

# MUCM TAP

## Installation and Programming Manual

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This manual covers the MUCM application for communicating with a paging system using the TAP protocol.

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## Contents

1 Introduction.....	5
2 Installation.....	7
Module Installation.....	7
Software Installation.....	7
Serial Connections to the MUCM.....	8
Port 1 to Z500.....	8
Port 1 to PC.....	8
Loading the Application into the MUCM.....	8
Updating the MUCM Firmware.....	10
3 Operation.....	11
Example 1.....	12
MUCM Lights.....	13
Pager Error Codes.....	13

## Figures

Figure 2.1.: MU3 Serial Cable.....	8
Figure 2.2.: MU1 Serial Cable.....	8
Figure 2.3: FWLOAD Screen.....	10

## Tables

Table 3-1: 4x Registers (PLC Outputs).....	11
Table 3-2: 3x Registers (PLC Inputs).....	11
Table 3-3: 4x Registers (PLC Outputs) Example.....	12
Table 3-4: LED description.....	13



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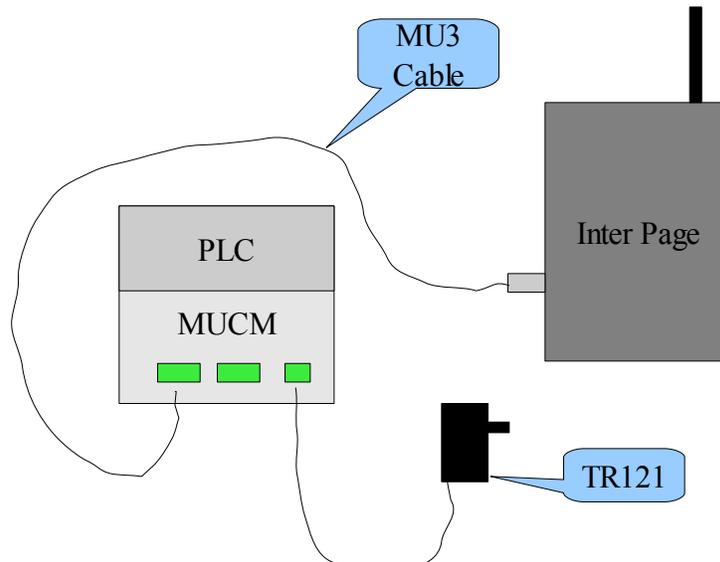
# 1 Introduction

The Niobrara MUCM is a Modicon Momentum compatible module that is capable of running multiple applications for performing serial communication with other devices. This document covers an application that allows an Momentum PLC to generate wireless pages through an InterPage Z500 paging system.

The InterPage Z500 includes a standard RS-232 serial port that supports the TAP paging protocol. This connection is fixed at 9600 baud, 8 data bits, 1 stop bit, and no parity. The MUCM serial port 1 (RS-232) is connected to the Z500 with a Niobrara MM3 cable. The MUCM serial port 2 (RS-485) is not used for this application.

Any Modicon Momentum PLC or communications adapter may be used with the MUCM to provide the pager number and ASCII message to be sent as the page. The MUCM uses 32 words IN (3x) and 32 words out (4x) to the PLC (tophat).

The MUCM contains its own power supply and needs a source of 12-24VDC or 12-24VAC (isolated) such as the Niobrara TR121-ST.



*Drawing 1: Typical Configuration*



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## 2 Installation

Installation of the MUCM should go quickly, with the necessary materials. The following items are necessary:

- MUCM
- Momentum PLC or communications adapter
- MU1 cable (see Figure 2.2) for connecting to a PC for loading of the application and module firmware
- MU3 cable (see Figure 2.1) for connecting to the 9-pin RS-232 port of the Z500
- Power source for the MUCM such as the Niobrara TR121-ST
- DIN rail for mounting the MUCM

### ***Module Installation***

- Mount the MUCM on a DIN rail, or mount as desired using screws through the two holes provided. The DIN rail should be Earth-grounded for the MUCM serial ports' transient suppression.
- Supply power to the MUCM.

### ***Software Installation***

The application files for the MUCM are included in the MUCM\_TAP\_SETUP.EXE file. The latest version of this file is located at [www.niobrara.com](http://www.niobrara.com). Follow the link for “Application Notes”, select “MUCM”, and “TAP”.

The program MUCM\_SETUP.EXE is also required to be ran before the TAP program may be loaded into the MUCM. The MUCM\_SETUP program installs the QLOAD program and the FWLOAD program, as well as this manual.

## Serial Connections to the MUCM

### Port 1 to Z500

Port 1 of the MUCM is connected to the serial port of the Z500 via RS-232. The Z500 serial port is DCE so the Niobrara MU3 cable is required for this connection.

Figure 2.1.: MU3 Serial Cable

MUCM Connection	Z500 Serial Port Pin
TX	3
RX	2
SG	5
RTS	7
CTS	8

### Port 1 to PC

The Niobrara MU1 cable is used to connect Port 1 of the MUCM is to the a standard 9-pin serial port on a PC for loading the application into the MUCM. This cable is also used to load firmware into the MUCM.

Figure 2.2.: MU1 Serial Cable

MUCM Connection	PC Serial Port Pin
TX	2
RX	3
SG	5
RTS	7
CTS	8
	4
	6

## Loading the Application into the MUCM

The QLOAD program is used to install the MUCM\_TAP\_APP1 program.

1. The MUCM must be powered.
2. The RUN/LOAD switch must be in RUN.
3. Application Switches 1 (left) and 2 (right) must be in HALT.

4. Start QLOAD.EXE. The Windows Start Menu link is “Start, Programs, Niobrara, MUCM, Apps, TAP, QLOAD TAP Application 1”.
5. Click on the Browse button and select MUCM\_TAP\_APP1.QCC.
6. Click on the “Modbus Serial” tab and verify the following:
  1. The proper PC com port is selected (COM1).
  2. The baud rate is 9600.
  3. The Modbus Drop is 255.
  4. The Application 1 radio button is selected.
  5. The Parity is Even.
  6. 8 bits is selected.
  7. ASCII is NOT checked.
7. Connect the MU1 cable from the MUCM port 1 (in RS-232) to the selected PC serial port.
8. Press the “Start Download” button. QLOAD will open a progress bar to show the status of the download.
9. After downloading the application, disconnect the MU1 cable from the MUCM and connect the MU3 cable to the MUCM port 1 and the Z500.
10. Move Switch 1 (left) to RUN. The RN1 light should now be ON.

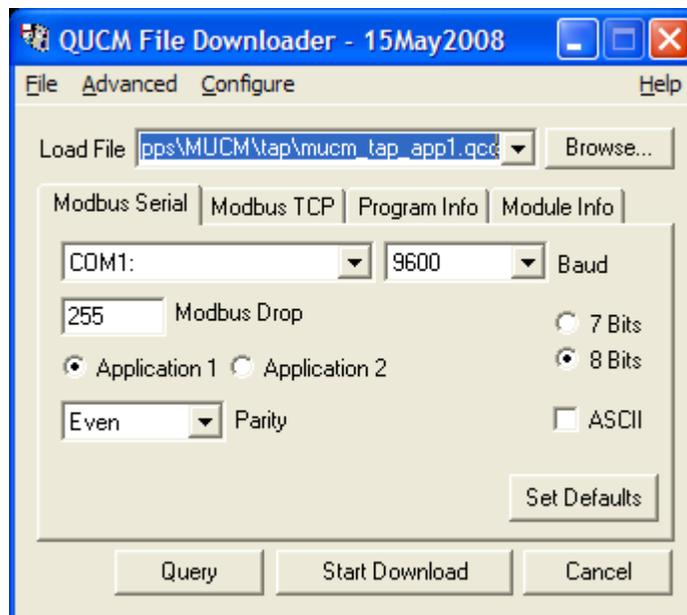


Figure 2.3: QLOAD

## Updating the MUCM Firmware

On occasion it may be necessary to update the operating system of the MUCM. The FWLOAD program is used to install the MUCM firmware.

1. The MUCM must be powered.
2. The RUN/LOAD switch must be in LOAD.
3. Application Switches 1 are ignored.
4. Start FWLOAD.EXE. The Windows Start Menu link is “Start, Programs, Niobrara, MUCM, FWLOAD MUCM Firmware”.
5. Click on the Browse button and select MUCM.FWL.
6. Ensure that the proper PC serial port is selected (COM1).
7. Connect the MU1 cable from the MUCM port 1 (in RS-232) to the selected PC serial port.
8. Press the “Start Download” button. FWLOAD will open a progress bar to show the status of the download.
9. Move the LOAD/RUN switch to RUN. The module is ready for use.

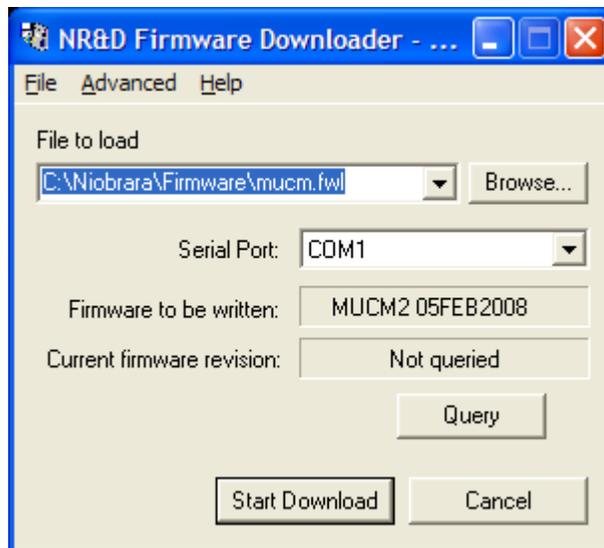


Figure 2.4: FWLOAD Screen

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## 3 Operation

The operation of the MUCM is controlled through the 32 words of input and output automatically exchanged with the PLC or communications adapter.

*Table 3.1: 4x Registers (PLC Outputs)*

Register	Description
1	Command from the PLC. Set bit 0 to send page. Clear bit 0 when 3x0001.1 is set.
2	Target Pager number
3	Packed ASCII characters 00 and 01. Terminate text with x00.
4	ASCII characters 02 and 03
5	ASCII characters 04 and 05
6	ASCII characters 06 and 07
7	ASCII characters 08 and 09
8	ASCII characters 10 and 11
9	ASCII characters 12 and 13
...	...
31	ASCII characters 56 and 57
32	ASCII characters 58 and 59

The PLC Input registers (3x) are used to provide feedback from the MUCM. Only the first four 3x registers are used.

*Table 3.2: 3x Registers (PLC Inputs)*

Register	Description
1	Runtime status of MUCM application. Normal value is x8000 hex.

2	Halted line number of MUCM application. Normal value is 0.
3	Status of application. Bit 0 is on when 4x0001.0 is on. Bit 1 is on when message has been successfully sent to pager system. When bit 1 comes on, the PLC must clear 4x0001.0.
4	Error status from Z500. Normal value is 211 decimal.

### Example 1

To send the message “This is test 123.” to pager # 4, the following values would be loaded into the 4x registers by the PLC.

Table 3.3: 4x Registers (PLC Outputs) Example

Register	Value (hex)	Description
1	0000	Set to 0. Check that 3x0001=0. Then set to 1.
2	0004	Pager #4
3	5468	“Th”
4	6973	“is”
5	2069	“ i”
6	7320	“s ”
7	7465	“te”
8	7374	“st”
9	2031	“ 1”
10	3233	“23”
11	2E00	“.”
12	0000	

NOTE: the packed ASCII text must be terminated by x00 if the length of the message is shorter than 60 characters.

NOTE: The pagers must be configured into the database of the paging system to use the simple four digit (or shorter) pager numbers. Also the pagers may be configured for group addresses (such as 200) which allows multiple devices to be paged with one message.

## MUCM Lights

There are four user LEDs on the MUCM to give an indication of the operation of the TAP application.

Table 3.4: LED description

Light	Color	Description
1	Green	On when 4x0001 = 1, Off when 4x0001 = 0
2	Green	On when 3x0003.1 is ON (page successful)
3	Red	Login message timeout.
4	Red	Page message timeout.

## Pager Error Codes

Input register 4 will display the status of the communication with the Z500 station. As the QUCM attempts to log into the Z500, it will zero 3x0004. This register is updated during the progress of attempting to send the page. The final status may be analyzed when bit 3x0003.1 is ON.

Table 3.5.: Communication status

Value (decimal)	Description
0	Attempting to connect to pager system.
1	Id response timeout.
2	PG1 login response timeout.
3	ACK timeout.
110	Paging System supports TAP protocol.
211	Paging message successfully delivered.
510	Invalid character in pager ID.
511	Invalid pager ID – not in database.
512	Temporarily cannot deliver. Queue full.
514	Checksum error in page message.