

Please Read This Notice

Successful application of this module requires a reasonable working knowledge of the Rockwell Automation ControlLogix hardware, the MVI56-PDPS Module and the application in which the combination is to be used. For this reason, it is important that those responsible for implementation satisfy themselves that the combination will meet the needs of the application without exposing personnel or equipment to unsafe or inappropriate working conditions.

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

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

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Warnings

UL Warnings

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

ATEX Warnings and Conditions of Safe Usage:

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

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

Electrical Ratings

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

Markings:



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

Battery Life Advisory

All modules in the MVI series use a rechargeable Lithium Vanadium Pentoxide battery to backup the 512K SRAM memory, real-time clock, and CMOS. The battery should last for the life of the module.

The module must be powered for approximately twenty hours before it becomes fully charged. After it is fully charged, the battery provides backup power for the CMOS setup and configuration data, the real-time clock, and the 512K SRAM memory for approximately 21 days.

Before you remove a module from its power source, ensure that the battery within the module is fully charged. A fully charged battery will hold the BIOS settings (after being removed from its power source) for a limited number of days (15 for the PC56). When the battery is fully discharged, the module will revert to the default BIOS settings.

Note: The battery is not user replaceable.

ProSoft® Product Documentation

In an effort to conserve paper, ProSoft Technology no longer includes printed manuals with our product shipments. User Manuals, Datasheets, Sample Ladder Files, and Configuration Files are provided at: <http://www.prosoft-technology.com>

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

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Your Feedback Please

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

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MVI56-PDPS User Manual

August 5, 2021

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Certifications



For professional users in the European Union

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



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

Agency Approvals & Certifications

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

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Guide to the MVI56-PDPS User Manual

Function		Section to Read	Details
Introduction (Must Do)	→	Start Here (page 9)	This Section introduces the customer to the module. Included are: package contents, system requirements, hardware installation, and basic configuration.
Verify Communication, Diagnostic and Troubleshooting	→	Verifying Communication (page 53) Diagnostics and Troubleshooting (page 41)	This section describes how to verify communications with the network. Diagnostic and Troubleshooting procedures.
Reference Product Specifications Functional Overview Glossary	→	Reference (page 55) Functional Overview (page 57) Product Specifications (page 55)	These sections contain general references associated with this product, Specifications, and the Functional Overview.
Support, Service, and Warranty Index	→	Support, Service and Warranty (page 77)	This section contains Support, Service and Warranty information. Index of chapters.

1 Start Here

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Installing the MVI56-PDPS module requires a reasonable working knowledge of the Rockwell Automation hardware, the MVI56-PDPS Module and the application in which they will be used.



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

1.1 System Requirements

The MVI56-PDPS 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-PDPS module. The module requires 800mA of available power.
- Rockwell Automation RSLogix 5000 programming software version 2.51 or higher.
- Rockwell Automation RSLinx communication software
- Pentium® II 450 MHz minimum. Pentium III 733 MHz (or better) recommended
- Supported operating systems:
 - Microsoft Windows XP Professional with Service Pack 1 or 2
 - Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3
 - Microsoft Windows Server 2003
- 128 Mbytes of RAM minimum, 256 Mbytes of RAM recommended

- 100 Mbytes of free hard disk space (or more based on application requirements)
- 256-color VGA graphics adapter, 800 x 600 minimum resolution (True Color 1024 × 768 recommended)
- HyperTerminal or other terminal emulator program.

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

1.2 Package Contents

The following components are included with your MVI56-PDPS 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-PDPS Module	MVI56-PDPS	Profibus DP Slave Communication Module
1	Cable	Cable #15, RS232 Null Modem	For RS232 Connection to the CFG Port
1	Cable	Cable #14, RJ45 to DB9 Male Adapter cable	For DB9 Connection to Module's Port

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

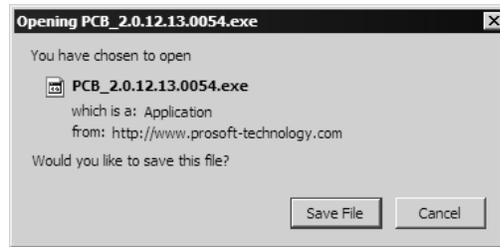
1.3 Install ProSoft Configuration Builder Software

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

To install ProSoft Configuration Builder from the ProSoft Web Site

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

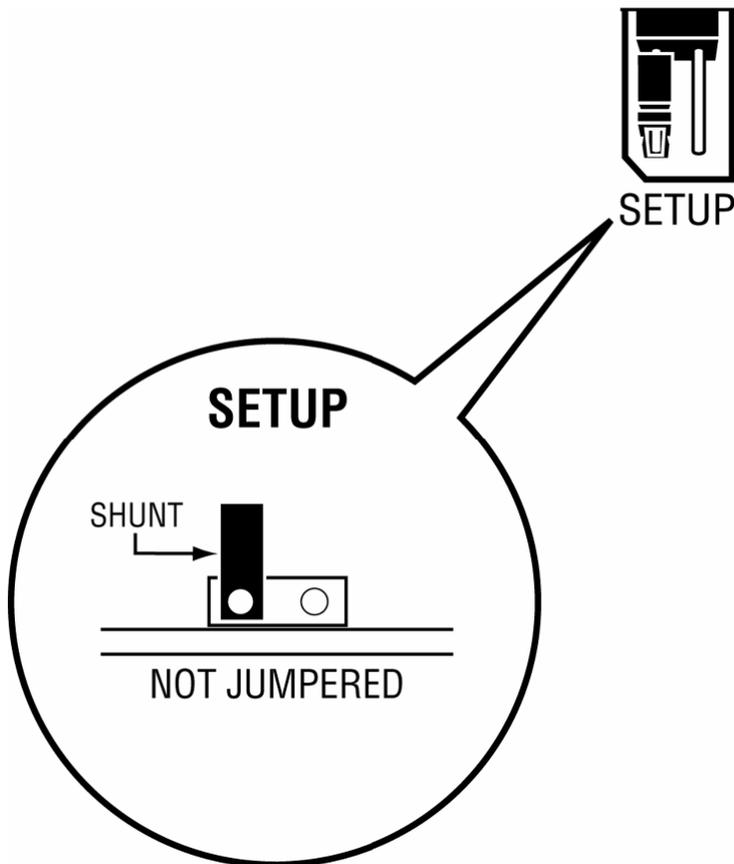
- 3 Choose "Save" or "Save File" when prompted. The following illustrations show the file download prompt for two of the most common web browsers.



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

1.4 Setting Jumpers

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



1.5 Install the Module in the Rack

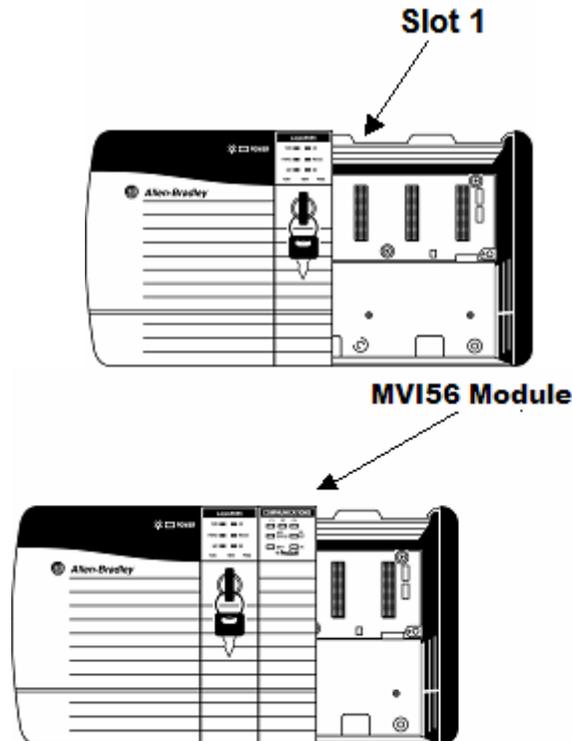
If you have not already installed and configured your ControlLogix processor and power supply, please do so before installing the MVI56-PDPS module. Refer to your Rockwell Automation product documentation for installation instructions.

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

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

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



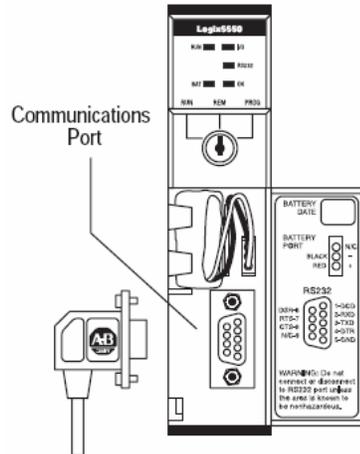
- 3 With a firm but steady push, snap the module into place.
- 4 Check that the holding clips on the top and bottom of the module are securely in the locking holes of the rack.
- 5 Make a note of the slot location. You will need to identify the slot in which the module is installed in order for the sample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

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

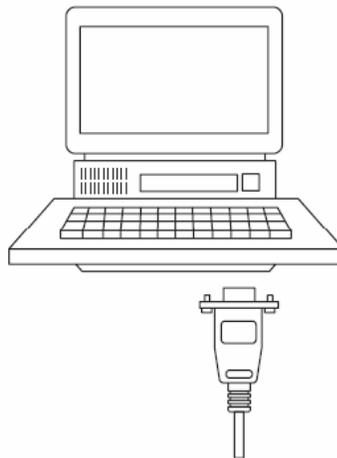
Note: If you are installing MVI56-PDPS with other modules connected to the PCI bus, the peripheral modules will not have holding clips. Make sure all of the modules are aligned with their respective slots before you snap them into place.

1.6 Connect your PC to the Processor

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



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



1.7 Open the Sample Ladder Logic

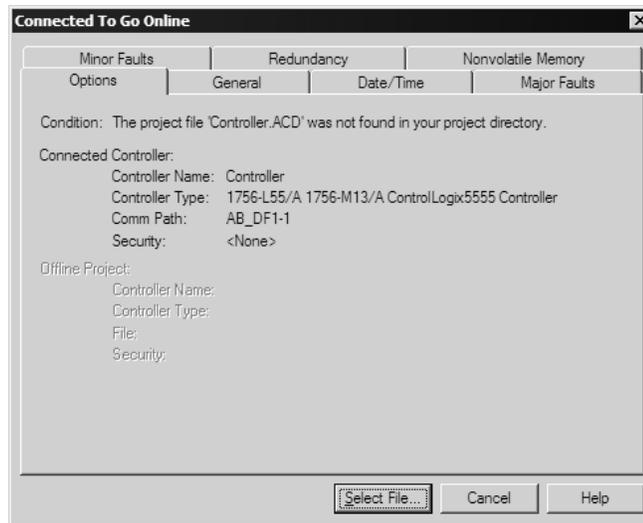
The sample program for your MVI56-PDPS module includes custom tags, data types and ladder logic for data I/O and status monitoring. For most applications, you can run the sample ladder program without modification, or, for advanced applications, you can incorporate the sample program into your existing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

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

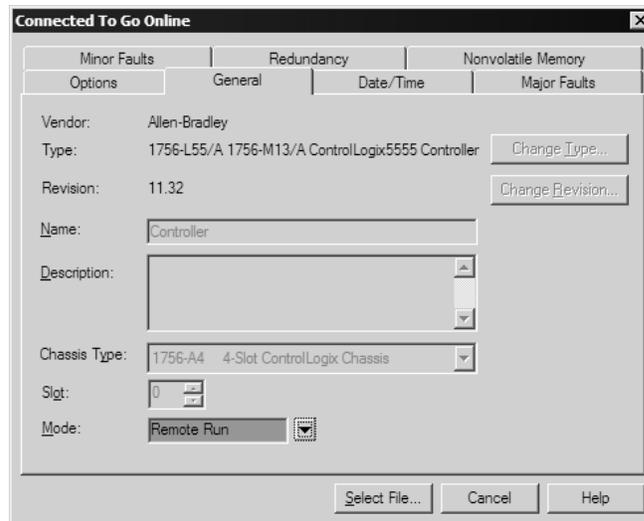
1.7.1 To Determine the Firmware Version of your Processor

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

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



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

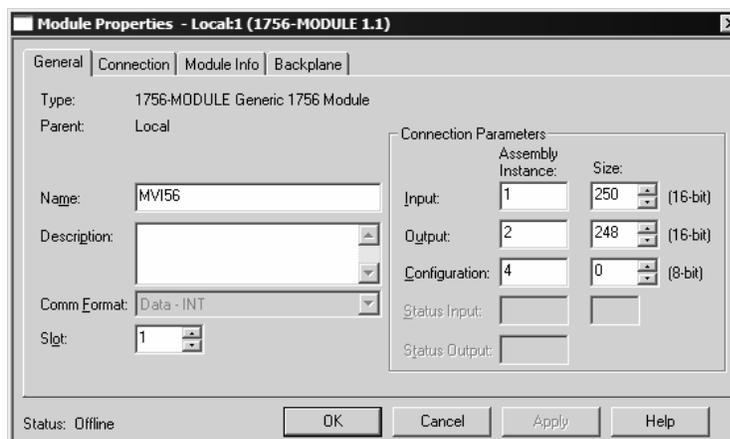


1.7.2 Select the Slot Number for the Module

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

To change the slot number

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



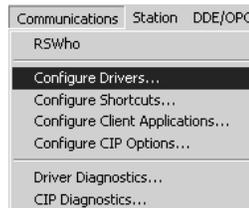
- 3 In the **Slot:** field, use the spinners on the right side of the field to select the slot number where the module will reside in the rack, and then click OK.

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

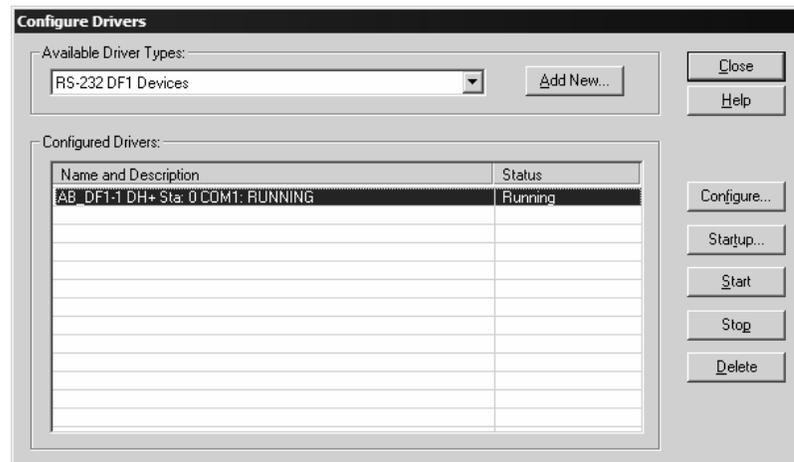
1.7.3 Configuring RSLinx

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

- 1 Open RSLinx.
- 2 Open the Communications menu, and choose Configure Drivers.



This action opens the Configure Drivers dialog box.



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

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



- 4 Click the Auto-Configure button. RSLinx will attempt to configure your serial port to work with the selected driver.
- 5 When you see the message "Auto Configuration Successful", click the OK button to dismiss the dialog box.

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

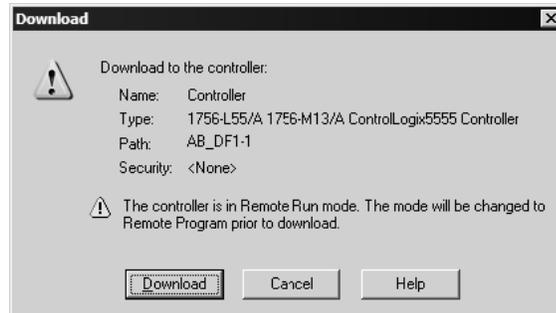
1.8 Download the Sample Program to the Processor

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

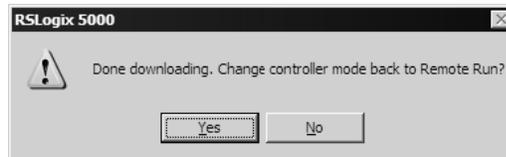
To download the sample program from RSLogix 5000 to the ControlLogix processor

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

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



- 3 RSLogix will compile the program and transfer it to the processor. This process may take a few minutes.
- 4 When the download is complete, RSLogix will open another confirmation dialog box. Click OK to switch the processor from Program mode to Run mode.



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

1.9 Connect your PC to the Module

With the module securely mounted, connect your PC to the Configuration/Debug port using the RJ45-DB-9 Serial Adapter Cable and the Null Modem Cable included in the package with the MVI56-PDPS module.

- 1 Connect the RJ45-DB-9 Serial Adapter Cable to the Null Modem Cable.
- 2 Insert the RJ45 cable connector from the RJ45-DB-9 cable into the Configuration/Debug port of the module.
- 3 Attach the other end to the serial port on your PC or laptop.

2 Configuring the Module with RSLogix 5000

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This section contains the setup procedure, data and ladder logic requirements for successful application of the MVI56-PDPS module. Each step in the setup procedure is defined in order to simplify the use of the module. Go to the Initial Processor ladder File Setup section to begin setting up RSLogix 5000 ladder file. Additionally, this document contains a discussion on configuring the module using the PDPS.CFG file. All configuration information used by the module is stored in this file. Go to the Configuration File section to begin setting up this file.

The document also contains a discussion of the data areas defined for the module. These areas contain the read and write data from the module and status related to the module. It is important to understand each element of the data areas for proper application of the module. Go to the Module Data Object section for the presentation of the data areas.

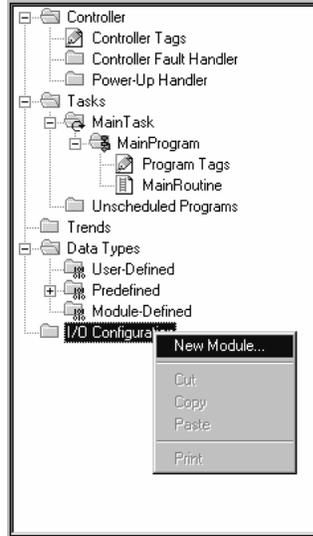
The ladder logic requirement section defines the minimum ladder logic required to apply the module in a user application. The logic is simple to understand and implement. Go to the Ladder Logic section for a complete discussion of the ladder logic requirements.

2.1 Initial Processor Ladder File Setup

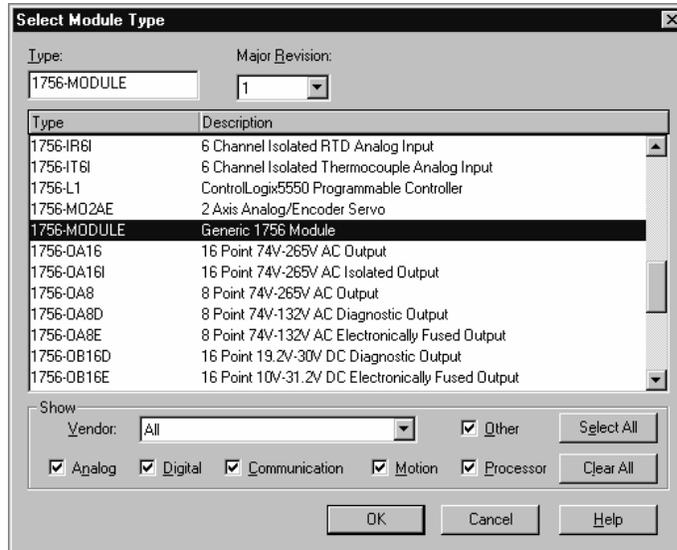
Processor communication to the MVI56-PDPS module requires configuration using the RSLogix 5000 program. The quickest way to configure the module is to start with the example provided with the module () and the default PDPS configuration file. If you are installing this module in an existing application, you can copy the elements required from the example ladder logic to your application.

Note: The module can only be added to a project using the software in offline mode.

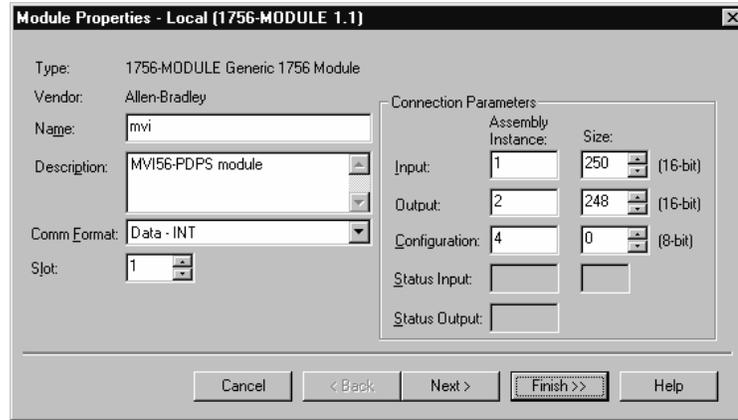
The first step in setting up the processor ladder file is to define the I/O type module to the system. Click the right mouse button on the I/O Configuration option in the Controller Organization list to open a shortcut menu. Select the New Module... option from the I/O Configuration menu:



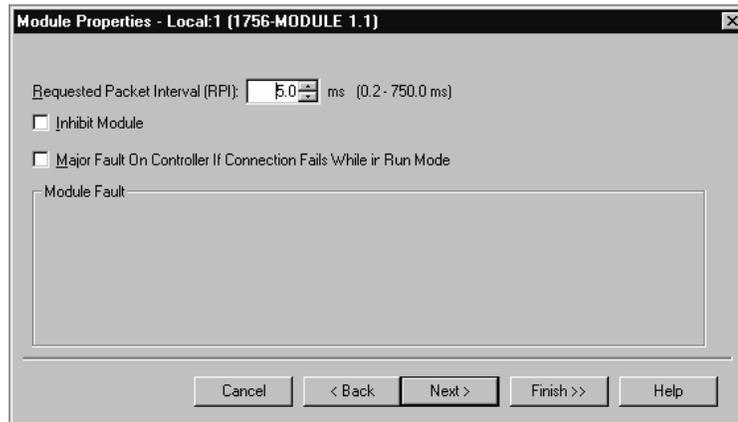
This action opens the following dialog box.



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

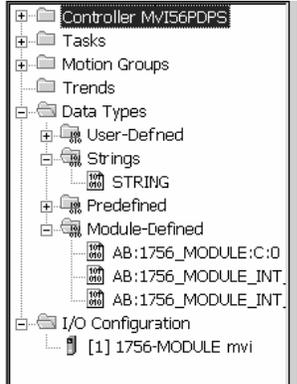


Fill in the dialog boxes as shown adjusting the Name, Description and Slot options for your application. You must select the **Comm Format** as **Data - INT** in the dialog box. Failure to set the **Assembly Instance** and **Size** values correctly will result in a module that will not communicate over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

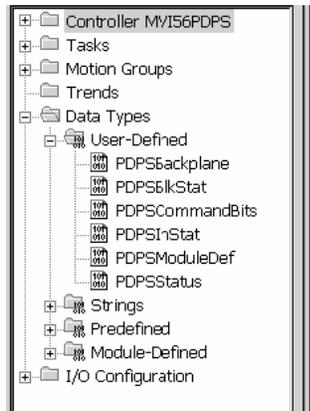


Select the Request Packet Interval value for scanning the I/O on the module. This value represents the minimum frequency the module will handle scheduled events. This value should not be set to less than 1 millisecond. Values between 1 and 10 milliseconds should work with most applications.

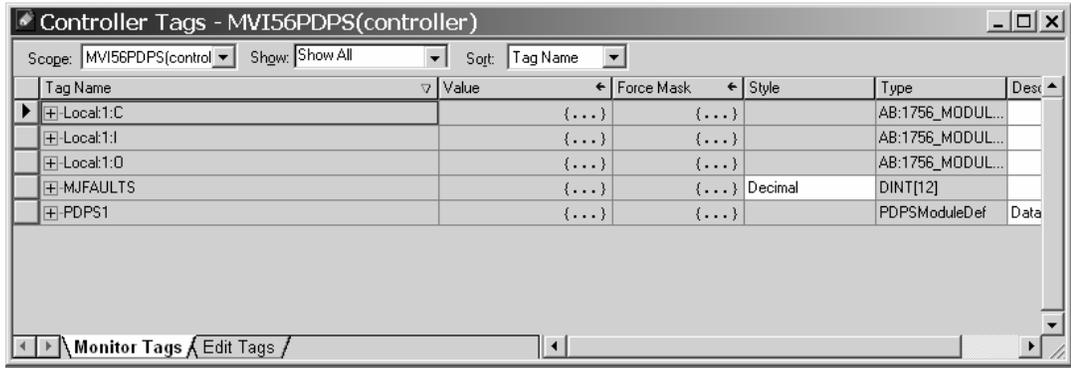
After completing the module setup, the Controller Organization list will display the module's presence. The data required for the module will be defined to the application, and objects will be allocated in the Controller Tags data area. An example of the Controller Organization list follows:



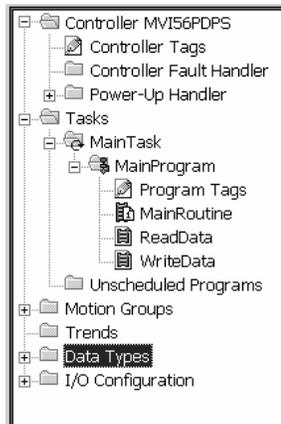
The next step in the module's setup is to define the User Defined Data Types to be used with the module. Copy these data types from the example ladder logic if you are not using the example. They will be defined if you are starting from the example ladder logic. The Controller Organization list should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



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



At this point, take the time to adjust the array sizes PDPS data table for the read and write data. The last step is to add the ladder logic. If you are using the example ladder logic, adjust the ladder to fit your application. If you are not using the ladder example, copy the ladder logic shown in the Controller Organization list shown to your application.

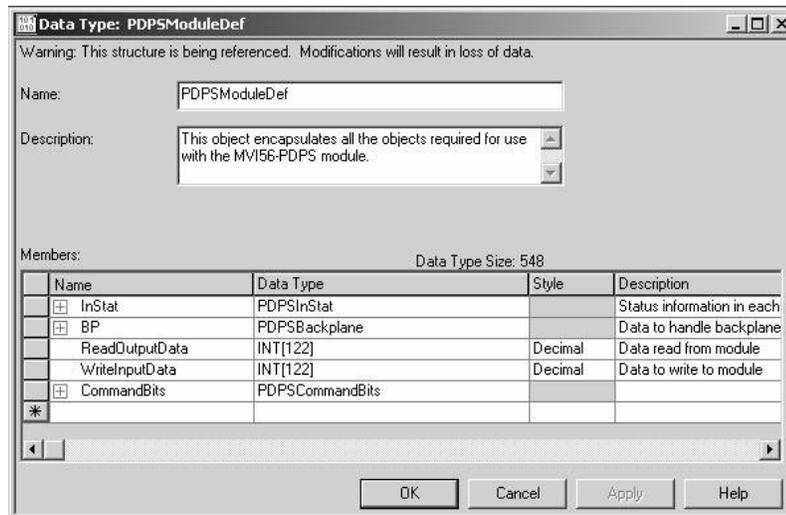


It is now time to edit the PDPS.CFG file to set up the module for the specific application. Refer to the **Configuration File** section of this document. The module is now set up and ready to use with your application. Insert the module in the rack and attach the PROFIBUS cable. Download the new application to the controller and place the processor in run mode. Download the new PDPS.CFG file to the module using HyperTerminal. If all the configuration parameters are set correctly and the module is attached to a network, the module's Application LED (APP LED) should remain off and the backplane activity LED (BP ACT) should blink very rapidly. If you encounter errors, refer to **Diagnostics and Troubleshooting** (page 41) for information on how to connect to the module's Config/Debug port to use its troubleshooting features.

2.2 Module Data Object

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

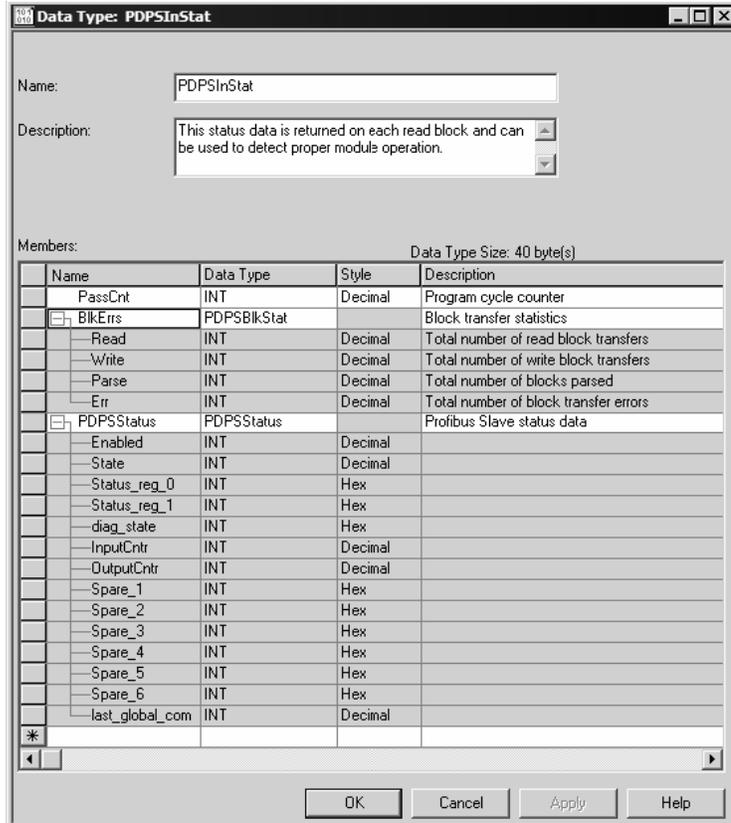
The structure of the object is displayed in the following figure:



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

2.2.1 Status Object (PDPSInStat Data Structure)

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



Refer to Status Data Definition for a complete listing of the data stored in this object.

2.2.2 User Data Objects

These objects hold data to be transferred between the processor and the MVI56-PDPS module. The user data is the read and write data transferred between the processor and the module as "pages" of data up to 200 words long.

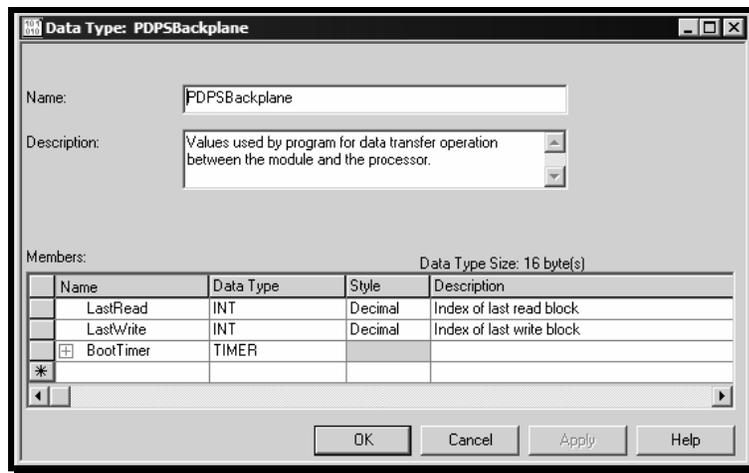
ReadOutputData	INT[122]	Decimal	Data read from module
WriteInputData	INT[122]	Decimal	Data to write to module

The read data (**ReadData**) is an array set to match the value entered in the **Read Register Count** parameter of the PDPS.CFG file. This data is paged up to 200 words at a time from the module to the processor. The ReadData task places the data received into the proper position in the read data array. This data will be data sent to the module by the PROFIBUS Master (PROFIBUS Outputs) and can be used for status and control in the ladder logic of the processor.

The write data (**WriteData**) is an array set to match the value entered in the **Write Register Count** parameter of the PDPS.CFG file. This data is paged up to 200 words at a time from the processor to the module. The WriteData task places the write data into the output image for transfer to the module. This data is passed from the processor to the module to be the PROFIBUS Input data read by the PROFIBUS Master as status and control information for use in other nodes on the network.

2.2.3 Block Control Data (PDPSBackplane)

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

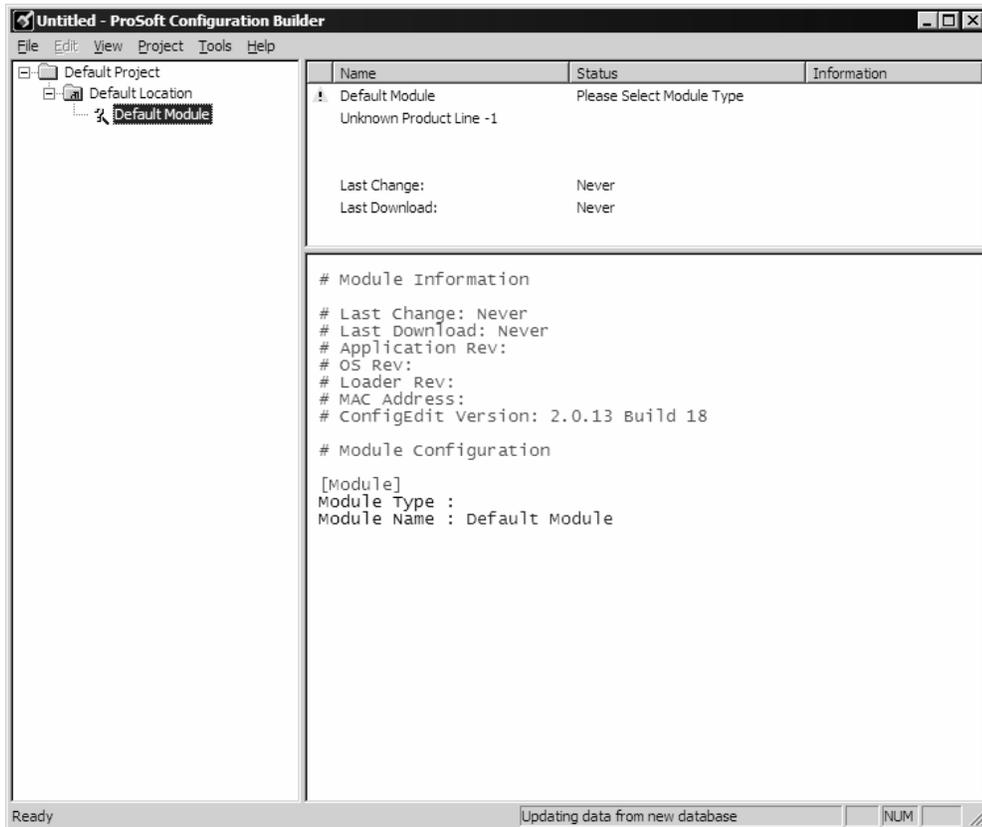


2.3 ProSoft Configuration Builder

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

2.3.1 Set Up the Project

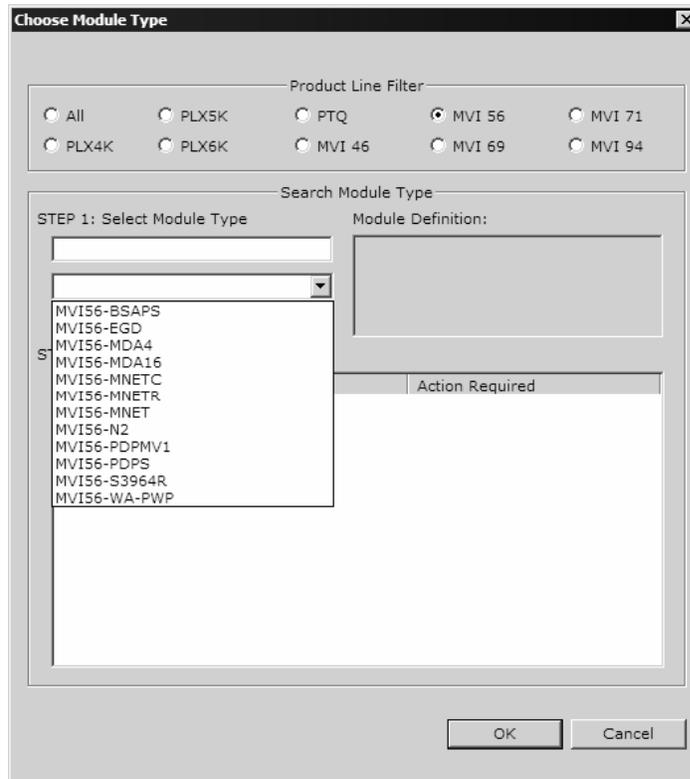
To begin, start ProSoft Configuration Builder. If you have used other Windows configuration tools before, you will find the screen layout familiar. ProSoft Configuration Builder's window consists of a tree view on the left, an information pane and a configuration pane on the right side of the window.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



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

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

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



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

The next task is to set the module parameters.

Adding a Project

To add a project to an existing project file:

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

Adding a Module

To add a module to your project:

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

or

- 1 Open the Project menu and choose Location

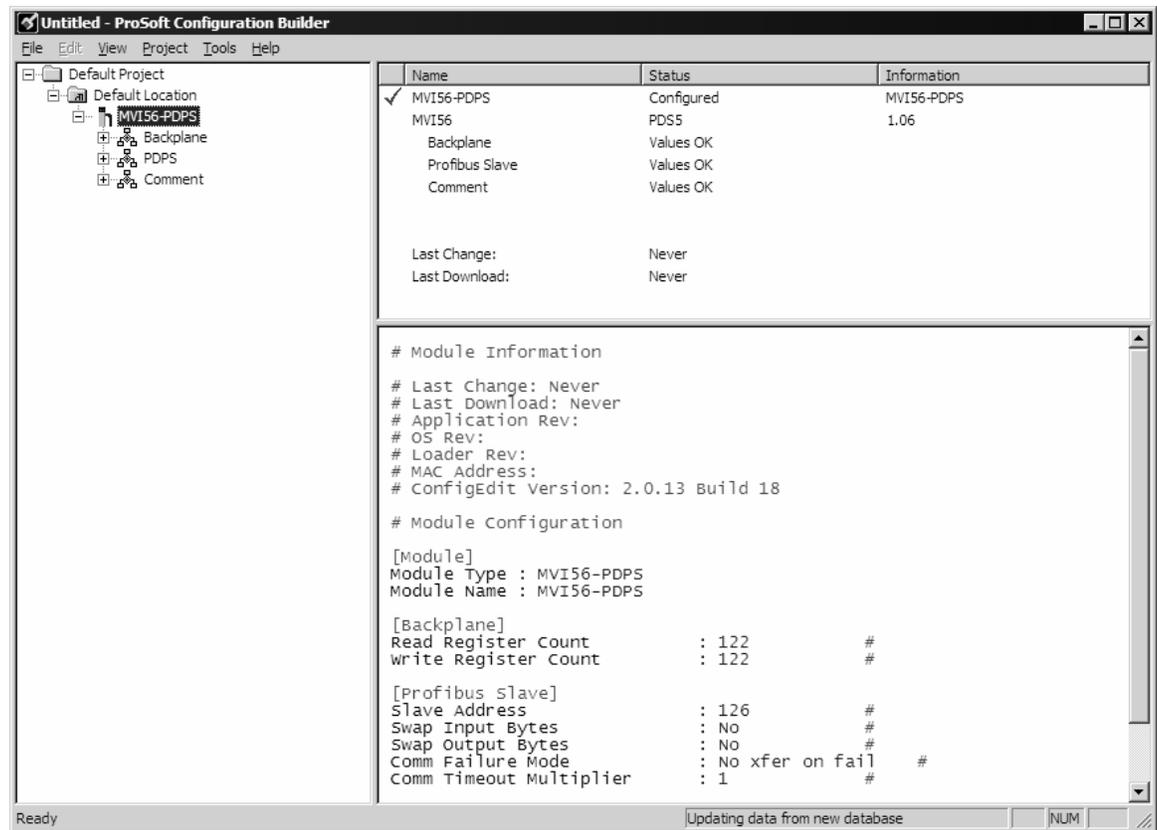
- 2 On the Location menu, choose Add Module.

To add a module to a different location:

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

2.3.2 Set Module Parameters

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



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

To rename an object:

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

Module Entries

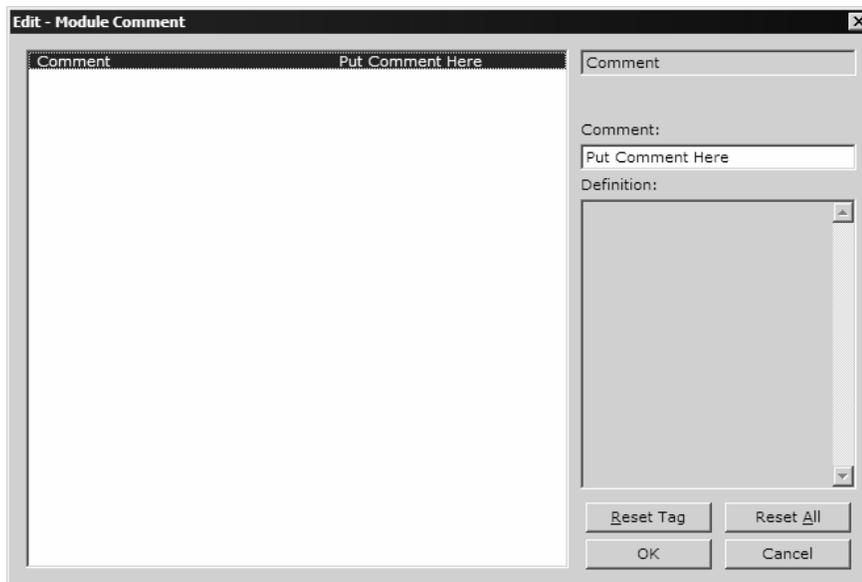
To configure module parameters

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

Comment Entries

To add comments to your configuration file:

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



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

Printing a Configuration File

To print a configuration file:

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

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

2.4 [MODULE]

The module section contains the data that applies to the whole module and includes the backplane data transfer parameters.

```
[Module]
Module Name           : MVI56-PDPS Communication Module DEFAULT
```

The following table describes the content of this section:

[Section]/Item	Value	Range	Description
[MODULE]			Configuration header for general module information
Module Name:		Up to 80 chars	Name of the module for use on reports. Use this parameter to identify your module in your system.

2.5 [BACKPLANE]

The backplane section contains the data that applies to the backplane data transfer parameters.

```
[Backplane]
Read Register Count   : 122  #Number of words to move from MVI to Processor
(Profibus Output)
Write Register Count  : 122  #Number of words to move from Processor to MVI
(Profibus Input)
```

[Section]/Item	Value	Range	Description
[BACKPLANE]			Configuration header for general Backplane information
Read Register Count	122	0 to 122	Number of words to move from the PDPS Module to controller tags in the processor (PROFIBUS Output)
Write Register Count	122	0 or 122	Number of words to move from controller tags in the processor to the PDPS module (PROFIBUS Input)

2.6 [PROFIBUS SLAVE]

The PROFIBUS Slave section contains the data that applies to the PROFIBUS Slave parameters.

```
[Profibus Slave]
Slave Address         :      6 #Profibus node address for slave (0-125)
Swap Input Bytes     :      No #Swap bytes in input image (Yes or No)
Swap Output Bytes    :      No #Swap bytes in output image (Yes or No)
Comm Failure Mode    :      1 #0=x-fer on comm fail, 1=no x-fer on fail
Comm Timeout Multiplier : 1 #(1 to 10) * 125 mSec communication timeout
Use Database Paging  :      N # Y or N. Enables or disable paging.
```

2.6.1 Slave Address

0 to 125

The parameter specifies the node address on the PROFIBUS network for the slave emulated in the module. Each node on the network must have a unique address.

Note: Although valid PROFIBUS Node addresses range from 0 to 125, Node 0 is not a valid node number for a Slave module and that Nodes 0, 1, and 2 are usually reserved for PROFIBUS Masters. Users are advised to use Node numbers 3-125

2.6.2 Swap Input Bytes

Yes or No

This parameter specifies if the data in the input data area of the module is to be byte swapped. If the order of the bytes in the words stored in the database is not correct, use this option. A value of Yes causes the module's program to swap the bytes in each word. A value of No indicates no byte swapping will occur.

2.6.3 Swap Output Bytes

Yes or No

This parameter specifies if the data in the output data area of the module is to be byte swapped. If the order of the bytes in the words stored in the database is not correct, use this option. A value of Yes causes the module's program to swap the bytes in each word. A value of No indicates no byte swapping will occur.

2.6.4 Comm Failure Mode

0 or 1

This parameter sets the data transfer mode of the module's PROFIBUS output image to the internal database when a communication failure on the PROFIBUS interface is detected. If the parameter is set to 0, the output image will continue to be transferred. If the parameter is set to 1, the output image will not be transferred and the last values will be retained.

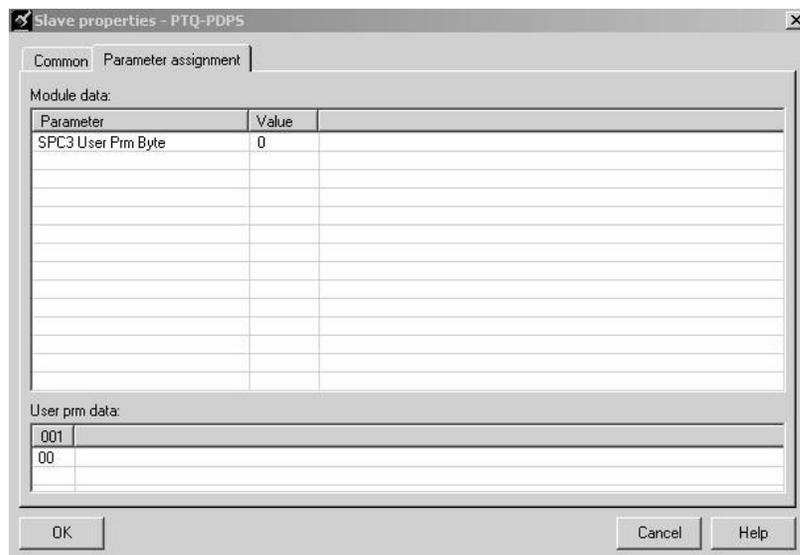
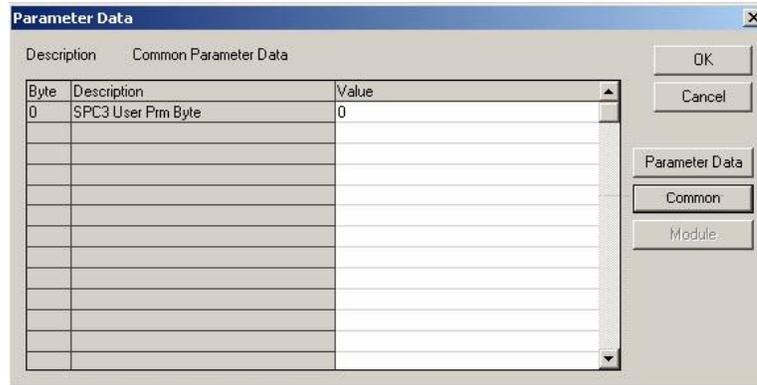
2.6.5 Comm Timeout Multiplier

1 to 10

This parameter sets the communication timeout value for the module. The value entered is multiplied by 125 milliseconds to determine the actual timeout value. For example, a value of 1 specifies a communication timeout of 125 milliseconds.

2.7 Set_Param (SAP61)

ProSoft PROFIBUS Slave (PDPS) devices have a configurable parameter for SPC3 User Prm Byte. The following illustrations show the value of this parameter in Sycon, the configuration tool for ProLinx PROFIBUS Master devices, and in ProSoft Configuration Builder for PROFIBUS, the configuration tool for ProSoft PROFIBUS Master devices.



Parameter Data Structure

SPC3 evaluates the first seven data bytes (without user prm data), or the first eight data bytes (with user prm data). The first seven bytes are specified according to the standard. The eighth byte is used for SPC3-specific communications. The additional bytes are available to the application.

Byte	Bit Position								Designation
	7	6	5	4	3	2	1	0	
0	Lock Reg	Unio Req	Sync Req	Free Req	WD on	Res	Res	Res	Station status

Byte	Bit Position								Designation
	7	6	5	4	3	2	1	0	
1									WD_Fact_1
2									WD_Fact_2
3									MinTSDR
4									Ident_Number_High
5									Ident_Number_Low
6									Group_Ident
7									Spec_User_Prm_Byte
8 to 243									User_Prm_Data

Byte 7 Spec_User_Prm_Byte			
Bit	Name	Significance	Default State
0	Dis_Startbit	The start bit monitoring in the receiver is switched off with this bit	Dis_Startbit = 1, That is, start bit monitoring is switched off.
1	Dis_Stopbit	Stop bit monitoring in the receiver is switched off with this bit	Dis_Stopbit = 0 That is, stop bit monitoring is not switched off.
2	WD_Base	This bit specifies the time base used to clock the watchdog. WD_Base = 0: time base 10 ms WD_Base = 1: time base 1 ms	WD_Base = 0 That is, the time base is 10 ms.
3 to 4	Res	To be parameterized with 0	0
5	Publisher_Enable	DXB-publisher-functionality of the SPC3 is activated with this bit	Publisher_Enable = 0, DXB-request-telegrams are ignored; Publisher_Enable = 1, DXB-request-telegramme are processed
6 to 7	Res	To be parameterized with 0	0

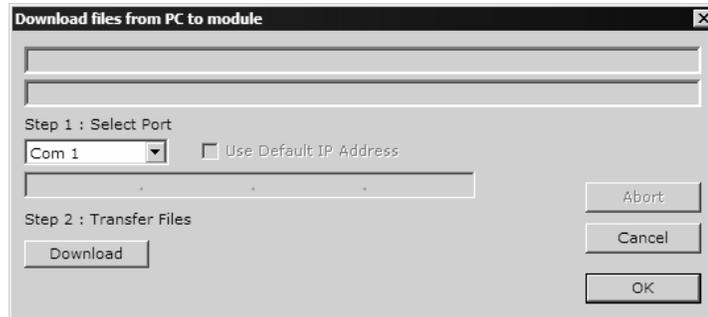
2.8 Download the Project to the Module

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

To Download the Project File

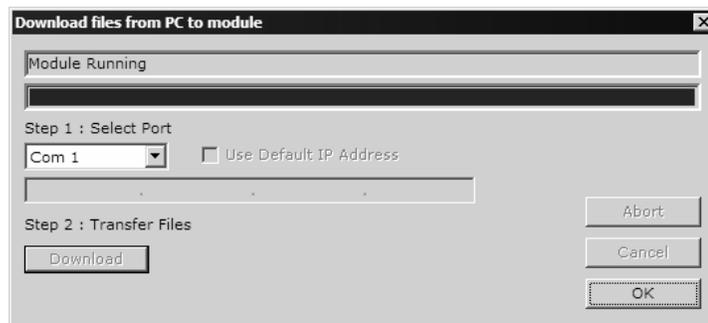
- 1 In the tree view in ProSoft Configuration Builder, click once to select the MVI56-PDPS module.

- Open the **Project menu**, and then choose **Module / Download**. The program will scan your PC for a valid com port (this may take a few seconds). When PCB has found a valid com port, the following dialog box will open.



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

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



3 Ladder Logic

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

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

4 Diagnostics and Troubleshooting

In This Chapter

- ❖ Reading Status Data from the Module 41
- ❖ LED Indicators 53

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

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

4.1 Reading Status Data from the Module

The MVI56-PDPS module returns a 20-word Status Data block that can be used to determine the module's operating status. This data can be located in the module's database at registers at the location specified in the configuration. This data is transferred to the ControlLogix processor continuously with each read block.

4.1.1 Definition of Module's Extended Diagnostics Data

The Extended Diagnostic Data is reported during startup and initialization sequence when the master requests diagnostic data from the module. The Extended Diagnostics is "Device Related" type providing status data (the extended diagnostic bit 3 in standard diagnostic byte 1 is set = 0). The data length is normally 14 (0E) bytes displayed in the following format:

Byte(s)	Description (HEX)
0	Extended Diagnostics length (normally 14 bytes (0E))
1 to 6	ASCII data for Product Version
7 to 10	ASCII data for Product Name
11	Value of Status Register [0] (see Section 2)
12	Value of Status Register [1] (see Section 2)
13	Module State (see Section 2)

Byte 10 Data - Specific Product Code Value

34 = ASCII "4" = MVI46

35 = ASCII "5" = MVI56

36 = ASCII "6" = MVI69

37 = ASCII "7" = MVI71

51 = ASCII "Q" = PTQ

Sample Diagnostics reported to master.

```
extended diagnostic data:
0E 56 30 31 2E 30 35 50
44 53 34 41 03 04

device related diagnostic data:
0E 56 30 31 2E 30 35 50
44 53 34 41 03 04
```

Translated as follows:

Extended diagnostics length 0E= 14 bytes, **Product Version** 56 = "V", 30 = "0", 31 = "1", 2E = ".", 30 = "0", 35 = "5", Product Name 50 = ""P", 44 = ""D", 53 = "S", 34 = "4" (MVI46),

Status Register [0] 41 = SPC3 in passive idle and WD-State is in DP_Control State, **Status Register [1]** 03 = 1.5 Baud rate, **Module State** 04 = not in data exchange.

4.1.2 Required Hardware

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

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

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

4.1.3 The Configuration/Debug Menu

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

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

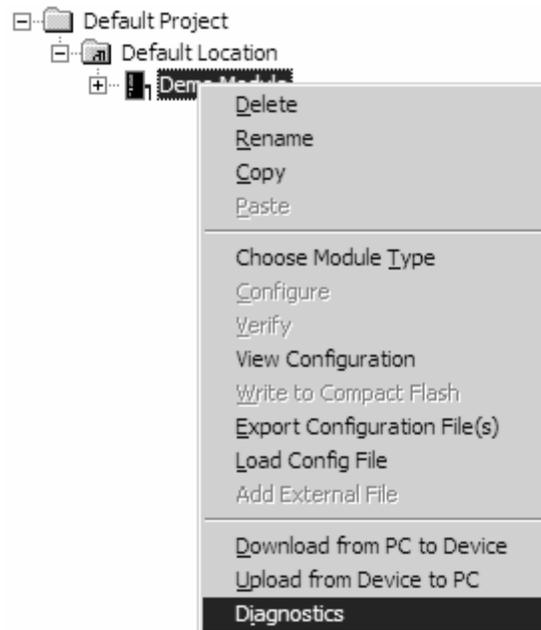
Using the Diagnostic Window in ProSoft Configuration Builder

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

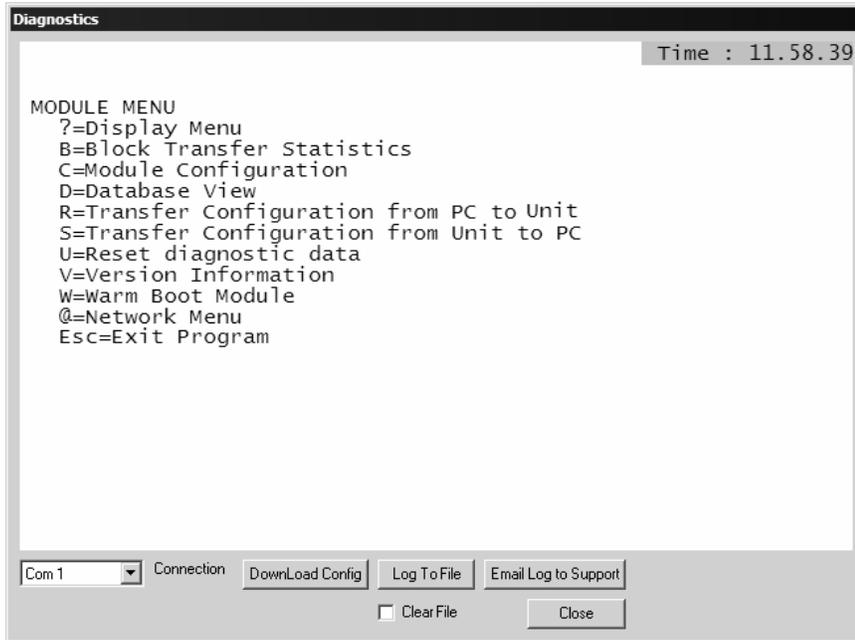
- 1 Start PCB program with the application file to be tested. Right click over the module icon.



- 2 On the shortcut menu, choose Diagnostics.



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



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

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

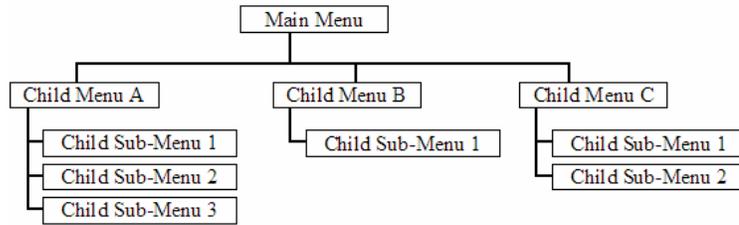
- Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.
- On computers with more than one serial port, verify that your communication program is connected to the same port that is connected to the module.

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

Navigation

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

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



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

Keystrokes

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

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

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

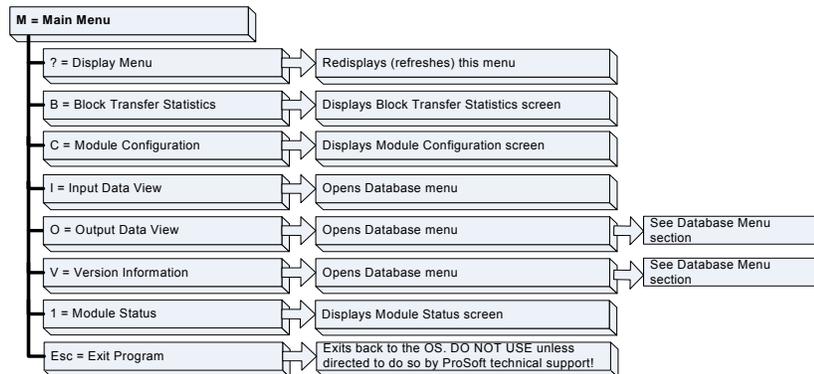
4.1.4 Main Menu

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

```

MVI56-PDPS COMMUNICATION MODULE MENU
?=Display Menu
B=Block Transfer Statistics
C=Module Configuration
P=Profibus Slave Menu
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
Esc=Exit Program
  
```

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



Redisplaying the Menu

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

Viewing Block Transfer Statistics

Press **[B]** 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 Input Data View Menu

Press **[I]** to open the Input Data View Menu. Use this command to view the contents of the input database.

Opening the Output Data View Menu

Press **[O]** to open the Output Data View Menu. Use this command to view the contents of the input database.

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.

Viewing Module Status

Press **[1]** to view information about Module Status. Use this command to view status information about the module. This screen also contains useful information for mailbox troubleshooting:

- Scan count
- Mailbox counters
- Alarm counters
- Number of acyclic read and write operations performed by the module.

You can also view the number of mailbox messages in the input and output queues, and the number of alarms in the alarm queue.

Exiting the Program

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

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

4.1.5 PROFIBUS Slave Menu

The PROFIBUS Slave menu provides slave (module) status information and error data.

Press [P] to open the PROFIBUS Slave menu.

```
PROFIBUS SLAVE MENU
C=Configuration
I=Show inputs
O=Show outputs
L=Show LED Data
l=Profibus Status
?=Show menu
M=Exit menu
```

Viewing PROFIBUS Slave Configuration

The Configuration Screen displays many specific SPC3 ASIC diagnostic data useful to ProSoft Technology Technical Support and advanced PROFIBUS users. Additional information can be found in the SPC3 specification.

```
Profibus Slave Menu Selected

PROFIBUS CONFIGURATION:
CONFIGURATION/BUFFER ASSIGNMENTS:
  Station Address = 3
  DOut Len : 200   S1=0040   S2=0108   S3=01D0
  DIn Len  : 200   S1=0298   S2=0360   S3=0428
  Diag1 Len: 6    S =0508   Diag2 Len: 20   S =0520
  Aux1 Len : 16   S =0568   Aux2 Len : 0    S =0578
  SSA Len  : 0    S =N/A    Parm Len : 8    S =0558
  Cfg Len  : 14   S =0538   RCfg Len : 14   S =0548
  Ident   : 098A (HEX)
  FDL SAP Last Ptr = 05F8 (Value = 0xFF)
  Comm Failure Mode : 0
I/O IMAGE DATA SWAPPING:
  Inputs  : 0    Outputs : 0
MODULE SETUP:
```

Station Address = The configured station address set by the user

DOut Len is the total number of output bytes with the S1, S2 and S3 values being pointers to the 3 output buffers in the SPC3 chip.

DIn Len is the total number of input bytes with the S1, S2 and S3 values being pointers to the 3 input buffers in the SPC3 chip.

Diag1Len should always be 6 to represent the minimal number of diagnostic bytes and S= pointer in SPC3 chip to this data.

Diag2Len is the extended diagnostic buffer length and S is a pointer to this data in the SPC3 chip.

Aux1 Len: (see SPC3 specification) and S is a pointer to this data in the SPC3 chip.

Aux2 Len: (see SPC3 specification) and S is a pointer to this data in the SPC3 chip.

SSA Len is not used and should be 0 and its pointer S is N/A.

Param Len = is the length of the parameter data for the slave with S as the pointer in the SPC3 chip to the data.

Cfg Len is the configuration length for the slave with S as the pointer.

RCfg len is that received from the master with S as the pointer.

Ident is the PROFIBUS identification number for the module.

FDL SAP last PTR is the end of all the PDPS data in the SPC3 chip. This value must be less than 0xFF or there is a memory overflow problem!

Comm Failure mode is that from the configuration file as is the swapping of input and output data.

Viewing PROFIBUS Status

```

PROFIBUS SLAVE STATUS DATA
Enable Status Flag   : 1
Module State        : 4
Product             : V01.06PDS5
Status Data (Hex)   : [0]=05 [1]=08
Diagnostic State (Hex): 01
Input Counter       : 1055
Output Counter      : 0
Last Global Cmd (Hex) : 00
  
```

Enable State

Indicates the initialized state of the MVI56-PDPS module.

- 0 = Module is not initialized
- 1 = Module is initialized

Module State

Indicates the current state of the MVI56-PDPS module.

- 0 = Normal Operation
- 1 = Shutdown
- 2 = File Transfer
- 3 = SPC3 ASIC problem
- 4 = Not in data exchange

Status Register [0]

SPC3 ASIC slave status information provided to the master.

Bit 0	Offline/Passive-Idle
	Offline-/Passive-Idle state
	0 = SPC3 is in offline
	1 = SPC3 in passive idle
Bit 1	FDL_IND_ST (Fieldbus Data link Layer)
	FDL indication is temporarily buffered.
	0 = No FDL indication is temporarily buffered.
	1 = FDL indication is temporarily buffered.

Bit 2	Diag_Flag
	Status diagnostics buffer
	0 = The DP master fetches the diagnostics buffer. 1 = The DP master has not yet fetched the diagnostics buffer.
Bit 3	RAM Access Violation
	Memory access > 1.5kByte
	0 = No address violation 1 = For addresses > 1536 bytes, 1024 is subtracted from the current address, and there is access to this new address.
Bits 4,5	DP-State
	DP-State Machine state
	00 = 'Wait_Prm' state 01 = 'Wait_Cfg' state 10 = 'DATA_EX' state 11 = Not possible
Bits 6,7	WD-State
	Watchdog-State-Machine state
	00 = 'Baud_Search' state 01 = 'Baud_Control' state 10 = 'DP_Control' state 11 = Not possible

Bit 0

Offline/Passive-idle

- 0 = SPC3 exits offline and goes to passive-idle. The idle timer and Wd timer go offline.
- 1 = SPC3 exits offline and goes to passive-idle. The idle timer and Wd timer are started.

Bit 4, 5

- 10 = Data Exchange State is Normal. The SPC3 has a correct configuration.

Bits 6, 7

- Watchdog Timer
- Automatic Baud Rate Identification

The SPC3 is able to identify the baud rate automatically. The "baud search" state is located after each RESET and also after the watchdog (WD) timer has run out in the "Baud_Control_state." As a rule, SPC3 begins the search for the set rate with the highest baud rate. If no SD1 telegram, SD2 telegram, or SD3 telegram was received completely and without errors during the monitoring time, the search continues with the next lowest baud rate.

After identifying the correct baud rate, SPC3 switches to the "Baud_Control" state and monitors the baud rate. The monitoring time can be parameterized (WD_Baud_Control_Val). The watchdog works with a clock of 100 Hz (10 milliseconds). The watchdog resets each telegram received with no errors to its own station address. If the timer runs out, SPC3 again switches to the baud search state.

Further explanation of Status Register [0]: Word 9 Bit states

Bit 0

Offline/Passive-idle

- 0 = SPC3 exits offline and goes to passive-idle. The idle timer and Wd timer go offline.
- 1 = SPC3 exits offline and goes to passive-idle. The idle timer and Wd timer are started.

Bit 4, 5

- 10 = Data Exchange State is Normal. The SPC3 has a correct configuration.

Bits 6, 7

- Watchdog Timer
- Automatic Baud Rate Identification

The SPC3 is able to identify the baud rate automatically. The "baud search" state is located after each RESET and also after the watchdog (WD) timer has run out in the "Baud_Control_state." As a rule, SPC3 begins the search for the set rate with the highest baud rate. If no SD1 telegram, SD2 telegram, or SD3 telegram was received completely and without errors during the monitoring time, the search continues with the next lowest baud rate.

After identifying the correct baud rate, SPC3 switches to the "Baud_Control" state and monitors the baud rate. The monitoring time can be parameterized (WD_Baud_Control_Val). The watchdog works with a clock of 100 Hz (10 milliseconds). The watchdog resets each telegram received with no errors to its own station address. If the timer runs out, SPC3 again switches to the baud search state.

Baud Rate Monitoring

The located baud rate is constantly monitored in 'Baud_Control.' The watchdog is reset for each error-free telegram to its own station address. The monitoring time results from multiplying both 'WD_Baud_Control_Val' (user sets the parameters) by the time base (10 ms). If the monitoring time runs out, WD_SM again goes to 'Baud_Search'. If the user carries out the DP protocol (DP_Mode = 1, see Mode register 0) with SPC3, the watchdog is used for the "DP_Control" state, after a 'Set_Param telegram' was received with an enabled response time monitoring 'WD_On = 1.' The watchdog timer remains in the baud rate monitoring state when there is a switched off 'WD_On = 0' master monitoring. The PROFIBUS DP state machine is also not reset when the timer runs out. That is, the slave remains in the DATA_Exchange state, for example.

Response Time Monitoring

The 'DP_Control' state serves response time monitoring of the DP master (Master_Add). The set monitoring times results from multiplying both watchdog factors and multiplying the result with the momentarily valid time base (1 ms or 10 ms):

- $TWD = (1 \text{ ms or } 10 \text{ ms}) * WD_Fact_1 * WD_Fact_2$ (See byte 7 of the parameter setting telegram.)

The user can load the two watchdog factors (WD_Fact_1, and WD_Fact_2) and the time base that represents a measurement for the monitoring time via the 'Set_Param telegram' with any value between 1 and 255.

EXCEPTION: The WD_Fact_1=WD_Fact_2=1 setting is not permissible. The circuit does not check this setting.

Monitoring times between 2 ms and 650 s - independent of the baud rate - can be implemented with the permissible watchdog factors. If the monitoring time runs out, the SPC3 goes again to 'Baud_Control,' and the SPC3 generates the 'WD_DP_Control_Timeout-Interrupt'. In addition, the DP_State machine is reset, that is, generates the reset states of the buffer management.

If another master accepts SPC3, then there is either a switch to 'Baud_Control' (WD_On = 0), or there is a delay in 'DP_Control' (WD_On = 1), depending on the enabled response time monitoring (WD_On = 0).

Status Register [1]

SPC3 ASIC slave status information provided to the master.

Bits	Baud rate:
0 to 3	The baud rates SPC3 found
	0000 = 12 MBaud
	0001 = 6 MBaud
	0010 = 3 MBaud
	0011 = 1.5 MBaud
	0100 = 500 kBaud
	0101 = 187.5 kBaud
	0110 = 93.75 kBaud
	0111 = 45.45 kBaud
	1000 = 19.2 kBaud
	1001 = 9.6 kBaud
	Rest = Not possible
Bits	SPC3-Release:
4 to 7	Release no. for SPC3
	0000 = Release 0
	Rest = Not possible

Dagnostic State

- 0 = Normal Operation or not in data exchange with Status Register [0] Bit 0x20 set.

- 1 = Not in data exchange state with the Status Register [0] bit 0x20 not set or normal operation with the Status Register [0] bit 0x20 not set.
- 3 = Not in a defined state or in module state 1, 2 or 3.
- 4 = Normal operation with Status Register [0] bit 0x20 set

PROFIBUS Input Counter

Input counter is incremented each time the input data is updated.

PROFIBUS Output Counter

Output counter is incremented each time the output data is updated.

Last Global Command

The value of the last global command code received from the master.

Bit	Designation	Significance
0	Reserved	
1	Clear_Data	With this command the ASCII output data is deleted in data transfer buffer and is changed to next transfer data buffer contents.
2	Unfreeze	With 'Unfreeze': freezing input data is cancelled.
3	Freeze	The ASCII input data is fetched from next transfer buffer to data transfer buffer and frozen. New input data is not fetched again until the master sends the next 'Freeze' command.
4	Unsync	The 'Unsync' command cancels the 'Sync' command.
5	Sync	The ASCII output data transferred with a WRITE_READ_DATA telegram is changed from data transfer buffer next state buffer. The following transferred output data is kept in data transfer buffer until the next 'Sync' command is given.
6,7	Reserved	The Reserved designation specifies that these bits are reserved for future function expansions.

4.2 LED Indicators

Troubleshooting the operation of the PROFIBUS Slave port can be performed using several methods.

The first and quickest is to scan the LEDs on the module to determine the existence and possibly the cause of a problem. This section provides insight into the operation of the PROFIBUS Slave Port status LEDs.

4.2.1 Module Status Indicators

Indicator	Color	Status	Indication
CFG	Green	On	Configuration/Debug Port is active
		Off	Configuration/Debug Port is inactive
APP STATUS	Not used	Always off	

Indicator	Color	Status	Indication
BP ACT	Amber	On	The LED is on when the module is communicating over the backplane. Under normal operation, the LED should blink rapidly on and off.
		Off	The LED is off when the module is unable to communicate with the processor. The processor is either absent or not running.
BATT	Red	Off	The battery voltage is OK and running.
		On	The battery voltage is low or the battery is not present. The battery LED will illuminate briefly upon the first installation of the module or if the unit has not had power for an extended period of time. This behavior is normal, however, should the LED come on in a working installation, please contact ProSoft Technology.
OK	Red / Green	Off	The card is not receiving any power and is not securely plugged into the rack.
		Green	The module has passed its internal diagnostic tests and is functional.
		Red	The module's diagnostics have detected an error, the module is being configured, is not functioning normally, or has not yet been able to initialize backplane communication with the processor."

4.2.2 LEDs for the PROFIBUS Slave Port



ACTIVE	ERROR	Description
Flashing	On	PROFIBUS communication problem (not receiving output)
Off	On	Module configured and waiting for first output data set.
Flashing	together	Configuration error during initialization.
Alternate	flashing	Watchdog timer expired.
On	Off	Normal operation.
On	Rapid/irregular flash	Configuration problem from master.
Off	Flashing	User timeout expired.
Off	Off	Module not receiving power or program terminated.

5 Reference

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5.1 Product Specifications

The MVI56 PROFIBUS DP Slave Communication Module allows ControlLogix I/O compatible processors to interface easily with a PROFIBUS DP Master device.

5.1.1 Features and Benefits

The PROFIBUS DP Slave protocol driver supports the PROFIBUS V0 Slave implementation, providing powerful data transfer capability between the module and a ControlLogix processor. User configurable data mapping and DP port operation make the interface an easy to use and powerful data transfer tool.

The MVI56 module Configuration/Debug Serial port connects a PC to the module for configuration, status, monitoring, and troubleshooting (serial cable is included with product shipment). After editing on a PC, a configuration file is downloaded and stored on the MVI56 module.

The PROFIBUS DP Slave gives access to the unit's input and output images with up to 122 words of Input and Output data. Total input and output may not exceed 200 words. These Input and Output data blocks are mapped by the user within the module's data memory allowing maximum flexibility and data transfer with other protocols.

5.1.2 General Specifications

- Single Slot - 1756 backplane compatible
- The module is recognized as an Input/Output module and has access to processor memory for data transfer between processor and module
- Ladder Logic is used for data transfer between module and processor. Sample ladder file included.

- Configuration data obtained from configuration text file downloaded to module. Sample configuration file included
- Local or remote rack

5.1.3 Hardware Specifications

Specification	Description
Backplane Current Load	800 mA @ 5 V DC 3mA @ 24V DC
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Shock	30g Operational 50g non-operational Vibration: 5 g from 10 to 150 Hz
Relative Humidity	5% to 95% (non-condensing)
LED Indicators	Module Status Backplane Transfer Status Application Status Serial Activity and Error LED Status
Debug/Configuration port (CFG)	
CFG Port (CFG)	RJ45 (DB-9M with supplied cable) RS-232 only CIPconnect™ Ethernet routing using 1756-ENBT, 1756-EN2T or similar
Shipped with Unit	RJ45 to DB-9M cables for each port 6-foot RS-232 configuration cable

5.1.4 PROFIBUS Slave Port Specifications

Type	Specifications
General Parameters	
Internal Database	400 registers (200 words) available
GSD File	Downloadable from ProSoft-Technology.com web site
PROFIBUS Slave	
Communication parameters	Baud Rate: 9.6 kbps to 12 Mbps
Supported I/O length	122 words Input data 122 words Output data 200 words combined maximum
Supported PROFIBUS DP features	Freeze Mode Sync Mode Auto Baud Setting
Configurable Parameters	a) PROFIBUS Node Address: 0 to 125 b) Data byte swapping c) Action on loss of PROFIBUS connection d) Comm Fail Timeout Multiplier

Type	Specifications
Physical Connection	
PROFIBUS Connector	Standard PROFIBUS DB-9F communication connector. Cable connection matches PROFIBUS pin out specification.

5.1.5 Functional Specifications

PROFIBUS Slave

- Communication parameters
 - Baud Rate: 9.6 kbps 12 Mbps
- Supported I/O length
 - Up to 122 words Input data
 - Up to 122 words Output data
 - Total not to exceed 200 words
- Freeze Mode
- Sync Mode
- Auto Baud Setting
 - Configurable Parameters
 - PROFIBUS Node Address: 0 to 125
 - Data byte swapping
 - Action on loss of PROFIBUS connection
 - Comm Fail Timeout Multiplier
 - Status Data location in Internal Database
- Status Data
 - PROFIBUS Status Data for slave
- Physical Connection
 - PROFIBUS Connector
 - Standard PROFIBUS DB-9F communication connector. Cable connection matches PROFIBUS pin out specification

5.2 Functional Overview

The PROFIBUS slave protocol driver may exist in a single port implementation. The driver can be configured as a slave interface with other PROFIBUS devices. The PROFIBUS slave port can be used to continuously interface with other PROFIBUS devices over a PROFIBUS serial communication network.

5.2.1 About the PROFIBUS Protocol

PROFIBUS (Process Field Bus) is a widely-used, open-standards protocol created by a consortium of European factory automation suppliers in 1989.

PROFIBUS is a master/slave protocol. The master establishes a connection to the remote slave. When the connection is established, the master sends the PROFIBUS commands to the slave. The MVI56-PDPS module works as a slave.

PROFIBUS supports a variety of network types. The network type supported by the MVI56-PDPS module is PROFIBUS DP (Device Bus) version 0, which is designed for remote I/O systems, motor control centers, and variable speed drives.

5.2.2 General Concepts

The following discussion explains several concepts that are important for understanding the operation of the MVI56-PDPS module.

Module Power Up

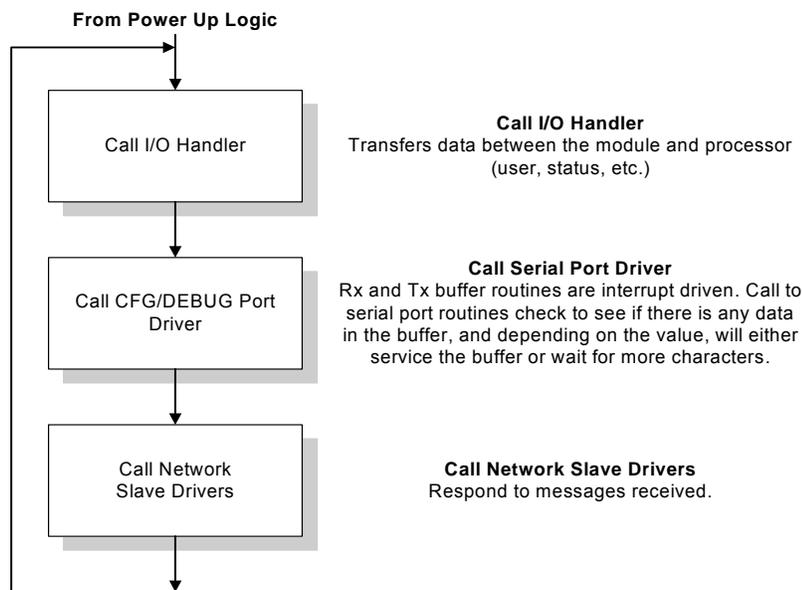
On power up the module begins performing the following logical functions:

- 1 Initialize hardware components
 - Initialize ControlLogix backplane driver
 - Test and Clear all RAM
 - Initialize the PROFIBUS Slave port
- 2 Reads configuration from Compact Flash Disk
- 3 Initialize Module Register space
- 4 Enable Slave Driver on PROFIBUS port

After the module has received the Module Configuration, the module is waiting to communicate with other nodes on the network, depending on the configuration.

Main Logic Loop

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



ControlLogix Processor Not in Run

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

5.2.3 PROFIBUS DP Architecture

The PROFIBUS DP network supports multiple master systems with several slaves.

The following table shows the most important features of PROFIBUS DP:

Standard	EIN 501 70 DIN 19245
Transmission Equipment (Physical)	EIA RS-485 IEC 1158-2 (through link or coupler) Fiber Optic Cable (not available)
Transfer Procedure	Half-duplex
Bus Topology	Linear bus with active bus termination
Bus Cable Type	Shielded twisted pair conductors
Connector	9-pin D-Sub
Number of nodes on the bus	Max: 32 with no repeaters Max: 125 with 3 repeaters in 4 segments

Bus Access

Two different bus access procedures handle the various communication requirements for the PROFIBUS DP topology:

- Token Passing
- Polling

Token Passing

Token passing ring is the basis for communication between the more complex, active stations. All stations have the same rights in that a token is passed from station to station in a logical ring. The token is passed to each station with a maximum, definable token cycle time. A station is given transmission rights for the duration of time that it has the token.

Master/Slave Polling

Master/Slave polling guarantees a cyclic, real-time based data exchange between the station with transmission rights, active station and its subordinates, passive stations. In this case, the master is able to pass data to the slave and/or receive data. The services in layer 2 (field-bus data link in ISO-OSI reference model) organize this communication.

Communication Types

In addition to point-to-point data transfer, the PROFIBUS protocol can also handle the following types of communication:

- Broadcast communication:
 - An active node sends an unacknowledged message to all other nodes (master and slaves)
- Multicast communication (control instructions)
 - An active node sends an unacknowledged message to a group of nodes (Master and Slaves).

Master/Slave Communication Phases

The communication between the Master and the Slaves takes place in the following phases:

- Parameterization and configuration phase
- Usable data transfer phase

Before a DP Slave can be integrated into the usable data transfer phase, the parameterization and configuration phase runs a device identification test that verifies that the planned configuration matches the actual device configuration for each slave in the PROFIBUS network. The test verifies that:

- the device is actually there
- it is the right type of device
- the address, which is set on the device, matches the station address on the bus
- the formats, telegram length information, and bus parameters are correct and
- the number of configured inputs and outputs is correct.

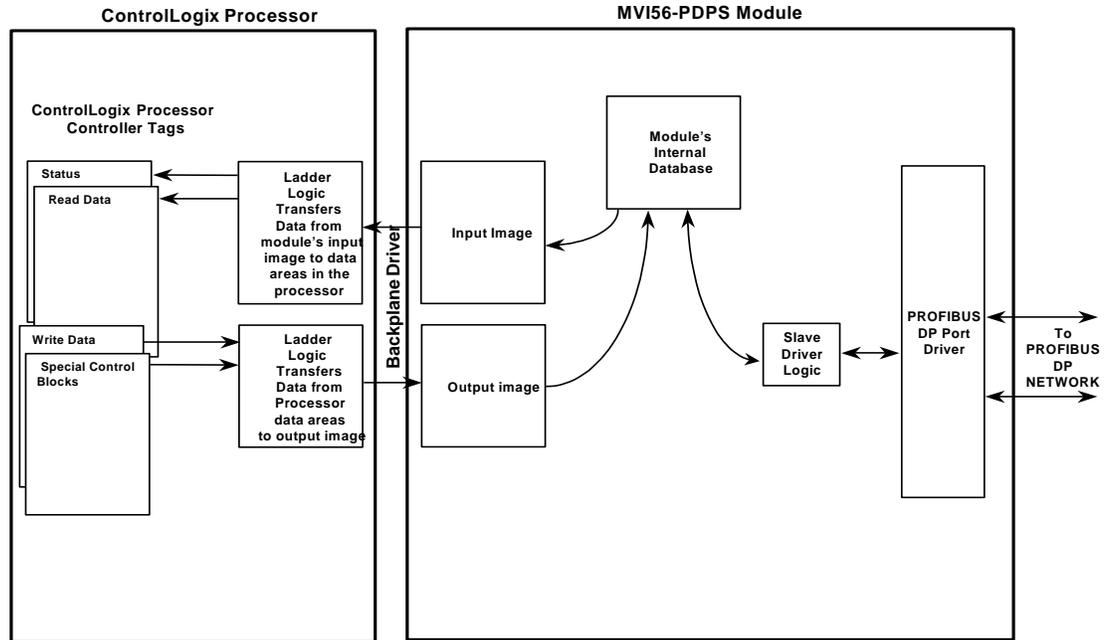
5.2.4 Backplane Data Transfer

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

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

The processor inserts data into the module's output image to transfer to the module. The module's program extracts the data and places it in the module's internal database. The output image for the module is set to 248 words. This large data area permits fast throughput of data from the processor to the module

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



As shown in the previous diagram, 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 consisting of 200 registers for I/O and Status information.

Data contained in this database is paged through the input and output images by coordination of the ControlLogix ladder logic and the MVI56-PDPS module's program. Up to 248 words of data can be transferred from the module to the processor at a time. Up to 247 words of data can be transferred from the processor to the module.

Note: Not all of the input and output images will contain PROFIBUS data.

The read and write block identification codes in each data block determine the function to be performed or the content of the data block. The block identification codes used by the module are listed in the following table:

Block Range	Descriptions
-1	Null block
0 to 1	Read or write data
9998	Warm-boot control block
9999	Cold-boot control block

Each image has a defined structure depending on the data content and the function of the data transfer as defined in the following topics:

5.2.5 Normal Data Transfer

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

Read Block

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

Word	Description	Length
0	Write Block ID	1
1 to 122	Read Data	122
123 to 201	Reserved	79
202	Program Scan Counter	1
203 to 206	Block Transfer Status	4
207 to 220	PDPS Status	14
221 to 248	Reserved	28
249	Read Block ID	1

Write Block

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

Word	Description	Length
0	Write Block ID	1
1 to 122	PROFIBUS input data	122
123 to 200	Reserved	78
201 to 247	Spare	47

5.2.6 Command Control Blocks

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

Warm Boot (Write Block)

This block is sent from the ControlLogix processor to the module (output image) when the module is required to perform a warm-boot (software reset) operation. This block is commonly sent to the module any time configuration data modifications are made. This will force the module to read the new configuration information and to restart. The structure of the control block is shown in the following table:

Word	Description	Length
0	9998	1
1 to 247	Spare	247

Because many of the parameters set in the configuration file require the program to restart, this function works the same as the cold-boot function. It will cause the module to exit and restart the program.

Cold Boot (Write Block)

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

Word	Description	Length
0	9999	1
1 to 247	Spare	247

5.2.7 PROFIBUS Slave Error and Status Data

The PROFIBUS Slave Error and Status Data area is discussed in this section. This information is available in the PDPS1.InStat.PDPSSstatus structure, and found in the diagnostic PROFIBUS SLAVE STATUS screen. See Diagnostics and Troubleshooting (page 41) for more information.

The data area is initialized with zeros whenever the module is initialized. This occurs during a cold-start (power-on) or a warm-boot operation. Counter values are also initialized to 0 at power up.

Word	Value	Description
207	Status	PROFIBUS enable state
208	Status	PDPS module state
209	Status	PROFIBUS status register[0]
210	Status	PROFIBUS status register[1]
211	Status	Diagnostic state
212	Status	PROFIBUS input counter
213	Status	PROFIBUS output counter
214	Status	Reserved
215	Status	Reserved
216	Status	Reserved

Word	Value	Description
217	Status	Reserved
218	Status	Reserved
219	Status	Reserved
220	Status	Last global command

Refer to the following topics to interpret the status/error codes present in the data area.

PROFIBUS Enable State: Word 207

Indicates the initialized state of the PDPS module.

- 0 = Module is not initialized
- 1 = Module is initialized

MVI56-PDPS Module State - Word 208

Indicates the current state of the MVI56-PDPS module.

- 0 = Normal Operation
- 1 = Shutdown
- 2 = File Transfer
- 3 = SPC3 ASIC problem
- 4 = Not in data exchange

PROFIBUS Status Register [0]: Word 209

SPC3 ASIC slave status information provided to the master

Bit 0	Offline/Passive-Idle
	Offline-/Passive-Idle state
	0 = SPC3 is in offline
	1 = SPC3 in passive idle
Bit 1	FDL_IND_ST (Fieldbus Data link Layer)
	FDL indication is temporarily buffered.
	0 = No FDL indication is temporarily buffered.
	1 = FDL indication is temporarily buffered.
Bit 2	Diag_Flag
	Status diagnostics buffer
	0 = The DP master fetches the diagnostics buffer.
	1 = The DP master has not yet fetched the diagnostics buffer.
Bit 3	RAM Access Violation
	Memory access > 1.5kByte
	0 = No address violation
	1 = For addresses > 1536 bytes, 1024 is subtracted from the current address, and there is access to this new address.
Bits	DP-State
4,5	DP-State Machine state

	00 = 'Wait_Prm' state
	01 = 'Wait_Cfg' state
	10 = 'DATA_EX' state
	11 = Not possible

Bits	WD-State
6,7	Watchdog-State-Machine state

	00 = 'Baud_Search' state
	01 = 'Baud_Control' state
	10 = 'DP_Control' state
	11 = Not possible

Further explanation of Status Register [0]: Word 9 Bit states

Bit 0

Offline/Passive-idle

- 0 = SPC3 exits offline and goes to passive-idle. The idle timer and Wd timer go offline.
- 1 = SPC3 exits offline and goes to passive-idle. The idle timer and Wd timer are started.

Bit 4, 5

- 10 = Data Exchange State is Normal. The SPC3 has a correct configuration.

Bits 6, 7

- Watchdog Timer
- Automatic Baud Rate Identification

The SPC3 is able to identify the baud rate automatically. The "baud search" state is located after each RESET and also after the watchdog (WD) timer has run out in the "Baud_Control_state." As a rule, SPC3 begins the search for the set rate with the highest baud rate. If no SD1 telegram, SD2 telegram, or SD3 telegram was received completely and without errors during the monitoring time, the search continues with the next lowest baud rate.

After identifying the correct baud rate, SPC3 switches to the "Baud_Control" state and monitors the baud rate. The monitoring time can be parameterized (WD_Baud_Control_Val). The watchdog works with a clock of 100 Hz (10 milliseconds). The watchdog resets each telegram received with no errors to its own station address. If the timer runs out, SPC3 again switches to the baud search state.

Baud Rate Monitoring: The located baud rate is constantly monitored in 'Baud_Control.' The watchdog is reset for each error-free telegram to its own station address. The monitoring time results from multiplying both 'WD_Baud_Control_Val' (user sets the parameters) by the time base (10 ms). If the monitoring time runs out, WD_SM again goes to 'Baud_Search'. If the user carries out the DP protocol (DP_Mode = 1, see Mode register 0) with SPC3, the watchdog is used for the "DP_Control' state, after a 'Set_Param telegram' was received with an enabled response time monitoring 'WD_On = 1.' The watchdog timer remains in the baud rate monitoring state when there is a switched off 'WD_On = 0' master monitoring. The PROFIBUS DP state machine is also not reset when the timer runs out. That is, the slave remains in the DATA_Exchange state, for example.

Response Time Monitoring: The 'DP_Control' state serves response time monitoring of the DP master (Master_Add). The set monitoring times results from multiplying both watchdog factors and multiplying the result with the momentarily valid time base (1 ms or 10 ms):

- $TWD = (1 \text{ ms or } 10 \text{ ms}) * WD_Fact_1 * WD_Fact_2$ (See byte 7 of the parameter setting telegram.)

The user can load the two watchdog factors (WD_Fact_1, and WD_Fact_2) and the time base that represents a measurement for the monitoring time via the 'Set_Param telegram' with any value between 1 and 255.

EXCEPTION: The WD_Fact_1=WD_Fact_2=1 setting is not permissible. The circuit does not check this setting.

Monitoring times between 2 ms and 650 s - independent of the baud rate - can be implemented with the permissible watchdog factors. If the monitoring time runs out, the SPC3 goes again to 'Baud_Control,' and the SPC3 generates the 'WD_DP_Control_Timeout-Interrupt'. In addition, the DP_State machine is reset, that is, generates the reset states of the buffer management.

If another master accepts SPC3, then there is either a switch to 'Baud_Control" (WD_On = 0), or there is a delay in 'DP_Control' (WD_On = 1), depending on the enabled response time monitoring (WD_On = 0).

PROFIBUS Status Register [1]: Word 210

SPC3 ASIC slave status information provided to the master.

Bits	Baud rate:
0 to 3	The baud rates SPC3 found

0000 = 12 MBaud
0001 = 6 MBaud
0010 = 3 MBaud
0011 = 1.5 MBaud
0100 = 500 kBaud
0101 = 187.5 kBaud
0110 = 93.75 kBaud
0111 = 45.45 kBaud
1000 = 19.2 kBaud
1001 = 9.6 kBaud
Rest = Not possible

Bits	SPC3-Release:
4 to 7	Release no. for SPC3

0000 = Release 0
Rest = Not possible

Diagnostic state - Word 211

- 0 = Normal Operation or not in data exchange with Status Register [0] Bit 0x20 set.
- 1 = Not in data exchange state with the Status Register [0] bit 0x20 not set or normal operation with the Status Register [0] bit 0x20 not set.
- 3 = Not in a defined state or in module state 1, 2 or 3.
- 4 = Normal operation with Status Register [0] bit 0x20 set

PROFIBUS Input Counter: Word 212

Input counter is incremented each time the input data is updated.

PROFIBUS Output Counter: Word 213

Output counter is incremented each time the output data is updated.

PROFIBUS Reserved Words: Word 214 to Word 219

Reserved for future use.

Last Global Command: Word 220

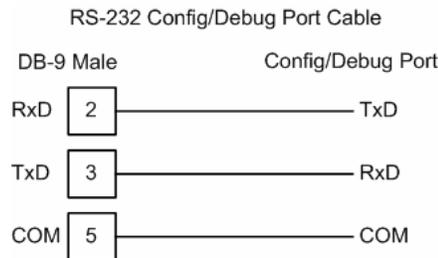
The value of the last global command code received from the master.

Bit	Designation	Significance
0	Reserved	
1	Clear_Data	With this command the ASCII output data is deleted in data transfer buffer and is changed to next transfer data buffer contents.
2	Unfreeze	With 'Unfreeze': freezing input data is cancelled.
3	Freeze	The ASCII input data is fetched from next transfer buffer to data transfer buffer and frozen. New input data is not fetched again until the master sends the next 'Freeze' command.

Bit	Designation	Significance
4	Unsync	The 'Unsync' command cancels the 'Sync' command.
5	Sync	The ASCII output data transferred with a WRITE_READ_DATA telegram is changed from data transfer buffer next state buffer. The following transferred output data is kept in data transfer buffer until the next 'Sync' command is given.
6,7	Reserved	The Reserved designation specifies that these bits are reserved for future function expansions.

5.3 RS-232 Configuration/Debug Port

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

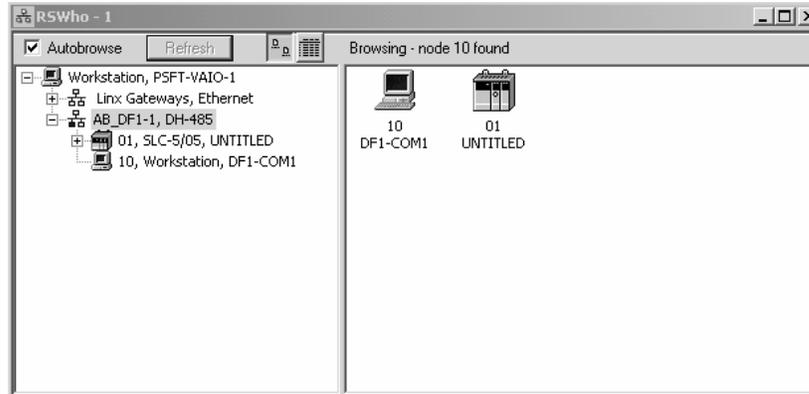


5.3.1 Disabling the RSLinx Driver for the Com Port on the PC

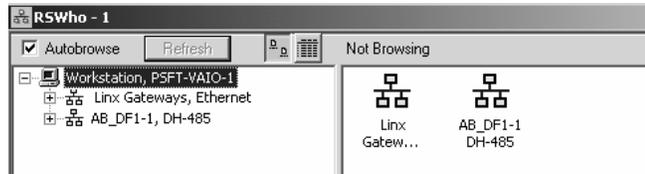
The communication port driver in RSLinx can occasionally prevent other applications from using the PC's COM port. If you are not able to connect to the module's configuration/debug port using ProSoft Configuration Builder (PCB), HyperTerminal or another terminal emulator, follow these steps to disable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

- 1 Open RSLinx and go to Communications>RSWho

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



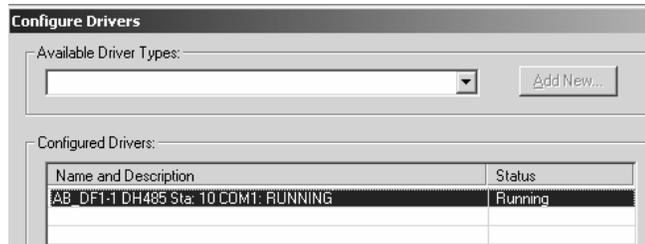
- 3 Notice how the DF1 driver is opened, and the driver is looking for a processor on node 1. If the network is being browsed, then you will not be able to stop this driver. To stop the driver your RSWHo screen should look like this:



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



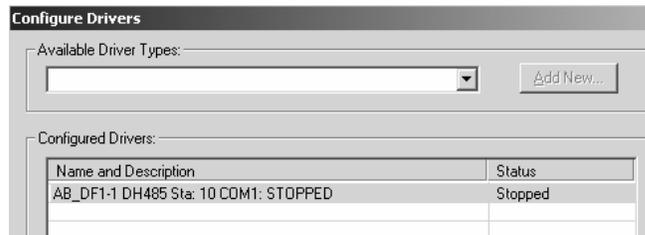
- 4 When you have verified that the driver is not being browsed, go to **Communications>Configure Drivers**
 You may see something like this:



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



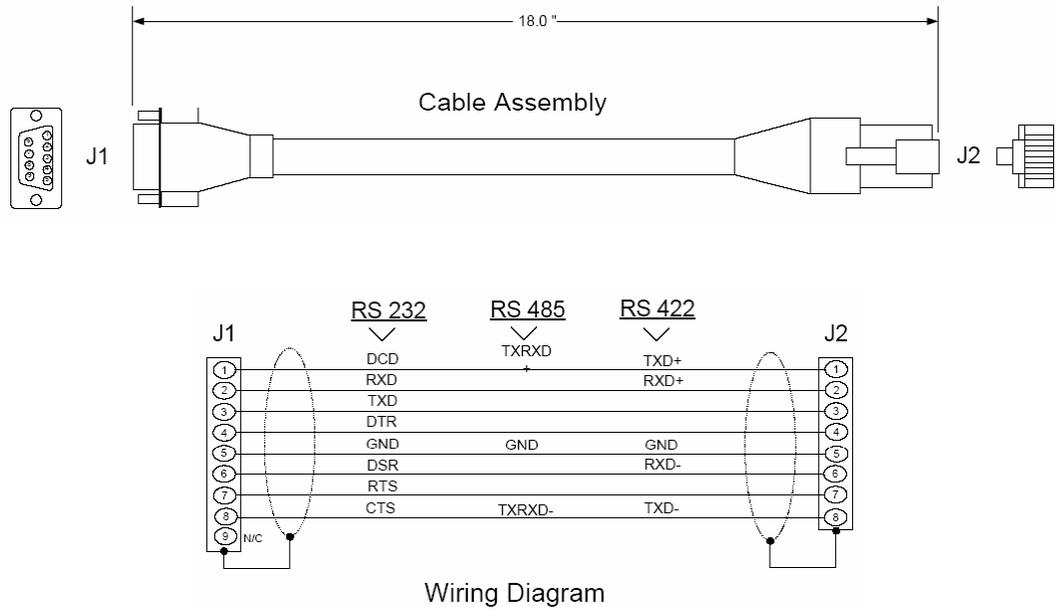
5 After you have stopped the driver you will see the following:



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

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

5.4 DB9 to RJ45 Adaptor (Cable 14)



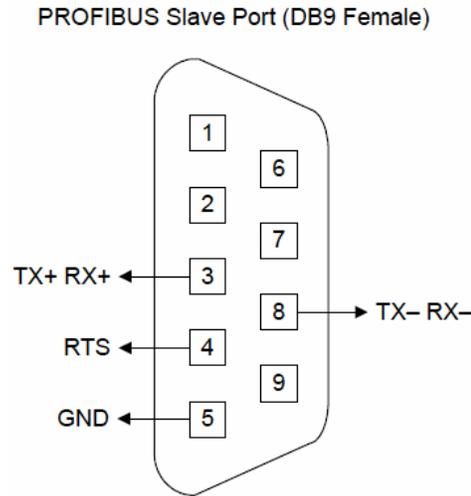
5.5 PROFIBUS Slave Port

The MVI56 module supports this protocol as a slave module on a PROFIBUS network.

The relationship between the port labeling on the front of the MVI56 module and the application is as follows:

Port Label	Function
PROFIBUS Slave	PROFIBUS Slave Port
Debug	Debug/Configuration
Port 0	Communication Port 0

The following illustration shows the pinout for the PROFIBUS Slave port on the front of the MVI56-PDPS module.

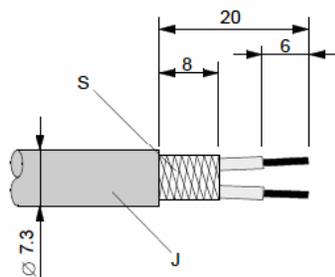


5.6 Constructing a Bus Cable for PROFIBUS DP

The bus cable for connecting PROFIBUS DP devices must be constructed by the user. A special PROFIBUS cable (twisted pair) is required here. This standard cable is available from various manufacturers and is a Belden part number of 3079A

To construct the cable, proceed as follows:

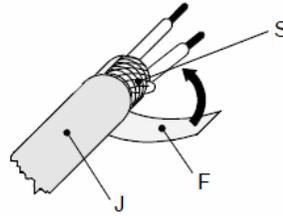
- 1 Cut the cable to the required length.
- 2 Prepare the cable ends as shown in the illustration (dimensions in mm):



- J** PVC Jacket
- S** Braided shielding

- 3 Remove the PVC jacket J to the indicated length.

- 4 Wrap the provided copper shielding F around the shield braiding S:

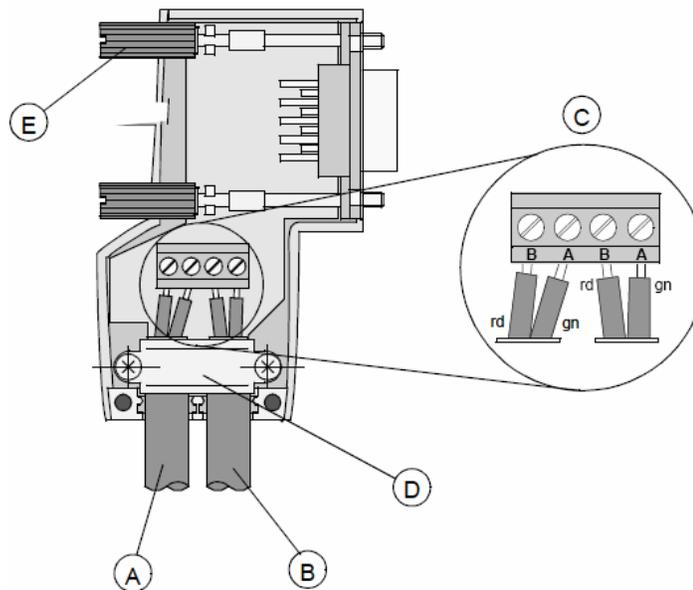


- J** PVC jacket
S Braided shielding
F Copper foil shielding
 Additional foil can be obtained from 3M.

- 5 Plug the leads of the corresponding cable(s) into the terminals as shown:
- Green leads in terminal A
 - Red lead in terminal B

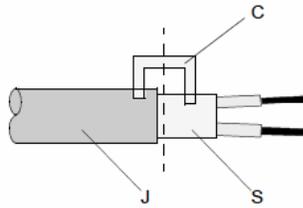
- **Note:** Do not tighten the corresponding screws yet.

Connection terminal assignment on the PROFIBUS DP:



- A** Incoming cable
B Outgoing cable
C Connection terminals (only once (B,A))
D Cable cleat for relieving tension
E Bus connector screws

- 6 Attach the cables with the provided cable cleat to create a robust shielded connection and to relieve any tension as shown:



- J** PVC Jacket
- S** Braided shielding with foil shielding
- C** Cable cleat

- **Note:** Half of the cable jacket must lie under the cable cleat!

Pay attention to the cable cleat installation instructions.

- 7** Fasten the individual wires of the PROFIBUS cable to the terminals
- 8** Close the connector housing.

- **Note:** The shielding of both cables is connected internally with the metal housing of the connector.

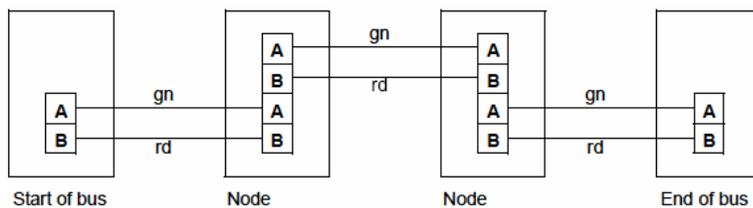
- 9** Complete the Central Shielding Measures (below) and grounding operations for the shielding before you connect the cable connector to the module.
- 10** Plug the PROFIBUS DP connector into the module and secure it with the screws.

Bus Begin and Bus End

The PROFIBUS connector with termination is required at the beginning and the end of the bus. These connectors emulate the line impedance.

It is recommended that at least one connector with diagnostics interface is used.

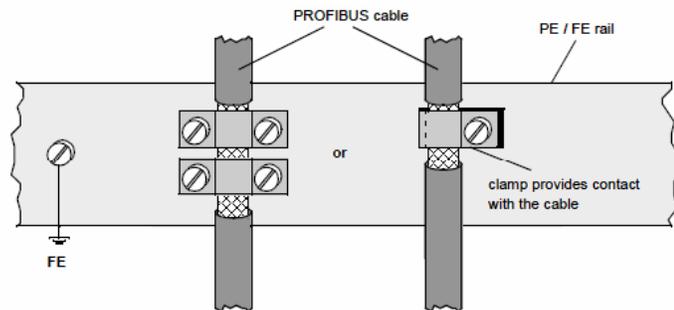
Wiring diagram for a PROFIBUS DP cable



Grounding and Shielding for Systems with Equipotential Bonding

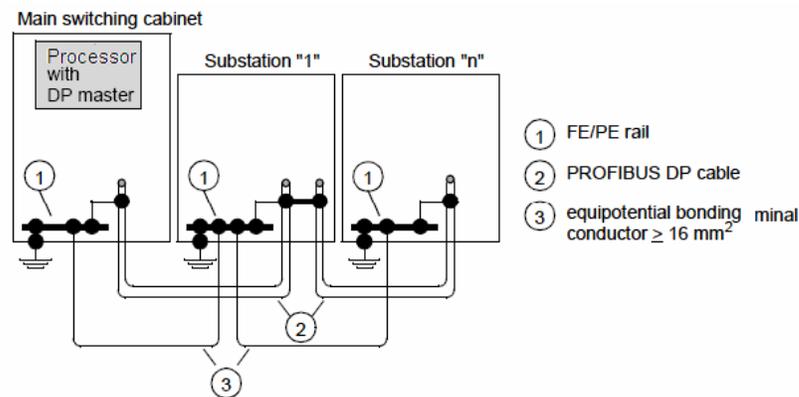
Each cable shield should be galvanically grounded with the earth using FE/PE grounding clamps immediately after the cable has been connected to the cabinet.

This example indicates the shielding connection from the PROFIBUS cable to the FE/PE rail.



Note: An equalization current can flow across a shield connected at both ends because of fluctuations in ground potential. To prevent this, it is imperative that there is potential equalization between all the attached installation components and devices.

This example indicates the system components and devices in a system with equipotential bonding.

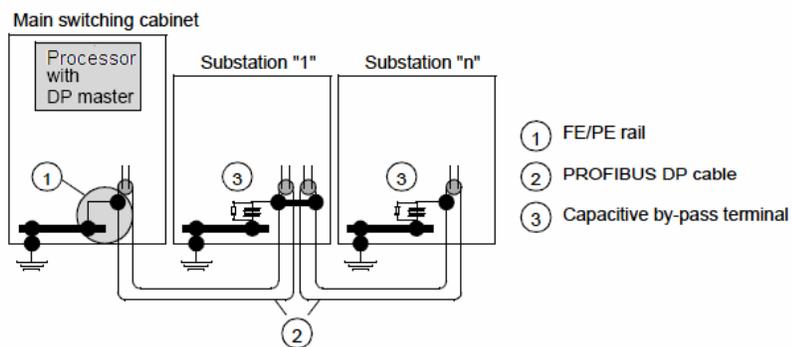


Grounding and Shielding for Systems without Equipotential Bonding

Note: Grounding and shielding is to be carried out the same as for systems **with** equipotential bonding.

If this is not possible because of system or construction specific reasons however, use distributed ground with a capacitive coupling of high frequency interference signals.

This representation shows distributed grounding with capacitive coupling.



6 Support, Service & Warranty

6.1 Contacting Technical Support

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

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

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

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

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

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

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

6.2 Warranty Information

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

www.prosoft-technology/legal