RadiSys®

SERVICE MANUAL

EPC-3208 Series
CompactPCI® SBC

P/N 007-01166-0000 December 2000

Limited Warranty

A. RadiSys Corporation warrants that the item sold by it hereunder will be free from defects in materials or workmanship, under normal use and service, for a period of 2 years from date of shipment. Said item will meet the specifications in effect at the time of manufacture. RadiSys' sole obligation under this warranty shall be, at its option, to repair or replace, without charge, any defective component of said item, within a reasonable period of time.

B. RadiSys Corporation shall not be liable under this warranty for (i) the item that the Buyer alleges to be defective and was repaired or altered by someone other than RadiSys designated personnel or authorized representative, unless such repair or alteration was effected pursuant to prior written approval of RadiSys, or (ii) where the Buyer fails to notify RadiSys of any alleged defect within the period of warranty, or (iii) where the Buyer fails to return the allegedly defective item to RadiSys Corporation, in Houston, Texas, USA, freight prepaid, or (iv) where the item was altered or damaged in a way which RadiSys reasonably determines to affect the performance and reliability of the item, or (v) where the item was subject to misuse, neglect, or accident. The rights and remedies granted to the Buyer under this paragraph constitute the Buyer's sole and exclusive remedy against RadiSys Corporation, its officers, agents, and employees, for negligence, inexcusable delay, breach of warranty, express or implied, or any other default relating to the item or RadiSys' duties to eliminate any errors.

This warranty supersedes any other warranty, whether expressed, implied, or statutory, including but not limited to any warranty for fitness of purpose, merchantability, or freedom from infringement or the like, and any warranty otherwise arising out of any proposal, specifications, or sample. Furthermore, RadiSys Corporation neither assumes nor authorizes any person to assume for it any other liability.

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Every effort has been made to ensure that the information provided in this manual is complete and accurate. However, technical inaccuracies or typographical errors may be inadvertently included. RadiSys assumes no responsibility for any errors that may be contained in this document. RadiSys makes no promise to update or keep current the information contained in this document. Information in this document, including product specifications, is subject to change without notice.

Important

Always use caution when handling or operating the equipment. Only qualified and trained electronics service personnel should access the equipment. Use extreme caution when installing or removing components. For additional information, please contact RadiSys Technical Support at (800) 438-4769 or (713) 541-8200 Monday through Friday between 7:00 a.m. and 6:00 p.m., Central Time, continental USA.

Wichtig

Arbeiten am System bzw. Betrieb des Systems, sollten immer mit der nötigen Vorsicht vorgenommen werden. Nur qualifiziertes und ausgebildetes Fachpersonal sollte am Inneren des Gerätes arbeiten. Beim Installieren und Entfernen von Komponenten ist besondere Vorsicht geboten.

Für weitere Informationen wenden Sie sich bitte an den Technical Support von RadiSys:

- USA: (800) 438-4769 oder (713) 541-8200 Montags bis Freitags von 0700 Uhr bis 1800 Uhr, Central USA.
- International: +31-36-5365595 Montags bis Freitags von 0830 Uhr bis 1700 Uhr. (CET GMT +1.00)

Changes or modifications not expressly approved by RadiSys Corporation could void the product warranty and the user's authority to operate the equipment.

Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can emit radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at the user's expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation

Any change or modification not expressly approved by the manufacturer is prohibited and could void the user's authority to operate the equipment.

This product also meets requirements for compliance with EN55022, Class B ITE.

Symbols

	**Notice:** This symbol indicates an item for special consideration.
	**Warning:** This symbol indicates the presence of a potential hazard that can cause personal injury. Only qualified and trained electronics service personnel should access the equipment.

Customer Support

Calling Technical Support

1. Have the RadiSys product model and serial number available.
2. Call Tech Support:
   - In the continental USA, Monday – Friday, 7:00 a.m. – 6:00 p.m., Central Time, dial 1-800-438-4769 in the USA.
   - Outside the USA, dial 713-541-8200 (add long distance/international access codes).
   - In Europe, Monday – Friday, 8:30 a.m. – 5:00 p.m., dial +31-36-5365595.

Returning Products for Service

1. Have the RadiSys product model and serial number available.
2. Call Tech Support:
   - In the Continental USA, Monday – Friday, 7:00 a.m. – 6:00 p.m., Central Time, dial 1-800-438-4769 in the USA.
   - Outside the USA, dial 713-541-8200 (add long distance/international access codes).
   - In Europe, Monday – Friday, 8:30 a.m. – 5:00 p.m., dial +31-36-5365595.
3. When you are assigned a Returned Material Authorization (RMA) number by a Technical Support Representative, place it, along with the product serial number, on the packaging materials and correspondence. The factory will be unable to accept delivery without these numbers.
   Note: The factory does not accept RMAs sent freight collect.

Accessing the Web Site

http://www.radisys.com

Upon receiving your equipment, inspect the packaging, shipping materials, and contents.
If damaged, return the equipment to RadiSys in the original packaging and shipping materials.

If you are satisfied with your equipment, retain the packaging and shipping materials in case of future need.

Table of Contents

List of Figures

1 Introduction

This chapter discusses functions and features of the equipment that can be accessed *only* by qualified and trained electronics service personnel. The material contained in this chapter does *not* discuss any user-accessible parts or operations. All tasks related to material in this chapter must be referred to qualified service personnel.

This chapter discusses the primary features of the EPC-3208 Compact PCI SBC.

If you are familiar with the primary features and components of the EPC-3208 SBC, and you wish to quickly begin operating the SBC, go to Chapter 2, “5 Steps to Operation,” on page 7. Then read this chapter later at your convenience.

EPC-3208 Single Board Computer

Standard Features

The RadiSys EPC-3208 (Task Processor) is a low power Single Board Computer (SBC) that provides the following standard features (Figure 1 and Figure 2):

- Intel® Mobile Pentium II™ Processor
  - 333 MHz
  - 256 KB on-die Level 2 write-back cache operating at full clock speed
- Intel 440BX AGPset
  - 82443BX Host Bridge/Controller (System Controller, or North-Bridge)
  - 82371EB PCI-to-ISA/IDE Xcelerator (PIIX4E, or South-Bridge)
- SMC super I/O controller
- Hot Swap Controller (PICMG 2.1 Basic, Full and RadiSys Enhanced Hot Swap)
- EIDE connection for two drives
- Nine or eighteen 64 Mbit or 128 Mbit SDRAM memory chips soldered on-board for 128 MB or 256 MB unbuffered SDRAM with ECC
- CompactFlash™ device at primary IDE port, type I and type II
- Floppy disk controller
- 2 Serial / 1 USB port
- One or two 10/100BaseTX Ethernet with RJ-45 connectors
- Hitachi H8/3437 system IPMI monitoring microcontroller with I^2C bus interface and Preventative Maintenance
- Intel 21554 non-transparent PCI Bridge
- Maxim MAX1617 remote/local temperature sensor with SMBus serial interface
- Dallas DS1232 MicroMonitor
- Integrated Circuit Systems spread clock synthesizer
- CR2032 lithium (Li/MnO_2) coin battery to retain date, time, and CMOS parameters
- Two PCI mezzanine card (PMC) sites with front and rear I/O
- Two RS-232 serial ports (1 rear and 1 front, or 2 rear)
- Parallel port 25-pin female D-Sub connector on the rear I/O panel (AT-compatible / bi-directional / enhanced operations) (in RadiSys standard version)
- One USB Series A male connector on the rear I/O panel (in RadiSys standard version)
- ESD protection for keyboards, serial ports and parallel ports with reduced EMI design
- PS/2 keyboard/mouse 6-pin female mini-DIN connector on the front panel
- IDE activity LED on the rear I/O panel
- System power LED on the rear I/O panel

Optional Features

The EPC-3208 SBC is available with optional on-board peripherals (Figure 1 and Figure 2):

- Two PMC Modules
- If two PMC Modules are present, there will be one 10/100BaseTX Ethernet with RJ-45 connector.
- 128 MB or 256 MB of soldered on-board SDRAM Memory

Ethernet

The Ethernet ports provide the following features and components:

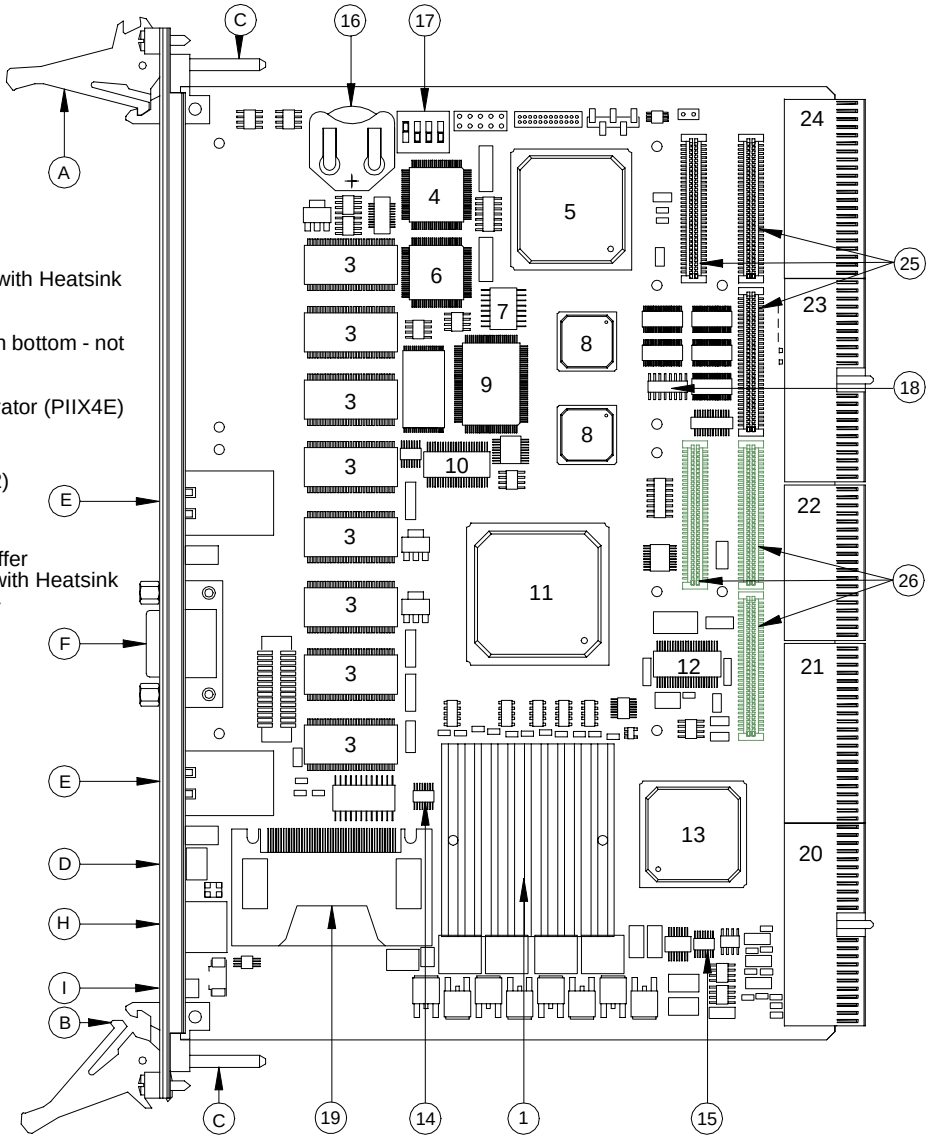
- Intel 82559 10/100 Ethernet PCI Controller
- One or two RJ-45 10/100 Base-TX Ethernet connectors on the Front I/O panel
- Two RJ-45 10/100 Base-TX Ethernet connectors on the Rear I/O panel
- Ethernet activity and link LEDs on the I/O panels

More...

For more information on the components of the EPC-3208, contact:

Company	Web Site
Altera Corporation	http://www.altera.com
Dallas Semiconductor Corporation	http://www.dalsemi.com
Hitachi America Ltd.	http://www.hitachi.com
Integrated Circuit Systems Inc.	http://www.icst.com
Intel Corporation	http://www.intel.com
Maxim Integrated Products	http://www.maxim-ic.com
Standard Microsystems Corporation	http://www.smsc.com
PCI Special Interest Group	http://www.pcisig.com
PICMG	http://www.picmg.com
CompactFlash Association	http://www.compactflash.org

Figure 1. EPC-3208 SBC Components



Circuit Board Components

1. Intel Mobile Pentium II Processor with Heatsink Installed
2. PMC Module
3. SDRAM Chips (8) (10 additional on bottom - not shown)
4. Altera MAX EMP7128S PLD
5. Intel 82371EB PCI-ISA/IDE Xcelerator (PIIX4E)
6. Hitachi H8/3437 Microcontroller
7. Dallas DS1232 MicroMonitor
8. Intel 82559 Ethernet Controllers (2)
9. SMSC FDC37B787 Super I/O Controller
10. ICS 9179BF-01 SDRAM Clock Buffer
11. Intel 82443BX System Controller with Heatsink
12. ICS 9148CF-20 Clock Synthesizer
13. Intel 21554 PCI-to-PCI Bridge
14. Maxim MAX1617 Temperature Sensor
15. Hot Swap Controller
16. CR2032 Li/MnO_2 System Battery
17. DIP Switch Block
18. Maxim MAX3185 Serial Port
19. CompactFlash Memory Device
20. J1 CompactPCI Connector
21. J2 CompactPCI Connector
22. J3 CompactPCI Connector
23. J4 CompactPCI Connector
24. J5 CompactPCI Connector
25. PMC Slot 1 Connections
26. PMC Slot 2 Connections

I/O Panel Components

A. Injector/Ejector Lever (Upper; Closed/Locked)
B. Injector/Ejector Lever (Lower; Open/Unlocked)
C. Guide Pins
D. System Reset Button
E. RJ-45 Ethernet Connectors
F. Serial Port Connector
G. I/O Connectors on PMC card
H. PS/2 Mouse / Keyboard Connectors
I. Hot Swap LED

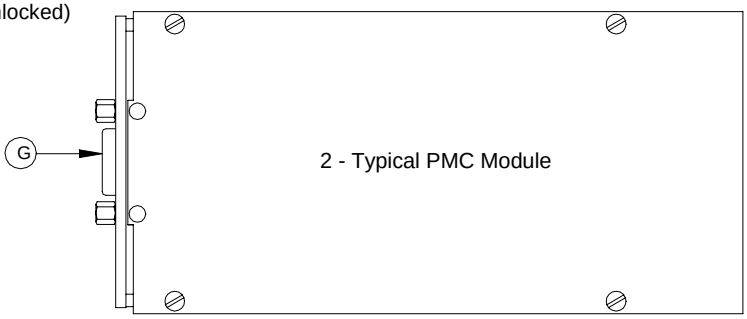
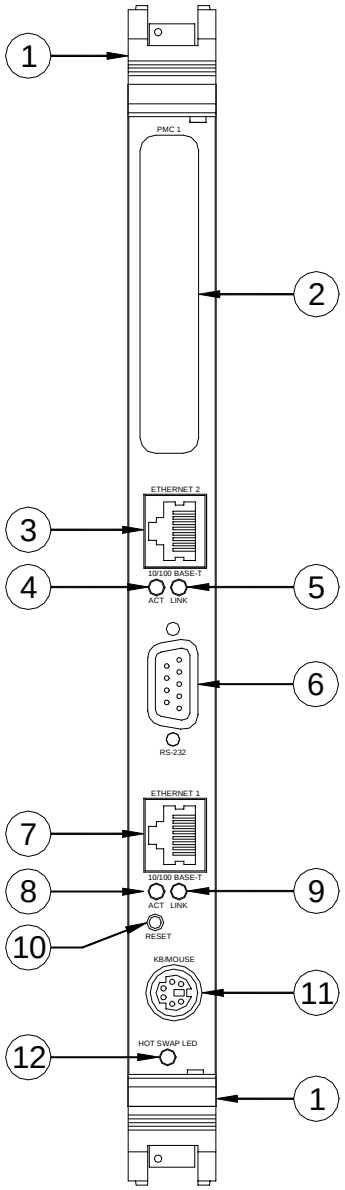
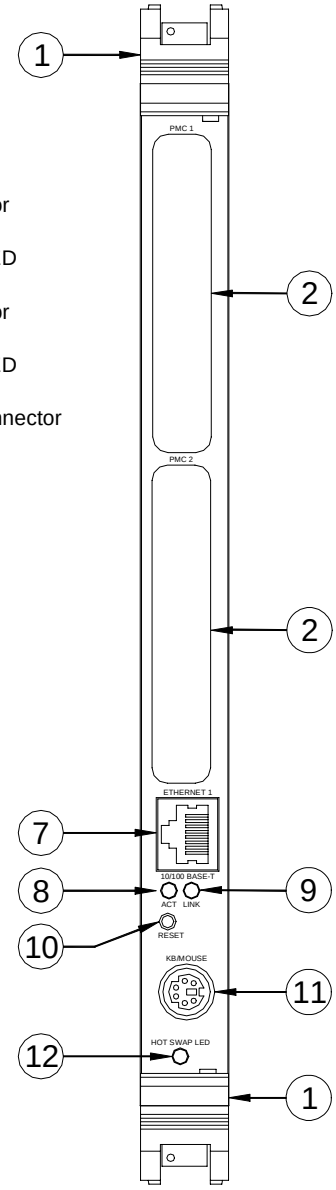


Figure 2. I/O Panel Components



1. Injector/Ejector Levers (2)
2. PMC Access Slot
3. RJ-45 Ethernet 2 Connector
4. Ethernet 2 Activity LED
5. Ethernet 2 Link Integrity LED
6. RS-232 Connector
7. RJ-45 Ethernet 1 Connector
8. Ethernet 1 Activity LED
9. Ethernet 1 Link Integrity LED
10. System Reset Button
11. PS/2 Keyboard/Mouse Connector
12. Hot Swap LED



P2ES Version:
1 PMC, Dual Ethernet, 1 Serial Port

2PE Version:
2 PMC, 1 Ethernet

Notes

2 5 Steps to Operation

This chapter discusses functions and features of the equipment that can be accessed *only* by qualified and trained electronics service personnel. The material contained in this chapter does *not* discuss any user-accessible parts or operations. All tasks related to material in this chapter must be referred to qualified service personnel.

This chapter describes essential precautions for Handling the EPC-3208 SBC and then outlines the basic steps for setting up the SBC:

Step 1: Check Switch Settings

Step 2: Install the SBC

Step 3: Attach Peripheral Devices

Step 4: Power-On the System

Step 5: Run the Setup Utility

Handling the EPC-3208 SBC

Overview

This section suggests basic precautions when handling the EPC-3208 SBC.

Static Electricity

The EPC-3208 SBC design is protected against normal ESD (electro-static discharge) and excessive voltage when operating. However, excessive static electricity can damage components.

Before you handle the SBC, use the grounding wrist strap provided with the system to discharge static electricity. Instructions for using the wrist strap are printed on the strap's envelope.

Handle the SBC by the I/O panel to help prevent accidental damage caused by static discharge (Figure 3).

Safety

It is important to protect yourself and your equipment before you perform any of the procedures outlined in this manual.

You should check the configuration before you install the SBC. If the SBC is already installed in your system and you need to change the configuration, follow all safety precautions as outlined by the chassis manufacturer.

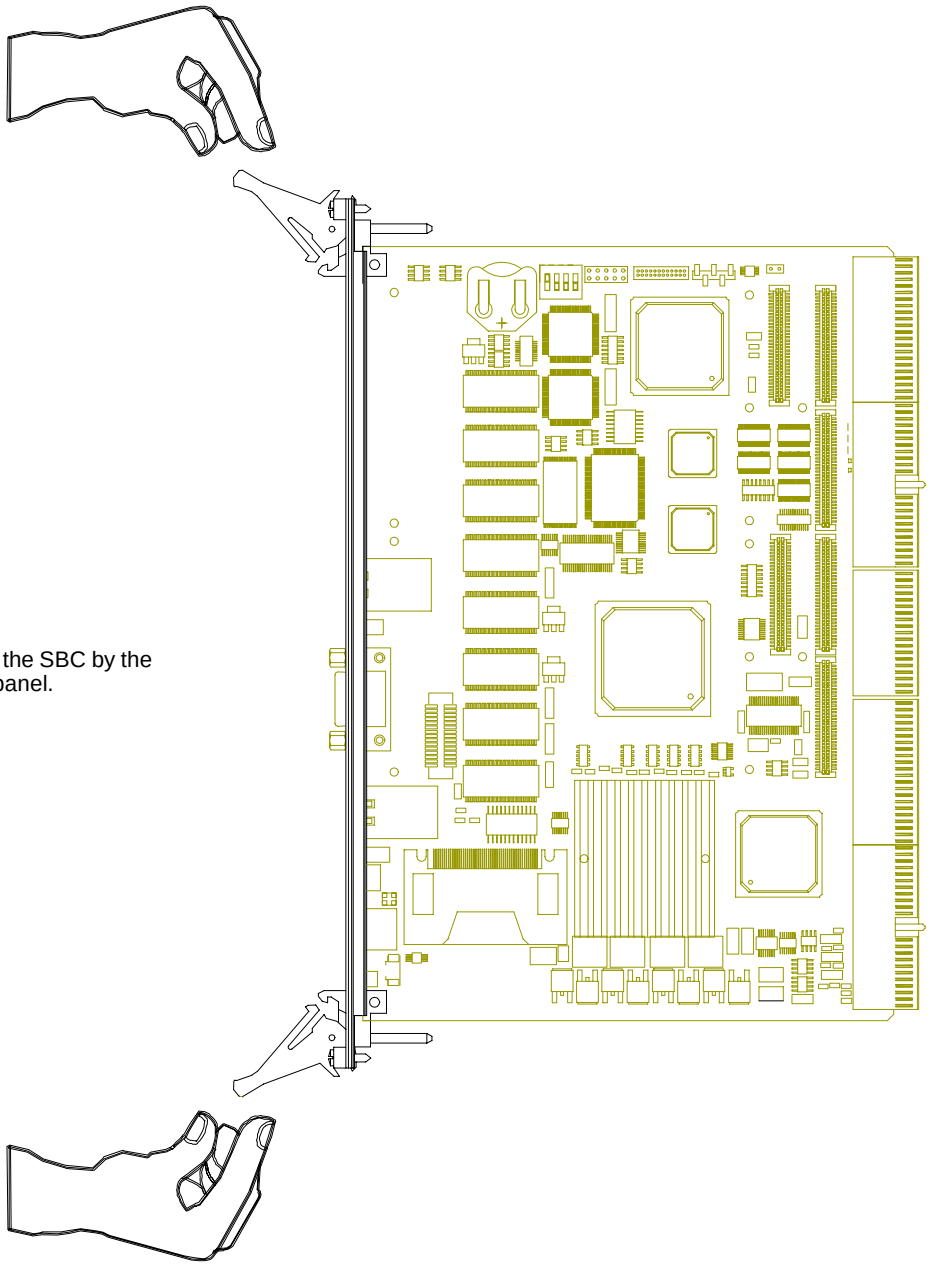
To avoid damage or injury, always power-off the system and disconnect all power cords from their source before handling the equipment. To help prevent accidental damage caused by static discharge, use a grounding wrist strap or other static-dissipating device when handling the equipment.
Um Sachschaden und Verletzung zu vermeiden, schalten Sie vor Arbeiten am Gerät den Netzschalter aus, und ziehen Sie alle Stecker aus den Steckdosen. Um unbeabsichtigte Schäden durch elektrostatische Entladung vorzubeugen, sollte bei Arbeiten am System immer ein Erdungsarmband getragen oder andere elektrostatische Entladungs-Vorsichtsmaßnahmen verwendet werden.

Only qualified, experienced electronics service personnel should access and handle the equipment.
Es sollte nur qualifiziertes und erfahrenes Fachpersonal am System arbeiten.

Next...

Before you install the SBC in a chassis, check the DIP switch settings, outlined in Step 1, page 10.

Figure 3. Safely Handling the SBC



Step 1: Check Switch Settings

Overview

Check the switch block on the EPC-3208 SBC for proper settings (Figure 4).

Switch Block

The switch block contains four DIP switches that you can configure to affect the following items:

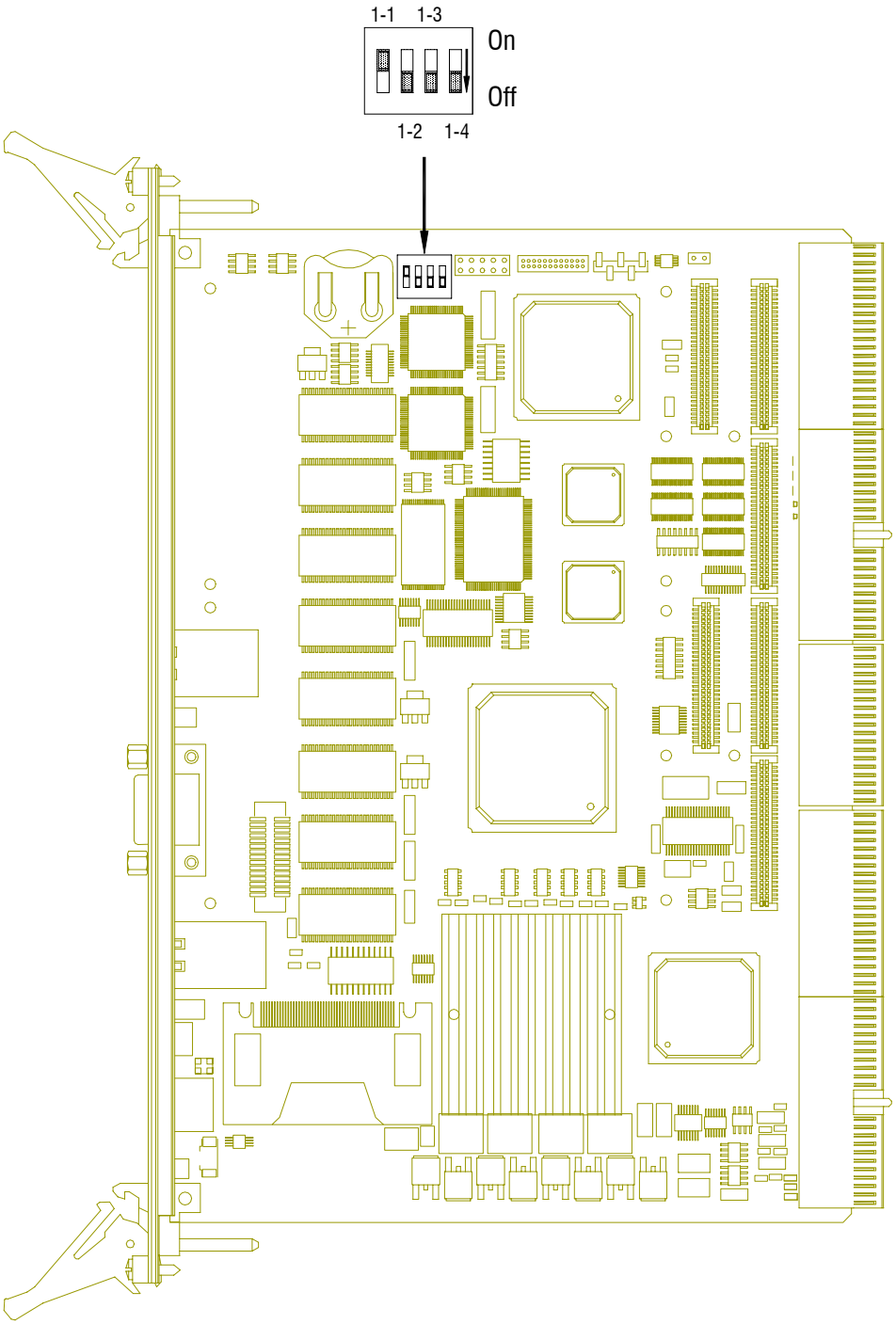
- On-board ROM access
- CMOS RAM
- Configuration ports

Settings

Settings for the switches are provided in the following table:

S1-1	Reserved
S1-2	**On-Board ROM Access**
Open / Off	Crisis Recovery mode disabled (default)
Closed / On	Crisis Recovery mode enabled
S1-3	**CMOS RAM**
Open / Off	Normal operation of CMOS RAM (default)
Closed / On	Factory default values for the Setup Utility are loaded into CMOS RAM
S1-4	**Configuration Ports**
Open / Off	Configuration ports are mapped to I/O address 270 – 273 (default)
Closed / On	Configuration ports are mapped to I/O address 370 – 373

Figure 4. Switch Block Location



A Note on Crisis Recovery

Crisis Recovery mode causes the system to boot from the floppy drive and re-flash the BIOS.
Note: Video is disabled on boot with Crisis Recovery mode enabled.

Before using Crisis Recovery mode, attempt the loading of factory BIOS default values by switching on SW1-3. Use Crisis Recovery mode only if the system will not boot otherwise.

RadiSys Corporation produces a utility to generate a Crisis Recovery Diskette. This diskette is to be used only with Crisis Recovery mode enabled. To acquire the proper release BIOS for this product, contact RadiSys Technical Support. See page v. After downloading the proper release BIOS of the utility, follow the instructions contained in the file README.TXT to generate the diskette. The Crisis Recovery Diskette must be generated on a system that is operating MS-DOS®, Windows® 95, Windows 98, Windows NT®, or OS/2.

Step 2: Install the SBC

Overview

Before you connect any peripheral devices to the EPC-3208 SBC, install the SBC onto a passive backplane in a chassis.

To install the EPC-3208 SBC onto a passive backplane not manufactured by RadiSys, consult the instructions provided by the manufacturer.

Installing the SBC

To install the SBC (Figure 5):

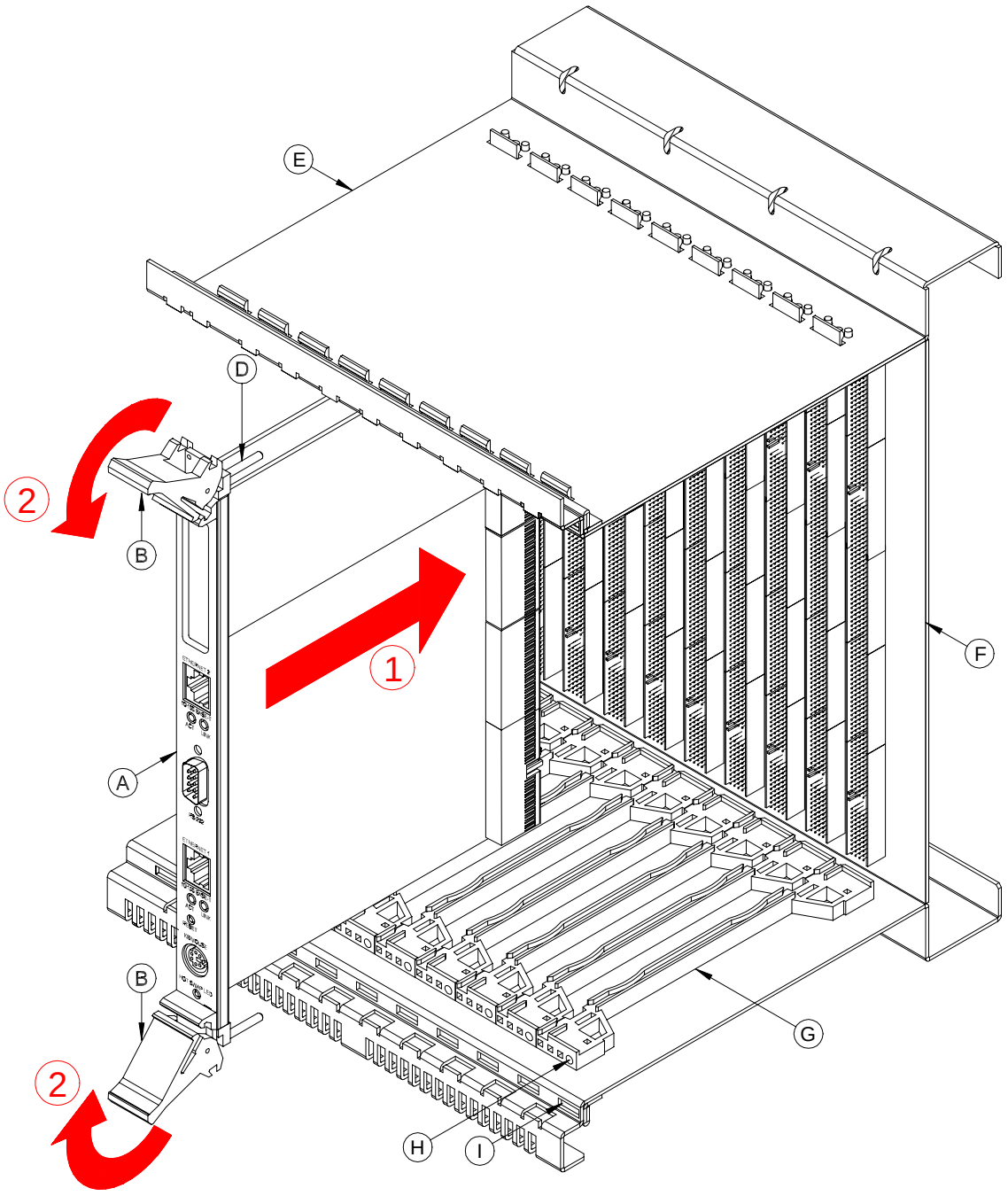
1. Use a grounding wrist strap or other static-dissipating device when accessing and handling the equipment.
2. Locate the “Non-System” slot(s) on the CompactPCI passive backplane.
3. Unlock the injector/ejector levers on the SBC I/O panel (if required).
4. Align the edges of the SBC with the card guide rails in the chassis subrack.
5. Insert the SBC into the chassis subrack with the card edges in the card guide rails. Carefully push the SBC into the chassis subrack until the injector/ejector levers engage the subrack front rails.
   Note: The alignment pins on the SBC I/O panel will insert into the alignment holes in the card guide rails.
6. Lock the injector/ejector levers on the SBC I/O panel.
7. Tighten the captive fasteners on the I/O panel to the subrack front rails.
   Note: The captive fasteners secure the SBC in the chassis subrack.
8. Connect I/O devices. For detailed information, proceed to Step 3, “Attach Peripheral Devices,” on page 14.

The CPU requires unimpeded airflow across the processor within the temperature specifications outlined on page 24. Operations outside these specifications could void the warranty.

Next...

Before you reconnect the power cords and power-on the system, proceed to Step 3, “Attach Peripheral Devices,” page 14.

Figure 5. Installing the SBC



A. SBC I/O panel
B. Injector/ejector levers (upper/lower)
C. Transition I/O card (not shown)
D. Alignment pins (upper/lower)
E. Chassis subrack
F. CompactPCI passive backplane
G. Card guide rails (upper/lower)
H. Alignment hole (upper/lower)
I. Subrack front rails (upper/lower)

Step 3: Attach Peripheral Devices

Overview

After you have installed the EPC-3208 SBC in a chassis, attach peripheral devices to the SBC (Figure 6).

Always power-off the system and disconnect all power cords from their source before connecting or disconnecting cables for peripheral devices.

Attention

When attaching devices to the EPC-3208, certain considerations must be made:

Device(s)	Consideration
Serial	• These ports are 9-pin male D-Sub connectors on the I/O panel. • One serial device can be attached to each 16550-compatible serial port. • These ports both provide an RS-232 interface.  Do not connect an RS-232 device to port 0 on the rear I/O panel if the RS-232 port on the front I/O panel is connected to a device.
Parallel	• This port is a 25-pin female D-Sub connector on the I/O bracket. • The IEEE 1284 port provides a Centronics compatible printer interface. • AT-compatible / bidirectional / EPP / ECP operations are supported.
USB	• The USB bus will support up to 127 USB devices, which can be attached to the Series A connector on the I/O panel in a daisy-chain configuration. • A single USB cable cannot exceed 5 meters (16.4 feet) in length. • Software drivers appropriate to the OS will be needed to operate USB devices. RadiSys does *not* supply such drivers.
PS/2 Devices	• A PS/2 keyboard and mouse can both be attached to this 6-pin female mini-DIN connector on the I/O bracket using a dual PS/2 adapter. For more information, see Figure 9 on page 30. **Note:** This connector can support a PS/2 mouse without an adapter.

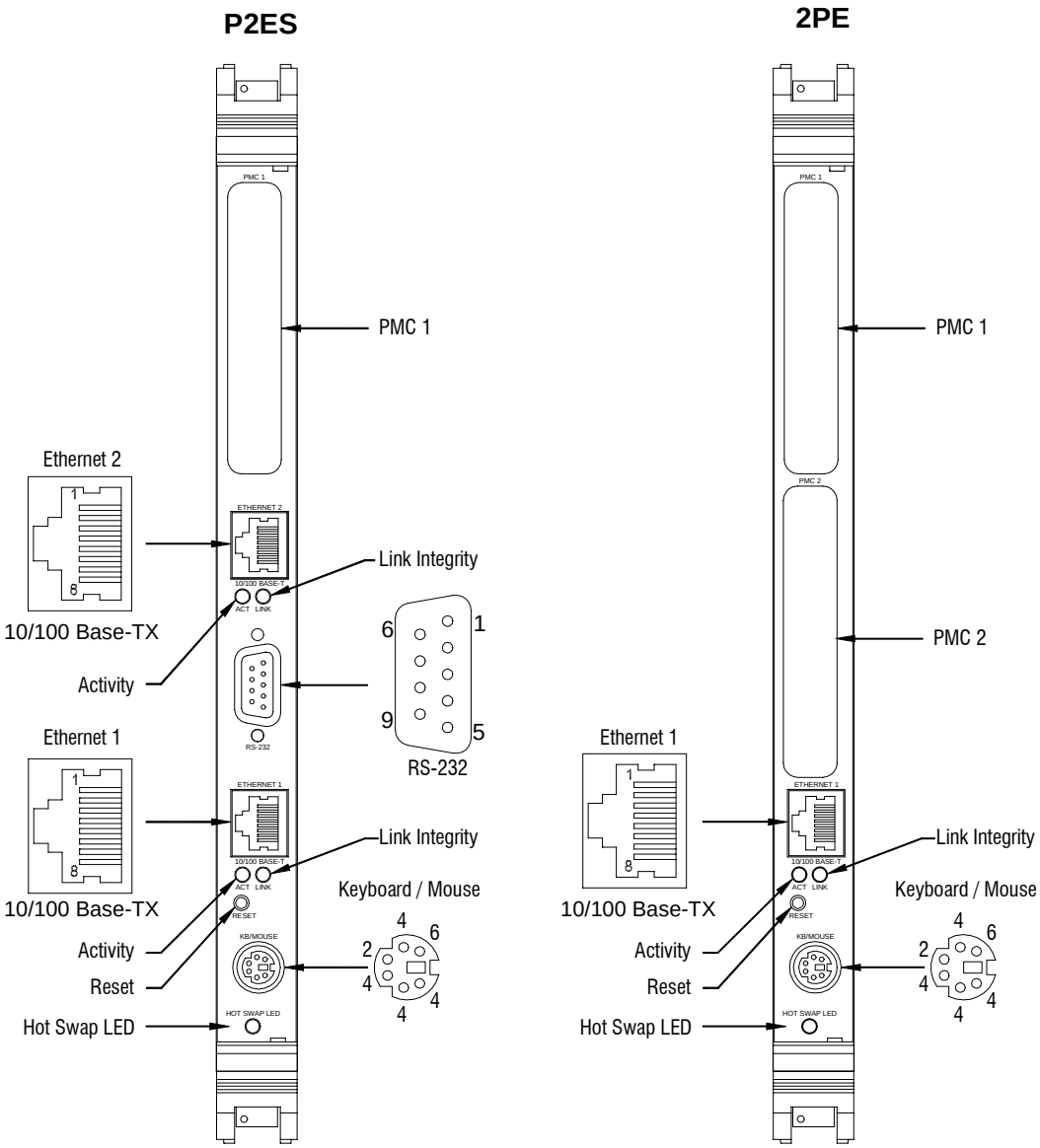
Optional Features

When attaching devices for the optional on-board peripherals of the EPC-3208, certain considerations must be made:

Device(s)	Consideration

Ethernet	• The Ethernet connectors on the I/O panel are 8-pin RJ-45 type.
	• This connector integrates the isolation transformers, common mode chokes, and contact termination.
	• Two (2) LEDs on the I/O bracket indicate the status of Ethernet operations:
	  • Activity: This LED indicates activity on the cable. When activity is occurring, the LED is lit. When activity ceases, the LED will fade.
	  • Link Integrity: This LED indicates whether a valid link is established with the Ethernet controller in either 10 or 100 Mbps. When the link is valid, the LED is lit. When the link has failed or is invalid, the LED will fade.

Figure 6. Peripheral Connectors



For pin signals and positions, see page 29.
For information on compatible peripheral connections, see page 30.

Step 4: Power-On the System

Overview

After you have installed the EPC-3208 SBC and attached the peripheral devices, connect all power cords and power-on the system.

No Power

If the system does not power-on, check all power connections and the power source.

If power connections are secure and the power source is adequate, contact Technical Support. See “Customer Support,” page v.

Startup

After you power-on the system, it will:

- Execute the Power-On Self Test (POST) to ensure that the system is functional and properly configured
- Start the operating system if appropriate boot device is connected and properly configured

Setup

During the POST, you can access the Setup Utility (Figure 7) to configure the system.

Before using the SBC for the first time, you should verify the system settings in the Setup Utility. See page 17.

Figure 7. Setup Utility Main Menu

```
                    RadiSys CPD Setup Utility
 Main    Advanced    Security  Power    Boot     Server      Exit

                                          Item Specific Help

System Time:          [14:41:47]
System Date:          [02/28/2000]

Legacy Diskette A:    [1.44/1.25 Mb 3½"]      <Tab>, <Shift-Tab>, or
Legacy Diskette B:    [Disabled]              <Enter> selects field.

> Primary Master        [Maxtor 7541 A]
> Primary Slave         [None]
> Secondary Master      [LS-120 CSMO  05]
> Secondary Slave       [None]
> Cache Memory
> Boot Options
> Keyboard Features

Extended Memory:      63 MB
Memory Bank 0:        64MB SDRAM
Memory Bank 1:        Not Installed

F1 Help    ↑↓ Select Item     -/+ Change Values       F9  Setup Defaults
ESC Exit   ←→ Select Menu   Enter Select  >Sub-Menu  F10 Save and Exit
```

Step 5: Run the Setup Utility

Overview

The BIOS (Basic Input/Output System) Setup Utility allows you to configure the operations of the EPC-3208.

Access

To access the Setup Utility, press F2 when prompted during the Power-On Self Test (POST).

Main Menu

The Setup Utility display (Figure 7) contains two areas:

- Options: The options for the current menu are on the left side of the screen
- Item-Specific Help: Instructions for the current item are on the right side

Menus

The Setup Utility contains a toolbar at the top of the screen that allows you to access the following menus:

- Main
- Advanced
- Security
- Power
- Boot
- Server
- Exit

Options and items for these menus are listed in the tables beginning on page 19.

Boot and Exit

The Boot and Exit menus do not have “default” values. Items for these menus are not included in the tables below.

Operation

Use the following keys to operate the Setup Utility:

Key	Action
Up Arrow (↑) and Down Arrow (↓)	Select a menu item
Left Arrow (←) and Right Arrow (→)	Select a menu
Plus (+) and Minus (-)	Change the value of an item
Enter	Access a sub-menu or pop-up menu
F1	Access Help for the Setup Utility
F9	Load default values for the setup options
F10	Save the changes you have made and exit the Setup Utility
Esc	Access the Exit menu

Optional Components

The Setup Utility displays the configuration options and values that apply to all installed components. The following tables list items in the Setup Utility that are affected by the optional on-board peripherals.

Ethernet

	Option / Sub-Menu	Item
Advanced	Embedded PCI Devices	Ethernet 1
		Ethernet 2
		Ethernet Port

Main Menu

The options for the Main menu are listed in the following table:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
System Time	N/A	Current Time in Hours, Minutes, and Seconds	N/A
System Date	N/A	Current Date in Month, Day, and Year	N/A
Legacy Diskette A	N/A	1.44/1.25MB 3½"	Disabled, 720KB 3½", 2.88MB 3½", 360KB 5¼", 1.2MB 5¼"
Legacy Diskette B	N/A	Disabled	720KB 3½", 1.44/1.25MB 3½", 2.88MB 3½", 360KB 5¼", 1.2MB 5¼"
» Primary / Secondary Master / Slave	Type	Auto (all 4 possible devices)	User, 1-39, CD-ROM, IDE Removable, ATAPI Removable, Other ATAPI, None
		Note: If this option is set to Auto, the only option available will be 32-Bit I/O. **Note:** Type 15 is Reserved (not available).	
	• Cylinders • Heads • Sectors • Maximum Capacity (Display only)	Enter a value	N/A
	Multi-Sector Transfers	N/A	2 Sectors, 4 Sectors, 8 Sectors, 16 Sectors, Disabled
	LBA Mode Control	N/A	Enabled, Disabled
	32-Bit I/O	N/A	Enabled, Disabled
	Transfer Mode	N/A	Fast PIO 1, Fast PIO 2, Fast PIO 3, Fast PIO 4, FPIO 3/DMA 1, FPIO 4/DMA 2, Standard
	Ultra DMA Mode	N/A	Mode 0, Mode 1, Mode 2, Disabled
	Note: Multi-Sector Transfers, LBA Mode Control, 32-Bit I/O, Transfer Mode, and Ultra DMA Mode do not have default values. Values are inserted when the BIOS queries IDE devices.		
» Cache Memory	Memory Cache (L2 Cache)	Enabled	Disabled
	Cache System BIOS Area	Write Protect	Uncached
	Cache Video BIOS Area	Write Protect	Uncached
	Cache 0 ─ 512 KB	Write Back	Uncached, Write Through, Write Protect
	Cache 512 KB ─ 640 KB	Write Back	Uncached, Write Through, Write Protect
	Cache Extended Memory Area	Write Back	Uncached, Write Through, Write Protect
	Cache A000 ─ BFFF	Disabled	Write Back, Write Through, Write Protect, USWC Caching
	Note: USWC Caching allows burst writes into video RAM. Not all operating systems support this feature.		
	Cache C800 ─ EFFF	Disabled	Write Through, Write Protect, Write Back
» Boot Options	Summary Screen	Enabled	Disabled
	Floppy Check	Disabled	Enabled
	Quiet Boot Screen	Enabled	Disabled
	POST Errors	Enabled	Disabled
	Hard Disk Pre-Delay	No Delay	3 sec., 6 sec., 9 sec., 12 sec., 15 sec., 21 sec., 30 sec.
	Pre-Boot System Idle	Disabled	Enabled
» Keyboard Features	Numlock	Auto	On, Off
	Key Click	Disabled	Enabled
	Keyboard Auto-Repeat Rate	30/sec.	2/sec., 6/sec., 10/sec., 13.3/sec., 18.5/sec., 21.8/sec., 26.7/sec.
	Keyboard Auto-Repeat Delay	1/2 sec.	1/4 sec., 3/4 sec., 1 sec.

Advanced

The options for the Advanced menu are listed in the following table:

	Item	Default Setting	Alternate Settings
» I/O Device Configuration / Integrated Peripherals	Serial Port A	Enabled (user configuration)	Disabled, Auto
		Note: Base I/O Address and Interrupt are available only if the Serial Port is Enabled. **Note:** For console redirection, select Enabled.	
	Serial Port A: Base I/O Address/IRQ	3F8/IRQ4	2F8/IRQ3, 3E8/IRQ4, 2E8/IRQ3
	Serial Port B	Enabled	Disabled, Auto
		Note: Base I/O Address and Interrupt are available only if the Serial Port is Enabled. **Note:** For console redirection, select Enabled.	
	Serial Port B: Base I/O Address/IRQ	2F8/IRQ3	3F8/IRQ4, 2F8/IRQ3, 3E8/IRQ4
	Parallel Port	Enabled	Disabled, Auto
		Note: Mode, Base I/O Address, and Interrupt are available only if the Parallel Port is Enabled.	
	Parallel Port: Mode	Bi-Directional	Output Only (ISA), EPP, ECP
		Note: If Mode is set to ECP, a DMA channel must be set.	
	Parallel Port: Base I/O Address	378	278, 3BC
	Parallel Port: Interrupt	IRQ 7	IRQ 5
	Parallel Port: DMA Channel	DMA 1	DMA 3
		Note: This option is available only if Mode is set to ECP.	
	Floppy Disk Controller	Enabled	Disabled
	Floppy Disk Controller: Base I/O Address	Primary	Secondary
	Local Bus IDE Adapter	Both	Disabled, Primary, Secondary
» Advanced Chipset Control	ECC Configuration	EC	ECC, ECC Scrub, Disabled
	Watchdog Timer Status	Disabled	Enabled
	Watchdog Timer Delay	1.2 sec	150 ms
	Note: For more information on the Watchdog Timer, see page 35.		
	Thermal Duty Cycle	37.5%	12.5%, 25%, 50%, 62.5%, 75%, 87.5%
» PCI Configuration	PCI IRQ Line 1 ─ 4	Auto Select (all IRQ lines)	Disabled, 3 (COM2/COM4), 4 (COM1/COM3), 5 (2nd LPT), 7 (1st LPT), 9 (Open), 10 (Open), 11 (Open), 12 (PS/2 Mouse), 14 (Primary IDE), 15 (Secondary IDE)
	Platform IRQ's Back-Plane PCI IRQ A – D	Disabled	Enabled
	Platform IRQ's Local ENUM # IRQ:	Disabled	3,4,5,7,10,11,12
	USB IRQ Enable	Yes	No
		Note: The USB controller uses PCI IRQ line 4 (INTD).	
	Latency Timer	Auto (64)	32, 96, 128, 160, 192, 224
	Cache Line Size	Auto (8)	8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60
	PCI/PNP ISA UMB Region Exclusion: C800─CBFF, CC00─CFFF, D000─D3FF, D400─D7FF, D800─DBFF, DC00─DFFF	Available (all regions)	Reserved
	PCI/PNP ISA IRQ Resource Exclusion: IRQ 3, IRQ4, IRQ5, IRQ7, IRQ9, IRQ10, IRQ11, IRQ12	Available (all IRQ's)	Reserved
	Embedded PCI Devices: Ethernet 1	Disabled	Enabled
		Note: This Ethernet controller uses PCI IRQ line 1 (INTA).	
	Embedded PCI Devices: Ethernet 2	Disabled	Enabled
		Note: This Ethernet controller uses PCI IRQ line 4 (INTD).	
	Embedded PCI Devices: Ethernet Port	Front Panel	Chassis Panel
	Intel 554 PCI-PCI Bridge: 554 Bridge Setup Override	No	Yes (If "Yes" see Advanced - PCI Configuration section)

Advanced - PCI Configuration

Option / Sub-Menu	Item	Default Setting	Alternate Settings
If "554 Bridge Setup Override" is Yes:	Primary CSR and Downstream Memory 0 BAR		
	Size	4 KB	16KB, 64KB, 256KB, 1MB, 4MB, 16MB, 64MB, 256MB, 1GB
	Type	Anywhere†	"Below 1 MB"
	Pre-fetchable	No †	Yes
	Downstream Memory 1 BAR		
	Size	Disabled	4KB, 16KB, 64KB, 256KB, 1MB, 4MB, 16MB, 64MB, 256MB, 1GB
	Type	Anywhere †	"Below 1 MB"
	Pre-fetchable	No†	Yes
	Downstream Memory 2 BAR		
	Size	Disabled	4KB, 16KB, 64KB, 256KB, 1MB, 4MB, 16MB, 64MB, 256MB, 1GB
	Type	Anywhere †	"Below 1 MB"
	Pre-fetchable	No†	Yes
	Downstream Memory 3 BAR		
	Size	Disabled	4KB, 16KB, 64KB, 256KB, 1MB, 4MB, 16MB, 64MB, 256MB, 1GB, 4GB, 16GB, 64GB, 256GB
	Pre-fetchable	No †	Yes
	Upstream Memory 0 BAR		
	Size	Disabled	4KB, 16KB, 64KB, 256KB, 1MB, 4MB, 16MB, 64MB, 256MB, 1GB
	Type	Anywhere †	"Below 1 MB"
	Pre-fetchable	No†	Yes
	Upstream Memory 1 BAR		
	Size	Disabled	4KB, 16KB, 64KB, 256KB, 1MB, 4MB, 16MB, 64MB, 256MB, 1GB
	Type	Anywhere †	"Below 1 MB"
	Pre-fetchable	No †	Yes
	Upstream Memory 2 BAR		
	Page Size	Disabled	256Bytes, 512Bytes, 1KB, 2KB, 4KB, 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB, 1MB, 2MB, 4MB
	† - Option Hidden if Size Parameter is set to Disabled		

Advanced

The options for the Advanced menu are continued in the following table:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
PS/2 Mouse	N/A	Auto Detect	Disabled, Enabled
CPU BIOS Update	N/A	Enabled	Disabled
Plug & Play O/S	N/A	No	Yes
	Note: If this option is set to Yes, the BIOS will not configure any PCI device on PCI bus 0 unless the device has an on-board ROM, e.g., video or SCSI controllers. **Note:** This option should be set to No while installing a PnP O/S. After the O/S is installed, this option can be set to Yes to allow the O/S to configure the devices.		
Secured Setup Configuration	N/A	Yes	No
	Note: If this option is set to Yes, the BIOS will ignore all Plug and Play configuration change requests made by the PnP O/S.		
Reset Configuration Data	N/A	No	Yes
Large Disk Access Mode	N/A	DOS	Other
	Note: Select Other for UNIX and Novell Netware operating systems. Select DOS for DOS-based, Windows 95/98/NT, OS/2, or other operating systems. If the drive(s) fail during software installation, change this selection and try again.		

Security

The options for the Security menu are listed in the following table:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
Supervisor Password Is	N/A	Clear / Set (Display only)	N/A
User Password Is	N/A	Clear / Set (Display only)	N/A
Set Supervisor Password	N/A	Enter a value	N/A
Set User Password	N/A	Enter a value	N/A

Password on Boot	N/A	Disabled	Enabled
Fixed Disk Boot Sector	N/A	Normal	Write Protect
Diskette Access	N/A	Supervisor	User
Virus Check Reminder	N/A	Disabled	Daily, Weekly, Monthly
System Backup Reminder	N/A	Disabled	Daily, Weekly, Monthly

Power

The options for the Power menu are listed in the following table:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
Power Savings	N/A	Disabled	Customized, Maximum Power Savings, Maximum Performance
	Note: Standby, Auto Suspend, Hard Disk, and Video Timeouts will be disabled if this feature is not set to Customized. **Note:** The following table lists preset options:		
Standby Timeout	N/A	Off	1 Minute, 2 Minutes, 4 Minutes, 6 Minutes, 8 Minutes, 12 Minutes, 16 Minutes
Auto Suspend Timeout	N/A	Off	5 Minutes, 10 Minutes, 15 Minutes, 20 Minutes, 30 Minutes, 40 Minutes, 60 Minutes
Hard Disk Timeout	N/A	Disabled	10 Seconds, 15 Seconds, 30 Seconds, 45 Seconds, 1 Minute, 2 Minutes, 4 Minutes, 6 Minutes, 8 Minutes, 10 Minutes, 15 Minutes
Video Timeout	N/A	Disabled	10 Seconds, 15 Seconds, 30 Seconds, 45 Seconds, 1 Minute, 2 Minutes, 4 Minutes, 6 Minutes, 8 Minutes, 10 Minutes, 15 Minutes
Resume on Time	N/A	Off	On
Resume Time	N/A	00:00:00 (24-hour format)	N/A

Feature	Maximum Power Savings	Maximum Performance
Standby Timeout	1 Minute	16 Minutes
Auto Suspend Timeout	5 Minutes	60 Minutes

Server

The options for the Server menu are listed in the following table:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
Dynamic Console	N/A	Disabled	Enabled
Console Redirect Port	N/A	Disabled	3F8 IRQ 4 (COM 1), 2F8 IRQ 3 (COM 2), 3E8 IRQ 4 (COM 3), 2E8 IRQ 3 (COM 4), 3F8 IRQ 3, 2F8 IRQ 4, 3E8 IRQ 3, 2E8 IRQ 4
Console Redirect Baud Rate	N/A	9600	19200, 38400, 57600, 115200
	Note: For more information on Console Redirection, see page 34.		

3 Technical Data

This chapter discusses functions and features of the equipment that can be accessed *only* by qualified and trained electronics service personnel. The material contained in this chapter does *not* discuss any user-accessible parts or operations. All tasks related to material in this chapter must be referred to qualified service personnel.

This chapter provides the following:

- System Specifications and environmental tolerances
- Description of Platform Management
- Pin Signals for all headers and connectors
- Descriptions of compatible Peripheral Connections
- Notes on Console Redirection
- A description of the Watchdog Timer operations
- Information on Memory
- Instructions for System Battery Replacement
- Information on Product Identification through the system BIOS
- Notes on installing PMC Modules

Specifications

Overview

Listed in the tables below are system specifications and environmental tolerances for the EPC-3208 SBC.

Note: These specifications are subject to change without notice.

Environmental

Environmental tolerances are listed in the following table:

	Operating	Non-Operating
Temperature	0 to 60 °C (32 to 140 °F) at 200 LFM	-40 to 70 °C (-40 to 158 °F)
Humidity	5 to 95% @ 40 °C, non-condensing	0 to 95% @ 40 °C, non-condensing
Shock	1 G @ 10 ms	30 G @ 10 ms
Vibration	0.25 G @ 5 to 150 Hz	5 G @ 5 to 150 Hz
Altitude	15,000 ft (4,572 m)	50,000 ft (15,240 m)

Testing

The operating temperature of the SBC was verified using RadiSys approved or designed video and ethernet PMC modules. Operation of the SBC with other third party PMC modules not validated by RadiSys may yield different results.

Ambient temperature is measured at the leading edge of the CPU heatsink with a 333 MHz processor installed and all components fully populated.

A Note on Thermal Specifications

The technology and power density of the microprocessor is rapidly increasing. The 80386 required less than a few hundred milliamps of current. The 80486DX4 peaked at less than 1.5 A and typically dissipated less than 5 W of power. The 233 MHz Pentium® processor with MMX™ technology requires up to 6.5 A and dissipates as much as 17 W, while the Pentium II and later processors continue this trend toward higher power levels.

RadiSys is continually working to ensure that its products will conform to thermal specifications. However, one peripheral device installed within a chassis can significantly alter operating temperature, and software applications can cause as much as 20 °C variation. Even the cable layout within the chassis can affect airflow and thereby performance.

RadiSys validates the operating specifications of its products by testing with the “hottest” available hardware and software configuration to maximize the power supply draw and generate a worst-case scenario. Despite these efforts, the specifications outlined above are only benchmarks and should be regarded as such.

System

System specifications are listed in the following table:

CPU	Intel® Pentium II™ Processor: • 333 MHz
Chipset	Intel 440BX AGPset
Cache	256 KB integrated Level 2 write-back cache operating at full clock speed
Memory	128 or 256 MB Single bit error correction, double bit detection (ECC mode only)
Addressing	Real and protected mode supported Real address mode:20-bit Protected address mode:16-bit on ISA bus, 32-bit on PCI local bus
Data Path	• 64-bit on-board processor bus at 66MHz • 32-bit on-board PCI bus at 33 MHz • 64-bit CPCI bus
Flash Memory	4 Mb (512 K x 8)
Clock/ Calendar	Embedded Real-Time Clock accurate to +/- 12 minutes/year, at 25 °C; includes 256 bytes of CMOS in NVRAM
Power Requirements excluding PMC Options	Input Power — 23.5 W max. +3.3 V — 3.0 A +5 V — 4.0 A +12 V — 0.2 A -12 V — 0.1 A **Note:** These values represent all components fully-populated.
Battery	CR2032 Lithium (Li/MnO_2)
Form Factor	6U x 4HP x 160 mm, PICMG® / CompactPCI® compliant (Complies with IEEE 1101.1 and 1101.10 mechanical requirements)

Platform Management

Platform management is provided on the EPC-3208 SBC by an on-board intelligent platform management (IPM) controller. The IPM controller is capable of monitoring environmental sensors on the EPC-3208 SBC and communicating with other IPM controllers in an IPM-capable chassis.

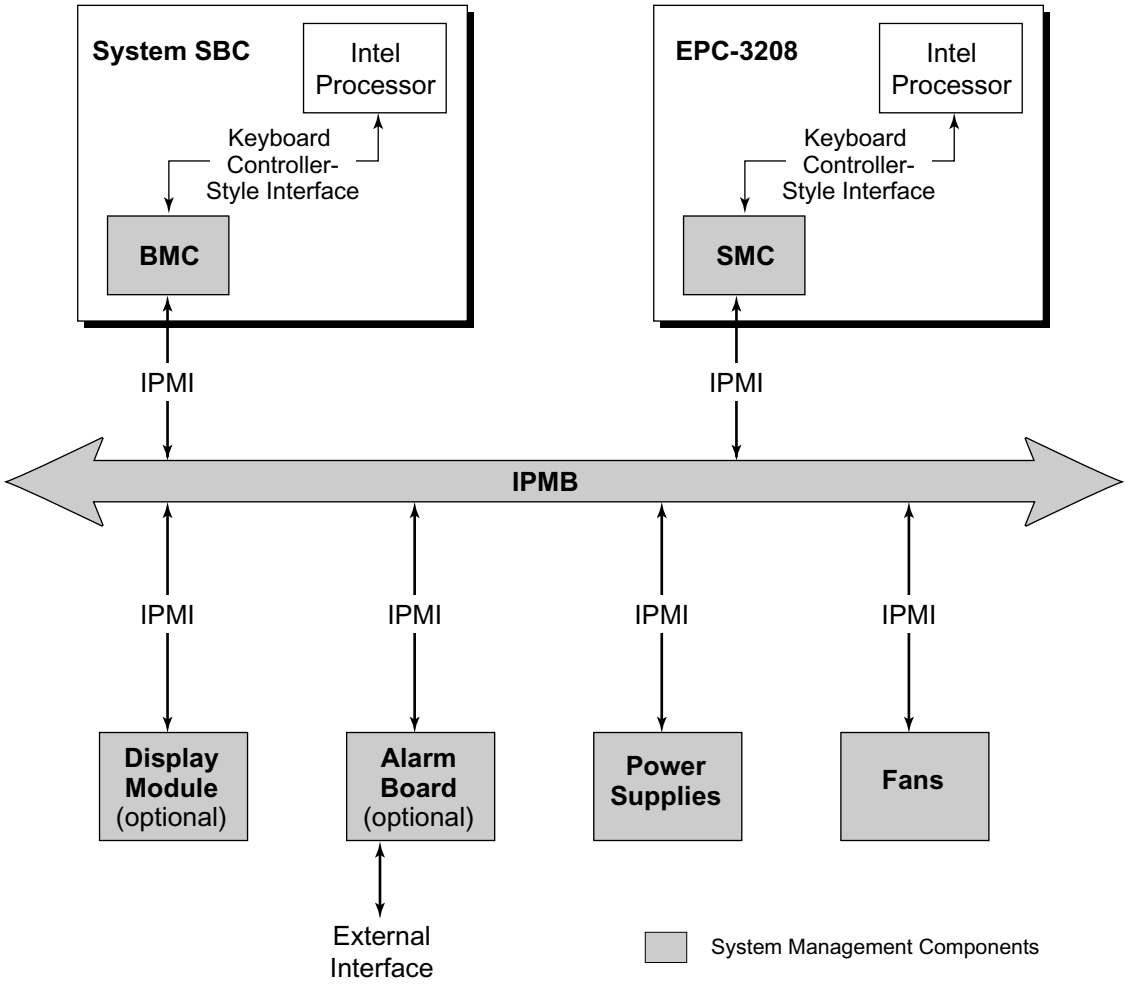
The monitoring and logging functions of the IPM subsystem are independent of the main processors, BIOS, and operating system. This allows devices supporting IPM to communicate even when the system is not powered or operational.

Inter-device communication is provided by the Intelligent Platform Management Bus (IPMB) which connects all intelligent devices. The Inter-Integrated Circuit (I^2C) interface enables the IPMB and is located in the passive backplane of a chassis.

Intelligent devices communicate general state information and event information (such as warnings or critical conditions) to a centralized management controller, the Baseboard Management Controller (BMC). The BMC provides a system event log (SEL) for storing events generated by IPM devices in the chassis.

Figure 1 shows a EPC-3208 SBC in a typical platform management environment.

Figure 8. Platform Management



Satellite Management Controller

Located on the EPC-3208 SBC, the Satellite Management Controller (SMC) provides platform management services for the EPC-3208. The SMC is responsible for monitoring local environmental sensors and for generating platform events when sensor readings cross programmable thresholds.

The SMC supports two interfaces for communicating with system software and other intelligent devices:

- System management software running on a RadiSys EPC-3208 can access the instrumentation through the Satellite Management Controller (SMC). The SMC interfaces with the on-board CPU using a Keyboard Controller-Style (KCS) interface. The KCS interface acts as a gateway between System Management Software (SMS) and the SMC or other intelligent devices located on the IPMB.
- The SMC also contains an interface to the Intelligent Platform Management Bus (IPMB) to allow other intelligent devices to communicate with the SMC.

Sensor Devices

The SMC on the EPC-3208 is responsible for monitoring seven sensors. Six threshold sensors monitor environmental values on the CPU board and one is a discrete sensor monitoring backplane signals.

Six programmable thresholds are associated with each threshold sensor, as follows:

- Low non-critical
- Low critical
- Low non-recoverable
- High non-critical
- High critical
- High non-recoverable

Also, two programmable hysteresis values are associated with each threshold sensor — positive and negative. The SMC monitors the sensors and generates a platform event when one or more programmable thresholds are crossed.

The following two tables list the seven sensors on the EPC-3208 SBC and their factory presets.

Table 1. EPC-3208 SBC Sensors

Sensor No.	Description	IPMI Reading Type	Engineering Units	Conversion Factor (Raw x CF = Eng)	Nominal Value
0	CPU Processor Temperature	Threshold	Degrees C	1.0000	40
1	CPU Board Temperature	Threshold	Degrees C	1.0000	30
2	CPU +5 V	Threshold	Volts	0.032156863	5
3	CPU +2.5 V	Threshold	Volts	0.016078431	2.5
4	CPU +5 V	Threshold	Volts	0.024867974	5
5	Vcore	Threshold	Volts	0.016078431	1.65
6	Slot Address	Discrete			

Table 2. Threshold Sensors and Their Factory Presets

Sensor No.	Description	Low Non-Critical Threshold	Low Critical Threshold	Low Non-Recoverable Threshold	High Non-Critical Threshold	High Critical Threshold	High Non-Recoverable Threshold
0	Processor Temp.	Disabled	Disabled	5.00	50.00	60.00	70.00
1	Board Temp.	Disabled	Disabled	5.00	40.00	50.00	60.00
2	Switched +5 V	4.75	4.60	Disabled	5.25	5.40	Disabled
3	2.5 V	Disabled	2.38	2.30	Disabled	2.63	2.70
4	+5 V	4.75	4.60	Disabled	5.25	5.40	Disabled
5	Vcore	Disabled	1.57	1.52	Disabled	1.73	1.78

Pin Signals

Overview

The tables below list the pin signals for the peripheral connectors. Figure 6 on page 15 indicates the pin positions for each.

Serial Ports 1 & 2	
Pin	**Description**
1	Data Carrier Detect (In)
2	Receive Data (In)
3	Transmit Data (Out)
4	Data Terminal Ready (Out)
5	Ground
6	Data Set Ready (In)
7	Request to Send (Out)
8	Clear to Send (In)
9	Ring Indicator (In)

Parallel Port			
Pin	**Description**	**Pin**	**Description**
1	- Strobe	10	- Acknowledge
2	+ Data Bit 0	11	+ Busy
3	+ Data Bit 1	12	+ Paper Feed
4	+ Data Bit 2	13	+ Select
5	+ Data Bit 3	14	- Auto Feed
6	+ Data Bit 4	15	- Error
7	+ Data Bit 5	16	- Initialize Printer
8	+ Data Bit 6	17	- Select Input
9	+ Data Bit 7	18-25	Ground

RJ-45 Ethernet 1 & 2	
Pin	**Description**
1	Ethernet Transmit (TX+)
2	Ethernet Transmit (TX-)
3	Ethernet Receive (RX+)
4	Ethernet COM
5	Ethernet COM
6	Ethernet Receive (RX-)
7	Ethernet COM
8	Ethernet COM

PS/2 Mouse & Keyboard	
Pin	**Description**
1	Mouse Data
2	Keyboard Data
3	Ground
4	+5 V
5	Mouse Clock
6	Keyboard Clock

See Figure 9 Dual PS/2 Adapter for pin positioning

USB Port	
Pin	**Description**
1	+5 V
2	USB0 Data -
3	USB0 Data +
4	Ground

Connectivity

PMC I/O for J5/P5 follows the guidelines of PICMG 2.3 R1.0.

Peripheral Connections

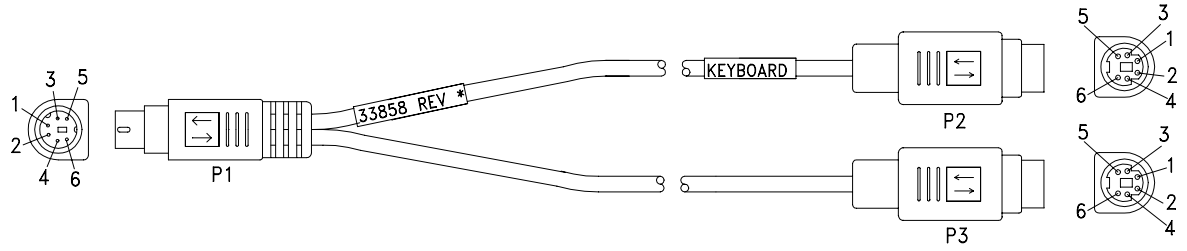
Overview

The EPC-3208 provides controllers to support a variety of peripheral input/output functions. These functions are supported either directly by the EPC-3208, or via a passive backplane or companion rear I/O transition module or PMC Modules.

Controller	Functionality	C	I/O
Intel 82559 Fast Ethernet - Dual	10/100 Base-T Ethernet (RJ-45 connector)	Y	Y
	10/100 Base-T Ethernet LEDs	Y	Y
Optional Components			
Intel 82371EB PCI-TO-ISA/IDE Xcelerator (PIIX4)	Primary EIDE	Y	N
	Secondary EIDE	N	Y
	Primary USB (USB0)	N	Y
SMC FDC37B78X Ultra I/O™ Controller	Serial ports 1 and 2 (COM1 and COM2)	Y	Y
	Parallel port	N	Y
	PS/2 mouse	Y	N
	PS/2 keyboard	Y	N
	Floppy disk drive	N	Y
Standard components	IDE activity LED	N	Y
	System power LED	N	Y
	System reset button	Y	N
C – Connector on the EPC-3208 I/O – Connector / header on transition I/O module			

For more information, see the Transition I/O Module Addendum.

Figure 9. Dual PS/2 Adapter



SBC Connector	
Pin	Description
1	Mouse Data
2	Keyboard Data
3	Ground
4	+5 V
5	Mouse Clock
6	Keyboard Clock

Note: The Dual PS/2 connector can support a PS/2 mouse without an adapter.

Peripheral Connector	
Pin	Description
1	Data*
3	Ground
4	+5 V
5	Clock*
2, 6	Not Connected
* Keyboard or Mouse	

CompactPCI® Connectors

Overview

The tables below list the pin signals for the CompactPCI connectors. The following illustration (Figure 10) indicates pin positions.

J2

Pin	E	D	C	B	A
22	GA0	GA1	GA2	GA3	GA4
21	RSVD	RSVD	RSVD	GND	CLK6
20	RSVD	GND	RSVD	GND	CLK5
19	RSVD	RSVD	RSVD	GND	GND
18	BRSVP2E18	GND	BRSVP2C18	BRSVP2B18	BRSVP2A18
17	GNT6–	REQ6–	PRST–	GND	BRSVP2A17
16	BRSVP2E18	GND	DEG–	BRSVP2B16	BRSVP2A16
15	GNT5–	REQ5–	FAL–	GND	BRSVP2A15
14	AD[32]	GND	AD[33]	AD[34]	AD[35]
13	AD[36]	AD[37]	V(I/O)	GND	AD[38]
12	AD[39]	GND	AD[40]	AD[41]	AD[42]
11	AD[43]	AD[44]	V(I/O)	GND	AD[45]
10	AD[46]	GND	AD[47]	AD[48]	AD[49]
9	AD[50]	AD[51]	V(I/O)	GND	AD[52]
8	AD[53]	GND	AD[54]	AD[55]	AD[56]
7	AD[57]	AD[58]	V(I/O)	GND	AD[59]
6	AD[60]	GND	AD[61]	AD[62]	AD[63]
5	PAR64	C/BE[4]–	V(I/O)	GND	C/BE[5]–
4	C/BE[6]–	GND	C/BE[7]–	BRSVP2B4	V(I/O)
3	GNT4–	REQ4–	GNT3–	GND	CLK4
2	REQ3–	GNT2–	SYSEN–	CLK3	CLK2
1	REQ2–	GNT1–	REQ1–	GND	CLK1

J5

Pin	E	D	C	B	A
22	PMCA 1	PMCA 2	PMCA 3	PMCA 4	PMCA 5
21	PMCA 6	PMCA 7	PMCA 8	PMCA 9	PMCA 10
20	PMCA 11	PMCA 12	PMCA 13	PMCA 14	PMCA 15
19	PMCA 16	PMCA 17	PMCA 18	PMCA 19	PMCA 20
18	PMCA 21	PMCA 22	PMCA 23	PMCA 24	PMCA 25
17	PMCA 26	PMCA 27	PMCA 28	PMCA 29	PMCA 30
16	PMCA 31	PMCA 32	PMCA 33	PMCA 34	PMCA 35
15	PMCA 36	PMCA 37	PMCA 38	PMCA 39	PMCA 40
14	PMCA 41	PMCA 42	PMCA 43	PMCA 44	PMCA 45
13	PMCA 46	PMCA 47	PMCA 48	PMCA 49	PMCA 50
12	PMCA 51	PMCA 52	PMCA 53	PMCA 54	PMCA 55
11	PMCB 1	PMCB 2	PMCB 3	PMCB 4	PMCB 5
10	PMCB 6	PMCB 7	PMCB 8	PMCB 9	PMCB 10
9	PMCB 11	PMCB 12	PMCB 13	PMCB 14	PMCB 15
8	PMCB 16	PMCB 17	PMCB 18	PMCB 19	PMCB 20
7	PMCB 21	PMCB 22	PMCB 23	PMCB 24	PMCB 25
6	PMCB 26	PMCB 27	PMCB 28	PMCB 29	PMCB 30
5	PMCB 31	PMCB 32	PMCB 33	PMCB 34	PMCB 35
4	PMCB 36	PMCB 37	PMCB 38	PMCB 39	PMCB 40
3	PMCB 41	PMCB 42	PMCB 43	PMCB 44	PMCB 45
2	PMCB 46	PMCB 47	PMCB 48	PMCB 49	PMCB 50
1	PMCB 51	PMCB 52	PMCB 53	PMCB 54	PMCB 55

J1

Pin	E	D	C	B	A
25	+5 V	+3.3 V	ENUM–	REQ64–	+5 V
24	ACK64–	AD[0]	V(I/O)	+5 V	AD[1]
23	AD[2]	+5 V	AD[3]	AD[4]	+3.3 V
22	AD[5]	AD[6]	+3.3 V	GND	AD[7]
21	C/BE[0]–	M66EN	AD[8]	AD[9]	+3.3 V
20	AD[10]	AD[11]	V(I/O)	GND	AD[12]
19	AD[13]	GND	AD[14]	AD[15]	+3.3 V
18	C/BE[1]–	PAR	+3.3 V	GND	SERR–
17	PERR–	GND	IPMI_SDA	IPMI_SCL	+3.3 V
16	LOCK–	STOP–	V(I/O)	GND	DEVSEL–
15	TRDY–	GND	IRDY–	FRAME–	+3.3 V
12 – 14	Key				
11	C/BE[2]–	GND	AD[16]	AD[17]	AD[18]
10	AD[19]	AD[20]	+3.3 V	GND	AD[21]
9	AD[22]	GND	AD[23]	IDSEL	C/BE[3]–
8	AD[24]	AD[25]	V(I/O)	GND	AD[26]
7	AD[27]	GND	AD[28]	AD[29]	AD[30]
6	AD[31]	CLK	+3.3 V	GND	REQ–
5	GNT–	GND	RST–	BRSVP1B5	BRSVP1A5
4	INTS	INTP	V(I/O)	Ground	IPMI_PWR
3	INTD–	+5 V	INTC–	INTB–	INTA–
2	BRSVP1E2	BRSVP1D2	BRSVP1C2	+5 V	BRSVP1A2
1	+5 V	+12 V	IPMI_INTR–	-12 V	+5 V

J4

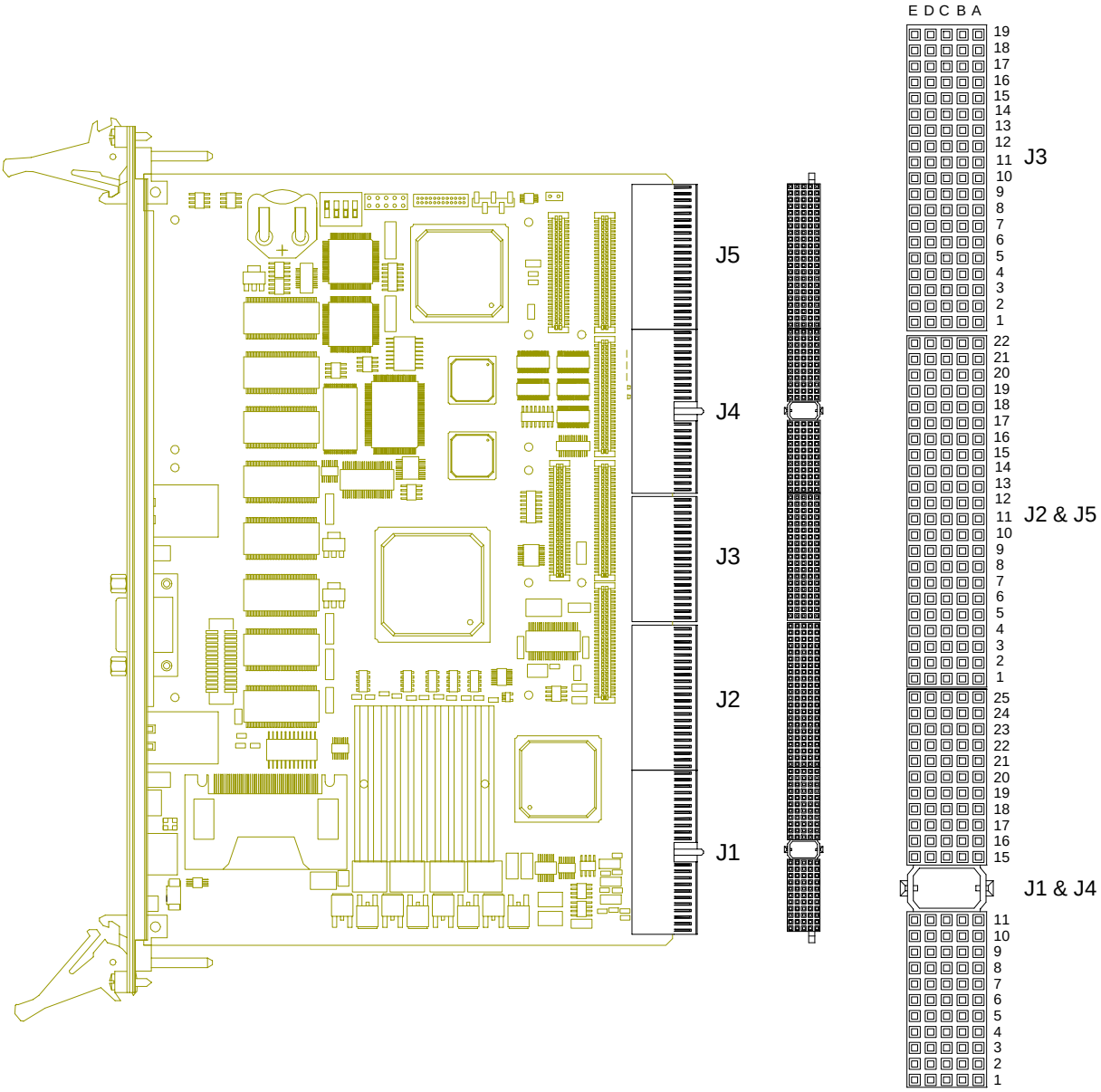
Pin	E	D	C	B	A
25					
24					
23		–12 V			+12 V
22	RSVD	RSVD	RSVD	RSVD	NC (PFS)
21	Sbat	RSVD	RSVD	NC	Sbat
20	NC	NC	NC	NC	NC
19	NC	NC	NC	NC	NC
18	VRG	NC	NC	NC	VRG
17	NC	NC	NC	NC	NC
16	NC	NC	NC	NC	NC
15	Vbat	NC	NC	NC	Vbat
12 – 14	Key				
11	FDWrData	V I/O	FDWE	FDSTEP–	FDDIR
10	FDS0–	+5 V	FDME0-	+3.3 V	FDME1–
9	FDHDSEL–	GND	FDS1–	DRVDEN0	DRVDEN1
8	FDRdData–	+5 V	FDWP–	FDTRK0–	FDINDX–
7	RSVD	GND	FDDSKChg–	+5 V	NC
6	RSVD	GND	PPD0	PPD1	PPD2
5	RSVD	+3.3 V	PPD3	PPD4	PPD5
4	USBP1+	+3.3 V	PPD6	+5 V	PPD7
3	USBP1–	GND	RSVD	PPSLIN–	PPSTB–
2	GND	PPSLCT	PPACK–	PPAutoFD–	PPINIT–
1	PPPE	PPERR–	PPBSY	+3.3 V	RSVD

Notes: – after a signal name denotes an active low signal N/C — Not connected RSVD — Reserved for future I/O expansion Shaded — H.110 power reserved

CompactPCI® Connectors - Continued

J3						
Pin	**F**	**E**	**D**	**C**	**B**	**A**
19	GND	RSVD	HS_LED	+#># V_S	RESET	+3.3 V_S
18	GND	IDEA_D0 (xDD0)	IDEA_D1 (xDD1)	IDEA_D2 (xDD2)	IDEA_D3 (xDD3)	IDEA_D4 (xDD4)
17	GND	IDEA_D5 (xDD5)	IDEA_D6 (xDD6)	IDEA_D7 (xDD7)	IDEA_D8 (xDD8)	IDEA_D9 (xDD9)
16	GND	IDEA_D10 (xDD10)	IDEA_D11 (xDD11)	IDEA_D12 (xDD12)	IDEA_D13 (xDD13)	IDEA_D14 (xDD14)
15	GND	IDEA_D15 (xDD15)	GND	GND	GND	GND
14	GND	Modem_EN	IDEA_Ctl0 (xDA0)	IDEA_Ctl1 (xDA1)	IDEA_Ctl2 (xDA2)	IDEA_Ctl3 (xDDAK-)
13	GND	IDEA_Ctl4 (xCS1-)	IDEA_Ctl5 (xCS3-)	IDEA_Ctl6 (xDIOW-)	IDEA_Ctl7 (xDIOR)	IDEA_Ctl8 (xIDE-RST)
12	GND	GND	GND	GND	EXT_SPKR	IDEA_Rsp1 (xIORDY)
11	GND	+12V_S	KBD0 (KB_CLK-)	KBD1 (KB_DAT)	IDAE_Rsp2 (IRQ14/15)	IDEA_Rsp3 (xDREQ)
10	GND	EA_TX+ (TDA+)	KBD3 (MS_CLK-)	KBD4 (MS_DAT-)	PB_RST-	IDEA_Rsp4 (xIDE_Dasp-)
9	GND	EA_TX- (TDA+)	GND	GND	GND	GND
8	GND	EA_RX+ (RDA)	HD_LED-	-12V_S	RS232A_R0 (RXA)	RS232A_T0 (TXA)
7	GND	EA_RX- (RDA-)	ACT_LED0-	RS232A_R3 (DCDA-)	RS232A_R1 (CTSA-)	RS232A_T1 (RTSA-)
6	GND	GND	LINK_LED0-	RS232A_R4 (RIA-)	RS232A_R2 (DSRA-)	RS232A_T2 (DTRA-)
5	GND	EB_TX+ (TDB+)	GND	GND	GND	GND
4	GND	EB_TX- (TDB+)	ACT_LED1-	RS232B_R3 (DCDB-)	RS232B_R0 (RXB)	RS232B_T0 (TXB)
3	GND	EB_RX- (RDB+)	LINK_LED1-	RS232B_R4 (RIB-)	RS232B_R1 (CTSB-)	RS232B_T1 (RTSB-)
2	GND	EB_RX- (RDB-)	USBA0 (USBP0+)	USBA1 (USBP0-)	RS232B_R2 (DSRB-)	RS232B_T2 (DTRB-)
1	GND	RSVD	GND	+5V_S	GND	+5V_S

Figure 10. Compact PCI Connectors



Note: Pin positions for J4 are identical to J1. Pin positions for J5 are identical to J2.

Console Redirection

Overview

Console, or serial, redirection allows an SBC or motherboard to be installed at a remote location and operated via a serial terminal. Redirection does not require a video controller or keyboard connected to the SBC in order to operate.

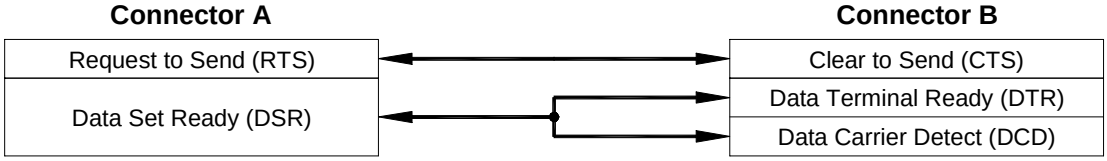
Interrupts

Console redirection utilizes two interrupts:

- **Video:** Redirection uses the video interrupt (10h) to detect any video operations not made by direct screen memory or an I/O controller.
  Note: Because the redirection service sends ASCII data to the serial terminal, only text can be supported, not graphics.
- **Keyboard:** Redirection uses the keyboard interrupt (16h) to receive characters sent from the serial terminal and convert them to the appropriate PC scan codes.
  Note: Operating systems or applications that do not use the interrupt 16h services will require a redirection driver to receive data from the serial terminal.

Cable

For proper operation of most serial terminals, it is strongly recommended that signals from each end of the serial cable be configured as listed below:



Note: The Ring Indicator (RI) signal can be ignored.

The Setup Utility can be accessed through console redirection. However, it is slow because the setup screens are graphical, and each change requires the entire screen to be redrawn.

Configuration

To enable console redirection:

1. Run the Setup Utility. See page 17.
2. Provide a serial port for console redirection.
   Note: A serial port on the SBC can be used for console redirection. See page 17. A serial I/O expansion card can also be used.
3. Select the address and interrupt for the serial port.
4. Set the console redirect port to the same address and interrupt that was selected in step 3. See page 20.
5. Set the baud rate for the console redirect port.
   Note: This must match the baud rate of the serial terminal.
6. Connect the serial cable between the redirection port and the serial terminal.
   Note: Redirection uses XON and XOFF for flow control. For a simple connection, a three-wire serial cable can be used. Only Ground, Transmit, and Receive signals are required.

Console redirection will function once the CPU is reset.

Watchdog Timer

Overview

The watchdog timer provides an escape from a system lockup caused by electrical noise, electrostatic discharge, component power failure, processor hang-up, etc. The watchdog provides the escape by performing a reset of all on-board components.

Reset

Once the watchdog timer detects an activity pulse, an internal timer begins to count down from the preset time delay, either 150 milliseconds or 1.2 seconds. If the watchdog counts down to zero before it detects another pulse, it will perform a reset. This, in turn, issues a reset to the local PCI buses, thereby resetting the devices installed on the buses.

Control

Two features control the watchdog timer operations: Status and Delay. These options are defined in the Setup Utility. See page 17.

- **Watchdog Status:** sets the source of the activity monitored by the watchdog timer.
  - Enabled: the source of the pulse is the CPU Address Strobe (ADS) line.
  - Disabled: the source of the pulse is the CPU system clock.
- **Watchdog Delay:** sets the amount of time in which the system will be monitored for activity, either 150 milliseconds or 1.2 seconds.

User Mode

In addition to the Setup Utility features, there is a User mode to control the watchdog timer operations. A user-controlled bit can be used to block the activity pulse from the watchdog timer. If the control bit is set, the user-defined application must clear the bit within the designated time to prevent a reset.

For more information, contact Technical Support. See “Customer Support,” page v.

Memory

SDRAM Memory Chips

The EPC-3208 contains nine or eighteen SDRAM memory chips soldered to the board (Figure 1). This provides either 128 or 256 MB of on-board memory.

CompactFlash™ Memory

The EPC-3208 supports Type I and Type II CompactFlash memory. Removable memory media cards are secured to the board with a tensile steel spring clip.

Figure 11. CompactFlash Components

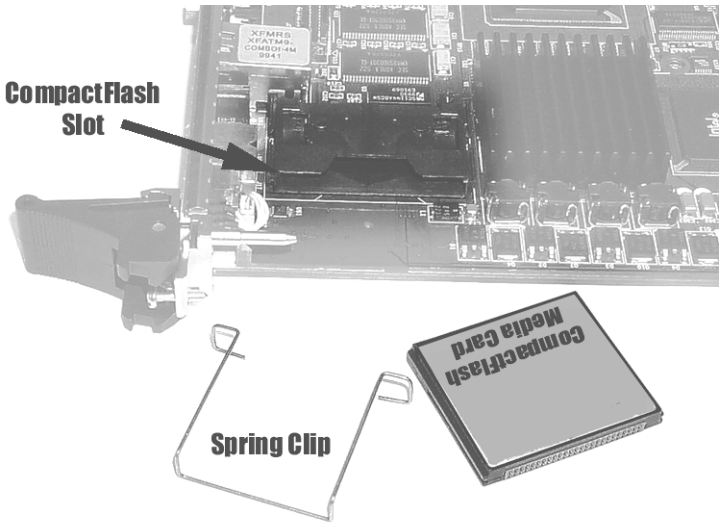


Figure 12. Steps to Install CompactFlash Media Cards

1. Insert the memory card into the CompactFlash slot. Gently push the card into the slot to meet the pins.
2. Place the spring clip next to the CompactFlash socket rotated 90 degrees from its final installed position. The right side of the spring clip will then align with a notch in the base of the CompactFlash slot.

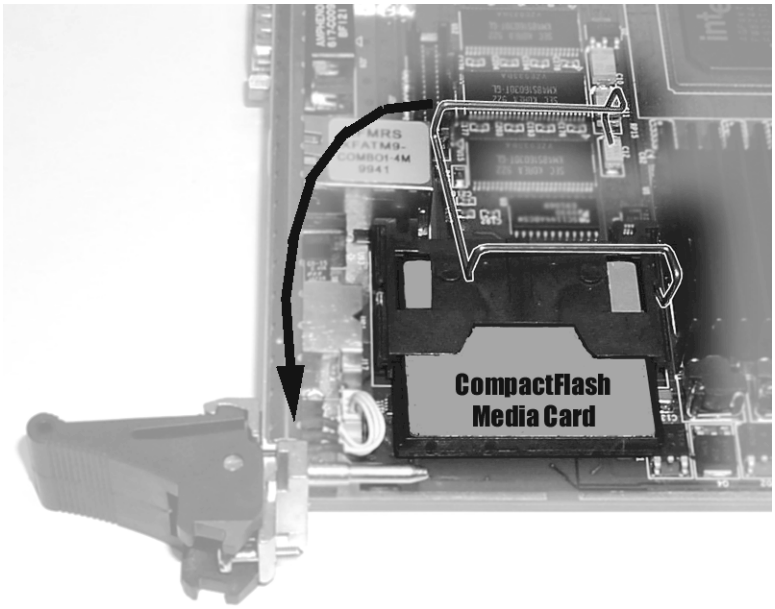
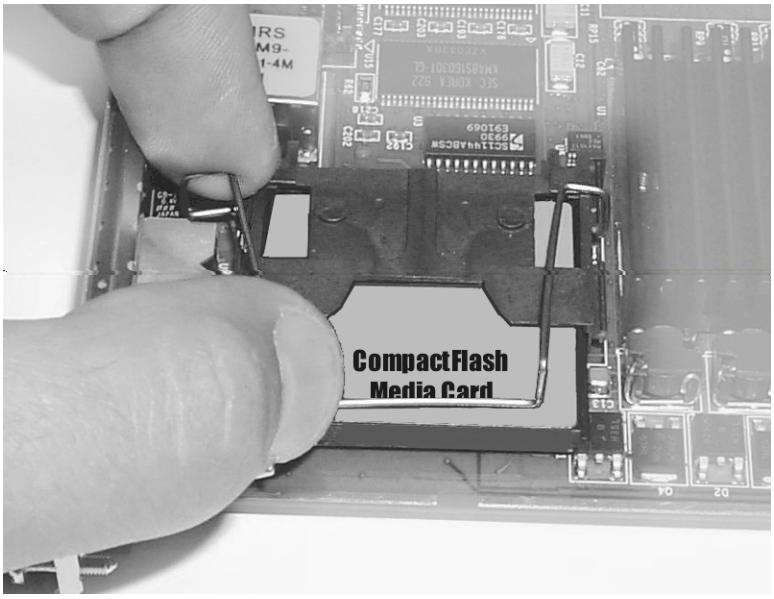
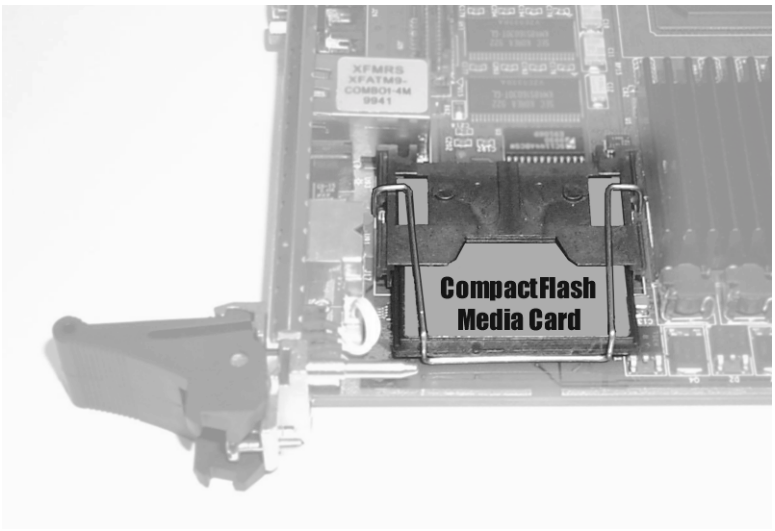


Figure 13. Positioning the Spring Clip



3. Rotate the spring clip -90 degrees to the installed position. The right side of the spring clip will be seated in the right notch, not visible in the photo.
4. Grasp the left side of the spring clip and pull it to the left, then push the clip down, positioning the spring clip in the left notch.

Figure 14. Securing CompactFlash Card



5. Push the center portion of the spring clip downward, to retain the CompactFlash memory card.

Steps to Remove the CompactFlash Memory Card

1. Lift the center portion of the spring clip to release it from the edge of the CompactFlash card.
2. Swing the clip away from the surface of the SBC so that it does not obstruct the removal of the CompactFlash card.
3. Then pull the CompactFlash memory card out of its slot. You may need to use your fingernail or tweezers to grip the edge of the memory card, but be careful not to damage the case.

If not using the CompactFlash feature of the EPC-3208, RadiSys recommends removing the spring clip from the SBC.

System Battery Replacement

Overview

The EPC-3208 utilizes a CR2032 lithium (Li/MnO2) coin battery (Figure 15 on page 39). This 3-volt battery provides power to retain the correct date, time, and computer parameters in CMOS when the system is powered off. This information assists the BIOS in performing initialization and configuration during power-on or reset operations.

The battery must be used or stored within the temperature specifications outlined on page 24.
Bezüglich Betrieb und Lagerung der Batterie beachten Sie bitte die Temperaturspezifikationen auf Seite 24.

Due to risk of fire or explosion, do not attempt to recharge, force open, or heat the battery. There is danger of explosion if the battery is incorrectly installed. Replace the battery only with the same or equivalent type. Reference the battery manufacturer's packaging or labeling for further cautions and warnings.
Wegen Feuer- oder Explosionsgefahr, versuchen Sie nicht die Batterie wieder aufzuladen, sie zu öffnen oder zu erhitzen. Bei falscher Installierung besteht eine Explosionsgefahr. Ersetzen Sie die Batterie nur mit einem Gleichen oder gleichwertigen Typ. Weitere Informationen und Warnungen entnehmen Sie bitte der Verpackung bzw. dem Aufdruck des Herstellers.

Service

The system battery is designed to provide years of service without replacement. However, if configuration or clock-related inconsistencies occur, the battery may need to be replaced.

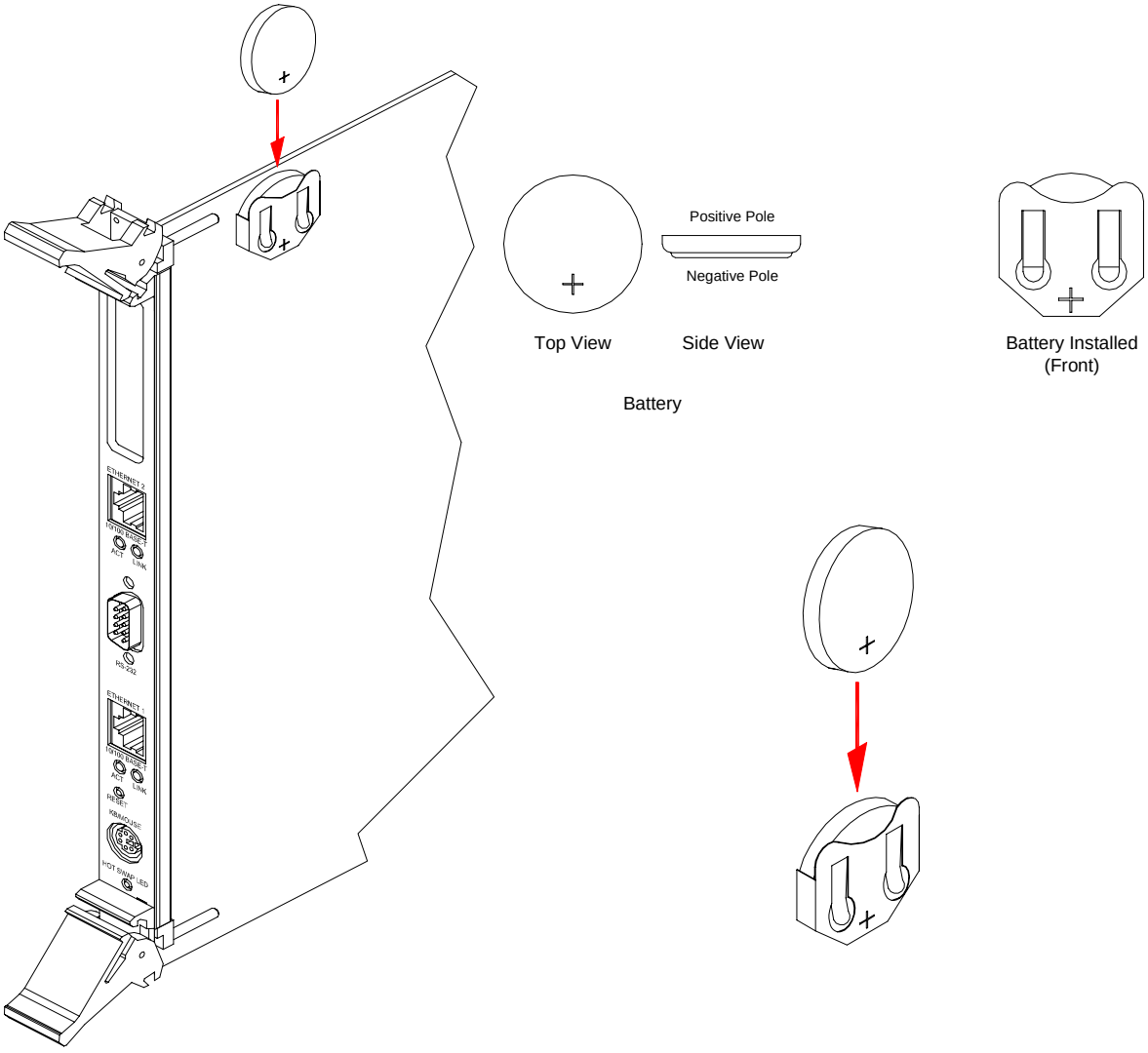
Installation

The procedure for installing the system battery (Figure 15) is outlined in the following table:

Step	Action
1	Power-off the system and disconnect all power cords. **Note:** Use the grounding wrist strap provided with the system to discharge static electricity.
2	Remove the SBC from the chassis.
3	Orient the battery face upward in relation to the battery connector. **Note:** The battery will not discharge voltage if installed upside down.
4	Insert the top edge of the battery beneath the retention brackets at the positive end (top side) of the battery connector.
5	Press the raised edge of the battery downward until it firmly engages with the fastening clips.

The battery housing is powered at 3 Volts. Do not touch the battery housing with metal/conductive objects.

Figure 15. System Battery Components



Product Identification

Overview

All current RadiSys SBCs support product identification. This information is embedded in the BIOS and can be read by an operating system or application. The location of the data is fixed for all current products.

BIOS

The starting location for these fields in the BIOS is F000:FF90h (000FFF90h), and it is identified by the ASCII string "TMI" terminated with a null (0h). All data is stored in ASCII. A map of the data fields is provided in the following table:

Location	Size	Contents
F000:FF90h	4 Bytes	Text string "TMI" terminated with a null
F000:FF94h	Varies	Model ID text string, terminated with a null
F000:FFA0h	8 Bytes	Reserved
F000:FFB0h	2 Bytes	Text string "SN"
F000:FFB2h	12 Bytes	Serial number text string, terminated with a null
F000:FFC0h	Varies	BIOS release text string, terminated with a null

The date on which the BIOS was created can be found at F000:FFF5h. The build date is stored as eight (8) ASCII characters in the format "MM/YY/DD" with no termination character. The BIOS build date is present in any PC-compatible BIOS.

Serial Number

The Serial Number field will contain an ASCII string "SN" then the ASCII serial number string, terminated with a null. RadiSys serial numbers are up to twelve (12) characters in length, using numbers and uppercase letters. The operating system or application must verify the presence of the "SN" string before attempting to retrieve a serial number from the location F000:FFB2h.

Sample

The following is sample content of fields in the locations F000:FF90h through F000:FFF0 on a EPC-3208 series SBC:

Location	ASCII	String
F000:FF90h	54 4D 49 00 45 50 43 2D 33 32 30 38 00 00 00 00	TMI.EPC-3208
F000:FFA0	00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00	....
F000:FFB0	00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00	....
F000:FFC0	34 2E 30 36 61 2E 31 2E-30 00 00 00 00 00 00 00	4.06a.1.0.......
F000:FFD0	00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00	....
F000:FFE0	00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00	....
F000:FFF0	00 00 00 00 00 30 32 2F-32 38 2F 30 30 00 00 00	.....02/28/00...

This identifies a **EPC-3208** model SBC, and the BIOS release is **4.06a.1.0**, built on **02/28/2000**.

PMC Modules

The EPC-3208 may support either one or two Slim PCI Mezzanine Card (PMC) modules for a variety of task processing applications, including ATM, Ethernet, SONET/SDH, T1/E1 and T3/E3 applications.

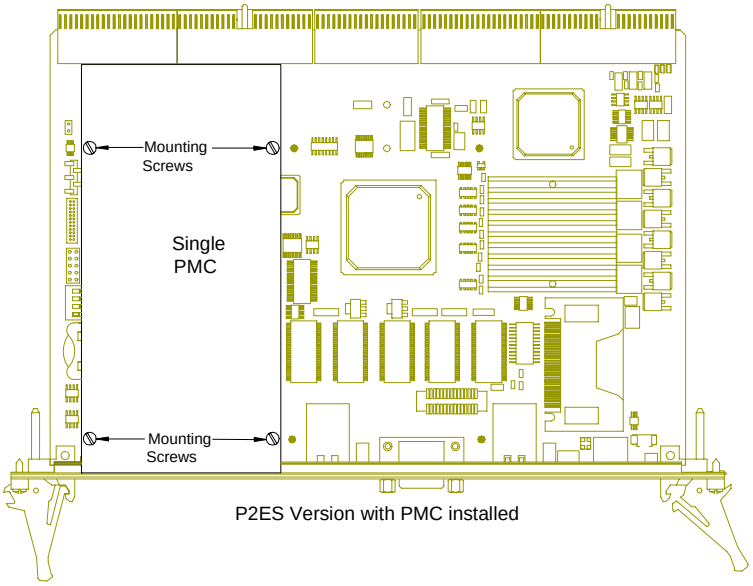
PMC Modules follow the standards developed by the Bus Architecture Standards Committee of the IEEE Computer Standards Committee in P1386/Draft 2 and P1386.1/Draft 2.

Installing PMC Modules

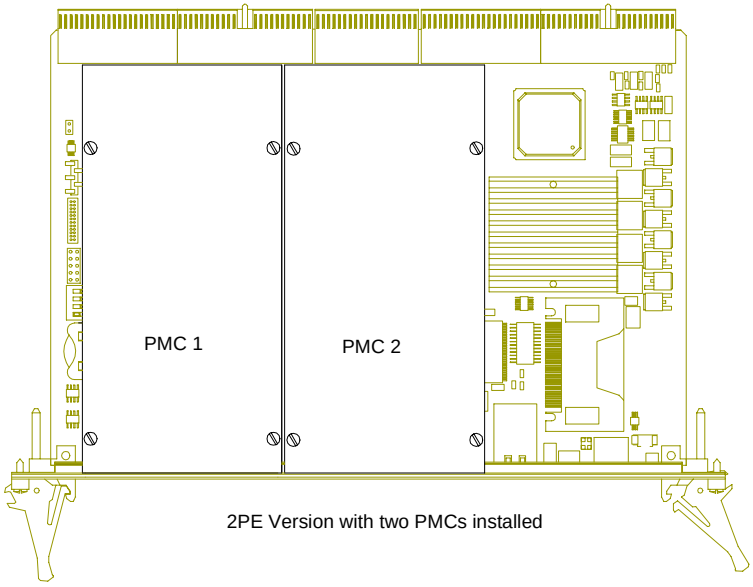
PMC modules have integral connectors that plug into slots on the EPC-3208, see Figure 17 on page 42. Standoffs are built into the PMC to separate the components of the PMC module from the SBC. Do not attempt to change the length of the standoffs.

Each PMC is secured by four screws that attach the PMC module to the circuit board as shown in Figure 16. Use the screws supplied with the PMC module.

Figure 16. PMC Module Installation



P2ES Version with PMC installed



2PE Version with two PMCs installed

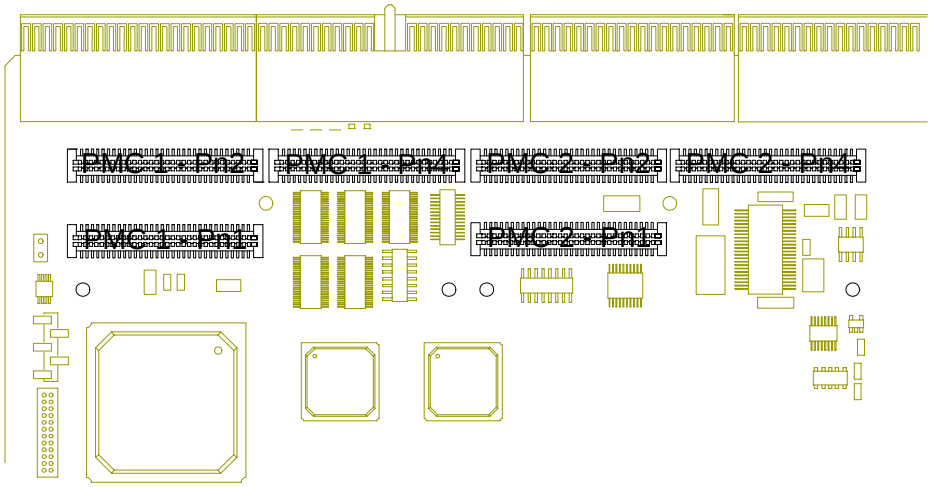
PMC Pin Positions

The following table provides locations and identification of the pins for PMC modules. Pin positions are identical between the one PMC and the two PMC versions of the EPC-3208.

Table 3. PMC Pin Identification

Pn1/Ju1				Pn2/Ju2				Pn4/Ju4			
Pin #	Signal Name	Signal Name	Pin #	Pin #	Signal Name	Signal Name	Pin #	Pin #	Signal Name	Signal Name	Pin #
1	Signal	-12V	2	1	+12V	Signal	2	1	I/O	I/O	2
3	Ground	Signal	4	3	Signal	Signal	4	3	I/O	I/O	4
5	Signal	Signal	6	5	Signal	Ground	6	5	I/O	I/O	6
7	BUSMODE1	+5V	8	7	Ground	Signal	8	7	I/O	I/O	8
9	Signal	Signal	10	9	Signal	Signal	10	9	I/O	I/O	10
11	Ground	Signal	12	11	BUSMODE2	+3.3V	12	11	I/O	I/O	12
13	Signal	Ground	14	13	Signal	BUSMODE3	14	13	I/O	I/O	14
15	Ground	Signal	16	15	+3.3V	BUSMODE4	16	15	I/O	I/O	16
17	Signal	+5V	18	17	Signal	Ground	18	17	I/O	I/O	18
19	V (I/O)	Signal	20	19	Signal	Signal	20	19	I/O	I/O	20
21	Signal	Signal	22	21	Ground	Signal	22	21	I/O	I/O	22
23	Signal	Ground	24	23	Signal	+3.3V	24	23	I/O	I/O	24
25	Ground	Signal	26	25	Signal	Signal	26	25	I/O	I/O	26
27	Signal	Signal	28	27	+3.3V	Signal	28	27	I/O	I/O	28
29	Signal	+5V	30	29	Signal	Ground	30	29	I/O	I/O	30
31	V(I/O)	Signal	32	31	Signal	Signal	32	31	I/O	I/O	32
33	Signal	Ground	34	33	Ground	Signal	34	33	I/O	I/O	34
35	Ground	Signal	36	35	Signal	+3.3V	36	35	I/O	I/O	36
37	Signal	+5V	38	37	Ground	Signal	38	37	I/O	I/O	38
39	Ground	Signal	40	39	Signal	Ground	40	39	I/O	I/O	40
41	Signal	Signal	42	41	+3.3V	Signal	42	41	I/O	I/O	42
43	Signal	Ground	44	43	Signal	Ground	44	43	I/O	I/O	44
45	V(I/O)	Signal	46	45	Signal	Signal	46	45	I/O	I/O	46
47	Signal	Signal	48	47	Ground	Signal	48	47	I/O	I/O	48
49	Signal	+5V	50	49	Signal	+3.3V	50	49	I/O	I/O	50
51	Ground	Signal	52	51	Signal	Signal	52	51	I/O	I/O	52
53	Signal	Signal	54	53	+3.3V	Signal	54	53	I/O	I/O	54
55	Signal	Ground	56	55	Signal	Ground	56	55	I/O	I/O	56
57	V(I/O)	Signal	58	57	Signal	Signal	58	57	I/O	I/O	58
59	Signal	Signal	60	59	Ground	Signal	60	59	I/O	I/O	60
61	Signal	+5V	62	61	Signal	+3.3V	62	61	I/O	I/O	62
63	Ground	Signal	64	63	Ground	Signal	64	63	I/O	I/O	64

Figure 17. PMC Connectors



Notes

Notes