



Intel AR450GX MP Rack Mount Server System Technical Product Specification

Order Number **283005-002**

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The AR450GX MP Server System may contain design defects or errors known as errata that may cause the product to deviate from published specifications. Characterized errata that may cause the AR450GX MP Rack Mount Server system's behavior to deviate from published specifications will be documented in the AR450GX MP Rack Mount Server System Specification Update.

Revision History

Revision	Revision History	Date
-001	Initial release	9/97
-002	Updates in Sections 2.5, 4.5, and 4.14	10/97

This product specification applies only to the standard AR450GX MP Rack Mount Server System.

Changes to this specification will be published in the AR450GX MP Rack Mount Server System Specification Update before being incorporated as a revision to this document.

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1. INTRODUCTION

The AR450GX MP Rack Mount Server System is a high reliability, high availability, high performance rack mountable server system capable of supporting up to four Pentium® Pro processors and up to 2 GB of memory. An optional memory module which supports up to 4 GB of memory is also available. The system contains the AP450GX MP Server Board Set, redundant cooling, a 6 device SCSI backplane, optional redundant power supplies and many built-in server management features.

This document details key chassis and system features of the AR450GX MP Rack Mount Server System. Refer to the *AR450GX MP Rack Mount Server System Specification Update* for the most recent specification updates on the system. The AP450GX board set features are detailed in the *AP450GX MP Server Board Set Technical Product Specification*. Refer to the *AP450GX MP Server Board Set Specification Update* for the most recent specification updates concerning the board set. The combination of these documents provides a full overview of the AR450GX MP Rack Mount Server System. This product specification details the following:

- Chassis
- Power system
- Chassis cooling
- Peripheral bays
- Baseboard (limited description)
- I/O and interconnects
- System configuration
- System certifications
- Environmental limits
- Reliability, availability, and serviceability

1.1 Related Documentation

Contact your Intel sales representative to obtain the following documents:

AP450GX MP Server Board Set Technical Product Specification

AP450GX MP Server Board Set Specification Update

AR450GX MP Rack Mount Server System Specification Update

AP450GX MP Server System, 200 MHz/1MB L2 Pentium® Pro Processor Performance Brief

Installation Guide -- for the AR450GX MP Rack Mount Server System

Service Guide -- for the AP450GX Server System (Available only in electronic format)

Server SCSI Software User's Guide for the AIC-7800 Family of Controllers

LANDesk® Server Manager Technical Product Specification

LANDesk® Server Manager Installation and User's Guide

LANDesk® Server Control Installation and User's Guide

Server Monitor Module Technical Product Summary

1.2 Feature Summary

Table 1-1. AR450GX Feature Summary

System feature	Description
Symmetric Multi-processing support	Two expansion slots for processor modules; up to four Pentium® Pro microprocessors (two on each module). The system may include one processor module and one terminator module, or two processor modules. MPS 1.1 and 1.4 compliant with the appropriate Pentium Pro processor extensions.
Upgradable memory	One expansion slot for a memory module, supporting up to 2GB of memory using SIMM technology. An alternate memory module is available which supports up to 4GB of memory using DIMM technology.
PCI bus support	Two PCI "peer" buses, each with three 32-bit PCI slots, on the system baseboard
EISA bus support	Four dedicated EISA bus master slots on the system baseboard
SCSI controller	Two PCI based, integrated AIC-7880 controllers; fast/wide and Fast-20 SCSI support
Hot-swap hard drives	Up to 6 Hot-swap hard drives (3.5" wide, 1" or 1.6" high SCSI hard drives with the 80 pin SCA-2 connector)
Peripheral bays	Four 5.25" half-height bays, shipped with CD-ROM installed. Floppy drive bay shipped with floppy installed.
Video controller	Integrated ISA based CL-GD5424 super VGA controller shipped with 1MB RAM
External device connectors	Onboard connectors for 2 serial ports, parallel port, PS/2-compatible keyboard and mouse, and VGA monitor
Redundant cooling	Four dedicated chassis fans; any one can fail without degraded system cooling capabilities
Optional redundant power supplies	The system supports one, two (redundant) or three (redundant) 625W power supplies which are easily replaced.
System hardware monitoring	Chassis intrusion switches and onboard sensors for temperature, voltage, and fan failure
Emergency management	Optional Server Monitor Module to allow remote access and emergency server control
I ² C Bus support	I ² C bus connects all major system components together for diagnostic information.

2. CHASSIS

The chassis is designed to provide reliability and serviceability while conforming to standard dimensions which permit installation into 19" rack furniture. It is used with the modular AP450GX MP Server Board Set. The main features of the chassis are:

- 19" width for installation into standard rack mount furniture
- Built-in 3.5" diskette drive bay
- Built-in 16x CD-ROM
- Two additional 5.25" half-height external peripheral bays
- Integrated drive bay which allows for six 1" or 1.6" SCSI SCA-2 hot-swap hard drives
- LCD display
- Front panel status indicator LED's
- Power and reset controls
- Redundant cooling fans
- Redundant power supplies (optional)

2.1 Chassis Features and Controls

Below is a brief description of the chassis features and controls on both the front and back of the chassis. Details of each feature are discussed later in this document.

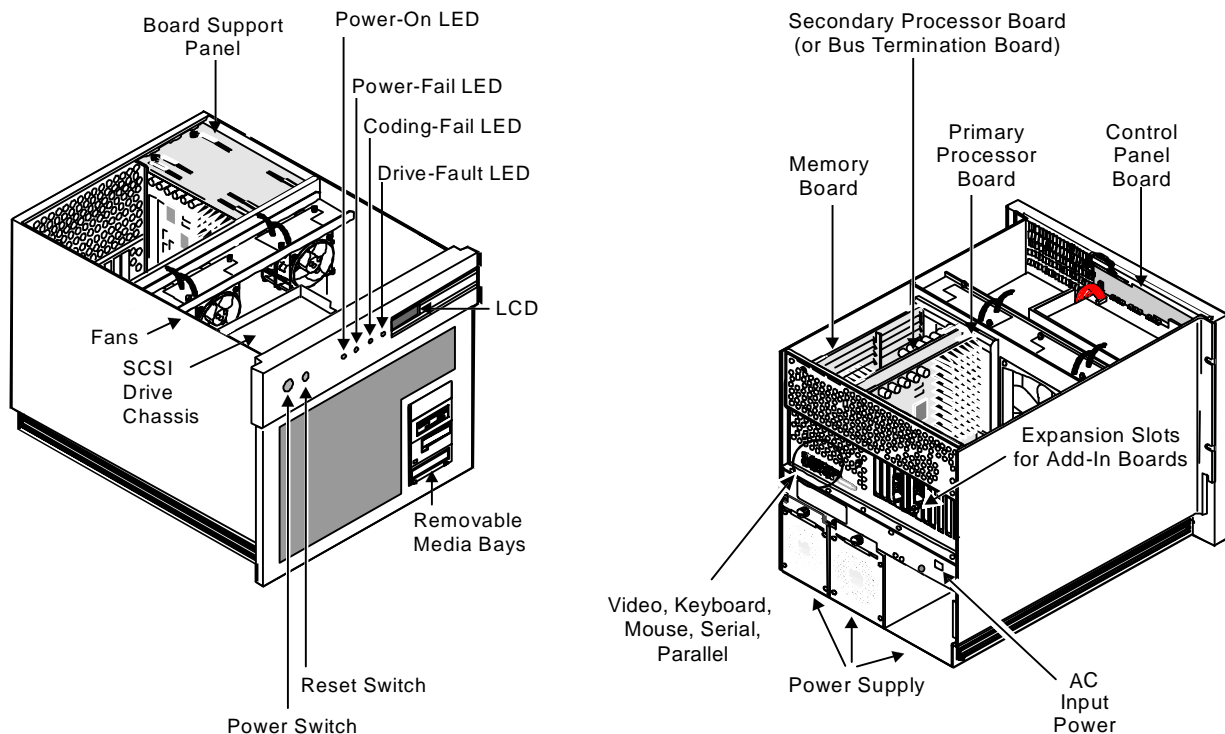


Figure 2-1. AR450GX Features & Controls

Table 2-1. Chassis Features

Chassis Feature	Description
Removable Media Bays	Four 5.25" device bays provide for integration of 3.5" floppy, 16x CD-ROM, and 2 additional devices.
DC power switch (large green button)	Press to turn system DC power on or off. For system security, the power-off function can be disabled via the BIOS secure mode.
Reset switch (small brown button)	Press to cause a hard reset to the system; the power-on self test (POST) will run. The reset switch can be disabled via the BIOS secure mode.
Power-on LED, green	When lit, power is present in system (+5 and +12 VDC). When off, power is turned off or power source is disrupted.
Power-fail LED, yellow	When lit, a power supply has failed (this LED blinks if chassis interlock switch has been opened).
Cooling-fail LED, yellow	When lit, a fan has slowed or stopped, indicating failure.
Drive-fault LED, yellow	When lit, a drive has failed (this LED will function only if a SCSI host controller that supports the SAF-TE control signals is installed in the system).
LCD panel	Displays information about processor/BIOS type and system failures (error and diagnostic information).
SCSI Drive Chassis	Provides 6 hot-swap SCSI hard drive bays (1" and 1.6" drive form factor)
System Fans	4 fans (2 series pairs) provide redundant cooling for all chassis components
Board Support Panel	Ensures AP450GX processor and memory modules are properly seated/installed
Memory Module	Standard SIMM memory module allows for up to 2GB RAM. Optional DIMM memory module allows for up to 4GB RAM.
Primary Processor Module	Accommodates 1 or 2 Pentium® Pro processors.
Secondary Processor Module	Provides for an additional 3 and 4 Pentium Pro processors.
Front Panel Control Board	Monitors chassis intrusion and provides power/reset control, interfaces with other chassis components to inform of system abnormalities via the LCD display and 4 LED's
Exp. Slots for Add-In Boards	Six PCI and four EISA available adapter card locations
AC Input Power	AC power is provided to entire system through a single cord input, an IEC320 high current power cord.
Power Supplies (2 shown installed)	1 supply (non-redundant, most configurations) 2 supplies (redundant, most configurations) 3 supplies (redundant, only used for absolute max load configurations)
Keyboard, Mouse	PS/2 compatible 6-pin connector. Mouse, keyboard connectors are identical
Video	VGA monitor 15-pin connector
Serial Ports (COM1, COM2)	Serial port 9-pin connectors
Parallel Port (LPT1)	LPT1 25-pin parallel port connector

Chassis Feature	Description
SCSI drive status LEDs (not shown, visible through front bezel)	Left to right: Drive present/power on; drive active; drive fault. Each drive has three LEDs visible above the bay from the front. See following table for status descriptions.

Table 2-2. SCSI Drive Status LED Descriptions

SCSI drive present, power on green LED	SCSI drive active green LED	SCSI drive faulty ¹ yellow LED	Description and action if needed
● On	○ Off	○ Off	Drive is present with power.
● On	* Blinking	○ Off	Drive is present with power and is being accessed.
● On	○ Off	● On	Drive CAN be replaced. Steady yellow fault light indicates drive has a problem. Power to drive is on.
● On	○ Off	* Slow blinking	Drive SHOULD NOT be replaced at this time. A slow blinking yellow fault light indicates that a drive that has just been replaced is in recovery mode (drive array being rebuilt). Power to drive is on.
○ Off	○ Off	○ Off	There is no drive installed in the bay.

Note:

1. Table assumes a SCSI host controller is installed to send the appropriate SAF-TE control signals to control the drive fault LED's.

2.2 System Color

The primary exterior finished color of the bezel components is beige. The bezel components are the only two components included as finished surfaces of the AR450 GX Rack Mount Server. The remaining chassis components are unpainted/unfinished as they are not intended to be visible once installed in the rack furniture.

2.3 Front Bezel

The front bezel is composed of 2 main components. The upper molded plastic portion of the bezel is permanently affixed to the main chassis. It provides a housing for the LCD readout, the 4 system status LED's and the power and reset switches. The second portion of the front bezel is a mesh screen surrounded by a rigid frame. This section can easily be removed from the system which allows the user access to the hot-swap SCSI hard drive bays. The removable section of the bezel is held in place through use of two lower retaining clips and two upper thumb screws.

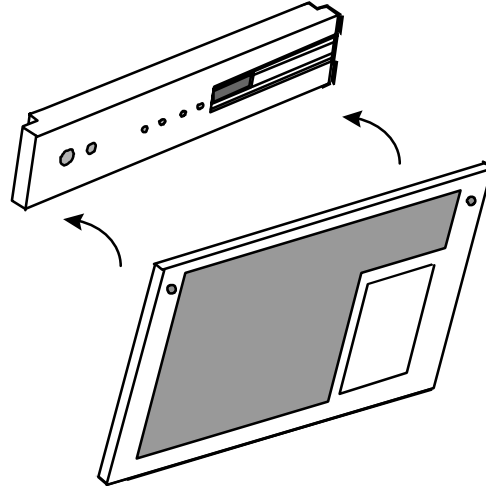


Figure 2-2. Front Bezel Components

2.4 Security

Each chassis top cover and SCSI drive bay EMI door has an intrusion alarm switch. When the cover or door is opened, the switch transmits an alarm signal to the front panel. Intrusions can then be monitored by server management software which can take appropriate action such as shut down the system or lock the keyboard. These intrusion alerts can also be logged in the operating system's event log.

2.5 Chassis Dimensions

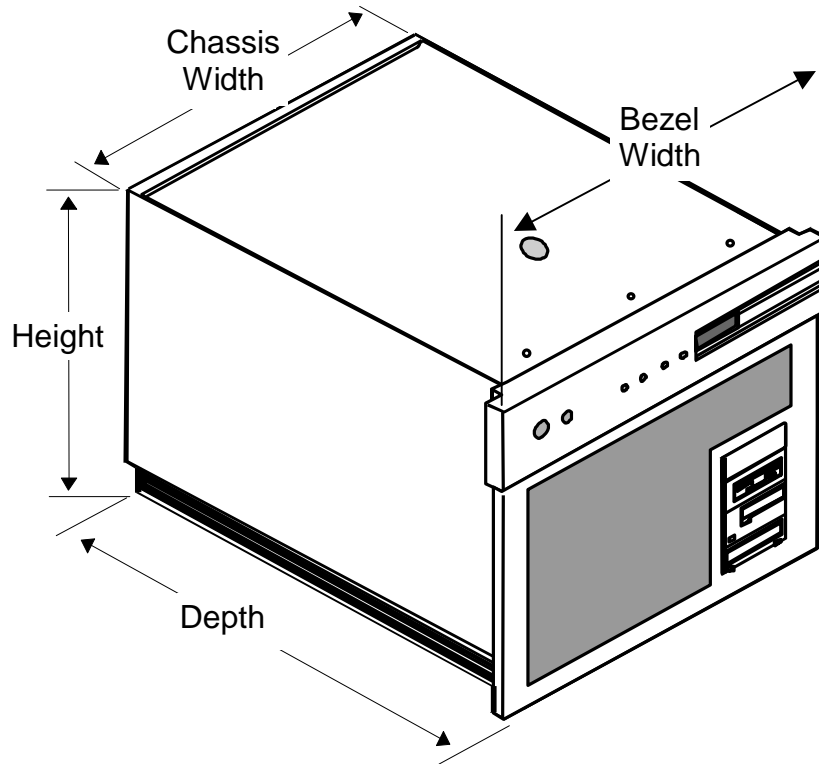


Figure 2-3. System View

Table 2-3. Chassis Dimensions

Chassis Dimension	Measurement
Height	41cm (16in.) or 9U
Bezel Width	48.3cm (19in.)
Chassis Width	44.5cm (17.5in.)
Depth	74cm (29in.)
Clearance Front/Rear	Dependant on rack enclosure
Weight ¹	110 pounds (unpackaged) 140 pounds (packaged)

Note: 1. Weight will vary with system configuration.

3. SYSTEM BOARD SET

The AP450GX MP Server Board Set supports one to four (identical clock speed and L2 cache size) Pentium Pro processors. The system is fully MPS 1.1 and 1.4 compliant with appropriate Pentium Pro processor extensions. The memory subsystem supports up to 2 GB of system memory using commodity Fast Page Mode DRAM SIMMs and up to 4 GB with an optional DIMM-based memory module.

- Pentium Pro® processors supported (166 MHz/512KB, 200MHz/512KB, or 200MHz/1MB)
- Intel 450GX PCIset
- Dual-peer PCI high-performance I/O segments
- 6 PCI slots (3 per PCI bus)
- 4 EISA slots
- PC-compatible I/O control (2 serial ports, one ECP bi-directional parallel port, PS/2 keyboard & mouse)
- Dual onboard Adaptec* AIC-7880 SCSI adapters
- Onboard IDE controller
- Onboard Cirrus* 5424 SVGA adapter (1MB video memory)
- Optional LANDesk® Server Monitor Module for emergency server management

For more details, refer to the *AP450GX MP Server Board Set Technical Product Specification* and the *AP450GX MP Server Board Set Specification Update*.

4. SYSTEM POWER

4.1 Overview

The power system is a modular design and may be configured with one, two or three power supplies. AC power is delivered to each supply via the power distribution backplane. This system simplifies rack wiring by using a single AC input to the entire system, regardless of the number of supplies installed. For systems with redundant/hot-swappable power (two, or three power supplies), the loss of a single power supply will not affect the operation of the system. The failed supply can then be replaced immediately or during normally scheduled maintenance.

Power supplies are easily removed and installed in the AR450GX rack mount server. When adding or removing a hot-swappable power supply, the system power need not be shut down. Engaging or disengaging of the supply is accomplished using a single high thread count screw attached at the back of the supply. This same screw and the chassis guide rails align the supply with its mating connector during insertion.

NOTE: Because of chassis airflow disruption, vacant power supply bays must use the power supply blanking plate. This plate helps ensure front to rear airflow path which provides the necessary cooling for the hot-swap SCSI hard drives.

The power distribution backplane implements power sharing between the supplies with a minimal amount of active circuitry. The power distribution circuitry reports quantity and location of installed supplies through the I²C server management bus. A failed supply results in a yellow LED being illuminated on the front. The power distribution board also provides power connections for the system fans. A failed system fan alarm signal is provided to the AP450GX baseboard from the power distribution board through a fan fail wire harness (please see the system interconnect diagram, Figure 7.1).

Each power supply incorporates a 120mm fan in order to cool the power supply components. The airflow is from the front of the supply (inside the chassis) and exits through the back (rear of chassis). The power supply fan also incorporates failure detection circuitry which will signal an alarm if the fan is faulty. This alarm is communicated to the front panel and lights the power supply failure LED.

4.2 Power Supply Input Specifications

Each power supply is specified for AC inputs of 110V or 220V inputs and is auto-ranging. The exact specifications are listed in Table 4-1. The power supplies incorporate a universal power input with active power factor correction that reduces line harmonics in accordance with CE mark requirement EN6100-3-2.

Table 4-1. AC Input Voltage Specifications

Parameter	Minimum	Nominal	Maximum	Units
V _{in} (110)	90	100-120	132	V _{rms}
V _{in} (220)	180	200-240	264	V _{rms}
V _{in} Frequency	47	50/60	63	Hz

4.3 Power Supply Output Specifications

The following table summarizes the power supply output for each supply. Each is rated at 625W.

Table 4-2. Power Supply Output Summary (per supply)

Description	Specification
DC Power	+3.3 V @ 33 A +5.1 V @ 46 A +12 V @ 28 A -5.0 V @ 0.5 A -12 V @ 1.5 A 5 V Standby @ 1 A
AC Line Voltage (auto ranging)	100-120 Vac 200-240 Vac
AC Line Frequency	50 / 60 Hz
AC Input Current (max)	10.12 @ 90 Vac 5.06 @ 180 Vac
Power Supply Efficiency	70%

The +3.3V, +5.1V and +12V outputs are used by the baseboard, system peripherals and other boards in the chassis. Note that 5.1V is specified instead of the typical 5.0V to insure margin during high current transients. The -5V and -12V outputs are routed to the baseboard to be used by the PCI and EISA slots as needed. The 5V standby output is used by the front panel board primarily to allow remote on/off capabilities.

4.4 Supported Configurations

The system is supported with one, two or three power supplies installed. One power supply can supply the requirements to power most configurations non-redundantly. A second supply will allow the AR450GX rack server to be redundant in that if one supply were to fail, the system would continue to operate unaffected. The third supply configuration should only be used in providing redundancy for absolute worst case loading configurations. It is not intended to provide two levels of redundancy for a light or moderately loaded system, and in fact should never be used as such.

The user should be aware however, that power requirements can exceed a single supply's output capacity under extreme worst case loading configurations. The limiting factor in these cases is the available 5.1V output. It is important to reference Table 4-4 (*AR450GX System Power Breakdown*) in Section 4.5 and be aware of the 5.1V peripheral device consumption to understand when a second power supply is required.

4.5 DC Output Limits

The minimum and maximum allowable DC load conditions on each voltage are listed in Table 4-3.

Table 4-3. Minimum and Maximum DC Load Requirements (Amps)

Number of Supplies	+3.3V		+5.1V		+12V		-5V		-12V		5V Stby	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	0	33	1	46	4	28	0	0.25	0	1	0	0.1
2 (redundant)	0	66	2	92	8	56	0	0.5	0	2	0	0.2
3 (redundant, maximum load)	0	66	2	92	8	56	0	0.5	0	2	0	0.2

Table 4-4 shows the breakdown of power for a “heavily” configured system. The table is provided for reference only and is not meant to provide the exact power usage in a system.

Table 4-4. AR450GX System Power Breakdown

Component	Maximum Power Usage (Watts)						Total ¹
	3.3V	+5.1V ²	+12V ³	-5V	-12V	5V Stby	
AP450GX baseboard	7W	10W	1.2W	---	---	---	18.2W
PPro 1MB Capable ² Processor Module (w/ 2 200MHz/1 MB Pentium® Pro processors)	5.02W	1.19W	93.8W				100.01
4 Dual Fan Heatsinks (200MHz/1 MB processor only)		10.2W					10.2W
Terminator Module	---	1W	11W	---	---	---	---
1GB Memory Module (No Memory)	3.8W	2.7W	---	---	---	---	---
1GB Memory Module (1GB Memory)	4W	76W	---	---	---	---	80W
1GB Memory Module (2GB Memory)	4W	53W	---	---	---	---	---
4GB Memory Module (No Memory)	4.42W	0.5W	---	---	---	---	---
4GB Memory Module (4GB Memory)	53W	0.5W	---	---	---	---	---
1 floppy drive	---	---	6W	---	---	---	6W
6 Hot Swap SCSI Hard Drive (15W max per drive)	---	35W	55W	---	---	---	90W
4 chassis fans (at 3.4W each)	---	---	13.44W	---	---	---	13.44W
SCSI backplane	---	5W	---	---	---	---	5W
Front Panel	---	2W	---	---	---	0.4W	2.4W
CD-ROM drive	---	3.5W	12W	---	---	---	10W
6 PCI Adapters (Max = 25W per card, 10 W typical)	--	6@10W	---	---	---	---	60W
4 EISA Adapters (Max = 22.5 W per card, 10 W typical)	--	4@10W	---	---	---	---	40W
TOTAL (Watts)¹	21.0W	244.0W	275.2W	---	---	0.4W	525.06W
TOTAL (Amps)¹	6.36A	47.8A	22.9A	---	---	0.08A	---

Notes:

1. Totals are for a system with two 1 MB processor modules (each with two 200 MHz/512 KB Pentium® Pro processors), one floppy drive, six SCSI hard drives, one CD-ROM drive, six PCI adapters, four EISA adapters, and 1GB of 5V SIMM memory.

2. This processor module will support the 166MHz/512KB, 200/512KB or the 200MHz/1MB Pentium Pro processor

4.6 Efficiency

The power supply has a minimum efficiency of 70% while operating under full load at all rated voltages and frequencies as specified in Section 4.2, Power Supply Input Specifications.

4.7 AC Line Dropout

AC line dropout is a transient condition defined as a line voltage power supply input drop to 0.0 Vrms. AC line dropout will not damage the power supply under any load conditions.

While the system operates under a fully configured load, an AC line dropout condition of up to one half period of AC input power frequency (i.e., 10 milliseconds at 50 Hz) is acceptable. These short dropout periods will not cause an out-of-regulation condition such as undershoot, and will not cause a nuisance trip of the power supply protection circuit. AC dropout transients in excess of 20 milliseconds may shutdown the power supply or cause out-of-regulation conditions, but will not damage the power supply.

4.8 AC Line Transient Specification

AC line transient conditions are defined here as sag and surge conditions. Sag conditions are also commonly referred to as “brownout”. A sag condition is when the AC line voltage drops below nominal voltage conditions. A surge condition is when the AC line voltage rises above nominal voltage.

The power supply will meet requirements under the AC line sag conditions specified in the following table. The line frequency is 50 or 60 Hz.

Table 4-5. AC Line Sag Transient Performance

Duration	Sag	Operating AC Voltage	Performance Criteria
0 to 500 ms	10%	Rated AC voltages ¹	No loss of function or performance
0 to 15 minutes	15%	Midpoint of rated AC voltages	No loss of function or performance
0 to ½ AC cycle	30%	Midpoint of rated AC voltages	No loss of function or performance
0 to 5 AC cycles	50%	Midpoint of rated AC voltages	Loss of function acceptable, self recoverable

¹See Section 4.2, *Power Supply Input Specifications*, for rated AC input voltages

The power supply will meet requirements under the AC line surge conditions specified in the following table. The performance criteria is no loss of function or performance. The line frequency is 50 or 60 Hz.

Table 4-6. AC Line Surge Transient Performance

Duration	Surge	Operating AC Voltage
0 to 500 mS	10%	Rated AC voltages ¹
0 to 15 minutes	10%	Mid-point of rated AC voltages
0 to ½ AC cycle	30%	Mid-point of rated AC voltages

¹See Section 4.2, *Power Supply Input Specifications*, for rated AC input voltages

4.9 Regulation Voltage

The following table indicates the regulation voltages as measured on the power supply remote sense points, or if there is no remote sense point for that output then on the power supply output connector.

Table 4-7. Regulation Voltage

Output	Minimum	Nominal	Maximum	% Reg.
+5.1 V (+/- remote sensed)	+4.95	+5.10	+5.25	+/- 3%
+12 V (+/- remote sensed)	+11.4	+12.00	+12.6	+/- 5%
+3.3 V (+/- remote sensed)	+3.20	+3.30	+3.40	+/- 3%
-12 V (- remote sensed)	-11.4	-12.00	-12.6	+/- 5%
-5 V (- remote sensed)	-4.85	-5.00	-5.15	+/- 3%
+5 V standby (- remote sensed)	+4.85	+5.00	+5.15	+/- 3%

4.10 Capacitive Load

The power supply will turn on and operate properly when subjected to a capacitive load within the ranges shown in the following table. Capacitive loads outside this range may cause start-up failure or cause the power supply to operate outside the rated capacity.

Table 4-8. Normal Operating Capacitive Load Range

Capacitive Load Range	Output
1,000 to 5,000 μ F	+5.1 Vdc
7,000 to 14,000 μ F	+12 Vdc
500 to 1,500 μ F	+3.3 Vdc
350 μ F	-12 Vdc

4.11 Ripple and Noise

Ripple and noise are measured with 10 μ F of electrolytic + 0.1 μ F ceramic capacitance on each of the power supply outputs on the docking backplane. The output noise is taken over a 1 Hz to 20 MHz bandwidth.

Table 4-9. Ripple and Noise

+5.1v	+12v	+3.3v	-12v	-5v	+5v standby
50 mVp-p	100 mVp-p	30 mVp-p	120 mVp-p	50 mVp-p	50 mVp-p

4.12 Over Voltage Protection (OVP)

An over voltage condition is sensed on the 3.3 Vdc, 12 Vdc, and 5.1 Vdc outputs for each power supply. The power supply shuts down and latches off in an over voltage condition and is guaranteed to do so within the over voltage threshold range described below. To turn the power supply on again the AC line must be cycled off then turned back on.

Table 4-10. Over Voltage Protection Trip Values

Output Voltage	OVP Threshold
+5.1 V	5.7 - 6.5 V
+12 V	13 - 14 V
+3.3 V	3.7 - 4.2 V
-5 V	(-) 5.7 - 6.5 V
-12 V	(-) 13 - 14 V
5 V Stby.	5.7 - 6.5 V

4.13 Current Transient Specifications

The output voltage remains within the regulation limits defined in Section 4.9, *Regulation Voltage*, for the current transients shown in the table below. The transient response measurements are made with a load changing repetition rate of 50 Hz to 333 Hz and with a capacitance as specified in Section 4.10, *Capacitive Load*. The slew rate of the transient is 1 amp per μ S.

Table 4-11. Current Transient Limits

Output Voltage	Allowable Current Transients
+5.1 Vdc	25 A
+12 Vdc	16 A
+3.3 Vdc	10 A

4.14 Control Signals

4.14.1 System Interlock Switch

The chassis top cover has an integrated interlock switch to protect the user from gaining access to greater than 240VA of energy. This switch will open and disable all power supply outputs in the event that the user tries to gain access to service the computer while the power outputs are enabled. Upon opening the interlock switch, 100 to 800 ms will pass before the system shuts down. This allows time for the system to log an event indicating why the power shut down (i.e., log a chassis intrusion alert).

4.14.2 Remote Sensing

Remote sensing exists on the +5.1 Vdc, +12 Vdc, and the +3.3 Vdc outputs. The -12 Vdc, -5 Vdc, and +5 V standby outputs are referenced to the negative (-) remote sense point. The amount of drop in each output voltage for the remote sense to regulate is specified in the table below. Only voltage drops exterior to the power supply are included. The loss of a remote sense connection will not cause the power supply to go into an over voltage condition.

Table 4-12. Remote Sense Regulation Thresholds

Output Voltage	Maximum Voltage Drop
+5.1 Vdc	0.4V
+12 Vdc	0.4V
+3.3 Vdc	0.4V
Ground	0.4V

4.14.3 Forced Load Sharing

The +5.1 Vdc, +12 Vdc and +3.3 Vdc outputs have forced load sharing. The outputs share within 10% at full load. The failure of a power supply should not affect the load sharing or output voltages of other supplies still operating.

4.14.4 Power Good (PGOOD) Signal

Each power supply provides a power good (PGOOD) signal. This signal indicates that all outputs have reached operating state. The PGOOD signal characteristics are shown in the following table.

Table 4-13. PGOOD Signal Characteristics

Signal State	Voltage / TTL Level
Low state (deasserted)	0.4 V max.
High state (asserted)	3.5 V min.

The PGOOD signal is held low until the +5.1 Vdc output voltage reaches a minimum of 4.75 Vdc. The turn on delay for the PGOOD signal is between 500 and 1500 milliseconds.

4.14.5 Power Supply Failure (FAULT) Signal

The power supply backplane provides an indicator for power supply failure (FAULT). The power supply looks at the load share bus levels, overvoltage conditions, fan fail, over temperature conditions, and over current to assert the fault signal. The signal characteristics for FAULT are shown in the following table.

Table 4-14. Power Supply Failure (FAULT) Signal

Signal State	Voltage / TTL Level
Low state (deasserted - no fault)	0.4 V max.
High state (asserted - fault)	3.5 V min.

4.14.6 LED Indicators

Each power supply has a LED status indicator which can be seen through the exhaust air grating in the rear of the supply. The LED is illuminated green if the power supply self diagnostics test determines that it is operating correctly. If the system is powered up and configured with multiple supplies, a failed supply can be identified as the supply with the dim, unlit, status LED. All failed supplies are also reported to the front panel and the power supply front panel LED is illuminated.

4.14.7 Power Supply Presence (DETECT) Signal

The DETECT signal is used to sense the number of power supplies in the system (operational or not). Detection is done by the I²C controller on the power supply backplane. The DETECT signal is simply the power supply ground signal connected to a pin on the backplane control and status connector (J8).

Table 4-15. Power Supply Presence (DETECT) Signal

DETECT signal	Voltage / TTL level
LOW state (power supply present)	0.4 V max.
HIGH state (power supply NOT present)	3.5 V min.

4.14.8 Fan Requirements

The power supply incorporates a 120 mm fan to exhaust air. The fan implements a failure detect circuit that enables the system to detect a failed power supply fan. This failure is communicated via the front panel controller and is also available on the I²C bus and is reported as a power supply failure, not a system fan failure.

4.14.9 DC Power Enable (PON) Signal

The DC output enable circuit is Safe Extra Low Voltage (SELV). The circuit enables or disables the +5.1Vdc, +12Vdc, +3.3Vdc, -12Vdc, and -5Vdc outputs only. The +5Vstandby output is unaffected by the output enable signal.

Table 4-16. DC Power Enable (PON) Signal Description

PON Signal	Voltage
High, power supply enabled	4 V min.
Low, power supply disabled	2 V max. or open circuit

5. SYSTEM COOLING

Redundant cooling is a standard feature of the AR450GX MP Rack Mount Server System. Four system fans are used to cool the baseboard and adapter card area. The fans are integrated into the system as two series pairs meaning that there are two sets of two stacked fans. Should any one of these fans fail, adequate cooling can still be provided to all system components. System fan failures (such as a locked rotor) illuminate a yellow LED on the front panel, and pass the information to the server management software.

The system fans are fixed speed, ball-bearing type fans which receive their power from the power distribution board. Each fan will assert a signal through the power distribution board to the baseboard should they fail. The fans are easily replaceable, but the system must be powered down to replace them.

The AR450GX MP Rack Mount Server also provides the cooling requirements for the Pentium Pro 200MHz / 1MB processor. Because of the extended power consumption of this high performance processor, a fan heatsink is required to allow for the integration of this processor. An active dual fan heatsink is provided with the 200MHz /1MB processor upgrade kit which provides the cooling requirements while maintaining fan failure redundancy. Each processor module provides the power connectors required for the dual fan heatsink. A fan fail harness is also provided such that heatsink fan failures can be reported to the baseboard and front panel in the same fashion as system fan failures. A fan failure illuminates the front panel LED and the failure information is made available to server management software. Exact details on the installation of the dual fan heatsink and the fan fail harness are included in the 200MHz /1MB processor upgrade kit.

NOTE: Because of the airflow characteristics of the system, the user must not install a full length PCI card in PCI slot 1 (slot nearest the primary processor module). A full length card in this slot blocks airflow necessary to maintain redundant cooling. More commonly used half length PCI cards in slot one will not effect cooling redundancy nor are there any other restrictions placed on the remaining PCI or EISA slots.

In addition to the four system fans, each power supply also contains a fan which is used to cool both the power supply and aid in cooling the SCSI hot-swap drive bay. It is important to recognize that any unpopulated power supply bay must use the blanking plate in order to guarantee the appropriate system cooling characteristics.

6. SYSTEM PERIPHERAL BAYS

6.1 Overview

The AR450GX chassis has three half-height (5.25") peripheral drive bays. The system ships with one of these bays populated with an IDE CD-ROM drive. The two remaining bays are available additional removable media devices such as tape drives or additional CD-ROM drives. Because of the EMI/EMC, ESD, airflow and system cooling characteristics, these bays should not be used for high power/capacity/speed hard drives.

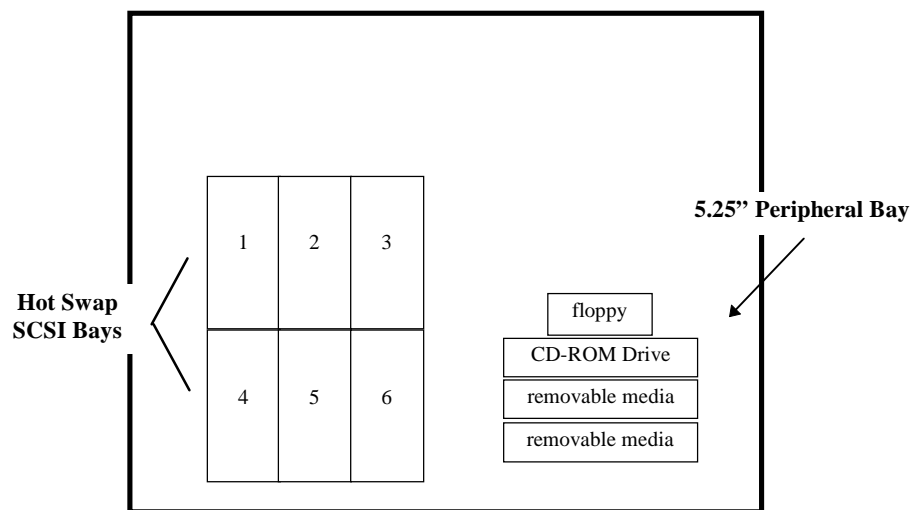


Figure 6-1. AR450GX Chassis Drive Bays

6.2 3.5" Floppy Drive Bay

The system ships from the factory with a 3.5" diskette drive installed in the floppy drive bay. Access to the drive for replacement is by removing the lower section of the front bezel and connecting/disconnecting all cabling by opening the top panel of the chassis. The drive is powered off of one of the peripheral bay power cables.

6.3 CD-ROM Drive

The system ships from the factory with a 16x CD-ROM drive installed in the first 5.25" drive bay below the floppy drive. This CD-ROM uses the integrated IDE controller on the baseboard. Access to the drive for replacement is by removing the lower section of the front bezel and connecting/disconnecting all cabling by opening the top panel of the chassis. The drive is powered off of one of the peripheral bay power cables.

6.4 5.25" Peripheral Drive Bays

The system includes two additional 5.25" half-height peripheral bays. These bays accommodate peripherals with removable media (e.g. diskette drives, CD-ROM drives, or tape drives). These two 5.25" bays are also convertible to a single full-height bay. Mounting brackets for the 5.25" peripherals are included in the cosmetic blanking tray that is installed in these bays as it ships from the factory.

NOTE: The 5.25" peripheral bays are not recommended for hard disk drives, due to several factors. These include hard disk drive generated electromagnetic interference (EMI), increased ESD susceptibility, and cooling issues associated with the power consumption of these devices.

6.5 SCSI Hot-swap Drive Bays

The chassis includes a 6 device hot-swap hard drive bay that accepts 1" and 1.6" hard drive form factors. A hot-swap backplane is part of this drive bay assembly. This backplane uses the industry standard 80 pin Single Connector Attach (SCA-2) connector to attach to the wide SCSI hard drives. The backplane consists of two rows of three drive connectors each. SCSI ID numbering is set by jumpers on the SCSI backplane. A SAF-TE Enclosure Processor (SEP) is located on the backplane to send and receive SAF-TE commands across the SCSI bus. The SEP is identified with SCSI ID 6.

A drive carrier is part of the hot-swap implementation. Any 3.5" peripherals up to 1.6" high can be accommodated in the carrier. The drives are mounted in the carrier with four fastening screws. The carrier is retained in the chassis by a locking handle. Six carriers are included with every system.

These bays accept peripherals that consume up to a maximum of 15W of power and operate at a maximum temperature of 50°C.

An indicator board located above each row of drives displays individual drive status and is visible by looking through the front bezel screen. Each drive has three status LED's: for power on (green LED), activity (blinking green LED), and fault (yellow LED). A fault light on the front panel board also indicates there has been a fault on one of the hard drives. The fault lights will only operate when a SCSI host controller is installed in the system which sends the appropriate SAF-TE control signals. The onboard SCSI controllers do not send the SAF-TE signals and thus will not light the yellow fault lights.

7. SYSTEM INTERCONNECTION

This section details the connections between each of the components in the system as well as the external connections. Refer to Figure 7-1 for a diagram of the system interconnections. Detailed pin outs for most of the connectors is provided in Appendix D of this document. Some of the baseboard pin outs are defined in the *AP450GX MP Server Board Set Technical Product Specification*.

7.1 External Connections

7.1.1 Keyboard and Mouse Control

The keyboard and mouse connectors are PS/2 compatible. These two connectors are identical.

7.1.2 Serial Ports

The baseboard provides two RS-232C, 9-pin serial ports. The two serial port connectors are stacked, 9-pin, D-subminiature connectors. COM A is the top connector of the stacked arrangement, and COM B is the bottom. Each serial port can be enabled separately via the BIOS setup.

7.1.3 Parallel Port

The parallel port is accessed through a 25-pin D-subminiature connector. The parallel port supports ECP protocol with DMA, EPP protocol and IEEE 1284 protocol for PS/2 bi-directional compatibility.

7.1.4 Video Connector

The video port interface is a standard 15-pin, VGA-compatible connector.

7.2 Internal Connections

7.2.1 IDE Bus Interface

IDE is an 8- or 16-bit interface for intelligent disk drives that provides an interface directly to the AT bus. The IDE interface supports both programmed I/O and DMA access. An IDE controller is on the baseboard. A second IDE controller may be added via an adapter card.

7.2.2 Floppy Disk Interface

The AR450GX MP Rack Mount Server System chassis supports two sizes of floppy drives, 5.25" and 3.5". A 3.5" drive is installed in the standard configurations.

7.2.3 Onboard SCSI Interface

The AP450GX MP Server baseboard includes two embedded PCI SCSI controllers. The SCSI controllers are compatible with the Adaptec* AIC-7880, which supports 8-bit Fast SCSI (10 MB/sec), 16-bit fast/wide SCSI (20 MB/sec), or 16-bit Fast-20 SCSI (40 MB/sec). You can switch between fast/wide SCSI mode and Fast-20 SCSI mode via the Adaptec SCSI*Select* Utility. The default mode is fast/wide SCSI. In Fast-20 mode, 8-bit narrow

SCSI devices are not supported off of connector J8 of the SCSI backplane. As a PCI bus master, the SCSI controller supports a bus master burst data transfer up to the maximum rate of 133 MB/sec.

Note: In Figure 7-1, connectors with dashed lines indicate functionality is available but currently not being used. Items with dotted lines are not included in the standard product.

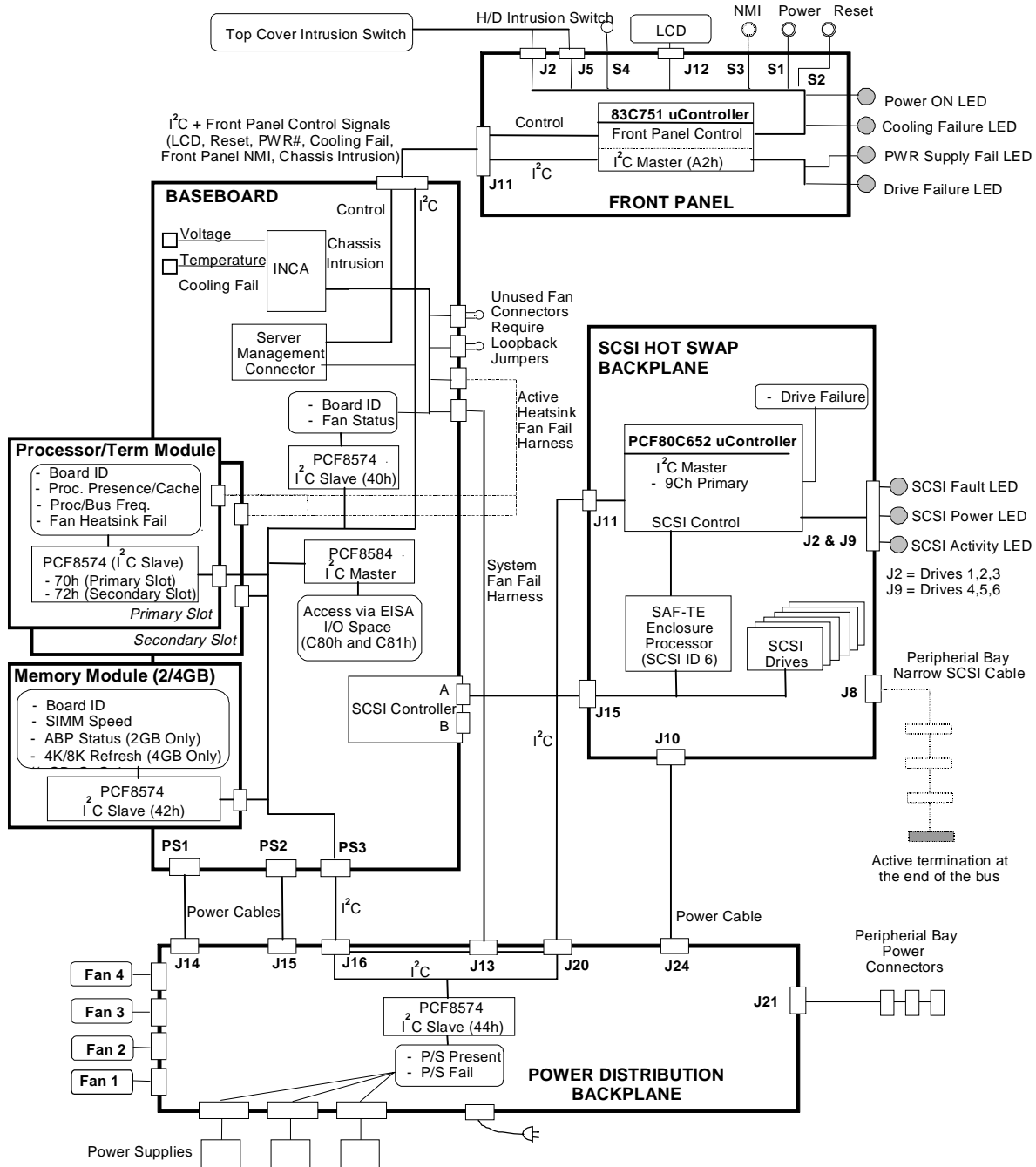


Figure 7-1. System Interconnect Diagram

8. CHASSIS ELECTRONICS

8.1 Overview

In addition to the AP450GX MP Server Board Set, the AR450GX MP Rack Mount Server System contains three other intelligent components. These components are the front panel, the hot-swap SCSI backplane, and the power distribution backplane. Each of these components is described in further detail in the sections below.

8.2 Front Panel

The front panel is a micro-controller-based design which monitors chassis intrusion and provides power control, reset control and an LCD interface. It also informs users of such system abnormalities as power fail, cooling fail, and drive fault via four LED's. Figure 8-1 gives a physical view of the front panel board with emphasis on interface components.

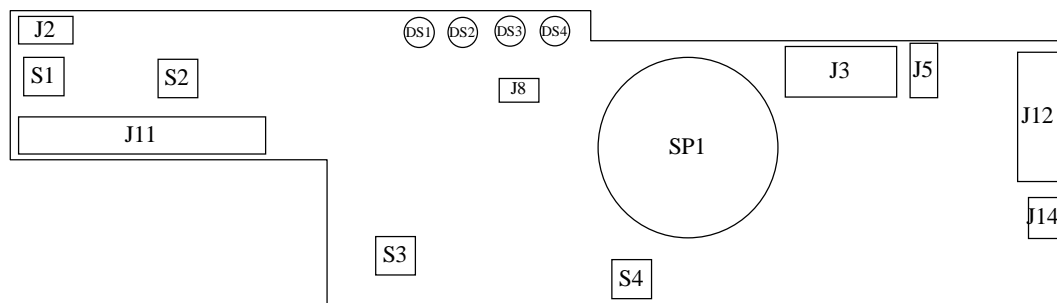


Figure 8-1. Front Panel Board Diagram

Switches S1 through S4 are push button, non-latching momentary contact switches. They are normally open and momentarily closed. The front panel micro-controller handles all the signal debounces.

Table 8-1. Front Panel Board Connector and Switches

Diagram Label	Description
J11	40-pin straight-head connector with housing and pin 17 removed. It provides the interface to the baseboard.
J2 and J5	3-pin right-angle latching-style connectors. They provide interfaces to the top cover intrusion switch
J3	10-pin right-angle connector with housing. (Not used)
J12	14-pin straight-head connector with housing. It provides interface to the LCD.
J14	3-pin straight-head latching-style connector. It routes power to the LCD.
J8	2x3 straight-head non-latching connector. It houses jumpers for software configurations (factory configurable only).
S1	Power switch
S2	Reset switch

Diagram Label	Description
S3	NMI switch. Each depression of this switch generates a non-maskable interrupt to the baseboard. The switch must be released after each depression to prevent the system processor from receiving multiple non-maskable interrupts.
S4	Hard drive bay intrusion switch
SP1	Speaker
DS1	Power on LED, green
DS2	Power fail LED, yellow
DS3	Cooling fail LED, yellow
DS4	Drive fault LED, yellow

8.2.1 Power Control

The system can be powered on or off in three different ways:

- The front panel power switch
- The real-time clock
- An optional server management card

All of the power control signals go through the front panel micro-controller for decoding.

8.2.1.1 Front Panel Power Switch

When the system is powered off, depressing the front panel power switch causes the front panel to initiate a system power-on sequence. This switch can initiate a power-on at any time and power-on in this manner is never blocked by any other system function.

When the system is powered on, depressing this switch causes the front panel to initiate a system power-off sequence. However, secure mode inhibits the power-off function of this switch. See Section 8.2.3, *Secure Mode*, for more information on power inhibiting.

Release of the power switch will not affect the system power state.

8.2.1.2 Real Time Clock Power Control

The baseboard real-time clock (RTC) has a power control signal routed to the baseboard interface connector (J11). This signal has two modes of operation on the front panel, level or pulse. Front panel jumper settings select the power signal mode and must match the mode used by the baseboard and BIOS.

Level mode can only be used on baseboards that supply separate power control signals for the RTC and server management card. The AP450GX MP Server baseboard uses level mode. Level mode defines the power control signal as active low. The system powers on when there is a high-to-low transition on the signal line. The power signal must be held low to maintain system power-on state. Alternatively, the system powers off when there is a low-to-high transition on the signal line. The power signal must be held high to maintain the system power-off state.

NOTE: *The level state of the power control signal does not in itself affect the state of the system power. A low on the power control signal does not indicate the system power should be on while a high does not indicate the power is off. A transition on the signal must happen for the level state of the signal to be interpreted. This restriction is enforced because the system can be powered on by mechanisms other than the RTC (e.g., front panel power switch, server management card, etc.). When the system power is turned on by any other means, the state of the power control signal can either stay unchanged or be toggled by software control. Holding the power control signal at a specific logic level does not prevent other mechanisms from controlling the system power.*

Power control from RTC is typically used during Automatic Server Recovery (ASR) by setting an alarm in the RTC prior to power-off. It can also be used by BIOS or a utility program to power the system on or off at a predetermined time set in the RTC.

8.2.1.3 Optional Server Management Card Power Control

The server management card connection on the baseboard provides a power signal line that is routed through the baseboard to the front panel via the baseboard interface connector (J11).

When the system is powered off, power-on can be initiated by the server management card pulsing the signal low. When the system is powered on, a low pulse of the power signal will initiate a system power-off sequence. The minimum pulse width is 5 ms, and the maximum pulse width is 100 ms.

8.2.2 Power Recovery

The front panel has an EEPROM chip that records the state of the system power. If AC power is interrupted while the system is powered on, the front panel will restore the system to the power-on state when AC power is restored. This function is automatic, is independent of secure mode, and does not require intervention by an operator or the server management card. If the system is powered off and AC power is interrupted, the system will remain at power-off when AC power is restored.

8.2.3 Secure Mode

Secure mode is a user selectable feature, via the BIOS setup, to keep accidental power-off or reboot from happening via the front panel switches. When the secure mode is enabled, a signal from the baseboard disables the front panel power and reset switches. The secure mode signal is routed to the baseboard interface connector (J11). Secure mode only disables the front panel reset and power switches. It has no effect on a server management card or the baseboard RTC power control.

Removal of secure mode will not cause the system power to change state. For example, if the power switch is depressed and released while secure mode is active, the system will not power off when secure mode is later removed. However, if the front panel power switch remains depressed when secure mode is removed, power-off will occur.

8.2.4 Reset Control

A hard system reset can be initiated by depressing the front panel reset switch. The system will be held in the reset state until the switch is released.

A system reset command can also be sent via the I²C bus. Secure mode has no effect on I²C reset control.

8.2.5 LCD Interface

The baseboard provides status information to the LCD. The front panel board converts serial data from the baseboard to parallel data on the LCD and vice versa. In addition, the front panel provides backlight power for the LCD.

8.2.6 Front Panel Micro-controller

The front panel micro-controller provides the following functions and operates on 5V standby:

- Signal Debounce for all switches
- Front Panel LED Control
- I²C Slave device (Address A2h)
- Power State Control

The micro-controller operates from firmware stored inside the controller. This firmware is not field upgradable. Currently the controller is a socketed device.

As an I²C slave device, the micro-controller stores the power supply and hard drive failure status information. The power supply and hard drive fault lights are then asserted if a fault is detected.

The cooling fail LED is asserted if the COOL_FAIL# signal, provided by the baseboard, is asserted. The COOL_FAIL# is a logical OR of all four fan fail signals.

An EEPROM on the front panel records the power state of the system. The micro-controller accesses the front panel EEPROM to restore the correct power state when power returns after AC power has been lost. If the system power was off when AC power was lost, the system will remain off when AC power is returned. If the system power was on when AC power was lost, the micro-controller will power back on the system when AC power is returned.

8.3 Hot-swap SCSI Backplane

The SCSI backplanes supports up to six SCA-2 style Hot-swap SCSI drives. The industry standard SCA-2 connector is used to ensure proper alignment and connection of the hard drive to the SCSI backplane connector.

The SCSI backplane includes the following features:

- Up to six wide SCSI (16-bit) drives per board
- Single connector attachment (SCA-2) to simplify insertion and removal of hard disk drives and ensure drive alignment and connection
- Insertion and removal of hard drives with power on (hot-swap)
- Jumper selectable SCSI ID
- LED indicators for each drive
- Power control for each hard drive
- Onboard Wide to Narrow SCSI conversion for additional 8-bit devices (In Fast-20 mode, 8-bit narrow SCSI devices are not supported)
- Automatic cable sense termination for narrow SCSI connector
- Micro-controller to monitor activities
- I²C bus master for server management information (Address 9Ch/9EH Primary/Secondary)
- Ease of RAID integration
- Flash memory for upgrading firmware

Figure 8-2 illustrates the SCSI backplane board layout, emphasizing the interface components.

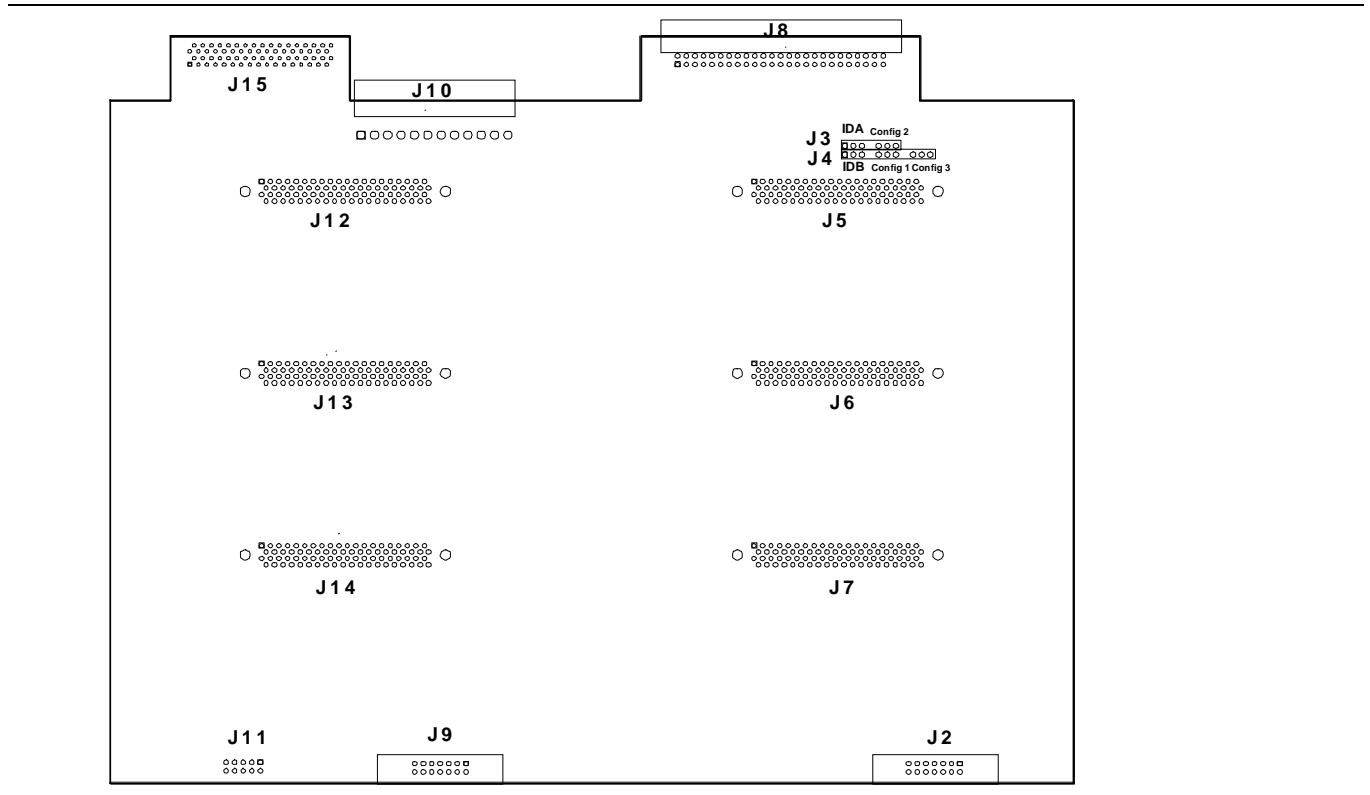


Figure 8-2. SCSI Backplane Block Diagram

8.3.1 Drive Support

The SCSI backplane supports a maximum of six 1" or 1.6" tall, wide SCSI drives. SCSI I or II drives may be installed with either an SCA-1 or SCA-2 connector.

8.3.2 Connector Descriptions

Below are descriptions for each of the board connectors. Refer to Appendix D for pin outs.

8.3.2.1 Hot Plug Single Connector Attachment (J5, J6, J7, J12, J13, J14)

The Single Connector Attachment (SCA) drive connector is designed for 500 insertions. This is an SCA-2 connector.

A power control circuit is added to the SCA connection, to allow removing and replacing drives while power is on. A hot plugged drive will not cause electrical disturbance to adjacent drives or disrupt data integrity on the SCSI bus.

8.3.2.2 Narrow SCSI Support (J8)

One to three additional narrow SCSI drives can be controlled by the SCSI backplane. The narrow drives are attached using a standard 50 pin header ribbon cable at connector J8. No conversion for narrow SCSI is required. In Fast-20 mode, 8-bit narrow SCSI devices are not supported off of connector J8.

8.3.2.3 LED Hard Drive Indicators (J2, J9)

The SCSI backplane drives two LED boards connected through J2 and J9. The LED boards contain three high intensity LED indicators for each hard drive. A yellow LED indicates a drive fault, a green LED indicates power, and a second green LED indicates drive activity.

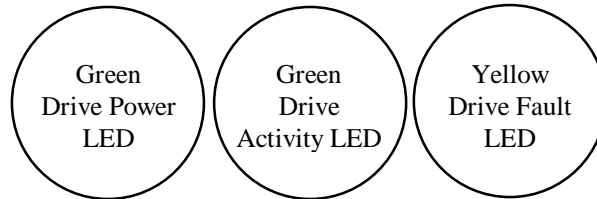


Figure 8-3. LED Drive Indicators

8.3.2.4 Power (J10)

Power to the SCSI backplane is provide from the power distribution backplane through connector J10.

8.3.2.5 Fast/Wide SCSI Connection (J15)

A 16-bit wide SCSI connection is provided with J15. In a standard configuration J15 is connected to the SCSI controllers on the system baseboard. If a SCSI adapter is installed, it may connect to the SCSI backplane via this connector.

8.3.2.6 I²C Bus & Power Control (J11)

J11 connects the SCSI backplanes to the power distribution backplane. Power control and the I²C bus are routed through J11.

8.3.3 SCSI Backplane Micro-controller

The SCSI backplane has an 8-bit micro-controller (P80C652) which performs two functions. It controls a Symbios 53C80E which functions as the SEP (SAF-TE Enclosure Processor). The SEP (SCSI ID 6) sends and receives SAF-TE commands between the backplane and a host SCSI controller. The SAF-TE commands allow the host adapter to communicate with the backplane via the SCSI bus and perform functions such as turning on the fault light for a faulted drive. The micro-controller also performs the function of a bus master on the internal I²C diagnostic bus. As a bus master the micro-controller queries the power distribution backplane for faulted power supplies. It also queries itself for faulted hard drives. If a power supply or hard drive is faulted, the micro-controller will signal the front panel, via the I²C bus, to light the appropriate yellow fault LED on the front panel.

The micro-controller operates from firmware stored in a flash device on the SCSI backplane. The firmware is field upgradable via a DOS based update utility. Refer to the system *Installation Guide* for more details on the update procedure.

8.3.4 Termination

The SCSI bus runs from the baseboard or controller card, through a cable to the connector J15, through J12, J13, J14, J7, J6, and J5. The upper 9 bits (8 data bits and 1 parity bit) of the bus are then terminated. With no cable plugged in to J8, the remaining narrow SCSI bus at J8 is automatically terminated using active termination. A cable plugged into J8 (with devices on the cable) will be sensed by pin 21 on connector J8 and the termination on the Narrow portion of the SCSI bus will be deactivated. The end of the bus is now the end of the cable that is plugged in, which means the user must provide active termination at the end of the cable.

NOTE: A plugged in narrow cable with no SCSI devices on it will not deactivate the termination. The SCSI device on the cable is what makes pin 21 sense activity. The user must not plug in the narrow cable and leave it hanging with no SCSI devices attached to the cable. This will violate the bus specification by attachment of a huge stub.

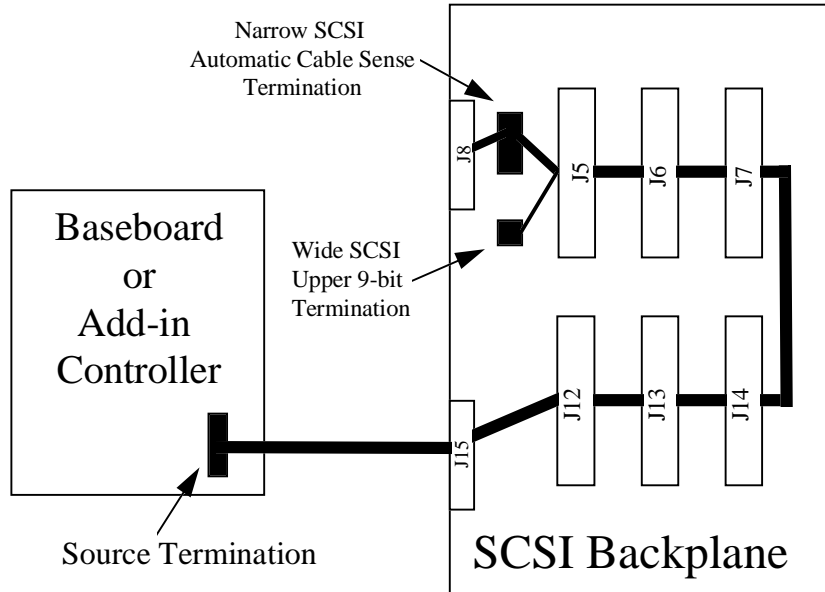


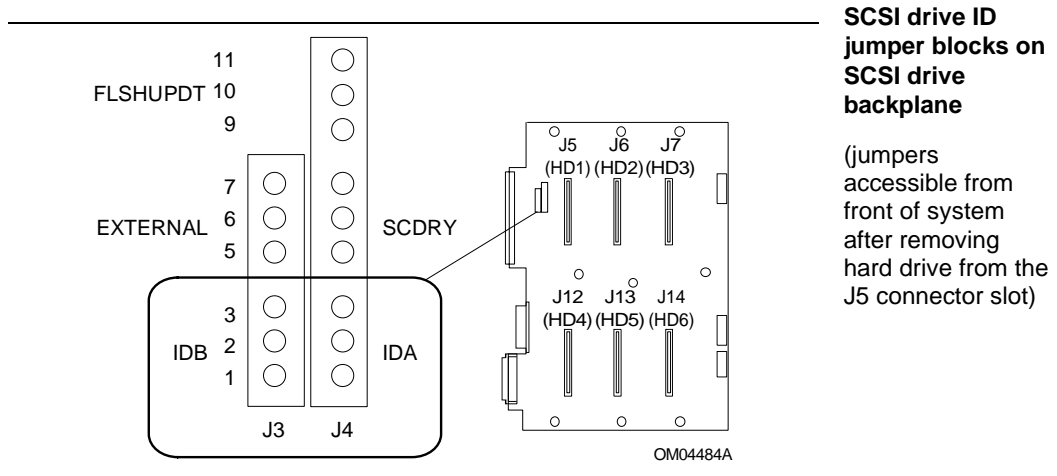
Figure 8-4. SCSI Bus And Termination

8.3.5 SCSI Backplane Jumpers

The SCSI backplane has a jumper block which controls various configuration options. There are five different jumpers, each of which are described below.

8.3.5.1 SCSI Drive ID Jumpers (J3, J4)

The six drives on the SCSI backplane can be configured to have different SCSI ID's to allow specific IDs to be used for narrow SCSI devices like a CD-ROM or tape backup drive which may have a fixed SCSI ID. Program control must read the drive ID to correlate a drive fault message to the appropriate fault light over a drive bay. The SCSI micro-controller on the SCSI backplane is always set to SCSI ID 7. Similarly the SAF-TE Enclosure Processor (SEP) is always set to SCSI ID 6. Figure 8-5 shows the location of the jumper block on the SCSI backplane. Table 8-2 shows the ID configuration choices for each drive. Although the physical connectors are numbered Jx on the backplane, the drive locations are called HD1 through HD6 here to make it easier to describe ID jumpering for each drive (see Table 8-2).



SCSI drive ID jumper blocks on SCSI drive backplane

(jumpers accessible from front of system after removing hard drive from the J5 connector slot)

Figure 8-5. SCSI Drive ID Jumper Blocks

Table 8-2. SCSI Drive ID Jumpers

Jumper pins at		SCSI IDs for HD 1 through HD 6:					
J3	J4	HD 1	HD 2	HD 3	HD 4	HD 5	HD 6
1-2	1-2	0	1	10	3	4	13
1-2¹	2-3¹	0	1	2	3	4	5
2-3	2-3	8	9	2	11	12	5
2-3	1-2	8	9	10	11	12	13

Note:

1. Factory default settings shown in **boldface**.

8.3.5.2 SCSI External Jumper (J4)

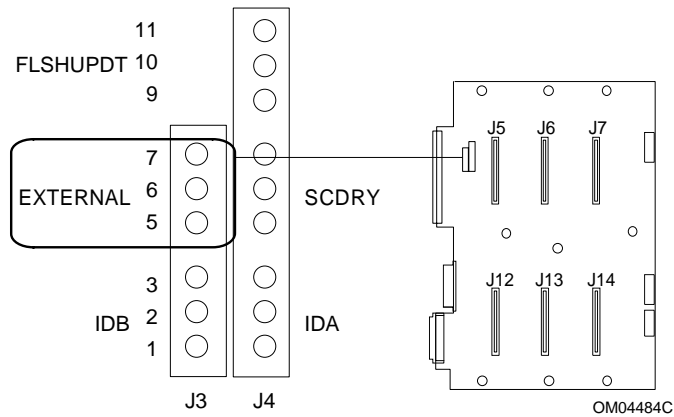


Figure 8-6. SCSI External Jumper (J4)

5-6 Internal backplane, factory default

6-7 External backplane

This jumper is used to indicate if the SCSI backplane is installed in the host system/chassis (internal) or in an external chassis (for example a hard disk only chassis). In the latter case, the jumper setting could enable the backplane to assume basic enclosure services associated with the front panel. The SCSI backplane, however, is only being used in the “internal” configuration thus the external jumper setting should never be used.

8.3.5.3 SCSI Flash Update Jumper (J4)

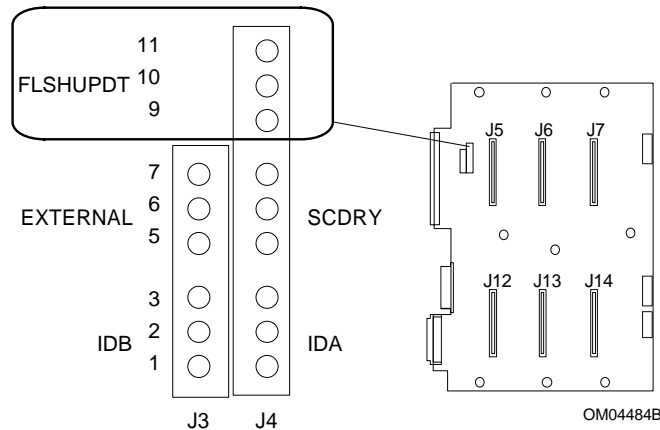


Figure 8-8. SCSI Flash Update Jumper (J4)

9-10	Normal, factory default
10-11	SCSI flash recovery mode

For normal operation and flash updates, the jumper should be on pins 9 and 10 at J4. To enable the SCSI flash recovery mode, the jumper should be moved to pins 10 and 11 at J4. The SCSI flash recovery mode should only be used if the SCSI backplane firmware becomes corrupted and a recovery is needed. In recovery mode, the SCSI backplane has limited functionality and all drive fault lights will be lit. For normal and recovery update procedures, see the “Updating Flash Memory” chapter in the *Installation Guide*.

8.4 Power Supply and Power Distribution Backplane

System power is provided by either one, two or three 625W power supplies. Each supply plugs into a power distribution backplane which connects together the outputs from all supplies in the system into one output for each voltage (+3.3V, +5.1V, +12V, +5Vstandby, and -5V). This current sharing allows each power supply to provide an approximately equal amount of current at each voltage. In addition, the load sharing circuit guarantees the +3.3V, +5.1V and +12V current outputs for each supply in the system will be to within 10% of each other. The failure of a power supply in a redundant configuration will not affect the load sharing or output voltages of the power supplies still operating.

8.4.1 Connector Descriptions

Below are descriptions for each of the board connectors. Refer to Appendix D for pinouts.

8.4.1.1 System Fan Power Connectors (J1 -J12)

Power to the four system fans is provided through J1, J2, J3 and J4. These connectors also allow for the fan failure signal to be communicated from each fan. J5 - J12 are not used in the AR450GX MP Rack Server System but have jumpers attached which disable the fan fail signal.

8.4.1.2 Fan Fail Harness Connector (J13)

System fan fail signals are communicated through J13 to the baseboard. The fan fail harness plugs into Fan 3 or 4 on the baseboard.

8.4.1.3 Baseboard Power (J14, J15)

Power to the baseboard is provided from J14 and J15. These two connectors are identical and the cables may plug into either PS1 or PS2 on the baseboard.

8.4.1.4 Baseboard Power Control (J16)

The power control, including remote sense signals, are provided to the baseboard through J16. This connector also connects the I²C communication bus from the SCSI backplane and power distribution board to the baseboard. The cable plugs into PS3 on the baseboard.

8.4.1.5 Unused Connectors (J17 - J19)

These connectors are unused.

8.4.1.6 SCSI Backplane Power and Control (J20)

The power distribution backplane provides +5.1V, +5V standby and an I²C bus connection through J20. The power distribution backplane provides power supply status information via the I²C bus.

8.4.1.7 Peripheral Bay Power (J21 - J23)

Power to the 5.25" peripheral bays is provided from J21. J22 and J23 are also provided for powering standard 5.25" peripheral devices.

8.4.1.8 SCSI backplane Power Connectors (J24)

Power to the SCSI backplane is provided through J24.

8.4.1.9 Unused Connectors (J25 - J32)

These connectors are unused.

8.4.1.10 Top Cover Intrusion Alert (J33)

Notification of an opening of the top panel of the chassis is delivered through J33. The top cover intrusion alert cable is plugged into J1 and J6 of the front panel controller.

8.4.1.11 Top Cover Intrusion Interlock Switch (J34)

Power to the system is shut down if the chassis intrusion switch connected to J34 is opened while the system is operating. This feature is implemented for safety purposes in order to protect the user from access to any 240VA energy hazards.

8.4.1.12 Unused Connector (J35)

This is an unused connector but requires that a jumper be installed for appropriate operation of the system.

8.4.1.13 Unused Connectors (J36, J37)

These connectors are unused.

9. SERVER MANAGEMENT

The AR450GX MP Rack Mount Server System provides the following server management features that allow prediction and detection of system errors. Many of the features are available via Intel's LANDesk® Server Manager (LDSM) software.

- Chassis Intrusion Alert
- Fan Fail Alert
- Power Supply Fail Alert
- Hard Drive Fail Alert
- Temperature and Voltage Monitoring
- Fault Resilient Booting
- Error Logging
- ECC Memory
- Memory Down Sizing
- I²C diagnostic bus
- LCD Display
- Optional Emergency and Remote Management capabilities via Intel's Server Monitor Module

9.1 System Alerts

All alerts as well as the temperature and voltage monitoring listed above are monitored by LANDesk Server Manager. LANDesk Server Manager will notify the user of the alert by generating an event on the server management console. Each alert can be either turned on or off with LANDesk Server Manager. If turned on, the alert will generate a number of user defined events (tasks) from beeping the console and flashing an icon, to powering down the server or even sending a page (only if Intel's Server Monitor Module is installed). Refer to the LANDesk Server Manager manuals and the *Intel Server Monitor Module Technical Product Specification* for more details.

9.1.1 Chassis Intrusion Alert

There are two intrusion switches on the chassis, one on the top chassis cover and one on the metal hot-swap hard drive EMI door, that will generate an alert if any one is opened. These alerts are passed to the INCA component on the baseboard where the server management software will detect them and indicate a breach of security on the server management console.

9.1.2 Fan Fail Alert

Each of the four system fans will assert a fail signal to the baseboard if the fan has a significant reduction in speed. The fan fail signals are logically OR'd and passed to the INCA component on the baseboard where the server management software will detect them and indicate a system fan failure on the server management console.

9.1.3 Power Supply Fail Alert

Each power supply provides a signal that indicates a fault. The power supply looks at load share bus levels, over-voltage conditions, fan fail, over temperature conditions, and over-current. If any is out of specification, the power supply will assert its fault signal. If any one of the power supplies indicates a fault, the Power Supply Fault

LED on the front panel will be lit. The status of LED light on the failed power supply will help determine which supply has failed when installed in a multiple power supply configuration. Other than the Front Panel LED and the LED light on the back of the power supply, there are no other indications of a power supply failure.

In addition to the power supply fault status, a power supply present status is also stored in the I²C slave device on the power distribution backplane.

9.2 Temperature and Voltage Monitoring

Voltage and temperature are both monitored by devices on the baseboard. Voltage is monitored at the pins of the INCA component (+3.3V, +5.1V and +12V), while temperature is monitored at two different places on the baseboard. One is near the processor modules, the other is near the PCI adapter slot area. All three conditions are routed to the INCA device where management software will monitor them.

Within Intel's LANDesk Server Manager, two different levels of user selectable alerts for the voltage and temperature channels can be enabled. The first is a warning alert which indicates something is beginning to go wrong, but is not deemed to be a critical event, such as the temperature in the system is beginning to rise, but is not yet out of specification. The second is a fatal alert indicating something more drastic has occurred, like the system is beyond its guaranteed operating temperature. Different events can be selected in LANDesk Server Manager for the different level of alert. For example a warning alert may only flash a message to the console, while a fatal alert may immediately shut down the system. Refer to the LANDesk Server Manager manuals for more details.

9.3 Fault Resilient Booting

To insure greater reliability and up time, the system has the ability to boot, even if the Boot Strap Processor (BSP) is faulty. This is called fault resilient booting (FRB). FRB is implemented in the following manner: If the BSP is faulty, the faulted processors is marked "bad" and eliminated from the system. The BSP responsibilities are then passed to the next processor. If this processor is also faulty, it too is eliminated from the system and the BSP responsibilities are passed on to the next processor in the system. This procedure continues until a "good" processor is found to complete system boot. If all processors in the system are deemed faulty, the system will try to boot with the last processor it marked "bad".

A processor is deemed good by passing two tests. First the processor must pass its own BIST (Built-In-Self-Test). BIST is built into the processor. If the processors fails its own BIST, it will be deemed faulty. Second, the processor must complete its BSP responsibilities before a "watchdog timer" in the INCA component times out. The watchdog timer is set at power on and begins counting down. The BSP will turn off the timer when it completes its BSP responsibilities. If the BSP processor does not turn off the timer before it gets to zero, the processor will be deemed faulty. The timer is set for ~26 minutes, which is the theoretical maximum time it will take the processor to complete its BSP responsibilities with a fully loaded system (4GB of memory, 10 adapter cards, lots of disk etc.) This timer value is not user programmable. The BIOS will send an error message to the screen if it determines one of the processors is faulty.

It is the responsibility of the operating system to determine if processors in the system other than the BSP are faulty. This process varies with different operating systems. Both the SCU and BIOS setup will indicate if a processor has been deemed faulty.

9.4 Critical Event Logging

The system has the ability to log critical system events into a non-volatile event log. These events can then be communicated to the server console via server management software such as Intel's LANDesk Server Manager. The critical events that are logged are listed below:

- Processor bus errors (Single Bit and Multiple Bit bus errors)
- ECC Memory Errors (Single Bit, Multiple Bit and memory parity errors)
- PCI Bus Errors (PCI Parity or PCI System errors)
- POST Errors (If Memory is resized and other POST errors)
- Environmental Errors (Voltage, Temperature or Cooling errors)

Notes:

1. Both Event Logging and the SMM (System Management Mode) should both be enabled for full critical event logging and proper responses to occur.
2. Errors will only be logged if Event Logging is turned on in the BIOS set-up.
3. Intel's LANDesk® Server Manager will still detect and report all errors, except ECC Memory Errors, even if Event Logging is turned off.
4. The BIOS will perform memory scrubbing (i.e., fix single bit errors in memory) only if the SMM is enabled.

9.5 ECC Memory

Using affordable parity SIMMs or DIMMs, the system performs single bit error correction and double-bit error detection. Single bit errors have no impact on system performance or data integrity because the errors are corrected on the fly, however if a double bit error is detected, the system will not be able to continue and will halt. Whether the shutdown is graceful or not is dependent on the ability of the operating system to handle the double bit error. If error logging is enabled, both the single bit and double bit errors will be logged in NVRAM.

9.6 Memory Downsizing

During POST (Power-On-Self-Test) the system scans memory for bad memory locations (unless the memory scan is turned off in the BIOS setup). If a bad memory location is found, memory will be reduced in size, but not configuration, until the bad location is no longer used.

9.7 I²C Diagnostic Bus

The system has an I²C (Inter-Integrated Circuit) bus routed in the system to facilitate diagnostic communications between all major components in the system. Refer to Figure 7-1 in Chapter 7 for the exact routing within the system. There is also a separate connector on the baseboard to allow for additional I²C connections, although I²C connections other than those shown below are not recommended.

During POST (Power-On-Self-Test) the BIOS performs three operations from the baseboard I²C master device:

- Read to the memory module to determine the speed of SIMMs or DIMMs installed.
- Read to both processor slots to determine the processor and bus frequency requested by each module as well as the processor steppings installed.
- Read to the baseboard to determine revision level of the baseboard.

During system runtime, the primary SCSI backplane performs three operations:

- Reads the secondary SCSI backplane to determine if a drive has faulted.
- Reads the power distribution backplane to determine if a power supply has faulted.
- Writes to the front panel to assert the power supply or hard drive fault light if a power supply or hard drive fault has occurred.

9.8 LCD Display

The LCD display has two lines with 16 characters per line and is used to display the BIOS POST codes as well as certain runtime error messages. The display can be programmed through the SCU to display anything the user wants, however the second line may be used by the BIOS to display runtime error messages.

9.9 Server Monitor Module Connector

The sever monitor module or “feature” connector on the baseboard allows Intel’s Server Monitor Module to be installed. The ISA based module enables emergency and remote management of the server. Refer to the *Intel Server Monitor Module Technical Product Specification* for more details.

10. ENVIRONMENTAL CERTIFICATIONS

10.1 Safety

The system is UL listed to UL 1950, 2nd Edition.

10.1.1 USA

The system is certified by UL(cUL) to meet the requirements of CSA C22.2 No. 950-M93. The product bears the cUL mark.

10.1.2 Canada

The system is certified by UL(cUL) to meet the requirements of CSA C22.2 No. 950-M93. The product bears the cUL mark.

10.1.3 Europe

The system is certified to meet the requirements of EN 60 950 with TUV (GS License), and IEC 950 with amendments.

10.1.4 International

The system is certified to meet the requirements of amendments and IEC 950 with amendments, EN 60 950 with amendments and Nordic deviations by NEMKO.

10.2 Electro-Magnetic Compatibility

10.2.1 USA

The system is certified to FCC CFR 47 Part 15, Class A.

10.2.2 Canada

The system complies with the Limits for Radio Noise Emissions for Class A Digital Apparatus as required by Industry Canada (IC).

10.2.3 Europe

The system complies with the EU EMC directive (89/336/EEC) via EN 55022, EN61000-3-1, Class A and EN 50082-1. The product will carry the CE mark. The system is tested to the following immunity standards and maintains normal performance within these specification limits:

IEC 801-2	ESD Susceptibility (level 1 contact discharge, level 3 air discharge)
IEC 801-3	Radiated Immunity (level 1)
IEC 801-4	Electrical fast transient (level 1)

10.2.4 International

The system is compliant with CISPR 22 class A.

10.2.5 Japan

The system is registered with VCCI and complies with VCCI Class 1 limits (CISPR 22 A Limit).

11. ENVIRONMENTAL LIMITS

Table 11-1. System Environment Summary

Parameter	Minimum Specification
<ul style="list-style-type: none"> Temperature 	Operating: 10° to 35°C Non-Operating: -40° to +60°C
<ul style="list-style-type: none"> Relative Humidity 	Non-Operational: 95% RH @ 30°C
<ul style="list-style-type: none"> Shock 	Operating: Half Sine 2g for 11ms. Packaged: Half Sine 2msec, height is determined by weight of the package: Free Fall Height: 6"
<ul style="list-style-type: none"> Unpackaged Vibration 	5Hz to 20Hz: 0.001g ² /Hz sloping up to 0.01g ² /Hz 20Hz to 500Hz : 0.01g ² /Hz (flat) Area under the PSD curve is 2.2 gRMS 10 minutes per axis for all samples
<ul style="list-style-type: none"> Packaged Vibration 	10Hz to 40Hz: 0.015g ² /Hz (flat) 40Hz to 500Hz :0.015g ² /Hz sloping down to 0.00015g ² /Hz Area under the PSD curve is 1.03 gRMS 1 hour per axis for all samples
<ul style="list-style-type: none"> Operating Voltage and Frequency 	AC Frequency: 47 to 63Hz AC Voltage: 90 - 132V 180 - 264V
<ul style="list-style-type: none"> Power Fail 	AC Source interrupt: No loss of data for power line drop of one half cycle, full load over full operating range.
<ul style="list-style-type: none"> Power Surge 	AC Surge: Non-operational and operational: 1.0KV unidirectional, 2.0KV ring wave
<ul style="list-style-type: none"> ESD 	Air discharge operational ESD: 0 - 2KV no flicker/bounce 0 - 8KV no intermittent failures 0 - 15KV no hard failures
<ul style="list-style-type: none"> Acoustic Noise 	System active less than 55dbA, at the bystander position (~3 ft from the system)
<ul style="list-style-type: none"> Operating Altitude 	0 to 10,000 feet (0 to 3,050 meters)

12. RELIABILITY, SERVICEABILITY AND AVAILABILITY

12.1 MTBF

The following table lists the calculated AR450GX MP Rack Mount Server System hard Mean Time Between Failures (MTBF). A hard failure indicates a permanent or repeatable failure that can be readily remedied by replacing the faulty part with a good one. MTBF numbers are calculated using the Bell Core Method 1, Case 3 and associated tables.

Table 12-1. AR450GX System MTBF at 35°C

Sub Assembly Description	Total Sub Assembly MTBF (In Hours)	Total Sub Assembly Failure Rate (FITs)
Baseboard	144,191	6,935
2 Processor Modules (w/ 1 200/512KB processor each)	136,183	7,343
1GB Memory Module	582,892	1,716
1 SCSI Backplane	299,043	3,334
Front Panel Board	1,055,911	947
2 SCSI drive LED Boards	6,493,506	154
Power Distribution Backplane	220,828	4,528
LCD	862,995	1,159
One 625W Power Supply	75,000	13,333
1.44 MB 3.5" Floppy Drive	405,000	2,469
Four 64MB SIMMs	862,664	3,709
AR450GX Rack Chassis	19,230,769	42
Total MTBF (hours)	23,524	
Total Failure Rate (FITs)		42,510

Notes:

1. 1 baseboard, 2 processor modules, 2 200 MHz/512 KB Pentium® Pro processors, and a 1 GB memory module with 256 MB memory.
2. At 25°C the MTBF for this configuration is expected to be 31,692 hours.

12.2 Serviceability

The system is designed for service by qualified technical personnel only. The desired Mean Time To Repair (MTTR) of the system is 30 minutes including diagnosis of the system problem. To meet this goal, the system enclosure and hardware have been designed to minimize the MTTR. In Table 12-2 are the maximum times a trained field service technician should take to perform the listed system maintenance procedures, after diagnosis of the system.

Table 12-2. Maintenance Procedure Performance Times

Maintenance Procedure	Maximum Time to Perform
Remove cover	30 seconds
Remove and replace disk drive	1 minute
Remove and replace power supply	1 minute
Remove and replace expansion board	5 minutes
Remove and replace front panel board	5 minutes
Remove and replace baseboard (with no expansion boards)	10 minutes
Remove and replace power backplane	30 minutes
Remove and replace SCSI backplane	15 minutes
Overall MTTR (not including problem diagnosis)	15 minutes

12.2.1 Power and Status/Control Signals to SCSI Backplane

The distribution board provides power from connectors J1 and J2 to J20 on the SCSI backplane(s). The distribution board provides power status and control signals from connector J10 to J11 on the SCSI backplane(s). See pinout tables in Appendix D.

APPENDIX A -- SUPPORTED ENVIRONMENTS

The AR450GX MP Rack Mount Server System has been validated with the leading network operating systems, adapter cards and SIMM combinations. Refer to the *AP450GX Server Board Set Technical Product Specification* and the *AP450GX MP Server Board Set Specification Update* for more details.

APPENDIX B -- PRODUCT CODES

Contact your Intel sales representative for the current product codes, availability and pricing.

APPENDIX C -- SPARES LIST

Contact your Intel sales representative for the current spares list, availability and pricing.

APPENDIX D -- CONNECTOR PINOUTS

This appendix contains the connector pinouts for the AR450GX MP Rack Mount Server System. Refer to the *AP450GX Board Set Technical Product Specification* for the baseboard connectors not listed here.

D.1 SCSI Backplane Connectors

Figure D-1 shows connector locations on the SCSI drive backplane.

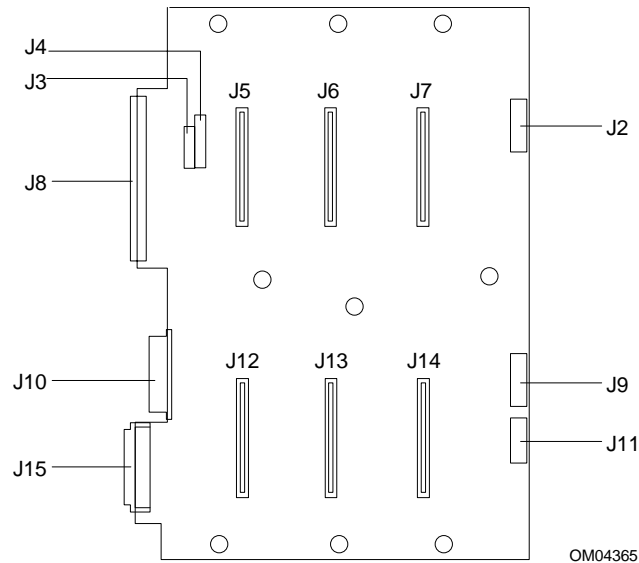


Figure D-1. SCSI Backplane Connectors

Table D-1. SCSI Backplane Connectors

J3, J4	Drive ID and configuration jumper blocks
J8	Narrow SCSI cable, output (only supported in fast/wide mode)
J10	Power and ground from power distribution board
J15	Wide SCSI cable, input from SCSI channel A or B
J2	LED connector cable for drives 1, 2, 3
J9	LED connector cable for drives 4, 5, 6
J11	I ² C bus connector (power status/control signal)
J5	Wide SCSI drive bay
J6	Wide SCSI drive bay
J7	Wide SCSI drive bay
J12	Wide SCSI drive bay
J13	Wide SCSI drive bay
J14	Wide SCSI drive bay

D.1.1 50-pin Narrow Output Connector (J8 - SCSI Backplane)

This is only supported in fast/wide mode.

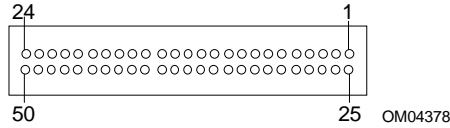


Figure D-2. Connector J8 - SCSI Backplane

Table D-2. Connector J8 - SCSI Backplane

Signal name	Connector contact	SCSI bus conductor	SCSI bus conductor	Connector contact	Signal name
GND	1	1	2	2	DB(0) #
GND	3	3	4	4	DB(1) #
GND	5	5	6	6	DB(2) #
GND	7	7	8	8	DB(3) #
GND	9	9	10	10	DB(4) #
GND	11	11	12	12	DB(5) #
GND	13	13	14	14	DB(6) #
GND	15	15	16	16	DB(7) #
GND	17	17	18	18	DB(P) #
GND	19	19	20	20	GND
GND	21	21	22	22	GND
Reserved	23	23	24	24	Reserved
Open	25	25	26	26	TERMPWR
Reserved	27	27	28	28	Reserved
GND	29	29	30	30	GND
GND	31	31	32	32	ATN #
GND	33	33	34	34	GND
GND	35	35	36	36	BSY #
GND	37	37	38	38	ACK #
GND	39	39	40	40	RST #
GND	41	41	42	42	MSG #
GND	43	43	44	44	SEL #
GND	45	45	46	46	C/D #
GND	47	47	48	48	REQ #
GND	49	49	50	50	I/O #

D.1.2 68-pin Wide Input Connector (J15 - SCSI Backplane)

This is only supported in fast/wide mode.

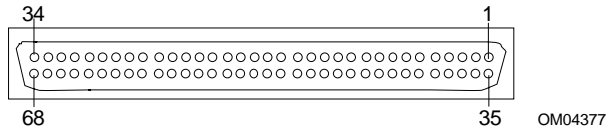


Figure D-3. Connector J15 - SCSI Backplane

Table D-3. Connector J15 - SCSI Backplane

Signal name	Connector contact	SCSI bus conductor	SCSI bus conductor	Connector contact	Signal name
GND	1	1	2	35	DB(12) #
GND	2	3	4	36	DB(13) #
GND	3	5	6	37	DB(14) #
GND	4	7	8	38	DB(15) #
GND	5	9	10	39	DB(P1) #
GND	6	11	12	40	DB(0) #
GND	7	13	14	41	DB(1) #
GND	8	15	16	42	DB(2) #
GND	9	17	18	43	DB(3) #
GND	10	19	20	44	DB(4) #
GND	11	21	22	45	DB(5) #
GND	12	23	24	46	DB(6) #
GND	13	25	26	47	DB(7) #
GND	14	27	28	48	DB(P) #
GND	15	29	30	49	GND
GND	16	31	32	50	GND
TERMPWR	17	33	34	51	TERMPWR
TERMPWR	18	35	36	52	TERMPWR
Reserved	19	37	38	53	Reserved
GND	20	39	40	54	GND
GND	21	41	42	55	ATN #
GND	22	43	44	56	GND
GND	23	45	46	57	BSY #
GND	24	47	48	58	ACK #
GND	25	49	50	59	RST #
GND	26	51	52	60	MSG #
GND	27	53	54	61	SEL #
GND	28	55	56	62	CD #
GND	29	57	58	63	REQ #
GND	30	59	60	64	I/O #
GND	31	61	62	65	DB(8) #
GND	32	63	64	66	DB(9) #
GND	33	65	66	67	DB(10) #
GND	34	67	68	68	DB(11) #

D.1.3 Power Connector (J10 - SCSI Backplane)

Table D-4. Connector J10 - SCSI Backplane

Pin	Description
1 - 3	+12 VDC
4 - 9	GND
10 - 12	+5.1 VDC

D.1.4 Power Status/Control Signal Connector (J11 - SCSI Backplane)

The SCSI backplane receives power status and control signals at J11 from a connector on the power distribution board.

Table D-5. Connector J11 - SCSI Backplane

Pin	Description
1 - 3	GND
4	+5V standby
5 - 6	+5.1 VDC (Channel B)
7	Not connected
8	I ² C-SCL
9	I ² C -SDA
10	I ² C presence

D.1.5 LED Connectors (J2, J9 - SCSI Backplane)

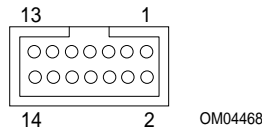


Figure D-4. Connectors J2, J9 - SCSI Backplane

The hot-swap backplane has two 14-pin cable connectors for the SCSI drive LED's. Each cable connects to the LED's for one row of three drives.

Table D-6. Connectors J2, J9 - SCSI Backplane

Pin	Signal
1	+5 V
2	+5 V
3	Not connected
4	DRV0PWR#/DRV3PWR#
5	DRV0ACT#/DRV3ACT#
6	DRV0FLT#/DRV3FLT#
7	DRV1PWR#/DRV4PWR#
8	DRV1ACT#/DRV4ACT#
9	DRV1FLT#/DRV3FLT#
10	DRV2PWR#/DRV5PWR#
11	DRV2ACT#/DRV5ACT#
12	DRV2FLT#/DRV5FLT#
13	Not connected
14	Not connected

D.1.6 SCA Drive Connectors (J5-J7, J12-J14 - SCSI Backplane)*Table D-7. Connectors J5-J7, J12-J14 - SCSI Backplane*

Connector contact	Signal name	Connector contact	Signal name
1	12V charge	41	12V GND
2	12V	42	12V GND
3	12V	43	12V GND
4	12V	44	Mated 1
5	Reserved/ESI-1	45	EFW #
6	Reserved/ESI-2	46	DIFFSNS
7	DB(11) #	47	GND
8	DB(10) #	48	GND
9	DB(9) #	49	GND
10	DB(8) #	50	GND
11	I/O #	51	GND
12	REQ #	52	GND
13	C/D #	53	GND
14	SEL #	54	GND
15	MSG #	55	GND
16	RST #	56	GND
17	ACK #	57	GND
18	BSY #	58	GND
19	ATN #	59	GND
20	DB(P) #	60	GND
21	DB(7) #	61	GND
22	DB(6) #	62	GND
23	DB(5) #	63	GND
24	DB(4) #	64	GND
25	DB(3) #	65	GND
26	DB(2) #	66	GND
27	DB(1) #	67	GND
28	DB(0) #	68	GND
29	DB(P1) #	69	GND
30	DB(15) #	70	GND
31	DB(14) #	71	GND
32	DB(13) #	72	GND
33	DB(12) #	73	GND
34	5V	74	Mated 2
35	5V	75	5V GND
36	5V charge	76	5V GND
37	Spindle sync	77	Active LED out
38	MTRON	78	DLYD_START
39	SCSI ID (0)	79	SCSI ID (1)
40	SCSI ID (2)	80	SCSI ID (3)

D.2 Front Panel Control Board Connectors

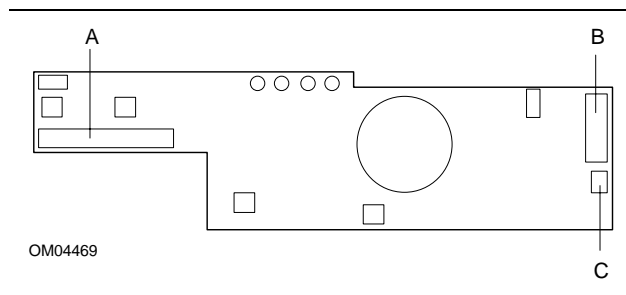


Figure D-5. Front Panel Control Board

Front panel control board

- A Signal interface to system board; 40-pin straight-head connector (J3)
- B Signal interface to LCD; 14-pin straight-head connector (J2)
- C Backlight power to LCD; 3-pin straight-head connector latching-style connector (J7)

D.2.1 LCD Signal Interface (J2 - Front Panel)

Table D-8. Connector J2 - Front Panel

Pin	Signal	Description
1	DB6	Data bit 6
2	DB7	Data bit 7
3	DB4	Data bit 4
4	DB5	Data bit 5
5	DB2	Data bit 2
6	DB3	Data bit 3
7	DB0	Data bit 0
8	DB1	Data bit 1
9	RW	Control LCD read/write
10	EN	Enable LCD
11		LCD contrast control signal
12	RS	Select LCD register
13	GND	Ground
14	LCD-VDD	Power line to LCD

D.2.2 LCD Backlight Power (J7 - Front Panel)

Table D-9. Connector J7 - Front Panel

Pin	Description
1	Ground
2	Backlight power
3	Ground

D.2.3 System Board Signal Interface (J3 - Front Panel)

Table D-10. Connector J3 - Front Panel

Pin	Signal name	Type ¹	Function
1	SPKRDAT	In	Drives standard PC-AT speaker
2	VCC5	In	5 V power supply
3	5VSTANDBY	In	5 V power supply standby
4	PS_ON	I/O	Power supply on/off switch connection
5	FP_RESET #	Out	Active-low front panel reset switch connection
6	GND		Ground
7	FP_NMI #	Out	Connects to FP_NMI driver
8	GND		Ground
9	HD1_LED_VCC		Hard Drive 1 Activity indicator LED return
10	HD1_LED_ACT#		Hard Drive 1 Activity indicator LED
11	HD2_LED_ACT#		Hard Drive 2 Activity indicator LED
12	HD2_LED_VCC		Hard Drive 2 Activity indicator LED return
13	KEYLOCK#		Keyboard lock signal
14	GND		Ground
15	SECURE	In	Secure mode indicator
16	VCC5	In	LCD Display controller power
17	KEY		Not connected
18	VCC5	In	5 V power supply
19	I ² C-SDA	I/O	I ² C interface data signal
20	CHASIS_SWT_RET	Out	Chassis intrusion detection switch return
21	LCD_SD	I/O	Serial I/O data to LCD controller
22	H_PWROFF#	In	Host power control (from Server Management board)
23	LCD_SCLK	In	Clock for LCD serial I/O
24	I ² C_SCL	I/O	I ² C interface clock signal
25	LCD_PCLK	In	LCD controller processor clock
26	GND		Ground
27	EN	In	LCD enable

Pin	Signal name	Type ¹	Function
28	GND		Ground
29	RW	In	LCD Read/Write strobe
30	VCC3		3.3 V power supply
31	RS	In	LCD reset
32	PWR#	In	RTC power control indication
33	LCD_GND	In	LCD display ground connection
34	GND		Ground
35	FAN_FAIL#	In	Indicates failure of at least one cooling fan
36	GND		Ground
37	I ² C_PRES		I ² C control signal
38	RESERVED		Reserved
39	Vcc		Vcc
40	RESERVED		Reserved

Note:

1. In: driven by system board. Out: driven by front panel.

D.3 External Baseboard Connectors

D.3.1 VGA Video Port (Baseboard)

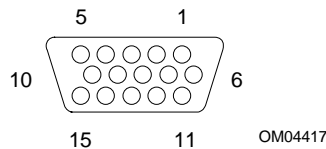


Figure D-6. VGA Video Port Connector

Table D-11. VGA Video Port Connector

Pin	Signal	Pin	Signal
1	Red	9	Not connected
2	Green	10	GND
3	Blue	11	Not connected
4	Not connected	12	Not connected
5	GND	13	HSYNC (horizontal sync)
6	GND	14	VSYSN (vertical sync)
7	GND	15	Not connected
8	GND		

D.3.2 Parallel Port Connector (Baseboard)

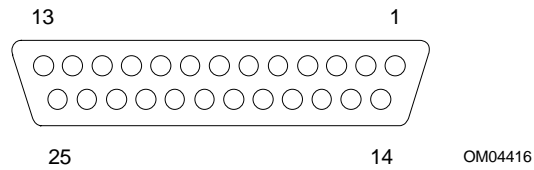


Figure D-7. Parallel Port Connector

Table D-12. Parallel Port Connector

Pin	Signal	Pin	Signal
1	Strobe #	10	ACK (acknowledge) #
2	Data bit 0	11	Busy
3	Data bit 1	12	PE (paper end)
4	Data bit 2	13	SLCT (select)
5	Data bit 3	14	AUFDXT (auto feed) #
6	Data bit 4	15	Error #
7	Data bit 5	16	INIT (initialize printer)
8	Data bit 6	17	SLCTIN (select input) #
9	Data bit 7	18–25	GND

D.3.3 Serial Port Connectors 1 and 2 (Baseboard)

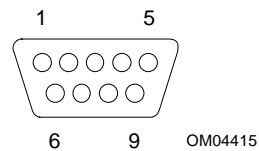


Figure D-8. Serial Port Connectors

Table D-13 Serial Port Connectors

Pin	Signal
1	DCD (data carrier detect)
2	RXD (receive data)
3	TXD (transmit data)
4	DTR (data terminal ready)
5	GND
6	DSR (data set ready)
7	RTS (request to send)
8	CTS (clear to send)
9	RI (ring indicator)

D.3.4 Keyboard and Mouse Connectors (Baseboard)

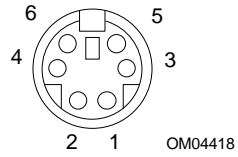


Figure D-9. Keyboard & Mouse Connectors¹

Note:

1. These identical PS/2-compatible connectors share a common housing.

Table D-14. Keyboard and Mouse Connectors

Pin	Keyboard signal	Pin	Mouse signal
1	KEYDAT (keyboard data)	1	MSEDAT (mouse data)
2	Not connected	2	Not connected
3	GND	3	GND
4	FUSED_VCC (+5 V)	4	FUSED_VCC (+5 V)
5	KEYCLK (keyboard clock)	5	MSECLK (mouse clock)
6	Not connected	6	Not connected

APPENDIX E -- ERRATA

This appendix lists the errata which apply to the AR450GX MP Rack Mount Server System. Intel intends to fix some of the errata in the future, and to account for the other outstanding issues through documentation or specification changes as noted. Refer to the *AR450GX MP Rack Mount Server System Specification Update* for additional specification updates concerning the AR450GX MP Rack Mount Server System.

Refer to the *AP450GX MP Server Board Set Specification Update* and the *AP450GX MP Server Board Set Technical Product Specification* for errata on the board set.

The following sections will be completed in a future revision of this document.

E.1 Summary Table of Changes

The following table indicates the errata which apply to the AR450GX MP Rack Mount Server System. Intel intends to fix some of the errata in the future, and to account for the other outstanding issues through documentation or specification changes as noted. This table uses the following notations:

Codes Used in Summary Table

Fix:	This erratum is intended to be fixed in a future revision of the hardware or software associated with the AR450GX MP Rack Mount Server System.
Fixed:	This erratum has been previously fixed.
No Fix:	There are no plans to fix this erratum.

Table E-1. Summary Table of Changes

NO.	PLANS	ERRATA

E.2 Errata