

Ampro Technical Manual

MiniModule/PCC™

P/N 5001361 Revision B



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MiniModule/PCC Technical Manual

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Preface

Introduction

This manual is for developers of systems that use the Ampro Socket Module, a PC/104 Version 2.3 PCMCIA card interface for use with Ampro CPU products. The manual contains information about hardware requirements, interconnection, and how to use the supplied software.

Technical Support

Ampro technical support for this product is available from 8:00 AM to 5:00 PM, Pacific time, Monday through Friday. When you call, please have the product's technical manual and the product available.

Table i lists contact information for Ampro technical support.

Table i. Technical Support Contact Information

Telephone	800-966-5200 (USA), or 408 360-0200
FAX	408 360-0250
Email	techsupport@ampro.com
Website	http://www.ampro.com
FTP	ftp://ftp.ampro.com
Surface Mail	Ampro Computers, Incorporated, 4757 Hellyer Avenue, San Jose, CA 95138, USA
Virtual Technician	Http://www.ampro.com/scripts/virtual_technician.exe?faq

Chapter 1

Introduction

General Description

The MiniModule™/PCC Socket Module allows the integration of PCMCIA memory cards and PCMCIA peripheral cards into systems based on Ampro's CoreModule™ and Little Board™ CPUs. It provides a convenient means for connecting one or two PCMCIA memory or peripheral cards to an Ampro embedded system.

The PCMCIA standard has gained acceptance in instrumentation and embedded applications for data storage and peripheral interfacing. The Socket Module supports the mechanical and electrical characteristics defined in the PCMCIA Release 2.1 and JEIDA 4.1 specifications. PCMCIA cards are accessed using drivers compliant with this standard..

The Socket Module supports memory cards such as Flash EPROM, SRAM, and One Time Programmable EPROM (OTPROM). It also supports I/O devices such as modems, LAN adapters, or PCMCIA-ATA (IDE) drives. PCMCIA XIP (eXecute In Place) is fully supported.

The Socket Module provides two PCMCIA card sockets, compatible with Type I, Type II, Type III, and Type IV cards. A version with a single PCMCIA socket is available on special order. Up to two Socket Modules can be installed in a system.

The Socket Module can be used with any Ampro 16-bit CPU, either CoreModules or Little Boards. "16-bit" in this case refers to the I/O expansion bus width, not the CPU internal bus width.

The Socket Module (Local Version) is used as a stand-alone board, mounted directly on a CPU module. The Socket Module (Remote Version) is mounted remotely, connected to the CPU by a ribbon cable to an additional board, the Buffer Module. The Socket Module (Remote Version) can be mounted up to 14 inches from the Buffer Module and CPU. You can use up to two Socket Modules in a system.

Both the Socket Module and the Buffer Module cards are compatible with the PC/104 specification Version 2.3, an embedded computer standard for PC-compatible modules. (For more information about the PC/104 standard, contact the PC/104 Consortium at the address listed on page 4-1.)

"Cardware for DOS or Cardware for WindowsNT may be purchased from Ampro. In addition, runtime licenses for Windows NT and DOS may be purchased. Please contact Ampro Sales for pricing and availability."

- Cards based on battery-backed static RAMs (SRAMs) appear as read/write disk drives to programs using the comprehensive set of Award CardWare® drivers and utilities provided with the Quickstart Kit.

- Cards based on Flash EPROM can be handled in two ways, as write once/read many (WORM) cards using supplied utilities, or as full read/write drives, using either Award CardWare® or M-Systems' True Flash File System (TrueFFS™), also provided with the Quickstart Kit.
- Standard PCMCIA peripheral cards, such as modems, Ethernet or other LANs, and ATA (IDE) hard disks are supported. The Quickstart Kit supplies the baseline drivers to support these peripherals (the Award CardWare® drivers). Some peripheral cards come with their own special purpose drivers as well.

Note

Not all vendors of PCMCIA peripheral cards follow the PCMCIA Release 2 specification exactly when developing their drivers. There might be an incompatibility. OEMs should test the configuration they intend to support to be sure that the drivers are compatible.

- OTPROM cards are read-only devices. If formatted using the supplied utilities (or their equivalent), they can be used as read-only disk drives. These are typically used to distribute application program upgrades or data in high volume applications.

The Socket Module provides a +5V to +12V power converter to supply reliable programming power for Flash PCMCIA cards. This guarantees that the programming voltage for Flash cards meets the stringent demands of the Flash memory devices used on these cards. In addition, the on-board +12V converter eliminates the need for a separate +12V supply, allowing for a 5-volt-only embedded system.

You can order a model of the MiniModule/PCC with a 28F010 Flash EPROM. This EDPRM can be configured to act as a system boot ROM. This allows booting the system even when no PCMCIA card is installed in a socket.

Product Features

- Adds a PCMCIA Release 2 interface to all Ampro 16-bit CoreModule and Little Board products.
- Bus interface is compatible with the PC/104 Version 2.3 standard.
- Based on the Vadem VG-469 chipset, register-compatible with the Intel 82365SL.
- Supports PCMCIA SRAM, Flash EPROM, and OTPROM memory cards of up to 64 megabyte capacity.
- Supports standard PCMCIA peripheral cards, such as modems, LANs, and ATA (IDE) hard drives.
- DMA operation supported in local mode (with the Socket Module mounted directly on the CPU module).

- Available with either one or two PCMCIA card sockets. Sockets support Type I, II, III, and IV cards.
- Both 3.3V and 5V PCMCIA cards are supported.
- The optional Buffer Module permits mounting the Socket Module card up to 14 inches from the CPU board.
- Supports “hot” insertion and removal (“hot swapping”) of PCMCIA cards. That is, cards may be inserted and removed while the system is powered up.
- Provides a +5V to +12V converter to supply programming power for PCMCIA Flash EPROM cards. This allows for an embedded system with a single +5V supply.
- A boot ROM (utilizing a 28F010 Flash EPROM) is available as a factory option. (*Contact Ampro Technical Support for information about programming a boot ROM.*)

Chapter 2

Product Reference

Overview

This chapter contains the technical information you will need to install and configure the MiniModule/PCC. The information is presented in the following order:

- Physical Layout (page 2-2)
- Connector Summary (page 2-7)
- Configuration Jumper Summary (page 2-8)
- Hardware Setup (page 2-10)
- Software Setup (page 2-15)

Physical Layout

Figure 2- 1 shows the mounting dimensions, jumper locations, and connector locations for the two-socket version of the MiniModule/PCC.

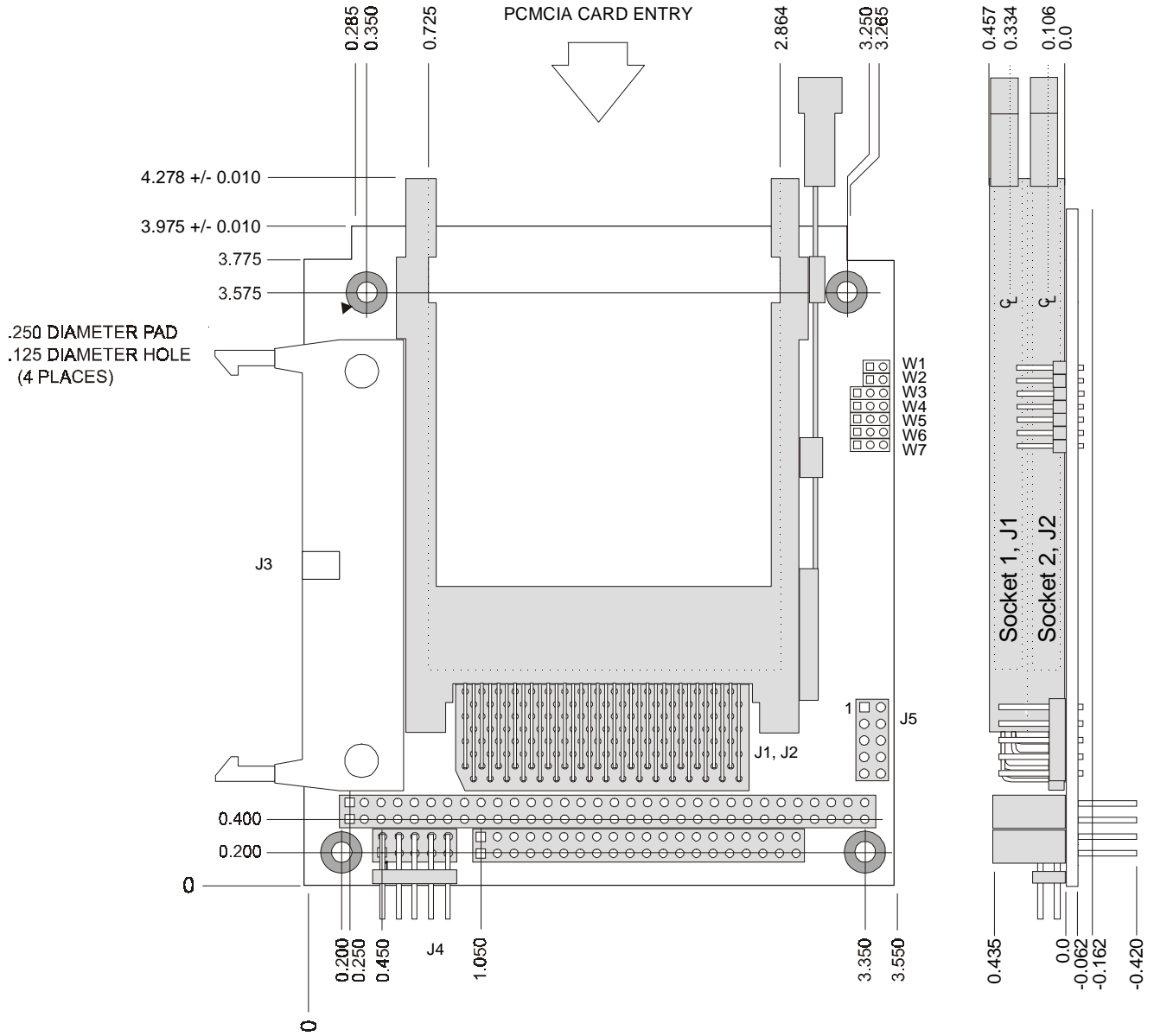


Figure 2- 1. Socket Module Mounting Dimensions, Dual-Socket Version

Figure 2– 2 shows additional details of the mounting dimensions, and connector locations for the two-socket version of the MiniModule/PCC.

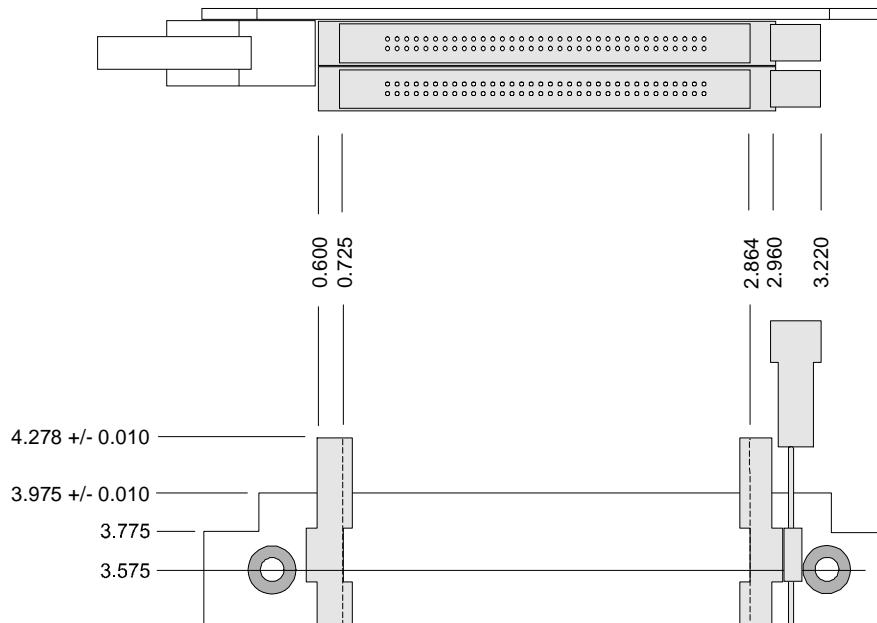


Figure 2– 2. Socket Module Dimension Details, Dual-Socket Version

Figure 2– 3 shows the mounting dimensions, jumper locations, and connector locations for the single-socket version of the MiniModule/PCC.

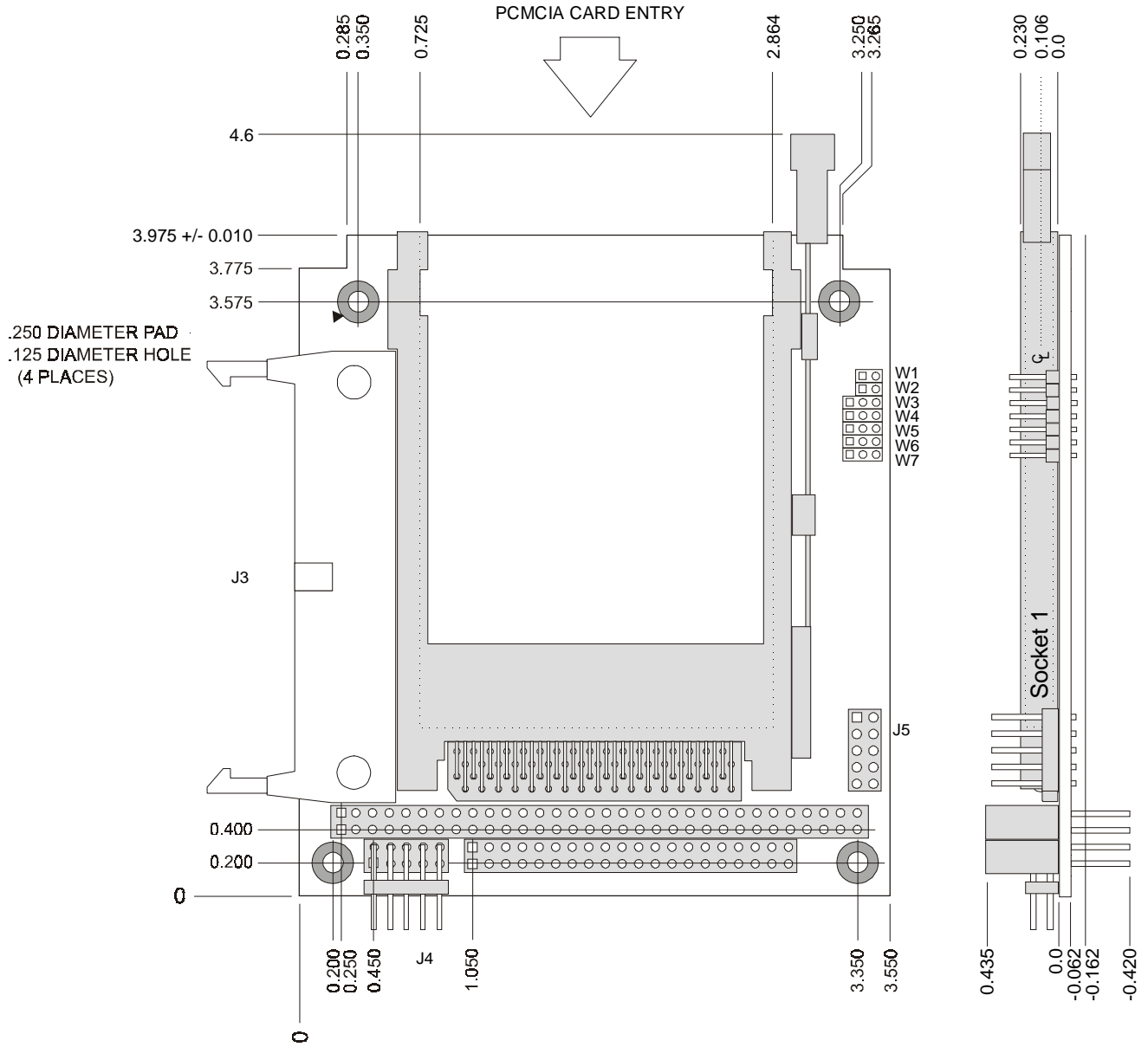


Figure 2– 3. Socket Module Mounting Dimensions, Single-Socket Version

Figure 2– 4 shows additional details of the mounting dimensions, and connector locations for the single-socket version of the MiniModule/PCC.

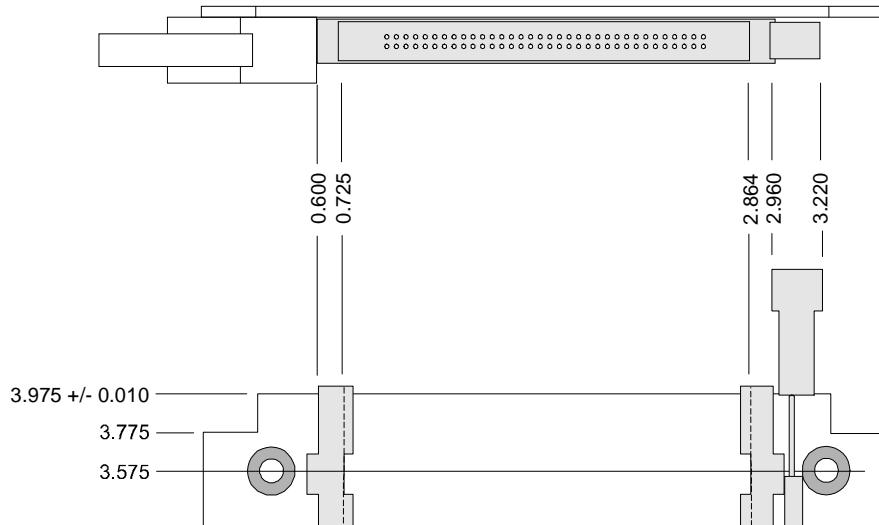


Figure 2– 4. Socket Module Dimension Details, Single-Socket Version

Figure 2– 5 shows the mounting dimensions, and connector locations for the Buffer Module.

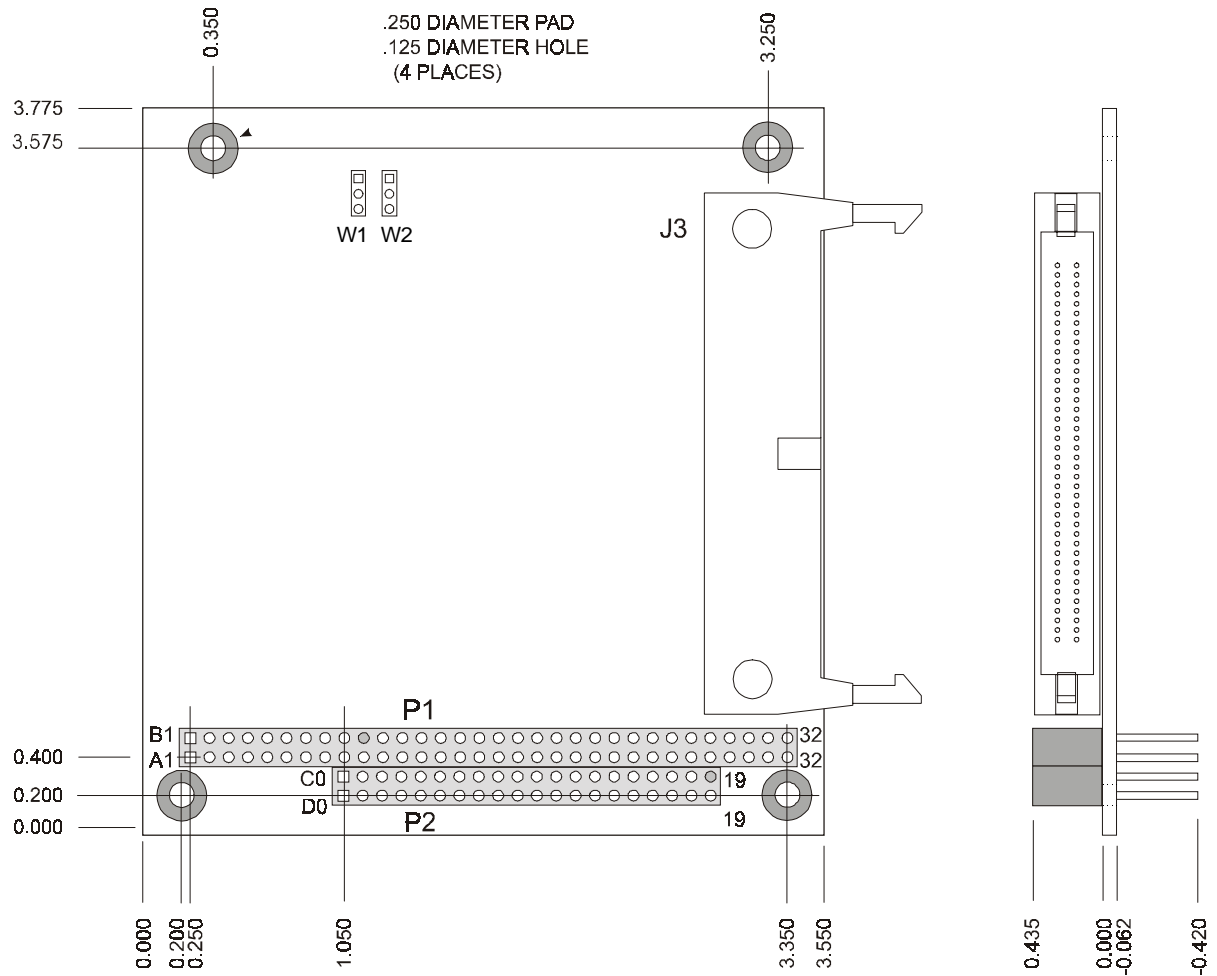


Figure 2– 5. Buffer Module Mechanical Dimensions

Connector Summary

Table 2– 1 lists the connectors on the Socket Module and Table 2– 2 lists the connectors on the Buffer Module. Details about these connectors are given in the sections listed in the Reference columns.

Table 2– 1. Socket Module Connector Summary

Connector	Description	Connector Type
P1a/P1b	PC/104 Connector	Local Version: 64-pin ST Remote Version: 64-pin NST
P2c/P2d	PC/104 Connector	Local Version: 40-pin ST Remote Version: 40-pin NST
J1	PCMCIA Socket	Upper PCMCIA Card Socket
J2	PCMCIA Socket	Lower PCMCIA Card Socket
J3	Inter-Module Connector	80-pin (dual 40-pin) ribbon cable connector (Remote Version only)
J4	Power Connector	10-pin .100 pin spacing (Remote Version only)
J5	Inter-Module Connector	10-pin ribbon cable connector
ST Stackthrough connector NST Non-Stackthrough connector		

Table 2– 2. Buffer Module Connector Summary

Connector	Description	Connector Type
P1a/P1b	PC/104 Connector	64-pin Stackthrough
P2c/P2d	PC/104 Connector	40-pin Stackthrough
J3	Inter-Module Connector	80-pin (dual 40-pin) ribbon cable connector

Jumper Summary

Table 2– 3 lists the jumper options available on the Socket Module. These options are described in sections listed in the Reference column.

Table 2– 3. Socket Module Jumper Summary (W1 – W7)

Jumper	Function	Default	Reference
W1	Boot ROM Enable (Factory-installed option) ON: Boot ROM enabled OFF: Boot ROM disabled	OFF: Disabled	2–17
W2	Programming Power to Boot ROM ON: Enabled OFF: Disabled	OFF: Disabled	2–17
W3	Voltage Mode 1/2: 5V Only 2/3: 5V/3.3V (Requires driver support)	1/2: 5V Only	
W4	I/O Address Selection 1/2: 3E0h/3E1h 2/3: 3E2h/3E3h	1/2: 3E0h – 3E1h	2–10
W5	DACK Select 1/2: DACK1 2/3: DACK7	1/2: DACK1	2–10
W6	Mode Control 1/2: Basic Mode 2/3: Extended Mode	2/3: Extended Mode	2–11
W7	DRQ Select 1/2: DRQ1 2/3: DRQ7	1/2: DRQ1	2–10

Table 2- 4 lists the jumper options available on the Buffer Module.

Table 2– 4. Buffer Module Jumper Summary (W1 – W2)

Jumpers	Function	Default	Reference
W1, W2	SD7 Support	W1-2/3, W2-2/3 (Disabled)	Both jumpers must be set to 2/3 if the driver supports SD7 for the bootable disk.

Hardware Setup

This section describes how to install the Socket Module hardware in your embedded system.

CPU Expansion Bus

The Socket Module is designed for CPU modules with 16-bit PC/104 interfaces only. CPU modules with 8-bit expansion buses are not supported. For memory card support in 8-bit-bus systems, use the Ampro Memory Card Adapter (MCA).

Selecting an I/O Address

The Socket Module uses two consecutive I/O port addresses. Two pairs of I/O addresses are available, a primary set and a secondary set. Normally you will choose the primary set if you install a single Socket Module in a system. Use the secondary set for a second Socket Module when you install two Socket Modules in a system.

Use jumper W4 to select the I/O addresses for the Socket Module.

- Install a shorting jumper on W4-1/2 to select 3E0h – 3E1h. This is the default value for a single Socket Module in a system.
- Install a shorting jumper on W4-2/3 to select 3E2h – 3E3h. This is the secondary address selection.

Selecting an Interrupt

When a PCMCIA card is inserted in a socket, the system is notified via an interrupt. An available interrupt channel is automatically selected during installation of the software driver. There are no jumpers or switches to set to assign interrupts.

PCMCIA peripheral cards, such as modems, LAN adapters, ATA hard disks, etc., often need an additional interrupt assignment. The circuitry on the Socket Module can attach a card interrupt to any unused interrupt channel on the PC/104 bus, under software control.

Selecting a DMA Channel

Some PCMCIA peripheral cards use DMA to transfer data. If you use the Socket Module in local mode, you can configure it for DMA transfers.

Note

DMA is available only if the Socket Module is in *local* mode. You cannot use DMA if the card is remotely connected by a ribbon cable using the Buffer Module.

You can select either DMA1 or DMA7. DMA1 is the default channel. (Be sure that the channel you choose is not being used by another peripheral in your system. DMA channels are not sharable resources.)

Set the following jumpers to configure the adapter for a DMA channel.

- Set W6 to enable Basic Mode.
- To select DMA channel 1, install jumpers on W5-1/2 (DACK1) and W7-1/2 (DRQ1).
- To select DMA channel 7, install jumpers on W5-2/3 (DACK7) and W7-2/3 (DRQ7).

PCMCIA Card Sockets

There are two PCMCIA card sockets on the dual-socket version of the Socket Module. They are called "Socket 1" and "Socket 2." Socket 2 is the one closest to the circuit board. On the single-socket version, there is just "Socket 1."

Card Types I, II, III, and IV are supported. (PCMCIA card "types" refer to the thickness of the cards.)

"Hot insertion" ("hot swapping") of memory and peripheral cards is permitted. "Hot insertion" means that you may plug your card in and remove it while the system is hot, that is, when the power is on.

Memory cards or disk drive cards are given the next logical drive letter in socket order by the operating system.

Local (Single-Board) Vs. Remote (Two-Board) Setup

The Socket Module can be mounted directly on a CPU module, or remotely, connected by an 80-wire ribbon cable to a Buffer Module that in turn is mounted on the CPU module.

In a *local* setup, mount the Socket Module (Local Version) directly on the host CPU module. You can stack one or two Socket Modules. Stack the Socket Module(s) and any other MiniModules so that the PCMCIA card slots are accessible. That is, order the modules in the stack to accommodate your product needs.

In a *remote* setup, mount the Socket Module independently from the CPU module, connected by a ribbon cable assembly to a Buffer Module. This permits additional flexibility in mounting both the CPU stack and the Socket Module(s). You can stack two Socket Modules remotely, one Local Version and one Remote Version.

In a *combination of local and remote* setup, you can mount one Socket Module (Local Version) directly on the host CPU module, and mount another Socket Module (Remote Version) independently from the CPU module, connected by a ribbon cable.

Certain jumpers are set differently, depending on whether you use a local or remote arrangement in your system. Table 2– 5 compares the jumper settings for each arrangement.

Table 2– 5. Local and Remote Jumper Options

Jumper	Local Settings	Remote Settings	Description
W6	1/2 (Basic)	2/3 (Extended)	Basic/Extended Mode Selection (See description below.)
W5	Optional	OFF	DACK Selection
W7	Optional	OFF	DRQ Selection

Note

If you stack two Socket Modules, a 10-pin inter-module ribbon cable is required.

If you use *two* Socket Modules in your system, make sure that you assign different I/O addresses to each with W4, and that the software drivers are configured properly for the two different addresses/interrupts.

Basic Mode

To set Basic Mode, install a jumper on W6.

In Basic Mode, the Socket Module must be installed locally, that is, directly on the ISA bus. You cannot use the Buffer Module.

In Basic Mode, both 5V and 3.3V PCMCIA cards can use DMA. (Note that W3 must be removed to permit mixed 5V/3.3V card support.)

Extended Mode

To set Extended Mode, remove any jumper from W6.

In Extended Mode, the Socket Module can be mounted either locally, or remotely (via the Buffer Module).

If mounted remotely, DMA is not available. If mounted locally, both 5V and 3.3V PCMCIA cards can use DMA. (Note that W3 must be removed to permit mixed 5V/3.3V card support.)

In Extended Mode, the Socket Module supports Plug and Play.

Mounting the Modules

Because the Socket Module and Buffer Module conform to the PC/104 mounting hole and board size dimensions, either can be mounted in a CoreModule stack or on a Little Board using threaded spacers. Details about mounting hole positions and sizes and board dimensions are provided in the set of figures beginning on page 2-2.

There is a distinct difference between dual-socket and single-socket versions of the Socket Module. The single-socket version does not stick out as far from the front edge of the PC board. Refer to Figure 2- 1 through Figure 2- 4 (beginning on page 2-2) to see the range of dimensions you will need to accommodate. The exact mounting requirements, of course, depend on the specifics of your stacking arrangement, the mechanical layout of your system, and servicing requirements.

If the module is mounted to allow inserting a PCMCIA card through a panel (or other arrangement requiring precise alignment), allow for some variation in the dimensions of the card socket used on the module. Specifically, the distance the card socket can protrude past the end of the PC board and the height of the card slot above the mounting plane can vary.

Power Cable

Connector J4 is provided on the Socket Module for +5V power. You should not power the board and its installed PCMCIA cards through the ribbon cable. J4 is an 10-pin connector with the following pinout (Table 2- 6).

Table 2- 6. Power Connector (J4)

J4 Pin	Function
1, 3, 7, 9	Ground
2, 8, 10	+5 Volts
4, 5, 6	No Connect

Table 2- 7. J4 Mating Connector

Connector Type	Mating Connector
Discrete Wire, 10-pin	MOLEX Housing 22-55-2010 Pin 16-02-0103

I/O Cables

When mounting the Socket Module remotely, mount the Buffer Module on the system CPU module and connect the 14-inch 80-pin cable between J3 on the Buffer Module and J3 on the Socket Module.

Using two Socket Modules in a System

If you are mounting a second Socket Module in your system, connect a short 10-pin ribbon cable between the connectors labeled J5 on the Socket Modules. Keep these cables as short as possible (~2 inches).

Note that each Socket Module must have unique I/O addresses. See “Selecting an I/O Address” on page 2–10 for details.

Additional Installation Issues

The following are additional considerations you should understand when designing an embedded system using the Socket Module.

- FCC RF emissions regulations may apply to systems built with the Socket Module. Take care to shield the embedded system, including the Socket Module, to keep RF emissions as low as possible. It is the responsibility of the OEM to make their systems compliant with FCC regulations.
- The frame ground connection provided by the PCMCIA socket(s) is connected through a 1K ohm resistor to logic ground. This provides a controlled static discharge path from the PCMCIA card to the system's power supply ground.
- +12V Flash programming power for flash cards comes from an on-board 5V to 12V power converter. You do not need to provide 12V DC power from an external source.

Software Setup

This section provides some basic information about installing Socket Module software in your embedded system. Detailed instructions for installing the software is provided in separate manuals.

Ampro supplies three sets of software for use with the MiniModule/PCC, Cardware for DOS/Windows 3.1x, Cardware for Windows NT, and TrueFFS. To obtain software drivers for other operating systems, contact the operating system vendor or visit their web sites:

OS/2: <http://www.software.ibm.com/os/warp/>

QNX: <http://www.qnx.com/>

VxWorks: <http://www.wrs.com/>

Software Licenses

The CardWare software (for Windows, Windows NT, and DOS) is a product of Award Software, a leader in system software, including BIOSes, drivers, and PCMCIA card support software. A license for the CardWare software is included with each Socket Module, permitting the software to be used with that Socket Module (only).

The TrueFFS Flash file system provided for the Socket Module is licensed from M-Systems, a leader in Flash file systems. A license for TrueFFS (True Flash File System) is included with each Socket Module, permitting TrueFFS to be used with that Socket Module (only).

Flash Card Drivers

Cards based on Flash EPROM can be handled as full read/write drives, using M-System's True Flash File System (TrueFFS™).

The TrueFFS drivers and utilities make Flash memory cards appear as disk drives with full read/write capability. TrueFFS provides an advanced "wear-leveling" technique to extend the life of Flash memory cards. Standard DOS utilities such as COPY, DIR, CHKDSK, etc. operate normally under TrueFFS. In addition, the TrueFFS system supplies a number of useful utilities, described in the TrueFFS documentation.

Procedures for installing TrueFFS software and for utilizing its associated utilities are described in the TrueFFS product documentation, provided under separate cover.

Windows Software Installation

Drivers for operation with Microsoft Windows 95 and Windows NT 4.x are provided by the Award CardWare suite of programs.

Documentation describing how to install the CardWare software, including these drivers, on your system is provided with the software. Refer to the CardWare documentation for information about installing the software on your Ampro-based system.

Plug and Play

The Socket Module supports the Plug and Play ISA Specification Version 1.0a to provide automatic configuration capability. This plug and play implementation lets the software relocate the module's internal registers from the default at 3E0h/3E1h or 3E2h/3E3h. Note that, for Plug and Play to function correctly, it must be supported by the BIOS and operating system.

Plug and Play is only available in Extended Mode. See page 2–12 for details about mode jumpering.

Using PCMCIA Peripheral Cards

The CardWare software can control a wide variety of PCMCIA peripheral cards, both memory cards and peripheral cards. However, some peripheral cards require additional drivers, called client drivers or *enablers*, to work properly. (A client driver operates during a card's active operation. An enabler runs once to configure the card and socket.)

The following is a list of some cards that may require a client driver or enabler:

- Network (LAN) cards
- SCSI cards
- Sound cards
- Pager cards
- Compression software

Refer to your card's technical documentation for instructions about required software. Normally, if a card requires special software, it is included with the card.

Using One-Time Programmable EPROM (OTEPROM) Cards

A One-Time Programmable EPROM (OTEPROM) card must be programmed by a card programmer. The Socket Module is not an OTPROM card programmer and cannot program such cards. However, the module's utility software can be used to format the data one would program into such cards. By using an SRAM PCMCIA card, data is automatically formatted and stored in a form that can be used to program into OTPROM cards. The SRAM memory image, stored in an OTPROM card, acts as a compatible read-only device when used in the Ampro system.

Most PCMCIA card programmers are also card readers. They read the information from cards without needing to know the format. To a card reader it is just a block of data. These programmers capture the SRAM card contents in their internal memory. They can then program this same data into an OTPROM card.

The sequence for creating OTPROM cards, then, is:

Step 1: Create an SRAM card as you normally would (using the Cardware software)

Step 2: Read the SRAM card into an OTPROM card programmer

Step 3: Write to one or more OTPROM cards.

Step 4: Use the OTPROM cards in systems that have the Socket Module.

Booting From an On-Board Boot EPROM

You may wish for your system to boot from a solid-state “boot EPROM.” This allows you to design a system with no rotating media, yet does not require that a PCMCIA card be installed in the Socket Module at boot time.

A boot EPROM Flash memory device is installed on the Socket Module as a factory option. The device is a 28F010 Flash memory chip. It can store 128K bytes of boot code. Order the MiniModule/PCC with the boot EPROM option if you want this feature.

Enabling a Boot EPROM

If your Socket Module has a boot EPROM, you can enable or disable it using jumper W1.

- To enable the boot EPROM, install a jumper on W1.
- To disable the boot EPROM, remove the jumper on W1.

Programming a Boot EPROM

If your Socket Module has a boot EPROM installed, and you plan to use this device for booting your system, you must program the device with the appropriate boot code.

To enable the 12V boot EPROM programming voltage, install a jumper on W2 during programming. It is best to leave W2 off except when programming the EPROM to prevent accidentally corrupting its contents if the system malfunctions.

(If you plan to use the onboard boot EPROM, contact Ampro Technical Support for detailed information about programming the device.)

Chapter 3

Specifications

Socket Module Specifications

This section lists the technical specifications of the Socket Module.

Physical Specifications

- **Size** 3.6 x 4.278 x 0.6 inches (91 x 108 x 15 mm)
 Mounting holes and basic form-factor compatible with the PC/104 specification. (See Figure 1-1 for details.)
- **Weight** Adapter only: 3.4 oz. (96 gm)

Power Specifications

- Without PCMCIA card installed 45 mA, typical, @ 5 Vdc \pm 5% (Input)
- With a typical memory card installed 50 mA, typical, @ 5 Vdc \pm 5% (Input)
- Flash Programming Power Converter 10 mA @ +12 Vdc \pm 5% (Output)
 (while programming a Flash card)

Operating Environment

- Operating Temperature Range: 0° to 70° C (32° to 158° F)
- Humidity: 5 to 95% relative humidity (non-condensing)
- Storage temperature: -55° to +85° C (-67° to 185° F)

Buffer Module Specifications

This section lists the technical specifications of the Buffer Module.

Physical Specifications

- **Size** 3.6 x 3.8 x 0.6 inches (91 x 96.5 x 15 mm)
 Mounting holes and basic form-factor compatible with the PC/104 specification.
- **Weight** Adapter only: 2.3 oz. (65 gm)

Power Specifications

- Module only: 200 mA, typical, @ 5 Vdc \pm 5% (Input)

Operating Environment

- Operating Temperature Range: 0° to 70° C (32° to 158° F)
- Humidity: 5 to 95% relative humidity (non-condensing)
- Storage temperature: -55° to +85° C (-67° to 185° F)

Ampro Product Reliability Testing

Regulatory testing

Knowing that many embedded systems must qualify under EMC emissions susceptibility testing, Ampro designs boards with careful attention to EMI issues. Boards are tested in standard enclosures to ensure that they can pass such emissions tests. Tests include European Union Directives EMC EN55022 and EN55011, ESD EN 61000-4-2, RF susceptibility ENV 50140, EFT EN61000-4-5, and conducted emissions at US voltages per FCC Part 15, Subpart J.

Shock and Vibration Testing

Boards intended for use in harsh environments are tested for shock and vibration durability to MIL-STD 202F, Method 213-I, Condition A (three 50G shocks in each axis) and MIL-STD 202F, Method 214A, Table 214-I, Condition D (11.95B random vibration, 100 Hz to 1000 Hz). (Contact your Ampro sales representative to obtain *Shock and Random Vibration Test Report for the Little Board/P5i CPU* for details.)

ISO 9001 Manufacturing

Ampro is a certified ISO 9001 vendor.

Wide-range temperature testing

Ampro Engineering qualifies all of its designs by extensive thermal and voltage margin testing. Contact your Ampro sales representative to obtain details about the thermal and voltage margin tests performed on the MiniModule/PCC during product qualification.

Chapter 4

Contact Information

Useful Addresses

If you want to know more about the PC/104 Version 2.3 standard, you can obtain information from:

PC/104 Consortium

PO Box 4303

Mountain View, CA 94040-4303

Phone: 415 903-8304

FAX: 415 967-0995

If you want to know more about the PCMCIA standards, you can obtain the PCMCIA Release 2 specification and the PCMCIA Socket Services Interface Specification from:

PCMCIA

1030G East Duane Avenue

Sunnyvale, CA 94086

Phone: (408) 720-0107

FAX: (408) 720-9416

For more information about Award's CardWare software products, contact:

Award Software International, Inc.

Corporate Offices

777 East Middlefield Road

Mountain View, CA 94043-4023

Phone: (415) 968-4433

FAX: (415) 968-0274

Internet: <http://www.award.com>

For more information about M-Systems TrueFFS, contact:

In the USA:

M-Systems

200 Broadhollow Road

Suite 207

Melville, NY 11747

Phone: 516 424-4545

FAX: 516 424-4546

In Europe, etc.:

M-Systems

PO Box 58036

Tel Aviv, Israel 61580

Phone: 972-3-647-7776

FAX: 972-3-647-6668

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