RX7i Features and Specifications

- **IC698CPE010:** 300MHz CPU microprocessor

- **IC698CPE020:** 700MHz CPU microprocessor

- **IC698CRE020:** 700MHz CPU microprocessor with redundancy

Indicators

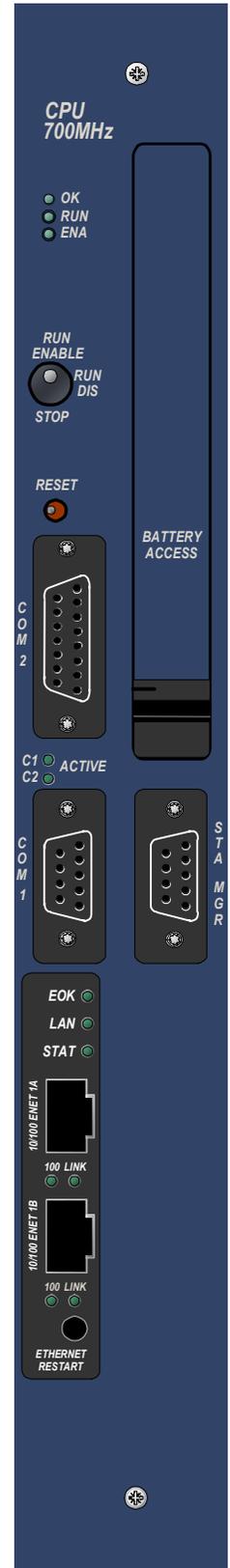Five CPU LEDs indicate the operating status of various CPU functions.

The Ethernet Interface indicators consist of seven light emitting diodes (LEDs). All are single-color green LEDs controlled by the Ethernet interface.

- Module OK (EOK)

- LAN online (LAN)

- Status (STAT)

- Two activity LEDS (LINK)

- Two speed LEDS (100)

The **EOK**, **LAN**, and **STAT** LEDs are grouped together and indicate the state and status of the Ethernet interface.

Each Ethernet port has two green LED indicators, **Link** and **100**. The **LINK** LED indicates the network link status and activity. This LED is illuminated when the link is physically connected and blinks when traffic is detected at the port. Note that traffic at the port does not necessarily mean that traffic is present at the Ethernet interface, since the traffic may be going between ports of the switch. The **100** LED indicates the network data speed (10 or 100 Mb/sec). This LED is illuminated if the network connection is 100 Mbps.

LED operation is described in the following tables.

CPU LED Operation

	LED State			CPU Operating State
	🟢 On	🟢 Blinking	⚪ Off	
🟢	**OK**		On	CPU has passed its powerup diagnostics and is functioning properly.
⚪	**OK**		Off	CPU problem. EN and RUN LEDs may be blinking in an error code pattern, which can be used by technical support for troubleshooting. This condition and any error codes should be reported to your technical support representative.
🟢	**OK**, **EN**, **RUN**		Blinking in unison	CPU is in boot mode and is waiting for a firmware update through a serial port.
🟢	**RUN**		On	CPU is in Run mode
⚪	**RUN**		Off	CPU is in Stop mode.
🟢	**EN**		On	Output scan is enabled.
⚪	**EN**		Off	Output scan is disabled.
🟢	**Port 1**		Blinking	Signal activity on port.
	Port 2		Blinking	

*After initialization sequence is complete.

Ethernet LED Operation

	LED State			Ethernet Operating State
	🟢 On	🟢 Blinking	⚪ Off	
🟢	EOK		Blink error code	Hardware Failure
⚪	LAN		Off	
⚪	STAT		Off	
🟢	EOK		Fast Blink	Performing Diagnostics
⚪	LAN		Off	
⚪	STAT		Off	
🟢	EOK		Slow Blink	Waiting for Ethernet configuration from CPU
⚪	LAN		Off	
⚪	STAT		Off	
🟢	EOK		Slow Blink*	Waiting for IP Address
🟢🟢⚪	LAN		On/Traffic/Off	
🟢	STAT		Slow Blink*	
	(* *EOK and STAT blink in unison*)			
🟢🟢⚪	EOK		On	Operational
	LAN		On/Traffic/Off	
	STAT		On/Off	
🟢	EOK		Slow Blink*	Software Load
🟢	LAN		Slow Blink*	
🟢	STAT		Slow Blink*	
	(* *All LEDs blink in unison*)			

EOK LED Operation

The EOK LED indicates whether the Ethernet interface is able to perform normal operation. This LED is on for normal operation and flashing for all other operations. When a hardware or unrecoverable runtime failure occurs, the EOK LED blinks a two-digit error code identifying the failure. The LED first blinks to indicate the most significant error digit, then after a brief pause blinks again to indicate the least significant error digit. After a long pause the error code display repeats.

EOK LED Blink Codes for Ethernet Hardware Failures

Blink Code	Description
0x12	Undefined or Unexpected Interrupt.
0x13	Timer failure during power up diagnostics.
0x14	DMA failure during power up diagnostics.
0x21	RAM failure during power up diagnostics.
0x22	Stack error during power up diagnostics.
0x23	Shared Memory Interface error during power up diagnostics.
0x24	Firmware CRC (cyclic redundancy check) error during power up or Factory Test.*
0x25	Run time exception
0x31	Undefined instruction or divide by zero
0x32	Software interrupt
0x33	Instruction prefetch abort
0x34	Data abort
0x35	Unexpected Runtime IRQ
0x36	Unexpected Runtime FIQ (fast interrupt request)
0x37	Reserved Exception or branch through zero

* CRC error or software error during normal operation causes Ethernet restart.

LAN LED Operation

The LAN LED indicates access to the Ethernet network. During normal operation and while waiting for an IP address, the LAN LED blinks to indicate network activity. This LED remains on when the Ethernet interface is not actively accessing the network but the network is available, and it is off if network access is not available. The definition of the network being available as indicated by this LED is that the Ethernet physical interface is available and one or both of the Ethernet ports is connected to an active network.

STAT LED Operation

The STAT LED indicates the condition of the Ethernet interface in normal operational mode. If the STAT LED is off, an event has been entered into the exception log and is available for viewing via the Station Manager interface. The STAT LED is on during normal operation when no events are logged.

In the other states, the STAT LED is either off or blinking and helps define the operational state of the module.

Ethernet Port LEDs Operation (100Mb and Link/Activity)

Each of the two Ethernet ports has two green LED indicators, **100** and **LINK**. The **100** LED indicates the network data speed (10 or 100 Mb/sec). This LED is illuminated if the network connection is 100 Mbps.

The **LINK** LED indicates the network link status and activity. This LED is illuminated when the link is physically connected and blinks when traffic is detected at the port. Note that traffic at the port does not necessarily mean that traffic is present at the Ethernet interface, since the traffic may be going between ports of the switch.

Ethernet Restart Pushbutton

This pushbutton is used to manually restart the Ethernet firmware without power cycling the entire control system. It is recessed to prevent accidental operation.

LED Operation during Restart

When the Ethernet firmware is manually restarted by the Ethernet pushbutton in any state, the EOK, LAN and STAT LEDs are briefly turned on in unison as an LED test. These three LEDs are turned on for ½ second and are then turned off when the firmware is restarted. The Ethernet port LEDs are not affected by a manual restart of the Ethernet firmware.

The LED test is performed only upon a manual pushbutton restart; there is no LED test when the Station Manager initiates a restart.

Serial Ports

The CPU has three independent, on-board serial ports, accessed by connectors on the front of the module. Ports 1 and 2 provide serial interfaces to external devices. Port 1 or port 2 can be used for firmware upgrades. The third on-board serial port is used as the Ethernet station manager port. All serial ports are isolated. For serial port pinouts and details on serial communications, refer to chapter 12.

Ethernet Ports

There are two RJ-45 Ethernet ports on the embedded Ethernet Interface. Either or both of these ports may be attached to other Ethernet devices. Each port automatically senses the data rate (10Mbps or 100Mbps), duplex (half duplex or full duplex), and cabling arrangement (straight through or crossover) of the attached link.) For Ethernet port pinouts, refer to chapter 12. For details on Ethernet communications, refer to the following manuals:

TCP/IP Ethernet Communications for PACSystems User's Guide, GFK-2224
PACSystems TCP/IP Communications Station Manager Manual, GFK-2225

Caution

The two ports on the Ethernet Interface must not be connected, directly or indirectly to the same device. The hub or switch connections in an Ethernet network must form a tree; otherwise duplication of packets may result.

Error Checking and Correction

The redundancy CPU, IC698CRE020, is shipped with error checking and correction (ECC) enabled. Enabling ECC results in slightly slower system performance, primarily during power-up, because it uses an extra 8 bits that must be initialized. If you upgrade the firmware on a non-redundancy CPU model IC698CPE020 to support redundancy, you must set the ECC jumper to the enabled state as described in the installation instructions provided with the upgrade kit. This feature is not available for other CPUs in the PACSystems family

For details on ECC, refer to the *PACSystems Hot Standby CPU Redundancy User's Guide,* GFK-2308.

Specifications

For environmental specifications, see "RX7i General Specifications" in Appendix A of the *RX7i Installation Manual,* GFK-2223.

IC698CPE010, IC698CPE020, and IC698CRE020	
Battery: Memory retention	5 years at 20°C (68°F) 40 days nominal without applied power
Program storage	Up to 10 Mbytes of battery-backed RAM 10 Mbytes of non-volatile flash user memory
Current required from 5V bus	CPE010: 3.2 Amps nominal CPE020, CRE020: 4.5 Amps nominal
Operating Temperature	CPE010: 0 to 50°C (32°F to 122°F 0 to 60°C (32°F to 140°F) with fan tray CPE020, CRE020: 0 to 60°C (32°F to 140°F), fan tray required
Floating point	Yes

Boolean execution speed, typical
        CPE010
        CPE020
	
	0.195ms per 1000 Boolean contacts/coils
	0.14ms per 1000 Boolean contacts/coils

Time of Day Clock accuracy	Maximum drift of 9 seconds per day
Elapsed Time Clock (internal timing) accuracy	0.01% maximum
Embedded communications	RS-232, RS-485, Ethernet interface
Serial Protocols supported	Modbus RTU Slave, SNP, Serial I/O To determine availability for a given firmware version, please refer to the *Important Product Information* document provided with the CPU.
Ethernet Ports	Embedded auto-sensing 10/100 Mbps half/full duplex Ethernet interface
VME Compatibility	System designed to support the VME64 standard ANSI/VITA 1
Program blocks	Up to 512 program blocks. Maximum size for a block is 128KB.
Memory (For a detailed listing of memory areas, refer to chapter 7.)	*%I and %Q:* 32Kbits for discrete *%AI and %AQ:* configurable up to 32Kwords *%W:* configurable up to the maximum available user RAM *Symbolic:* configurable up to 10 Mbytes
Error Checking and Correction	CRE020 only.

IC698CPE010, IC698CPE020, and IC698CRE020	
Ethernet Interface Specifications	
Web-based data monitoring	Up to 16 web server and FTP connections (combined)
Ethernet data rate	10Mb/sec and 100Mb/sec
Physical interface	10BaseT RJ45
WinLoader support	Yes
Number of EGD configuration-based pages	255
Time synchronization	SNTP
Selective consumption of EGD	Yes
Load EGD configuration from PLC to programmer	Yes
Remote Station Manager over UDP	Yes
Local Station Manager (RS-232)	Dedicated RS-232 port
Configurable Advanced User Parameters	Yes