Modular Computers ®

PMC260

ULTRA-2 SCSI PMC Interface for CompactPCI

Manual ID 19927, Rev. Index 0100
Mar 99

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

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Preface

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Revision History

Revision History			
Manual/Product Title:	**PMC260**		
Manual ID Number:	19927		
Rev. Index	**Brief Description of Changes**	**Board Index**	**Date of Issue**
0100	Initial Issue	0000	Mar. 99

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Explanation of Symbols



CE Conformity

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



Caution!

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

See also the section “High Voltage Safety Instructions”.



ESD-Sensitive Device!

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

Please read also the section “Special Handling and Unpacking Instructions” of this manual.



Attention!

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



Note:

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



PEP Advantage

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



Troubleshooting

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

For your safety

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

High Voltage Safety Instructions



Warning!

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



Caution!

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

Special Handling and Unpacking Instructions



ESD Sensitive Device!

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

- Do not handle this product out of its protective enclosure while it is not used for operational purposes, unless it is otherwise protected.
- Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where safe work stations are not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.
- It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory back-up, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or tracks on the board.

General Instructions on Usage

- In order to maintain *PEP's* product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by *PEP Modular Computers* and described in this manual or received from *PEP* Technical Support as a special handling instruction, will void your warranty.
- This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.
- In performing all necessary installation and application operations, please, follow only the instructions supplied by the present manual.
- Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board please re-pack it as nearly as possible in the manner in which it was delivered.
- Special care is necessary when handling or unpacking the product. Please, consult the special handling and unpacking instruction on the 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*.

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

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Chapter 1

Introduction

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1. Introduction

1.1 System Overview

The *PEP Modular Computers* CompactPCI systems described in this chapter operate with the PCI bus architecture to support additional I/O and memory-mapped devices as required by various industrial applications. In the following you will find the most important information on all system relevant CompactPCI features. For more detailed information concerning the CompactPCI standard, please consult the complete Peripheral Component Interconnect (PCI) and CompactPCI Specifications. For further information regarding these standards and their use, visit the homepage of the *PCI Industrial Computer Manufacturers Group (PICMG)*.

1.1.1 Note on CompactPCI

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

1.1.2 Main Features of CompactPCI Systems

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

- PCI signalling
- 32 and 64 bit data transfer at 33 MHz
- up to 16 PCI slots per backplane
- industry standard software support
- 3U small form factor (100 mm by 160 mm)
- 6U form factor (233 mm by 160 mm)
- Eurocard packaging
- wide variety of available I/O functions
- industry support from over 350 members.
- possibility of PMC modules on some boards



PEP Advantage

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

1.2 System Components

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

CompactPCI Backplane(s)

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

CPU Function

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

Display Related Functions

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

Communication

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

Fieldbus Control

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

- CAN fieldbus control
- PROFIBUS control

Industrial I/O Functions

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

- Digital I/O
- Analog I/O

Self-Testing

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

System Hardware

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

Multiprocessor

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

Housings

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

Mass Storage Devices

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

Power Supply Units

- 6U "M", 270 W, 120/230 V AC, 3.3V/30A, 5.1V/20A, 12V/4A, -12V/2A
- 3U "M", 180 W, 120/230 V AC, 3.3V/14A, 5.1V/20A, 12V/2A, -12V/1A
- "ATX", 235 W, 120/230 VAC, 3.3V/14A, 5V/22A, 12V/8A,-12V/1A, -5V/0.5A, 5VSB/0.1A

Form Factors

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

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

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

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

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

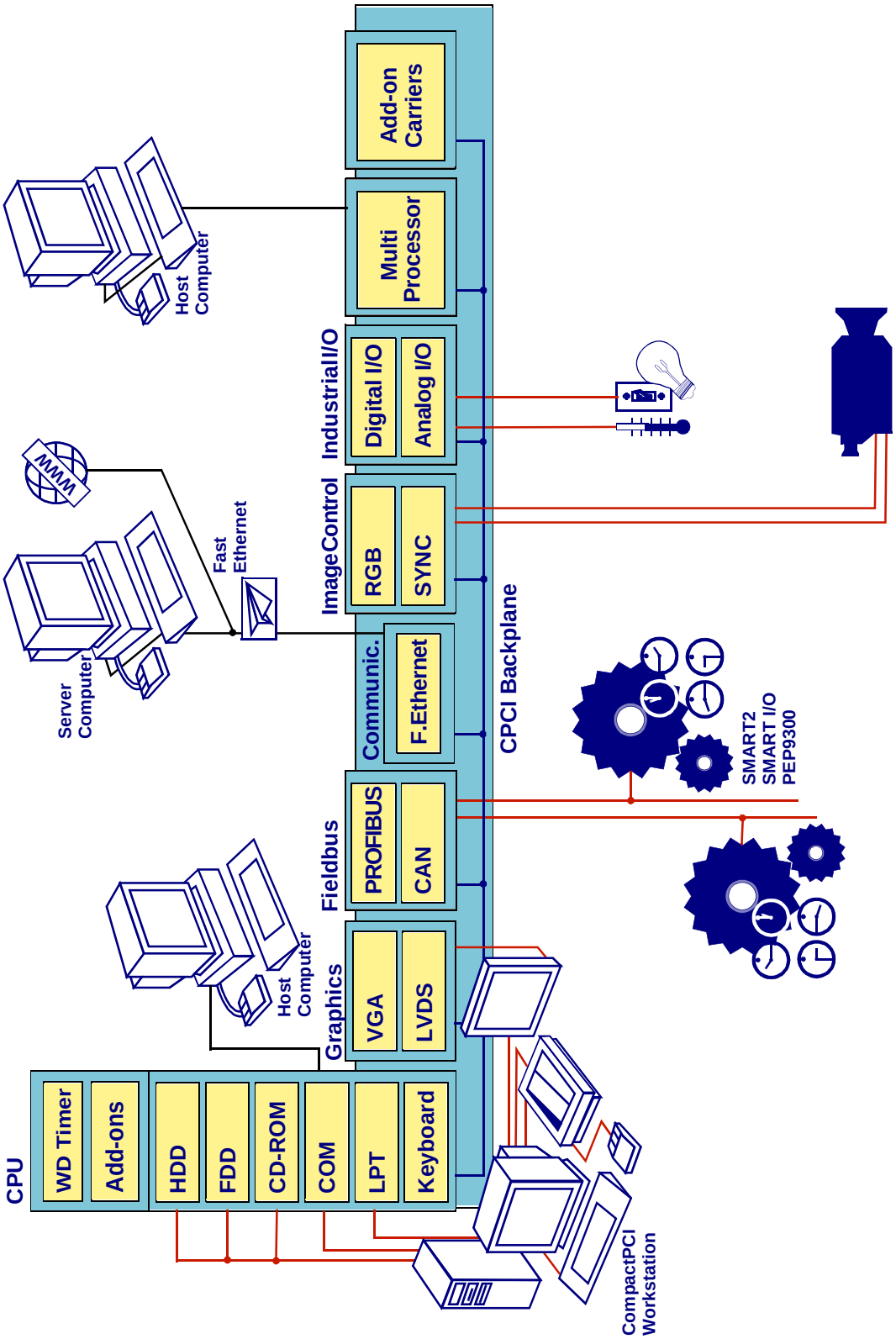
For a detailed description of the *PEP Modular Computers* CompactPCI modules please consult the specific component's manuals or data sheets.



PEP Advantage

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

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



1.3 Introduction

PMC modules are a flexible, system-independant solution providing easy-to-upgrade mezzanine add-on modules. *PEP Modular Computers*' PMC Modules are operable in VME and CompactPCI systems. They offer all the key benefits of PC I/O technology, namely:

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

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

- CompactPCI 6U CPU CP612
- CompactPCI PMC carrier board CP390

Please note that the form factor of *PEP Modular Computers*' PMC Modules is:

- 149mm * 74mm (single-size standard)

1.4 Board Overview

PMC260 is a Wide Ultra-2 SCSI host adapter for CompactPCI.

The PMC260 is designed for parallel data exchange either in “Ultra-2” or single-ended transmission mode. “Ultra-2” allows for Low voltage differential signalling (LVD) with a possible transmission speed of 80 Mbyte/s.

The LVD transceivers automatically detect whether any single-ended devices are attached to the bus, if so they then switch automatically to single-ended mode. The maximum speed in single-ended mode is 40 MByte/s.

The low signal voltage of “Ultra-2” allows a high level of integration. For this reason, the bus drivers are integrated in the controller chip and no external bus drivers are required.

The total number of devices that can be connected to the bus is sixteen devices including the PMC260 host adapter itself.

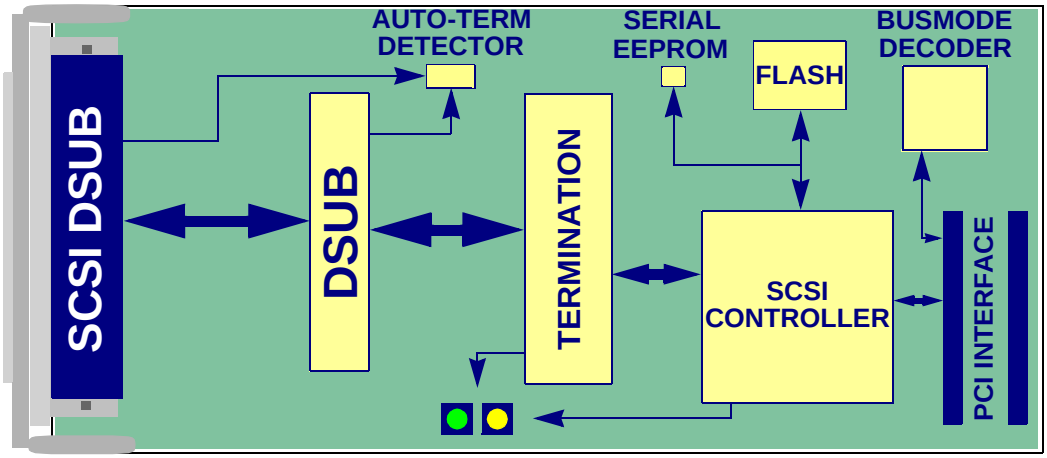
Main Features

The PMC260 provides the following basic features:

- Transfer rate max. 80 Mbyte/s (16-bit bus/ultra-wide SCSI);
- Maximum cable length 12 m;
- Maximum of 16 devices connected to the bus;
- Same connectors and cables as used by ultra-wide SCSI.

1.4.1 Functional Block Diagram

Figure 1-2: PMC260 Functional Block Diagram



1.4.2 Board Interfaces

Both the SCSI and the PC interfaces are integrated in the SCSI controller SYM53C895 produced by LSI, formerly Symbios Logic. Auto-termination of the SCSI bus is provided by three Unitrode active terminator chips. Thanks to an on-board SCSI BIOS extension the PMC260 can be used as a boot device for any operating system based on the Intel processor architecture.

The design of the board is based on multiple blocks:

- CPCI and SCSI interface (derived from Symbios Logic SYM53C895);
- internally active SCSI termination (provided by three Unitrode UCC5630 or Dallas DS2118 terminator chips);
- auto-detection circuit for switching the internal terminators;
- an indicator circuit (2 LEDs with drivers for indicating if the SCSI bus is active and LVD mode is in use);
- in-circuit programmable BIOS extension Flash memory for providing a boot BIOS extension for SCSI devices;
- a serial EEPROM for storage of initial data;
- an oscillator providing the 40 MHz clock which enables the “Ultra-2” speed standard of 80 MByte/s;
- board design for operation in either a 5V or 3V signaling environment.

In the following chapters the individual function blocks are described in detail.

The PMC260 PMC and SCSI interfaces are integrated in the Symbios Logic SYM53C895 SCSI controller. The next chapter provides an overview of the SYM53C895 architecture and function.

PMC Interface

The main features of the SYM53C895 PCI interface are as follows:

- compliance with the PCI 2.1 Specifications;
- 32-bit 33-MHz PCI interface;
- supports 32-bit word data burst with variable burst lengths;
- bursts 2, 4, 8, 16, 32, 64, or 128 dwords across PCI bus,
- pre-fetches up to 8 dwords of script instructions
- burst scripts opcode fetching across the PCI bus;
- zero-wait state bus master data bursting in excess of 110 MB/s at 33 MHz;
- support of PCI cache line register;
- support of PCI write and invalidate, read line and read multiple commands;
- full 32-bit PCI DMA bus master.

SCSI Interface

The main features of the SYM53C895 SCSI interface are as follows:

- integrated universal “LVDlink” transceivers;
- supports single-ended and LVD signals;
- enhanced device connectivity and considerable cable length;
- no external differential transceivers thanks to “LVDlink” transceivers;
- supports long-term performance migration path;
- chip burst of up to 512 Bytes across the PCI bus due to 816-byte FIFO;
- wide synchronous “Ultra-2” SCSI transfers at a speed of 80 MByte/s;
- on-chip SCSI clock quadrupler allowing the chip to achieve “Ultra-2” SCSI transfer rates with a 40MHz clock;
- 4 kByte internal RAM for Scripts instruction storage;
- 31 levels of SCSI synchronous offset;
- support of variable block size and scatter/gather data transfer;
- memory-to-memory DMA transfers faster than 47MByte/s at 33 MHz;
- minimization of SCSI I/O start latency;
- complex bus sequences without any interrupts, including restore data pointers;
- reduced ISR overhead through a unique interrupt status reporting method;
- load and store Scripts instruction increasing data performance as well as transfers to and from chip registers;
- support of target disconnection and subsequent reconnection without any interrupt to the system processor;
- support of multi-threaded I/O algorithms in SCSI Scripts with fast I/O context switching;
- expanded register move instruction supporting additional arithmetic capability.

Termination

Active integrated SCSI termination is provided by three Unitrode or Dallas termination chips. These same chips automatically detect whether ”Ultra-2” or single-ended devices are connected to the bus, then automatically select the correct transmission mode.

In addition, a special board circuit detects whether any internal termination is necessary; i.e. whether the PMC260 is placed at the end of the bus, then accordingly switches the internal termination on or off.

Memory/Boot Extention

The PMC260 is equipped with an in-system programmable Flash memory containing a BIOS extension for Intel-based computer systems and a configuration utility for the SCSI bus. The BIOS extension provides boot support for SCSI devices.

SCSI Connectors

The PMC260 module is provided with one, optionally two, 68-pin female high-density SCSI DSUB connectors functioning as LVD P-cable connectors. The standard SCSI DSUB connector, which is shielded, is located on the bezel. It is designed for external connection. The second connector, which is optionally available in addition to the PMC standard, is located on the PMC module reverse side and is designed for internal connection.

1.4.3 Bezel

Figure 1-3: PMC260 Bezel View

The PMC260 bezel (front panel) hosts a 68-pin high-density SCSI DSUB connector. To ensure full immission compliance the PMC260 bezel is equipped with a special EMC gasket designed to conduct any electromagnetic disturbances to the shield.

1.4.4 Board Layout

Figure 1-4: PMC260 Board Layout (Front View)

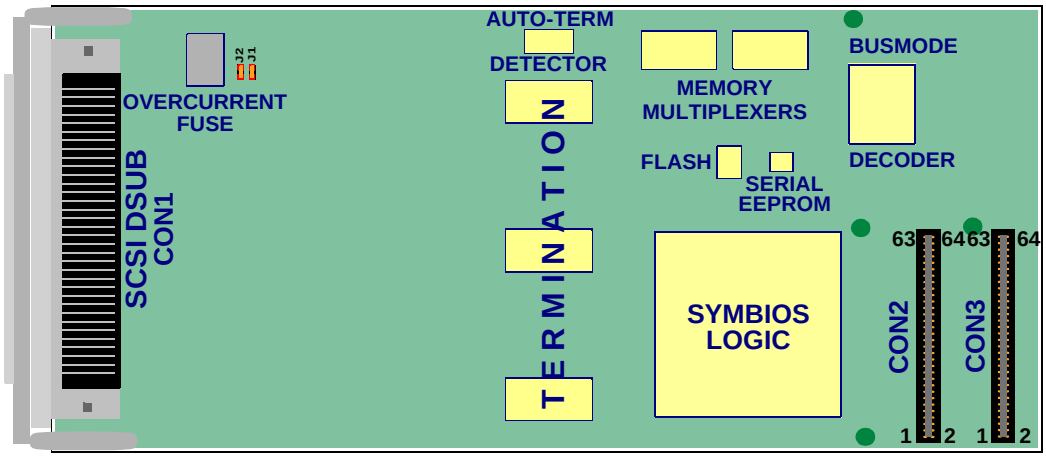


Figure 1-5: PMC260 Board Layout (Reverse View)

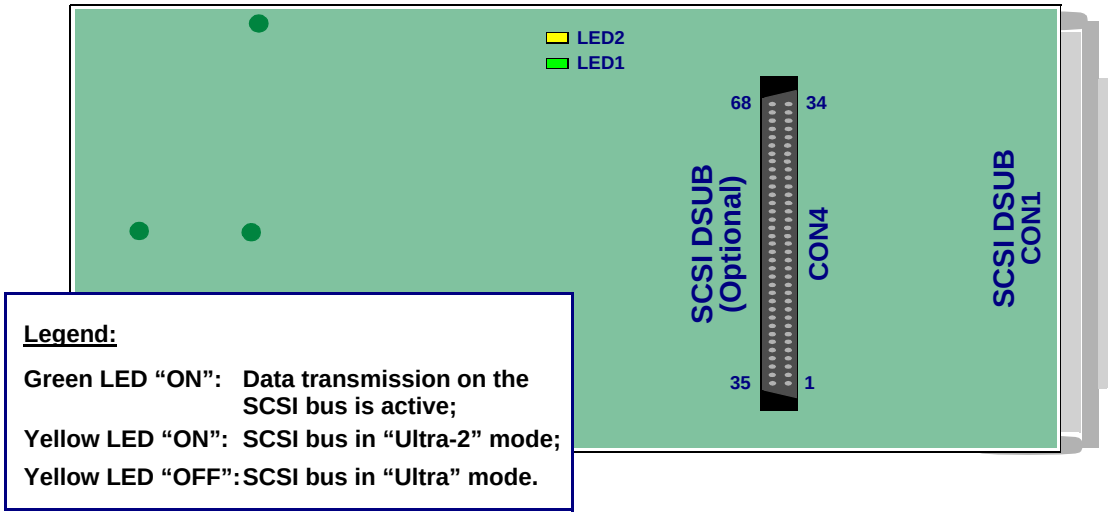


Table 1-1: PMC260 Technical Specifications

PMC260	Specifications
Chipset	Symbios Logic 53C895
SCSI Interface	Ultra-2 SCSI Interface: • Max. transfer rate: 80 MByte/s (LVD mode); • Max. cable length: 12 m • Max. number of SCSI devices: 16 including host adapter
PMC Interface	• 32-bit bus master interface at 33 MHz; • Max. transfer rate: 132 MByte/s
Signalling Voltage	3.3V / 5V tolerant
Configuration Utility	On board
Boot Support	BIOS extention in flash memory
SupportedDrivers	Available driver support for: • Windows NT, • VxWorks
Connectors: • External • Internal	 68 pin HD-DSUB-Connector (shielded) 68 pin HD-DSUB-Connector (unshielded), optional
Power Supply	Core supply: 3.3V (20 mA approx.) Logic and term-power supply: 5V (250 mA approx.) Flash programming: +12V (10 mA approx.)
Temperature Range • Standard • Extended • Storage	 0°C to 60°C -28°C to 75°C -55°C to 85°C

Table 1-1: PMC260 Technical Specifications

PMC260	Specifications
Operating Humidity	5 to 95% (non-condensing)
Form Factor	PMC (single size): • Dimensions: 149 mm x 74 mm • Stand-off height: 10mm
Weight	80g

1.5 Applied Standards

1.5.1 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

1.5.2 Mechanical Compliance

- Mechanical Dimensions IEEE 1101.10

1.5.3 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

1.6 Related Publications

1.6.1 CompactPCI Systems/Boards

CompactPCI Specification, V. 2.0, Rev. 2.1

1.6.2 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

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2. Installation

2.1 Board Installation



Caution!

If your carrier board type is not specifically qualified as hot-swap capable, 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 standoff, which is positioned at the PCI-Bridge

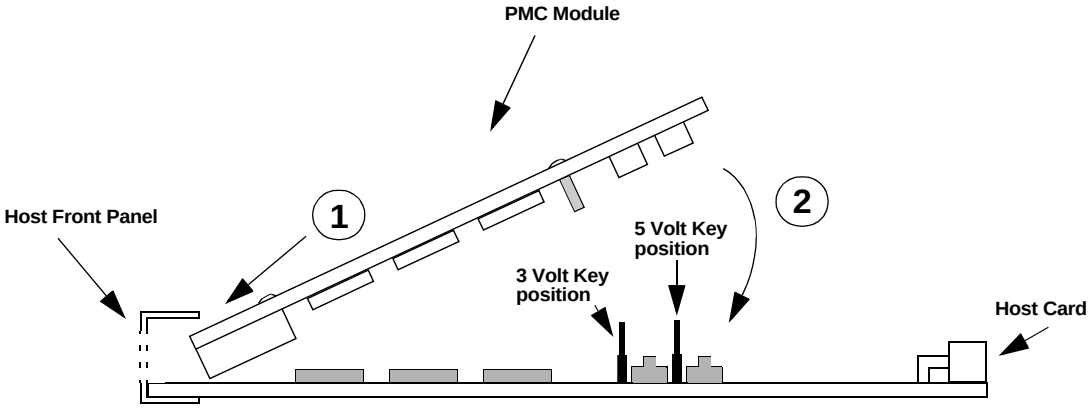


Note:

In order to support an active PMC-Carrier and therefore, to comply with the CPCI Spec., it was necessary to place the PCI-TO-PCI-Bridge in the position, where a socket for mounting a standoff would normally be (PMC Spec.). As a result, the second standoff has to be unmounted.

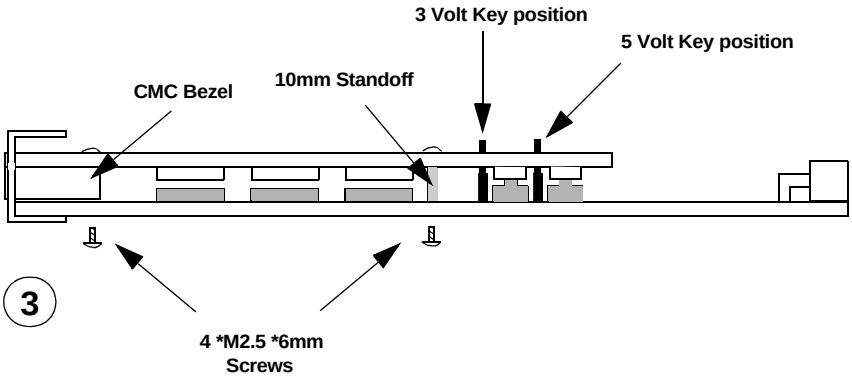
3. push the PMC-Bezel into the Mounting Hole of the front-panel of the CP390 and plug the connectors together.
4. use three screws (M2.5 x 6mm) to fix the board

Figure 2-1: Installation Diagrams



Note:

Only one key is present on your carrier board, either 3V or 5V, depending on the signalling used.



2.2 Board Interfaces

2.2.1 PMC Interface

The PMC260 is a PMC Bus Master device. For proper operation it must be plugged into a PCI Bus Master slot. No rear I/O functionality is supported.

2.2.2 SCSI Interface

One or, optionally, two 68-pin SCSI DSUB high-density connectors “CON 1” and “CON 4” are used. Both connectors are electrically connected to the same SCSI bus.

Note:

As the PMC260 supports Ultra-2 SCSI, high-quality termination cables and connectors must be used. Otherwise intermittent errors may occur.

2.3 SCSI Connection

2.3.1 Termination

Correct termination is important for proper functioning of the SCSI bus. The SCSI bus must be provided with active termination on each end of the bus.

Note:

Termination arrangements of cables are not permitted on an SCSI bus, this means that end stubs should not exceed 10cm in length.

The internal SCSI termination is provided by three Unitrode or Dallas active termination chips. A special detection circuit determines whether the PMC260 is placed at the end of the bus and responds by switching the integrated termination on or off automatically.

Note:

If not all the wires of an SCSI cable are connected, it is possible to switch off the integrated termination manually by closing the two solder jumpers “J1” and “J2”.

2.3.2 Cabling

It is recommended that only high-quality (twisted-pair) 16-bit wide SCSI bus cabling and 16-bit termination be used. A combination of 8 and 16-bit cables may cause termination problems, as without the use of proper adapters a 16-bit termination would result on one side of the bus and an 8-bit termination on the other side.

Note:

For the connection of an 8-bit device via a 16-bit cable, a 50-to-68 pin adapter is recommended. This adaptor is available from *PEP Modular Computers*.

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Chapter 3

Configuration

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3.2 Pinouts ..... 3 - 3
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3. Configuration

3.1 Jumper Setting

The PMC260 on-board termination can be enabled or disabled by setting jumpers “J1 and “J2”. If enabled, the termination detects whether external SCSI cables are present and will automatically switch off the internal terminators. If disabled, termination will remain off.

Table 3-1: Jumpers “J1” and “J2” — Auto-Termination Enable

J1	J2	Function
Open	*Open*	*Automatic termination*
Open	Closed	Automatic termination
Closed	Open	Automatic termination
Closed	Closed	Termination disabled

The default setting is in italics.

Note:

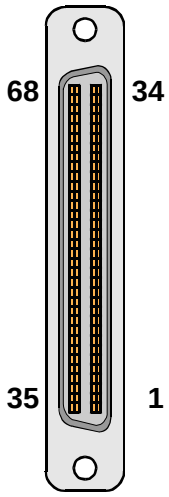
If not all the wires of an SCSI cable are connected, it is possible to switch off the integrated termination manually by closing the two solder jumpers “J1” and “J2”.

3.2 Pinouts

3.2.1 SCSI DSUB Connectors

Figure 3-1: 68-Pin SCSI DSUB Connector

The PMC260 module is provided with one, optionally two, 68-pin female high-density SCSI DSUB connectors functioning as LVD P-cable connectors. One of the connectors, which is shielded, is located on the bezel. It is designed for external connection. The second connector is located on the PMC260 module reverse side and is designed for internal connection.



3.2.2 PMC Connectors

Table 3-2: Connector “CON2”

Pin	Signal Name	Signal Name	Pin
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[0021]	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

Table 3-3: Connector “CON3”

Pin	Signal Name	Signal Name	Pin
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[02]#	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[01]#	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

Table 3-4: Pinout for LVD-P-Connectors “CON1” and “CON4”

Pin	Signal	Pin	Signal
1	+DB(12)	35	-DB(12)
2	+DB(13)	36	-DB(13)
3	+DB(14)	37	-DB(14)
4	+DB(15)	38	-DB(15)
5	+DB(P1)	39	-DB(P1)
6	+DB(0)	40	-DB(0)
7	+DB(1)	41	-DB(1)
8	+DB(2)	42	-DB(2)
9	+DB(3)	43	-DB(3)
10	+DB(4)	44	-DB(4)
11	+DB(5)	45	-DB(5)
12	+DB(6)	46	-DB(6)
13	+DB(7)	47	-DB(7)
14	+DB(P)	48	-DB(P)
15	GROUND	49	GROUND
16	DIFFSENS	50	CONNECTOR-Detect
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20	GROUND	54	GROUND
21	+ATN	55	-ATN
22	GROUND	56	GROUND
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MSG
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB(8)	65	-DB(8)
32	+DB(9)	66	-DB(9)
33	+DB(10)	67	-DB(10)
34	+DB(11)	68	-DB(11)

Chapter 4

SCSI BIOS

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4. SCSI BIOS

The SCSI BIOS is an OEM software produced by Symbios Logic, the manufacturer of the SCSI Controller (SYM53C895). The following description comprises the manual for using this software.

4.1 BIOS Extension

An SCSI BIOS is the bootable ROM code that manages SCSI hardware resources. It is specific to a family of Symbios SCSI controllers or processors. A Symbios SCSI BIOS can be integrated with a standard system BIOS, extending the standard disk service routine provided through INT13h.

During boot time initialization, the SCSI BIOS determines if there are other hard disks, such as an IDE, already installed via the system BIOS. If there are, the SCSI BIOS maps any SCSI drives it finds behind the drive(s) already installed. Otherwise, the SCSI BIOS installs drives starting with the system boot drive. In this case, the system boots from a drive controlled by the SCSI BIOS. For 4.05 versions and higher, Symbios supports the BIOS Boot Specification (BBS).

4.1.1 Boot Initialization with BIOS Boot Specification

The SDMS SCSI BIOS provides support for the BIOS Boot Specification (BBS), which allows you to choose which device to boot from by selecting the priority.

To use this feature, the system BIOS must also be compatible with the BBS. If your system supports the BBS, then you will use the system BIOS setup menu to select the boot and drive order. In the system BIOS setup, the Boot Connection Devices menu appears with a list of available boot options. Use that menu to select the device and rearrange the order. Then exit to continue the boot process.

4.1.2 CD-ROM Boot Initialization

The SDMS SCSI BIOS supports boot initialization from a CD-ROM drive. There are five types of emulation:

- No emulation disk
- Floppy 1.2 MB emulation disk
- Floppy 1.44 MB emulation disk
- Floppy 2.88 MB emulation disk
- Hard disk emulation

The assignment of the drive letter for the CD-ROM is based on the type of emulation. For example, if a 1.44 MB emulation CD is loaded, then the CD-ROM drive would become the designated A: drive, and the existing Floppy would become the B: drive.

4.2 Onboard SCSI Configuration Utility

4.2.1 Starting the Configuration Utility

If you have SCSI BIOS version 4.0 and it includes the Symbios SCSI BIOS Configuration utility, you can change the default configuration of your SCSI host adapters. You may decide to alter these default values if there is a conflict between device settings or if you need to optimize system performance.

You can see the version number of your SCSI BIOS in a banner displayed on your computer monitor during boot. If the utility is available, the following message also appears on your monitor (for about five seconds) and looks like this:

```
Press Ctrl-C to start Symbios Configuration Utility...
```

This message remains on your screen for about five seconds, giving you time to start the utility. If you decide to press "Ctrl-C", the message changes to:

```
Please wait, invoking Symbios Configuration Utility...
```

After a brief pause, your computer monitor displays the Main Menu of the Symbios SCSI BIOS Configuration utility. To make changes with this menu driven utility, one or more Symbios SCSI host adapters must have NVRAM (non-volatile random access memory) to store the changes.



Important!

This utility is a powerful tool. If, while using it, you somehow disable all of your controllers, pressing Ctrl-A (or Ctrl-E on version 4.04 or later) after memory initialization during reboot will allow you to re-enable and reconfigure.



Note

Not all devices detected by the Configuration utility can be controlled by the BIOS. Devices such as tape drives and scanners require that a device driver specific to that peripheral be loaded.

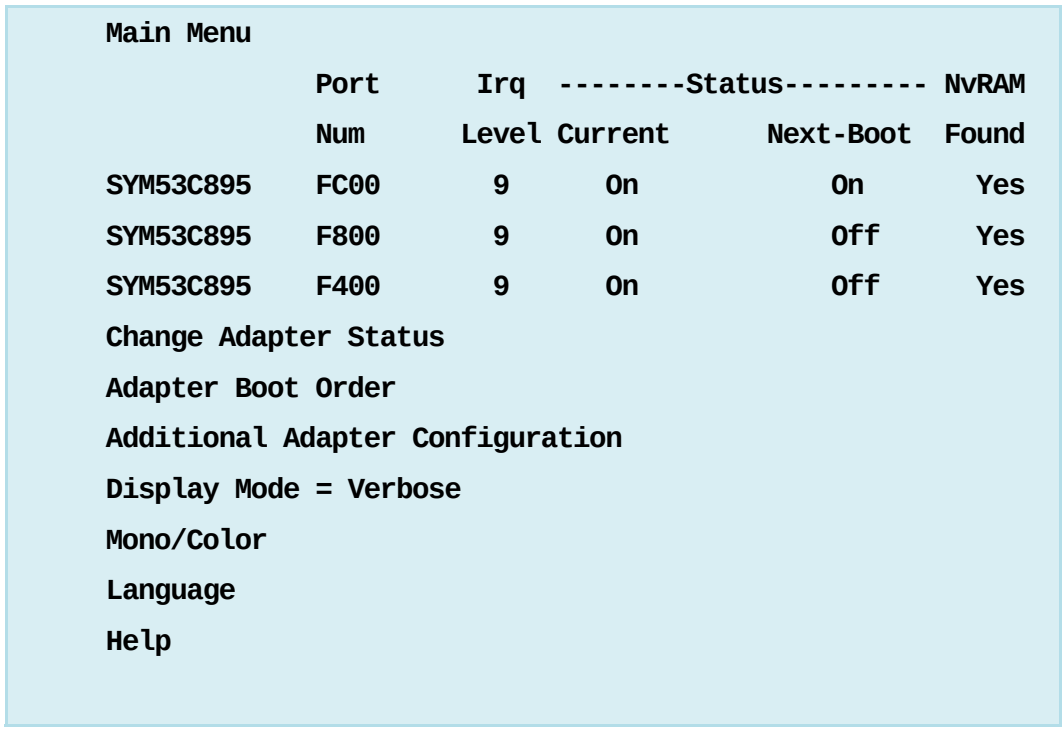
4.2.2 Main Menu

When you start the Symbios SCSI BIOS Configuration Utility, the Main Menu appears. This menu displays a list of up to four Symbios PCI to SCSI host adapters in your system and information about each of them.

To select an adapter, use only the arrow keys and the enter key. Then you can view and/or change the current settings for that adapter, and the SCSI devices attached to it.

You can select an adapter only if Current Status is "On". Changes are possible only if NVRAM is present on your adapter. Selections that are not permissible will be grayed out.

Figure 4-1: Main Menu of the SCSI BIOS Configuration Utility

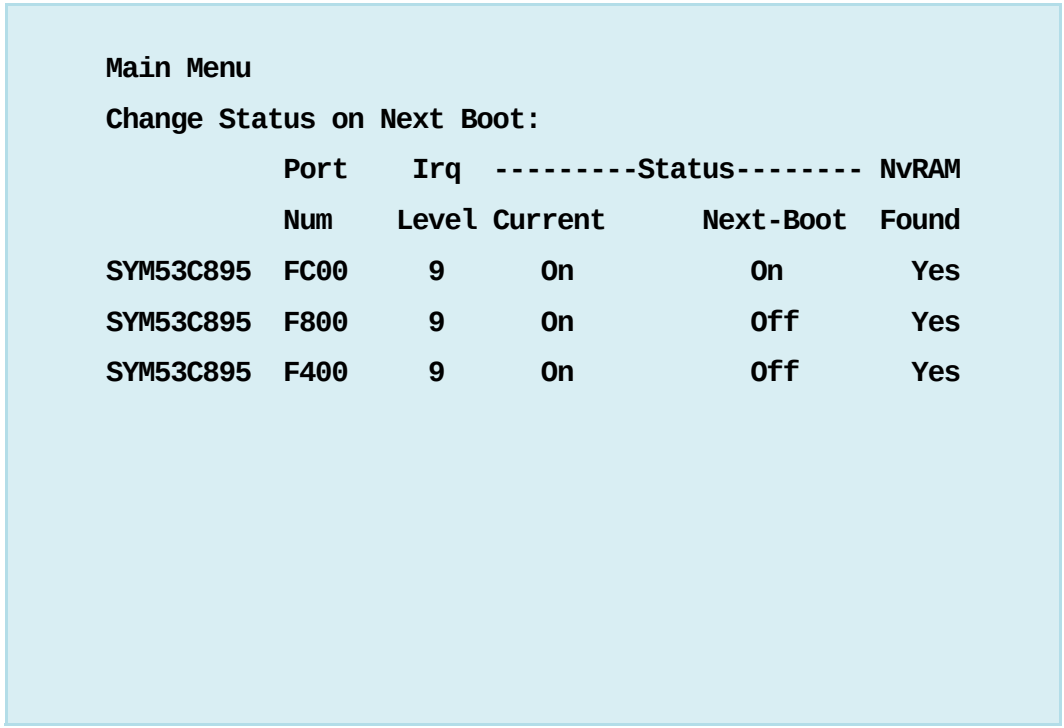


Below the list of host adapters on the Main Menu display are eight options. They are described in detail below. If these settings are altered, the system reboots upon exit from the configuration utility via the Quit option.

4.2.3 Change Adapter Status

The change adapter status allows you to activate or deactivate a host adapter and all SCSI devices attached to it. When this option is used to make a change, the change takes place after a reboot that is automatic upon exit from the utility.

Figure 4-2: Change Status on the Next Boot Menu

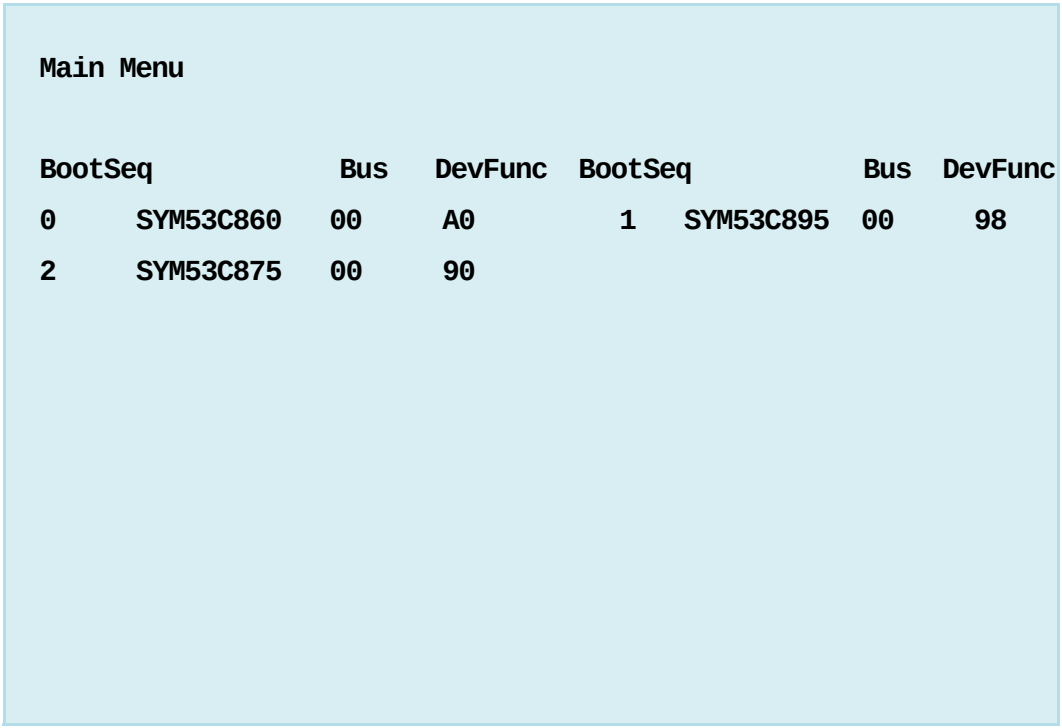


To change an adapter's status, select it and press Enter. Then press the Escape (Esc) key to exit from this menu.

4.2.4 Adapter Boot Order

The adapter boot order allows you to set the order in which host adapters will boot when you have more than one Symbios host adapter in your system. When this option is selected, the Boot Order menu appears.

Figure 4-3: Boot Order Menu

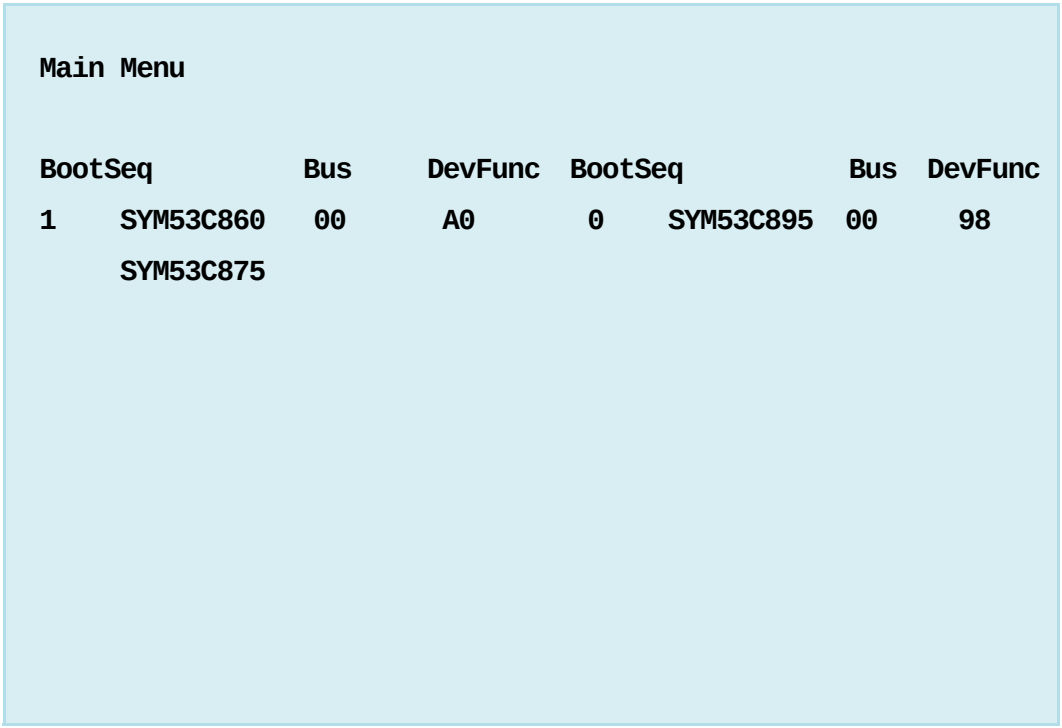


To change an adapter's boot order, select it and press Enter. You are then prompted to enter the new boot sequence number. To remove an adapter's boot order, press Enter again rather than entering a new sequence number. While the maximum capacity is 32 adapters, only 0 through 3 can be assigned a boot order. If an invalid number is entered, an error message appears. When the adapters have been put in the desired order, press the Escape (Esc) key to exit from this menu and reboot.

4.2.5 Additional Adapter Configuration

The additional adapter configuration allows you to configure an adapter that is not assigned a boot order. When this option is selected, the Adapter Configuration menu appears.

Figure 4-4: Adapter Configuration Menu



Highlight the adapter to be configured and press Enter. The message "Resetting Adapter, Please wait" appears, and then the system scans for devices. Finally, the Utilities Menu appears and lists the available options, which are described below.

Display Mode

Display mode determines how much information about your host adapters and SCSI devices appears on your computer monitor during boot. For more complete information, choose the verbose setting. For a faster boot, choose the terse setting.

Monochrome/Color

Monochrome/Color allows you to choose between a monochrome or color display for the SCSI configuration utility. You might need to choose the mono setting to get a more readable screen on a monochrome monitor.

Language

If enabled, the Language option allows you to select from five languages for the configuration utility: English, German, French, Italian and Spanish.

Help

The Help option allows you to bring up a help screen with information about the Main Menu.

Quit

The Quit option allows you to exit from the SCSI BIOS Configuration utility when on the Main Menu.

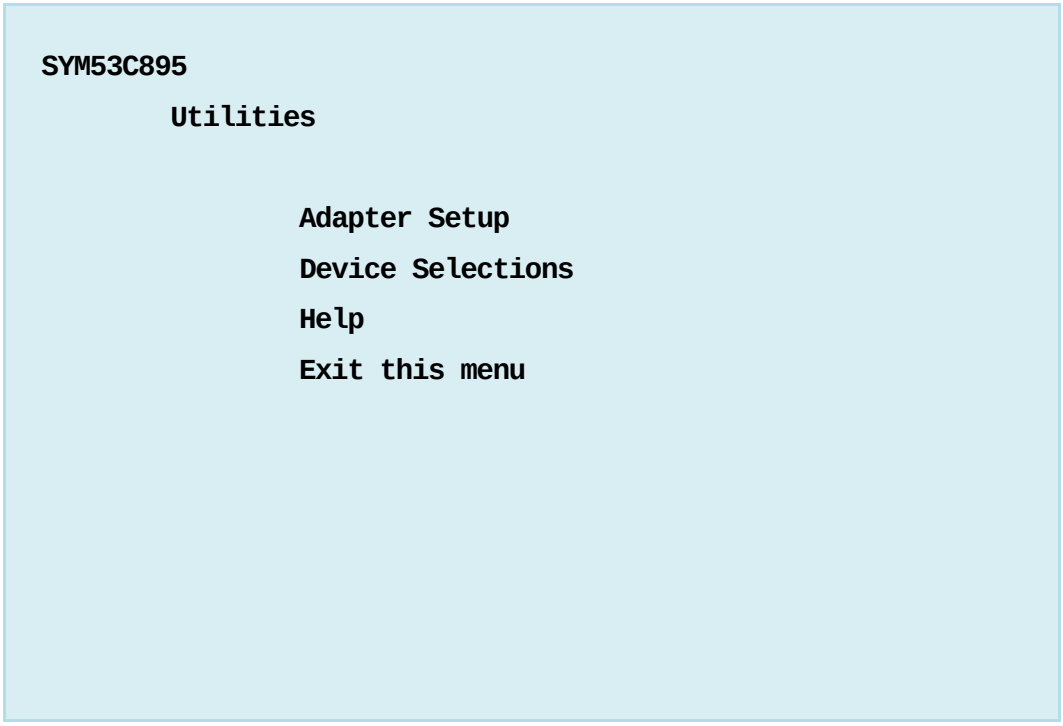
Esc

Pressing the Esc key allows exit from all the screens except the Main Menu.

4.2.6 Utilities Menu

When you select a host adapter on the Main menu, the Utilities menu appears.

Figure 4-5: Utilities Menu



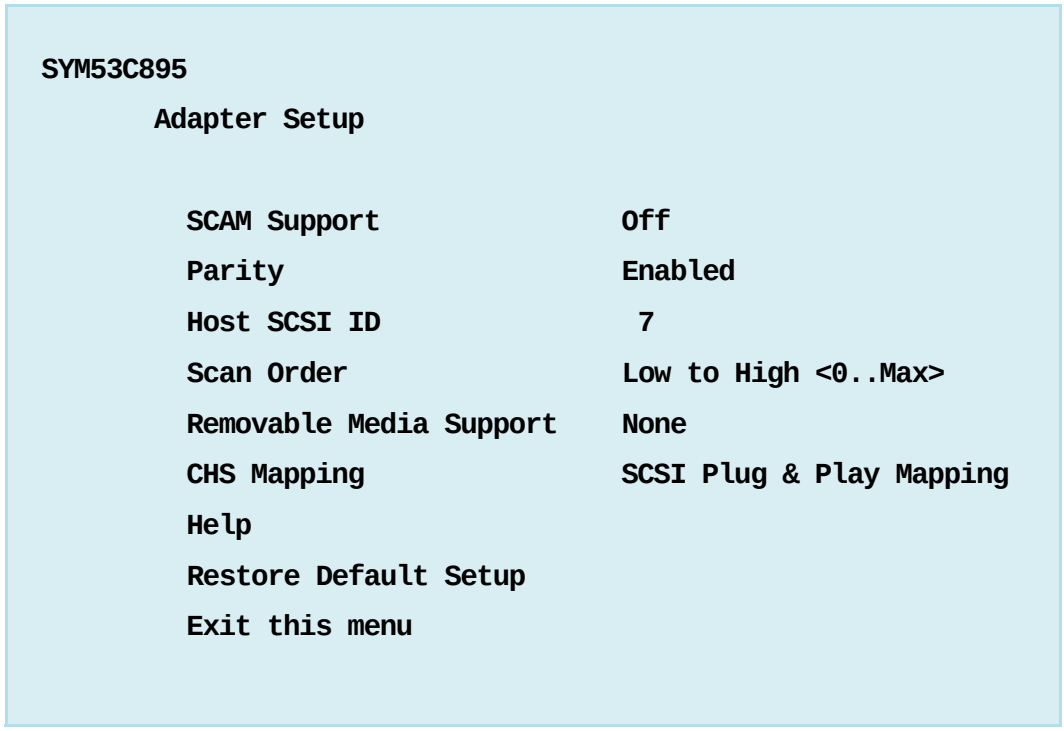
Choose Adapter Setup to view and change the selected adapter settings. Choose Device Selections to view and change settings for the devices attached to the selected adapter.

You are returned to this menu after making changes to the configuration of any host adapter or connected SCSI device. Before you exit this menu, you are prompted to save or cancel any changes.

4.2.7 Adapter Setup Menu

When you select Adapter Setup, the Adapter Setup menu appears.

Figure 4-6: Adapter Setup Menu



The settings in this menu are global settings that affect the selected host adapter and all SCSI devices attached to it. One of these choices can be selected by highlighting it and pressing Enter.

SCAM Support

The Symbios BIOS version 4.0 and higher supports the SCSI Plug and Play protocol called SCAM (SCSI Configured AutoMatically). SCAM support by default is off in versions 4.09 and later. You may choose to turn this on. Note that if this BIOS is flashed onto a board with existing settings, then these settings will not be changed to reflect the new BIOS defaults.

Parity

The Symbios PCI to SCSI host adapters always generate parity, but some older SCSI devices do not. Therefore, you are offered the option of disabling parity checking.



Note:

When disabling parity checking, it is also necessary to disable disconnects for all devices, as parity checking for the reselection phase is not disabled. If a device does not generate parity, and it disconnects, the I/O process never completes because the reselection never completes.

Host SCSI ID

In general, it is suggested that you not change your host adapter ID from the default value of 7, as this gives it the highest priority on the SCSI bus.

Scan Order

This option allows you to tell the SCSI BIOS and your device drivers to scan the SCSI bus from low to high (0 to max) SCSI ID, or from high to low (max to 0) SCSI ID. If you have more than one device on the SCSI bus, changing the scan order changes the order in which drive letters are assigned by the system. Drive order may be reassigned differently in systems supporting the BIOS Boot Specification (BBS). See the section "Boot Initialization for BIOS Boot Specification (BBS)" for more information.



Note:

This scan order option may conflict with operating systems that automatically assign a drive order.

Removable Media Support

This option defines the removable media support for a specific drive. When this option is selected, a window appears with three choices:

```
None
Boot Drive Only
With Media Installed
```

None indicates that there is no removable media support whether the drive is selected in BBS as being first, or first in scan order in non-BBS.

Boot Drive Only provides removable media support for a removable hard drive if it is first in the scan order.

With Media Installed provides removable media support wherever the drive(s) actually resides.

CHS Mapping

This option defines the cylinder head sector (CHS) values that will be mapped onto a disk without pre-existing partitioning information. SCSI Plug and Play Mapping is the default value.

To support interchange with non-compatible systems, there is an another option that can be selected by choosing CHS Mapping and then cursoring to "Alternate CHS Mapping".



Note

Neither of these options will have any affect after the disk has been partitioned with the FDISK command.

To remove partitioning, two options are available:

- Reformat the disk using the Format Device option. See the section "Device Selections Menu" below.
- Use the FDISK /MBR command at the C:\ prompt, where MBR represents master boot record.



Important!

Reformatting the disk or using FDISK /MBR erases all partitioning and data that exists. Be careful when using either the Format utility or the FDISK /MBR command that you target the correct disk.



Note

After clearing the partition data, it is necessary to reboot and clear memory or the old partitioning data will be reused, thus nullifying the previous operation.

4.2.8 Device Selections Menu

When you select the Device Selections option, the corresponding menu appears.

Figure 4-7: Device Selections Menu

```
SYM53C895
Device Selections 0-7

Sync    Data    Disc    Time       Scan       Queue
Rate    Width           Out    Bus    LUNS    Tags

0-Dev0 N/A       80      16      On      10     Yes     Yes     Enabled
1-Dev1 N/A       80      16      On      10     Yes     Yes     Enabled
2-Dev2 N/A       80      16      On      10     Yes     Yes     Enabled
3-Dev3 N/A       80      16      On      10     Yes     Yes     Enabled
4-Dev4 N/A       80      16      On      10     Yes     Yes     Enabled
5-Dev5 N/A       80      16      On      10     Yes     Yes     Enabled
6-Dev6 N/A       80      16      On      10     Yes     Yes     Enabled
SYM53C895
```

The settings in this menu affect individual SCSI devices attached to the selected host adapter. Changes made from this menu do not cause the system to reboot upon exit from the SCSI configuration utility. To change a value, select the required device by using the arrow keys and press Enter:

`Device Name`

A new menu appears providing the options and utilities available. For example, you could cursor to Sync Rate to change the Sync Rate value of the chosen device.

4.2.9 Inside Device

Figure 4-8: Inside Device Menu

```
Inside device
          Sync Rate
          Width
          Disconnect
          Read/Write I/O Timeout (secs)
          Scan for Device at Boot Time
          Scan for SCSI LUNs
          Queue Tags
          Format
          Verify
          Help
          Restore Default Setup
          Exit this menu
```

Please review the descriptions of each option below before changing any values.

Sync Rate

The value in MBytes/sec. set with this option defines the maximum data transfer rate the host adapter attempts to negotiate. The host adapter and an SCSI device must agree to a rate they can both handle.

Width

The value in bits set with this option defines the maximum SCSI data width the host adapter attempts to negotiate. The host adapter and an SCSI device must agree to a width they can both handle. Only host adapters that are capable of 16-bit data transfers have this option enabled.

Disconnect

SCSI devices have the ability to disconnect from the initiator during an I/O transfer. This disconnect frees the SCSI Bus to allow other I/O processes. This option tells the host adapter whether or not to allow a device to disconnect. Some devices run faster with disconnects enabled (mostly newer devices), while some run faster with disconnects disabled (mostly older devices).

Read Write I/O Timeout

This option sets the amount of seconds the host adapter waits for a read, write, or seek command to complete before trying the I/O transfer again. Since this provides a safe-guard allowing the system to recover if an I/O operation fails, it is recommended that you always set the time-out to a value greater than zero. A zero value allows unlimited time for an operation to complete and could result in a “hang” if the operation does not complete.

Scan for Device at Boot Time

When there is a device you do not want to be available to the system, set this option to "No" for that device. Also, on a bus with only a few devices attached, you can speed up boot time by changing this setting to "No" for all unused SCSI IDs.

Scan for SCSI Logical Units

You can set this option to "No" if you have problems with a device that responds to all LUNs whether they are occupied or not. For example, if an SCSI device with multiple LUNs exists on your system but you do not want all of those LUNs to be available to the system, then set this option to "No." This will limit the scan to LUN 0 only.

Queue Tags

This option allows you to enable or disable the issuing of queue tags during I/O requests when your device driver can do this.

Format

If enabled, this option allows you to low-level format a magnetic disk drive. Low-level formatting will completely and irreversibly erase all data on the drive.

Verify

This option allows you to read all the sectors on a disk looking for errors. When selected, this option displays the following message.

```
"Verify all sectors on the device
 Press ESC to abort
 Else press any key to continue"
```

Help

This option brings up a help screen with information about the current menu.

Restore Default Setup

This option resets all device selections back to their optimal settings. Select this option to restore all manufacturing defaults for the specified adapter.



Note

All user customized options will be lost upon saving after restoring default setup.

Exit this Menu

This option allows you to leave the current menu screen and return to the previous screen.

Exit the SCSI Configuration Utility

Since some changes only take effect after your system reboots, it is important that you exit this configuration utility properly. Return to the Main menu and exit via the Quit option. If you reboot the system without properly exiting the utility, some changes may not take effect.

4.3 SCSI BIOS Updates

The BIOS-EXTENTION and Configuration-utility can be updated incircuit by using a software tool provided by Symbios Logic, the manufacturer of the SCSI-Chip. Please ask our Support Department for more information.