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5136-PFB-VME
Hardware Guide

Version 2.02



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This document applies to the 5136-PFB-VMEInterface Card.

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Written and designed at SST, 50 Northland Road, Waterloo, Ontario, Canada N2V 1N3.

Contents

Introduction 1

1

1.1 Purpose 2
1.2 Conventions 2
1.2.1 Style 2
1.2.2 Special Notation 2
1.3 Card Overview 3
1.4 Reference Documents 4
1.5 Warranty 5
1.6 Technical Support 6
1.6.1 Before you call for help... 6
1.6.2 Getting Help 6

Installation 7
2
2.1 Handling Precautions 8
2.2 Application Design Considerations 8
2.2.1 Running from Flash or RAM? 8
2.2.2 Which Addressing Mode? 9
2.3 Installation 9
2.3.1 Board Layout 10
2.4 Setting the Switches 11
2.4.1 Setting the Short I/O Base Address 11
2.4.2 Access Privileges 14
2.4.3 Interrupts 16
2.4.4 Default Switch Settings 16
2.5 Setting the Jumpers 16
2.5.1 Transmit Enable Jumper (JP2) 16
2.5.2 Flash Write Enable Jumper (JP4) 16
2.5.3 Boot Protect Jumper (JP9) 17
2.5.4 Byte Order of Addresses and Data 17
2.6 Starting the Card 18
2.6.1 Loading the VMEPROFI Module into Shared Memory from the host 18
2.6.2 Loading the VMEPROFI Module into Flash Memory from the Serial Port 19
2.6.3 Running the VMEPROFI module 20
2.6.4 Installing the Files for the SST ProfiBus Configuration Tool 22
2.6.5 Installing the Files for COM PROFIBUS 22
2.7 Configuring the VMEPROFI Module 22
2.7.1 From the Host 22
2.7.2 From the Serial Port 22
2.7.3 Initial Boot Record 23
2.8 Using the Serial Port 27
2.8.1 Loading Software Modules 27
2.8.2 Configuring VMEPROFI 27
2.8.3 Uploading a DP Master Configuration to the Card 29
2.8.4 Exiting Configuration 29
2.9 Connecting to a Network 30
2.10 Card LEDs 32

Card Registers 33
3
3.1 Short I/O Registers 34
3.1.1 Board Control register at BASE+1 36
3.1.2 Memory Control register at BASE + 3 35
3.1.3 Memory Page register at BASE + 5 36
3.1.4 Interrupt Control register at BASE + 7 37
3.1.5 Interrupt ID register at BASE+9 38

Technical Data 39
A

1

Introduction

This chapter describes the following:

- the purpose of the manual
- the style conventions used in the manual
- an overview of the card
- reference material
- warranty and technical support information

1.1 Purpose

This document is a hardware user's guide for the SST 5136-PFB-VME interface card. This card allows an application running on a VMEbus host computer to communicate with ProfiBus Networks using Profibus DP and FDL.

1.2 Conventions

1.2.1 Style

The following conventions are used throughout the manual:

- Listed items, where order is of no significance, are preceded by bullets.
- Listed items, to be performed in the order in which they appear, are preceded by a number.
- References to commands, or dialog boxes are *italicized.*
- User entry text is in `Courier 9 pt` font.
- Buttons that the user may press are in SMALL CAPS.

1.2.2 Special Notation

The following special notations are used throughout the manual:



Warning messages alert the reader to situations where personal injury may result. Warnings are accompanied by the symbol shown, and precede the topic to which they refer.



Caution messages alert the reader to situations where equipment damage may result. Cautions are accompanied by the symbol shown, and precede the topic to which they refer.



A note provides additional information, emphasizes a point, or gives a tip for easier operation. Notes are accompanied by the symbol shown, and follow the text to which they refer.

1.3 Card Overview

The 5136-PFB-VME card can:

- act as a DP slave
- act as a DP master
- send and receive FDL (layer 2) messages

The card supports simultaneous operation in all these modes.

The card supports the standard ProfiBus baud rates of 9.6K, 19.2K, 93.75K, 187.5K, 500K, 750K, 1.5M, 3M, 6M and 12M baud.

The card has an onboard Intel i960 processor with 512 Kbytes of local RAM., that handles the communication protocol and data formatting into the shared RAM.

The 5136-PFB-VME consists of:

a VMEbus interface, with capabilities as outlined in the *Specifications* section of this manual

five registers in VME short address space for control of the card

The card has an additional 256 Kbytes of RAM which is shared with the host as either a single block of 256 Kbytes (linear addressing mode) or as one of sixteen, 16 Kbyte pages (paged mode). In paged mode, the host determines which page of this shared RAM is mapped into the host memory by writing to a register on the card. This block of memory contains all the tables and buffers that are used to pass information between the interface card and the application software running in the host computer. This approach ensures a fast and simple connection between the host computer and the card software.

In addition, the card has 512 Kbytes of sectored flash memory, for storage of programs and configuration data. ProfiBus configuration information may also be stored in flash.

1.4 Reference Documents

For information on ProfiBus, refer to one of the following:

- ProfiBus standard DIN 19 245 parts 1, 2 and 3. Part 1 describes the low level protocol and electrical characteristics, part 2 describes FMS, part 3 describes DP
- European standard EN 50170
- ET 200 Distributed I/O System Manual, 6ES5 998-3ES22

Refer to the *IEEE Standard for a Versitile Backplane Bus: VMEbus, ANSI/ IEEE Std. 1014-1987* for explanations of VMEbus Terminology.

1.5 Warranty

SST guarantees that all new products are free of defects in material and workmanship when applied in the manner for which they were intended and according to SST's published information on proper installation.

The Warranty period for the 5136-PFB-VME is 10 years from the date of shipment.

SST will repair or replace, at our option, all products returned freight prepaid which prove, upon examination, to be within the Warranty definitions and time period.

The Warranty does not cover costs of installation, removal or damage to user's property or any contingent expenses or consequential damages. Maximum liability of SST is the cost of the product(s).

Product Returns

If it should be necessary to return or exchange items, please contact SST for a Return Authorization number.

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1.6 Technical Support

1.6.1 Before you call for help...

Please ensure that you have the following information readily available before calling for technical support.

- Card type and serial number
- Computer make and model and hardware configuration (other cards installed)
- Operating system type and version
- Details of the problem; application module type and version, target network, circumstances that caused the problem

1.6.2 Getting Help

Technical support is available during regular business hours by telephone, fax or email from any SST office, or from the company Web site at www.mySST.com.

Documentation and software updates are available on our Web site.

North America

Telephone: 519-725-5136, Fax: 519-725-1515

Email: techsupport@mySST.com

Europe

Telephone: +49/(0)7252/9496-30, Fax: +49/(0)7252/9496-39

Email: sst@woodhead.de

Asia

Telephone: +81-4-5224-3560, Fax: +81-4-5224-3561

Email: techsupport@woodhead.co.jp

2

Installation

This chapter describes the following:

- application design considerations
- installation
- setting the switches and jumpers on the card
- installing the card software
- connecting the card to a ProfiBus network
- downloading software modules to shared memory or flash memory on the card

2.1 Handling Precautions



Caution

The 5136-PFB-VME interface card contains components that are sensitive to electrostatic discharge.

Do not remove the card from its protective bag without following these precautions:

- Adequately ground yourself by touching a grounded object, such as the case of your computer, before handling the card.
- Never touch the backplane connectors or pins. Handle the card by the mounting bracket.
- Always store the card in the protective bag.

2.2 Application Design Considerations

2.2.1 Running from Flash or RAM?

When designing an application for the 5136-PFB-VME, the first decision you have to make is whether you want to load and run the card software from flash memory or by downloading it from the host computer.

Advantages of Running from Flash

- The application does not need to download software modules to the card or store the software module (approximately 120 Kbytes is required) with the application.
- Loading software modules and configuration data is simpler from the serial port since the card takes care of most of the details.
- Does not require access to a file system

Disadvantages of Running from Flash

- Since the software module and configuration is stored on the card, you cannot simply swap cards in order to replace a card. You have to reload and configure the replacement card.
- Access to the card and the device it is installed in is required to be able to load the card from the serial port

In general, if you have access to a file system, you should load and configure the card from the host. Running from flash is preferred in embedded environments or whenever it is difficult to send files to the card, such as a VME based PLC.

2.2.2 Which Addressing Mode?

The card can run in either linear addressing mode or paged mode. In linear addressing mode, the card occupies 256 Kbytes of standard memory, and in paged mode, the card occupies 16 Kbytes of standard memory. Shared memory is accesses in 16 Kbytes pages by selecting the current page and writing to the Memory page register.

Unless the environment restricts how much memory you can access, linear addressing mode is preferred to simplify application development.

2.3 Installation

This section describes the procedures for:

- setting the switches and jumpers on the interface card
- installing the card in your computer
- downloading the firmware and configuration to the card
- getting the card to communicate on a network and verifying that it is working

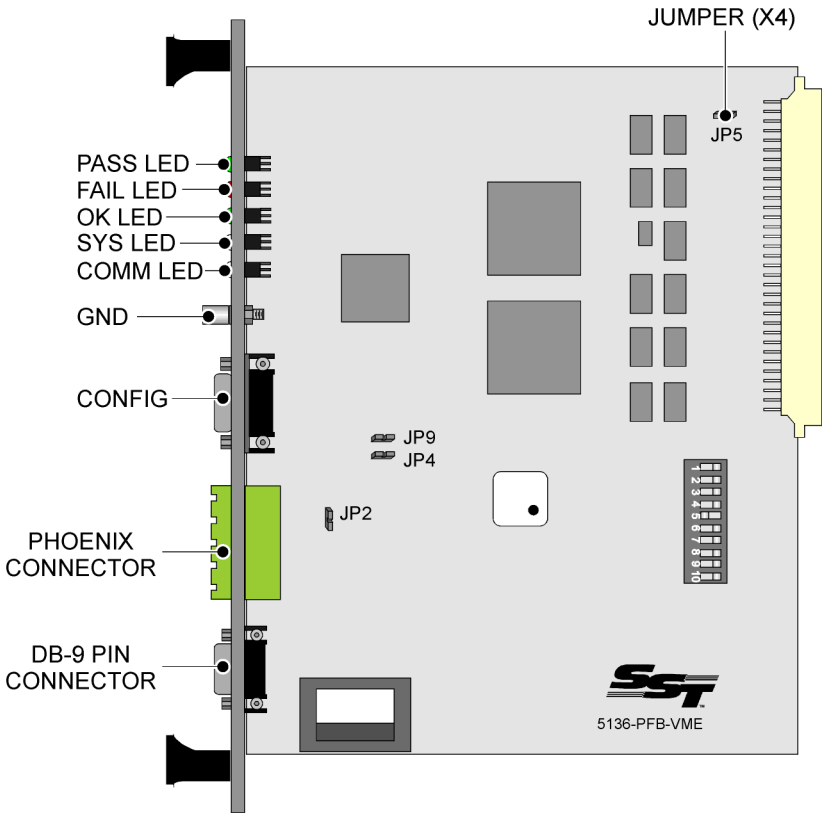
This section also contains information about short I/O register usage on the card.



Caution

This equipment is neither designed for, nor intended for operation in installations where it is subject to hazardous voltages and hazardous currents.

2.3.1 Board Layout



2.4 Setting the Switches

The card has a 10-position DIP switch that must be set before installing the card.

Position	Purpose	Refer to Section
1-6	short I/O address	2.4.1
7	access privilege	2.4.2
8-10	interrupt	2.4.3

2.4.1 Setting the Short I/O Base Address

The 1 Kbyte block of short address space occupied by the card is located on a 1 Kbyte boundary at an address selected by positions 1 through 6 of the switch. These switch positions correspond to address bits A15 through A10, respectively. Therefore, when all switches are ON, the base address is 0000 and the card responds to short space addresses 0001, 0003, 0005, 0007, and 0009.

S1 - positions 1 through 6

Position	Corresponding address line
1	A15
2	A14
3	A13
4	A12
5	A11
6	A10

The following table shows the possible base addresses and the corresponding switch settings.

Switch	1	2	3	4	5	6
FC00	OFF	OFF	OFF	OFF	OFF	OFF
F800	OFF	OFF	OFF	OFF	OFF	ON
F400	OFF	OFF	OFF	OFF	ON	OFF
F000	OFF	OFF	OFF	OFF	ON	ON
EC00	OFF	OFF	OFF	ON	OFF	OFF
E800	OFF	OFF	OFF	ON	OFF	ON
E400	OFF	OFF	OFF	ON	ON	OFF
E000	OFF	OFF	OFF	ON	ON	ON
DC00	OFF	OFF	ON	OFF	OFF	OFF
D800	OFF	OFF	ON	OFF	OFF	ON
D400	OFF	OFF	ON	OFF	ON	OFF
D000	OFF	OFF	ON	OFF	ON	ON
CC00	OFF	OFF	ON	ON	OFF	OFF
C800	OFF	OFF	ON	ON	OFF	ON
C400	OFF	OFF	ON	ON	ON	OFF
C000	OFF	OFF	ON	ON	ON	ON
BC00	OFF	ON	OFF	OFF	OFF	OFF
B800	OFF	ON	OFF	OFF	OFF	ON
B400	OFF	ON	OFF	OFF	ON	OFF
B000	OFF	ON	OFF	OFF	ON	ON
AC00	OFF	ON	OFF	ON	OFF	OFF
A800	OFF	ON	OFF	ON	OFF	ON
A400	OFF	ON	OFF	ON	ON	OFF
A000	OFF	ON	OFF	ON	ON	ON
9C00	OFF	ON	ON	OFF	OFF	OFF
9800	OFF	ON	ON	OFF	OFF	ON

Switch	1	2	3	4	5	6
9400	OFF	ON	ON	OFF	ON	OFF
9000	OFF	ON	ON	OFF	ON	ON
8C00	OFF	ON	ON	ON	OFF	OFF
8800	OFF	ON	ON	ON	OFF	ON
8400	OFF	ON	ON	ON	ON	OFF
8000	OFF	ON	ON	ON	ON	ON
7C00	ON	OFF	OFF	OFF	OFF	OFF
7800	ON	OFF	OFF	OFF	OFF	ON
7400	ON	OFF	OFF	OFF	ON	OFF
7000	ON	OFF	OFF	OFF	ON	ON
6C00	ON	OFF	OFF	ON	OFF	OFF
6800	ON	OFF	OFF	ON	OFF	ON
6400	ON	OFF	OFF	ON	ON	OFF
6000	ON	OFF	OFF	ON	ON	ON
5C00	ON	OFF	ON	OFF	OFF	OFF
5800	ON	OFF	ON	OFF	OFF	ON
5400	ON	OFF	ON	OFF	ON	OFF
5000	ON	OFF	ON	OFF	ON	ON
4C00	ON	OFF	ON	ON	OFF	OFF
4800	ON	OFF	ON	ON	OFF	ON
4400	ON	OFF	ON	ON	ON	OFF
4000	ON	OFF	ON	ON	ON	ON
3C00	ON	ON	OFF	OFF	OFF	OFF
3800	ON	ON	OFF	OFF	OFF	ON
3400	ON	ON	OFF	OFF	ON	OFF
3000	ON	ON	OFF	OFF	ON	ON
2C00	ON	ON	OFF	ON	OFF	OFF
2800	ON	ON	OFF	ON	OFF	ON
2400	ON	ON	OFF	ON	ON	OFF

Switch	1	2	3	4	5	6
2000	ON	ON	OFF	ON	ON	ON
1C00	ON	ON	ON	OFF	OFF	OFF
1800	ON	ON	ON	OFF	OFF	ON
1400	ON	ON	ON	OFF	ON	OFF
1000	ON	ON	ON	OFF	ON	ON
0C00	ON	ON	ON	ON	OFF	OFF
0800	ON	ON	ON	ON	OFF	ON
0400	ON	ON	ON	ON	ON	OFF
0000	ON	ON	ON	ON	ON	ON

2.4.2 Access Privileges

The 5136-PFB-VME provides 8-bit access to objects in the short address space and 8- and 16-bit access to objects in the standard address space. The VME master selects whether a particular bus cycle accesses short, standard, extended, or long (extended and long are not used on the 5136-PFB-VME) address spaces, and the type of access, through the use of the address modifier codes. The card decodes these address modifier codes and determines the object to be accessed.

In addition to selecting one of four spaces available on the VMEbus, address modifier codes also select:

- whether the master is making a supervisory or non-privileged access
- whether the access is to program or data space (for all but short address space accesses)
- whether it is to be a single-object or block access

The 5136-PFB-VME can respond to address modifier codes 3Dh, 39h, 2Dh, and 29h. Supervisory or non-privileged data accesses may be made to standard address space (3Dh and 39h respectively). Supervisory or non-privileged accesses may be made to short address space (2Dh and 29h respectively). An access to the card with an address modifier code that is not supported causes a VMEbus error.

Position 7 of the card's DIP switch selects whether only supervisory accesses or both supervisory and non-privileged accesses are permitted. The following table shows the switch positions.

Switch S1 - Position 7

Switch Position	Permitted Access
ON	supervisory and non-privileged
OFF	supervisory only



Caution

If the host makes a non-privileged access to the card when this switch is in the supervisory only position, a VMEbus error occurs.

2.4.3 Interrupts

The card can generate and acknowledge interrupts on any one of VMEbus interrupt lines 1 through 7, (or none). The interrupt level is selected by positions 8 through 10 of switch S1, as detailed below:

Switch S1 - positions 8 through 10

8	9	10	Interrupt level
ON	ON	ON	none
OFF	ON	ON	1
ON	OFF	ON	2
OFF	OFF	ON	3
ON	ON	OFF	4
OFF	ON	OFF	5
ON	OFF	OFF	6
OFF	OFF	OFF	7

The card interrupter is a ROAK (release-on-acknowledge) type. The interrupt request is removed from the VMEbus when the card responds to an interrupt acknowledge. However, the CpuIntVme bit in the Interrupt Control register remains set until cleared by the host.

2.4.4 Default Switch Settings

The 5136-PFB-VME is shipped with all switches ON. This corresponds to:

- short I/O address 0000
- supervisory and non-privileged access permitted
- interrupts disabled

2.5 Setting the Jumpers

Set the jumpers on the 5136-PFB-VME before installing the card in a VMEbus computer. These jumpers control various aspects of the card operation.

2.5.1 Transmit Enable Jumper (JP2)

The transmit enable jumper JP2 controls whether the card can transmit on the network. To enable transmission, put the jumper on the two pins. To disable transmission, remove the jumper. For normal operation, the transmitter should be enabled.

Use this feature if you are using the card for passive monitoring of the network and to ensure that you do not go active on the network.

2.5.2 Flash Write Enable Jumper (JP4)

The flash write enable jumper JP4 controls writing to flash memory on the card. To disable writing to flash, remove the jumper from the card or put it on just one of the pins for storage. If the jumper is removed, the current contents of flash memory cannot be overwritten.

Use this feature if you have a software module and configuration in flash and you want to prevent anyone from accidentally overwriting the software module or configuration.

2.5.3 Boot Protect Jumper (JP9)



Caution

Do not remove this jumper.

The 5136-PFB-VME contains a short bootstrap program in flash memory which is written at the factory and does not normally need to be overwritten.

The boot protect jumper JP9 controls whether you can overwrite the contents of this boot program. If the jumper is installed, the contents of the boot loader are protected and cannot be overwritten. If the jumper is removed, you can overwrite the boot loader.

If the boot program becomes corrupted, the card must be returned to the factory to be reinitialized.

2.5.4 Byte Order of Addresses and Data

Byte ordering of addresses and data is always an issue with VME computers. The processor on the card is an Intel i960. It stores data in low byte-high byte order. Depending on the type of host system, you may have to do swapping of addresses and data in order to access data correctly.



Note

If you are reading or writing words, the address must be even and you must swap bytes of data. If you are reading or writing a byte, you must use the alternate byte address within the word. For example to read from address 0, use address 1 and to read from address 1, use address 0.

The 5136-PFB-VME distribution contains two versions of the include file that describes the structure of the data on the card. *Profictl.h* shows the structures for the module in an unswapped environment and *profiswp.h* shows the structures for the module in a swapped environment.

The addresses in this manual are the addresses as seen by the processor on the card.

2.6 Starting the Card

Before using the 5136-PFB-VME card on ProfiBus, download the PFBPROFI software module to the card, and configure and run the software module.

Download the software module into shared memory from the host or into flash memory using the serial CONFIG port on the card. The module for shared memory is called *vmeprofi.ss1*. The module for flash memory is called *vmeprofi.ssf*.

To run a software module, load the appropriate Initial Boot Record to the card (IBR, refer to section 2.7.3, *Initial Boot Record*). There are two IBRs, one to run a module from flash and another to run a module from shared memory. It is possible to have one module in flash and a different one in shared memory and to run one or the other depending on which IBR you use.

When you first receive the card, the only software on the card is a short bootstrap startup program in flash. Use this bootstrap program to access the card and download a software module to the card through the serial port.

2.6.1 Loading the VMEPROFI Module into Shared Memory from the host

Use the following steps to load *vmeprofi.ss1* into shared memory from the host:

1. Make sure the card processor is in reset by setting the CpuReset bit in the Board Control register to 1.
2. Set the standard memory address using the Memory Control register and the address bits in the Interrupt Control register.
3. Select the addressing mode (linear or paged) and enable card memory.
4. If you are using interrupts, initialize the Interrupt ID register and enable interrupts in the Interrupt Control register.
5. Copy the *vmeprofi.ss1* to shared memory on the card. In linear mode, just copy the module starting at offset 0. In paged mode, copy the module one 16 Kbyte page at a time, changing pages as required.
6. Write the shared memory initial boot record. In linear addressing mode, write it to the base address + 3FF30h. In paged mode, set the page register to FFh and write the IBR to the base address + 3F30h.

2.6.2 Loading the VMEPROFI Module into Flash Memory from the Serial Port

Use the following steps to load *vmeprofi.ssf* into flash memory from the serial port:

1. Make sure the card processor is in reset by setting the CpuReset bit in the Board Control register to 1.
2. Set the standard memory address using the Memory Control register and the address bits in the Interrupt Control Register.
3. Select the addressing mode and enable the memory on the card.
4. If you are using interrupts, initialize the Interrupt ID register and enable interrupts in the Interrupt Control register.
5. Write the flash memory initial boot record. In linear addressing mode, write it to the base address + 3FF30h. In paged mode, set the page register to FFh and write the IBR to the base address + 3F30h.
6. Run the i960. Wait up to 1 second for the i960 to clear the fail bit in the BCR.
7. The card waits up to 2 seconds for you to access the serial port. While it is waiting, it flashes the SYS LED green.
8. Type an exclamation mark from your communication software to get access to the serial port. Type several exclamation marks to let the card detect the baud rate you are using

The card displays:

```
5136-VME Card Boot Utility
Copyright (c) 1999 SST
Ver. 1.01
; Commands:
; LoadFlash, Run, Ver, Help
```

and flashes the SYS and COMM LEDs orange alternately.

9. Use the LoadFlash command from the serial port to download the *vmeprofi.ssf* module to the card. If a module has already been downloaded, the card asks if you want to replace the current module.

10. Initiate an XModem transfer with your communication software. When the transfer is complete, the card asks if you want to program the new module into flash.
11. To complete the download, issue the *Run* command from your communication software.

2.6.3 Running the VMEPROFI module

Once you have loaded the VMEPROFI module, use the following handshaking sequence to run the module:

1. Write *A5h* to the diagnostic semaphore location. In linear addressing mode, the diagnostic semaphore location is the standard memory base address + 3FFFFh. In paged address mode, first set the page register to FFh, then the diagnostic semaphore location is the base address + 3FFFh.
2. Run the i960 and wait up to 1 second for the card to clear the CpuFail bit in the Board Control register.
3. Wait for up to 5 seconds for the card to set the diagnostic semaphore location to CARD_OK (5Ah).



Note

If the value does not change from A5h, or if the value is anything other than `CARD_OK`, there has been an error.

If the value is `CARD_ERROR` (EEh), the card writes a null-terminated string to memory to indicate the cause of the problem. In linear addressing mode, this string is found at offset 3FF00h from the base address. In paged addressing mode this string is found by setting the page register to the uppermost page, and reading the string starting at offset 3F00h.

If the module has run successfully and the value is `CARD_OK`, the card writes a null-terminated string to memory containing copyright information and a module description. In linear addressing mode, this string is found at offset 3FF00h from the base address. In paged addressing mode you find this string by setting the page register to the uppermost page, then reading the string starting at offset 3F00h.

When the VMEPROFI module runs successfully, it writes the home page to the top of memory. In linear mode, the card writes the home page to offset 3FFFEh. In paged mode, find the home page by setting the page register to FFh and reading the value at offset 3FFEh.

4. Write 0 to the diagnostic semaphore location to tell the VMEPROFI module to continue.
5. Set the page register to the home page.
6. Wait for up to 1 second for the VMEPROFI module to set its command register to E0h. In linear addressing mode, the command register is found at offset 8000h from the base memory location. In paged mode, it is found at offset 0 on page 2.
7. Configure the network and whatever functions are required (DP master, DP slave, etc.).
8. Put the card online.

   Wait up to 1 second for E1h (CARD_ONLINE) in the command register.
9. If there have been no problems up to this point, turn the pass LED on by setting the SysFail bit in the Board Control register. This also turns the fail LED off.
10. Run your application.

2.6.4 Installing the Files for the SST ProfiBus Configuration Tool

Run the *setup.exe* file from the Windows 32 installation disk to set up the SST ProfiBus Configuration Tool.

2.6.5 Installing the Files for COM PROFIBUS

Run the batch file *\comet\updcomet* to copy the files for configuring the 5136-PFB-VME with COM PROFIBUS into appropriate directories. You must tell it the name of the main directory containing the COM PROFIBUS files. For example, for version 3.0 of COM PROFIBUS, this directory is *\compb30*, so you would type:

```
A:\comet\updcomet c:\compb30
```

2.7 Configuring the VMEPROFI Module

2.7.1 From the Host

To configure the 5136-PFB-VME from the host, refer to the *Software User's Guide.*

2.7.2 From the Serial Port

Whenever the VMEPROFI module is running but is offline, you canaccess the serial port by typing an asterisk [*] to the serial port using your communication software. You may have to type several asterisks so that the card can detect the baud rate.

Use the *Help* command to list commonly used commands. These include several help commands that list other available commands. For example, *HelpNet* shows commands that can be used to set the network parameters.

If you are using the card as a DP master, use the *RecbssXmodem* command to load a binary file exported from the SST ProfiBus Configuration Tool to the card, using an XModem transfer, or use *Rec2bfXmodem* to load a binary configuration file exported from COM PROFIBUS. The binary file contains all the information required to configure the network parameters and DP master operation on the card.

You can display and edit DP slave configuration and network parameters as well. When you are done, type *Exit*. You will be prompted to save the configuration to flash. Issue the `CMD_FLASH_GO_ON` command to the PFBPROFI command register from the host application to configure the card from flash, then go online.

When you have configured all required card operations, put the card online.

2.7.3 Initial Boot Record

The initial boot record is a short section of 48 bytes of startup data that must be loaded into the card to get it started.

There are two versions of the initial boot record, one to start the card from a module stored in flash, the other to start the card from a module in shared RAM.

Since VME computers may access memory differently, this initial boot record is: provided here in several different formats.

This information is also available on the distribution disk in the file *\loader\ibr.txt*.

Flash Initial Boot Record

If there is no module in flash, use the flash initial boot record (IBR), to get the card to a state where you can download a module from the serial port. Refer to section 2.7.3, *Initial Boot Record*,

The card first runs the bootstrap loader from flash. In the first two seconds the bootstrap loader flashes the SYS LED green to indicate that you can type an exclamation mark from your communication software to get access to the serial port. If the bootstrap loader does not detect an [!] in 2 seconds, the bootstrap loader runs the module in flash.

The flash initial boot record consists of the following, expressed as long integers.

00000000h, 00000000h, 00000040h, 00000000h, 4007C048h, 4007C020h, FFFFFFFEh, AAAAAAAAh, 55555555h, 55AA55AAh, AA55AA55h, 7FF07F99h

Flash initial Boot Record Table

Offset	Hex	Hex, swapped	Integer	Integer, swapped
0	0000	0000	0	0
1	0000	0000	0	0
2	0000	0000	0	0
3	0000	0000	0	0
4	0040	4000	64	16384
5	0000	0000	0	0
6	0000	0000	0	0
7	0000	0000	0	0
8	C048	48C0	-16312	18624
9	4007	0740	16391	1856
10	C020	20C0	-16352	8384
11	4007	0740	16391	1856
12	FFFE	FEFF	-2	-257
13	FFFF	FFFF	-1	-1
14	AAAA	AAAA	-21846	-21846
15	AAAA	AAAA	-21846	-21846
16	5555	5555	21845	21845
17	5555	5555	21845	21845
18	55AA	AA55	21930	-21931
19	55AA	AA55	21930	-21931
20	AA55	55AA	-21931	21930
21	AA55	55AA	-21931	21930
22	7F99	997F	32665	-26241
23	7FF0	F07F	32752	-3969

Shared RAM Initial Boot Record

The initial boot record to start the card from shared RAM consists of the following, expressed as long integers:

00000000h, 00000000h, 00000040h, 00000000h, E0000048h, E0000020h, FFFFFFFEh, AAAAAAAAh, 55555555h, 55AA55AAh, AA55AA55h, 3FFFFFF98h

Since VME computers may access memory differently, this initial boot record is provided here in several different formats.

Shared RAM Initial Boot Record

Offset	Hex	Hex, swapped	Integer	Integer, swapped
0	0000	0000	0	0
1	0000	0000	0	0
2	0000	0000	0	0
3	0000	0000	0	0
4	0040	4000	64	16384
5	0000	0000	0	0
6	0000	0000	0	0
7	0000	0000	0	0
8	0048	4800	72	18432
9	E000	00E0	-8192	224
10	0020	2000	32	8192
11	E000	00E0	-8192	224
12	FFFE	FEFF	-2	-257
13	FFFF	FFFF	-1	-1
14	AAAA	AAAA	-21846	-21846
15	AAAA	AAAA	-21846	-21846
16	5555	5555	21845	21845
17	5555	5555	21845	21845
18	55AA	AA55	21930	-21931
19	55AA	AA55	21930	-21931
20	AA55	55AA	-21931	21930
21	AA55	55AA	-21931	21930
22	FF98	98FF	-104	-26369
23	3FFF	FF3F	16383	-193

2.8 Using the Serial Port

Use the serial CONFIG port on the front of the card to download software modules and configuration files and data to the card.

The serial cable needs lines 2 and 3 swapped. It does not require any hand-shaking. Pins 2 and 3 are wired the same as a PC 9-pin COM port.

Connect to the serial port using any communication software. The card serial port supports any baud rate from 9600 baud to 115 kbaud, with no parity, 8 data bits, 1 stop bit. The card automatically detects the baud rate you are using.

2.8.1 Loading Software Modules

Use the serial port to load the *vmeprofi.ssf* module into the flash memory on the card and program it into flash.

Refer to section 2.6.2, *Loading the VMEPROFI Module into Flash Memory from the Serial Port* for more information.

2.8.2 Configuring VMEPROFI

Whenever the VMEPROFI software module on the card is running and the card is offline, access the serial port by sending an asterisk [*] to the serial port using your communication software. You may have to type several asterisks so that the card can detect the baud rate.

Use the serial port to display or set network parameters, DP master parameters, and DP slave parameters. You can upload a binary configuration file (exported from the SST ProfiBus Configuration Tool or Siemens COM PROFIBUS) through the serial port. You can also update the configuration stored in flash memory.

While connected to the serial port, the card alternately flashes the SYS and COMM LEDs amber.

If you send the *help* command using your communication program, the card gives the following list of commonly used commands

Command	**Description**
HelpNet	Lists commands to set network parameters
HelpMas	Lists commands related to DP master operation
HelpSlv	Lists commands related to DP slave operation. Refer to section 3.7 for information on how to use the scanner as a DP slave.
ShowNet	Displays network parameters
ShowMas	Displays the DP master configuration
ShowSlv	Displays the DP slave configuration. Refer to section 3.7 for information on how to use the scanner as a DP slave.
Rec2bfXmodem	Upload a DP master configuration exported as a binary file from COM PROFIBUS
UpdFlash	Store the current network, DP master and DP slave configuration into flash memory
Ver	Displays the version number of the firmware running on the card

2.8.3 Uploading a DP Master Configuration to the Card

You can upload a DP master configuration file (*.bss* exported from the SST ProfiBus Configuration Tool or*.2bf* exported from Siemens COM PROFIBUS configuration software) through the serial port. First issue the *RecbssXmodem* (*.bss*) or *Rec2bfXmodem* (*.2bf*) command, then initiate an XModem file upload from your communication software. The details of how you do this depend on the communication software you are using.



Note

These parameters are only in memory. To store them to flash, use the *UpdFlash* command.

2.8.4 Exiting Configuration

Use the *Exit* command to exit serial port configuration. If you have changed the configuration but have not stored it in flash, the card asks if you want to store the new configuration in flash.

2.9 Connecting to a Network

This section contains information on how to connect the card to a ProfiBus communication network.

The card contains a standard ProfiBus DB9 connector which can be connected to an L2 (ProfiBus) bus terminal.

This section contains information on how to connect the card to a ProfiBus communication network. The card contains a standard ProfiBus DB9 connector and a 5-pin Phoenix Combicon connector to allow a direct connection to a Profibus network.

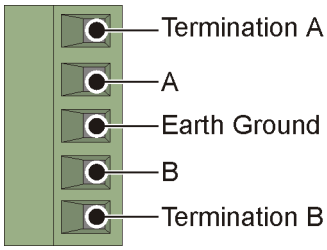
DB9 Pin Description	DB9 Pin #	DB9 Termination with 5136-PFB-VME	Phoenix Connector	Phoenix Termination
chassis ground	1		Earth ground	
reserved	2			
data +	3	connect this pin to pin 8 (data -) with 220 ohm resistor	B	jumper this pin to Termination B (see diagram in this section of the manual)
Tx enable	4			
isolated ground	5	connect this pin to pin 8 (data -) with 390 ohm resistor		
voltage plus	6	connect this pin to pin 3 (data +) with 390 ohm resistor		
reserved	7			
data -	8		A	jumper this pin to Termination A (see diagram in this section of the manual)
reserved	9			

Terminate the network at each physical end of the network, in two places.

Note

If you are using a card that has both types of connectors and you are using the DB9 connector, it is easier to terminate using the Phoenix connector. Since both connectors are internally connected, terminating with the Phoenix connector will also terminate the DB9 connector

The Phoenix connector pins are:



The two physical ends of the network should be terminated. There should be two and only two terminators on a network.

The recommended cable is Belden 3079A. Examples include:

- Siemens 6XV1 830-0AH10 Two Core Shielded
- Siemens 6XV1 830-0BH10 w/PE Sheath
- Siemens 6XV1 830-3AH10 for underground burial
- Siemens 6XV1 830-3BH10 trailing cable
- Bosch Comnet DP #913 548 Flexible ProfiBus Cable
- Bosch Comnet DP #917 201 Trailing ProfiBus Cable
- Bosch Comnet DP #917 202 Massive ProfiBus Cable

Allen-Bradley blue hose, which has an impedance of 78 ohms, is not recommended.

2.10 Card LEDs

The PASS and FAIL LEDs provide information on the overall operation of the card. A VMEbus master controls these LEDs via the SysFail bit in the Board Control register. When the bit is 1, the PASS LED is on and the FAIL LED is off. When the bit is 0, the PASS LED is off and the FAIL LED is on.

The system status (SYS) LED on the bracket of the 5136-PFB-VME shows the current state of the various operations configured on the 5136-PFB-VME by flashing in sequence. The order is DP master, DP slave, Layer 2 messages, layer 2 SAPs. Only those operations configured on the card are shown and you have the option of disabling the LED display for a particular operation even if you are using that operation. If only one function is configured, the SYS LED shows this status constantly.

The OK LED is on when the card local watchdog is OK.

The system status LED flashes red if there is a problem with one of the configured PFBPROFI operations and green if the operation is OK. For DP master, yellow means all slaves are OK but we are scanning in program mode. For DP slave, yellow means the card is being scanned by a master in program mode.

The communication status (COMM) LED shows the state of communication. Red indicates a network error. If no network error has occurred, the LED is green when this station has the token.



Note

If the card is configured as a passive station (for example, DP slave only), this LED will normally be off since the card never gets the token.

Selecting the Proper Line Type

Use this table to determine which line type best suits system requirements:

Baud Rate (bits/s)	Line A Distance (Max)	Line B Distance (Max)	Total Capacitance of all Drop Cables
v19.2k	1200 m**	1200 m**	*15nF
93.75k	1200 m**	1200 m**	*3nF
187.5k	1000 m**	600 m**	*1nF
500k	400 m**	200 m**	*0.6nF
1.5M	200 m**	NA	*0.2nF
3, 6 and 12M	100 m**	NA	*0.05nF

NA = Not Applicable
*If using a combination of both line types, divide the lengths shown by two.
**This is the sum of all bus segment and drop cable lengths.

3

Card Registers

This section describes the card registers, and is provided as a reference. The registers are as follows:

- board control register at BASE +1
- memory control registr at BASE +3
- memory page register at BASE +5
- interrupt control register at BASE +9

3.1 Short I/O Registers

Five registers are used in the short address space.

Offset from base	Selected register
1	Board Control register
3	Memory Control register
5	Memory Page register
7	Interrupt Control register
9	Interrupt ID register

These five registers must be accessed as bytes only. Any other access (such as a double-byte access to an even address) causes a VMEbus bus error.

The following sections summarize the function of these registers.



Note

The access column in the tables in this section refer to access from the host computer.

3.1.1 Board Control register at BASE+1

The Board Control register, at offset 1 from the base, is used to:

- enable and reset the local processor
- enable standard memory
- assert interrupt and synchronization signals to the local processor
- control the VMEbus SYSFAIL signal
- select linear or paged addressing mode
- show CPU and watchdog status

Bit	Function	Access	Reset state
0	CpuReset	R/W	1

1	VmeIntCpu	R/W	0
2	MemEn	R/W	0
3	SysFail	R/W	0
4	LinAdrsEn	R/W	0
5	Sema	R/W	0
6	CpuFail	R	1
7	WdBite	R	0

The host sets bit 0, CpuReset, to hold the i960 processor on the card in reset. The host clears this bit to let the processor run. The card defaults to bit 0 set and the processor is in reset.

The host sets bit 1, VmeIntCpu, to assert an interrupt to the i960. Current software modules for the 5136-PFB-VME do not require or support interrupts to the i960.

The host sets bit 2, MemEn, to 1 to enable it to access shared memory on the card in the standard memory space. To disable access to shared memory from the host, the host sets the bit to 0.

The host clears bit 3, SysFail, to assert the SYSFAIL signal on the VMEbus. If the bit is 0, the fail LED is on, the pass LED is off and SYSFAIL is asserted. If the bit is 1, the fail LED is off and the pass LED is on.

The host sets bit 4, LinAdrsEn, to enable linear addressing mode. In linear addressing mode, the card occupies 256 Kbytes of standard memory. If the host sets this bit to 0, the card operates in paged mode, and occupies 16 Kbytes of shared memory. The 256 Kbytes of shared memory on the card are then accessible from the host in one of sixteen 16 Kbyte pages. The host then selects which page of card memory is mapped into standard memory by writing to the memory page register.

Bit 5, Sema, is reserved to be used by the host as a semaphore when multiple processors are accessing the card.

3.1.2 Memory Control register at BASE + 3

Bit	Function	Access	Reset state
0	Address line A14	R/W	0

1	Address line A15	R/W	0
2	Address line A16	R/W	0
3	Address line A17	R/W	0
4	Address line A18	R/W	0
5	Address line A19	R/W	0
6	Address line A20	R/W	0
7	Address line A21	R/W	0

Following system reset, the shared RAM enable bit in the Board Control register is reset, preventing the card from driving the bus during any standard address cycles. This is done to allow the host to set the base address of the standard address space occupied by card.

The host sets the base address of the card in standard memory by writing to the bits in the memory control register, as well as to two bits in the interrupt control register (see section 3.1.4, *Interrupt Control register at BASE + 7*)

Standard address space accesses use 24 bits of address (so they can access up to 16 Mbytes).

The card can operate in one of two modes. In paged mode, it occupies 16 Kbytes of standard memory on a 16 Kbyte boundary. In linear addressing mode, it occupies 256 Kbytes of memory on a 256 Kbyte boundary.

3.1.3 Memory Page register at BASE + 5

In paged memory mode, the memory page register determines which 16 Kbyte block of shared memory on the card is mapped into the host memory.

The host writes to the MPR to select which 16 Kbyte page of card shared memory maps into the host memory.

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	0	0	0	Page_sel_3	Page_sel_2	Page_sel_1	Page_sel_0

To select a particular page, write the page number to the MPR. Pages are numbered from 0 to 15.

Bits 4 to 7 are reserved and should be set to 0.

At powerup, the MPR contains 0.

In linear addressing mode, the memory page register is unused.

3.1.4 Interrupt Control register at BASE + 7

Bit	Function	Access	Reset state
0	reserved	R	0
1	reserved	R	0
2	reserved	R	0
3	IntVmeEn	R/W	0
4	Address line A22	R/W	0
5	Address line A23	R/W	0
6	VmeIntSet	R	0
7	CpuIntVme	R	0

Bit 3, IntVmeEn, enables VME interrupts. If this bit is 0, the card does not generate interrupts.

Bits 4 and 5 are used in conjunction with the bits in the memory control register to select the base address of the card in standard memory.

The card sets bit 7, CpuIntVme, when the CPU is trying to generate a VME interrupt. If IntVmeEn is set on, the card generates the interrupt.

3.1.5 Interrupt ID register at BASE+9

Bits	Function	Access	Reset state
0-7	card ID returned during interrupt acknowledge	R/W	0

When an interrupt request is made from the card on one of the VME interrupt lines, an interrupt handler acquires the bus and executes an interrupt acknowledge cycle. The card recognizes the acknowledgment and places an 8-bit interrupt ID on the odd half of the data bus. The value is taken from the Interrupt ID register, located at offset 9 from the selected register base address in short address space.

This register is zeroed by system reset and may be read or written at any time. If you are using interrupts, initialize this register before the local processor is allowed to run.

A

Technical Data

Part number	5136-PFB-VME
Function	Interface card for ProfiBus DP, FMS and FDL (layer 2) networks
Size	IEEE 1014, 6U height, P1 compatible
Capabilities	memory SD16, SADO24
Addressing	(standard) 256 Kbytes on any even 256 Kbyte boundary or 16 Kbytes on any 16 Kbyte boundary (short) 8 bytes on any 1 Kbyte boundary
Interrupts	switch selected level 1-7 software set 8-bit status/ID release on acknowledge.
Current Consumed	maximum 950 mA at 5V. This must be from a supply delivering Separated Extra Low voltage.
Environmental Storage Temp	operating temperature 0-60 degrees Celsius -40 - +85 degrees Celsius
Card connectors	standard ProfiBus DB-9 connector Phoenix Combicon connector, part number MSTB 2.5/5-ST-5.08

CISPR22 Compliance

This device meets or exceeds the requirements of the following standard:

- CISPR22:1997/EN 55022:1994 +A2:1997 - Class A - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment.



Caution

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Marking of this equipment with the symbol CE indicates compliance with European Council Directive 89/336/EEC - The EMC Directive. This equipment meets or exceeds the following technical standards:

CISPR22:1997/EN 55022:1994 + A2:1997 - "Limits and methods of measurement of radio disturbance characteristics of information technology equipment."

EN 50082-1:1997 - "Electromagnetic compatibility - Generic immunity standard Part 1. Residential, commercial and light industry."

IEC 1000-4-2/EN61000-4-2 - Electromagnetic Compatibility : Electrostatic Discharge Immunity Test.

IEC 1000-4-3/EN61000-4-3/ENV 50204 - Electromagnetic Compatibility : Radiated Radio Frequency Electromagnetic Field Immunity Test.

IEC 1000-4-4/EN61000-4-4 - Electromagnetic Compatibility : Electrical Fast Transient/Burst Immunity Test.

IEC 1000-4-6/EN61000-4-6 - Electromagnetic Compatibility : Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields.



Note

To maintain compliance with the limits and requirements of the EMC Directive it is required to use quality interfacing cables and connectors when connecting to this device. Refer to the cable specifications in this manual for selection of cable types.

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