Cabrillo Chassis
Technical Product Specification

Revision 1.0

Order Number: 243784-001

June 1998

The Cabrillo chassis may contain design defects or errors known as errata. Characterized errata that may cause the Cabrillo chassis's behavior to deviate from published specifications are documented in the Specification Update.

Revision History

Revision	Revision History	Date
1.0	Initial release	6/98

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The Cabrillo chassis may contain design defects or errors known as errata. Current characterized errata are available on request.

TABLE OF CONTENTS

1. Product Overview

1.1 Introduction

This Technical Product Specification (TPS) details the following attributes of the Cabrillo chassis: dimension, power system, cooling system, peripheral bays, compatible Intel server board set products, front panel, I/O and interconnects, system configurations, safety certifications, environmental limits, and reliability, availability and serviceability features.

1.2 Product Description

The chassis is 12.25 inches wide, 18.06 inches high and 25.25 inches deep in the pedestal configuration. The chassis is designed to be modular with a base unit, two easily removable units, one to hold the front panel and drive bays (C-tilt), one to hold the baseboard and I/O panels (E-bay). The base section is U shaped and holds the power supplies and power share or distribution board. The E-bay drops in at the rear of the base unit and the C-tilt drops in from the front. Both the C-tilt and the E-bay are fastened to the base unit with two screws. The fans will be placed in an E-Pak carrier and installed above the drives and in front of the E-bay. Three bays are supplied in the back of the chassis base unit for power supplies. Covers are used to cover bays that do not have power supplies installed.

The top cover can be replaced with a rack slide and a rack slide can be installed on the bottom allowing the system to be mounted in a rack as a 7U-rack unit.

Table 1: Chassis Dimensions

Configuration	Pedestal	Rack
Height	18.06 inches with feet	7U
Width	12.25 inches	19 inches rack
Depth	25.25 inches	25.25 inches
Clearance Front	12 inches	12 inches
Clearance Rear	9 inches	9 inches
Clearance Side	0 inches	NA

The primary exterior system color is dusty beige.

1.2.1 Front Bezel

The front bezel is a multiple-part plastic molding. There is one key-lock door covering the drive bays. The front panel LEDs, power switch and reset switch are on the upper right corner for the pedestal design, and in upper left corner for the rack mount design. There will be provision for placing a logo that will work for pedestal or rack configurations.

1.2.2 Security

At the system level a variety of security options are provided. A three position key lock/switch will unlock all, lock the side access cover or lock the side access cover and the front door. In addition there is provision for a small padlock on the drive bay (3.5”) door.

Software and BIOS security features are described in the S450NX MP Server Board Set TPS.

1.2.3 I/O panel

All input/output connectors are accessible at the back of the chassis. The built-in interfaces on the baseboard are mapped in the following figure.

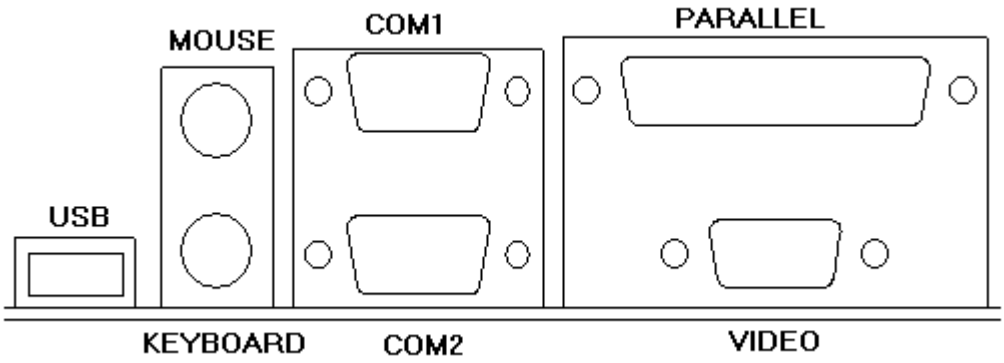

Figure 1. S450NX MP Server I/O Panel

Chassis View

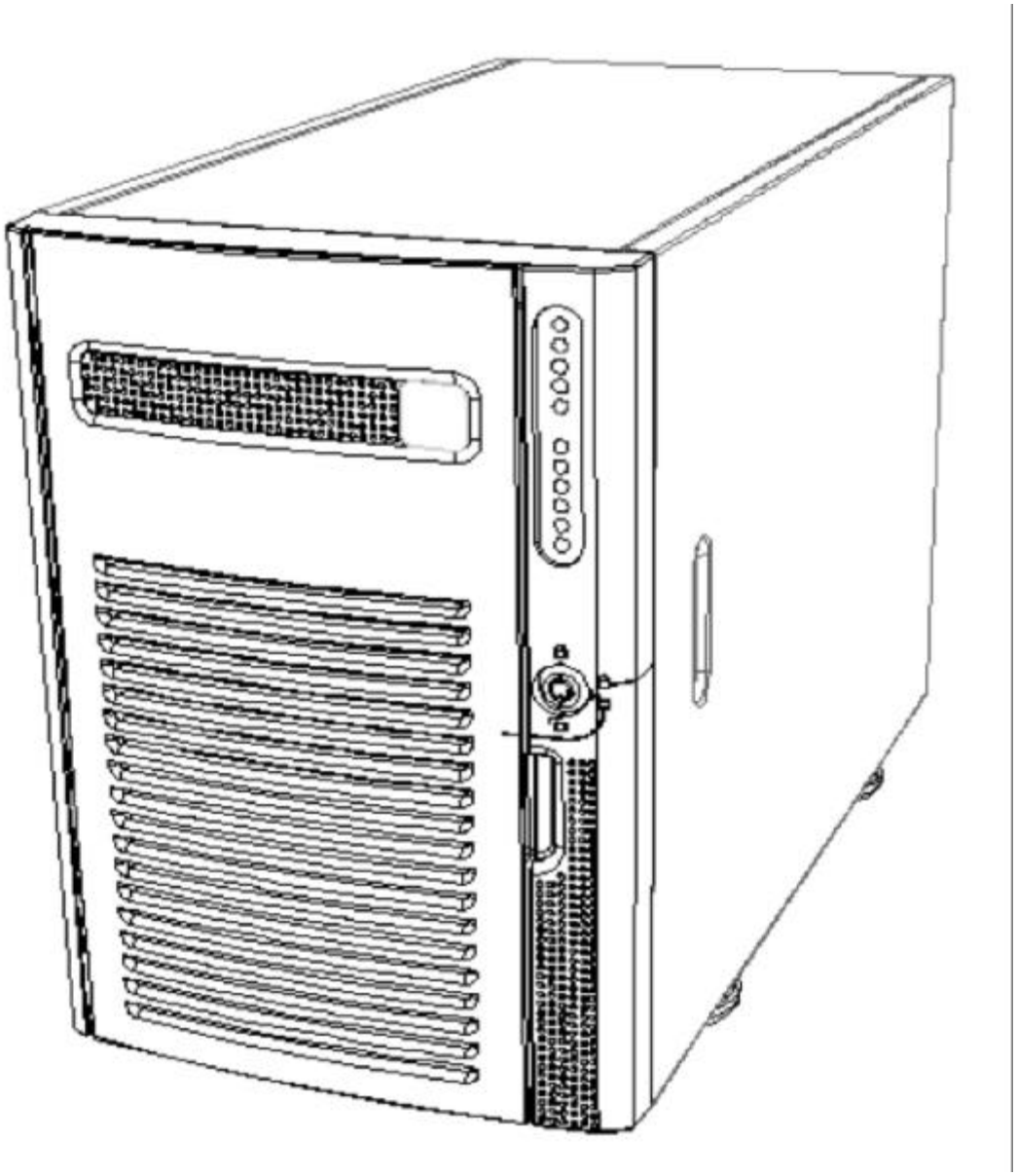

Figure 2. Cabrillo Front View

2. System Configuration

2.1 System Power

The power system is a modular design. The system may be configured with one, two, or three power supplies. These configurations are referenced as Entry Level Power, Maximum Level Power, and Maximum Level Redundant Power. The system may contain either a single power supply power distribution board, a two power supply power distribution board (not available at launch) or a three power supply power share board.

The power supply approximate dimensions are 7.5in. deep by 5.1in. high by 4.25in. with a mounting flange extending 0.12in. top and bottom and 0.35in. each side. The supply is equipped with handles formed into the rear flange and a floating connector for easy slide in, slide out removal and replacement. Each power supply has it's own power cord. All supplies should be connected to the same AC main branch circuit.

Table 2: Power Supply output summary (per supply)

	400 Watt Supply w/PFC -XXX
+5 VDC Output	24 Amp Max
+12 VDC Output	18 Amp Sustained - peak 19.0A <10ms
-12 VDC Output	0.5 Amp Max
+3.3 VDC Output	36 Amp Max
+5 VDC Standby	1.5 Amp Max
Output balancing	Total combined output power of +3.3V and +5V shall not exceed 195 W.
AC Line Voltage	PFC: auto sense
AC Line Freq.	50/60 Hz
AC Input Current	7.6 Amp at 100 - 120 V 3.8 Amp at 200 - 240 V
Board sets	S450NX MP

For detailed information on this power supply, please refer to the 400W Power Supply Specification # 681374-001.

2.1.1 Fan Requirements

The power supply incorporates a 92mm low acoustic noise fan to exhaust air from the peripheral bay. These fans have thermal sensors for speed control and incorporate a provision to shut down the power supply if the fans fail.

2.1.2 AC Power Line

The system is specified to operate from 100-120VAC, 200-240VAC, at 50 or 60Hz. The power supply incorporates Power Factor Correction (PFC) as a standard feature. The system is tested to meet these line voltages, and has been tested (but not specified) at +10% and -10% of the voltage ranges, and similarly ± 3Hz on the line input frequency.

The system is specified to operate without error with line source interruptions not to exceed 20 milliseconds at nominal line conditions and at full power supply output load.

The system is not damaged by AC surge ring wave up to 3.0kV/500A. This ring wave is a 100kHz damped oscillatory wave with a specified rise-time for the linear portion of the initial half-cycle of 0.5µsec. Additionally, the system will not be damaged by a uni-directional surge wave form of 2.0kV/3000A, with a 1.2µsec rise time and 50µsec duration. Further details on these wave forms can be obtained in ANSI/IEEE STD C62.45-1987.

2.1.3 Power Distribution Boards

A system may be configured with a single power supply (entry level power) using a power distribution board for a single power supply system. With a single supply power distribution board, the S450NX MP Server baseboard will have power only to the first two processors. The entry level system must be configured so that the power requirements can be met by the 400W power supply.

When two power supplies are required, a dual power distribution board can be used in the system (note: this option is not available at launch). With the dual power distribution board the first two processors are powered from the first power supply and the last two processors are powered from the second power supply. The first power supply also powers the 5volts for the peripheral bays and the baseboard 12 volt and 3.3 volt power requirements. The second power supply powers the 12 volts to the peripheral bays and the 5 volts to the baseboard. The system must be configured so that each power supply can meet the requirements placed on it. When a dual power distribution board is installed, two power supplies must be used.

2.1.4 System with Power Share Configuration

An optional power share board provides current sharing between supplies allowing redundant power, “hot swapping” of power supplies and also enables power subsystem server management functions. There can be either one, two or three power supplies with the power share board. More information about this board is given in S450NX MP Server Board Set TPS.

When two or three power supplies are utilized, a power share board must be used to implement a redundant power distribution system. This power share board also implements the server power management features which, via IPMB, reports the quantity, location and operational status of the power supplies installed. Power sensing in the power share board shuts down the entire power system if any single output from the power share board exceeds 240VA. The parts of the power share board that have greater than 240VA are protected from operator contact by a shield that cannot be removed with power present. This feature enables the system to meet CSA Level 3 operator accessibility without interlocks.

When adding a second or third power supply for redundancy, the loss of a single power supply will not affect the operation of the system if the limited configuration limitations are not exceeded for the two power supply case. The failed supply can be replaced while the system is operating (under this configuration, the power supplies are hot-swappable). If a single power supply fails in a redundant system, a Power Supply Failure LED on the front panel will be turned on. The power supply is inserted into and removed from the chassis from the rear and is held in place with four screws. There is an interlock to prevent removal or insertion while the power cord is plugged into the power supply.

2.2 System Cooling

Three fans will provide cooling for the processors and the add-in cards in the card cage area. Three additional fans may be installed for redundant cooling of the processor and add in-cards. Multiple power supplies and the optional two drive fans will provide for redundant cooling in the peripheral side. All system fans will provide a fault signal if the fan fails. The baseboard senses this signal and turns on a Fan Failure LED on the front panel. This signal will also be available for server management functions. The power share board must be installed for the fault signal of the power supply fans to be available to the server management. Removal of the side cover allows access to the fans. Failed fans are easily changed after the system has been shut down.

2.3 System Peripheral Bays

2.3.1 3.5" Floppy Drive Bay

The system includes a 3-mode 3.5” floppy drive installed in the floppy drive bay. Access for replacement of the drive is removal of the side cover.

2.3.2 5.25" Peripheral Bays

The system design includes three 5.25" half height peripheral bays designed for peripherals with removable media (e.g. floppy disk, CD-ROM or tape drive). Three removable filler panels are installed into the system.

Any two adjacent 5.25" bays are convertible to a single full height bay. The cable from the on-board narrow SCSI controller allows two 5.25” half height narrow SCSI devices to be installed in these bays. The 5.25" peripherals are removable directly from the front of the chassis.

2.3.3 Internal 3.5" Hard Drive Bays with SCSI Hot Swap Back plane

The product contains one bay for two 3.5" one inch high or two 3.5” one and five-eighths inch high SCSI hard drives with internal cabling. An optional hot swap capable back plane will accommodate six 3.5" one inch high or two 3.5” one and five-eighths inch high hard drives. Each can be accessed from the front of the system. The back plane is designed for LVDS SCSI devices using the Industry Standard 80-pin SCSI II connector. The maximum power per drive is 18 watts.

As part of the hot-swap implementation, a drive carrier is required. The 3.5" peripherals can be accommodated in the carrier. The drives are mounted in the carrier with four fasteners. The carrier snaps into the chassis. A heat sink for high power drives is available.

A single metal EMI door and the plastic door in the front cover will cover the drive bays.

Details for the hot swap SCSI back plane can be obtained from the S450NX MP Server Board Set TPS.

2.4 System Baseboard

S450NX MP Server

The E-bay for the Cabrillo chassis was designed to incorporate the S450NX MP Server baseboard, which is built from these circuit boards:

- One to four Pentium® II Xeon™ processor SEC cartridges
- One to three Termination cards
- Memory module
- Baseboard

The S450NX MP Server supports 1 to 4 identical (clock speed, revision and L2 cache size) processor SEC cartridges. The memory subsystem supports up to 4.0GB of system memory using EDO DRAM DIMMs on the memory module. The baseboard provides connector slots for the processor SEC cartridges, the memory module and a PC-AT-compatible and PCI I/O system including the following:

- Dual PCI high-performance I/O segments - PCI-A and PCI-B both via host bridge.
- 7 PCI and 1 ISA add-in card slots – (one shared slot).
- PC-compatible I/O controls (2 serial, parallel, keyboard/mouse, VGA Internal USB and external USB).
- Onboard PCI bus master, 3 SCSI channels (2-LVDS Ultra2 1-Narrow), and IDE subsystems.
- Server Management features support via onboard micro-controllers.

Detailed information on this product is available in the S450NX MP Server Board Set Technical Product Specification.

2.5 Standard Configurations

Table 3. Standard System-level Configurations

Features	Standard System Configurations		
	Base System	**Base Redundant System**	**Redundant System w/ Processors**
Redundant	No	No	No
Standard Chassis	1	1	1
Std Bezel	0	0	0
Front Panel	1	1	1
3.5" Floppy	1	1	1
400 W Power Supply	1	2	2
VRM	2	2	3
Standard Cable Set	1	1	1
Power Distribution Board 1	1	0	0
Power Share Board	1	1	1
Drive Bay Fan	0	2	2
Electronics Bay Fans	3	3	3
SCSI Backplane	0	1	1
Drive Bay Cable Set	1	0	0
Baseboard (S450NX MP Server)	1	1	1
Processor Retention Bracket™	1	1	1
Pentium II Xeon Processor (400MHz/512K)	0	0	2
Slot 2 Termination Card	0	0	2
Memory Module	1	1	1

2.6 System Interconnection

2.6.1 Signal Definitions

The standard cable construction is briefly described below. The pin-out on the connectors referred to in this section, are defined in the S450NX MP Server Board Set Technical Product Specification.

2.6.2 System Internal Cables

Baseboard to Front Panel

2X15 connectors with 30 wire cable

Baseboard to SCSI devices

1- 68 pin Wide SCSI cable to the hot swap back planes and (optional)the rear panel .
1- 68 pin Wide SCSI cable to the rear panel(optional).
1- 50 pin Narrow SCSI cable to the 5.25” drive bays.

Baseboard to IDE devices

1- 2X20 connector for 18“ IDE cable for a 5.25” IDE CD-ROM

Baseboard to Floppy device

1- 2X17 connector for floppy cable for a 3.5” Floppy drive.

Baseboard to Power Share Board

2- 2X10 connectors with 10 wire cable-processor power
1- 2x7 connector with 14 wire cable-auxiliary power

Front Panel to Hot-Swap SCSI Back Planes

1-2X5 connector for cabling front panel to hot swap SCSI back plane

Front Panel Chassis Intrusion Cables

2 wire cables from chassis intrusion micro-switches to front panel

Fan Connectors

8- 3 pin connectors on Front panel
2- 3 pin connector on hot-swap back plane
1- 3 pin connector on powershare or power distribution board.

2.7 Front Panel

The front panel is located in the upper portion of the right side of the system. The front panel contains four momentary switches, one for Power On/Off, one for Sleep/Service or Cluster, one for System Reset and one for NMI. These switches are behind the front door of the bezel. The front panel also contains 11 LEDs. There is a green Power On LED, a green Disk bay Power On LED, a yellow Power Supply Failure LED, a yellow Fan Failure LED, 6 yellow Hard Drive Failure LEDs and a green HDU activity LED. These LEDs are visible through the bezel. A loudspeaker is mounted on the front panel. The electronics bay fans receive power from the front panel and return tachometer signals to the baseboard through the front panel.

Table 4. Cabrillo LED current

SIGNAL NAME	RECOMMENDED SERIES R VALUE	CURRENT	LED COLOR
PWR_LED_L	150 ohms	20 mA	GREEN
CLUSTER_LED_L	150 ohms	20 mA	GREEN
HD_ACT_L	150 ohms	20 mA	GREEN
POWER_FAULT_L	150 ohms	20 mA	YELLOW
FAN_FAILED_L	150 ohms	20 mA	YELLOW
HD0..5_FAULT_L	150 ohms	20 mA	YELLOW

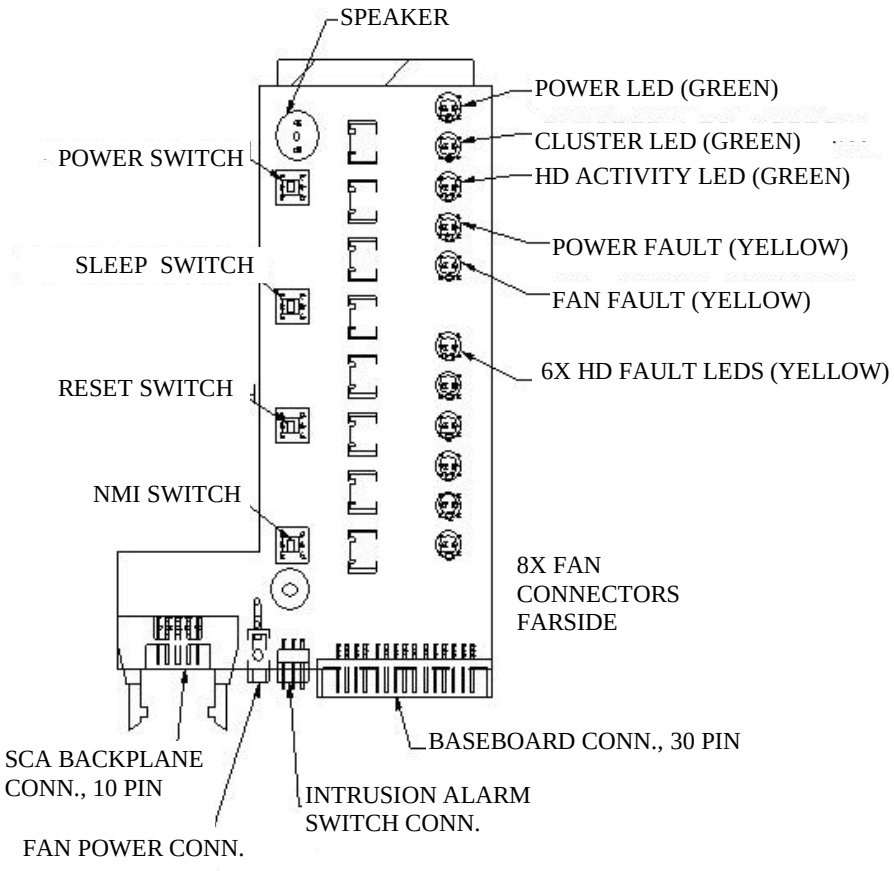

Figure 3. S450NX MP Server Front Panel

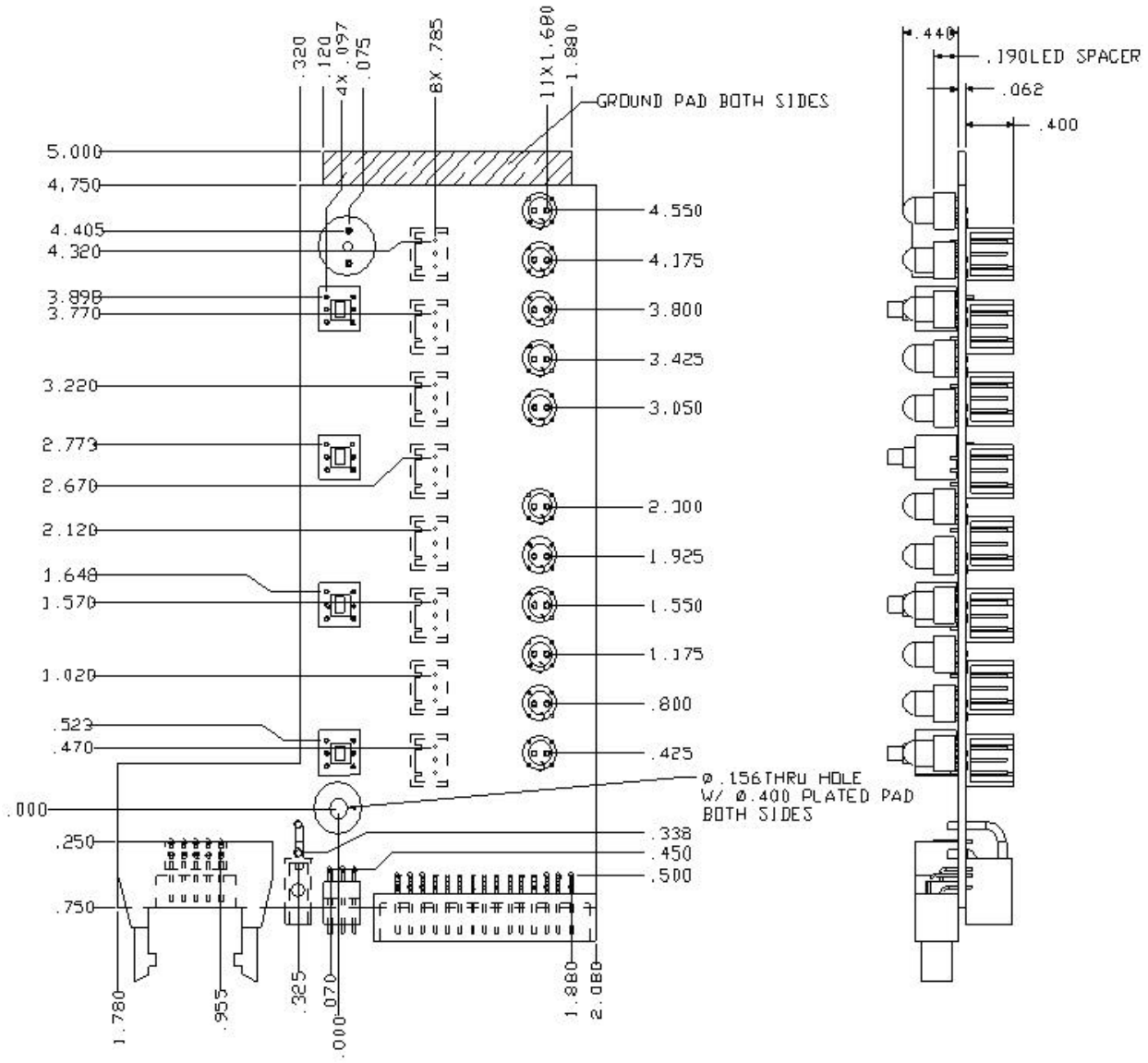

Figure 4 Mechanical Specification

2.7.1 Baseboard / Front Panel Interface

Table 5. Baseboard/Front Panel Interface

Pin #	I/O	Description
1	I	5V pulse speaker input
2	PWR	GND
3	O	TTL High True = chassis intrusion
4	I	TTL Low true = hard disk activity
5	PWR	5V VCC
6	O	TTL Low True = toggle ACPI sleep/service
7	I	TTL Low True = fan failed condition
8	I	TTL Low True = system power on condition TTL pulse = system in sleep mode
9	I	TTL Low True = power fault condition
10	PWR	GND
11	I/O	I^2C - SDA
12	O	TTL Low True = NMI to CPU
13	I/O	I^2C - SCL
14	O	TTL Low True = reset system
15	PWR	5V VCC Standby
16	O	TTL Low True = toggle system power
17		Reserved
18	PWR	GND
19	O	Open Collector pulse = fan 1 speed
20	O	Open Collector pulse = fan 2 speed
21	O	Open Collector pulse = fan 3 speed
22	O	Open Collector pulse = fan 4 speed
23	O	Open Collector pulse = fan 5 speed
24	O	Open Collector pulse = fan 6 speed
25	O	Open Collector pulse = fan 7 speed
26	O	Open Collector pulse = fan 8 speed
27	I	TTL Low True = electronics bay power on condition TTL pulse = electronics bay power off condition
28		NC
29		NC
30		NC

2.7.2 Hot Swap Backplane / Front Panel Interface

Table 6. Hot Swap Backplane Interface

Pin #	I/O	Description
1	I/O	I^2C - SDA
2	PWR	GND
3		NC
4	I/O	I^2C - SCL
5	I	TTL Low True = Disk drive 1 fault
6	I	TTL Low True = Disk drive 0 fault
7	I	TTL Low True = Disk drive 3 fault
8	I	TTL Low True = Disk drive 2 fault
9	I	TTL Low True = Disk drive 5 fault
10	I	TTL Low True = Disk drive 4 fault

2.7.3 Fan Power Connector / Front Panel Interface

Table 7. Fan power connector interface

Pin #	I/O	Description
1	PWR	+12V
2	PWR	GND

2.7.4 Chassis Intrusion Switch Connector / Front Panel Interface

Table 8: Chassis intrusion switch connector interface

Pin #	I/O	Description
1	O	TTL High True = Chassis switch
2	PWR	Chassis switch return (GND or output of next chassis switch connector)
3	O	TTL High True = Chassis switch

2.7.5 Fan Connector / Front Panel Interface

Table 9. Fan connector interface

Pin #	I/O	Description
1	PWR	GND
2	I	Open Collector pulse = fan speed
3	PWR	+12V (+10V/+13.8V with power share system option

3. Certification

3.1 Safety

3.1.1 USA
The system is UL listed to UL 1950, 3rd Edition.

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

3.1.3 Europe
The system is certified to meet the requirements of EN 60 950 with by TUV (GS License).

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

3.2 Electro-Magnetic Compatibility

3.2.1 USA
The system is certified to FCC CFR 47 Part 15, Class B.

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

3.2.3 Europe
The system complies with the EU EMC directive (89/336/EEC) via EN 55022, Class B and EN 50082-2. 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 2 contact discharge, level 3 air discharge)
IEC 801-3 Radiated Immunity (level 2)
IEC 801-4 Electrical fast transient (level 2)

3.2.4 International
The system is compliant with CISPR 22, Class B.

3.2.5 Japan
The system is registered with VCCI and complies with VCCI Class 2 limits (CISPR 22 B Limit).

3.3 Environmental Limits

3.3.1 System Office Environment

Table 10. System Office Environment Summary

Operating Temperature	+10°C to +35°C with the maximum rate of change not to exceed 10°C per hour.
Non-Operating Temperature	-40°C to +70°C
Non-Operating Humidity	95%, non-condensing @ 30°C
Altitude De-rate	0.5° per 1000 feet
Acoustic noise	< 47 dBA with one power supply @ 28+-2°C < 50 dBA with two power supplies @ 28+-2°C < 55 dBA with three power supplies @ 28+-2°C
Operating Shock	No errors with a half sine wave shock of 2G (with 11 millisecond duration).
Package Shock	System operational after a 30" free fall, cosmetic damage may be present
ESD	20KV per Intel Environmental test specification*

3.3.2 System Environmental Testing

The system environmental tests include:

- Temperature Operating and Non-Operating
- Humidity Non-Operating
- Shock Packaged and Unpackaged
- Vibration Packaged and Unpackaged
- AC Voltage, Freq. & Source Interrupt
- AC Surge
- Acoustics
- ESD

4. Reliability, Serviceability and Availability

4.1 Mean-Time-Between-Failure (MTBF)

The system MTBF has yet to be calculated.

4.2 Serviceability

The Intel Server system should only be serviced through a qualified technician. 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. Following are the maximum times a trained field service technician should take to perform the listed system maintenance procedures, after diagnosis of the system.

Table 11: Serviceability Times

Remove cover	2 minutes
Remove and replace disk drive	1 minute
Remove and replace power supply	3 minutes
Remove and replace fan	5 minutes
Remove and replace expansion board	2 minutes
Remove and replace front panel board	10 minutes
Remove and replace baseboard (with no expansion boards)	15 minutes
Remove and replace power back plane	10 minutes
Remove and replace SCSI back plane	10 minutes
Replace memory module	3 minutes
Replace/add DIMMs	2 minutes
Replace/add processor	5 minutes
Replace/add ICMB	2 minutes
Overall MTTR	20 minutes