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In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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CIMSTAR	Modelmaster	PowerTRAC	VersaPoint
Field Control	Motion Mate	Series 90	VersaPro
GEnet	PACSystems	Series Five	VuMaster
		Series One	Workmaster

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Chapter 1 Introduction

This manual describes installation and operation of the Series 90™ -30 Ethernet Network Interface Unit (ENIU). The Ethernet NIU makes it possible to use Series 90-30 I/O remotely on an Ethernet network. Once set up by configuration, data exchange is completely automatic. System control can be provided by any GE Fanuc master device capable of exchanging Ethernet Global Data. The Ethernet NIU automatically provides the controller with status information in each exchange. The application program logic in the controller can monitor this status data, and issue appropriate commands to the Ethernet NIU.

This chapter describes the Ethernet NIU and provides an overview of how it it interfaces I/O modules to an Ethernet network. The following chapters explain how to implement an NIU application:

Chapter 2: Installation, summarizes basic installation steps and describes specific installation information for the Ethernet NIU and I/O Station.

Chapter 3: **Control, Status, and I/O Data**, describes the content of the data exchanged by the Ethernet NIU and the controller.

Chapter 4: Configuration, explains how to set up data exchange between the Ethernet NIU and one or two controllers.

Chapter 5 : Diagnostics, describes how to view and clear fault information for the Ethernet NIU.

Appendix A: Setting Up Output Defaults, describes how to set up optional default states or values for output data.

Additional Documentation

The Ethernet NIU and associated equipment will function as part of a larger control system. Additional documentation will be required to complete the system installation and configuration procedures. The following user manuals may be required:

***TCP/IP Ethernet Communications for Series 90 PLCs*, GFK-1541.** This manual provides details of Ethernet communications, and information about GE Fanuc PLC modules with Ethernet interfaces.

***Series 90-30 PLC Installation and Hardware Manual*, GFK-0356.** This manual describes Series 90-30 hardware components and provides basic hardware installation procedures.

***Series 90-30 Module Specifications*, GFK-0898.** This manual is a collection of detailed module datasheets.

TCP/IP Communications for Series 90 PLCs, Station Manager Manual, GFK-1186

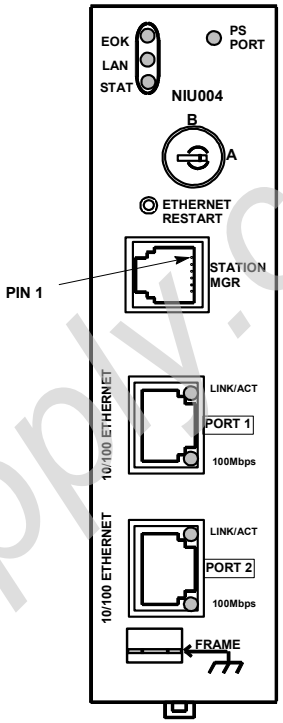
TCP/IP Communications for PACSystem, Station Manager Manual, GFK-2225.

These user manuals, module datasheets, and other important product documents are available online at www.gefanuc.com.

The Ethernet NIU

The Series 90-30 Ethernet Network Interface Unit (IC693NIU004) operates as an Ethernet Global Data (EGD) station, exchanging I/O data, status, and control data on an Ethernet network.

The Ethernet NIU has eight LEDs, an Ethernet Restart pushbutton, three port connectors, and a shield ground connection tab. The keyswitch on the front of the module is not used. The station address (MAC address) label is located on the outside of the module.



LEDs

There are eight LEDs on the ENIU. Four of these LEDs: EOK, LAN, STAT, and PS PORT give module status information. Four LEDS are associated with the two RJ-45 ports. The PS (Power Supply) PORT LED is not Ethernet related; it indicates the presence of serial traffic through the serial port of the NIU's power supply. Each of the three Ethernet LEDs (EOK, LAN, and STAT) can be ON, OFF, BLINKING slow, or BLINKING fast. They indicate the state of the Ethernet Interface, traffic at the Ethernet Interface (LAN LED), and that an exception event has occurred.

The seven Ethernet LEDs are briefly turned ON whenever a restart is performed in the Operational state by pressing and releasing the Restart pushbutton.

Each RJ-45 port has two green LED indicators on it. The upper indicator, labeled LINK/ACT, lights when the link is physically present and blinks when traffic is detected on the port. Traffic at the port does not necessarily mean that traffic is present at the Ethernet Interface, because the traffic can be going between the two ports of the switch. The lower indicator, labeled 100MBPS, lights if the network connection is 100Mbps.

Ethernet Restart Pushbutton

The Ethernet Restart pushbutton serves two functions: LED test and Restart. Pressing the Ethernet Restart pushbutton will disrupt Ethernet communications (including any communications to other devices attached to the embedded switch).

LED Test: Any time the Ethernet Restart pushbutton is pressed, the seven Ethernet LEDs flash ON. The operator should visually verify that the LEDs go OFF and then ON at this time. Then the Interface performs a restart.

Restart: Pressing the Ethernet Restart pushbutton requests a restart of the Ethernet Interface. When the Restart pushbutton is pressed, the seven Ethernet LEDs go out then flash ON, then power-up diagnostics run, and the software on the Interface is restarted into the Operational state.

RS-232, RJ-11 Port (Station Manager Port)

The RS-232, 6-pin, RJ-11 "phone jack" port is used to connect a terminal or terminal emulator to access the Station Manager software on the Ethernet Interface. A cable (IC693CBL316A) is needed to connect the terminal, emulator, or Software Loader to the Ethernet. The Station Manager feature can be used for testing and troubleshooting Ethernet communications. Its use is optional.

Ethernet Ports

There are two RJ-45 Ethernet ports on the NIU. Either or both of these ports may be attached to other Ethernet devices. Each port automatically senses the data rate (10Mbps or 100Mbps), duplex (half duplex or full duplex), and cabling arrangement (straight through or crossover) of the attached link.

Caution

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

The two Ethernet ports are 10-BASE-T/100-BASE-Tx Autonegotiating Full-Duplex ports, which provide direct connection to one or two 10-BASE-T/100-BASE-TX cat 5 (twisted pair) Ethernet LAN cables. Cables may be shielded or unshielded, and direct or cross-over. The ports are connected to an embedded switch. There is not a separate IP address for each port.

The LINK/ACT LED on each port goes on when a network link is established and blinks when data is being transferred through the port. The 100Mbps LED goes on if the network link has been established at 100 MBPS and goes off if the network link has been established at 10Mbps.

Shield Ground Connection Tab

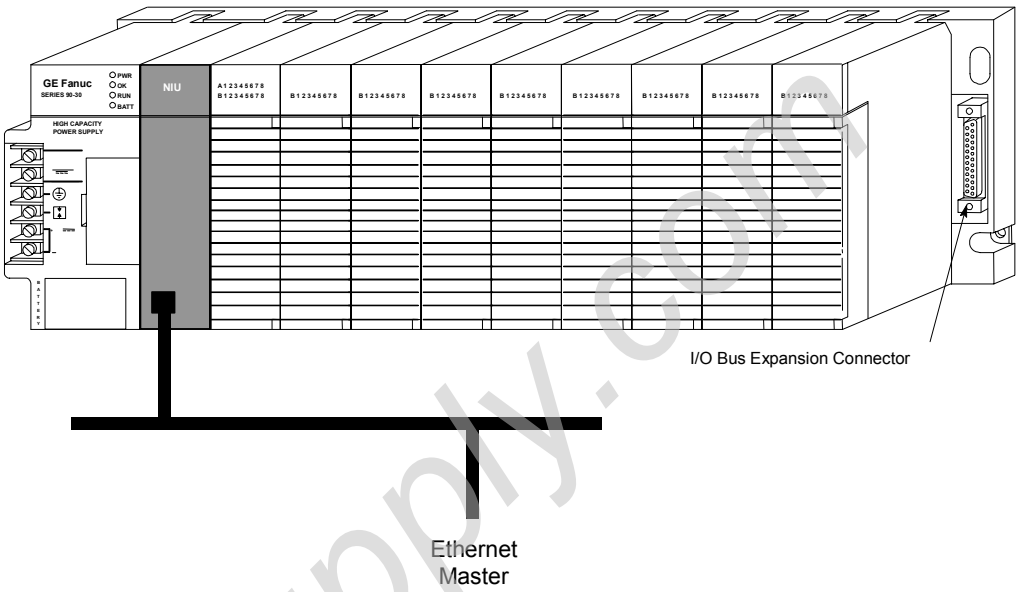
This tab is used to make the module's shield ground connection. A wire with the applicable terminal ends is supplied with the module for this purpose.

NIU Specifications

Type of Memory Storage	RAM and Flash
User Memory (total)	None
Discrete Input Points - %I	2,048 (fixed)
Discrete Output Points - %Q	2,048 (fixed)
Discrete Global Memory - %G	NA
Internal Coils - %M	4096 (fixed). Reserved for system use.
Output (Temporary) Coils - %T	256 bits (fixed). Reserved for system use.
System Status References - %S	128 bits (%S, %SA, %SB, %SC - 32 bits each) (fixed)
Register Memory - %R	9999. Reserved for system use.
Analog Inputs - %AI	1268
Analog Outputs - %AQ	512
System Registers - %SR	NA
Timers/Counters	NA
Battery Backed Clock	Use of a battery is recommended, if a battery is not present the ENIU will report a low battery fault. It can be used to maintain the clock, or to save a configuration stored in RAM, The clock is used to initialize the EGD timestamp clock of the Ethernet interface.
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 supplies required.
EZ Program Store Device	No
Total Baseplates per System	8 (CPU baseplate + 7 expansion and/or remote)
Programming Support	CIMPLICITY Machine Edition Logic Developer 4.0, service pack 3, with Special 4 or later.
Built-in Serial Ports	None. 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 Server and Ethernet Global Data (EGD)
Operating Temperature	0 to 60°C (32 to 140°F) ambient
Storage Temperature	-40°C to +85°C
Agency Approvals	UL508, C-UL (Class I, DIV II, A, B, C, D), CE Mark
Low Temperature (LT) Testing	Yes. The NIU is available for -40° to 60°C operation.

A Series 90-30 I/O Station

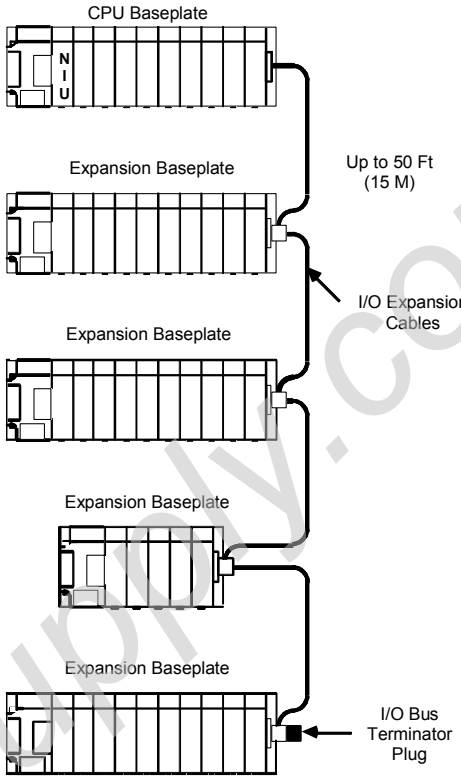
A set of Series 90-30 modules can be selected to suit the application, and connected as a slave on an Ethernet network via the NIU.



The NIU is located in the CPU baseplate's CPU slot. Together, the NIU and the modules selected for the application function as an I/O Station.

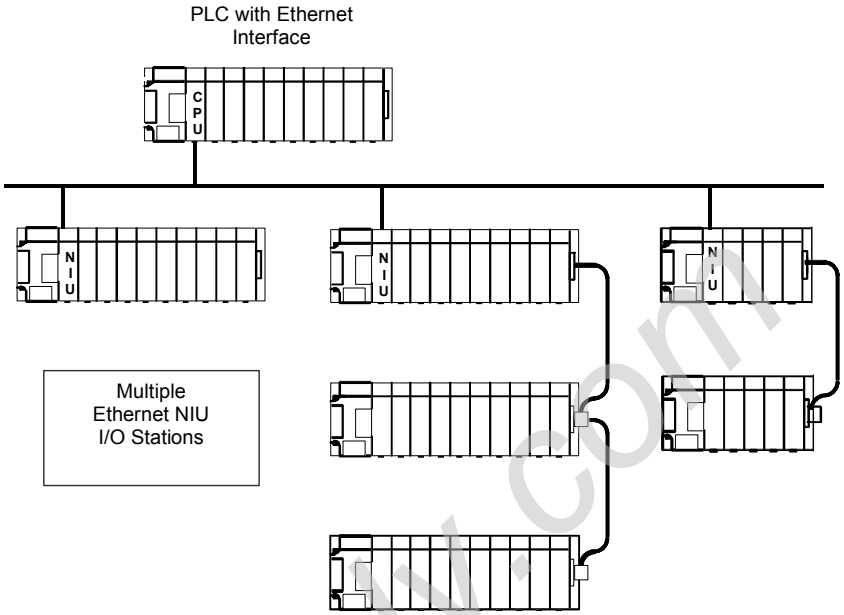
Modules and Racks in the I/O Station

The I/O Station can consist of just the CPU baseplate with NIU and modules,or a CPU baseplate and additional Expansion baseplates and Remote baseplates with modules as appropriate for the application.



- An Ethernet NIU can support up to 2048 discrete inputs, 2048 discrete outputs, 1268 analog inputs and 512 analog outputs. Additional I/O in the system can be located in other I/O Stations on the same network.
- There can be up to 50 feet (15 meters) of cable interconnecting Expansion baseplates and the CPU baseplate. The maximum number of Expansion baseplates in the I/O Station is 7. The actual number that can be used in an application depends on the amount of I/O capacity available on the network and the memory capacity of the CPU. Expansion baseplates are available in two versions; 5-slot (IC693CHS398) and 10-slot (IC693CHS392). All Expansion baseplates must be connected to a common ground, as described in the hardware installation manual.
- If a baseplate must be located more than 50 feet from the NIU, a Remote baseplate must be used. There can be up to 700 feet of cable connecting all baseplates in a system that uses Remote baseplates. Up to 7 Remote baseplates can be used in the system. Remote baseplates are available in two sizes; 5-slot (IC693CHS398) and 10-slot (IC693CHS392). The cable type recommended for use with Remote baseplates must be used throughout the system. I/O Stations on the Network

An Ethernet network can serve more than one NIU I/O Station.

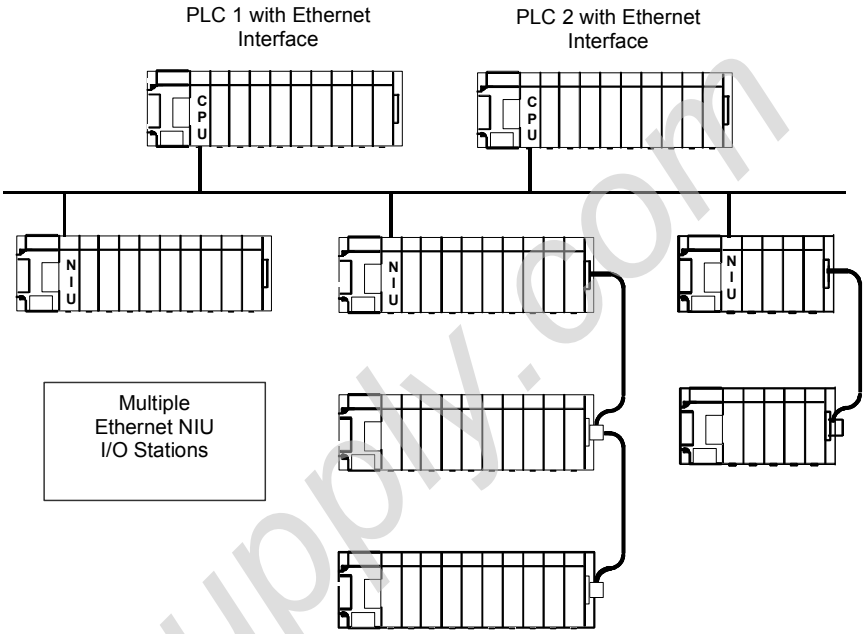


The Ethernet Interface in the master PLC sees all of the modules on the network without regard to their location in a specific I/O Station. That means each module must be assigned *unique* I/O references during configuration. The application program in the PLC sends output data on the Ethernet network, and each NIU consumes all of the output data. Each NIU then maps the output data to its own output memory. During the output portion of each NIU's I/O scan, it automatically sends the appropriate output data to the modules in its I/O Station.

Similarly, when the master PLC receives data from the NIUs, it maps the I/O data into PLC memory at the appropriate addresses. Therefore, it is important to be sure that all of the input references are unique to prevent input data being accidentally overwritten. See chapter 3 for more information about reference usage in the system.

Controllers on the Network

Many applications will use one master to control one or more I/O Stations on the network. However, it is also possible to have two masters, with one serving as the primary controller and the other as a secondary controller to provide backup operation should communications with the primary controller be lost. When using more than one master, it is important to balance the needs of the application against the greater complexity of coordinating the controllers.



Any GE Fanuc Ethernet interface master capable of exchanging Ethernet Global Data messages, such as a PAC Systems, Series 90-30 or Series 90-70 CPU, or PC Control can function as a controller for the Ethernet NIU. In a system that uses a primary and secondary controller, it is not necessary for the controllers to be the same type.

Communications Overview

The mechanism used for communications between the controller (or two controllers) and ENIUs on the network is Ethernet Global Data exchanges.

Ethernet Global Data provides periodic data transfer over an Ethernet network. It supports fast, efficient communications because it is connectionless and is not acknowledged.

Caution

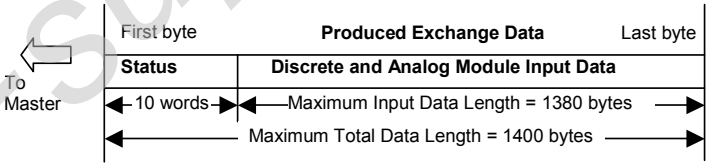
Ethernet Global Data (EGD) communication is connectionless and is not acknowledged. It is important to include error-checking and interlocking circuitry in the application to ensure the safety of personnel and equipment in the event that EGD data is lost. Failure to heed this warning could result in injury to personnel and damage to equipment.

In EGD communications, a device (called a producer) shares a portion of its memory contents periodically with one or more other devices (called consumers). This sharing of memory between devices is called an exchange.

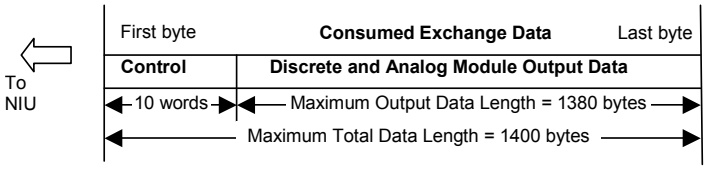
EGD Exchanges

An Ethernet NIU uses one EGD consumed data exchange and one produced data exchange. Each exchange begins with 10 words of NIU status data or CPU control data, followed by up to 1380 bytes of input or output data. The overall maximum length of a single exchange is 1400 bytes.

- The NIU's produced data exchanged consists of status data and the input data being sent to the controller.



- The NIUs consumed data exchange consists of control data and output data from the controller.



Chapter 3 describes the content of the status and control data, and explains how it can be used in the application. Chapter 4 describes how to configure EGD exchanges. If the system includes both a primary and secondary controller, EGD exchanges must be configured for both the primary and secondary controllers. In addition, if the system includes a secondary controller, the Ethernet NIU must be configured for two consumed exchanges. However, the ENIU uses data from only one controller at a time.

Station Manager Overview

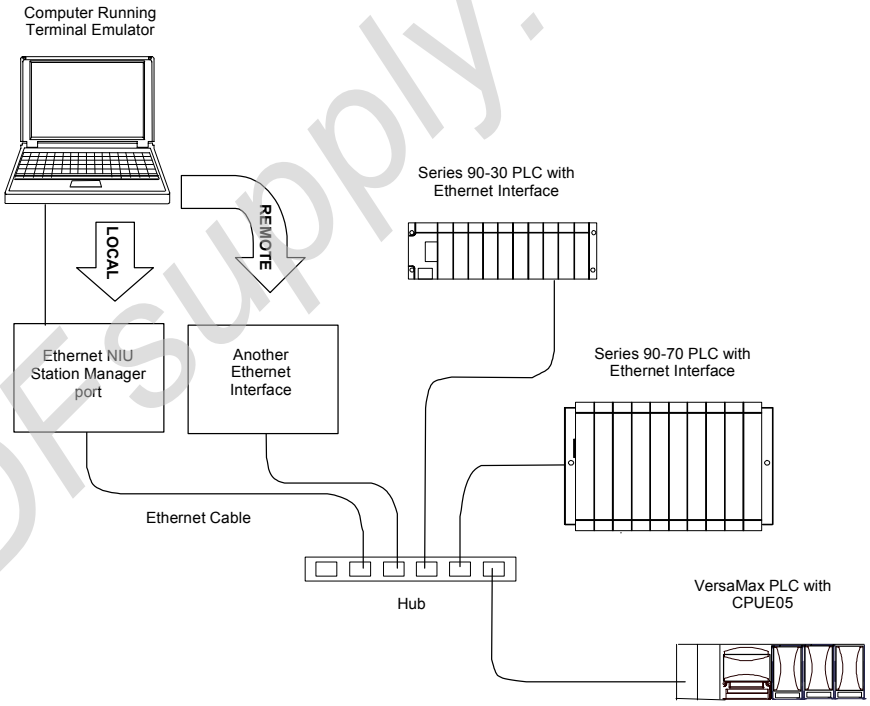
The Station Manager is a built-in function of an Ethernet interface device like the Ethernet NIU. The Station Manager can be used to monitor the Ethernet interface and check its operation on the network. If a problem occurs, the Station Manager can be used to locate the source.

The Station Manager function operates in background mode when the Ethernet interface is in its operational state. It cannot be accessed during Powerup Diagnostics or when using the Software Loader.

Using the Station Manager

The operator interface to the Station Manager function is a computer running a terminal emulator such as the Hyper Terminal application provided with Windows operating system software. An ASCII terminal can also be used.

The computer or terminal can be connected locally at the Station Manager port on the ENIU, or it can be connected remotely at another device on the network via the UDP network protocol.



For More Information

Use of the Station Manager, mentioned later in this manual, is optional. For specific instructions to use the Station Manager, please refer to one of the following publications:

TCP/IP Communications for Series 90 PLCs Station Manager Manual, GFK-1186

TCP/IP Communications for PACSystems Station Manager Manual, GFK-2225.

Chapter 2 Installation

When installing the Ethernet NIU and the Series 90-30 modules in its I/O Station, the primary reference for installation instructions should be the *Series 90-30 PLC Installation Manual*, GFK-0356. That manual includes detailed and important information about wiring, grounding, system planning, and power connections, and gives module specifications for Series 90-30 equipment.

This chapter provides additional installation information for the Series 90-30 Ethernet NIU and I/O Station that is not uncluded in that manual, and also summarizes general installation steps.

- Meeting Agency Standards and Requirements
- Equipment Needed for Installation
- Basic Installation Steps for the I/O Station
- Installing the Ethernet NIU in the CPU Baseplate
- Grounding
- Installing the Ethernet Cable
- Starting Up the Ethernet NIU
- Loading an EZ-Store Devie with Ethernet NIU Data

Equipment Needed for Installation

Make sure you have the items listed below before starting the installation.

- A Series 90-30 PLC CPU baseplate with power supply. The Series 90-30 Ethernet NIU requires PLC power supply IC693PWR321, (Revision K or later), IC693PWR322, or IC693PWR330. A high capacity power supply is required.
- Battery for the system is recommended. ***Optional***
- Programming/configuration software: CIMPLICITY Machine Edition Logic Developer Version 4.0, SP3, with Special 4 or higher is required.
- Ethernet cables.
- A serial cable for the Station Manager port on the ENIU. (IC693CBL316A)***Optional***
- A terminal or computer equipped with terminal emulation software. ***Optional***

Meeting Agency Standards and Requirements

Conformance to Standards

Before installing GE Fanuc products in situations where compliance to standards or directives from the Federal Communications Commission, the Canadian Department of Communications, or the European Union is necessary please refer to GE Fanuc's *Installation Requirements for Conformance to Standards*, GFK-1179.

CE Mark Installation Requirements

The following requirements for surge, electrostatic discharge (ESD), and fast transient burst (FTB) protection must be met for applications that require CE Mark listing:

- The I/O Station is considered to be open equipment and should therefore be installed in an enclosure (IP54).
- This equipment is intended for use in typical industrial environments that utilize anti-static materials such as concrete or wood flooring. If the equipment is used in an environment that contains static material, such as carpets, personnel should discharge themselves by touching a safely grounded surface before accessing the equipment.
- If the AC mains are used to provide power for I/O, these lines should be suppressed prior to distribution to the I/O so that immunity levels for the I/O are not exceeded. Suppression for the AC I/O power can be made using line-rated MOVs that are connected line-to-line, as well as line-to-ground. A good high-frequency ground connection must be made to the line-to-ground MOVs.
- AC or DC power sources less than 50V are assumed to be derived locally from the AC mains. The length of the wires between these power sources and the PLC should be less than a maximum of approximately 10 meters.
- Installation must be indoors with primary facility surge protection on the incoming AC power lines.
- In the presence of noise, serial communications could be interrupted.

Basic Installation Steps for the I/O Station

All of the baseplates and modules in the I/O Station must be mounted in a protective enclosure. The enclosure should be capable of properly dissipating the heat produced by all of the devices mounted inside it. Please refer to *the Series 90-30 Installation Manual*, GFK-0356, for details of all of the following installation steps.

- Mount the baseplates. Use good quality 8-32 x 1/2 inch or 4 x 12mm size screws. Use star lock washers and flat washers under the screw heads (star lock washer should be located between screw head and flat washer) to ensure a tight baseplate ground connection.
- If the I/O Station includes Expansion baseplates:
  - determine the correct rack number for each one, then set the rack numbers using the Rack Number Selection DIP switch on the baseplate.
  - connect the I/O Bus Expansion Cables between the I/O Bus Expansion Connectors. The cables are connected in a "daisy-chain" arrangement from one baseplate to the other.
  - on the last I/O Bus Expansion Connector, plug in an I/O Bus Expansion Terminator, Catalog Number IC693ACC307, unless using a cable with built-in terminator resistors.
- Install the modules in their correct slots in the I/O Station.
- Connect field devices to the modules in the I/O Station.

Configuring the Ethernet NIU

Before you can use the Ethernet NIU on the network, you must configure the NIU using the CIMPLICITY Machine Edition Logic Developer software. Use the configuration software to:

- Assign the IP address for the ENIU.
- Optionally, define the subnet mask, the gateway address, and the name server address.
- Set up Ethernet Global Data Exchange messaging between the ENIU and controller(s)

Chapter 4 explains how to configure the Ethernet NIU and how to include it in the control system configuration.

Installing the Ethernet NIU in the CPU Baseplate

A Series 90-30 Ethernet NIU must be installed in the CPU slot of a CPU baseplate.

Warning

Do not insert or remove modules with power applied. This could damage the module, or result in personal injury.

1. Be sure the baseplate power is OFF.
2. Align the module with slot 1 and the connector. Tilt the module up so the top rear hook of the module engages the slot on baseplate.
3. Swing the module down until the connectors mate and the locking lever on the bottom of the module snaps into place, engaging the baseplate notch.
4. Check the module to be sure that it is properly seated.
5. Connect one or both of the Ethernet ports on the Ethernet Interface to the network.
6. Restore power to the baseplate.

Removing the Module from the Baseplate

To remove the module from the baseplate:

1. Turn off power to baseplate.
2. Remove all cables from the module.
3. Press the release located on the bottom of the module and slowly raise the module from the bottom until it comes out of the baseplate.

Grounding

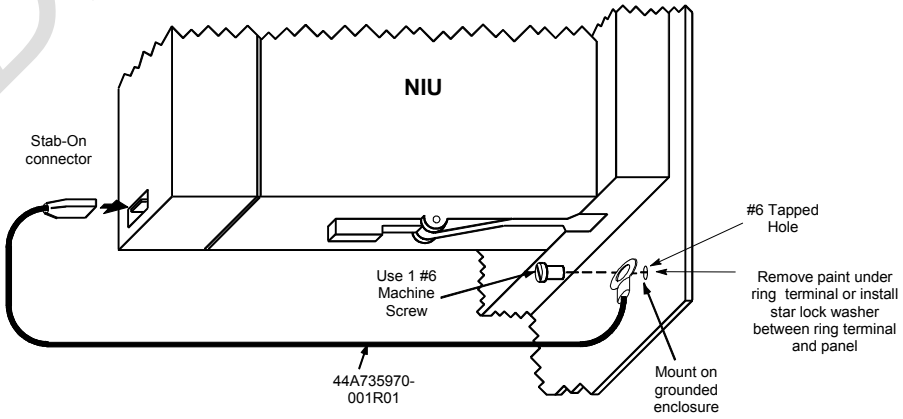
System Grounding Overview

All components of the I/O Station must be properly grounded, in accordance with applicable codes. Details of recommended grounding procedures are provided in the *Series 90-30 Installation Manual*, GFK-0356.

- Ground conductors should be connected in a tree fashion with branches routed to a central earth ground point. This ensures that no ground conductor carries current from any other branch.
- Baseplates must be grounded using a separate conductor; the baseplate mounting screws are not an adequate ground connection. Use a minimum AWG #12 (3.3 mm^2) wire with a ring terminal and star lock washer under the head of one of the baseplate's two lower mounting holes. Connect the other end of this ground wire to a tapped hole in the panel that the baseplate is mounted to, using a machine screw, star lock washer, and flat washer. Alternatively, if the panel has a ground stud, use a nut and star lock washer for each wire on the ground stud to ensure adequate grounding. Where connections are made to a painted panel, the paint should be removed so clean, bare metal is exposed at the connection point.
- For safety and proper operation, the computer running the programming and configuration software must have a ground connection in common with the CPU baseplate. Normally, this common ground connection is provided by ensuring that the programmer's power cord is connected to the same power source (with the same ground reference point) as the baseplate.

Ethernet NIU Shield Grounding

The Ethernet NIU must be connected to frame ground at the slot where it is installed. The NIU module comes with a grounding wire for this purpose. The Ethernet NIU does not support or require the use of a grounding bracket. If the ring terminal on the grounding wire is to be mounted to a painted surface, remove the paint under the ring terminal to ensure good contact, or place a star lock washer between the ring terminal and the painted surface. **Note: The star lock washer method is suitable for a shield ground, but not suitable for a safety ground.**



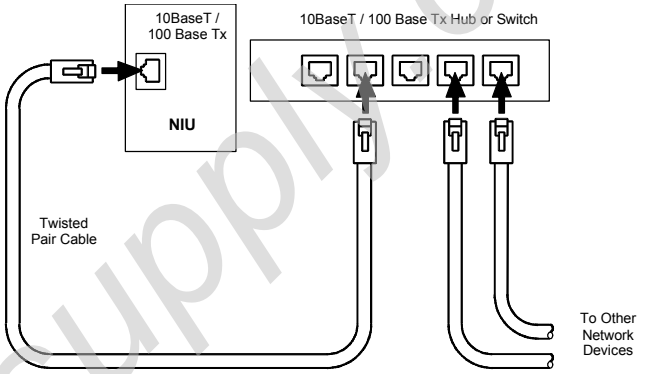
Installing the Ethernet Cable

The 10Base-T / 100Base-TX RJ-45 port on the Ethernet NIU connects directly to a network without an external transceiver. Connect the port to an external 10Base-T / 100Base-TX hub or switch using a twisted pair cable. Category 5 cable is required for 100Base-TX operation, and recommended tor all installations. 10Base-T / 100Base-TX cables are readily available from commercial distributors. GE Fanuc recommends purchasing rather than making cables. Cables must meet the applicable IEEE 802.3 or 802.3u standard, noted in the table below.

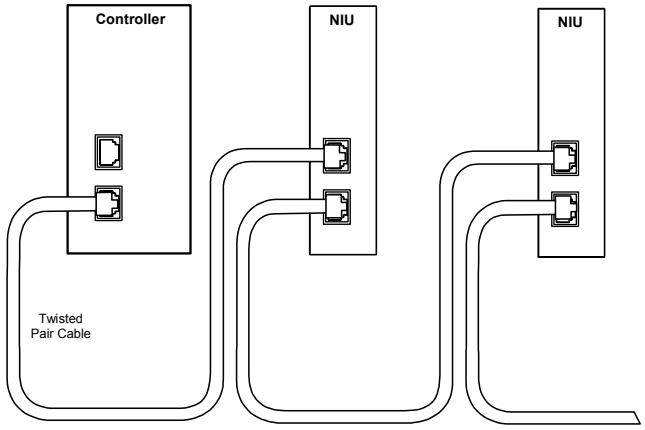
The Ethernet NIU automatically senses whether it is connected to a 10BaseT or 100BaseTX network, and whether communications are half-duplex or full duplex.

Network Connections

Connection of the Ethernet Interface to a 10Base-T or 100Base-TX network via a hub or switch is shown below (each cable drop can be up to 100 meters long):



Connection between a controller Ethernet port and one or more Ethernet NIUs can also be made directly. In this type of installation, loss of power on any NIU breaks the communications link to all units that follow the unit without power.



Starting Up the Ethernet NIU

After configuring the Ethernet NIU, follow the steps below to be sure the ENIU is operating correctly.

1. Turn power OFF to the Ethernet NIU for 3–5 seconds, then turn the power back ON. This starts a series of diagnostic tests.

   The EOK LED blinks to indicate the progress of power-up.

2. The Ethernet LEDs have the following pattern upon successful power-up. At this time the Ethernet NIU is fully operational and on-line.

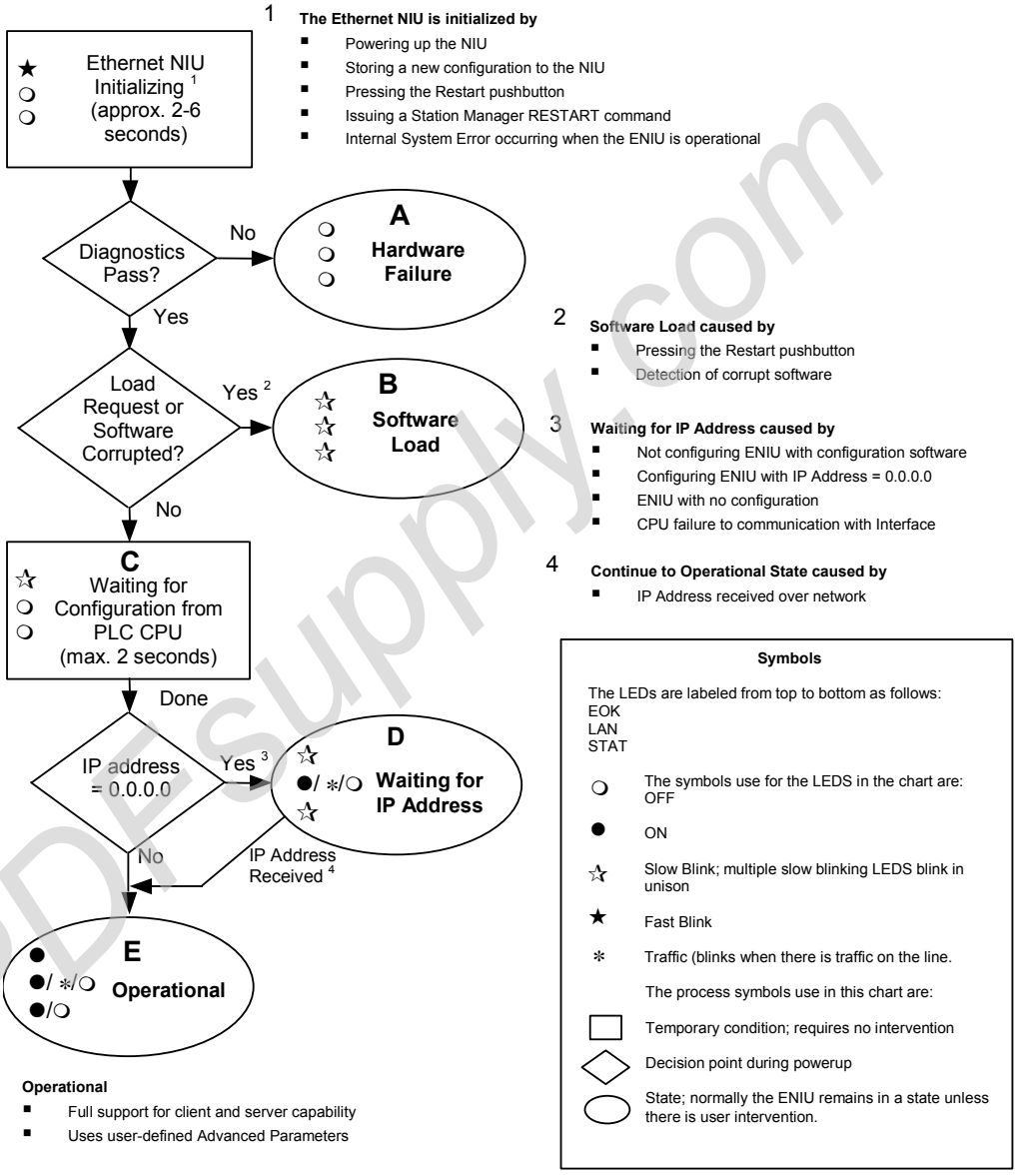
LED	Ethernet Interface Online
EOK	● (ON)
LAN	●/✲ (ON/Traffic)
STAT	● (ON)

The table below lists possible corrective actions associated with LED states A through E in the graphic.

State	*Corrective Actions*
A: Hardware Failure Fatal Hardware Error.	▪ Make sure the NIU has power. ▪ Examine the Fault Table for clues. ▪ Recheck the configuration. ▪ Power off baseplate, inspect the ENIU for loose components, reseat the module, and press Restart. ▪ If the problem persists, replace the module.
B: Software Loader Software corrupt.	Connect a PC Software Loader and load new software
C: Waiting for Configuration ▪ Did not configure slot using the software. ▪ CPU not communicating with Ethernet Interface. (Condition can last a maximum of 2 seconds.)	▪ Use the software to configure the ENIU then store the configuration to the ENIU. ▪ Power cycle the ENIU. ▪ Clear faults and press Restart.
D: Waiting for IP Address Interface's IP address has not been configured or has been configured as 0.0.0.0.	▪ Use the software to configure the ENIU with a non-zero IP address. ▪ Assign IP address over network
E: Operational ▪ If the LAN LED is OFF, the problem may be network cable not connected ▪ If the STAT LED is OFF, an exception condition has occurred.	▪ Connect cable. ▪ Examine Fault Table to find out why the STAT LED is OFF.

LED States During Power-up

If a problem is occurs during power-up, the Ethernet NIU may not transition directly to the operational state. In that case,check the LED pattern on the module and refer to the following chart and table for corrective action.



Using an EZ Program Store Device with Ethernet NIU

Loading Data from an Ethernet NIU to an EZ Program Store Device

Follow these steps to properly load the Ethernet NIU Program/Configuration/Initial values into the EZ Program Store device.

1. Connect the programmer to the Ethernet NIU via Ethernet.
2. Stop the Ethernet NIU.
3. If any faults exist in the Ethernet NIU, they must be cleared.
4. In the Programmer, navigate (Target,On-Line Commands, Flash/Eeprom…) to the Read/Write/Verify Flash Memory screen .
5. On the Read/Write/Verify Flash Memory screen, click the Read button. Select all three items (Hardware Configuration, Logic, Initial Values). Make sure Flash/EEProm is select and click OK. Check the information box to see that the read succeeded. This step loads everything from Flash into RAM so the complete Ethernet NIU setup can be placed on the EZ Program Store.
6. Connect the EZ Program Store device to the Power Supply Port of the Ethernet NIU. The LED on the EZ Program Store device should show Steady Green and the P S Port LED on the NIU should blink steadily.
7. The sequence of actions in this step must be followed in the exact order listed to insure that the EZ Program Store is properly loaded with the Ethernet NIU information
    a. On the Read/Write/Verify Flash Memory screen, click the radio button at the bottom to select the EZ Program Store
    b. Click the Write button at the top (all 3 items will be selected and grayed out)
    c. Click the OK button. The EZ Program Store LED should immediately go to a steady amber and remain amber for about 15 seconds. The EZ Program Store LED will then go steady green. The Ethernet NIU data is now stored in the EZ Program Store device. If the EZ Program store LED did NOT go amber, the operation failed.
8. The EZ Program Store can now be removed and the Ethernet NIU can be put in Run mode.

Restoring Ethernet NIU Data from an EZ-Program Store Devicee

The following procedure must be followed to load the Ethernet NIU from an EZ Program Store device that contains the Ethernet NIU data.

1. You will need a key for the Ethernet NIU. The key could be in either the “A” or “B” position
2. Plug in the EZ Program Store to the Power Supply port. After about 2 seconds the EZ Program Store LED will come on Steady Green. The Run LED will start to blink, and the PS Port LED will start to blink. If the key is in the B position, turn it to the A position. If the key is in the A position, turn it to B and back to A. The Run Led will go out.
3. Press the dark red button on the side on the EZ Program Store device The LED on the EZ Program Store deviceimmediately goes to a steady amber and stays amber for about 15 to 30

seconds. The EZ Program Store LED then goes to steady green and the Run LED starts to flash. The Ethernet NIU has been loaded from the EZ Program Store.

4. Turn the keyswitch to the B position to place the Ethernet NIU into Run mode. The keyswitch can be put back to the A position if desired.
5. Remove the EZ Program Store device.

Chapter 3 Control, Status, and I/O Data Formats

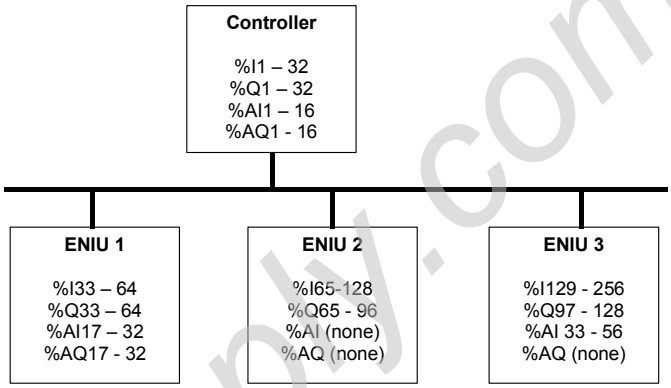
This chapter describes the content of the data exchanged by the Ethernet NIU and the controller.

- System I/O Data References
- Data Memory in the Ethernet NIU
  - References Used in the Ethernet NIU
  - Discrete and Analog Outputs in the Ethernet NIU
- Exchanging Data with One or Two Controllers
  - ENIU Operation with Two Controllers
  - ENIU Operation if No Data is Received
- Control Data Format
- Status Data Format
- Using the Control and Status Data
  - Switching Back to the Primary Controller
  - Setting Up the Output Defaults
  - Checking for Faults and Clearing Faults
  - Using the Optional Application-Specific Command Word

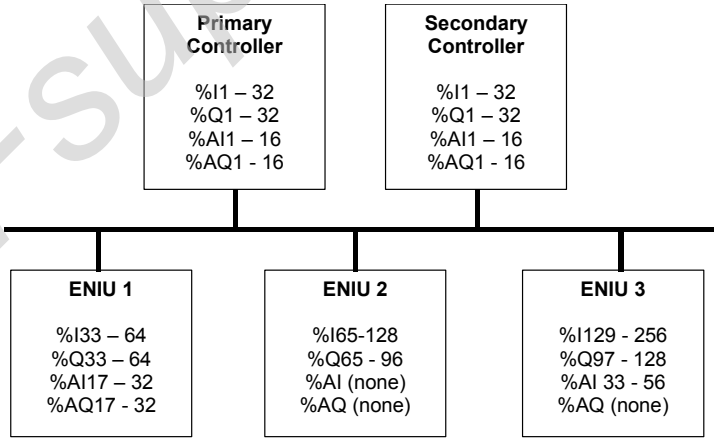
System I/O Data References

I/O modules are added to the Ethernet NIU configuration and their parameters are configured the same way they are configured in a PLC system.

To a controller, the I/O data it exchanges with Ethernet NIUs on the network is part of its overall I/O system. If the same controller serves multiple Ethernet NIUs and their I/O Stations, each I/O Station MUST use a unique set of I/O references, as shown in the simplified example below. Duplicated I/O references for multiple Ethernet NIUs would be overwritten in the controller's memory.



If an I/O Station has two controllers, the local I/O in each controller could use some or all of the same I/O references. In the illustration below, both controllers use the same local references.



Data Memory in the Ethernet NIU

The Ethernet NIU has the following types of data memory:

Discrete Input Points - %I	2,048 (fixed)
Discrete Output Points - %Q	2,048 (fixed)
Discrete Global Memory - %G	Not available
Internal Coils - %M	4096 (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	9999
Analog Inputs - %AI	1268
Analog Outputs - %AQ	512

References Used in the Ethernet NIU

The references used by the Ethernet NIU for its I/O, status, and control data are assigned during configuration. The configuration steps are explained in chapter 4.

The ENIU maps data into its internal memory as shown below. *The references shown in italics for status and control data are required for correct operation.*

Type of Data	*Ethernet NIU References*
Discrete Inputs from field devices	%I0001 - %I2048 (bits)
Discrete Outputs from controller (primary / only)	*Must be %M0001 - %M2048 (bits)*
Discrete Outputs from optional secondary controller	*Must be %M2049 - %M4096 (bits)*
Ethernet Global Data Exchange status (consumed from primary / only controller)	*Must be %T0001 - %T0016 (bits)*
Ethernet Global Data Exchange status (consumed from secondary controller)	*Must be %T0017 - %T0032 (bits)*
Ethernet Global Data Exchange status (produced by ENIU)	*Must be %T0033 - %T0048 (bits)*
Analog Inputs from field devices	%AI001 - %AI512 (words)
Analog Outputs from controller (primary / only)	*Must be %R0001 - %R0512 (words)*
Analog Outputs from optional secondary controller	*Must be %R0513 - %R1024 (words)*
ENIU Status data to be sent to controller(s)	*Must be %R1101 - %R1110 (words)*
Control Data (from primary / only controller)	*Must be %R1111 - %R1120 (words)*
Control Data (from secondary controller)	*Must be %R1121 - %R1130 (words)*

Discrete and Analog Outputs in the Ethernet NIU

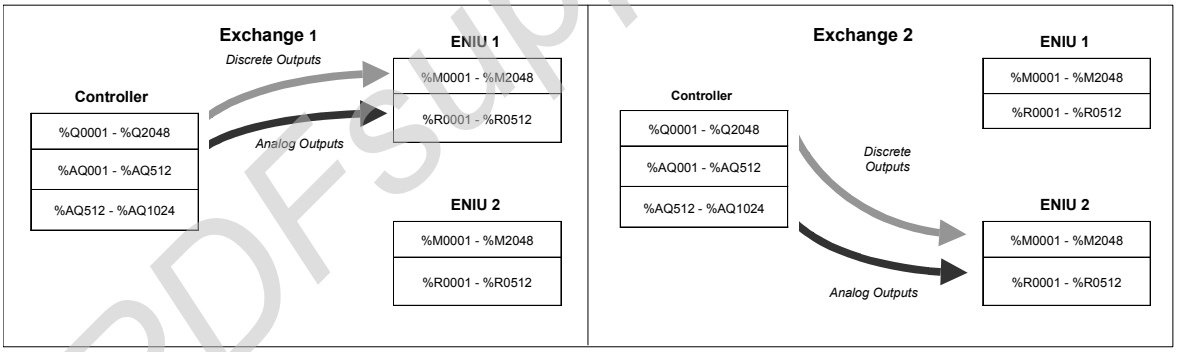
The ENIU is configured in the EGD consumed exchanges to place the discrete output data it receives from its primary and optional secondary controllers into its internal coils (%M) table. It places analog output data from its only or primary controller in its register (%R) table.

The ENIU moves the discrete and analog output data to the %Q and %AQ tables after determining that data is being received from an active controller. If no active controller is available then the ENIU moves zeros, hold last state, or default values to the %Q and %AQ tables as directed by the control bit from the last active controller.

Typically, the controller sends the entire contents of each output table. When the data is received, the ENIU places it in memory beginning at the first reference in each table (for example, %Q0001). However, this is not required. The exchange definitions for both the controller and the Ethernet NIU can be adjusted for improved performance by only transferring the data actually used in the system.

Using Multiple Exchanges for Systems with More than 512 Analog Outputs

In a system with multiple Ethernet NIUs, it is possible for the total amount of analog output data of all the ENIUs to exceed the 512 word limit of one ENIU. In that case, the controller must produce multiple exchanges to send all the output data. Each exchange can have the same discrete outputs (%Q), but different analog outputs (%AQ). When an Ethernet NIU receives its exchange, it stores the discrete outputs in discrete memory as described above. However, some of the Ethernet NIUs will use different reference addresses for the analog output data than are used in the controller:



Exchanging Data with One or Two Controllers

In addition to the Ethernet NIU's primary controller, there can also be a secondary controller that provides backup if the primary controller becomes unavailable. Chapter 4 explains how to set up messaging between the ENIU and one or two controllers.

ENIU Operation with Two Controllers

If the system includes a primary controller and a secondary controller, both controllers regularly send output and control data for the I/O Station, and receive the latest input and status data from the Ethernet NIU.

During normal operation, the Ethernet NIU uses the output and control data it receives from its primary controller. However, if the ENIU stops receiving data from the primary controller within the configured timeout period, the ENIU begins using output and control data from the secondary controller instead.

After the ENIU has started using data from the secondary controller, it keeps using data from the secondary controller until it receives a command from the primary controller (in the control data portion of the output message) telling it to switch back.

The primary controller can also command the Ethernet NIU to switch to the secondary. If the secondary controller is not available, the Ethernet NIU will NOT switch.

ENIU Operation if No Data is Received

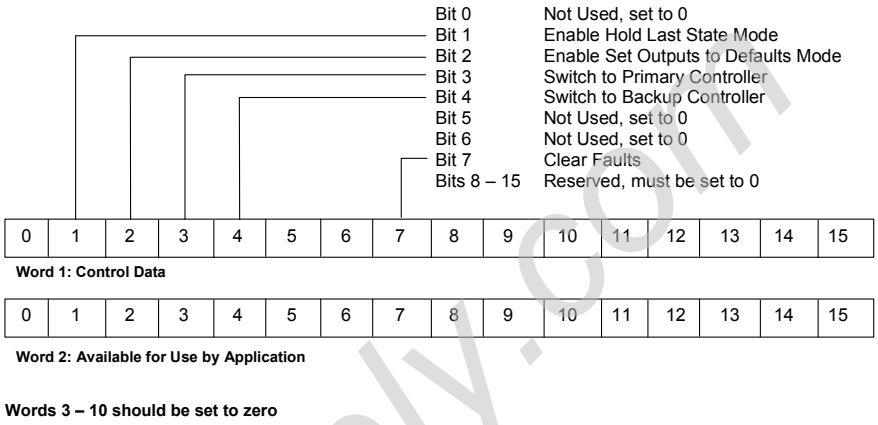
If the Ethernet NIU does not receive output and control data from any controller within the configured timeout period, the ENIU either sets the outputs in the I/O Station to their defaults or holds them in their last states or zeroes the outputs. The choice of how outputs will behave if communications are lost is determined by the output control bits (described later in this section).

If the Ethernet NIU has not received output and control data from any controller since the ENIU powered up, the state of the ENIU outputs is normally the default state. It is possible to change this option so that the ENIU outputs are zeroed after powerup if no controller communications have been received. To make this change go, to the variable InitDefaults for the ENIU in CIMPLICITY ME and change the initial value from 1 to 0. Then store to the ENIU. This must be done for each ENIU that is to operate this way.

Control Data Format

The first 10 words of data consumed by the Ethernet NIU are control data. They determine the behavior of outputs if communications are lost, and can be used to clear faults.

In addition, if there are two controllers, the control data determines which of them will supply the I/O Station outputs.



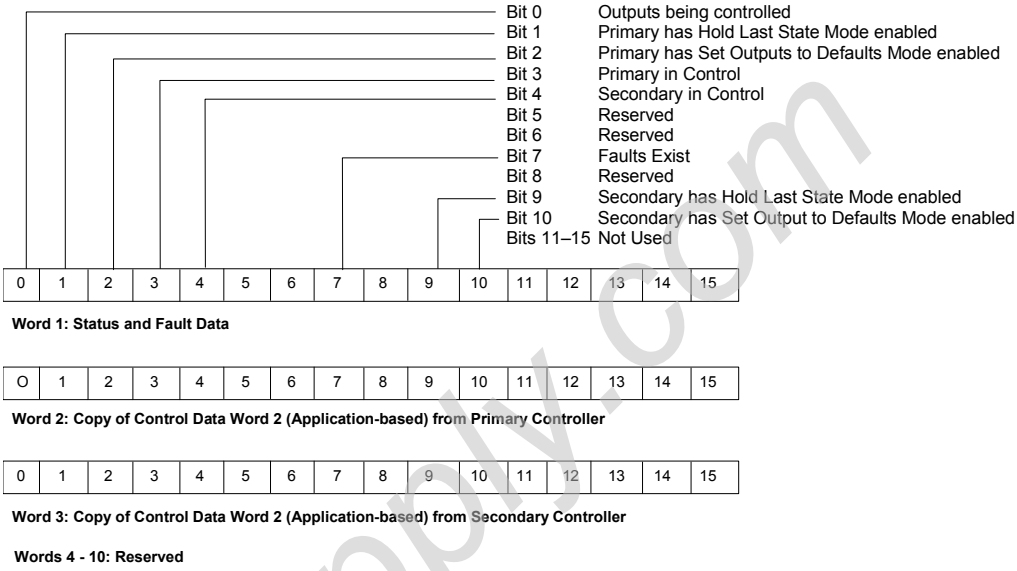
The application program in the controller(s) is responsible for correctly setting the content of this control data as described below. Unused words should be set to zero.

Enable Hold Last State Mode:*	Set this bit if outputs in the I/O Station should hold their last commanded state when communications are lost. For systems with two controllers, this bit should be the same in both the primary and secondary controller exchanges.
Enable Set Outputs to Default Mode: *	Set this bit if outputs in the I/O Station should go to their configured defaults when communications are lost. If this bit is set, bit 1 (Hold Last State) is ignored. For systems with two controllers, this bit should be the same in both the primary and secondary controller exchanges.
Switch to Primary Controller:	If the secondary controller is presently controlling the NIU and providing output data for the I/O Station, the primary controller must set this bit to regain control of the I/O Station. See “Switching Back to the Primary Controller” below for additional steps that are necessary to return to normal operation with the primary controller.
Switch to Secondary Controller:	If the primary controller is presently controlling the NIU and providing output data for in the I/O Station, it can switch control to the secondary by setting this bit. If this bit is set, bit 3 (Switch to Primary) should NOT be set. If the secondary controller is not present, the switch will not occur.
Clear Faults:	Setting this bit clears all faults in ALL Ethernet NIUs that receive the same exchange. In a system with two controllers, only the exchange from the currently-active controller is used to clear faults.
Word 2, Available to Application:	The application program in the controller(s) can optionally use word 2 as described later in this section.

* See the section on setting up the output defaults.

Status Data Format

The 20 bytes of status data sent by the Ethernet NIU provide the controller(s) with information about output and fault status in the format shown below. The application program in the controller(s) should continually monitor this status data from the ENIU.



Status Data Definitions

Outputs Being Controlled:	Set if the I/O Station outputs are being controlled from the application program, and are not defaulted or in Hold Last State mode. If this bit is set, bits 1 and 2 should NOT be set.
Controller has Hold Last State Mode Enabled:	The ENIU sets bits 1 and 9 to mirror the present Hold Last State control bit being received from the primary controller and the secondary controller
Controller has Set Outputs to Defaults Mode:	The ENIU sets bits 2 and 10 to mirror the present Outputs Default control bit being received from the primary controller and the secondary controller.
Primary in Control:	Set when the primary controller is presently controlling the NIU and providing output data for the I/O Station. If this bit is set, bit 4 (Secondary in control) should NOT be set.
Secondary in Control:	Set when the secondary controller is presently controlling the NIU and providing output data for in the I/O Station. If this bit is set, bit 3 (Primary in Control) should NOT be set.
Faults Exist:	Set when any fault exists in the Ethernet NIU.
Words 2 & 3, Copy of Optional Control Data	The ENIU mirrors the content of word 2 of the control data in these status words. If the ENIU is receiving outputs from the primary controller, status word 2 has content. If the ENIU is receiving outputs from the secondary controller, status word 3 has content.

Using the Control and Status Data

The application program in the controller(s) should monitor the Ethernet NIU status data, and use the control data to interact with the NIU.

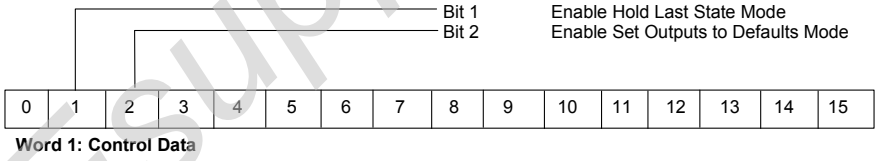
Switching Control Back to the Primary Controller

When the Ethernet NIU is using output data from the secondary controller, the application program in the primary controller must follow the steps below to regain control of the ENIU.

1. Start up with bit 3 reset.
2. Synchronize the program state with data from the secondary controller.
3. Set output bit 3 ("Switch to Primary Controller") of the data going to the ENIU.
4. The primary controller must then reset the output bit 3 to 0 when all Ethernet NIUs report "primary in control" in their input status data.

Setting Up the Output Defaults

If the Ethernet NIU does not receive any communication with the controller(s) within the configured timeout period, it sets the outputs in the I/O Stations to specified states. These output states are determined by commands previously received in the output data control bits.



If control bit 1 is set to 1, the ENIU will hold the outputs at their last commanded states.

If control bit 2 is set to 1, the ENIU will set outputs to their individual default states (see below).

Bit 2 takes precedence; if both bits 1 and 2 are inadventently set, the ENIU sets outputs to their default states.

If control bits 1 and 2 are both 0, outputs are set to 0.

When the Ethernet NIU has both primary and secondary controllers, output bits 1 and 2 should be set the same by both. If they are not the same, the Ethernet NIU will use the values it received from the last controller that provided outputs before communications were lost.

Specifying Individual Output Defaults

If the control outputs are set to have the outputs default instead of hold last state, ordinarily all outputs will default to zero. If that is suitable for the application, no further action is needed. However, for some applications taking outputs to a safe state requires setting them to one or forcing analog outputs to individually-specified values.

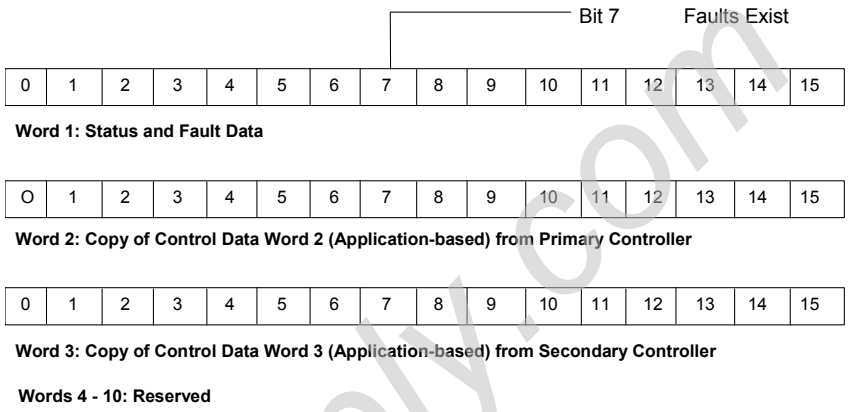
An optional procedure can be used to set up defaults for the Ethernet NIU. Use of this procedure is described in appendix A.

Checking for Faults and Clearing Faults

The regular exchange of status and control data provides the controller with the ability to check for fault conditions and clear faults.

Checking for Faults

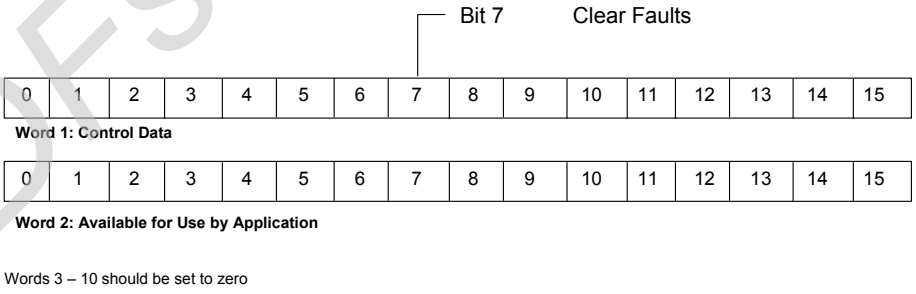
The application program in the controller(s) should monitor Ethernet NIU status bit 7 to check for faults.



If faults exist, they can be viewed using the programming software as described in chapter 5.

Clearing Faults

The controller can clear faults by setting bit 7 in the control data portion of its produced exchange. This will clear faults in ALL the Ethernet NIUs that receive the same exchange.



Using the Optional Application-Specific Command Word

The word 2 of the command data can be used by the controller for several purposes.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Word 1: Control Data

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Word 2: Available for Use by Application

Words 3 – 10 should be set to zero

Setting Up a Heartbeat

For example, the controller could use a free-running counter as a heartbeat for the value of this word, then check the incoming Ethernet NIU status block to make sure the ENIU is still running. In redundant applications, each controller could check the other controller's heartbeat to determine whether the other controller is operating.

Sequencing Outputs

This word could also be used to sequence outputs. The controller would set the outputs to a particular state and set the sequence number in the command data. When the Ethernet NIU returns the same sequence number in its status data, the controller knows that the ENIU has received the outputs. The controller can then take the next step in the sequence.

Checking the Status of the Heartbeat / Sequence

The primary controller's heartbeat/sequence ID word is returned in the second word of the ENIU status block. The secondary controller's heartbeat/sequence ID word is returned in the third word of the ENIU status block.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Word 1: Status and Fault Data

O	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Word 2: Copy of Control Data Word 2 (Application-based) from Primary Controller

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Word 3: Copy of Control Data Word 2 (Application-based) from Secondary Controller

Words 4 - 10: Reserved

Chapter 4 Configuration

This chapter explains how an Ethernet NIU and the modules in an I/O Station can be configured. Configuration determines certain characteristics of module operation and also establishes the program references to be used by each module in the system.

- Configuring the Exchanges of the device that will control the Ethernet NIU.
  - Configuring a Controller's Produced Exchange
  - Configuring a Controller's Consumed Exchange
- Configuring the Ethernet NIU
  - Configuring ENIU Network Parameters
  - Configuring an Ethernet NIU's Produced Exchange
  - Configuring an Ethernet NIU's Consumed Exchange
  - Configuring the Ethernet NIU's Consumed Exchange from a Secondary Controller
- Programmer Communications with the Ethernet NIU

Configuration Overview

Configuring a Controller to Work with the Ethernet NIU.

In addition to any other configuration required for the controller, two basic configuration steps are required to incorporate the Ethernet NIU and its I/O modules into the system:

1. The controller must be set up to enable Ethernet Global Data exchanges. The maximum number of total EGD exchanges (produced and consumed) that can be configured in a single controller depends on the controller type. For PACSystens RX7i and Series 90-70 PLCs, it is 255 exchanges. For the Series 90-30 CPU364 and 374, it is 128. Consult the documentation for the control system if you need more information.
2. The exchanges need to be defined. Configuring the exchanges assigns I/O references in the controller's memory to the data in the exchange. During operation, the application program in the controller will handle these I/O references in the same way as the references used by local I/O modules. The individual modules in the Ethernet NIU's I/O Station are not explicitly included in the controller configuration.

If the system includes a secondary controller, its EGD exchanges must also be configured, and they must match the exchanges of the primary controller, with the exception of the Producer ID.

Please refer to the controller documentation and the online help for the programmer software for specific configuration instructions.

Configuring an Ethernet NIU

Configuring an Ethernet NIU includes:

- Selecting the parameters of the ENIU.
- Adding I/O modules to the I/O Station hardware configuration. This is done in the same way as adding I/O modules to the hardware configuration of a Series 90-30 PLC. This part of the configuration assigns I/O references in the ENIU to each module and sets up any other configurable module parameters.
- Enabling Ethernet Global Data messaging.
- Setting up its Ethernet Global Data exchanges:
  - One EGD produced exchange
  - One EGD consumed exchange from the primary or only controller.
  - An optional EGD consumed exchange from a secondary controller.

Configuring the Ethernet NIU Parameters

Before you can use the Ethernet NIU on the network, its configuration must be set up as summarized below. Please refer to the programming software online help if you need detailed instructions for using the software.

The Series 90-30 ENIU is a target type in CIMPLICITY Machine Edition. When you create a project or add a target to an existing project, select GE Fanuc Remote I/O, Series 90-30 Ethernet.

Ethernet NIU Parameters

Configuration parameters for the Ethernet NIU are defined on the Ethernet tab as explained below.

Adapter Name: This is set to 0.1 (the rack and slot of the Ethernet NIU) and cannot be changed.

Status Address: The Status Reference Type is the location of the LAN Interface Status is set to %R4001, Length = 5. It cannot be changed

IP Address, Subnet Mask, and Gateway IP Address: These values should be assigned by the person in charge of your network (the network administrator). It is important that these parameters are correct; otherwise, the Ethernet NIU may be unable to communicate on the network and/or network operation may be corrupted. It is especially important that each node on the network is assigned a *unique* IP address.

For a simple isolated network with no gateways, you can use the following range of values for the assignment of local IP addresses:

10.0.0.1	First NIU
10.0.0.2	Second NIU
10.0.0.3	Third NIU
.	.
10.0.0.101	Primary Controller
10.0.0.102	Secondary Controller
	.
	.
10.0.0.255	PLC Programmer TCP or host

Also, in this case set the subnet mask and gateway IP address to 0.0.0.0

The IP addresses given above are the IP addresses used in the Quick Start Example in Appendix B

Note

If the isolated network is ever connected to another network, the IP addresses 10.0.0.1 through 10.0.0.255 must not be used and the subnet mask ,and gateway IP address must be assigned by the network administrator. **The IP addresses must be assigned so that they are compatible with the connected network.**

Network Time Sync: This is set to None (for no network time synchronization) and cannot be changed.

Configuring EGD Exchanges in the Controller that will Operate the ENIU

There are three basic steps to setting up communications between a controller and an Ethernet NIU:

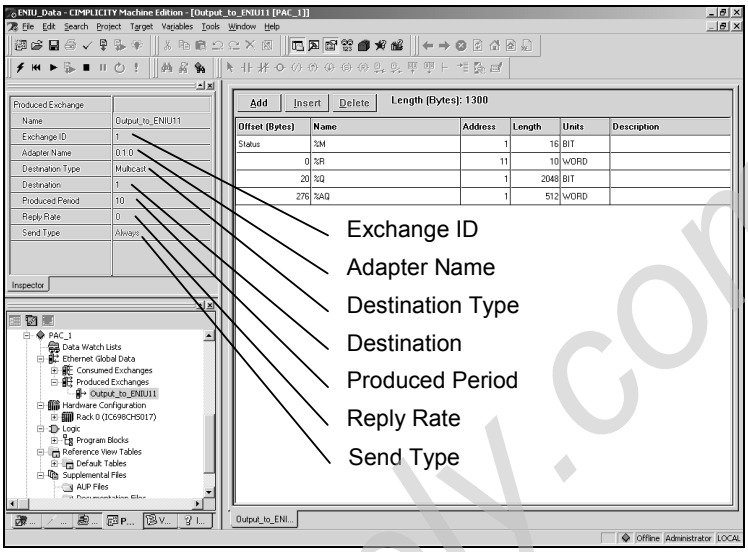
1. Configuring the controller for at least one Ethernet Global Data produced exchange to send outputs and control data to one or more Ethernet NIUs. This can be done in different ways:
   - The simplest method is to configure one Ethernet Global Data produced exchange that contains all the discrete outputs and analog outputs for one or more Ethernet NIUs in the system.
   - The controller could also produce multiple Ethernet Global Data exchanges, each of which would send outputs to only some of its Ethernet NIUs. That might be done, for example, if the overall amount of I/O Station analog output data is more than 512 words.
   - Alternatively, the controller could produce one or more EGD messages, each containing only a portion of its output data. There is no need to send all of the output data if the Ethernet NIUs don't need it all. This method can also reduce the performance of the system.
2. Configuring the controller for at least one Ethernet Global Data consumed exchange to receive inputs and status data from each Ethernet NIU. In systems where there are multiple Ethernet NIUs, the controller must be configured to receive a consumed exchange from each ENIU.

These configuration parameters are part of the overall CPU(controller) configuration.

If the system includes both a primary controller and a secondary (backup) controller, both will require this configuration.

Configuring a Controller's Produced Exchange

To set up a Produced Ethernet Global Data , configure the parameters and ranges as described below. Note: the description below is for a PACSystem controller.



1. The Exchange ID should be 1 if the controller will produce only one exchange. If the controller sends more than one exchange (to other devices), each must have a different Exchange ID.

2. Change the Destination Type to Multicast. (For Series 90 Controllers this is Group).

3. Any Destination (1 to 32) can be used as long as it is consistent:

Parameter	IP Address
Group 1	224.0.7.1
Group 2	224.0.7.2
:	:
:	:
Group 32	224.0.7.32

4. The Produced Period defaults to 200 millseconds. Change it to less then ½ the scan time of the controller. 10 milliseconds is usually a good number, do not set it less than 6 milliseconds, as settings less than 6 will cause performance to decrease. For very large configuration or Ethernet segments with lots of Ethernet traffic, a Produced Period greater than 10 milliseconds may be required. This parameter sets the network production time, and is the main configuration factor in I/O response time.

Setting Up the Data Ranges for a Controller's Produced Exchange

After establishing the parameters for a produced exchange, set up the controller memory ranges for the exchange. An exchange can include up to 100 ranges and/or variables. Click the Add button to add a range.

Add | Insert | Delete | Length (Bytes): 1300

Offset (Bytes)	Name	Address	Length	Units	Description
Status	%M	1	16	BIT	
0	%R	11	10	WORD	
20	%Q	1	2048	BIT	
276	%AQ	1	512	WORD	

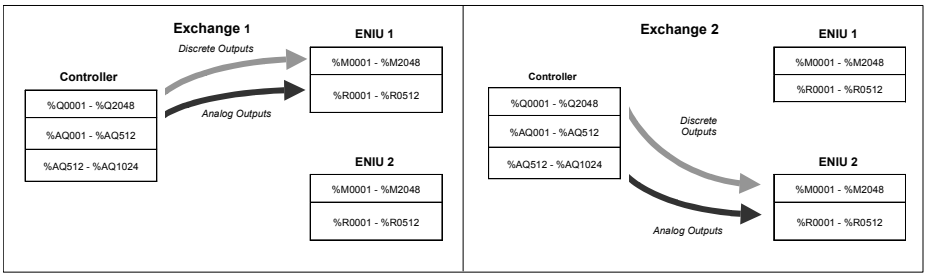
1. The first range is for the status data for the Ethernet Global Data exchange. In the controller, this data can be assigned to any appropriate available reference range. In the example above, it is assigned to 16 bits starting at %M0001. This range is for local status in the controller. It is NOT transmitted to the ENIU.

2. Add a 10-word data range for the control data that will be sent in the exchange (see chapter 3 for details). In the example above, the starting reference for this data is %R0011.

3. It is recommended that all 2048 of the discrete Ouputs %Q be sent to the ENIU(s). Each ENIU that receives the exchange will use only the discrete outputs it needs and ignore the rest. If no ENIU that will receive the exchange has any discrete outputs, it is not necessary to configure a discrete output range for the exchange. If the total number of %Q used in the system is much less than 2048 a smaller range can be configured.

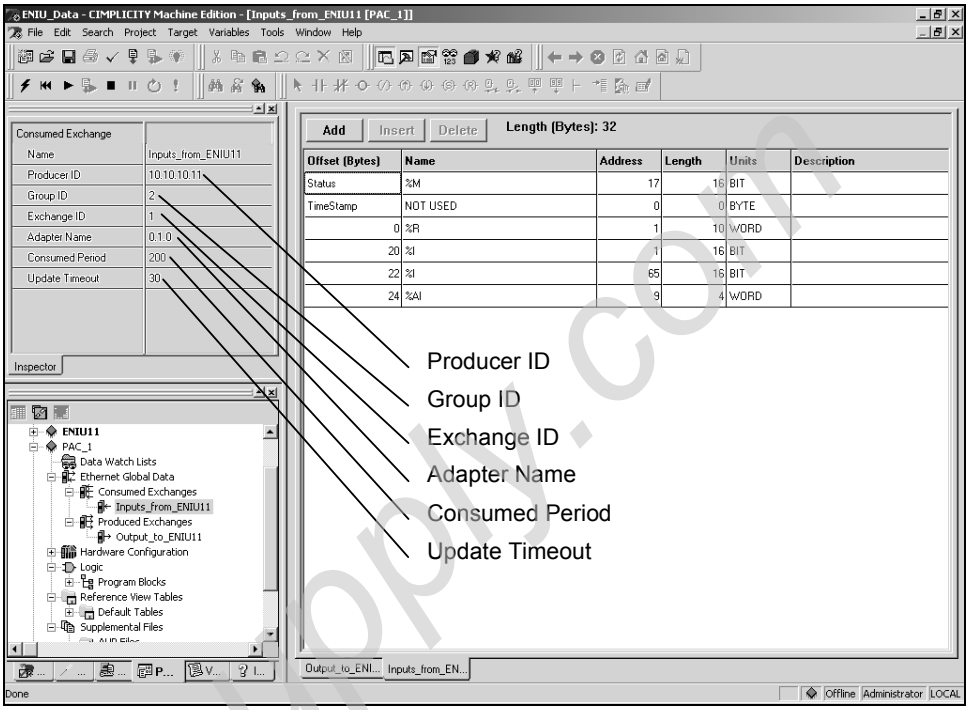
4. It is recommended that the first 512 analog outputs %AQ be sent to the ENIU(s). Each ENIU will use only the analog outputs it needs and ignore the rest. If no ENIU that will receive the exchange has any analog outputs, it is not necessary to configure an analog output range for the exchange. If the total number of %AQ used in the system is much less than 512 a smaller range can be configured.

   In a system with multiple Ethernet NIUs, if the total amount of analog output data exceeds the 512 word limit of one ENIU, the controller must produce multiple exchanges to send all the analog outputs to multiple ENIUs. Each exchange can have the same discrete outputs (%Q), but different analog outputs (%AQ). When configuring this type of produced exchange for the controller, enter the actual controller references to be sent. When an Ethernet NIU receives the exchange, it will store the analog outputs beginning at the start of its analog output table. Therefore, in a system with more than 512 analog outputs, some of the analog outputs will have different reference addresses in the ENIU than in the controller as illustrated below.



Configuring a Controller's Consumed Exchange

Set up a Consumed EGD exchange in the controller for each Ethernet NIU in the system. Even if an I/O Station has only output modules, its controller(s) must be configured for a consumed exchange to receive the ENIU's status data. Note: the description below is for a PACSystem controller.



For each exchange:

1. Producer ID should be the IP address of the Ethernet NIU that produced the exchange. In this example, it is 10.10.10.11
2. Set the Group ID to 2. For systems with Multiple ENIUs, all consumed exchanges from ENIUs in the controller are set for Group 2. Do not forget to set the Group ID. The default is 0, which means do not use a Group but use just the producer ID.
3. The Exchange ID should be 1 because each ENIU produces only 1 exchange.
4. The Adapter Name of the CPU was configured previously in the CPU configuration window.
5. The Update Timeout parameter is related to produced period of the ENIU, which should be set to approximately 2.5 times the Produced Period of the ENIU. The recommended setting for Update Timeout is 50 milliseconds. The Update Timeout defaults to "0" which means don't enforce a timeout. This must be set to detect loss of communication. If the CPU does not receive an exchange from the Ethernet NIU within this time period, it will declare a refresh error. This parameter can be adjusted for best performance.

Setting Up the Data Ranges for a Controller's Consumed Exchange

After establishing the parameters for a consumed exchange, set up the data ranges in controller memory for the exchange. Click the Add Range button to add a range.

Add | Insert | Delete | Length (Bytes): 32

Offset (Bytes)	Name	Address	Length	Units	Description
Status	%M	17	16	BIT	
TimeStamp	NOT USED	0	0	BYTE	
0	%R	1	10	WORD	
20	%I	1	16	BIT	
22	%I	65	16	BIT	
24	%AI	9	4	WORD	

1. Set up a 16-bit reference in controller memory (%M00017 above) to store the status of the Ethernet Global Data exchange. It can be any CPU memory location. This status is local to the controller and is NOT received from the ENIU.
2. Add a range to store the 10 words of status data that will be sent by the Ethernet NIU. The format of this data is shown in chapter 3.
3. Add one or more ranges for any discrete input data (%I) that will be received in the exchange. These discrete inputs must not duplicate or overlap any discrete inputs in other exchanges or in the controller, as explained in chapter 3. The ranges entered will correspond to discrete inputs that are configured in the hardware configuration of the ENIU. In most applications, the controller input references should match the references configured in the Ethernet NIU. It is not necessary to add a separate range for each input module in the I/O Station. Contiguous inputs can be grouped into ranges that include data from multiple modules. If there is a gap in the reference assignments, separate ranges must be configured as shown above.
4. Add one of more ranges for any analog input data (%AI) that will be included in the exchange. These analog inputs must not duplicate or overlap any analog inputs in other exchanges or in the controller. The ranges entered will correspond to analog inputs that are configured in the hardware configuration of the ENIU. Like the discrete input assignments, analog inputs can be assigned in ranges that include multiple modules as long as care is taken to assure that the ranges match the module inputs.

Configuring the Ethernet NIU

The Ethernet NIU and I/O Station must be configured using CIMPLICITY Machine Edition Logic Developer version 4.0, service pack 3, special 4 or later.

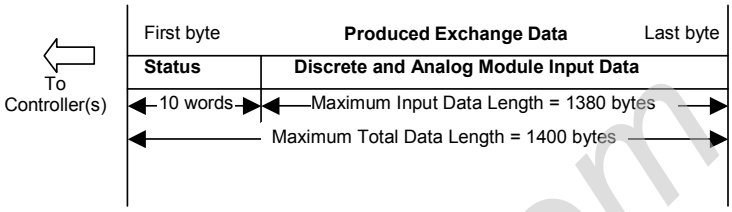
Configuring ENIU Network Parameters

ENIU Network configuration establishes the basic operating characteristics of the Network Interface Unit. If the ENIU will be communicating with devices on other networks, the parameters in the following table must be set appropriately. These values should be assigned by the person in charge of your network (the network administrator).

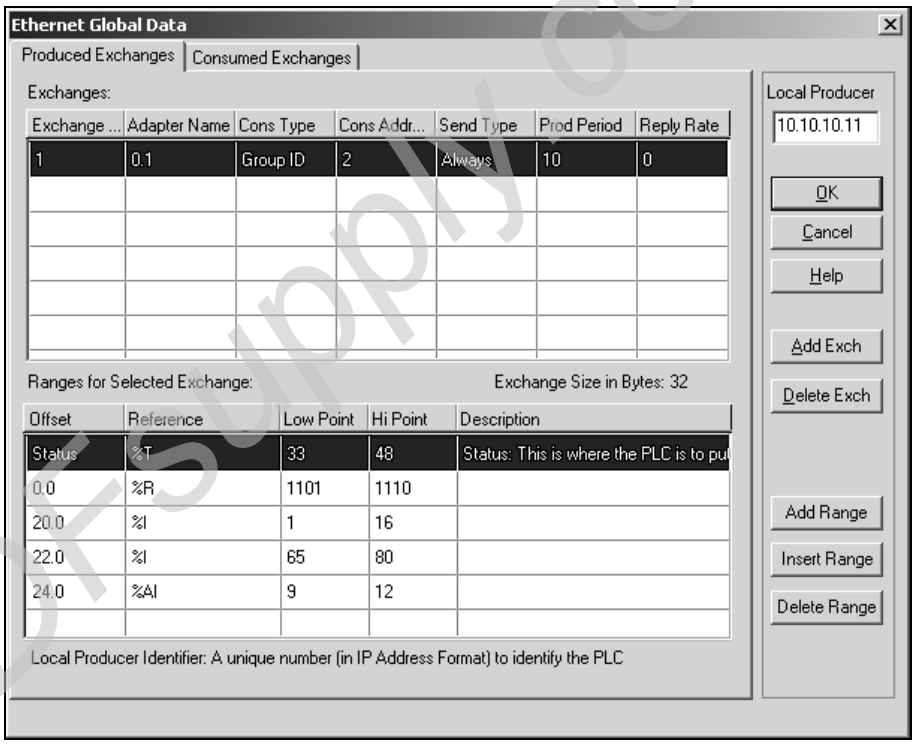
Feature	Description	Config. Default	Choices
IP Address	The IP Address is the unique address of the Ethernet interface as a node on the network.	0.0.0.0	A valid Class A, B, or C address
Subnet Mask	Subnet mask of the ENIU used to identify the section of the overall network the ENIU is on.	0.0.0.0	A valid dotted-notation mask.
Gateway IP Address	IP address of the default gateway (router) device to be used when the ENIU is unable to locate the desired remote device on the local sub-network.	0.0.0.0	A valid Class A, B, or C address in the same subnet as the ENIU.
ENET Status		%R4001	Fixed at %R4001.

Configuring an Ethernet NIU's Produced Exchange

Set up a Produced Ethernet Global Data exchange for the inputs the ENIU will send to the controller(s). This exchange will include all the discrete and analog inputs in the I/O Station. Even if the I/O Station has no input modules, it must still send an input message to report its status data (ENIU status data is described in chapter 3).



An example configuration screen is shown below:



Setting Up the Parameters of the ENIU's Produced Exchange

1. Enter the Exchange number. "1" is recommended
2. The Cons Type should be "Group ID".
3. Group ID should be 2.
4. The Produced Period should typically be 10 milliseconds. For small exchanges this can be made smaller, but it should not be less than 6. For very large exchanges, the Produced Period may need to be longer. This parameter should be tuned for best performance.

Setting Up the References for the ENIU's Produced Exchange

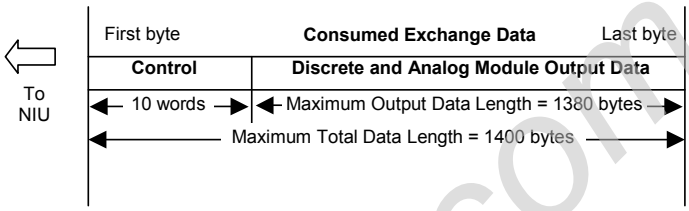
After establishing the parameters for a produced exchange, set up the data ranges in ENIU memory for the exchange. Click the Add Range button to add a range.

1. For Status, enter the location where the status of the Ethernet Global Data exchange will be placed in the ENIU's internal memory. The produced EGD exchange status must be assigned 16 bits of %T memory, from %T0033 to %T0048 as shown (see chapter 3 for more information about required references in the Ethernet NIU).
2. Add a range of 10 words for the I/O Station status data that the ENIU will send to the controller(s). The required range for this data is %R1101 to %R1110.
3. Add ranges as needed to configure the I/O Station discrete and analog inputs. These inputs must not duplicate or overlap any inputs in other NIUs or in the local CPU, as explained earlier in this chapter. The ranges entered will correspond to inputs %I and %AI that are configured in the hardware configuration of the ENIU. In most applications, the controller input references should match the references configured in the Ethernet NIU. It is not necessary to add a separate range for each input module in the I/O Station. Contiguous inputs can be grouped into ranges that include data from multiple modules. If there is a gap in the reference assignments, separate ranges must be configured as shown above.

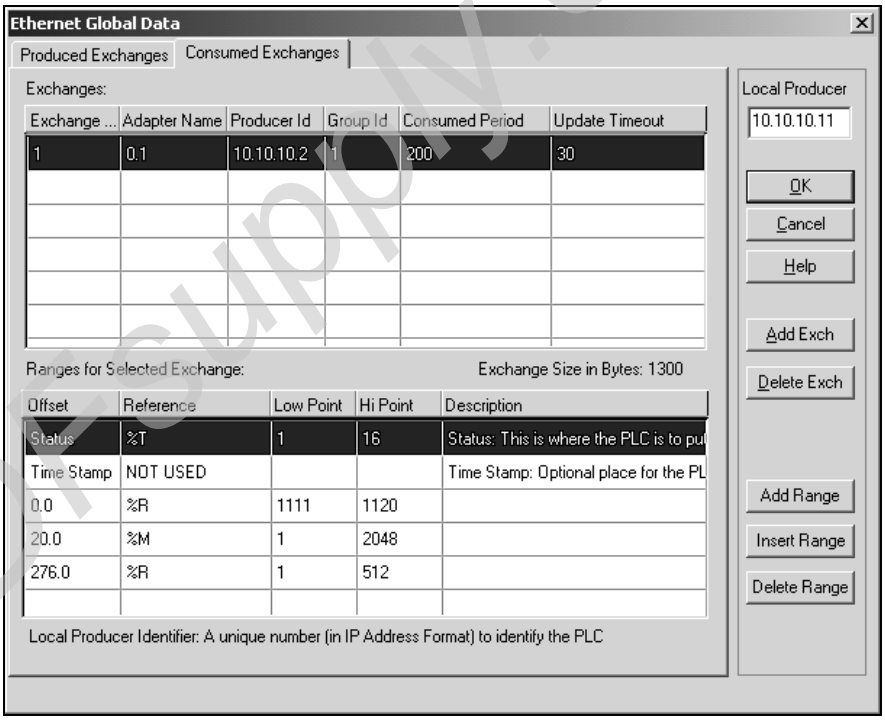
Configuring an Ethernet NIU's Consumed Exchange

Set up an Ethernet Global Data consumed exchange for output data the Ethernet NIU will receive from the controller or from the primary controller in a two-controller system. In a two-controller system, another consumed exchange must be configured in the Ethernet NIU for the secondary controller.

Even if the I/O Station does not have any output modules, it must consume an exchange from its controller(s) containing the control outputs (ENIU control data is described in chapter 3).



An example configuration screen is shown below:



Setting Up the Parameters of the Consumed Exchange

On the Consumed Exchanges tab:

1. The Exchange number must be "1"
2. The Adapter Name is 0.1 (this represents slot 0, rack 1).
3. Producer ID is the IP address of the primary controller. In this example, it is: 10.10.10.2
4. The Group ID should be "1".

5. The consumed period is not used and can be left at 200.
6. The update timeout for this example is 30 milliseconds. This parameter should be tuned for best performance. It should be 2.5 times greater than the Produced Period of the controller. For systems with very large configuration or with controller with lots of Ethernet traffic, the update timeout may need to be increased. If occassional timeouts are occuring on the ENIU communications increase the update timeout to 5 times the produced period of the controller.

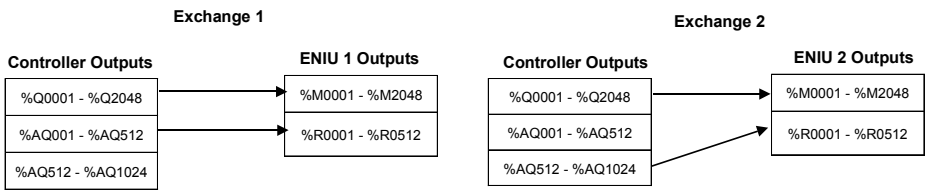
Setting Up the Ranges for the ENIU's Consumed Exchange

The I/O references portion of the configuration screen lists the assigned references and gives the offset of each from the start of the Ethernet NIU's consumed data exchange.

Offset	Reference	Low Point	Hi Point	Description
Status	%T	1	16	Status: This is where the PLC is to pul
Time Stamp	NOT USED			Time Stamp: Optional place for the PL
0.0	%R	1111	1120	
20.0	%M	1	2048	
276.0	%R	1	512	

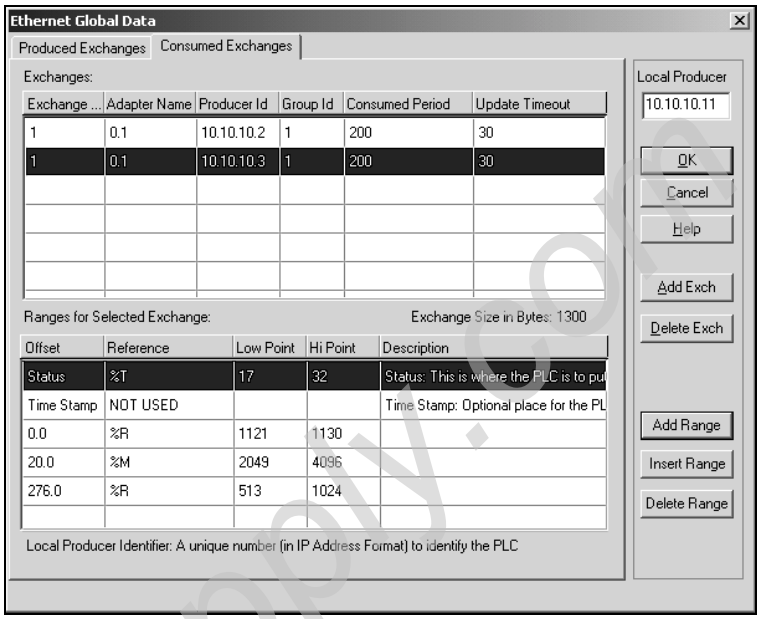
1. For Status, enter the location in the ENIU's internal memory where the status of the Ethernet Global Data exchange will be stored. This MUST be assigned 16 bits of %T memory, from %T0001 to %T0016. The Ethernet NIU firmware requires these specific addresses to operate.
2. Add a range of 10 words to contain command information from the controller, as explained in chapter 3. This range must be assigned references %R1111 to %R1120.
3. Add a range as shown above which receives the 2048 discrete outputs and puts them in %M1 through %M2048. If you choose to not send the full 2048 discrete outputs, then add ranges for the discrete outputs that are sent by the controller. These discrete outputs must go into the %M reference table at the matching offsets as in the produced end.
4. Add a range as shown above which receives the 512 analog outputs and puts them in %R1 through %R512 If you choose to not send the full 512 analog outputs, then add ranges for the analog outputs that are sent by the controller. These analog outputs must go into the %R reference table at the matching offsets as in the produced end.

   The Ethernet NIU can accommodate up to 512 analog outputs. If the control system includes multiple Ethernet NIUs that have a total of more than 512 analog outputs, the controller must use separate (and separately configured) exchanges to send the analog outputs. Therefore, some of the ENIUs must be configured with low and high points in %AQ memory that do not match the reference offsets used for the controller. Each exchange will send the same range of discrete outputs to all Ethernet NIUs as shown below.



Configuring the Ethernet NIU's Consumed Exchange from a Secondary Controller

In a two-controller system, a consumed exchange must also be configured from the secondary controller. The parameters and ranges for this exchange must correspond to the configuration of the consumed exchange from the primary controller, with the exceptions described below:



Setting Up the Parameters of the Consumed Exchange

On the Consumed Exchanges tab:

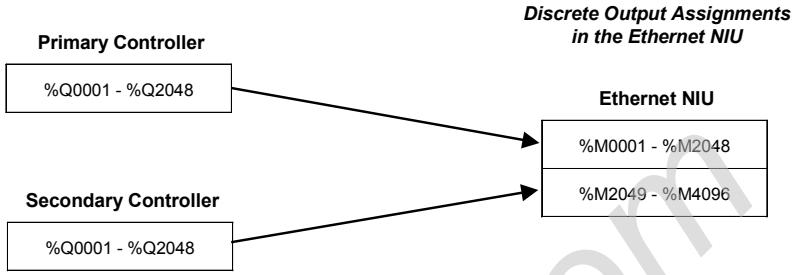
1. The Exchange number must be "1"
2. The Adapter Name is 0.1 (this represents slot 0, rack 1).
3. Producer ID is the IP address of the secondary controller. In this example, it is: 10.10.10.3
4. The Group ID should be "1".
5. The consumed period should be matched to the produced period configured for the exchange in the CPU.
6. The update timeout for this example is 30 milliseconds. This parameter should be tuned for best performance. It should be 2.5 times greater than the Produced Period of the controller.

Setting Up the Ranges for the ENIU's Consumed Exchange

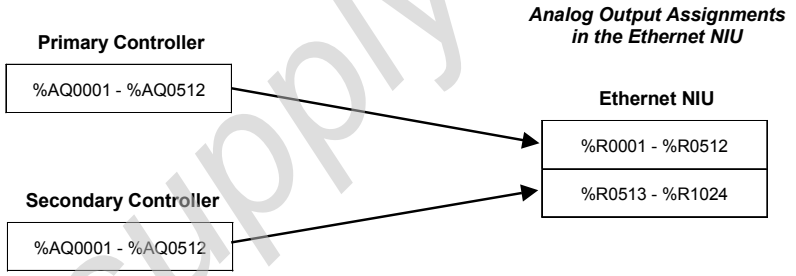
The I/O references portion of the configuration screen lists the assigned references and gives the offset of each from the start of the Ethernet NIU's consumed data exchange.

1. For Status, enter the location in the ENIU's internal memory where the status of the Ethernet Global Data exchange will be stored. This must be assigned 16 bits of %T memory, from %T0017 to %T0032. The Ethernet NIU firmware requires these specific addresses to operate.
2. Add a range of 10 words to contain command information from the secondary controller, as explained in chapter 3. This range must be assigned references %R1121 to %R1130.

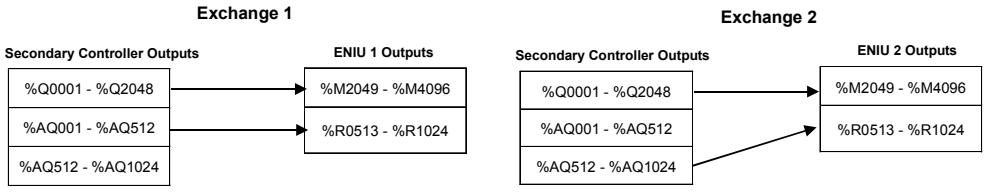
5. Add ranges as needed to configure the discrete outputs for the I/O Station. The Ethernet NIU stores discrete outputs from the primary controller in %Q memory, but it stores discrete outputs from the secondary controller in %M memory. Therefore, the discrete output ranges for the secondary controller should be assigned to %M instead of %Q memory as shown below.



6. Add I/O ranges as needed to configure the analog outputs for the I/O Station The Ethernet NIU stores analog outputs from the primary controller in %AQ memory, but it stores analog outputs from the secondary controller in %R memory. Therefore, the analog output ranges for the secondary controller should be assigned to %R instead of %AQ memory as shown below.

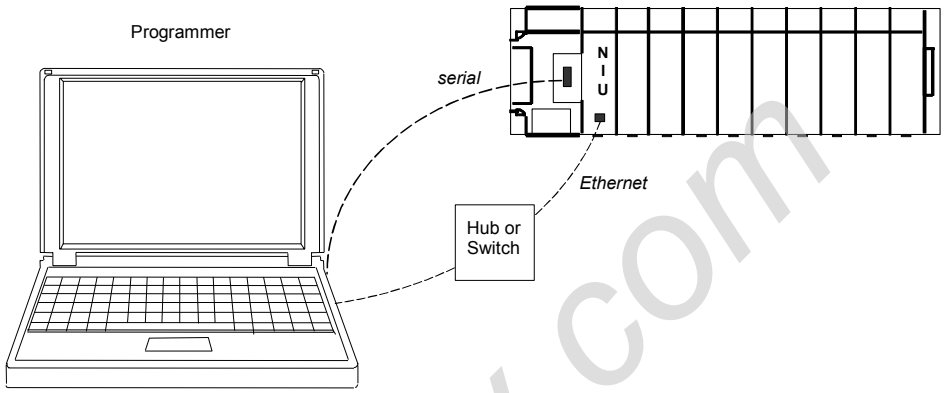


As mentioned earlier, the Ethernet NIU can accommodate up to 512 analog outputs. If the control system includes multiple Ethernet NIUs that have a total of more than 512 analog outputs, the controller must use separate (and separately configured) exchanges to send the analog outputs. When configuring the exchange from the secondary controller, some of the ENIUs must be configured with low and high points in %R memory that do not match the reference offsets used for the controller. Each exchange will send the same range of discrete outputs to all Ethernet NIUs as shown below.



Programmer Communications with the Ethernet NIU

After completing the configuration, it is stored from the programmer to the ENIU. A serial connection is required to store the initial configuration to the ENIU.



After establishing the IP Address of the ENIU in the initial configuration, an Ethernet connection can be used for subsequent communications between the programmer and the ENIU.

For serial communications, the computer can be connected to the 15-pin RS-485 compatible serial port on the I/O Station rack 0 power supply in the same way as for a Series 90-30 PLC CPU:

After completing the configuration as described on the following pages, the programmer can be used to:

- *Store* the configuration to the Ethernet NIU.
- *Load* a previously-stored configuration from the Ethernet NIU back to the programmer.
- Compare (*Verify)* a configuration file in the programmer with a configuration that was previously stored to the Ethernet NIU.
- *Clear* a previously-stored configuration from the ENIU. After a *Clear* function, the ENIU will remain at the same IP address with the same subnet mask and gateway IP address.

Chapter 5 Diagnostics

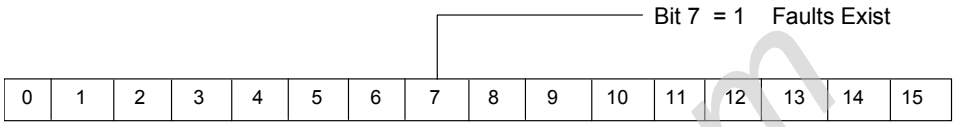
This chapter describes how to view and clear fault information about the Ethernet NIU.

- Using the Status and Control Data for Fault Monitoring
- Viewing the Fault Tables in the Ethernet NIU
- Using the Station Manager
  - Checking the IP Address of the Ethernet NIU
  - Testing communications on the network
  - Viewing the Exception Log
  - Checking the Network Connection
- What to do if you can't solve the problem

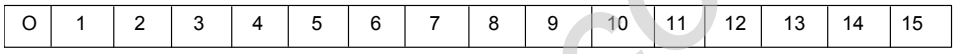
Using the Status and Control Data for Fault Monitoring

During system operation, the controller(s) should routinely monitor the status portion of each EGD consumed exchange to check for faults in the Ethernet NIUs in the system.

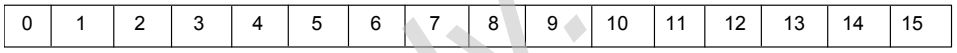
If bit 7 of a consumed exchange is set to 1, the fault should be investigated and corrected as described in this section.



Word 1: Status and Fault Data



Word 2: Copy of Control Data Word 2 (Application-based) from Primary Controller

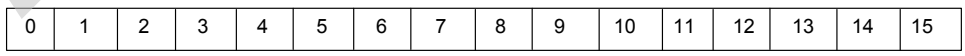


Word 3: Copy of Control Data Word 3 (Application-based) from Secondary Controller

Words 4 - 10: Reserved

The programmer can be used to view the Fault Table in the ENIU. After the condition that caused the fault condition has been corrected, the programmer can be used to clear the Fault Table or the application program in the controller can set bit 7 in the control data portion of its produced EGD exchange to clear the fault report. Setting this bit clears faults in ALL Ethernet NIUs that consume the same EGD exchange. If the system has a primary and secondary controller, only the exchange from the currently-active controller can be used to clear faults.

Word 1: Control Data



Word 2: Available for Use by Application

Words 3 – 10 should be set to zero

Viewing the Fault Tables in the Ethernet NIU

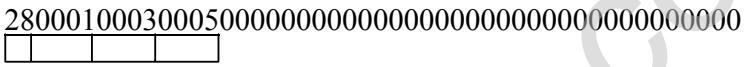
The Ethernet NIU maintains a "PLC" Fault Table and I/O Fault Table that can be accessed with a connected programmer.

The I/O Fault table lists faults associated with modules in the I/O Station, such as the loss or addition of a module.

The PLC fault table lists faults associated with the ENIU itself. Fault descriptions are listed on the next page. For each fault, see the "User Action" column for information about correcting the fault.

Viewing Extra Fault Data

In the PLC Fault Table, double-clicking the entry displays additional fault data as shown below:



The Station Manager utility can be used to view more detailed information about specific faults.

For the Ethernet NIU, the leftmost 14 digits of fault extra data (underlined in the example above) show the corresponding Log Event (2 digits) and Entries 2, 3, and 4 (in that order, 4 digits each). The example above is reporting an Event 28, Entry 2=1, Entry 3=3, and Entry 4=5.

PLC Fault Table Descriptions

PLC Fault	User Action
Backplane communications with PLC fault; lost request	If problem persists, contact GE Fanuc.
Bad local application request; discarded request	If problem persists, contact GE Fanuc.
Bad remote application request; discarded request	Try to validate the operation of the remote node. *
Can't locate remote node; discarded request	Error reported when message received where IP/MAC address cannot be resolved. Error may indicate that remote host is not operational on the network.
Comm_req - Bad task ID programmed	Internal request for unknown Ethernet Interface task.
Comm_req - Wait mode not allowed	Internal request error.
Config'd gateway addr bad; can't talk off local net	Error in configuration. Verify IP address, Subnetwork Mask, and default Gateway IP address are correct.
Connection to remote node failed; resuming without it	Underlying communications software detects error transferring data; resuming. If persistent error, check connection to LAN and operation of remote node.
LAN controller fault; restart LAN I/F	Hardware fault, perform power cycle. *
LAN controller Tx underflow; attempt recovery	Internal system error. *
LAN controller underrun/overrun; resuming	Internal system error. *
LAN data memory exhausted - check parms; resuming	The Ethernet NIU does not have free memory to process communications. *
LAN duplicate MAC Address; resuming	A frame was received in which the source MAC Address was the same as this station's MAC Address. Immediately isolate the offending station; it may be necessary to turn it off or disconnect it from the network. This station remains Online unless you intervene to take it Offline.
LAN I/F can't init - check parms; running soft Sw utl	Internal system error. *
LAN I/F capacity exceeded; discarded request	Verify that connection limits are not being exceeded.
LAN interface hardware failure; switched off network	Replace Ethernet NIU.
LAN network problem exists; performance degraded	Backlog of transmission requests due to excessive traffic on the network. For a sustained period the MAC was unable to send frames as quickly as requested. *
LAN severe network problem; attempting recovery	External condition prevented transmission of frame in specified time. Could be busy network or network problem. Check transceiver to make sure it is securely attached to the network. Check for unterminated trunk cable.
LAN system-software fault; aborted connection resuming	Internal system error. *
LAN system-software fault; restarted LAN I/F	Internal system error. *
LAN system-software fault; resuming	Internal system error. *
LAN transceiver fault; OFF network until fixed	Transceiver or transceiver cable failed or became disconnected. Reattach the cable or replace the transceiver cable. Check SQE test switch if present on transceiver.
Local request to send was rejected; discarded request	Internal error. Check that the Ethernet NIU is online.*
Memory backup fault; may lose config/log on restart	Internal error accessing FLASH device. * May need to replace Ethernet NIU.
Module software corrupted; requesting reload	Catastrophic internal system error. *
Module state doesn't permit Comm_req; discarded	Ethernet NIU cannot process request. Make sure Ethernet NIU is configured and online.
Unsupported feature in configuration	Attempt has been made to configure a feature not supported by the Ethernet NIU version.

- If this problem persists, contact GE Fanuc.

Using the Station Manager

The built-in Station Manager function of the Ethernet NIU provides additional tools for troubleshooting that are particularly useful during system startup.

Use of the Station Manager requires an operator interface device, either a computer running terminal emulation software or an ASCII terminal. The commands that can be used with the Station Manager are described in *the Station Manager User's Manual*. For PACSystems controllers, this manual is catalog number GFK-2225. For Series 90 systems, it is GFK-1186. Both manuals are available online at GEFanuc.com.

The Station Manager can be used to:

- Check the IP Address of the local Ethernet NIU.
- Make sure the IP Address is unique on the network.
- Display additional information about a node, such as its data rate and parity.
- Test communications on the network.
- View the Exception log, which lists the same types of faults as the PLC Fault Table.
- View communications errors with the TALLY command.
- Checking Exchanges with the Stat command.

Checking the IP Address of the Ethernet NIU

With the terminal connected directly to the Station Manager port on the Ethernet NIU, issue the NODE command:

```
> node
IC693NIU004 Embedded Ethernet
Copyright (c) 2004.  All rights reserved.
Version 1.02 (03A1) TCP/IP
Version 1.02 (03A1) Loader
IP Address = 10.0.0.2        Subnet Mask = 255.255.0.0
Gateway = 0.0.0.0
MAC Address = <<080019010203>>
SNTP Not Configured

Station Manager Port:
  Data Rate = 9600,  Parity = NONE,  Flow Control = NONE

Source of Soft Switches: PLC Configuration
Source of IP Address:    Configuration

Apr 28, 2004  0:11:19.2
Date/time initialized from PLC CPU
```

The NODE command also displays other identifying information about the Ethernet NIU as shown above.

Verifying that the IP Address of the Ethernet NIU is Unique

Make sure the Ethernet NIU does not have the same IP address as another node.

1. Disconnect the LAN cable from the Ethernet NIU.
2. Log on to another device on the network
3. From the other device, ping the IP address assigned to the Ethernet NIU.

If you get an answer to the ping, it means the chosen IP address is already in use by another node. You *must* correct this situation by assigning unique IP addresses.

Testing Communications on the Network

During system setup, use the Station Manager to test each installed Ethernet device to be sure that each is operational and configured with proper TCP/IP parameters. To do that:

1. Enter the LOGIN command:

   login

   The password prompt appears:

   Password:

2. The factory default password is:

   system (lower case).

   Enter the default password, or other password if it has been changed.

3. If the password matches the current password for the Modify level, the Modify prompt appears:

   =

4. Use the PING command to test the ability to reach individual nodes. The test works by sending an ICMP echo request message to a specific destination and waiting for a reply. Most nodes on TCP/IP networks implement *ping*.

   PING can reach remote IP networks through gateways.

   Enter the PING command using the IP address for the destination to be tested. A typical PING command is shown below:

```
= ping 10.0.0.2 10
Ping initiated

<<< Ping Results >>>
Command:  ping  10.0.0.2  10  100  64
Sent = 10, Received = 10, No Timely Response = 0
Late/Stray Responses = 0
Round—trip (ms)  min/avg/max  0/1/10
```

Viewing the Exception Log

When the Ethernet NIU detects an unusual condition, it records information about the condition in its *exception log*. The exception log can be viewed using the Station Manager LOG command. For example:

```
> log
<<< Exception Log >>>
IC693NIU004 Embedded Ethernet Interface version 1.02 (03A1)
Log displayed 04-APR-2004  11:25:28.3
Log initialized using valid RAM information
Log last cleared 31-MAR-2004  09:33:46.9
  Date         Time         Event Count  Entry 2 through Entry 6
  03-APR-2004  09:33:47.0     1H    1H   0000H 0001H 0000H 0000H 0000H
  03-APR-2004  09:33:47.0     0H    1H   MII/PHY Fail
  03-APR-2004  14:01:22.2    20H    1H   0001H 0000H 0000H 0001H 0117H
->03-APR-2004  09:33:47.2    2aH    1H   0004H 0000H 0000H 0004H 0192H
```

Each new (not repeating) log event is also sent to the PLC Fault Table, where it can be viewed using the programming software.

The Station Manager LOG command returns the time/date of each exception event, a hexadecimal code that identifies the fault type (for example, 28H for an Ethernet Global Data fault), a count, and additional data in entries 2 through 6. When an error occurs, this information may pinpoint the cause more precisely than the PLC Fault Table display.

Checking the Network Connection

If the LAN LED is off, the Ethernet NIU is not able to send or receive on the network. The usual cause is some type of hardware problem. If this occurs, follow the procedure below.

1. Check to be sure that the network cables are securely fastened to the Ethernet NIU and to the network connection device (hub, switch, etc.).
2. Use the Station Manager to check the network interface task using a TALLY L command. The TALLY L command displays a list of tallies for all network interface tasks, and will identify specific communications errors that may be occurring.

If the Ethernet NIU is the only device experiencing problems:

1. Be sure the network cable is properly connected to the Ethernet NIU and to the network connection device.
2. Verify that the network connection device is operating properly on the network. (Are other devices operating on the same network segment?)
3. Make sure the Ethernet NIU is seated and secured properly.
4. Replace the network cable with a known good cable.
5. Verify that the system power supply is properly grounded.

If all stations are experiencing the problem, the network is probably at fault. Contact the network administrator.

Checking Exchanges with the STAT Command

The existence and correct operation of Exchanges can be checked using the STAT command

Using the Station Manager, type STAT G

The Station Manager will show the configured exchanges for this device, show their status and indicate the number of exchanges that have occurred.

```
> stat g
<<< EGD Status >>>   01-JAN-2000  11:02:40.0

        Transfers
Ndx     Producer ID      Exchange ID  Mode        State
        Completed
 0H        10.10.10.3             1  CONSUMER    ACTIVE(00H)    1379368
 1H        10.10.10.2             1  CONSUMER    ACTIVE(00H)    1447992
 2H       10.10.10.11             1  PRODUCER    ACTIVE(01H)    1399605
```

The State column indicates whether the Exchange is active or idle and gives a code in hexadecimal that indicates the status.

For Produced Exchanges, (01H) indicates the exchange is being sent

For Consumed exchanges

00H and 01H indicate the exchange is being received properly and on time

06H indicates the exchange is not being received

0eH indicates the exchange is being received but the number of bytes received is different than expected, exchange is not being used due to a length error.

When the STAT LED is ON

Sometimes problems can occur even when the STAT LED is on indicating normal operation. In that case, check if the LAN LED is steadily on, indicating that the Ethernet NIU is successfully attached to the Ethernet network, but there is no network activity.

To find out whether the Ethernet interface component in the Ethernet NIU can access the module's CPU, issue successive TALLY C commands. If the *PlcSweep* tally is not increasing, there are no windows being provided by the CPU. If any of the following tallies: *PlcAbt*, *MyAbt*, or *Timeout* are incrementing, there may be a hardware problem with the backplane interface. Check the PLC Fault Table entries.

If You Can't Solve the Problem

If you are not able to solve the problem, call GE Fanuc Automation. Please have the following information available when you call.

1. The name and catalog number marked on the module
2. Description of symptoms of problem. Depending on the problem, you may also be asked for the following information:
   - The application program and the PLC sweep time at the time the problem occurred.
   - A list of the configuration parameters for the Ethernet device that failed.
   - A list of reported errors. This can be the contents of the Ethernet exception log, the contents of the PLC Fault Table, or both.
   - A description of the network configuration. This should include the following:
     - The number of systems accessing the network
     - The type of network cable used (for example, twisted pair, fiber optic, etc.)
     - The length of network cable
     - The manufacturer and quantity of hubs and network switches.

Appendix A

Setting Up Output Defaults

This section explains how to establish output defaults for applications where needed.

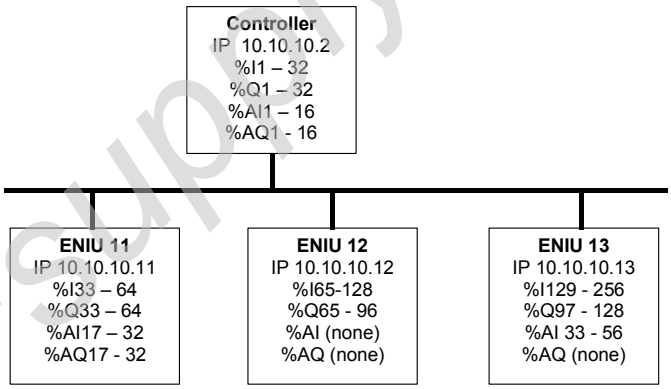
1. In CIMPLICITY Machine Edition, select the Variable Table and locate the Ethernet NIU variables. The variables are in a table of the form <Devicename><variable name>
2. In the ENIU section, locate the particular output (Qxxxx or AQxxxx) that is to be given a default value. If unable to locate a variable with the current reference address, create a new variable and give it the desired address. A range of new variables with sequential addresses can be generated using the Duplicate command available by right-click.
3. If creating output variables (Qxxxx) you must set the Retentive property to True or the Default value will not be stored properly.
4. Do not execute the command to delete unused variable as this will delete your added variables and initial values.
5. In the properties of the selected variable, change the Initial Value to the desired default value.
6. Download to the ENIU while CIMPLICITY ME is online. The initial values will be downloaded and also stored to flash. Default values are loaded into a holding buffer from flash when the ENIU starts up.

Appendix B Quick Start Guide

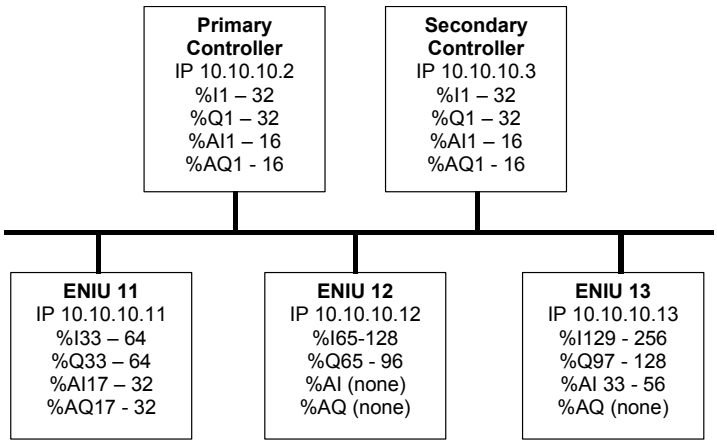
This appendix uses an example system with either one or two controllers to give an overview of the steps needed to set up an Ethernet NIU application.

1. Create List of ENIUs and I/O like the example shown below. The list should include:
   - the Controller(s) with IP addresses and local I/O.
   - Each ENIU with IP Address, and the I/O for the ENIU. Leave expansion space for additional I/O if the system is likely to change or grow.

Example System with One Controller



Example System with Redundant Controllers



2. A set of CIMPLICITY ME backup folders to start from is provided online at www.gefanuc.com. Go to:

   <GE Fanuc Technical Support > Controllers & I/O > Series 90-30 > Downloads>

   File Description - IC693NIU004 Quick Start Example Folders
   File Name - 30ENIUQuickStart.zip

   Choose the folder that best matches your system configuration:

   - 30ENIU_Quick_Start_One_RX7i – Primary Controller and 3 ENIUs
   - 30ENIU_Quick_Start_Two_RX7i – Primary & Secondary Controller and 3 ENIUs
   - 30ENIU_Quick_Start_One_9070– Primary Controller and 3 ENIUs
   - 30ENIU_Quick_Start_Two_9070– Primary & Secondary Controller and 3 ENIUs
   - 30ENIU_Quick_Start_One_9030– Primary Controller and 3 ENIUs
   - 30ENIU_Quick_Start_Two_9030– Primary & Secondary Controller and 3 ENIUs

3. Restore the chosen folder.

4. The Quick Start project is set up with controllers named Primary Controller and Secondary Controller (two only) and 3 ENIUs named ENIU11, ENIU12, ENIU13. You can rename the folder and the devices as appropriate. If you need fewer ENIUs, delete the ones you don't need. If you need more ENIUs, select hardware configuration of a ENIU, right click and export the configuration. Create a new target, select hardware configuration, right click and import the hardware configuration. You will need to adjust the IP address before proceeding to the next step.

5. Using the list you created in step 1, change the hardware configuration for the controllers and ENIU to match the I/O in your project. Check the CPU model for the controller and change it if necessary. Make sure the I/O reference addresses are correct.

6. Adjust the Produced exchange of the ENIUs and the Consumed exchange of the Controller(s) to match the %I and %AI in the hardware configuration of the ENIUs.

7. If you are changing the IP addresses of the devices, you need to change the following items:
   - the IP address of each device. This must be done in two places: in the properties of the device (how programmer connects) and in the Ethernet settings in hardware configuration.
   - the Subnet mask of each device (if required).
   - the Gateway IP address of each device (if required).
   - Check the Local Producer ID of each device and verify it is the IP address.
   - For Consumed Exchanges, change the Producer ID of the Exchange

8. Set default values for variables.

9. Download configurations to the hardware.

   When downloading to new or unknown hardware, first set the physical port property of the device in the programmer to a serial com port (com1) and connect via a serial cable to the power supply port. After the initial store of the configuration sets the IP Address, the physical port property can be set to Ethernet and the IP address entered. This will allow connection of the programmer via Ethernet.