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Hardware Installation Manual
for the Sun™-3/50M

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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.

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Preface

Welcome to the Sun Workstation®. This manual is meant to help you get the Sun-3/50M Desktop Workstation up and running. It explains how to unpack and set-up the workstation and presents basic information about the hardware configuration.

Summary of Contents

This manual is organized in this way:

Chapter 1

Unpacking and Setting Up the Sun-3/50M — is a guide to getting your Sun-3/50M out of the shipping cartons and setting it up, ready to run.

Chapter 2

Basic Component Set-up — describes how to set the voltage selectors; how to connect the Sun-3/50M to its keyboard, mouse, video monitor, and Thin Ethernet or Ethernet; what the power-up self-test procedures mean; connecting a modem, terminal or printer to the serial ports; and connecting a SCSI bus cable to the workstation.

Appendix A

Connector Pinouts — describes the single board computer connector pinouts.

Appendix B

Serial Port Signals — provides a signal description of the serial ports.

Finally, to help us maintain the currency and accuracy of this material we have supplied a reader comment sheet at the end of this guide. Please use the comment sheet to list errors and omissions. Your responses will help a great deal in our efforts to keep our documentation up to date.

Applicable Documents

We emphasize that this manual outlines rather than exhausts many of the topics contained within. References to applicable documents supplied with your system are given throughout, however, and we urge you to read these documents should you need further information.

Table 1   *Documentation*

Part Number	Description
800-1150	System Administration
800-1317	Installing UNIX
800-1173	System Interface
813-1010	Sun-3 Mass Storage Subsystem Installation

1

Unpacking the Sun-3/50M

1

Unpacking the Sun-3/50M

This chapter describes how to unpack and set up your Sun-3/50M. The "basic" Sun-3/50M consists of the single-board computer, monitor (CRT), keyboard, and mouse.

1.1. Safety Precautions

CAUTION **To avoid electric shock and/or a fire hazard, do not disassemble the Sun-3/50M monitor and base unit, with the exception of removing the PC board AS DIRECTED in *Chapter 2* if necessary for Ethernet configuration. Refer all servicing to qualified service personnel.**

1.2. Tools Needed for Unpacking

To unpack your Sun-3/50M, you will need:

□   a knife, to cut the packing tape and open the box.

1.3. Unpacking Instructions for the Sun-3/50M

The monitor and attached computer base, keyboard, mouse, are packed in a Styrofoam block inside the shipping container. This manual is packed in an indentation in the foam along with various cables, software tapes, other documentation, and a box that contains the mouse and mouse pad.

When you receive your shipment, inspect the shipping carton *immediately* for evidence of damage. Check the "Shock Watch" on the side of the carton to see if the clear portion in the center has turned red, meaning that the carton has been jarred.

If any shipping carton is severely damaged, request that the carrier's agent be present when the carton is opened. If the carrier's agent is not present when a carton is opened and the contents are found to be damaged, keep all contents and packing materials for the agent's inspection.

NOTE *The workstation is packed between two big blocks of Styrofoam. By now you have cut the shipping tape and have found this manual and the other items tucked in the indentation in the the Styrofoam block. The two halves of this Styrofoam block fit snugly into the Sun shipping carton, so it may be difficult to remove them.*

Sun-3/50 — Unpacking

1. Place a pad or a cushion down on a flat surface in an open working area (to protect the machine from being scratched while you unpack it). Give yourself plenty of space to move around.

NOTE   *Although the shipping weight of the Sun-3/50M is about 80 pounds, the packaging has been designed so that one person can unpack it alone. After unpacking the Sun-3/50M, you may need help moving the workstation to the place you finally want to set it up.*

2. Remove and set aside the small box that contains the mouse and mouse pad, and the cabling, software tapes and documentation that are packed in the indentation in the Styrofoam.

3. **Carefully** roll the carton first on one side, then upside down, keeping the flaps open.

4. The open top of the carton is now facing down. Gently tug the cardboard carton up and off of the Styrofoam packing blocks.

5. When you have removed the carton from the packing blocks, roll the entire workstation assembly over on its side so that the split between the two blocks of Styrofoam is running horizontally. It should look like this:

Key	Description
1	Monitor and Base
2	Keyboard (goes here)
3	Foam Packing Blocks
4	Indentation for cables, etc.
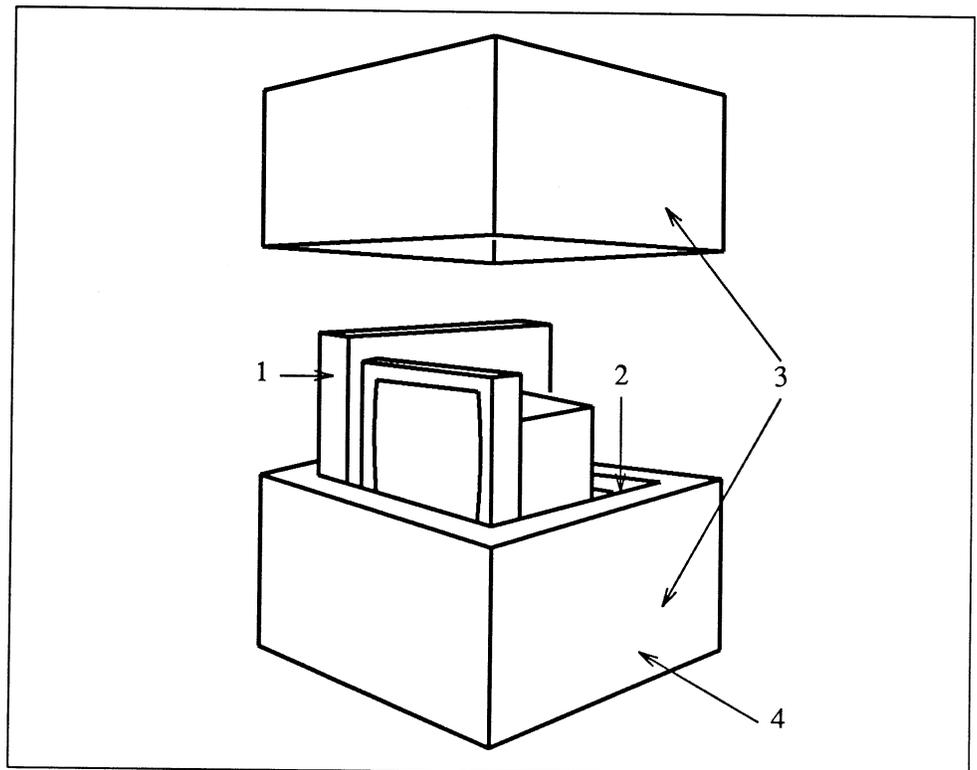
6. Remove the top piece of Styrofoam packing. Remove the keyboard from its slot in the Styrofoam, and set it aside.

7. **Carefully** turn the workstation upright and remove the remaining Styrofoam block. Remove the plastic bag from around the workstation.

8. The workstation should now be sitting upright and facing you in your working area, with all packing material removed from it.

We recommend that you save the shipping carton and packing material for future use in case the product must be reshipped.

2

Basic Component Set-up

2

Basic Component Set-up

You have now unpacked your Sun-3/50M and placed it in your work area, and are ready to connect the cabling and power-up. The procedures in this chapter are intended to help you do that.

Information on installation and configuration of options that you may want to use with your Model 3/50M is found in the manual that comes with the option, such as the *Sun-3 Mass Storage Subsystem Installation* manual, PN 813-1010.

2.1. Tools Needed For Set-Up

To set up your Sun-3/50M, you may need:
- a #0 Phillips screwdriver, for changing the voltage setting on the monitor
- a 3/16" flat-blade screwdriver, to change the base unit voltage setting
- a #3-32 hex (allen) wrench, to remove the computer board for Ethernet configuration

2.2. Conventions Used in This Chapter

Anything printed in typewriter font in this text is a reproduction of a display just as it will appear on your screen, such as:

```
Autoboot in progress...
```

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

```
>q 1f
```

Boldfaced type is used outside of a display for emphasis.

Italic font is used within a display example to indicate that the display may vary, and in other parts of the text to reference other documents or other sections of this document.

```
EEPROM 018 : some value?
         or
Refer to  Chapter 3, Environmental and Electrical Specifications.
```

Hexadecimal values in the text are preceded with *0x*, and the leading zeroes (in memory addresses, for example) are not always shown. For example, the hexadecimal address "000068" will be written "0x68".

CAUTION   Before plugging in the power cord of any component of your Sun system, be sure that the line power supply voltage and frequency are as required by the label on the base unit of your workstation. The following paragraphs list possible options.

Make certain that the voltage selectors on the base unit and monitor (CRT) are correctly set to the available line voltage, whether 115VAC or 230VAC. You can reset the voltage selectors yourself, if necessary (see the heading, *Resetting the Voltage Selectors*).

Use only three-pronged (grounded) outlets. All servicing must be performed by qualified personnel.

2.3. Resetting the Voltage Selectors

Voltage select mechanisms are located in two places:

1.   on the back of the base unit of the Sun-3/50M, and

2.   on the rear of the monitor (CRT).

2.4. Voltage Selection on the Sun-3/50M Base Unit

The voltage selector for the Sun-3/50M base unit is on the rear panel, to the left (when facing from the rear) of the AC power switch as shown in the following figure, *Sun-3/50M Workstation: Power Connections on the Base Unit*. It is a round plastic mechanism with a slot in it for a flat-blade screwdriver.

To reset the voltage selector, use a flat-blade screwdriver and twist the inner core of the voltage selector so that the voltage you want is aligned with the arrowhead that is on the top outer edge of the voltage selector. For instance, if you want to set the Sun-3/50M to 115 VAC operation, the "115" would be aligned with the arrow.

Figure 2-1   *Sun-3/50M Workstation: Power Connections on the Base Unit*
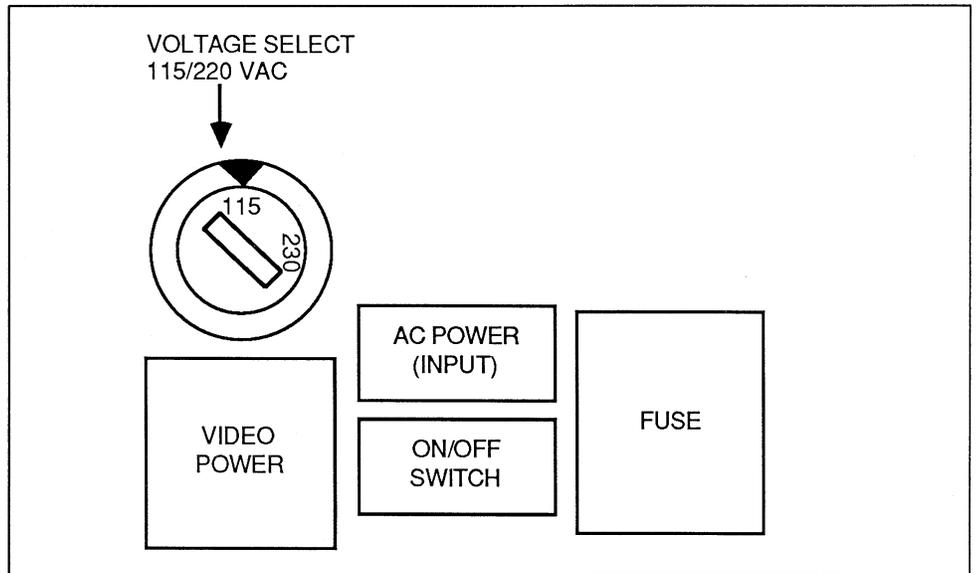
CAUTION   The connector below the voltage selector is to be used for providing power to the monitor only. Serious damage can occur if anything else is inadvertently plugged into this outlet. Specifically, make VERY certain that you do not plug AC power from the wall into this outlet!

2.5. Voltage Selection on the Monitor

There are two methods of voltage selection on the monitor (depending on the monitor type), and they are:

1.   printed circuit board (PCB)

2.   switch

Monitor Switch Setting

If voltage selection is done by switch, you will see a (possibly red) switch to the right rear side of the monitor chassis (when facing from the rear). One setting of the switch will display "115 V," the other "230 V." Use a flat-blade screwdriver to push the switch either up (so the "115 V" is displayed, for 115 VAC operation) or down (so the "230 V" is displayed, for 230 VAC operation).

The diagram below shows the relative location of the voltage selection switch.

Figure 2-2   *Location of the Voltage Selection Switch*
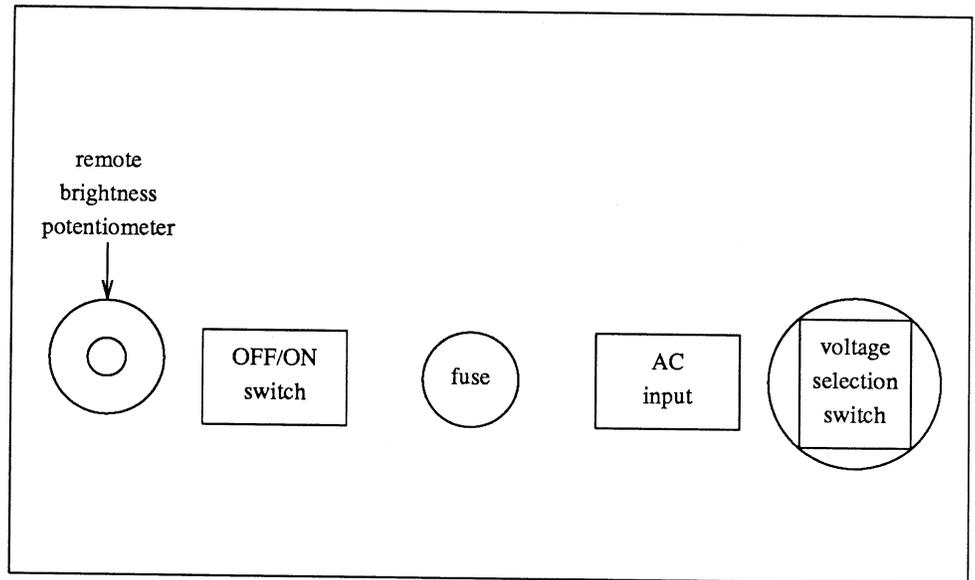
Monitor PC Board Setting   The other method of voltage selection is a little more complicated. It involves changing the position of a small PC board inside the fuse case. There are four voltages that can be selected, two from each side of the PC board, and they are:

1.   120 or 240 VAC, and

2.   100 or 230 (referred to as "220" on the voltage select PCB) VAC.

The diagram below shows the location of the voltage select PCB.

Figure 2-3   *AC Power, Voltage Select, and Fuse*
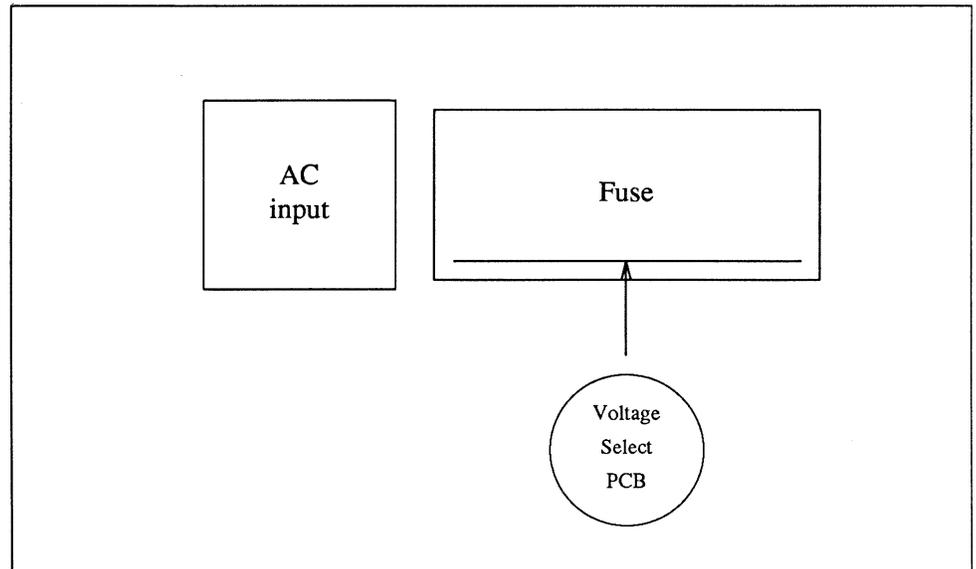
To gain access to the voltage select PCB:

1.   turn the power to the base unit off (press the OFF/ON switch so the "0" side is pushed in);

2.   pull the AC power cord from the AC input receptacle on the rear panel;

3.   slide the clear plastic panel that covers the fuse case to the left. The fuse and voltage select PCB will now be accessible.

4.   Insert a pointed instrument, such as a #0 Phillips screwdriver, in the extraction hole on the board, and pull the voltage select PCB out.

120/240 VAC Operation

Below is a diagram of the 120/240 VAC side of the voltage select PCB. For 120 VAC operation, slide the voltage select PCB into the fuse case with this side up (with the legend **CHECK FUSE 120** on the left-hand side and facing out towards you).

Figure 2-4   *120/240 VAC Select*

EXTRACTION HOLE
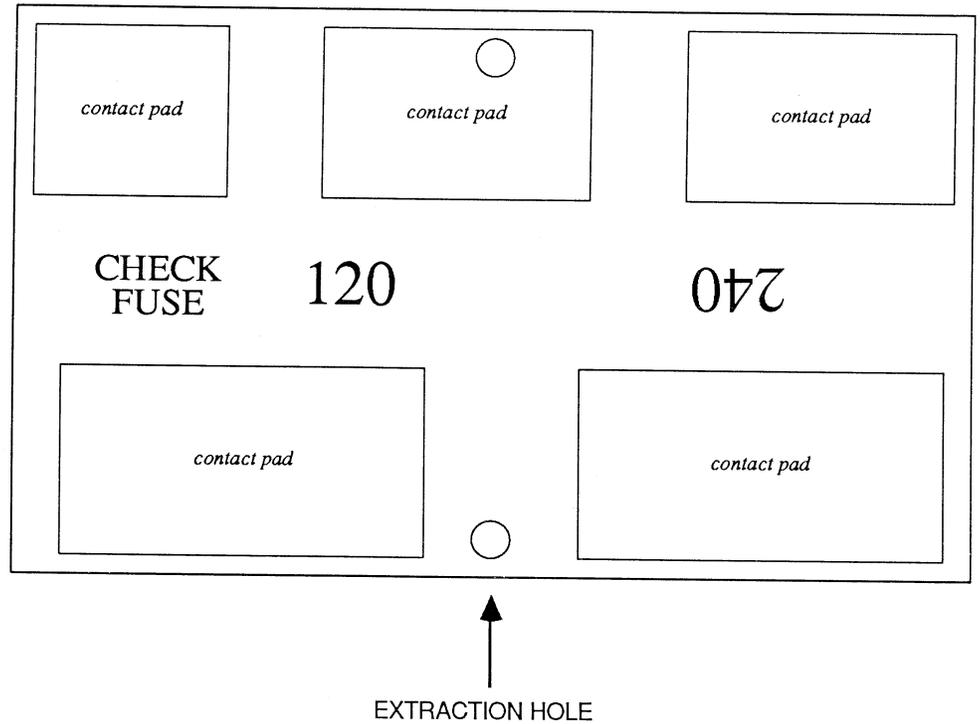
For 240 VAC operation, keep this side up and rotate the PCB 180 degrees, so that the legend "240" is on the left-hand side and faces out towards you. Slide the PCB into the fuse case in this position.

100/230 VAC Operation

For 100/230 VAC operation, flip the board over. It looks something like this:

Figure 2-5   *100/230 VAC Select*

EXTRACTION HOLE
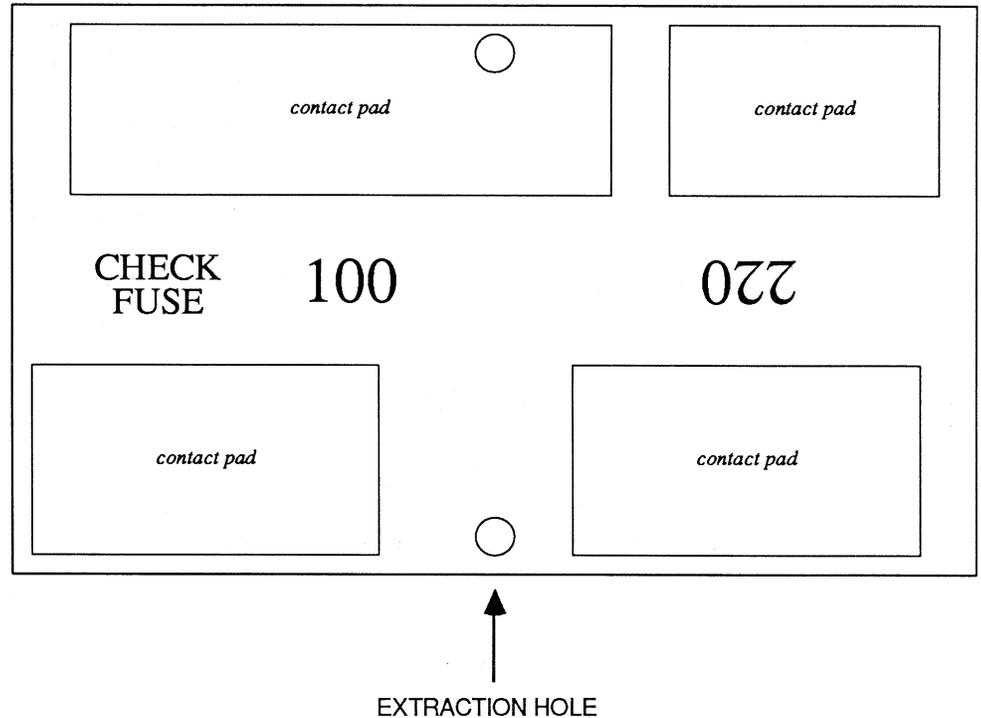
For 100 VAC operation, position the board up so the legend **CHECK FUSE 100** is on the left-hand side and facing out towards you. Slide the PCB into the fuse case in this position.

For 230 VAC operation, rotate the PCB 180 degrees so that the ''220'' is on the left hand side, facing you. Slide the PCB into the fuse case in that position.

2.6. Keyboard, Mouse, Thin Ethernet, Ethernet, and Video Connections

CAUTION   There is a video power outlet on the base of the Sun-3/50M (labeled "VIDEO") which is to be used for providing power to the monitor only (refer to Figure 2-1). Serious damage can occur if anything else is inadvertently plugged into this outlet. Specifically, make VERY certain that you do not plug AC power from the wall into this outlet!

CPU board connectors at the rear of the base unit are arranged like this:

Figure 2-6   *Sun-3/50M Computer Board Connectors*
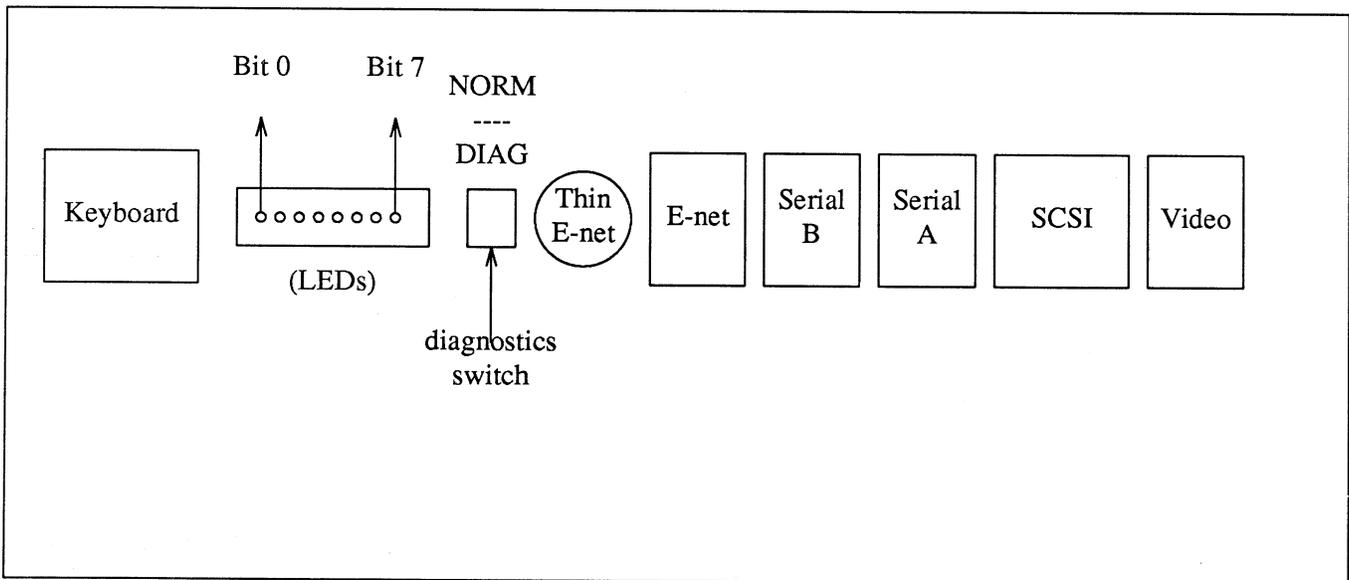
This section describes how cables will be connected from the rear edge of the CPU board to each of the following items:

□   keyboard,

□   Thin-Ethernet

□   Ethernet,

□   and monitor.

The two connectors, marked SERIAL PORT A and SERIAL PORT B are serial I/O ports to which peripherals such as modems, printers, and other terminals can be connected.

The connector labeled "SCSI" may be used to connect peripherals such as disk and tape drives that operate on a Small Computer Systems Interface (SCSI).

There are guidelines at the end of this chapter to help you in connecting such peripherals.

Figure 2-7   *Rear View of Sun-3/50 Set-Up*
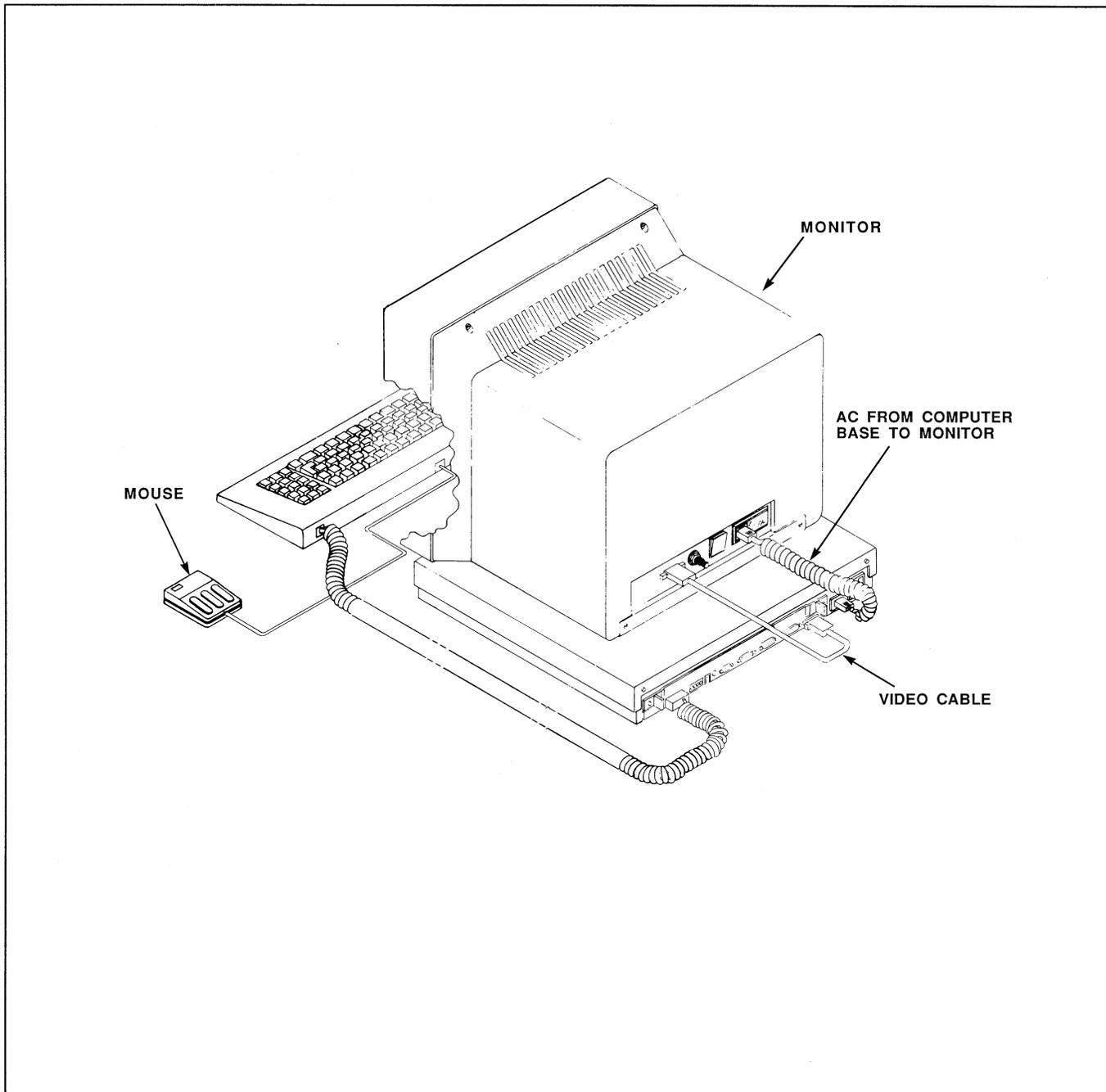
Attach the keyboard, mouse, Ethernet or Thin Ethernet, and video monitor to the workstation base according to the procedures on the following pages. If you connect up to a standard Ethernet, you may skip over the Thin Ethernet subsection that follows the Keyboard and Mouse procedures. If the workstation will be a standalone system, skip both network subsections and proceed to *Connecting the Monitor to the Sun-3/50M.*

Keyboard and Mouse Connections

The keyboard cable is permanently connected to the keyboard; the other end plugs into the DB-15 (15-pin D connector) at the backpanel of the CPU board.

CAUTION   **Make sure that you have not connected the workstation to a power source at this point; connecting or disconnecting the keyboard with power on may damage keyboard circuitry.**

1.   Find your keyboard cable and plug it in now to the KEYBOARD connector on the back of the base unit (refer to Figure 2-6).

2.   Find the mouse and its cable. The mouse is a little rectangular box with three long buttons which is permanently attached to its connecting cable.

3.   The mouse plugs directly into the keyboard itself; there is a connector for the mouse in the top middle area of the keyboard. Find the mouse and its cable and plug this cable into the jack on the keyboard now.

Figure 2-8   *Orienting the Mouse on its Pad*
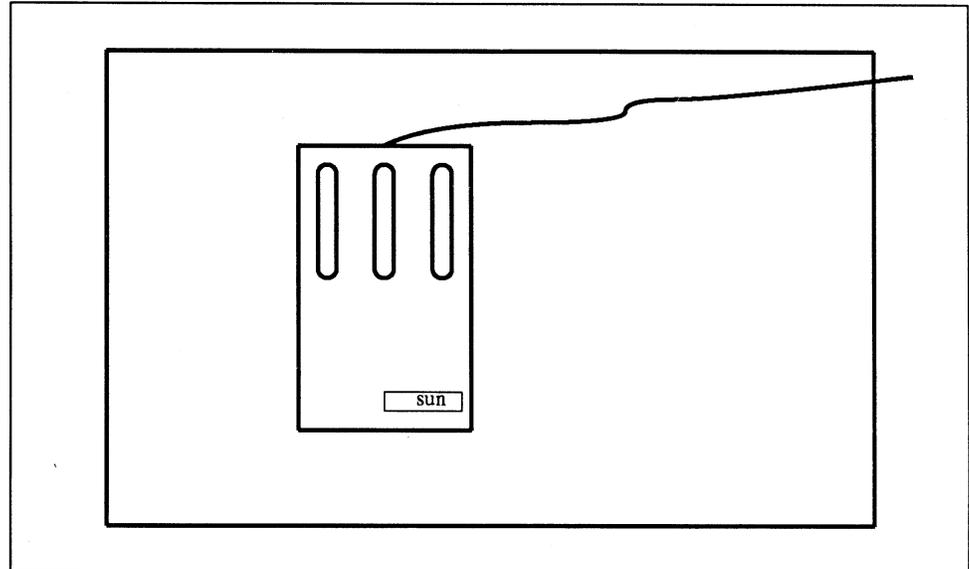
4.   Take out the mouse pad, a hard shiny metallic plate about 9 inches by 11 inches. The mouse sits on the side of the pad that has the grid markings, and the pad must be oriented so that its length is **horizontal** in relation to the mouse (see the figure, *Orienting the Mouse on its Pad*). After setting your system up and logging into SunWindows™, moving the mouse across the face of the pad will cause the cursor to move across the display.

Connecting Sun-3/50M to the Thin Ethernet

NOTE   *This section concerns only those who need to connect the Sun-3/50M directly to a network with 50 ohm, .25 inch, RG58 coaxial cable, using the BNC-type connector shown as "Thin Ethernet" in Figure 2-6. If you want to connect the workstation directly to a standard Ethernet, using "fat" coaxial cable and external transceivers, refer to the Connecting the Sun-3/50M to the Ethernet heading.*

CAUTION   **To avoid Ethernet jamming, do not connect both Ethernet and Thin Ethernet cables to the workstation at once. The Sun-3/50M is not intended to operate while directly connected to both network types.**

A "BNC" type connector at the back of the Model 3/50M base (refer to Figure 2-6) connects the thin Ethernet coaxial cable to the integrated Ethernet controller/transceiver resident on the computer board. The Thin Ethernet cable replaces the heavier standard Ethernet cable and eliminates the need for external transceivers and drop cables. A Thin Ethernet configuration may be used alone or linked with a standard Ethernet through the use of adapters, described later in this section.

NOTE   *Dip Switch 0618 is factory set for Thin Ethernet connection. If you connect up the thin Ethernet cable as described below, and the network does not function, check the dip switch setting as described under the Checking Thin Ethernet Configuration heading.*

Connecting the Thin Ethernet Cable

This procedure assumes that you are using the "T" connector and Thin Ethernet cable that is shipped with the system to link Sun-3/50M workstations and that you have ordered the appropriate accessories to complete your configuration. The following illustration depicts the various accessories and briefly describes their function.

NOTE   *All Thin Ethernet configurations use the BNC "T" type connector to link the Sun-3/50M with other workstations; some may use adapters to link the Thin Ethernet cable to a standard Ethernet. Figure 2-10 illustrates possible configurations.*

The illustration and table on the following page describe the various Thin Ethernet accessories available through your Sun sales office. One "T" connector and a 15 meter length of Thin Ethernet cable comes with each system. You will receive the number of connectors shown under *Qty* when you use the Sun order number.

Figure 2-9   *Thin Ethernet Connector Types*
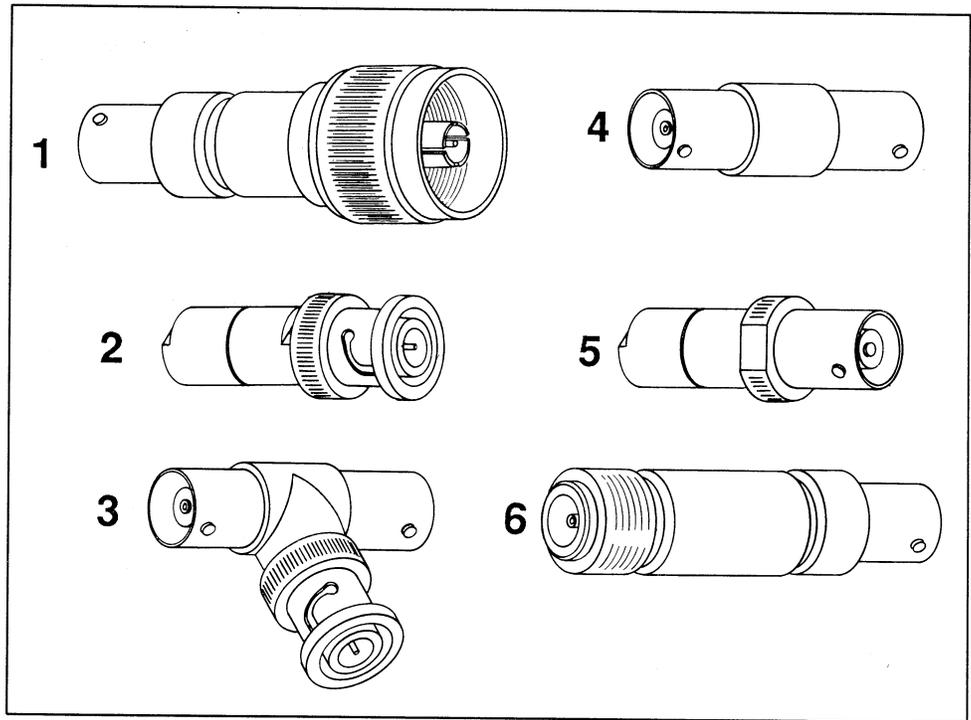
Key	Sun Order Number	Qty	Description	Purpose
1	TA-M	10	Adapter, BNC female to type "N" male	connect thin cable to transceiver port
2	TT-M	10	50 ohm terminator, BNC male	to terminate a "T"
3	TTC	10	BNC "T" (F,M,F)	to daisy-chain workstations on thin cable
4	TBC	10	barrel,BNC female to BNC female	to extend/connect thin cables
5	TT-F	10	50 ohm terminator, BNC female	to terminate a thin cable
6	TA-F	10	Adapter, Type "N" female to BNC female	to connect fat Ethernet cable to thin cable

"N" type connectors are screw-on connectors used in standard Ethernet configurations described in the section on connecting an Ethernet network to the Sun-3/50M.

You will need to use adapters (as shown in Figure 2-9) to connect a Thin Ethernet to a standard Ethernet. Any "T" connection or length of Thin Ethernet cable not connected to a workstation, transceiver or another cable must be terminated with the appropriate terminator. Use Sun order number TS-15M for an additional 15 meter length of Thin Ethernet cable, or TS-5M for a five meter length. Figure 2-10 presents an example of two possible topologies, and illustrates the use of the various connectors shown in Figure 2-9.

NOTE   *There are special cable length limitations that apply if you plan to combine Thin Ethernet and Ethernet networks. Table 2-1 and the paragraphs that follow it explain these considerations.*

To connect the Thin Ethernet Cable (so called due to its size in comparison with the standard Ethernet cable referenced under *Connecting the Ethernet Coaxial Cable*):

1. Refer to Table 2-1, *Thin Ethernet Cabling Limitations*, and then connect the male connectors on the ends of Thin Ethernet cable lengths to the female ends of the "T" connector (No. 3 in Figure 2-9). (If you only use one side of the "T", you should terminate the other side with the terminator (No. 2 in Figure 2-9.)

    Make the connections in this way:

    Simply match the male BNC connector to the female BNC connector, fit the male connector over the female, aligning the pin in the male connector with the hole in the female connector. Push in and turn the outer housing until it locks in place.

2. To connect the "T" connector to the back of your Sun-3/50M, match the male portion of the "T" to the female BNC connector on the computer base, and make the connection as described above.

In order to ensure proper network operation, make sure that you observe these limitations:

Table 2-1   *Thin Ethernet Cabling Limitations*

MAXIMUM contiguous length of a coaxial cable segment	185.0 meters
MAXIMUM length of Thin Ethernet network	5 segments*
MAXIMUM number of stations per segment	30
MINIMUM distance between two stations	.5 meters

(1 meter = 39.37 inches)

*requires repeater sets

Note that when you add a Thin Ethernet network to a standard Ethernet network, each Thin Ethernet must be counted as three times its actual length in calculating the maximum length that the combined networks can be. (The maximum length of one standard Ethernet segment is 500 meters, and the maximum length of a standard Ethernet network is 2.5 Kilometers.)

In other words:

If you were combining a 200 meter standard Ethernet segment with a Thin Ethernet segment, the Thin Ethernet segment must be no long than 100 meters, but will be counted as 300 meters, which brings the combined segment length to the 500 meter limit.

(Ethernet Segment Length) + (Thin Ethernet Segment Length X 3) < 500 Meters

If you are adding a Thin Ethernet network to an existing standard Ethernet, and the total length of your Ethernet network is 1 Kilometer, for example, then the total length of your Thin Ethernet network must be no more than 500 meters — 1/3 of what is left of the 2.5 Kilometer Ethernet limit:

Ethernet limit - Actual total Ethernet length = Remainder of Ethernet limit

Remainder of Ethernet limit / 3 = Maximum length of Thin Ethernet when added to "Actual total Ethernet length"

Figure 2-10   *Example of Thin Ethernet/Ethernet Topology*
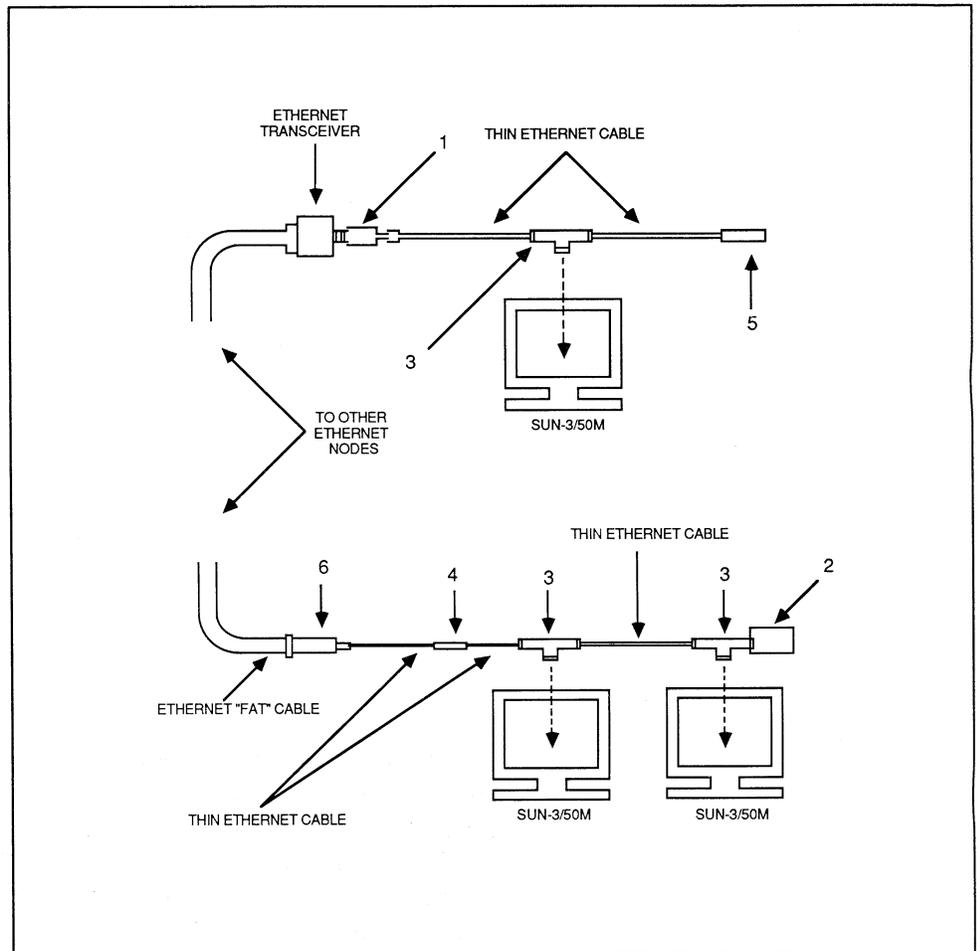
Key	Description
1	Adapter, BNC female to Type N male
2	Terminator, 50 ohm BNC male
3	BNC T, (F,M,F)
4	Barrel Connector, BNC female to BNC female
5	BNC terminator, 50 ohm female
6	Adapter, Type N female to BNC female

Checking Thin Ethernet Configuration

To confirm that the dip switch on the computer board is set for Thin Ethernet, follow these procedures to partially remove the board and look for the dip switch. It is located just behind and between the Thin Ethernet and standard Ethernet connectors.

To check the single board computer (CPU board) configuration:

1.   Make sure that the workstation is **not** connected to a power source, then obtain a #3-32 hex (allen) wrench.

2.   Turn the workstation base so that you are facing the rear of the unit.

3.   Remove the four hex-head type screws that attach the board to the computer base, as shown in Figure 2-11.

Figure 2-11   *Removing the Single Board Computer*
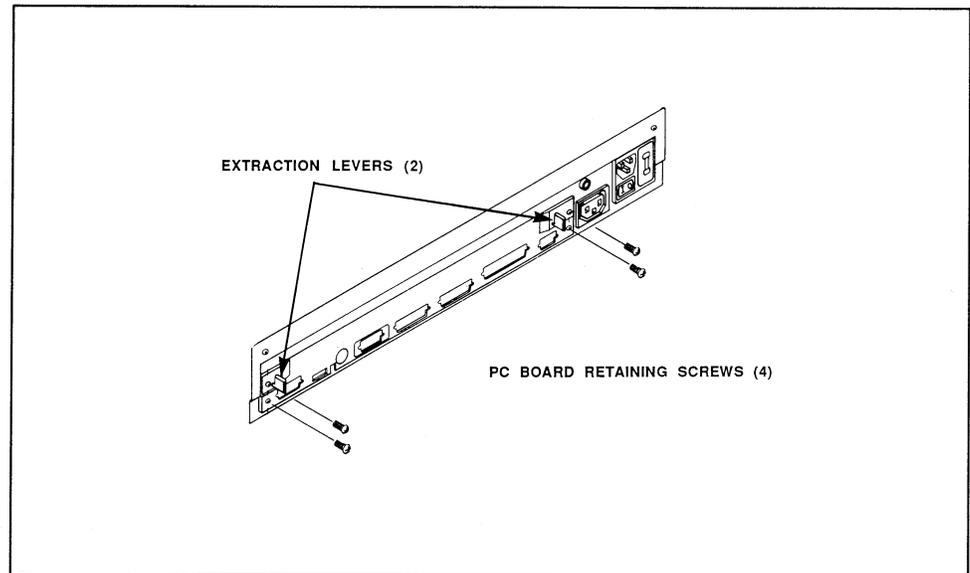
CAUTION   **This board contains components that are sensitive to damage from electrostatic discharge, which can occur, for example, when you walk across a carpet and then touch the board. Before handling the board, make sure that you have placed your hand on a conductive surface that is grounded to a common earth ground, (such as the metal screws on the AC receptacle cover) to discharge any static electricity present in your body.**

4.   Push the two extraction levers (on each side of the board edge) outward, toward the sides of the unit, until the PC board releases from the base. (See Figure 2-11 for the location of the extraction levers.)

5.   Now gently slide the board out until you can see the dip switch that is just behind the BNC and Ethernet connectors, as shown in Figure 2-12.

Figure 2-12   *Thin Ethernet Dip Switch Setting*
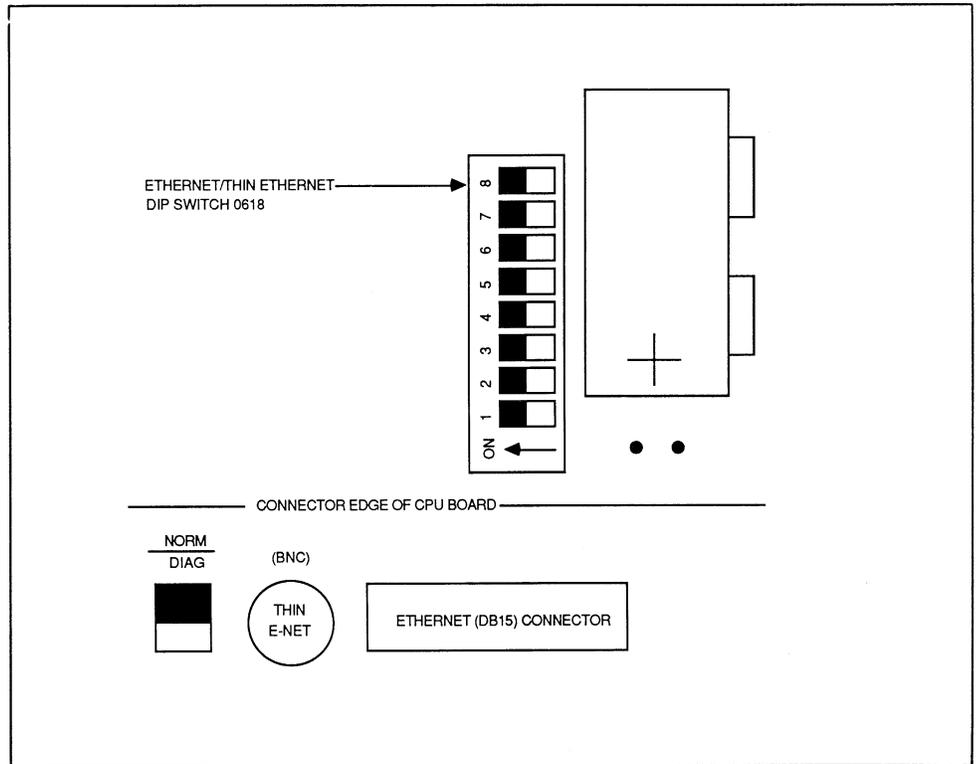
6.   Make sure that the eight-position dip-switch is set as shown above for Thin Ethernet use. The black squares represent the raised portion of the switches.

All eight positions are in the ON position, which is marked on the switch package. When all eight positions are ON, the raised parts of the switch are ALL all the way over to the left (toward the Thin Ethernet BNC connector), as shown in Figure 2-12.

If you should need to change the switch setting, use a pointed instrument to slide each switch into position. (There will either be a small indentation in the switches in which you may insert the pointed instrument, or the switches will be raised enough that you can use the instrument to push the switch over to the ON position.)

7.   To reinstall the board, carefully slide the board back into the base unit and secure it with the screws removed during Step 3.

Connecting the Sun-3/50M to the Ethernet

This section is optional, and is only for those who need to connect their Sun-3/50M directly to an Ethernet (using a Sun ETHKIT and appropriate accessories). If you want to connect the workstation directly to a Thin Ethernet, read the section entitled *Connecting the Sun-3/50M to the Thin Ethernet.*

NOTE   *Before going on, make certain that J0642 on the single board computer is properly jumpered. (If your workstation does not have Jumper J0642, it is preset for use with a Level 2 transceiver.) If you are using a Level 1 Ethernet transceiver, the jumper must be IN. If you are using a Level 2 Ethernet transceiver, the jumper must be OUT. Examples of transceiver types are listed below, and Figure 2-14 shows the jumper location.*

The computer board is factory configured for connection to the Thin Ethernet, BNC type connector, which means that you will need to change the switch setting in order to connect up to a standard Ethernet.

Refer to the procedures below to check and/or change this jumper setting, and to set Dip Switch 0618 for an Ethernet connection.

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.

Note that multiplexer boxes such as Digital Equipment Corporation's DELNI require a transceiver.

NOTE   *While these transceivers are compatible with Sun equipment, it should be understood that Sun does not guarantee the performance of any component not purchased from Sun.*

In order to check board configuration:

1.   Make sure that the workstation is **not** connected to a power source, then obtain a #3-32 hex (allen) wrench.

2.   Turn the workstation so that you are facing the rear of the unit.

3. Remove the two hex-head type screws on each side of the board that attach
    the board to the workstation base, as shown below:

Figure 2-13   *Removing the Single Board Computer*
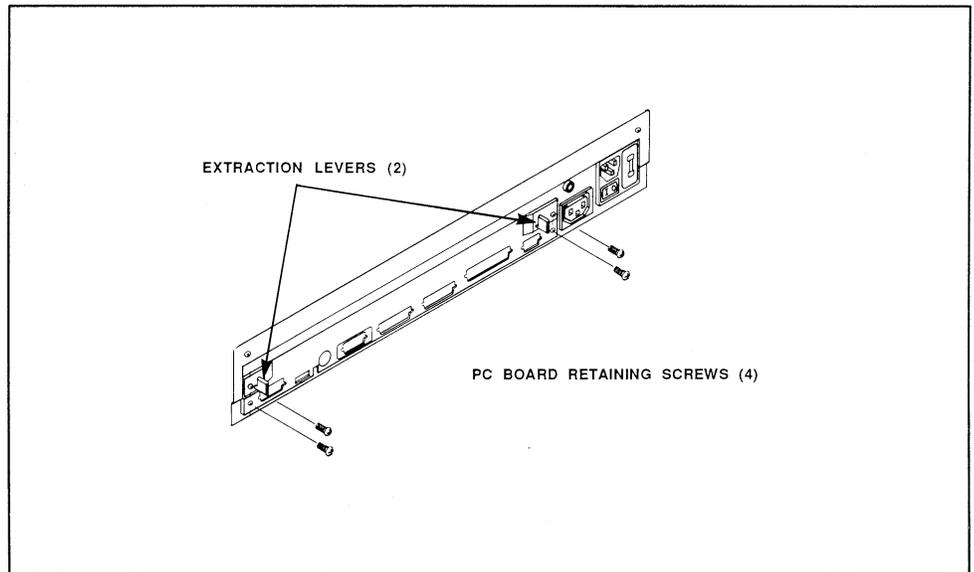
CAUTION   **This board contains components that are sensitive to damage from electros-
tatic discharge, which can occur when you walk across a carpet and then
touch the board. Before handling the board, make sure that you have
placed your hand on a conductive surface that is grounded to a common
earth ground, (such as the metal screws on the AC receptacle cover) to
discharge any static electricity present in your body.**

3. Push the two extraction levers (on each side of the board edge) outward,
    toward the sides of the unit, until the PC board releases from the base. (See
    Figure 2-13 for the location of the extraction levers.)

4. Now gently slide the board out until you can see the dip switch that is just
    behind the BNC and Ethernet connectors, as shown in Figure 2-14.

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Figure 2-14   *Ethernet Switch and Jumper Settings*
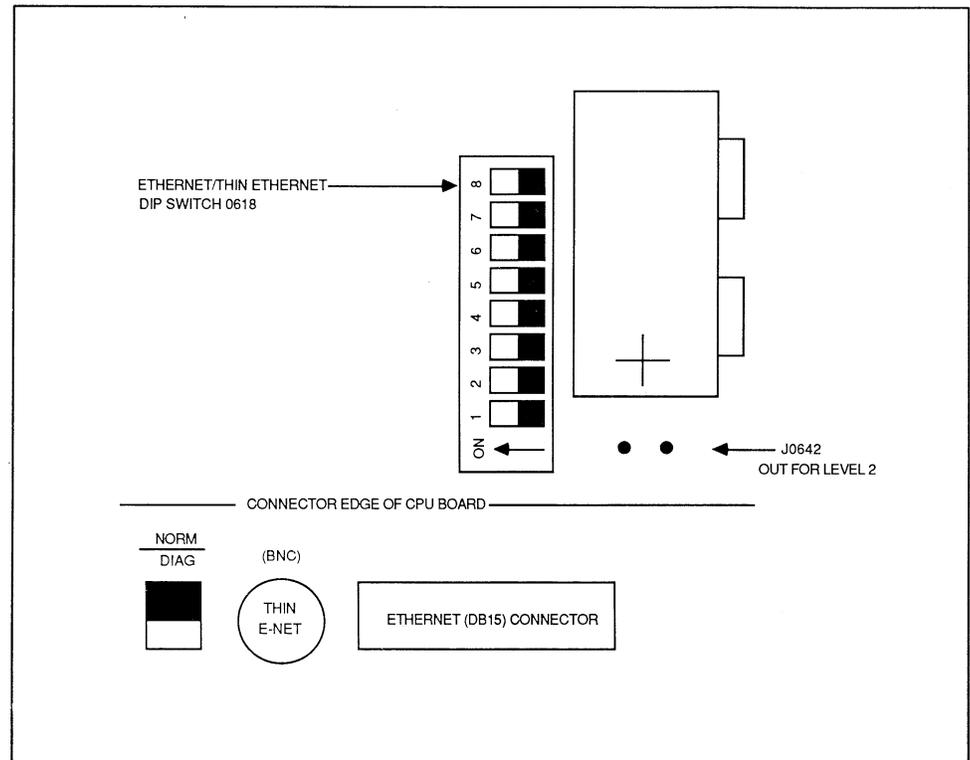
5.   Make sure that the eight-position dip-switch is set this way for standard Ethernet use (connecting to the 15-pin Ethernet connector):

All eight positions are in the OFF position. When all eight positions are OFF, the small raised parts of the switch are ALL all the way over to the RIGHT (closest to the DB15 Ethernet connector). The black squares in the dip switch (shown above) represent the raised portion of the switches.

To change the switch setting, use a pointed instrument to slide each switch into position. (There will either be a small indentation in the switches in which you may insert the pointed instrument, or the switches will be raised enough that you can use the instrument to push the switch over to the OFF position.)

6.   Now locate jumper J0642, which is just to the right of dip switch 0618 (refer to Figure 2-14). The board is factory configured for a Level 2, transformer type transceiver, which means there is no jumper in this location. If you have a Level 1, capacitive coupled type transceiver, place a jumper in this position.

Examples of Level 1 and Level 2 transceivers are at the beginning of this section.

CAUTION   **To avoid Ethernet jamming, do not connect both Ethernet and Thin Ethernet cables to the workstation. The Sun-3/50M is not intended to operate while connected to both network types.**

Connecting the Ethernet
Transceiver Cable

1. Find the transceiver cable. It is a thick cable with 15-pin D connectors at
    both ends, also called a "drop" cable. The male end of the Ethernet tran-
    sceiver cable has a pair of metal studs that fit into the slide lock assembly
    attached to the ETHERNET jack on the computer board edge. Plug this male
    end into the "ETHERNET" jack. 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.

If you ordered an Ethernet kit, you have received a 15 meter length of transceiver
cable and either 'vampire tap' or 'N' type connectors. (See Figure 2-15, *Linking
Up to an Ethernet*.) The coaxial cable and terminators necessary to connect mul-
tiple workstations to a network may be purchased separately from Sun.

Connecting the Ethernet
Coaxial Cable

Setting up an Ethernet with all Sun-supplied components is fairly straightforward:

1.   Screw the 50 ohm coaxial cable into one of the transceiver N connectors (an N connector is a round, screw-on connector).

2.   Each end of the coaxial cable must have a 50 ohm terminator attached. This may be done either by attaching the 50 ohm terminator

     □   to the transceiver's vacant N connector, or to

     □   the end of the coaxial cable, using a barrel connector. (A barrel connector is a double N connector.)

CAUTION   **Handle the coaxial cable with care; it is fragile. Don't install it in an area where it may be run over or stepped on.**

3.   For each workstation, plug the female end of the workstation's transceiver cable into the 15-pin D connector on the transceiver, and the male end of the workstation's transceiver cable into the "ETHERNET" connector on the rear of the base unit.

Figure 2-15   *Linking Up to an Ethernet*

Key	Description
1	Terminator
2	Female N connector to transceiver
3	Male N connector to transceiver
4	Ethernet transceiver D connector
5	Sun-3 to Ethernet D connector
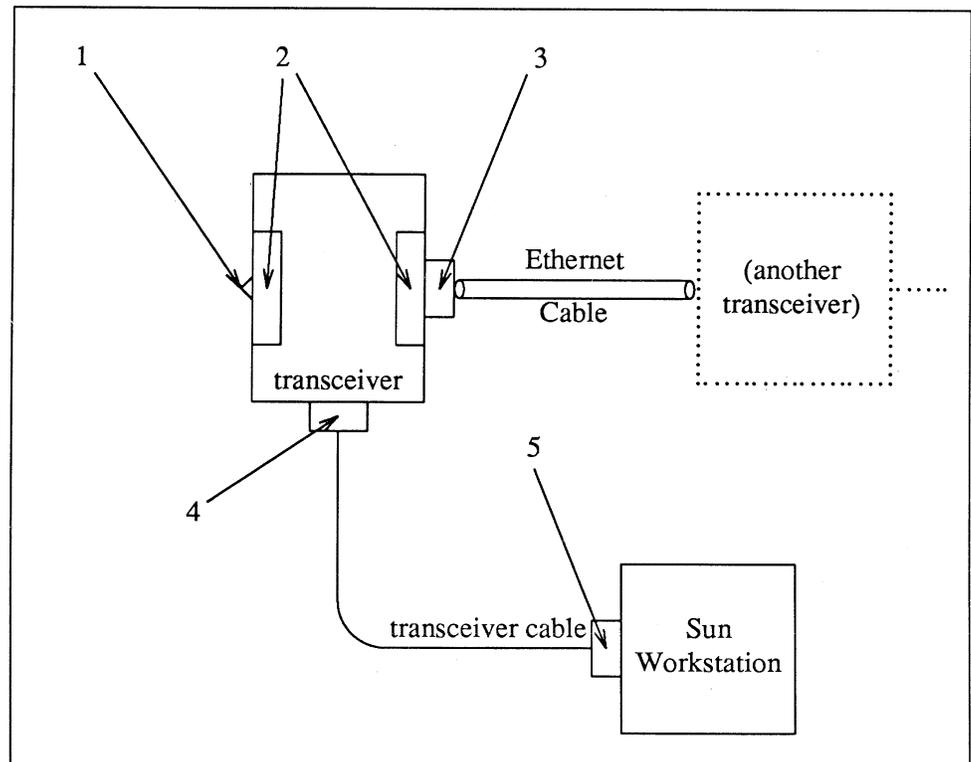
Please note that there are certain cabling limitations that must be observed for proper Ethernet implementation:

Table 2-2   *Ethernet Cabling Limitations*

MAXIMUM contiguous length of coaxial cable segments	500.0 meters
Distance between transceivers*	2.5 meter multiples*
MAXIMUM length of transceiver cable	50.0 meters

*Transceivers must be placed at 2.5 meter **intervals** along the coaxial cable. That is, you could connect transceivers 2.5 meters apart, but not 2.0 meters; you could connect transceivers 7.5 meters apart, but not 7.0 meters (see figure below).

Figure 2-16   *Ethernet Cabling Lengths*
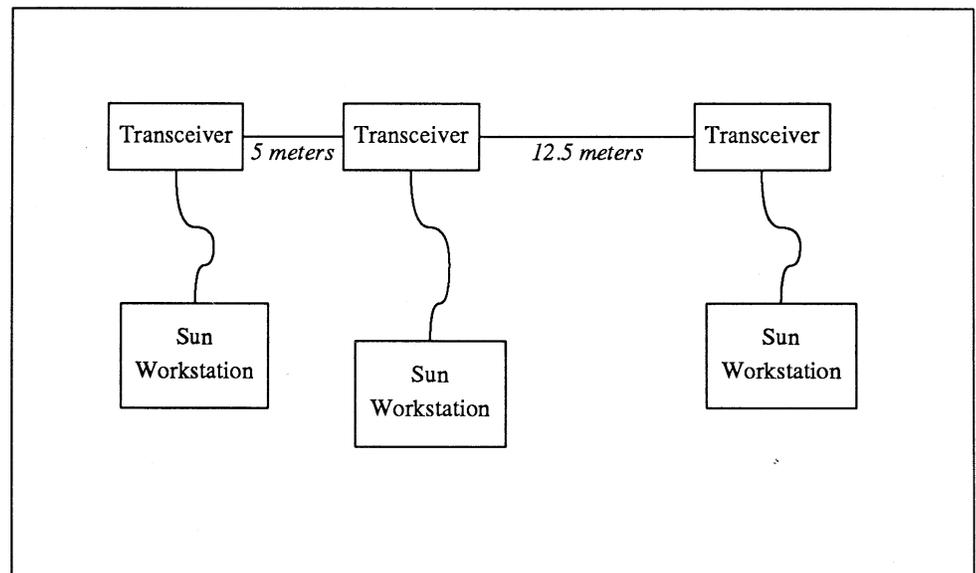
The female N connector on the transceiver connects to the male N connector on the Ethernet cable.

If you buy Ethernet cable in bulk, the cable should be marked every 2.5 meters. Make certain you attach each transceiver on a mark, and also make certain to cut the cable ends on marks.

NOTE   *If you combine the Ethernet network with a Thin Ethernet network, you must observe cabling limitations described under the Connecting Sun-3/50M to the Thin Ethernet heading.*

Connecting the Monitor to the
Sun-3/50M

CAUTION   **Make certain that the AC power switches of the monitor and the base are OFF. The OFF position of the AC power switch is with the side marked "0" pushed in.**

Find the monitor's video cable. The monitor's video cable has a 9-pin D connector at each end.

1. Plug the male D connector of the video cable into the "VIDEO" jack on the rear of the single board computer, and tighten the screws.

2. Plug the female D connector of the video cable into the "VIDEO" input of the monitor and tighten the screws on it.

Find the monitor power cable; it is a short, coiled cable with a three-pronged connector at one end and a three-slot connector at the other.

1. Plug the male end into the receptacle marked "VIDEO", located to the left of the ON/OFF switch on the computer base.

2. Plug the female end into the video power receptacle on the rear of the monitor.

The Diagnostic Switch

There is a switch on the back of the single board computer that determines whether UNIX† will be booted following self-tests, or whether a menu of special extended diagnostic tests will be offered instead. Figure 2-6 shows the switch location.

□   If you *do* want to enable extended diagnostics when you power the system up, set the rocker switch to the "DIAG" position.

NOTE   *If you place the diagnostics switch in DIAG position, power-on self-test messages are sent to serial port A — so you must have a terminal connected to port A to see them.*

□   If you do *not* want to enable extended diagnostics when you power up, set the rocker switch to the "NORM" position. (On some early Sun-3/50Ms, this position is labeled "BOOT".) Ordinarily, you place the DIAGNOSTICS switch in the NORM position when booting or running the system.

NOTE   *If the switch is accidentally placed in the DIAG position, nothing will appear on the monitor screen while the power-on self tests are running. When they finish successfully, you will be prompted to depress any key on the workstation keyboard or on a terminal connected to Port A within 10 seconds, which will bring up a menu of extended tests.*

If you do not depress a key, the system will react according to EEPROM programming (explained under the Selecting the Diagnostic Boot Device) heading, and

---

† UNIX is a trademark of AT&T Bell Laboratories.

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you may receive a ">" prompt.

To exit the monitor program (identified by the ">" monitor prompt) and reboot the system:

Set the diagnostics switch to the NORM position, type "b" and the argument that represents the boot device and program you wish to boot, then press the return key. The system will now begin to reboot automatically.

2.7. Powering Up the Sun-3/50M

CAUTION   **Before going on, make certain that the AC power switches of the base unit AND the monitor are OFF. The OFF position of the AC power switch is with the side marked "0" pushed in.**

So far you have made certain that

□   the monitor and base unit have been set correctly for available AC power,

□   the base unit VIDEO power and signal connectors are plugged into the monitor,

□   and the DIAGNOSTICS switch is the NORM position.

1.   Turn the power switch of the monitor to ON.

2.   Find the AC power cord. The AC power cord has a three-slot female plug at one end and a three-pronged wall (or "mains," if European) plug at the other. For safety reasons, first plug the female end of the AC power cord into the input on the back of your Sun-3/50M (located above the ON/OFF switch).

3.   Again make certain that the AC power switch on the back panel is OFF (side of the switch with the "0" is pushed in) then plug the other end of the AC power cord into the wall AC outlet.

CAUTION   **Make sure that all peripheral devices connected to the SCSI connector are switched OFF before you apply power to the Sun-3/50M. If a SCSI device is ON when you power-up the workstation, all the LEDs on the computer board may light. Should this happen, turn the SCSI device and the workstation OFF, then reapply power to the workstation, as described below.**

4.   Turn ON the power switch on the rear of the base unit (the side with the "1" is pushed in).

The eight diagnostic LEDs on the computer PC board will begin blinking on and off (see *Power-On Self Test Procedures* and the table following, *Diagnostic LEDs*) and the CRT screen will slowly come on. The blinking LEDs indicate that the Sun-3/50M is going through a self-test; when this self-test is successfully completed, the following message will come onto your screen:

```
Self Test completed successfully.

        Sun Workstation, Model Sun-3/50M, Sun-3 Keyboard
        ROM Rev --, 4MB Memory installed, Serial # - - - -
        Ethernet address --:--:--:--:--:--

Autoboot in progress.
```

For further information on how to bring up UNIX, log on and choose your password, please see *Installing UNIX on the Sun Workstation*, part number 800-1317.

Procedures for changing the optional banner that includes the Sun logo, workstation model number and keyboard type are under the heading *EEPROM Options*.

CAUTION   **To avoid damage to internal circuitry, do not disconnect the keyboard while the workstation is powered-up.**

2.8. Power-On Self Test Procedures

The single board computer of the Sun-3/50M has a programmable, read-only memory (PROM) chip that contains a program generally known as the ''monitor.'' The monitor controls the operation of the system before the UNIX kernel takes control.

When system power is first turned on, the PROM monitor invokes a quick self-test procedure, a running commentary of which is carried by the eight LEDs on the rear edge of the Sun-3/50M single printed circuit board. The table below interprets the results of this self-test. A black bullet "●" means the light is on; a circle "o" means the light is off.

If at some point during the self-test sequence, the LEDs freeze (keep the same pattern for more than a couple minutes), or the sequence restarts from the beginning, there is a critical hardware problem with the workstation. In this case, contact Sun Microsystems Field Service or your local Field Service organization. Copy down the pattern of lights (as well as you can, if it is repeating over and over); they contain important diagnostic information.

Table 2-3   *Diagnostic LEDs*

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 7 Lights
● ● ● ● ● ● ● ●	A reset sets LEDs to this state	CPU or PROMs bad*
o o o o o o o o	Test 0 Checking CPU to SCC path	CPU Board (SCC)
● o o o o o o o	Test 1 checking the boot PROM	Boot PROM
● ● o o o o o o	Test 3 checking the Context Register	CPU Board (MMU)
o o ● o o o o o	Test 4 Segment Map RAM Rd/Wr Test	CPU Board (MMU)
● o ● o o o o o	Test 5 checking Segment Map RAM	CPU Board (MMU)
o ● ● o o o o o	Test 6 checking Page Map RAM	CPU Board (MMU)
● ● ● o o o o o	Test 7 checks memory data path	CPU Board
o o o ● o o o o	Test 8 checks bus error detection	CPU Board
● o o ● o o o o	Test 9 checks interrupt capabilities	CPU Board
o ● o ● o o o o	Test 10 checking MMU read access	CPU Board
● ● o ● o o o o	Test 11 checking MMU write access	CPU Board
o o ● ● o o o o	Test 12 writing to invalid page	CPU Board
● o ● ● o o o o	Test 13 tries to write to protected page	CPU Board
o ● ● ● o o o o	Test 14 performs parity error check	CPU Board
● ● ● ● o o o o	Test 15 performs parity error check	CPU Board
o o o o ● o o o	Test 16 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 (LED is blinking)	CPU Board
● ⇒ o⇒ o⇒ o⇒ o⇒ o⇒ o⇒ o	"Walking Ones" pattern	UNIX running okay

* This indication may also mean that a SCSI device was powered on prior to workstation power-up.

Figure 2-17   *What the Diagnostic LEDs Mean*
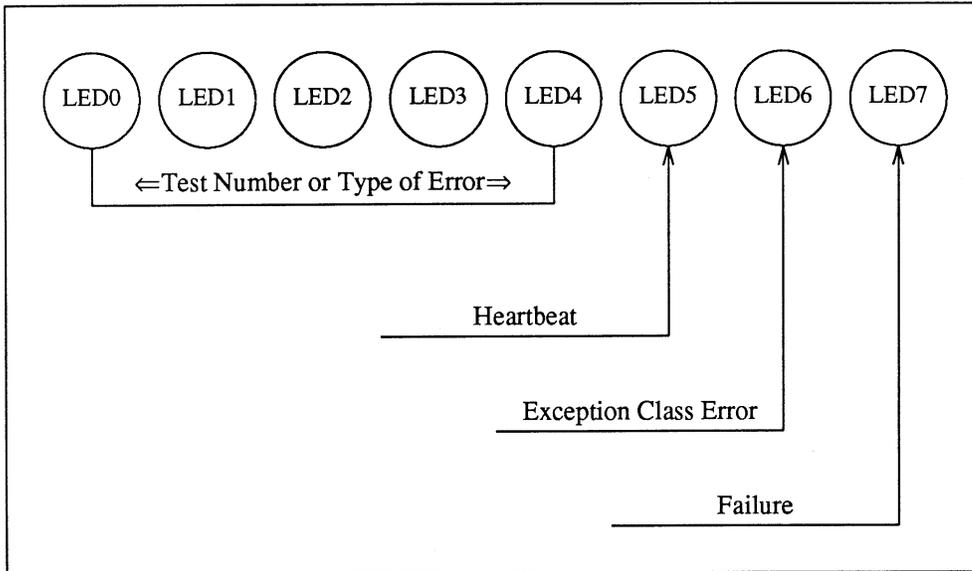
NOTE   *The LEDs at the rear of the workstation base actually appear with bit position 0 on the left and 7 on the right.*

1.   If LED 7 lights during self-test, it indicates a failure. LEDs 0 through 4 indicate the number of the test in progress, interpreted by the *Diagnostic LEDs* table.

2.   If the LED in bit position 6 lights up during the self-test, it indicates the failure is an exception class failure — bus error trap, address error trap, unexpected interrupt, etc.

3.   LED 5 is the heartbeat LED. It starts blinking after the conclusion of self-test to indicate that the CPU is receiving clock interrupts and that the monitor is in quiescent state and/or UNIX is in boot state.

4.   LEDs 0-4 indicate the exact test in progress during self-test. If LED 7 is not lit, then the tests are proceeding without error; if LED 7 lights up, then LEDs 0-4 will freeze, indicating which test failed. Refer to table 2-3, if necessary.

If all 8 LEDs are lighting up in sequence from 0 to 7 then back to 0 again, it means that you have exited self-test and UNIX is running successfully.

2.9. EEPROM Options

The single board computer has an electrically erasable, programmable memory (EEPROM) chip that can be accessed through the boot PROM monitor in order to change system configuration parameters.

These paragraphs will tell you how to program the EEPROM to:

□   change the primary terminal or console device,

□   specify a normal boot device,

□   change the banner that appears on power-up,

□   turn the keyboard "click" on or off,

□   and specify a diagnostic boot device and path.

NOTE   *You may need to use the Installing UNIX manual (shipped with this workstation) in conjunction with some of these procedures, which require information on disk or tape partitions, file numbers, and so on.*

To program the EEPROM, you must first power-up the system and then enter the monitor program: Simultaneously press the **L1** key (upper left-hand corner of the keyboard) and the **A** key. You have now aborted your present session and accessed the monitor program. The monitor displays as its characteristic prompt the "greater than" symbol:

>

To access the EEPROM now, type the letter **q**, followed by the EEPROM address that you want to examine or modify. You may use either upper or lower case characters to enter monitor commands or write to the EEPROM. Here are some addresses that you may want to modify:

Table 2-4   *EEPROM Address Space Allocation*

Location	*Function*
0x1f	Set console (primary terminal) I/O
0x18 to 0x1d	Choose polling or selected boot device
0x19 to 0x1D	Specify vmunix device
0x20	Choose boot display banner
0x68 to 0xb7	Store custom banner
0x21	Turn keyboard "click" on or off
0x22 to 0x26	Specify diagnostic boot device
0x28 to 0x4f	Specify diagnostic boot path

Thus, if the location you want to access is hexadecimal address 0x00001f, you would type:

>q 1F

and press the return key.

The system will then display the contents of address 0x1f in the EEPROM (the value that determines which device is considered the system console).

>EEPROM 01F: 00

To update the contents of this location, enter the new value immediately following the displayed value, and then a carriage return. You have now written the new value to address 0x1f — and automatically incremented to the next address.

Let's say you want to replace the value 0x00 with the value 0x10:

>EEPROM 01F: 00 **10** [RETURN]

The address counter now automatically increments and you will view the contents of the next location. If you want to terminate this process, press the space bar when the question mark is displayed, followed by a carriage return, and you will receive the monitor prompt again:

>EEPROM 020: *some value*? [SPACE] [RETURN]
>

To exit the modify mode and receive the monitor prompt immediately following the entry of a new value into an EEPROM address, enter a non-hexadecimal character, such as a period, immediately following your entry, and then press [RETURN]:

>EEPROM 02F: 00 **10** . [RETURN]
>

In order to see the effect of your EEPROM programming, you must reinitialize the system. To boot UNIX from the monitor prompt, set the diagnostic switch to NORM and enter **b** and the appropriate argument.

> **b () vmunix** [RETURN]

Setting Up Console I/O

You can make the display come up on a device other than the workstation monochrome monitor, each time you boot-up:

The device might be either one or two ASCII terminals, connected to the serial port(s) — port A and port B — on the computer base rear panel.

You must let the processor know which terminal you consider to be your console or "primary" terminal — the device over which you and the processor will communicate.

You can set a byte in the EEPROM to select your console or primary terminal: either serial port A, serial port B, or your workstation monochrome monitor.

Location of the byte that sets your primary terminal is 0x00001f. Values assigned to your choices are:

0x00 = monochrome monitor
0x10 = serial port A
0x11 = serial port B

Let's say you want to set your primary terminal to be serial port A. You would access EEPROM location 0x00001f, and then enter the value which identifies serial port A — 0x10.

First, access location 0x00001f.

>q 1f [RETURN]

You have now opened EEPROM location 0x00001f. The value presently at this location will be displayed (we'll say it's 0x00, for monochrome monitor):

>EEPROM 01F: 00?

Enter the value for serial port A — 0x10 — and then enter a period (or any other non-hex character) and [RETURN], to escape.

>EEPROM 01F:000 10 . [RETURN]

Selecting the Boot Device

Ordinarily, when the system boots with the diagnostic switch in NORM position, (BOOTSTRAP on early workstations) and EEPROM address 0x18 contains the value 0x00, the monitor program polls boot devices in this order:

Boot Device Codes:
sd = SCSI disk
le = Ethernet

□   It first checks to see if a disk controller is present, and if so, attempts to boot from it.

□   If the polling sequence does not find a disk drive, the Ethernet controller on the CPU board is polled and becomes the boot device.

To delete the polling sequence and change the normal boot device, you must open the EEPROM to address location 0x18 and change the contents from 0x00 (which causes polling) to 0x12 (to delete polling), followed by a two byte hex code for the ASCII string that represents the new boot device (refer to the codes shown in the left margin). Then you must open the next three addresses and write values that represent the controller, unit and partition or file number.

For example, this read/write sequence would make Ethernet the default boot device:

ASCII equivalent of hex values
shown here:

    6c = 1
    65 = e

```
>q 18 [RETURN]
EEPROM 018:some value?  12 [RETURN]
EEPROM 019:some value?  6c [RETURN]
EEPROM 01A:some value?  65 [RETURN]
EEPROM 01B:some value?  0 [RETURN]
EEPROM 01C:some value?  0 [RETURN]
EEPROM 01D:some value?  0  .  [RETURN]
>
```

The example above tells the system to boot le(0,0,0), which represents Lance Ethernet, and controller, unit and partition numbers 0,0,0.

You may use the ASCII/Hex conversion table at the end of this EEPROM programming discussion to aid you in entering the hexadecimal values that represent the ASCII characters you have selected.

Changing the Banner

To change the Sun banner that appears during boot-up along with the model and keyboard type, enter:

```
>q 20 [RETURN]
```

which will open the EEPROM address that pertains to that display. The monitor will echo the address you entered and display some value (0x00 for Sun Logo display), which you must change to the hex value 12:

```
>EEPROM 020:00 12  .  [RETURN]
>
```

You have just instructed the monitor program not to display the banner that includes the Sun Logo. To create a new banner, you must now write the hex value for ASCII blanks (0x20) or the hex equivalent of a new ASCII string into locations 0x68 to 0xb7.

NOTE   *If you do not fill locations 0x68 to 0xb7 (80 characters) with appropriate hex numbers after you have changed the contents of address 0x20 to 0x12, you may see garbage in place of the Sun banner when you boot-up. The last two addresses, 0xb6 and 0xb7, must contain 0x0d and 0x0a, which represent the ASCII code for carriage return and line feed.*

To create a custom banner, after you have written the value 12 into address 0x20, entered a period and then return (to exit the modify mode), access address 0x68:

```
>q 68 [RETURN]
>EEPROM 068:some value?
```

Then begin entering the hexadecimal code for the new banner immediately after the value in each address is displayed, and press [RETURN] to increment to the next address.

You may use the ASCII/Hex conversion chart (Table 2-5) to select values that represent the characters you wish to display in place of the Sun banner during power-up.

NOTE   *The banner you have created will be displayed the next time you power-up and reboot the system. If you entered all blanks (except for the carriage return and line feed values), there will be no banner upon power up.*

Turning Keyboard Click On or Off

The value in EEPROM location 0x21 determines whether or not the keyboard will make a "clicking" noise when you type. Use the procedures described at the beginning of this EEPROM section to access location 0x21 and view or change the contents:

To turn the keyboard click OFF:

```
>q 21
EEPROM 021:012 00
```

To turn the keyboard click ON:

```
>q 21
EEPROM 021:000 12
```

Selecting the Diagnostic Boot Device

If you switch the diagnostic switch to the DIAG position and then boot without specifying either vmunix or a boot device and path that indicates where the selected diagnostic program is located, the system may display an error message and drop into monitor mode, displaying the ">" prompt.

You can program the EEPROM so that, when the diagnostic switch is in DIAG position, and you enter

>b

with no arguments, the monitor program will boot the desired program, which can be a diagnostic or vmunix. To do this, you must first enter parameters that specify whether to boot from Ethernet or disk. Then you must enter the path that tells the boot PROM where it can find the selected program in your file systems (see the heading, *Setting the Diagnostic Boot Path*).

If you want to invoke the monitor program after self-test when you do not select Extended Tests, simply enter zeroes in addresses 0x22 through 0x4f.

The EEPROM addresses 0x22 and 0x23 contain the hexadecimal values that represent the selected boot device. For example, locations 0x22 and 0x23 might contain the values 0x73 and 0x64, respectively — the hex equivalent of ASCII "sd", for SCSI disk.

The next three bytes (0x24 through 0x26) contain the hexadecimal values that literally represent the controller, unit and partition or file numbers specific to the chosen device. In other words, these bytes represent the part of the boot command that is enclosed in parentheses:

>**b sd (0,0,0)**

To set the "diagnostic boot device", obtain the monitor prompt as described at the beginning of this section, and access EEPROM address 0x22:

>**q 22**
EEPROM 022:00

A hexadecimal value will be displayed as the contents of address 0x22, as shown above.

To specify a diagnostic boot device, simply enter the hex equivalent of the first letter that represents the new device — you can use the ASCII/Hex Conversion Chart at the end of this section — press [RETURN] and then, when the contents of location 0x23 are displayed, enter the value for the second letter than represents the device. (Entering **b   ?** after the > prompt will give you a list of possible boot device choices.)

NOTE   *To ensure that diagnostics are **not** invoked after self-test, and that the system drops into monitor mode during a boot-up with the diagnostic switch in DIAG position, enter zeroes instead of hex values.*

If you have entered values to specify a boot device, press [RETURN] again and write the controller, unit and partition or file numbers into addresses locations 0x24, 0x25 and 0x26, respectively. You do not need to use ASCII characters for these values. Simply enter one hexadecimal value in each location, and press [RETURN].

If you have specified the monitor mode, enter zeroes in all three locations.

Now, if you have specified a boot device, you are ready to use up to forty bytes, beginning with EEPROM address 0x28, to represent your complete diagnostic boot path. The values you enter represent any of the following:

1.   the location that you have selected to store the diagnostic program,

2.   the acronym *vmunix*, which means virtual memory UNIX,

3.   or zeroes to invoke the monitor program after self-test, during a diagnostic boot.

Setting the Diagnostic Boot Path

You have just programmed the EEPROM to tell the boot PROM monitor program what device, controller, unit and partition or file number to boot from during a diagnostic boot-up.

Now you must use the same method to tell the monitor one of the following:

1.   Where in your file systems the selected diagnostic program is located;

2.   that you want UNIX to boot after self-test when the diagnostic switch is in DIAG position and you have not selected Extended Tests;

3.   or that you want the monitor program to be invoked after self-test when you do not select Extended Tests.

For example, if you want to tell the monitor that the selected diagnostic program is located in the `/usr/stand` directory, you would first open EEPROM address 0x000028:

>**q 28** [RETURN]

The program would then display the contents of location 0x000028, after which you would begin entering the hexadecimal equivalent of your diagnostic path. (Table 2-5 can help you with ASCII/Hex conversions.) You are allowed forty bytes, or the equivalent of forty characters for your path name, and the last value you enter must be 0x00.

To enter `/usr/stand`, for example:

```
EEPROM 028:  some value?  2f[RETURN]  (for /)
EEPROM 029:  some value?  75[RETURN]  (for u)
EEPROM 02A:  some value?  73[RETURN]  (for s)
EEPROM 02B:  some value?  72[RETURN]  (for r)
EEPROM 02C:  some value?  2f[RETURN]  (for /)
EEPROM 02D:  some value?  73[RETURN]  (for s)
EEPROM 02E:  some value?  74[RETURN]  (for t)
EEPROM 02F:  some value?  61[RETURN]  (for a)
EEPROM 030:  some value?  6e[RETURN]  (for n)
EEPROM 031:  some value?  64[RETURN]  (for d)
EEPROM 032:  some value?  00  .  [RETURN]  (to end)
>
```

To select UNIX, use Table 2-5 to determine the hexadecimal equivalent for each character in the acronym *vmunix*, and enter those values in the addresses beginning with 0x28. All other locations in the forty-byte block should be zeroes.

If you are specifying that the monitor program is invoked during a diagnostic boot, ensure that locations 0x028 through 0x4f contain zeroes.

This table provides a hexadecimal value for each character on your keyboard. Use these values when you are asked to enter ASCII values in EEPROM memory locations. One hexadecimal value, representing any character, is written to each address location (byte).

Table 2-5   *ASCII/Hex Conversion Table*

ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex
nl (line feed)	0A	6	36	N	4E	f	66
cr (return)	0D	7	37	O	4F	g	67
sp (space)	20	8	38	P	50	h	68
!	21	9	39	Q	51	i	69
"	22	:	3A	R	52	j	6A
#	23	;	3B	S	53	k	6B
$	24	<	3C	T	54	l	6C
%	25	=	3D	U	55	m	6D
&	26	>	3E	V	56	n	6E
'	27	?	3F	W	57	o	6F
(	28	@	40	X	58	p	70
)	29	A	41	Y	59	q	71
*	2A	B	42	Z	5A	r	72
+	2B	C	43	[	5B	s	73
,	2C	D	44	\	5C	t	74
-	2D	E	45	]	5D	u	75
.	2E	F	46	^	5E	v	76
/	2F	G	47	_	5F	w	77
0	30	H	48	`	60	x	78
1	31	I	49	a	61	y	79
2	32	J	4A	b	62	z	7A
3	33	K	4B	c	63	{	7B
4	34	L	4C	d	64			7C
5	35	M	4D	e	65	}	7D
						~	7E
						del	7F

2.10. Asynchronous Serial Ports

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

Each Sun-3/50M serial port provides a 25-pin connector (DB-25) compatible with RS-232-C equipment. All signals in our connector are semantically the same as their RS-232-C counterparts. However the Sun-3/50M uses improved electrical circuits which, while working with RS-232-C devices, are also compatible with the newer RS-423 standard.

The serial ports on the Sun-3/50M 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. All 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 thus allow direct connection of Data Communications Equipment (DCE) such as modems. Computers, terminals, printers, and other DTE devices can also be connected directly to the serial ports by using the null modem cable available from Sun, part number 530-1056. For further information refer to *System Interface Manual for the Sun Workstation* (part number 800-1173), section ZS(4S), which discusses the Zilog serial interface.

Signals carried on the SERIAL PORT A and SERIAL PORT B connectors are described in the appendices.

NOTE   *The following sections — which describe connecting modems, terminals, and printers to the serial ports — are guidelines only, and specific devices may require more detailed information such as that contained in the System Interface manual.*

Connecting a Modem to the Sun-3/50M

The serial ports are wired as DTEs, and most modems are wired as DCEs. The cable connecting your modem to the Sun-3/50M 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.

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*, part number 800-1150, and *Installing UNIX on the Sun Workstation*, part number 800-1317, which detail connecting to a modem.

Connecting a Terminal to the Sun-3/50M

The serial ports are wired as DTEs. Most terminals are wired as DTEs too. 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
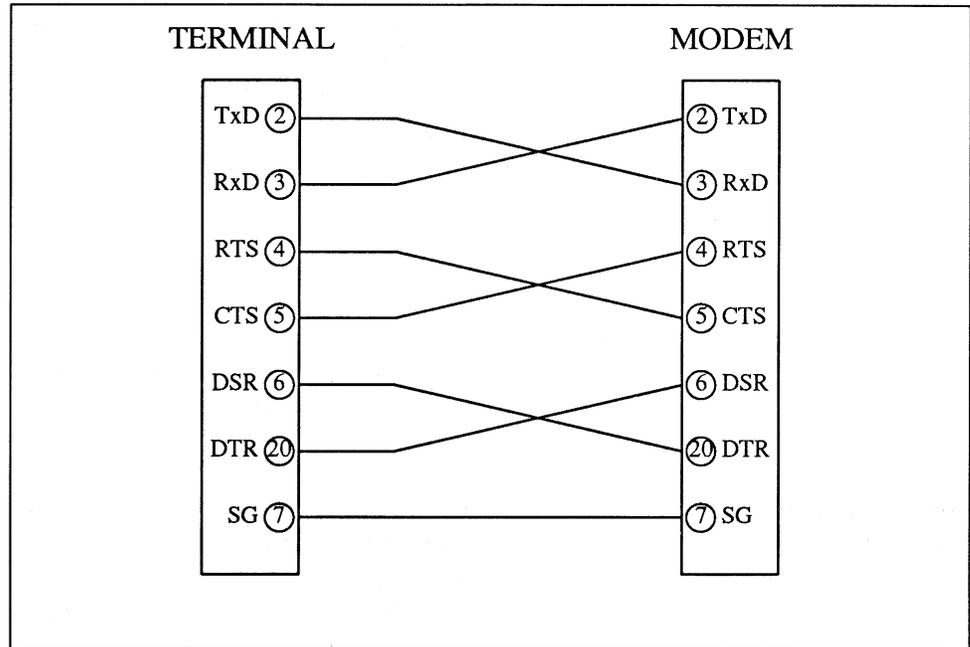
2 and 3 are crossed

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 figure below). The connector on the left is the Serial I/O Port on the CPU board; the connector on the right is the terminal (DTE).

Figure 2-18   *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*, part number 800-1150, and *Installing UNIX on the Sun Workstation*, part number 800-1317, which detail connecting to a terminal.

Connecting a Printer to the Sun-3/50M

The serial ports are wired as DTEs. Most printers are wired as DTEs too. 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-3/50M 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 null modem cable wiring, 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*, part number 800-1150, and *Installing UNIX on the Sun Workstation*, part number 800-1317, which detail connecting to a printer.

Connecting to the SCSI Connector

The single board computer has Small Computer Systems Interface (SCSI) circuitry on it, and the 50-pin female connector on the edge of the board (labeled SCSI on the back of the workstation base) allows you to use the interface.

You may connect SCSI compatible disk and tape drive controller boards to the interface with a round 50-conductor cable that is terminated on both ends with a 50-pin D-type connector, wired to match the pinout given in Appendix A.

Appendix A provides the signal names and pin number arrangement for the connector at the back of the workstation.

To connect a SCSI bus cable to the Sun-3/50M:

1. Ensure that the cable pinout matches that of the workstation connector, then align the male connector at the end of the cable with the female SCSI connector at the back of the workstation.

2. Make the connection and tighten the connector securing screws.

The *Sun-3 Mass Storage Subsystem Installation* manual, PN 813-1010, provides information on setting up SCSI type peripherals that are designed for use with the Sun-3/50M.

CAUTION   **Make sure that all peripheral devices connected to the SCSI connector are switched OFF before you apply power to the Sun-3/50M. If a SCSI device is ON when you power-up the workstation, all the LEDs on the computer board will light. Should this happen, turn the SCSI device and the workstation OFF, then reapply power to the workstation.**

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3

Environmental and Electrical Specifications
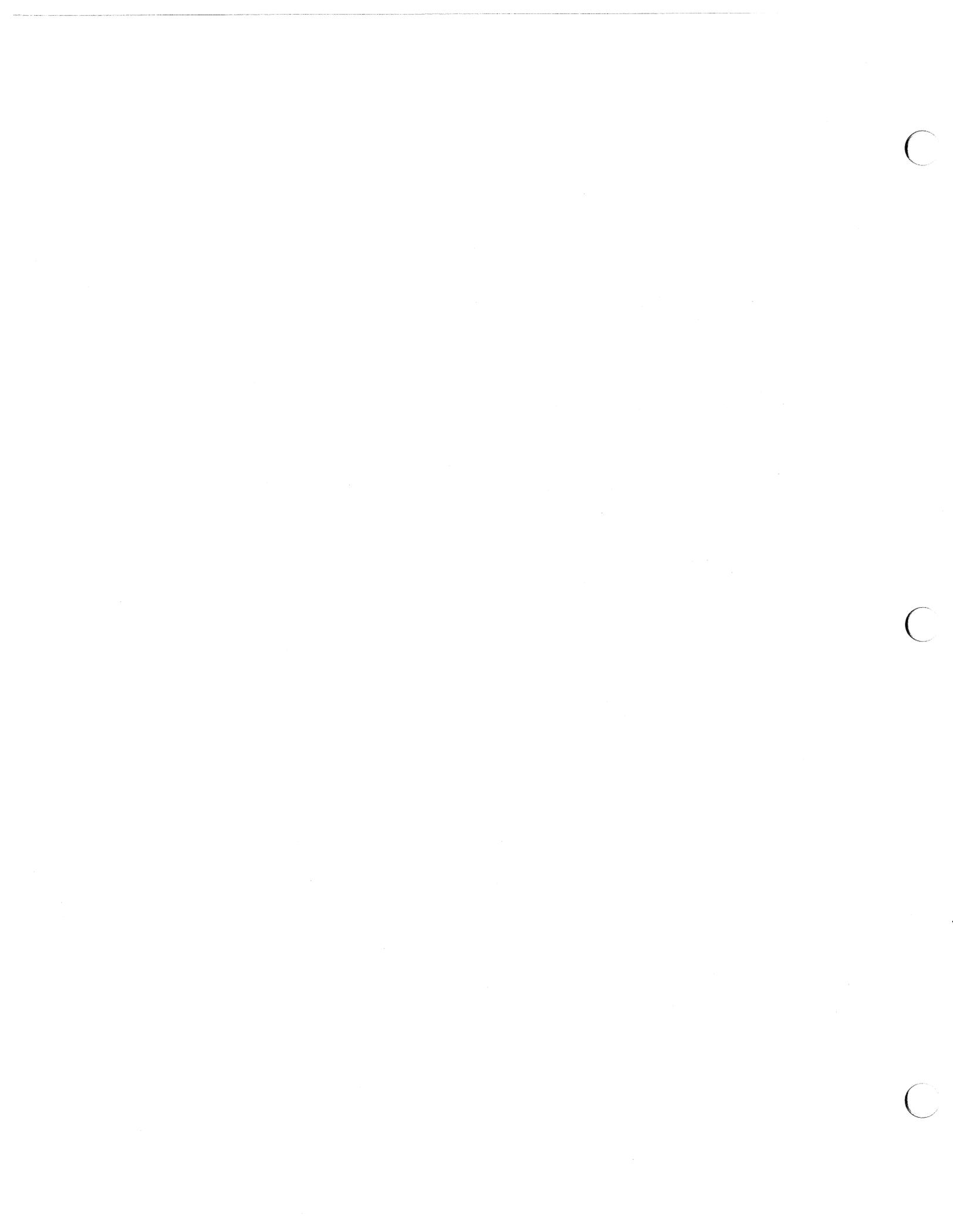
Environmental and Electrical Specifications

This section describes the environmental and electrical requirements for the Sun-3/50M.

NOTE   *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction 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.*

3.1. Physical Environment

The Sun-3/50M is manufactured for the following physical environment:

Table 3-1   *Physical Environment Specifications*

	Operating	*Non-Operating*
Ambient Temperature	10°C to 40°C	−20°C to 75°C
	(50°F to 104°F)	(−4°F to 167°F)
Humidity (non-condensing)	5% to 80%†	5% to 95%†
Altitude	0m to 2300m	0m to 12192m
	0 to 7000 feet	0 to 40000 feet

† at 40° Centigrade

3.2. Electrical Specifications

Table 3-2   *Sun-3/50M Power Supply Specifications*

Nominal AC Input Voltage	Operating Range	Frequency Range
115 VAC	94-128 VAC	47-70 Hz
230 VAC	180-260 VAC	47-70 Hz

Table 3-3   *Sun-3/50M Power Supply DC Output Ratings*

Output	Voltage	Max Amps
Output 1	+5 VDC	15 Amps
Output 2	+12 VDC	1.3 Amps
Output 3	−5.2VDC	2.0 Amps

Table 3-4   *Sun-3/50M PC Board Power Consumption*

Component	Max Amps @ +5V	Max Amps @ −5.2V	Max Amps @ +12V	Max Total Watts
Single Board Computer	13.5	0.8	0.5	100

Table 3-5   *Total System Power Consumption*

Computer Base Requirement	Monitor Requirement	Total System Requirement
145 Watts	150 Watts	295 Watts (1006.8 BTU/hr)

Table 3-6   *Fuse*

Base Unit AC Fuse size	Monitor Fuse size
4 Amps, slow-blow	1.5 amps, slow blow (Moniterm) 1.6 Amps, fast blow (Phillips)

A

Computer Board Connector Pinouts

Computer Board Connector Pinouts

This appendix provides the pin designations for the connectors on the edge of the single board computer, found at the rear of the workstation base. The pinouts of these connectors are given on the pages that follow:

- Keyboard/Mouse Connector

- Serial Port(s)

- Ethernet Connector

- Video Connector

- SCSI Connector

Pins that are not connected to anything are not listed.

A.1. Pinout of Connectors at Rear of Workstation

Figure A-1 represents pin locations on DB-9, DB-15 and DB-25 connectors.

Table A-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 A-2   *Pinout of 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	VERR

See Appendix B for more information about serial port signals.

Table A-3   *Pinout of Ethernet Connector*

Pin	Signal	Pin	Signal
2	E.COL+	9	E.COL-
3	E.TXD+	10	E.TXD-
5	E.RXD+	12	E.RXD-
6	GND	13	+12V

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Table A-4   *Pinout of Video Connector*

Pin	Signal	Pin	Signal
1	VIDEO+	6	VIDEO-
3	HSYNC	7	GND
4	VSYNC	8	GND
		9	GND

Figure A-1   *Typical DB-9 to DB-25 Pin Numbering*

PIN#	CONNECTOR TYPE
6	DB-9
9	DB-15
14	DB-25
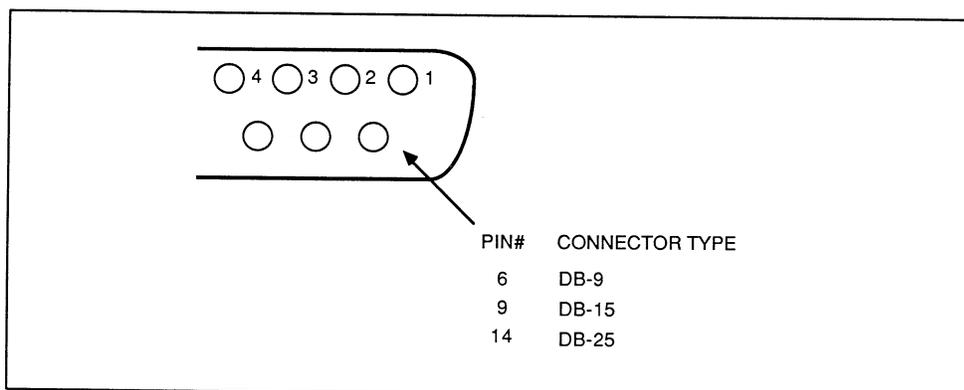
A.2. SCSI Connector Pinout

Table A-5   *SCSI Connector Pinout*

Acronym	Definition
DB1-DB7	data bus lines
DBP	data parity
ATN	attention
BSY	busy
ACK	acknowledge
RST	reset
MSG	message
SEL	select
CD	command/data
REQ	request
I/O	input/output

Signal	Pin	Signal	Pin
-DB(0)	2	GND	1
-DB(1)	4	GND	3
-DB(2)	6	GND	5
-DB(3)	8	GND	7
-DB(4)	10	GND	9
-DB(5)	12	GND	11
-DB(6)	14	GND	13
-DB(7)	16	GND	15
-DB(P)	18	GND	17
GND	20,22,24	GND	19
		GND	21
		GND	23
GND	28,30	GND	27
-ATN	32	GND	29
GND	34	GND	31
-BSY	36	GND	33
-ACK	38	GND	35
-RST	40	GND	37
-MSG	42	GND	39
-SEL	44	GND	41
-C/D	46	GND	43
-REQ	48	GND	45
-I/O	50	GND	47
		GND	49

Refer to Figure A-2 for a representation of the female SCSI connector (located on the computer board edge).

Figure A-2   *SCSI Connector*
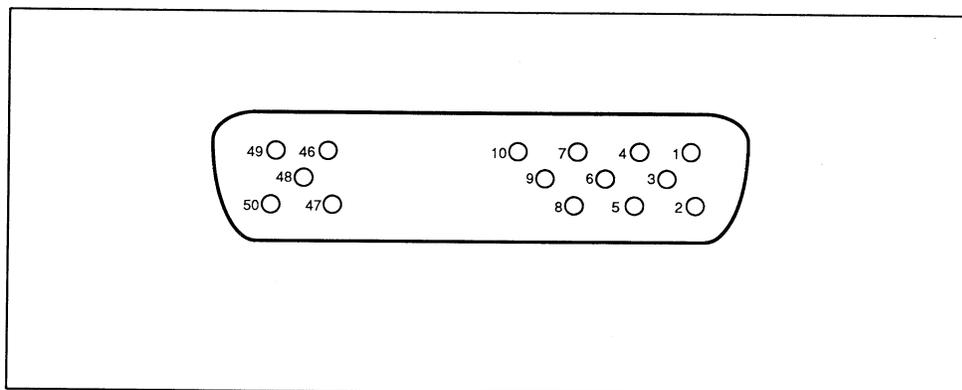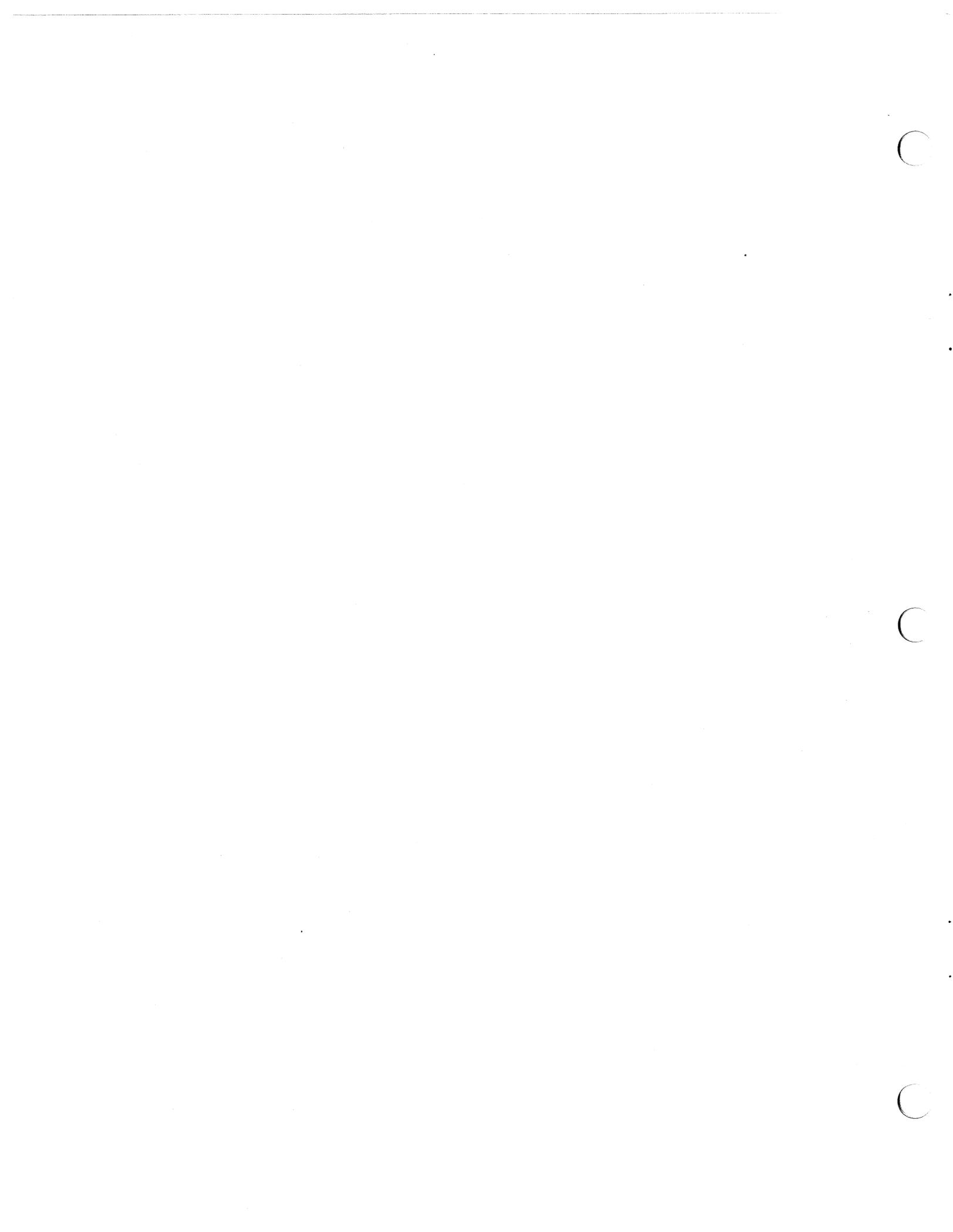
B

Description of Serial Port Signals

B

Description of Serial Port Signals

This appendix briefly describes the serial port signals. The "data communications equipment" mentioned below might be a printer, a plotter, a modem, or any other device which uses an RS-232-C or and RS-423 interface. A signal called "output" flows from the Sun-3/50 towards the peripheral device. An "input" signal flows from the peripheral into the Sun-3/50.

Figure B-1   *A Typical DTE/DCE Configuration*
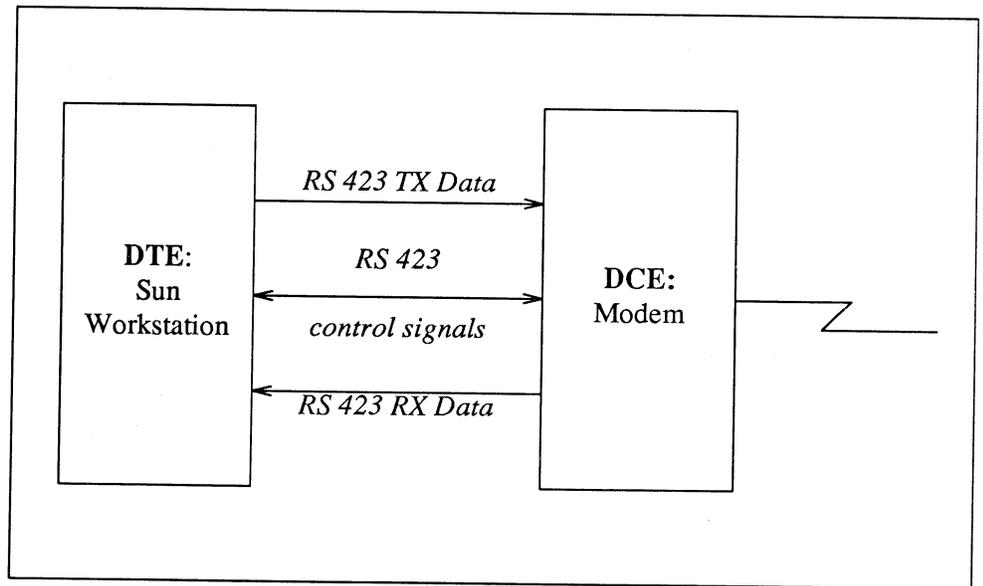
Table B-1   *Description of Serial Port Signals*

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-3.
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-3 is powered on and willing to communicate as the "local data terminal" with the data communication equipment (for example, the modem).

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Table B-1   *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-3. This signal is usually not used for asynchronous devices (most terminals, printers, modems, etc.).
25	VERR	reference -5V level	none	This signal is used by some modems to sense connection to the workstation.

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Revision History

Revision	Date	Comments
1	11 November 1985	α Review of this Hardware Installation Manual
50	22 November 1985	β Release of this Hardware Installation Manual
A	31 January 1986	FCS Release of this Hardware Installation Manual

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