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PLC CPUs

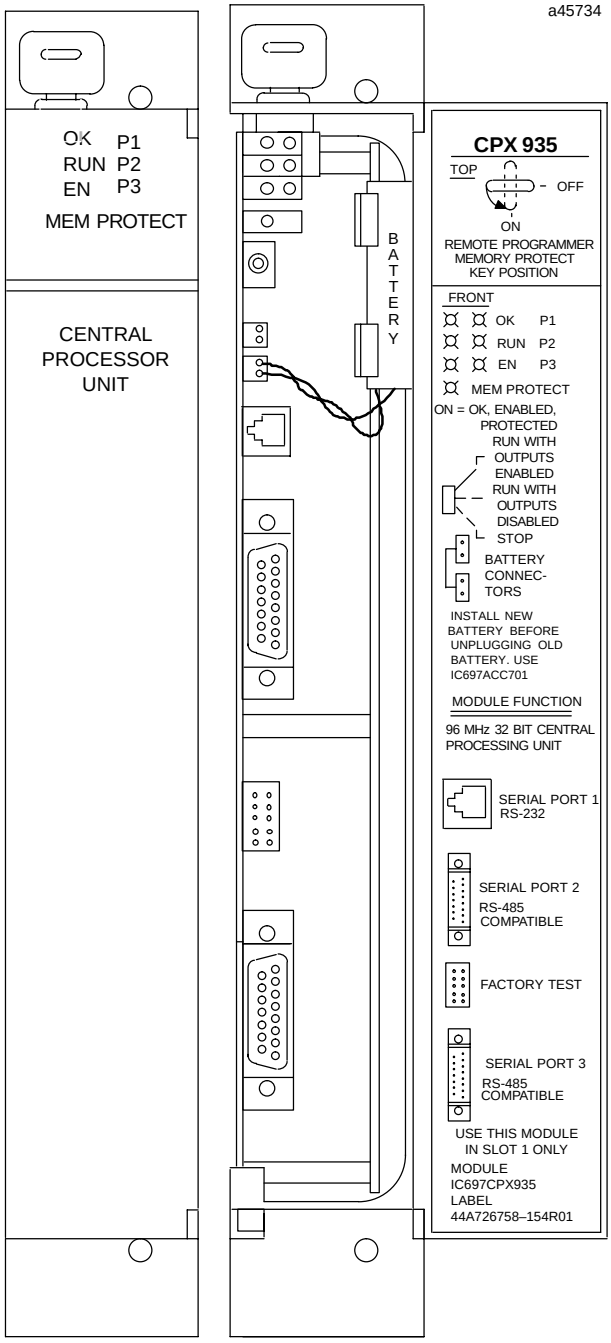
IC697CPX935

GFK-1435E
November 1999

96 MHz, 32-Bit, Floating Point, 1 Mbyte Fast Memory Central Processing Unit

Features

- Single slot CPU with three serial ports
- Provides 1 Mbyte of battery-backed memory in the same slot
- Contains 256K of non-volatile user flash memory
- Supports BMA in release 7.92 and later
- Supports floating point calculations
- 12K inputs and outputs (any mix), and up to 8K analogI/O
- 0.4 microseconds per boolean function
- 96 MHz, 80486DX4 microprocessor
- Supports IC66 (can be IC660 or IC661) and IC697 I/O
- Programmed by MS-DOS® software products, or Windows® based software products running on Windows® 95 or Windows NT® over Ethernet TCP/IP or through an SNP port
- Configurable data and program memory
- Battery-backed calendar clock
- Three position operation mode switch
- Password controlled access
- Remote programmer keyswitch memory protection
- Seven status LEDs
- Software configuration (No DIP switches or jumpers)
- Reference information inside front door
- In-system upgradable firmware



Functions

The CPX 935 is a single slot PLC CPU that is programmed and configured by MS-DOS or Windows based programming software to perform real time control of machines, processes, and material handling systems. It communicates with I/O and smart option modules over a rack mounted backplane using the VME C.1 Standard format.

Supported option modules include LAN Interface modules, Programmable Coprocessor, Alphanumeric Display Coprocessor, Bus Controller for IC660/661 I/O products, Communications modules, I/O Link Interface, and all of the IC697 family of discrete and analog I/O modules.

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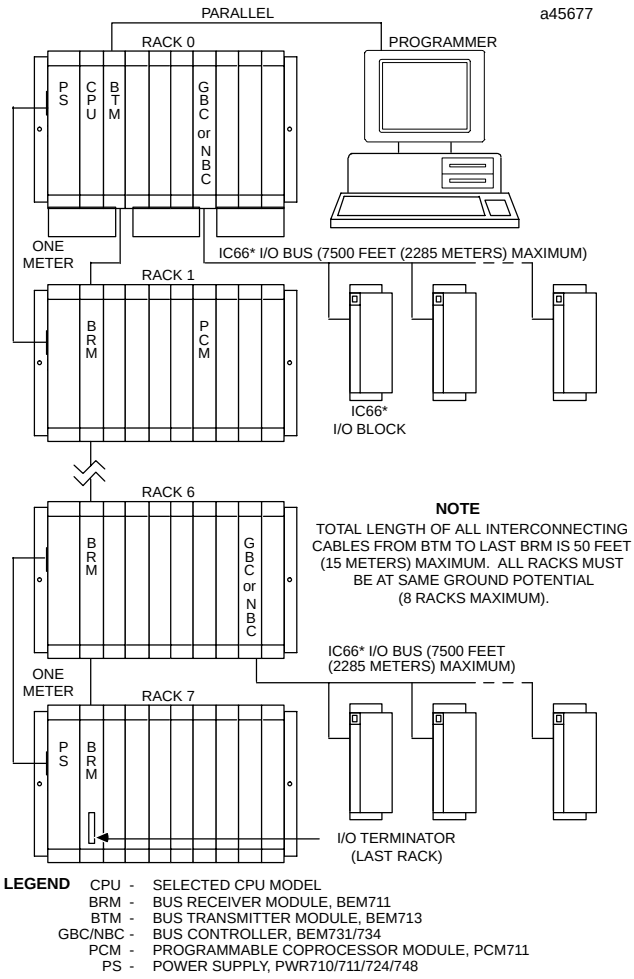


Figure 1. PLC System Configuration Example

User RAM Memory

The CPX935 has a built-in memory board with 1 Mbyte of battery-backed Fast CMOS RAM memory for user data (program, configuration, and register data) storage.

User Flash Memory

The CPX935 has 256K of built-in, non-volatile flash memory for user data (program, configuration, and register data) storage. Use of this flash memory is optional.

Firmware Storage in Flash Memory

This CPU uses non-volatile flash memory for storing the operating system firmware. This allows firmware to be updated without disassembling the module or replacing EPROMs. The operating system firmware is updated by connecting a PC compatible computer to the module's serial port and running the software included with the firmware upgrade kit.

Operation, Protection, and Module Status

Operation of this module can be controlled by the three-position RUN / STOP switch or remotely by an attached programmer and programming software. Program and configuration data can be locked through software passwords or manually by the memory protect keyswitch. When the key is in the *protected* position, program and configuration data can only be changed by a programmer connected parallel only (to the Bus Transmitter module). The status of a CPU is indicated by the seven green LEDs on the front of the module.

Operating Temperature

The CPX 935 requires forced air cooling for proper operation in ambient temperatures greater than 50°C (122°F). A fan capable of 70 CFM (including filters) should be located beneath slot 1 of the rack containing the CPU.

Fan assemblies (IC697ACC 721, IC697ACC724, and IC697ACC744) can be ordered for direct mounting on the IC697 rack. Refer to the applicable *Programmable Controller Installation Manual* for detailed information.

Installation

It is the responsibility of the OEM, system integrator, or end user to properly install the PLC equipment for safe and reliable operation. Product manuals provide detailed information about installation, startup, and proper use of the PLC equipment. The installation manual, shipped with your PLC programming software, describes how to properly install the equipment.

If the PLC installation must comply with supported standards, such as FCC or CE Directives, please refer to the *Installation Requirements for Conformance to Standards*, shipped with the PLC programming software, for additional guidelines.

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- Installation should not be attempted without referring to the applicable *Programmable Controller Installation Manual.*
- Connect the battery to either of the battery connectors on the module (see Figure 2).
- Put the toggle switch in the STOP position.
- Put the keyswitch in the *Memory Protection OFF* position.
- Make sure that rack power is off.
- Install the CPX 935 module in slot 1 of rack 0 (see Figure 1).
- Turn on power.

The module should power up and the top left (**OK**) LED should blink. When the diagnostics have completed successfully, the top left LED stays on and the second (**RUN**) and third (**EN**) LEDs are off. The fourth (bottom left) LED (**MEM PROTECT**) is off if the keyswitch is in the OFF position. The CPU is now ready to be programmed (if connected parallel, the CPU can be programmed regardless of key position).

After the program has been verified the toggle switch can be moved to the appropriate operation mode position; RUN WITH OUTPUTS ENABLED, RUN WITH OUTPUTS DISABLED, or STOP. The seven LEDs indicate the position of the toggle switch, memory protection status, status of serial port activity, and the state of the program.

Programmer Connection, Parallel

For a parallel interface (MS-DOS programmer only) the programmer is connected to the top port on the Bus Transmitter Module (IC697BEM713) as shown in Figure 1. Consult the applicable *Programming Software User's Manual* for a description of programming functions.

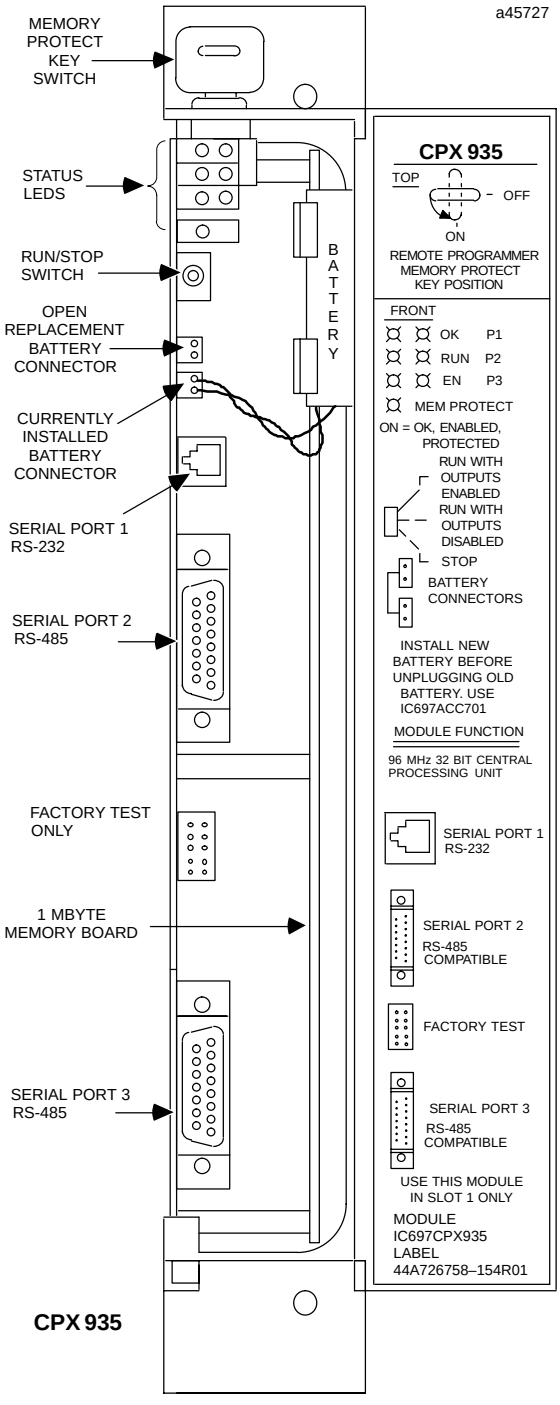


Figure 2. CPX 935 - Location of Major Features

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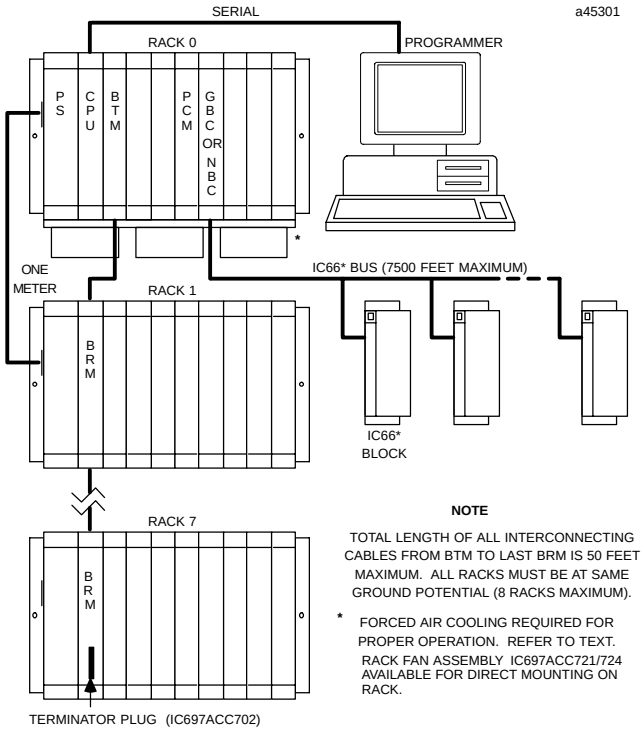


Figure 3. System Configuration, Serial Connection to Programmer

Programmer Connection, Serial Ports

The CPX 772 has three independent, on-board serial ports. These ports, accessed by connectors on the front of the module, are used for serial interface to a programming computer or other serial devices.

Starting with Firmware Release 8.00, support for program Load/Store operations and Datagrams was added to Ports 1 and 2. Also, Break-Free SNP was added as the default protocol for Ports 1 and 2 in Firmware Release 8.00. For details, see the *Important Product Information* sheet that ships with the module.

Protocols Supported

Protocol	Port 1	Port 2	Port 3
SNP (Slave)	Yes	Yes	Yes
Break-Free SNP (Slave)	Yes	Yes	No
SNPX	No	No	No
RTU	No	No	No

- **Port 1**, the top port, is RS-232 compatible. It has a 6-pin, female, RJ-11 connector, which is similar in appearance (although larger) to modular jacks commonly used for telephones and modems.

Table 10-1. Port 1 RS-232 Signals

Pin Number	Signal Name	Description
1 *	CTS	Clear To Send
2	TXD	Transmit Data
3	0V	Signal Ground
4	0V	Signal Ground
5	RXD	Receive Data
6	RTS	Request to Send

** Pin 1 is at the top of the connector as viewed from the front of the module.*

- **Port 2**, the center port, is RS-485 compatible and is optocoupler isolated. Port 2 has a 15-pin, female D-connector.

Table 10-2. Port 2 RS-485 Signals

Pin Number	Signal Name	Description
1*	Shield	Cable Shield
2	NC	No Connection
3	NC	No Connection
4	NC	No Connection
5	+5VDC	Logic Power **
6	RTS(A)	Differential Request to Send
7	SG	Signal Ground
8	CTS(B')	Differential Clear To Send
9	RT	Resistor Termination
10	RD(A')	Differential Receive Data
11	RD(B')	Differential Receive Data
12	SD(A)	Differential Send Data
13	SD(B)	Differential Send Data
14	RTS(B')	Differential Request To Send
15	CTS(A')	Differential Clear To Send

**Pin 1 is at the bottom right of the connector as viewed from the front of the module.*

*** Note that Pin 5 provides Isolated +5 VDC power (100 mA maximum) for powering external options.*

- **Port 3**, the bottom port, is also RS-485 compatible, but is not isolated. Port 3 has a 15-pin, female D-connector. Pin-out information can be found in the *IC697 PLC Installation Manual.*

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Three of the LED indicators on the front of the CPX935 provide the status of serial port activity on the CPU without having a terminal connected. The LEDs are labeled as P1, P2, and P3 to correspond to the applicable port.

The connection from a CPU serial port to the serial port on a programming computer or other serial device requires a serial cable and, for Ports 2 and 3, a converter. This connection can be made with the IC690ACC901 cable kit (includes cable and miniconverter) or you may build cables to fit the needs of your particular application. See the *IC697 PLC Installation Manual* for more information on serial communications, cables, and converters.

Programmer Connection, Ethernet TCP/IP

Connecting your programmer via an Ethernet TCP/IP network requires installation of an Ethernet Interface module in the PLC. This can be either the Ethernet Controller, IC697CMM741, or Ethernet Interface (Type 2), IC697CMM742. Before connecting your programmer and PLC to the Ethernet TCP/IP network you must set the IP address in the Ethernet Interface. After setting the IP address, connect the PLC and the programmer running Windows software to the Ethernet Interface. For more detailed information on the programmer connection via Ethernet TCP/IP, refer to the *TCP/IP Ethernet Communications (Type 2) User's Manual*, and the Windows programming manual, GFK-1295.

Configuration

The IC697 CPU and I/O system is configured with MS-DOS or Windows based programming software, although the MS-DOS software does not support all features, such as Bulk Memory Area (BMA), which requires the Windows software version 2.2 or later. See the IPI shipped with this module for programming software feature support details. There are no DIP switches or jumpers used to configure the system. The CPU verifies the actual module and rack configuration at power-up and periodically during operation. The actual configuration must be the same as the programmed configuration. Deviations are reported to the CPU alarm processor function for configured fault response. Refer to the applicable *Programming Software User's Manual* for a description of configuration functions.

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Battery

A lithium battery (IC697ACC701) is installed as shown in Figure 2. This battery maintains program and data memory when power is removed and operates the calendar clock. Be sure to install the new battery before removing the old battery. Specific indication of a low battery state is detailed in the applicable *Programmable Controller Reference Manual*.

Removing a Module

The instructions listed below should be followed when removing a module from its slot in a rack.

- Grasp the board firmly at the top and bottom of the board cover with your thumbs on the front of the cover and your fingers on the plastic clips on the back of the cover.
- Squeeze the rack clips on the back of the cover with your fingers to disengage the clip from the rack rail and pull the board firmly to remove it from the backplane connector.
- Slide the board along the card guide and remove it from the rack.

Table 1. Specifications for IC697CPX935 †

Battery: Shelf life	5 years at 20° C (68° F)
Battery: Memory retention	6 months nominal without applied power.
Current required from 5V bus	3.1 Amps nominal
Operating Temperature	0 to 60°C (32°F to 140°F); *70 CFM forced air required* 0 to 50°C (32°F to 122°F); *without forced air*
Time of Day Clock accuracy	" 3.5 seconds per day maximum
Elapsed Time Clock (internal timing) accuracy	" .01% maximum
Serial Ports **Port 1: RS-232 compatible** **Port 2: RS-485 compatible (optocoupler isolated)** **Port 3: RS-485 compatible (not isolated)**	Programmer Serial Attachment, or other serial devices Protocols supported: SNP Slave only
VME Compatibility	System designed to support the VME standard C.1

† Refer to GFK-0867B, or later for product standards and general specifications. For installations requiring compliance to more stringent requirements (for example, FCC or European Union Directives), refer to *Installation Requirements for Conformance to Standards.*

Table 2. Ordering Information

Description	Catalog Number
Central Processing Unit 96 MHz, 32-Bit, Floating Point, 1 Mbyte Fast Memory	IC697CPX935
Lithium Battery	IC697ACC701
Rack Fan Assembly, 120 VAC Rack Fan Assembly, 240 VAC Rack Fan Assembly, 24 VDC	IC697ACC721 IC697ACC724 IC697ACC744

Note: For Conformal Coat option, please consult the factory for price and availability.

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