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MVI69-EGD

CompactLogix or MicroLogix Platform

GE Ethernet Global Data Communication Module

11/3/2008

USER MANUAL

Please Read This Notice

Successful application of this module requires a reasonable working knowledge of the Rockwell Automation CompactLogix or MicroLogix hardware, the MVI69-EGD Module and the application in which the combination is to be used. For this reason, it is important that those responsible for implementation satisfy themselves that the combination will meet the needs of the application without exposing personnel or equipment to unsafe or inappropriate working conditions.

This manual is provided to assist the user. Every attempt has been made to ensure that the information provided is accurate and a true reflection of the product's installation requirements. In order to ensure a complete understanding of the operation of the product, the user should read all applicable Rockwell Automation documentation on the operation of the Rockwell Automation hardware.

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Battery Life Advisory

All modules in the MVI series use a rechargeable Lithium Vanadium Pentoxide battery to backup the 512K SRAM memory, 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 it becomes fully charged. After it is fully charged, the battery provides backup power for the CMOS setup and configuration data, the real-time clock, and the 512K SRAM memory for approximately 21 days.
Before you remove a module from its power source, ensure that the battery within the module is fully charged. A fully charged battery will hold the BIOS settings (after being removed from its power source) for a limited number of days. When the battery is fully discharged, the module will revert to the default BIOS settings.

Note: The battery is not user replaceable.

Your Feedback Please

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ProSoft Technology
1675 Chester Avenue, Fourth Floor
Bakersfield, CA 93301
+1 (661) 716-5100
+1 (661) 716-5101 (Fax)
http://www.prosoft-technology.com

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MVI69-EGD User Manual
11/3/2008

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Contents

Guide to the MVI69-EGD User Manual

Function		**Section to Read**	**Details**
Introduction (Must Do)	→	Start Here (page 9)	This Section introduces the customer to the module. Included are: package contents, system requirements, hardware installation, and basic configuration.
Verify Communication, Diagnostic and Troubleshooting	→	Verifying Communication (page 57) Diagnostics and Troubleshooting (page 45)	This section describes how to verify communications with the network. Diagnostic and Troubleshooting procedures.
Reference Product Specifications Functional Overview Glossary	→	Reference (page 59) Functional Overview (page 61) Product Specifications (page 59)	These sections contain general references associated with this product, Specifications, and the Functional Overview.
Support, Service, and Warranty Index	→	Support, Service and Warranty (page 87)	This section contains Support, Service and Warranty information. Index of chapters.

1   Start Here

In This Chapter

Installing the MVI69-EGD module requires a reasonable working knowledge of the Rockwell Automation hardware, the MVI69-EGD Module and the application in which they will be used.

⚠ **Caution**: It is important that those responsible for implementation can complete the application without exposing personnel, or equipment, to unsafe or inappropriate working conditions. Safety, quality and experience are key factors in a successful installation.

1.1   System Requirements

The MVI69-EGD module requires the following minimum hardware and software components:

- Rockwell Automation CompactLogix or MicroLogix processor, with compatible power supply and one free slot in the rack, for the MVI69-EGD module. The module requires 800mA of available power.

Important: The MVI69-EGD module has a power supply distance rating of 2 (L43 and L45 installations on first 2 slots of 1769 bus).
Important: For 1769-L23x processors, please make note of the following limitations.
- 1769-L23-QBFC1B = 800mA at 5Vdc (1 MVI69-EGD will use all 800mA of available power. No other modules can be used with an MVI69 module connected to this processor).
- 1769-L23E-QB1B = 1000mA at 5Vdc (1 MVI69-EGD will use 800mA of available power. One other module can be used on this rack provided it consumes less than 200mA at 5Vdc.
- 1769-L23E-QBFC1B = 450mA at 5Vdc (no MVI69 module can be used with this processor)

- Rockwell Automation RSLogix 5000 (CompactLogix) or RSLogix 500 (MicroLogix) programming software
- Rockwell Automation RSLinx communication software

- Pentium® II 450 MHz minimum. Pentium III 733 MHz (or better) recommended
- Supported operating systems:
  - o Microsoft Windows XP Professional with Service Pack 1 or 2
  - o Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3
  - o 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
- HyperTerminal or other terminal emulator program capable of file transfers using Ymodem protocol.

1.2   Package Contents

The following components are included with your MVI69-EGD 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	MVI69-EGD Module	MVI69-EGD	GE Ethernet Global Data Communication Module
1	Cable	Cable #15, RS232 Null Modem	For RS232 Connection to the CFG Port
1	Cable	RJ45 to DB9 Male Adapter	For DB9 Connection to Module's Port
1	inRAx Solutions CD		Contains sample programs, utilities and documentation for the MVI69-EGD module.

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

1.3 Install ProSoft Configuration Builder Software

You must install the ProSoft Configuration Builder (PCB) software in order to configure the MVI69-EGD module. You can always get the newest version of ProSoft Configuration Builder from the ProSoft Technology web site.

To install ProSoft Configuration Builder from the ProSoft Web Site

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. The following illustrations show the file download prompt for two of the most common web browsers.
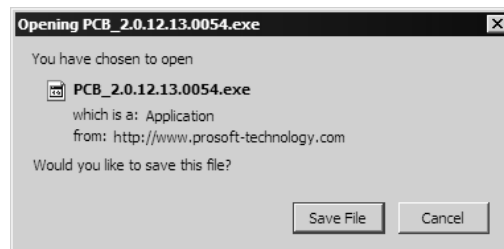
4 Make a note of the location where you saved the file, for example "Desktop", or "My Documents", so you can start the installation program.
5 When the download is complete, locate and open the file, and then follow the instructions on your screen to install the program.

If you do not have access to the Internet, you can install ProSoft Configuration Builder from the ProSoft Solutions CD-ROM, included in the package with your MVI69-EGD module.

*To install ProSoft Configuration Builder from the CD-ROM*

1 Insert the ProSoft Solutions CD-ROM into the CD drive of your PC. Wait for the startup screen to appear.
2 On the startup screen, click *Product Documentation*. This action opens an explorer 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 *ProSoft Configuration Builder Setup* program and follow the instructions on your screen to install the software on your PC.

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

Note: 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.
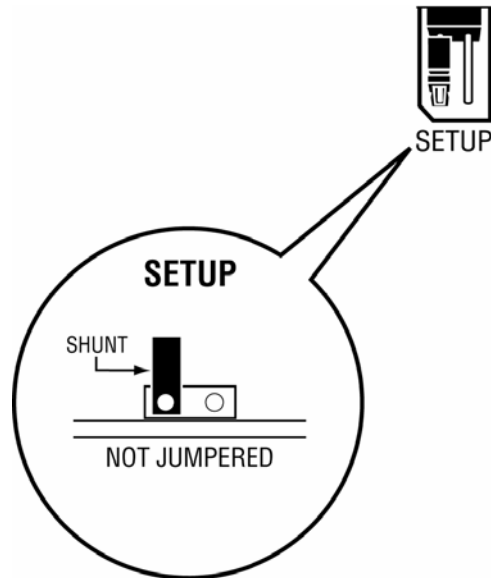
1.5   Install the Module in the Rack

This section describes how to install the module into a CompactLogix or MicroLogix rack

Before you attempt to install the module, make sure that the bus lever of the adjacent module is in the unlocked (fully right) position.

Warning: This module is not hot-swappable! Always remove power from the rack before inserting or removing this module, or damage may result to the module, the processor, or other connected devices.

1 Align the module using the upper and lower tongue-and-groove slots with the adjacent module and slide forward in the direction of the arrow.

Upper Tongue and Groove

Lower Tongue and Groove
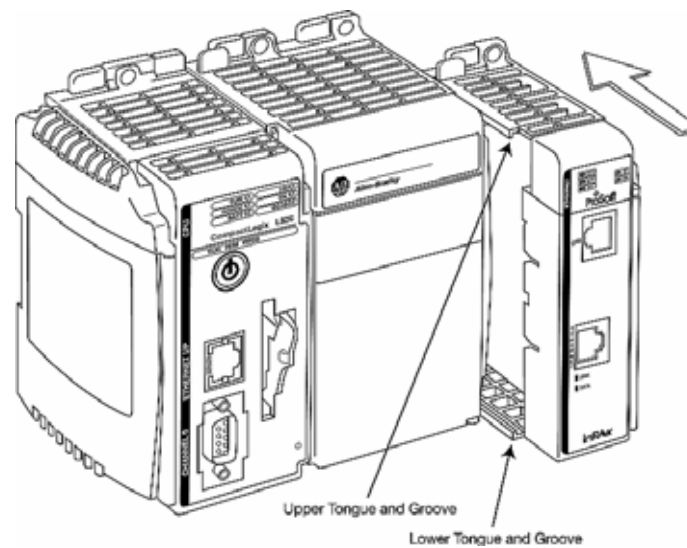
2 Move the module back along the tongue-and-groove slots until the bus connectors on the MVI69 module and the adjacent module line up with each other.

3 Push the module's bus lever back slightly to clear the positioning tab and move it firmly to the left until it clicks. Ensure that it is locked firmly in place.

DIN Rail Latches

Bus Lever

Free position →

Top View
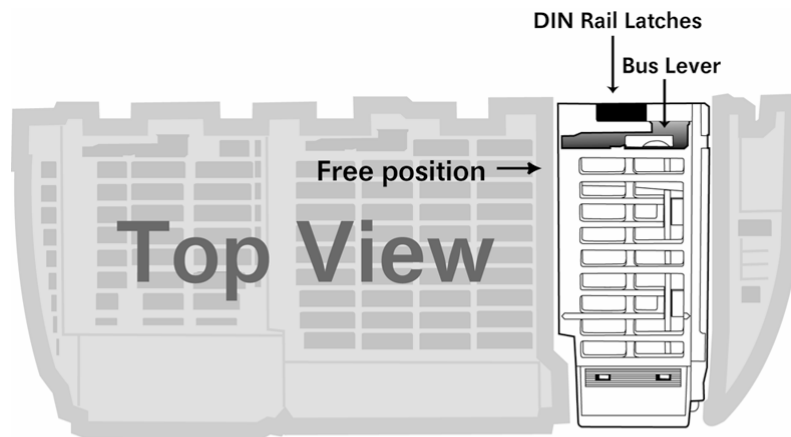
Bus Lever

Move the Bus Lever to the left until it clicks

Bus Lever

Engaged position →

Top View
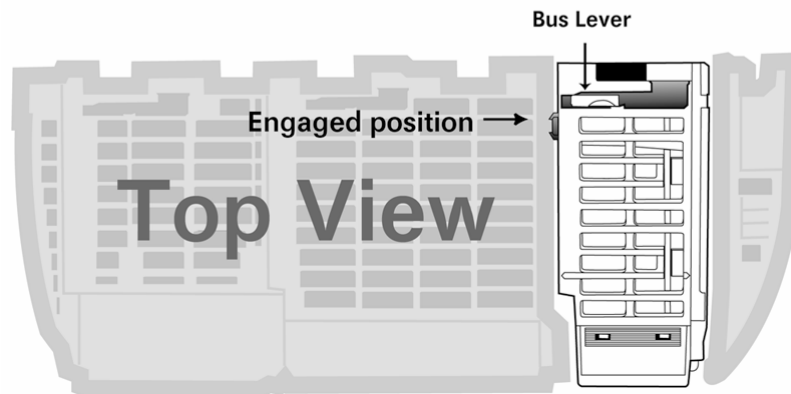
4 Close all DIN rail latches.

5 Press the DIN rail mounting area of the controller against the DIN rail. The latches will momentarily open and lock into place.
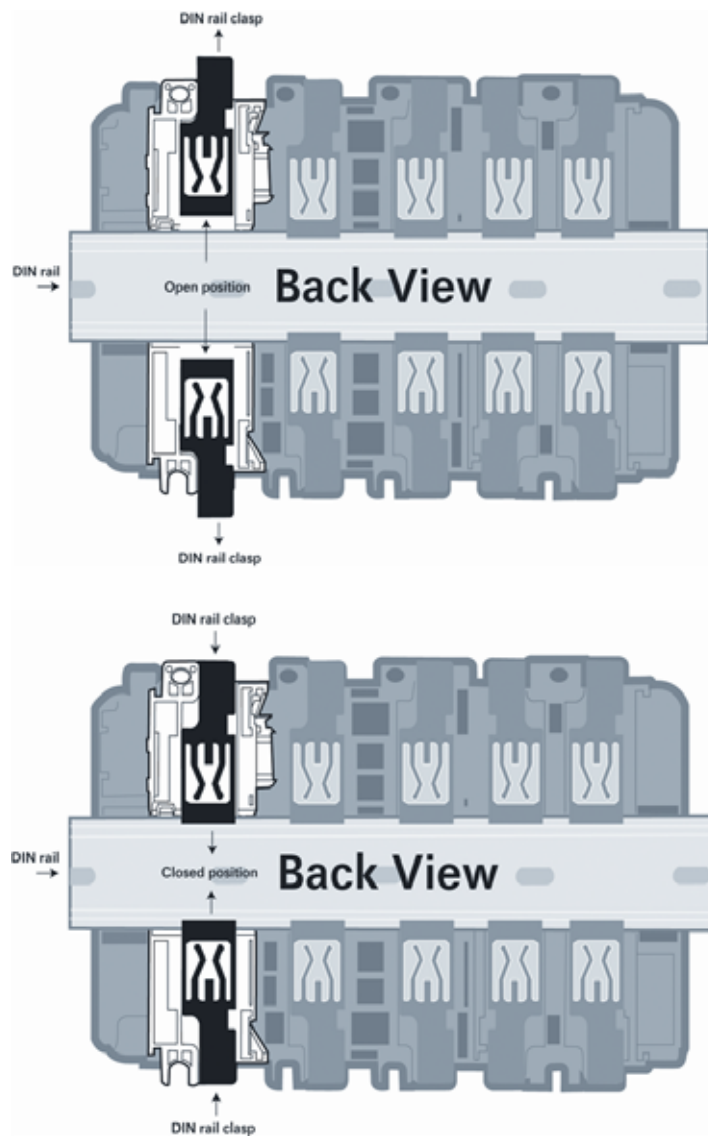
1.6   Connect your PC to the Processor

1   Connect the right-angle connector end of the cable to your controller at the
communications port.
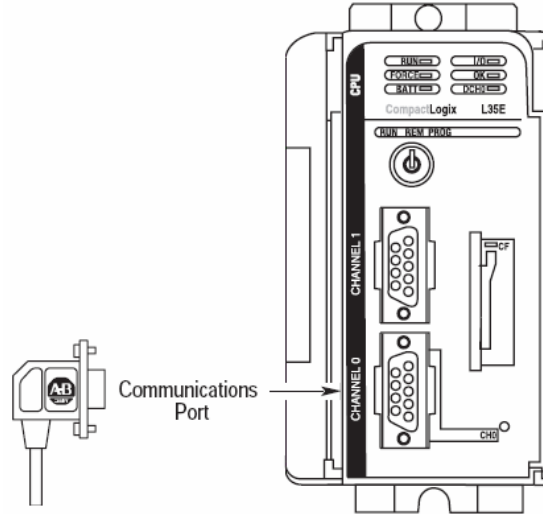
2   Connect the straight connector end of the cable to the serial port on your
computer.
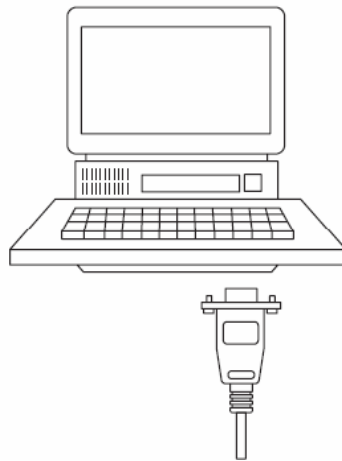
1.7 Download the Sample Program to the Processor

Important: For most applications, the sample program will work without modification.
Note: The key switch on the front of the CompactLogix processor must be in the REM position.

1 If you are not already online to the processor, open the Communications menu, and then choose Download. RSLogix will establish communication with the processor.

2 When communication is established, RSLogix will open a confirmation dialog box. Click the Download button to transfer the sample program to the processor.
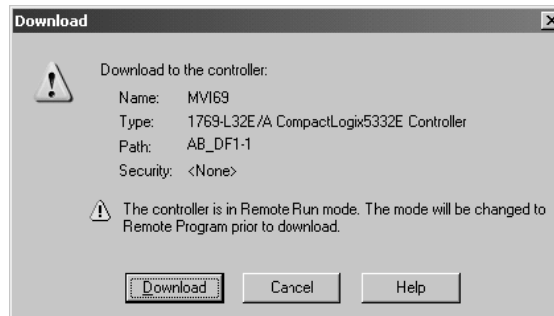
3 RSLogix will compile the program and transfer it to the processor. This process may take a few minutes.

4 When the download is complete, RSLogix will open another confirmation dialog box. Click OK to switch the processor from Program mode to Run mode.
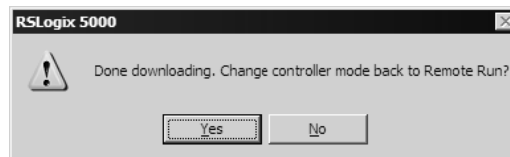
Note: If you receive an error message during these steps, refer to your RSLogix documentation to interpret and correct the error.

1.7.1 Configuring RSLinx

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

1 Open RSLinx.
2 Open the Communications menu, and choose Configure Drivers.
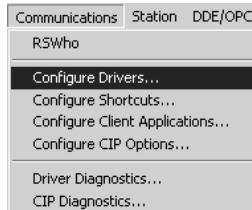
This action opens the Configure Drivers dialog box.
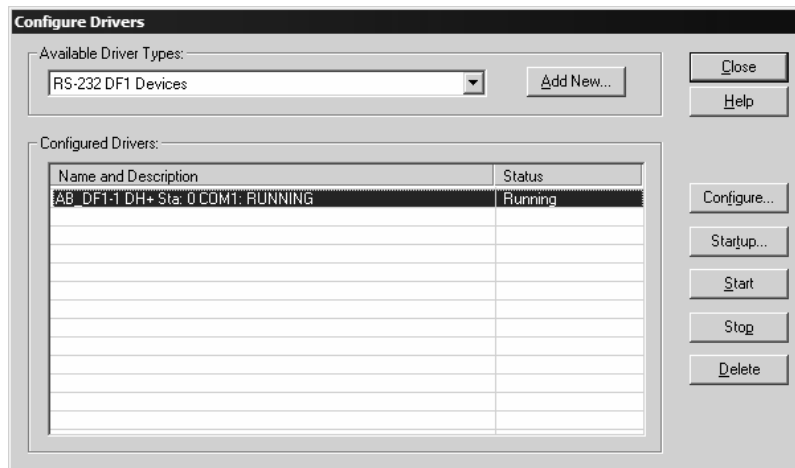
Note: If the list of configured drivers is blank, you must first choose and configure a driver from the Available Driver Types list. The recommended driver type to choose for serial communication with the processor is "RS-232 DF1 Devices".

3 Click to select the driver, and then click Configure. This action opens the Configure Allen-Bradley DF1 Communications Device dialog box.

4 Click the Auto-Configure button. RSLinx will attempt to configure your serial port to work with the selected driver.
5 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 RSLinx documentation for further troubleshooting steps.

1.8   Connect 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 or laptop.
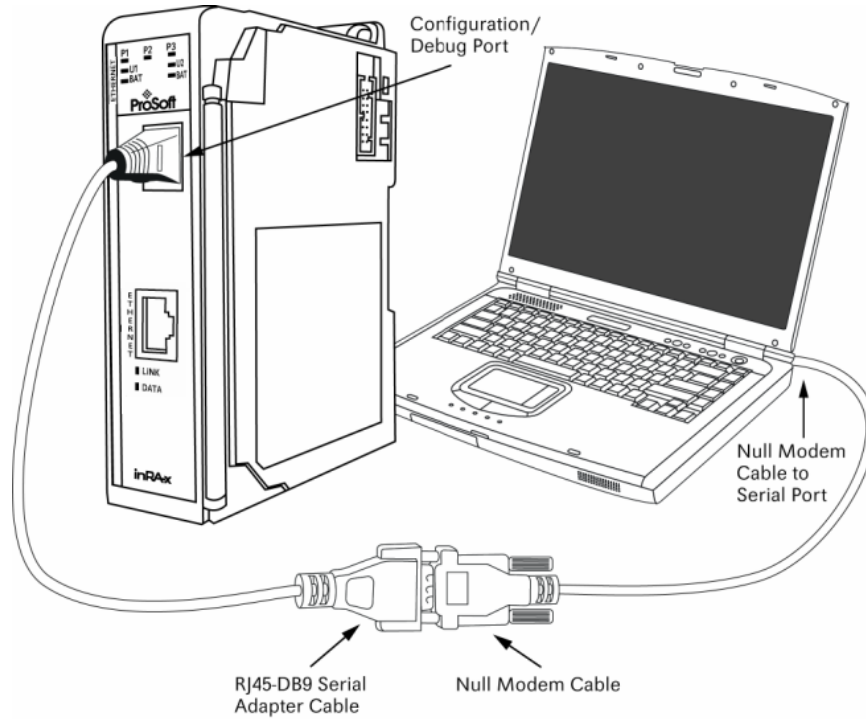
2   Configuring the MVI69-EGD Module

In This Chapter

2.1   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 Set Up the Project

To begin, start ProSoft Configuration Builder. If you have used other Windows configuration tools before, you will find the screen layout familiar. ProSoft Configuration Builder's window consists of a tree view on the left, an information pane and a configuration pane on the right side of the window. When you first start ProSoft Configuration Builder, 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 ProSoft Configuration Builder window with a new project.
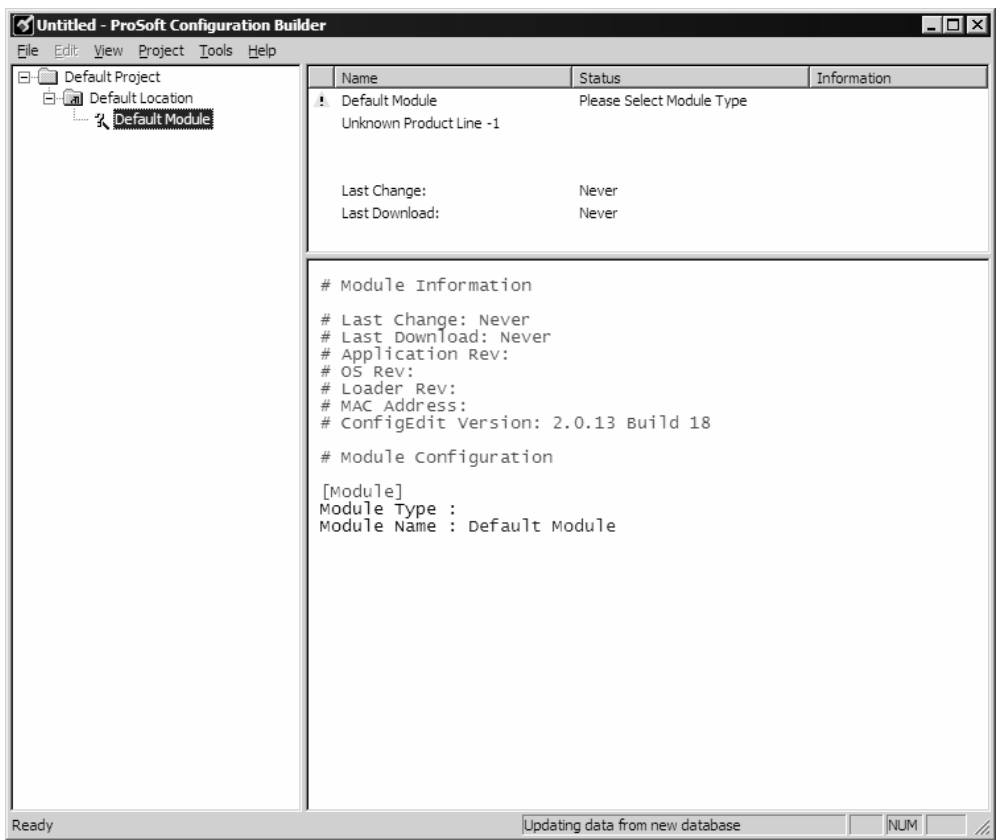
Your first task is to add the MVI69-EGD module to the project.

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.
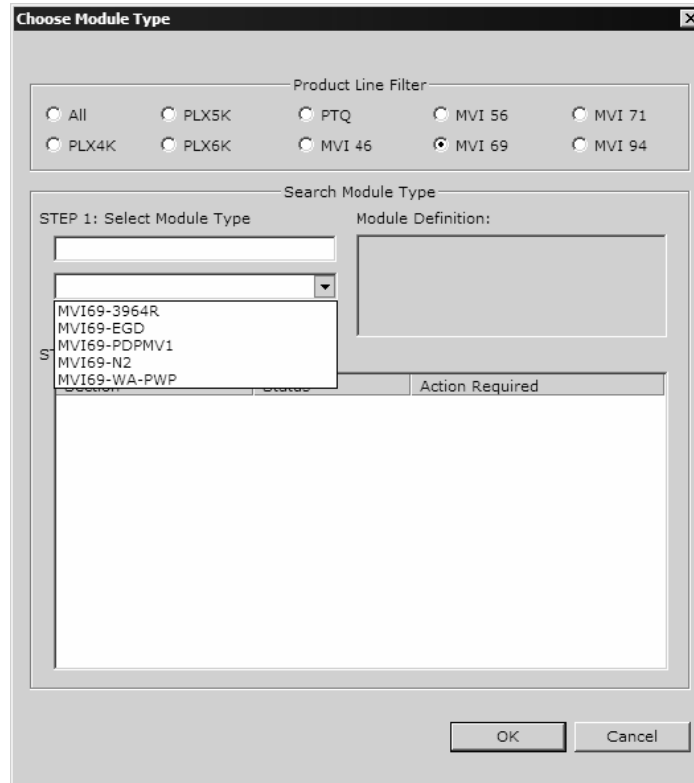
3 In the Product Line Filter area of the dialog box, select MVI69. In the Select Module Type dropdown list, select MVI69-EGD, and then click OK to save your settings and return to the ProSoft Configuration Builder window.

Adding a Project

To add a project to an existing project file:

1 Select the Default Project icon.
2 Choose Project from the Project menu, then choose Add Project. A new project folder appears.

Adding a Module

To add a module to your project:

1 Double-click the Default Module icon to open the Choose Module Type dialog box.
2 On the Choose Module Type dialog box, select the module type.

Or

1 Open the Project menu and choose Location.
2 On the Location menu, choose Add Module.

1 Right-click the Location folder and choose Add Module. A new module icon appears.

Or

1 Select the Location icon.
2 From the Project menu, select Location, then select Add Module.

2.1.2 Set Module Parameters

Notice that the contents of the information pane and the configuration pane changed when you added the MVI69-EGD module to the project.
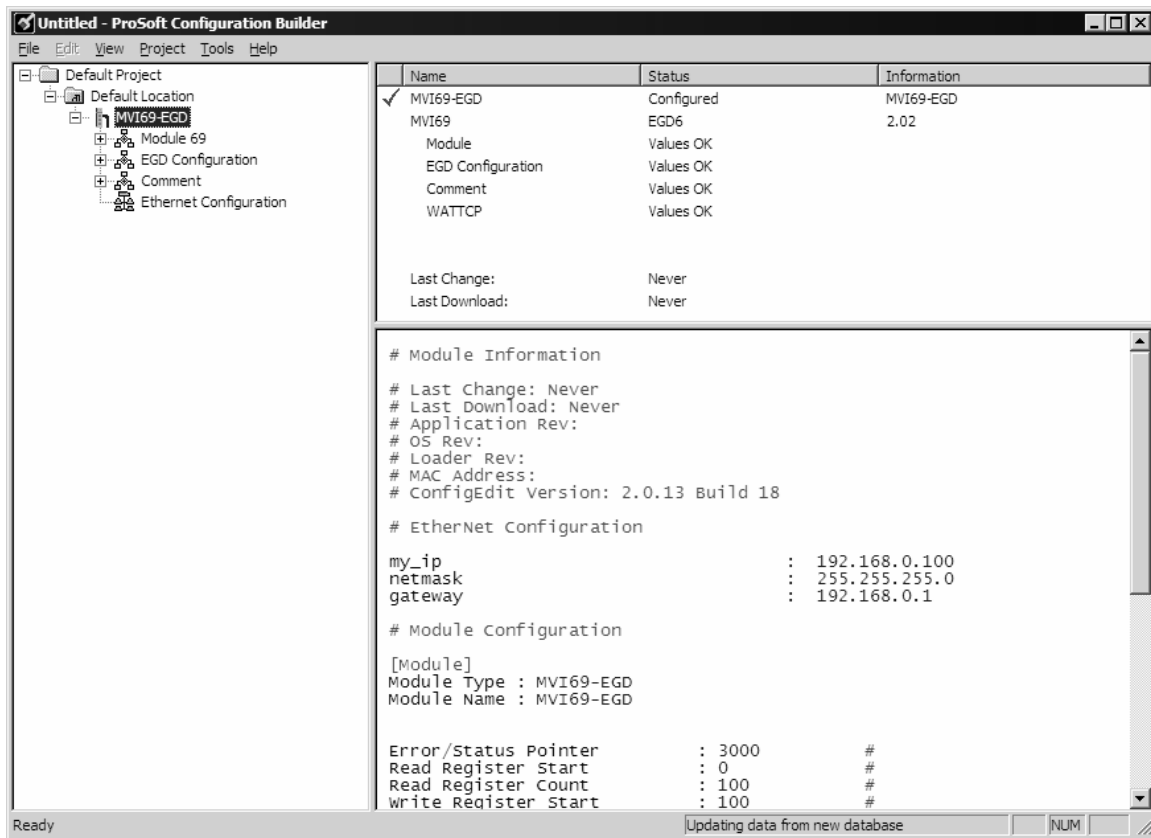
At this time, you may wish to rename the "Default Project" and "Default Location" folders in the tree view.

To rename an object:

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.

Module Entries

To configure module parameters

1   Click on the plus sign next to the icon ⊞ 🖧 Comment to expand module information.
2   Double-click the 🅱 Module Comment icon to open the Edit dialog box.
3   To edit a parameter, select the parameter in the left pane and make your changes in the right pane.
4   Click OK to save your changes.

Comment Entries

To add comments to your configuration file:

1   Click the plus sign to the left of the ⊞ 🖧 Comment icon to expand the Module Comments.
2   Double-click the 🅱 Module Comment icon. The Edit - Module Comment dialog appears.
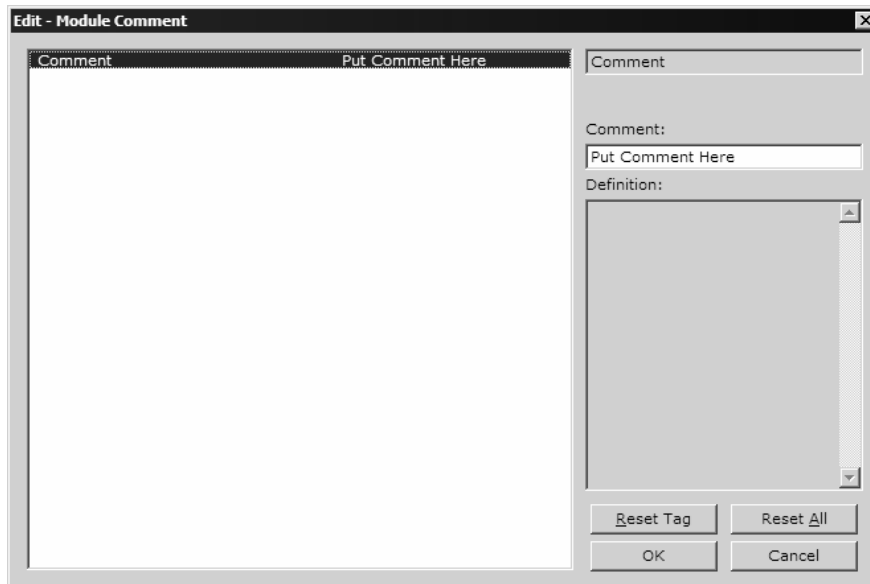
3   Enter your comment and click OK to save your changes.

Printing a Configuration File

To print 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   On the View Configuration window, open the File menu, and choose Print. This action opens the Print dialog box.
4   On the Print dialog box, choose the printer to use from the dropdown list, select printing options, and then click OK.

2.2 [Module69]

This section designates database addresses for input and output on the module and on the processor, and identifies the method of failure for the communications for the module if the processor is not in run mode.

2.2.1 Read Register Start

Range 0 to 3999

This parameter specifies the starting register in the module where data will be transferred from the module to the processor. Valid range for this parameter is 0 to 3999.

2.2.2 Read Register Count

Range 0 to 3999

This parameter specifies the number of registers to be transferred from the module to the processor. Valid entry for this parameter is 0 to 3999.

2.2.3 Write Register Start

0 to 3999

This parameter specifies the starting register in the module where the data will be transferred from the processor to the module.

2.2.4 Write Register Count

Range 0 to 3999

This parameter specifies the number of registers to be transferred from the module to the processor. Valid entry for this parameter is 0 to 3999

2.2.5 Failure Flag Count

0 to 65535

This parameter specifies the number of successive transfer errors that must occur before the communication ports are shut down. If the parameter is set to 0, the communication ports will continue to operate under all conditions. The value range should be between 0 and 6900.

2.2.6 Block Transfer Size

60, 120 or 240

This read-only parameter specifies the number of words in each block transferred between the module and processor. Valid values for this parameter are 60, 120 and 240.

2.3 [SNTP Client]

The [SNTP CLIENT] section of the **CFG** file is used to specify the parameters for the Simple Network Time Protocol (SNTP) client provided with the protocol driver. This client is required in order to keep the driver's internal clock set correctly. This version of the driver supports the unicast implementation of the SNTP Revision 3 and stratum between 1 and 14.

The module can be configured to periodically synchronize its clock with a remote SNTP server. Approximately every 6 minutes the module sends 10 consecutive requests to the remote SNTP client (at approximately 6 second intervals). You can check these requests and responses by looking at the SNTP Client Configuration Menu (press the N key at the Configuration/Debug Main Menu). If the module receives a valid response from the SNTP server, the computations value will be also be incremented. After 10 consecutive successful requests and responses, the module will synchronize its internal clock (an average is performed based on all 10 responses for better accuracy). The Time Set Cnt value is incremented every time the clock is synchronized.

After the synchronization is performed, the time valid register is set to Yes. If the module cannot connect to the remote SNTP server after 3 consecutive attempts, the time valid register is set to No. You can also configure the GMT settings to use, and the database address where the date and time information can be copied.

The following parameters in the configuration file set up the SNTP client:

```
[SNTP CLIENT]
NTP SERVER IP ADDRESS    : 132.163.4.102 #IP address for NIST, Boulder,
Colorado
TIME ZONE               : 7             #Number of hours from GMT (-11 to +11)
USE DAYLIGHT SAVINGS TIME: No            #Yes or No
DATABASE REGISTER       : 2500          #database word location to store time
                                        # (-1=ignore).
                                        #This register value should be an even
                                        # number
```

The database register parameter defines a database register where the SNTP time and date values are copied. It occupies 4 words as follows:

Word Offset	Description
0 and 1	Date and time in Unix format (long integer)
2 and 3	Microseconds (long integer)

2.3.1 NTP Server IP Address

Enter in dotted notation

This parameter sets the IP address of the NTP server to contact for time acquisition. Select an NTP server with the greatest accuracy that is available all the time from your network. Set this IP address to 0.0.0.0 to disable SNTP server requests.

2.3.2 Time Zone

-11 to 11

This parameter sets the time zone offset from UTC. Positive values are for time zones west of UTC, and negative values are for time zones east of UTC. Set this value to 0 to use UTC in the module.

2.3.3 Use Daylight Savings Time

Yes or No

This parameter specifies if daylight savings time will be used in the time computation.

2.3.4 Database Register

-1 or 0 to 3992 as an even value

This parameter specifies if the NTP time computed by the driver is to be placed into the module's database. If a value of -1 is specified, the time will not be placed into the database. If the value is between 0 and 3992, the time will be placed in the database. The first 4 bytes represent the seconds since 1/1/1970, and the second 4 bytes represent the number of microseconds. An even value should be used for the register value in order for the data to be stored correctly.

2.4   [EGD Exchanges]

In order to interface the module with EGD devices, you must construct an exchange list. The exchanges specify messages that will be produced or consumed at a user-defined frequency using the module's internal database. Messages can be broadcast to all nodes on the network, sent to a multicast group on the network or associated with a single node on the network. Up to 100 exchanges can be defined for the driver. Up to 680 word registers can be produced or consumed in a single exchange.

The [EGD Exchanges] section defines the messages that will be produced and consumed by the driver. The UDP protocol on the IP network is used to transport these over Ethernet between all the EGD devices.

For the exchanges to operate correctly, the other EGD devices must be configured and correctly set up. The primary reason for user problems with the module is failure to provide devices that are correctly configured. Before trying to connect the module to the network, the remote device must be able to communicate with ProSoft Configuration Builder. You must understand and document all parameters.

2.4.1 Exch Type

Producer: exchange will be producing data to other stations

Consumer: exchange will be consuming data from another station

The Exchange Type field defines the type of exchange used in the exchange as either producer or consumer. Producer exchanges (P) are generated by the driver using the module's database. Consumer exchanges (C) are those received from other EGD devices with the data in the message being placed in the module's database.

2.4.2 Cast Type

When the Exchange Type is **Producer,** the cast type field determines if the exchange is a unicast ('U' = point-to-point) exchange, multicast ('M'=multicast group) or a broadcast ('B' = all nodes) exchange.

- Producer Unicast - produce message to another station
- Producer Multicast - produce message to a group of stations. In order to use this option you need to configure the same Multicast IP address used in the exchange also at the EGD MULTICAST ADDRESS section.

Important: For Multicast mode, use transmit rates of 1 or 2 for best results.

- Producer Broadcast - produce message to all stations (set exchange IP address to 255.255.255.255)

When the Exchange Type is **Consumer,** the cast type field determines how the local database area associated to this exchange will be updated in case an RF Error (timeout) occurs.

- Consumer No DB Change on RF Error
- Consumer Set DB to -1 On RF Error
- Consumer Set DB to 0 On RF Error
- Consumer Set DB to 1 On RF Error

2.4.3 DB Reg

The DB Register field defines the starting database register in the module where data sourced (produced data) or placed (consumed data) is determined by the value entered in the DB Reg column. This parameter can have a value of 0 to 3999. The validity of the entry is dependent on the number of registers (Reg Count) to be produced or consumed. The sum of the two values cannot exceed 4000, as this would be outside the range of the module's database.

2.4.4 Reg Count

Number of database registers to transfer/accept in message.

2.4.5 Swap Code

0, 1, 2 or 3

The Swap Code field sets byte and word swapping of data produced or consumed. Swapping of words and/or bytes in the message may be required for different protocol and operating systems as their representation of multi-byte values may not be the same as that of the EGD protocol.

Swap Code	Description
0	None - No Change is made in the byte ordering (1234 = 1234)
1	Words - The words are swapped (1234=3412)
2	Words & Bytes - The words are swapped then the bytes in each word are swapped (1234=4321)
3	Bytes - The bytes in each word are swapped (1234=2143)

2.4.6 P/C Time

The P/C Time field defines the number of milliseconds between productions of the exchange data and for consumed exchanges. This value defines the number of milliseconds to wait for a produced exchanged before a timeout condition is present.

- For a producer exchange it defines the number of milliseconds between consecutive producer exchanges.
- For a consumer exchange it defines the number of milliseconds to wait for a produced message before a timeout error is set. It is suggested to use a value at least four times greater than the value used in the producer exchange.

For consumed messages, set this value to approximately 4 times the produced time of the exchange on the other device. This will prevent the exchange from constantly timing out on a busy network. If this parameter is set to zero, the message will not be produced.

A zero value for a consumed message indicates that the exchange will never timeout. The zero value can be used for exchanges that will interface with the command service port (7937) to handle data read and write requests from another device.

2.4.7 IP Address

The IP Address field should be set to the IP address of destination device (produced data) or source device (consumed data).

Producer Exchange IP address: If the cast type is set to 'U' for a produced exchange, the address should be set to IP address of the specific node to receive (consume) the data. If the cast type is set to 'B' for produced data, set the IP to either a network (255.255.255.255) or subnet (192.168.0.255) broadcast address. If the cast type is set to 'M' for produced data, set the IP address to a valid multicast address.

Multicast Address Assignments

Important: Use Multicast whenever the module produces data to at least two other modules. Using Unicast for these applications can cause data transmission delay when at least one of the consumer modules is powered down.

Multicast group addresses 224.0.7.1 to 224.0.7.32 are reserved. The module does not place this limit for messages but the user should consider using the reserved group addresses. The following table shows the relationship between multicast group parameters and IP addresses. Refer to Underlying Protocol Requirements and Constraints for more detailed information on IP and UDP addresses.

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

Important: For Multicast mode, use transmit rates of 1 or 2 for best results.

Consumer Exchange IP address: For consumed messages both Broadcast and Multicast type messages should be set to the IP address of the producer generating the specific exchange. The combination of the IP address and the exchange ID uniquely identify the exchange to the system.

2.4.8 Exch ID

1 to 16383

The Exch ID field defines the Exchange ID for this message, and must be unique for each node. For produced exchanges, the module IP address and the entered exchange ID uniquely define the exchange to the network. Defined consumer exchanges use the IP address in the message along with this exchange ID to determine which exchange to associate with the message. The parameters defined in the exchange then determine how much data is present in the message and where to place it into the module's internal database.

2.4.9 CS Major, CS Minor

This is an optional functionality that can be used to prevent unexpected results when changes are performed to existing producer and consumer exchanges.

The Configuration Signature consists of two one-byte integer value (CS Major and CS Minor). The CS Major must be equal for both Producer and Consumer exchanges. The CS Minor reflects backward compatible modifications made to an exchange (for example: adding registers to the producer exchange count). Truncating data within an exchange is not backward compatible and requires a change in the major number.

The purpose of the Configuration Signature (CS) is to guarantee that the produced exchange will contain data in a format expected by a consumer module. Therefore it prevents the consumer module to process received data if it is not compatible because of later modifications.

Whenever a consumer module receives an exchange message, it will look for a configured consumer exchange that contains the same Exchange ID. If it finds a matching consumer exchange it will compare the Configuration Signature for validation.

If the exchange is not validated then the data will not be consumed.

Because this functionality is optional, the modules will exchange data even if the Configuration Signature validation is disabled. To disable this functionality, configure all exchanges with both CS Major and CS Minor values equal to zero.

The following rules are used by the consumer module to validate an exchange based on its Configuration Signature:

Rules for CS Validation

An exchange will be considered valid if at least one of the following conditions is true:

- Producer CS Major and CS Minor are both equal to 0
- Consumer CS Major and CS Minor are both equal to 0
- Producer CS Major is equal than Consumer CS Major AND Producer CS Minor is greater or equal than Consumer CS Minor

The following table contains some examples that will help you to understand the consumer criteria to validate received exchanges based on the Configuration Signature:

Producer CS Major	Producer CS Minor	Consumer CS Major	Consumer CS Minor	Will Data be Consumed?	Comment
0	0	0	0	Yes	Same CS value of 0.0 (Major.Minor) validates the exchange
0	0	1	2	Yes	Producer CS value of 0.0 (Major.Minor) validates the exchange
1	2	0	0	Yes	Consumer CS value of 0.0 (Major.Minor) validates the exchange
1	2	1	2	Yes	Same CS value (1.2) validates the exchange
2	2	1	2	No	CS Major mismatch - exchange is not validated
1	2	2	2	No	CS Major mismatch - exchange is not validated
1	2	1	1	Yes	Same CS Major and Consumer CS Minor is less than Producer CS Minor - exchange is validated
1	2	1	3	No	Same CS Major but Consumer CS Minor is greater than Producer CS Minor - exchange is not validated

2.4.10 EGD Exchange Command List Example

The following is an example section from the [EGD Exchanges] section:

2.5 [EGD Multicast Group List]

This section contains the list of multicast group addresses the EGD server should process (consumer messages for this server produced on other units). This list may contain up to 16 IP addresses. The reserved group addresses for the EGD protocol are 224.0.7.1 to 224.0.7.32. The module will support other group addresses than this data set.

Important: Use Multicast whenever the module produces data to at least two other modules. Using Unicast for these applications can cause data transmission delay when at least one of the consumer modules is powered down.

2.6 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:
    o   IP address (fixed IP required) _____ . _____ . _____ . _____
    o   Subnet mask   _____ . _____ . _____ . _____
2   Gateway address   _____ . _____ . _____ . _____Click [+] to expand the tree for the MVI69-EGD module.

3 Double-click the Ethernet Configuration object. This action opens the Edit dialog box.
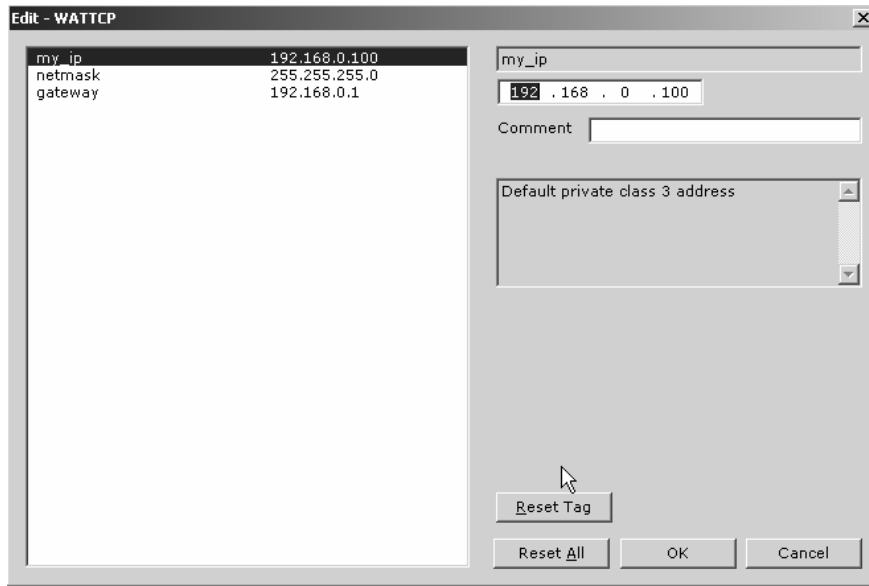
4 Edit the values for my_ip, netmask (subnet mask) and gateway (default gateway).
5 When you are finished editing, click OK to save your changes and return to the ProSoft Configuration Builder window.

2.7 Download the Project to the Module

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

To Download the Project File

1 In the tree view in ProSoft Configuration Builder, click once to select the MVI69-EGD 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 following dialog box will open.
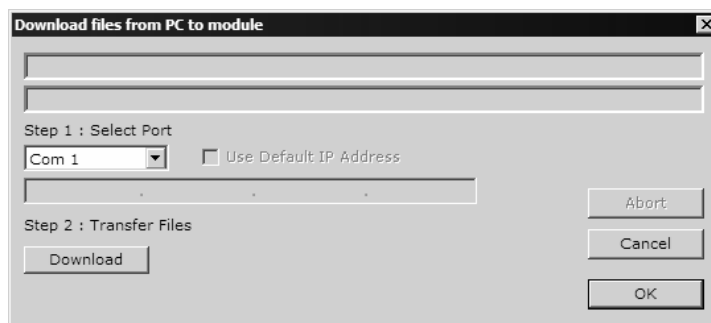
3 Choose the com port to use from the dropdown list, and then click the
Download button.

The module will perform a platform check to read and load its new settings.
When the platform check is complete, the status bar in ProSoft Configuration
Builder will be updated with the message *"Module Running"*.

3   Ladder Logic

Ladder logic is required for application of the MVI69-EGD 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   Adding the Module to an Existing CompactLogix Project

Important: The MVI69-EGD module has a power supply distance rating of 2 (L43 and L45 installations on first 2 slots of 1769 bus)

If you are installing and configuring the module with a CompactLogix processor, follow these steps. If you are using a MicroLogix processor, refer to the next section.

1 Add the MVI69-EGD **module to the project.** Right-click the mouse button on the I/O Configuration option in the Controller Organization window to display a pop-up menu. Select the New Module option from the I/O Configuration menu.
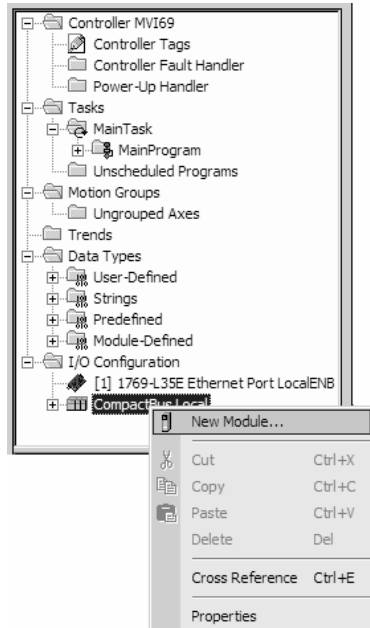
This action opens the following dialog box:
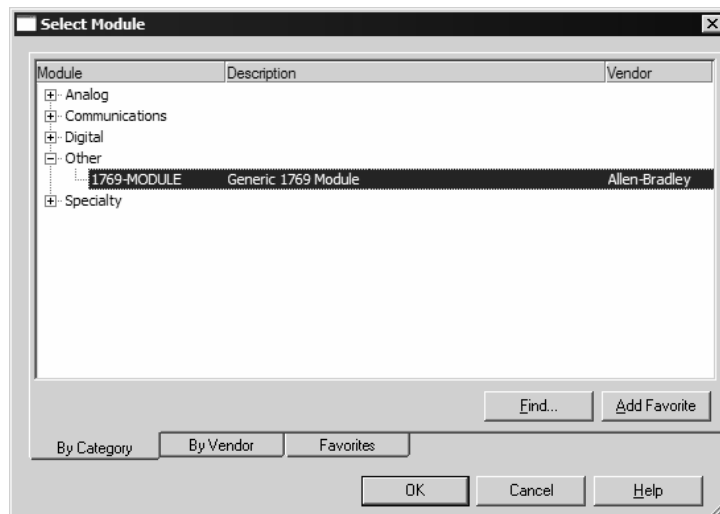
2 Select the 1769-Module (Generic 1769 Module) from the list and click OK.

3 Enter the Name, Description and Slot options for your application, using the values in the illustration above. You must select the **Comm Format** as **Data - INT** in the dialog box, otherwise the module will not communicate over the backplane of the CompactLogix rack.
4 Configure the Connection Parameters to match to the Block Transfer Size parameter in the configuration file. Use the values in the table corresponding with the block transfer size you configured.

Block Transfer Size = 60

Field	Recommended Value
Type	1769-MODULE Generic 1769 Module
Parent	Local
Name	MVI69
Description	MVI69 Application Module
Comm Format	Data - INT
Slot	The slot number in the rack where the module is installed
Input Assembly Instance	101
Input Size	62
Output Assembly Instance	100
Output Size	61
Configuration Assembly Instance	102
Configuration Size	0

Block Transfer Size = 120

Field	Recommended Value
Type	1769-MODULE Generic 1769 Module
Parent	Local
Name	MVI69
Description	MVI69 Application Module
Comm Format	Data - INT
Slot	The slot number in the rack where the module is installed

Block Transfer Size = 120

Field	Recommended Value
Input Assembly Instance	101
Input Size	122
Output Assembly Instance	100
Output Size	121
Configuration Assembly Instance	102
Configuration Size	0

Block Transfer Size = 240

Field	Recommended Value
Type	1769-MODULE Generic 1769 Module
Parent	Local
Name	MVI69
Description	MVI69 Application Module
Comm Format	Data - INT
Slot	The slot number in the rack where the module is installed
Input Assembly Instance	101
Input Size	242
Output Assembly Instance	100
Output Size	241
Configuration Assembly Instance	102
Configuration Size	0

5 Click **Next** to continue.
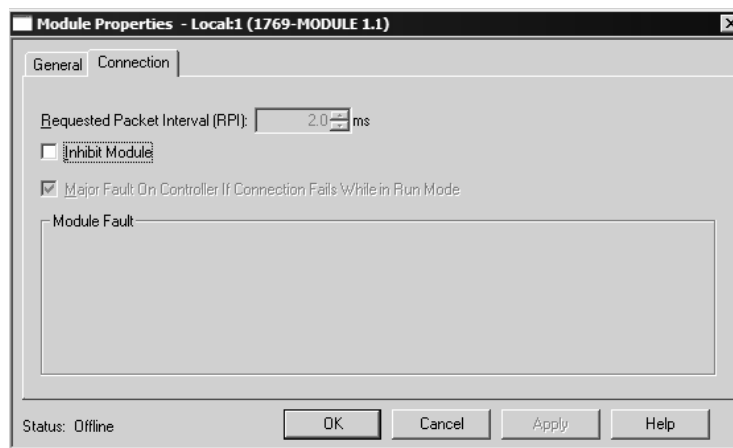
6 Select the Request Packet Interval value for scanning the I/O on the module. This value represents the minimum frequency the module will handle scheduled events. This value should not be set to less than 1 millisecond. Values between 1 and 10 milliseconds should work with most applications.

7 Save the module. Click OK to dismiss the dialog box. The Controller Organization window now displays the module's presence. The following illustration shows the Controller Organization window:
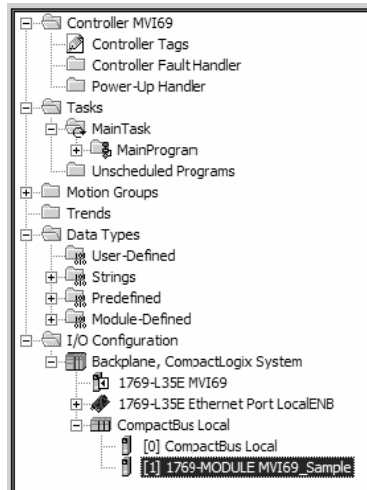
8 Copy the Controller Tags from the sample program.
9 Copy the User Defined Data Types from the sample program.
10 Copy the Ladder Rungs from the sample program.
11 Save and Download the new application to the controller and place the processor in run mode.

3.2 Adding the Module to an Existing MicroLogix Project

If you are installing and configuring the module with a MicroLogix processor, follow these steps. If you are using a CompactLogix processor, refer to the previous section.

The first step in setting up the processor ladder file is to define the I/O type module to the system. Start RSLogix 500, and follow these steps:

1 In RSLogix, open your existing application, or start a new application, depending on your requirements.

2 Double-click the I/O Configuration icon located in the Controller folder in the project tree. This action opens the I/O Configuration dialog box.
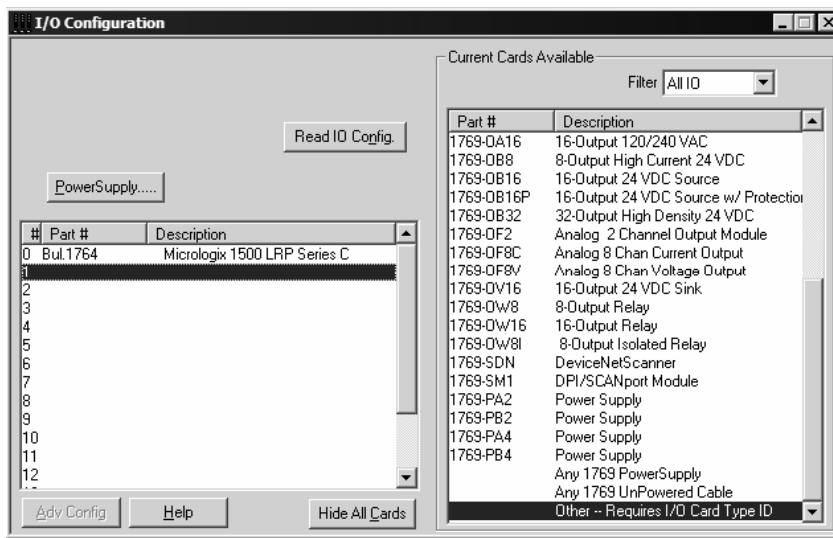
3 On the I/O Configuration dialog box, select "Other - Requires I/O Card Type ID" at the bottom of the list in the right pane, and then double-click to open the Module dialog box.

4 Enter the values shown in the following illustration to define the module correctly for the MicroLogix processor, and then click OK to save your configuration.

The input words and output words parameter will depend on the Block Transfer Size parameter you specify in the configuration file. Use the values from the following table.

Block Transfer Size	Input Words	Output Words
60	62	61
120	122	121
240	242	241

5 Click **Next** to continue.
6 After completing the module setup, the I/O configuration dialog box will display the module's presence.

The last step is to add the ladder logic. If you are using the example ladder logic, adjust the ladder to fit your application. Refer to the example Ladder Logic section in this manual.

Download the new application to the controller and place the processor in run mode. If you encounter errors, refer to **Diagnostics and Troubleshooting** (page 45) for information on how to connect to the module's Config/Debug port to use its troubleshooting features.

4 Diagnostics and Troubleshooting

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

- Status data values are transferred from the module to the processor.
- Data contained in the module can be viewed through the Configuration/Debug port attached to a terminal emulator.
- LED status indicators on the front of the module provide information on the module's status.

4.1 Reading Status Data from the Module

The MVI69-EGD module returns a 20-word Status Data block that can be used to determine the module's operating status. This data can be located in the module's database at registers at the location specified in the configuration. This data is transferred to the CompactLogix or MicroLogix processor continuously with each read block.

4.1.1 Required Hardware

You can connect directly from your computer's serial port to the serial port on the module to view configuration information, perform maintenance, and send (upload) or receive (download) configuration files.

ProSoft Technology recommends the following minimum hardware to connect your computer to the module:

- 80486 based processor (Pentium preferred)
- 1 megabyte of memory
- At least one UART hardware-based serial communications port available. USB-based virtual UART systems (USB to serial port adapters) often do not function reliably, especially during binary file transfers, such as when uploading/downloading configuration files or module firmware upgrades.
- A null modem serial cable.

4.1.2 The Configuration/Debug Menu

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 sub-menus 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.

Using the Diagnostic Window in ProSoft Configuration Builder

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

1 Start PCB program with the application file to be tested. Right click over the module icon.
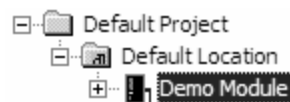
2 On the shortcut menu, choose Diagnostics.
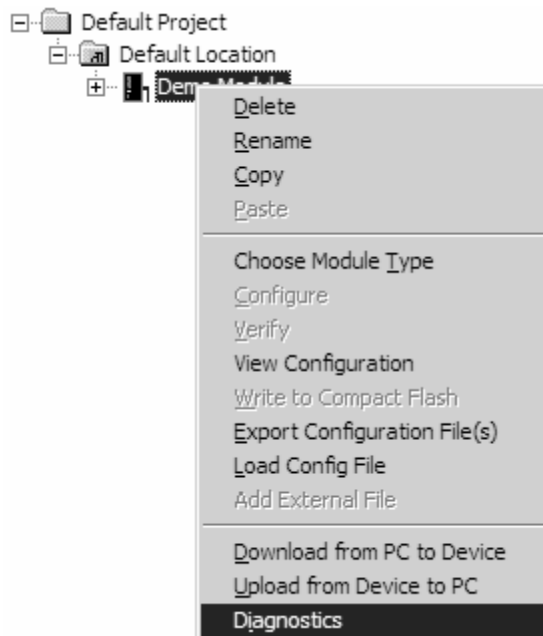
3 This action opens the Diagnostics dialog box. Press "?" to display the Main Menu.
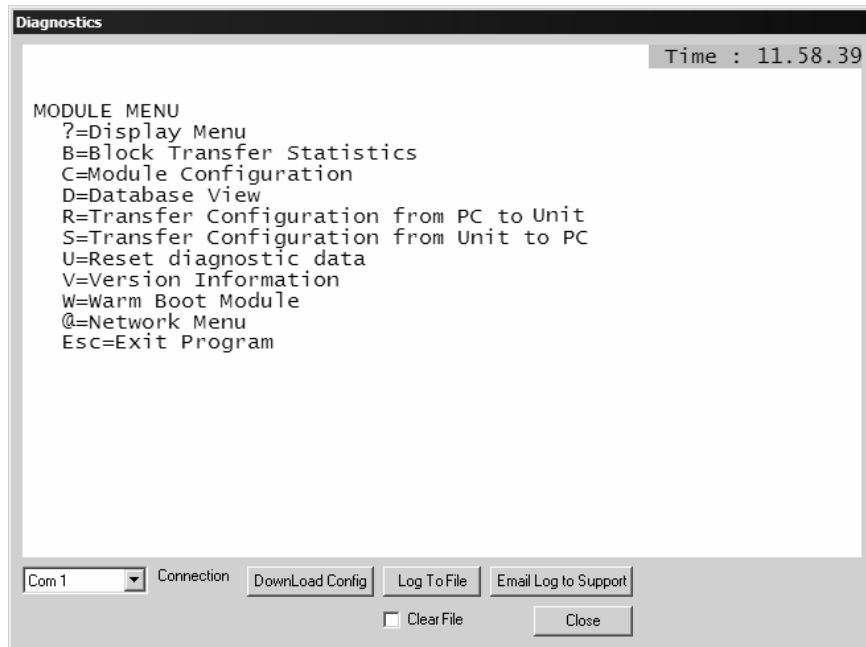
Important: The illustrations of configuration/debug menus in this section are intended as a general guide, and may not exactly match the configuration/debug menus in your own module.

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

1 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.
2 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.

Navigation

All of the sub-menus for this module contain commands to redisplay the menu or return to the previous menu. You can always return from a sub-menu 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:
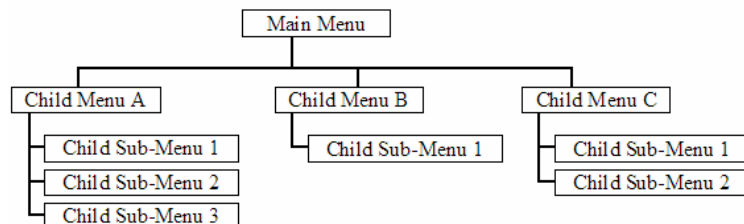
The remainder of this section shows you the menus available for this module, and briefly discusses the commands available to you.

Keystrokes

The keyboard commands on these menus are almost always non-case sensitive. You can enter most commands in lower case or capital 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][/]**.

Also, take care to distinguish capital letter **[I]** from lower case letter **[l]** (L) and number **[1]**; likewise for capital letter **[O]** and number **[0]**. Although these characters look nearly the same on the screen, they perform different actions on the module.

4.1.3 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 on your terminal screen:

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.

```
MVI56-EGD COMMUNICATION MODULE MENU
  ?=Display Menu
  B=Block Transfer Statistics
  C=Module Configuration
  D=Database View
  E=EGD Menu
  I=SNTP setup
  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
  @=Network Menu
  Esc=Exit Program
```

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.

Opening the Database Menu

Press **[D]** to open the Database View menu. Use this menu command to view the current contents of the module's database.

Opening the EGD Menu

Press **[E]** to open the EGD Menu. Use this command to view the configuration and status of EGD Producer/Consumer Exchanges.

Viewing SNTP Status

Press **[I]** to view configuration information about the SNTP client.

```
SNTP CLIENT CONFIGURATION:
  NTP SERVER IP : 0.0.0.0
  DB REGISTER   : 3000
  TIME ZONE     : 8          USE DST       : No
  TIME VALID    : No
  REQUESTS      : 0          RESPONSES     : 0
  COMPUTATIONS  : 0          TIME SET CNT  : 0
  TIMEOUT ERRS  : 0

SNTP Local time is: Fri Dec 14 08:22:38 2007
 SNTP GMT is:       Fri Dec 14 16:22:38 2007
```

Refer to SNTP Support for more information on configuring and using this function.

Transferring the Configuration File from PC to MVI69 module

Press **[R]** to send (upload) the configuration file from your PC to the module and store the file on the module's Compact Flash Disk.

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 MVI69 module to PC

Press **[S]** to receive (download) 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 downloaded, 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

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.

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 re-boot.

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. You can find more information about the commands on this menu in the Network Menu (page 53) section.

Exiting the 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.

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 ROM to configure the module.

4.1.4 Database View Menu

Press **[D]** from the Main Menu to open the Database View menu. Use this menu command to view the current contents of the module's database. Press **[?]** to view a list of commands available on this menu.
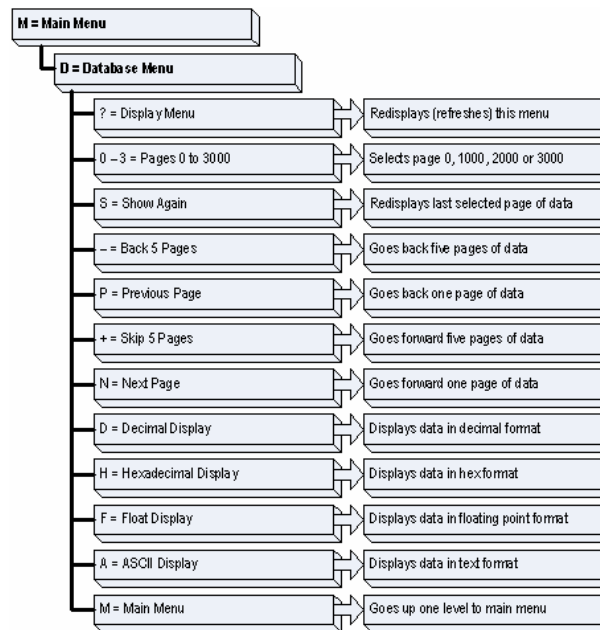
Viewing Register Pages

To view sets of register pages, use the keys described below:

Command	Description
[0]	Display registers 0 to 99
[1]	Display registers 1000 to 1099
[2]	Display registers 2000 to 2099

And so on. The total number of register pages available to view depends on your module's configuration.

Displaying the Current Page of Registers Again

```
DATABASE DISPLAY 0 TO 99 <DECIMAL>
   100    101    102      4      5      6      7      8      9     10
    11     12     13     14     15     16      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
     0      0      0      0      0      0      0      0      0      0
```

This screen displays the current page of 100 registers in the database.

Moving Back Through 5 Pages of Registers

Press **[-]** from the Database View menu to skip back to the previous 500 registers of data.

Viewing the Previous 100 Registers of Data

Press **[P]** from the Database View menu to display the previous 100 registers of data.

Skipping 500 Registers of Data

Hold down **[Shift]** and press **[=]** to skip forward to the next 500 registers of data.

Viewing the Next 100 Registers of Data

Press **[N]** from the Database View menu to select and display the next 100 registers of data.

Viewing Data in Decimal Format

Press **[D]** to display the data on the current page in decimal format.

Viewing Data in Hexadecimal Format

Press **[H]** to display the data on the current page in hexadecimal format.

Viewing Data in Floating Point Format

Press **[F]** from the Database View menu. Use this command to display the data on the current page in floating point format. The program assumes that the values are aligned on even register boundaries. If floating-point values are not aligned as such, they are not displayed properly.

Viewing Data in ASCII (Text) Format

Press **[A]** to display the data on the current page in ASCII format. This is useful for regions of the database that contain ASCII data.

Returning to the Main Menu

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

4.1.5   Network Menu

The network menu allows you to send, receive and view the WATTCP.CFG file that contains the IP and gateway addresses, and other network specification information.
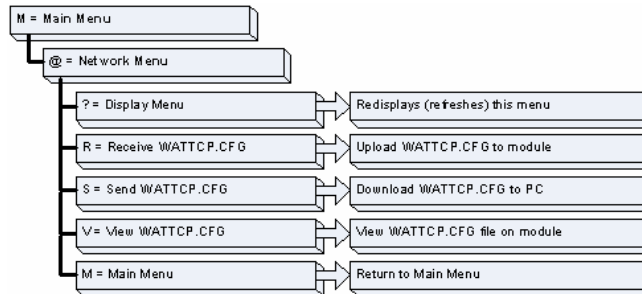
Transferring WATTCP.CFG to the module

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.

```
Network Menu Selected

WATTCP.CFG FILE:
# ProLinx Communication Gateways, Inc.
#
# Default private class 3 address
my_ip=192.168.0.135
#
# Default class 3 network mask
netmask=255.255.255.0
#
# The gateway I wish to use
gateway=192.168.0.1
#
#Parameters used by the ProLinx Communication Gateways, Inc. module
#Local_Domain_Name=mycompany.com
Password=PASSWORD
```

Returning to the Main Menu

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

4.1.6 EGD Menu

Press **[E]** to open the EGD Menu. Use this command to view configuration and status for the EGD protocol.

```
ETHERNET GLOBAL DATA (EGD) MENU
   C=Producer/Consumer List Menu
   G=Multicast Group List
   S=Status Data Menu
   ?=Display Menu
   M=Exit Menu
```

Opening the Producer/Consumer List Menu

Press **[C]** to open the Producer/Consumer List menu. Use this command to view the status of producers and consumers currently communicating on the network.

```
PRODUCER/CONSUMER LIST 0 TO 9
P/C U/B  ADDR REG_CNT SWP PROD_TIME IP ADDRESS     EX_ID CFG_VER
 P   U    100        1   0       100 192.168.0.20     1   0.0
 C   N    100        1   0       100 192.168.0.20     2   0.0
 P   U    100        1   0       100 192.168.0.20     1   3.0
 C   N    100        1   0       100 192.168.0.20     4   0.0
```

Viewing the Multicast Group List

Press **[G]** to view the Multicast Group List. Use this command to see a list of IP addresses in the radio's configured multicast group.

```
MULTICAST GROUP LIST (Count=2):
E0000701 224.0.7.1
E0000702 224.0.7.2
```

Opening the Status Data Menu

Press **[S]** to open the Producer/Consumer Status Data menu. Use this command to view communication status for each of the configured producers and consumers.

```
PRODUCER/CONSUMER STATUS 0 TO 9
S P MSG_COUNT MISS_COUNT REF_COUNT INVALID TM_SYNC SHORT  LONG PROTO CFG_SIG
0 0        0          0          0       0       0       0     0     0       0
2 0        0          0     573908       0       0       0     0     0       0
0 0        0          0          0       0       0       0     0     0       0
2 0        0          0     573908       0       0       0     0     0       0
```

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.

Returning to the Main Menu

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

4.1.7 Producer/Consumer List Menu

Press **[C]** to open the Producer/Consumer List menu. Use this command to view a list of the configured producers and consumers.

```
PRODUCER/CONSUMER LIST MENU
 ?=Display Menu
 S=Show Again
 -=Back 2 Pages
 P=Previous Page
 +=Skip 2 Pages
 N=Next Page
 M=Return to EGD Main Menu
```

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.

Redisplaying the Current Page

Press **[S]** to display the current page of data.

Going Back Two Pages of Data

Press **[-]** from the Database View menu to skip back to the previous 200 registers of data.

Viewing the Previous Page of Data

Press **[P]** to display the previous page of data.

Going Ahead Two Pages of Data

Hold down **[Shift]** and press **[=]** to skip forward to the next 200 registers of data.

Viewing the Next Page of Data

Press **[N]** to display the next page of data.

Returning to the Previous Menu

Press **[M]** to return to the Previous Menu.

4.1.8 Producer/Consumer Status Menu

Press **[S]** to open the Producer/Consumer Status menu. Use this command to view communication status for each of the configured producers and consumers.

```
PRODUCER/CONSUMER STATUS MENU
?=Display Menu
S=Show Again
-=Back 2 Pages
P=Previous Page
+=Skip 2 Pages
N=Next Page
M=Return to EGD Main Menu
```

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.

Redisplaying the Current Page

Press **[S]** to display the current page of data.

Going Back Two Pages of Data

Press **[-]** from the Database View menu to skip back to the previous 200 registers of data.

Viewing the Previous Page of Data

Press **[P]** to display the previous page of data.

Going Ahead Two Pages of Data

Hold down **[Shift]** and press **[=]** to skip forward to the next 200 registers of data.

Viewing the Next Page of Data

Press **[N]** to display the next page of data.

Returning to the Previous Menu

Press **[M]** to return to the Previous Menu.

4.2   LED Status Indicators

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

Module	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.
APP STATUS	Amber	Off	The MVI69-EGD is working normally.
		On	The MVI69-EGD module program has recognized a communication error on one of its ports.
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.
BATT	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.

If the APP, BP ACT and OK LEDs blink at a rate of every one-second, call ProSoft Technology support. There is a serious problem with the module, and it will have to be sent back to ProSoft.

4.2.1   Ethernet LED Indicators

LED	State	Description
Data	Off	No activity on the port.
	Green Flash	The port is either actively transmitting or receiving data.
Link	Off	No connection to hub or network is detected.
	Green Solid	Connected to hub or network correctly. This is the normal operating state.

4.2.2 Clearing a Fault Condition

Typically, if the OK LED on the front of the module becomes illuminated red for more than ten seconds, a hardware problem has been detected in the module or the program has exited. To attempt to clear the condition:

1 Remove the card from the rack and re-insert the card in the rack
2 Verify the configuration data being transferred to the module from the CompactLogix or MicroLogix processor

If the module's OK LED does not turn green, make sure the module is inserted completely into the rack. If this does not cure the problem, contact ProSoft Technology Support.

4.2.3 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.
	Verify that the slot in the rack configuration has been set up correctly in the ladder logic.
Processor I/O LED flashes	This indicates a problem with backplane communications. Verify that all modules in the rack are configured in the ladder logic.

Module Errors

Problem Description	Steps to take
BP ACT LED remains off or blinks slowly	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 mode.
	▪ The backplane driver is loaded in the module.
	▪ The module is configured for read and write block data transfer.
	▪ The ladder logic handles all read and write block situations.
	▪ The module is configured in the processor.
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 the card in the rack, and then restore power to the rack.

5   Reference

In This Chapter

5.1   Product Specifications

The Ethernet Global Data (EGD) module can be used to interface many different protocols with EGD devices. The EGD driver supports both the producer/consumer service port (18246) and the command service port (7937) using the UDP protocol over an IP network. The user defines the data to be produced and consumed in a configuration file downloaded to the module.

GE Fanuc Automation and GE Drive Systems developed an Ethernet Global Data, or EGD, exchange for PLC and computer data in 1998. Ethernet Global Data (EGD) offers versatility where a mix of control devices requires cooperation with each other. This involves sharing of information across the applications regardless of device or network type, often at high speed, and with high reliability. High reliability means fewer communication failures and having the ability to detect failures upon occurrence. Particular emphasis is delivered for applications requiring periodic or frequent updates and time synchronization of devices. The protocol supports Unicast, Broadcast and Multicast group messaging. Efficiency is based on the fact each device on the network can produce these types of messages and each device determines which of these messages to consume.

5.1.1 General Specifications

- Single Slot - 1769 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.
- Supports all CompactLogix processors: L20/L23/L30/L31/L32/L35, L43 and L45 (L43 and L45 supported with RSLogix 5000 v16.03 or later)
- Also supports MicroLogix 1500 LRP

5.1.2 Hardware Specifications

Specification	Description
Dimensions	Standard 1769 Single-slot module
Current Load	800 mA max@ 5 VDC Power supply distance rating of 2 (L43 and L45 installations on first 2 slots of 1769 bus)
Operating Temp.	0 to 60°C (32 to 140°F)
Storage Temp.	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% (non-condensing)
LED Indicators	Power and Module Status Application Status CFG Port Activity Ethernet Port Activity Error Status
CFG Port (CFG)	RJ45 (DB-9M with supplied cable) RS-232 only No hardware handshaking
App Port (Ethernet modules)	10/100 Base-T Ethernet compatible interface Electrical Isolation 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in section 5.3.2 of IEC 60950: 1991
	Ethernet Broadcast Storm Resiliency = less than or equal to 5000 [ARP] frames-per-second and less than or equal to 5 minutes duration
Shipped with Unit	RJ45 to DB-9M cables for each port 6-foot RS-232 configuration Cable

5.1.3 Functional Specifications

The driver interfaces with a common internal database in the module. This permits the sharing of data across many different networks.

The module supports UDP of service port 7927 (0x1F01) to handle all requests made of the module. The module will only service the requests and generate response messages. It will not generate command requests. The module supports the following functions specified in the EGD protocol:

Code	Description
3	Retrieve Configuration Request
4	Retrieve Configuration Response
7	Summary Request
8	Summary Response
9	Capabilities Request
10	Capabilities Response
15	Statistics Request
16	Statistics Response
18	Command NAK
32	Read Request
33	Read Response

Code	Description
34	Write Request
35	Write Response
36	Masked Write Request
37	Masked Write Response

The producer functionality provided in the EGD protocol is used to transfer portions of the module's database to other EGD nodes on the network. The consumer functionality is used to transfer data from other nodes on the network into the module's database.

The EGD module generates produced data as defined in the user configuration exchange list, from the module's internal database, and is produced at the frequency defined in the exchange list. This data can be broadcast to all nodes or to a specific node on the network.

The EGD module consumes data as defined in the user configuration exchange list. This data is derived from other nodes on the network and is placed in the module's internal database. If a consumer exchange is not received at the specified timeout, the driver will update the status of the exchange. When the driver again receives the exchange, the status will be updated.

5.2 Functional Overview

GE Fanuc Automation and GE Drive Systems developed an Ethernet Global Data, or EGD, exchange for PLC and computer data in 1998. GE Ethernet Global Data (EGD) offers versatility where a mix of control devices requires cooperation with each other. This involves sharing of information across the applications regardless of device or network type, often at high speed, and with high reliability. Bandwidth utilization is optimized by using efficient communication methods. High reliability means fewer communication failures and having the ability to detect failures upon occurrence. Particular emphasis is delivered for applications requiring periodic or frequent updates and time synchronization of devices. The protocol supports Unicast, Broadcast and Multicast group messaging. Efficiency is based on the fact each device on the network can produce these types of messages and each device determines which of these messages to consume.

5.2.1 Ethernet Global Data Compatible Devices

List of devices that support the Ethernet Global Data protocol:

- GE Series 90-70 PLC CPU (CMM742 with EGD support)
- GE Series 90-30 PLC CPU 364 (with EGD support)
- VersaMax CPU E05
- Several drives and turbines
- Ethernet Global Data Service for NT
- CIMPLICITY HMI software
- Several HMI products

5.2.2 EGD Command Server

The module supports UDP service port 7937 (0x1F01) to handle all command requests made of the module. The module will only service the requests and generate response messages. **It will not generate command requests.** The module supports the following functions specified in the EGD protocol:

Code	Description
3	Retrieve Configuration Request (page 63) (example provided)
4	Retrieve Configuration Response (page 63) (example provided)
7	Summary Request (page 67)
8	Summary Response (page 67)
9	Capabilities Request (page 66)
10	Capabilities Response (page 66)
15	Statistics Request (page 69)
16	Statistics Response (page 69)
18	Command NAK (page 70)
32	Read Request (page 71)
33	Read Response (page 71)
34	Write Request (page 73)
35	Write Response (page 73)
36	Masked Write Request (page 75)
37	Masked Write Response (page 75)

The module only supports address type 0 for the read and write commands. Therefore, the data requested is relative to the EGD exchange delimited in the request. In order to use these functions, an exchange must first exist in the module's exchange list defining the database and register count. If the production/consumption time is set to zero, the exchange will never be produced or consumed and will only be valid for command processing. These functions should be used for data that is not time critical and does not require periodic updating. The maximum length of the message is 1400 bytes.

The module supports the masked write request command to alter one or more bits. Multiple cells can be provided in the request to alter more than one byte of data. The maximum length of the message is 1400 bytes.

Refer to EGD Protocol Specific Configuration for information on the data structures required for each command. Command support is usually not available in most EGD devices or drivers. Most devices only support the producer/consumer services. Therefore, this service may not be utilized by those devices.

Retrieve Configuration PDUs Example

PDU Type=3

Retrieve Configuration Request

The retrieve configuration request PDU command permits an application program to request the configuration details associated with a matching Producer and Exchange ID. A retrieve configuration request sent from a requesting node must be followed by a retrieve configuration response message from the responding node.

Packet Info	Description		Data	
Ethernet II	Destination MAC:		00:0D:8D:00:13:83	
	Source MAC:		00:12:3F:AE:5C:AE	
	Type:		0x0800 - Ipv4	
IPv4	Version:		0x4	
	Header Size:		20 bytes	
	Type of service:	000----0:	Routine	
		---0---0:	Normal Delay	
		----0-—0:	Normal throughput	(0x 00)
		-----0-0:	Normal reliability	
		------00:	Normal Monetary cost	
	Total Length:		44 bytes (0x002C)	
	Identification:		2645 (0x0A55)	
	Flags:	00-:	May Fragment	(0x 00)
		0-0:	Last Fragment	
	Fragment Offset:		0 bytes (0x0000)	
	Time to Live:		64 (0x40)	
	Protocol:		17 (0x11) [UDP]	
	Header Checksum:		39947 correct (0x9C0B)	
	Source Address:		105.102.0.200 (0x 69 66 00 C8)	
	Destination Address:		105.102.0.205 (0x 69 66 00 CD)	
UDP	Source Port:		7937 (0x 1F01)	
	Destination Port:		7937 (0x 1F01)	
	Length:		24 bytes (0x 00 18)	
	Checksum:		32236 - correct (0x 7DEC)	
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 03
		Message Flag:	1	1	0x 00
		Request ID:	2	2	0x 11 11
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x 00
		Message Length:	6	2	0x 10 00
		Producer ID:	8	4	0x 69 66 00 C8
		Exchange ID:	12	4	0x E0 2E 00 00

This is an example of an EGD Configuration Request Command Production Data Unit

This is the Hexadecimal representation of the Retrieve configuration Request from the above table. It includes the Ethernet II, IPv4, UDP and within UDP the EGD Command PDU Type 3 depicted in bold font.

```
00 0D 8D 00 13 83 00 12 3f AE 5C AE 08 00 45 00
00 2C 0A 55 00 00 40 11 9C 0b 69 66 00 C8 69 66
00 CD 1F 01 1F 01 00 18 7D EC 03 00 11 11 01 00
10 00 69 66 00 C8 E1 2E 00 00
```

PDU Type=4.

Retrieve Configuration Response

The retrieve configuration response PDU supports the retrieval of exchange configurations for Ethernet Global Data. This message packet will be sent in response to a retrieve configuration request message.

Packet Info	Description		Data (Hex)		
Ethernet II	Source MAC:		00:12:3F:AE:5C:AE (0x 00 12 3F AE 5C AE)		
	Destination MAC:		00:0D:8D:00:13:83 (0x 00 0D 8D 00 13 83)		
	Type:		0x0800 - IPv4 (0x 08 00)		
IPv4	Version:		0x45 (0x 45)		
	Header Size:				
	Type of service:	000----0:	Routine	(0x 00)	
		---0---0:	Normal Delay		
		----0-—0:	Normal throughput		
		-----0-0:	Normal reliability		
		------00:	Normal Monetary cost		
	Total Length:		104 bytes (0x00 68)		
	Identification:		2645 (0x00 04)		
	Flags:	00-:	May Fragment	(0x 00)	
		0-0:	Last Fragment		
	Fragment Offset:		0 bytes (0x00 00)		
	Time to Live:		254 (0x FE)		
	Protocol:		17 [UDP] (0x 11)		
	Header Checksum:		8168 correct (0x E8 1F)		
	Source Address:		105.102.0.200 (0x 69 66 00 C8)		
	Destination Address:		105.102.0.205 (0x 69 66 00 CD)		
UDP	Source Port:		1025 (0x 04 01)		
	Destination Port:		7937 (0x 1F 01)		
	Length:		84 bytes (0x 00 54)		
	Checksum:		62188- correct (0x EC F2)		
	EGD:	EGD's PDU Field:	Offset	Bytes	Hex code
		PDU Type:	0	1	0x 04
		Message Flag:	1	1	0x 00

		Request ID:	2	2	0x 11 11
		PVN1:	4	1	0x 01
		Status:	5	1	0x 00
		Message Length:	6	2	0x 4C 00
		Producer ID:	8	4	0x 69 66 00 C8
		Exchange ID:	12	4	0x E1 2E 00 00
		Production Period:	16	4	0x 40 06 00 00
		Reserved:	20	2	0x 00 00
		Destination Type:	22	2	0x 01 00
		Destination address	24	32	0x 69 66 00 C8 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
		Configuration State:	56	2	0x 02 00
		Exchange Length:	58	2	0x 78 05
		Reserved:	60	4	0x 00 00 00 00
		UDP/IP Port	64	2	0x 46 47
		Configuration Type:	66	2	0x 00 00
		Configuration Sig.:	68	2	0x 00 00
		Mode:	70	2	0x 02 00
		Reserved:	72	2	0x 00 00
		Configuration Data:	74	2	0x 00 00

This is an example of The Module's EGD Configuration Response to the Command Production Data Unit.

This is the Hexadecimal representation of the Retrieve configuration Response from the above table. It includes the Ethernet II, IPv4, UDP and within UDP the EGD Server's Reply PDU Type 4 depicted in bold font.

```
00 12 3F AE 5C AE 00 0D 8D 00 13 83 08 00 45 00
00 68 00 04 00 00 FE 11 E8 1F 69 66 00 CD 69 66
00 C8 04 01 1F 01 00 54 EC F2 04 00 11 11 01 00
4C 00 69 66 00 C8 E1 2E 00 00 40 06 00 00 00 00
01 00 69 66 00 C8 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 02 00 78 05 00 00 00 00 46 47 00 00 00 00
02 00 00 00 00 00
```

PDU Type = 9

Capabilities Request

The capabilities request PDU command permits an application program to request the supported capabilities of the EGD implementation on the destination node. A capabilities request sent from a requesting node must be followed by a capabilities response message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 09
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH

PDU Type = 10

Capabilities Response.

The capabilities response command PDU is sent in response a capabilities request. This message returns the functional capabilities and limits of the supported EGD implementation on the responding controller.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 0A
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Producer ID:	8	4	0x HH HH HH HH

Packet Info	Description		Data		
		Reserved:	12	4	0x HH HH HH HH
		Maximum Exchanges:	16	4	0x HH HH HH HH
		Capabilities Bit Mask:	20	4	0x HH HH HH HH
		Reserved:	24	2	0x HH HH
		Configuration Type:	26	2	0x HH HH
		Identification String (up to 80 characters):	28	XX	0x HH . . . HH

Summary PDUs

PDU Type = 7

Summary Request

The summary request PDU command permits an application program to request a summary of the exchanges configured on a given node. This allows a user to get a complete list of all exchanges defined. The Index field is normally 0 and is used to request a block of summaries in nodes which contain a large number of exchanges. A summary request sent from a requesting node must be followed by a summary response message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 07
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Index:	8	1	0x HH
		Reserved:	9	3	0x 00 00 00

PDU Type = 8

Summary Response.

The summary response PDU is used to respond to a summary request. This PDU returns a list of exchanges which are currently defined on the responding node. This message is of variable length; the number of summaries, or cells, included in the message is returned in the header of the message. If the number of cells returned is less than the total number of cells, remaining summaries can be retrieved by subsequent requests with a larger index variable.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 08
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Index:	8	1	0x HH
		Producer ID:	9	4	0x HH HH HH HH
		Total Cells: (Qty of exchange cells defined for this node)	13	2	0x HH HH
		Cells contained in the message:	15	2	0x HH HH
		The following six items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD Module's configuration file. Cell Qty is limited to [EGD Exchange] command lines present in the module's configuration file.			
		Producer ID:	17	4	0x HH HH HH HH
		Exchange ID:	21	4	0x HH HH HH HH
		Mode:	25	1	0x HH
		Reserved:	26	1	0x HH
		State:	27	2	0x HH HH
		Production Period:	29	4	0x HH HH HH HH

Statistics PDUs

PDU Type = 15

Statistics Request

The statistics request PDU command permits an application program to obtain the current operating statistics of the specified Exchange. The exchange must be valid on the destination node. A statistics request sent from a requesting node must be followed by a statistics response message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 0F
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Reserved:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Producer ID:	8	4	0x HH HH HH HH
		Exchange ID:	12	4	0x HH HH HH HH

PDU Type = 16

Statistics Response.

The statistics response PDU command returns the operating statistics for the Producer and Exchange ID specified in the request message.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 10
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Producer ID:	8	4	0x HH HH HH HH
		Exchange ID:	12	4	0x HH HH HH HH
		Configuration Time:	16	4	0x HH HH HH HH
		Due Time:	20	4	0x HH HH HH HH

Packet Info	Description		Data		
		State:	24	4	0x HH HH HH HH
		Exchange Length:	28	4	0x HH HH HH HH
		Message Count:	32	4	0x HH HH HH HH
		Missed Count:	36	4	0x HH HH HH HH
		Refresh Error Count:	40	4	0x HH HH HH HH
		Reserved:	44	4	0x HH HH HH HH

Command NAK PDU

PDU Type = 18

Command NAK Response.

The command NAK response may be sent by a responder to any command received on the command port that is in error. Use of the command NAK allows the responder to give more precise and detailed information about the nature of the error to the requester. The command NAK shall not be sent in response to a NAK message.

The NAK message is returned to indicate a syntactic error in a request message. It should only be used if the request is unintelligible. Thus, whenever possible, the corresponding response to a received request message shall be returned.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 12
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Producer ID:	8	4	0x HH HH HH HH
		Exchange ID:	12	4	0x HH HH HH HH
		Error Code:	16	2	0x HH HH
		Reserved:	18	2	0x HH HH
		Offending Message:	20	16	0x HH . . . HH
		Error String: (up to 80 characters)	36	XX	0x HH . . . HH

Read PDUs

PDU Type = 32

Read Request

The read request PDU is used to request the contents of one or more contiguous groups of memory from a specific peer controller. The header defines parameters which apply to the all of the individual cell references in the message. Each cell reference specifies an offset into the specified Exchange or target-specific address and the number of bytes to read. Based on the address type, the Domain ID must contain an Exchange and Producer ID or target-specific address which is valid on the destination node. A read request sent from a requesting node must be followed by a read response message from the responding node.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 20
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell Count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
	The following two items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD Module's configuration file.				
	Offset: reads the DB Register specified in the Command.				
	Length: is Bytes count not Words.				
	Multiple Cells may be requested dependent on the Cell Count: field specified above.				
		Offset:	32	2	0x HH HH
		Length:	34	2	0x HH HH

PDU Type = 33

Read Response.

The read response PDU (Read_Resp) is used to return the contents of one or more contiguous groups of memory from the local node to the requesting controller. The header defines parameters which apply to the all of the individual cell references in the message. Each cell reference specifies an offset into the specified Exchange, the number of bytes of Data, and the Data itself. All data returned must be padded to the nearest 4 byte boundary.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 20
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
	The following four items are referred to as the exchange Cell. Each Cell contains data from one [EGD Exchange] command line present in the EGD Module's configuration file.				
	Offset: reads the DB Register specified in the [EGD Exchange] command.				
	Length: is Bytes Qty not Words.				
	Multiple Cells may be returned dependent on the Cell Count: field specified in the Requesting PDU.				
		Offset:	32	2	0x HH HH
		Length:	34	2	0x HH HH
		Data(depends on length requested):	36	XX	0x HH . . . HH
		Padding(to 32 bit boundary):	XX	XX	0x HH HH

Write PDUs

PDU Type = 34

Write Request

The write request PDU is used to change the contents of one or more contiguous groups of memory on a specific peer controller. The header defines parameters which apply to the all of the individual cell references in the message. Each cell reference specifies an offset into the specified Exchange or target-specific address, the number of bytes to write, and the Data. Each Data field must be padded to the nearest 4 byte boundary. Based on the address type, the Domain ID must contain an Exchange and Producer ID or target-specific address which is valid on the destination node. A write request sent from a requesting node must be followed by a write response message from the responding node. See the discussion in the section entitled Exchange Data Handling for information about coherency in the write.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 22
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell Count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
		The following two items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD Module's configuration file. **Offset:** reads the DB Register specified in the Command. **Length:** is Bytes count not Words. Multiple Cells may be requested dependent on the Cell Count: field specified above.			
		Offset:	32	2	0x HH HH
		Length:	34	2	0x HH HH
		Data(depends on length requested):	36	XX	0x HH . . . HH
		Padding(to 32 bit boundary):	XX	XX	0x HH HH

PDU Type = 35

Write Response.

The write response is returned from a destination controller in response to a write request message. It serves as an acknowledgment for the original request. A positive response indicates that all of the data has been written to the responding device. An error response indicates that one or more of the transfers to the responding device failed. Responders shall use all available means to assure that a write is performed in its entirety or not performed at all. Requesting applications are advised that if partial failures of the write can cause problems with the control algorithm, they should include only one cell in each write to assure complete knowledge of the disposition of the write request.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 23
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Length:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH

Masked Write PDUs

PDU Type = 36

Mask Write Request

The masked write request PDU is used to change individual bits in one or more bytes in the destination controller. The header defines parameters which apply to the all of the individual cell references in the message. Each cell reference specifies which bits to change in the byte specified by the offset given. Based on the address type, the Domain ID must contain an Exchange and Producer ID or target-specific address which is valid on the destination node. A masked write request sent from a requesting node must be followed by a masked write response message from the responding node. Some devices may not support writing individual bits and others may support writing only one bit at a time. Such devices shall return a status of MEMORY_ACCESS_ERROR for masked write attempts that they do not support.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 24
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Option Type:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell Count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH
		The following three items are referred to as the exchange Cell. Each Cell targets one [EGD Exchange] command line present in the EGD Module's configuration file.			
		Offset: writes into the DB Register specified in the [EGD Exchange] command line.			
		Mask: example 0x AA AA. Bin 1010101010101010			
		Data: is ANDed with the Mask Bytes on the target server.			
		Offset:	32	4	0x HH HH HH HH
		Mask:	36	2	0x HH HH
		Data:	38	2	0x HH HH

PDU Type = 37

Masked Write Response.

The Masked Write Response provides an acknowledgment to the masked write request message. A positive response indicates that all of the data has been written to the responding device. An error response indicates that one or more of the transfers to the responding device failed. Responders shall use all available means to assure that a write is performed in its entirety or not performed at all. Requesting applications are advised that if partial failures of the write can cause problems with the control algorithm, they should include only one cell in each write to assure complete knowledge of the disposition of the write request. Requesters should be aware that some responding devices are not capable of setting more than one bit in a request. Before sending a mask with more than one bit set, the requester should assure that the responding device supports multiple bit writes.

Packet Info	Description		Data		
UDP	Source Port:		7937 (0x 1F01)		
	Destination Port:		7937 (0x 1F01)		
	Length:		xx bytes (0x 00 XX)		
	Checksum:		xxxxx (0x XX XX)		
	EGD:	**EGD's PDU Field:**	**Offset**	**Bytes**	**Hex code**
		PDU Type:	0	1	0x 25
		Message Flag:	1	1	0x HH
		Request ID:	2	2	0x HH HH
		PVN1:	4	1	0x 01
		Status:	5	1	0x HH
		Message Length:	6	2	0x HH HH
		Configuration Signature:	8	2	0x HH HH
		Address Type:	10	1	0x HH
		Cell count:	11	1	0x HH
		Producer ID:	12	4	0x HH HH HH HH
		Exchange ID:	16	4	0x HH HH HH HH
		Time Stamp:	20	8	0x HH . . . HH
		Reserved:	28	4	0x HH HH HH HH

5.2.3 EGD Data Producer

The EGD driver will generate produced data as defined in the user configuration exchange list. This data is derived from the module's internal database and is produced at the set frequency defined in the exchange list. This data can be broadcast to all nodes or to a specific node on the network. Up to 700 database registers can be transferred in a single produced message. Therefore, to transfer the whole database would only require 6 messages (4000 word registers in the module's database).

Central to the functionality of the module is the internal database. This database is shared between all the drivers in the module and is used as a conduit to pass information from one device on one network to one or more devices on another network. This permits data from devices on one communication port to be viewed and controlled by devices on another port.

The producer functionality provided in the EGD driver is used to transfer portions of the module's database to other EGD nodes on the network. The following diagram describes the flow of data between the producer, the internal database and the remote EGD devices:
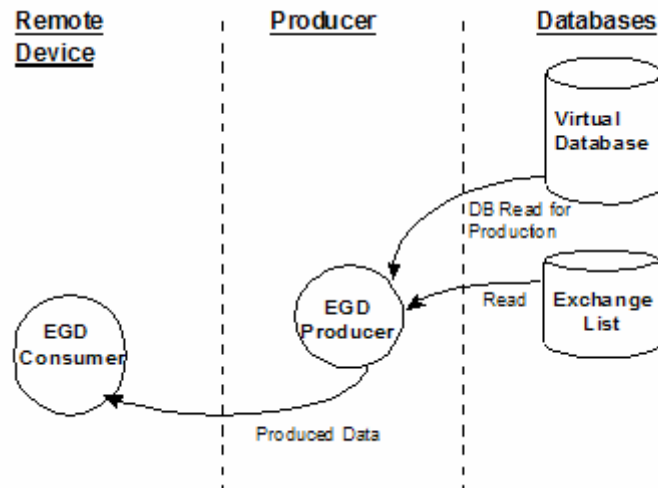
5.2.4 EGD Data Consumer

The EGD driver will consume data as defined in the user configuration exchange list. This data is derived from other nodes on the network and is placed in the module's internal database. If a consumer exchange is not received at the specified timeout, the driver will update the status of the exchange. When the driver again receives the exchange, the status will be updated. Exchanges received by the consumer driver that are not defined in the exchange list will be discarded. Up to 700 words of data can be consumed in a single message. Therefore, to fill the whole database with values would only require 6 exchanges (4000 word registers in the module's database).

Central to the functionality of the module is the internal database. This database is shared between all the drivers in the module and is used as a conduit to pass information from one device on one network to one or more devices on another network. This permits data from devices on one communication port to be viewed and controlled by devices on another port.

The consumer functionality provided in the EGD driver is used to transfer data from other nodes on the network into the module's database. The following diagram describes the flow of data between the consumer, the internal database and the remote EGD devices:
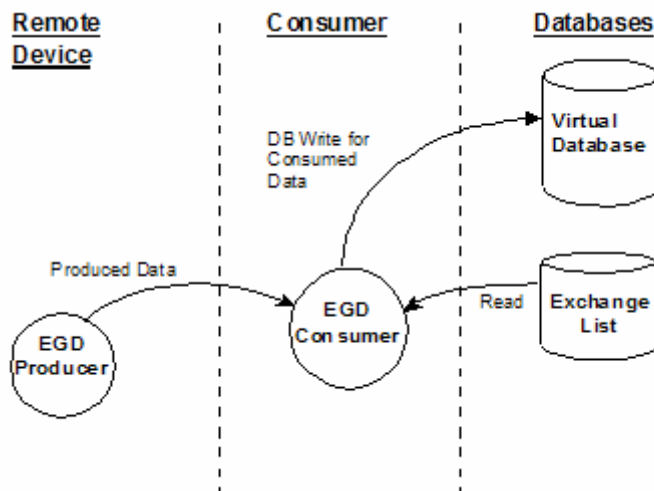
5.2.5 General Concepts

The following topics describe several concepts that are important for understanding the operation of the MVI69-EGD module.

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

1 Initialize hardware components
  o   Initialize CompactLogix or MicroLogix backplane driver
  o   Test and Clear all RAM
  o   Initialize the serial communication ports

2 Reads configuration from Compact Flash Disk
3 Initialize Module Register space
4 Enable Slave Driver on selected ports

After the module has received the Module Configuration, the module will begin communicating with other nodes on the network, depending on the configuration.

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.
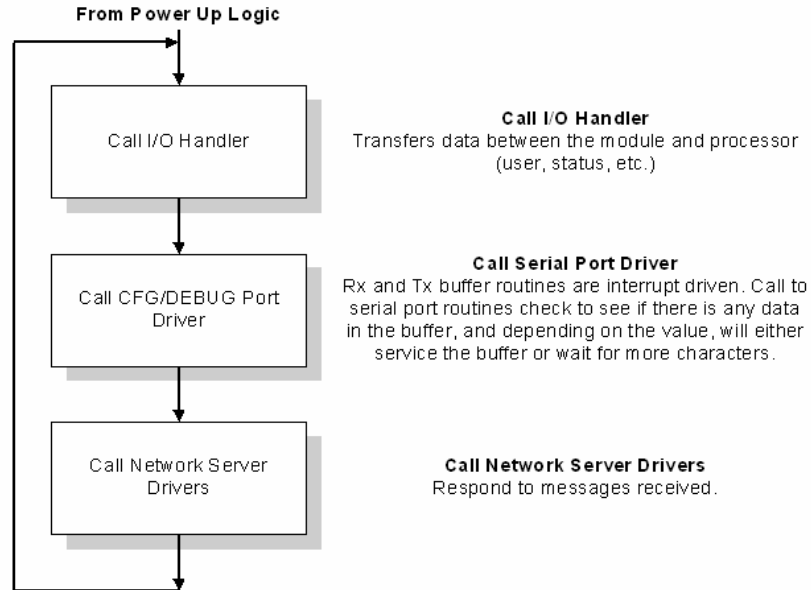
CompactLogix or MicroLogix Processor Not in Run

Whenever the module detects that the processor has gone out of the Run mode (that is, Fault or PGM), backplane communications will halt between processor and module but not on the EGD network. When the processor is returned to a running state, the module will resume communication with the Processor.

Backplane Data Transfer

The MVI69-EGD module communicates directly over the CompactLogix or MicroLogix backplane. Data is paged between the module and the CompactLogix or MicroLogix processor across the backplane using the module's input and output images. The update frequency of the images is determined by the scheduled scan rate defined by the user for the module and the communication load on the module. Typical updates are in the range of 1 to 10 milliseconds.

This bi-directional transference of data is accomplished by the module filling in data in the module's input image to send to the processor. Data in the input image is placed in the Controller Tags in the processor by the ladder logic. The input image for the module is set to 60, 120 or 240 words. This large data area permits fast throughput of data between the module and the processor.

The processor inserts data into the module's output image to transfer to the module. The module's program extracts the data and places it in the module's internal database. The output image for the module is set to 60, 120 or 240 words. This large data area permits fast throughput of data from the processor to the module.

The following illustration shows the data transfer method used to move data between the CompactLogix or MicroLogix processor and the MVI69-EGD module.
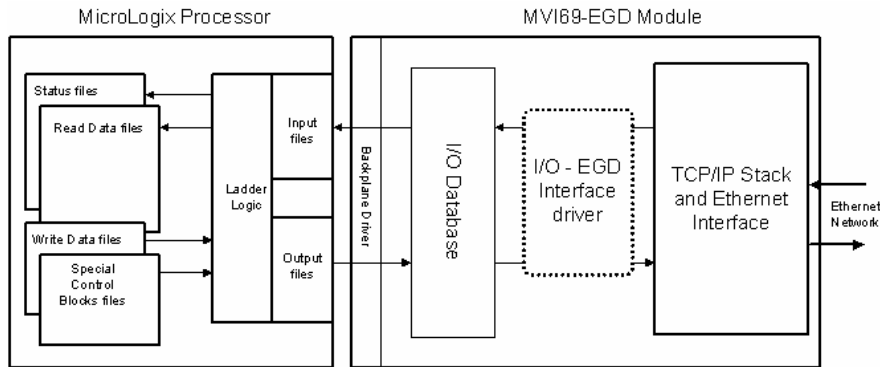
All data transferred between the module and the processor over the backplane is through the input and output images. Ladder logic must be written in the CompactLogix or MicroLogix processor to interface the input and output image data with data defined in the Controller Tags. All data used by the module is stored in its internal database. The following illustration shows the layout of the database:

Module's Internal Database Structure

4000 registers for user data
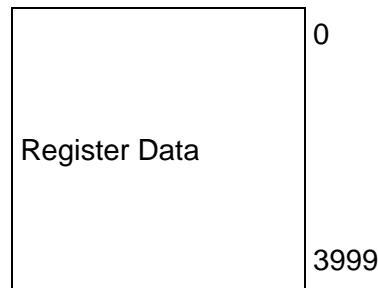
Data contained in this database is paged through the input and output images by coordination of the CompactLogix or MicroLogix ladder logic and the MVI69-EGD module's program. Up to 248 words of data can be transferred from the module to the processor at a time. Up to 247 words of data can be transferred from the processor to the module. The read and write block identification codes in each data block determine the function to be performed or the content of the data block. The module uses the following block numbers:

Block Range	Descriptions
-1 or 0	Empty Data Blocks
1 to 67	Data Read or Write Blocks
2000	CP Status Data
9250	General Status Data
9998	Warm-boot control block
9999	Cold-boot control block

Each image has a defined structure depending on the data content and the function of the data transfer.

5.2.6 Normal Data Transfer

Normal data transfer includes the paging of the user data found in the module's internal database in registers 0 to 3999 and the status data. These data are transferred through read (input image) and write (output image) blocks. Refer to the **Module Configuration** and **Ladder Logic** sections for a description of the data objects used with the blocks and the ladder logic required. The structure and function of each block is discussed in the following topics.

Normal Input Data Block

These blocks of data transfer information from the module to the CompactLogix or MicroLogix processor and transfer output (control) data sent to the module from the remote master unit. The structure of the input image used to transfer this data is shown in the following table.

Words	Description
0	Block read ID
1	Block write ID requested
2 to n	Input data (60, 120 or 240 words)

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

Normal Input Empty Data Block

Words	Description
0	Block read ID (0 or -1)
1	Block write ID requested
2	Program scan counter
3	Block write counter
4	Block read counter
5	Block parse counter
6	Block error counter
7	SNTP valid time
8	SNTP request count
9	SNTP response count
10	SNTP computation count
11	SNTP set count
12	SNTP timeout error count
13	SNTP seconds (LSW)
14	SNTP seconds (MSW)
15	SNTP microseconds (LSW)
16	SNTP microseconds (MSW)
17 to n	Reserved

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

Normal Output Data Block

These blocks of data transfer information from the CompactLogix or MicroLogix processor to the module and source the input (monitored) data to be used by the remote master. The structure of the output image used to transfer this data is shown in the following table.

Words	Description
0	Block write ID
1 to n	Output data (60, 120 or 240 words)

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

The Write Block ID is an index value used to determine the location in the module's database where the data will be placed. Each transfer can move up to 200 words (block offsets 1 to 200) of data.

5.2.7 Command Control Blocks

Command control blocks are special blocks used to control the module. The current version of the software supports the following command control blocks.

Code	Description
-1 or 0	Empty data blocks
1 to 20	Data read or write blocks
2000	C/P status data
9250	General status data
9998	Warm boot module (same effect as 9999)
9999	Cold boot module

Block 2000 Request

Words	Description
0	2000 Command Block ID
1	Number of C/P messages (1 to 4)
2	First C/P index (0 to 99)
3 to n	Reserved

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

Block 2000 Response

Words	Description
0	2000 Command Block ID
1	Block write ID requested
2	Number of C/P messages (0 to 4) Will be set to 0 if error in request.
3	First C/P index (0 to 99)
4 to 17	C/P Status Data
18 to 31	C/P Status Data
32 to 45	C/P Status Data

Words	Description
46 to 59	C/P Status Data
60 to n	Reserved

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

Block 2000 C/P Status Data Format

Words	Description
0	Status (0=invalid, 1=producing/healthy, 2=pending/unhealthy)
1	Status bit mapped (bit0=error or invalid, bit1=not time synchronized, bits 2 to 15 reserved)
2	Number of times C/P (LSW)
3	Number of times C/P (MSW)
4	Missed count (LSW)
5	Missed count (MSW)
6	Refresh count error (LSW)
7	Refresh count error (MSW)
8	Invalid error bit set by producer
9	Time sync error set by producer
10	Short message error in exchange
11	Long message error in exchange
12	Protocol PVN not set to 1
13	Configuration signature not set correctly

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

Block 9250 Request Block (General Status)

Words	Description
0	9250 Command code value
1 to n	Reserved

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

Block 9250 Response Block (General Status)

Words	Description
0	9250 Command code value
1	Block write ID requested
2	Program scan counter
3	Product code bytes 0 & 1
4	Product code bytes 2 & 3
5	Revision bytes 0 & 1
6	Revision bytes 2 & 3
7	Op bytes 0 & 1
8	Op bytes 2 & 3

Words	Description
9	Run bytes 0 & 1
10	Run bytes 2 & 3
11	Block write counter
12	Block read counter
13	Block parse counter
14	Block error counter
15	SNTP valid time
16	SNTP request count
17	SNTP response count
18	SNTP computation count
19	SNTP set count
20	SNTP timeout error count
21	SNTP seconds (LSW)
22	SNTP seconds (MSW)
23	SNTP microseconds (LSW)
24	SNTP microseconds (MSW)
25 to n	Reserved

where n = 60, 120, or 240 depending on the Block Transfer Size parameter (refer to the configuration file).

Warm Boot (9998) or Cold Boot (9999)

If the processor places a value of 9998 in this register, the module will perform a warm-boot operation. If the processor places a value of 9999 in this register, the module will perform a cold-boot operation. In this application module, both of these operations perform the same function. They exit the program and then restart the program. Many of the program parameters set in the user configuration must be set at program initialization and cannot be set while the program is running. Therefore, both functions operate the same way.

5.3 Exchange Configuration Form

Use this form to design the exchange list for an application.

1	2	3	4	5	6	7	8	9	10
Exchange Type (C/P)	Cast Type (B/M/U)	Database Address	Register Count	Swap Code	Prod/Cons Time	IP Address	Exchange ID	CFG Signature Version	
								Major	Minor

6 Support, Service & Warranty

In This Chapter

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 contents of file
   o Module Operation
   o Configuration/Debug status information
   o LED patterns
2 Information about the processor and user data files as viewed through and LED patterns on the processor.
3 Details about the serial devices interfaced, if any.

6.1 How to Contact Us: Technical Support

| Internet | Web Site: http://www.prosoft-technology.com/support (http://www.prosoft-technology.com/support) |
| | E-mail address: support@prosoft-technology.com (mailto:support@prosoft-technology.com) |

Asia Pacific

+603.7724.2080, support.asia@prosoft-technology.com
(mailto:support.asia@prosoft-technology.com)

Languages spoken include: Chinese, English

Europe (location in Toulouse, France)

+33 (0) 5.34.36.87.20, support.EMEA@prosoft-technology.com
(mailto:support.emea@prosoft-technology.com)

Languages spoken include: French, English

North America/Latin America (excluding Brasil) (location in California)

+1.661.716.5100, support@prosoft-technology.com (mailto:support@prosoft-technology.com)

Languages spoken include: English, Spanish

For technical support calls within the United States, an after-hours *answering system allows pager access to one of our qualified technical and/or application support engineers at any time to answer your questions.*

Brasil (location in Sao Paulo)

+55-11-5084-5178 , eduardo@prosoft-technology.com (mailto:eduardo@prosoft-technology.com)

Languages spoken include: Portuguese, English

6.2   Return Material Authorization (RMA) Policies and Conditions

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

6.2.1 All Product Returns:

a) In order to return a Product for repair, exchange or otherwise, the Customer must obtain a Returned Material Authorization (RMA) number from ProSoft and comply with ProSoft 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 87). 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, 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 using a shipment method other than that specified by ProSoft 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.

6.2.2 Procedures for Return of Units Under Warranty:

A Technical Support Engineer must approve the return of Product under ProSoft'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 at designated location referenced on the Return Material Authorization.

6.2.3 Procedures for Return of Units Out of Warranty:

a) Customer sends unit in for evaluation
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:

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

6.2.4 Purchasing Warranty Extension:

a) ProSoft's standard warranty period is three (3) years from the date of shipment as detailed in "Limited Warranty (page 90)". The Warranty Period may be extended at the time of equipment purchase for an additional charge, as follows:

• Additional 1 year = 10% of list price
• Additional 2 years = 20% of list price
• Additional 3 years = 30% of list price

6.3 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, 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.

6.3.1 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 years from the date of shipment (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. 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 used replacement parts. 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 warranteed 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.

6.3.2 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.

6.3.3 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 of 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.

6.3.4 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.

6.3.5 Disclaimer of all Other Warranties

The Warranty set forth in What Is Covered By This Warranty (page 90) 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.

6.3.6 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 included, 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.

6.3.7 Time Limit for Bringing Suit

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

6.3.8 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.

6.3.9 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.

6.3.10 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.

Index