inRAx

MVI56-GRCM

ControlLogix Platform

GARECO Checkweigher Interface Module

User Manual

April 01, 2008

ProSoft TECHNOLOGY

Please Read This Notice

Successful application of this module requires a reasonable working knowledge of the Rockwell Automation ControlLogix hardware, the MVI56-GRCM 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.

Under no conditions will ProSoft Technology be responsible or liable for indirect or consequential damages resulting from the use or application of the product.

Information in this manual is subject to change without notice and does not represent a commitment on the part of ProSoft Technology Improvements and/or changes in this manual or the product may be made at any time. These changes will be made periodically to correct technical inaccuracies or typographical errors.

Warnings

UL Warnings

A Warning - Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2.
B Warning - Explosion Hazard - When in Hazardous Locations, turn off power before replacing or rewiring modules.
Warning - Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous.
C Suitable for use in Class I, division 2 Groups A, B, C and D Hazardous Locations or Non-Hazardous Locations.

ATEX Warnings and Conditions of Safe Usage:

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

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

Electrical Ratings

- Backplane Current Load: 800 mA @ 5 V DC; 3mA @ 24V DC
- Operating Temperature: 0 to 60°C (32 to 140°F)
- Storage Temperature: -40 to 85°C (-40 to 185°F)
- Shock: 30g Operational; 50g non-operational; Vibration: 5 g from 10 to 150 Hz
- Relative Humidity 5% to 95% (non-condensing)
- All phase conductor sizes must be at least 1.3 mm(squared) and all earth ground conductors must be at least 4mm(squared).

Markings:

 II 3 G 0C <=Ta<= 60C EEx nA IIC T4 DEMKO 07ATEX0710717X

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 (15 for the PC56). When the battery is fully discharged, the module will revert to the default BIOS settings.

Note: The battery is not user replaceable.

ProSoft® Product Documentation

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

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

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We always want you to feel that you made the right decision to use our products. If you have suggestions, comments, compliments or complaints about the product, documentation or support, please write or call us.

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MVI56-GRCM User Manual
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Contents

Guide to the MVI56-GRCM 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 45) Diagnostics and Troubleshooting (page 31)	This section describes how to verify communications with the network. Diagnostic and Troubleshooting procedures.
Reference Product Specifications Functional Overview Glossary	→	Reference (page 49) Functional Overview (page 51) Product Specifications (page 49)	These sections contain general references associated with this product, Specifications, and the Functional Overview.
Support, Service, and Warranty Index	→	Support, Service and Warranty (page 79)	This section contains Support, Service and Warranty information. Index of chapters.

1 Start Here

In This Chapter

Installing the MVI56-GRCM module requires a reasonable working knowledge of the Rockwell Automation hardware, the MVI56-GRCM 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 MVI56-GRCM module requires the following minimum hardware and software components:

- Rockwell Automation ControlLogix™ processor, with compatible power supply and one free slot in the rack, for the MVI56-GRCM module. The module requires 800mA of available power.
- Rockwell Automation RSLogix 5000 programming software version 2.51 or higher.
- Rockwell Automation RSLinx communication software
- Pentium® II 450 MHz minimum. Pentium III 733 MHz (or better) recommended
- Supported operating systems:
  - Microsoft Windows XP Professional with Service Pack 1 or 2
  - Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3
  - Microsoft Windows Server 2003
- 128 Mbytes of RAM minimum, 256 Mbytes of RAM recommended
- 100 Mbytes of free hard disk space (or more based on application requirements)

- 256-color VGA graphics adapter, 800 x 600 minimum resolution (True Color 1024 × 768 recommended)
- CD-ROM drive
- HyperTerminal or other terminal emulator program.

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

1.2 Package Contents

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

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

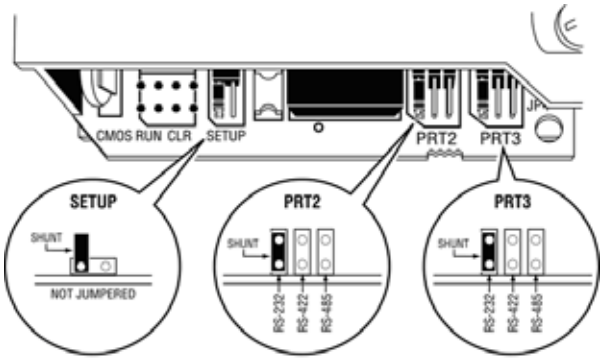
Qty.	Part Name	Part Number	Part Description
1	MVI56-GRCM Module	MVI56-GRCM	GARECO Checkweigher Interface Module
1	Cable	RS232 Null Modem	For RS232 Connection to the CFG Port
3	Cable	Cable #14, RJ45 to DB9 Male Adapter	For DB9 Connection to Module's Port
2	Adapter	1454-9F	Two Adapters, DB9 Female to Screw Terminal. For RS422 or RS485 Connections to Port 1 and 2 of the Module
1	ProSoft Solutions CD		Contains sample programs, utilities and documentation for the MVI56-GRCM module.

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

1.3 Setting Jumpers

If you use an interface other than RS-232 (default), you must change the jumper configuration to match the interface. There are three jumpers located at the bottom of the module.

The following illustration shows the MVI56-GRCM jumper configuration:



1. Set the PRT 2 (for application port 1) and PRT 3 (for application port 2) jumpers for RS232, RS422 or RS485 to match the wiring needed for your application. The default jumper setting for both application ports is RS-232.
2. 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.

1.4 Install the Module in the Rack

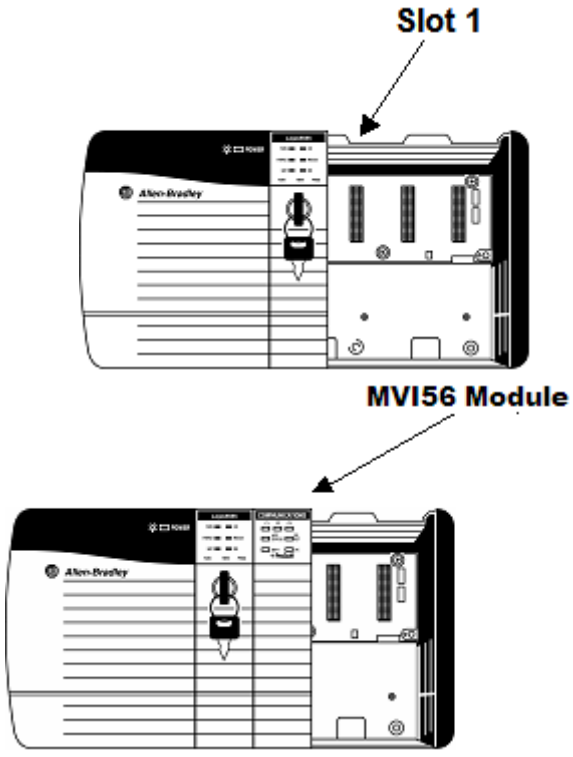
If you have not already installed and configured your ControlLogix processor and power supply, please do so before installing the MVI56-GRCM module. Refer to your Rockwell Automation product documentation for installation instructions.

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

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

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

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



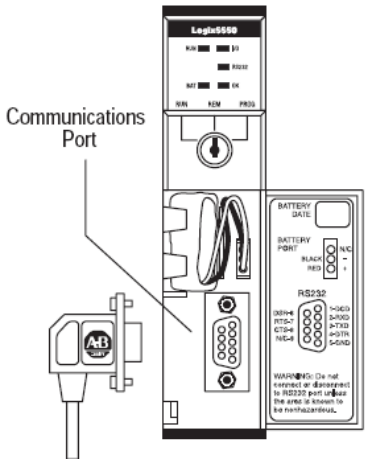
3. With a firm but steady push, snap the module into place.

4 Check that the holding clips on the top and bottom of the module are securely in the locking holes of the rack.
5 Make a note of the slot location. You will need to identify the slot in which the module is installed in order for the sample program to work correctly. Slot numbers are identified on the green circuit board (backplane) of the ControlLogix rack.
6 Turn power ON.

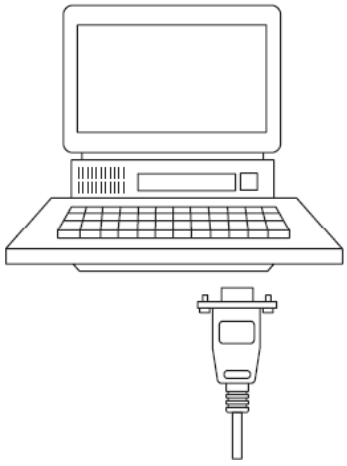
Note: If you insert the module improperly, the system may stop working, or may behave unpredictably.
Note: If you are installing MVI56-GRCM with other modules connected to the PCI bus, the peripheral modules will not have holding clips. Make sure all of the modules are aligned with their respective slots before you snap them into place.

1.5 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.



1.6 Open the Sample Ladder Logic

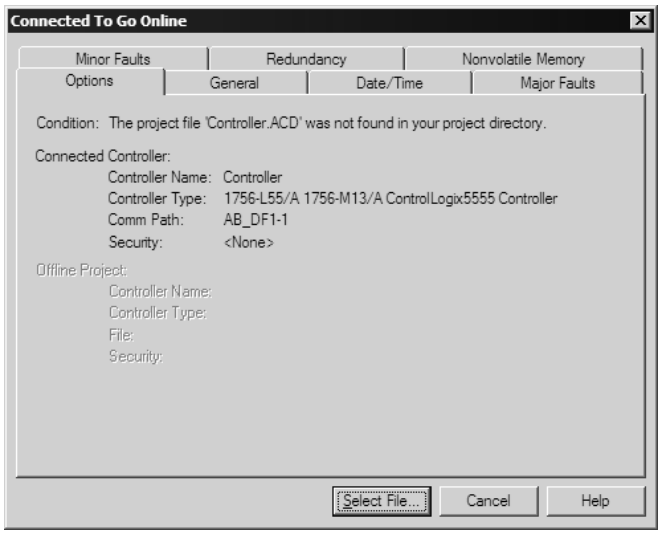
The sample program for your MVI56-GRCM module includes custom tags, data types and ladder logic for data I/O and status monitoring. For most applications, you can run the sample ladder program without modification, or, for advanced applications, you can incorporate the sample program into your existing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

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

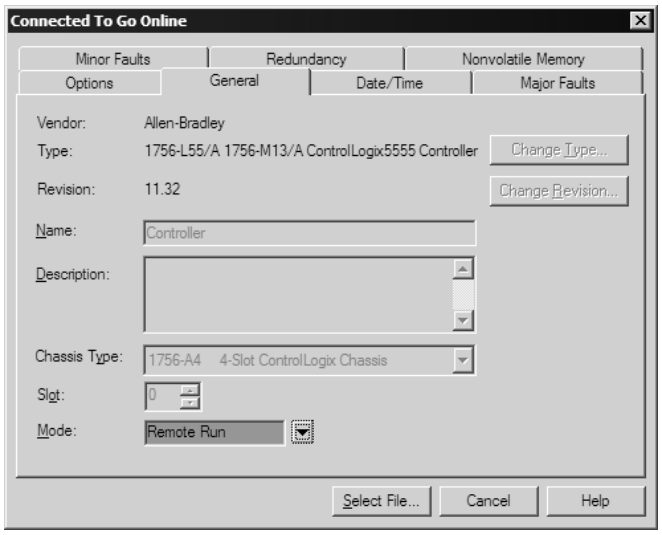
1.6.1 To Determine the Firmware Version of your Processor

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

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



5 On the Connected To Go Online dialog box, click the General tab. This tab shows information about the processor, including the Revision (firmware) version. In the following illustration, the firmware version is 11.32

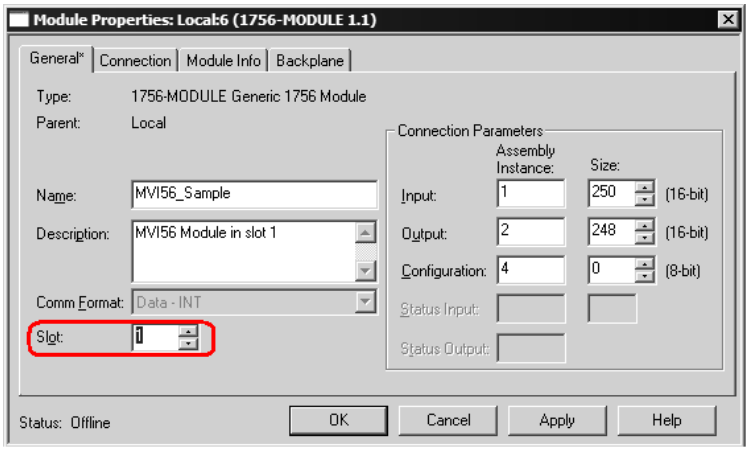


1.6.2 Verify the Slot Number for the Module

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

To change the slot number

1 In the Controller Organization list, select the module [1] 1756-MODULE MVI56, and then click the right mouse button to open a shortcut menu.
2 On the shortcut menu, choose **Properties**. This action opens the Module Properties dialog box.



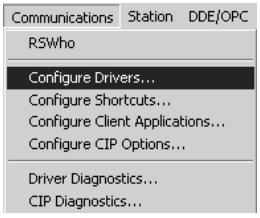
3 In the **Slot:** field, use the up and down arrows on the right side of the field to select the slot number where the module will reside in the rack, and then click OK.

RSLogix will automatically apply the slot number change to all tags, variables and ladder logic rungs that use the MVI56-GRCM slot number for computation.

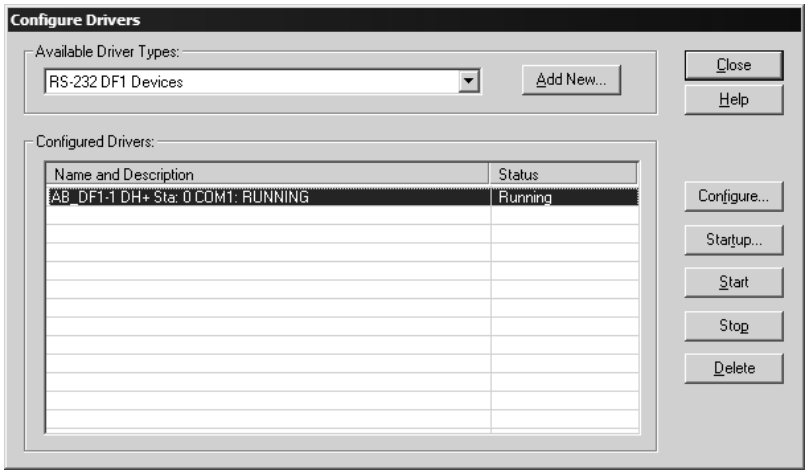
1.6.3 Configuring RSLinx

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.

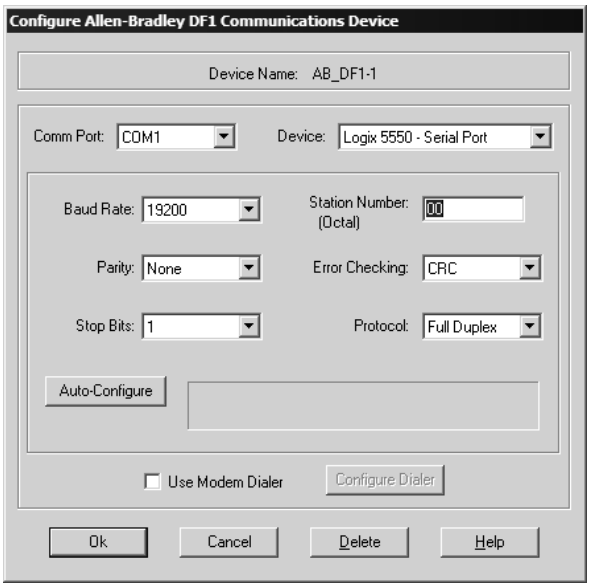


This action opens the Configure Drivers dialog box.



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.

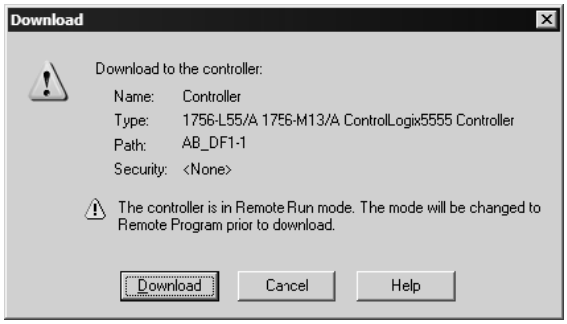
Note: If the auto-configuration procedure fails, verify that the cables are connected correctly between the processor and the serial port on your computer, and then try again. If you are still unable to auto-configure the port, refer to your RSLinx documentation for further troubleshooting steps.

1.7 Download the Sample Program to the Processor

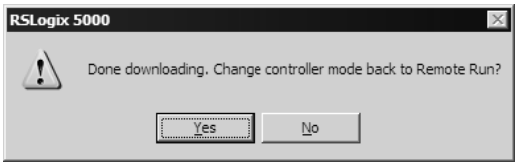
Note: The key switch on the front of the ControlLogix module must be in the REM position.

To download the sample program from RSLogix 5000 to the ControlLogix processor

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.

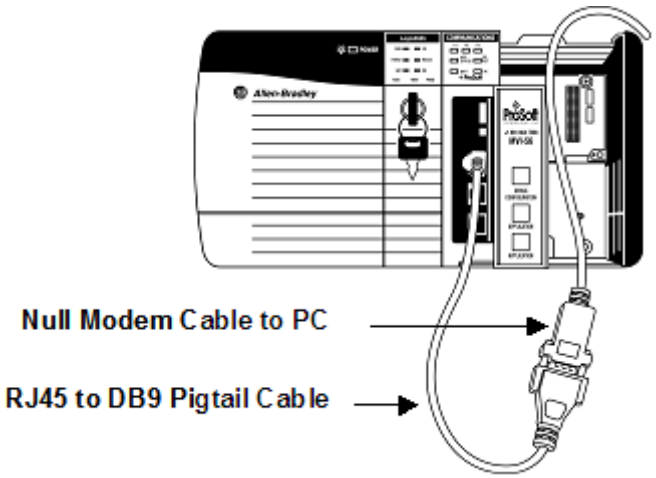


Note: If you receive an error message during these steps, refer to your RSLogix documentation to interpret and correct the error.

1.8 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 Installing and Configuring the Module

In This Chapter

This chapter describes how to install and configure the module to work with your application. The configuration process consists of the following steps.

1 Use RSLogix 5000 to identify the module to the processor and add the module to a project.

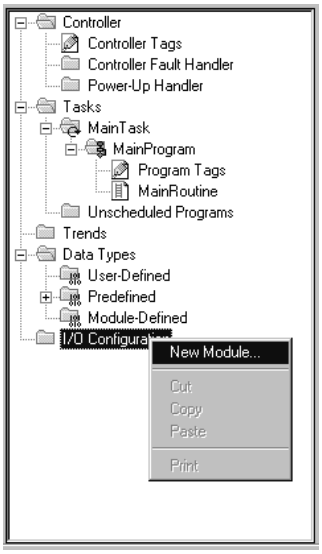
Note: The RSLogix 5000 software must be in "offline" mode to add the module to a project.

2 Modify the example ladder logic to meet the needs of your application, and copy the ladder logic to the processor. Example ladder logic files are provided on the CD-ROM.

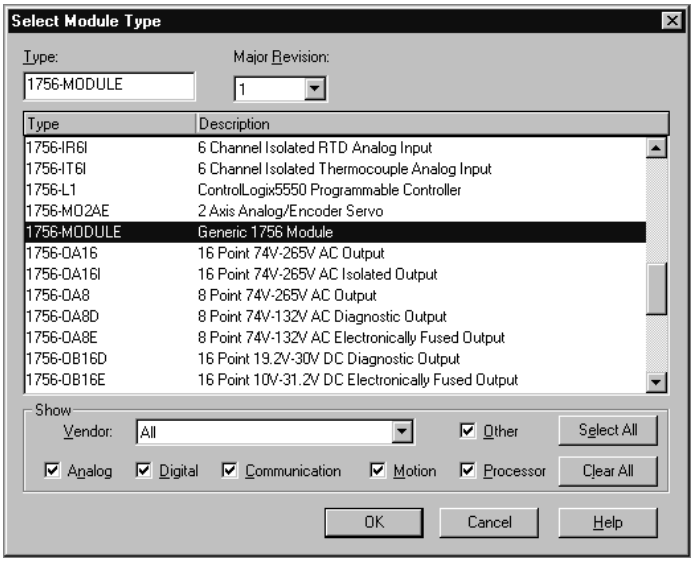
Note: If you are installing this module in an existing application, you can copy the necessary elements from the example ladder logic into your application.

The rest of this chapter describes these steps in more detail.

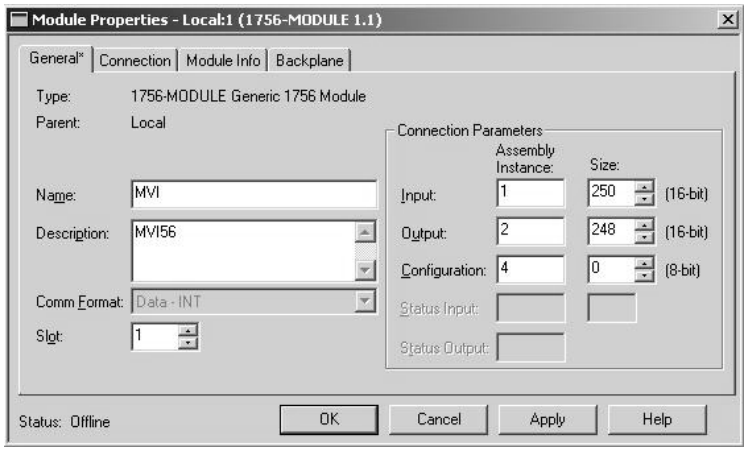
The first step in installing and configuring the module is to define the module to the system. Right-click the mouse button on the I/O Configuration option in the Controller Organization window to display a pop-up menu. Select the New Module… option from the I/O Configuration menu:



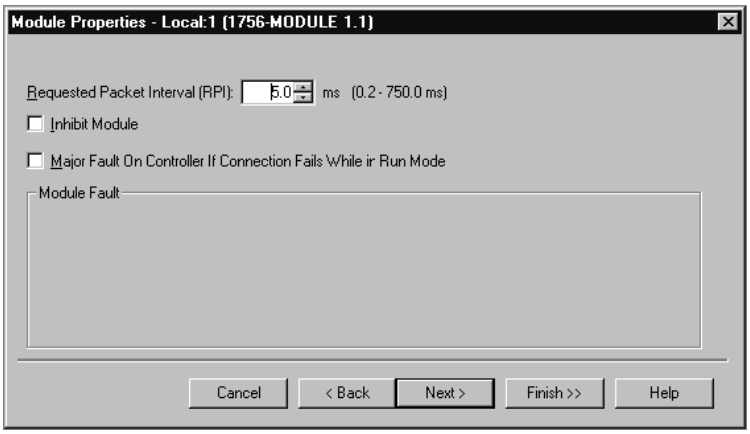
This action opens the following dialog box:



Select the 1756-Module (Generic 1756 Module) from the list and click OK. The following dialog box is displayed:

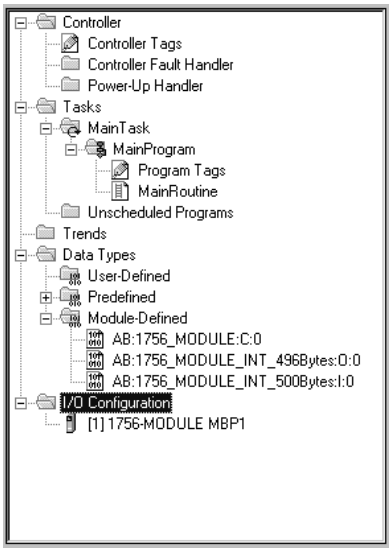


Fill in the dialog boxes as shown adjusting the Name, Description and Slot options for your application. You must select the **Comm Format** as **Data - INT** in the dialog box. Failure to set the **Assembly Instance** and **Size** values correctly will result in a module that will not communicate over the backplane of the ControlLogix rack. Click Next to display the following dialog box.

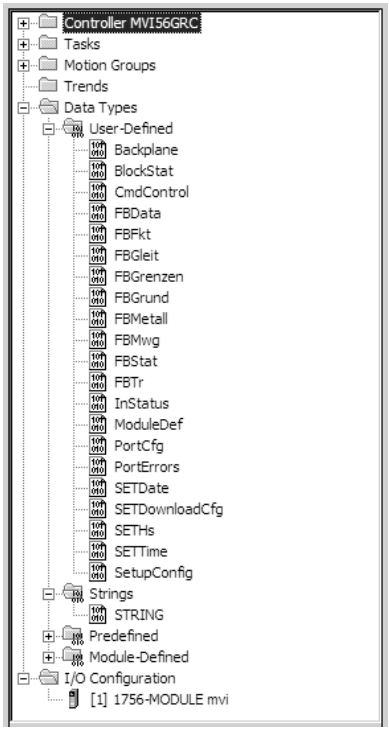


Select the Request Packet Interval value for scanning the I/O on the module. This value represents the minimum frequency the module will handle scheduled events. This value should not be set to less than 1 millisecond. Values between 1 and 10 milliseconds should work with most applications.

After completing the module setup, the Controller Organization window displays the module's presence. The data required for the module is then defined to the application, and objects are allocated in the Controller Tags data area. An example of the Controller Organization window is shown in the following example:

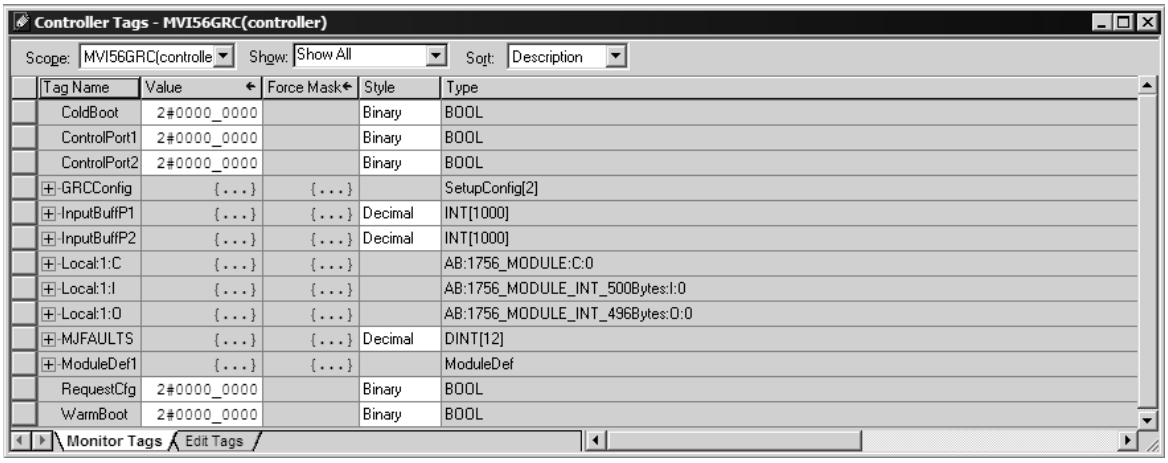


The next step in the module's setup is to define the User Defined Data Types to be used with the module. Copy these data types from the example ladder logic if you are not using the example. They are defined if you are starting from the example ladder logic. The Controller Organization window should display the User Defined Data Types shown in the following example:



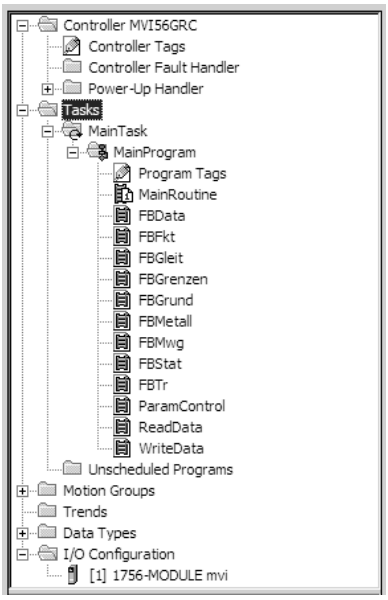
The next step in module setup is to define the data to be used to interface with the module and the ladder logic.

Open the Controller Tags Edit Tags dialog box and enter the values shown in the following example. The MVI56-GRCM module is defined in the example as ModuleDef1. You can set the tag name to any valid tag name you desire. If you are using the example ladder logic, this step has already been performed.



At this point, take the time to fill in the configuration values in the ModuleDef1 data table and adjust array sizes. Refer to the Module Data Object section of this document for information on configuring the module.

The last step in the module setup is to add the ladder logic. If you are using the example ladder logic, adjust the ladder to fit your application. If you are not using the ladder example, copy the ladder logic shown in the Controller Organization window below to your application.



The module is now set up and ready to be used with your application.

Download the new application to the processor and place the processor in run mode. If all the configuration parameters are set correctly and the module is attached to a network, the module's Application LED (APP LED) should remain off and the backplane activity LED (BP ACT) should blink very rapidly. Refer to Diagnostics and Troubleshooting (page 31) if you encounter errors. Attach a computer or terminal to Debug/Configuration port on the module and look at the status of the module using the Configuration/Debug Menu in the module.

2.1 Modifying the Module Configuration

In order for the MVI56-GRCM module to function, a minimum amount of configuration data must be transferred to the module. The following table provides an overview of the different types of configuration data that the module requires, depending on the operating modes to be supported.

Module Register Address	Functional Modes Affected	Name	Description
4500 to 4515 and 4520 to 4536	Master	Port Configuration	These sections define the characteristics of each of the serial communication ports on the module. These parameters must be set correctly for proper module operation.

The MVI56-GRCM module must be configured at least once when the card is first powered, and any time thereafter when the parameters must be changed.

2.1.1 Power Up

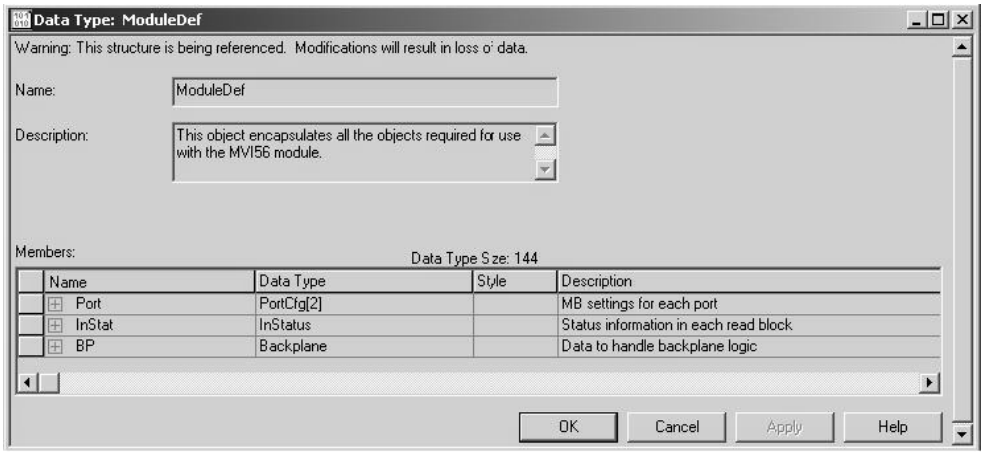
On power up, the module enters into a logical loop waiting to receive configuration data from the processor. Upon receipt, the module will begin execution of the command list if it is present.

2.1.2 Changing Parameters During Operation

A copy of the module's configuration data is mapped in the module's database as displayed in the table above. These values are initialized when the module first receives its configuration from the ControlLogix processor. Ladder logic can be written to issue a Write Configuration command block (9997) to the module. Alternatively, the configuration/debug port on the module can be used to issue the command directly to the module. All three of these methods will force the module to download the configuration to the ControlLogix processor. Ladder logic must exist in the processor to accept the blocks sent by the module. If everything is configured correctly, the module can receive its configuration from a remote device.

2.1.3 Module Data Object (ModuleDef)

All data related to the MVI56-GRCM is stored in a user defined data type. An instance of the data type is required before the module can be used. This is done by declaring a variable of the data type in the Controller Tags Edit Tags dialog box. The structure of the object is displayed in the following figure.

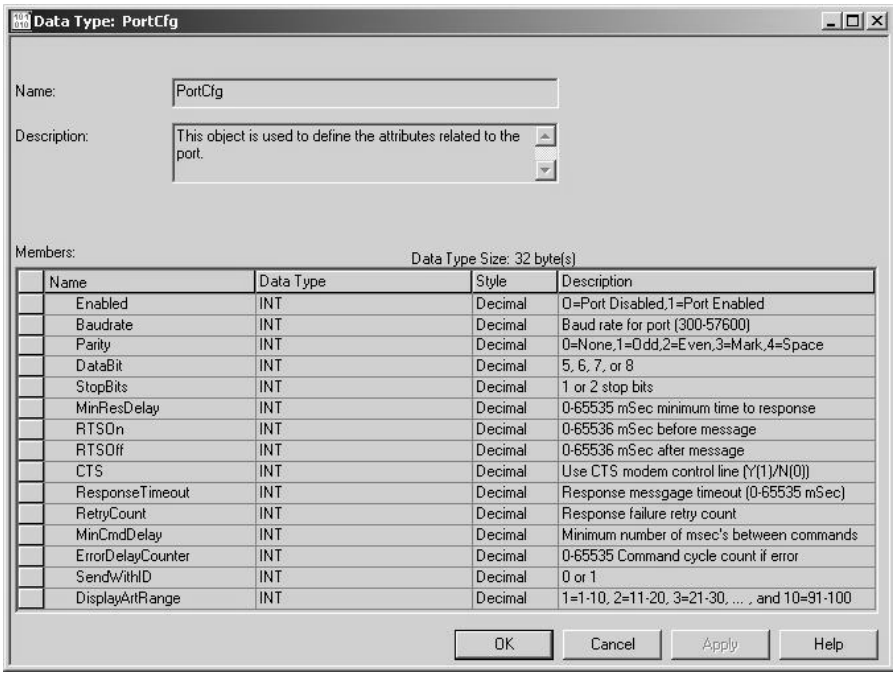


This object contains objects that define the configuration, user data, status and command control data related to the module. Each of these object types is discussed in the following topics of the document.

Configuration Objects

Configuration of the module is performed by filling in the values in the module object defined in the Controller Tags Edit Tags dialog. Each parameter required by the module has a defined location in the object. The following tables and topics describe the parameters set in the dialog box. You can view these tables by opening the data type under the User Defined Data Type option in the Controller Organization window.

Port Parameters (Port)



Name	Data Type	Style	Description
Enabled	INT	Decimal	0=Port Disabled,1=Port Enabled
Baudrate	INT	Decimal	Baud rate for port (300-57600)
Parity	INT	Decimal	0=None,1=Odd,2=Even,3=Mark,4=Space
DataBit	INT	Decimal	5, 6, 7, or 8
StopBits	INT	Decimal	1 or 2 stop bits
MinResDelay	INT	Decimal	0-65535 mSec minimum time to response
RTSOn	INT	Decimal	0-65536 mSec before message
RTSOff	INT	Decimal	0-65536 mSec after message
CTS	INT	Decimal	Use CTS modem control line (Y(1)/N(0))
ResponseTimeout	INT	Decimal	Response messgage timeout (0-65535 mSec)
RetryCount	INT	Decimal	Response failure retry count
MinCmdDelay	INT	Decimal	Minimum number of msec's between commands
ErrorDelayCounter	INT	Decimal	0-65535 Command cycle count if error
SendWithID	INT	Decimal	0 or 1
DisplayArtRange	INT	Decimal	1=1-10, 2=11-20, 3=21-30, ... , and 10=91-100

This object defines the parameters for the operation of each port on the module. Refer to the Reference chapter for the definition of each parameter.

2.1.4 User Defined Data Types

The module uses a set of User Defined Data Types to store input and output. Refer to the Sample Program for a description of all the data types required for the application.

The ProSoft Solutions CD-ROM, included in the package with the module, contains sample ladder, configuration information and documentation for the MVI56-GRCM module. You can also find the latest version of the sample program on the ProSoft Technology web site at http://www.prosoft-technology.com.

3 Ladder Logic

Ladder logic is required for application of the MVI56-GRCM 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.

4 Diagnostics and Troubleshooting

In This Chapter

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

4.1.1 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 terminal application (for example, HyperTerminal). The module does not respond to mouse movements or clicks. The command executes as soon as you press the command letter — you do not need to press **[Enter]**. When you type a command letter, a new screen will be displayed in your terminal application.

4.1.2 Required Hardware

You can connect directly from your computer's serial port to the serial port on the module to view configuration information and perform maintenance.

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 serial communications port available
- A null modem serial cable.

4.1.3 Required Software

In order to send and receive data over the serial port (COM port) on your computer to the module, you must use a communication program (terminal emulator).

A simple communication program called HyperTerminal is pre-installed with recent versions of Microsoft Windows operating systems. If you are connecting from a machine running DOS, you must obtain and install a compatible communication program. The following table lists communication programs that have been tested by ProSoft Technology.

DOS	ProComm, as well as several other terminal emulation programs
Windows 3.1	Terminal
Windows 95/98	HyperTerminal
Windows NT/2000/XP	HyperTerminal

4.1.4 Using the Configuration/Debug Port

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

1. Connect your computer to the module's port using a null modem cable.
2. Start the communication program on your computer and configure the communication parameters with the following settings:

Baud Rate	57,600
Parity	None
Data Bits	8
Stop Bits	1
Software Handshaking	None

3. Open the connection. When you are connected, press the **[?]** key on your keyboard. If the system is set up properly, you will see a menu with the module name followed by a list of letters and the commands associated with them.

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

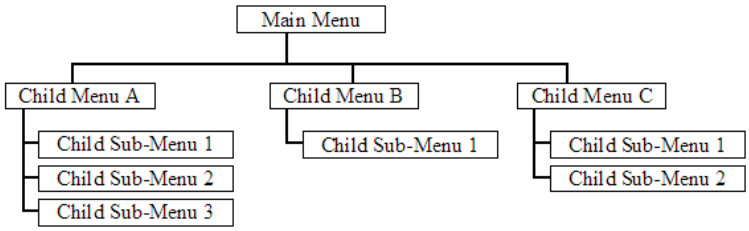
1. Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.
2. Verify that RSLinx is not controlling the COM port. Refer to Disabling the RSLinx Driver for the Com Port on the PC (page 60).
3. Verify that your communication software is using the correct settings for baud rate, parity and handshaking.
4. 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, you can contact ProSoft Technology Technical Support for further 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.

4.1.5 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:

```
GARECO COMMUNICATION MODULE <MVI56-GRCM> MENU
  ?=Display Menu
  A=Data Analyzer
  B=Backplane Transfer Statistics
  D=Database View
  GRCM Command Errors : E=Port 1   F=Port 2
  GRCM Command List   : I=Port 1   J=Port 2
  Slave Status List   : N=Port 1   O=Port 2
  V=Version Information
  W=Warm Boot Module
  Y=Transfer Module Cfg to Processor
  Z=Gareco Menu
  Communication Status : 1=Port 1   2=Port 2
  Port Configuration   : 6=Port 1   7=Port 2

  Esc=Exit Program
```

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

Opening the Data Analyzer Menu

Press **[A]** to open the Data Analyzer Menu. Use this command to view all bytes of data transferred on each port. Both the transmitted and received data bytes are displayed. Refer to Data Analyzer for more information about this menu.

Important: When in analyzer mode, program execution will slow down. Only use this tool during a troubleshooting session. Before disconnecting from the Config/Debug port, please press [S] to stop the data analyzer, and then press [M] to return to the main menu. This action will allow the module to resume its normal high speed operating mode.

Viewing Block Transfer Statistics

Press **[B]** from the Main Menu 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: To determine the number of blocks transferred each second, mark the numbers displayed at a specific time. Then some seconds later activate the command again. Subtract the previous numbers from the current numbers and divide by the quantity of seconds passed between the two readings.

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 Command Error List Menu

Press **[E]** (port 1) or **[F]** (port 2) to open the Command Error List. This list consists of multiple pages of command list error/status data. Press **[?]** to view a list of commands available on this menu.

Opening the Command List Menu

Press **[I]** (port 1) or **[J]** (port 2) to open the Command List menu. Use this command to view the configured command list for the module.

Viewing the Slave Status List (Port 1 and 2)

Press **[N]** (port 1) or **[O]** (port 2) to view the 250 slave status values associated with the ports. The slave status values are defined as follows:

0 = slave is not used

1 = slave being actively polled.

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.

Transferring Module Configuration to the Processor

Press **[Y]** to transfer the module's configuration data to the processor. Ladder logic is required in the processor to receive and implement the updated configuration. You will be prompted to confirm the transfer.

If the operation is not successful, an error code will be returned.

Code	Description
0	Transfer successful
-1	Error transferring module configuration data (block -9000)
-2	Error transferring device definition data (blocks -9100 to -9103)
-3	Error transferring master command list data (blocks -6000 to -6007)

After successful data transfer, the module will perform a warm-boot operation to read in the new data.

Viewing Port Communication Status

Press **[1]** or **[2]** from the Main Menu to view the port communication status for Ports 1 and 2.

Use this command to view communication status and statistics for the selected port. This information can be informative when troubleshooting communication problems.

Viewing Port Configuration

Press **[6]** or **[7]** from the Main Menu to view configuration information for ports 1 and 2.

Use this command to display detailed configuration information for the selected port.

Viewing Gareco Device Response Information

Press **[Z]** to view GRC device response information.

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.

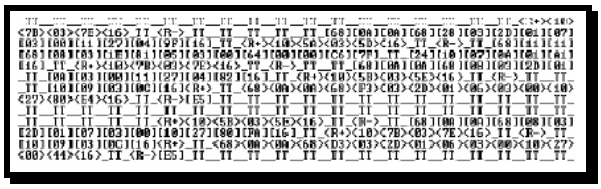
4.1.6 Data Analyzer

The data analyzer mode allows you to view all bytes of data transferred on each port. Both the transmitted and received data bytes are displayed. Use of this feature is limited without a thorough understanding of the protocol.

Note: The Port selection commands on the Data Analyzer menu differs very slightly in different modules, but the functionality is basically the same. Use the illustration above as a general guide only. Refer to the actual data analyzer menu on your module for the specific port commands to use.
Important: When in analyzer mode, program execution will slow down. Only use this tool during a troubleshooting session. Before disconnecting from the Config/Debug port, please press [S] to stop the data analyzer, and then press [M] to return to the main menu. This action will allow the module to resume its normal high speed operating mode.

Analyzing Data for the first application port

Press **[1]** to display I/O data for the first application port in the Data Analyzer. The following illustration shows an example of the Data Analyzer output.



Analyzing Data for the second application port

Press **[2]** to display I/O data for the second application port in the Data Analyzer.

Displaying Timing Marks in the Data Analyzer

You can display timing marks for a variety of intervals in the data analyzer screen. These timing marks can help you determine communication-timing characteristics.

Key	Interval
[5]	1 milliseconds ticks
[6]	5 milliseconds ticks
[7]	10 milliseconds ticks
[8]	50 milliseconds ticks
[9]	100 milliseconds ticks
[0]	Turn off timing marks

Removing Timing Marks in the Data Analyzer

Press **[0]** to turn off timing marks in the Data Analyzer screen.

Viewing Data in Hexadecimal Format

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

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.

Starting the Data Analyzer

Press **[B]** to start the data analyzer. After the key is pressed, all data transmitted and received on the currently selected port will be displayed. An example display is shown below:

The Data Analyzer displays the following special characters:

Character	Definition
[ ]	Data enclosed in these characters represent data received on the port.
< >	Data enclosed in these characters represent data transmitted on the port.
<R+>	These characters are inserted when the RTS line is driven high on the port.
<R->	These characters are inserted when the RTS line is dropped low on the port.
<CS>	These characters are displayed when the CTS line is recognized high.
_TT_	These characters are displayed when the timing mark interval has been reached. This parameter is user defined.

Stopping the Data Analyzer

Press **[S]** to stop the data analyzer. Use this option to freeze the display so the data can be analyzed. To restart the analyzer, press **[B]**.

Important: When in analyzer mode, program execution will slow down. Only use this tool during a troubleshooting session. Before disconnecting from the Config/Debug port, please press [S] to stop the data analyzer, and then press [M] to return to the main menu. This action will allow the module to resume its normal high speed operating mode.

Returning to the Main Menu

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

4.1.7 Data Analyzer Tips

From the main menu, press **[A]** for the "Data Analyzer". You should see the following text appear on the screen:

```
Data Analyzer Mode Selected
```

After the "Data Analyzer" mode has been selected, press **[?]** to view the Data Analyzer menu. You will see the following menu:

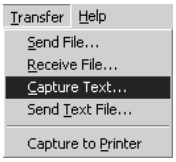
```
DATA ANALYZER VIEW MENU
 ?=Display Menu
 1=Select Port 1
 2=Select Port 2
 5=1 mSec Ticks
 6=5 mSec Ticks
 7=10 mSec Ticks
 8=50 mSec Ticks
 9=100 mSec Ticks
 0=No mSec Ticks
 H=Hex Format
 A=ASCII Format
 B=Start
 S=Stop
 M=Main Menu

 Port = 1, Format=HEX, Tick=10
```

From this menu, you can select the "Port", the "format", and the "ticks" that you can display the data in.

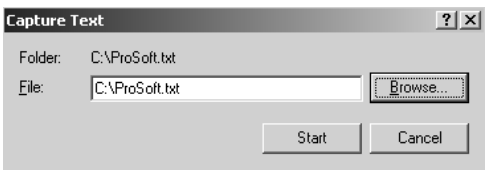
For most applications, HEX is the best format to view the data, and this does include ASCII based messages (because some characters will not display on HyperTerminal and by capturing the data in HEX, we can figure out what the corresponding ASCII characters are supposed to be).

The Tick value is a timing mark. The module will print a _TT for every xx milliseconds of no data on the line. Usually 10milliseconds is the best value to start with.

After you have selected the Port, Format, and Tick, we are now ready to start a capture of this data. The easiest way to do so is to go up to the top of you HyperTerminal window, and do a **Transfer / Capture Text** as shown below:



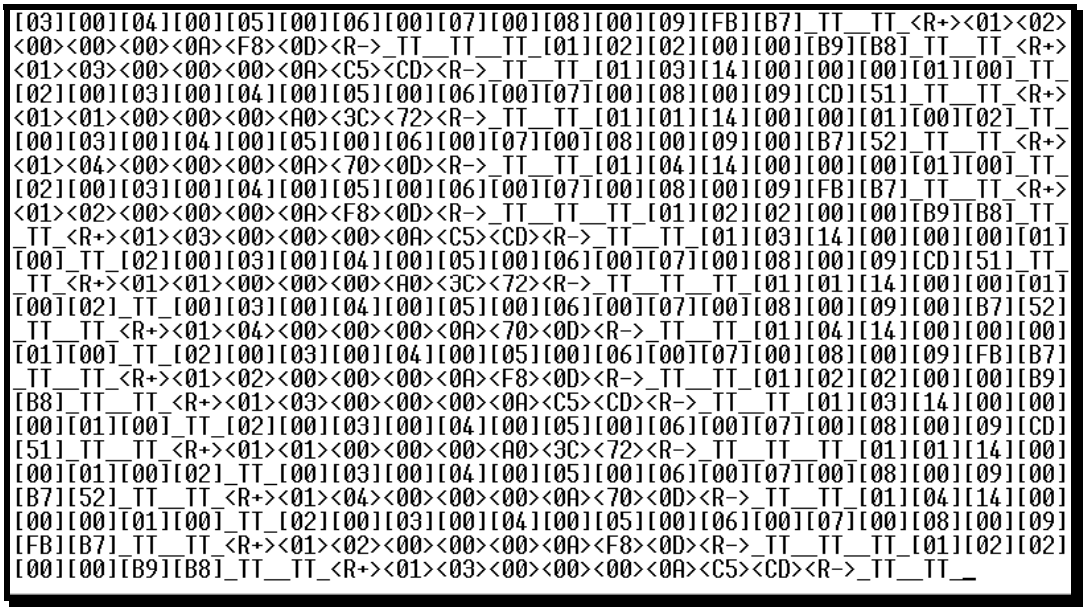
After selecting the above option, the following window will appear:



Next name the file, and select a directory to store the file in. In this example, we are creating a file ProSoft.txt and storing this file on our root C: drive. After you have done this, press the Start button.

Now you have everything that shows up on the HyperTerminal screen being logged to a file called ProSoft.txt. This is the file that you will then be able to email to ProSoft Technical Support to assist with issues on the communications network.

To begin the display of the communications data, you will then want to press 'B' to tell the module to start printing the communications traffic out on the debug port of the module. After you have pressed 'B', you should see something like the following:



The <R+> means that the module is transitioning the communications line to a transmit state.

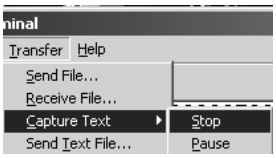
All characters shown in <> brackets are characters being sent out by the module.

The <R-> shows when the module is done transmitting data, and is now ready to receive information back.

And finally, all characters shown in the [ ] brackets is information being received from another device by the module.

After taking a minute or two of traffic capture, you will now want to stop the "Data Analyzer". To do so, press the 'S' key, and you will then see the scrolling of the data stop.

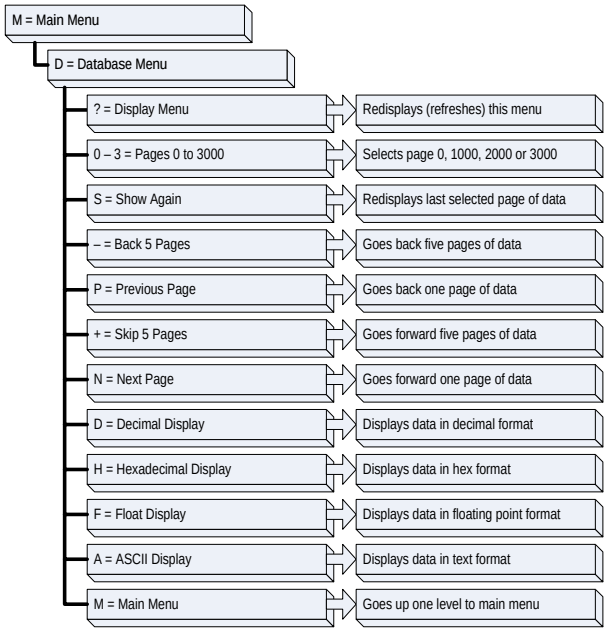
When you have captured the data you want to save, open the Transfer menu and choose Capture Text. On the secondary menu, choose Stop.



You have now captured, and saved the file to your PC. This file can now be used in analyzing the communications traffic on the line, and assist in determining communication errors.

4.1.8 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.



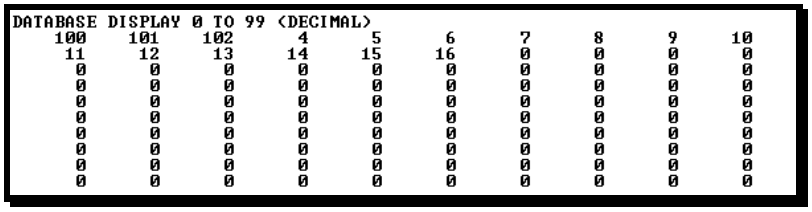
Viewing Register Pages

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



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

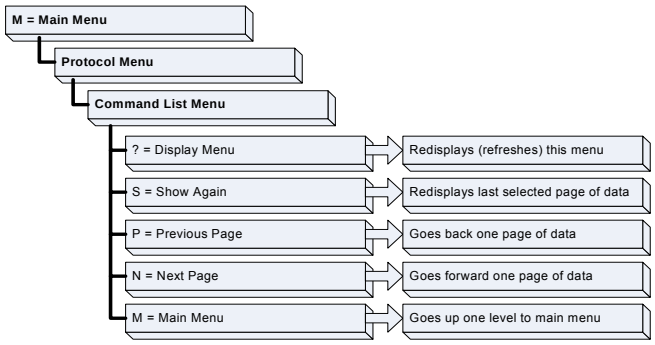
Press **[A]** to display the data on the current page in ASCII format. This is useful for regions of the database that contain ASCII data.

Returning to the Main Menu

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

4.1.9 Master Command Error List Menu

Use this menu to view the command error list for the module. Press **[?]** to view a list of commands available on this menu.



Redisplaying the Current Page

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

Viewing the Previous 20 Commands

Press **[-]** to display data for the previous 20 commands.

Viewing the Previous Page of Commands

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

Viewing the Next 20 Commands

Press **[+]** to display data for the next 20 commands.

Viewing the Next Page of Commands

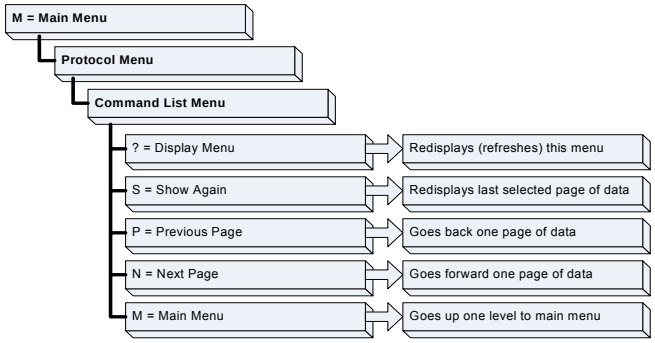
Press **[N]** to display the next page of commands.

Returning to the Main Menu

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

4.1.10 Master Command List Menu

Use this menu to view the command list for the module. Press **[?]** to view a list of commands available on this menu.



Redisplaying the Current Page

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

Viewing the Previous 50 Commands

Press **[-]** to view the previous 50 commands.

Viewing the Previous Page of Commands

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

Viewing the Next 50 Commands

Press **[+]** to view the next 50 commands from the master command list.

Viewing the Next Page of Commands

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

Returning to the Main Menu

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

4.2 LED Status Indicators

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

ProSoft 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.
P1	Green	On	Data is being transferred between the module and the network on Port 2.
		Off	No data is being transferred on the port.
P2	Green	On	Data is being transferred between the module and the network on Port 3.
		Off	No data is being transferred on the port.
APP	Amber	On	The MVI56-GRCM is working normally.
		Off	The MVI56-GRCM 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.
BAT	Red	Off	The battery voltage is OK and functioning.
		On	The battery voltage is low or battery is not present. Allow battery to charge by keeping module plugged into rack for 24 hours. If BAT LED still does not go off, contact ProSoft Technology, as this is not a user serviceable item.

During module configuration, the OK will be red and the APP and BP ACT LEDs will be on. If the LEDs are latched in this mode for a long period of time, look at the configuration error words in the configuration request block. The structure of the block is shown in the following table:

Offset	Description	Length
0	Reserved	1
1	9000	1
2	Port 1 Configuration Errors	1
3	Port 2 Configuration Errors	1
4 to 248	Spare	245
249	-2 or -3	1

The bits in each configuration word are shown in the following table. The module configuration error word has the following definition:

Bit	Description	Value
0	Baud Rate	0x0100
1	Parity	0x0200
2	Data Bit	0x0400
3	Stop Bit	0x0800

Correct any invalid data in the configuration for proper module operation. When the configuration contains a valid parameter set, all the bits in the configuration words will be clear. This does not indicate that the configuration is valid for the user application. Make sure each parameter is set correctly for the specific application.

If the APP, BP ACT and OK LEDs blink at a rate of every one-second, this indicates a serious problem with the module. Call ProSoft Technology support to arrange for repairs.

4.2.1 Clearing a Fault Condition

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

To clear the condition, follow these steps:

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

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

4.2.2 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 MVI56 GARECO Checkweigher Interface Module allows ControlLogix I/O compatible processors to interface easily with GARECO Checkweighers using Remote Control Instruction. The driver supports two ports that provide access to two independent GARECO serial devices.

5.1.1 Features and Benefits

The MVI56-GRCM module acts as an input/output module between the check-weighers and the ControlLogix processor. The data transfer from the ControlLogix processor is asynchronous from the actions on the checkweigher.

5.1.2 General Specifications

- Single Slot - 1756 backplane compatible
- Local or remote rack
- 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.
- Configuration data obtained through user-defined ladder. Sample ladder file included

5.1.3 Hardware Specifications

Specification	Description
Backplane Current Load	800 mA @ 5 V DC 3mA @ 24V DC
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)

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

5.1.4 Functional Specifications

- Ports: Two ports to receive and/or transmit data; 1 GARECO device per port
- Receive buffer size: 255 bytes
- Receive termination: Termination character
- Receive database location: 0 to 7000
- Communication Configuration
  - Baud Rate: 300 to 115,200
  - Parity: None, Odd, Even
  - Data Bits: 5 to 8
  - Stop Bits: 1 or 2
  - RTS On and Off Timing: 0 to 65535 milliseconds
  - Minimum Response Delay: 0 to 65535 milliseconds
  - Hardware Handshaking: RTS/CTS
- Supports device types of Topline VS/VO, "S" Series, and "E" Series

5.2 Functional Overview

This section provides an overview of how the MVI56-GRCM module transfers data using the GRCM protocol. You should understand the important concepts in this chapter before you begin installing and configuring the module.

5.2.1 General Concepts

The following topics describe several concepts that are important for understanding the operation of the MVI56-GRCM module.

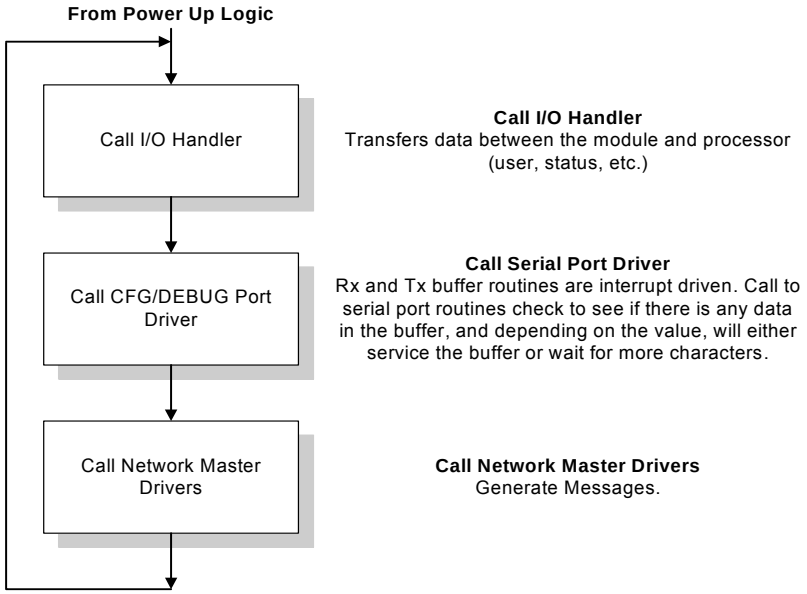
On power up the module begins performing the following logical functions:

1 Initialize hardware components
2 Initialize ControlLogix backplane driver
3 Test and Clear all RAM
4 Initialize the serial communication ports
5 Wait for Module Configuration from ControlLogix processor
6 Initialize Module Register space
7 Enable Master Driver on selected ports

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

5.2.2 Main Logic Loop

Upon completing the power up configuration process, the module enters an infinite loop that performs the following functions:



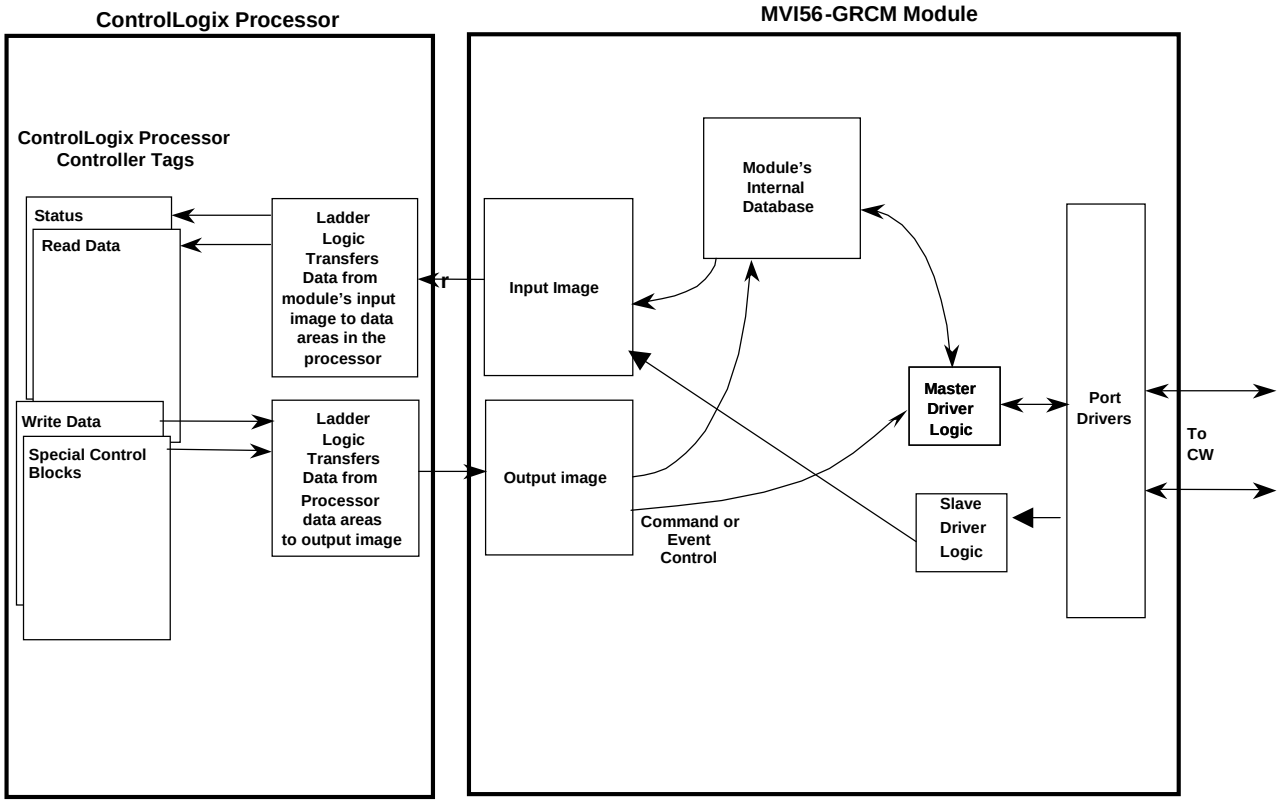
5.2.3 Backplane Data Transfer

The MVI56-GRCM module communicates directly over the ControlLogix backplane. Data is paged between the module and the ControlLogix 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 2 to 10 milliseconds.

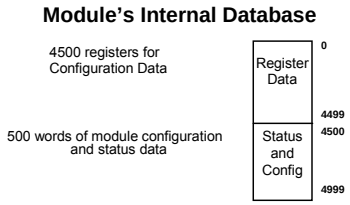
This bi-directional transference of data is accomplished by the module filling in data in the module's input image to send to the processor. Data in the input image is placed in the Controller Tags in the processor by the ladder logic. The input image for the module is set to 250 words. This large data area permits fast throughput of data between the module and the processor.

The processor inserts data to 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 248 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 ControlLogix processor, the MVI56-GRCM module and the check-weigher.



As shown in the diagram above, all data transferred between the module and the processor over the backplane is through the input and output images. Ladder logic must be written in the ControlLogix processor to interface the input and output image data with data defined in the Controller Tags. All data used by the module is stored in its internal database. This database is defined as a virtual data table with addresses from 0 to 4999. The following illustration shows the layout of the database:



Data contained in this database is paged through the input and output images by coordination of the ControlLogix ladder logic and the MVI56-GRCM module's program. Up to 248 words of data can be transferred from the module to the processor at a time. In addition, 10 blocks of response data is generated for transfer to the processor. Up to 247 words of data can be transferred from the processor to the module. An additional 2 blocks of parameter data is also transferred to the module. Each image has a defined structure depending on the data content and the function of the data transfer as defined below.

5.2.4 Configuration Data Transfer

When the module performs a restart operation, it will request configuration information from the ControlLogix processor. This data is transferred to the module in specially formatted write blocks (output image). The module will poll for each block by setting the required write block number in a read block (input image). Refer to the **Module Set Up** section for a description of the data objects used with the blocks and the ladder logic required. The format of the blocks for configuration is given in the following topics.

Module Configuration Data

This block sends general configuration information from the processor to the module. The data is transferred in a block with an identification code of 9000. The structure of the block is displayed in the following table:

Offset	Description	Length
0	9000	1
1 to 16	Port 1 Configuration	16
17 to 33	Port 2 Configuration	16
34 to 247	Spare	235

The read block used to request the configuration has the following structure:

Offset	Description	Length
0	Reserved	1
1	9000	1
2	Port 1 Configuration Errors	1
3	Port 2 Configuration Errors	1
4 to 248	Spare	245
249	-2 or -3	1

If there are any errors in the configuration, the bit associated with the error will be set in one of the three configuration error words. The error must be corrected before the module starts operating.

5.2.5 Normal Data Transfer

Normal data transfer includes the paging of the request parameter and response data found in the module's internal database in registers 0 to 4499 and the status data. These data are transferred through read (input image) and write (output image) blocks. There is ten read blocks to transfer response data to PLC and two write blocks to transfer parameter to the module. The structure and function of each block is discussed below.

Read Block

These blocks of data transfer response information from the module to the PLC processor. The structure of the input image used to transfer this data is shown in the following table:

Offset	Description	Length
0	1 to 10	1
1	Write Block ID	1
2 to 201	Read Data	200
202 to 248	Spare	48
249	1 to 10	1

The Read Block ID is an index value used to determine the location of where the data will be placed in the PLC processor user data table. Each transfer moves 200 words (block offsets 1 to 200) of data.

The Write Block ID associated with the block requests data from the PLC processor. Under normal, program operation, the module sequentially sends read blocks and requests write blocks. For example, if three read and two write blocks are used with the application, the sequence will be as follows:

R1W1 → R2W2 → R3W1 → R1W2 → R2W1 → R3W2 → R1W1 →

This sequence will continue until interrupted by other write block numbers sent by the controller or by a command request from a node on the Modbus network or operator control through the module's Configuration/Debug port.

Write Block

These blocks of data transfer information from the PLC processor to the module. The structure of the output image used to transfer this data is shown in the following table:

Offset	Description	Length
0	Write Block ID (1, 2)	1
1 to 215	Write Data	215
216 to 247	Spare	33

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 moves 215 words (block offsets 1 to 215) of data. Write Data is placed in each block in a way that matches the location shown in the Reference chapter parameter Map session.

Status Data Block (Read Block ID = 0)

After the last Read Block is sent, the module builds a BTR block (ID = 0) to transfer the module's status information to the processor. This information can be used by the PLC program to determine the current status of the module. Ladder logic should be constructed to transfer the information in this block to a user data file. The structure of this block is shown in the following table:

Offset	Content	Description
0	Reserved	Reserved
1	Write Block ID	Block identification code 0 to indicate a status block.
2	Program Scan Count	This value is incremented each time a complete program cycle occurs in the module.
3 to 4	Product Code	These two registers contain the product code of "MCM"
5 to 6	Product Version	These two registers contain the product version for the currently running software.
7 to 8	Operating System	These two registers contain the month and year values for the program operating system.
9 to 10	Run Number	These two registers contain the Run Number value for the currently running software.
11	Port 1 Command List Requests	This field contains the number of requests made from this port to slave devices on the network.
12	Port 1 Command List Response	This field contains the number of slave response messages received on the port.
13	Port 1 Command List Errors	This field contains the number of command errors processed on the port. These errors could be due to a bad response or command.
14	Port 1 Requests	This field contains the total number of messages sent out of the port.
15	Port 1 Responses	This field contains the total number of messages received on the port.
16	Port 1 Errors Sent	This field contains the total number of message errors sent out of the port.
17	Port 1 Errors Received	This field contains the total number of messages errors received on the port.

Offset	Content	Description
18	Port 2 Command List Requests	This field contains the number of requests made from this port to slave devices on the network.
19	Port 2 Command List Response	This field contains the number of slave response messages received on the port.
20	Port 2 Command List Errors	This field contains the number of command errors processed on the port. These errors could be due to a bad response or command.
21	Port 2 Requests	This field contains the total number of messages sent out the port.
22	Port 2 Responses	This field contains the total number of messages received on the port.
23	Port 2 Errors Sent	This field contains the total number of message errors sent out of the port.
24	Port 2 Errors Received	This field contains the total number of message errors received on the port
25	Read Block Count	This field contains the total number of read blocks transferred from the module to the processor.
26	Write Block Count	This field contains the total number of write blocks transferred from the processor to the module.
27	Parse Block Count	This field contains the total number of blocks successfully parsed that were received from the processor.
28	Command Event Block Count	This field contains the total number of command event blocks received from the processor.
29	Command Block Count	This field contains the total number of command blocks received from the processor.
30	Error Block Count	This field contains the total number of block errors recognized by the module.
31	Port 1 Current Error	For a slave port, this field contains the value of the current error code returned. For a master port, this field contains the index of the currently executing command.
32	Port 1 Last Error	For a slave port, this field contains the value of the last error code returned. For a master port, this field contains the index of the command with an error.
33	Port 2 Current Error	For a slave port, this field contains the value of the current error code returned. For a master port, this field contains the index of the currently executing command.
34	Port 2 Last Error	For a slave port, this field contains the value of the last error code returned. For a master port, this field contains the index of the command with an error.
35 to 248	Spare	Spare
249	Read Block ID	Block requested from the processor by the module.

5.2.6 Command Control Blocks

Command control blocks are special blocks used to control the module or request special data from the module. The current version of the software supports three command control blocks: Poll Event Command, Warm Boot and Cold Boot.

Poll Event Command

Poll Event Command blocks either configure GRC devices or request information from the ladder logic to one of the master ports. The format for these blocks is displayed in the following table:

Offset	Description	Length
0	1000 or 2000	1
1	Node Address	1
2 to 6	Article Name	5
7	Command Count	1
8 to 107	Command List	99
108 to 247	Spare	139

Block 1000 is directed to Port 1, and block 2000 is directed to Port 2. The other parameters passed with the block construct the command. The **Poll Event Command** contains data for commands to set up a GRC device.

Write Module Configuration

This block is sent from the ControlLogix processor to the module to force the module to write its current configuration back to the processor. This function is used when the module's configuration has been altered remotely using database write operations. The write block contains a value of -9000 in the first word. The module will respond with blocks containing the module configuration data. Ladder logic must handle the receipt of these blocks. The blocks transferred from the module are as follows:

Block -9000, General Configuration Data:

Offset	Description	Length
0	Reserved	1
1	-9000	1
2 to 17	Port 1 Configuration	16
18 to 33	Port 2 Configuration	16
34 to 248	Spare	213

Warm Boot

This block is sent from the ControlLogix processor to the module (output image) when the module is required to perform a warm-boot (software reset) operation. This block is commonly sent to the module any time configuration data modifications are made in the controller tags data area. This will force the module to read the new configuration information and to restart.

The structure of the control block is shown in the following table:

Offset	Description	Length
0	9998	1
1 to 247	Spare	247

Cold Boot

This block is sent from the ControlLogix processor to the module (output image) when the module is required to perform the cold boot (hardware reset) operation. This block is sent to the module when a hardware problem is detected by the ladder logic that requires a hardware reset. The structure of the control block is shown in the following table:

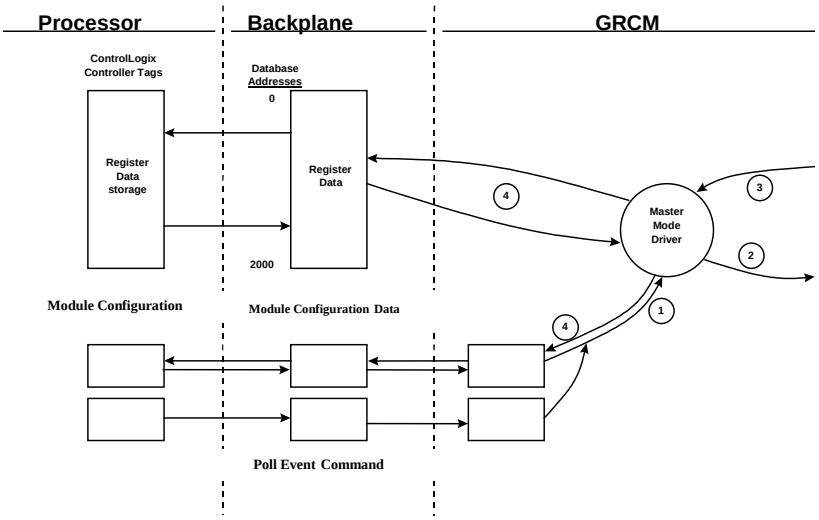
Offset	Description	Length
0	9999	1
1 to 247	Spare	247

5.2.7 Data Flow Between MVI56-GRCM Module and ControlLogix Processor

The following topics describe the flow of data between the two pieces of hardware (ControlLogix processor and MVI56-GRCM module). Each port on the module is configured to emulate a GRC device with the ability to master configuration data. The operation of each port is dependent on this configuration. The following topics discuss the operation of each mode.

Master Driver Mode

In the Master mode, the MVI56-GRCM module is responsible for issuing commands to GRC Checkweighers. These commands are user configured in the module issued directly from the ControlLogix processor (Poll Event Command). The following flow chart and associated table describe the flow of data into and out of the module.

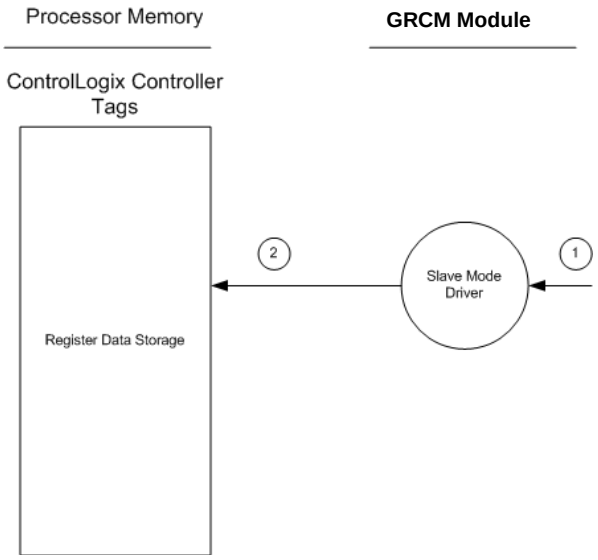


Step	Description
1	The Master driver obtains configuration data from the ControlLogix processor. The configuration data obtained includes module configuration and GRC configuration data. These values are used by the Master driver to determine the type of commands to be issued to the checkweigher.
2	After configuration, the Master driver can be triggered to begin transmitting poll event commands to the device.
3	Presuming successful processing by the node specified in the command, a response message is received into the Master driver for processing.
4	Data received from the node on the network is passed into the module's internal database, assuming a read command.

Refer to the **Module Set Up** section for a complete description of the parameters required to define the virtual master port. Refer to MVI56-GRCM Parameter and Response Data Map (page 68) for a complete discussion of the structure and content of each command.

Slave Driver

The slave driver mode allows the MVI56-GRCM module to read multiple response data from a GRC device. The following flow chart and associated table describe the flow of data into the module.



Step	Description
1	The slave port driver receives the information returned from the GRC device.
2	After the module accepts the data, it is immediately transferred to the ControlLogix Register Data Storage.

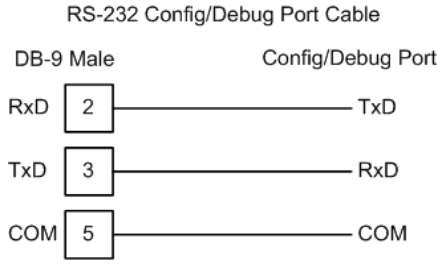
5.3 Cable Connections

The application ports on the MVI56-GRCM module support RS-232, RS-422, and RS-485 interfaces. Please inspect the module to ensure that the jumpers are set correctly to correspond with the type of interface you are using.

Note: When using RS-232 with radio modem applications, some radios or modems require hardware handshaking (control and monitoring of modem signal lines). Enable this in the configuration of the module by setting the UseCTS parameter to 1.

5.3.1 RS-232 Configuration/Debug Port

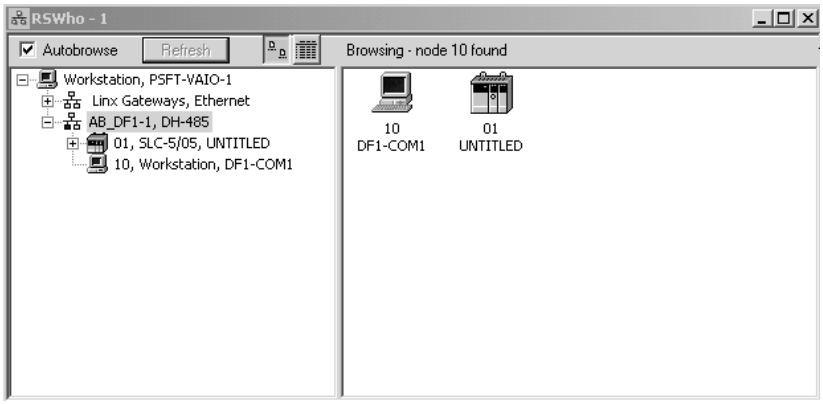
This port is physically an RJ45 connection. An RJ45 to DB-9 adapter cable is included with the module. This port permits a PC based terminal emulation program to view configuration and status data in the module and to control the module. The cable for communications on this port is shown in the following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



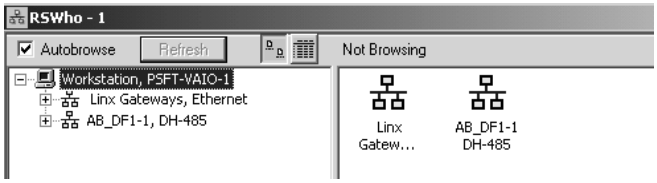
Disabling the RSLinx Driver for the Com Port on the PC

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

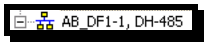
1. Open RSLinx and go to Communications>RSWho
2. Make sure that you are not actively browsing using the driver that you wish to stop. The following shows an actively browsed network:



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

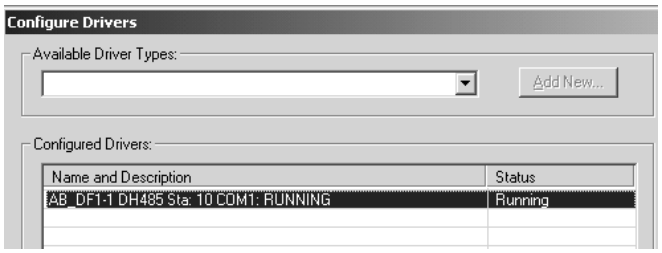


Branches are displayed or hidden by clicking on the ⊞ or the ⊟ icons.



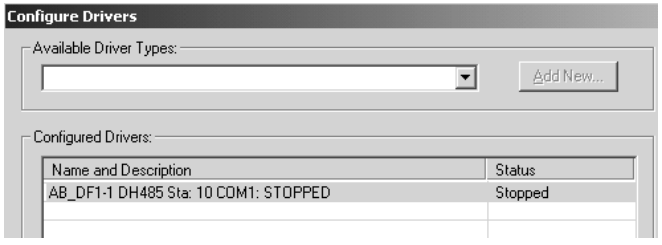
4 When you have verified that the driver is not being browsed, go to

Communications>Configure Drivers
You may see something like this:



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

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

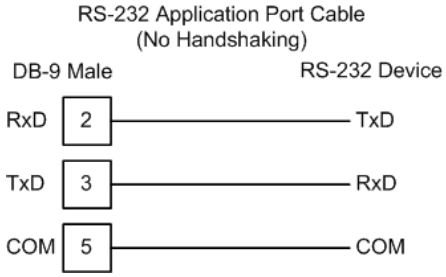


6 Upon seeing this, you may now use that com port to connect to the debug port of the module.

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

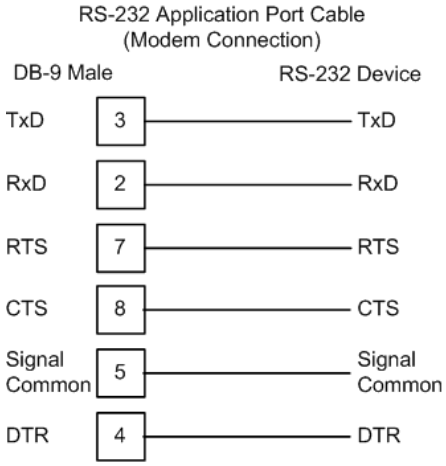
5.3.2 RS-232

When the RS-232 interface is selected, the use of hardware handshaking (control and monitoring of modem signal lines) is user definable. If no hardware handshaking will be used, the cable to connect to the port is as shown below:



RS-232: Modem Connection

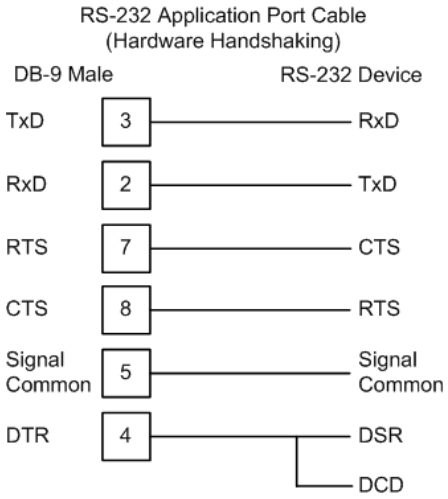
This type of connection is required between the module and a modem or other communication device.



The "Use CTS Line" parameter for the port configuration should be set to 'Y' for most modem applications.

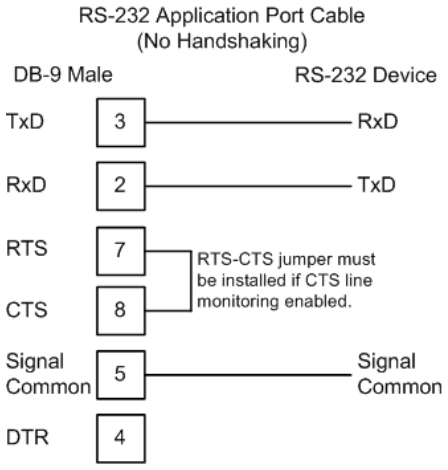
RS-232: Null Modem Connection (Hardware Handshaking)

This type of connection is used when the device connected to the module requires hardware handshaking (control and monitoring of modem signal lines).



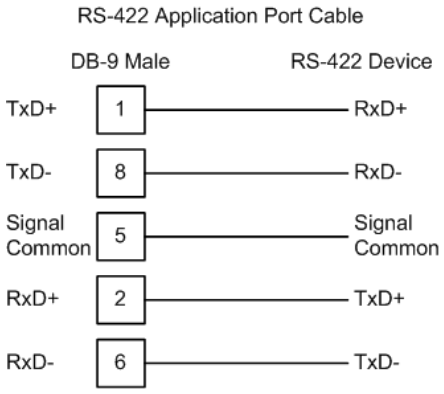
RS-232: Null Modem Connection (No Hardware Handshaking)

This type of connection can be used to connect the module to a computer or field device communication port.



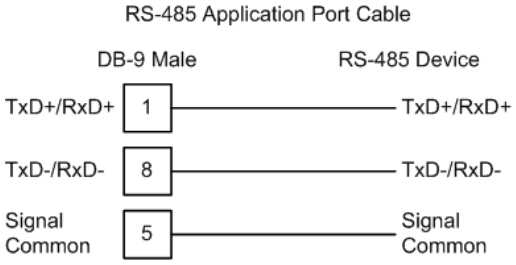
Note: If the port is configured with the "Use CTS Line" set to 'Y', then a jumper is required between the RTS and the CTS line on the module connection.

5.3.3 RS-422



5.3.4 RS-485

The RS-485 interface requires a single two or three wire cable. The Common connection is optional and dependent on the RS-485 network. The cable required for this interface is shown below:

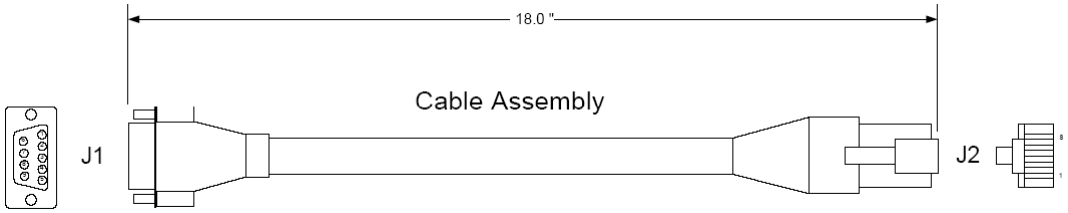


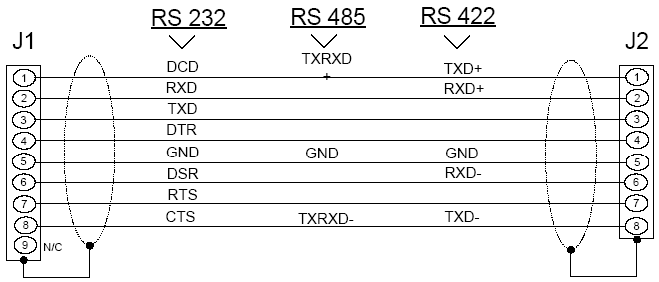
Note: Terminating resistors are generally not required on the RS-485 network, unless you are experiencing communication problems that can be attributed to signal echoes or reflections. In this case, install a 120 ohm terminating resistor on the RS-485 line.

RS-485 and RS-422 Tip

If communication in the RS-422/RS-485 mode does not work at first, despite all attempts, try switching termination polarities. Some manufacturers interpret +/- and A/B polarities differently.

5.3.5 DB9 to RJ45 Adaptor (Cable 14)





Wiring Diagram

5.4 MVI56-GRCM Database Definition

This section contains a listing of the internal database of the MVI56-GRCM module. This information can be used to interface other devices to the data contained in the module.

Port No.	Toggle Command (0 or 1)	Assign ID for RS-485 (0=no id included)	Article Name (keyword "CURRENT" for current article)	Command Count	Command Number (MAX 99 commands)	Start Parameter	Start Response Value
Port 1	0	2	4 to 9	100	101 to 199	1000	2300
Port 2	10	12	14 to 19	200	201 to 299	1300	3300
Port 3	20	22	24 to 29	300	301 to 399	1600	4300
Port 4	30	32	34 to 39	400	401 to 499	1900	5300

Definition of the configuration data areas can be found in the data definition section of this document and in the Reference chapter. The Reference chapter also contains the GRC parameter configuration mapping data and GRC Response Mapping Data.

5.5 MVI56-GRCM Configuration Data

This section contains listings of the MVI56-GRCM module's database related to the module's configuration. This data is read from the ControlLogix processor when the module first initializes.

5.5.1 Port 1 Setup

Register	Content	Description
4500	Enable	This parameter defines if this port will be used. If the parameter is set to 0, the port is disabled. A value of 1 enables the port.
4501	Baud Rate	This is the baud rate to be used on the port. Enter the baud rate as a value. For example, to select 19K baud, enter 19200. Valid entries are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115.
4502	Parity	This is the parity code to be used for the port. Values are None, Odd, Even.
4503	Data Bits	This parameter sets the number of data bits for each word used by the protocol. Valid entries for this field are 5 through 8.
4504	Stop Bits	This parameter sets the number of stop bits to be used with each data value sent. Valid entries are 1 and 2.
4505	Minimum Response Time	This parameter specifies the minimum number of milliseconds to delay before responding to a request message. This pre-send delay is applied before the RTS on time. This may be required when communicating with slow devices.
4506	RTS On	This parameter sets the number of milliseconds to delay after RTS is asserted before the data will be transmitted. Valid values are in the range of 0 to 65535 milliseconds.
4507	RTS Off	This parameter sets the number of milliseconds to delay after the last byte of data is sent before the RTS modem signal will be set low. Valid values are in the range of 0 to 65535.
4508	Use CTS Line	This parameter specifies if the CTS modem control line is to be used. If the parameter is set to 0, the CTS line will not be monitored and must be high before the module will send data. The parameter is normally only required when half-duplex modems are used for communication (2-wire).
4509	Response Timeout	This parameter represents the message response timeout period in 1-millisecond increments. This is the time that a port configured as a master will wait before re-transmitting a command if no response is received from the addressed slave. The value is set depending upon the communication network used and the expected response time of the slowest device on the network.
4510	Retry Count	This parameter specifies the number of times a command will be retried if it fails. If the master port does not receive a response after the last retry, the slave devices communication will be suspended on the port for Error Delay Counter scans.
4511	Minimum Command Delay	This parameter specifies the number of milliseconds to wait between issuing each command. This delay value is not applied to retries.
4512	Error Delay Counter	This parameter specifies the number of polls to skip on the slave before trying to re-establish communications. After the slave fails to respond, the master will skip commands to be sent to the slave the number of times entered in this parameter.

Register	Content	Description
4513	Send With ID	This parameter specifies if a network ID is to be used. If the parameter is set to "Yes", a network ID will be attached to the command. If the parameter is set to "No" a network ID is not used.
4514	Display Article Range	This parameter is set to allow the display of 10 article names at a time in the database area.

5.5.2 Port 2 Setup

Register	Content	Description
4520	Enable	This parameter defines if this port will be used. If the parameter is set to 0, the port is disabled. A value of 1 enables the port.
4521	Baud Rate	This is the baud rate to be used on the port. Enter the baud rate as a value. For example, to select 19K baud, enter 19200. Valid entries are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115.
4522	Parity	This is the parity code to be used for the port. Values are None, Odd, Even.
4523	Data Bits	This parameter sets the number of data bits for each word used by the protocol. Valid entries for this field are 5 through 8.
4524	Stop Bits	This parameter sets the number of stop bits to be used with each data value sent. Valid entries are 1 and 2.
4525	Minimum Response Time	This parameter specifies the minimum number of milliseconds to delay before responding to a request message. This pre-send delay is applied before the RTS on time. This may be required when communicating with slow devices.
4526	RTS On	This parameter sets the number of milliseconds to delay after RTS is asserted before the data will be transmitted. Valid values are in the range of 0 to 65535 milliseconds.
4527	RTS Off	This parameter sets the number of milliseconds to delay after the last byte of data is sent before the RTS modem signal will be set low. Valid values are in the range of 0 to 65535.
4528	Use CTS Line	This parameter specifies if the CTS modem control line is to be used. If the parameter is set to 0, the CTS line will not be monitored and must be high before the module will send data. The parameter is normally only required when half-duplex modems are used for communication (2-wire).
4529	Response Timeout	This parameter represents the message response timeout period in 1-millisecond increments. This is the time that a port configured as a master will wait before re-transmitting a command if no response is received from the addressed slave. The value is set depending upon the communication network used and the expected response time of the slowest device on the network.
4530	Retry Count	This parameter specifies the number of times a command will be retried if it fails. If the master port does not receive a response after the last retry, the slave devices communication will be suspended on the port for Error Delay Counter scans.
4531	Minimum Command Delay	This parameter specifies the number of milliseconds to wait between issuing each command. This delay value is not applied to retries.

Register	Content	Description
4532	Error Delay Counter	This parameter specifies the number of polls to skip on the slave before trying to re-establish communications. After the slave fails to respond, the master will skip commands to be sent to the slave the number of times entered in this parameter.
4533	Send With ID	This parameter specifies if a network ID is to be used. If the parameter is set to "Yes", a network ID will be attached to the command. If the parameter is set to "No" a network ID is not used.
4534	Display Article Range	This parameter is set to allow the display of 10 article names at a time in the database area.

5.5.3 Misc. Status

Register	Content	Description
4800	Program Scan Count	This value is incremented each time a complete program cycle occurs in the module.
4801 to 4802	Product Code	These two registers contain the product code of "GRC".
4803 to 4804	Product Version	These two registers contain the product version for the current running software.
4805 to 4806	Operating System	These two registers contain the month and year values for the program operating system.
4807 to 4808	Run Number	These two registers contain the run number value for the currently running software.

5.6 MVI56-GRCM Parameter and Response Data Map

5.6.1 Parameter Map

DB	0	1	2	3	4	5	6	7	8	9
0	FB_ SENDEN inquire specific data block (INT)		FB_SET_ TOLSYST production legislation (INT)		FB_SET_ PGS Plus to Good (INT)		FB_SET_ PAUSE Delay (INT)		FB_SET_ AUTO HOUR Automatic sending production hour (INT)	
10	FB_SET_ DATE 1 Day (INT)	FB_SET_ DATE 2 Month (INT)	FB_SET_ DATE 3 Year (INT)		FB_SET_ TIME 1 Hour (INT)	FB_SET_ TIME 2 Minute (INT)		FB_SET_ HS 1 Handshake Protocol (INT)	FB_SET_ HS 2 Handshake Protocol (INT)	
20	FB_PD 1 (Two CHAR Byte)	FB_PD 2 (Two CHAR Byte)	FB_PD 3 (Two CHAR Byte)	FB_PD 4 (Two CHAR Byte)	FB_PD 5 (Two CHAR Byte)					

DB	0	1	2	3	4	5	6	7	8	9
30	FB_ GRUND 1 version number (Two CHAR Byte)	FB_ GRUND 2 version number (Two CHAR Byte)	FB_ GRUND 3 version number (Two CHAR Byte)		FB_ GRUND 1 article name (Two CHAR Byte)	FB_ GRUND 2 article name (Two CHAR Byte)	FB_ GRUND 3 article name (Two CHAR Byte)	FB_ GRUND 4 article name (Two CHAR Byte)	FB_ GRUND 5 article name (Two CHAR Byte)	
40	FB_ GRUND 1 article name (Two CHAR Byte)	FB_ GRUND 2 article name (Two CHAR Byte)	FB_ GRUND 3 article name (Two CHAR Byte)	FB_ GRUND 4 article name (Two CHAR Byte)	FB_ GRUND 5 article name (Two CHAR Byte)	FB_ GRUND 6 article name (Two CHAR Byte)	FB_ GRUND 7 article name (Two CHAR Byte)		FB_ GRUND weight unit (INT)	
50	FB_DATA 1 nominal weight (Float)	FB_DATA 2 nominal weight (Float)			FB_DATA 1 mean fixed tare (Float)	FB_DATA 2 mean fixed tare (Float)		FB_DATA product length (INT)		FB_DATA successive errors number (INT)
60	FB_DATA target throughput (INT)		FB_DATA measuring time (INT)		FB_DATA 1 correction factor (Float)	FB_DATA 2 correction factor (Float)		FB_DATA max length (INT)		
70	FB_DATA 1 block termination (Float)	FB_DATA 2 block termination (Float)								
80	FB_ GRENZEN 1 limit PLUS 3 (Float)	FB_ GRENZEN 2 limit PLUS 3 (Float)			FB_ GRENZEN 1 limit PLUS 2 (Float)	FB_ GRENZEN 2 limit PLUS 2 (Float)			FB_ GRENZEN 1 limit PLUS 1 (Float)	FB_ GRENZEN 2 limit PLUS 1 (Float)
90	FB_ GRENZEN 1 limit MINUS 1 (Float)	FB_ GRENZEN 2 limit MINUS 1 (Float)			FB_ GRENZEN 1 limit MINUS 2 (Float)	FB_ GRENZEN 2 limit MINUS 2 (Float)			FB_ GRENZEN 1 limit MINUS 3 (Float)	FB_ GRENZEN 2 limit MINUS 3 (Float)
100	FB_STAT 1 batch number (Two CHAR Byte)	FB_STAT 2 batch number (Two CHAR Byte)	FB_STAT 3 batch number (Two CHAR Byte)	FB_STAT 4 batch number (Two CHAR Byte)	FB_STAT 5 batch number (Two CHAR Byte)		FB_STAT 1 tolerance limit TO 2 (Float)	FB_STAT 2 tolerance limit TO 2 (Float)		
110	FB_STAT 1 tolerance limit TO 1 (Float)	FB_STAT 2 tolerance limit TO 1 (Float)			FB_STAT 1 tolerance limit TU 1 (Float)	FB_STAT 2 tolerance limit TU 1 (Float)			FB_STAT 1 tolerance limit TU 2 (Float)	FB_STAT 2 tolerance limit TU 2 (Float)
120	FB_STAT tolerance system (INT)		FB_STAT TU 1 percentage (INT)		FB_STAT type of interval (INT)		FB_STAT scope of one interval (INT)		FB_STAT block termination (INT)	
130	FB_TR 1 tolerance+ (Float)	FB_TR 2 tolerance+ (Float)			FB_TR 1 tolerance- (Float)	FB_TR 2 tolerance- (Float)			FB_TR 1 high limit (Float)	FB_TR 2 high limit (Float)

DB	0	1	2	3	4	5	6	7	8	9
140	FB_TR 1 low limit (Float)	FB_TR 2 low limit (Float)			FB_TR 1 overfill (Float)	FB_TR 2 overfill (Float)		FB_TR no. of pcs (INT)		FB_TR neutral distance (INT)
150	FB_TR start phase (INT)		FB_TR start vaule (INT)		FB_TR 1 control factor (Float)	FB_TR 2 control factor (Float)		FB_TR feedback controlling on/off (INT)		
160	FB_ GLEIT 1 reference weight (Float)	FB_ GLEIT 2 reference weight (Float)			FB_ GLEIT 1 high limit (Float)	FB_ GLEIT 2 high limit (Float)			FB_ GLEIT 1 T1+ limit (Float)	FB_ GLEIT 2 T1+ limit (Float)
170	FB_ GLEIT 1 T1- limit (Float)	FB_ GLEIT 2 T1- limit (Float)			FB_ GLEIT 1 low limit (Float)	FB_ GLEIT 2 low limit (Float)		FB_ GLEIT gliding limits (INT)		
180	FB_FKT number of cycle (INT)		FB_FKT neutral distance (INT)		FB_FKT 1 high limit (Float)	FB_FKT 2 high limit (Float)			FB_FKT 1 low limit (Float)	FB_FKT 2 low limit (Float)
190	FB_FKT automatic printing (INT)		FB_FKT fill head test (INT)							
200	FB_MWG number of pcs for mean value (INT)		FB_MWG 1 high limit (Float)	FB_MWG 2 high limit (Float)			FB_MWG 1 low limit (Float)	FB_MWG 2 low limit (Float)		FB_MWG monitoring (INT)
210	FB_ METALL product memory No. (INT)		FB_ METALL sensitivity (INT)		FB_ METALL block termination (INT)					

5.6.2 Response Value Map

DB	0	1	2	3	4	5	6	7	8	9
0	Article Name 1	Article Name 1	Article Name 1	Article Name 1	Article Name 1	Article Name 1	Article Name 1	Article Name 1	Article Name 1	Article Name 1
10	Article Name 2	Article Name 2	Article Name 2	Article Name 2	Article Name 2	Article Name 2	Article Name 2	Article Name 2	Article Name 2	Article Name 2
20	Article Name 3	Article Name 3	Article Name 3	Article Name 3	Article Name 3	Article Name 3	Article Name 3	Article Name 3	Article Name 3	Article Name 3
30	Article Name 4	Article Name 4	Article Name 4	Article Name 4	Article Name 4	Article Name 4	Article Name 4	Article Name 4	Article Name 4	Article Name 4
40	Article Name 5	Article Name 5	Article Name 5	Article Name 5	Article Name 5	Article Name 5	Article Name 5	Article Name 5	Article Name 5	Article Name 5
50	Article Name 6	Article Name 6	Article Name 6	Article Name 6	Article Name 6	Article Name 6	Article Name 6	Article Name 6	Article Name 6	Article Name 6
60	Article Name 7	Article Name 7	Article Name 7	Article Name 7	Article Name 7	Article Name 7	Article Name 7	Article Name 7	Article Name 7	Article Name 7

DB	0	1	2	3	4	5	6	7	8	9
70	Article Name 8	Article Name 8	Article Name 8	Article Name 8	Article Name 8	Article Name 8	Article Name 8	Article Name 8	Article Name 8	Article Name 8
80	Article Name 9	Article Name 9	Article Name 9	Article Name 9	Article Name 9	Article Name 9	Article Name 9	Article Name 9	Article Name 9	Article Name 9
90	Article Name 10	Article Name 10	Article Name 10	Article Name 10	Article Name 10	Article Name 10	Article Name 10	Article Name 10	Article Name 10	Article Name 10
100	Weigher Number	Weigher Number	Weigher Number	Weigher Number	Weigher Number	Weigher Number	Weigher Number	Weigher Number	Weigher Number	
110	Identity Letter of program option	Identity Letter of program option	Identity Letter of program option	Identity Letter of program option	Identity Letter of program option	Identity Letter of program option				
120	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article	Latest Deleted Article
130	Hourly Records: current number		Hourly Records: time of begin 1	Hourly Records: time of begin 2	Hourly Records: time of begin 3		Hourly Records: date of begin 1	Hourly Records: date of begin 2	Hourly Records: date of begin 3	Hourly Records: date of begin 4
140	Hourly Records: time of end 1	Hourly Records: time of end 2	Hourly Records: time of end 3		Hourly Records: date of end 1	Hourly Records: date of end 2	Hourly Records: date of end 3	Hourly Records: date of end 4		
150	Hourly Records: throughput 1	Hourly Records: throughput 2			Hourly Records: mean value 1	Hourly Records: mean value 2			Hourly Records: TU1% 1	Hourly Records: TU1% 2
160	Filling Heads: current number		Filling Heads: mean value 1	Filling Heads: mean value 2			Filling Heads: standard deviation 1	Filling Heads: standard deviation 2		
170	Filling Heads: minimum 1	Filling Heads: minimum 2			Filling Heads: maximum 1	Filling Heads: maximum 2				
180	FB_ LADEN Command Upload Status Command 1	FB_ LADEN Command Upload Status Command 2	FB_ LADEN Command Upload Status Command 3	FB_ LADEN Command Upload Status Command 4	FB_ LADEN Command Upload Status Command 5	FB_ LADEN Command Upload Status Command 6	FB_ LADEN Command Upload Status Command 7	FB_ LADEN Command Upload Status Command 8	FB_ LADEN Command Upload Status Command 9	
190	FB_Load_ Started number 1	FB_Load_ Started number 1								
200	FBQU_ GRUND response param 1	FBQU_ GRUND response param 2	FBQU_ GRUND response param 3	FBQU_ GRUND response param 4						
210	FBQU_ DATA response param 1	FBQU_ DATA response param 2	FBQU_ DATA response param 3	FBQU_ DATA response param 4	FBQU_ DATA response param 5	FBQU_ DATA response param 6	FBQU_ DATA response param 7	FBQU_ DATA response param 8	FBQU_ DATA response param 9	

DB	0	1	2	3	4	5	6	7	8	9
220	FBQU_ GRENZEN response param 1	FBQU_ GRENZEN response param 2	FBQU_ GRENZEN response param 3	FBQU_ GRENZEN response param 4	FBQU_ GRENZEN response param 5	FBQU_ GRENZEN response param 6				
230	FBQU_ STAT response param 1	FBQU_ STAT response param 2	FBQU_ STAT response param 3	FBQU_ STAT response param 4	FBQU_ STAT response param 5	FBQU_ STAT response param 6	FBQU_ STAT response param 7	FBQU_ STAT response param 8	FBQU_ STAT response param 9	FBQU_ STAT response param 10
240	FBQU_TR response param 1	FBQU_TR response param 2	FBQU_TR response param 3	FBQU_TR response param 4	FBQU_TR response param 5	FBQU_TR response param 6	FBQU_TR response param 7	FBQU_TR response param 8	FBQU_TR response param 9	FBQU_TR response param 10
250	FBQU_TR response param 11									
260	FBQU_ GLEIT response param 1	FBQU_ GLEIT response param 2	FBQU_ GLEIT response param 3	FBQU_ GLEIT response param 4	FBQU_ GLEIT response param 5	FBQU_ GLEIT response param 6				
270	FBQU_ FKT response param 1	FBQU_ FKT response param 2	FBQU_ FKT response param 3	FBQU_ FKT response param 4	FBQU_ FKT response param 5	FBQU_ FKT response param 6				
280	FBQU_ MWG response param 1	FBQU_ MWG response param 2	FBQU_ MWG response param 3	FBQU_ MWG response param 4						
290	FBQU_ METALL response param 1	FBQU_ METALL response param 2	FBQU_ METALL response param 3							
300	FB_ GRUND response value 1	FB_ GRUND response value 1	FB_ GRUND response value 1		FB_ GRUND response value 2	FB_ GRUND response value 2	FB_ GRUND response value 2	FB_ GRUND response value 2	FB_ GRUND response value 2	
310	FB_ GRUND response value 3	FB_ GRUND response value 3	FB_ GRUND response value 3	FB_ GRUND response value 3	FB_ GRUND response value 3	FB_ GRUND response value 3	FB_ GRUND response value 3		FB_ GRUND response value 4	
320	FB_DATA response value 1	FB_DATA response value 1			FB_DATA response value 2	FB_DATA response value 2		FB_DATA response value 3		FB_DATA response value 4
330	FB_DATA response value 5		FB_DATA response value 6		FB_DATA response value 7	FB_DATA response value 7		FB_DATA response value 8		
340	FB_DATA response value 9	FB_DATA response value 9								
350	FB_ GRENZEN response value 1	FB_ GRENZEN response value 1			FB_ GRENZEN response value 2	FB_ GRENZEN response value 2			FB_ GRENZEN response value 3	FB_ GRENZEN response value 3

DB	0	1	2	3	4	5	6	7	8	9
360	FB_ GRENZEN response value 4	FB_ GRENZEN response value 4			FB_ GRENZEN response value 5	FB_ GRENZEN response value 5			FB_ GRENZEN response value 6	FB_ GRENZEN response value 6
370	FB_STAT response value 1	FB_STAT response value 1	FB_STAT response value 1	FB_STAT response value 1	FB_STAT response value 1		FB_STAT response value 2	FB_STAT response value 2		
380	FB_STAT response value 3	FB_STAT response value 3			FB_STAT response value 4	FB_STAT response value 4			FB_STAT response value 5	FB_STAT response value 5
390	FB_STAT response value 6		FB_STAT response value 7		FB_STAT response value 8		FB_STAT response value 9		FB_STAT response value 10	
400	FB_TR response value 1	FB_TR response value 1			FB_TR response value 2	FB_TR response value 2			FB_TR response value 3	FB_TR response value 3
410	FB_TR response value 4	FB_TR response value 4			FB_TR response value 5	FB_TR response value 5		FB_TR response value 6		FB_TR response value 7
420	FB_TR response value 8		FB_TR response value 9		FB_TR response value 10	FB_TR response value 10		FB_TR response value 11		
430	FB_GLEIT response value 1	FB_GLEIT response value 1			FB_GLEIT response value 2	FB_GLEIT response value 2			FB_GLEIT response value 3	FB_GLEIT response value 3
440	FB_GLEIT response value 4	FB_GLEIT response value 4			FB_GLEIT response value 5	FB_GLEIT response value 5		FB_GLEIT response value 6		
450	FB_FKT response value 1		FB_FKT response value 2		FB_FKT response value 3	FB_FKT response value 3			FB_FKT response value 4	FB_FKT response value 4
460	FB_FKT response value 5		FB_FKT response value 6							
470	FB_MWG response value 1		FB_MWG response value 2	FB_MWG response value 2			FB_MWG response value 3	FB_MWG response value 3		FB_MWG response value 4
480	FB_ METALL response value 1		FB_ METALL response value 2		FB_ METALL response value 3					
490	FB_PD_ PLUS response value 1	FB_PD_ PLUS response value 1			FB_PD_ PLUS response value 2	FB_PD_ PLUS response value 2			FB_PD_ PLUS response value 3	FB_PD_ PLUS response value 3
500	FB_PD_ PLUS response value 4	FB_PD_ PLUS response value 4			FB_PD_ PLUS response value 5	FB_PD_ PLUS response value 5			FB_PD_ PLUS response value 6	FB_PD_ PLUS response value 6
510	FB_PD_ PLUS response value 7	FB_PD_ PLUS response value 7			FB_PD_ PLUS response value 8	FB_PD_ PLUS response value 8			FB_PD_ PLUS response value 9	FB_PD_ PLUS response value 9

DB	0	1	2	3	4	5	6	7	8	9
520	FB_PD_ GUT response value 1	FB_PD_ GUT response value 1			FB_PD_ GUT response value 2	FB_PD_ GUT response value 2			FB_PD_ GUT response value 3	FB_PD_ GUT response value 3
530	FB_PD_ GUT response value 4	FB_PD_ GUT response value 4			FB_PD_ GUT response value 5	FB_PD_ GUT response value 5				
540	FB_PD_ MINUS response value 1	FB_PD_ MINUS response value 1			FB_PD_ MINUS response value 2	FB_PD_ MINUS response value 2			FB_PD_ MINUS response value 3	FB_PD_ MINUS response value 3
550	FB_PD_ MINUS response value 4	FB_PD_ MINUS response value 4			FB_PD_ MINUS response value 5	FB_PD_ MINUS response value 5			FB_PD_ MINUS response value 6	FB_PD_ MINUS response value 6
560	FB_PD_ MINUS response value 7	FB_PD_ MINUS response value 7			FB_PD_ MINUS response value 8	FB_PD_ MINUS response value 8			FB_PD_ MINUS response value 9	FB_PD_ MINUS response value 9
570	FB_PD_ STAT response value 1	FB_PD_ STAT response value 1	FB_PD_ STAT response value 1	FB_PD_ STAT response value 1	FB_PD_ STAT response value 1		FB_PD_ STAT response value 2	FB_PD_ STAT response value 2	FB_PD_ STAT response value 2	
580	FB_PD_ STAT response value 3	FB_PD_ STAT response value 3	FB_PD_ STAT response value 3	FB_PD_ STAT response value 3	FB_PD_ STAT response value 3					
590	FB_PD_ STAT response value 4	FB_PD_ STAT response value 4	FB_PD_ STAT response value 4	FB_PD_ STAT response value 4	FB_PD_ STAT response value 4					
600	FB_PD_ STAT response value 5	FB_PD_ STAT response value 5			FB_PD_ STAT response value 6	FB_PD_ STAT response value 6			FB_PD_ STAT response value 7	FB_PD_ STAT response value 7
610	FB_PD_ STAT response value 8	FB_PD_ STAT response value 8			FB_PD_ STAT response value 9	FB_PD_ STAT response value 9			FB_PD_ STAT response value 10	FB_PD_ STAT response value 10
620	FB_PD_ STAT response value 11	FB_PD_ STAT response value 11			FB_PD_ STAT response value 12	FB_PD_ STAT response value 12			FB_PD_ STAT response value 13	FB_PD_ STAT response value 13
630	FB_PD_ STAT response value 14	FB_PD_ STAT response value 14			FB_PD_ STAT response value 15	FB_PD_ STAT response value 15				
640	FB_PD_ AKTINT response value 1	FB_PD_ AKTINT response value 1	FB_PD_ AKTINT response value 1	FB_PD_ AKTINT response value 1	FB_PD_ AKTINT response value 1		FB_PD_ AKTINT response value 2	FB_PD_ AKTINT response value 2	FB_PD_ AKTINT response value 2	

DB	0	1	2	3	4	5	6	7	8	9
650	FB_PD_ AKTINT response value 3	FB_PD_ AKTINT response value 3			FB_PD_ AKTINT response value 4	FB_PD_ AKTINT response value 4			FB_PD_ AKTINT response value 5	FB_PD_ AKTINT response value 5
660	FB_PD_ AKTINT response value 6	FB_PD_ AKTINT response value 6			FB_PD_ AKTINT response value 7	FB_PD_ AKTINT response value 7			FB_PD_ AKTINT response value 8	FB_PD_ AKTINT response value 8
670	FB_PD_ AKTINT response value 9	FB_PD_ AKTINT response value 9			FB_PD_ AKTINT response value 10	FB_PD_ AKTINT response value 10			FB_PD_ AKTINT response value 11	FB_PD_ AKTINT response value 11
680	FB_PD_ LASTINT response value 1	FB_PD_ LASTINT response value 1	FB_PD_ LASTINT response value 1	FB_PD_ LASTINT response value 1	FB_PD_ LASTINT response value 1		FB_PD_ LASTINT response value 2	FB_PD_ LASTINT response value 2	FB_PD_ LASTINT response value 2	
690	FB_PD_ LASTINT response value 3	FB_PD_ LASTINT response value 3			FB_PD_ LASTINT response value 4	FB_PD_ LASTINT response value 4			FB_PD_ LASTINT response value 5	FB_PD_ LASTINT response value 5
700	FB_PD_ LASTINT response value 6	FB_PD_ LASTINT response value 6			FB_PD_ LASTINT response value 7	FB_PD_ LASTINT response value 7			FB_PD_ LASTINT response value 8	FB_PD_ LASTINT response value 8
710	FB_PD_ LASTINT response value 9	FB_PD_ LASTINT response value 9			FB_PD_ LASTINT response value 10	FB_PD_ LASTINT response value 10			FB_PD_ LASTINT response value 11	FB_PD_ LASTINT response value 11
720	FB_PD_14 response value 1	FB_PD_14 response value 1			FB_PD_14 response value 2	FB_PD_14 response value 2			FB_PD_14 response value 3	FB_PD_14 response value 3
730	FB_PD_14 response value 4	FB_PD_14 response value 4			FB_PD_14 response value 5	FB_PD_14 response value 5			FB_PD_14 response value 6	FB_PD_14 response value 6
740	FB_PD_14 response value 7	FB_PD_14 response value 7			FB_PD_14 response value 8	FB_PD_14 response value 8			FB_PD_14 response value 9	FB_PD_14 response value 9
750	FB_PD_14 response value 10	FB_PD_14 response value 10			FB_PD_14 response value 11	FB_PD_14 response value 11			FB_PD_14 response value 12	FB_PD_14 response value 12
760	FB_PD_14 response value 13	FB_PD_14 response value 13			FB_PD_14 response value 14	FB_PD_14 response value 14				
770	FB_PD_ CHARGE response value 1	FB_PD_ CHARGE response value 1	FB_PD_ CHARGE response value 1	FB_PD_ CHARGE response value 1	FB_PD_ CHARGE response value 1		FB_PD_ CHARGE response value 2	FB_PD_ CHARGE response value 2	FB_PD_ CHARGE response value 2	
780	FB_PD_ CHARGE response value 3	FB_PD_ CHARGE response value 3	FB_PD_ CHARGE response value 3	FB_PD_ CHARGE response value 3	FB_PD_ CHARGE response value 3		FB_PD_ CHARGE response value 4	FB_PD_ CHARGE response value 4		

DB	0	1	2	3	4	5	6	7	8	9
790	FB_PD_ CHARGE response value 5	FB_PD_ CHARGE response value 5			FB_PD_ CHARGE response value 6	FB_PD_ CHARGE response value 6			FB_PD_ CHARGE response value 7	FB_PD_ CHARGE response value 7
800	FB_PD_ CHARGE response value 8	FB_PD_ CHARGE response value 8			FB_PD_ CHARGE response value 9	FB_PD_ CHARGE response value 9			FB_PD_ CHARGE response value 10	FB_PD_ CHARGE response value 10
810	FB_PD_ CHARGE response value 11	FB_PD_ CHARGE response value 11			FB_PD_ CHARGE response value 12	FB_PD_ CHARGE response value 12				
820	FB_PD_ LASTCHR response value 1	FB_PD_ LASTCHR response value 1	FB_PD_ LASTCHR response value 1	FB_PD_ LASTCHR response value 1	FB_PD_ LASTCHR response value 1		FB_PD_ LASTCHR response value 2	FB_PD_ LASTCHR response value 2	FB_PD_ LASTCHR response value 2	
830	FB_PD_ LASTCHR response value 3	FB_PD_ LASTCHR response value 3	FB_PD_ LASTCHR response value 3	FB_PD_ LASTCHR response value 3	FB_PD_ LASTCHR response value 3		FB_PD_ LASTCHR response value 4	FB_PD_ LASTCHR response value 4		
840	FB_PD_ LASTCHR response value 5	FB_PD_ LASTCHR response value 5			FB_PD_ LASTCHR response value 6	FB_PD_ LASTCHR response value 6			FB_PD_ LASTCHR response value 7	FB_PD_ LASTCHR response value 7
850	FB_PD_ LASTCHR response value 8	FB_PD_ LASTCHR response value 8			FB_PD_ LASTCHR response value 9	FB_PD_ LASTCHR response value 9			FB_PD_ LASTCHR response value 10	FB_PD_ LASTCHR response value 10
860	FB_PD_ LASTCHR response value 11	FB_PD_ LASTCHR response value 11			FB_PD_ LASTCHR response value 12	FB_PD_ LASTCHR response value 12				
870	FB_PD_ HOUR response value 1	FB_PD_ HOUR response value 1	FB_PD_ HOUR response value 1	FB_PD_ HOUR response value 1	FB_PD_ HOUR response value 1		FB_PD_ HOUR response value 2	FB_PD_ HOUR response value 2	FB_PD_ HOUR response value 2	
880	FB_PD_ HOUR response value 3	FB_PD_ HOUR response value 3	FB_PD_ HOUR response value 3	FB_PD_ HOUR response value 3	FB_PD_ HOUR response value 3					
890	FB_PD_ HOUR response value 4	FB_PD_ HOUR response value 4	FB_PD_ HOUR response value 4	FB_PD_ HOUR response value 4	FB_PD_ HOUR response value 4					
900	FB_PD_ HOUR response value 5	FB_PD_ HOUR response value 5			FB_PD_ HOUR response value 6	FB_PD_ HOUR response value 6			FB_PD_ HOUR response value 7	FB_PD_ HOUR response value 7
910	FB_PD_ HOUR response value 8	FB_PD_ HOUR response value 8			FB_PD_ HOUR response value 9	FB_PD_ HOUR response value 9			FB_PD_ HOUR response value 10	FB_PD_ HOUR response value 10

DB	0	1	2	3	4	5	6	7	8	9
920	FB_PD_HOUR response value 11	FB_PD_HOUR response value 11			FB_PD_HOUR response value 12	FB_PD_HOUR response value 12			FB_PD_HOUR response value 13	FB_PD_HOUR response value 13
930	FB_PD_HOUR response value 14	FB_PD_HOUR response value 14			FB_PD_HOUR response value 15	FB_PD_HOUR response value 15				

6 Support, Service & Warranty

In This Chapter

Be sure and read the full Warranty that can be found on our web site at www.prosoft-technology.com for details and other terms and conditions. The content in this summary is subject to change without notice. The content is current at date of publication.

ProSoft Technology, Inc. strives to provide meaningful support to its customers. Should any questions or problems arise, please feel free to contact us at:

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

Those of us at ProSoft Technology, Inc. want to provide the best and quickest support possible, so before calling please have the following information available. You may wish to fax this information to us prior to calling.

1 Product Version Number
2 System architecture
3 Network details

In the case of hardware, we will also need the following information:

1 Module configuration and contents of file
2 Module Operation
3 Configuration/Debug status information
4 LED patterns
5 Information about the processor and user data files as viewed through the development software and LED patterns on the processor
6 Details about the networked devices interfaced, if any

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.

6.1 How to Contact Us: Sales and Support

All ProSoft Technology Products are backed with full technical support. Contact our worldwide Technical Support team and Customer Service representatives directly by phone or email:

USA / Latin America (excluding Brasil) (Office in California)

+1(661) 716-5100
+1(661) 716-5101 (Fax)
1675 Chester Avenue, 4th Floor
Bakersfield, California 93301
U.S.A.
+1.661.716.5100, support@prosoft-technology.com
Languages spoken include: English, Spanish

Asia Pacific Sales (office in Malaysia)

+603.7724.2080
+603.7724.2090 (Fax)
C210, Damansara Intan,
1 Jalan SS20/27, 47400 Petaling Jaya
Selangor, Malaysia
+603.7724.2080, asiapc@prosoft-technology.com
Languages spoken include: Chinese, Japanese, English

Asia Pacific Support (office in China)

+86.21.64518356 x 8011
+86.21.64756957 (Fax)
4/F, No. 16 Hongcao Road
Shanghai, China 200233
China
+86.21.64518356 x 8011, zhang@prosoft-technology.com
Languages spoken include: Chinese, English

Europe / Middle East / Africa (office in Toulouse, France)

+33 (0) 5.34.36.87.20
+33 (0) 5.61.78.40.52 (Fax)
Zone d'activité de Font Grasse
17, rue des Briquetiers
F-31700 Blagnac
France
+33 (0) 5.34.36.87.20. support.emea@prosoft-technology.com
Languages spoken include: French, English

Brasil (office in Sao Paulo)

+55-11-5084-5178
+55-11-5083-3776 (Fax)
Rua Vergueiro, 2949 - sala 182 - Edifício Vergueiro Work Center
Vila Mariana - São Paulo
Cep: 04101-300 - Brasil
+55-11-5084-5178, eduardo@prosoft-technology.com
Languages spoken include: Portuguese, English

6.2 Return Material Authorization (RMA) Policies and Conditions

The following RMA Policies and Conditions apply to any returned product. These RMA Policies are subject to change by ProSoft without notice. For warranty information, see Section C below entitled "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

1 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.
2 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 in Section A. A Technical Support Engineer will request several tests in an attempt to isolate the problem. If after these tests are completed, the Product is found to be the source of the problem, ProSoft will issue an RMA.
3 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. 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 without an RMA number will be returned to the Customer, freight collect. Contact ProSoft Technical Support for further information.
4 Out of warranty returns are not allowed on RadioLinx accessories such as antennas, cables, and brackets.

The following policy applies for Non-Warranty Credit Returns:

A 10% Restocking Fee if Factory Seal is *not* broken
B 20% Restocking Fee if Factory Seal is broken

ProSoft retains the right, in its absolute and sole discretion, to reject any non-warranty returns for credit if the return is not requested within three (3) months after shipment of the Product to Customer, if the Customer fails to comply with ProSoft's shipping instructions, or if the Customer fails to return the Product to ProSoft within six (6) months after Product was originally shipped.

6.3 Procedures for Return of Units Under Warranty

1 A Technical Support Engineer must pre-approve all product returns.
2 Module is repaired or replaced after a Return Material Authorization Number is entered and a replacement order is generated.
3 Credit for the warranted item is issued within 10 business days after receipt of product and evaluation of the defect has been performed by ProSoft. The credit will only be issued provided the product is returned with a valid Return Material Authorization Number and in accordance with ProSoft's shipping instructions.

a) If no defect is found, a credit is issued.

b) If a defect is found and is determined to be customer generated or if the defect is otherwise not covered by ProSoft's Warranty, or if the module is not repairable, a credit is not issued and payment of the replacement module is due.

6.4 Procedures for Return of Units Out of Warranty

1 Customer sends unit in for evaluation.

2 If no defect is found, Customer will be charged the equivalent of US $100 plus shipping, duties and taxes that may apply. A new Purchase Order will be required for this evaluation fee.

If the unit is repaired the charge to the Customer will be 30%* of the list price plus any shipping, duties and taxes that may apply. A new Purchase Order will be required for a product repair.

3 For an immediate exchange, a new module may be purchased and sent to Customer while repair work is being performed. Credit for purchase of the new module will be issued when the new module is returned in accordance with ProSoft's shipping instructions and subject to ProSoft's policy on non-warranty returns. This is in addition to charges for repair of the old module and any associated charges to Customer.

4 If, upon contacting ProSoft Customer Service, the Customer is informed that unit is believed to be unrepairable, the Customer may choose to send unit in for evaluation to determine if the repair can be made. Customer will pay shipping, duties and taxes that may apply. If unit cannot be repaired, the Customer may purchase a new unit.

6.4.1 Un-repairable Units

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

*** 30% of list price is an estimated repair cost only. The actual cost of repairs will be determined when the module is received by ProSoft and evaluated for needed repairs.**

6.4.2 Purchasing Warranty Extension

As detailed below in ProSoft's Warranty, the standard Warranty Period is one year (or in the case of RadioLinx modules, three years) from the date of delivery. The Warranty Period may be extended 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

6.5 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.

6.5.1 What Is Covered By This Warranty

A *Warranty On New Products*: ProSoft warrants, to the original purchaser only, 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 one year (or in the case of RadioLinx modules, 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 15 months (or in the case of RadioLinx modules, 39 months) from the date of delivery. 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. If ProSoft is unable to repair the Product to conform to this Warranty after a reasonable number of attempts, ProSoft will provide, at its option, one of the following: a replacement product, a full refund of the purchase price or a credit in the amount of the purchase price. All replaced product and parts become the property of ProSoft. These remedies are the Customer's only remedies for breach of warranty.

B *Warranty On Services*: Material and labor used by ProSoft to repair a verified malfunction or defect are warranted on 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.

C The Warranty Period for RadioLinx accessories (such as antennas, cables, brackets, etc.) are the same as for RadioLinx modules, that is, three years from the date of shipment.

6.5.2 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 With the exception of RadioLinx accessories referenced in paragraph 1(c) this Warranty does not cover any product, components, or parts not manufactured by ProSoft.

C This Warranty also 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 programming languages, or "C") 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 outside of the limits indicated on the product specifications; or (viii) disasters such as fire, flood, earthquake, wind or lightning.

D 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 guides included with your original product purchased by you 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.

6.5.3 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, 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.

6.5.4 DISCLAIMER OF ALL OTHER WARRANTIES

THE WARRANTIES SET FORTH IN PARAGRAPH 1 ABOVE 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.

6.5.5 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 AND ITS DEALER WILL NOT BE RESPONSIBLE FOR INCLUDE, BUT ARE NOT LIMITED TO: LOSS OF PROFITS; LOSS OF SAVINGS OR REVENUE; LOSS OF USE OF THE PRODUCT OR ANY ASSOCIATED EQUIPMENT; LOSS OF DATA; COST OF CAPITAL; COST OF ANY SUBSTITUTE EQUIPMENT, FACILITIES, OR SERVICES; DOWNTIME; THE CLAIMS OF THIRD PARTIES, INCLUDING CUSTOMERS OF THE PURCHASER; AND INJURY TO PROPERTY.

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

6.5.6 Time Limit for Bringing Suit

Any action for breach of warranty must be commenced within 15 months (or in the case of RadioLinx modules, 39 months) following shipment of the Product.

6.5.7 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.

6.5.8 Intellectual Property

A Any documentation included with Product purchased from ProSoft is protected by copyright and may not be photocopied 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.

6.5.9 Additional Restrictions Relating To Software And Other Intellectual Property

In addition to complying 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.

6.5.10 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.

6.5.11 Controlling Law and Severability

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

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