CONTINUON™

0818D

CompactPCI System

User's Guide

Thank You
from the

team for
purchasing this product

Table of Contents

Chapter 4. **Power Distribution**

Chapter 5. **Software**

Chapter 6. **Platform Management Option**

This page was intentionally left blank

1 Introduction

Welcome to the I-Bus family of CompactPCI computer systems. This manual provides information necessary to set up and maintain the 0818D system.

The 0818D system is an 18-slot CompactPCI platform in an 8U optimally cooled enclosure. Its backplane consists of two electrically independent segments of PCI bus. Each segment accommodates a system master SBC slot and 7 peripheral slots. The remaining two slots are fabric slots. The system also contains four 200W DC input hot-swap power supplies. The cooling system for the C08xx family of enclosures incorporates three individually hot-swap blowers and a hot-swap fan array in a redundant push-pull configuration.

The 0818D is a full hot-swap CompactPCI system that will accommodate two-system master Single Board Computers (SBC's) such as the Intel based I-Bus 2801.

The reliability of the 0818D system is further enhanced when powered by two alternative, independent power sources. The utilization of these power sources is controlled by DC input power modules. The input modules plug into the computer backplane from the rear of the chassis. The two modules are identical and their physical location determines which one is the preferred power source. The module in slot A (upper) becomes the preferred input and the module in slot B (lower) controls the secondary power input. See Chapter 4 for more complete information on the dual power input feature.

The 0818D has provision for 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. See Chapter 6 for a discussion of the CMC as it relates to the 0818D. Refer to the CMC Programmer's Guide for further instructions and specifications.

This page was intentionally left blank

2 Specifications

2.1 Overview

- The I-Bus 0818D is designed to serve the Telecom Company/Central Office market for rack mount HA Full Hot-Swap CompactPCI systems.
- The system is an 8U, 18-slot, CompactPCI Platform consisting of sixteen node slots and two fabric slots.
- The integrated enclosure houses a monolithic backplane compliant to PICMG standards 2.1, 2.5, 2.9 and 2.16. It consists of two 8-slot cPCI segments, each with an H.110 bus, and two standard fabric slots; N+1 redundant 200W power supplies (N=3); and DC Dual Power Input Module system.
- It is designed for NEBS compliance for rack mount CompactPCI systems
- The system accommodates one 2400 or one 2801 SBC in the system slot of each 8-slot cPCI segment within the custom monolithic backplane. In a 2400 configuration, the system accommodates up to 16 2802 SBC's in the node slots and up to two PICMG 2.16 compliant Ethernet fabric switch boards.
- The power supplies and cooling devices are front accessible; the input power modules and the CMC module are rear accessible. The input power modules require a manual switch to provide the hot-swap feature (see Chapter 4).
- The 0818D system platform supports Sun Solaris, Windows Operating Systems, and Linux.
- An integrated Chassis Management Controller (CMC) is optional to the system.

Figure 2-1 shows the configuration for 0818D.

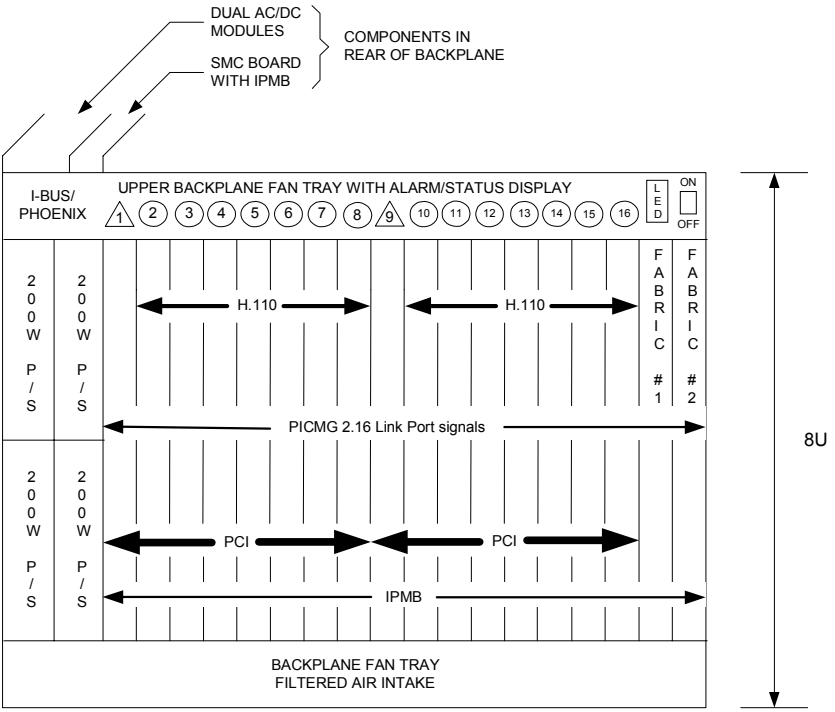

Figure 2-1. 0818D Block Diagram

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.
- The rack mount bracket design incorporates mounting keyways for temporary hanging of the chassis.
- There are provisions for mounting four (4), front pluggable, 3U X 6HP power supplies.
- Enclosure front panel incorporates a DC power switch plus an LED power-on indicator. The DC power switch enables or inhibits output of the power supply modules.
- The DC Power, power switch is protected from accidental trip.

- The front panel is capable of customization with customer's designation/logo, as well as accommodating alarm/status display board.
- Entire front surface of the enclosure is powder coated black.
- All Backplane cooling fans are hot pluggable, either individually or on trays.
- Cool air intake is through a user removable, washable filter element.
- Mains input modules are in the rear of the enclosures.
- Enclosure has a ground bonding point (internal thread) on the rear surface.
- There is craftsperson ESD plug point on both the front and rear surfaces of the enclosure.
- The top front panel mounts small alarm display board to show the alarm condition, as well as a push button to disable the ACO, and a pushbutton to check the integrity of the status LEDs.
- The enclosure supports 80mm depth rear I/O boards.

2.2.1.1 Basic Chassis Configuration

- Eurocard 6U card cage per PICMG 2.0 Rev 3.0, CompactPCI specification.
- Central 6U card cage with 18 cPCI slots (total opening of 14.40" front and rear).
- Total rack height shall be 8U (14.00"/355.6mm).
- Cool air intake shall be in front below the 18 slot card cage.
- Hot air exhaust shall be in the rear above the 6U backplane.
- Overall dimensions are 14.00" High, 17.10" Wide, 12.00" Deep.

2.2.2 Power Subsystem

The following specifications apply to a 25°C ambient temperature condition:

- N+1 redundant power supplies (N = 3), delivering a minimum of 200W each throughput from the Dual Power Input Module system, should share current load on all DC outputs.
- DC Dual Input Power Module system provides full redundancy of input power components.
- Total chassis load supported by the subsystem is 500W at ambient of 40^0C.
- Power supply interface is compliant with PICMG 2.11, R 1.0, with the 47 pin Positronic interface.
- DC input range is –42 to–68VDC.
- Internal Power Factor Correction (PFC) meets IEC EN61000-3 requirements for harmonic distortion and flicker.
- Individual maximum loads (per power supply module) are as follows:

+5VDC	@ 25A
+3.3VDC	@ 20A
+12VDC	@ 5A
-12VDC	@ 0.5A

- Minimum load for +5VDC of each power supply module is 3A.
- Combined maximum output current of +3.3VDC and +5VDC shall not be more than 30A per power supply module.
- Maximum allowable ripple does not exceed:

75mV for +5V and 3.3V
150mV for +12V
150mV for –12V

- Load Regulation is:

+/-5% for +5V, +3.3V and +12V
+/-10% for –12V

- Power Supply MTBF is at least 100,000 hrs, operating full load at 25^0C (MIL-217).

2.2.3 DC Input Power Modules

These modules control the 800 watts required by the power supplies to provide 600 watts of computer power for the N+1 redundant requirement. The input voltage range of the DC modules is less than the 36 to 72V range of the power supplies. This assures that a power transfer occurs within the operating range of the power supplies.

Each DC input module provides a differential sense amplifier that will provide a ground referenced 0 to +5V output for 0 to +72V input.

Applying the input voltage in the reverse polarity will cause the input circuit breaker to trip.

Each DC module panel has three LED indicators.

Power Good	The applied input is between 37 and 69 Vdc.
Active	The module is supplying power to the system.
Thermal Fault	The system has shut off due to over temperature.

- Input Voltage:

  Start Voltage: 41V Min. 43V Max.
  Under voltage Cutoff: 36.5V Min. 37.5V Max.
  Over voltage Cutoff: 67V Min. 70V Max.
- Input Current: 25A Maximum at full load
  50mA Maximum in standby mode
- Transfer Time: Less than 100 microseconds
- Input Termination: Panel mounted 3-terminal barrier strip (+, -, Gnd)
- Input Protection: One single pole 25A circuit breaker in the negative lead and a 30A fuse in the positive lead.

2.2.4 Backplane

- The backplane portion of the system incorporates I-Bus proprietary cPCI monolithic backplane.

- This monolithic backplane has 2 segments of H.110 bus. One H.110 bus exists on slots #2 through #8. The other H.110 bus exists on slots #10 through #16.
- The backplane includes two standard fabric slots (#17 and #18) according to PICMG 2.16 and two 8-slot cPCI bus segments, each with one system slot (#1 and #9) and seven peripheral slots. The system and peripheral slots are standard dual nodes according to PICMG 2.16.

2.2.4.1 cPCI Backplane

- The cPCI backplane includes two independent segments of 8-slot cPCI connectors.
- The cPCI backplane includes power supply connectors to the power supply modules (47 pin connector to each module) and power distribution to all slots.
- DC main input to the power supply section of the backplane is be through the DC Input module system.
- The cPCI backplane provides a connector behind the Power Supply section for the purpose of connecting a stand-alone CMC (Chassis Management Controller) board.
- The cPCI backplane incorporates six sets of fan control signals, originating on the CMC connector. Each set of fan control signals includes: FANTACH or LKROTOR, 12VDC (PWM), GND.
- The cPCI backplane incorporates a continuous IPMB0 bus from the CMC connector to all 18 cPCI slots.
- The cPCI backplane provides local I2C bus from the CMC connector pins to two locations in the upper portion of the backplane and one location in the lower left corner of the backplane for the purpose of connecting I2C sensor components at strategic locations within the enclosure.

2.2.4.2 Backplane CMC Connector

- Chassis Management Controller (CMC) is optional to the system enclosure.

- To allow CMC functionality, the cPCI backplane incorporates a special connector to carry all the necessary signals to and from the CMC board. These signals are as follows:

  Temperatures

  DC rail voltages (+12V, -12V, +5V, +3.3V)

  DC main input (dual main inputs)

  Battery Power to the CMC (optional)

  Fan Tachometers (three blowers)

  Fan Health (three groups of fans)

  Fan Speed Controls (three groups of fans and three blowers)

  Power Supply status (four power supplies)

- The backplane CMC connector shall carry the above signals, as well as the front panel display inputs and outputs, necessary to show status of the alarm.
- The backplane CMC connector shall be located behind the power supply connectors on the cPCI backplane.

2.2.5 Hardware

- The 0818D system consists of a single SBC connected to the CompactPCI backplane.

2.2.5.1 CMC Board

- The CMC (Chassis Management Controller) board is optional. It is a stand-alone board supporting IPMI (Intelligent Platform Management Interface) version 1.0.
- The board is hot-pluggable (no need for the enclosure power to be turned off). After the board is inserted, an on-board power switch may be used to cycle the CMC board supply voltages.
- The CMC board is the size of a standard Rear Transition Board, and is hot-pluggable to the CMC connector through a dedicated card guide.
- The telephony Alarm Relay outputs shall be accessible from the card connectors of CMC board.

- Environment variables to be monitored/controlled by the CMC board include the following:

  Temperatures

  DC rail voltages (+12V, -12V, +5V, +3.3V)

  DC main input (dual main inputs)

  Battery Power to the CMC (optional)

  Fan Tachometers (three blowers)

  Fan Health (three groups of fans)

  Fan Speed Controls (three groups of fans and three blowers)

  Power Supply status (four power supplies)

- Two versions of the CMC shall be supported by the 0818D. Which one is used will depend on the functionality of the SBC that occupies the main system slot. If this SBC is PICMG 2.9 compliant, with a BMC, the "Chassis Management" option applies. Otherwise, the "System Management" option applies.

2.2.6 Software

The 0818D supports the Sun Solaris 8, Microsoft Windows NT 4.0, Windows 2000, and Linux (Red Hat/Hard Hat) with the appropriate I-Bus supported SBC.

2.3 Environmental

2.3.1 Temperature

- Operating temperature: 0°C to 40°C.
- Short-term operating temperature: -5°C to 55°C (30 minutes)
- Non-operating temperature: –40°C to 70°C.

2.3.2 Humidity

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

2.3.3 Altitude

- Operating altitude 6000 ft. at operating temp, 15,000ft. at derated temp.
- Non-operating altitude 40,000 ft.

2.3.4 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
- NEBS earthquake zone 4.
- Storage/transport shock. 30g @ 11 msec.

2.3.5 Safety Agency

- UL 1950,
- cUL or CSA 950
- TUV EN 60950
- CE
- FCC Class A.
- NEBS

3 Hardware

This chapter discusses the removal and installation of the SBC module, add-in board modules, rear I/O modules, CMC board, backplane, fan tray, blowers, and air filter.

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 be easily 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 airflow to take place. Leaving a slot uncovered could result in overheating and failure of one or more system components.

3.1 SBC Module

The 0818D supports one PICMG compliant Single Board Computer (SBC). The SBC is mounted through the front of the enclosure in slot #1.

The SBC 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 SBC module Removal/Replacement instructions.

3.1.1 Removal 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.

3.1.2 Installation of the SBC Board Module

1. 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.
2. 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.

3. Secure the SBC board module by tightening the two captive screws.

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 0818D provides for full hot swap of add-in boards to PICMG 2.1 R2.0 and PICMG 2.12 R1.0 standards, supporting both vendor specific hot-swap software or Pigeon Point Systems Hot Swap Kit software. For full I/O Board hot swap with Pigeon Point software the system must be running:

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

Other full I/O hot-swap software may be supported under other operating systems. Consult the specific vendor documentation for details and operating systems supported.

3.2.1 Removal and Installation of I/O 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. (Non-Hot swap only) Shut down the system and turn off the main system power.
   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. (Non-Hot swap only) Turn on the main system power and start up the system.
   (Hot swap only) The blue LED will light momentarily and should extinguish after full insertion is complete.
4. (Hot swap only) 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 0818D is configured to support rear I/O transition modules.

3.3.1 Removal of the Rear I/O Transition Modules

1. If the corresponding front I/O board has been removed as a hot swap board, the rear I/O transition module can be removed without powering down the system. Otherwise, it is necessary to shut down the system and turn off the main system power to remove the rear I/O transition module.
2. Loosen the two screws on the rear I/O module's faceplate as much as possible.

   Note: The screws are captive to the faceplate and cannot be completely removed. (some modules may not have screws on the faceplate).

3. Completely retract the injector/ejector handles by pressing them away from each other.

   Note: This may require some force.

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

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

3.3.2 Insertion of a Rear I/O Transition Module

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).
4. Turn on the main system power.

3.4 CMC (Chassis Management Controller) Board

The 0818D supports a Chassis Management Controller (CMC) Board in a connector slot located behind the power supply connectors on the rear of the cPCI backplane. Refer to Chapter 6 for more information about this optional feature.

Figure 3-1. CMC Board Front Plate

3.4.1 Indicators and Controls

Figure 3-1 is a drawing of the front plate of the CMC 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 occurrence 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 CMC 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 CMC 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 Health 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.

3.4.2 Removal 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 CMC 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.

3.4.3 Insertion of a CMC Board

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

The 0818D backplane is designed to be PICMG 2.16 compliant. The backplane supports 16 node slots with 2 fabric slots. The system can be configured in to a two independent 8 slot CPCI bus segments.

CAUTION!

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.

In the 0818D system, the SBC occupies slot #1 and/or slot #9.

Figure 3-2. Front View of I-Bus Monolithic Backplane

3.6 Backplane Cooling Fans and Blowers

For optimum cooling, the 0818D has eight 9.5 cfm fans at the bottom of the card cage, two 23 cfm fans under the power supplies, and three blowers located at the top of the card cage. The eight 9.5 cfm and two 23 cfm fans are mounted on a fan tray which can be hot-swapped (see Figure 3-3). However, the fan tray must be immediately replaced after being withdrawn to avoid overheating. If this is not possible, shut down the system before replacing the fans.

Figure 3-3. Fan Tray (partially withdrawn)

3.6.1 Removal of the Hot-Swap Fan Tray

Note: Removing the fan tray interrupts power to all fans. Therefore, if the fan tray is being hot-swapped, you should have another fan tray ready to install immediately after the first one is removed to prevent the unit from overheating.

1. Loosen the captive Thumb Screw located on the right hand end of the fan access cover at the bottom front of the enclosure.
2. Remove the access cover.
3. Grasp the two tray handles as shown in Figure 3-3 and slide the fan tray out of the chassis.

3.6.2 Installation of the Hot-Swap Fan Tray

1. Carefully align the right and left hand edges of the fan tray through the guide flanges in the chassis and slide the replacement fan tray into the chassis and press firmly to engage the power connectors at the rear of the chassis. If the system is

energized and the tray is correctly aligned, the fans will immediately start running as contact is made with the rear power connectors.

2. Replace the access cover and tighten the captive thumbscrew.

Individual fans may be replaced on the fan tray, however this should not be attempted as part of a hot-swap operation.

3.6.3 Removal of the Cooling Blowers

Three cooling blowers force hot air out the exhaust openings at the top rear of the chassis. The blowers may be individually hot swapped as follows:

1. Loosen the captive thumbscrew at the right hand end of the blower access cover at the top front of the chassis (see Figure 3-4).

Figure 3-4. Blower Access Cover

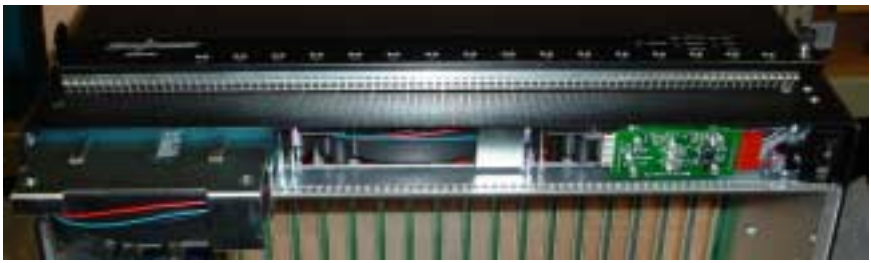

Figure 3-5. Cooling Blowers (one partially withdrawn)

2. Remove the access cover and withdraw the blower to be replaced (see
Figure 3-5). To remove the rightmost blower it is necessary to rotate the small Display/Status board fully outward on its hinge (see

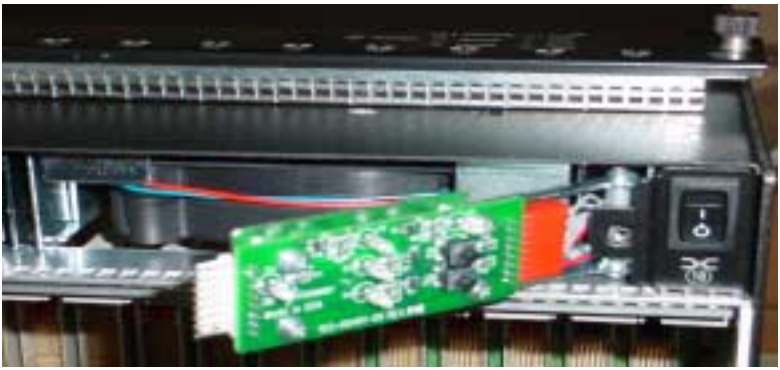

Figure 3-6).
Figure 3-5. Cooling Blowers (one partially withdrawn)

Figure 3-6. Display/Status Board Partially Rotated Outward

3.6.4 Installation of the Cooling Blowers

1. Carefully align the right and left hand edges of the replacement blower shuttle with the guide tracks in the chassis and slide it into the chassis. Press firmly to engage the power connectors at the rear of the chassis. If the system is energized and the blower is correctly aligned, it will immediately start running as contact is made with the rear power connectors.
2. Replace the blower access cover being careful that the LED's and small pushbuttons properly align with and project through the holes in the cover. Tighten the thumbscrew to secure the cover.

3.7 Chassis Filter

Using a vacuum cleaner or compressed air, clean the chassis filter once a month or whenever dust accumulates on it. Failure to do so may cause the unit to overheat and fail. The filter element may be washed if it is very dirty. If the filter is washed, it should be thoroughly dried before replacing it.

3.7.1 Removing the Chassis Filter

1. Loosen the captive thumbscrew located on the right hand end of the fan access cover at the bottom front of the chassis.
2. Remove the access cover.
3. Remove the filter from the access cover and clean it. If the filter is washed, it should be thoroughly dried before replacing it.

3.7.2 Replacing the Chassis Filter

1. Replace the filter in the fan access cover and replace the access cover on the chassis.
2. Secure the fan access cover by tightening the captive thumbscrew.

This page was intentionally left blank

4 Power Distribution

This chapter discusses the input power modules, power supply and input circuit breaker, and provides installation and removal instructions for each.

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

4.1 Dual Input Power Modules

The reliability of the 0818D system is enhanced by being powered by two independent DC power sources. The utilization of these two power sources is controlled by two input power modules, each fed by a different and separate source of power. No interconnection wiring between the two modules is needed. See Figure 4-1.

Figure 4-1. Input Power Modules

The two input power modules will plug into the computer backplane at the left rear of the computer chassis (see Figure 4-2). The physical location of the modules will determine which module is the preferred input. The two modules are identical, and any module that is plugged into slot A (top slot) becomes the preferred input. The module plugged into slot B (bottom slot) becomes the secondary power input. If the output from the primary module goes outside its specified limits, transfer to the secondary module occurs within 100 microseconds so the system will continue to operate without interruption.

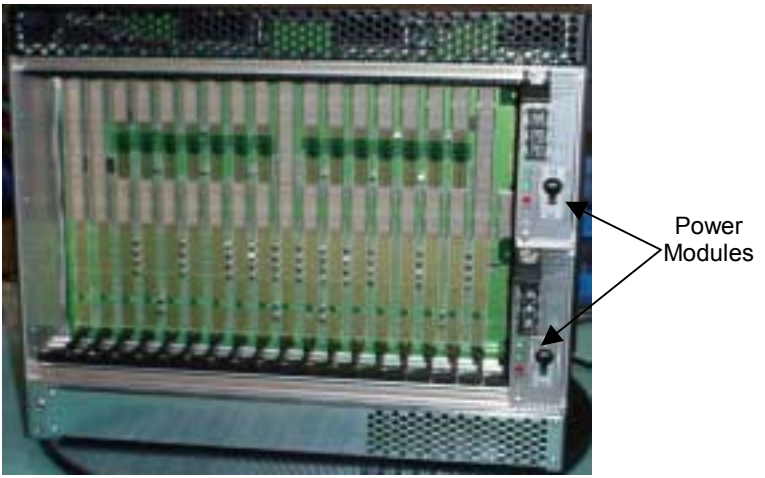

Figure 4-2. Rear View of Chassis Showing DC Input Power Modules

Warning

If both input power modules are fully inserted into the backplane, but only one has external voltage applied, dangerous voltage will be present at the terminals of the second module.

4.1.1 Thermal Shutdown

If the internal temperature sensors exceed 100°C, the input power module will shut down and the red Thermal Fault LED indicator on the front face of the module will illuminate. After the cause of the over temperature has been corrected and the internal temperature has returned to an acceptable limit, it is necessary to turn off the input power for at least two seconds and then turn it on again to reset the fault condition.

4.1.2 Removal of an Input Power Module

1. Turn off the input circuit breaker and disconnect the input power cable to the module.
2. Loosen the two captive screws on the power module's faceplate as much as possible.

   Note: The screws are captive to the faceplate and cannot be completely removed.
3. Lift up the injector/ejector handle fully to release the module from the backplane.
4. Slide the module out of the chassis.

4.1.3 Installation of an Input Power Module

1. Slide the replacement power module into the chassis and engage the injector/ejector handle by pressing it to its full downward position.
2. Secure the module by tightening the two captive faceplate screws.
3. Reconnect the input power cable(s) and turn on the input circuit breaker.

4.2 Power Supplies

Chassis DC power is provided by four front accessible, 200W, DC input, hot swap, current sharing power supplies in an N+1 configuration. Any one of the four power supplies may be removed and replaced with the system power on without interrupting the system. Figure 4-3 shows one of the power supply modules.

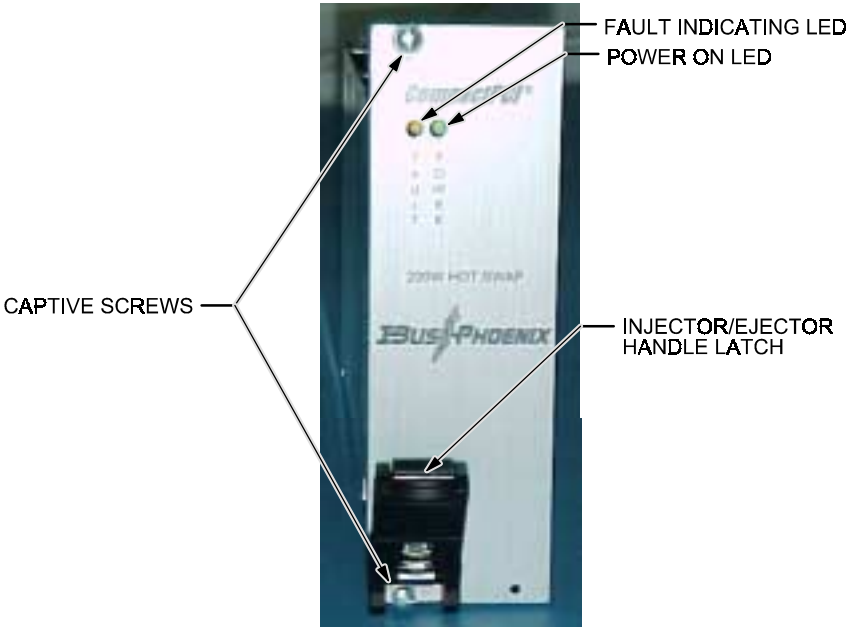

Figure 4-3. Power Supply Module

4.2.1 To Remove a Failed Power Supply Module

1. Determine which power supply has failed by observing the LED's on the faceplate of the power supply modules (Figure 4-3).
2. Loosen the two captive screws on the power supply module's faceplate as much as possible.

   Note: The screws are captive to the faceplate and cannot be completely removed.

3. Depress the injector/ejector handle latch and pull the handle outward to release the power supply module from its backplane connectors.

   Note: This may require some force.

4. Slide the power supply module out of the chassis.

4.2.2 To Replace a Power Supply Module

1. Slide the replacement power supply module into the chassis and engage the injector/ejector handle by pressing it to its full inward position.
2. Secure the power supply module by tightening the two captive faceplate screws.

Figure 4-4. Power Supply Module Partially Withdrawn

4.3 Input Circuit Breaker

The DC Input Power Module has a single pole 25-ampere circuit breaker in the negative input lead (as well as a 30 ampere fuse in the positive input lead). The ON/OFF switch on the front panel is used to interrupt or restore DC power from the power supply to the backplane, fans, and blowers.

This page was intentionally left blank

5 Software

The 0818D can be preloaded with Microsoft Windows 2000, Windows NT 4.0, or Linux operating system, or with the SUN Solaris 7 or 8 operating system. For software configuration support on this platform, refer to the software manufacturer's Installation and Configuration manual.

For other third party software, refer to the appropriate User's Manual.

This page was intentionally left blank

6 Platform Management Option

6.1 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, or as an Intelligent Platform Management device manageable through IPMB0. 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.

6.2 Description

The CMC Board is plugged into the back of an I-Bus cPCI monolithic backplane, and mounted vertically behind the power supply connectors.

Figure 6-1 shows the architecture of a CMC Board in conjunction with the SBC(s) in a cPCI system.

The CMC board has four I2C ports, to support cPCI Intelligent Platform Management Bus per PICMG 2.9. The use of these ports is shown in Figure 6-2.

Control and communication with the CMC board is via IPMI-command structure through the RS232 port or through IPMB0. 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.

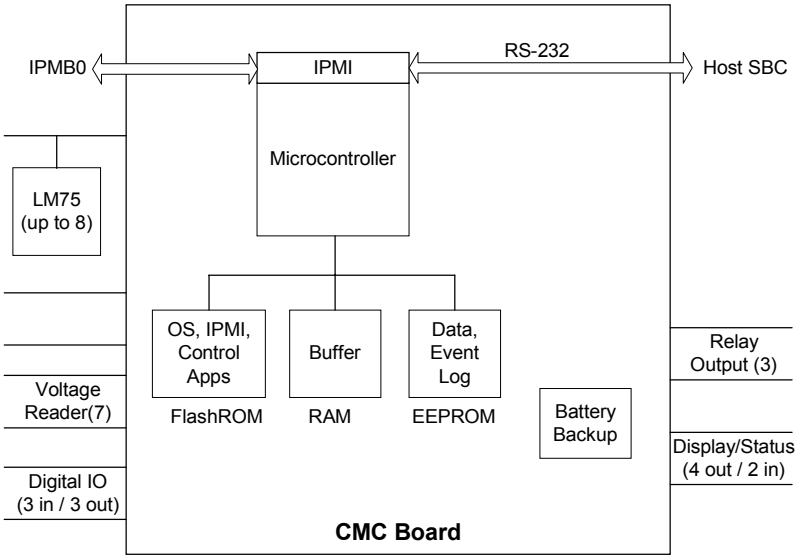

Figure 6-1. Block Diagram of a Chassis Management Controller

Figure 6-2 shows the I2C ports assignment between the CMC controller chip (e.g., VSC215) and the CompactPCI backplane.

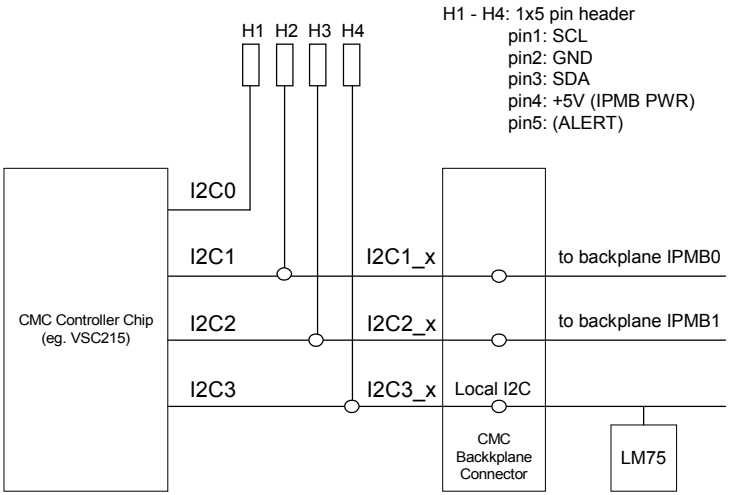

Figure 6-2. I2C Ports Assignment

6.3 CMC Board Mechanical and Environmental Specifications

6.3.1 Physical Size

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

6.3.2 User Access

- Chassis Management Controller Card is mounted vertically in the rear of the chassis, behind the power supply connectors.
- Shielded, EMI-filtered type connectors for Chassis Management Controller
- Relays and RS-232 interface directly accessible externally through cutouts in rear 6U panel.
- Additional headers on the CMC board are available to connect RS232 devices (such as host SBCs) directly to the board.

6.3.3 Temperature Range

- Operation: 0_C to 55_C.
- Storage: -40_C to 85_C.

6.4 Sensors Supported

The CMC board is capable of reading temperatures, DC voltages, fan tachometers, fan health, and power supply health. It can also output alarm conditions on the relay outputs and LEDs.

6.4.1 Temperature Sensors

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

The CMC supports up to eight temperature sensors.

Temperature sensor 0 (intake) is located In the air intake path at the bottom of the chassis. Temperature sensor 1 is located in the air exhaust path at the top of the left side. Temperature sensor 7 is located in the air exhaust path at the top of the right side. Temperature sensors 2 through 6 are not currently 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	

6.4.2 Voltage Sensors

The CMC monitors 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 CMC also monitors the input voltage on the input modules. Note that in a chassis that uses AC power, the thresholds reflect the fact that the AC input modules will accept AC power between 90 and 260 volts. No alarm is triggered at abnormal voltages like 180.

*Volt sensors 5 and 6 monitor the input voltage to the power input modules.

The accuracy for the above voltages is shown in the following table. Please see Table 6-1 for information about the normal ranges and thresholds associated with them:

Sensor No.	Voltage	Resolution (10 bit)
Volt0	+3.3V	20 mV
Volt1	+5V	30 mV
Volt2	Battery 6V	40 mV
Volt3	-12V	53 mV
Volt4	+12V	80 mV
Volt5 and Volt6	120V AC -48V DC	2 V 0.5V
Volt7	+5V	36 mV

6.4.3 Fan Sensors

Fans 0, 1, and 2 are the three blowers located at the top of the card cage. Fan 3, Fan 4, and Fan 5 each consist of a group of fans (total of 10) located at the bottom of the card cage. In each of these lower fan groups, if all of the fans are turning at an acceptable speed, the sensor for that group reads 0. If any of the fans in the group are not working, the sensor for that group will read 1. By default, a reading of 1 on any of the digital fan sensor causes a minor alarm.

6.4.4 Power Supply Sensors

Power supply sensors detect the health of individual power supplies. If a power supply is good, its sensor will read 0. A reading of 1 indicates that the power supply is not healthy. By default, this will cause a major alarm.

6.4.5 IPMB Power

The +5V DC IPMB Power on the bus is regulated separately from the rest of the CMC 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 +5%/-3% at backplane, 0A to 0.8A load or with 500 mA hot swap transient.

The CMC board monitors its own IPMB power voltage. The IPMB power voltage is shown as Volt7 in Table 6-1. Default SDR Parameters. Any IPMB_PWR reading outside these thresholds will set a Major Alarm.

6.5 Electrical Description

6.5.1 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.

6.5.2 Battery Backup

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

The CMC Board generates IPMB_PWR when powered by battery backup.

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

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

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

The acceptable output range of the battery is 6V ±5%.

The CMC 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.

6.5.3 Host Interface Ports

The CMC board provide an RS232 serial port to connect to an external host SBC. Connection is made through DB9 style connectors and headers on the board.

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

The CMC is also connected to IPMB0 in the backplane so that an IPMI compliant BMC can manage it. The I-Bus 2801 and 2802 SBCs provide such a BMC. Using this interface does not require any external connectors.

6.5.4 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.

6.5.5 CMC Reset Switch

There is an inset reset pushbutton on the CMC board to reset the CMC micro controller.

6.5.6 Digital Input/Output

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

6.5.7 ACO (Alarm Cut Off)

The CMC board provides an external pushbutton input to allow the user to disable the 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.

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

6.5.8 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.

6.5.9 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 CMC LEDs.

6.5.10 Display/Status Board

The CMC 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

6.6 CMC Firmware Description

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.

6.6.1 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 tachometers, voltage values, pushbuttons, etc.

The types 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 CMC's EEPROM-based file system. If this should occur, the default SDRs will be loaded.

Default sensors are defined in Table 6-1 "DEFAULT SDR PARAMETERS" on page 6-10, 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 I-Bus Platform Management Programmer's Guide.

CMC will log SEL (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 transient configuration table in the CMC board. Default manufacturing thresholds are defined in Table 6-1 and are incorporated in the firmware.

Any violations of the thresholds will trigger alarm conditions (critical, major, minor). Once a violation has triggered an alarm, the sensor reading must satisfy the requirements of the hysteresis values for the alarm condition to go away. 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 I-Bus Platform Management Programmer's Guide. To make the changes persistent across resets of the CMC, 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 I-Bus Platform Management Programmer's Guide for more information.

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

Table 6-1. Default SDR Parameters

Sensor #	Nominal	Normal Maximum	Normal Minimum	Upper Non-Recoverable Threshold	Upper Critical Threshold	Upper Non-Critical Threshold
Temp0	25°C	40°C	5°C	50°C	45°C	40°C
Temp1	25°C	40°C	5°C	50°C	45°C	40°C
Temp7	40°C	55°C	20°C	70°C	65°C	55°C
Fan0	3000 RPM	3400 RPM	2800 RPM	4000 RPM	3700 RPM	3500 RPM
Fan1	3000 RPM	3400 RPM	2800 RPM	4000 RPM	3700 RPM	3500 RPM
Fan2	3000 RPM	3400 RPM	2800 RPM	4000 RPM	3700 RPM	3500 RPM
Fan3	0	0	0	1	1	1
Fan4	0	0	0	1	1	1
Fan5	0	0	0	1	1	1
Volt0	3.3V	3.47V	3.20V	N/A	3.5V	N/A
Volt1	5V	5.25V	4.85V	N/A	5.3V	N/A
Volt2	6V (Vbat)	6.8V	5.5V	N/A	12.0V	N/A
Volt3	-12V	-11.40V	-12.60V	N/A	-11.0V	N/A
Volt4	12V	11.40V	12.60V	N/A	13.0V	N/A
Volt5*	120V/48V	135V/68V	110V/40V	N/A	260V/68V	N/A
Volt6*	120V/48V	135V/68V	110V/40V	N/A	260V/68V	N/A
Volt7	5V	5.25V	4.85V	N/A	5.3V	N/A
PWR0	0	0	0	1	1	1
PWR1	0	0	0	1	1	1
PWR2	0	0	0	1	1	1
PWR3	0	0	0	1	1	1

Continued on the next page…

Sensor #	Lower Non-Recoverable Threshold	Lower Critical Threshold	Lower Non-Critical Threshold	Positive Going Hysteresis Threshold	Negative Going Hysteresis Threshold
Temp0	N/A	0°C	N/A	2	2
Temp1	N/A	0°C	N/A	2	2
Temp7	N/A	0°C	N/A	2	2
Fan0	2100 RPM	2400 RPM	2700 RPM	96	96
Fan1	2100 RPM	2400 RPM	2700 RPM	96	96
Fan2	2100 RPM	2400 RPM	2700 RPM	96	96
Fan3	N/A	N/A	N/A	N/A	N/A
Fan4	N/A	N/A	N/A	N/A	N/A
Fan5	N/A	N/A	N/A	N/A	N/A
Volt0	N/A	3.15V	N/A	0.00	0.00
Volt1	N/A	4.75V	N/A	0.00	0.00
Volt2	N/A	5.4V	N/A	0.00	0.00
Volt3	N/A	-13.0V	N/A	0.00	0.00
Volt4	N/A	11.0V	N/A	0.00	0.00
Volt5*	N/A	90V/40V	N/A	0.00	0.00
Volt6*	N/A	90V/40V	N/A	0.00	0.00
Volt7	N/A	4.75	N/A	0.00	0.00
PWR0	N/A	N/A	N/A	N/A	N/A
PWR1	N/A	N/A	N/A	N/A	N/A
PWR2	N/A	N/A	N/A	N/A	N/A
PWR3	N/A	N/A	N/A	N/A	N/A

*Volt5 and Volt6 monitor input power to the chassis. If the chassis uses AC power, the first value shown in the table is used. If the chassis uses DC power, the second value is used.

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

By default, fan Sensors 3, 4, and 5 will only trigger minor alarms.

By default, voltage and power supply sensors will only trigger major alarms.

6.6.2 IPMI Command Interface Software

The IPMI Command Interface software module is accessible through the RS232 port and the IPMB0 connection of the CMC board.

IPMI commands these interfaces are accepted serially and passed on to the IPMI command interface of the controller chip by the firmware.

The firmware will switch between the two interfaces to determine if any activity is present, which means only one can be active an any one time. Once one interface is locked in as the command originator, the other interface may not receive a command until the first command has been fully received.

Response messages will be sent to the requesting SBC only.

6.6.2.1 Packet Format

The packet format on the RS232 interface 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.

6.6.2.2 Timeouts

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

SBC Exchange Timeout: The timeout between the end of receipt of a request by the CMC to the end of receipt of a complete response by the SBC will be set to 5 seconds.

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

6.6.2.3 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.

6.7 CMC Connector Pins

6.7.1 CMC-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
	PWR_ON_OFF			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

6.7.2 CMC-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
	PWR_ON_OFF	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

6.7.3 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	

6.7.4 RS-232 Pinouts

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

6.7.5 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 -

6.7.6 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

This page was intentionally left blank

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)

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)

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

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

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)

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 (64-bit extension)	AD(32:63)	Address/Data bus
	C/BE(4:7)_	Command/Byte Enable bus
	PAR64	64-bit Bus parity
	BRSVPxxx	PCI bus reserved signals
PCI bus arbitration signals	GNT(6:1)_	Bus grants
	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

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

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.

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 signaling 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.

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, version 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.

Appendix 3 – Limited Warranty

LIMITED WARRANTY

I-Bus 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 charged.

Receipt of damaged goods voids the I-Bus warranty.

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:

I-Bus (see page 2 to get I-Bus address)
ATTENTION: RMA REPAIR DEPT.
RMA ####

This page was intentionally left blank

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.

This page was intentionally left blank