



CP390

Active PMC Carrier Board for CompactPCI Applications

Manual ID 19976, Rev. Index 0200
Jan 00



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



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Revision History

Revision History			
Manual/Product Title:		CP390	
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0100	Initial Issue	1000	Apr. 99
0200	Hotswap chapter added, description of CompactPCI and PMC connectors added, deletion of I/O voltage switching description	2000	Jan. 00

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Explanation of Symbols



CE Conformity

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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!

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Note:

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



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High Voltage Safety Instructions



Warning!

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Caution!

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Special Handling and Unpacking Instructions



ESD Sensitive Device!

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-  Do not handle this product while it is outside 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 backup, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or tracks on the board.



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- ☞ 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.
- ☞ When 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 instructions on the preceding page of this manual.



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Chapter 1

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1. Introduction

1.1 Overview

PMC modules are renowned for their flexibility and versatility of use. They afford the user wide ranging system independent solutions by means of easily interchanged or upgraded mezzanine add-on modules. The *PEP* CP390 has been designed to maximize the advantages provided by PMC modules in a 3U environment. Flexibility, versatility, convenience and ease of use have been keynotes throughout the design process. The result is a board which, although essentially a carrier for PMC modules, also includes a wide range of important features such as a PCI-PCI bridge and (optionally available) the ability to hotswap. Use of the hotswap version means, of course, that all PMC modules employed on the board are effectively hotswappable.

The CP390 is a 3U non-intelligent, active CPCI carrier board with one PMC slot.

Some of the Outstanding Features of the CP390:

- active carrier with PCI-to-PCI bridge: the primary and secondary PCI busses are capable of being operated independently of one another
- 32 Bit / 33MHz PCI Bus on the CPCI and on the PMC side
- it supports the Interrupts INTA, INTB, INTC and INTD
- software transparent: the non-hotswap version does not require a software driver.
- it supports all the signals of the PCI Bus on its connectors Jn1 (CON2), Jn2 (CON3)
- The connectors which connect the mezzanine board with the carrier include all the signals of a 33MHz, 32-bit, multi-master PCI bus, the power rails for 5V, 3.3V, V(I/O) and other specialised signals for Board Detection.
- A PCI-to-PCI bridge provides for coupling of the PMC side to the CompactPCI side, so that two independent PCI busses exist. The PCI-to-PCI bridge is the INTEL 21150. It is software transparent and consequently a software driver is not required to manage data transfer between the PMC module and the CPCI bus.
- The CP390 has been designed to function with all *PEP* CompactPCI backplanes.

Features of the *PEP* Modular Computers' PMC modules

PEP Modular Computers' PMC modules are operable in both CompactPCI and VME systems. They offer all the key benefits of PC I/O technology, namely:

- low cost solutions
- high performance
- a processor independent local I/O bus
- a broad range of I/O peripheral devices

PEP Modular Computers' PMC modules may be installed on a variety of different carrier boards, including:

- CompactPCI 3U/6U: CPU CP600, CP602, CP610, CP611, CP612
- CompactPCI PMC carrier boards such as the CP390 and CP690

Customers who additionally require the functionality of the CP390 in the 6U Form Factor are referred to *PEP*'s new double-height PMC Module carrier board, the CP690, which holds two PMC modules.



1.2 Board Interfaces

CompactPCI Interface

The CompactPCI interface connector J1 (CON1) provides all the necessary signals for data transfer as defined by PCI Specification Rev. 2.1.

The CP390 is routed to the CompactPCI backplane by means of the Intel 21150 PCI-to-PCI bridge which interfaces the board with a data path width of 32-bit and a speed up to 33MHz.

PMC Interface

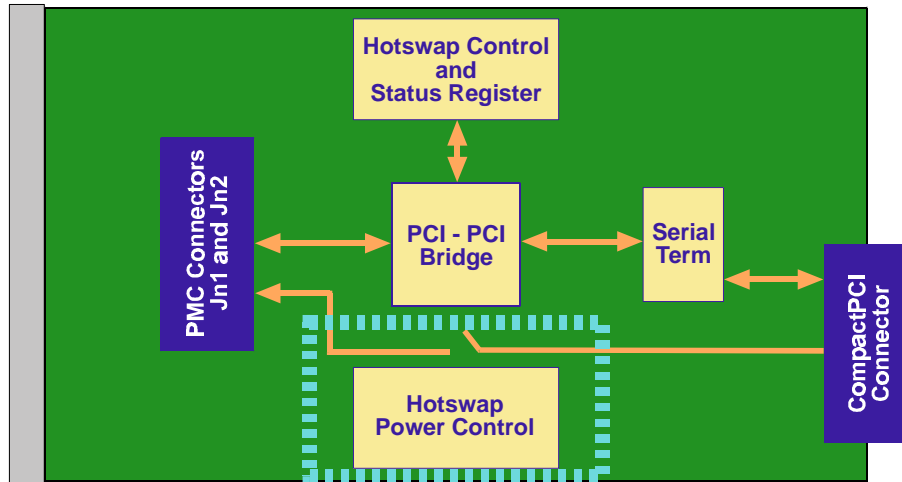
The PMC interface of the CP390 provides an easy way to extend a CompactPCI system via the wide array of interfaces and functions which are available on PMC modules produced by the entire range of PMC vendors. The secondary side of the PCI-to-PCI Bridge provides a 32-bit wide PCI data path with a speed of up to 33MHz which is routed to the onboard connectors Jn1 and Jn2. These connectors also provide the power supply for the PMC module. The interface has been designed to comply with the IEEE 1386.1 specification which defines a PCI electrical interface for the CMC (Common Mezzanine Card) form factor.

Additionally, the CP390-HS (Hotswap version) has been designed to comply with the CPCI Hotswap specification PICMG 2.1 R1.0, which means that the power supply of the PMC modules will be ramped up and a reset generated whenever the board is plugged into a running system.



1.3 Block Diagram

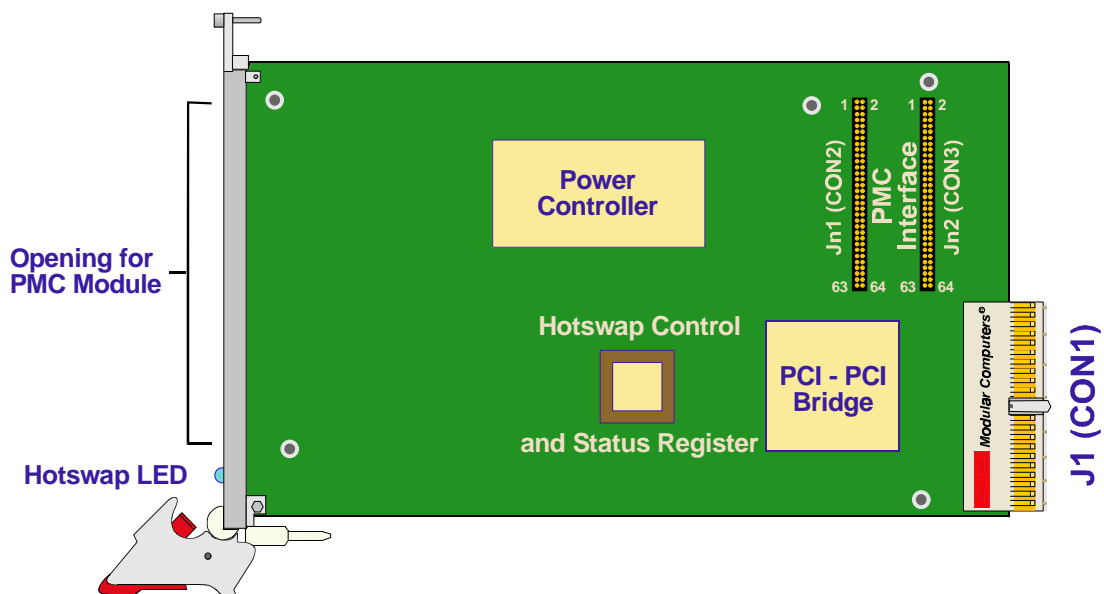
Figure 1-1: Block Diagram



1.4 Board Layout

The CP390 has two connectors onboard which provide all the PCI signals and the power supply for the PMC-Module.

Figure 1-2: Board Layout (Front View)

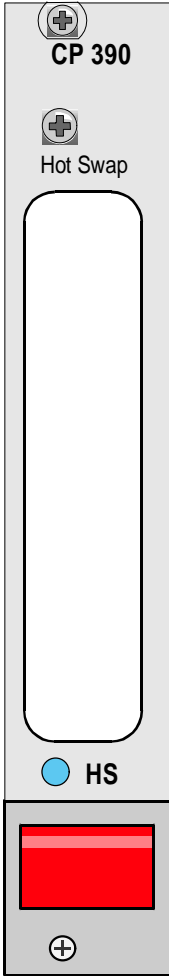
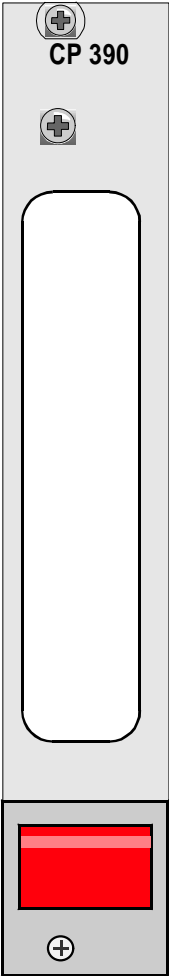




1.5 Front Panels

Standard

Hotswap



The CP390 front panel is provided with a window for the insertion of a PMC module bezel.



1.6 Technical Specifications

Table 1-1: CP390 Specifications

CP390	Specifications
PCI-Standard	Compliant with PCI 2.1
Signaling Voltage	CPCI-Side: 3.3V / 5V tolerant PMC-Side: 5V signaling
Driver Support	A software driver is not required
Connectors	PMC Jn1 (CON2) and Jn2 (CON3) connectors
Mechanical Compliance	IEEE 1101.10 CMC IEEE P1386/Draft 2.0 (with minor exceptions)
Power	3.3V / 0.07 A (Core-Supply)
Temperature Range	Operation: <ul style="list-style-type: none"> • 0° to +60°C (standard) • -25° to +75°C (extended) Storage: <ul style="list-style-type: none"> • -55° to +85°C
Operating Humidity	5 – 95% (non condensing)
Vibrations and Broad-Band Random Vibration	IEC68-2-6 compliant IEC68-2-64
Shocks Permanent Shocks Single Shock	IEC68-2-29 IEC68-2-27
Board Dimensions	Single-height Eurocard: 100 mm x 160 mm 1 x 4 HP slot
Board Weight	122 grams



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

CompactPCI hotswap Specification, PICMG 2.1 R1.0

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. Installation

2.1 Board Installation

**Caution!**

If you are using the non-hotswap version of the CP390, please switch off the target system before installing the board in a free slot. Failure to do so could endanger your life/health and may damage your board or system.

**ESD Equipment!**

Your carrier board and PMC module contain electrostatically sensitive devices. Please observe the necessary precautions to avoid damage to your board:

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

PMC Module Installation

1. Place the EMC gasket on the bezel of your PMC-Module
2. Unscrew the stand-off, which is positioned at the PCI-Bridge

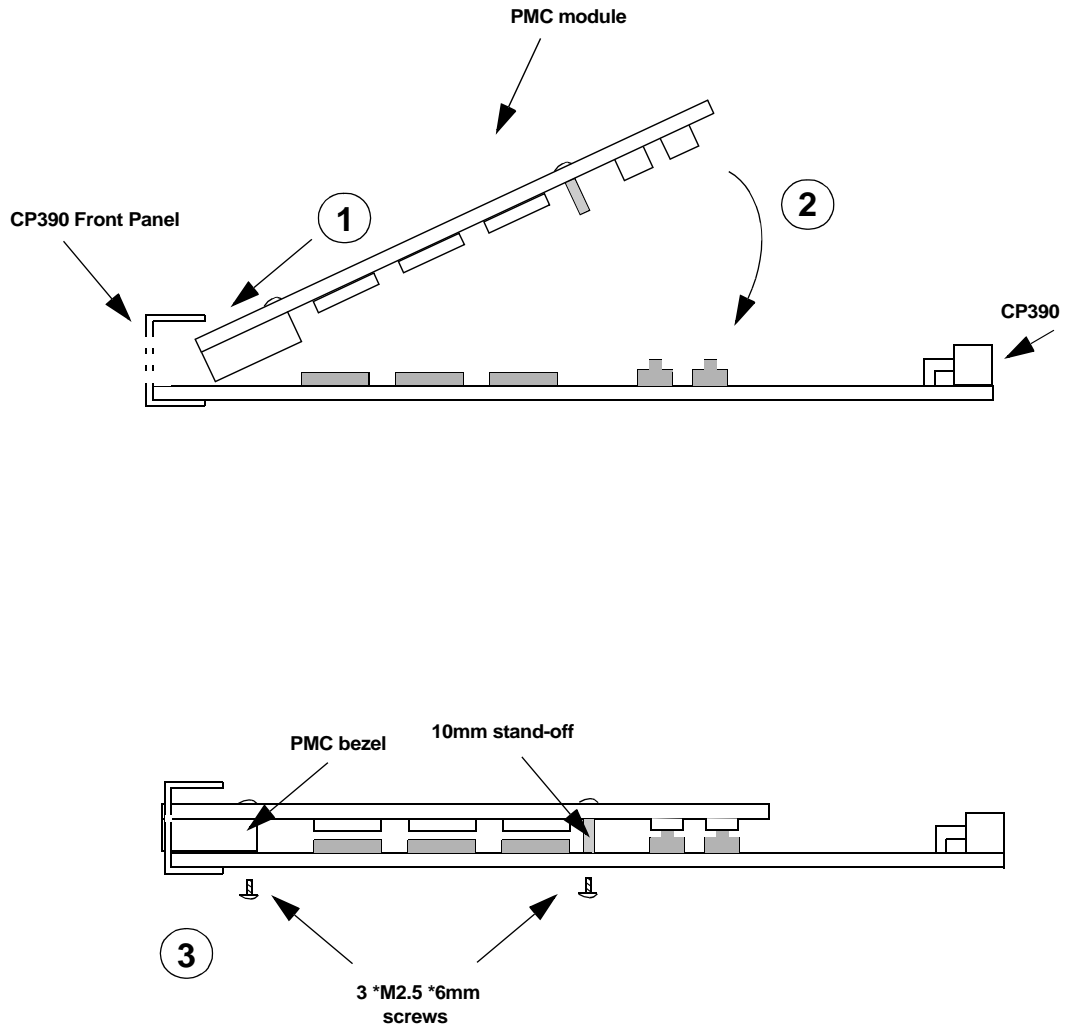
**Note:**

In order to support an active PMC carrier and, therefore, to comply with the CPCI specification, it was necessary to place the PCI-to-PCI bridge in the position where a socket for mounting a stand-off would normally be (PMC specification). As a result, the second stand-off has been omitted.

3. Push the PMC bezel into the window of the front-panel of the CP390 and plug the connectors together.
4. Use three screws (M2.5 x 6mm) to fix the board



Figure 2-1: Installation Diagrams



2.1.1 CPCI Signaling Voltage

The primary side of the PCI-to-PCI bridge, i.e. the CPCI side, has buffers for 3.3V signaling but works equally well in a 5V signaling environment.



Chapter **3**

Configuration

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3. Configuration

3.1 Pinouts

3.1.1 Jn1 (CON2) Pin Assignment

Table 3-1: Jn1, 32-bit PCI

Pin Number	Signal Name	Signal Name	Pin Number
1	TCK	-12V	2
3	Ground	INTA#	4
5	INTB#	INTC#	6
7	BUSMODE1#	+5V	8
9	INTD#	PCI-RSVD*	10
11	Ground	PCI-RSVD*	12
13	CLK	Ground	14
15	Ground	GNT#	16
17	REQ#	+5V	18
19	V(I/O)	AD[31]	20
21	AD[28]	AD[27]	22
23	AD[25]	Ground	24
25	Ground	C/BE[3]#	26
27	AD[22]	AD[21]	28
29	AD[19]	+5V	30
31	V(I/O)	AD[17]	32
33	FRAME#	Ground	34
35	Ground	IRDY#	36
37	DEVSEL#	+5V	38
39	Ground	LOCK#	40
41	SDONE#	SBO#	42
43	PAR	Ground	44
45	V(I/O)	AD[15]	46
47	AD[12]	AD[11]	48
49	AD[09]	+5V	50
51	Ground	C/BE[0]#	52
53	AD[06]	AD[05]	54
55	AD[04]	Ground	56
57	V(I/O)	AD[03]	58
59	AD[02]	AD[01]	60
61	AD[00]	+5V	62
63	Ground	REQ64#	64



3.1.2 Jn2 (CON3) Pin Assignment

Table 3-2: Jn2, 32-bit PCI

Pin Number	Signal Name	Signal Name	Pin Number
1	+12V	TRST#	2
3	TMS	TDO	4
5	TDI	Ground	6
7	Ground	PCI-RSVD*	8
9	PCI-RSVD*	PCI-RSVD*	10
11	BUSMODE2#	+3.3V	12
13	RST#	BUSMODE3#	14
15	3.3V	BUSMODE4#	16
17	PCI-RSVD*	Ground	18
19	AD[30]	AD[29]	20
21	Ground	AD[26]	22
23	AD[24]	+3.3V	24
25	IDSEL	AD[23]	26
27	+3.3V	AD[20]	28
29	AD[18]	Ground	30
31	AD[16]	C/BE[2]#	32
33	Ground	PMC-RSVD	34
35	TRDY#	+3.3V	36
37	Ground	STOP#	38
39	PERR#	Ground	40
41	+3.3V	SERR#	42
43	C/BE[1]#	Ground	44
45	AD[14]	AD[13]	46
47	Ground	AD[10]	48
49	AD[08]	+3.3V	50
51	AD[07]	PMC-RSVD	52
53	+3.3V	PMC-RSVD	54
55	PMC-RSVD	Ground	56
57	PMC-RSVD	PMC-RSVD	58
59	Ground	PMC-RSVD	60
61	ACK64#	+3.3V	62
63	Ground	PMC-RSVD	64



Chapter 4

Hotswap

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4. Hotswap

4.1 Technical Background of CompactPCI Hotswap

In many modern application systems downtime is costly and/or unacceptable. Server applications, telecommunications networks and automated systems requiring continuous monitoring call for a system design in which a single card can be inserted or extracted without affecting the rest of the system. The ease with which a board may be removed and replaced is dependent on the mechanical design (form factor), the possibility of deactivating the software drivers for the board (operating system) and the ability to remove and insert the board without disturbing the signal quality on the bus.

CompactPCI hotswap is currently the most effective way to meet this need. Staggered pins on the backplane guarantee controlled power sequencing of the board, while the signals ENUM, BDSEL, HEALTHY and the hotswap control and status register bits may be used to control board access from the software side.

4.1.1 Hotswap System

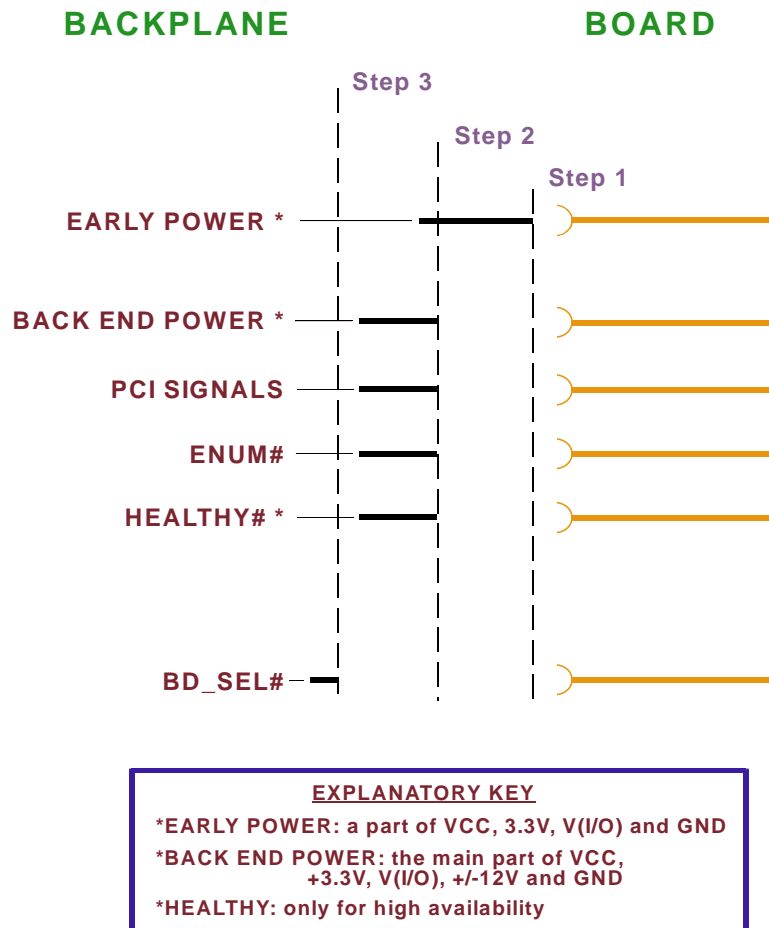
A hotswap system consists of a hotswap platform which comprises a hotswap backplane, the system host (CPU) with hotswap features, cooling, power supplies etc. plus the boards to be hotswapped. Hotswapping is not possible unless the operating system has the capability to enable and disable the board specific driver during normal operation.



4.1.1.1 The Hotswap Backplane

The hotswap backplane has staggered pins to ensure defined power sequencing.

Figure 4-1: Illustration of Staggered Pinning on the Hotswap Backplane



Note:



Some special signals (e.g. ENUM, HEALTHY, BDSEL...) have particular routing requirements.

4.1.1.2 The System Host (System Controller)

The System Controller must have the possibility to utilize the special signals defined by the CompactPCI hotswap specification. If a high availability system is used it must additionally be able to control the hardware connection with the peripheral boards (Hardware Connection Control).



4.1.1.3 The Hotswap Board

To ensure that a board may be removed and replaced in a working bus without disturbing the system it requires the following additional features.

- precharge
- power ramping
- hotswap Control and status register bits
- automatic interrupt generation whenever a board is about to be removed or replaced.
- an LED to indicate that the board may be safely removed.

4.1.1.4 Software and Operating System

No hotswap support is currently provided by Intel based operating systems. Windows 2000, which is scheduled to become available in February 2000, is expected to provide hotswap support. Special software will require to be developed for other proprietary systems.

In a hotswap environment the software driver and the operating system have the following additional requirements:

- The OS must provide the possibility to initialize PCI devices during normal operation whenever required (allocate resources).
- The OS must provide the possibility to load or unload software drivers during normal operation whenever required.

4.2 Design Implementation on the CP390

4.2.1 Power Ramping

On the CP390, a special hotswap controller is used to ramp up the supply voltage of the PMC modules (Back End Power). This is done to avoid transients on the 3.3V and the 5V power supplies from the Hotswap system. When the power supply is stable, the hotswap controller generates a reset on the PMC slots to put the devices into a definite state.

4.2.2 Precharge

Precharge is provided on the CP390 by a resistor on each signal line (PCI bus), connected to a 1V reference voltage.

4.2.3 Handle Switch

A microswitch is situated in the extractor handle. Opening the handle initiates the generation of the ENUM interrupt (produced by the onboard logic).



4.2.4 ENUM# Interrupt

The onboard logic generates a low active interrupt signal to indicate that the board is about to be extracted from the system or inserted into the system.

4.2.5 Hotswap Control and Status Register / State-machine

All hotswap peripheral boards provide a HotSwap Control And Status Register which provides information on the current state of the board. The defined bits in this register set are named:

Table 4-1: Hotswap Control and Status Register / State-machine

Bit Name	Function
EXT	Indication of extraction process
INS	Indication of insertion process
LOO	Led on
EIM	ENUM mask bit

Due to the fact that no 64-bit transparent PCI-to-PCI bridge currently exists, which would provide built-in hotswap status registers, another way of implementing these bits had to be found.

The solution, therefore, is to put this information into the onboard logic.

Since on-chip registers handle read and write accesses in the same way, it is necessary to exercise care when configuring the PCI-to-PCI GPIOs (general purpose IOs).

Table 4-2: Hotswap Register Bits

Bit Name	Signal on 21150
EXT	GPIO[2]
INS	GPIO[3]
LOO	GPIO[0]
EIM	GPIO[1]

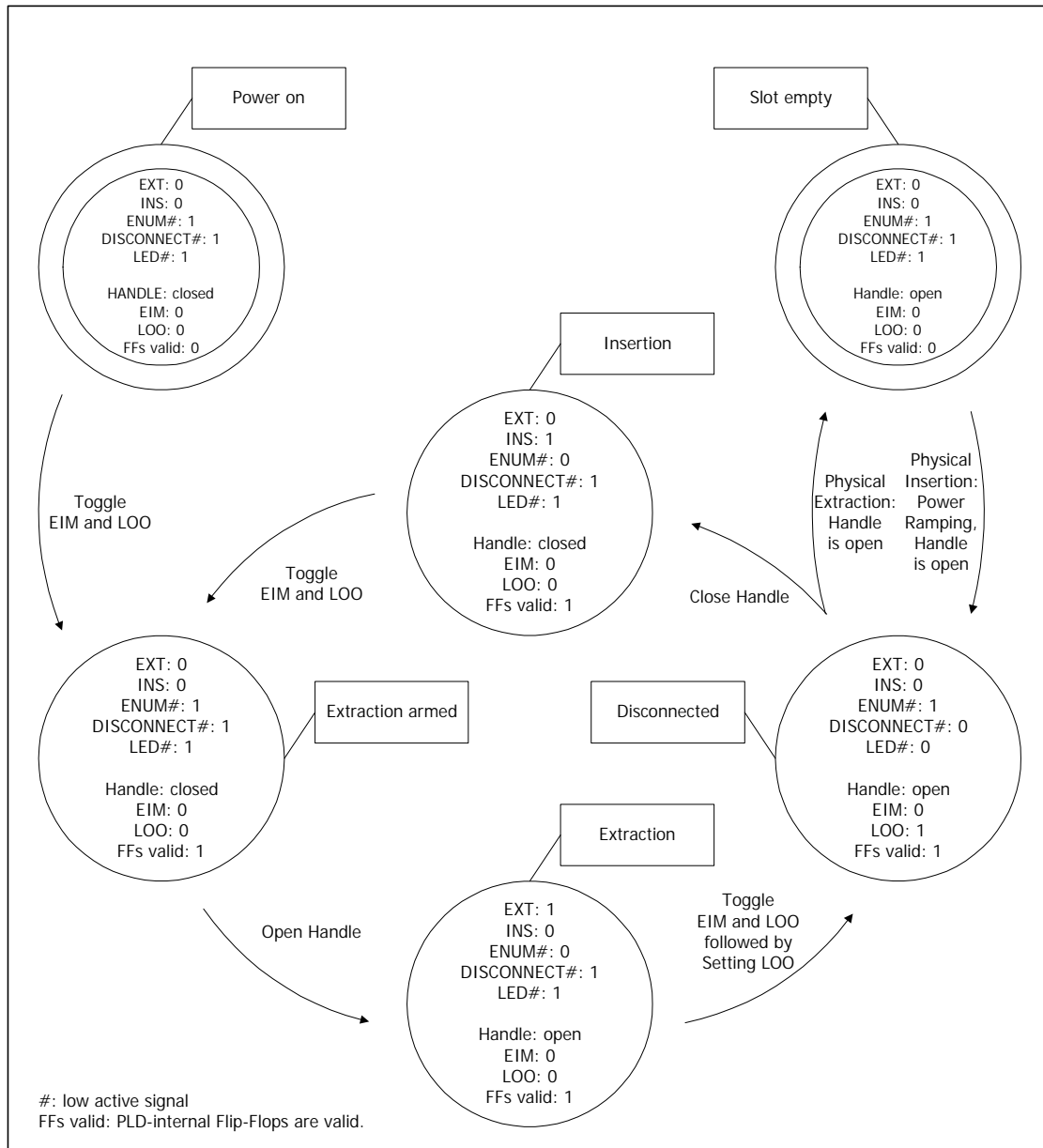


Attention!

GPIO[2:3] have to be configured as inputs. A different configuration may damage your bridge device.



Figure 4-2: Hotswap State Machine





4.2.6 Programming the GPIO's

This sub-chapter provides information for programming the GPIO's (General Purpose I/O's) of the PCI-to-PCI bridge.

4.2.6.1 GPIO: Output Enable Control Register - Offset 66h

This section describes the GPIO for the Output Enable Control Register.

Dword address = 64h

Byte enable p_cbe_1<3:0> = x0xxb

Table 4-3: GPIO Output Enable Control Register - Offset 66h

Dword Bit	Name	R/W	Description
19:16	GPIO output enable write-1-to-clear	R/W1TC	The gpio<3:0> output enable control write-1-to-clear. Writing 1 to any of these bits configures the corresponding gpio<3:0> pin as an input only; that is, the output driver is tristated. Writing 0 to this register has no effect. When read, reflects the last value written. Reset value: 0 (all pins are input only).
23:20	GPIO output enable write-1-to-set	R/W1TS	The gpio<3:0> output enable control write-1-to-set. Writing 1 to any of these bits configures the corresponding gpio<3:0> pin as bidirectional, that is, enables the output driver and drives the value set in the output data register (65h). Writing 0 to this register has no effect. When read, reflects the last value written. Reset value: 0 (all pins are input only).

4.2.6.2 GPIO Input Data Register - Offset 67h

This section describes the GPIO input data register.

Dword address = 64h

Byte enable p_cbe_1<3:0> = 0xxxb

Table 4-4: GPIO Input Data Register - Offset 67h

Dword Bit	Name	R/W	Description
27:24	Reserved	R	Reserved. Returns 0 when read.
31:28	GPIO input	R	This read-only register reads the state of the gpio<3:0> pins. This state is updated on the PCI clock cycle following a change in the gpio pins.



4.2.6.3 GPIO Output Data Register - Offset 65h

This section describes the GPIO output data register.

Dword address = 64h

Byte enable p_cbe_1<3:0> = xx0xb

Table 4-5: GPIO Output Data Register - Offset 65h

Dword Bit	Name	R/W	Description
11:8	GPIO output enable write-1-to-clear	R/W1TC	<p>The gpio<3:0> pin output data write-1-to-clear. Writing 1 to any of these bits drives the corresponding bit low on the gpio<3:0> bus if it is programmed as bi-directional. Data is driven on the PCI clock cycle following completion of the configuration write to this register. Bit positions corresponding to gpio pins that are programmed as input only are not driven. Writing 0 to these bits has no effect. When read, reflects the last value written.</p> <p>Reset value: 0.</p>
15:12	GPIO output enable write-1-to-set	R/W1TS	<p>The gpio<3:0> pin output data write-1-to-set. Writing 1 to any of these bits drives the corresponding bit high on the gpio<3:0> bus if it is programmed as bi-directional. Data is driven on the PCI clock cycle following completion of the configuration write to this register. Bit positions corresponding to gpio pins that are programmed as input only are not driven. Writing 0 to these bits has no effect. When read, reflects the last value written.</p> <p>Reset value: 0.</p>



Appendix **A**

CompactPCI System Notes

<i>A</i>	<i>System Overview</i>	<i>A - 2</i>
1	<i>Note on CompactPCI</i>	<i>A - 2</i>
2	<i>Main Features of CompactPCI Systems</i>	<i>A - 2</i>
<i>B</i>	<i>System Components</i>	<i>A - 3</i>



CompactPCI System Notes

A 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 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.

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 66 MHz
- up to 16 (2 × 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.



B 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 (2 × 8) 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 sub-systems 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
- SERCOS

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, available in 3U/4U/6U/7U heights and 42HP/84HP width

Mass Storage Devices

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

Power Supply Units

Table 1-1: Power Supply Units

Form Factor	Input Type	Power Output	Power Supply Connector	Power Supply Unit
3U	AC	180W	DIN M-Series	CP3-SVE-M-180AC
		235W	ATX	CP3-SVE-ATX-235AC
	DC	120W	DIN M-Series	CP3-SVE-M-120DC-V1 (-E1)
		150W	DIN M-Series	CP3-SVE-M-150DC-V2 (-R)
6U	AC	250W	DIN M-Series	CP6-SVE-M-250AC-R
		270W	DIN M-Series	CP6-SVE-M-270AC
	DC	250W	DIN M-Series	CP6-SVE-M-250DC-R
		270W	DIN M-Series	CP6-SVE-M-270DC



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 currently implemented by *PEP Modular Computers* for its 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

