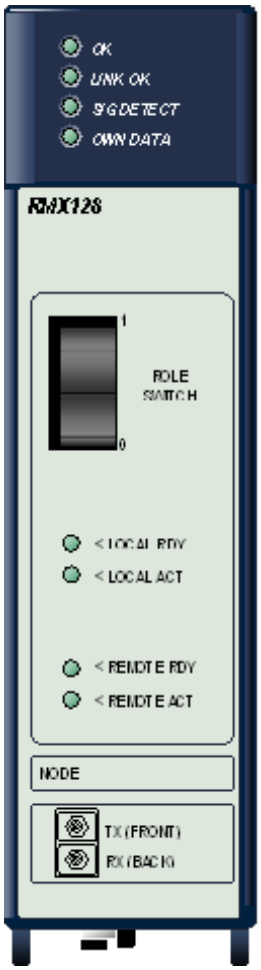
PACSystems* RX3i

IC695RMX128-AC

Redundancy Memory Xchange Module

GFK-2511C
August 2011



The PACSystems* Redundancy Memory Xchange (RMX) module operates as a node on a reflective memory network or as a dedicated link between CPUs in an RX3i Hot Standby CPU Redundancy system. When the RMX is not being used as a link in a redundancy system, it is functionally identical to the IC695CMX128 module. Each node in the network can be any reflective memory device that is compatible with the 5565 family. Whenever data is written to one node, all nodes on the network are automatically updated with the new data.

When used as a node on a reflective memory network, the RMX module provides deterministic sharing of data among PLCs and other computing devices on a high-speed fiber optic network. A reflective memory network can contain up to 256 nodes.

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 at the receiver of the first node.

When used in a CPU redundancy system, the RMX modules provide a path for transferring data between the two redundancy CPUs in the redundant system. A complete communications path consists of one RMX in the primary unit, one RMX in the secondary unit, and two high-speed fiber optic cables connecting them to each other. This must be a two-node ring: no other reflective memory nodes are allowed to be part of this fiber optic network.

GE Intelligent Platforms ***strongly recommends*** two redundancy links (a total of four RMX modules) be configured and installed. Optionally, systems can be configured for a single redundancy link (a total of two RMX modules).

When the RMX is being used as link in a redundancy system, it cannot be used as a general-purpose Memory Xchange module. For details on the operation of a PACSystems CPU redundancy system, refer to the *PACSystems Hot Standby CPU Redundancy User's Manual,* GFK-2308.

A PACSystems RX3i main rack supports a maximum of six Memory Xchange modules in any combination of RMX128 and CMX128 modules. A maximum of two RMX modules can be configured as redundancy communication links.

Features

- PACSystems RX3i single slot form factor.
- 128 Mbytes reflective memory.*
- Software configuration of all node parameters (no jumper or switch settings required).*
- High-speed easy-to-use 2.12 Gbaud fiber-optic network.
- No RX3i CPU processing required to operate the network.
- Network-compatible with VMIC 5565 family of reflective memory devices, including the RX7i CMX/RMX module.
- Connection with multimode fiber up to 300m/984.25ft.
- Dynamic packet sizes of 4 to 68 bytes, controlled by the RMX128 module when configured to operate as a CMX128 module.
- Maximum network transfer rate of 2.1 Gbyte/s programmable module 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.*

The RMX128 module must be located in an RX3i Universal Backplane. The module can be hot-inserted and removed following the instructions in the *PACSystems RX3i System Manual,* GFK-2314.

*Not available when operating as a redundancy link in a CPU redundancy system.

Specifications

Packet size	Dynamic, automatically controlled by RMX128 module
User memory	128MB SDRAM
Input power (from RX3i power supply)	580 mA @ +3.3 VDC 220 mA @ +5 VDC
Connectors	■ Fiber optic LC type, conforms to IEC 61754-20 ■ Zirconium ceramic ferrule ■ Insertion loss: 0.35 dB (maximum) ■ Return loss: -30dB

Refer to the *PACSystems RX3i System Manual,* GFK-2314, for product standards and general specifications.

Related Publications

PACSystems CPU Reference Manual, GFK-2222
PACSystems RX3i System Manual, GFK-2314D or later
PACSystems Memory Xchange Modules User's Manual, GFK-2300D or later
PACSystems RX3i Ethernet NIU User's Manual, GFK-2439
PACSystems Hot Standby CPU Redundancy User's Guide, GFK-2308C or later

Release History

Release	Version	Date	Upgrade Kit	Comments
IC695RMX128-AC	1.04	Aug. 2011	82A1558-MS10-000-A1	Increases the maximum packet size that can be accepted and processed to 68 bytes *when configured to operate as a CMX128 module*. Adds the ability to detect and correct a rarely occurring condition of corruption in data read operations.
IC695RMX128-AB	1.01	Feb. 2009	82A1558-MS10-000-A1	Initial Release

Upgrades

RMX128-AA modules can be updated to firmware version 1.04 using upgrade kit 82A1558-MS10-000-A1.

Upgrade kits can be downloaded from www.ge-ip.com/support.

Important Product Information for this Release

The RMX128 offers 128MB of user reflective memory and supports redundancy link operation in an RX3i Hot Standby (HSB) CPU Redundancy system.

Functional Compatibility

The RMX requires the following versions for configuration and operation.

Subject	Description
Programmer Version Requirements	PME version 5.90 SIM1 or later must be used for compatibility with the RMX128 module.
RX3i CPU	CPU firmware version 5.70 or later is required, PACSystems RX3i CRU320 is required for use in a redundancy system.
Series 90-30 Compatibility	The RMX128 must be located in the main RX3i rack. IC695RMX128 modules require a PCI backplane, which is not available on IC694CHSxxx expansion bases.

Problems Resolved by Release 1.04

Subject	Description
Memory Read Data Corruption	RX3i CMX and RMX (when configured as a CMX) firmware has been modified to detect an extremely rare condition where corruption can occur during a memory read (seen by user as corrupted or swapped data). Once the module enters this state, portions of "data reads" from memory will exhibit corruption until the module is power cycled. Firmware version 1.04 (and later) identifies this condition by setting the local memory parity error bit (bit 13) in the LISR and, if configured to do so, generates a parity error interrupt. When firmware version 1.04 (and later) identifies the condition it will also correct the condition prior to the next memory access (a power cycle of the module is no longer required). It is also recommended that applications verify that bit 13 of the LISR (immediately after the read data command) is clear, even if local memory parity is not enabled in the application. Detection of this condition on bit 13 remains enabled even if local memory parity is not enabled. If bit 13 of the LISR is set, applications should acknowledge this error by clearing bit 13 of the LISR and re-reading the memory locations accessed prior to the detection of this condition. Please refer to GFK-2300 for additional details on access the LISR and configuring Memory Parity Checking. Section 5 – Memory Parity Checking Appendix B - Register Definitions (for information on LISR)

New Features and Enhancements in Release 1.04

Subject	Description
68 Byte Packets *(For an RMX128 configured and used as a CMX128)*	Previous versions of the firmware did not allow packet sizes greater than 64 bytes. However, some versions of the 5565 reflective memory products generate packet sizes up to 68 bytes. When the CMX128 module received these 68 byte packets it would generate "BAD Data" errors and discard the data. The CMX128 now accepts and processes packet sizes up to 68 bytes.

Restrictions and Open Issues in this Release

Subject	*Description*
RX3i RMX and CMX modules with version A hardware require a metal enclosure to meet radiated emissions requirements.	For installation requirements, see “Government Regulations” on page 6.
RX3i CPU does not disable the CMX128/RMX128 transmitter when the CPU goes to Stop/Halt mode.	For IC695CMX128 and IC695RMX128 modules not used as redundancy links, the automatic transmitter disable feature currently does not work correctly when a controller goes to Stop/Halt mode. When the CPU goes to Stop/Halt mode or fails and the automatic transmitter disable feature is enabled, the fiber optic transmitter should be turned off, breaking the reflective memory link. When the feature is disabled, the transmitter remains ON and the reflective memory link will not be broken. If this feature is enabled, the automatic transmitter disable feature does not work when the CPU goes into Stop/Halt mode (such as after a software watchdog trip or multi-bit ECC error detection) leaving the fiber optic transmitter ON. The fiber optic transmitter is properly disabled if the CPU fails or is lost (for instance the CPU hardware is removed, the CPU experiences a hardware watchdog event, or displays a blink code such as a page fault). This user-configurable feature is enabled by default. The feature may be disabled by clearing bit 12 with a BUS_WRITE to region 3, offset 0x440.
Parity error received after extended run on RMX module.	Infrequently, if parity is enabled on the RMX128 module when it is not used as a Redundancy link, the module may intermittently report a false parity error, although the associated data is valid. The problem is more likely to occur when the same memory locations are simultaneously and constantly accessed from both the network and the RX3i backplane side.
The LCSR status bit is not turning ON after LISR turns ON when Interrupt (Sync Loss) is generated.	When a sync loss condition is detected the LISR bit is latched ON but the LCSR sync loss bit is not latched ON (i.e. it remains OFF). To check the sync loss status, monitor the sync loss bit in the LISR register instead of the LCSR sync loss bit.

Installation in Hazardous Locations

- 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
- 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; AND
- WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

Government Regulations

U.S., European, Canadian, and Australian radio-frequency emission regulations are intended to prevent equipment from interfering with approved transmissions or with the operation of other equipment. In order to meet the emissions limits for Class A digital devices as specified in 47 CFR 15, EN 55011, ICES-003, and AS/NZ 3548, the Control system in which the IC695RMX128-Ax and IC695CMX128-Ax modules are used shall be installed as follows:

- The Control system must be mounted in a minimum IP54 rated metal enclosure or the equivalent. All surfaces of the enclosure must be adequately grounded to adjacent surfaces to provide electrical conductivity. Wiring external to the enclosure must be routed in metal conduit or the equivalent.
- The conduit must be mounted to the enclosure using standard procedures and hardware to ensure electrical conductivity between the enclosure and conduit. Equivalent termination for the shielded cable alternative to conduit may also be used.
- Applications using these modules outside a grounded metal enclosure may experience RF interference at 956.24MHz, 3.08GHz, or 3.29GHz.