Server Products Division
Intel® SR2000 2U Server Chassis
Technical Product Specification

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Revision History

Revision	Revision History	Date
Rev 1.0	Released	5/00
Rev 1.5	Updated to include functional descriptions of the Front Panel LEDS, added the tested acoustic level for a L440GX+/SR2000 system, added power connector pinouts, added MTBF numbers	6/00

The Intel® SR2000 2U Server chassis may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are available on request.

The Intel® L440GX+ DP Server Board may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Features:

- High Density 2U Rack Server
- 3.46”(88mm) H x 18.90” (480mm) W x 24.10” (612mm) L with front bezel
- 2 slot passive PCI riser card capable of supporting 32 bit 33MHz PCI add-in cards
- 4 Hot Swappable SCSI Drive Bays
- Hot Swap SCSI backplane is capable of supporting Ultra-2 or Ultra-160 SCSI HDD
- One flexible 3.5 “ bay that supports Floppy, IDE, or Tape Drive
- One bay for a Slimline CD-ROM drive with drive tray and attached IDE adapter card
- 275 Watts PFC power supply with custom form factor
- Two system fans and one power supply fan for cooling
- Support for a volume server baseboard based on the Intel® Pentium® III Processor

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1.0 System Overview

This chapter provides an overview of the SR2000 2U Rack Server System, showing functional blocks, system diagrams, etc.

1.1 - System Level Block Diagram

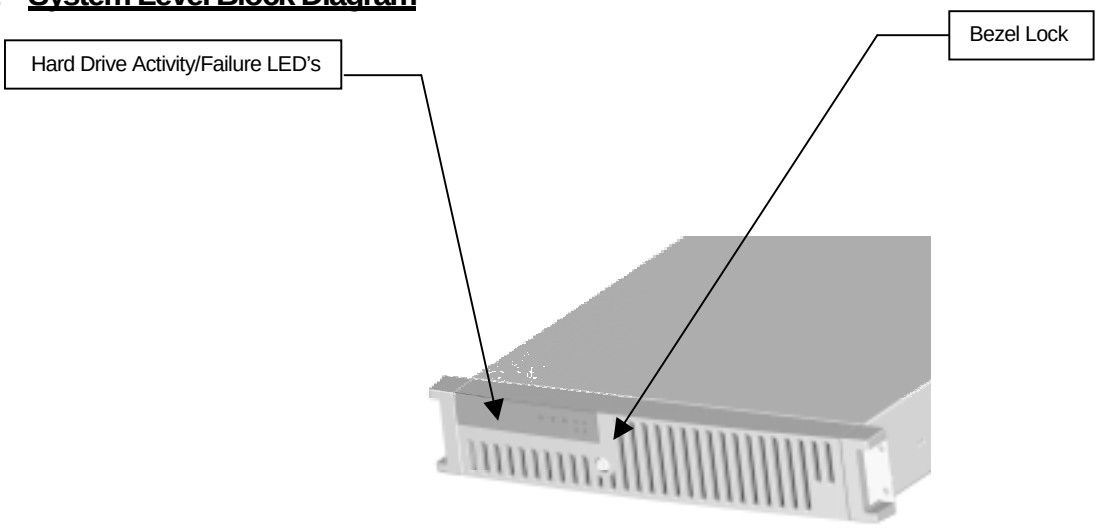


Figure 1. SR2000 Front Bezel

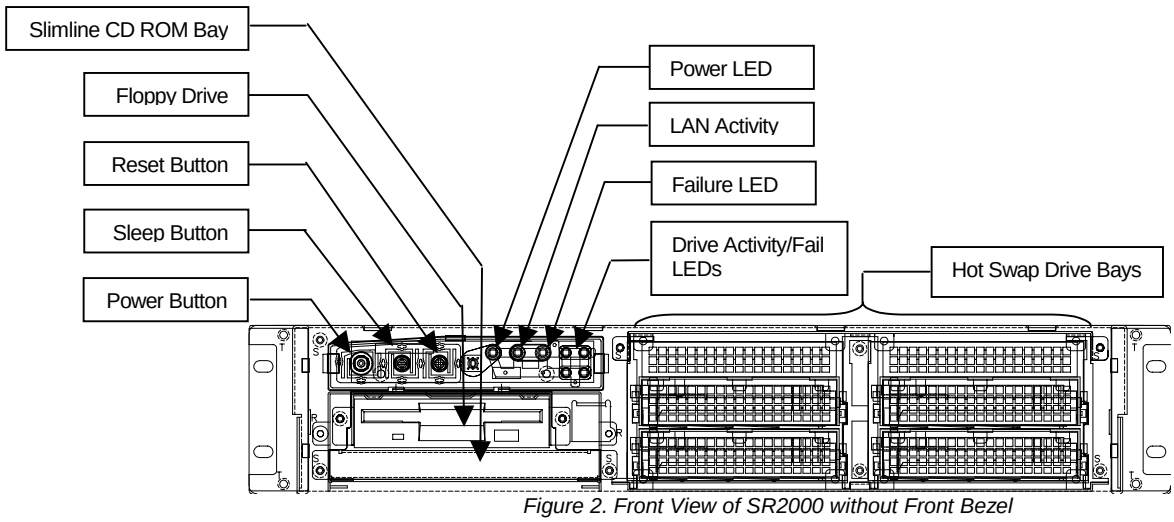


Figure 2. Front View of SR2000 without Front Bezel

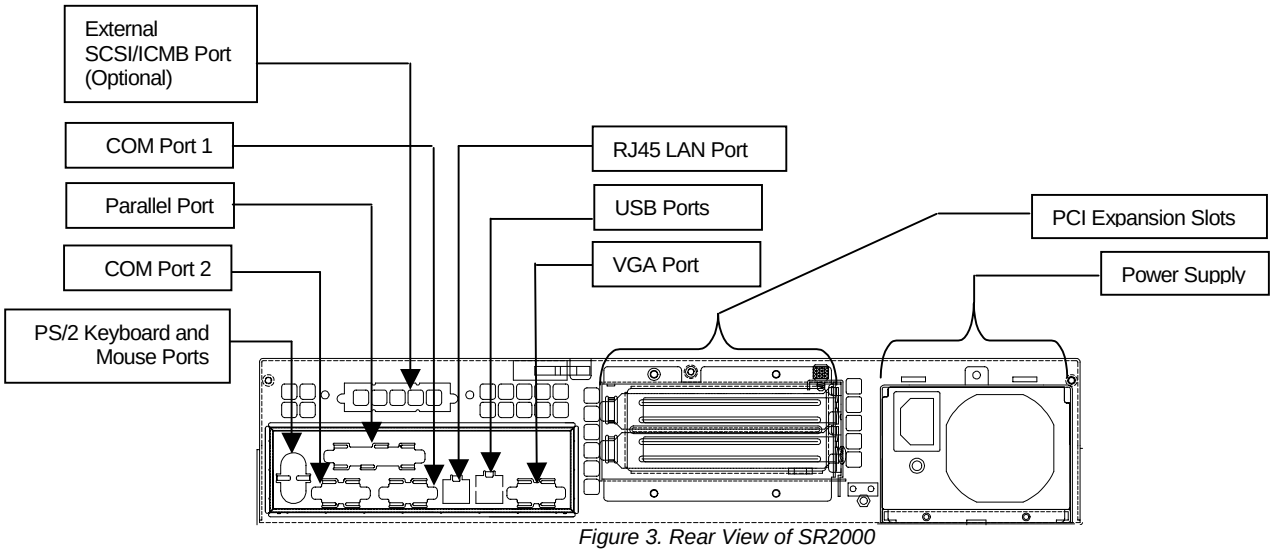


Figure 3. Rear View of SR2000

1.2 - Chassis Dimensions

Height	80 mm
Width	480 mm
Depth	612 mm

Table 1: Chassis Dimensions

2.0 SR2000 Chassis

This section describes the various features and functions of the SR2000 chassis, an ATX compatible server chassis.

2.1 - Front Bezel Features

The standard front bezel is molded plastic. The bezel can be folded down to reveal the floppy, CD-ROM and SCSI drive bays, as well as the power, sleep, and reset switches. The front bezel displays the various indicator LED's (see section 1.1). The front bezel also contains a key lock that can be used to prevent opening of the bezel.

2.2 - Security

A key lock on the front bezel can be used to prevent extraction of the 5.25" peripherals. An alarm switch is provided for the chassis side cover that may be connected directly to the server board, where server management software, such as Intel® Server Control can process alarm switch activity as desired.

2.3 - I/O panel

All input/output connectors are accessible on the rear of the chassis. An ATX 2.03 compatible cutout is provided for I/O shield installation. The metal I/O shield must be installed in the cutout in order to maintain Electromagnetic Interference (EMI) compliance levels. In some hardware configurations, an additional EMI gasket may be necessary to maintain EMI compliance. The I/O cutout dimensions are shown in Figure-4 below.

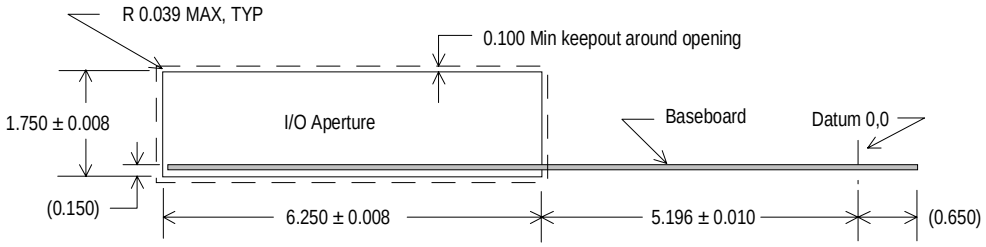


Figure 4. ATX 2.03 I/O Aperture

2.4 - Chassis Power Sub-system

This chassis uses a custom form factor power supply. The form factor was chosen to optimize the overall chassis dimensions. The power sub-system provides a remote system enable feature. The remote system enable feature permits the chassis power to be activated from a variety of sources and allows the implementation of "Wake On LAN*" (WOL) or other remote management features. The 275watt PFC (Power Factor Correction) power supply features a 24 pin main power connector and a 6 pin Auxiliary ATX power connector. The following table is a brief overview:

OUTPUT VOLTAGE	VOLTAGE TOLERANCE	MIN LOAD CURRENT	FULL LOAD CURRENT	SURGE CURRENT	PARD MV
+5.125	±3%	1.00	20.0		50
+3.3	±3%	0.00	14.0		50
+12.05	±5%	0.00	14.0	14.0	120
-12	±10%	0.00	0.2		120
-5	±10%	0.00	0.2		120
+5 V stand-by	±5%	0.00	2.0		50

Table 2: Power Supply Output Summary

NOTE:

1. The total continuous and surge load power for a single module shall be limited to 275W with any combination of loads not to exceed maximum currents on any one channel as defined in table 2.
2. The power supply shall be capable of providing all surge load currents, at a 5% duty cycle with the maximum surge load duration being 10 seconds.
3. The +3.49V output voltage shall not exceed +5V output voltage during power up & normal operation.
4. Output voltages shall be measured at the load-side output connectors.

Mechanical Outline

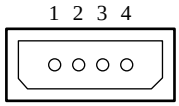
The mechanical outline and dimensions of the power supply adhere to optimize the overall chassis dimensions. The approximate dimensions of the power supply are: 3.85" (97.8mm) high X 2.5" (63.5mm) wide X 9.5" (241.3mm) deep.

•

Power Supply/Chassis Configuration

The SR2000 server chassis can only be configured with a single power supply. For a more detailed specification on the power supply, see the specification for the Lite-On* 275-Watt with PFC Power Supply. The power supply interfaces to the chassis through a 70 pin edge connector to a power share board. The power share board provides two 4-pin power connectors, one to provide power to the Hot Swap SCSI backplane, and the other to provide power to the CDROM and floppy drives.

The Hot-swap backplane power connector and peripheral power connectors are standard four-pin shrouded plastic PC power connectors with mechanical keying. The connector pinout is shown below.



OM04656

Figure 5. Peripheral power connector

Table 3: Peripheral power connectors

Name	Pin	Description
+12V	1	+12 Volt power supply (yellow wire)
GND	2	0V Electrical ground (black wire)
GND	3	0V Electrical ground (black wire)
+5V	4	+5 Volt power supply (red wire)

In addition, there is a 24-pin Main power connector and a 6-pin AUX power connector. Both connectors are used to provide power to the baseboard. The connector pinouts are shown in the following tables.

Table 4: 24-pin Main Power Connector

Pin	Signal	18 AWG COLOR	Pin	Signal	18 AWG COLOR
1	+3.3Vdc	Orange	13	+3.3Vdc	Orange
2	+3.3Vdc	Orange	14	-12Vdc	Blue
3	COM	Black	15	COM	Black
4	+5 Vdc	Red	16	PS-ON	Green
5	COM	Black	17	COM	Black
6	+5 Vdc	Red	18	COM	Black
7	COM	Black	19	COM	Black
8	PWR OK	Gray	20	-5V	White
9	5VSB	Purple	21	+5 Vdc	Red
10	+12Vdc	Yellow	22	+5 Vdc	Red
11	+12Vdc	Yellow	23	+5 Vdc	Red
12	+3.3Vdc	Orange	24	COM	Black

Table 5: 6-pin AUX Power Connector

Pin	Signal	18 AWG COLOR	Pin	Signal	18 AWG COLOR
1	COM	Black	4	+3.3Vdc	Orange
2	COM	Black	5	+3.3Vdc	Orange
3	COM	Black	6	+5 Vdc	Red

2.5 - CHASSIS COOLING

Chassis cooling is accomplished using two 80mm system fans mounted in the middle of the chassis. There is also a power supply fan. Removal of the top cover gives access to the fans, which then can be easily changed with the system powered down.

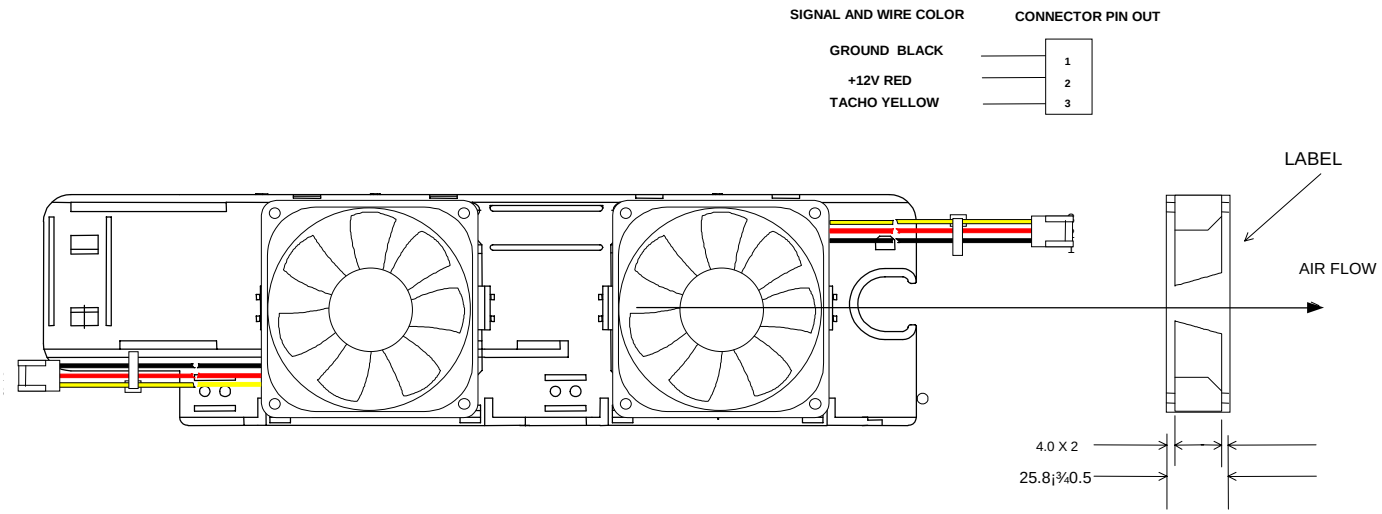


Figure 6. 80mm Mid System Fan

2.6 - CHASSIS PERIPHERAL BAYS

3.5" Drive Bay

The chassis provides one flexible 3.5“ bay that can support a Floppy drive, IDE drive, or Tape Drive above the slim CD-ROM drive. Removal of the front bezel and top cover provides access to the 3.5” drive bay for the installation or replacement of a floppy drive, IDE, or Tape Drive.

Slim CD-ROM Drive Bay

The chassis is supplied with a 0.5” (12.7mm) Slimline CD-ROM drive. The Slimline CD-ROM tray is exposed by pulling down the front bezel. When installed, the tray resides directly beneath the 3.5” drive bay.

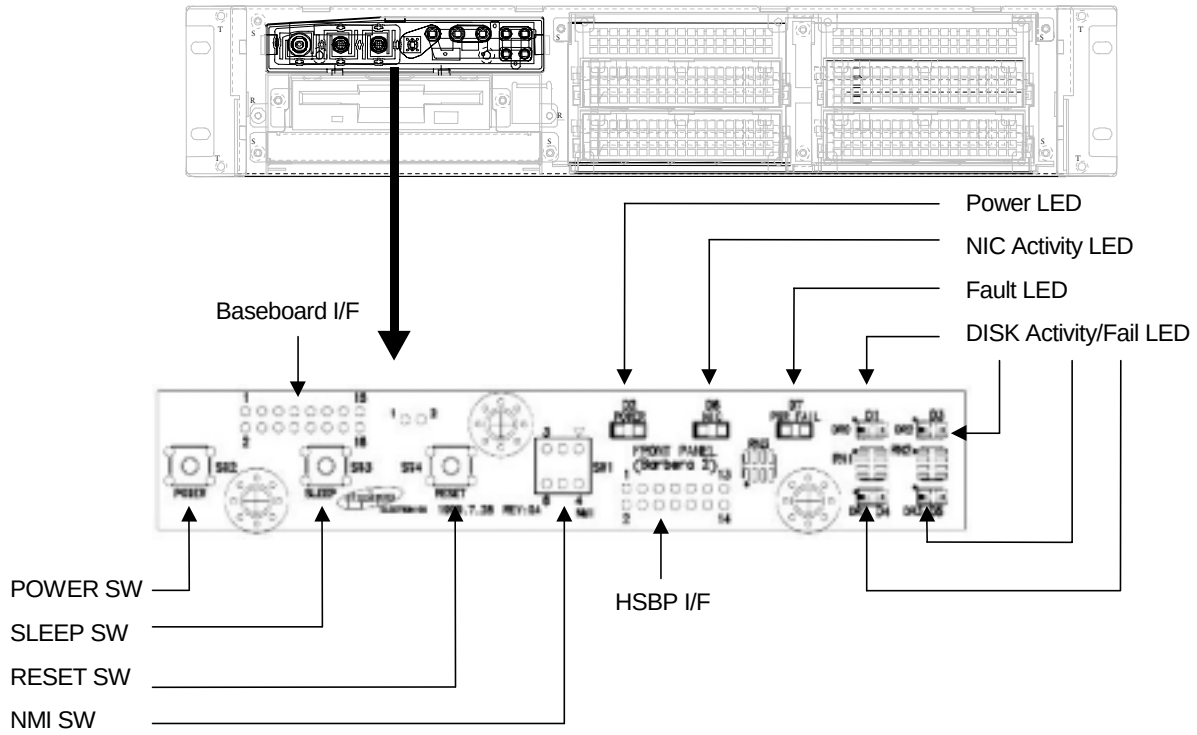
SCSI Hot Swap Drive Bay

The SR2000 server chassis can support up to four (two-1” high and two- 1.6” high or four 1” high) 3.5" SCA2 SCSI hard drives. The SCSI drive bay is capable of supporting either Ultra2 (LVD) or Ultra-160 SCSI hard drives. The drives are accessible in the front of the chassis with the bezel open. The four drive carriers are provided with the chassis. With the addition of a SCSI RAID controller or Software RAID implementation, the SR2000 Server chassis can support a variety of RAID configurations

2.7 - FRONT PANEL

The front panel is located behind the front bezel above the floppy drive. It provides four buttons and seven LED's. The buttons are Power, Reset, Sleep and NMI. The LED's are one green for power, one green for NIC activity, one yellow for System Fault and four bi-color (green – disk activity, yellow – disk fail) for the SCSI Drives. These LED's are visible on the front bezel through light pipes.

Figure 7. Front Panel and Functions



Power LED

The Power LED is capable of showing three power related states; Solid on, Blinking 1Hz, Blinking 3 Hz. The BMC interprets the state of 5V Standby, 5V, the Power State, and the PS-ON signal and drives the Power LED according to the following table:

Table 6: Power Light States

Power State	5V Standby	PWR_GD	PS-ON	Power LED	Condition
ON	ON	ON	High	ON	Power ON and OK
ON	ON	OFF	High	FAST BLINK~3.3Hz	Supply failed
ON	OFF	ON	High	OFF	5V Standby failure
ON	OFF	OFF	High	OFF	AC Power has failed
OFF	OFF	ON	Low	OFF	5V Standby failure
OFF	ON	OFF	Low	OFF	Normal Power OFF
OFF	OFF	OFF	n/a	OFF	Normal OFF & Unplugged
SLEEP	ON	ON	High	SLOW BLINK ~1 Hz	Machine is in S1 - S3 sleep state

Fault LED

The Fault LED is NOT designed to detect all system faults. The purpose of the Fault LED is to alert the System Administrator that a Power Fault has occurred. The BMC monitors whether the power supply is ON and operational using the **PWR_GD_PS** signal from the power supply. The controller uses the **PWR_GD_PS** signal to confirm whether the actual system power state matches the intended system on/off power state that was commanded using PS-ON.

This signal generates an interrupt to the BMC, which it uses to detect loss of AC power. If AC power suddenly is lost, the BMC attempts to assert a system reset before the power is completely off.

If the BMC asserts **PS-ON** and **PWR_GD_PS** does not become asserted, the BMC asserts the Fault LED signal on the front panel connector. It then continues to wait for the power supply to assert **PWR_GD_PS**; if the supply does eventually drive the signal, the BMC clears the power fault state and then proceeds to take the system out of reset.

Drive Fault LEDs

The 4 drive fault LEDs are controlled by the micro-controller on the Hot swap Back-plane and are used to indicate a failure status for each drive. A front panel interface connector is provided for an electrical path between the Hot-swap SCSI Backplane, drive fault LEDs, and front panel drive activity indication. During initialization, the micro-controller flashes the LEDs for 1 second as part of the POST.

2.8 - Hot-Swap SCSI Sub-System with Saf-Te

The Hot-swap SCSI Sub-system supports the following features:

- Enclosure management and monitoring functions conforming to the *SCSI-Accessed Fault-Tolerant Enclosure Specification* (SAF-TE), Revision 1.00.
- Four Single Connector Assembly(SCA2) connectors for SCA2-compatible SCSI drives
- Hot-swapping of SCSI drives, that allows connection of SCSI devices while the power is on and automatic slot power down upon drive removal.
- Full dual mode LVD/SE operation, compliant with Fast, Ultra, Ultra-2, and Ultra-160 SCSI bus operation.
- Internal Intelligent Management Bus (IMB)
- Active termination on SCSI bus (SCSI-2 compatible)

The SCSI hot-swap backplane provides control signals and power for four Ultra2/LVD 3.5 inch SCA2 SCSI hard disk drives. The backplane receives control signals from the SCSI controller on the server board through a cable connected to the wide SCSI connector on the backplane. The backplane is powered through the cables connected to the power connector.

Drives get their control signals and power from the SCA2 connectors on the backplane.

The SAF-TE specified features supported by the Hot-swap SCSI Backplane include monitoring the SCSI bus for enclosure services messages, and acting on them appropriately. Examples of such messages include activating a drive fault indicator and powering down a drive that has failed.

Abstract

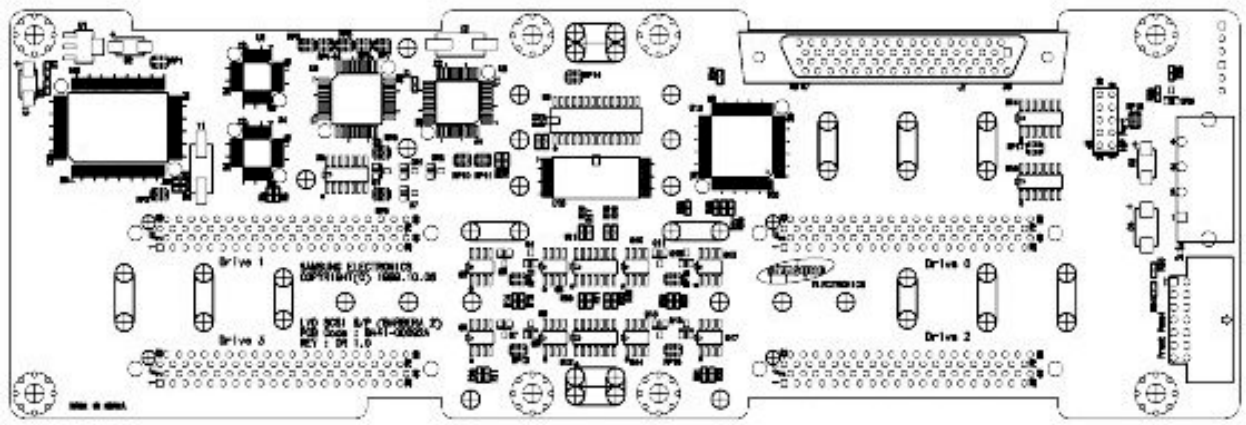
The SR2000 Hot-Swap SCSI Backplane is made up of the following functional blocks:

- SCSI Bus with SCA2 (Single Connector Attach) drive connectors, and active LVDS terminators
- Micro-controller with programmable Flash and RAM
- SCSI interface that allows the micro-controller to respond as a SCSI target
- Fault indicator support
- SCSI drive power control
- Configuration jumpers

Hot-Swap Backplane Board Layout

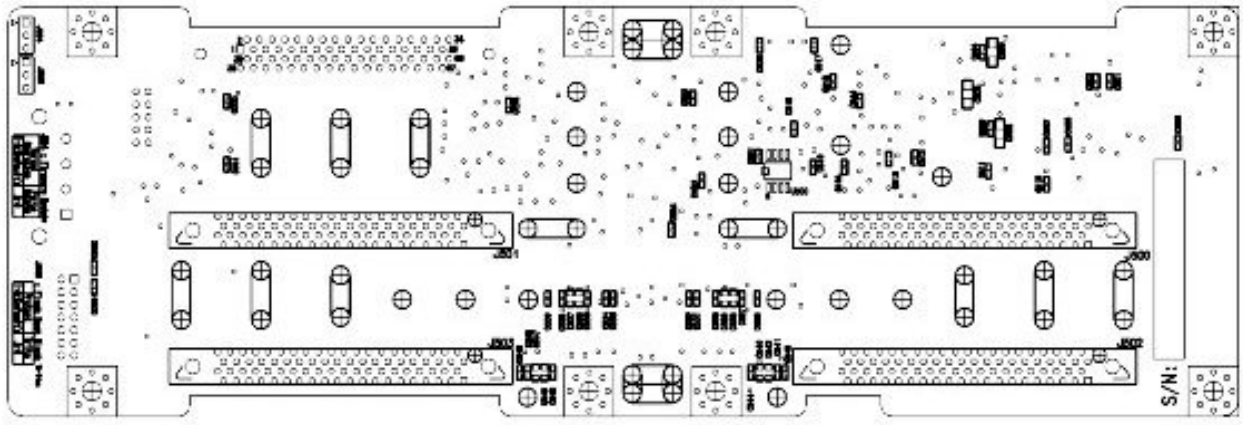
The Hot-Swap SCSI Backplane resides in the hot-swap drive bay of the SR2000 server chassis.

The following diagrams show the layout of components and connectors on the Hot-swap SCSI Backplane printed circuit board. The ovals in the diagram below represent ventilation holes for the hard drive bay.



< Component Side >

Figure 8. SR2000 Hot-Swap SCSI Backplane Component and Connector Placement



< SCA 2 Connector Side >

Figure 9. SR2000 Hot-Swap SCSI Backplane Component and Connector Placement

Configuration Options

The following table describes the various configuration options for the SR2000 Hot-Swap SCSI Backplane, along with their function and intended usage.

Option Jumper ID Description

Option	Location	Description
Firmware Update	J504	Placing this jumper in the “FORCE UPDATE” position forces external firmware update of the program code stored in Flash memory. Placing this jumper in the “NORMAL OPERATION” position allows normal operation.
Flash Boot Block Write	J505	This jumper allows the boot block of the program flash to be updated. “PROTECT” (Default) does not allow the boot block to be written to. “WRITE” allows updating of the boot block.

Table 7: HSBP Configuration Jumpers

Functional Description

This section defines the architecture of the SR2000 Hot-swap SCSI Backplane, describing functional blocks and how they operate. The following figure shows the functional blocks of the Hot-swap SCSI Backplane. An overview of each block follows.

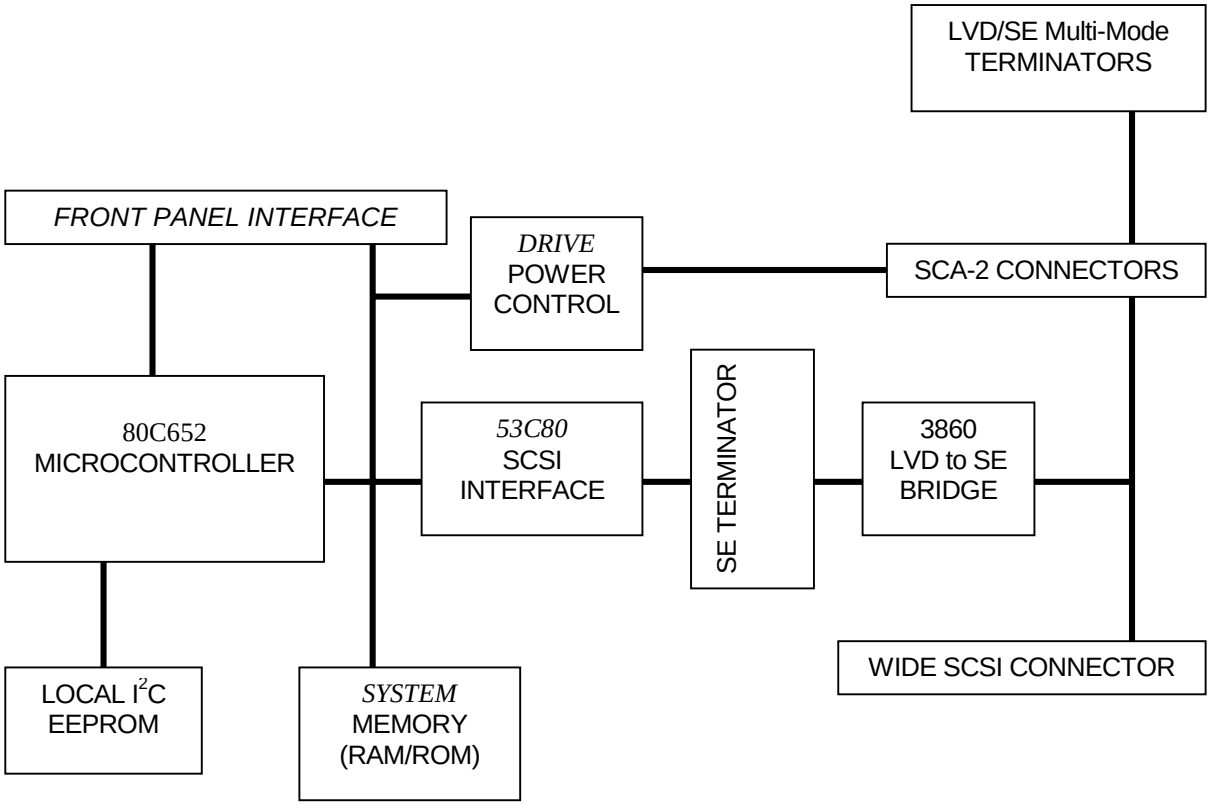


Figure 10. Hot Swap Backplane Block Diagram

SCA2 Hot-Swap Connectors

The SR2000 Hot-swap SCSI Backplane provides four hot-swap SCA2 connectors, which provide power and SCSI signals using a single connector. Each SCA drive attaches to the backplane using one of these connectors.

SCSI Interface

The SCSI interface on the SR2000 Hot-swap SCSI Backplane provides the required circuitry between the SCSI bus and the micro-controller, which contains the intelligence for the backplane. This allows the micro-controller to respond as a SCSI target. The interface consists of a Symbios* 53C80S SCSI Interface Chip, which functions as translator between the SCSI bus and the micro-controller. The 53C80S is a single-ended, narrow device.

LVD to SE Bridge

Since the 53C80S is a single-ended, narrow device, an Adaptec* AIC-3860 LVD-to-SE Transceiver (Bridge) is used to create a single-ended extension of the LVD bus. This allows the 53C80S to communicate with the LVD bus.

SE Termination

Passive SE termination is used for the single-ended extension of the SCSI bus on which the 53C80S is located.

Power Control

Power control on the SR2000 Hot-swap SCSI Backplane supports the following features:

- Power-down of a drive when failure is detected and reported (using enclosure services messages) via the SCSI bus. This decreases the likelihood that the drive, which may be under warranty, is damaged during removal from the hot-swap drive bay. When a new drive is inserted, the power control waits a small amount of time for the drive to be fully seated, and then applies power to the drive in preparation for operation.

- If system power is on, the Hot-swap SCSI Backplane immediately powers off a drive slot when it detects that a drive has been removed. This prevents possible damage to the drive when it is partially removed and re-inserted while full power is available and possible disruption of the entire SCSI array from possible sags in supply voltage and resultant current spikes.

- Hot-spare drive support, where spare drives are kept in the hot-swap bay, but are left un-powered until a drive is determined to have failed. In this case, the hot spare can be powered up and put into service automatically without requiring immediate operator intervention to replace the drive.

- The Hot-swap SCSI Backplane will automatically bypass the power control circuitry if a shorted drive is inserted or if a drive develops a short during operation. This prevents the Hot-swap SCSI Backplane from being damaged by a drive that draws excessive current.

Micro-controller and Memory

The micro-controller provides the intelligence for the SR2000 Hot-swap SCSI Backplane. It is implemented using a Phillips 80C652 micro-controller, with a built-in I^2C interface. The micro-controller uses a 2 Mbit FLASH EEPROM for program code storage, and a 32 KB SRAM for program execution.

Front Panel Drive Fault LEDs

The Drive Fault Indicators are not physically part of the SR2000 Hot-swap SCSI Backplane, but rather located on the system front panel. They are referenced here because the driving circuitry is entirely contained on the backplane. The drive fault LEDs are controlled by the micro-controller and are used to indicate a failure status for each drive. A front panel interface connector is provided for an electrical path between the Hot-swap SCSI Backplane, drive fault LEDs, and front panel drive activity indication. During initialization, the micro-controller flashes the LEDs for 1 second as part of the POST.

IMB Bus

The IMB bus is a system-wide server management bus, based on the Phillips I^2C bus specification. It provides a way for various system components to communicate independently of the standard system interfaces (e.g., PCI bus or processor/memory bus). The I^2C bus controller is integrated into the micro-controller. IMB connectivity is provided to the Backplane via the front panel connector.

Local I²C EEPROM & Temperature Sensor

A temperature sensor is connected to the micro-controller on a Private I^2C bus. Micro-controller programming implements the private I^2C connection by explicitly setting and clearing appropriate clock and data signals, to emulate an I^2C-like interface to the sensor. Temperature information is made available to other devices in the chassis using Enclosure Services messages. A Dallas DS1624 Serial EEPROM/Temperature Sensor implements this function. The EEPROM stores the Field Replaceable Unit (FRU) information for the Backplane.

2.9 - 2-Slot Passive PCI Riser Card

The SR2000 server chassis employs a dual-slot PCI riser, which provides two full-length 32-bit/33Mhz PCI slots. The riser is passive in that there is no PCI bridge on the card. The riser resides in PCI slot 5 of the Intel® L440GX+ server board. The L440GX+ server board has six PCI slots and one ISA slot. PCI Slot 5 is used for the SR2000 PCI Riser Card. The other slots on the server board should not be used. Any PCI add-in card used in the system should be inserted in the slots on the PCI Riser card only. Although PCI slot 5 of the L440GX+ is capable of supporting 66MHz PCI add-in cards, the two slot passive PCI riser card of the SR2000 server chassis does not. The passive PCI riser card will only support 33 MHz PCI add-in cards.

Note: When using a single PCI add-in card, the lower of the two PCI slots (labeled slot 5 on the PCI riser card) must be used. Using the upper PCI slot (labeled slot 6 on the PCI riser card) in a single PCI add-in card configuration will not work. The upper PCI slot can ONLY be used in dual PCI add-in card configurations.

2.10 - Chassis Internal Cables

Front Panel to Hot-swap Backplane

A 14-pin cable connects the Front Panel board to the Hot-swap backplane to transfer the drive activities to LED indicators and provide the IMB bus path..

Table 8: Front Panel to Hot-swap Backplane Connector Pinout

Pin #	I/O	Description
1	I/O	I^2C SCL (Serial Clock)
2	PWR	GND
3	PWR	+5V
4	I/O	I^2C Data (Serial Data)
5	-	NC
6	-	NC
7	I	Drive0 Fault LED Cathode
8	I	Drive0 Activity LED Cathode
9	I	Drive1 Fault LED Cathode
10	I	Drive1 Activity LED Cathode
11	I	Drive2 Fault LED Cathode
12	I	Drive2 Activity LED Cathode
13	I	Drive3 Fault LED Cathode
14	I	Drive3 Activity LED Cathode

Baseboard to Front Panel

A 16-pin flat cable is used for connecting the baseboard to the front panel. The functions of the each signal are in the table.

Table 9: Front Panel to Baseboard connector Pinout

Pin #	I/O	Description
1	PWR	GND
2	-	NC
3	O	Reset Switch
4	O	Power Switch
5	PWR	+5V
6	-	NC
7	O	NMI Switch
8	I	Power LED Anode
9	-	NC
10	-	NC
11	I	Power fault LED Cathode
12	PWR	+5V standby
13	I/O	IMB Data line
14	I	NIC Activity LED Cathode
15	I/O	IMB Clock line
16	PWR	GND

Baseboard to SCSI devices

A 68 pin SCSI cable is used to interface the SCSI backplane with either of the on-board SCSI channels of the L440GX+ baseboard or an add-in PCI SCSI controller installed on the PCI riser card. Four SCA2 connectors provide the interface between the Hot-Swap SCSI backplane and hot-swap SCSI devices.

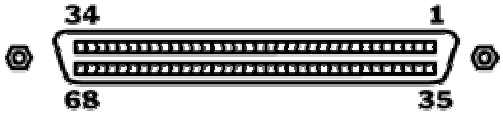


Figure 11. 68 Pin SCSI Cable Connector

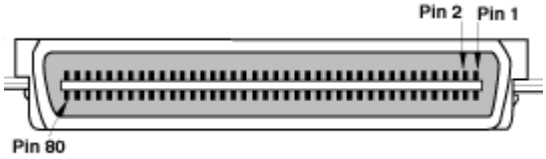


Figure 12. 80 Pin SCA2 Connector

Table 10: Ultra Wide (SE) & Ultra2 (LVD) SCSI Connector Pinout

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

2.11 - Rail Mount Kit

The SR2000 comes with a rail mount kit that is used to mount the chassis into a (19” wide X up to a 30” deep) server cabinet.

An optional front or center mounting kit is also available with brackets that allow the chassis to be mounted in either front or center mount relay racks, or regular server cabinets. The brackets can be attached at the front of the chassis for front mounting, or in the middle of the chassis for center mounting.

For mounting in a regular server cabinet, the front mount brackets are attached to the front of the chassis, and a set of rear support brackets are attached to the back end of the cabinet. This allows the weight of the server to be distributed evenly to prevent the mounting rails on the cabinet from bending.

3.0 Supported Intel Server Boards

The following is a summary of the feature sets for Intel server boards supported by the SR2000 server chassis. Please refer to the appropriate server board Technical Product Specification for additional information.

3.1 - L440GX+ Server Board

Major features of the L440GX+ Server Board:

- Volume server platform based on the Intel® Pentium® II and Intel Pentium® III Processor. On the L440GX+, these processors operate with a 100MHz front side bus. The L440GX+ provides two 100MHz 242-contact slot connectors.
- Using dual processors, the system is fully MPS (Multi-Processor Specification) 1.4 compliant (with appropriate Pentium® II and Pentium® III extensions). In addition, support is provided for MP operating systems that may not be fully MPS 1.4 compliant.
- System design based on Intel® 440GX AGPset, PIIX4e, and I/O APIC devices.

- 100MHz main memory interface supporting up to 2GB of PC/100-compliant commodity SDRAM DIMMs. (ECC and Non-ECC)
- PCI I/O system, compliant with revision 2.1 of the PCI specification.
- Integrated Adaptec* 7896 PCI dual-port SCSI controller providing separate Ultra2 and Ultra wide SCSI channels.
- Integrated Intel® EtherExpress™ PRO100+ 10/100Mbit PCI Ethernet controller with integrated physical layer (Intel® 82559).
- Cirrus Logic* GD5480 High performance 2D PCI video controller with 2MB of SGRAM onboard
- PCI IDE controller (in PIIX4E) providing dual independent Ultra DMA/33 IDE interfaces, each able to support two IDE drives.
- 4 – PCI 33 MHz, 5 Volt, 32-bit expansion slots.
- 2 – PCI 33/66 MHz, 32-bit, "Universal" expansion slots.[1]
- 1 ISA expansion slot. (Not shared)
- 0-channel RAID expansion slot – specific support for Adaptec* ARO1130U2 RAIDPort III Raid Card only
- Compatibility I/O device integrating floppy, serial and parallel ports.
- Integration of server management features, including thermal, voltage, fan, and chassis monitoring into one controller.
- Dual Universal Serial Bus (USB) ports.
- Emergency Management Port (EMP).
- Platform Event Paging (PEP)
- Flash BIOS support for all of the above.

Note: The PCI Riser Card of the SR2000 server chassis supports two 32-bit, 33MHz PCI connectors. The PCI Riser Card is installed into PCI Slot 5 of the L440GX+ board. The total number of usable PCI slots when using the L440GX+ in a SR2000 chassis is two (the two PCI slots on the Riser Card only). All other ISA and PCI slots on the baseboard are inactive and should not be used.

[1] Although PCI slot 5 of the L440GX+ is capable of supporting 66MHz PCI add-in cards, the two slot passive PCI riser card of the SR2000 server chassis does not. The passive PCI riser card will only support 33 MHz PCI add-in cards.

4.0 Installation

⚠ CAUTION

Follow these guidelines to meet safety and regulatory requirements when installing this board assembly.

Read and adhere to all of these instructions and the instructions supplied with the host computer and associated modules. If the instructions for the host computer are inconsistent with these instructions or the instructions for associated modules, contact the supplier's technical support to find out how you can ensure that your computer meets safety and regulatory requirements. If you do not follow these instructions and the instructions provided by the host computer and module suppliers, you increase the safety risk and the possibility of noncompliance with regional laws and regulations.

Ensure EMC

Before computer integration, make sure that the host chassis, power supply, and other modules have passed EMC certification testing.
In the installation instructions for the host chassis, power supply, and other modules pay close attention to the following:

- Certifications
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when miss mating of connectors could be hazardous

If the host chassis, power supply, and other modules have not passed applicable EMC certification testing before integration, EMC testing must be conducted on a representative sample of the newly completed computer.

Ensure Host Computer and Accessory Module Certifications

Make sure that the host computer and any added subassembly (such as a board or drive assembly, including internal or external wiring), are certified for the region(s) where the end product will be used. Marks on the product are proof of certification. Certification marks are as follows:

In Europe
The CE marking signifies compliance with all relevant European requirements. If the host computer does not bear the CE marking, obtain a supplier's Declaration of Conformity to the appropriate standards required by the European EMC Directive and Low Voltage Directive. Other directives, such as the Machinery and Telecommunications Directives, may also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate over current protection. Appropriate protection is provided by a maximum 8 Amp current limiting circuit or a maximum 5 Amp fuse or positive temperature coefficient (PTC) resistor. This Intel server board has PTCs on all external ports that provide DC power externally.

In the United States
A certification mark by a Nationally Recognized Testing Laboratory (NRTL) such as UL, CSA, or ETL signifies compliance with safety requirements. External wiring must be UL Listed and suitable for the intended use. Internal wiring must be UL Listed or Recognized and rated for applicable voltages and temperatures. The FCC mark (Class A for commercial or industrial only or Class B for residential) signifies compliance with electromagnetic interference requirements.

In Canada
A nationally recognized certification mark such as CSA or cUL signifies compliance with safety requirements. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate over current protection. Appropriate protection is provided by a maximum 8 Amp current limiting circuit or a maximum approved 5 Amp fuse or positive temperature coefficient (PTC) resistor. This server board has PTCs on all external ports that provide DC power externally.

Prevent Power Supply Overload

Do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated total current load of all the modules within the computer is less than the maximum output current rating of the power supply. If you do not do this, the power supply may overheat, catch fire, or damage the insulation that separates hazardous AC line circuitry from low voltage user accessible circuitry and result in a shock hazard. If the load drawn by a module cannot be determined by the markings and instructions supplied with the module, contact the module supplier's technical support.

Place Battery Marking on Computer

There is insufficient space on this server board to provide instructions for replacing and disposing of the battery. The following warning must be placed permanently and legibly on the host computer as near as possible to the battery.


WARNING

Danger of explosion if battery is incorrectly replaced.

Replace with only the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

Use Only for Intended Applications

This product was evaluated for use in ITE computers that will be installed in offices, schools, computer rooms and similar locations. The suitability of this product for other product categories other than ITE applications, (such as medical, industrial, alarm systems, and test equipment) may require further evaluation.

Installation Precautions

When you install and test the server board, observe all warnings and cautions in the installation instructions.
To avoid injury, be careful of:

- Sharp pins on connectors
- Sharp pins on printed circuit assemblies
- Rough edges and sharp corners on the chassis
- Hot components (like processors, voltage regulators, and heat sinks)
- Damage to wires that could cause a short circuit
- Observe all warnings and cautions that instruct you to refer computer servicing to qualified technical personnel.

WARNING

Do not open the power supply. Risk of electric shock and burns from high voltage and rapid overheating. Refer servicing of the power supply to qualified technical personnel.

5.0 Regulatory Information

CAUTION

INTEGRATION OF THIS SUBASSEMBLY IS A REGULATED ACTIVITY: YOU MUST ADHERE TO THE ASSEMBLY INSTRUCTIONS IN THIS GUIDE TO ENSURE AND MAINTAIN COMPLIANCE WITH EXISTING PRODUCT REGULATIONS. USE ONLY THE DESCRIBED, REGULATED COMPONENTS SPECIFIED IN THIS GUIDE. USE OF OTHER PRODUCTS / COMPONENTS WILL VOID THE UL LISTING OF THE PRODUCT, WILL MOST LIKELY VOID OTHER COMPLIANCE MARKINGS PROVIDED, AND MAY RESULT IN NONCOMPLIANCE WITH PRODUCT REGULATIONS IN THE REGION(S) IN WHICH THE PRODUCT IS SOLD.

5.1 - Regulatory Compliance

This subassembly, when correctly integrated per this guide, complies with the following safety and electromagnetic compatibility (EMC) regulations.

Safety Standards

UL 1950 - CSA 950-95, 3rd Edition, July 28, 1995

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada). This product has been evaluated and complies with UL1950 – CSA 950-95 3rd Edition. However, if a UL1950 2nd Edition modem telecommunications add-in card is used, the system will be deemed to comply with UL 1950 2nd Edition/CSA950-93.

EN 60 950, 2nd Edition, 1992 (with Amendments 1, 2, and 3)

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Union)

IEC 950, 2nd edition, 1991 (with Amendments 1, 2, 3 and 4)

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)

EMKO-TSE (74-SEC) 207/94

Summary of Nordic deviations to EN 60 950. (Norway, Sweden, Denmark, and Finland)

EMC Regulations

FCC Class B

Title 47 of the Code of Federal Regulations, Parts 2 and 15, Subpart B, pertaining to unintentional radiators. (USA)
CISPR 22, 2nd Edition, 1993, Amendment 1, 1995

Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)
EN 55 022, 1995

Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)
EN 50 082-1, 1992

Generic Immunity Standard. Currently, compliance is determined via testing to IEC 801-2, -3 and -4. (Europe)
VCCI Class B (ITE)

Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)
ICES-003, Issue 2

Interference Causing Equipment Standard, Digital Apparatus. (Canada)
Australian Communication Authority (ACA)

Australian C-tick mark, limits and methods of measurement radio interference characteristics of information technology equipment to ASNZS 3548 (Australian requirements based on CISPR 22 requirements).
New Zealand Ministry of Commerce

Australian C-tick mark, limits and methods of measurement radio interference characteristics of information technology equipment to ASNZS 3548 (New Zealand requirements based on CISPR 22 requirements). New Zealand authorities accept ACA C-Tick Compliance Mark.

Regulatory Compliance Markings

This SR2000 chassis subassembly is provided with the following Product Certification Markings.

- UL and cUL Listing Marks
- CE Mark
- The CE marking on this product indicates that it is in compliance with the European community's EMC (89/336/EEC) and low voltage directives (73/23/EEC)
- NEMKO Mark
- FCC, Class B Markings (Declaration of Conformity)
- ICES-003 (Canada Compliance Marking)

5.2 - Electromagnetic Compatibility Notice (USA)

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

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

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

Only peripherals (computer input/output devices, terminals, printers, etc.) that comply with FCC Class B limits may be attached to this computer product. Operation with noncompliant peripherals is likely to result in interference to radio and TV reception.

All cables used to connect to peripherals must be shielded and grounded. Operation with cables, connected to peripherals that are not shielded and grounded may result in interference to radio and TV reception.

⇒ NOTE

If a Class A device is installed within this system, then the system is to be considered a Class A system. In this configuration, operation of this equipment in a residential area is likely to cause harmful interference.

FCC Declaration of Conformity

Product Type: ASTNIT, ASTLAN

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124-6497
Phone: 1-800-628-8686

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre Canadian des Communications.

(English translation of the notice above) This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the interference causing equipment standard entitled "Digital Apparatus," ICES-003 of the Canadian Department of Communications.

5.3 - Electromagnetic Compatibility Notices (International)

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

(English translation of the notice above) This is a Class B product based on the standard of the Voluntary Control Council For Interference (VCCI) from Information Technology Equipment. If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.
When used near a radio or TV receiver, it may become the cause of radio interference.
Read the instructions for correct handling.
This equipment has been tested for radio frequency emissions and has been verified to meet CISPR 22 Class B.

6.0 Environmental Limits

6.1 - System Office Environment

Parameter	Limits
Operating Temperature	+5^{o}C to +35^{o}C with the maximum rate of change not to exceed 10^{o}C per hour.
Non-Operating Temperature	-40^{o}C to +70^{o}C
Non-Operating Humidity	95%, non-condensing @ 30^{o}C
Acoustic noise	50 dBA in an idle state at typical office ambient temperature (65-75F)
Operating Shock	No errors with a half sine wave shock of 2G (with 11 millisecond duration).
Package Shock	Operational after a 24 inch free fall, although cosmetic damage may be present
ESD	20kV per Intel Environmental test specification
System Cooling Requirement in BTU/Hr	1676 BTU/hour

- Table 5: System Office Environment Summary

6.2 - System Environmental Testing

The system will be tested per the Environmental Standards Handbook, Intel Doc.#662394-03. These tests shall include:

Temperature Operating and Non-Operating

Humidity Non-Operating

Packaged and Unpackaged Shock

Packaged and Unpackaged Vibration

AC Voltage, Freq. & Source Interrupt

AC Surge

Acoustics

ESD

EMC Radiated Investigation

7.0 Serviceability, and Availability

7.1 - Serviceability

The system is designed to be serviced 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.

Following are the maximum times that a trained field service technician should take to perform the listed system maintenance procedures, after diagnosis of the system.

Remove cover	1 minute
Remove and replace hard disk drive	1 minute
Remove and replace 5 ¼ peripheral device	5 minutes
Remove and replace power supply	5 minutes
Remove and replace front system fan	5minutes
Remove and replace expansion board	5minutes
Remove and replace front panel board	5minutes
Remove and replace baseboard (with no expansion boards)	10minutes
Overall MTTR	20 minutes

7.2 - Calculated MTBF

The MTBF (Mean Time Between Failures) for the SR2000 Server chassis as configured from the factory is calculated at 43,748 hours operating at 35 Degrees C. The following table shows the MTBF numbers for individual components within the chassis.

Table 11: SR2000 Component MTBF numbers

Item	Percent Usage	Temperature	MTBF Hours
Front Panel Board	100	50 C	2,852,904
Hot Swap SCSI Backplane	100	50 C	248,836
PCI Riser Card	100	50 C	738,390
IDE CDROM	5	50 C	100,000
Power supply	100	50 C	100,000
FAN	100	50 C	612,184