

1.0 GENERAL OVERVIEW

The PEX 5000 NETCOM Port Expander is a five port device that can be used to multiply the effectiveness of Modbus speaking devices. The NETCOM's five individually configurable ports allow Modbus protocol communication between master devices such as the P190 Programmer, data acquisition equipment, intelligent operator stations, etc., and slave devices such as Modicon micro84, 484, 584, 884, and 984 controllers. All ports are user configurable for any baud rate up to 19.2 kilobaud, in either EIA RS-232AC or EIA R-422-A modes. In addition, any port can be configured as either RTU or ASCII protocol thus allowing communications between master/slave units having different baud rates, bit lengths, parities, stop bits, and Modbus formats.

The DB-9 is a dedicated slave port. the remaining four ports can be configured as either master or slave.

2.0 SYSTEM INTRODUCTION

Essentially the NETCOM is a communications multiplexing tool that is used with devices capable of communicating in the Modbus protocol. It is designed to allow multiple Modbus master and slave devices to operate concurrently, thus providing a viable solution for difficult Modbus interfacing problems. The NETCOM can be visualized as a switching device that takes care of all of the "communications housekeeping" necessary for successful intercommunication between several master units and several slave units.

A master device is any device which will initiate communications with a Modbus speaking controller such as a Modicon P190 programmer. A slave device is always defined as a Modbus speaking controller.

The four ports on the NETCOM are easily configured with the aid of an off-line configuration editor running on an IBM Compatible PC. It provides a simple way to configure the NETCOM for a particular application.

On the front of the NETCOM at the right side is the Mode Selection dipswitch. It is used to place the unit in either the EDIT or RUN mode and can be used to manually perform system diagnostics.

The NETCOM has an LED (light emitting diode) Status Lamp which is located along the right edge of the unit. It provides an indication of the current operating mode and overall operational status of the unit. In addition, each individual port has a status LED that shows the relative communication activity level of that particular port. The lamp blinks briefly whenever serial information is transmitted to or from the port.

All of the above subjects are discussed in much greater detail on the pages that follow.

3.0 OPERATIONAL OVERVIEW

The NETCOM requires connection to at least one master unit and one slave unit for proper operation. It can simultaneously handle master devices communicating with multiple slaves.

One of the more useful features of the NETCOM is the ability to do communication parameter conversions (i.e. baud rate, Modbus formats, etc.) between the Modbus master device and the slave device. For example, by using the NETCOM, a 300 baud Modbus master device speaking ASCII can effectively communicate with a 19.2K baud RTU speaking controller, even though each device is speaking at an entirely different baud rate and format. The NETCOM will do the necessary conversions transparently and “on the-fly.”

3.1 GETTING STARTED

The following sections will explain all of the initialization procedures and requirements that must be met before placing the NETCOM in operation. They are presented in a step-by-step manner, with each section requiring completion before the next section is begun. For general reference purposes an illustration of the physical layout of the NETCOM is shown in figure 1. The illustration also depicts specifications, port identification, and dipswitch location.

In addition, both a glossary and an index are provided to define unfamiliar terms, and to allow rapid pin-pointing of a specific topic.

3.1.1 RS-232/RS-422 PORT CONFIGURATION

Each of the four ports on the NETCOM can communicate in either RS-232 or RS-422 mode to provide flexibility when communicating with other devices. The RS-232 and R-422 signals are located on different pins of the D~25 connector, therefore no dipswitch selection is required. However, please note that connection may only be made to either the 232 or 422 pins at any given time.

An RS232 communications link is typically reliable up to about 75 feet. However, when connecting equipment over longer distances (75 to 4000 feet), it is advisable to use the RS422 communications link. RS422 is capable of communicating up to 4000 feet (3/4 mile) using a shielded 4 wire cable.

If a long distance communications link is desired, but the Modbus device in question does not support RS422, an adapter to convert the RS232 to an RS422 signal may be used. Only one 232/422 adapter is needed for the Modbus device as the NETCOM has built-in RS422 capabilities. PANEL-TEC sells this type of adapter (Model No. ICC-11) or one may be purchased from a company that specializes in serial

3.0 OPERATIONAL OVERVIEW (continued)

communications products. This method of long distance interfacing is an inexpensive solution to the high cost of using a pair of short-haul modems at both ends of the ca...

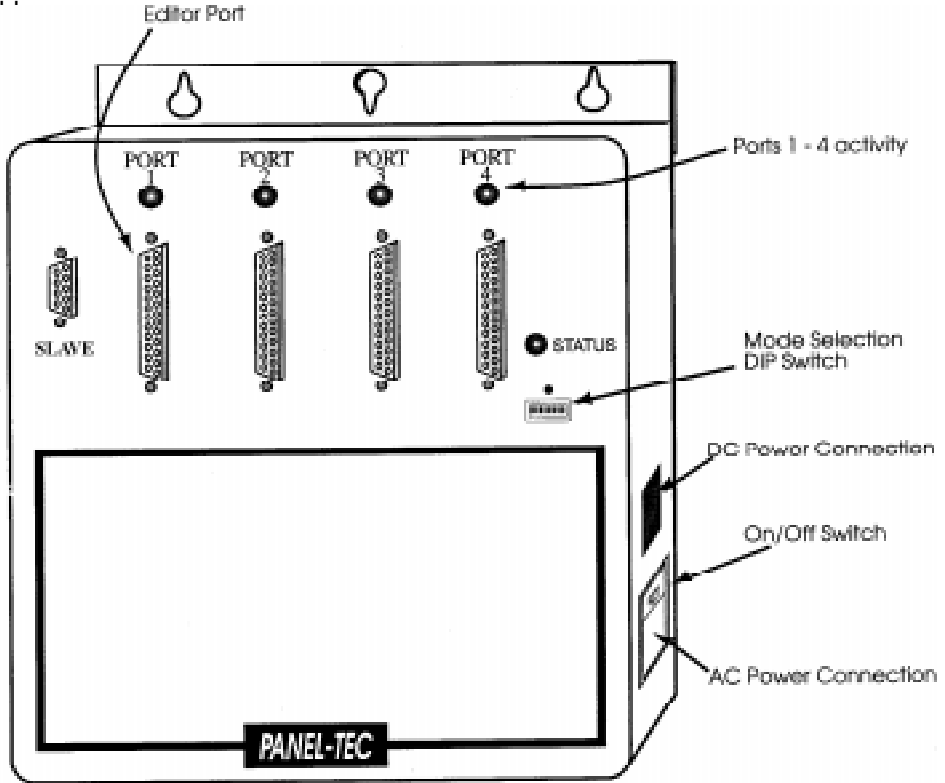


Figure 1

SPECIFICATIONS

DIMENSIONS

w/o brackets
 HEIGHT: 10 1/4"
 WIDTH: 8 5/8"
 DEPTH: 2 1/4"

PORT CONNECTION

DB-25 Female connector
 DB-9 Female (slave)

ENVIRONMENTAL

Temperature: 0 - 70° C
 Humidity: 0 - 95% non-condensing

ELECTRICAL

VOLTAGE: 7 - 35VDC
 105 - 130 VAC
 210 - 250 VAC
 FUSED: 1/2 Amp 3AG TYPE

COMMUNICATIONS

RS-232C Single Mode +/- 12V
 RS-422A Differential Mode 5V
 Polarity non reversing

3.0 OPERATIONAL OVERVIEW (continued)

3.2 RS232/RS422 MASTER/SLAVE PORT CABLING REQUIREMENTS

Proper interconnection between all devices and the NETCOM is an absolute necessity if the NETCOM is to perform correctly and reliably. The user, in addition to determining whether the communication link is RS232 or RS422, must also see to it that the appropriate cable is used for the particular device that will be connected to the NETCOM.

The RS-232 mode is usually reliable up to 75 feet at 9600 baud. RS-422 mode can be used up to 4000 feet at 19.2k baud. For long cable distances it is recommended that a low capacitance cable of less than 20 pF per foot be used to ensure maximum data integrity. There are many companies that manufacture quality communication cable. Consult a local electrical or electronic supplier for information on the best cable for a particular application.

The port pinouts for RS232 and RS422 modes are shown in figure 2. The actual connections required by a Modbus device may vary depending on the extent that the device relies on hardware handshaking signals. To insure that the cabling will support the appropriate RS232 signals, refer to the NETCOM port pinouts in figure 2 and the cable diagrams section located in the appendix. Also refer to any pinout or cable diagrams in the operating instructions of the Modbus device being used. In most cases a null-modem cable can be used to interconnect the NETCOM with virtually any Modbus device.

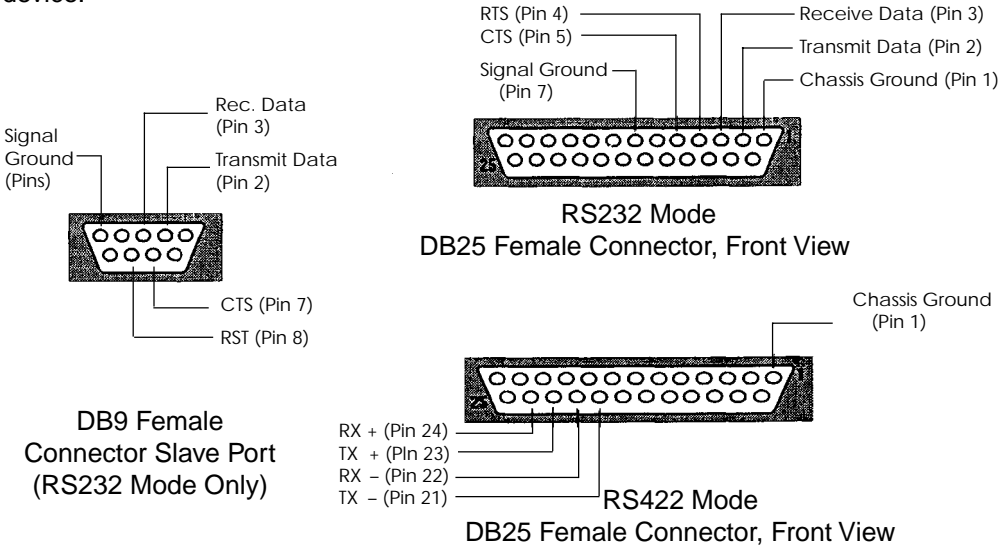


Figure 2

3.0 OPERATIONAL OVERVIEW (continued)

3.3 MODE SELECTION DIPSWITCH

The Mode Selection dipswitch is used to place the unit in either the EDIT, RUN, or DIAGNOSTICS mode of operation. All valid dipswitch settings are shown in figure 3.

THE DIPSWITCH IS ONLY READ UPON POWER-UP. EACH TIME THE DIPSWITCH IS CHANGED THE NETCOM MUST BE SWITCHED OFF AND THEN SWITCHED ON AGAIN IN ORDER FOR THE NEW SETTING TO BE COME ACTIVE.

MODE Selection DIPswitch Settings

Dipswitch #s	1	2	3	4	5	6	7	8	
	0	0	0	0	0	0	0	0	Run Mode (all off)
	0	0	0	0	0	0	0	1	Edit Mode
	0	0	0	0	0	0	1	0	Loopback Test

Figure 3

When the unit is in Run Mode, the Status LED will be solid green. In Edit Mode, the Status LED will be flashing green. In Diagnostics Mode (Loopback Test), the Status LED will be flashing red.

MODE SELECTION SWITCH NOTES

- **1) THE DIPSWITCH IS ONLY READ UPON POWER-UP. EACH TIME THE DIPSWITCH IS CHANGED THE UNIT MUST BE SWITCHED OFF AND THEN SWITCHED ON AGAIN IN ORDER FOR THE NEW SETTING TO BECOME ACTIVE.**
- **2) Port number 1 is used as the Editor port when the NETCOM is in the edit mode. Port 1 automatically reverts back to its previous configuration after the Mode Selection dipswitch is placed in the Run mode setting.**
- **3) For the majority of applications, the most frequently used dip switch settings will likely be Run mode (all switches OFF) and the Edit mode (switch 8 ON). Less often used is the setting for running diagnostic tests.**

Typical Mode Selection DIP Switch Settings

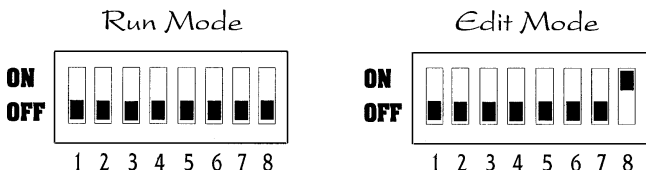


Figure 4

4.0 THE CONFIGURATION EDITOR

To install the configuration editor on your IBM Compatible PC, place the editor diskette into drive A and enter the command A:INSTALL. You will be prompted for the Drive and Subdirectory in which to install the configuration editor.

After installation is complete, enter the command PEX4000 and the editor menu screen will appear. On-line help screens are available to assist you through the configuration process.

Panel-Tec PEX5000 Configuration Editor Version 3.01
 < PEX5000 Port Configuration >

Port Number ==>	Port 1	Port 2	Port 3	Port 4	Slave
Protocol Selection	RTU	RTU	RTU	RTU	RTU
Master or Slave Port	Master	Master	Master	Master	Slave
Slave Selection Mode	n/a	n/a	n/a	n/a	All
Slave ID or Range Entry	n/a	n/a	n/a	n/a	n/a
Baud Rate	9600	9600	9600	9600	9600
Character Length	8 bits	8 bits	8 bits	8 bits	8 bits
Parity Selection	Even	Even	Even	Even	Even
Number of Stop Bits	1 bit	1 bit	1 bit	1 bit	1 bit
Priority for Master	0	0	0	0	n/a
Time Out for Slave (ms)	n/a	n/a	n/a	n/a	500
Number of Retries	n/a	n/a	n/a	n/a	2
InterMessage Time (ms)	10	10	10	10	10
RTS Control Selection	None	None	None	None	None
RTS Delay Time ~ms)	n/a	n/a	n/a	n/a	n/a

F1=Help, ►, ◀, ▲, ▼, Enter to change, F10=Save, Esc=Quit W/O Saving.

4.1 EDITOR PARAMETERS:

4.1.1 BROADCAST MESSAGES

The Allow Broadcast Messages parameter is found under Unit Configuration and determines how broadcast messages are handled. If Allow Broadcast Messages is set to ~ and a broadcast message is received on a master port, it will be sent out on each slave port. If Allow Broadcast Messages is set to 'N', any broadcast messages received will be ignored.

4.0 THE CONFIGURATION EDITOR (cont.)

4.1.2 PROTOCOL SELECTION (ASCII/RTU)

This parameter is selectable for both master and slave ports. When configuring a Modbus port, it is important that the protocol is set to match that of the Modbus device(s) that will be communicating on the particular port. Each individual NETCOM port may be configured for a different protocol and the NETCOM will do any necessary conversions between protocol formats. For example, a Modbus master device is communicating in Modbus ASCII protocol, and is connected to port 2 which is configured as ASCII. A Modbus slave device is communicating in Modbus RTU protocol and is connected to port 3 which is configured as RTU. When the master device issues a command, the NETCOM will receive the command on port 2, translate it and route it over to port 3, then re-transmit it in the different protocol. This feature is inherent to the design of the NETCOM and provides great flexibility when setting up a particular system.

NOTE: In general it is preferable to use the Modbus RTU mode whenever possible, especially on slave ports. The RTU format is approximately twice as fast at any given baud rate as the ASCII format.

4.1.3 MASTER/SLAVE

A Slave is a device which “speaks only when spoken to.” This is usually a PLC or Daniels unit which is assigned an address and only responds to messages it receives that contain that address. Multiple slave devices can be attached to a single NETCOM port.

A Master is a device that initiates communication with a slave device and has no address assigned to it. This is usually a host computer or OIT. Only one master device may be attached to a single NETCOM port.

If slave device(s) are attached to a port, that port should be configured as a Slave port. If a port other than the dedicated slave port is unused or has a master device attached, it should be configured as a Master port. If the dedicated slave port is not being used, it should be set to unused.

4.0 THE CONFIGURATION EDITOR (cont.)

4.1.4 SLAVE SELECTION MODE

The Slave Selection Mode tells the NETCOM unit how to determine which port a particular Slave ID is attached to. The three choices are as follows:

- **1) Specific – All Slave ID's that are attached to a port must be known and be entered individually. This mode should be used when multiple slave ports are configured and the Slave ID's attached to the port cannot be easily grouped into ranges.**
- **2) Range – Up to 3 ranges may be entered. If a Slave ID falls within any one of the 3 ranges, any messages for that Slave ID will be routed to the port. If multiple slave ports are configured, a Slave ID that falls within a specified range may not be configured on any other port, regardless of the Slave Selection Mode of the other port.**
- **3) All – If only one port on the NETCOM unit is configured as a slave port, All may be selected. Any messages for any Slave ID will automatically be routed to the port.**

4.1.5 SLAVE ID or RANGE ENTRY

If the Slave Selection Mode for a particular slave port is set to Specific, this parameter will display as “Enter ID's.” If the Enter key is pressed when this parameter is highlighted, a screen will appear allowing entry of the specific Slave ID's that are attached to the port.

If the Slave Selection Mode for a particular slave port is set to Range, this parameter will display as “Enter Range.” If the Enter key is pressed when this parameter is highlighted, a screen will appear allowing entry of the range(s) of Slave ID's that are attached to the port.

If a port is configured as a slave port with Slave Selection Mode “All” or as a master port, this parameter will not be selectable for that port.

4.1.6 BAUDRATE, CHARLENGTH, PARITY, STOPBITS

These parameters are selectable for both master and slave ports. When configuring a Modbus port, it is important that these parameters are set to the EXACT SAME SETTINGS as the Modbus device which will be communicating with that particular port. Each individual NETCOM port may be configured for a totally different set of communication parameters (relative to the other NETCOM ports) as long as the port's

4.0 THE CONFIGURATION EDITOR (cont.)

communication parameters exactly match those of the Modbus device which is connected to it. The NETCOM will do the necessary conversions between different communication formats. For example, a Modbus master device is communicating at 1200 baud, 7 bits, odd parity, 2 stop bits, and is connected to port 2 which is configured to match those parameters. A Modbus slave device is communicating at 19.2K baud, 8 bits, even parity, 1 stop bit, and is connected to port 3 which is configured to match those parameters. When the master device issues a command, the NETCOM will receive the command from port 2, translate and route it over to port 3, and then re-transmit it at the higher baud rate and different format. This feature is inherent to the design of the NETCOM and provides great flexibility when setting up a particular system.

4.1.7 MASTER PRIORITY LEVELS

Priorities can only be set for master ports. Assigning a priority value other than 0 will delay processing of a message received on a master port if the slave port that the message is to be routed to is busy. The amount of time that the port will be delayed is the priority value multiplied by 30 milliseconds. Therefore, the higher the priority value, the larger the delay time is which results in an overall lower priority for a port.

When all Master Priority Levels are set to 0, the NETCOM unit will process all messages to be routed through a particular slave port on a first come, first serve basis, regardless of which master port the message was initially received on. While one master device is processing the response from a message and preparing its next message, the NETCOM unit can be processing a message from another master communicating with the same slave. This method of "time slicing" provides maximum throughput on all ports by keeping slave ports fully utilized and ensuring that all master ports are serviced promptly.

Priorities for Masters are provided for backwards compatibility with earlier versions of NETCOM units and should only be used if it is necessary to slow down one or more master ports. If used, it is recommended that priority levels be separated with a factor somewhere between 5 and 10 and that the master with the lowest priority (highest priority value) does not exceed 50.

4.1.8 TIME OUT FOR SLAVE

The port time out is a parameter assigned only to slave ports. This parameter determines the maximum amount of time that the NETCOM unit should wait for a response after transmitting a message on a slave port. If a response has not been received in this amount of time, a time-out condition will occur and the message will be retried if specified by the Number of Retries parameter. If all retries fail, the NETCOM unit will "give up" and process the next message.

4.0 THE CONFIGURATION EDITOR (cont.)

A port time-out seldom occurs, but it is imperative that the time-out parameter be set correctly so that when one does occur, the master device and the NETCOM unit do not become out of synchronization with each other. The time out value should be 250 milliseconds greater than the maximum response time of the "slowest" slave device attached to the port. This information can usually be found in the manual for the slave device or by installing data communications test equipment and monitoring all communications on the port. In addition, the time out value must be at least 100 ms less than the time out parameter of any master devices that will be communicating with a slave on this port.

This parameter defaults to 500 milliseconds, but is selectable from 100 to 30,000 milliseconds allowing precise time-out control.

4.1.9 NUMBER OF RETRIES

The Number of Retries is a parameter only assigned to slave ports. It specifies how many times the NETCOM unit should re-attempt to send a message to a slave device when it fails to receive a response within the amount of time specified by the slave port time-out value.

To determine the proper setting for the Number of Retries, all master devices that will communicate with any slave device attached to the port must be considered. If all master devices will automatically retry a message if no or an invalid response is received and the NETCOM unit is being used on a low noise communications network, you will want to set the number of retries on the NETCOM to 0. If any setting other than 0 is used, the time-out value of all master devices must be set high enough to allow the NETCOM unit to perform all configured retries before the master device times out on the NETCOM unit.

4.1.10 INTER-MESSAGE TIME

The NETCOM determines when a complete message has been received on a port by checking for an Inter-Message Time. Starting with the first character of a message, if a gap of at least the Inter-Message Time occurs without any additional characters being received, the NETCOM will determine that a complete message has been received and process it.

The InterMessage Time should correspond to somewhere between 5 and 10 character times. A character time is the amount of time it takes to transmit one character across a serial communications link and is dependent upon the baud rate. The following table shows the approximate character times for the most common baud rates and the recommended value to be configured as the InterMessage Time.

4.0 THE CONFIGURATION EDITOR (cont.)

Maximum InterMessage Time is 250 ms

Baud Rate	Approximate Character Time	Recommended Value for Configuration Editor
19,200	.5 ms	5 ms
9,600	1 ms	7 ms
4,800	2 ms	14 ms
2,400	4 ms	28 ms
1,200	8 ms	56 ms

Some devices leave gaps between characters when sending a message. If you are having problems establishing communication this might be your problem. Your Inter-Message time should be increased above the recommended values in this case.

4.1.11 RTS CONTROL

The NETCOM supports three types of RTS control for transmitting messages. These are as follows:

- > NONE: RTS will not be activated and CTS will not be checked when transmitting a message on a port.
- > CTS: RTS will be activated and the port will wait for CTS to become active before transmitting a message. If CTS has not become active within 2 seconds of activating RTS, a time-out will occur and the message will be retried up to a maximum of 3 times.
- > DELAY: RTS will be activated and the port will wait for the specified delay time to pass before transmitting a message.

4.1.12 DOWNLOADING TO THE NETCOM

When all configuration parameters have been set, you will be ready to download the configuration data to the NETCOM.

The DB-25 female connector belonging to port number one is used for two purposes. Its main purpose is to allow connection from the NETCOM to a Modbus device. Its secondary purpose is to allow the connection of an IBM Compatible PC to the NETCOM for system configuration.

4.0 THE CONFIGURATION EDITOR (cont.)

After connecting the cable from the PC to Port 1 of the NETCOM and setting the Mode Selection Dipswitch to Edit, power on the NETCOM and select "Send to PEX4000" from the Save Configuration Menu of the Editor. The configuration data will be downloaded to the NETCOM and stored in non-volatile memory (NOVRAM).

Port number 1 is used as the Editor port when the NETCOM is in the edit mode. Port 1 automatically reverts back to its run-time configuration after the Mode Selection dipswitch is placed in the Run mode setting.

After configuration, the unit may be placed into the RUN mode by setting the Mode Selection Dipswitch to the appropriate settings as shown in figure 4 (all switches to OFF position).

In order for the NETCOM to operate properly, it is extremely important that the NETCOM's ports are correctly set to either RS232 or RS422 to match the Modbus device that will be connected to it. In addition, the cable used to connect each Modbus device to its respective NETCOM port is critical. If the cabling is incorrect, the NETCOM will perform erratically or not at all.

Proper interconnection between an devices and the NETCOM is an absolute necessity if the NETCOM is to pefforn correctly and reliably. The user, in addition to determining whether the communications port is RS232 or RS422, must also see to it that the appropriate cable is used for the particular device that will be connected to the NETCOM.

Once the NETCOM is properly configured, cabled, and placed in the Run mode, the NETCOM will perform its multiplexing and routing operations completely transparent to all Modbus devices. Neither the controllers nor the master devices will be aware that the NETCOM is intercepting, converting, and routing commands back and forth.

5.0 MODBUS INFORMATION

5.1 P190 PROGRAMMER UNIT WARNING

Never attach multiple P190 programmers (or equivalent) to a single Modicon controller. Although relatively harmless when simply monitoring registers, if multiple P190's are allowed to attach to a single controller, and programming type functions are performed (i.e. add or delete a network, force a coil, etc.) on both P190's, an erratic and/or dangerous condition may exist. Loss of ladder code, corruption of data tables, and complete lock-up of the controller are symptoms which can occur.

FAILURE TO OBSERVE THE ABOVE WARNING MAY RESULT IN DANGEROUS OPERATING CONDITIONS AND/OR SYSTEM CRASHES RECOVERABLE ONLY BY A POWER DOWN RESET OF THE ENTIRE SYSTEM AND/OR POSSIBLE LOSS OF CONTROLLER DATA OR LADDER LOGIC CODE.

IF ADDITIONAL NETCOM SYSTEM INFORMATION IS REQUIRED, CALL THE PANEL-TEC TECHNICAL SUPPORT LINE: 1-205-534 8132.

GLOSSARY

BAUD RATE A serial communication parameter that determines the speed of transmission between two serial devices. The baud rates between two communicating serial devices must always be equal.

CHARLENGTH Character Length. See Word Length.

CONFIGURATION EDITOR The off-line software package used to create and edit configuration files for the NETCOM unit. Requires an IBM Compatible personal computer.

CONTROLLER A programmable logic controller. When this manual uses the generic term "controller," it assumes a slave device that can speak the Modbus protocol.

DB25 CONNECTOR The popular male or female 25 pin connector traditionally used in serial communications systems. A DB25 female connector is used on the NETCOM, as well as most all Modbus master and slave devices.

DIPSWITCH A multi-pole switch packaged in a DIP (dual in-line package) type of enclosure. On the NETCOM, an 8 pole dipswitch is used as the Mode Selection Switch.

EDITOR See CONFIGURATION EDITOR.

LED STATUS INDICATORS See Status Indicators.

MASTER DEVICE Any device which speaks the Modbus protocol, and initiates commands to a slave device.

MASTER PORT A port on the NETCOM that will have a master device connected to it.

MODBUS PROTOCOL Modbus is a fairly widespread serial protocol popularized by the Modicon brand of programmable controllers. Many other controller manufacturers support this protocol by offering Modbus compatible expansion boards or modules.

MODBUS ASCII The ASCII format of this protocol uses only 7 bits per character, thus requiring 2 (hexadecimal) ASCII characters to represent 1 eight bit (RTU) character. Therefore, it is twice as slow as RTU format at any given baud rate. An LRC type of checksum is used to maintain data integrity.

MODBUS RTU The RTU format of this protocol uses a full 8 bits. Relative to the ASCII format, RTU is twice as fast at any given baud rate. A CRC type of checksum is used to maintain data integrity.

NOVRAM A non-volatile memory device capable of saving data after power has been removed. Does not require a battery backup. Can be electrically re-programmed many thousands of times.

P190 PROGRAMMER A programmer unit or software equivalent used to program ladder logic code in Modicon controllers.

GLOSSARY (continued)

PARITY A serial communication parameter used as a low-level form of character error checking. The parity setting between two communicating serial devices must always be equal.

PORT Any one of the four DB25 connectors or the DB9 connector located on the front of the NETCOM. A port can be configured as a master or slave port by using the on-board editor. In the case of port number one, it temporarily acts as the editor port to allow communication to with the Configuration Editor.

RS-232-C An EIA standardized asynchronous serial communications link utilizing zero-crossing techniques for data transmission. This type of communications link requires a minimum of 3 wires (typically shielded) and can be used effectively up to 75 feet @ 9600 baud.

RS-422-A An EIA standardized asynchronous serial communications link utilizing differential mode techniques for data transmission. This type of communications link requires a minimum of 4 wires (typically 2 twisted pairs, shielded) and can be used effectively up to 4000 feet @ 19200 baud.

SERIAL COMMUNICATIONS A method of transmitting 8 bit parallel data sequentially or in series over a non-parallel or serial data link. Usually used to achieve greater noise immunity and/or longer transmission distances as compared to a parallel communications link.

SLAVE DEVICE Any device which speaks the Modbus protocol, and accepts and processes commands from a master device. A slave device is almost always a programmable controller.

SLAVE PORT A port on the NETCOM that will have a slave device connected to it.

SLAVE ID The Slave ID number is always the Unit Address of the controller(s) that is connected to a NETCOM slave port.

STATUS INDICATORS Light Emitting Diode lamps used to indicate NETCOM operational and port activity status.

STOP BITS A serial communication parameter used as a low-level form of character synchronization. The stop bits setting between two communicating serial devices must always be equal.

UNIT ADDRESS The unit address is the identification number assigned to a controller, either via the controller's programmer unit, or via the controller's address ing dipperswitches, that provide a means of singling out, and communicating with a particular controller. The unit address is automatically contained in a master device's command, and is used to determine which slave unit the master wishes to converse with. The NETCOM uses this unit number to route the master's command out of the appropriate slave port, so that the controller may respond.

WORD LENGTH A serial communication parameter used to determine the length of a transmitted character. The word length setting between two communicating serial devices must always be equal.

APP-2 TROUBLESHOOTING INFORMATION

System diagnostics are automatically performed on power-up. If the NETCOM fails any of its internal tests it will display the failure by flashing the STATUS lamp yellow. The number of flashes will determine the error as shown below. The unit will not enter the RUN mode. At this time the unit should be referred to qualified personnel for servicing.

- > 2 Flashes = RAM test (read/write) failed
- > 3 Flashes = ROM test failed
- > 4 Flashes = Unit Not Configured or NOVRAM failure

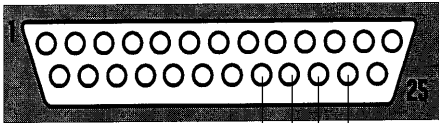
PORT STATUS INDICATOR LAMPS

The NETCOM also has a set of four status lights that indicate the activity level of each of the DB25 ports. These lights will respond with a green flash each time data is transmitted and a red flash each time data is received in the Run or Edit mode. This allows the user to see that proper communications are established. If flashing of a particular port is not evident, even though a device is known to communicate properly, then a communication problem exists. *Check and re-check the cabling and communication parameters.*

In the Diagnostics (Loopback Test) mode which requires port pins connections shown below, the status of each LED will be as follows:

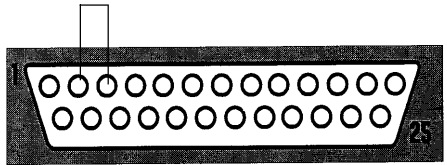
- > No activity - Port Failure, unable to transmit.
- > Flashing Red - Transmit OK, unable to receive. This will occur if no loopback connector is present.
- > Flashing Green - Transmit and receive OK.

**RS232 Loopback Connector
DB24 Male Connector, Front View**



Jumper Pin #21 to Pin #22 & Pin 23 to Pin 24

Jumper Pin #2 to Pin #3



**RS422 Loopback Connector
DB25 Male Connector, Front View**

APP-3 584 CABLE MODIFICATIONS

APP-3 584 Cable Modifications

When using any Modicon 584 Programmable Controller (mainly the "M" and "A" versions) with the NETCOM, it is recommended that the W190 cable be modified or a cable adapter be used to avoid a P190 'NOT LOGGED IN' error which may occur when attempting to write information to the control ler.

To accommodate all of the communication handshaking requirements necessary when attached to a P190 programmer (or software equivalent), the 584 must have the DSR (Data Set Ready) signal held high (ON). This can be accomplished with a slight modification to the Modicon W-190 cable (the W-190 cable is commonly used to connect the 584 to the NETCOM). Locate the end of the W-190 cable which has the DB-25 connector and jumper pin# 20 to pin# 6. If it is not desirable to modify the W-190 cable, an adapter may be constructed as shown in the diagram below. The above modification will hold the DSR line high and restore full 584/P190 communications.

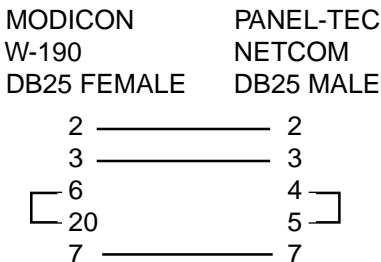
This modification reportedly causes the P190 to "hang," but only if the modified cable is used to directly connect the P190 to the 584. **DO NOT USE THE MODIFIED W-190 CABLE FOR CONNECTING THE 584 CONTROL LER DIRECTLY TO THE P190.**

NOTE: The above modification is needed for the controller's benefit, not the NETCOM's. Therefore, if an extension cable is used to further extend the W-190 cable, the above modification must still be done to the DB-25 connector on the W-190 cable and NOT the extension cable.

If modifying the W190 cable is undesirable, a simple adapter may be constructed to provide the necessary jumpering:

ADAPTER FOR MODICON 584 TO NETCOM VIA W-190 CABLE

TO CONNECT A MODICON 584A or 584M TO THE NETCOM, USE MODICON CABLE # W190. The short adapter cable shown below will be required for all version "M" controllers and some version "A" controllers.



APP-4 CONTROLLER CABLE DIAGRAMS

APP-5 EDITOR CABLE DIAGRAMS

APP-6 MISC. CABLE DIAGRAMS

APP-7 MOUNTING INFORMATION

DEDICATED SLAVE PORT

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