

AP2000

Dual Pentium[®] II Department Server

Hardware Reference Guide

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FCC & DOC Compliance

Federal Communications Commission Statement

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING! The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

I. Introduction

This Reference Guide

You are reading the AP2000 Hardware Reference Guide. This hardware reference guide provides information and procedures on the various components used in this server. Some components shown in this reference guide are optional and may be individually purchased to complete the server. This guide is intended for experienced users and integrators with hardware knowledge of personal computers. You should also read all documentation and manuals included with this server and with your separately purchased components.

Sections

There are only a few sections in this reference guide as follows:

I. Introduction

This section gives general and startup information and features for this server.

II. Components

This is the main section which gives descriptions of each server component.

III. Appendix

This section gives you additional information to help plan your server.

Symbols

A few symbols are used throughout this guide that you should be aware of to complete certain tasks safely and completely. These symbols indicate the degree of importance of a procedure or information.

 **NOTE:** Tips and information to aid in completing a task.

 **IMPORTANT:** Information that **MUST** be followed in order to complete a task.

 **CAUTION:** Information to prevent damage to the components when trying to complete a task.

 **WARNING:** Information to prevent injury to yourself when trying to complete a task.

I. Introduction

This Server

AP2000 is a department server configured on the ASUS P2B-DS smart motherboard which uses the 440BX chipset from Intel which supports the Pentium II processor and 100MHz front side bus in order to support even the most complicated server tasks.

Component Checklist

If assembling this server by yourself, it is important to prepare all the server components before starting. This will save a great deal of time by not having to hunt down components. The following checklist provides a guideline as to the necessary components for a server.

Standard components

- Chassis: ASUS AS-30 Tower
- Power Supply: 400W ATX
- Motherboard: ASUS P2B-DS
- CD-ROM Drive: ASUS 40X
- Floppy Drive: 1.44MB
- Cables: Power, IDE, Floppy, 50&68pin SCSI, CD audio cable
- SCSI Terminator: Passive terminator for 68pin SCSI cables.
- User's Manuals: CD-ROM, SCSI, Motherboard, Hardware Guide
- Drivers/Utilities: SCSI, CD-ROM, Motherboard

Required components (you may purchase from ASUS or from a third party)

- Processor (CPU): (optional Intel Pentium II 233MHz-450MHz)
- Memory Modules: (optional 16, 32, 64, 128, 256MB SDRAM)
- Hard drive Drives: (optional 4/9GB Ultra2 or Fast/Ultra-Wide SCSI)

Optional components (you may purchase from ASUS or from a third party)

- Ethernet Card: (optional ASUS PCI-L101)
- RAID Card: (optional ASUS PCI-DA2100A)

I. Introduction

Features

The following are highlights to this server's many features. For additional features and details, read the motherboard User's Manual included with this server package.

- **Processor:** Dual Intel Pentium II processors provide up to 450MHz on each processor for extreme server processing speeds.
- **Memory:** Four DIMM slots with up to 1GB EDO or SDRAM with ECC.
- **Onboard IDE:** Up to 33MB/sec IDE transfer with UltraDMA/33.
- **Chipset:** Intel 440BX supports up to 100MHz front side bus.
- **Onboard LAN:** Onboard Intel 10/100Base-TX Fast Ethernet.
- **Onboard SCSI:** Three onboard connectors to independently connect 68-pin Ultra2 SCSI devices, 68-pin Wide-SCSI devices, and 50-pin Narrow-SCSI devices.
- **SCSI Backplane:** Ultra2 SCSI SCA backplane with remote SCSI ID dip switches and power to support up to 5 Ultra2 SCSI SCA hard drives.
- **Device Bays:** Support one floppy, one CD-ROM, two additional fixed devices, and five hot-swap SCA hard disk drives.
- **Onboard Hardware Monitor:** Provides information for system and processor voltages, fan status, temperature, chassis intrusion, and provides automatic system restart.
- **ASMA and Intel LDSM:** Provides server monitoring, management, and control.



I. Introduction

Safety and Warning

Observe the following safety instructions any time you are connecting or disconnecting devices to the workstation.



WARNING: An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.

To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.



WARNING: This product is equipped with a three-wire power cable and plug for the user's safety. Use the power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.

Static-Sensitive Devices





CAUTION: Motherboards, adapters, and disk drives are sensitive to static electricity discharge. These devices are wrapped in antistatic bags to prevent this damage. Take the following precautions:

- If you have an antistatic wrist strap available, use it while handling the device.
- Do not remove the device from the antistatic bag until you are ready to install the device in the system unit.
- With the device still in its antistatic bag, touch it to a metal frame of the system.
- Grasp cards and boards by the edges. Hold drives by the frame. Avoid touching the solder joints or pins.
- If you need to lay the device down while it is out of the antistatic bag, lay it on the antistatic bag. Before picking it up again, touch the antistatic bag and the metal frame of the system unit at the same time.
- Handle the devices carefully in order to prevent permanent damage.

I. Introduction

Tools Required

A few items are needed to install or remove the components in this server.

- Phillips (cross) screwdriver 
- Standard (flat) screwdriver 
- Antistatic wrist strap

Preparation

1. Unpack your server, do not connect the power cord.



IMPORTANT: Most servers use an AT power supply that has a fixed ON and OFF switch located on the front. This server uses an ATX power supply that is normally OFF until an electrical signal is given to the power supply through a *momentary* switch located on the front of the server. There is always a standby power in the power supply in order for ATX power supply features to work, and therefore removing the power cord is necessary to prevent electrical shocks when working on the server components.

2. Unlock the padlock if one is used. This server is equipped with a lockable front door to prevent unauthorized access. Open the side panel.
3. Install final server components such as CPU, Memory, Hard Disk Drives, expansion cards. Use this hardware reference guide along with your motherboard manual in order to make these installations.
4. Connect a Keyboard and Mouse (purchased separately)
5. Connect a VGA-compatible monitor (purchased separately)
6. Connect a printer to the parallel port if desired.
7. Connect server to network (an optional network card is needed)



WARNING: To prevent electrical shock or fire, be sure not to plug telecommunications/telephone cables into the network RJ45 connector in the server if one is installed.

8. Set the power supply input voltage to either 115V for 110V-120V areas or 130V for 120V-140V areas.



CAUTION: The voltage must be set correctly or damage may occur.

9. Connect the included power cord to the server's power supply.
10. Connect the server to a grounded (three pronged) AC power source such as a UPS or power strip (preferably with surge protection).

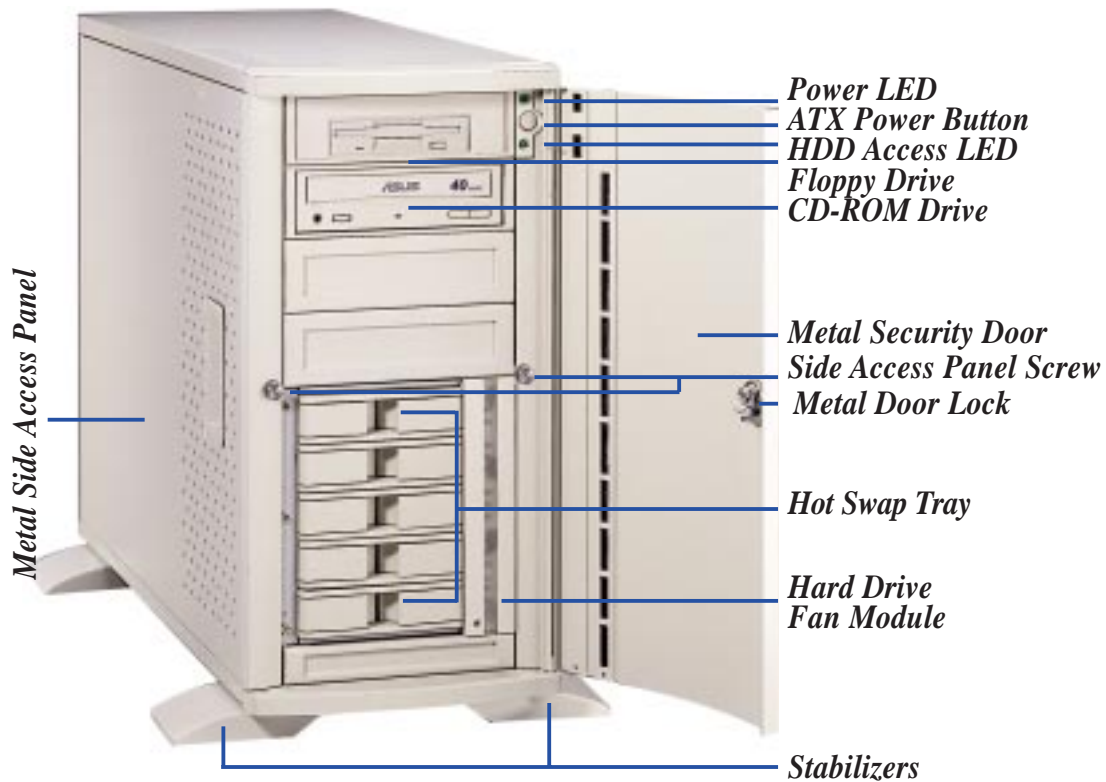


WARNING: This server is designed for connection to a grounded (earthed) outlet. To reduce the risk of electrical shock or damage to your server, do not bypass the grounding plug.

II. System Components

Server Front Side

The front side of the server is provided to show the front exterior components of this server. The chassis is made of strong rust-resistant metal and covered with a protective ivory surfacing.



Server front side

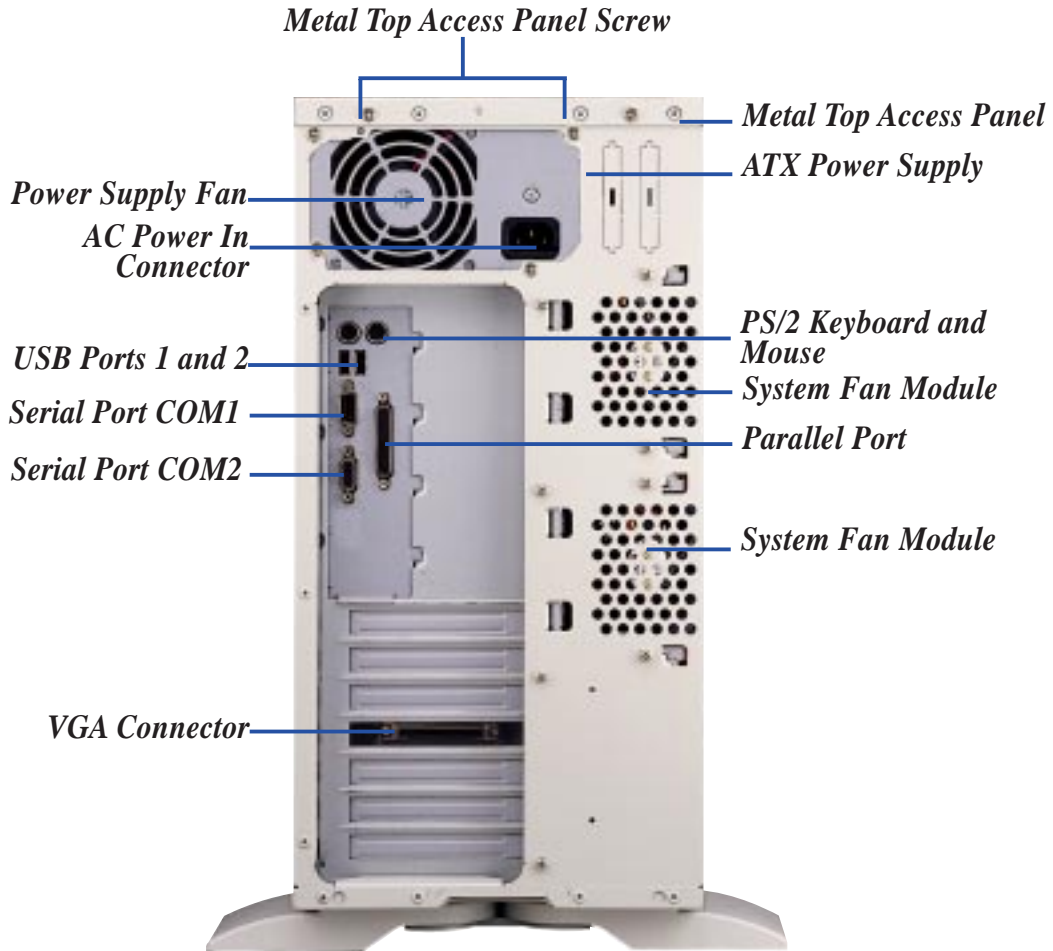


WARNING: Always remove the power cord when working on the server internal components to prevent electrical shocks or damage to electrical components. ATX power supplies that are plugged into an AC outlet always have standby power even when the server is powered OFF.

II. System Components

Server Back Side

The back side of the server is provided to show the back exterior components of this server.



Server back side

Chassis Security

To protect the server chassis from unauthorized intrusion, the chassis front panel can be locked with the built-in keylock. Chassis intrusion switches can be connected to the motherboard’s “chassis” connector to allow monitoring of the chassis side panels’ open/close status. If either one or both of the side panels are opened, the motherboard’s onboard hardware monitor can provide alerting and logging with the provided management software.

II. System Components

Chassis Panels

There are two identical side panels on the chassis, one on each side. Each panel is secured by two large thumb screws on the front of the server. To open the left side of the panel (see the left view), remove the side panel screw, then pull the handle outward while pulling the panel forward. To open the right panel, the front door must be removed by pushing down on the hinge spring.

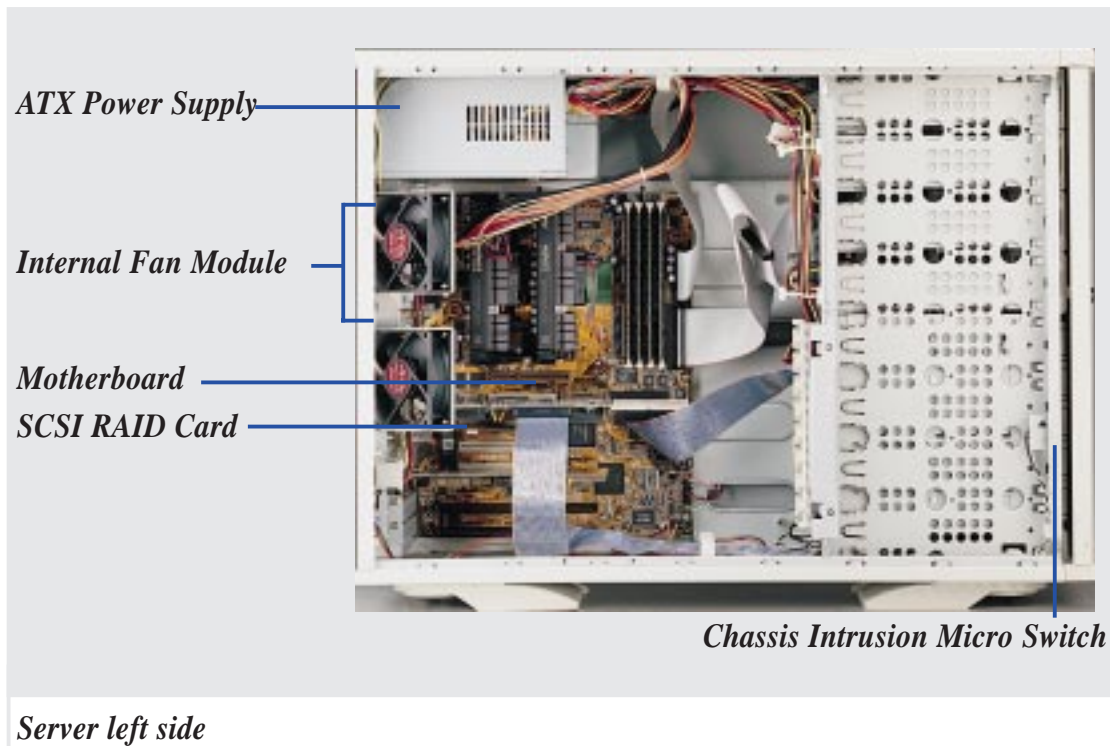


Front door hinge spring



Front door hinge spring

With the left panel removed, you should see the following components if you purchased a complete server.



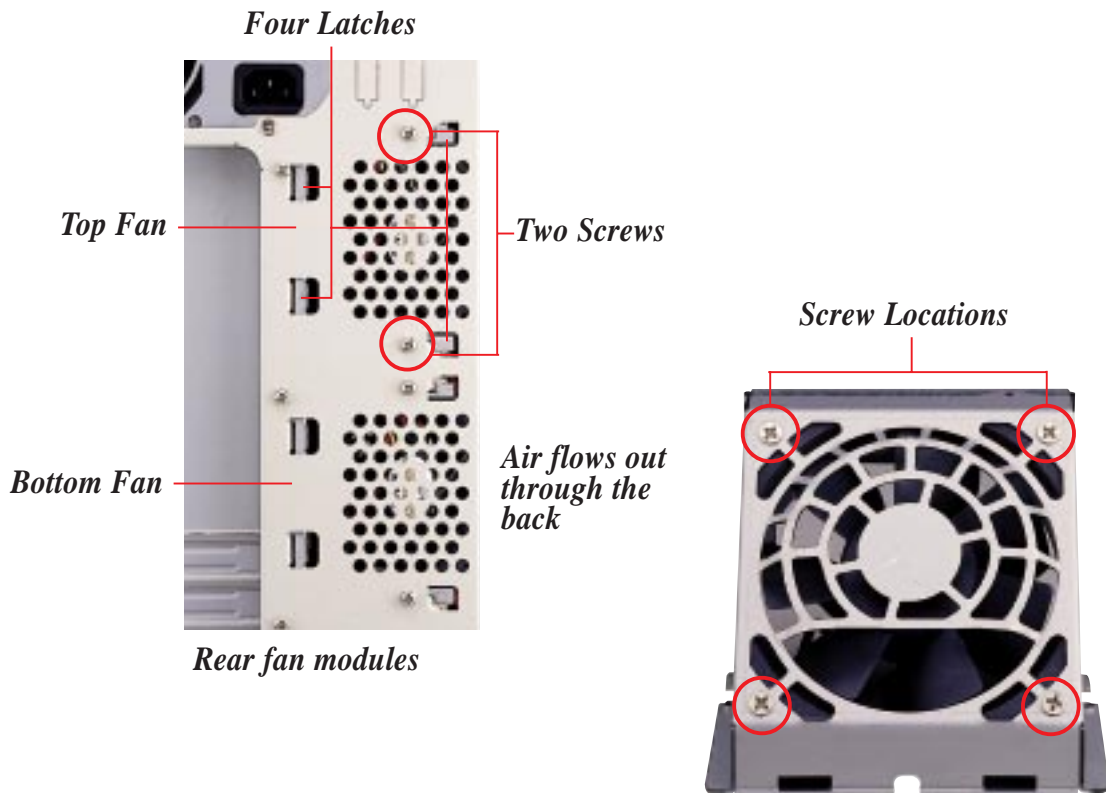
II. System Components

Chassis Circulation System

The circulation system cools the hard disk drives by bringing fresh air in from the side of the server and forcing the hot air out through the back. The server's air circulation system is comprised of two 3 inch (8 cm) fans mounted in a removable module which brings cool air in from the outside to cool the hard disk drives. Another set of two 2 1/4 inch (6 cm) cooling fans mounted on the chassis, forces the warm air out of the chassis. The two fans in each module provides redundancy in order to increase air flow as well as insure continued circulation if one fan should fail. This circulation system should ensure that the air surrounding the hard disk drives are kept below 122°F (50°C) to prevent hard disk failures.

Rear Cooling Fans

The system fan modules on the rear is held by two screws and four latches on the interior of the chassis. There are four screws used to secure the fan into the individual frames. The fan module's operating status can be viewed through the ASMA software. If an individual fan fails, remove the fan and send it back to the vendor for replacement. If both fans fail, it may be that the fan control board needs replacing. If the fans do not work after replacing both of them, remove the control board and send it back to your vendor for replacement.



Usually, the rotation of the fan sends air toward the manufacturer's label on the center of the fan.

Individual fan with frame

II. System Components

Rear Cooling Fan Control Board

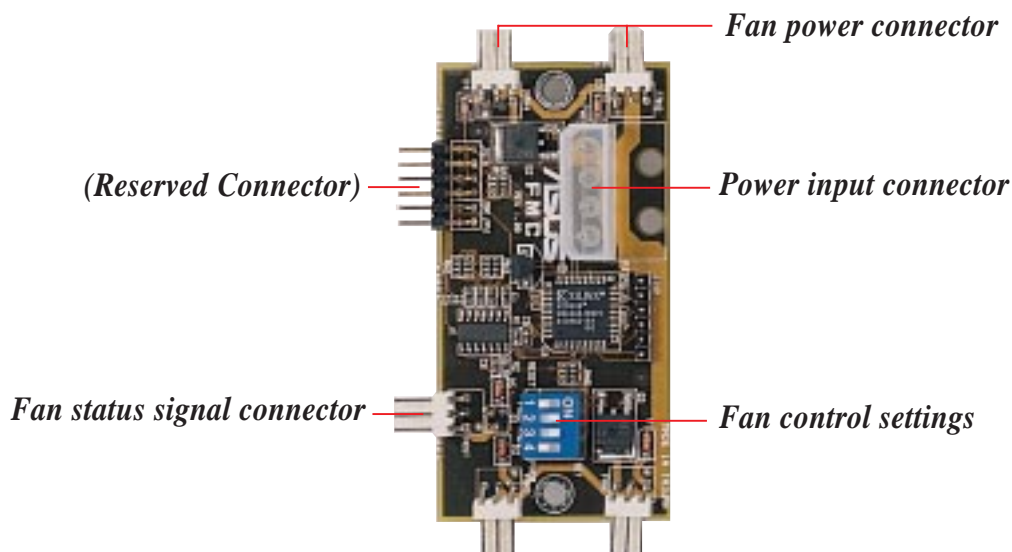
The rear fans are controlled and monitored by a control board. The fan control board requires power input from the power supply which allows the individual fans to obtain their power when connected to the control board. The control board also sends fan status information to the LEDs located on the front of the server and to the ASMA software. The fan control board's cable connections are shown below.



Fan control board with cable connections

Rear Cooling Fan Control Board Layout

The rear fan control board, although small, has many functions as shown.



II. System Components

Rear Cooling Fan Control Board Settings

The rear fan control board has DIP switches to allow controlling the number of fans and the control board.

DIP Switch SET1	Fan control setting
ON (momentarily)	Reset Control Board
OFF	Normal (Default)

SET2	SET3	SET4	Number of Fans
ON	ON	ON	1
ON	ON	OFF	2 (Default)
ON	OFF	ON	3
ON	OFF	OFF	4
OFF	ON	ON	5
OFF	ON	OFF	6
OFF	OFF	ON	7
OFF	OFF	OFF	8

Front Cooling Fans

The hard disk drive fan module can be removed by using a small screw driver to push the eject lever in the fan module. The eject lever is behind a small hole as circled below. There are two individual 2 1/4 inch (6cm) fans secured by four screws on each fan. The ASMA software will report an error message when any of these two fans malfunction.



Removing the front fan module

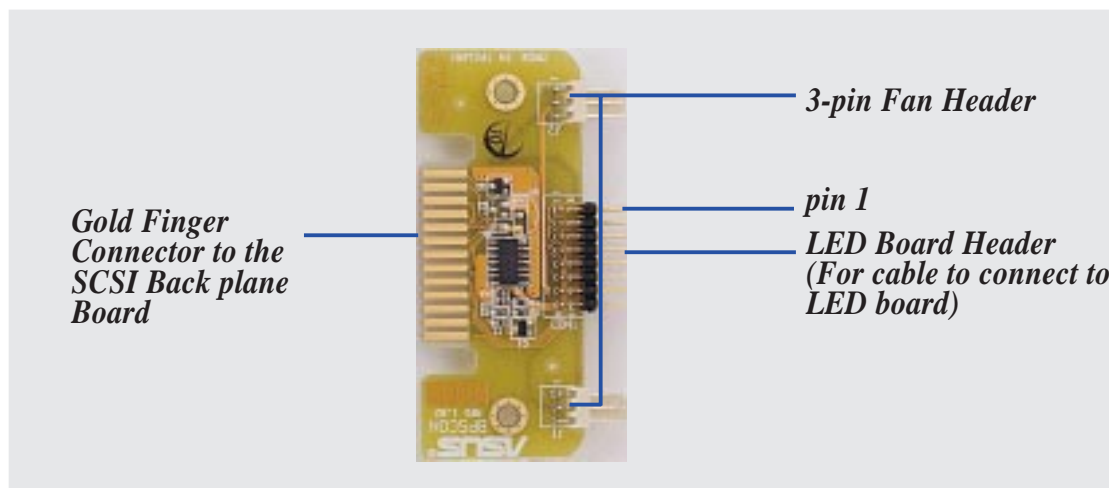
The control boards mount with the component side face down

The front fan module frame

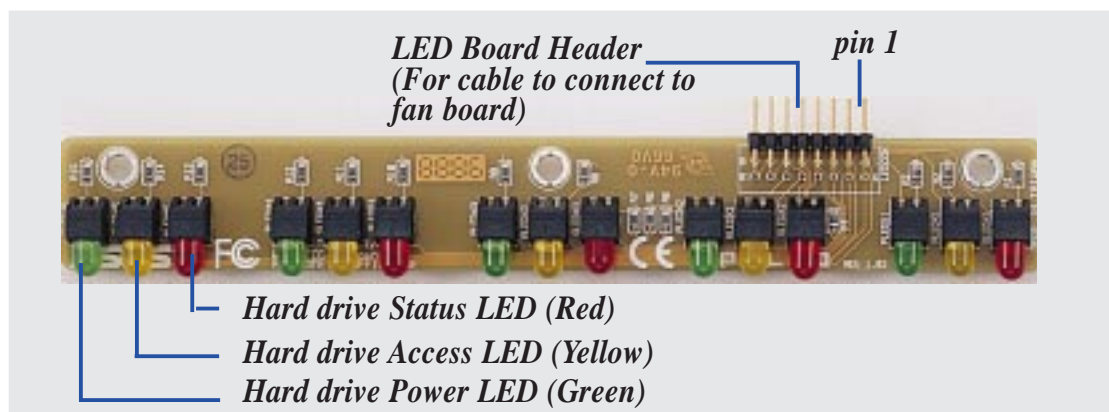
II. System Components

Front Cooling Fan Control Board

The front cooling fans' main purpose is to cool the hard disk drives. These fans also have a fan control board like the rear cooling fans. The front cooling fan module consists of a control board, a hard disk drive LED status board, and two cooling fans. The message LED board mounted in the front of the cooling fan module consists of five sets of LEDs to represent the status of up to five hard disk drives. Each set has three LEDs which shows the power, activity, and status of each hard disk drive.



Front cooling fan control board



Hard disk drive message board

Message LED Description

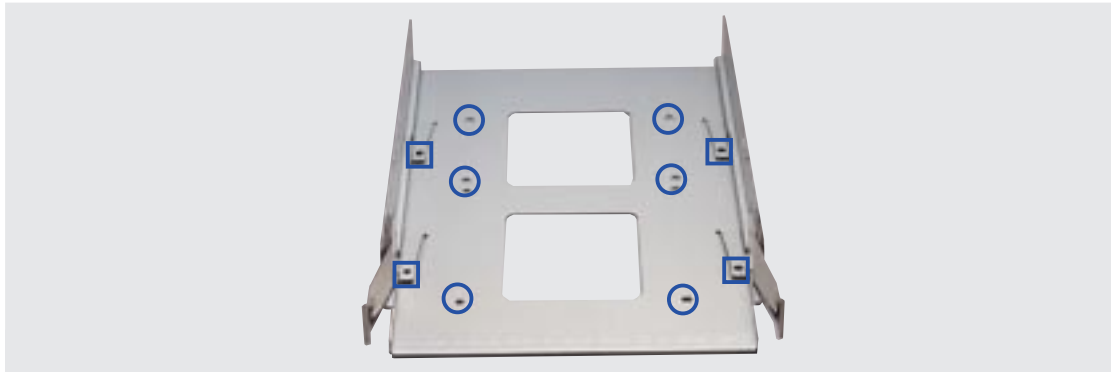
Power LED	Status LED	Description
off	off	power subsystem OK and ready for hard drive insertion
on	off	Hard disk drive is OK for operation
on	on	Hard disk drive failure (*)
on	fast flash	RAID in rebuilding (*)
on	slow flash	Hot-spare hard disk drive (*)
fast flash	on	Hard disk drive power failure/short circuit
fast flash	fast flash	Fan failure

** Must be provided by RAID controller's SAF-TE function.*

II. System Components

Fixed Storage Device Tray

Internal fixed storage devices are mounted on removable trays. There are four available, one for a floppy device and another three for full-size devices. There are six screws provided (as circled) for mounting a 4 inch device such as a floppy or hard disk drive. Four screws are provided (as boxed) for mounting a 6 inch device such as a CD-ROM or tape drive.



Fixed storage device tray

Fixed Device Bay Cover Clips

The device bay panel is held by two plastic clips on each side. Press these clips in with a screwdriver to release.



Removing the device bay cover clips

Fixed Device Bay Cover

After releasing the device bay cover clips, pry the cover away from the chassis using a screw driver from the front.



Removing the device bay cover clips

II. System Components

Fixed Storage Devices

Floppy Drive and CD-ROM

The floppy drive fits in the topmost bay along with the power button. A CD-ROM can fit into either the second, third, or fourth bay from the top. A metal clip on each side of the device tray secures the tray in place. Press inward to release the clips. The tray slides in or out on the side rails.

IMPORTANT: If using an IDE hard disk drive in this large chassis, it is recommended that only *one* is installed and with the shortest IDE cable possible. Long IDE cables will cause poor signal. Select “...PIO/DMA Mode : 3/1” in BIOS CHIPSET FEATURES SETUP for a more stable IDE operation.



Removing a floppy or CD-ROM drive

Floppy Drive and Storage Device Spacers

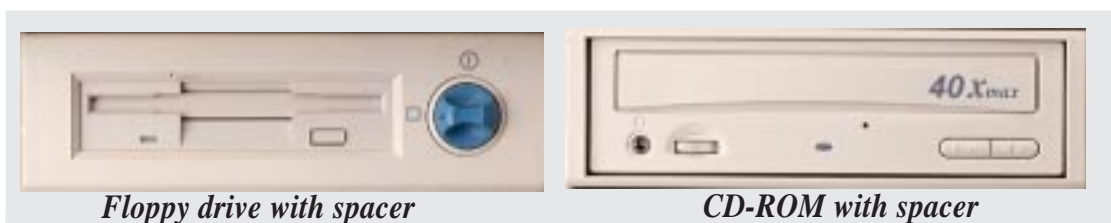
Spacers are required for cosmetics only. A floppy drive spacer is used to cover the floppy drive and power button. A standard storage device spacer is used to cover the CD-ROM, tape drive, or additional CD-ROMs. You should purchase an extra spacer for each storage device.



Floppy Drive Spacer

Fixed Device Spacer

Floppy and CD-ROM drive spacers



Floppy drive with spacer

CD-ROM with spacer

Floppy and CD-ROM drives

II. System Components

Hot-Swap Trays

Maximum uptime in a server requires devices that can be easily replaced or “swapped.” The main hard drives are mounted in internal hot-swap trays for easy replacement. The AP2000 hot-swap bay has two different models. The 1.6 inch SCA hot-swap bay can accommodate three 1.6 inch hard disk drives. The 1.0 inch SCA hot-swap bay can accommodate five 1.0 inch hard disk drives.



1.6” SCA Hot-Swap Bay



1.6” tray with 1.6” SCA hard drive



1.0” SCA Hot-Swap Bay



1.0” tray with 1.0” SCA hard drive

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II. System Components

Hot-Swap Bay

There are two levers on the front of the hot swap tray to help release or lock the tray. To remove the tray, extend both levers and pull on both levers. To install the tray, push the tray firmly into the bay with the levers extended, then close the levers. Three hard disk drive LEDs are located inside the system fan module for each hard disk drive tray. LEDs



provide information on the power and activity status of the hard disk drive. When power is received by the hot-swap tray's connector board, the power LED will light. When data is written or read to or from the contained hard disk drive, the activity LED will flash proportional to the amount of data transferred.

Hot-Swap Tray

Each hot-swap tray provides an aluminum carrier for a single SCSI hard disk drive with a maximum height of 1 inch or 1.6 inch (depending on model), a width of 4 inches, and a length of 6 inches. The aluminum tray provides protection and maximum heat dissipation for almost all types of high speed SCSI disk drives. The provided screws are needed to secure the hard disk drive into the tray.



II. System Components

SCSI Backplane

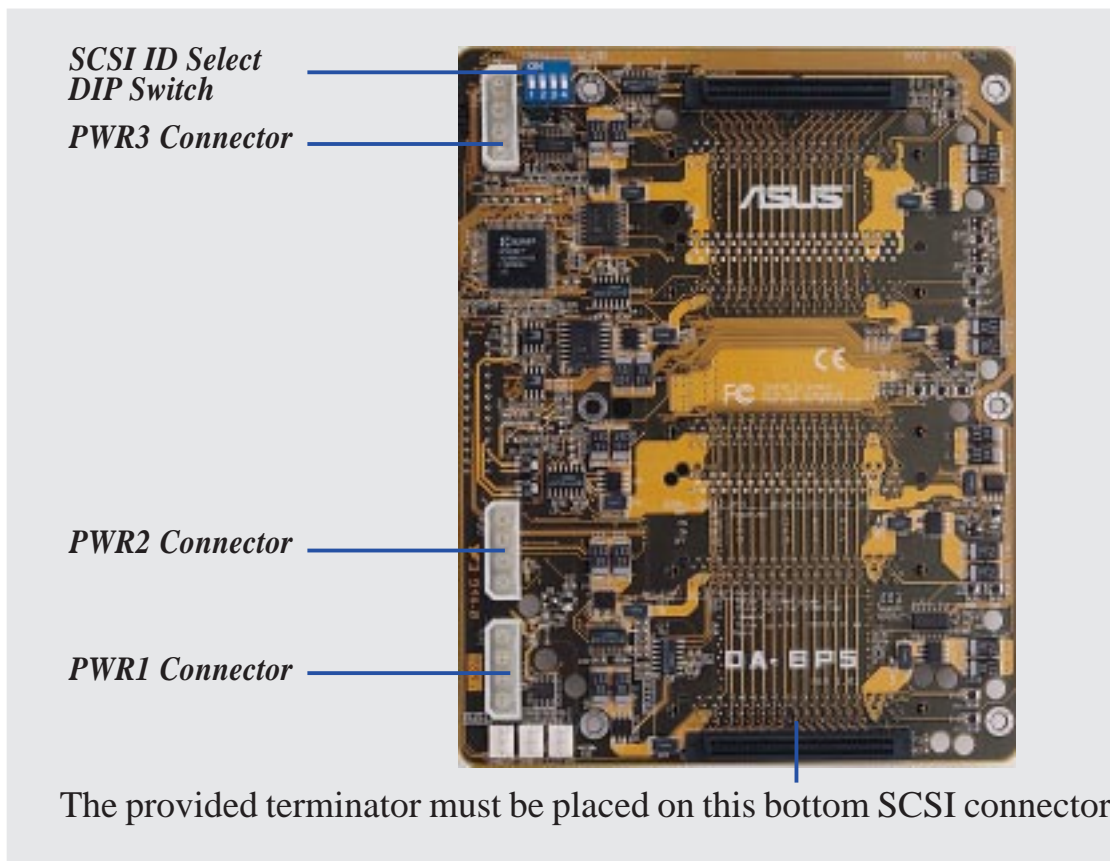
The SCSI backplane of this server is comprised of one SCSI board with Ultra2 SCSI connectors, power inputs, and SCSI ID dip switches. This configuration allows Ultra2 SCSI SCA hard disk drives to be docked into the server using a SCA connector.

SCSI Board Placement

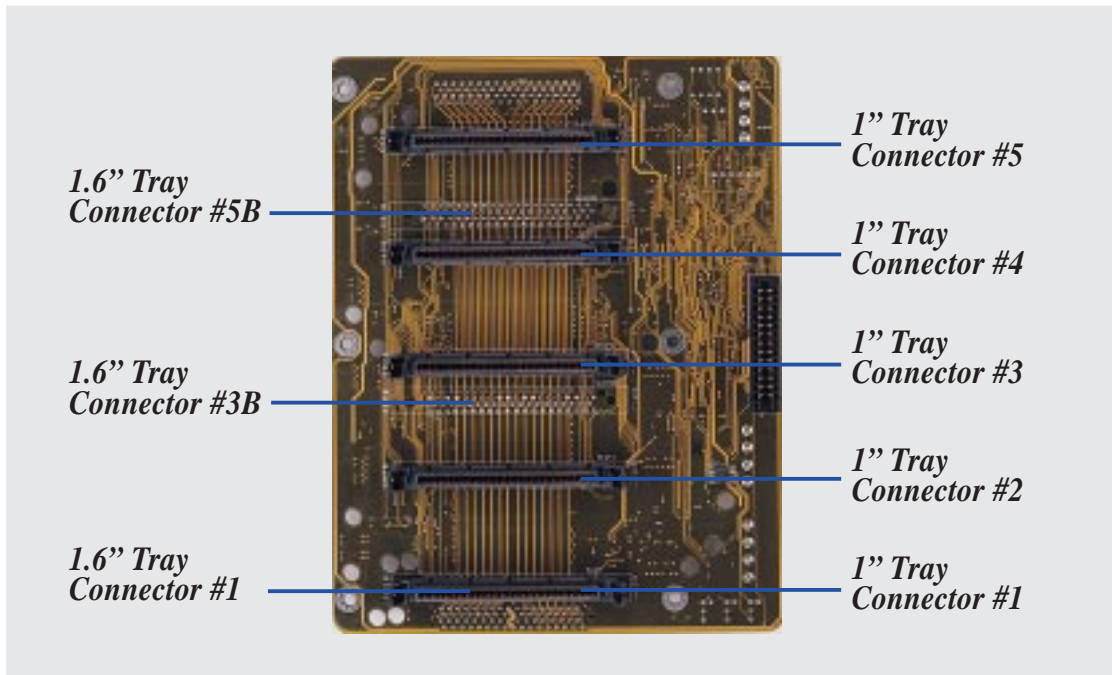
There are six screws on the SCSI board. The extended expansion card guide must be removed before the SCSI board can be removed. The SCSI board has one side with two connectors and three power connectors and another side with either three or five SCSI SCA connectors. Face the side with the power connector toward the motherboard. In order to ensure proper orientation of the SCSI board, the screw holes are not placed symmetrically.

SCSI Board Power Installation

There are three power connectors on the front side of the SCSI board. The PWR1 and PWR2 connectors have to be connected to the power supply, the PWR3 connector is a spare power connector which will supply power if PWR1 and/or PWR2 connectors fail to supply power. The voltage distribution for the three power connectors are not equal due to the enormous voltage and current requirements by the SCSI drives.



II. System Components



SCSI ID Setting

SCSI ID settings are made through DIP switches located on the SCSI board. The SCSI board has four dip switches to set the hard drive's power on delay and SCSI ID.

SCSI ID Setting

<i>IDSEL1</i>	<i>IDSEL0</i>	<i>Slot1</i>	<i>Slot2</i>	<i>Slot3A/3B</i>	<i>Slot4</i>	<i>Slot5A/5B</i>
<i>off</i>	<i>off</i>	<i>Reserved</i>				
<i>on</i>	<i>on</i>	<i>15</i>	<i>12</i>	<i>11</i>	<i>8</i>	<i>3</i>
<i>on</i>	<i>off</i>	<i>14</i>	<i>9</i>	<i>6</i>	<i>4</i>	<i>1</i>
<i>off</i>	<i>on</i>	<i>13</i>	<i>10</i>	<i>5</i>	<i>2</i>	<i>0</i>

Hard Disk Drive Power On Delay

<i>RMT_START</i>	<i>DLY_START</i>	<i>description</i>
<i>off</i>	<i>off</i>	<i>Motor up when power on</i>
<i>on</i>	<i>off</i>	<i>Motor up after START UNIT command</i>
<i>off</i>	<i>on</i>	<i>Motor up after 12xSCSI ID ms</i>
<i>on</i>	<i>on</i>	<i>Reserved</i>

II. System Components

SCSI ID Dip Switches

The following illustrates the different possibilities using the dip switches.



II. Components

	IDSEL1	IDSEL0	Slot1	Slot2	Slot3A	Slot4	Slot5A
 IDSEL 1=off IDSEL 0=off	off	off	Resv.				
 IDSEL 1=on IDSEL 0=on	on	on	15	12	11	8	3
 IDSEL 1=on IDSEL 0=off	on	off	14	9	6	4	1
 IDSEL 1=off IDSEL 0=on	off	on	13	10	5	2	0

	IDSEL1	IDSEL0	Slot1	Slot3B	Slot5B
 IDSEL 1=off IDSEL 0=off	off	off	Resv.		
 IDSEL 1=on IDSEL 0=on	on	on	15	11	3
 IDSEL 1=on IDSEL 0=off	on	off	14	6	1
 IDSEL 1=off IDSEL 0=on	off	on	13	5	0

IMPORTANT: If your hard disk drives have terminator jumpers, they must be removed because an external terminator is provided for the SCSI board.

II. System Components

SCSI Information

SCSI Connections

Your server can support up to 15 user installed single-ended SCSI devices. Be sure to include both internal and external SCSI devices in your device setup. Each SCSI device (both internal and external) must have a unique address (or SCSI ID). Check your SCSI device documentation for instructions. Be sure to record all SCSI addresses so that you can prevent SCSI address conflicts.

SCSI Termination

SCSI devices are connected together in a “chain” by cables. Internal devices connect to the motherboard with a 50 pin or 68 pin flat ribbon cable. External SCSI devices may be connected using an external SCSI connector or SCSI card with an external connector. If there are more than one internal or external device, additional devices are connected with cables to form a “chain.” Terminating the SCSI Bus “chain” is necessary for SCSI devices to work properly. SCSI devices normally come with its termination enabled by jumpers or dip switches. You must disable these termination for devices in between the SCSI chain. Ultra2 devices do not have a termination jumper and must be terminated using a terminator on the SCSI cable. The terminator must always be on the end of the cable which means that you cannot connect a device on the last connector.

SCSI ID Jumpers

All SCSI devices, including this motherboard with onboard SCSI, must have a SCSI identification number that is not in use by any other SCSI device. There are sixteen possible ID numbers, 0 through 15. The SCSI ID serves two purposes:

- It uniquely defines each SCSI device on the bus.
- It determines which device controls the bus when two or more devices try to use it at the same time.

SCSI IDs on one channel do not interfere with the IDs on another channel. You can connect up to 15 SCSI devices to this motherboard. You must set a SCSI ID number (ID 0 to ID 15) for each device. Note that the onboard SCSI chipset is also a SCSI device and will also require a SCSI ID number. SCSI devices vary in how they set the ID number. Some use jumpers, others have some kind of selector switch. Refer to the manual for any device you install for details on how to set its ID number.

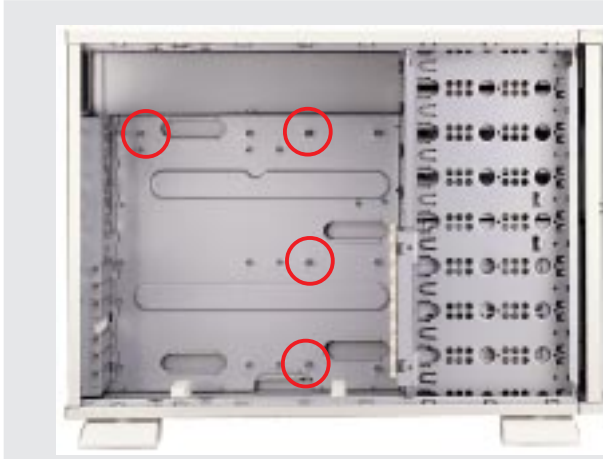
SCSI ID Priority

The motherboard has an onboard 16bit single-channel SCSI chipset. SCSI ID 15 has the highest priority, and SCSI ID 0 has the lowest priority.

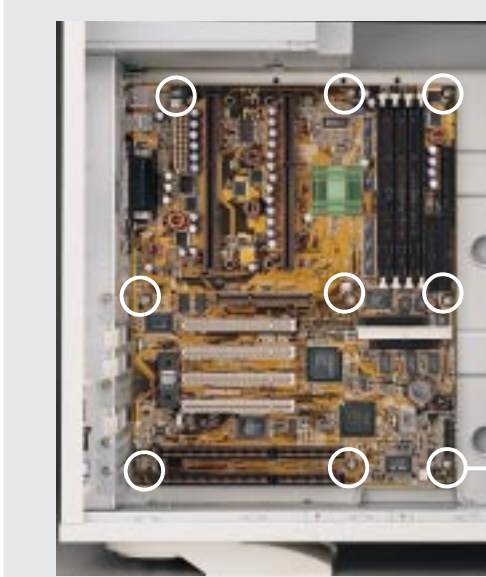
II. System Components

Motherboard Securing

Remove the extended expansion card guide before installing or removing the motherboard. All screws are necessary to provide the needed stabilization to support all the motherboard expansion cards used in a server.



Place four spacers in the areas circled on the chassis.



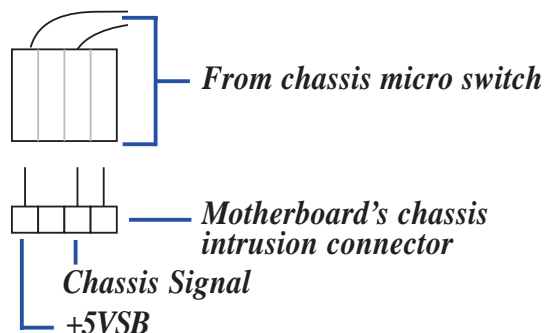
Place nine screws in the areas circled on the motherboard.

There is a chassis intrusion connector here.

Installed P2B-DS motherboard

Chassis Intrusion Switch

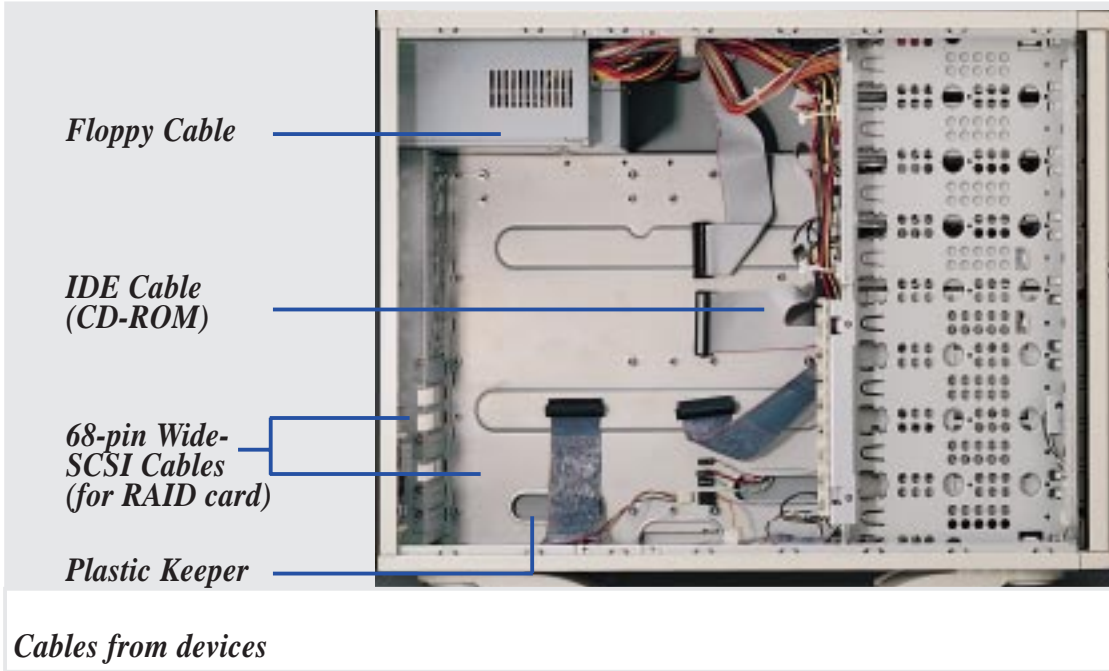
The chassis provides an micro toggle switch that must be connected to the motherboard for the intrusion detection to work. The motherboard will signal the ASMA software when the side panel is opened. The connection diagram is given here.



II. System Components

Device Cables

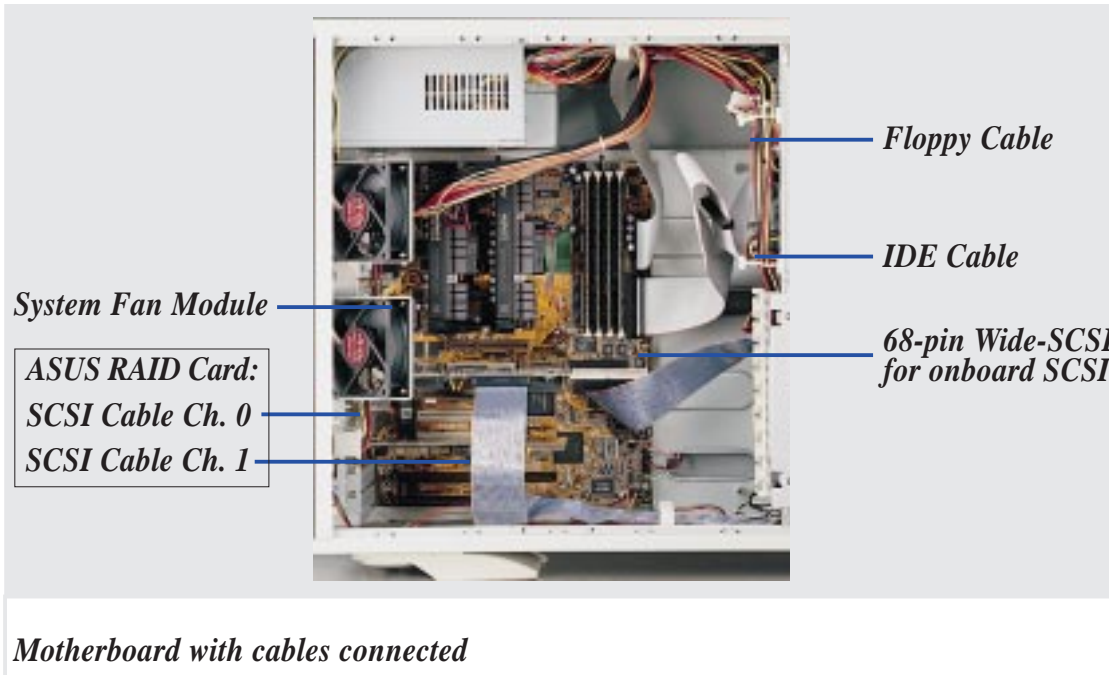
Several cables are used for connecting devices in the server. The following picture points out the name of each cable and its suggested location. Plastic keepers protect the cables from contact with the fans and other devices. Make sure that all cables are properly secured.



II. Components

Cable Connections

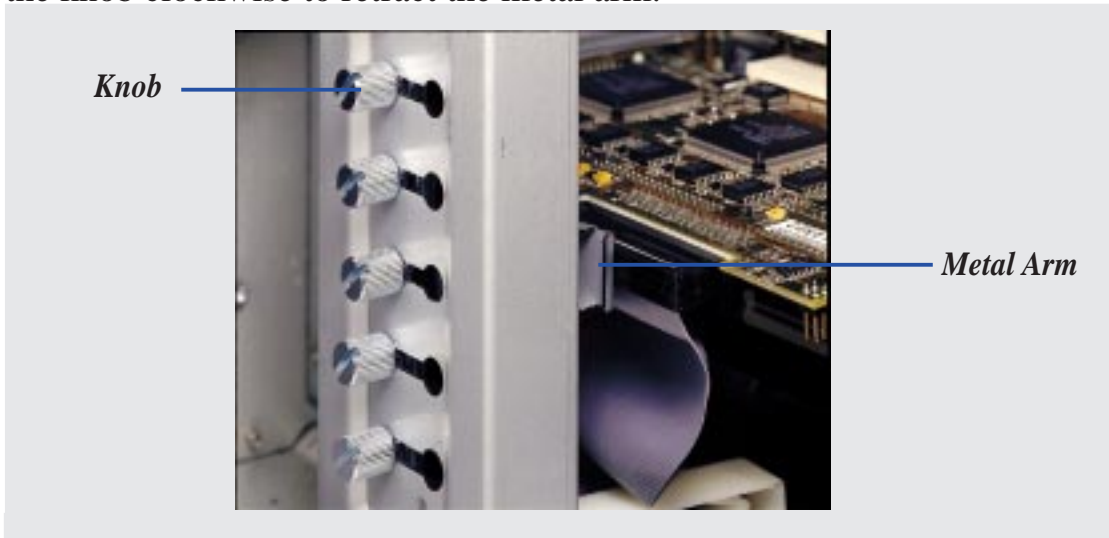
The cables connect to the motherboard as shown. The P2B-DS includes onboard SCSI with 68-pin and 50-pin SCSI connectors. RAID connections require the ASUS PCI-DA2100A RAID card.



II. System Components

Card-Secure Module

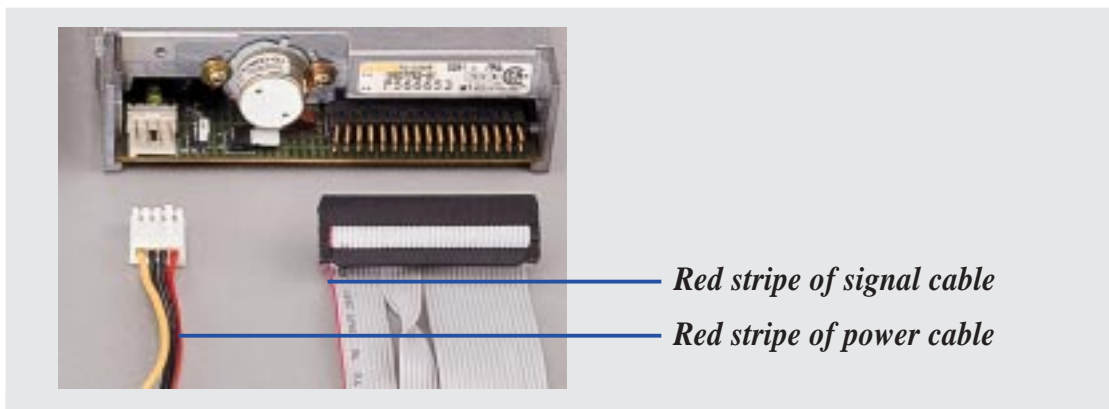
The AP2000 provides an adjustable expansion card securing rack to help hold expansion cards in their slots. The securing rack module is mounted by four screws on the edge of the server. There are 18 knobs on the module. Turn the knob counter clockwise to extend the metal arm under each knob. Keep turning until the arm is firmly press against the expansion card. Turn the knob clockwise to retract the metal arm.



Cables connected to devices

Floppy Disk Drive (1.44MB)

The 1.44MB floppy disk drive requires signal and power connections. The power connection is easy since it only fits one way and a latch is available to secure it when fully inserted. The signal cable is tricky because the cable fits in both orientations as well as shifted one direction or the other. The signal cable also has no latch to determine when full insertion is made. Align the red stripes of the signal and power cables so that they face each other. Carefully insert the connector while visually watching the progress so that proper alignment and insertion is made.



1.44MB floppy disk drive connections

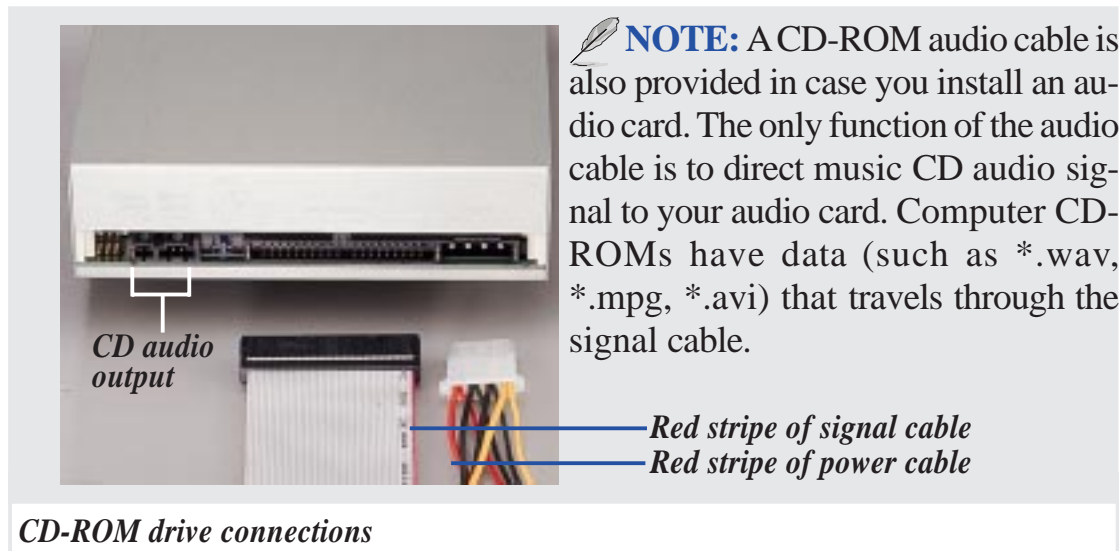
II. System Components

IDE Cabling

Proper IDE device operation requires that the IDE ribbon cable does not exceed 18 inches. If only one IDE device is used, connect it to the *end* of the cable. Remove unused cables from the motherboard's IDE connector to ensure proper signal strength.

CD-ROM Disk Drive (IDE)

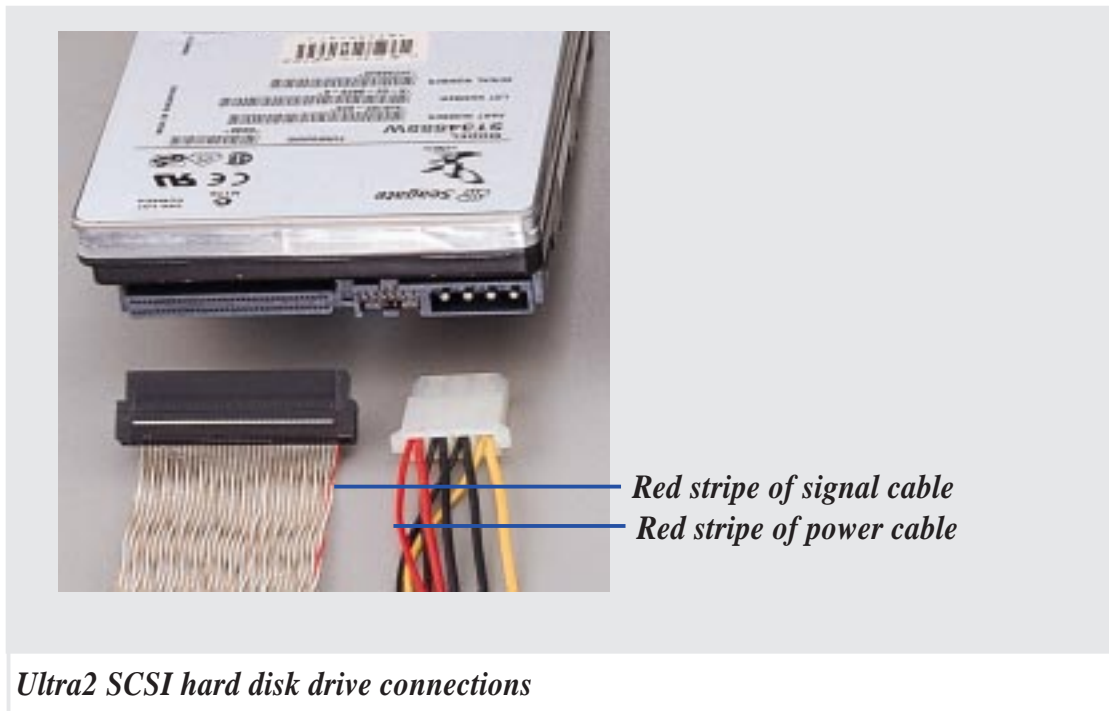
The CD-ROM disk drive mounts only in one of the three fixed device bays and requires signal and power connections like that of IDE hard disk drives. The power and signal cable is straightforward with connectors designed to only fit correctly. The red stripe of the signal and power cables should face each other.



II. System Components

Ultra2 SCSI Disk Drive

The Ultra2 SCSI disk drive has separate signal and power connections. The power connector is the same as standard hard disk drive power. The signal cable is different. For proper signal stability in Ultra2 speeds, a special twisted ribbon cable must be used. Each pair of wires are twisted for signal shielding like that of high speed (e.g. category 5) LAN cabling.

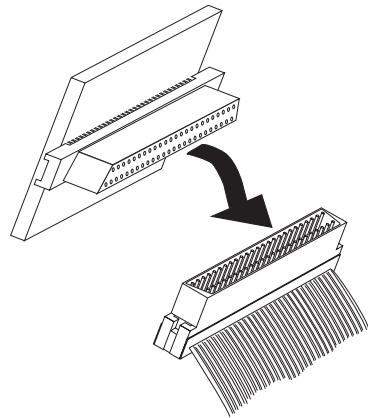


IMPORTANT: You must use Ultra2 SCSI ribbon cables for Ultra2 devices. Ultra2 ribbon cables (may be colored red and white) are similar to wide-SCSI ribbon cables (normally colored gray) but each pair of wire is twisted to reduce signal interference.

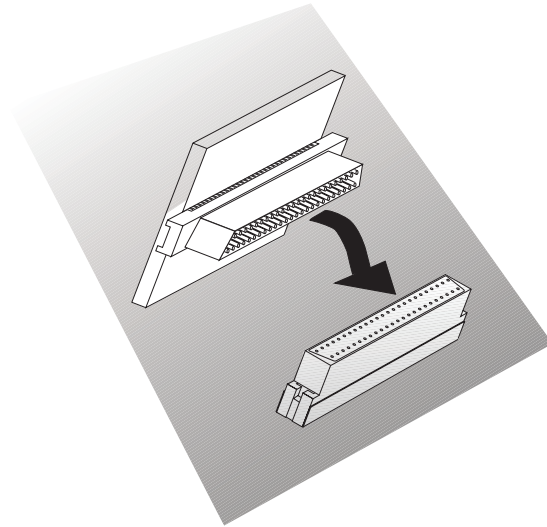
External Ultra2 SCSI Terminator

To prevent SCSI signal loss, the provided external SCSI terminator must be used at the end of the 68-pin SCSI cable. 50-pin SCSI cables may also use terminators but usually use termination jumpers on the device itself. Currently Wide-SCSI devices have termination jumpers but Ultra2 devices do not. Some manufacturers ship SCSI devices with the terminator set, others do not. All termination jumpers must be removed along the cable where the external SCSI terminator is used.

II. System Components



Female Terminator for SCSI Cable



Male Terminator for SCSI board



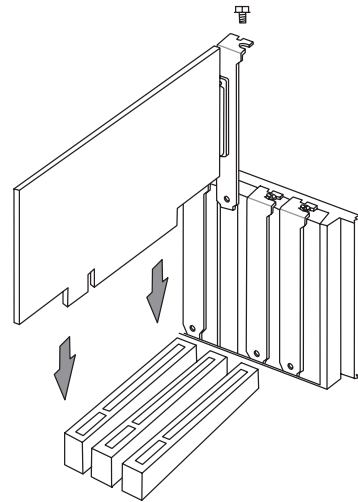
Expansion Cards

Expansion cards can be easily installed just like any standard PC computer. Up to 4 PCI or 2 ISA (1 slot is shared allowing a maximum of 5 cards at one time) cards can be installed. One AGP slot is also available for a hardware 3D accelerator with an AGP connector.



Expansion Card Installation Procedure:

1. Follow the static precautions described in the front of this manual.
2. Switch OFF your system and all peripheral devices and remove the main power cord.
3. Remove the side panel to the chassis.
4. Find an unused expansion slot on the motherboard and unscrew the metal cover plate from the slot and put the screw to one side.
5. Ensure the jumpers (if any) are correctly set on your expansion card
6. Align the card's connector with the expansion slot on the motherboard and gently lower and push the card into the free slot.
7. Secure the card to the expansion slot with the screw you removed from the metal plate.
8. Attach cables or wires if necessary.
9. Reinstall the side panel if no other work is needed inside the chassis.



II. System Components

Power Supply

This server has a standard power supply with specifications to meet this server's motherboard requirements. A clearly marked label gives detailed specifications of the power supply. It is normal practice to remove the power cord before opening the side panel. With the power cord removed, you can ensure there are no voltages which can cause shorts while installing or removing internal components.

CAUTION: Before turning on your server for the first time, set the power supply's voltage. Some products may have auto voltage switching to accommodate 220V-240V or 110-120V but this power supply must be set manually. The factory default should be on 230V to accommodate the higher voltage but it is safer to visually inspect the switch yourself in case it is not.

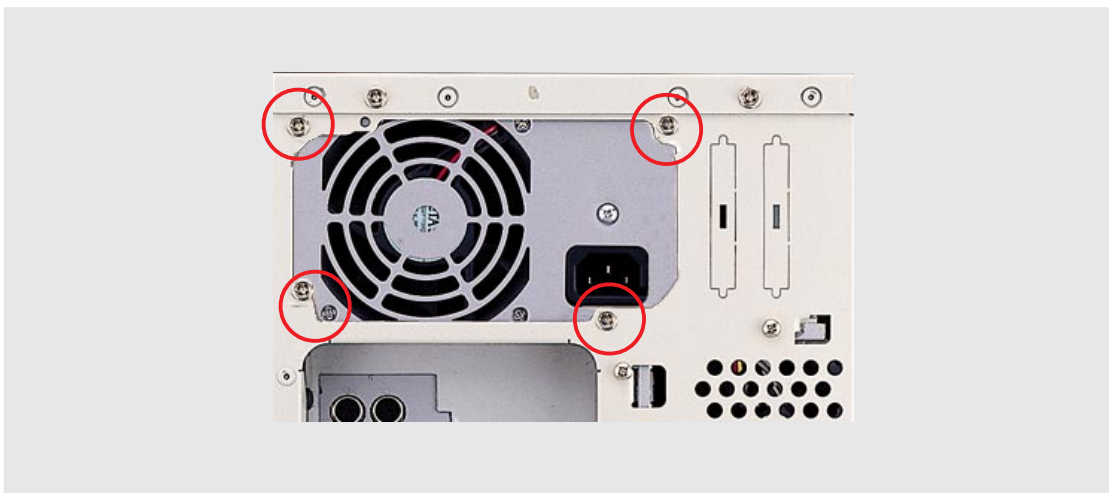
IMPORTANT: For countries using 110V-120V, you must slide the switch to 115V or else power up is not possible (but no damage will occur).

Power Supply On and OFF

Normal powering ON and powering OFF of the ATX power supply is done using the momentary ATX power switch located on the front panel which is connected to the motherboard, unlike AT power supplies which uses a permanent switch on the power supply or chassis. The power supply's main power switch must be turned on before the ATX power switch on the front panel will work.

Power Supply Mounting

Mounting and unmounting the power supply must be done from the inside as shown below. Four screws are used to secure the power supply to the chassis back side.



Power Supply remove screws

II. System Components

Starting the Server

Turn ON the server by pushing the power button. The power button will snap back when released because ATX power systems have an electrical ON/OFF switch unlike AT systems which require a permanent ON or OFF position. If the Power On LED does not light, make sure the power cord is connected to the system unit and to a working grounded outlet.



When booting your server for the first time, hold the “Delete” key and enter BIOS setup in order to make settings. ISA cards requires that you set “IRQ XX Used by ISA : Yes” in BIOS PNP AND PCI SETUP in order for that IRQ to be reserved for your ISA expansion card. You need to set “Boot Sequence : A, C” in BIOS FEATURES SETUP in order to boot from a floppy diskette to setup your hard disk. Insert a bootable floppy diskette and select “Save & Exit Setup” from the BIOS main menu. Once your server has properly booted, an “A:\>” prompt will appear. Use the boot diskettes provided with the server operating system or create your own. If you are planning to use RAID on your server, you need to install a RAID card, such as the ASUS PCI-DA2100A and then run the RAID setup program from a floppy diskette. Reboot your server with the operating system boot disk in order to install drivers for your devices (such as CD-ROM and SCSI devices) and install your server operating system. You may be prompted for manufacturer supplied driver diskettes for each device on your server if they are not included in the operating system setup drivers.

III. Appendix

SCSI Cable Limits

SCSI cables have a limit to the length that it may have. Exceeding the length may cause problems mounting or using any one of the SCSI devices.



CAUTION: Exceeding the SCSI cable limits may cause unreliable data transfers even if all the devices are mounted properly.



NOTES:

- Narrow refers to 50 pin and Wide refers to 68 pin. Don't get confused by the width of the connector or cable.
- The SCSI ID for devices on one connector cannot be the same as the SCSI ID for devices on the other connectors. None of the devices on any connector can use ID7, which is reserved for the SCSI controller.
- A maximum of **15** devices may be connected to the motherboard (three connectors) at one time. The following "Max Devices" are for individual connectors and do not take into account other SCSI devices.

<u>Cable Limits</u>	<u>Max Data Transfer Rates</u>	<u>Max Devices</u>
1) 12m (29.4ft)	Ultra2-SCSI (68 pin 80MB/Sec)	15
2) 3m - 1.5m	Wide Ultra-SCSI (68 pin 40MB/Sec)	4 - 8
3) 3m (9.8ft)	Wide-SCSI (68 pin 20MB/Sec)	15
4) 3m - 1.5m	Narrow Ultra-SCSI (50 pin 20MB/Sec)	4 - 7
5) 3m (9.8ft)	Narrow Fast-SCSI (50 pin 10MB/Sec)	7



Notes for the above chart:

- 1) A total of **15** "Ultra2-SCSI" devices (ID0-ID15) may be connected to the 68-pin Ultra2 connector on the motherboard.
NOTE: If connecting Fast/Ultra devices with Ultra2 devices on the Ultra2 connector, the entire SCSI bus will be limited to the Ultra SCSI conditions listed above. Mixing SCSI devices is highly not recommended.
- 2) A total of **8** "Wide Ultra-SCSI" devices (ID0-ID15) may be connected to the 68-pin Wide connector if using a 1.5m (4.9ft) cable, but only **4** "Wide Ultra-SCSI" devices if using a 3m (9.89ft) cable. Ultra-SCSI technology is unstable over long lengths, therefore stability will depend on they quality of your cable and devices.
- 3) A total of **15** "Wide-SCSI" devices (ID0-ID15) may be connected to the 68-pin Wide connector.
- 4) A total of **7** "Narrow Ultra-SCSI" devices (ID0-ID6) may be connected to the 50-pin Narrow connector when using 1.5m (4.9ft) cable but only 4 devices when using 3m (9.8ft) cable. Ultra-SCSI technology is unstable over long lengths, therefore stability will depend on the quality of your cable and devices.
- 5) A total of **7** "Narrow Fast SCSI" devices (ID0-ID7) may be connected to the 50-pin Narrow connector.

III. Appendix

Power Supply Information

Input Voltage

<u>Range</u>	<u>Min (V)</u>	<u>Nom (V)</u>	<u>Max (V)</u>
Range 1	90	120	132
Range 2	180	230	265

Output Current Capacity

<u>Output</u>	<u>Nom Out (Vdc)</u>	<u>Min (A)</u>	<u>Max (A)</u>
1	3.3V	1.4	30*
2	5.0V	2.4	43*
3	12.0V	0.5	12
4	-5.0V	0	0.5
5	-12.0V	0	0.5

* Total output power for 3.3V and 5V combined shall be 210W

Output Voltage Regulation, Ripple, and Noise

<u>Output</u>	<u>Output Voltage Limits (Vdc)</u>			<u>Ripple/Noise</u>
	<u>Min</u>	<u>Nom</u>	<u>Max</u>	<u>Maximum</u>
1	3.17V	3.30V	3.46V	50mVp-p
2	4.80V	5.00V	5.25V	50mVp-p
3	11.40V	12.00V	12.60V	120mVp-p
4	-4.50V	-5.00V	-5.50V	120mVp-p
5	-10.92V	-12.00V	-13.20V	120mVp-p
6	4.75V	5.00Vsb	5.25V	120mVp-p

Regulatory Information

Safety

The power system meets all applicable clauses for UL 1950 2nd edition without D3 deviations. The power system passes all tests for CUL and TUV safety.

EMI

The power system, operating with resistive load, meets FCC class B and CISPR 22 class B conducted limits.

III. Appendix

Power Supply Requirement Calculation Table

Item	Volts	Amp	x	Qty.	=	Total Amp	Watts (5V)	Watts (12V)
Total Motherboard Power							209.55	3.6
Hard Drive	5.0V	1.3	x		=			
	12V	1.5	x		=			
CD-ROM	5.0V		x		=			
	12V		x		=			
Tape Drive	5.0V		x		=			
	12V		x		=			
Floppy Drive	5.0V		x		=			
	12V		x		=			
System Fans	5.0V		x		=			
	12V	0.3	x		=	0.6		7.2
Other	3.3V		x		=			
	5.0V		x		=			
	12V		x		=			
Total Power								

III. Appendix

Glossary

Byte (Binary Term)

One byte is a group of eight contiguous bits. A byte is used to represent a single alphanumeric character, punctuation mark, or other symbol.

CHKDSK (Check Disk)

An MS-DOS command that gives you information such as disk space, files, and directories on your hard disk drive.

COM Port

COM is a logical device name used to designate the computer serial ports. Pointing devices, modems, and infrared modules can be connected to COM ports. Each COM port is configured to use a different IRQ and address assignment.

CPU (Central Processing Unit)

The CPU, sometimes called “Processor,” actually functions as the “brain” of the computer. It interprets and executes program commands and processes all the data stored in memory. Currently, there are socket 7, slot 1, and slot 2 CPUs. Intel Pentium Processors fit on socket 7, Intel Pentium II fit on slot 1, and Intel Xeon fit on slot 2.

FDISK (Fixed Disk Setup Program)

An MS-DOS program used to partition the hard disk drive. FDISK is required to setup a new non-RAID hard disk drive before formatting and installing an operating system.

IDE (Integrated Drive Electronics)

IDE devices integrate the drive control circuitry directly on the drive itself, eliminating the need for a separate adapter card (in the case for SCSI devices). UltraDMA/33 IDE devices can achieve up to 33MB/Sec transfer.

LPT Port (Line Printer Port)

Logical device name reserved by DOS for computer parallel ports. Each LPT port is configured to use a different IRQ and address assignment.

PCI Bus (Peripheral Component Interconnect Local Bus)

PCI bus is a specification that defines a 32-bit data bus interface. PCI is a standard widely used by expansion card manufacturers.

III. Appendix

Peripherals

Peripherals are components on the outside of the computer such as a monitor, printer, keyboard, or mouse. Peripherals are attached to the computer via I/O ports. Peripheral devices allow your computer to perform an almost limitless variety of specialized tasks.

POST (Power On Self Test)

When you turn on the computer, it will first run through the POST, a series of software-controlled diagnostic tests. The POST checks system memory, the motherboard circuitry, the display, the keyboard, the diskette drive, CPU, and other I/O devices.

PS/2 Port

PS/2 ports are based on IBM's Micro Channel Architecture. This type of architecture transfers data through a 16-bit or 32-bit bus. A PS/2 mouse and/or keyboard may be used on ATX motherboards.

RAID (Redundant Array of Inexpensive Disks)

RAID can be set up to provide mirroring (for fault tolerance), parity (for data guarding), or striping (for data distribution over several drives for increased performance). A RAID card is required to setup a RAID system.

RAM (Random Access Memory)

There are several different types of RAM such as DRAM (Dynamic RAM), EDO DRAM (Extended Data Out DRAM), SDRAM (Synchronous DRAM).

ROM (Read Only Memory)

ROM is nonvolatile memory used to store permanent programs (called firmware) used in certain computer components. Flash ROM (or EEPROM) can be reprogrammed with new programs (or BIOS).

SCSI (Small Computer System Interface)

High speed parallel interface defined by the X3T9.2 committee of the American National Standards Institute (ANSI) for connecting many peripheral devices.

UPS (Uninterruptible Power Supply)

A battery system that can provide power to an electronic device or computer when power fails in the building. A passive UPS only provides power. An active UPS provides power conditioning that offers protection against transient power conditions and short-term power outages.