

PACSystems™ RX7i

IC698CMX016-ED

Control Memory Xchange Module

GFK-2323C
May 10, 2010

The Control Memory Xchange (CMX) module provides deterministic sharing of data among PLCs and other computing devices on a high-speed fiber optic network, using reflective memory technology. A reflective memory network can contain up to 256 nodes. Each node in the network can be any reflective memory device that is compatible with the 5565 family. When data is written to one node, all nodes on the network are automatically updated with the new data.

Each node in the reflective memory network is connected in a daisy-chained loop using fiber optic cables. The transmitter of the first node is tied to the receiver of the second. The transmitter of the second node is tied to the receiver of the third node, and so on, until the loop is completed back at the receiver of the first node. The figure on page 3 shows an example of a six-node reflective memory network.

A PACSystems RX7i main rack supports a maximum of four Memory Xchange modules.

Features

- PACSystems RX7i single slot form factor.
- 16 Mbytes reflective memory with parity.
- Software configuration of all node parameters (no jumper or switch settings required).
- High-speed easy-to-use 2.12 Gbaud fiber-optic network.
- No RX7i CPU processing required to operate the network.
- Network-compatible with VMIC 5565 family of reflective memory devices.
- Connection with multimode fiber up to 300m/984.25ft.
- Dynamic packet sizes of 4 to 64 bytes, controlled by the Memory Xchange module.
- Maximum network transfer rate of 43 Mbyte/s (4 byte packets) to 174 Mbyte/s (64 byte packets)
- Programmable VMEbus interrupt output.
- Four general-purpose network interrupts with 32 bits of data each.
- Network error detection.
- Up to 256 nodes per network.
- Redundant transfer mode operation. This optional mode reduces the chance of a data packet being dropped from the network.
- Configurable network memory offset allows you to assign nodes on a network to groups according to the 16MB segment in the network address space that they use.



Release Information

Release History

| <i>Part Number</i> | <i>Hardware Version</i> | <i>Firmware Version</i> |
|-------------------------------------|-------------------------|-------------------------|
| IC698CMX016-ED | E | D |
| IC698CMX016-DC | D | C |
| IC698CMX016-CB | C | B |
| IC698CMX016-BA | B | A |
| IC698CMX016-AA (Initial Release) | A | A |

Updates

IC698CMX016 modules with versions -BA and earlier cannot be upgraded in the field. These modules must be returned for replacement.

Customers can upgrade IC698CMX016-CB and -DC versions to version -ED by ordering and installing upgrade kit 44A753080-G02.

All Conformal Coated boards (IC698RMX016CA-xx and IC698CMX016CA-xx) must be returned for replacement.

Problems Resolved in this Release (ED)

| <i>Subject</i> | <i>Description</i> |
|--|--|
| Incorrect Bad Data or Sync loss error reported | In earlier versions of this product, under rare conditions, Bad Data and Sync Loss errors were erroneously reported. This condition was seen at temperatures above 40° C (no fans) and large data transfers (64K). This problem has been corrected in version –ED. |

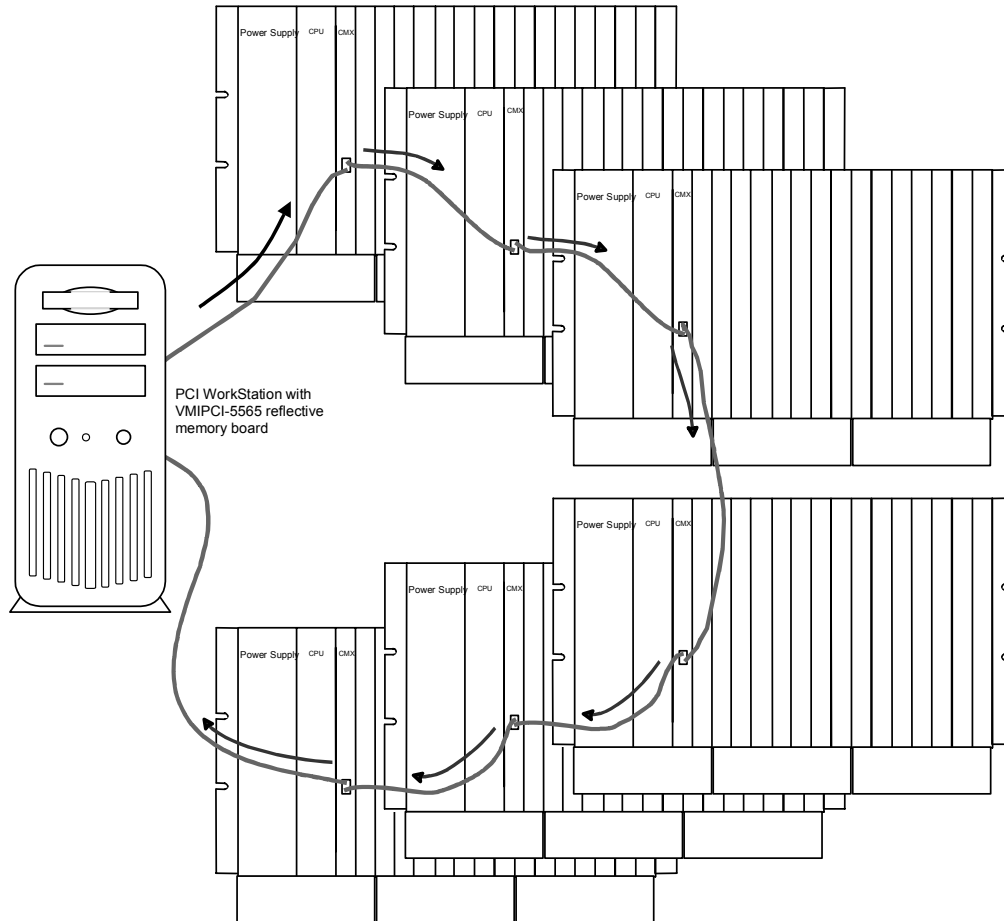
Network Bandwidth

The maximum bandwidth of the reflective memory network is 174Mbytes/s. The application must avoid a situation where the transmit FIFO becomes full. You can accomplish this by not having multiple nodes transmit a large amount of data at the same time.

The RX FIFO Almost Full status (bit 09) of the LISR (Region 2, offset 10h) can be monitored to determine if the network is becoming saturated.

For an example of network load balancing, refer to “Optimizing Network Bandwidth” in the *PACSystems RX7i Memory Xchange Modules User’s Manual*, GFK-2300.

Sample Six-node Reflective Memory Network



User Features

The front panel of the CMX module has four LED indicators and an optical transceiver.

Optical Transceiver

The optical transceiver has two "LC" type fiber optic ports. The port labeled "TX" is the transmitter and the port labeled "RX" is the receiver.

Memory Xchange modules are networked together using either simplex (single fiber) or duplex (dual fiber) multimode fiber optic cables. The specific cable construction depends on your operating environment. For details on cables, refer to the *PACSystems RX7i Memory Xchange Modules User's Manual*, GFK-2300.

LEDs

All front panel LED indicators are green.

| LED Label | Description |
|---------------|---|
| OK | ON indicates the module is functioning properly. |
| CONFIG | When not used as a redundancy link, ON indicates the module is configured. When used as a redundancy link (RMX only), ON indicates the link is functioning properly. |
| OWN DATA | ON indicates the module has received its own data packet from the network at least once. |
| SIGNAL DETECT | ON indicates the receiver is detecting a fiber optic signal. |

Installation

Make sure you have the items listed below before you begin.

- A PACSystems RX7i CPU with release 2.00 or higher firmware
- A PACSystems RX7i CPU rack with power supply.
- Programming software: Machine Edition – Logic Developer PLC, version 4.5 or later (and a PC-compatible computer).
- Cables. For details, see “Fiber Optic Cables and Connectors” in the *PACSystems RX7i Memory Xchange Modules User’s Manual*, GFK-2300.

Note: RX7i systems that include one or more Memory Xchange modules must be installed in a metal enclosure with conduit or equivalent to meet radiated emission standards. For details, refer to the *PACSystems RX7i Installation Manual*, GFK-2223.

Installing the CMX Module in an RX7i Rack

Warning

Do not insert or remove modules with power applied. This could cause the CPU to stop, damage the module, or result in personal injury.

Memory Xchange modules must only be installed in the main (Rack 0) RX7i rack. RX7i supports a maximum of four Memory Xchange modules per main rack.

1. Make sure rack power is off.
2. Slide the module into the slot for which it was configured in the system.
3. Press the board firmly in place, but do not force the board. Tighten the screws on the top and bottom of the faceplate.
4. Connect the fiber optic cables to the TX and RX connectors.
5. Route the cable from TX to the RX connector of the next node in the ring. Connect the cable from that board’s TX to the RX connector of the next node. Repeat this step until the last node in the ring routes its TX to the RX of the first node.
6. Turn on power to the RX7i rack.

Configuration

The CMX module initially powers up in an unconfigured state with its optical transmitter and receiver disabled. The module cannot operate on a network until the RX7i CPU has delivered a hardware configuration to the module.

Basic operating functions are configured using Machine Edition – Logic Developer PLC. You can configure the following parameters in the hardware configuration: Node ID, Redundant Transfer Mode, Rogue Master, Network Memory Offset, and Interrupt enable.

Additional functions beyond the basic read and write operations, including enabling interrupts, reading interrupt status, enabling parity, and reading parity errors, can be performed by user logic. For details on accessing these advanced functions, refer to the *PACSystems RX7i Memory Xchange Modules User's Manual*, GFK-2300.

CMX Operation

Once the CMX has been configured, a transfer of data over the network can be initiated by writing to the reflective memory region through the VMEbus. The Memory Xchange module forms the data into variable length packets sized from 4 to 64 bytes, which it transmits over the fiber-optic network to the receiver of the next node. Whenever a packet is received, the Memory Xchange module evaluates the packet. If the packet is valid and did not originate on this node, it is accepted. If, however, the data packet is invalid or if it originated at this node, it is discarded. The receiving node writes the data into the local reflective memory and simultaneously transmits the data to the next node on the network. From there, the process is repeated until the data returns to the originating node, where it is removed from the network.

Related Publications

PACSystems RX7i CPU Reference Manual, GFK-2222

PACSystems RX7i Installation Manual, GFK-2223

PACSystems RX7i Memory Xchange Modules User's Manual, GFK-2300

Proficy™ Machine Edition Logic Developer-PLC Getting Started, GFK-1918

Specifications*

| | |
|----------------------|--|
| Physical size | PCB: 6.299" W x 9.187" H |
| Packet size | Dynamic, automatically controlled by Memory Xchange module |
| User memory | 16MB SDRAM |
| Operating voltage | +5VDC (from power supply) |
| Current requirements | 1.8A |
| Connectors | <ul style="list-style-type: none"> ■ Fiber optic LC type, conforms to IEC 61754-20 ■ Zirconium ceramic ferrule ■ Insertion loss: 0.35 dB (maximum) ■ Return loss: -30dB ■ Temperature Range: -20°C to +85°C |

* For environmental specifications and compliance to standards (for example, FCC or European Union Directives), refer to the *PACSystems RX7i Installation Manual*, GFK-2223.

Ordering Information

| <i>Description</i> | <i>Catalog Number</i> |
|--|---|
| Control Memory Xchange Module for RX7i | IC698CMX016 |
| Redundancy Memory Xchange Module for RX7i | IC698RMX016 |
| Fiber Optic Cables | VMICBL-000-F5-0XX, where 0XX is used to distinguish different lengths |
| Lithium Battery pack | IC698ACC701 |
| Rack Fan Assembly, 120VAC Rack Fan Assembly, 240VAC Rack Fan Assembly, 24VDC | IC697ACC721 IC697ACC724 IC697ACC744 |
| RX7i PLC Power Supply, 85 to 264 VAC at 47 to 63 Hz Input, 100 watt output | IC698PSA100 |
| RX7i PLC Power Supply, 85 to 264 VAC at 47 to 63 Hz Input, 350 watt output | IC698PSA350 |
| [Optional] RS-232 cable; also Station Manager cable for Ethernet interface | IC200CBL001 |

The following information is for products bearing the UL marking for Hazardous Locations:

- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.
- WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES.
- WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.
- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C, & D, DIV. 2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY.