PACSystems RX3i

IC695CPE305

Central Processing Unit

GFK-2714
September 2011

The PACSystems* RX3i CPE305 can be used to perform real time control of machines, processes, and material handling systems. The CPU communicates with the programmer via the internal Ethernet port or a serial port. It communicates with I/O and Intelligent Option modules over a dual PCI/Serial backplane.

Features

- Contains 5 Mbytes of user memory and 5 Mbytes of non-volatile flash user memory.
- Battery-less retention of user memory.
- Optional Energy Pack,* which on system power loss powers CPU long enough to write user memory to non-volatile storage (NVS).
- Configurable data and program memory.
- Programming in Ladder Diagram, Structured Text, Function Block Diagram, and C.
- Supports auto-located Symbolic Variables that can use any amount of user memory.
- Reference table sizes include 32Kbits for discrete %I and %Q and up to 32Kwords each for analog %AI and %AQ.
- Supports most Series 90-30 modules and expansion racks. For supported I/O, Communications, Motion, and Intelligent modules, see the *PACSystems RX3i Hardware and Installation Manual,* GFK-2314.
- Supports up to 512 program blocks. Maximum size for a block is 128KB.
- An RS-232 serial port
- Embedded Ethernet interface supports a maximum of two programmer connections.
- Rack-based Ethernet Interface module (IC695ETM001) supports a complete set of Ethernet functionality. For details, see *TCP/IP Ethernet Communications,* GFK-2224.
- Time synchronization to SNTP Time Server on Ethernet network when used with a rack-based Ethernet module (IC695ETM001) version 5.0 or later.
- Ability to display serial number and date code in programmer Device Information Details.
- Ability to transfer applications to and from USB 2.0 A-type compatible RDSDs (removable data storage devices).
- Compliant with EU RoHS Directive 2002/95/EC using the following exemptions identified in the Annex: 7(a), 7(c)-I and III, and 15.

Ordering Information

Description	*Catalog Number*
RX3i 1.1GHz CPU	IC695CPE305
Standard Pwr Supplies 120/240VAC, 125VDC 24VDC	 IC695PSA040 IC695PSD040
Multifunctional Pwr Supplies 120/240 VAC, 125 VDC 24 VDC	 IC695PSA140 IC695PSD140
Rx3i Universal Backplane 7 Slot 12 Slot 16 Slot	 IC695CHS007 IC695CHS012 IC695CHS016
Real Time Clock Battery	IC690ACC001
RX3i CPU Energy Pack	IC695ACC400
Energy Pack Cable	IC695CBL001
RS-232 cable	IC693CBL316
Note: For Conformal Coat option, please consult the factory for price and availability.	

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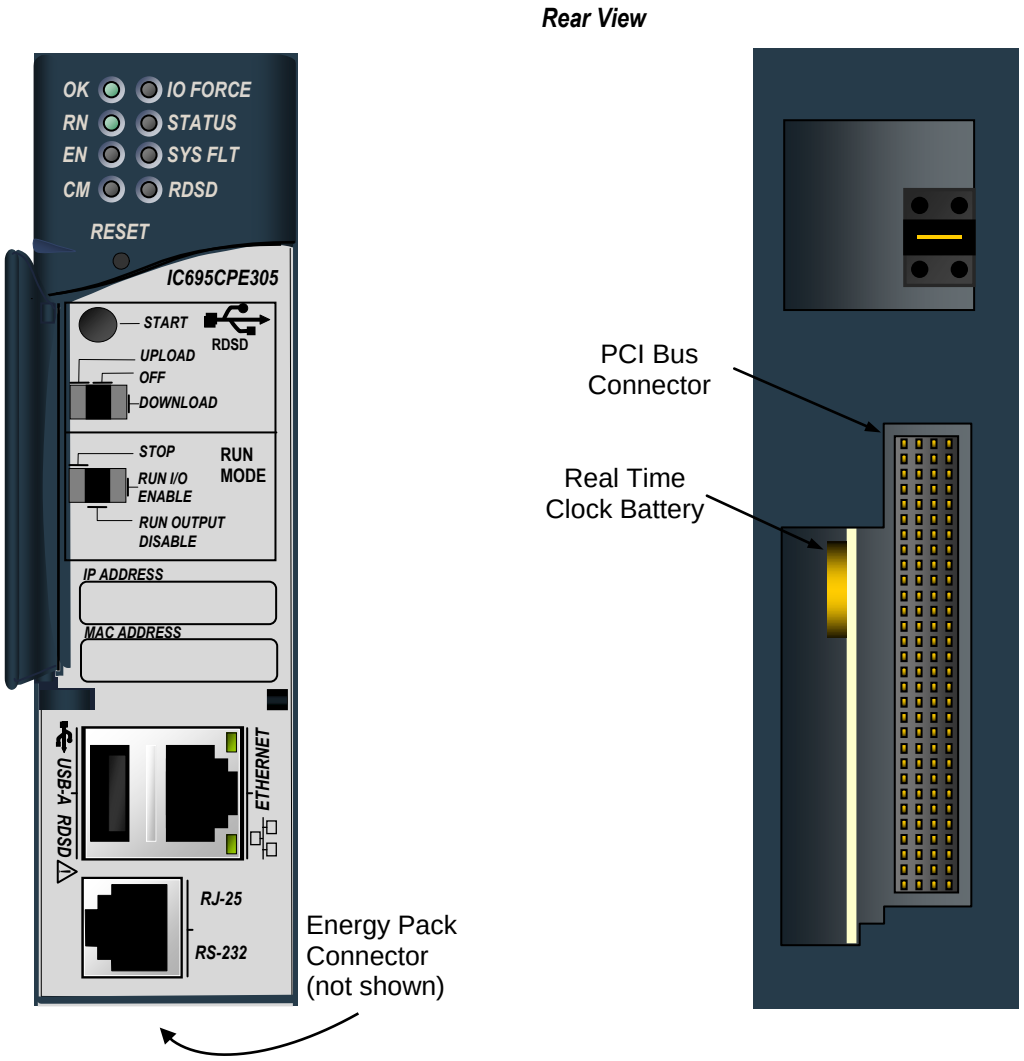
Specifications

Memory retention	The non-volatile storage (NVS) can retain data indefinitely without loss of data integrity. When CPU power is restored, data stored in NVS is transferred back to user memory and the NVS is cleared.
Program storage	5 Mbytes of non-volatile flash user memory
Power requirements	+3.3 VDC: 1.0 A +5 VDC: 1.0 A (up to 1.5 A if USB is fully loaded with 0.5 A) +24 VDC: 0.5A at startup, 0.1 A during run time (Applies only if Energy Pack is connected to the CPE305.)
Operating Temperature	0 to 60°C (32°F to 140°F)
Floating point	Yes
Boolean execution speed, typical	0.072 ms per 1000 Boolean instructions
Time of Day Clock accuracy	Maximum drift of 2 seconds per day
Elapsed Time Clock (internal timing) accuracy	0.01% maximum
Embedded serial communications	RS-232
Serial Protocols supported	Modbus RTU Slave, SNP Slave, Serial I/O
Backplane	Dual backplane bus support: RX3i PCI and 90-30-style serial
PCI compatibility	System designed to be electrically compliant with PCI 2.2 standard
Program blocks	Up to 512 program blocks. Maximum size for a block is 128KB.
Memory	*%I and %Q:* 32Kbits for discrete *%AI and %AQ:* configurable up to 32Kwords *%W:* configurable up to the maximum available user memory Symbolic: configurable up to 5 Mbytes
Embedded Ethernet interface specifications	
Max. no. of connections	Two programmer connections
Ethernet data rate	10Mb/sec and 100Mb/Sec
Physical interface	10BaseT RJ-45
Remote Station Manager over UDP	Yes. Refer to the *Station Manager Manual,* GFK-2225J or later for supported commands.
Configurable Advanced User Parameters	Yes. Refer to *TCP/IP Ethernet Communications for PACSystems*, GFK-2224K or later for supported AUPs.
For environmental specifications and compliance to standards (for example, FCC or European Union Directives), refer to the PACSystems RX3i Hardware and Installation Manual, GFK-2314.	

CPE305 Battery and Switch Locations



Switches

The Reset switch is not used. The RDSD and Run Mode switches are located behind the protective door, as shown above.

RDSD Switches	
Start pushbutton	Pressing this switch initiates RDSD data transfer. (The three-position switch must be set to Upload or Download.)
Three-position switch	Enables/disables RDSD data transfer and selects the direction of data transfer.
Upload	Loads application from CPU to RDSD.
Off	Disables RDSD data transfer.
Download	Stores application from RDSD to CPU.
Run Mode Switch	The Run Mode switch operates as described in the *CPU Reference Manual,* GFK-2222.

Real Time Clock Battery

The CPE305 is shipped with a real time clock (RTC) battery (IC690ACC00) installed, with a pull-tab on the battery. The pull-tab should be removed before installing the module.

The RTC battery has an estimated life of 5 years and must be replaced every 5 years on a regular maintenance schedule.

CPE305 Indicators

CPU Indicators

LED	LED State On Blinking Off	CPU Operating State
OK	On	CPU has passed its powerup diagnostics and is functioning properly. (After initialization sequence is complete.)
	Off	CPU problem. RUN and OUTPUTS ENABLED 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.
	Blinking; Other LEDs off.	CPU in Stop/Halt state; possible watchdog timer fault. Refer to the fault tables. If the programmer cannot connect, cycle power with a charged Energy Pack attached and refer to the fault tables.
OK and **OUT EN**	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.
	Off	CPU is in Stop mode.
OUT EN	On	(Outputs Enabled) Output scan is enabled.
	Off	Output scan is disabled.
I/O FORCE	On	Override is active on a bit reference.
STATUS	Blinking green	Energy Pack charging; not yet charged above the minimum operating voltage.
	On red	Energy Pack circuit fault.
	Blinking red	Energy Pack is near its end of life and should be replaced soon
	On green	Energy Pack is charged above its minimum operating voltage.
	Off	Energy Pack not connected.
SYS FAULT	On red	(System Fault) CPU is in Stop/Faulted mode because a fatal fault has occurred.
COM1	Blinking green	Signal activity on COM1 port.
	Off	No activity on COM1 port
RDSD	On green	Valid RDSD connected, or data transfer complete.
	Blinking green	Data transfer in progress.
	On red	RDSD fault. Check for and correct the following conditions: CPU type mismatch with project on RDSD. Data transfer error. Corrupted or invalid USB file system. Insufficient space on RDSD. Device has been removed during a store to the CPE305. The CPE305 must be power cycled to resume RDSD operations.
	Blinking red	RDSD-Controller project name mismatch.
	Off	RDSD not attached or USB port is disabled.

Ethernet Indicators

LED	LED State On Blinking Off	CPU Operating State
100	On, Green	Network data speed is 100 Mbps.
	Off	Network data speed is 10 Mbps.
LINK	On, Green	The link is physically connected.
	Blinking green	Traffic is detected at the port.

Configuration

The CPE305 has the same configuration parameters as the CPU310, with the following exceptions.

- ***Universal Serial Bus:*** The RDSD (USB) port is enabled by default in the Controller and in the Proficy Machine Edition hardware configuration.

  If a configuration with *Universal Serial Bus* set to *Disabled* is stored to the CPE305, USB port operation can be restored by storing a configuration with the port enabled or by performing a Clear All operation (power cycling the CPU with the Energy Pack disconnected).

- **Modbus Address Space Mapping:** Not supported.

- ***Ethernet configuration:*** The embedded Ethernet must be initially configured by downloading a CPE305 configuration to the RX3i from Machine Edition using a serial connection.

  The embedded Ethernet interface is configured in Machine Edition by expanding the CPU slot to display the Ethernet daughterboard. The Settings tab for the embedded Ethernet module contains IP Address, Subnet Mask and Gateway IP Address. (Note that this release does not support setting a temporary IP address using the SetIP tool in PME.)

- ***Ports:*** The CPE305 has one RS-232 serial port.

Release History

Catalog Number	*FW Version*	*Comments*
IC695CPE305-AAAA	7.10	Initial release.

Important Product Information for this Release

This release introduces the following new features to the RX3i CPU family:

- Battery-less retention of user memory in non-volatile storage (NVS). The CPE305 preserves user memory using an Energy Pack without the need to periodically replace batteries.
- Optional Energy Pack, which, on system power loss, powers the CPU long enough to write user memory to NVS.
- Embedded Ethernet interface for programmer connection.
- Ability to display the CPU's serial number and date code in the programmer Device Information Details dialog box.
- Support for USB-A compatible RDSD (removable data storage device) memory devices

CPU Functional Compatibility

Subject	*Description*
Programmer Version Requirements	Proficy Machine Edition Logic Developer 7.0 SIM 3 or later is required to configure and program the RX3i CPE305.
CPU Backward Compatibility	Legacy CPU310 Projects are ***not*** supported on the CPE305.
C Toolkit Compatibility	C Toolkit version 7.00 or later The C Toolkit for PACSystems is distributed with Proficy Machine Edition Logic Developer. Updates can be downloaded from http://www.ge-ip.com/support. **Note:** ***All*** C blocks must be recompiled using the new toolkit before downloading to a release 7.00 or later CPU. The Series 90 Toolkit (IC641SWP709/719) is not compatible with PACSystems.
Backplanes, power supplies and system modules	As listed in the *PACSystems RX3i System Manual,* GFK-2314D or later.

Subject	Description
Series 90-30 Expansion Rack Compatibility	The PACSystems RX3i supports Series 90-30 expansion racks, both local and remote. PACSystems RX3i CPU does not operate in a Series 90-30 Rack. **Note:** The RUN LED on the 90-30 Power Supply located in an expansion rack (both local and remote) will ***not*** be illuminated when the RX3i System is in RUN mode and there are only input modules in the expansion rack. The RUN LED on the 90-30 Power Supply located in an expansion rack (both local and remote) ***will be*** illuminated when the RX3i System is in RUN mode and there are output modules in the expansion rack.
Series 90-30 Main Rack Compatibility	Series 90-30 Main Racks cannot be used in a PACSystems RX3i system. Series 90-30 CPUs do not operate in PACSystems RX3i Racks.
Isolated 24V power	In applications that use the IC69xALG220/221/222, consult *PACSystems RX3i Hardware and Installation Manual*, GFK-2314 for details of wiring the 24V power.
COMMREQ to PBM300	In Release 3.0, the behavior of the COMMREQ fault output on a COMMREQ sent to the PROFIBUS master module IC695PBM300 was changed to be compatible with the Series 90-30 CPU366 PROFIBUS Master. Previously, the fault output was enabled when the module received a COMMREQ and it was busy. Now, the busy condition does not result in the fault output being enabled.
Recommended IC200ALG240 revision	When a VersaMax* system Genius* Network Interface Unit (IC200GBI001) operates with a Genius Bus Controller located in an RX3i, and the VersaMax system contains an IC200ALG240 Analog Input Module, it is recommended to update the IC200ALG240 firmware to Revision 1.10 or later. Upgrade kits are available at http://www.ge-ip.com/support.
Configuration of IC694MDL754	Always configure 16 bits of module status when using this module. Configuring 0 bits of module status will result in invalid data in the module's ESCP status bits.

CPU Restrictions and Open Issues in Release 7.10

Subject	Description
Ethernet rack-based module failed to exchange EGD data properly during power cycling	Very rarely, after experiencing multiple rapid power cycles, the CPU may fail to establish communication with one or more modules in the backplane at power up. When this occurs, several pairs of "Loss of, or missing option module" and "Reset of option module" faults with identical timestamps will be logged in the controller fault table. If the module is an Ethernet module, an event 30H is recorded in its station manager event log. To recover from this issue, cycle power again.
Loss of Power Supplies after firmware update	A Loss of Power Supplies after firmware update may occur. This does not happen with all firmware updates and will ***not*** occur if the system is power cycled after the firmware upgrade has completed. The faults displayed when this issue occurs are as follows: 0.0 Loss of, or missing option module 01-12-2009 11:25:38 Error Code Group Action Task Num 36 4 3:Fatal 9 Fault Extra Data: 01 58 02 4f 80 08 0a 07 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Hot swapping some analog modules slowly result in modules not being recognized	Occasionally during a hot insertion (hot swap) of IC695 Non-Isolated Analog Input Modules, input channels may take up to 2 seconds to reflect actual input values after the Module OK bit is enabled in the module status word. This has only been seen when the hot insertion has been done slowly (i.e. approximately 1.5 seconds to insert the module)
Simultaneous clears, loads and stores not supported	Currently, PACSystems CPUs do not support multiple programmers changing CPU contents at the same time. The programming software may generate an error during the operation. Simultaneous loads from a single controller are allowed.

Subject	*Description*
Hardware configuration Not Equal after changing target name	If the user stores a hardware configuration to flash that sets “Logic/Config Power up Source” to “Always Flash” or “Conditional Flash” and then subsequently changes the name of the target in the programming software, the hardware configuration will go Not Equal and will not Verify as equal.
Controller and IO Fault Tables may need to be cleared twice to clear faulted state	Both Controller and IO fault tables may need to be cleared to take the CPU out of Stop/Fault mode. If one of the tables contains a recurring fault, the order in which the tables are cleared may be significant. If the CPU is still in Stop/Fault mode after both tables are cleared, try clearing the fault tables again.
Setting force on/off by storing initial value	Once a force on or force off has been stored to the RX3i, you cannot switch from force on to force off or vice-versa directly by downloading initial values. To turn off the force, perform a download, and then change the force on or off by another download.
Number of active programs returned as zero	The SNP request Return Controller Type and ID currently returns the number of active programs as zero.
Serial I/O failure at 115K during heavy interrupt load	Rare data corruption errors have been seen on serial communications when running at 115K under heavy interrupt load on the RX3i. Under heavy load applications, users should restrict serial communications to 57K or lower.
SNP ID not always provided	Unlike the Series 90-30, the RX3i CPU’s SNP ID will not appear in the Machine Edition programmer Show Status display. Service Request 11 will always return zeros.
Second programmer can change logic while in Test & Edit mode	While currently active in a Test and Edit session using Machine Edition on one PC, Machine Edition running on another PC is not prevented from storing new logic to the RX3i.
Must have logic if powering-up from flash	If the application will configure the CPU to retrieve the contents of flash memory at power-up, be sure to include logic along with hardware configuration when saving to flash memory.
Two loss of module faults for Universal Analog Module	Occasionally, the hot removal of the Universal Analog Input Module (IC695ALG600) results in two “Loss of I/O Module” faults instead of one.
Power up of Series 90-30 HSC module may take as long as 20 seconds	As power is applied to a 90-30 High-Speed Counter, the "module ready" bit in the status bits returned each sweep from the module may not be set for as long as 20 seconds after the first PLC sweep, even though there is no "loss of module" indication. I/O data exchanged with the module is not meaningful until this bit is set by the module. Refer to pages 4-3 to 4-5 of GFK-0293.
Informational fault at power up	Intermittently during power-up, an Informational non-critical CPU software fault may be generated with fault extra data of 01 91 01 D6. This fault will have no effect on the normal operation of the RX3i. But, if the hardware watchdog timer expires after this fault and before power has been cycled again, then the outputs of I/O modules may hold their last state, rather than defaulting to zero.
Extended memory types for IO triggers	%R, %W and %M cannot be used as IO triggers.
SNP Update Datagram message	If an Update Datagram message requests 6 or less bits or bytes of data, the RX3i will return a Completion Ack without Text Buffer. The protocol specifies that the returned data will be in the Completion Ack message, but it may not be present.
GBC30 may not resume operation after power cycle	In rare instances, a GBC30 in an expansion rack may not resume normal operation after a power cycle of either the expansion rack or the main rack.
Configuration of third-party modules	Do not specify a length of 0 in the configuration of a third-party module. The module will not work properly in the system.
Power supply status after CPU firmware update	The RX3i will report a “Loss of or missing option module” fault for the IC695PSD140 power supply following an update of CPU firmware. Also, the slot will appear empty in the programmer’s online status detail view. The power supply continues to operate normally. Power cycle to restore normal status reporting.
Power supply status after power cycling	Rarely, turning a power supply on or off may not result in an *add* or *loss* fault. Also, the slot will appear empty in the programmer’s online status detail view. The power supply continues to operate normally. To restore normal status reporting, cycle the power.

Subject	Description
Don't use multiple targets	In a system in which the hardware configuration is stored from one target and logic is stored from a different target, powering-up from flash will not work. The observed behavior is that, following a power up from flash, PME reports hardware configuration and logic "not equal".
Missing "Loss of terminal block" fault	The IC695ALG600/608/616 analog input modules do not produce a "Loss of terminal block" fault when hardware configuration is stored or the module is hot-inserted, and the terminal block is not locked into place.
Sequence Store Failure	When downloading projects with very large hardware configuration or which use large amounts of user memory, it is possible to encounter a "PLC Sequence Store Failure" error when writing the project to flash. To avoid this error, either or both of the following actions may be helpful: 1. Perform an explicit clear of flash prior to performing the write. 2. Increase the operation timeout used by ME prior to performing the write. This is done by expanding the Additional Configuration in the Inspector window for the target controller, and adjusting Request Timeout. The timeout may need to be increased to as much as 60000 msec, depending on the amount of memory used and the condition of the flash memory.
IC694MDL754: must configure module status bits	Always configure 16 bits of module status when using this module. Configuring 0 bits of module status will result in invalid data in the module's ESCP status bits.
IC695ALG600 Lead Resistance Compensation setting	A configuration store operation will fail if a channel is configured for 3-wire RTD and Lead Resistance Compensation is set to Disabled. A Loss of Module fault will be logged in the I/O Fault table at the end of the store operation. To recover the lost module, the configuration must be changed to enable Lead Resistance Compensation and module must be power cycled.
WinLoader may stop operating	On computers running Windows 2000 and using some versions of Symantec Antivirus protection, WinLoader will lock up if used in Advanced mode. To recover, cycle the computer's power.
Logic and HWC not equal after power cycle	If the Hardware Config from Target 1, with Logic/Configuration Power-up Source and Data Source both set to "Always from Flash," is stored in Flash, then Logic and Hardware Config from Target 2, with Logic/Configuration Power-up Source both set to "Always from RAM," are stored to RAM and there is a good battery, then when power is cycled the programmer may show that Logic and Hardware Config are not equal. The remedy is to clear Flash and re-store the Logic and Hardware Config from Target 2.
WinLoader does not detect PC COM port in use when upgrading PACSystems CPU	WinLoader does not detect whether a PC's COM port is in use when attempting to connect to a PACSystems CPU to perform a firmware upgrade. If the port is already in use it displays the status "trying to connect" followed by "waiting for target." To proceed with the upgrade, press the "abort" button and disconnect the other application that is using the COM port.
WinLoader does not display error when it cannot connect serially with PACSystems CPU	WinLoader does not display an error message if it cannot connect to a PACSystems CPU to perform a firmware upgrade. This occurs if the cable is physically not connected to the CPU or if the CPU's serial port is not configured for the same baud as WinLoader. In this case Winloader displays the status "trying to connect" followed by "waiting for target." To proceed with the upgrade, press the "abort" button and correct the cable or baud rate setting.
SRTP connections remain open after IP address changed	The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Thus, once the local IP address has changed, the privileged connection may not be available until the TCP keep-alive timeout has expired. If quicker recovery of the SRTP connection is needed, modify the "wkal_idle" Advanced User Parameter to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to *TCP/IP Ethernet Communications for PACSystems,* GFK-2224, for details.
REPP does not save results of aborted PING	The station manager REPP command does not retain the results of a PING that is aborted due to error. The PING results are reported when the PING is aborted, but subsequent REPP commands give the results of the last successfully terminated PING.

Subject	*Description*
Multiple log events	The Ethernet Interface sometimes generates multiple exception log events and Controller Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or Controller Fault Table can be completely filled with repetitive error messages.
Clear of large hardware configurations may cause log event 08/20	A Log event 08/20 may occur when very large hardware configurations are cleared and transfers are active on other Server connections. This log event can be safely ignored.
PLC response timeout errors (8/08) in Ethernet exception log under extremely heavy SRTP traffic	Under extremely heavy SRTP traffic conditions, the Ethernet Interface may log an event in the Ethernet exception log (Event 8, Entry 2 = 08H) indicating an overload condition. This error terminates the SRTP connection. If this event appears, either the traffic load should be reduced, or the application should use an alternate communications method to verify that critical data transfers were not lost due to the overload.
SRTP channel transfers may take up to 20 seconds after power cycle	When SRTP communications are interrupted by a power cycle, the Ethernet interface may require up to 20 seconds to re-establish TCP connection used for SRTP communications.
TCP connection may timeout early if the timeout is set above 10 minutes	If the TCP connection timeout is set higher than 10 minutes, the connection may time out before the configured value. The connection timeout is derived from three AUP parameters: wkal_idle + (wkal_cnt + 1) * wkal_intvl
Station Manager PARM command help text is wrong	Although the ***parm v*** Station Manager command works correctly, the ***v*** subsystem code (SRTP server) is not shown as supported by the online help.

CPU Operational Notes

Subject	Description
Serial port operation	▪ Cable IC693CBL316 must be used for RS-232 serial connections to the CPE305. ▪ The RS-232 port does ***not*** supply the 5V power offered by earlier RX3i and Series 90-30 CPUs.
C Toolkit Application Compatibility	Beginning with Rel 7.00 of the C Toolkit, writes to %S memory will fail to compile. In previous releases a compilation warning was issued. This affects use of the GE supplied C Toolkit macros Sw(), Si(), and Sd().
Multiple calls to SVC_REQ 57 (Logic Driven Write to Nonvolatile Storage) in a single sweep)	Multiple calls to SVC_REQ 57 could cause the CPU to trip the watchdog timer and go to STOP-HALT mode. The number of calls to SVC_REQ 57 that can be made depends on variables such as the software watchdog timeout value, how much data is being written, how long the sweep is, age of nonvolatile storage (flash), etc. GE Intelligent Platforms recommends limiting the number of calls to SVC_REQ 57 to one call per sweep to avoid the potential of going to STOP-HALT mode.
Use of SVC_REQ 56 and 57 should be limited in frequency to avoid CPU watchdog timeouts	The Logic Driven Read/Write to Flash service requests are not intended for high frequency use. Depending on the amount of data being accessed and the condition of the flash memory, writing to flash could take more than one sweep interval to finish. If the application attempts to write to flash too frequently, the CPU could experience a watchdog timeout while waiting for a preceding write operation to complete. To avoid the potential for causing a watchdog timeout (resulting in the CPU going to Stop-Halt), the application should be designed such that one Logic Driven Write operation (SVC_REQ 57) is executed per sweep.
RUN LED is not illuminated on the Series 90-30 power supply for an RX3i remote/expansion rack with input modules only	For firmware version 6.70 and later, the RUN LED for remote/expansion racks will reflect the current IO enable/disable state (even when there are no output modules in the expansion rack). RUN LED for remote/expansion rack with input modules only works as follows for all versions prior to version 6.70: When a remote or expansion baseplate is used with the RX3i, the RUN LED on the Series 90-30 power supply for that baseplate is illuminated when the system is in Run mode only if the rack contains at least one output module. If the rack contains input modules only, the RUN LED is not illuminated. This is due to the way input modules are managed in the PACSystems design and does not indicate an error.
Length of serial I/O buffer	(Release 5.70 or later) The "Set Up Input Buffer Function" will always allocate a buffer containing 2097 bytes. This is one byte more than previous PACSystems releases.
LD-PLC operations	Machine Edition LD-PLC no longer supports a function that connects to the PLC, downloads, and then disconnects from the PLC. The connect and download functions are now separate. To perform a download to the PLC, you must first connect to the PLC.
NaN handled differently than in 90-30	The PACSystems RX3i CPU may return slightly different values for Not A Number as compared to Series 90-30 CPUs. In these exception cases (e.g., 0.0/0.0), power flow out of the function block is identical to Series 90-30 operation and the computed value is still Not A Number.

<table>
<tr><th>Subject</th><th>Description</th></tr>
<tr><td>Slot numbering, power supply placement, CPU placement and reference</td><td>
1. The A/C Power-Supply (IC695PSA040) for the RX3i is a doublewide module whose connector is left justified as viewed when installed in a rack. It cannot be located in Slot 11 of a 12-slot rack nor Slot 15 of a 16-slot rack. No latch mechanism is provided for the last (right-most) slot in a rack, therefore it is not possible to place the power-supply in the second to last slot.
2. The doublewide RX3i CPUs are modules whose connector is right justified as viewed when installed in a rack. They are referenced for configuration and by user logic applications by the leftmost slot that it occupies. For example, if one of these modules has its physical connector inserted in to slot 4, which means it occupies slots 3 and 4, the CPU is referenced as being located in slot 3. The referenced location of the CPU is not determined by what slot the physical connector is located in, but rather by the left most slot occupied by the entire module.
3. Due to item #2 above, a doublewide RX3i CPU may be located in Slot 0 of a rack (physical connector in Slot 1). In addition the CPU cannot be located in Slot 11 of a 12-slot rack nor slot 15 of a 16-slot rack, since doing so would require the physical connector to be located in the slot reserved for an expansion module.
4. When migrating a Series 90-30 CPU system to a PACSystems RX3i CPU, be aware that to maintain the Slot 1 location of the CPU, only a singlewide power-supply may be used in Slot 0. Either DC power supply can be used (IC695PSD040 or IC695PSD140). Therefore, if the application using an existing Series 90-30 system must maintain a Slot 1 CPU and uses an AC power-supply, the RX3i system must have the RX3i AC power-supply located in a slot to the right of the RX3i CPU in Slot 1.
5. In deciding to place the CPU in slots other than Slot 1, the user should be aware of the possible application migration issues that could arise. The following lists the areas that could be affected when migrating an application from one CPU slot to another.
<table>
<tr><th colspan="2">Item Affected</th><th>How Affected</th></tr>
<tr><td rowspan="3">User Logic</td><td>Service Request #15 (Read Last-Logged Fault Table Entry)</td><td rowspan="2">Location of CPU faults will not be the standard 0.1 location, but will reflect the slot the CPU is located in. User logic that decodes fault table entries retrieved by these service requests may need updating.</td></tr>
<tr><td>Service Request #20 (Read Fault Tables)</td></tr>
<tr><td>Communications Request (COMM_REQ)</td><td>COMM_REQs directed to the CPU (e.g. those directed to the serial ports of the CPU) will need to be updated with the correct CPU slot reference.</td></tr>
<tr><td>H/W Configuration</td><td>CPU Slot location</td><td>Slot location of the CPU must be updated in the HW Configuration to reflect the CPU’s true location.</td></tr>
<tr><td>Fault Tables</td><td>Faults logged for the CPU</td><td>The location of faults logged for the CPU in the fault table will not be the standard 0.1 (rack.slot) location, but will reflect the CPU’s actual slot.</td></tr>
<tr><td>External Devices</td><td colspan="2">Note: CPE305 and CPE310 only provide the ability to communicate with a programmer. Additional protocols and communication with other devices are not supported.</td></tr>
</table>
</td></tr>
<tr><td>PID algorithm improved</td><td>The PID algorithm used in PACSystems has been improved and therefore PID will function slightly differently on PACSystems RX3i than on the Series 90-30. The differences are that the elapsed time is computed in 100 µS instead of 10 mS units. This smooths the output characteristic, eliminating periodic adjustments that occurred when the remainder accumulated to 10mS.
Also, previous non-linear behavior when the integral gain is changed from some value to 1 repeat/second was eliminated.</td></tr>
</table>

Subject	Description
Some service requests different from 90-30 or no longer supported	▪ Service Requests 6, 15, and 23 have slightly different parameters. Refer to GFK-2222. ▪ PACSystems PLCs support Service Request 26/30 functionality via fault locating references. ▪ Service Request 13 requires a valid value in the input parameter block (Refer to GFK-2222 for details). On the Series 90-30 and Series 90-70 the parameter block value was ignored. ▪ Service Requests 48 and 49 are no longer supported (there is no auto-restart) because most faults can be configured to be not fatal.
IL and SFC	IL and SFC are not available.
DO I/O instruction	The Series 90-30 Enhanced DO I/O instruction is converted to a standard DO I/O instruction (the ALT parameter is discarded and ignored.)
END instruction	The Series 90-30 END instruction is not supported. Alternate programming techniques should be used.
Non-nested JUMP, LABEL, MCR, & ENDMCR Instructions	Non-nested JUMPs, LABELs, MCRs, & ENDMCRs are translated to the corresponding nested JUMPs, LABELs, MCRs, & ENDMCRs when converting from Series 90-30 to PACSystems RX3i.
Duplicate station address for Modbus will conflict with other nodes	The default serial protocol for the RX3i is Modbus RTU. The default Station Address is 1. If the PLC is added to a multi-drop network, care must be taken that the PLC is configured with a unique Station Address. Nodes with duplicate Station Addresses on the same network will not work correctly.
Timer operation	Care should be taken when timers (ONDTR, TMR, and OFDTR) are used in program blocks that are NOT called every sweep. The timers accumulate time across calls to the sub-block unless they are reset. This means that they function like timers operating in a program with a much slower sweep than the timers in the main program block. For program blocks that are inactive for large periods of time, the timers should be programmed in such a manner as to account for this catch up feature. Related to this are timers that are skipped because of the use of the JUMP instruction. Timers that are skipped will NOT catch up and will therefore not accumulate time in the same manner as if they were executed every sweep.
Constant sweep	**Constant Sweep** time, when used, should be set at least 10 milliseconds greater than the normal sweep time to avoid any over-sweep conditions when monitoring or performing on-line changes with the programmer. Window completion faults will occur if the constant sweep setting is not high enough.
Large number of COMM_REQs sent to module in one sweep causes faults	A large number of COMM_REQs (typically greater than 8) sent to a given module in the same sweep may cause Module Software faults to be logged in the Controller fault table. The fault group is MOD_OTHR_SOFTWR (16t, 10h) and the error code is COMMREQ_MB_FULL_START (2). When this occurs, the “FT” output of the function block will also be set. To prevent this situation, COMM_REQs issued to a given module should be spread across multiple sweeps so that only a limited number (typically 8 or less) of COMM_REQs are sent to a given module in each sweep. In addition, the FT output parameter should be checked for errors. If the FT output is set (meaning an error has been detected), the COMM_REQ could be re-issued by the application logic.
C Block standard math functions do not set errno	In C Blocks, standard math functions (e.g. sqrt, pow, asin, acos) do not set errno to the correct value and do not return the correct value if an invalid input is provided.
Upgrading firmware	▪ Upgrading the CPU firmware with the WinLoader utility may fail when multiple IO modules are in the main rack, due to the time it takes to power cycle the rack system. If the upgrade process fails, move the CPU to a rack without IO modules and restart the upgrade process. ▪ Winloader initial connect baud rate is fixed at 19200 baud. Note that the firmware download will occur at 115.2K baud by default. ▪ Note that if you have hyperterm open on a port, and then try to use Winloader on the same port, Winloader will often say “Waiting for Target” until the hyperterm session is closed.
Hot swap	Hot swap of CPUs is not supported in this release.

Subject	*Description*
Serial port configuration COMM_REQs	With the following combination of circumstances, it is possible to render serial communications with the CPU impossible: ▪ User configuration disables the Run/Stop switch ▪ User configures the power up mode to Run or Last ▪ Logic is stored in FLASH and user configures CPU to load from FLASH on power up ▪ User application issues COMMREQs that set the protocol on both of the serial ports to something that does not permit communications to the PME programmer.
Run Mode Store of EGD	Rx3i rack-based Ethernet modules (IC695ETM001) must be running firmware version 6.00 or greater to utilize the Run Mode Store of EGD feature.
LAN must be tree, not ring	The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result. In this situation, the RX3i Ethernet modules will continually reset.
Reporting of duplicate IP address	The PACSystems RX3i does not log an exception or a fault in the Controller Fault Table when it detects a duplicate IP address on the network.
SRTP connections remain open after IP address changed	The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Once the local IP address has changed, any existing open TCP connections are unable to normally terminate. This can leave SRTP connections open until their underlying TCP connections time out. If quicker recovery of the SRTP connection is needed, modify the "wkal_idle" Advanced User Parameter to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to *TCP/IP Ethernet Communications for PACSystems,* GFK-2224, for details.
Lengthy CPE backplane operations	Some exceptionally lengthy CPE backplane operations, such as MC_CamTableSelect, Data Log, and Read Event Queue functions, will take longer to complete compared to other RX3i CPU models, and may delay backplane operations to IC695 modules. For example, when an MC_CamTableSelect function block is executed on the PMM335 module, the CPU's acknowledgement of the PMM355 module interrupt may be delayed. In this situation, you may see the following fault in the I/O Fault Table, even when the interrupt has not been dropped: *Error initiating an interrupt to the CPU.*
Incorrect COMM_REQ status for invalid program name	The program name for PACSystems is always "LDPROG1". When another program name is used in a COMM_REQ accessing %L memory, an Invalid Block Name (05D5) error is generated.
FANUC I/O Master and Slave operation	Scan sets on the master do not work properly for the first operation of the scan set after entering RUN mode. They do work properly for subsequent scans. After downloading a new hardware configuration and logic, a power cycle may be required to resume FANUC I/O operation. Use PLCs of similar performance in FANUC I/O networks. If a master or slave is located in an RX3i system, the other PLCs should be RX3i CPUs or Series 90-30 CPU374s. Repeated power up/down cycles of an expansion rack containing FANUC I/O slaves may result in failure of the slaves' operation, with the RDY LED off.
Lost count at power up for Serial IO Processor	The serial IO Processor (IC693APU305) will lose the first count after every power up or every time the module receives a configuration.
COMM_REQ status words declared in bit memory types must be byte-aligned	In previous releases, the CPU allowed configuration of COMMREQ Status Words in bit memory types on a non-byte-aligned boundary. Even though the given reference was not byte-aligned, the firmware would adjust it the next-lowest byte boundary before updating status bits, overwriting the bits between the alignment boundary and specified location. To ensure that the application operates as expected, release 3.50 requires configuration of COMMREQ Status Words in bit memory types to be byte-aligned. For example if the user specified status bit location of %I3, the CPU aligns the status bit location at %I1. Release 3.50 firmware requires the user to specify the appropriate aligned address (%I1) to ensure that the utilized location is appropriate for their application. Note that the actual reference location utilized is not changed, but now is explicitly stated for the user.

Subject	Description
STOP and RUN mode transition priority	The PACSystems CPU receives requests to change between stop and run mode from many different sources. These include (but are not limited to) Proficy Machine Edition, HMIs, the user application, and the RUN/STOP switch. Since there are many potential sources for a mode change request, it is possible to receive a new mode change request while another is already in progress. When this occurs, the CPU evaluates the priority of the new mode change request with the mode change that is in progress. If the new mode change request has an equal or higher priority than the one already in progress, the CPU transitions to the new mode instead of the one in progress. If, however, the new mode change request has a lower priority than the one in progress, the new mode request is discarded and the CPU completes the mode change that is in progress. The sweep mode priorities are (listed from highest to lowest priority) STOP HALT, STOP FAULT, STOP, and RUN. (Note: The IO ENABLED/DISABLED state is not part of the mode priority evaluation.) For example, a CPU is in RUN IO ENABLED mode and a SVC_REQ 13 function block is executed to place the CPU into STOP IO DISABLED mode. Before the transition to STOP IO DISABLED is completed, the RUN/STOP switch is changed from RUN IO ENABLED to RUN IO DISABLED. In this case, the CPU ignores the new request from the RUN/STOP switch to go to RUN IO DISABLED mode because it is already processing a request to go to STOP IO DISABLED mode and STOP mode has a higher priority than RUN mode.
Suspend IO Function Block does not Suspend EGD	In a 9070 the SUSPEND_IO function block suspends EGD in addition to IO Scan. In PACSystems controllers the SUSPEND IO only suspends IO Scan.
Nuisance faults sometimes logged for missing power supply	If a power supply is missing or has some fault that makes it appear to be missing, the CPU may improperly report (upon download of configuration) more than one fault. Such additional faults may be safely ignored and will not occur in a properly configured rack (with no mismatches or missing modules),
Uploaded controller supplemental files lose date and time	Controller supplemental files uploaded from the CPU are time stamped as 8/1/1980 12:08AM regardless of PC or PLC time.

Removable Data Storage Devices (RDSDs)

The CPE305 provides the ability to transfer applications to and from an RDSD (USB-compatible device, such as a memory stick, smart phone, digital camera or MP3 device). Once the data is copied to the RDSD, it can be written to other RX3i CPE305 CPUs, with no programmer software needed. The RDSD interface requires a user-supplied flash memory device that complies with the USB 2.0 Specification.

The USB port must be enabled in the RX3i configuration in order to transfer data between the CPU and the RDSD. The CPE305 is shipped with the RDSD (USB) port enabled (see "Configuration" on page 5).

The RDSD load and store operations can include the following data:

- An entire application, including logic and configuration, reference table data, and cam files for Motion applications. (Motion files and local logic for DSM motion applications are supported.) Configuration can include Ethernet Global Data and Advanced User Parameters for the rack-based Ethernet interface. (Although a complete, unmodified application must be placed on the RDSD, you can use an *options.txt* file to download selected components of the application to the target CPU.)
- Passwords and OEM key, if any, are encrypted and written to the RDSD when the project is loaded from the CPU. When the project is stored to a CPU that has no passwords or OEM key, those are copied to the CPU. When the project is stored to a CPU that has passwords and/or OEM key, the passwords must match or the store will fail.
- Fault tables are written to the RDSD before and after a load to or store from the RDSD.
- If a hardware configuration that disables the USB port is successfully stored to the CPU, the fault tables will not be written to the RDSD at completion of the store operation.

Note: The USB port is for transfer of application data only. It is not intended for permanent connection.

RDSD Restrictions and Open Issues in Release 7.10

Subject	*Description*
Default RDSD Write to Flash value is 'N' when no *Options.txt* file is created	The default RDSD Write_Flash value is 'N'. Storing a project from the RDSD to the CPE305 or CPE310 will result in the files not being written to user flash if no *Options.txt* file is included on the RDSD device.
Logic/CFG not updated when power lost during RDSD download	If power is lost prior to a download completing from the RDSD, data and/or cam files may not have been downloaded. When power is restored a Controller Sequence Store Failure will be reported. The CPU will be in Stop-Fault mode, preventing it from going into RUN mode. If the fault table is then cleared, your logic can be executed without the correct initial values or cam files being present.
RDSD *option.txt* file does not limit downloads	If the *options.txt* file on your RDSD indicates that logic and hardware configuration should ***not*** be downloaded from the device (Download_LogicAndCfg N), the logic and hardware configuration will not be downloaded from the device, but the logic and hardware configuration will be ***cleared*** on the CPU.

RDSD Operational Notes

Note: When using RDSD, all PME connections must be in the "Offline" state for the RDSD to function properly.

Uploading a Project from the CPU to the RDSD

Notes: Only one application project can be stored to the RDSD at a time. Before the RX3i writes the project to the RDSD, any previous application is removed; if a directory named *PACS_Folder* exists on the RDSD at the start of the upload, it is deleted with all of its contents.

Flash devices write in whole memory blocks and memory block sizes vary among devices. The amount of space used by a project may vary between RDSDs due to the differences in minimum block sizes and therefore the number of blocks used by a project. The minimum amount of memory required will be the size of the entire project plus an additional block for the *options.tx*t file, if used.

1. Place the CPU that contains the project to be transferred in Run or Stop mode.
2. If PROFICY Machine Edition is online with the RX3i, either go Offline or select Monitor mode.
3. Insert the RDSD into the USB connector on the CPU. (After 1 – 2 sec, the RDSD/COM2 LED turns solid green.)
4. Push the RDSD direction switch to the left (UPLOAD).
5. Momentarily depress the START pushbutton. ***Do not*** remove the RDSD from the CPU during the transfer.
   - The RDSD LED blinks green during the transfer. This can take from 10 – 150 sec, depending upon the size of the project data.
   - The RDSD LED should turn solid green, indicating that the transfer completed successfully.
   - If the RDSD LED turns solid red, the transfer has failed. There will be a copy of the fault tables as they existed at the end of the attempted transfer on the RDSD. Insert the RDSD into a PC which has the PACS Analyzer software and select the *plcfaultafter.dat* file on the RDSD for fault table analysis by the Analyzer. The PACS Analyzer software can be downloaded from the Support website, http://support.ge-ip.com.
   - If the RDSD LED turns solid red, indicating an error, another RDSD operation cannot be initiated until the device is disconnected then reconnected.

Cautions

   - If the RDSD is removed during data transfer from the CPU, the integrity of the RDSD and the files on it cannot be guaranteed. The RDSD status LED will indicate a fault, and the CPU will abort the data transfer and remain in its current operating mode.
   - The project files, consisting of the entire contents of the PACS_Folder directory and all of its subdirectories, loaded on the RDSD must ***not*** be modified. If they are modified, the files transferred to the CPU will be invalid

6. When the RDSD LED turns solid green, indicating the transfer has been successfully completed, remove the RDSD from the CPU. The RDSD can now be used to transfer the application to other RX3i controllers with CPE305 CPUs.

   You can copy the entire *applications* directory to another USB device and use that device as the source for downloads to CPE305 CPUs, provided none of the files in that directory are changed in any way during the transfer.

Downloading a Project from the RDSD to the CPU

To download a project to the RX3i, the RDSD must contain a valid project, consisting of the hardware configuration, application logic, and reference memory in a compiled format (originating from another RX3i controller). The project files, consisting of the entire contents of the PACS_Folder directory and all of its subdirectories, loaded on the RDSD must ***not*** be modified. If they are modified, the files transferred to the CPU will be invalid.

By default, all project components are stored to the CPU and are written to flash. You can change this operation by placing an *options.txt* file on the RDSD as described below.

1. Ensure that the RX3i is in STOP mode
2. If PROFICY Machine Edition is online with the RX3i, either go Offline or select Monitor mode.
3. Connect the RDSD to the USB connector on the CPU that will be receiving the files. The RDSD/COM2 LED turns solid green. Move the RDSD direction switch to the right (DOWNLOAD).
4. Momentarily depress the START pushbutton. ***Do not*** remove the RDSD from the CPU during the transfer.
   - If the target name in the RDSD is different from the target name in the RX3i, the RDSD LED will blink red. If this is expected or acceptable, momentarily depress the START pushbutton again.
   - The RDSD LED blinks green during the transfer. This can take from 10 – 150 sec, depending upon the size of the project data.
   - The RDSD LED should turn solid green, indicating that the transfer completed successfully. Unless the RUN/STOP switch has been disabled in the hardware configuration just stored, it can be used to place the RX3i into RUN mode after the transfer.
   - If the RDSD LED turns solid red, the transfer has failed. There will be a copy of the fault tables as they existed at the end of the attempted transfer on the RDSD. Insert the RDSD into a PC which has the PACS Analyzer software and select the *plcfaultafter.dat* file on the RDSD for fault table analysis by the Analyzer.

     If the RDSD LED turns solid red, indicating an error, another RDSD operation cannot be initiated until the device is disconnected then reconnected.

Caution

If the RDSD is removed during data transfer to the CPU, the RX3i controller will generate a fatal fault (sequence store fault). You will need to clear the fault tables through a programmer connection or by power cycling the CPU with the Energy Pack disconnected before attempting to download again.

5. When the RDSD LED turns solid green, indicating the transfer has been successfully completed, remove the RDSD from the CPU.

   The RUN/STOP switch can be used to place the RX3i into RUN mode after the transfer, unless it has been disabled in the hardware configuration just stored. (If the RUN/STOP switch is disabled, you will need to connect with the programmer to place the RX3i in RUN mode.

Using an Options.txt File to Modify Download Operation

An *options.txt* file can be used to modify the operation of the RDSD during a store to the RX3i. This is a plain-text file which can contain some or all of the following statements, in any order. The format of each option line is the option keyword, followed by a space, followed by either a capital Y or a capital N. The option keyword must be spelled exactly as indicated below. If an option statement is omitted from the file, the default value will be used.

If you want to use all of the default operations, *the options.txt* file is not necessary.

Options.txt File Format

Option Keyword	Default value	Description
Download_LogicAndCfg	Y (yes)	Logic and configuration are copied to the CPE305 (including symbolic variables)
Download_Data	Y (yes)	Reference memory is copied to the CPE305 (excluding symbolic variables)
Download_CamFiles	Y (yes)	Cam files are copied to the CPE305
Write_Flash	Y (yes)	The downloaded CPE305 contents (as specified by the above keywords) by default will be written to flash upon completion of the store

Sample options.txt File

If the following *options.txt* file is present on the RDSD, logic, configuration and reference data are copied to the CPU, and files are written to flash. Cam files are not copied.

Download_LogicAndCfg Y
Download_Data Y
Download_CamFiles N
Write_Flash Y

Security

When the application is written to the RDSD from a controller that has passwords and/or an OEM key defined, the passwords and OEM key are encrypted and stored on the RDSD. When the project is written from the RDSD to a CPE305, the passwords and OEM key are copied to it.

If an OEM key is defined on the RDSD, when transfer is complete, the OEM protection will be enabled (locked). When an application is being stored to a CPE305 that already has passwords and/or an OEM key defined, the passwords/key on the RDSD must match the passwords/key in the target CPE305, or the transfer will fail.

Error Reporting

Errors are indicated when the RDSD LED becomes solid red (not blinking). All errors are reported in the Controller fault tables. If the Controller has faults in its fault tables before it receives a store, the fault tables are written to *plcfaultbefore.dat* and *iofaultbefore.dat* on the RDSD. If the Controller has faults in its fault tables after it receives a store, the fault tables are written to *plcfaultafter.dat* and *iofaultafter.dat* on the RDSD. Previous versions of these files are deleted before the transfer. If either fault table is empty, the corresponding file is not written and will not be present.

If a hardware configuration that disables the USB port is stored to the CPU, the fault tables will not be written to the RDSD at completion of the store operation because the USB port will be disabled at the end of the store process.

Embedded Ethernet Interface

The Embedded Ethernet port is available for Programmer use ***only*** – The CPE305 provides two SRTP-server connections for use by the Programmer. Use with other SRTP enabled devices (HMI, etc.) is not supported by this release.

Embedded Ethernet Interface Restrictions and Open Issues in Release 7.10

Subject	*Description*
Ethernet disconnect during word-for-word change	If the Ethernet connection is broken during a word–for-word change, the programmer may not allow a subsequent word-for-word change after reconnecting due to the fact that it thinks another programmer is currently attached. If this occurs, you should go offline and then back online again.
Possible PME inability to connect	Infrequently, an attempt to connect a programmer to an RX3i via Ethernet will be unsuccessful. The normal connection retry dialog will not be displayed. Rebooting the computer that is running the programmer will resolve the behavior.
Spurious Ethernet fault	In rare instances, after power cycle, the Ethernet Interface may log the following fault, Event = 28h, Entry 2 = 000Eh. This fault can be safely ignored.
Intermittent Ethernet log event 8H/15H after power cycle	When starting after a power cycle, the Ethernet Interface may intermittently log an exception (entry 8H, Entry 2 = 15H, Entry 3 = 0000H, Entry 4 = 00aaH). This exception is benign and may be ignored.
Station Manager PING commands	When initiating ICMP echo requests from the PLC via Station Manager's PING command, the operation occasionally fails and an exception is logged (Event eH, Entry 2 = 6H).

Embedded Ethernet Interface Operational Notes

Subject	*Description*
Configuration of IP address is required *before* using Ethernet communications	***Note: BOOTP and the SetIP tool in PME are not supported.*** The embedded Ethernet Interface cannot operate on a network until a valid IP address is configured. (The default IP address is 192.168.0.100.) The Ethernet addressing information must be configured prior to actual network operation, or to recover from inadvertent changes to the Ethernet addressing data at the Ethernet Interface. Use one of the following methods to initially assign an IP address: ▪ Download a CPE configuration from the Programmer using a serial connection. ▪ Download a CPE configuration from the Programmer using the Ethernet connection of an ETM001 in the same rack with a known IP address configuration.
Programmer version requirements	Proficy Machine Edition Logic Developer PLC 7.00 SIM3 or later must be used to configure the embedded Ethernet port of a CPE305.
Ethernet Event Log not preserved across power cycle	The Ethernet event log on the CPE305 is not maintained across a power-cycle. However, Ethernet log events will be reported in the Controller Fault Table as with other Rx3i CPUs. An Energy Pack can be used to preserve these entries when power is lost.
Station Manager commands	A subset of the documented Station Manager Commands will be supported for the CPE305. Refer to *TCP/IP Ethernet Communications for PACSystems Station Manager Manual,* GFK-2225J or later for details.
AUP parameter restrictions	▪ The Advanced User Parameter "wsnd_buf" should not be changed by the user. Changing the value of this parameter may cause the Ethernet Interface to drop its connection and the LAN LED to turn off. ▪ When explicitly configuring speed or duplex mode for a PACSystems RX3i port using Advanced User Parameters (AUP), do not request a store to flash as a part of the download when communicating over the CPE's embedded Ethernet port. In this situation you first must store to the RX3i and then initiate a separate request to write to flash.

Subject	Description
Changing IP address of Ethernet interface while connected	Storing a hardware configuration with a new IP address to the RX3i while connected via Ethernet will succeed, then immediately disconnect because the RX3i is now using a different IP address than the Programmer. You must enter a new IP address in the Target Properties in the Machine Edition Inspector window before reconnecting.
Proper IP addressing is always essential	The PACSystems Ethernet Interface must be configured with the correct IP Address for proper operation in a TCP/IP Ethernet network. Use of incorrect IP addresses can disrupt network operation for the PACSystems and other nodes on the network. Refer to *TCP/IP Ethernet Communications for PACSystems,* GFK-2224 for important information on IP addressing. When storing a new HW configuration to the RX3i, be sure that the HW configuration contains the proper Ethernet addressing data (IP Address, Subnet Mask, and Gateway IP Address) for the RX3i. ***Note:*** Machine Edition programming software maintains the target IP address (used to connect the programmer to the target) independent of the contents of the HW Configuration for that target). The target IP address is set in the Target Properties in the Machine Edition Inspector window. Storing a HW Configuration whose Ethernet addressing data contains an IP Address that is different from the RX3i target IP address will change the IP address used by the target RX3i as soon as the Store operation is completed; this will break the Programmer connection. Before attempting to reconnect the Programmer, you must change the target IP address in the Target Properties in the Machine Edition Inspector window to use the new IP address. To regain communication at the former IP address, use the manual corrective action described above. Storing a HW Configuration containing incorrect Ethernet addressing data to the PACSystems RX3i will result in loss of the Programmer connection and will require manual corrective action as described above.
Two 10Base-T / 100Base-TX auto-negotiating full-duplex Ethernet ports	The PACSystems RX3i CPU with embedded Ethernet provides a direct connection to one 10Base-T /100Base-TX CAT5 (twisted pair) Ethernet LAN cable from one network port. By comparison, Rx3i peripheral Ethernet modules (IC695ETM001) provide direct connection to one or two 10Base-T /100Base-TX CAT5 (twisted pair) Ethernet LAN cables from two network ports. In either case, the Ethernet-enabled device has only one IP address that may be used by one or two ports. Cables may be shielded or unshielded. **Caution** The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result. **Caution** The IEEE 802.3 standard strongly discourages the manual configuration of duplex mode for a port (as would be possible using Advanced User Parameters). Before manually configuring duplex mode for a PACSystems RX3i port using Advanced User Parameters (AUP), be sure that you know the characteristics of the link partner and are aware of the consequences of your selection. Setting both the speed and duplex AUPs on a PACSystems RX3i port will disable the port's auto-negotiation function. If its link partner is not similarly manually configured, this can result in the link partner concluding an incorrect duplex mode. In the words of the IEEE standard: "Connecting incompatible DTE/MAU combinations such as full duplex mode DTE to a half-duplex mode MAU, or a full-duplex station (DTE or MAU) to a repeater or other half duplex network, can lead to severe network performance degradation, increased collisions, late collisions, CRC errors, and undetected data corruption."
Use AUPs to specify non-default Station Manager password	End-users can utilize an AUP file to set their own non-default password for Station Manager operations. GE Intelligent Platforms recommends that our customers use this functionality in their applications.

Energy Pack

The CPE305 preserves user memory using an Energy Pack without the need to periodically replace batteries. An IC695ACC400 Energy Pack powers the CPU long enough for the CPU to write its user memory contents to the CPU's non-volatile storage during a system power loss. For details on the Energy Pack, refer to the datasheet GFK-2724.

Energy Pack Operational Notes

The %S0014 (PLC_BAT) system status reference indicates the Energy Pack status as follows:

0 Energy Pack is connected and functioning.

1 Energy Pack is not connected or has failed.

Note: When the Energy Pack is powered up for the first time, or is in a system that has been powered down long enough to completely discharge the Energy Pack, it may require a few seconds for it charge to its operating level. The CPU's STATUS LED will blink green during this time.

Note: Because the Time of Day (TOD) clock is powered by the Real Time Clock battery, removal of the Energy Pack does not cause the CPU to lose the TOD value.

Power up characteristics

The Conditional Power-up From Flash feature works the same as in previous Rx3i CPUs: that is if the configuration is configured for "Conditional – Flash" and the Energy Pack is disconnected or has failed, the contents of flash will be loaded into RAM at power up. The CPU's logic and configuration source and operating mode at power-up are in accordance with the tables on pages 4-14 and 4-15 of GFK-2222, where "memory not preserved" means that the Energy Pack is not connected or not working. The contents of those tables apply as follows:

- All entries in the "Logic/Configuration Source and CPU Operating Mode at power-up" table which address "Logic/Configuration Power-up Source in User Memory" apply to Logic/Configuration as if there were a battery.
- The condition of "Memory not preserved (i.e., no battery or memory corrupted)" is created on a CPE305 by power cycle with the Energy Pack removed.
- The condition of "No configuration in User Memory, memory preserved" is created on a CPE305 by clearing configuration (or never downloading configuration), and then cycling power with the Energy Pack connected.
- The conditions for Logic/Configuration source of "Always Flash," "Conditional Flash" and "Always RAM" are created by setting the appropriate configuration setting in the CPE305 and cycling power with the Energy Pack connected.
- User memory is preserved only if the Energy Pack is connected (and charged) at power-down. Similarly, user memory is preserved only if the Energy Pack is present at power-up.
- The user memory is preserved on a CPE305 by an Energy Pack connection at the instant of power-down and the instant of power-up. Removing or reconnecting the Energy Pack while the CPE305 is not powered has no effect on the preservation of user memory.

Energy Pack Replacement

If an Energy Pack fails, you can replace it with a new unit while the CPU is in operation. When an Energy Pack is replaced, the new Energy Pack must charge. If a loss of power occurs while the Energy Pack is disconnected or before it is fully charged, a memory loss may occur.

General Conditions of Safe Use

This product is intended to be for use with the RX3i system. Its components are considered open equipment [having live electrical parts that may be accessible to users] and must be installed in a protective enclosure or incorporated into an assembly that is manufactured to provide safety. As a minimum, the enclosure or assembly shall provide a degree of protection against solid objects up to 12mm (e.g. fingers). This equates to a NEMA/UL Type 1 enclosure or an IP20 rating (IEC60529) providing at least a pollution degree 2 environment.

Installation in Hazardous Areas

The following information is for products installed in Class 1 Division/Zone 2 environments:

- THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS 1, DIVISION 2 GROUPS A B C D OR IN ZONE 2 AREAS WHEN INSTALLED IN A MINIMUM IP54 RATED ENCLOSURE.
- 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.
- ⚠ WARNING - EXPLOSION HAZARD - USB PORT IS ONLY FOR USE IN NONHAZARDOUS LOCATIONS, DO NOT USE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.