NR&D

CUCM

TSX Compact Programmable Communication Module

Description

Niobrara's TSX Compact Universal Communications Module (CUCM-O & CUCM-OE) are programmable serial communication modules for Schneider Automation's TSX Compact PLC with two serial ports, a PLC interface, Indicator LEDs, a real-time clock, a TCP/IP stack, two application areas, and internal registers. The CUCM-OE offers an additional Ethernet port.

Uses for the CUCM

Data Concentrator
- Read data from external devices and/or the PLC
- Allow external devices and/or the PLC to write data to the CUCM
- Both the PLC and external devices can read the gathered data
- Time-stamp data for later retrieval

Protocol Converter
- Allow devices with different protocols on separate ports to communicate
- The PLC can use standard MSTRs to read/write non-Modbus devices
- Non-Modbus devices and read/write the CUCM or the PLC

Add PLC Modbus Master ports (RTU or ASCII)
- Read/write Modbus Slaves devices from the PLC or the User Application
- Use MSTRs to read 0x, 1x, 3x, 4x values
- Use MSTRs to write 0x coils and 4x holding registers

Add PLC Modbus Slave ports (RTU or ASCII)
- Read, write and program the PLC
- Read and write the CUCM

Repeater
- Connect the CUCM as a slave on one port and allow the Master to access additional slave devices on the other port

Email client
- Send and receive e-mails for alarm conditions

Web server*
- Access device data and configure setup parameters with a web page

Gateway
- Allow Ethernet clients to access PLC and serial slaves.
- Allow serial master to access PLC and Ethernet servers.

Applications

The engineers at Niobrara have written several applications:
- Interfacing an ACCU-SORT Scanner to a TSX Compact PLC
- Interfacing Modbus RTU master to 3694(R) devices

- Interfacing Modbus RTU master to an Allen Bradley® DF1 device
- Interfacing Modbus RTU master to ENRON/Daniel Modbus Slaves
- Gathering data from Simpson Hawk™ meters for the TSX Compact PLC

The source code for these applications is available at www.niobrara.com. The applications can be used as is or modified to solve your PLC communication problem or used as examples to start your own CUCM application development.

QUCM Language

The CUCM is programmed via Niobrara's QUCM language. The language has a BASIC-like structure which makes it easy to read and follow. Powerful language extensions for data communications and PLC interfacing make it ideal for use as a PLC communication language. A TCP/IP stack is built in, making it easy to write application layer protocols using TCP, UDP, PPP, and IP. The language is compiled for the fastest possible execution. The compiler is included at no extra charge.

Applications developed for the QUCM can be run in the CUCM. See the application notes for the QUCM at http://www.niobrara.com/html/qucm_apn.html.

Although the CUCM is designed for user programming, many companies choose to have Niobrara write their CUCM code. Contact Niobrara for a quote.

"Each of the serial ports can be individually configured to speak one of many protocols..."

Application Areas

The CUCM can run two simultaneous applications. Both applications have access to the PLC backplane, the serial ports, the LED array, the real-time clock, the TCP/IP stack, and the internal registers. The applications can be independent or they can cooperate, using mailbox registers to exchange data.

Serial Ports

The two serial ports on the CUCM are switch selectable RS-232 or RS-485. They use Modicon's pinouts, so standard cables work well. They are independently configurable as to baud rate, parity, data bits, and stop bits. Write the protocol of your equipment to:

- Be a Master or a Slave device while multidropping up to 32 devices off of either port
- Build a Protocol Converter
- Build a Data Concentrator for serial or Ethernet devices
- Use the PLC to trigger messages to printers or signs
- Bring data into the PLC from barcode readers, scales, and other ASCII devices
- Build a gateway to allow ASCII devices onto the Ethernet network
- Dial-out to your ISP and communicate on the Internet using PPP

Several serial protocols have been implemented in various products and are available online:

- 3964R
- Caterpillar EMCP Genset
- Caterpillar 3500 Engines
- DNP 3.0
- Dupline I/O
- ENRON/Daniel Modbus
- Cutler-Hammer INCOM
- GE Multilin 169 Plus
- Johnson Controls N2 (Metasys®)
- Mitsubishi UPS

- Allen-Bradley® DF1
- Elliott Flow Computer
- Siemens SEAbus & SEAbus+
- Simpson Hawk™ meters

Ethernet Port (CUCM-OE only)

The single 10BaseT RJ45 Ethernet port defaults to Modbus/TCP protocol. The CUCM has a TCP/IP stack which the user's application can access for easy implementation of various application layer protocols. Several application layer protocols have been implemented; examples are available online.

- HTML/HTTP
- Cutler-Hammer INCOM
- Chat
- FTP
- DNS
- SNMP (Client or server)
- SMTP
- Telnet
- POP3

Backplane

The programmer has a choice of backplane interfaces. The CUCM can be either an I/O Module or an Option Adapter.

When the CUCM is configured as an option-module:

- The backplane acts as a bidirectional Modbus port giving both the TSX Compact processor and the CUCM access to the other's register space.
- The PLC can be programmed from the CUCM
- Using standard MSTRs, the PLC can speak new Serial Protocols.
- Requires a free slot in the main rack

As an I/O module, the CUCM can be used:

- In any slot in any TSX Compact rack; local, distributed or remote.
- In applications that require fewer than 32 registers in and 32 registers out.

LEDs / Real-Time Clock

The CUCM has eight LEDs under Application control. It also has LEDs to indicate Application 1 RUN, Application 2 RUN, Port 1 transmit and receive, Port 2 transmit and receive, Ethernet transmit and receive, as well as Module Active, Ready, Run, Link, Collision, and Fault.

A real-time clock is available to the applications and is especially useful for scheduling events or time-stamping data.

PLC Requirements

- TSX Compact PLC (-258, -265, -275, - 285) only
- Compact PLC Executive 2.07 or greater

Niobrara Research & Development Corporation
www.niobrara.com

Ordering Information

The CUCM is available as:

- **CUCM-O** with two switchable RS-232/RS-485 ports
- **CUCM-OE** with two switchable RS-232/RS-485 ports, one 10BaseT Ethernet port

Related Equipment

The CUCM has the following equipment available:

- **BB85** DIN-rail mount breakout box, RJ45 to screw-terminal connector w/ MM0 cable
- **DDC2I** Optically-isolated RS-232 to RS-485 converter, DIN-rail mount w/ MM0 cable
- **MM1** PC to CUCM configuration cable
- **TPH** Twisted-pair Ethernet cable; connect CUCM-OE to a hub or switch
- **CNOE-211** Ethernet Option Module for Compact.
- **CNOE-800** Ethernet & Serial Option Module for Compact.

* Schneider Automation holds a patent for serving web pages from a PLC. If the CUCM is used to serve web pages from the Compact PLC a license is required. This license is available from NR&D at additional cost or from Schneider Automation.

Specifications

Warranty / Manual	The CUCM is furnished with a user manual on cd and carries a one year warranty from the date of shipment. During the warranty period, free firmware upgrades are available. See Niobrara's Standard Terms and Conditions of Sale for additional warranty information.
Dimensions	Single-width Compact module. 1.6" wide by 5.5" tall by 4.5" deep (40 x 140 x 114 mm).
Power Requirements	From Compact bus; 5 VDC, 350-550 mA.
Operating Conditions	0 to 60 degrees C; humidity up to 90% noncondensing; pressure altitude -200 to +10,000 feet MSL.
Ethernet Port (CUCM-OE only)	10BaseT with front-mounted RJ45 connector.
Ethernet Protocols	Defaults to Modbus/TCP, TCP & UDP. Others as defined by user's application.
Serial Ports	Two front-mounted RJ45 connectors; switch-selectable RS-232 or RS-485. 50, 75 110, 134.5, 150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600 or 19,200 baud. 7 or 8 data bits; odd, even or no parity; 1 or 2 stop bits.
Serial Protocol	Defaults to Modbus RTU or PPP. Others as defined by user's application.
Indicators	LED indicators for MODULE: Power, Busy, Error, PLC run, Backplane Comms Active, App1 Run & App 2 Run; ETHERNET: Active, Error, Link, and Collision; SERIAL PORTS: Tx & Rx for each port; USER APPLICATION: 8 under user control (6-green, 2-red). 23 total indicators.
Mailbox Registers	2,048 4x registers. Available at Modbus address 255 (configurable). Non-volatile.
Setup Registers	4x registers accessible by PLC across backplane or by external device through any port; stored in non-volatile RAM.
PLC Interface	Configurable as either an option module or an I/O module. As an I/O module up to 32 words in, 32 words out in any rack. Requires -258, -265, -275 ,-285 CPU Rev 2.07 or greater
Memory	Two 128K byte FLASH areas for Application storage with Application 2 having a possible 256K bytes; 32K bytes of Non-volatile RAM memory for variables; 8K bytes of Application accessible FLASH; Two 128K bytes of Non-volatile RAM memory as files.

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