Modular Computers ®

# CP341

## Dual-Port Ethernet/Fast Ethernet Board for CompactPCI Applications

Manual ID 18845, Rev. Index 0102
20 Nov 98

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

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# Preface

# Revision History

| Revision History | | | | |
|---|---|---|---|---|
| **Manual/Product Title:** | **CP341** | | | |
| **Manual ID Number:** | **18845** | | | |
| **Rev. Index** | **Brief Description of Changes** | **Board Index** | | **Date of Issue** |
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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 following 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

# Introduction

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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. You can connect to the homepage of the *PCI Industrial Computer Manufacturers Group (PICMG)* by clicking into the highlighted area.

### 1.1.1 Note on CompactPCI

CompactPCI is an extension of the PCI specification. It has been optimized for industrial and/or 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 the PICMG, which is a consortium of companies involved in utilizing PCI for embedded applications.

### 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.

***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 graphics control and frame grabbing are supported by dedicated boards.

### Communication

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

### Fieldbus Control

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

- 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 multi-processer system, a system controller (CP610) communicates with other CPU's through a non-transparent PCI / PCI bridge

*Housings*

- Board cages for 19-inch 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

Please note that the following units of measurement are used to express the dimensions of PEP cards and housings:

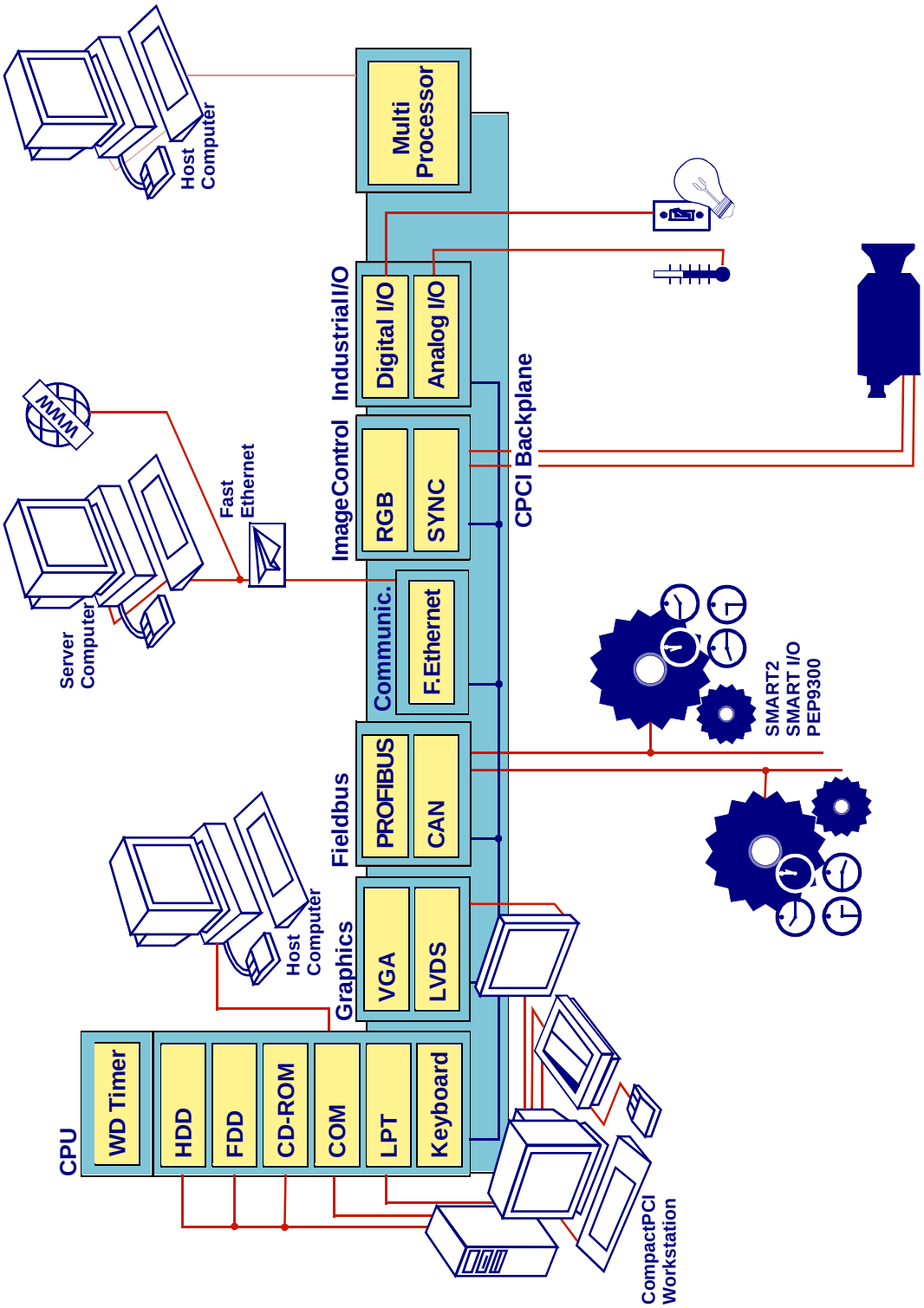
- Height: 1 U = 44.45 mm
- Width: 1 HP = 5.08 mm

For a detailed description of the *PEP Modular Computers* CompactPCI modules please consult the specific components' 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 CP-341 board by *PEP Modular Computers* is a CompactPCI network controller based on the Intel Fast Ethernet PCI Bus LAN Controller 82558.

Some of the CP341's outstanding features are:

- Dual independent Fast Ethernet interfaces
- Multiple server-to-client networking
- 10Base-T and 100Base-TX auto-negotiation
- Integrated physical layer interface (PHY)
- 6 kByte FIFO buffer
- Galvanic de-coupling

## 1.4 Board Overview

The CP341 board by *PEP Modular Computers* is a Compact PCI Fast Ethernet LAN controller for multiple server-to-client networking functions. It provides dual independent fast Ethernet Interfaces. Both interfaces are based on the Intel Fast Ethernet PCI Bus LAN Controller 82558 with integrated physical layer interface (PHY).

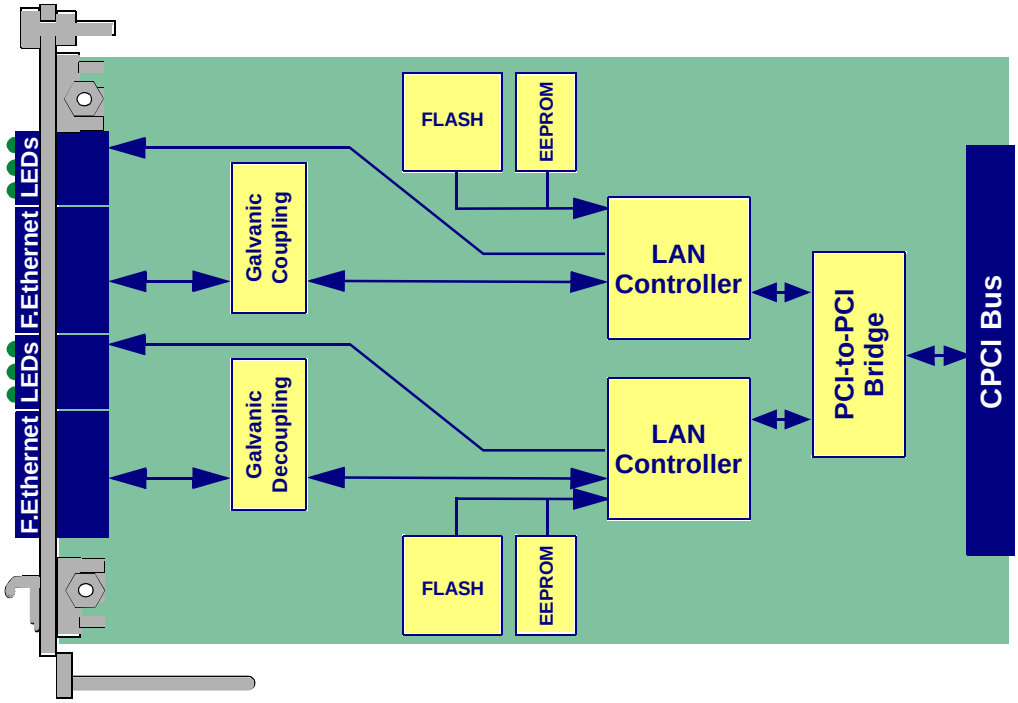
CP341 is a 3U CPCI Ethernet board suitable for both 10Base-T and 100Base-TX connections and includes all necessary features for auto-negotiation. Thus, both 10 Mbit/s and 100 Mbit/s transfer rates are supported by the board. In fact, provided that your network has the speed capability, the CP341 switches automatically from 10 Mbit/s to 100 M/bit/s. Additionally, if the addressed network station is compatible, it switches automatically to full-duplex mode.

The 3.3V/5V signalling board is designed to permit a very high PCI data bandwidth, which is achieved thanks to a large, 3 kByte-in/3 kByte-out FIFO buffer.

An Advanced Configuration Power Interface (ACPI) guarantees various power-down states and the ability to wake up on a single package addressed to the system, while remote stations may be returned to full power by any remote machine being networked.

The board does not have any jumpers and, therefore, does not require configuration. This is due to the use of a standard Windows NT driver (both Windows NT 3.5 and 4.0 drivers are supplied with the board). To make installation, repairs and updates easier, a LANDesk Service Agent allows the system to be started from a different operating system via network.

**Figure 1-2: CP341 Functional Block Diagram**




## 1.5 Main Features

The following description illustrates the main features of the principal functional blocks of the CP341 LAN controller board.

### 1.5.1 LAN Controller

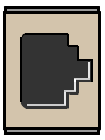
The Intel 82558 is the first fully integrated combination 32-bit PCI bus LAN controller and physical layer interface for 10/100Mbps Fast Ethernet networks. It is characterized by advanced control features for high performance and outstanding reliability.

### 1.5.2 Memory

The board conception includes hardware support for an optional FLASH memory up to two times 64 kByte.

### 1.5.3 Board Interfaces

**Figure 1-3: RJ45 Ethernet/Fast Ethernet Connector**



The CP341 is provided principally with two RJ45 network communication connectors for Ethernet or Fast Ethernet, to which your system's communication lines are connected.

### Ethernet and Fast Ethernet

The CP341 LAN controller board envisages the use of the renown CSMA/CD protocol (Carrier Sense Multiple Access/Collision Detection), enabling data to move between Ethernet and Fast Ethernet nodes on the LAN without any protocol translation.

Ethernet and Fast Ethernet are ruled by standards issued by IEEE (Institute of Electrical and Electronic Engineers). Ethernet supports a transfer speed of 10 Mbit/s, Fast Ethernet of 100 Mbit/s.

### Cable Types

CP341 is designed to support star topology 2-pair category 5 UTP/STP cables which are one of the most widely available cable types on the market.

”UTP” stands for ”Unshielded Twisted-Pair” cables, while ”STP” stands for ”Shielded Twisted-Pair” cables. The purpose of wire twisting and shielding is to reduce electromagnetic interference between cable wires.

## 1.5.4 Front Panel

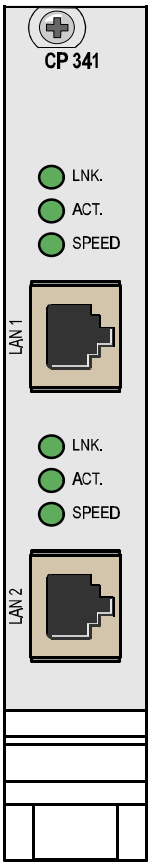



**Figure 1-4: CP341 Front Panel View**

The CP341 front panel is provided with two Ethernet/Fast Ethernet RJ45 LAN connectors, while three control LEDs are associated with each of them in order to allow monitoring the board activity. The LEDs have the following functions:

- LINK “ON” = LAN link is integer;
- ACT “ON” = board is active;
- SPEED “ON” = transfer speed corresponds to 100 Mbit/s.

***PEP Advantage***

A power indicator on the front panel is not necessary, since the board is provided with an advanced-configuration power interface (ACPI) which guarantees various power-down states and the ability to wake up on a single package addressed to the system, while remote stations may be returned to full power by any remote machine of the network.

Also there is no collision indicator on the front panel, since the frequency of network collisions is reduced to a minimum thanks to the CSMA/CD protocol enabling data to move evenly between Ethernet and Fast Ethernet nodes on the LAN without protocol translation.

## 1.6 Specifications

**Table 1-1: CP341 Specifications**

| CP341 | Specification |
|---|---|
| Windows NT Compatibility | Hardware design for WinNT network interface chip driver (NIC) according to Windows and WinNT network driver interface specification (NDIS) |
| Ethernet IEEE Standard | 10 Mbit/s 802.3 and 100 Mbit/s 802.3u |
| Compact PCI Interface | Peripheral board interface;<br>32-bit bus address/data/33 MHz<br>INT A/INT B support;<br>IDSEL hardware support;<br>CPCI data burst rate close to 132 MByte/s<br>1 4TE slot |
| Signalling Voltage | 3.3V/5 V |
| Plug & Play Design | No jumpers to be configurated |
| Remote Boot | 2 x EEPROM/FLASH socket, 64 kByte max. each |
| Speed Configuration | Auto-speed sensing/switching |
| Wake-up on LAN (Remote Wake-up) | Package detection logics reacting on incoming packages |
| Front-Panel Connector | 2 x RJ-45, with 2-pair 5 UTP/STP cable pinout each |
| Mechanical Compliance | IEEE 1101.10 |
| Power Supply | 3.3V/5 V, codes according to CPCI specification |
| Temperature Range<br>- Operation<br>- Storage | <br>• 0° to +60°C (standard)<br>• -55° to +85°C |
| Operating Humidity | 5 - 95% (non-condensing) |
| Vibrations | IEC68-2-6 compliant |
| Shocks:<br>- Permanent Shocks<br>- Single Shocks | <br>IEC68-2-29<br>IEC68-2-27 |
| Board Dimensions | Single-height Eurocard: 100 mm x 160 mm |

## 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

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

## 1.8 Related Publications

CompactPCI Specification, V. 2.0, Rev. 2.1.

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# Chapter 2

# Configuration

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# 2. Configuration

The CP341 accords fully with the plug & play philosophy. Since it uses a standard Windows NT driver It does not need any jumpers and, therefore, does not require configuration. A complete set of drivers is located on the *PEP Modular Computers* “Drivers” disk supplied with the CP341.

Simply insert the cable terminal into the CP341 Ethernet/Fast Ethernet RJ-45 socket, run the automatic configuration software, install the network drivers and — it’s ready!

***Important!***

Useful hints on driver installation and configuration of the CP341 board via software as well as the relevant troubleshooting options are provided in Chapter 3 of this manual.

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Chapter 3

# Installation

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# 3. Installation

As a sophisticated electronic device using AC power, your CP341 must be set up and used correctly to maintain safe and proper functioning. Please follow the instructions in this chapter fully to ensure successful installation and long lasting, trouble-free operation.

## 3.1 Hardware Installation

### 3.1.1 Cable Connections

To ensure correct operation of your network, you must use cables of permitted types and lengths with your CP341, since some cable types are subject to mandatory limitations in this regard. Cable categories are governed by the relevant EIA (Electronic Industries Association) standards.

CP341 is designed to support star topology 2-pair Category 5 UTP/STP cables.

### 3.1.2 Board Placement

In deciding on a location for the unit which will house your CP341, the following factors must be considered:

- length of each cable connection between devices;
- environmental factors.

#### Distance between Devices

If your network connections consist of twisted-pair connections, the maximum distance between devices is 100 meters (328 feet). Using this cable type, the maximum length of cabling between any two end nodes, including any uplink connection, is 205 meters. These limits include every bit of cabling between the CP341 and other devices, both inside and outside walls and wiring closets.

#### Environmental Factors

Your CP341 must be operated within specific environmental limits. It must not be exposed to direct sunlight, strong magnetic fields, extremely dusty or humid air, extreme heat or cold, or temperature shocks. For detailed guidance on these operating conditions, please consult table 2-1 of this manual.

***Important!***

Mount your CP341 only after having ensured that the tower you intend to fit it into is placed in a suitable location.

### 3.1.3 Board Installation

***Caution!***

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

***Note:***

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

***ESD Equipment!***

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

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

The CP341 is fully compatible with the plug & play philosophy. As it uses standard Windows NT drivers it does not need any jumper setting and, therefore, does not require any hardware configuration. A complete set of drivers is located on the *PEP Modular Computers* Driver disk supplied with the CP341.

However, if your system runs into an error message while booting, its configuration may require additional steps. In this case, please refer to the `readme.lst` file on the Driver disk.

### 3.1.4 Board Connection

To connect the CP341 Ethernet/Fast Ethernet adapter please simply insert the network cable into the board's RJ-45 socket. Then run the automatic configuration software and install the network drivers,

***Important!***

Make connections to your CP341 only after having mounted it in a suitable location (see section "Board Placement" of this manual).

However, if your system runs into an error during network connection, its configuration may require additional steps. In this case, please refer to the `readme.lst` file on the Driver disk.

### 3.1.5 AC Power Connection

***Attention!***

Before reconnecting the computer your CP341 was fitted into to AC power, replace the dummy front panels of your tower. Failure to do so could endanger your life and may damage the board and/or computer.

***Important!***

Connect the computer your CP341 is fitted into to AC power only after having mounted it in a suitable location and correctly completed all network connections.

## 3.2 Software Installation

The CP340 is fully compatible with the plug & play philosophy. As it uses standard Windows NT drivers it does not need any jumper setting and, therefore, does not require any hardware configuration. A complete set of drivers is located on the *PEP Modular Computers* Drivers disk supplied with the CP340.

***Important!***

To ensure full functionality please use the Intel 82558 Ethernet driver disk supplied with your adapter board.

### 3.2.1 Automatic Configuration

CompactPCI systems automatically detect and configure PCI-compliant interface boards while booting. The CP341 IRQ level and I/O address are automatically set by BIOS each time you start your system.

Thus, for configuring your computer after having mounted the CP341 board, just boot it. Configuration is complete when Windows NT starts or the DOS prompt appears.

### 3.2.2 Installation of Network Drivers

After having inserted your CP341 board into the CompactPCI backplane and started Windows NT, you need to install the Intel board drivers and test your CP341 board. Proceed as follows:

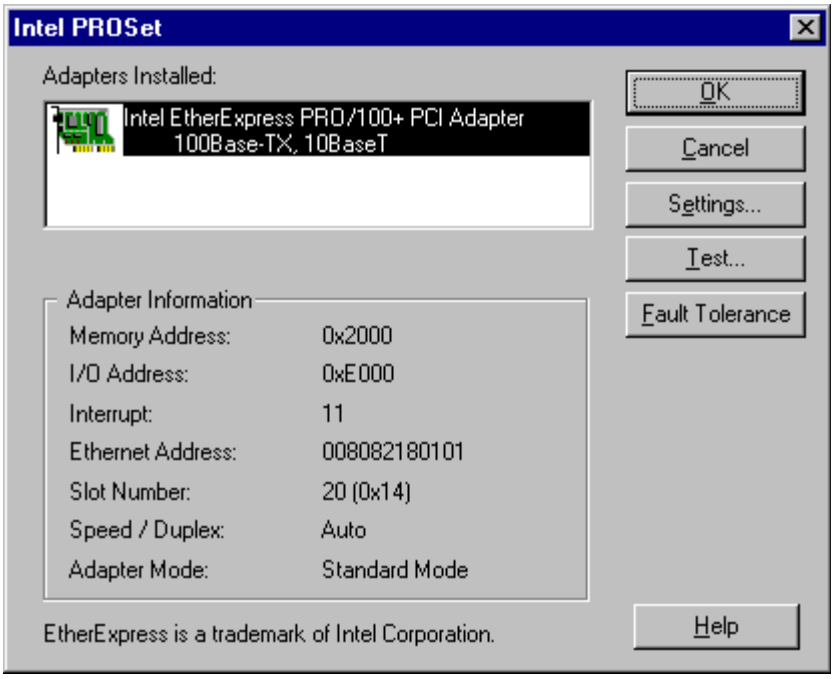
- Double-click the “Network” icon in the “Control panel”.
- Click “Adapters” tab.

- Click “Add”. You will see a list of adapters.
- Do not select an adapter from the list. Instead, insert your *PEP Modular Computers* “Drivers” disk into your floppy drive and click “Have disk”.
- Type A:\ (or B:\) in the dialog box and click “OK”. Then follow the interactive instructions to install the drivers. When the CP341 board is added, you will see its name listed in the “Network adapters” list.
- Select the CP341 interface board and click “Properties” to run PROSet to view the board configuration or test diagnosis. Board diagnostics are available only while the drivers are not loaded, i.e. before restarting your computer. Driver diagnostics are available when the drivers are loaded.

### 3.2.3 Configuration Utility PROSET

PROSet is an enhanced utility you can use to easily configure and test your CP341 board in Windows NT. PROSet also displays the computer’s resources that were assigned to each CP341 interface board installed.

**Figure 3-1: PROSet “Main Window”**




To use the utility please procede as follows:

- Click “OK” on the main PROSet window to return to Windows NT.
- The CP341 board now appears on the list in the “Network” window. Click “Close” to finish. Remove the Drivers disk from your system floppy drive.
- Restart Windows NT when prompted.
- To install multiple interface boards, repeat this procedure for each new adapter.

### 3.2.4 Adapter Fault Tolerance Mode

Adapter Fault Tolerance (AFT) is a simple, effective, and fail-safe approach to increase the reliability of server connections. AFT gives you the ability to set up link recovery to the server adapter in the event of a cable, port, or network interface card failure. By assigning two single-port CP340 adapters or one twin-port CP341 adapter as a team, AFT enables you to maintain uninterrupted network performance.

AFT is implemented with two Ethernet adapters: a primary adapter and a backup, or secondary, adapter. During normal operation, the backup will have transmit disabled. If the link to the primary adapter fails, the link to the backup adapter automatically takes over.

***Notes:***

This feature is currently available for NetWare* 4.1x and Windows NT* 4.0 only.

For more information about AFT, please see the NetWare or Windows NT AFT readme files for setup instructions

## 3.3 Troubleshooting

Further information on troubleshooting is available on the Driver disk. Please refer to the `readme.lst` file on the disk.

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