User Manual for the
HE693PBM101,
HE693PBM101-12

PROFIBUS MASTER

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PREFACE

This manual explains how to use the Horner APG Profibus Master Module (PBM101/ PBM101-12).

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ABOUT PROGRAMMING EXAMPLES

Any example programs and program segments in this manual or provided on accompanying diskettes are included solely for illustrative purposes. Due to the many variables and requirements associated with any particular installation, Horner APG cannot assume responsibility or liability for actual use based on the examples and diagrams. It is the sole responsibility of the system designer utilizing the Profibus Master to appropriately design the end system, to appropriately integrate the Profibus Master and to make safety provisions for the end equipment as is usual and customary in industrial applications as defined in any codes or standards which apply.

Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

Revisions to this manual

1. Removed PBM103 from this manual and all references to it.

2. Revised Section 1.3, Item b.

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NOTES

CHAPTER 1: INTRODUCTION

1.1 Product Description

The Profibus Master Module (HE693PBM101/HE693PBM101-12) functions as a Profibus DP network master and is capable of controlling up to 64 slave devices. The Profibus DP application allows for the connection of I/O devices and simple field devices to an automation system via a Profibus network. Emphasis is on fast transmission of small data volumes. The PBM101/ PBM101-12 operates as Profibus DP module only and does not support other types of Profibus (FMS, PA).

The PBM101/PBM101-12 function similarly except that PBM101 operates at 24MHz while the PBM101-12 operates at 48MHz.

Profibus uses a Master-Slave type of communication with the PBM101/ PBM101-12 functioning as the master device. The PBM101/ PBM101-12 communicates with slave devices such as input/output devices, drives, valves, and measuring transmitters via a Profibus network. The PBM101/ PBM101-12 (when used with HE-APG Profibus Slave Modules) also allows communication between modules located in different PLC racks via the Profibus network. (For information covering HE-APG Slave Modules, see the User Manuals for the PBS105 and the PBM106.)

1.2 Profibus Overview

Profibus, a token-passing network, supports one master (Type I) controlling the network and writing to the slave devices. Multiple masters (Type II), however, can read information simultaneously off the Profibus network. Master devices (PBM101/ PBM101-12) are used to determine the data communication on the bus.

Slave devices are peripherals such as input/output devices, valves, drives, and measuring transmitters, etc. Slaves devices also include HE-APG Profibus Slave Modules located in PLCs that the PBM101/ PBM101-12 reads or writes to over the Profibus network. Slaves do not have bus access rights and only acknowledge received messages or send messages to the master when requested to do so. Data from the slave devices can be read by any master. All connected Slaves have the same priority.

Up to 32 devices (masters or slaves) can be connected in one segment without using repeaters or up to 64 devices can be connected using repeaters.

For further information on the PROFIBUS Network, visit their web site at *http:\\www.profibus.com*

1.3 System Requirements and Limitations

a. The PBM101/PBM101-12 require a CPU350 (or higher) with Firmware Version 8.0 (or higher).

PBM101/PBM101-12: Up to 32 devices (masters or slaves) can be connected in one segment without using repeaters or up to 64 devices can be connected using repeaters.

b. PBM101/PBM101-12: The number of slave devices on the network depends on the amount of total slave data produced and consumed on the network. Up to 504 bytes of total data can be *produced* on the network and up to 504 bytes of total data can be *consumed* from the network. Consumed data is reduced 2 bytes for every 1 word of diagnosis data.

c. PBM101/PBM101-12: VersaPro Software (1.10) or Cimplicity Control (Version 2.20 or later) are required to configure the modules. The Series 9030 PLC is limited to 25 bytes of **Extra Parameter Data**.

d. L*ogicmaster® software and earlier versions of CPU Firmware do NOT support these modules.*

1.4 Physical Layout of PBM101/PBM101-12

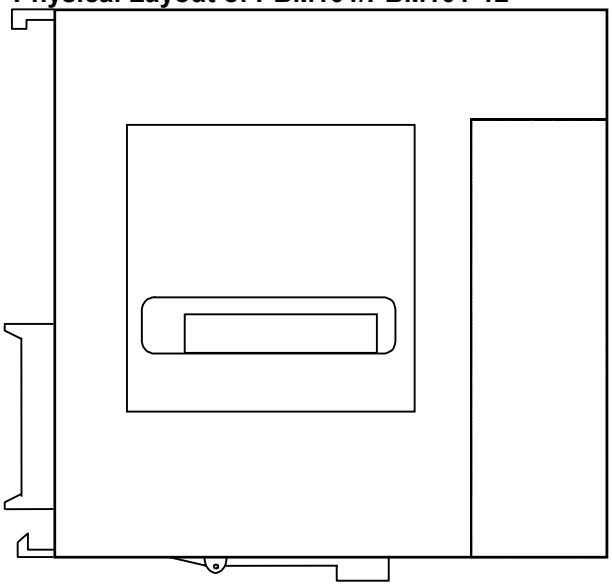


Figure 1.1 - Front Cover

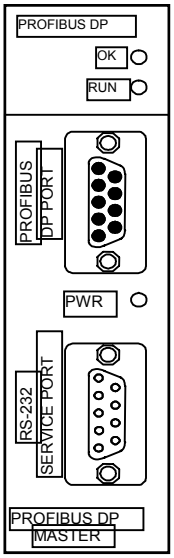


Figure 1.2 – Side View

CHAPTER 2: INSTALLATION

2.1 PBM101/ PBM101-12 Mounting Requirements

The PBM101/ PBM101-12 Module is designed to plug into any Series 90-30 local slot. The PBM101/ PBM101-12 requires at least a CPU350 model or higher with Firmware Revision 8. The PBM101/ PBM101-12 can not operate correctly with a lower version Firmware. Please refer to the appropriate manufacturer's installation manual.

2.2 Profibus DP Connector

The 9-pin Profibus DP connector is for physical connection between the slaves and the master. For further information on the cable and connectors, see Chapter 4 in this manual.

2.3 RS-232 Connector

The RS-232 Service Port is used to upgrade the firmware specific to the slave. This port uses a standard RS-232 9-pin connector.

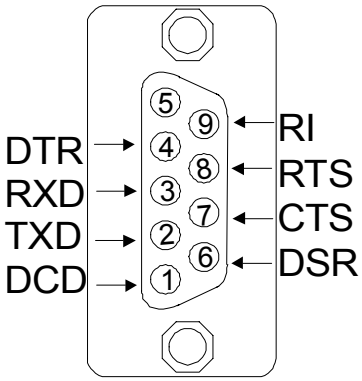


Figure 2.1- Pin-out for the RS-232

2.4 LED Operation of PBM101/PBM101-12

There are three visible LED's on the PBM101/ PBM101-12, the OK LED, RUN LED, and the POWER LED. Various combinations of these LED's will indicate different states of the master. See **Table 2.1** for the states indicated by the LED's. **Table 2.2** indicates fault conditions.

Table 2.1 – LED Operation			
OK LED	RUN LED	POWER LED	Meaning
Off	Off	Off	Module not receiving any power.
Yellow	Red	Green	Module has good power, but has not received valid configuration from CPU and is not communicating on the Profibus-DP network.
Green	Red	Green	Module has good power, has received valid configuration from CPU but is not communicating on the Profibus-DP network. This may be due to the CPU being in STOP mode.
Green	Yellow	Green	Module has good power, has received valid configuration from CPU and is communicating on the Profibus-DP network ,but one or more configured slaves is not responding. Or one or more slave are flagging that diagnosis needs to be addressed. Or the network configuration on slave information tab is not correct.
Green	Green	Green	Module has good power, has received valid configuration from CPU and is communicating on the Profibus-DP network. And no slaves have diagnosis to be addressed.
Red	Blinking between yellow and green	Yellow	A fault has occurred. Refer to the following description to determine fault.

Table 2.2 – Fault Conditions *	
Pulse Count	**Meaning**
2	An error was encountered receiving configuration from the PLC CPU.
3	An error was encountered creating the Profibus-DP network configuration.
4	An internal error was encountered while communicating with the Profibus hardware
10-23	Internal Error Codes. If witnessed, record value and report to GE Fanuc.
* The blinking RUN light indicates a fault. To determine the fault, count the number of green pulses. (The LED pauses for 2 seconds, and pulses green a number of times, and then repeats the cycle.) Table 1-2 describes the fault as represented by the number of green pulses.	

2.5 PBM101/ PBM101-12 Status Error/Diagnosis Reporting

2.5.1 PLC Status Bit Definition

The PBM101/ PBM101-12 has 128 bits of diagnosis and status information reported to the PLC CPU. 64 bits are assigned as status bits, and 64 are assigned as diagnosis bits. The 64 status bits are by default assigned to the top of the existing memory map in the Settings tab of the PBM101/ PBM101-12 parameters screen (see Figure 3.4).

The following explanation describes the Slave Status and indicates the information needed to setup the Slave Status parameters in the program language being used (such as Ladder Logic or C-Programming). The Slave Diagnosis inputs contain additional information about the slaves, which is useful for slave specific issues.

This data is contained in 8 bytes with each bit containing the system diagnosis flags for each slave and is explained later in this chapter. The 64 Diagnosis Flag bits are by default assigned to the top of the existing memory map in the Settings tab of the PBM101/ PBM101-12 parameters setup screen (see Figure 3.4).

Status Bits: These 64 bits report the communication status between the master and the slaves on the bus. Each bit represents the slave area as set up using the Slave Information tab on the PBM101/ PBM101-12 parameters screen (see Figure 3.5). The following table represents the area, byte offset, bit offset, and value of each diagnosis bit.

2.5.2 Determining Slave Bus Addresses and Obtaining Slave Status using Status Bits

To obtain a slave status using Status Bits, several pieces of information are needed. The user must be able to properly "read" various configuration screens in order to obtain the needed information used to give a slave status. The following example uses configuration screens that are used in *Chapter Three: Configuration* in this manual.

Step 1: Upon selecting the Settings Tab (Figure 3.4**), determine which bit has been selected as the *Starting Bit*** by the VersaPro Programming Software. In Figure 3.4, the Starting Bit is %I00065, which is the value in the *Status Reference Type* row.

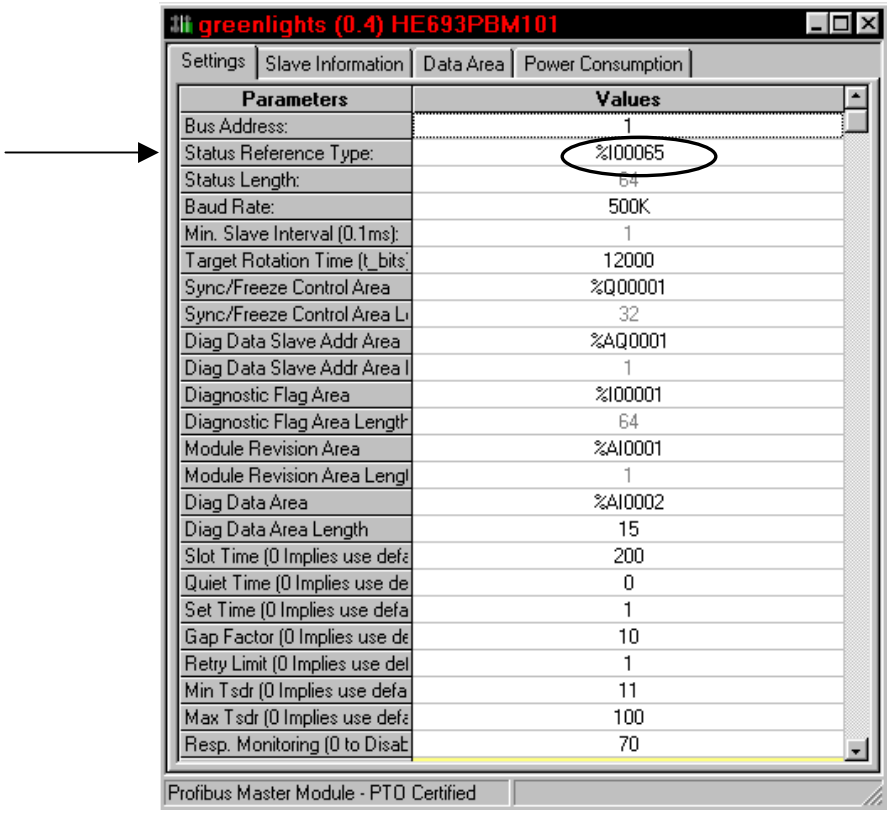


Figure 3.4 – Settings Tab

Step 2: Select the *Slave Information* Tab (Figure 3.5). The **Bus Address** correlates to the bus address that is assigned to the slave by the user. In Figure 3.5, the Bus Address for Slave 1 is "2."

Note: A common misconception is that Status Bits and Slave Bus Addresses are represented by the same value. Slave Bus Addresses do not represent Status Bits. Rather, bits 0-63 are the slave status bits that are assigned by the master configuration in VersaPro Programming Software.

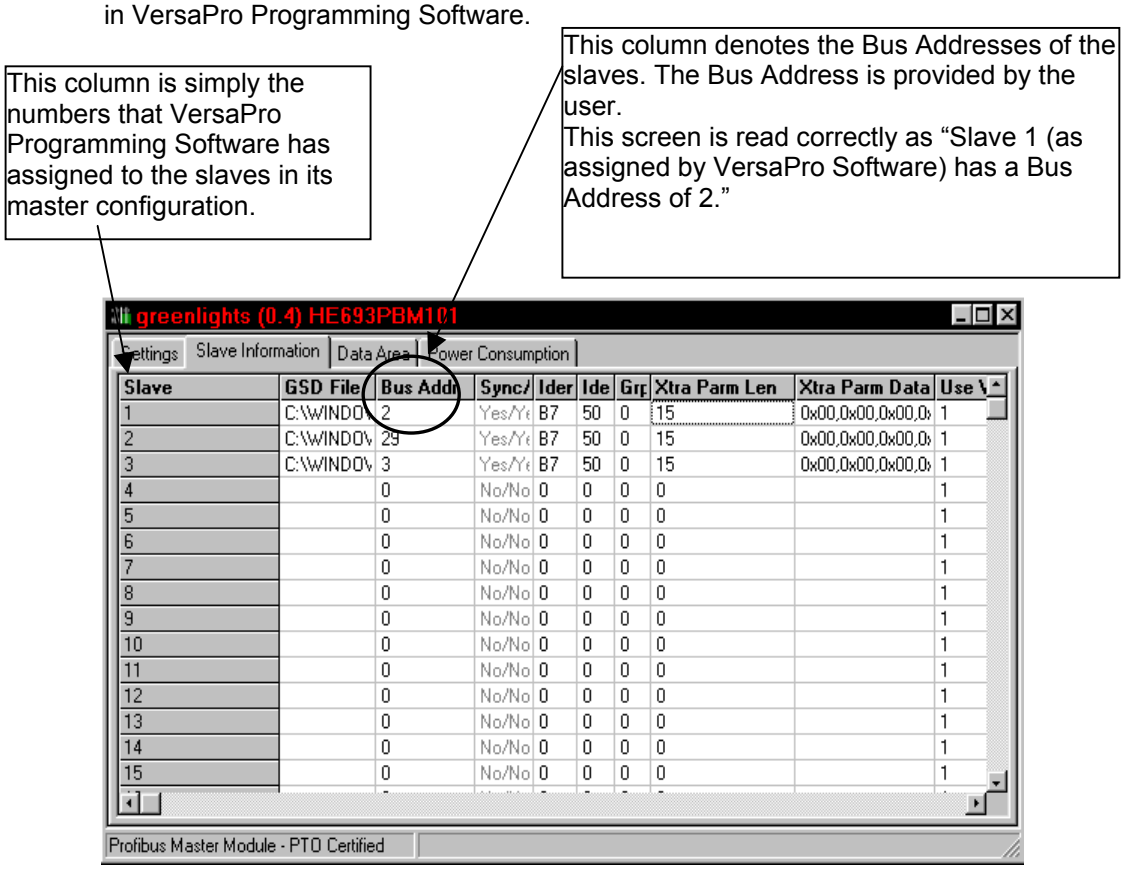


Figure 3.5 – Slave InformationTab

Step 3. Finally, determine the Bit Status of the slave. The Starting Bit value serves as a reference point for calculating bit offsets. The following worksheet depicts the Bit Statuses for the example. Refer to Appendix A for a handy work sheet that can be used for the user's application.

Example Work Sheet: Determining Slave Bus Addresses							
Slave Area	**Status Reference Type**		**Bus Addr.**	**Slave Area**	**Status Reference Type**		**Bus Addr.**
1	%I00065	(Starting Bit + 0)	2	**34**	%I00098	(Starting Bit + 33)	N/A
2	%I00066	(Starting Bit + 1)	29	**35**	%I00099	(Starting Bit + 34)	N/A
3	%I00067	(Starting Bit + 2)	3	**36**	%I00100	(Starting Bit + 35)	N/A
4	%I00068	(Starting Bit + 3)	N/A	**37**	%I00101	(Starting Bit + 36)	N/A
5	%I00069	(Starting Bit + 4)	N/A	**38**	%I00102	(Starting Bit + 37)	N/A
6	%I00070	(Starting Bit + 5)	N/A	**39**	%I00103	(Starting Bit + 38)	N/A
7	%I00071	(Starting Bit + 6)	N/A	**40**	%I00104	(Starting Bit + 39)	N/A
8	%I00072	(Starting Bit + 7)	N/A	**41**	%I00105	(Starting Bit + 40)	N/A

2.5.3 PLC Diagnosis Bit Definition

Note: To determine slave bus addresses and obtain slave Diagnostic Flag Bits, refer to *Section 2.5.2.* Although the procedures in the section cover the use of Status Bits, they are similar to the procedures that can be used with Diagnostic Flag Bits.

Diagnosis Bits: In addition to 64 status bits, there are 64 diagnosis Flag bits used for monitoring slave requests to send the diagnosis. These 64 bits are by default assigned to the top of the existing memory map in the Settings tab of the PBM101/ PBM101-12 configuration screen (see Figure 3.4). In order to properly configure the master to accommodate the diagnosis data from the slaves, the Diagnosis Data Slave Address Area, Diagnosis Data Slave Address Length, Diagnosis Flag Area, Diagnosis Flag Length, Diagnosis Data Area, and the Diagnosis Data Length must be configured.

Note: The diagnosis bits are ordered in the same manner as the status bits.

a. Slave diagnosis is not sent to the master without being told to do so where a Flag is. The Diagnosis Data from the slave is read at the Diagnosis Data Area only when the bus address is set at the Diagnosis Slave Address Area. This address must be an %AQ with a length of one word. Diagnosis data from a particular slave is desired when the slave sets its flag. The address of that slave is entered into the %AQ selected. The diagnosis data from the slave can be any type of diagnosis data. **Diagnosis data does <u>not</u> necessarily mean that the data represents a "Fault" condition. It is, however, typically a fault condition.**

The following are examples of what types of data the slave might send to the master:

Module Diagnosis:

Corrupted EPROM
Unsupported Feature
Loss of Power
High Alarm
Low Alarm
Over Range

Communications Diagnosis:

Station Not Present
Station Not in Run Mode
Freeze Mode Is Active
Invalid Response
Parameter Fault

b. The Diagnosis Flag Data is read from the address set as the Diagnosis Flag Area. The address for this area must be a %I with a length of 64 bits. Each bit represents a slave number configured on the Slave Information tab of the PBM101/ PBM101-12 setup screen. Diagnostic flag is only valid if the associated status bit is a “1”, indicating data exchange with this device. The Master will set the diagnosis bit to “1”, until the slave puts a flag (available diagnostics) on the bus, this allows the Master to set the diagnosis bit to a “0”. Devices that do not support diagnostics will not allow the Master to change the diagnosis bits to “0”, unless the Master is not in data exchange (Status = “0”).

c. The Diagnosis Data Area is the area in memory set aside for the diagnosis data coming from the slave. This area must be set as a %AI address and the length will be dependent on the slave. The length must be set to the largest amount as set by a slave. For instance; if there are four slaves on the bus and two of them send diagnosis data at a length of five words and the other two send the data at a length of 12 words, then the Diagnosis Data Area must be set to 12 words.

It is important to monitor both the status bits and the diagnosis bits both. It is possible to have diagnosis data without having a problem (fault) on the bus.

For further information on how to setup these areas, see Chapter 3 of this manual.

Note: If both the **Status** and **Diagnosis** bits for each slave are AND'ed to together and the result is a '1,' the Slave is communicating with no faults. If the result is '0,' then test the status bit.

If the **Status** bit is zero, the slave is not communicating, and the **Diagnosis** bit is not applicable.

If the **Status** is '1' then the slave is indicating that Diagnosis data is available, and its bus address needs to be entered to the Diagnosis Slave address area to acknowledge the diagnosis and reset the Flag.

CHAPTER 3: CONFIGURATION

3.1 Configuring the PBM101/ PBM101-12

Chapter Three provides procedures for configuring the PBM101/ PBM101-12 using VersaPro Programming Software. To install VersaPro, refer to the manufacturer's software tutorial and help files included with the software.

Note: The following procedures apply to the PBM101/ PBM101-12. The configuration example below uses the PBM101.

1. Access the VersaPro Screen using the procedures described in the manufacturer's software tutorial (refer to **Hardware Configuration**).

Note: As part of the manufacturer's procedures, the user must select **Series 90-30 High End** (CPU350 or higher) as the default hardware. A new folder must also be opened. After these steps are accomplished, a screen similar to Figure 3.1 appears.

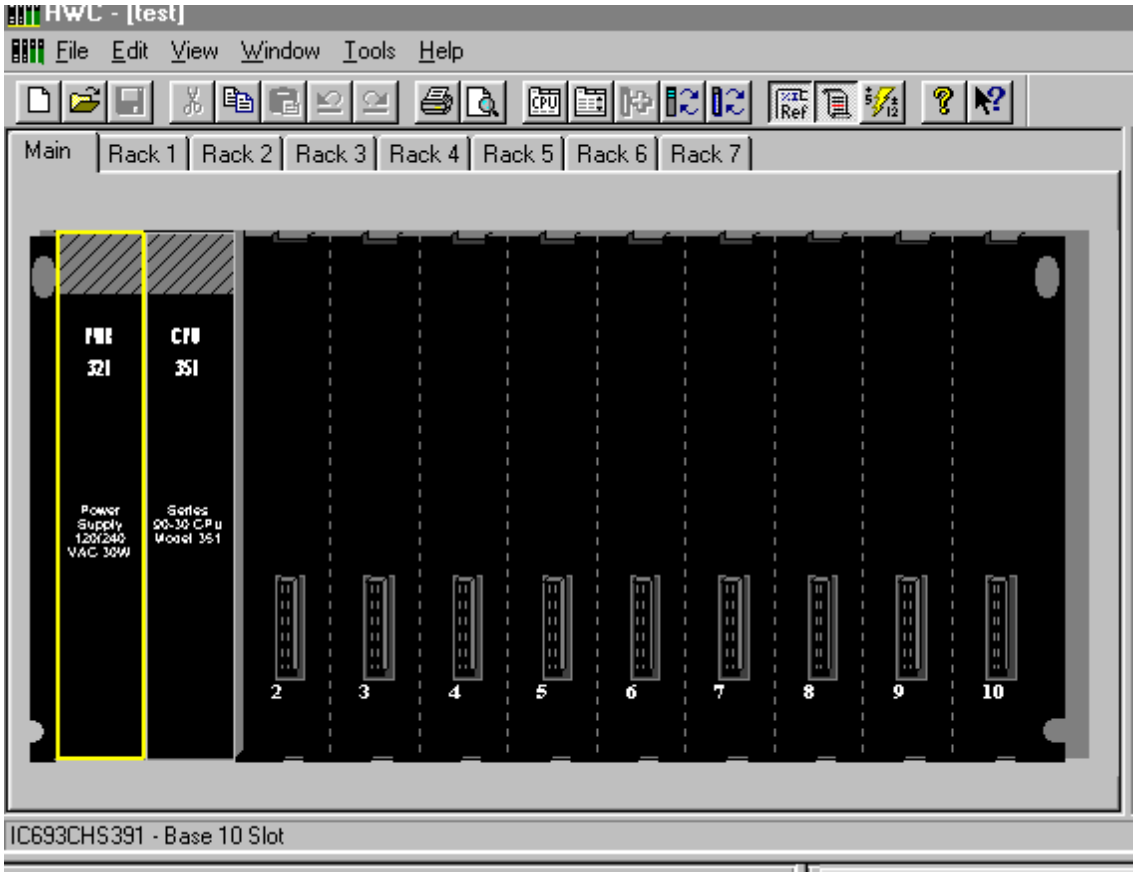


Figure 3.1 – VersaPro Screen

2. If the rack type is not correct, place the mouse cursor (arrow) on the rack, press the right mouse button (right click) and select **Change Rack Type**.

3. Highlight the slot where the PBM101 is to be placed by left-clicking (or pressing) the left mouse button on that spot.

4. Right click on the highlighted slot and select **Add Module**. The Module Catalog screen appears. Select the **Bus Controller** tab. Then, use the mouse to select the HE693PBM101 as shown in Figure 3.2. The empty slot is now replaced with the PBM101 module.

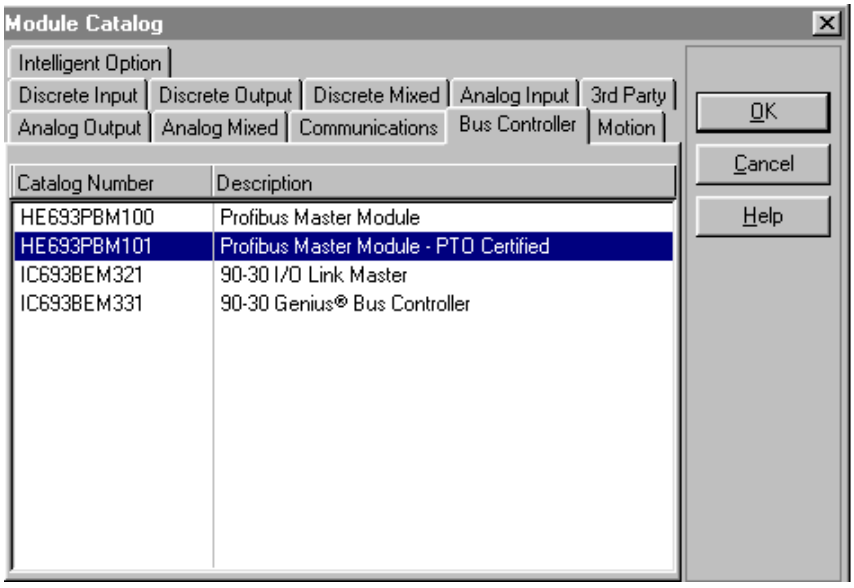


Figure 3.2 - Bus Controller Tab

5. The following screen appears (Figure 3.3). Left-click the slot containing the PBM101.

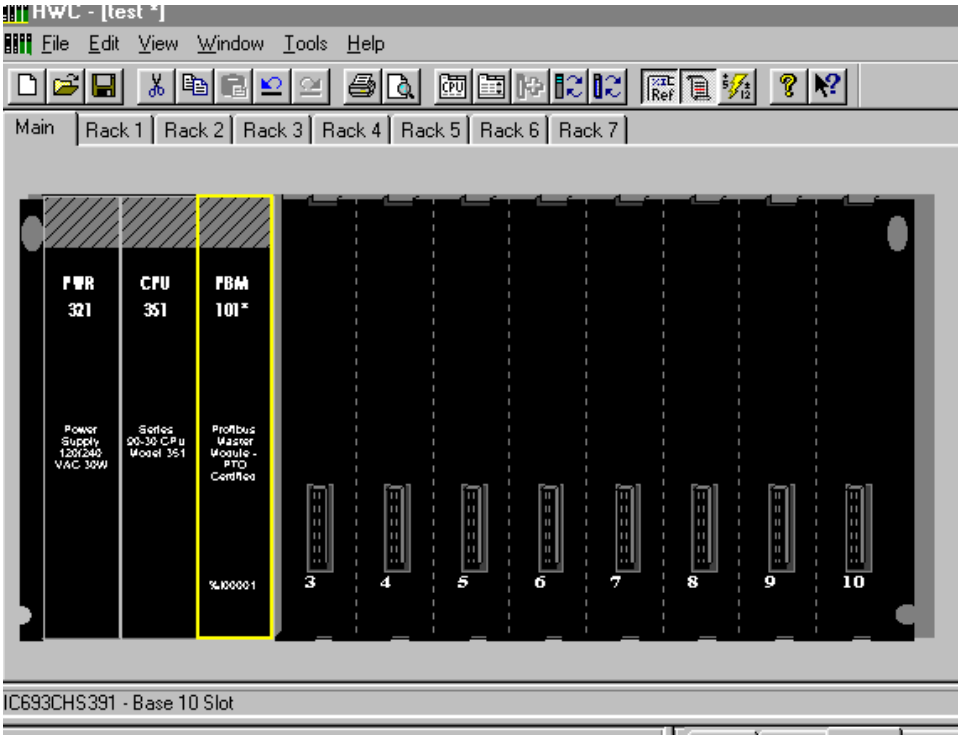


Figure 3.3 – PBM101 Highlighted

6. The following screen appears (Figure 3.4).

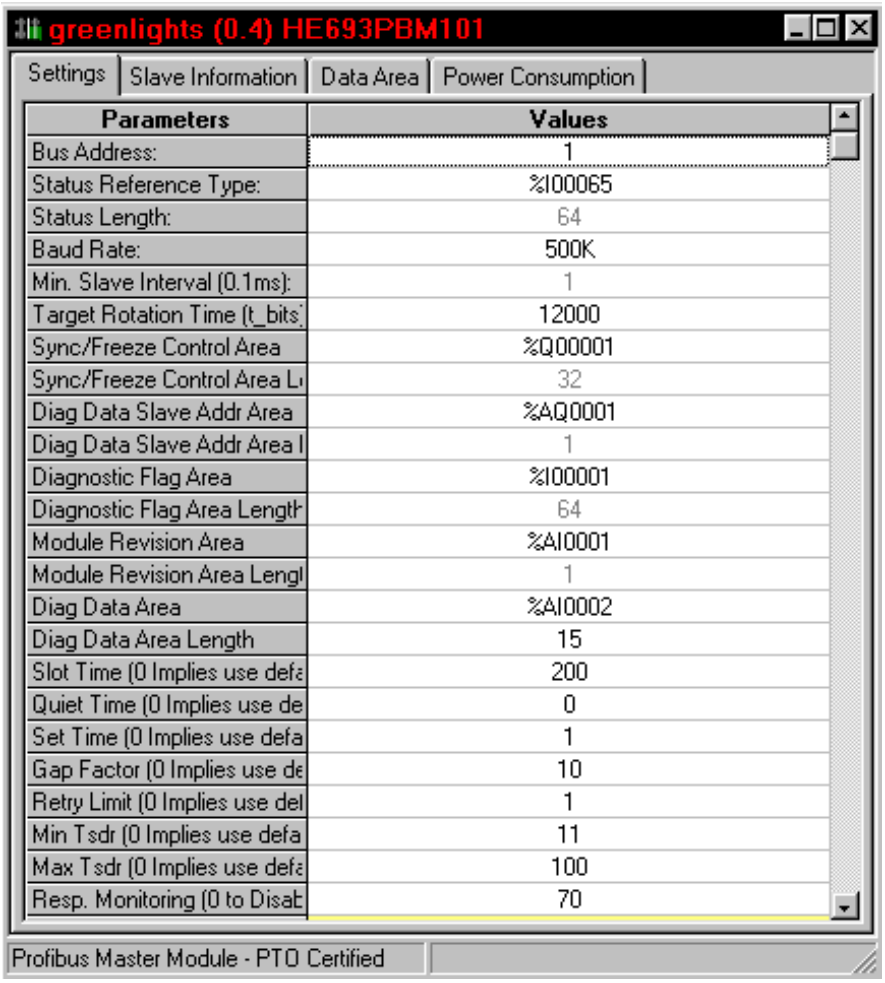


Figure 3.4 – Settings Tab

7. Select the **Settings** tab to set parameters for the Master. Alter the parameters using the information contained in Table 3.1.

a. For additional information covering parameters, refer to Sections 2.5.1 and 2.5.2. Various parameters involving the slave devices are discussed such as **Diagnostic Flag**.

Table 3.1 briefly describes the fields on the **Settings** Tab, which set parameters for the master.

Table 3.1 – Fields on the Settings Tab	
Bus Address	Profibus Station Address 1 - 125
Status Reference Type	Reference Type for Master Status (Must Be %I). Represents the location of Status Bits (see **Table 1.3** of this document) in PLC memory. (8 bytes)
Status Length	Number of Status Bits (Fixed at 64)
Baud Rate	Baud Rate of data transmissions on the Profibus network. (range between 9.6K - 12M)
Min. Slave Interval (.1ms)	Smallest allowed period of time between two successive poll cycles of a particular slave. It is in .1ms increments and has a range of 1-65535.
Target Rotation Time (t_bits) **	Allowable cycle time in which all slaves will be polled by this master. It is in t_bits and has a range of 1-65535.
Sync/Freeze Control Area	Reference Area for Sync/Freeze data (Must be a %Q.) For more information, refer to 3.1, Step 7, item b.
Sync/Freeze Area Length	Always 32 Bits.
Diag. Data Slave Addr. Area	Reference Area for address of desired Slave with requested Diagnosis Data. (Must be a %AQ.) See Section 2.5.1 and 2.5.2.
Diag. Data Slave Addr. Area length.	Always one word.
Diagnosis Flag Area	Reference area for Profibus Diagnosis flags. (Must be a %I.) See Section 2.5.1 and 2.5.2.
Diagnosis Flag Area Length	Always 64 bits.
Module Revision Area	Reference Area for Module Version (Must be %AI).
Module Revision Area Length	Always set to 1.
Diagnosis Data Area	Reference area for address of diagnosis data. (Must be a %AI.) See Section 2.5.1 and 2.5.2.
Diagnosis Data Area Length	Dependent on slave data. (From 1 to 122)
Slot Time: **	Profibus Slot Time in bit times.
Quiet Time: **	Profibus Quiet time in bit times.
Set Time: **	Profibus Set Time in bit times.
Gap Factor: **	Profibus Gap Factor (1 – 100).
Retry Limit: **	Max Number of message retries.
Min Tsdr: **	Profibus Min Tsdr (station delay time) in bit times.
Max Tsdr: **	Profibus Max Tsdr (station delay time) in bit times.
Resp. Monitoring (0 to Disable) (10ms units)	Network Response Monitoring Time. Set in 10ms units if enabled.
** These values will default accordingly for a single Master DP bus at the entered Baud Rate. A good understanding of the Profibus timed is required if these values are adjusted. Entering a '0' will also provide default values.	

b. The following information is provided for the **Sync/Freeze** function in the Master device and is used to setup the **Sync/Freeze** parameters in the program language being used (i.e., Ladder Logic or C-Programming).

The **Sync/Freeze** controls allow the Logic to control the data flow to and from the inputs and outputs of the slaves. The **Freeze** control can be used to synchronize the slave inputs, and the SYNC command is used to synchronize the slave outputs.

The **Freeze** control freezes the physical input data existing on one or more slaves simultaneously, like taking a snap shot. The selected slave(s) stay in the frozen state until an **Unfreeze** control is issued.

The **Sync** control works in much the same way. It unlocks the physical output data existing on one or more slaves simultaneously. This data remains static until an **Unsync** control or new **Sync** control is issued. Additional **Sync** controls update the output data.

The slaves can be selected individually or in groups. To use the group functions, the Slaves must have been configured for a group. The **Slave Information** dialog screen contains the **Grp Mask** fields for each slave. This field can contain a group number of 0 - 8. The zero group is a global group.

The format of the **Sync/Freeze** control data is as follows:

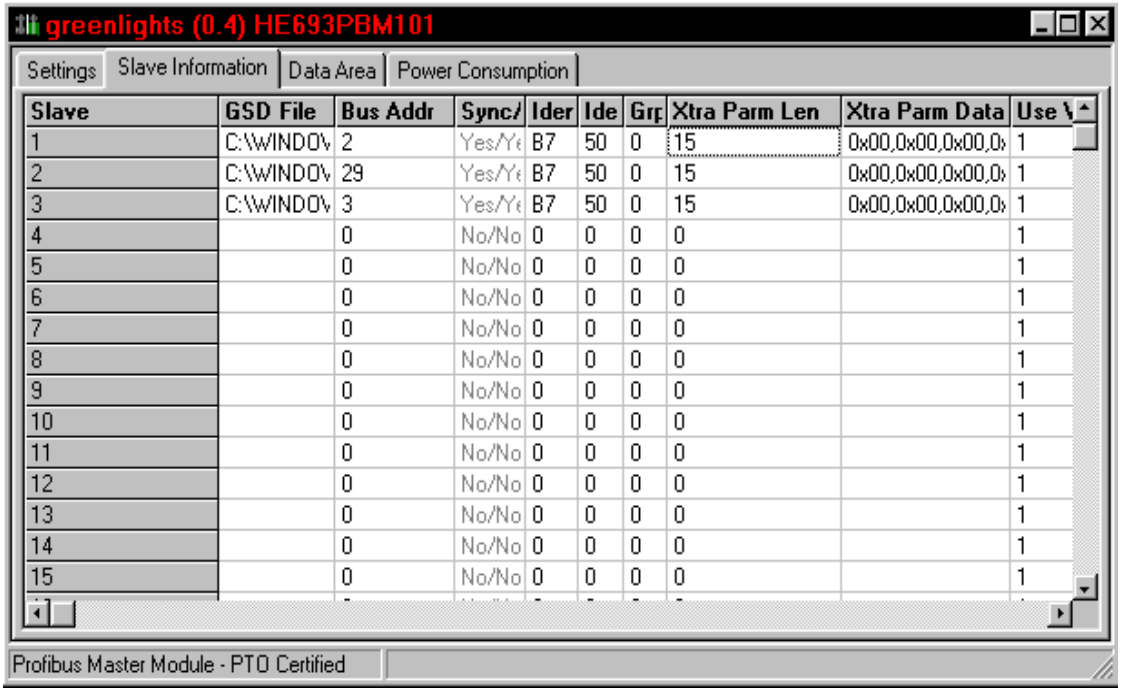
Byte 0 = Group data
Bit 0 = Group 1
Bit 1 = Group 2
Bit 2 = Group 3
Bit 3 = Group 4
Bit 4 = Group 5
Bit 5 = Group 6
Bit 6 = Group 7
Bit 7 = Group 8
data FFH = Group 0, Global group

Byte 1 = Slave Address (7FH = broadcast, all addresses)

Byte 2 = Control type
01H = UNFREEZE
02H = FREEZE
04H = UNSYNC
08H = SYNC

Byte 3 = Transmit Control command
This can be any data - any change in this byte triggers a Control update.

8. After the **Settings** parameters are set, click on the **Slave Information** tab. The following screen appears (Figure 3.5).



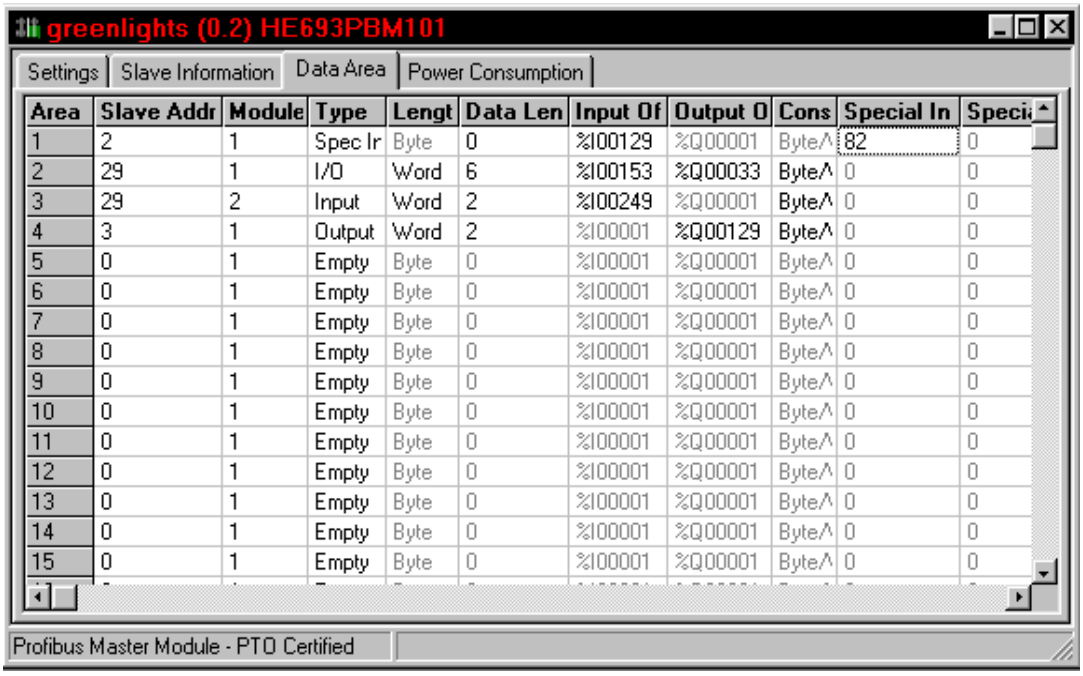
Slave	GSD File	Bus Addr	Sync/	Ider	Ide	Grp	Xtra Parm Len	Xtra Parm Data	Use
1	C:\WINDO\	2	Yes/Ye	B7	50	0	15	0x00,0x00,0x00,0x	1
2	C:\WINDO\	29	Yes/Ye	B7	50	0	15	0x00,0x00,0x00,0x	1
3	C:\WINDO\	3	Yes/Ye	B7	50	0	15	0x00,0x00,0x00,0x	1
4		0	No/No	0	0	0	0		1
5		0	No/No	0	0	0	0		1
6		0	No/No	0	0	0	0		1
7		0	No/No	0	0	0	0		1
8		0	No/No	0	0	0	0		1
9		0	No/No	0	0	0	0		1
10		0	No/No	0	0	0	0		1
11		0	No/No	0	0	0	0		1
12		0	No/No	0	0	0	0		1
13		0	No/No	0	0	0	0		1
14		0	No/No	0	0	0	0		1
15		0	No/No	0	0	0	0		1

Figure 3.5 –Slave Information Tab

9. The **Slave Information** tab is used to define the DP slaves that reside on the Profibus network and communicate with this Master. Set the parameters using the information contained in Table 3.2.

Table 3.2 – Fields on the "Slave Information" Tab	
Slave	A number assigned to a slave by the VersaPro Software master configuration. The assignment is not necessarily identical to the Bus Address. (See **Bus Address**.)
GSD File	The GSD File contains mapping information from the Master to the Slave. This file is imported from the GSD directory. The GSD file is required to allow VersaPro to derive operational parameters for each slave. The GSD file is selected by clicking in the first available empty box under the **GSD File** heading. With the box highlighted, enter a SPACE followed by the ENTER key. A **File Name Selection** Dialog starts and allows the user to find and open the desired GSD file. If the path and name of the GSD file is known, the path and name can be entered directly into the **GSD File** box. Once the GSD file name is selected and entered, VersaPro reads the GSD data, and all pertinent parameters is used by VersaPro to build the configuration. For slaves that have multiple module configurations, the user is required to enter the module specific data into the **Data Area** screen. **Note: The GSD Files are located at the Horner APG Web site at www.heapg.com.**
Bus Address	The **Bus Addr** field refers to the bus address of the slaves that are being mapped to this Master.
Sync/Freeze	Non-editable field in slave. Indicates if the module is in the Freeze Control and/or Sync modes. For more information about Sync/Freeze Control in the Master, see 3.1, Step 7, item b.
Ident High	The **Ident High** field sets the High byte Ident Number of the DP-Slave device as assigned by the Profibus Trade Organization (PTO).
Ident Low	The **Ident Low** field sets the Low byte Ident number of the DP-Slave device as assigned by the Profibus Trade Organization.
Group Mask	The **Grp Mask** field sets the Bit Mask denoting group control for Sync and Freeze Functions. Each bit identifies a particular group. Group Control is only possible if bit 7 in the above Operating Flags is set to 1.
Extra Parameter Length	The **Xtra Parm Len** indicates the number of bytes entered in the Parameter Data. Must be in decimal and is limited to 25 bytes.
Extra Parameter Data	The **Xtra Parm Data** provides additional data that pertains specifically to a particular slave. It is a string of values that can be entered in decimal or hexadecimal. Values must be separated as shown: Decimal: (1,10,0, 32) Hexadecimal: (0x1,0xA, 0x0, 0x20)
Watch Dog	The **WD** sets the Watch Dog. The WD is set by the GSD File. To disable, set to 0.

10. Click on the **Data Area** tab, and the following screen appears (Figure 3.6).



Area	Slave Addr	Module	Type	Lengt	Data Len	Input Of	Output O	Cons	Special In	Speci
1	2	1	Spec Ir	Byte	0	%I00129	%Q00001	Byte^	82	0
2	29	1	I/O	Word	6	%I00153	%Q00033	Byte^	0	0
3	29	2	Input	Word	2	%I00249	%Q00001	Byte^	0	0
4	3	1	Output	Word	2	%I00001	%Q00129	Byte^	0	0
5	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
6	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
7	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
8	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
9	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
10	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
11	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
12	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
13	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
14	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0
15	0	1	Empty	Byte	0	%I00001	%Q00001	Byte^	0	0

Figure 3.6 – Data Area Tab

a. This tab completes the configuration for the mapping of the Profibus-DP network data to the PLC memory locations. The order in which the data is configured must be identical to that of the DP-Slave and must conform within its GSD file parameters. If configuration mismatches exist, no data is exchanged with that particular slave.

b. To configure the slave at bus address 29, start on the next available unused line. (In Figure 3.6, this is the second line, represented by Area 2) and enter the bus address (for this example, it is 29). Enter a “1” for the module number. The module type is “I/O,” so left click on the field with the mouse and select “I/O” from the pull-down menu. The “Length Type” is the data format (either a byte or a word), and the “Data Length is the number of bytes or words in this module. The remainder of the lines are used to map the input from the network to the PLC, and the outputs place updates on *to* the network.

c. To configure the input, tab down to the next line (area 2 in Figure 3.6). Enter a “29” for the
Slave Address. The module a “2”, because the slave is configured for *both* I/O and inputs. It is looked at by the master as two modules with the same bus address. Configure the type, length, and mapping as described by the GSD file. To assist in configuring the slave, the GSD file has the necessary information needed. If additional assistance is required, please, contact the GE Fanuc PLC hotline or Horner APG Technical Support.

NOTE: It is important to remember that an input is updated ***from*** the network, and an output places an update on ***to*** the network.

Table 3.3 – Fields in the "Data Area" Tab	
Area	Memory area being defined within the PLC. It is not configurable. The master currently supports configuring 64 unique areas.
Slave Address	Bus address of the particular slave for which you are adding a data area mapping. It must be equal to a corresponding value set in the Slave n Settings tab.
Module #	Particular module ID which is being configured for the given slave address. The number of modules used must be identical to the slave configuration for proper data exchange to occur. For example, if the slave to which communication is desired is a GE Fanuc Field Control Profibus BIU which has an input module followed by an output module, the number of modules would be three. The Module # of the area mapped to the BIU would be 1; the Module # of the input module would be 2; and the Module # of the output module would be 3.
Type	Data Type of module being defined. Possible types are: Input, Output, I/O (both input and output), Special input, Special output, Special I/O, and Empty.
Length Type	Specifies whether data is of type Byte or Word.
Data Length	Length of data. This value is expressed in units according to the Length Type field. If the Type field is set to I/O, this value is both the length of the input and the length of the output. Range is 0-16. A value of 0 implies that this area is not defined.
Input Offset	Memory location in PLC where input data will be mapped. This field must be set if the Type value is Input or I/O.
Output Offset	Memory location in PLC where output data will be mapped. This field must be set if the Type value is Output or I/O.
Consistency	Consistency Option Flag. Possible choices are: "Byte/Word" and "Entire Length". (Not used for "Special" Types)
Special In Byte	Data Byte used for Types Special Input and Special I/O. This byte (range 0-ff) represents a special input identifier as defined by a particular slave.
Special Out Byte	Data Byte used for Types Special Output and Special I/O. This byte (range 0-ff) represents a special output identifier as defined by a particular slave.
Mfg 1 - 15	Manufacturer Specific Data (1-15) that is sent to a particular slave (up to 15 bytes). Although the information is usually imported in the GSD file, it is necessary to access if modifications are required.

11. After the **Data Area** parameters are set, the **Power Consumption** tab can be selected to display power consumption characteristics of the module. No fields are editable on this tab.

12. Save the Configuration.

13. After the configuration is completed, download the configuration to the PLC. Consult the manufacturer's manual for details on how to download using VersaPro Programming Software.

NOTES

CHAPTER 4: WIRING

4.1 Profibus Wiring

4.1.1 Assembling Cable for Use with DP Port on the PBM101/ PBM101-12 and PBS105.

a. The PBM101/ PBM101-12 uses a 9-pin D-sub plug connector for its DP port. The pin assignment of the plug connector and the wiring are shown below **(Figure 4.1)**.

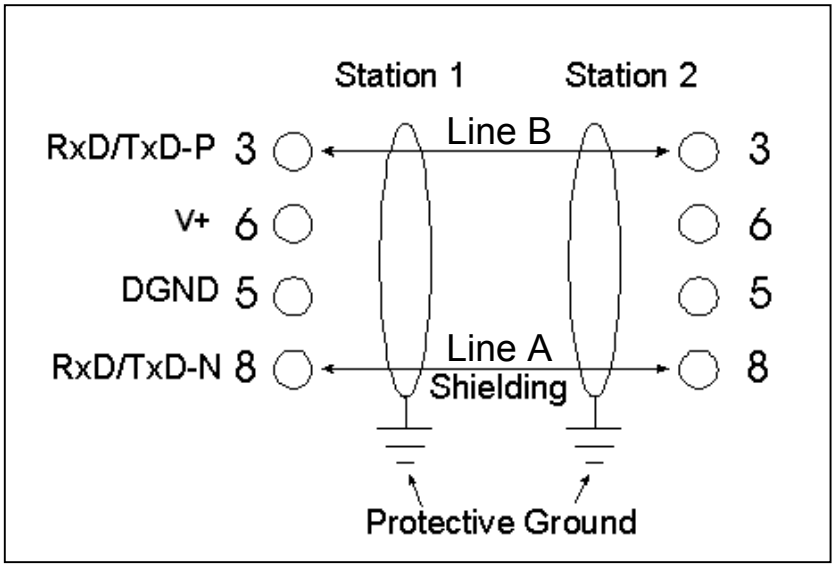


Figure 4.1

b. It is necessary to terminate both ends of the network. Both terminations must have power to them to insure proper operation of the network. The following diagram **(Figure 4.2)** illustrates the correct connection for the termination resistors.

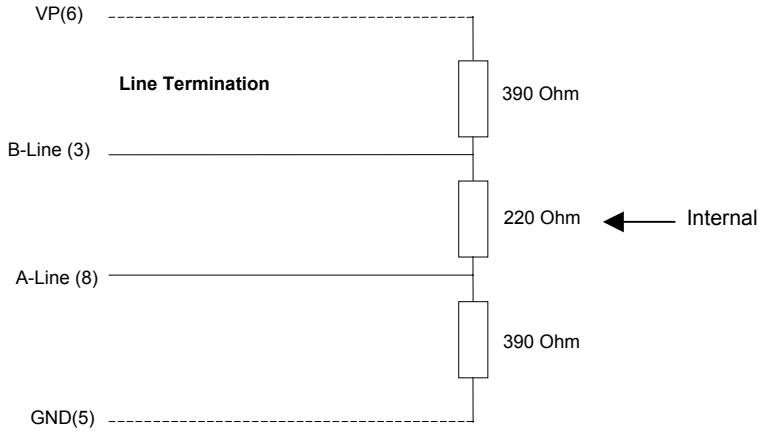


Figure 4.2

NOTE: The above wiring diagram (Fig. 4.2) is for illustrative purposes only. Cabling and connectors should be PTO-approved to achieve the desired performance results. See Section 4.1.3 for recommended part numbers.

c. The shield braiding (and if present, the shield foil) must be connected to protective ground on both sides and must have good conductivity via shield clamps that cover as large an area as possible. In addition, it is recommended that the data lines be kept separate from all high-voltage cables.

4.1.2 Other Considerations When Wiring Profibus Network

a. In the Profibus network, up to 32 stations (master or slaves) can be connected per segment without the addition of repeaters. If more that 32 stations are desired, repeaters must be used. The repeaters are used to connect individual bus segments together.

b. The maximum cable length depends on the transmission speed. The specified cable length can be increased by the use of repeaters. However, the use of more than three repeaters in series is not recommended.

c. The following cable length specifications are based on type-A cable with a 135 to 165 Ohm impedance; less than 30 pf/m capacity; a loop resistance of 110 Ohms/Km, a wire gauge of .64mm; and a conductor area of 0.34mm².

Table 4.1 - Baud/Distance Rates

Baud Rate(bit/sec)	9.6K	19.2K	93.75K	187.5K	500K	1.5M	12M
Distance/Segment	1200m	1200m	1200m	600m	200m	200m	100m

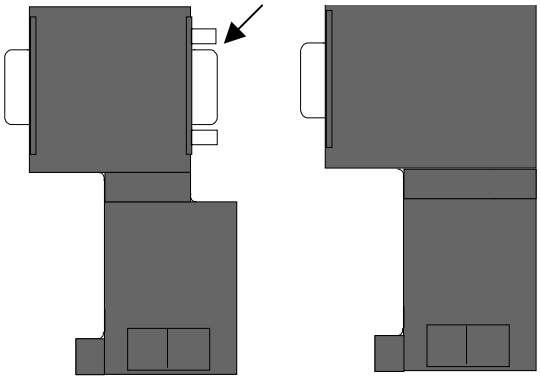
d. For data transmission speeds of greater than 500 kbit/sec., stub lines (free hanging ends of the cable) must be avoided. There are plug connectors available on the market that permit data line A and data line B to be connected directly to the plug connector.

4.1.3 Recommended Part Numbers

It is highly recommended that the following cable and connectors be used for high speed data transmissions. Both cable and connector part numbers are Siemens part numbers.

a. Connectors:

Extra 9-pin DSUB for easy cable stacking.



6ES7-972-0BB10-0XAO **6ES7-972-0BA10-0XAO**

Figure 4.3 - Connectors

b. Cable: Part Number 6XV1-830-OAH10

APPENDIX A: USER WORKSHEET

If desired, the following worksheet is available to the user when determining slave bus addresses. Refer to Sections 2.5.2 and 2.5.3.

User Work Sheet: Determining Slave Bus Addresses							
Slave Area	**Status / Diagnosis Flag Ref. Type**	**Offset**	**Bus Addr.**	**Slave Area**	**Status / Diagnosis Flag Ref. Type**	**Offset**	**Bus Addr.**
1		(Starting Bit + 0)		**34**		(Starting Bit + 33)	
2		(Starting Bit + 1)		**35**		(Starting Bit + 34)	
3		(Starting Bit + 2)		**36**		(Starting Bit + 35)	
4		(Starting Bit + 3)		**37**		(Starting Bit + 36)	
5		(Starting Bit + 4)		**38**		(Starting Bit + 37)	
6		(Starting Bit + 5)		**39**		(Starting Bit + 38)	
7		(Starting Bit + 6)		**40**		(Starting Bit + 39)	
8		(Starting Bit + 7)		**41**		(Starting Bit + 40)	
9		(Starting Bit + 8)		**42**		(Starting Bit + 41)	
10		(Starting Bit + 9)		**43**		(Starting Bit + 42)	
11		(Starting Bit + 10)		**44**		(Starting Bit + 43)	
12		(Starting Bit + 11)		**45**		(Starting Bit + 44)	
13		(Starting Bit + 12)		**46**		(Starting Bit + 45)	
14		(Starting Bit + 13)		**47**		(Starting Bit + 46)	
15		(Starting Bit + 14)		**48**		(Starting Bit + 47)	
16		(Starting Bit + 15)		**49**		(Starting Bit + 48)	
17		(Starting Bit + 16)		**50**		(Starting Bit + 49)	
18		(Starting Bit + 17)		**51**		(Starting Bit + 50)	
19		(Starting Bit + 18)		**52**		(Starting Bit + 51)	
20		(Starting Bit + 19)		**53**		(Starting Bit + 52)	
21		(Starting Bit + 20)		**54**		(Starting Bit + 53)	
22		(Starting Bit + 21)		**55**		(Starting Bit + 54)	
23		(Starting Bit + 22)		**56**		(Starting Bit + 55)	
24		(Starting Bit + 23)		**57**		(Starting Bit + 56)	
25		(Starting Bit + 24)		**58**		(Starting Bit + 57)	
26		(Starting Bit + 25)		**59**		(Starting Bit + 58)	
27		(Starting Bit + 26)		**60**		(Starting Bit + 59)	
28		(Starting Bit + 27)		**61**		(Starting Bit + 60)	
29		(Starting Bit + 28)		**62**		(Starting Bit + 61)	
30		(Starting Bit + 29)		**63**		(Starting Bit + 62)	
31		(Starting Bit + 30)		**64**		(Starting Bit + 63)	
32		(Starting Bit + 31)					
33		(Starting Bit + 32)					