ProSoft® TECHNOLOGY

Where Automation Connects.

inRAx®

MVI56-MNETCR

ControlLogix Platform

Modbus TCP/IP Multi Client Communication Module for Remote Chassis

May 12, 2014

USER MANUAL

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 our products, documentation, or support, please write or call us.

How to Contact Us

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MVI56-MNETCR User Manual

May 12, 2014

ProSoft Technology® Product Documentation

In an effort to conserve paper, ProSoft Technology no longer includes printed manuals with our product shipments. User Manuals, Datasheets, Sample Ladder Files, and Configuration Files are provided on the enclosed DVD in Adobe® Acrobat Reader file format (.PDFs). These product documentation files may also be freely downloaded from our web site: www.prosoft-technology.com

Warnings

North America Warnings

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

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

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

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

ATEX Warnings and Conditions of Safe Usage

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

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

Markings

Hardware Ratings

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

Label Markings

<cULus>
E183151
CL I Div 2 GP A, B, C, D
Temp Code T6
-30°C <= Ta <= 60°C
<Ex>
II 3 G
EEx nA IIC T6
0°C <= Ta <= 60°C
II – Equipment intended for above ground use (not for use in mines).
3 – Category 3 equipment, investigated for normal operation only.
G – Equipment protected against explosive gasses.

Agency Approvals and Certifications

Agency
RoHS
ATEX
CSA
CE
CSA CB Safety
cULus
GOST-R

Battery Life Advisory

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

Note: The battery is not user replaceable.

Contents

Guide to the MVI56-MNETCR User Manual

Function		Section to Read	Details
Introduction (Must Do)	□	Start Here (page 11)	This section introduces the customer to the module. Included are: package contents, system requirements, hardware installation, and basic configuration.
Diagnostic and Troubleshooting	□	Diagnostics and Troubleshooting (page 73)	This section describes Diagnostic and Troubleshooting procedures.
Reference Product Specifications	□	Reference (page 93) Product Specifications (page 94)	These sections contain general references associated with this product and its Specifications..
Support, Service, and Warranty Index	□	Support, Service and Warranty (page 145) Index	This section contains Support, Service and Warranty information. Index of chapters.

1 Start Here

In This Chapter

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

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

1.1 System Requirements

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

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

1.2 Package Contents

The following components are included with your MVI56-MNETCR 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-MNETCR Module	MVI56-MNETCR	Modbus TCP/IP Multi Client Communication Module for Remote Chassis
1	Cable	Cable #15 - RS232 Null Modem	For RS232 between a Personal Computer (PC) and the CFG port of the module
1	Cable	Cable #14 - RJ45 to DB9 Male Adapter	For connecting the module's port to Cable #15 for RS-232 connections
1	ProSoft Solutions DVD	DVD-001	Contains sample programs, utilities and documentation for the MVI56-MNETCR module.

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

1.3 Installing ProSoft Configuration Builder Software

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

<u>To install ProSoft Configuration Builder from the ProSoft Technology website</u>

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

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

<u>To install ProSoft Configuration Builder from the Product DVD</u>

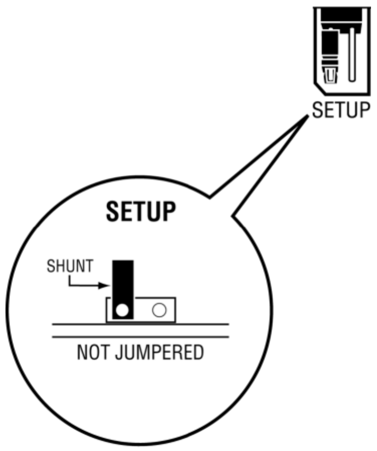
1 Insert the *ProSoft Solutions Product DVD* into the DVD drive of your PC. Wait for the startup screen to appear.
2 On the startup screen, click **PRODUCT DOCUMENTATION**. This action opens a *Windows Explorer* file tree window.
3 Click to open the **UTILITIES** folder. This folder contains all of the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

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

1.4 Setting Jumpers

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

The following illustration shows the MVI56-MNETCR jumper configuration.



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

1.5 Installing the Module in the Rack

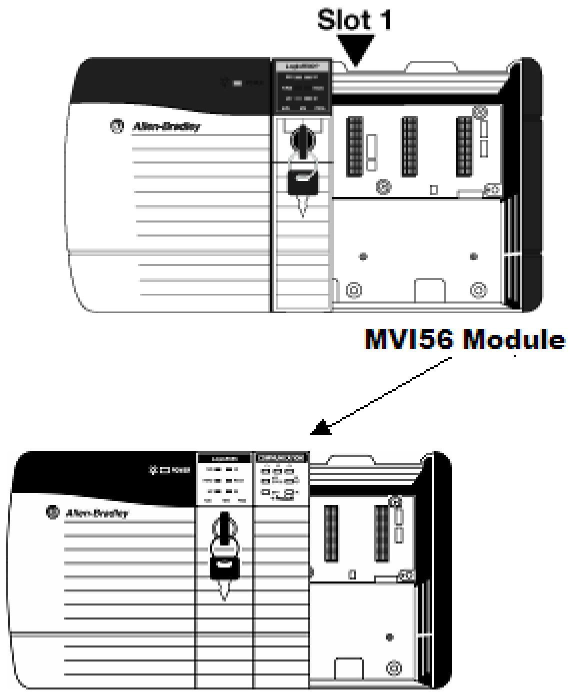
If you have not already installed and configured your ControlLogix processor and power supply, please do so before installing the MVI56-MNETCR module. Refer to your Rockwell Automation product documentation for installation instructions.

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-MNETCR into the ControlLogix chassis. Use the same technique recommended by Rockwell Automation to remove and install ControlLogix modules.

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

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



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

Note: If you insert the module improperly, the system may stop working, or may behave unpredictably.

2 Configuring the MVI56-MNETCR Module

In This Chapter

2.1 Importing the Sample Add-On Instruction

Note: This section only applies if your processor is using RSLogix 5000 version 16 or higher. If you have an earlier version, please see Using the Sample Program (page 138).

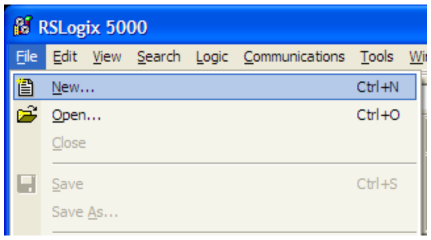
Before You Begin

The following file is required before you start this procedure. Copy the file from the *ProSoft Solutions DVD*, or download it from www.prosoft-technology.com.

File Name	Description
MVI56MNETCR_AddOn_Rung_v1_4.L5X	L5X file containing Add-On instruction, user defined data types, data objects and ladder logic required to set up the MVI56-MNETCR module

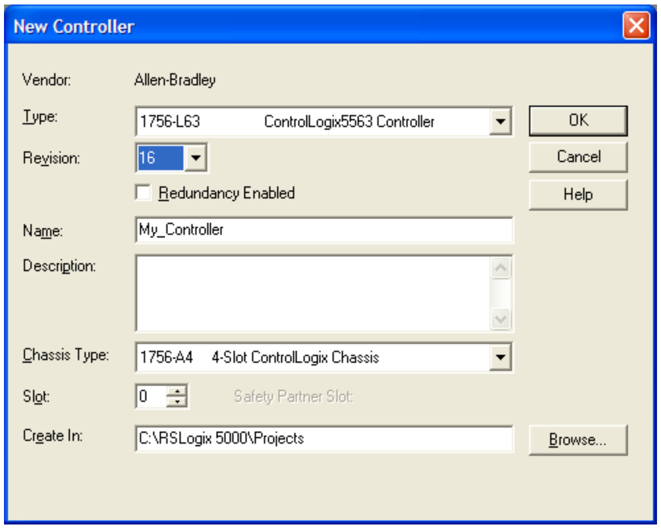
2.1.1 Creating a New RSLogix 5000 Project

1 Open the **FILE** menu, and then choose **NEW**.



2 Select your ControlLogix controller model.
3 Select **REVISION 16**.
4 Enter a name for your controller, such as *My_Controller*.
5 Select your ControlLogix chassis type.

6 Select **SLOT 0** for the controller.



New Controller

Vendor: Allen-Bradley

Type: 1756-L63 ControlLogix5563 Controller

Revision: 16

Redundancy Enabled

Name: My_Controller

Description:

Chassis Type: 1756-A4 4-Slot ControlLogix Chassis

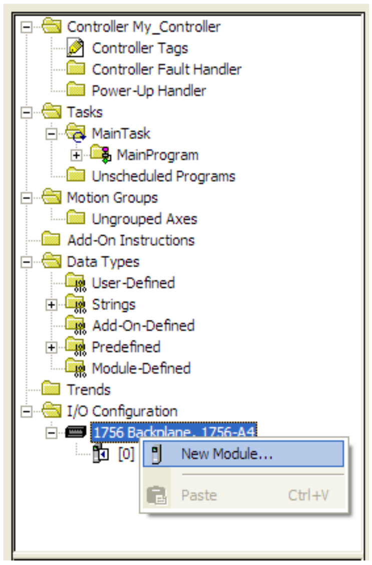
Slot: 0 Safety Partner Slot:

Create In: C:\RSLogix 5000\Projects

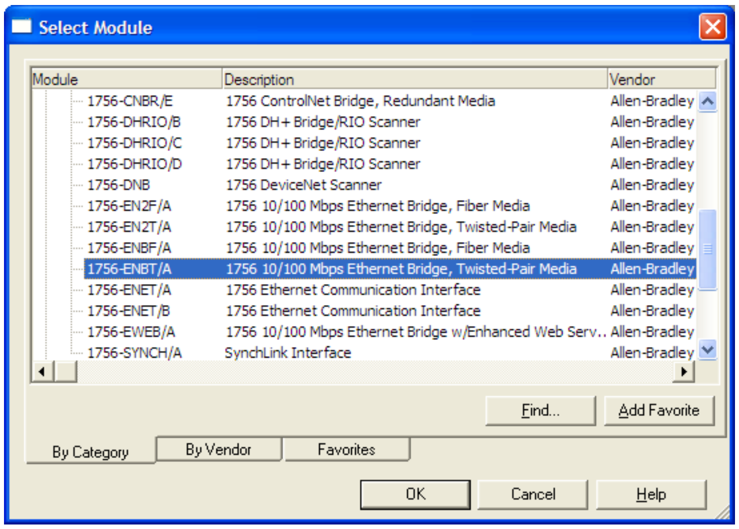
Creating the Remote Network

Note: If you are installing the MVI56-MNETCR module in a remote rack, follow these steps. If you are installing the module in a local rack, follow the steps in Creating the Module - Local Rack (page 25).

1 Right-click **I/O CONFIGURATION** and choose **NEW MODULE**.



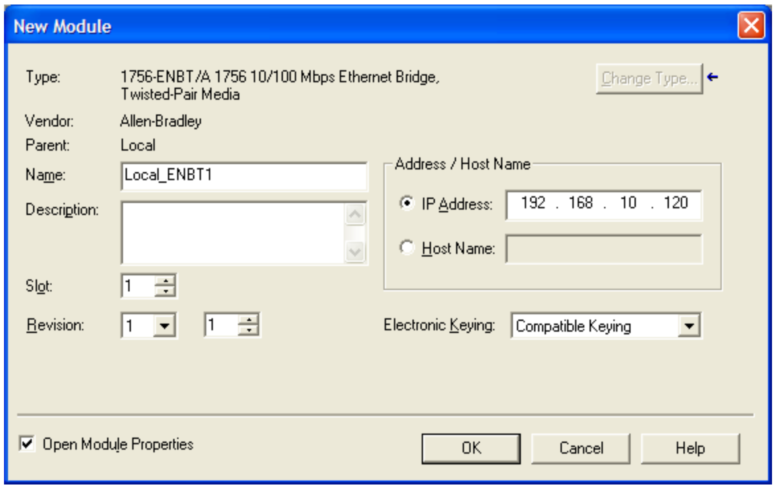
2 Expand the Communications module selections and then select the Ethernet Bridge module that matches your hardware. This example uses a 1756-ENBT/A module.



Module	Description	Vendor
1756-CNBR/E	1756 ControlNet Bridge, Redundant Media	Allen-Bradley
1756-DHRIO/B	1756 DH+ Bridge/RIO Scanner	Allen-Bradley
1756-DHRIO/C	1756 DH+ Bridge/RIO Scanner	Allen-Bradley
1756-DHRIO/D	1756 DH+ Bridge/RIO Scanner	Allen-Bradley
1756-DNB	1756 DeviceNet Scanner	Allen-Bradley
1756-EN2F/A	1756 10/100 Mbps Ethernet Bridge, Fiber Media	Allen-Bradley
1756-EN2T/A	1756 10/100 Mbps Ethernet Bridge, Twisted-Pair Media	Allen-Bradley
1756-ENBF/A	1756 10/100 Mbps Ethernet Bridge, Fiber Media	Allen-Bradley
1756-ENBT/A	1756 10/100 Mbps Ethernet Bridge, Twisted-Pair Media	Allen-Bradley
1756-ENET/A	1756 Ethernet Communication Interface	Allen-Bradley
1756-ENET/B	1756 Ethernet Communication Interface	Allen-Bradley
1756-EWEB/A	1756 10/100 Mbps Ethernet Bridge w/Enhanced Web Serv...	Allen-Bradley
1756-SYNCH/A	SynchLink Interface	Allen-Bradley

Note: If you are prompted to *Select Major Revision*, choose the lower of the available revision numbers.

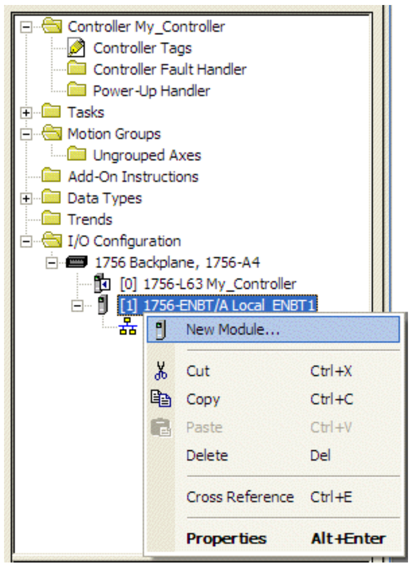
3 Name the ENBT/A module, then set the IP Address and slot location in the local rack with the ControlLogix processor.



Type: 1756-ENBT/A 1756 10/100 Mbps Ethernet Bridge, Twisted-Pair Media
Vendor: Allen-Bradley
Parent: Local
Name: Local_ENBT1
Description:
Slot: 1
Revision: 1 1
[✓ IP Address:] 192 . 168 . 10 . 120
Host Name:
Electronic Keying: Compatible Keying
[✓ Open Module Properties]

4 Click **OK**.

5 Next, select the **1756-ENBT** module that you just created in the *Controller Organization* pane and click the right mouse button to open a shortcut menu. On the shortcut menu, choose **NEW MODULE**.

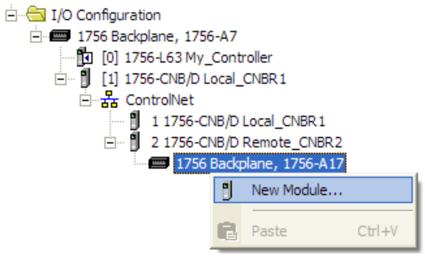


6 Repeat steps 2 and 3 to add the second EtherNet/IP module to the remote rack.

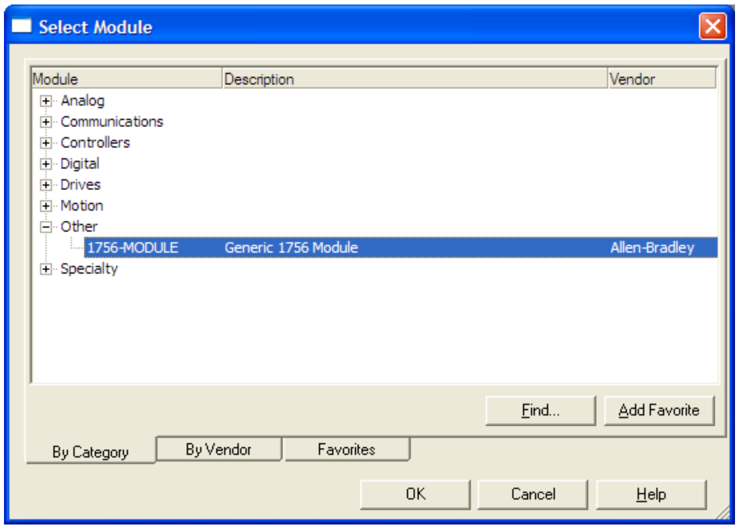
Creating the Module - Remote Rack

Note: To continue installing the MVI56-MNETCR module in a remote rack, follow the next steps. If you are installing the module in a local rack, follow the steps in Creating the Module - Local Rack (page 25).

1 In the *Controller Organization* window, select the remote **1756 BACKPLANE** node, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose **NEW MODULE.**



2 This action opens the *Select Module* dialog box. Expand the **OTHER** node, and then select **1756-MODULE (GENERIC 1756 MODULE)**.

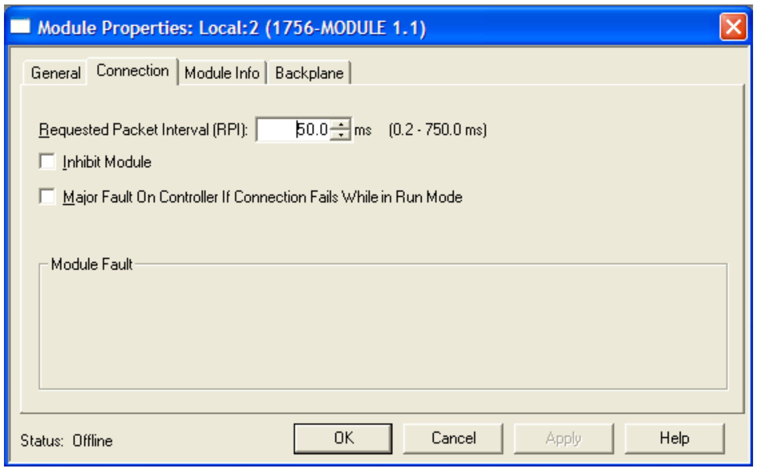


Module	Description	Vendor
Analog		
Communications		
Controllers		
Digital		
Drives		
Motion		
Other		
1756-MODULE	Generic 1756 Module	Allen-Bradley
Specialty		

3 Set the Module Properties values as follows:

Parameter	Value
Name	Enter a module identification string. The recommended value is **MNETCR**.
Description	Enter a description for the module. Example: **MODBUS TCP/IP MULTI CLIENT COMMUNICATION MODULE FOR REMOTE CHASSIS**.
Comm Format	Select **DATA-INT (Very Important)**
Slot	Enter the slot number in the rack where the MVI56-MNETCR module will be installed.
Input Assembly Instance	**1**
Input Size	**42**
Output Assembly Instance	**2**
Output Size	**42**
Configuration Assembly Instance	**4**
Configuration Size	**0**

4 On the *Connection* tab, set the *RPI* value for your project. Fifty (**50**) milliseconds is usually a good starting value.


Module Properties: Local:2 (1756-MODULE 1.1)

General | Connection | Module Info | Backplane

Requested Packet Interval (RPI): 50.0 ms (0.2 - 750.0 ms)

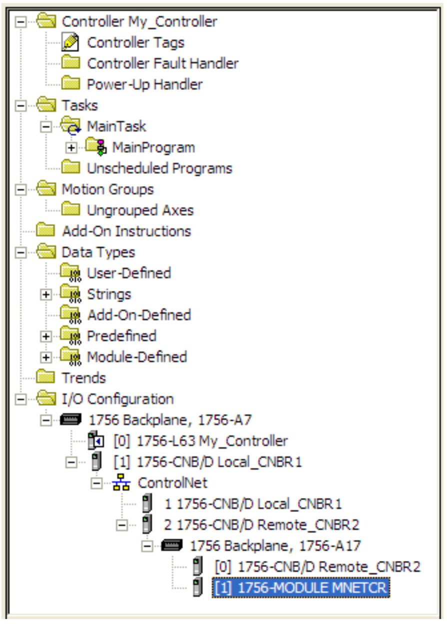
☐ Inhibit Module

☐ Major Fault On Controller If Connection Fails While in Run Mode

Module Fault

Status: Offline

The **MVI56-MNETCR** module is now visible in the *I/O Configuration* pane.

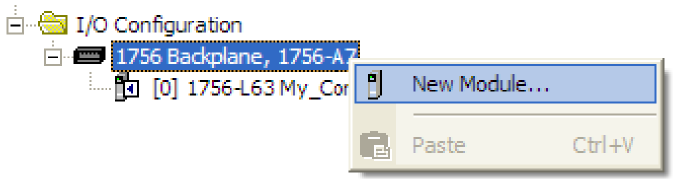


Creating the Module - Local Rack

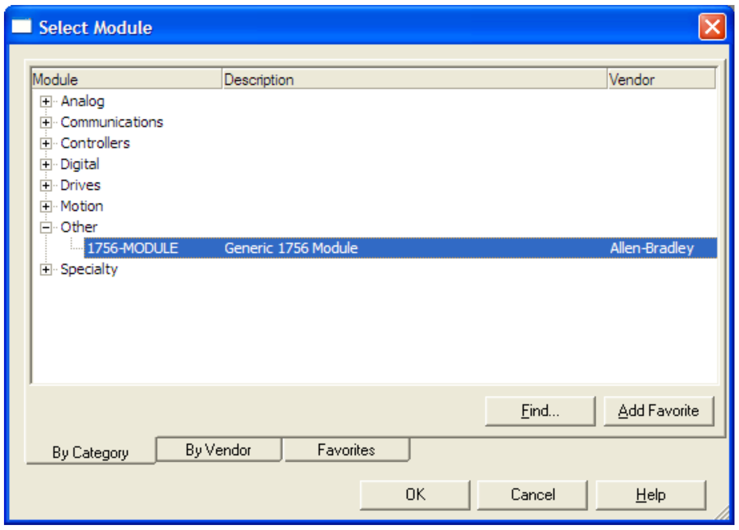
Note: If you are installing the MVI56-MNETCR module in a local rack, follow these steps. If you are installing the module in a remote rack, follow the steps in Creating the Module - Remote Rack (page 21).

1 In the *Controller Organization* window, expand the **I/O CONFIGURATION** node.

2 Select the **1756 BACKPLANE** node, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose **NEW MODULE**.



3 This action opens the *Select Module* dialog box.

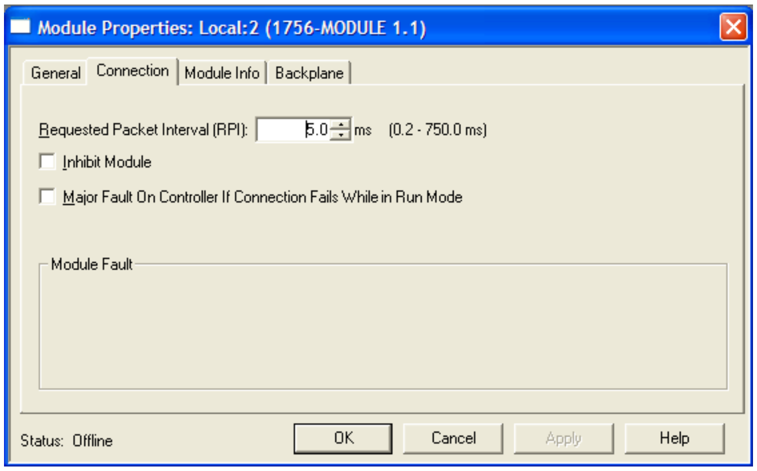


Module	Description	Vendor
Analog		
Communications		
Controllers		
Digital		
Drives		
Motion		
Other		
1756-MODULE	Generic 1756 Module	Allen-Bradley
Specialty		

4 Select the **1756-MODULE (GENERIC 1756 MODULE)** from the list and click **OK**.
5 Set the Module Properties values as follows:

Parameter	Value
Name	Enter a module identification string. The recommended value is **MNETCR**.
Description	Enter a description for the module. Example: **MODBUS TCP/IP MULTI CLIENT COMMUNICATION MODULE FOR REMOTE CHASSIS**.
Comm Format	Select **DATA-INT (Very Important)**
Slot	Enter the slot number in the rack where the MVI56-MNETCR module is to be installed.
Input Assembly Instance	**1**
Input Size	**42**
Output Assembly Instance	**2**
Output Size	**42**
Configuration Assembly Instance	**4**
Configuration Size	**0**

6 On the *Connection* tab, set the *RPI* value for your project. Five (**5**) milliseconds is usually a good starting value. Click **OK** to confirm.



Module Properties: Local:2 (1756-MODULE 1.1)

General | Connection | Module Info | Backplane

Requested Packet Interval (RPI): 5.0 ms (0.2 - 750.0 ms)

☐ Inhibit Module

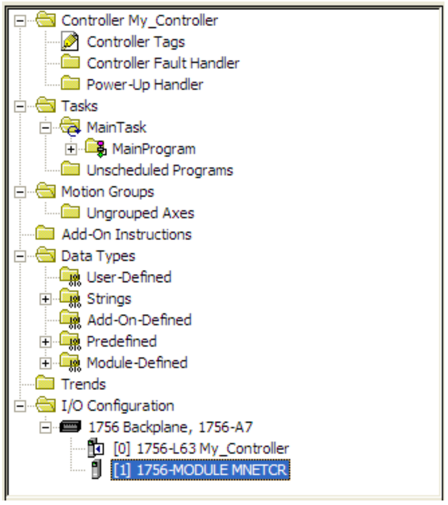
☐ Major Fault On Controller If Connection Fails While in Run Mode

Module Fault

Status: Offline

OK | Cancel | Apply | Help

The **MVI56-MNETCR** module is now visible in the *I/O Configuration* pane.

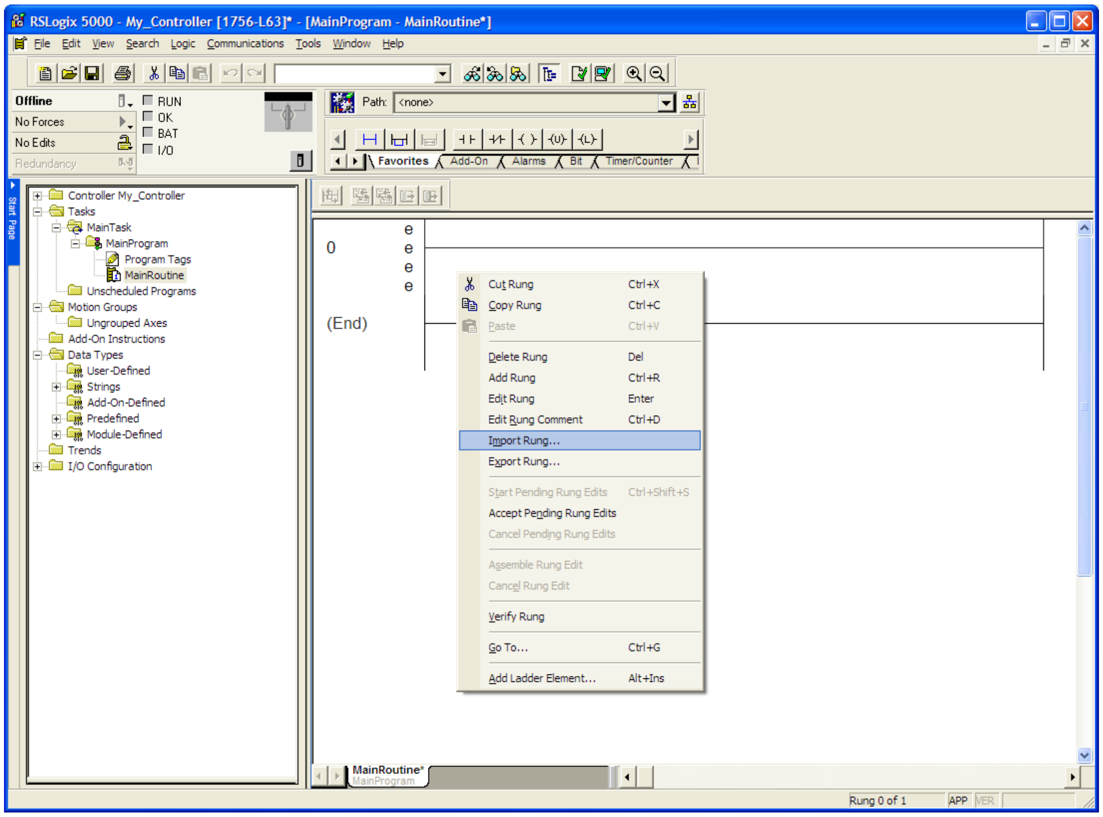


```
Controller My_Controller
    Controller Tags
    Controller Fault Handler
    Power-Up Handler
Tasks
    MainTask
        MainProgram
    Unscheduled Programs
Motion Groups
    Ungrouped Axes
Add-On Instructions
Data Types
    User-Defined
    Strings
    Add-On-Defined
    Predefined
    Module-Defined
Trends
I/O Configuration
    1756 Backplane, 1756-A7
        [0] 1756-L63 My_Controller
        [1] 1756-MODULE MNETCR
```

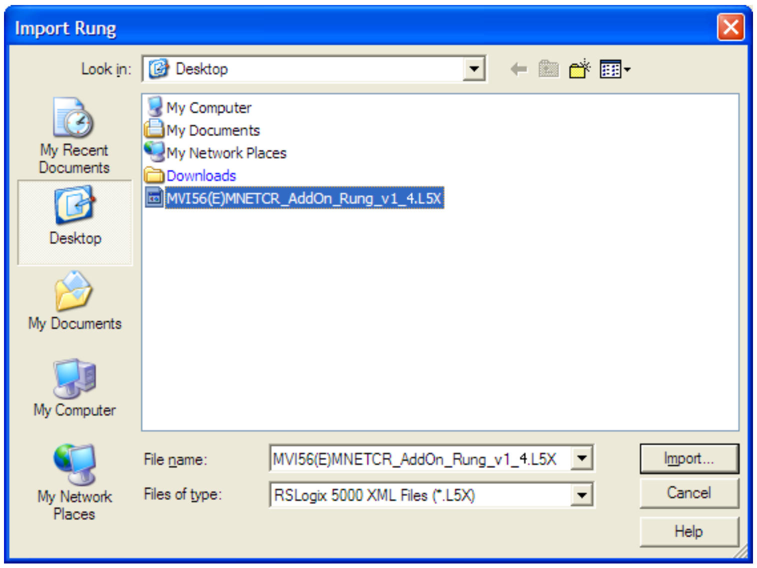
2.1.2 *Importing the Add-On Instruction*

Important: If your processor uses RSLogix 5000 version 15 or earlier, see Using the Sample Program (page 138).

1 In the *Controller Organization* window, expand the **TASKS** folder and subfolder until you reach the **MAINPROGRAM** folder.
2 In the **MAINPROGRAM** folder, double-click to open the **MAINROUTINE** ladder.
3 Select an empty rung in the new routine, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose **IMPORT RUNG**.



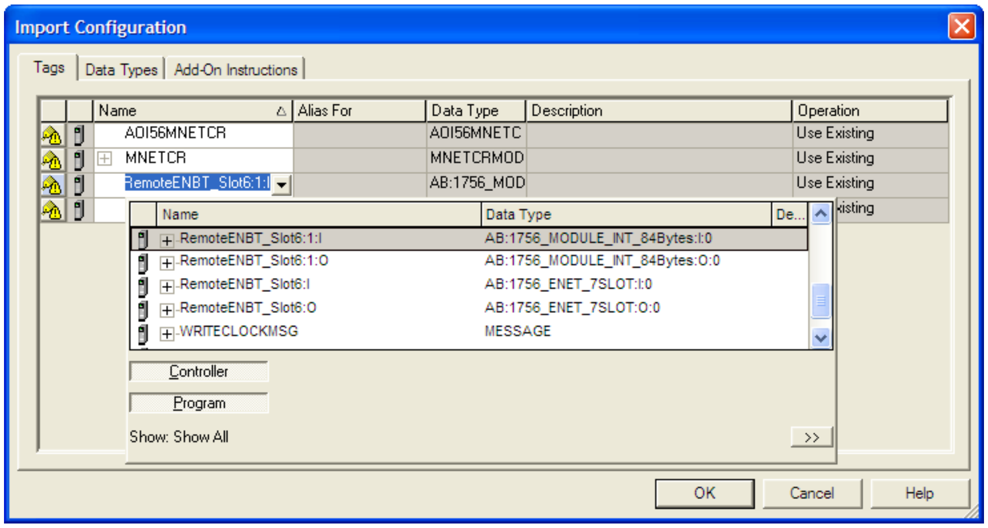
4 Navigate to the location on your PC where you saved the Add-On Instruction (for example, *My Documents* or *Desktop*). Select the **MVI56MNETCR_ADDON_RUNG_V1_4.L5X** file.



File name: MVI56(E)MNETCR_AddOn_Rung_v1_4.L5X
Files of type: RSLogix 5000 XML Files (*.L5X)

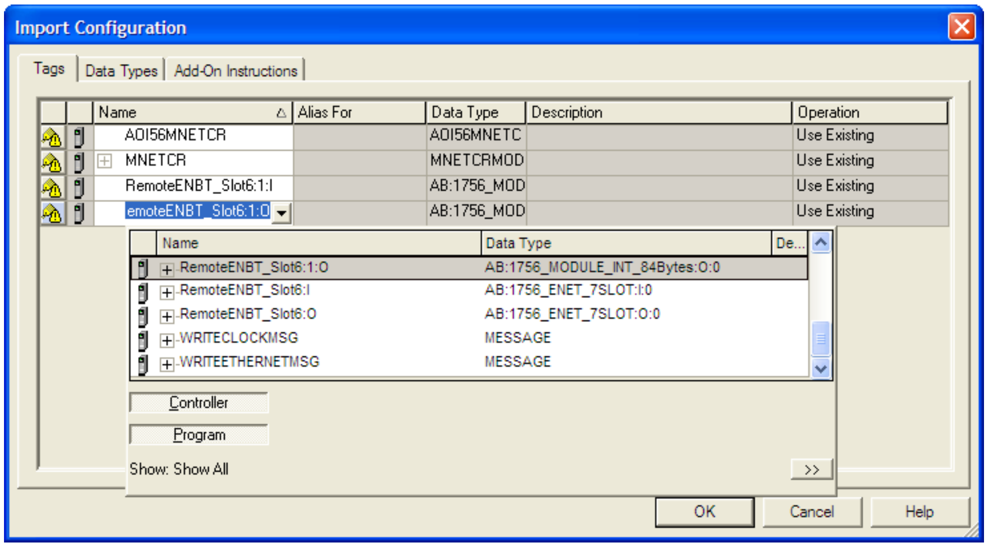
This action opens the *Import Configuration* dialog box, showing the controller tags that will be created.

If you are installing the module in a Remote Rack, open the dropdown menus for the Input and Output tags, and select the MNETCR module in the remote rack.



Name	Alias For	Data Type	Description	Operation
AOI56MNETCR		AOI56MNETC		Use Existing
MNETCR		MNETCRMOD		Use Existing
RemoteENBT_Slot6:1:I		AB:1756_MOD		Use Existing

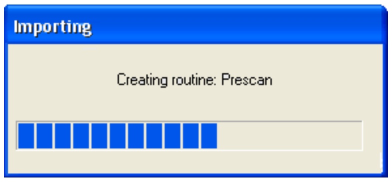
Name	Data Type	De...
RemoteENBT_Slot6:1:I	AB:1756_MODULE_INT_84Bytes:I:0	
RemoteENBT_Slot6:1:O	AB:1756_MODULE_INT_84Bytes:O:0	
RemoteENBT_Slot6:I	AB:1756_ENET_7SLOT:I:0	
RemoteENBT_Slot6:O	AB:1756_ENET_7SLOT:O:0	
WRITECLOCKMSG	MESSAGE	



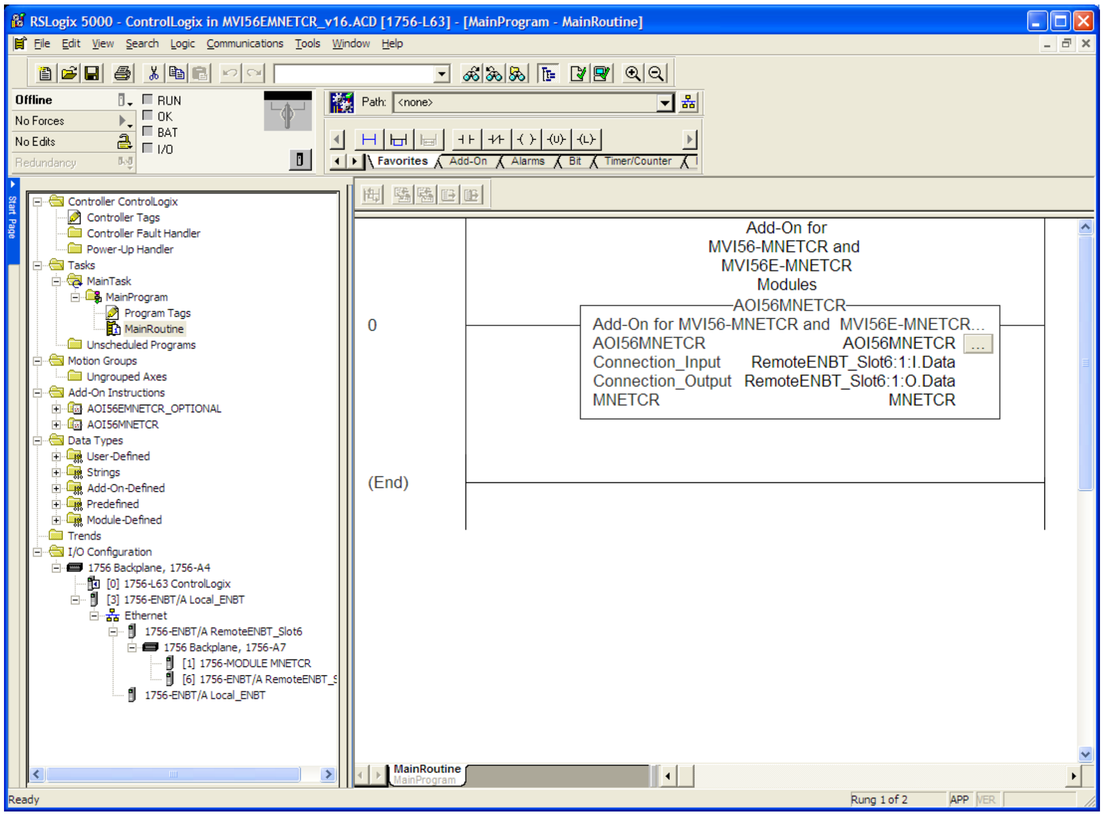
Name	Alias For	Data Type	Description	Operation
AOI56MNETCR		AOI56MNETC		Use Existing
MNETCR		MNETCRMOD		Use Existing
RemoteENBT_Slot6:1:I		AB:1756_MOD		Use Existing
emoteENBT_Slot6:1:O		AB:1756_MOD		Use Existing

Name	Data Type	De...
RemoteENBT_Slot6:1:O	AB:1756_MODULE_INT_84Bytes:O:0	
RemoteENBT_Slot6:I	AB:1756_ENET_7SLOT:I:0	
RemoteENBT_Slot6:O	AB:1756_ENET_7SLOT:O:0	
WRITECLOCKMSG	MESSAGE	
WRITEETHERNETMSG	MESSAGE	

5 Click **OK** to confirm the import. RSLogix will indicate that the import is in progress:

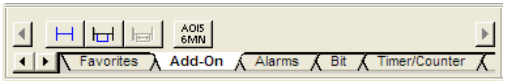


When the import is complete, you will see the new Add-On Instruction rung in the ladder.



```
Add-On for
MVI56-MNETCR and
MVI56E-MNETCR
Modules
0        AOI56MNETCR
         Add-On for MVI56-MNETCR and  MVI56E-MNETCR...
         AOI56MNETCR                  AOI56MNETCR
         Connection_Input     RemoteENBT_Slot6:1:I.Data
         Connection_Output    RemoteENBT_Slot6:1:O.Data
         MNETCR                            MNETCR
(End)
```

The procedure has also imported new user-defined data types, controller tags and the Add-On instructions for your project.

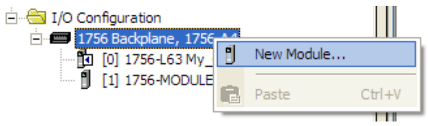


6 Save the application and then download the sample ladder logic into the processor.

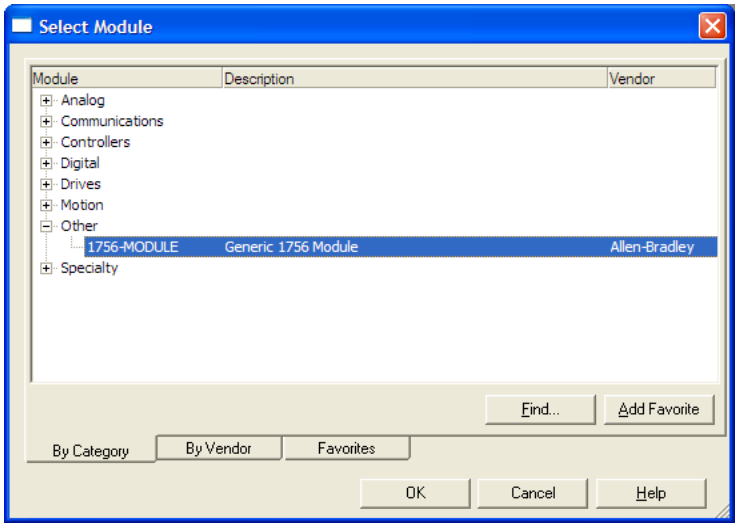
Adding Multiple Modules (Optional)

Important: If your application requires more than one MVI56-MNETCR module in the same project, follow the steps below.

1 In the **I/O CONFIGURATION** folder, click the right mouse button to open a shortcut menu, and then choose **NEW MODULE**.



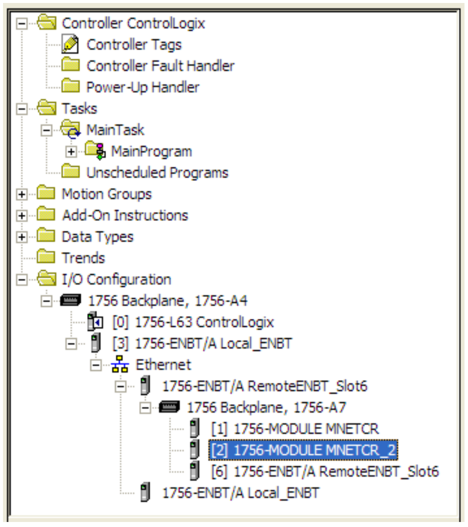
2 Select **1756-MODULE**.



3 Fill the module properties as follows:

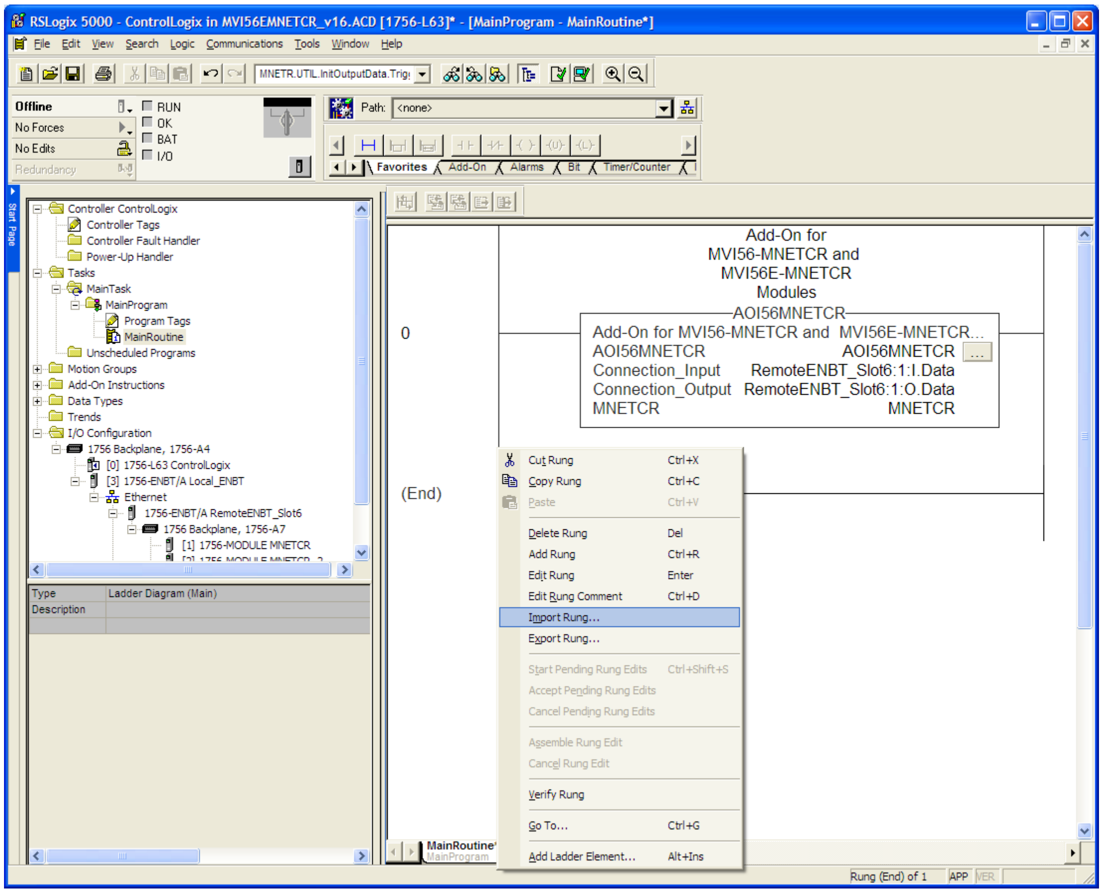
Parameter	**Value**
Name	Enter a module identification string. Example: **MNETCR_2**
Description	Enter a description for the module. Example: **MODBUS TCP/IP MULTI CLIENT COMMUNICATION MODULE FOR REMOTE CHASSIS**
Comm Format	Select **DATA-INT**.
Slot	Enter the slot number in the rack where the MVI56-MNETCR module is located.
Input Assembly Instance	**1**
Input Size	**42**
Output Assembly Instance	**2**
Output Size	**42**
Configuration Assembly Instance	**4**
Configuration Size	**0**

4 Click **OK** to confirm. The new module is now visible:

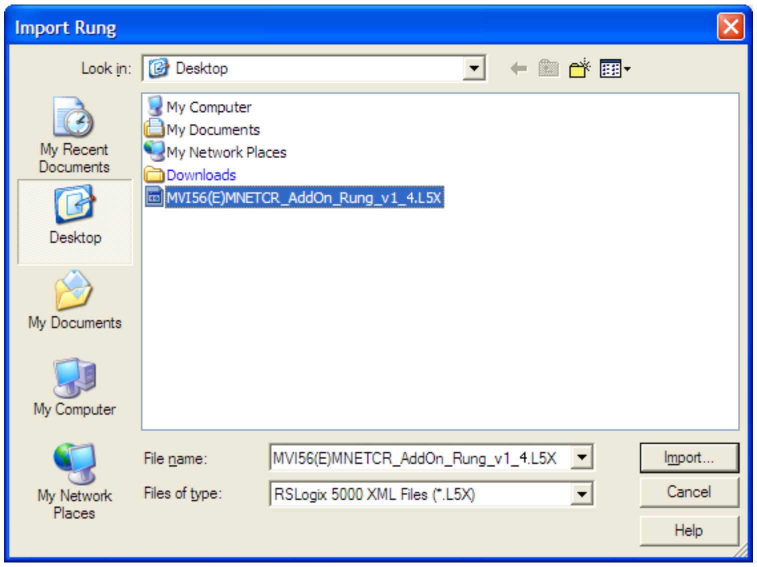

Controller ControlLogix
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Unscheduled Programs
Motion Groups
Add-On Instructions
Data Types
Trends
I/O Configuration
1756 Backplane, 1756-A4
[0] 1756-L63 ControlLogix
[3] 1756-ENBT/A Local_ENBT
Ethernet
1756-ENBT/A RemoteENBT_Slot6
1756 Backplane, 1756-A7
[1] 1756-MODULE MNETCR
[2] 1756-MODULE MNETCR_2
[6] 1756-ENBT/A RemoteENBT_Slot6
1756-ENBT/A Local_ENBT

5 Expand the **TASKS** folder, and then expand the **MAINTASK** folder.
6 In the **MAINPROGRAM** folder, double-click to open the **MAINROUTINE** ladder.

7 Select an empty rung in the routine, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose **IMPORT RUNG**.


RSLogix 5000 - ControlLogix in MVI56EMNETCR_v16.ACD [1756-L63]* - [MainProgram - MainRoutine*]
Add-On for MVI56-MNETCR and MVI56E-MNETCR Modules
AOI56MNETCR
Add-On for MVI56-MNETCR and MVI56E-MNETCR...
AOI56MNETCR AOI56MNETCR
Connection_Input RemoteENBT_Slot6:1:I.Data
Connection_Output RemoteENBT_Slot6:1:O.Data
MNETCR MNETCR
(End)
Cut Rung Ctrl+X
Copy Rung Ctrl+C
Paste Ctrl+V
Delete Rung Del
Add Rung Ctrl+R
Edit Rung Enter
Edit Rung Comment Ctrl+D
Import Rung...
Export Rung...
Start Pending Rung Edits Ctrl+Shift+S
Accept Pending Rung Edits
Cancel Pending Rung Edits
Assemble Rung Edit
Cancel Rung Edit
Verify Rung
Go To... Ctrl+G
Add Ladder Element... Alt+Ins

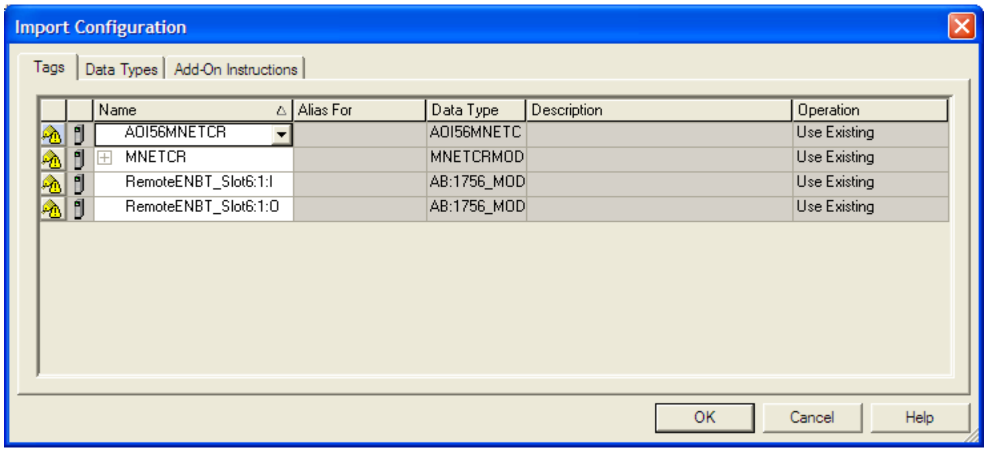
8 Select the **MVI56MNETCR_AddOn_Rung_v1_4.L5X** file, and then click **Import.**



My Computer
My Documents
My Network Places
Downloads
MVI56(E)MNETCR_AddOn_Rung_v1_4.L5X

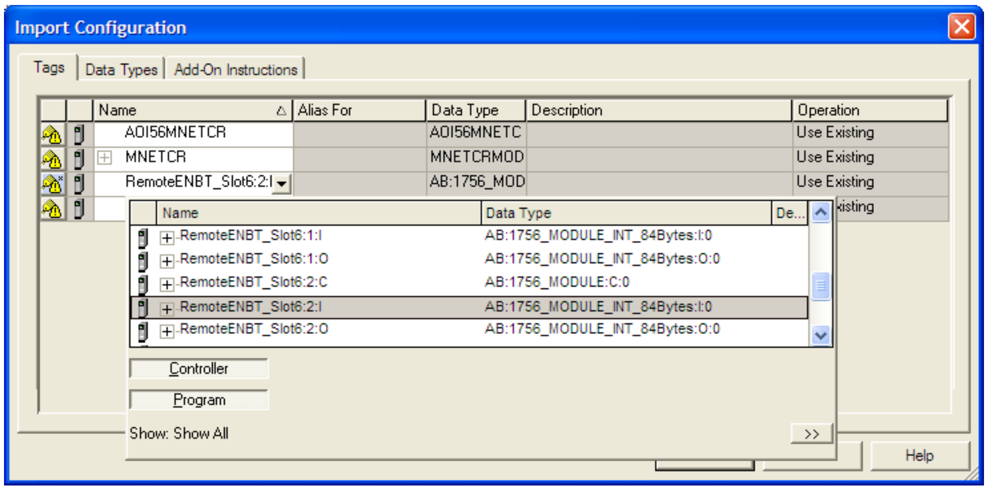
File name: MVI56(E)MNETCR_AddOn_Rung_v1_4.L5X
Files of type: RSLogix 5000 XML Files (*.L5X)

9 This action opens the *Import Configuration* window, which shows the tags that will be imported.



Name	Alias For	Data Type	Description	Operation
AOI56MNETCR		AOI56MNETC		Use Existing
MNETCR		MNETCRMOD		Use Existing
RemoteENBT_Slot6:1:I		AB:1756_MOD		Use Existing
RemoteENBT_Slot6:1:O		AB:1756_MOD		Use Existing

10 Associate the I/O connection variables to the correct module. The default values are RemoteENBT_Slot6:1:I and RemoteENBT_Slot6:1:O, so these require change.



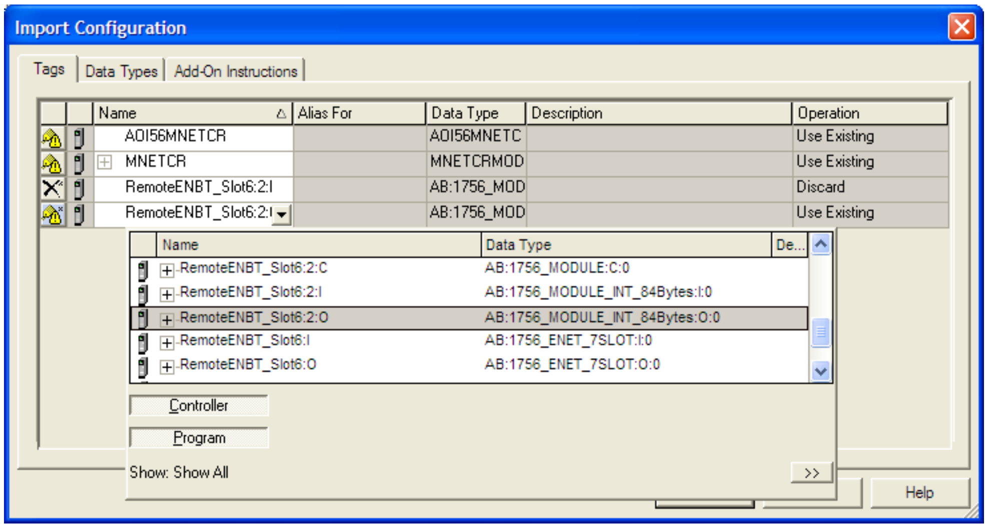
Import Configuration

Tags | Data Types | Add-On Instructions

Name	Alias For	Data Type	Description	Operation
AOI56MNETCR		AOI56MNETC		Use Existing
MNETCR		MNETCRMOD		Use Existing
RemoteENBT_Slot6:2:I		AB:1756_MOD		Use Existing
				xisting

Name	Data Type	De...
RemoteENBT_Slot6:1:I	AB:1756_MODULE_INT_84Bytes:I:0	
RemoteENBT_Slot6:1:O	AB:1756_MODULE_INT_84Bytes:O:0	
RemoteENBT_Slot6:2:C	AB:1756_MODULE:C:0	
RemoteENBT_Slot6:2:I	AB:1756_MODULE_INT_84Bytes:I:0	
RemoteENBT_Slot6:2:O	AB:1756_MODULE_INT_84Bytes:O:0	

Controller
Program
Show: Show All
Help



Import Configuration

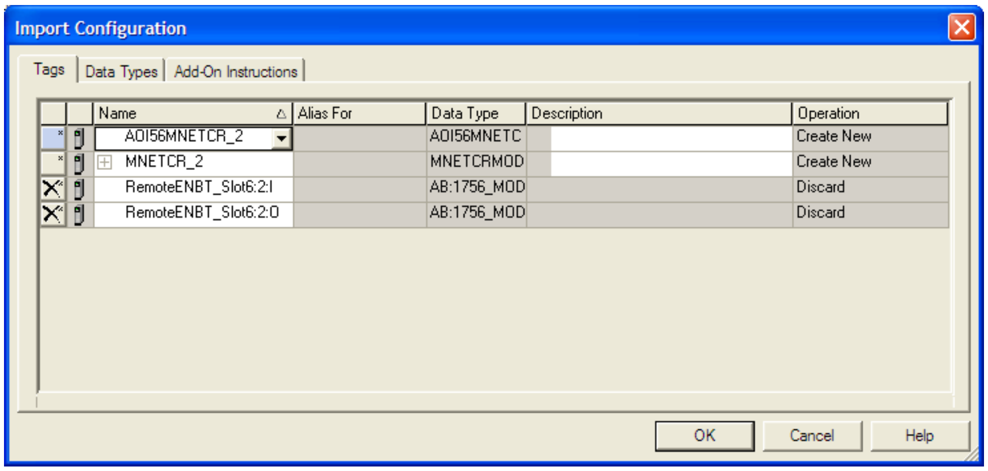
Tags | Data Types | Add-On Instructions

Name	Alias For	Data Type	Description	Operation
AOI56MNETCR		AOI56MNETC		Use Existing
MNETCR		MNETCRMOD		Use Existing
RemoteENBT_Slot6:2:I		AB:1756_MOD		Discard
RemoteENBT_Slot6:2:I		AB:1756_MOD		Use Existing

Name	Data Type	De...
RemoteENBT_Slot6:2:C	AB:1756_MODULE:C:0	
RemoteENBT_Slot6:2:I	AB:1756_MODULE_INT_84Bytes:I:0	
RemoteENBT_Slot6:2:O	AB:1756_MODULE_INT_84Bytes:O:0	
RemoteENBT_Slot6:I	AB:1756_ENET_7SLOT:I:0	
RemoteENBT_Slot6:O	AB:1756_ENET_7SLOT:O:0	

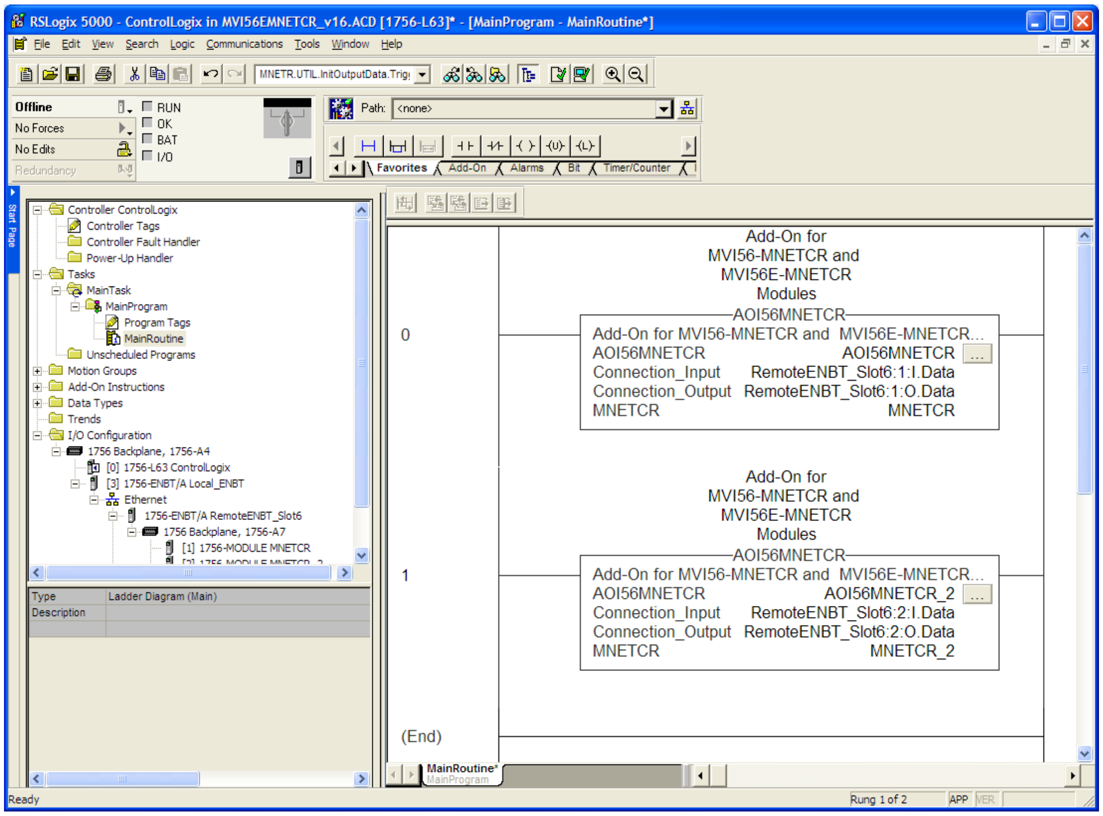
Controller
Program
Show: Show All
Help

11 Change the default tags **MNETCR** and **AOI56MNETCR** to avoid conflict with existing tags. In this procedure, you will append the string "_2" as shown in the following illustration.



Name	Alias For	Data Type	Description	Operation
AOI56MNETCR_2		AOI56MNETC		Create New
MNETCR_2		MNETCRMOD		Create New
RemoteENBT_Slot6:2:I		AB:1756_MOD		Discard
RemoteENBT_Slot6:2:O		AB:1756_MOD		Discard

12 Click **OK** to confirm.



```
0   Add-On for
    MVI56-MNETCR and
    MVI56E-MNETCR
    Modules
    AOI56MNETCR
    Add-On for MVI56-MNETCR and MVI56E-MNETCR...
    AOI56MNETCR                     AOI56MNETCR
    Connection_Input       RemoteENBT_Slot6:1:I.Data
    Connection_Output      RemoteENBT_Slot6:1:O.Data
    MNETCR                                MNETCR

1   Add-On for
    MVI56-MNETCR and
    MVI56E-MNETCR
    Modules
    AOI56MNETCR
    Add-On for MVI56-MNETCR and MVI56E-MNETCR...
    AOI56MNETCR                   AOI56MNETCR_2
    Connection_Input       RemoteENBT_Slot6:2:I.Data
    Connection_Output      RemoteENBT_Slot6:2:O.Data
    MNETCR                              MNETCR_2

(End)
```

The setup procedure is now complete. Save the project and download the application to your ControlLogix processor.

Adjusting the Input and Output Array Sizes

Note: It is unnecessary to manually edit the *ReadData* and *WriteData* user-defined data types in the ladder logic, as these are automatically updated to match the changed array sizes from *ProSoft Configuration Builder*.

The module internal database is divided into two user-configurable areas:

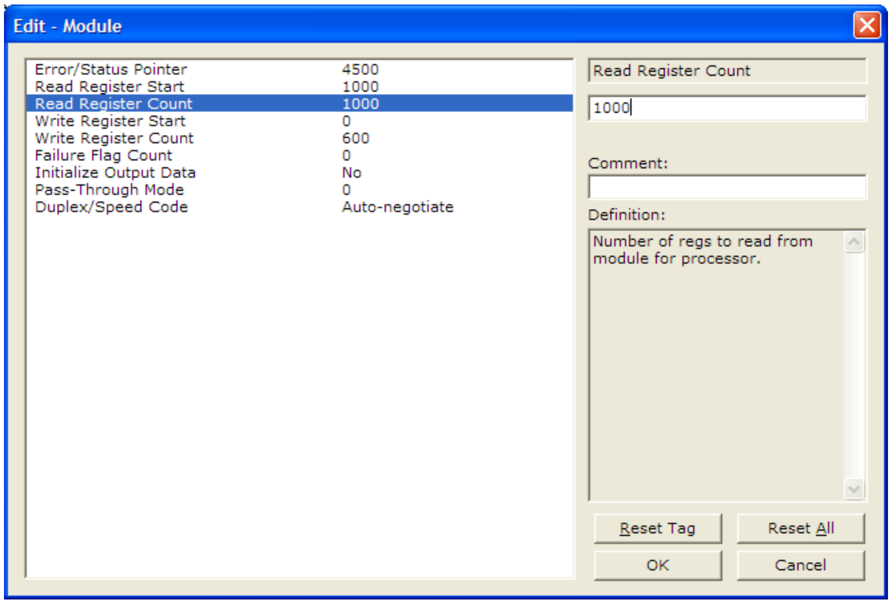
- Read Data
- Write Data

The Read Data area is moved from the module to the processor, while the Write Data area is moved from the processor to the module.

The MVI56-MNETCR Add-On Instruction rung is configured for 600 registers of Read Data and 600 registers of Write Data, which is sufficient for most applications. However, you can configure the sizes of these data areas to meet the needs of your application.

1 In *ProSoft Configuration Builder*, expand the *Module* icon in the tree view and double-click **MODULE** to open an *Edit* window. Change the **READ REGISTER COUNT** to contain the number of words for your Read Data area.

Important: Because the module pages data in blocks of 40 registers at a time, you should configure your user data areas in multiples of 40 registers.



Error/Status Pointer	4500
Read Register Start	1000
Read Register Count	1000
Write Register Start	0
Write Register Count	600
Failure Flag Count	0
Initialize Output Data	No
Pass-Through Mode	0
Duplex/Speed Code	Auto-negotiate

Read Register Count
1000
Comment:
Definition:
Number of regs to read from module for processor.

2 To modify the *WriteData* array, follow the above steps, substituting *WriteData* for *ReadData*.

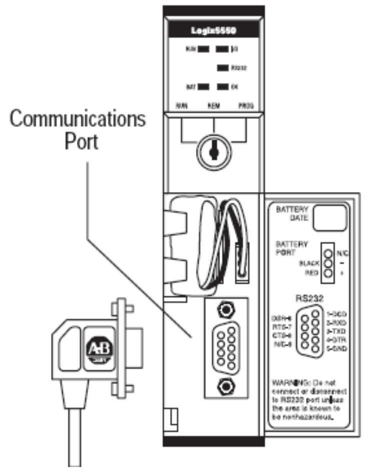
3 Save and download the configuration to the module (page 60) and reboot.

Make sure that the *ReadData* and *WriteData* arrays do not overlap in the module memory. For example, if your application requires 2000 words of *WriteData* starting at register 0, then your *Read Register Start* parameter must be set to a value of 2000 or greater.

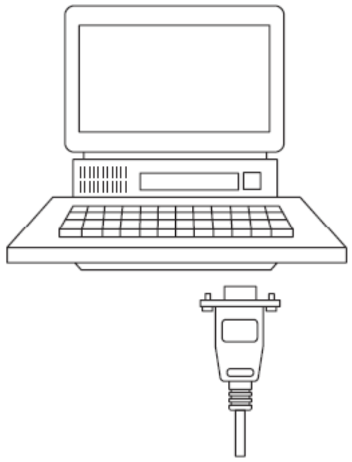
2.1.3 Connecting Your PC to the ControlLogix Processor

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

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



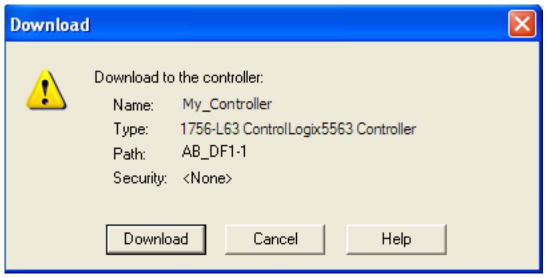
2 Connect the straight connector end of the cable to the serial port on your computer.



2.1.4 Downloading the Sample Program to the Processor

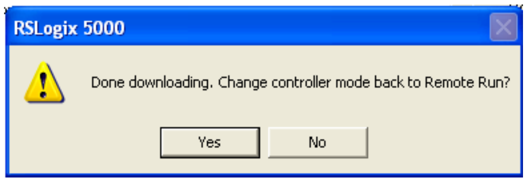
Note: The key switch on the front of the ControlLogix processor must be in the REM or PROG position.

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



Download to the controller:
Name: My_Controller
Type: 1756-L63 ControlLogix5563 Controller
Path: AB_DF1-1
Security: <None>

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



Done downloading. Change controller mode back to Remote Run?

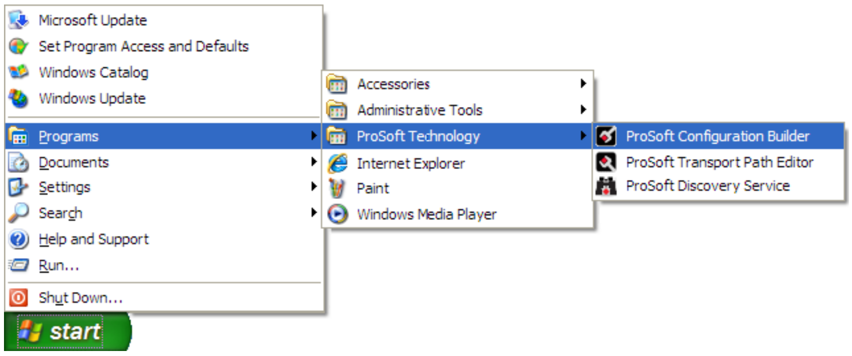
Note: If you receive an error message during these steps, refer to your RSLogix documentation to interpret and correct the error.

2.2 Using ProSoft Configuration Builder

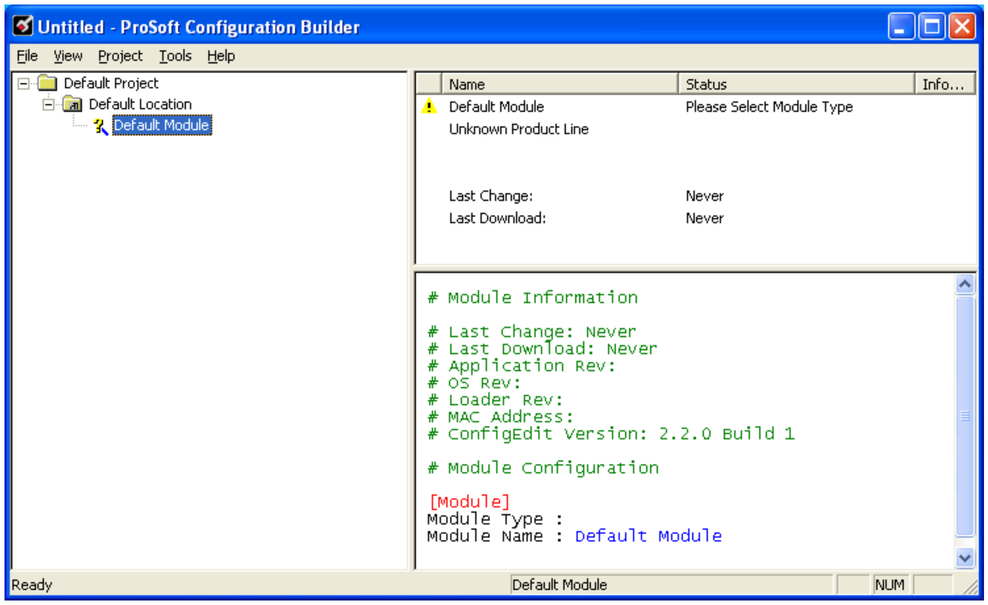
ProSoft Configuration Builder (PCB) provides a convenient way to manage module configuration files customized to meet your application needs. *PCB* is not only a powerful solution for new configuration files, but also allows you to import information from previously installed (known working) configurations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

2.2.1 Setting Up the Project

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



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


Untitled - ProSoft Configuration Builder
File View Project Tools Help
Default Project
Default Location
Default Module
Ready
Default Module
NUM

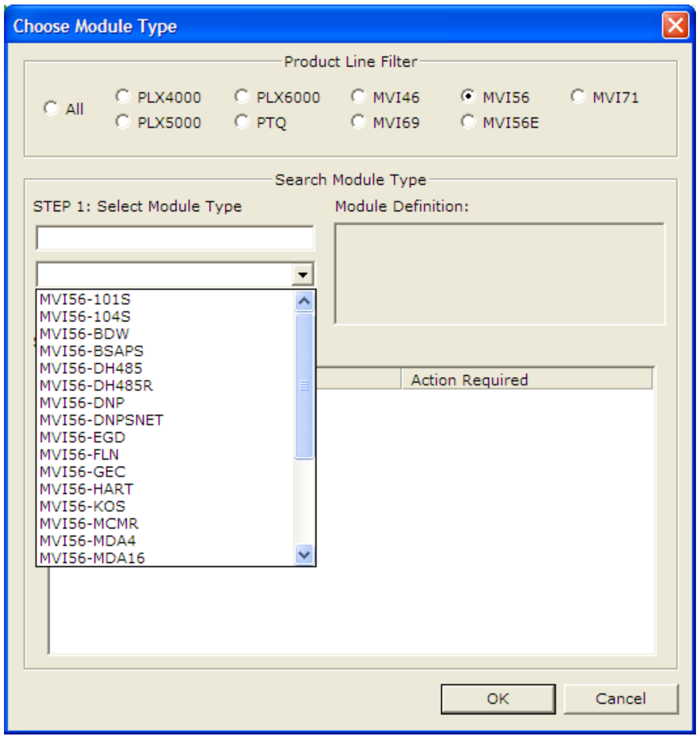
Name	Status	Info...
Default Module	Please Select Module Type	
Unknown Product Line		
Last Change:	Never	
Last Download:	Never	

```
# Module Information

# Last Change: Never
# Last Download: Never
# Application Rev:
# OS Rev:
# Loader Rev:
# MAC Address:
# ConfigEdit Version: 2.2.0 Build 1

# Module Configuration

[Module]
Module Type :
Module Name : Default Module
```

Adding the MVI56-MNETCR 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.



Product Line Filter: MVI56 [✓]

STEP 1: Select Module Type

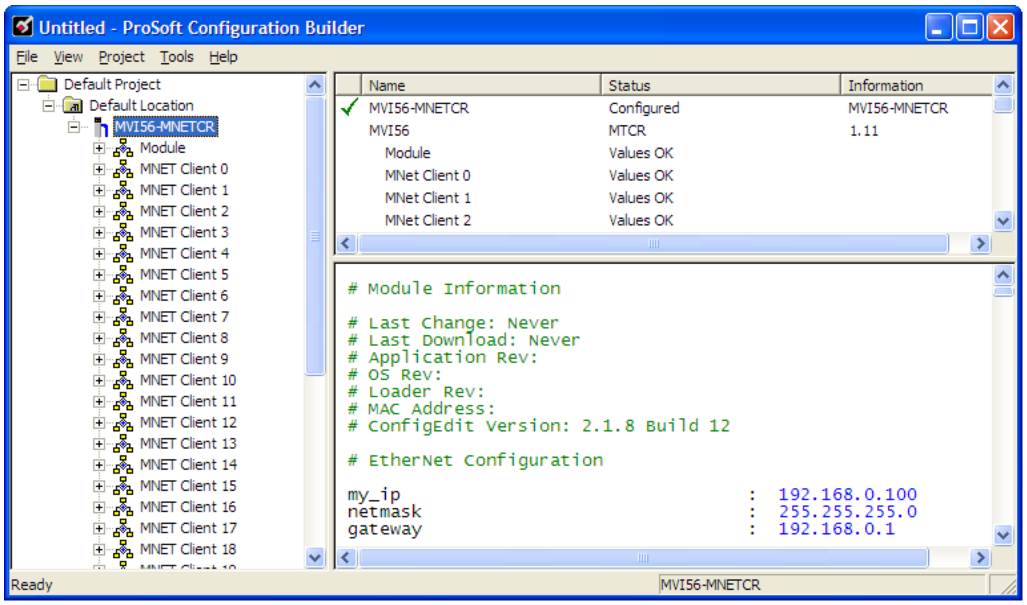
Module Definition:

MVI56-101S
MVI56-104S
MVI56-BDW
MVI56-BSAPS
MVI56-DH485
MVI56-DH485R
MVI56-DNP
MVI56-DNPSNET
MVI56-EGD
MVI56-FLN
MVI56-GEC
MVI56-HART
MVI56-KOS
MVI56-MCMR
MVI56-MDA4
MVI56-MDA16

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

2.2.2 Setting Module Parameters

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



Name	Status	Information
✓ MVI56-MNETCR	Configured	MVI56-MNETCR
MVI56	MTCR	1.11
Module	Values OK	
MNet Client 0	Values OK	
MNet Client 1	Values OK	
MNet Client 2	Values OK	

```
# Module Information

# Last Change: Never
# Last Download: Never
# Application Rev:
# OS Rev:
# Loader Rev:
# MAC Address:
# ConfigEdit Version: 2.1.8 Build 12

# EtherNet Configuration

my_ip                                    :  192.168.0.100
netmask                                  :  255.255.255.0
gateway                                  :  192.168.0.1
```

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

Renaming 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.

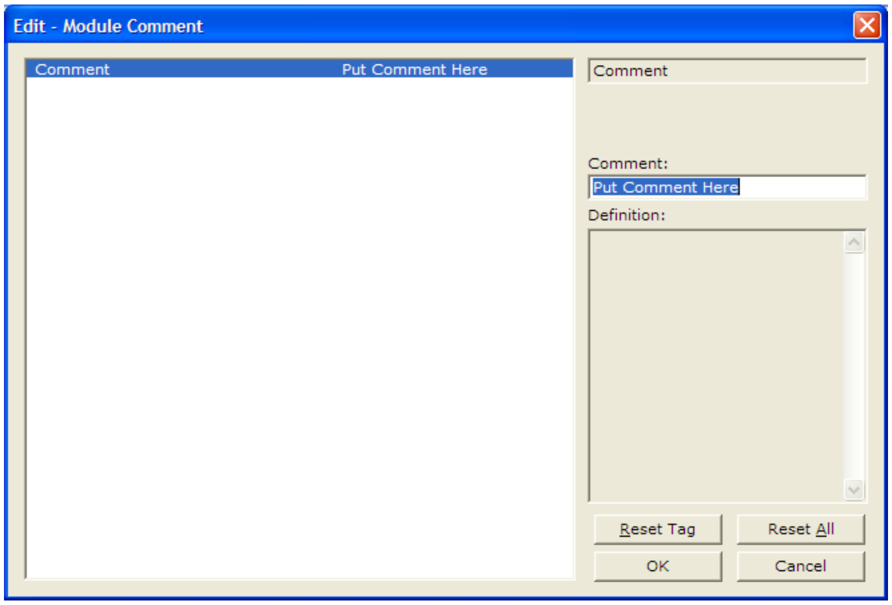
Configuring Module Parameters

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

Creating Optional Comment Entries

1 Click the **[+]** to the left of the Comment icon to expand the module comments.

2 Double-click the Module Comment icon. The *Edit - Module Comment* dialog box appears.



Comment	Put Comment Here

Comment

Comment: Put Comment Here

Definition:

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

Printing a Configuration File

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

2.2.3 Module

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

Backplane Error/Status Pointer

1 to **4955**

This parameter sets the address in the internal database where the backplane error/status data will be placed. If you want the error/status data to be moved to the processor and placed into the *ReadData* array, the value entered should be a module memory address in the Read Data area. If the value is set to **-1**, the error/status data will not be stored in the module's internal database and will not be transferred to the processor's *ReadData* array.

Enabling the *Error/Status Pointer* is optional. The error/status data is routinely returned as part of the input image, which is continually being transferred from the module to the processor. For more information, see Normal Data Transfer Blocks (page 98).

Read Register Start

0 to **4999**

The *Read Register Start* parameter specifies the start of the Read Data area in module memory. Data in this area will be transferred from the module to the processor.

Note: Total user database memory space is limited to the first 5000 registers of module memory, addresses 0 through 4999. Therefore, the practical limit for this parameter is 4999 minus the value entered for *Read Register Count*, so that the Read Data Area does not try to extend above address 4999. Read Data and Write Data Areas must be configured to occupy separate address ranges in module memory and should not be allowed to overlap.

Read Register Count

0 to **5000**

The *Read Register Count* parameter specifies the size of the Read Data area of module memory and the number of registers to transfer from this area to the processor, up to a maximum of 5000 words.

Note: Total *Read Register Count* and *Write Register Count* cannot exceed 5000 total registers. Read Data and Write Data Areas must be configured to occupy separate address ranges in module memory and should not be allowed to overlap.

Write Register Start

0 to **4999**

The *Write Register Start* parameter specifies the start of the Write Data area in module memory. Data in this area will be transferred in from the processor.

Note: Total user database memory space is limited to the first 5000 registers of module memory, addresses 0 through 4999. Therefore, the practical limit for this parameter is 4999 minus the value entered for *Write Register Count*, so that the Write Data Area does not try to extend above address 4999. Read Data and Write Data Areas must be configured to occupy separate address ranges in module memory and should not be allowed to overlap.

Write Register Count

0 to **5000**

The *Write Register Count* parameter specifies the size of the Write Data area of module memory and the number of registers to transfer from the processor to this memory area, up to a maximum value of 5000 words.

Note: Total *Read Register Count* and *Write Register Count* cannot exceed 5000 total registers. Read Data and Write Data Areas must be configured to occupy separate address ranges in module memory and should not be allowed to overlap.

Failure Flag Count

If this value is greater than zero the protocol communication will be interrupted once the backplane failure is detected, or communication with the processor fails. A value of zero will disable this feature.

Initialize Output Data

0 = No, **1** = Yes

This parameter is used to determine if the output data for the module should be initialized with values from the processor. If the value is set to **0**, the output data will be initialized to 0. If the value is set to **1**, the data will be initialized with data from the processor. Use of this option requires associated ladder logic to pass the data from the processor to the module.

Duplex/Speed Code

0, **1**, **2**, **3** or **4**

This parameter allows you to cause the module to use a specific duplex and speed setting.

- Value = **1**: Half duplex, 10 MB speed
- Value = **2**: Full duplex, 10 MB speed
- Value = **3**: Half duplex, 100 MB speed
- Value = **4**: Full duplex, 100 MB speed
- Value = **0**: Auto-negotiate

Auto-negotiate is the default value for backward compatibility. This feature is not implemented in older software revisions.

2.2.4 MNET Client x

This section defines general configuration for the MNET Client (Master).

Client Error/Status Pointer

-1 to **4990**

This parameter sets the address in the internal database where the Client error/status data will be placed. If you want the error/status data to be moved to the processor and placed into the *ReadData* array, the value entered should be a module memory address in the Read Data area. If the value is set to **-1**, the error/status data will not be stored in the module's internal database and will not be transferred to the processor's *ReadData* array.

Enabling the *Error/Status Pointer* is optional. Alternatively, the error/status data for a specific Client can be requested by the processor and returned in a special Client Status block. For more information, see Client Status Blocks (page 104).

Command Error Pointer

-1 to **4999**

This parameter sets the address in the internal database where the Command Error List data will be placed. If you want the Command Error List data to be moved to the processor and placed into the *ReadData* array, the value entered should be a module memory address in the Read Data area. If the value is set to **-1**, the Command Error List data will not be stored in the module's internal database and will not be transferred to the processor's *ReadData* array.

Enabling the *Command Error Pointer* is optional. Alternatively, the Command Error List data for a specific Client can be requested by the processor and returned in a special Client Status block. For more information, see Client Status Blocks (page 104).

Minimum Command Delay

0 to **65535** milliseconds

This parameter specifies the number of milliseconds to wait between the initial issuances of a command. This parameter can be used to delay all commands sent to servers to avoid "flooding" commands on the network. This parameter does not affect retries of a command as they will be issued when failure is recognized.

Response Timeout

0 to **65535** milliseconds

This is the time in milliseconds that a Client will wait before re-transmitting a command if no response is received from the addressed server. The value to use depends on the type of communication network used, and the expected response time of the slowest device on the network.

Retry Count

0 to **10**

This parameter specifies the number of times a command will be retried if it fails.

Float Flag

YES or **NO**

This flag specifies how the Client driver will issue Function Code 3, 6, and 16 commands (read and write Holding Registers) to a remote server when it is moving 32-bit floating-point data.

If the remote server expects to receive or will send one complete 32-bit floating-point value for each count of one (1), then set this parameter to **YES**. When set to **YES**, the Client driver will send values from two consecutive 16-bit internal memory registers (32 total bits) for each count in a write command, or receive 32 bits per count from the server for read commands. Example: Count = **10**, Client driver will send 20 16-bit registers for 10 total 32-bit floating-point values.

If, however, the remote server expects to use a count of two (2) for each 32-bit floating-point value it sends or receives, or if you do not plan to use floating-point data in your application, then set this parameter to **NO**, which is the default setting.

You will also need to set the *Float Start* and *Float Offset* parameters to appropriate values whenever the *Float Flag* parameter is set to **YES**.

Float Start

0 to **65535**

Whenever the *Float Flag* parameter is set to **YES**, this parameter determines the lowest Modbus Address, used in commands to a remote server, to consider as commands to read or write floating-point data. All commands with address values greater than or equal to this value will be considered floating-point data commands. All commands with address values less than this value will be considered normal 16-bit register data commands.

This parameter is used only if the *Float Flag* is set to **YES**. For example, if a value of 7000 is entered, all commands sent with addresses of 47001 (or 407001) and above will be considered as floating-point data commands and 32 bits of data will be sent or received for each count of one in the command.

You will also need to set the *Float Offset* parameter to an appropriate value whenever the *Float Flag* parameter is set to **YES**.

Float Offset

0 to **9999**

This parameter defines the start register for floating-point data in the internal database. This parameter is used only if the *Float Flag* is enabled. For example, if the *Float Offset* value is set to **3000** and the *Float Start* parameter is set to **7000**, data requests for register 7000 will use the internal Modbus register 3000.

ARP Timeout

1 to **60**

This parameter specifies the number of seconds to wait for an ARP reply after a request is issued.

Command Error Delay

0 to **300**

This parameter specifies the number of 100 millisecond intervals to turn off a command in the error list after an error is recognized for the command. If this parameter is set to **0**, there will be no delay.

MBAP Port Override

YES or **NO**

If this parameter is set to **YES**, all messages generated by the Client driver will be MBAP format messages to all Service Port values.

If this parameter is set to **NO** (default value), or is omitted from the configuration file, all messages sent to Service Port 502 will be MBAP format messages, and all other Service Ports values will use the encapsulated Modbus message format (MNET).

Each Client is configured independently in the configuration file.

This parameter applies to firmware version 1.05 and above. For downward compatibility, you may omit this parameter from the Client's configuration.

2.2.5 MNET Client x Commands

The *MNET Client x Commands* section of the configuration sets the Modbus TCP/IP Client command list. This command list polls Modbus TCP/IP server devices attached to the Modbus TCP/IP Client port. The module supports numerous commands. This permits the module to interface with a wide variety of Modbus TCP/IP protocol devices.

The function codes used for each command are those specified in the Modbus protocol. Each command list record has the same format. The first part of the record contains the information relating to the MVI56-MNETCR communication module, and the second part contains information required to interface to the Modbus TCP/IP server device.

Command List Overview

In order to interface the module with Modbus TCP/IP server devices, you must construct a command list. The commands in the list specify the server device to be addressed, the function to be performed (read or write), the data area in the device to interface with, and the registers in the internal database to be associated with the device data. The Client command list supports up to 16 commands.

The command list is processed from top (command #1) to bottom. A poll interval parameter is associated with each command to specify a minimum delay time in tenths of a second between the issuances of a command. If the user specifies a value of **10** for the parameter, the command will be executed no more frequently than every 1 second.

Commands Supported by the Module

The format of each command in the list depends on the Modbus Function Code being executed.

The following table lists the functions supported by the module.

Function Code	Definition
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force (Write) Single Coil
6	Preset (Write) Single Register
15	Force (Write) Multiple Coils
16	Preset (Write) Multiple Registers

Each command list record has the same general format. The first part of the record contains the information relating to the communication module and the second part contains information required to interface to the Modbus TCP/IP server device.

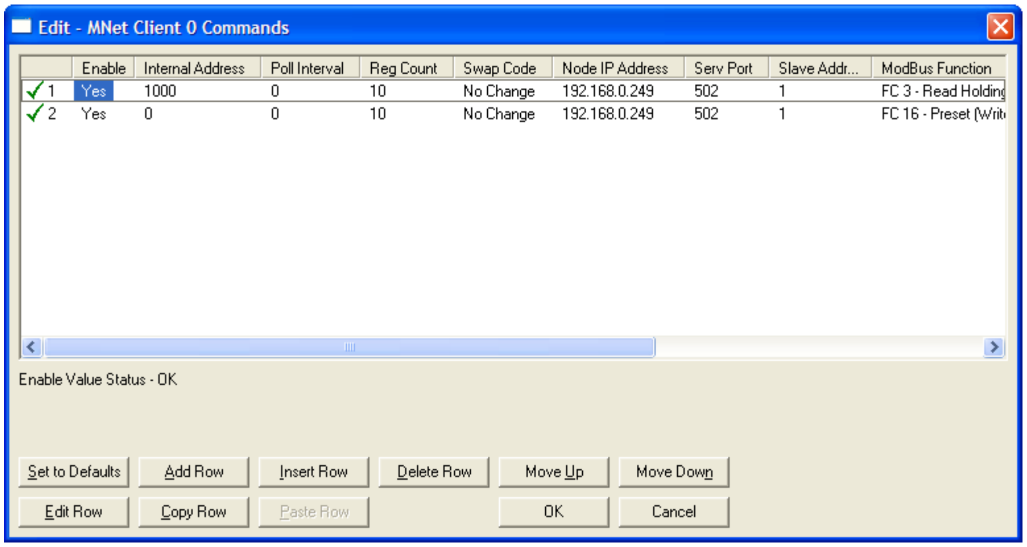
Command Entry Formats

The following table shows the structure of the configuration data necessary for each of the supported commands.

1	2	3	4	5	6	7	8	9	10
Enable Code	**Internal Address**	**Poll Interval Time**	**Count**	**Swap Code**	**IP Address**	**Serv Port**	**Slave Node**	**Function Code**	**Device Modbus Address**
Code	Register (bit)	1/10th Seconds	Bit Count	0	IP Address	Port #	Address	Read Coil (0x)	Register
Code	Register (bit)	1/10th Seconds	Bit Count	0	IP Address	Port #	Address	Read Input (1x)	Register
Code	Register	1/10th Seconds	Word Count	Code	IP Address	Port #	Address	Read Holding Registers (4x)	Register
Code	Register	1/10th Seconds	Word Count	0	IP Address	Port #	Address	Read Input Registers (3x)	Register
Code	1 bit	1/10th Seconds	Bit Count	0	IP Address	Port #	Address	Force (Write) Single Coil (0x)	Register
Code	1 bit	1/10th Seconds	Word Count	0	IP Address	Port #	Address	Preset (Write) Single Register (4x)	Register
Code	Register (bit)	1/10th Seconds	Bit Count	0	IP Address	Port #	Address	Force (Write) Multiple Coil (0x)	Register
Code	Register	1/10th Seconds	Word Count	0	IP Address	Port #	Address	Preset (Write) Multiple Register (4x)	Register

The first part of the record is the module information, which relates to the MVI56 module, and the second part contains information required to interface to the server device.

Command list example:



	Enable	Internal Address	Poll Interval	Reg Count	Swap Code	Node IP Address	Serv Port	Slave Addr...	ModBus Function
✓ 1	Yes	1000	0	10	No Change	192.168.0.249	502	1	FC 3 - Read Holding
✓ 2	Yes	0	0	10	No Change	192.168.0.249	502	1	FC 16 - Preset (Writ

Enable Value Status - OK

Enable

NO (0) or **YES** (1)

This field defines whether or not the command is to be executed.

Value	**Description**
NO (0)	The command is disabled and will not be executed in the normal polling sequence.
YES (1)	The command is executed each scan of the command list if the Poll Interval Time is set to zero (**0**). If the Poll Interval time is set, the command will be executed when the interval timer expires.

Important: The commands must also be enabled in the ladder logic in order for them to be executed. The *MNETCR.CONTROL.WriteCmdBits* controller tag holds 16-command bit arrays for each Client. If a bit for a specific command is set to zero (**0**) in the *WriteCmdBits* controller tag, the command will not be executed, regardless of its state in the configuration. For more information, see Command Control Blocks (page 105).

Internal Address

0 to **65535** (for bit-level addressing)

or

0 to **4999** (for word-level addressing)

This field specifies the database address in the module's internal database to use as the destination for data brought in by a read command or as the source for data to be sent out by a write command. The database address is interpreted as a bit address or a 16-bit word (register) address, depending on the Modbus Function Code used in the command.

- For Modbus functions 1, 2, 5, and 15, this parameter is interpreted as a bit-level address.
- For Modbus functions 3, 4, 6, and 16, this parameter is interpreted as a word-level or register-level address.

Poll Interval

0 to **65535**

This parameter specifies the minimum interval between issuances of a command during continuous command execution (*Enable* code of **1**). The parameter is entered in tenths of a second. Therefore, if a value of **100** is entered for a command, the command executes no more frequently than every 10 seconds.

Reg Count

Regs: **1** to **125**

Coils: **1** to **800**

This parameter specifies the number of 16-bit registers or binary bits to be transferred by the command.

- Functions 5 and 6 ignore this field as they apply only to a single data point.
- For functions 1, 2, and 15, this parameter sets the number of bits (inputs or coils) to be transferred by the command.
- For functions 3, 4, and 16, this parameter sets the number of registers to be transferred by the command.

Swap Code

NONE

SWAP WORDS

SWAP WORDS & BYTES

SWAP BYTES

This parameter defines if and how the order of bytes in data received or sent is to be rearranged. This option exists to allow for the fact that different manufacturers store and transmit multi-byte data in different combinations. This parameter is helpful when dealing with floating-point or other multi-byte values, as there is no one standard method of storing these data types. The parameter can be set to rearrange the byte order of data received or sent into an order more useful or convenient for other applications. The following table defines the valid *Swap Code* values and the effect they have on the byte-order of the data.

Swap Code	Description
NONE	No change is made in the byte ordering (1234 = 1234)
SWAP WORDS	The words are swapped (1234=3412)
SWAP WORDS & BYTES	The words are swapped, then the bytes in each word are swapped (1234=4321)
SWAP BYTES	The bytes in each word are swapped (1234=2143)

These swap operations affect 4-byte (or 2-word) groups of data. Therefore, data swapping using these *Swap Codes* should be done only when using an even number of words, such as when 32-bit integer or floating-point data is involved.

Node IP Address

xxx.xxx.xxx.xxx

The IP address of the device being addressed by the command.

Service Port

502 or other port numbers supported on a server

Use a value of **502** when addressing Modbus TCP/IP servers that are compatible with the Schneider Electric MBAP specifications (this will be most devices). If a server implementation supports another service port, enter the value here.

Slave Address

0 - Broadcast to all nodes

1 to **255**

Use this parameter to specify the slave address of a remote Modbus Serial device through a Modbus Ethernet to Serial converter.

Note: Use the *Node IP Address* parameter (page 54) to address commands to a remote Modbus TCP/IP device.
Note: Most Modbus devices accept an address in the range of only 1 to 247, so check with the slave device manufacturer to see if a particular slave can use addresses 248 to 255.
If the value is set to zero, the command will be a broadcast message on the network. The Modbus protocol permits broadcast commands for **write** operations. **Do not** use node address 0 for **read** operations.

Modbus Function

1, **2**, **3**, **4**, **5**, **6**, **15**, or **16**

This parameter specifies the Modbus Function Code to be executed by the command. These function codes are defined in the Modbus protocol. The following table lists the purpose of each function supported by the module. More information on the protocol is available from www.modbus.org.

Modbus Function Code	Description
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force (Write) Single Coil
6	Preset (Write) Single Register
15	Force Multiple Coils
16	Preset Multiple Registers

MB Address in Device

This parameter specifies the starting Modbus register or bit address in the server to be used by the command. Refer to the documentation of each Modbus server device for the register and bit address assignments valid for that device.

The Modbus Function Code determines whether the address will be a register-level or bit-level OFFSET address into a given data type range. The offset will be the target data address in the server minus the base address for that data type. Base addresses for the different data types are:

- 00001 or 000001 (0x0001) for bit-level Coil data (Function Codes 1, 5, and 15).
- 10001 or 100001 (1x0001) for bit-level Input Status data (Function Code 2)
- 30001 or 300001 (3x0001) for Input Register data (Function Code 4)
- 40001 or 400001 (4x0001) for Holding Register data (Function Codes 3, 6, and 16).

Address calculation examples:

- For bit-level Coil commands (FC 1, 5, or 15) to read or write a Coil 0X address 00001, specify a value of 0 (00001 - 00001 = 0).
- For Coil address 00115, specify 114

  (00115 - 00001 = 114)
- For register read or write commands (FC 3, 6, or 16) 4X range, for 40001, specify a value of 0

  (40001 - 40001 = 0).
- For 01101, 11101, 31101 or 41101, specify a value of 1100.

  (01101 - 00001 = 1100)
  (11101 -10001 = 1100)
  (31101 - 30001 = 1100)
  (41101 - 40001 = 1100)

Note: If the documentation for a particular Modbus server device lists data addresses in hexadecimal (base16) notation, you will need to convert the hexadecimal value to a decimal value to enter in this parameter. In such cases, it is not usually necessary to subtract 1 from the converted decimal number, as this addressing scheme typically uses the exact offset address expressed as a hexadecimal number.

Comment

0 to 35 alphanumeric characters

2.2.6 Static ARP Table

The Static ARP Table defines a list of static IP addresses that the module will use when an ARP (Address Resolution Protocol) is required. The module will accept up to 40 static IP/MAC address data sets.

Use the Static ARP table to reduce the amount of network traffic by specifying IP addresses and their associated MAC (hardware) addresses that the MVI56-MNETCR module will be communicating with regularly.

Important: If the device in the field is changed, this table must be updated to contain the new MAC address for the device and downloaded to the module. If the MAC is not changed, no communications with the module will be provided.

IP Address

Dotted notation

This table contains a list of static IP addresses that the module will use when an ARP is required. The module will accept up to 40 static IP/MAC address data sets.

Important: If the device in the field is changed, this table must be updated to contain the new MAC address for the device and downloaded to the module. If the MAC is not changed, no communications with the module will occur.

Hardware MAC Address

Hex value

This table contains a list of static MAC addresses that the module will use when an ARP is required. The module will accept up to 40 static IP/MAC address data sets.

Important: If the device in the field is changed, this table must be updated to contain the new MAC address for the device and downloaded to the module. If the MAC is not changed, no communications with the module will occur.

2.2.7 Ethernet Configuration

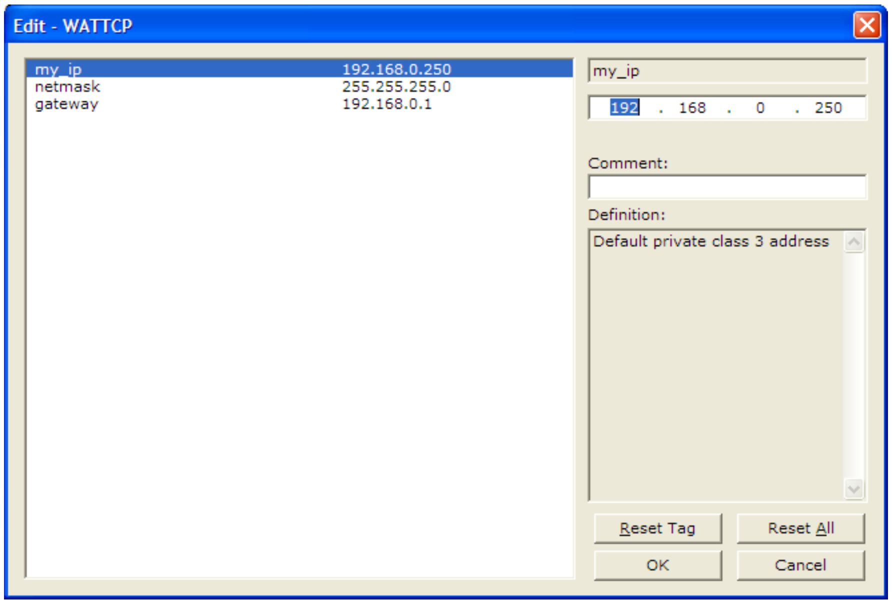
Use this procedure to configure the Ethernet settings for your module. You must assign an IP address, subnet mask and gateway address. After you complete this step, you can connect to the module with an Ethernet cable.

1 Determine the network settings for your module, with the help of your network administrator if necessary. You will need the following information:

- IP address (fixed IP required) _____ . _____ . _____ . _____
- Subnet mask _____ . _____ . _____ . _____
- Gateway address _____ . _____ . _____ . _____

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

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


Edit - WATTCP

my_ip	192.168.0.250
netmask	255.255.255.0
gateway	192.168.0.1

my_ip
192 . 168 . 0 . 250
Comment:
Definition:
Default private class 3 address

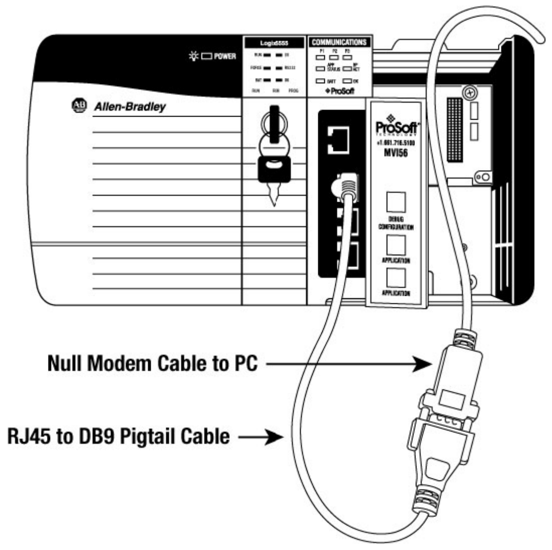
3 Edit the values for *my_ip*, *netmask* (subnet mask) and *gateway* (default gateway).

4 When you are finished editing, click **OK** to save your changes and return to the *ProSoft Configuration Builder* window.

2.2.8 Connecting your PC to the Module

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

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

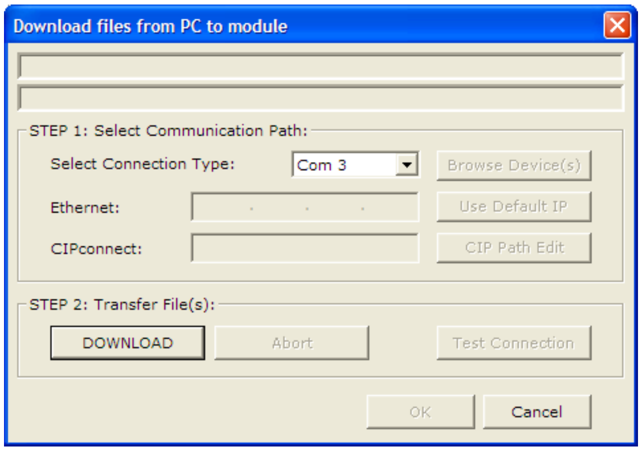


2.2.9 Downloading the Project to the Module Using a Serial COM Port

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

To download the project file

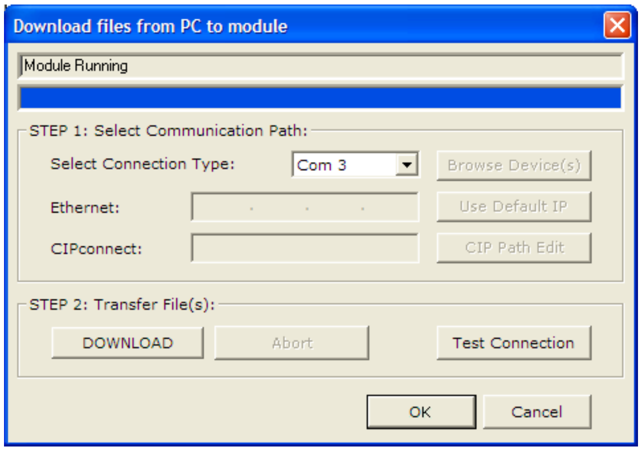
1 In the tree view in *ProSoft Configuration Builder*, click once to select the module.
2 Right-click the module icon to open a shortcut menu. From the shortcut menu, choose **DOWNLOAD FROM PC TO DEVICE**. The program will scan your PC for a valid com port (this may take a few seconds). When *PCB* has found a valid COM port, the *Download* dialog box will open.



Select Connection Type: Com 3

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

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



Module Running

Select Connection Type: Com 3

3 Ladder Logic

In This Chapter

Ladder logic is required for managing communication between the MVI56-MNETCR module and the processor. The ladder logic handles tasks such as:

- Module backplane data transfer
- Special block handling
- Status data receipt

Additionally, a power-up handler may be needed to initialize the module's database and may clear some processor fault conditions.

The sample Import Rung with Add-On Instruction is extensively commented to provide information on the purpose and function of each user-defined data type and controller tag. For most applications, the Import Rung with Add-On Instruction will work without modification.

3.1 Controller Tags

Data related to the MVI56-MNETCR is stored in the ladder logic in variables called controller tags. Individual controller tags can be grouped into collections of controller tags called controller tag structures. A controller tag structure can contain any combination of:

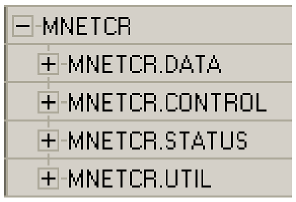
- Individual controller tags
- Controller tag arrays
- Lower-level controller tag structures

The controller tags for the module are pre-programmed into the Add-On Instruction Import Rung ladder logic. You can find them in the *Controller Tags* subfolder, located in the *Controller* folder in the *Controller Organizer* pane of the main RSLogix 5000 window.

This controller tag structure is arranged as a tree structure. Individual controller tags are found at the lowest level of the tree structure. Each individual controller tag is defined to hold data of a specific type, such as integer or floating-point data. Controller tag structures are declared with user-defined data types, which are collections of data types.

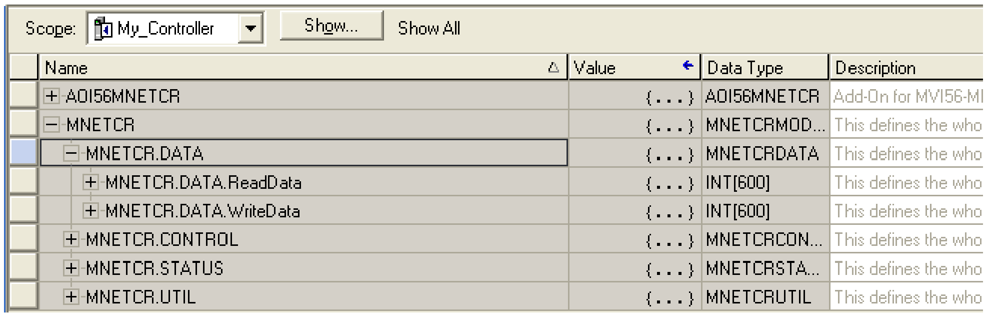
3.1.1 MVI56(E)-MNETCR Controller Tags

The main controller tag structure, *MNETCR*, is broken down into four lower-level controller tag structures.



The four lower-level controller tag structures contain other controller tags and controller tag structures. Click the **[+]** sign next to any controller tag structure to expand it and view the next level in the structure.

For example, if you expand the *MNETCR.DATA* controller tag structure, you will see that it contains two controller tag arrays, *MNETCR.DATA.ReadData* and *MNETCR.DATA.WriteData*, which are 600-element integer arrays by default.



Name	Value	Data Type	Description
AOI56MNETCR	{...}	AOI56MNETCR	Add-On for MVI56-MI
MNETCR	{...}	MNETCRMOD...	This defines the who
MNETCR.DATA	{...}	MNETCRDATA	This defines the who
MNETCR.DATA.ReadData	{...}	INT[600]	This defines the who
MNETCR.DATA.WriteData	{...}	INT[600]	This defines the who
MNETCR.CONTROL	{...}	MNETCRCON...	This defines the who
MNETCR.STATUS	{...}	MNETCRSTA...	This defines the who
MNETCR.UTIL	{...}	MNETCRUTIL	This defines the who

Each controller tag in the Add-On Instruction is commented in the *Description* column.

Notice that the *Data Type* column displays the data types used to declare each controller tag, controller tag array or controller tag structure. Individual controller tags are declared with basic data types, such as INT and BOOL. Controller tag arrays are declared with arrays of basic data types. Controller tag structures are declared with user-defined data types (UDTs).

3.2 User-Defined Data Types (UDTs)

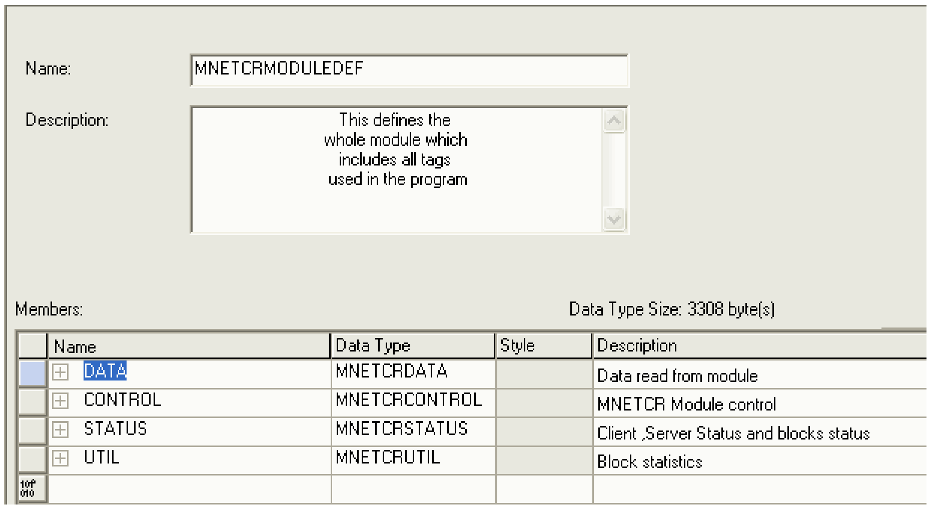
User-defined data types (UDTs) allow users to organize collections of data types into groupings. These groupings, or data type structures, can then be used to declare the data types for controller tag structures. Another advantage of defining a UDT is that it may be re-used in other controller tag structures that use the same data types.

The Add-On Instruction Import Rung ladder logic for the module has pre-defined UDTs. You can find them in the *User-Defined* subfolder, located in the *Data Types* folder in the *Controller Organizer* pane of the main RSLogix window. Like the controller tags, the UDTs are organized in a multiple-level tree structure.

3.2.1 MVI56(E)-MNETCR User-Defined Data Types

Ten different UDTs are defined for the MVI56(E)-MNETCR Add-On Instruction.

The main UDT, *MNETCRMODULEDEF*, contains all the data types for the module and was used to create the main controller tag structure, *MNETCR*. There are four UDTs one level below *MNETCRMODULEDEF*. These lower-level UDTs were used to create the *MNETCR.DATA*, *MNETCR.CONTROL*, *MNETCR.STATUS*, and *MNETCR.UTIL* controller tag structures.



Name: MNETCRMODULEDEF

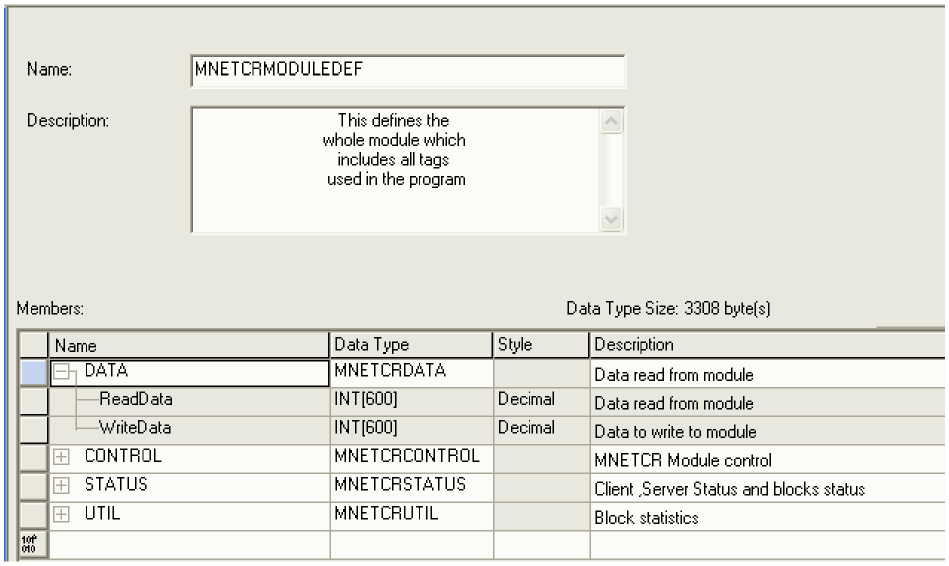
Description: This defines the whole module which includes all tags used in the program

Members: Data Type Size: 3308 byte(s)

Name	Data Type	Style	Description
⊞ DATA	MNETCRDATA		Data read from module
⊞ CONTROL	MNETCRCONTROL		MNETCR Module control
⊞ STATUS	MNETCRSTATUS		Client ,Server Status and blocks status
⊞ UTIL	MNETCRUTIL		Block statistics

Click the **[+]** signs to expand the UDT structures and view lower-level UDTs.

For example, if you expand *MNETCR.DATA*, you will see that it contains two UDTs, *ReadData* and *WriteData*. Both of these are 600-element integer arrays by default.



Name: MNETCRMODULEDEF

Description: This defines the whole module which includes all tags used in the program

Members: Data Type Size: 3308 byte(s)

Name	Data Type	Style	Description
DATA	MNETCRDATA		Data read from module
ReadData	INT[600]	Decimal	Data read from module
WriteData	INT[600]	Decimal	Data to write to module
CONTROL	MNETCRCONTROL		MNETCR Module control
STATUS	MNETCRSTATUS		Client ,Server Status and blocks status
UTIL	MNETCRUTIL		Block statistics

Notice that these UDTs are the data types used to declare the *MNETCR.DATA.ReadData* and *MNETCR.DATA.WriteData* controller tag arrays.

Each UDT is commented in the *Description* column.

3.3 Using Controller Tags

You can use controller tags to:

- View read and write data that is being transferred between the module and the processor.
- View status data for the module.
- Set up and trigger special functions.
- Initiate module restarts (Warm Boot or Cold Boot).

3.4 Controller Tag Overview

Controller Tag	Description
MNETCR.DATA	MNET input and output data transferred between the processor and the module
MNETCR.CONTROL	Governs the data movement between the PLC rack and the module
MNETCR.STATUS	Status information
MNETCR.UTIL	Block statistics and generic tags used for internal ladder processing (DO NOT MODIFY)

The following sections describe each of these controller tag structures in more detail.

3.4.1 MNETCR.DATA

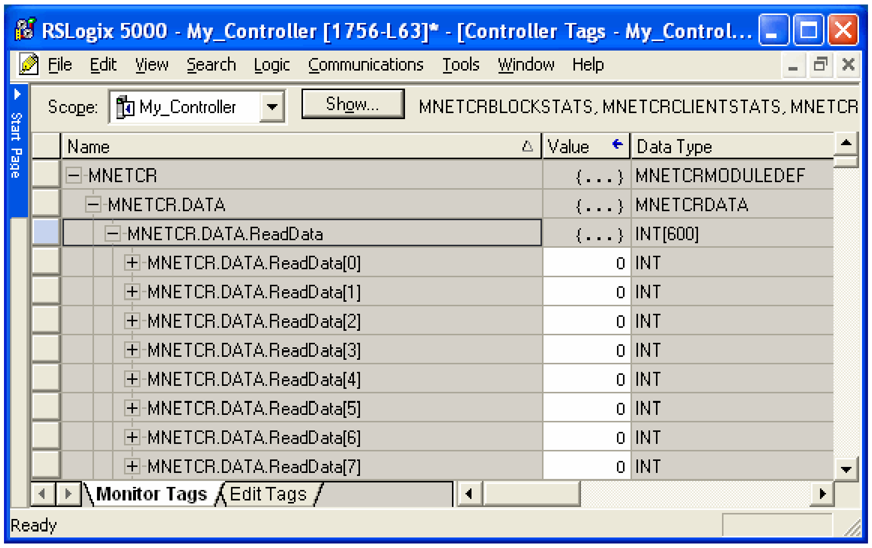
The controller tags in *MNETCR.DATA* hold data to be transferred between the processor and the MVI56-MNETCR module. This read and write data is transferred between the processor and the module as "pages," or blocks, of data up to 40 words long.

The data types for the *MNETCR.DATA.ReadData* and *MNETCR.DATA.WriteData* controller tag arrays are integer arrays containing variable numbers of elements.

Controller Tag	Data Type	Description
ReadData	INT[x]	Data read from module. Array size is equal to the size set in the configuration.
WriteData	INT[x]	Data to write to module. Array size is equal to the size set in the configuration.

MNETCR.DATA.ReadData

ReadData is a controller tag array that automatically adjusts to match the value entered in the *Read Register Count* (page 45) parameter of the configuration. For ease of use, this array should be dimensioned as a multiple of 40 words. This data is paged up to 40 words at a time from the module to the processor. The ladder logic places the received data into the proper position in the *ReadData* array. This data is used for status and control in the processor ladder logic.


RSLogix 5000 - My_Controller [1756-L63]* - [Controller Tags - My_Control...
File Edit View Search Logic Communications Tools Window Help
Start Page
Scope: My_Controller
Show...
MNETCRBLOCKSTATS, MNETCRCLIENTSTATS, MNETCR
Monitor Tags
Edit Tags
Ready

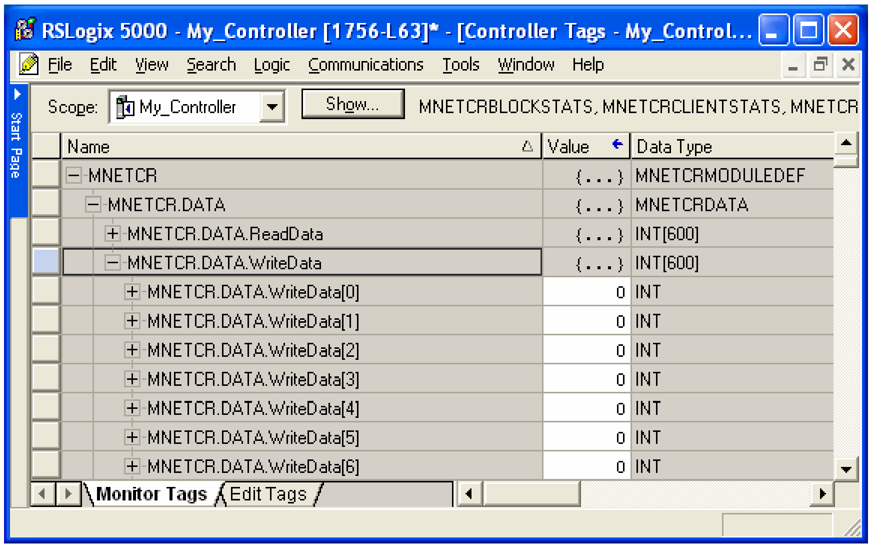
Name	Value	Data Type
MNETCR	{...}	MNETCRMODULEDEF
MNETCR.DATA	{...}	MNETCRDATA
MNETCR.DATA.ReadData	{...}	INT[600]
MNETCR.DATA.ReadData[0]	0	INT
MNETCR.DATA.ReadData[1]	0	INT
MNETCR.DATA.ReadData[2]	0	INT
MNETCR.DATA.ReadData[3]	0	INT
MNETCR.DATA.ReadData[4]	0	INT
MNETCR.DATA.ReadData[5]	0	INT
MNETCR.DATA.ReadData[6]	0	INT
MNETCR.DATA.ReadData[7]	0	INT

The *ReadData* array is related to the contents of the Read Data area of the module's internal database. To view the actual registers in the module's internal database, access the database display from *ProSoft Configuration Builder's Diagnostics* menu. For more information, see the section on *PCB* Diagnostics (page 77).

```
DATABASE DISPLAY 0 TO 99 (DECIMAL)

   6666   7777   8888   9999   1010      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
```

MNETCR.DATA.WriteData

WriteData is a controller tag array that automatically adjusts to match the value entered in the *Write Register Count* (page 46) parameter of the configuration. For ease of use, this array should be dimensioned as a multiple of 40 words. This data is paged up to 40 words at a time from the processor to the module. The ladder logic places the write data into the output image for transfer to the module. This data is passed from the processor to the module for status and control information for use in other nodes on the network.


RSLogix 5000 - My_Controller [1756-L63]* - [Controller Tags - My_Control...
File Edit View Search Logic Communications Tools Window Help
Start Page
Scope: My_Controller
Show...
MNETCRBLOCKSTATS, MNETCRCLIENTSTATS, MNETCR
Monitor Tags
Edit Tags

Name	Value	Data Type
MNETCR	{...}	MNETCRMODULEDEF
MNETCR.DATA	{...}	MNETCRDATA
MNETCR.DATA.ReadData	{...}	INT[600]
MNETCR.DATA.WriteData	{...}	INT[600]
MNETCR.DATA.WriteData[0]	0	INT
MNETCR.DATA.WriteData[1]	0	INT
MNETCR.DATA.WriteData[2]	0	INT
MNETCR.DATA.WriteData[3]	0	INT
MNETCR.DATA.WriteData[4]	0	INT
MNETCR.DATA.WriteData[5]	0	INT
MNETCR.DATA.WriteData[6]	0	INT

The *WriteData* array is related to the contents of the Write Data area of the module's internal database. To view the actual registers in the module's internal database, access the database display from *ProSoft Configuration Builder's Diagnostics* menu. For more information, see the section on *PCB* Diagnostics (page 77).

```
DATABASE DISPLAY 1000 TO 1099 (DECIMAL)

   1111    2222    3333    4444    5555       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       0       0       0       0       0
```

3.4.2 MNETCR.CONTROL

This controller tag structure is used to request special tasks from the module. For more information, see Special Function Blocks (page 100).

Controller Tag	Data Type	Description
BootTimer	TIMER	Timer used to clear both cold and warm boot requests
WarmBoot	BOOL	Configuration data reset in the module
ColdBoot	BOOL	Hardware reset of the module
EventCmdTrigger	BOOL	Initiates Event Command
EventCmdPending	BOOL	Allows Event Command
ClientID	INT	Client ID to poll a server with the Event Command.
EventCmd	MNETCREVENTCMD	Holds Event Command configuration
CmdControl	MNETCRCMDCONTROL	Holds Command Control status
CmdControlTrigger	BOOL	Initiates Command Control
CmdControlPending	BOOL	Halts rung until module is ready
IPAddress	MNETCRIPADDRESS	IP address statistics including triggers
WriteCmdBits	INT[30]	Selects individual Clients to activate its commands.

3.4.3 MNETCR.STATUS

This controller tag structure contains module and Client status data. For a more complete description of the *MNETCR.STATUS* controller tag structure, refer to the Status Data Definition (page 88).

Controller Tag	Data Type	Description
PassCnt	INT	Program cycle counter
BlockStats	MNETCRBLOCKSTATS	Block Statistics
CmdBits	INT[30]	Commands bits array to be used for 30 Clients
ClientStatsTrigger	BOOL	Get Client Status
ClientIDReq	INT	Client ID requested
ClientStatus	MNETCRCLIENTSTATS[30]	Client status requests
ClientIDRec	INT	Client ID received.
CmdErrorList	INT[16]	Command Error List
ClientStatsPending	BOOL	Allows Get Client Status

3.4.4 MNETCR.UTIL

This controller tag structure stores the variables required for the data transfer between the processor and the MVI56-MNETCR module.

Controller Tag	Data Type	Description
LastRead	INT	Index of last read block
LastWrite	INT	Index of last write block
BlockIndex	INT	Computed block offset for data table
ReadDataSizeGet	INT	Gets *ReadData* array length
WriteDataSizeGet	INT	Gets *WriteData* array length
ReadDataBlkCount	INT	Holds the value of the block counts of the *ReadData* array
WriteDataBlkCount	INT	Holds the value of the block counts of the *WriteData* array
RBTSremainder	INT	Holds remainder calculation value from the *ReadData* array
WBTSremainder	INT	Holds remainder calculation value from the *WriteData* array
IPgetPending	BOOL	Allows setting module IP address
IPsetPending	BOOL	Allows getting module IP address
InitOutBlkIDLim	INT	Block Index Limit for *ReadData* size of the array

The *LastRead* tag stores the latest Read Block ID received from the module. The *LastWrite* tag stores the latest Write Block ID to be sent to the module. The *BlockIndex* tag is an intermediate variable used during the block calculation.

4 Diagnostics and Troubleshooting

In This Chapter

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

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

4.1 LED Indicators

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

LED	Color	Status	Indication
CFG	Green	ON	Data is being transferred between the module and a remote terminal using the Configuration/Debug port.
		OFF	No data is being transferred on the Configuration/Debug port.
P1	Green	ON	Port not used
		OFF	Port not used
P2	Green	ON	Port not used
		OFF	Port not used
APP	Amber	OFF	The MVI56-MNETCR is working normally.
		ON	The MVI56-MNETCR 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 more than 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.

4.1.1 Ethernet LED Indicators

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

4.1.2 Clearing a Fault Condition

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

To clear the condition, follow these steps:

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

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

4.1.3 Troubleshooting

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

Processor Errors

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

Module Errors

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

4.2 Using ProSoft Configuration Builder (PCB) for Diagnostics

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

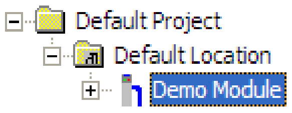
Because this is a text-based menu system, you enter commands by typing the [command letter] from your computer keyboard in the *Diagnostic* window in *ProSoft Configuration Builder (PCB)*. The module does not respond to mouse movements or clicks. The command executes as soon as you press the **[COMMAND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

4.2.1 Using the Diagnostic Window in ProSoft Configuration Builder

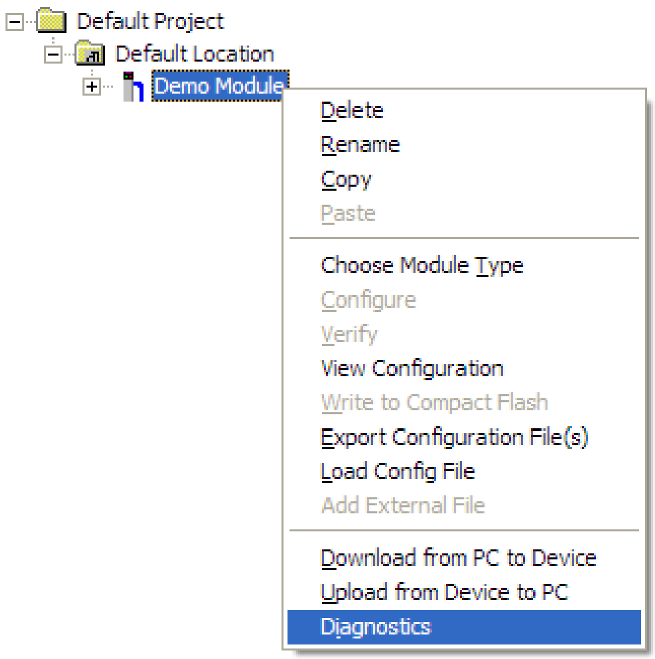
Tip: You can have a ProSoft Configuration Builder Diagnostics window open for more than one module at a time.

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

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

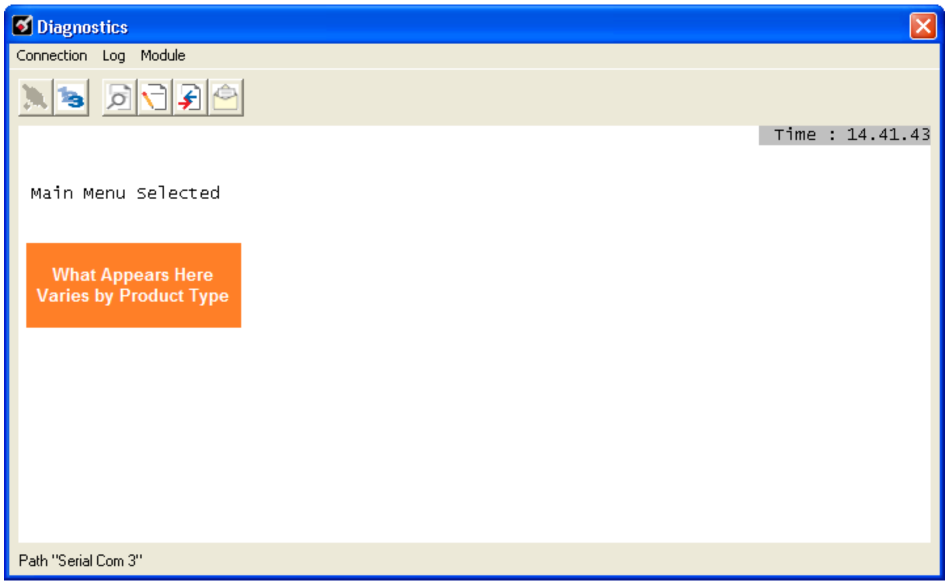


2 On the shortcut menu, choose **DIAGNOSTICS**.



This action opens the *Diagnostics* dialog box.

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

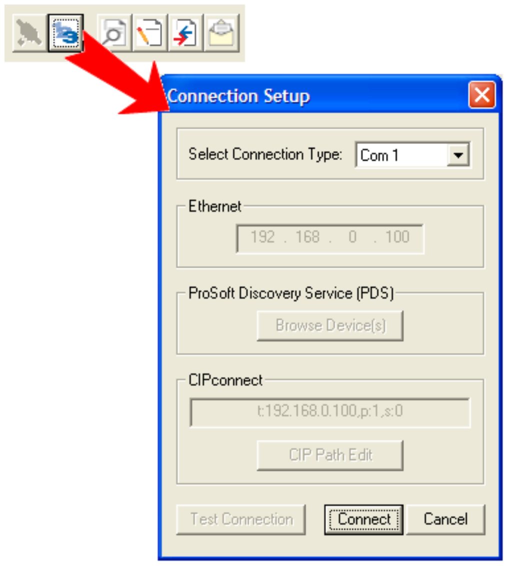


```
Time : 14.41.43

Main Menu Selected
```

Path "Serial Com 3"

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

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



Select Connection Type: Com 1

Ethernet: 192 . 168 . 0 . 100

CIPconnect: t:192.168.0.100,p:1,s:0

2 Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.

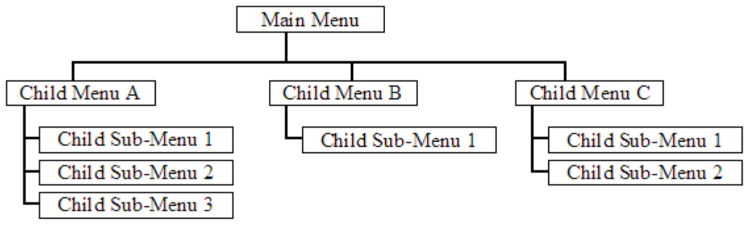
3 On computers with more than one serial port, verify that your communication program is connected to the same port that is connected to the module.

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

4.2.2 Navigation

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

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



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

Keystrokes

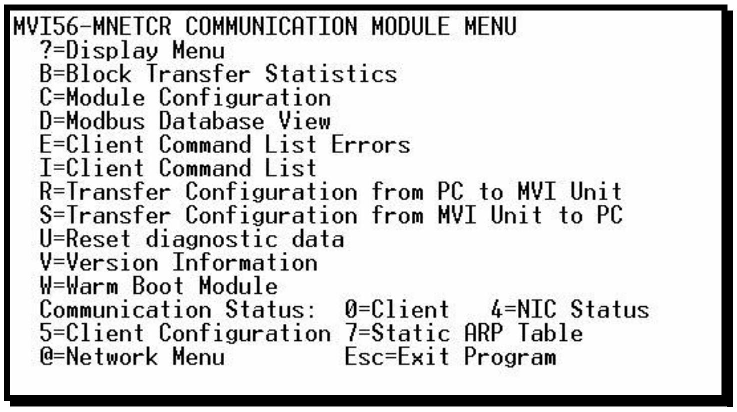
The keyboard commands on these menus are usually not case sensitive. You can enter most commands in lowercase or uppercase letters.

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

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

4.2.3 Main Menu

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



```
MVI56-MNETCR COMMUNICATION MODULE MENU
  ?=Display Menu
  B=Block Transfer Statistics
  C=Module Configuration
  D=Modbus Database View
  E=Client Command List Errors
  I=Client Command List
  R=Transfer Configuration from PC to MVI Unit
  S=Transfer Configuration from MVI Unit to PC
  U=Reset diagnostic data
  V=Version Information
  W=Warm Boot Module
  Communication Status:  0=Client   4=NIC Status
  5=Client Configuration 7=Static ARP Table
  @=Network Menu         Esc=Exit Program
```

Caution: Some of the commands available to you from this menu are designed for advanced debugging and system testing only, and can cause the module to stop communicating with the processor or with other devices, resulting in potential data loss or other communication failures. Use these commands only if you fully understand their potential effects, or if you are specifically directed to do so by ProSoft Technology Technical Support Engineers.
There may be some special command keys that are not listed on the menu but that may activate additional diagnostic or debugging features. If you need these functions, you will be advised how to use them by Technical Support. Please be careful when pressing keys so that you do not accidentally execute an unwanted command.

<u>*Viewing Block Transfer Statistics*</u>

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.

Viewing Module Configuration

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

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

Opening the Database View Menu

Press **[D]** to open the *Database View* menu.

Use this menu command to view the current contents of the module's database. For more information about this submenu, see Database View Menu (page 84).

Opening the Command Error List Menu

Press **[E]** 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]** to open the Command List menu. Use this command to view the configured command list for the module.

Receiving the Configuration File

Press **[R]** to download (receive) the current configuration file from the module.

Sending the Configuration File

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

Resetting Diagnostic Data

Press **[U]** to reset the status counters for the Client in the module.

Viewing Version Information

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

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

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

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

Warm Booting the Module

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

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

Viewing Client Status

Press **[0]** (zero) to display the statistics of the Client.

Viewing NIC Status

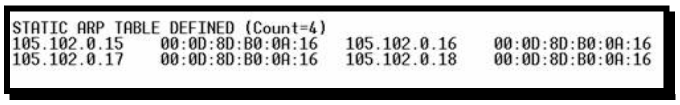
Press **[4]** to view NIC status. Use this command to view the communication status for the Network Interface Card.

Viewing Client Configuration

Press **[5]** to display the configuration information for the Client.

Viewing the Static ARP Table

Press **[7]** to view the Static ARP Table. Use this command to view the list of IP and MAC addresses that are configured not to receive ARP messages from the module.



```
STATIC ARP TABLE DEFINED (Count=4)
105.102.0.15    00:0D:8D:B0:0A:16   105.102.0.16    00:0D:8D:B0:0A:16
105.102.0.17    00:0D:8D:B0:0A:16   105.102.0.18    00:0D:8D:B0:0A:16
```

Opening the Network Menu

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

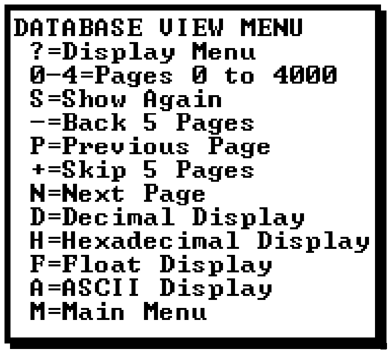
The *Network* menu allows you to send, receive and view the WATTCP.CFG file that contains the IP, gateway and other network specification information. For more information about this submenu, see Network Menu (page 86).

Exiting the Program

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

4.2.4 Modbus Database View Menu

Press **[D]** to open the *Modbus Database View* menu. Use this command to view the module's internal database values. Press **[?]** to view a list of commands on this menu.



```
DATABASE VIEW MENU
 ?=Display Menu
 0-4=Pages 0 to 4000
 S=Show Again
 -=Back 5 Pages
 P=Previous Page
 +=Skip 5 Pages
 N=Next Page
 D=Decimal Display
 H=Hexadecimal Display
 F=Float Display
 A=ASCII Display
 M=Main Menu
```

All data contained in the module's database is available for viewing using the commands. Refer to the Modbus Protocol Specification (page 119) for information on the structure of Modbus messages. Each option available on the menu is discussed in the following topics.

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.

Redisplaying the Current Page

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

Moving Back Through 5 Pages of Registers

Press **[-]** from the *Database View* menu to skip five pages back in the database to see the 100 registers of data starting 500 registers before the currently displayed page.

Viewing the Previous Page of Registers

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

Moving Forward Through 5 Pages of Registers

Press **[+]** from the *Database View* menu to skip five pages ahead in the database to see 100 registers of data 500 registers ahead of the currently displayed page.

Viewing the Next Page of Registers

Press **[N]** from the *Database View* menu to display the next page of data.

Viewing Data in Decimal Format

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

Viewing Data in Hexadecimal Format

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

Viewing Data in Floating-Point Format

Press **[F]** from the *Database View* menu 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]** from the *Database View* menu 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.

4.2.5 Network Menu

From the *Main* menu press **[@]** to display the *Network* menu. The *Network* menu allows you to send, receive, and view the WATTCP.CFG file that contains the IP and module addresses, and other network information.

Transferring WATTCP.CFG to the Module

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

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

Transferring WATTCP.CFG to the PC

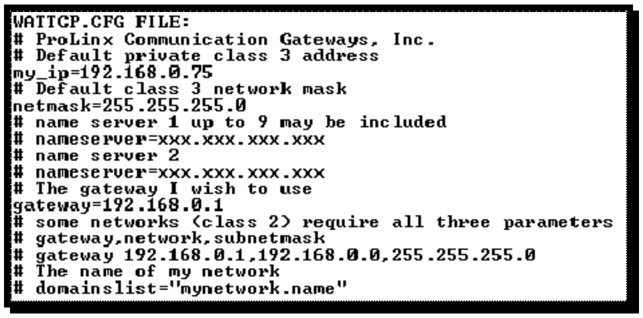
Press **[S]** to transfer the WATTCP.CFG file from the module to your PC.

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

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

Viewing the WATTCP.CFG File on the module

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



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

Returning to the Main Menu

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

4.3 Reading Status Data from the Module

Module status information is useful for troubleshooting and can be accessed in several different ways.

In the ladder logic's *MNETCR.STATUS* controller tag structure.

The MVI56-MNETCR module returns status data in the input image that can be used to determine the module's operating status. This data is transferred from the module to the processor continuously as part of the normal data transfer block sequence (page 98). You can view this data in the *MNETCR.STATUS* controller tag structure in the ladder logic.

Client status data can also be requested and returned in a special Client Status block (page 104), outside of the normal data transfer block sequence. The status data contained in the Client Status block is different from the status data in the normal data transfer blocks. It can also be viewed in the *MNETCR.STATUS* controller tag structure.

For more information about status data contained in *MNETCR.STATUS*, see the Status Data Definition (page 88).

In *ProSoft Configuration Builder's Diagnostics* screens.

For more information, see the section on PCB Diagnostics (page 77).

In database locations specified by *Error/Status Pointers* (optional).

If optional *Error/Status Pointer*s are enabled, the status data can also be found in the Read Data area of the module's database at the locations specified by the pointer configuration parameters. For more information, see Backplane Error/Status Pointer (page 44), Client Error/Status Pointer (page 47) and Command Error Pointer (page 47).

Via the Configuration/Debug port.

Use a terminal program such as HyperTerminal. The Configuration/Debug port provides the following functionality:

- Full view of the module's configuration data
- View of the module's status data
- Complete display of the module's internal database (registers 0 to 4999)
- Version information
- Control over the module (warm boot, cold boot, transfer configuration)
- Facility to upload and download the module's configuration file

4.3.1 Status Data Definition

This section contains a description of the controller tags in the *MNETCR.STATUS* structure, which contains module and Client status data.

- The first eight controller tags contain status data routinely transferred from the module to the processor in the normal data transfer block sequence (page 98).
- The remaining controller tags are used to request and receive Client status data via the Client Status block functionality (page 104).

Note: In order to access up-to-date status data from these remaining controller tags, you must ensure that a Client Status block was recently received from the module. Client Status blocks are not routinely sent from the module; they are returned on a once-per-request basis as a response to a Client Status block request from the processor.

Controller Tag	**Data Type**	**Description**
PassCnt	INT	This value is incremented each time a complete program cycle occurs in the module.
BlockStats.Read	INT	Total number of read blocks transferred from the module to the processor
BlockStats.Write	INT	Total number of write blocks transferred from the processor to the module
BlockStats.Parse	INT	Total number of blocks successfully parsed that were received from the processor
BlockStats.Event	INT	Total number of Event Command blocks received from the processor
BlockStats.Cmd	INT	Total number of Command Control blocks received from the processor
BlockStats.Err	INT	Total number of block errors recognized by the module
CmdBits[x]	INT	Displays enabled or disabled status of all 16 commands in the *Client x Command List* for each Client
ClientStatsTrigger	BOOL	Initiates request for Client Status block from module when set to **1**
ClientIDReq	INT	Specifies Client (**0**-**29**) to request status data from
ClientStatus[x].CmdReq	INT	Total number of command list requests sent from Client
ClientStatus[x].CmdResp	INT	Total number of command list responses received by Client
ClientStatus[x].CmdErr	INT	This value is incremented each time an error message is received from a remote unit or a local error is generated for a command.
ClientStatus[x].Requests	INT	Not used
ClientStatus[x].Responses	INT	Not used

Controller Tag	Data Type	Description
ClientStatus[x].ErrSent	INT	Not used
ClientStatus[x].ErrRec	INT	Not used
ClientStatus[x].CfgErrWord	INT	Configuration Error Word - This word contains a bitmap that indicates general module configuration errors.
ClientStatus[x].CurErr	INT	Most recent error code recorded for the Client
ClientStatus[x].LastErr	INT	Previous most recent error code recorded for the Client
ClientIDRec	INT	Specifies Client (0-29) for which status data was received in the most recently processed Client Status block
CmdErrorList[x]	INT	Command error code for each command (0-15) on the specified Client's command list
ClientStatsPending	BOOL	Temporary variable used to prevent a new Client Status block request from being sent to the module until the previously sent Client Status block request has been completely processed and a response block has been returned.

4.3.2 Configuration Error Word

The *Configuration Error Word* contains Client configuration error indications, in a bit-mapped format. Specific bits in the module's *Configuration Error Word* are turned on (set to 1) to indicate various configuration errors. The *Configuration Error Word* appears in the *MNETCR.STATUS.ClientStatus[x]* controller tag array.

Bits set to 1 in the *Configuration Error Word* indicate the following errors.

Bit	Description	Hex Value
0	Reserved - not currently used	0001h
1	Reserved - not currently used	0002h
2	Reserved - not currently used	0004h
3	Reserved - not currently used	0008h
4	Invalid retry count parameter	0010h
5	The float flag parameter is not valid.	0020h
6	The float start parameter is not valid.	0040h
7	The float offset parameter is not valid.	0080h
8	The ARP Timeout is not in range (ARP Timeout parameter 0 or greater than 60000 milliseconds) and will default to 5000 milliseconds.	0100h
9	The Command Error Delay is > 300 and will default to 300.	0200h
10	Reserved - not currently used	0400h
11	Reserved - not currently used	0800h
12	Reserved - not currently used	1000h
13	Reserved - not currently used	2000h
14	Reserved - not currently used	4000h
15	Reserved - not currently used	8000h

Combinations of errors will result in more than one bit being set in the error word. Correct any invalid data in the configuration for proper module operation. A value of zero (0) in this word indicates all bits are clear, which means that all module configuration parameters contain valid values. However, this does not mean that the configuration is valid for the user application. Make sure each parameter is set correctly for the intended application.

4.3.3 Client Command Errors

There are several different ways to view Client Command Errors.

- In the *MNETCR.STATUS.CmdErrorList* controller tag array
- On the Client status data screens in the *ProSoft Configuration Builder Diagnostics*
- At a module database location specified by the configuration's *MNET Client x Command Error Pointer*, if the *Command Error Pointer* is enabled. This means that the first register refers to command 1 and so on.

Word Offset	Description
0	Command 0 Error
1	Command 1 Error
2	Command 2 Error
3	Command 3 Error
…	….
…	…
15	Command 15 Error
16	Command 16 Error

For every command that has an error, the module automatically sets the poll delay parameter to 30 seconds. This instructs the module to wait 30 seconds until it attempts to issue the command again.

As the commands in the Client Command Last are polled and executed, an error value is maintained in the module for each command. This error list can be transferred to the processor.

Standard Modbus Exception Code Errors

Code	Description
1	Illegal function
2	Illegal data address
3	Illegal data value
4	Failure in associated device
5	Acknowledge
6	Busy; message was rejected

Module Communication Error Codes

Code	Description
-2	Timeout while transmitting message
-11	Timeout waiting for response after request (same as -36)
253	Incorrect slave/server address in response
254	Incorrect function code in response
255	Invalid CRC/LRC value in response

MNET Client Specific Errors

Code	Description
-33	Failed to connect to server specified in command
-35	Invalid length of response message
-36	MNET command response timeout (same as -11)
-37	TCP/IP connection ended before session finished

Command List Entry Errors

Code	Description
-40	Too few parameters
-41	Invalid enable code
-42	Internal address > maximum address
-43	Invalid node address (<0 or >255)
-44	Count parameter set to 0
-45	Invalid function code
-46	Invalid swap code
-47	ARP could not resolve MAC from IP (bad IP address, not part of a network, invalid parameter to ARP routine).
-48	Error during ARP operation: the response to the ARP request did not arrive to the module after a user-adjustable ARP Timeout.

Note: When the Client gets error -47 or -48, it uses the adjustable ARP Timeout parameter in the configuration file to set an amount of time to wait before trying again to connect to this non-existent server. This feature allows the Client to continue sending commands and polling other existing servers, while waiting for the non-existent server to appear on the network.

5 Reference

In This Chapter

5.1 Product Specifications

The MVI56 Modbus TCP/IP Multi Client Communication Module for Remote Chassis allows Rockwell Automation® ControlLogix® Programmable Automation Controllers (PACs) to interface easily with multiple Modbus TCP/IP server-compatible instruments and devices. The multi-Client module improves performance when controlling multiple servers on a Modbus TCP/IP network, by supporting up to 30 Clients.

Compatible devices include Modicon PAC's as well as a wide variety of instruments and devices. This module uses a small I/O data area for data transfer between the module and the ControlLogix processor, making it ideal for ControlNet™ or Ethernet applications with the module in a remote rack. The module exchanges up to 5000 words of data between the processor and the Modbus TCP/IP network.

5.1.1 General Specifications

- Single Slot - 1756 backplane compatible
- 10/100 MB Ethernet port
- Module I/O data memory mapping supports up to 5000 registers and is user definable
- ProSoft Configuration Builder (PCB) software supported, a Windows-based graphical user interface providing simple product and network configuration
- Sample Ladder Logic and Add-On Instructions (AOI) are used for data transfer between module and processor and module configuration
- Personality Module (non-volatile CF card) used to store configuration allowing for quick in-the-field product replacement.
- This module uses a small I/O data area for 40 words data block transfer between the module and the ControlLogix processor, for applications with the module in a remote rack.

Modbus TCP/IP Client (Master)

The MVI56-MNETCR is a Client-only module that will operate on a local or remote rack. This module was created to improve performance when controlling multiple servers on a Modbus TCP/IP network.

- Offers 30 Client connections with up to 16 commands each to talk to multiple servers
- Actively reads data from and writes data to Modbus TCP/IP devices, using MBAP or Encapsulated Modbus message formats
- Transmits Modbus Function Codes 1, 2, 3, 4, 5, 6, 7, 15, and 16
- ControlLogix processor can be programmed to use special functions to control the activity on the Client by actively selecting commands to execute from the command list (Command Control) or by issuing commands directly from the ladder logic (Event Commands)

5.1.2 Functional Specifications

- Modbus data types overlap in the module's memory database, so the same data can be conveniently read or written as bit-level or register-level data.
- Configurable floating-point data movement is supported, including support for Enron or Daniel® floating-point formats
- Special functions (Event Commands, Command Control, status, etc.) are supported by message transfer (unscheduled) using the MSG instruction
- Configurable parameters for the Client including a minimum response delay of 0 to 65535 ms and floating-point support
- Supports up to 30 Clients with up to 16 commands for each Client
- Error codes, counters, and module status available from module memory through the Clients, or through the ladder logic and controller tags in RSLogix 5000

5.1.3 Hardware Specifications

Specification	**Description**
Backplane Current Load	800 mA @ 5 Vdc 3 mA @ 24 Vdc
Operating Temperature	32°F to 140°F (0° C to 60°C)
Storage Temperature	-40°F to 185°F (-40° C to 85°C)
Shock	30 g operational 50 g non-operational Vibration: 5 g from 10 Hz to 150 Hz
Relative Humidity	5% to 95% (with no condensation)
LED Indicators	Module Status Backplane Transfer Status Application Status Serial Activity
Application port (Ethernet)	
Ethernet Port (Ethernet modules)	10/100 Base-T RJ45 Connector Link and activity LED indicators Electrical Isolation 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in section 5.3.2 of IEC 60950: 1991 Ethernet Broadcast Storm Resiliency = less than or equal to 5000 [ARP] frames-per-second and less than or equal to 5 minutes duration
Shipped with Unit	RJ45 to DB-9M cables for each port 6-foot RS-232 configuration cable
Debug/Configuration port (CFG)	
CFG Port (CFG)	RJ45 (DB-9M with supplied cable) No hardware handshaking

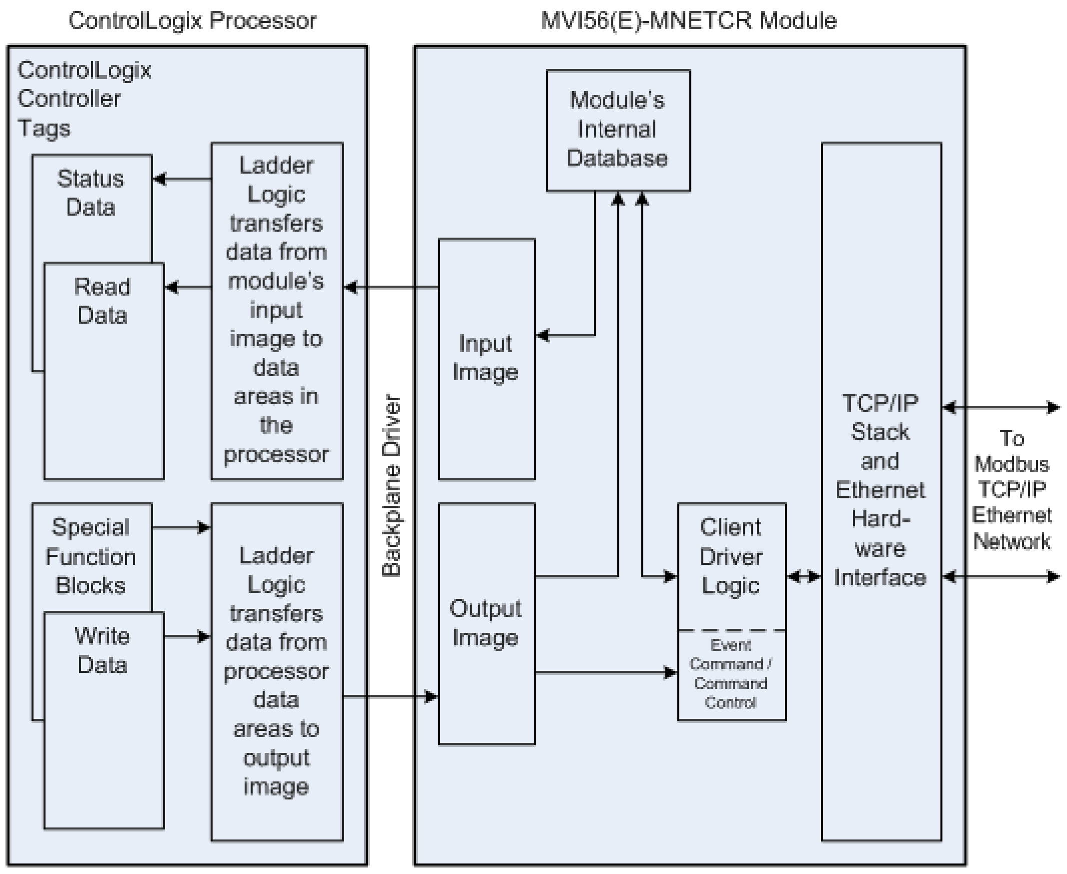
5.2 Backplane Data Transfer

The MVI56-MNETCR 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 update times range from 1 to 10 milliseconds.

This bi-directional transference of data is accomplished by the module putting data in the module's input image to send to the processor. Data in the input image is placed in the processor's controller tags by ladder logic. The input image is set to 42 words.

Processor logic inserts data to the output image to be transferred to the module. The module's firmware program extracts the data and places it in the module's internal database. The output image is set to 42 words.

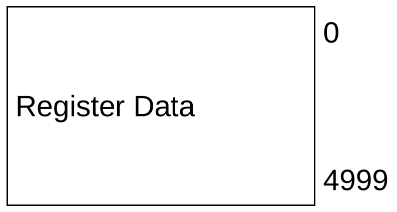
The following illustration shows the data transfer method used to move data between the ControlLogix processor, the MVI56-MNETCR module and the Modbus TCP/IP Network.


ControlLogix Processor
MVI56(E)-MNETCR Module
ControlLogix Controller Tags
Status Data
Read Data
Ladder Logic transfers data from module's input image to data areas in the processor
Special Function Blocks
Write Data
Ladder Logic transfers data from processor data areas to output image
Backplane Driver
Module's Internal Database
Input Image
Output Image
Client Driver Logic
Event Command / Command Control
TCP/IP Stack and Ethernet Hard-ware Interface
To Modbus TCP/IP Ethernet Network

All data transferred between the module and the processor over the backplane is through the input and output images. Ladder logic must be written in the ControlLogix processor to interface the input and output image data 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 Modbus data table with addresses from 0 (40001 Modbus) to 4999 (45000 Modbus).

Module's Internal Database Structure

5000 registers for user data



Data contained in this database is transferred in blocks, or pages, using the input and output images. ControlLogix ladder logic and the MVI56-MNETCR module's program work together to coordinate these block transfers. Up to 40 words of data can be transferred from the module to the processor (read block - input image) or from the processor to the module (write block - output image) in each block transfer. The block structure of each block type depends on the data content and the data transfer function to be performed by the block. The module uses the following block identification numbers.

Block Range	Descriptions
-1	Null block
0	Null block
1 to 125	Read or Write blocks
1000 to 1124	Initialize Output Data blocks
2000 to 2029	Event Command blocks
3000 to 3029	Client Status blocks
5001 to 5016	Command Control blocks
9990	Set Module IP Address block
9991	Get Module IP Address block
9998	Warm-boot block
9999	Cold-boot block

These block identification codes can be broken down into two groups:

Normal data transfer blocks

- Status, Read and Write blocks (-1 to 125)

Special function blocks

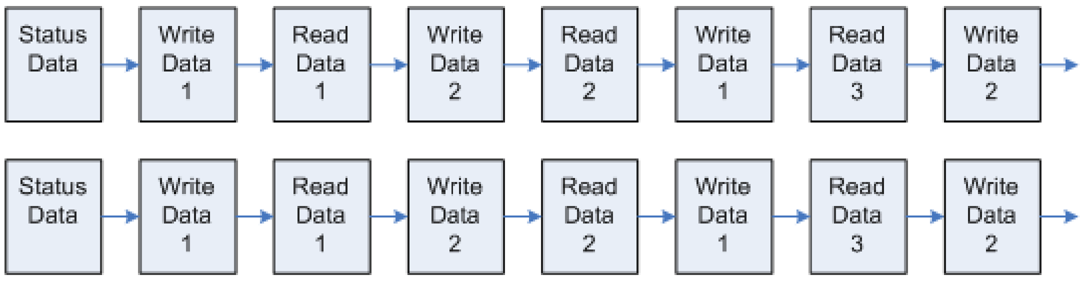
- Initialize Output Data blocks (1000 to 1124)
- Event Command blocks (2000 to 2029)
- Client Status blocks (3000 to 3029)
- Command Control blocks (5001 to 5016)
- Module IP Address blocks (9990 and 9991)
- Warm-boot and Cold-boot blocks (9998 and 9999)

5.2.1 *Normal Data Transfer Blocks*

Normal data transfer includes the paging of user data between the processor's data areas and the module's internal database (registers 0 to 4999), as well as the paging of status data. These data are transferred through Read (input image), Write (output image) and Status blocks. The data is paged 40 words at a time.

During normal program operation, the module sequentially sends Read and Status Data blocks and receives Write blocks. The Status block is first in the sequence, followed by alternating Write and Read blocks.

As an example, assume that an application's Read Data area consists of 120 words and its Write Data area consists of 80 words. Since the Read and Write data is paged 40 words at a time, the module will use 3 Read blocks and 2 Write blocks to transfer the data. The Read, Write and Status blocks will be sequenced as follows.



This sequence will continue until interrupted by other special function blocks sent by the processor, by a command request from a node on the Modbus network, or by operator control through the module's Configuration/Debug port.

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

Read Block

These blocks of data transfer information from the module to the ControlLogix processor.

The following table describes the structure of the input image.

Read Block from Module to Processor

Word Offset	Description	Length
0	Write Block ID	1
1 to 40	Read Data	40
41	Read Block ID	1

The Read Block ID is an index value used to determine where the 40 words of data from module memory will be placed in the *ReadData[x]* controller tag array of the ControlLogix. Each transfer can move up to 40 words (block offsets 1 to 40) of data.

Write Block

These blocks of data transfer information from the ControlLogix processor to the module.

The following table describes the structure of the output image.

Write Block from Processor to Module

Word Offset	Description	Length
0	Write Block ID	1
1 to 40	Write Data	40
41	Spare	1

The Write Block ID is an index value used to determine the location in the module's database where the data will be placed. Each transfer can move up to 40 words (block offsets 1 to 40) of data.

Status Block

This block contains status information about the module and is routinely copied from the module into the *MNETCR.STATUS* controller tag array in the sequence of normal data transfer blocks. A Status block has a Block ID of 0 or -1, distinguishing it from Read or Write blocks.

Status Block from Module to Processor

Word Offset	Description	Length
0	Write Block ID	1
1	Program Scan Counter	1
2 to 7	Block Transfer Status: Read, Write, Parse, Event Command, Command Control, and Error Block Counts	6
8 to 37	Client 0 to Client 29 Command Execution Control Bits	2
38 to 40	Reserved	17
41	Read Block ID (-1 or 0)	1

Status information transferred in the Status block can be viewed in the *MNETCR.STATUS* controller tag in the ladder logic. For more information, see the Status Data Definition (page 88).

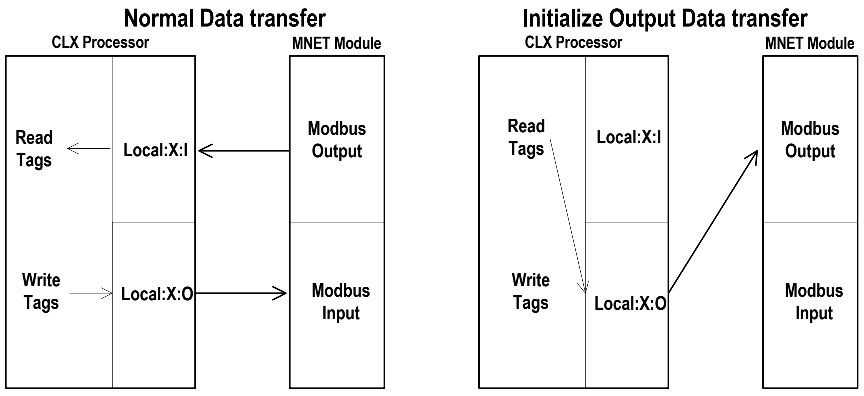
Additional Client status data is transferred in the Client Status blocks (page 104). The contents of these blocks are also displayed in the Status Data Definition.

5.2.2 Special Function Blocks

Special function blocks are optional blocks used to request special tasks from the module.

Initialize Output Data Blocks (1000 to 1124)

Use the *Initialize Output Data* parameter in the configuration to bring the module to a known state after a restart operation. If the *Initialize Output Data* parameter is enabled, when the module performs a restart operation, it will request blocks of output data from the *ReadData* array in the processor to initialize the Read Data area of the module's internal database.



Block Request from Module to Processor

Word Offset	Description	Length
0	1000 to 1124	1
1 to 40	Spare	40
41	1000 to 1124	1

The block number in word 0 of the block determines the data set of up to 40 output words to transfer from the processor. Ladder logic in the processor must recognize these blocks and place the correct information in the output image to be returned to the module.

Block Response from Processor to Module

Word Offset	Description	Length
0	1000 to 1124	1
1 to 40	Output Data to preset in module.	40
41	Spare	1

Event Command Blocks (2000 to 2029)

Note: Event Commands are not needed for normal Modbus command list polling operations and are needed only occasionally for special circumstances.

During routine operation, the module continuously cycles through the user-defined *MNET Client x Command List* (page 50) for each Client, examining commands in the order they are listed, and sending enabled commands on the network. However, the module also has a special command priority queue, which is an internal buffer that holds commands from special function blocks until they can be sent on the network.

When one or more commands appear in the command priority queue:

1 The routine polling process is temporarily interrupted.
2 The commands in the command priority queue are executed until the queue is empty.
3 Then the module goes back to where it left off on the *MNET Client x Command List* and continues routine polling.

Event Command blocks send Modbus TCP/IP commands directly from controller tags by ladder logic to the Client command priority queue on the module. Event Commands are not placed in the module's internal database and are not part of the *MNET Client x Command List*.

Block Request from Processor to Module

Word Offset	Description
0	*Block ID* - This word contains the block **2000** to **2029** identification code to indicate that this block contains a command to execute by the Client driver.
1 to 4	*IP Address* -These words contain the IP address for the server the message is intended. Each digit (**0** to **255**) of the IP address is placed in one of the four registers. For example, to reach IP address 192.168.0.100, enter the following values in words 1 to 4 □ 192, 168, 0 and 100. The module will construct the normal dotted IP address from the values entered. The values entered will be anded with the mask 0x00ff to insure the values are in the range of 0 to 255.
5	*Service Port* - This word contains the TCP service port the message will be interfaced. For example, to interface with a MBAP device, the word should contain a value of **502**. To interface with a MNET device, a value of **2000** should be utilized. Any value from **0** to **65535** is permitted. A value of **502** will cause a MBAP formatted message to be generated. All other values will generate an encapsulated Modbus message.
6	*Slave Address* - This word contains the Modbus node address for the message. This field should have a value from **0** to **41**.
7	*Internal DB Address* - This word contains the internal Modbus address in the module to use with the command. This word can contain a value from **0** to **4999**.
8	*Point Count* - This word contains the count parameter that determines the number of digital points or registers to associate with the command.

Word Offset	Description
9	*Swap Code* - The parameter specifies the swap type for the data. This function is only valid for function codes 3 and 4.
10	*Modbus Function Code* - This word contains the Modbus function code for the command.
11	*Device Database Address* - This word contains the Modbus address in the slave device to be associated with the command.
12 to 41	Spare

The module will use the parameters passed in this block to construct the command. The module then places the command in the command priority queue (if the queue is not already full; maximum capacity is 16 commands), and returns a response block to tell the ladder logic whether or not the command has been successfully added to the queue.

Block Response from Module to Processor

Word Offset	Description	Length
0	Write Block ID	1
1	0=Fail, 1=Success	1
2 to 40	Spare	39
41	2000 to 2029	1

Word 2 of the block can be used by the ladder logic to determine if the command was successfully added to the command priority queue. The command will fail if the queue for the Client is already full at the time when the Event Command block is received by the module.

Controller Tags

The elements of the *MNETCR.CONTROL* controller tag array contain all the values needed to build one Modbus TCP/IP command, have it sent to a specific Client on the module, and control the processing of the returned response block.

Controller Tag	Data Type	Description
EventCmdTrigger	BOOL	When all other values have been entered, set this bit to one (**1**) to trigger the execution of the Event Command.
EventCmdPending	BOOL	Temporary variable used to prevent a new Event Command block from being sent to the module until the previously sent Event Command block has been completely processed and a response block has been returned.
ClientID	INT	Enter the Client to issue the command to (**0** to **29**)
EventCmd.IP0	INT	Enter the first digit of the destination server's IP address
EventCmd.IP1	INT	Enter the second digit of the destination server's IP address
EventCmd.IP2	INT	Enter the third digit of the destination server's IP address
EventCmd.IP3	INT	Enter the fourth digit of the destination server's IP address
EventCmd.ServPort	INT	Enter the TCP Service Port number (**0**-**65535**). Enter **502** for a MBAP message or **2000** for a MNET message.
EventCmd.SlvAddrNode	INT	Enter the Modbus slave node address (**1** to **247**). Enter **0** if not needed.
EventCmd.DBAddress	INT	Enter the module internal database address to associate with the command.
EventCmd.Count	INT	Enter the number of words or bits to be transferred by the Client.
EventCmd.Swap	INT	Enter the swap code for the data. This function is only valid for function codes 3 and 4.
EventCmd.MBFunction	INT	Enter the Modbus function code for the command
EventCmd.Address	INT	Enter the database address for the server.

Client Status Blocks (3000 to 3029)

Client status data for a specific Client can be requested and returned in a special Client Status block. The status data contained in the Client Status block is different from the status data contained in the normal data transfer blocks.

Block Request from Processor to Module

Word Offset	Description	Length
0	3000 to 3029 (last digits indicate which Client to consider)	1
1 to 41	Spare	40

Block Response from Module to Processor

Word Offset	Description	Length
0	Write Block ID	1
1	3000 to 3029 number requested	1
2 to 11	Client status data	10
12 to 27	Command error list data for Client	16
28 to 40	Reserved	13
41	3000 to 3029	1

Client Status Data

Word Offset	Client Status
2	Total number of command list requests
3	Total number of command list responses
4	Total number of command list errors
5	Not used
6	Not used
7	Not used
8	Not used
9	Configuration Error Word
10	Current Error
11	Last Error

Status information transferred in the Client Status block can be viewed in the *MNETCR.STATUS* controller tag in the ladder logic. For more information, see the Status Data Definition (page 88).

Controller Tags

To issue a Client Status block request, enter the appropriate values in the following members of the *MNETCR.STATUS* controller tag in the ladder logic.

Controller Tag	Data Type	Description
ClientIDReq	INT	Enter the Client (**0**-**29**) to request status data for.
ClientStatsTrigger	BOOL	Set the value of this tag to **1** to trigger the Client Status block request.

<u>Command Control Blocks (5001 to 5016)</u>

Note: Command Control is not needed for normal Modbus command list polling operations and is needed only occasionally for special circumstances.

During routine operation, the module continuously cycles through the user-defined *MNET Client x Command List* (page 50) for each Client, examining commands in the order they are listed, and sending enabled commands on the network. However, the module also has a special command priority queue, which is an internal buffer that holds commands from special function blocks until they can be sent on the network.

When one or more commands appear in the command priority queue:

1 The routine polling process is temporarily interrupted.
2 The commands in the command priority queue are executed until the queue is empty.
3 Then the module goes back to where it left off on the *MNET Client x Command List* and continues routine polling.

Like Event Command blocks, Command Control blocks place commands into the module's command priority queue. Unlike Event Command blocks, which contain all the values needed for one command, Command Control is used with commands already defined in the *MNET Client x Command List*.

Commands in the *MNET Client x Command List* may be either enabled for routine polling or disabled and excluded from routine polling. A disabled command has its bit in the *MNETCR.CONTROL.WriteCmdBits* controller tag set to zero (**0**) and is skipped during routine polling. An enabled command has its bit in the *WriteCmdBits* controller tag set to one (**1**) and is sent during routine polling. However, Command Control allows any command in the predefined *MNET Client x Command List* to be added to the command priority queue, whether it is enabled for routine polling or not.

Command Control also gives you the option to use ladder logic to have commands from the *MNET Client x Command List* executed at a higher priority and out of routine order, if such an option might be required in special circumstances.

A single Command Control block request can place up to 16 commands from the *MNET Client x Command List* into the command priority queue.

Block Request from Processor to Module

Word Offset	Description	Length
0	Command Control block identification code of **5001** to **5016**. The rightmost digit indicates the number of commands (**1** to **16**) to add to the command priority queue.	1
1	Client index (**0** to **29**)	1
2	This word contains the Command Index for the first command to be entered into the queue.	1
3	Command Index 2	1
4	Command Index 3	1
5	Command Index 4	1
6	Command Index 5	1
7	Command Index 6	1
8	Command Index 7	1
9	Command Index 8	1
10	Command Index 9	1
11	Command Index 10	1
12	Command Index 11	1
13	Command Index 12	1
14	Command Index 13	1
15	Command Index 14	1
16	Command Index 15	1
17	Command Index 16	1
18 to 41	Spare	24

The last digit in the block identification code indicates the number of commands to process. For example, a block identification code of **5003** indicates that three commands are to be placed in the queue. In this case, the first three of the 16 available Command Indexes will be used to determine exactly which three commands will be added to the queue, and to set their order of execution.

Values to enter for the 16 Command Indexes range from **0** to **15** and correspond to the *MNET Client x Command List* entries, which are numbered from 1 to 16. To determine the Command Index value, subtract one (**1**) from the row number of the command in the *MNET Client x Command List*, as seen in the *Command Editor* window of *ProSoft Configuration Builder (PCB)*.

The module responds to a Command Control block request with a response block, indicating the number of commands added to the command priority queue.

Block Response from Module to Processor

Word Offset	Description	Length
0	Write Block ID	1
1	Number of commands added to command priority queue	1
2 to 40	Spare	39
41	5001 to 5016	1

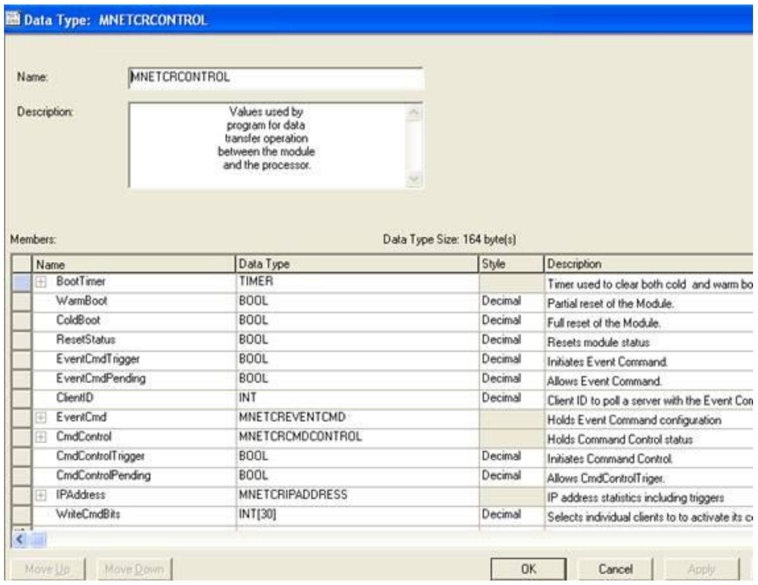
Controller Tags

The *MNETCR.CONTROL* controller tag array holds all the values needed to create one Command Control block, have it sent to the module, and control the processing of the returned response block.

Controller Tag	Data Type	Description
CmdControl.ClientIDreq	INT	Client (**0**-**29**) to execute command
CmdControl.CmdQty	INT	Enter a decimal value representing the quantity of commands to be requested in the Command Control block (**1** to **16**).
CmdControl.CmdIndex	INT[16]	Enter the **ROW NUMBER** of the command in the *MNET Client x Command List* in *Prosoft Configuration Builder* minus **1**. This is a 16-element array. Each element holds one Command Index.
CmdControlTrigger	BOOL	Set this tag to **1** to trigger the execution of a Command Control block after all the other parameters have been entered.
CmdControlPending	BOOL	Temporary variable used to prevent a new Command Control block from being sent to the module until the previously sent Command Control block has been completely processed and a response block has been returned.

Reset Module Status Block (9971)

This block allows the processor to reset all status values available from the module to the processor or through the PCB diagnostics menu. This block is triggered through the following data type and controller tag elements:

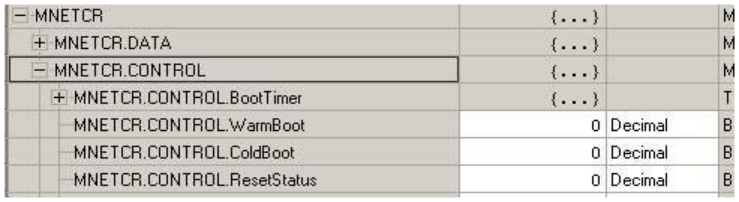


Name: MNETCRCONTROL

Description: Values used by program for data transfer operation between the module and the processor.

Members: Data Type Size: 164 byte(s)

Name	Data Type	Style	Description
BootTimer	TIMER		Timer used to clear both cold and warm bo
WarmBoot	BOOL	Decimal	Partial reset of the Module.
ColdBoot	BOOL	Decimal	Full reset of the Module.
ResetStatus	BOOL	Decimal	Resets module status
EventCmdTrigger	BOOL	Decimal	Initiates Event Command.
EventCmdPending	BOOL	Decimal	Allows Event Command.
ClientID	INT	Decimal	Client ID to poll a server with the Event Con
EventCmd	MNETCREVENTCMD		Holds Event Command configuration
CmdControl	MNETCRCMDCONTROL		Holds Command Control status
CmdControlTrigger	BOOL	Decimal	Initiates Command Control.
CmdControlPending	BOOL	Decimal	Allows CmdControlTriger.
IPAddress	MNETCRIPADDRESS		IP address statistics including triggers
WriteCmdBits	INT[30]	Decimal	Selects individual clients to to activate its c



MNETCR	{...}		M
MNETCR.DATA	{...}		M
MNETCR.CONTROL	{...}		M
MNETCR.CONTROL.BootTimer	{...}		T
MNETCR.CONTROL.WarmBoot	0	Decimal	B
MNETCR.CONTROL.ColdBoot	0	Decimal	B
MNETCR.CONTROL.ResetStatus	0	Decimal	B

Set Module IP Address Block (9990)

Block Request from Processor to Module

Word Offset	Description	Length
0	9990	1
1	First digit of dotted IP address	1
2	Second digit of dotted IP address	1
3	Third digit of dotted IP address	1
4	Last digit of dotted IP address	1
5 to 41	Reserved	36

Block Response from Module to Processor

Word Offset	Description	Length
0	0	1
1	Write Block ID	1
2	First digit of dotted IP address	1
3	Second digit of dotted IP address	1
4	Third digit of dotted IP address	1
5	Last digit of dotted IP address	1
6 to 41	Spare data area	35

Get Module IP Address Block (9991)

Block Request from Processor to Module

Word Offset	Description	Length
0	9991	1
1 to 41	Spare data area	40

Block Response from Module to Processor

Word Offset	Description	Length
0	0	1
1	Write Block ID	1
2	First digit of dotted IP address	1
3	Second digit of dotted IP address	1
4	Third digit of dotted IP address	1
5	Last digit of dotted IP address	1
6 to 41	Spare data area	35

Warm Boot Block (9998)

This block is equivalent to performing a software reset, and causes the module to exit the program, reload the configuration file, and then restart the program. The Warm Boot control block also initializes the application port(s) and status data, and resets all internal registers to zero.

Note: In some cases, the read section of the module database (transferred from module to processor) must keep its values after a reboot. To repopulate the module's registers with the last values the module sent to the processor, set the *Initialize Output Data* parameter in the module configuration to **YES**.

Block Request from Processor to Module

Word Offset	Description	Length
0	9998	1
1 to 41	Spare	41

The module does not send a response block for this command.

Cold Boot Block (9999)

This block is equivalent to performing a hardware reset, and causes the module to restart in the same way as if the power was cycled. The Cold Boot control block also reloads the module's backplane and application port drivers, restarts the program, and resets all internal registers to zero.

Note: In some cases, the read section of the module database (transferred from module to processor) must keep its values after a reboot. To repopulate the module's registers with the last values the module sent to the processor, set the *Initialize Output Data* parameter in the module configuration to **YES**.

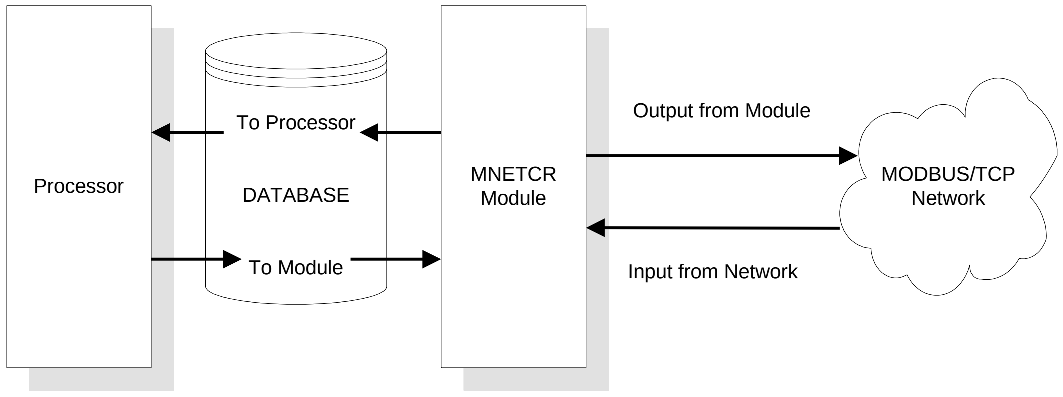
Block Request from Processor to Module

Word Offset	Description	Length
0	9999	1
1 to 41	Spare	41

The module does not send a response block for this command.

5.3 Data Flow between MVI56-MNETCR Module, Processor, and Network

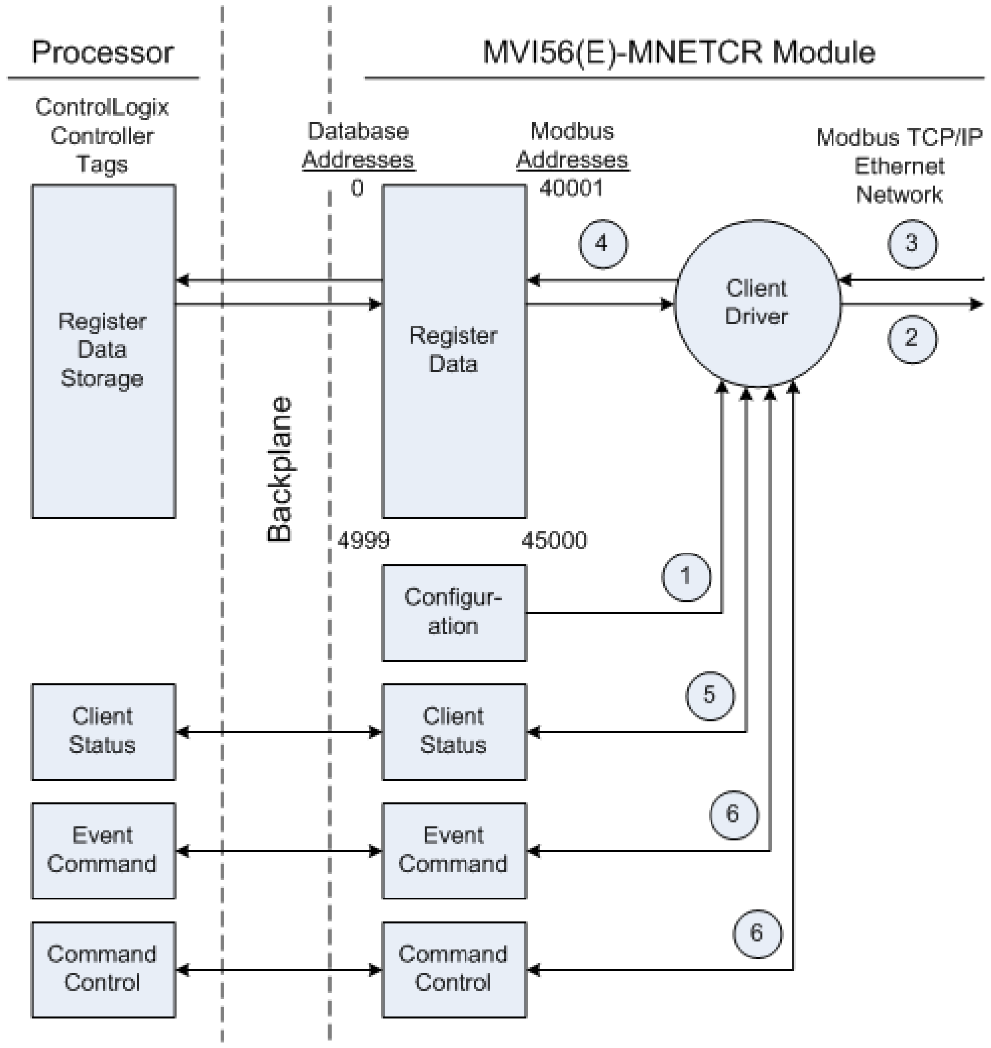
The following topics describe the flow of data between the two pieces of hardware (processor and MVI56-MNETCR module) and other nodes on the Modbus TCP/IP network. The module contains up to 30 Clients, which can generate either MBAP (Modbus API for network communications) or MNET requests dependent on the service port selected in the command.



The following topics discuss the operation of the Client drivers.

5.3.1 Client Driver

In the Client driver, the MVI56-MNETCR module issues read or write commands to servers on the Modbus TCP/IP network using up to 30 simulated Clients. The commands originate either from the module's user-configured *Client x Command List* for each Client, or directly from the processor as Event Commands. The commands from the *Client x Command List* are executed either via routine polling or as a result of special Command Control block requests from the processor. Client status data is returned to the processor in special Client Status blocks. The following flowchart describes the flow of data into and out of the module.



1 The Client driver obtains configuration data when the module restarts. This includes the timeout parameters and the Command List. These values are used by the driver to determine the types of commands to be issued to servers on the Modbus TCP/IP network.

2 When configured, the Client driver begins transmitting read and/or write commands to servers on the network. The data for write commands is obtained from the module's internal database.
3 Assuming successful processing by the server specified in the command, a response message is received into the Client driver for processing.
4 Data received from the server is passed into the module's internal database, if the command was a read command. General module status information is routinely returned to the processor in the input images.
5 Status data for a specific Client can be requested by the processor and returned in a special Client Status block.
6 Special functions, such as Event Commands and Command Control options, can be generated by the processor and sent to the Client driver for action.

5.3.2 Client Command List

In order for the Client to function, the module's Client Command List must be defined in the *MNET Client x Commands* section of the configuration. This list contains up to 16 individual entries, with each entry containing the information required to construct a valid command. This includes the following:

- Command enable mode: (**0**) disabled or (**1**) continuous
- IP address and service port to connect to on the remote server
- Slave Node Address
- Command Type - Read or Write up to 100 words per command
- Database Source and Destination Register Address - Determines where data will be placed and/or obtained
- Count - Select the number of words to be transferred - 1 to 100
- Poll Delay - 1/10th seconds

For information on troubleshooting commands, see Client Command Errors (page 91).

5.4 Cable Connections

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

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

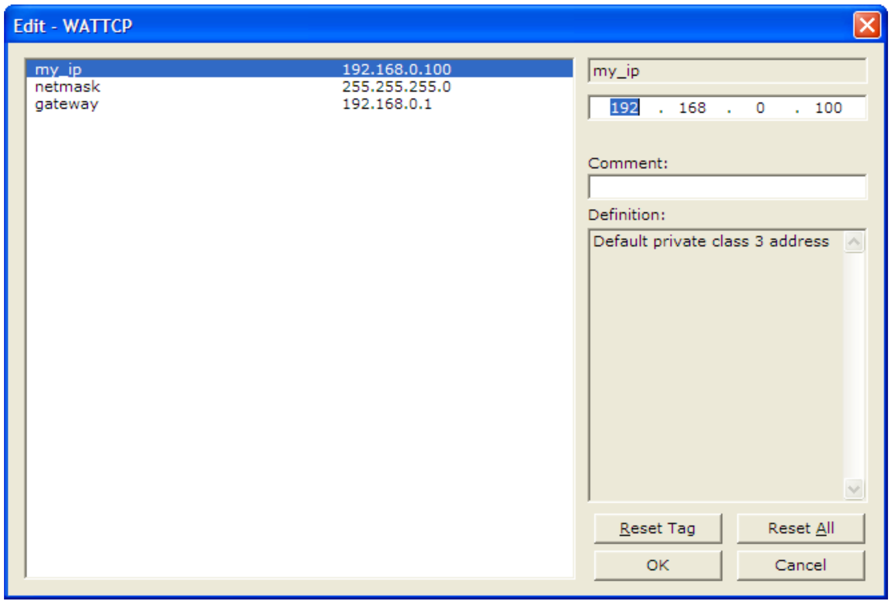
5.4.1 Ethernet Connection

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

Note: Depending on hardware configuration, you may see more than one RJ45 port on the module. The Ethernet port is labeled *Ethernet*.
Warning: The MVI56-MNETCR module is NOT compatible with Power Over Ethernet (IEEE802.3af / IEEE802.3at) networks. Do NOT connect the module to Ethernet devices, hubs, switches or networks that supply AC or DC power over the Ethernet cable. Failure to observe this precaution may result in damage to hardware, or injury to personnel.
Important: The module requires a static (fixed) IP address that is not shared with any other device on the Ethernet network. Obtain a list of suitable IP addresses from your network administrator BEFORE configuring the Ethernet port on this module.

Ethernet Port Configuration - wattcp.cfg

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



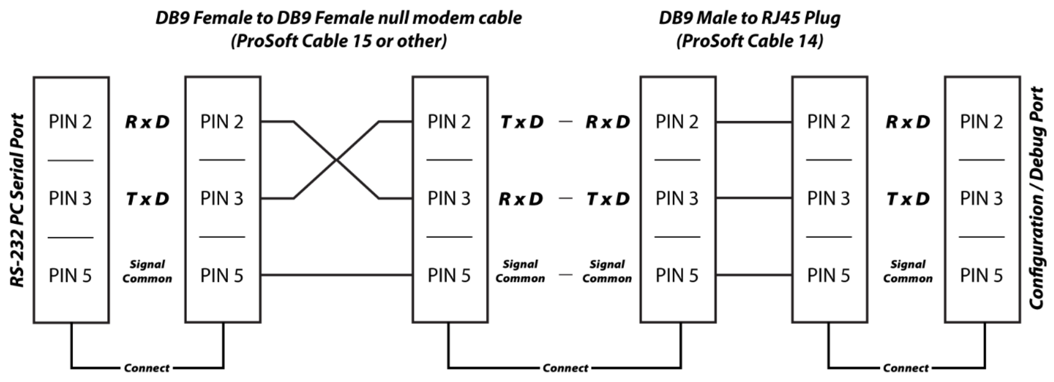
my_ip	192.168.0.100
netmask	255.255.255.0
gateway	192.168.0.1

my_ip
192 . 168 . 0 . 100
Comment:
Definition:
Default private class 3 address

You may also view the network configuration using a PC serial port connection and an ASCII terminal program (like Windows HyperTerminal) by selecting **[@]** (Network Menu) and **[V]** (View) options when connected to the Debug port. For more information on serial port access, see the chapter on Diagnostics and Troubleshooting (page 73).

5.4.2 RS-232 Configuration/Debug Port

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

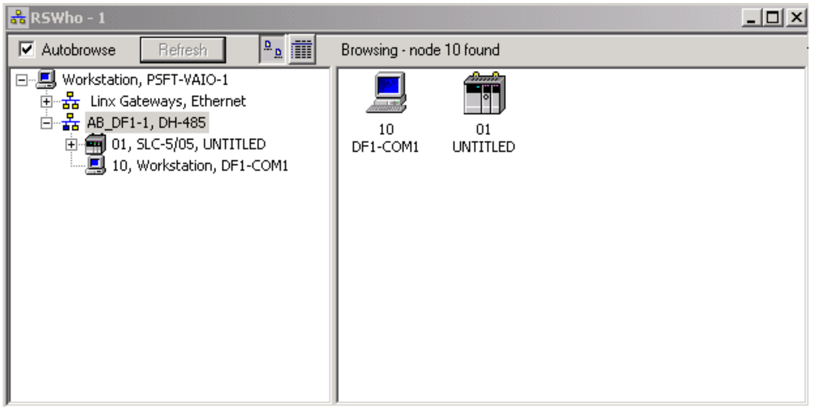

DB9 Female to DB9 Female null modem cable
(ProSoft Cable 15 or other)
DB9 Male to RJ45 Plug
(ProSoft Cable 14)
RS-232 PC Serial Port
PIN 2
PIN 3
PIN 5
RxD
TxD
Signal Common
TxD — RxD
RxD — TxD
Signal Common — Signal Common
Connect
Configuration / Debug Port

Disabling the RSLinx Driver for the Com Port on the PC

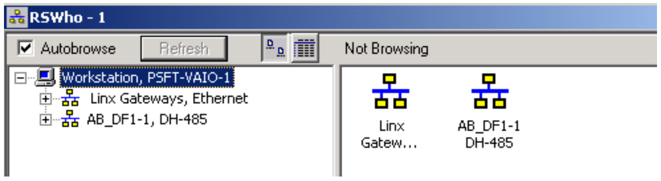
The communication port driver in *RSLinx* can occasionally prevent other applications from using the PC's COM port. If you are not able to connect to the module's configuration/debug port using *ProSoft Configuration Builder (PCB)*, *HyperTerminal* or another terminal emulator, follow these steps to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

1 Open *RSLinx* and go to **COMMUNICATIONS** > **RSWHO**.

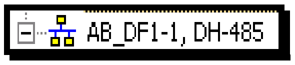
2 Make sure that you are not actively browsing using the driver that you wish to stop. The following shows an actively browsed network.



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:

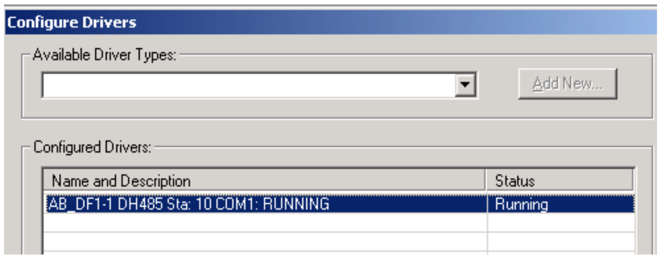


Branches are displayed or hidden by clicking on the ⊞ or the ⊟ icons.



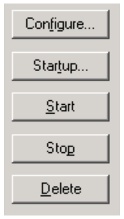
4 When you have verified that the driver is not being browsed, go to **COMMUNICATIONS** > **CONFIGURE DRIVERS**.

You may see something like this:

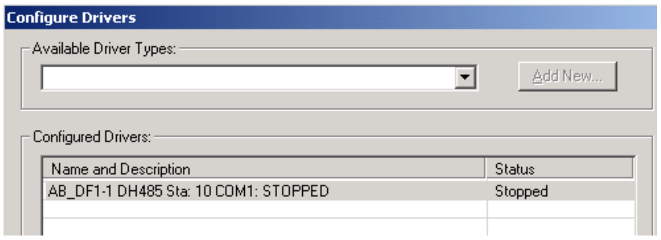


Name and Description	Status
AB_DF1-1 DH485 Sta: 10 COM1: RUNNING	Running

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



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

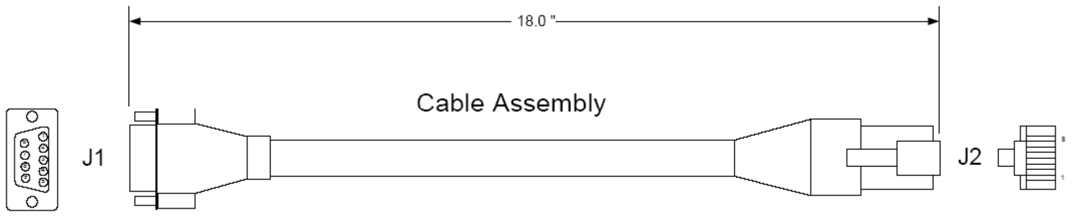


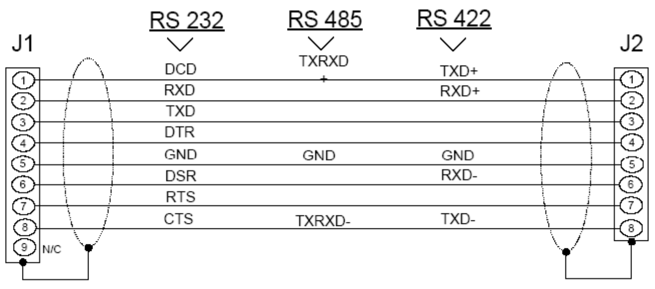
Name and Description	Status
AB_DF1-1 DH485 Sta: 10 COM1: STOPPED	Stopped

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

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

5.4.3 DB9 to RJ45 Adaptor (Cable 14)





Wiring Diagram

5.5 Modbus Protocol Specification

The following pages give additional reference information regarding the Modbus protocol commands supported by the MVI56-MNETCR.

5.5.1 About the MODBUS/TCP Protocol

MODBUS is a widely-used protocol originally developed by Modicon in 1978. Since that time, the protocol has been adopted as a standard throughout the automation industry.

The original MODBUS specification uses a serial connection to communicate commands and data between Client and server devices on a network. Later enhancements to the protocol allow communication over Ethernet networks using TCP/IP as a "wrapper" for the MODBUS protocol. This protocol is known as MODBUS/TCP.

MODBUS/TCP is a Client/server protocol. The Client establishes a connection to the remote server. When the connection is established, the Client sends the MODBUS/TCP commands to the server. The MVI56-MNETCR module simulates up to 30 Clients.

Aside from the benefits of Ethernet versus serial communications (including performance, distance, and flexibility) for industrial networks, the MODBUS/TCP protocol allows for remote administration and control of devices over an Internet connection. It is important to note that not all Internet protocols are implemented in the module; for example, HTTP and SMTP protocols are not available. Nevertheless, the efficiency, scalability, and low cost of a MODBUS/TCP network make this an ideal solution for industrial applications.

The MVI56-MNETCR module acts as an input/output module between devices on a MODBUS/TCP network and the Rockwell Automation backplane. The module uses an internal database to pass data and commands between the processor and the server devices on the MODBUS/TCP network.

5.5.2 Read Coil Status (Function Code 01)

Query

This function allows the user to obtain the ON/OFF status of logic coils used to control discrete outputs from the addressed server only. Broadcast mode is not supported with this function code. In addition to the server address and function fields, the message requires that the information field contain the initial coil address to be read (Starting Address) and the number of locations that will be interrogated to obtain status data.

The addressing allows up to 2000 coils to be obtained at each request; however, the specific server device may have restrictions that lower the maximum quantity. The coils are numbered from zero; (coil number 1 = zero, coil number 2 = one, coil number 3 = two, and so on).

The following table is a sample read output status request to read coils 0020 to 0056 from server device number 11.

Adr	**Func**	**Data Start Pt Hi**	**Data Start Pt Lo**	**Data # Of Pts Ho**	**Data # Of Pts Lo**	**Error Check Field**
11	01	00	13	00	25	CRC

Response

An example response to Read Coil Status is as shown in Figure C2. The data is packed one bit for each coil. The response includes the server address, function code, quantity of data characters, the data characters, and error checking. Data will be packed with one bit for each coil (1 = ON, 0 = OFF). The low order bit of the first character contains the addressed coil, and the remainder follow. For coil quantities that are not even multiples of eight, the last characters will be filled in with zeros at high order end. The quantity of data characters is always specified as quantity of RTU characters, that is, the number is the same whether RTU or ASCII is used.

Because the server interface device is serviced at the end of a controller's scan, data will reflect coil status at the end of the scan. Some servers will limit the quantity of coils provided each scan; thus, for large coil quantities, multiple PC transactions must be made using coil status from sequential scans.

Adr	**Func**	**Byte Count**	**Data Coil Status 20 to 27**	**Data Coil Status 28 to 35**	**Data Coil Status 36 to 43**	**Data Coil Status 44 to 51**	**Data Coil Status 52 to 56**	**Error Check Field**
11	01	05	CD	6B	B2	OE	1B	CRC

The status of coils 20 to 27 is shown as CD(HEX) = 1100 1101 (Binary). Reading left to right, this shows that coils 27, 26, 23, 22, and 20 are all on. The other coil data bytes are decoded similarly. Due to the quantity of coil statuses requested, the last data field, which is shown 1B (HEX) = 0001 1011 (Binary), contains the status of only 5 coils (52 to 56) instead of 8 coils. The 3 left most bits are provided as zeros to fill the 8-bit format.

5.5.3 Read Input Status (Function Code 02)

Query

This function allows the user to obtain the ON/OFF status of discrete inputs in the addressed server PC Broadcast mode is not supported with this function code. In addition to the server address and function fields, the message requires that the information field contain the initial input address to be read (Starting Address) and the number of locations that will be interrogated to obtain status data.

The addressing allows up to 2000 inputs to be obtained at each request; however, the specific server device may have restrictions that lower the maximum quantity. The inputs are numbered form zero; (input 10001 = zero, input 10002 = one, input 10003 = two, and so on, for a 584).

The following table is a sample read input status request to read inputs 10197 to 10218 from server number 11.

Adr	Func	Data Start Pt Hi	Data Start Pt Lo	Data #of Pts Hi	Data #of Pts Lo	Error Check Field
11	02	00	C4	00	16	CRC

Response

An example response to Read Input Status is as shown in Figure C4. The data is packed one bit for each input. The response includes the server address, function code, quantity of data characters, the data characters, and error checking. Data will be packed with one bit for each input (1=ON, 0=OFF). The lower order bit of the first character contains the addressed input, and the remainder follow. For input quantities that are not even multiples of eight, the last characters will be filled in with zeros at high order end. The quantity of data characters is always specified as a quantity of RTU characters, that is, the number is the same whether RTU or ASCII is used.

Because the server interface device is serviced at the end of a controller's scan, data will reflect input status at the end of the scan. Some servers will limit the quantity of inputs provided each scan; thus, for large coil quantities, multiple PC transactions must be made using coil status for sequential scans.

Adr	Func	Byte Count	Data Discrete Input 10197 to 10204	Data Discrete Input 10205 to 10212	Data Discrete Input 10213 to 10218	Error Check Field
11	02	03	AC	DB	35	CRC

The status of inputs 10197 to 10204 is shown as AC (HEX) = 10101 1100 (binary). Reading left to right, this show that inputs 10204, 10202, and 10199 are all on. The other input data bytes are decoded similar.

Due to the quantity of input statuses requested, the last data field which is shown as 35 HEX = 0011 0101 (binary) contains the status of only 6 inputs (10213 to 102180) instead of 8 inputs. The two left-most bits are provided as zeros to fill the 8-bit format.

5.5.4 Read Holding Registers (Function Code 03)

Query

Read Holding Registers (03) allows the user to obtain the binary contents of holding registers 4xxxx in the addressed server. The registers can store the numerical values of associated timers and counters which can be driven to external devices. The addressing allows up to 125 registers to obtained at each request; however, the specific server device may have restriction that lower this maximum quantity. The registers are numbered form zero (40001 = zero, 40002 = one, and so on). The broadcast mode is not allowed.

The example below reads registers 40108 through 40110 from server 584 number 11.

Adr	Func	Data Start Reg Hi	Data Start Reg Lo	Data #of Regs Hi	Data #of Regs Lo	Error Check Field
11	03	00	6B	00	03	CRC

Response

The addressed server responds with its address and the function code, followed by the information field. The information field contains 1 byte describing the quantity of data bytes to be returned. The contents of the registers requested (DATA) are two bytes each, with the binary content right justified within each pair of characters. The first byte includes the high order bits and the second, the low order bits.

Because the server interface device is normally serviced at the end of the controller's scan, the data will reflect the register content at the end of the scan. Some servers will limit the quantity of register content provided each scan; thus for large register quantities, multiple transmissions will be made using register content from sequential scans.

In the example below, the registers 40108 to 40110 have the decimal contents 555, 0, and 100 respectively.

Adr	Func	ByteCnt	Hi Data	Lo Data	Hi Data	Lo Data	Hi Data	Lo Data	Error Check Field
11	03	06	02	2B	00	00	00	64	CRC

5.5.5 Read Input Registers (Function Code 04)

Query

Function code 04 obtains the contents of the controller's input registers at addresses 3xxxx. These locations receive their values from devices connected to the I/O structure and can only be referenced, not altered from within the controller, The addressing allows up to 125 registers to be obtained at each request; however, the specific server device may have restrictions that lower this maximum quantity. The registers are numbered for zero (30001 = zero, 30002 = one, and so on). Broadcast mode is not allowed.

The example below requests the contents of register 3009 in server number 11.

Adr	Func	Data Start Reg Hi	Data Start Reg Lo	Data #of Regs Hi	Data #of Regs Lo	Error Check Field
11	04	00	08	00	01	CRC

Response

The addressed server responds with its address and the function code followed by the information field. The information field contains 1 byte describing the quantity of data bytes to be returned. The contents of the registers requested (DATA) are 2 bytes each, with the binary content right justified within each pair of characters. The first byte includes the high order bits and the second, the low order bits.

Because the server interface is normally serviced at the end of the controller's scan, the data will reflect the register content at the end of the scan. Each PC will limit the quantity of register contents provided each scan; thus for large register quantities, multiple PC scans will be required, and the data provided will be form sequential scans.

In the example below the register 3009 contains the decimal value 0.

Adr	Func	Byte Count	Data Input Reg Hi	Data Input Reg Lo	Error Check Field
11	04	02	00	00	E9

5.5.6 Force Single Coil (Function Code 05)

Query

This message forces a single coil either ON or OFF. Any coil that exists within the controller can be forced to either state (ON or OFF). However, because the controller is actively scanning, unless the coil is disabled, the controller can also alter the state of the coil. Coils are numbered from zero (coil 0001 = zero, coil 0002 = one, and so on). The data value 65,280 (FF00 HEX) will set the coil ON and the value zero will turn it OFF; all other values are illegal and will not affect that coil.

The use of server address 00 (Broadcast Mode) will force all attached servers to modify the desired coil.

Note: Functions 5, 6, 15, and 16 are the only messages that will be recognized as valid for broadcast.

The example below is a request to server number 11 to turn ON coil 0173.

Adr	Func	Data Coil # Hi	Data Coil # Lo	Data On/off Ind	Data	Error Check Field
11	05	00	AC	FF	00	CRC

Response

The normal response to the Command Request is to re-transmit the message as received after the coil state has been altered.

Adr	Func	Data Coil # Hi	Data Coil # Lo	Data On/ Off	Data	Error Check Field
11	05	00	AC	FF	00	CRC

The forcing of a coil via MODBUS function 5 will be accomplished regardless of whether the addressed coil is disabled or not (*In ProSoft products,* the coil *is only affected if the necessary ladder logic is implemented).*

Note: The Modbus protocol does not include standard functions for testing or changing the DISABLE state of discrete inputs or outputs. Where applicable, this may be accomplished via device specific Program commands (*In ProSoft products, this is only accomplished through ladder logic programming).*

Coils that are reprogrammed in the controller logic program are not automatically cleared upon power up. Thus, if such a coil is set ON by function Code 5 and (even months later), an output is connected to that coil, the output will be "hot".

5.5.7 Preset Single Register (Function Code 06)

Query

Function (06) allows the user to modify the contents of a holding register. Any holding register that exists within the controller can have its contents changed by this message. However, because the controller is actively scanning, it also can alter the content of any holding register at any time. The values are provided in binary up to the maximum capacity of the controller unused high order bits must be set to zero. When used with server address zero (Broadcast mode) all server controllers will load the specified register with the contents specified.

Note Functions 5, 6, 15, and 16 are the only messages that will be recognized as valid for broadcast.

Adr	Func	Data Start Reg Hi	Data Start Reg Lo	Data #of Regs Hi	Data #of Regs Lo	Error Check Field
11	06	00	01	00	03	CRC

Response

The response to a preset single register request is to re-transmit the query message after the register has been altered.

Adr	Func	Data Reg Hi	Data Reg Lo	Data Input Reg Hi	Data Input Reg Lo	Error Check Field
11	06	00	01	00	03	CRC

5.5.8 Diagnostics (Function Code 08)

MODBUS function code 08 provides a series of tests for checking the communication system between a Client device and a server, or for checking various internal error conditions within a server.

The function uses a two-byte sub-function code field in the query to define the type of test to be performed. The server echoes both the function code and sub-function code in a normal response. Some of the diagnostics cause data to be returned from the remote device in the data field of a normal response.

In general, issuing a diagnostic function to a remote device does not affect the running of the user program in the remote device. Device memory bit and register data addresses are not accessed by the diagnostics. However, certain functions can optionally reset error counters in some remote devices.

A server device can, however, be forced into 'Listen Only Mode' in which it will monitor the messages on the communications system but not respond to them. This can affect the outcome of your application program if it depends upon any further exchange of data with the remote device. Generally, the mode is forced to remove a malfunctioning remote device from the communications system.

Sub-function Codes Supported

Only Sub-function 00 is supported by the MVI56-MNETCR module.

00 Return Query Data

The data passed in the request data field is to be returned (looped back) in the response. The entire response message should be identical to the request.

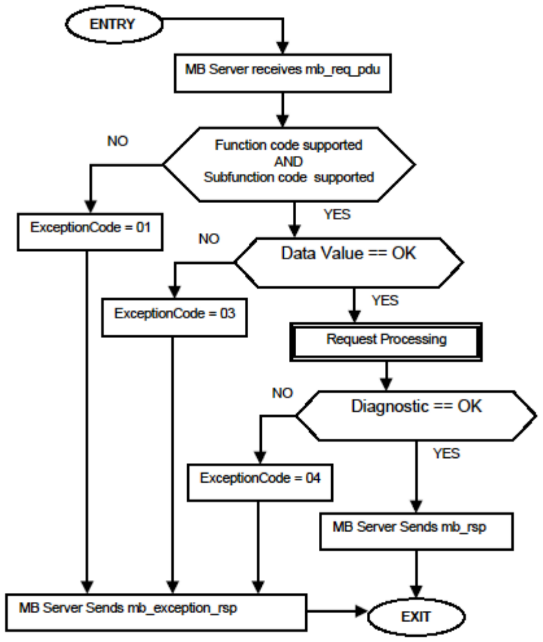
Sub-function	Data Field (Request)	Data Field (Response)
00 00	Any	Echo Request Data

Example and State Diagram

Here is an example of a request to remote device to Return Query Data. This uses a sub-function code of zero (00 00 hex in the two-byte field). The data to be returned is sent in the two-byte data field (A5 37 hex).

Request		Response	
Field Name	**(Hex)**	**Field Name**	**(Hex)**
Function	08	Function	08
Sub-function Hi	00	Sub-function Hi	00
Sub-function Lo	00	Sub-function Lo	00
Data Hi	A5	Data Hi	A5
Data Lo	37	Data Lo	27

The data fields in responses to other kinds of queries could contain error counts or other data requested by the sub-function code.



5.5.9 Force Multiple Coils (Function Code 15)

Query

This message forces each coil in a consecutive block of coils to a desired ON or OFF state. Any coil that exists within the controller can be forced to either state (ON or OFF). However, because the controller is actively scanning, unless the coils are disabled, the controller can also alter the state of the coil. Coils are numbered from zero (coil 00001 = zero, coil 00002 = one, and so on). The desired status of each coil is packed in the data field, one bit for each coil (1= ON, 0= OFF). The use of server address 0 (Broadcast Mode) will force all attached servers to modify the desired coils.

Note: Functions 5, 6, 15, and 16 are the only messages (other than Loopback Diagnostic Test) that will be recognized as valid for broadcast.

The following example forces 10 coils starting at address 20 (13 HEX). The two data fields, CD =1100 and 00 = 0000 000, indicate that coils 27, 26, 23, 22, and 20 are to be forced on.

Adr	**Func**	**Hi Add**	**Lo Add**	**Quantity**	**Byte Cnt**	**Data Coil Status 20 to 27**	**Data Coil Status 28 to 29**	**Error Check Field**	
11	0F	00	13	00	0A	02	CD	00	CRC

Response

The normal response will be an echo of the server address, function code, starting address, and quantity of coils forced.

Adr	**Func**	**Hi Addr**	**Lo Addr**	**Quantity**	**Error Check Field**	
11	0F	00	13	00	0A	CRC

The writing of coils via Modbus function 15 will be accomplished regardless of whether the addressed coils are disabled or not.

Coils that are unprogrammed in the controller logic program are not automatically cleared upon power up. Thus, if such a coil is set ON by function code 15 and (even months later) an output is connected to that coil, the output will be hot.

5.5.10 Preset Multiple Registers (Function Code 16)

Query

Holding registers existing within the controller can have their contents changed by this message (a maximum of 60 registers). However, because the controller is actively scanning, it also can alter the content of any holding register at any time. The values are provided in binary up to the maximum capacity of the controller (16-bit for the 184/384 and 584); unused high order bits must be set to zero.

Note: Function codes 5, 6, 15, and 16 are the only messages that will be recognized as valid for broadcast.

Adr	Func	Hi Add	Lo Add	Quantity		Byte Cnt	Hi Data	Lo Data	Hi Data	Lo Data	Error Check Field
11	10	00	87	00	02	04	00	0A	01	02	CRC

Response

The normal response to a function 16 query is to echo the address, function code, starting address and number of registers to be loaded.

Adr	Func	Hi Addr	Lo Addr	Quantity		Error Check Field
11	10	00	87	00	02	56

5.5.11 Modbus Exception Responses

When a Modbus Client sends a request to a server device, it expects a normal response. One of four possible events can occur from the Client's query:

- If the server device receives the request without a communication error, and can handle the query normally, it returns a normal response.
- If the server does not receive the request due to a communication error, no response is returned. The Client program will eventually process a timeout condition for the request.
- If the server receives the request, but detects a communication error (parity, LRC, CRC, ...), no response is returned. The Client program will eventually process a timeout condition for the request.
- If the server receives the request without a communication error, but cannot handle it (for example, if the request is to read a non-existent output or register), the server will return an exception response informing the Client of the nature of the error.

The exception response message has two fields that differentiate it from a normal response:

Function Code Field: In a normal response, the server echoes the function code of the original request in the function code field of the response. All function codes have a most-significant bit (MSB) of 0 (their values are all below 80 hexadecimal). In an exception response, the server sets the MSB of the function code to 1. This makes the function code value in an exception response exactly 80 hexadecimal higher than the value would be for a normal response.

With the function code's MSB set, the Client's application program can recognize the exception response and can examine the data field for the exception code.

Data Field: In a normal response, the server may return data or statistics in the data field (any information that was requested in the request). In an exception response, the server returns an exception code in the data field. This defines the server condition that caused the exception.

The following table shows an example of a Client request and server exception response.

Request		**Response**	
Field Name	**(Hex)**	**Field Name**	**(Hex)**
Function	01	Function	81
Starting Address Hi	04	Exception Code	02
Starting Address Lo	A1		
Quantity of Outputs Hi	00		
Quantity of Outputs Lo	01		

In this example, the Client addresses a request to server device. The function code (01) is for a Read Output Status operation. It requests the status of the output at address 1245 (04A1 hex). Note that only that one output is to be read, as specified by the number of outputs field (0001).

If the output address is non-existent in the server device, the server will return the exception response with the exception code shown (02). This specifies an illegal data address for the server.

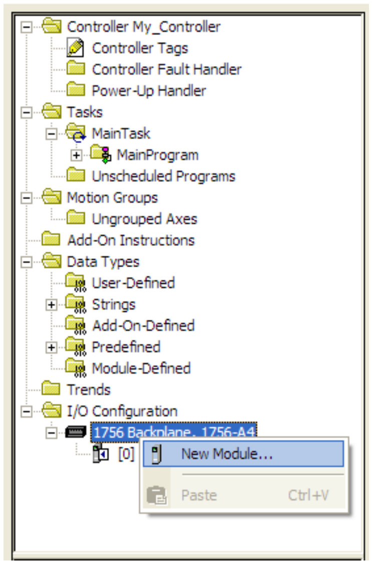
Modbus Exception Codes

Code	Name	Meaning
01	Illegal Function	The function code received in the query is not an allowable action for the server. This may be because the function code is only applicable to newer devices, and was not implemented in the unit selected. It could also indicate that the server is in the wrong state to process a request of this type, for example because it is unconfigured and is being asked to return register values.
02	Illegal Data Address	The data address received in the query is not an allowable address for the server. More specifically, the combination of reference number and transfer length is invalid. For a controller with 100 registers, a request with offset 96 and length 4 would succeed; a request with offset 96 and length 5 will generate exception 02.
03	Illegal Data Value	A value contained in the query data field is not an allowable value for server. This indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect. It specifically does not mean that a data item submitted for storage in a register has a value outside the expectation of the application program, because the Modbus protocol is unaware of the significance of any particular value of any particular register.
04	Slave Device Failure	An unrecoverable error occurred while the server was attempting to perform the requested action.
05	Acknowledge	Specialized use in conjunction with programming commands. The server has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a timeout error from occurring in the Client. The Client can next issue a poll program complete message to determine if processing is completed.
06	Slave Device Busy	Specialized use in conjunction with programming commands. The server is engaged in processing a long-duration program command. The Client should retransmit the message later when the server is free.
08	Memory Parity Error	Specialized use in conjunction with function codes 20 and 21 and reference type 6, to indicate that the extended file area failed to pass a consistency check. The server attempted to read record file, but detected a parity error in the memory. The Client can retry the request, but service may be required on the server device.

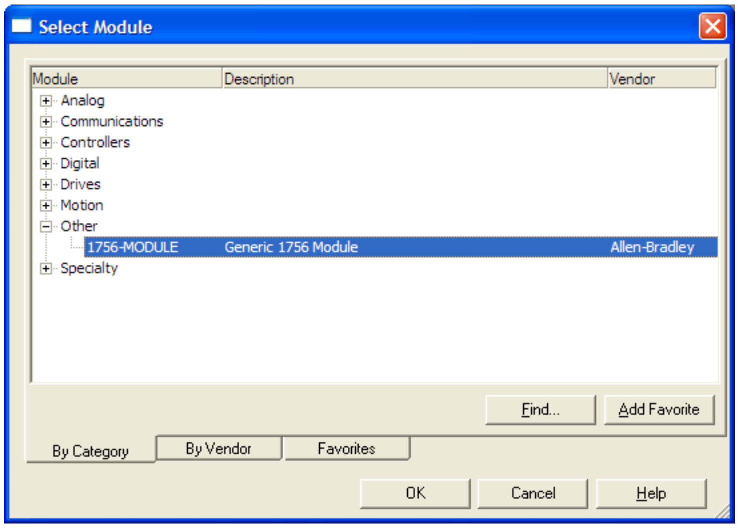
Code	Name	Meaning
0a	Gateway Path Unavailable	Specialized use in conjunction with gateways, indicates that the gateway was unable to allocate an internal communication path from the input port to the output port for processing the request. Usually means that the gateway is misconfigured or overloaded.
0b	Gateway Target Device Failed To Respond	Specialized use in conjunction with gateways, indicates that no response was obtained from the target device. Usually means that the device is not present on the network.

5.6 Adding the Module to an Existing Project

1 **Add the MVI56-MNETCR module to the project.** Select the **I/O CONFIGURATION** folder in the *Controller Organization* window, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose **NEW MODULE**.

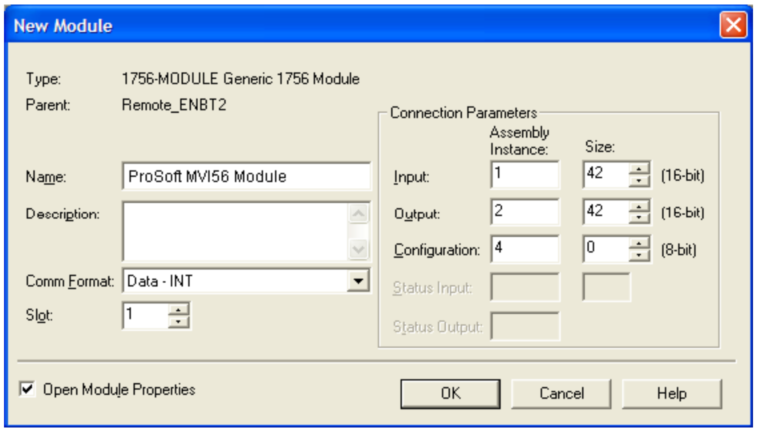


This action opens the *Select Module* dialog box:



Module	Description	Vendor
1756-MODULE	Generic 1756 Module	Allen-Bradley

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

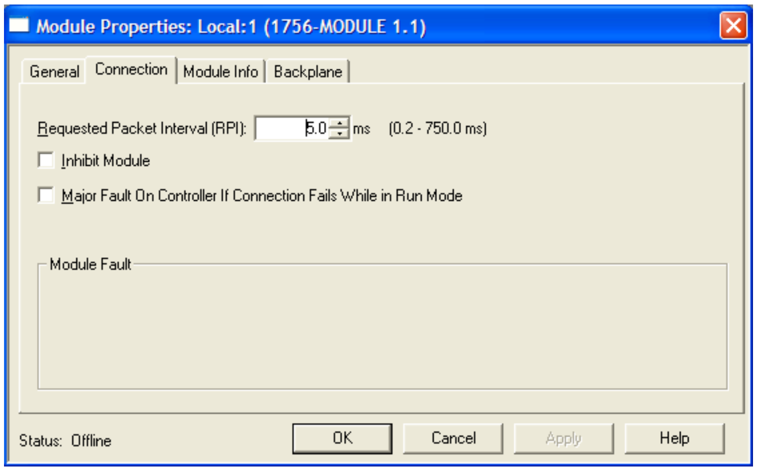


Type: 1756-MODULE Generic 1756 Module
Parent: Remote_ENBT2
Name: ProSoft MVI56 Module
Description:
Comm Format: Data - INT
Slot: 1
Input: 1, 42 (16-bit)
Output: 2, 42 (16-bit)
Configuration: 4, 0 (8-bit)
☑ Open Module Properties

Parameter	Value
Name	Enter a module identification string. The recommended value is **MNETCR**.
Description	Enter a description for the module. Example: **MODBUS TCP/IP MULTI CLIENT COMMUNICATION MODULE FOR REMOTE CHASSIS**.
Comm Format	Select **DATA-INT (Very Important)**
Slot	Enter the slot number in the rack where the MVI56-MNETCR module will be installed.
Input Assembly Instance	**1**
Input Size	**42**
Output Assembly Instance	**2**
Output Size	**42**
Configuration Assembly Instance	**4**
Configuration Size	**0**

Enter the Name, Description and Slot options for your application. You must select the **COMM FORMAT AS DATA - INT** in the dialog box, otherwise the module will not communicate over the backplane of the ControlLogix rack. Click OK to continue.

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



Module Properties: Local:1 (1756-MODULE 1.1)

General | Connection | Module Info | Backplane

Requested Packet Interval (RPI): 5.0 ms (0.2 - 750.0 ms)

☐ Inhibit Module

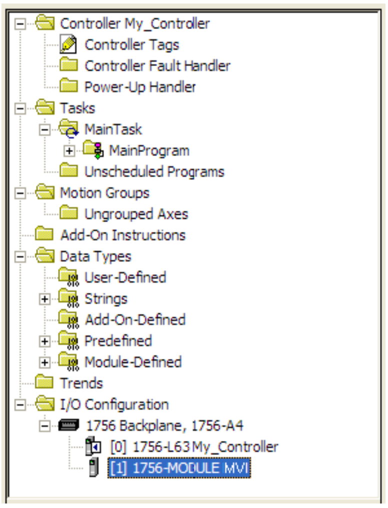
☐ Major Fault On Controller If Connection Fails While in Run Mode

Module Fault

Status: Offline

OK | Cancel | Apply | Help

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



```
Controller My_Controller
    Controller Tags
    Controller Fault Handler
    Power-Up Handler
Tasks
    MainTask
        MainProgram
    Unscheduled Programs
Motion Groups
    Ungrouped Axes
Add-On Instructions
Data Types
    User-Defined
    Strings
    Add-On-Defined
    Predefined
    Module-Defined
Trends
I/O Configuration
    1756 Backplane, 1756-A4
        [0] 1756-L63 My_Controller
        [1] 1756-MODULE MVI
```

5 Copy the Controller Tags (page 62) from the sample program.
6 Copy the User Defined Data Types (page 64) from the sample program.
7 Copy the Ladder Rungs from the sample program.
8 Save and Download (page 40, page 142) the new application to the controller and place the processor in run mode.

5.7 Using the Sample Program

If your processor uses RSLogix 5000 version 15 or earlier, you will not be able to use the Add-On Instruction for your module. Follow the steps below to obtain and use a sample program for your application.

5.7.1 Opening the Sample Program in RSLogix

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

Download the manuals and sample program from the ProSoft Technology web site

You can always download the latest version of the sample ladder logic and user manuals for the MVI56-MNETCR module from the ProSoft Technology website, at www.prosoft-technology.com/support/downloads (http://www.prosoft-technology.com/support/downloads)

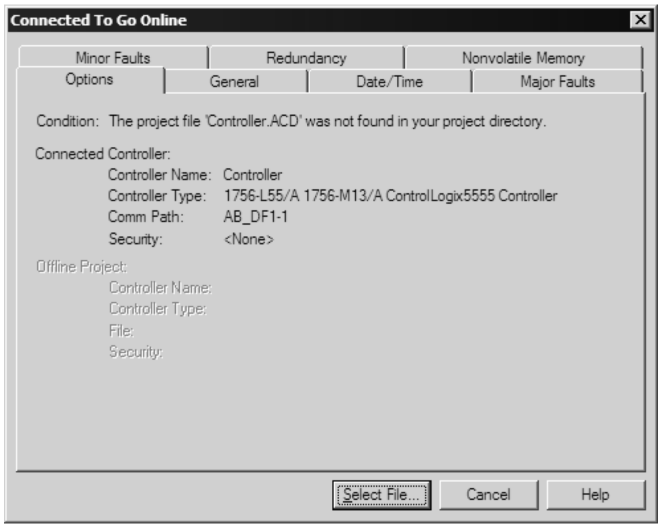
From that link, navigate to the download page for your module and choose the sample program to download for your version of RSLogix 5000 and your processor.

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.

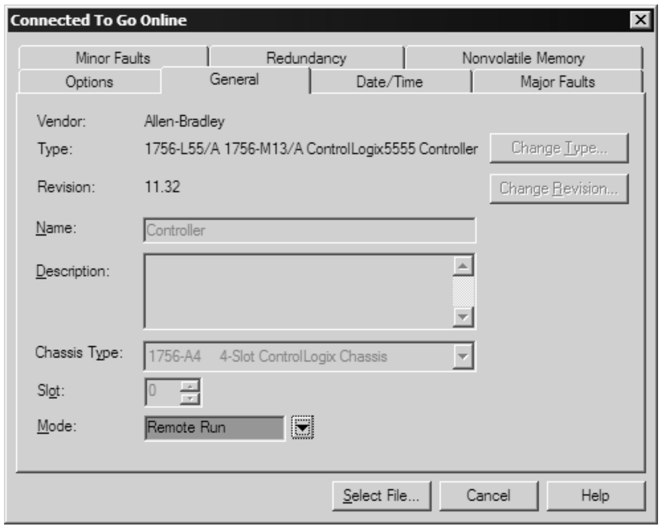


Condition: The project file 'Controller.ACD' was not found in your project directory.

Connected Controller:
Controller Name: Controller
Controller Type: 1756-L55/A 1756-M13/A ControlLogix5555 Controller
Comm Path: AB_DF1-1
Security: <None>

Offline Project:
Controller Name:
Controller Type:
File:
Security:

5 In 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



Vendor: Allen-Bradley
Type: 1756-L55/A 1756-M13/A ControlLogix5555 Controller
Revision: 11.32
Name: Controller
Description:
Chassis Type: 1756-A4 4-Slot ControlLogix Chassis
Slot: 0
Mode: Remote Run

6 Select the sample ladder logic file for your firmware version.

To open the sample program

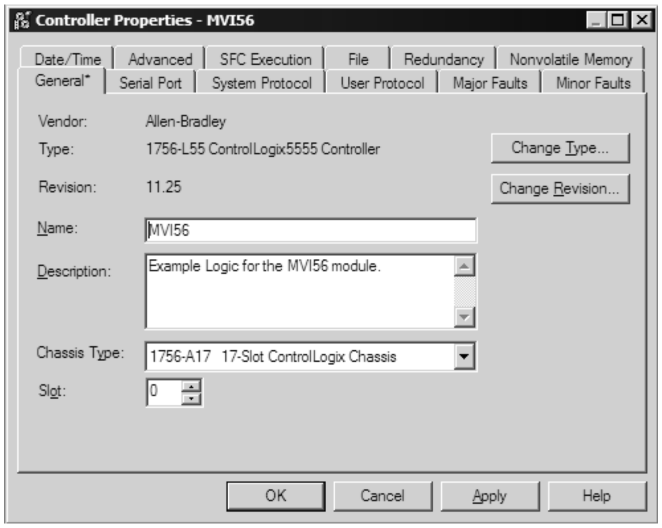
1 On the *Connected to Go Online* dialog box, click the **SELECT FILE** button.
2 Choose the sample program file that matches your firmware version, and then click the **SELECT** button.
3 RSLogix will load the sample program.

The next step is to configure the correct controller type and slot number for your application.

5.7.2 Choosing the Controller Type

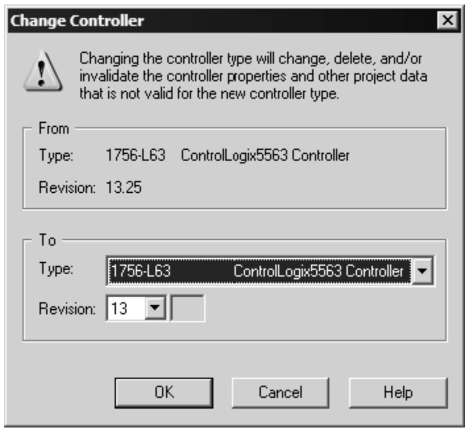
The sample application is for a 1756-L63 ControlLogix 5563 Controller. If you are using a different model of the ControlLogix processor, you must configure the sample program to use the correct processor model.

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



Vendor: Allen-Bradley
Type: 1756-L55 ControlLogix5555 Controller
Revision: 11.25
Name: MVI56
Description: Example Logic for the MVI56 module.
Chassis Type: 1756-A17 17-Slot ControlLogix Chassis
Slot: 0

3 Click the **CHANGE TYPE** or **CHANGE CONTROLLER** button. This action opens the *Change Controller* dialog box.


Change Controller

Changing the controller type will change, delete, and/or invalidate the controller properties and other project data that is not valid for the new controller type.

From
Type: 1756-L63 ControlLogix5563 Controller
Revision: 13.25

To
Type: 1756-L63 ControlLogix5563 Controller
Revision: 13

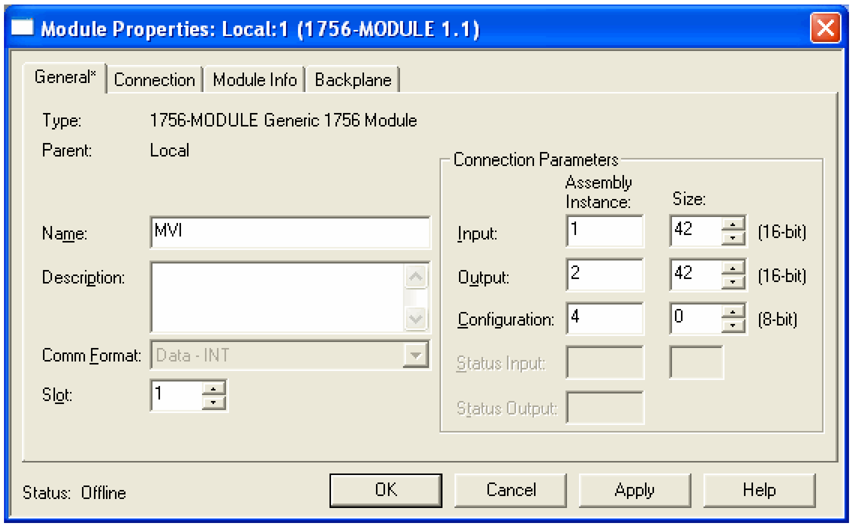
4 Open the **TYPE** dropdown list, and then select your ControlLogix controller.
5 Select the correct firmware revision for your controller, if necessary.
6 Click **OK** to save your changes and return to the previous window.

5.7.3 Selecting 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, 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.


Module Properties: Local:1 (1756-MODULE 1.1)

Type: 1756-MODULE Generic 1756 Module
Parent: Local
Name: MVI
Description:
Comm Format: Data - INT
Slot: 1

Connection Parameters

	Assembly Instance:	Size:	
Input:	1	42	(16-bit)
Output:	2	42	(16-bit)
Configuration:	4	0	(8-bit)
Status Input:			
Status Output:			

Status: Offline

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-MNETCR slot number for computation.

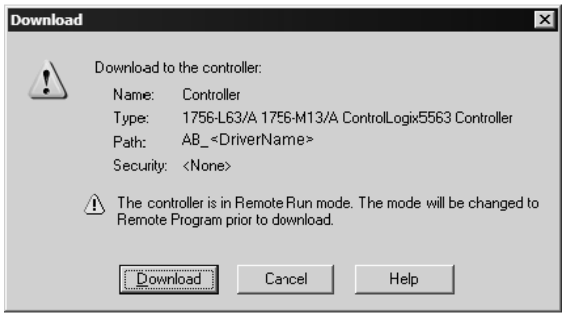
5.7.4 Downloading the Sample Program to the Processor

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

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

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

2 When communication is established, RSLogix will open a confirmation dialog box. Click the **DOWNLOAD** button to transfer the sample program to the processor.


Download

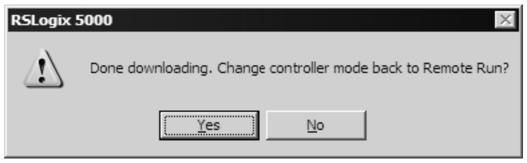
Download to the controller:

Name: Controller
Type: 1756-L63/A 1756-M13/A ControlLogix5563 Controller
Path: AB_<DriverName>
Security: <None>

The controller is in Remote Run mode. The mode will be changed to Remote Program prior to download.

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.


RSLogix 5000

Done downloading. Change controller mode back to Remote Run?

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

5.7.5 Adding the Sample Ladder to an Existing Application

1 Copy the Controller Tags (page 62) from the sample program.
2 Copy the User-Defined Data Types (page 64) from the sample program.
3 Copy the Ladder Rungs from the sample program.
4 Save and Download (page 40, page 142) the new application to the controller and place the processor in RUN mode.

6 Support, Service & Warranty

In This Chapter

Contacting Technical Support

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

1 Product Version Number
2 System architecture
3 Network details

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

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

Note: *For technical support calls within the United States, an after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers. Detailed contact information for all our worldwide locations is available on the following page.*

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

6.1 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 on the Product DVD or go to www.prosoft-technology/warranty

Documentation is subject to change without notice

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