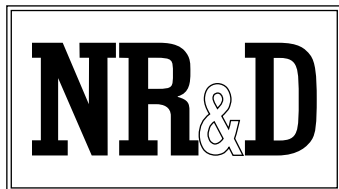


UCM IMPACC

Installation and Programming Manual

This Manual describes the UCM applications for interfacing Cutler-Hammer IMPACC devices to a POWER-LOGIC system.

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Niobrara Research & Development Corporation
P.O. Box 3418 Joplin, MO 64803 USA

Telephone: (800) 235-6723 or (417) 624-8918

Facsimile: (417) 624-8920

www.niobrara.com

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Introduction

The Niobrara UCM4 is a SY/MAX[®] compatible module that is capable of running multiple applications for performing communication translations between serial protocols. This document covers three such applications that operate in unisons to place Cutler-Hammer[®] (Westinghouse[®]) IMPACC[®] devices on a Square D POWERLOGIC[®] network as POWERLOGIC compatible devices. This setup allows existing C-H equipment to be integrated into the POWERLOGIC System Manager Software system.

The three applications are listed as follows: PORT1.UCM, PORT3.UCM, and PORT4.UCM. Each program is compiled and loaded into the appropriate port of the UCM with the Auto-Start feature enabled for stand-alone operation. PORT1.UCM is loaded into the UCM's Port 1 and provides the interface for the IMPACC network with the use of a C-H MINT II. PORT3.UCM is loaded into the UCM Port 3 and provides a user interface via a terminal emulator for assistance in configuring the system. PORT4.UCM provides a Modbus RTU Slave application for emulating the POWERLOGIC register mapping of the IMPACC devices. The Niobrara EPE5-TCP, MEB-TCP, or SPE4-1D may be used as a convenient method for interfacing the UCM into a POWERLOGIC network.

Any version of the UCM4 may be used for this application with the appropriate cables. The UCM4-D and UCM4-M modules will use the same RS-422 cabling while the UCM4-S will use RS-232 cabling. Examples will be given for both the UCM4-D and UCM4-S.

The Niobrara NRK2 single-slot rack and power supply may be used for mounting and powering the UCM4, EPE5, or SPE4 modules. Any SY/MAX RRK style register rack and appropriate power supply may also be used including the two-slot POWERLOGIC rack.

Module Installation

- 1 Remove power from the rack.
- 2 Mount the UCM4 in an available slot in the register rack. Secure the screw at the bottom of the module.
- 3 Apply power to the rack.

Software Installation

The application files for the UCM4 are included in the IMPACC.ZIP file. This file must be unzipped using PKUNZIP.EXE. A copy of PKUNZIP is included on the standard NR&D software disk and is also available at www.niobrara.com. The latest version of the IMPACC.ZIP file is located at

[ftp.niobrara.com/ucm/impacc/impacc.zip](ftp://ftp.niobrara.com/ucm/impacc/impacc.zip)

The latest version of this document in pdf format is located at:

[ftp.niobrara.com/ucm/impacc/impacc.pdf](ftp://ftp.niobrara.com/ucm/impacc/impacc.pdf)

The IMPACC communications protocol is available from Cutler-Hammer at:

www.ch.cutler-hammer.com:2084/docs/fred/apscpgh/html/COMMUNIC/IL17384.HTM

Serial Connections to the UCM4-D

Port 1 to MINT II

Port 1 of the UCM4-D is RS-422 while the MINT II is RS-232. The Niobrara SC606 cable is ideal for this connection since it includes a 9-pin male SY/MAX pinout RS-422 connection for the UCM4-D and a 25-pin male RS-232 modem pinout for the MINT II. If the SC406 cable is used, a 25-pin male-male gender changer and a 25-pin null-modem will be needed for proper communication with the MINT II.

NOTE: The included power supply with the SC606 (or SC406) must be used!

The MINT II must be configured to match the serial settings of the UCM4 Port 1. The DIP switches on the front of the MINT II must be set for the following:

- RS-232 Baud: 9600 (ON OFF)
- INCOM Baud: set to match the INCOM network, typically 9600 baud (OFF)
- STOP BITS: 1 (OFF)
- MODEM CONTROL: NO RTS/CTS (ON)
- ACK/NAK BYTE: NOT SENT (ON)
- HANDSHAKE BYTE: NOT SENT (OFF)

The switches for the above configuration will be ON, OFF, OFF, OFF, ON, ON, OFF.

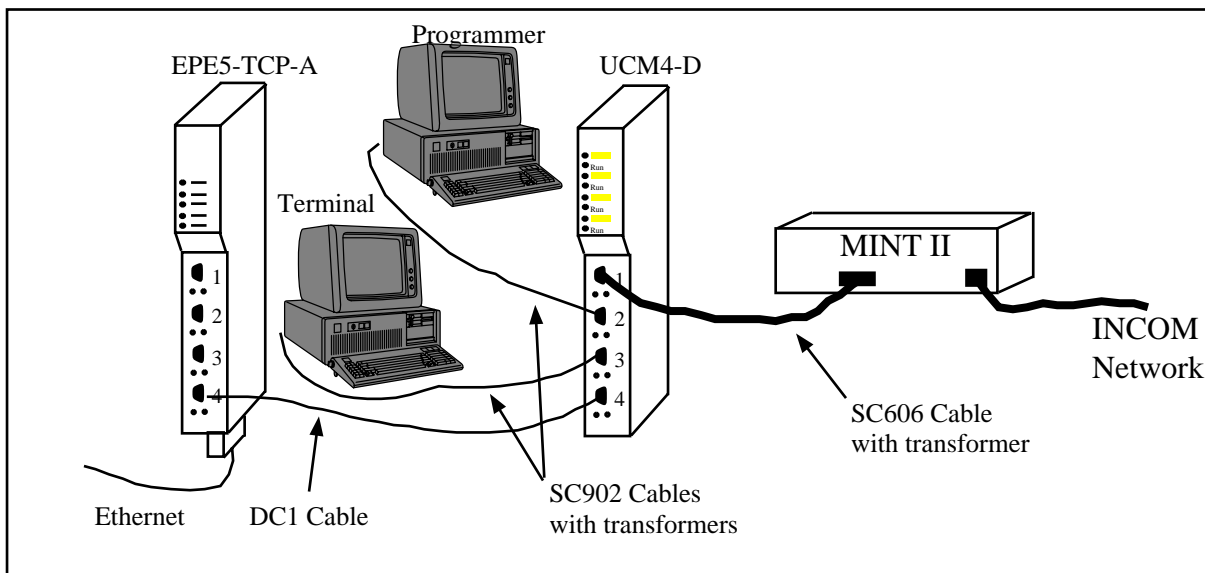


Figure 2-1 UCM4-D Layout

Port 2 to the Personal Computer

A physical connection must be made from the personal computer to the UCM in order to download the applications. This link may be a serial connection from a COM port on the personal computer to the RS-422 port on the UCM4. Usually an RS-232 to RS-422 converter is required for this connection and the Niobrara SC902 (or SC406) smart cable is recommended.

Connect your personal computer to the UCM4-D. It is assumed here that this connection will be made from COM1: of the personal computer using an SC902 Smart Cable with the included transformer.

If remote configuration is desirable, Port 2 of the UCM may be connected to a spare SY/MAX mode port of the EPE5-TCP, MEB-TCP, or SPE4 by means of a DC1 cable. The network module port should be set for SY/MAX mode, 9600 baud, EVEN parity, 8 data bits, 1 stop bit, and BCC error checking.

Port 3 to Terminal

The Niobrara SC902 (or SC406) cable is ideal for connecting a personal computer running a terminal emulator to Port 3. The SC902 cable has a 9-pin RS-232 connection for the computer and a 9-pin SY/MAX RS-422 connection for the UCM4-D.

NOTE: The included transformer with the SC902 (or SC406) must be used!

The terminal emulator must be set for 9600 baud, NO parity, 8 data bits, 1 stop bit, and NO handshaking.

Port 4 to EPE5

The Niobrara DC1 or Square D CC-100 (or CC-102) cables may be used to connect the UCM4 Port 4 to the RS-422 port of an EPE5-TCP, MEB-TCP, SPE4-2D, or SPE4-1D. This cable pinout is described in Figure 2-2.

UCM4-D RS-422 to SY/MAX RS-422 port

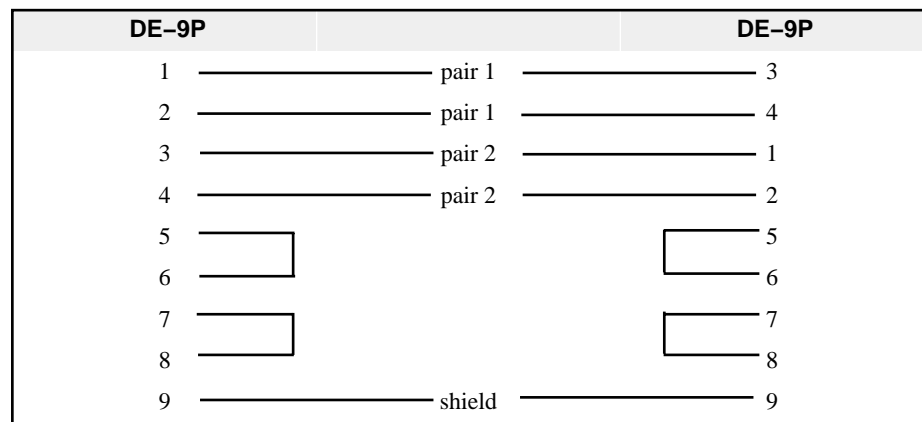


Figure 2-2 DC1 Pinout

The network module should have firmware of 17Apr98 or newer and the serial port should be set for MODBUS GATE mode at 9600 baud, EVEN parity, 8 data bits, 1 stop bit, timeout = 200. This mode uses the new POWERLOGIC Modbus Random Read opcode 100 for translations from SY/MAX Random Access Reads.

If the module's firmware is older than 17Apr98 then use MODBUS HOST mode at 9600 baud, 8 data bits, EVEN parity, 1 stop bit, Bias = 0, Read command = 3, WRITE command = 16, timeout = 200. It is strongly recommended that the firmware be upgraded to include the new Random Read since this will greatly increase performance.

Serial Connections to the UCM4-S

Port 1 to MINT II

Port 1 of the UCM4-S is RS-232 and the MINT II is also RS-232. The Niobrara cable MC9B is ideal for this connection since it includes a 9-pin female RS-232 connection for the UCM4-S and a 25-pin male RS-232 modem pinout for the MINT II. This cable pinout is described in Figure 2-2.

UCM4-S RS-232 to MINT II RS-232 port

| DE-9S | | DB-25P |
|-------|-------|--------|
| 1 | _____ | 8 |
| 2 | _____ | 3 |
| 3 | _____ | 2 |
| 4 | _____ | 20 |
| 5 | _____ | 7 |
| 6 | _____ | 6 |
| 7 | _____ | 4 |
| 8 | _____ | 5 |
| 9 | _____ | 22 |

Figure 2-3 MC9B Pinout

The MINT II must be configured to match the serial settings of the UCM4 Port 1. The DIP switches on the front of the MINT II must be set for the following:

- RS-232 Baud: 9600 (ON OFF)
- INCOM Baud: set to match the INCOM network, typically 9600 baud (OFF)
- STOP BITS: 1 (OFF)
- MODEM CONTROL: NO RTS/CTS (ON)
- ACK/NAK BYTE: NOT SENT (ON)
- HANDSHAKE BYTE: NOT SENT (OFF)

The switches for the above configuration will be ON, OFF, OFF, OFF, ON, ON, OFF.

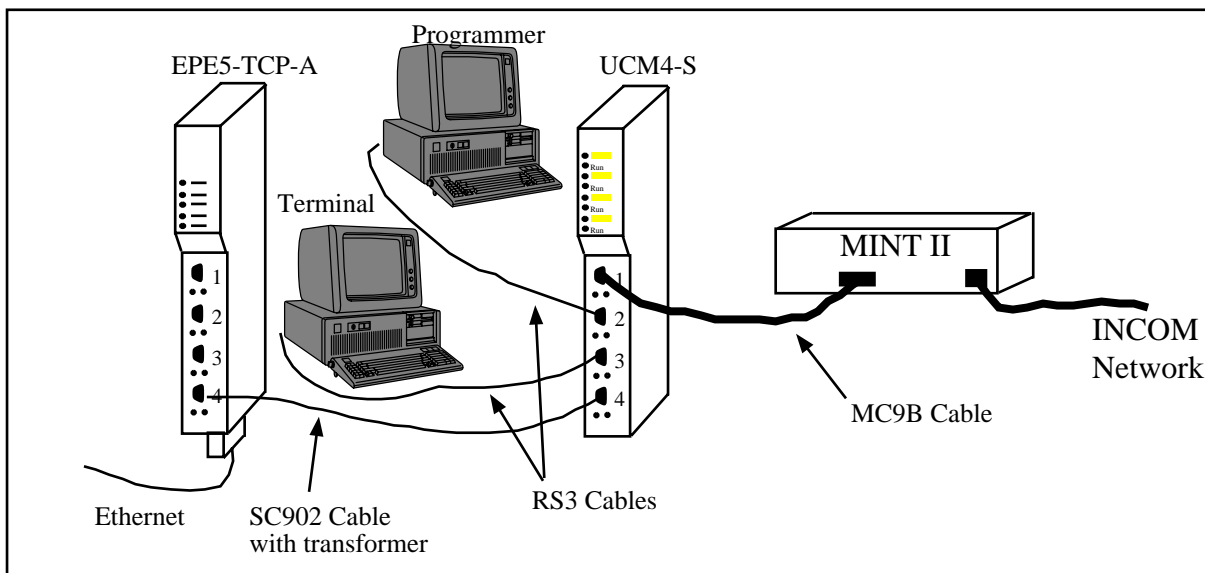


Figure 2-4 UCM4-S Layout

Port 2 to the Personal Computer

A physical connection must be made from the personal computer to the UCM in order to download the applications. This link may be a serial connection from a COM port on the personal computer to the RS-232 port on the UCM4-S. The Niobrara RS3 cable may be used for this connection. This cable pinout is shown in Figure 2-5.

If remote configuration is desirable, Port 2 of the UCM may be connected to a spare SY/MAX mode port of the EPE5-TCP, MEB-TCP, or SPE4 by means of an SC902 cable with its external power supply. The network module port should be set for SY/MAX mode, 9600 baud, EVEN parity, 8 data bits, 1 stop bit, and BCC error checking.

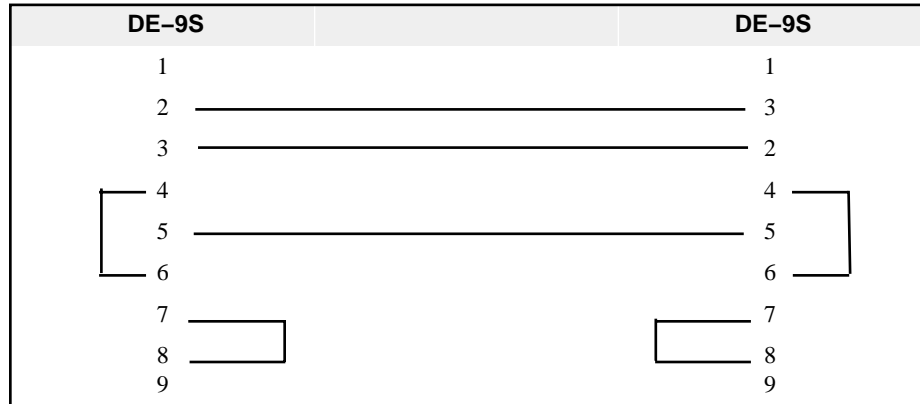


Figure 2-5 RS3 Pinout

Port 3 to Terminal

The Niobrara RS3 cable is ideal for connecting a personal computer running a terminal emulator to Port 3. The SC902 cable has a 9-pin RS-232 connection for the computer and a 9-pin RS-232 connection for the UCM4-S.

The terminal emulator must be set for 9600 baud, NO parity, 8 data bits, 1 stop bit, and NO handshaking.

Port 4 to EPE5

The Niobrara SC902 cable may be used to connect the UCM4 Port 4 to the RS-422 port of an EPE5-TCP, MEB-TCP, SPE4-2D, or SPE4-1D. The external transformer for the SC902 must be used.

The network module should have firmware of 17Apr98 or newer and the serial port should be set for MODBUS GATE mode at 9600 baud, EVEN parity, 8 data bits, 1 stop bit, timeout = 200. This mode uses the new POWERLOGIC Modbus Random Read opcode 100 for translations from SY/MAX Random Access Reads.

If the module's firmware is older than 17Apr98 then use MODBUS HOST mode at 9600 baud, 8 data bits, EVEN parity, 1 stop bit, Bias = 0, Read command = 3, WRITE command = 16, timeout = 200. It is strongly recommended that the firmware be upgraded to include the new Random Read since this will greatly increase performance.

Loading the Applications into the UCM4

Two batch files are included to assist loading the programs into the UCM4. With the computer connected to Port 2 of the UCM4, run either L1.BAT if COM1: of the computer is used or L2.BAT for COM2:.. These files will automatically load the programs into the proper port and set them for Auto-Start. After completion of the loading, the green RUN lights at the top of the UCM should light on Ports 1, 3, and 4. The module should be ready to learn the network.

IMPACC Installation

The following IMPACC devices with their commands are supported by this UCM application:

| IMPACC Device | PLOGIC Device | IMPACC Commands |
|-------------------------|--|-----------------------------------|
| AEM II | not mapped, must be set for AEM II mode. | 300, 351 |
| Advantage | Digital Relay | 300, 305 |
| Digitrip RMS T700, T800 | Digital Relay, Must be on AEM subnet. | 300, 305, 308 |
| Digitrip T810 | Digital Relay | 300, 305, 308, 309, 30A |
| Digitrip T910 | Digital Relay | 300, 305, 306, 308, 309, 30A |
| Digitrip MV | Digital Relay | 300, 305 |
| IQ Data Plus II/HV | CM2050 | 300, 305, 306, 307, 308, 309, 30A |
| IQ 1000 II | CM 2050 | 300, 305 |
| IQ Data/Generator | CM 2050 | 300, 305, 306, 307, 309 |
| IQ Analyzer | CM 2050 | 300, 305, 306, 307, 308, 309 |
| ABB MPS/NIM | CM 2050 | 300, 354 |

Digitrip T700 and T800 units must be on an AEM II subnet. The AEM II must be set for AEM II mode. IQ Data Plus II units are supported on AEM II subnets.

The present release of this application does not support writes from the POWERLOGIC system.

Learning the IMPACC Network

Using a terminal on UCM Port 3, press the "L" key to learn the network. Port 1 will change from normal polling operation and turn on its RED light. Port 1 will then step through the Main network addresses set by the limits shown on the screen searching for IMPACC devices. When a device is found, it is displayed on the screen with its corresponding PLOGIC address. If an AEM II device is found, its subnet network is polled to find the devices on the subnet. Port 1 will continue to poll until it finds 40 devices or the upper limit address is reached. The limits may be adjusted by pressing the "A" key on the terminal.

A record of the devices may be made by capturing the text with the terminal emulator program. It may be advisable to disable the polling update before saving to file.

Example 1

Figure displays an example IMPACC network with a UCM4-S, MINT II, an AEM II (address = 012) with a sub-network consisting of an IQ Data Plus II (address = 001) and a Digitrip T700 (address = 011). Also on the main network is another IQ Data Plus II (address 004) and an ABB MPS/NIM (address = 01E).

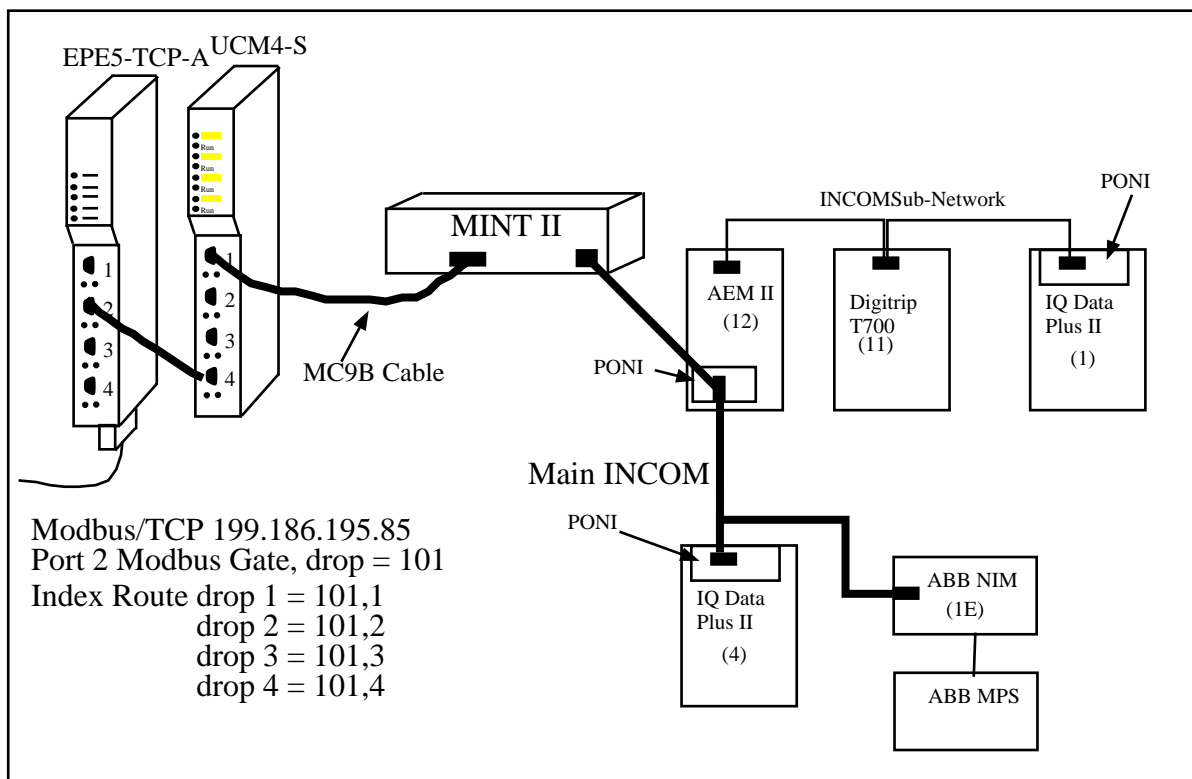


Figure 3-1 Network Example

Port 2 of an EPE5-TCP is connected to Port 4 of the UCM with an SC902 cable. The EPE5's Port 2 is set for Modbus Gate mode, 9600, EVEN, 8, 1, and has a drop number of 101. The Ethernet port is set for Modbus/TCP protocol with an IP address of 199.186.195.85. The Modbus Routing table for the Ethernet port has entries for Destination Index values of 1, 2, 3, and 4 to point to Modbus Slaves 1, 2, 3, and 4. Figures 3-2 and 3-3 show these EPE5SW screens.

```

Niobrara R&D      E P E 5   E T H E R N E T   P O R T   E X P A N D E R
                                05May98
                                CONFIGURATION AND UTILITY SOFTWARE
                                Press F2 for help.
-----
Drop                0
On Ethernet         YES
Protocol            MODBUS/TCP
IP Address          199.186.195.85
Subnet Mask         255.255.255.0
Default Gate       199.186.195.1
Buffer Limit       16
MBAP TCP Port      502
TCP Backoff        100
Downstream Timeout 500
Quiet Timeout      600

      E T H E R N E T   P O R T   1   P O R T   2   P O R T   3   P O R T   4
      1                   NO          NO          NO          NO
      2                   NO          NO          NO          NO
      3                   SY/MAX      MODBUS GATE SY/MAX      SY/MAX
      4                   9600        9600        9600        9600
      5                   EVEN        EVEN        EVEN        EVEN
      6                   8           8           8           8
      7                   1           1           1           1
      8                   16          16          16          16

```

Figure 3-2 EPE5-TCP Edit Port Parameters Screen

```

Niobrara R&D      E P E 5   E T H E R N E T   P O R T   E X P A N D E R
                                05May98
                                CONFIGURATION AND UTILITY SOFTWARE
                                bOnline  bOffline  Utility  Setup  Quit
MODBUS SERVER ROUTING FOR ETHERNET PORT
-----
INDEX  ROUTE
  0    NONE
  1    101,1
  2    101,2
  3    101,3
  4    101,4
  5    NONE
  6    NONE
  7    NONE
  8    NONE
  9    NONE
 10    NONE
 11    NONE
 12    NONE
 13    NONE
 14    NONE
 15    NONE
Type digits to enter route. F4 to edit start address.
Use + and - to select port. Escape to exit.

```

Figure 3-3 EPE5-TCP Modbus Index Routing

Figure 3-4 shows the terminal emulator screen from UCM Port 3 after a "Learn" operation. The UCM found all five devices and mapped the IQ Data Plus II (address = 004) on the Main network as PLOGIC (Modbus) device 1. The AEM II (address = 12) was found but since it doesn't have pertinent data, it was not assigned a PLOGIC address. The IQ Data Plus II (address = 01) on the AEM subnet as found next and assigned as PLOGIC device 2. The Digtirip (address = 11) was assigned PLOGIC ad-

dress 3. The ABB MPS/NIM (address = 1E) was the last device found and assigned PLOGIC address 4.

```

'S' to Suppress Polling Display
Polling Plogic Slave 001...
In Learn Mode...

Plogic  Main  Subnet  Div.  Prod.  Comm.  Product
Addr.   Addr.  Addr.   Code  ID     Ver.   Description
(dec)   (hex)  (hex)   (dec) (dec)  (dec)  -----
001     004    000     001   002   007   IQ Data Plus II
N/A     012    000     003   001   007   AEM II
002     012    001     001   002   008   IQ Data Plus II
003     012    011     004   001   001   Digitrip T700, T800, or T900
004     01E    000     005   007   011   ABB MPS/NIM

Trying Main Address      030
Main Network Starting Address is 001
Main Network Ending Address is 030
Polling Display Enabled.

Press 'L' to Enter Learn Mode
      'A' to Adjust Address Range
      'S' to Suppress Polling Display
Polling Plogic Slave 003...

```

Figure 3-4 Terminal Screen

Incoming Modbus/TCP messages with a Destination Index of 1 will be sent to the IQ Data Plus II (address = 04), Index 2 will be sent to the IQ Data Plus II (address 01), Index 3 will be sent to the Digitrip, and Index 4 will be sent to the ABB.

If an IMPACC device fails to respond to a poll from Port 1, then a status bit will be cleared and the Port 4 program will not respond to Modbus messages addressed to that slave's PLOGIC address. An error 17 will be returned from the EPE5's Modbus Gate port.