QUCM Modem Dialer

Installation and Programming Manual

This Manual describes the QUCM application for interfacing remote Modbus and PowerLogic slaves through dial-up modems via Modbus ASCII, Modbus RTU, and PNIM from a Modbus/TCP Ethernet system.

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1
Introduction

The Niobrara QUCM is a TSX Quantum® compatible module that is capable of running multiple applications for performing communication translations between serial protocols. This document covers an application that uses standard dial-up modems to access remote Modbus RTU and PowerLogic protocol slaves by way of the Modbus ASCII protocol. The QUCM dials the appropriate telephone number based on the Modbus/TCP Destination Index, translates the Modbus/TCP message to Modbus ASCII for transmission across the modem link. Optionally, the QUCM may use Modbus RTU or PNIM protocols to connect to the remote slaves. The QUCM configuration is accomplished by a built-in web page.

The remote location includes a Niobrara MUCM to interface between the modem and the RS-485 network of slaves. This MUCM converts the Modbus ASCII messages to Modbus RTU or PNIM based upon the slave address of the Modbus ASCII message. If the slave address is below 100 then the message is transmitted out the MUCM's RS-485 port as Modbus RTU. Messages with slave addresses greater than 100 are transmitted as PNIM with the slave address subtracted from 100. This is an inverted operation of the CHEVRON mode in standard Niobrara network products. Optionally, the remote slaves may be directly connected to the modem for Modbus RTU or PNIM operation.

The application, "app1.qcm" is compiled and loaded into Application 1 of the QUCM-LE with the Auto-Start feature enabled for stand-alone operation. The application includes multiple threads for simultaneously servicing both serial ports and the Ethernet port. The application, "app2.qcm" is compiled and loaded into Application 2 of the QUCM. This application contains the web server. The application, "mucmapp1.qcm" is loaded into each remote MUCM.

The Niobrara QXBP-001 single slot rack with built-in power supply is used for mounting the QUCM-LE. A two (or more) slot Quantum rack and appropriate Quantum power supply may also be used for mounting the QUCM-LE.

Both serial ports of the QUCM may be used to connect to local modems. The Niobrara cable MM12 is used to connect the QUCM-LE in RS-232 mode to a standard 25-pin modem. An MM1 cable is needed to load the IP Address into the QUCM.

The Niobrara MU12 cable is used to connect the RS-232 port on the MUCM to a standard 25-pin modem. The Niobrara METH-001 should be used to cover the option adapter on the MUCM. The Niobrara TR121-ST or a 12 or 24V DC or AC power supply is needed to power the MUCM. An MU1 cable is needed to load the program into the MUCM.

2
Installation

QUCM Installation

1 Mount the QUCM in an available slot in the register rack. Secure the screw at the bottom of the module.

Software Installation

The application files and this user manual aree included in the QUCM_MODEM_SETUP.EXE file. The latest version of the file is located at
http://www.niobrara.com/

Serial Connections to the QUCM-OE

Port 1 (and Port 2) to 25-pin DCE Modem

The serial ports of the QUCM-OE must be switched to RS-232. The Niobrara cable MM12 is used to connect to a standard 25-pin Modem.

NOTE: Do not use the MM4 cable for this application.

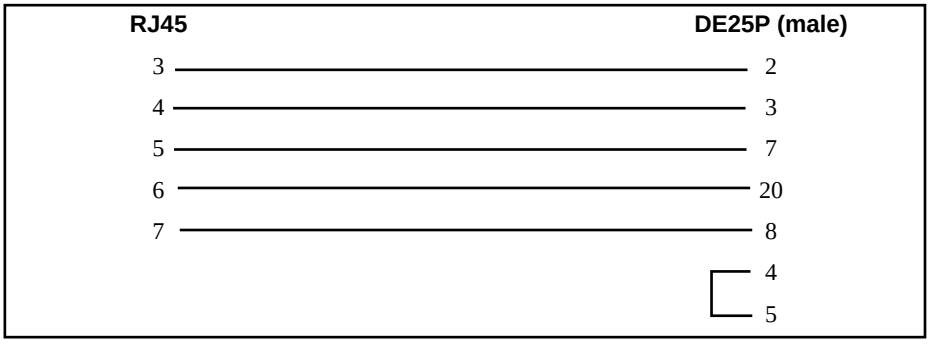

Figure 2-1 QUCM-LE to RS-232 Modem DCE Port (25-pin) (MM12 Cable)

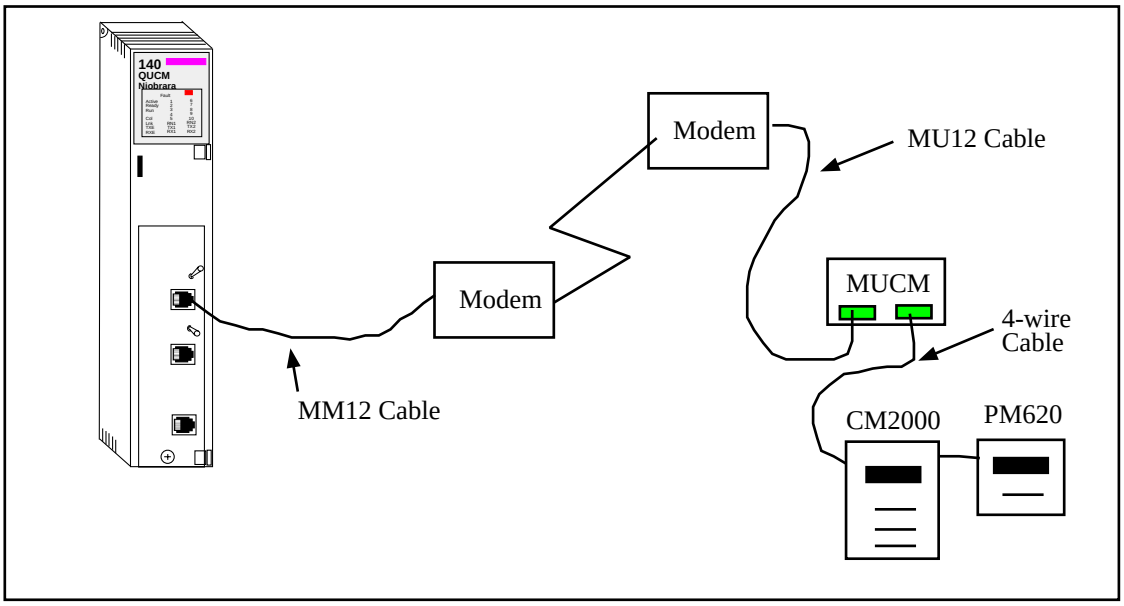

Figure 2-2 Typical system setup

Port 1 to the Personal Computer

A physical connection must be made from the personal computer to the QUCM in order to configure the Ethernet parameters of the QUCM-OE. This link may be a serial connection from a COM port on the personal computer to the RS-232 port on the QUCM-OE. The Niobrara MM1 cable may be used for this connection. This cable pinout is shown in Figure 2-4.

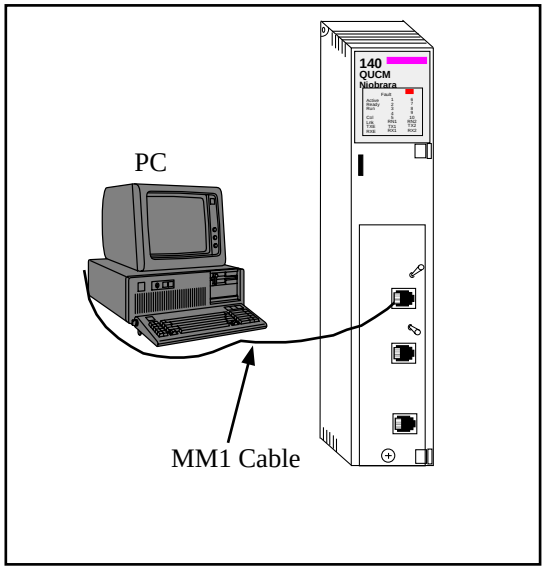

Figure 2-3 PC Connection to QUCM-LE serial port

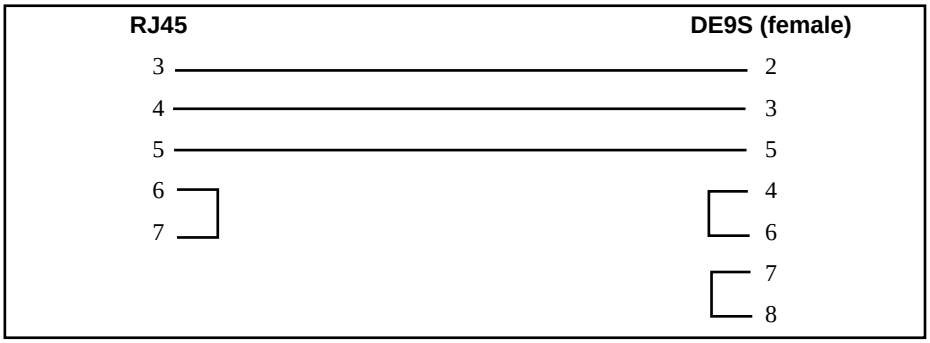

Figure 2-4 QUCM-SE to RS-232 PC Port (9-pin) (MM1 Cable)

Serial Connections to the MUCM-002

Port 1 to 25-pin DCE Modem

The RS-232 serial port of the MUCM is used to connect to the modem. The Niobrara cable MM12 is used to connect to a standard 25-pin Modem.

NOTE: Do not use the MU4 cable for this application.

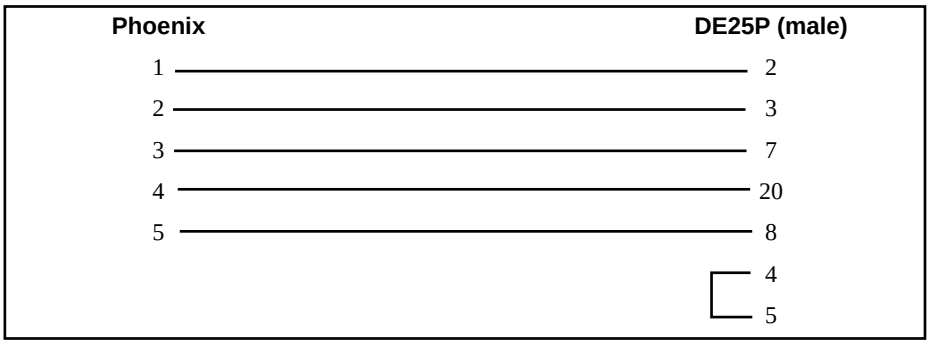

Figure 2-5 MUCM to RS-232 Modem DCE Port (25-pin) (MU12 Cable)

MUCM Port 1 to the Personal Computer

A physical connection must be made from the personal computer to the MUCM in order to load the application. This link may be a serial connection from a COM port on the personal computer to the RS-232 port on the MUCM. The Niobrara MU1 cable may be used for this connection. This cable pinout is shown in Figure 2-6.

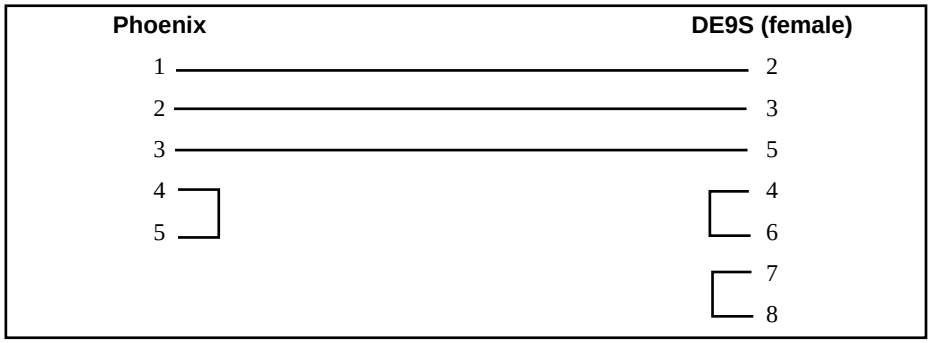

Figure 2-6 MUCM to RS-232 PC Port (9-pin) (MU1 Cable)

MUCM Port 2 to the Slaves

Standard Belden 8273 cable may be used to connect the MUCM to a 4-wire network of slaves.

NOTE: 2-wire RS-485 networks may be formed by jumpering the TX+ to RX+ and TX- to RX- on the MUCM.

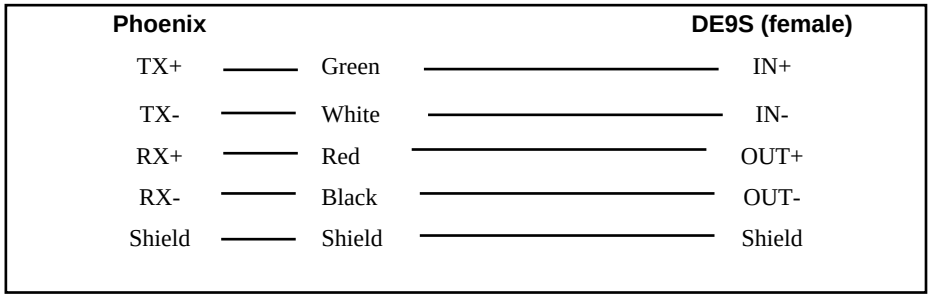

Figure 2-7 MUCM to RS-232 PC Port (9-pin) (MU1 Cable)

Loading the Applications into the QUCM

The QUCM-OE must use the qucmtcpl.fwl or qucmtcpl.qcc firmware included in the modem.zip file. This firmware is dated 28Oct2002 or later. There are two ways to upgrade the firmware of the QUCM-LE: QLOAD and FWLOAD.

Using ZAPREG32.EXE to set the IP Address

It is recommended to use the Ethernet capabilities of QLOAD to load the firmware, APP!.QCC and APP2.QCC into the QUCM. Set up the IP parameters of the module by the following method:

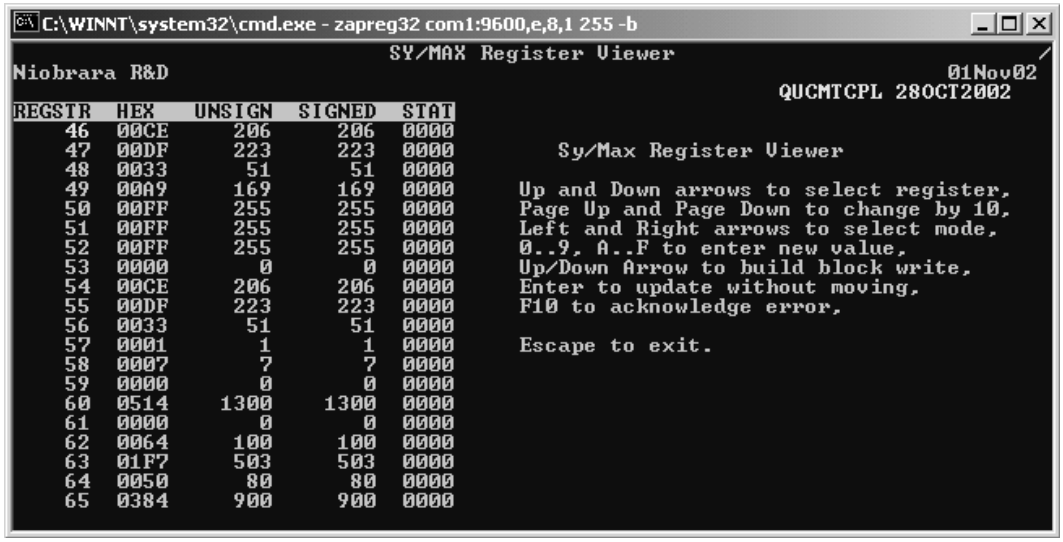

Figure 2-8 ZAPREG32 COM1:9600,E,8,1 255 -B

1 Move Switch 1 and Switch 2 to Halt.

2 Connect the PC to QUCM Port 1 with a MM1 cable.

3 From the command line enter

>zapreg32 com1:9600,e,8,1 255 -b

This will start zapreg32 in Modbus RTU mode to slave address 255. Use the arrow and Page Up/Down keys to move to register 46. The IP parameters are shown below for a unit with the IP = 206.223.51.161 subnet Mask = 255.255.255.0, Default Gate = 206.223.51.1, Modbus/TCP port number = 503:

Register	Description	Example (decimal)
46	IP MSByte	206
47	IP	223
48	IP	51
49	IP LSByte	161
50	SN Mask	255
51	SN Mask	255
52	SN Mask	255
53	SN Mask	0
54	Def. Gate	206
55	Def. Gate	223
56	Def. Gate	51
57	Def. Gate	1
58	(leave this alone)	
59	(leave this alone)	
60	(leave this alone)	
61	(leave this alone)	

62 (leave this alone)
63 Modbus Port 503 (this defaults to 502)

4 After entering the IP parameters, attempt to ping the module to verify the settings.
> ping 206.223.51.161

5 Verify a connection to the internal Modbus/TCP server with zapreg32.
> zapreg32 206.223.51.161:503 255
Should connect to the QUCM on port 503 with Destination index 255.

QLOAD QUCM Firmware Update

QLOAD is a convenient method for upgrading the firmware of a QUCM, especially if the QUCM already has an IP Address. A direct serial connection to the module is not required, the module does not need to be powered down, and the entire process may be done remotely across the Ethernet.

1 Application 1 Switch must be in RUN.

2 Start QLOAD.EXE

3 Click on the Browse button and select the file qucmtcpl.qcc.

4 Select the Application 1 Radio Button.

5 Verify the following:

a. Status Register = 1.

b. Run Pointer Register = 33.

c. Auto Start is checked.

d. Erase Flash is checked.

e. Load File is checked.

f. The Modbus/TCP tab is selected.

(1) The IP Address of the QUCM is entered correctly.

(2) The TCP Port number is set to 503.

(3) The Modbus Drop is set to 255.

6 Press the Start Download button. QLOAD will open a progress window to show the status of the download. Wait approximately 20 seconds for the upgrade to finish after the download is complete. The unit should be ready to received the new versions of app1.qcc and app2.qcc.

FWLOAD QUCM Firmware Update.

If the QUCM has corrupt firmware or completely non-responsive then the old method of using FWLOAD may be required.

Firmware upload is as follows:

1 Remove the module form the rack.

2 Move the RUN/LOAD switch on the back of the module to LOAD.

3 Replace the module in the rack and apply power.

4 Only the 3 light should be on. (The Link and RX E-net lights may be on if the E-net port is connected and there is traffic.)

5 Connect the PC to QUCM Port 1 with a MM1 cable.. Make sure that Port 1 is set to RS232 mode with the slide switch below the port.

6 From the command line enter

> fwload qucmtcp.fwl com1:

Be sure to have the colon after the PC's com port name. The download will only take a few minutes and will inform when finished.

7 Remove the module from the rack and change the switch back to RUN.

QLOAD APP1 and APP2

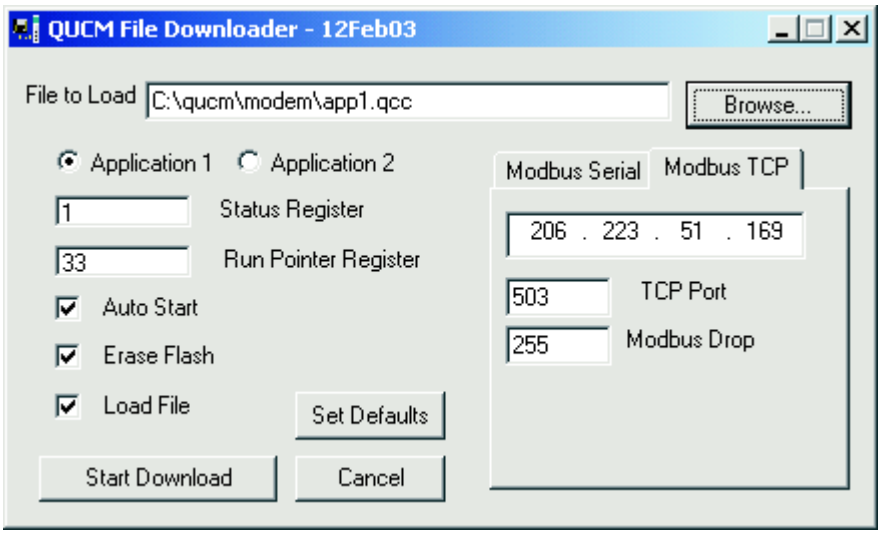

Figure 2-9 QLOAD of APP1

1 Application 1 and 2 Switches must be in RUN.

2 Start QLOAD.EXE

3 Click on the Browse button and select the file qucm_modem_app1.qcc.

4 Select the Application 1 Radio Button.

5 Verify the following:

a. Status Register = 1.

b. Run Pointer Register = 33.

c. Auto Start is checked.

d. Erase Flash is checked.

e. Load File is checked.

f. The Modbus/TCP tab is selected.

(1) The IP Address of the QUCM is entered correctly.

(2) The TCP Port number is set to 503.

(3) The Modbus Drop is set to 255.

6 Press the Start Download button. QLOAD will open a progress window to show the status of the download.

7 Click on the Browse button and select the file qucm_modem_app2.qcc.

8 Select the Application 2 Radio Button.

9 Verify the following:

a. Status Register = 3.

b. Run Pointer Register = 33.

c. Auto Start is checked.

d. Erase Flash is checked.

e. Load File is checked.

f. The Modbus/TCP tab is selected.

(1) The IP Address of the QUCM is entered correctly.

(2) The TCP Port number is set to 503.

(3) The Modbus Drop is set to 255.

10 Press the Start Download button. QLOAD will open a progress window to show the status of the download.

After downloading both applications, the RN1 and RN2 lights should be on. Open a web browser and point it to the IP Address of the QUCM for configuration.

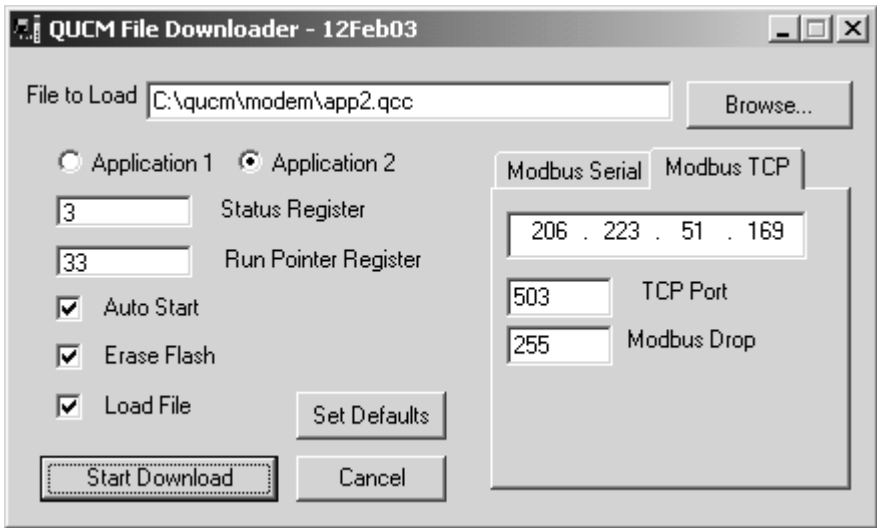

Figure 2-10 QLOAD of APP2

Loading the Application into the MUCM

The MUCM-002 must use the mucm.fwl or mucm.qcc firmware included in the modme.zip file. This firmware is dated 28Oct2002 or later. There are two ways to upgrade the firmware of the MUCM-001: QLOAD and FWLOAD.

QLOAD MUCM Firmware Update

QLOAD is a convenient method for upgrading the firmware of a MUCM. A direct serial connection to either port1 or port 2 on the MUCM is required.

1 Application 1 and 2 Switches must be in HALT

2 Start QLOAD.EXE

3 Click on the Browse button and select the file mucm.qcc.

4 Select the Application 1 Radio Button.

5 Verify the following:

   a. Status Register = 1.

   b. Run Pointer Register = 33.

   c. Auto Start is checked.

   d. Erase Flash is checked.

   e. Load File is checked.

   f. The Modbus Serial tab is selected.

      (1) The COM port of the PC is selected in the pull-down.

      (2) The baud rate is set to 9600.

      (3) The Modbus Drop is set to 255

      (4) The ASCII box is not checked.

      (5) The 8 Bits button is checked.

      (6) The Parity is set to EVEN.

6 Connect the PC to MUCM Port 1 with a MU1 cable..

7 Press the Start Download button. QLOAD will open a progress window to show the status of the download.

8 Move switch 1 to RUN. Wait approximately 20 seconds for the upgrade to finish after the download is complete. The unit should be ready to received the new versions of app1.qcc and app2.qcc.

FWLOAD MUCM Firmware Update.

If the QUCM has corrupt firmware or completely non-responsive then the old method of using FWLOAD may be required.

Firmware upload is as follows:

1 Move the RUN/LOAD switch to LOAD.

2 Connect the PC to QUCM Port 1 with a MU1 cable..

3 From the command line enter

   > fwload mucm.fwl com1:

   Be sure to have the colon after the PC's com port name. The download will only take a few minutes and will inform when finished.

4 Remove the module from the rack and change the switch back to RUN.

QLOAD MUCMAPP1

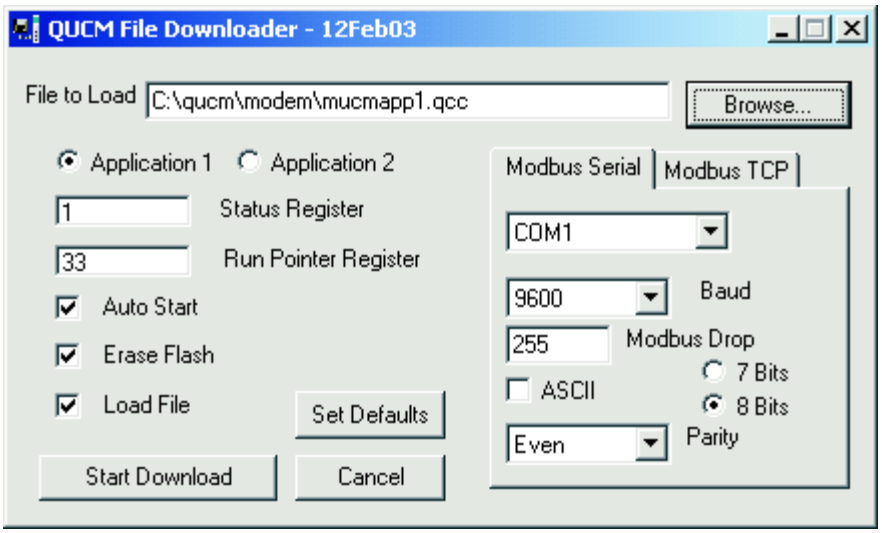

Figure 2-11 QLOAD of MUCMAPP1

1 Application 1 and 2 Switches must be in HALT.

2 Start QLOAD.EXE

3 Click on the Browse button and select the file mucm_modem_app1.qcc.

4 Select the Application 1 Radio Button.

5 Verify the following:

   a. Status Register = 1.

   b. Run Pointer Register = 33.

   c. Auto Start is checked.

   d. Erase Flash is checked.

   e. Load File is checked.

   f. The Modbus Serial tab is selected.

      (1) The COM port of the PC is selected in the pull-down.

      (2) The baud rate is set to 9600.

      (3) The Modbus Drop is set to 255

      (4) The ASCII box is not checked.

      (5) The 8 Bits button is checked.

      (6) The Parity is set to EVEN.

6 Connect the PC to MUCM Port 1 with a MU1 cable..

7 Press the Start Download button. QLOAD will open a progress window to show the status of the download.

8 Select the Application 2 Radio Button.

9 Verify the following:

   a. Status Register = 3.

   b. Run Pointer Register = 33.

   c. Auto Start is NOT checked.

   d. Erase Flash is checked.

   e. Load File is NOT checked.

   f. The Modbus Serial tab is selected.

      (1) The COM port of the PC is selected in the pull-down.

      (2) The baud rate is set to 9600.

      (3) The Modbus Drop is set to 255

      (4) The ASCII box is not checked.

      (5) The 8 Bits button is checked.

      (6) The Parity is set to EVEN.

10 Press the Start Download button. QLOAD will open a progress window to show the status of the download. This step is to simply erase the FLASH for application 2 to make sure that a previous program is not accidentally running.

After downloading both applications, move the Application Switch 1 to RUN. The RN1 light should be on.

3

Operation

A web browser is used to configure the QUCM. The serial ports must be configured to set the default modem dialing strings, configuration strings, baud rate, etc. Each remote slave must also be entered into the QUCM's look-up table and associated with a particular Modbus/TCP destination index. Each entry consists of the destination index, QUCM serial port, serial protocol to use, remote slave address, the remote telephone number, and a text name.

QUCM Operation

Modbus TCP messages arrive at the QUCM during normal operation. The QUCM examines the destination index for the message and if it matches an entry in its setup the following happens:

- The QUCM examines the QUCM port number to decide which serial port to use.
- The QUCM looks at CTS on the proper port to see if the modem has carrier. (CTS on the QUCM is connected to DCD on the modem with the MM12 cable.) If the modem has carrier, then the QUCM looks at the phone number of the current connection to see if it matches the phone number of the target slave. If the number matches then the QUCM proceeds to the next step. If the phone numbers do not match then the QUCM hangs up the modem by dropping RTS (DSR to the modem) The QUCM should then dial the remote system and wait for carrier..
- After the QUCM has carrier on the modem, it translates the message from Modbus/TCP to Modbus ASCII or optionally Modbus RTU or PNIM. The slave address of the Modbus or PNIM message is inserted from the entry in the look-up table.
- The QUCM then waits for the reply. If the reply happens before the timeout then the QUCM will translate the Modbus ASCII (RTU or PNIM) reply to Modbus/TCP, insert the appropriate destination index, and send the reply back to the Client. If a timeout occurs then the QUCM will generate an exception x0B reply.

MUCM Operation

The MUCM watches its RTS (modem DCD) line on its RS-232 port.. When the line goes high (carrier) it watches for a valid Modbus ASCII message to arrive. The MUCM looks at the slave address for the Modbus ASCII message to decide whether to send the message out the RS-485 port as Modbus RTU or PNIM.

Downstream Protocol Detection

- If the slave address is below 100 then the message is directly translated from Modbus ASCII to Modbus RTU and sent to the slave.
- If the slave address is between 100 and 199 then the message is translated into RNIM and sent to the slave address minus 100. For example, if the Modbus ASCII message is addressed to slave 105 then the message is sent to PNIM device 5.

Message Translations

Modbus ASCII messages are translated directly to Modbus RTU for slaves below 100. Messages that are translated into PNIM obey the following rules:

Modbus Opcode	PNIM Opcode
x03 Holding Register Read	Non-Priority Read
x04 Input Register Read	Non-Priority Read
x64 Random Holding Read	Non-Priority Random Read
x06 Single Holding Write	Non-Priority Write
x10 Block Holding Write	Non-Priority Write

Remote Operation without an MUCM

Niobrara recommends that Modbus ASCII be used to communicate across standard 10-bit dial-up modems. Modbus ASCII requires a minimum of special configuration of the modem pair. Modbus RTU or PNIM absolutely require modem configuration of 8 data bits and the modem pair must be set for no error correction, no software flow control, and no hardware flow control.

This application may be used to dial remote modems with Modbus RTU or PNIM slaves directly connected to the modem. Simply select the appropriate protocol when adding the target device on the web page. It is permitted to have all three protocols on a remote system, but they all must be set for 8 bit operation.

4

Web Server

Navigation Bar

The left side of each page includes a set of navigation links. This list changes dynamically based on the current page displayed. The root links are Home, Configuration, Statistics, and Help.

Home

The Home link displays a page similar to figure 4-1. It gives a brief summary of the number of devices configured, the settings on the two QUCM serial ports, and the status of the modem connections. The table of devices shows the Modbus/TCP destination Index, QUCM port number, remote Slave Address, text Name, Dial String, and a link for the Last Connect Status.

Clicking on the link in the Last Connect Status will show a page for the settings for that device. See figure 4-2. This page gives statistical counters for the number of good connects, no dialtone, no carrier, good replies, reply timeouts, and the state of the modem DCD. Links are provided at the bottom of the page for Next Device, Previous Device, Test Dial, Reset Counter, and Home.

Test Dial

The Test Dial link may be used to force a dial-up of the remote system. The QUCM will dial the remote number and if carrier is established, it will poll the remote MUCM for its setup parameters and poll the remote slave device for the test data. This is a handy testing tool to check the communication with the remote system. See Figure 4-3.

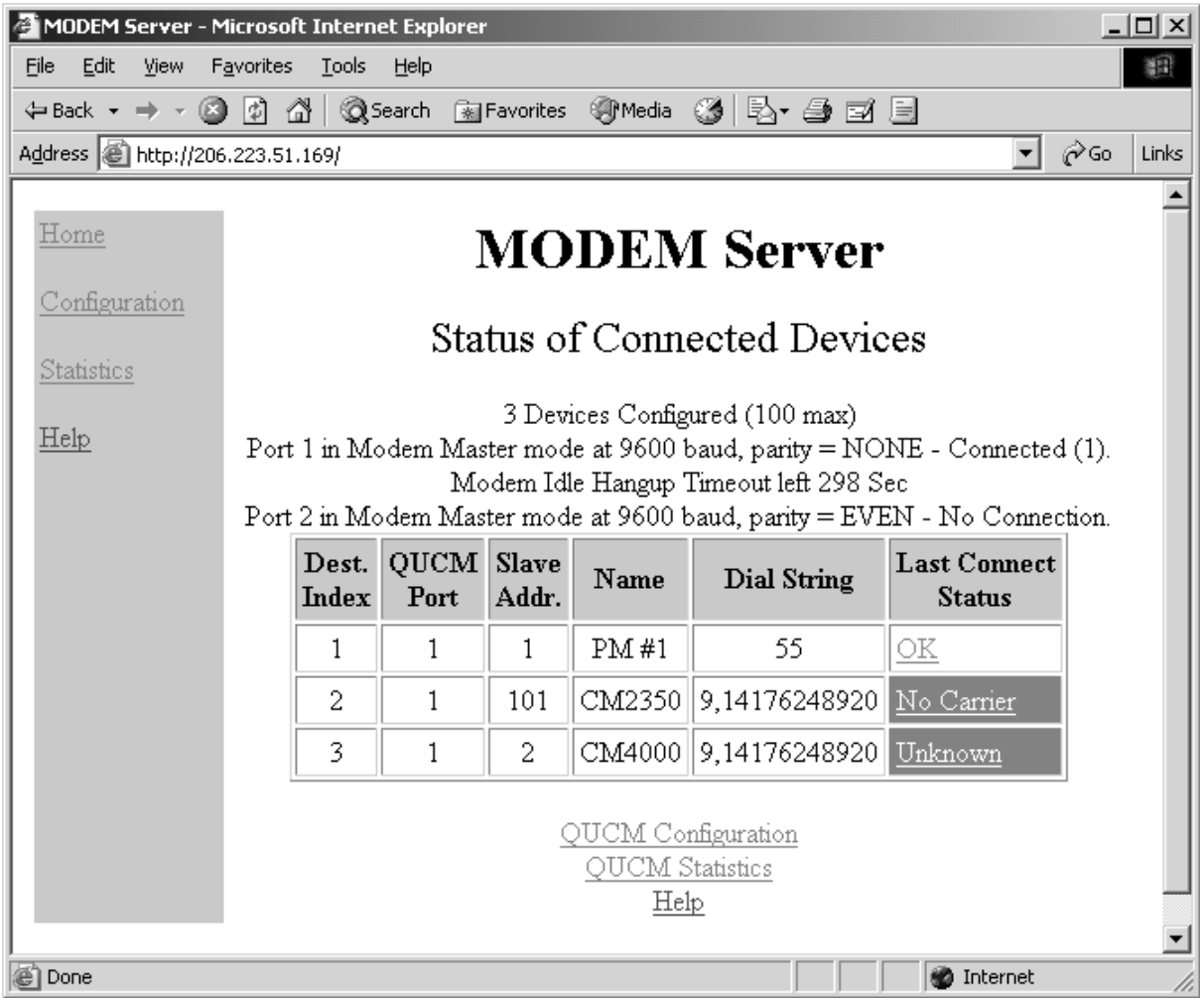

Figure 4-1 Main Page with three devices configured

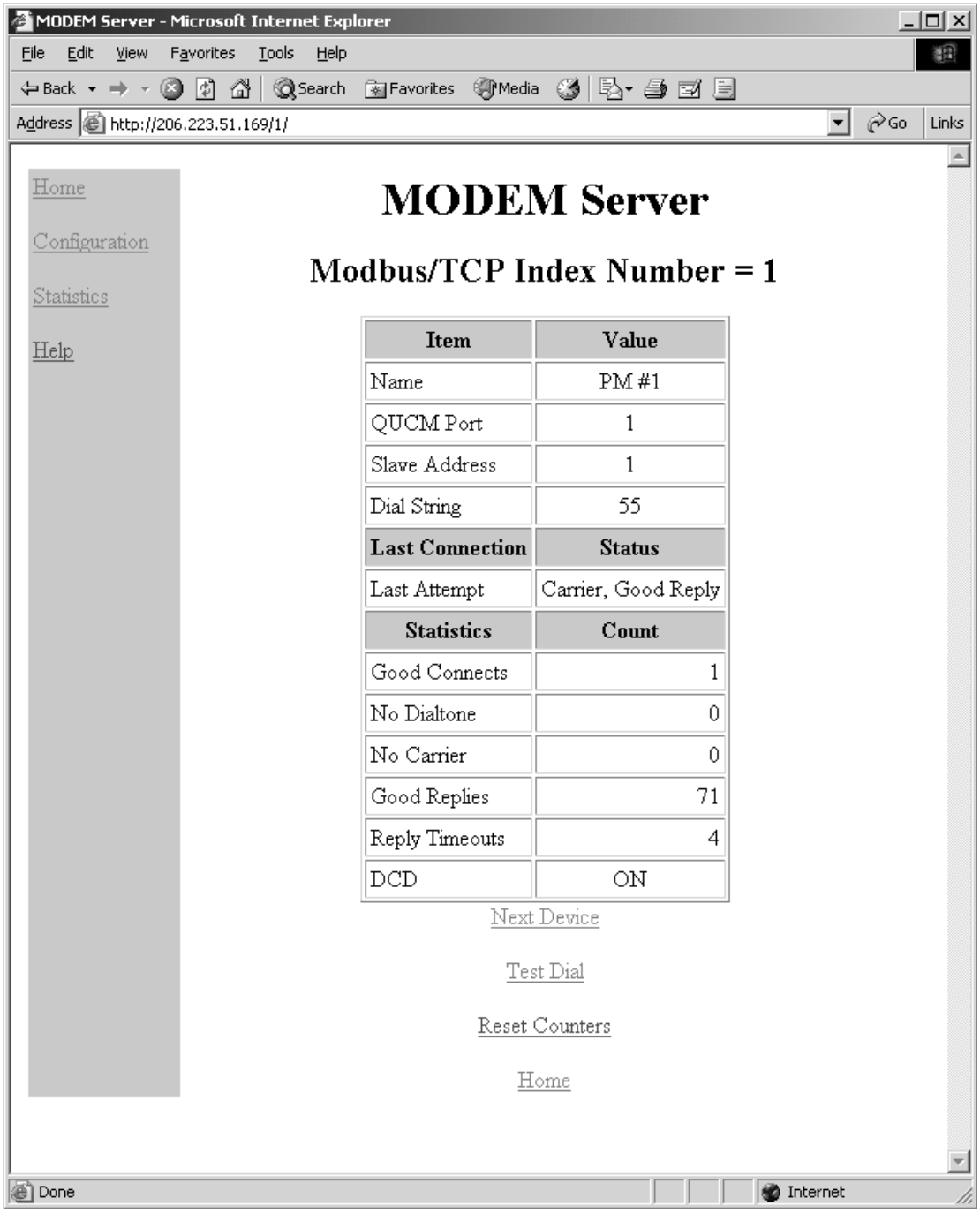

Figure 4-2 Device Page

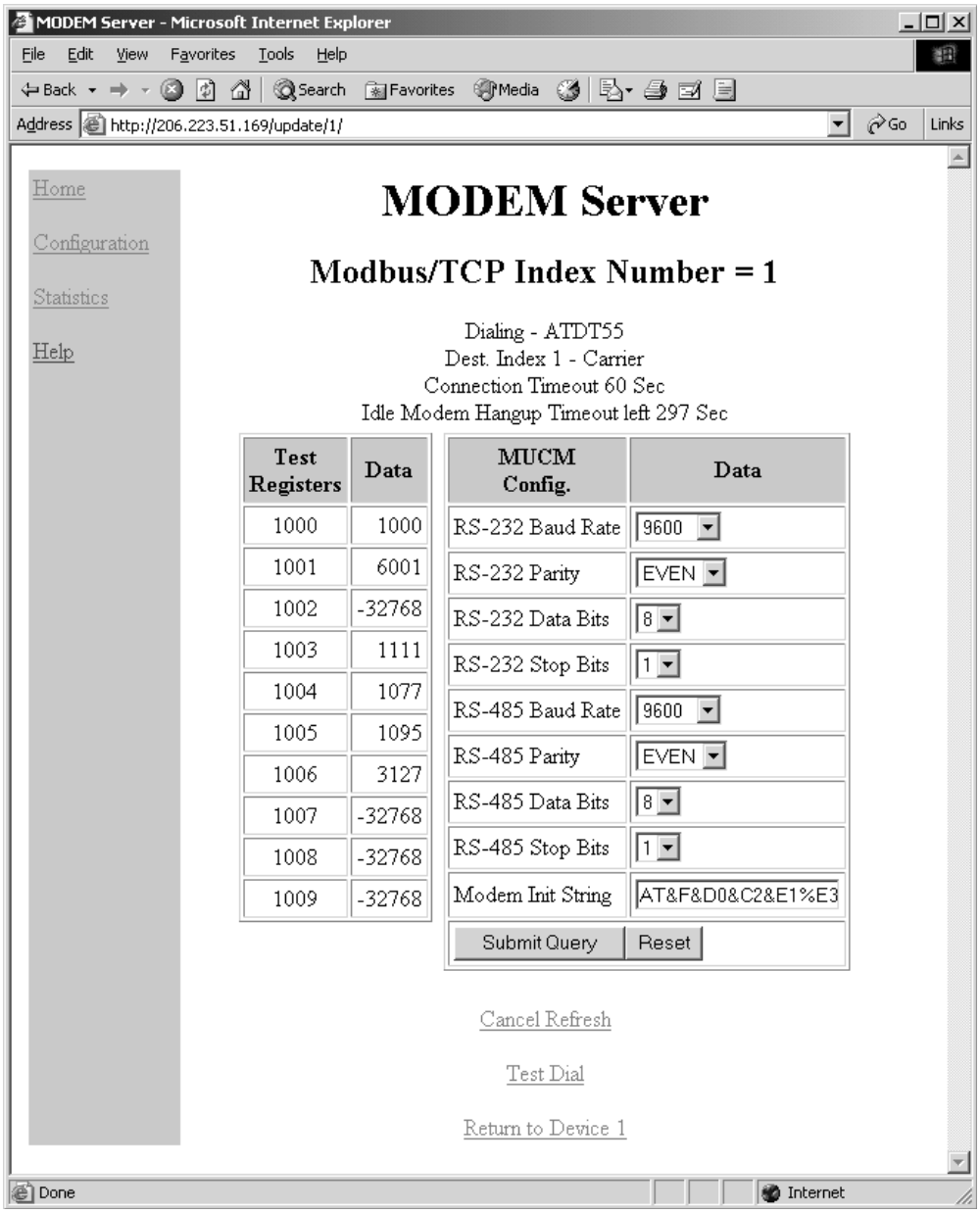

Figure 4-3 Test Dial Page

Configuration Page

The Configuration Page link will enter a set of pages for configuring the QUCM. A table is shown with the currently configured devices with links to Edit or Remove each device. Additional links are provided to Add Device, Serial Port Configuration, Change QUCM Titles, Change QUCM TCP/IP Address, Change Password, Store Configuration in Flash, and Home. See figure 4-4.

Password

These pages are password protected based on a 3 minute activity timer. If the password timer has expired the user will be prompted to enter the password. Some configuration parameters require the password to be entered before the action is taken.

The default password is "master" and it is case sensitive.

Add Device

The Add Device link is used to add new remote devices. Each device allows the selection of the Modbus/TCP Destination Index, Slave Address, QUCM Port number, protocol, text Name, Dial String, Test Query Starting Register, Test Query Count, and In Service check box.

The Destination Index is the Modbus/TCP slave address used by the Client software to decide which remote device to dial. Valid entries are 1 to 100.

The Slave Address is the Modbus ASCII slave address used for the message to the remote system. The remote MUCM interprets the slave address as follows:

- If the slave address is < 100 then the message is translated from Modbus ASCII directly to Modbus RTU and sent out the RS-485 serial port.
- If the slave address is > 100 then the message is translated to PNIM and the target address is the slave address minus 100. For example, if the slave address is 125 then the MUCM will send a PNIM message to device 25.

The QUCM port is the port that the message will be transmitted from. Possible values depend on the settings of the serial ports.

The Name is a text description for the remote slave. This description is shown in most QUCM tables. The maximum length is 20 characters.

The Dial String is a text string that is sent to the modem when dialing the remote slave. The maximum length is 60 characters. Normal modem dial characters are allowed such as commas.

The Test Query Starting Register is the remote 4x register in the slave that is polled during a test dial.

The Test Query Count is the number of 4x registers polled from the remote slave during a test dial.

The In Service check box is used to temporally disable a device.

Serial Port Configuration

The Serial Port Configuration page is used to set up the parameters for the local modems.

The Port Mode allows the setting of Port 1 or Port 2 operation. The only mode at the present time is Modem ASCII Master.

The Baud Rate settings allow the chosen serial port to be set at 1200, 2400, 9600, and 19200 baud. The default values are 9600.

The Parity setting allow the port to be set to NONE or EVEN. The default value is EVEN.

The Modem Init String is used to send the modem general configuration. The modem must be configured for active DCD and active DSR hang-up. Normally these are set with the &C1 and &D2 values. Consult the modem manual for more information. The default string is for a Multitech modem:
AT&FX4&C1&D2&E1&E3&E14$EB1$BA0&W0

The Dial Prefix is prepended on every dial string. The default value is ATDT.

The Hang-up Delay is the number of seconds that the QUCM allows for the Modem to finish hanging up after DSR is dropped. The default is 2 seconds.

The Connection Timeout is the number of seconds that the QUCM will wait for the modem to raise DCD to indicate carrier. The default is 60 seconds.

The Modbus Timeout is the number of seconds that the QUCM will wait for a Modbus ASCII reply from the remote system. The default is 3 seconds.

The Idle Time before Hang-up is the number of seconds that the QUCM will keep the modem connected while no communication is occurring. After the timeout, the QUCM will hang-up the modem. The default is 300 seconds. A value of 0 will disable this timeout and allow the connection to stay on.

Edit Title Page

The Edit Title page allows the setting of the HTML Title and Head values. The Title is displayed at the top of most browsers and it also the text displayed when bookmarked. The Head is the text displayed in bold at the top of every QUCM web page.

QUCM TCP/IP Configuration

The QUCM TCP/IP page allows the changing of the IP Address, Subnet Mask, and Default Get of the QUCM. The new settings are not automatically stored to flash so they must be stored after the change.

Change Password

This page allows the user to change the default password for the configuration of the QUCM.

Store Configuration to FLASH

The Store Configuration to FLASH link must be used to save the current settings to non-volatile memory. All changes will be lost on power cycle if the store to flash is not used.

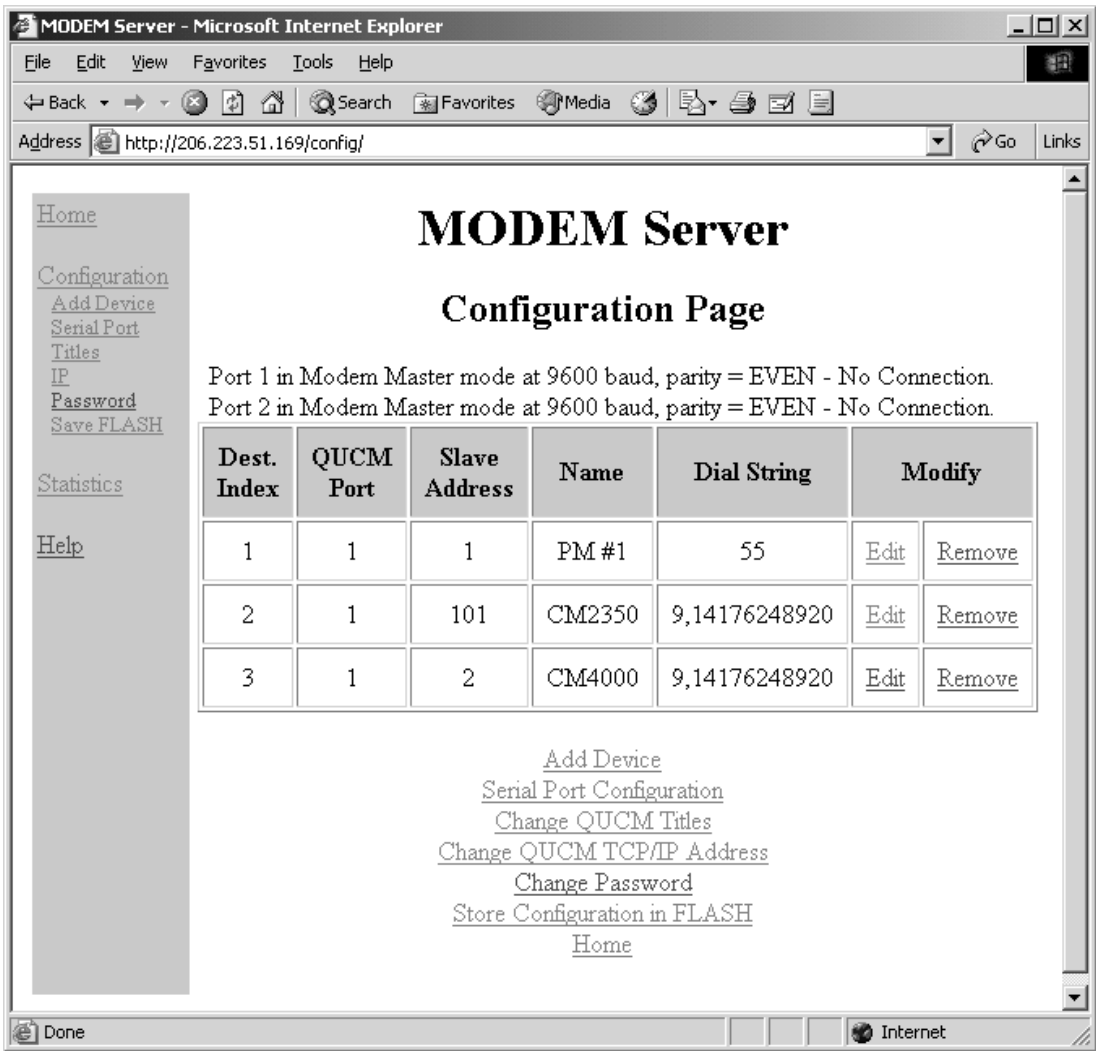

Figure 4-4 Configuration Page

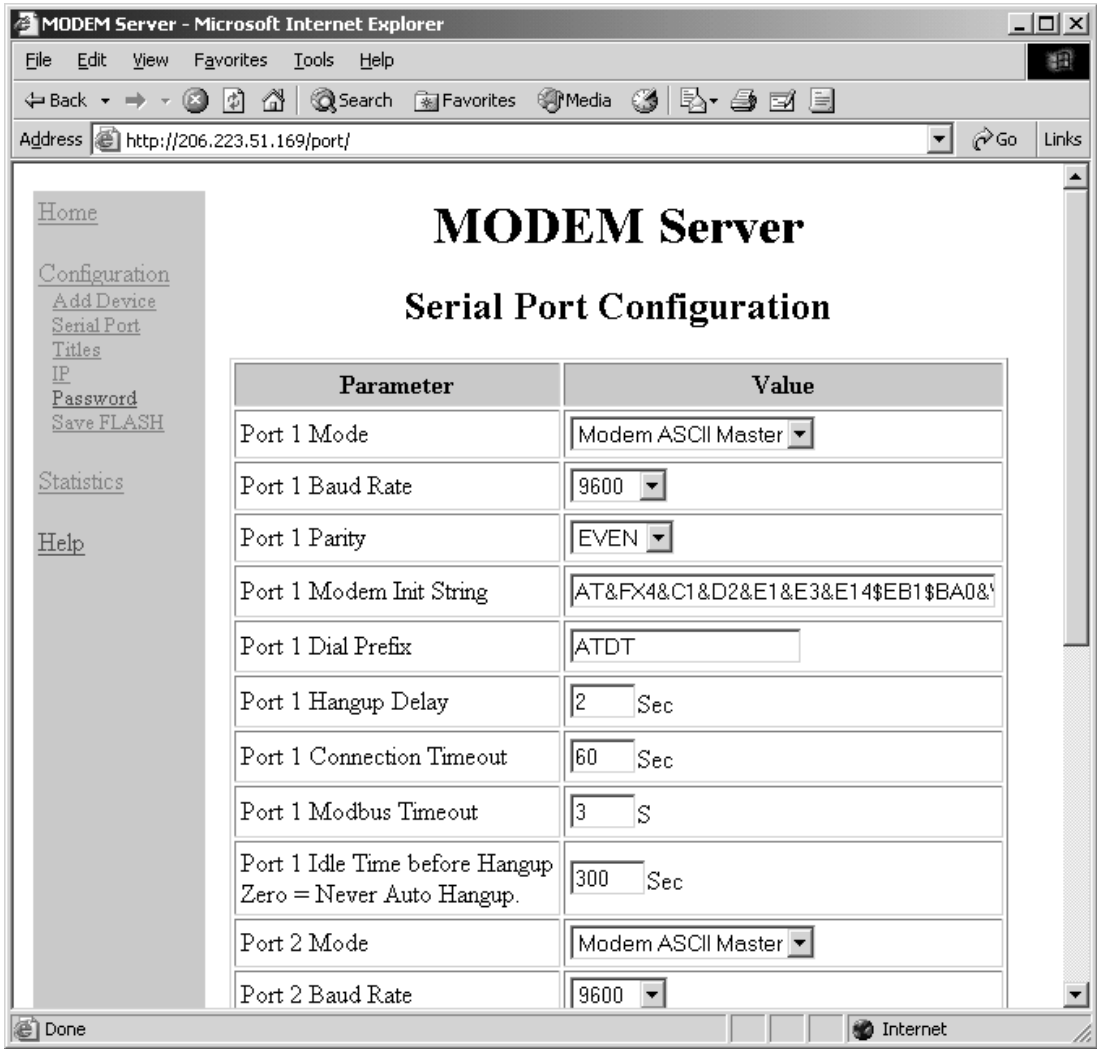

Figure 4-5 Serial Port Page

Statistics Pages

There are two links for statistics: QUCM and Device stats.. (See Figure 4-6 for the QUCM stats sample page) The QUCM stats page shows a variety of information about the QUCM itself including the MAC address, IP settings, firmware revisions and downloaded application revisions. The Device Stats page shows a summary of the counters for each device.

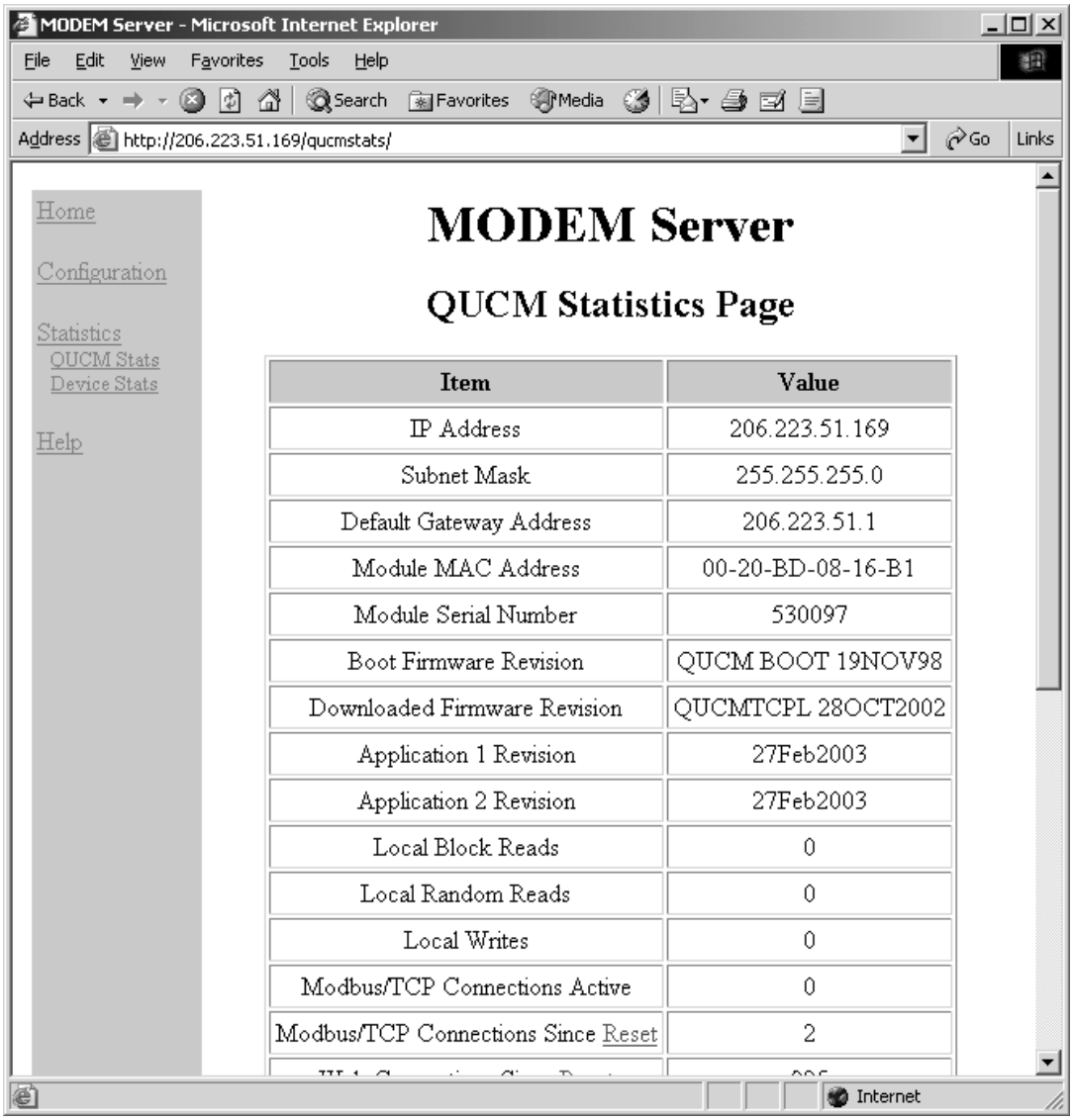

Figure 4-6 Statistics Web Page

Help Pages

There are a number of help pages to assist in understanding how the QUCM and MUCM work together, serial cable pinouts, and links to support from Niobrara's web site. Figure shows the help page for the MUCM.

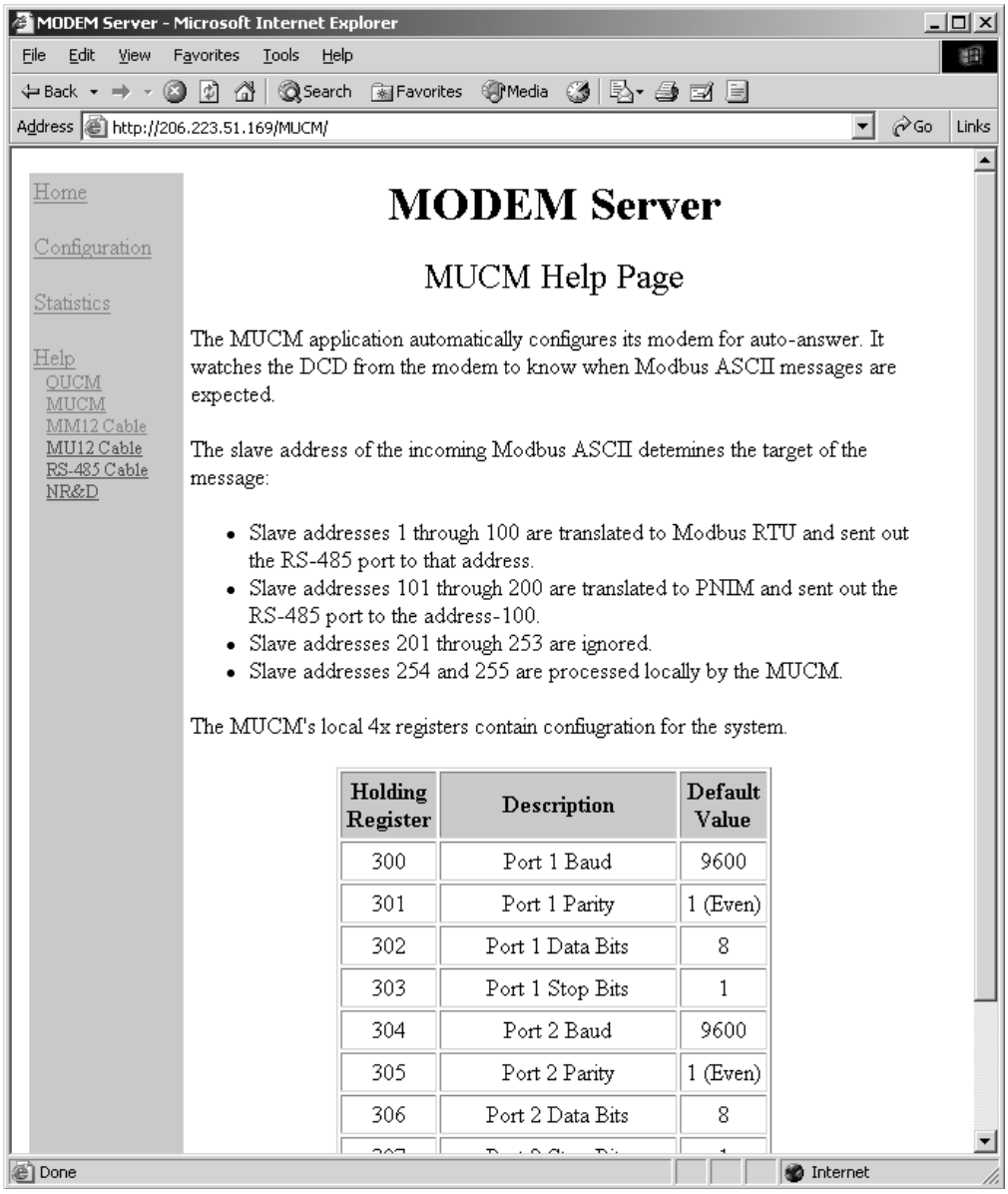

Figure 4-7 MUCM Help Page

5
Examples

Example 1

Figure 5-1 displays an example system with a QUCM-LE with a modem connected to Port 1. Two remote systems are included with a local modem at PBX extension 55 and a remote modem at a long distance phone number.

The local modem has a PM-620 connected to the MUCM speaking Modbus RTU at slave address 1.

The remote system has a CM2350 speaking PNIM at slave address 1 and a CM4000 speaking Modbus RTU at slave 2.

The configuration web page is shown in Figure 5-2. The local PM is entered as Destination Index 1 with a remote Slave Address of 1 and a dial string of 55. Both meters at the remote location will have dial strings of 9,14176248918 where the 9 selects an outside line, the comma waits for 2 seconds, and then the reset of the number is dialed. The CM2350 has a slave address of 101 to indicate to the remote MUCM that it should use the PNIM protocol to device 1 on the RS-485 port. The CM4000 is simply set to slave address 2.

The SMS setup would consist of a communication connection to the QUCM using Modbus/TCP. The three devices would be entered with the PM as slave address 1, the CM2350 as slave address 2 and the CM4000 as slave address 3.

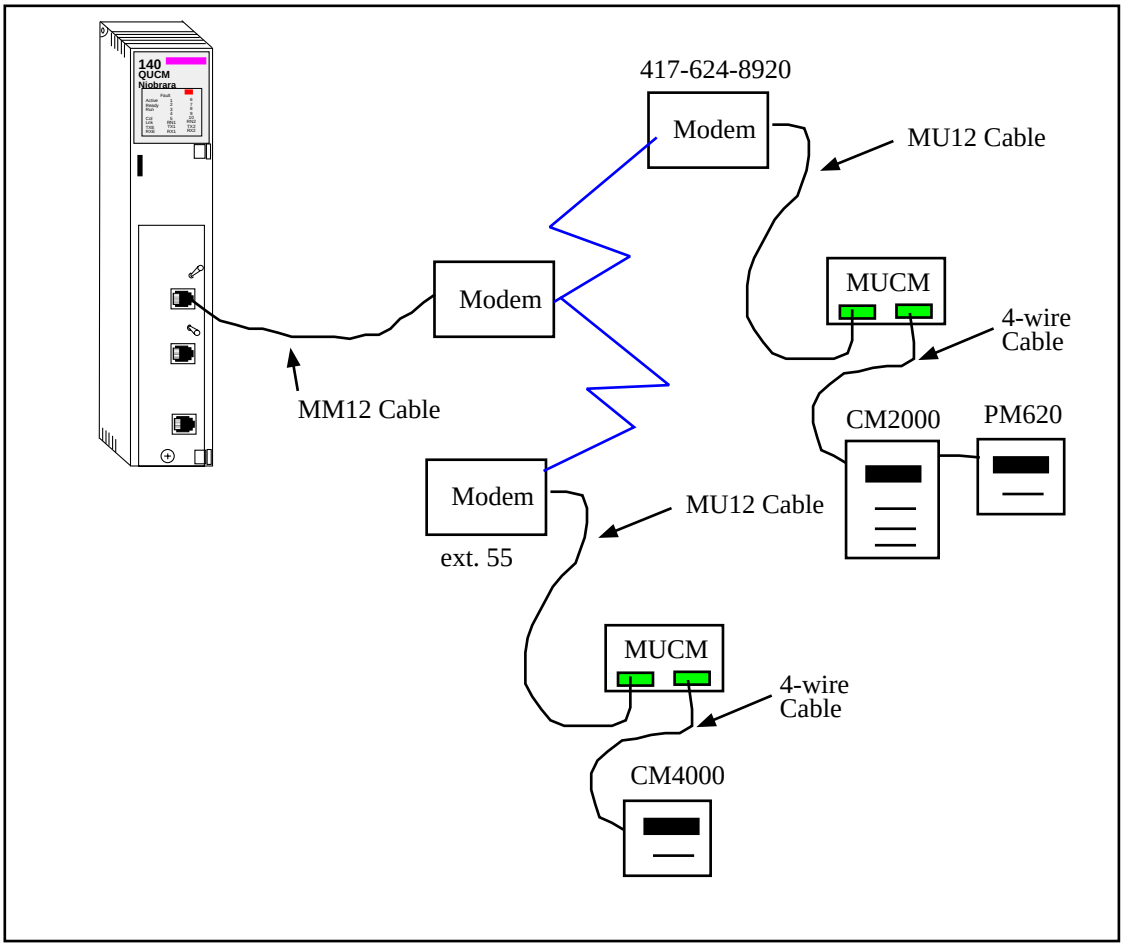

Figure 5-1 Example system setup

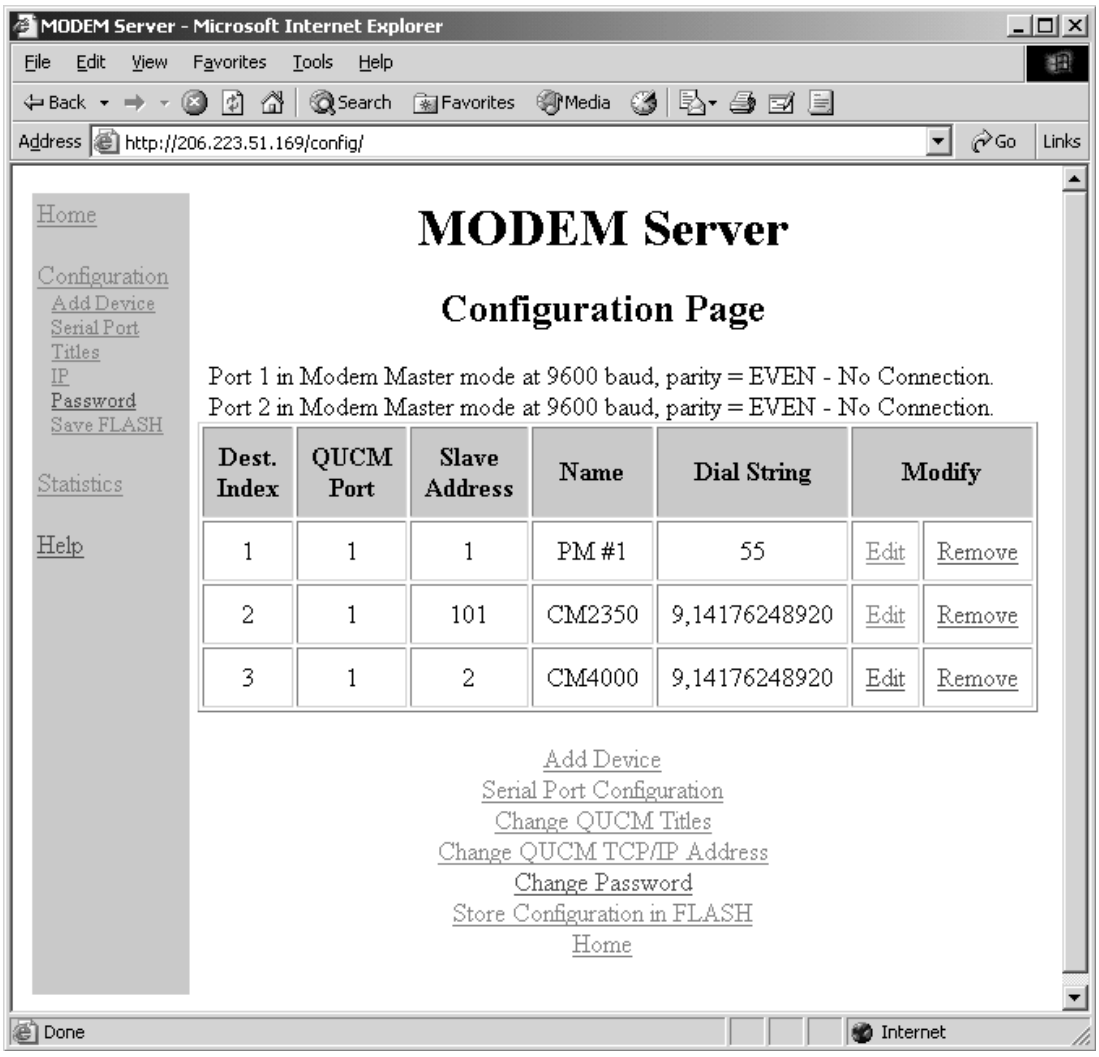

Figure 5-2 Example Configuration Page

6
Troubleshooting

Module Lights

The QUCM-SE has several lights that indicate the status of the module. Table 6-1 shows the meanings of these lights.

Table 6-1 Module Lights

Light	Meaning
Fault	The module has a catastrophic fault.. Call the factory.
Active	This light will be on if the module is in a traffic copped slot in a Quantum PLC system and the PLC is in RUN.
Ready	This light should always be on (as long as it isn't in firmware load).
Run	This light will be on if the module is in a traffic copped slot in a Quantum PLC system and the PLC is in RUN.
Col	Comes on when an Ethernet collision occurs.
Lnk	Is on when LINK is established on the 10BaseT port.
TXE	Comes on when the module is transmitting on the Ethernet port.
RXE	Comes on when the module is receiving on the Ethernet port.
RN1	This light should be on to indicate app1 is running.
TX1	Comes on when the module is transmitting on serial port 1.
RX2	Comes on when the module is receiving on serial port 1.
RN2	This light should not come on since there is no app2 loaded.
TX1	Comes on when the module is transmitting on serial port 1.
RX2	Comes on when the module is receiving on serial port 1.

User Lights

The QUCM-LE has 10 application driven lights numbered 1-10. The meaning of these lights while the APP1 and APP2 programs are running is shown in Table 6-2.

Table 6-2 QUCM User Light Definitions

Light	Meaning
1	Flashes quickly when no devices are configured.
2	Toggles as the QUCM steps through the devices for port 1.
3	Toggles as the QUCM steps through the devices for port 2.
4	Comes on when the Modem on port 1 has DCD.
5	Comes on when the Modem on port 2 has DCD.
6	Not used.
7	Not used.
8	Not used.
9	Not used.
10	Comes on while the debugging telnet server is connected.

Table 6-3 MUCM User Light Definitions

Light	Meaning
1	
2	Comes on when the Modem on RS232 port has carrier (DCD).
3	
5	

Testing the RS-485 network on the MUCM

Zapreg32 may be used to quickly test the RS-485 network at the QUCM.

1 Verify that the switches 1 and 2 are in RUN and that the RN1 light is on.

2 Connect the meters to the MUCM's RS-485 port.

3 Verify that the meters have the correct slave address, baud rate, and parity.

4 Connect the PC to the MUCM RS232 port with an MU1 cable.

5 Verify that the MUCM has the same baud rate and parity by using zapreg32.
>zapreg32 com1:9600,E,8,1 255 -a
to start zapreg32 in Modbus ASCII mode.
Move the cursor to the Register column and enter the number 300. and press enter. The meaning of each register is shown in Table 6-4. Press ESC when finished.

6 Communicate with each of the slaves using zapreg32 in Modbus ASCII mode.
>zapreg32 com1:9600,e,8,1 1 -a
will try to communicate with slave 1 in Modbus RTU.
>zapreg32 com1:9600,e,8,1 105 -a
will try to hit PNIM slave 5.

Table 6-4 MUCM Serial Port Setup Registers

Register	Description	Default Value
300	Port 1 Baud	9600
301	Port 1 Parity	1=EVEN
302	Port 1 Data Bits	8
303	Port 1 Stop Bits	1
304	Port 2 Baud	9600
305	Port 2 Parity	1=EVEN
306	Port 2 Data Bits	8
307	Port 2 Stop Bits	1