FORCE COMPUTERS
A SOLECTRON COMPANY

SPARC/CPU-5VT

Installation Guide

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Table of Contents

List of Tables and Figures

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Using This Manual

This section does not provide information on the product, but on standard features of the manual itself:

- Its structure
- Special layout conventions
- Related documents

Audience of the Manual and Overview of the Manual

This *Installation Guide* is intended for hard- and software developers as well as support and service engineers installing the SPARC/CPU-5VT. It is packaged and shipped together with the product.

Note: **Please take a moment to examine the Table of Contents to see how this documentation is structured. This will be of value to you when looking for information in the future.**

This *Installation Guide* includes the installation instructions for powering up the board, in detail:

- The default configuration of the board, for example, the default switch setting
- Initialization prerequisites and procedures
- Connector pinouts

The installation instructions are also published in the product's *Technical Reference Manual* – a separate manual delivered as separate price list item. The *Technical Reference Manual* includes the following sections:

- Overview of the product, its specification and ordering information
- Detailed hardware description
- Circuit schematics of the SPARC/CPU-5VT for reference purposes
- Data sheets of SPARC/CPU-5VT components that are relevant for configuring and integrating the board in systems
- Detailed software description

Table a History of manual publication

Order No.	Revision	Date	Description
204028	1	First Print	January 1996
204028	2	Sept. 1996	Updated description of the Ethernet address and host ID and added description of availablity of parallel port on 5-row P2 connector
204028	3	October 1996	Extended safety note
204028	4	November 1996	Reformatted
204028	5	October 1997	Section 1.4.2 “VMEbus SYS-RESET” revised
204028	6.0	June 1998	Section 2.4.3 “Serial Ports”: addition of Hybrid FH-422T
204028	7.0	March 1999	Figure 10 “VME P2 Connector Pinout”, pins D27-D30: ETH#1 replaced by ETH#2 P2 factory option changed from 5-row to 3-row and 5-row became the standard
204028	8.0	December 1999	Added section 1 “Safety Notes” on page 1, editoral changes
215901	AA	October 2001	Completely revised Safety Notes, added section “Sicherheitshinweise”, editorial changes

Table b **Fonts, notations and conventions**

Notation	Description
	All numbers are decimal numbers except when used with the following notations:
`0000.0000`$_{16}$	Typical notation for hexadecimal numbers (digits are 0 through F), e.g. used for addresses and offsets. Note the dot marking the 4th (to its right) and 5th (to its left) digit.
`0000`$_{8}$	Same for octal numbers (digits are 0 through 7)
`0000`$_{2}$	Same for binary numbers (digits are 0 and 1)
`Program`	Typical character format used for names, values, and the like. It is used to indicate when to type literally the same word. Also used for on-screen output.
Variable	Typical character format for words that represent a part of a command, a programming statement, or the like, and that will be replaced by an applicable value when actually applied.

Icons for Ease of Use: Safety Notes and Tips & Tricks

The following three types of safety notes appear in this manual. Be sure to always read and follow the safety notes of a section first – before acting as documented in the other parts of the section.

Danger

Dangerous situation: serious injuries to people or severe damage to objects.

Caution

Possibly dangerous situation: slight injuries to people or damage to objects possible.

Note: **No danger encountered. Pay attention to important information marked using this layout.**

1 Safety Notes

This section provides safety precautions to follow when installing, operating, and maintaining the SPARC/CPU-5VT.

We intend to provide all necessary information to install and handle the SPARC/CPU-5VT in this Installation Guide. However, as the product is complex and its usage manifold, we do not guarantee that the given information is complete. If you need additional information, ask your Force Computers representative.

The SPARC/CPU-5VT has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.

Only personnel trained by Force Computers or persons qualified in electronics or electrical engineering are authorized to install, maintain, and operate the SPARC/CPU-5VT. The information given in this manual is meant to complete the knowledge of a specialist and must not be taken as replacement for qualified personnel.

EMC

The board has been tested in a Standard Force Computers system and found to comply with the limits for a Class A digital device in this system, pursuant to part 15 of the FCC Rules respectively EN 55022 Class A. These limits are designed to provide reasonable protection against harmful interference when the system is operated in a commercial, business or industrial environment.

The board generates and uses radio frequency energy and, if not installed properly and used in accordance with this Installation Guide, may cause harmful interference to radio communications. Operating the system in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

If you use the board without a PMC module, cover empty slots with blind panels to ensure proper EMC shielding. If boards are integrated into open systems, always cover empty slots.

The front panel of the SPARC/CPU-5VT provides one cutout for a PMC module. If the board is shipped without the module installed, the front panel cutout is covered by a blind panel to ensure proper EMC shielding. To ensure proper EMC shielding, always operate the SPARC/CPU-5VT with the blind panel or with a PMC module installed.

Installation

Electrostatic discharge and incorrect board installation and removal can damage circuits or shorten their life. Therefore:

- **Before installing or removing the board, read section 3 “Installation” on page 9.**
- **Before touching boards or electronic components, make sure that you are working in an ESD-safe environment.**
- **When plugging the board in or removing it, do not press on the front panel but use the handles.**
- **Before installing or removing an additional device or module, read the respective documentation.**
- **Make sure that the board is connected to the VMEbus backplane via all assembled connectors and that power is available on all power pins.**
- **Before installing the board in or removing it from a VME rack, take the following precautions:**
  - **Check all installed boards for steps you have to take before turning off power.**
  - **Take those steps.**
  - **Finally, turn off power.**

Operation

While operating the board ensure that the environmental and power requirements are met.

When operating the board in areas of electromagnetic radiation ensure that the board is bolted on the VME system and the system is shielded by enclosure.

Make sure that contacts and cables of the board cannot be touched while the board is operating.

Replacement/Expansion

Only replace or expand components or system parts with those recommended by Force Computers. Otherwise, you are fully responsible for the impact on EMC and the possibly changed functionality of the product.

Check the total power consumption of all components installed (see the technical specification of the respective components). Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).

RJ-45 Connector

An RJ-45 connector is used for telephone connectors and for twisted-pair Ethernet (TPE) connectors. Mismatching these two connectors may destroy your telephone as well as your SPARC/CPU-5VT. Therefore:

- **Make sure that TPE connectors are clearly marked as network connectors.**
- **Make sure that TPE bushing of the system is connected only to safety extra low voltage (SELV) circuits.**
- **Verify that the total length of the electric cable connected to a TPE bushing does not exceed 100 meter.**

If in doubt, ask your administrator.

IOBP

The IOBP-10 and the IOBP-DS are especially designed for the SPARC/CPU-5VT. Do not use any other IOBPs on the SPARC/CPU-5VT.

Jumper Settings

If you use an IOBP-DS, the switch matrix must be located on B2/B1 and B5/B4 to route SCSI#2 to P2 row C. If you use an IOBP-10, the switch matrix must be located on B3/B2 and B6/B5 to route the floppy interface to P2 row C.

Environment

Always dispose of old boards according to your country's legislation, if possible in an environmentally acceptable way.

2 Sicherheitshinweise

Dieser Abschnitt enthält Sicherheitshinweise, die bei Einbau, Betrieb und Wartung des SPARC/CPU-5VT zu beachten sind.

Wir sind darauf bedacht, alle notwendigen Informationen zum Einbau und zum Umgang mit dem SPARC/CPU-5VT in diesem Handbuch bereit zu stellen. Da es sich jedoch bei dem SPARC/CPU-5VT um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Ihnen Informationen fehlen sollten, wenden Sie sich bitte an Ihren Vertreter von Force Computers.

Das SPARC/CPU-5VT erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschließlich für Anwendungen in der Telekommunikationsindustrie und im Zusammenhang mit Industriesteuerungen verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch Force Computers ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschließlich dazu, das Wissen von Fachpersonal zu ergänzen, können dieses jedoch nicht ersetzen.

EMV

Das Board wurde in einem Force Computers Standardsystem getestet. Es erfüllt die für digitale Geräte der Klasse A gültigen Grenzwerte in einem solchen System gemäß den FCC-Richtlinien Abschnitt 15 bzw. EN 55022 Klasse A. Diese Grenzwerte sollen einen angemessenen Schutz vor Störstrahlung beim Betrieb des Boards in Geschäfts-, Gewerbe- sowie Industriebereichen gewährleisten.

Das Board arbeitet im Hochfrequenzbereich und erzeugt Störstrahlung. Bei unsachgemäßem Einbau und anderem als in diesem Handbuch beschriebenen Betrieb können Störungen im Hochfrequenzbereich auftreten. Warnung! Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen. In diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen.

Wenn Sie das Board ohne ein PMC Modul verwenden, schirmen Sie freie Steckplätze mit einer Blende ab, um einen ausreichenden EMV Schutz zu gewährleisten. Wenn Sie Boards in Systeme einbauen, schirmen Sie freie Steckplätze mit einer Blende ab.

Die Frontplatte des SPARC/CPU-5VT hat eine Aussparung für ein PMC Modul. Wird das Board ohne installiertes PMC Modul geliefert, ist die Aussparung in der Frontplatte von einer Blende bedeckt, um ausreichenden EMV-Schutz zu gewährleisten. Um ausreichenden EMV-Schutz zu gewährleisten, betreiben Sie das SPARC/CPU-5VT immer mit der Blende oder mit einem installierten PMC Modul.

Installation

Elektrostatische Entladung und unsachgemäßer Ein- und Ausbau des Boards kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen. Beachten Sie deshalb die folgenden Punkte:

- **Bevor Sie Boards oder elektronische Komponenten berühren, vergewissern Sie sich, dass Sie in einem ESD-geschützten Bereich arbeiten.**
- **Lesen Sie vor Ein- oder Ausbau des Boards den Abschnitt 3 “Installation” auf Seite 9.**
- **Drücken Sie bei Ein- oder Ausbau des Boards nicht auf die Frontplatte, sondern benutzen Sie die Griffe.**
- **Lesen Sie vor dem Ein- oder Ausbau von zusätzlichen Geräten oder Modulen das dazugehörige Benutzerhandbuch.**
- **Vergewissern Sie sich, dass das Board über alle Stecker an die VMEbus Backplane angeschlossen ist und Strom an allen Spannungskontakten anliegt.**
- **Machen Sie folgendes vor Ein- oder Ausbau aus einem VME System:**
  - **Überprüfen Sie alle installierten Boards auf Schritte, die Sie vor dem Stromabschalten unternehmen müssen.**
  - **Unternehmen Sie diese Schritte.**
  - **Schalten Sie danach den Strom ab.**

Betrieb

Achten Sie darauf, dass die Umgebungs- und die Leistungsanforderungen während des Betriebs eingehalten werden.

Wenn Sie das Board in Gebieten mit elektromagnetischer Strahlung betreiben, stellen Sie sicher, dass das Board mit dem CompactPCI System verschraubt ist und das System durch ein Gehäuse abgeschirmt wird.

Stellen Sie sicher, dass Anschlüsse und Kabel des Boards während des Betriebs nicht berührt werden können.

Austausch/Erweiterung

Verwenden Sie bei Austausch oder Erweiterung nur von Force Computers empfohlene Komponenten und Systemteile. Andernfalls sind Sie für mögliche Auswirkungen auf EMV und geänderte Funktionalität des Produktes voll verantwortlich.

Überprüfen Sie die gesamte aufgenomme Leistung aller eingebauten Komponenten (siehe die technischen Daten der entsprechenden Komponente). Stellen Sie sicher, dass die Ausgangsströme jedes Verbrauchers innerhalb der zulässigen Grenzwerte liegen (siehe die technischen Daten des entsprechenden Verbrauchers).

RJ-45 Stecker

Das CPU Board ist mit RJ-45 Steckern ausgestattet. Dieser Stecker wird sowohl für Telefonanschlüsse als auch für Netzwerkkabel (Twisted Pair Ethernet - TPE) verwendet. Die Verwechslung dieser Anschlüsse kann sowohl das Telefon als auch das Board zerstören. Beachten Sie deshalb die folgenden Punkte:

- **Vergewissern Sie sich, dass Anschlüsse deutlich als Netzwerkanschlüsse gekennzeichnet sind.**
- **Schließen Sie TPE-Stecker/Netzwerkstecker Ihres Systems nur an Sicherheitskleinspannungskreise (SELV) an.**
- **Vergewissern Sie sich, dass die an einem TPE-Anschluss angeschlossene Leitung eine Gesamtlänge von 100 Metern nicht überschreitet.**

Falls Sie Fragen haben, wenden Sie sich an Ihren Systemadministrator.

IOBP

Das IOBP-10 und das IOBP-DS wurden speziell für das SPARC/CPU-5VT entwickelt. Verwenden Sie keine anderen IOBPs zusammen mit dem SPARC/CPU-5VT.

Jumper Einstellungen

Bei einem IOBP-DS muss die Switch-Matrix auf B2/B1 und B5/B4 liegen, um SCSI#2 Signale zu P2 Reihe C zu leiten. Bei einem IOBP-10 muss die Switch-Matrix auf B3/B2 und B6/B5 liegen, um die Diskettenschnittstelle zu P2 Reihe C zu leiten.

Umweltschutz

Entsorgen Sie alte Boards gemäß der in Ihrem Land gültigen Gesetzgebung, wenn möglich umweltfreundlich.

3 Installation

3.1 Location Diagram

A location diagram showing the important components on the SPARC/CPU-5VT (top view) appears on the following page. On the page next to it, there is a location diagram of the SPARC/CPU-5VT (bottom view) showing the position of five of the on-board switches.

Figure 1 SPARC/CPU-5VT Location Diagram: Top View

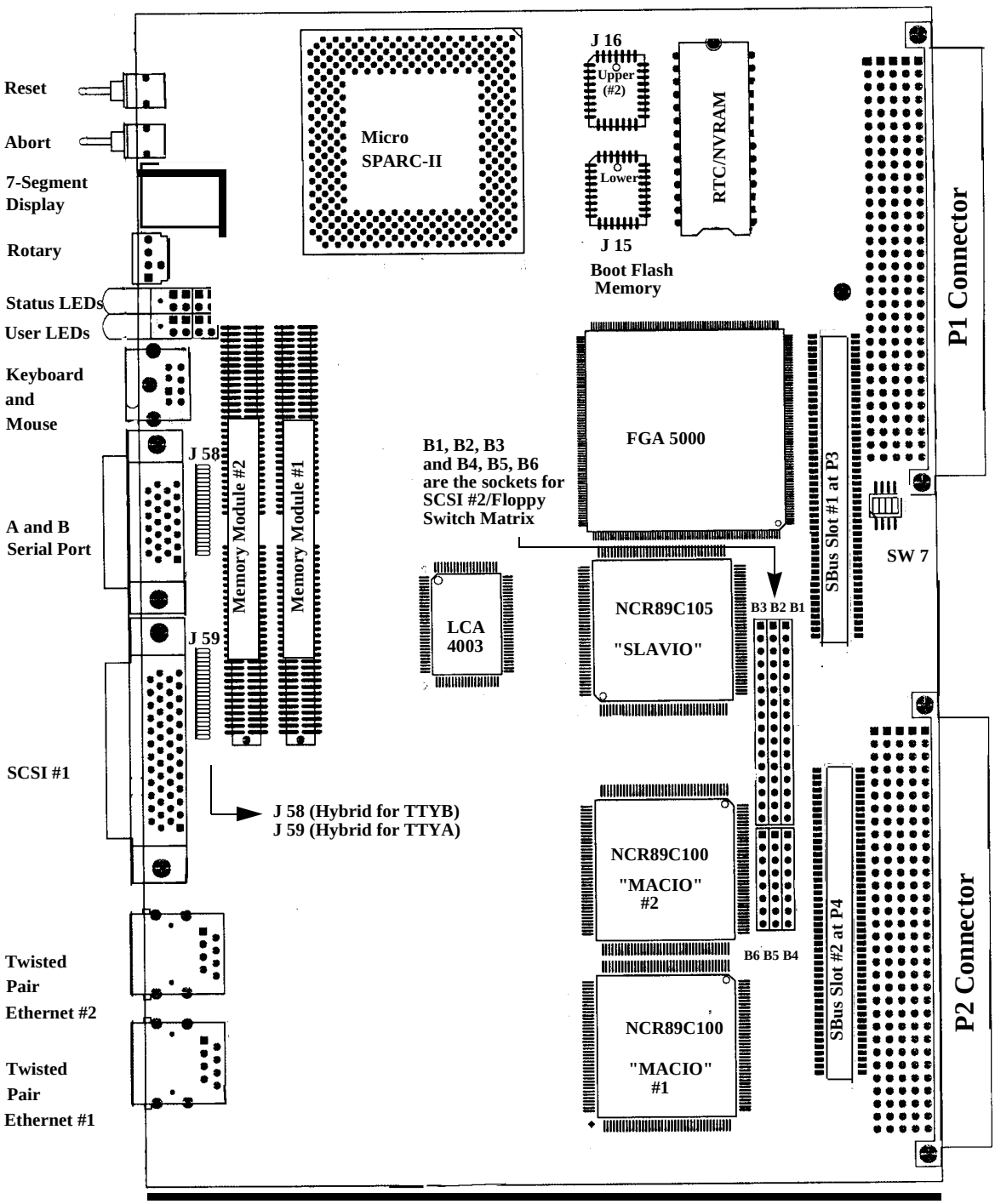
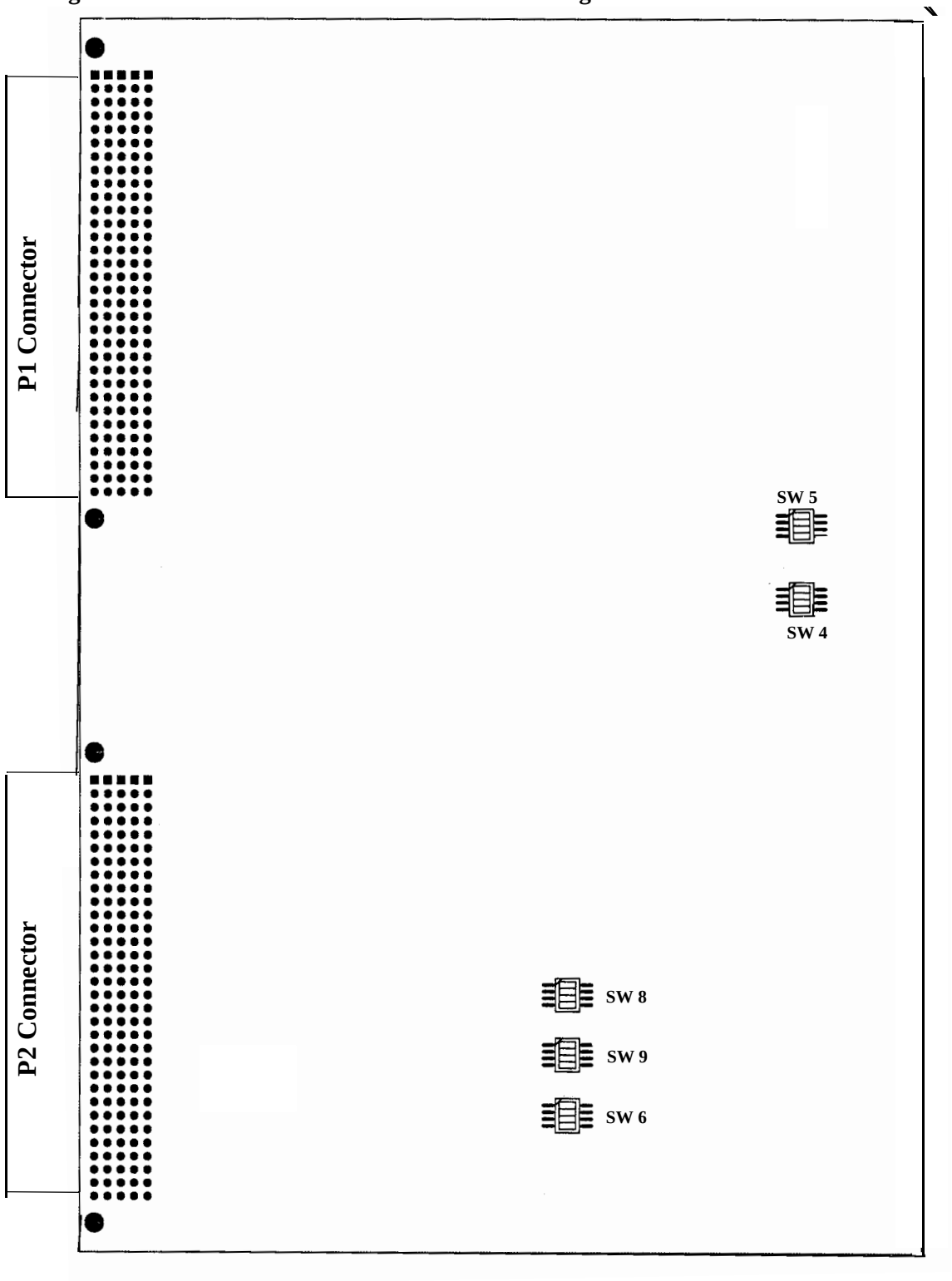


Figure 2 SPARC/CPU-5VT Location Diagram: Bottom View



3.2 Before Powering Up

Before powering up, please make sure that the default switch settings are all set according to the table below. Check these switch settings before powering up the SPARC/CPU-5VT because the board is configured for power up according to these default settings. For the position of the switches on the board, please see the diagrams on the previous two pages.

3.2.1 Default Switch Setting

Table 3 Default Switch Settings

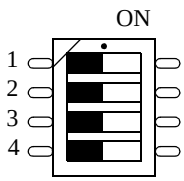
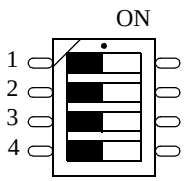
Name and Default Setting		Function
Serial A Config. 	SW4-1 OFF	OFF = TRXC on Front Panel Connector for RS-232 ON = reserved for RS-485 OFF = RS-422
	SW4-2 OFF	OFF = CTS (CTS+/-) on Front Panel Connector for RS-232 (RS-422) ON = RTXC +/- on Front Panel Connector for RS-422
	SW4-3 OFF	OFF = RTS (RTS+/-) on Front Panel Connector for RS-232 (RS-422) ON = TRXC +/- on Front Panel Connector for RS-422
	SW4-4 OFF	reserved: must be OFF.
Serial B Config. 	SW5-1 OFF	OFF = TRXC on Front Panel Connector for RS-232 ON = reserved for RS-485 OFF = RS-422
	SW5-2 OFF	OFF = CTS (CTS+/-) on Front Panel Connector for RS-232 (RS-422) ON = RTXC +/- on Front Panel Connector for RS-422
	SW5-3 OFF	OFF = RTS (RTS+/-) on Front Panel Connector for RS-232 (RS-422) ON = TRXC +/- on Front Panel Connector for RS-422
	SW5-4 OFF	reserved; must be OFF.

Table 3 Default Switch Settings (cont.)

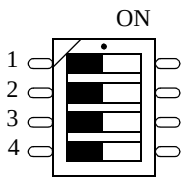
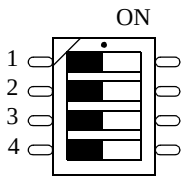
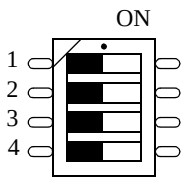
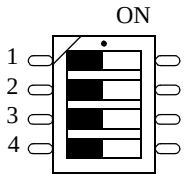
Name and Default Setting		Function
	SW6-1 OFF	SCSI Termination for SCSI #1 on Front Panel OFF = SCSI-Term Front Panel automatic ON = SCSI-Term Front Panel disabled
	SW6-2 OFF	SCSI Termination for SCSI #1 on P2 OFF = disabled ON = enabled
	SW6-3 OFF	SCSI Termination for SCSI #2 on P2 OFF = enabled ON = disabled
	SW6-4 OFF	Reset Key on Front Panel Control OFF = RESET Key enabled ON = RESET Key disabled
	SW7-1 OFF	VMEbus SYSRESET on POWER UP OFF = enabled ON = disabled
	SW7-2 OFF	External VMEbus SYSRESET OFF = VMEbus SYSRESET generates on-board RESET ON = VMEbus SYSRESET does not generate on-board RESET
	SW7-3 OFF	VMEbus SYSRESET Generation OFF = SYSRESET is driven to VMEbus ON = SYSRESET is not driven to VMEbus
	SW7-4 OFF	Abort Key Control OFF = ABORT Key enabled ON = ABORT Key disabled

Table 3 Default Switch Settings (cont.)

Name and Default Setting		Function
	SW8-1 OFF	Automatic VMEbus Slot-1 Detection OFF = Automatic detection of VME Slot 1 Function ON = Automatic detection of VME Slot 1 Function disabled. Use SW8-2 instead.
	SW8-2 OFF	Manual VMEbus Slot-1 Selection OFF = VME Slot 1 Function enabled ON = VME Slot 1 Function disabled SW8-2 is active only when SW8-1 = ON!
	SW8-3 OFF	Test Switch, must be OFF
	SW8-4 OFF	Voltage Sensor Sensibility Select OFF = Power Sense 4.75V ON = Power Sense 4.5V
	SW9-1 OFF	Boot Flash EPROM Write Protection OFF = Write Boot Flash disabled ON = Write Boot Flash enabled
	SW9-2 OFF	User Flash EPROM Write Protection OFF = Write User Flash disabled ON = Write User Flash enabled
	SW9-3 OFF	Local LCA Configuration Mode OFF = LCA Configuration Mode Serial PROM ON = LCA Configuration Mode Download
	SW9-4 OFF	VME64 EXT LCA Configuration Mode OFF = LCA Configuration Mode Serial PROM ON = LCA Configuration Mode Download The VME64EXT LCA is an assembly option.

3.2.2 Memory Module MEM-5

It is necessary to install the memory module on the board before powering up. For instructions on installing the MEM-5, please see the document ***How to Install MEM-5.***

Memory Module # 1 must be installed for power up because it holds configuration information for booting the board. Memory Module # 2 is optional for increasing memory capacity. For the location of the memory module connectors on the board, please see figure 1 “SPARC/CPU-5VT Location Diagram: Top View” on page 10.

3.3 Powering Up

The initial power up can easily be done by connecting a terminal to ttya (serial port A). The advantage of using a terminal is that no frame buffer, monitor, or keyboard is used for initial power up, which facilitates a simple startup.

Note: **For the initial power up, do not connect a keyboard to the board when using ttya (serial port A). Please see section 3.4.1 "Boot the System" on page 20 for more detailed information on booting the system.**

3.3.1 VME Slot-1 Device

Automatic VME Slot-1 Detection

Your SPARC/CPU-5VT is configured by default for an automatic detection of VMEbus Slot-1 position (SW8-1 is OFF).

Note: **Automatic VMEbus Slot-1 detection will function properly only if all VMEbus boards installed in your system support this feature.**

It is necessary that all boards installed in your system drive the VMEbus BG3OUT* signal at power up to support the automatic VME Slot-1 detection.
To disable this automatic VMEbus Slot-1 detection feature you must turn SW8-1 to ON.
If automatic detection of VMEbus Slot-1 position is turned off (SW8-1 is ON), then SW8-2 is used to enable the VMEbus Slot-1 controller functions of your SPARC/CPU-5VT.

Note: **Before installing the SPARC/CPU-5VT in a miniforce chassis, please first disable the VMEbus System Controller function by setting switch SW8-2 to ON. And be sure SW8-1 is turned ON to disable automatic detection of VMEbus Slot-1.**

3.3.2 VMEbus SYSRESET

SYSRESET Input

A SYSRESET received from VMEbus generates an on-board RESET if switch SW7-2 is OFF (Default Setting). When SW7-2 is ON, the SYSRESET received from the VMEbus does not generate an on-board RESET.

SYSRESET Output

A SYSRESET signal is generated to the VMEbus when an on-board local SBus reset occurs on your SPARC/CPU-5VT (e.g. the front panel reset key is toggled or power failure is detected), the SPARC/CPU-5VT generates the SYSRESET signal to the VMEbus. This SYSRESET signal can be disabled by setting the switch SW7-3 to ON.

As written in the VME specification, each board must assert SYSRESET output at power up when power supply reaches 3 volts until power is stable. This feature is enabled by default (SW 7-1 is OFF). It can be disabled by setting SW 7-1 to ON.

3.3.3 Serial Ports

By default, both serial ports are configured as RS-232 interfaces. It is also possible to configure both ports as RS-422 interfaces. This optional configuration is achieved with the special Force Computers Hybrid FH-003 or FH-422T.

The table 3 “Default Switch Settings” on page 12 shows the necessary switch settings for RS-232 operation, where SW4 controls serial port A and SW5 controls serial port B. Please check that the switches are set accordingly.

3.3.4 RESET and ABORT Key Enable

By default, the RESET and ABORT Key functions on the front panel are enabled. To disable the RESET or the ABORT Key functions on the front panel, set switches SW6-4 (RESET) and SW7-4 (ABORT) to ON, respectively.

3.3.5 SCSI Termination

SCSI #1 Termination

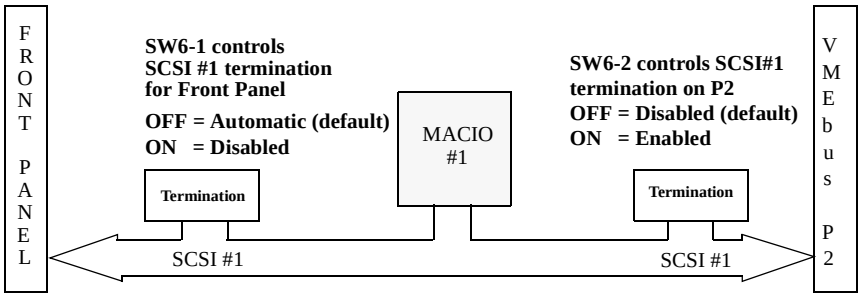
The SCSI #1 Interface is available on the front panel (50-pin connector) and on row A of VME-P2 connector.
Therefore, termination networks are placed near the front-panel connector and near P2:

- SW 6-1 controls SCSI #1 termination on the front panel (default is OFF = automatic termination). When switch SW6-1 is OFF, the termination is set to automatic termination mode. Automatic termination mode means the respective termination is disabled when you connect a standard SCSI cable to the connector.
- SW 6-2 controls SCSI #1 termination on P2 (default is OFF = termination disabled).

By default, both switches are OFF. This means that P2 termination is off and a SCSI device can be connected via P2. The automatic front-panel termination via SW 6-1 ensures that the termination is enabled when no SCSI device is connected to the front panel and will automatically be disabled when a SCSI device is connected to the front panel.

If you do not connect a SCSI device on P2, the SCSI #1 P2 termination (SW 6-2) must be enabled (for example, when you connect a SCSI device via the front panel to SCSI #1 and your board is located at the physical end of the SCSI #1 bus).

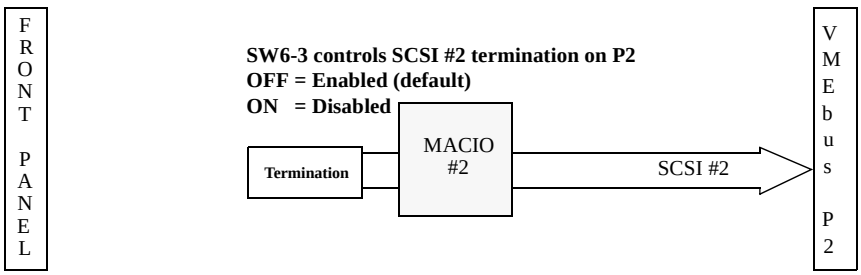
Figure 3 **SCSI #1 Termination**



SCSI #2 Termination

The SCSI #2 interface is only available on P2 row C if it is enabled by switch matrix instead of floppy interface.
Therefore, only one termination is placed for SCSI #2. SW 6-3 controls SCSI #2 termination on P2 (Default is OFF = termination enabled).
If you connect a SCSI device on SCSI #2 via P2, you may disable the SCSI #2 termination by setting SW 6-3 to ON. For example, in case your board is not located at the physical end of the SCSI #2 bus, that is there are SCSI devices on the left and on the right of your board's SCSI #2.

Figure 4 **SCSI Termination**



3.3.6 Boot Flash Memory Write Protection

Both Boot Flash Memories are write protected via the switch SW9-1. When SW9-1 is OFF, the devices are write protected, and this is the default setting.

3.3.7 User Flash Memory Write Protection

The optional User Flash Memories are write protected via SW9-2. When SW9-2 is OFF, the User Flash EPROMs are write protected, and this is the default setting.

3.3.8 Reserved Switches

SW4-4, SW5-4 and SW 8-3 are reserved for test purposes. They must be OFF.

3.3.9 Floppy Interface or SCSI #2 Availability on P2

It is important to understand that the availability of both the floppy and SCSI #2 devices at the same time is dependent upon the availability of a 5-row P2 connector. When using a 3-row P2 connector (factory option), you have the choice of either the floppy or the SCSI #2 on P2. The following describes how to configure the board for floppy or SCSI #2:

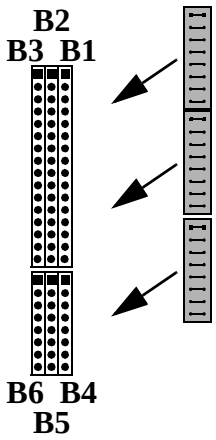
Via a 3-piece configuration switch matrix, it is possible for either the floppy interface or the SCSI #2 to be available on the VME P2 connector on row C:

- For the floppy interface on row C plug the switch matrix into sockets B3/B2 and B6/B5. This is the default setting.
- For the SCSI #2 interface on row C plug the switch matrix into sockets B2/B1 and B5/B4.

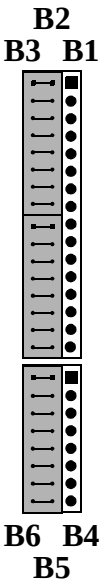
Caution

If you use an IOBP-DS, the switch matrix must be located on B2/B1 and B5/B4 in order to route SCSI #2 to P2 row C. If you use an IOBP-10, the switch matrix must be located on B3/B2 and B6/B5 in order to route the floppy interface to P2 row C.

Figure 5 **Floppy or SCSI #2 Availability on P2**

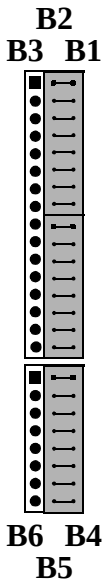


Floppy interface on row C when the switch matrix is plugged in B3/B2 and B6/B5:



This configuration must be used when using an IOBP-10.

SCSI #2 interface on row C when the switch matrix is plugged in B2/B1 and B5/B4:



This configuration must be used when using an IOBP-DS.

3.3.10 Network Interface Selection (NIS) for Ethernet

It is important to understand that the Ethernet is selected either via the twisted pair connector or the AUI (Attachment Unit Interface). When you boot your system and a connection exists with an AUI network, then the AUI is automatically selected. In other words, when you have a successful connection with a network, the AUI is used. When you have no connection with the network, then the twisted pair is selected. This is valid for both Ethernet #1 and Ethernet #2. The Ethernet #1 channel and the Ethernet #2 channel function independently of each other. For both Ethernet interfaces there is one Ethernet address. This means that you don't have to connect both interfaces to one physical cable.

Note: **The Ethernet #2 AUI Interface on P2 depends on the availability of a 5-row P2 connector. On the 3-row P2 connector (factory option), only Ethernet #1 AUI-Port is available.**

3.3.11 Parallel Port

The parallel port is only available on a 5-row P2 connector. When using a 3-row P2 connector (factory option), it is not available.

3.4 OpenBoot Firmware

This chapter describes the use of OpenBoot firmware. Specifically, you will read how to perform the following tasks.

- Boot the System
- Run Diagnostics
- Display System Information
- Reset the System
- OpenBoot Help

For further information concerning OpenBoot, please consult the following webpage: http://www.sun.com.

3.4.1 Boot the System

The most important function of OpenBoot firmware is the booting of the system. Booting is the process of loading and executing a stand-alone program such as the operating system. After it is powered on, the system usually boots automatically after it has passed the Power On Self Test (POST). This occurs without user intervention.
If necessary, you can explicitly initiate the boot process from the OpenBoot command interpreter. Automatic booting uses the default boot device specified in nonvolatile RAM (NVRAM); user initiated booting uses either the default boot device or one specified by the user.

To boot the system from the default boot device, enter the following command at the Forth monitor prompt `ok`:

```
ok boot
```

If you are at the restricted monitor prompt `>`, enter:

```
> b
```

The boot command has the following format:
`boot [`*`device-specifier`*`] [`*`filename`*`] [-ah]`

Optional Boot Parameters

Note: **These options are specific to the operating system and may differ from system to system.**

`[device-specifier]` The name (full path or alias) of the boot device. Typical values are `cdrom`, `disk`, `floppy`, `net`, or `tape`.

[*filename*] The name of the program to be booted. *`filename`* is relative to the root of the selected device. If no filename is specified, the boot command uses the value of *`boot-file`* NVRAM parameter. The NVRAM parameters used for booting are described in the following section.

`[-a]` `-a` prompt interactively for the device and name of the boot file.

`[-h]` `-h` halt after loading the program.

Devices to Boot from

To explicitly boot from the internal disk using the Forth monitor enter:

```
ok boot disk
```

At the restricted monitor prompt enter:

```
> b disk
```

To retrieve a list of all device alias definitions, type `devalias` at the Forth Monitor command prompt. The following table lists some typical device aliases:

Table 4 **Device Alias Definitions**

Alias	Description
disk	Default disk (1st internal) SCSI-ID 3
disk3	First internal disk SCSI-ID 3
disk2	Additional internal disk SCSI-ID 2
disk1	External disk SCSI-ID 1
disk0	External disk SCSI-ID 0
tape	First tape drive SCSI-ID 4
tape0	First tape drive SCSI-ID 4

Table 4 **Device Alias Definitions**

Alias	Description
tape1	Second tape drive SCSI-ID 5
cdrom	CD-ROM partition d, SCSI-ID 6
net	Ethernet
floppy	Floppy drive

3.4.2 NVRAM Boot Parameters

The OpenBoot firmware holds configuration parameters in NVRAM. At the Forth Monitor prompt, type *printenv* to see a list of all available configuration parameters. The OpenBoot command *setenv* may be used to set these parameters:
`setenv` *`[configuration parameter] [value]`*

This information refers only to those configuration parameters which are involved in the boot process. The following table lists these parameters.

Table 5 **Setting Configuration Parameters**

Parameter	Default value	Description
`auto-boot?`	`true`	If `true`, automatic booting after power on or reset
`boot-device`	`disk`	Device from which to boot
`boot-file`	`empty string`	File to boot
`diag-switch?`	`false`	If `true`, run in diagnostic mode
`diag-device`	`net`	Device from which to boot in diagnostic mode
`diag-file`	`empty string`	File to boot in diagnostic mode

When booting an operating system or another stand-alone program, and neither a boot device nor a filename is supplied, the `boot` command of the Forth monitor takes the omitted values from the NVRAM configuration parameters. If the parameter `diag-switch?` is `false`, `boot-device` and `boot-file` are used. Otherwise, the OpenBoot firmware uses `diag-device` and `diag-file` for booting.
For a detailed description of all NVRAM configuration parameters please refer to the *OPEN BOOT PROM 2.0 MANUAL SET.*

3.4.3 Diagnostics

At power on or after reset the OpenBoot firmware executes POST. If the NVRAM configuration parameter `diag-switch?` is `true` for each test, a message is displayed on a terminal connected to the serial I/O port A. If the system does not work correctly, error messages are displayed which indicate the problem. After POST the OpenBoot firmware boots an operating system or enters the Forth monitor, if the NVRAM configuration parameter `auto-boot?` is `false`.
The Forth Monitor includes several diagnostic routines. These on-board tests let you check devices such as network controller, SCSI devices, floppy disk system, memory, clock and installed SBus cards. User installed devices can be tested if their firmware includes a self-test routine.

The table below lists several diagnostic routines.

Table 6 Diagnostic Routines

Command	Description
`probe-scsi`	Identify devices connected to the on-board SCSI bus
`probe-scsi-all` *`[device-path]`*	Perform probe-scsi on all SCSI buses installed in the system below the specified device tree node. (If *device-path* is omitted, the root node is used).
`test` *`device-specifier`*	Execute the specified device's self-test method. *`device-specifier`* may be a device path name or a device alias. For example: `test` *`net`* - test network connection `test` *`/memory`* - test number of megabytes specified in the self-test-#megs NVRAM parameter or test all of memory if diag-switch? is true
`test-all` *`[device-specifier]`*	Test all devices (that have a built-in self-test method) below the specified device tree node. (If *device-path* is omitted, the root node is used.)
`watch-`*`clock`*	Monitor the clock function
`watch-`*`net`*	Monitor network connection

Examples:

SCSI bus To check the on-board SCSI bus for connected devices enter:

```
ok probe-scsi
Target 3
Unit 0 Disk superP 1684-07MB1036511AS0C1684
ok
```

All SCSI buses

To test all the SCSI buses installed in the system enter the following (The actual response depends on the devices on the SCSI buses):

```
ok probe-scsi-all
/iommu@0,10000000/sbus@0,10001000/esp@2,100000

Target 6
Unit 0 Disk Removable Read Only Device SONY CD-ROM CDU-8012 3.1a

/iommu@0,10000000/sbus@0,10001000/espdma@4,8400000/esp@4,8800000

Target 3
Unit 0 Disk superP 1684-07MB1036511AS0C1684
ok
```

Single device

To test a single installed device enter:

```
ok test device-specifier
```

This executes the `self-test` device method of the specified device node.
`device-specifier` may be a device path name or a device alias as described in Table 4, “Device Alias Definitions,” on page 21. The response depends on the self-test of the device node.

Group of devices

To test a group of installed devices enter:

```
ok test-all
```

All devices below the root node of the device tree are tested. The response depends on the devices having a self-test routine. If a device specifier option is supplied at the command line, all devices below the specified device tree node are tested.

Memory

When you use the memory testing routine, the system tests the number of MBytes of memory specified in the NVRAM configuration parameter `self-test-#megs`. If the NVRAM configuration parameter `diag-switch?` is `true`, the whole memory is tested.

```
ok test /memory
testing 32 megs of memory at addr 0 27
ok
```

The command `test-memory` is equivalent to `test /memory`. In the above-mentioned example, the first number (`0`) is the base address of the memory bank to be tested, the second number (`27`) is the number of the remaining MBytes. If the CPU board works correctly, the memory is erased and tested and you will receive the **ok** prompt. If the PROM or the

on-board memory does not work, you will receive one of several potential error messages indicating the problem.

Clock

To test the clock function enter:

```
ok watch-clock
Watching the ‘seconds’ register of the real time clock
chip.
It should be ‘ticking’ once a second.
Type any key to stop.
22
ok
```

The system responds by incrementing a number once a second. Press any key to stop the test.

Network

To monitor the network connection enter:

```
ok watch-net
Using AUI Ethernet Interface
Lance register test -- succeeded.
Internal loopback test -- succeeded.
External loopback test -- succeeded.
Looking for Ethernet packets.
‘.’ is a good packet. ‘X’ is a bad packet.
Type any key to stop.
..........X.........................X.............
ok
```

The system monitors the network traffic displaying a dot (`.`) each time it receives a valid packet and displaying an `X` each time it receives a packet with an error which can be detected by the network hardware interface.

3.4.4 Display System Information

The Forth monitor provides several commands to display system information. These commands let you display the system banner, the Ethernet address for the Ethernet controller, the contents of the ID PROM, and the version number of the OpenBoot firmware.
The ID PROM contains specific information to the individual machine, including the serial number, date of manufacture, and assigned Ethernet address.
The following table lists these commands:

Table 7 **Commands to Display System Information**

Command	Description
`banner`	Displays system banner
`show-sbus`	Displays list of installed and probed SBus devices
`.enet-addr`	Displays current Ethernet address
`.idprom`	Displays ID PROM contents, formatted
`.traps`	Displays a list of SPARC trap types
`.version`	Displays version and date of the boot PROM
`show-devs`	Displays a list of all device tree nodes
`devalias`	Displays a list of all device aliases

3.4.5 Reset the System

If your system needs to be reset, you either press the reset button on the front panel or, if you are in the Forth Monitor, type **reset** on the command line.

```
ok reset
```

The system immediately begins executing the Power On Self Test (POST) and the initialization procedures. Once the POST is completed, the system either boots automatically or enters the Forth Monitor, just as it would have done after a power-on cycle.

3.4.6 OpenBoot Help

The Forth Monitor contains an online help which can be activated by entering:

```
ok help
Enter ‘help command-name’ or ‘help category-name’ for more help
(Use ONLY the first word of a category description)
Examples: help select -or- help line
Main categories are:
File download and boot
Resume execution
Diag (diagnostic routines)
Power on reset
>-prompt
Floppy eject
Select I/O devices
Ethernet
System and boot configuration parameters
Line editor
Tools (memory,numbers,new commands,loops)
Assembly debugging (breakpoints,registers,disassembly,symbolic)
Sync (synchronize disk data)
Nvramrc (making new commands permanent)
ok
```

A list of all available help categories is displayed. These categories may also contain subcategories. To get help for special Forth words or subcategories just type **`help [name]`**.

- The online help shows you the Forth word, the parameter stack before and after execution of the Forth word (before -- after), and a short description.
- The online help of the Forth monitor is located in the boot PROM, that means that there is not an online help for all Forth words.

Example:

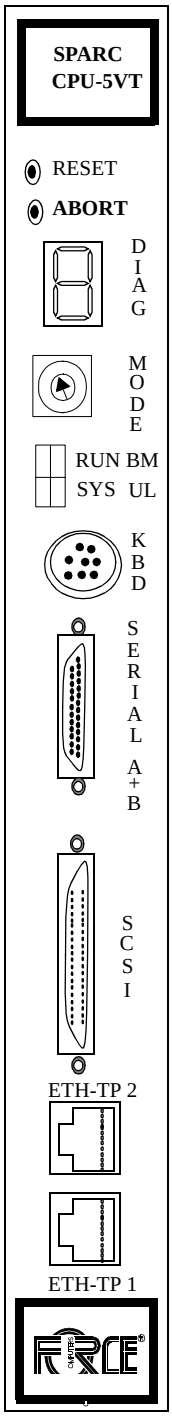
How to get help for special Forth words or subcategories:

```
ok help tools
 Category: Tools (memory,numbers,new commands,loops)
 Subcategories are:
Memory access
Arithmetic
Radix (number base conversions)
Numeric output
Defining new commands
Repeated loops
ok
```

```
ok help memory
 Category: Memory access
dump ( addr length -- ) display memory at addr for length bytes
fill ( addr length byte -- ) fill memory starting at addr with byte
move ( src dest length -- ) copy length bytes from src to dest address
map? ( vaddr -- ) show memory map information for the virtual address
l? ( addr -- ) display the 32-bit number from location addr
w? ( addr -- ) display the 16-bit number from location addr
c? ( addr -- ) display the 8-bit number from location addr
l@ ( addr -- n ) place on the stack the 32-bit data at location addr
w@ ( addr -- n ) place on the stack the 16-bit data at location addr
c@ ( addr -- n ) place on the stack the 8-bit data at location addr
l! ( n addr -- ) store the 32-bit value n at location addr
w! ( n addr -- ) store the 16-bit value n at location addr
c! ( n addr -- ) store the 8-bit value n at location addr
ok
```

3.5 Front Panel

Figure 6 **Diagram and Layout of the Front Panel**



Device	Function	Name
Key	Reset	RESET
Key	Abort	ABORT
HEX. Display	Diagnostic	DIAG
Rotary Switch	Diagnostic	MODE
LED/LED	Run-Halt	RUN
	VME BM-SYSFAIL	BM
LED/LED	Slavio SYS LED	SYS
	User LED	UL
Mini DIN Connector	Keyboard/Mouse	KBD
Serial Connector	Serial Interface A and B	SERIAL A+B
SCSI Connector	SCSI Interface	SCSI
RJ-45 Connector	Ethernet Interface	ETH 2
RJ-45 Connector	Ethernet Interface	ETH 1

The following features are described in detail in section 5 of the ***SPARC/CPU-5VT Technical Reference Manual:***

- Reset and Abort key
- Status LEDs on the front panel
- Hex display on the front panel

3.6 Connectors

The SPARC/CPU-5VT connectors are listed in the following table.

Table 8 SPARC/CPU-5VT Connectors

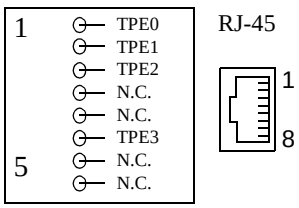
Function	Location	Type	Manufacturer Part Number
Ethernet #1 (Twisted Pair)	Front Panel	RJ-45	AMP 555131-1
Ethernet #2 (Twisted Pair)	Front Panel	RJ-45	AMP 555131-1
Serial Port A + B	Front Panel	26-pin Fine Pitch	AMP 749831-2
SCSI #1	Front Panel	50-pin Fine Pitch	AMP 749831-5
Keyboard/Mouse	Front Panel	8-pin Mini DIN	AMP 749232-1
SBus Slot2 (SBus Slave Select 1)	P3	96-pin SMD	FUJITSU FCN-234J096-G/V
SBus Slot3 (SBus Slave Select 2)	P4	96-pin SMD	FUJITSU FCN-234J096-G/V
VMEbus P1	P1	96-pin VGA	Various
VMEbus P2	P2	96-pin VGA	Various

The following pages show the pinouts of the connectors.

3.6.1 Twisted Pair Ethernet Connector Pinout

The following figure shows the pinout of the twisted pair Ethernet connector. The pinout for both of the connectors is identical.

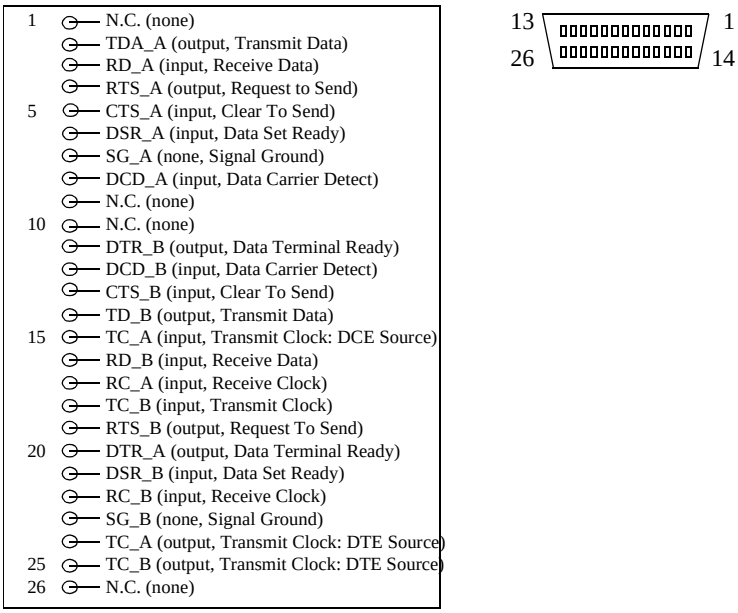
Figure 7 Twisted Pair Ethernet Connector Pinout



3.6.2 Serial Port A and B Connector Pinout

The following figure is a pinout of the serial port connector.

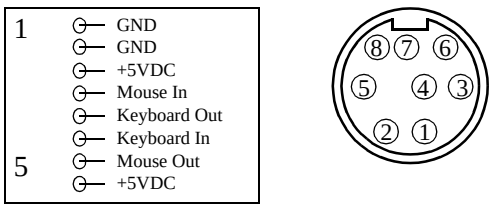
Figure 8 Serial Port A und B Connector Pinout



3.6.3 Keyboard/Mouse Connector Pinout

The keyboard and mouse port is available on the front panel via a mini DIN connector.

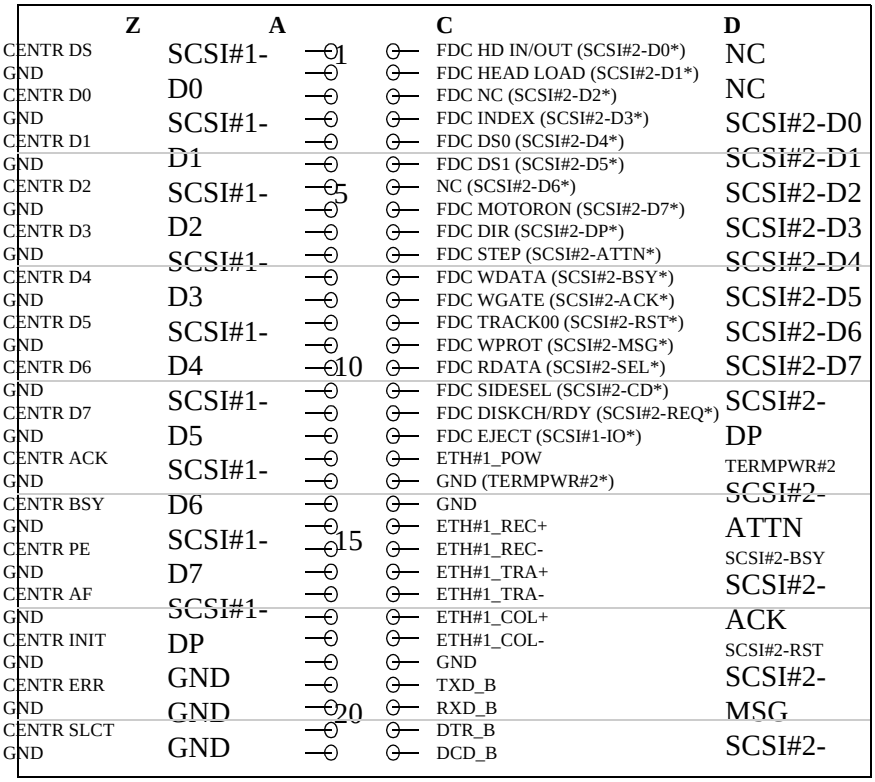
Figure 9 Keyboard/Mouse Connector Pinout



3.6.4 VME P2 Connector Pinout

The SCSI #2 interface is an alternative to the FDC interface. The signals for rows Z and D are not available on the 3-row P2 Connector.

Figure 10 **VME P2 Connector Pinout**



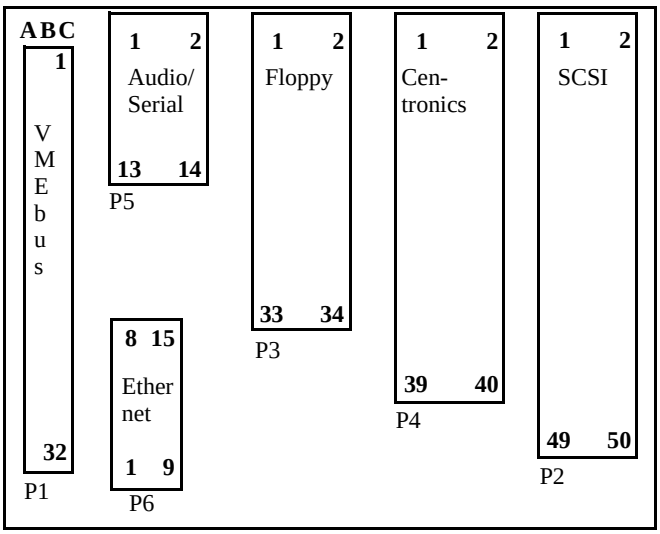
* The SCSI #2 interface is an alternative to the FDC interface (see section 3.3.9 “Floppy Interface or SCSI #2 Availability on P2” on page 18).

3.7 IOBP-10

IOBP-10 and IOBP-DS can be plugged to the back side of a VMEbus backplane. They only fit into 3-row backplanes. Any attempt to attach them to a 5-row backplane connector might damage the backplane.

The IOBP-10 is an I/O back panel on VMEbus P2 with flat cable connectors for SCSI, serial I/O, Centronics/floppy interface, and a micro D-Sub connector for the Ethernet #1 interface. The Centronics interface on the IOBP-10 is not supported by the SPARC/CPU-5VT. This back panel can be plugged into the VMEbus P2 connector. The diagram below shows all the connectors. The IOBP-10 back panel and the IOBP-DS are especially designed for the SPARC/CPU-5VT. Do not use any other I/O back panels on the SPARC/CPU-5VT, for example, the IOBP-1.

Figure 11 **IOBP-10**



The pinouts of the connectors are shown shown on the following pages.

3.7.1 Jumper Setting for IOBP-10

Caution

Please make sure that the configuration switch matrix is plugged into sockets B3/B2 and B6/B5, that is, the configuration for floppy interface on P2. This is described in section 3.3.9 “Floppy Interface or SCSI #2 Availability on P2” on page 18.
This IOBP-10 back panel and the IOBP-DS are especially designed for the SPARC/CPU-5VT. Do not use any other I/O back panels on the SPARC/CPU-5VT, for example, the IOBP-1.

3.7.2 IOBP-10 Connector Pinouts

Figure 12 **IOBP-10 P1 pinout**

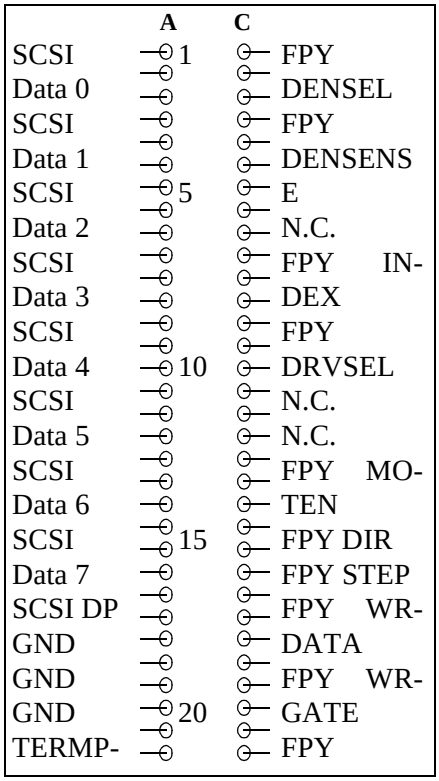


Figure 13 **IOBP-10 P2 pinout (SCSI #1)**

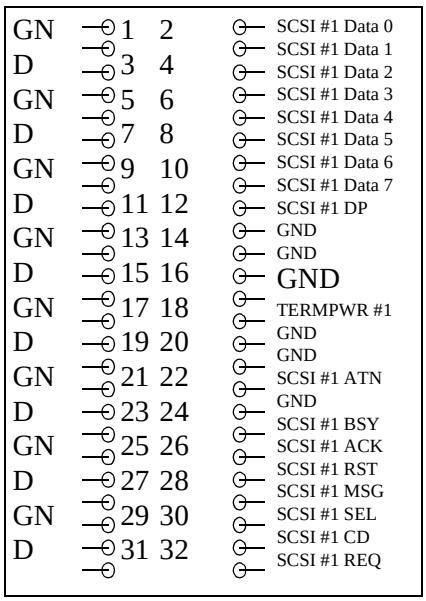


Figure 14 **IOBP-10 P3 Pinout (Floppy)**

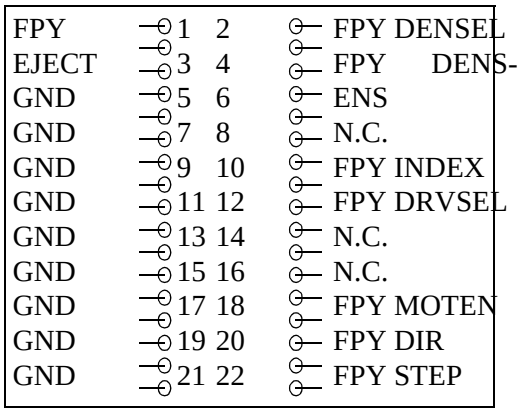


Figure 15 **IOBP-10 P5 Pinout (Serial A and B)**

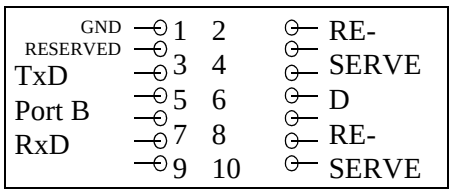
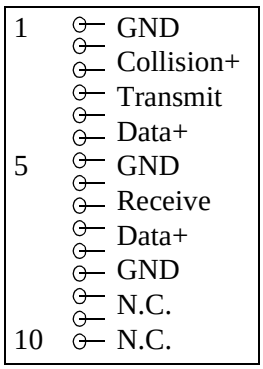


Figure 16 **IOBP-10 P6 Pinout (Ethernet #1 – AUI)**



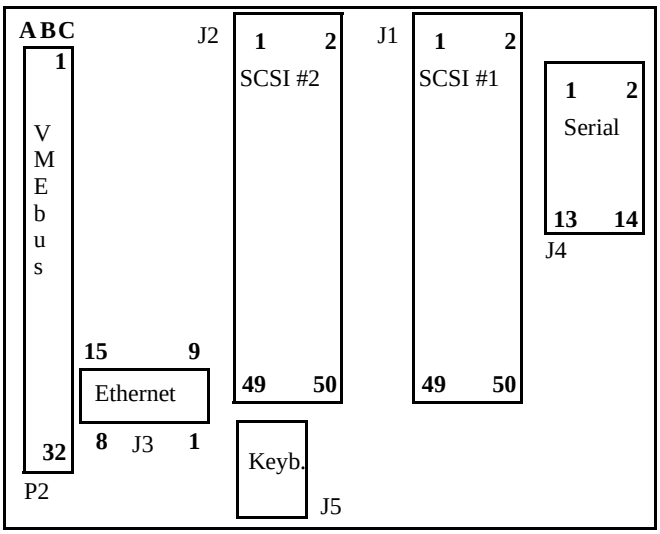
3.8 IOBP-DS

IOBP-10 and IOBP-DS can be plugged to the back side of a VMEbus backplane. They only fit into 3-row backplanes. Any attempt to attach them to a 5-row backplane connector might damage the backplane.

The IOBP-DS is an I/O back panel on VMEbus P2 with flat cable connectors for SCSI #1, SCSI #2, serial I/O, keyboard/mouse and a micro D-Sub connector for the Ethernet #1 interface (AUI). This back panel can be

plugged into the VMEbus P2 connector. The diagram below shows all the connectors. The IOBP-I/O back panel and the IOBP-DS are especially designed for the SPARC/CPU-5VT. Do not use any other I/O back panels on the SPARC/CPU-5VT, for example, the IOBP-1.

Figure 17 The IOBP-DS



The pinouts of the connectors are shown on the following pages.

3.8.1 Jumper Setting for IOBP-DS

Caution

Please make sure that the configuration switch matrix is plugged into sockets B2/B1 and B5/B4, that is, the configuration for dual SCSI interface on P2 (5-row connector). This is described in section 3.3.9 “Floppy Interface or SCSI #2 Availability on P2” on page 18.
This IOBP-DS back panel and the IOBP-10 are especiall designed for the SPARC/CPU-5VT. Do not use any other I/O back panels on the SPARC/CPU-5VT, for example, the IOBP-1.

3.8.2 IOBP-DS Connector Pinouts

Figure 18 IOBP-DS P2 Pinout

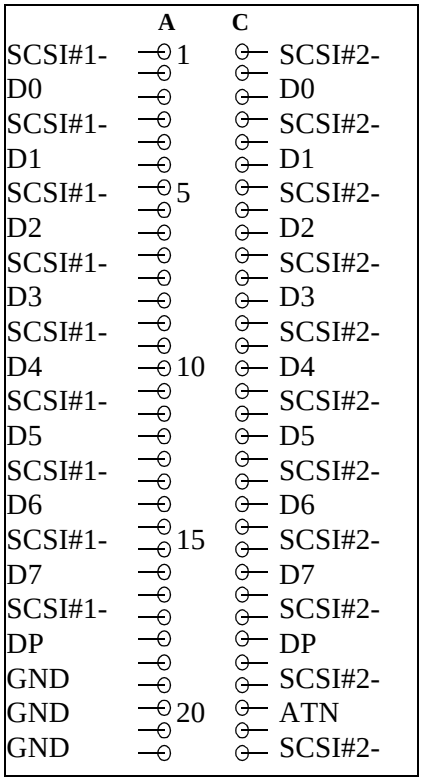


Figure 19 IOBP-DS J1 Pinout (SCSI #1)

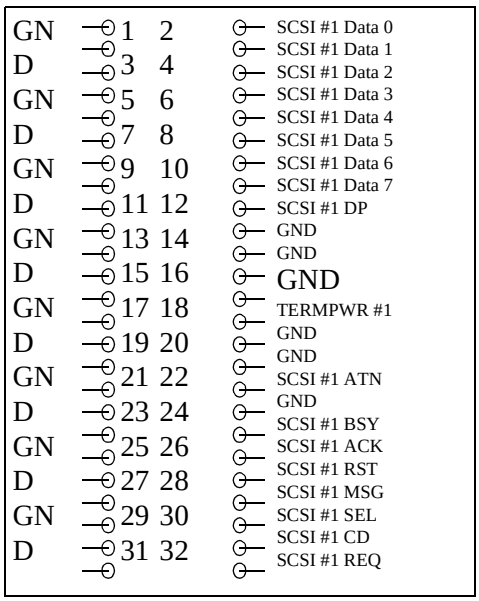


Figure 20 **IOBP-DS J2 Pinout (SCSI #2)**

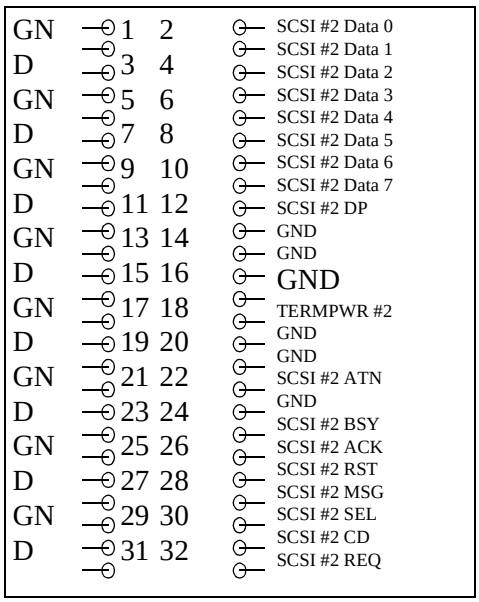


Figure 21 **IOBP-DS J3 Pinout (Ethernet #1 – AUI)**

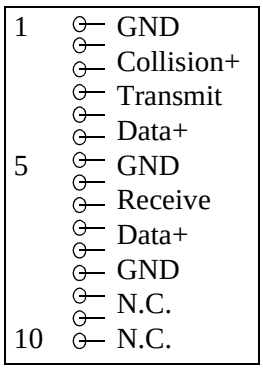


Figure 22 **IOBP-DS J4 Pinout (Serial A and B)**

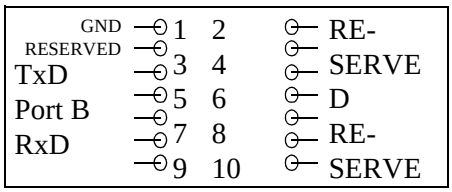
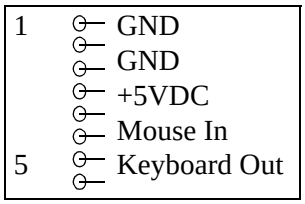


Figure 23 **IOBP-DS J5 Pinout (Keyboard/Mouse)**



3.9 Ethernet Address and Host ID

In order to see the Ethernet address and host ID, type the following command at the prompt:

```
ok banner
```

The information below explains how the SPARC/CPU-5VT Ethernet address and the host ID are determined.

Figure 24 **The 48-bit (6-byte) Ethernet address**

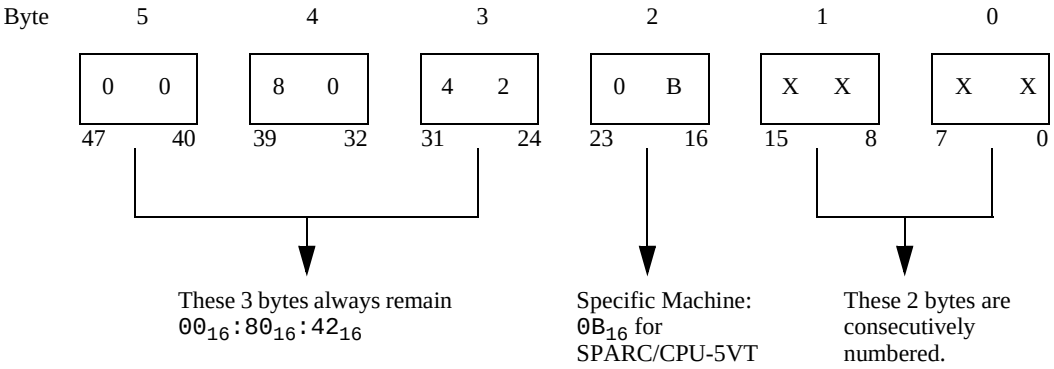
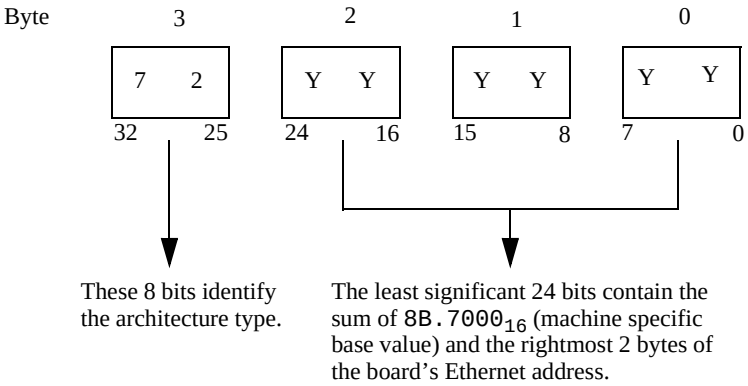


Figure 25 **The 32-bit (4-byte) host ID**



Product Error Report

PRODUCT:	SERIAL NO.:
DATE OF PURCHASE:	ORIGINATOR:
COMPANY:	POINT OF CONTACT:
TEL.:	EXT.:
ADDRESS: _____ _____ _____	
PRESENT DATE:	
AFFECTED PRODUCT: ❑ HARDWARE ❑ SOFTWARE ❑ SYSTEMS	AFFECTED DOCUMENTATION: ❑ HARDWARE ❑ SOFTWARE ❑ SYSTEMS
ERROR DESCRIPTION: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

THIS AREA TO BE COMPLETED BY FORCE COMPUTERS:

DATE:

PR#:

RESPONSIBLE DEPT.: ❑ MARKETING ❑ PRODUCTION
ENGINEERING ➠ ❑ BOARD ❑ SYSTEMS

✉ Send this report to the nearest Force Computers headquarter listed on the back of the title page.