Communications Modules

IC697CMM741

GFK-0532K
August 1997

Ethernet Controller

- Direct PLC attachment to IEEE 802.3 CSMA/CD LAN
- Standard 15-pin AUI port connection allows choice of 10Base5, 10Base2, 10BaseT, 10BaseF, or 10Broad36 medium with user-supplied 802.3-compatible transceiver
- For IC697 programmable controllers
- Occupies a single slot in PLC rack
- Software (separately licensed) is easily loaded or upgraded via RAM load
- Software is retained through power outages for a minimum of six months
- Alternative software packages provide:
  - TCP/IP communications
  - MMS/OSI communications
  - Full MS-DOS® or WIndows® programming and configuration services
  - Comprehensive station management and diagnostic tools

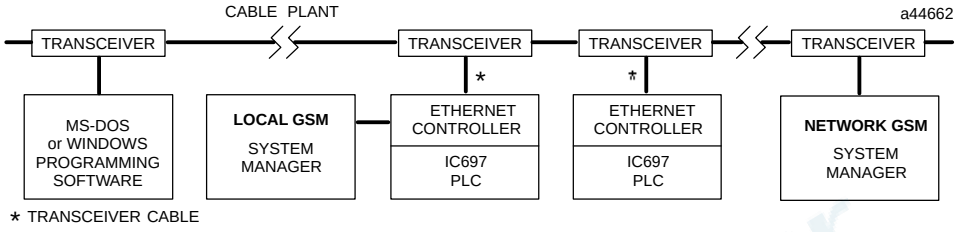


Figure 1. Ethernet Controller Connects the IC697 PLC to a 802.3 LAN

The Ethernet Controller is a member of the family of IC651 Factory LAN hardware and software products. The Factory LAN family of products provides high performance solutions for interconnecting automation controllers and for integrating them into multi-vendor networks.

The Ethernet Controller plugs into a single slot in an IC697 PLC rack and provides an 802.3-standard 15-pin D-connector for attachment of a user-supplied AUI (Attachment Unit Interface) or transceiver cable. The AUI cable connects to a user-supplied transceiver that is directly connected to the 10Mbps Ethernet network cable. The transceiver must be 802.3-compatible and must have the SQE option enabled.

Transceivers are commercially available to operate on a variety of 10Mbps media including thickwire coaxial cable (10Base5), ThinWire™ coaxial cable (10Base2), twisted pair (10BaseT), fiber optic (10BaseF), and broadband cable (10Broad36).

The Ethernet Controller is designed so the communications protocols which operate above the Ethernet data link layer are implemented in software. This permits the user to choose between two* alternative communication protocols by downloading the Ethernet Controller with the applicable Communications Software:

- **TCP/IP-Ethernet Communications Software** - Communicate with host computers and/or MS-DOS or WIndows Programmer using proprietary SRTP over a 4-layer TCP/IP (Internet) protocol stack; requires either a Local or Network Factory LAN System Manager (GSM) for configuration and downloading of Ethernet Controller software.
- **MMS-Ethernet Communications Software** - Communicate with host computers and/or MS-DOS or Windows Programmer using MMS (Manufacturing Message Specification - ISO 9506) on a 7-layer OSI protocol stack; requires GSM for configuration and downloading of Ethernet Controller software.

Figure 1 shows the general relationship between the Ethernet Controller, the local and network GSMs, and the MS-DOS or Windows Programming Software on Ethernet station.

* A third option, SRTP communications software (IC641SWP711) supports only communications with MS-DOS or WIndows Programmers using SRTP over a 4-layer OSI protocol stack; this Ethernet Controller software does not require configuration and can be downloaded directly from the MS-DOS or Windows Programer.

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® MS-DOS, Windows, Windows 95 , and Windows NT are registered trademarks of Microsoft Corporation.

Features of the Ethernet Controller

The Ethernet Controller is a single-slot module that is inserted directly into the IC697 CPU rack.

Connection to the Ethernet LAN is made via a transceiver cable to an external transceiver. The transceiver and cable are provided by the user. The transceiver is attached directly to the IEEE 802.3 network cable. The Ethernet Interface operates at 10 Mbps on the Ethernet LAN.

The Ethernet Controller uses three LEDs for indicating the status of the interface. A battery is provided to maintain the contents of Random Access Memory (RAM) over power outages.

The Ethernet Controller provides basic functions in firmware or Read Only Memory (ROM). This firmware includes self-test diagnostics and special software that allows you to configure and test your interface in the PLC and on the Ethernet LAN. It also allows you to load the communications software into RAM either from the GSM (serially or over the network), or from an MS-DOS or Windows OSI-Ethernet Programmer station.

The communications software is stored in RAM so you can upgrade communications software without replacing ROM chips. The battery maintains the contents of RAM over power outages.

"Soft Switches" are used to tailor the Ethernet Controller to your application. The MS-DOS or Windows Configuration Software package is used to configure the Ethernet Controller in the IC697 PLC, and to set the soft switches for the Ethernet Controller.

More detailed information about the Ethernet Controller, hardware installation, attachment to the Ethernet LAN, and Ethernet software follows this overview. For a complete description, refer to the User's Manual that applies to the software you choose to run on it. These related publications are listed on page 8.

IEEE 802.3 Media

The Ethernet Controller can operate on any of the following media with the appropriate user-supplied transceiver cable and transceiver. IEEE 802.3 specifies the definitive requirements of each medium.

10Base5 Coax: 10Base5 uses a 0.4 inch diameter 50-ohm coaxial cable. The maximum length of a cable segment (single span of cable) is 500 meters. The distance between any two stations must be a multiple of 2.5 meters. A maximum of 100 stations is allowed on a thickwire Ethernet segment.

10Base2 Coax: 10Base2 uses a 0.2 inch diameter 50-ohm coaxial cable. The maximum length of a thinwire cable segment is 185 meters. A maximum of 30 stations is allowed on a thinwire Ethernet segment.

10BaseT: 10BaseT uses a twisted pair cable of up to 100 meters in length between each node and a hub or repeater. Typical hubs or repeaters support 6 to 12 nodes connected in a star wiring topology.

10BaseF: 10BaseF has two variations that both use the same type of fiber optic cable: 10BaseFP can support up to 33 nodes at distances of up to 500 meters from a passive star; 10BaseFL supports up to 2000 meters between a node and a repeater (a multi-port repeater would thus constitute a star). Additionally, 10BaseFB provides a means of interconnecting (only) repeaters by up to 2000 meters of (the same) fiber optic cable.

Note

Various Ethernet baseband media can be interconnected by appropriate repeaters. Capabilities and limitations are defined in IEEE 802.3 Chapter 13, "System Considerations for Multi-Segment Networks".

10Broad36: 10Broad36 uses 75-ohm coaxial cable and CATV-like media components (taps, amplifiers, headend translators, etc.) to support hundreds of nodes at distances of up to 2800 meters. Broadband cannot be connected to baseband via repeaters. Broadband cable plant design and installation must be in accordance with IEEE 802.7 and requires special expertise. GE Fanuc recommends you contract professional specialists for these services. Consult your GE Fanuc sales representative or field service office for help in identifying local specialists.

Table 1. Ethernet Controller Indicators

Indicator	Status	Description
MODULE OK	ON	This LED is ON if the Ethernet Controller has passed diagnostics and its hardware is operating properly.
	OFF	It is OFF if the module fails a diagnostic test or if a fatal failure is detected while the board is running.
	BLINKING	This LED is blinking if the module is running diagnostics or is in Soft Switch entry state.
ONLINE	ON	This LED is ON when the Ethernet Controller is connected to and ready to communicate on the network.
	OFF	This LED is OFF when: - the station is not communicating in the network due to disconnection or a disruption of the cable. - the local station has malfunctioned. - the Ethernet Controller has been commanded not to enter the network or is in a state where network operation is inappropriate, such as Soft Switch Entry state or local loading.
	BLINKING	It is BLINKING when the module is transferring data on the network or loading over the network.
STATUS OK	ON	This LED is ON if the module is running without exception conditions.
	OFF	This LED is OFF if the module is running and detects an event that calls for supervisory attention. In this case you should connect the GSM and follow the instructions in Chapter 8 of the User's Manual to obtain further information.
	BLINKING	This LED is BLINKING if the module is loading or looking for a load source for the LAN Interfacesoftware.

Restart Button

The Restart button serves two functions: Restart, and Restart and Reload. The Restart button is inaccessible when the door to the Ethernet Controller is closed.

Restart: Pressing the Restart button (for less than 5 seconds) forces a restart of the Ethernet Controller. The power-up diagnostics run and the software on the module is restarted.

Restart and Reload: Pressing and holding the Restart button for 5 seconds or more requests a restart and reload of the Ethernet Controller. When the Restart button is pressed, all LEDs go out. After 5 seconds have elapsed, the STATUS OK LED will come ON to indicate that the Ethernet Controller will request a reload. Upon release of the button, the power-up diagnostics run and the Ethernet Controller requests a reload. See "Configuring and Loading the Ethernet Controller" for more information.

Note

Any data being transferred by the Ethernet Controller at the time of the Restart, or Restart and Reload, will be lost.

The Restart Button is not operable during the Ethernet Controller diagnostic phase. The Ethernet Controller is in diagnostic phase when the BOARD OK LED is BLINKING and the ONLINE and STATUS OK LEDs are OFF.

Battery

The battery and battery holder are located to the right of the LEDs. The battery connectors are located on the board between the Restart button and the 9-pin serial port connector.

When connected, the battery preserves the contents of RAM when there is no power to the board. The battery will maintain the RAM contents for a minimum of six months.

Nonetheless, certain occasional maintenance activities require that the user provide an external computer, such as a properly equipped IBM®-compatible personal computer.

The Ethernet Controller software includes the Factory LAN System Manager (GSM) to run on this external computer. The GSM is used to store on disk and to download the communications software to the LAN Interface directly from the COM1 port on the GSM computer to the Ethernet Controller 9-pin serial port.

The System Manager (GSM) also supports node configuration and downloading across the LAN from a centralized location. A network GSM computer must include an appropriate Ethernet Interface.

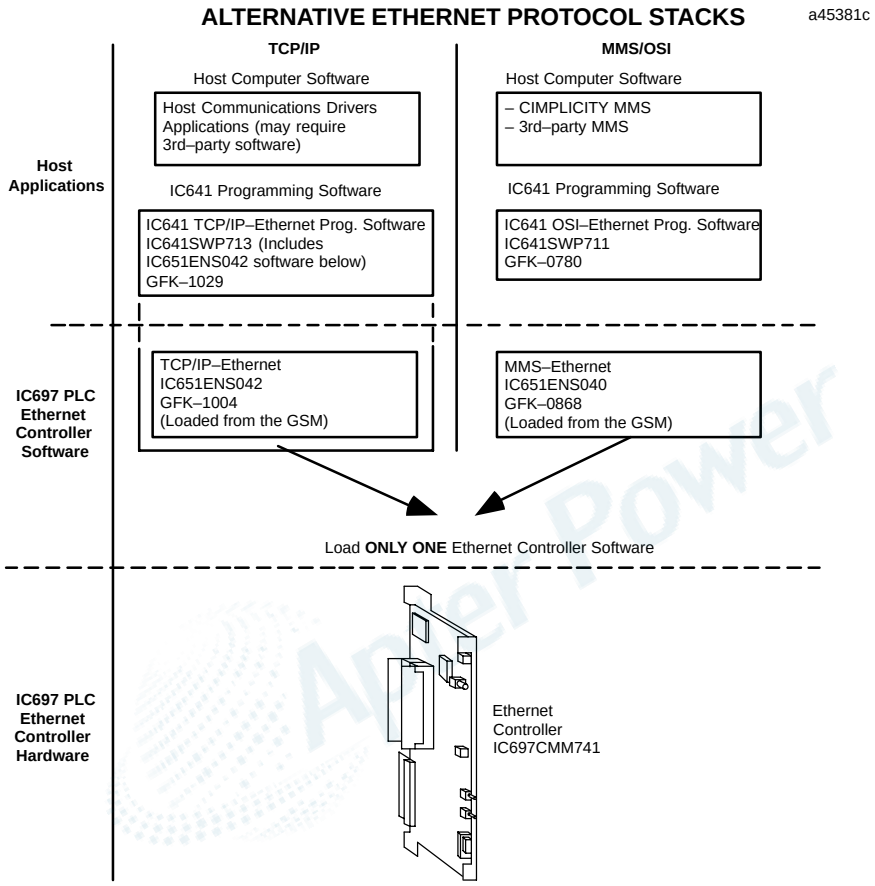


Figure 5. Alternative Ethernet Protocol Stacks for the IC697CMM741 Ethernet Controller

Related Publications (Factory LAN)

The following documents are related user documentation for the Factory LAN family of communication products.

- *TCP/IP-Ethernet Communications User's Manual*
- *MMS-Ethernet Communications User's Manual*
- *PLC Programmer TCP/IP-Ethernet User's Manual*
- *PLC Programmer-Ethernet User's Manual*
- *PLC Programming Software User's Manual*
- *Programmable Controller Reference Manual*
- *Programmable Controller Installation Manual*
- *Host Communications Toolkit C/C++ and Visual Basic User's Manual*
- *Host Communications Drivers for Microsoft Windows User's Manual*
- *TCP/IP Windows 95/Windows NT User's Manual Supplement*

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Table 4. Module Specifications †

Power Consumption (Typical):	Power consumption for the Ethernet Controller includes external RS-232 loads and the external transceiver. The module is powered by the rack. The power supply must provide +12 Vdc. +5 Vdc: 1.00 A +12 Vdc: 0.5 A
Memory Retention:	An on-board battery provides backup power (at least 6 months) when power is removed from the CPU rack containing the Ethernet Controller.
Physical Dimensions: Circuit Board:	6.3 x 9.19 inches (160 x 233 mm). Occupies a single slot in an IC697 PLC rack.
Mounting:	The module plugs into the IC697 CPU rack in the first available slot to the right of the CPU or BTM. (Bus Receiver Module if remote rack) - LED Indicators: MODULE OK, ONLINE, STATUS OK - Restart pushbutton and Battery connectors - front edge of board behind the hinged door
Connectors:	Serial and Transceiver Ports - Serial Port: 9-pin female, D-connector (to Local GSM) - Transceiver Port: 15-pin female, D-connector (to Ethernet transceiver cable and network)
InterfaceSpecifications:	LAN (to Network GSM and/or IC641-Ethernet Programmer) IEEE 802.2 Logical Link Control Class I IEEE 802.3 CSMA/CD Medium Access Control 10Mbps Serial Port: RS-232 DTE, 9600 bps Transceiver Port: Ethernet, IEEE 802.3 CSMA/CD, Transceiver SQE must be Enabled.

† 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 5. Ordering Instructions

Ethernet Controller	Ethernet Controller Module	IC697CMM741
TCP / IP Ethernet Controller Software	TCP / IP Software and Documentation for the PLC Ethernet Controller (Includes GSM).	IC651ENS042
TCP / IP Ethernet Programming Software and LAN Interface Software (MS-DOS version) (Windows version)	Software and Documentation for the IC641-TCP / IP Ethernet Programmer and Software and Documentation for the IC697 PLC (Includes IC651ENS042). TCP / IP Windows® 95 / Windows NT® MS-DOS® Box version of above.	IC641SWP713 IC641SWC716
MMS / OSI Ethernet Controller Software	MMS Software and Documentation for the PLC Ethernet Controller (Includes GSM).	IC651ENS040
OSI-Ethernet Programming Software	Software and Documentation for the IC641 OSI-Ethernet Programmer which includes SRTP-Ethernet software and documentation.	IC641SWP711

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

Replacement Parts

PLC Power Supply	120/240 VAC or 125 VDC Input, 100 watt Power Supply 24 VDC Input, 90 watt Power Supply 48 VDC Input, 90 watt Power Supply (One of these Power Supplies is a prerequisite, since +5 Vdc and +12 Vdc are required by the Ethernet Controller Module)	IC697PWR711 IC697PWR724 IC697PWR748
Battery	Lithium Battery, 3V, to protect LAN Controller memory from power loss	IC697ACC701