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CP6000

6U Pentium® M
PICMG 2.16 CPU Blade

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User Guide

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Final disposition of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.

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Explanation of Symbols



CE Conformity

This symbol indicates that the product described in this manual is in compliance with CE standards.



Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.

Please refer also to the section “High Voltage Safety Instructions” on the following page.



Warning, ESD Sensitive Device!

This symbol and title inform that electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Please read also the section “Special Handling and Unpacking Instructions” on the following page.



Warning!

This symbol and title emphasize points which, if not fully understood and taken into consideration by the reader, may endanger your health and/or result in damage to your material.



Note ...

This symbol and title emphasize aspects the reader should read through carefully for his or her own advantage.

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For Your Safety

Your new Kontron product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of the correct operation of your new Kontron product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions



Warning!

All operations on this device must be carried out by sufficiently skilled personnel only.



Caution, Electric Shock!

Before installing your new Kontron product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks.

Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.

Special Handling and Unpacking Instructions



ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the board.

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General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron Modular Computers GmbH and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction on the previous page of this manual.

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If the customer's eligibility for warranty has not been voided, in the event of any claim, he may return the product at the earliest possible convenience to the original place of purchase, together with a copy of the original document of purchase, a full description of the application the product is used on and a description of the defect. Pack the product in such a way as to ensure safe transportation (see our safety instructions).

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Chapter 1

Introduction

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1. Introduction

1.1 System Overview

The CompactPCI board described in this manual operates with the PCI and PCI-X bus architecture to support additional I/O and memory-mapped devices as required by various industrial applications. For detailed information concerning the CompactPCI standard, please consult the complete Peripheral Component Interconnect (PCI) and CompactPCI Specifications. For further information regarding these standards and their use, visit the home page of the *PCI Industrial Computer Manufacturers Group (PICMG)*.

Many system-relevant CompactPCI features that are specific to Kontron Modular Computers CompactPCI systems may be found described in the Kontron CompactPCI System Manual. Due to its size, this manual cannot be downloaded via the internet. Please refer to the section “Related Publications” at the end of this chapter for the relevant ordering information.

The CompactPCI System Manual includes the following information:

- Common information that is applicable to all system components, such as safety information, warranty conditions, standard connector pinouts etc.
- All the information necessary to combine Kontron’s racks, boards, backplanes, power supply units and peripheral devices in a customized CompactPCI system, as well as configuration examples.
- Data on rack dimensions and configurations as well as information on mechanical and electrical rack characteristics.
- Information on the distinctive features of Kontron CompactPCI boards, such as functionality, hot swap capability. In addition, an overview is given for all existing Kontron CompactPCI boards with links to the relating data sheets.
- Generic information on the Kontron CompactPCI backplanes, such as the slot assignment, PCB form factor, distinctive features, clocks, power supply connectors and signalling environment, as well as an overview of the Kontron CompactPCI standard backplane family.
- Generic information on the Kontron CompactPCI power supply units, such as the input/ output characteristics, redundant operation and distinctive features, as well as an overview of the Kontron CompactPCI standard power supply unit family.

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1.2 Board Overview

1.2.1 Board Introduction

The CP6000 is a CompactPCI system controller board. It has been designed to support all Intel® Pentium® M and Intel® Celeron® M processors with 400 MHz FSB.

A key performance factor of the Intel® Pentium® M processor is the newly designed CPU core with an integrated 64 kB L1 and up to 2048 kB L2 cache, which provide more CPU power per MHz than an Intel® Pentium® 4 processor.

The Pentium® M has the advantage of very low power consumption, whilst at the same time providing impressive processor speeds ranging from 1.1 GHz through 1.8 GHz with a Processor Side Bus (PSB) running at 400 MHz. The CP6000 utilizes the Intel® 855GME and 6300ESB I/O Controller Hub chipset.

The board includes two SODIMM sockets to provide up to 2 GB Double Data Rate (DDR) memory with Error Checking and Correcting (ECC) for rugged environments. The CP6000 supports memory speed up to 333 MHz (PC2700).

The CP6000 offers more features and expandability than other CompactPCI boards in its class. The board comes with two onboard Ultra ATA/100 interfaces, two Serial ATA interfaces, four Gigabit Ethernet ports (two Intel® 82546GB controllers), up to four USB 2.0 ports, one PMC interface with 64-bit/66 MHz on the PCI-X bus, rear I/O with several interfaces, one CompactFlash type II socket and a built-in Intel 3D Graphics accelerator with up to 64 MB of shared memory for enhanced graphics performance with a VGA CRT-display interface. Several onboard connectors provide flexible expandability.

The board supports a configurable 32-bit/33 MHz, hot swap CompactPCI interface. In the System Master slot the interface is enabled, and if installed in a peripheral slot, the CP6000 is isolated from the CompactPCI bus.

One of the more important features of the CP6000 is its support of the PICMG CompactPCI Packet Switching Backplane Specification 2.16. When installed in a backplane which supports packet switching, the CP6000 can communicate via two Gigabit Ethernet interfaces with other peripherals.

Designed for stability and packaged in a rugged format, the board fits into all applications situated in industrial environments, including I/O intensive applications where only one slot is available for the CPU, making it a perfect core technology for long life applications. Components which have high temperature tolerance have been selected from embedded technology programs, and therefore offer long-term availability.

The board is offered with the Microsoft® Windows® 2000, Windows® XP and Windows® XP Embedded operating systems. Kontron further supports, as a standard, Linux and VxWorks®. Please contact Kontron Modular Computers for further information concerning other operating systems.

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1.2.2 Board-Specific Information

The CP6000 is a CompactPCI Pentium® M based single-board computer specifically designed for use in highly integrated platforms with solid mechanical interfacing for a wide range of industrial environment applications.

Some of the CP6000's outstanding features are:

- Supports all Intel® Pentium® M and Intel® Celeron® M microprocessors with 400 MHz FSB
- 479-pin µFCBGA package
- Up to 2048 kB L2 cache on-die, running at CPU speed
- 400 MHz processor system bus
- 855GME and 6300ESB chipset
- Up to 2 GB DDR SDRAM memory running up to DDR333 (PC2700)
- Integrated 3D high performance VGA controller
- Analog display support up to 2048 x 1536 pixels at 16-bit and 60 Hz
- PMC interface (64-bit/66 MHz PCI-X, 3.3V only) with rear I/O support and bezel cutout on front panel and PCI-X functionality
- Four Gigabit Ethernet interfaces
  - Two Gigabit Ethernet interfaces on the front panel
  - Two Gigabit Ethernet interfaces on rear I/O (PICMG 2.16)
- Two EIDE Ultra ATA/100 interfaces
- Two Serial ATA interfaces on rear I/O, one thereof can be routed to onboard connectors
- Optional socket for 2.5" hard disk (only for standard temperature range)
- Onboard CompactFlash type II socket (True IDE)
- Four USB ports
  - Two USB 2.0 ports on the front panel
  - Two USB 2.0 ports on rear I/O
- 1 MB onboard FWH for BIOS
- Hardware Monitor (LM87)
- Floppy disk interface on rear I/O
- Watchdog timer
- Real-time clock
- Two COM ports on rear I/O (RS-232/RS-422/RS-485)
- I/O extension connector (LPC)
- 4HP, 6U CompactPCI
- Jumperless board configuration
- Extended temperature range: -40°C to + 85°C (optional)
- Passive heat sink solution for external airflow
- AMI BIOS
- PCI-X interface onboard (64-bit/66 MHz)
- Compatible with CompactPCI spec. Rev. 3.0 (32-bit/33 MHz)
- Hot swap capability: as system controller or as peripheral device
- Supports PICMG Packet Switching Backplane Specification 2.16
- Several rear I/O configurations
- Rear I/O on J3 and J5; optionally on J4
- IPMI compliant Baseboard Management controller

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1.3 System Expansion Capabilities

1.3.1 PMC Modules

The CP6000 has one PCI-X, 64-bit/66 MHz, 3.3V, rear I/O capable, PMC mezzanine interface. This interface supports a wide range of available PMC modules with PCI and PCI-X interface including all of Kontron's PMC modules and provides an easy and flexible way to configure the CP6000 for various application requirements.

1.3.2 CTM80-2 Rear I/O Module

The CTM80-2 rear I/O module has been designed for use with the CP6000 6U CompactPCI board from Kontron Modular Computers. This module provides comprehensive rear I/O functionality and may also be configured for use in other applications.

For further information concerning the CTM80-2 module, please refer to Appendix A.

1.3.3 CP6000-EXT-SATA Module

The CP6000-EXT-SATA module (order no. CP6000-MK2.5SATA) has been designed for use with the CP6000 6U CompactPCI board from Kontron Modular Computers and enables the user to connect an onboard 2.5" Serial ATA hard disk to the CP6000.

For further information concerning the CP6000-EXT-SATA module, please refer to Appendix B.

1.4 System Relevant Information

The following system relevant information is general in nature but should still be considered when developing applications using the CP6000.

Table 1-1: System Relevant Information

SUBJECT	INFORMATION
System Slot/System Master Functionality	The CP6000 is designed for use as a System Master board whereby it can support up to 7 peripheral boards with 32-bit/33 MHz. It may, however, be operated in a peripheral slot in which case it does not support the CompactPCI bus interface.
Peripheral Slot Functionality	When installed in a peripheral slot, the CP6000 is electrically isolated from the CompactPCI bus. It receives power from the backplane and supports rear I/O and, if the system supports it, packet switching (in this case up to two channels of Gigabit Ethernet).
Hot Swap Compatibility	When operated as a System Master, the CP6000 supports individual clocks for each slot and ENUM signal handling is in compliance with the PICMG 2.1 Hot Swap Specification. When operated in a peripheral slot the CP6000 supports basic hot swap.
Operating Systems	The CP6000 can be operated under the following operating systems: • Microsoft® Windows® 2000 • Microsoft® Windows® XP • Microsoft® Windows® XP Embedded • Linux • VxWorks® Please contact Kontron Modular Computers for further information concerning other operating systems.

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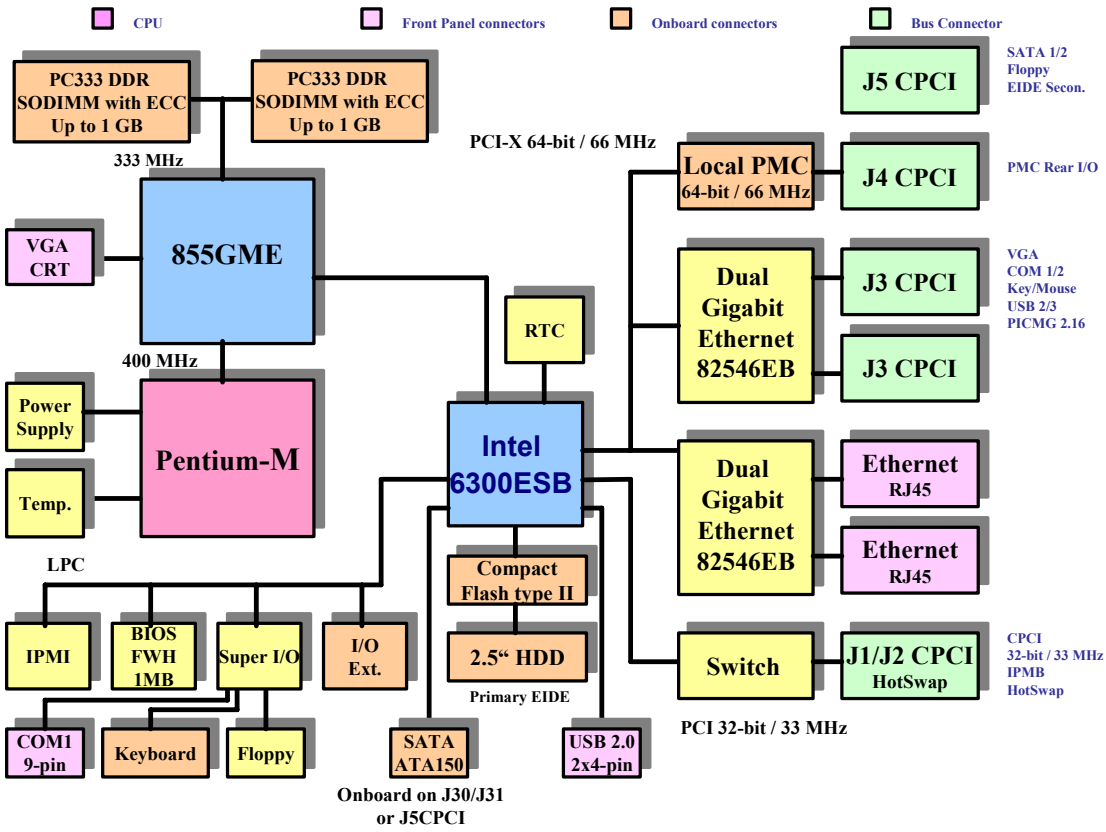
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1.5 Board Diagrams

The following diagrams provide additional information concerning board functionality and component layout.

1.5.1 Functional Block Diagram

Figure 1-1: CP6000 Functional Block Diagram



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1.5.2 Front Panels

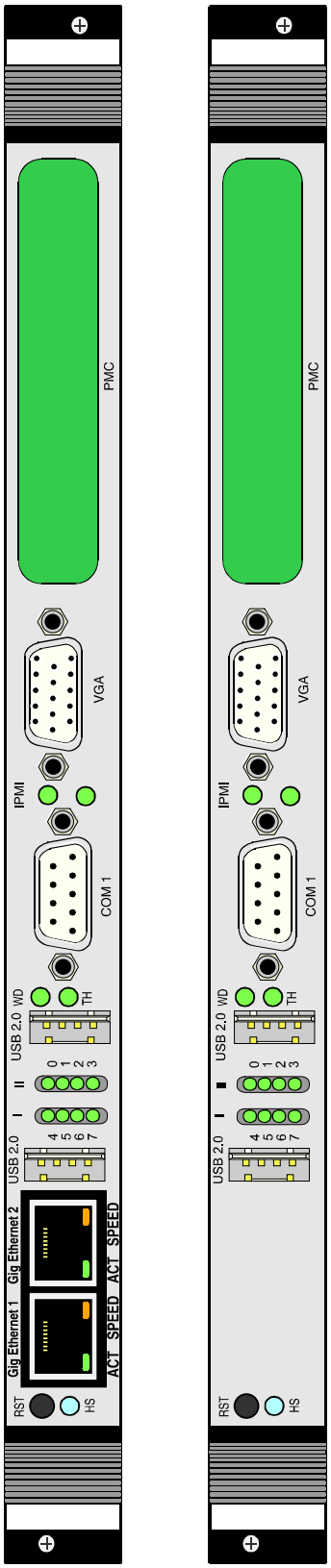


Figure 1-2: CP6000 4 HP Front Panels

Legend:

Left CP6000 with Front Panel Gigabit

Right CP6000 with PICMG 2.16 only

IPMI LEDs

IPMI (green): Indicate the software status of the IPMI controller.

General Purpose LEDs

WD (green): Watchdog, when lit during bootup, it indicates a PCI reset is active.

TH (green): Overtemperature Status, when lit during bootup, it indicates a power failure.

HS (blue): Hot Swap Control

Front-I: General Purpose or POST code

Front-II: General Purpose or POST code

Integral Ethernet LEDs

ACT (green): Ethernet Link/Activity

SPEED (green/orange): Ethernet Speed

SPEED ON (orange): 1000 Mbit

SPEED ON (green): 100 Mbit

SPEED OFF: 10 Mbit

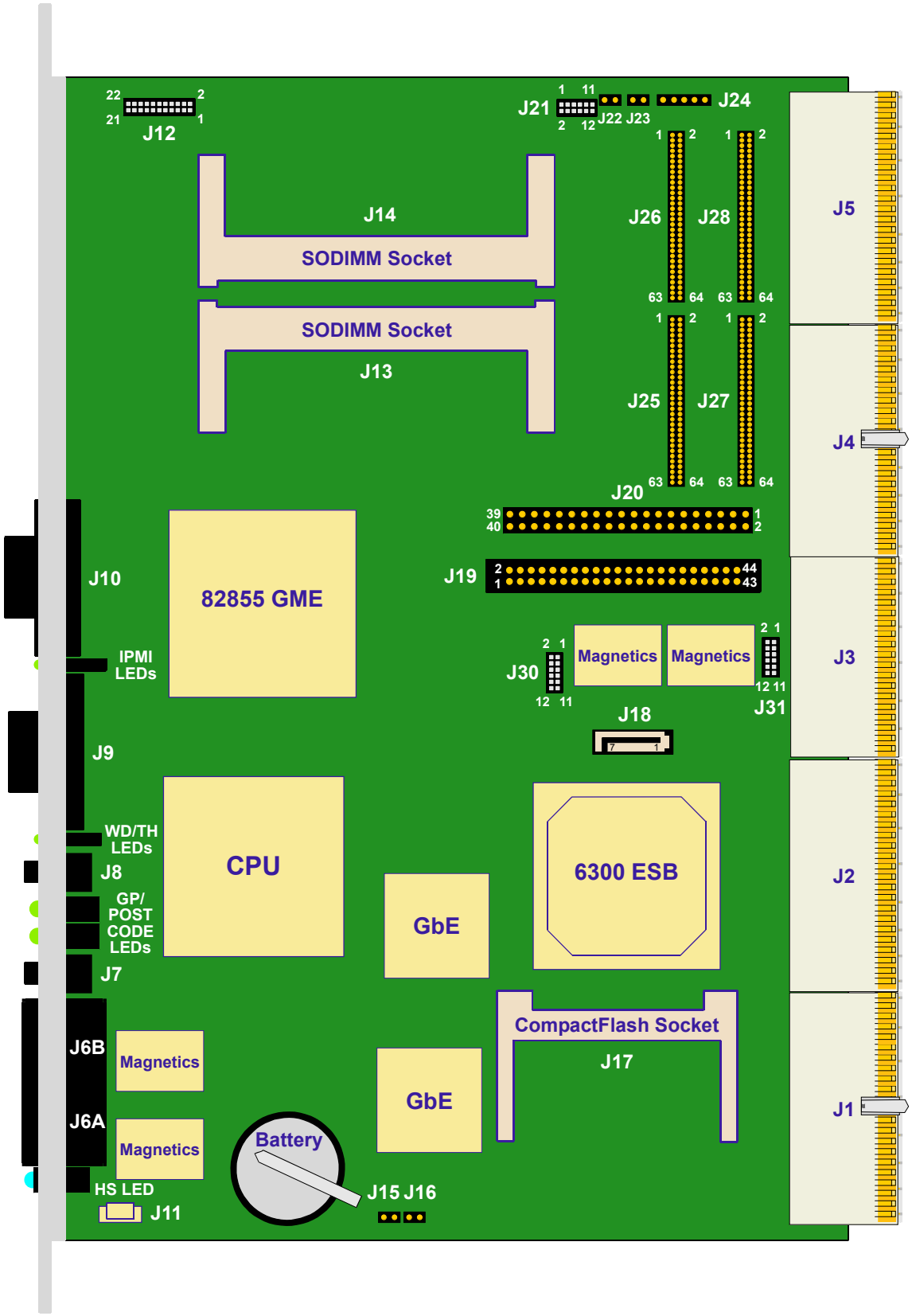
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1.5.3 Board Layout

Figure 1-3: CP6000 Board Layout (Front View)

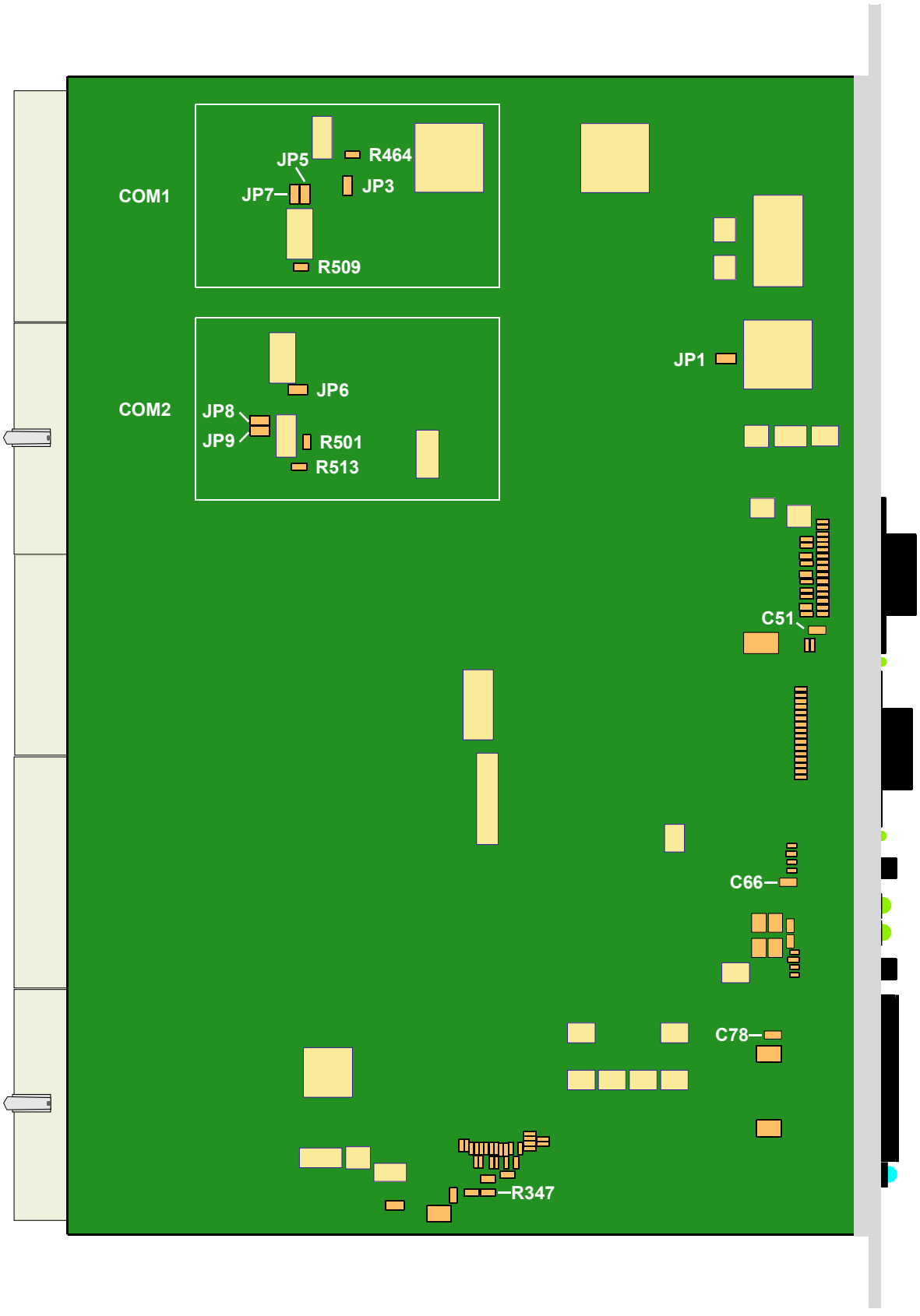


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Figure 1-4: CP6000 Board Layout (Reverse View)



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1.6 Technical Specification

Table 1-2: CP6000 4HP Version Main Specifications

	CP6000	SPECIFICATIONS

Processor and Memory	CPU	The CP6000 supports the following microprocessors:
		• Intel® Pentium® M with 1024 kB L2 cache
		  • 1.1 GHz (LV) version
		  • 1.6 GHz version
		• Intel® Pentium® M with 2048 kB L2 cache
		  • 1.4 GHz (LV) version
		  • 1.8 GHz version
		• Intel® Celeron® M with 512 kB L2 cache
		  • 1.3 GHz version
		All microprocessors are provided with 400 MHz PSB (Processor Side Bus) in 479 µFCBGA packaging.

	Memory	Main Memory:
		• Up to 2 GB DDR333 (PC2700), SODIMM socket for DDR SDRAM memory with ECC
		Cache structure:
		• 64 kB L1 on-die full speed processor cache
		  • 32 kB for instruction cache
		  • 32 kB for data cache
		• Up to 2048 kB L2 on-die full speed processor cache
		FLASH Memory:
		• 1 MB FLASH for BIOS
		Memory Extension:
		• CompactFlash socket type II (true IDE mode)
		Serial EEPROM:
		• 24LC64 (64 kbit)

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
Chipsets	Intel® 855GME Chipset	Intel® 855GME Graphics Memory Controller Hub (GMCH) • Support for a single Pentium® M microprocessor • 64-bit AGTL/AGTL+ based System Bus interface at 400 MHz • 64-bit System Memory interface with optimized support for DDR333 (PC2700) SDRAM memory with ECC (additional 8 bits for ECC) • Integrated 2D and 3D Graphics Engines • Integrated H/W Motion Compensation Engine • Integrated 350 MHz DAC
	Intel® 6300ESB Chipset	Intel® 6300ESB I/O Controller Hub • PCI-X Rev. 1.0 with support for 64-bit/66 MHz PCI-X operations • PCI Rev. 2.2 compliant with support for 32-bit/33 MHz PCI operations • Power management logic support • Enhanced DMA controller, interrupt controller, and timer functions • Integrated IDE controller Ultra ATA/100/66/33 • Dual Channel SATA 150 • USB 2.0 host interface with up to four USB ports available on the CP6000 • System Management Bus (SMBus) compatible with most I²C™ devices • Low Pin Count (LPC) interface • Firmware Hub (FWH) interface support

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
Interfaces	CompactPCI	Compliant with CompactPCI Specification PICMG® 2.0 R 3.0 • System Master operation • 32-bit / 33 MHz master interface • 5V compliant (3.3V compliant version, optional) When the CP6000 is operated in a peripheral slot, the CompactPCI bus is electrically isolated (passive mode).
	Rear I/O	The following interfaces are routed to the rear I/O connector J3, J4 and J5: • COM1 and COM2 (RS-232, RS-422 and RS-485 signaling); no buffer on the rear I/O module is necessary • 2 x USB 2.0 • CRT VGA • PS/2 (Mouse / Keyboard) • 2 x Gigabit Ethernet (compliant with PICMG 2.16, R 1.0) • Secondary EIDE (ATA 100) • 2 x SATA 150 • General purpose signals • PMC rear I/O • Floppy disk interface
	Hot Swap Compatible	The CP6000 supports System Master hot swap functionality and application dependent hot swap functionality when used in a peripheral slot. When used as a System Master the CP6000 supports individual clocks for each slot and ENUM signal handling is in compliance with the PICMG 2.1 Hot Swap Specification.
	VGA	Built-in Intel 3D Graphics accelerator for enhanced graphics performance. • Supports resolutions of up to 2048 x 1536 by 16-bit color resolution at a 60 Hz refresh rate or up to 1280 x 1024 by 24-bit color resolution at an 85 Hz refresh rate. • Hardware motion compensation for software MPEG2 and MPEG4 decoding • The graphics controller provides flexible allocation of video memory up to 64 MB.
	Gigabit Ethernet	Up to four 10 Base-T/100 Base-TX/1000 Base-T Gigabit Ethernet interfaces based on two Intel® 82546GB Ethernet PCI-X bus controllers. • Two channels on rear I/O • Two RJ45 connectors on the front panel • Automatic mode recognition • Automatic cabling configuration recognition Cabling requirement: Category 5, UTP, four-pair cabling
	USB	Four USB ports supporting UHCI and EHCI: • Two USB 2.0 connectors on the front panel • Two USB 2.0 on the rear I/O interface

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
Interfaces	Serial	Two 16C550-compatible UARTs on the rear I/O interface (RS-232, RS-422 and RS-485 signaling), one thereof can be routed to the front panel
	PMC	CMC/PMC P1386/Draft 2.4a compliant mezzanine interface • Jn1, Jn2, Jn3 and Jn4 PCI mezzanine connectors for standard PMC modules • 64-bit/33 MHz PCI interface or 64-bit/66 MHz PCI-X interface • Only 3.3V compatible • Rear I/O supported through the CompactPCI connector J4
	Keyboard and Mouse	Keyboard and mouse are supported • USB Support on 4HP • PS/2 (keyboard and mouse) with rear I/O module (e.g. CTM80-2) • Separate onboard keyboard connector (5-pin) that requires an adapter in order to be connected to a regular keyboard

	Mass Storage	EIDE Ultra ATA/100/66/33:
		• Two interfaces:
		  • Primary EIDE: one 44-pin, 2.0 mm male pinrow EIDE connector for HDD (with CompactFlash card only up to ATA 33), one 50-pin CompactFlash socket
		  • Secondary EIDE: one 40-pin, 2.54 mm, male pinrow EIDE connector (standard), and rear I/O connector
		• Up to four devices (one CompactFlash and up to three hard disks or CD-ROMs)
		Onboard 2.5" hard disk:
		• Onboard 2.5" hard disk is supported on a 44-pin Parallel ATA interface or a 22-pin Serial ATA interface (only for standard temperature range)
		• For the Serial ATA interface, the CP6000-EXT-SATA module is used
		CompactFlash:
		• CompactFlash type II socket (true IDE mode and DMA support)
		• Supports type I and II CompactFlash cards and IBM Microdrive™
		SATA: Integrated Serial ATA Host Controllers
		• Provides independent DMA operation on 2 ports, one onboard port which can be routed to rear I/O, and one additional port only on rear I/O
		• Data transfer rates up to 150 MB/s
		Floppy Disk (only with rear I/O module):
		• Supports 5.25" or 3.5" floppy drives
		• 1.44 or 2.88 MB, 3.5" floppy disks

	I/O Extension Interface	I/O extension interface: • LPC devices

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
General	Mechanical	6U, 4HP, CompactPCI compliant form factor
	Power Consumption	See Chapter 5 for details
	Temperature Range	Operational: 0°C to +60°C Standard -40°C to +85°C E2 (optional; only with designated CPU types and DDR memory modules) Storage: -55°C to +85°C Without hard disk -40°C to +65°C With hard disk
	Climatic Humidity	93% RH at 40 °C, non-condensing (acc. to IEC 60068-2-78)
	Dimensions	233.35 mm x 160 mm
	Board Weight	477 g (4HP variants with standard heat sink and without mezzanine boards)
	Battery	3.0V lithium battery for RTC with battery socket. Recommended types: • VARTA CR2025 • PANASONIC BR2020
Sockets	Front Panel Connectors	• VGA: 15-pin, D-Sub connector • USB: two 4-pin connectors • Ethernet: up to two RJ-45 connectors • COM: 9-pin, D-Sub connector • PMC front panel

	Onboard Connectors	• Two EIDE interfaces supporting Ultra ATA/100/66/33
		  • One 44-pin, 2.0 mm connector
		  • One 40-pin, 2.54 mm connector
		• CompactFlash socket for type I, II and MicroDrive devices (primary EIDE interface)
		• I/O extension connector
		• PMC connector Jn1 - Jn4
		• Optional SATA connectors, either one 7-pin, standard SATA connector, or two 12-pin, SATA extension connectors
		• CompactPCI Connector J1 and J2 (J3 - J5 optional)
		• 5-pin PS/ 2 connector (keyboard)
		• Two 200-pin SODIMM sockets

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
HW Monitoring	LEDs	System status: • TH (green): Overtemperature Status, when remains lit during bootup, it indicates a PCI reset is active. • WD (green): Watchdog, when remains lit during bootup, it indicates a power failure. • IPMI: Control information Gigabit Ethernet status: • ACT (green): network activity • SPEED (green/orange): network speed General Purpose LEDs: • I (green): General Purpose or POST code • II (green): General Purpose or POST code
	Watchdog	Software configurable Watchdog generates IRQ, NMI, or hardware reset.
	Thermal Management	CPU overtemperature protection is provided by: • Internal processor temperature control unit • CPU shut down via hardware monitor • Custom-designed heat sinks
	System Monitor	LM87 hardware monitor for supervision of: • Several system power voltages • Two fan speed input
	IPMI	1.5 IMPI compliant Baseboard Management Controller (BMC) that supports keyboard-style and block transfer interfaces. The IPMI has been designed to monitor and control: • All system power voltages • The CPU surrounding board temperature • Up to two fan speed inputs • The hot swap LED • The hot swap controller The IPMI supports two I²C busses via the J1 and J2 connectors.

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Table 1-2: CP6000 4HP Version Main Specifications (Continued)

	CP6000	SPECIFICATIONS
Software	Software BIOS	AMI BIOS with 1 MB of Flash memory and having the following features: • QuickBoot • QuietBoot • BootBlock • LAN boot capability for diskless systems (standard Etherboot/PXE on demand) • Boot from USB floppy disk drive • BIOS boot support for USB keyboards • Plug and Play capability • BIOS parameters are saved in the EEPROM • Board serial number is saved within the EEPROM • PC Health Monitoring
	Operating Systems	Operating systems supported: • Microsoft® Windows® 2000 • Microsoft® Windows® XP • Microsoft® Windows® XP Embedded • Linux • VxWorks®

1.7 Kontron Software Support

Kontron is one of the few CompactPCI and VME manufacturers providing inhouse support for most of the industry-proven real-time operating systems that are currently available. Due to its close relationship with the software manufacturers, *Kontron* is able to produce and support BSPs and drivers for the latest operating system revisions thereby taking advantage of the changes in technology.

Finally, customers possessing a maintenance agreement with *Kontron* can be guaranteed hotline software support and are supplied with regular software updates. A dedicated web site is also provided for online updates and release downloads.

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1.8 Standards

This *Kontron Modular Computers'* product complies with the requirements of the following standards:

Table 1-3: Standards

TYPE	ASPECT	STANDARD	REMARKS
CE	Emission	EN55022 EN61000-6-3	--
	Immission	EN55024 EN61000-6-2	--
	Electrical Safety	EN60950-1	--
Mechanical	Mechanical Dimensions	IEEE 1101.10	--
Environmental	Vibration (sinusoidal)	IEC60068-2-6	Ruggedized version test parameters: • 10-300 (Hz) frequency range • 2 (g) accelleration • 1 (oct/min) sweep rate • 10 cycles/axis • 3 axis
	Vibration, broad-band random (digital control) and guidance	IEC60068-2-64	Ruggedized version test parameters: • 20-500Hz, 0.05 (g^2/Hz) PSD • 500-2000Hz, 0.005 (g^2/Hz) PSD • 3.5 (g RMS) acceleration • 30 (min) test time/axis • 3 axis
	Bump	IEC60068-2-29	Ruggedized version test parameters: • 15 (g) acceleration • 11 (ms) pulse duration • 500 bumps per direction • 6 directions • 1 (s) recovery time
	Shock	IEC60068-2-27	Ruggedized version test parameters: • 30 (g) acceleration • 9 (ms) pulse duration • 3 shocks per direction • 6 directions • 5 (s) recovery time
	Climatic Humidity	IEC60068-2-78	93% RH at 40 °C, non-condensing
	WEEE	Directive 2002/96/EC	Waste electrical and electronic equipment
	RoHS	Directive 2002/95/EC	Restriction of the use of certain hazardous substances in electrical and electronic equipment



Note ...

The values in the above table are valid for boards which are ordered with the ruggedized service. For more information please contact your local Kontron office.

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1.9 Related Publications

The following publications contain information relating to this product.

Table 1-4: Related Publications

PRODUCT	PUBLICATION
CompactPCI Systems and Boards	CompactPCI Specification 2.0, Rev. 3.0 CompactPCI Packet Switching Backplane Specification PICMG 2.16 Rev. 2.0 CompactPCI System Management Specification PICMG 2.9 Rev. 1.0 CompactPCI Hot Swap Specification PICMG 2.1 Rev. 2.0
	Hot Swap Specification PICMG 2.1
	Kontron Modular Computers' CompactPCI System Manual, ID 19954
CompactFlash Cards	CF+ and CompactFlash Specification Revision 1.4

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Chapter 2

Functional Description

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2. Functional Description

2.1 CPU, Memory and Chipset

2.1.1 CPU

The CP6000 supports the latest Intel® Pentium® M processor family up to speeds of 1.8 GHz with 400 MHz FSB. The Intel® Pentium® M microprocessors offer exceptional performance with low power consumption. This processor is based on a new core which is optimized for low power consumption.

The Intel® Pentium® M supports the latest Intel® SpeedStep® technology, which enables real-time dynamic switching of the voltage and frequency between several modes. This is achieved by switching the bus ratios, core operating voltage, and core processor speeds without resetting the system. The frequency for the Pentium® M processor may also be selected in the BIOS.

The following list sets out some of the key features of this processor:

- Supports Intel Architecture with Dynamic Execution
- High performance, low power core
- On-die, primary 32 kB instruction cache and 32 kB write-back data cache
- On-die, second level cache with Advanced Transfer Cache Architecture
  - Intel® Celeron® M with 512 kB L2 cache
  - Intel® Pentium® M with 1024 kB L2 cache
  - Intel® Pentium® M with 2048 kB L2 cache
- Advanced Branch Prediction and Data Prefetch Logic
- Streaming SIMD Extensions 2 (SSE2)
- 400 MHz, Source-Synchronous processor system bus
- Advanced Power Management features including Enhanced Intel® SpeedStep® technology

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The following tables indicate the Intel® Pentium® M processors supported on the CP6000, their maximum power dissipation and their core voltage in the various frequency modes.

Table 2-1: Supported Intel® Pentium® M Processors on the CP6000

SPEED	1.1 GHz	1.4 GHz	1.6 GHz	1.8 GHz
PACKAGE	µFCBGA	µFCBGA	µFCBGA	µFCBGA
L2 CACHE	1024 kB	2048 kB	1024 kB	2048 kB
CORE VOLTAGE	0.956 - 1.180 V	0.988 - 1.116 V	0.956 - 1.484 V	1.068 - 1.308 V
PROCESSOR SIDE BUS	400 MHz	400 MHz	400 MHz	400 MHz

Table 2-2: Maximum Power Dissipation of Intel® Pentium® M (CPU only)

FREQUENCY MODE	1.1 GHz	1.4 GHz	1.6 GHz	1.8 GHz
Maximum Power HFM[1)]	12 W	10 W	25.4 W	21 W
Maximum Power LFM[2)]	4 W	7.5 W	4 W	7.5 W

[1)]HFM High Frequency Mode (maximum frequency of the CPU)

[2)]LFM Low Frequency Mode (frequency is 600 MHz)



Note ...

Only the 1.1 GHz and 1.4 GHz versions are able to run in the extended temperature range because of the lower power dissipation.

Table 2-3: Intel® Pentium® M Core Voltage in the Various Frequency Modes

FREQUENCY	Vcore			
	1.1 GHz	1.4 GHz	1.6 GHz	1.8 GHz
1.8 GHz	--	--	--	1.276 V
1.6 GHz	--	--	1.484 V	1.228 V
1.4 GHz	--	1.116 V	1.420 V	1.180 V
1.2 GHz	--	1.100 V	1.276 V	1.132 V
1.1 GHz	1.180 V	1.068 V	--	--
1.0 GHz	1.164 V	1.052 V	1.164 V	--
900 MHz	1.100 V	1.036 V	--	--
800 MHz	1.020 V	1.020 V	1.036 V	1.036 V
600 MHz	0.956 V	0.988 V	0.956 V	0.988 V

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The following tables provide information on the Intel® Celeron® M processor supported on the CP6000 and its maximum power dissipation.

Table 2-4: Supported Intel® Celeron® M Processor on the CP6000

SPEED	1.3 GHz
PACKAGE	µFCBGA
L2 CACHE	512 kB
CORE VOLTAGE	1.356 V
PROCESSOR SIDE BUS	400 MHz

Table 2-5: Maximum Power Dissipation of Intel® Celeron® M (CPU only)

FREQUENCY MODE	1.3 GHz
Maximum Power	24.5 W

2.1.2 Memory

The CP6000 has two SODIMM sockets for installing memory and supports a maximum of 2 GB. All installed memory will be automatically detected, so there is no need to set any jumpers. The CP6000 supports all DDR200, DDR266 and DDR333 SDRAMs on 200-pin SODIMMs with or without ECC offered by Kontron Modular Computers. All memory components and SODIMMs used with this board must comply with the following PC DDR SDRAM memory specifications:

- PC DDR SDRAM Memory Specification DDR200, DDR266 and DDR333
- PC Serial Presence Detect Specification

Only qualified DDR SDRAMs from Kontron Modular Computers can be used with the CP6000.

Table 2-6: Memory Options Utilizing SODIMM Sockets

SODIMM-0	SODIMM-1	TOTAL
512 MB	--	512 MB
--	512 MB	512 MB
512 MB	512 MB	1 GB
1 GB	--	1 GB
--	1 GB	1 GB
1 GB	1 GB	2 GB

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Warning!

It is recommended to use only DDR333 (PC2700) memory at once. Do not mix DDR200, DDR266 and DDR333 modules, otherwise the maximum performance is given by the slowest module.

Do not mix ECC SODIMM modules with non-ECC SODIMM modules, otherwise the ECC functionality is disabled.

Note ...

The maximum memory size for the extended temperature range is 1 GB (2 modules 512 MB) with DDR266 (PC2100). This enhances the reliability and long life of the CP6000.

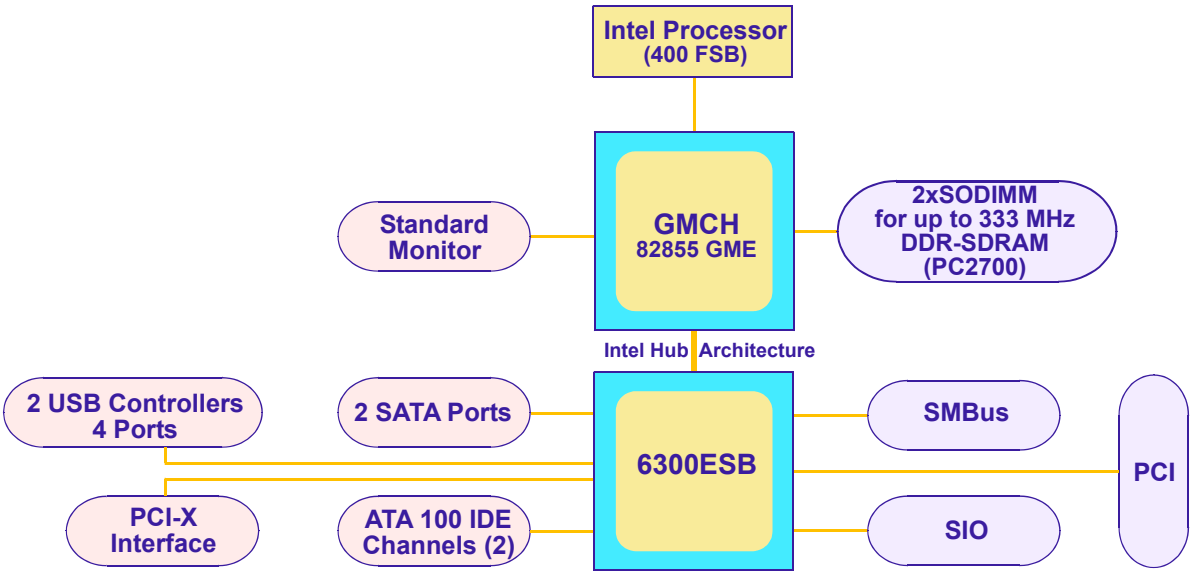
2.1.3 855GME Chipset Overview

The Intel® 855GME chipset consists of the following devices:

- 82855GME Graphics and Memory Controller Hub (GMCH) with Accelerated Hub Architecture (AHA) bus
- 6300ESB I/O Controller Hub (Hance Rapids) with AHA bus
- Firmware Hub (FWH)

The GMCH provides the processor interface for the Pentium® M microprocessor, the memory bus and includes a high performance graphics accelerator. The 6300ESB is a centralized controller for the boards' I/O peripherals, such as the PCI-X, USB 2.0, EIDE, and SATA ports. The Firmware Hub (FWH) provides the non-volatile storage for the BIOS.

Figure 2-1: 855GME Chipset Functional Block Diagram



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2.1.4 Graphics and Memory Controller Hub (855GME)

The 855GME Graphics Memory Controller Hub (GMCH) is a highly integrated hub that provides the CPU interface (optimized for the Intel® Pentium® M), the DDR SDRAM system memory interface (optimized for DDR200/PC1600, DDR266/PC2100 and DDR333/PC2700), a hub link interface to the 6300ESB and high performance internal graphics.

Graphics and Memory Controller Hub Feature Set

Host Interface

The 855GME is optimized for the Intel® Pentium® M microprocessors. The chipset supports a Processor Side Bus (PSB) frequency of 400 MHz using 1.05 V AGTL signalling. Single-ended AGTL termination is supported for single processor configurations. The AGTL bus supports 32-bit host addressing for decoding up to 4 GB memory address space.

System Memory Interface

The 855GME integrates a system memory Dual Data Rate (DDR) SDRAM controller with a 72-bit wide interface including ECC bits. The chipset supports DDR200, DDR266 and DDR333 (PC1600, PC2100 and PC2700) DDR SDRAM for system memory. The best memory speed for the CP6000 is DDR333 (PC2700).

855GME Graphics Controller

The 855GME includes a highly integrated graphics accelerator and H/W Motion Compensation engines for software MPEG2 decoding delivering high performance 3D and 2D video capabilities. The internal graphics controller provides an interface for a standard CRT display.

2.1.5 I/O Controller Hub 6300ESB

The 6300ESB is a highly integrated multifunctional I/O Controller Hub that provides the interface to the PCI and PCI-X Bus, and integrates many of the functions needed in today's PC platforms, such as Ultra DMA 100/66/33 controller, SATA 150, USB host controller supporting USB 2.0, LPC interface and FWH Flash BIOS interface controller. The 6300ESB communicates with the host controller over a dedicated hub interface.

The I/O Controller Hub Feature set comprises:

- PCI 2.2 interface with 32-bit/33 MHz and eight IRQ inputs
- PCI-X 1.0 interface with 64-bit/66 MHz and four IRQ inputs
- Bus Master EIDE controller UltraDMA 100/66/33
- SATA 150 controller
- Two USB controllers with up to four USB 1.1 or USB 2.0 ports
- Hub interface for a 855GME chipset
- FWH interface
- LPC interface
- RTC controller

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2.2 Peripherals

The following standard peripherals are available on the CP6000 board:

2.2.1 Timer

The CP6000 is equipped with the following timers:

- Real-time clock
  The 6300ESB contains a MC146818A compatible real-time clock with 256 bytes of battery-backed RAM.
  The real-time clock performs timekeeping functions and includes 256 bytes of general purpose battery-backed CMOS RAM. Features include an alarm function, programmable periodic interrupt and a 100-year calendar. All battery-backed CMOS RAM data remains stored in an additional EEPROM. This prevents data loss.
- Counter/Timer
  Three 8254-style counter/timers are included on the CP6000 as defined for the PC/AT.
- Multimedia Timer
  The 6300ESB includes an additional free timer

2.2.2 Watchdog Timer

A watchdog timer is provided, which forces either an IRQ5, NMI, or Reset condition (configurable in the watchdog register). The watchdog time can be programmed in 12 steps ranging from 125 msec up to 256 seconds. If the watchdog timer is enabled, it cannot be stopped.

2.2.3 Battery

The CP6000 is provided with a 3.0 V “coin cell” lithium battery for the RTC.

To replace the battery, proceed as follows:

- Turn off power
- Remove the battery
- Place the new battery in the socket.
- Make sure that you insert the battery the right way round. The plus pole must be on the top!

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer. Suitable batteries include the VARTA CR2025 and PANASONIC BR2020.

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Note ...

Care must be taken to ensure that the battery is correctly replaced.

The battery should be replaced only with an identical or equivalent type recommended by the manufacturer.

Dispose of used batteries according to the manufacturer's instructions.

The typical life expectancy of a 170 mAh battery (VARTA CR2025) is 5 - 6 years with an average on-time of 8 hours per working day at an operating temperature of 30°C. However, this typical value varies considerably because the life expectancy is dependent on the operating temperature and the standby time (shutdown time) of the system in which it operates.

To ensure that the lifetime of the battery has not been exceeded, it is recommended to exchange the battery after 4 - 5 years.

2.2.4 Reset

The CP6000 is automatically reset by a precision voltage monitoring circuit that detects a drop in voltage below the acceptable operating limit of 4.68 V for the 5 V line and below 3.09 V for the 3.3 V line, or in the event of a power failure of the DC/DC converter. Other reset sources include the watchdog timer and the push-button switch on the front panel. The CP6000 responds to any of these sources by initializing local peripherals.

A reset will be generated under the following conditions:

- +5 V supply falls below 4.68 V (typ.)
- +3.3 V supply falls below 3.09 V (typ.)
- Power failure of all onboard DC/DC converters
- Push-button "RESET" pressed
- Watchdog overflow
- CompactPCI backplane PRST input

2.2.5 SMBus Devices

The CP6000 provides a System Management Bus (SMBus) for access to several system monitoring and configuration functions. The SM Bus consists of a two-wire I²C bus interface. The following table describes the function and address of every onboard SM Bus device.

Table 2-7: SM Bus Device Addresses

DEVICE	SMB ADDRESS
Hardware Monitor LM87	0101110xb
EEPROM 24LC64	1010111xb
Clock	1101001xb

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2.2.6 Thermal Management/System Monitoring

The LM87 can be used to monitor several critical hardware parameters of the system, including power supply voltages, fan speeds and temperatures, all of which are very important for the proper operation and stability of a high-end computer system. The LM87 provides an I^2C serial bus interface.

The voltages of the onboard power supply core; +12 V, -12 V, +5 V, +3.3 V, +2.5 V, and Vcore are supervised. Two fan tachometer outputs can be measured using the LM87's FAN inputs.

The temperature sensors on the LM87 monitor the CPU temperature and the ambient temperature around the CPU to ensure that the system is operating at a safe temperature level. If the temperature is too high, the sensors automatically reduce the CPU clock frequency, depending on the mode chosen in the BIOS set.

2.2.7 Serial EEPROM

This EEPROM is connected to the I^2C bus provided by the 6300ESB.

Table 2-8: EEPROM Address Map

ADDRESS	FUNCTION
0 - FF	CMOS backup
100 - 1FF	Production data
200 - 3FF	OS Boot parameter
400 - 2000	User

2.2.8 FLASH Memory

There are two flash devices available as described below, one for the BIOS and one for the CompactFlash socket.

2.2.8.1 BIOS FLASH (Firmware Hub)

For simple BIOS updating a standard onboard 1 MB Firmware Hub device is used.

The FWH stores both the system BIOS and video BIOS. It can be updated as new versions of the BIOS become available. You may easily upgrade your BIOS using the AMI utility. For detailed information on BIOS refer to Appendix B.

2.2.8.2 CompactFlash

CompactFlash is a very small removable mass storage device. It provides true IDE functionality compatible with the 16-bit ATA/ATAPI-4 interface. CompactFlash cards are also available for data storage using the Microdrive hard disk from IBM with up to 6 GB capacity.

For further information on the CompactFlash, refer to section 2.3.8.3, CompactFlash Socket.

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2.3 Board Interfaces

2.3.1 Front Panel LEDs

The CP6000 is equipped with two LEDs for IPMI, two LEDs for watchdog and overtemperature, eight LEDs for general purpose or POST code (four LEDs for Front-I and four LEDs for Front-II), and one LED for hot swap. Their functionality is described in the following chapters.

2.3.1.1 IPMI LEDs

These two LEDs show the software status of the IPMI controller.

2.3.1.2 Watchdog and Overtemperature LEDs

The CP6000 provides two front LEDs for Overtemperature and Watchdog status. Additionally, if the TH LED remains on during bootup, it indicates a PCI reset is active, and if the WD LED remains on during bootup, it indicates a power failure. In this case, check the power supply. If the power supply appears to be functional and this LED remains on, contact Kontron Modular Computers' Technical Support.



Note ...

If the overtemperature LED flashes on and off at regular intervals, it indicates that the processor junction temperature has reached a level beyond which permanent silicon damage may occur. Upon assertion of Thermtrip, the processor will shut off its internal clocks (thus halting program execution) in an attempt to reduce the processor junction temperature.

Once activated, Thermtrip remains latched until a cold restart of the CP6000 is undertaken (all power off and then on again).

2.3.1.3 Front-I and Front-II General Purpose LEDs

These are two sets of General Purpose LEDs available on the front panel of the CP6000 which are designed to indicate the boot-up POST code if required or are available to the application as general purpose LEDs. To indicate POST code, J22 must be set. For general purpose use, J22 must not be set. Together Front-I and Front-II indicate a two-place hexadecimal number. Front-II is the lower nibble, Front-I is the higher nibble. An one is indicated by a lit LED. The LSB is 0, the MSB is 7. Default setting is general purpose and all LEDs not lit.

2.3.1.4 Hot Swap LED

On the CP6000, a blue HS LED can be switched on or off by software. It may be used, for example, to indicate that the shutdown process is finished and the board is ready for extraction. It may also be used for general purposes.

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2.3.2 Keyboard/Mouse Interface

The onboard keyboard controller is 8042 software compatible.

The keyboard and mouse port is routed to the CompactPCI rear I/O interface. There is no front I/O connector available. To connect a keyboard, a separate onboard connector is available. **The mouse port is only available on the CompactPCI rear I/O interface.**

The CP6000 has a 5-pin male pinrow connector, J24, for the keyboard interface.

Figure 2-2: Keyboard Connector J24



Table 2-9: Keyboard Connector J24 Pinout

PIN	SIGNAL	FUNCTION	I/O
1	KDATA	Keyboard data	I/O
2	--	--	--
3	GND	Ground	--
4	VCC	VCC 5V	--
5	KCLK	Keyboard clock	O

2.3.3 USB Interfaces

The CP6000 supports four USB 2.0 ports (two on the front I/O and two on the rear I/O). On the two rear I/O ports it is strongly recommended to use a cable below 3 metres in length for USB 2.0 devices. All four ports are high-speed, full-speed, and low-speed capable. High-speed USB 2.0 allows data transfers of up to 480 Mb/s - 40 times faster than a full-speed USB (USB 1.1). Please note that the CTM80-2 Rear I/O Module supports USB1.1 protocol.

One USB peripheral may be connected to each port. To connect more than four USB devices an external hub is required.

USB Connectors J7 and J8 Pinout

The CP6000 has two USB interfaces implemented on a 4-pin connector with the following pinout.

Figure 2-3: USB Connectors J7 and J8

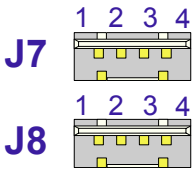


Table 2-10: USB Connectors J7 and J8 Pinout

PIN	SIGNAL	FUNCTION	I/O
1	VCC	VCC	--
2	UV0-	Differential USB-	I/O
3	UV0+	Differential USB+	I/O
4	GND	GND	--



Note ...

The USB power supply to each USB connector is protected with a fuse (500 mA) and all the signal lines are EMI-filtered.

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2.3.4 Graphics Controller

The 855GME includes a highly integrated graphics accelerator delivering high performance 3D, 2D video capabilities. The internal graphics controller provides interfaces to a standard progressive scan monitor. This interface is only active when running in internal graphics mode.

Integrated 2D/3D Graphics:

- 3D hyperpipelined architecture
- Full 2D hardware acceleration
- Intel® 855GME D.V.M. Technology graphics core
- Integrated 350 Mhz DAC
- Resolution up to 1600 x 1200 @ 100 Hz and 2048 x 1536 @ 75 Hz with True colors
- Integrated H/W Motion Compensation engines for software MPEG2 decode

2.3.4.1 Video Memory Usage

The 855GME chipset supports the new Dynamic Video Memory Technology (D.V.M.T.). This new technology ensures the most efficient use of all available memory for maximum 3D graphics performance. D.V.M.T. dynamically responds to application requirements allocating display and texturing memory resources as required.

The operating system requires a minimum of 1 MB and a maximum of 64 MB of system memory to support legacy VGA. System properties will display up to 64MB less than physical system memory available to the operating system.

The graphics driver for the Intel® 855GME configuration will request up to 64 MB of memory from the OS. By reallocating memory to the system, memory is freed up for other applications when not needed by the graphics subsystem. Thus, efficient memory usage is ensured for optimal graphics and system memory performance.

2.3.4.2 Video Resolution

The 855GME has an integrated 350 MHz RAMDAC that can directly drive a progressive scan analog monitor up to a resolution of 1600x1200 @ 100 Hz and 2048 x 1536 @ 75 Hz.

Table 2-11: Partial List of Display Modes Supported

DISPLAY MODE	COLOR RESOLUTION VERSUS HORIZONTAL FREQUENCY											
	8-BIT INDEXED				16-BIT				32-BIT			
	60	75	85	100	60	75	85	100	60	75	85	100
640 x 480	X	X	X	X	X	X	X	X	X	X	X	X
800 x 600	X	X	X	X	X	X	X	X	X	X	X	X
1024 x 768	X	X	X	X	X	X	X	X	X	X	X	X
1280 x 1024	X	X	X	X	X	X	X	X	X	X	X	X
1600 x 1200	X	X	X	X	X	X	X	X	X	X	X	X
1920 x 1440	X	X	X		X	X	X		X	X	X	
2048 x 1536	X	X			X	X			X	X		

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2.3.4.3 CRT Interface and Connector J10

The 15-pin female connector J10 is used to connect a CRT monitor to the CP6000 board.

Figure 2-4: D-Sub CRT Con. J10

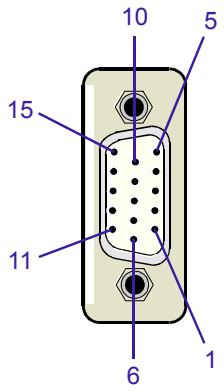


Table 2-12: D-Sub CRT Connector J10 Pinout

PIN	SIGNAL	FUNCTION	I/O
1	Red	Red video signal output	O
2	Green	Green video signal output	O
3	Blue	Blue video signal output	O
13	Hsync	Horizontal sync.	TTL Out
14	Vsync	Vertical sync.	TTL Out
12	Sdata	I^2C data	I/O
15	Sclk	I^2C clock	O
9	VCC	Power +5V 200 mA, no fuse protection	O
5,6,7,8,10	GND	Ground signal	--
4,11	Free	--	--

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2.3.5 COM Ports

The CP6000 provides two COM ports, COM1 and COM2. COM1 is available on the front panel as a 9-pin, D-Sub, PC-compatible connector, and is routed to rear I/O. COM2 is only available on the rear I/O. Thus, COM1 and COM2 are also available on the CTM80-2 RIO module. COM1 and COM2 are fully compatible with the 16550 controller and include a complete set of handshaking and modem control signals, maskable interrupt generation and data transfer of up to 460.8 kB/s.The two COM interfaces may be configured as either RS-232, RS-422 or RS-485 ports by setting the appropriate solder jumpers. The standard setting of the two COM ports envisages the RS-232 configuration.

RS-422 configuration:

The RS-422 interface uses two differential data lines RX and TX for communication (Full-Duplex).

RS-485 configuration:

The RS-485 interface uses one differential data line. It differs from the RS-422 mode in that it provides the ability to transmit and receive over the same wire. The RTS signal is used to enable the RS-485 transmitter.

The following figure and table provide pinout information for the serial port connector J9, which depends on the interface configuration.

Figure 2-5: Serial Port Con. J9 (COM1)

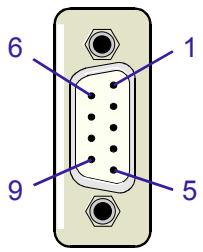


Table 2-13: Serial Port Con. J9 (COM1) Pinout

PIN	RS-232 (STANDARD PC)	RS-422	RS-485
1	DCD	+RXD	NC
2	RXD	NC	NC
3	TXD	+TXD	+TRXD
4	DTR	NC	NC
5	GND	GND	GND
6	DSR	-RXD	NC
7	RTS	NC	NC
8	CTS	-TXD	-TRXD
9	RIN	NC	NC

2.3.6 Floppy Drive Interface

The onboard floppy disk controller supports either 5.25 inch or 3.5 inch (1.44 or 2.88 MB) floppy disks. **The floppy disk port is only available on the CompactPCI rear I/O interface**.

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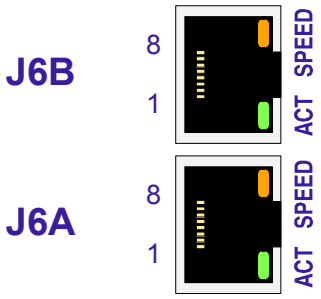
2.3.7 Gigabit Ethernet

The CP6000 board includes up to four 10Base-T/ 100Base-TX/1000Base-T Ethernet ports based on the Intel® 82546GB Gigabit Ethernet PCI-X Controller, which is connected to the PCI-X interface.

The Intel® 82546GB Dual Gigabit Ethernet Controller architecture is optimized to deliver high performance with the lowest power consumption. The controller's architecture includes independent transmit and receive queues to limit PCI bus traffic, and a PCI-X interface that maximizes the use of bursts for efficient bus usage.

The Boot from LAN feature is supported.

Figure 2-6: Dual Gigabit Ethernet Connector J6A/B





Note ...

The maximum length of cabling over which the Ethernet transmission can operate effectively depends upon the transceiver in use.

The Ethernet connectors are realized as RJ45 connectors. The interfaces provide automatic detection and switching between 10Base-T, 100Base-TX and 1000Base-T data transmission. Auto-wire switching for crossed cables is also supported.

RJ45 Connector J6A/B Pinouts

The J6A/B connector supplies the 10Base-T, 100Base-TX and 1000Base-T interfaces to the Ethernet controller.

Table 2-14: Pinouts of J6A/B Based on the Implementation

MDI / STANDARD ETHERNET CABLE						PIN	MDIX / CROSSED ETHERNET CABLE					
10BASE-T		100BASE-TX		1000BASE-T			10BASE-T		100BASE-TX		1000BASE-T	
I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL		I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL
O	TX+	O	TX+	I/O	BI_DA+	1	I	RX+	I	RX+	I/O	BI_DB+
O	TX-	O	TX-	I/O	BI_DA-	2	I	RX-	I	RX-	I/O	BI_DB-
I	RX+	I	RX+	I/O	BI_DB+	3	O	TX+	O	TX+	I/O	BI_DA+
-	-	-	-	I/O	BI_DC+	4	-	-	-	-	I/O	BI_DD+
-	-	-	-	I/O	BI_DC-	5	-	-	-	-	I/O	BI_DD-
I	RX-	I	RX-	I/O	BI_DB-	6	O	TX-	O	TX-	I/O	BI_DA-
-	-	-	-	I/O	BI_DD+	7	-	-	-	-	I/O	BI_DC+
-	-	-	-	I/O	BI_DD-	8	-	-	-	-	I/O	BI_DC-

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Ethernet LED Status

ACT (green): This LED monitors network connection and activity. The LED lights up when network packets are sent or received through the RJ45 port. When this LED is not lit it means that either the computer is not sending or receiving network data or that the cable connection is faulty.

SPEED (green/orange): This LED lights up to indicate a successful 100Base-TX or 1000BASE-T connection. When green it indicates a 100Base-TX connection and when orange it indicates a 1000Base-TX connection. When not lit and the ACT-LED is active, the connection is operating at 10Base-T.

2.3.8 EIDE Interfaces

The EIDE interfaces support the following modes:

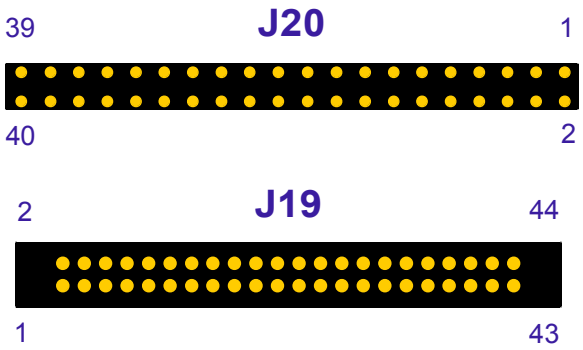
- Programmed I/O (PIO): CPU controls data transfer.
- 8237-style DMA: DMA offloads the CPU, supporting transfer rates of up to 16 MB/sec.
- Ultra DMA: DMA protocol on IDE bus supporting host and target throttling and transfer rates of up to 33 MB/sec.
- ATA-66: DMA protocol on IDE bus supporting host and target throttling and transfer rates of up to 66 MB/sec. ATA-66 protocol is similar to Ultra DMA and is device driver compatible.
- ATA-100: DMA protocol on IDE bus allows host and target throttling. The 6300ESB ATA-100 logic can achieve read transfer rates of up to 100 MB/sec and write transfer rates up to 88 MB/sec.



Note ...

ATA-66 and ATA-100 are faster timings and require a specialized cable which has additional grounding wires to reduce reflections, noise, and inductive coupling. This cable will also support all legacy IDE drives.

Figure 2-7: EIDE Interface Connectors J19 and J20



There are two independent EIDE ports available. The primary port is connected to the 44-pin, 2-row male connector, J19, and to the onboard CompactFlash socket, J17. The secondary EIDE interface is a 40-pin, 2-row male connector, J20, AT standard interface for an EIDE hard disk. This interface is also available at rear I/O.

The onboard 2.5" HDD can be installed on the 44-pin connector.

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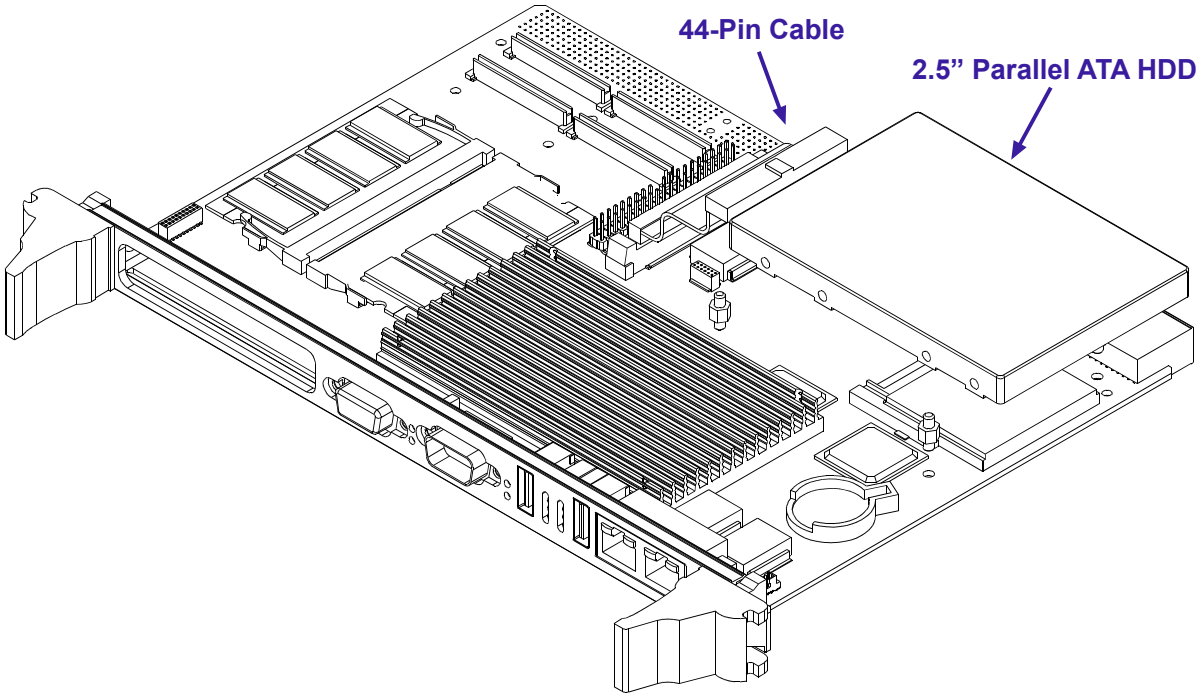
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Note ...

If the CP6000 is ordered for extended temperature range (-40°C to +85°C), the mounted heat sink extends partly over the area where the HDD is intended to be installed. For this reason, it is not possible to directly install a 2.5" HDD on this CP6000 version.

Each EIDE interface provides support for two devices (one master and one slave) and the two EIDE interfaces together support a maximum of 4 devices. All hard disks can be used in cylinder head sector (CHS) mode with the BIOS also supporting the logical block addressing (LBA) mode.

Figure 2-8: Connecting an Onboard 2.5" HDD to CP6000 via Parallel ATA



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2.3.8.1 J19 - ATA 44-Pin Connector

A 2.5” hard disk or Flash disk may be mounted directly onto the CP6000 board using the optional 44-pin connector J19. The maximum length of the cable that may be used is 35 cm.

Table 2-15: Pinout of ATA 44-Pin Connector J19

I/O	FUNCTION	SIGNAL	PIN	PIN	SIGNAL	FUNCTION	I/O
O	Reset HD	IDERESET	1	2	GND	Ground signal	--
I/O	HD data 7	HD7	3	4	HD8	HD data 8	I/O
I/O	HD data 6	HD6	5	6	HD9	HD data 9	I/O
I/O	HD data 5	HD5	7	8	HD10	HD data 10	I/O
I/O	HD data 4	HD4	9	10	HD11	HD data 11	I/O
I/O	HD data 3	HD3	11	12	HD12	HD data 12	I/O
I/O	HD data 2	HD2	13	14	HD13	HD data 13	I/O
I/O	HD data 1	HD1	15	16	HD14	HD data 14	I/O
I/O	HD data 0	HD0	17	18	HD15	HD data 15	I/O
--	Ground signal	GND	19	20	N/C	--	--
I	DMA request	IDEDRQ	21	22	GND	Ground signal	--
O	I/O write	IOW	23	24	GND	Ground signal	--
O	I/O read	IOR	25	26	GND	Ground signal	--
I	I/O channel ready	IOCHRDY	27	28	GND	Ground signal	--
O	DMA Ack	IDEDACKA	29	30	GND	Ground signal	--
I	Interrupt request	IDEIRQ	31	32	N/C	--	--
O	Address 1	A1	33	34	ATA66	Detect ATA66	I
O	Address 0	A0	35	36	A2	Address 2	O
O	HD select 0	HCS0	37	38	HCS1	HD select 1	O
I	LED driving	LED	39	40	GND	Ground signal	--
--	5V power	VCC	41	42	VCC	5V power	--
--	Ground signal	GND	43	44	N/C	--	--

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2.3.8.2 J20 - ATA 40-Pin Connector

The following table sets out the pinout of the J20 connector, giving the corresponding signal names. The maximum length of cable the that may be used is 35 cm.

Table 2-16: Pinout of ATA 40-Pin Connector J20

I/O	FUNCTION	SIGNAL	PIN	PIN	SIGNAL	FUNCTION	I/O
O	Reset HD	IDERESET	1	2	GND	Ground signal	--
I/O	HD data 7	HD7	3	4	HD8	HD data 8	I/O
I/O	HD data 6	HD6	5	6	HD9	HD data 9	I/O
I/O	HD data 5	HD5	7	8	HD10	HD data 10	I/O
I/O	HD data 4	HD4	9	10	HD11	HD data 11	I/O
I/O	HD data 3	HD3	11	12	HD12	HD data 12	I/O
I/O	HD data 2	HD2	13	14	HD13	HD data 13	I/O
I/O	HD data 1	HD1	15	16	HD14	HD data 14	I/O
I/O	HD data 0	HD0	17	18	HD15	HD data 15	I/O
--	Ground signal	GND	19	20	N/C	--	--
I	DMA request	IDEDRQ	21	22	GND	Ground signal	--
O	I/O write	IOW	23	24	GND	Ground signal	--
O	I/O read	IOR	25	26	GND	Ground signal	--
I	I/O channel ready	IOCHRDY	27	28	GND	Ground signal	--
O	DMA Ack	IDEDACKA	29	30	GND	Ground signal	--
I	Interrupt request	IDEIRQ	31	32	N/C	--	--
O	Address 1	A1	33	34	ATA66	Detect ATA66	I
O	Address 0	A0	35	36	A2	Address 2	O
O	HD select 0	HCS0	37	38	HCS1	HD select 1	O
I	LED driving	LED	39	40	GND	Ground signal	--

2.3.8.3 CompactFlash Socket

To enable flexible flash extension, a CompactFlash (CF) type II socket, J17, is available.

CF is a very small removable mass storage device. It provides true IDE functionality compatible with the 16-bit ATA/ATAPI-4 interface. CF cards are also available for data storage using the Microdrive hard disk from IBM with up to 6 GB capacity.

The CompactFlash socket is connected to the primary EIDE port and can be set to master or slave.

The board supports DMA and both CF types (type I and type II). CompactFlash is available in both CF type I and CF type II cards. The IBM Microdrive is a CF type II card.

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Note ...

The easiest way to remove the CompactFlash card is to affix a wide piece of adhesive tape to the top side, then pull it out and afterwards remove the tape.

The following table provides the pinout for the CompactFlash connector J17.

Table 2-17: CompactFlash Connector J17 Pinout

I/O	FUNCTION	SIGNAL	PIN	PIN	SIGNAL	FUNCTION	I/O
--	Ground signal	GND	1	2	D03	Data 3	I/O
I/O	Data 4	D04	3	4	D05	Data 5	I/O
I/O	Data 6	D06	5	6	D07	Data 7	I/O
O	Chip select 0	IDE_CS0	7	8	GND (A10)	--	--
--	--	GND (ATASEL)	9	10	GND (A09)	--	--
--	--	GND (A08)	11	12	GND (A07)	--	--
--	Power 5V	VCC	13	14	GND (A06)	--	--
--	--	GND (A05)	15	16	GND (A04)	--	--
--	--	GND (A03)	17	18	A02	Address 2	O
O	Address 1	A01	19	20	A00	Address 0	O
I/O	Data 0	D00	21	22	D01	Data 1	I/O
I/O	Data 2	D02	23	24	IOCS16	--	O
--	--	NC (CD2)	25	26	NC (CD1)	--	--
I/O	Data 11	D11	27	28	D12	Data 12	I/O
I/O	Data 13	D13	29	30	D14	Data 14	I/O
I/O	Data 15	D15	31	32	IDE_CS1	Chip select 1	O
--	--	NC (VS1)	33	34	IORD	I/O read	O
O	I/O write	IOWR	35	36	WE (VCC)	Write enable	O
I	Interrupt request	INTRQ	37	38	VCC	Power 5V	--
O	Master/Slave	CSEL (GND/pull-up)	39	40	NC (VS2)	--	--
O	Reset	Reset	41	42	IORDY	I/O ready	I
O	Acknowledge	INPACK	43	44	DACK	Data acknowl-edge	I
I/O	Drive active slave present	DASP	45	46	NC (PDIAG)	--	--
I/O	Data 08	D08	47	48	D09	Data 09	I/O
I/O	Data 10	D10	49	50	GND	--	--

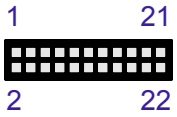
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2.3.9 Extension Connector J12

The I/O extension connector provides cost-effective, flexible configuration options. To provide flexible configuration of additional low speed PC devices, e.g. Super I/O, IPMI or CAN controller, the LPC port is connected to the I/O extension connector. The I/O extension interface contains all the signals necessary to connect up to two LPC devices.

Figure 2-9: Extension Con. J12



2.3.10 Serial ATA Interface

The CP6000 supports the new Serial ATA technology through the SATA interface. The SATA specification allows for thinner, more flexible cables with lower pin count (only 7 pins, instead of 40 pins as standard EIDE). The current Serial ATA interface allows up to 150 MB/s data transfer rate, which is faster than the standard Parallel ATA with 100 MB/s (Ultra ATA/100). Both ports are available on the CompactPCI rear I/O interface. A standard SATA HDD can be connected to the CP6000 either via the optional SATA connector, J18, or using the CP6000-EXT-SATA module connected to the optional SATA extension connectors, J30 and J31.

2.3.11 Serial ATA Connector J18 (Optional)

The CP6000 can be equipped with an optional SATA connector, J18, which is used to connect standard HDDs and other SATA devices to the CP6000.

Figure 2-10: SATA Connector J18



Table 2-18: SATA Connector J18 Pinout

PIN	SIGNAL	FUNCTION	I/O
1	GND	Ground signal	--
2	SATA_RX2+	Differential Receive +	I
3	SATA_RX2-	Differential Receive -	I
4	GND	Ground signal	--
5	SATA_TX2-	Differential Transmit -	O
6	SATA_TX2+	Differential Transmit +	O
7	GND	Ground signal	--



Note ...

If the onboard SATA interface will be used, due to the big SATA connector and the stiffly cable, the CP6000 will have a thickness of 8HP and the 2.5" HDD cannot be directly mounted on the CP6000. Vice versa, if an onboard 2.5" HDD is mounted on the CP6000, the SATA connector J18 cannot be used.

2.3.12 2.5" SATA HDD Extension Connectors J30 and J31 (Optional)

The CP6000 can be equipped with two optional 12-pin, female SATA extension connectors, J30 and J31. These connectors are used to connect an onboard 2.5" Serial ATA HDD to the CP6000 through the CP6000-EXT-SATA module. For further information on the CP6000-EXT-SATA module, refer to Appendix B.

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Figure 2-11: SATA Extension Connectors J30 and J31



Table 2-19: SATA Extension Connector J30 Pinout

PIN	SIGNAL	FUNCTION	I/O
1	GND	Ground signal	--
2	GND	Ground signal	--
3	SATA_TX2+	Differential Transmit+	O
4	GND	Ground signal	--
5	SATA_TX2-	Differential Transmit-	O
6	GND	Ground signal	--
7	GND	Ground signal	--
8	SATA_RX2+	Differential Receive+	I
9	GND	Ground signal	--
10	SATA_RX2-	Differential Receive-	I
11	GND	Ground signal	--
12	GND	Ground signal	--

Table 2-20: SATA Extension Connector J31 Pinout

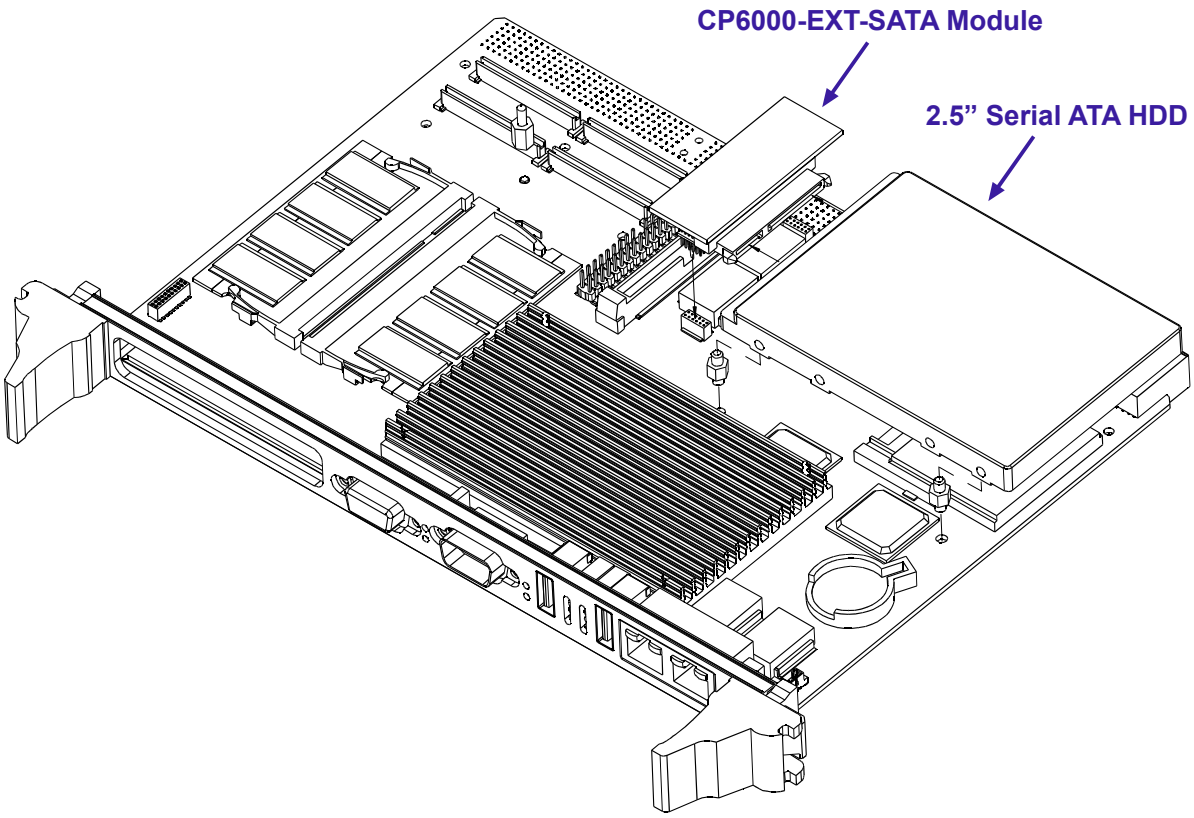
PIN	SIGNAL	FUNCTION	I/O
1	GND	Ground signal	--
2	5V	5V power	--
3	GND	Ground signal	--
4	5V	5V power	--
5	GND	Ground signal	--
6	5V	5V power	--
7	GND	Ground signal	--
8	5V	5V power	--
9	GND	Ground signal	--
10	5V	5V power	--
11	GND	Ground signal	--
12	5V	5V power	--

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Figure 2-12: Connecting an Onboard 2.5" SATA HDD to CP6000-EXT-SATA



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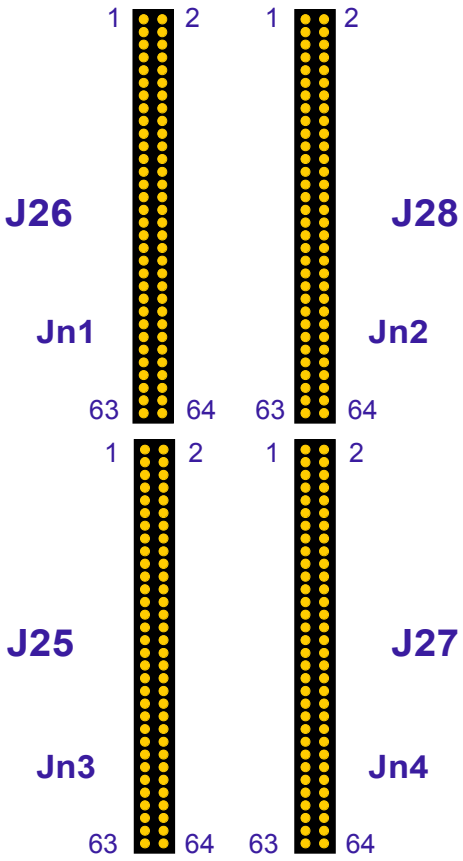
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2.3.13 PMC Interface

For flexible and easy configuration one onboard PMC socket is available. The Jn1 and Jn2 connectors provide the signals for the 32-bit PCI Bus. The 64-bit extension for the PMC interface is supported by the Jn3 connector. User defined I/O signals are supported (Jn4) and are connected to the CompactPCI rear I/O connector J4.

This interface has been designed to comply with the IEEEP1386.1 specification which defines a PCI electrical interface for the CMC (Common Mezzanine Card) form factor. The CP6000 provides only 3.3V PMC PCI signaling environment.

Figure 2-13: PMC Connectors J25, J26, J27 and J28



The PMC interface supports the following configurations:

Table 2-21: Onboard PCI Configuration

SIZE	SPEED	INTERFACE
32-bit	33 MHz	PCI
64-bit	33 MHz	PCI
64-bit	66 MHz	PCI-X



Note ...

The 64-bit/66 MHz PCI mode is not supported.

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2.3.13.1 PMC Connectors J25, J26, J27 and J28 Pinouts

Table 2-22: PMC Connectors J26 and J28 Pinouts

Jn1 (J26)				Jn2 (J28)			
SIGNAL	PIN	PIN	SIGNAL	SIGNAL	PIN	PIN	SIGNAL
Signal	1	2	-12V	+12V	1	2	Signal
Ground	3	4	Signal	Signal	3	4	Signal
Signal	5	6	Signal	Signal	5	6	Ground
BUSMODE1#	7	8	+5V	Ground	7	8	Signal
Signal	9	10	Signal	Signal	9	10	Signal
Ground	11	12	Signal	BUSMODE2#	11	12	+3.3V
Signal	13	14	Ground	Signal	13	14	BUSMODE3#
Ground	15	16	Signal	+3.3V	15	16	BUSMODE4#
Signal	17	18	+5V	Signal	17	18	Ground
V (I/O)	19	20	Signal	Signal	19	20	Signal
Signal	21	22	Signal	Ground	21	22	Signal
Signal	23	24	Ground	Signal	23	24	+3.3V
Ground	25	26	Signal	Signal	25	26	Signal
Signal	27	28	Signal	+3.3V	27	28	Signal
Signal	29	30	+5V	Signal	29	30	Ground
V (I/O)	31	32	Signal	Signal	31	32	Signal
Signal	33	34	Ground	Ground	33	34	Signal
Ground	35	36	Signal	Signal	35	36	+3.3V
Signal	37	38	+5V	Ground	37	38	Signal
PCIXCAP	39	40	Signal	Signal	39	40	Ground
Signal	41	42	Signal	+3.3V	41	42	Signal
Signal	43	44	Ground	Signal	43	44	Ground
V (I/O)	45	46	Signal	Signal	45	46	Signal
Signal	47	48	Signal	M66EN	47	48	Signal
Signal	49	50	+5V	Signal	49	50	+3.3V
Ground	51	52	Signal	Signal	51	52	Signal
Signal	53	54	Signal	+3.3V	53	54	Signal
Signal	55	56	Ground	Signal	55	56	Ground
V (I/O)	57	58	Signal	Signal	57	58	Signal
Signal	59	60	Signal	Ground	59	60	Signal
Signal	61	62	+5V	Signal	61	62	+3.3V
Ground	63	64	Signal	Ground	63	64	Signal



Note ...

The PMC capabilities are detected using the PCIXCAP and M66EN signals. The host controller detects the bus speed via the PICXCAP signal.
Low: PCI 33 MHz; High: PCI-X 66 MHz

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Table 2-23: PMC Connectors J25 and J27 Pinouts

Jn3 (J25)				Jn4 (J27)			
SIGNAL	PIN	PIN	SIGNAL	SIGNAL	PIN	PIN	SIGNAL
Signal	1	2	Ground	Rear I/O	1	2	Rear I/O
Ground	3	4	Signal	Rear I/O	3	4	Rear I/O
Signal	5	6	Signal	Rear I/O	5	6	Rear I/O
Signal	7	8	Ground	Rear I/O	7	8	Rear I/O
V(I/O)	9	10	Signal	Rear I/O	9	10	Rear I/O
Signal	11	12	Signal	Rear I/O	11	12	Rear I/O
Signal	13	14	Ground	Rear I/O	13	14	Rear I/O
Ground	15	16	Signal	Rear I/O	15	16	Rear I/O
Signal	17	18	Signal	Rear I/O	17	18	Rear I/O
Signal	19	20	Ground	Rear I/O	19	20	Rear I/O
V(I/O)	21	22	Signal	Rear I/O	21	22	Rear I/O
Signal	23	24	Signal	Rear I/O	23	24	Rear I/O
Signal	25	26	Ground	Rear I/O	25	26	Rear I/O
Ground	27	28	Signal	Rear I/O	27	28	Rear I/O
Signal	29	30	Signal	Rear I/O	29	30	Rear I/O
Signal	31	32	Ground	Rear I/O	31	32	Rear I/O
Ground	33	34	Signal	Rear I/O	33	34	Rear I/O
Signal	35	36	Signal	Rear I/O	35	36	Rear I/O
Signal	37	38	Ground	Rear I/O	37	38	Rear I/O
V(I/O)	39	40	Signal	Rear I/O	39	40	Rear I/O
Signal	41	42	Signal	Rear I/O	41	42	Rear I/O
Signal	43	44	Ground	Rear I/O	43	44	Rear I/O
Ground	45	46	Signal	Rear I/O	45	46	Rear I/O
Signal	47	48	Signal	Rear I/O	47	48	Rear I/O
Signal	49	50	Ground	Rear I/O	49	50	Rear I/O
Ground	51	52	Signal	Rear I/O	51	52	Rear I/O
Signal	53	54	Signal	Rear I/O	53	54	Rear I/O
Signal	55	56	Ground	Rear I/O	55	56	Rear I/O
V(I/O)	57	58	Signal	Rear I/O	57	58	Rear I/O
Signal	59	60	Signal	Rear I/O	59	60	Rear I/O
Signal	61	62	Ground	Rear I/O	61	62	Rear I/O
Ground	63	64	Signal	Rear I/O	63	64	Rear I/O



Note ...

The PMC rear I/O signals from Jn4 (J27) are routed to CompactPCI connector J4, whose pinout is described later in this chapter.

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2.3.14 CompactPCI Interface

The CP6000 supports a flexibly configurable, hot swap CompactPCI interface. In the System Master slot the interface is in the transparent mode, and in the peripheral slot the CompactPCI interface is isolated so that it cannot communicate with the CompactPCI bus. This mode is known as "passive mode".

2.3.14.1 System Master Configuration

In a system slot, the CP6000 can communicate with all other CompactPCI boards through a 32-bit/33MHz interface.

The CP6000 supports up to seven CompactPCI loads through a passive backplane.

The CP6000 is fully compliant with the PCI Local Bus Specification Rev. 2.2 for 32-bit/33 MHz.

2.3.14.2 Peripheral Master Configuration (Passive Mode)

In a peripheral slot, the board receives power but does not communicate on the CompactPCI bus; all CompactPCI signals are isolated.

In this configuration the communication is achieved via the two Gigabit Ethernet ports as defined in the PICMG 2.16 specification. In the passive mode the board may be hot-swapped.

2.3.14.3 Packet Switching Backplane (PICMG 2.16)

The CP6000 supports a dual Gigabit Ethernet link port (Node) on the J3 connector in accordance with the CompactPCI Packet Switching Backplane Specification PICMG 2.16, Version 1.0. The two nodes are connected in the chassis via the CompactPCI Packet Switching backplane to the Fabric slots "A" and "B".

The PICMG 2.16 feature can be used in the system slot and in the peripheral slot.

2.3.14.4 Hot Swap Support

To ensure that a board may be removed and replaced in a working bus without disturbing the system, the following additional features are required:

- Power ramping
- Precharge
- Hot swap control and status register bits
- Automatic interrupt generation whenever a board is about to be removed or replaced
- An LED to indicate that the board may be safely removed

2.3.14.5 Power Ramping

On the CP6000 a special hot swap controller is used to ramp up the onboard supply voltage. This is done to avoid transients on the +3.3V, +5V, +12V and -12V power supplies from the hot swap system. When the power supply is stable, the hot swap controller generates an onboard reset to put the board into a definite state.

2.3.14.6 Precharge

Precharge is provided on the CP6000 by a resistor on each signal line (PCI bus), connected to a +1V reference voltage. If the board is configured in the system master configuration, the reference voltage is disabled.

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2.3.14.7 Handle Switch

A microswitch is situated in the extractor handle. Opening the handle initiates the generation of a local interrupt (produced by the onboard logic). The microswitch is routed to J11 on the board.

2.3.14.8 ENUM# Interrupt

The onboard logic generates a low active interrupt signal to indicate that the board is about to be extracted from the system or inserted into the system. This interrupt is only generated in the peripheral master configuration. In system master configuration the ENUM signal is an input.

2.3.14.9 Hot Swap LED

On the CP6000 a blue HS LED can be switched on or off by software. It may be used, for example, to indicate that the shutdown process is finished and the board is ready for extraction.

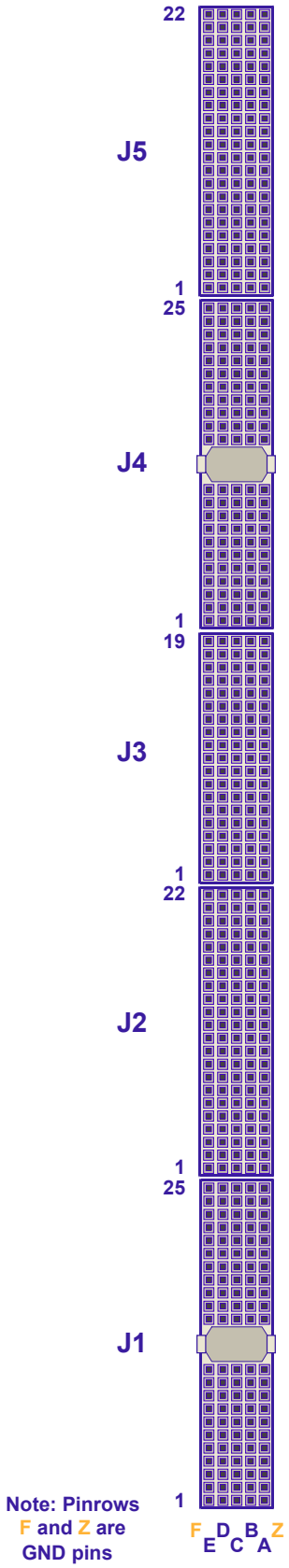
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2.3.15 CompactPCI Bus Connector

Figure 2-14: CompactPCI Connectors J1-J5



The complete CompactPCI connector configuration comprises five connectors named J1 to J5. Their functions are as follows:

- J1/J2: 32-bit CompactPCI interface with PCI bus signals, arbitration, clock and power
- J3, J4 and J5 have rear I/O interface functionality
- J4 only has optional rear I/O functionality from the PMC module

The CP6000 is designed for a CompactPCI bus architecture. The CompactPCI standard is electrically identical to the PCI local bus. However, these systems are enhanced to operate in rugged industrial environments and to support multiple slots.

2.3.15.1 CompactPCI Connector Keying

CompactPCI connectors support guide lugs to ensure a correct polarized mating. A proper mating is further assured by the use of color coded keys for 3.3V and 5V operation.

Color coded keys prevent inadvertent installation of a 5V peripheral board into a 3.3V slot. The CP6000 board is a 5V version. Backplane connectors are always keyed according to the signaling (VIO) level. Coding key colors on J1 are defined as follows:

Table 2-24: Coding Key Colors on J1

SIGNALING VOLTAGE	KEY COLOR
3.3V	Cadmium Yellow
5V	Brilliant Blue
Universal board (5V and 3.3V)	None

To prevent plugging a 5V CP6000 version into a 3.3V VI/O backplane slot, a blue key is installed in J1.

To prevent plugging the CP6000 into an H.110 backplane slot, a brown key is installed in J4.

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2.3.15.2 CompactPCI Connectors J1 and J2 Pinouts

The CP6000 is provided with two 2 mm x 2 mm pitch female CompactPCI bus connectors, J1 and J2.

Table 2-25: CompactPCI Bus Connector J1 System Slot Pinout

PIN	ROW F	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
25	GND	5V	REQ64#	ENUM#	3.3V	5V	GND
24	GND	AD[1]	5V	V(I/O)	AD[0]	ACK64#	GND
23	GND	3.3V	AD[4]	AD[3]	5V	AD[2]	GND
22	GND	AD[7]	GND	3.3V	AD[6]	AD[5]	GND
21	GND	3.3V	AD[9]	AD[8]	M66EN#	C/BE[0]#	GND
20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	GND	3.3V	AD[15]	AD[14]	GND	AD[13]	GND
18	GND	SERR#	GND	3.3V	PAR	C/BE[1]#	GND
17	GND	3.3V	IPMB SCL	IPMB SDA	GND	PERR#	GND
16	GND	DEVSEL	GND	V(I/O)	STOP#	LOCK#	GND
15	GND	3.3V	FRAME#	IRDY#	GND	TRDY#	GND
12-14	Key Area						
11	GND	AD[18]	AD[17]	AD[16]	GND	C/BE[2]#	GND
10	GND	AD[21]	GND	3.3V	AD[20]	AD[19]	GND
9	GND	C/BE[3]#	NC	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	REQ0#	GND	3.3V	CLK0	AD[31]	GND
5	GND	BRSVP1A5	BRSVP1B5	RST#	GND	GNT0	GND
4	GND	IPMB PWR	GND	V(I/O)	INTP	INTS	GND
3	GND	INTA#	INTB#	INTC#	5V	INTD#	GND
2	GND	TCK	5V	TMS	TDO	TDI	GND
1	GND	5V	-12V	TRST#	+12V	5V	GND

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Table 2-26: CompactPCI Bus Connector J1 Peripheral Slot Pinout

PIN	ROW Z	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
25	GND	5V	*	ENUM#	3.3V	5V	GND
24	GND	*	5V	V(I/O)	*	*	GND
23	GND	3.3V	*	*	5V	*	GND
22	GND	*	GND	3.3V	*	*	GND
21	GND	3.3V	*	*	M66EN#	*	GND
20	GND	*	GND	V(I/O)	*	*	GND
19	GND	3.3V	*	*	GND	*	GND
18	GND	*	GND	3.3V	*	*	GND
17	GND	3.3V	IPMB SCL	IPMB SDA	GND	*	GND
16	GND	*	GND	V(I/O)	*	*	GND
15	GND	3.3V	*	*	GND	*	GND
12-14	Key Area						
11	GND	*	*	*	GND	*	GND
10	GND	*	GND	3.3V	*	*	GND
9	GND	*	NC	*	GND	*	GND
8	GND	*	GND	V(I/O)	*	*	GND
7	GND	*	*	*	GND	*	GND
6	GND	*	GND	3.3V	*	*	GND
5	GND	BRSVP1A5	BRSVP1B5	*	GND	*	GND
4	GND	IPMB PWR	Healthy#	V(I/O)	INTP	INTS	GND
3	GND	*	*	*	5V	*	GND
2	GND	TCK	5V	TMS	TDO	TDI	GND
1	GND	5V	-12V	TRST#	+12V	5V	GND



Note ...

A * indicates that the signal normally present at this pin is disconnected from the CompactPCI bus when the CP6000 is inserted in a peripheral slot.

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Table 2-27: 64-bit CompactPCI Bus Connector J2 System Slot Pinout

PIN	ROW Z	ROW A	ROW B	ROW C	ROW D	ROW E	ROW 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	RSV	RSV	RSV	GND	RSV	GND
17	GND	RSV	GND	PRST#	REQ6#	GNT6#	GND
16	GND	RSV	RSV	DEG#	GND	RSV	GND
15	GND	RSV	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)	RSV	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



Note ...

The 64-bit CompactPCI signals are not supported, but all 64 control signals are terminated to V(I/O).

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Table 2-28: 64-bit CompactPCI Bus Connector J2 Peripheral Slot Pinout

PIN	ROW Z	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
22	GND	GA4	GA3	GA2	GA1	GA0	GND
21	GND	*	GND	RSV	RSV	RSV	GND
20	GND	*	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#	*	*	GND
16	GND	BRSVP2A16	BRSVP2B16	DEG#	GND	BRSVP2E16	GND
15	GND	BRSVP2A15	GND	FAL#	*	*	GND
14	GND	*	*	*	GND	*	GND
13	GND	*	GND	V(I/O)	*	*	GND
12	GND	*	*	*	GND	*	GND
11	GND	*	GND	V(I/O)	*	*	GND
10	GND	*	*	*	GND	*	GND
9	GND	*	GND	V(I/O)	*	*	GND
8	GND	*	*	*	GND	*	GND
7	GND	*	GND	V(I/O)	*	*	GND
6	GND	*	*	*	GND	*	GND
5	GND	*	GND	V(I/O)	*	*	GND
4	GND	V(I/O)	BRSVP2B4	*	GND	*	GND
3	GND	*	GND	*	*	*	GND
2	GND	*	*	SYSEN#	*	*	GND
1	GND	*	GND	*	*	*	GND



Note ...

A * indicates that the signal normally present at this pin is disconnected from the CompactPCI bus when the CP6000 is inserted in a peripheral slot.

2.3.15.3 CompactPCI Rear I/O Connectors J3-J5 and Pinouts

The CP6000 conducts all I/O signals through the rear I/O connectors J3, J4 and J5. The CP6000 board provides optional rear I/O connectivity for peripherals for special compact systems. All standard PC interfaces are implemented and assigned to the front panel and to the rear I/O connectors J3, and J5.

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When the rear I/O module is used, the signals of some of the main board/front panel connectors are routed to the module interface. Thus, the rear I/O module makes it much easier to remove the CPU in the rack as there is practically no cabling on the CPU board.

For the system rear I/O feature a special backplane is necessary. The CP6000 with rear I/O is compatible with all standard 6U CompactPCI passive backplanes with rear I/O support on the system slot.

The CP6000 conducts all I/O signals through the rear I/O connectors J3, J4 and J5.

Table 2-29: CompactPCI Rear I/O Connector J3 Pinout

PIN	Z	A	B	C	D	E	F
1	GND	SP0:RTS	SP0:RX#	SP0:DSR	SP0:DCD	ID1	GND
2	GND	SP0:RI	SP0:DTR	SP0:CTS	SP0:TX#	PS2:CLK	GND
3	GND	SP1:RTS	SP1:RX#	SP1:DSR	SP1:DCD	PS2:DATA	GND
4	GND	SP1:RI	SP1:DTR	SP1:CTS	SP1:TX#	KB:DATA	GND
5	GND	VGA:BLUE	VGA:HSYNC	VGA:VSYNC	VGA:SCL	KB:CLK	GND
6	GND	VGA:RED	VGA:GREEN	VGA:SDA	NC	NC	GND
7	GND	RIO_3.3V	ID2	ID3	ID4	SPEAKER	GND
8	GND	USB0:D-	USB0:D+	GND	NC	NC	GND
9	GND	USB1:D-	USB1:D+	GND	NC	NC	GND
10	GND	USB1:VCC	USB0:VCC	GND	NC	NC	GND
11	GND	NC	NC	GND	NC	NC	GND
12	GND	NC	NC	GND	NC	NC	GND
13	GND	LPa:ACT	LPb:ACT	NC	NC	FAN:SENSE1	GND
14	GND	LPa:LINK	LPb:LINK	LPab:CT1	NC	FAN:SENSE2	GND
15	GND	LPb_DB+	LPb_DB-	GND	LPb_DD+	LPb_DD-	GND
16	GND	LPb_DA+	LPb_DA-	GND	LPb_DC+	LPb_DC-	GND
17	GND	LPa_DB+	LPa_DB-	GND	LPa_DD+	LPa_DD-	GND
18	GND	LPa_DA+	LPa_DA-	GND	LPa_DC+	LPa_DC-	GND
19	GND	RIO_VCC	RIO_VCC	RIO_3.3V	RIO_+12V	RIO_-12V	GND



Warning!

The RIO_XXX signals are power supply **OUTPUTS** to supply the rear I/O module with power. These pins **MUST NOT** be connected to any other power source, either within the backplane itself or within a rear I/O module.

Failure to comply with the above will result in damage to your board.

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The following table describes the signals of the J3 connector.

Table 2-30: CompactPCI Rear I/O Connector J3 Signals

SIGNAL	DESCRIPTION
SP0	COM1 Signaling (RS-232, RS-422, RS485)
SP1	COM2 Signaling (RS-232, RS-422, RS485)
VGA	Graphic Signaling
USB0	USB Port Signaling
USB1	USB Port Signaling
KB	PS2 Keyboard Signaling
PS2	PS2 Mouse Signaling
SPEAKER	Standard PC Speaker
FAN	Fan Sensoring
LPa	Rear I/O LAN Port B
LPb	Rear I/O LAN Port A

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Table 2-31: CompactPCI Rear I/O Connector J4 Pinout

PIN	Z	A	B	C	D	E	F
1	GND	PIM:61	PIM:63	GND	PIM:62	PIM:64	GND
2	GND	PIM:57	PIM:59	GND	PIM:58	PIM:60	GND
3	GND	GND	GND	GND	GND	GND	GND
4	GND	PIM:53	PIM:55	GND	PIM:54	PIM:56	GND
5	GND	PIM:49	PIM:51	GND	PIM:50	PIM:52	GND
6	GND	GND	GND	GND	GND	GND	GND
7	GND	PIM:45	PIM:47	GND	PIM:46	PIM:48	GND
8	GND	PIM:41	PIM:43	GND	PIM:42	PIM:44	GND
9	GND	GND	GND	GND	GND	GND	GND
10	GND	PIM:37	PIM:39	GND	PIM:38	PIM:40	GND
11	GND	PIM:33	PIM:35	GND	PIM:34	PIM:36	GND
12-14	Key Area						
15	GND	PIM:29	PIM:31	GND	PIM:30	PIM:32	GND
16	GND	PIM:25	PIM:27	GND	PIM:26	PIM:28	GND
17	GND	GND	GND	GND	GND	GND	GND
18	GND	PIM:21	PIM:23	GND	PIM:22	PIM:24	GND
19	GND	PIM:17	PIM:19	GND	PIM:18	PIM:20	GND
20	GND	GND	GND	GND	GND	GND	GND
21	GND	PIM:13	PIM:15	GND	PIM:14	PIM:16	GND
22	GND	PIM:9	PIM:11	GND	PIM:10	PIM:12	GND
23	GND	NC	RIO_VCC	GND	NC	RIO_3.3V	GND
24	GND	PIM:5	PIM:7	GND	PIM:6	PIM:8	GND
25	GND	PIM:1	PIM:3	GND	PIM:2	PIM:4	GND



Note ...

The J4 connector is directly connected to the Jn4 connector from the PMC module.



Warning!

The RIO_XXX signals are power supply **OUTPUTS** to supply the rear I/O module with power. These pins **MUST NOT** be connected to any other power source, either within the backplane itself or within a rear I/O module.

Failure to comply with the above will result in damage to your board.

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Table 2-32: CompactPCI Rear I/O Connector J5 Pinout

PIN	Z	A	B	C	D	E	F
1	GND	GND	GND	GND	GND	GND	GND
2	GND	HT0:TX+	HT0:TX-	GND	HT0:RX+	HT0:RX-	GND
3	GND	GND	GND	GND	GND	GND	GND
4	GND	HT1:TX+	HT1:TX-	GND	HT1:RX+	HT1:RX-	GND
5	GND	GND	GND	GND	GND	GND	GND
6	GND	NC	NC	GND	NC	NC	GND
7	GND	GND	GND	GND	GND	GND	GND
8	GND	NC	NC	GND	NC	NC	GND
9	GND	GND	GND	GND	GND	GND	GND
10	GND	FD:MSEN0	FD:MSEN1	GND	SMB:SDA	SMB:SCL	GND
11	GND	FD: MTR0#	FD: INDEX#	GND	FD: FDEDIN#	FD: DENSEL#	GND
12	GND	FD: DIR#	FD: MTR1#	GND	FD: DSEL0#	FD: DSEL1#	GND
13	GND	FD: TRK0#	FD: WGATE#	GND	FD: WDATA#	FD: STEP#	GND
14	GND	FD: DSKCHG#	FD: HDSEL#	GND	FD: RDATA#	FD: WRPROT#	GND
15	GND	IDE:D6	IDE:D8	GND	IDE:D7	IDE:RESET#	GND
16	GND	IDE:D4	IDE:D10	GND	IDE:D5	IDE:D9	GND
17	GND	IDE:D2	IDE:D12	GND	IDE:D3	IDE:D11	GND
18	GND	IDE:D0	IDE:D14	GND	IDE:D1	IDE:D13	GND
19	GND	IDE:IOR#	IDE:IOW#	GND	IDE:REQ	IDE:D15	GND
20	GND	IDE:IOCS16#	IDE:IRQ	GND	IDE:ACK#	IDE:IORDY	GND
21	GND	IDE:A2	IDE:A0	GND	IDE:A1	IDE:DIAG#	GND
22	GND	IDE:ACT#/RSV	IDE:CS1#	GND	IDE:CS0#	BATT (3.0V)	GND

The following table describes the signals of the J5 connector.

Table 2-33: CompactPCI Rear I/O Connector J5 Signals

SIGNAL	DESCRIPTION
HT0	SATA Port 0 Signaling
HT1	SATA Port 1 Signaling
SMB	System Management Bus Signaling
FD	Floppy Disk Signaling
IDE	Secondary Hard Disk Drive Channel Signaling

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2.3.15.4 Rear I/O Configuration

Rear I/O interfaces are only available on the rear I/O version of the board.

Ethernet Interfaces

Gigabit Ethernet signals are available on the rear I/O interface (PICMG 2.16 pinout).

VGA CRT Interface

The VGA signals are available on both rear I/O and front I/O. The 75 ohm termination resistor for the red, green and blue video signals are equipped on the CP6000.

To enable the rear I/O VGA port, configure the jumper J23.



Note ...

Both VGA ports are electrically identical and can be switched between front and rear by configuring jumper J23 (open = front; closed = rear).

Serial Interfaces COM1 and COM2

Only one interface may be used (rear I/O or front I/O) for COM 1.



Note ...

Previous boards such as CP604 and CP605 used TTL signaling voltage for the COM1 and COM2 rear I/O interfaces. Due to a new common Kontron rear I/O pinout, the COM1 and COM2 ports can now be configured as RS-232, RS-422 and RS-485 ports. Thus, neither RS-232, RS-424 nor RS-485 buffers are now required on the rear I/O. The signals can be connected directly to the D-Sub connector.

Keyboard/Mouse Interface

The keyboard interface is available onboard and via the rear I/O. The combination of the onboard and the rear I/O is not supported. The mouse interface is only available via the rear I/O.

USB Interface

Two USB interfaces are available via the rear I/O. The USB power comes from the baseboard and it is protected by a self-resettable fuse.

Secondary EIDE Interface

Only one EIDE connector may be used at any one time through the same port; connecting both EIDE devices to the CP6000 baseboard and the rear I/O simultaneously will result in malfunction and data loss.

Floppy Interface

The floppy interface is only available via the rear I/O.

SATA

The SATA0 interface is available as onboard version or on the rear I/O. Combining the onboard SATA with the rear I/O SATA is not permitted.

PMC Rear I/O

The PMC Rear I/O pinout is optimized to connect the Kontron SCSI PMC board (PMC 261). This module provides SCSI rear I/O support. Other PMC modules with rear I/O functionality can also be used on the CP6000.

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2.4 Intelligent Platform Management Interface

2.4.1 Technical Background of IPMI

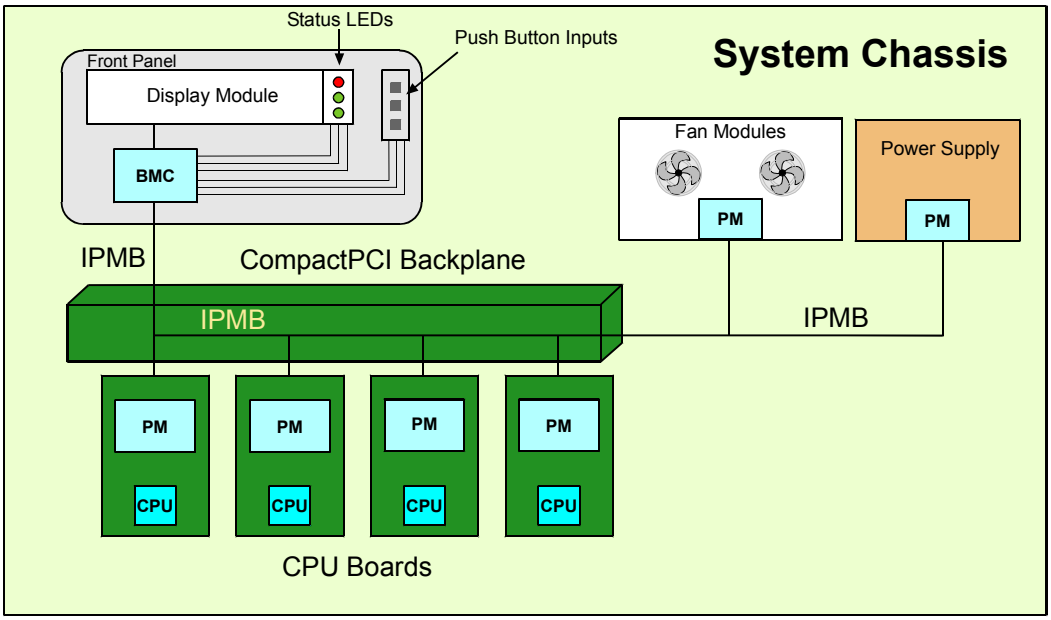
The CP6000 has been designed to support the "Intelligent Platform Management Interface" (IPMI) subsystem which is another step in providing high availability platforms. Intelligent Platform Management means monitoring the health of the entire system beyond the confines of the board itself, so that the status of the complete system is available to be used, for example, for control and intervention purposes. A range of variables is monitored on every board, to provide information on the system status, e.g. voltages, temperature, powergood signals, reset signals etc. Additionally, the IPMI Baseboard controller can intervene, regulating the operating status of the system by controlling fans, shutting down systems and generating alarm signals as and when fault conditions occur. These fault conditions are simultaneously logged in non-volatile memory for analysis and for fault recovery. IPMI also defines a protocol (software stack) for exchanging the status messages of the board, so that "IPMI ready" boards/systems from different suppliers can be monitored. In addition, a clear interface (registers, addresses etc.) is defined for guaranteeing that System-Management software can work with every compliant IPMI hardware.

The electrical interconnection between IPMI capable boards is an I²C interface (IPMB). On CompactPCI systems, this interface is provided on IPMI prepared backplanes and guarantees the data path between the boards.

The devices which handle the measurements and the protocol stack are microcontrollers known as Baseboard Management Controller (BMC) and Peripheral Management Controller (PM). The entire IPMI protocol is controlled by the BMC. On the CP6000, the IPMI controller can be configured to act as BMC or PM.

The interface between the system controller CPU's System Management software and the BaseBoard Management Controller is realized as a keyboard controller style interface (KCS) which can be found in the board's I/O space.

Figure 2-15: IPMI Functional Block Diagram



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2.4.2 IPMI Glossary

BMC	Base Board Management Controller In a CompactPCI chassis, there can be only one BMC present.
BT	Block Transfer Interface
SEL	System Event Log The SEL repository is present only in the BMC.
SDR	Sensor Data Record
SDRR	Sensor Data Record Repository The SDRR is only present in the BMC. Normally, the SDRR contains all sensor records of the chassis.
IPMI	Intelligent Platform Management Interface
IPMB	Intelligent Platform Management Bus
KCS	Keyboard Controller Style
FRU	Field Replaceable Units A FRU is available in BMC or satellite mode.
PM	Peripheral Management Controller The PM is a microcontroller located on the peripheral board in a Compact-PCI system and handles the measurements and the protocol stack.
SMS	System Management Software

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2.4.3 IPMI Implementation on the CP6000

This product fully supports Intelligent Platform Management Interface 1.5 and PICMG2.9 R1.0 specifications. It uses a 16-bit micro-controller (Hitachi H8/2148) to run an IPMI firmware. All the information collected by the IPMI controller is then accessible by software through a keyboard-style Interface (see IPMI-Intelligent Platform Management Interface Specification V 1.5 for more information).

Features of the IPMI implemented on the CP6000:

- Compliant with IPMI specification 1.5, revision 1.5
- Compliant with PICMG 2.9 specification
- Firmware designed and specially made for CompactPCI implementation
- KCS SMS interface with interrupt support
- I/O address map (0xCA2 - 0xCA3 and 0xCA4 - 0xCA5)
- Dual Port IPMB configurable as two independent channels or in redundant mode
- Out of band management and monitoring using IPMB interface permits access to sensors regardless of the SBC state
- Sensor threshold fully configurable
- Complete IPMI watchdog functionality
- Complete SEL, SDRR and FRU functionality
- Master Read/Write I²C support for external I²C communication devices (FRU, EEPROM, FAN)
- BMC or PM operation mode can be configured via BIOS
- Firmware can be updated in the field
- Firmware fully customizable according to the customer needs
- Interoperable with other IPMI solution

2.4.3.1 Sensors Implemented on the CP6000

The IPMI firmware includes many sensors. The CP6000 implements several sensors, such as sensors for voltage and pass/fail type signal monitoring. Each sensor's description is built in the IPMI firmware and is accessible to the SMS.

The following tables indicate the signals implemented on the CP6000.

Table 2-34: Processor and Chipset Supervision

FUNCTION	DESCRIPTION
PCI reset	Status of PCI reset signal
System reset	Status of reset input to chipset
Chipset Sleep state	Status of chipset sleep state
Critical interrupt: NMI	Status of processor NMI line
Critical interrupt: SMI	Status of processor SMI line

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Table 2-35: CompactPCI Sensors

FUNCTION	DESCRIPTION
System slot detection	Indicates board is in a system slot
Backplane power supply FAIL	Status of power supply
Backplane power supply DER-ATE	Status of power supply
Backplane HEALTHY	Status of board health
Backplane BDSEL	Status of board select input signal
Hot Swap LED	Controls the front panel hot swap LED
Hot Swap handle	Status of hot swap handle

Table 2-36: Onboard Power Supply Supervision

FUNCTION	DESCRIPTION
Power supply power good	Status of various onboard supply voltages
Hot swap early power good	Status of hot swap early supply voltages
Hot swap controller	Controls the various board input power voltages

Table 2-37: Reset Control

FUNCTION	DESCRIPTION
RTC reset	Resets the RTC controller
Board reset	Resets the complete board

Table 2-38: Onboard Voltage Sensors

FUNCTION	PRECISION	DESCRIPTION
Voltage 5V	1%	Board 5V supply
Voltage 3.3V	1%	Board 3.3V supply
Voltage IPMI	1%	IPMI supply
Voltage 2.5V	1%	Memory 2.5V supply
Voltage 1.25V	1%	Memory 1.25V termination supply
Voltage 1.5V	1%	Chipset core 1.5V supply
Voltage 1.8V	1%	Processor 1.8V supply
Voltage battery	1%	Board RTC battery

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Table 2-39: Temperature Sensors

FUNCTION	DESCRIPTION
Processor temperature	Current board temperature under processor
Board temperature	Current board temperature
CPU temperature control signal	Indicates a CPU overtemperature event (DIE temperature)
Board temperature control signal	Indicates a board overtemperature event
CPU overtemperature	Indicated a catastrophic cooling failure CPU temperature > 125°C
CPU internal thermal monitor	Status of the internal thermal monitor

Table 2-40: Fan Sense Sensors

FUNCTION	DESCRIPTION
Fan sense I	Fan tachometer input
Fan sense II	Fan tachometer input

2.4.4 Data Repositories

All the data gathered by the BMC is stored in a non-volatile memory, providing the possibility to obtain information about working conditions and failure situations.

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Chapter 3

Installation

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3. Installation

The CP6000 has been designed for easy installation. However, the following standard precautions, installation procedures, and general information must be observed to ensure proper installation and to preclude damage to the board, other system components, or injury to personnel.

3.1 Safety Requirements

The following safety precautions must be observed when installing or operating the CP6000. Kontron assumes no responsibility for any damage resulting from failure to comply with these requirements.



Warning!

Due care should be exercised when handling the board due to the fact that the heat sink can get very hot. Do not touch the heat sink when installing or removing the board.

In addition, the board should not be placed on any surface or in any form of storage container until such time as the board and heat sink have cooled down to room temperature.



Caution!

If your board type is not specifically qualified as being hot swap capable, switch off the CompactPCI system power before installing the board in a free CompactPCI slot. Failure to do so could endanger your life or health and may damage your board or system.



Note ...

Certain CompactPCI boards require bus master and/or rear I/O capability. If you are in doubt whether such features are required for the board you intend to install, please check your specific board and/or system documentation to make sure that your system is provided with an appropriate free slot in which to insert the board.



ESD Equipment!

This CompactPCI board contains electrostatically sensitive devices. Please observe the necessary precautions to avoid damage to your board:

- Discharge your clothing before touching the assembly. Tools must be discharged before use.
- Do not touch components, connector-pins or traces.
- If working at an anti-static workbench with professional discharging equipment, please do not omit to use it.

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3.2 CP6000 Initial Installation Procedures

The following procedures are applicable only for the initial installation of the CP6000 in a system. Procedures for standard removal and hot swap operations are found in their respective chapters.

To perform an initial installation of the CP6000 in a system proceed as follows:

1. Ensure that the safety requirements indicated Chapter 3.1 are observed.



Warning!

Failure to comply with the instruction below may cause damage to the board or result in improper system operation.

2. Ensure that the board is properly configured for operation in accordance with application requirements before installing. For information regarding the configuration of the CP6000 refer to Chapter 4. For the installation of CP6000 specific peripheral devices and rear I/O devices refer to the appropriate chapters in Chapter 3.



Warning!

Care must be taken when applying the procedures below to ensure that neither the CP6000 nor other system boards are physically damaged by the application of these procedures.

3. To install the CP6000 perform the following:
   1. Ensure that no power is applied to the system before proceeding.



Warning!

When performing the next step, **DO NOT** push the board into the backplane connectors. Use the ejector handles to seat the board into the backplane connectors.

   2. Carefully insert the board into the slot designated by the application requirements for the board until it makes contact with the backplane connectors.
   3. Using both ejector handles, engage the board with the backplane. When the ejector handles are locked, the board is engaged.
   4. Fasten the two front panel retaining screws.
   5. Connect all external interfacing cables to the board as required.
   6. Ensure that the board and all required interfacing cables are properly secured.

4. The CP6000 is now ready for operation. For operation of the CP6000, refer to appropriate CP6000 specific software, application, and system documentation.

Warning!



During power-up, the 3.3 V input power supply must be able to provide a minimum peak current of 10 A to the CP6000. This applies for each CP6000 in a given system.

Failure to comply with the above warning may result in damage to or improper operation of the CP6000.

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3.3 Standard Removal Procedures

To remove the board proceed as follows:

1. Ensure that the safety requirements indicated in Chapter 3.1 are observed. Particular attention must be paid to the warning regarding the heat sink!



Warning!

Care must be taken when applying the procedures below to ensure that neither the CP6000 nor system boards are physically damaged by the application of these procedures.

2. Ensure that no power is applied to the system before proceeding.
3. Disconnect any interfacing cables that may be connected to the board.
4. Unscrew the front panel retaining screws.



Warning!

Due care should be exercised when handling the board due to the fact that the heat sink can get very hot. Do not touch the heat sink when changing the board.

5. Disengage the board from the backplane by first unlocking the board ejection handles and then by pressing the handles as required until the board is disengaged.
6. After disengaging the board from the backplane, pull the board out of the slot.
7. Dispose of the board as required.

3.4 Hot Swap Procedures

The CP6000 is designed for hot swap operation. When installed in the system slot it is capable of supporting peripheral board hot swapping. When installed in a peripheral slot, its hot swap capabilities depend on the type of backplane in use and the system controller's capabilities. The reason for this being that communications with the system controller requires either front panel Ethernet I/O or use of a packet switching backplane. In any event, hot swap is also a function of the application running on the CP6000.

3.4.1 System Master Hot Swap

Hot swapping of the CP6000 itself when used as the system controller is possible, but will result in any event in a cold start of the CP6000 and consequently a reinitialization of all peripheral boards. Exactly what transpires in such a situation is a function of the application and is not addressed in this manual. The user must refer to appropriate application documentation for applicable procedures for this case. In any event, the safety requirements above must be observed.

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3.4.2 Peripheral Hot Swap Procedure

This procedure assumes that the board to be hot swapped has undergone an initial board installation and is already installed in an operating system, and that the system supports hot swapping of the board.

To hot swap the CP6000 proceed as follows:

1. Ensure that the safety requirements indicated in Chapter 3.1 are observed. Particular attention must be paid to the warning regarding the heat sink!



Warning!

Care must be taken when applying the procedures below to ensure that neither the CP6000 nor other system boards are physically damaged by the application of these procedures.

2. Unlock both board ejection handles ensuring that the bottom handle has activated the hot swap switch (this occurs with a very small amount of movement of the handle).



Note ...

What transpires at this time is a function of the application. If hot swap is supported by the application, then the blue HS LED should light up after a short time period. This indicates that the system has recognized that the CP6000 is to be hot swapped and now indicates to the operator that hot swapping of the CP6000 may proceed.

If the blue HS LED does not light up after a short time period, either the system does not support hot swap or a malfunction has occurred. In this event, the application is responsible for handling this situation and must provide the operator with appropriate guidance to remedy the situation.

3. After approximately 1 to 15 seconds, the blue HS LED should light up. If the LED lights up, proceed with the next step of this procedure. If the LED does not light up, refer to appropriate application documentation for further action.
4. Disconnect any interfacing cables that may be connected to the board.
5. Unscrew the front panel retaining screws.



Warning!

Due care should be exercised when handling the board due to the fact that the heat sink can get very hot. Do not touch the heat sink when changing the board.

6. Using the ejector handles, disengage the board from the backplane and carefully remove it from the system.
7. Dispose of the “old” board as required observing the safety requirements indicated in Chapter 3.1.

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8. Obtain the replacement CP6000 board.



Warning!

When performing the next step, **DO NOT** push the board into the backplane connectors. Use the ejector handles to seat the board into the backplane connectors.

9. Carefully insert the “new” board into the “old” board slot until it makes contact with the backplane connectors.



Warning!

During power-up, the 3.3 V input power supply must be able to provide a minimum peak current of 10 A to the CP6000. This applies for each CP6000 in a given system.

Failure to comply with the above warning may result in damage to or improper operation of the CP6000.

10. Using both ejector handles, engage the board with the backplane. When the ejector handles are locked, the board is engaged.
11. Fasten the front panel retaining screws.
12. Connect all required interfacing cables to the board. Hot swap of the CP6000 is now complete.

3.5 Installation of CP6000 Peripheral Devices

The CP6000 is designed to accommodate a variety of peripheral devices whose installation varies considerably. The following chapters provide information regarding installation aspects and not detailed procedures.

3.5.1 CompactFlash Installation

The CompactFlash socket supports all available CompactFlash ATA cards type I and type II with 5 V, optionally 3.3V.



Note ...

The CP6000 does not support removal and reinsertion of the CompactFlash storage card while the board is in a powered-up state. Connecting the CompactFlash cards while the power is on, which is known as "hot plugging", may damage your system.

3.5.2 USB Device Installation

The CP6000 supports all USB Plug and Play computer peripherals (e.g. keyboard, mouse, printer, etc.).



Note ...

All USB devices may be connected or removed while the host or other peripherals are powered up.

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3.5.3 Rear I/O Device Installation

To ensure proper functioning of the rear I/O VGA interface, the jumpers on the CP6000 must be configured for the rear I/O. See Chapter 4 for configuration details.

For physical installation of rear I/O devices, refer to the documentation provided with the device itself.



Note ...

It is strongly recommended to use COM1 only on the front or rear I/O panel.

3.5.4 Battery Replacement

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer. Suitable batteries include the VARTA CR2025 and PANASONIC BR2020.



Note ...

Care must be taken to ensure that the battery is correctly replaced.

The battery should be replaced only with an identical or equivalent type recommended by the manufacturer.

Dispose of used batteries according to the manufacturer's instructions.

The typical life expectancy of a 170 mAh battery (VARTA CR2025) is 5 - 6 years with an average on-time of 8 hours per working day at an operating temperature of 30°C. However, this typical value varies considerably because the life expectancy is dependent on the operating temperature and the standby time (shutdown time) of the system in which it operates.
To ensure that the lifetime of the battery has not been exceeded it is recommended to exchange the battery after 4 - 5 years.

3.5.5 Hard Disk Installation

The following information pertains to hard disks which may be connected to the CP6000 via normal cabling. To install a hard disk, it is necessary to perform the following operations in the given order:

1. Install the hardware.



Warning!

The incorrect connection of power or data cables may damage your hard disk unit and/or CP6000 board.

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Note ...

ATA-66 and ATA-100 are faster timings and require a specialized cable which has additional grounding wires to reduce reflections, noise, and inductive coupling. This cable will also support all legacy IDE drives.

The blue end of the ATA-100 cable must connect to the motherboard, the gray connector to the UltraDMA/100 slave device, and the black connector to the UltraDMA/100 master device.

Some symptoms of incorrectly installed HDDs are:

- Hard disk drives are not auto-detected: may be a Master / Slave problem or a bad IDE cable. Contact your vendor.
- Hard Disk Drive Fail message at bootup: may be a bad cable or lack of power going to the drive.
- No video on bootup: usually means the cable is installed backwards.
- Hard drive lights are constantly on: usually means bad IDE cable or defective drives / motherboard. Try another HDD.
- Hard drives do not power up: check power cables and cabling. May also result from a bad power supply or IDE drive.



Note ...

A 2.5" HDD can be directly installed only on the standard CP6000. It is not possible to directly install a 2.5" HDD on the CP6000 for extended temperature range (-40°C to +85°C).

2. Initialize the software necessary to run the chosen operating system.

3.6 Software Installation

The installation of the Ethernet and all other onboard peripheral drivers is described in detail in the relevant Driver Kit files.

Installation of an operating system is a function of the OS software and is not addressed in this manual. Refer to appropriate OS software documentation for installation.



Note ...

Users working with pre-configured operating system installation images for Plug and Play compliant operating systems, for example Windows® 95/98/ME, Windows® 2000, Windows® XP, Windows® XP Embedded, must take into consideration that the stepping and revision ID of the chipset and/or other onboard PCI devices may change. Thus, a re-configuration of the operating system installation image deployed for a previous chipset stepping or revision ID is in most cases required. The corresponding operating system will detect new devices according to the Plug and Play configuration rules.

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Chapter 4

Configuration

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4. Configuration

4.1 Jumper Description

4.1.1 CompactFlash Configuration

Table 4-1: CompactFlash Configuration

R347 / J16	DESCRIPTION
Open	***Configured for master***
Closed	Configured for slave

The default setting is indicated by using italic bold.

4.1.2 Clearing BIOS CMOS Setup

If the system does not boot (due to, for example, the wrong BIOS configuration, or wrong password setting), the CMOS setting may be cleared using jumper J15.

Procedure for clearing CMOS setting:

The system is booted with the jumper in the new, closed position, then powered down again. The jumper is reset back to the normal position, then the system is rebooted again

Table 4-2: Clearing BIOS CMOS Setup

J15	DESCRIPTION
Open	***Normal boot using the CMOS settings***
Closed	Clear the CMOS settings and use the default values

The default setting is indicated by using italic bold.

4.1.3 Shorting Chassis GND (Shield) to Logic GND

The front panel and front panel connectors are isolated to the logic ground.

To enable the connection between the chassis GND and logic GND the capacitors must be exchanged with zero ohm resistors.

Table 4-3: Shorting Chassis GND (Shield) to Logic GND

CAPACITOR	SETTING	DESCRIPTION
C51, C66, C78	***Closed 470pF 2KV capacitors***	***Connectors are isolated to logic GND with three 470pF 2KV capacitors***
	Closed zero ohm resistors	Connectors are connected to logic GND and chassis GND

The default setting is indicated by using italic bold.

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4.1.4 VGA CRT Rear I/O Configuration

The VGA CRT signals are configurable either for rear I/O or front I/O using the jumper J23.

Table 4-4: VGA-CRT Jumper Setting

J23	DESCRIPTION
Open	***Only front I/O***
Closed	Only rear I/O

The default setting is indicated by using italic bold.

4.1.5 Front-I and Front-II General Purpose LEDs

The General Purpose LEDs are available for either general application use or indicating the POST code during boot-up.

When POST code is selected, the General Purpose LEDs indicate POST code during BIOS boot-up. If not required to indicate POST code, they can be used as general purpose LEDs.

Table 4-5: General Purpose LED Setting

J22	DESCRIPTION
J22 closed	POST code
J22 open	***General purpose functionality***

The default setting is indicated by using italic bold.

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4.1.6 Serial Ports COM1 and COM2 Jumper and Resistor Settings

4.1.6.1 COM1 Jumper and Resistor Setting

The serial interface COM1 (J9) may be configured for either RS-232, RS-422 or RS-485 using solder jumpers and appropriate resistors. The following figure and tables indicate the physical locations of these jumpers and resistors, and their required configurations for the various operational modes.

Figure 4-1: COM1 Configuration Jumpers and Resistors

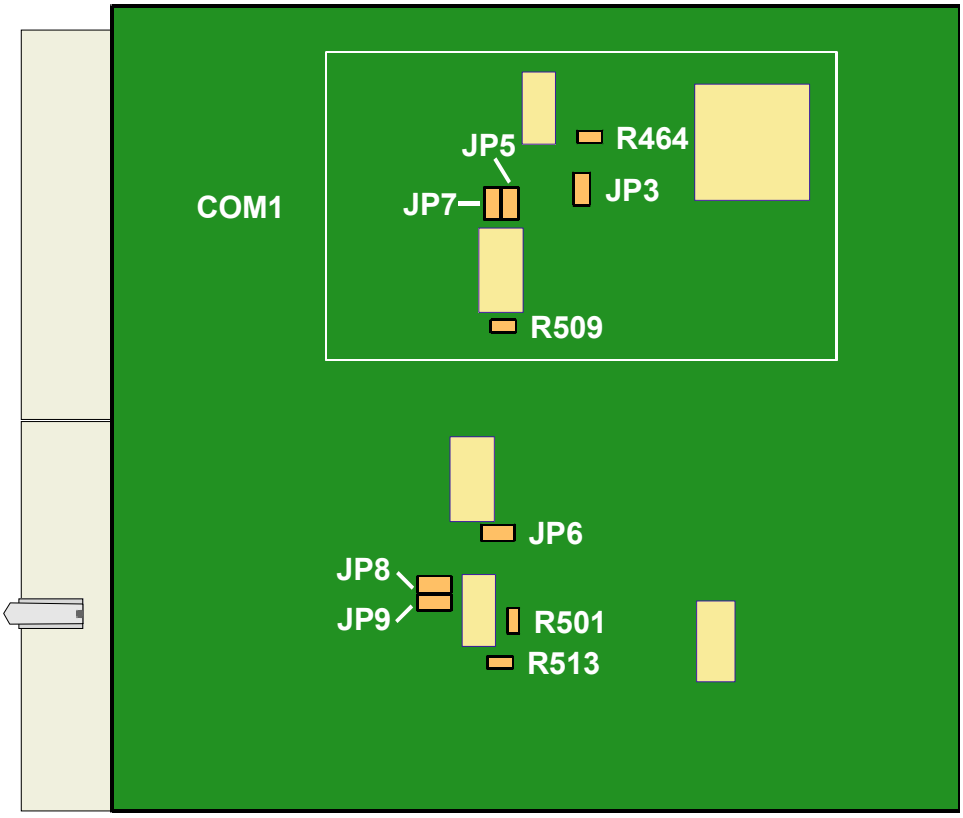


Table 4-6: Resistor Setting to Configure COM1

RESISTOR	RS-232	RS-422	RS-485
JP3 (soldered or 0 ohm, 0805 package)	***Closed***	Open	Open
R464 (4700 ohm, 0603 package)	***Open***	Open	Closed
R509 (soldered or 0 ohm, 0603 package)	***Open***	Open	Closed

The default setting is indicated by using italic bold.

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RS-422 and RS-485 COM1 Termination

When COM1 is configured for RS-422 or RS-485 operation and is the last device on the RS-422 or RS-485 bus, then the RS-422 or RS-485 interface must provide termination resistance. The purpose of jumpers JP5 and JP7 is to enable this line termination resistor (120 ohm).

Table 4-7: Jumper Setting for RS-422 RXD Termination (COM1)

TERMINATION	JP7
ON	Closed (soldered or 0 ohm, 0805 package)
OFF	***Open***

The default setting is indicated by using italic bold.

Table 4-8: Jumper Setting for RS-422 TXD and RS-485 Termination (COM1)

TERMINATION	JP5
ON	Closed (soldered or 0 ohm, 0805 package)
OFF	***Open***

The default setting is indicated by using italic bold.



Note ...

COM1 is available on the front and rear I/O without any switch. It is strongly recommended to use only one option at the same time.

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4.1.6.2 COM2 Jumper and Resistor Setting

The serial interface COM2 (rear I/O) may be configured for either RS-232, RS-422 or RS-485 by setting solder jumpers. The following figure and tables indicate the physical locations of these solder jumpers and their required configurations for the various operational modes.

Figure 4-2: COM2 Configuration Jumpers and Resistors

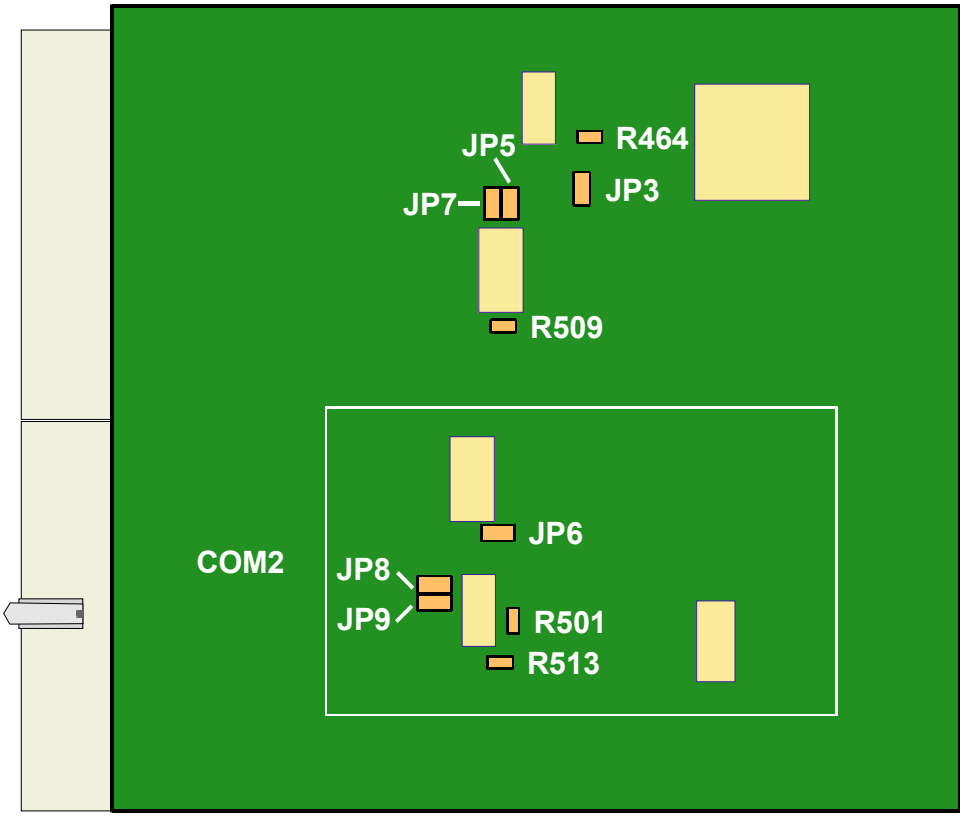


Table 4-9: Resistor Setting to Configure COM2

RESISTOR	RS-232	RS-422	RS-485
JP6 (soldered or 0 ohm, 0805 package)	***Closed***	Open	Open
R513 (4700 ohm, 0603 package)	***Open***	Open	Closed
R501 (soldered or 0 ohm, 0603 package)	***Open***	Open	Closed

The default setting is indicated by using italic bold.

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RS-422 and RS-485 COM2 Termination

When COM1 is configured for RS-422 or RS-485 operation and is the last device on the RS-422 or RS-485 bus, then the RS-422 or RS-485 interface must provide termination resistance. The purpose of jumpers JP8 and JP9 is to enable this line termination resistor (120 ohm).

Table 4-10: Jumper Setting for RS-422 RXD Termination (COM2)

TERMINATION	JP9
ON	Closed (0 ohm resistor)
OFF	***Open***

The default setting is indicated by using italic bold.

Table 4-11: Jumper Setting for RS-422 TXD and RS-485 Termination (COM2)

TERMINATION	JP8
ON	Closed (0 ohm resistor)
OFF	***Open***

The default setting is indicated by using italic bold.

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4.2 Interrupts

The CP6000 board uses the standard AT IRQ routing (8259 controller).

This interrupt routing is the default, but can be modified via the BIOS.

Table 4-12: Interrupt Setting

IRQ	PRIORITY	STANDARD FUNCTION
IRQ0	1	System Timer
IRQ1	2	Keyboard Controller
IRQ2	--	Input of the second IRQ controller (IRQ8-IRQ15)
IRQ3	11	COM2
IRQ4	12	COM1
IRQ5	13	Watchdog
IRQ6	14	Floppy Disk Controller
IRQ7	15	Reserved for IPMI
IRQ8	3	System Real Time Clock
IRQ9	4	PCI or APIC
IRQ10	5	PCI
IRQ11	6	PCI
IRQ12	7	PCI or PS/2 mouse
IRQ13	8	Coprocessor error
IRQ14	9	Primary hard disk
IRQ15	10	Secondary hard disk
NMI		Watchdog



Warning!

IRQ5 should normally have only **one** source enabled, otherwise improper system operation may result.

If more than one source is required to be enabled, contact Kontron Modular Computers' Technical Support before implementing the IRQs.

For events that are not time critical, such as ENUM, DERATE, etc., polling should be considered instead of using an IRQ.

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4.3 Onboard PCI Interrupt Routing

The 6300ESB provides up to 8 PCI and 4 PCI-X interrupt inputs. The table below describes the connection of these IRQ signals.

For more information, refer to the INTEL 6300ESB data sheet.

Table 4-13: PCI Interrupt Routing

6300ESB IRQ INPUT	PCI DEVICE	FUNCTION INTERNAL 6300ESB
PIRQA	VGA	USB A controller
PIRQB	Free	SMBUS
PIRQC	Free	SATA
PIRQD	Free	USB B controller
PIRQE	CPCI	Free
PIRQF	CPCI	Free
PIRQG	CPCI	Free
PIRQH	CPCI	USB 2.0 controller
PCIXIRQ0	Gigabit front / PMC INTA	Free
PCIXIRQ1	Gigabit rear / PMC INTB	Free
PCIXIRQ2	Gigabit rear / PMC INTC	Free
PCIXIRQ3	Gigabit front / PMC INTD	Free

For more information, refer to the INTEL 6300ESB data sheet.

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4.4 Memory Map

The CP6000 board uses the standard AT ISA memory map.

4.4.1 Memory Map for the 1st Megabyte

The following table sets out the memory map for the first megabyte:

Table 4-14: Memory Map for the 1st Megabyte

MEMORY RANGE	SIZE	FUNCTION
0xE0000 – 0xFFFFF	128 k	BIOS implemented in FWH Reset vector 0xFFFF0
0xD0000 – 0xDFFFF	64 k	Free
0xCC000 – 0xCFFFF	16 k	Free
0xC0000 – 0xCBFFF	48 k	BIOS of the VGA card.
0xA0000 – 0xBFFFF	128 k	Normally used as video RAM as follows: CGA video: 0xB8000-0xBFFFF Monochrome video: 0xB0000-0xB7FFF EGA/VGA video: 0xA0000-0xAFFFF
0x000000 – 0x9FFFF	640 k	DOS reserved memory space

4.4.2 I/O Address Map

The following table sets out the memory map for the I/O memory. The shaded table cells indicate CP6000 specific registers.

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Table 4-15: I/O Address Map

ADDRESS	DEVICE
000,00F	DMA controller #1
020,021	Interrupt controller #1
022,02F	Reserved
040,043	Timer
060,063	Keyboard interface
070,071	RTC port
080,08F	DMA page register
0A0,0A	Interrupt controller #2
0C0,0DF	DMA controller #2
0E0,0EF	Reserved
0F0,0FF	Math coprocessor
170,17F	Hard disk secondary
1F0,1FF	Hard disk primary
19C-19F	IPMI control
278,27F	Parallel port LPT2
280	Watchdog trigger
282	Watchdog timer
283	Geographic addressing
284	Watchdog, CPCI IRQ routing
285	CPCI reset
286	I/O status
288	Board version
289	Hardware index
28A	HS status
28B	Logic index
28D	LED control
28E	HS LED control
2E8,2EF	Serial port COM4
2F8,2FF	Serial port COM2
378,37F	Parallel printer port LPT1
3BC,3BF	Parallel printer port LPT3
3E8,3EF	Serial port COM3
3F0,3F7	Floppy Disk + Super-I/O #1 Com.
3F8,3FF	Serial port COM1
CA2-CA3	IPMI communication interface
CA4-CA5	IPMI communication interface

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4.5 Special Registers Description

The following registers are special registers which the CP6000 uses to watch the onboard hardware special features and the CompactPCI control signals.

Normally, only the system BIOS uses these registers, but they are documented here for application use as required.



Note ...
Take care when modifying the contents of these registers as the system BIOS may be relying on the state of the bits under its control.

4.5.1 IPMI Control

The IPMI registers are only available if the board is ordered with the IPMI function.

4.5.1.1 IPMI Configuration

The IPMI configuration register holds a series of bits defining the COM port routing of the BMC controller and the Super I/O. The COM2 port can be used for firmware update or debugging.

Table 4-16: IPMI Configuration Register

REGISTER NAME		IPMI Configuration Register						ACCESS	
ADDRESS		0x19C						R	W
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		Res.	Res.	Res.	Res.	BMC_EXT	BMC_COM	BMC_RST	BMC_PRG
DEFAULT		0	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0	BMC_PRG	0	Set normal operating mode						
		1	Set BMC controller in program mode						
1	BMC_RST	0	BMC controller is running						
		1	Reset BMC controller						
2	BMC_COM	0	Super I/O COM2 port is connected to COM2 connector						
		1	Super I/O COM2 port is connected to BMC						
3	BMC_EXT	0	BMC COM port is isolated						
		1	BMC COM port is connected to COM2 connector						
4		0	Reserved						
5		0	Reserved						
6		0	Reserved						
7		0	Reserved						

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4.5.1.2 IPMI Interrupt Configuration Register

The IPMI interrupt configuration register holds a series of bits defining the interrupt routing for the BMC controller.

Table 4-17: IPMI Interrupt Configuration Register

REGISTER NAME		IPMI Interrupt Configuration Register						ACCESS	
ADDRESS		0x19F						R	W
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		Res.	Res.	Res.	Res.	Res.	IPMI ISA7	IPMI ISA5	IPMI SMI
DEFAULT		0	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0	IPMI SMI	0	Disable SMI						
		1	Enable SMI						
1	IPMI ISA5	0	Disable IRQ5						
		1	Enable IRQ5						
2	IPMI ISA7	0	Disable IRQ7						
		1	Enable IRQ7						
3		0	Reserved						
4		0	Reserved						
5		0	Reserved						
6		0	Reserved						
7		0	Reserved						

4.5.2 Watchdog

The CP6000 has one watchdog timer. This timer is provided with a programmable timeout ranging from 125 msec to 256 sec. Failure to strobe the watchdog timer within a set time period results in a system reset, NMI or an interrupt. This can be configured via the register 0x284.

To enable the watchdog bit ”4” of the register 0x282 must be set. If the watchdog is enabled via bit ”4”, this bit cannot later be cleared.

With a write access to the register 0x280 the watchdog is retriggered. Once the watchdog is enabled, it must be continuously strobed within the terminal count period to avoid resetting the system hardware.

The watchdog can be configured in several modes, one of which is the dual stage configuration. If the NMI and the reset configuration bit are set (0x284 = 0x84), the watchdog has two stages. The first stage timeout generates an NMI interrupt. If the NMI handler does not reconfigure the watchdog, the watchdog switches to the second stage and generates a master reset after the configured timeout elapses.

4.5.3 Watchdog Trigger

A write access triggers the watchdog.

The I/O location for the watchdog trigger is 0x280.

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4.5.4 Watchdog Timer

Table 4-18: Watchdog Timer

REGISTER NAME		WATCHDOG TIMER						ACCESS	
ADDRESS		0x282						R	W
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		Res.	Res.	WDR	WDEN	WDT3	WDT2	WDT1	WDT0
DEFAULT		0	0	0	0	0	0	0	0

BIT	NAME	VAL	DESCRIPTION
0 1 2 3	WDT[3:0]		Timeout Period: Bits: 3 2 1 0 Setting: 0 0 0 0 = 0 = 000.125 sec 0 0 0 1 = 1 = 000.250 sec 0 0 1 0 = 2 = 000.500 sec 0 0 1 1 = 3 = 001 sec 0 1 0 0 = 4 = 002 sec 0 1 0 1 = 5 = 004 sec 0 1 1 0 = 6 = 008 sec 0 1 1 1 = 7 = 016 sec 1 0 0 0 = 8 = 032 sec 1 0 0 1 = 9 = 064 sec 1 0 1 0 = 10 = 128 sec 1 0 1 1 = 11 = 256 sec 1 1 0 0 = 12 = res. 1 1 0 1 = 13 = res. 1 1 1 0 = 14 = res. 1 1 1 1 = 15 = res.
4	WDEN	0	Watchdog timer disabled
		1	Watchdog timer enabled ***Note ...*** Once the watchdog timer is enabled it cannot be disabled except by resetting the system.
5	WDR	0	System reset generated by power-on reset
		1	System reset generated by Watchdog
6		0	Reserved
7		0	Reserved

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4.5.5 Geographic Addressing Register

The geographic addressing register describes the CompactPCI geographic addressing signals.

Table 4-19: Geographic Addressing Register

REGISTER NAME		Geographic Addressing Register						ACCESS	
ADDRESS		0x283						R	
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		Res.	Res.	Res.	GA4	GA3	GA2	GA1	GA0
DEFAULT		0	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0	GA0		Geographic address						
1	GA1		Geographic address						
2	GA2		Geographic address						
3	GA3		Geographic address						
4	GA4		Geographic address						
5		0	Reserved						
6		0	Reserved						
7		0	Reserved						

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4.5.6 Watchdog, CompactPCI Interrupt Configuration Register

The interrupt configuration register holds a series of bits defining the interrupt routing for the watchdog, the power control derate signal and the CompactPCI enumeration signal. If the watchdog timer fails, it can generate three independent hardware events: reset, NMI and IRQ5 interrupt.

The enumeration signal is generated by a hot swap compatible board after insertion and prior to removal. The system uses this interrupt signal to force software to configure the new board. The derate signal indicates that the power supply is beginning to derate its power output.

Table 4-20: Watchdog, CompactPCI Interrupt Configuration Register

REGISTER NAME		Interrupt Configuration Register						ACCESS	
ADDRESS		0x284						R	W
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		WNMI	CFNMI	CFIRQ	CEIRQ	CDIRQ	WRST	WIRQ	HSIRQ
DEFAULT		0	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0	HSIRQ	0	Disable hot swap handle IRQ5						
		1	Enable hot swap handle IRQ5						
1	WIRQ	0	Disable Watchdog IRQ5 routing						
		1	Enable Watchdog IRQ5 routing						
2	WRST	0	Disable Watchdog hardware reset						
		1	Enable Watchdog hardware reset						
3	CDIRQ	0	Disable CPCI derate signal to IRQ5 routing						
		1	Enable CPCI derate signal to IRQ5 routing						
4	CEIRQ	0	Disable CPCI enum signal to IRQ5 routing						
		1	Enable CPCI enum signal to IRQ5 routing						
5	CFIRQ	0	Disable CPCI fail signal to IRQ5 routing						
		1	Enable CPCI fail signal to IRQ5 routing						
6	CFNMI	0	Disable CPCI fail signal to NMI routing						
		1	Enable CPCI fail signal to NMI routing						
7	WNMI	0	Disable Watchdog NMI routing						
		1	Enable Watchdog NMI routing						



Note ...

To enable the dual stage watchdog the NMI and the reset bit must be set. At the first stage the watchdog generates an NMI and at the second stage the system will be reset.

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4.5.7 CPCI Master Reset

The CPCI master reset register describes the routing of the reset signal from the CompactPCI interface to the local reset controller if the board is installed in a peripheral slot. If the board is installed in a system slot, the reset is always an output. If the reset is disabled, the CP6000 ignores the reset signal from the CompactPCI interface.

Table 4-21: CPCI Master Reset Register

REGISTER NAME		CPCI Master Reset Register						ACCESS	
ADDRESS		0x285						W	
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		Res.	Res.	Res.	Res.	Res.	Res.	Res.	CRST
DEFAULT		0	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0	CRST	0	Disable the reset routing from the CompactPCI interface						
		1	Enable the reset routing from the CompactPCI interface						
1		0	Reserved						
2		0	Reserved						
3		0	Reserved						
5		0	Reserved						
6		0	Reserved						
7		0	Reserved						

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4.5.8 I/O Status

The I/O status register describes the local and CompactPCI control signals. The watchdog status bit indicates the status of the watchdog timer. If the timer is not retriggered within the previously set time period, the bit is set to ”0” and the watchdog LED lights. The fail signal is an output of the power supply and indicates a power supply failure. For the description of the derate and enumeration signals, please see the interrupt routing register.

Table 4-22: I/O Status Register

REGISTER NAME		I/O Status Register						ACCESS	
ADDRESS		0x286						R	
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		WST	Res.	Res.	Res.	CSLOT	CENUM	CFAIL	CDER
DEFAULT		1	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0	CDER	0	Indicates power derating (CPCI DEG signal)						
		1	Power normal						
1	CFAIL	0	Indicates a power supply failure (CPCI FAIL signal)						
		1	Power normal						
2	CENUM	0	Indicates the insertion or removal of a hot swap system board (CPCI ENUM)						
		1	No hot swap event						
3	CSLOT	0	Indicates that the board is installed in a system slot						
		1	Indicates that the board is installed in a peripheral slot						
4		0	Reserved						
5		0	Reserved						
6		0	Reserved						
7	WST	0	Indicates that a Watchdog timeout has occurred						
		1	Indicates that no Watchdog timeout has occurred						

4.5.9 Board Version

The board version register describes the hardware and the board version. The content of this register is unique for each Kontron CompactPCI board.

Table 4-23: Board ID Register

REGISTER NAME	Board Version						ACCESS	
ADDRESS	0x288						R	
BIT POSITION	MSB 7	6	5	4	3	2	1	0 LSB
CONTENT	BID7	BID6	BID5	BID4	BID3	BID2	BID1	BID0
DEFAULT	0	1	1	0	0	1	1	1

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4.5.10 Hardware Index

The hardware index will signal to the software when differences in the hardware require different handling by the software. It starts with the value 0 and will be incremented with each change in hardware as development continues.

Table 4-24: Hardware Index Register

REGISTER NAME	Hardware Index						ACCESS	
ADDRESS	0x289						R	
BIT POSITION	MSB 7	6	5	4	3	2	1	0 LSB
CONTENT	HWI7	HWI6	HWI5	HWI4	HWI3	HWI2	HWI1	HWI0
DEFAULT	0	0	0	0	0	0	0	0

4.5.11 Hot Swap Control

The hot swap control register describes the hot swap control signals.

Table 4-25: Hot Swap Control Register

REGISTER NAME		Hot Swap Control Register						ACCESS	
ADDRESS		0x28A						R	
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		Res.	HSH	HSLED	Res.	Res.	Res.	Res.	Res.
DEFAULT		0	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0		0	Reserved						
1		0	Reserved						
2		0	Reserved						
3		0	Reserved						
4		0	Reserved						
5	HSLED	0	Hot swap LED switch off						
		1	Hot swap LED switch on						
6	HSH	0	Hot swap handle in closed position						
		1	Hot swap handle in open position						
7		0	Reserved						

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4.5.12 Logic Version

The logic version register may be used to identify the logic status of the board by software. It starts with the value 0 and will be incremented with each logic update.

Table 4-26: Logic Version Register

REGISTER NAME	Logic Version						ACCESS	
ADDRESS	0x28B						R	
BIT POSITION	MSB 7	6	5	4	3	2	1	0 LSB
CONTENT	LR7	LR6	LR5	LR4	LR3	LR2	LR1	LR0
DEFAULT	0	0	0	0	0	0	0	0

4.5.13 LED Control

The LED control register enables the user to switch on and off the Front-I and Front-II LEDs on the front panel.

Table 4-27: LED Control Register

REGISTER NAME	LED Control Register						ACCESS	
ADDRESS	0x28D						W	
BIT POSITION	MSB 7	6	5	4	3	2	1	0 LSB
CONTENT	LED7	LED6	LED5.	LED4	LED3	LED2	LED1	LED0
DEFAULT	0	0	0	0	0	0	0	0

BIT	NAME	VAL	DESCRIPTION
0	LED0	0	LED switch off
		1	LED switch on
1	LED1	0	LED switch off
		1	LED switch on
2	LED2	0	LED switch off
		1	LED switch on
3	LED3	0	LED switch off
		1	LED switch on
4	LED4	0	LED switch off
		1	LED switch on
5	LED5	0	LED switch off
		1	LED switch on
6	LED6	0	LED switch off
		1	LED switch on
7	LED7	0	LED switch off
		1	LED switch on

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4.5.14 Hot Swap LED Control

The hot swap LED control register enables the user to switch on and off the hot swap LED on the front panel.

Table 4-28: Hot Swap LED Control Register

REGISTER NAME		Hot Swap LED Control Register						ACCESS	
ADDRESS		0x28E						R	W
BIT POSITION		MSB 7	6	5	4	3	2	1	0 LSB
CONTENT		Res.	Res.	Res.	Res.	Res.	HSLED	Res.	Res.
DEFAULT		0	0	0	0	0	0	0	0
BIT	NAME	VAL	DESCRIPTION						
0		0	Reserved						
1		0	Reserved						
2	HSLED	0	Hot swap LED switch off						
		1	Hot swap LED switch on						
3		0	Reserved						
4		0	Reserved						
5		0	Reserved						
6		0	Reserved						
7		0	Reserved						

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Chapter 5

BIOS

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5. BIOS

Detailed information concerning the BIOS for the CP6000 is contained in Appendix C.

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Chapter 6

Power Consumption

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6. Power Consumption

6.1 System Power

Some processors of the new Intel® Pentium® M processor family require more power than earlier Pentium® III processors, but less than the Pentium® 4. This results in special requirements for the power supply and the backplane. The considerations presented in the ensuing chapters must be taken into account by system integrators when specifying the CP6000 system environment.

6.1.1 CP6000 Baseboard

The CP6000 baseboard itself has been designed for optimal power input and distribution. Still it is necessary to observe certain criteria essential for application stability and reliability.

The table below indicates the absolute maximum input voltage ratings that must not be exceeded. Power supplies to be used with the CP6000 should be carefully tested to ensure compliance with these ratings.

Table 6-1: Maximum Input Power Voltage Limits

SUPPLY VOLTAGE	MAXIMUM PERMITTED VOLTAGE
+3.3 V	+3.6 V
+5 V	+5.5 V
+12 V	+14.0 V
-12 V	-14.0 V



Warning!

The maximum permitted voltage indicated in the table above must not be exceeded. Failure to comply with the above may result in damage to your board.

The following table specifies the ranges for the different input power voltages within which the board is functional. The CP6000 is not guaranteed to function if the board is not operated within the prescribed limits.

Table 6-2: DC Operational Input Voltage Ranges

INPUT SUPPLY VOLTAGE	ABSOLUTE RANGE	RECOMMENDED RANGE
+3.3 V	3.2 V min. to 3.47 V max.	3.3 V min. to 3.47 V max.
+5 V	4.85 V min. to 5.25 V max.	5.0 V min. to 5.25 V max.
+12 V	11.4 V min. to 12.6 V max.	12 V min. to 12.6 V max.
-12 V	-11.4 V min. to -12.6 V max.	Only for PMC

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6.1.2 Backplane

Backplanes to be used with the CP6000 must be adequately specified. The backplane must provide optimal power distribution for the +3.3 V, +5 V and +12 V power inputs. It is recommended to use only backplanes which have two power planes for the 3.3 V and +5 V voltages.

Input power connections to the backplane itself should be carefully specified to ensure a minimum of power loss and to guarantee operational stability. Long input lines, under dimensioned cabling or bridges, high resistance connections, etc. must be avoided. It is recommended to use POSITRONIC or M-type connector backplanes and power supplies where possible.

6.1.3 Power Supply Units

Power supplies for the CP6000 must be specified with enough reserve for the remaining system consumption. In order to guarantee a stable functionality of the system, it is recommended to provide more power than the system requires. An industrial power supply unit should be able to provide at least twice as much power as the entire system requires. An ATX power supply unit should be able to provide at least three times as much power as the entire system requires.

As the design of the CP6000 has been optimized for minimal power consumption, the power supply unit shall be stable even without minimum load.

Where possible, power supplies which support voltage sensing should be used. Depending on the system configuration this may require an appropriate backplane. The power supply should be sufficient to allow for die resistance variations.



Note ...

Non-industrial ATX PSUs require a greater minimum load than a single CP6000 is capable of creating. When a PSU of this type is used, it will not power up correctly and the CP6000 may hangup. The solution is to use an industrial PSU or to add more load to the system.

The start-up behavior of CPCI and PCI (ATX) power supplies is critical for all new CPU boards. These boards require a defined power of sequence and start-up behavior of the power supply. The required behavior is described in the ATX (http://www.formfactors.org/FFDetail.asp?FFID=1&CatID=2) and the CPCI (PICMG, http://www.picmgeu.org/) specification.

6.1.3.1 Start-Up Requirement

Power supplies must comply with the following guidelines, in order to be used with the CP6000.

- Beginning at 10% of the nominal output voltage, the voltage must rise within > 0.1 ms to < 20 ms to the specified regulation range of the voltage. Typically: > 5 ms to < 15 ms.
- There must be a smooth and continuous ramp of each DC output voltage from 10% to 90% of the regulation band.
- The slope of the turn-on waveform shall be a positive, almost linear voltage increase and have a value from 0 V to nominal Vout.



Warning!

During power-up, the 3.3 V input power supply must be able to provide a minimum peak current of 10 A to the CP6000. This applies for each CP6000 in a given system.

Failure to comply with the above warning may result in damage to or improper operation of the CP6000.

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6.1.3.2 Power-Up Sequence

The +5 VDC output level must always be equal to or higher than the +3.3 VDC output during power-up and normal operation.

The time from +5 VDC until the output reaches its minimum in regulation level and from +3.3 VDC until the output reaches its minimum in regulation level must be < 20 ms.

6.1.3.3 Tolerance

The tolerance of the voltage lines is described in the CPCI specification (PICMG 2.0 R3.0).The recommended measurement point for the voltage is the CPCI connector on the CPU board.

The following table provides information regarding the required characteristics for each board input voltage.

Table 6-3: Input Voltage Characteristics

VOLTAGE	NOMINAL VALUE	TOLERANCE	MAX. RIPPLE (p-p)	REMARKS
5 V	+5.0 VDC	+5%/-3%	50 mV	Main voltage
3.3 V	+3.3 VDC	+5%/-3%	50 mV	--
+12 V	+12 VDC	+5%/-5%	240 mV	Required
-12 V	-12 VDC	+5%/-5%	240 mV	Not required
V I/O (PCI) voltage	+3.3 VDC or +5 VDC	+5%/-3%	50 mV	Standard Version +5.0 V
GND	Ground, not directly connected to potential earth (PE)			

The output voltage overshoot generated during the application (load changes) or during the removal of the input voltage must be less than 5% of the nominal value. No voltage of reverse polarity may be present on any output during turn-on or turn-off.

6.1.3.4 Regulation

The power supply shall be unconditionally stable under line, load, unload and transient load conditions including capacitive loads. The operation of the power supply must be consistent even without the minimum load on all output lines.



Note ...

Non-industrial ATX PSUs require a greater minimum load than a single CP6000 is capable of creating. When a PSU of this type is used, it will not power up correctly and the CP6000 may hang up. The solution is to use an industrial PSU or to add more load to the system.



Note ...

If the main power input is switched off, the 3.3V supply voltage will not go to 0V instantly. It will take a couple of seconds until capacitors are discharged. If the voltage rises again before it went below a certain level, the circuits may enter a latch-up state where even a hard RESET will not help any more. The system must be switched off for at least 3 seconds before it may be switched on again. If problems still occur, turn off the main power for 30 seconds before turning it on again.

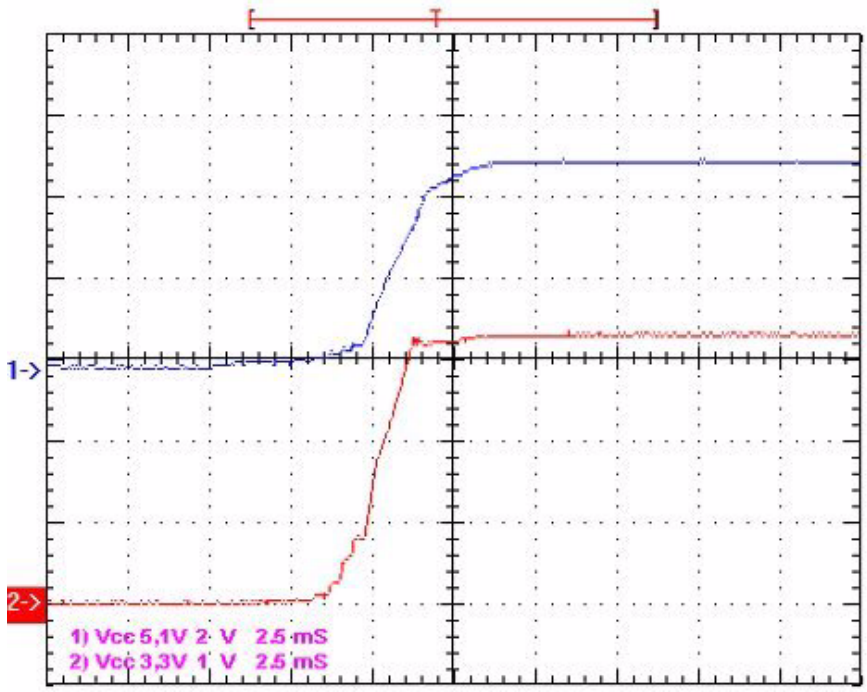
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6.1.3.5 Rise Time Diagram

The following figure illustrates an example of the recommended start-up ramp of a CPCI power supply for all Kontron boards delivered up to now.

Figure 6-1: Start-Up Ramp of the CP3-SVE180 AC Power Supply



6.2 Power Consumption

The goal of this description is to provide a method to calculate the power consumption for the CP6000 baseboard and for additional configurations. The Pentium® M processor dissipates the majority of the thermal power.

The power consumption tables below list the voltage and power specifications for the CP6000 board and the CP6000 accessories. The values were measured using an 8-slot passive CompactPCI backplane with two power supplies: one for the CPU, and the other for the hard disk. The operating systems used were DOS and Windows® 2000. All measurements were conducted at a temperature of 25°C. The measured values varied, because the power consumption was dependent on processor activity.

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6.2.1 Real Applications

The following tables indicate the power consumption using real applications.

The power consumption for the DOS was measured with power management not active.

Table 6-4: Power Consumption: DOS

POWER	PENTIUM® M 600 MHz 512 MB	PENTIUM® M 1.1 GHz 512 MB	PENTIUM® M 1.4 GHz 512 MB	PENTIUM® M 1.6 GHz 512 MB	PENTIUM® M 1.8 GHz 512 MB	CELERON® M 1.3 GHz 512 MB
Core	0.956 V	1.180 V	1.116 V	1.484 V	1.340 V	1.356 V
5 V	4.3 W	9.7 W	7.4 W	14.3 W	14.2 W	10.2 W
3.3 V	7.4 W	7.9 W	5.8 W	7.9 W	7.9 W	9.9 W
Total	11.8 W	17.7 W	13.2 W	22.2 W	22.1 W	20.1 W

The Power Consumption using Windows® 2000 IDLE Mode was measured at a VGA resolution of 1024X768.

Table 6-5: Power Consumption: Windows® 2000 IDLE Mode

POWER	PENTIUM® M 600 MHz 512 MB	PENTIUM® M 1.1 GHz 512 MB	PENTIUM® M 1.4 GHz 512 MB	PENTIUM® M 1.6 GHz 512 MB	PENTIUM® M 1.8 GHz 512 MB	CELERON® M 1.3 GHz 512 MB
Core	0.956 V	1.180 V	1.116 V	1.484 V	1.340 V	1.356 V
5 V	2.3 W	2.7 W	3.5 W	5.8 W	6.7 W	4.0 W
3.3 V	8.5 W	8.4 W	8.4 W	8.4 W	8.4 W	10.4 W
Total	10.6 W	11.1 W	11.9 W	14.2 W	15.1 W	13.4 W

The Power Consumption using Windows® 2000 at 100% CPU Usage was measured at a VGA resolution of 1024X768.

Table 6-6: Power Consumption: Windows® 2000 100% CPU Usage

POWER	PENTIUM® M 600 MHz 512 MB	PENTIUM® M 1.1 GHz 512 MB	PENTIUM® M 1.4 GHz 512 MB	PENTIUM® M 1.6 GHz 512 MB	PENTIUM® M 1.8 GHz 512 MB	CELERON® M 1.3 GHz 512 MB
Core	0.956 V	1.180 V	1.116 V	1.484 V	1.340 V	1.356 V
5 V	4.0 W	5.0 W	4.5 W	18.5 W	16.5 W	10.1 W
3.3 V	8.5 W	10.6 W	10.6 W	10.6 W	10.6 W	10.8 W
Total	12.5 W	15.6 W	15.1 W	29.1 W	27.1 W	21.0 W

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The Power Consumption using Windows® 2000 3D Mark Benchmark was measured at a VGA resolution of 1024X768 using a high performance VGA application.

Table 6-7: Power Consumption: Windows® 2000 3D Mark Benchmark

POWER	PENTIUM® M 600 MHz 512 MB	PENTIUM® M 1.1 GHz 512 MB	PENTIUM® M 1.4 GHz 512 MB	PENTIUM® M 1.6 GHz 512 MB	PENTIUM® M 1.8 GHz 512 MB	CELERON® M 1.3 GHz 512 MB
Core	0.956 V	1.180 V	1.116 V	1.484 V	1.340 V	1.356 V
5 V	4 W	7.0 W	6.5 W	18.2 W	14.2 W	14.9 W
3.3 V	10.6 W	12.9 W	12.4 W	10.9 W	12.1 W	9.5 W
Total	14.6 W	19.9 W	18.9 W	29.1 W	26.3 W	24.4 W

6.2.2 Testing Application

The Power Consumption using Windows® 2000 Intel® High Power Tool was measured at a VGA resolution of 1024X768 with the processor running at maximum power consumption (no real application).

Table 6-8: Power Consumption: Windows® 2000 Intel® High Power Tool

POWER	PENTIUM® M 600 MHz 512 MB	PENTIUM® M 1.1 GHz 512 MB	PENTIUM® M 1.4 GHz 512 MB	PENTIUM® M 1.6 GHz 512 MB	PENTIUM® M 1.8 GHz 512 MB	CELERON® M 1.3 GHz 512 MB
Core	0.956 V	1.180 V	1.116 V	1.484 V	1.340 V	1.356 V
5 V	5.5 W	11.3 W	10.2 W	27.2 W	21.3 W	16.5 W
3.3 V	9.3 W	9.5 W	9.5 W	8.4 W	8.4 W	10.0 W
Total	13.9 W	20.8 W	19.7 W	35.6 W	29.7 W	26.5 W



Note ...

The values in the above table are measured using the Intel® High Power Tool. This tool serves only for checking the onboard power supplies and does not represent the power consumption of the CP6000 during normal operation.

In normal software applications this maximum power consumption level will never be reached.

6.2.3 Power Consumption of CP6000 Accessories

The following table indicates the power consumption of the CP6000 accessories.

Table 6-9: Power Consumption Table for CP6000 Accessories

MODULE	POWER 5 V	POWER 3.3 V AVERAGE
Keyboard	100 mW	—
DDR SDRAM SODIMM PC2700 (DDR333) 1 GB	—	2 W - 6 W
DDR SDRAM SODIMM PC2700 (DDR333) 2 GB	—	6 W - 8 W
CompactFlash	—	100 mW - 300 mW
Ethernet	—	

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Chapter 7

System Considerations

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7. System Considerations

The thermal energy dissipation of the new generation of Intel® Pentium® M processors is less than that of Pentium® 4 processors, however, certain application configurations of the CP6000 require active thermal energy dissipation. This requires new technology to ensure that the processor's die temperature is maintained within factory specifications. The following chapters provide system integrators with the necessary information to satisfy thermal requirements when implementing CP6000 applications.

7.1 Passive Thermal Regulation

The thermal management architecture implemented on the CP6000 can be described as being three separate but related functions. The goal of all three functions is to protect the processor and reduce processor power consumption. Enabling the thermal control circuit allows the processor to maintain a safe operating temperature without the need for special software drivers or interrupt handling routines.

The three thermal protection functions provided by the processor are:

1. Pentium® M internal thermal monitor:

   This function controls the processor temperature by modulating the processor core clocks.

2. External (LM87) thermal monitor:

   This function controls via the processor Stopclock signal the power consumption. While asserted, it has the effect of stopping the clock to many internal elements of the processor.

3. Thermtrip:

   In the event of a cooling failure resulting in extreme overheating, the processor will automatically shut down when the die temperature has reached approximately 125 °C. This event is known as "Thermtrip".

7.1.1 CPU Internal Thermal Supervision

This function can be enabled and disabled in the BIOS, whereby the default value is: disabled. When the internal thermal control circuit has been enabled and a high temperature situation occurs, the internal clocks are modulated by alternately turning the clocks off and on with a duty cycle dependent on the processor type (typically 30-50%). This results in the processor power dissipation being reduced accordingly. Cycle times are processor speed dependent and will decrease linearly as processor core frequencies increase. The thermal control circuit is automatically deactivated when the temperature goes below the internal thermal supervision point. The internal temperature sensor is located near on the hottest area of the processor die. Each processor is individually calibrated during manufacturing to eliminate any potential manufacturing variations.



Note ...

The duty cycle and the internal thermal supervision point is factory configured by Intel and cannot be modified. For all Mobile Pentium® M processor the internal thermal supervision point is 100 °C.

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7.1.2 CPU External Thermal Supervision

This function can be enabled and disabled in the BIOS, whereby the default value is: disabled. There are two independent and isolated thermal sensors in the Pentium® M processor. One is the on-die thermal diode. The other is the temperature sensor used for the Thermal Monitor and for Thermtrip. The measured temperature of both sensors can vary significantly, whereby the temperature of the external measured on-die sensors is always lower.

When the external thermal control circuit has been enabled and a high temperature situation occurs, the front panel “TH” LED will be switched on and the external Stopclock signal of the processor will be modulated by alternately turning the clocks off and on at a duty cycle specified in the BIOS (12.5% - 75%) and the processor power dissipation will be reduced.

The thermal control circuit does not automatically go inactive once the temperature goes below the selected external thermal supervision point. Explicit software action is necessary to switch back to normal mode.



Note ...

The duty cycle and the external thermal supervision point can be configured in the BIOS. For all Mobile Pentium® M processor, the default external thermal supervision point is 100 °C.

7.1.3 CPU Emergency Thermal Supervision

This function cannot be enabled or disabled in the BIOS. It is always enabled to ensure that the processor is protected in any event.

Assertion of Thermtrip indicates that the processor junction temperature has reached a level beyond which permanent silicon damage may occur. Measurement of the temperature is accomplished through an internal thermal sensor which is configured to trip at approximately 125°C. Upon assertion of Thermtrip, the processor will shut off its internal clocks (thus halting program execution) in an attempt to reduce the processor junction temperature. Once activated, Thermtrip remains latched until the CP6000 undergoes a cold restart is performed (all power off and then on again).



Note ...

Upon assertion of Thermtrip, the front panel overtemperature LED flashes at regular intervals.

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7.1.4 Thermal Management Recommendations

If the CP6000 is operated in a properly configured CompactPCI environment with enough air flow, there is no need to enable the Thermal Management function. However, sometimes the system environment is not optimized for a Pentium® M processor board and this requires thermal protection to guarantee a stable system. The Thermal Management feature allows system designers to design lower cost thermal solutions without compromising system integrity or reliability.

In this case both the internal and the external Thermal Monitor should be enabled. These two monitors protect the processor and the system against excessive temperatures. In this configuration the clocks will be switched on and off. At a 50% duty cycle, for example, the average power dissipation can drop by up to 50%. In this case, the processor performance also drops by about 50% since program execution halts when the clocks are removed.



Warning!

For Benchmarks and performance tests all Thermal Management functions should be disabled, if enabled the results will be erroneous due to the thermal power reduction.

7.2 Active Thermal Regulation

The thermal management concept of the CP6000 also encompasses active thermal regulation. For this processor, a specifically designed heat sink is employed to ensure the best possible basis for operational stability and long term reliability. Coupled together with system chassis which provide variable configurations for forced air flow, controlled active thermal energy dissipation is guaranteed.

7.2.1 Heat Sinks

The CP6000 is fitted with an optimally designed heat sink. The physical size, shape, and construction ensures the best possible thermal resistance (R_{th}) coefficients. In addition, it is specifically designed to efficiently support forced air flow concepts as found in a modern CompactPCI system chassis.

Even though the CP6000 is fitted with an optimally designed heat sink, the thermal energy dissipated by the high performance Pentium® M exceeds the thermal capabilities of the heat sink except for very low performance applications which still require the outstanding features offered by this processor. For higher performance applications, the CP6000 must be operated with forced air flow.

There are two heat sink versions available for the CP6000, one for the standard version and one for the extended temperature version. Due to the fact that the heat sink for the extended temperature version is larger than the one for the standard version, it is not possible to directly mount a 2.5" HDD on the CP6000 if an E2 heat sink is installed. The main function of the E2 heat sink is to absorb the heat emitted by the chipset, processor and both Gigabit controllers.

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7.2.2 Forced Air Flow

When developing applications using the CP6000, the system integrator must be aware of the overall system thermal requirements. System chassis must be provided which satisfy these requirements. As an aid to the system integrator, a characteristics graph is provided for the CP6000.

The values have been measured using typical applications running under Windows® 2000. In worst case situations, the values vary and the temperature range must be reduced. In all situations, the maximum case temperature of the Pentium® M processor and the Ethernet controller must be kept below the maximum allowable temperature. This temperature value can be measured with the onboard remote temperature sensor. To ensure functionality at the maximum temperature, the BIOS supports a temperature control feature. In instances of overtemperature the hardware monitor will reduce the processor clock speed to reduce power consumption.

The maximum case temperatures for both processor types is a follows:

- Pentium® M: all versions: 100 °C
- Celeron® M: all versions: 100 °C

In addition to the Pentium® M processor, the two Gigabit Ethernet controllers need protection against overheating to provide a reliable operation of the CP6000 at operating temperatures up to +85 °C. The two Gigabit Ethernet controllers must be connected to the heat sink to ensure that sufficient heat is absorbed from them. For the standard temperature range (0 °C to +60 °C) the standard heat sink can be used, whereas the CP6000 for extended temperature range (-40 °C to +85 °C) requires a larger heat sink with connection to the Ethernet controller.



Warning!

If the CP6000 is operating at a higher temperature than +70 °C and not sufficient airflow is available, the performance of the Dual Ethernet controller must be reduced either by connecting only one Gigabit Ethernet interface to the controller (one on the front and one on the rear) or by reducing the transfer rate to Fast Ethernet (100 Base-TX). Failure to comply with the above may result in damage to your board.

In order to disable the Ethernet Port, the cable must be removed. If the Ethernet Port is connected to the receiver, it requires the same power regardless of whether the data transfer takes place or not.

The following table indicates the Intel® 82546 Gigabit Dual Ethernet controller power supply characteristics.

Table 7-1: Intel® 82546 Dual Gigabit Ethernet Controller Power Supply

ETHERNET PORTS	SPEED	POWER
BOTH ETHERNET PORTS UNPLUGGED	--	0.65 W
BOTH ETHERNET PORTS PLUGGED (2 X FRONT AND 2 X REAR)	100 Mbs	1 W
BOTH ETHERNET PORTS PLUGGED (2 X FRONT AND 2 X REAR)	1000 Mbs	3.2 W
ONE ETHERNET PORT PLUGGED (1 X FRONT AND 1 X REAR)	1000 Mbs	1.9 W

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Figure 7-1: Pentium® M Temp. Vs. Airspeed Graph with Standard Heat Sink

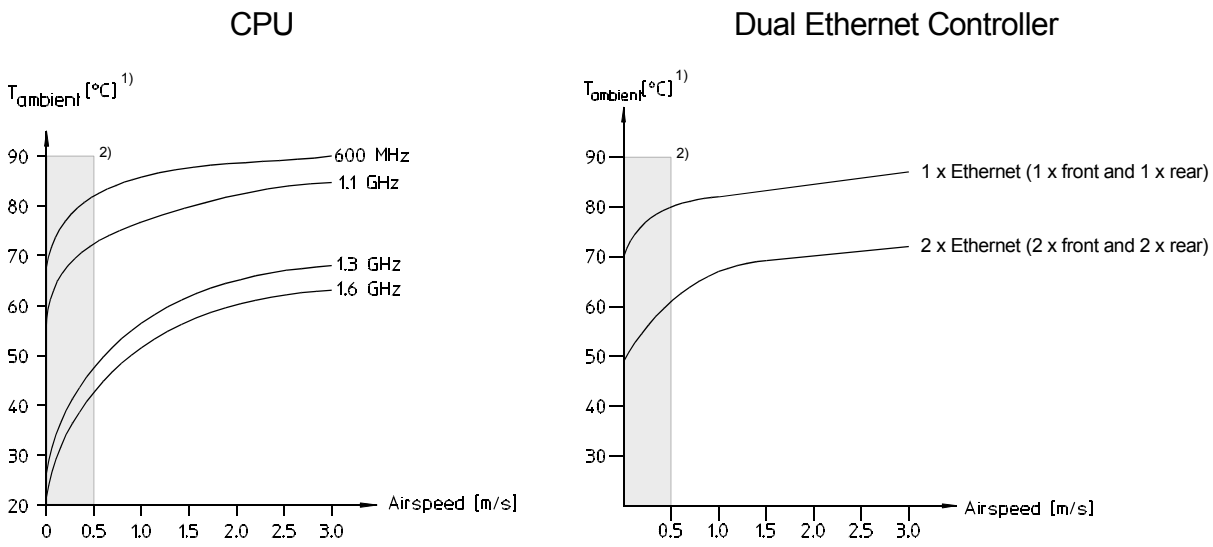
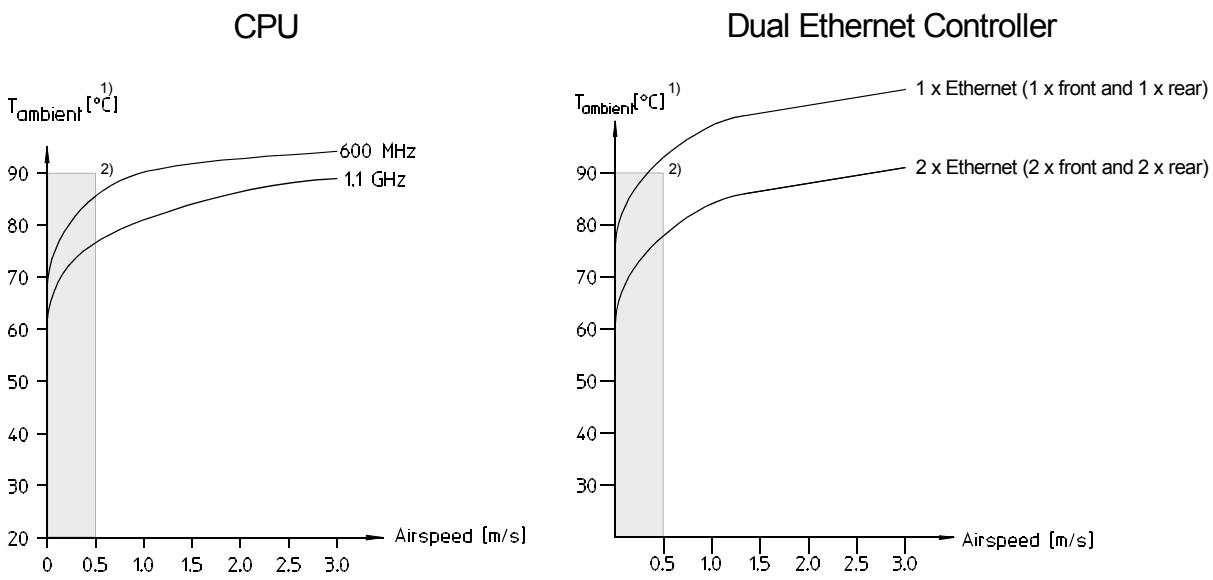


Figure 7-2: Pentium® M Temp. Vs. Airspeed Graph with E2 Heat Sink



Warning!

1) T_a is the initial temperature of the ambient air used for convectional cooling of the board. In a typical installation where the board is mounted vertically in a system rack, this would be the temperature of the air measured at the bottom of the board before the air flows over the board.

2) If the board is to be operated within the shaded area indicated above, it is imperative to verify that it can be safely operated before the board is integrated in an application system. This will require an empirical thermal design analysis and verification by the system designer.

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As individual processor characteristics vary as well as the system environment of the CP6000, the information contained in Figures 7-1 and 7-2 must be viewed as a guide and not as an absolute specification. It is the responsibility of the system integrator to ensure that system requirements are specified accordingly.

An airflow of 1.0 m/s is a typical value for a standard *Kontron* ASM rack (6U CompactPCI rack with a 1U cooling fan tray). Newer ASMs from *Kontron* will have an airspeed of 2.0 m/s or more. For other racks or housings the available airflow will differ. The maximum ambient operating temperature must be recalculated and/or measured for such environments. For the calculation of the maximum ambient operating temperature, the processor junction temperature must never exceed the specified limit for the involved processor type.

7.2.3 Peripherals

When determining the thermal requirements for a given application, peripherals to be used with the CP6000 must also be considered. Devices such as hard disks, PMC modules, etc. which are directly attached to the CP6000 must also be capable of being operated at the temperatures foreseen for the application. It may very well be necessary to revise system requirements to comply with operational environment conditions. In most cases, this will lead to a reduction in the maximum allowable ambient operating temperature or even require active cooling of the operating environment.



Warning!

As Kontron assumes no responsibility for any damage to the CP6000 or other equipment resulting from overheating of the CPU, it is highly recommended that system integrators as well as end users confirm that the operational environment of the CP6000 complies with the thermal considerations set forth in this document.



Note ...

If the CP6000 is ordered for extended temperature range (-40°C to +85°C), some features are limited, for example, the memory runs only with DDR266 (PC2100). As this version comes with a larger heat sink than the standard version, the mounted heat sink extends partly over the area where the HDD is intended to be installed. For this reason, it is not possible to directly install a 2.5" HDD on this CP6000 version.

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Appendix A

CTM80-2 RIO Module

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A. CTM80-2 RIO Module

A.1 Introduction

The CTM80-2 rear I/O module is available for use with the CP6000 6U CompactPCI board from Kontron Modular Computers. This rear I/O module provides comprehensive rear I/O functionality. There are two different CTM80-2 versions available, which have been designed for use both in a PICMG 2.16 and a non-PICMG 2-16 environment.

Everything that can be routed through the front panel may also be routed through the rear I/O. A particular advantage of the rear I/O capability is that there is no cabling on the CPU board, which makes it much easier to remove the CPU in the rack.

The rear I/O is installed in the back of the system into the backplane connectors P3, P4 and P5 in line with the CPU board.

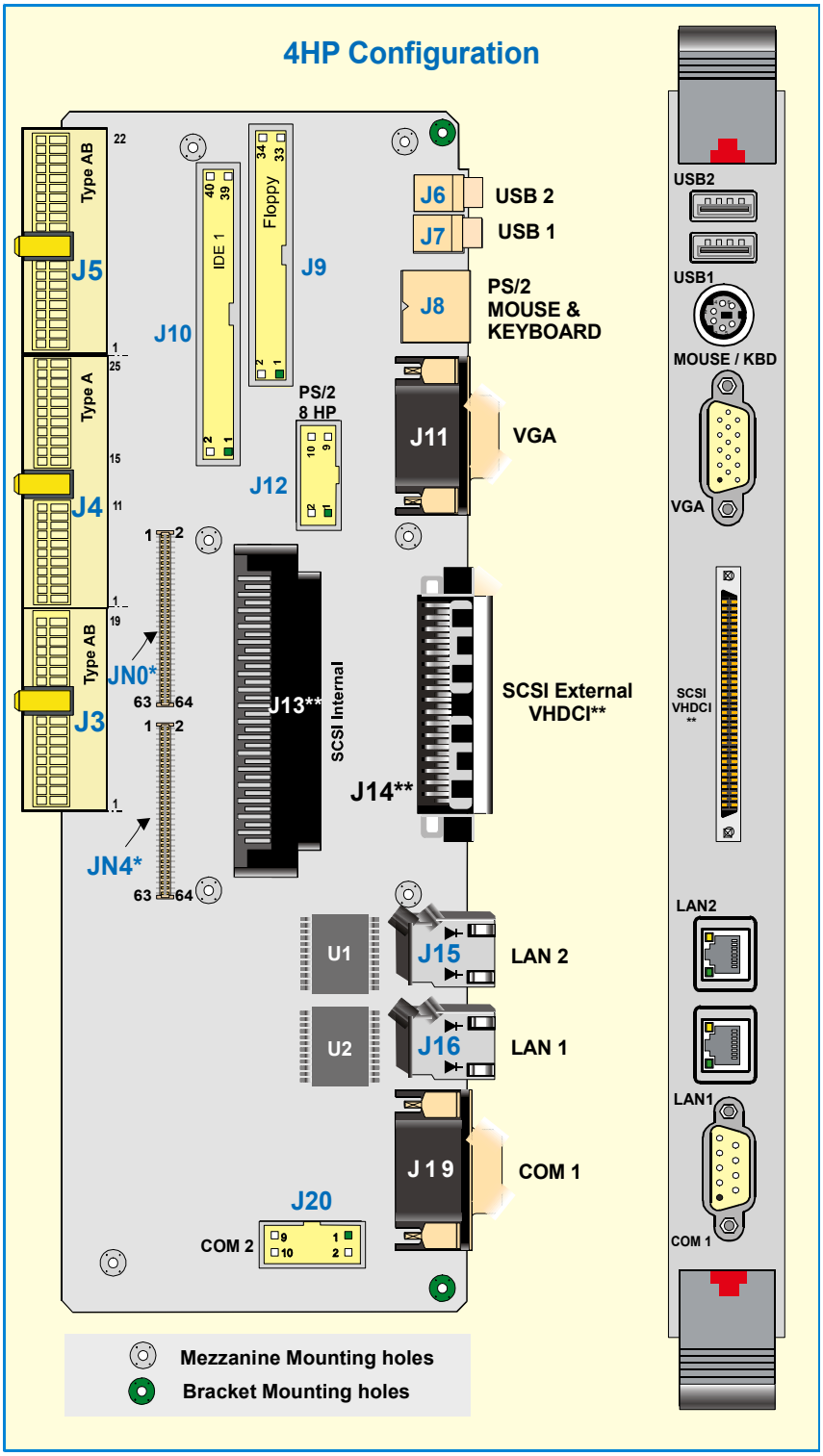
The following figure illustrates the basic board layout including the front panel. For further information regarding connector pinouts refer to the product's Quick Reference Card.

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Figure A-1: CTM80-2 RIO Module, 4HP Variant



Note ...

The CTM80-2 RIO Module supports USB1.1 protocol.

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Appendix B

CP6000-EXT-SATA

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B. CP6000-EXT-SATA

B.1 Overview

The CP6000-EXT-SATA module (order no. CP6000-MK2.5SATA) has been designed for use with the CP6000 6U CompactPCI board from Kontron Modular Computers and enables the user to connect an onboard 2.5" Serial ATA hard disk to the CP6000.

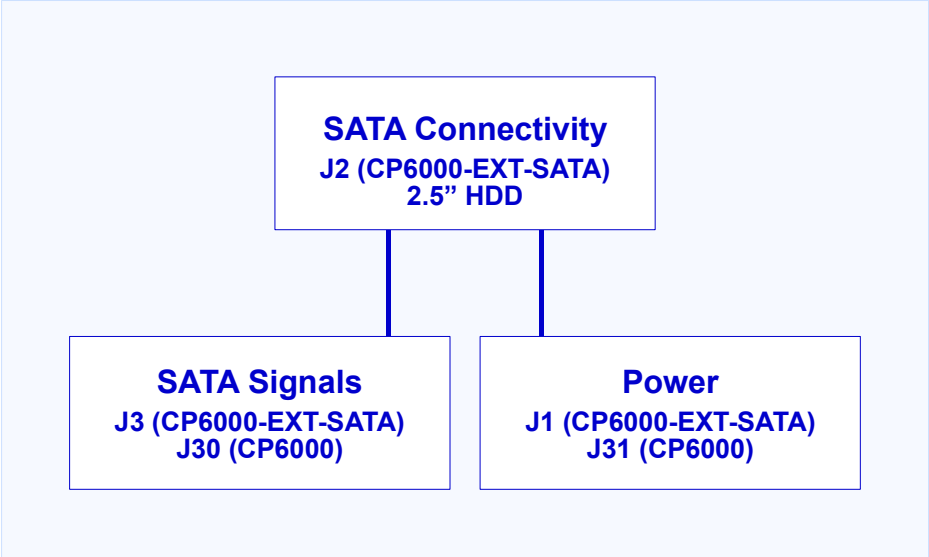
B.2 Technical Specifications

Table B-1: CP6000-EXT-SATA Module Main Specifications

	CP6000-EXT-SATA	SPECIFICATIONS
Interfaces	Board-to-Board Connectors	Two 12-pin, male, board-to-board connectors, J1 and J3
	Serial ATA Connector	One 22-pin Serial ATA connector, J2
General	Power Consumption	3.3 V or 5 V, depending on the hard disk Current 2.5” Serial ATA HDDs do not use 3.3 V.
	Temperature Range	Operating temp.: 0°C to +60°C Storage temp.: -55°C to +85°C
	Climatic Humidity	93% RH at 40°C, non-condensing (acc. to IEC 60068-2-78)
	Dimensions	54 mm x 27.5 mm
	Board Weight	ca. 50 grams (without hard disk)

B.3 CP6000-EXT-SATA Module Functional Block Diagram

Figure B-1: CP6000-EXT-SATA Module Functional Block Diagram



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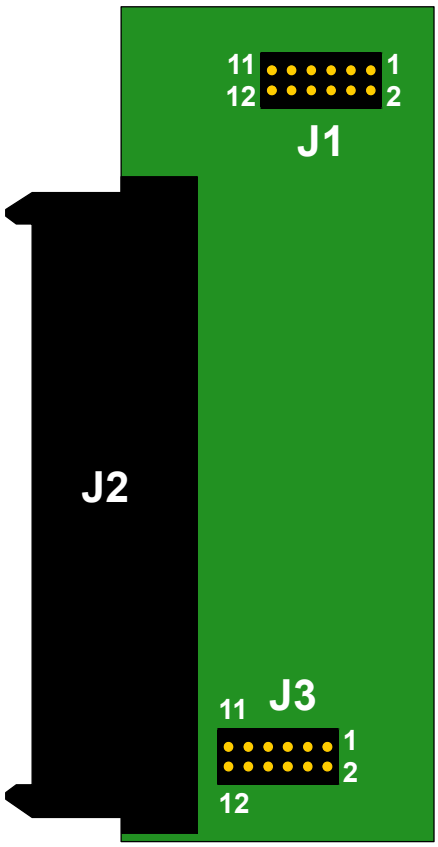
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B.4 CP6000-EXT-SATA Module Layout

The CP6000-EXT-SATA Module includes two board-to-board connectors, J1 and J3, and one SATA connector, J2.

B.4.1 CP6000-EXT-SATA Module Layout

Figure B-2: CP6000-EXT-SATA Module Layout



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B.5 Module Interfaces

B.5.1 Board-to-Board Connectors J1 and J3

The board-to-board connectors, J1 and J3, on the CP6000-EXT-SATA module are connected to the connectors J30 and J31 on the CP6000.

Table B-2: Board-to-Board Connector J3 Pinout

PIN	SIGNAL	FUNCTION	I/O
1	GND	Ground signal	--
2	GND	Ground signal	--
3	SATA_TX2+	Differential Transmit+	O
4	GND	Ground signal	--
5	SATA_TX2-	Differential Transmit-	O
6	GND	Ground signal	--
7	GND	Ground signal	--
8	SATA_RX2+	Differential Receive+	I
9	GND	Ground signal	--
10	SATA_RX2-	Differential Receive-	I
11	GND	Ground signal	--
12	GND	Ground signal	--

Table B-3: Board-to-Board Connector J1 Pinout

PIN	SIGNAL	FUNCTION	I/O
1	GND	Ground signal	--
2	5V	5V power	--
3	GND	Ground signal	--
4	5V	5V power	--
5	GND	Ground signal	--
6	5V	5V power	--
7	GND	Ground signal	--
8	5V	5V power	--
9	GND	Ground signal	--
10	5V	5V power	--
11	GND	Ground signal	--
12	5V	5V power	--

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B.5.2 SATA Connector J2

The SATA connector, J2, on the CP6000-EXT-SATA module is connected to the 2.5” SATA HDD mounted on the CP6000. The SATA connector is divided into two segments, a signal segment and a power segment. .

Figure B-3: SATA Connector J2

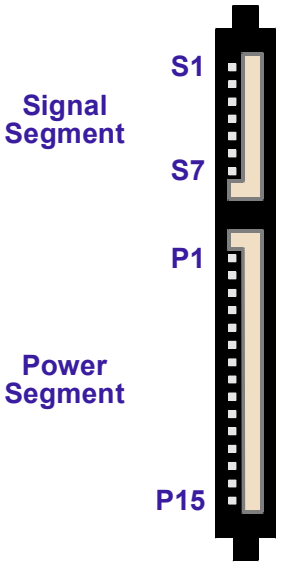


Table B-4: SATA Connector J2 Pinout

PIN	SIGNAL	FUNCTION	I/O
Signal Segment Key			
S1	GND	Ground signal	--
S2	SATA_TX2+	Differential Transmit+	I
S3	SATA_TX2-	Differential Transmit-	I
S4	GND	Ground signal	--
S5	SATA_RX2-	Differential Receive-	O
S6	SATA_RX2+	Differential Receive+	O
S7	GND	Ground signal	--
Signal Segment “L”			
Central Connector Polarizer			
Power Segment “L”			
P1	3.3V	3.3V power	--
P2	3.3V	3.3V power	--
P3	3.3V	3.3V power	--
P4	GND	Ground signal	--
P5	GND	Ground signal	--
P6	GND	Ground signal	--
P7	5V	5V power	--
P8	5V	5V power	--
P9	5V	5V power	--
P10	GND	Ground signal	--
P11	RES	Reserved	--
P12	GND	Ground signal	--
P13	NC (12V)	Not connected	--
P14	NC (12V)	Not connected	--
P15	NC (12V)	Not connected	--
Power Segment Key			

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Appendix C

AMIBIOS8

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C. AMIBIOS8

Attached to this appendix is the original AMIBIOS8 description as modified by Kontron Modular Computers for the CP6000.

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CP6000 Setup for AMIBIOS8

MAN-EZP-80
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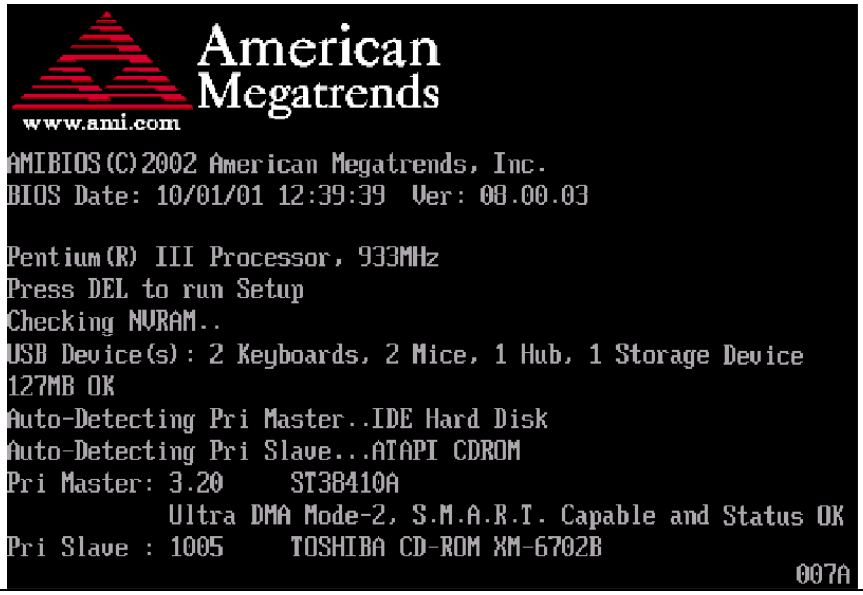
Chapter 1 Starting CP6000

AMIBIOS has been integrated into many motherboards for over a decade. In the past, people often referred to the AMIBIOS setup menu as BIOS, BIOS setup, or CMOS setup.

With the AMIBIOS **Setup** program, you can modify BIOS settings and control the special features of your computer. The Setup program uses a number of menus for making changes and turning the special features on or off.
Kontron refers to this setup as CP6000. This chapter describes the basic navigation of the CP6000 setup screens.

Starting CP6000

To enter the CP6000 setup screens, follow the steps below:

Step	Description
1	Power on the motherboard
2	Press the <Delete> key on your keyboard when you see the following text prompt: `Press DEL to run Setup` 
3	After you press the <Delete> key, the CP6000 main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Chipset and Power menus.

Note: This manual describes the standard look of the CP6000 setup screen. The motherboard manufacturer has the ability to change any and all of the settings described in this manual. This means that some of the options described in this manual do not exist in your motherboard's AMIBIOS.

Note: In most cases, the <Delete> key is used to invoke the CP6000 setup screen. There are a few cases that other keys are used, such as <F1>, <F2>, and so on.

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CP6000 Setup Menu

The CP6000 main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in this user's guide.

The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed-out" options cannot be configured. Options is blue can be.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

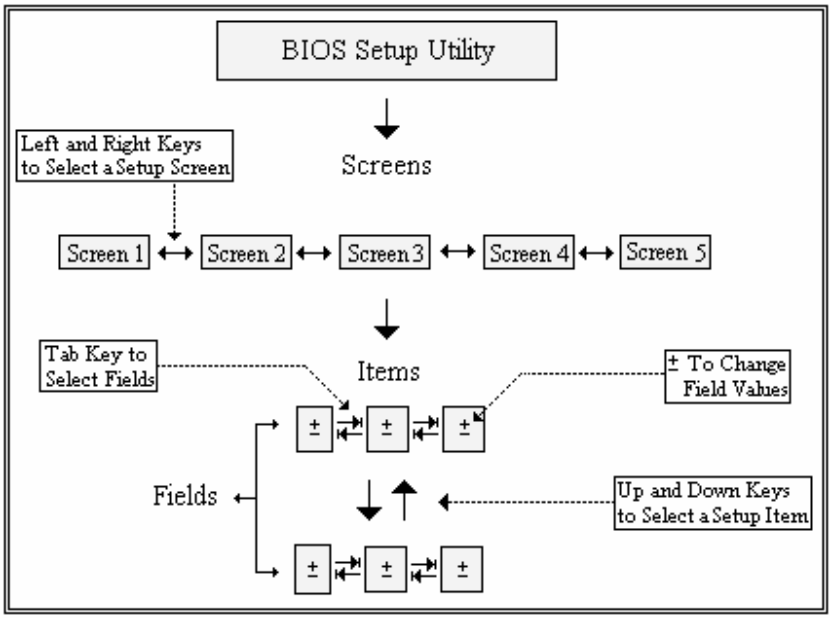


Navigation

The CP6000 BIOS setup/utility uses a key-based navigation system called hot keys. Most of the CP6000 BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.

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Navigation, Continued



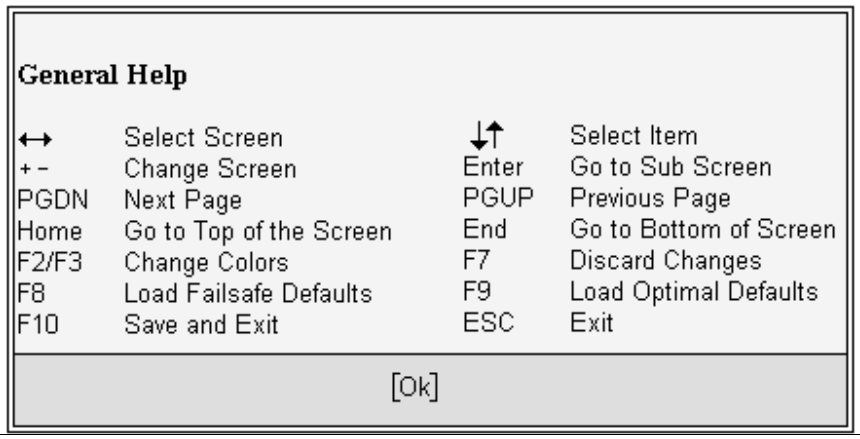
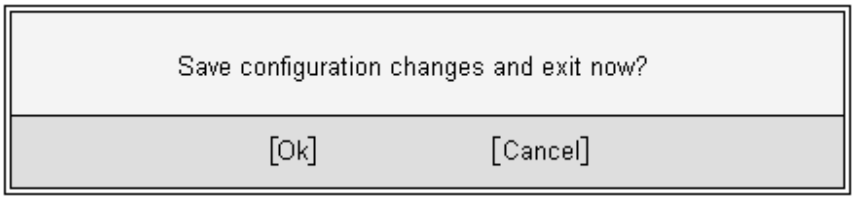
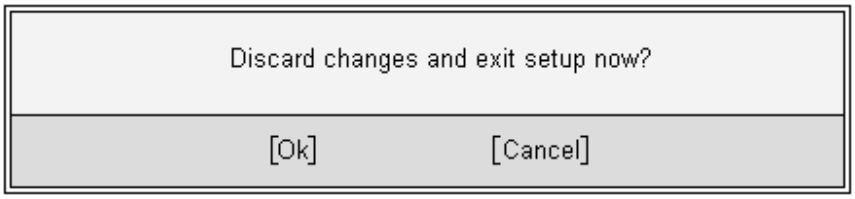
Note: There is a hot key legend located in the right frame on most CP6000 setup screens.

Hot Key	Description
→← Left/Right	The *Left and Right* <Arrow> keys allow you to select a CP6000 setup screen. For example: Main screen, Advanced screen, Chipset screen, and so on.
↑↓ Up/Down	The *Up and Down* <Arrow> keys allow you to select a CP6000 setup item or sub-screen.
+- Plus/Minus	The *Plus and Minus* <Arrow> keys allow you to change the field value of a particular setup item. For example: Date and Time.
Tab	The <Tab> key allows you to select CP6000 setup fields.

Note: The <F8> key on your keyboard is the Fail-Safe key. It is not displayed on the CP6000 key legend by default. To set the Fail-Safe settings of the BIOS, press the <F8> key on your keyboard. It is located on the upper row of a standard 101 keyboard. The Fail-Safe settings allow the motherboard to boot up with the least amount of options set. This can lessen the probability of conflicting settings

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Navigation, Continued

Hot Key	Description
F1	The <F1> key allows you to display the *General Help screen*. Press the <F1> key to open the *General Help screen*. 
F10	The <F10> key allows you to save any changes you have made and exit CP6000 Setup. Press the <F10> key to save your changes. The following screen will appear:  Press the <Enter> key to save the configuration and exit. You can also use the <Arrow> key to select *Cancel* and then press the <Enter> key to abort this function and return to the previous screen.
ESC	The <Esc> key allows you to discard any changes you have made and exit the CP6000 Setup. Press the <Esc> key to exit the CP6000 setup without saving your changes. The following screen will appear:  Press the <Enter> key to discard changes and exit. You can also use the <Arrow> key to select *Cancel* and then press the <Enter> key to abort this function and return to the previous screen.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

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Chapter 2 Main Setup

When you first enter the CP6000 Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the *Main* tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



System Time/System Date

Use this option to change the system time and date. Highlight *System Time* or *System Date* using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.

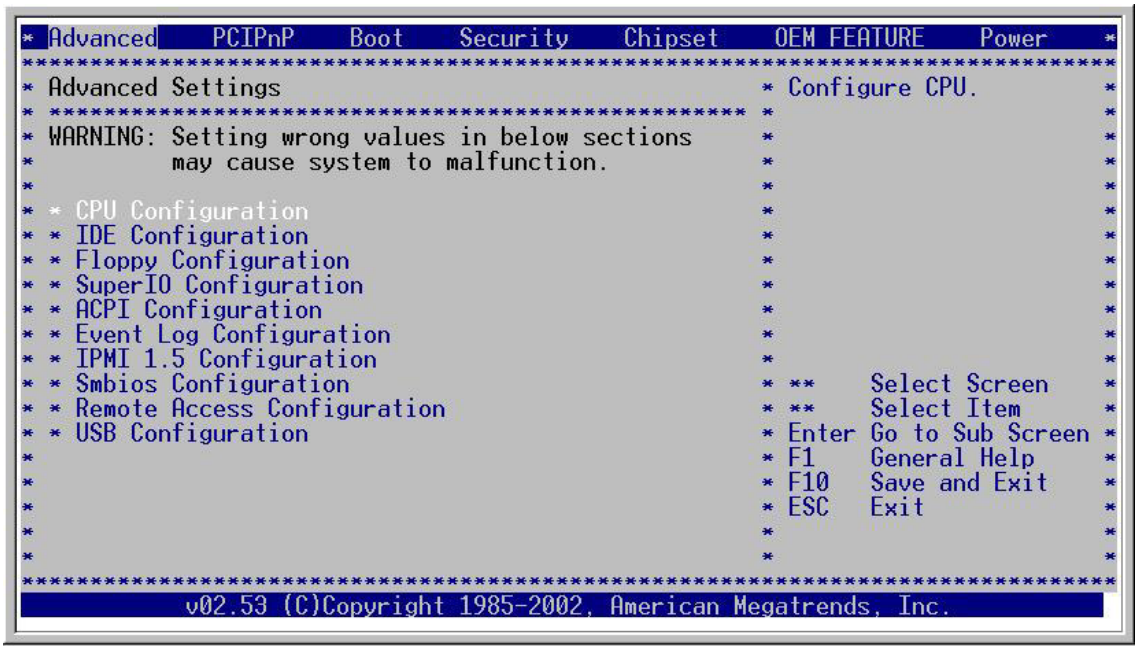
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Chapter 3 Advanced BIOS Setup

Select the *Advanced* tab from the CP6000 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub menus are described on the following pages.



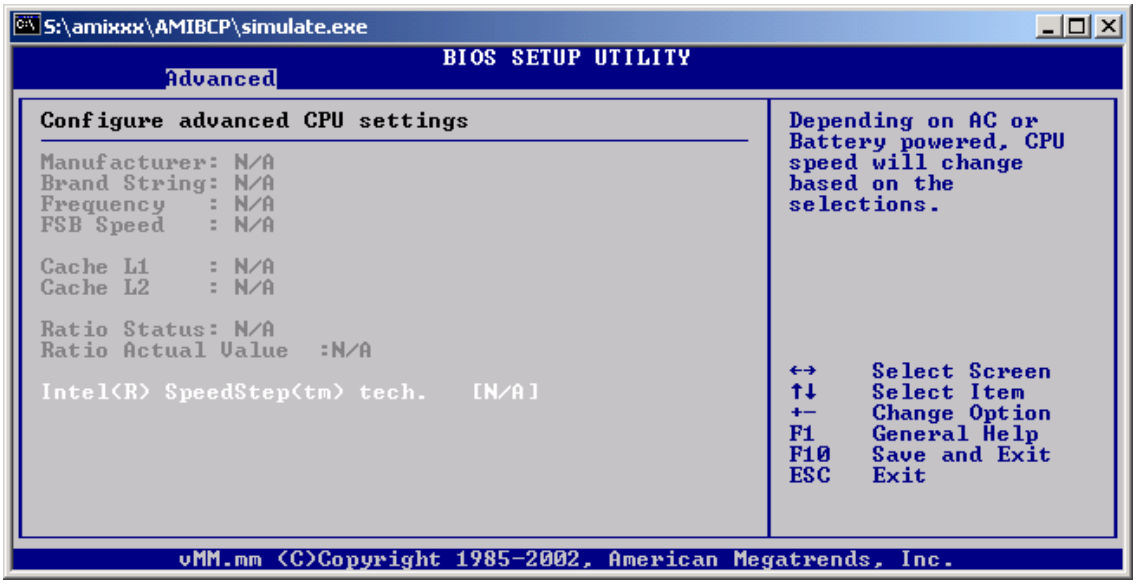
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Advanced BIOS Setup

CPU CONFIGURATION SCREEN

CPU Configuration Settings

You can use this screen for Board information or to select the Intel Speed Step options. Use the <Plus> and <Minus> keys to change the value of the selected option. A description of the item appears on the right side of the screen. The setting is described on the following page. An example of the *CPU Configuration* screen is shown below.



Intel® SpeedStep™ tech.

This item specifies the Intel Speed Step Feature. The settings are *Maximum Performance, Battery Optimized, Reversed, Automatic* and *Disabled.* The Optimal and Fail-Safe default setting is *Maximum Performance.*

If *Maximum Performance* is selected, the BIOS will enable high CPU speed (1.1 GHz or 1.6 GHz).

Using *Automatic* allows the operating system to control the CPU speed. The BIOS will start with high CPU speed.

All other settings will force the BIOS to use low speed (600 MHz).

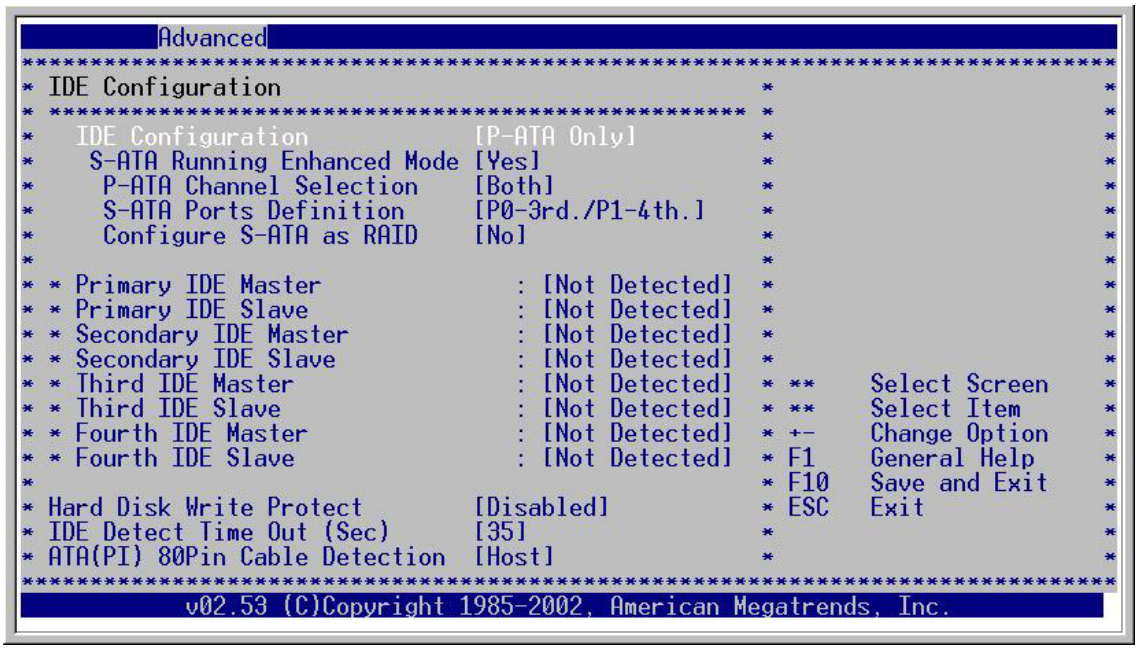
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Advanced BIOS Setup

IDE CONFIGURATION SCREEN

IDE Configuration Settings

You can use this screen to select options for the IDE Configuration Settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on the following pages. An example of the *IDE Configuration* screen is shown below.



IDE Configuration

This item specifies the IDE channels used by the onboard PCI IDE controller. The settings are *Disabled, P-ATA only, S-ATA only* or *P-ATA & S-ATA*. The Optimal and Fail-Safe default setting is *P-ATA Only*.

Option	Description
Disabled	Set this value to prevent the computer system from using the onboard IDE controller.
P-ATA only	Set this value to allow the computer system to detect 4 P-ATA & 2 S-ATA channels. This is the default setting.
S-ATA only	Set this value to allow the computer system to detect 2 S-ATA channels.
P-ATA & S-ATA	Set this value to allow the computer system to detect the 2 P-ATA & 2 S-ATA channels.

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Advanced BIOS Setup, Continued

Primary, Secondary, Third and Fourth IDE Master and Slave

Select one of the hard disk drives to configure it. Press <Enter> to access its sub menu. The options on the sub menu are described in the following sections.

Hard Disk Drive Write Protect

Set this option to protect the hard disk drive from being overwritten. The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	Set this value to allow the hard disk drive to be used normally. Read, write, and erase functions can be performed to the hard disk drive. This is the default setting.
Enabled	Set this value to prevent the hard disk drive from being erased.

IDE Detect Time Out (Seconds)

Set this option to stop the AMIBIOS from searching for IDE devices within the specified number of seconds. Basically, this allows you to fine-tune the settings to allow for faster boot times. Adjust this setting until a suitable timing that can detect all IDE disk drives attached is found. The Optimal and Fail-Safe default setting is *35*.

Option	Description
0	This value is the best setting to use if the onboard IDE controllers are set to a specific IDE disk drive in the AMIBIOS.
5	Set this value to stop the AMIBIOS from searching the IDE bus for IDE disk drives in five seconds. A large majority of ultra ATA hard disk drives can be detected well within five seconds.
10	Set this value to stop the AMIBIOS from searching the IDE bus for IDE disk drives in 10 seconds.
15	Set this value to stop the AMIBIOS from searching the IDE bus for IDE disk drives in 15 seconds.
20	Set this value to stop the AMIBIOS from searching the IDE bus for IDE disk drives in 20 seconds.
25	Set this value to stop the AMIBIOS from searching the IDE bus for IDE disk drives in 25 seconds.
30	Set this value to stop the AMIBIOS from searching the IDE bus for IDE disk drives in 30 seconds.
35	*35* is the default value. It is the recommended setting when all IDE connectors are set to *AUTO* in the AMIBIOS setting.

Note: Different IDE disk drives take longer for the BIOS to locate than others do.

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Advanced BIOS Setup, Continued

ATA (PI) 80-Pin Cable Detection

Set this option to select the method used to detect the ATA (PI) 80 pin cable. The Optimal and Fail-Safe setting is *Host & Device*.

Option	Description
Host & Device	Set this value to use both the motherboard onboard IDE controller and IDE disk drive to detect the type of IDE cable used. This is the default setting.
Host	Set this value to use motherboard onboard IDE controller to detect the type of IDE cable used.
Device	Set this value to use IDE disk drive to detect the type of IDE cable used.

The use of an 80-conductor ATA cable is mandatory for running Ultra ATA/66, Ultra ATA/100 and Ultra ATA/133 IDE hard disk drives. The standard 40-conductor ATA cable cannot handle the higher speeds.

80-conductor ATA cable is plug-compatible with the standard 40-conductor ATA cable. Because of this, the system must determine the presence of the correct cable. This detection is achieved by having a break in one of the lines on the 80-conductor ATA cable that is normally an unbroken connection in the standard 40-conductor ATA cable. It is this break that is used to make this determination. The AMIBIOS can instruct the drive to run at the correct speed for the cable type detected.

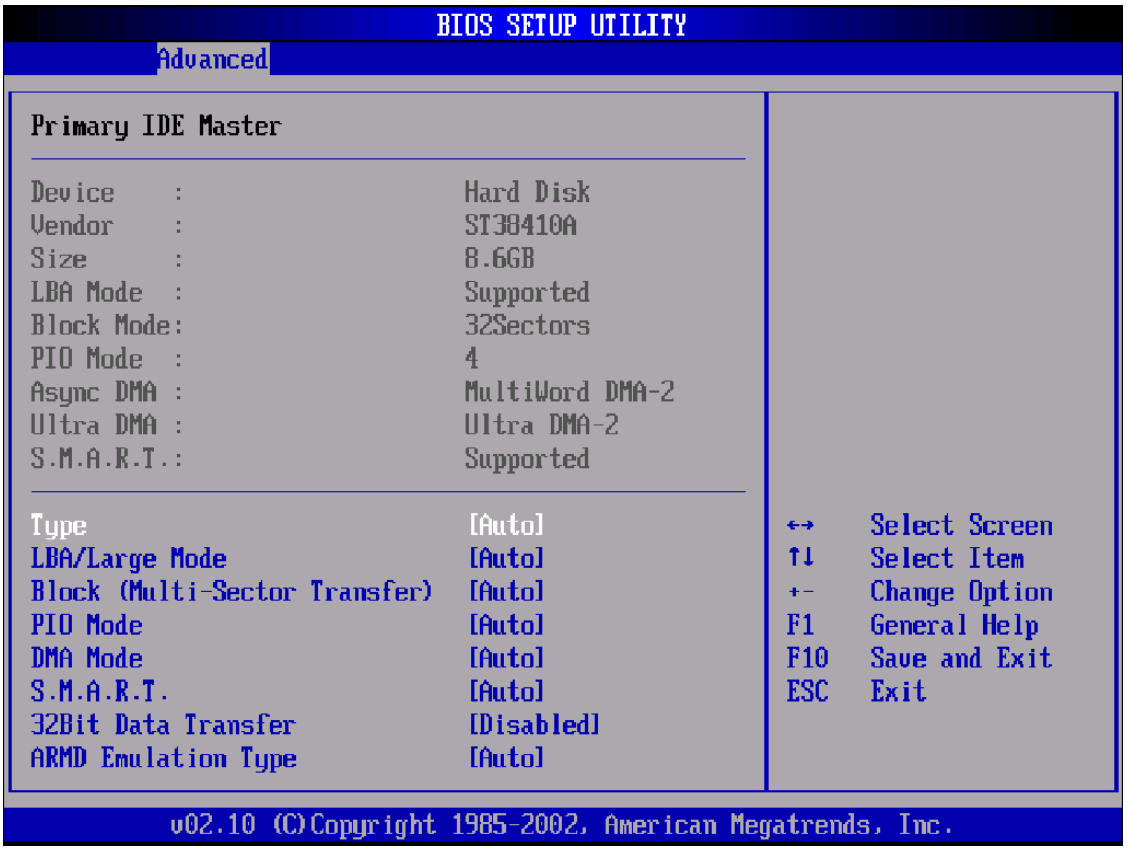
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Advanced BIOS Setup, Continued

PRIMARY, SECONDARY, THIRD AND FOURTH IDE MASTER AND SLAVE SUB MENU

Primary, Secondary, Third and Fourth IDE Master and Slave Settings

From the IDE Configuration screen, press <Enter> to access the sub menu for the primary and secondary IDE master and slave drives. Use this screen to select options for the Primary and Secondary IDE drives. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen for the Primary IDE Master is shown below.



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Advanced BIOS Setup, Continued

Drive Parameters

The "grayed-out" items in the left frame are the IDE disk drive parameters taken from the firmware of the IDE disk drive selected. The drive parameters listed are as follows:

Parameter	Description
Device	Type of device, such as Hard disk drive.
Vendor	Manufacturer of the device.
Size	The size of the device.
LBA Mode	LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your AMIBIOS must be equipped with 48-bit LBA mode addressing. If not, contact your motherboard manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode.
Block Mode	Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.
PIO Mode	IDE PIO mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.
Async DMA	This indicates the highest Asynchronous DMA Mode that is supported.
Ultra DMA	This indicates the highest Synchronous DMA Mode that is supported.
S.M.A.R.T.	Self-Monitoring Analysis and Reporting Technology protocol used by IDE drives of some manufacturers to predict drive failures.

Type

This option sets the type of device that the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) has completed. The Optimal and Fail-Safe default setting is *Auto*.

Option	Description
Not Installed	Set this value to prevent the BIOS from searching for an IDE disk drive on the specified channel.
Auto	Set this value to allow the BIOS auto detect the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel. This is the default setting.
CDROM	This option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The BIOS will not attempt to search for other types of IDE disk drives on the specified channel.
ARMD	This option specifies an ATAPI Removable Media Device. This includes, but is not limited to: • ZIP • LS-120

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB. The Optimal and Fail-Safe default setting is *Auto*.

Note: For drive capacities over 137 GB, your AMIBIOS must be equipped with 48-bit LBA mode addressing. If not, contact your motherboard manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode.

Option	Description
Disabled	Set this value to prevent the BIOS from using Large Block Addressing mode control on the specified channel.
Auto	Set this value to allow the BIOS to auto detect the Large Block Addressing mode control on the specified channel. This is the default setting.

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Advanced BIOS Setup, Continued

Block (Multi-Sector Transfer)

This option sets the block mode multi sector transfers option. The Optimal and Fail-Safe default setting is *Auto.*

Option	Description
Disabled	Set this value to prevent the BIOS from using Multi-Sector Transfer on the specified channel. The data to and from the device will occur one sector at a time.
Auto	Set this value to allow the BIOS to auto detect device support for Multi-Sector Transfers on the specified channel. If supported, Set this value to allow the BIOS to auto detect the number of sectors per block for transfer from the hard disk drive to the memory. The data transfer to and from the device will occur multiple sectors at a time. This is the default setting.

PIO Mode

IDE PIO (Programmable I/O) mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The Optimal and Fail-Safe default setting is *Auto*.

Option	Description
Auto	Set this value to allow the BIOS to auto detect the PIO mode. Use this value if the IDE disk drive support cannot be determined. This is the default setting.
0	Set this value to allow the BIOS to use PIO mode 0. It has a data transfer rate of 3.3 MBs.
1	Set this value to allow the BIOS to use PIO mode 1. It has a data transfer rate of 5.2 MBs.
2	Set this value to allow the BIOS to use PIO mode 2. It has a data transfer rate of 8.3 MBs.
3	Set this value to allow the BIOS to use PIO mode 3. It has a data transfer rate of 11.1 MBs.
4	Set this value to allow the BIOS to use PIO mode 4. It has a data transfer rate of 16.6 MBs. This setting generally works with all hard disk drives manufactured after 1999. For other disk drive, such as IDE CD-ROM drives, check the specifications of the drive.

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Advanced BIOS Setup, Continued

DMA Mode

This setting allows you to adjust the DMA mode options. The Optimal and Fail-Safe default setting is *Auto*.

Option	Description
Auto	Set this value to allow the BIOS to auto detect the DMA mode. Use this value if the IDE disk drive support cannot be determined. This is the default setting.
SWDMA0	Set this value to allow the BIOS to use Single Word DMA mode 0. It has a data transfer rate of 2.1 MBs.
SWDMA1	Set this value to allow the BIOS to use Single Word DMA mode 1. It has a data transfer rate of 4.2 MBs.
SWDMA2	Set this value to allow the BIOS to use Single Word DMA mode 2. It has a data transfer rate of 8.3 MBs.
MWDMA0	Set this value to allow the BIOS to use Multi Word DMA mode 0. It has a data transfer rate of 4.2 MBs.
MWDMA1	Set this value to allow the BIOS to use Multi Word DMA mode 1. It has a data transfer rate of 13.3 MBs.
MWDMA2	Set this value to allow the BIOS to use Multi Word DMA mode 2. It has a data transfer rate of 16.6 MBs.
UDMA0	Set this value to allow the BIOS to use Ultra DMA mode 0. It has a data transfer rate of 16.6 MBs. It has the same transfer rate as PIO mode 4 and Multi Word DMA mode 2.
UDMA1	Set this value to allow the BIOS to use Ultra DMA mode 1. It has a data transfer rate of 25 MBs.
UDMA2	Set this value to allow the BIOS to use Ultra DMA mode 2. It has a data transfer rate of 33.3 MBs.
UDMA3	Set this value to allow the BIOS to use Ultra DMA mode 3. It has a data transfer rate of 44.4 MBs. To use this mode, it is required that an 80-conductor ATA cable is used.
UDMA4	Set this value to allow the BIOS to use Ultra DMA mode 4. It has a data transfer rate of 66.6 MBs. To use this mode, it is required that an 80-conductor ATA cable is used.
UDMA5	Set this value to allow the BIOS to use Ultra DMA mode 5. It has a data transfer rate of 99.9 MBs. To use this mode, it is required that an 80-conductor ATA cable is used.
UDMA6	Set this value to allow the BIOS to use Ultra DMA mode 6. It has a data transfer rate of 133.2 MBs. To use this mode, it is required that an 80-conductor ATA cable is used.

S.M.A.R.T. for Hard Disk Drives

Self-Monitoring Analysis and Reporting Technology (SMART) feature can help predict impending drive failures. The Optimal and Fail-Safe default setting is *Auto*.

Option	Description
Auto	Set this value to allow the BIOS to auto detect hard disk drive support. Use this setting if the IDE disk drive support cannot be determined. This is the default setting.
Disabled	Set this value to prevent the BIOS from using the SMART feature.
Enabled	Set this value to allow the BIOS to use the SMART feature on support hard disk drives.

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Advanced BIOS Setup, Continued

32Bit Data Transfer

This option sets the 32-bit data transfer option. The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	Set this value to prevent the BIOS from using 32-bit data transfers. This is the default setting.
Enabled	Set this value to allow the BIOS to use 32-bit data transfers on support hard disk drives.

ARMD Emulation Type

ATAPI Removable Media Device (ARMD) is a device that uses removable media, such as the LS120, MO (Magneto-Optical), or Iomega Zip drives. If you want to boot up from media on an ARMD, it is required that you emulate boot up from a floppy or hard disk drive. This is especially necessary when trying to boot to DOS. You can select the type of emulation used if you are booting from such a device. The Optimal and Fail-Safe default setting is *Auto*.

Option	Description
Auto	Set this value to allow the BIOS to automatically set the emulation used by ARMD. This is the default setting.
Floppy	Set this value for ARMD to emulate a floppy drive during boot up.
Hard disk drive	Set this value for ARMD to emulate a hard disk drive during boot up.

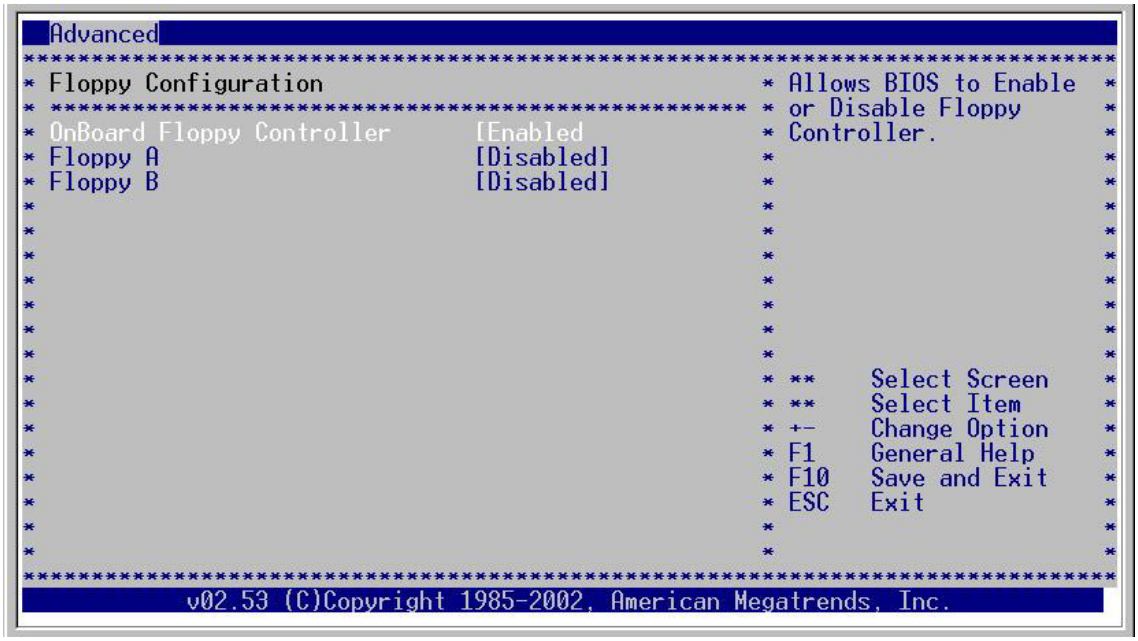
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Advanced BIOS Setup, Continued

FLOPPY CONFIGURATION SCREEN

Floppy Configuration Settings

You can use this screen to specify options for the Floppy Configuration Settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



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Advanced BIOS Setup, Continued

Onboard Floppy Controller

This option controls the legacy disk controller. The Optimal and Fail-Safe default setting is *Disabled.*

Option	Description
Disabled	Disabled turns off all legacy diskette drives. This is the default setting.
Enabled	Enables the onboard legacy diskette controller.

Floppy Drive A: and B:

Move the cursor to these fields via up and down <arrow> keys. Select the floppy type. The Optimal setting for floppy drive A: is *1.44 MB 3½".* The Fail-Safe setting for floppy drive A: is *1.44 MB 3½".* The Optimal setting for floppy drive B: is *Disabled.* The Fail-Safe setting for floppy drive B: is *Disabled*.

Option	Description
Disabled	Set this value to prevent the use of the selected floppy disk drive channel. This option should be set if no floppy disk drive is installed on the specified channel. This is the default setting for *Floppy Drive B*.
360 KB 5 ¼"	Set this value if the floppy disk drive attached to the corresponding channel is a 360 KB 5¼" floppy disk drive.
1.2 MB 5 ¼"	Set this value if the floppy disk drive attached to the corresponding channel is a 1.2 MB 5¼" floppy disk drive.
720 KB 3 ½"	Set this value if the floppy disk drive attached to the corresponding channel is a 720 KB 3½" floppy disk drive.
1.44 MB 3 ½"	Set this value if the floppy disk drive attached to the corresponding channel is a 1.44 MB 3½" floppy disk drive. This is the default setting for *Floppy Drive A*.

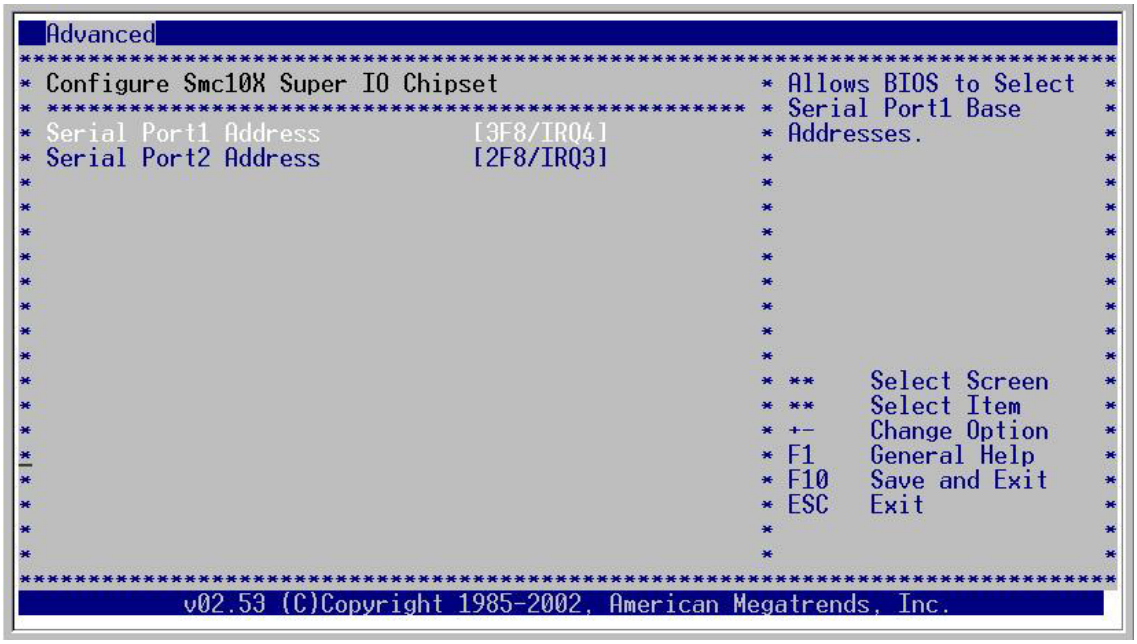
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Advanced BIOS Setup, Continued

SUPER IO CONFIGURATION SCREEN

SuperIO Configuration Screen

You can use this screen to select options for the Super I/O settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



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Advanced BIOS Setup, Continued

Serial Port1 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 1. The Optimal setting is *3F8/IRQ4*. The Fail-Safe default setting is *Disabled.*

Option	Description
Disabled	Set this value to prevent the serial port from accessing any system resources. When this option is set to *Disabled*, the serial port physically becomes unavailable.
3F8/IRQ4	Set this value to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. This is the default setting. The majority of serial port 1 or COM1 ports on computer systems use IRQ4 and I/O Port 3F8 as the standard setting. The most common serial device connected to this port is a mouse. If the system will not use a serial device, it is best to set this port to *Disabled*.
2F8/IRQ3	Set this value to allow the serial port to use 2F8 as its I/O port address and IRQ 3 for the interrupt address. If the system will not use a serial device, it is best to set this port to *Disabled*.
3E8/IRQ4	Set this value to allow the serial port to use 3E8 as its I/O port address and IRQ 4 for the interrupt address. If the system will not use a serial device, it is best to set this port to *Disabled*.
2E8/IRQ3	Set this value to allow the serial port to use 2E8 as its I/O port address and IRQ 3 for the interrupt address. If the system will not use a serial device, it is best to set this port to *Disabled*.

Serial Port2 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 2. The Optimal setting is *2F8/IRQ3*. The Fail-Safe setting is *Disabled.*

Option	Description
Disabled	Set this value to prevent the serial port from accessing any system resources. When this option is set to *Disabled*, the serial port physically becomes unavailable.
3F8/IRQ4	Set this value to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. If the system will not use a serial device, it is best to set this port to Disabled.
2F8/IRQ3	Set this value to allow the serial port to use 2F8 as its I/O port address and IRQ 3 for the interrupt address. This is the default setting. The majority of serial port 2 or COM2 ports on computer systems use IRQ3 and I/O Port 2F8 as the standard setting. The most common serial device connected to this port is an external modem. If the system will not use an external modem, set this port to *Disabled*. **Note:** Most internal modems require the use of the second COM port and use 3F8 as its I/O port address and IRQ 4 for its interrupt address. This requires that the Serial Port2 Address be set to *Disabled* or another base I/O port address and Interrupt Request address.
3E8/IRQ4	Set this value to allow the serial port to use 3E8 as its I/O port address and IRQ 4 for the interrupt address. If the system will not use a serial device, it is best to set this port to Disabled.
2E8/IRQ3	Set this value to allow the serial port to use 2E8 as its I/O port address and IRQ 3 for the interrupt address. If the system will not use a serial device, it is best to set this port to *Disabled*.

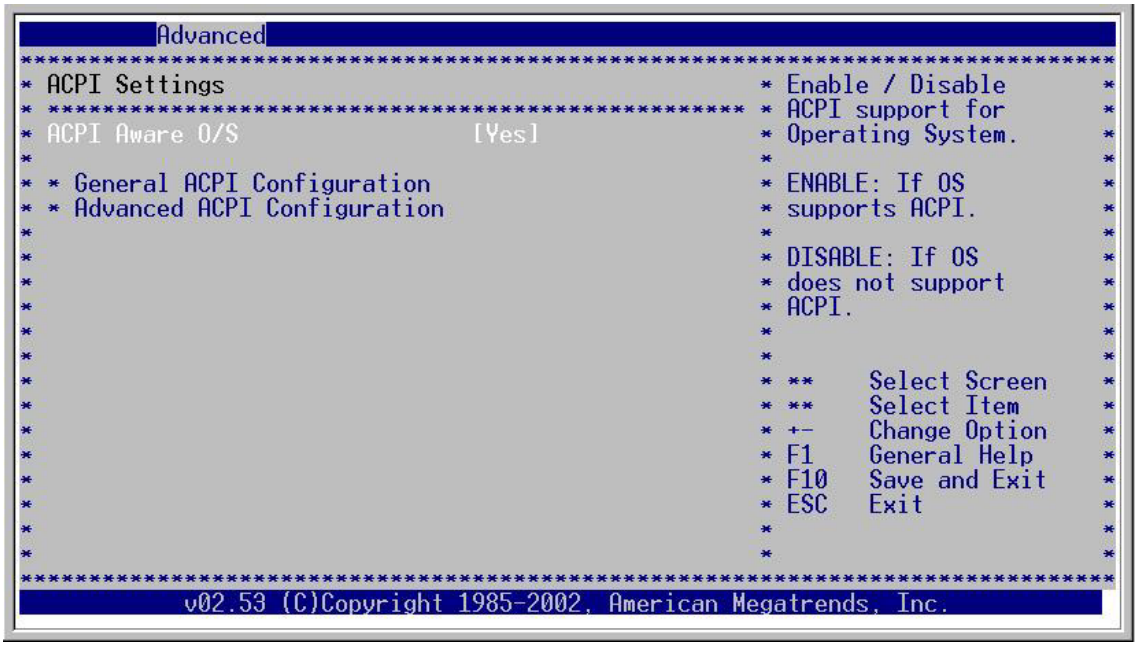
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Advanced BIOS Setup, Continued

ACPI CONFIGURATION SCREEN

Select the *ACPI Configuration* Menu to enter the ACPI BIOS Setup screen. You can select General ACPI Configuration or Advanced ACPI Configuration in the left frame of the screen to go to the sub menus for that item. You can display an ACPI BIOS Setup option by highlighting it using the <Arrow> keys. All ACPI BIOS Setup options are described in this section. The ACPI BIOS Setup screen is shown below.



ACPI Aware O/S

Set this value to allow the system to utilize the Intel ACPI (Advanced Configuration and Power Interface) specification. The Optimal and Fail-Safe default setting is *Yes*.

Option	Description
No	This setting should be set if the operating system in use does not comply with the ACPI (Advanced Configuration and Power Interface) specification. DOS®, Windows 3.x®, and Windows NT® are examples of non-ACPI aware operating systems.
Yes	This setting should be set if the operating system complies with the ACPI (Advanced Configuration and Power Interface) specification. This is the default setting. Windows 95®, Windows 98® and Windows 2000® are examples of ACPI aware operating systems.

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Advanced BIOS Setup, Continued

General ACPI Configuration

Suspend Mode

Select the ACPI state used for System Suspend.

Repost Video on S3 Resume

Set this value to allow video repost support.

Option	Description
No	This setting prevents the video BIOS to be initialized coming out of the S3 state.
Yes	This setting allows the video BIOS to be initialized coming out of the S3 state. Some video controllers require this option to be enabled. This is the default setting.

Note: In some cases, the ACPI Setup screen will not appear even if the BIOS supports the Advanced Configuration and Power Interface (ACPI).

S4 BIOS Support

Enable S4BIOS support if S4 (Hibernation) is not supported by OS.

Advanced ACPI Configuration

You can use this screen to select options for the ACPI Advanced Configuration Settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on this page. The screen is shown below.

ACPI 2.0 Feature

Set this value to allow or prevent the system to be complaint with the ACPI 2.0 specification.

Option	Description
No	This setting prevents the BIOS from supporting the ACPI 2.0 specification.
Yes	This setting allows the BIOS to support the ACPI 2.0 specification.

ACPI APIC Support

Include ACPI APIC table pointer to RSDT pointer list.

APIC ACPI SCI IRQ

Enable RSDP pointers to 64 Bit fixed System Description Table.

AMI OEMB Table

Include OEMB table pointer to R(X)SDT pointer list.

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Advanced BIOS Setup, Continued

RSDT

RSDT is the main ACPI table. It has no fixed place in memory. During the boot up process, the BIOS locates a pointer to the table during the memory scan. A Root System Descriptor Pointer (RSDP) is located in low memory space of the system. It provides the physical address of the RSDT. The RSDT itself is identified in memory because it starts with the signature "RSDT." Following the signature is an array of pointers that tell the operating system the location of other description tables that provide it with the information it needs about the standards defined on the current system and individual devices.

AML

ACPI Machine Language (AML) is a binary code format that the operating system's ACPI AML interpreter parses to discover the machine's properties. On boot up the BIOS startup code copies it into system memory, where it can be interpreted by the operating system's ACPI AML interpreter.

Headless Mode

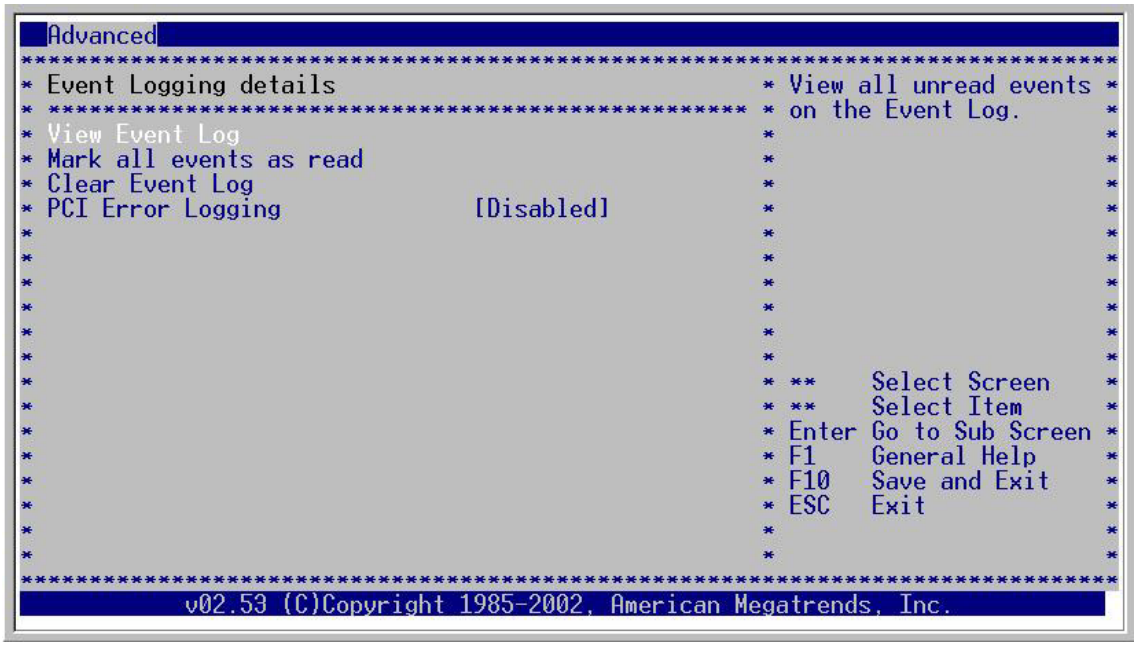
This option is used to update the ACPI FACP table to indicate headless operations.

Option	Description
Disabled	This option disables updating the ACPI FACP table to indicate headless operation.
Enabled	This option enables updating the ACPI FACP table to indicate headless operation.

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Advanced BIOS Setup, Continued

EVENT LOG CONFIGURATION SCREEN



View Event Log

A pop up window displays all unread events. e.g. 01/01/02 13:12:56
CMOS time not set

Mark all events as read

Mark all unread events as read and clear the Event Log buffer.

Clear Event Log

Discard all events in the Event Log.

PCI Error Logging

Enable the PCI Error Logging.

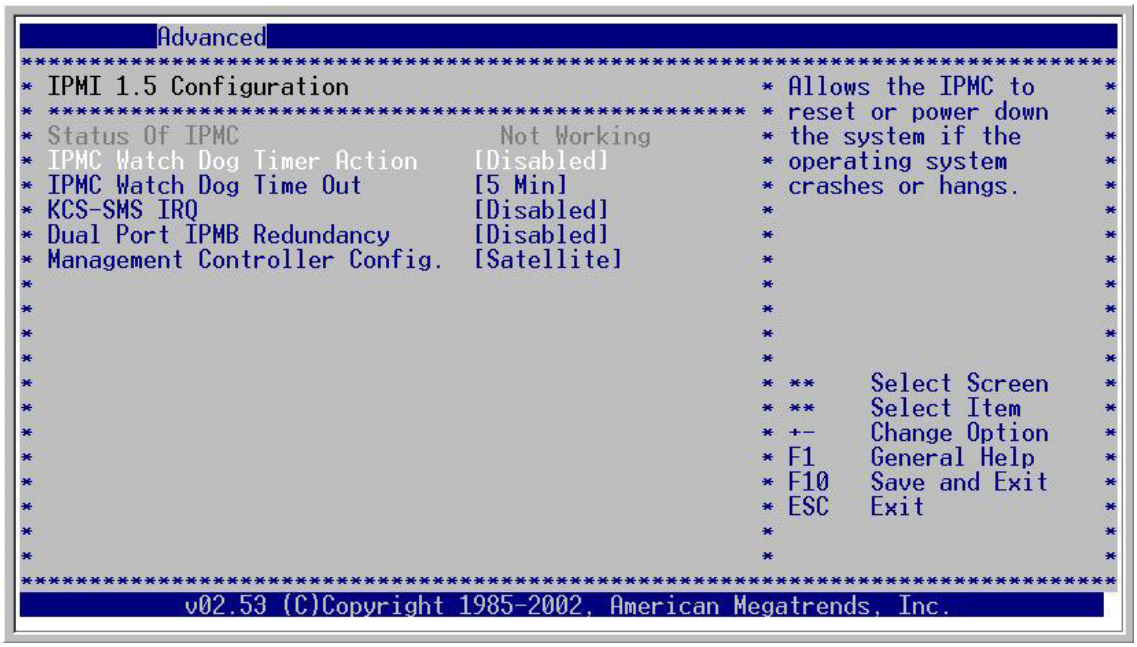
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Advanced BIOS Setup, Continued

IPMI 1.5 CONFIGURATION SCREEN

IPMI 1.5 Configuration

You can use this screen to select options for the IPMI 1.5 Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



IPMC Watchdog Timer Action

This item specifies the IPMC watchdog timer actions and allows the IPMC to reset or power down the system if the operating system crashes or hangs. The settings are *Disabled*, *Reset System*, *Power Down,* or *Power Cycle*. The Optimal and Fail-Safe default setting is *Disabled.*

Option	Description
Disabled	Set this value to prevent the computer system from using the IPMC watchdog timer. This is the default setting.
Reset System	Set this value to reset the computer system.
Power Down	Set this value to power down the computer system.
Power Cycle	Set this value to power cycle the computer system.

IPMC Watchdog Time Out

This item specifies the amount of time for the IPMC to wait before assuming the system has crashed and needs to be reset. The settings are *5 Min*, *1 Min*, *30 Sec* or *10 Sec*. The Optimal and Fail-Safe default setting is *5 Min.*

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Advanced BIOS Setup, Continued

KCS-SMS IRQ

This option is used to select the IRQ for the system management software. The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	No IRQ is reserved. This is the default setting.
IRQ5/IRQ7	Set this value to allow the computer system to select IRQ5/IRQ7 for the System Management Software.

Dual Port IPMB Redundancy

This option is used to select the dual port Intelligent Platform Management Bus (IPMB) redundancy. The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	IPMB0 and IPMB1 operate as separate channels.
Enabled	IPMB1 is hidden behind IPMB0 and used as a redundancy channel.

Management Controller Configuration

This option is used to select the Management Controller Configuration. The Optimal and Fail-Safe default setting is *Satellite*.

Option	Description
Baseboard	Set this value to allow the computer system to use the Management Controller located on the baseboard.
Satellite	The board is a Satellite Management Controller under the control of an external Central Management Controller.

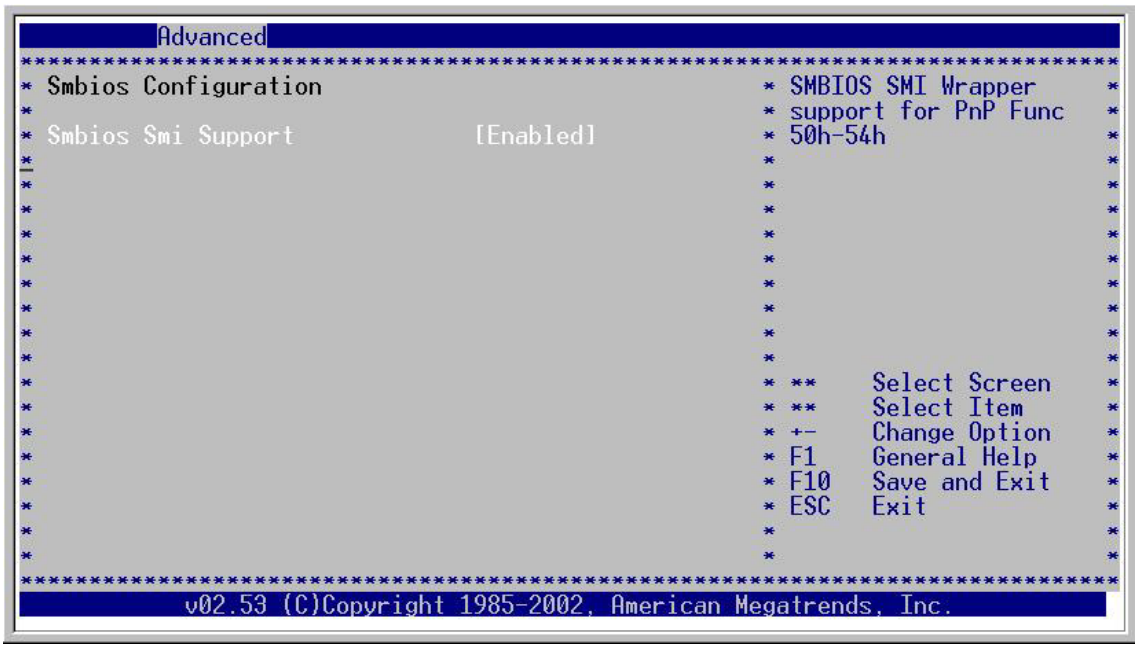
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Advanced BIOS Setup, Continued

SMBIOS CONFIGURATION SCREEN

SMBIOS Configuration

You can use this screen to select options for the SMBIOS Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



SMBIOS SMI Support

Enables the SMBIOS SMI Support. The Optimal and Fail-Safe default setting is *Enabled.*

Option	Description
Disabled	This option disables the SMBIOS SMI Support.
Enabled	This option enables the SMBIOS SMI Support for the PNP Function 50 h – 54 h. This is the default setting.

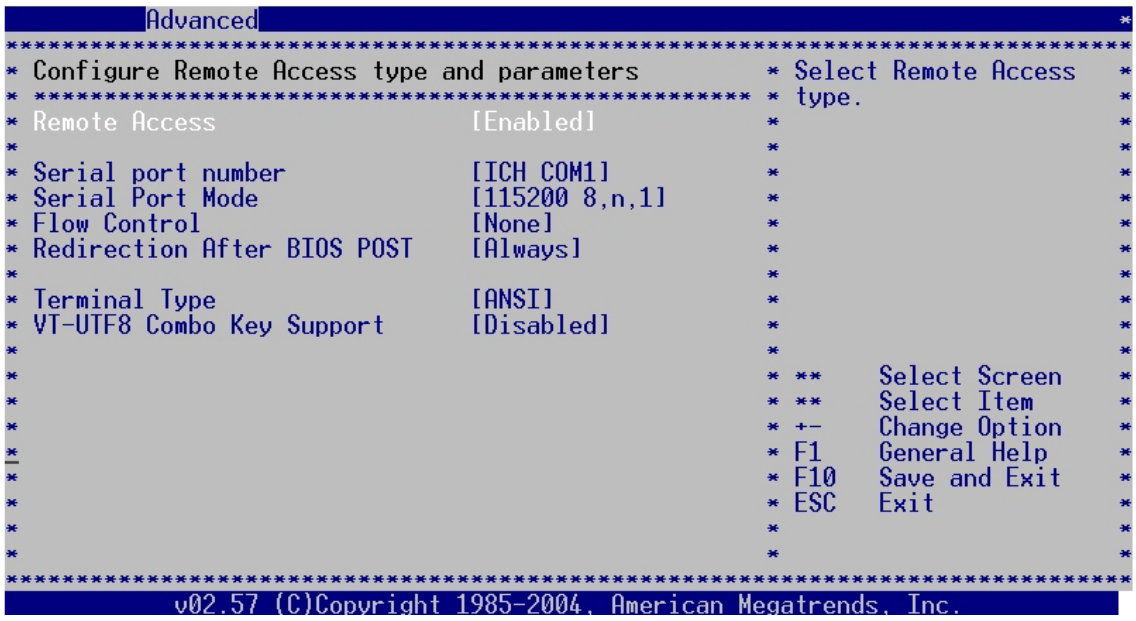
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Advanced BIOS Setup, Continued

REMOTE ACCESS CONFIGURATION SCREEN

Remote Access Configuration

You can use this screen to select options for the Remote Access Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



Remote Access

You can disable or enable the BIOS remote access feature here. The Optimal and Fail-Safe default setting is *Enabled.*

Option	Description
Disabled	Set this value to prevent the BIOS from using Remote Access.
Enabled	Set the value for this option to *Enabled* to allow the system to use the remote access feature. The remote access feature requires a dedicated serial port connection. This is the default setting.

Serial Port Number

Select the serial port you want to use for console redirection. You can set the value for this option to either *ICH COM1* or *ICH COM2*. The Optimal and Fail-Safe default setting is *ICH COM1*.

Option	Description
ICH COM1	Set this value to allow the system to use ICH COM1 (Communication port1) for the remote access interface. This is the default setting.
ICH COM2	Set this value to allow the system to use ICH COM2 (Communication port2) for the remote access interface.

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Advanced BIOS Setup, Continued

Serial Port Mode

Select the baud rate you want the serial port to use for console redirection. The Optimal and Fail-Safe default setting is *115200 8,n,1*.

Option	Description
115200 8,n,1	Set this value to allow you to select 115200 as the baud rate (transmitted bits per second) of the serial port.
57600 8,n,1	Set this value to allow you to select 57600 as the baud rate (transmitted bits per second) of the serial port.
38400 8,n,1	Set this value to allow you to select 38400 as the baud rate (transmitted bits per second) of the serial port.
19200 8,n,1	Set this value to allow you to select 19200 as the baud rate (transmitted bits per second) of the serial port.
09600 8,n,1	Set this value to allow you to select 09600 as the baud rate (transmitted bits per second) of the serial port.

Flow Control

This option is used to select the flow control for console redirection. The Optimal and Fail-Safe default setting is *None*.

Option	Description
Hardware	Set this value to select the flow control by hardware.
Software	Set this value to select the flow control by software.
None	No flow control is activated.

Redirection After BIOS POST

This option is used to select redirection after BIOS POST. The Optimal and Fail-Safe default setting is *Always*.

Option	Description
Disabled	Set this value to turn off the redirection after POST.
BootLoader	Set this value to activate the redirection during POST and during BootLoader.
Always	The redirection is always active.

Terminal Type

This option is used to select the target terminal type. The Optimal and Fail-Safe default setting is *ANSI*.

Option	Description
ANSI	Set this value to select the target terminal type.
VT100	Set this value to select the target terminal type.
VT-UTF8	Set this value to select the target terminal type.

VT-UTF8 Combo Key Support

This option is used to enable or disable the VT-UTF8 combo key support. The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	Set this value to disable the VT-UTF8 combination key support for the ANSI/VT100 terminals.
Enabled	Set this value to enable the VT-UTF8 combination key support for the ANSI/VT100 terminals.

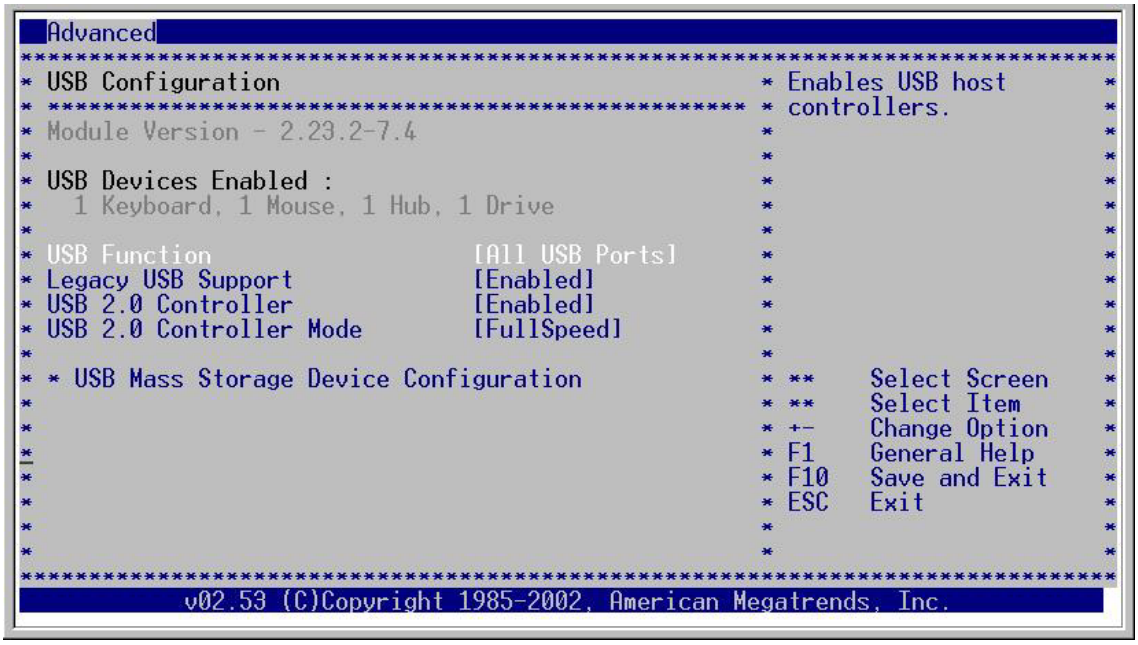
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Advanced BIOS Setup, Continued

USB CONFIGURATION SCREEN

USB Configuration

You can use this screen to select options for the USB Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



USB Function

Set this value to allow the system to enable or disable the onboard USB ports. The Optimal and Fail-Safe default setting is *All USB Ports*.

Option	Description
Disabled	This setting makes the onboard USB ports unavailable.
2 USB Ports	This setting allows the use of the two USB ports.
All USB Ports	This setting allows the use of the all USB ports. This is the default setting.

Legacy USB Support

Set this value to allow the system to enable or disable the legacy USB support. The Optimal and Fail-Safe default setting is *Enabled*.

Option	Description
Disabled	Set this value to disable the legacy USB support.
Enabled	Set this value to enable the legacy USB support. This is the default setting.
Auto	Set this value to disable the legacy USB support if no USB devices are connected.

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Advanced BIOS Setup, Continued

USB 2.0 Controller

Set this value to allow the system to enable or disable the USB 2.0 controller. The Optimal and Fail-Safe default setting is *Enabled*.

Option	Description
Disabled	Set this value to disable the USB 2.0 controller.
Enabled	Set this value to enable the USB 2.0 controller. This is the default setting.

USB 2.0 Controller Mode

Set this value to allow the system to configure the USB 2.0 controller. The Optimal default setting is *Full Speed*. The Fail-Safe default setting is *HiSpeed*.

Option	Description
Full Speed	Set this value to configure the USB 2.0 controller in Full Speed (12 Mbps).
HiSpeed	Set this value to configure the USB 2.0 controller in HiSpeed (480 Mbps).

USB Mass Storage Device Configuration

Configure the USB Mass Storage Class Devices. More Information displays the BIOS help.

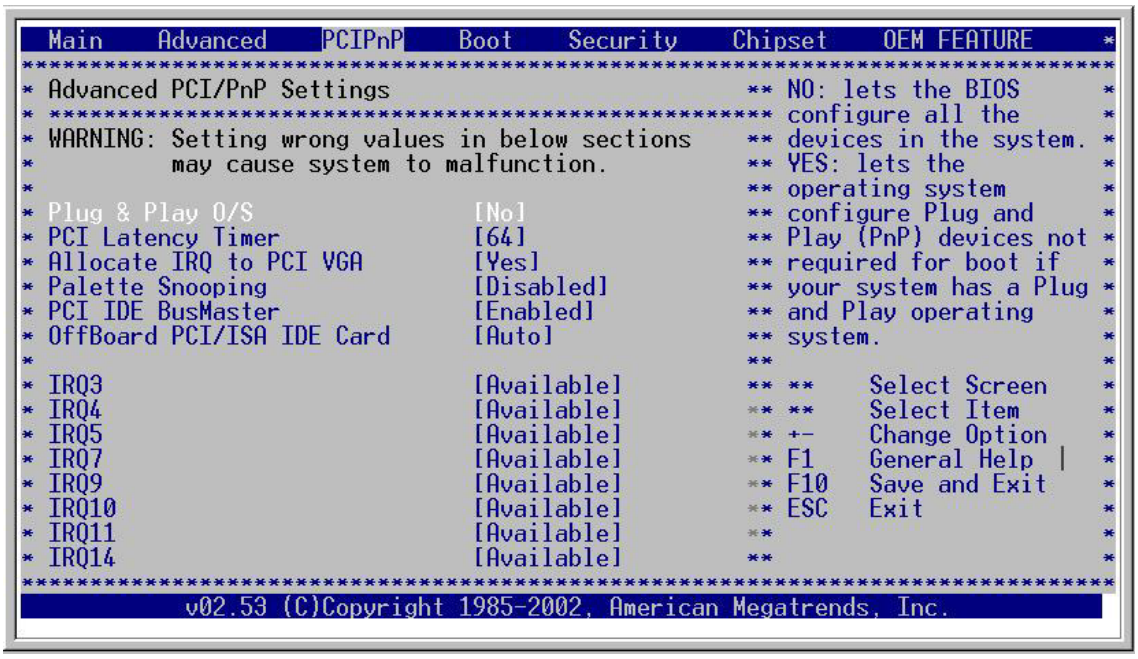
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Chapter 4 PCI/PnP Setup

Select the *PCI/PnP* tab from the CP6000 setup screen to enter the Plug and Play BIOS Setup screen. You can display a Plug and Play BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.



Plug and Play O/S

Set this value to allow the system to modify the settings for Plug and Play operating system support. The Optimal and Fail-Safe default setting is *No*.

Option	Description
No	The *No* setting is for operating systems that do not meet the Plug and Play specifications. It allows the BIOS to configure all the devices in the system. This is the default setting.
Yes	The *Yes* setting allows the operating system to change the interrupt, I/O, and DMA settings. Set this option if the system is running Plug and Play aware operating systems.

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PCI/PnP Setup, Continued

PCI Latency Timer

Set this value to allow the PCI Latency Timer to be adjusted. This option sets the latency of all PCI devices on the PCI bus. The Optimal and Fail-Safe default setting is *64*.

Option	Description
32	This option sets the PCI latency to 32 PCI clock cycles.
64	This option sets the PCI latency to 64 PCI clock cycles. This is the default setting.
96	This option sets the PCI latency to 96 PCI clock cycles.
128	This option sets the PCI latency to 128 PCI clock cycles.
160	This option sets the PCI latency to 160 PCI clock cycles.
192	This option sets the PCI latency to 192 PCI clock cycles.
224	This option sets the PCI latency to 224 PCI clock cycles.
248	This option sets the PCI latency to 248 PCI clock cycles.

Allocate IRQ to PCI VGA

Set this value to allow or restrict the system from giving the VGA adapter card an interrupt address. The Optimal and Fail-Safe default setting is *Yes*.

Option	Description
Yes	Set this value to allow the allocation of an IRQ to a VGA adapter card that uses the PCI local bus. This is the default setting.
No	Set this value to prevent the allocation of an IRQ to a VGA adapter card that uses the PCI local bus.

Palette Snooping

Set this value to allow the system to modify the Palette Snooping settings. The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	This is the default setting and should not be changed unless the VGA card manufacturer requires Palette Snooping to be Enabled.
Enabled	This setting informs the PCI devices that an ISA based Graphics device is installed in the system. It does this so the ISA based Graphics card will function correctly. This does not necessarily indicate a physical ISA adapter card. The graphics chipset can be mounted on a PCI card. Always check with your adapter card's manuals first, before modifying the default settings in the BIOS.

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PCI/PnP Setup, Continued

PCI IDE BusMaster

Set this value to allow or prevent the use of PCI IDE busmastering. The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	Set this value to prevent PCI busmastering. This is the default setting.
Enabled	This option specifies that the IDE controller on the PCI local bus has mastering capabilities.

OffBoard PCI/ISA IDE Card

Set this value to allow the OffBoard PCI/ISA IDE Card to be selected. The Optimal and Fail-Safe default setting is *Auto*.

Option	Description
Auto	This setting will auto select the location of an OffBoard PCI IDE adapter card. This is the default setting.
PCI Slot1	This setting will select PCI Slot 1 as the location of the OffBoard PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 1.
PCI Slot2	This setting will select PCI Slot 2 as the location of the OffBoard PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 2.
PCI Slot3	This setting will select PCI Slot 3 as the location of the OffBoard PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 3. This option is available even if the motherboard does not have a PCI Slot 3. If the motherboard does not have a PCI Slot 3, do not use this setting.
PCI Slot4	This setting will select PCI Slot 4 as the location of the OffBoard PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 4. This option is available even if the motherboard does not have a PCI Slot 4. If the motherboard does not have a PCI Slot 4, do not use this setting.
PCI Slot5	This setting will select PCI Slot 5 as the location of the OffBoard PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 5. This option is available even if the motherboard does not have a PCI Slot 5. If the motherboard does not have a PCI Slot 5, do not use this setting.
PCI Slot6	This setting will select PCI Slot 6 as the location of the OffBoard PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 6. This option is available even if the motherboard does not have a PCI Slot 6. If the motherboard does not have a PCI Slot 6, do not use this setting.

IRQ

Set this value to allow the IRQ settings to be modified. The Optimal and Fail-Safe default setting is *Available*.

Interrupt	Option	Description
IRQ3 IRQ4 IRQ5 IRQ7 IRQ9 IRQ10 IRQ11 IRQ14 IRQ15	Available	This setting allows the specified IRQ to be used by a PCI/PnP device. This is the default setting.
	Reserved	This setting allows the specified IRQ to be used by a legacy ISA device.

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PCI/PnP Setup, Continued

DMA

Set this value to allow the DMA setting to be modified. The optimal and Fail-Safe default setting is *Available.*

DMA Channel	Option	Description
DMA Channel 0 DMA Channel 1 DMA Channel 3	Available	This setting allows the specified DMA to be used by PCI/PnP device. This is the default setting.
DMA Channel 5 DMA Channel 6 DMA Channel 7	Reserved	This setting allows the specified DMA to be used by a legacy ISA device.

Reserved Memory Size

Set this value to allow the system to reserve memory that is used by ISA devices. The Optimal and Fail-Safe default setting is *Disabled.*

Option	Description
Disabled	Set this value to prevent BIOS from reserving memory to ISA devices.
16K	Set this value to allow the system to reserve 16K of the system memory to the ISA devices.
32K	Set this value to allow the system to reserve 32K of the system memory to the ISA devices.
64K	Set this value to allow the system to reserve 64K of the system memory to the ISA devices.

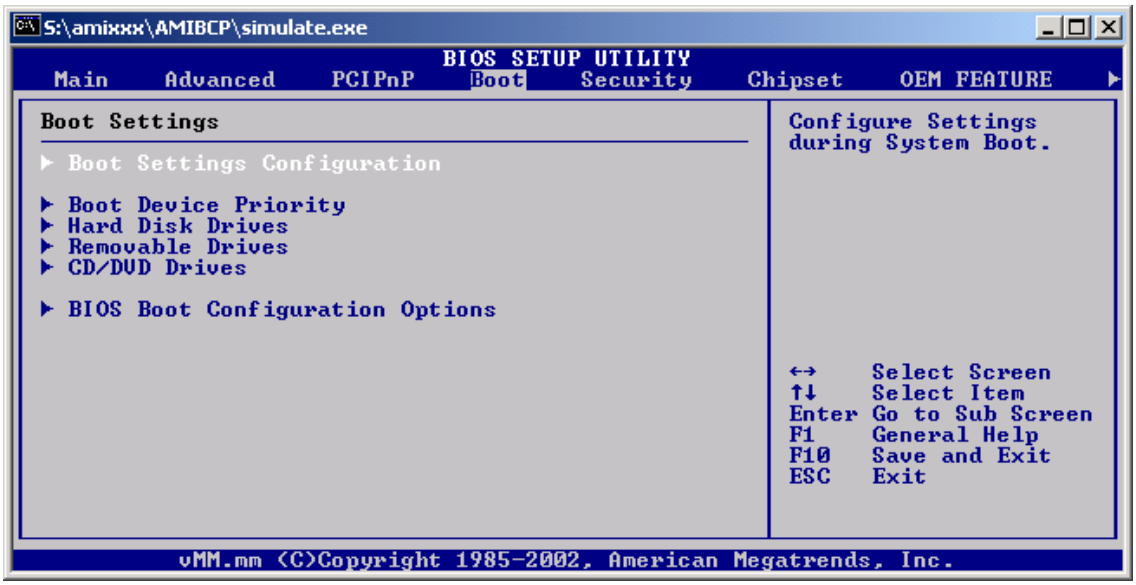
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Chapter 5 Boot Setup

Select the *Boot* tab from the CP6000 setup screen to enter the Boot BIOS Setup screen. You can select any of the items in the left frame of the screen, such as Boot Device Priority, to go to the sub menu for that item. You can display a Boot BIOS Setup option by highlighting it using the <Arrow> keys. All Boot Setup options are described in this section. Select an item on the Boot Setup screen to access the sub menu for:

- Boot Settings Configuration
- Boot Device Priority
- Hard disk drives
- Removable Devices
- CD/DVD Drives
- BIOS Boot Configuration Options

The Boot Setup screen is shown below:



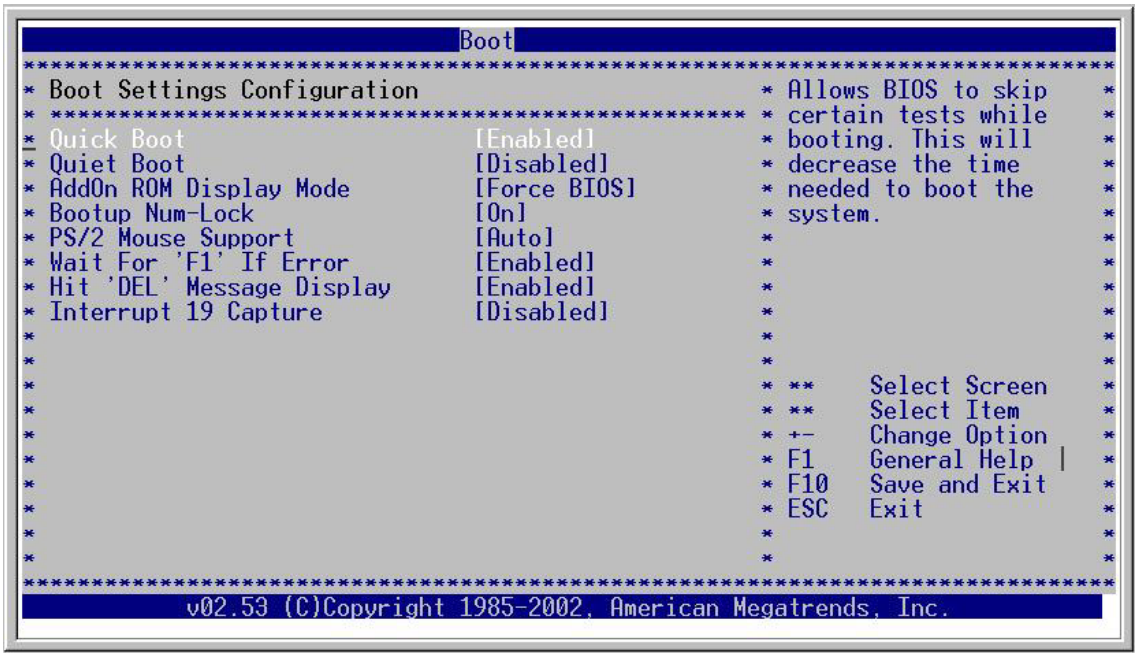
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Boot Setup, Continued

BOOT SETTINGS CONFIGURATION

Boot Settings Configuration

Use this screen to select options for the Boot Settings Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages. The screen is shown below.



Quick Boot

The Optimal and Fail-Safe default setting is *Enabled*.

Option	Description
Disabled	Set this value to allow the BIOS to perform all POST tests.
Enabled	Set this value to allow the BIOS to skip certain POST tests to boot faster. This is the default setting.

Quiet Boot

Set this value to allow the boot up screen options to be modified between POST messages or OEM logo. The Optimal and Fail-Safe default setting is *Disabled.*

Option	Description
Disabled	Set this value to allow the computer system to display the POST messages. This is the default setting.
Enabled	Set this value to allow the computer system to display the OEM logo.

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Boot Setup, Continued

Add-On ROM Display Mode

Set this option to display add-on ROM (read-only memory) messages. The Optimal and Fail-Safe default setting is *Force BIOS*. An example of this is a SCSI BIOS or VGA BIOS.

Option	Description
Force BIOS	Set this value to allow the computer system to force a third party BIOS to display during system boot. This is the default setting.
Keep Current	Set this value to allow the computer system to display the CP6000 information during system boot.

Boot-Up Num-Lock

Set this value to allow the Number Lock setting to be modified during boot up. The Optimal and Fail-Safe default setting is *On*.

Option	Description
Off	This option does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard will light up when the Number Lock is engaged.
On	Set this value to allow the Number Lock on the keyboard to be enabled automatically when the computer system is boot up. This allows the immediate use of 10-keys numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard will be lit. This is the default setting.

PS/2 Mouse Support

Set this value to allow the PS/2 mouse support to be adjusted. The Optimal and Fail-Safe default setting is *Auto*.

Option	Description
Disabled	This option will prevent the PS/2 mouse port from using system resources and will prevent the port from being active. Use this setting if installing a serial mouse.
Enabled	Set this value to allow the system to use a PS/2 mouse.
Auto	Set this value to allow the system to automatically use a PS/2 mouse if it is connected. This is the default setting.

Wait for 'F1' If Error

Set this value to allow the Wait for 'F1' Error setting to be modified. The Optimal and Fail-Safe default setting is *Enabled*.

Option	Description
Disabled	This prevents the CP6000 to wait on an error for user intervention. This setting should be used if there is a known reason for a BIOS error to appear. An example would be a system administrator must remote boot the system. The computer system does not have a keyboard currently attached. If this setting is set, the system will continue to boot up in to the operating system. If 'F1' is enabled, the system will wait until the BIOS setup is entered.
Enabled	Set this value to allow the system BIOS to wait for any error. If an error is detected, pressing <F1> will enter Setup and the BIOS setting can be adjusted to fix the problem. This normally happens when upgrading the hardware and not setting the BIOS to recognize it. This is the default setting.

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Boot Setup, Continued

Hit 'DEL' Message Display

Set this value to allow the *Hit "DEL" to enter Setup* Message Display to be modified. The Optimal and Fail-Safe default setting is *Enabled*.

Option	Description
Disabled	This prevents the CP6000 to display `Hit Del to enter Setup` during memory initialization. If Quiet Boot is enabled, the Hit 'DEL' message will not display.
Enabled	This allows the CP6000 to display `Hit Del to enter Setup` during memory initialization. This is the default setting.

Interrupt 19 Capture

Set this value to allow option ROMs such as network controllers to trap BIOS interrupt 19. The Optimal and Fail-Safe default setting is *Disabled.*

Option	Description
Disabled	The BIOS prevents option ROMs from trapping interrupt 19. This is the default setting.
Enabled	The BIOS allows option ROMs to trap interrupt 19.

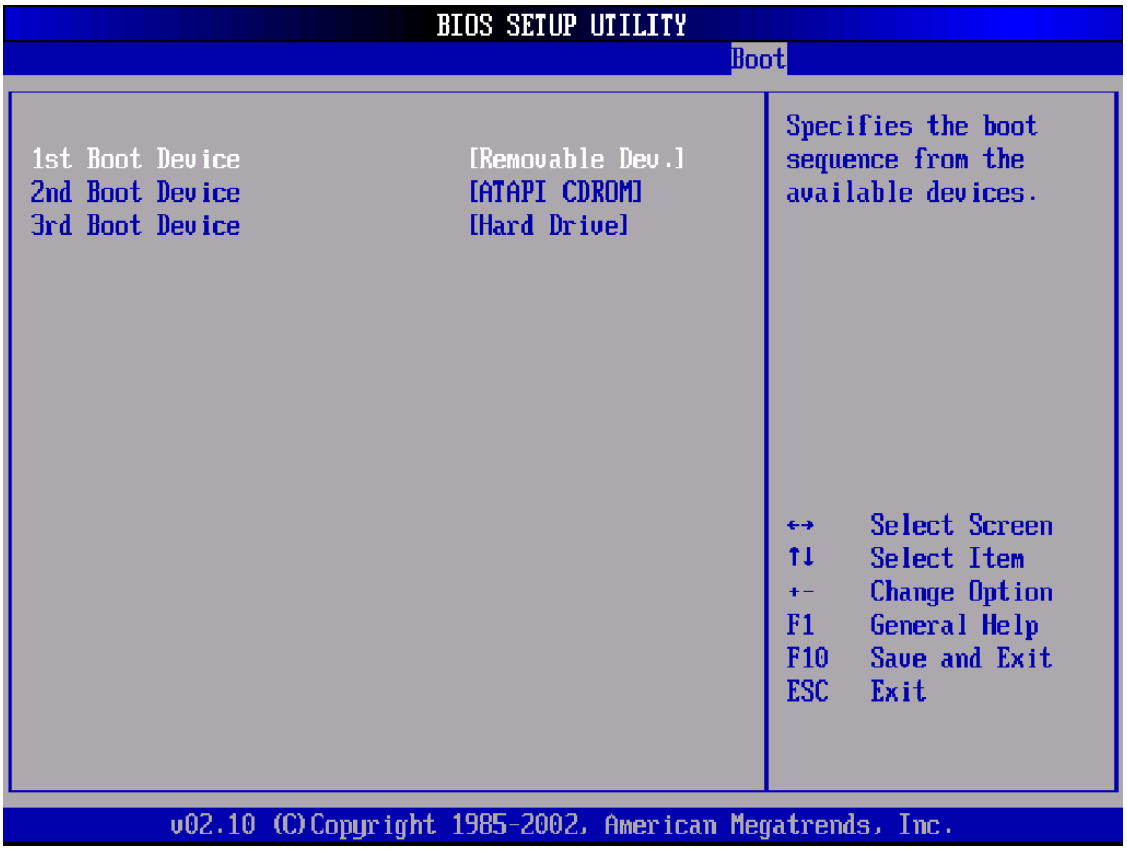
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Boot Setup, Continued

BOOT DEVICE PRIORITY

Boot Device Priority

Use this screen to specify the order in which the system checks for the device to boot from. To access this screen, select Boot Device Priority on the Boot Setup screen and press <Enter>. The following screen displays:



1st Boot Device
2nd Boot Device
3rd Boot Device

Set the boot device options to determine the sequence in which the computer checks which device to boot from. The settings are *Removable Dev., Hard Drive, or ATAPI CDROM*. The Optimal and Fail-Safe default settings are:

- 1st boot device – Removable Device
- 2nd boot device – Hard Drive
- 3rd boot device – ATAPI CDROM

To change the boot order, select a boot category type such as Hard disk drives, Removable media, or ATAPI CD ROM devices from the boot menu. For example, if the 1st boot device is set to Hard disk drives, then BIOS will try to boot to hard disk drives first.

Note: When you select a boot category from the boot menu, a list of devices in that category appears. For example, if the system has three hard disk drives connected, then the list will show all three hard disk drives attached.

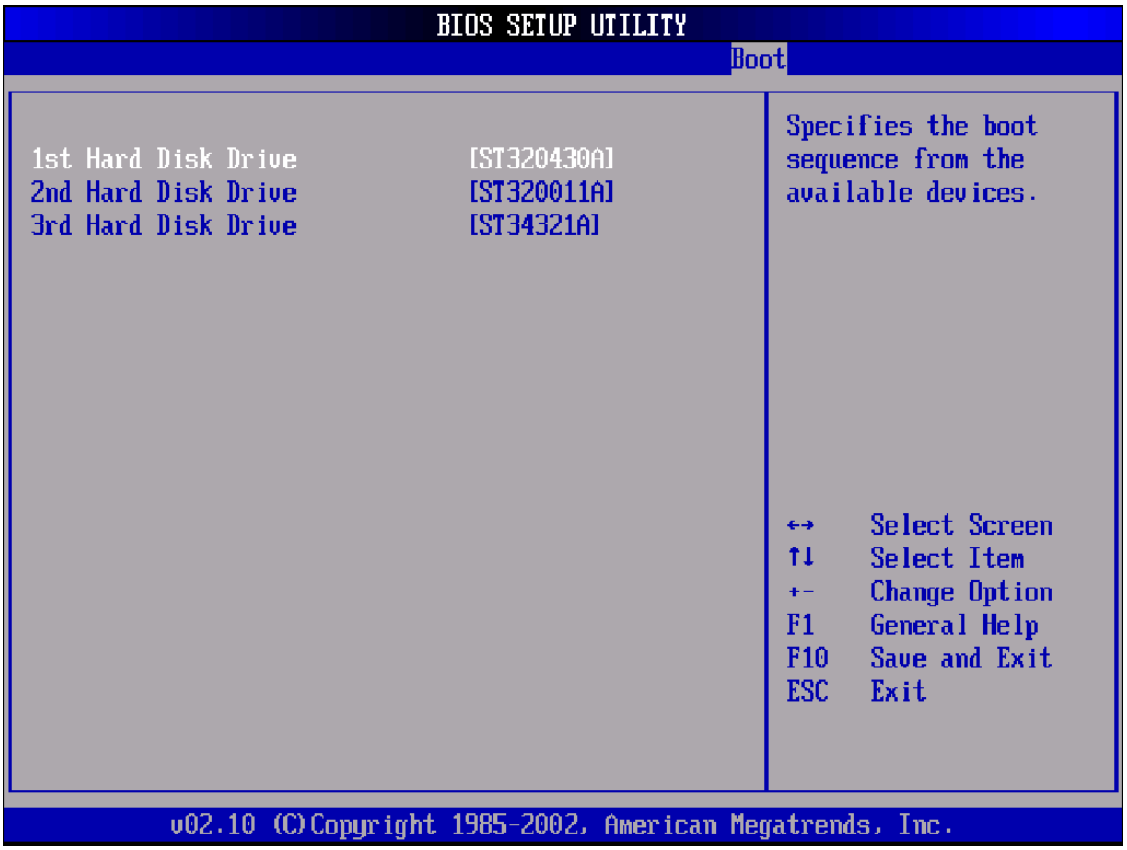
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Boot Setup, Continued

HARD DISK DRIVES

Hard Disk Drives

Use this screen to view the hard disk drives in the system. To access this screen, select Hard disk drives on the Boot Setup screen and press <Enter>. The following screen displays examples of hard disk drives:



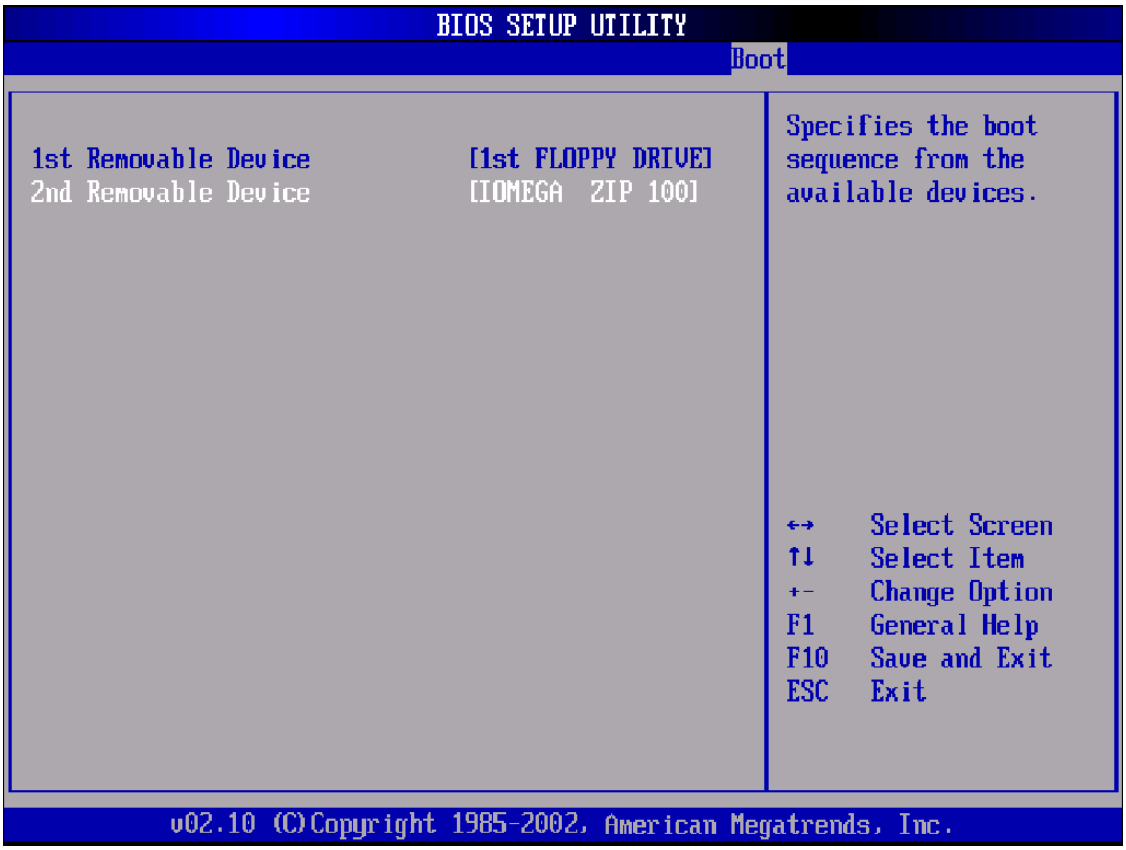
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Boot Setup, Continued

REMOVABLE DEVICES

Removable Devices

Use this screen to view the removable drives attached to the system. To access this screen, select Removable Devices on the Boot Setup screen and press <Enter>. The following screen displays examples of removable devices:



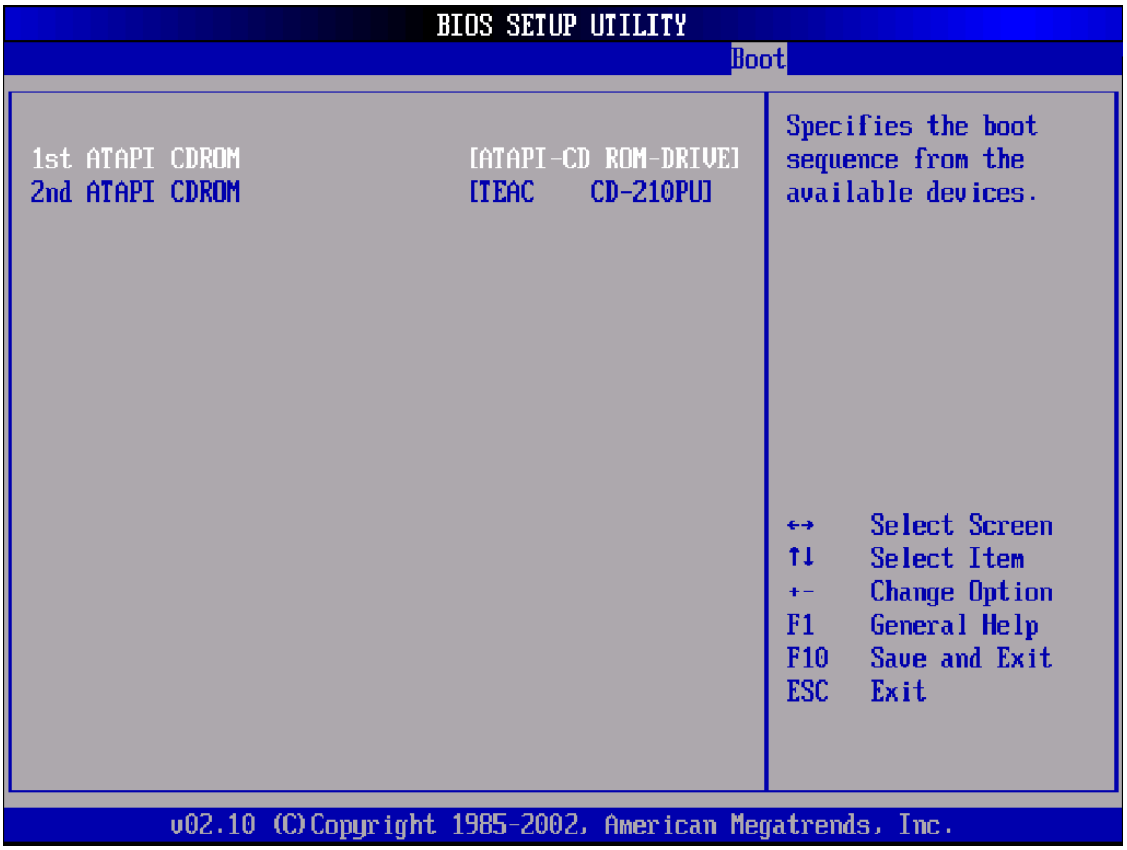
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Boot Setup, Continued

CD/DVD DRIVES

CD/DVD Drives

Use this screen to view the CD/DVD-ROM drives in the system. To access this screen, select CD/DVD ROM Drives on the Boot Setup screen and press <Enter>. The following screen displays examples of CD/DVD-ROM Drives:



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Chapter 6 Security Setup

CP6000 Password Support

Two Levels of Password Protection

CP6000 provides both a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

The system can be configured so that all users must enter a password every time the system boots or when CP6000 Setup is executed, using either or either the Supervisor password or User password.

The Supervisor and User passwords activate two different levels of password security. If you select password support, you are prompted for a one to six character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain NVRAM and reconfigure.

Remember the Password

Keep a record of the new password when the password is changed. If you forget the password, you must erase the system configuration information in NVRAM. See (Deleting a Password) for information about erasing system configuration information.

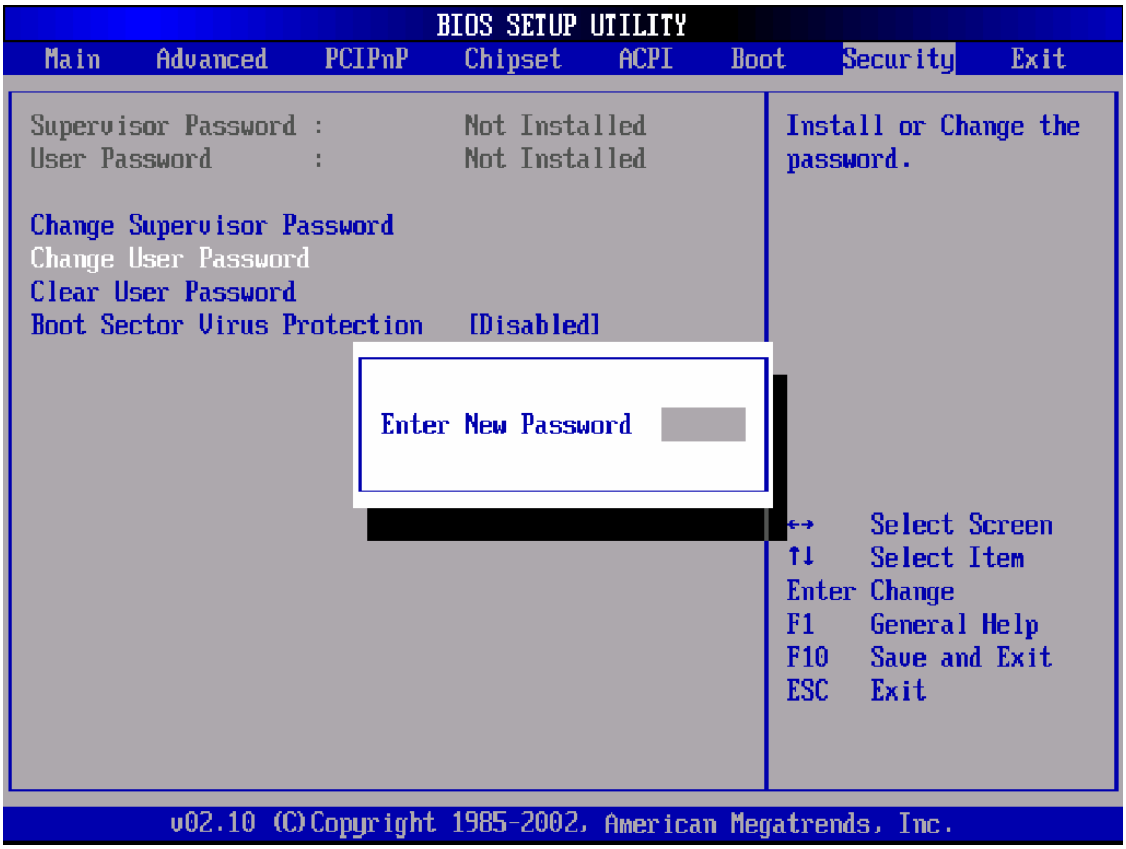
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Security Setup, Continued

Select Security Setup from the CP6000 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection, are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

- Change Supervisor Password
- Change User Password
- Clear User Password

The Security Setup screen is shown below. The sub menus are documented on the following pages.



Supervisor Password

Indicates whether a supervisor password has been set. If the password has been installed, *Installed* displays. If not, *Not Installed* displays.

User Password

Indicates whether a user password has been set. If the password has been installed, *Installed* displays. If not, *Not Installed* displays.

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Security Setup, Continued

Change Supervisor Password

Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the supervisor password.

Change User Password

Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the user password.

Clear User Password

Select this option and press <Enter> to access the sub menu. You can use the sub menu to clear the user password.

Boot Sector Virus Protection

This option is near the bottom of the Security Setup screen. The Optimal and Fail-Safe default setting is *Disabled*

Option	Description
Disabled	Set this value to prevent the Boot Sector Virus Protection. This is the default setting.
Enabled	Select Enabled to enable boot sector protection. CP6000 displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. If enabled, the following appears when a write is attempted to the boot sector. You may have to type N several times to prevent the boot sector write. Boot Sector Write! Possible VIRUS: Continue (Y/N)? _ The following appears after any attempt to format any cylinder, head, or sector of any hard disk drive via the BIOS INT 13 Hard disk drive Service: Format!!! Possible VIRUS: Continue (Y/N)? _

CHANGE SUPERVISOR PASSWORD

Change Supervisor Password

Select Change Supervisor Password from the Security Setup menu and press <Enter>.

```
Enter New Password:
```

appears. Type the password and press <Enter>. The screen does not display the characters entered. Retype the password as prompted and press <Enter>. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after CP6000 completes.

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Security Setup, Continued

Change User Password

Select Change User Password from the Security Setup menu and press <Enter>.

```
Enter New Password:
```

appears. Type the password and press <Enter>. The screen does not display the characters entered. Retype the password as prompted and press <Enter>. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after CP6000 completes.

Clear User Password

Select Clear User Password from the Security Setup menu and press <Enter>.

```
Clear New Password

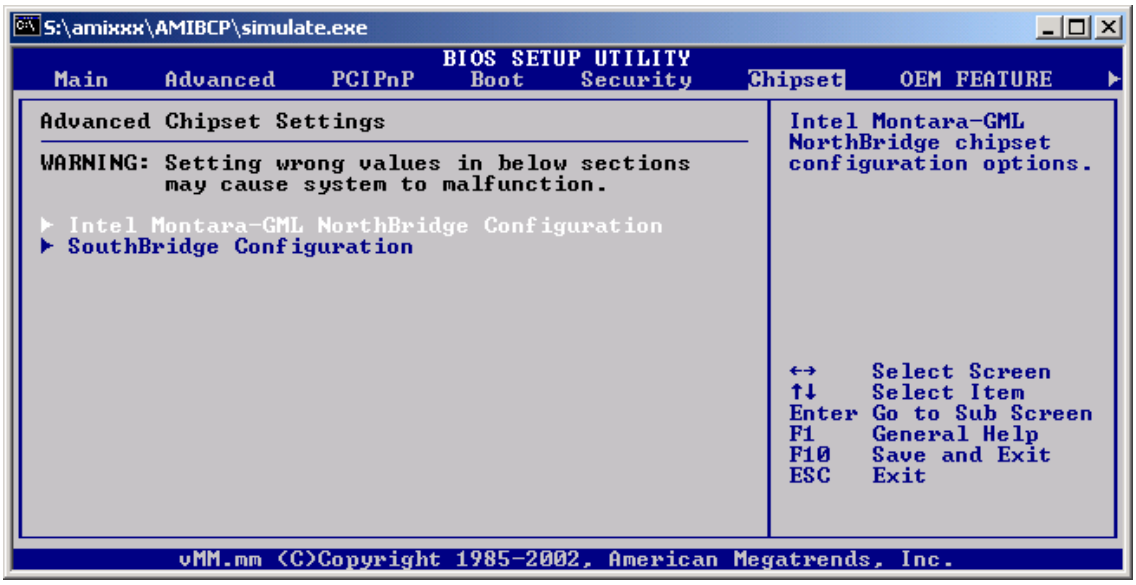
[Ok] [Cancel]
```

appears. Type the password and press <Enter>. The screen does not display the characters entered. Retype the password as prompted and press <Enter>. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after CP6000 completes.

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Chapter 7 Chipset Setup

Select the *Chipset* tab from the CP6000 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Chipset BIOS Setup options are described in this section. The Chipset BIOS Setup screen is shown below.



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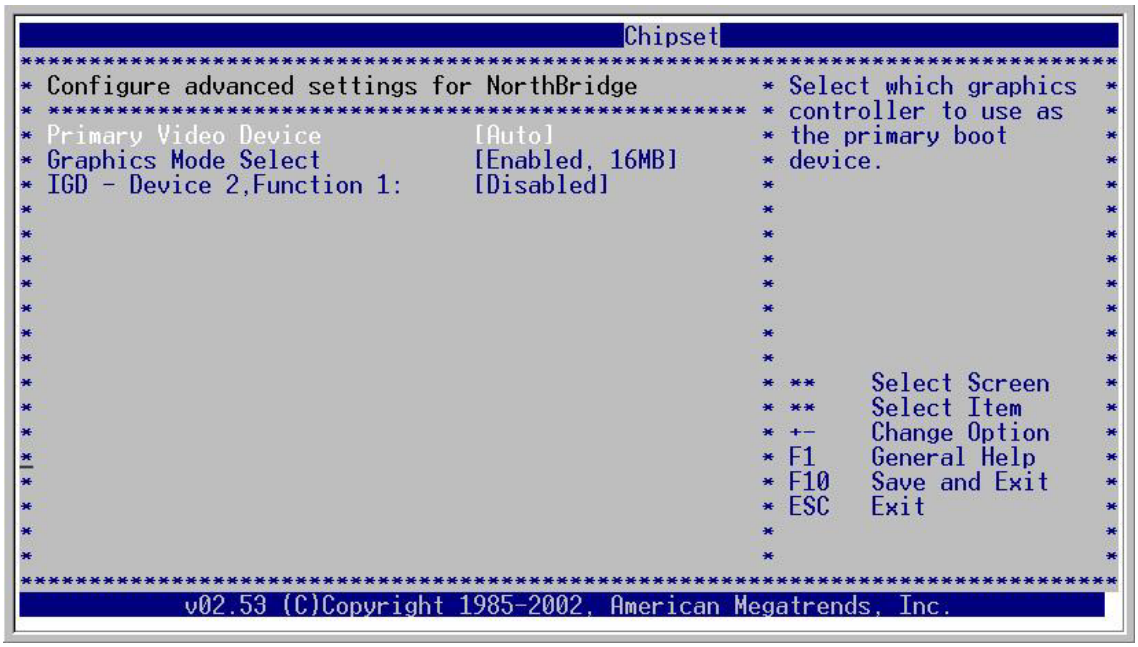
Chipset Setup, Continued

Intel Montara-GML NORTHBRIDGE CONFIGURATION

Intel Montara-GML NorthBridge Configuration

You can use this screen to select options for the NorthBridge Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.

Note: The NorthBridge Configuration setup screen varies depending on the supported NorthBridge chipset.



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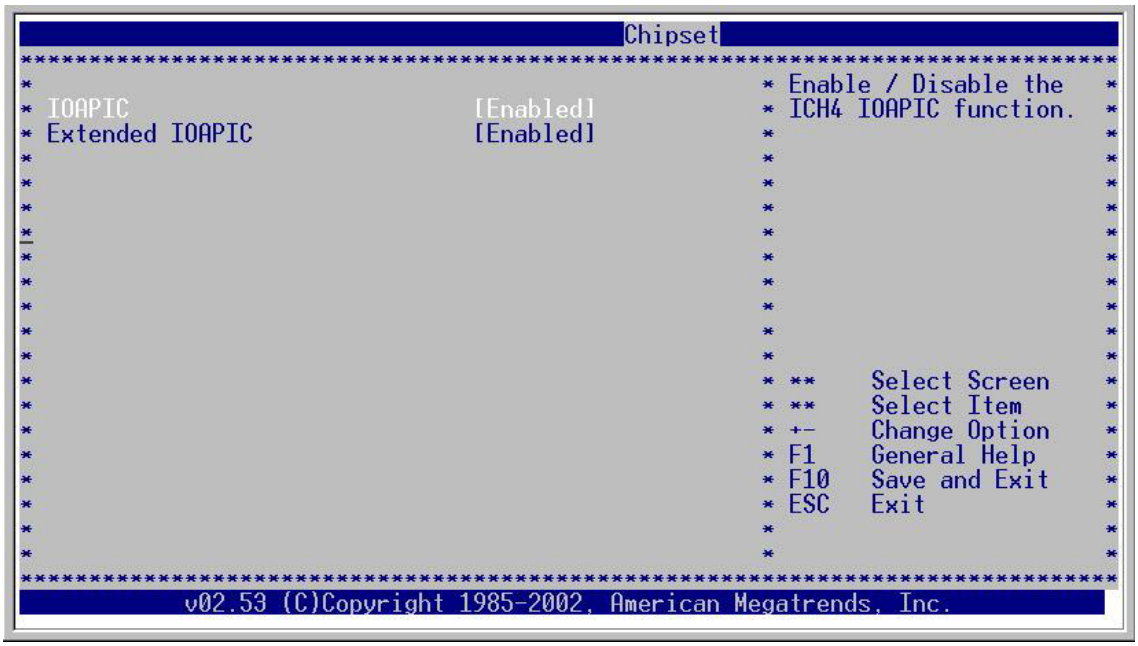
Chipset Setup, Continued

SOUTHBRIDGE CONFIGURATION

SouthBridge Configuration

You can use this screen to select options for the SouthBridge Configuration. SouthBridge is a chipset on the motherboard that controls the basic I/O functions, USB ports, audio functions, modem functions, IDE channels, and PCI slots. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.

Note: The SouthBridge Configuration setup screen varies depending on the supported SouthBridge chipset.



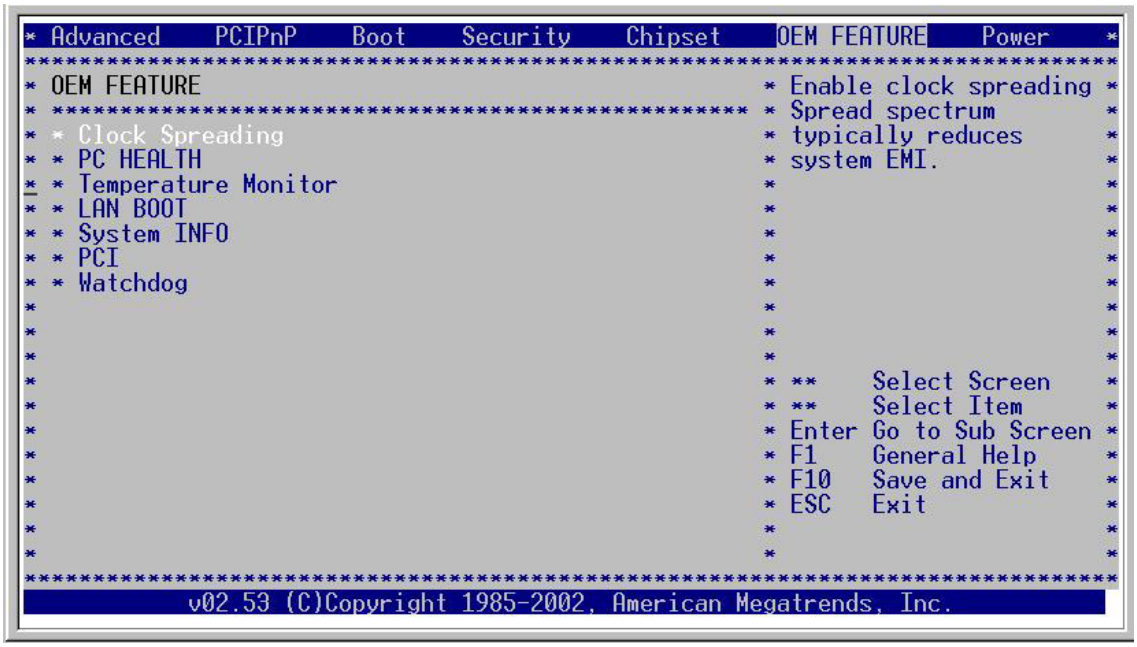
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Chapter 8 OEM Feature

Select the OEM Feature tab from the CP6000 setup screen to enter the Kontron specific BIOS Setup screen. You can display a Kontron BIOS Setup option by highlighting it using the <Arrow>keys. All OEM Feature BIOS Setup options are described in this section.



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OEM Feature, Continued

Clock Spreading

The Optimal and Fail-Safe default setting is *Disabled*.

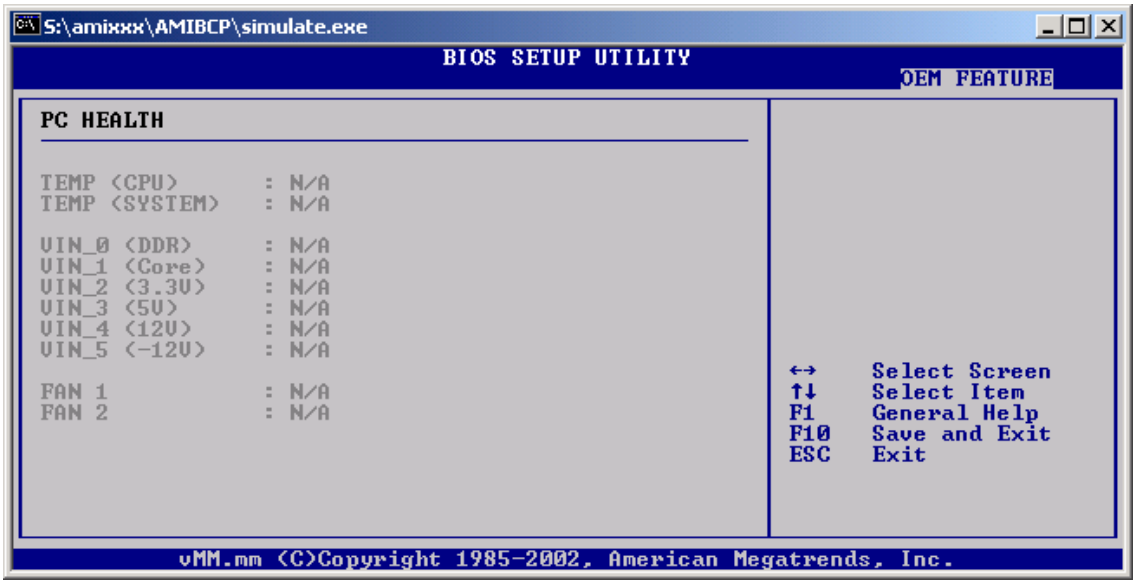


Option	Description
Disabled	No Clock Spectrum Modulation. This is the default setting.
Enabled	0.5% Clock Spreading. Spread spectrum typically reduces system EMI.

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OEM Feature, Continued

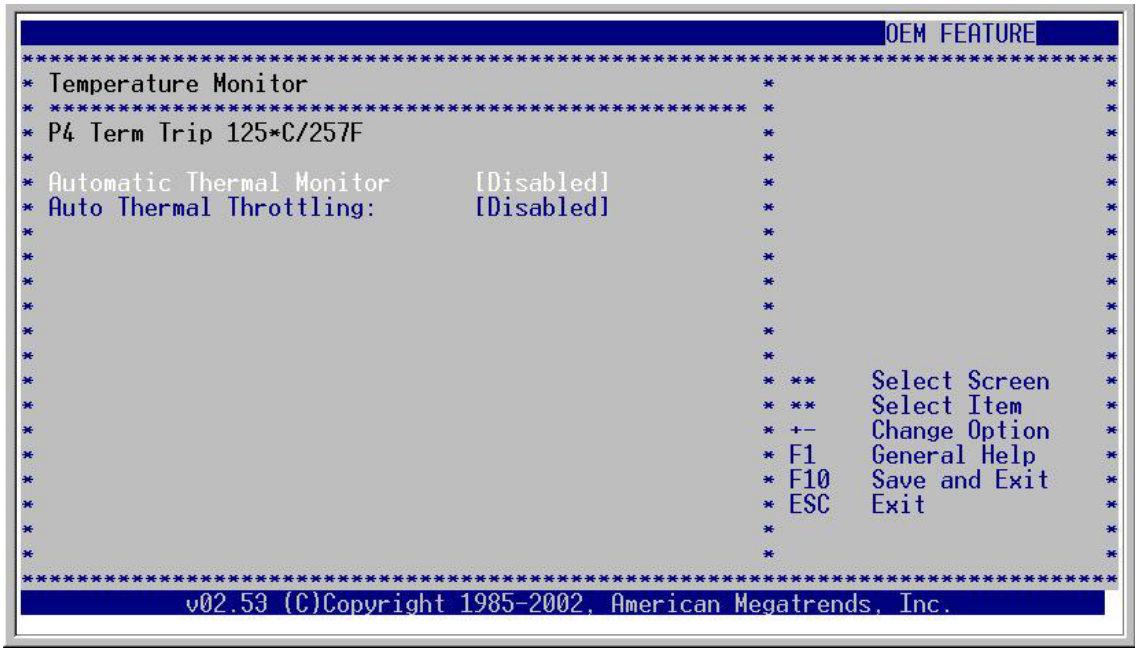
PC Health



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OEM Feature, Continued

Temperature Monitor



P4 Term Trip 125°C/257F

Shows the P4 max. temperature.

Automatic Thermal Monitor

Thermal Monitor is enabled and when the die temperature is very near to the temperature limits of the processor, the clocks will be modulated by alternately turning the clocks off and on at a duty cycle of 50%. The Optimal and Fail-Safe default setting is *Disabled.*

Auto Thermal Throttling

Auto Thermo Throttling reduces CPU speed to avoid overheating. Temperature Range is from 95°C up to 110°C. The Optimal and Fail-Safe default setting is *Disabled.*

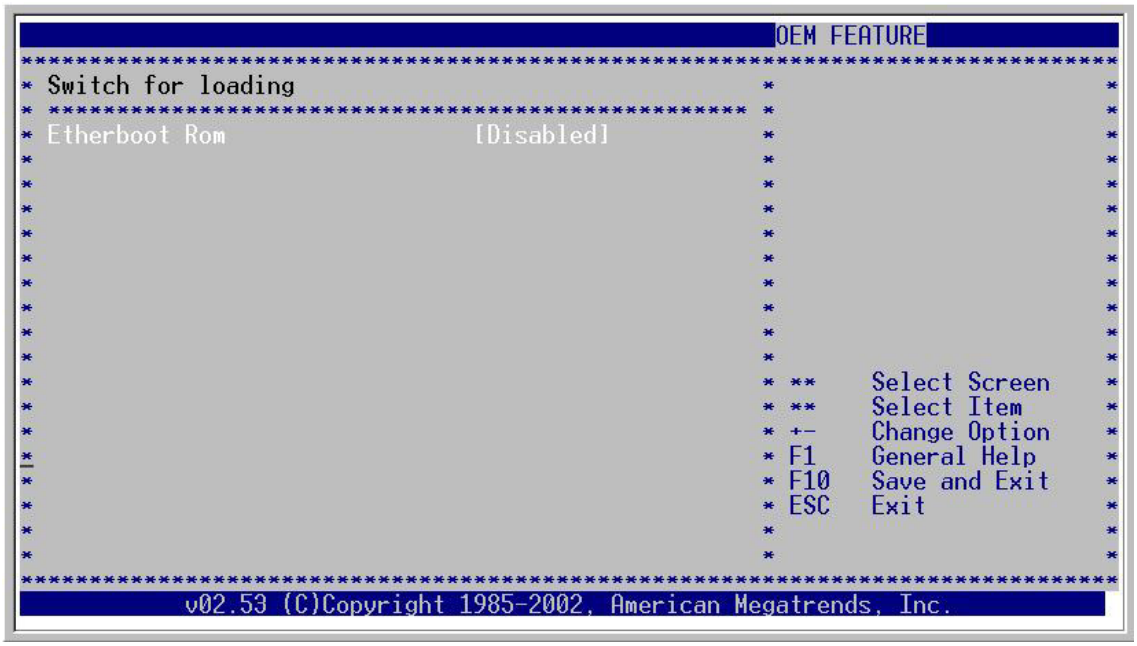
CPU Performance

The CPU performance will be reduced to the selected value when reaching the temperature threshold. CPU Performance 12.5%; 25%; 50%; 75%

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OEM Feature, Continued

LAN BOOT



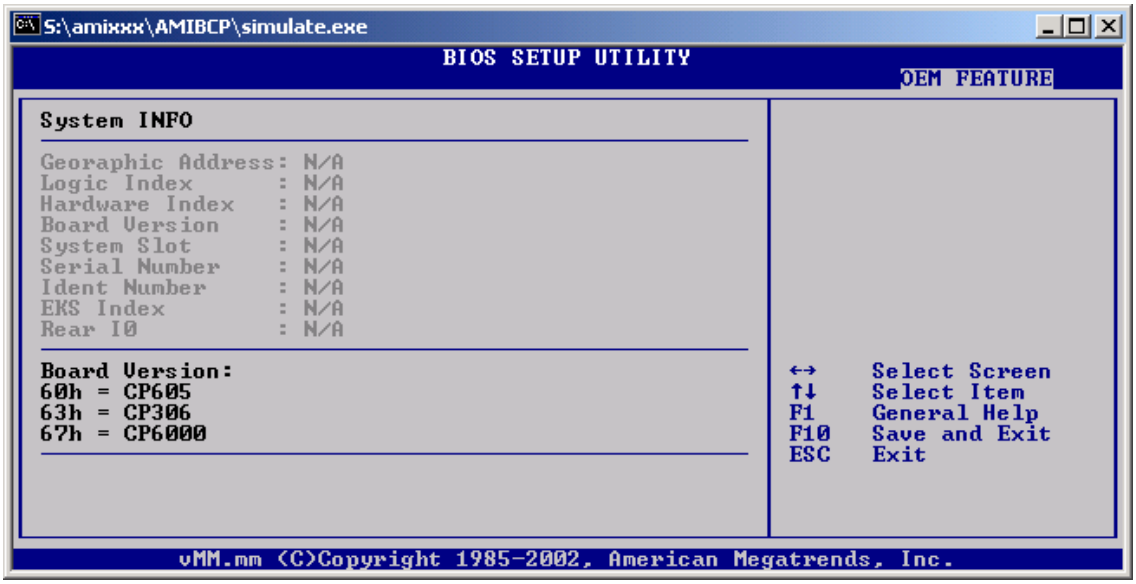
Etherboot ROM

Enable LAN Boot. When enabled, the BIOS loads the Etherboot Expansion ROM. The Optimal and Fail-Safe default setting is *Disabled.*

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OEM Feature, Continued

System INFO



Geographic Addressing

Displays the slot in which the card is placed starting on the Left side with address 0.

Logic Index

This is a display only field which reflects the value of an onboard register. It shows the index of the onboard logic.

Hardware Index

This is a display only field, which reflects the value of an onboard register. It shows the index of the Hardware Index.

Board Version

This is a display only field which reflects the value of an onboard register. This must always correspond with the CPU on which the BIOS is installed.

System Slot

Displays whether the board is in a System Slot or not.

Serial Number
EKS Index

This is a display only field which shows Kontron internal information about the board. EKS-Index refers to the production number and version respectively. The serial number is unique to each board produced by Kontron Modular Computers. It could be used also by the customer to identify specific boards.

Ident Number

This is a display only field which shows Kontron internal information about the board. EKS Number.

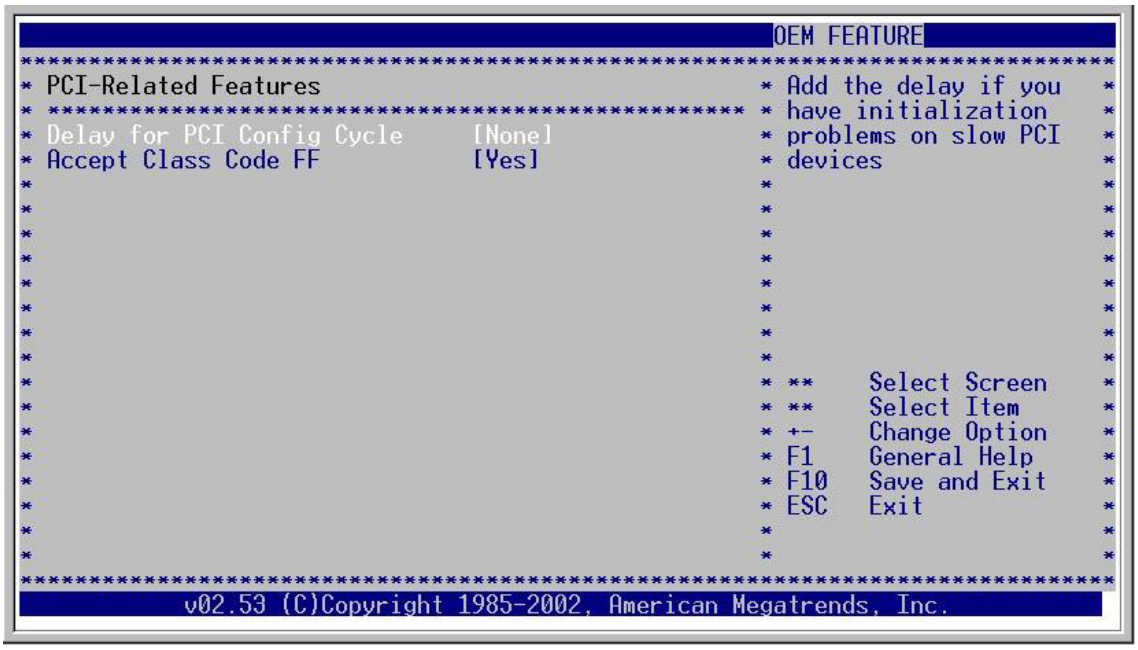
Rear I/O

This is a display only field which shows which Rear I/O board is installed.

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OEM Feature, Continued

PCI



Delay for PCI Config Cycle

Add the delay if you have initialization problems on slow PCI devices. The Optimal and Fail-Safe default setting is *None.*

Accept Class Code FF

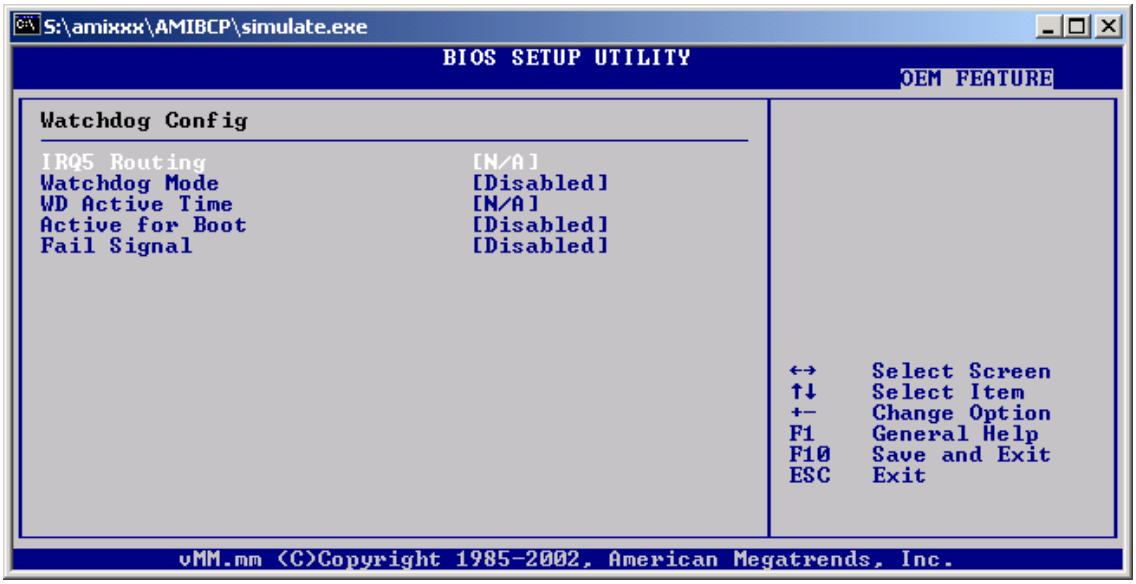
Add the delay if you have initialization problems on slow PCI devices. The Optimal and Fail-Safe default setting is *Yes.*

Option	Description
Yes	Initializes all of the PCI devices.
No	Does not initialize the devices with class code FF.

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OEM Feature, Continued

Watchdog



IRQ5 Routing

The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	No Resource is reserved.
Watchdog Derate Signal Enum Signal Fail Signal	Reserve resource 280h and IRQ5 for Watchdog, derate, Enum or Fail signal. Fail signal from the power supply. Enum signal is generated by a hot swap compatible board after insertion and prior to removal. Derate signal indicates that the power supply is beginning to derate its power output.

Watchdog Mode

The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	Watchdog mode inactive
NMI Reset Cascade (NMI + Reset)	Watchdog routing to NMI, NMI + Reset or Reset

WD Active Time

The Optimal and Fail-Safe default setting is *125ms*.

Option	Description
125ms, 250 ms, 500ms, 1s, 2s, 4s, 8s, 16s, 32s, 64s, 128s, 256s	Select the time after which the action selected occurs, if Watchdog timer is not retriggered.

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OEM Feature, Continued

Active for boot

The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	Watchdog must be started form the OS.
Enabled	Select Enabled if the watchdog timer requires to be started before the operating system is booted from the BIOS.

Fail Signal

The Optimal and Fail-Safe default setting is *Disabled*.

Option	Description
Disabled	Fail signal inactive
NMI	Fail signal from the power supply. If this signal is to be used inside an application, it may be routed to NMI here.

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Chapter 9 Power Setup

Select the *Power* tab from the CP6000 setup screen to enter the Power Management BIOS Setup screen. You can display a Power Management BIOS Setup option by highlighting it using the <Arrow> keys. All Power Management BIOS Setup options are described in this section.

Note: The Power Management Setup screen is not displayed when Advanced Power Management (APM) is not supported. The Power Setup screen can vary for different motherboards.

Power Management/APM

Set this value to allow Power Management/APM support. The Optimal and Fail-Safe default setting is *Enabled.*

Option	Description
Disabled	Set this value to prevent the chipset power management and APM (Advanced Power Management) features.
Enabled	Set this value to allow the chipset power management and APM (Advanced Power Management) features. This is the default setting.

Power Savings Under AC

Power Management when AC powered.

Power Savings Level

Configure the timer based Power Management.

Suspend Time Out (Minute)

This option specifies the length of time the system waits before it enters suspend mode. The Optimal and Fail-Safe default setting is *Disabled.*

Option	Description
Disabled	This setting prevents the system from entering suspend mode. This is the default setting.
1Min	Set this value to allow the computer system to enter suspend mode after being inactive for 1 minute.
5Min	Set this value to allow the computer system to enter suspend mode after being inactive for 5 minutes.
10Min	Set this value to allow the computer system to enter suspend mode after being inactive for 10 minutes.

Power Button Mode

This option specifies how the externally mounted power button on the front of the computer chassis is used. The Optimal and Fail-Safe default setting is *On/Off.*

Option	Description
On/Off	Pushing the power button turns the computer on or off. This is the default setting. This is the default setting.
Suspend	Pushing the power button places the computer in Suspend mode or Full On power mode.

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Power Setup, Continued

USB Controller Resume

USB wake from sleep state.

PME Resume

PME (Power Management Event) wake form sleep states.

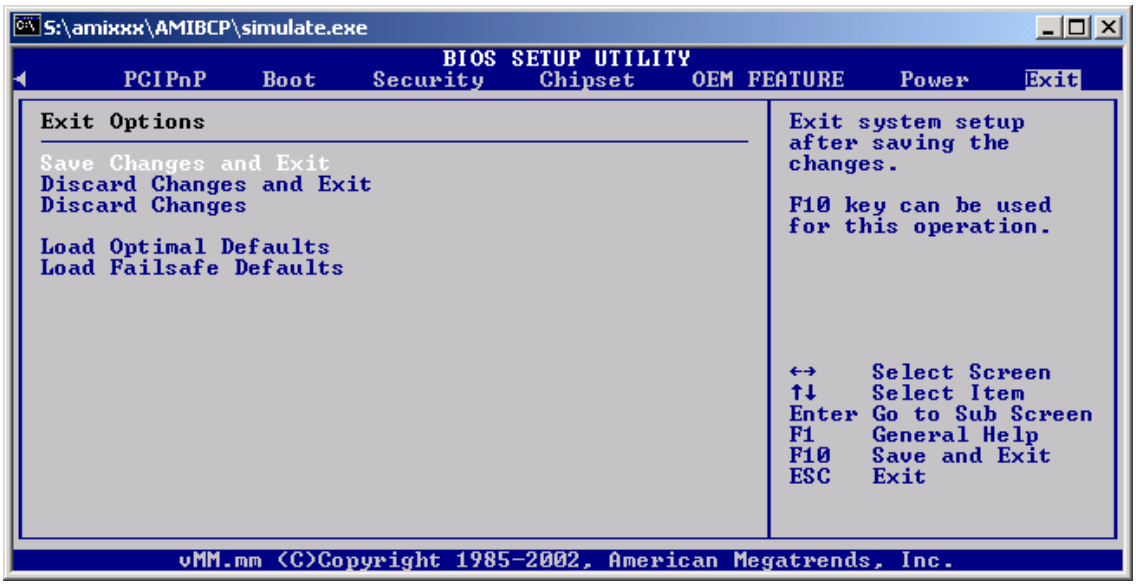
RI Resume

Ring Indicator wake form sleep states.

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Chapter 10 Exit Menu

Select the *Exit* tab from the CP6000 setup screen to enter the Exit BIOS Setup screen. You can display an Exit BIOS Setup option by highlighting it using the <Arrow> keys. All Exit BIOS Setup options are described in this section. The Exit BIOS Setup screen is shown below.



Save Changes and Exit

When you have completed the system configuration changes, select this option to leave CP6000 Setup and reboot the computer so the new system configuration parameters can take effect. Select Exit Saving Changes from the Exit menu and press <Enter>.

```
Save Configuration Changes and Exit Now?

[Ok]   [Cancel]
```

appears in the window. Select Ok to save changes and exit.

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Exit Menu, Continued

Discard Changes and Exit

Select this option to quit CP6000 Setup without making any permanent changes to the system configuration. Select Exit Discarding Changes from the Exit menu and press <Enter>.

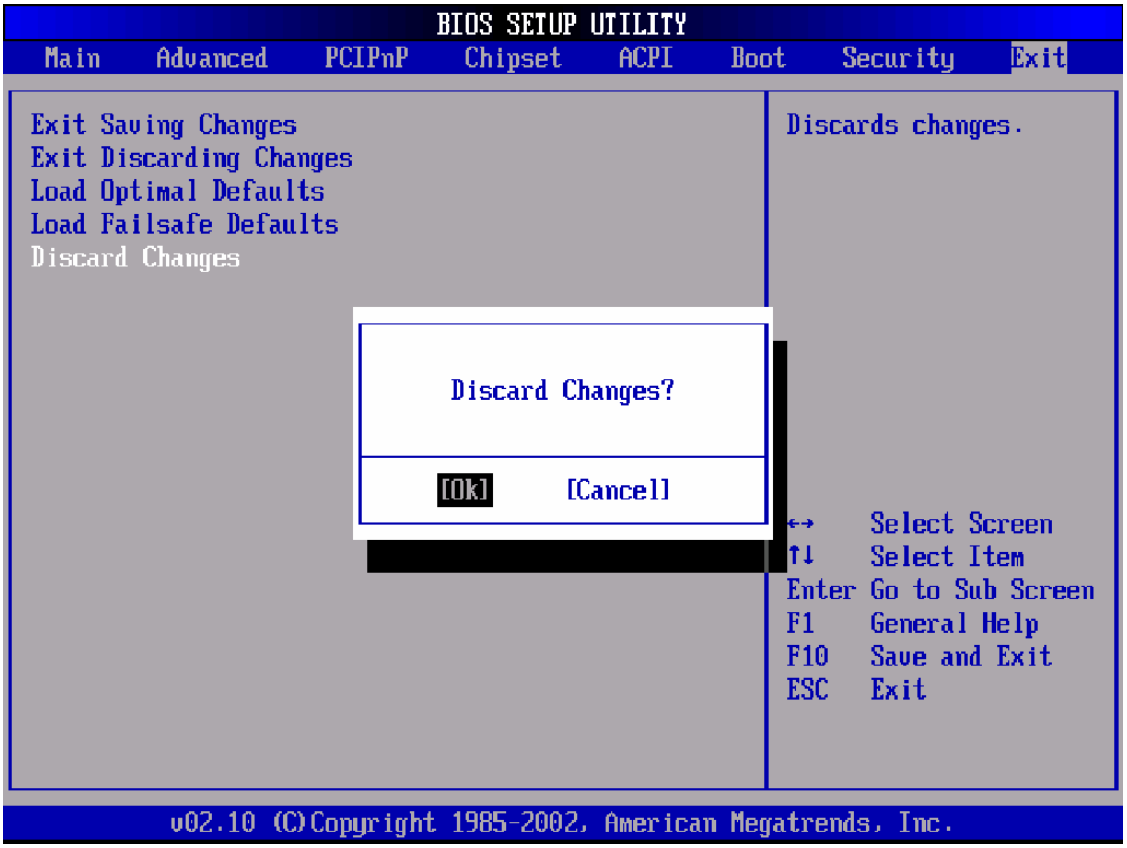
```
Discard Changes and Exit Setup Now?

[Ok]   [Cancel]
```

appears in the window. Select *Ok* to discard changes and exit.

Discard Changes

Select Discard Changes from the Exit menu and press <Enter>.



Select *Ok* to discard changes.

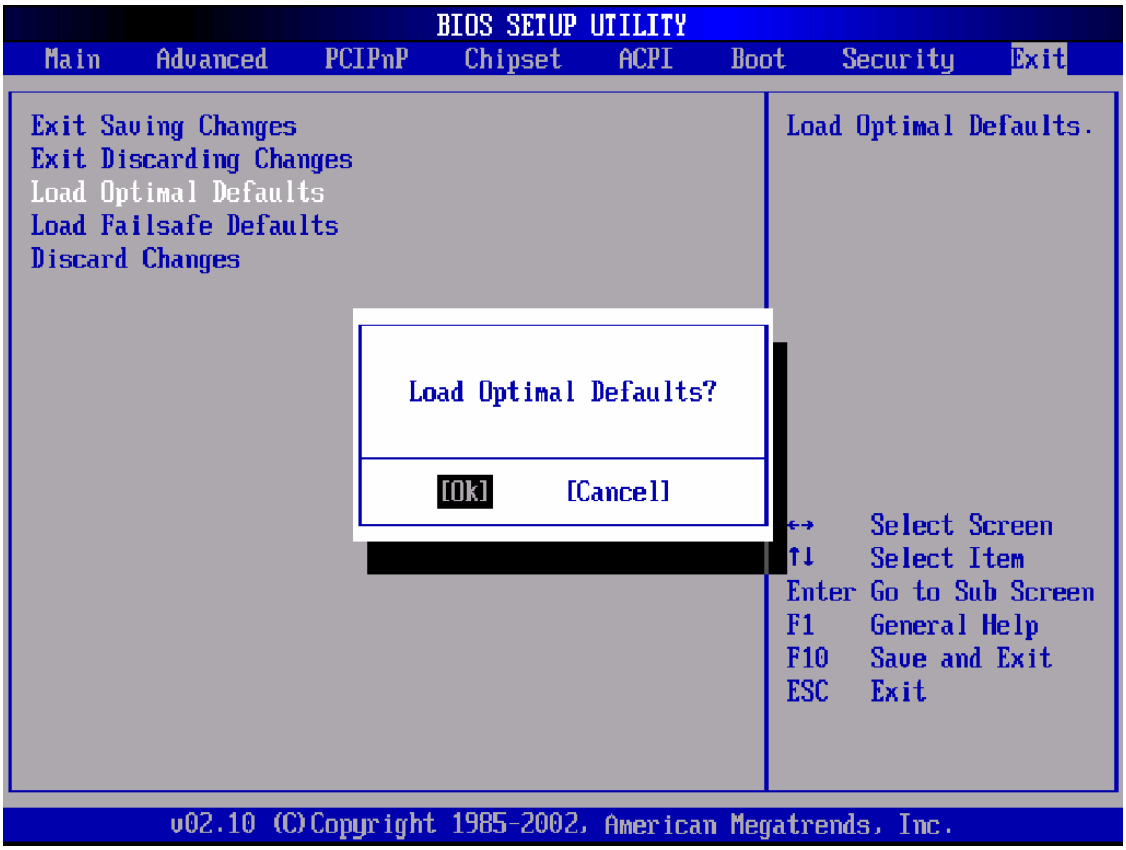
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Exit Menu, Continued

Load Optimal Defaults

CP6000 automatically sets all CP6000 Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal CP6000 Setup options if your computer is experiencing system configuration problems.

Select Load Optimal Defaults from the Exit menu and press <Enter>.



Select *Ok* to load optimal defaults.

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Exit Menu, Continued

Load Fail-Safe Defaults

CP6000 automatically sets all CP6000 Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe CP6000 Setup options if your computer is experiencing system configuration problems.
Select Load Fail-Safe Defaults from the Exit menu and press <Enter>.

```
Load Fail-Safe Defaults?

[Ok]    [Cancel]
```

appears in the window. Select *Ok* to load Fail-Safe defaults.

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Chapter 11 Deleting a Password

If you forget the passwords you set up through CP6000 Setup, the only way you can reset the password is to erase the system configuration information where the passwords are stored. System configuration data is stored in CMOS RAM, a type of memory that consumes very little power.

Erase Old Password

You can drain CMOS RAM power by using the CMOS drain jumper on the motherboard, or by removing the battery. CMOS RAM looses it content including the password when it is drained.

Note: For more information on draining CMOS using the drain jumper, see the motherboard user's manual.

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Chapter 12 POST Codes

Bootblock Initialization Code Checkpoints

The Bootblock initialization code sets up the chipset, memory and other components before system memory is available. The following table describes the type of checkpoints that may occur during the bootblock initialization portion of the BIOS:

Checkpoint	Description
Before D1	Early chipset initialization is done. Early super I/O initialization is done including RTC and keyboard controller. NMI is disabled.
D1	Perform keyboard controller BAT test. Check if waking up from power management is in suspend state. Save power-on CPUID value in scratch CMOS.
D0	Go to flat mode with 4GB limit and GA20 enabled. Verify the bootblock checksum.
D2	Disable CACHE before memory detection. Execute full memory sizing module. Verify that flat mode is enabled.
D3	If memory sizing module not executed, start memory refresh and do memory sizing in Bootblock code. Do additional chipset initialization. Re-enable CACHE. Verify that flat mode is enabled.
D4	Test base 512KB memory. Adjust policies and cache first 8MB. Set stack.
D5	Bootblock code is copied from ROM to lower system memory and control is given to it. BIOS now executes out of RAM.
D6	Both key sequence and OEM specific method is checked to determine if BIOS recovery is forced. Main BIOS checksum is tested. If BIOS recovery is necessary, control flows to checkpoint E0. See *Bootblock Recovery Code Checkpoints* section of document for more information.
D7	Restore CPUID value back into register. The Bootblock-Runtime interface module is moved to system memory and control is given to it. Determine whether to execute serial flash.
D8	The Runtime module is uncompressed into memory. CPUID information is stored in memory.
D9	Store the Uncompressed pointer for future use in PMM. Copying Main BIOS into memory. Leaves all RAM below 1MB Read-Write including E000 and F000 shadow areas but closing SMRAM.
DA	Restore CPUID value back into register. Give control to BIOS POST (ExecutePOSTKernel). See *POST Code Checkpoints* section of document for more information.

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Bootblock Recovery Code Checkpoints

The Bootblock recovery code gets control when the BIOS determines that a BIOS recovery needs to occur because the user has forced the update or the BIOS checksum is corrupt. The following table describes the type of checkpoints that may occur during the Bootblock recovery portion of the BIOS:

Checkpoint	Description
E0	Initialize the floppy controller in the super I/O. Some interrupt vectors are initialized. DMA controller is initialized. 8259 interrupt controller is initialized. L1 cache is enabled.
E9	Set up floppy controller and data. Attempt to read from floppy.
EA	Enable ATAPI hardware. Attempt to read from ARMD and ATAPI CDROM.
EB	Disable ATAPI hardware. Jump back to checkpoint E9.
EF	Read error occurred on media. Jump back to checkpoint EB.
E9 or EA	Determine information about root directory of recovery media.
F0	Search for pre-defined recovery file name in root directory.
F1	Recovery file not found.
F2	Start reading FAT table and analyze FAT to find the clusters occupied by the recovery file.
F3	Start reading the recovery file cluster by cluster.
F5	Disable L1 cache.
FA	Check the validity of the recovery file configuration to the current configuration of the flash part.
FB	Make flash write enabled through chipset and OEM specific method. Detect proper flash part. Verify that the found flash part size equals the recovery file size.
F4	The recovery file size does not equal the found flash part size.
FC	Erase the flash part.
FD	Program the flash part.
FF	The flash has been updated successfully. Make flash write disabled. Disable ATAPI hardware. Restore CPUID value back into register. Give control to F000 ROM at F000:FFF0h.

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POST Code Checkpoints

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following table describes the type of checkpoints that may occur during the POST portion of the BIOS:

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable "wCMOSFlags."
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
08	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
C0	Early CPU Init Start -- Disable Cache - Init Local APIC
C1	Set up boot strap processor Information
C2	Set up boot strap processor for POST
C5	Enumerate and set up application processors
C6	Re-enable cache for boot strap processor
C7	Early CPU Init Exit
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.
13	Early POST initialization of chipset registers.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that has optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.

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POST Code Checkpoints, Continued

Checkpoint	Description
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, … etc.) successfully installed in the system and update the BDA, EBDA…etc.
50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed / requested.
8C	Late POST initialization of chipset registers.
8D	Build ACPI tables (if ACPI is supported)
8E	Program the peripheral parameters. Enable/Disable NMI as selected
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRRs.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	End of POST initialization of chipset registers.
B1	Save system context for ACPI.
00	Passes control to OS Loader (typically INT19h).

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DIM Code Checkpoints

The Device Initialization Manager module gets control at various times during BIOS POST to initialize different BUSes. The following table describes the main checkpoints where the DIM module is accessed:

Checkpoint	Description
2A	Initialize different buses and perform the following functions: Reset, Detect, and Disable (function 0); Static Device Initialization (function 1); Boot Output Device Initialization (function 2). Function 0 disables all device nodes, PCI devices, and PnP ISA cards. It also assigns PCI bus numbers. Function 1 initializes all static devices that include manual configured onboard peripherals, memory and I/O decode windows in PCI-PCI bridges, and noncompliant PCI devices. Static resources are also reserved. Function 2 searches for and initializes any PnP, PCI, or AGP video devices.
38	Initialize different buses and perform the following functions: Boot Input Device Initialization (function 3); IPL Device Initialization (function 4); General Device Initialization (function 5). Function 3 searches for and configures PCI input devices and detects if system has standard keyboard controller. Function 4 searches for and configures all PnP and PCI boot devices. Function 5 configures all onboard peripherals that are set to an automatic configuration and configures all remaining PnP and PCI devices.

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