Modular Computers ®

CP312

Single-Height CPU Board for CompactPCI Systems

Manual ID 18782, Rev. Index 0200
Mar 99

The product described in this manual is in compliance with all CE standards applied.

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Preface

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Revision History

Revision History			
Manual/Product Title:	**CP312**		
Manual ID Number:	**18782**		
Rev. Index	**Brief Description of Changes**	**HW Index**	**Date of Issue**
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0110	Board Diag. (1.5.8), Pinout (Tab. 2-13/2-22), FD I/F (Tab. 2-30), Setup Utility (Page 4-4)	0002	Oct. 98
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0200	General update of manual	2000	Feb. 99

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Explanation of Symbols



CE Conformity

This symbol indicates that the item described in this manual is in compliance with all applied CE standards. See also the section “Applied standards” of this manual.



Caution!

This symbol and title warn you of hazards due to electrical shocks (> 60 V) when touching products or parts of them. The non-observance of the measures indicated and/or prescribed by the law may cause harm to your product and/or life/health.

See also the section “High Voltage Safety Instructions”.



ESD-Sensitive Device!

This symbol and title inform you 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” of this manual.



Attention!

This symbol and title emphasize aspects which, if not read through carefully by the reader, might cause hazards to health and/or damages to material.



Note:

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



PEP Advantage

This symbol and title emphasize advantages or positive aspects of a product and/or procedure.



Troubleshooting

This symbol and title characterize a message containing useful information on troubleshooting and problem solving.

For your safety

Your new *PEP* product was developed and tested carefully to provide all features necessary to ensure the renown 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 interests of your own safety and of the correct operation of your new *PEP* 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!

However, serious electrical shock hazards exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable to avoid exposure to hazardous voltage.
Before installing your new *PEP* product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks.

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 safe work stations are 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 back-up, 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 tracks on the board.

General Instructions on Usage

- In order to maintain *PEP'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 *PEP Modular Computers* and described in this manual or received from *PEP* 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.

Two Years Warranty

PEP Modular Computers grants the original purchaser of *PEP* products a ***TWO YEARS LIMITED HARDWARE WARRANTY*** as described in the following. However, no other warranties that may be granted or implied by anyone on behalf of *PEP* are valid unless the consumer has the express written consent of *PEP Modular Computers*.

PEP Modular Computers warrants their own products, excluding software, to be free from manufacturing and material defects for a period of 24 consecutive months from the date of purchase. This warranty is not transferable nor extendible to cover any other users or long-term storage of the product. It does not cover products which have been modified, altered or repaired by any other party than *PEP Modular Computers* or their authorized agents. Furthermore, any product which has been, or is suspected of being damaged as a result of negligence, improper use, incorrect handling, servicing or maintenance, or which has been damaged as a result of excessive current/voltage or temperature, or which has had its serial number(s), any other markings or parts thereof altered, defaced or removed will also be excluded from this warranty.

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).

PEP provides for repair or replacement of any part, assembly or sub-assembly at their own discretion, or to refund the original cost of purchase, if appropriate. In the event of repair, refunding or replacement of any part, the ownership of the removed or replaced parts reverts to *PEP Modular Computers*, and the remaining part of the original guarantee, or any new guarantee to cover the repaired or replaced items, will be transferred to cover the new or repaired items. Any extensions to the original guarantee are considered gestures of goodwill, and will be defined in the "Repair Report" issued by *PEP* with the repaired or replaced item.

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Chapter 1

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1. Introduction

1.1 System Overview

The *PEP Modular Computers* CompactPCI systems described in this chapter operate with the PCI bus architecture to support additional I/O and memory-mapped devices as required by various industrial applications. In the following you will find the most important information on all system relevant CompactPCI features. For more 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 homepage of the *PCI Industrial Computer Manufacturers Group (PICMG)*.

1.1.1 Note on CompactPCI

CompactPCI is an extension of the PCI specification. It has been optimized for industrial and embedded applications that require a more robust mechanical form factor as compared to Desktop PCI. CompactPCI systems use industry standard mechanical components and high performance connector technologies to provide systems that are well suited for rugged applications. CompactPCI stands for systems that are electrically compatible with the PCI Specification, allowing low cost PCI components to be used. CompactPCI is an open specification supported by PICMG.

1.1.2 Main Features of CompactPCI Systems

Some of the outstanding features of the CompactPCI systems compliant with Specification 2.0, Release 2.1 are:

- PCI signalling
- 32 and 64 bit data transfer at 33 MHz
- up to 8 PCI slots per backplane
- industry standard software support
- 3U small form factor (100 mm by 160 mm)
- 6U form factor (233 mm by 160 mm)
- Eurocard packaging
- wide variety of available I/O functions
- industry support from over 350 members.
- possibility of PMC modules on some boards



PEP Advantage

PEP Modular Computers' CompactPCI systems are designed as open systems, able to be expanded at any time, so that their backplanes can be equipped with precisely the CPCI boards that correspond to a customer's specific needs. However, in order to supply you with an appropriate choice of workstations, the *PEP* basic equipment is divided into pre-configured sets and custom solutions.

1.2 System Components

PEP Modular Computers have devised their CompactPCI systems as a comprehensive open solution for industrial environments, offering different workstation configurations which are capable of including all the components necessary to fulfill the requirements of virtually all existing system functionalities.

CompactPCI Backplane(s)

- 4-slot backplane;
- 6-slot backplane;
- 8-slot backplane;
- 16-slot backplane.

CPU Function

PEP Modular Computers provides CPU boards corresponding in size and characteristics to the special features of the *PEP* systems.

Display Related Functions

Display related functions such as frame grabbing are supported by dedicated boards.

Communication

Communication boards are provided for the currently relevant industrial communication systems such as Fast Ethernet.

Fieldbus Control

Fieldbus control boards provide data exchange with field control and automation subsystems like *PEP Modular Computers'* SMART2 or VMEbus systems using up-to-date transmission standards for example:

- CAN fieldbus control
- PROFIBUS control

Industrial I/O Functions

PEP's CompactPCI systems support an ever increasing number of industrial I/O functionalities in the fields of:

- Digital I/O
- Analog I/O

Self-Testing

A special *PEP* self-testing board provides a trouble-spotting capability within your *PEP* system.

System Hardware

The *PEP* CompactPCI system hardware includes housings, storage devices, power supply units, network adapters etc. The most important system hardware elements with which to configure your CompactPCI system are as follows:

Multiprocessor

In a CompactPCI multiprocessor system, a system controller communicates with other CPU's through a non-transparent PCI / PCI bridge. *PEP Modular Computers'* CompactPCI system controllers, CP600/CP610, which are designed to work together with PEP CPU's, CP611/CP612, provide full multiprocessor solutions.

Housings

- Board cages for 19-inch cabinets or wall mounting
- PCI tower
- PCI desktop housing

Mass Storage Devices

- Hard-disk drive
- Floppy-disk drive
- CD-ROM drive

Power Supply Units

- 19-inch "M", 180 W, 120/230 V AC, 3.3V/14A, 5.1V/20A, 12V/2A, -12V/1A
- "ATX", 235 W, 120/230 VAC, 3.3V/14A, 5V/22A, 12V/8A,-12V/1A, -5V/0.5A, 5VSB/0.1A

Form Factors

PEP Modular Computers CompactPCI boards are available in different form factors, mainly as 3U (single-height) and 6U (double-height) boards and as 4HP (single-width), 8HP (double-width), and 12HP (triple-width) boards.

Please note that the following units of measurement are used to express the dimensions of *PEP* CompactPCI card slots:

- Height: 1 U = 44.45 mm
- Width: 1 HP = 5.08 mm

On certain boards/carriers with PMC connectors, PMC add-on modules can also be installed. Please note that the form factor of *PEP Modular Computers* PMC modules is:

- 149mm x 74mm (single-size standard).

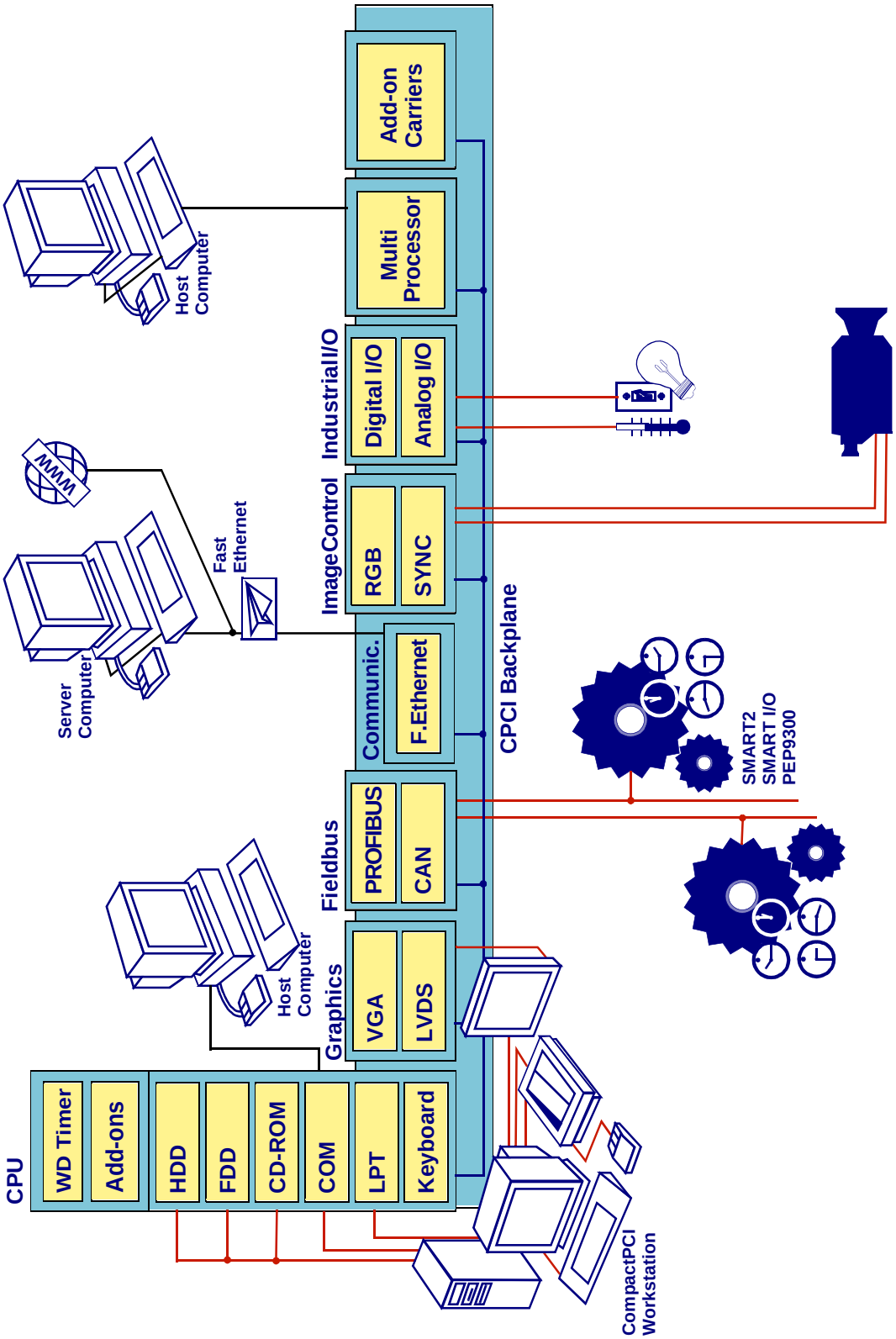
For a detailed description of the *PEP Modular Computers* CompactPCI modules please consult the specific component's manuals or data sheets.



PEP Advantage

As the *PEP Modular Computers* CompactPCI system provides comprehensive open solutions. New features and functionalities may be added to our range. To keep abreast of the latest developments, please contact your local *PEP Sales Office* or visit the ***PEP Web Site***.

Figure 1-1: Example of a *PEP Modular Computers* CompactPCI System



1.3 Board Introduction

The CP312 is a CompactPCI Pentium-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 CP312's outstanding features are:

- compliance with CompactPCI Interface 2.1
- suitable for all common socket-7 processors for standard PC applications
- max. 512 KByte CPU L2 cache
- up to 128 MByte DRAM
- 256 KByte FLASH for BIOS
- on-board SVGA
- Flash Disk up to 144 MByte
- two IDE interfaces

The CP312 includes the following commonly used peripheral devices:

- floppy disk drive interface
- keyboard or USB controller
- serial I/O (ESD protected and EMI compliant)
- counter/timers
- watchdog timer
- real-time clock
- double-width version with additional serial and parallel port, or a 10BASE-T Ethernet and one serial interface.

1.4 Product Overview

The CP312 is a highly integrated single-board computer that is designed around the Pentium family of Intel and AMD K6 microprocessors.

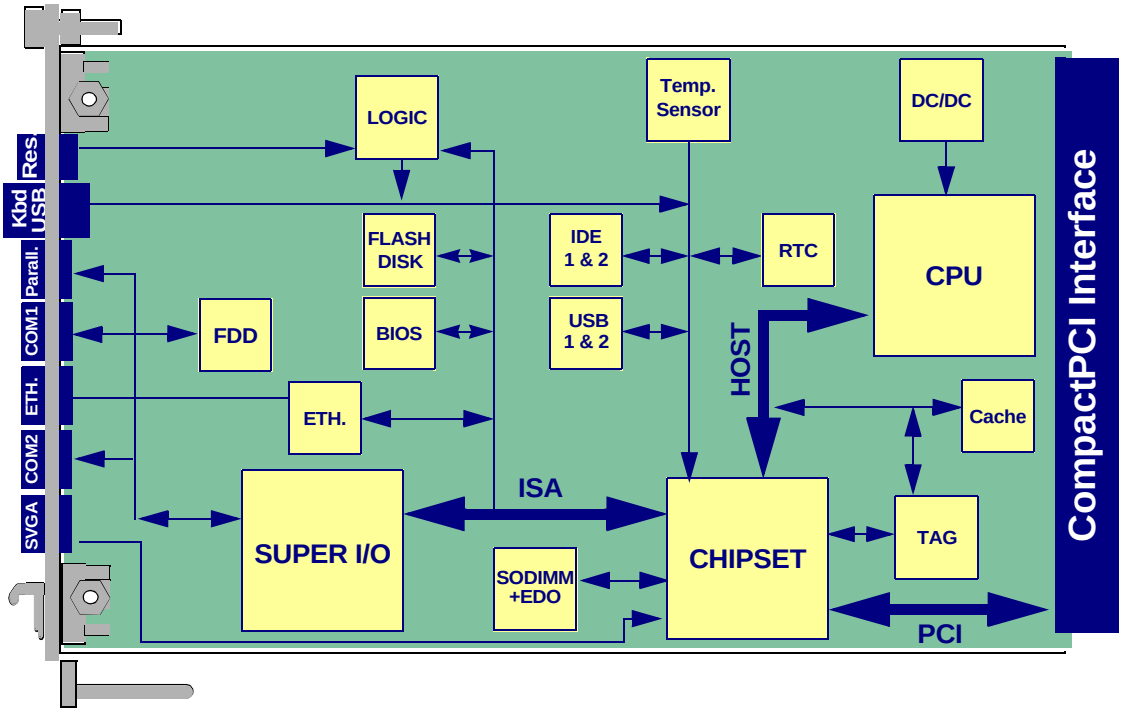
Finding an optimum equilibrium between performance and power dissipation, the CP312 is a reliable Pentium-controlled board supporting a clock speed of up to 333MHz.

Designed for stability and packaged in a rugged format, the board fits into all applications situated in industrial environments. The low power feature of the board is further assured through the use of 3.3 V technology for support of the latest 64 MBit DRAM components.

The CPU is compatible with Microsoft Windows® NT. However, the performance of CompactPCI can be tuned to suit real-time applications and operating systems like VxWorks or QNX which are instrumental to the success of CompactPCI in these market sectors.

For industrial applications, a solid mechanical configuration requires easy access to the main module interfaces. Therefore, all critical user I/O's (keyboard, VGA, Ethernet, and COM1) are routed to the front panel. The remaining two IDE hard disk drive interfaces and one floppy disk drive interface are provided as on-board pin-row connectors.

Figure 1-2: CP312 Functional Block Diagram*



** Full Functionality of CP312 Double-Width Version*

Transition Modules

There are several special transition modules available.

8 HP Modules

- additional serial interface, a parallel port, LED's for operator board control, and a reset button (TR1)
- additional serial interface, a 10BASE-T Ethernet interface, LED's for operator board control, and a reset button (TR3)

12 HP Module

- additional serial interface, a parallel port, LED's for operator board control, reset button, one 2 GByte hard disk drive (2½"), and one 1.44 MByte floppy disk drive (TR2)

Front panel, LEDs, and interfaces characterize the board as a whole and, therefore, are described in this chapter. The jumper settings and pinout of the transmission module are described under separate headings in chapter: "Configuration".

1.5 Main Features

The following description illustrates the main features of the principal functional blocks of the CP312.

1.5.1 CPU

The CP312 supports the Pentium processor family:

- P54C, P55C, up to 233 MHz;
- Intel VRT with 133 MHz;
- AMD K6 up to 333 MHz

1.5.2 Memory

The CP312 can accommodate 32- or 64-MByte modules of 64-bit DRAM which are soldered in place for optimum mechanical stability. In addition, up to 64 MByte on-board DRAM EDO or SRAM are installed on a SODIMM socket and up to 144 MByte on-board FLASH on a DIL socket.

1.5.3 Board Interfaces

CompactPCI Bus Interface

The CP312 can operate as a system controller for 32-bit CompactPCI systems which are electrically identical to the PCI local bus. However, these systems are enhanced to operate in rugged industrial environments and to support multiple slots.

VGA Interface

The VGA interface contains an embedded 64-bit SVGA chip. The system memory shares up to 4 MB with the video buffer and supports high resolution graphic mode 1024*768, 64k colors.



Note:

The CP312 can be booted with the VGA interface disabled (see jumper settings in chapter 2.1.6, Integrated VGA Controller of this manual).

10BASE-T Ethernet Interface

A 10BASE-T Ethernet controller with 6 KByte memory is available on a special module.

Hard Disk Drive Interfaces

The CP312 supports two IDE interfaces, a primary one (“IDE1”) and a secondary one (“IDE2”). The IDE interfaces are 40-pin, 2.54 mm pitch, 2-row male connector, AT standard interfaces for IDE hard disk drives.

Each IDE interface provides support for up to two hard disk drives and/or CD-ROM drives (two master-slave pairs). All hard disk drives can be used in CHS mode, but the BIOS also supports the LBA mode..

Note:

Each of the two interfaces, “IDE1” and “IDE2”, support a maximum of two hard disk drives connected in a master-slave mode. To configure the first as a master disk and the second as a slave disk, please refer to the hard disk drive’s manufacturer documentation.

Floppy Disk Drive Interface

With the single-width version of the CP312, an adapter (CP312-FD) is available which allows for the installation of an optional floppy disk drive.

PEP Advantage

The double-width version of the CP312 provides instead a standard floppy disk drive connector which is described in detail in the “Transition Module” chapter.

USB or Keyboard Interfaces

Depending on the version you have acquired, your CP312 is provided either with a PS/2 keyboard connector or with two USB-type serial ports.

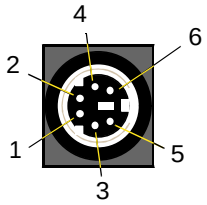


Figure 1-3: PS/2-Type Keyboard Connector

The PC/AT standard keyboard connector is a 6-pin shielded mini-DIN connector. The keyboard power supply unit is protected by a 500 mA fuse. All signal lines are EMI-filtered.

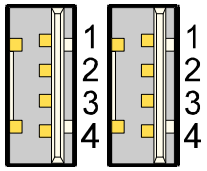


Figure 1-4: USB Connectors

Alternatively two independent USB ports with a maximum transfer rate of 12 Mbit each are provided. The USB power supply feeding the two connectors is protected by a 1.5 A fuse. All signal lines are EMI-filtered.

Serial Ports

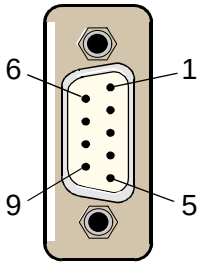


Figure 1-5: PC-Compatible D-Sub Serial Interface

One, or in the case of the double-width version, two PC-compatible serial 9-pin DSUB ports are available with 5V charge-pump technology eliminating the need for a ±12V supply.

The RS232 serial interface COM1, which is part of the single-width version of the CP312, includes a complete set of handshaking and modem control signals, maskable interrupt generation and data transfers of up to 460.8 KBit/s.

Watchdog Timer

The CP312 has one watchdog timer: a programmable time-out ranging from 250 msec to 250 sec.

Interrupts

Two enhanced 8259-style interrupt controllers provide a total of fifteen interrupt inputs with features which include: level and edge-triggered inputs, fixed and rotating priorities, and individual input masking. Interrupt sources include: counter/timers, serial I/O, RTC, keyboard/mouse, printer, floppy disk drive, IDE interfaces, and four interrupt sources on the CompactPCI backplane.

Reset

The CP312 will be automatically reset by means of a precision voltage monitoring circuit that detects when the power supply input voltage is below the acceptable operating limit of 4.725 V for the 5V line and below 3.0 V for the 3.3V line, or in the case of a power failure of the DC/DC converter. Other reset sources include the watchdog timer and the reset switch. The CP312 responds to any of these sources by initializing local peripherals and issuing the PCIRST* signal on the CompactPCI bus.

Standard Peripherals

- Real-Time Clock

  The real-time clock performs time keeping 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.

- Counter/Timer

  Three 8254-style counter/timers are included on the CP312 as defined for the PC/AT.

1.5.4 Flash Disk Socket

In order to achieve flexibility with low cost, the CP312 FLASH disk is not soldered but connected via a special module of M-Systems (Disk-on-Chip 2000).

Module Versions

Different flash module versions are available on the CP312.

- Standard flash memory of up to 512 KByte in a 32-pin DIL package
  - AMD29F010
  - AMD29F040
- Standard EPROM memory in a 32-pin DIL package
  - AMD27C010
  - AMD27C020
- Disk-on-chip flash memory:
  - 2 - 24 MByte (dimensions 41.7 x 17.9 x 5.6mm);
  - 40 - 144 MByte (dimensions 42.0 x 18.3 x 11.8mm).

For higher flash disk capacity it is recommended to use an ATA flash disk.

Software Support

Real-time operating systems like QNX, VxWorks, and others are supported. The standard PC features supported by the BIOS allow also for PC operating systems like MS-DOS, Windows 95, Windows NT, OS-2, or UNIX.

1.5.5 Battery

The CP312 is provided with a 3.0V “coin cell” lithium battery for RTC.

To replace the battery please proceed as follows:

- Turn off power
- Remove the battery
- Place the new battery in the socket
- Check CMOS settings.

Suitable batteries include the VARTA CR 2025 or the PANASONIC BR 2020.



Note:

Booting of the CP312 without a battery is possible starting from hardware index 1000. CMOS data are stored automatically in on-board volatile RAM. Please note that system date and time data are reset.

1.5.6 Transition Module Interfaces

Serial Port

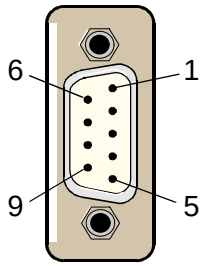


Figure 1-6: PC-Compatible D-Sub Serial Interface

In addition to the serial port of the single-width version of the CP312, the double-width version is provided with a second PC-compatible serial 9-pin DSUB port. This port supports the same 5V charge-pump technology in order to eliminate the need for a ±12V supply. Both ports include a complete set of handshaking and modem control signals, maskable interrupt generation, and data transfers of up to 460.8 KBits/s.

The additional COM2 interface of the double-width version can be configured as a RS232, RS422 or RS485 port through setting the appropriate solder jumpers. The standard setting of COM2 envisages the RS232 configuration.

Parallel Port

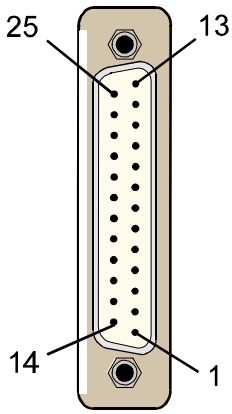


Figure 1-7: PC-Compatible D-Sub Parallel Interface

Two double-width versions of the CP312 are available with an IEEE1284, ECP/EPP-compatible, parallel port/printer interface. The parallel port is a 25-pin DSUB female connector mounted on the front panel.

Note:

The parallel port is not available on the CP312 variant with an Ethernet port.

Transition Module Connection Interface

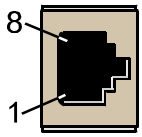
With the double-width version of the CP312 the “BU1” connector located on the carrier board is a 2-row, 50-pin female connector. A matching male connector is placed on the transition module to allow transmission of signals between the two boards.

Floppy Disk Drive Interface

The double-width version of the CP312 is provided with a 2-row 34-pin standard floppy disk drive connector – “ST2” – to which up to two floppy disk drives can be connected. A description of this floppy disk drive configuration is provided in the chapter: “Configuration”.

Ethernet Interface

Figure 1-8: Ethernet Connector RJ45



The Ethernet connector is realized as an RJ45 unshielded, twisted-pair connector.

1.5.7 Front Panels

Figure 1-9: CP312 Front Panel Views: USB Connector Versions

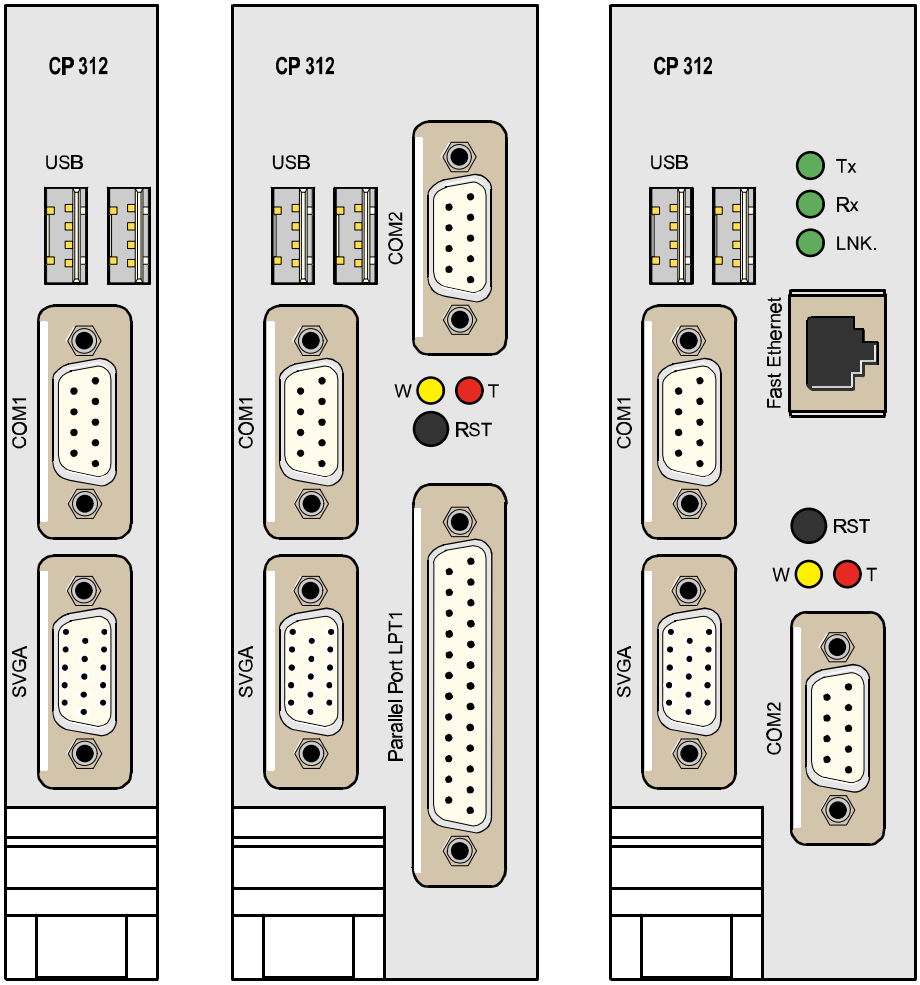
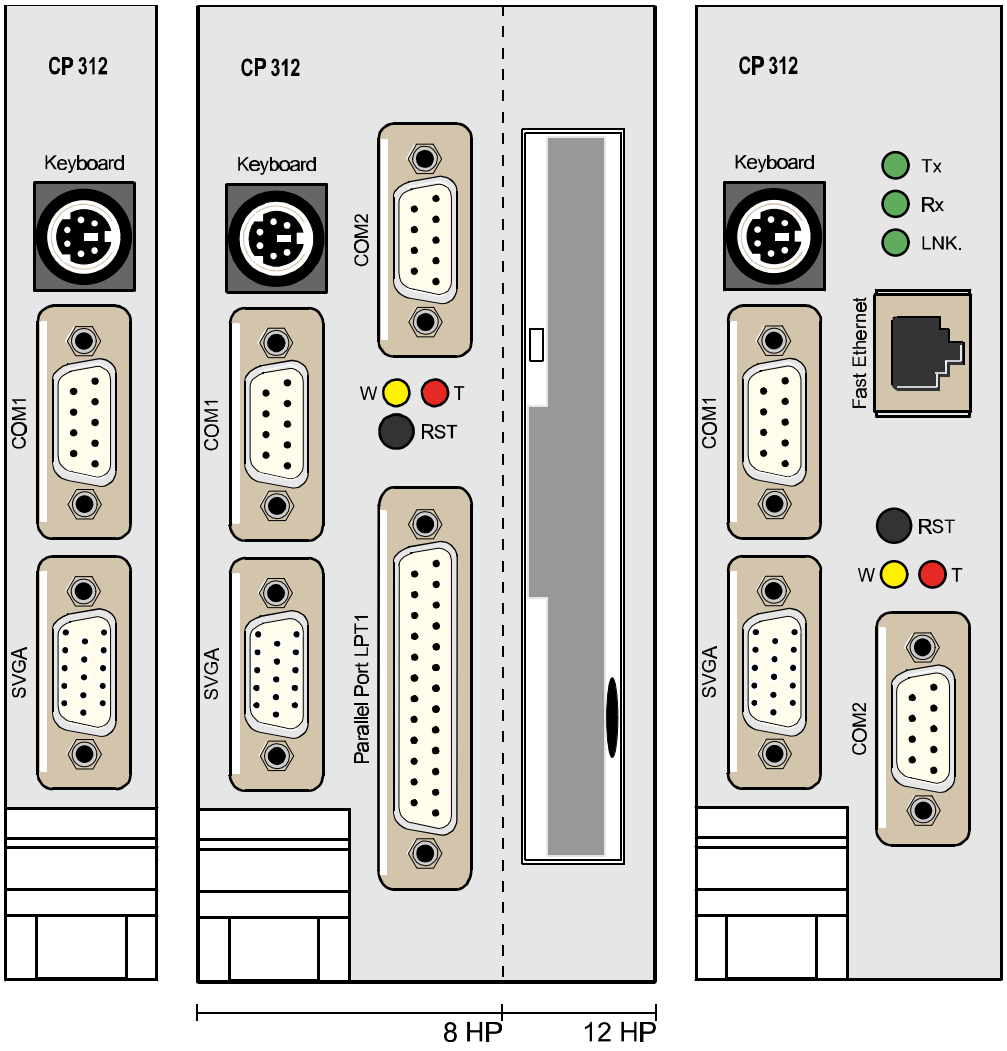


Figure 1-10: CP312 Front Panel Views: PS/2 Connector Versions



Figures 1-9 and 1-10 show the front panels for the various possible configurations of the CP312.

Both the PS/2 and USB CP312 controller versions are available with the following configurations:

- 4HP, IEC standard, single-width, without parallel port;
- 8HP, double-width, including a parallel port; or
- 8HP, double-width, with Ethernet port.

In addition, the PS/2 controller version is available as a:

- 12HP version with one 2 GByte hard disk drive (2½”), and one 1.44 MByte floppy disk drive. Transition Module TR2 is required to realize this version.

The front panel of the multiple-width versions also have operating status LED's which have the following functions:

all multiple-width boards

- "W" (yellow) = watchdog timer status. (If ON, the watchdog is active.)
- "T" (red) = temperature alarm. (If ON, an over-temperature has occurred.)

all multiple-width boards with an Ethernet port

- "Tx" (green) = transmitting data. (If ON, data is being transmitted.)
- "Rx" (green) = receiving data. (If ON, data is being received.)
- "LNK" (green) = link (If ON, Ethernet link is active.)

1.5.8 Board Layouts

Figure 1-11: CP312 Board Layout (Front Side)

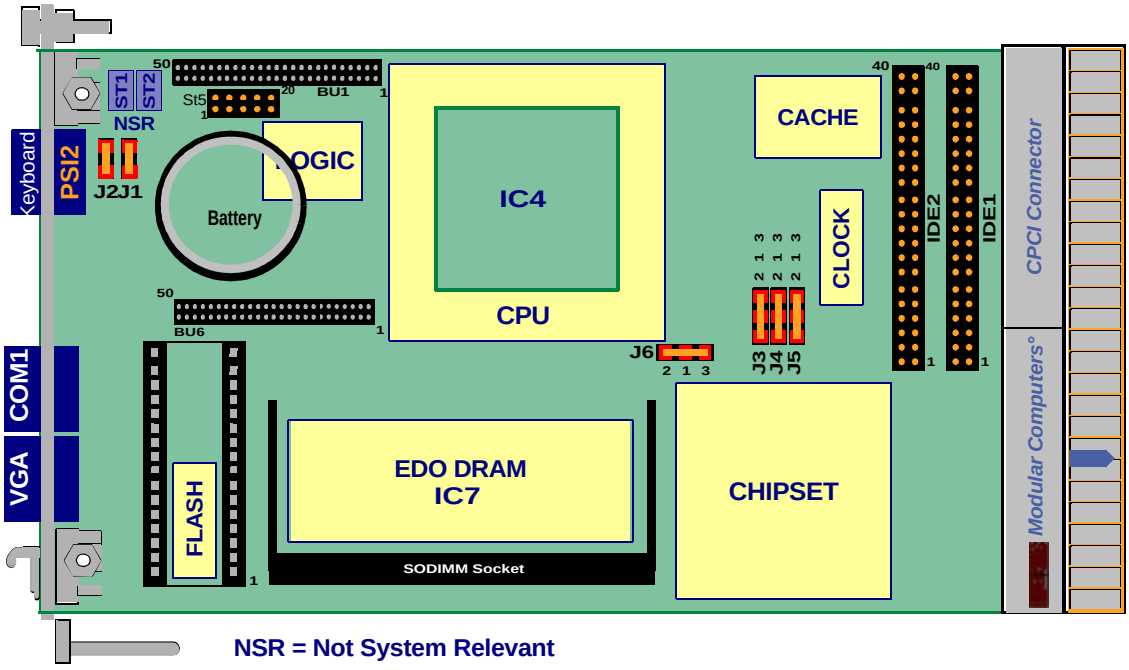
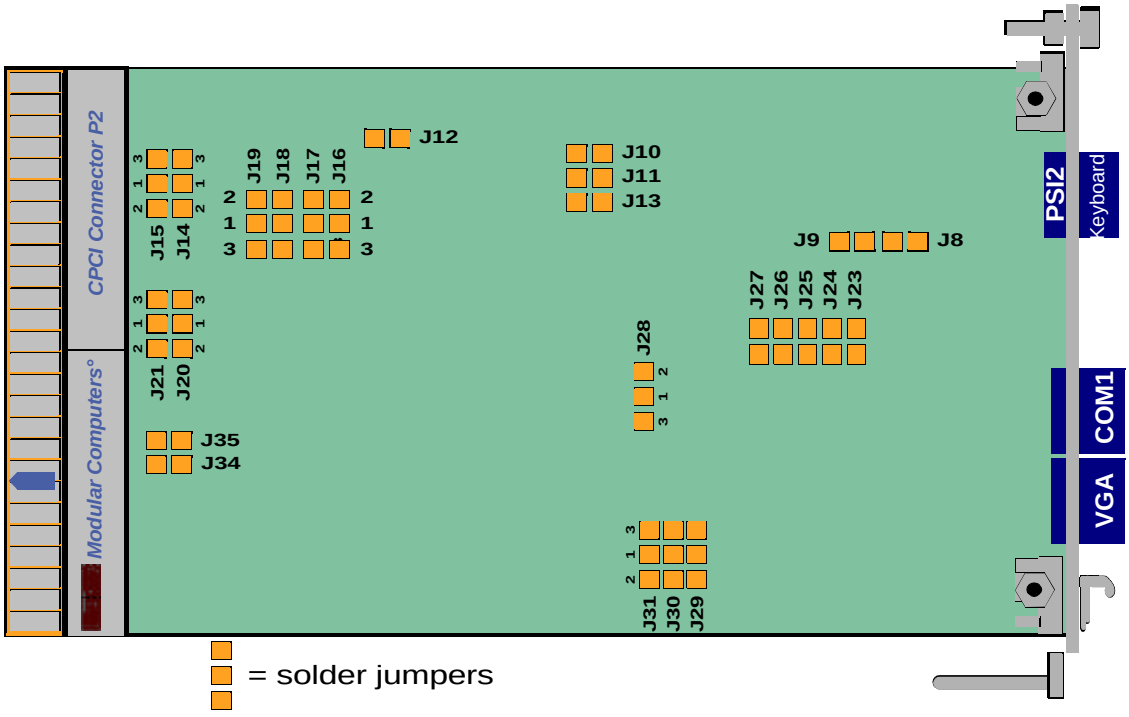
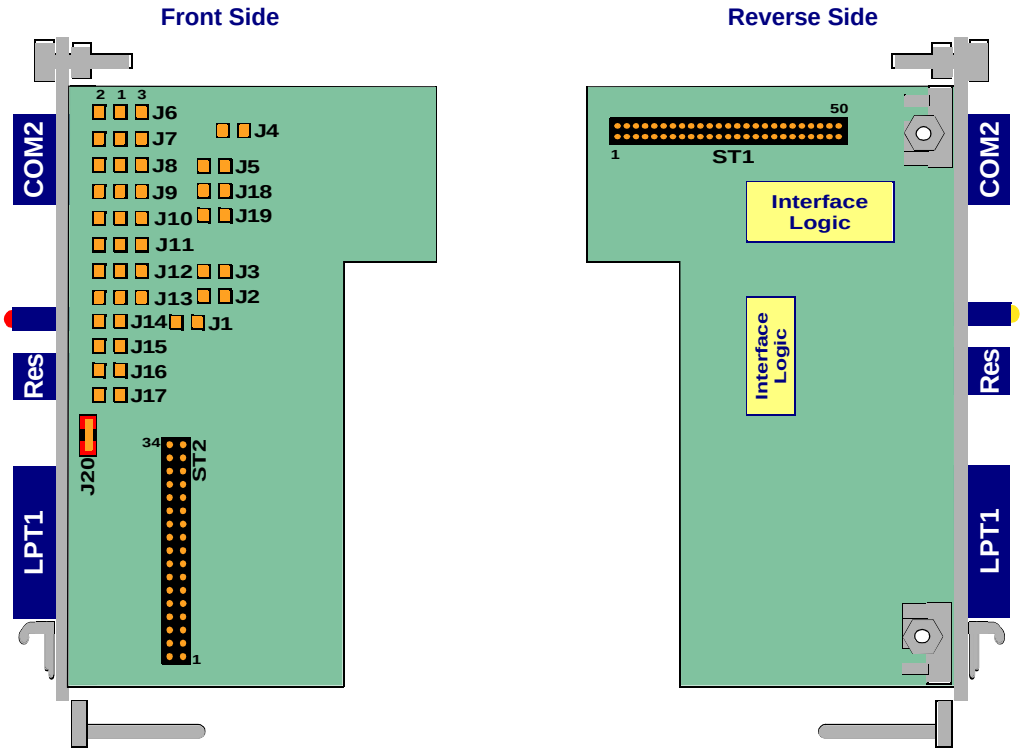


Figure 1-12: CP312 Board Layout (Reverse Side)



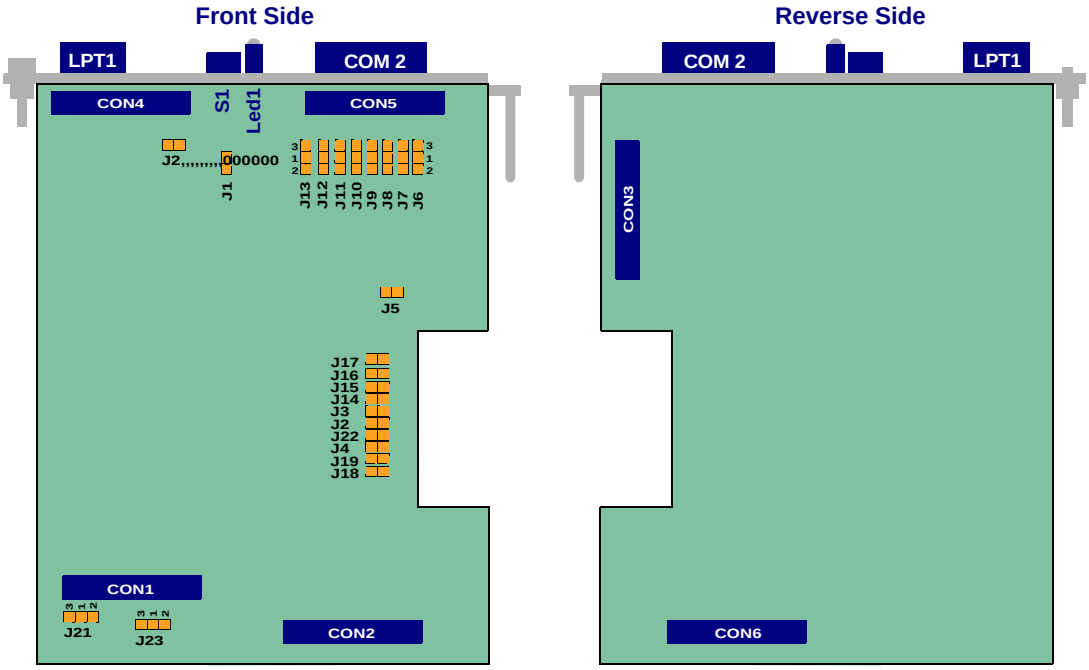
1.5.8.1 Transition Module - TR1

Figure 1-13: Transition Module - TR1 Board Layout



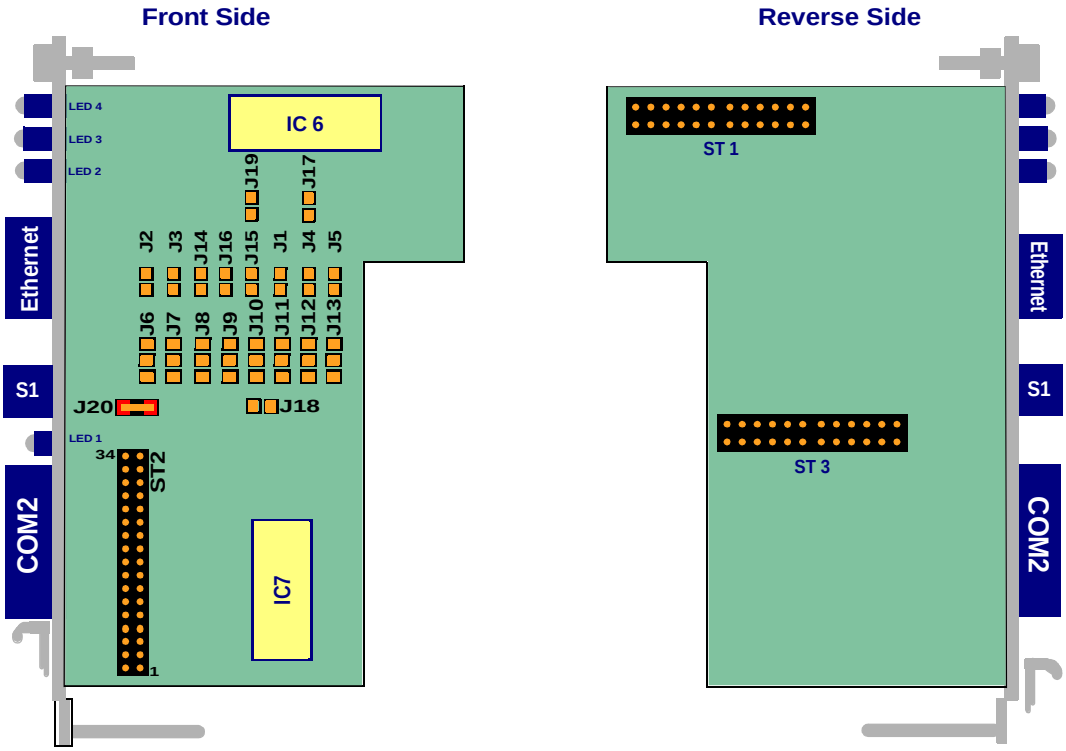
1.5.8.2 Transition Module - TR2

Figure 1-14: Transition Module - TR2 Board Layout

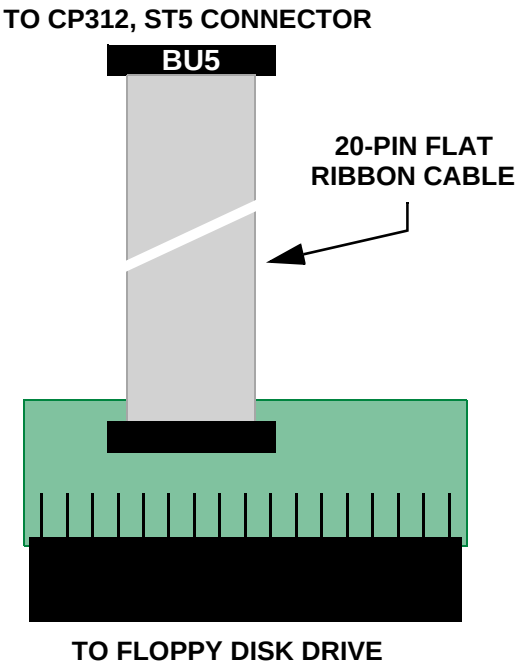


1.5.8.3 Transition Module - TR3

Figure 1-15: Transition Module TR3 Board Layout



1.5.8.4 Floppy Adapter, CP312-FD



1.6 Main Specifications

Table 1-1: CP312 Main Specifications

CP312	Specifications
CPU	All common socket-7 processors up to 333MHz Built-in numeric co-processor support.
Memory	32 KByte or 64 KByte internal CPU cache (processor) 512 KByte burst-SRAM pipelined L2 expansion cache 64 MByte on-board DRAM expandable to 128 MByte (SODIMM socket for 64 MByte EDO and SDRAM)
Pentium System Controller	SiS 5598 single-chip PCIset with: • Level 2 write-back cache controller, Burst DRAM controller, PCI & ISA interface, consuming only 1PCI load, • real-time clock with general-purpose, battery-backed CMOS RAM (s/w compatible with DS1287/MC146818), • two enhanced 8237-style DMA controllers, and • a 8042 compatible PC/AT keyboard controller.
AT Peripheral Controller	SMC FDC37C669 provides the following functions: • two 16C550 compatible UARTs with 16 bytes FIFO, • support for IRDA compliant devices is provided on COM2, and • a multi-mode, bi-directional parallel port, IBM CENTRONICS compatible enhanced parallel Port (EPP) (High-Speed mode: ECP compatible).
Mass-Storage Interfaces	Floppy-disk interface for up to 2 devices: • 720 kByte, 1.2/1.44 or 2.88 Mbyte. 2 IDE/ATA interfaces, each supporting ultra DMA protocol for 2 hard-disks or CD-ROM on 40-pin 2.54mm connectors. Up to 144 MByte FLASH disk-on-chip.
Real-Time Features	Software configured watchdog timer that can be BIOS configured to issue an IRQ, INT, or system RESET
SVGA Video Support	High-performance, embedded 64-bit GUI accelerator with shared display memory (4 MByte) for screen resolutions up to 1024 x 768 pixels for both interlaced and non-interlaced operational modes
Software Support	Award BIOS is contained within 256 KByte FLASH memory. Due to the standard PC features supported by the BIOS, all PC operating systems like MS-DOS, OS-2, Windows, or UNIX may be installed. Real-time operating systems like QNX, VxWorks, etc. may also be installed.
CompactPCI Bus Interface	Compatible with CompactPCI Specification V 2.0, Rev. 2.1 (09/97) 32-bit master interface One slot local system operation 5.0V compatible

Table 1-1: CP312 Main Specifications

CP312	Specifications
General	Power consumption: 10W at 133 MHz 2W, 3.3 V 8W, 5.0 V 2W apx., 12.0 V (fan version only) Dimensions: 100mm * 160mm (3U card size) Operating temp: 0°C to +60°C, -25°C to +75°C (optional) Storage temp.: -55°C to +85°C Operating humidity: 0% to 95% non condensing Weight: 300g (without memory)
Front-Panel Interfaces	PS-2 style keyboard connector or 2 USBs COM1 mouse/serial port with 9-pin D-Sub COM2 serial port with 9-pin D-Sub (8HP version) 15-pin D-Sub SVGA connector LPT physical interface on 25-pin D-Sub (8HP version) Board RESET button (8HP version) Ethernet on RJ45 connector (8HP version)
Ethernet Interface	Controller: SMSC 91C96 Ethernet Controller Data Rate: 10 MBits Standard: full 802.2 and 802.3 IEEE supporting 10BASE-T Cabling: Category 5, twisted-pair cabling Memory Location: 300h - 31Fh IRQ: INT 9 Configuration: jumperless via EEPROM
LEDs (8HP version)	“W” (yellow) = watchdog timer status. “T” (red) = temperature alarm. Ethernet port “Tx” (green) = transmitting data. “Rx” (green) = receiving data. “LNK” (green) = link (active)
Common Features	DC power monitors (3.3V and 5V) Battery socket and 3.0V lithium battery for RTC: • VARTA Type CR2025 • PANASONIC BR2020 LM75 temperature sensor

1.7 Applied Standards

1.7.1 CE Compliance

The *PEP Modular Computers’* CompactPCI systems comply with the requirements of the following CE-relevant standards:

- Emission EN50081-1

- Immission EN50082-2
- Electrical Safety EN60950

1.7.2 Mechanical Compliance

- Mechanical Dimensions IEEE 1101.10

1.7.3 Environmental Tests

- Vibration/Broad-Band IEC68-2-6
  Random Vibration IEC68-2-64 (3U boards)
- Permanent Shock IEC68-2-29
- Single Shock IEC68-2-27

1.8 Related Publications

1.8.1 CompactPCI Systems/Boards

CompactPCI Specification, V. 2.0, Rev. 2.1

1.8.2 PMC Add-On Modules/Carriers

- Draft Standard for a Common Mezzanine Card Family, P1386/Draft 2.0
- Draft Standard Physical and Environment Layers for PCI Mezzanine Cards, P1386.1/Draft 2.0

Chapter 2

Installation

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2.1.3 Master Slot Setting ..... 2 - 5

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2. Installation

2.1 Hardware Installation



High Voltage!

Before removing or connecting any cables, switch off the CPCI system. Pull the mains plug connector of the system before inserting or removing your CP312 board. Failure to do so could hazard your life and health and may damage your board or system.



ESD Equipment!

Your CP312 board contains electrostatically sensitive devices. Please, observe the necessary precautions to avoid damages to your board:

- Discharge your clothing before touching the assembly. Also your 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.

The following chapters deal with the hardware and software setup of the controller board CP312, its CPU and the following devices relating to it:

- serial port COM1
- floppy-disk interface
- two IDE hard-disk interfaces
- keyboard interface on the front-panel
- VGA
- Ethernet



PEP Advantage

One or more of the above mentioned devices may be connected to your CP312 controller board. However, none of the devices must be necessarily installed, since the CP312 is designed for being bootstrapped just from the FLASH device.

2.1.1 Placement of the CP312

The *PEP* CompactPCI system configuration is characterized by the fact that its system slot (slot “1”) is on the right end of the backplane, thus allowing for physical CPU growth (heat-sink, cooling fan etc.) associated with higher-performance processors.



Important!

After having inserted your controller board, please make sure it has been fit into the system slot.

IDE Interfaces

The CP312 board is provided with two IDE interfaces, a primary one, “IDE1”, and a secondary one, “IDE2”. Both are placed on the motherboard.

The two interfaces allow installation of up to four hard disk drives (two master-slave pairs). If installed, the hard disk drives are automatically recognized by the BIOS at system “power on”.



Important!

Each of the two interfaces, “IDE1” and “IDE2”, supports a maximum of two hard disk drives connected in a master-slave mode. To configure the first as a master disk drive and the second a as a slave disk drive, please refer to the hard-disk manufacturer’s documentation.

Hard Disk Drive Installation

To install a hard disk drive, it is necessary to observe the following operations in the given order:

1. Install the hardware;
2. Configure the BIOS parameters by using the IDE autodetection
3. Initialize the software running on the choice of operating system.



Attention!

The incorrect connection of power or data cables can damage your hard disk drive and/or the CP312 board.

2.1.2 Keyboard/Mouse Connector

The CP312 uses a PC/AT standard keyboard/mouse connection realized as a 6-pin shielded mini-DIN connector.



Attention!

Incorrect pinning of your keyboard connector may damage your CP312 board.

2.1.3 Master Slot Setting

Backplane slots 2 and 3 are always master. All remaining slots may be configured to be master by using the relevant jumpers.

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Chapter 3

Configuration

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3. Configuration

3.1 Jumper Settings

3.1.1 CPU

Principally, the CP312 controller board is designed for all socket-7 processors. The CPU frequency can be determined by setting the frequency ratio and system frequency which are in the following relationship to one another:

CPU Frequency = Frequency ratio * System frequency

3.1.2 System Frequency

The table below shows the solder jumper settings for the different CPU and PCI synchronous speed configurations.

Table 3-1: Jumper Settings for Different CPU and PCI Speed Configurations

J19	J18	J17	J16	CPU Clock	PCI Clock
1-2	1-3	1-3	1-3	33.3MHz	16.7MHz
1-2	1-2	1-3	1-3	50.0MHz	25.0MHz
1-2	1-3	1-2	1-3	55.0MHz	27.0MHz
1-2	1-2	1-2	1-3	60.0MHz	30.0MHz
1-2	*1-2*	*1-3*	*1-2*	*66.6MHz*	*33.3MHz*

The default setting is indicated by italics.

3.1.3 CPU-to-Bus Frequency Ratio

These three solder jumpers are used in combination to decide the ratio of the internal frequency of the CPU to the bus clock.

Table 3-2: Jumper Settings for CPU-to-Bus Frequency Ratio

J13 (BF2)	J11 (BF1)	J10 (BF0)	Intel Pentium P54C	Intel Pentium MMX P55C	AMD K6
Closed	Closed	Closed	N/A	N/A	4.5x
Closed	Closed	Open	N/A	N/A	5.0x
Closed	Open	Closed	N/A	N/A	4.0x
Closed	Open	Open	N/A	N/A	5.5x
Open	Closed	Closed	2.5x	2.5x	2.5x

Table 3-2: Jumper Settings for CPU-to-Bus Frequency Ratio

J13 (BF2)	J11 (BF1)	J10 (BF0)	Intel Pentium P54C	Intel Pentium MMX P55C	AMD K6
Open	Closed	Open	3.0x	3.0x	3.0x
Open	Open	Closed	2.0x	2.0x	2.0x
Open	Open	Open	1.5x	3.5x	3.5x

3.1.4 CPU Voltage Selection

The core voltage must be configured for every CPU type. The voltage is digitally programmable from 1.2 V to 3.3 V.

Table 3-3: Jumper Settings for Core Voltage Configuration

J23	J24	J25	J26	J27	Core Voltage	CPU
Open	Closed	Open	Closed	Closed	3.3V	--
Open	Closed	Open	Closed	Open	3.2V	--
Open	Closed	Closed	Open	Closed	3.1V	--
Open	Closed	Closed	Open	Open	3.0V	--
Open	Closed	Open	Open	Closed	2.9V	Intel Pentium VRT 133MHz
Open	*Closed*	*Open*	*Open*	*Open*	*2.8V*	*Intel Pentium P55C 133MHz-233MHz*
Open	Open	Closed	Closed	Closed	2.7V	--
Open	Open	Closed	Closed	Open	2.6V	--
Open	Open	Open	Closed	Closed	2.5V	--
Open	Open	Open	Closed	Open	2.4V	--
Open	Open	Closed	Open	Closed	2.3V	--
Open	Open	Closed	Open	Open	2.2V	AMD K6 266MHz-300MHz
Open	Open	Open	Open	Closed	2.1V	--
Closed	Closed	Closed	Closed	Open	2.0V	AMD K6 266MHz Mobile
Open	Open	Open	Open	Open	OFF	Intel Pentium P54C 100MHz-200MHz Core Voltage = I/O Voltage
Closed	Closed	Closed	Closed	Open	2.0V	
Closed	Closed	Open	Closed	Closed	1.9V	--

Table 3-3: Jumper Settings for Core Voltage Configuration

J23	J24	J25	J26	J27	Core Voltage	CPU
Closed	Closed	Closed	Open	Open	1.8V	--
Closed	Closed	Open	Open	Open	1.7V	--
Closed	Open	Closed	Closed	Open	1.6V	--
Closed	Open	Open	Closed	Open	1.5V	--
Closed	Open	Closed	Open	Open	1.4V	--
Closed	Open	Open	Open	Open	1.3V	--

The default setting is indicated by italics.

3.1.5 CPU Burst Mode

This solder jumper selects the cache burst mode.

Table 3-4: Jumper “J12” — Settings for Cache Burst Mode Selection

J12	Function
Open	*Intel burst interleaved*
Closed	Linear burst

The default setting is indicated by italics.

3.1.6 Integrated VGA Controller

The tables below show the jumper settings for the integrated VGA controller.

Table 3-5: Jumper “J28” — VGA Interrupt Selection

J28	VGA Interrupt Selection
1-2	*Disable VGA interrupt*
1-3	Enable VGA interrupt

The default settings are indicated by italics.

Table 3-6: Jumpers “J3/J4/J5” — Integrated VGA Control

J3	J4	J5	Integrated VGA Control
1-2	*1-2*	*1-2*	*Enable integrated VGA*
1-3	1-3	1-3	Disable integrated VGA and enable REQ4 and GNT4 for the CPCI slot 6

The default setting is indicated by italics.

3.1.7 Memory Configuration

The integrated VGA controller can only share the DRAM bank “0”. To achieve a high system performance it is recommended to use SDRAM memory for the VGA controller. The following solder jumpers select the DRAM type for the integrated VGA

Table 3-7: Jumpers “J29/J30/J31” — DRAM Type Selection

J29	J30	J31	On-Board EDO	SODIMM EDO	SODIMM SDRAM	Note
1-2	*1-2*	*1-2*	*32/64MB Bank “0”*	-- *£ 64MB*	--	--
1-3	1-3	1-3	64MB	--	≤ 64MB Bank “0”	Recommended for integrated VGA

The default setting is indicated by italics.

3.1.8 External BIOS

It is possible to re-direct the first CPU fetch from the on-board flash to the disk-on-chip socket.

Table 3-8: Jumper “J1” — BIOS Selection

J1	Function	Notes
Closed	External BIOS	To be set only in the event that the on-board FLASH does not work.
Open	*Internal BIOS*	*Normal boot from the on-board BIOS*

The default setting is indicated by italics.

3.1.9 Bus Master Slots

The CP-312 has an internal PCI arbiter that allows the use of five bus masters at the same time. The user can select the slot on the backplane to be used as a bus master, which can be done through Jumpers J14 to J21. The PCI slots 2 and 3 are always bus master.

Table 3-9: Jumper Settings for Bus Master Slot Selection

J14	J15	J20	J21	J3, 4, 5	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Notes
1-2	*1-2*	*1-2*	*1-2*	*1-2*	*BM*	*BM*	*BM*	*BM*	--	--	--	--

Table 3-9: Jumper Settings for Bus Master Slot Selection

J14	J15	J20	J21	J3, 4, 5	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Notes
1-2	1-2	1-2	1-2	1-3	BM	BM	BM	BM	BM	--	--	Integrated VGA disabled
1-3	1-3	1-2	1-2	1-2	BM	BM	BM	--	--	--	BM	
1-2	1-2	1-3	1-3	1-2	BM	BM	--	BM	--	BM	--	
1-3	1-3	1-3	1-3	1-2	BM	BM	--	--	--	BM	BM	

BM = bus master. The default setting is indicated by italics.

3.1.10 FLASH Type Selection

This solder jumper selects the FLASH type to be installed on the FLASH socket IC10.

Table 3-10: Jumper "J9" — Flash Type Selection

J9	Function
Closed	4Mbit Flash type
Open	*2Mbit Flash type*

The default setting is indicated by italics.

3.1.11 External IDE support

Two interrupts (INTP, INTS) have been defined by the CompactPCI specification for supporting legacy IDE devices. These have been mapped to IRQ14 (primary) and IRQ15 (secondary).

With the two solder jumpers J34 and J35 the external interrupts can be routed to the on-board IRQs.

Table 3-11:

J34 - J35	Function
Open	On-board IDE IRQ routing
Close	External CompactPCI IDE IRQ routing

Note:

If the external IDE controller IRQ routing is enabled, the on-board controller must be disabled via the BIOS.

3.1.12 Reserved Jumpers

Jumper J8 is not system relevant. It is reserved for the configuration of possible future board features.

3.1.13 Transition Module Jumper Settings

3.1.13.1 Serial Port Setting

The additional serial port COM2 of the CP312 transition modules can be set to either RS232, RS422, or RS485 mode by setting solder jumpers ”J1” to “J19”. The standard configuration is RS232.

Table 3-12: Jumpers “J1..J19” — Serial Port Setting

Jumpers	RS232	RS422	RS485	Jumpers	RS232	RS422	RS485
J1	*Open*	Close	Close	J11	*2 - 1*	3 - 1	3 - 1
J2	*Open*	Open	Close	J12	*2 - 1*	3 - 1	3 - 1
J3	*Open*	Open	Close	J13	*2 - 1*	3 - 1	3 - 1
J4	*Open*	Close	Open	J14	*Open*	Open	Open
J5	*Open*	Close	Open	J15	*Open*	Open	Open
J6	*2 - 1*	3 - 1	3 - 1	J16	*Open*	Open	Open
J7	*2 - 1*	3 - 1	3 - 1	J17	*Open*	Open	Open
J8	*2 - 1*	3 - 1	3 - 1	J18	*Open*	Close	Open
J9	*2 - 1*	3 - 1	3 - 1	J19	*Open*	Close	Open
J10	*2 - 1*	3 - 1	3 - 1				

The default setting is indicated by italics.

3.1.13.2 External Reset

The external reset button of the double-width version can be bypassed via jumper “J20”. This jumper is parallel to the external reset jumper/connector “J2” of the carrier board.

Table 3-13: Jumper “J20” — External Reset

J20	Function
Open	*Normal operation*
Close	System reset

The default setting is indicated by italics.

3.2 Pinout

The following table shows the function of each connector/socket.

Table 3-14: Connector Functions

Connector	Short Name	Connector	Short Name
CPU socket 7	IC4	IDE1	ST4
Serial port COM1	BU4	IDE2	ST3
VGA interface	BU5	CompactPCI	P1, P2
Keyboard PS/2	BU2	Fan Power	J6
USB	BU3	FLASH socket	IC10
External Reset	J2	SODIMM socket (144 pins 3.3V EDO or SDRAM)	IC17
Floppy disk or transition module interface	BU1	JTAG Connector (for production use only)	ST1, ST2

3.2.1 External Reset

An external reset button placed on the front panel of the tower or rack can be plugged to this jumper.

Table 3-15: Jumper “J2” — External Reset

J2	Function
Open	*Normal operation*
Close	System reset

The default setting is indicated by italics.

3.2.2 Serial Port Connector

The serial port male connector “BU4” allows the connection of RS232 devices to the CP312 board.

Table 3-16: Serial Port Connector “BU4”

DSUB 9	Signal	Function	In/Out
1	DCD	Data carrier detect	In
2	RXD	Receive data	In
3	TXD	Transmit data	Out
4	DTR	Data terminal ready	Out
5	GND	Signal ground	--
6	DSR	Data send request	In
7	RTS	Request to send	Out
8	CTS	Clear to send	In
9	RI	Ring indicator	In

3.2.3 Ethernet Connector

The BU1 supplies the RJ45-type 10BASE-T interface to the Ethernet controller.

Table 3-17: RJ45 Connector Pinout

RJ45	Signal	Function
1	TX+	Transmit +
2	TX-	Transmit –
3	RX+	Receive +
4	N/C	--
5	N/C	--
6	RX-	Receive –
7	N/C	--
8	N/C	--

3.2.4 VGA Connector

The female connector “BU5” is used to connect a VGA monitor to the CP-312 board.

Table 3-18: VGA Connector “BU5”

DSUB 15	Signal	Function	In/Out
1	Red	Red video signal output	Out
2	Green	Green video signal output	Out
3	Blue	Blue video signal output	Out
13	HSYNC	Horizontal sync.	TTL out
14	VSYNC	Vertical sync.	TTL out
12	SDATA	I2C data	In/out
15	SCLK	I2C clock	Out
9	VCC	Power +5V 200mA no fuse protection	Out
5, 6, 7, 8, 10	GND	Signal ground	--
4, 11	Reserved	--	--

3.2.5 Keyboard/USB Connectors

3.2.5.1 Keyboard Connector

Several of the CP312 versions are provided with a PC/AT standard keyboard connector.

Table 3-19: Keyboard Connector Pinout

Pin	Signal	Description	Direction
1	KD	Keyboard Data	IN/OUT
2	MD	Mouse Data	IN/OUT
3	GND	Signal Ground	N/A
4	VCC	VCC signal (+5 V)	N/A
5	KC	Keyboard Clock	Out
6	MC	Mouse Clock	OUT

3.2.5.2 USB Connector

Alternatively, the CP-312 is provided with two USB interfaces implemented on a dual stacked 4-pin connector.

Table 3-20: USB Connector Pinout

Pin	Name	Function	In/Out	Pin	Name	Function	In/Out
1	VCC	VCC signal	---	1A	VCC	VCC signal	---
2	UV0-	Differential USB-	---	2A	UV0-	Differential USB-	---
3	UV0+	Differential USB+	---	3A	UV0+	Differential USB+	---
4	GND	GND signal	---	4A	GND	GND signal	---

3.2.6 IDE Interfaces

The CP312 board is provided with two IDE interfaces, a primary one, “IDE1”, and a secondary one, “IDE2”. The primary ST4 and the secondary ST3 are standard 40-pin 2.54mm pinrow connectors. The two IDE interfaces that are present on the board allow one to attach up to 4 Hard Disk drives (two master/slave pairs). The table describes the pin numbers of the connectors ST4 and ST3 and the corresponding signal names.

Table 3-21: Pinout of AT Standard Connectors “IDE1”/”IDE2”

Pin	Signal	Description	Direction	Pin	Signal	Description	Direction
1	IDERESET	Reset hard-disk	Out	2	GND	Signal ground	N/A
3	HD7	HD data 7	In/out	4	HD8	HD data 8	In/out
5	HD6	HD data 6	In/out	6	HD9	HD data 9	In/out
7	HD5	HD data 5	In/out	8	HD10	HD data 10	In/out
9	HD4	HD data 4	In/out	10	HD11	HD data 11	In/out
11	HD3	HD data 3	In/out	12	HD12	HD data 12	In/out
13	HD2	HD data 2	In/out	14	HD13	HD data 13	In/out
15	HD1	HD data 1	In/out	16	HD14	HD data 14	In/out
17	HD0	HD data 0	In/out	18	HD15	HD data 15	In/out
19	GND	Signal ground	N/A	20	N/C	Not connected	N/A
21	N/C	Not connected	N/A	22	GND	Signal ground	N/A
23	IOW	I/O write	Out	24	GND	Signal ground	N/A
25	IOR	I/O read	Out	26	GND	Signal ground	N/A
27	IOCHRDY	I/O channel ready	In	28	BALE	Bus address latch enable	In
29	N/C	Not connected	N/A	30	GND	Signal ground	N/A
31	IRQ14	Interrupt request	In	32	IOCS16	16-bit transfer	In
33	A1	Address 1	Out	34	N/C	Not connected	N/A
35	A0	Address 0	Out	36	A2	Address 2	Out
37	HCS0	HD select 0	Out	38	HCS1	HD select 1	Out
39	LED	LED driver	In	40	GND	Signal ground	N/A

3.2.7 CompactPCI Bus Connector

The CP312 has two 2 mm x 2 mm pitch, 7 x 47 row female CompactPCI bus connectors, “P1” and “P2”..

Table 3-22: CompactPCI Bus Connector “P1”

Pin	Row “A”	Row “B”	Row “C”	Row “D”	Row “E”	Row “F”
25	5V	REQ64*	ENUM*	3.3V	5V	GND
24	AD[1]	5V	V(I/O)	AD[0]	ACK64*	GND
23	3.3V	AD[4]	AD[3]	5V	AD[2]	GND
22	AD[7]	GND	3.3V	AD[6]	AD[5]	GND
21	3.3V	AD[9]	AD[8]	M66EN*	C/BE[0]*	GND
20	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	3.3V	AD[15]	AD[14]	GND	AD[13]	GND
18	SERR*	GND	3.3V	PAR	C/BE[1]*	GND
17	3.3V	SDONE	SBO*	GND	PERR*	GND
16	DEVSEL	GND	V(I/O)	STOP*	LOCK*	GND
15	3.3V	FRAME*	IRDY*	GND	TRDY*	GND
12-14	Key Area					
11	AD[18]	AD[17]	AD[16]	GND	C/BE[2]*	GND
10	AD[21]	GND	3.3V	AD[20]	AD[19]	GND
9	C/BE[3]*	IDSEL	AD[23]	GND	AD[22]	GND
8	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
7	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
6	REQ*	GND	3.3V	CLK	AD[31]	GND
5	BRSVP1A5	BRSVP1B5	RST*	GND	GNT*	GND
4	BRSVP1A4	GND	V(I/O)	INTP	INTS	GND
3	INTA*	INTB*	INTC*	5V	INTD*	GND
2	TCK	5V	TMS	TDO	TDI	GND
1	5V	-12V	TRST*	+12V	5V	GND

Table 3-23: CompactPCI Bus Connector “P2”

Pin	Row “A”	Row “B”	Row “C”	Row “D”	Row “E”	Row “F”
22	N/C	N/C	N/C	N/C	N/C	GND
21	N/C	GND	N/C	N/C	N/C	GND
20	N/C	GND	N/C	GND	N/C	GND
19	GND	GND	N/C	N/C	N/C	GND
18	N/C	N/C	N/C	GND	N/C	GND
17	N/C	GND	N/C	REG6*	GNT6*	GND
16	N/C	N/C	N/C	REG5*	GNT5*	GND
15	N/C	GND	N/C	N/C	N/C	GND
14	N/C	N/C	N/C	GND	N/C	GND
13	N/C	GND	V(I/O)	N/C	N/C	GND
12	N/C	N/C	N/C	GND	N/C	GND
11	N/C	GND	V(I/O)	N/C	N/C	GND
10	N/C	N/C	N/C	GND	N/C	GND
9	N/C	GND	V(I/O)	N/C	N/C	GND
8	N/C	N/C	N/C	GND	N/C	GND
7	N/C	GND	V(I/O)	N/C	N/C	GND
6	N/C	N/C	N/C	GND	N/C	GND
5	N/C	GND	V(I/O)	N/C	N/C	GND
4	V(I/O)	N/C	N/C	GND	N/C	GND
3	CLK4	GND	GNT3*	REQ4*	GNT4*	GND
2	CLK2	CLK3	N/C	GNT2*	REQ3*	GND
1	CLK1	GND	REQ1*	GNT1*	REQ2*	GND

3.2.8 Floppy Disk Drive Interface

With the single-width version of the CP312 a 20-pin male connector (“BU1”) provides the signals for the floppy disk drive. To connect the floppy disk drive a 20-to-34 pin adapter is necessary. In the following the pinout of the 20-pin connector is described. The remaining 14 pins of the adapter correspond to those of a standard floppy interface.



PEP Advantage

With the double-width version of the CP312, the transition module is provided with a standard floppy interface. In this case the “BU1” connector is used to install the CP312 transition module.

Table 3-24: Floppy Disk and Transmission Module Connector “ST5”

Pin	Signal	Function	In/Out
20	DRVDEN0	Drive and media select	Out
19	DRVDEN1	Drive and media select	Out
18	MTR0	Motor 0 enable	Out
17	INDEX	Index pulse	In
16	DS0	Driver select 0	Out
15	DS1	Driver select 1	Out
14	DIR	Step direction	Out
13	MTR1	Motor 1 enable	Out
12	WDAT	Write data	Out
11	STEP	Step pulse	Out
10	TRK0	Track 0 signal	In
9	WGAT	Write enable	Out
8	RDATA	Read data	In
7	WP	Write protect	In
6	DSKCH	Disk change	In
4	HDSEL	Head select	Out
1-4	GND	Ground signal	--

Important!

The adapter must be mounted directly onto the floppy-drive. No intermediate cable between the floppy-drive and the adapter is necessary.

3.2.9 Fan Power Supply

A fan for CPU cooling can be connected through the power connector “J6”.

Table 3-25: Fan Power Supply Pinout

J6	Description
2	+5V
1	GND
3	+12V

3.2.10 Transition Module Pinout

3.2.10.1 Floppy Disk Drive Connector

The floppy disk drive interface of the CP312 transition module is realized as a 34-pin, 2.54 mm pitch pin-row connector.

Important!

If the floppy disk drive connection cable is inverted (pin “1” in place of pin “34”), at “power on” the floppy disk drive will continuosly attempt to operate with the consequent risk of damaging the floppy disk currently in the drive.

Table 3-26: Floppy-Drive Interface

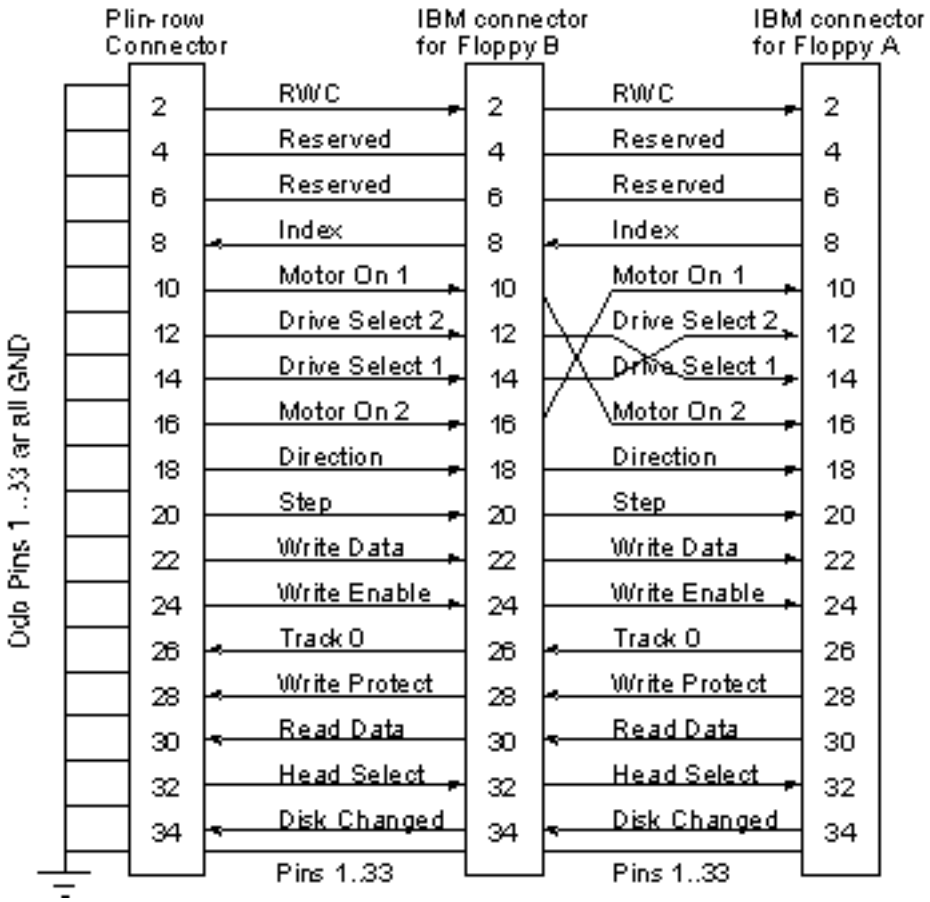
Pin	Signal	Description	Direction	Pin	Signal	Description	Direction
1	GND	Signal ground	N/A	2	RWC	Write pre-com-pression	Out
3	GND	Signal ground	N/A	4	N/C	Not connected	N/A
5	GND	Signal ground	N/A	6	N/C	Not connected	N/A
7	GND	Signal ground	N/A	8	INDEX	Index pulse	In
9	GND	Signal ground	N/A	10	MOTEN1	Motor enable 1	Out
11	GND	Signal ground	N/A	12	DRVSEL 1	Drive select 1	Out
13	GND	Signal ground	N/A	14	DRVSEL 2	Drive select 2	Out
15	GND	Signal ground	N/A	16	MOTEN2	Motor enable 2	Out
17	GND	Signal ground	N/A	18	DIREC-TION	Step direction	Out
19	GND	Signal ground	N/A	20	STEP	Step pulse	Out
21	GND	Signal ground	N/A	22	WRDATA	Write data	Out
23	GND	Signal ground	N/A	24	WREN	Write enable	Out
25	GND	Signal ground	N/A	26	TRACK0	Track 0 signal	In
27	GND	Signal ground	N/A	28	WRPROT	Write protect	In
29	GND	Signal ground	N/A	30	RDDATA	Read data	In
31	GND	Signal ground	N/A	32	HEAD-SEL	Head select	Out
33	GND	Signal ground	N/A	34	DSKCHG	Disk change	In

Floppy Disk Drive “A+B” Configuration

Important!

The floppy disk drive connection cable is suitable for access of two PC-compatible floppy disk drives. Make sure you plug the cable into the connector assigned to floppy disk drive “A:”. If plugged into the drive “B:” connector, no boot from the floppy disk drive is possible.

Figure 3-1: Two-Drive Floppy Disk Drive Configuration



3.2.10.2 Parallel Port

The CP312 transition module is provided with a PC-compatible 25-pin DSUB connector.

Table 3-27: 25-Pin DSUB Connector Pinout

DSUB Pin	Signal	Description	Direction	DSUB Pin	Signal	Description	Direction
1	-STB	Strobe data	Out	14	-AFD	Auto feed	Out
2	PD0	LSB of printer data	Out	15	-ERR	Printer error	In
3	PD1	Printer data 1	Out	16	-INIT	Initialize printer	Out
4	PD2	Printer data 2	Out	17	-SLIN	Select printer	Out
5	PD3	Printer data 3	Out	18	GND	Signal ground	N/A
6	PD4	Printer data 4	Out	19	GND	Signal ground	N/A
7	PD5	Printer data 5	Out	20	GND	Signal ground	N/A
8	PD6	Printer data 6	Out	21	GND	Signal ground	N/A
9	PD7	Printer data 7	Out	22	GND	Signal ground	N/A
10	-ACK	Character accepted	In	23	GND	Signal ground	N/A
11	BSY	Busy	In	24	GND	Signal ground	N/A
12	PE	Paper end	In	25	GND	Signal ground	N/A
13	SLCT	Ready to receive	In	N/A	GND	Signal ground	N/C

3.2.10.3 Serial Port

The additional serial port of the CP312 transition modules (TR1, 2, and 3) can alternatively support an RS232, RS422 or RS485 interface. The standard configuration is RS232.

Table 3-28: Serial Port Connector, COM2, Pinout

Pins	RS232	RS422*	RS485
1	DCD	+RXD	N/C
2	RXD	+CTS	N/C
3	TXD	+TXD	+TRXD
4	DTR	+RTS	N/C
5	GND	GND	GND
6	DSR	-RXD	N/C
7	RTS	-CTS	N/C
8	CTS	-TXD	-TRXD
9	RI	-RTS	N/C

* The RS422 pinout is *PEP*-specific. The signals “DTR” and “DCD” are not pinned out.

3.3 Software Configuration

3.3.1 IRQ Routing

The CP312 board uses a standard AT IRQ routing (8259 Controller).

Table 3-29: Interrupt Routing

Controller 1	
IRQ0	Timer
IRQ1	Keyboard
IRQ2	Interrupt controller 2
IRQ3	COM2
IRQ4	COM1
IRQ5	Watchdog
IRQ6	Floppy
IRQ7	LPT1



Input of Controller 2

Controller 2	
IRQ8	Real-time controller
IRQ9	PCI
IRQ10	PCI
IRQ11	PCI
IRQ12	PCI
IRQ13	Co-proces-sor error
IRQ14	IDE 1
IRQ15	IDE 2

3.3.2 Memory Map

The CP312 board uses the standard AT ISA memory map.

The following table provides the memory map for the first Megabyte:

Table 3-30: First Megabyte Memory Map

Memory (hex)	Size	Function
FFFFF E0000	128 KBytes	BIOS implemented in flash EPROM Reset vector FFFF0h
DFFFF D8000	32 KBytes	Flash
D7FFF C8000	64 KBytes	Free
C7FFF C0000	32 KBytes	BIOS of the VGA card.
BFFFF A0000	128 KBytes	Normally used as video RAM as follows: CGA video: 0B8000h 0BFFFFh Monochrome video: 0B0000h 0B7FFFh EGA/VGA video: 0A0000h 0AFFFFh
9FFFF 00000	640 KBytes	DOS reserved memory space
00501 00000	1281 Bytes	BIOS data area and interrupt space

The following table provides the memory map for the I/O memory:

Table 3-31: Memory Map for I/O Memory

Address Range (hex)	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, 0A1	Interrupt controller #2
0C0, 0DF	DMA controller #2
0E0, 0EF	Reserved

Table 3-31: Memory Map for I/O Memory

Address Range (hex)	Device
0F0, 0FF	Math co-processor
170, 17F	Hard disk secondary
1F0, 1FF	Hard disk primary
278, 27F	Paralel port LTP2
280	Watchdog trigger
282	Watcdog time
284	Interrupt configuration
286	I/O status
288	Board version
289	Hardware Index
28A	Jumper status
28B	Logic Version
28C	Free
28F	CPU core voltage
300, 31F	Ethernet port
2E8, 2EF	Serial port COM4
2F8, 2FF	Serial port COM2
370, 371	Free
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

Legend:

	CP312 - Specific Registers

3.3.3 Special Registers

The following registers are special registers for the CP312 to watch the on-board hardware special features and the CompactPCI control signals.

Watchdog

The CP312 has one watchdog timer. This timer is provided with a programmable time-out 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 284h.

To enable the watchdog, bit “4” of the register 282h must be set. If the watchdog is enabled via bit “4” this bit can not be cleared. With a read or write access to the register 280h the watchdog is retriggered.

Watchdog Trigger

The memory mapped I/O location is 280h. A write access triggers the watchdog.

Watchdog Configuration

The memory mapped I/O location is 282h.

Table 3-32: Watchdog Configuration

Bits	Type	Default	Function
7-5	R	0	Reserved
4	RW	0	1 = enable watchdog (write) 0 = watchdog disabled (read only)
3-0	RW	0	0 = 125 msec 1 = 250 msec 2 = 500 msec 3 = 1 sec 4 = 2 sec 5 = 4 sec 6 = 8 sec 7 = 16 sec 8 = 32 sec 9 = 64 sec 10 = 128 sec 11 = 256 sec 12 - 15 = reserved

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 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.

The I/O location for the interrupt configuration is 284h.

Table 3-33: On-Board Interrupt Configuration

Bits	Type	Default	Function
7-5	R	0	Reserved
4	RW	0	CPCI enum signal IRQ routing (IRQ5) 1 = enable IRQ 0 = disable IRQ
3	RW	0	CPCI derate signal IRQ routing (IRQ5) 1 = enable IRQ 0 = disable IRQ
2	RW	0	Watchdog hardware reset 1 = enable reset 0 = disable reset
1	RW	0	Watchdog IRQ routing (IRQ5) 1 = enable IRQ 0 = disable IRQ
0	RW	0	Watchdog NMI routing 1 = enable NMI 0 = disable NMI

I/O-Status

This 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 up. The fail signal is an output of the power supply indicate a power supply failure.

For the description of the derate and enumeration signals see the interrupt routing register.

The I/O location for the I/O status is 286h.

Table 3-34: Local and CompactPCI Control Inputs

Bits	Type	Default	Function
7	R	-	Watchdog status 0 = watchdog interrupt
6	R	-	1
5	R	-	1
4	R	-	1
3	R	-	System slot identification 0 = System slot
2	R	-	P1/2 system enumeration hot swap 0 = new board
1	R	-	P1/2 supply fail signal of CPCI
0	R	-	P1/2 derating signal of CPCI

Board ID

The I/O location for the board ID is 288h.

This register describes the hardware and the board index.

Table 3-35: Board ID

Bits	Type	Default	Function
7 - 0	R	0	Board version 0 = reserved 1 = CP-610 2 = CP-312 3 = CP-600 4 = CP-611 16 = reserved 17 = CP-610 Index 1 18 = CP-312 Index 1 19 = CP-600 Index 1 20 = CP-611 Index 1

Hardware Index

Memory mapped I/O location 289h

The hardware index can be used by software drivers to identify the device.

This register is valid starting from the hardware index 1000.

Table 3-36: Hardware Index

Bits	Type	Default	Function
7-0	R	-	Revision ID 0 = reserved 1 = Index 1000

Revision ID is incremented for each hardware or logic revision.

Jumper Status

Memory mapped I/O location 28Ah

These registers can be used to read the on-board jumper configuration.

Table 3-37: On-Board Jumper and Clock Setting

Bits	Type	Default	Function
7	R	-	Boot jumper 1 = on-board flash 0 = socket flash
6	R	-	CPU clock select S2
5	R	-	CPU clock select S1
4	R	-	CPU clock select S0
3	R	-	Bus select 1 –> PCICLK = CPUCLK/2 0 –> PCICLK = 33MHz
2	R	-	Reserved
1	R	-	Reserved
0	R	-	Reserved

Logic Version

Memory mapped I/O location 28Bh.

The logic version can be used for the support to determine the current logic version.

This register is valid starting from the hardware index 1000.

Table 3-38:

Bits	Type	Default	Function
7-0	R	-	Logic version 0 = reserved 1 = Index 1000

The logic version is incremented for each logic update.

CPU core voltage

Memory mapped I/O location 28Fh.

This register describes the CPU core voltage jumper setting.

Table 3-39:

Bits	Type	Default	Function
7-5	R	0	Reserved
4	R	-	VID4 = Jumper J23
3	R	-	VID3 = Jumper J24
2	R	-	VID2 = Jumper J25
1	R	-	VID1 = Jumper J26
0	R	-	VID0 = Jumper J27

See at the Chapter „CPU Voltage Setting“ for more information about voltage setting.

Memory Management of the Flash Socket

Memory mapped I/O location 28Eh

This register controls the higher address lines for the socket Flash. The 32kByte of flash memory space is mapped from D8000h – DFFFFh.

Bits	Type	Default	Function
7-4	R	-	Reserved
3	RW	0	Address A18
2	RW	0	Address A17
1	RW	0	Address A16
0	RW	0	Address A15

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Chapter 4

CMOS Setup

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4. CMOS Setup

This chapter describes the Award BIOS Setup program, EliteBIOS, version 4.51PG. The Setup program lets you modify basic system configuration settings.

4.1 Proprietary Notice

This chapter describes the Award BIOS Setup program, EliteBIOS, version 4.51PG. The Setup program lets you modify basic system configuration settings.

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4.2 Introduction to Setup

This manual describes the Award BIOS Setup program. The Setup program lets you modify basic system configuration settings. The settings are then stored in a dedicated battery-backed memory, called CMOS RAM, that retains the information when the power is turned off.

The Award BIOS in your computer is a customized version of an industry-standard BIOS for IBM PC AT–compatible personal computers. It supports Intel x86 and compatible processors. The BIOS provides critical low-level support for the system central processing, memory, and I/O subsystems.

The Award BIOS has been customized by adding important, but nonstandard, features such as virus and password protection, power management, and detailed fine-tuning of the chipset controlling the system.

The rest of this manual is intended to guide you through the process of configuring your system using Setup.

Starting Setup

The Award BIOS is immediately activated when you first turn on the computer. The BIOS reads system configuration information in CMOS RAM and begins the process of checking out the system and configuring it through the power-on self test (POST).

When these preliminaries are finished, the BIOS seeks an operating system on one of the data storage devices (hard drive, floppy drive, etc.). The BIOS launches the operating system and hands control of system operations to it.

During POST, you can start the Setup program in one of two ways:

- By pressing <Del> immediately after switching the system on, or
- By pressing the <Del> key or by simultaneously pressing <CTRL>, <ALT>, and <ESC> keys when the following message appears briefly at the bottom of the screen during POST:

To enter SETUP before BOOT, press CTRL-ALT-ESC or DEL key.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the RESET button on the system case. You may also restart by simultaneously pressing <CTRL>, <ALT>, and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message appears and you are again asked to

Press F1 to continue, CTRL-ALT-ESC or DEL to enter SETUP

Setup Keys

The following table shows to navigate in Setup using the keyboard.

Table 4-1: Keyboard Commands

Up Arrow	Move to previous item
Down Arrow	Move to next item
Left Arrow	Move to the item in the left hand
Right Arrow	Move to the item in the right hand
Esc Key	Main Menu: Quit and not save changes into CMOS RAM. Status Page Setup Menu and Option Page Setup Menu: Exit current page and return to Main Menu
PgUp Key	Increase the numeric value or make changes
PgDn Key	Decrease the numeric value or make changes
+ Key	Increase the numeric value or make changes
- Key	Decrease the numeric value or make changes
F1 Key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 Key **Shift-F2**	Change color from total 16 colors. F2 to select color forward, Shift-F2 to select color backward

Table 4-1: Keyboard Commands

F3 Key	Calendar, only for Status Page Setup Menu
F4 Key	Reserved
F5 Key	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
F6 Key	Load the default CMOS RAM value from BIOS default table, only for Option Page Setup Menu
F7 Key	Load the default
F8 Key	Reserved
F9 Key	Reserved
F10 Key	Save all the CMOS changes, only for Main Menu

Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the F1 key again.

In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the Award BIOS supports an override to the CMOS settings that resets your system to its default configuration.

You can invoke this override by immediately pressing <Insert> when you restart your computer. You can restart by either using the ON/OFF switch, the RESET button or by pressing <CTRL>, <ALT> and <Delete> at the same time.

The best advice is to alter only settings that you thoroughly understand. In particular, do not change settings in the Chipset screen without a good reason. The Chipset defaults have been carefully chosen by *PEP Modular Computers* for the best performance and reliability. Even a seemingly small change to the Chipset setup may causing the system to become unstable.

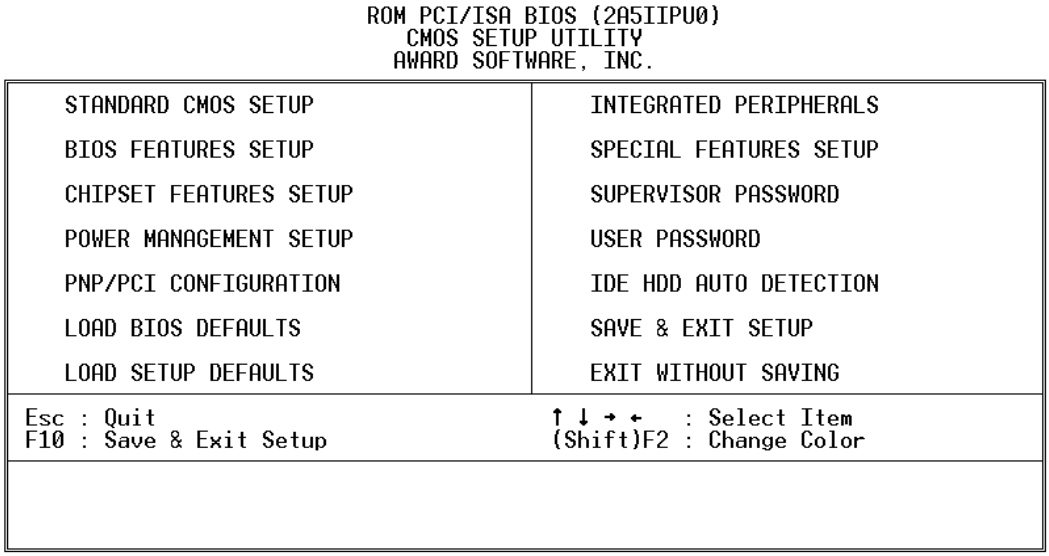
Setup Variations

Not all systems have the same Setup. While the basic look and function of the Setup program remains the same for all systems, the appearance of your Setup screens may differ from the screens shown here. Each system design and chipset combination require custom configurations. In addition, the final appearance of the Setup program depends on your system designer. Your system designer can decide that certain items should not be available for user configuration and remove them from the Setup program.

4.3 Main Setup Menu

When you enter the Award BIOS CMOS Setup Utility, a Main Menu, similar to the one shown below, appears on the screen. The Main Menu allows you to select from several Setup functions and two exit choices. Use the arrow keys to select among the items and press ↵ to accept and enter the sub-menu.

Figure 4-1: CMOS Setup Utility Main Menu — Screen Display



A brief description of each highlighted selection appears at the bottom of the screen.

Following is a brief summary of each Setup category.

Standard CMOS Setup

Options in the original PC AT-compatible BIOS.

BIOS Features Setup

Award enhanced BIOS options.

Chipset Features Setup

Options specific to your system chipset.

Power Management Setup

Advanced Power Management (APM) options.

PNP/PCI Configuration

Plug and Play standard and PCI Local Bus configuration options.

Integrated Peripherals

I/O subsystems, that depend on the integrated peripherals controller in your system.

Special Features Setup

Items related to features of this board, which are not common to standard motherboard designs.

Supervisor/User Password

Change, set, or disable a password. In BIOS versions that allow separate user and supervisor passwords, only the supervisor password permits access to Setup. The user password generally allows only power-on access.

IDE HDD Auto Detection

Automatically detect and configure IDE hard disk parameters.

Load BIOS Defaults

BIOS defaults are factory settings for the most stable, minimal-performance system operations.

Load Setup Defaults

Setup defaults are factory settings for optimal-performance system operations.

Save & Exit Setup

Save settings in nonvolatile CMOS RAM and exit Setup.

Exit Without Save

Abandon all changes and exit Setup.

4.4 Standard CMOS Setup

In the Standard CMOS menu you can set the system clock and calendar, record disk drive parameters and the video subsystem type, and select the type of errors that stop the BIOS POST.

Date

The BIOS determines the day of the week from the other date information. This field is for information only.

Press the → or ← key to move to the desired field (date, month, year). Press the “PgUp” or “PgDn” key to increment the setting, or type the desired value into the field.

Time

The time format is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Press the → or ← key to move to the desired field. Press the PgUp or PgDn key to increment the setting, or type the desired value into the field.

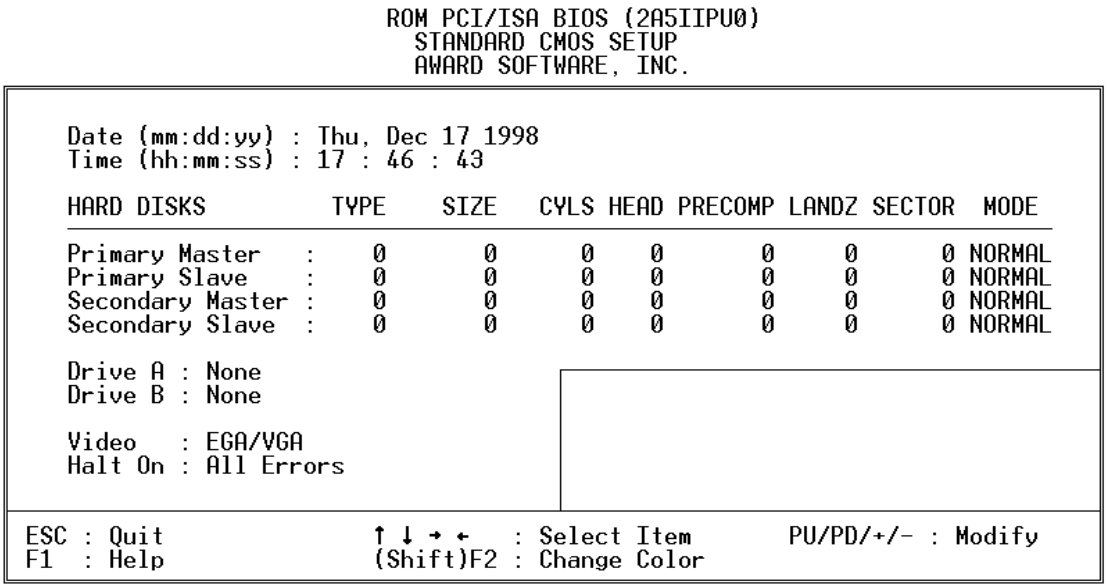
Hard Disks

The BIOS supports up to four IDE drives. This section does not show information about other IDE devices, such as a CD-ROM drive, or about other hard drive types, such as SCSI drives.

Important!

We recommend that you select the AUTO type for all drives.

Figure 4-2: Standard CMOS Setup Menu — Screen Display



The BIOS can automatically detect the specifications and optimal operating mode of almost all IDE hard drives. When you select type AUTO for a hard drive, the BIOS detects its specifications during POST, every time the system boots.

If you do not want to select drive type AUTO, other methods of selecting the drive type are available:

- Match the specifications of your installed IDE hard drive(s) with the pre-programmed values for drive types 1 through 45.
- Select USER and enter values into each drive parameter field.
- Use the IDE HDD AUTO DECTECTION function in “Setup”.

Here is a brief explanation of drive specifications:

- Type: The BIOS contains a table of pre-defined drive types. Each defined drive type has a specified number of cylinders, number of heads, write pre-compensation factor, landing zone, and number of sectors. Drives whose specifications do not accommodate any pre-defined type are classified as type USER.
- Size: Disk drive capacity (approximate). Note that this size is usually slightly greater than the size of a formatted disk given by a disk-checking program.
- Cyls: Number of cylinders
- Head: Number of heads
- Precomp: Write pre-compensation cylinder
- Landz: Landing zone
- Sector: Number of sectors

- Mode: “Auto”, “Normal”, “Large” or “LBA”
  - Auto: The BIOS automatically determines the optimal mode.
  - Normal: Maximum number of cylinders, heads, and sectors supported are 1024, 16, and 63.
  - Large: For drives that do not support LBA and have more than 1024 cylinders.
  - LBA (Logical Block Addressing): During drive accesses, the IDE controller transforms the data address described by sector, head, and cylinder number into a physical block address, significantly improving data transfer rates. For drives with greater than 1024 cylinders.

Drive A / Drive B

Select the correct specifications for the diskette drive(s) installed in the computer.

Table 4-2: Diskette Drives

None	No diskette drive installed
360K, 5.25 in	5-1/4 inch PC-type standard drive; 360 kilobyte capacity
1.2M, 5.25 in	5-1/4 inch AT-type high-density drive; 1.2 megabyte capacity
720K, 3.5 in	3-1/2 inch double-sided drive; 720 kilobyte capacity
1.44M, 3.5 in	3-1/2 inch double-sided drive; 1.44 megabyte capacity
2.88M, 3.5 in	3-1/2 inch double-sided drive; 2.88 megabyte capacity

Video

Select the type of primary video subsystem in your computer. The BIOS usually detects the correct video type automatically. The BIOS supports a secondary video subsystem, but you do not select it in Setup.

Table 4-3: Primary Video Subsystem Selection

EGA/VGA	Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, SVGA or PGA monitor adapters.
CGA 40	Color Graphics Adapter, power up in 40 column mode
CGA 80	Color Graphics Adapter, power up in 80 column mode
MONO	Monochrome adapter, includes high resolution monochrome adapters

Halt On

During the power-on self-test (POST), the computer stops if the BIOS detects a hardware error. You can tell the BIOS to ignore certain errors during POST and continue the boot-up process. The possible selections are listed in the following table.

Table 4-4: POST Specific Commands

Command	POST Action
No errors	POST does not stop for any errors.
All errors	If the BIOS detects any non-fatal error, POST stops and prompts you to take corrective action.
All, But Keyboard	POST does not stop for a keyboard error, but stops for all other errors.
All, But Diskette	POST does not stop for diskette drive errors, but stops for all other errors.
All, But Disk/Key	POST does not stop for a keyboard or disk error, but stops for all other errors.

Memory

You cannot change any values in the Memory fields; they are only for your information. The fields show the total installed random access memory (RAM) and amounts allocated to base memory, extended memory, and other (high) memory. RAM is counted in kilobytes (KB: approximately one thousand bytes) and megabytes (MB: approximately one million bytes).

RAM is the computer's working memory, where the computer stores programs and data currently being used, so they are accessible to the CPU. Modern personal computers may contain up to 64 MB, 128 MB, or more.

Base Memory

Typically 640 KB. Also called conventional memory. The DOS operating system and conventional applications use this area.

Extended Memory

Above the 1-MB boundary. Early IBM personal computers could not use memory above 1 MB, but current PCs and their software can use extended memory.

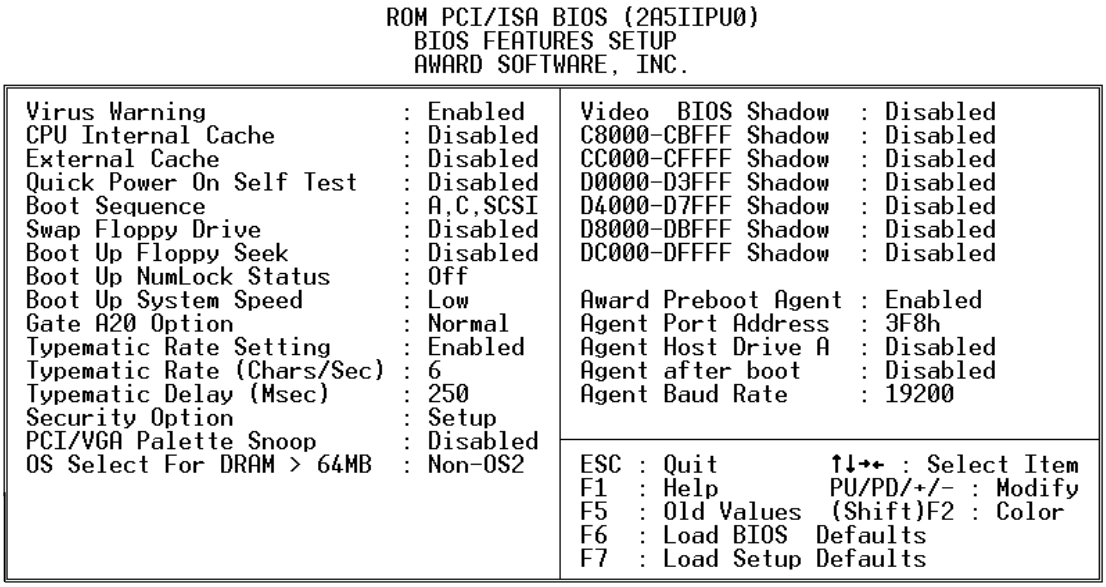
Other Memory

Between 640 KB and 1 MB; often called High memory. DOS may load terminate-and-stay-resident (TSR) programs, such as device drivers, in this area, to free as much conventional memory as possible for applications. Lines in your CONFIG.SYS file, that start with LOADHIGH load programs into high memory.

4.5 BIOS Features Setup

This screen contains industry-standard options additional to the core PC AT BIOS. This section describes all fields offered by Award Software in this screen. The example screen below may vary from the one in your Setup program. Your system board designer may omit or modify some fields

Figure 4-3: BIOS Features Setup — Screen Display.



Virus Warning

When enabled, you receive a warning message, if a program, namely a virus, attempts to write to the boot sector or the partition table of the hard disk drive. You should then run an anti-virus program. Keep in mind that this feature protects only the boot sector, not the entire hard drive.

Important!

Many disk diagnostic programs that access the boot sector table can trigger the virus warning message. If you plan to run such a program, we recommend that you first disable the virus warning.

CPU Internal Cache / External Cache

Cache memory is additional memory that is much faster than conventional DRAM (system memory). CPUs from 486-type on up contain internal cache memory, and most, but not all, modern PCs have additional (external) cache memory. When the CPU requests data, the system transfers the requested data from the main DRAM into cache memory, for even faster access by the CPU.

The External Cache field may not appear if your system does not have external cache memory.

Quick Power On Self Test

Select Enabled to reduce the amount of time required to run the power-on self-test (POST). A quick POST skips certain steps. We recommend that you normally disable quick POST. Better to find a problem during POST than lose data during your work.

Boot Sequence

The original IBM PCs loaded the operating system from drive A (floppy disk), so IBM PC-compatible systems are designed to search for an operating system first on drive A, and then on drive C (hard disk). However, modern computers usually load the operating system from the hard drive, and may even load it from a CD-ROM drive. The BIOS now offers 10 different boot sequence options of three drives each. In addition to the traditional drives A and C, options include IDE hard drives D, E and F; plus an SCSI hard drive and a CD -ROM drive.

Swan Floppy Drive

This field is effective only in systems with two floppy drives. Selecting Enabled assigns physical drive B to logical drive A, and physical drive A to logical drive B.

Boot Up Floppy Seek

When Enabled, the BIOS tests (seeks) floppy drives to determine whether they have 40 or 80 tracks. Only 360-KB floppy drives have 40 tracks; drives with 720 KB, 1.2 MB, and 1.44 MB capacity all have 80 tracks. Because very few modern PCs have 40-track floppy drives, we recommend that you set this field to Disabled to save time.

Boot Up Numlock Status

Toggle between On or Off to control the state of the NumLock key when the system boots. When toggled On, the numeric keypad generates numbers instead of controlling cursor operations.

Boot Up System Speed

Select High to boot at the default CPU speed; select Low to boot at the speed of the AT bus. Some add-in peripherals or old software (such as old games) may require a slow CPU speed. The default setting is High.

Gate A20 Option

Gate A20 refers to the way the system addresses memory above 1 MB (extended memory). When set to Fast, the system chipset controls Gate A20. When set to Normal, a pin in the keyboard controller controls Gate A20. Setting Gate A20 to Fast improves system speed, particularly with OS/2 and Windows.

Typematic Rate Setting

When Disabled, the following two items (Typematic Rate and Typematic Delay) are irrelevant. Keystrokes repeat at a rate determined by the keyboard controller in your system.

When Enabled, you can select a typematic rate and typematic delay.

Typematic Rate (Chars/Sec)

When the typematic rate setting is enabled, you can select a typematic rate (the rate at which character repeats when you hold down a key) of 6, 8, 10,12, 15, 20, 24 or 30 characters per second.

Typematic Delay (ms)

When the typematic rate setting is enabled, you can select a typematic delay (the delay before key strokes begin to repeat) of 250, 500, 750 or 1000 milliseconds.

Security Option

If you have set a password, select whether the password is required every time the System boots, or only when you enter Setup.

PCI/VGA Palette Snoop

Your BIOS Setup many not contain this field. If the field is present, leave at Disabled.

OS Select for DRAM>64MB

Select OS2 only if you are running OS/2 operating system with greater than 64 MB of RAM on your system.

Shadow

Software that resides in a read-only memory (ROM) chip on a device is called *firmware*. The Award BIOS permits *shadowing* of firmware such as the system BIOS, video BIOS, and similar operating instructions that come with some expansion peripherals, such as, for example, a SCSI adaptor.

Shadowing copies firmware from ROM into system RAM, where the CPU can read it through the 16-bit or 32-bit DRAM bus. Firmware not shadowed must be read by the system through the 8-bit X-bus. Shadowing improves the performance of the system BIOS and similar ROM firmware for expansion peripherals, but it also reduces the amount of high memory (640 KB to 1 MB) available for loading device drivers, etc.

Enable shadowing into each section of memory separately. Many system designers hardwire shadowing of the system BIOS and eliminate a System BIOS Shadow option.

Video BIOS shadows into memory area C0000-C7FFF. The remaining areas shown on the BIOS Features Setup screen may be occupied by other expansion card firmware. If an expansion peripheral in your system contains ROM-based firmware, you need to know the address range the ROM occupies to shadow it into the correct area of RAM.

Award Preboot Agent

Agent software may be enabled and disabled. Default is Disabled.

Agent Port Address

Select which UART address Agent software should use. Note to have set a UART in the INTEGRATED PERIPHERALS page to one of the below allowed settings. Recommended is 03F8h, which means COM1 (03F8h / IRQ 4); “auto” must not be selected.

The Agent system must have a serial (RS-232C) peripheral subsystem, to support a null modem (direct) connection.

If the Agent and host connect, but a session is not established, check the Agent COM port settings:

Use these settings:

3F8h - IRQ4

2F8h - IRQ3

3E8h - IRQ4

2E8h - IRQ3

Agent Host Drive A

When the administrative host is using the Preboot Manager application, the Agent can boot and run applications from host floppy drive A. INT13 calls intended for the Agent floppy drive A are redirected by the Agent extension to the host floppy drive A. All other INT13 calls are passed along to the original interrupt handler. The Manager application can receive the Agent drive A interrupt and interpret the commands. It then calls its own INT13 handler to read or write the requested sectors to host drive A. Both Manager and Agent serial version software use Xmodem protocol for all transfers.

The floppy drive redirection feature permits support personnel to remotely administer two vital tools on the Agent system:

- PC DIAG diagnostics package from Unicore Software (available through Award Software as part of the Manager application).
- AWDFLASH BIOS flash upgrade utility.

Select Enabled to enable this feature, default is Disabled.

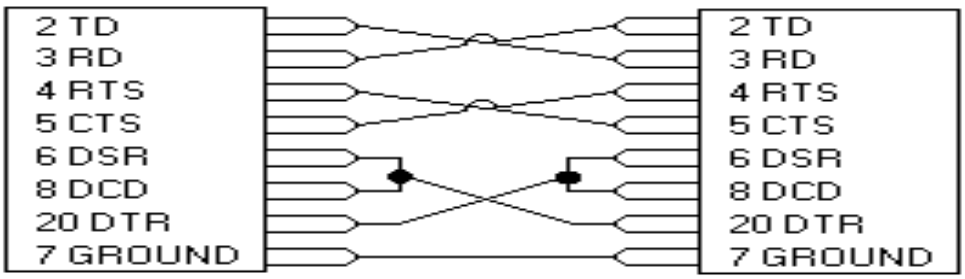
Agent after Boot

In the "standard" Agent product, Agent software continues to function after the operating system loads. However, some non-DOS operating systems are not compatible with the Agent BIOS extension, so the Agent should disable when the OS loads. Selecting Disabled turns off the Agent software just as the BIOS hands off to the operating system. Default is Disabled.

Award Baud Rate

Select with which speed the UART should work. Default is 19200. When using the Preboot Manager on the host, always select 19200 baud.

Null Modem Cable Pinout



A null-modem cable is a serial cable designed to connect two PCs. Each end has a 9-pin, female RS-232C connector. If you are create your own 9-pin cable, connect the two

ends through the cable as shown here.

Further Information

For further information take a look at the manual for the Award Preboot Manager™ 2.0 and the Award Preboot Agent™ 2.0 coming with the Award Preboot Manager™ 2.0.

4.6 Chipset Features Setup

This section describes features of the SiS 5598 PCIset. If your system contains a different chipset, this section will bear little resemblance to what you see on your screen.

ADVANCED OPTIONS. The parameters in this screen are for system designers, service personnel, and technically competent users only. Do not reset these values unless you understand the consequences of your changes.



PEP Advantage

This chapter describes all fields offered by the screen. Thanks to the use of the Award standard software, your system board designer may omit or modify some of the fields described in the following.

Advanced Options

The parameters in this screen are for system designers, service personnel, and technically competent users only. Do not reset these values unless you understand the consequences of your changes.

Figure 4-4: Chipset Features Setup — Screen Display.

```
                    ROM PCI/ISA BIOS (2A5IIPU0)
                     CHIPSET FEATURES SETUP
                      AWARD SOFTWARE, INC.

Auto Configuration      : Disabled          Memory Hole at 15M-16M  : Disabled
                                            VGA Shared Memory Size  : 0.5MB
SRAM Back-to-Back       : Enabled           VGA Memory Clock (MHz)  : 40
Starting Point of Paging: 1T                CPU Warning Temperature : 50C/122F
Refresh Cycle Time (us) : 15.6              Temperature Interrupt   : None
RAS Pulse Width Refresh : 4T                Current CPU Temperature :
RAS Precharge Time      : 2T                Reduce CPU Clock        : Disabled
RAS to CAS Delay        : 2T
CAS# Pulse Width (FP)   : 2T
CAS# Pulse Width (EDO)  : 2T
RAMW# Assertion Timing  : 3T
CAS Precharge Time (FP) : 1T
CAS Precharge Time (EDO): 1T
SDRAM WR Retire Rate    : X-2-2-2
SDRAM Wait State Control: 1WS
Read Prefetch Memory RD : Enabled           ESC : Quit        ↑↓→← : Select Item
CPU to PCI Post Write   : 3T                F1  : Help        PU/PD/+/- : Modify
CPU to PCI Burst Mem. WR: Disabled          F5  : Old Values  (Shift)F2 : Color
System BIOS Cacheable   : Disabled          F6  : Load BIOS  Defaults
Video  BIOS Cacheable   : Disabled          F7  : Load Setup Defaults
```

Auto Configuration

Auto Configuration selects predetermined optimal values of chipset parameters. When *Disabled*, chipset parameters revert to setup information stored in CMOS. Many fields in this screen are not available when Auto Configuration is *Enabled*.

SRAM Back-to-Back

If *Enabled* the second level cache will run in Write-Back mode. Disabling this option has no effect. It is recommended to leave this option enabled.

Starting Point of Paging

Select the Starting point of Paging function. It is recommended to set this option to *1T*.

Refresh Cycle Time (US)

Selects the refresh time for the DRAM. If Auto Configuration is enabled this option is disabled and the BIOS determines the correct value. When Auto Configuration is disabled a wrong value may result in an instable version due to memory failures.

RAS Pulse Width Refresh

Selects the RAS pulse width for the refresh cycle. See Refresh Cycle Time for information about the Auto Configuration of this value.

RAS Precharge Time

The precharge time is the number of cycles it takes for the RAS to accumulate its charge before DRAM refresh. If insufficient time is allowed, refresh may be incomplete and the DRAM may fail to retain data.

RAS To CAS Delay

Select the RAS to CAS delay time. See Refresh Cycle Time for information about the Auto Configuration of this value.

CAS# Pulse Width (FP)

The number of wait states for the CPU to read FastPage DRAM. The lower the better.

CAS# Pulse Width (EDO)

The number of wait states for the CPU to read EDO DRAM. The lower the better.

RAMW# Assertion Time

Selects the RAMW assertion time, when a read cycle followed by a write cycle.

CAS Precharge Time (FP)

Selects the CAS Precharge time for FP DRAM. *1T/2T* means 1T during burst cycles and 2T for different cycles (1 wait state between cycles). *1T* or *2T* means the same for all cycles.

CAS Precharge Time (EDO)

The same as above for EDO RAM.

SDRAM WR Retire Rate

A specification of the number of clocks needed to load four 32-bit words into a CPU internal cache. Typically specified as clocks per word. X-1-1-1 indicates x+3 clocks to load the four words. Possible values are *X-2-2-2* and *X-1-1-1*.

SDRAM Wait State Control

The number of wait states for the CPU accessing the cache memory. It is recommend to set *0WS*.

Read Prefetch Memory RD

If *Enabled*, the Memory Read Multiple and Memory Read Line of PCI bus commands always do prefetch. It is recommended to enable this option.

CPU-To-PCI Post Write

When this field is *Enabled,* writes from the CPU to the PCI bus are buffered, to compensate for the speed differences between the CPU and the PCI bus. When *Disabled*, the writes are not buffered and the CPU must wait until the write is complete before starting another write cycle.

CPU to PCI Burst Mem.WR

If enabled, back-to-back sequential CPU memory write cycles to PCI are translated to PCI burst memory write cycles. Otherwise, each single write to PCI will have an associated FRAME# sequence. Enabled is best for performance, but some non-standard PCI cards (e.g. VGA) may have problems.

System BIOS Cacheable

Selecting *Enabled* allows caching of the system BIOS ROM at F0000h to FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a memory access error may result.

Video BIOS Cacheable

Selecting *Enabled* allows caching of the video BIOS ROM at C0000h to C7FFFh, resulting in better video performance. However, if any program writes to this memory area, a memory access error may result.

Memory Hole at 15M-16M

You can reserve this area of system memory for ISA adapter ROM. When this area is reserved, it cannot be cached. The user information of peripherals that need to use this area of system memory usually discusses their memory requirements.

VGA Shared Memory Size

This function determines the amount of DRAM to be used by the VGA accelerator. If the internal VGA accelerator is disabled, this setting has no effect.

VGA Memory Clock

Do not change the setup default value (MHz).

CPU Warning Temperature

Selecting the temperature at which the chipset will reduce the CPU clock to avoid destroying the CPU, if “Reduce CPU clock” is enabled. If *disabled* the temperature measuring system takes no influence on the CPU clock. If this item is selected and the “Reduce CPU clock” is disabled, the temperature measuring system is programmed to detect critical CPU temperature and visualize it through the LED, but the CPU clock is not reduced.

Temperature Interrupt

The output of the temperature measuring system may be routed to an interrupt. If "CPU Warning Temperature" is enabled, the interrupt is generated on reaching the selected temperature and again, if the temperature falls down to selected temperature minus 5°C/9°F. Default is Disabled.

Current CPU Temperature

Display of the current temperature of the CPU. This field is automatically updated while displaying this setup page.

Reduce CPU Clock

If “CPU Warning Temperature” is enabled and this item is *enabled*, the CPU clock will be reduced to avoid destroying the CPU. If *disabled* the temperature measuring system takes no influence on the CPU clock.

4.7 Power Management

Power Management

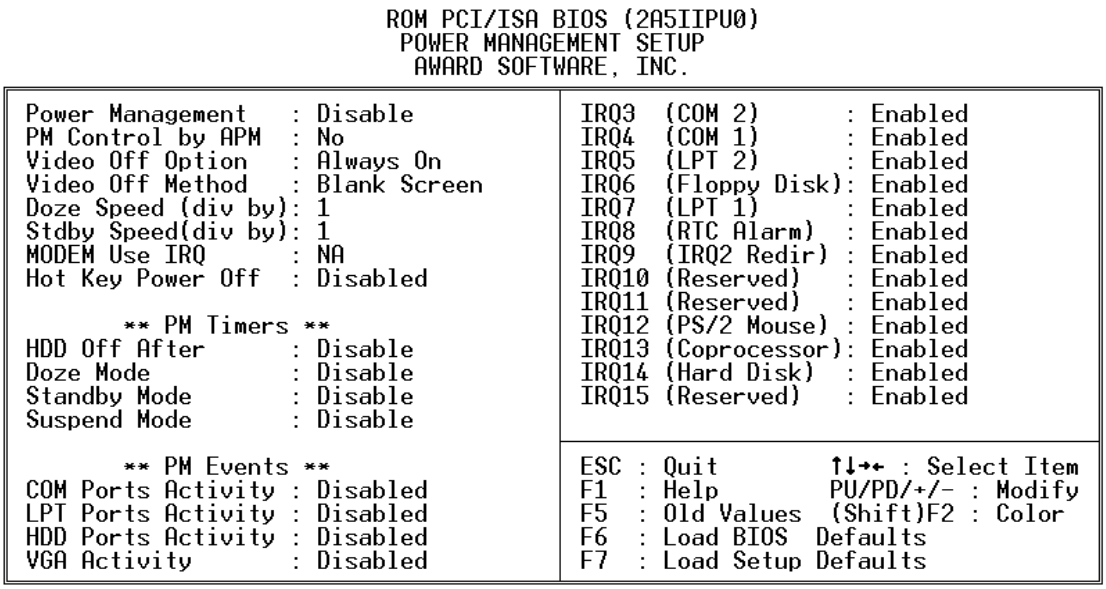
This option allows you to select the type (or degree) of power saving for Doze, Standby, and Suspend modes. See the section *PM Timers* for a brief description of each mode.



PEP Advantage

This chapter describes all fields offered by the screen. Thanks to the use of the Award standard software, your system board designer may omit or modify some of the fields described in the following.

Figure 4-5: Power Management Setup — Screen Display.



This table describes each power management mode:

Table 4-5: Power Management Modes

Mode	Description
Max Saving	Maximum power savings. **Only Available for SL CPUs**. Inactivity period is 1 minute in each mode.
User Define	Set each mode individually. Select time-out periods in the *PM Timers* section, following.
Min Saving	Minimum power savings. Inactivity period is 1 hour in each mode (except the hard drive).

PM Control by APM

If Advanced Power Management (APM) is installed on your system, selecting *Yes* gives better power savings.

Video-Off Option

This item determines the power management modes the monitor will enter before entering the Off-state as defined by the Video Off Method below. The Video Off Option moves from the low (doze) to the medium (standby) to high (suspend) power saving modes.

Video-Off Method

Determines the manner in which the monitor is blanked.

Table 4-6: Video-Off Commands

V/H SYNC+Blank	System turns off vertical and horizontal synchronization ports and writes blanks to the video buffer.
DPMS Support	Select this option if your monitor supports the Display Power Management Signaling (DPMS) standard of the Video Electronics Standards Association (VESA). Use the software supplied for your video subsystem to select video power management values.
Blank Screen	System only writes blanks to the video buffer.

Doze Speed (div by)

This option determines the Doze speeds of the CPU's external clock, when the Power Management mode is enabled.

Stdby Speed (div by)

This option determines the Standby speeds of the CPU's external clock, when the Power Management mode is enabled.

Modem Use IRQ

Name the interrupt request (IRQ) line assigned to the modem (if any) on your system. Activity of the selected IRQ always awakens the system.

Hot Key Power Off

If *Enabled* pressing CTRL+ALT+BACKSPACE will activate power down mode.

4.8 PM Timers

The following modes are Green PC power saving functions. They are user-configurable only during User Defined Power Management mode.

HDD Power Down

After the selected period of drive inactivity (1 to 15 minutes), the hard disk drive powers down while all other devices remain active.

Doze Mode

After the selected period of system inactivity (1 minute to 1 hour), the CPU clock runs at slower speed while all other devices still operate at full speed.



Stand-By Mode

After the selected period of system inactivity (1 minute to 1 hour), the fixed disk drive and the video shut off while all other devices still operate at full speed.

Suspend Mode

After the selected period of system inactivity (1 minute to 1 hour), all devices except the CPU shut off.

4.9 Wake-Up Events

When the system is in Doze or Standby mode, you may disable activity monitoring of some common interrupt requests so they do not wake up the system.

The default wake-up event is keyboard activity. In these wake-up event fields, you can turn *On* or *Off* four commonly used interrupts. For example, if you have a modem on IRQ3, you can turn *On* IRQ3 as a wake-up event, so an interrupt from the modem can wake up the system. Or you may wish to turn *Off* IRQ12 (the PS/2) mouse as a wake-up event, so accidentally brushing the mouse does not awaken the system.

4.10 Power-Down and Resume Events

You may disable monitoring of common interrupt requests so that they do not reset activity timers

IRQ3 (COM 2)
IRQ4 (COM 1)
IRQ5 (LPT 2)
IRQ6 (Floppy Disk)
IRQ7 (LPT 1)
IRQ8 (RTC Alarm)
IRQ9 (IRQ2 Redir)
IRQ10 (Reserved)
IRQ11 (Reserved)
IRQ12 (PS/2 Mouse)
IRQ13 (Co-processor)
IRQ14 (Hard Disk)
IRQ15 (Reserved)

4.11 PNP/PCI Configuration



PEP Advantage

This chapter describes all fields offered by the screen. Thanks to the use of the Award standard software, your system board designer may omit or modify some of the fields described in the following.

Figure 4-6: PNP/PCI Configuration — Screen Display

```
                    ROM PCI/ISA BIOS (2A5IIPU0)
                     PNP/PCI CONFIGURATION
                      AWARD SOFTWARE, INC.

Resources Controlled By  : Manual          Slot 1/5 Use IRQ No.     : Auto
Reset Configuration Data : Disabled        Slot 2/6 Use IRQ No.     : Auto
                                           Slot 3/7 Use IRQ No.     : Auto
IRQ-3  assigned to : PCI/ISA PnP           Slot 4 Use IRQ No.       : Auto
IRQ-4  assigned to : PCI/ISA PnP           PCI IRQ Actived By       : Edge
IRQ-5  assigned to : PCI/ISA PnP           PCI IDE IRQ Map To       : PCI-AUTO
IRQ-7  assigned to : PCI/ISA PnP            Primary   IDE INT#      : A
IRQ-9  assigned to : PCI/ISA PnP            Secondary IDE INT#      : A
IRQ-10 assigned to : PCI/ISA PnP           Reset PCI-to-PCI Bridges: Disabled
IRQ-11 assigned to : PCI/ISA PnP
IRQ-12 assigned to : PCI/ISA PnP
IRQ-14 assigned to : PCI/ISA PnP
IRQ-15 assigned to : PCI/ISA PnP
DMA-0  assigned to : PCI/ISA PnP
DMA-1  assigned to : PCI/ISA PnP           ESC : Quit         ↑↓→← : Select Item
DMA-3  assigned to : PCI/ISA PnP           F1  : Help         PU/PD/+/- : Modify
DMA-5  assigned to : PCI/ISA PnP           F5  : Old Values   (Shift)F2 : Color
DMA-6  assigned to : PCI/ISA PnP           F6  : Load BIOS  Defaults
DMA-7  assigned to : PCI/ISA PnP           F7  : Load Setup Defaults
```

Resources Controlled by

The Award Plug and Play BIOS can automatically configure all the boot and Plug and Play-compatible devices. If you select *Auto*, all the interrupt request (IRQ) and DMA assignment fields disappear, as the BIOS automatically assign them.

Reset Configuration Data

Normally, you leave this field *Disabled*. Select *Enabled* to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on and the system re-configuration has caused such a serious conflict that the operating system cannot boot.

IRQ *n* Assigned to

When resources are controlled manually, assign each system interrupt as one of the following types, depending on the type of device using the interrupt.

Legacy ISA	Devices compliant with the original PC AT bus specification, requiring a specific interrupt (such as IRQ4 for serial port 1).
PCI/ISA PnP	Devices compliant with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

DMA *n* Assigned to

When resources are controlled manually, assign each system interrupt as one of the following types, depending on the type of device using the interrupt.

Legacy ISA	Devices compliant with the original PC AT bus specification, requiring a specific DMA channel
PCI/ISA PnP	Devices compliant with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

Slot X Use IRQ No.

Select *Auto* to automatically assign an IRQ through the PnP mechanism. Any other will assign the specified IRQ to the slot(s). Not all slots can be configured independently, because of the IRQ routing through the backplane. It is recommended to select *Auto*.

PCI IRQ Activated by

Leave the IRQ trigger set at *Level* unless the PCI device assigned to the interrupt specifies *Edge*-triggered interrupts.

PCI IDE IRQ Map to

This field lets you select PCI IDE IRQ mapping or PC AT (ISA) interrupts. If your system does not have one or two PCI IDE connectors on the system board, select values according to the type of IDE interface(s) installed in your system (PCI or ISA). Standard ISA interrupts for IDE channels are IRQ14 for primary and IRQ15 for secondary.

Primary/Secondary IDE INT#

Each PCI peripheral connection is capable of activating up to four interrupts: *INT# A*, *INT# B*, *INT# C* and *INT# D*. By default, a PCI connection is assigned *INT# A*. Assigning *INT# B* has no meaning unless the peripheral device requires two interrupt services rather than just one. Because the PCI IDE interface in the chipset has two channels, it requires two interrupt services. The primary and secondary IDE INT# fields default to values appropriate for two PCI IDE channels, with the primary PCI IDE channel having a lower interrupt than the secondary.

Reset PCI-to-PCI Bridges

The BIOS may reset the PCI-to-PCI Bridges in the system using a software-reset mechanism. Especially in conjunction with HotSwap compatible boards, it should be disabled. Default is disabled.

4.12 Integrated Peripherals

Important!

This chapter describes all fields offered by Award Software in this screen. Your system board designer may omit or modify some fields.

Figure 4-7: Integrated Peripherals — Screen Display

```
                    ROM PCI/ISA BIOS (2A5IIPU0)
                     INTEGRATED PERIPHERALS
                      AWARD SOFTWARE, INC.

Internal PCI/IDE          : Primary      ECP Mode Use DMA          : 1
IDE Primary Master PIO    : Auto         Parallel Port EPP Type    : EPP1.9
IDE Primary Slave  PIO    : Auto
IDE Secondary Master PIO  : Auto         PS/2 mouse function       : Disabled
IDE Secondary Slave  PIO  : Auto
Primary Master  UltraDMA  : Auto         Watch Dog Timer           : Reset
Primary Slave   UltraDMA  : Auto         WDT Active for Booting    : Enabled
Secondary MasterUltraDMA  : Auto         WDT Active Time           : 125 ms
Secondary Slave UltraDMA  : Auto
IDE Burst Mode            : Enabled      USB Controller            : Enabled
IDE Data Port Post Write  : Enabled      USB Keyboard Support      : Disabled
IDE HDD Block Mode        : Enabled

Onboard FDC Controller    : Disabled
Onboard UART 1            : Auto
Onboard UART 1 MIDI       : Disabled     ESC : Quit        ↑↓→← : Select Item
Onboard UART 2            : Auto         F1  : Help        PU/PD/+/- : Modify
Onboard UART 2 MIDI       : Disabled     F5  : Old Values  (Shift)F2 : Color
Onboard Parallel Port     : 378/IRQ7     F6  : Load BIOS  Defaults
Parallel Port Mode        : ECP+EPP      F7  : Load Setup Defaults
```

Internal PCI/IDE

To use the internal PCI IDE controller, set this to Primary (IDE 1), Secondary (IDE 2) or Both. If you want to use your own external PCI IDE controller card, disable the IDE port(s), you are using, with the Disable command

PIO / UltraDMA (Primary/Secondary)

The eight IDE PIO / UltraDMA fields let you set a PIO mode (0-4) or UltraDMA mode (Enabled/Disabled) for each IDE device that the internal PCI IDE interface supports. Modes 0 through 4 provide successively increased performance. In *Auto* mode, the system automatically determines the best mode for each device.

IDE Burst Mode

Select *Enabled*, if the PCI IDE bust master should generate PCI burst cycle. It is recommended to enable this option, to speed up the IDE bus master.

IDE Data Port Post Write

Select *Enabled*, to automatically start IDE write cycles as long as the IDE data FIFO is non-empty. It is recommended to enable this option to speed up data writes.

IDE Hard-Disk Drive Block Mode

Select *Enabled* only if your hard drives support block mode.

On-Board FDC Controller

Select *Enabled* if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install an add-in FDC or the system has no floppy drive, select *Disabled* in this field.

Onboard UART (1,2)

Select a logical COM port address and corresponding interrupt for the first and second serial ports.

Onboard UART (1,2) MIDI

MIDI (musical instrument digital interface) is a standard adopted by the electronic music industry for controlling devices, such as synthesizers and sound cards, that emit music. Select Enabled for the appropriate port, if a MIDI device is connected to serial port 1 or serial port 2. Default is Disabled.

On-Board Parallel Port

Select a logical LPT port address and corresponding interrupt for the physical parallel port.

Parallel Port Mode

Select an operating mode for the onboard parallel port. Select *Normal* unless you are certain both your hardware and software support one of the other available modes.

ECP Mode Use DMA

Select a DMA channel for the parallel port for use during ECP mode.

Parallel Port EPP Type

Select the EPP port version.

PS/2 Mouse Function

On systems that support a PS/2 style mouse, this setting enables or disables this port. If you are using the port you should enable this, otherwise you should disable it so that the interrupt reserved for the PS/2 mouse (IRQ12) can be used for another purpose.

Watchdog Timer

Select the watchdog routing.

WDT Active for Booting

Select *Enable* if the watchdog timer should be started before the operation system is booted from the BIOS.

WDT Active Time

Select the time after which the action selected occurs, if the watchdog timer is not retriggered.

USB Controller

Select *Enabled* if your system contains a USB controller and you have USB peripheral(s) connected.

Usb Keyboard Support

Select *Enabled* if you have connected an USB keyboard, which should be used through BIOS calls (e.g. for MS-DOS).

4.13 Special Setup Features

Important!

This chapter describes all fields offered by Award Software in this screen. Your system board designer may omit or modify some fields.

Figure 4-8: Special Features Setup — Screen Display

```
                    ROM PCI/ISA BIOS (2A5IIPU0)
                      SPECIAL FEATURES SETUP
                      AWARD SOFTWARE, INC.

System Slot                 : Yes

Board Version               : CP-312
Board Index                 : 01
Logic Index                 : 01
Core Voltage Setting        : 10100
Clock Setting (CPU/PCI)     : 66.6/33.3

                                    ESC : Quit          ↑↓→← : Select Item
                                    F1  : Help          PU/PD/+/- : Modify
                                    F5  : Old Values    (Shift)F2 : Color
                                    F6  : Load BIOS  Defaults
                                    F7  : Load Setup Defaults
```

System Slot

This is a display only field. Yes indicates, that this CPU is the system controller configuring the backplane and handling all interrupts of the backplane. No indicates, that this CPU is a slave CPU.

Board Version

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

Board Index

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

Logic Index

This is a display only field, which reflects the value of an onboard register. It shows the index of the onboard logic. This item is not displayed, when the Board Index is 00.

Core Voltage Setting

This is a display only field, which reflects the value of an onboard register. It shows the jumper setting for the core voltage setting of the CPU according to the hardware manual. Take a look at the hardware manual for this CPU to get further information.

Clock Setting (CPU/PCI)

This is a display only field, which reflects the current setting of the jumpers for the CPU and PCI clock. Lock at the hardware manual for the jumper description in detail.

4.14 Password Setting

When you select this function, a message appears at the center of the screen:

`Enter password:`

Type the password, up to eight characters, and press "↵". Typing a password clears any previously entered password from the CMOS memory.

After having pressed "↵" the message changes:

`Confirm password:`

Again, type the password and press "↵". To abort the process at any time, press "Esc".

In the "Security Option" item in the "BIOS Features Setup" screen, select `System` or `Setup`:

Table 4-7: Security Options

System	Enter a password each time the system boots and whenever you enter Setup.
Setup	Enter a password whenever you enter Setup.

Important!

To clear the password, simply press "↵" when asked to enter a password. Then the password function is disabled.

4.15 POST Messages

During the power-on self test (POST), the BIOS displays a message whenever it detects a correctable error. Any error message is followed by this prompt:

```
Press “F1” to continue, “Ctrl-Alt-Esc” or “Del” to enter setup.
```

Following is a list of POST error messages for both the ISA and the EISA BIOS.

CMOS Battery Has Failed

CMOS battery is no longer functional. It should be replaced.

CMOS Checksum Error

Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused by a weak battery. Check the battery and replace it, if necessary.

Disk Boot Failure, Insert System Disk and Press Enter

No boot device was found. This could mean that either a boot drive was not detected or the drive does not contain proper system boot files. Insert a system disk into Drive A: and press <Enter>. If you assumed the system would boot from the hard drive, make sure the controller is inserted correctly and all cables are properly attached. Also be sure the disk is formatted as a boot device. Then reboot the system.

Diskette Drives or Types Mismatch Error - Run Setup

Type of floppy-disk drive installed in the system is different from the CMOS definition. Run “Setup” to reconfigure the drive type correctly.

Display Switch is Set Incorrectly

Display switch on the motherboard can be set to either monochrome or color. This indicates the switch is set to a different setting than indicated in Setup. Determine which setting is correct, and then either turn off the system and change the jumper, or enter Setup and change the VIDEO selection.

Display Type Has Changed Since Last Boot

Since last powering off the system, the display adapter has been changed. You must configure the system for the new display type.

EISA Configuration Checksum Error - Please Run EISA Configuration Utility

The EISA non-volatile RAM checksum is incorrect or cannot correctly read the EISA slot. This can indicate either the EISA non-volatile memory has become corrupt or the slot has been configured incorrectly. Also be sure the card is installed firmly in the slot.

EISA Configuration Is Not Complete - Please Run EISA Configuration Utility

The slot configuration information stored in the EISA non-volatile memory is incomplete.



Note:

When either error appears, the system boots in ISA mode so you can run the EISA Configuration Utility.

Error Encountered Initializing Hard-Drive

Hard drive cannot be initialized. Be sure the adapter is installed correctly and all cables are correctly and firmly attached. Also be sure the correct hard drive type is selected in “Setup”.

Error Initializing Hard-Disk Controller

Cannot initialize controller. Make sure the cord is correctly and firmly installed in the bus. Be sure the correct hard drive type is selected in Setup. Also check to see if any jumper needs to be set correctly on the hard drive.

Floppy-Disk Controller Error or No Controller Present

Cannot find or initialize the floppy drive controller. Make sure the controller is installed correctly and firmly. If there are no floppy drives installed, be sure the floppy-disk drive selection in “Setup” is set to `NONE`.

Invalid EISA Configuration - Please Run EISA Configuration Utility

The non-volatile memory containing EISA configuration information was programmed incorrectly or has become corrupt. Re-run EISA configuration utility to correctly program the memory.



Note:

When this error appears, the system boots in ISA mode so you can run the EISA configuration utility.

Keyboard Error or No Keyboard Present

Cannot initialize the keyboard. Make sure the keyboard is attached correctly and no keys are being pressed during the boot.

If you are deliberately configuring the system without a keyboard, set the “Error Halt” condition in “Setup” to `HALT ON ALL, BUT KEYBOARD`. This causes the BIOS to ignore the missing keyboard and continue the boot process.

Memory Address Error at ...

Indicates a memory address error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

Memory Parity Error at ...

Indicates a memory parity error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

Memory Size Has Changed Since Last Boot

Memory has been added or removed since the last boot. In EISA mode use the configuration utility to reconfigure the memory configuration. In ISA mode enter “Setup” and enter the new memory size into the memory fields.

Memory Verify Error at ...

Indicates an error verifying a value already written to memory. Use the location along with your system's memory map to locate the bad chip.

Offending Address not Found

This message is used in conjunction with the “I/O Channel Check” and “RAM Parity Error” messages whenever the segment that has caused the problem cannot be isolated.

Offending Segment

This message is used in conjunction with the “I/O Channel Check” and “RAM Parity Error” messages whenever the segment that has caused the problem has been isolated.

Press a Key to Reboot

This message appears at the bottom of the screen when an error occurs that requires you to reboot. Press any key to reboot the system.

Press “F1” to Disable NMI, “F2” to Reboot

When BIOS detects a non-maskable interrupt condition during boot, you can disable the NMI and continue to boot, or you can reboot the system with the NMI enabled.0

RAM Parity Error - Checking for Segment ...

Indicates a parity error in the random access memory.

Should Be Empty But EISA Board Found - Please Run EISA Configuration Utility

A valid board ID was found in a slot that was configured as having no board ID.



Note:

When this error appears, the system boots in ISA mode so you can run the EISA configuration utility.

Should Have EISA Board but not Found - Please Run EISA Configuration Utility

The board installed is not responding to the ID request, or no board ID has been found in the indicated slot.



Note:

When this error appears, the system boots in ISA mode so you can run the EISA configuration utility.

Slot not Empty

Indicates that a slot designated as empty by the EISA Configuration Utility actually contains a board.



Note:

When this error appears, the system boots in ISA mode so you can run the EISA configuration utility.

System Halted, <CTRL-ALT-DEL> to Reboot ...

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the “CTRL” and “ALT” keys and press “DEL”.

Wrong Board in Slot - Please Run EISA Configuration Utility

The board ID does not match the ID stored in the EISA non-volatile memory.



Note:

When this error appears, the system boots in ISA mode so you can run the EISA configuration utility.

4.16 POST Codes

ISA and PCI POST codes are output to port address 80H.

Table 4-8: POST Code Functions

Code (Hex)	Name	Description
C0	Turn Off Chipset Cache	OEM Specific-Cache control
1	Processor Test 1	Processor Status (1FLAGS) Verification. Tests the following processor status flags: carry, zero, sign, overflow, The BIOS sets each flag, verifies they are set, then turns each flag off and verifies it is off.
2	Processor Test 2	Read/Write/Verify all CPU registers except SS, SP, and BP with data pattern FF and 00.
3	Initialize Chips	Disable NMI, PIE, AIE, UEI, SQWV Disable video, parity checking, DMA Reset math co-processor Clear all page registers, CMOS shutdown byte Initialize timer 0, 1, and 2, including set EISA timer to a known state Initialize DMA controllers 0 and 1 Initialize interrupt controllers 0 and 1 Initialize EISA extended registers.
4	Test Memory Refresh Toggle	RAM must be periodically refreshed to keep the memory from decaying. This function assures that the memory refresh function is working properly.
5	Blank video, Initialize keyboard	Keyboard controller initialization.
6	Reserved	
7	Test CMOS Interface and Battery Status	Verifies CMOS is working correctly, detects bad battery.
BE	Chipset Default Initialization	Program chipset registers with power on BIOS defaults.
C1	Memory presence test	OEM Specific-Test to size on-board memory
C5	Early Shadow	OEM Specific-Early Shadow enable for fast boot.
C6	Cache presence test	External cache size detection
8	Setup low memory	Early chip set initialization Memory presence test OEM chip set routines Clear low 64K of memory Test first 64K memory.

Table 4-8: POST Code Functions

Code (Hex)	Name	Description
9	Early Cache Initialization	Cyrix CPU initialization Cache initialization
A	Setup Interrupt Vector Table	Initialize first 120 interrupt vectors with SPURIOUS_INT_HDLR and initialize INT 00h-1Fh according to INT_TBL
B	Test CMOS RAM Checksum	Test CMOS RAM Checksum, if bad, or insert key pressed, load defaults.
C	Initialize keyboard	Detect type of keyboard controller (optional) Set NUM_LOCK status.
D	Initialize Video Interface	Detect CPU clock. Read CMOS location 14h to find out type of video in use. Detect and Initialize Video Adapter.
E	Test Video Memory	Test video memory, write sign-on message to screen. Setup shadow RAM - Enable shadow according to Setup.
F	Test DMA Controller 0	BIOS checksum test. Keyboard detect and initialization
10	Test DMA Controller 1	
11	Test DMA Page Registers	Test DMA Page Registers.
12-13	Reserved	
14	Test Timer Counter 2	Test 8254 Timer 0 Counter 2.
15	Test 8259-1 Mask Bits	Verify 8259 Channel 1 masked interrupts by alternately turning off and on the interrupt lines.
16	Test 8259-2 Mask Bits	Verify 8259 Channel 2 masked interrupts by alternately turning off and on the interrupt lines.
17	Test Stuck 8259's Interrupt Bits	Turn off interrupts then verify no interrupt mask register is on.
18	Test 8259 Interrupt Functionality	Force an interrupt and verify the interrupt occurred.
19	Test Stuck NMI Bits (Parity/IO Check)	Verify NMI can be cleared.
1A		Display CPU clock
1B-1E	Reserved	

Table 4-8: POST Code Functions

Code (Hex)	Name	Description
1F	Set EISA Mode	If EISA non-volatile memory checksum is good, execute EISA initialization. If not, execute ISA tests an clear EISA mode flag. Test EISA Configuration Memory Integrity (checksum & communication interface).
20	Enable Slot 0	Initialize slot 0 (System Board).
21-2F	Enable Slots 1-15	Initialize slots 1 through 15.
30	Size Base and Extended Memory	Size base memory from 256K to 640K and extended memory above 1MB.
31	Test Base and Extended Memory	Test base memory from 256K to 640K and extended memory above 1MB using various patterns. NOTE: This test is skipped in EISA mode and can be skipped with ESC key in ISA mode.
32	Test EISA Extended Memory	If EISA Mode flag is set then test EISA memory found in slots initialization. NOTE: This test is skipped in ISA mode and can be skipped with ESC key in EISA mode.
33-3B	Reserved	
3C	Setup Enabled	
3D	Initialize & Install Mouse	Detect if mouse is present, initialize mouse, install interrupt vectors.
3E	Setup Cache Controller	Initialize cache controller.
3F	Reserved	
BF	Chipset Initialization	Program chipset registers with Setup values
40		Display virus protect disable or enable
41	Initialize Floppy Drive & Controller	Initialize floppy disk drive controller and any drives.
42	Initialize Hard Drive & Controller	Initialize hard drive controller and any drives.
43	Detect & Initialize Serial/Parallel Ports	Initialize any serial and parallel ports (also game port).
44	Reserved	
45	Detect & Initialize Math Co-processor	Initialize math co-processor.
46	Reserved	
47	Reserved	

Table 4-8: POST Code Functions

Code (Hex)	Name	Description
48-4D	Reserved	
4E	Manufacturing POST Loop or Display Messages	Reboot if Manufacturing POST Loop pin is set. Otherwise display any messages (i.e., any non-fatal errors that were detected during POST) and enter Setup.
4F	Security Check	Ask password security (optional).
50	Write CMOS	Write all CMOS values back to RAM and clear screen.
51	Pre-boot Enable	Enable parity checker Enable NMI, Enable cache before boot.
52	Initialize Option ROMs	Initialize any option ROMs present from C8000h to EFFFFh. NOTE: When FSCAN option is enabled, ROMs initialize from C8000h to F7FFFh.
53	Initialize Time Value	Initialize time value in 40h: BIOS area.
60	Setup Virus Protect	Setup virus protect according to Setup
61	Set Boot Speed	Set system speed for boot
62	Setup NumLock	Setup NumLock status according to Setup
63	Boot Attempt	Set low stack Boot via INT 19h.
B0	Spurious	If interrupt occurs in protected mode.
B1	Unclaimed NMI	If unmasked NMI occurs, display Press F1 to disable NMI, F2 reboot.
E1-EF	Setup Pages	E1- Page 1, E2 - Page 2, etc.
FF	Boot	