Installation Notes

for the Sun 501-1164 CPU Board

CARRERA

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Revision A of 10 December 1986

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CAUTION

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARNING

There is a Lithium Battery (BBCV2), Matsushita Electric Type No. BR2325, located on the Sun 501-1164 CPU Board. This battery is NOT a field replaceable part. The battery is marked as follows: "Warning— Replace battery with MATSUSHITA ELECTRIC or PANASONIC Part No. BR2325 only. Use of another battery may present a risk of fire or explosion."

The battery may explode if mistreated. Do not dispose of in fire, attempt to recharge or disassemble the battery.

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Preface

This manual is intended to help you install a 4 Megabyte 501-1164 CPU board in an existing workstation, or to configure and cable the board in a new installation.

Subjects that are not directly related to the CPU board, such as unpacking and setting up the logic enclosure, connecting the monitor and keyboard, and so on, are covered in the installation manual that comes with the logic enclosure.

Summary of Contents

The contents of this manual are organized in this way:

Chapter 1 — *Unpacking and Inspection* — describes precautions necessary to prevent damage when unpacking and inspecting the board.

Chapter 2 — *General Description and Configuration* — provides an overview of 501-1164 board features as well as information on configuration options.

Chapter 3 — *Board Installation* — includes information necessary when installing a replacement CPU board, as well as instructions for connecting cables to a CPU board that is already installed in a new workstation.

Chapter 4 — *Power-Up and Self-Test* — describes the function of CPU board switches and LEDs, and briefly describes a normal and a diagnostic boot-up.

Appendix A — *Connecting a Modem, Terminal or Printer* — contains guidelines to aid in connecting peripheral devices to the serial ports.

Appendix B — *Connector Pinouts and Serial Port Signals* — provides the pinout for each connector on the CPU board edge, and describes the serial port signals.

Finally, you will find a record of revisions to this manual and a *Reader Comment Sheet* at the back of this document. Please fill out and return the sheet to us; it will help us to maintain the accuracy and usefulness of this document. Your comments are greatly appreciated.

Applicable Documents

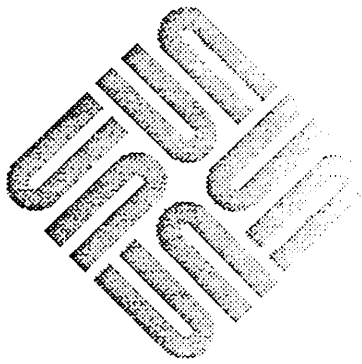
We emphasize that this manual outlines rather than exhausts many of the topics contained within. References to applicable documents are listed below, and we urge you to read these documents should you need further information.

Table 1 *Applicable Documentation*

Part Number	*Description*
800-1323	System Administration for the Sun Workstation
800-1521	Installing UNIX on the Sun Workstation
813-10xx	Sun Hardware Options Guides
813-2004	Cardcage Slot Assignments and Backplane Configuration Procedure

1

Unpacking and Inspection



1

Unpacking and Inspection

NOTE *This chapter applies only to CPU boards that are shipped separately. If you are installing a new Sun workstation (that already has a CPU board in it), read the unpacking and inspection section of the installation manual that comes with the logic enclosure, then proceed to Chapter 2 of this manual for configuration information.*

1. When you receive your board, inspect the shipping container *immediately* for evidence of damage. If the carrier's agent is not present when a container is opened and the contents are found to be damaged, keep all contents and packing materials for the agent's inspection.

CAUTION **Printed circuit boards contain components sensitive to damage from electrostatic discharge (ESD) that may occur, for example, when you walk across a carpet and then touch the board. Before handling a board, place your hand on a conductive surface that is grounded to a common earth ground, (such as the metal screw or plate on the AC wall receptacle) to discharge any static electricity from your body.**

To minimize the risk of ESD damage, handle the board only by its edges. If you are going to work on the board for longer periods of time, use appropriate grounding devices and store the board in the anti-static bag provided.

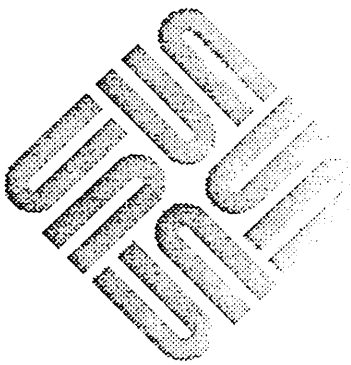
2. If there is no evidence of damage, carefully remove the CPU board from the shipping container. Save the carton and the packing material for possible later use.

3. Inspect the CPU board for any socketed parts that may have loosened during shipment. Firmly seat any loose components in the sockets.

CAUTION **These devices are fragile and should be handled with care to avoid damage. When reseating chips, make sure that the pins are aligned with the holes in the board, then gently push down on the center of the chip. In addition, make sure that the dot or "v-shaped" notch on the chip is aligned with the "v" printed on the board.**

2

General Description and Configuration



2

General Description and Configuration

2.1. General Description

The 501-1164 CPU board features an MC68020 Central Processing Unit (CPU) with on-chip instruction cache, an MC68881 Floating Point Coprocessor (FPC) and interface circuitry that supports the VMEbus Ethernet and two RS-423 serial ports. It has 4 Megabytes of on-board RAM.

A 16.67 Mhz clock provides timing for internal data processing. A 32-bit data bus provides a high-bandwidth path between both the CPU and Direct Virtual Memory Access (DVMA) devices and main memory.

The Memory Management Unit (MMU) translates virtual addresses into physical addresses to provide access to devices such as main and video memory, the VMEbus master interface, and I/O. It protects and manages these devices, and allows them to be shared.

2.2. Configuration

CAUTION **Read the caution note at the beginning of Chapter 3 for precautions concerning the springfingers on the board.**

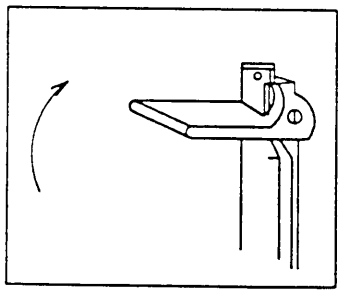
1. **For replacement boards:**

   Verify that the board is correctly configured as shown in *Sun 501-1164 CPU Board Configuration Procedures*, then proceed to Step 2.

   If the CPU board is already installed in the system:

   Unfasten the two recessed, hex-head screws on either side of the board, then move the ejector tabs outward (as shown to the left of this text) until the board is released from the backplane. The board should now slide out easily.

   Check the configuration jumpers against the table and illustration in the *Sun 501-1164 Configuration Procedure* and proceed to Step 2.



Extraction Lever

2. If the host system is an Ethernet node:

   Find out whether the transceiver in use is a "Level 1" or "Level 2" type. Examples of Level 1 transceivers are the TCL 2010E, 3COM 3C100, and the Interlan NT10. Examples of a Level 2 transceiver are the TCL 2010I, 3COM 3C101, 3C102, BICC 1110.

   Pins in position 7-8 on the jumper block at location K-11 on the CPU board must be jumpered for connection to a "Level 1" transceiver. No jumper is installed at that location for "Level 2" type transceivers, and the board is factory configured for use with a "Level 2" type transceiver.

   Note that multiplexer boxes such as Digital Equipment Corporation's DELNI require a transceiver. All transceivers sold by Sun are the "Level 2" type.

3. Skip this step when installing a new system, or when the board you are replacing is different from the new one. For example, you would not swap ID PROMs when replacing a Sun-2 CPU board with a Sun-3 CPU board.

   If the old board is a Sun 501-1164 CPU:

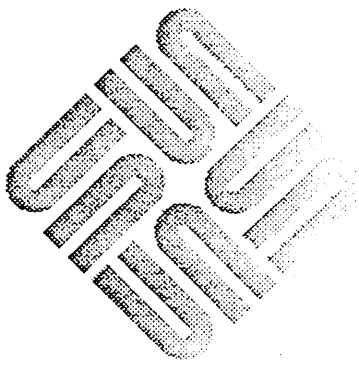
   Remove the ID PROM from location B-10 on the new board, and replace it with the ID PROM that you have removed from the same location on the old board. (The ID PROM contains the workstation's unique Ethernet address, and must stay with the workstation.)

4. **If this is a replacement board** refer to *Installing UNIX on the Sun Workstation* and the Power-up procedures in Chapter 4 of this manual, then use the monitor `q` command to program the EEPROM correctly for host system configuration.

   If you are installing a new workstation, the EEPROM should already be factory configured. The *Power-Up and Self-Test* subsection in Chapter 4 of this manual describes symptoms that would indicate improper EEPROM programming.

3

Board Installation



3

Board Installation

Each Sun workstation is shipped with a CPU board installed in Slot 1. If you are installing a new workstation, or moving an existing workstation to a new location, skip the following board installation procedures and begin with *Connecting the Keyboard, Mouse, Ethernet and Video.*

If you are replacing an existing CPU board with the 501-1164 CPU board, read the cautions and procedures that follow.

3.1. Installing the Board

CAUTION **Before installing this board, make sure that the host system is powered down. (The system administrator should have warned clients or other users that the system is about to be powered down, and then used a command such as `/etc/halt` or `/etc/fasthalt`. This procedure ensures that any data in the buffers is written to disk before UNIX† is halted.**

Springfingers are metal strips that are installed between the edge of the PC board and the outer panel to reduce RFI emissions. Serrated metal "fingers" protrude from either side of the strip.

Installation of a board WITHOUT springfingers may affect RFI emissions and may therefore affect FCC compliance. **Sun will no longer be responsible for FCC compliance if non-springfingered boards are added to a system originally shipped WITH springfingers and FCC approval.**

If a board WITH springfingers is installed next to a board WITHOUT springfingers, the insulator shield on the outside of the fingers MUST be present to prevent possible shorting of component leads to the springfingers.

If a logic enclosure contains boards WITH and WITHOUT springfingers, use the following guidelines:

- **Before removing a board WITHOUT springfingers, remove the board below it (or to the left of it for pedestal mode) if that board is equipped WITH springfingers and an outer insulator shield.**

† UNIX is a registered trademark of AT&T.

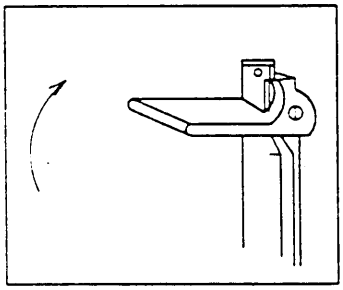
- **Always install a board WITHOUT springfingers first, and then replace the board WITH springfingers and insulator shield in the slot below it (or to the left of it).**

If a board WITH springfingers is installed next to a board or filler panel also equipped WITH springfingers, the outside insulator shields should be removed.

Ensure that the insulator strip between the inner side of the springfingers and the PC board is intact at all times.

When removing and replacing boards with springfingers, check the condition of the insulator strip/shield(s) and replace if damaged. Call 800-USA-4SUN with questions or for information on how to obtain additional insulator strips or shields.

To Install the Board



Extraction Lever

1. Face the rear of the workstation and disconnect all cables from the existing CPU board (if present) in Slot 1. (Slot 1 is to the extreme left on pedestal-type enclosures, or on the bottom in desktop enclosures. Some cardcages are stamped with the slot number near the upper (or left) extraction lever.)
2. If Slot 1 is empty, go on to Step 3. Otherwise, unfasten the two recessed hex-head screws located on either side of the PCB to be removed, then move the extraction levers outward (as shown) until the old board is released from the backplane. The board should now slide out easily.
3. Install the new board in the cardcage so that the component side faces the right side of the cardcage for pedestal enclosures (when viewed from the rear of the pedestal), or the top for desktop models.

NOTE *The board should slide into the cardcage slot with little resistance and fit snugly when seated into the backplane connectors. If the board does not insert and seat easily, inspect the cardcage slot for any obvious obstructions and both the board and the backplane for damage (bent connector pins, springfingers, etc.).*

4. When the board is firmly seated in the backplane, replace the screws removed during Step 2. *The board may not function properly if these screws are not tightened.*

Checking Backplane Configuration

5. Gain access to the solder side of the cardcage backplane in order to check backplane jumpers:

   If you are installing a Sun-3 pedestal-type system, unsnap the front bezel and remove the four screws that hold the power supply panel in place. Then lower the power supply tray (refer to your service manual for the exact procedure).

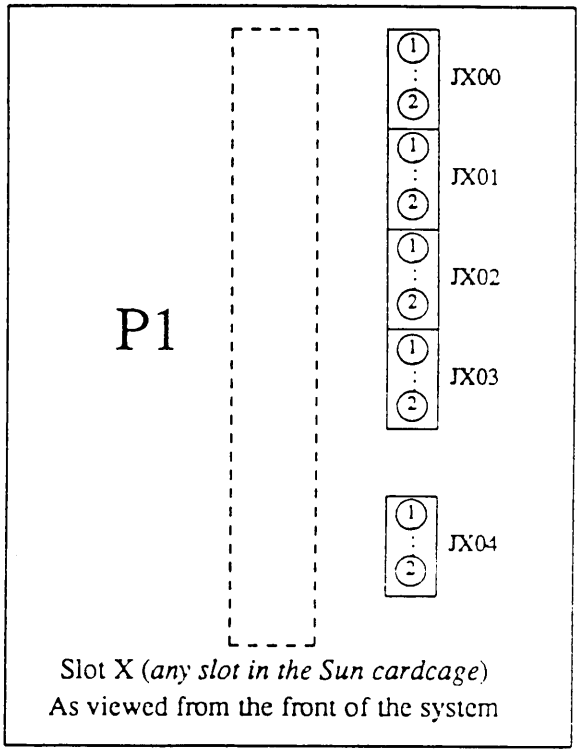
   For desktop models, use a flat-blade screwdriver to release the two snap details that hold the front bezel in place, then unfasten the two M4 screws that secure the EMI cover. (The *Field Service Manual for the Sun-3/110*

Workstation, Sun P/N 800-1523, illustrates this procedure).

If you have a Sun-3 fileserver, unsnap the bezel and remove the 12 screws that secure the RFI shield.

6. Ensure that all backplane jumpers are installed in Slot 1 as indicated in *Cardcage Slot Assignments and Backplane Configuration Procedures*, Sun P/N 813-2004. Figure 3-1 shows you what the backplane jumpers look like.

Figure 3-1 *Backplane Jumper Locations*



7. Close the host system up and connect cables to the CPU board according to the procedures that follow.

3.2. Connecting the Keyboard, Mouse, Ethernet, and Video

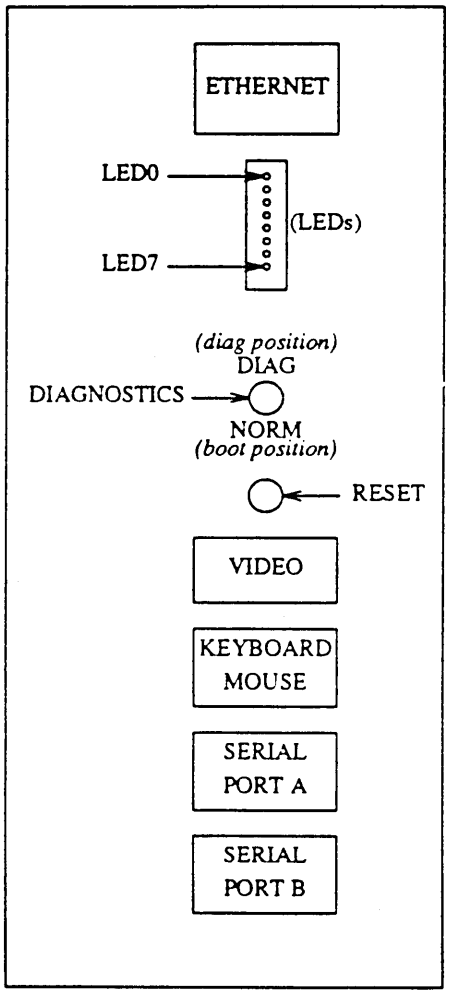
This section describes how to connect cables from the keyboard and mouse, Ethernet, and monitor (CRT) to the connectors on the edge of the CPU board. For more information on Ethernet and Monitor cabling, refer to the installation manual that comes with the logic enclosure.

CAUTION **Before attempting any of the following connections, make certain that:**

1. **the OFF/ON switch on the logic enclosure is OFF (side with the "0" is pushed in), and**
2. **the AC power cord is unplugged from the wall.**

This illustration shows the location of 501-1164 CPU board connectors when the board is in a vertical position, with the component side on the right. When the board is in a horizontal position, the connector shown at the top is at the extreme left.

Figure 3-2 *501-1164 CPU Board Edge Connectors*



Keyboard and Mouse Connections

The keyboard cable plugs into the DB-15 (15-pin D connector) on the edge of the CPU board. The cable is shipped with the system keyboard.

1. Plug the cable into the DB-15 connector labeled "keyboard" and tighten the screwlocks.
2. Plug the mouse cable into the keyboard "quick disconnect" connector that looks like a telephone jack.

Connecting the Ethernet Transceiver Cable

If the host system functions as an Ethernet node, connect the transceiver ("drop") cable as described below.

1. The male end of the Ethernet cable has a pair of metal studs that fit into the slide lock assembly attached to the CPU board's "ETHERNET" connector. Plug this male end into the "ETHERNET" connector. Push the slide lock over the studs to fasten the D connector securely in place.
2. The female end of the cable has the slide lock assembly attached to *it*; plug this end into the Ethernet transceiver and lock it securely also.

Refer to the installation manual that comes with the logic enclosure for information on Ethernet coaxial cable installation.

Connecting the Video Cable

This subsection applies only if the host system is using a monochrome (black and white) monitor.

1. Plug the male D connector of the video cable into the "VIDEO" connector on the edge of the CPU board and tighten the screws that secure it.
2. Connect the other end of the video cable as directed in the installation manual that comes with the host system logic enclosure.

Asynchronous Serial Ports

You may attach modems, printers, plotters, or other serial devices that use the RS-232-C or RS-423 interface, to the serial port connectors labeled "SERIAL PORT A" and "SERIAL PORT B" on the CPU board backpanel.

Each serial port provides a 25-pin connector (DB-25) compatible with RS-232-C equipment. All signals in the connector are semantically the same as their RS-232-C counterparts. The CPU board uses improved electrical circuits which, while working with RS-232-C devices, are also compatible with the newer RS-423 standard. Appendix B contains a description of each signal on the serial port connectors.

The serial ports on the CPU board were designed for connecting to peripherals such as printers and plotters, and can drive these output lines at speeds up to 19.2 kilobaud; input lines may be driven to 9.6 kilobaud.

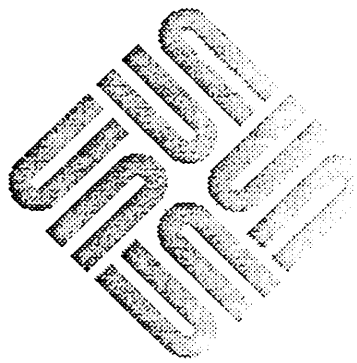
All ports provide DTR, RTS, and clock signals, and receive DSR, CTS, and DCD signals. (The DTR and RTS signals may be inhibited through EEPROM programming.) The serial ports are wired as as Data Terminal Equipment (DTE) ports (which means Transmit Data from the workstation is on pin 2 and Receive Data from the peripheral is on pin 3), and thus allow direct connection of Data Communications Equipment (DCE) such as modems.

You may also connect computers, terminals, printers, and other DTE devices directly to the serial ports with a null modem cable (Sun P/N 530-1056). For further information refer to Appendix A of this manual, and the *UNIX Interface Reference Manual*, section ZS(4S), which discusses the Zilog serial interface.

NOTE *The following chapter describes power-up self-tests associated with the CPU board. If this installation involves a software upgrade, be sure to read the software Release Notes or Release Manual that comes with the tapes. If this is a new system, read Installing UNIX on the Sun Workstation before attempting to boot-up.*

4

Power-Up and Self-Test



4

Power-Up and Self-Test

This chapter provides:

- information on CPU board switches
- self-tests executed by the PROM monitor program that is resident on the CPU board
- examples of the displays that appear on the console screen during power-up.

CAUTION **Read the installation manual that comes with the logic enclosure before plugging in the AC power cord. Make sure that the available AC line voltage matches the label on the logic enclosure and that you have taken all the precautions and followed the procedures outlined in that document before applying power to the system.**

4.1. Conventions Used in This Chapter

Anything printed in typewriter font in this text is a reproduction of a screen display, such as:

```
Testing 4 megabytes of memory...Completed
```

Boldfaced text within that display means that you must enter that information exactly as shown. For example:

```
>b
```

Roman Italic font is used for titles of or chapters within documents, and for notes.

Installing UNIX on the Sun Workstation..

Hexadecimal values in the text are preceded with *0x*, and the leading zeros (in memory addresses, for example) are not shown:

0x18

4.2. Diagnostics and User Reset Switches

There are two switches on the back of the CPU board, labeled DIAG/NORM and RESET.

Diagnostics Switch

Make sure that the diagnostics switch is set to NORM for a normal boot-up.

If you want to run the Boot PROM resident extended diagnostic tests or automatically boot an EEPROM selected program, set the switch to DIAG. In this mode, with a terminal attached to Serial Port A at 9600 BAUD, or Port B at 1200 BAUD, you may interact with power-on self-tests. (More information on this mode is found in the Field Service Manual for the system under test.)

During a diagnostics boot-up with no terminal connected to a serial port, the console screen remains blank until memory tests begin, at which time a `Testing ... Megabytes of Memory` message and a prompt to press any key for an extended test menu appears.

If you do not depress a key, the system will react according to EEPROM programming (explained more fully in *Installing Unix on the Sun Workstation*), and you may receive a > PROM monitor prompt. (See the following paragraphs on how to reboot UNIX when you receive this prompt.)

User Reset Switch

The User Reset Switch invokes a watchdog reset and results in the action defined in Address 0x17 of the EEPROM:

A value of 0x12 at that location imitates a power-on reset.

A value of 0x00 invokes the PROM monitor program, identified by the > prompt.

To exit from the monitor program, you may reboot UNIX. To do so, enter

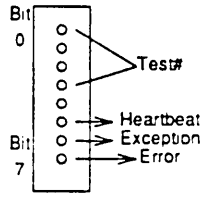
```
> b [RETURN]
```

The system now automatically boots from the device specified in EEPROM. For more detailed information, please see *Installing UNIX on the Sun Workstation*.

4.3. Power-up and Self-tests

Follow the power-up procedures and heed the cautions in the Hardware Installation manual that comes with the workstation. DO NOT SWITCH THE LOGIC ENCLOSURE OR MONITOR POWER ON UNTIL YOU HAVE DONE SO.

You have now made certain that the CPU board and other workstation assemblies are properly configured and that power requirements have been met. You should also be familiar with *Installing UNIX on the Sun Workstation* (for new systems) or the appropriate *Release Notes* (for upgrades), as well as the *System Administration for the Sun Workstation* before you attempt to boot UNIX.



Upon power-up, eight diagnostic LEDs on the edge of the CPU board all light briefly, then begin blinking on and off in a running commentary on the self-tests. (The illustration to the left of this text depicts the LEDs when the board is installed vertically.) The LED in position 0 lights when Test 1 begins. The table that follows interprets the binary code that indicates which self-test is running.

When a test detects an error, the LED in bit position 7 lights, and LEDs 0-5 freeze in a pattern that represents the failed test number. If the pattern with bit 7 keeps repeating itself, there is a critical problem with the CPU board, and you should contact your Sun Customer Support Center. If you can record the test pattern, the information will aid Field Service Personnel in solving the problem.

If the LED in bit position 6 lights, an exception class failure, such as a bus or address error trap, or an unexpected interrupt has occurred.

NOTE *The last self-test consumes a variable amount of time, depending on the quantity of memory specified for test in EEPROM. During a diagnostic boot, all memory is automatically tested. The LED memory test pattern may appear to freeze when a large quantity of memory is tested.*

To Read the LED Table

This table provides a brief interpretation of the patterns displayed by the LED indicators on the edge of the CPU board. When the CPU board is installed in the upright position, the LEDs appear vertically, rather than horizontally as presented in this table. The LED depicted on the left in this table is then located at the top of the display; the LED on the right is at the bottom of the display.

Table 4-1 *LED Interpretation*

LEDs ●= ON, o= OFF 0							7	*What the System is Doing When These LEDs Are Cycling*	*What Might Be Bad If This Indication Stays On And LED 6/7 Lights*
●	●	●	●	●	●	●	●	A reset sets LEDs to this state	CPU or PROMs bad or +5VDC is low
●	o	o	o	o	o	o	o	Test 0x01 checking the boot PROM	Boot PROM
o	●	o	o	o	o	o	o	Test 0x02 checking DVMA Register	CPU Board
●	●	o	o	o	o	o	o	Test 0x03 checking the Context Register	CPU Board (MMU)
o	o	●	o	o	o	o	o	Test 0x04 Segment Map RAM Rd/Wr Test	CPU Board (MMU)
●	o	●	o	o	o	o	o	Test 0x05 checking Segment Map RAM	CPU Board (MMU)
o	●	●	o	o	o	o	o	Test 0x06 checking Page Map RAM	CPU Board (MMU)
●	●	●	o	o	o	o	o	Test 0x07 checks memory data path	CPU Board
o	o	o	●	o	o	o	o	Test 0x08 checks bus error detection	CPU Board
●	o	o	●	o	o	o	o	Test 0x09 checks interrupt capabilities	CPU Board
o	●	o	●	o	o	o	o	Test 0x0A performsTOD clock interrupt test	CPU Board
●	●	o	●	o	o	o	o	Test 0x0B checking MMU protection and status	CPU Board (MMU)
o	o	●	●	o	o	o	o	Test 0x0C performs parity error check	CPU Board
●	o	●	●	o	o	o	o	Test 0x0D performs parity error check	CPU Board
o	●	●	●	o	o	o	o	Test 0x0E performs memory tests	CPU Board
o	o	o	o	o	o	o	●	Self-Tests have found an error	CPU Board
o	o	o	o	o	o	●	o	An Exception Class error was found	CPU Board
o	o	o	o	o	●	o	o	Self-Test done, UNIX in boot-state or monitor quiescent (LED is blinking)	CPU Board
●⇒	o⇒	o⇒	o⇒	o⇒	o⇒	o⇒	o	"Walking Ones" pattern	UNIX running okay

After a successful self-test, the "monitor heartbeat" LED in bit position five pulses steadily to indicate that the CPU is receiving clock interrupts. At this point the monitor is in quiescent state and/or UNIX is in boot state. Once UNIX is running, the LEDs light sequentially, in rapid order, from 0 to 7 and back again, and continue to do so as long as the CPU is processing or waiting to process instructions.

The rotating diagonal (known as the "packet pump") that appears on the console screen following the `Testing...memory...` message and prior to the `Completed` message, means that the memory test is progressing normally.

After a successful self-test, a display that looks something like this should appear on the console:

```
Selftest Completed Successfully.

        Sun Workstation, Model Sun-3/___, Sun-3 keyboard
        ROM Rev __, _ MB memory installed, Serial #_____
        Ethernet address __:__:__:__:__:__

Testing __ megabytes of memory...Completed
```

The values left blank will vary, depending on system configuration.

No Display?

If the LEDs indicate that self-tests were successful and that UNIX is booting, but the console screen remains blank for more than two minutes after power-up, check the following:

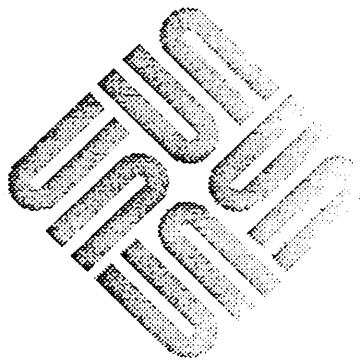
- Ensure that the diagnostics switch is in NORM position and that the video monitor is switched on.
- Refer to the EEPROM documentation in *Installing UNIX* and use the PROM monitor `q` command to make sure that EEPROM location 0x01F contains the appropriate value for the type of monitor in use. If you are installing this board in a system with a color monitor, for example, the value in location 0x01F should be 0x12. Values are assigned as follows:

EEPROM Value	*Display Device*
0x00	Black and White Monitor
0x10	Terminal Connected to Serial Port A
0x11	Terminal Connected to Serial Port B
0x12	Color Monitor

Contact your Sun Customer Support Center if you need further assistance.

A

Connecting a Modem, Terminal or Printer



A

Connecting a Modem, Terminal or Printer

These procedures are intended as guidelines only, to aid in connecting peripherals to Serial ports A and B. Specific devices may require more detailed information such as that contained in the *UNIX Interface Reference Manual.*

A.1. Connecting a Modem to the Sun-3 CPU Board

The serial ports are wired as Data Terminal Equipment (DTE) ports (which means Transmit Data from the workstation is on pin 2 and Receive Data from the peripheral is on pin 3), and most modems are wired as Data Communications Equipment (DCE).

The cable connecting your modem to the CPU board should be "straight through" — the signals on pins 2, 3, 4, 5, 6, 7, 8, and 20 at the output of the cable should be the same as those signals on corresponding pins of the serial port. Do *not* use a null modem cable to connect the serial port to your modem. It does not matter which serial port you connect to; both are identical when the Diagnostic switch is in NORM position. (Serial Port B comes up at 1200 baud during a diagnostic boot-up.)

Refer to the manual that comes with your modem to see which signals you will need for proper operation of your modem. Refer also to *System Administration for the Sun Workstation*, the *UNIX Interface Reference Manual, ZS(4S)*, and *Installing UNIX on the Sun Workstation* all of which contain more information on connecting to a modem.

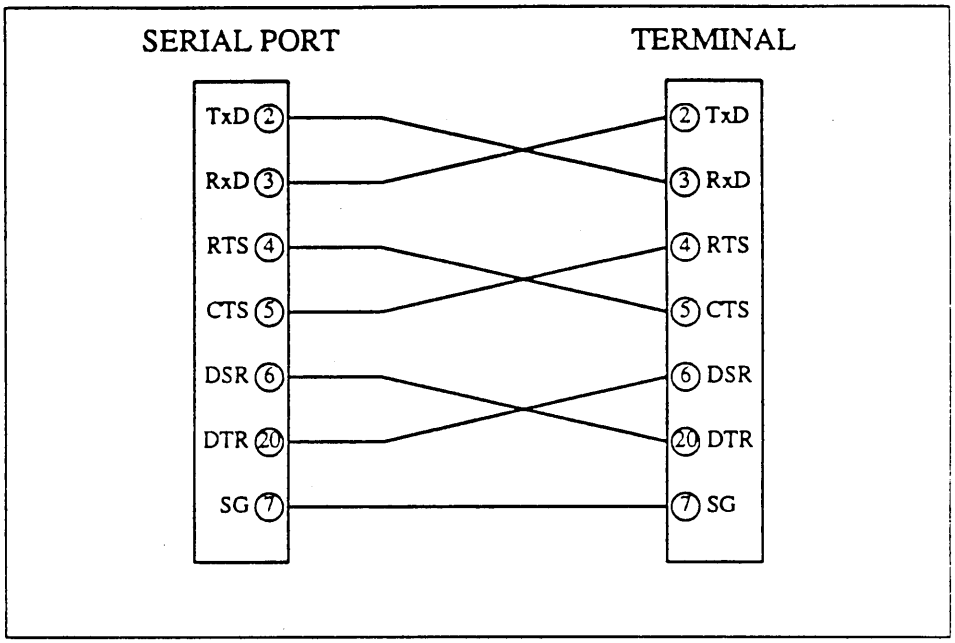
A.2. Connecting a Terminal to the Sun-3 CPU Board

Most terminals are wired as DTEs. To connect a terminal to a serial port you must first make certain that the terminal you are using accepts the RS-232-C or RS-423 protocol. If it does, you may then connect the terminal to either serial port with a null modem cable, Sun part number 530-1056. In the null modem cable, pins

2 and 3 are crossed
4 and 5 are crossed
6 and 20 are crossed
and pin 7 is wired straight through.

"Pins 2 and 3 crossed" means that the signal entering the cable on pin 2 emerges on pin 3, and vice versa (see the following figure). The connector on the left in Figure A-1 is the Serial I/O Port on the CPU board; the connector on the right is the terminal (DTE).

Figure A-1 *Null Modem Cable Pin Arrangement*



Refer to the manual that comes with your terminal to make certain that the signals needed to operate the terminal are provided at the correct pins of the serial port. Refer also to *System Administration for the Sun Workstation* and *Installing UNIX on the Sun Workstation* which detail connecting to a terminal.

NOTE *The EEPROM section of Installing UNIX describes how to disable the DTR and RTS signals if necessary.*

A.3. Connecting a Printer to the Sun-3 CPU Board

Most printers are wired as DTEs. To connect a printer to a serial port you must first make certain that the printer you are using has a DB-25 connector and uses the RS-232-C standard. Most serial printers do. However it should be noted that you **cannot** connect a parallel interface printer to a Sun-3 CPU board unless you also use a serial-to-parallel converter. After determining that you have a serial interface printer (or a parallel interface printer with a serial-to-parallel converter), connect the printer to either serial port with a null modem cable, Sun part number 530-1056. In the null modem cable, pins

2 and 3 are crossed

4 and 5 are crossed

6 and 20 are crossed

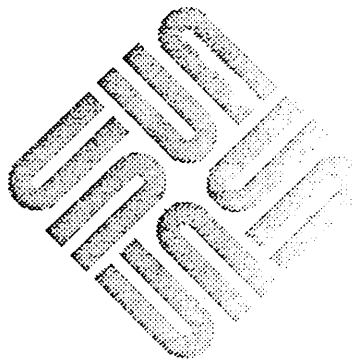
and pin 7 is wired straight through.

"Pins 2 and 3 crossed" means that the signal entering the cable on pin 2 emerges on pin 3, and vice versa (see the figure above).

Refer to the manual that comes with your printer to make certain that the signals needed to operate the printer are provided at the correct pins of the serial port. Refer also to *System Administration for the Sun Workstation* and *Installing UNIX on the Sun Workstation*, which detail connecting to a printer.

B

Connector Pinout and Serial Port Signals



B

Connector Pinout and Serial Port Signals

This appendix contains the pinouts for the 501-1164 CPU board:

- Keyboard/Mouse Connector
- Serial Port(s)
- Ethernet Connector
- Video Connector

and also contains a signal description of the serial ports.

NOTE *Only those pins actually connected to something are listed; open pins are not documented.*

Table B-1 *Pinout of Keyboard/Mouse DB-15 Connector*

Pin	*Signal*	*Pin*	*Signal*
1	RXD0 (keyboard)	8	GND
2	GND	9	GND
3	TXD0 (keyboard)	10	VCC
4	GND	11	VCC
5	RXD1 (mouse)	12	VCC
6	GND	14	VCC
7	TXD1 (mouse)	15	VCC

Table B-2 *Pinout of Serial Ports A and B*

Serial Ports A and B			
Pin	Signal	Pin	Signal
2	TXD	8	DCD
3	RXD	15	DB
4	RTS	17	DD
5	CTS	20	DTR
6	DSR	24	DA
7	GND	25	-5V

A EEPROM parameter may be used to inhibit the DTR and RTS signals.

Table B-3 *Pinout of Ethernet Connector*

Ethernet			
Pin	Signal	Pin	Signal
1	chassis ground		
2	E.COL+	9	E.COL-
3	E.TXD+	10	E.TXD-
4	chassis ground		
5	E.RXD+	12	E.RXD-
6	GND	13	+12V
7	VCC*		

* This pin is VCC only when 501-1164 board J2303 is jumpered; That jumper will not be present on later revisions of this board, and in that case, pin 7 will be unused.

Table B-4 *Pinout of Monochrome Video Connector*

Pin	*Signal*	*Pin*	*Signal*
1	VIDEO+	6	VIDEO-
3	HSYNC	7	GND
4	VSYNC	8	GND
5	No connection	9	GND

Video+ and Video- are at ECL voltage levels; HSYNC and VSYNC are at TTL voltage levels.

Serial Port Signals

Following is a brief description of serial port signals. The "data communications equipment" (DCE) mentioned below might be a printer, a plotter, a modem, or any other device that uses an RS-232-C or an RS-423 interface. An "output" signal flows from the CPU board toward the peripheral device. An "input" signal flows from the peripheral into the CPU board. Those pins not mentioned are not used — that is, they are open.

Figure B-1 *A Typical DTE/DCE Configuration*

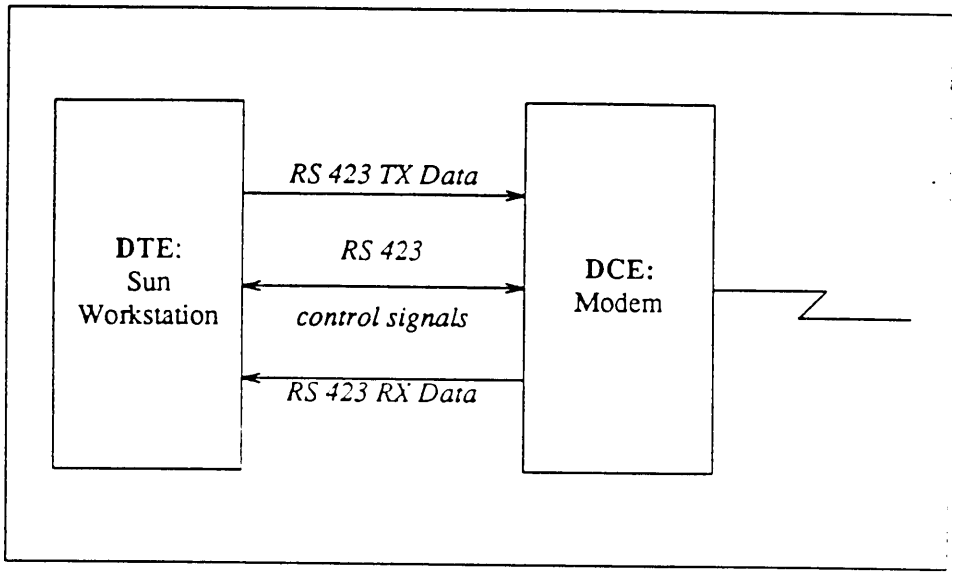


Table B-5 *Description of Serial Port Signals*

Pin	*Signal*	*Signal Name*	*Direction (Input or Output)*	*Description*
2	TXD	Transmit Data	output	The actual data transmitted to the data communications equipment.
3	RXD	Receive Data	input	The actual data received from the data communications equipment.
4	RTS	Request to Send	output	Signal sent to the data communications equipment, asking if it is ready to start accepting data.
5	CTS	Clear to Send	input	Signal from the data communications equipment saying it is ready to accept data.
6	DSR	Data Set Ready	input	Signal from the data communications equipment indicates the status of the local data set — that is, a peripheral connected to the Sun.
7	GND	Signal Ground	none	Signal Gound provides a reference level for the signal voltages.
8	DCD	Data Carrier Detect	input	The data communications equipment has detected "carrier," for example, a modem senses tones sent to it by another modem over phone lines.
15	DB	Transmit Clock from DCE	input	Transmit clock from the modem. This signal is usually not used for asynchronous devices (most terminals, printers, modems, etc.).
17	DD	Receive Clock from DCE	input	Receive clock from the modem. This signal is usually not used for asynchronous devices (most terminals, printers, modems, etc.).
20	DTR	Data Terminal Ready	output	Indicates that the Sun is powered on and willing to communicate as the "local data terminal" with the data communication equipment (for example, the modem).

Table B-5 *Description of Serial Port Signals— Continued*

Pin	*Signal*	*Signal Name*	*Direction (Input or Output)*	*Description*
24	DA	Transmit Clock from DTE	output	Provides transmit clock from the Sun. This signal is usually not used for asynchronous devices (most terminals, printers, modems, etc.).
25	VERR	reference -5V level	output	This signal is used by some modems to sense connection to the workstation.

Revision History

Revision	*Date*	*Comments*
01-1	16 October 1986	Beta Review Draft
A-5	10 December 1986	Production Release of this manual;includes review comments