

inRAx



MVI56-S3964R

ControlLogix Platform
Siemens 3964R Protocol

User Manual

August 5, 2021



Please Read This Notice

Successful application of this module requires a reasonable working knowledge of the Rockwell Automation ControlLogix hardware, the MVI56-S3964R 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.

Reproduction of the contents of this manual, in whole or in part, without written permission from ProSoft Technology is prohibited.

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 at: <http://www.prosoft-technology.com>

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

Asia Pacific: +603.7724.2080

Europe, Middle East, South Africa: +33.5.34.36.87.20

Latin America: +1.281.298.9109

North America: +1.661.716.5100

Your Feedback Please

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.

ProSoft Technology, Inc.

+1 (661) 716-5100

+1 (661) 716-5101 (Fax)

<http://www.prosoft-technology.com>

Copyright © ProSoft Technology, Inc. 2021. All Rights Reserved.

MVI56-S3964R User Manual

August 5, 2021

ProSoft Technology®, ProLinX®, inRAX®, ProTalk® and RadioLinX® are Registered Trademarks of ProSoft Technology, Inc.



For professional users in the European Union

If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.



Warning – Cancer and Reproductive Harm – www.P65Warnings.ca.gov

Agency Approvals & Certifications

Please visit our website: www.prosoft-technology.com

Contents

PLEASE READ THIS NOTICE.....	2
Warnings.....	2
Battery Life Advisory.....	3
ProSoft® Product Documentation.....	3
Your Feedback Please.....	4
GUIDE TO THE MVI56-S3964R USER MANUAL.....	7
1 START HERE.....	9
1.1 System Requirements.....	9
1.2 Package Contents.....	10
1.3 Install ProSoft Configuration Builder Software.....	10
1.4 Setting Jumpers.....	12
1.5 Install the Module in the Rack.....	12
1.6 Connect your PC to the Processor.....	14
1.7 Open the Sample Ladder Logic.....	15
1.7.1 To Determine the Firmware Version of your Processor.....	15
1.7.2 Select the Slot Number for the Module.....	16
1.7.3 Configuring RSLinx.....	17
1.8 Download the Sample Program to the Processor.....	18
1.9 Connect your PC to the Module.....	19
2 INSTALLING AND CONFIGURING THE MODULE.....	21
2.1 Installation Instructions.....	21
2.1.1 Module Data Object.....	22
2.2 ProSoft Configuration Builder.....	26
2.2.1 Set Up the Project.....	26
2.2.2 Set Module Parameters.....	28
2.3 [Module].....	30
2.3.1 Module Name.....	30
2.4 [Backplane 56].....	30
2.4.1 Block Transfer Size.....	30
2.4.2 Status Interval.....	30
2.5 [3964R Port x].....	30
2.5.1 Enable.....	31
2.5.2 Baud Rate.....	31
2.5.3 Parity.....	31
2.5.4 Data Bits.....	31
2.5.5 Stop Bits.....	31
2.5.6 RTS On.....	31
2.5.7 RTS Off.....	31
2.5.8 Use CTS Line.....	31
2.5.9 Swap.....	31
2.5.10 Priority.....	32
2.5.11 Protocol.....	32
2.5.12 ACK Delay.....	32
2.5.13 Setup Attempts.....	32
2.5.14 Transmit Attempts.....	32
2.6 Download the Project to the Module.....	32
3 LADDER LOGIC.....	35
3.1 Introduction.....	35
3.1.1 Explanations About the Example Programs.....	35
3.1.2 The 3964R Communication Program.....	36

3.2	Commands	36
3.2.1	9998 Warm Boot	36
3.2.2	9999 Cold Boot.....	36
4	DIAGNOSTICS AND TROUBLESHOOTING.....	37
4.1	Reading Status Data from the Module	37
4.1.1	Required Hardware	37
4.1.2	The Configuration/Debug Menu	38
4.1.3	Main Menu.....	40
4.1.4	Database View Menu	43
4.1.5	Backplane Menu.....	45
4.1.6	Protocol Serial 3964R Menu.....	46
4.2	LED Status Indicators	47
4.2.1	Clearing a Fault Condition	48
4.2.2	Troubleshooting.....	48
5	REFERENCE	51
5.1	Product Specifications	51
5.1.1	Features and Benefits	51
5.1.2	General Specifications	51
5.1.3	Hardware Specifications.....	52
5.1.4	Functional Specifications.....	52
5.2	Functional Overview	53
5.2.1	Products in the Environment	53
5.2.2	3964R Protocol Overview.....	53
5.2.3	General Concepts	54
5.2.4	Communications.....	58
5.2.5	Job Processing.....	61
5.3	Cable Connections	61
5.3.1	RS-232 Configuration/Debug Port.....	61
5.3.2	RS-232	64
5.3.3	RS-232 Cable.....	64
5.3.4	RS-422	64
5.3.5	DB9 to RJ45 Adaptor (Cable 14).....	65
5.4	Reference Documents.....	65
5.5	Status Data	65
5.6	Error Codes	66
6	SUPPORT, SERVICE & WARRANTY	67

Guide to the MVI56-S3964R 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 47) Diagnostics and Troubleshooting (page 37)	This section describes how to verify communications with the network. Diagnostic and Troubleshooting procedures.
Reference Product Specifications Functional Overview Glossary	→	Reference (page 51) Functional Overview (page 53) Product Specifications (page 51)	These sections contain general references associated with this product, Specifications, and the Functional Overview.
Support, Service, and Warranty Index	→	Support, Service and Warranty (page 67)	This section contains Support, Service and Warranty information. Index of chapters.

1 Start Here

In This Chapter

❖ System Requirements	9
❖ Package Contents	10
❖ Install ProSoft Configuration Builder Software.....	10
❖ Setting Jumpers	12
❖ Install the Module in the Rack	12
❖ Connect your PC to the Processor	14
❖ Open the Sample Ladder Logic.....	15
❖ Download the Sample Program to the Processor.....	18
❖ Connect your PC to the Module	19

Installing the MVI56-S3964R module requires a reasonable working knowledge of the Rockwell Automation hardware, the MVI56-S3964R 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-S3964R 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-S3964R 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)
- 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-S3964R 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-S3964R Module	MVI56-S3964R	Siemens 3964R Protocol
1	Cable	Cable #15, RS232 Null Modem	For RS232 Connection to the CFG Port
3	Cable	Cable #14, RJ45 to DB9 Male Adapter cable	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

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

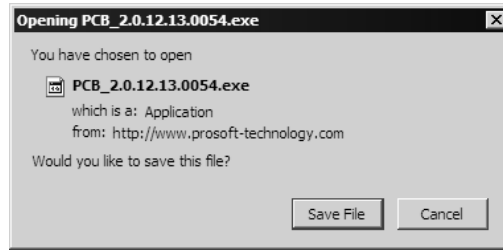
1.3 Install ProSoft Configuration Builder Software

You must install the ProSoft Configuration Builder (PCB) software in order to configure the MVI56-S3964R module. You can always get the newest version of ProSoft Configuration Builder from the ProSoft Technology web site.

To install ProSoft Configuration Builder from the ProSoft Web Site

- 1 Open your web browser and navigate to <http://www.prosoft-technology.com/pcb>
- 2 Click the **Download Here** link to download the latest version of ProSoft Configuration Builder.

- 3 Choose "Save" or "Save File" when prompted. The following illustrations show the file download prompt for two of the most common web browsers.

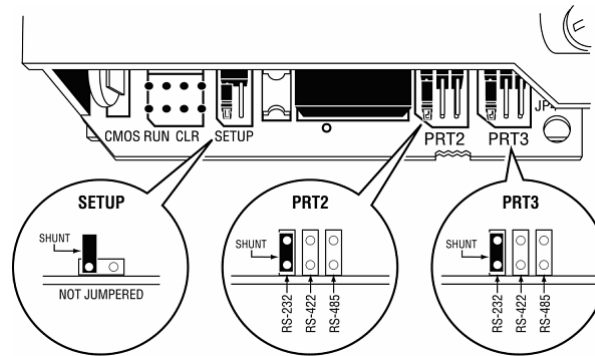


- 4 Make a note of the location where you saved the file, for example "Desktop", or "My Documents", so you can start the installation program.
- 5 When the download is complete, locate and open the file, and then follow the instructions on your screen to install the program.

1.4 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-S3964R 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.

1.5 Install the Module in the Rack

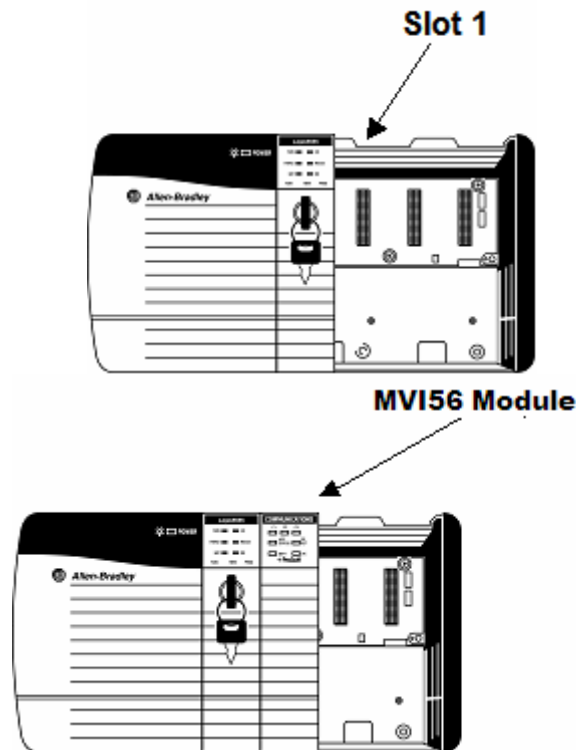
If you have not already installed and configured your ControlLogix processor and power supply, please do so before installing the MVI56-S3964R module. Refer to your Rockwell Automation product documentation for installation instructions.

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-S3964R 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.



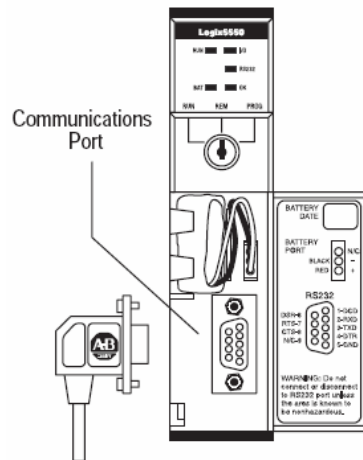
- 3 With a firm but steady push, snap the module into place.
- 4 Check that the holding clips on the top and bottom of the module are securely in the locking holes of the rack.
- 5 Make a note of the slot location. You will need to identify the slot in which the module is installed in order for the sample 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.

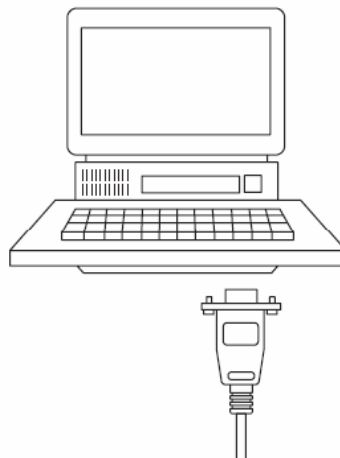
Note: If you are installing MVI56-S3964R with other modules connected to the PCI bus, the peripheral modules will not have holding clips. Make sure all of the modules are aligned with their respective slots before you snap them into place.

1.6 Connect your PC to the Processor

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



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



1.7 Open the Sample Ladder Logic

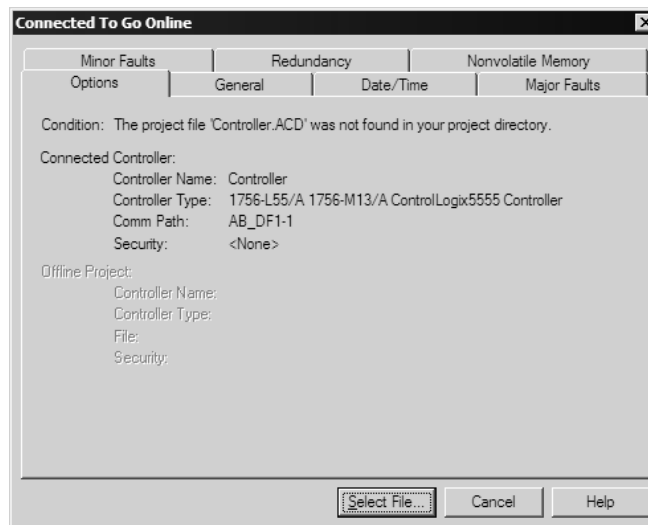
The sample program for your MVI56-S3964R module includes custom tags, data types and ladder logic for data I/O and status monitoring. For most applications, you can run the sample ladder program without modification, or, for advanced applications, you can incorporate the sample program into your existing application.

The version number appended to the file name corresponds with the firmware version number of your ControlLogix processor. The firmware version and sample program version must match.

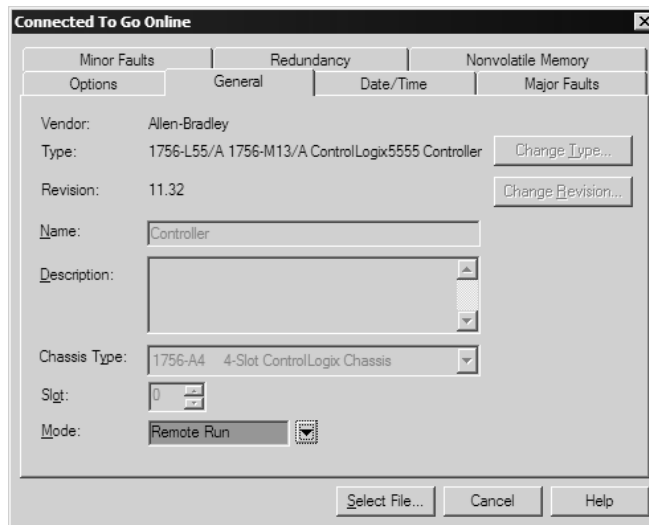
1.7.1 To Determine the Firmware Version of your Processor

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

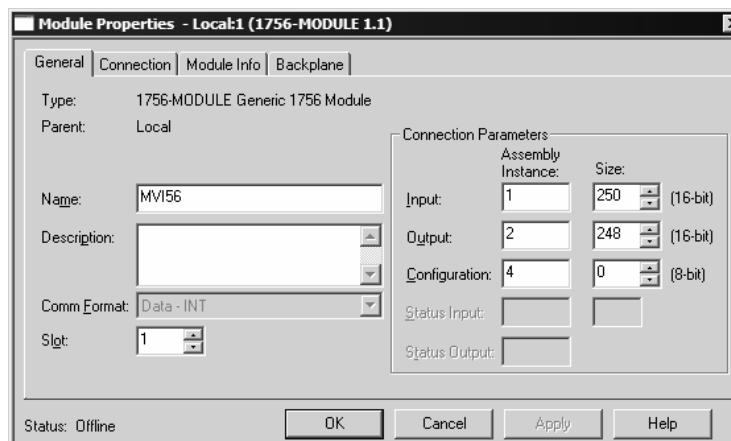


1.7.2 Select the Slot Number for the Module

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.



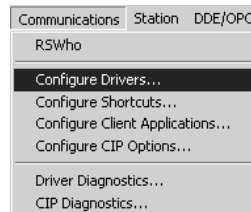
- 3 In the **Slot:** field, use the spinners on the right side of the field to select the slot number where the module will reside in the rack, and then click OK.

RSLogix will automatically apply the slot number change to all tags, variables and ladder logic rungs that use the MVI56-S3964R slot number for computation.

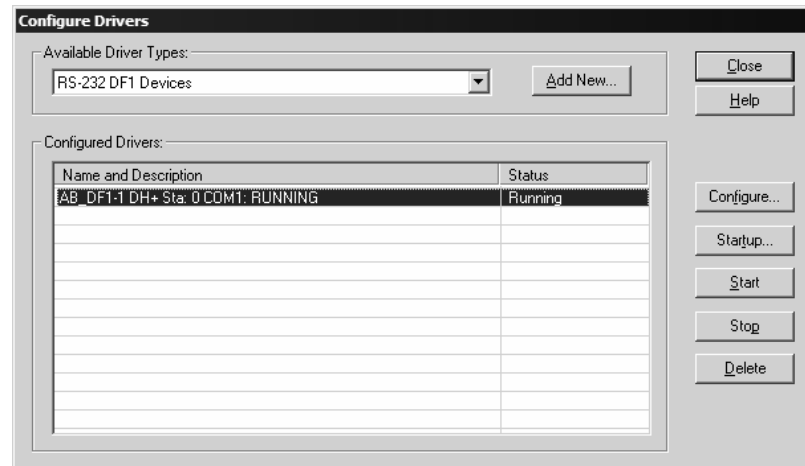
1.7.3 Configuring RSLinx

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.

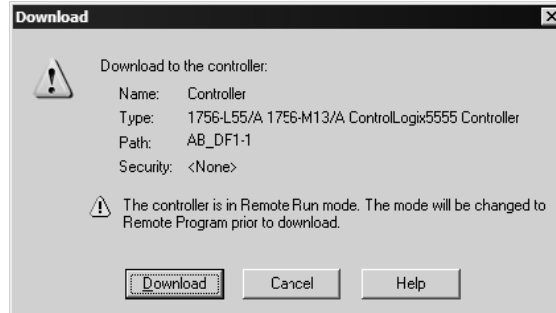
1.8 Download the Sample Program to the Processor

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

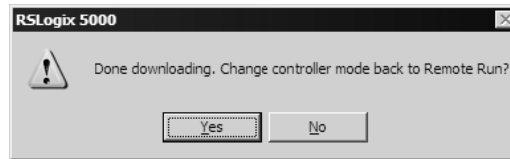
To download the sample program from RSLogix 5000 to the ControlLogix processor

- 1 If you are not already online to the processor, open the Communications menu, and then choose Download. RSLinx 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.



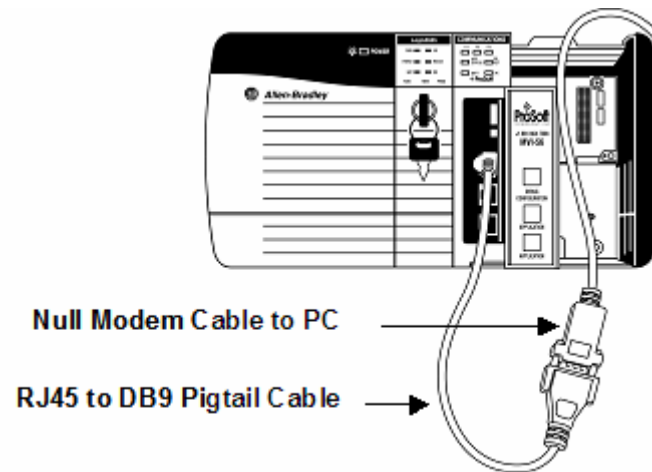
Note: If you receive an error message during these steps, refer to your RSLogix documentation to interpret and correct the error.

1.9 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

❖ Installation Instructions	21
❖ ProSoft Configuration Builder	26
❖ [Module].....	30
❖ [Backplane 56].....	30
❖ [3964R Port x]	30
❖ Download the Project to the Module.....	32

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 at www.prosoft-technology.com.

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.

2.1 Installation Instructions

The following setups/limitations are to be observed:

Please make sure that you are using an MVI56-S3964R with the original parameters and image as delivered. Jumper SETUP: Please remove to run the MVI56-S3964R in application mode.



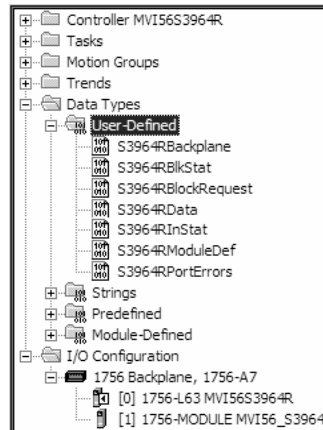
ATTENTION: Incorrect setting of the jumpers may cause damage to the MVI56-S3964R module.

The remaining jumpers for PRT1 and PRT2 have to be set according to the requirements of the user.

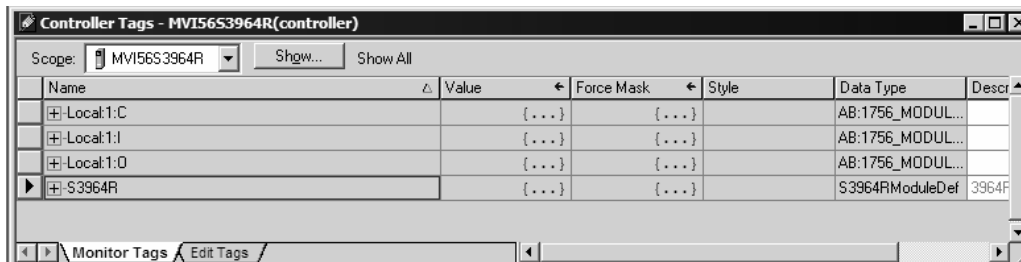
The communication partners are to be connected to the serial interface PRT1 and/or PRT2 of the MVI56-S3964R.

The serial parameters of the communication partners are to be set to 9600 Baud, even parity, 8 bit and 1 stop bit if the standard parameters of the MVI56-S3964R will be used.

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 will be defined if you are starting from the example ladder logic. The Controller Organization window should display the User Defined Data Types shown below:



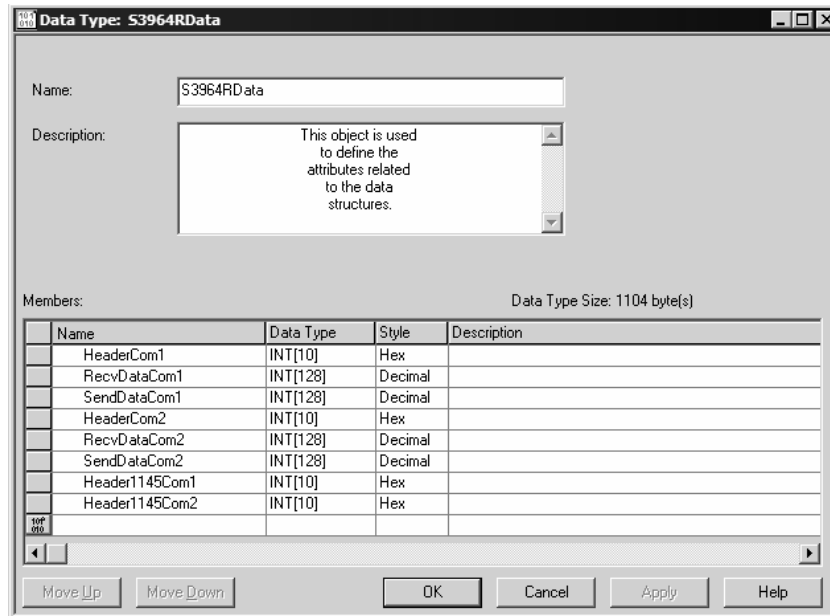
After you have defined the User Defined Data Types, the next step is to define the data to be used to interface with the module and the ladder logic. Open the Controller Tags Edit Tags dialog box and enter the values shown in the following example. The MVI56-S3964R module is defined in the example as S3964R. 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.



2.1.1 Module Data Object

All data related to the MVI56-S3964R module 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.

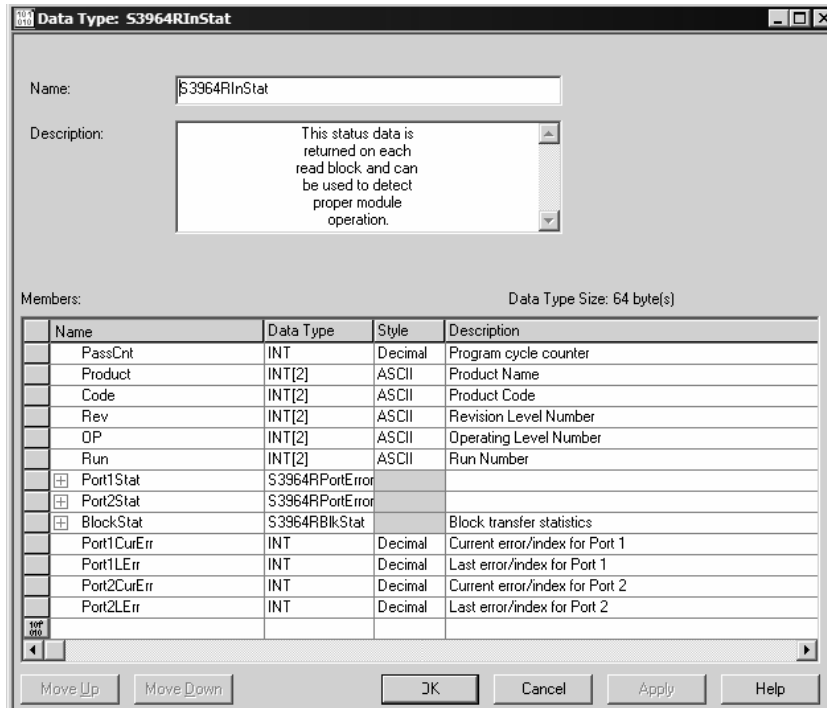
The structure of the object is displayed in the following figure:



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

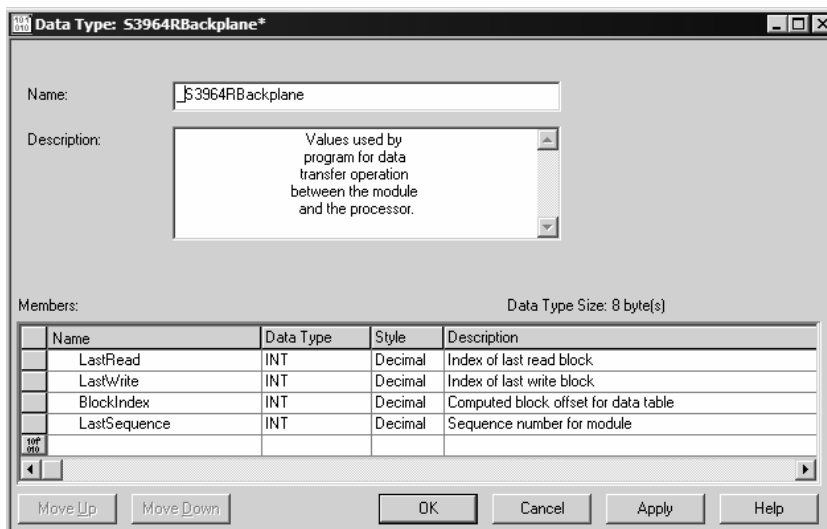
Status Object (S3964RInStat Data Structure)

This object views the status of the module. The **S3964RInStat** object shown below is updated each time a read block is received by the processor. Use this data to monitor the state of the module at a "real-time rate".



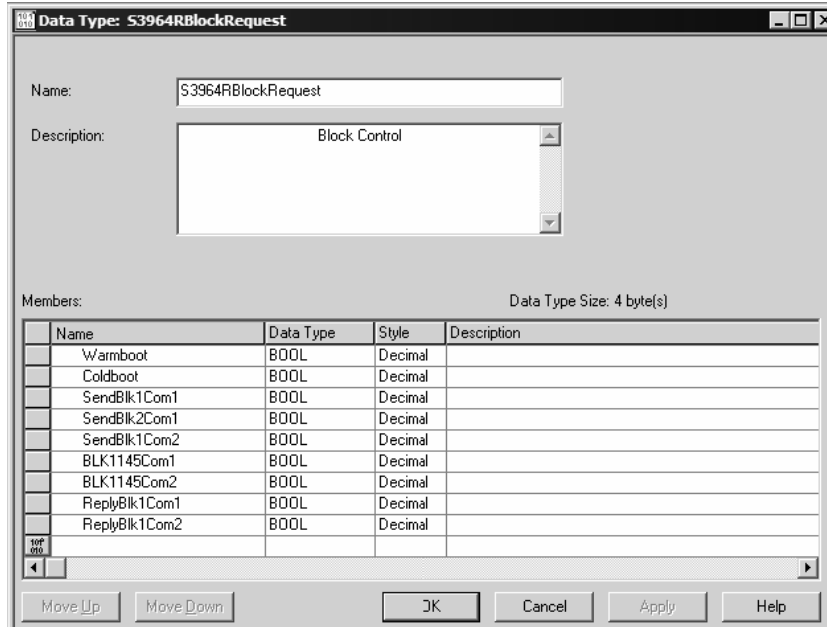
Refer to Module Status Data Table (page 65) for a complete listing of the data stored in this object.

Backplane Object

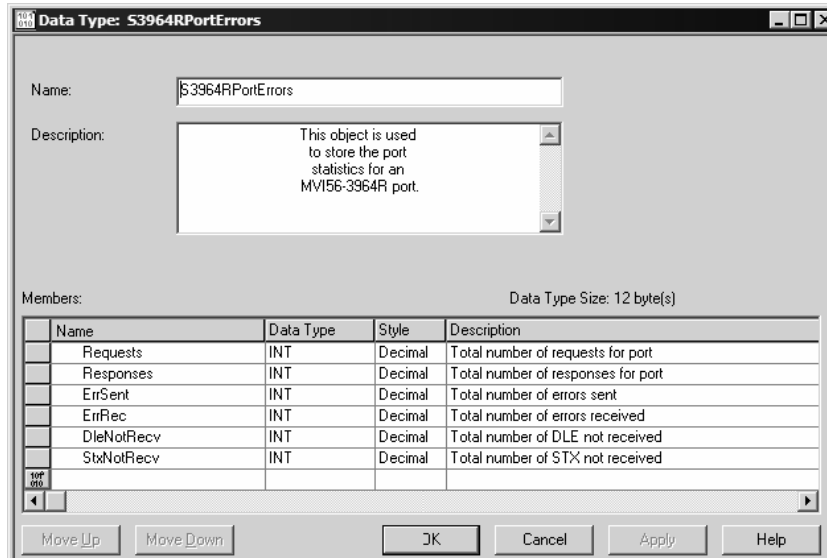


Block Control Data

This data object stores the variables required for the data transfer between the processor and the MVI56-S3964R module. The structure of the object is shown in the following illustration.



Port Errors

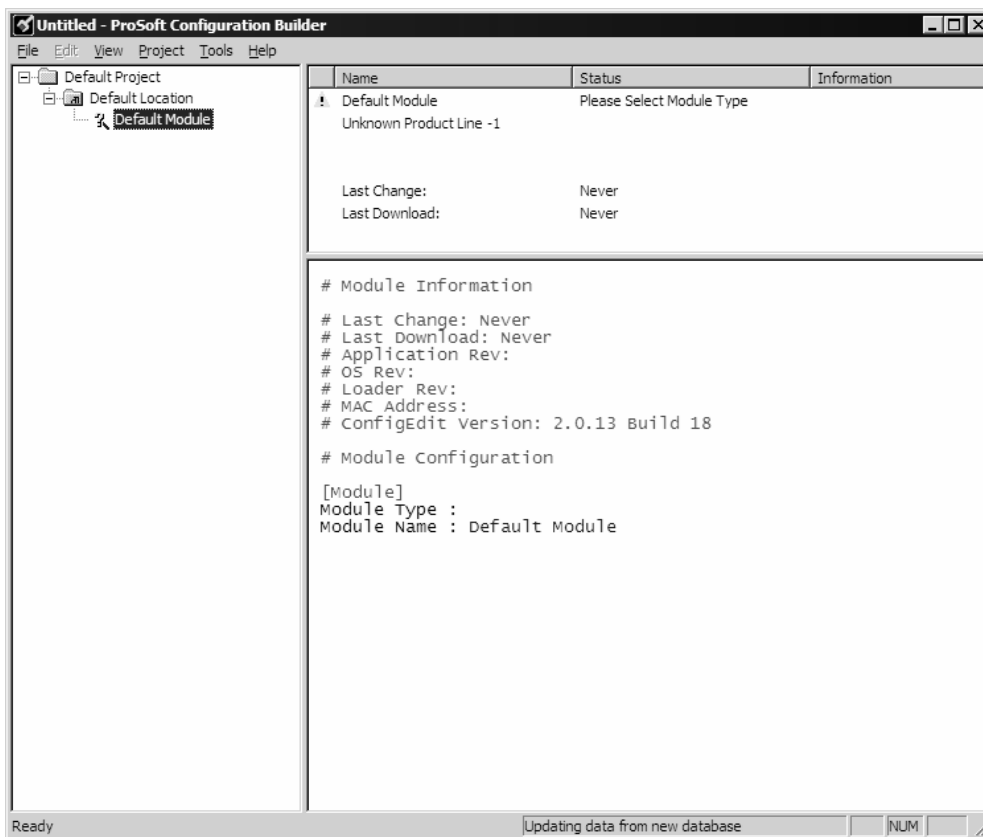


2.2 ProSoft Configuration Builder

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

2.2.1 Set Up the Project

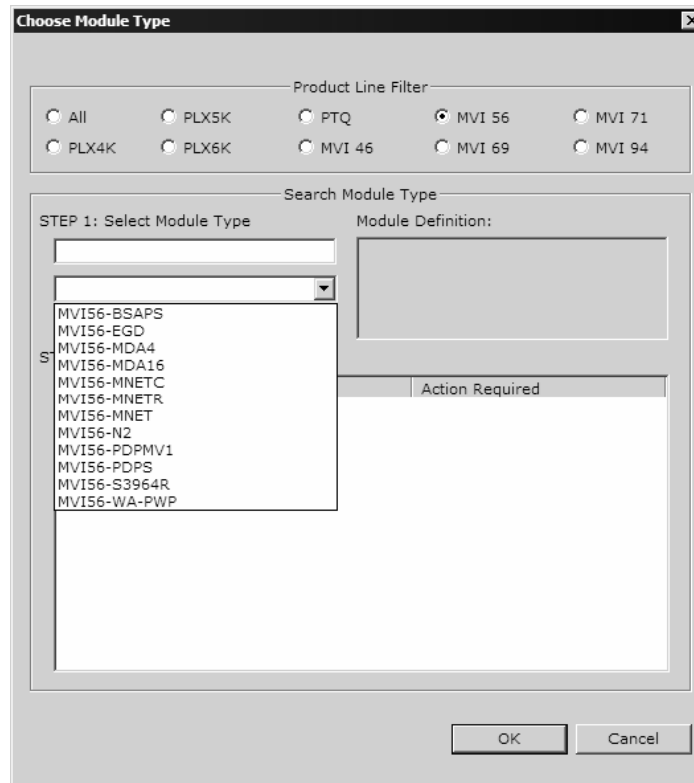
To begin, start ProSoft Configuration Builder. If you have used other Windows configuration tools before, you will find the screen layout familiar. ProSoft Configuration Builder's window consists of a tree view on the left, an information pane and a configuration pane on the right side of the window.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



Your first task is to add the MVI56-S3964R module to the project.

- 1 Use the mouse to select "Default Module" in the tree view, and then click the right mouse button to open a shortcut menu.

- 2 On the shortcut menu, choose "Choose Module Type". This action opens the Choose Module Type dialog box.



- 3 In the Product Line Filter area of the dialog box, select MVI56. In the Select Module Type dropdown list, select MVI56-S3964R, and then click OK to save your settings and return to the ProSoft Configuration Builder window.

The next task is to set the module parameters.

Adding a Project

To add a project to an existing project file:

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

Adding a Module

To add a module to your project:

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

or

- 1 Open the Project menu and choose Location

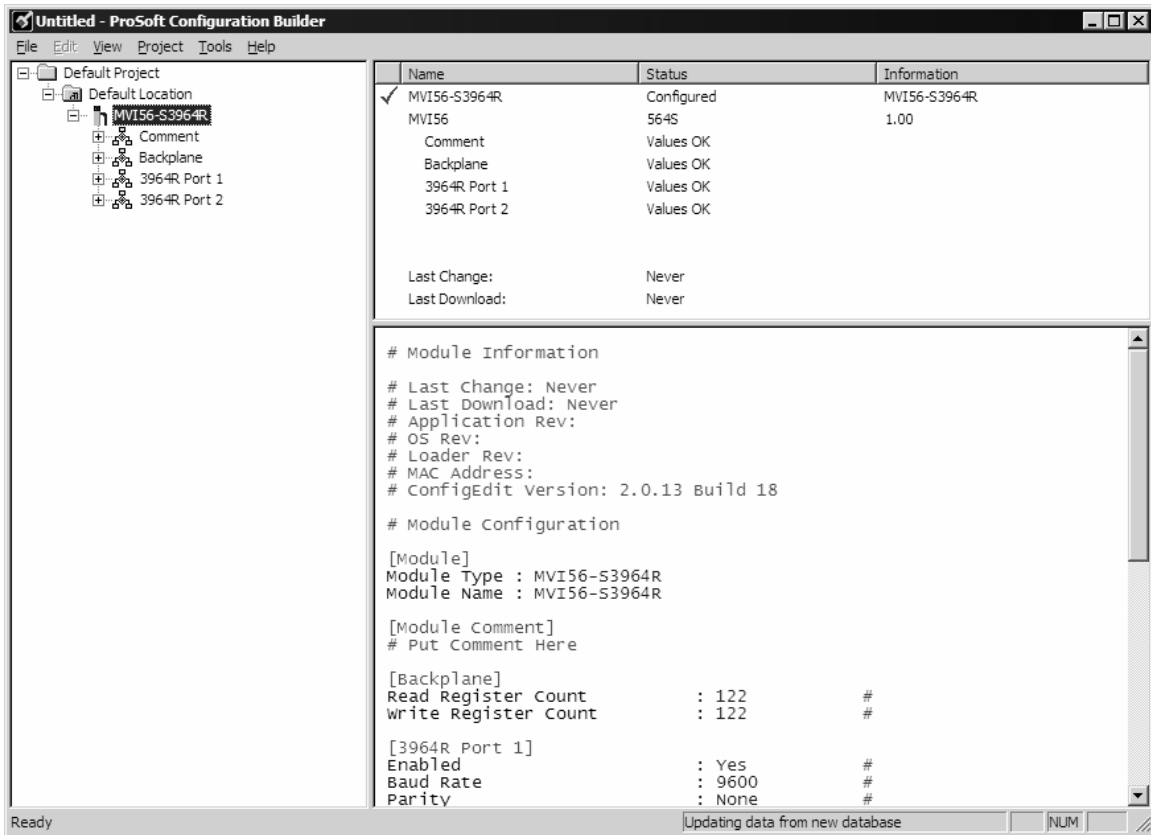
- 2 On the Location menu, choose Add Module.

To add a module to a different location:

- 1 Right-click the Location folder and choose Add Module. A new module icon appears.
 or
 Select the Location icon.
- 2 From the Project menu, select Location, then select Add Module.

2.2.2 Set Module Parameters

Notice that the contents of the information pane and the configuration pane changed when you added the MVI56-S3964R module to the project.





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

To rename an object:

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



Module Entries

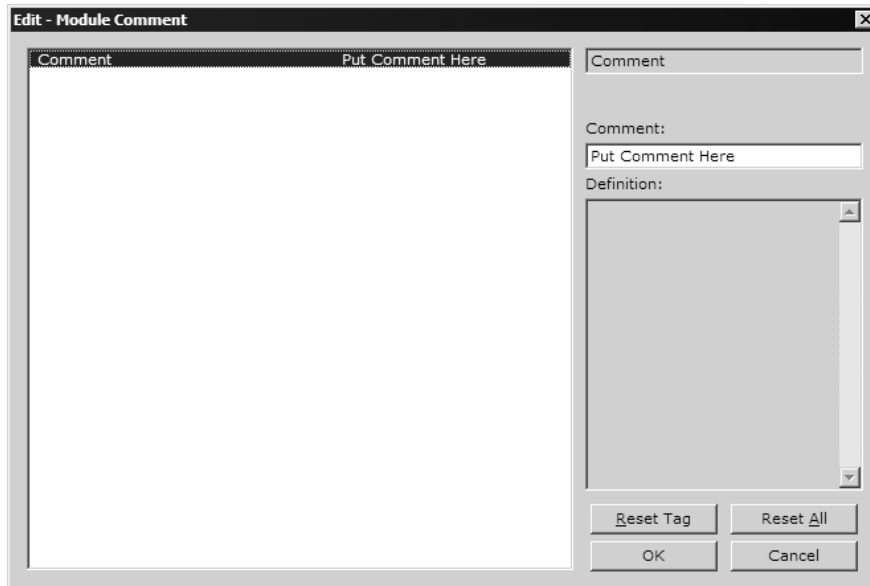
To configure module parameters

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

Comment Entries

To add comments to your configuration file:

- 1 Click the plus sign to the left of the  Comment icon to expand the Module Comments.
- 2 Double-click the  Module Comment icon. The Edit - Module Comment dialog appears.



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

Printing a Configuration File

To print a configuration file:

- 1 Select the Module icon, and then click the right mouse button to open a shortcut menu.
- 2 On the shortcut menu, choose View Configuration. This action opens the View Configuration window.
- 3 On the View Configuration window, open the File menu, and choose Print. This action opens the Print dialog box.

- 4 On the Print dialog box, choose the printer to use from the dropdown list, select printing options, and then click OK.

2.3 [Module]

This section defines the configuration for the Module level data.

2.3.1 Module Name

0 to 80 characters

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

2.4 [Backplane 56]

```
[Backplane 56]
Status Interval:      0 #Minimum interval (ms) between status blocks (0 =
disable)
```

2.4.1 Block Transfer Size

60

This read-only parameter specifies the number of words in each block transferred between the module and processor. This value is fixed at 60 words.

2.4.2 Status Interval

Minimum interval (ms) between status blocks (0 = disable)

2.5 [3964R Port x]

This section is used to define the port 1 configuration for the 3964R device

```
[3964R Port 1]
Enable           : Yes #No=Port Disabled,Yes=Port Enabled
Baud Rate       : 9600 #Baud rate for port (300, 600, 1200, 2400, 4800,
                  #9600, 19200, 38400, 57600, 115)
Parity          : Even #N=None,O=Odd,E=Even
Data Bits       : 8 #7 or 8 data bits for messages
Stop Bits       : 1 #1 or 2 stop bits for messages
RTS On          : 0 #Delay after RTS set before message sent (mSec)
RTS Off         : 0 #Delay after message before RTS dropped (mSec)
Use CTS Line    : No #Monitor CTS modem line (Y/N)
Swap            : 0 #0=No Data Byte Swapping, 1=Data Byte Swapping
Priority        : 1 #0=High Priority, 1=Low Priority
Protocol        : 0 #0=3964 RK512, 1=3964
ACK Delay       : 1000 #Number of mSec to wait for ACK (Default 1000ms)
Setup Attempts  : 1 #Number of times to try to connect to CP (Default 6)
Transmit Attempts : 1 #Number of times to try to transmit to CP (Default 6)
```

2.5.1 Enable

Yes or No

This parameter specifies whether to enable or disable the port. No = Port Disabled, Yes = Port Enabled.

2.5.2 Baud Rate

300 to 115200

This parameter specifies the baud rate to be used on the port. Valid values are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.

2.5.3 Parity

N, O, E

This parameter specifies the parity setting for this port. Valid values are N = None, O = Odd, E = Even.

2.5.4 Data Bits

7 or 8

This parameter specifies the number of message data bits. Valid values are 7 or 8 bits.

2.5.5 Stop Bits

1 or 2

This parameter specifies the number of message stop bits. Valid values are 1 or 2 stop bits.

2.5.6 RTS On

Delay (in milliseconds) after RTS before message is sent.

2.5.7 RTS Off

Delay (in milliseconds) after message before RTS dropped.

2.5.8 Use CTS Line

Yes or No

This parameter specifies whether or not to monitor CTS modem line.

2.5.9 Swap

0 or 1

This parameter specifies whether bytes should be swapped. 0 = No data byte swapping, 1 = Data byte swapping.

2.5.10 Priority

0 or 1

This parameter specifies whether the data is high priority or low priority. 0 = High priority, 1 = Low Priority.

2.5.11 Protocol

0 or 1

0=3964 RK512, 1=3964

2.5.12 ACK Delay

Number of milliseconds to wait for ACK. The default is 1000 ms.

2.5.13 Setup Attempts

Number of times to try to connect to CP (Default 6)

2.5.14 Transmit Attempts

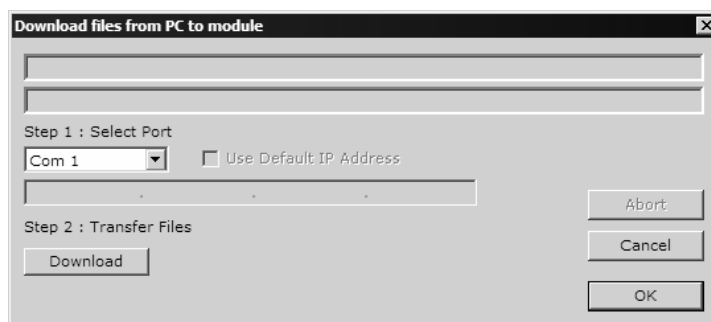
Number of times to try to transmit to CP (Default 6)

2.6 Download the Project to the Module

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

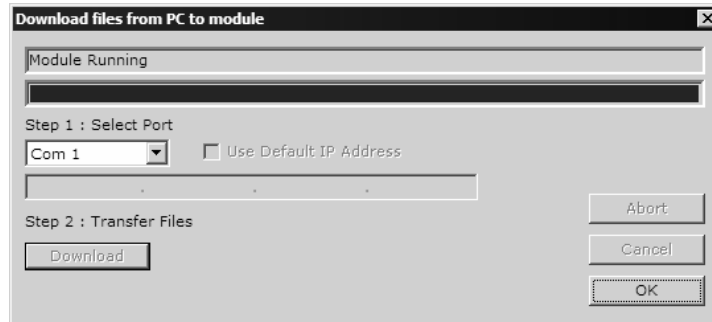
To Download the Project File

- 1 In the tree view in ProSoft Configuration Builder, click once to select the MVI56-S3964R module.
- 2 Open the **Project menu**, and then choose **Module / Download**. The program will scan your PC for a valid com port (this may take a few seconds). When PCB has found a valid com port, the following dialog box will open.



- 3 Choose the com port to use from the dropdown list, and then click the Download button.

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



3 Ladder Logic

In This Chapter

- ❖ Introduction..... 35
- ❖ Commands 36

Ladder logic is required for application of the MVI56-S3964R 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 is extensively commented, to provide information on the purpose and function of each rung. For most applications, the sample ladder will work without modification.

3.1 Introduction

The example programs mentioned in the following paragraphs illustrate the principle of how to communicate between an MVI56-S3964R and a ControlLogix processor. All programs mentioned were tested with appropriate communication partners.

It is up to the programmer to examine the programs in detail and integrate them into the ControlLogix processor application.

The following setups/limitations are to be observed in the example programs:

Changes according to the requirements of your ControlLogix system are recommended for setups only. Limitations must not be changed.

- **Setup:** The MVI56-S3964R resides in slot 2 of the ControlLogix chassis.
- **Setup:** The 1756-L series controller resides in slot 0 of the ControlLogix chassis.



ATTENTION: You must be trained in programming and operating Rockwell Automation 1756-L series controllers and ControlLogix environment. Otherwise, incorrect use may lead to personal injury or death, property damages or economic loss.

3.1.1 Explanations About the Example Programs

is the general S3964R communication program used for the following types of 3964R jobs:

3.1.2 The 3964R Communication Program

The general functionality of the program is as follows:

Send jobs to a CP:

- Transfer the job data to the MVI56-S3964R.
- Acknowledgement from the MVI56-S3964R regarding validity of the job data.
- Depending on the type of send job the transfer of the user data from/to the MVI56-S3964R/ControlLogix processor takes place.
- Acknowledgement from the MVI56-S3964R regarding successful/unsuccessful completion of the send job.

Receive jobs from a CP:

- Depending on the type of receive job the transfer of the user data from/to the MVI56-S3964R/ControlLogix processor takes place. The header data generated from the MVI56-S3964R will be added automatically. The MVI56-S3964R needs no extra job data from the ControlLogix processor for receive jobs, it will be triggered through the STX character sent from the CP to establish the communication.
- Acknowledgement from the MVI56-S3964R regarding successful/unsuccessful completion of the receive job.

During the processes described above additional status/error messages may be transferred from the MVI56-S3964R to the ControlLogix processor (refer to Module Status Data Table (page 65)). Refer to Error Processing for more information.

3.2 Commands

The WriteData sub-routine is used to handle special block processing, as well as 3964R communication jobs.

Special blocks include:

- 9998 - Warm Boot
- 9999 - Cold Boot

3.2.1 9998 Warm Boot

The ControlLogix processor can request a warm boot operation of the module by placing a value of 9998 in Word 0 of the module's Output Image.

3.2.2 9999 Cold Boot

The ControlLogix processor can request a cold boot operation by the module by placing a value of 9999 in Word 0 of the module's Output Image.

4 Diagnostics and Troubleshooting

In This Chapter

- ❖ Reading Status Data from the Module 37
- ❖ LED Status Indicators..... 47

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

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

4.1 Reading Status Data from the Module

The MVI56-3964R module returns a 31-word Status Data Block (page 65) that may be used to determine the module's operating status.

This data is transferred to the ControlLogix processor every time the module does not have 3964R communication data to send to the processor.

The Configuration/Debug port provides the following functionality:

- Full view of the module's configuration data
- View of the module's status data
- Version Information
- Control over the module (warm boot, cold boot, transfer configuration)

4.1.1 Required Hardware

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

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

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

4.1.2 The Configuration/Debug Menu

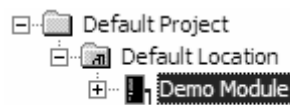
The Configuration and Debug menu for this module is arranged as a tree structure, with the Main Menu at the top of the tree, and one or more sub-menus for each menu command. The first menu you see when you connect to the module is the Main menu.

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

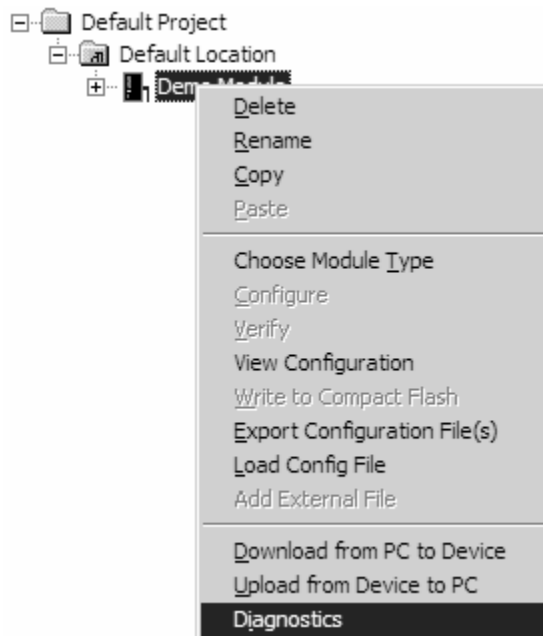
Using the Diagnostic Window in ProSoft Configuration Builder

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

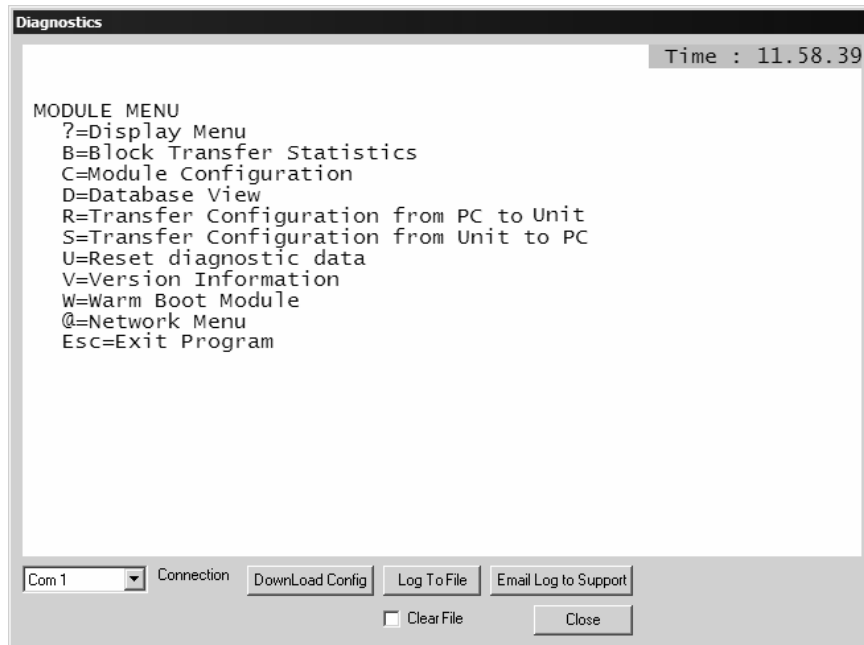
- 1 Start PCB program with the application file to be tested. Right click over the module icon.



- 2 On the shortcut menu, choose Diagnostics.



- This action opens the Diagnostics dialog box. Press "?" to display the Main Menu.



Important: The illustrations of configuration/debug menus in this section are intended as a general guide, and may not exactly match the configuration/debug menus in your own module.

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

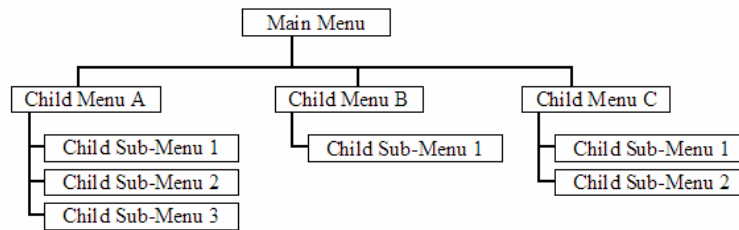
- Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.
- On computers with more than one serial port, verify that your communication program is connected to the same port that is connected to the module.

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

Navigation

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

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



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

Keystrokes

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

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

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

4.1.3 Main Menu

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

```
MVI3964R MENU
?=Display Menu
V=Version Information
D=Database Menu
C=Clear diagnostic data
B=Backplane Menu
0=Protocol_Serial_3964R 1
1=Protocol_Serial_3964R 2
S=Transfer Configuration from Unit to PC
R=Transfer Configuration from PC to Unit
W=Warm Boot Module
Esc=Exit Program
```

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

Redisplaying the Menu

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

Viewing 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.

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.

Clearing Diagnostic Data

Press **[C]** to clear diagnostic data from the module's memory.

Opening the Backplane Menu

Press **[B]** from the Main Menu to view the Backplane Data Exchange List. Use this command to display the configuration and statistics of the backplane data transfer operations.

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

Opening the Protocol Serial S3964R Menu

Press **[0]** or **[1]** from the Main Menu to open the Protocol_Serial_S3964R menu for S3964R Ports 1 and 2.

Use this command to view communication status and statistics for the selected port. This information can be useful for trouble-shooting communication problems.

Transferring the Configuration File from MVI56 module to PC

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

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

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

Transferring the Configuration File from PC to MVI56 module

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

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

After the file has been successfully downloaded, the module will restart the program and load the new configuration information. Review the new configuration using menu commands **[0]** and **[1]** to verify that the module is configured correctly.

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.

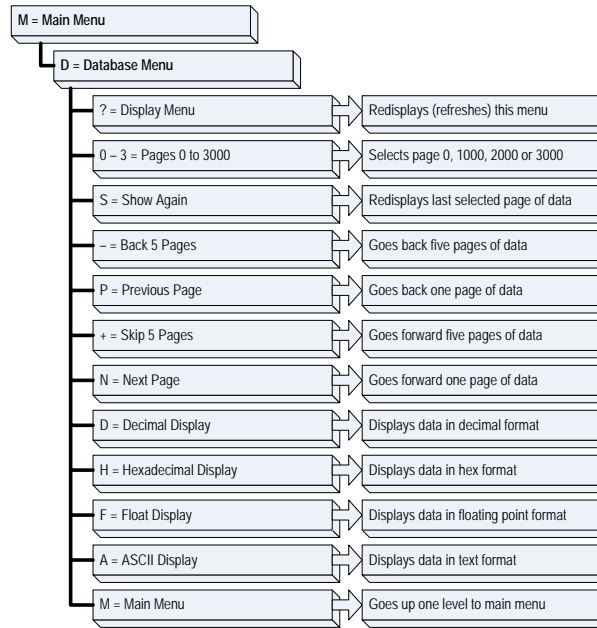
Exiting the Program

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

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

4.1.4 Database View Menu

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



Viewing Register Pages

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

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

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

Displaying the Current Page of Registers Again

```

DATABASE DISPLAY 0 TO 99 <DECIMAL>
 100  101  102   4   5   6   7   8   9  10
  11  12  13  14  15  16  17  18  19  20
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0
  
```

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

Moving Back Through 5 Pages of Registers

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

Viewing the Previous 100 Registers of Data

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

Skipping 500 Registers of Data

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

Viewing the Next 100 Registers of Data

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

Viewing Data in Decimal Format

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

Viewing Data in Hexadecimal Format

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

Viewing Data in Floating Point Format

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

Viewing Data in ASCII (Text) Format

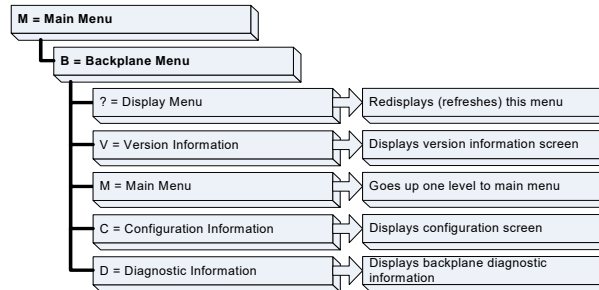
Press **[A]** to display the data on the current page in ASCII format. This is useful for regions of the database that contain ASCII data.

Returning to the Main Menu

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

4.1.5 Backplane Menu

Press **[B]** from the Main Menu to view the Backplane Data Exchange List. Use this command to display the configuration and statistics of the backplane data transfer operations. Press **[?]** to view a list of commands available on this menu.



Redisplaying the Menu

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

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.

Returning to the Main Menu

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

Viewing Configuration Information

Press **[C]** to view configuration information for the selected port, protocol, driver or device.

Viewing Backplane Diagnostic Information

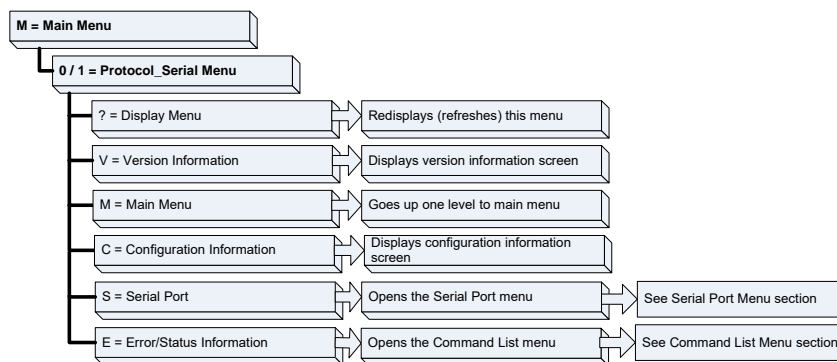
Press **[D]** to view Backplane Diagnostic information.

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

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

4.1.6 Protocol Serial 3964R Menu

Press **[0]** or **[1]** to view protocol serial information for ports 1 and 2, respectively. Use this command to view a variety of error and status screens for the port. Press **[?]** to view a list of commands available on this menu.



Redisplaying the Menu

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

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.

Returning to the Main Menu

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

Viewing Configuration Information

Press **[C]** to view configuration information for the selected port, protocol, driver or device.

Opening the Serial Port Menu

Press **[S]** to open the Serial Port menu. Use this command to view and change additional serial port driver settings.

Viewing Error and Status Data

Press **[E]** to display the error/status data for the module.

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 being transferred between master and port 1.
		Off	No data
P2	Green	On	Data being transferred between master and port 2.
		Off	No data
APP Status	Amber	Off	The MVI56-3964R is working normally.
		On	The MVI56-3964R module program has recognized a communication error.
BP ACT	Amber	On	The LED is on when the module is performing a write operation on the backplane.
		Off	The LED is off when the module is performing a read operation on the backplane. Under normal operation, the LED should blink rapidly on and off.
OK	Red/ Green	Off	The card is not receiving any power and is not securely plugged into the rack.
		Green	The module is operating normally.
		Red	The program has detected an error or is being configured. If the LED remains red for over 10 seconds, the program has probably halted. Remove the card from the rack and re-insert the card to restart the module's program.
BAT	Red	Off	The battery voltage is OK and functioning.
		On	The battery voltage is low or battery is not present. Allow battery to charge by keeping module plugged into rack for 24 hours. If BAT LED still does not go off, contact ProSoft Technology, as this is not a user serviceable item.

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	<p>This indicates that backplane transfer operations are failing. Connect to the module's Configuration/Debug port to check this.</p> <p>To establish backplane communications, verify the following items:</p> <ul style="list-style-type: none">▪ 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	<p>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.</p>

5 Reference

In This Chapter

❖ Product Specifications	51
❖ Functional Overview	53
❖ Cable Connections	61
❖ Reference Documents	65
❖ Status Data	65
❖ Error Codes	66

5.1 Product Specifications

The MVI56 S3964R Protocol module from ProSoft Technology allows point-to-point communication between a ControlLogix processor (1756-L1, -L1Mx, L55, L6x) and a partner with 3964R communication capability.

5.1.1 Features and Benefits

The 3964R protocol (with or without RK512) was designed by Siemens for bi-directional data communication through a point-to-point connection. It is a peer to peer protocol with read and write access. A BCC checksum ensures the safety of the transfer.

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)
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

- Single-slot, ControlLogix backplane compatible
- Multiple modules can be placed in a rack up to the chassis power supply limit
- While in 3964R with RK512 mode on PRT1 and PRT2, DB-SEND and DB-FETCH instructions can be initiated from the ControlLogix processor or received by the communications partner
- While in 3964R without RK512 mode on PRT1 and PRT2, data can be sent from the ControlLogix processor or be received from the communications partner
- The maximum transfer size is 512 bytes in any mode
- Data byte swapping can be configured to adjust to a different word format

- While in 3964R with RK512 mode on PRT1 and PRT2, evaluation of the header information DB (data block), DW (data word) and coordination bytes 9 and 10 is possible
- Communication activity and diagnostics are available through LEDs and acknowledgment telegrams

Ladder Logic

Ladder logic programming in the ControlLogix processor is required in order to enable and support the Siemens 3964R protocol functionality. The ladder program handles the encoding/decoding of data transferred from the module as well as the initiation of protocol-specific functionality in the module. Example ladder programs are provided with the module to simplify the implementation of the module in the user application.

5.2 Functional Overview

5.2.1 Products in the Environment

The 3964R protocol can be installed in all local ControlLogix chassis with at least one controller.

You can obtain more information about ControlLogix and the ControlLogix environment through your Rockwell Automation branch office.

Product Compatibility

The communication between the MVI56 and the ControlLogix processor is realized through the module's Input/Output Images.

5.2.2 3964R Protocol Overview

The 3964R Protocol in General

The 3964R protocol defined by Siemens is used for bi-directional data exchange between two peers through a bit-serial point-to-point connection. This protocol may be additionally embedded in the RK512 telegram level. If 3964R is used with RK512, each participant can send jobs to its partner and has read (**DB-FETCH**) and write access (**DB-SEND**) to the partner's data. The data exchange is realized in the form of messages and response messages. The maximum user data volume is 512 byte per job and 128 byte per message.

3964R without RK512 allows only block wise sending and receiving of data. The detailed handshake procedure through messages and response messages is not applicable in this case.

If both partners want to send a job (3964R with RK512) or data (3964R without RK512) at the same time, the resulting initialization conflict will be solved through the high/low priority setup. In such a case one partner will be allocated high priority and the other one low priority. Thus, in case of an initialization conflict the device with low priority will defer its job whereas the device with the high priority will be able to send a job.

The safety of data transmission on the line is guaranteed by a **BCC** checksum.

You should have sufficient knowledge about the 3964R protocol in order to understand the operation of the driver for the MVI56-S3964R and to make efficient use of the example programs.

MVI56-S3964R Operation

The protocol realized on the MVI56-S3964R has the following special features:

- Immediately after power-up and completion of the internal/external initialization procedures the MVI56-S3964R with installed 3964R protocol is ready to serve as an interface between a ControlLogix processor and one or two communication partners using 3964R protocol. The parameterization of the module is realized through a configuration file. This is where a differentiation between the communication modes 3964R with RK512 and 3964R without RK512 takes place.
- The communication mode 3964R without RK512 supports processing of up to 512 bytes.
- The serial transmission parameters are optional and can be allocated independently to each interface. Possible baud rates are 300 to 115200. The following parity setups are possible: **Even, Odd and None**.

5.2.3 General Concepts

Module Power Up

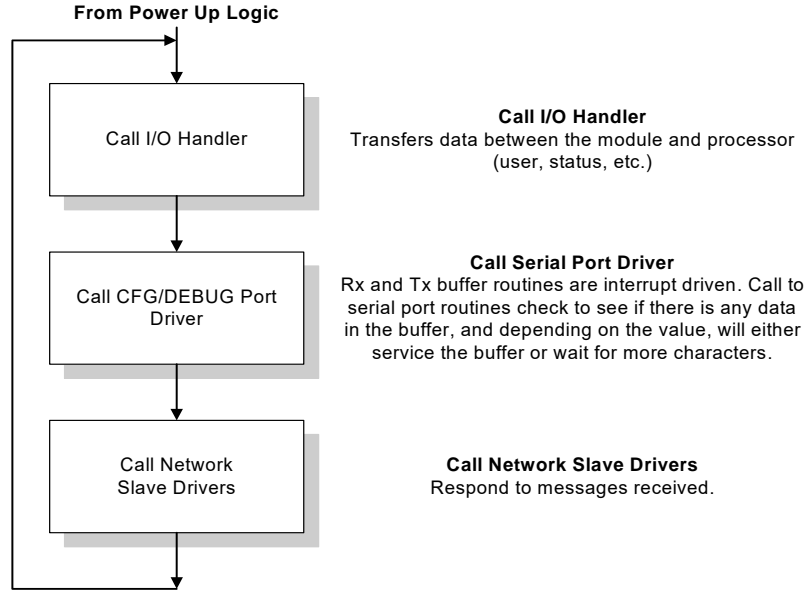
On power up the module begins performing the following logical functions:

- Initialize hardware components
 - Initialize ControlLogix backplane driver
 - Test and Clear all RAM
 - Initialize the serial communication ports
- Read module configuration from the Compact Flash
- Initialize Module Register space
- Set up the communication interface for the debug/configuration port

When this initialization procedure is complete, the module will begin communicating with other nodes on the network, depending on the configuration.

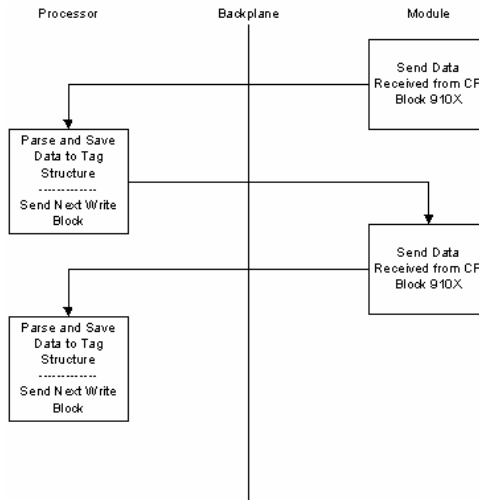
Main Logic Loop

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

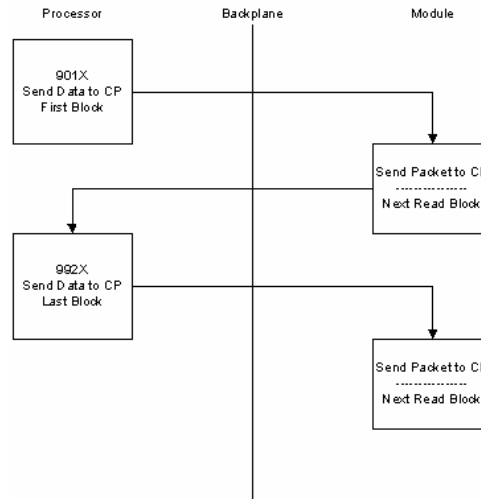


Backplane Data Transfer

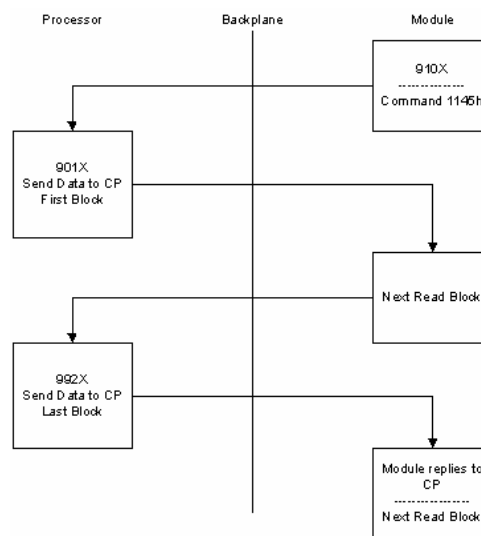
Receive from CP



Send to CP



Request from CP



Block ID for the transfer of data from the processor to the module to be sent out the serial port

9	X	X	X
9	Always 9	0	Not Last Block
		9	Last block
		1	Block 1
		2	Block 2
		3	Block 3
		4	Block 4
		5	Block 5

- 9011 First block for port 1
- 9921 Second and last block for port 1
- 9912 First and last block for port 2

Send Block for Module to send to CP (Block 1)

Offset	Data	Length
0	9X1X	1
1	Header	10
11	Data	50

Send Block for Module to send to CP (Blocks 2 to 4)

Offset	Data	Length
0	9X2X, 9X3X, 9X4X	1
1	Data	60

Request for data Block from Module to respond to CP

Offset	Data	Length
0	910X	1
1	Reserved	2
3	1145h	1
4	Data Block (DB)	1
5	Data Word (DW)	1
6	Number of Data Words	1
7	Coordination Bytes	1
8	Data Type (4Dh/44h)	1
9 to 12	Reserved	4

Receive Data from CP (First Block)

Offset	Data	Length
0	910X	1
1	Reserved	1
2	Data Block 1	1
3	1141h/11FFh	1
4	Data Block (DB)	1
5	Data Word (DW)	1
6	Number of Data Words	1
7	Coordination Bytes	1
8	Data Type (4Dh/44h)	1
9 to 12	Reserved	4
13	Data	49

Receive Data from CP (Blocks 2 to 4)

Offset	Data	Length
0	910X	1
1	Reserved	1
2	Data Block (2 to 4)	1
3	Data	59

Receive Data from CP (Block 5)

Offset	Data	Length
0	910X	1
1	Reserved	1
2	Data Block (5)	1
3	Data	30

5.2.4 Communications

Job Allocation by the ControlLogix Controller

This section describes the different types of jobs and the relevant parameters to be entered. For a better understanding a printout of the sample ladder file is recommended.

Every job that is transferred to or from the MVI56-S3964R consists of defined header data and user data.

The Job structure in general:

Word:	High Byte:	Low Byte:
0	Header data	
..	..	
9	Header data	
10	User data	
..	..	
137	User data	

Header Data

The header data consists of 10 words with a job identifier and parameter data.

The header data is to be entered either in the file **HEADER_P1** to send to port 1 or the file **HEADER_P2** to send to port 2.

The header in general:

Word:	High Byte:	Low Byte:
0	Job identifier (hex)	
1	00	Data Block (DB)
2	00	Data Word (DW)
3	Number of data words/data bytes	
4	Coordination byte 9	Coordination byte 10
5	00	Data Type
6	00	00
7	00	00
8	00	00
9	00	00

The meaning of the entries and possible values are described below.

Job Identifier

The job identifiers are defined as follows:

Send jobs to a CP:

Job:	Identifier:
3964R with RK512: DB-SEND to CP	0041hex
3964R with RK512: DB-FETCH to CP	0045hex

The MVI56-S3964R receives jobs from a CP automatically without extra parameterization. To differentiate the header data the MVI56-S3964R adds a header to the user data received and transfers it to the ControlLogix processor.

Receive jobs from a CP

Job:	Identifier:
3964R with RK512: DB-SEND from CP	1141hex
3964R with RK512: DB-FETCH from CP	1145hex

Data Block (DB)

Number of the data block. This data block must exist in the communication partner (3964R with RK512 only, otherwise to be set to "0").

Data Word (DW)

Number of the data word in the selected data block. The selected data block must contain this number (3964R with RK512 only, otherwise to be set to "0").

Number of Data Words/Data Bytes

Dependent on the type of communication mode used on port 1/2 of the module, this value will be interpreted as number of data words. This value defines whether a job will be carried out with or without subsequent telegram. For jobs without subsequent telegram the value will be 1 ... 64 words (1 ... 128 bytes), and for jobs with subsequent telegram(s) it will be 65 ... 256 words (129 ... 512 bytes).

Coordination Byte 9/10

3964R with RK512 send jobs offer the possibility of entering so called coordination bytes (byte 9 and 10 in the RK512 telegram header). Otherwise to be set to "0".

Data Type

The send message can request a data type of Data Words (44h) or Marker (4Dh). If the value is 0 (zero), then data words is used.

Receive Jobs

To receive jobs from a CP only, no additional parameterization is necessary. The user data received is stored in a file in the ControlLogix processor.

The following table shows an example of the data *stored* in HeaderCom1 in case of a DB-Send from a CP. The CP is connected to port 1.

Word:	High Byte:	Low Byte:
0	1141hex	
1	00	Data Block (DB)
2	00	Data Word (DW)
3	Number of data words (total number) ¹	
4	Number of data words (actual block) ²	
5	00	00
6	00	00
7	00	00
8	00	00
9	00	00

¹ = This is the total number of data words for the whole job.

² = This is the number of data words stored in RecvDataCom1.

The user data is copied to **RecvDataCom1**. This is the file you should operate with.

For port 2, which is similar to port 1, the file for storing the user data received is called **RecvDataCom2**.

Send Jobs

To send a job to a CP, the next step is to define the appropriate header for the job. The following table shows an example of the header data for a DB-Send job to a CP with the following parameters:

DB = 10, DW = 0, 128 words, coordination byte 9 = FFhex, coordination byte 10 = FFhex, Data Type = 44hex.

Word:	High Byte:	Low Byte:
0	0041hex	
1	00	10
2	00	0
3	80hex (= 128dec)	
4	FFhex	FFhex
5	00	44hex
6	00	00
7	00	00
8	00	00
9	00	00

A DB-Fetch job will be parameterized similar to the example above.

To send with 3964R without RK512 to a CP (identifier 00FFhex), the values for DB, DW and the coordination bytes will be ignored and can be set to "0".

The next step is to copy the user data into the appropriate files of the ControlLogix processor.

5.2.5 Job Processing

Both ports can be used independently from each other (multi tasking).

A possible initialization conflict will be solved as follows:

MVI56-S3964R has "High Priority":

The MVI56-S3964R retries the sending of the 3964R start character (STX) 3 times and waits for the CP to send the 3964R acknowledge (DLE). If the CP does not send the acknowledge as expected the communication will fail and has to be restarted.

MVI56-S3964R has "Low Priority":

The MVI56-S3964R rejects its send job and sends the 3964R acknowledge (DLE) to the CP.

Important: If the MVI56-S3964R has rejected its send job due to "Low Priority", you must restart its send job completely (starting with the copying of the job data).

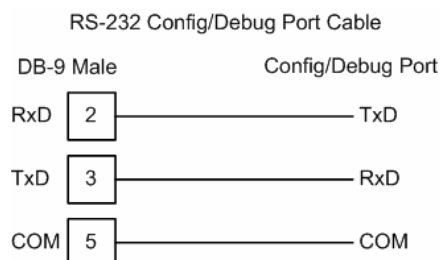
5.3 Cable Connections

The application ports on the MVI56-S3964R module support RS-232 and RS-422 interfaces. Please look at 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

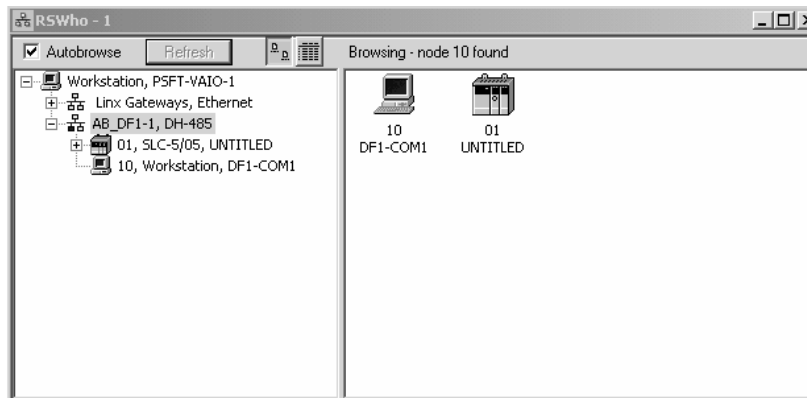
This port is physically an RJ45 connection. An RJ45 to DB-9 adapter cable is included with the module. This port permits a PC based terminal emulation program to view configuration and status data in the module and to control the module. The cable for communications on this port is shown in the following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



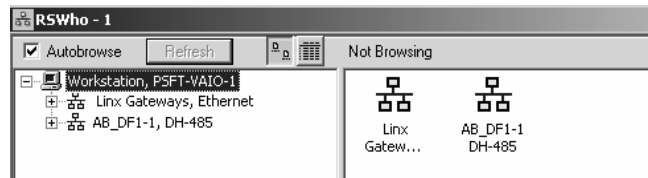
Disabling the RSLinx Driver for the Com Port on the PC

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:

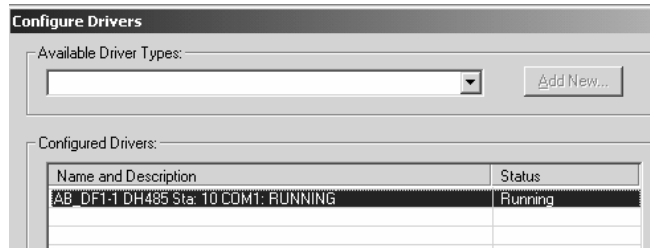


Branches are displayed or hidden by clicking on the  or the  icons.



- 4 When you have verified that the driver is not being browsed, go to **Communications>Configure Drivers**

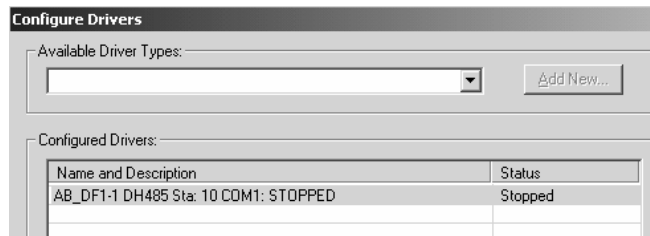
You may see something like this:



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:

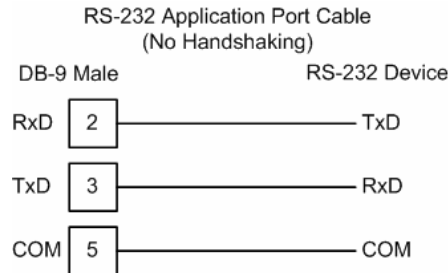


6 Upon seeing this, you may now use that com port to connect to the debug port of the module.

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:



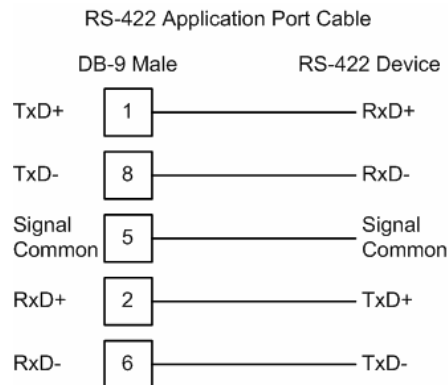
5.3.3 RS-232 Cable

The assignment of the RS-232 connection cable between PRT1/2 (9 pole) and CP-544 (25 pole) is as follows:

PRT1/2 Pin	Description	CP 544 Pin	Description
2	RxD	2	TxD
3	TxD	3	RxD
5	Gnd	7	Gnd

Important: The other pins of the RS-232 must not be used.

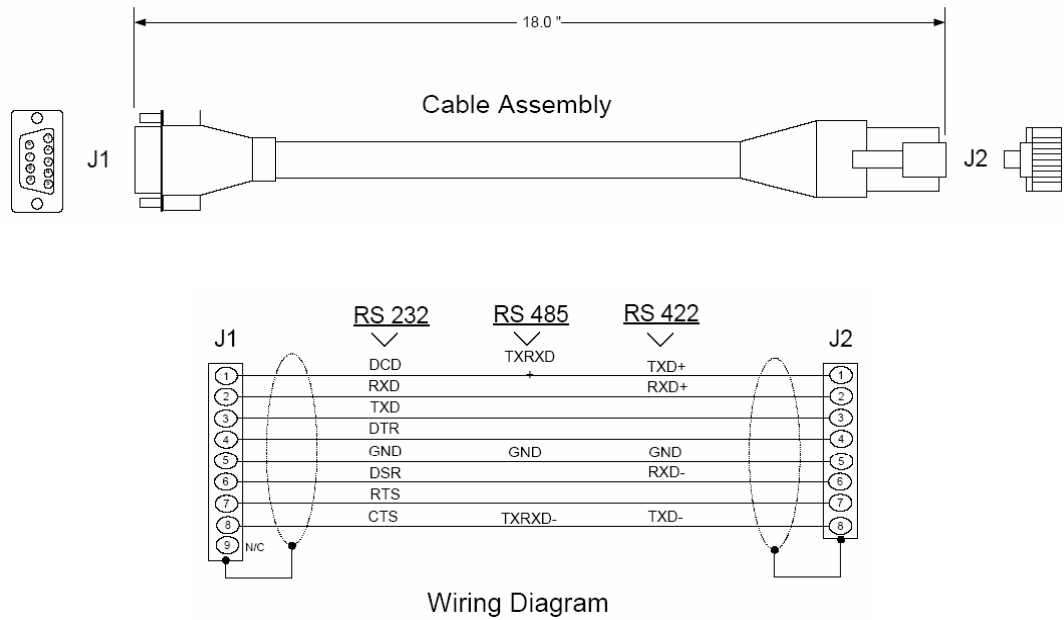
5.3.4 RS-422



RS-422 Tip

If communication in the RS-422 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)



5.4 Reference Documents

Siemens

Simatic CP544

Handbuch zum Kommunikationspartner CP544

Ausgabe 01

Bestell-Nr. 6ES5 998-2DB11

5.5 Status Data

Value	Description
0	Pass Count
1	Product
3	Code
5	Revision
7	Operating System
9	Run Number
11	Port 1 Requests
12	Port 1 Responses
13	Port 1 Errors Sent
14	Port 1 Errors Received
15	Port 1 DLE Not Received

Value	Description
16	Port 1 STX Not Received
17	Port 2 Requests
18	Port 2 Responses
19	Port 2 Errors Sent
20	Port 2 Errors Received
21	Port 2 DLE Not Received
22	Port 2 STX Not Received
23	Backplane Writes
24	Backplane Reads
25	Backplane blocks parsed
26	Backplane Errors
27	Port 1 Current Error
28	Port 1 Last Error
29	Port 2 Current Error
30	Port 2 Last Error

5.6 Error Codes

Error Code	Description
-2 0xFFFFE	DLE could not be sent
-10 0xFFFF6	DLE not received in time
-11 0xFFFF5	Communication Timeout occurred
-20 0xFFEC	Invalid character or acknowledge received
-30 0xFFE2	Amount of user data is 0 or greater than 256 words
-31 0xFFE1	Reject pending job from the processor due to low priority
-32 0xFFE0	No reaction (STX) from Communication Partner
-33 0xFFDF	Communication Partner error occurred
-34 0xFFDE	Job code not defined
-35 0xFFDD	High/High (priority) initialization conflict occurred
-36 0xFFDC	First Header Byte does not match telegram type
-37 0xFFDB	Character received was not an STX
-38 0xFFDA	S3964R problem occurred after connection to Communication Partner was established
-39 0xFFD9	S3964R communication could not be established/finished

6 Support, Service & Warranty

6.1 Contacting Technical Support

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

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

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

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

Note: For technical support calls within the United States, ProSoft's 24/7 after-hours phone support is available for urgent plant-down issues.

North America (Corporate Location)	Europe / Middle East / Africa Regional Office
Phone: +1.661.716.5100 info@prosoft-technology.com Languages spoken: English, Spanish REGIONAL TECH SUPPORT support@prosoft-technology.com	Phone: +33.(0)5.34.36.87.20 france@prosoft-technology.com Languages spoken: French, English REGIONAL TECH SUPPORT support.emea@prosoft-technology.com
Latin America Regional Office	Asia Pacific Regional Office
Phone: +52.222.264.1814 latinam@prosoft-technology.com Languages spoken: Spanish, English REGIONAL TECH SUPPORT support.la@prosoft-technology.com	Phone: +60.3.2247.1898 asiapc@prosoft-technology.com Languages spoken: Bahasa, Chinese, English, Japanese, Korean REGIONAL TECH SUPPORT support.ap@prosoft-technology.com

For additional ProSoft Technology contacts in your area, please visit:

<https://www.prosoft-technology.com/About-Us/Contact-Us>.

6.2 Warranty Information

For complete details regarding ProSoft Technology's TERMS & CONDITIONS OF SALE, WARRANTY, SUPPORT, SERVICE AND RETURN MATERIAL AUTHORIZATION INSTRUCTIONS please see the documents at:

www.prosoft-technology/legal