A rack/shelf may contain several operating systems. If there is another system in the general area you want to install this system, be cautious of any exposed connectors or wires and, with permission, remove power to the other systems. Failure to take the necessary safety precautions subjects the installer or maintenance personnel to severe electrical shock that may cause serious injury or death.
8. This equipment may connect to lead-acid batteries. Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. **Wash hands after touching batteries.**

Cautions

1. Follow proper grounding instructions.
2. If connecting batteries, remove the battery-box-fuse or trip the circuit breaker. Check batteries and connections for proper polarity and power before connecting the batteries to the system
3. To remove the circuit breakers or fuses, the DC and/or AC input to the system will need to be disconnected, thereby disabling the system output to the load(s). Take the necessary precautions and inform the plant engineer that the system output power to the loads will be disabled.
4. Before performing any maintenance, ensure AC or DC power is not applied to the system.
5. Fuse holders, fuses, and circuit breakers are not to be loaded to more than 80 percent of their ampere rating.

SECTION 1: INSTALLER INFORMATION

CHAPTER 1: GENERAL INFORMATION

1.1 GENERAL

The paragraphs that follow contain information that is intended to help the user with the understanding of the NetMACS II operation. The system is configured with 24 Universal Input monitoring points (Analog (AI) or Digital (DI)), which may be established (named) by the user, however a standard factory configuration is installed prior to ship.

The NetMACS II basic system is comprised of (1) 6200608P-3 Gateway card, (1) 6200467P Relay card, and (1) 6200442P1-1 PicoMACS II card. A total of 31 more PicoMACS II's can be connected to a single NetMACS II.

1.2 SYSTEM DESCRIPTION

The NetMACS II basic (Fig. 1-1) provides up to 24 universal monitoring points used for digital or analog inputs that may be identified (named) by the user. These monitoring points can be used to monitor a variety of electronic equipment. The NetMACS II is a programmable unit that allows for each input to be customized to the parameters established by the user. As equipped, the NetMACS II allows 10BaseT Ethernet connectivity. The system operates from a -20 to -60 VDC power input via the connection on the side of the unit, refer to Figure 1-4.

In addition, the NetMACS II is equipped with a digital output option that provides four relay channels, each providing two Form C contacts. These relays reside on the companion interface card (for connection points see fig. 1-5) and extend plant alarms created within the NetMACS II.



Figure 1-1. Front View of NetMACS II

NOTE: If the NetMACS II will be used with a TL1 SNMP Bridge, refer to manual #4380201PD for further TL1 details.

CHAPTER 2: MECHANICAL INSTALLATION

1.3 DIMENSIONS

Width:	19"
Depth:	9.5"
Height:	1.75"

1.4 MECHANICAL INSTALLATION

The paragraphs that follow contain the necessary procedures to install the system.

A. Remove the system from the shipping container as follows:

1. With a utility knife and starting at the four top corners of the cardboard shipping container and working down, carefully and slowly cut the corners of the cardboard until the shipping container separates.
2. Remove the excess packing material.
3. Inspect the equipment. Note any shipping damage, if present, and immediately notify the carrier and PECO II at the numbers listed at the front of this manual. It is recommended that if there is shipping damage, photographs be taken of the damage.
4. Take an inventory.

B. Ensure the system matches the order that was placed.

All external wiring will be connected by the installer, including: the input power, individual wiring to input channels, alarm wiring to customer furnished external alarms (if required), the serial local connection, etc.

C. Mount the system as follows: (instructions for use and installation are also on the print)

1. Ensure there is proper clearance to install the system.
2. Use brackets 4082048P for 19" mtg. For 23" mounting use brackets 4082048P-2.
3. Put the system into position and secure with screws at each mounting bracket (Refer to figure 1-2).

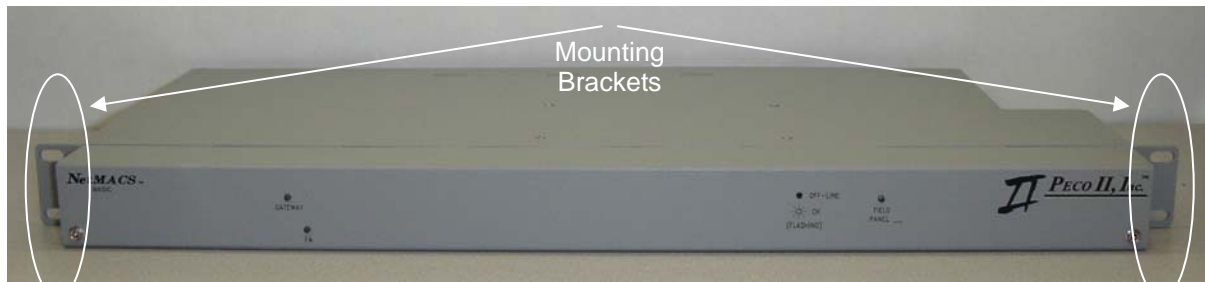


Figure 1-2. Location of Mounting Brackets

Figure 1-3. Wall Mounting Brackets (NetMacs shown)



WALL MOUNT OPTION (see Figure 1-3, detailed instructions for use and installation are also on the print)

1. Use brackets 4082048P for 19" mtg. For 23" mounting use brackets 4082048P-2.
2. Adjust the wiring cover to match the width of the unit.
3. Re-use the mounting bracket hardware from the unit.
4. Ensure that the star lock and dragon tooth washers are placed per print to maintain the frame ground integrity.

CHAPTER 3: ELECTRICAL CONNECTIONS

Note 1: Fuse or circuit breaker protection external to the system is to be provided by the customer unless factory wired into a power board.

Note 2: Wire sizes are based on the voltage drop considerations and the National Electric Code Table 310-16 for copper wire.

1.5 GENERAL

The NetMACS II is installed with -20 to -60 VDC input power. In addition, several connections will be made for monitoring points, alarms, and interfaces.

1.6 INPUT POWER REQUIREMENTS

(See The T-drawings contained as an attachment to this manual, the plant manuals, and the associated configuration sheets for diagrams of connections.)

The input voltage required is -20 to -60 VDC. This source must be fused with a one and a third amp (1 $\frac{1}{3}$ A) fuse and is provided internally (see figure 1-3).

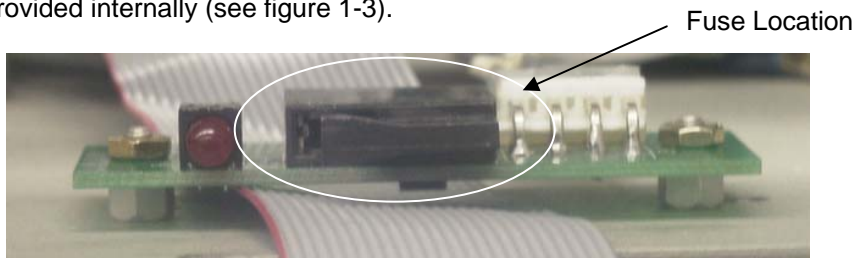


Figure 1-3. Location of 1 $\frac{1}{3}$ Amp Input Power Fuse

1.6.1 INPUT ELECTRICAL CONNECTIONS

The system electrical input connection is on the left side of the system (looking at the front). The system operates on a -20 to -60VDC power input. See Figure 1-4 and Table 1-1.



Figure 1-4. Input Power Connection

Table 1-1. System 48 VDC Power (All) Terminals

Terminal Capacity	Terminal Type	Recommended Wire Size	Recommended DC Feeder
18-22 AWG	Push-In Terminals on Interface PWB (TB1)	20 GA	1 $\frac{1}{3}$ Amps

1.7 ANALOG INPUTS (AI), DIGITAL INPUTS (DI), & DIGITAL OUTPUTS (DO)

All Analog Inputs (AI) and Digital Inputs (DI) are to be wired by the on-site installer. The inputs are on the back of the NetMACS II. The top row is for the positive input, while the bottom row is for the return. See Figure 1-5 and Table 1-2 and 1-3.

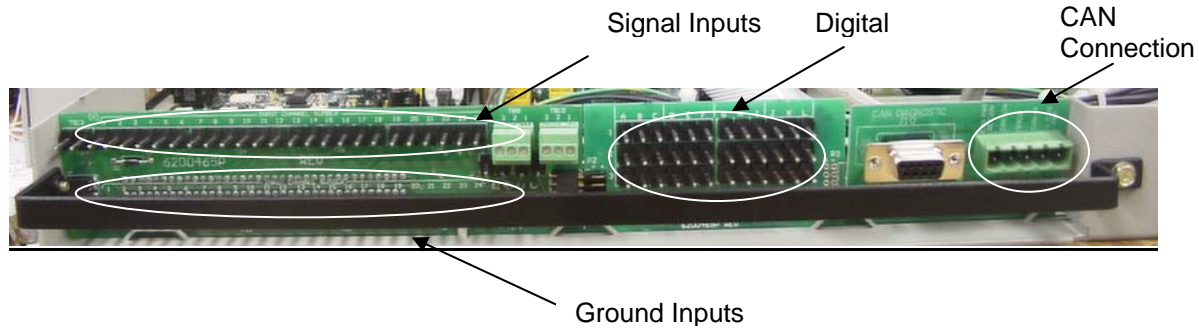


Figure 1-5. Location of Input Channels

Digital (alarm) outputs are to be wired by the on-site installer to the office alarm collection system per TELCO assignment. See the relay pin outputs below.

	A	B	C	D	E	F	G	H	I	J	K	L	
1		closure when on			closure when on			closure when on			closure when on		1
	*	*	*	*	*	*	*	*	*	*	*	*	
	closure when off				closure when off				closure when off				
	RELAY 1			RELAY 4			RELAY 7			RELAY 10			
2		closure when on			closure when on			closure when on			closure when on		2
	*	*	*	*	*	*	*	*	*	*	*	*	
	closure when off				closure when off				closure when off				
	RELAY 2			RELAY 5			RELAY 8			RELAY 11			
3		closure when on			closure when on			closure when on			closure when on		3
	*	*	*	*	*	*	*	*	*	*	*	*	
	closure when off				closure when off				closure when off				
	RELAY 3			RELAY 6			RELAY 9			RELAY 12			

Table 1-2. Input (AI/DI) Terminals

Terminal Capacity	Terminal Type	Recommended Wire Size
20-24 AWG (Solid)	Wire-Wrap Terminals	22 GA Twisted Pair. (1350010P)

Table 1-3. DO (Digital Output) Terminals (When ordered with Digital Output Option)

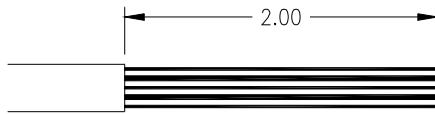
Terminal Capacity	Terminal Type	Recommended Wire Size
20-24 AWG (Solid)	Wire-Wrap Terminals	22 GA Twisted Pair. (1350010P)

1.8 COMMUNICATION INSTALLATION

A. Connect the communications to the NetMACS II as follows:

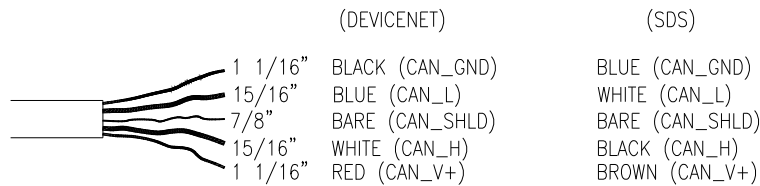
1. For local communications, connect to the serial interface via the DB25 connector located on the back of the panel. A null modem cable is required for connecting to a PC. For a DB9 PC connection, a DB25 to DB9 adapter is needed.
2. For a permanent Ethernet connection, plug the RJ45 connection into the RJ45 socket (J15) in the rear of the system. Verify Ethernet Link Valid (L5) on the Gateway PWB is lit.
3. For a modem connection (when ordered) with a rack-mounted system, connect the modem connection located on the rear of the system (J11) with an RJ11 type connector.
4. To connect the CAN, wire the connector as follows:

- a. Start by trimming back 2" of sheath, filler, and foil. Do not cut any wires, including bare (GND-DRAIN) wire until step 2.



Ensure that there are no nicks in the insulation on the wires.

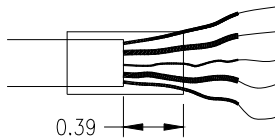
- b. Cut individual lengths of wire as indicated:



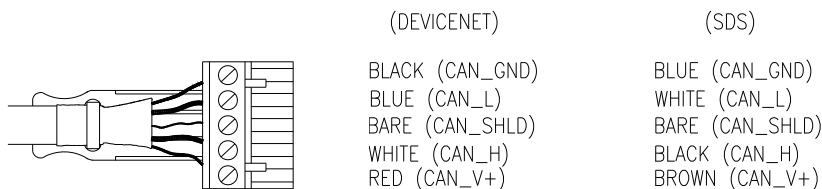
NOTE: On the end of each CAN cable there is a 120 ohm resistor. This resistor needs to be removed from each cable, except the last supplemental unit. If no supplemental unit is required, the resistor on the main unit will remain in place.

- c. Strip and tin each lead to 1/4"

- d. Install 1" of 110809 heat shrink tubing as shown (DO NOT apply heat until step f).



- e. Install leads in 3090369P-5 connector as shown:



- f. Apply heat to heat shrink tubing and fasten with cable tie.

CHAPTER 4: INITIAL TURN ON & ACCEPTANCE PROCEDURES

1.9 APPLYING INPUT POWER

Once all input and output connections have been made, apply the required -20 to -60VDC input power to the NetMACS II. Once this is accomplished, the acceptance procedures may begin. First, Con_ui must be installed on the user's PC that is connected to the NetMACS II.

1.10 CONSOLE USER INTERFACE (Con_ui)

Refer to the Con_ui manual (4380200PD) contained as an attachment to this manual.

Con_ui.exe is a Client-based program that executes on the User's PC. Con_ui provides a text-based User interface to the Gateway. This interface is similar to MS-DOS™ with its command line prompt and structured syntax.

1.10.1 USING CON_UI (CONSOLE USER INTERFACE)

Prior to running Con_ui, four conditions must be met. These conditions, A through D, are as follows:

- A. Physical Connection to the User's Network or the User's PC. The User's PC must be connected to the network on which the NetMACS Gateway resides. Alternately the User's PC may be directly connected to the Gateway via an Ethernet cable (RJ45 to RJ45, cross connect wired) or through a serial cable, (DB9F to DB25M, null modem wired) connection. Note: If a serial connection is used, select an unused COM port on the User's PC. An adapter is required if the selected COM port is not a DB9 connector.
- B. NetMACS Gateway IP Configuration. A unique IP address must be assigned to the Gateway by a Network Administrator. The Gateway must then be configured to use this assigned IP address. If the Network Administrator needs to know what sockets to open up for the IP address, in addition to FTP and HTML the system requires 80 and 1500 to be opened to pass browser and Con_ui data.

1. Ethernet Connection

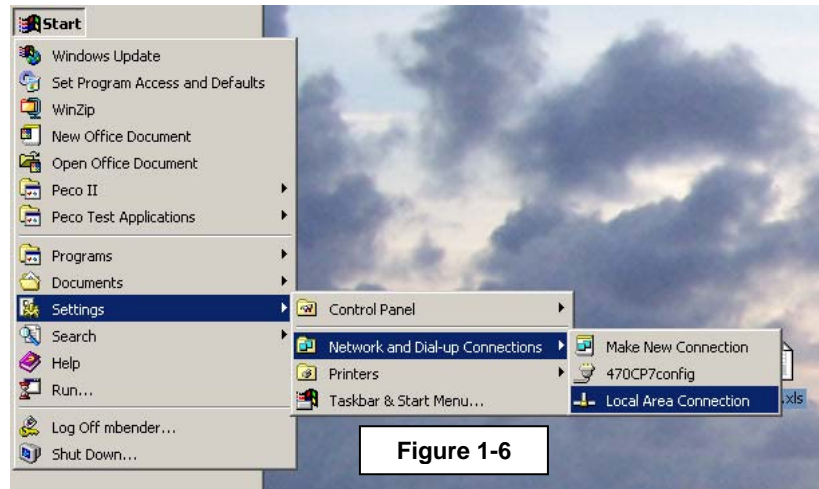
If a serial connection is used to connect, skip to the Serial Connection section. The IP address on the User's PC must be changed initially in order to connect to the Gateway. This allows the IP address of the Gateway to be changed to the address as assigned above. The IP address for the NetMACS II is stated on a tag, which is attached to the unit. This manual uses the Factory default IP address (Users IP address may be different) for the Gateway, which is 10.1.4.50, the IP address of the User's PC must first be changed so that it is in the same scope as the Gateway's address. Setting the IP address of the User's PC to 10.1.4.30 satisfies this requirement. For specific instructions on changing the IP address of the User's PC consult the Corporate Network Administrator or, for Users who are familiar with the terms and procedures stated previously, abbreviated instructions are as follows:

- a. Abbreviated Instructions for Changing the User PC's IP Address in Windows 98

Please note: Changing the IP address of the User's PC, which is network connected, will cause the PC to no longer be part of the local network. For this reason it is suggested that a portable PC be configured and directly connected to perform this task. In Windows9X™, the IP address can be changed by selecting Start ≡ Settings ≡ Control Panel ≡ Network ≡ TCP/IP->... Ethernet.....≡Properties. Select the radio button next to "Specify an IP address" and type 10.1.4.30. For the subnet mask, type 255.255.255.0. When all open Network windows are closed, Windows9X™ will prompt to restart for changes to take effect. Choose Yes. After the User's PC restarts, it is ready to connect to the Gateway through Con_ui.

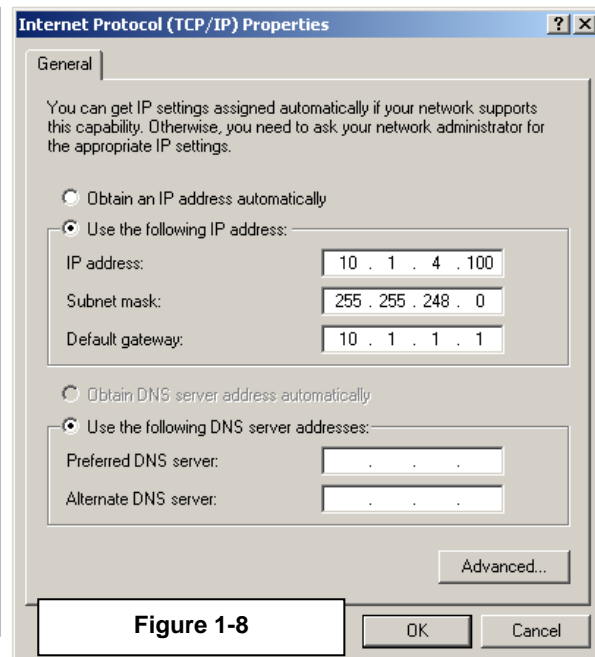
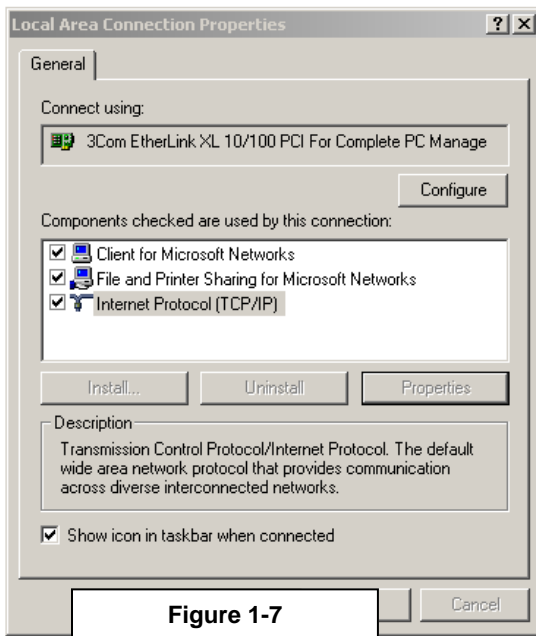
b. Abbreviated Instructions for Changing the User PC's IP Address in Windows 2000

1. Open the local area connection (Ethernet) through the Start menu. Refer to Figure 1-6.



2. Select **Properties**.
3. Next, highlight "**Internet Protocol (TCP/IP)**" and click **Properties**. Refer to Figure 1-7.
4. Next, select the **Use the following IP address** option and enter the following (Figure 1-8).

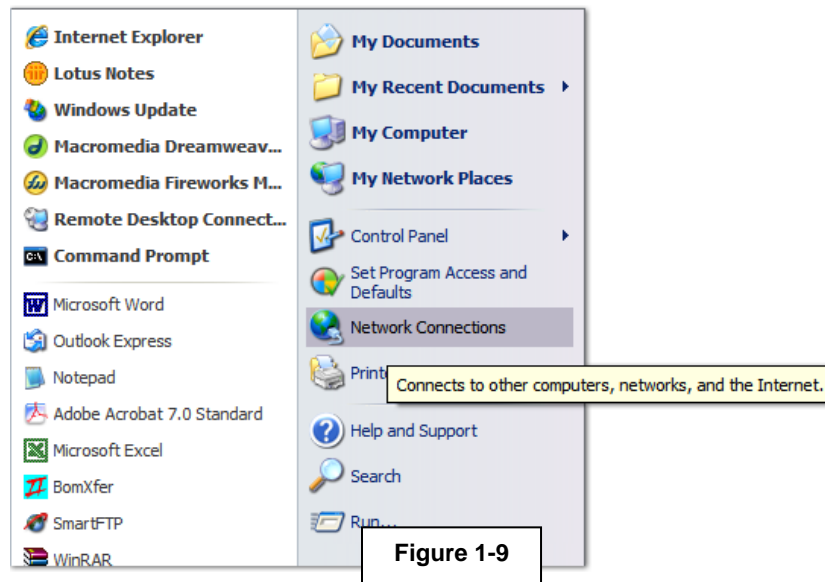
IP address: 10.1.4.100
 Subnet mask: 255.255.248.0
 Default gateway: 10.1.1.1



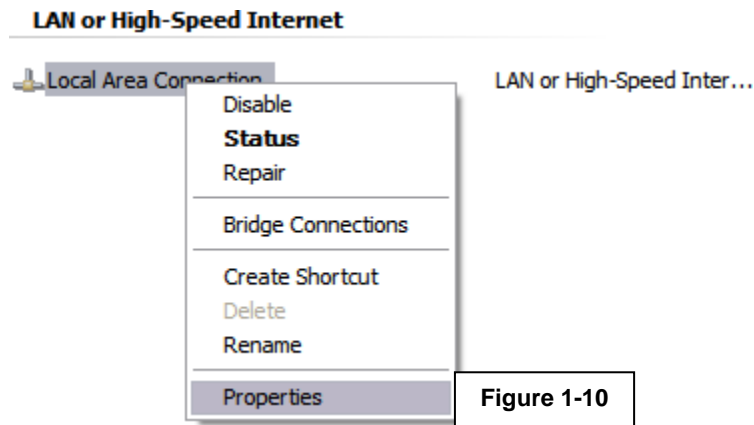
5. Click OK on all screens. The PC may require a reboot, if so reboot now.
6. Connect the crossover (Ethernet) cable to both, the PC and the NetMACS II.

c. Abbreviated Instructions for Changing the User PC's IP Address in Windows XP

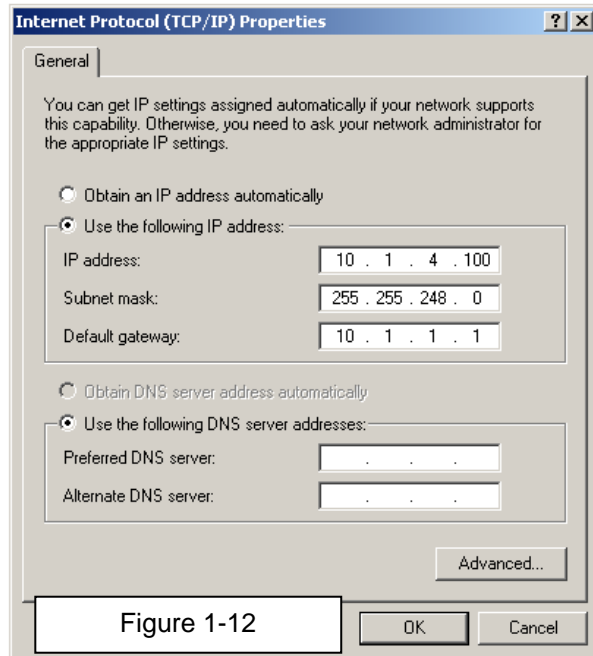
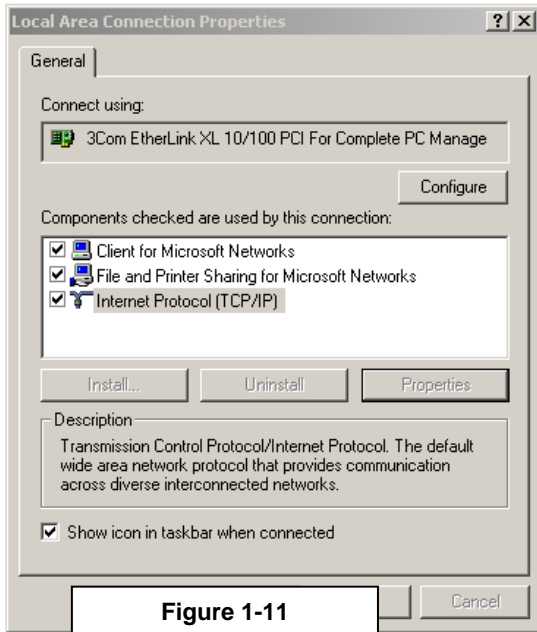
1. Open the network connections on the PC, as shown in figure 1-9.



2. Right click on the LAN connection and select properties. Refer to Figure 1-10 below.



3. Next, highlight "**Internet Protocol (TCP/IP)**" and click **Properties**. Refer to Figure 1-11.



4. Select the **Use the following IP address** option and enter the following (Figure 1-12).

IP address: 10.1.4.100
Subnet mask: 255.255.248.0
Default gateway: 10.1.1.1

5. Click OK on all screens. The PC may require you to reboot, if so reboot now.
6. Connect the crossover (Ethernet) cable to both, the PC and the NetMACS II.

3. Serial Connection

The Serial Connection does not require the IP address of the User's PC to be changed. Rather, it uses the Direct Cable Connection component of the Windows9X™ Operating System to establish a PPP (point to point protocol) connection to the Gateway.

a. Abbreviated Instructions for Direct Cable Connection

A portable PC should be configured and directly connected to perform this task. In Windows9X™, the IP address can be changed by selecting Start = Programs = Accessories = Direct Cable Connection (or Accessories = Communication = Direct Cable Connection). If this option does not appear on the User's PC, the Direct Cable Connection program must be installed from the original Windows™ media. (Control Panel, Add/Remove Programs, Communications, etc.)

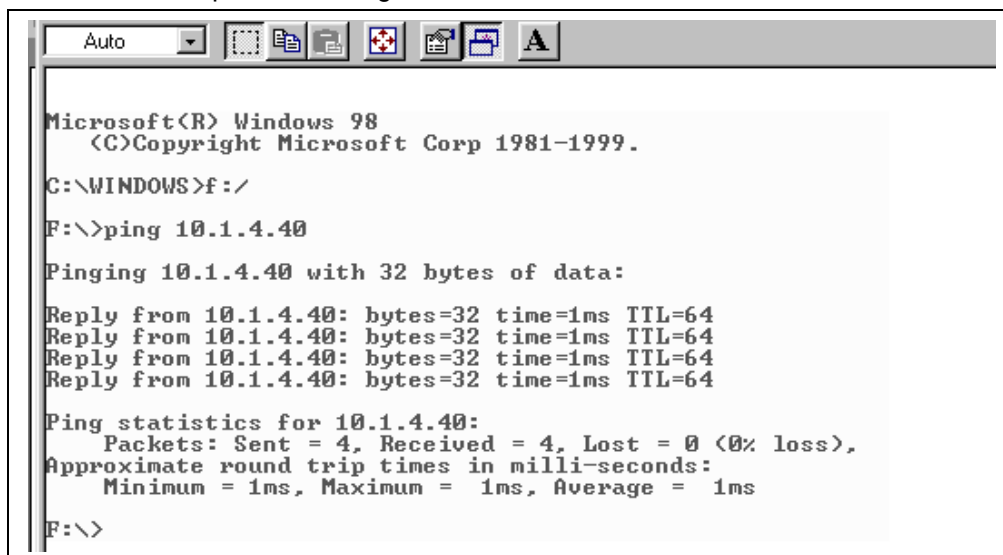
The connection process will take the User through several dialog boxes, resulting in the direct connection. In the first Dialog box, select the radio button next to *GUEST*. In the next Dialog Box, select the COM port to be used, and in the last Dialog Box, select finish.

As the process continues, *Status* Dialog Boxes will appear indicating User Name and Password verifying, the verified. If prompted for "Enter Network Password", select cancel (A password is not required for the connection, only for the Con_ui session). Likewise, if prompted for "Host Computer Name" also select cancel. When successful, the status dialog box "Direct Cable Connection" Status: Connected via Serial Cable on COMX will remain on the screen. Do not close this box, doing so will drop the connection and end the session. If desired, this window may, however, be minimized.

C. Verifying the Network Connection

NOTE: The Gateway responds to two IP addresses, one configurable, and the other fixed. The IP address depends on which connection was established (Ethernet or Serial) For the remainder of the document the Ethernet IP address will appear in the text, followed by the fixed Serial IP address in (parenthesis). Example 10.1.4.50 (10.0.0.1)

While Console User Interface is a true Windows™ 32 bit application, it is not graphical. For this reason it runs inside an MS-DOS™ window. From the Start button, Choose Programs, then MS-DOS™ Prompt. An MS-DOS™ window will open on the screen. To verify the network connection, at the MS-DOS™ prompt type "*ping 10.1.4.50 (10.0.0 TT.1)*" MS-DOS™ will respond with "*Pinging 10.1.4.50 (10.0.0.1) with 32 bytes of data*" If it is successful in finding the Gateway, MS-DOS™ will respond with "*Reply from 10.1.4.50 (10.0.0.1): bytes=32 time=xxms L=xx*" If MS-DOS™ responds with messages such as "*Destination Host Unreachable*, or "*No reply from....*" there is a problem with the configuration. This problem must be corrected prior to running Con_ui.



```

Microsoft(R) Windows 98
(C)Copyright Microsoft Corp 1981-1999.

C:\WINDOWS>f:/
F:\>ping 10.1.4.40

Pinging 10.1.4.40 with 32 bytes of data:

Reply from 10.1.4.40: bytes=32 time=1ms TTL=64
Reply from 10.1.4.40: bytes=32 time=1ms TTL=64
Reply from 10.1.4.40: bytes=32 time=1ms TTL=64
Reply from 10.1.4.40: bytes=32 time=1ms TTL=64

Ping statistics for 10.1.4.40:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

F:\>

```

D. Changing the IP Address of the Gateway (Refer to section 1.10.3)

1.10.2 STARTING CON_UI

NOTE: This manual will use Drive A as the Floppy drive, the user's computer Floppy Drive may differ.

From the Start button, choose Programs, then MS-DOS™ Prompt. An MS-DOS™ window will open on the screen. Insert the 3.5" Diskette, supplied by the Factory, into Floppy Drive A. Change the current directory to Drive "A:" The MS-DOS™ prompt will now be "A:\>"

At the MS-DOS™ prompt type "*Con_ui 10.1.4.50 (10.0.0.1)*". If prompted for a password; type "*macs*". When the password is accepted, a session is started by showing the standard logon and Header information.

Please Note: Con_ui keywords or commands will appear underlined in the following text. Text which shows interaction between Con_ui and the User will appear as follows: Text or Prompts from Con_ui will appear in ***Bold Italics***, while the User's response will appear in *italics*. Below is an example of a typical logon:

<p>A:\><i>con_ui 10.1.4.50 (10.0.0.1)</i></p>	<p>Start Con_ui Session Customer Definable Password</p>
<p><i>Password? macs (Note: password is not echoed to the screen!)</i></p>	<p>Standard Logon Text Standard Logon Text</p>
<p><i>Control Evaluation v4.55, Interface v4.55 PECO II, Inc. 1376 St. Rt. 598 Galion, OH 44833</i></p>	<p>Standard Logon Text Standard Logon Text</p>
<p><i>Copyright (c) PECOII, Inc. Controls Corp. 1990-2001. All rights reserved.</i></p>	<p>Standard Logon Text</p>
<p><i>PECO II, Inc. NetMacs Monitor, and Alarm System Level 3 Monitor System 620NETP-10 - - Enter MENU, HELP, or ? for List of Commands Application Program Version 6</i></p>	<p>Customer Definable Header Customer Definable Header Customer Definable Header Customer Definable Header Customer Definable Header Customer Definable Header</p>
<p><i>Number of active alarms: 0</i></p>	<p>Customer Definable Header</p>
<p><i>Wed Oct 10 2001 10:44:37 Auto DST</i></p>	<p>Customer Definable Header</p>
<p><i>Command?</i></p>	<p>Customer Definable Header</p>
<p></p>	<p>Standard Logon Text</p>
<p></p>	<p>Standard Logon Text</p>
<p></p>	<p>Command Prompt</p>

Important editing note: The User may abort any chain of commands and return to the Command? Prompt by using the Ctrl C (^C) key combination. (Press and hold the Ctrl key, then press the C key.)

1.10.3 CHANGING THE GATEWAY IP ADDRESS

To change the IP address of the Gateway, perform the following:

Command? <i>access</i>	Get to Programming Level
Command? <i>setup</i>	Select <u>Setup</u> sub-menu
Setup? <i>Network</i>	Select Network
Network Configuration? <i>?</i>	Entering "?" here will provide a list of options to choose from. The ? can be entered from any of the prompts to obtain a list of possible selections.
Choose from - IP-Configuration Domain-Name System-Name Title Reply-To User-Id	
Network Configuration? <i>IP-Configuration</i>	Select IP-Configuration
Current IP Configuration: IP address: 10.1.4.40 Netmask: 0.0.0.0 Gateway: 10.1.1.1	Current Information is displayed
Network configuration is user specified	
IP address? <i>10.1.4.42</i> Netmask? <i>0.0.0.0</i> Gateway address? <i>10.1.1.1</i> New IP address, 10.1.4.42, will take effect after next boot	Enter new IP address Enter Netmask Enter Gateway address
Command?	User is returned to the command prompt

After resetting, the Gateway is now responding at its new IP address. At this time, the User's PC must be set back to its original IP address. Keep in mind that the next time Con_ui is started; the IP address used must be the new IP address of the Gateway as set in the steps above.

1.11 OPERATIONAL CHECKOUT

For the entire operational checkout, a computer with Con_ui loaded is needed (refer to paragraph 1.10).

A. Connect a PC to the NetMACS II communication port RS-232 (DTE) J14 (Gateway) using a customer supplied null modem cable, or via the RJ45 Ethernet port (J15). Refer to sections 2.1.7 and 2.1.8.

B. Compare a known voltage level at one channel of the NetMACS II to the corresponding reading indicated through the Con_ui interface. Error should be less than +/- .1Vdc. Refer to 4380200PD contained as an attachment for detailed information regarding Con_ui.

C. Verify another analog reading is available. All readings should be accurate to within 0.5% of full scale.

There are numerous monitoring points that are available on a typical –48 VDC power plant. Mid-string voltage and battery string currents are listed below.

D. Read the midstring battery voltage channels and verify the readings on the NetMACS II. Readings should be within ± 0.1 Vdc of the actual reading taken at the battery string. This should clear any alarms that are being logged in by midstring difference voltage channels and alarm outputs from DO1. Enter adjustments in the channels as required to match the actual voltage.

E. The battery string shunt channels (when equipped) have been calibrated at the factory by simulating battery currents. Verify their accuracy by turning off all the rectifiers and allowing the batteries to carry the load. Measure the millivolts present at the shunt sense lead connection points and equate it to the amount of current that is being discharged from the batteries. This should be a negative reading on the NetMACS II channel. Compare the measured reading to the NetMACS II reading. If readings do not match, verify the shunt size matches the programmed full-scale range in the NetMACS II. If these match but the readings are more than 0.5% off, then enter an adjustment to the channel to make them match. Turn the rectifiers back on. This should result in the rectifiers providing charge current to the batteries. This reading should be positive on the NetMACS II.

F. Verify AC voltage readings match actual measurements. Enter an adjustment to the channel as required.

G. Verify proper ambient temperature readings (when equipped) at the NetMACS II. Adjustment was entered at the factory for this channel. If temperatures differ by more than 2 degrees, enter an adjustment for the channel.

H. Using Con_ui, clear the alarm log of the NetMACS II. (Type access, then enter, type clear, then enter, type alarm log, then enter.)

I. Using Con_ui, clear the trend log of the NetMACS II. (Type access, then enter, type clear, then enter, type trend log, then enter.)

J. Using Con_ui, clear the analog statistics of the NetMACS II. (Type access, then press enter, type clear, then press enter, type analog statistics, then press enter.)

SECTION 2: DETAILED SYSTEM COMPONENT INFORMATION

2.1 STANDARD FEATURES

The system comes with many standard features. These features are detailed in the following paragraphs.

2.1.1 FRONT ACCESS

The system has been designed to allow the user front access to all controls and indicators. The front panel is removable to allow the user or maintenance personnel access to the Gateway PWB, the PicoMACS PWB, the relay PWB, and the memory backup battery.

2.1.2 SIMPLE CONFIGURATION

The system is configured to accept up to 24 digital or analog inputs and provides for up to four DO relays via connections on the interface PWB.

2.1.3 PROGRAMMING

As shipped, a Factory Configuration is loaded into the NetMACS II, however, programming of the NetMACS II is relatively simple due to the internal operating system (user interface, DOS and Text based). Simple prompts at each access level provide guidance to the user. Once the prompts have been satisfactorily answered, the system will accept the programming routine without any additional programming required by the user. Programming access levels can be password protected.

2.1.4 INPUT CHANNEL PROTECTION

Each input channel allows a 60 VDC maximum (analog) on the input pins. Over voltage should not damage the inputs, and will report overrange on the overvoltaged channels.

2.1.5 STATUS/REPORTS

Once the system has been programmed, the user can select to review prior alarm indications and the condition of the system that is being monitored at each control point. Reports can be generated that give the user an alarm history for each channel designated as an alarm point.

2.1.6 BATTERY BACKUP

The system has a 3.6 Volt Lithium cell battery (figure 2-1) to retain programming memory in the event system power would be lost. This battery should be changed annually (refer to section 2.6).

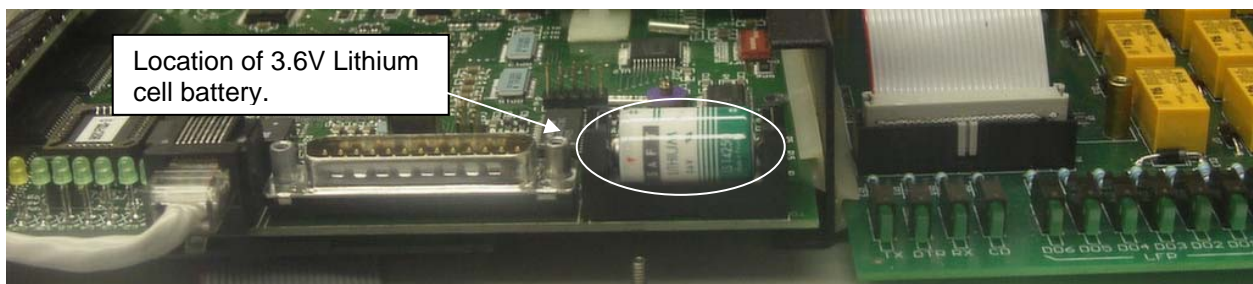


Figure 2-1. Location of 3.6 Volt Lithium cell Battery.

2.1.7 LOCAL PORT CONNECTION

A DB25 connector on the rear panel, J14, (Gateway) allows direct connection of a PC for initial IP configuration.

2.1.8 ETHERNET CONNECTION (10BASE-T CONNECTIVITY)

The NetMACS II has the ability to be monitored and controlled remotely through the Ethernet connection on the back of the unit.

2.1.9 24 UNIVERSAL MONITORING POINTS

The NetMACS II is equipped with 24 universal monitoring points that can be either analog or digital.

2.1.10 CHANNELS

The NetMACS II is equipped with 24 universal monitoring points to monitor either Digital or Analog Inputs, as determined by the user. In addition, the NetMACS II has Digital Outputs (Form C contacts) that reside on the interface PWB. The purpose of each channel is as follows:

2.1.10.1 Digital Input (DI) Channels

When a channel is selected as a digital input, it is used primarily for monitoring any alarms (GRD or BAT) from the plant. These channels are typically used to monitor alarms, relay contacts from local or remote equipment, etc.

NOTE: For DI points, a voltage greater than 30VDC (up to 60VDC) is interpreted as a closure.

2.1.10.2 Analog Input (AI) Channels

When a channel is selected as an Analog Input, it is used primarily for monitoring any signals (ranges) from the plant. These channels are typically used for direct temperature readings, AC voltage (from a transducer), DC voltage and current from rectifiers, converters, etc. via transducers and shunts, and other analog ranges. Maximum Input voltage to the Analog channels is 60 VDC

2.1.10.3 Digital Output (DO) Channels

The NetMACS II interface PWB contains the (6) digital output relay channels; each channel provides two Form C contacts. Typical applications include extending alarms or for control of equipment.

2.2 OPTIONAL COMPONENTS

2.2.1 Optional Transducers

Several transducers are available, depending on the type, amplitude, and parameters to be measured. These transducers must be utilized prior to connecting the output of the plant to the NetMACS II Analog Input channels (maximum 60 VDC to the channels, when selected). PTC (Positive Temperature Coefficient) thermistors are recommended for use with all DC voltage and DC current channel inputs to protect the wiring. The installer is required to provide wire, splices, and other lugs as required for installation.

2.2.2 DB25 to DB9 NULL cable

A DB25 to DB9 NULL adapter must be utilized to connect to the NetMACS II locally. Additionally, an application program (supplied by the manufacturer) must be installed on the User's PC.

2.3 CONFIGURATION ARRANGEMENT

See the appropriate (ordered) or custom application configuration sheets for your system. Standard configurations are available as plant list numbers or custom systems can be provided.

2.4 PWB REMOVAL

The system has a removable front access panel and the PWBs can be removed. This section gives the procedures necessary for the removal of the system PWBs that are replaceable by field service technicians. The installation of these components is covered in paragraph 2.5, PWB Installation.

The system is completely repairable to the board level in the field. The NetMACS II Control PWB can be removed and installed from/to the system.

NOTE: In the following removal procedures, the connectors that are going to be removed should be marked regarding location before they are removed from the PWB. If they are not marked, to ease installation, it is recommended that they be identified as to location before they are removed.

Remove the PWBs from the system as follows:

- A. Inform the Site Engineer that maintenance is being performed and a system error will occur.
- B. Remove the front cover of the NetMACS II to gain access to the PWBs.
- C. Remove the NetMACS II input power fuse (F1). The fuse is located (see Figure 1-3) to the bottom, left of the unit.
- D. Pull the board towards you and remove the connectors and connections as required.

CAUTION: In the following paragraphs, during the removal/installation of the PWBs there are components, which can be harmed by electro-static discharge (ESD). Ground yourself with a grounding strap and stand on a rubber mat using normal shop practices whenever the boards are handled.

2.5 PWB INSTALLATION

The system has a removable front panel and the PWBs are easily installed. This section gives the procedures necessary for the installation of the system PWBs that are repairable by field service technicians. The removal of these PWBs is covered in 2.4.

The system is completely repairable to the board level in the field. The NetMACS II Control PWB can be removed and installed from/to the system.

If not already accomplished, gain access to the PWBs per Section 2.4, PWB Removal and install the PWBs as follows:

- A. Remove the old board per steps in Section 2.4.
- B. Install the new board into position, replace connectors as needed, and gently push on the front of the board until properly seated.
- C. Replace (F1) input power fuse.

- D. The PWB is installed. Replace the front cover and perform the operational checkout procedure in Section 1.11.

2.6 BATTERY REMOVAL/REPLACEMENT

There is a 3.6 V lithium battery installed on the NetMACS II Control PWB (figure 2-1) to retain system memory in the event the power was lost to the system. This battery should be replaced annually. Replace the battery as follows:

- A. Remove the front cover of the NetMACS II.

CAUTION: It is very important to ensure the system is in operation and that the power does not become disabled while the battery is removed from the system. If the battery is removed while power is disabled, the NetMACS II application programming will be erased.

- B. Ensure the system is **operating normally** and then locate the battery.
- C. Remove and replace the battery. Observe the correct polarity of the battery when it is replaced into the system. Ensure the system maintains normal operation.
- D. Record the date when the battery was replaced. Identify this date on the system or battery.

SECTION 3: SPECIFICATIONS AND TROUBLESHOOTING

3.1 SPECIFICATIONS

The following information is intended to give the user a quick reference to information that is necessary to install and operate the system. Included are input requirements and other information that may be useful during the operation or installation of the NetMACS II.

Input Requirements:

Voltage:	20 to 60 VDC
Current:	< 1 Amp
Recommended DC Feeder	1 1/3 Amps

Channel Ratings:

Maximum DC Input:	60 VDC on Input Pins
Digital Inputs:	30 to 60 VDC interpreted as a closure
Digital Outputs:	Open Collector rated at 80 VDC
Relay Rating:	110 VDC, 0.3 Amp 30 VDC, 1.0 Amp

Mechanical Requirements:

Mounting:	Rack mounted
Weight:	<1 lb each PWB

Environmental Ratings:

Temperature:	Operating:	0°C to +50°C (+32°F to +122°F)
	Storage:	-40°C to +85°C (-40°F to +185°F)
Altitude:	Sea Level to 4800 feet:	0°C/+50°C (+32°F/+122°F)
	4800 feet to 7000 feet:	0°C/+45°C (+32°F/+113°F)
	7000 feet to 10000 feet:	0°C/+40°C (+32°F/+104°F)
Cooling:	Convection Cooled	
Humidity:	<95% Non-condensing	
Shock:	This equipment, in its shipping container, withstands shock developed during shipping without physical damage or degradation of the electrical performance.	
Vibration:	This equipment, in its shipping container, withstands vibration encountered in shipping without physical damage or degradation of the electrical performance.	
Ventilation:	System Ventilation openings should not be blocked and the ambient temperature of the air entering the system should not exceed 50°C (122°F).	

3.2 TROUBLESHOOTING

The appropriate operational checks should be accomplished after any maintenance has been performed. If a system fault has been identified, refer to the troubleshooting of the system as follows.

Troubleshooting of the system is limited to performing the start-up and operational checks and the following procedures. If further assistance is required, contact the PECO II Field Service Group at the numbers listed in the front matter of this manual.

Whenever a malfunction occurs, first look for the obvious fault. Try to find out whether it is caused by the system or by its environment (e.g. temperature, humidity or monitored source). In addition, there may be other situations such as:

- A. Input Voltage is missing/not at the correct level.
- B. Input and Output connections are not securely fastened.
- C. Connectors are not secure.
- D. Blown fuses.
- E. Tripped circuit breakers.
- F. Broken wires.
- G. Check the indicators on the NetMACS II Control PWB to ensure the correct ones are illuminated and the timing is correct. Timing should be approximately on one second and then off one second for the green LED.

1. PicoMACS II Indicators There are two green LEDs located on the front of the PicoMACS II circuit pack.

L1	CAN Traffic	GRN	Visible through front cover.
L2	CAN Communications Error	GRN	

- a. CAN Traffic - Toggles on and off with each receive and send of CAN traffic to the Gateway when communications are normal. This is typically at a one second on, one second off rate. A very fast blip of LED1 indicates an attempt of the PicoMACS II to log into the Gateway circuit pack.
- b. CAN Communications Error - Normally off. Upon a CAN traffic error event, LED2 will latch on and remain on until reset manually. It is used for CAN traffic diagnostics. Toggles on and off during a CAN controller reset.

2. Gateway Indicators There are seven LEDs on the Gateway PWB, L1 through L7. Their function is as follows:

L1	Communications Error	GRN	Visible through front cover.
L2	CAN Communications Error	GRN	
L3	CEV Heartbeat	GRN	
L4	+5V Gateway Power Present	GRN	
L5	Ethernet Link Valid	GRN	
L6	Ethernet Transmit	GRN	
L7	CAN Traffic	AMB	

-
- a. Communications Error – Not Implemented
 - b. CAN Communications Error – See Above (1)
 - c. CEV Heartbeat - Toggles on and off with each reset of a software watchdog. Verifies the operating system is running.
 - d. +5V Gateway Power Present – The DC to DC converter is providing operating voltage to circuit pack.
 - e. Ethernet Link Valid – The Ethernet cable is correctly connected and in turn connected to an active port.
 - f. Ethernet Transmit – Flashes with each valid Ethernet send from the Gateway Circuit Pack.
 - g. CAN Traffic – See Above (1)
- H. If a Digital Output will not work, check (the programming) to ensure the port is turned on. If the port is turned on and the DO will not work, if there is another available port, move the DO wire to the available port and reprogram the NetMACS II or try resetting the NetMACS II per step J.
- I. If the digital outputs remain in the off condition, the relays are not working properly. Try resetting the NetMACS II per step J.
- J. To reset the NetMACS II proceed as follows:
1. Check to ensure there is a minimum of 2.7 VDC potential across the memory backup battery.
 2. Remove the input fuse to the NetMACS II.
 3. Let the NetMACS II sit for 30 seconds.
 4. Insert the fuse to re-apply input power.
 5. If after the above procedures have been accomplished and the NetMACS II is still not operating properly, before replacing the NetMACS II Control PWB accomplish the following steps:
 6. Remove the input fuse to the NetMACS II.
- NOTE:** In the following step, when the DC input and the memory backup battery are removed, the NetMACS II memory will be lost. After the DC power and the NetMACS II memory backup battery have been reinstalled, re-program the NetMACS II.
7. Remove the memory backup battery.
 8. Let the NetMACS II sit for 30 seconds.
 9. Insert the memory backup battery.
 10. Insert the fuse to re-apply input power.
 11. Check to see if the lamp is illuminating properly (timing is correct). If the lamp timing is correct, re-program the NetMACS II per factory defaults using the diskette supplied.
- K. To reset IP address and System to defaults: Recovery Process for the Gateway module (cp700):
1. Method A
 - a. Power down, remove gateway.
 - b. Note existing DIP switch positions.
 - c. Move all switches to “OFF” which is “away from board edge”.
 - d. Power up the module.
-

- e. Connect using the defaults per the manual
 - f. Set desired IP Address per Section 1.10.3 of this manual
 - g. Power down.
 - h. Return Dip Switch settings to state in step 'b.'
 - i. Change to your IP address per Section 1.10 using Setup -> Network -> IP..... -> Ethernet
2. Method B
- a. Follow procedure to directly connect via RS232 (NetMACS assigns your PC it's address).
 - b. Change IP address per Section 1.10 using Setup -> Network -> IP..... -> Ethernet

L. Software problem - improper changes made to programming routine

Always check these external factors before concluding that your system is faulty.

SECTION 4: SYSTEM CONFIGURATIONS / PARTS LIST

4.1 GENERAL

This section gives the complete parts listing of the system for the components that are repairable at the field level.

Available systems are identified by a configuration model code (CC) alpha assignment. Each component as identified on the parts list has the configuration model code character assigned. In many cases the parts are used on all systems produced by PECO II. If the component is used on all systems, the configuration model code will have a dash.

Indenture Code (IC) on the parts list refers to the level of indenture of a part as compared to the assembly. For example, an assembly may have several subassemblies. Under the subassemblies there may be parts associated with that subassembly. In this example the assembly would not have an indenture level since that is the main component. The subassembly would be indenture level 1. The parts that make that subassembly would be indenture level 2.

As Required (A/R) in the Quantity (QTY) column implies that the part may be used more than once and is dependant on the operator. In addition, if a dash precedes an Item Number (i.e., -10) that item is used by the assembly but is not referenced in the illustration.

4.2 CONFIGURATIONS

TABLE 4-1. System Parts Listing

<u>Item No.</u>	<u>PECO Part No.</u>	<u>Nomenclature</u>	<u>IL</u>	<u>CC</u>	<u>QTY</u>
-1	6200442P1-1	PicoMACS II PWB	-	-	-
-2	6200608P1-3	Gateway PWB Assembly	-	-	-
-3	6200467P	Relay PWB	-	-	-
-4	3750020P	3.6V Lithium Battery	-	-	-
-5	6420570P	NetMACS Wall Mount Kit	-	-	-

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ATTACHMENTS

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