PPC/PowerCore-6603/4

Installation Guide

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List of Tables and Figures

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Using This Manual

This section does not provide information on the product but on common features of the manual itself:

- its structure,
- special layout conventions,
- and related documents.

Audience of the Manual

This *Installation Guide* is intended for hard- and software developers as well as for support and service engineers installing PPC/PowerCore-6603/4. It is packaged and shipped together with the product.

Overview of the Manual

This *Installation Guide* provides a brief hardware guide not only to the base board PPC/PowerCore-6603/4, but also to the PPC/SSIO-6603/4 module and the IOBP-SSIO/232 rear I/O board.
The section 3.13 ‘PPC/SSIO-6603/4’ and the section 3.14 ‘IOBP-SSIO/232’ are relevant only for the PPC/PowerCore-6603/4-SSIO.

Note: **Please take a moment to examine the *Table of Contents* to see how this documentation is structured. This will be of value to you when looking for information in the future.**

This *Installation Guide* includes:

- the default configuration of the CPU board, for example the default switch setting,
- initialization prerequisites and procedures,
- connector pinouts,
- installation instructions for powering up the PPC/SSIO-6603/4 module, the default configuration (switches and the like), and connector pinout,
- and installation instructions for the IOBP-SSIO/232 rear I/O board and its connector pinouts.

The installation instructions are also published in the product's *Technical Reference Manual* – a separate manual delivered as a separate price list item. The *Technical Reference Manual* includes

- an overview of the product, its specification, and ordering information,
- a detailed hardware description,
- the data sheets of board components that are relevant for configuring and integrating the board in systems,
- and a detailed software description.

Publication History of the Manual

Table a History of manual publication

Edition/ Revision	Date	Description
1	November 1996	First print
2	January 1997	Memory module description updated. Description of the PCI-to-ISA bridge corrected. Power supply values updated.
3	October 1997	Battery safety note revised. Installation Prerequisites and Requirements revised. Location diagram corrected. Timer description corrected. PN15 connector pinout updated. SSIO description added. Editorial changes.
4	December 1997	Safety Note extended. Installation Prerequisites and Requirements corrected, completed, and restructured. PMC slots description revised. Upgrading description revised.
5.0	April 1998	Installation Prerequisites and Requirements extended. Upgrading description revised. Description of PowerPC 604e with 300-MHz nominal processor frequency added. New SSIO name inserted: PPC/SSIO-6603/4. Editorial changes.
6.0	August 1998	Installation Prerequisites and Requirements extended and corrected.
7.0	September 1999	Safety Notes revised.
8.0/AA	August 2001	Added German Sicherheitshinweise
9.0/AB	September 2001	Corrected German Sicherheitshinweise
AC	November 2001	Updated title page and address page, added copyright page

Fonts, Notations and Conventions

Table b **Fonts, notations and conventions**

Notation	Description
	All numbers are decimal numbers except when used with the following notations:
0000.0000_{16}	Typical notation for hexadecimal numbers (digits are 0 through F), e.g. used for addresses and offsets. Note the dot marking the 4th (to its right) and 5th (to its left) digit.
0000_{8}	Same for octal numbers (digits are 0 through 7)
0000_{2}	Same for binary numbers (digits are 0 and 1)
`Program`	Typical character format used for names, values, and the like that should be used typing literally the same word. Also used for on-screen-output.
Variable	Typical character format for words that represent a part of a command, a programming statement, or the like and that will be replaced by an applicable value when actually applied.
#	A # symbol at the end of a PCI, ISA, or IDE signal name indicates that the signal is active when it is at low voltage. The absence of the # symbol indicates that the signal is active at high voltage.
*	A * symbol at the end of a VMEbus signal name indicates that the signal is active when it is at low voltage. The absence of the * symbol indicates that the signal is active at high voltage.

Icons for Ease of Use: Safety Notes and Tips & Tricks

There are three levels of safety notes used in this manual which are described below in brief by displaying a typical layout example.

Be sure to always read and follow the safety notes of a section first – before acting as documented in the other parts of the section.

Danger

Dangerous situation: injuries to people or severe damage to objects possible.

Caution

Possibly dangerous situation: no injuries to people but damage to objects possible.

Note: **No danger encountered. Only application hints and time-saving tips & tricks or information on typical errors when using the information mentioned below this safety hint.**

1 Safety Notes

This section provides safety precautions to follow when installing, operating, and maintaining the PPC/PowerCore-6603/4. For your protection, follow all warnings and instructions found in the following text.

General notes

This *Installation Guide* provides the necessary information to install and handle the PPC/PowerCore-6603/4. As the product is complex and its usage manifold, we do not guarantee that the given information is complete. In case you need additional information, ask your Force Computers representative.

The PPC/PowerCore-6603/4 has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.

Only personnel trained by Force Computers or qualified persons in electronics or electrical engineering are authorized to install, uninstall or maintain the PPC/PowerCore-6603/4. The information given in this manual is meant to complete the knowledge of a specialist and must not be taken as replacement for qualified personnel.

Make sure that contacts and cables of the board cannot be touched while the board is operating.

Installation

Electrostatic discharge and incorrect board installation and uninstallation can damage circuits or shorten their life. Therefore:

- **Before installing the board, check:**
  - **table 1 “Typical Power Requirements of the CPU Board” on page 9.**
  - **table 5 “Environmental Requirements of PPC/PowerCore-6603/4” on page 12.**
- **Before touching integrated circuits, ensure that you are working in an electrostatic-free environment.**
- **When plugging the board or removing it, do not press on the front panel but use the handles. Otherwise, the front panel can be damaged.**

- **Before installing or uninstalling the board, read section 3 “Installation” on page 9.**
- **Before installing or uninstalling an additional device or module, read the documentation shipped with the device or the module.**
- **Before installing or uninstalling the board in a VME rack:**
  - **Check all installed boards for steps that you have to take before turning off the power.**
  - **Take those steps.**
  - **Finally turn off the power.**

Operation

- **While operating the board ensure that the power and environmental requirements as given in table 1 “Typical Power Requirements of the CPU Board” on page 9 and table 5 “Environmental Requirements of PPC/PowerCore-6603/4” on page 12 are met.**
- **Ensure that the board is connected to the VMEbus via both the P1 and the P2 connectors and that the power is available on both VMEbus connectors.**
- **When operating the board in areas of strong electromagnetic radiation ensure that the board is bolted on the VME rack and shielded by closed housing.**
- **To ensure proper operation of the PPC/PowerCore-6603/4 board, remove the jumper for IACKIN-IACKOUT- and BGIN-BGOUT-bypass on the backplane. This is not necessary on active backplanes.**

EMC

- **If boards are integrated into open systems, always cover empty slots.**
- **The front panel of the PPC/PowerCore-6603/4 provides 2 cutouts for the front panels of the PMC modules. If the PPC/PowerCore-6603/4 is shipped without the related devices or modules installed, the front-panel cutouts are covered by blind panels to ensure proper EMC shielding.**
- **Always operate a PPC/PowerCore-6603/4 always with the blind panels for the PPC/PowerCore-6603/4 front panel installed or with the respective devices or modules installed.**
- **If the PPC/PowerCore-6603/4 is upgraded, ensure that the blind panels are stored in a safe place to be used again when uninstalling the upgrades.**

Expanding

- **Check the total power consumption of all components installed (see the technical specification of the respective components). For the total power consumption of the PPC/PowerCore-6603/4, see table 1 “Typical Power Requirements of the CPU Board” on page 9.**
- **Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).**
- **Only replace components or system parts with those recommended by Force Computers. In case you use components other than those recommended by Force Computers, you are fully responsible for the impact on EMI and the eventually changed functionality of the product.**

Save your environment

Always dispose used batteries and/or old boards according to your country’s legislation.

Battery change

The board is designed to be maintenance-free. However, note that a Lithium battery is installed on the board. The battery provides a data retention of 7 years summing up all periods of actual battery use. Therefore, Force Computers assumes that there is usually no need to exchange the lithium battery except for example in the case of long-term spare part handling.

If a Lithium battery on the board has to be exchanged, observe the following safety notes:

- **Exchange the battery before 7 years of actual battery use have elapsed.**
- **Always use the same type of Lithium battery as is already installed.**
- **Exchanging the battery always results in data loss of the devices which use the battery as power backup. Therefore, back up affected data before exchanging the battery.**
- **When installing the new battery ensure that the marked dot on top of the battery covers the dot marked on the chip.**
- **Incorrect exchange of Lithium batteries can result in a hazardous explosion.**

RJ-45 connector

If an RJ-45 connector is available on the board, take into account that the RJ-45 connector type is used for telephone connectors and for twisted pair Ethernet (TPE) connectors. Note that mismatching these 2 connectors may destroy your telephone as well as your PPC/PowerCore-6603/4. Therefore:

- **Make sure that TPE connectors near your working area are clearly marked as network connectors.**
- **Make sure that TPE bushing of the system is connected only to safety extra low voltage (SELV) circuits.**
- **Verify that the length of the electric cable connected to a TPE bushing does not exceed 1 kilometer outside the building.**
- **If in doubt, ask your system administrator.**

2 Sicherheitshinweise

Dieser Abschnitt enthält Sicherheitshinweise, die bei Einbau, Betrieb und Wartung des PPC/PowerCore-6603/4 zu beachten sind.

Wir sind darauf bedacht, alle notwendigen Informationen zum Einbau und zum Umgang mit dem PPC/PowerCore-6603/4 in diesem Handbuch bereit zu stellen. Da es sich jedoch bei dem PPC/PowerCore-6603/4 um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Ihnen Informationen fehlen sollten, wenden Sie sich bitte an Ihren Vertreter von Force Computers.

Das PPC/PowerCore-6603/4 erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschliesslich für Anwendungen in der Telekommunikationsindustrie und im Zusammenhang mit Industriesteuerungen verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch Force Computers ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschliesslich dazu, das Wissen von Fachpersonal zu ergänzen, können dieses jedoch nicht ersetzen.

Installation

Elektrostatische Entladung und unsachgemäße Installation und Ausbau des Boards kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen. Deswegen sind folgende Punkte vor der Installation zu überprüfen:

- **Lesen Sie vor Einbau oder Ausbau des Boards Tabelle 1 “Typical Power Requirements of the CPU Board auf Seite 9 und Tabelle 5 “Environmental Requirements of PPC/PowerCore-6603/4” auf Seite 12.**
- **Bevor Sie integrierte Schaltkreise berühren, vergewissern Sie sich, dass Sie in einem ESD-geschützten Bereich arbeiten.**
- **Drücken Sie beim Einbau oder Ausbau des Boards nicht auf die Frontplatte sondern benutzen Sie die Griffe.**
- **Lesen Sie vor dem Einbau oder Ausbau des Boards den Abschnitt “Installation” auf Seite 1.**
- **Lesen Sie vor dem Einbau oder Ausbau von zusätzlichen Geräten oder Modulen das jeweilige Benutzerhandbuch.**

- **Überprüfen Sie folgendes vor dem Einbau des Boards in ein VME Rack oder seinem Ausbau:**
  - **Überprüfen Sie alle installierten Boards auf Schritte, die vor dem Abschalten unternommen werden müssen.**
  - **Unternehmen Sie diese Schritte.**
  - **Schalten Sie dann den Strom ab.**

Betrieb

Achten Sie darauf, dass die Umgebungs- und die Leistungsanforderungen während des Betriebs eingehalten werden.

Wenn Sie das Board in Gebieten mit elektromagnetischer Strahlung betreiben, stellen Sie sicher, dass das Board mit dem VME System verschraubt ist und das System durch ein Gehäuse abgeschirmt wird.

Stellen Sie sicher, dass Anschlüsse und Kabel des Boards während des Betriebs nicht berührt werden können.

Entfernen Sie den Jumper für den IACKIN-IACKOUT und BGIN-BGOUT Bypass auf der Backplane für einen korrekten Betrieb des CPU Boards. Bei aktiven Backplanes ist das nicht nötig.

EMV

Werden Boards in offene Systeme eingebaut, müssen freie Steckplätze mit einer Blende abgeschirmt werden.

Die Frontplatte des CPU Boards hat zwei Aussparungen für die Frontplatten der PMC Module. Falls das CPU Board ohne die entsprechenden installierten Bauteile oder Module geliefert wird, werden die Aussparungen an der Frontplatte durch Blenden abgedeckt, um EMV-Schutz zu gewährleisten. Betreiben Sie das CPU Board immer mit den installierten Blenden für die Frontplatte des CPU Boards oder mit den entsprechenden installierten Bauteilen oder Modulen.

Vergewissern Sie sich beim Aufrüsten des CPU Boards, dass die Blenden gelagert werden, damit sie wiederverwendet werden können, wenn das Upgrade entfert wird.

Austausch/ Erweiterung

Verwenden Sie bei Austausch oder Erweiterung nur von Force Computers empfohlene Komponenten und Systemteile. Andernfalls sind Sie für mögliche Auswirkungen auf EMV und geänderte Funktionalität des Produktes voll verantwortlich.

Überprüfen Sie die gesamte aufgenommene Leistung aller eingebauten Komponenten (siehe die technischen Daten der entsprechenden Komponente). Stellen Sie sicher, dass die Ausgangsströme jedes Verbrauchers innerhalb der zulässigen Grenzwerte liegen (siehe die technischen Daten des entsprechenden Verbrauchers).

Umwelt-schutz

Entsorgen Sie alte Boards gemäß der in Ihrem Land gültigen Gesetzgebung, wenn möglich umweltfreundlich.

Batterie

Das Board wurde für einen wartungsfreien Gebrauch entwickelt. Es befindet sich jedoch eine Lithiumbatterie auf dem Board. Die Batterie bietet einen Datenspeicher von bis zu sieben Jahren reiner Betriebsdauer. Daher geht Force Computers davon aus, dass ein Batteriewechsel im Normalfall nicht nötig ist, ausser bei Ersatzteillagerung. Falls Sie die Batterie auswechseln möchten, beachten Sie folgende Sicherheitshinweise:

- **Unsachgemäßer Batteriewechsel kann zu gefährlichen Explosionen führen.**
- **Wechseln Sie die Batterie vor Ende der reinen Betriebsdauer.**
- **Der Austausch der Batterie bringt immer einen Datenverlust bei den Komponenten mit sich, die sich durch die Batterie die Stromversorgung sichern. Sichern Sie deshalb vor dem Batteriewechsel die betroffenen Daten.**
- **Vergewissern Sie sich beim Einbau einer neuen Batterie, dass die Markierung auf der Batterie den Punkt auf dem Chip bedeckt.**
- **Verwenden Sie nur den bereits eingesetzten Batterietyp.**

RJ-45 Stecker

Das CPU Board ist mit RJ-45 Steckern ausgestattet. Dieser Stecker wird sowohl für Telefonanschlüsse als auch für Netzwerkkabel (Twisted Pair Ethernet - TPE) verwendet. Die Verwechslung dieser Anschlüsse kann sowohl das Telefon als auch das Board zerstören. Beachten Sie deshalb die folgenden Punkte:

- **Vergewissern Sie sich, dass Anschlüsse an Ihrem Arbeitsplatz deutlich als Netzwerkanschlüsse gekennzeichnet sind.**
- **Schließen Sie TPE-Stecker/Netzwerkstecker Ihres Systems nur an Sicherheitskleinspannungskreise (SELV) an.**

- **Vergewissern Sie sich, dass die an einem TPE-Anschluss angeschlossene Leitung eine Gesamtlänge von 100 Metern nicht überschreitet.**

Falls Sie Fragen haben, wenden Sie sich an Ihren Systemadministrator.

3 Installation

This chapter provides important information for the installation. Before installing the PPC/PowerCore-6603/4, read section "Safety Notes" on page xv.

3.1 Installation Prerequisites and Requirements

Note: **Before powering up, check this section for installation prerequisites and requirements, check the consistency of the current switch setting (see section 3.3 "Switch Settings" on page 15), and check the consistency of the current switch settings on the PPC/SSIO-6603/4 if a PPC/SSIO-6603/4 is installed (see section 3.13.2 "Switch Settings" on page 31).**

3.1.1 Requirements

The installation requires only

- a power supply,
- a fan unit providing an airflow meeting the thermal requirements of the PPC/PowerCore-6603/4,
- and a VMEbus backplane with P1 and P2 connectors.

Power requirements

PPC/PowerCore-6603/4 provides a limited current at the PMC supply pins. The maximum current depends on:

- the CPU type and frequency
- and the installed memory module(s). Typical power requirements of the CPU board are given in the following table:

Table 1 Typical Power Requirements of the CPU Board

CPU board without PMC module or memory module	+5V	Power consumption
PPC/PowerCore-6603e/16-120-L0-0	2.6 A	13 W
PPC/PowerCore-6603ev/16-166-L512-0	2.9 A	14.5 W
PPC/PowerCore-6604e/16-200-L512-0	4.3 A	21.5 W

Table 1 **Typical Power Requirements of the CPU Board (Continued)**

CPU board without PMC module or memory module	+5V	Power consumption
PPC/PowerCore-6604e/16-300-L512-4	3.1 A	15.5 W

– Memory Modules

The available system memory may be increased by one or two additional memory module(s).

Caution

PPC/PowerCore-6603/4 may be equipped only with EDO DRAM memory modules qualified by Force Computers. Otherwise the board or connected components may be damaged.

Out of the comprehensive list of possible configurations the memory configurations shown in the following table have been qualified.

Table 2 **Qualified Memory Module Configurations**

Total memory module capacity [MByte]	PPC/PowerCore-MEM/…
16	16
32	32
64	64L
128	128L
256	128L + 128U

The upgrading instructions are shipped together with the memory modules: see the respective *Memory Module Installation Guide.*

When installing a memory module, you have to consider the power consumption. In this case add

- the power consumption of the CPU board (see table 1 “Typical Power Requirements of the CPU Board” on page 9)
- and the max. power consumption drawn by the memory module(s) (see table 3 “Max. Power Consumption Values of the Memory Modules”).

Table 3 Max. Power Consumption Values of the Memory Modules

PPC/PowerCore-MEM/…	3.3 V	Power consumption
16	0.05 A	0.2 W
32		
64L	0.1 A	0.4 W
128L		
128L + 128U	0.2 A	0.7 W

– PMC

The values given in the following table are valid for PPC/PowerCore-6603/4 without any additional memory module(s).
If memory modules are installed, the power consumption value of the PMC modules is reduced by the power consumption value of the installed memory module(s).

Table 4 Maximum Permissible Power Consumption of PMC Modules

	Total maximum power consumption of all PMC modules		
		if 3.3 V and 5 V are used	
CPU board/ frequency	if only 3.3 V are used [W]	max. at 3.3 V [W]	max. totalled across 3.3 V and 5 V [W]
603e/120	13.4	13.4	15.0
603ev/166	15.0	15.0	15.0
604e/200	13.0	13.0	13.0
604e/300	15.0	15.0	15.0

RS-232 serial interface

The RS-232 serial interface must meet the following values:

– +12 V: 0.1 A (typical)

– –12 V: 0.1 A (typical)

Thermal requirements

The operating temperature is 0×C to +55×C (humidity 5% to 95% non-condensing at +40×C), when operating the PPC/PowerCore-6603/4 in systems providing a minimum forced airflow of 300 LFM (linear feet per minute). The airflow is required at the heat sink of the CPU and at the top side of the CPU board. The typical operating temperature of the system is 0°C to +40°C. The following table summarizes the environmental requirements of the PPC/PowerCore-6603/4.

Table 5 Environmental Requirements of PPC/PowerCore-6603/4

	Operating	Non-operating
Temperature	0°C to +55°C	–40°C to +85°C
Forced air flow	300 LFM (linear feet per minute)	–
Temp. change	+/– 0.5°C/min	+/– 1°C/min
Rel. humidity	5% to 95% noncondensing at +40°C	5% to 95% noncondensing at +40°C
Altitude	–300 m to +3.000 m	–300 m to +13.000 m

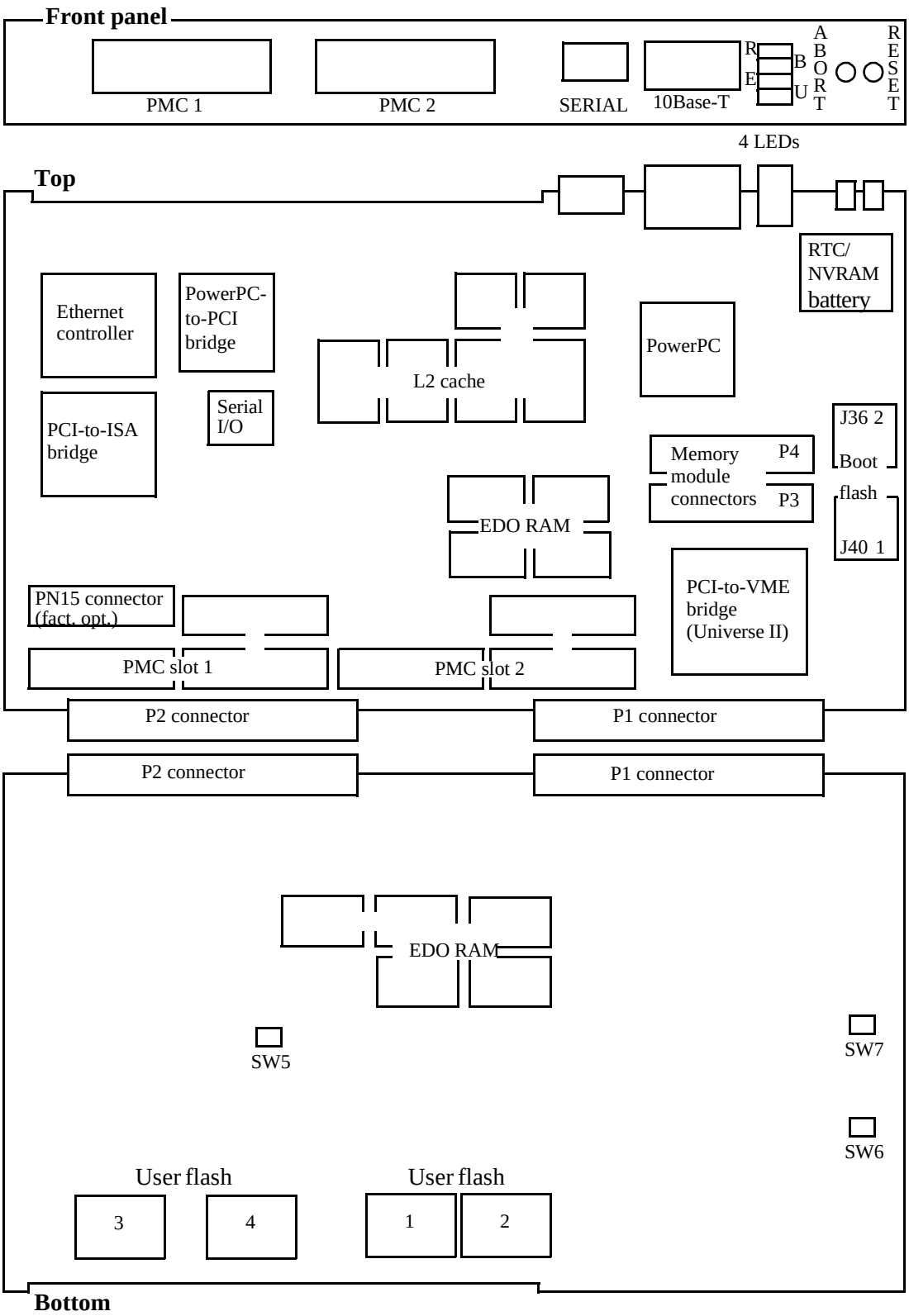
3.1.2 Terminal Connection

For the initial power-up, a terminal can be connected to the 9-pin MicroD-Sub connector of the serial port, which is located at the front panel (see section 3.6 “Serial I/O Port” on page 19).

3.1.3 Location Overview

The figure 1 “Location Diagram of the PPC/PowerCore-6603/4 (schematic)” on page 13 highlights the position of the important PPC/PowerCore-6603/4 components. Depending on the board type it might be that your board does not include all components named in the location diagram.

Figure 1 Location Diagram of the PPC/PowerCore-6603/4 (schematic)



3.1.4 Upgrading PPC/PowerCore-6603/4

Memory module

To increase the capacity of the available system memory, a memory module can be installed on PPC/PowerCore-6603/4. If the memory module directly installed on the base board is equipped with memory module connectors, the capacity can additionally be increased by installing a second (upper) memory module on the first (lower) one. For more information on the memory module,

- see section 3.1 “Installation Prerequisites and Requirements” on page 9
- and the *PPC/PowerCore-MEM Installation Guide*.

PMC module

PPC/PowerCore-6603/4 provides 2 PMC slots. The PMC slots can be used to install PMC modules based on the PCI bus architecture.
For detailed information on the PMC modules,

- see section 3.1 “Installation Prerequisites and Requirements” on page 9
- and section 3.8 “PMC Slots” on page 20.

3.2 Automatic Power Up – Voltage Sensor and Watchdog Timer

Voltage sensors

If the voltage levels drop below the voltage values given in the VMEbus specification or below the processor core low-voltage level respectively, the voltage sensors generate automatically a reset of the CPU board and proceed with a normal booting procedure.

Watchdog timer

Per factory default the watchdog timer is disabled. If the watchdog timer is enabled, it generates a non-maskable interrupt (NMI) followed by a reset when it is not retriggered by the software. The watchdog timer can be enabled by SW5-1 (see “SW5-1” on page 15).

3.3 Switch Settings

The following table lists the functions and the default settings of all switches shown in figure 1 “Location Diagram of the PPC/PowerCore-6603/4 (schematic)” on page 13. The switches are located on the bottom side of the board. For switching it is not required to remove any modules.

Note: **Before powering up the board check the current switch settings for consistency.**

Note: **SW7-1, SW7-2, and SW7-3 will only be read on a power up.**

Note: **Do not switch during operation.**

Table 6 Switch Settings

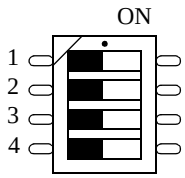
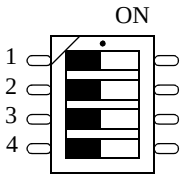
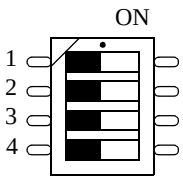
Name and default setting		Description
	SW5-1 OFF	Watchdog timer OFF = Timer disabled ON = Timer enabled
	SW5-2 OFF	Watchdog time (±±±±8ms) OFF = NMI: 39 ms, RESET: 134 ms ON = NMI: 363 ms, RESET: 1.66 s
	SW5-3 OFF	VMEbus SYSRESET input OFF = SYSRESET generates power up reset ON = SYSRESET does not generate power up reset
	SW5-4 OFF	Reserved

Table 6 Switch Settings (Continued)

Name and default setting		Description
	SW6-1 OFF	RESET key OFF = RESET key enabled ON = RESET key disabled
	SW6-2 OFF	ABORT key OFF = ABORT key enabled ON = ABORT key disabled
	SW6-3 OFF	User flash write protection OFF = writing enabled ON = write-protected
	SW6-4 OFF	Boot flash write protection OFF = write-protected ON = writing enabled
	SW7-1 OFF	VMEbus slot 1 auto-detection OFF = enabled ON = disabled (also called manual mode)
	SW7-2 OFF	System controller (only available if SW7-1 = ON) OFF = disabled ON = enabled
	SW7-3 OFF	Power up detection level OFF = conforms to ANSI/VITA 1-1994 ON = below ANSI/VITA 1-1994 (This has the advantage that sudden voltage sags do not generate a reset.)
	SW7-4 OFF	VMEbus SYSRESET output OFF = enabled ON = disabled

3.4 Front Panel

The features of the front panel are described in the following sections. For a location diagram see figure 1 “Location Diagram of the PPC/PowerCore-6603/4 (schematic)” on page 13.

Table 7 Front Panel Features

Device	Description
RESET	Mechanical reset key: When enabled and toggled it instantaneously affects the CPU board by generating a reset. Depending on SW7-4 the reset generates a VMEbus SYSRESET (see “SW7-4” on page 16). A reset of all on-board I/O devices and the CPU is performed when the reset key is pushed to the active position. RESET is held active until the key is back in the inactive position, however at least 200 ms are guaranteed by a local timer. Power fail (below approximately 4.7 V) and power up – both lasting at minimum 200 ms to 300 ms – also force a reset to start the CPU board. For information on enabling the key, see “SW6-1” on page 16.
ABORT	Mechanical abort key: When enabled and toggled it instantaneously affects the CPU board by generating an interrupt request (NMI) via the PCI-to-ISA bridge. This allows to implement an abort of the current program, to trigger a self-test or to start a maintenance program. For information on enabling the key, see “SW6-2” on page 16.
LED R	RUN/RESET LED indicating the board status: • green: normal operation • red: reset is active
LED B	VMEbus master and SYSFAIL LED: • green: when the CPU board accesses the VMEbus as VMEbus master • red: when the CPU board drives SYSFAIL on the VMEbus • off: otherwise

Table 7 Front Panel Features (Continued)

Device	Description
LED E	Ethernet LED: • green: transmit data • red: receive data • off: no traffic
LED U	User LED: Software programmable by the CIO counter/timer and parallel I/O unit. Bits 0 and 1 of port C are used. Possible status: green, red, or off.
10Base-T ETHERNET	An 8-pin RJ45 connector for 10Base-T Ethernet interface.
SERIAL PORT	A 9-pin MicroD-Sub connector for serial interface (see section 3.6 “Serial I/O Port” on page 19).

3.5 PPC/PowerCore-6603/4 Parameters and Timers – CIO

Device: CIO	
Frequency	4.125 MHz or 3.75 MHz
Accessible from	PowerPC processor
Access base address	ISA: 0000.0300_{16} PCI: 0000.0300_{16} CPU: $FE00.0300_{16}$
Port width	8 bit
Interrupt request	Priority level 3 (software reprogrammable, IRQ8#)

Configurable parameters

Via the CIO device several parameters can be configured or read, respectively: programming voltage V_{PP}, user flash device select, user flash page select, VMEbus SYSRESET out, watchdog trigger, user LED control, ID-ROM (serial EEPROM), PCI busmode signals, and the three 16-bit timers.

Timers

Three 16-bit timers with a resolution of approximately 500 ns are available.

3.6 Serial I/O Port

Device: Serial I/O port	
Frequency	1.8432 MHz
Accessible from	PowerPC processor
Access base address	ISA: $0000.03F8_{16}$ PCI: $0000.03F8_{16}$ CPU: $FE00.03F8_{16}$
Port width	8 bit
Interrupt request	Priority level 12 (software reprogrammable, IRQ4)

Connector availability

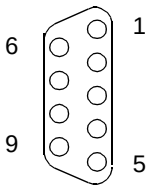
The RS-232 serial I/O port is available via a 9-pin MicroD-Sub connector at the front panel. The serial port with 4 lines is also available on the 5-row VMEbus P2 connector (factory option) (see section 3.11 “VMEbus P2 Connector Pinout” on page 24).

Pinout

For the front-panel pinout of the serial lines, see below. For the P2 pinout see section 3.11 “VMEbus P2 Connector Pinout” on page 24.

Table 8 Pinout of the Front-Panel Serial I/O Port for RS-232

9-pin MicroD-Sub



Pin	Signal
1	DCD (Data Carrier Detect, input)
2	RXD (Receive Data, input)
3	TXD (Transmit Data, output)
4	DTR (Data Terminal Ready, output)
5	GND (Ground)
6	DSR (Data Set Ready, input)
7	RTS (Request to Send, output)
8	CTS (Clear to Send, input)
9	GND (Ground)

Port setup

- RS-232 asynchronous communication
- 9600 baud, 8 data bits, 1 stop bit, no parity
- No handshake protocol used by default.

3.7 IDE

Device: PCI-to-ISA bridge	
Frequency	PCI bus frequency of 33 MHz or 30 MHz
Accessible from	PowerPC processor
Access base address	not defined
Port width	32 bit
Interrupt request	Priority level 9 (IRQ14) Priority level 10 (IRQ15) [1)]

1. In the PCI-to-ISA bridge MIRQ0 has to be routed to IRQ15 via the respective operating system.

The PCI-to-ISA bridge provides two fast IDE interfaces which are routed to the 5-row VMEbus P2 connector (factory option).

The PCI bus interface is 32-bit wide and able to transfer data via the internal DMA controller.

The PCI-to-ISA bridge integrates a high performance interface between PCI and IDE. This interface is capable of accelerating PIO data transfers and to act as PCI bus master on behalf of an IDE DMA slave device. First, the slave device declares that it wants to be served by the PCI-to-ISA bridge master by requesting DMA.

3.8 PMC Slots

PPC/PowerCore-6603/4 provides 2 PMC slots for installing PMC modules compliant with IEEE P1386 ("Draft Standard Physical and Environmental Layers for PCI Mezzanine Cards: PMC"). The PCI bus, a high speed local bus compliant with Rev. 2.1., connects different high speed I/O cards with PPC/PowerCore-6603/4. Both PMC slots support 32-bit data bus width with a maximum frequency of 33 MHz.

Power of the PMC modules

For information on the power of the PMC modules, see section 3.1 “Installation Prerequisites and Requirements” on page 9.

3.8.1 PMC Voltage Keys

The PCI bus uses a 5-V voltage to signal bus levels. The voltage keys prevent 3.3V PMC cards from being plugged into the PMC slots.

3.8.2 Connector Configuration

The 32-bit PCI bus requires 2 PMC connectors. The 3rd PMC connector connects additional user I/O signals of PMC slot 1 and PMC slot 2 with the VMEbus P2 connector rows A and C.

PMC slot 1 connectors

- for the PCI bus: J11 and J12
- for 64 user I/O signals: J14

PMC slot 2 connectors

- for the PCI bus: J21 and J22
- for 32 user I/O signals: J24

Caution

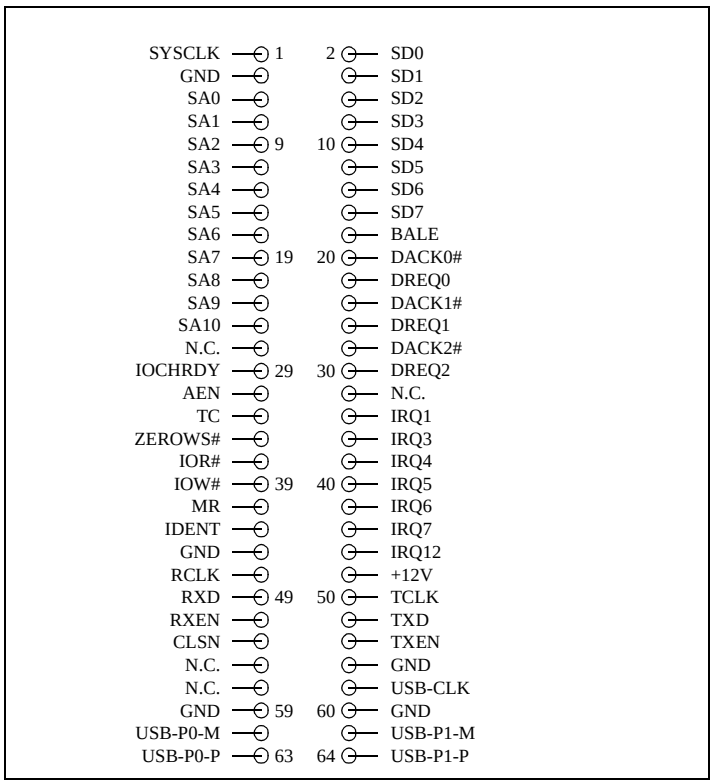
PMC slot 1 has 64 user I/O signals, PMC slot 2 has 32 user I/O signals. The 32 user I/O signals of PMC slot 2 are connected with 32 user I/O signals of PMC slot 1. Both, the 64 user I/O signals of PMC slot 1 and the 32 user I/O signals of PMC slot 2, are routed to the 64 user I/O pins of the VMEbus P2 connector (see figure 3 “3- or 5-row P2 Connector Pinout, Row A and C” on page 24). This is compliant with the “Draft Standard for a Common Mezzanine Card Family: CMC”, P1386/Draft 2.0.
Do not plug in 2 PMC cards both driving the same I/O lines (see PMC cards’ manuals). Otherwise the PMC cards may be damaged.

3.8.3 ISA Connector

The connector PN15 is a factory option and makes a set of ISA bus signals available including 7-wire AUI signals.

The following figure shows the signals available on the ISA connector.

Figure 2 PN15 Connector Pinout



3.9 Ethernet Interface

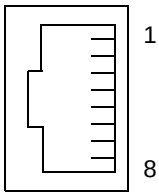
Device: Ethernet controller	
Frequency	PCI bus frequency: 33 MHz or 30 MHz
Accessible from	PowerPC processor
Access base address	PCI: 0080.0000_{16} CPU: $FE80.0000_{16}$
Port width	32 bit
Interrupt request	Priority level 5 (INTA#, IRQ10)

The Ethernet 10Base-T interface is available at the front panel via an 8-pin RJ45 connector.

Note: **If a PPC/SSIO-6603/4 is installed, the 10Base-T Ethernet interface and the Ethernet LED on the front panel of the PPC/PowerCore-6603/4 base board are disabled.**

The PCI bus interface is 32-bit wide and able to transfer data via the on-chip DMA with programmable PCI burst size.
The following table shows the pinout of the factory default Ethernet connector.

Table 9 8-pin RJ45 Connector



Pin	Signal
1	TXP
2	TXM
3	RXP
4	N.C.
5	N.C.
6	RXM
7	N.C.
8	N.C.

3.10 VMEbus Interface – Universe II

Device: Universe II	
Frequency	PCI bus frequency: 33 MHz or 30 MHz
Accessible from	PowerPC processor and VMEbus masters
Access base address	PCI: 0081.0000_{16} CPU: $FE81.0000_{16}$
PCI bus width	32 bit
Interrupt request	Priority level 6 (INTB#, IRQ11)

Universe II is a PCI-to-VME interface which is compliant with ANSI/VITA 1-1994 and able to transfer data via the programmable DMA

controller with linked list support. Furthermore, it provides full VMEbus system controller functionality and a PCI bus interface of up to 33 MHz.

3.11 VMEbus P2 Connector Pinout

The following two figures show the signals available on the VMEbus P2. The signals shown in figure 3 “3- or 5-row P2 Connector Pinout, Row A and C” on page 24 are available at a 3-row and at a 5-row P2 connector (see section 3.8.2 “Connector Configuration” on page 21).
The signals shown in figure 4 “5-Row P2 Connector Pinout, Row Z and D” on page 25 are available only at a 5-row P2 connector (factory option).

Figure 3 3- or 5-row P2 Connector Pinout, Row A and C

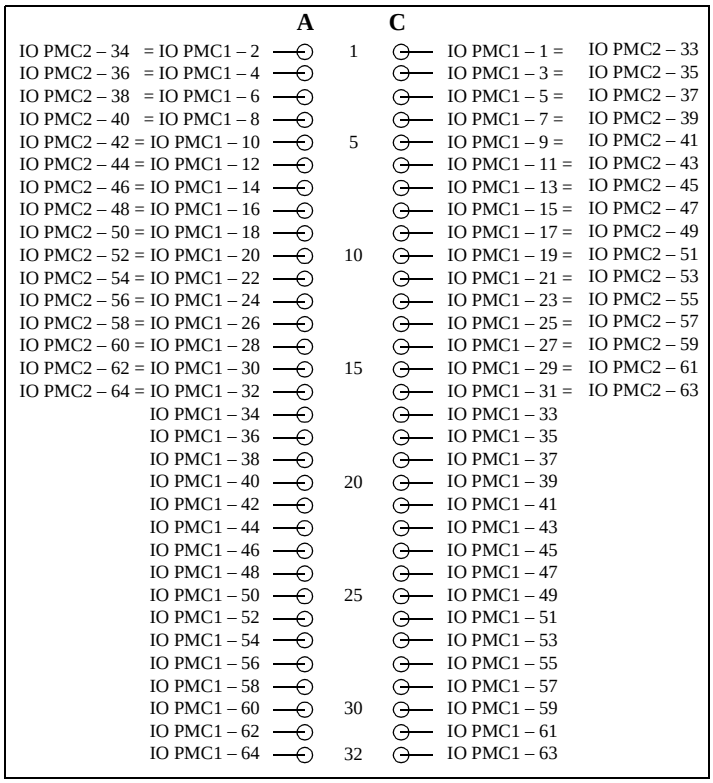
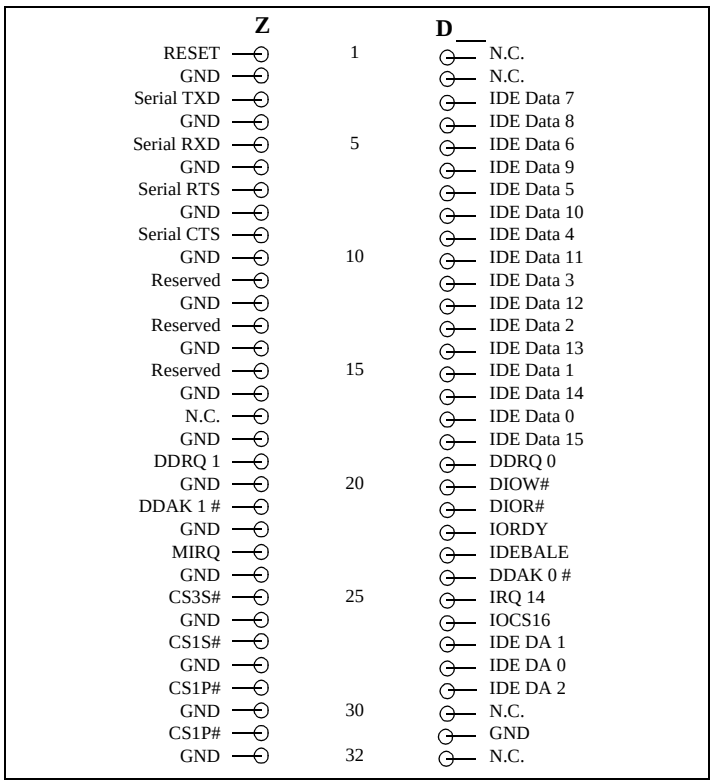


Figure 4 **5-Row P2 Connector Pinout, Row Z and D**



3.12 Testing the CPU Board Using PowerBoot

PowerBoot is firmware providing some basic test and debug commands. It is stored in the on-board boot PROM.

Booting up PowerBoot

PowerBoot automatically starts during power up or reset. After the successful pass of the self-initialization routine, the following message or a similar one will appear on the screen:

```
Init serial at address: 0xFE0003F8
Init CIO at address: 0xFE000300
Init Ethernet Controller at address: 0xFE800000
Init UNIVERSE VMEbus device at address: 0xFE810000
PowerCore is -NOT- VMEbus System Controller (SYSCON=0)
Found CPU603ev, PVR=00070201,
CPU clock: 166MHz, Bus clock: 66MHz
DRAM EDO mode enabled, DRAM ECC mode disabled
Onboard DRAM      : 16MB, 0x00000000..0x00FFFFFF
Init DRAM Module 1: none
Init DRAM Module 2: none
Init DTLB/ITLB for block translation, enable MMU
Init L1-Icache
Init L1-Dcache
Init L2-Cache, found 2 Banks, 512 kByte cache
Init exception vectors starting at address: 0x00000100
Read NVRAM...identify board
Ethernet: 00:80:42:0E:02:1D
PMC1/2: no auto mapping setup

<<PowerBoot Software V1.02 for PowerPC>>

PowerBoot> _
```

System controller

If the board is configured as system controller, the user LED at the front panel turns green.

Starting a test after booting

To test the CPU board for correct operation enter `probepci`. `Probepci` does not provide a full-featured power-on self-test. Howev-

er, it tests some I/O devices and scans the PCI bus for participants. Depending on the board configuration, the following message will appear:

```
PowerBoot> probepci
Probing PCIbus at 0x80000000
Device ID = 0x0002; Vendor ID = 0x1057;
Status    = 0x2080; Command   = 0x0006;
Base Class= 0x06;   Sub Class = 0x00;   Prg. Inter= 0x00;   Rev. ID = 0x20;
BIST      = 0x00;   Header Typ= 0x00;   Latency Ti= 0x00;   Cache Line=0x08;
base addr0= 0x00000000;
Max Lat   = 0x00;   Min Gnt   = 0x00;   IRQ Pin   = 0x00;   IRQ Line  = 0x00;
Found PCI device: Motorola MPC106 PowerPC PCI bridge

Probing PCIbus at 0x8000C000
Device ID = 0x0000; Vendor ID = 0x10E3;
Status    = 0x0200; Command   = 0x0007;
Base Class= 0x06;   Sub Class = 0x80;   Prg. Inter= 0x00;   Rev. ID   = 0x00;
BIST      = 0x00;   Header Typ= 0x80;   Latency Ti= 0xF8;   Cache Line= 0x00;
base addr0= 0x00810001;
Max Lat   = 0x00;   Min Gnt   = 0x03;   IRQ Pin   = 0x01;   IRQ Line  = 0x00;
Found PCI device: Tundra UNIVERSE VMEbus interface

Probing PCIbus at 0x8000D000
Device ID = 0x122E; Vendor ID = 0x8086;
Status    = 0x0280; Command   = 0x0007;
Base Class= 0x06;   Sub Class = 0x01;   Prg. Inter= 0x00;   Rev. ID   = 0x02;
BIST      = 0x00;   Header Typ= 0x80;   Latency Ti= 0x00;   Cache Line= 0x00;
base addr0= 0x00000000;
Max Lat   = 0x00;   Min Gnt   = 0x00;   IRQ Pin   = 0x00;   IRQ Line  = 0x00;
Found PCI device: 82371FB PCI ISA (PIIX) function 0

Probing PCIbus at 0x8000D100
Device ID = 0x1230; Vendor ID = 0x8086;
Status    = 0x0280; Command   = 0x0000;
Base Class= 0x01;   Sub Class = 0x01;   Prg. Inter= 0x80;   Rev. ID   = 0x02;
BIST      = 0x00;   Header Typ= 0x00;   Latency Ti= 0x00;   Cache Line= 0x00;
base addr0= 0x00000000;
Max Lat   = 0x00;   Min Gnt   = 0x00;   IRQ Pin   = 0x00;   IRQ Line  = 0x00;
Found PCI device: 82371FB IDE (PIIX) function 1

Probing PCIbus at 0x8000D800
Device ID = 0x0009; Vendor ID = 0x1011;
Status    = 0x0280; Command   = 0x0007;
Base Class= 0x02;   Sub Class = 0x00;   Prg. Inter= 0x00;   Rev. ID   = 0x12;
BIST      = 0x00;   Header Typ= 0x00;   Latency Ti= 0x7F;   Cache Line= 0x00;
base addr0= 0x00800001;
Max Lat   = 0x00;   Min Gnt   = 0x00;   IRQ Pin   = 0x01;   IRQ Line  = 0x88;
Found PCI device: DEC Chip 21140A Fast Ethernet LAN

Probing PCIbus at 0x8000F800
PowerBoot>
```

3.13 PPC/SSIO-6603/4

This section describes how to install the PPC/PowerCore-6603/4 into a VMEbus system. The PPC/SSIO-6603/4 is maintenance free. For general safety notes and installation prerequisites and requirements, see section 1 “Safety Notes” on page 1 and see section 3.1 “Installation Prerequisites and Requirements” on page 9.

Interfaces of the PPC/SSIO-6603/4

The PPC/SSIO-6603/4 provides the following interfaces available via the VME P2 connector of the PPC/PowerCore-6603/4 base board:

- 4 serial interfaces,
- a SCSI interface,
- and an AUI Ethernet interface.

Note: **Before powering up the base board check the consistency of the current switch settings on the PPC/SSIO-6603/4, see section 3.13.2 “Switch Settings” on page 31. With an installed PPC/SSIO-6603/4 the 10Base-T Ethernet interface and the Ethernet LED on the front panel of the PPC/PowerCore-6603/4 base board are disabled.**

Power consumption

The PPC/SSIO-6603/4 requires 450 mA at 5 V. If a device is connected to the Ethernet interface, the required current can rise up to 1 A.

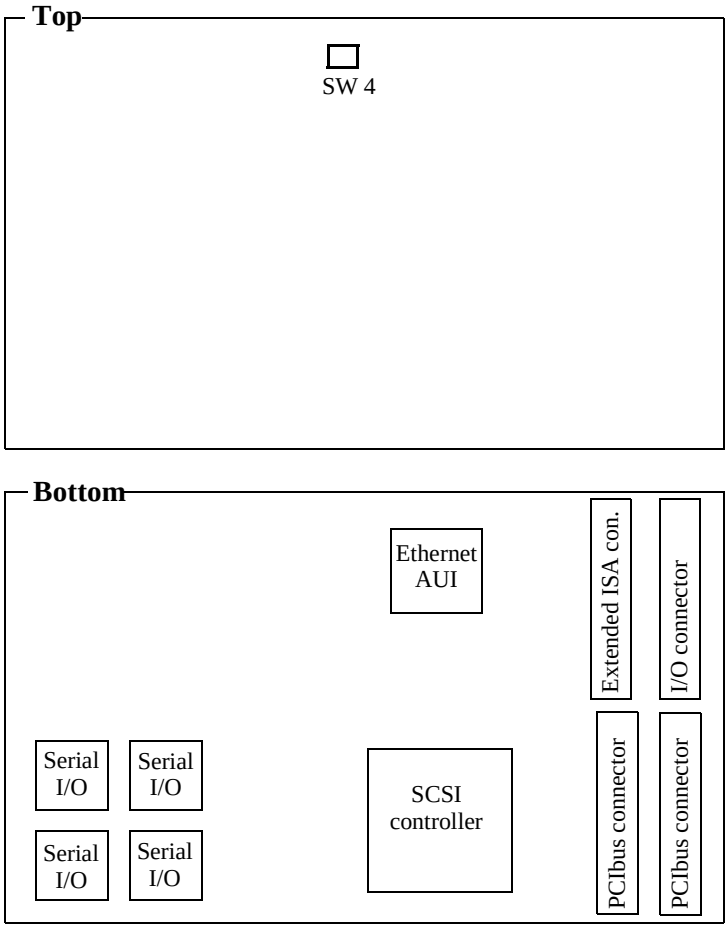
Accessory kit

For accessing the interfaces of the PPC/SSIO-6603/4 via standard I/O connectors the PPC/PowerCore-6xxx-SSIO/232-AccKit is required. The accessory kit contains the IOBP-SSIO/232 rear I/O board with cables and is available as a separate price list item from Force Computers.

3.13.1 Location Overview

The figure 5 “Location diagram of the PPC/SSIO-6603/4 (schematic)” on page 30 highlights the position of important PPC/SSIO-6603/4 components.

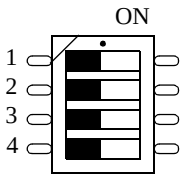
Figure 5 Location diagram of the PPC/SSIO-6603/4 (schematic)



3.13.2 Switch Settings

The following table lists the functions and the default settings of all switches of the PPC/SSIO-6603/4, for their location see figure 5 “Location diagram of the PPC/SSIO-6603/4 (schematic)” on page 30. For switching it is not required to remove the PPC/SSIO-6603/4 from the base board. Do not switch during operation.

Table 10 Switch settings

Name and default setting		Description
	SW4-1 OFF	SCSI termination (Data bits: D0…D7) OFF = Termination enabled ON = Termination disabled
	SW4-2 OFF	Wide SCSI termination (Data bits: D8…D15) OFF = Termination enabled ON = Termination disabled
	SW4-3 OFF	Reserved
	SW4-4 OFF	Reserved

3.13.3 Serial I/O Ports

Device: Serial I/O	
Frequency	1.8432 MHz
Access base address	Port 1: ISA: $0000.03E8_{16}$ PCI: $0000.03E8_{16}$ CPU: $FE00.03E8_{16}$ Port 2: ISA: $0000.02E8_{16}$ PCI: $0000.02E8_{16}$ CPU: $FE00.02E8_{16}$ Port 3: ISA: $0000.03D8_{16}$ PCI: $0000.03D8_{16}$ CPU: $FE00.03D8_{16}$ Port 4: ISA: $0000.02D8_{16}$ PCI: $0000.02D8_{16}$ CPU: $FE00.02D8_{16}$
Port width	8 bit
Interrupt request	Port 1: IRQ6 Port 2: IRQ6 Port 3: IRQ12 Port 4: IRQ12

The RS-232 serial I/O ports are available via P2 connector of the base board. For the base board's P2 connector pinout, see figure 7 "3- or 5-row P2 connector pinout of the base board, row A and C" on page 34.

Default port settings

- RS-232 asynchronous communication
- 9600 baud, 8 data bits, 1 stop bit, no parity
- No handshake protocol used

Data sheet

For more information on the serial I/Os, see the data sheets of the Texas Instruments TL16C550C serial I/Os on the following website: http://www.ti.com

3.13.4 SCSI

Device: SCSI controller	
Frequency	40 MHz SCSI clock
Port width	8 or 16 bit (SCSI or Wide SCSI)
Interrupt request	INTA

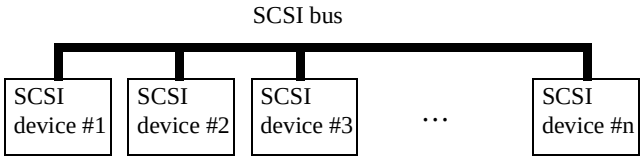
SCSI is available via P2 connector of the base board. For the base board's P2 connector pinout, see figure 7 "3- or 5-row P2 connector pinout of the base board, row A and C" on page 34.

Features

- Ultra SCSI technology (Fast-20: extension of the SCSI-3 standard) performs wide high speed SCSI bus synchronous transfers up to 40 MB/s and 14-MB/s asynchronous transfers.
- Full SCSI-2 capabilities are provided.
- Full software compatible to SYM53C825.

Note: **Enable SCSI termination at both ends of the bus (SCSI device #1 and SCSI device #n), see figure below. All other SCSI devices must not be terminated. For information on the respective switch settings, see table 10 "Switch settings" on page 31.**

Figure 6 SCSI termination



Data sheet

For more information on the SCSI controller, see the data sheets of the Symbios SYM53C875 SCSI controller on the following website: http://www.symbios.com

3.13.5 Ethernet AUI Interface

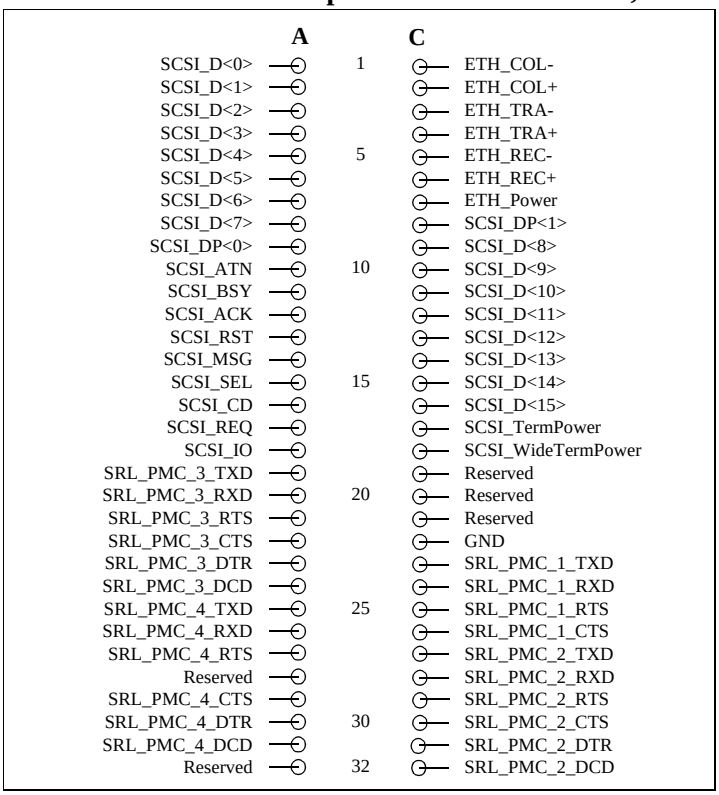
The Ethernet AUI signals are available via the P2 connector of the base board. For the base board's P2 connector pinout, see figure 7 "3- or 5-row P2 connector pinout of the base board, row A and C" on page 34.

Data sheet

For more information on the Ethernet Serial Interface Adapter, see the data sheets of the AMD Am7992B Ethernet Interface Adapter which is available on the following website:
http://www.amd.com

3.13.6 VMEbus P2 Connector Pinout of the Base Board

Figure 7 3- or 5-row P2 connector pinout of the base board, row A and C



3.14 IOBP-SSIO/232

As a separate price list item Force Computers offers a PPC/PowerCore-6xxx-SSIO/232-AccKit which includes an IOBP-SSIO/232 rear I/O board with cables and is specially designed for the PowerCore-6603/4-SSIO. Plug the IOBP-SSIO/232 only into the VMEbus backplane from its rear to the P2 connector of the base board.

Connectors of the IOBP-SSIO/232

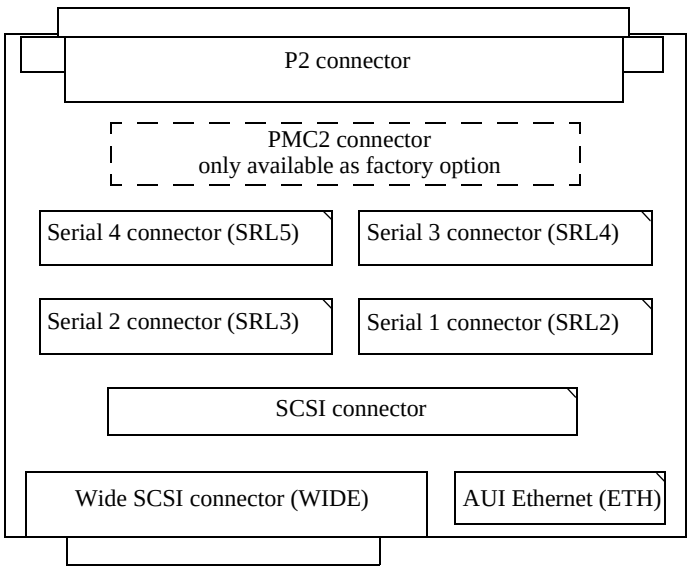
The IOBP-SSIO/232 provides the following connectors:

- 4 RS-232 serial connectors
- 1 SCSI connector
- 1 Wide SCSI shielded connector
- 1 Ethernet AUI connector
- a 50-pin socket for PMC2 signals (only available as factory option)

Note: **Use only the SCSI or Wide SCSI connector, not both of them. For connecting the serial interface to a modem host, an RS-232 Null Modem Adapter is required.**

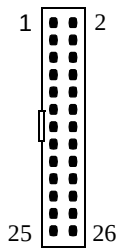
The following schematic location diagram highlights the position of the IOBP-SSIO/232 components.

Figure 8 **IOBP-SSIO/232 (schematic)**



The pinouts of the connectors are shown in the following tables.

Table 11 **Serial connectors pinout**

Signal	Pin	Connector	Pin	Signal
n.c.	1		2	n.c.
SRL_TXD	3		4	n.c.
SRL_RXD	5		6	n.c.
SRL_RTS	7		8	Reserved
SRL_CTS	9		10	n.c.
n.c.	11		12	n.c.
GND	13		14	SRL_DTR[1)]
SRL_DCD[1)]	15		16	n.c.
n.c.	17		18	n.c.
n.c.	19		20	n.c.
n.c.	21		22	Reserved
n.c.	23		24	n.c.
n.c.	25		26	Shield GND

1. SRL_DTR signal and SRL_DCD signal are not available on the Serial 1 connector (SRL2)

Table 12 **Ethernet connector pinout**

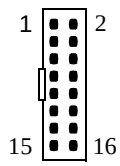
Signal	Pin	Connector	Pin	Signal
GND	1		2	ETH_COL-
ETH_COL+	3		4	ETH_TRA-
ETH_TRA+	5		6	GND
GND	7		8	ETH_REC-
ETH_REC+	9		10	ETH_Power
GND	11		12	GND
n.c.	13		14	n.c.
GND	15		16	Shield GND

Table 13 **SCSI connector pinout**

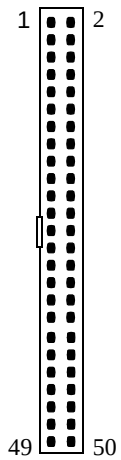
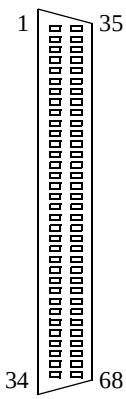
Signal	Pin	Connector	Pin	Signal
GND	1		2	SCSI_D<0>
GND	3		4	SCSI_D<1>
GND	5		6	SCSI_D<2>
GND	7		8	SCSI_D<3>
GND	9		10	SCSI_D<4>
GND	11		12	SCSI_D<5>
GND	13		14	SCSI_D<6>
GND	15		16	SCSI_D<7>
GND	17		18	SCSI_DP<0>
GND	19		20	GND
GND	21		22	GND
n.c.	23		24	n.c.
n.c.	25		26	SCSI_TermPower
n.c.	27		28	n.c.
GND	29		30	GND
GND	31		32	SCSI_ATN
GND	33		34	GND
GND	35		36	SCSI_BSY
GND	37		38	SCSI_ACK
GND	39		40	SCSI_RST
GND	41		42	SCSI_MSG
GND	43		44	SCSI_SEL
GND	45		46	SCSI_CD
GND	47		48	SCSI_REQ
GND	49		50	SCSI_IO

Table 14 Wide SCSI connector pinout

Signal	Pin	Connector	Pin	Signal
GND	1		35	SCSI_D<12>
GND	2		36	SCSI_D<13>
n.c.	3		37	SCSI_D<14>
GND	4		38	SCSI_D<15>
GND	5		39	SCSI_DP<1>
GND	6		40	SCSI_D<0>
GND	7		41	SCSI_D<1>
GND	8		42	SCSI_D<2>
GND	9		43	SCSI_D<3>
GND	10		44	SCSI_D<4>
GND	11		45	SCSI_D<5>
GND	12		46	SCSI_D<6>
GND	13		47	SCSI_D<7>
GND	14		48	SCSI_DP<0>
GND	15		49	GND
GND	16		50	n.c.
SCSI_ WideTermPower	17		51	SCSI_TermPower
SCSI_ WideTermPower	18		52	SCSI_TermPower
n.c.	19		53	n.c.
GND	20		54	GND
GND	21		55	SCSI_ATN
GND	22		56	GND
GND	23		57	SCSI_BSY
GND	24		58	SCSI_ACK
GND	25		59	SCSI_RST
GND	26		60	SCSI_MSG
GND	27		61	SCSI_SEL
GND	28		62	SCSI_CD
GND	29		63	SCSI_REQ
GND	30		64	SCSI_IO
GND	31		65	SCSI_D<8>
GND	32		66	SCSI_D<9>
GND	33		67	SCSI_D<10>
GND	34		68	SCSI_D<11>

Product Error Report

Product:	Serial No.:
Date Of Purchase:	Originator:
Company:	Point Of Contact:
Tel.:	Ext.:
Address:	
Present Date:	
Affected Product: ❑ Hardware ❑ Software ❑ Systems	Affected Documentation: ❑ Hardware ❑ Software ❑ Systems
Error Description:	

This Area to Be Completed by Force Computers:

Date:

PR#:

Responsible Dept.: ❑ Marketing ❑ Production

Engineering ➠ ❑ Board ❑ Systems

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