



Where Automation Connects.



inRAX[®]
MVI56-GEC
ControlLogix Platform
Generic ASCII Ethernet
Communication Module

October 8, 2010

USER MANUAL

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MVI56-GEC User Manual

October 8, 2010

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ProSoft Technology[®] Product Documentation

In an effort to conserve paper, ProSoft Technology no longer includes printed manuals with our product shipments. User Manuals, Datasheets, Sample Ladder Files, and Configuration Files are provided on the enclosed CD-ROM, and are available at no charge from our web site: www.prosoft-technology.com

Printed documentation is available for purchase. Contact ProSoft Technology for pricing and availability.

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Latin America: +1.281.298.9109

Important Installation Instructions

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

- A** WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV. 2;
- B** WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES
- C** WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
- D** THIS DEVICE SHALL BE POWERED BY CLASS 2 OUTPUTS ONLY.

MVI (Multi Vendor Interface) Modules

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DÉCONNECTER L'ÉQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

Warnings

North America Warnings

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

- A** Warning - Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2.
- B** Warning - Explosion Hazard - When in hazardous locations, turn off power before replacing or rewiring modules.
- C** Warning - Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Avertissement - Risque d'explosion - Avant de déconnecter l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.

- D** Suitable for use in Class I, Division 2 Groups A, B, C and D Hazardous Locations or Non-Hazardous Locations.

ATEX Warnings and Conditions of Safe Usage

Power, Input, and Output (I/O) wiring must be in accordance with the authority having jurisdiction.

- A** Warning - Explosion Hazard - When in hazardous locations, turn off power before replacing or wiring modules.
- B** Warning - Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- C** These products are intended to be mounted in an IP54 enclosure. The devices shall provide external means to prevent the rated voltage being exceeded by transient disturbances of more than 40%. This device must be used only with ATEX certified backplanes.
- D** DO NOT OPEN WHEN ENERGIZED.

Battery Life Advisory

The MVI46, MVI56, MVI56E, MVI69, and MVI71 modules use a rechargeable Lithium Vanadium Pentoxide battery to backup the real-time clock and CMOS. The battery should last for the life of the module. The module must be powered for approximately twenty hours before the battery becomes fully charged. After it is fully charged, the battery provides backup power for the CMOS setup and the real-time clock for approximately 21 days. When the battery is fully discharged, the module will revert to the default BIOS and clock settings.

Note: The battery is not user replaceable.

Markings

Electrical Ratings

- Backplane Current Load: 800 mA @ 5.1 Vdc; 3 mA @ 24 Vdc
- Operating Temperature: 0°C to 60°C (32°F to 140°F)
- Storage Temperature: -40°C to 85°C (-40°F to 185°F)
- Shock: 30 g, operational; 50 g, non-operational; Vibration: 5 g from 10 Hz to 150 Hz
- Relative Humidity: 5% to 95% (without condensation)
- All phase conductor sizes must be at least 1.3 mm(squared) and all earth ground conductors must be at least 4mm(squared).

Label Markings

ATEX

II 3 G

EEx nA IIC T6

0°C ≤ Ta ≤ 60°C

cULus

E183151

Class I Div 2 Groups A,B,C,D

T6

-30°C ≤ Ta ≤ 60°C

Agency Approvals and Certifications

Agency	Applicable Standard
RoHS	
CE	EMC-EN61326-1:2006; EN61000-6-4:2007
ATEX	EN60079-15:2003
cULus	UL508; UL1604; CSA 22.2 No. 142 & 213
CB Safety	CA/10533/CSA IEC 61010-1 Ed.2; CB 243333-2056722 (2090408)
GOST-R	EN 61010
CSA	EN 61010

RoHS



ME06



E18315

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Guide to the MVI56-GEC User Manual

Function		Section to Read	Details
Introduction (Must Do)	→	Start Here (page 11)	This section introduces the customer to the module. Included are: package contents, system requirements, hardware installation, and basic configuration.
Diagnostic and Troubleshooting	→	Diagnostics and Troubleshooting (page 53)	This section describes Diagnostic and Troubleshooting procedures.
Reference Product Specifications Functional Overview	→	Reference (page 67) Product Specifications (page 68) Functional Overview (page 71)	These sections contain general references associated with this product, Specifications, and the Functional Overview.
Support, Service, and Warranty Index	→	Support, Service and Warranty (page 97) Index	This section contains Support, Service and Warranty information. Index of chapters.

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To get the most benefit from this User Manual, you should have the following skills:

- **Rockwell Automation® RSLogix™ software:** launch the program, configure ladder logic, and transfer the ladder logic to the processor
- **Microsoft Windows:** install and launch programs, execute menu commands, navigate dialog boxes, and enter data
- **Hardware installation and wiring:** install the module, and safely connect Generic Ethernet ASCII and ControlLogix devices to a power source and to the MVI56-GEC module's application port(s)

1.1 System Requirements

The MVI56-GEC module requires the following minimum hardware and software components:

- Rockwell Automation ControlLogix™ processor, with compatible power supply and one free slot in the rack, for the MVI56-GEC module. The module requires 800 mA of available power.
- Rockwell Automation RSLogix 5000 programming software version 2.51 or higher
- Rockwell Automation RSLinx communication software
- Pentium® II 450 MHz minimum. Pentium III 733 MHz (or better) recommended
- Supported operating systems:
 - Microsoft Windows XP Professional with Service Pack 1 or 2
 - Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3
 - Microsoft Windows Server 2003
- 128 Mbytes of RAM minimum, 256 Mbytes of RAM recommended
- 100 Mbytes of free hard disk space (or more based on application requirements)
- 256-color VGA graphics adapter, 800 x 600 minimum resolution (True Color 1024 × 768 recommended)
- CD-ROM drive
- ProSoft Configuration Builder, HyperTerminal or other terminal emulator program.

Note: You can install the module in a local or remote rack. For remote rack installation, the module requires EtherNet/IP or ControlNet communication with the processor.

1.2 Package Contents

The following components are included with your MVI56-GEC module, and are all required for installation and configuration.

Important: Before beginning the installation, please verify that all of the following items are present.

Qty.	Part Name	Part Number	Part Description
1	MVI56-GEC Module	MVI56-GEC	Generic ASCII Ethernet Communication Module
1	Cable	Cable #15 - RS232 Null Modem	For RS232 between a Personal Computer (PC) and the CFG port of the module
1	Cable	Cable #14 - RJ45 to DB9 Male Adapter	For connecting the module's port to Cable #15 for RS-232 connections
1	inRAX Solutions CD		Contains sample programs, utilities and documentation for the MVI56-GEC module.

If any of these components are missing, please contact ProSoft Technology Support for replacement parts.

1.3 Installing ProSoft Configuration Builder Software

You must install the *ProSoft Configuration Builder (PCB)* software to configure the module. You can always get the newest version of *ProSoft Configuration Builder* from the ProSoft Technology website.

Installing ProSoft Configuration Builder from the ProSoft website

- 1 Open your web browser and navigate to *http://www.prosoft-technology.com/pcb*
- 2 Click the **DOWNLOAD HERE** link to download the latest version of *ProSoft Configuration Builder*.
- 3 Choose **SAVE** or **SAVE FILE** when prompted.
- 4 Save the file to your *Windows Desktop*, so that you can find it easily when you have finished downloading.
- 5 When the download is complete, locate and open the file, and then follow the instructions on your screen to install the program.

If you do not have access to the Internet, you can install *ProSoft Configuration Builder* from the *ProSoft Solutions Product CD-ROM*, included in the package with your module.

Installing ProSoft Configuration Builder from the Product CD-ROM

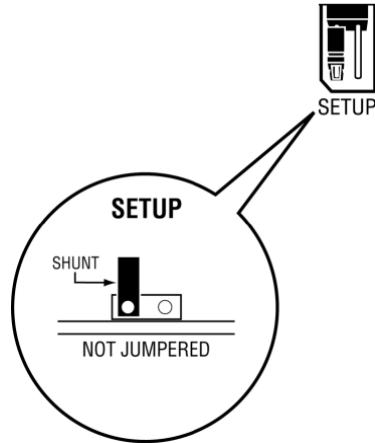
- 1 Insert the *ProSoft Solutions Product CD-ROM* into the CD-ROM drive of your PC. Wait for the startup screen to appear.
- 2 On the startup screen, click **PRODUCT DOCUMENTATION**. This action opens a *Windows Explorer* file tree window.
- 3 Click to open the **UTILITIES** folder. This folder contains all of the applications and files you will need to set up and configure your module.
- 4 Double-click the **SETUP CONFIGURATION TOOL** folder, double-click the **PCB_*.EXE** file and follow the instructions on your screen to install the software on your PC. The information represented by the "*" character in the file name is the *PCB* version number and, therefore, subject to change as new versions of *PCB* are released.

Note: Many of the configuration and maintenance procedures use files and other utilities on the CD-ROM. You may wish to copy the files from the Utilities folder on the CD-ROM to a convenient location on your hard drive.

1.4 Setting Jumpers

The Setup Jumper acts as "write protection" for the module's flash memory. In "write protected" mode, the Setup pins are not connected, and the module's firmware cannot be overwritten. Do not jumper the Setup pins together unless you are directed to do so by ProSoft Technical Support.

The following illustration shows the MVI56-GEC jumper configuration.



Note: If you are installing the module in a remote rack, you may prefer to leave the Setup pins jumpered. That way, you can update the module's firmware without requiring physical access to the module.

1.5 Installing the Module in the Rack

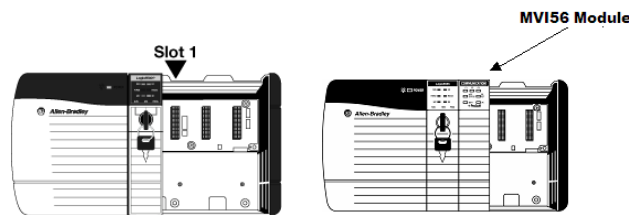
If you have not already installed and configured your ControlLogix processor and power supply, please do so before installing the MVI56-GEC module. Refer to your Rockwell Automation product documentation for installation instructions.

Warning: You must follow all safety instructions when installing this or any other electronic devices. Failure to follow safety procedures could result in damage to hardware or data, or even serious injury or death to personnel. Refer to the documentation for each device you plan to connect to verify that suitable safety procedures are in place before installing or servicing the device.

After you have checked the placement of the jumpers, insert MVI56-GEC into the ControlLogix chassis. Use the same technique recommended by Rockwell Automation to remove and install ControlLogix modules.

Warning: When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Verify that power is removed or the area is non-hazardous before proceeding. Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

- 1 Turn power OFF.
- 2 Align the module with the top and bottom guides, and slide it into the rack until the module is firmly against the backplane connector.

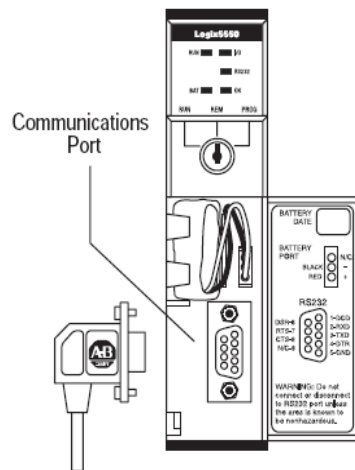


- 3 With a firm but steady push, snap the module into place.
- 4 Check that the holding clips on the top and bottom of the module are securely in the locking holes of the rack.
- 5 Make a note of the slot location. You must identify the slot in which the module is installed in order for the sample program to work correctly. Slot numbers are identified on the green circuit board (backplane) of the ControlLogix rack.
- 6 Turn power ON.

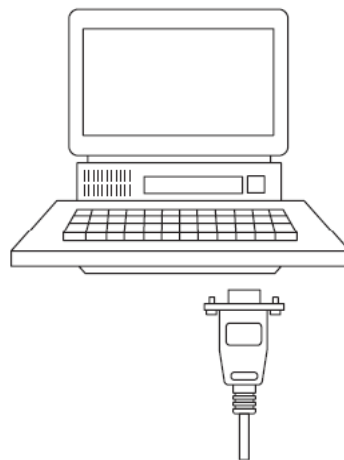
1.6 Connecting Your PC to the ControlLogix Processor

There are several ways to establish communication between your PC and the ControlLogix processor. The following steps show how to establish communication through the serial interface. It is not mandatory that you use the processor's serial interface. You may access the processor through whatever network interface is available on your system. Refer to your Rockwell Automation documentation for information on other connection methods.

- 1 Connect the right-angle connector end of the cable to your controller at the communications port.



- 2 Connect the straight connector end of the cable to the serial port on your computer.



1.7 Opening the Sample Ladder Logic

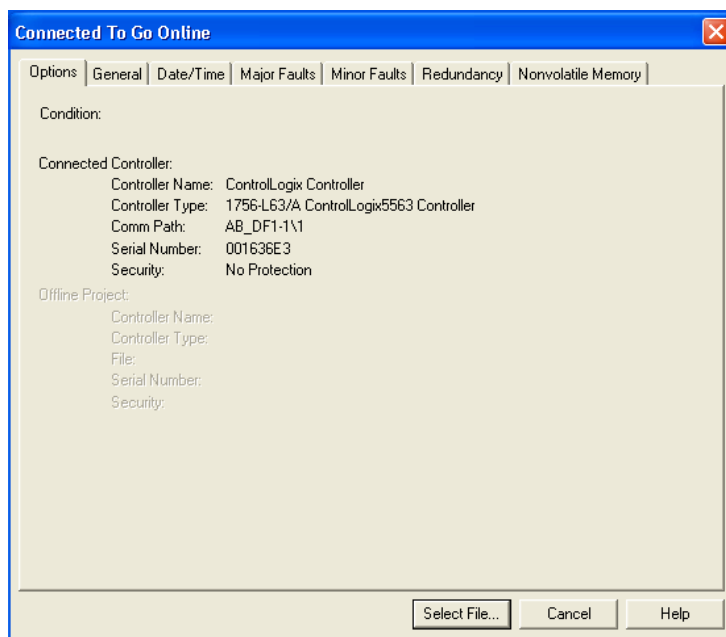
The sample program for your MVI56-GEC module includes custom tags, data types and ladder logic for data I/O and status monitoring. For most applications, you can run the sample ladder program without modification, or, for advanced applications, you can incorporate the sample program into your existing application.

The *inRAX Solutions CD* provides one or more versions of the sample ladder logic. The version number appended to the file name corresponds with the firmware version number of your ControlLogix processor. The firmware version and sample program version must match.

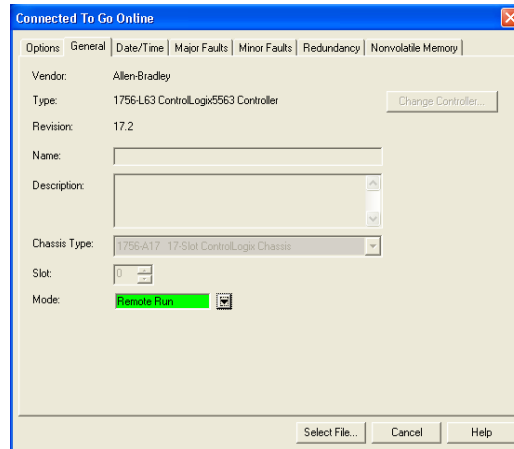
1.7.1 Determining the Firmware Version of Your Processor

Important: The RSLinx service must be installed and running on your computer in order for RSLogix to communicate with the processor. Refer to your RSLinx and RSLogix documentation for help configuring and troubleshooting these applications.

- 1 Connect an RS-232 serial cable from the COM (serial) port on your PC to the communication port on the front of the processor.
- 2 Start RSLogix 5000 and close any existing project that may be loaded.
- 3 Open the **COMMUNICATIONS** menu and choose **GO ONLINE**. RSLogix will establish communication with the processor. This may take a few moments.
- 4 When RSLogix has established communication with the processor, the *Connected To Go Online* dialog box will open.



- 5 On the *Connected To Go Online* dialog box, click the **GENERAL** tab. This tab shows information about the processor, including the *Revision* (firmware) version. In the following illustration, the firmware version is 17.2.

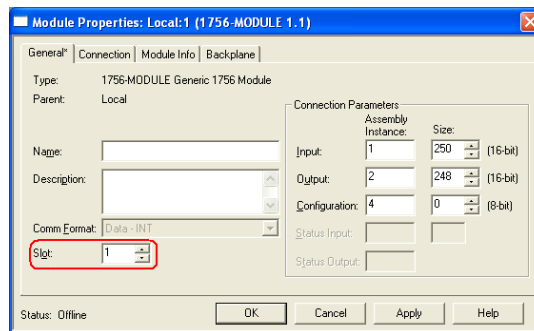


1.7.2 Selecting the Slot Number for the Module

This sample application is for a module installed in Slot 1 in a ControlLogix rack. The ladder logic uses the slot number to identify the module. If you are installing the module in a different slot, you must update the ladder logic so that program tags and variables are correct, and do not conflict with other modules in the rack.

Changing the slot number

- 1 In the *Controller Organization* list, select the module and then click the right mouse button to open a shortcut menu.
- 2 On the shortcut menu, choose **PROPERTIES**. This action opens the *Module Properties* dialog box.

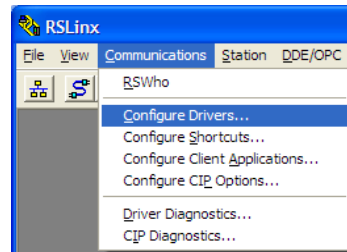


- 3 In the *Slot* field, use the spinners on the right side of the field to select the slot number where the module will reside in the rack, and then click **OK**.
RSLogix will automatically apply the slot number change to all tags, variables and ladder logic rungs that use the MVI56-GEC slot number for computation.

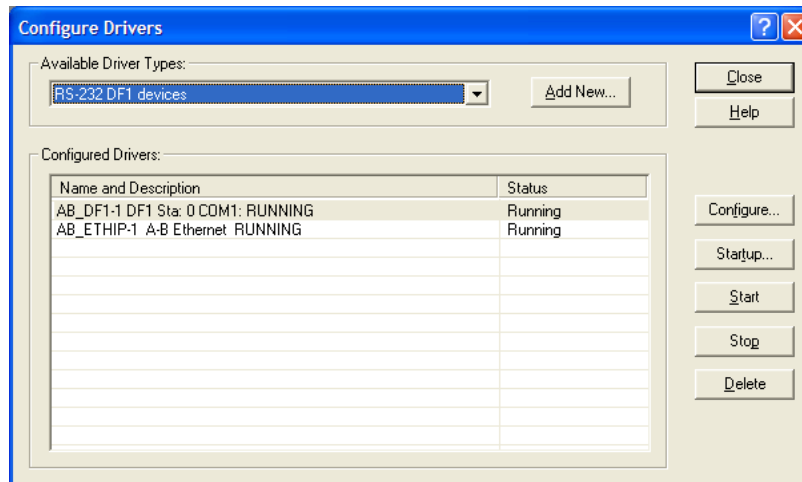
1.7.3 Configuring the RSLogix Driver for the PC COM Port

If RSLogix is unable to establish communication with the processor, follow these steps.

- 1 Open *RSLogix*.
- 2 Open the **COMMUNICATIONS** menu, and choose **CONFIGURE DRIVERS**.

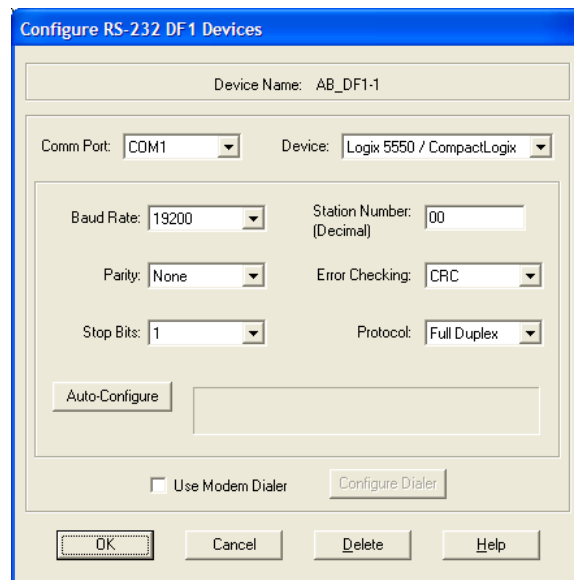


This action opens the *Configure Drivers* dialog box.



Note: If the list of configured drivers is blank, you must first choose and configure a driver from the Available Driver Types list. The recommended driver type to choose for serial communication with the processor is *RS-232 DF1 Devices*.

- 1 Click to select the driver, and then click **CONFIGURE**. This action opens the *Configure RS-232 DF1 Devices* dialog box.



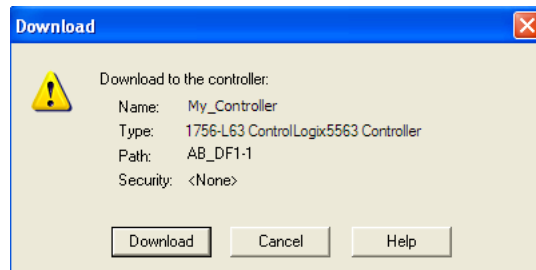
- 2 Click the **AUTO-CONFIGURE** button. *RSLogix* will attempt to configure your serial port to work with the selected driver.
- 3 When you see the message *Auto Configuration Successful*, click the **OK** button to dismiss the dialog box.

Note: If the auto-configuration procedure fails, verify that the cables are connected correctly between the processor and the serial port on your computer, and then try again. If you are still unable to auto-configure the port, refer to your *RSLogix* documentation for further troubleshooting steps.

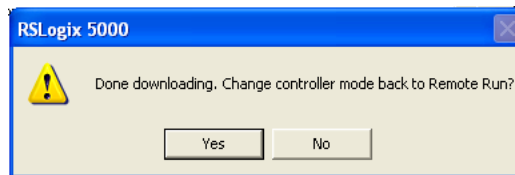
1.8 Downloading the Sample Program to the Processor

Note: The key switch on the front of the ControlLogix processor must be in the REM or PROG position.

- 1 If you are not already online with the processor, open the *Communications* menu, and then choose **DOWNLOAD**. RSLogix 5000 will establish communication with the processor. You do not have to download through the processor's serial port, as shown here. You may download through any available network connection.
- 2 When communication is established, RSLogix 5000 will open a confirmation dialog box. Click the **DOWNLOAD** button to transfer the sample program to the processor.



- 3 RSLogix 5000 will compile the program and transfer it to the processor. This process may take a few minutes.
- 4 When the download is complete, RSLogix 5000 will open another confirmation dialog box. If the key switch is in the REM position, click **OK** to switch the processor from PROGRAM mode to RUN mode.

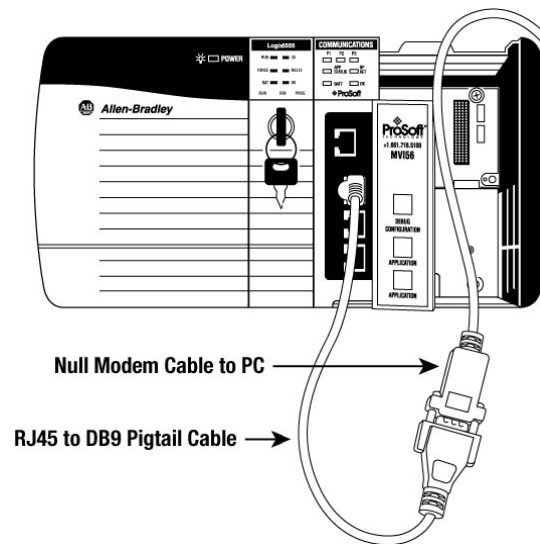


Note: If you receive an error message during these steps, refer to your RSLogix documentation to interpret and correct the error.

1.9 Connecting your PC to the Module

With the module securely mounted, connect your PC to the *Configuration/Debug* port using an RJ45-DB-9 Serial Adapter Cable and a Null Modem Cable.

- 1 Attach both cables as shown.
- 2 Insert the RJ45 cable connector into the Configuration/Debug port of the module.
- 3 Attach the other end to the serial port on your PC.



2 **Configuring the MVI56-GEC Module**

In This Chapter

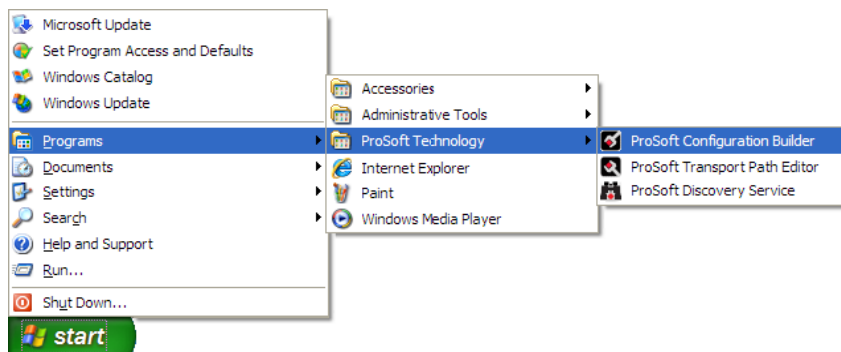
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2.1 Using ProSoft Configuration Builder

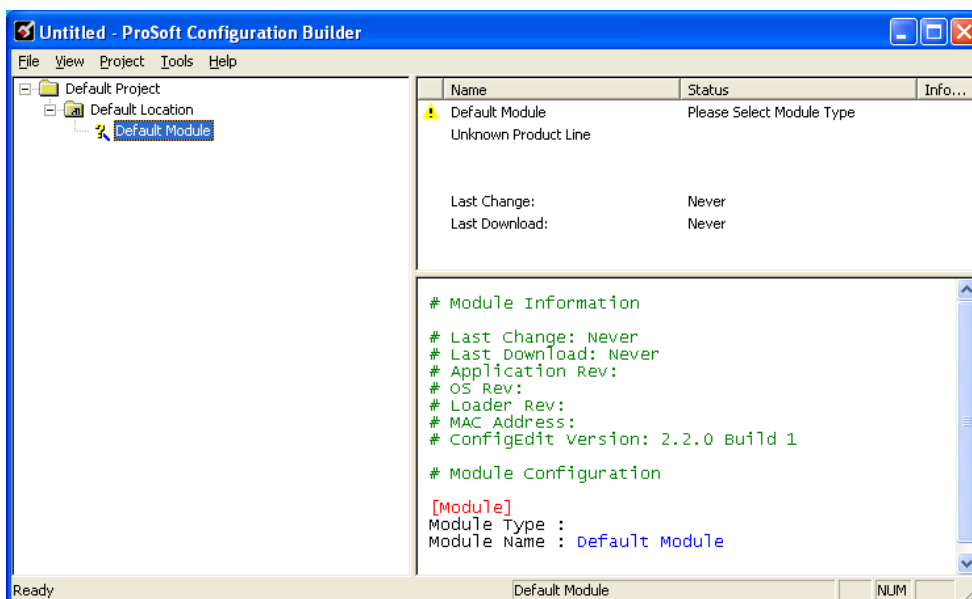
ProSoft Configuration Builder (PCB) provides a quick and easy way to manage module configuration files customized to meet your application needs. *PCB* is not only a powerful solution for new configuration files, but also allows you to import information from previously installed (known working) configurations to new projects.

2.1.1 Setting Up the Project

To begin, start **PROSOFT CONFIGURATION BUILDER (PCB)**.

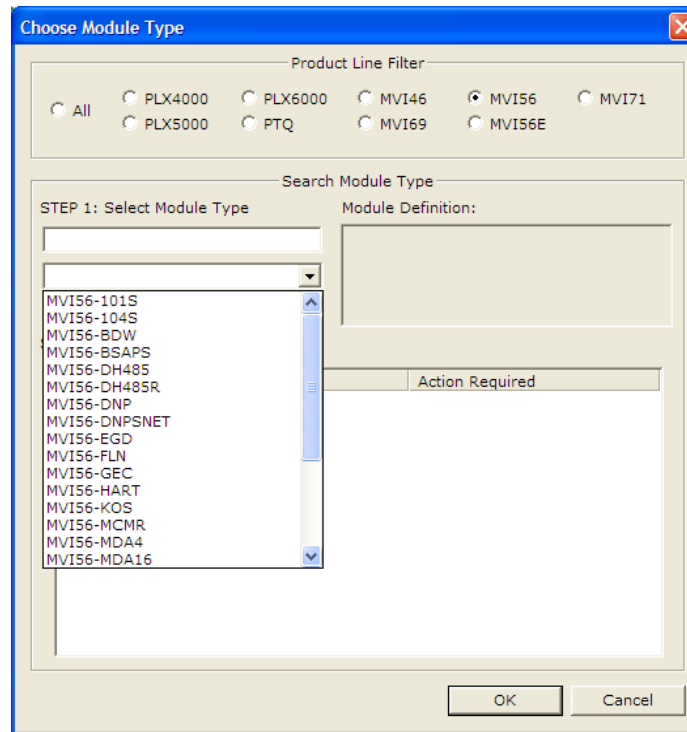


If you have used other Windows configuration tools before, you will find the screen layout familiar. *PCB*'s window consists of a tree view on the left, and an information pane and a configuration pane on the right side of the window. When you first start *PCB*, the tree view consists of folders for *Default Project* and *Default Location*, with a *Default Module* in the *Default Location* folder. The following illustration shows the *PCB* window with a new project.



Adding the MVI56-GEC module to the project

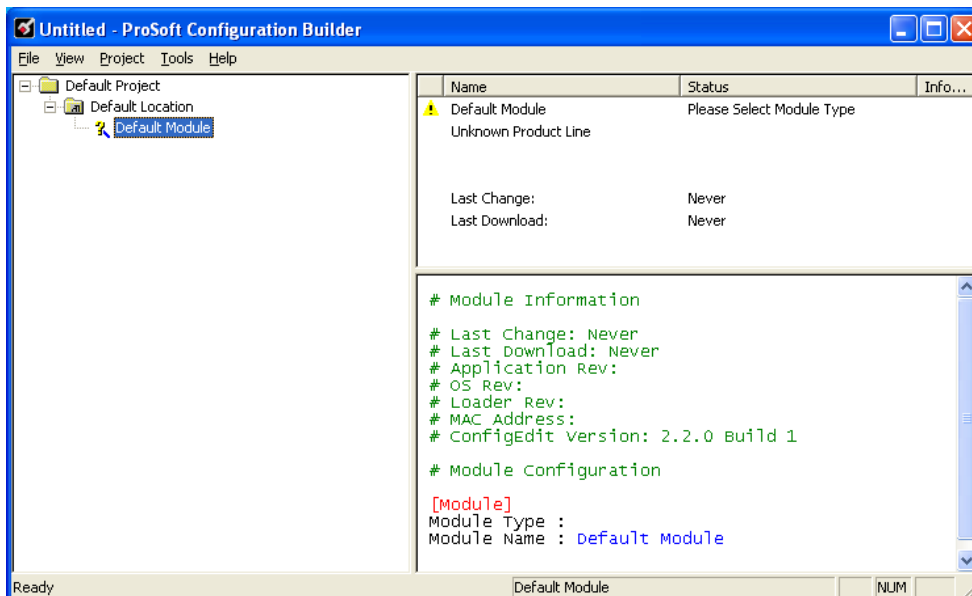
- 1 Use the mouse to select **DEFAULT MODULE** in the tree view, and then click the right mouse button to open a shortcut menu.
- 2 On the shortcut menu, choose **CHOOSE MODULE TYPE**. This action opens the *Choose Module Type* dialog box.



- 3 In the *Product Line Filter* area of the dialog box, select **MVI56**. In the *Select Module Type* dropdown list, select **MVI56-GEC**, and then click **OK** to save your settings and return to the *ProSoft Configuration Builder* window.

2.1.2 Renaming PCB Objects

Notice that the contents of the information pane and the configuration pane changed when you added the module to the project.



At this time, you may wish to rename the *Default Project* and *Default Location* folders in the tree view.

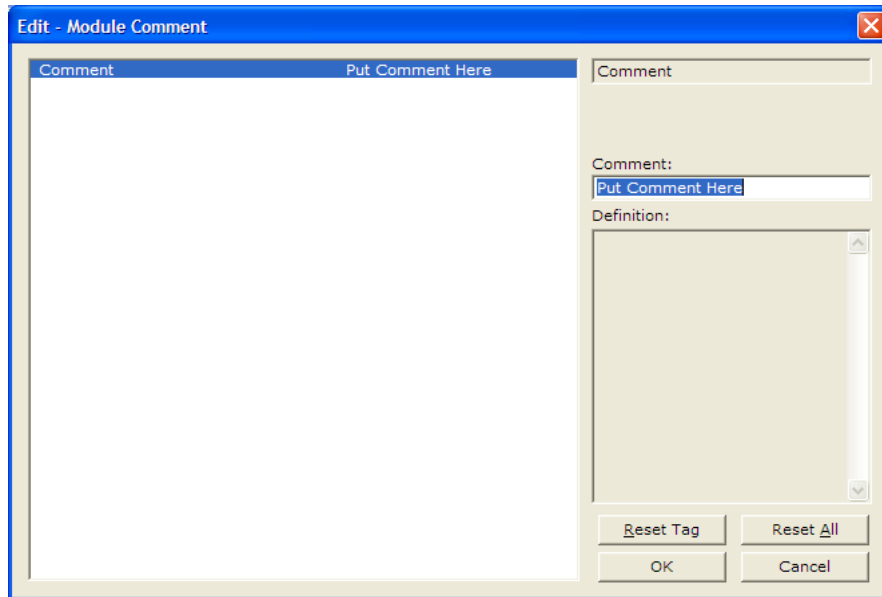
- 1 Select the object, and then click the right mouse button to open a shortcut menu. From the shortcut menu, choose **RENAME**.
- 2 Type the name to assign to the object.
- 3 Click away from the object to save the new name.

Configuring Module Parameters

- 1 Click on the **[+]** sign next to the module icon to expand module information.
- 2 Click on the **[+]** sign next to any  icon to view module information and configuration options.
- 3 Double-click any  icon to open an *Edit* dialog box.
- 4 To edit a parameter, select the parameter in the left pane and make your changes in the right pane.
- 5 Click **OK** to save your changes.

Creating Optional Comment Entries

- 1 Click the **[+]** to the left of the  **Comment** icon to expand the module comments.
- 2 Double-click the  **Module Comment** icon. The *Edit - Module Comment* dialog box appears.



- 3 Enter your comment and click **OK** to save your changes.

Printing a Configuration File

- 1 Select the module icon, and then click the right mouse button to open a shortcut menu.
- 2 On the shortcut menu, choose **VIEW CONFIGURATION**. This action opens the *View Configuration* window.
- 3 In the *View Configuration* window, open the **FILE** menu, and choose **PRINT**. This action opens the *Print* dialog box.
- 4 In the *Print* dialog box, choose the printer to use from the drop-down list, select printing options, and then click **OK**.

2.2 [Module]

This section of the file describes the database setup and module level parameters.

[Module]

Module Name: MVI56-GEC Communication Module DEFAULT

2.2.1 *Module Name*

0 to **80** characters

This parameter assigns a name to the module that can be viewed using the configuration/debug port. Use this parameter to identify the module and the configuration file.

2.3 [Server x]

You can configure up to five servers ([Server 0] through [Server 4]). The configuration section for each server contains the same set of parameters. You can configure the parameters for each server to meet the requirements of your application.

2.3.1 *Enabled*

Yes or No

This parameter determines if the server will be utilized by the module. If a value of "Yes" is entered, the server will be used. Any other value will disable the server.

2.3.2 *Service Port Number*

1 to 65535

This parameter sets the TCP/IP service port for this server. Each server can have its own unique service port or can share the same number with other servers.

2.3.3 *Connection Timeout*

0 or 5000 to 65535

This parameter specifies the number of milliseconds the server will permit the server to be inactive after a connection is made before closing the socket. This timeout period is reset on each read or write packet. If the parameter is set to 0, the connection will not timeout.

2.3.4 *Connection Close Type*

0, 1 or 2

This coded parameter defines the personality of the server after a connection is made. If the parameter is set to 0, the socket will only be closed when a request from the client is received or the connection timeout is exceeded. If a value of 1 is selected, the server will close the socket after it transmits a single message. If a value of 2 is selected, the server will close the socket after it receives a message.

2.3.5 *Swap Rx Data Bytes*

Yes or No

This parameter determines if the data received by the server will have the byte order of the data swapped. If the parameter is set to No, no byte swapping will occur. If the parameter is set to Yes, the odd byte will be swapped with the even byte in each word of data received.

2.3.6 Swap Tx Data Bytes

Yes or No

This parameter determines if the data to be transmitted by the module will have the byte order of the data swapped. If the parameter is set to No, no byte swapping will occur. If the parameter is set to Yes, the odd byte will be swapped with the even byte in each word of data received.

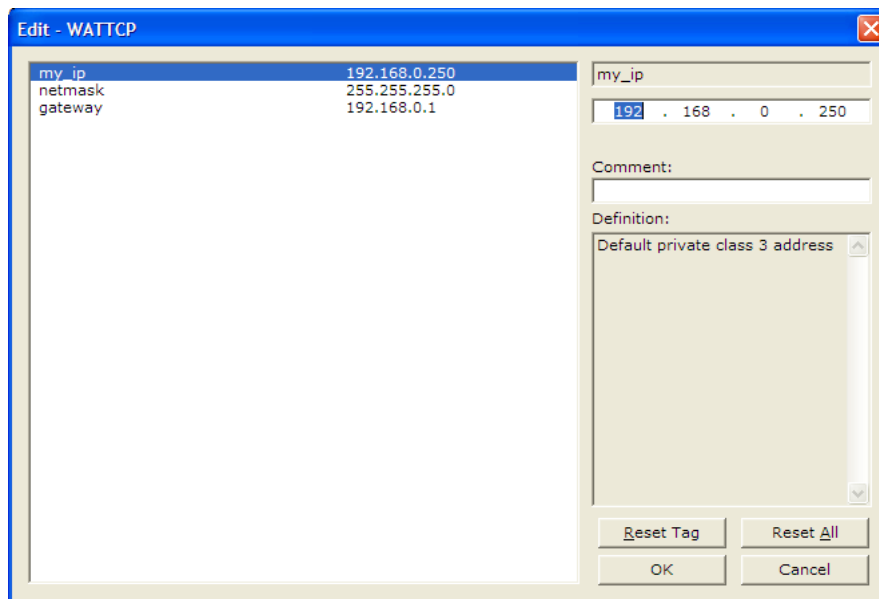
2.4 Ethernet Configuration

Use this procedure to configure the Ethernet settings for your module. You must assign an IP address, subnet mask and gateway address. After you complete this step, you can connect to the module with an Ethernet cable.

- 1 Determine the network settings for your module, with the help of your network administrator if necessary. You will need the following information:
 - IP address (fixed IP required) _____ . _____ . _____ . _____
 - Subnet mask _____ . _____ . _____ . _____
 - Gateway address _____ . _____ . _____ . _____

Note: The gateway address is optional, and is not required for networks that do not use a default gateway.

- 2 Double-click the **ETHERNET CONFIGURATION** icon. This action opens the *Edit* dialog box.

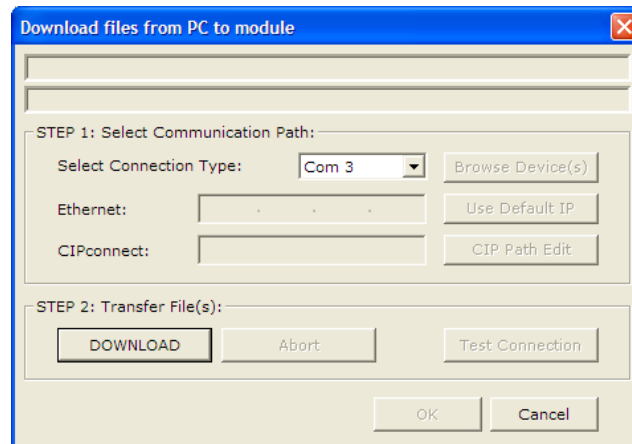


- 3 Edit the values for *my_ip*, *netmask* (subnet mask) and *gateway* (default gateway).
- 4 When you are finished editing, click **OK** to save your changes and return to the *ProSoft Configuration Builder* window.

2.5 Downloading the Project to the Module Using a Serial COM port

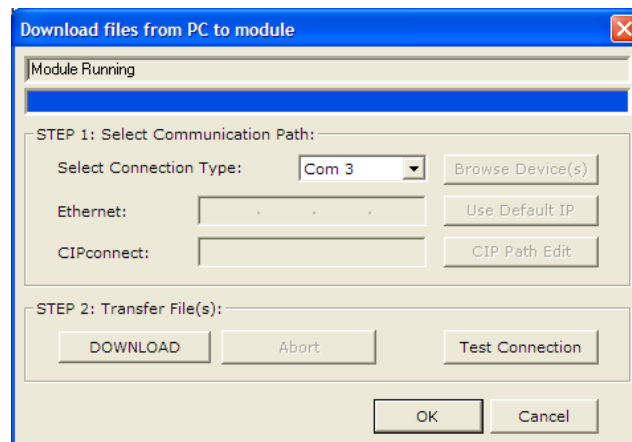
For the module to use the settings you configured, you must download (copy) the updated *Project* file from your PC to the module.

- 1 In the tree view in *ProSoft Configuration Builder*, click once to select the module.
- 2 Open the *Project* menu, and then choose **MODULE/DOWNLOAD**. The program will scan your PC for a valid com port (this may take a few seconds). When *PCB* has found a valid COM port, the *Download* dialog box will open.



- 3 Choose the COM port to use from the dropdown list, and then click the **DOWNLOAD** button.

The module will perform a platform check to read and load its new settings. When the platform check is complete, the status bar in the *Download* dialog box will display the message *Module Running*.



3 Ladder Logic

In This Chapter

- ❖ Module Data 36
- ❖ Adding the Module to an Existing Project 49

Ladder logic is required for application of the MVI56-GEC module. Tasks that must be handled by the ladder logic are module data transfer, special block handling, and status data receipt. Additionally, a power-up handler may be needed to handle the initialization of the module's data and to clear any processor fault conditions.

The sample ladder logic, on the *ProSoft Solutions CD-ROM*, is extensively commented, to provide information on the purpose and function of each rung. For most applications, the sample ladder will work without modification.

3.1 Module Data

All data related to the MVI56-GEC is stored in a user defined data type.

The following Table depicts the Object Hierarchy of the Tags used along with Data Type of the Tags.

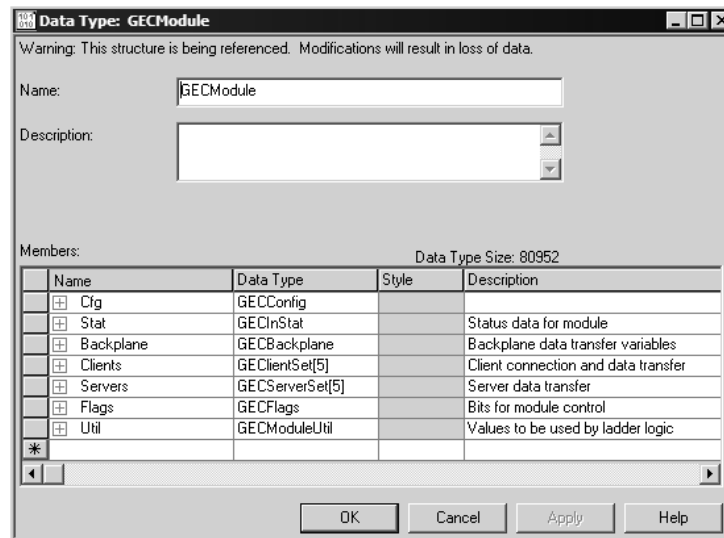
OBJECT HIERARCHY		DATA TYPE
Module		GECModule
Cfg		GECConfig
ModName		SINT[80]
Password		SINT[20]
Servers		GECServer[5]
Enable		INT
ServicePort		INT
ConnTimeout		INT
ConnCloseType		INT
SwapRx		INT
SwapTx		INT
Wattcp		GECWattcp
My_IP		INT[4]
Netmask		INT[4]
Gateway		INT[4]
GNetwork		INT[4]
GMask		INT[4]
Stat		GECInStat
PassCnt		INT
Product		INT[2]
Rev		INT[2]
OP		INT[2]
Run		INT[2]
BlkErrs		GECBlkStat
Read		INT
Write		INT
Parse		INT
Err		INT
Server		GECServerStat[5]
Enabled		INT
State		INT
IP		INT[2]

OBJECT HIERARCHY		DATA TYPE
	Port	INT
	Open	INT
	Est	INT
	Close	INT
	Rx	INT
	RxOverflow	INT
	Tx	INT
	TxOverflow	INT
	Timeout	INT
	CfgErrword	INT
	Client	GECClientStat[5]
	Connected	INT
	State	INT
	IP	DINT
	Port	INT
	RxCount	INT
	RxOverflow	INT
	TxCount	INT
	TxOverflow	INT
	Spare	INT
	Backplane	GECKBackplane
	LastRead	INT
	LastWriteCount	INT
	CurBlock	INT
	UnitNumber	INT
	RxLen	INT
	TxServer	INT
	TxCount	INT
	Clients	GEClientSet[5]
	ConnectionSetup	GECClientConnection
	Client	INT
	Spare1	INT
	ServerIP	INT[4]
	ServicePort	INT
	SwapRx	INT
	SwapTx	INT
	TimeOut	INT

OBJECT HIERARCHY		DATA TYPE
	ReadData	SINT[4000]
	ReadDataCount	INT
	ReadTotalCount	INT
	WriteData	SINT[4000]
	WriteDataCount	INT
	WriteTotalCount	INT
	Flags	GECCClientFlags
	Connect	BOOL
	CloseConnection	BOOL
	WriteData	BOOL
	Util	GECCClientUtil
	LastTxCount	INT
	LastRxCount	INT
	ReadingBlocks	BOOL
	ReadIndex	INT
	WritingBlocks	BOOL
	WriteIndex	INT
	WriteData	BOOL
	WriteCount	INT
	LastWriteCount	INT
	Servers	GECServerSet[5]
	ReadData	SINT[4000]
	ReadDataCount	INT
	ReadTotalCount	INT
	WriteData	SINT[4000]
	WriteDataCount	INT
	WriteTotalCount	INT
	Flags	GECServerFlags
	InitiateWriteData	BOOL
	CloseConnection	BOOL
	Util	GECServerUtil
	ReadingBlocks	BOOL
	ReadIndex	INT
	WritingBlocks	BOOL
	WriteIndex	INT
	WriteData	BOOL

OBJECT HIERARCHY		DATA TYPE
	WriteCount	INT
	LastWriteCount	INT
Flags		GECFlags
	Cfg	BOOL
	Coldboot	BOOL
	Warmboot	BOOL
Util		GECModuleUtil
	CommTimer	TIMER[5]
	ReadIndex	INT
	WriteIndex	INT

An instance of the data type is required before the module can be used. This is done by declaring a variable of the data type in the Controller Tags Edit Tags dialog box. The following table describes the structure of the object.



This object contains objects that define variables for the module and status data related to the module. Each of these object types is discussed in the following topics of the document.

3.1.1 GECBackplane (Backplane Object)

The GECBackplane object stores all the variables required for the data transfer operation between the module and the controller. The LastRead data member is used as the handshaking byte to indicate the arrival of new data from the module. The following table describes the structure of the object.

Name	Data Type	Description
LastRead	INT	Sequence number of last block read
LastWriteCount	INT	Last number of bytes written
CurBlock	INT	Sequence number for current block
UnitNumber	INT	Current server or client in read block
RxLen	INT	Length of message received
TxServer	INT	Server number for current transmit
TxCount	INT	Number of bytes processed from last tx message

The other members of the object can be utilized in the ladder logic to assist in the data transfer operation.

3.1.2 GECBlkStat (Block Error Status Object)

The GECBlkStat object holds the status data related to the data transfer between the module and the controller. Each read and write block transferred between the module and the controller is counted in the Read and Write data members, respectively. Each write block that is parsed by the module is counted in the Parse data member. The Err member is incremented each time a bad block is transferred between the two devices, or there is an error in the backplane driver in the module. The following table describes the structure of this object.

Name	Data Type	Description
Read	INT	Number of blocks read by the module
Write	INT	Number of blocks written by the module
Parse	INT	Number of blocks parsed by the module
Err	INT	Number of block transfer errors

3.1.3 GECClientConnection

Name	Data Type	Description
Client	INT	Index of client (range of 10 to 14) 10=first client
Spare1	INT	Reserved for future use
ServerIP	INT[4]	IP address of server for connection
ServicePort	INT	Service port on server to utilize
SwapRx	INT	Swap receive bytes (0=No and not 0=Yes)
SwapTx	INT	Swap transmit bytes (0=No and not 0=Yes)
Spare2	INT	Reserved for future use

3.1.4 GECClientFlags

Name	Data Type	Description
Connect	BOOL	Connects this client to a server
CloseConnection	BOOL	Close the connection with the connected server
WriteData	BOOL	Writes data to the module

3.1.5 GEClientSet

Name	Data Type	Description
ConnectionSetup	GECClientConnection	This data structure is copied to the module for a connection request
ReadData	SINT[4000]	Read Data from Buffer from Remote Server to GEC Client
ReadDataCount	INT	Number of bytes to be read from MVI to CLX
ReadTotalCount	INT	Total number of bytes in read msg
WriteData	SINT[4000]	Write Data Buffer from GEC Client to Remote Server
WriteDataCount	INT	Number of Bytes to be transferred to Remote Server
WriteTotalCount	INT	Total number of bytes in write msg
Flags	GECClientFlags	
Util	GECClientUtil	

3.1.6 GECConfig (Configuration Object)

This object is used with the module configuration option from the ladder logic. In the previous version of the module, the configuration parameters for the module could only be altered by downloading new files using the Debug/Configuration port. This feature allows configuration files to be generated from data held in the processor. When the module receives this new data set from the processor, it generates the files. The following illustration shows this new object:

Name	Data Type	Description
ModName	SINT[80]	Module name (null terminated)
Password	SINT[20]	Password (null terminated)
Servers	GECServer[5]	5 Servers for module
Wattcp	GECWattcp	Cfg data for wattcp.cfg file

The ModName and Password members of the object must be null-terminated strings (must end with a value of 0 decimal). If the Password member is not to be used in the module's configuration file, set the first byte of the member to decimal 0. When the module recognizes the zero-length string, it will not set the password item in the file. These first two options reside in the [MODULE] section of the GEC.CFG file.

The array of five objects that follow specify the configuration items in the [SERVER x] sections of the GEC.CFG file. The following table describes the structure of this object.

Name	Data Type	Description
Enable	INT	Enable this server (0=No and not 0=Yes)
ServicePort	INT	Service port to listen of with this server
ConnTimeout	INT	Connection timeout
ConnCloseType	INT	Connection close type (0, 1 or 2)
SwapRx	INT	Swap Rx bytes (0=No and not 0=Yes)
SwapTx	INT	Swap Tx bytes (0=No and not 0=Yes)

The parameters in this data area are the same as that described in module configuration.

The next section of the object defines the parameters of the WATTCP.CFG file. The following table describes the structure of this object.

Name	Data Type	Description
My_IP	INT[4]	IP address for module
Netmask	INT[4]	Subnet mask for module (that is, 255.255.255.0)
Gateway	INT[4]	IP address for gateway
GNetwork	INT[4]	Network IP address for the gateway
GMask	INT[4]	Subnet mask IP address for gateway

Each member of this object is an IP address specified in four words. Each word represents a single digit of a dotted IP address. For example, the My_IP member four words could be set to 192, 168, 0, 100. This corresponds to IP address 192.168.0.100. Care must be taken in assigning the values set for the members. If the parameters are not set correctly, you may be unable to communicate with the module. Check with your network administrator if you do not understand or know the values to enter in this object.

After completely filling in the GECConfig object, use ladder logic to request that the files be formed. Example ladder logic is provided in this documentation.

3.1.7 GECClientStat

This object stores the status information for a single client in the module. This data is received from the module in each new input image. The following table describes the structure of the object.

Name	Data Type	Description
Connected	INT	Connection state
State	INT	Socket state
IP	DINT	IP address of connected server
Port	INT	Service port of connected server
RxCount	INT	Number of receive messages
RxOverflow	INT	Number of times receive buffer overflowed
TxCount	INT	Number of transmit messages
TxOverflow	INT	Number of times the transmit buffer overflowed
Spare	INT	reserved for future use

The connected member of the object can have one of the values shown in the following table.

State Value	Definition
-3	Server closed connection for client or server is not available.
-2	Unable to open connection with specified server
-1	Unable to open connection with specified server because of invalid IP address.
0	The client is idle and not connected.
1	The client set to connect to the server and waiting for the connection to establish.
2	The client is connected to the server and can transfer data.
3	The connection is being closed for the client.

A value less than one indicates that the client is not connected to a server and is available for use. If the client was previously used and an error condition existed relative to the socket, this parameter will be set to a value less than zero. If the client socket closed normally, the value will be set to 0.

When the ladder logic requests a new connection, it will set the parameter to a value of 1. The module will recognize this request and initiate the connection with the specified server. If the connection is established, the parameter will be set to two. Data may now be exchanged between the client and the server.

The parameter will be set to a value of 3 when the connection is being closed. This operation can be initiated from either the client using the Client control word in the output image or by the server.

The state member of the object can have one of the following values:

State Value	Definition
-1	Client is waiting for a connection request.
0	The client is waiting to establish the connection with the server.
1	The client has established a connection with the server and can send and receive data.
1000	The client has initiated a close operation on the connection.
1001	The client is waiting for the close on the connection to complete.
1002	The client is issuing an abort (reset) on the connection. The socket is forced closed.
1003	The server is issuing an abort (reset) on the connection due to control from user.
3000	The client is issuing the ARP command request and waiting for the response.
3001	The client has received the ARP response and has opened the socket.

This member reports the current state of the client socket state machine in the module. It is preferred to use the Connected member of the object in the ladder logic instead of this member for control.

The next two members of the object are set by the ladder logic and correspond to the IP address of the server connected to the client and the service port in the server used for the connection.

The last four members of the object are statistics representing the transmit and receive activity of the client socket.

3.1.8 GECClientUtil

Name	Data Type	Description
LastTxCount	INT	
LastRxCount	INT	
ReadingBlocks	BOOL	Flags that the client is reading a block >200 bytes
ReadIndex	INT	Word offset in Read Block
WritingBlocks	BOOL	Flags the current msg as a multi-block msg (>400 bytes)
WriteIndex	INT	Word Offset for Write Blocks
WriteData	BOOL	Writing the Data
WriteCount	INT	WriteCount (used by logic)
LastWriteCount	INT	Last Block Write Count (bytes)

3.1.9 GECFlags

Name	Data Type	Description
Cfg	BOOL	
Coldboot	BOOL	
Warmboot	BOOL	

3.1.10 GECInStat (Status Object)

This object views the status of the module. The **GECInStat** object shown below is updated each time a read block is received by the processor. Use this data to monitor the state of the module at a "real-time rate".

Name	Data Type	Description
PassCnt	INT	Program cycle counter for module
Product	INT[2]	Product code for module (GSC)
Rev	INT[2]	Revision level of module's code
OP	INT[2]	Operating system version for module
Run	INT[2]	Run number for module
BlkErrs	GECBlkStat	Data block transfer statistics
Server	GECServerStat[5]	Status for each server
Client	GECClientStat[5]	Status for each client

Within the GECInStat objects are objects containing the status information for each server and the block transfer process. Refer to Status Data Area (page 88) for a complete listing of the data stored in this object.

3.1.11 GECModuleUtil

Name	Data Type	Description
CommTimer	TIMER[5]	Timer to verify if the clients are still transferring data
ReadIndex	INT	
WriteIndex	INT	

3.1.12 GECServerFlags

Name	Data Type	Description
InitiateWriteData	BOOL	Writes data to the connected client
CloseConnection	BOOL	Close the connection with the connected Server

3.1.13 GECServerSet

Name	Data Type	Description
ReadData	SINT[4000]	
ReadDataCount	INT	Number of characters in each read block
ReadTotalCount	INT	Total number of characters in read message
WriteData	SINT[4000]	
WriteDataCount	INT	Number of characters in each write block
WriteTotalCount	INT	Total number of characters in write message
Flags	GECServerFlags	
Util	GECServerUtil	

3.1.14 GECServerStat (Server Status Object)

The GECServerStat object stores the status information related to each server on the module. All messages are counted for both receive and transmit operations. The object also contains the CfgErrword (page 48) member. The following table describes the structure of this object.

Name	Data Type	Description
Enabled	INT	Flag to indicate if server is enabled (1=Yes,0=No)
State	INT	Current state of server
IP	INT[2]	IP address of host connected to server
Port	INT	TCP port for host connected to server
Open	INT	Number of times server performed an open
Est	INT	Number of times connection established
Close	INT	Number of times socket closed
Rx	INT	Number of messages received
RxOverflow	INT	Number of receive buffer overflows
Tx	INT	Number of messages transmitted
TxOverflow	INT	Number of transmit buffer overflows
Timeout	INT	Number of socket timeout conditions
CfgErrword	INT	Configuration error word value for server

3.1.15 GECServerUtil

Name	Data Type	Description
ReadingBlocks	BOOL	Flags the current msg as a multi-block msg (>200 bytes)
ReadIndex	INT	Word offset for Read Blocks
WritingBlocks	BOOL	Flags the current msg as a multi-block msg (>400 bytes)
WriteIndex	INT	Word Offset for Write Blocks
WriteData	BOOL	Writing the Data
WriteCount	INT	WriteCount (used by logic)
LastWriteCount	INT	Last Block Write Count (bytes)

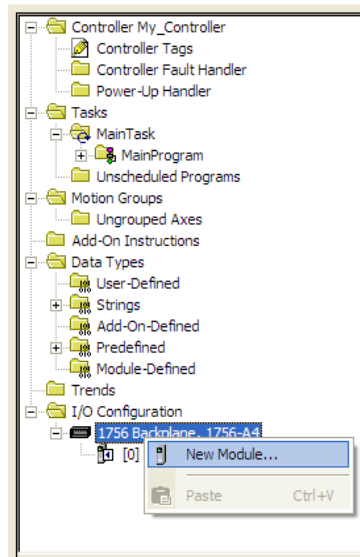
3.1.16 CfgErrword (Configuration/Error Status Flags)

The CfgErrword member reports configuration errors for the respective server. If the module is not functioning as expected, inspect the value presented in this object. If a configuration error exists, the associated bit will be set. A value of zero for the bit indicates the configuration value is valid. This does not guarantee that the module is configured correctly for your application. The bits used by this member are shown below:

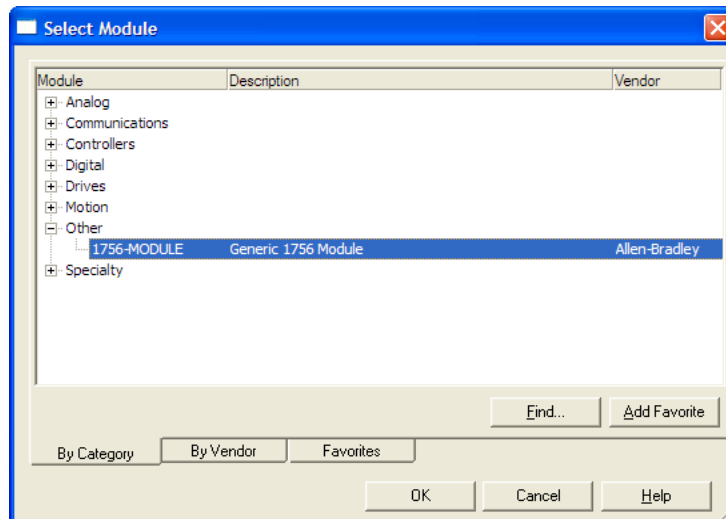
Bit Position		Description
Bit 0	0x01	A value other than Yes or No was entered for the enabled parameter.
Bit 1	0x02	Not used.
Bit 2	0x04	A value less than 5000 but not 0 is entered for the timeout parameter.
Bit 3	0x08	An invalid value is entered for the Connection Close Type parameter. The program only accepts a value of 0 to 2.

3.2 Adding the Module to an Existing Project

- 1 Select the *I/O Configuration* folder in the *Controller Organization* window of RSLogix 5000, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose **NEW MODULE**.



This action opens the *Select Module* dialog box:

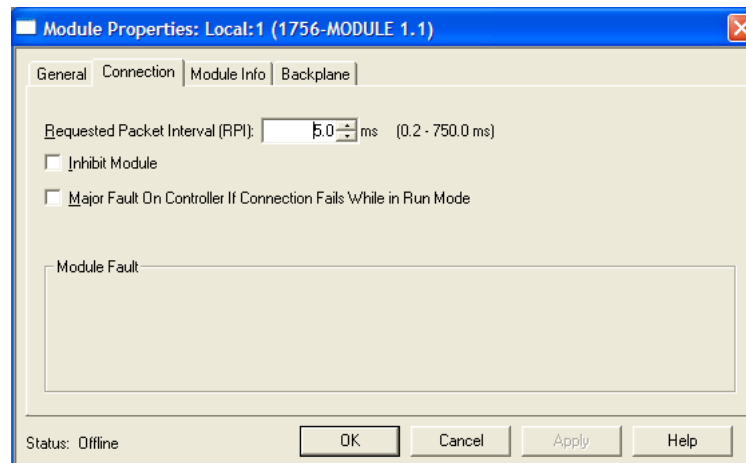


- 2 Select the **1756-MODULE (GENERIC 1756 MODULE)** from the list and click **OK**. This action opens the *New Module* dialog box.

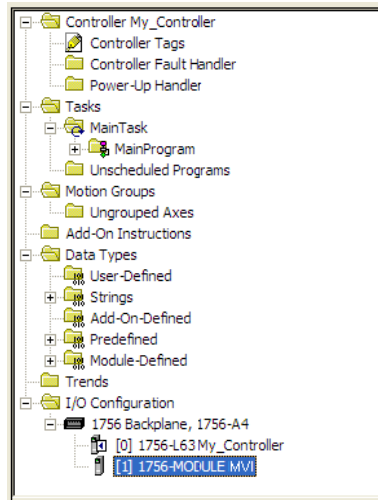
- 3 Enter the *Name*, *Description* and *Slot* options for your application. You must select the *Comm Format* as **DATA - INT** in the dialog box, otherwise the module will not communicate. Click **OK** to continue.

Parameter	Value
Name	Enter a module identification string. Example: GEC_2
Description	Enter a description for the module. Example: GENERIC ASCII ETHERNET COMMUNICATION MODULE
Comm Format	Select DATA-INT .
Slot	Enter the slot number in the rack where the MVI56-GEC module is located.
Input Assembly Instance	1
Input Size	250
Output Assembly Instance	2
Output Size	248
Configuration Assembly Instance	4
Configuration Size	0

- 4 Select the *Requested Packet Interval* value for scanning the I/O on the module. This value represents the minimum frequency that the module will handle scheduled events. This value should not be set to less than **1** millisecond. The default value is **5** milliseconds. Values between **1** and **10** milliseconds should work with most applications.



- 5 Save the module. Click **OK** to dismiss the dialog box. The *Controller Organization* window now displays the module's presence.



- 6 Copy the *User-Defined Data Types* from the sample program into your existing RSLogix 5000 project.
- 7 Copy the *Controller Tags* from the sample program into your project.
- 8 Copy the *Ladder Rungs* from the sample program into your project.

4 Diagnostics and Troubleshooting

In This Chapter

- ❖ LED Indicators 54
- ❖ Using ProSoft Configuration Builder (PCB) for Diagnostics..... 57
- ❖ Reading Status Data from the Module 65

The module provides information on diagnostics and troubleshooting in the following forms:

- LED status indicators on the front of the module provide general information on the module's status.
- Status data contained in the module can be viewed through the Configuration/Debug port, using the troubleshooting and diagnostic capabilities of *ProSoft Configuration Builder (PCB)*.
- Status data values can be transferred from the module to processor memory and can be monitored there manually or by customer-created logic.

4.1 LED Indicators

The LEDs indicate the module's operating status as follows:

LED	Color	Status	Indication
CFG	Green	On	Data is being transferred between the module and a remote terminal using the Configuration/Debug port.
		Off	No data is being transferred on the Configuration/Debug port.
P1	Green	On	Port not used
		Off	Port not used
P2	Green	On	Port not used
		Off	Port not used
APP Status	Amber	Off	The MVI56-GEC is working normally.
		On	The MVI56-GEC module program has recognized a communication error.
BP ACT	Amber	On	The LED is on when the module is performing a write operation on the backplane.
		Off	The LED is off when the module is performing a read operation on the backplane. Under normal operation, the LED should blink rapidly on and off.
OK	Red/ Green	Off	The card is not receiving any power and is not securely plugged into the rack.
		Green	The module is operating normally.
		Red	The program has detected an error or is being configured. If the LED remains red for over 10 seconds, the program has probably halted. Remove the card from the rack and re-insert the card to restart the module's program.
BAT	Red	Off	The battery voltage is OK and functioning.
		On	The battery voltage is low or battery is not present. Allow battery to charge by keeping module plugged into rack for 24 hours. If BAT LED still does not go off, contact ProSoft Technology, as this is not a user serviceable item.

4.1.1 Ethernet LED Indicators

LED	State	Description
Data	OFF	No activity on the Ethernet port.
	GREEN Flash	The Ethernet port is actively transmitting or receiving data.
Link	OFF	No physical network connection is detected. No Ethernet communication is possible. Check wiring and cables.
	GREEN Solid	Physical network connection detected. This LED must be ON solid for Ethernet communication to be possible.

4.1.2 Clearing a Fault Condition

Typically, if the OK LED on the front of the module turns RED for more than ten seconds, a hardware problem has been detected in the module or the program has exited.

To clear the condition, follow these steps:

- 1 Turn off power to the rack.
- 2 Remove the card from the rack.
- 3 Verify that all jumpers are set correctly.
- 4 If the module requires a Compact Flash card, verify that the card is installed correctly.
- 5 Re-insert the card in the rack and turn the power back on.
- 6 Verify correct configuration data is being transferred to the module from the ControlLogix controller.

If the module's OK LED does not turn GREEN, verify that the module is inserted completely into the rack. If this does not cure the problem, contact ProSoft Technology Technical Support.

4.1.3 Troubleshooting

Use the following troubleshooting steps if you encounter problems when the module is powered up. If these steps do not resolve your problem, please contact ProSoft Technology Technical Support.

Processor Errors

Problem description	Steps to take
Processor fault	Verify that the module is plugged into the slot that has been configured for the module in the I/O Configuration of RSLogix. Verify that the slot location in the rack has been configured correctly in the ladder logic.
Processor I/O LED flashes	This indicates a problem with backplane communications. A problem could exist between the processor and any installed I/O module, not just the MVI56-GEC. Verify that all modules in the rack are correctly configured in the ladder logic.

Module Errors

Problem description	Steps to take
BP ACT LED (not present on MVI56E modules) remains OFF or blinks slowly MVI56E modules with scrolling LED display: <i><Backplane Status></i> condition reads ERR	This indicates that backplane transfer operations are failing. Connect to the module's Configuration/Debug port to check this. To establish backplane communications, verify the following items: ▪ The processor is in RUN or REM RUN mode. ▪ The backplane driver is loaded in the module. ▪ The module is configured for read and write data block transfer. ▪ The ladder logic handles all read and write block situations. ▪ The module is properly configured in the processor I/O configuration and ladder logic.
OK LED remains RED	The program has halted or a critical error has occurred. Connect to the Configuration/Debug port to see if the module is running. If the program has halted, turn off power to the rack, remove the card from the rack and re-insert it, and then restore power to the rack.

4.2 Using ProSoft Configuration Builder (PCB) for Diagnostics

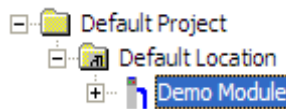
The *Configuration and Debug* menu for this module is arranged as a tree structure, with the *Main* menu at the top of the tree, and one or more submenus for each menu command. The first menu you see when you connect to the module is the *Main* menu.

Because this is a text-based menu system, you enter commands by typing the [command letter] from your computer keyboard in the *Diagnostic* window in *ProSoft Configuration Builder (PCB)*. The module does not respond to mouse movements or clicks. The command executes as soon as you press the **[COMMAND LETTER]** — you do not need to press **[ENTER]**. When you type a **[COMMAND LETTER]**, a new screen will be displayed in your terminal application.

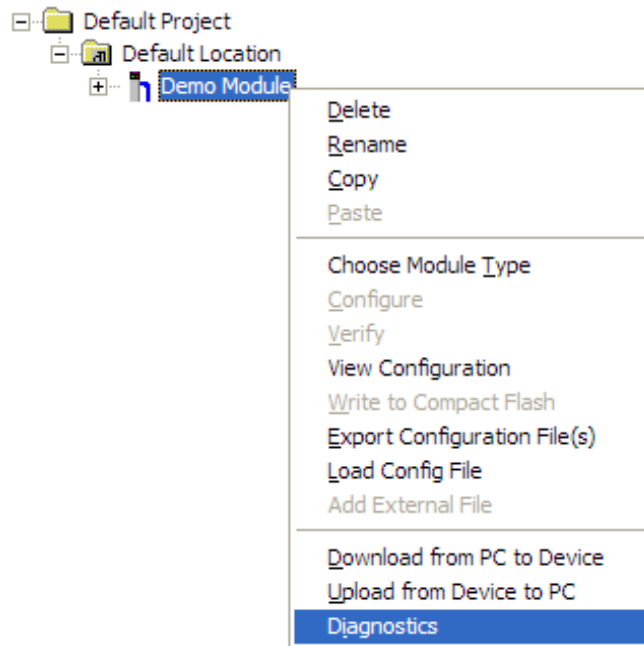
4.2.1 Using the Diagnostic Window in ProSoft Configuration Builder

To connect to the module's Configuration/Debug serial port

- 1 Start *PCB*, and then select the module to test. Click the right mouse button to open a shortcut menu.

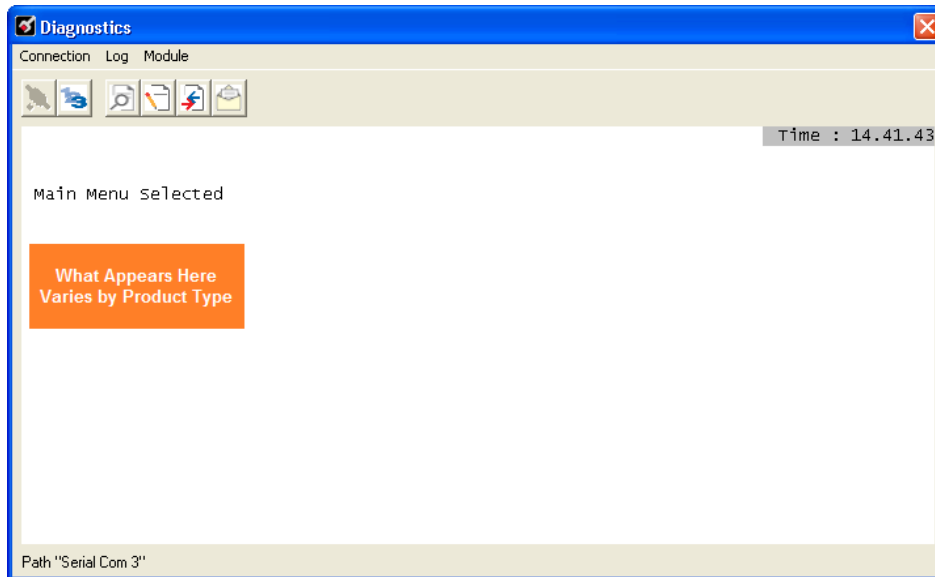


- 2 On the shortcut menu, choose **DIAGNOSTICS**.



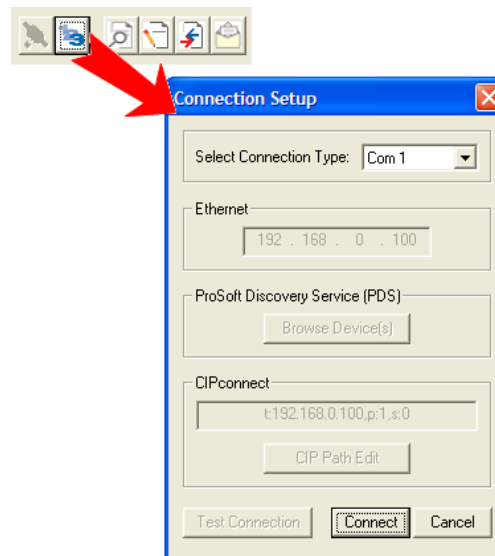
This action opens the *Diagnostics* dialog box.

- 3 Press [?] to open the *Main* menu.



If there is no response from the module, follow these steps:

- 1 Click to configure the connection. On the *Connection Setup* dialog box, select a valid com port or other connection type supported by the module.



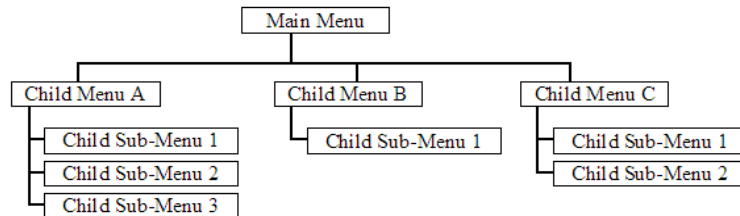
- 2 Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.
- 3 On computers with more than one serial port, verify that your communication program is connected to the same port that is connected to the module.

If you are still not able to establish a connection, contact ProSoft Technology for assistance.

4.2.2 Navigation

All of the submenus for this module contain commands to redisplay the menu or return to the previous menu. You can always return from a submenu to the next higher menu by pressing **[M]** on your keyboard.

The organization of the menu structure is represented in simplified form in the following illustration:



The remainder of this section shows the menus available for this module, and briefly discusses the commands available to you.

Keystrokes

The keyboard commands on these menus are usually not case sensitive. You can enter most commands in lowercase or uppercase letters.

The menus use a few special characters (**?**, **-**, **+**, **@**) that must be entered exactly as shown. Some of these characters will require you to use the **SHIFT**, **CTRL**, or **ALT** keys to enter them correctly. For example, on US English keyboards, enter the **?** command as **SHIFT** and **/**.

Also, take care to distinguish the different uses for uppercase letter "eye" (**I**), lowercase letter "el" (**L**), and the number one (**1**). Likewise, uppercase letter "oh" (**O**) and the number zero (**0**) are not interchangeable. Although these characters look alike on the screen, they perform different actions on the module and may not be used interchangeably.

4.2.3 Main Menu

When you first connect to the module from your computer, your terminal screen will be blank. To activate the main menu, press the [?] key on your computer's keyboard. If the module is connected properly, the following menu will appear.

```
MVI-GEC COMMUNICATION MODULE MENU
?=Display Menu
B=Block Transfer Statistics
C=Module Configuration
R=Transfer Configuration from PC to MVI Unit
S=Transfer Configuration from MVI Unit to PC
U=Reset diagnostic data
V=Version Information
W=Warm Boot Module
Status: 1=Server 0, 2=Server 1, 3=Server 2, 4=Server 3, 5=Server 4
        E=Client 0, F=Client 1, G=Client 2, H=Client 3, I=Client 4
Cfg    : 6=Server 0, 7=Server 1, 8=Server 2, 9=Server 3, 0=Server 4
@=Network Menu      Esc=Exit Program
```

Caution: Some of the commands available to you from this menu are designed for advanced debugging and system testing only, and can cause the module to stop communicating with the processor or with other devices, resulting in potential data loss or other failures. Only use these commands if you are specifically directed to do so by ProSoft Technology Technical Support staff. Some of these command keys are not listed on the menu, but are active nevertheless. Please be careful when pressing keys so that you do not accidentally execute an unwanted command.

Redisplaying the Menu

Press [?] to display the current menu. Use this command when you are looking at a screen of data, and want to view the menu choices available to you.

Viewing Block Transfer Statistics

Press [B] to view the Block Transfer Statistics screen.

Use this command to display the configuration and statistics of the backplane data transfer operations between the module and the processor. The information on this screen can help determine if there are communication problems between the processor and the module.

Tip: Repeat this command at one-second intervals to determine the number of blocks transferred each second.

Viewing Module Configuration

Press [C] to view the *Module Configuration* screen.

Use this command to display the current configuration and statistics for the module.

Transferring the Configuration File from the PC to the Module

On the Diagnostics Menu this is referred to as *Receive Module Configuration*.

Press **[R]** to receive (download) the configuration file from your PC to the module and store the file on the module's Compact Flash Card (Personality Module) or Flash RAM.

Press **[Y]** to confirm the file transfer, and then follow the instructions on the terminal screen to complete the file transfer process.

After the file has been successfully downloaded, the module will restart the program and load the new configuration information. Review the new configuration using menu commands **[6]** and **[0]** to verify that the module is configured correctly.

Transferring the Configuration File from The Module to the PC

On the Diagnostics Menu this is referred to as *Send Module Configuration*.

Press **[S]** to send (upload) the configuration file from the module to your PC.

Press **[Y]** to confirm the file transfer, and then follow the instructions on the terminal screen to complete the file transfer process.

After the file has been successfully uploaded, you can open and edit the file to change the module's configuration.

Resetting Diagnostic Data

Press **[U]** to reset the status counters for the Client and/or servers in the module.

Viewing Version Information

Press **[V]** to view version information for the module.

Use this command to view the current version of the software for the module, as well as other important values. You may be asked to provide this information when calling for technical support on the product.

Values at the bottom of the display are important in determining module operation. The *Program Scan Counter* value is incremented each time a module's program cycle is complete.

Tip: Repeat this command at one-second intervals to determine the frequency of program execution.

Warm Booting the Module

Press **[W]** from the *Main* menu to warm boot (restart) the module.

This command will cause the program to exit and reload, refreshing configuration parameters that must be set on program initialization. Only use this command if you must force the module to reboot.

Viewing Server Communication Status (Servers 0 to 4)

Use commands [1] [2] [3] [4] or [5] to view the communication status and statistics of the specified server. This information can be useful when troubleshooting communication problems.

```
SERVER 0 (Port 15000):
  Enabled      : YES
  State        : 1
  IP of Connected Host : C0680039
  Port of Connected Host : 1504
  Open Count   : 1
  Establish Count : 1
  Close Count  : 0
  Receive Message Count : 125
  Receive Busy State : 0
  Receive Message Length : 0
  Receive Overflow Count : 0
  Transmit Message Count : 125
  Transmit Busy State : 0
  Transmit Message Length : 0
  Transmit Overflow Count : 0
  Timeout Error Count : 0
  Configuration Error Word : 0x0000
```

Viewing Client Communication Status (Clients 10 to 14)

Use commands [E] [F] [G] [H] or [I] to view the communication status and statistics of the specified client. This information can be useful when troubleshooting communication problems.

```
CLIENT 0:
  Connected State : 0
  State           : -1
  IP of Connected Host : 0
  Port of Connected Host : 0
  Receive Message Count : 0
  Receive Busy State : 0
  Receive Message Length : 0
  Receive Overflow Count : 0
  Receive Swap Type : NO
  Transmit Message Count : 0
  Transmit Busy State : 0
  Transmit Message Length : 0
  Transmit Overflow Count : 0
  Transmit Swap Type : NO
```

Viewing Server Configuration (Servers 0 to 4)

Use commands [6] [7] [8] [9] or [0] to view the configuration of the specified server.

```
SERVER 0 (Enabled = YES)
  Service Port : 15000
  Maximum Buffer Size : 4096
  Connection Timeout : 0
  Close Type : 0
```

Opening the Network Menu

Press [@] to open the *Network* menu.

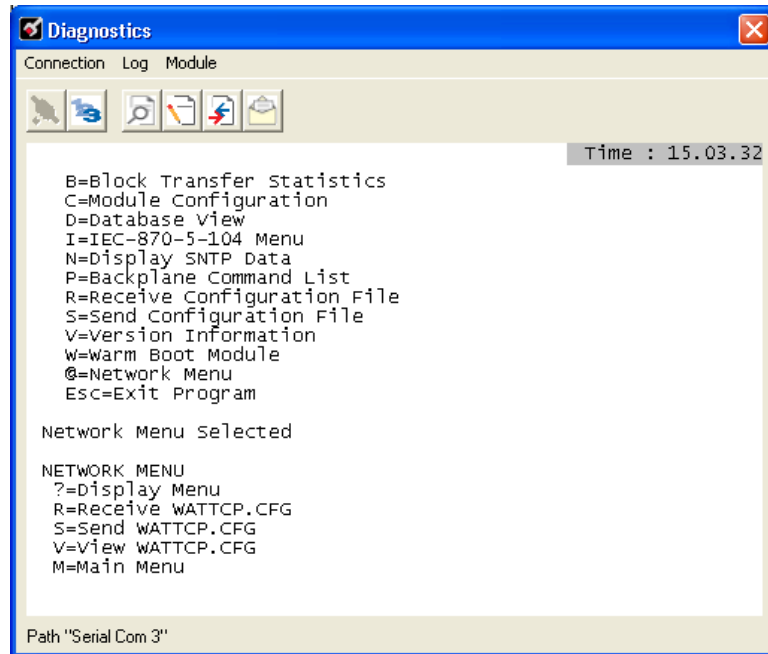
The *Network* menu allows you to send, receive and view the WATTCP.CFG file that contains the IP, gateway and other network specification information. For more information about this submenu, see Network Menu (page 63).

Exiting the Program

Press [ESC] to restart the module and force all drivers to be loaded. The module will use the configuration stored in the module's Flash memory to configure the module.

4.2.4 Network Menu

From the *IEC-870-5-104 Server* menu press **[@]** to display the *IEC-870-5-104 Network* menu screen. The *Network* menu allows you to send, receive, and view the WATTCP.CFG file that contains the IP and module addresses, and other network information.



Transferring WATTCP.CFG to the Module

Press **[R]** to transfer a new WATTCP.CFG file from the PC to the module. Use this command to change the network configuration for the module (for example, the module's IP address).

Press **[Y]** to confirm the file transfer, and then follow the instructions on the terminal screen to complete the file transfer process.

Transferring WATTCP.CFG to the PC

Press **[S]** to transfer the WATTCP.CFG file from the module to your PC.

Press **[Y]** to confirm the file transfer, and then follow the instructions on the terminal screen to complete the file transfer process.

After the file has been successfully transferred, you can open and edit the file to change the module's network configuration.

Viewing the WATTCP.CFG File on the module

Press **[V]** to view the module's WATTCP.CFG file. Use this command to confirm the module's current network settings.

```
WATTCP.CFG FILE:
# ProLinx Communication Gateways, Inc.
# Default private class 3 address
my_ip=192.168.0.75
# Default class 3 network mask
netmask=255.255.255.0
# name server 1 up to 9 may be included
# nameserver=xxx.xxx.xxx.xxx
# name server 2
# nameserver=xxx.xxx.xxx.xxx
# The gateway I wish to use
gateway=192.168.0.1
# some networks (class 2) require all three parameters
# gateway.network.subnetmask
# gateway 192.168.0.1,192.168.0.0,255.255.255.0
# The name of my network
# domainlist="mynetwork.name"
```

Returning to the Main Menu

Press **[M]** to return to the *Main* menu.

4.3 Reading Status Data from the Module

The MVI56-GEC module returns a status data set to the ControlLogix processor in each read block. This data is transferred to the ControlLogix processor continuously with each read block.

The Configuration/Debug port provides the following functionality:

- Full view of the module's configuration data
- View of the module's status data
- Version Information
- Control over the module (warm boot and cold boot)
- Facility to upload and download the module's configuration file

5 Reference

In This Chapter

- ❖ Product Specifications 68
- ❖ Functional Overview 71
- ❖ Cable Connections 85
- ❖ MVI56-GEC Status Data Area 88
- ❖ Configuration Data 94

5.1 Product Specifications

The MVI56 Generic ASCII Ethernet Interface module is designed to allow ControlLogix processors to interface easily with ASCII devices using the TCP/IP protocol and the ControlLogix processor. Compatible devices may be either ASCII instruments with Ethernet built-in or Ethernet connection via a thin server to the existing ASCII device.

Five servers and clients are present on the module permitting both the reception and transmission of data between the Rockwell Automation processor and attached devices.

The MVI56-GEC module is a powerful communication interface for ControlLogix processors. Developed under license from Rockwell Automation, the module incorporates proprietary backplane technology that enables powerful data access between the module and the ControlLogix processor.

Five servers and clients are present on the module permitting both the reception and transmission of data between the ControlLogix processor and attached devices.

The MVI56-GEC module is a powerful communication interface for ControlLogix 7processors. Developed under license from Rockwell Automation, the module incorporates proprietary backplane technology that enables powerful data access between the module and the ControlLogix processor.

5.1.1 General Specifications

- Single Slot - 1756 backplane compatible
- The module is recognized as an Input/Output module and has access to processor memory for data transfer between processor and module.
- Ladder Logic is used for data transfer between module and processor. Sample ladder file included.
- Configuration data obtained from configuration text file downloaded to module. Sample configuration file included
- Local or remote rack

5.1.2 Hardware Specifications

Specification	Description
Backplane Current Load	800 mA @ 5 VDC 3 mA @ 24 VDC
Operating Temperature	0 to 60 °C (32 to 140 °F)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)
Shock	30g Operational 50g non-operational Vibration: 5 g from 10 to 150 Hz
Relative Humidity	5 to 95% (non-condensing)
LED Indicators	Module Status Backplane Transfer Status Application Status Serial Activity
Debug/Configuration port (CFG)	
CFG Port (CFG)	RJ45 (DB-9M with supplied cable) RS-232 only
Application ports (PRT1 & PRT2)	
Full hardware handshaking control, providing radio, modem and multi-drop support	
Software configurable communication parameters	Baud rate: 110 to 115,200 baud, depending on protocol RS-232, 485 and 422 Parity: none, odd or even Data bits: 5, 6, 7, or 8 Stop bits: 1 or 2 RTS on/off delay: 0 to 65535 milliseconds
App Ports (P1, P2) (Serial modules)	RJ45 (DB-9M with supplied cable) RS-232 handshaking configurable 500V Optical isolation from backplane
Shipped with Unit	RJ45 to DB-9M cables for each port 6-foot RS-232 configuration cable

5.1.3 Functional Specifications

- Five Servers and five Clients to receive and/or transmit data
- 10/100 Base-T Ethernet-compatible interface
- Configurable parameters
 - Service port number
 - Connection timeout
 - Close type
- Simple ladder logic operation
- Setup and monitoring through RS-Logix 5000 software and user-constructed configuration file (GEC.CFG)
- ControlLogix backplane interface via I/O access
- Each Server monitors
 - State
 - IP and port number of connected Client
 - Error codes
- Each Client monitors
 - State
 - IP and port number of connected Server
 - Message related parameters
- ASCII character strings up to 2048 characters in length supported
- Full hardware handshaking control, providing radio, modem, and multi-drop support
- User-definable module memory usage, supporting the storage and transfer of up to 4000 bytes to/from the control processor
- Module error and status conditions returned to processor for diagnostic purposes
 - Module status
 - Port error status word (bit mapped)
 - Port receive state
 - Port receive character count
 - Port receive block count
 - Port transmit state
 - Port transmit character count
 - Port transmit block count
- All data related to the module is contained in a single controller tag with defined objects to simplify the configuration, monitoring, and interfacing with the module
- Module configuration and communication configuration data is transferred to the MVI56-GEC via a pre-defined user data type in the processor

5.2 Functional Overview

5.2.1 General Concepts

The following discussion explains several concepts that are important for understanding module operation.

Module Power Up

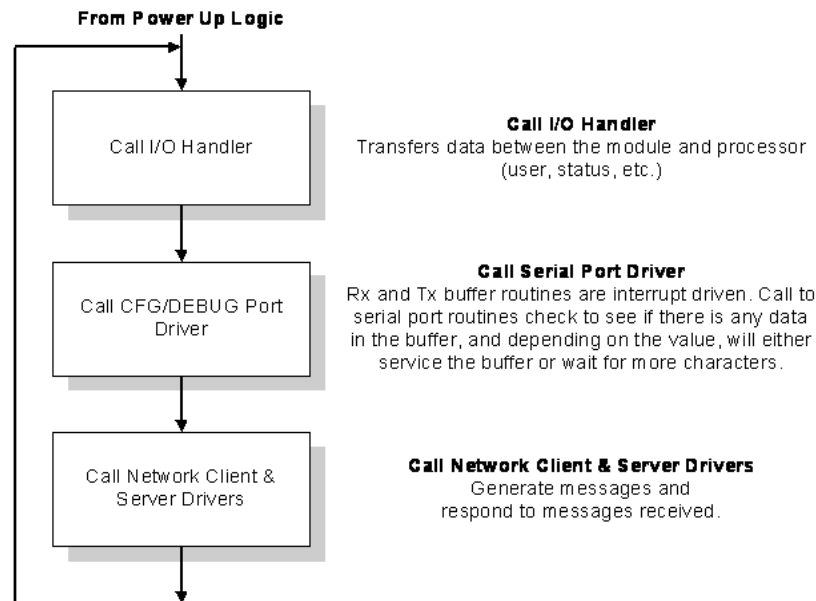
On power up the module begins performing the following logical functions:

- 1 Initialize hardware components
 - Initialize ControlLogix backplane driver
 - Test and clear all RAM
 - Initialize the serial communication ports
 - Initialize the TCP/IP stack and Ethernet interface
- 2 Initialize servers and clients
- 3 Set up the serial communication interface for the debug/configuration port

After the module has received the configuration, the module will begin receiving and transmitting messages with clients and servers on the Ethernet network.

Main Logic Loop

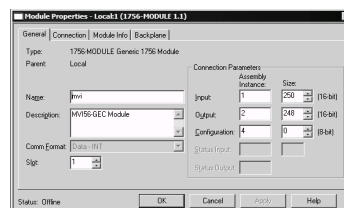
Upon completing the power up configuration process, the module enters an infinite loop that performs the functions shown in the following diagram.



Backplane Data Transfer

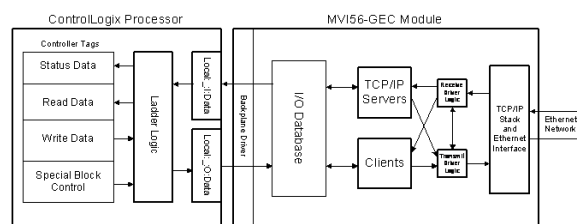
The MVI56-GEC module communicates directly over the ControlLogix backplane. Data travels between the module and the ControlLogix processor across the backplane using the module's input and output images. The update frequency of the data is determined by the user-defined scan rate for the module, and the communication load on the module. Typical updates are in the range of 1 to 10 milliseconds.

Data received by the module's clients and servers is placed in the module's Database. This data is read and then processed by the ladder logic in the ControlLogix processor through the Input Image (Local Input connection). The input image parameter in RSLogix 5000 for the module is set to 250 registers (500 bytes).



The processor writes data through the Output Image (Local Output connection) for transfer into the module's Database. The module's program extracts the data from the module's Database and transmits the data out to the Ethernet network. Each message is directed to a client or server that is connected to a remote host. The Output image parameter in RSLogix for the module is set to 248 registers (496 bytes). This large I/O area permits fast throughput of data between the module and the processor.

The following illustration shows the data transfer method used to move data between the ControlLogix processor, the MVI56-GEC module, and the Ethernet network.



All data transferred between the module and the processor over the backplane is through the input and output images. Ladder logic must be written in the ControlLogix processor to interface the input and output image data defined in the controller tags.

You must configure the module properly for accurate reception of data through its ports, and you must program the ladder logic to interpret the data from the module and send the correct response to the module.

Use the sample ladder logic program on the CD-ROM to establish data transfer between the module and the processor.

Normal Data Transfer

Normal data transfer includes data transmitted between clients and servers, and status data. Data transfer takes place through read (input image) and write (output image) blocks.

Refer to Installing and Configuring the Module for a description of the data objects used with the blocks, and the ladder logic required.

The following topics discuss the structure and function of each block.

Read Block

These blocks of data transfer information from the module to the ControlLogix processor. The following table shows the structure of the input image used to transfer this data.

	Word Offset	Description
Received Data	0	Server/Client Number for data received. If the word contains a value of -1, no receive data is present. If the word contains a value from 0 to 4, the block contains data for one of the servers in the module. If the word contains a value of 10 to 14, the block contains data for one of the clients.
	1	Number of characters (0 to 200) in receive block (2 to 101). If the receive data in the module is larger than 200 bytes, multiple blocks will be transferred. Any block with a value of -1 in this field represents the first or continuation block and the block contains 200 bytes of data. The last block of data will contain a positive number in this field that represents the number of characters in the last block.
	2 to 101	200 bytes of data received for specified server or client.
Module Status	102 to 234	This data area contains the status data block. Each block transferred to the processor contains this set of information.
IDs for Servers, Clients and Message Blocks	235 to 246	Reserved for future use.
	247	Value for designated Server or Client number during writing process (0-4) for Servers (10-14) for clients.
	248	Number of characters processed from last write block (0 to 400).
	249	Block Sequence Number (Bumped each scan by module)

The Block Sequence Number (word offset 249) is an index value that signals to the ControlLogix processor that a new block is ready for processing. The ladder logic must recognize a change in this value, and then process the data encapsulated in the input image. If data is available for a server, the module passes a block containing data received and the complete status data area to the processor. The value at word 0 in the block contains one of the following values:

Value	Description
-1	No receive data in block
0	Server 0 data in block
1	Server 1 data in block
2	Server 2 data in block
3	Server 3 data in block
4	Server 4 data in block
10	Client 0 data in block
11	Client 1 data in block
12	Client 2 data in block
13	Client 3 data in block
14	Client 4 data in block

Word 1 of the input image determines the number of bytes in the data area of the block. This word only has significance if word 0 of the block is set to a valid server index value (0 to 4), or client index value (10 to 14).

Multiple Blocks

If a server or client receives a message longer than 200 bytes, it must send the received message in multiple blocks to the processor. In this case, the byte count field of the block will be set to -1 for each block where the server is sending more than 200 characters. Each block with a byte count field of -1 contains 200 bytes of data. The data set is located in the block starting at word offset 2. When the last block of data to send by the server is less than or equal to 200 bytes, the byte count field will be set to a number from 1 to 200. This signifies to the processor that this is the last block. The ladder logic must handle data received on each server or client enabled in the module.

The module status data begins at word offset 102. Refer to Installing and Configuring the Module for a full discussion of this data set. The ladder logic should use the state value of each server to determine which servers have open connections (state value of 1). Ladder logic can send messages to any open connection.

Word 248 of the message informs the ladder logic of the number of bytes sent in the last write block that were processed by a server. Ladder logic should check to make sure all bytes sent to a server are processed. If not, data may be lost.

The last word of the input image (word offset 249) is the block sequence number. This word's value changes each time the module has processed the previous output image or is sending new information to the processor. This value should be copied to the first word of the output image (write block sequence number). Both the processor and the module can easily recognize the arrival of new data by the sequence number.

Write Block

These blocks of data transfer information from the ControlLogix processor to the module. The following table shows the structure of the output image used to transfer this data.

	Word Offset	Description
	0	Block Sequence Number (Read block number as set by module)
Transmit Data	1	Server/Client Number for data to transmit. If the word contains a value of -1, no transmit data is present. If the word contains a value from 0 to maximum number of servers -1, the block contains data to send from the specified server in the module. If the word contains a value from 10 to 14, then the block contains data to send from one of the clients.
	2	Number of characters to transmit to a server or client. Each block can transmit up to 400 bytes of data. If this word contains a value of -1, the block contains 400 bytes of data and more blocks of data are to follow. When the module received the last block containing a positive value representing the number of bytes in the block, the server or client will transmit the data to the end device.
	3 to 202	Data to transmit on specified server or client.
Transmit Control	203 to 212	Client connection request data.
	213 to 235	Reserved for future use
	236	Server[0] Control Word (1=Abort)
	237	Server[1] Control Word (1=Abort)
	238	Server[2] Control Word (1=Abort)
	239	Server[3] Control Word (1=Abort)
	240	Server[4] Control Word (1=Abort)
	241	Client[0] Control Word
	242	Client[1] Control Word
	243	Client[2] Control Word
	244	Client[3] Control Word
	245	Client[4] Control Word
	246	Server Control Word
	247	Module Control Word contains a value of 0, -1, -2 or -3.

The Block Sequence Number is received on the last read block transfer through the input image on the module. The ladder logic should copy this value from word 249 of the input image to word 0 of output image in the ladder logic.

Block ID	Description
0 to 65535	Normal data blocks for read and write

Note: This is the last operation performed when constructing the write block. The module's program will trigger the Process Write Block function when it recognizes a new value in word 0 of the output image.

Words 236 to 240 are used for server socket control. If the server socket is established and the user sets the value in the appropriate word to 1, the server state will be changed to 1003 (new server state) and will abort the socket immediately. It will then reopen the socket to wait for a new connection. These words should be set to zero when no operation is required.

Word 1 of the block contains one of the following values:

Value	Description
-1	No transmit data in block
0	Server 0 data in block
1	Server 1 data in block
2	Server 2 data in block
3	Server 3 data in block
4	Server 4 data in block
10	Client 0 data in block
11	Client 1 data in block
12	Client 2 data in block
13	Client 3 data in block
14	Client 4 data in block

If the word is set to a value of -1, there is no data in the message. A value of 0 to 4 will cause the enclosed message to be sent to the server if the message length is set to a value other than zero and the server has an open connection. A value of 10 to 14 will cause the enclosed message to be sent to the client if a message length is set to a value other than zero. Word 2 of the block defines the length of data in the block.

Up to 400 bytes of data can be sent in each block starting at word offset 3 in the block. If the message to be sent to a server is longer than 400 bytes, multiple blocks are required. If more than 400 bytes are required to send, the message length field (Word Offset 2) should be set to a value of -1 and 400 bytes of data should be placed in the block. When 400 or fewer bytes remain to be sent, the message length field should be set to that value and the remaining data placed in the block. The client or server will accept messages up to a length of 8192 bytes. If a message longer than 8192 bytes is sent to a server, a transmit overflow error will be recorded and the message will be sent when 8192 bytes are received. The remaining part of the message will be sent as it is received.

Word offsets 203 and 212 request a new connection for one of the five clients in the module. The format of this data area is shown in the following table.

Word	Description
203	Client to utilized for connection (10 to 14)
204	Reserved for future use.
205 to 208	IP address of server to which connection will be made. Each word contains one of the digits of a dotted notation IP address.
209	Service port in server to which connection will be made. This service must be available in the server for the connection to succeed.
210	Swap Rx data bytes (0 = No, not 0 = Yes)
211	Swap Tx data bytes (0 = No, not 0 = Yes)
212	Client TimeOut value in milliseconds. The client will close the connection with remote Server after the specified milliseconds once data transfer ceases between the client and the remote Server. A value of 0 will keep the connection open indefinitely.

Ladder logic is required to transfer this data to the block when a connection is required. The ladder logic should also clear the area after the connection is requested. The example ladder logic present in this document presents code to accomplish these tasks.

Client Control Word Codes

Words 241 to 245 close the connection on one of the clients. The following table lists the values recognized by the module for these words:

Code	Definition
0	No operation to perform
1	Close the client socket
2	Abort the client socket

Server Control Word Codes

The last two words of the image control the server or the module. The server control word (word 246) controls the server. The following table lists the values recognized by the module:

Code	Definition
0	No operation to perform
1	Close socket after transmit operation
2	Abort socket after transmit operation

If a value of 0 is present in the field, the server takes no action. If a value of 1 is present in the field, the server will gently close the socket after it transmits the message contained in the block. If a value of 2 is present, the server will send the message contained in the block and then force the connection closed by sending a reset message to the client.

Module Control Word Codes

Word 247 is used to control the module. The following table lists the commands recognized by the module.

Code	Definition
0	No operation to perform
-1	Warm boot module
-2	Cold boot module
-3	Build configuration files.

The module will perform the action specified in the command control word.

Configuration Block

In order to support module configuration from the ladder logic, a write block format is required when the Control Word is set to -3. The following table shows the general structure of the block:

	Word Offset	Description
	0	Block Sequence Number (Read block number as set by module)
[Module]	1 to 40	Module Name (80 characters of data with null termination)
	41 to 50	Password (20 characters with null termination)
[Server 0]	51	Enabled (0 = No, not 0 = Yes)
	52	Service port
	53	Connection Timeout
	54	Connection Close Type (0, 1 or 2)
	55	Swap Rx Data Bytes (0 = No, not 0 = Yes)
	56	Swap Tx Data Bytes (0 = No, not 0 = Yes)
[Server 1]	57	Enabled (0 = No, not 0 = Yes)
	58	Service port
	59	Connection Timeout
	60	Connection Close Type (0, 1 or 2)
	61	Swap Rx Data Bytes (0 = No, not 0 = Yes)
	62	Swap Tx Data Bytes (0 = No, not 0 = Yes)
[Server 2]	63	Enabled (0 = No, not 0 = Yes)
	64	Service port
	65	Connection Timeout
	66	Connection Close Type (0, 1 or 2)
	67	Swap Rx Data Bytes (0 = No, not 0 = Yes)
	68	Swap Tx Data Bytes (0 = No, not 0 = Yes)
[Server 3]	69	Enabled (0 = No, not 0 = Yes)
	70	Service port
	71	Connection Timeout
	72	Connection Close Type (0, 1 or 2)
	73	Swap Rx Data Bytes (0 = No, not 0 = Yes)
	74	Swap Tx Data Bytes (0 = No, not 0 = Yes)
[Server 4]	75	Enabled (0 = No, not 0 = Yes)
	76	Service port
	77	Connection Timeout
	78	Connection Close Type (0, 1 or 2)
	79	Swap Rx Data Bytes (0 = No, not 0 = Yes)
	80	Swap Tx Data Bytes (0 = No, not 0 = Yes)
My_IP	81 to 84	The IP address for the module. Each word contains one of the four values that comprise the IP address. For example, 192.168.0.100.

	Word Offset	Description
Netmask	85 to 88	Network mask. Each word contains one of the values for the network mask.
Gateway	89 to 92	Default gateway
	93 to 96	Default network
	97 to 100	Default subnet mask
	101 to 246	Reserved for future use
	247	Module Control Word contains a value of -3 to indicate build configuration file option.

When configuring the module from the ladder logic, use numeric values to select options (0 for "No" and non-zero for "Yes") rather than text values. After the module receives this block, it will build the two configuration files and perform a reboot operation. The module will then use the new configuration.

Handling Multiple Blocks

It is important to understand how to handle multiple blocks. The buffer size supports 8192 bytes, but the module can handle only 2048 bytes. The module can only send 200 bytes at each scan to the processor. For example, if a device sends a message that contains 1000 bytes to the module, the module will break the message down into 5 blocks of 200 bytes. The first four blocks will set the number of characters parameter as -1, indicating that each block is part of the same message. The last block sets the number of characters to 200, indicating that there are no more blocks from that message.

The concept is the same for writing data from the processor to the module, except that you can write up to 400 bytes at a time to the module. The module buffers all data until it receives a block that contains the "number of characters" parameter set to ≥ 0 . In this case, it sends all data to the client that is connected to the server, or the server connects to the client.

Important: Messages are usually broken down into smaller frames by the IP layer in a specific LAN or WAN according to the Maximum Transmit Unit (MTU) of the network. For example, a message that contains 2000 bytes can be broken down into 2 messages by the IP layer in the network (after it is sent to the module). The same issue is applied when a client sends data to the server; although a client sends a single message to the module, it could be broken down into smaller fragments before it gets to the module. In this case, the module would interpret it as two different messages.

The application layer defines when a message is finished. This is the reason why the user should consider using some sort of control so the ladder could identify different messages as actually part of one single message. This could be accomplished either by using a specific character at the end of each message or by using a fixed length for each message.

Network Data Transfer

In order for data to be transferred between the module and another device, a TCP/IP connection must be made between a client and a server on the module. The MVI56-GEC module contains five servers that listen on the user assigned service ports waiting for a connection. When a client wishes to send data to the module, it must open a TCP/IP connection to the module. After the connection is established, either device can send and receive data. When either device is finished with the connection, the connection must be closed. This operation can be initiated from either end device.

The MVI56-GEC module servers and clients are configured to handle their TCP/IP session independently. The user parameter Connection Timeout is utilized to determine the amount of time a connection can remain idle before the server will close the connection. If the parameter is set to 0, the server will not perform the timeout logic and the socket will never be closed by the server on an idle condition. If this feature is utilized, it can prevent connections that may be lost and were not properly closed. After the connection is established, the ladder logic should verify that the client had not been communicating for some time and close the connection.

Each server on the module is assigned its own server port number. This does not mean that two or more servers cannot share the same port number. In fact this might be desirable in some instances. It is up to the ladder logic to keep track of each message and to insure that a request/response transaction is associated with the correct connection. Information to keep track of each connection is passed in each input image. The status data set provides the IP address and TCP port address for the connection on each server. Each message transferred between the module and the processor has a server index word. This word associates the message with a server, which is associated with a connection to a specific IP address and TCP port address. Therefore, each connection is specified to the processor by the server index. The following illustration shows a snapshot of the modules status data:

Server	Status Data	Description of Server
Server 0	IP of Host (192.168.0.100)	This server is connected (State=1) to IP address 192.168.0.100 on TCP port 1243.
	Port of Host (1243)	
	State = 1	
Server 1	IP of Host (192.168.0.100)	This server is connected (State=1) to IP address 192.168.0.100 on TCP port 1244.
	Port of Host (1244)	
	State = 1	
Server 2	IP of Host (192.168.0.101)	This server is connected (State=1) to IP address 192.168.0.101 on TCP port 56443.
	Port of Host (56443)	
	State = 1	
Server 3	IP of Host (192.168.0.102)	This server is connected (State=1) to IP address 192.168.0.102 on TCP port 7943.
	Port of Host (7943)	
	State = 1	
Server 4	IP of Host (0.0.0.0)	This server is not connected (State not equal to 1) and is waiting for a connection.
	Port of Host (0)	
	State = 0	

Ladder logic can send messages to the clients connected to servers 0 to 3. Messages sent to server 4 will not be sent from the module because there is no connection active on that server.

Each server has a state value in the status data area. This value is utilized by the ladder logic to determine if a connection is present on server. The following table defines the state status values used by each server:

Server state list

State Value	Definition
-1	Server is initializing and is being set up to listen.
0	The server is waiting for a client to establish a connection.
1	The server has established a connection with a client and can send or receive data.
1000	The server has initiated a close operation on the connection.
1001	The server is waiting for the close on the connection to complete.
1002	The server is issuing an abort (reset) on the connection. The socket is forced closed.
1003	The server is issuing an abort (reset) on the connection due to control from user.

Client state list

State Value	Definition
-1	Client is waiting for a connection request.
0	The client is waiting to establish the connection with the server.
1	The client has established a connection with the server and can send and receive data.
1000	The client has initiated a close operation on the connection.
1001	The client is waiting for the close on the connection to complete.
1002	The client is issuing an abort (reset) on the connection. The socket is forced closed.

Client Connection States

State Value	Definition
-4	The Client is idle and not connected. It was disconnected by time value entered in the tag for clients' connection setup Time-Out register.
-3	Server closed connection for client or server is not available.
-2	Unable to open connection with specified server.
-1	Unable to open connection with specified server because of invalid IP address.
0	The client is idle and not connected. Disconnected by the ladder logic timer.
1	The client set to connect to the server and waiting for the connection to establish.
2	The client is connected to the server and can transfer data.
3	The connection is being closed for the client.

Ladder logic should only direct messages to servers that have a state status value of 1. The module will ignore all messages sent to servers with any other state value.

When the ladder logic sends a message to a server, it can request that the socket be closed after the message is sent. The server control word in the output image is used for this purpose. Place a value of 1 in this register to gently close the connection after the message is sent. If a value of 2 is placed in the register, the server will abort the connection to force the socket closed (send a message with the Reset Flag set to the client). Most applications will have the client close the socket.

5.3 Cable Connections

The MVI56-GEC module has the following functional communication connections installed:

- One Ethernet port (RJ45 connector)
- One RS-232 Configuration/Debug port (RJ45 connector)

5.3.1 Ethernet Connection

The MVI56-GEC module has an RJ45 port located on the front of the module, labeled *Ethernet*, for use with the TCP/IP network. The module is connected to the Ethernet network using an Ethernet cable between the module's Ethernet port and an Ethernet switch or hub.

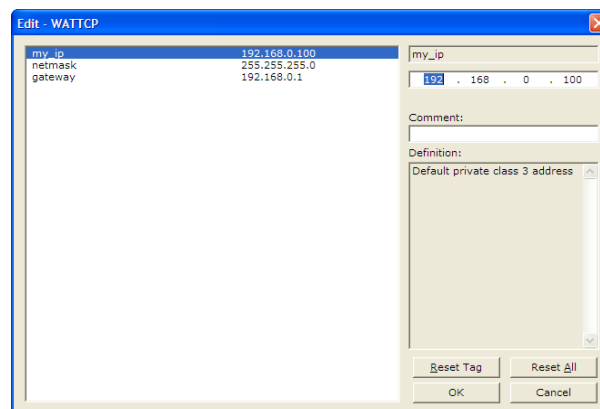
Note: Depending on hardware configuration, you may see more than one RJ45 port on the module. The Ethernet port is labeled *Ethernet*.

Warning: The MVI56-GEC module is NOT compatible with Power Over Ethernet (IEEE802.3af / IEEE802.3at) networks. Do NOT connect the module to Ethernet devices, hubs, switches or networks that supply AC or DC power over the Ethernet cable. Failure to observe this precaution may result in damage to hardware, or injury to personnel.

Important: The module requires a static (fixed) IP address that is not shared with any other device on the Ethernet network. Obtain a list of suitable IP addresses from your network administrator BEFORE configuring the Ethernet port on this module.

Ethernet Port Configuration - wattcp.cfg

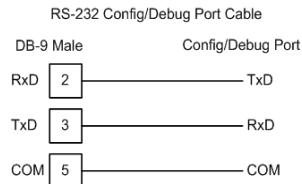
The wattcp.cfg file must be set up properly in order to use a TCP/IP network connection. You can view the current network configuration in *ProSoft Configuration Builder (PCB)*, as shown:



You may also view the network configuration using a PC serial port connection and an ASCII terminal program (like Windows HyperTerminal) by selecting **[@]** (Network Menu) and **[V]** (View) options when connected to the Debug port. For more information on serial port access, see the chapter on Diagnostics and Troubleshooting (page 53).

5.3.2 RS-232 Configuration/Debug Port

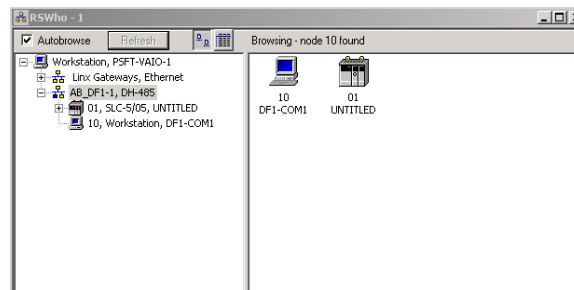
This port is physically an RJ45 connection. An RJ45 to DB-9 adapter cable is included with the module. This port permits a PC based terminal emulation program to view configuration and status data in the module and to control the module. The cable for communications on this port is shown in the following diagram:



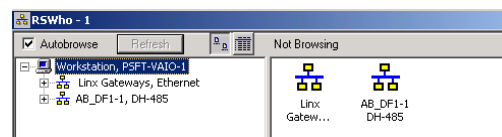
Disabling the RSLinx Driver for the Com Port on the PC

The communication port driver in *RSLinx* can occasionally prevent other applications from using the PC's COM port. If you are not able to connect to the module's configuration/debug port using *ProSoft Configuration Builder (PCB)*, *HyperTerminal* or another terminal emulator, follow these steps to disable the *RSLinx* Driver.

- 1 Open *RSLinx* and go to **COMMUNICATIONS>RSWho**
- 2 Make sure that you are not actively browsing using the driver that you wish to stop. The following shows an actively browsed network:



- 3 Notice how the DF1 driver is opened, and the driver is looking for a processor on node 1. If the network is being browsed, then you will not be able to stop this driver. To stop the driver your *RSWho* screen should look like this:



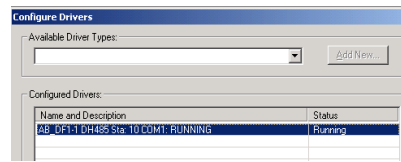
Branches are displayed or hidden by clicking on the  or the  icons.



- 4 When you have verified that the driver is not being browsed, go to

COMMUNICATIONS>CONFIGURE DRIVERS

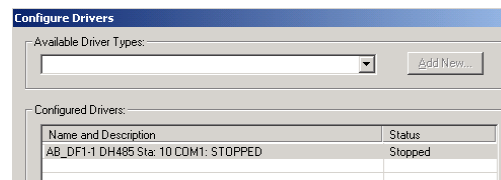
You may see something like this:



If you see the status as running, you will not be able to use this com port for anything other than communication to the processor. To stop the driver press the **STOP** button on the side of the window:



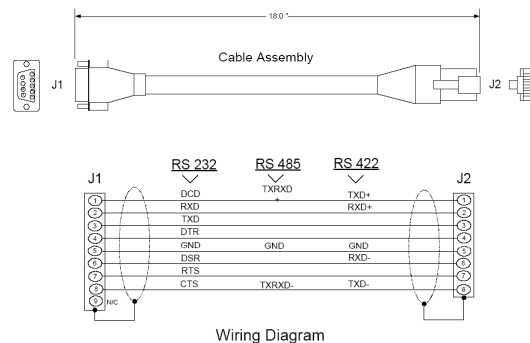
- 5 After you have stopped the driver you will see the following:



- 6 You may now use the com port to connect to the debug port of the module.

Note: You may need to shut down and restart your PC before it will allow you to stop the driver (usually only on *Windows NT* machines). If you have followed all of the above steps, and it will not stop the driver, then make sure you do not have *RSLogix* open. If *RSLogix* is not open, and you still cannot stop the driver, then reboot your PC.

5.3.3 DB9 to RJ45 Adaptor (Cable 14)



5.4 MVI56-GEC Status Data Area

This section contains a listing of the data contained in the MVI56-GEC status data object.

Object in GSCInStat	Block Offset Start	Description
PassCnt	102	Program cycle counter
Product	103	Product name as ASCII string
Rev	105	Revision level as ASCII string
OP	107	Operating system level as ASCII string
Run	109	Run number as ASCII string
BlkErrs.Read	111	Number of blocks transferred from module to processor
BlkErrs.Write	112	Number of blocks transferred from processor to module
BlkErrs.Parse	113	Number of blocks parsed by module
BlkErrs.Err	114	Number of block errors in module
Server[0].Enabled	115	This flag defines if the server is utilized. A value of 0 indicates the server is not used. Any other value indicates the server is used.
Server[0].State	116	This flag defines the current state of the server.
Server[0].IP	117	This double-word value contains the IP address of the client connected to the server.
Server[0].Port	119	This word value contains the port address for the client connected to the server.
Server[0].Open	120	Indicates that the module has opened the server port and is waiting for a connection to a client.
Server[0].Established	121	This status value contains the total number of times a connection was established on the socket.
Server[0].Closed	122	This status value contains the total number of times a close operation was performed on the socket.
Server[0].RxCount	123	This status value contains the total number of messages received by the server.
Server[0].RxOverflow	124	This status value contains the total number of messages received that exceed the user specified buffer size for the server.
Server[0].TxCount	125	This status value contains the total number of messages transmitted by the server.
Server[0].TxOverflow	126	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the server.
Server[0].Timeout	127	This status value contains the total number of times a connection timeout occurred on the socket. This status value is incremented each time a connection timeout or a socket close timeout (2 seconds) occurs.
Server[0].CfgErrWord	128	This bit mapped word defines the configuration errors for the server.
Server[1].Enabled	129	This flag defines if the server is utilized. A value of 0 indicates the server is not used. Any other value indicates the server is used.

Object in GSCInStat	Block Offset Start	Description
Server[1].State	130	This flag defines the current state of the server.
Server[1].IP	131	This double-word value contains the IP address of the client connected to the server.
Server[1].Port	133	This word value contains the port address for the client connected to the server.
Server[1].Open	134	Indicates that the module has opened the server port and is waiting for a connection to a client.
Server[1].Established	135	This status value contains the total number of times a connection was established on the socket.
Server[1].Closed	136	This status value contains the total number of times a close operation was performed on the socket.
Server[1].RxCount	137	This status value contains the total number of messages received by the server.
Server[1].RxOverflow	138	This status value contains the total number of messages received that exceed the user specified buffer size for the server.
Server[1].TxCount	139	This status value contains the total number of messages transmitted by the server.
Server[1].TxOverflow	140	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the server.
Server[1].Timeout	141	This status value contains the total number of times a connection timeout occurred on the socket. This status value is incremented each time a connection timeout or a socket close timeout (2 seconds) occurs.
Server[1].CfgErrWord	142	This bit mapped word defines the configuration errors for the server.
Server[2].Enabled	143	This flag defines if the server is utilized. A value of 0 indicates the server is not used. Any other value indicates the server is used.
Server[2].State	144	This flag defines the current state of the server.
Server[2].IP	145	This double-word value contains the IP address of the client connected to the server.
Server[2].Port	147	This word value contains the port address for the client connected to the server.
Server[2].Open	148	Indicates that the module has opened the server port and is waiting for a connection to a client.
Server[2].Established	149	This status value contains the total number of times a connection was established on the socket.
Server[2].Closed	150	This status value contains the total number of times a close operation was performed on the socket.
Server[2].RxCount	151	This status value contains the total number of messages received by the server.
Server[2].RxOverflow	152	This status value contains the total number of messages received that exceed the user specified buffer size for the server.
Server[2].TxCount	153	This status value contains the total number of messages transmitted by the server.

Object in GSCLnStat	Block Offset Start	Description
Server[2].TxOverflow	154	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the server.
Server[2].Timeout	155	This status value contains the total number of times a connection timeout occurred on the socket. This status value is incremented each time a connection timeout or a socket close timeout (2 seconds) occurs.
Server[2].CfgErrWord	156	This bit mapped word defines the configuration errors for the server.
Server[3].Enabled	157	This flag defines if the server is utilized. A value of 0 indicates the server is not used. Any other value indicates the server is used.
Server[3].State	158	This flag defines the current state of the server.
Server[3].IP	159	This double-word value contains the IP address of the client connected to the server.
Server[3].Port	161	This word value contains the port address for the client connected to the server.
Server[3].Open	162	Indicates that the module has opened the server port and is waiting for a connection to a client.
Server[3].Established	163	This status value contains the total number of times a connection was established on the socket.
Server[3].Closed	164	This status value contains the total number of times a close operation was performed on the socket.
Server[3].RxCount	165	This status value contains the total number of messages received by the server.
Server[3].RxOverflow	166	This status value contains the total number of messages received that exceed the user specified buffer size for the server.
Server[3].TxCount	167	This status value contains the total number of messages transmitted by the server.
Server[3].TxOverflow	168	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the server.
Server[3].Timeout	169	This status value contains the total number of times a connection timeout occurred on the socket. This status value is incremented each time a connection timeout or a socket close timeout (2 seconds) occurs.
Server[3].CfgErrWord	170	This bit mapped word defines the configuration errors for the server.
Server[4].Enabled	171	This flag defines if the server is utilized. A value of 0 indicates the server is not used. Any other value indicates the server is used.
Server[4].State	172	This flag defines the current state of the server.
Server[4].IP	173	This double-word value contains the IP address of the client connected to the server.
Server[4].Port	175	This word value contains the port address for the client connected to the server.

Object in GSCLnStat	Block Offset Start	Description
Server[4].Open	176	Indicates that the module has opened the server port and is waiting for a connection to a client.
Server[4].Established	177	This status value contains the total number of times a connection was established on the socket.
Server[4].Closed	178	This status value contains the total number of times a close operation was performed on the socket.
Server[4].RxCount	179	This status value contains the total number of messages received by the server.
Server[4].RxOverflow	180	This status value contains the total number of messages received that exceed the user specified buffer size for the server.
Server[4].TxCount	181	This status value contains the total number of messages transmitted by the server.
Server[4].TxOverflow	182	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the server.
Server[4].Timeout	183	This status value contains the total number of times a connection timeout occurred on the socket. This status value is incremented each time a connection timeout or a socket close timeout (2 seconds) occurs.
Server[4].CfgErrWord	184	This bit mapped word defines the configuration errors for the server.
Client[0].Connected	185	This flag defines if the client is utilized and connected to a server. A value of 0 indicates the client is not connected and can be utilized for a connection. Any other value indicates the client is connected and being used.
Client[0].State	186	This flag defines the current state of the client.
Client[0].IP	187	This double-word value contains the IP address of the server connected to the client.
Client[0].Port	189	This word value contains the port address for the server connected to the client.
Client[0].RxCount	190	This status value contains the total number of messages received by the client.
Client[0].RxOverflow	191	This status value contains the total number of messages received that exceed the user specified buffer size for the client.
Client[0].TxCount	192	This status value contains the total number of messages transmitted by the client.
Client[0].TxOverflow	193	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the client.
Client[0].spare	194	Reserved for future use
Client[1].Connected	195	This flag defines if the client is utilized and connected to a server. A value of 0 indicates the client is not connected and can be utilized for a connection. Any other value indicates the client is connected and being used.

Object in GSCLnStat	Block Offset Start	Description
Client[1].State	196	This flag defines the current state of the client.
Client[1].IP	197	This double-word value contains the IP address of the server connected to the client.
Client[1].Port	199	This word value contains the port address for the server connected to the client.
Client[1].RxCount	200	This status value contains the total number of messages received by the client.
Client[1].RxOverflow	201	This status value contains the total number of messages received that exceed the user specified buffer size for the client.
Client[1].TxCount	202	This status value contains the total number of messages transmitted by the client.
Client[1].TxOverflow	203	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the client.
Client[1].spare	204	Reserved for future use
Client[2].Connected	205	This flag defines if the client is utilized and connected to a server. A value of 0 indicates the client is not connected and can be utilized for a connection. Any other value indicates the client is connected and being used.
Client[2].State	206	This flag defines the current state of the client.
Client[2].IP	207	This double-word value contains the IP address of the server connected to the client.
Client[2].Port	209	This word value contains the port address for the server connected to the client.
Client[2].RxCount	210	This status value contains the total number of messages received by the client.
Client[2].RxOverflow	211	This status value contains the total number of messages received that exceed the user specified buffer size for the client.
Client[2].TxCount	212	This status value contains the total number of messages transmitted by the client.
Client[2].TxOverflow	213	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the client.
Client[2].spare	214	Reserved for future use
Client[3].Connected	215	This flag defines if the client is utilized and connected to a server. A value of 0 indicates the client is not connected and can be utilized for a connection. Any other value indicates the client is connected and being used.
Client[3].State	216	This flag defines the current state of the client.
Client[3].IP	217	This double-word value contains the IP address of the server connected to the client.
Client[3].Port	219	This word value contains the port address for the server connected to the client.

Object in GSCInStat	Block Offset Start	Description
Client[3].RxCount	220	This status value contains the total number of messages received by the client.
Client[3].RxOverflow	221	This status value contains the total number of messages received that exceed the user specified buffer size for the client.
Client[3].TxCount	222	This status value contains the total number of messages transmitted by the client.
Client[3].TxOverflow	223	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the client.
Client[3].spare	224	Reserved for future use
Client[4].Connected	225	This flag defines if the client is utilized and connected to a server. A value of 0 indicates the client is not connected and can be utilized for a connection. Any other value indicates the client is connected and being used.
Client[4].State	226	This flag defines the current state of the client.
Client[4].IP	227	This double-word value contains the IP address of the server connected to the client.
Client[4].Port	229	This word value contains the port address for the server connected to the client.
Client[4].RxCount	230	This status value contains the total number of messages received by the client.
Client[4].RxOverflow	231	This status value contains the total number of messages received that exceed the user specified buffer size for the client.
Client[4].TxCount	232	This status value contains the total number of messages transmitted by the client.
Client[4].TxOverflow	233	This status value contains the total number of transmit messages that exceeded the user specified maximum buffer size for the client.
Client[4].spare	234	Reserved for future use

The following table describes the format format of the server configuration error word.

Configuration Error Word Bits

Bit Position		Description
Bit 0	0x01	A value other than Y or N was entered for the server enabled parameter.
Bit 1	0x02	Not utilized
Bit 2	0x04	A value less than 5000 is entered for the Connection Timeout parameter other than 0.
Bit 3	0x08	An invalid value is entered for the Connection Close Type parameter. The program only accepts value of 0 to 2.

5.5 Configuration Data

This section contains a listing of the parameters and their definitions for the MVI56-GEC module configuration.

[Section]/Item	Range	Description
[MODULE]		Module parameter definitions
Module Name:	0 to 80 characters	This parameter assigns a name to the module that can be viewed using the configuration/debug port. Use this parameter to identify the module and the configuration file.
Password:	Up to 20 chars	Not supported with the latest release

[Section]/Item	Range	Description
[Server 0]		Server definitions
Enabled:	Y or N	This parameter determines if the server will be utilized by the module. If a value of "Y" is entered, the server will be used. Any other value will disable the server.
Service Port Number:	1 to 65535	This parameter sets the TCP/IP service port for this server. Each server can have its own unique service port or can share the same number with other servers.
Connection Timeout:	0 or 5000 to 65535	This parameter specifies the number of milliseconds the server will permit the server to be inactive after a connection is made before closing the socket. This timeout period is reset on each read or write packet. If the parameter is set to 0, the connection will not timeout.
Connection Close Type:	0, 1 or 2	This coded parameter defines the personality of the server after a connection is made. If the parameter is set to 0, the socket will only be closed when a request from the client is received or the connection timeout is exceeded. If a value of 1 is selected, the server will close the socket after it transmits a single message. If a value of 2 is selected, the server will close the socket after it receives a message.
Swap Rx Data Bytes:	Y or N	This parameter is determines if the data received by the server will have the byte order of the data swapped. If the parameter is set to N, no byte swapping will occur. If the parameter is set to Y, the odd byte will be swapped with the even byte in each word of data received.
Swap Tx Data Bytes:	Y or N	This parameter is determines if the data to be transmitted by the server will have the byte order of the data swapped. If the parameter is set to N, no byte swapping will occur. If the parameter is set to Y, the odd byte will be swapped with the even byte in each word of data received.

Note: Add other [Server n] sections for each server to be utilized.

[Section]/Item	Range	Description
[Server n]		Server definitions

[Section]/Item	Range	Description
Enabled:	Y or N	This parameter determines if the server will be utilized by the module. If a value of "Y" is entered, the server will be used. Any other value will disable the server.
Service Port Number:	1 to 65535	This parameter sets the TCP/IP service port for this server. Each server can have its own unique service port or can share the same number with other servers.
Connection Timeout:	0 or 5000 to 65535	This parameter specifies the number of milliseconds the server will permit the server to be inactive after a connection is made before closing the socket. This timeout period is reset on each read or write packet. If the parameter is set to 0, the connection will not timeout.
Connection Close Type:	0, 1 or 2	This coded parameter defines the personality of the server after a connection is made. If the parameter is set to 0, the socket will only be closed when a request from the client is received or the connection timeout is exceeded. If a value of 1 is selected, the server will close the socket after it transmits a single message. If a value of 2 is selected, the server will close the socket after it receives a message.
Swap Rx Data Bytes:	Y or N	This parameter is determines if the data received by the server will have the byte order of the data swapped. If the parameter is set to N, no byte swapping will occur. If the parameter is set to Y, the odd byte will be swapped with the even byte in each word of data received.
Swap Tx Data Bytes:	Y or N	This parameter is determines if the data to be transmitted by the server will have the byte order of the data swapped. If the parameter is set to N, no byte swapping will occur. If the parameter is set to Y, the odd byte will be swapped with the even byte in each word of data received.

6 Support, Service & Warranty

In This Chapter

- ❖ Contacting Technical Support 97
- ❖ Return Material Authorization (RMA) Policies and Conditions..... 99
- ❖ LIMITED WARRANTY 101

Contacting Technical Support

ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

- 1 Product Version Number
- 2 System architecture
- 3 Network details

If the issue is hardware related, we will also need information regarding:

- 1 Module configuration and associated ladder files, if any
- 2 Module operation and any unusual behavior
- 3 Configuration/Debug status information
- 4 LED patterns
- 5 Details about the serial, Ethernet or fieldbus devices interfaced to the module, if any.

Note: For technical support calls within the United States, an after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers.

Internet	Web Site: www.prosoft-technology.com/support E-mail address: support@prosoft-technology.com
Asia Pacific (location in Malaysia)	Tel: +603.7724.2080, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Asia Pacific (location in China)	Tel: +86.21.5187.7337 x888, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Europe (location in Toulouse, France)	Tel: +33 (0) 5.34.36.87.20, E-mail: support.EMEA@prosoft-technology.com Languages spoken include: French, English
Europe (location in Dubai, UAE)	Tel: +971-4-214-6911, E-mail: mea@prosoft-technology.com Languages spoken include: English, Hindi
North America (location in California)	Tel: +1.661.716.5100, E-mail: support@prosoft-technology.com Languages spoken include: English, Spanish
Latin America (Oficina Regional)	Tel: +1-281-2989109, E-Mail: latinam@prosoft-technology.com Languages spoken include: Spanish, English
Latin America (location in Puebla, Mexico)	Tel: +52-222-3-99-6565, E-mail: soporte@prosoft-technology.com Languages spoken include: Spanish
Brasil (location in Sao Paulo)	Tel: +55-11-5083-3776, E-mail: brasil@prosoft-technology.com Languages spoken include: Portuguese, English

6.1 Return Material Authorization (RMA) Policies and Conditions

The following Return Material Authorization (RMA) Policies and Conditions (collectively, "RMA Policies") apply to any returned product. These RMA Policies are subject to change by ProSoft Technology, Inc., without notice. For warranty information, see Limited Warranty (page 101). In the event of any inconsistency between the RMA Policies and the Warranty, the Warranty shall govern.

6.1.1 Returning Any Product

- a) In order to return a Product for repair, exchange, or otherwise, the Customer must obtain a Return Material Authorization (RMA) number from ProSoft Technology and comply with ProSoft Technology shipping instructions.
- b) In the event that the Customer experiences a problem with the Product for any reason, Customer should contact ProSoft Technical Support at one of the telephone numbers listed above (page 97). A Technical Support Engineer will request that you perform several tests in an attempt to isolate the problem. If after completing these tests, the Product is found to be the source of the problem, we will issue an RMA.
- c) All returned Products must be shipped freight prepaid, in the original shipping container or equivalent, to the location specified by ProSoft Technology, and be accompanied by proof of purchase and receipt date. The RMA number is to be prominently marked on the outside of the shipping box. Customer agrees to insure the Product or assume the risk of loss or damage in transit. Products shipped to ProSoft Technology using a shipment method other than that specified by ProSoft Technology, or shipped without an RMA number will be returned to the Customer, freight collect. Contact ProSoft Technical Support for further information.
- d) A 10% restocking fee applies to all warranty credit returns, whereby a Customer has an application change, ordered too many, does not need, etc. Returns for credit require that all accessory parts included in the original box (i.e.; antennas, cables) be returned. Failure to return these items will result in a deduction from the total credit due for each missing item.

6.1.2 Returning Units Under Warranty

A Technical Support Engineer must approve the return of Product under ProSoft Technology's Warranty:

- a) A replacement module will be shipped and invoiced. A purchase order will be required.
- b) Credit for a product under warranty will be issued upon receipt of authorized product by ProSoft Technology at designated location referenced on the Return Material Authorization
 - i. If a defect is found and is determined to be customer generated, or if the defect is otherwise not covered by ProSoft Technology's warranty, there will be no credit given. Customer will be contacted and can request module be returned at their expense;
 - ii. If defect is customer generated and is repairable, customer can authorize ProSoft Technology to repair the unit by providing a purchase order for 30% of the current list price plus freight charges, duties and taxes as applicable.

6.1.3 Returning Units Out of Warranty

- a) Customer sends unit in for evaluation to location specified by ProSoft Technology, freight prepaid.
- b) If no defect is found, Customer will be charged the equivalent of \$100 USD, plus freight charges, duties and taxes as applicable. A new purchase order will be required.
- c) If unit is repaired, charge to Customer will be 30% of current list price (USD) plus freight charges, duties and taxes as applicable. A new purchase order will be required or authorization to use the purchase order submitted for evaluation fee.

The following is a list of non-repairable units:

- 3150 - All
- 3750
- 3600 - All
- 3700
- 3170 - All
- 3250
- 1560 - Can be repaired, only if defect is the power supply
- 1550 - Can be repaired, only if defect is the power supply
- 3350
- 3300
- 1500 - All

6.2 LIMITED WARRANTY

This Limited Warranty ("Warranty") governs all sales of hardware, software, and other products (collectively, "Product") manufactured and/or offered for sale by ProSoft Technology, Incorporated (ProSoft), and all related services provided by ProSoft, including maintenance, repair, warranty exchange, and service programs (collectively, "Services"). By purchasing or using the Product or Services, the individual or entity purchasing or using the Product or Services ("Customer") agrees to all of the terms and provisions (collectively, the "Terms") of this Limited Warranty. All sales of software or other intellectual property are, in addition, subject to any license agreement accompanying such software or other intellectual property.

6.2.1 What Is Covered By This Warranty

- a) *Warranty On New Products:* ProSoft warrants, to the original purchaser, that the Product that is the subject of the sale will (1) conform to and perform in accordance with published specifications prepared, approved and issued by ProSoft, and (2) will be free from defects in material or workmanship; provided these warranties only cover Product that is sold as new. This Warranty expires three (3) years from the date of shipment for Product purchased **on or after** January 1st, 2008, or one (1) year from the date of shipment for Product purchased **before** January 1st, 2008 (the "Warranty Period"). If the Customer discovers within the Warranty Period a failure of the Product to conform to specifications, or a defect in material or workmanship of the Product, the Customer must promptly notify ProSoft by fax, email or telephone. In no event may that notification be received by ProSoft later than 39 months from date of original shipment. Within a reasonable time after notification, ProSoft will correct any failure of the Product to conform to specifications or any defect in material or workmanship of the Product, with either new or remanufactured replacement parts. ProSoft reserves the right, and at its sole discretion, may replace unrepairable units with new or remanufactured equipment. All replacement units will be covered under warranty for the 3 year period commencing from the date of original equipment purchase, not the date of shipment of the replacement unit. Such repair, including both parts and labor, will be performed at ProSoft's expense. All warranty service will be performed at service centers designated by ProSoft.
- b) *Warranty On Services:* Materials and labor performed by ProSoft to repair a verified malfunction or defect are warranted in the terms specified above for new Product, provided said warranty will be for the period remaining on the original new equipment warranty or, if the original warranty is no longer in effect, for a period of 90 days from the date of repair.

6.2.2 What Is Not Covered By This Warranty

- a) ProSoft makes no representation or warranty, expressed or implied, that the operation of software purchased from ProSoft will be uninterrupted or error free or that the functions contained in the software will meet or satisfy the purchaser's intended use or requirements; the Customer assumes complete responsibility for decisions made or actions taken based on information obtained using ProSoft software.
- b) This Warranty does not cover the failure of the Product to perform specified functions, or any other non-conformance, defects, losses or damages caused by or attributable to any of the following: (i) shipping; (ii) improper installation or other failure of Customer to adhere to ProSoft's specifications or instructions; (iii) unauthorized repair or maintenance; (iv) attachments, equipment, options, parts, software, or user-created programming (including, but not limited to, programs developed with any IEC 61131-3, "C" or any variant of "C" programming languages) not furnished by ProSoft; (v) use of the Product for purposes other than those for which it was designed; (vi) any other abuse, misapplication, neglect or misuse by the Customer; (vii) accident, improper testing or causes external to the Product such as, but not limited to, exposure to extremes of temperature or humidity, power failure or power surges; or (viii) disasters such as fire, flood, earthquake, wind and lightning.
- c) The information in this Agreement is subject to change without notice. ProSoft shall not be liable for technical or editorial errors or omissions made herein; nor for incidental or consequential damages resulting from the furnishing, performance or use of this material. The user guide included with your original product purchase from ProSoft contains information protected by copyright. No part of the guide may be duplicated or reproduced in any form without prior written consent from ProSoft.

6.2.3 Disclaimer Regarding High Risk Activities

Product manufactured or supplied by ProSoft is not fault tolerant and is not designed, manufactured or intended for use in hazardous environments requiring fail-safe performance including and without limitation: the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines or weapons systems in which the failure of the product could lead directly or indirectly to death, personal injury or severe physical or environmental damage (collectively, "high risk activities"). ProSoft specifically disclaims any express or implied warranty of fitness for high risk activities.

6.2.4 Intellectual Property Indemnity

Buyer shall indemnify and hold harmless ProSoft and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not ProSoft is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless ProSoft and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party. ProSoft makes no warranty that the product is or will be delivered free of any person's claiming of patent, trademark, or similar infringement. The Buyer assumes all risks (including the risk of suit) that the product or any use of the product will infringe existing or subsequently issued patents, trademarks, or copyrights.

- a) Any documentation included with Product purchased from ProSoft is protected by copyright and may not be duplicated or reproduced in any form without prior written consent from ProSoft.
- b) ProSoft's technical specifications and documentation that are included with the Product are subject to editing and modification without notice.
- c) Transfer of title shall not operate to convey to Customer any right to make, or have made, any Product supplied by ProSoft.
- d) Customer is granted no right or license to use any software or other intellectual property in any manner or for any purpose not expressly permitted by any license agreement accompanying such software or other intellectual property.
- e) Customer agrees that it shall not, and shall not authorize others to, copy software provided by ProSoft (except as expressly permitted in any license agreement accompanying such software); transfer software to a third party separately from the Product; modify, alter, translate, decode, decompile, disassemble, reverse-engineer or otherwise attempt to derive the source code of the software or create derivative works based on the software; export the software or underlying technology in contravention of applicable US and international export laws and regulations; or use the software other than as authorized in connection with use of Product.
- f) **Additional Restrictions Relating To Software And Other Intellectual Property**

In addition to compliance with the Terms of this Warranty, Customers purchasing software or other intellectual property shall comply with any license agreement accompanying such software or other intellectual property. Failure to do so may void this Warranty with respect to such software and/or other intellectual property.

6.2.5 Disclaimer of all Other Warranties

The Warranty set forth in What Is Covered By This Warranty (page 101) are in lieu of all other warranties, express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

6.2.6 Limitation of Remedies **

In no event will ProSoft or its Dealer be liable for any special, incidental or consequential damages based on breach of warranty, breach of contract, negligence, strict tort or any other legal theory. Damages that ProSoft or its Dealer will not be responsible for include, but are not limited to: Loss of profits; loss of savings or revenue; loss of use of the product or any associated equipment; loss of data; cost of capital; cost of any substitute equipment, facilities, or services; downtime; the claims of third parties including, customers of the Purchaser; and, injury to property.

** Some areas do not allow time limitations on an implied warranty, or allow the exclusion or limitation of incidental or consequential damages. In such areas, the above limitations may not apply. This Warranty gives you specific legal rights, and you may also have other rights which vary from place to place.

6.2.7 Time Limit for Bringing Suit

Any action for breach of warranty must be commenced within 39 months following shipment of the Product.

6.2.8 No Other Warranties

Unless modified in writing and signed by both parties, this Warranty is understood to be the complete and exclusive agreement between the parties, suspending all oral or written prior agreements and all other communications between the parties relating to the subject matter of this Warranty, including statements made by salesperson. No employee of ProSoft or any other party is authorized to make any warranty in addition to those made in this Warranty. The Customer is warned, therefore, to check this Warranty carefully to see that it correctly reflects those terms that are important to the Customer.

6.2.9 Allocation of Risks

This Warranty allocates the risk of product failure between ProSoft and the Customer. This allocation is recognized by both parties and is reflected in the price of the goods. The Customer acknowledges that it has read this Warranty, understands it, and is bound by its Terms.

6.2.10 Controlling Law and Severability

This Warranty shall be governed by and construed in accordance with the laws of the United States and the domestic laws of the State of California, without reference to its conflicts of law provisions. If for any reason a court of competent jurisdiction finds any provisions of this Warranty, or a portion thereof, to be unenforceable, that provision shall be enforced to the maximum extent permissible and the remainder of this Warranty shall remain in full force and effect. Any cause of action with respect to the Product or Services must be instituted in a court of competent jurisdiction in the State of California.

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