Motherboard and Component Replacement

This chapter contains removal and replacement procedures for the Netra t 1400/1405 motherboard and components of the motherboard.

9.1   CPU Modules

Up to four self-contained CPU modules are housed in a cage which is fixed to the motherboard.

▼ To Remove a CPU Module

Caution – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

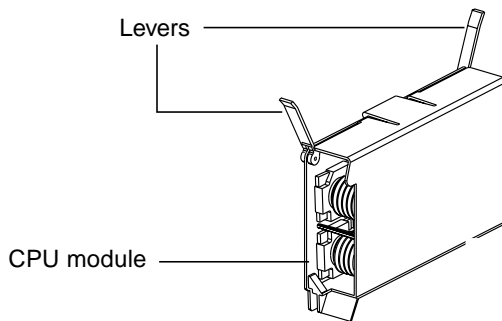4. **Using both thumbs, simultaneously lift the two levers on the CPU module upward and to the side. See** FIGURE 9-1 **below.**

Levers

CPU module

FIGURE 9-1 CPU Module Levers

5. **Using the two levers, lift the CPU module upwards until it clears the system chassis.**

6. **Place the CPU module on an ESD mat.**

▼ To Install or Replace a CPU Module

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **On the antistatic mat, hold the CPU module in an upright position with the plastic surface facing you.**

4. **Move the levers on the CPU module to point straight upwards.**

5. **Lower the CPU module along the vertical plastic guides until the module touches the motherboard slot socket. Ensure connectors are aligned. With both hands, simultaneously turn and press the levers downward to the fully horizontal position.**

6. **Firmly press the module downward into the socket until it is fully seated and the levers are fully locked.**

7. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

8. **Detach the antistatic wrist strap and replace the front cover.**

9. **Power on the system.**

   See "To Power On the System" on page 6-1.

9.2 System Fan Assembly

Two system fans are located in the front of the system chassis. The fan assembly contains no user-serviceable parts and must be replaced as a unit if it is faulty.

▼ To Remove a System Fan Assembly

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Remove the fan cover by turning the two captive Phillips-head quarter-turn screws anticlockwise through 90° Remove the cover and filter from the immediate vicinity of the system.**

5. **Disconnect the fan assembly power cable from the fan control board.**

6. **Using a No.2 Phillips-head screwdriver, from the front of the chassis undo the four screws securing the fan assembly and carefully remove the assembly from the chassis.**

Note – Refer to the diagram on the inside of the top access cover for details of the fan connections to the fan control board.

▼ To Replace the System Fan Assembly

Caution – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Carefully position the fan assembly in the chassis and secure with four Phillips-head countersunk screws.**

3. **Connect the fan assembly power cable to the fan control board.**

   Note – Refer to the diagram on the inside of the top access cover for details of the fan connections to the fan control board.

4. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

5. **Replace the front cover and filter and secure by turning the two captive Phillips-head quarter-turn screws clockwise through 90˚. If necessary, clean or replace the filter before refitting the cover.**

6. **Detach the antistatic wrist strap.**

7. **Power on the system.**
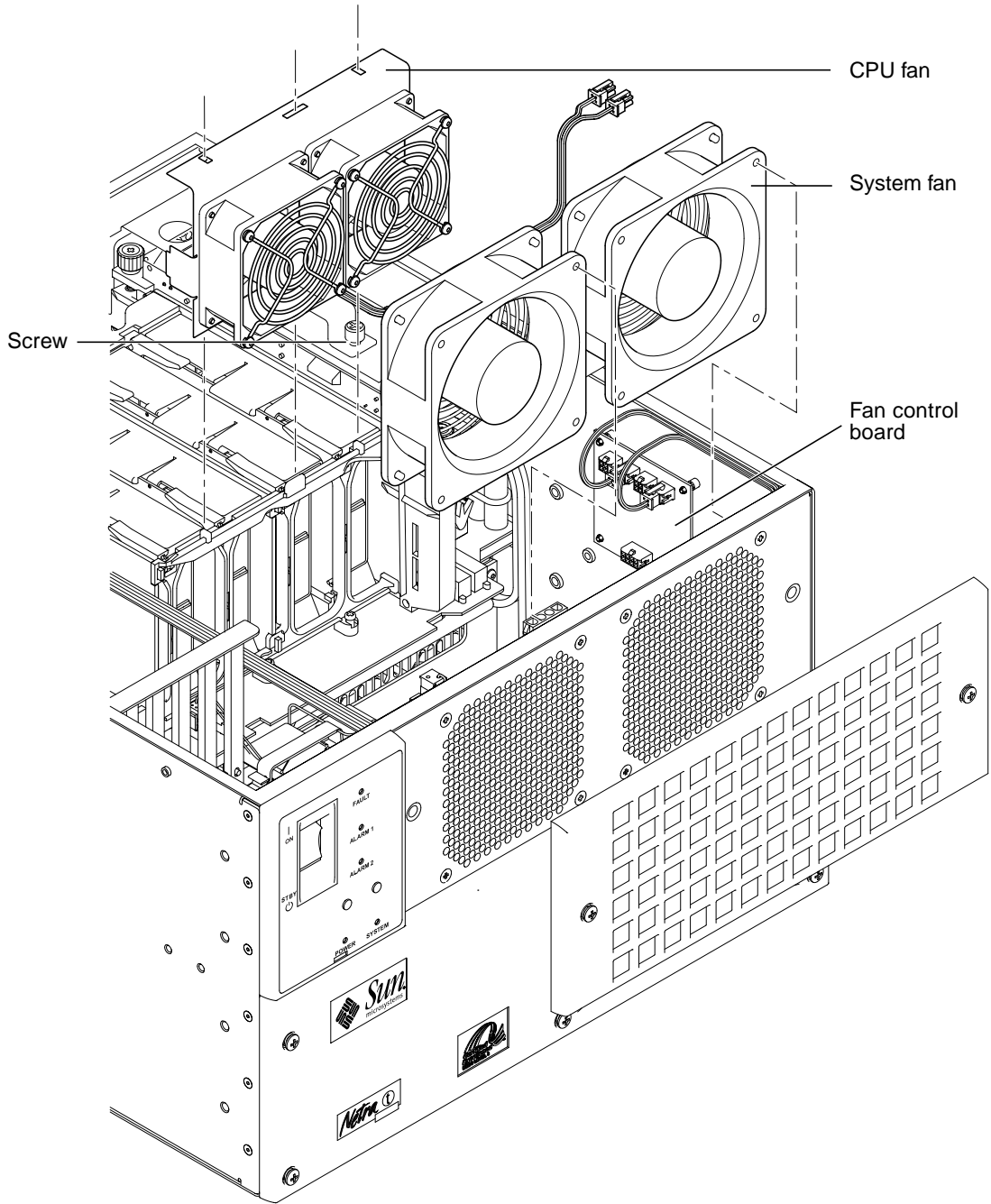
   See "To Power On the System" on page 6-1.

FIGURE 9-2 Removing and Replacing the Fan Assemblies

9.3　CPU Fan Assembly

The two CPU fans are mounted together in single cage.

▼ To Remove the CPU Fan Assembly

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Disconnect the fan assembly power cable from the fan control board.**

5. **Release the lower fan bracket from the drive assembly cage by slackening the captive Phillips-head screw (see "Removing and Replacing the Fan Assemblies" on page 9-5.**

6. **Lift off the fan unit from the locating pins on the CPU cage and remove it from the chassis.**

▼ To Replace the CPU Fan Assembly

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Carefully position the fan assembly over the locating pins on the CPU cage and secure the lower fan bracket to the disk drive cage by tightening the single captive Phillips-head screw.**

3. **Connect the fan assembly power cable to the fan control board.**

Note – Refer to the diagram on the inside of the top access cover for details of the fan connections to the fan control board.

4. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

5. **Replace the front cover and filter and secure by turning the two captive Phillips-head quarter-turn screws clockwise through 90°. If necessary, clean or replace the filter before refitting the cover.**

6. **Detach the antistatic wrist strap.**

7. **Power on the system.**

   See "To Power On the System" on page 6-1.

9.4 Fan Control Board

The fan control board is mounted on the right-hand side of the system chassis, above the SCSI adapter board.

▼ To Remove the Fan Control Board

Caution – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power On the System" on page 6-1.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Disconnect the four cables to the fans and the single cable to the PDB.**

5. **Pull off the fan control board and place it on an ESD mat.**

▼ To Replace the Fan Control Board

⚠️ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Locate the fan control board over the four stand off-pins and gently press until it snaps into place.**

3. **Reconnect the four cables to the fans and the cable to the PDB.**

   Note – Refer to the diagram on the inside of the top access cover for details of the fan connections to the fan control board.

4. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

5. **Detach the antistatic wrist strap.**

6. **Power on the system.**

   See "To Power On the System" on page 6-1.

9.5 PCI Card

▼ To Remove a PCI Card

⚠️ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Disconnect the cables from the PCI card to be removed.**

5. **Using a No.2 Phillips-head screwdriver, remove the screw securing the PCI card bracket tab to the system chassis.**

⚠️ **Caution –** Avoid applying force to one end or one side of the board as this can damage the connector.

6. **Pull the PCI card straight upwards from the slot.**

7. **Place the PCI card on an ESD mat.**

▼ To Replace a PCI Card

> ⚠️ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See Section t "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

> **Note –** Read the PCI card product guide for information about jumper or switch settings, slot requirements and required tools.

4. **Lower the PCI card so that it touches its associated slot on the motherboard.**

5. **From the two upper corners of the card, push the card straight downwards into the slot until it is fully seated.**

6. **Using a No.2 Phillips-headed screwdriver, insert and tighten the screw securing the card bracket tab to the system chassis.**

7. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

8. **Connect the cables to the PCI card.**

9. **Detach the antistatic wrist strap and replace the front cover.**

10. **Power on the system.**

    See "To Power On the System" on page 6-1.

9.6   DIMMs

⚠ **Caution –** DIMMs consist of electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or work environment can destroy the DIMM.

⚠ **Caution –** When removing a DIMM, an identical replacement is required. The replacement DIMM must be inserted into the same socket as the removed DIMM.

⚠ **Caution –** Each DIMM bank must contain at least two DIMMs of equal density (for example, two 64Mbyte DIMMs) to function properly. Do not mix DIMM densities in any bank.

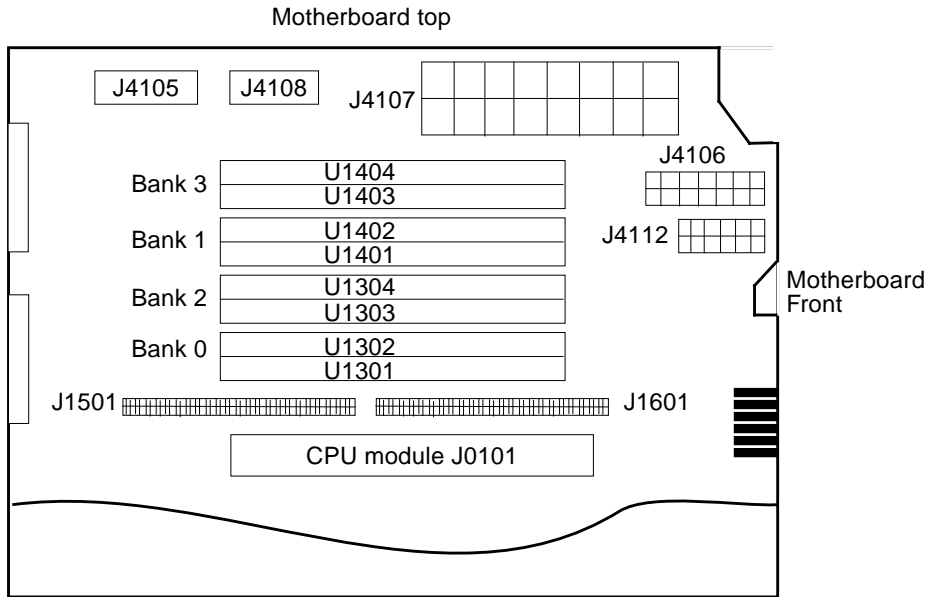DIMMs must be inserted in pairs in both the motherboard and memory riser card, according to TABLE 9-1 on page 9-11.

Note – The system unit *must* have at least two identical DIMMs installed in paired sockets of any DIMM bank. For best system performance, install four identical DIMMs. TABLE 10-1 identifies DIMM installation locations.

TABLE 9-1   DIMM Bank and Bank Quads

Bank	U Number (Motherboard)	U Number (Memory Riser Card)
0	U1301 and U1302	U0301 and U0302
2	U1303 and U1304	U0303 and U0304
1	U1401 and U1402	U0401 and U0402
3	U1403 and U1404	U0403 and U0404

Motherboard top

FIGURE 9-3   DIMM Mapping (Motherboard)

Bank 3 (U0403, U0404)

Bank 2 (U0401, U0402)

Bank 1 (U0303, U0304)

Bank 0 (U0301, U0302)
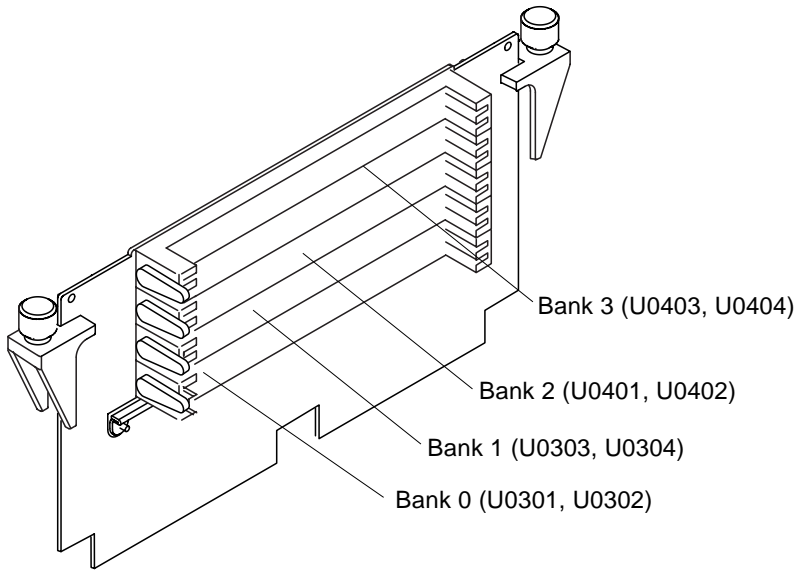
FIGURE 9-4   DIMM Mapping (Memory Riser Card)

▼ To Remove a DIMM

⚠ **Caution –** Handle DIMMs only by the edges. Do not touch the DIMM components or metal parts. Always wear a grounding strap when handling a DIMM.

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Locate the DIMM to be removed.**

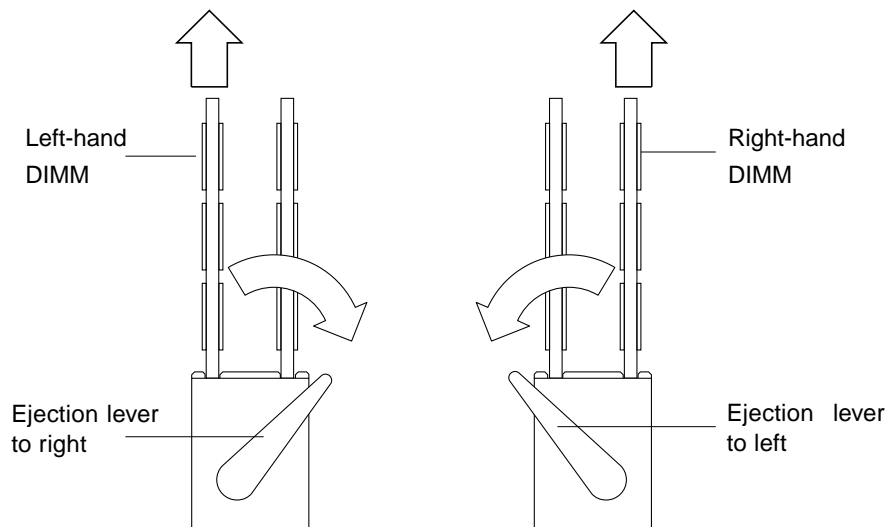5. **Push the lever away from the DIMM (see FIGURE 9-5) to be removed.**

FIGURE 9-5 DIMM Ejection Lever

6. **Remove the DIMM from the socket.**

7. **Place the DIMM on an ESD mat.**

▼ To Replace a DIMM

⚠ **Caution –** DIMMs are made of electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or work environment can destroy the DIMM.

⚠ **Caution –** Do not remove any DIMM from the antistatic container until ready to install it on the motherboard. Handle DIMMs only by their edges. Do not touch DIMM components or metal parts. Always wear an antistatic wrist strap when handling DIMMs.

⚠ **Caution –** Each DIMM bank must contain two DIMMs of equal density (for example, two 64 Mbyte DIMMs) to function properly. Do not mix DIMM density in any bank.

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Locate the appropriate DIMM slot(s) on the motherboard.**

   Note – The system unit *must* have at least two identical DIMMs installed in paired sockets of any DIMM bank. For best system performance, install four identical DIMMs. TABLE 10-1 identifies DIMM installation locations.

⚠ **Caution –** Hold DIMMs only by the edges.

3. **Remove the DIMM from the antistatic container.**

4. **Position the DIMM in the socket, ensuring that the notch is on the same side as the lever.**

5. **Using your thumbs, press firmly on the top of the DIMM until it is properly seated.**

Note – Proper DIMM seating is verified by a clicking sound. Ensure the DIMM is properly seated.

---

6. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

7. **Detach the antistatic wrist strap.**

8. **Power on the system.**

   See "To Power Off the System" on page 6-2.

▼ To Remove the Memory Riser Card

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

---

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Slacken the two thumbscrews securing the memory riser card to the motherboard.**

   Using equal pressure, gently ease the memory riser card from its connectors and place it on an ESD mat.

▼ To Replace the Memory Riser Card

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Insert DIMMs in the memory riser card banks as required.**

3. **Position the memory riser card on its motherboard connectors.**

⚠ **Caution –** The memory riser card connectors must be seated straight into the motherboard connectors to avoid damaging the motherboard connector pins.

4. **Using equal pressure, seat the memory riser card into the motherboard connectors.**

5. **Fully seat the memory riser card by simultaneously turning clockwise, by hand, both thumbscrews at the upper corners of the memory riser card until the thumbscrews are finger tight.**

6. **Insert the short leg of the torque indicator driver (part number 340-6091-xx) into a thumbscrew on the memory riser card to tighten it to the correct torque.**

7. **Using the torque indicator driver, alternately turn each thumbscrew clockwise, one turn at a time. Stop turning each thumbscrew as soon as the torque indicator gap closes.**
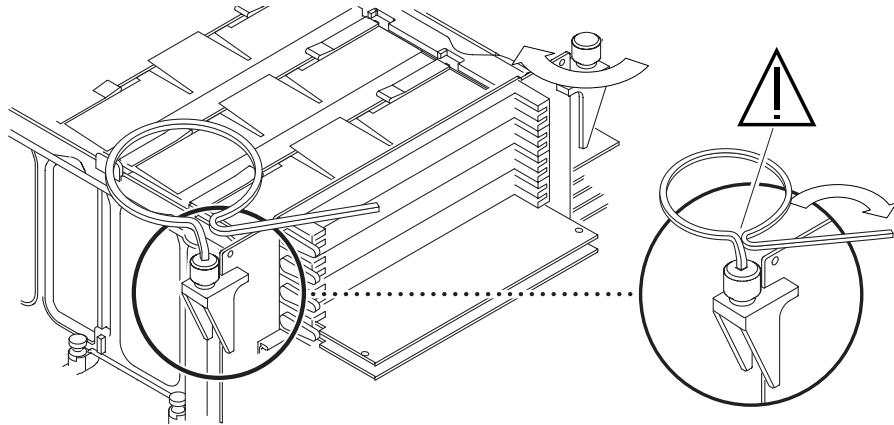
FIGURE 9-6   Setting the Memory Riser Card Thumbscrew Torque

8. Detach the antistatic wrist strap.

9.7   Alarms Card

Th alarms card is mounted immediately behind the left-most CPU.

▼ To Remove the Alarms Card

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. Power off the system.

See "To Power Off the System" on page 6-2.

2. Disconnect the external Ethernet (RJ45) and serial (DB-15) cables to the alarms card.

3. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

4. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

5. **At the alarms card, disconnect the cable to the LED board.**

6. **At the alarms card, disconnect the cable to the PDB.**

7. **Using a No.2 Phillips-head screwdriver, remove the screw securing the alarms card bracket tab to the system chassis.**

> ⚠ **Caution –** Avoid damaging the connector. Apply equal force to both ends or sides of the board.

8. **At the two upper corners of the alarms card, pull the card straight upward from the slot. See** FIGURE 9-7 **on page 9-19.**

9. **Remove the alarms card and place it on an ESD mat.**

▼ To Replace the Alarms Card

> ⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the antistatic wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Position the alarms card into the chassis.**

3. **Lower the alarms card so that it touches the appropriate slot on the motherboard (immediately behind the left-most CPU).**

4. **At the two upper corners of the card, push the card straight downwards into the slot until it is fully seated.**

5. **Using a No.2 Phillips-head screwdriver, replace the screw securing the alarms card to the system chassis.**

6. **Reconnect the cable from the PDB.**

7. **Reconnect the cable from the LED board.**
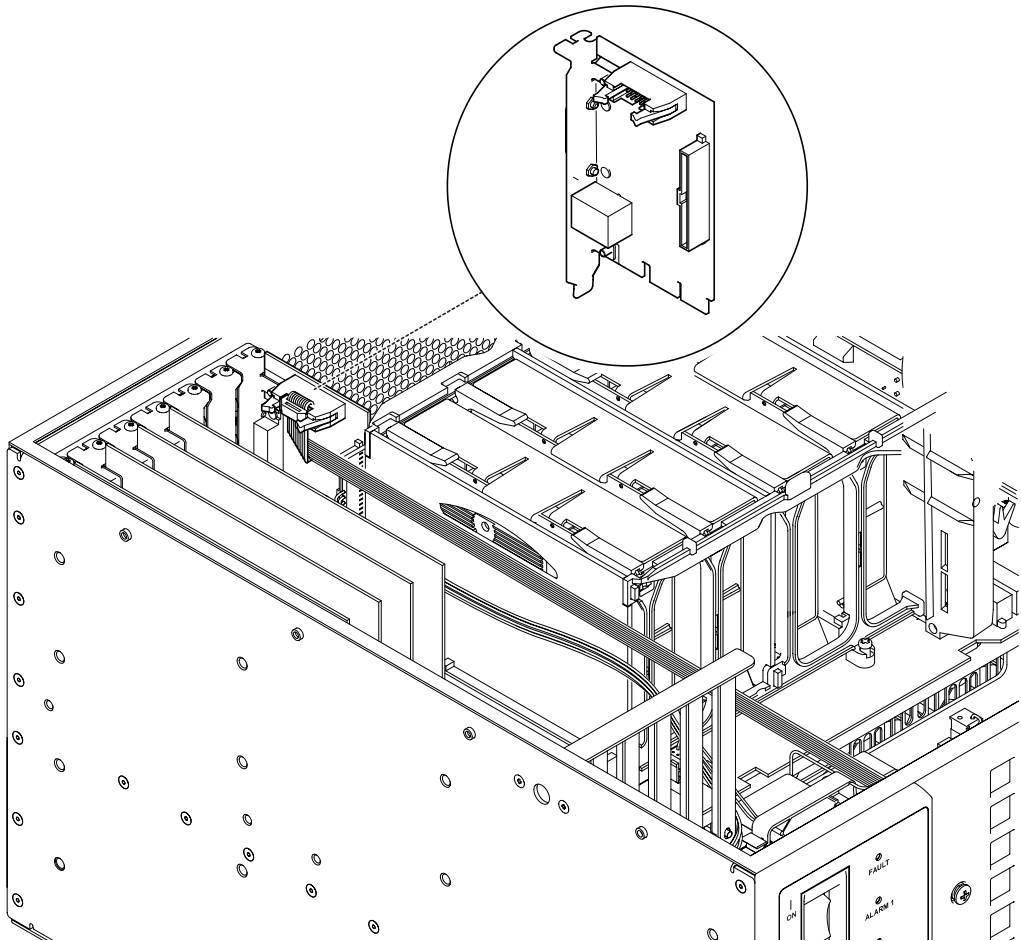
8. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

9. **Detach the antistatic wrist strap.**

10. **Reconnect the external Ethernet (RJ45) and serial (DB-15) cables to the alarms card.**

11. **Power on the system.**

    See "To Power On the System" on page 6-1.

FIGURE 9-7   Removing and Replacing the Alarms Card

9.8 NVRAM/TOD

Note – The NVRAM/TOD contains the system host identification (ID) and Ethernet address. If the same ID and Ethernet address are to be used on the replacement motherboard, remove the NVRAM/TOD from the motherboard and install the same NVRAM/TOD on the replacement motherboard after installation.

▼ To Remove the NVRAM/TOD

Caution – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Locate the NVRAM/TOD and carrier on the motherboard.**

   See "Motherboard Layout" on page 9-24.

5. **Grasp the NVRAM/TOD carrier at each end and pull straight up.**

   Note – Gently rock the NVRAM/TOD from side to side as necessary.

6. **Place the NVRAM/TOD and carrier on an ESD mat.**

▼ To Replace the NVRAM/TOD

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Position the NVRAM/TOD and carrier on the motherboard.**

3. **Carefully insert the NVRAM/TOD and carrier into the socket.**

   Note – The carrier is keyed so the NVRAM/TOD can only be installed one way round.

4. **Push the NVRAM/TOD into the carrier until properly seated.**

5. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

6. **Detach the wrist strap.**

9.9   DC-to-DC Converter

The DC-to-DC converter is located at the rear of the motherboard, in front of the serial ports.

▼ To Remove the DC-to-DC Converter

Caution – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Power off the system.**

   See "To Power Off the System" on page 6-2.

2. **Attach the wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Locate the DC-to-DC converter and slacken the single captive Phillips-head screw securing it to the motherboard.**

5. **Gently ease the assembly from of its two sockets and place it on an ESD mat.**

▼ To Replace the DC-to-DC Converter

> **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach the wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Locate the open slot in the fan mounting panel on the DC-to-DC converter over the corresponding slot in the CPU cage, and align the connectors with those on the motherboard.**

3. **Gently press the DC-to-DC converter into the motherboard connectors.**
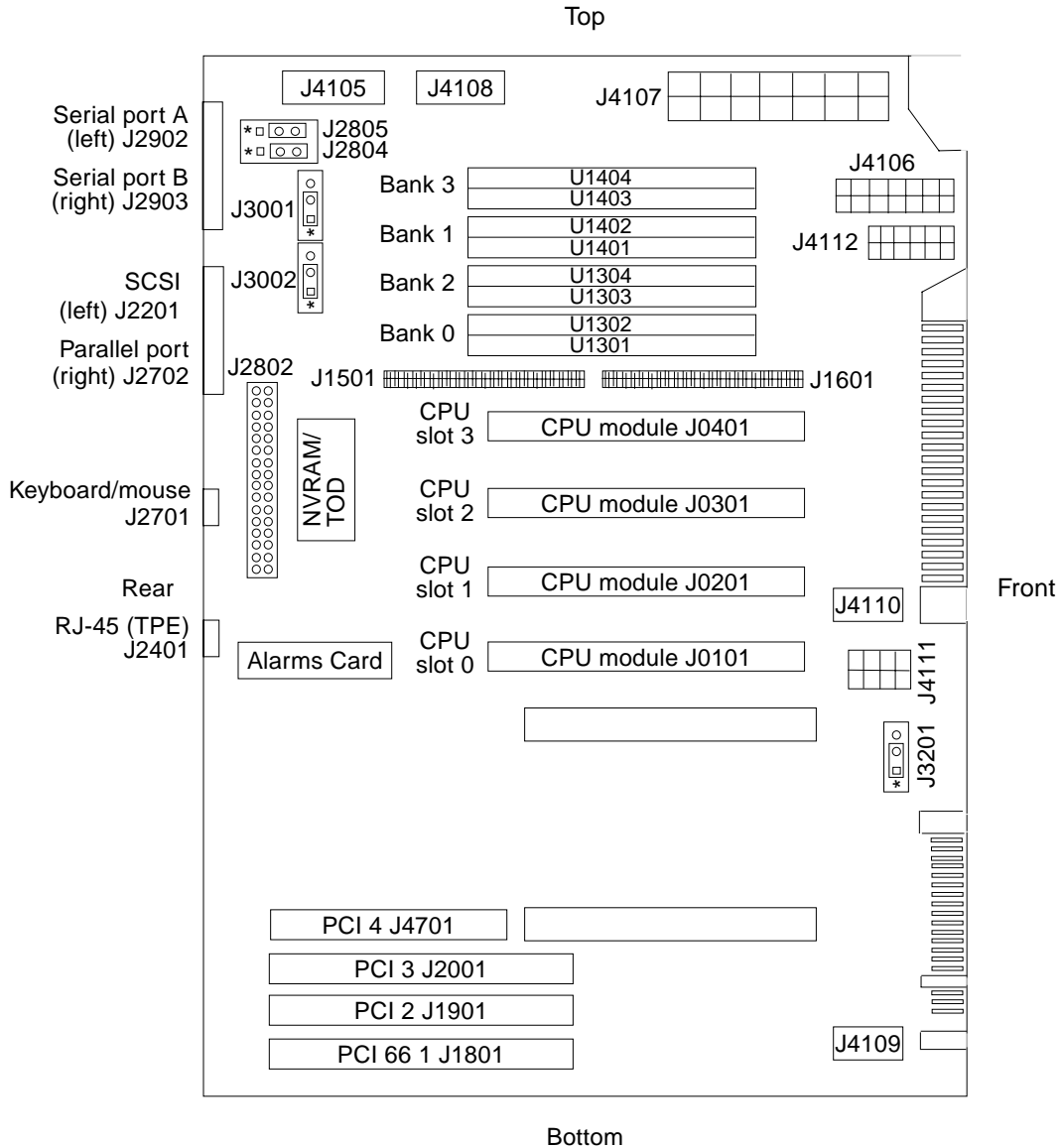
4. **Secure the DC-to-DC converter to the motherboard by tightening the single captive, Phillips-head screw.**

5. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

6. **Detach the antistatic wrist strap.**

9.10 Motherboard

Top

Serial port A (left) J2902	J4105 J4108 J4107
Serial port B (right) J2903	J2805 J2804 J4106
	J3001 Bank 3 U1404 U1403
	Bank 1 U1402 U1401 J4112
SCSI (left) J2201	J3002 Bank 2 U1304 U1303
Parallel port (right) J2702	Bank 0 U1302 U1301
	J2802 J1501 J1601
	CPU slot 3 CPU module J0401
	NVRAM/TOD CPU slot 2 CPU module J0301
Keyboard/mouse J2701	CPU slot 1 CPU module J0201
Rear	CPU slot 0 J4110
RJ-45 (TPE) J2401	Alarms Card CPU module J0101 J4111
	J3201
	PCI 4 J4701
	PCI 3 J2001
	PCI 2 J1901
	PCI 66 1 J1801 J4109

Front

Bottom

J2805+J2804=RS423/RS232, J3001=FPROM R/W, J3002=FPROM Select

FIGURE 9-8   Motherboard Layout

Caution – Use an ESD mat when working with the motherboard. An ESD mat contains the cushioning needed to protect the underside components, to prevent motherboard flexing, and to provide antistatic protection.

Note – If the motherboard is being replaced, remove all DIMMs, PCI card(s), alarms card, and CPU module prior to removing the motherboard. Note the chassis slot location for each DIMM and PCI card prior to removal.

Note – The NVRAM/TOD contains the system host identification (ID) and Ethernet address. If the same ID and Ethernet address are to be used on the replacement motherboard, remove the NVRAM/TOD from the motherboard and install the same NVRAM/TOD on the replacement motherboard after installation.

▼ To Remove the Motherboard

Note that the motherboard can be removed with the CPU cage assembly in place.

Caution – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach an antistatic wrist strap to the rear of the chassis.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

2. **Power off the system.**

   See "To Power Off the System" on page 6-2.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Depopulate the motherboard by removing the following:**

   a. **CPU module(s)**

   See "To Remove a CPU Module" on page 9-1.

   b. **CPU fan assembly**

   See "To Remove the CPU Fan Assembly" on page 9-6.

   c. **Alarms card**

   See "To Remove the Alarms Card" on page 9-17.

   d. **PCI card(s)**

   See "To Remove a PCI Card" on page 9-9.

   e. **Motherboard DIMMs and memory riser card**

   See "To Remove a DIMM" on page 9-13 and "To Remove the Memory Riser Card" on page 9-15.

   f. **Remove the NVRAM/TOD**

   See "To Remove the NVRAM/TOD" on page 9-20.

5. **Disconnect the SCSI cable at the motherboard.**

6. **Disconnect the external cables.**

7. **Disconnect the two power connectors at the motherboard.**

8. **Using a No.2 Phillips-head screwdriver, undo the three external captive screws securing the motherboard to the rear chassis panel.**

9. **Remove the motherboard by sliding it towards the front of the chassis slightly, then raising the front (viewed from the front of system).**

⚠️ **Caution –** Handle the motherboard by the edges only.

10. **Place the motherboard on an ESD mat.**

▼ To Replace the Motherboard

⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

1. **Attach an antistatic wrist strap to the rear of the chassis.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

⚠ **Caution –** Handle the motherboard by the edges only.

2. **Align the motherboard with the clips on the motherboard shelf and with the cut-outs in the rear panel of the chassis, then slide the motherboard into position.**

3. **Secure the motherboard by tightening the three external captive, Phillips-head screws, starting with the centre screw.**

4. **Using long-nose pliers, set the motherboard serial port jumpers as described in Chapter 12 "Motherboard Jumpers".**

5. **Connect the external cables.**

6. **Populate the motherboard by replacing the following:**

   a. **DIMMs and memory riser card**
      See "To Replace a DIMM" on page 9-14 and "To Replace the Memory Riser Card" on page 9-16.

   b. **PCI card(s)**

      See "To Replace a PCI Card" on page 9-10.

   c. **Alarms card**

      See "To Replace the Alarms Card" on page 9-18.

   d. **NVRAM/TOD with carrier**

      See "To Replace the NVRAM/TOD" on page 9-21.

   e. **CPU module(s)**

      See "To Install or Replace a CPU Module" on page 9-2.

7. **Replace the CPU fan assembly.**

   See "To Replace the CPU Fan Assembly" on page 9-6.

8. **Reconnect the two power cables at the motherboard.**

9. **Reconnect the SCSI cable at the motherboard.**

10. **Replace the top access cover.**

    See "To Replace the Top Access Cover" on page 6-7.

11. **Detach the antistatic wrist strap.**

12. **Reset the `#power-cycles` NVRAM variable to zero as follows:**

    a. **Set system power to on.**

       See "To Power On the System" on page 6-1.

    b. **Send a `Break` command after the system banner appears on the monitor.**

    c. **At the `ok` prompt, type:**

    ```
    ok setenv #power-cycles 0
    ```

    d. **Verify that the `#power-cycles` NVRAM variable increments each time the system is power cycled.**

Note – The Solaris operating environment Power Management software uses the `#power-cycles` NVRAM variable to control the frequency of automatic system shutdown, if it is enabled.

System Reference
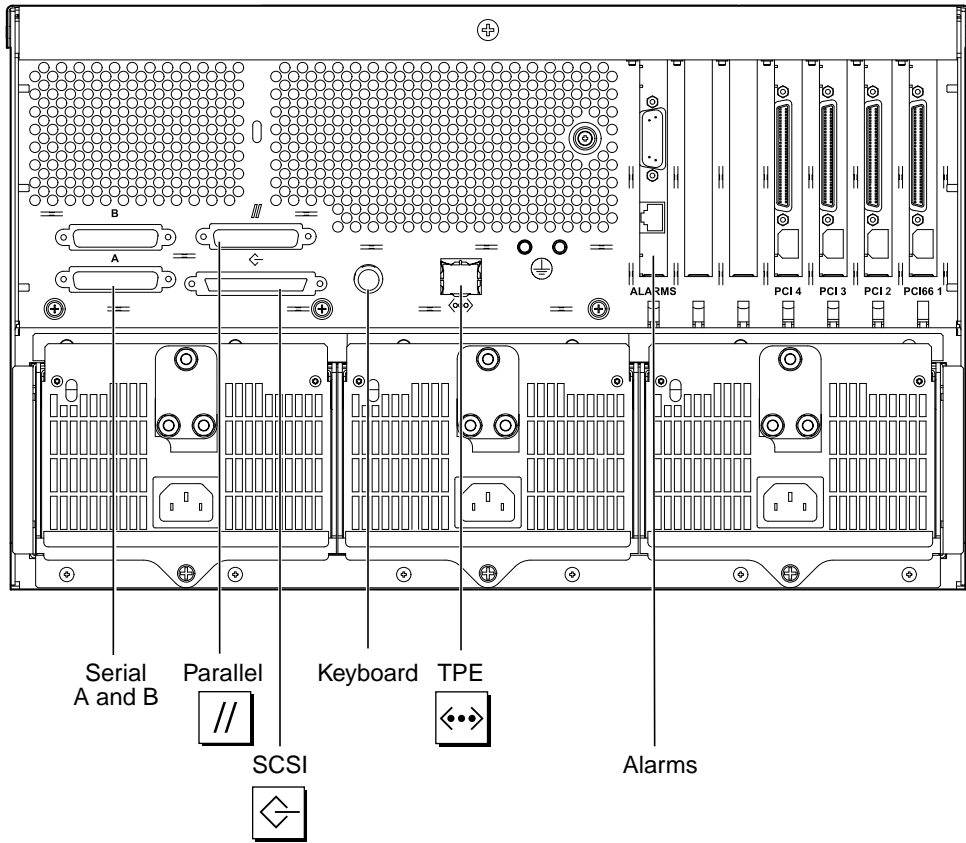
Back Panel Connectors

10.1   Connector Layout

This chapter provides information about external I/O connections.Connector Layout

FIGURE 10-1 shows the locations of the Netra t 1400/1405 system back panel connectors.

Note – The figure shows the Netra t 1405. However, the layout of the connectors is identical on the Netra t 1400.

FIGURE 10-1 Back Panel Connectors
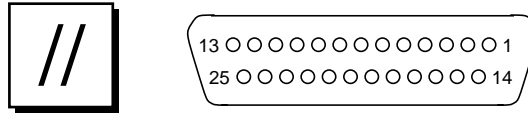
10.2   Parallel Interface


FIGURE 10-2 DB-25 Parallel Connector

TABLE 10-1   Parallel Connector Pinout

Pin	Signal Name	I/O	Service
1	DATA_STROBE_L		Data Strobe (active LOW)
2	DAT(0)		Data Bit 0
3	DAT(1)		Data Bit 1
4	DAT(2)		Data Bit 2
5	DAT(3)		Data Bit 3
6	DAT(4)		Data Bit 4
7	DAT(5)		Data Bit 5
8	DAT(6)		Data Bit 6
9	DAT(7)		Data Bit 7
10	ACK_L		Acknowledge (active LOW)
11	BSY		Busy (active HIGH)
12	PERROR		Paper End (active HIGH)
13	SELECT_L		Select (active LOW)
14	AFXN_L		Auto Line Feed (active LOW)
15	ERROR_L		Error (active LOW)
16	RESET_L		Initialize Printer (prime active LOW)
17	IN_L		Select Input (active LOW)
18	GND		Ground
19	GND		Ground
20	GND		Ground
21	GND		Ground

TABLE 10-1   Parallel Connector Pinout *(Continued)*

Pin	Signal Name	I/O	Service
22	GND		Ground
23	GND		Ground
24	GND		Ground
25	GND		Ground

10.3   Serial Connectors
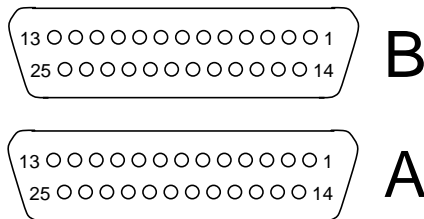
FIGURE 10-3 DB-25 Serial Connectors

TABLE 10-2   Serial Connector Pinout, RS423/RS232

Pin	Function	I/O	Signal Description
1			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			Not connected
15	TRxC	I	Transmit Clock
16			Not connected
17	RTxC	I	Receive Clock

TABLE 10-2   Serial Connector Pinout, RS423/RS232 *(Continued) (Continued)*

Pin	Function	I/O	Signal Description
18–19			Not connected
20	DTR	O	Data Terminal Ready
21-23			Not connected
24	TxC	O	Transmit Clock
25			Not connected

Note: For information about serial port jumpers on the Netra t 1400/1405 system main logic board, see the Netra t 1400/1405 *System Reference Manual.*

10.4   Twisted-Pair Ethernet (TPE) Connector

FIGURE 10-4 RJ45 TPE Socket

TABLE 10-3   TPE Connector Pinout

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

TPE Cable-Type Connectivity

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

- For 10BASE-T applications, shielded twisted-pair (STP) cable:
  - Category 3 (STP-3, *voice* grade)
  - Category 4 (STP-4)
  - Category 5 (STP-5, *data* grade)
- For 100BASE-T applications, shielded twisted-pair category 5 (STP-5, *data* grade) cable.

TABLE 10-4   TPE STP-5 Cable Lengths

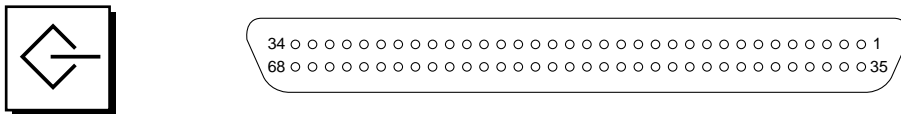| Cable Type	Application(s)	Max Length (Metric)	Max Length (Imperial)
Shielded twisted pair category 5 (STP-5, *data* grade)	10BASE-T	1000m	3282ft
Shielded twisted pair category 5 (STP-5, *data* grade)	100BASE-T	100m	327ft

10.5   SCSI Connector

FIGURE 10-5 68-Pin SCSI Connector

TABLE 10-5   68-Pin SCSI Connector Pinout

Pin	Signal Name	Pin	Signal Name
1	GND	21	GND
2	GND	22	GND
3	GND	23	GND
4	GND	24	GND
5	GND	25	GND
6	GND	26	GND

TABLE 10-5   68-Pin SCSI Connector Pinout *(Continued)*

Pin	Signal Name	Pin	Signal Name
7	GND	27	GND
8	GND	28	GND
9	GND	29	GND
10	GND	30	GND
11	GND	31	GND
12	GND	32	GND
13	GND	33	GND
14	GND	34	GND
15	GND	35	–DB<12>
16	GND	36	–DB<13>
17	TERMPWR	37	–DB<14>
18	TERMPWR	38	–DB<15>
19	Not connected	39	–PAR<1>
20	GND	40	–DB<0>
41	–DB<1>	55	–ATN
42	–DB<2>	56	GND
43	–DB<3>	57	–BSY
44	–DB<4>	58	–ACK
45	–DB<5>	59	–RST
46	–DB<6>	60	–MSG
47	–DB<7>	61	–SEL
48	–PAR<0>	62	–CD
49	GND	63	–REQ
50	TERM.DIS	64	–IO
51	TERMPWR	65	–DB<8>
52	TERMPWR	66	–DB<9>
53	Reserved	67	–DB<10>
54	GND	68	–DB<11>

Note – All signals shown in TABLE 10-5 on page 10-6 are active low.

10.5.1　SCSI Implementation

- SCSI-3 Fast-20 (UltraSCSI) parallel interface
- 16-bit SCSI bus
- 40Mbps data transfer rate
- Support for 16 SCSI addresses:
  - Target 0 to 6 and 8 to F for devices
  - Target 7 reserved for SCSI host adapter on main logic board
- Support for up to seven internal SCSI devices (including the host adapter):
  - Fast-20 SCSI disk drive target 0 (left-most drive slot)
  - Fast-20 SCSI disk drive target 1
  - Fast-20 SCSI disk drive target 2
  - Fast-20 SCSI disk drive target 3 (right-most drive slot)
  - Fast-10 SCSI removable media device target 4
  - Fast-10 SCSI removable media device target 6
- Support for external 8-bit and 16-bit SCSI devices via 68-pin SCSI connector mounted on an adapter board

10.5.2　SCSI Cabling and Configuration

The SCSI-3 Fast-20 (UltraSCSI) specification requires that the external SCSI bus length be limited to 3m (10ft) for less than five devices (internal and external), and 1.5m (5ft) for five to eight devices. When SCSI-3 and SCSI-2 devices are connected to the Netra t 1400/1405 system SCSI bus, the system enables each device to operate at its respective data transfer rate. The last external SCSI device in a daisy-chain must be terminated internally (active termination) or with an external terminator according to Forced-Perfect Termination (FPT) technology.

10.5.2.1　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 10-6 Determining SCSI Bus Length

SCSI Implementation	Bus Width	Data Transfer Rate, Mb/s	Number of Devices	SCSI Bus Length
SCSI-2, Fast	8 bits	10	1–8	6.0m
SCSI-2, Fast/Wide	16 bits	20	1–8	6.0m
SCSI-3 Parallel Interface, Fast-20 Wide (UltraSCSI) (WideUltra)	16 bits	40	1–4	3.0m
SCSI-3 Parallel Interface, Fast-20 Wide (UltraSCSI) (WideUltra)	16 bits	40	5–8[*]	1.5m

[*] The maximum number of single-ended/differential SCSI devices is 16.

3. **Verify the cable type used to connect external SCSI devices. You must use Fast-20 SCSI cable(s).**

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

10.5.2.2 SCSI-2 (Fast Wide SCSI) External Devices

If you connect SCSI-2 (Fast Wide SCSI, 20Mb data transfer rate) external devices to a Netra t 1400/1405 system, follow these cabling and configuration guidelines (as shown in FIGURE 10-6) to ensure proper device addressing and operation:

- If all external mass storage devices use 68-pin connectors, connect all non-Sun devices to the Netra t 1400/1405 system first and follow them with Sun devices. Sun devices use auto-termination.
- If external mass storage devices consist of 68-pin Sun devices and 50-pin devices, connect the Sun 68-pin devices to the Netra t 1400/1405 system first and terminate the daisy chain with the 50-pin device and its terminator.
- The total SCSI bus length for all external SCSI devices is 6.0m (19.7ft).
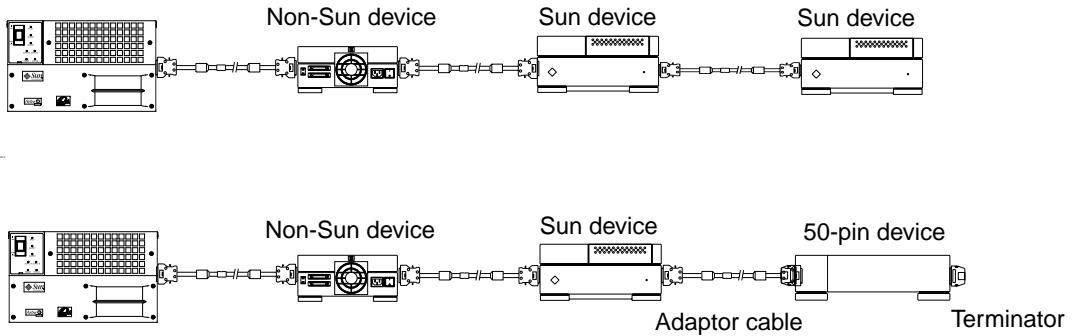
FIGURE 10-6 Connecting External Mass Storage Devices

10.6 Alarms Ports

The alarms service port connector (male DB-15) and LOM port connector (RJ45) are located on the alarms card. TABLE 10-7 lists each connector pinout.
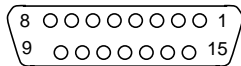

FIGURE 10-7 DB-15 (Male) Alarms Service Port Connector

TABLE 10-7 Alarms Service Port Connector Pinout

Pin	Signal Name	Pin	Signal Name
1	Not connected	9	ALARM1_NC
2	Not connected	10	ALARM1_COM
3	Not connected	11	ALARM2_NO
4	Not connected	12	ALARM2_NC
5	SYSTEM_NO	13	ALARM2_COM
6	SYSTEM_NC	14	Not connected
7	SYSTEM_COM	15	Not connected
8	ALARM1_NO	Shell	CHGND

The remote Lights Out Management serial port is located below the alarms port. The connector is a shielded RJ45 and TABLE 10-8 lists the connector pin assignments.
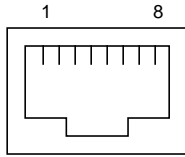
FIGURE 10-8 RJ45 Lights Out Management Serial Connector

TABLE 10-8 Lights Out Management Serial Connector Pinout

Pin	Signal Name	Pin	Signal Name
1	RTS	5	REF (0V)
2	DTR	6	RXD
3	TXD	7	DSR
4	REF (0V)	8	CTS
Shell	CHGND		

CHAPTER **11**

Modem Setup

Any modem compatible with CCITT V.24 can be connected to the Netra t 1400/1405 serial ports. Modems can be set up to function in one of three ways:

■ Dial out only
■ Dial in only
■ Bidirectional calls.

11.1 To Set Up the Modem

To set up your modem:

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

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

2. **Click on Serial Port Manager.**

3. **Select Port a or Port b for your modem connection.**

4. **Click on 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:**

   a. **Modem – Dial-Out only**

   b. **Modem – Dial-In only**

   c. **Modem – Bidirectional**

7. **Click on Apply.**

8. **Set your modem auto-answer switch to one of the following:**
   - Off – Dial-Out Only
   - On – Dial-In Only
   - On – Bidirectional

11.2   Serial Port Speed Change

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

1. **Become super user, 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]`.

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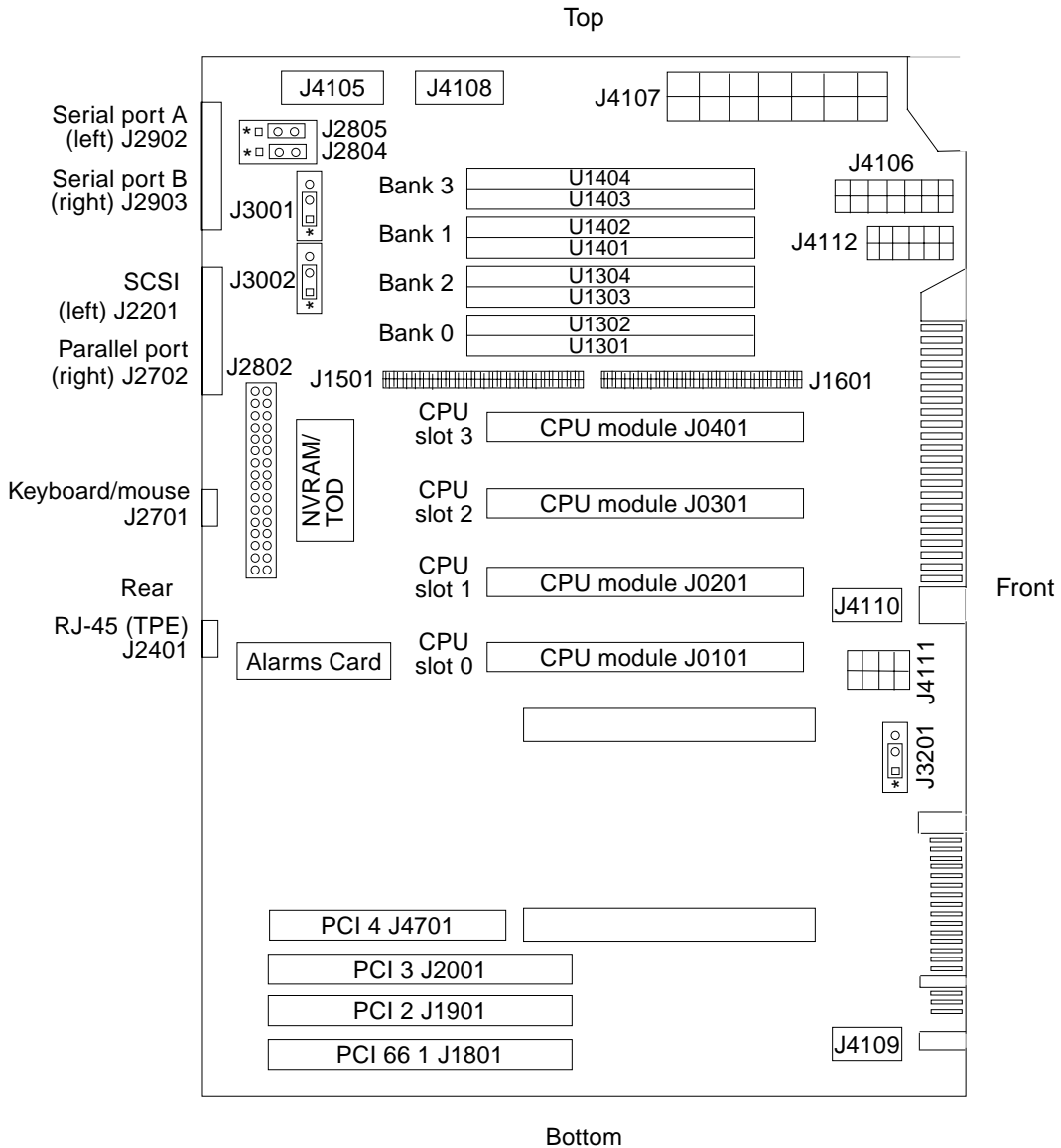
11.3   Recommendations

For a modem-to-host (system) connection, use an RS423/RS232 straight-through cable with DB-25 male connectors at both ends.

Motherboard Jumpers

This chapter describes how to set the motherboard jumpers for:

■ Serial ports
■ Flash PROM

Top

Serial port A (left) J2902

Serial port B (right) J2903

SCSI (left) J2201

Parallel port (right) J2702

Keyboard/mouse J2701

Rear

RJ-45 (TPE) J2401

J4105   J4108   J4107

J2805
J2804

J3001

J3002

Bank 3   U1404
         U1403
Bank 1   U1402
         U1401
Bank 2   U1304
         U1303
Bank 0   U1302
         U1301

J2802

NVRAM/ TOD

J1501   J1601

CPU slot 3   CPU module J0401

CPU slot 2   CPU module J0301

CPU slot 1   CPU module J0201

CPU slot 0   CPU module J0101

Alarms Card

PCI 4 J4701

PCI 3 J2001

PCI 2 J1901

PCI 66 1 J1801

J4106

J4112

J4110

J4111

J3201

J4109

Front

Bottom

J2805+J2804=RS423/RS232, J3001=FPROM R/W, J3002=FPROM Select

FIGURE 12-1 System Motherboard Block Diagram

12.1 Jumper Descriptions

Jumper configurations can be changed by setting jumper switches on the motherboard. The motherboard's jumpers are preset at the factory.

A jumper switch is *closed* (sometimes referred to as shorted) with the plastic cap inserted over two pins of the jumper. A jumper is *open* with the plastic cap inserted over one or no pin(s) of the jumper.
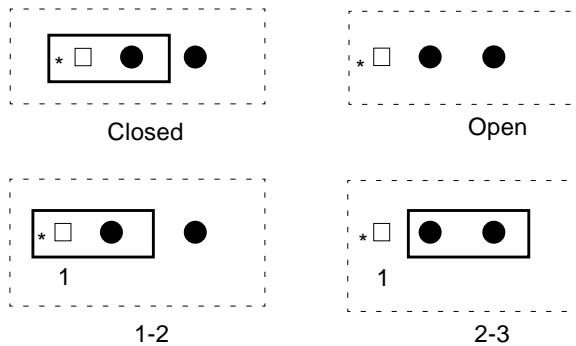
FIGURE 12-2 Selected Jumper Settings

Jumper descriptions include brief overviews of serial port jumpers, flash PROM jumpers, and additional system board jumper and connector blocks.

Jumpers are identified on the system board by J designations. Jumper pins are located immediately adjacent to the J designator. Pin 1 is marked with an asterisk in any of the positions shown (FIGURE 12-3). Ensure that the serial port jumpers are set correctly.
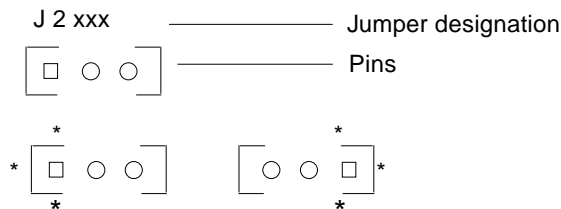
FIGURE 12-3 Identifying Jumper Pins

12.1.1 Serial Port Jumpers

Serial port jumpers J2804 and J2805 can be set to either the RS-423 or RS-232 serial interface. The jumpers are preset for RS-423. RS-232 is required for digital telecommunication within the European Community. TABLE 12-2 on page 12-6 identifies serial port jumper settings. If the system is being connected to a public X.25 network, the serial port mode jumper setting may need to change from RS-423 to RS-232 mode.
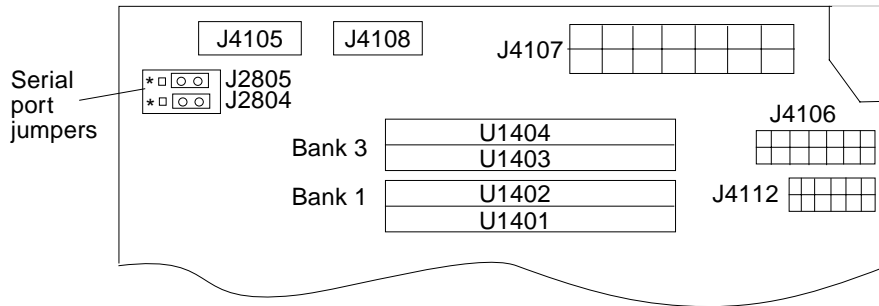

FIGURE 12-4 Serial Port Jumpers

To change the serial port mode jumper setting:

1. **Power off the system and remove the access panel.**

   See "To Power Off the System" on page 6-2.

   ⚠ **Caution –** Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

2. **Attach the wrist strap.**

   See "To Attach the Antistatic Wrist Strap" on page 6-5.

3. **Remove the top access cover.**

   See "To Remove the Top Access Cover" on page 6-7.

4. **Remove the DC-to-DC converter.**

   See "To Remove the DC-to-DC Converter" on page 9-22.

5. **Locate the jumpers on the motherboard. Change the J2804 and J2805 jumper selection.**

TABLE 12-1   Serial Port Jumper Settings

Jumper	Pins 1 + 2 Select	Pins 2 + 3 Select	Default Jumper on Pins
J2804	RS-232	RS-423	2 + 3
J2805	RS-232	RS-423	2 + 3

6. **Replace the DC-to-DC converter.**

   See "To Replace the DC-to-DC Converter" on page 9-23.

7. **Replace the top access cover.**

   See "To Replace the Top Access Cover" on page 6-7.

8. **Detach the wrist strap.**

9. **Power on the system.**

   See "To Power On the System" on page 6-1.

12.1.2   Flash PROM Jumpers

Flash PROM jumpers J3001 and J3002 are for reprogramming specific code blocks and remote programming of the flash PROM. TABLE 12-2 on page 12-6 identifies the flash PROM jumper settings.

For easier access to the jumpers, remove the DC-toDC converter as described in Section 12.1.1 "Serial Port Jumpers" on page 12-4".
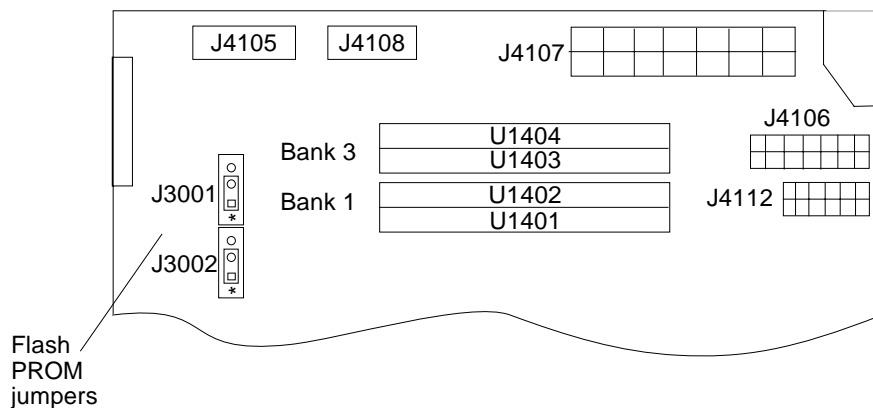
FIGURE 12-5 Flash PROM Jumpers

TABLE 12-2 Flash PROM Jumper Settings

Jumper	Pins 1 + 2 Select	Pins 2 +3 Select	Default Jumper on Pins	Signal Controlled
J3001	Write protect	Write Enable	1 + 2	FLASH PROM PROG ENABLE
J3002	Select	No select	1 + 2	XOR LOGIC SET