



# Sun™ Ultra™ 60 Reference Manual

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Sun Microsystems, Inc.  
901 San Antonio Road  
Palo Alto, CA 94303-4900 U.S.A.  
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# Contents

---

## **Preface xi**

How This Book Is Organized xi

Related Documents xii

## **1. Back Panel Connectors 1-1**

1.1 Connector Layout 1-2

1.2 Serial Connectors 1-3

1.3 Parallel Connector 1-4

1.4 Keyboard/Mouse Connector 1-5

1.5 Media Independent Interface (MII) Connector 1-6

1.5.1 MII Cable-Type Connectivity 1-7

1.5.2 External Cable Lengths 1-7

1.5.3 External Transceivers 1-7

1.6 Twisted-Pair Ethernet (TPE) Connector 1-8

1.6.1 TPE Cable-Type Connectivity 1-8

1.6.2 External UTP-5 Cable Lengths 1-9

1.7 SCSI Connector 1-9

1.7.1 SCSI Implementation 1-10

1.7.2 SCSI Cabling Procedure 1-14

|           |  |            |
|-----------|--|------------|
| 1.7.3     | SCSI-2 (Fast/Wide SCSI) External Devices | 1-15       |
| 1.8       | Audio Ports                              | 1-16       |
| 1.9       | Audio Specifications                     | 1-18       |
| 1.10      | Graphics Card 13W3 Video Connector       | 1-19       |
| <b>2.</b> | <b>Modem Setup Specifications</b>        | <b>2-1</b> |
| 2.1       | Setting Up the Modem                     | 2-1        |
| 2.2       | Serial Port Speed Change                 | 2-2        |
| 2.3       | Recommendations                          | 2-2        |
| 2.3.1     | Cable                                    | 2-2        |
| 2.3.2     | Modem Switch Settings (AT Commands)      | 2-3        |
| <b>3.</b> | <b>Motherboard Jumpers</b>               | <b>3-1</b> |
| 3.1       | Identifying Jumpers                      | 3-3        |
| 3.2       | Flash PROM Jumpers                       | 3-4        |
| 3.3       | Serial Port Jumpers                      | 3-5        |
| <b>4.</b> | <b>System Specifications</b>             | <b>4-1</b> |
| 4.1       | Power Specifications                     | 4-1        |
| 4.2       | Environmental Specifications             | 4-2        |
| 4.3       | Physical Specifications                  | 4-3        |
| 4.4       | Memory Mapping                           | 4-4        |
| 4.4.1     | DIMM Installation Guidelines             | 4-4        |
| 4.4.2     | DIMM Banks and Slots                     | 4-4        |
| 4.5       | PCI Card Slot Specifications             | 4-6        |
| 4.5.1     | Locating the PCI Card Slots              | 4-6        |
| 4.5.2     | PCI Card Slot Operating Frequencies      | 4-8        |

# Figures

---

|             |   |      |
|-------------|---|------|
| FIGURE 1-1  | Back Panel Switches and Connectors                    | 1-2  |
| FIGURE 1-2  | DB-25 Serial Connectors                               | 1-3  |
| FIGURE 1-3  | DB-25 Parallel Connector                              | 1-4  |
| FIGURE 1-4  | DIN-8 Keyboard/Mouse Connector                        | 1-5  |
| FIGURE 1-5  | 40-Pin Miniature-D MII Connector                      | 1-6  |
| FIGURE 1-6  | RJ-45 TPE Connector                                   | 1-8  |
| FIGURE 1-7  | 68-Pin SCSI Connector                                 | 1-9  |
| FIGURE 1-8  | Configuration for the SCSI Bus                        | 1-11 |
| FIGURE 1-9  | SCSI Subassembly Functional Block Diagram             | 1-13 |
| FIGURE 1-10 | Connecting External Mass Storage Devices              | 1-15 |
| FIGURE 1-11 | Audio Port Locations                                  | 1-16 |
| FIGURE 1-12 | 13W3 Video Connector                                  | 1-19 |
| FIGURE 3-1  | Jumper Locations on the Motherboard                   | 3-2  |
| FIGURE 3-2  | Identifying Jumper Pins                               | 3-3  |
| FIGURE 4-1  | Ultra 60 System Enclosure Physical Dimensions         | 4-3  |
| FIGURE 4-2  | Map of DIMM Banks and Slots on Motherboard            | 4-5  |
| FIGURE 4-3  | PCI Card Slot Locations on the System Unit Back Panel | 4-6  |
| FIGURE 4-4  | PCI Card Slot Locations on the Motherboard            | 4-7  |



# Tables

---

|            |  |      |
|------------|--|------|
| TABLE 1-1  | RS-423/RS-232 Serial Connector Pinouts   | 1-3  |
| TABLE 1-2  | Parallel Connector Pinouts               | 1-4  |
| TABLE 1-3  | Keyboard/Mouse Connector Pinouts         | 1-5  |
| TABLE 1-4  | MII Connector Pinouts                    | 1-6  |
| TABLE 1-5  | MII External Cable Lengths               | 1-7  |
| TABLE 1-6  | MII Connectivity: Supported Transceivers | 1-7  |
| TABLE 1-7  | TPE Connector Pinouts                    | 1-8  |
| TABLE 1-8  | TPE UTP-5 Cable Lengths                  | 1-9  |
| TABLE 1-9  | 68-Pin SCSI Connector Pinouts            | 1-9  |
| TABLE 1-10 | SCSI Target Devices                      | 1-12 |
| TABLE 1-11 | Determining SCSI Bus Length              | 1-14 |
| TABLE 1-12 | Audio Port Signals                       | 1-16 |
| TABLE 1-13 | Audio Port Functions                     | 1-17 |
| TABLE 1-14 | Audio Inputs and Output                  | 1-18 |
| TABLE 1-15 | Internal Monaural Speaker Specifications | 1-18 |
| TABLE 1-16 | 13W3 Video Connector Pinouts             | 1-19 |
| TABLE 3-1  | User-Configurable Jumpers                | 3-3  |
| TABLE 3-2  | Flash PROM Jumper Settings               | 3-4  |
| TABLE 3-3  | Serial Port Jumper Settings              | 3-5  |
| TABLE 4-1  | Power Specifications                     | 4-1  |

TABLE 4-2      Power Supply Outputs    4-1

TABLE 4-3      Environmental Specifications: Operating    4-2

TABLE 4-4      Environmental Specifications: Nonoperating    4-2

TABLE 4-5      Dimensions and Weight    4-3

TABLE 4-6      DIMM Banks and Slots    4-4

TABLE 4-7      PCI Card Slot Operating Frequencies    4-8



# Preface

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The *Sun Ultra 60 Reference Manual* contains information about the use and maintenance of an Ultra™ 60 system. It also includes information about configuring system communications settings.

The revision of the *Sun Ultra 60 Reference Manual* provided here is the latest version of the document, and includes information that may be different from that contained in the reference documentation originally shipped with the Sun Ultra 60 system.

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## How This Book Is Organized

**Chapter 1, “Back Panel Connectors,”** shows the location of each back panel connector and gives the pinouts for each connector.

**Chapter 2, “Modem Setup Specifications,”** gives modem settings for Ultra 60 systems used in specific network telecommunication applications.

**Chapter 3, “Motherboard Jumpers,”** gives the locations and pin definitions of user-configurable motherboard jumpers.

**Chapter 4, “System Specifications,”** gives system requirements about power and environment, and also gives system dimension, weight, memory mapping, and peripheral component interconnect (PCI) card slot specifications.

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## Related Documents

The following documents contain topics that relate to the information in the *Sun Ultra 60 Reference Manual*.

**TABLE P-1** Related Documents

| Application  | Title                                  | Part Number |
|--------------|--|-------------|
| Installation | <i>Sun Ultra 60 Installation Guide</i> | 805-1707    |
| Service      | <i>Sun Ultra 60 Service Manual</i>     | 805-1709    |

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# Back Panel Connectors

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This chapter contains specifications for the back panel connectors on the Ultra 60 system.

# 1.1 Connector Layout

FIGURE 1-1 shows the locations of Ultra 60 system back panel switches and connectors.

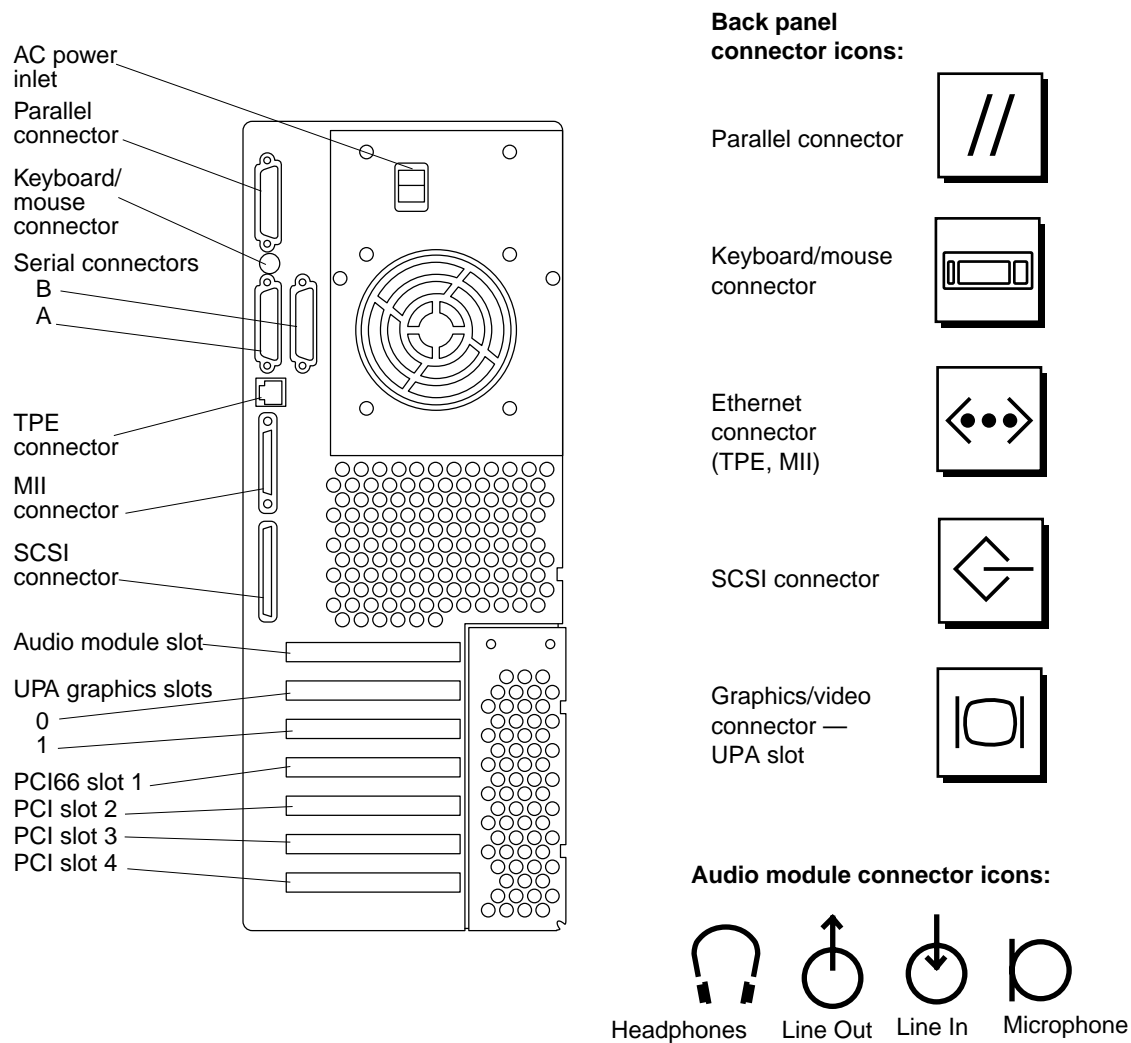


FIGURE 1-1 Back Panel Switches and Connectors

# 1.2 Serial Connectors

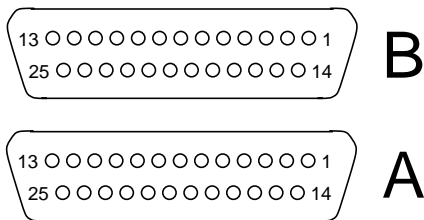


FIGURE 1-2 DB-25 Serial Connectors

TABLE 1-1 RS-423/RS-232 Serial Connector Pinouts

| Pin   | Function | I/O  | Signal Description  |
|-------|----------|------|---------------------|
| 1     | none     | none | Not connected       |
| 2     | TxD      | O    | Transmit Data       |
| 3     | RxD      | I    | Receive Data        |
| 4     | RTS      | O    | Ready To Send       |
| 5     | CTS      | I    | Clear To Send       |
| 6     | DSR      | I    | Data Set Ready      |
| 7     | Gnd      |      | Signal Ground       |
| 8     | DCD      | I    | Data Carrier Detect |
| 9–14  | none     | none | Not connected       |
| 15    | TRxC     | I    | Transmit Clock      |
| 16    | none     | none | Not connected       |
| 17    | RTxC     | I    | Receive Clock       |
| 18–19 | none     | none | Not connected       |
| 20    | DTR      | O    | Data Terminal Ready |
| 21–23 | none     | none | Not connected       |
| 24    | TxC      | O    | Transmit Clock      |
| 25    | none     | none | Not connected       |

Note: For information about serial port jumpers on the Ultra 60 system motherboard, see Section 4.1, “Identifying Jumpers,” and Section 4.3, “Serial Port Jumpers.”

# 1.3 Parallel Connector

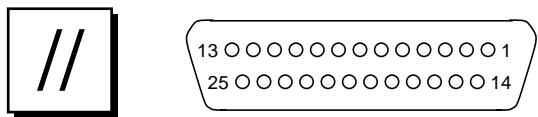


FIGURE 1-3 DB-25 Parallel Connector

TABLE 1-2 Parallel Connector Pinouts

| Pin | Description   | Pin | Description |
|-----|---------------|-----|-------------|
| 1   | Data_Strobe_L | 14  | AFXN_L      |
| 2   | Data0         | 15  | ERROR_L     |
| 3   | Data1         | 16  | RESET_L     |
| 4   | Data2         | 17  | IN_L        |
| 5   | Data3         | 18  | Ground      |
| 6   | Data4         | 19  | Ground      |
| 7   | Data5         | 20  | Ground      |
| 8   | Data6         | 21  | Ground      |
| 9   | Data7         | 22  | Ground      |
| 10  | ACK_L         | 23  | Ground      |
| 11  | BUSY          | 24  | Ground      |
| 12  | PERROR        | 25  | Ground      |
| 13  | SELECT_L      |     |             |



# 1.4 Keyboard/Mouse Connector

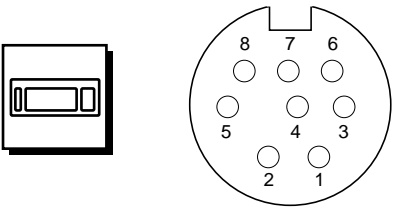


FIGURE 1-4 DIN-8 Keyboard/Mouse Connector

TABLE 1-3 Keyboard/Mouse Connector Pinouts

| Pin | Description     | Pin | Description          |
|-----|-----------------|-----|----------------------|
| 1   | Ground          | 5   | Keyboard_Data_ Out_L |
| 2   | Ground          | 6   | Keyboard_Data_ In_L  |
| 3   | Power           | 7   | Poweron_L            |
| 4   | Mouse_Data_In_L | 8   | Power                |

**Note** – All signals are standard TTL levels. The +5V supply is fuse-protected.

# 1.5 Media Independent Interface (MII) Connector

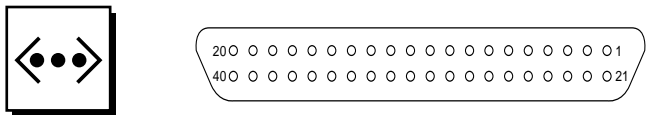


FIGURE 1-5 40-Pin Miniature-D MII Connector

TABLE 1-4 MII Connector Pinouts

| Pin | Function | Pin | Function      |
|-----|----------|-----|---------------|
| 1   | +5V      | 18  | COL           |
| 2   | MDIO     | 19  | CRS           |
| 3   | MDC      | 20  | +5V           |
| 4   | RXD<3>   | 21  | +5V           |
| 5   | RXD<2>   | 22  | Signal Ground |
| 6   | RXD<1>   | 23  | Signal Ground |
| 7   | RXD<0>   | 24  | Signal Ground |
| 8   | RX_DV    | 25  | Signal Ground |
| 9   | RX_CLK   | 26  | Signal Ground |
| 10  | RX_ER    | 27  | Signal Ground |
| 11  | TX_ER    | 28  | Signal Ground |
| 12  | TX_CLK   | 29  | Signal Ground |
| 13  | TX_EN    | 30  | Signal Ground |
| 14  | TXD<0>   | 31  | Signal Ground |
| 15  | TXD<1>   | 32  | Signal Ground |
| 16  | TXD<2>   | 33  | Signal Ground |
| 17  | TXD<3>   | 34  | Signal Ground |
| 35  | Ground   | 38  | Signal Ground |
| 36  | Ground   | 39  | Signal Ground |
| 37  | Ground   | 40  | +5V           |

# 1.5.1 MII Cable-Type Connectivity

The following types of Ethernet cables can be connected to the 40-pin MII connector when using specific interface conversion devices:

- Shielded twisted-pair (STP)
- Unshielded twisted-pair (UTP)
- Fiber (connected to an external transceiver)

# 1.5.2 External Cable Lengths

TABLE 1-5 MII External Cable Lengths

| Cable Type                          | Application(s)   | Maximum Length (Metric) | Maximum Length (English) |
|-------------------------------------|------------------|-------------------------|--------------------------|
| 40-conductor (20 signal-ground STP) | All external MII | 0.5 meter               | 20 inches                |
| UTP-5, “data grade”                 | 10BASE-T         | 100 meters*             | 109 yards*               |
| UTP-5, “data grade”                 | 100BASE-T        | 100 meters*             | 109 yards*               |

\* IEEE 802.3

# 1.5.3 External Transceivers

TABLE 1-6 MII Connectivity: Supported Transceivers

| Cable Type                   | Transceiver Model and Application     | Transceiver Manufacturer |
|------------------------------|---------------------------------------|--------------------------|
| Thick coaxial-cable Ethernet | XF467A, MII to AUI, 10BASE-5          | Sun MII-to-AUI           |
| UTP-3, “voice grade”         | CT4-1030, 100BASE-T4                  | Canary Communications    |
| Fiber                        | 6211 Micro, Fast Ethernet, 100BASE-FX | Transcast Corporation    |
| Fiber                        | CFX-107X, Fast Ethernet, 100BASE-FX   | Canary Communications    |

# 1.6 Twisted-Pair Ethernet (TPE) Connector

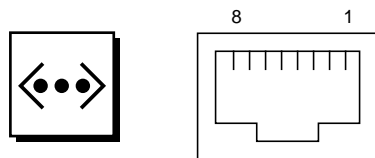


FIGURE 1-6 RJ-45 TPE Connector

TABLE 1-7 TPE Connector Pinouts

| Pin | Description             | Pin | Description             |
|-----|-------------------------|-----|-------------------------|
| 1   | Transmit Data +         | 5   | Common Mode Termination |
| 2   | Transmit Data -         | 6   | Receive Data -          |
| 3   | Receive Data +          | 7   | Common Mode Termination |
| 4   | Common Mode Termination | 8   | Common Mode Termination |

## 1.6.1 TPE Cable-Type Connectivity

The following types of twisted-pair Ethernet cables can be connected to the 8-pin TPE connector:

- For 10BASE-T applications, UTP cable:
  - Category 3 (UTP-3, “voice grade”)
  - Category 4 (UTP-4)
  - Category 5 (UTP-5, “data grade”)
- For 100BASE-T applications, UTP-5, “data grade” cable

# 1.6.2 External UTP-5 Cable Lengths

TABLE 1-8 TPE UTP-5 Cable Lengths

| Cable Type          | Application(s) | Maximum Length (Metric) | Maximum Length (English) |
|---------------------|----------------|-------------------------|--------------------------|
| UTP-5, “data grade” | 10BASE-T       | 100 meters*             | 109 yards*               |
| UTP-5, “data grade” | 100BASE-T      | 100 meters*             | 109 yards*               |

\* IEEE 802.3

# 1.7 SCSI Connector

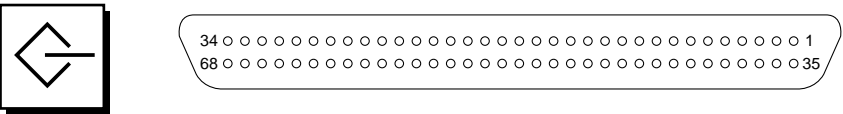


FIGURE 1-7 68-Pin SCSI Connector

TABLE 1-9 68-Pin SCSI Connector Pinouts

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1   | Ground      | 35  | -DB<12>     |
| 2   | Ground      | 36  | -DB<13>     |
| 3   | Ground      | 37  | -DB<14>     |
| 4   | Ground      | 38  | -DB<15>     |
| 5   | Ground      | 39  | -PAR<1>     |
| 6   | Ground      | 40  | -DB<0>      |
| 7   | Ground      | 41  | -DB<1>      |
| 8   | Ground      | 42  | -DB<2>      |
| 9   | Ground      | 43  | -DB<3>      |
| 10  | Ground      | 44  | -DB<4>      |
| 11  | Ground      | 45  | -DB<5>      |
| 12  | Ground      | 46  | -DB<6>      |

**TABLE 1-9** 68-Pin SCSI Connector Pinouts

| Pin | Signal Name   | Pin | Signal Name |
|-----|---------------|-----|-------------|
| 13  | Ground        | 47  | -DB<7>      |
| 14  | Ground        | 48  | -PAR<0>     |
| 15  | Ground        | 49  | Ground      |
| 16  | Ground        | 50  | TERM.DIS    |
| 17  | TERMPWR       | 51  | TERMPWR     |
| 18  | TERMPWR       | 52  | TERMPWR     |
| 19  | Not connected | 53  | Reserved    |
| 20  | Ground        | 54  | Ground      |
| 21  | Ground        | 55  | -ATN        |
| 22  | Ground        | 56  | Ground      |
| 23  | Ground        | 57  | -BSY        |
| 24  | Ground        | 58  | -ACK        |
| 25  | Ground        | 59  | -RST        |
| 26  | Ground        | 60  | -MSG        |
| 27  | Ground        | 61  | -SEL        |
| 28  | Ground        | 62  | -CD         |
| 29  | Ground        | 63  | -REQ        |
| 30  | Ground        | 64  | -IO         |
| 31  | Ground        | 65  | -DB<8>      |
| 32  | Ground        | 66  | -DB<9>      |
| 33  | Ground        | 67  | -DB<10>     |
| 34  | Ground        | 68  | -DB<11>     |

---

**Note** – All signals shown in TABLE 1-9 are active low.

---

## 1.7.1 SCSI Implementation

The Ultra 60 implements a small computer system interface (SCSI) Fast-20 (UltraSCSI) parallel interface bus. The UltraSCSI provides the following:

- Efficient peer-to-peer I/O bus devices

- Mechanical, electrical, and timing specification definition that support transfer rates of 20 or 40 Mbytes per second (corresponding to the data path width of an 8-bit, or 16-bit bus, respectively).
- Peak bandwidth of 40 Mbytes per second (with implemented 16-bit bus width).

The internal SCSI bus is terminated at each end. One set of terminators is located close to the CD-ROM drive connector on the CD-ROM SCSI card. A second set of terminators is located close to the 68-pin external SCSI connector. FIGURE 1-8 shows the SCSI bus configuration.

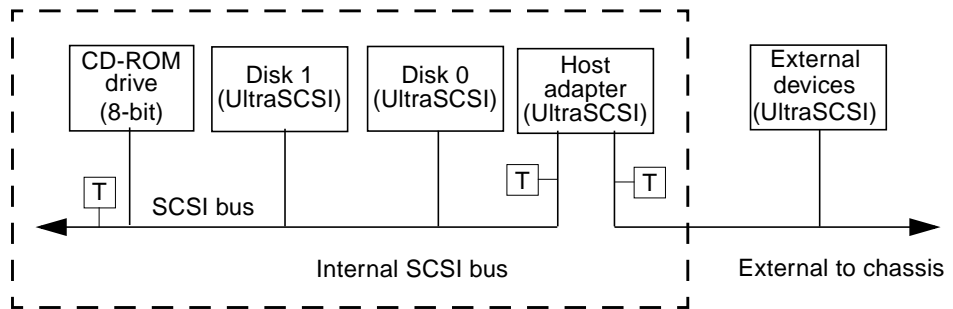


FIGURE 1-8 Configuration for the SCSI Bus

### 1.7.1.1 Host Adapter

The host adapter is a Symbios Logic PCI-SCSI I/O processor IC. The host adapter and all target devices comply with the Fast-20 single-ended drivers and receivers characteristics. The electrical characteristics of the output buffers include:

- $V_{ol}$  (output low) equals 0 to 0.5 Vdc with  $I_{ol}$  at 48 mA (signal asserted)
- $V_{oh}$  (out high) equals 2.5 to 3.7 Vdc (signal negated)
- $t_{rise}$  (rising slew rate) equals 520 mV per nanosecond maximum (0.7 to 2.3 Vdc)
- $t_{fall}$  (falling slew rate) equals 520 mV per nanosecond maximum (2.3 to 0.7 Vdc)

The Fast-20 electrical characteristics for the host adapter and target device include:

- $V_{il}$  (input low) equals 1.0 Vdc maximum (signal true)
- $V_{ih}$  (input high) equals 1.9 Vdc minimum (signal false)
- $I_{il}$  (input low current) equals +/- 20  $\mu$ A at  $V_i$  equals 0.5 Vdc
- $I_{ih}$  (input high current) equals +/- 20  $\mu$ A at  $V_i$  equals 2.7 Vdc
- Minimum input hysteresis equals 0.3 Vdc

### 1.7.1.2 Supported Target Devices

The SCSI subsystem supports a maximum of four internal devices, including the host adapter. The CD-ROM drive is a narrow device. A unipack with one drive or a six-pack, accommodating six drives, can be used as external devices. TABLE 1-10 lists the target devices supported by the SCSI subsystem.

**TABLE 1-10** SCSI Target Devices

| Target Device                 | Comment  |
|-------------------------------|--|
| Internal disks                | Up to two 3.5-inch x 1.6-inch disks (4.2, or 9.1-Gbyte). All internal disks are UltraSCSI-compliant.                               |
| Internal CD-ROM drive         | Optional 644-Mbyte SunCD 12X speed; photo CD compatible. Headphone jack with volume control. CD-ROM drive is a narrow SCSI device. |
| Internal tape drive(s)        | Refer to product guide.  |
| External SPARCstorage UniPack | Refer to product guide.  |
| External SPARCstorage SixPack | .Refer to product guide.   |

### 1.7.1.3 External Cables

External UltraSCSI-compliant SCSI cables have an impedance of 90 ohm (+/- 6 ohm) and are required for UltraSCSI interface. Sun's implimentation of UltraSCSI requires that the total SCSI bus length be limited to no more than approximately 20 feet (6 meters) with up to 12 Sun compensated devices. Due to the considerably short bus length, an approximale 32-inch (0.8-meter) UltraSCSI-compliant external cable is supported (part number 530-2883) in addition to an approximale 6.5-foot (2-meter) UltraSCSI-compliant external cable (part number 530-2884).



### 1.7.1.4 Internal SCSI Subassembly

The internal SCSI subassembly consists of two cable assemblies and two SCSI cards. The SCSI subassembly is attached to the motherboard using an insulation displacement connector (IDC) receptacle attached to a 80-conductor cable. In addition to the SCSI signals, the 80-conductor cable carries diskette drive and system LED signals to the SCSI backplane card. The IDC receptacle mates with a right angle plug that is mounted on the motherboard.

The 80-conductor cable attaches on the other end to the SCSI backplane card with another IDC connector. The SCSI backplane card incorporates two SCA-2 connectors for mounting the hard drives, a four-circuit power connector to supply 5 Vdc and 12 Vdc power to the hard drives, a 34-pin diskette drive signal connector, and a green, right-angle LED.

A 68-conductor cable exits the SCSI backplane card, carrying 27 SCSI signals and the Termpower to the internal CD-ROM drive (or tape drive). The SCSI backplane card houses the CD-ROM drive connector and three SCSI bus terminators. The Termpower is routed through the SCSI subassembly to connect to the terminators on the SCSI backplane card in support of the multi-host configuration. FIGURE 1-9 functionally shows the internal SCSI subassembly.

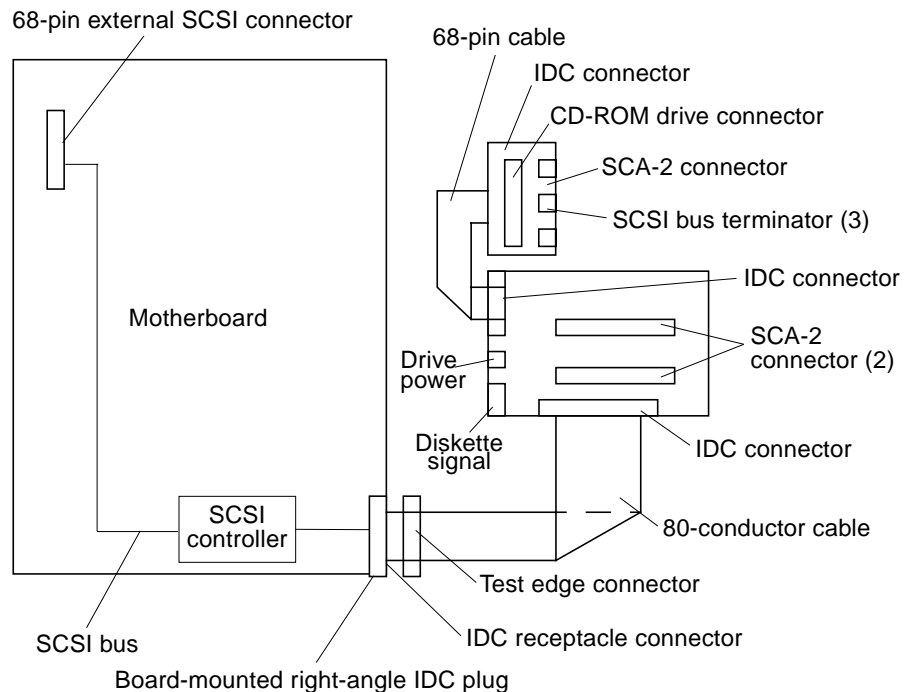


FIGURE 1-9 SCSI Subassembly Functional Block Diagram

### 1.7.1.5 SCSI ID Selection

The motherboard host adapter is assigned the SCSI identification of 7 for both ports. The two internal drives attached to the SCA-2 connectors have a SCSI identification of 0 and 1, while the CD-ROM has an identification of 6.

## 1.7.2 SCSI Cabling Procedure

**1. Count the number of SCSI devices on the system SCSI bus.**

Be sure to count the host adapter as a SCSI device.

**2. Determine the total SCSI bus length.**

**TABLE 1-11** Determining SCSI Bus Length

| SCSI Implementation   | Bus Width | Data Transfer Rate, Mbytes/s | Number of Devices | SCSI Bus Length         |
|---|-----------|------------------------------|-------------------|-------------------------|
| SCSI-2, Fast  | 8 bits    | 10                           | 1–8               | 6.0 meters              |
| SCSI-2, Fast/Wide   | 16 bits   | 20                           | 1–8               | 6.0 meters              |
| SCSI-3 Parallel Interface, Fast-20 Wide (UltraSCSI) (WideUltra) | 16 bits   | 40                           | 1–4               | 3.0 meters <sup>2</sup> |
| SCSI-3 Parallel Interface, Fast-20 Wide (UltraSCSI) (WideUltra) | 16 bits   | 40                           | 5–8 <sup>1</sup>  | 1.5 meters <sup>2</sup> |

1. The maximum number of single-ended/differential SCSI devices is 16.

2. The effective internal SCSI bus length of the Ultra 60 system unit is 0.9 meter.

**3. Verify the cable type used to connect external SCSI devices.**

You must use Fast-20 SCSI cable(s).

**4. Ensure that the total SCSI cable length does not exceed the permissible total SCSI bus length.**

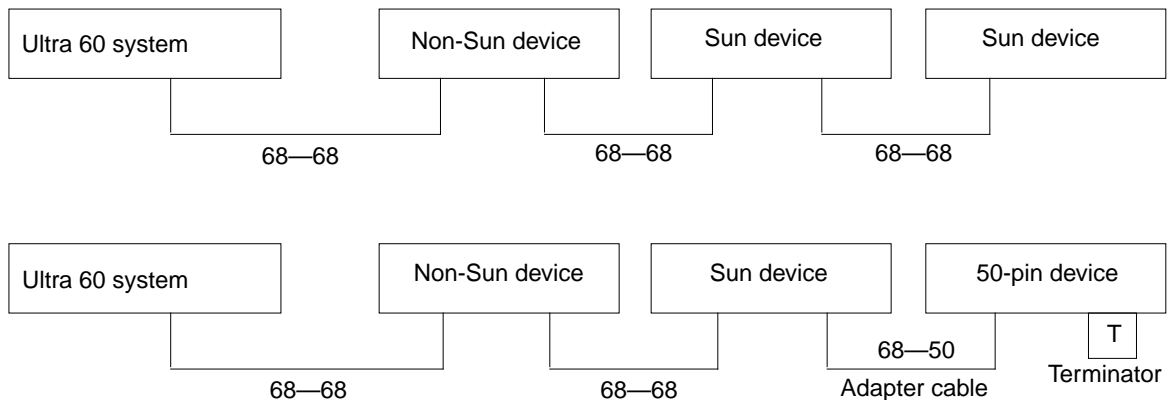
An Ultra 60 system enables the use of a single 0.8 meter (32 inch) Fast-20 SCSI cable to a single external SCSI-3 parallel interface, Fast-20 Wide (UltraSCSI, WideUltra) device or device cluster.

## 1.7.3 SCSI-2 (Fast/Wide SCSI) External Devices

If you connect SCSI-2 (Fast/Wide SCSI, 20 Mbytes data transfer rate) external devices to an Ultra 60 system, follow these cabling and configuration guidelines to ensure proper device addressing and operation:

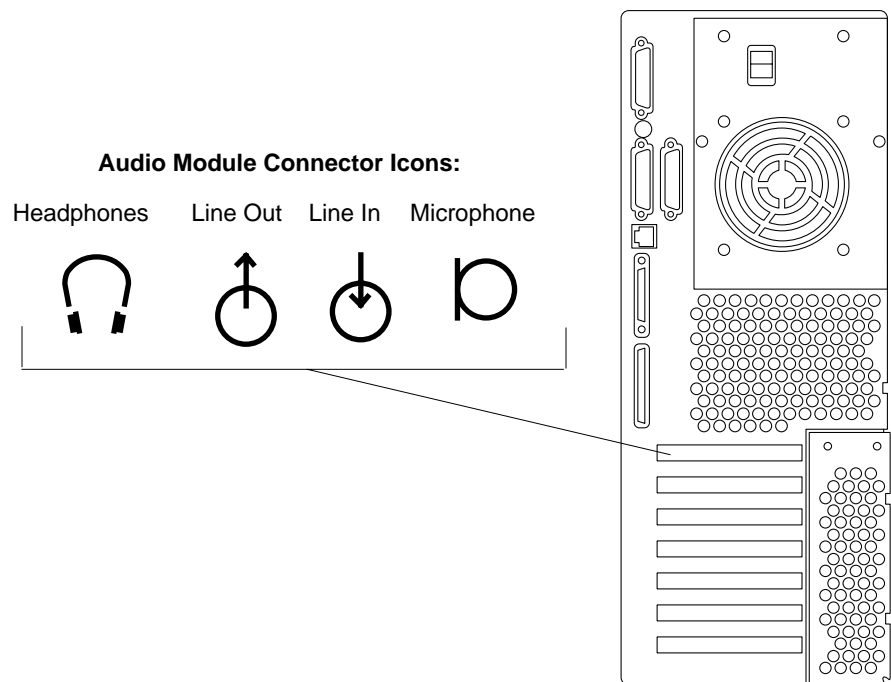
- If all external mass storage devices use 68-pin connectors, connect all non-Sun devices to the Ultra 60 system first and follow them with Sun devices. Sun devices use autotermination.
- If external mass storage devices consist of 68-pin Sun devices and 50-pin devices, connect the Sun 68-pin devices to the Ultra 60 system first and terminate the daisy chain with the 50-pin device and its terminator.
- The total SCSI bus length for all SCSI devices (internal and external) is 6.0 meters (19.7 feet).

See FIGURE 1-10 for a summary of cabling and configuration guidelines.



**FIGURE 1-10** Connecting External Mass Storage Devices

# 1.8 Audio Ports



**FIGURE 1-11** Audio Port Locations

All audio ports use EIA standard 3.5-mm/0.125-inch jacks.

**TABLE 1-12** Audio Port Signals

| Plug          | Headphones    | Line Out      | Line In       | Microphone    |
|---------------|---------------|---------------|---------------|---------------|
| Tip           | Left Channel  | Left Channel  | Left Channel  | Left Channel  |
| Ring (Center) | Right Channel | Right Channel | Right Channel | Right Channel |
| Shield        | Ground        | Ground        | Ground        | Ground        |

**TABLE 1-13** Audio Port Functions

| Port       | Function   |
|------------|--|
| Headphones | Connects stereophonic headphones for private listening of audio output   |
| Line Out   | Connects the system audio output to an external stereophonic amplifier   |
| Line In    | Connects external stereophonic audio sources such as a compact disc player or cassette tape player to the system |
| Microphone | Connects the SunMicrophone™ II (or other suitable microphone <sup>1</sup> ) to the system                        |

1. The Ultra 60 system microphone port accepts stereophonic input; however, the Sun Microphone II is a monophonic device. Note also that the older SunMicrophone is not compatible with the Ultra 60 system.

---

## 1.9 Audio Specifications

The microphone input specifications are designed for the SunMicrophone II or equivalent.

**TABLE 1-14** Audio Inputs and Output

| Stereo I/Os        | Specifications  |
|--------------------|---|
| Line In            | 3.3V peak (nominal), 9.2 k $\Omega$ input impedance   |
| Frequency Response | 20 Hz–17 kHz +/- 1 dB   |
| Microphone Input   | 35 mV peak (nominal), 2.21 k $\Omega$ input impedance   |
| Headphones Output  | 0.84V peak (nominal), 9 $\Omega$ output impedance; headphone impedance may vary from 9 $\Omega$ to 1 k $\Omega$ |
| Line Out           | 1.4V peak (nominal), 220 $\Omega$ output impedance  |

**TABLE 1-15** Internal Monaural Speaker Specifications

| Speaker            | Specifications          |
|--------------------|-------------------------|
| Power Output       | 1W average, 2W peak     |
| Distortion         | 0.02%, typical at 1 kHz |
| Impedance          | 16 $\Omega$ +/- 15%     |
| Frequency Response | 170 Hz–20 kHz +/- 6 dB  |

# 1.10 Graphics Card 13W3 Video Connector

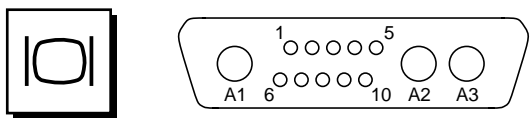


FIGURE 1-12 13W3 Video Connector

The graphics card for your system provides the 13W3 video connector for transmitting video output signals from the system unit to the monitor.

TABLE 1-16 13W3 Video Connector Pinouts

| Pin | Function     | I/O | Level  |
|-----|--------------|-----|--------|
| A1  | Red          | O   | Analog |
| A2  | Green        | O   | Analog |
| A3  | Blue         | O   | Analog |
| 1   | Serial Read  |     | TTL    |
| 2   | Vert Sync    | O   | TTL    |
| 3   | Sense <0>    | I   | TTL    |
| 4   | Ground       |     | GND    |
| 5   | Comp Sync    | O   | TTL    |
| 6   | Horiz Sync   | O   | TTL    |
| 7   | Serial Write |     | TTL    |
| 8   | Sense <1>    | I   | TTL    |
| 9   | Sense <2>    | I   | TTL    |
| 10  | Ground       |     | GND    |





# Modem Setup Specifications

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## 2.1 Setting Up the Modem

Any modem compatible with CCITT V.24 can be connected to the Ultra 60 serial ports. Modems can be set up to function in one of three ways:

- Dial out only
- Dial in only
- Bidirectional calls

To set up your modem:

1. **Become superuser and type `admintool`.**

```
% su
Password:
# admintool
```

2. **Click Serial Port Manager.**
3. **Select Port a or Port b for your modem connection.**
4. **Click Edit.**

The Serial Port Manager: Modify Service window is displayed.

5. **Choose the Expert level of detail.**
6. **From the Use Template menu, choose one of the following:**
  - Modem - Dial-Out only
  - Modem - Dial-In Only
  - Modem - Bidirectional
7. **Click Apply.**

8. Set your modem auto-answer switch to one of the following:

- Off – Dial-Out Only
- On – Dial-In Only
- On – Bidirectional

---

## 2.2 Serial Port Speed Change

To change the speed of a serial port, you must edit the `/etc/remote` file as follows:

1. Become superuser, and type `cd /etc`.

```
% su
Password:
# cd /etc
```

2. Type `vi remote`.

3. Type `tip speed device-name`.

Typical speeds are 9600, 19200 to 38400 bps\*.

The device name is the serial port name — for example,  
`/dev/tty[a,b]` or `/dev/term/[a,b]`.

---

**Note** – \*The Ultra 60 serial ports are tested to a maximum of 460,000 bps. As of March 1997, Ultra 60 systems have not been tested with 56,000 bps V.34 modems.

---

4. Press Esc and type `:wq` to save your file change(s) and to exit from the `vi` text editor.

---

## 2.3 Recommendations

### 2.3.1 Cable

For a modem-to-host (system) connection, use an RS-423/RS-232 straight-through cable with DB-25 male connectors at both ends.

## 2.3.2 Modem Switch Settings (AT Commands)

These settings are guidelines to help you get started quickly. They may change depending on your site requirements and the modem you are using.

- Enable transmit flow control (AT&H1) [suggested setting]  
(Required for sending binary/8-bit data.)
- Set link rate to fixed  
(Will not track modem data rate, AT&Bn; n = menu choice in modem manual.)
- Set display result codes (ATQ0)
- Set verbal result codes (ATV1)
- Set result code subset (ATXn; n = option choice)
- Save settings in NVRAM (AT&W)

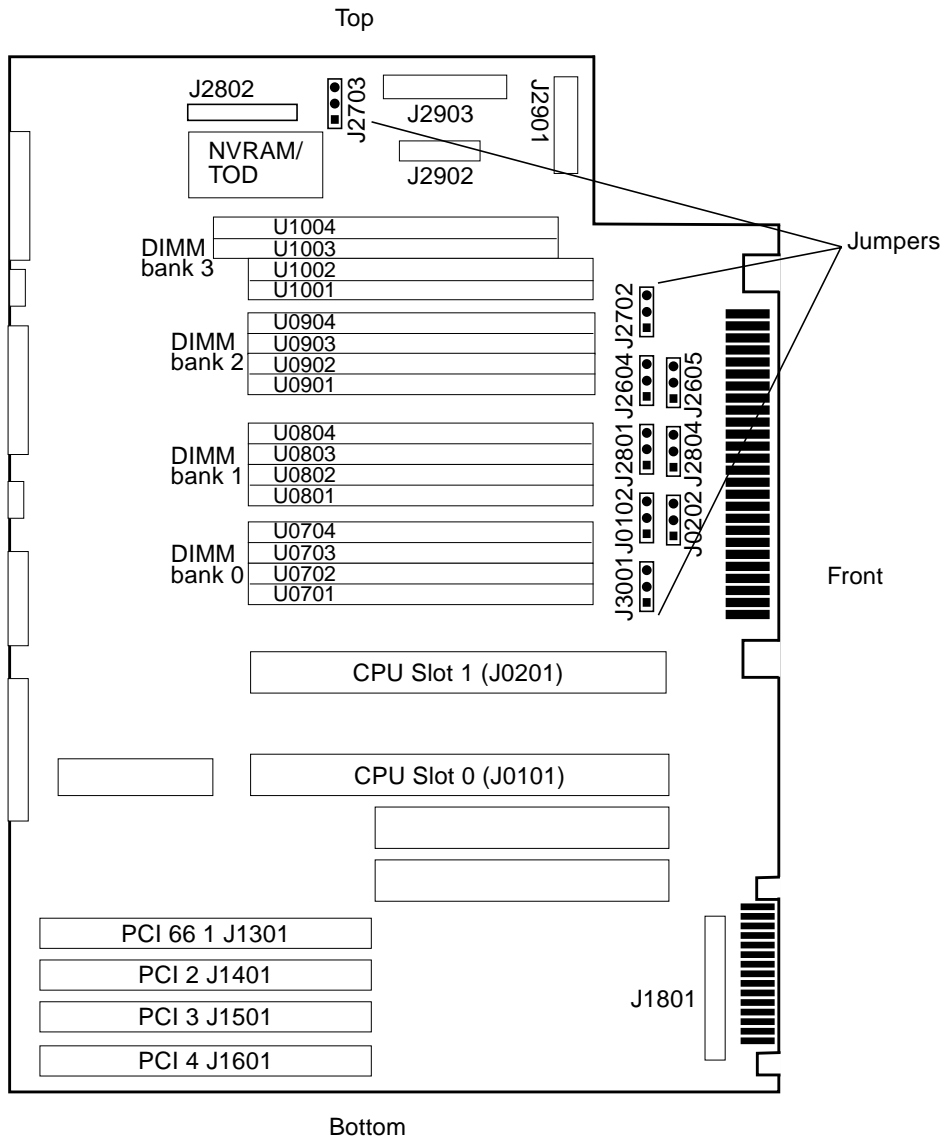
For additional information about modem switch settings, refer to the manual that came with your modem.



# Motherboard Jumpers

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The jumper settings in this chapter refer to the etchings on the motherboard. The jumpers are labeled with the letter “J” followed by a four-digit number (for example, J2702).

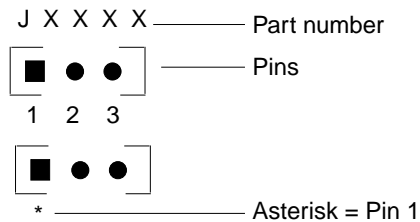


**FIGURE 3-1** Jumper Locations on the Motherboard

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## 3.1 Identifying Jumpers

Jumpers are marked on the motherboard with part numbers. For example, the serial port jumpers are marked J2604 and J2605. Jumper pins are located immediately adjacent to the part number. Pin 1 is marked with an asterisk in the position shown in FIGURE 3-2.



**FIGURE 3-2** Identifying Jumper Pins

**TABLE 3-1** User-Configurable Jumpers

| Jumper         | Functionality                         |
|----------------|---------------------------------------|
| J2703          | Flash PROM write protect/write enable |
| J2605<br>J2604 | Serial ports B & A RS-423/RS-232      |
| J2804          | Flash PROM boot control               |

---

## 3.2 Flash PROM Jumpers

The Ultra 60 system uses flash PROMs (programmable read-only memory). Flash PROMs enable:

- Reprogramming of specific code blocks
- Remote reprogramming of the PROM chip by a system administrator over a local area network

The default shunt setting of J2703 is on pins 1 and 2 (write protect). This disables the flash PROM chip from being reprogrammed. Placing the shunt on pins 2 and 3 (write enable) enables reprogramming of the flash PROM chip.

---

**Note** – After reprogramming your system flash PROM, make sure you return the flash PROM write protect/enable jumper (J2703) to the write protect position to increase system security.

---

**TABLE 3-2** Flash PROM Jumper Settings

| Jumper | Pins 1 + 2 Select | Pins 2 + 3 Select | Default Jumper on Pins | Name                           |
|--------|-------------------|-------------------|------------------------|--------------------------------|
| J2703  | Write protect     | Write enable      | 1 + 2                  | Write protect/<br>write enable |
| J2804  | High half booting | Normal booting    | 2 + 3                  | Boot control                   |



---

## 3.3 Serial Port Jumpers

The serial port jumpers on the motherboard enable you to configure the two DB-25 serial ports on the system unit back panel for either RS-423 or RS-232 signal levels. RS-423 levels are the default standard for North American users. RS-232 levels are required for telecommunication in nations of the European Community.

**TABLE 3-3** Serial Port Jumper Settings

| Jumper | Pins 1 + 2 Select | Pins 2 + 3 Select | Default Jumper<br>on Pins | Signal Controlled |
|--------|-------------------|-------------------|---------------------------|-------------------|
| J2604  | RS-232            | RS-423            | 2 + 3                     | RS232/RS423 SEL   |
| J2605  | RS-232            | RS-423            | 2 + 3                     | RS232/RS423 SEL   |



# System Specifications

## 4.1 Power Specifications

TABLE 4-1 Power Specifications

| Input/Output    | Specifications                     |
|-----------------|------------------------------------|
| AC power input  | 100–240 volts AC nominal, 47–63 Hz |
| DC power output | 350 watts maximum                  |

TABLE 4-2 Power Supply Outputs

| Output | DC Voltage (Volts) | Maximum Current (Amperes) | Voltage Regulation Range |
|--------|--------------------|---------------------------|--------------------------|
| 1*     | 3.3                | 60                        | 3.23 to 3.43             |
| 2      | 5                  | 30                        | 4.85 to 5.25             |
| 3*     | 12                 | 6                         | 11.65 to 12.60           |
| 4      | -12                | 0.4                       | -12.6 to -11.4           |
| 5      | 2.5–3.5            | 25                        | +/-2%                    |

\* The combined power of outputs 1 and 3 must be less than 300 watts.

## 4.2 Environmental Specifications

The specifications in TABLE 4-3 comply with the *International Electrotechnical Commission (IEC) Standards*, 5th ed., 1990–1994.

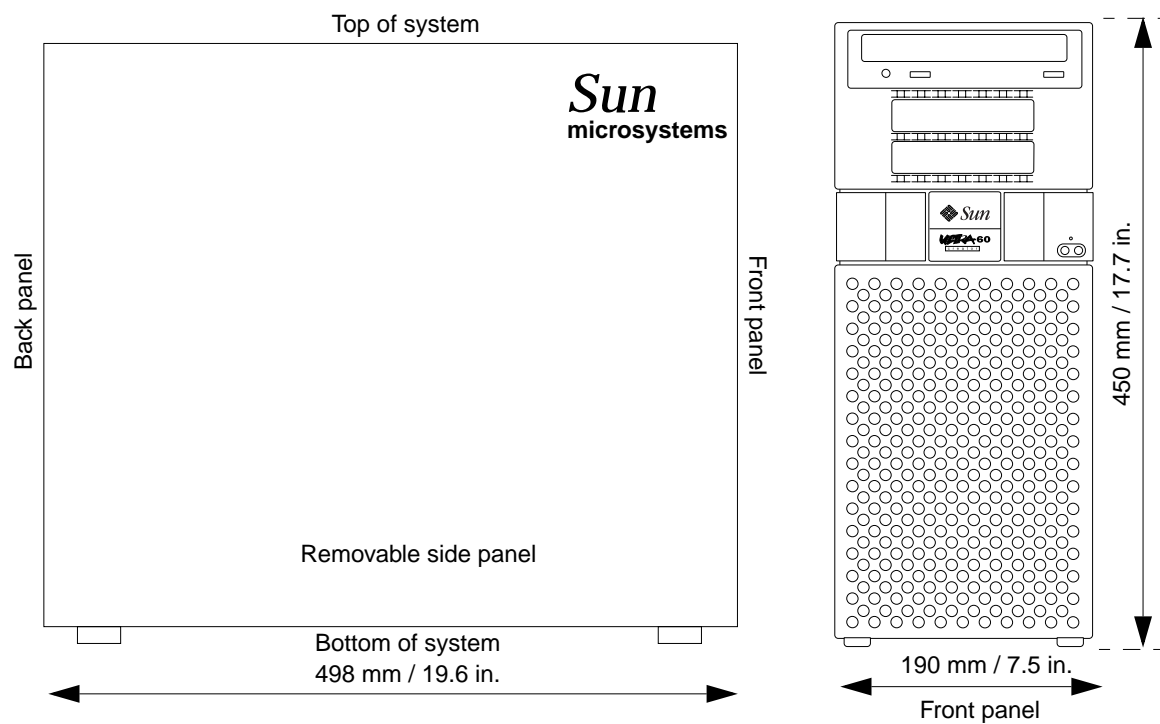
**TABLE 4-3** Environmental Specifications: Operating

| Parameter                                | Specification   | Standard             |
|--|---|----------------------|
| Altitude                                 | 0 meters (0 feet) [sea level] to 3000 meters (9840 feet)          | IEC 68-2-13          |
| Humidity                                 | 20% to 80% relative humidity (RH), wet bulb limit of 27°C         | IEC 68-2-02, 68-2-03 |
| Shock                                    | 5.0G, 11 milliseconds, half sine pulse                            | IEC 68-2-27          |
| Vibration                                | 0.2G, 5 to 500 to 5 Hz, 5 sweeps in 3 mutually perpendicular axes | IEC 68-2-06          |
| Temperature without removable tape media | 10°C to 40°C (50°F to 104°F)                                      | IEC 68-2-01, 68-2-02 |
| Temperature with removable tape media    | 10°C to 35°C (50°F to 95°F)                                       | IEC 68-2-01, 68-2-02 |

**TABLE 4-4** Environmental Specifications: Nonoperating

| Parameter   | Specification   | Standard             |
|-------------|---|----------------------|
| Altitude    | 0 to 12,000 meters (0 to 39,360 feet)                             | IEC 68-2-13          |
| Humidity    | 5%-93% relative humidity (RH) at 40°C (104°F)                     | IEC 68-2-03          |
| Shock       | 30G peak, 11 milliseconds, half sine pulse                        | IEC 68-2-27          |
| Vibration   | 1.0G, 5 to 500 to 5 Hz, 5 sweeps in 3 mutually perpendicular axes | IEC 68-2-06          |
| Temperature | -20°C to 60°C (-4°F to 140°F)                                     | IEC 68-2-01, 68-2-02 |

## 4.3 Physical Specifications



**FIGURE 4-1** Ultra 60 System Enclosure Physical Dimensions

**TABLE 4-5** Dimensions and Weight

| Height            | Width            | Depth             | Weight             |
|-------------------|------------------|-------------------|--------------------|
| 450 mm (17.7 in.) | 190 mm (7.5 in.) | 498 mm (19.6 in.) | 18.1 kg (39.9 lb)* |

\*This weight is an approximation for a system equipped with four dual in-line memory modules (DIMMs), two CPU modules, two UPA graphics cards, and one hard disk drive.

---

# 4.4 Memory Mapping

## 4.4.1 DIMM Installation Guidelines

- Ultra 60 dual in-line memory modules (DIMMs) are installed and mapped in banks of four DIMMs.
- DIMM sizes of 16-, 32-, 64-, and 128-Mbytes are supported. Therefore, the minimum capacity for a bank of four DIMMs is 64 Mbytes and the maximum capacity is 512 Mbytes.
- You must install each bank with four DIMMs of the same memory size and speed.
- If DIMMs of different memory size are installed together in a bank of four, the system might not function properly.
- A minimum of four DIMMs must be installed in a bank of four slots in order for the system to boot.

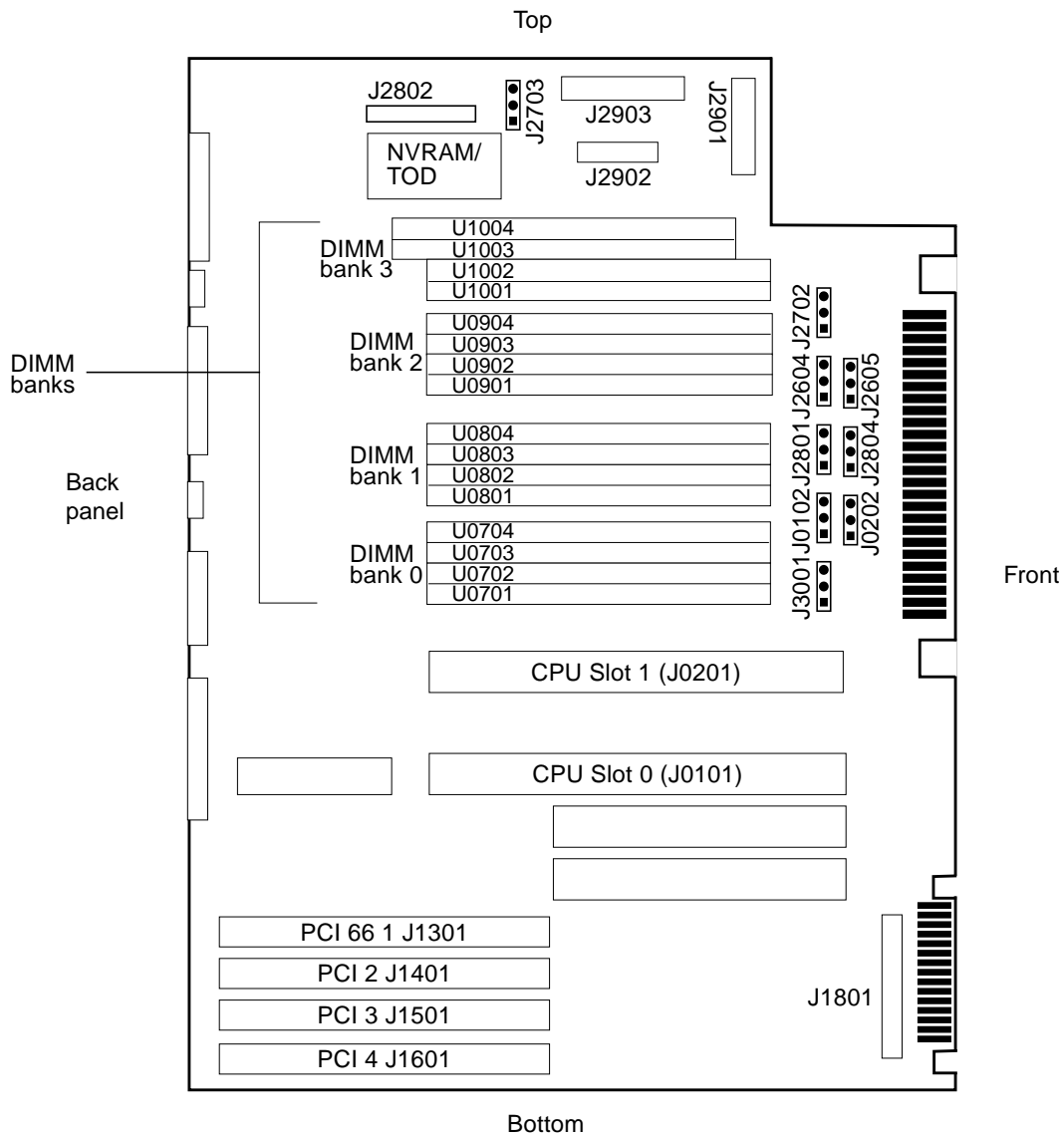
## 4.4.2 DIMM Banks and Slots

TABLE 4-6 lists the DIMM banks and slots, and FIGURE 4-2 shows the banks on the motherboard.

Bank 3 (the bank closest to the top of the system) is the default location for the four factory-installed DIMMs.

**TABLE 4-6** DIMM Banks and Slots

| Bank | Slots                      |
|------|----------------------------|
| 3    | U1001, U1002, U1003, U1004 |
| 2    | U0901, U0902, U0903, U0904 |
| 1    | U0801, U0802, U0803, U0804 |
| 0    | U0701, U0702, U0703, U0704 |



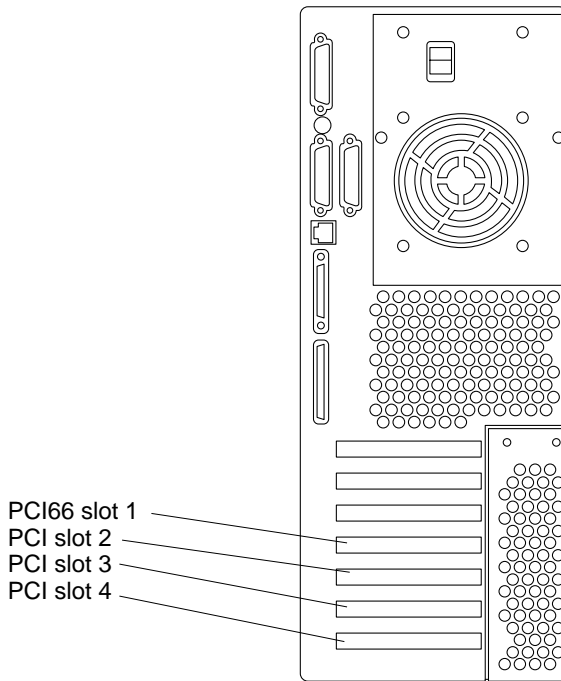
**FIGURE 4-2** Map of DIMM Banks and Slots on Motherboard

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## 4.5 PCI Card Slot Specifications

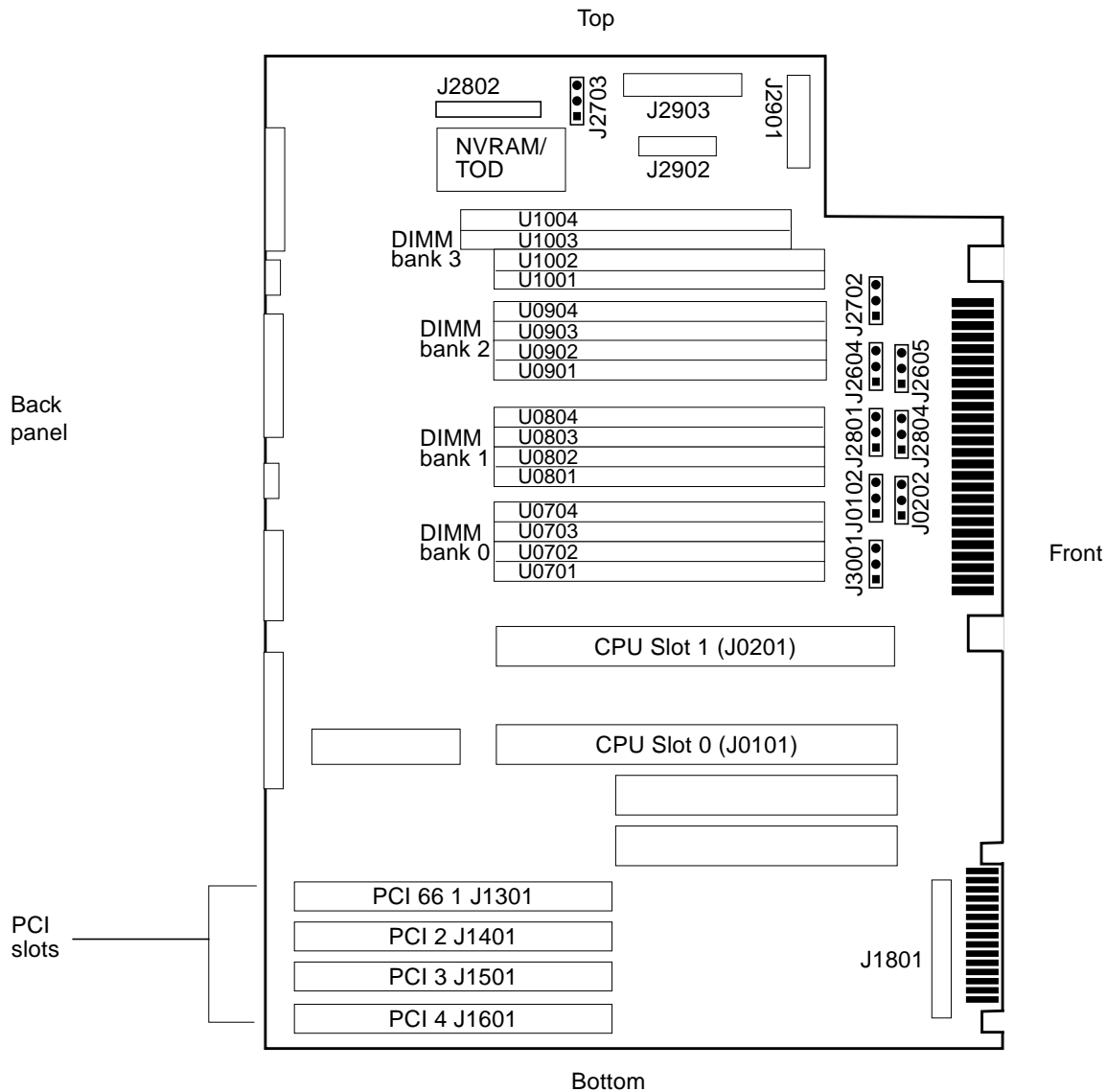
The Ultra 60 system uses the peripheral component interconnect (PCI) local bus architecture to connect PCI accessory cards (printed circuit boards). PCI cards plug into Ultra 60 system PCI slots. PCI cards come in different physical sizes, operate at different frequencies, and provide many different types of functionality.

### 4.5.1 Locating the PCI Card Slots



**FIGURE 4-3** PCI Card Slot Locations on the System Unit Back Panel





**FIGURE 4-4** PCI Card Slot Locations on the Motherboard

## 4.5.2 PCI Card Slot Operating Frequencies

TABLE 4-7 PCI Card Slot Operating Frequencies

| PCI Card Slot        | Operating Frequency or Frequencies | Input/Output Signaling Level |
|----------------------|------------------------------------|------------------------------|
| PCI66 Slot 1 (J1301) | 66 MHz                             | 3.3 volts                    |
|                      | 33 MHz                             | 3.3 volts                    |
| PCI Slot 2 (J1401)   | 33 MHz                             | 5.0 volts                    |
| PCI Slot 3 (J1501)   | 33 MHz                             | 5.0 volts                    |
| PCI Slot 4 (J1601)   | 33 MHz                             | 5.0 volts                    |

- All Ultra 60 system PCI card slots operate at 32-bit or 64-bit bus widths.
- Most PCI cards operate at 33 MHz.
- Cards designed to operate at 66 MHz must be installed in the PCI66 slot.

---

**Note** – If you install a 33 MHz PCI card in PCI66 slot 1, refer to the card manufacturer's documentation and verify that the card will operate with an I/O signaling level of 3.3 volts.

---