

Sun Ultra 1 Series Reference Manual



THE NETWORK IS THE COMPUTER™

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Preface

The *Sun Ultra 1 Series Reference Manual* contains useful information about the use and maintenance of a Sun™ Ultra™ 1 Series system.

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, “Twisted-Pair Ethernet Link Test,” presents a full tutorial about connecting the system to a twisted-pair Ethernet local area network.

Chapter 3, “Modem Setup Specifications,” gives modem settings for Ultra 1 Series systems used in specific network telecommunication applications.

Chapter 4, “Main-Logic Board Jumpers,” gives the locations and pin definitions of user-configurable main-logic board jumpers.

Chapter 5, “Physical Specifications,” gives system requirements about power and environment, and also gives system dimension, weight, and memory mapping specifications.

Related Books

- *Sun Ultra 1 Series Hardware Setup Instructions*
- *Sun Ultra 1 Series Installation Guide*
- *Sun Ultra 1 Series Product Notes*

- *Sun Ultra 1 Series Service Manual*
- *Solaris Handbook for SMCC Peripherals*

Typographic Conventions

The following table describes the typographic changes used in this book.

TABLE P-1 Typographic Conventions

| Typeface or Symbol | Meaning | Example |
|--------------------|--|---|
| AaBbCc123 | The names of commands, files, and directories; on-screen computer output | Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. machine_name% You have mail. |
| AaBbCc123 | What you type, contrasted with on-screen computer output | machine_name% su Password: |
| <i>AaBbCc123</i> | Command-line placeholder: replace with a real name or value | To delete a file, type <code>rm filename</code> . |
| <i>AaBbCc123</i> | Book titles, new words or terms, or words to be emphasized | Read Chapter 6 in <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be root to do this. |

Back Panel Connectors

1.1 Connector Layout

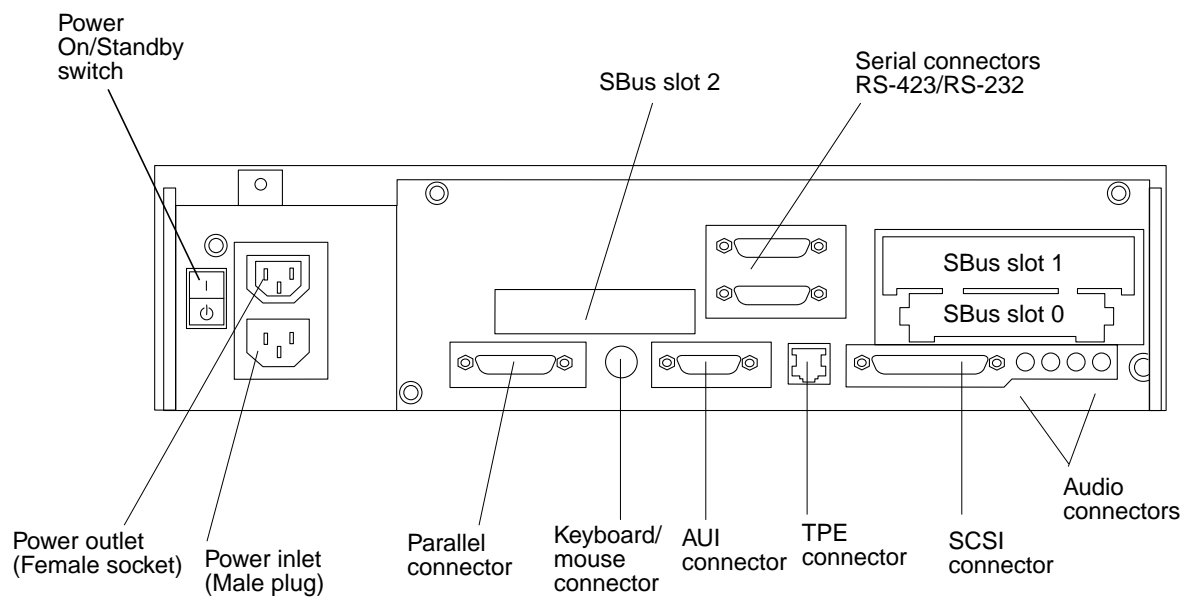


FIGURE 1-1 Back Panel Switches and Connectors

1.2 Serial Connectors

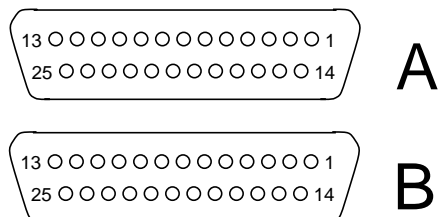


FIGURE 1-2 DB-25 Serial Connectors

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

| 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 |

1.3 Parallel Connector

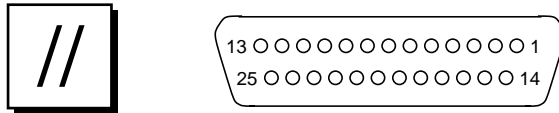


FIGURE 1-3 DB-25 Parallel Connector

TABLE 1-2 Parallel Connector Pinouts

| Pin | Description | Pin | Description |
|-----|-------------|-----|---------------|
| 1 | nStrobe | 14 | nAutoFd |
| 2 | Data[1] | 15 | nFault |
| 3 | Data[2] | 16 | nInit |
| 4 | Data[3] | 17 | nSelectIn |
| 5 | Data[4] | 18 | Signal Ground |
| 6 | Data[5] | 19 | Signal Ground |
| 7 | Data[6] | 20 | Signal Ground |
| 8 | Data[7] | 21 | Signal Ground |
| 9 | Data[8] | 22 | Signal Ground |
| 10 | nAck | 23 | Signal Ground |
| 11 | Busy | 24 | Signal Ground |
| 12 | PError | 25 | Signal Ground |
| 13 | Select | | |

1.4 Keyboard/Mouse Connector

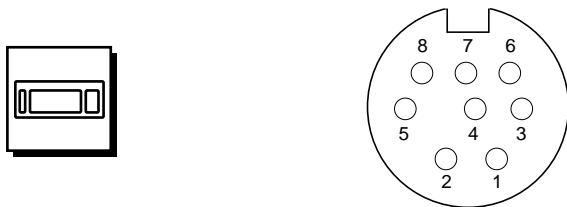


FIGURE 1-4 DIN-8 Keyboard/Mouse Connector

TABLE 1-3 Keyboard/Mouse Connector Pinouts

| Pin | Description | Pin | Description |
|-----|-------------|-----|--------------|
| 1 | Ground | 5 | Keyboard Out |
| 2 | Ground | 6 | Keyboard In |
| 3 | +5 Vdc | 7 | Power Key In |
| 4 | Mouse In | 8 | +5 Vdc |

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

1.5 Attachment Unit Interface (AUI) Connector



FIGURE 1-5 DB-15 AUI Connector

TABLE 1-4 AUI Connector Pinouts

| Pin | Function |
|-----|----------|
| 1 | Gnd |
| 2 | AUI_CI+ |
| 3 | AUI_DO+ |
| 4 | Gnd |
| 5 | AUI_DI+ |
| 6 | Gnd |
| 7 | NC |
| 8 | Gnd |
| 9 | AUI_CI- |
| 10 | AUI_DO- |
| 11 | Gnd |
| 12 | AUI_DI- |
| 13 | +12 VDC |
| 14 | Gnd |
| 15 | NC |

1.6 Twisted-Pair Ethernet (TPE) Connector



FIGURE 1-6 RJ-45 TPE Connector

TABLE 1-5 TPE Connector Pinouts

| Pin | Description | Pin | Description |
|-----|-----------------|-----|----------------|
| 1 | Transmit Data + | 5 | N.C. |
| 2 | Transmit Data - | 6 | Receive Data - |
| 3 | Receive Data + | 7 | N.C. |
| 4 | N.C. | 8 | N.C. |

1.7 SCSI Connector

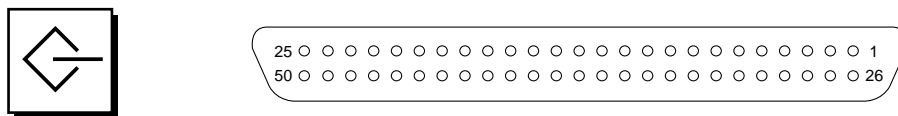


FIGURE 1-7 50-Pin SCSI Connector

Note – All signals shown in Table 1-6 are active low.

TABLE 1-6 SCSI Connector Pinouts

| Pin | Level | Function | I/O | Description |
|-------|-------|-----------|-----|---------------------|
| 1-25 | GND | Ground | | |
| 26 | TTL | sd0 | I&O | SCSI Data Bit 0 |
| 27 | TTL | sd1 | I&O | SCSI Data Bit 1 |
| 28 | TTL | sd2 | I&O | SCSI Data Bit 2 |
| 29 | TTL | sd3 | I&O | SCSI Data Bit 3 |
| 30 | TTL | sd4 | I&O | SCSI Data Bit 4 |
| 31 | TTL | sd5 | I&O | SCSI Data Bit 5 |
| 32 | TTL | sd6 | I&O | SCSI Data Bit 6 |
| 33 | TTL | sd7 | I&O | SCSI Data Bit 7 |
| 34 | TTL | sdp | I&O | SCSI Data Parity |
| 35-37 | GND | Ground | | |
| 38 | TTL | Termpower | I&O | Termination Voltage |
| 39-40 | GND | | | |
| 41 | TTL | atn | O | Attention |
| 42 | GND | Ground | | |
| 43 | TTL | bsy | O | Busy |
| 44 | TTL | ack | O | Acknowledge |
| 45 | TTL | rst | O | Reset |
| 46 | TTL | msg | O | Message |
| 47 | TTL | sel | O | Select |
| 48 | TTL | cd | O | Control/Data |
| 49 | TTL | req | O | Request |
| 50 | TTL | io | O | Input/Output |

1.7.1 SCSI Implementation

- Single-ended

- 8-bit (narrow SCSI) with parity
- 10 MBytes/sec Fast SCSI
- Supports 8 SCSI addresses:
 - Target 0-6 for devices
 - Target 7 reserved for SCSI host adapter on main-logic board
- Supports up to 3 internal SCSI drives:
 - SCSI disk drive target 0 (lower drive slot)
 - SCSI disk drive target 1 (upper drive slot)
 - SCSI CD-ROM drive target 6
- External 8-bit SCSI devices supported via 50-pin SCSI connector

1.8 Audio Ports

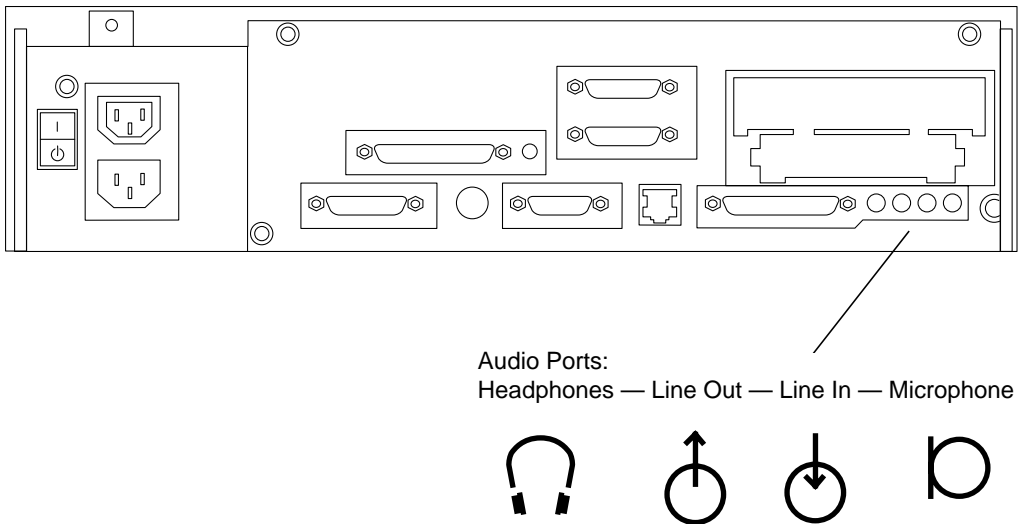


FIGURE 1-8 Audio Port Locations

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

TABLE 1-7 Audio Port Signals

| | 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 1-8 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 and loudspeakers. |
| 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*) to the system. *The Ultra 1 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 1 system. |

1.9 Audio Specifications

The specifications in Table 1-9 assume use of the Audio Tool format setting “CD-ROM or DAT” selected.

The microphone input specifications are for the SunMicrophone II.

TABLE 1-9 Audio Inputs and Output

| Stereo I/Os | Specifications |
|--------------------|--|
| Line In | 2V typical, 4V max.; 5-50 ohms impedance |
| Frequency Response | 20 Hz-17 kHz +/- 0.5 dB |
| Internal CD Input | |

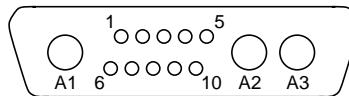
TABLE 1-9 Audio Inputs and Output

| Stereo I/Os | Specifications |
|--------------------|--|
| Input Level | 0.1 Vrms typical at 10 kOhms; 2Vpp max. |
| Distortion | 0.01%, typical at 1 kHz |
| S/N Ratio | 84 dB, typical IEC 179 A-weighted |
| Frequency Response | 20 Hz-17 kHz +/- 0.5 dB |
| Microphone Input | 15 mV typical, 0.6-1.0 kOhms impedance; +5 VDC input bias via a 2.2kOhms resistor |
| Headphones Output | 1V typical, 2.4V max.; 16 Ohms -1kOhms impedance |
| Line Out | 1V typical, 2.4V max.; 5-50 kOhms impedance |

TABLE 1-10 Internal Monaural Speaker Specifications

| Speaker | Specifications |
|--------------------|--------------------------|
| Power Output | 1.5W ave., 3W peak |
| Distortion | 0.02%, typical at 1 kHz |
| Impedance | 16 Ohms +/- 20% |
| Frequency Response | 150 Hz-17 kHz +/- 0.5 dB |

1.10 SBus Card 13W3 Video Connector

**FIGURE 1-9** 13W3 Video Connector

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

See Table 1-11 for 13W3 video connector pinouts.

TABLE 1-11 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 |

Twisted-Pair Ethernet Link Test

Read this chapter if you are connecting your Ultra 1 Series system to a twisted-pair Ethernet (TPE) network. This chapter contains important information for getting your system to communicate correctly over a TPE network. If you have no experience with TPE networks, ask your system or network administrator to perform the procedures in this chapter.

2.1 Overview

- The twisted-pair Ethernet link integrity test is a function defined by the IEEE 802.3 10BASE-T specification.
- For a networked workstation (host) to communicate with a network hub, the link test state (enabled or disabled) must be the same on the host and hub.
- If either the host or hub does not share the link test enabled/disabled state of the other, then the host cannot communicate effectively with the hub, and the hub cannot communicate effectively with the host.

FIGURE 2-1 gives an example of a star configuration local area network (LAN), showing the relationship of hosts to a hub.

FIGURE 2-2 shows the importance of ensuring that the host and hub link test settings match.

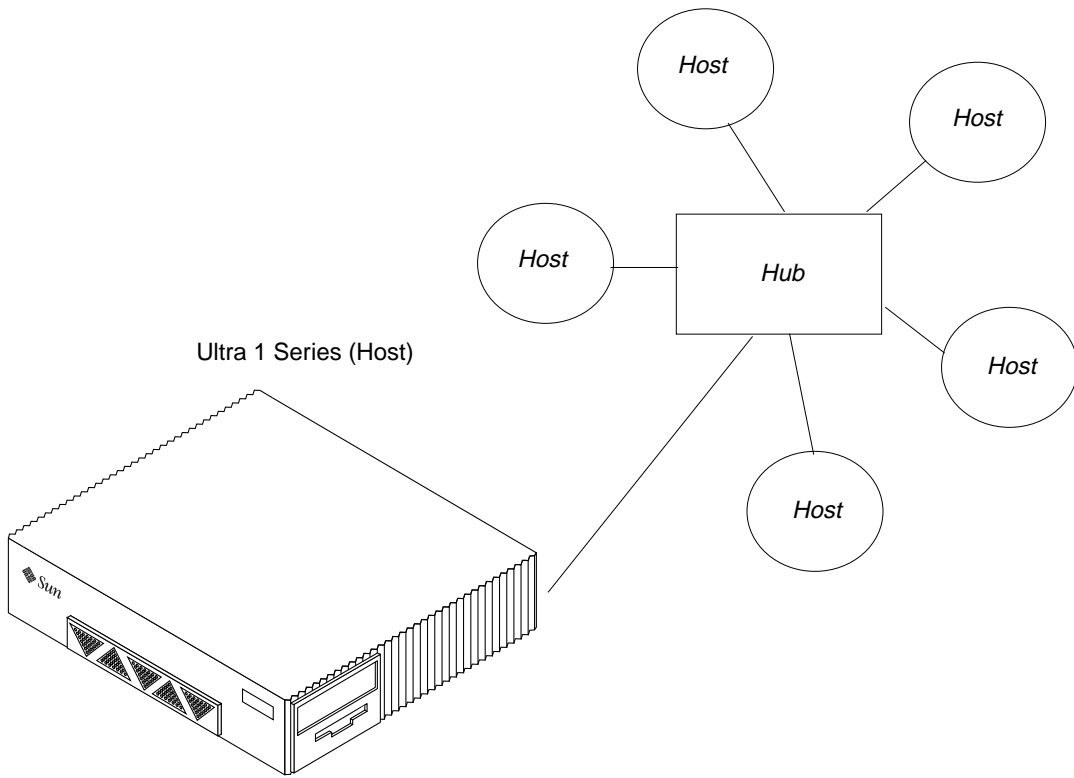


FIGURE 2-1 Hosts and Hub in a Local Area Network

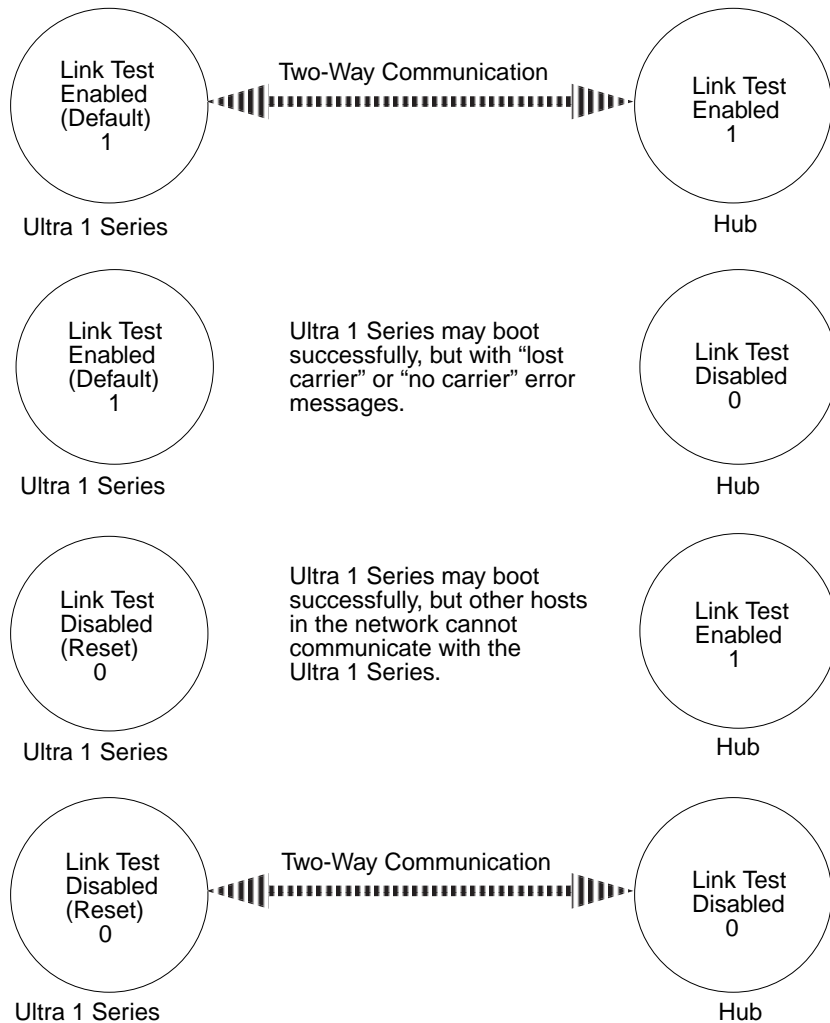


FIGURE 2-2 Ensuring Host-Hub Communication

2.2 Technical Discussion

The twisted-pair Ethernet link integrity test determines the state of the twisted-pair cable link between the host and the hub in a network. Both the host and hub regularly transmit a link test pulse. When either the host or hub has not received a link test pulse within a certain amount of time (50-150 ms), it makes the transition from the link-pass state to the link-fail state and remains in the link-fail state until it once again receives regular link test pulses.

The link integrity test is specific to twisted-pair Ethernet and is not applicable to the other physical layer implementations of IEEE 802.3 such as 10BASE5 ("thicknet") or 10BASE2 ("thinnet").

The link test function at the host or hub is either enabled (link test enabled or 1) or disabled (link test disabled or 0). The IEEE 802.3 10BASE-T specification requires that the link test be enabled at both the host and the hub.

Although link test disabled does not conform to the specification, it is often encountered in real-world installations. Hubs from various vendors can exhibit any of the following:

- Link test is "hardwired" enabled—link test is always enabled.
- Link test is "hardwired" disabled—link test is always disabled.
- Link test is configurable—the network administrator may enable or disable link test.

2.3 Troubleshooting

If you have connected an Ultra 1 Series host to a hub using twisted-pair Ethernet cable and observe either "no carrier" messages or fail to communicate effectively with another host in the same network, look first at the hub. If it supports configurable link test, then make sure "link test enabled" is configured. This is usually done by setting a hardware switch.

If the hub does not support configurable link test, then refer to the hub manufacturer's documentation. Check to see if your hub is hardwired for link test disabled. If it is, you must follow the "Checking or Disabling the Link Test" procedure elsewhere in this chapter to disable the link test at your Ultra 1 Series host.

2.4 Moves and Changes

If the Ultra 1 Series host is physically moved to another network location or if the hub is reconfigured, remember to refer back to Figure 2-2. Unless the new network relationship between the host and the hub is functional (that is, 1-1 link test enabled-link test enabled or 0-0 link test disabled-link test disabled), there will be no full, regular two-way communication between the host and the hub.

2.5 Checking or Disabling the Link Test

To check the link test state of an Ultra 1 Series host:

1. If you do not see the `ok` prompt, press the Stop (L1)-a keys.
2. At the `ok` prompt, type:

```
ok printenv tpe-link-test?
tpe-link-test?      true           true
ok
```

The above screen shows the current link test state (true, or enabled), followed by the default state (true, or enabled).

To disable the host's link test function:

- Type the following command:

```
ok setenv tpe-link-test? false
tpe-link-test? =    false
ok
```

- Boot the host and verify that the transceiver cable problem messages do not appear. Type either `boot net` or `boot disk` and press Return.

2.6 Enabling the Link Test

1. If you do not see the `ok` prompt, press the Stop (L1)-a keys.
2. At the `ok` prompt, type:

```
ok printenv tpe-link-test?
tpe-link-test?      false           true
ok
```

The above screen shows the current link test state (false, or disabled), followed by the default state (true, or enabled).

- To enable the host's link test function, type:

```
ok setenv tpe-link-test? true
tpe-link-test? =    true
ok
```

- Boot the host and verify that the transceiver cable problem messages do not appear. Type either `boot net` or `boot disk` and press Return.

Modem Setup Specifications

3.1 Setting Up the Modem

Any modem compatible with U.S. Robotics[®] or CCITT V.24 can be connected to the Ultra 1 Series 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:

- **Become root (superuser).** Type `admintool`.

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

1. **Highlight** `Browse`.
2. **Select** `Serial Port`.
3. **Select Port A or Port B for your modem connection.**
4. **Select** `Edit`.
5. **Select** `Expert`.
6. **Open the Use Template menu, and choose one of the following:**
 - Select `Modem - Dial-Out Only`

- Select Modem - Dial-In Only
- Select Modem - Bidirectional

7. **Select** `Apply`.

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

- For Dial-Out Only, set the switch to Off
- For Dial-In Only, set the switch to On
- For Bidirectional, set the switch to On

3.2 Serial Port Speed Change

You must edit the `/etc/remote` file to change the speed of a serial port.

- **Become root (superuser), and type** `cd /etc`.

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

1. **Type** `vi remote`.

2. **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]`.

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

3.3 Recommendations

3.3.1 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.

3.3.2 Modem Switch Settings (AT Commands)

- 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)

Note – The above settings are guidelines to help you get started quickly. Changes to these guidelines should be expected depending on your site requirements and the modem you are using.

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

Main Logic Board Jumpers

Jumper settings given in this chapter refer to etchings on the main logic board. Jumpers are labeled with the letter “J” followed by a four-digit number. See Figure 4-1.

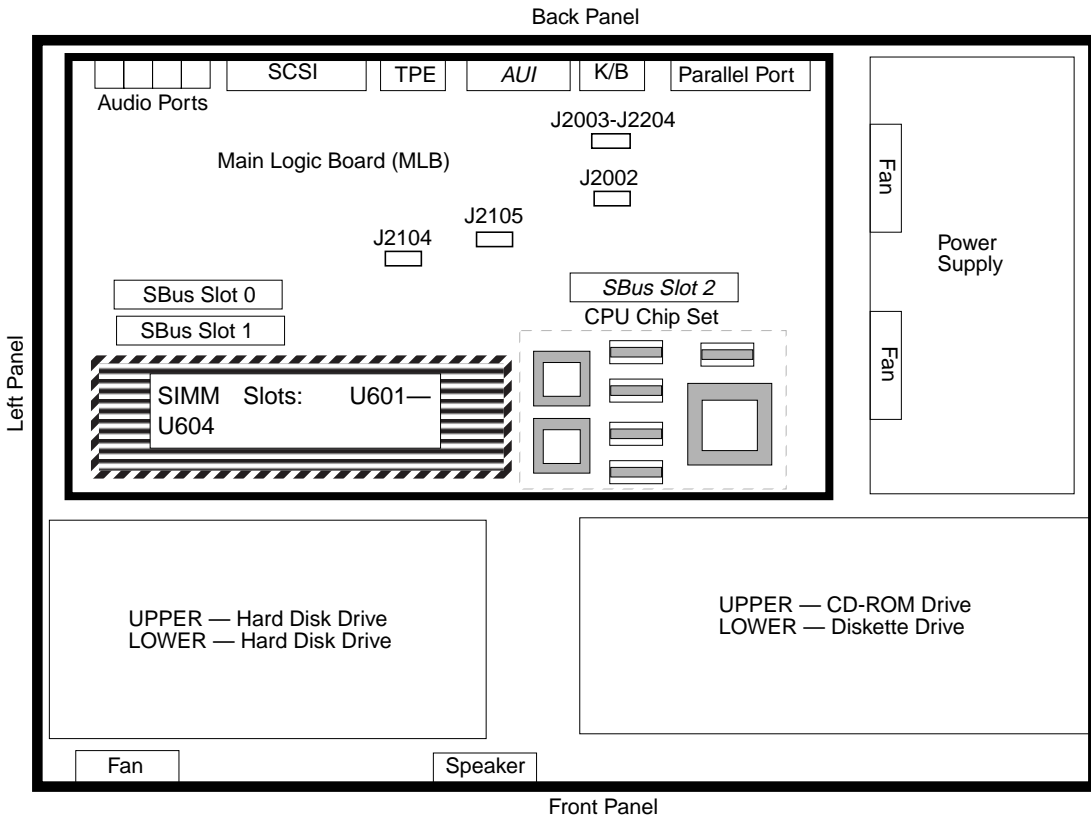


FIGURE 4-1 Jumper Locations on the Main Logic Board

4.1 Identifying Jumpers

Jumpers are marked on the main logic board with part numbers. For example, the serial port jumpers are marked J2104 and J2105. Jumper pins are located immediately adjacent to the part number. Pin 1 is marked with an asterisk in any of the positions shown. See Figure 4-2.

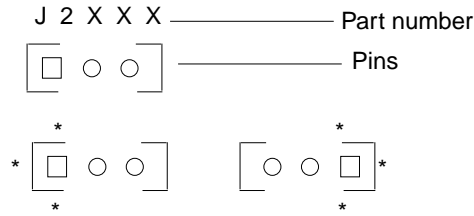


FIGURE 4-2 Identifying Jumper Pins

4.2 Flash PROM Jumpers

The Ultra 1 Series system uses flash PROMs. Flash PROMs permit the following:

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

TABLE 4-1 Flash PROM Jumper Settings

| Jumper | Pins 1 + 2 Select | Pins 2 + 3 Select | Default Jumper on Pins | Signal Controlled |
|--------|-------------------|-------------------|------------------------|---------------------------|
| J2002 | Flash PROM | Not To Be Used | 1 + 2 | FLASH PROM SEL |
| J2003 | Write Protect | Write Enable | 1 + 2 | FLASH PROM PROG ENABLE |
| J2204 | High Half Booting | Normal Booting | 2 + 3 | XOR LOGIC SET |

Note – If you are reprogramming your system flash PROM, after successful reprogramming be sure to return the flash PROM Write Protect/Enable jumper (J2003) to the Write Protect position to ensure system security.

For flash PROM reprogramming information and the function of J2204, see the *SMCC System Flash PROM Programming Guide*.

4.3 Serial Port Jumpers

The serial port jumpers on the main logic board permit configuring 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 digital telecommunication in nations of the European Community.

TABLE 4-2 Serial Port Jumper Settings

| Jumper | Pins 1 + 2 Select | Pins 2 + 3 Select | Default Shunt on Pins | Signal Controlled |
|--------|-------------------|-------------------|-----------------------|-------------------|
| J2104 | RS-232 | RS-423 | 2 + 3 | RS232/RS423 SEL |
| J2105 | RS-232 | RS-423 | 2 + 3 | RS232/RS423 SEL |

Note – In an Ultra 1 Series system, jumper J2104 is not marked with an asterisk to indicate pin 1. The pins are numbered in the way shown in Figure 4-3 in relation to the J2104 marking on the main logic board.

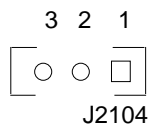


FIGURE 4-3 Ultra 1 Series, Jumper J2104 Pin Numberin

System Specifications

5.1 Power

TABLE 5-1 Power Specifications

| Input/Output | Specifications |
|-----------------|--------------------------------|
| AC Power Input | 100-240 VAC nominal, 47-63 Hz. |
| DC Power Output | 180 W maximum |

5.2 Environment

The following specifications comply with the *International Electrotechnical Commission (IEC) Standards*, 5th ed., 1990-1994.

See TABLE 5-2..

TABLE 5-2 Environmental Specifications

| Operating | |
|---------------------|--|
| Altitude | 0 to 3000 meters (0 to 9840 feet), 5°C to 35°C (41°F to 95°F) —IEC 68-2-40, 68-2-41 |
| Humidity | 20% to 80% Relative Humidity (RH), noncondensing —IEC 68-2-2, 68-2-3 |
| Shock | 5 gravity (g) peak, 11 milliseconds half-sine pulse —IEC 68-2-27 |
| Vibration | 0.1 g peak, 5 to 500 Hz, 3 perpendicular axes —IEC 68-2-26 |
| Temperature | 5°C to 40°C (41°F to 104°F) at 20%-70% RH noncondensing —IEC 68-2-1, 68-2-2 |
| Nonoperating | |
| Altitude | 0 to 12,000 meters (0 to 39,360 feet), 0°C to 10°C (32°F to 50°F) —IEC 68-2-40, 68-2-41 |
| Humidity | 95% RH, noncondensing —IEC 68-2-2, 68-2-3 |
| Shock | 30 g peak, 11 milliseconds half-sine pulse —IEC 68-2-27 |
| Vibration | 1 g peak, 5 to 500 Hz, 3 perpendicular axes —IEC 68-2-6 |
| Temperature | -40°C to 65°C (-40°F to 149°F) at 20%-70% RH, noncondensing —IEC 68-2-1, 68-2-2 |

5.3 Physical Specifications

TABLE 5-3 Dimensions and Weight

| Height | Width | Depth | Weight* |
|---------------------|---------------------|---------------------|--------------------|
| 10.15 cm (4.00 in.) | 41.7 cm (16.44 in.) | 44.3 cm (17.44 in.) | 12.25 kg (27.0 lb) |

Note – *These weight figures are approximations for a system equipped with 2 hard disk drives, 1 CD-ROM drive, and 3 SBus cards.

TABLE 5-4 Physical Clearances

| Clearance | Specification |
|-----------------------------------|--------------------|
| Compact Disc/ Diskette | 16.51 cm (6.5 in.) |
| System Unit Parallel Placement | 7.6 cm (3.0 in.)* |

*Physical space between two system units side by side

5.4 Memory Mapping

Single Inline Memory Modules (SIMMs) are grouped on the main logic board in banks of two slots each. SIMMs are installed in identical pairs per bank.

TABLE 5-5 Main Logic Board Memory Mapping

| Bank | Slots |
|------|---------------|
| 0 | U0701 + U0601 |
| 1 | U0702 + U0602 |
| 2 | U0703 + U0603 |
| 3 | U0704 + U0604 |

