C0406A

Hot Swap
CompactPCI® System

User's Guide

I-BUS

Infini-Availability™

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1   Introduction

Welcome to the I-Bus Corporation family of CompactPCI® computer systems. This manual provides information necessary to set up and maintain your C0406A. The C0406A System is a CompactPCI® platform that may be equipped with either a SunSPARC or an Intel based single board computer (SBC) module The system with an Intel based SBC installed is designated CP0406A. The designation CS0406A refers to a system with a SunSPARC SBC. In this manual, when referring to either or both of these systems, the term C0406A will be used.

If 2-slot (8HP) SBC's are used, such as the IBC 2600 or IBC 2601 in the C0406A system, four expansion slots are available, while 1-slot (4HP) SBC's such as the CP1500 SunSPARC will allow for five expansion slots.

The C0406A is intended to meet the need for a reduced height rackmount CompactPCI® system. The 4U high integrated enclosure houses a six slot PICMG H.110 and PICMG 2.1 Hot Swap compliant backplane. The enclosure can mount up to five 3.5" front accessible SCSI SCA removable drives; it also mounts a front accessible CD ROM drive and either a tape drive or a floppy drive. The enclosure supports up to six 80MM depth rear I/O transition boards.

The C0406A has provision for the I-Bus Corporation Chassis Management Controller (CMC). The CMC Board functions to monitor and control the system environment of a custom cPCI enclosure. It operates as an independent Chassis Management Controller manageable through its RS232 port by an external device. Refer to the CMC User's Guide for further instructions and specifications.

The system is equipped with a 300W (AC or DC) dual redundant power supply.

Chapter 1 - Introduction

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2   Specifications

2.1   Overview

- The I-Bus C0406A system is a CompactPCI Platform intended to serve the market for reduced height, rack mounted environments.

- The 4U high integrated enclosure houses a six slot PICMG H.110 and PICMG 2.1, Hot Swap compliant backplane.

- The enclosure can mount up to five 3.5" SCSI SCA drives, front accessible/removable. The enclosure also mounts a front accessible CD ROM drive and either a tape drive or a Floppy Drive.

- The system can be configured with either a SunSparc SBC or an Intel SBC, with up to five peripheral cards.

- The system supports up to six 80mm depth rear transition boards. However, depending on which SBC occupies the system slot, the top slot may or may not be available for a rear I/O transition board. If the rear I/O board for the SBC is a single slot board, the top slot is available for another I/O card. If the SBC rear I/O board occupies two slots, the top slot will not be availaable.

- The system is equipped with a 300W (AC or DC) dual redundant power supply.

- The system can be optionally equipped with a Chassis Management Controller (CMC) to monitor power supply status and internal temperature. The CMC board occupies a special rear slot above the rear I/0 transition slots, with status LEDs visible on the chassis front panel. See Chapter 7 for information on the SMC.

- Figures 2-1, 2-2, and 2-3 show the configuration for C0406A.

Chapter 2 - Specifications
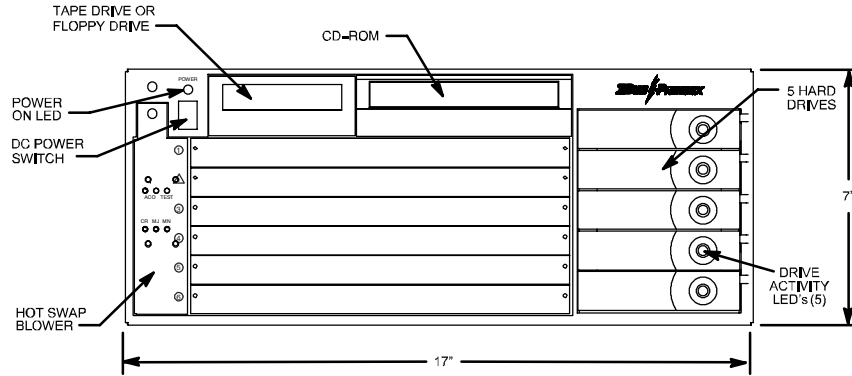
Figure 2-1. C0406A System Configuration - Front View
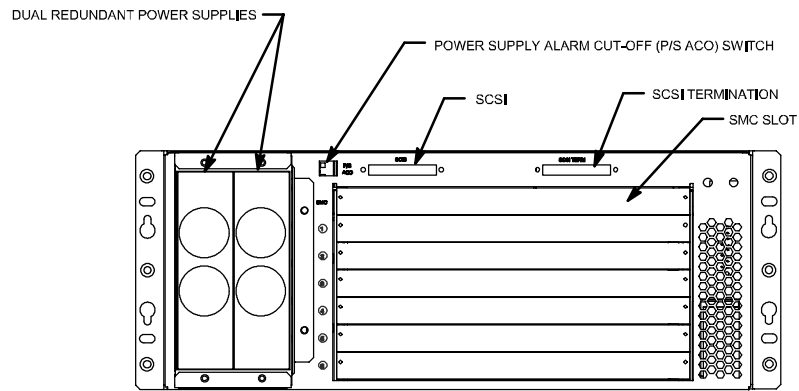
Figure 2-2. C0406A System Configuration - Rear View
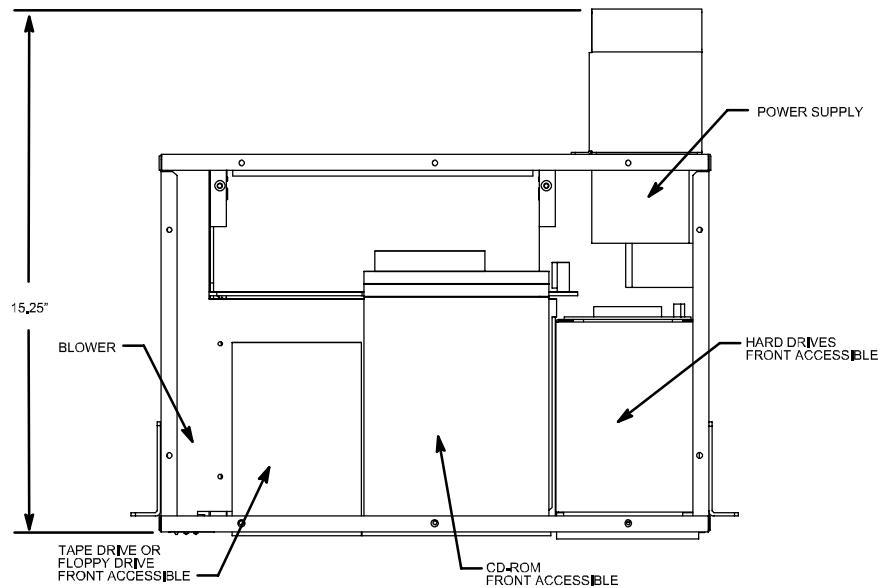
Figure 2-3. C0406A System Configuration - Top View

2.2 Mechanical

2.2.1 Enclosure

- Designed for EIA RS-310 19"and 23" rack mounts
- Detachable rack mount brackets can be positioned for front flush mount or mid-chassis rack mount
- A single rack mount bracket design is used for both 19" and 23" racks, both left and right sides, incorporating mounting keyways for temporary hanging of the chassis.
- Enclosure front panel incorporates a DC on-off switch, plus an LED power-on indicator.
- Main power input is in the rear of the enclosure.

2.2.1.1 Basic Chassis Configuration

- Eurocard 6U card cage, per PICMG 2.0 Rev 3.0, CompactPCI specification.
- Space for a total of six 4 HP slots, oriented horizontally (total opening of 4.80" front and rear).

Chapter 2 - Specifications

- Total rack height is 4U (7.00")
- Cool air intake is in front; hot air exhaust is in the rear.
- Overall dimensions are 7.00" High, 17.00" Wide, 15.25" deep.

2.2.1.2   Disk Drive Mounting

- Mounts five 3.5" SCSI SCA hard disk drives, horizontally. These disk drives are front accessible/ removable.
- A CD ROM drive and Floppy Drive, oriented horizontally, mount above the backplane. Both are accessible through the front panel.

2.3   Electrical

2.3.1   Power Subsystem

- Dual redundant power supplies, delivering 300W output from AC or DC mains input.
- AC input range: 90-264VAC, 47-63Hz, auto sensing, auto ranging.
- DC input range: -36 to –72VDC.

2.3.1.1   Outputs (AC and DC)

- Maximum loads: +5VDC @ 25A   +3.3VDC @ 20A   +12VDC @ 10A   -12VDC @ 1A; combined total output not to exceed 300W; combined total output of +5V and +3.3V not to exceed 150W.
- Minimum loads: +5VDC @ 3A +3.3VDC @ 0.5A   +12VDC @ 1A
  Ripple (max): 50mV for +5V and 3.3V, 100mV for +12V and –12V.
- Load regulation: ±5% for +5V and +3.3V, ±10% for +12VDC and, -12VDC
- Line regulation: ±0.5% for all outputs.
- Ripple: 50mV for +5V and 3.3V, 100mV for +12V, 150mV for –12V
- MTBF: 100,000 hrs, full load at 25°C (MIL-217).
- Operating temperature Range: 0°C to 50°C

2.3.2 Single Board Computer

- The system currently supports the following I-Bus/Phoenix Single Board Computers and corresponding rear I/O transition modules:

  CS0406A

  SUN - CP1500/2060/2040/2080 SPARC engines
  360, 460, or 500MHz CPU

  Standard 512MB Up to 2GB RAM supported.

  CP0406A

  I-Bus/Phoenix IBC2600 or IBC2601 SBCs

  600, 700 or 850 MHz Intel PIII CPU

  433 MHz or 566 MHz Celeron CPU

  128, 256, 512, or 768 MB RAM

2.3.3 CPCI Backplane

2.3.3.1 Monolithic Backplane

- This backplane contains two ATX connectors for DC power input.

- The backplane supports a maximum of 400 watts input power, however, utilizing this capability will require that the power supplies no longer be hot-swap redundant.

- The back plane has one cPCI system Slot and five cPCI I/O slots. There is also an additional slot in the rear for the SMC board (see Chapter 7 for instructions on the SMC option).

- The CompactPCI system slot has a PCI bus with 32-bit/64-bit at 33MHz.

- All CompactPCI I/O slots have PCI bus with 32-bit/64-bit at 33MHz and H.110 bus.

- The back plane complies with the following specifications:

  CompactPCI Specification: PICMG 2.0 R3.0
  Hot Swap Specification: PICMG 2.1 R2.0

  System Management Specification: PICMG 2.9 R1.0

  CompactPCI Computer Telephony: PICMG 2.5 R1.0

- Backplane Dimension: 11.2 X 4.7 inches.

- Temperature Range

  Operation: -5°C to 55°C
  Storage: -40°C to 85°C

2.3.3.2   Media Bay Backplane

▪The chassis incorporates five Media Bay Backplanes. Each backplane contains one 4-pin power connector, one 68-pin SCSI connector, one 80-pin SCA connector, and one 18-pin HD Select connector

▪Individual Media Bay Backplanes are 0.905 wide by 3.937 high.

▪A single internal SCSI cable goes from the rear SCSI connector above the SMC slot to each of the media bay backplanes, to the CD ROM drive, to the tape drive, and back to the SCSI Termination connector above the SMC slot.

Connect an active SCSI terminator to the SCSI Termination connector. Connect an shielded SCSI cable between the SCSI Controller and the connector labeled "SCSI" on the rear of the chassis. Note that the 18" shielded SCSI cable and the SCSI terminator are shipped separately as accessories, not attached to the unit. Figure 2-4 shows how these are to be connected.
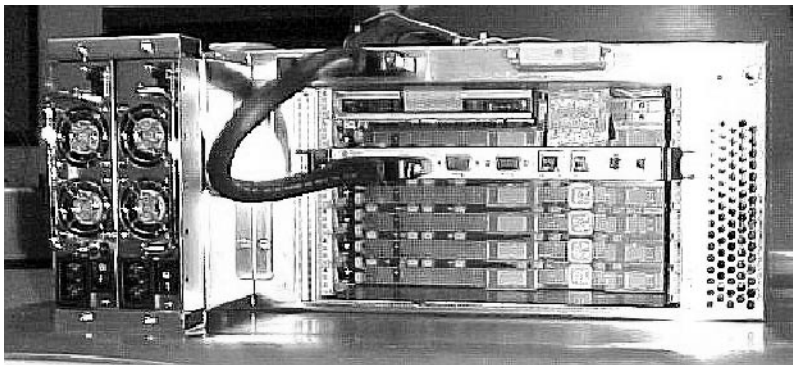
Figure 2-4. Connecting SCSI Cable and Terminator

▪ Power to the Media Bay backplane is supplied through a standard PC peripheral power connector.

▪ Figure 2-5 shows the Media Bay Backplane connectors and layout.

HD SEL

68
PIN
SCSI

80
PIN
SCA

PWR CONN

REAR VIEW

SIDE VIEW
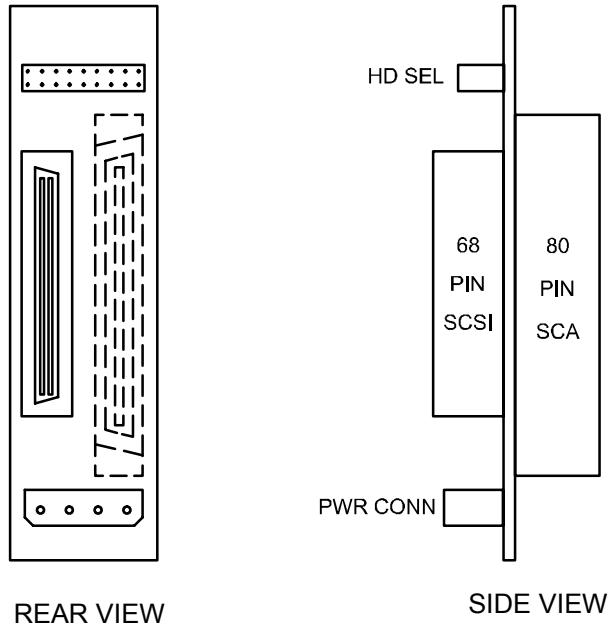
Figure 2-5. Connectors on Media Bay Backplane

2.3.4   Alarm Module (Optional)

See Chapter 7 for functionality

2.4   Operating System Software

Configuration	Software
CS0406A	Solaris 2.6, 7 or 8
CP0406A	Windows NT, 98, 2000 or Linux Redhat 7.0

2.5   Environmental

2.5.1   Temperature

■Continuous Operating: 0ºC to 40ºC

■Short-term (30 mins max) Operating: –5ºC to 55ºC

■Non-operating: –40ºC to 70ºC

2.5.2 Humidity

- Operating: 5-85% @ 40°C (non-condensing).
- Non-operating: 0-95% @ 40°C (non-condensing).

2.5.3 Altitude

- Operating altitude 6000 ft. at operating temperature, 15,000 ft. at 25°C.
- Non-operating altitude 40,000 ft.

2.5.4 Vibration/Shock

- Operating vibration: 0.25g @ 2-100 Hz, 1.5g @ 100-500 Hz.
- Storage/transport vibration: 2g @ 5-500 Hz.
- Operating shock: 10g @ 11 msec
- Storage/transport shock: 30g @ 11 msec.

2.6 Safety Agency

- UL 1950, Recognized Component.
- cUL or CSA 950 Approved.
- TUV EN 60950 Certified.
- CE Certified.
- FCC Class A.

3 Hardware

This chapter discusses the removal and installation of the Single Board Computer (SBC) module, add-in board modules, rear I/O modules, SMC Board, backplane, and cooling blower.

CAUTION!

Unless working on hot-swap components, always shut down the system and turn OFF all power and disconnect the power cord before working on the system.

CAUTION!

Connector pins on CompactPCI® backplanes are extremely delicate and can easily be bent. Precise alignment and proper insertion/ejection procedures are critical in order to avoid bending backplane pins.

CAUTION!

Electrostatic Discharge (ESD) may damage memory chips, programmed devices and other electrical components. ESD can be prevented by wearing a wrist strap attached to a ground post on a static mat. Handling of this product should ONLY be done by a properly trained technician in an approved ESD work area.

CAUTION! PLEASE NOTE

Any Unoccupied slots, both front and rear, must be covered by a filler plate in order for proper cooling air flow to take place. Leaving a slot uncovered could result in overheating and failure of one or more system components

Chapter 3 - Hardware

3.1   SBC Module

In the C0406A, the SBC module is mounted in the second slot from the top. The C0406A supports either a SunSPARC CP1500 or an Intel based SBC Module such as the I-Bus/Phoenix IBC 2600 or IBC 2601. The SBC module is mounted through the front of the enclosure. It is held in place with two injector/ejector handles that stabilize the board when they are engaged. It is also secured by two captive screws located on the SBC module's faceplate. See the following instructions if the SBC module needs to be removed for maintenance or replacement

3.1.1   Removal and Installation of the SBC Board Module

1   Shut down the system and turn off the DC power via the switch on the front of the chassis. Verify that the Power On light is extinguished.

2   Loosen the two captive screws on the SBC module's faceplate. Note: When loosened, the screws should be pushed inward to prevent obstructing the movement of the injector/ejector handles.

3   Completely retract the injector/ejector handles by pressing them away from each other.
Note: Some force may be required.

4   Slide the SBC module out of the chassis.

5   With the Injector/Ejector handles in their outward (open) position, insert the SBC module on its card guides until the handle latches begin to engage. Make sure the two guide pins mate properly into the corresponding hole in the SBC card guides.

6   Fully seat the SBC module by engaging the injector/ejector handles, pressing them to their full inward position.

Note: If a firm steady pressure on the handles does not readily seat the board, verify proper board alignment, clear insertion path and connector pin straightness.

7   Secure the SBC board module by tightening the two captive screws.
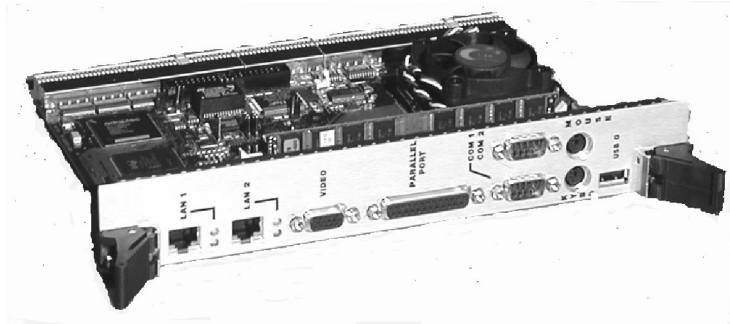
Figure 3-1: I-Bus IBC 2600 SBC Board
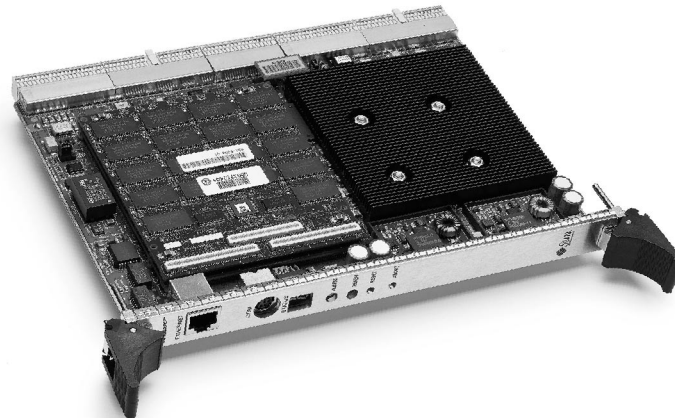
Figure 3-2: SunSPARC Ultra IIi SBC Board

3.2   Add-in boards

All add-in board modules are mounted through the front of the enclosure. They are held in place with two injector/ejector handles that stabilize the boards when they are engaged.

The C0406A provides for full hot swap of add-in boards to PICMG 2.1 R2.0 and PICMG 2.12 R1.0 standards, supporting Pigeon Point Systems Hot Swap Kit software. For full I/O Board hot swap, the system must be running Pigeon Point software under one of the following systems:

> a) Microsoft Windows 2000 (Advanced Server, Server, Professional)
> b) Microsoft Windows NT with a Hot Swap Manager

3.2.1   Removal and Installation of Add-In Boards

1 (Hot swap only) Toggle the bottom injector/ejector handle of the card down or activate the hot swap thumb switch.
   (Non-Hot swap only) Shut down the system and turn off the main system power.

2 (Hot swap only) The card's blue LED should light, indicating that the card is safe to remove.

3 Loosen the screws on the add-in board's faceplate, if any.

4 Completely retract the injector/ejector handles of the add-in board module by pressing them away from each other.
   Note: Some force may be required.

5 Slide the add-in board module out of the chassis.

Note: If you do not plan on immediately replacing a removed add-in board, you must close the space left open with a filler panel in order to maintain EMI specifications.

To insert or re-insert a card back into that slot, the following must be done.

1 With the Injector/Ejector handles in their outward (open) position, insert the add-in board module on its card guides until the handle latches begin to engage. Make sure the two guide pins mate properly into the corresponding hole in the add-in board card guides.

2 Engage the injector/ejector handles by pressing them towards each other.

Note: If a firm steady pressure on the handles does not readily seat the board, verify proper board alignment, clear insertion path and connector pin straightness.

3   (Hot swap only) The blue LED will light momentarily and should extinguish after full insertion is complete.

4   The operating system should automatically recognize the card and accomplish the correct steps to allocate resources and load drivers.

5   Secure the add-in board module by tightening the two captive screws (if they are present).

For hot swap instructions on other third party hot swap software, consult the applicable instruction manual for the software.

3.3   Rear I/O Transition Modules

The C0406A is configured to support rear I/O transition modules. As an optional feature, the IBC 2700, the IBC 2702, or the SunSPARC CP1500 rear transition module may be installed.

NOTE, however, that the Intel based IBC 2700 rear I/O transition module occupies two slot spaces. The SunSPARC CP1500 rear I/O transition module occupies only one space, but because of the space required for cabling, the slot above is not available for other transition modules, and must be covered with a filler panel. Therefore, depending on which SBC occupies the system slot, the top slot may or may not be available for a rear I/O transition board.

3.3.1   Removal and Installation of the Rear I/O Modules

1   Shut down the system and turn off the main system power.

2   Loosen the screws on the rear I/O board's faceplate, if any.

3   Completely retract the injector/ejector handles of the rear I/O board module by pressing them away from each other.
Note: Some force may be required.

4   Slide the rear I/O board module out of the chassis.

Note: If you do not plan on immediately replacing a removed rear I/O board, you must close the space left open with a filler panel in order to maintain EMI specifications.

To insert or re-insert a card back into that slot, the following must be done.

1   With the Injector/Ejector handles in their outward (open) position, insert the rear I/O module on its card guides until the handle latches begin to engage. Make sure the two guide pins mate properly into the corresponding hole in the rear I/O card guides.

2   Engage the injector/ejector handles by pressing them towards each other.

Note: If a firm steady pressure on the handles does not readily seat the board, verify proper board alignment, clear insertion path and connector pin straightness.

3   Secure the rear I/O board module by tightening the two captive screws (if they are present).

IBC 2700   SunSPARC

Figure 3-3: Rear I/O Transition Modules

3.4   CMC (Chassis Management Controller) Board

The C0406A supports a Chassis Management Controller (CMC) Board in top rear slot of the backplane. Refer to Chapter 7 for more information about this optional feature.

3.4.1   Indicators and Controls

Figure 3-4 is a drawing of the front plate of the SCMC Board. LED indicators and pushbutton controls on the board are as follows:

3.4.1.1   Critical Alarm LED (CR)

This Red LED, when illuminated, indicates the presence of a Critical Alarm condition.

3.4.1.2   Major Alarm LED (MJ)

This Orange LED, when illuminated, indicates the presence of a Major Alarm condition.

3.4.1.3   Minor Alarm LED (MN)

This Yellow LED, when illuminated, indicates the presence of a Minor Alarm condition.

3.4.1.4   Alarm Cut Off LED (ACO)

This Yellow LED, when illuminated, indicates that the audible alarm, which sounds upon the occurence of an alarm condition, has been silenced by the ACO OFF pushbutton. Should another alarm condition occur while the previous alarm condition is still present, the LED will be extinguished and the audible alarm will again sound.

3.4.1.5   SMC Health LED (CMC)

Normally, this LED is illuminated Green. Should any software or hardware malfunction cause the CMC Board to become inoperative, this LED will turn Red. It will also turn Red temporarily during a reset of the SMC processor initiated by the RST pushbutton.

3.4.1.6   Reset Pushbutton (RST)

This pushbutton restarts the processor on the CMC Board. There is little reason to use it in normal operation unless the user is doing software development.

3.4.1.7   LED Test Pushbutton

This pushbutton initiates a test cycle of the five LEDs on the front plate of the CMC Board. Each LED, beginning with the Critical Alarm LED, will be illuminated for approximately one second. The last LED, the CMC Helath LED, will turn Red for approximately one second before reverting to its normal Green condition.

3.4.1.8   ACO Off Pushbutton

This pushbutton silences the audible alarm that sounds upon the occurrence of any alarm condition and also illuminates the ACO LED. Silencing the audible alarm does not correct the alarm condition. Also, the occurrence of a subsequent additional alarm condition will reactivate the audible alarm.

3.4.1.9   Battery Pushbutton (BAT)

This pushbutton is employed to prevent draining of the CMC Board backup battery after an intentional system shutdown. When the main system power is shut down, the CMC Board will remain operative, being powered by its backup battery. Pressing the BAT pushbutton at this time will disconnect the battery and de-energize the CMC Board.
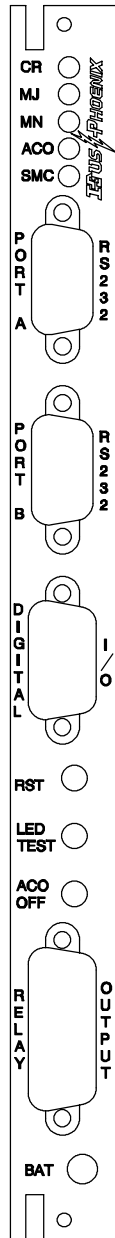
Figure 3-4. CMC Board Front Plate

3.4.2   Removal and Installation of the CMC Board

1 Shut down the system and turn off the main system power.

2 Loosen the screws on the CMC board's faceplate, if any.

3 Completely retract the injector/ejector handles of the rear I/O board module by pressing them away from each other.
Note: Some force may be required.

4 Slide the CMC board module out of the chassis.

Note: If you do not plan on immediately replacing a removed SCMC board, you must close the space left open with a filler panel in order to maintain EMI specifications.

Note: To prevent draining the backup battery on the CMC board after an intentional system shutdown, press the BAT pushbutton on the front plate of the CMC Board. Battery backup will be re-initialized at the next system start-up.

To insert or re-insert an CMC Board back into that slot, the following must be done.

1 With the Injector/Ejector handles in their outward (open) position, insert the rear I/O module on its card guides until the handle latches begin to engage. Make sure the two guide pins mate properly into the corresponding hole in the rear I/O card guides.

2 Engage the injector/ejector handles by pressing them towards each other.

Note: If a firm steady pressure on the handles does not readily seat the board, verify proper board alignment, clear insertion path and connector pin straightness.

3 Secure the rear I/O board module by tightening the two captive screws (if they are present).

3.5   Backplane

3.5.1   Backplane Connector Pin Assignments

The C0406A supports a 6-slot CompactPCI® backplane. See Appendix 1, Tables A1-1 thru A1-5 for connector information for the CompactPCI® backplane.

Do not attempt to remove the backplane from the chassis. The backplane is not a user serviceable item. Please contact I-Bus Technical Support for further information.

3.5.2 Backplane Cooling Blower

The C0406A features a hot-swap backplane cooling blower. It is located to the left of the backplane card cage behnd the SMC Alarm Status Display Panel (see Figure 3-5).

3.5.2.1 Removal and Replacement of Backplane Cooling Blower.

The backplane cooling blower can be removed without shutting down the system by simply loosening the captive thumb screw and withdrawing the blower. Then insert the replacement blower and tighten the thumb screw. Always replace the blower <u>immediately</u> after removing it to avoid system overheating.
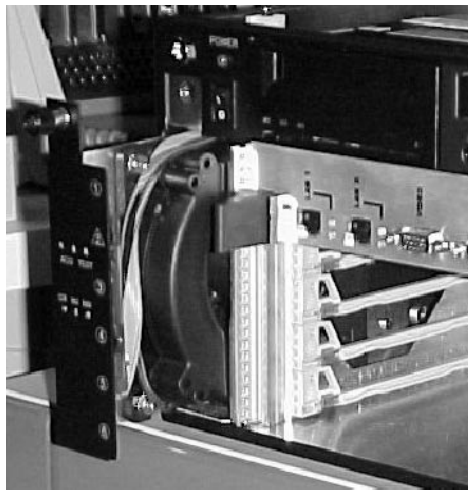
Figure 3-5. Cooling Blower (Partially Withdrawn)

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4 Power Distribution

This chapter discusses the power supply and provides installation and removal instructions.

CAUTION!

Equipment uses multiple power cords. Unless working with hot-swap components, always shut down the system, turn OFF all power, and disconnect all power cords before working on the system.

Power supply replacement is to be done by qualified service personnel only.

4.1   Power Supply

Chassis DC power is provided by dual redundant power supplies with a combined maximum total output of 300W from AC or DC input. In this optional arrangement, either power supply may be hot swapped without interrupting system operation.

Figure 4-1 shows the dual redundant power supplies with one partially withdrawn.

P/S
ACO Switch
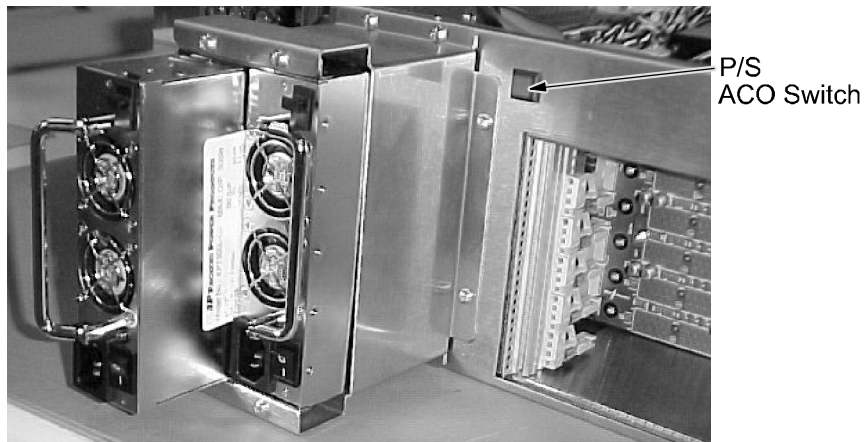
Figure 4-1. Dual Redundant Power Supplies
(One Shown Partially Withdrawn)

Chapter 4 - Power Distribution

4.1.1   Power Supply Alarm Cut-Off (P/S ACO) Switch

If one of the power supplies should fail, an audible alarm will sound. This audible signal can be silenced by pressing the P/S ACO switch (a red button on the rear of the chassis; see Figure 4-1). Please note that silencing the audible alarm does not correct the failed condition of the power supply.

If the system is equipped with the SMC Option (See Chapter 7), the red P/S ACO switch will not be present, and the failure of any power supply will be indicated by an SMC major alarm and the SMC Board ACO pushbutton will function to silence the audible alarm.

4.1.2   Removing and Installing a Power Supply Module

In normal operation the two power supplies share the load equally, but either one is capable of sustaining the entire 300 watts of load, should the other one fail. To replace a failed power supply, follow the steps below:

1   Determine which power supply has failed by observing which one has its green LED not illuminated.

2   Turn off the power switch on the rear face of the failed power supply.

3   Disconnect the power cord/cable from the power supply to be replaced.

4   Press down on the release latch, grasp the power supply handle and withdraw it from its housing.

5   Verify that the power switch on the replacement power supply is in the off position.

6   Insert the new replacement power supply and, holding down its release latch, press it firmly into place.

7   Reconnect the power cord/cable to the replacement power supply.

8   Turn on the power supply switch and note that the green LED becomes illuminated.

5   Drive Bay

This chapter describes the removal and installation of the drives.

CAUTION!

Unless working on hot-swap components, always shut down the system and turn OFF all power and disconnect the power cord before working on the system.

⚠ CAUTION! ⚠

Electrostatic Discharge (ESD) may damage memory chips, programmed devices and other electrical components. ESD can be prevented by wearing a wrist strap attached to a ground post on a static mat. Handling of this product should ONLY be done by a properly trained technician in an approved ESD work area.

5.1   Removing/Installing the Drives

The C0406A provides for up to five SCA swappable hard drives. They may be either "hot-swap" or "cold-swap," depending on your system configuration. The cold-swap configuration requires that power to the system be shut down before withdrawing the drive. The drives are mounted in shuttles to allow easy withdrawal and replacement. Figure 5-1 shows a hard drive shuttle partially withdrawn.

Figure 5-1. Hard Drive Shuttle Partially Withdrawn

Chapter 5 - Drive Bay

5.1.1   To Replace a Hard Drive

1   If your system configuration requires that the drive be "cold-swapped," shut down the system and turn off power to the hard drive(s).

2   Insert a suitable tool in the small hole in the front of the shuttle to release the shuttle handle. A "Combi-Tool" is shipped with each C0406A unit, and one end of this tool is intended to be used to release the shuttle handle. If this tool is not available, a stiff wire such as a straighened out paper clip or any similar device will work well.

3   Using the handle just released, withdraw the shuttle from the chassis.

4   If the replacement drive is already mounted in a shuttle, skip to Step 11. If not, proceed with the following steps.

5   Place the drive shuttle on an ESD safe work surface and observe proper ESD precautions as you perform the following steps.

6   Remove the four screws, two from each side and remove the drive from the shuttle.

7   Position the replacement drive in the shuttle. Be sure the shuttle is oriented as shown in Figure 5-2 and the replacement drive has its component side down.

8   Replace the four screws removed in Step 6 Be sure the screws are inserted in the two slotted holes in the shuttle.

9   Before tightening the screws, slide the drive forward or back so that the holes in the drive align with the non-slotted holes in the shuttle. Then tighten the screws.

10 Turn the shuttle over and connect the leads for the drive activity LED to the correct jumper position on the drive (see Figure 5-3). The correct jumper for LED Out should be identified by a marking or label on the drive (as shown in Figure 5-3). Note that the connection is polarity sensitive.

11 Insert the shuttle with the replacement drive into the C0406A chassis and close the shuttle handle to lock it into position.

If you are unable to close the shuttle handle into its locked position, it may be necessary to remove the drive and loosen the four screws holding it to the shuttle, and slide the drive forward slightly. Then tighten the screws. This should allow the drive to be fully inserted into its slot in the chassis.
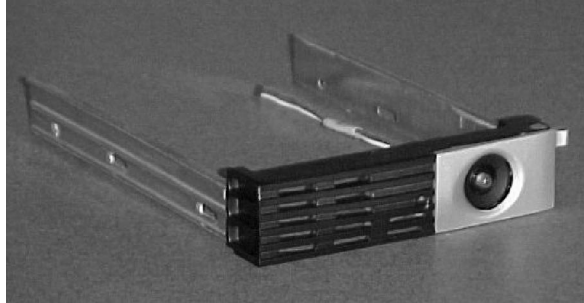
Figure 5-2: Hard Drive Shuttle

LED ACTIVITY
JUMPER
CONNECTION

JUMPER
IDENTITY
LABEL
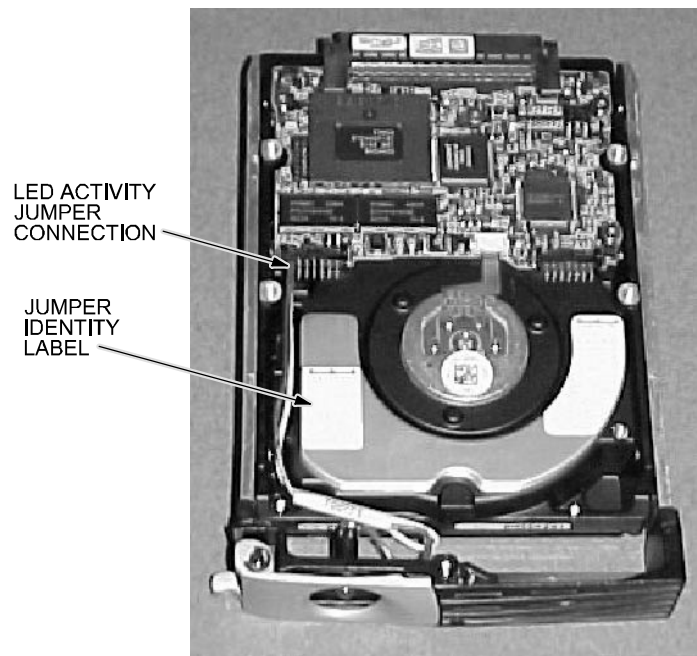
Figure 5-3: Hard Drive Mounted in Shuttle

5.1.2 To Replace the Floppy or Tape Drive and/or CD-ROM Drive

The C0406A provides one 5.25" CD-ROM drive and either one 3.5" floppy drive or one 3.5" tape drive located above the card cage. To replace either of these drives follow the steps below:

1 Shut down the system and turn off the main system power.

2 Disconnect the power cord from the power supplies at the rear of the unit.

3 Remove the unit from the rack and place it on an ESD safe work surface.

4 Remove the top cover.

5 Disconnect the power and data cables from the floppy or tape drive and the CD-ROM drive.

6 Remove the C0406A front panel bezel. There are three screws on the top surface, two on each end, and two on the bottom that hold this part in place. Figure 5-4 shows this bezel removed and swung aside.
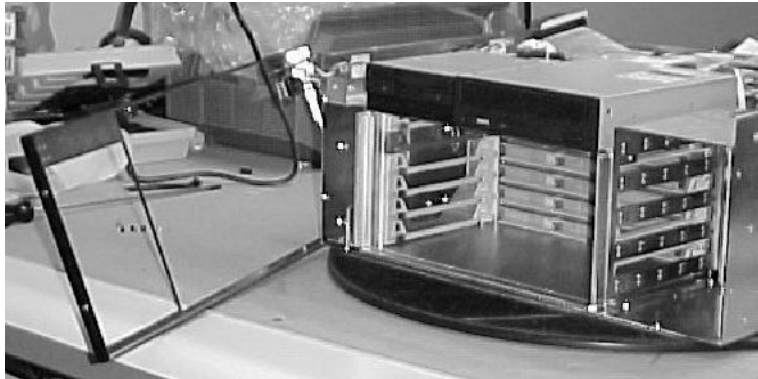
Figure 5-4.   C0406A with Front Panel Bezel Removed

7 Remove any hard drives that are in the Hard Drive Bay.

8 Using a short Phillips screw driver, remove the screws shown in Figures 5-5, 5-6, and 5-7.

REMOVE
THESE
SCREWS ———

Figure 5-5. Removing the Drive Mounting Plate

REMOVE
THESE
SCREWS ———
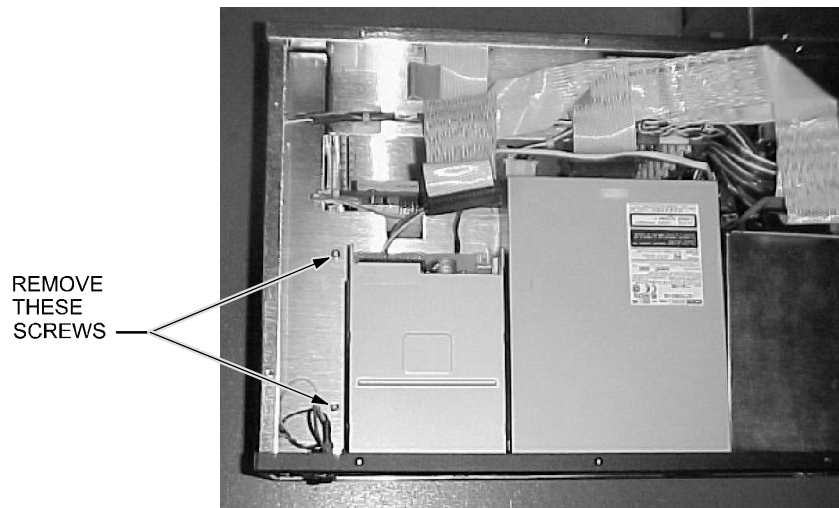
Figure 5-6. Removing the Drive Mounting Plate
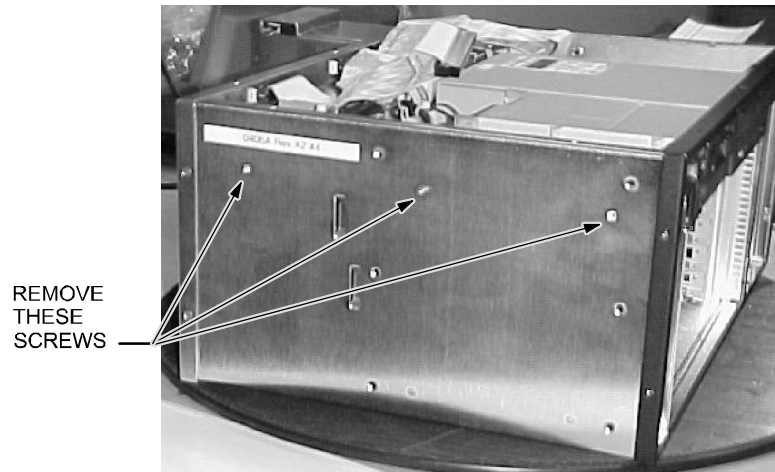
Figure 5-7. Removing the Drive Mounting Plate

9   Lift the right hand end of the drive mounting plate and draw it forward
out of the chassis. You may now turn the plate over and remove the
screws that hold the drive to be replaced to the plate.

10 After replacing the drive, reassemble the unit by reversing the above
steps.

6   Software

The C0406 can be preloaded with Red Hat Linux, Microsoft Windows 2000 or Windows NT 4.0 or Sun Solaris 2.6, 7, or 8 Operating System. For software configuration support on this platform, refer to the software manufacturer's Installation and Configuration manual.

For Pigeon Point (or other third party) Hot Swap Kit software, refer to the appropriate User's Manual.

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7   Chassis Management Controller Option

7.1   Overview

This chapter describes the functional and interface specifications of the I-Bus Chassis Management Controller (CMC). The CMC Board functions to monitor and control the system environment of a custom cPCI enclosure. It operates as an independent Chassis Management Controller manageable through its RS232 port by an external device. It conforms to the PICMG 2.9 R1.0 System Management Specification, supporting the following:

> IPMB0 on the cPCI backplane
> IPMI Command Protocol
> Local I^2C bus to connect temperature sensors and any
>   other remote sensing devices

The IPMB0 is driven by an I^2C bus controller.

7.2   Description

The SCMC Board is plugged into the back of an I-Bus cPCI monolithic backplane, and mounted vertically behind the power supply connectors. Figure 7-1 shows the architecture of an CMC Board in conjunction with the SBC(s) in a cPCI system.

The CMC board has two I^2C ports, to support cPCI System Management Bus per PICMG 2.9. One of the ports is used as the local I^2C bus to be connected to temperature sensors, etc. The other port is used as the IPMB0 bus and routed to the cPCI backplane connectors.

Control and communication with the CMC board is via IPMI-command structure through the RS232 port(s). For example, the host controller is capable of changing and setting limits/masks for the sensors via the IPMI command.

The CMC board is capable of replying to messages from the host controller.

Chapter 7 - System Management Controller Option
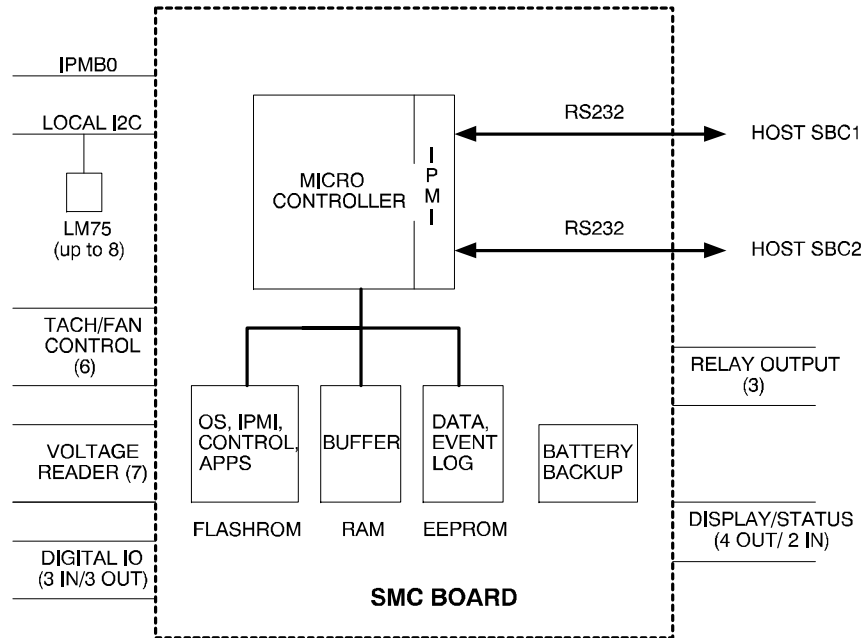
Figure 7-1. Block Diagram of a Chassis Management Controller

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Figure 7-2 shows the I^{2}C ports assignment between the CMC controller chip (e.g., VSC215) and the CompactPCI backplane.
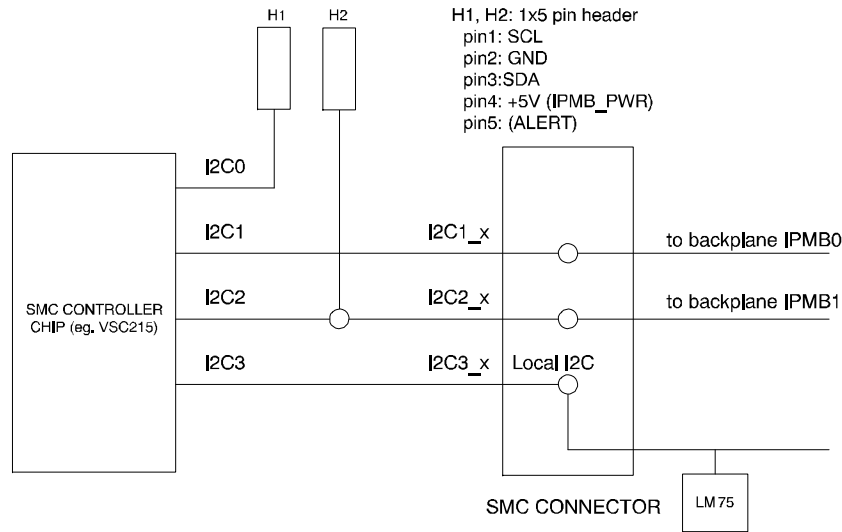
Figure 7-2. PC Ports Assignment

7.3 CMC Board Mechanical and Environmental Specifications

7.3.1 Mechanical Specifications

7.3.1.1 Physical Size

- 9.190" high X 3.150" wide.
- Mounts to 6U rear panel of I-Bus custom monolithic cPCI backplane.

7.3.1.2 User Access

- Chasis Management Controller Card is mounted at the top of the backplane in the rear of the chassis, above the rear I/O card cage with the CMC LEDs on the right side.
- Shielded, EMI-filtered type connectors for Chassis Management Controller
- Relays and RS-232 interface directly accessible externally through cutouts in rear 6U panel.

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▪ Additional headers on the CMC board are available to connect RS232 devices (such as host SBCs) directly to the board.

7.3.2 Environmental Specifications

7.3.2.1 Temperature Range

▪ Operation: 0°C to 55°C.

▪ Storage: -40°C to 85°C.

7.4 Sensors Supported

The SCMC board is capable of reading temperatures, DC voltages, Fan Tachometers, as well as controlling speed of the fans, and outputting alarm condition on the relay outputs and LEDs.

7.4.1 Temperature Sensors

There are connector(s) in the backplane to extend the Local I2C bus (I2C3_CLK and I2C3_SDA) to the external temperature sensor modules (LM75s). The LM75s will be on I2C bus 3 of the VSC215 and then tied to I2C3_CLK and I2C3_SDA on the SMC connector (see figure 7-2).

The SCMC supports up to eight temperature sensors.

Temperature sensor 0 (intake) is located on the air intake side of the card cage near the system slot about halfway between the front of the chassis and the backplane. Temperature sensor 7 (exhaust) is located in the air exhaust path behind the blower. Sensors 1 through 6 are not used.

The range and accuracy for the temperature readings is shown in the following table:

Temperature	Range	Resolution (8 bit)
0ºC to 70ºC	-55ºC to 125ºC	1.0ºC

Sensor Number	I2C Address
LM75 – 0	0x90
LM75 – 1	0x92
LM75 – 2	0x94
LM75 – 3	0x96
LM75 – 4	0x98
LM75 – 5	0x9A
LM75 – 6	0x9C
LM75 – 7	0x9E

7.4.2   DC Voltages

The CMC is capable of reading and monitoring the following DC voltages: +12V, -12V, +5V, +3.3V, Battery Output. By default, voltage sensors will trigger major alarms when their threshold limits are exceeded.

The ranges and accuracy for the above voltages is shown in the following table:

Voltage	Range	Resolution (10 bit)
+3.3V	+3.10 to +3.5V	5 mV
+5V	+4.75 to +5.25V	10 mV
Battery 6V	+5.50 to +6.50V	10 mV
+12V	+11.40 to +12.60V	15 mV
–12V	–11.40 to –12.60V	15 mV

7.4.3   IPMB Power

The +5V DC IPMB Power on the bus is regulated separately from the rest of the SMC circuit. It is taken from +12 Vdc input and regulated down to +5 Vdc. Optional battery backup is provided.

The IPMB Power is capable of supplying 1 ampere DC current at +5 Vdc per PICMG 2.9.

Voltage Tolerance: +5V ±3% at backplane, 0A to 0.8A load.
Voltage Tolerance: +5V ±3% at backplane, with 500 mA hot swap transient.

The CMC board monitors its own IPMB power voltage.

Any IPMB_PWR voltage reading outside the above thresholds will set a Major Alarm.

7.4.4   Fan Tachometer

The fan tachometer monitors the speed of the cooling blower. Refer to Table 7-1 Default SDR Parameters on page 7-11 for fan speed thresholds.

7.4.5   Power Supply Sensor

The power supply sensor detects the health of the power supply subsystem. If the subsystem is good, the sensor will read 0. A reading of 1 indicates that the power supply subsystem is not healthy. By default, this will cause a major alarm.

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7.5   Electrical Description

7.5.1   Relay Contacts

There are three NEBS Alarm Relays for the following alarm conditions:

> Critical Alarm (red LED on).
> Major Alarm (orange LED on).
> Minor Alarm (yellow LED on).

The Alarm Relays are accessible on the board through a DB15 connector. All alarm relays are of the type: SPDT, HAMLIN, HE721C0500.

Leads for each relay: NC, NO, Common, and 1 Kilo-ohm Resistor Common.

7.5.2   Battery Backup

The CMC board provides a battery charger for charging an on-board 6V sealed rechargable battery.

The SCMC Board generates IPMB_PWR when powered by battery backup.

The SCMC Board will continue to operate when powered by battery backup.

The SCMC Board provides a connector to an external 6V battery.

The recommended battery is POWERSONIC PS-605, with battery capacity of 0.5 Ah.

The output range of Battery Voltage is +5.75V to +6.35V.

The SCMC board monitors the battery output voltage.

Any battery voltage reading outside the above threshold will set an Alarm.

> *Please Note:*
> *To prevent draining the backup battery on the CMC board after an intentional system shutdown, press the BAT pushbutton on the front plate of the CMC Board. Battery backup will be re-initialized at the next system start-up.*

7.5.3 Host Serial Interface Ports

The CMC board provides two RS232 serial ports to connect to the host SBC(s). Connection is made through DB9 style connectors and headers on the board.

The default port setup is 19200, 8, n, 1.

7.5.4 Hot Pluggable Board

The CMC board is hot-pluggable, that is, it will not require the chassis power supply to be turned off to insert and remove the board. Furthermore, the insertion and removal of the CMC board will not cause system interruption or system reset.

7.5.5 CMC Reset Switch

There is a pushbutton reset on the CMC board to reset the SCMC microcontroller momentarily.

There is an opening to allow pressing of the pushbutton from the outside.

7.5.6 Digital Input/Output

The CMC Board provides three TTL Level Inputs and three TTL Level Outputs, accessible on a DB9 connector.

7.5.7 ACO (Alarm Cut Off)

The CMC board provides an external pushbutton input to allow the software to disable the active audible alarm.

The ACO pushbutton operates as a toggle switch, allowing enable and disable of the ACO state by pressing the pushbutton repeatedly. The current ACO state is reflected in the ACO LED.

Activating the ACO (by pressing the pushbutton) when any of the alarm conditions occurs, will turn off the on-board audible piezo buzzer. This does not affect the actual alarm condition.

Chapter 7 - Chassis Management Controller Option

When a new change in the alarm condition occurs, the enabled ACO will be overridden. In other words, the audible alarm will be reenabled automatically until the ACO push button is pressed again.

7.5.8 CMC Health LED

The CMC board firmware changes the color of the CMC LED from red to green when it finishes a self-test and begins operating normally. Any conditions that prevent the CMC firmware from running normally will cause this LED to turn red.

7.5.9 LED Self-Test Pushbutton

The CMC board provides an external Pushbutton for self-test of display/status LEDs. Activating the LED Self-Test Pushbutton at any time will cause the display/status LEDs to be turned on individually for one second, one LED at a time. The sequence is: CRITICAL, MAJOR, MINOR, ACO, and SMC LEDs.

7.5.10 Display/Status Board

The SCMC board is able to control an external LED display/status board to display the alarm status of the system. The display/status signals are provided via the backplane. The following signals are on the CompactPCI connector for the CMC:

> CRITICAL LED (red)
> MAJOR LED (orange)
> MINOR LED (yellow)
> ACO LED (yellow)
> ACO PUSHBUTTON
> SELF-TEST PUSHBUTTON

7.6 CMC Firmware Description

7.6.1 General

In general, the CMC is a stand-alone microcontroller that will perform system management tasks on power up. This includes monitoring the enclosure system environment independently of the SBC(s). The parameters of the CMC operation, such as temperature thresholds, etc. have been set to manufacturing defaults.

The communication port(s) between the CMC module and host controller are needed for the purpose of setting up the module parameters and acquiring the CMC status.

Reply message/packet from the CMC controller chip is sent to the requestor only.

The CMC firmware consists of the following main modules:

> System Monitoring Software.
> IPMI Command Interface Software.
> I2C Controller Software.

7.6.1.1   System Monitoring Software

The System Monitoring software module executes on the CMC board automatically on power up. It functions to continuously monitor the environment of the system's sensors, such as temperature sensors, fan tachs, voltage values, pushbuttons, etc.

The type of sensors in the system are configured at the factory, and stored in a non-volatile memory area of the board. Factory defaults are compiled into the firmware image(s).

Note: Changes to the default Sensor Data Records (SDRs) when made will not be persistent in the event of a failure of the SMC's EPROM-based file system. If this should occur, the default SDRs will be loaded.

Default sensors are defined in Table 7-1 Default SDR Parameters on page 7-11 and are incorporated in the firmware.

All sensor information must be interpreted after reading SDR data from the CMC via IPMI commands. The SDR data required for interpreting a sensor's output is available via the *Get Sensor Reading Factors* command. The documentation for this command, explaining how to perform the conversion, can be found in the CMC Programmer's Guide.

CMC will log SELs (System Event Log entries) in the event of a violation of a sensor threshold. This can be read by the host controller by sending IPMI Command "Get SEL Entry."

The threshold values for the installed sensors are configurable at any time via the IPMI command interface. They are kept in a configuration table within the non-volatile memory of the CMC board. Default thresholds are defined in the DEFAULT SDR PARAMETERS table and are incorporated in the firmware.

Chapter 7 - Chassis Management Controller Option

Any violations of the thresholds will trigger alarm conditions (critical, major, minor). Alarm triggering makes use of a hysteresis curve, based on the hysteresis values. These values refer to changes in raw sensor output, and they are individually configurable. To change the current settings for thresholds and hysteresis, please see the commands *Set Sensor Hysteresis,* and *Set Sensor Thresholds* in the CMC Programmer's Guide. To change the defaults for these settings, it is necessary to delete the SDR for the sensor and add a new one with the new default values. Please see the section on Sensor Data Records (SDR) and the commands, *Reserve SDR Repository, Get SDR, Delete SDR,* and *Partial Add SDR* in the CMC Programmer's Guide for more information.

All configuration parameters are stored in a non-volatile memory, and are used to operate the SCMC controller on power up.

Chapter 7 - Chassis Management Controller Option

Table 7-1. Default SDR Parameters

Sensor #	Nominal	Normal Maximum	Normal Minimum	Upper Non-Recoverable Threshold	Upper Critical Threshold	Upper Non-Critical Threshold
Temp0	25°C	30°C	20°C	TBD	45°C	40°C
Temp1	25°C	30°C	20°C	TBD	45°C	40°C
Fan0	3100 RPM	3200 RPM	3000 RPM	TBD	3720 RPM	3410 RPM
Volt0	3.3V	3.35V	3.25V	TBD	3.50V	3.40V
Volt1	5V	5.10V	4.90V	TBD	5.25V	5.15V
Volt2	6V (Vbat)	6.20V	5.85V	TBD	6.50V	6.35V
Volt3	-12V	-11.80V	-12.20V	TBD	-12.60V	-12.40V
Volt4	12V	11.80V	12.20V	TBD	12.60V	12.40V
Volt5	-48V	-48.50V	-47.50V	TBD	-50.50V	-49.50V
Volt6	-48V	-48.50V	-47.50V	TBD	-50.50V	-49.50V

Sensor #	Lower Non-Recoverable Threshold	Lower Critical Threshold	Lower Non-Critical Threshold	Positive Going Hysteresis Threshold	Negative Going Hysteresis Threshold
Temp0	TBD	10°C	15°C	2	2
Temp1	TBD	10°C	15°C	2	2
Fan0	TBD	2480 RPM	2790 RPM	3	3
Volt0	TBD	3.10V	3.20V	0.00	0.00
Volt1	TBD	4.75V	4385V	0.00	0.00
Volt2	TBD	5.50V	5375V	0.00	0.00
Volt3	TBD	-11.40V	-11.60V	0.00	0.00
Volt4	TBD	11.40V	11.60V	0.00	0.00
Volt5	TBD	-45.50V	-46.50V	0.00	0.00
Volt6	TBD	-45.50V	-46.50V	0.00	0.00

Trigger Conditions:

Critical Alarm	=	Upper Non-Recoverable Threshold or Lower Non-Recoverable Threshold
Major Alarm	=	Upper Critical Threshold or Lower Critical Threshold
Minor Alarm	=	Upper Non-Critical Threshold or Lower Non-Critical Threshold

7.6.1.2   IPMI Command Interface Software

The IPMI Command Interface software module is accessible through the RS232 ports of the SMC board.

IPMI commands from both serial ports are accepted serially and buffered into the CMC memory. One command at a time will be passed on to the IPMI command interface of the controller chip by the firmware.

The firmware will switch between the two ports to determine if any activity is present, which means only one can be active an any one time.

In the idle state the CMC is able to receive characters from either RS232 port. Once one port is locked in as the command originator, the other port will be turned off by activating its hardware flow control, thus preventing the SBC from sending more characters to the CMC.

Response messages will be sent to the requesting SBC only.

Both RS232 ports require hardware flow control (RTS/CTS).

7.6.1.2.1 Packet Format

The packet format uses the standard Block Transfer format as described in the IPMI 1.0 rev 1.1 specification (section 9). The host must set a unique sequence number. The response will use the same sequence number. The command buffer must be no bigger then 36 bytes. None of Block Transfer status registers or bits are used, only the packet format.

7.6.1.2.2 Timeouts

Inter-Byte Timeout: Is the timeout between successive bytes which will be set to 1 second.

SBC Exchange Timeout: Is the timeout from request to receiving a complete response back which will be set to 5 seconds.

Back-off Timeout: Is the time the SBC must wait if it detects any other timeout which is 6 seconds.

7.6.1.3 Watchdog Timer

Furthermore, the CMC controller chip enables its own internal hardware watchdog timer, causing it to reset itself in case the firmware does not actively refresh the timer. When this happens, the CMC LED will be red for a moment while the self-test is performed.

7.7   CMC Connector Pins

7.7.1   SMC-P3 Connector Pinout Assignments: To connect CMC board to the Backplane

A	B	C	D	E	F	PIN#
TACH_0	TACH_1	GND	PWM_0	PWM_1	GND	1
TACH_2	TACH_3	GND	PWM_2	PWM_3	GND	2
TACH_4	TACH_5	GND	PWM_4	PWM_5	GND	3
GND	GND	GND	GND	GND	GND	4
I^2C1_CLK	I^2C1_SDA	IPMB_PWR	I^2C2_CLK	I^2C2_SDA	GND	5
IPMB_PWR	IPMB_PWR	ALERT_1	IPMB_PWR	IPMB_PWR	GND	6
I2C3_CLK	I2C3_SDA			SYS_PRST	GND	7
IPMB_PWR	IPMB_PWR			48AvS	GND	8
	GND			48BvS	GND	9
+12V		+12V		+12V	GND	10
					GND	11
	+12V		+12V		GND	12
PWR_GD1	PWR_GD2	PWR_GD3	PWR_GD4	TEST_SW	GND	13
PWR_EN1	PWR_EN2	PWR_EN3	PWR_EN4		GND	14
+12V	+12V	+12V	+12V	+12V	GND	15
P3_CRT	MJR_LED	MNR_LED	ACO_LED	ACO_SW	GND	16
IPMB_PWR	GND	GND	GND	GND	GND	17
3.3Vs	5Vs	12Vs	12VNs		GND	18
GND	GND	GND	GND	GND	GND	19

7.7.2 SMC-P4 Connector Pinout Assignments: To connect CMC board to the Backplane

A	B	C	D	E	F	PIN#
TACH_0	TACH_1	GND	PWM_0	PWM_1	GND	1
TACH_2	TACH_3	GND	PWM_2	PWM_3	GND	2
TACH_4	TACH_5	GND	PWM_4	PWM_5	GND	3
GND	GND	GND	GND	GND	GND	4
I^2C1_CLK	I^2C1_SDA	IPMB_PWR	I^2C2_CLK	I^2C2_SDA	GND	5
IPMB_PWR	IPMB_PWR	ALERT_1	IPMB_PWR	IPMB_PWR	GND	6
I2C3_CLK	I2C3_SDA				GND	7
IPMB_PWR	IPMB_PWR			48AvS	GND	8
	GND	SYS_PRST		48BvS	GND	9
+12V		+12V		+12V	GND	10
					GND	11
					GND	12
					GND	13
					GND	14
					GND	15
					GND	16
					GND	17
	+12V		+12V		GND	18
PWR_GD1	PWR_GD2	PWR_GD3	PWR_GD4	TEST_SW	GND	19
PWR_EN1	PWR_EN2	PWR_EN3	PWR_EN4		GND	20
+12V	+12V	+12V	+12V	+12V	GND	21
CRT_LED	MJR_LED	MNR_LED	ACO_LED	ACO_SW	GND	22
IPMB_PWR	GND	GND	GND	GND	GND	23
3.3Vs	5Vs	12Vs	12VNs	Vbat	GND	24
GND	GND	GND	GND	GND	GND	25

7.7.3 NEBS CMC Relay Output Connector Pinouts

PIN#	SIGNAL NAME
1	K1 RESISTOR COMMON
2	K1 COMMON
3	K1 N.C.
4	K1 N.O.
5	K2 RESISTOR COMMON
6	K2 COMMON
7	K2 N.C.
8	K2 N.O.
9	K3 RESISTOR COMMON
10	K3 COMMON
11	K3 N.C.
12	K3 N.O.
13	
14	
15	

7.7.4 RS-232 Pinouts

Port A

PIN#	SIGNAL NAME
1	
2	TX
3	RX
4	
5	GND
6	
7	CTS
8	RTS
9	RI

Port B

PIN#	SIGNAL NAME
1	DCD
2	TX
3	RX
4	DTR
5	GND
6	DSR
7	CTS
8	RTS
9	RI

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7.7.5 **Battery Connector (Molex type 22-11-2022). The mating cable connector is Molex type 22-01-3027 housing with 08-58-0110 terminals.**

PIN#	SIGNAL NAME
1	Battery +
2	Battery -

7.7.6 **Pin Assignments for DB9 Connector for Digital Input/Output**

PIN#	SIGNAL NAME
1	Input
2	Input
3	Output
4	Output
5	GND
6	Input
7	GND
8	Output
9	GND

Appendix 1 - Technical Reference

P1 Connector Pin Assignments (System Slot)

Pin #	Z	A	B	C	D	E	F
25	GND	VCC	REQ 64	ENUM	VCC3	VCC	GND
24	GND	AD[1]	VCC	V(I/O)	AD[0]	ACK64_	GND
23	GND	VCC3	AD[4]	AD[3]	VCC	AD[2]	GND
22	GND	AD[7]	GND	VCC3	AD[6]	AD[5]	GND
21	GND	VCC3	AD[9]	AD[8]	M66EN	C/BE[0]_	GND
20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	GND	VCC3	AD[15]	AD[14]	GND	AD[13]	GND
18	GND	SERR_	GND	VCC3	PAR	C/BE[1]	GND
17	GND	VCC3	IPMB_SCL	IPMB_SDA	GND	PERR	GND
16	GND	DEVSEL_	GND	V(I/O)	STOP_	LOCK_	GND
15	GND	VCC3	FRAME_	IRDY_	GND	TRDY_	GND
Key 12-14							
11	GND	AD[18]	AD[17]	AD[16]	GND	C/BE[2]_	GND
10	GND	AD[21]	GND	VCC3	AD[20]	AD[19]	GND
9	GND	C/BE[3]	GND	AD[23]	GND	AD[22]	GND
8	GND	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
7	GND	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
6	GND	REQ_	GND	VCC3	CLK0	AX[31]	GND
5	GND	BRSVP1A5	BRSVP1B5	PCI_RST_	GND	GNT0	GND
4	GND	IPMB_PWR	HEALTHY	V(I/O)	INTP	INTS	GND
3	GND	INTA_	INTB_	INTC_	VCC	INTD_	GND
2	GND	TCK	VCC	TMS	TDO	TDI	GND
1	GND	VCC	-12V	TRST_	+12V	VCC	GND

Table A1-1: P1 Connector Pin Assignments (System Slot)

Appendix 1 - Technical Reference

P1 Connector Pin Assignments (I/O Slot)

Pin #	Z	A	B	C	D	E	F
25	GND	VCC	REQ 64	ENUM	VCC3	VCC	GND
24	GND	AD[1]	VCC	V(I/O)	AD[0]	ACK64_	GND
23	GND	VCC3	AD[4]	AD[3]	VCC	AD[2]	GND
22	GND	AD[7]	GND	VCC3	AD[6]	AD[5]	GND
21	GND	VCC3	AD[9]	AD[8]	M66EN	C/BE[0]_	GND
20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	GND	VCC3	AD[15]	AD[14]	GND	AD[13]	GND
18	GND	SERR_	GND	VCC3	PAR	C/BE[1]	GND
17	GND	VCC3	IPMB_SCL	IPMB_SDA	GND	PERR	GND
16	GND	DEVSEL_	GND	V(I/O)	STOP_	LOCK_	GND
15	GND	VCC3	FRAME_	IRDY_	BD_SEL_	TRDY_	GND
Key 12-14							
11	GND	AD[18]	AD[17]	AD[16]	GND	C/BE[2]_	GND
10	GND	AD[21]	GND	VCC3	AD[20]	AD[19]	GND
9	GND	C/BE[3]	IDSEL	AD[23]	GND	AD[22]	GND
8	GND	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
7	GND	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
6	GND	REQ_	GND	VCC3	CLK	AX[31]	GND
5	GND	BRSVP1A5	BRSVP1B5	PCI_RST_	GND	GNT	GND
4	GND	IPMB_PWR	HEALTHY	V(I/O)	INTP	INTS	GND
3	GND	INTA_	INTB_	INTC_	VCC	INTD_	GND
2	GND	TCK	VCC	TMS	TDO	TDI	GND
1	GND	VCC	-12V	TRST_	+12V	VCC	GND

Table A1-2: P1 Connector Pin Assignments (I/O Slot)

Appendix 1 - Technical Reference

P1 Signal Descriptions

General	VCC	5V power
	VCC3	3.3V power
	+12V	12V power
	-12V	-12V power
	V(I/O)	5V or 3.3V power
	GND	To digital signal ground plane
	PCI_RST_	Master reset
PCI Bus Signals	AD(31:0)	32 bit Address/Data bus
	C/BE(3:0)_	Command/Byte Enable bus
	PAR	Bus parity
	BRSVPxxx	PCI bus reserved signals
PCIbus arbitration signals	GNT0_	Bus grant 0
	REQ0_	Bus request 0
Interrupt Request Signals	INTA_, INTB_, INTC_, INTD_	
PCI Bus transaction control signals	FRAME_	Cycle Frame
	TRDY_	Target Ready
	IRDY_	Initiator Ready
	STOP_	Target/Initiator transaction stop bit
	IDSEL	Initialization Device Select
	LOCK_	Resource Lock bit
	DEVSEL_	Device Select
PCI bus error reporting signals	PERR_	Data Parity Error
	SERR_	System Error
PCI bus speed signals	M66EN	66MHz bus enable
PCI bus clock	CLK0	
System Management Bus	IPMB_SCL	
	IPMB_SDA	
	IPMB_PWR	
64-bit Extension Signals	REQ64_	Request 64-bit Transfer
	ACK 64_	Acknowledge 64-bit Transfer

Appendix 1 - Technical Reference

JTAG/Boundary Scan Signals	TCK	Test Clock
	TDI	Test Input
	TDO	Test Output
	TMS	Test Mode Select
	TRST_	Test Reset
IDE Interrupts	INTP	Primary Interrupt
	(IRQ14)	INTS Secondary Interrupt
	IRQ15)	
Hot Swap compatible signals	ENUM_	System Enumeration
	BD_SEL_	Board Slot Control
	HEALTHY_	Board Healthy

Appendix 1 - Technical Reference

P2 Connector Pin Assignments (System Slot)

Pin #	Z	A	B	C	D	E	F
22	GND	GA4	GA3	GA2	GA1	GA0	GND
21	GND	CLK6	GND	RSV	RSV	RSV	GND
20	GND	CLK5	GND	RSV	GND	RSV	GND
19	GND	GND	GND	RSV	RSV	RSV	GND
18	GND	BRSVP2A18	BRSVP2B18	BRSVP2C18	GND	BRSVP2E18	GND
17	GND	BRSVP2A17	GND	PRST	REQ6	GNT6_	GND
16	GND	BRSVP2A16	BRSVP2B16	DEG_	GND	BRSVP2E16	GND
15	GND	BRSVP2A15	GND	FAL_	REQ5	GNT5	GND
14	GND	AD[35]	AD[34]	AD[33]	GND	AD[32]	GND
13	GND	AD[38]	GND	V(I/O)	AD[37]	AD[36]	GND
12	GND	AD[42]	AD[41]	AD[40]	GND	AD[39]	GND
11	GND	AD[45]	GND	V(I/O)	AD[44]	AD[43]	GND
10	GND	AD[49]	AD[48]	AD[47]	GND	AD[46]	GND
9	GND	AD[52]	GND	V(I/O)	AD[51]	AD[50]	GND
8	GND	AD[56]	AD[55]	AD[54]	GND	AD[53]	GND
7	GND	AD[59]	GND	V(I/O)	AD[58]	AD[57]	GND
6	GND	AD[63]	AD[62]	AD[61]	GND	AD[60]	GND
5	GND	C/BE[5]	GND	V(I/O)	C/BE[4]_	PAR64	GND
4	GND	V(I/O)	BRSVP2B4	C/BE[7]_	GND	C/BE[6]_	GND
3	GND	CLK4	GND	GNT3_	REQ4_	GNT4_	GND
2	GND	CLK2	CLK3	SYSEN_	GNT2_	REQ3_	GND
1	GND	CLK1	GND	REQ1_	GNT1_	REQ2_	GND

_ = signal is active low

" = signal is not currently used

Table A1-3: P2 Connector Pin Assignments (System Slot)

Appendix 1 - Technical Reference

P2 Connector Pin Assignments (I/O Slot)

Pin #	Z	A	B	C	D	E	Z
22	GND	GA4	GA3	GA2	GA1	GA0	GND
21	GND	RSV"	RSV"	RSV"	RSV	RSV	GND
20	GND	RSV"	RSV"	RSV"	GND	RSV	GND
19	GND	RSV"	RSV"	RSV"	RSV	RSV	GND
18	GND	BRSVP2A18	BRSVP2B18	BRSVP2C18	GND	BRSVP2E18	GND
17	GND	BRSVP2A17	GND	RSV"	RSV	RSV	GND
16	GND	BRSVP2A16	BRSVP2B16	RSV"	GND	BRSVP2E16	GND
15	GND	BRSVP2A15	GND	RSV"	RSV	RSV	GND
14	GND	AD[35]	AD[34]	AD[33]	GND	AD[32]	GND
13	GND	AD[38]	GND	V(I/O)	AD[37]	AD[36]	GND
12	GND	AD[42]	AD[41]	AD[40]	GND	AD[39]	GND
11	GND	AD[45]	GND	V(I/O)	AD[44]	AD[43]	GND
10	GND	AD[49]	AD[48]	AD[47]	GND	AD[46]	GND
9	GND	AD[52]	GND	V(I/O)	AD[51]	AD[50]	GND
8	GND	AD[56]	AD[55]	AD[54]	GND	AD[53]	GND
7	GND	AD[59]	GND	V(I/O)	AD[58]	AD[57]	GND
6	GND	AD[63]	AD[62]	AD[61]	GND	AD[60]	GND
5	GND	C/BE[5]	GND	V(I/O)	C/BE[4]_	PAR64	GND
4	GND	V(I/O)	BRSVP2B4	C/BE[7]_	GND	C/BE[6]_	GND
3	GND	RSV"	GND	RSV"	RSV	RSV	GND
2	GND	RSV"	RSV"	UNC	RSV	RSV	GND
1	GND	RSV"	GND	RSV"	RSV	RSV	GND

_ = signal is active low

" = signal is not currently used

Table A1-4: P2 Connector Pin Assignments (I/O Slot)

P2 Signal Descriptions

General	V(I/O)	5V or 3.3V power
	GND	To digital ground plane
PCI Bus Signals	AD(32:63)	Address/Data bus
(64-bit extension)	C/BE(4:7)_	Command/Byte Enable bus
	PAR64	64-bit Bus parity
	BRSVPxxx	PCI bus reserved signals
PCI bus arbitration	GNT(6:1)_	Bus grants
signals	REQ(6:1)_	Bus requests
PCI bus clocks	CLK(6:1)	
Miscellaneous signals	PRST_	Push Button Reset
	DEG_	Degrade signal (Power Supply)
	FAL_	Supply Fail Signal (Power Supply)
	GA(4:0)	Geographic Addressing
	SYSEN_	System slot identification (Grounded at the system slot)
	64EN_	64-bit bus enable

P3, P4, P5 Connectors Pin Assignments (System Slot)

P3, P4, and P5 are used for the purpose of providing access to the rear I/O. There is no connection on the backplane to these connectors at the system slot. The P3, P4, and P5 connector pinouts are unique to the CP1500 Sparc CPU board and described in the SPARCengine CP1500 360MHz/440MHz Technical Reference and Manual, located at the Sparc web site: http://www.sun.com/microelectronics/SPARCengineCP/1500

Appendix 1 - Technical Reference

P4 Connector Pin Assignments (Computer Telephony Bus) (I/O Slot)

Pin #	Z	A	B	C	D	E	F
25	NP	SGA4	SGA3	SGA2	SGA1	SGA0	FG
24	NP	GA4	GA3	GA2	GA1	GA0	FG
23	NP	+12V	CT_Reset_	CT_EN_	-12V	CT_MC	FG
22	NP	RSV	RSV	RSV	RSV	RSV	FG
21	NP	-SELVbat	RSV	RSV	RSV	SELVBatRtn	FG
20	NP	NP	NP	NP	NP	NP	NP
19	NP	NP	NP	NP	NP	NP	NP
18	NP	VRG	NP	NP	NP	VRGRtn	NP
17	NP	NP	NP	NP	NP	NP	NP
16	NP	NP	NP	NP	NP	NP	NP
15	NP	-Vbat	NP	NP	NP	VBatRtn	NP
Key 12-14							
11	NP	CT_D29	CT_D30	CT_D31	V(I/O)	CT_FRAME_A_	GND
10	NP	CT_D27	VCC3	CT_D28	VCC	CT_FRAME_B_	GND
9	NP	CT_D24	CT_D25	CT_D25	GND	FR_COMP_	GND
8	NP	CT_D21	CT_D22	CT_D23	VCC	CT_C8_A	GND
7	NP	CT_D19	VCC	CT_D20	GND	CT_C8_B	GND
6	NP	CT_D16	CT_D17	CT_D18	GND	CT_NETREF_1	GND
5	NP	CT_D13	CT_D14	CT_D15	VCC3	CT_NETREF_2	GND
4	NP	CT_D11	VCC	CT_D12	VCC3	SCLK	GND
3	NP	CT_D8	CT_D9	CT_D10	GND	SCLKx2	GND
2	NP	CT_D4	CT_D5	CT_D6	CT_D7	GND	GND
1	NP	CT_D0	VCC3	CT_D1	CT_D2	CT_D3	GND

_ = signal is active low

Table A1-5: P4 Connector Pin Assignments (Computer Telephony Bus) (I/O Slot)

P4 Signal Descriptions (Computer Telephony Bus)(I/O Slot)

General	VCC	5V power
	VCC3	3.3V power
	V(I/O)	5V or 3.3V power
	+12V	12V power
	-12V	-12V power
	GND	To digital signal ground plane
	FG	To chassis (frame) ground
	SGA(4:0)	Shelf enumeration bus signals
	GA(4:0)	Slot ID signals; not bussed
	RSV	Reserved pin
	NP	Pin and pad to Not be Populated
H.110 TDM Bus (Computer Telephony)	CT_Dxx	H.110 TDM bus signals (8Mfpbs)
	CT_C8A	8.192 MHz data clock
	CT_C8_B	Redundant 8.192 MHz data clock
	CT_FRAME_A_8	kHz frame clock
	CT_FRAME_B_	Redundant 8kHz frame clock
	CT_NETREF_1	8kHz, 1.544MHz or 2.048MHz telecom network timing reference
	CT_NETREF_2	Secondary 8kHz,1.544MHz or 2.048MHz telecom network timing reference
	CT_MC	2Mbps message channel
	FR_COMP_	8kHz SCbus compatibility frame clock
	SCLK	8.192MHz SCbus compatibility data clock
	SCLKx2	Skewed 8.192MHz SCbus compatibility data clock
	CT_EN_	Logical equivalent of the CPCI signal BD_SEL_ on P1
	CT_Reset	Reset for use by CT Front Cards that do not populate P1

Appendix 1 - Technical Reference

Telecom Power Bus -Vbat   Telecom power source
                                    VbatRtn   Telecom power source return
                                    -SELVbat   Short loop battery (voltage within SELV limits)
                                    SELVbatRtn   Short loop battery return (voltage within SELV limits)

Telecom Ringing Bus VRG   Bussed ringing voltage
                                    VRGRtn   Bussed ringing voltage return for VRG

B

backplane: A device inside the chassis that contains slots, or sockets, for plugging in I/O cards or cables.

bidirectional parallel port: An eight-bit port that can be used as an input as well as an output device.

bus: One or more electrical conductors that transmit power or data to the various sections of a computer or any common pathway between hardware devices. A computer bus connects the CPU to its main memory and the control units of peripheral devices.

C

card cage: A cabinet or metal frame that holds printed circuit cards.

CMOS (Complementary Metal Oxide Semiconductor): A technology of arranging transistors on a semiconductor which uses very low power.

D

disk access LED: The LED located on the front control panel that indicates when the hard disk drive is active.

DRAM (Dynamic Random Access Memory): A type of computer memory that needs to be refreshed by a memory controller or it loses its information.

drive bay: Area in the chassis where drives are mounted.

E

electrostatic discharge (ESD): A sudden uncontrolled movement of accumulated electrical charge from one location to another. Voltage potentials and discharge currents associated with ESD can damage many types of electronic components used in computers. ESD prevention methods should always be employed when servicing computer hardware.

Appendix 2 - Glossary of Terms

EMI (ElectroMagnetic Interference): Noise generated by the switching action of the power supply and other system components. Conducted EMI is interference generally conducted into the power line, and is normally controlled with a line filter. Radiated EMI is that portion that radiates into free space, one way to suppress it is by enclosing circuitry in a metal case.

EPROM (Erasable Programmable Read Only Memory): A programmable device which stores information regardless of power.

expansion card: A printed circuit board that plugs into an expansion slot.

F

floppy drive: A device for reading information from or writing information to external, portable computer disks called floppy disks.

front control panel: The small panel on the front of the computer that usually contains one or more of the following: power switch, reset switch, Power ON LED, disk access LED, keyboard connector, status display, etc.

H

hard drive: A non-volatile data storage device. Hard drives magnetically store computer data on spinning internal disks.

I

IDE (Integrated Drive Electronics): A standard protocol for signalling and communicating with a hard drive, CD-ROM drive, or other peripheral device.

I/O card: A printed circuit board that plugs into an I/O slot.

I/O slot: A slot for plugging in additional I/O cards to expand the capability of a computer.

ISA: The original IBM/PC expansion bus standard released into the public domain by IBM..

K

keyboard connector: The connector through which keyboard signals are input to a computer.

kilobyte (KB): 1,024 bytes.

L

LED: Light Emitting Diode. Long-lasting light emitters usually used as indicators.

load board: A board having specific power load characteristics which are typically used for testing.

P

parallel port: I/O connector used to hook up a printer or other parallel interface device. The parallel port is usually a 25-pin female DB25 connector.

PCI(Peripheral Component Interconnect): A PC expansion bus standard maintained by the PCI Special Interest Group, a consortium of industrial partners..

port: Ports are used to connect peripheral devices such as external drives and printers to your computer.

power good: A logic signal used to indicate that DC output from a PC power supply has stabilized. The power good line switches from 0 to +5 volts within one tenth to one half second after the power supply reaches normal voltage levels. Whenever output voltage is out of normal operating range for any reason, the power good signal goes back to zero.

power ON/diagnostic LED: The LED located on the front control panel that indicates that power is applied to the computer.

power supply: Electrical system that converts AC or DC source power into the lower level DC power required by the computer circuitry. In a personal computer, 3.3, +5, -5, +12 and -12 voltages are generated by the system power supply.

Appendix 2 - Glossary of Terms

power switch: The power switch turns main source power ON/OFF to the computer. It is usually located on the front computer panel or the rear panel near the input power cable.

R

RAID (Redundant Arrays of Independent Disks): A storage technology using an array of two or more disks to redundantly store information. If one disk fails in a RAID array, the unit continues to function without loss of data.

RAM (Random Access Memory): The memory used to execute applications while your computer is turned ON. When you turn your computer OFF, all data stored in RAM is lost.

real-time clock (RTC): A periodic interrupt used to derive local time.

reset switch: Button or key that reboots the computer. All current activities are stopped and any data in memory is lost.

S

SCSI (Small Computer System Interface): A high speed, general purpose interface to storage devices.

SDR (Sensor Data Record): A record of data about a sensor. The full description of the contents of these records can be found in IPMI, verion 1.0, section 28.1.

SEL (System Event Log): A non-volatile storage area and associated interfaces for storing system platform event information for later retrieval.

serial port: A two-channel port, one channel used for "In" transmissions and one for "Out" transmissions.

W

watchdog timer: A device that monitors CPU activity and resets the CPU when no activity is detected for a user specified period.

LIMITED WARRANTY

I-Bus Corporation warrants this product to be free of defects in material and workmanship for an initial period of one (1) year from date of delivery to the original purchaser from I-Bus.

During this period, I-Bus will, at its option, repair or replace this product at no additional charge to the purchaser, except as set forth in this warranty agreement.

I-Bus will, at its option, repair or replace this product at no additional charge to the purchaser, if the defect is related to the I-Bus manufactured product, such as power supply, backplanes, other chassis components, or CPUs. I-Bus is not liable for any defects in material or workmanship of any peripherals, products or parts which I-Bus does not design or manufacture. However, I-Bus will honor the original manufacturer's warranty for these products.

I-Bus will analyze the defective component and the customer will be charge.

Repair parts and replacement products will be furnished on an exchange basis and will be either new or reconditioned. All replacement parts and products shall become the property of I-Bus, if such parts or products are provided under this warranty agreement. In the event a defect is not related to the I-Bus manufactured product, I-Bus shall repair or replace the defective parts at purchaser's cost and deliver the defective parts to the purchaser.

This Limited Warranty shall not apply if the product has been misused, carelessly handled, defaced, modified or altered, or if unauthorized repairs have been attempted by others.

The above warranty is the only warranty authorized by I-Bus and is in lieu of any implied warranties, including implied warranty of merchantability and fitness for a particular purpose.

In no event will I-Bus be liable for any such damage as lost business, lost profits, lost savings, downtime or delay, labor, repair or material cost, injury to person or property or any similar or dissimilar consequential loss or damage incurred by purchaser, even if I-Bus has been advised of the possibility of such losses or damages.

In order to obtain warranty service, the product must be delivered to the I-Bus facility, or to an authorized I-Bus service representative, with all included parts and accessories as originally shipped, along with proof of purchase and a Returned Merchandise Authorization (RMA) number.

The RMA number is obtained, in advance, from I-Bus Customer Service Department and is valid for 30 days. The RMA number must be clearly marked on the exterior of the original shipping container or equivalent. Purchaser will be responsible and liable for any missing or damaged parts. Purchaser agrees to pay shipping charges one way, and to either insure the product or assume the liability for loss or damage during transit. Ship to:

<div align="center">

I-Bus

ATTENTION: RMA REPAIR DEPT.

RMA ####

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Appendix 3 - Limited Warranty

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Appendix 4 - FCC Information

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.

WARNING: This equipment has been tested and found to comply with the limits for a Class "A" digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This product was FCC verified under test conditions that included the use of shielded I/O cables and connectors between system components. To be in compliance with FCC regulations, the user must use shielded cables and connectors and install them properly.

Appendix 4 - FCC Information

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