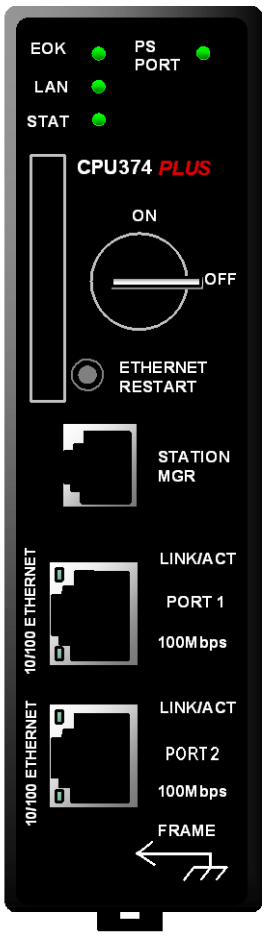
GFK-2123AA
July 2013

The Series 90*-30 CPU374 *PLUS* provides a built-in enhanced Ethernet interface that provides TCP/IP communications with:

- Series 90, PACSystems, and VersaMax PLCs
- Host computers running the Host Communications Toolkit or CIMPLICITY software
- Computers running the TCP/IP version of the programming software



CPU Features

- High speed Boolean and non-Boolean processing provided by a 586-class 133MHz processor
- Two Ethernet ports: 10/100 Mbytes (one IP address) with a built-in, auto-sensing Ethernet switch
- Support for EZ Store Device allows you to download a program without a PC
- 240KB of user memory

Key Ethernet Features

- Full PLC programming and configuration services
- Periodic data exchange using Ethernet Global Data (EGD) and EGD commands to read and write PLC and EGD exchange memory over the network
- TCP/IP communication services using SRTP
- Support for SRTP Client (Channels)
- Modbus/TCP Server, supporting Modbus Conformance classes 0, 1, and 2.
- Modbus/TCP Client, supporting Modbus Conformance classes 0, 1, and Function Codes 15, 22, 23, and 24 for Conformance class 2.
- Remote PLC monitoring from a web browser
- Comprehensive station management and diagnostic tools

Ordering information

Description	*Catalog Number*
Series 90-30 CPU374 *PLUS*	IC693CPU374
Auxiliary Battery Module	IC693ACC302
High Capacity Power Supplies	
120/240 VAC/125 VDC, 30W	IC693PWR330
24 VDC, 30W	IC693PWR331
12 VDC, 30W	IC693PWR332
E-Z Program Store Device	IC200ACC003

The CPU374 *PLUS* requires a high capacity power supply.

Because the built-in battery is limited to 1.5 months of continuous power outage, an IC693ACC302 external battery is recommended.

* indicates a trademark of GE Intelligent Platforms, Inc. and/or its affiliates. All other trademarks are the property of their respective owners.

IC693CPU374 PLUS Specifications

Controller Type	Single slot CPU module with embedded Ethernet Interface
Processor	
Processor Speed	133 MHz
Processor Type	AMD SC520
Execution Time (Boolean Operation)	0.15 μsec per Boolean instruction
Type of Memory Storage	RAM and Flash
Memory	
User Memory (total)	240KB (245,760) Bytes
Note: Actual size of available user program memory depends on the amounts configured for %R, %AI, and %AQ word memory types.	
Discrete Input Points - %I	2,048 (fixed)
Discrete Output Points - %Q	2,048 (fixed)
Discrete Global Memory - %G	1,280 bits (fixed)
Internal Coils - %M	4,096 bits (fixed)
Output (Temporary) Coils - %T	256 bits (fixed)
System Status References - %S	128 bits (%S, %SA, %SB, %SC - 32 bits each) (fixed)
Register Memory - %R	Configurable 128 to 32,640 words
Analog Inputs - %AI	Configurable 128 to 32,640 words
Analog Outputs - %AQ	Configurable 128 to 32,640 words
System Registers - %SR	28 words (fixed)
Timers/Counters	>2,000 (depends on available user memory)
Hardware Support	
Battery Backed Clock	Yes
Battery Back Up (Number of months with no power)	1.2 months for internal battery (installed in the power supply) 15 months with external battery (IC693ACC302)
Load Required from Power Supply	7.4 watts of 5VDC. High Capacity power supply required.
Hand Held Programmer	CPU374 does not support Hand Held Programmer
Program Store Devices supported	PLC Program Download Device (PPDD) and EZ Program Store Device
Total Baseplates per System	8 (CPU baseplate + 7 expansion and/or remote)
Software Support	
Interrupt Support	Supports the periodic subroutine feature.
Communications and Programmable Coprocessor Compatibility	Yes
Override	Yes
Floating Point Math	Yes, hardware floating point math
Communications Support	
Built-in Serial Ports	No serial ports on CPU374. Supports RS-485 port on power supply.
Protocol Support	SNP and SNPX on power supply RS-485 port
Built-in Ethernet Communications	Ethernet (built-in) – 10/100 base-T/TX Ethernet Switch
Number of Ethernet Ports	Two, both are 10/100baseT/TX ports with auto sensing. RJ-45 connection
Number of IP Addresses	One
Protocols	SRTP and Ethernet Global Data (EGD) and channels (producer and consumer); Modbus/TCP Client/Server
EGD Class II Functionality (EGD Commands)	Supports acknowledged singe command transfers (sometimes referred to as “datagrams”) and Reliable Data Service (RDS – a delivery mechanism to make sure a command message gets through once and only once).
SRTP Channels	Up to 16 SRTP Channels Up to 36 SRTP/TCP connections total, consisting of up to 20 SRTP Server connections and up to 16 Client Channels.
Web Server Support	Provides basic Reference Table, PLC Fault Table, and IO Fault Table data monitoring over the Ethernet network from a standard web browser
Environmental and Agency Specifications	
Refer to *Installation Requirements for Conformance to Standards,* GFK-1179	

Installation in Hazardous Areas

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

- 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.

Important Installation Instructions for Battery

Warning

If installing in a hazardous location, perform the following procedure in a system that is located outside the hazardous area, then remove the CPU and install it in the system that is located in the hazardous area.

To save battery life, do not connect the battery for the first time until the CPU is powered up. Install the CPU in the rack, power the rack on, wait for the CPU to complete its initialization, and then connect the battery. The battery can be attached to either of the two terminals in the battery compartment. Once that is done, the CPU can be powered down and normal battery back up operation will begin.

If replacing an existing battery, connect the new battery to the other connector before disconnecting the old battery.

CPU Functional Compatibility

IC693MDL730 Discrete Output Module Version Requirements	All IC693MDL730 modules used with a CPU374 PLUS *MUST* be version E or later. When Revision D or earlier modules are used the module may occasionally update the outputs incorrectly.
HHP Compatibility	The CPU374 does not support the Hand Held Programmer.
Programmer Version Requirements	Proficy* Machine Edition Logic Developer PLC 5.6 SIM 9 or later must be used to use Modbus TCP or to utilize the less restrictive sub-network mask. Proficy Machine Edition Logic Developer PLC 5.0 Service Pack 3 Hot Fix 3 or later must be used to configure Web Server support or to enable EGD Signatures. Machine Edition Logic Developer version 2.60 or later, VersaPro™ version 2.03 or later, or Control software version 2.50 or later must be used to configure and program the CPU374. (Note: The new features cannot be utilized with VersaPro or Control software).
C Toolkit Compatibility	Version 4.00 or later of the C toolkit must be used for C programming.
IC693CMM321 Ethernet Option Module Version Requirements	All Series 90-30 Ethernet Interface (IC693CMM321) modules used with this CPU should be updated to IC693CMM321 firmware release 1.10 or later.
FBC Compatibility	FIP Bus Controller version 3 or later is required for this CPU.
Power Supply Compatibility and Requirements	A CPU374 requires the use of a ***High Capacity Power Supply (IC693PWR330, IC693PWR331 or IC693PWR332).*** Power consumptions of the CPU374 and its supporting devices are listed below: ■ CPU374 requires 1.48A @ +5VDC (= 7.4 Watts). ■ If used, the converter in the IC690ACC901 serial cable assembly adds 100mA at 5VDC (=0.5 Watts). ■ If used, the IC690ACC900 RS-422/RS-485 to RS-232 converter adds 170 mA at 5 VDC (=0.85 Watts).
IC693ALG220/221 Analog Input Module Version Requirements	Series 90-30 CPUs 35x/36x/37x are not compatible with versions F and earlier of the IC693ALG220/221 Analog Input Modules. Version G or later of the IC693ALG220/221 must be used with these CPUs. If a version F or earlier IC693ALG220/221 module is used with a 35x/36x/37x CPU, the %AI values reported by the module may exhibit erratic behavior.
IC693PBM200 PROFIBUS Master Module Version Requirements	All IC693PBM200 modules used with a CPU374 ***must*** be updated to firmware version 1.16 or later. When earlier IC693PBM200 versions are used with CPU374, backplane communications errors and PLC faults occur frequently while the CPU is in RUN mode.
IC693PBS201 PROFIBUS Slave Module Version Requirements	All IC693PBS201 modules used with a CPU374 ***must*** be updated to firmware version 1.28.1 or later. Earlier IC693PBS201 versions have issues similar to IC693PBM200 versions earlier than 1.16.
PPDD Compatibility	The PLC Program Download Device, IC690ACC990-BC, is fully compatible with the CPU374/372 *PLUS*.

Ethernet Functional Compatibility

Subject	*Description*
Programmer Version Requirements	Proficy Machine Edition Logic Developer PLC 5.6 SIM 7 or later must be used to use Modbus TCP or to utilize the less restrictive sub-network mask. Proficy Machine Edition Logic Developer PLC 5.0 Service Pack 3 Hot Fix 3 or later must be used to configure Web Server support or to enable EGD Signatures.
CIMPLICITY® Plant Edition Version Requirements	CIMPLICITY Plant Edition 6.1 Service Pack 1a with Update 040204_s90tcp_6101 or Service Pack 2 or later must be used for Ethernet communications with CPU374 Release 12.0 or greater.
Name Resolution	Unlike the CPU364 (IC693CPU364), the CPU374 *PLUS* does not support Name Resolution.

Operational Notes	*Description*
LAN Must be Tree, Not Ring	The two Ethernet network ports on the Ethernet Interface must not be connected, directly or indirectly, to the same network device. 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 Ethernet modules will continually reset.
Proper IP Addressing is Always Essential	The CPU's embedded 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 PLC and other nodes on the network. Refer to *TCP/IP Ethernet for Series 90-30 CPU374 PLUS User's Manual,* GFK-2382 for important information on IP addressing. When storing a new HW configuration to the PLC, be sure that the HW configuration contains the proper Ethernet addressing data (IP Address, Subnet Mask, and Gateway IP Address) for the PLC. **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 ME Inspector window. Storing a HW Configuration whose Ethernet addressing data contains an IP Address that is different from the PLC target IP address will change the IP address used by the target PLC 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 CME 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 default (0.0.0.0) or incorrect Ethernet addressing data to the PLC will result in loss of the Programmer connection and will require manual corrective action as described above.
Reporting of Duplicate IP Address	The CPU374 does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network.
Multiple Zero-Period EGD Exchanges May Not Produce Similar Numbers of Samples	If more than one EGD produced exchange is configured for a production period of zero, the exchanges may not produce similar numbers of samples. Due to the way that scheduling occurs when multiple exchanges are scheduled "as fast as possible", some zero period exchanges may produce significantly more samples than others. For more consistent EGD production, configure the produced EGD exchanges with non-zero production periods.
Changing IP Address While SRTP Connection Open May Generate Log Events	Open SRTP Server connections established with a remote SRTP client are not terminated as expected when the PLC's IP address is changed (typically by storing a new HW Configuration). A Series 90 SRTP client ("SRTP channels") reports either a 9690H or 0190H status; the SRTP connection may remain open until the connection is terminated as a result of a client timeout.
AUP Parameter Should Not be Changed	The Advanced User Parameter "wsnd_buf" should not be changed by the user. Changing the value of this parameter may cause the LAN led to go out and the Ethernet Interface to drop connection.
Heavy Load Can Block Station Manager	As explained in the *TCP/IP Ethernet Station Manager Manual*, GFK-2383, Chapter 1, a heavy EGD and/or SRTP load can block Station Manager operation.
Web Server Browser Restrictions	Internet Explorer version 4.0 running on Windows 98 will give an error when the reference table web page is accessed. Web Server operation has been verified with Internet Explorer version 5.0
Very Heavy EGD Production/Consumption at Server May Cause EGD Command Timeouts	Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the "gcmd_pri" Advanced User Parameter to 2 (see GFK-2382, Appendix A). Note that by doing so, EGD exchange production may be delayed.

Operational Notes	*Description*
SRTP Application Timeouts Must Accommodate Network Connection Overhead	The application timeouts within SRTP Channels also include the time needed to establish and maintain the underlying network and SRTP connection. Examples are establishing the TCP connection for a new channel, establishing communication with the remote device, and TCP retransmissions during Channel operations. If the time needed for TCP connection establishment or maintenance exceeds the user-specified channel application timeout values, an application timeout will occur. Channel application timeouts are temporary errors; the channel continues to run.
AUP Parameter "gcmd_pri" Does Not Affect the Behavior of EGD	The Advanced User Parameter “gcmd_pri” does not have the desired effect in the CPU374. Under sufficiently heavy EGD data exchange load, EGD commands may still be blocked from execution.
Firmware Update Failure with “Reset of Daughter Board” Fault	Some revision -EK and -EL units may exhibit random "reset of daughter board" faults in the PLC Fault Table. These units may fail during a firmware update. Customers who experience this issue should contact Technical Support.
SRTP channel data coherency for atomic operations is limited to 256 bytes (128 words).	For SRTP channel transfers, data lengths beyond 256 bytes are not guaranteed to have coherency as they are not guaranteed to be all written at once. The channel status bits or RDCS status should be used to determine when the entire transfer is completed.
Requests for invalid memory types on remote servers can return different error codes.	The error code generated when accessing an invalid memory type on a remote server for a CPU374 *PLUS* is not the error code expected. The expected error code is 8390, however a 9590 error code is received.
Ethernet Programmer May Briefly Lose Communications When Configuration Stored	Storing a PLC configuration containing Ethernet configuration values may require the Ethernet interface to restart itself in order to use any changed configuration values. When the Ethernet interface restarts, an Ethernet PLC Programmer briefly reports a loss of communications. If this occurs, the Ethernet Interface will post two or more PLC faults with the text “LAN system-software fault; resuming”, and fault-specific data starting with 080008 and/or 080042. In addition, faults with text “Bad remote application request; discarded request” (1B0021) and “Local request to send rejected; discarded request” (110005) may occur. When these faults occur, the STAT LED on the CPU374 is turned off to indicate posting of faults to the PLC fault tables. In some cases, a 10-second delay may occur before loss of communications is detected. Normal operation resumes once the Ethernet Interface restarts. The STAT LED can be reset using the Station Manager OK command. When the PLC configuration is stored from an Ethernet PLC Programmer, the communications loss occurs immediately after successful completion of the store. Attempts to store configuration plus logic and/or reference tables in one operation can fail. However, storing configuration separately from logic or reference tables always succeeds.
Store of Program or Reference Tables to Flash May Cause Loss of Ethernet Communications	While storing the PLC program, configuration, and/or reference tables from PLC RAM memory into Flash memory or to the EZ Program Store device, Ethernet data communications may be lost. Normal data transfers are temporarily suspended during a Flash or EZ Program Store device store operation. In these cases, Ethernet data transfers (such as used by an Ethernet PLC Programmer connection) will fail when the store exceeds the 16-second maximum period allowed for completion. Upon completion of the store operation, normal operation will resume. If a timeout occurs during a store to Flash or EZ Program Store device, the timeout value should be increased in the programming software being used. See the User’s Manual for the programming software for more details.
COMMREQ status word returns AA90 (attempt to establish a TCP connection with a remote server failed) error code	For connections with Ethernet channels (Modbus/TCP or SRTP), if the connect COMMREQ or subsequent RDCS command returns an AA90 error code in the COMMREQ status word, the connection attempt should be tried again within user logic.
COMMREQ status word returns 8890 (invalid channel number) error code	If the connect COMMREQ for a Modbus/TCP client connection returns a successful status (1) but subsequent COMMREQs on the connection result in an 8890 status, the connection should be tried again within user logic. Subsequent COMMREQs on the newly re-opened connection should succeed.

Operational Notes	*Description*
Station Manager RMDIR (remove directory) Commands	Issuing the Station Manager command *RMDIR dir1/dir2* does not result in *dir2* being removed. Instead, the error "RMDIR failed, dir1/dir2 does not exist" is returned. As a workaround, use "*CD dir1*" to reach the subdirectory before issuing "*RMDIR dir2*".
Client Channels TCP Resource Management	There is a period of time that the OS Network stack hangs on to the TCP resources associated with a connection after it is closed. It applies to the initiator of the close, which is almost always the client side. This time is referred to as the "TCP Linger Period". Once the TCP Linger Period expires (60 seconds in the current OS implementation), the TCP resources are released. Application developers using client channels need to be aware of this behavior when designing their logic. There are a finite number of TCP resources allocated to client channels, and if channel connections are brought up and down so fast that these resources are depleted, then the application may have to wait until a TCP resource frees up in order to establish another client channel (a COMMREQ Status of 0xA890 is returned if no TCP resources are currently available; application should wait and retry again). SRTP Client Channels provides features that help you preserve TCP connections. These include a "period time" where one can establish an SRTP Channel and specify the channel to run at a given interval, or run as fast a possible. One can also specify a number of iterations, or run forever. Additionally, SRTP Channels allows re-tasking of an active channel to the same remote device, where the parameters of an active channel, such as the channel command type (Read/Write), number of repetitions, time periods, local memory address, remote memory address, etc. can be changed. SRTP Channels also allows re-tasking of an active channel to a different remote device (changing the remote device's IP address, etc.). However, re-tasking to a different remote device will neither conserve TCP connections, nor save on the time it takes to create a channel.

Product Documentation

Series 90-30 PLC Installation and Hardware Manual, GFK-0356

Series 90-30/20/Micro PLC CPU Instruction Set Reference Manual, GFK-0467

TCP/IP Ethernet for Series 90-30 CPU374 User's Manual, GFK-2382

TCP/IP Ethernet for Series 90-30 CPU374 Station Manager Manual, GFK-2383