RadiSys®

SERVICE MANUAL

EPC®-2104
(L5000HX)
Single Board Computer

P/N 007-29094-003 September 2001

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. The sole obligation of RadiSys 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 an authorized representative of RadiSys, 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 the duties of RadiSys 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.

The software included with this equipment is warranted only in accordance with the terms of its license agreement. Except as warranted in that license agreement, the manufacturer of the software disclaims all warranties and conditions with regard to the software, including all implied warranties and conditions of merchantability, fitness for a particular purpose, title, and non-infringement.

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 system. Only qualified and experienced electronics service personnel should access the unit's interior. Use extreme caution when installing or removing components. If you have any questions, please contact RadiSys Technical Support at (800) 627-8700 or (713) 541-8200 Monday through Friday between 8:00 a.m. and 5:00 p.m., Central Time, continental USA.

A Lire Imperativement

Quand vous manipulez ou utilisez la système, faites preuve en toutes circonstances de la plus grande prudence. Seuls des techniciens électroniciens qualifiés et expérimentés peuvent avoir accès à l'intérieur de la système. Si vous désirez poser des questions complémentaires, n'hésitez pas à prendre contact avec le Département d'assistance technique de RadiSys au (USA) 1-713-541-8200.

Bitte Zuerst Lesen

Seien Sie immer vorsichtig, wenn Sie mit Ihrem System umgehen oder es bedienen. Nur qualifiziertes, erfahrenes Personal fär Elektronik sollte am Inneren des Gerätes arbeiten. Für Ihre Sicherheit sind Hinweise zur Vorsicht, Win Sie irgenwelche Fragen haben, setzen Sie sich bitte nit der Abteilung fr technische Unterstützung von RadiSys unter der Rufnummer (USA) 1-713-541-8200 in Verbindung.

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.

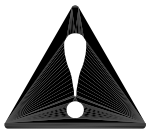
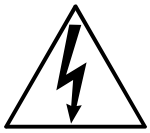
This product also meets requirements for compliance with EN55022, Class B ITE.

Document Conventions

Typography

Title Case	Titles of menus, windows, tabs, lists, and groups.
Bold Title Case	Names of menu items, fields, buttons, icons, check boxes, list items, group items, and keystrokes.
UPPER CASE	Acronyms and abbreviations.
Italics	Emphasis.
Sans Serif Type	Items in tables, illustrations, and notations.
`Monospace Type`	Output from a printer or monitor. Graphic items will be displayed as an image.

Symbols

	**Caution**: indicates an item for special consideration.
	**Warning**: indicates a hazard that can cause personal injury and/or damage to the equipment.
	**High Voltage**: indicates one or both of the following: • The presence of a high electrical current that can cause personal injury and/or damage to the equipment • Electronic parts that can be damaged by electrostatic discharge (ESD)

Customer Support

Accessing the Web Site

In-depth printable service manuals and other documentation are available for download from the RadiSys Web site:

http://www.radisys.com

Then click on Service and Support to access a link to the documentation, drivers, and BIOS. Documentation is available at this Web site in Adobe® Acrobat® .PDF format, and may be viewed and printed using the free Acrobat® Reader™ software. BIOS files are available as self-extracting disk image files. Links are provided to various partners' web sites where any files and tools needed to install drivers are available for download.

Calling Technical Support

1. Have the RadiSys product model and serial number available.
2. Call Technical Support:
   - In the continental USA, Monday – Friday, 8:00 a.m. – 5:00 p.m., Central Time, dial 1–800–627–8700.
   - Outside the USA, dial 1–713–541–8200 (add long distance/international access codes).
   - In Europe, Monday – Friday, 8:30 a.m. – 5:00 p.m., dial +31–36–5365595.

Inspection of Contents / Packaging of Product

The packaging for this product has been tested to assure that it will withstand responsible handling by the carrier.

Caution: Inspect contents immediately and file a claim with the delivering carrier for any damage. Save the shipping box and packaging material to use for any further shipment of this equipment.

However, if the packaging is damaged and is not suitable for shipment, call RadiSys Technical Support to obtain new packaging. The warranty may be void if the product is returned using unapproved or damaged original packaging.

Returning Your Product

A Returned Material Authorization (RMA) number must be written on the outside of the shipping carton of all equipment returned to RadiSys for service and/or repair. It is recommended that any correspondence included with the carton contents also refer to the RMA number.

Note: The factory will refuse the shipment if it is sent freight collect or if it does not display an RMA number.

Table of Contents

List of Figures

1 Introduction

This chapter discusses the primary features of the EPC-2104 (L5000HX).

If you are familiar with the primary components and functions of the EPC-2104, and you wish to quickly begin operating the SBC, go to Chapter 2, "7 Steps to Operation," page 5. Then read this chapter later at your convenience.

EPC-2104 Series SBC

Overview

The RadiSys EPC-2104 Single Board Computer (SBC) provides the following features:

- 100/133/166 MHz Intel™ Pentium® processor (P54C)

Use of a Pentium processor with MMX™ technology (P55C) can cause damage to the equipment and could void the warranty.

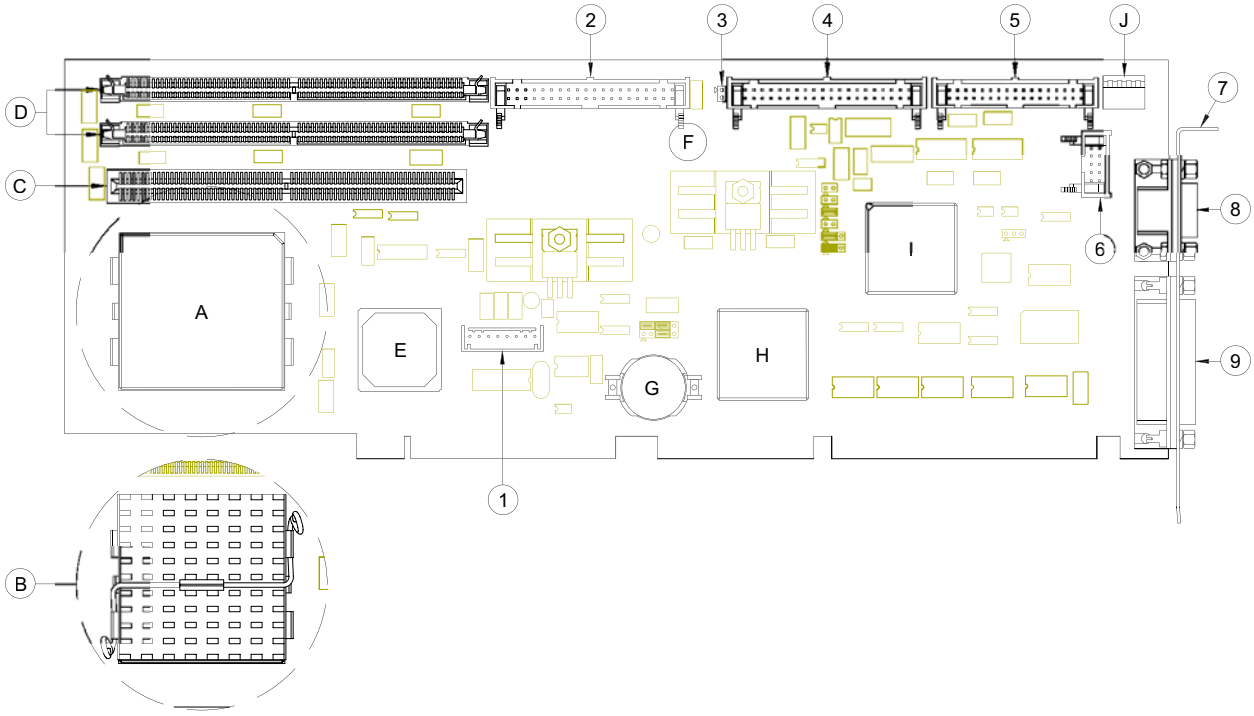
- Intel 430HX PCIset
  - 82439HX System Controller (TXC, or North-Bridge)
  - 82371SB PCI I/O IDE Xcelerator (PIIX3, or South-Bridge)
- SMC FDC37C935 Ultra I/O™ Controller
- 2 Mb (256 KB x 8) flash memory
- Level 2 write-back cache socket for 256 or 512 KB pipeline burst COAST SRAM
- Two (2) SIMM sockets for up to 128 MB scalable DRAM
  Note: The EPC-2104 supports Parity/FPM or Non-Parity, ECC or EDO.
- Two (2) serial ports (one RS-232 or RS-422; one RS-232 only)
- Parallel port (AT-compatible/bi-directional/enhanced operations)
- Floppy drive controller
- Two (2) EIDE hard disk drive controllers

More...

For more information on the components of the EPC-2104, contact:

Company	Telephone	Website
Intel Corporation	(602) 554-8080	http://www.intel.com
Standard Microsystems Corporation	(516) 435-6000	http://www.smsc.com
PCI Special Interest Group	(503) 696-2000	http://www.pcisig.com
PICMG	(781) 246-9318	http://www.picmg.com

Figure 1. EPC-2104 Components and Layout



A. Intel Pentium P54C Processor
B. Pentium Processor with Heatsink
C. Level 2 SRAM Cache Socket
D. DRAM SIMM Sockets
E. Intel 82439HX System Controller (TXC, or North-Bridge)
F. Speaker
G. Battery for CMOS Real Time Clock
H. Intel 82371SB PCI I/O IDE Accelerator (PIIX3, or South-Bridge)
I. SMC FDC37C935 Ultra I/O Controller
J. DIP Switch Block

1. Keyboard Header
2. EIDE Header (Primary Controller)
3. IDE Activity LED Header
4. EIDE Header (Secondary Controller)
5. Floppy Drive Header
6. Serial Port 2 Header
7. I/O Bracket
8. Serial Port 1 Connector
9. Parallel Port Connector

Notes

2 7 Steps to Operation

This chapter describes basic precautions for handling the EPC-2104.

This chapter then outlines the basic steps for setting up the SBC:

1. Check jumper settings
2. Check switch settings
3. Install the SBC
4. Attach peripheral devices to headers
5. Attach peripheral devices to connectors
6. Power-on the system
7. Run the Setup Utility

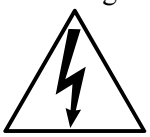
Handling the EPC-2104

Overview

This section suggests basic precautions when handling the EPC-2104 series SBC.

Static Electricity

Static electricity can damage components of the EPC-2104. 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.

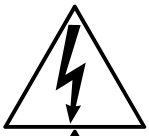


Always handle the SBC by the edges to help prevent accidental damage that can be caused by static discharge (Figure 2).

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, power-off the system and disconnect all power cords from their source. 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 power source before handling the equipment. To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Only qualified, experienced electronics personnel should access the interior of the chassis and handle the equipment.

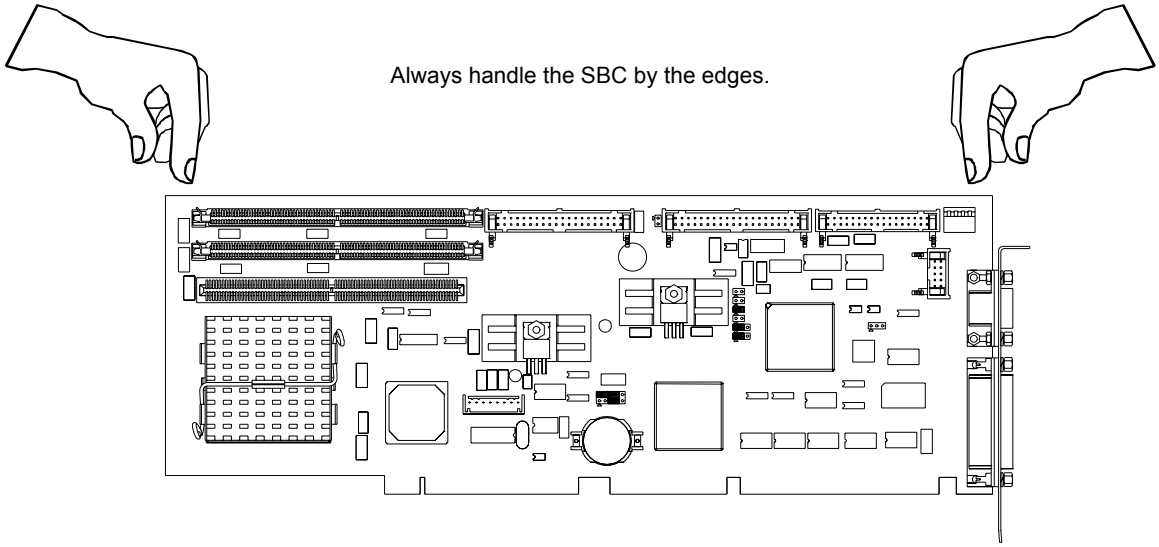
Next...

Before you install the SBC in a chassis, check the following:

- Jumper settings, outlined in Step 1, page 8
- DIP switch settings, outlined in Step 2, page 10

Pay particular attention to the switch settings. The jumper settings are preconfigured at the factory and are appropriate for most applications.

Figure 2. Safely Handling the SBC



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Step 1: Check Jumper Settings

Overview

Before you install the EPC-2104 onto a passive backplane in a chassis, check the jumper settings on the SBC (Figure 3).

Definition

A *Jumper* is a small "bridge" that connects two pins on a Jumper Block. The position of a jumper affects the device's operational parameters.

Jumper Blocks

The EPC-2104 contains:

- Six (6) two-pin jumper blocks (JP1, JP3, JP4, JP5, JP8A, and JP8B)
- Four (4) three-pin jumper blocks (JP2, JP6, JP8C, and JP8D)

Settings

Settings for the jumper blocks are provided in the following tables:

2-Pin Jumper Blocks

JP8A	JP8B	Host Bus Speed
None	B1—B2	66.6 MHz (default)
A1—A2	None	60.0 MHz
A1—A2	B1—B2	50.0 MHz

JP1	JP3	JP4	JP5	Serial 1 Configuration
None	1—2	None	None	RS-232 (default)
1—2	None	1—2	1—2	RS-422

3-Pin Jumper Blocks

JP8C	JP8D	Bus/Core Ratio†	CPU Speed
C2—C3	D2—D3	2/3	100 MHz
C2—C3	D1—D2	1/2	133 MHz
C1—C2	D1—D2	2/5	166 MHz
†The Bus Core Ratio is based on the Host Bus Speed at 66.6MHz.			

JP2	JP6	Reserved
1—2	1—2	Do Not Alter

Figure 3. Jumper Block Locations

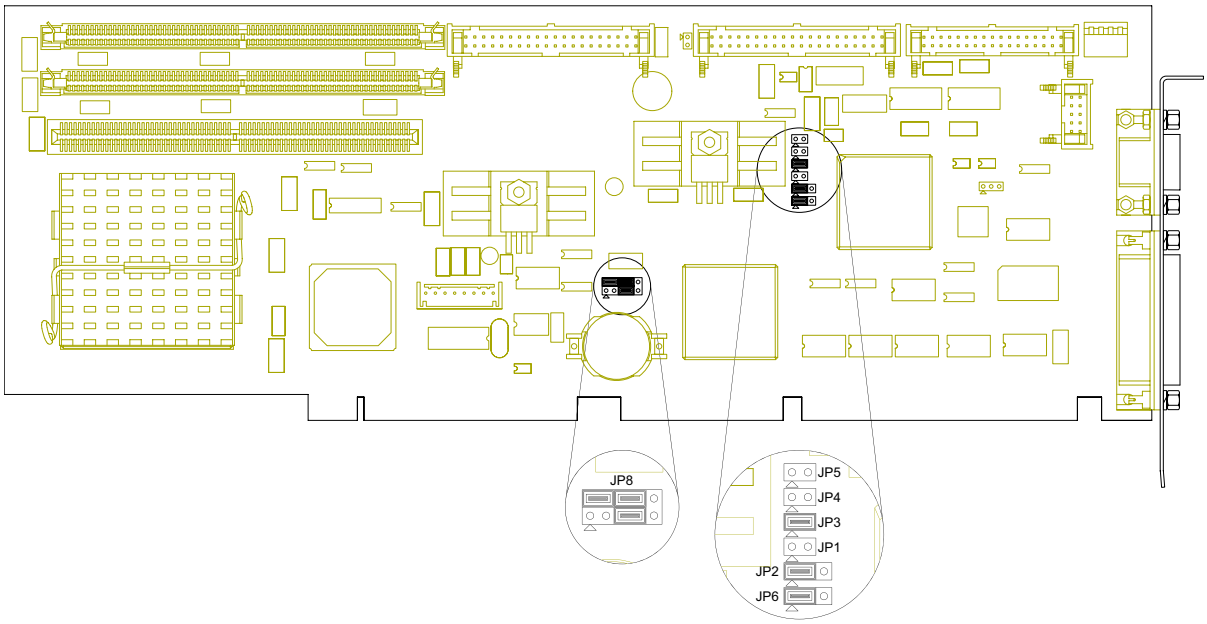
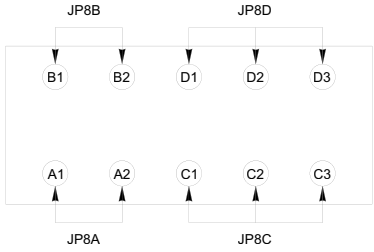
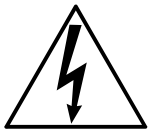


Figure 4. Jumper Block JP8 Pins



	Jumpers	Function
2-Pin	JP8A, JP8B	Host Bus Speed
	JP1, JP3, JP4, JP5	Serial 1 Configuration
3-Pin	JP8C, JP8D	CPU Speed
	JP2, JP6	Reserved



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Step 2: Check Switch Settings

Overview

After you check the jumper settings, check the switch block on the EPC-2104 for proper settings (Figure 5).

Switch Block

The switch block contains four (4) DIP switches that you can configure to affect the following items:

- Default monitor type
- On-board ROM access
- CMOS RAM

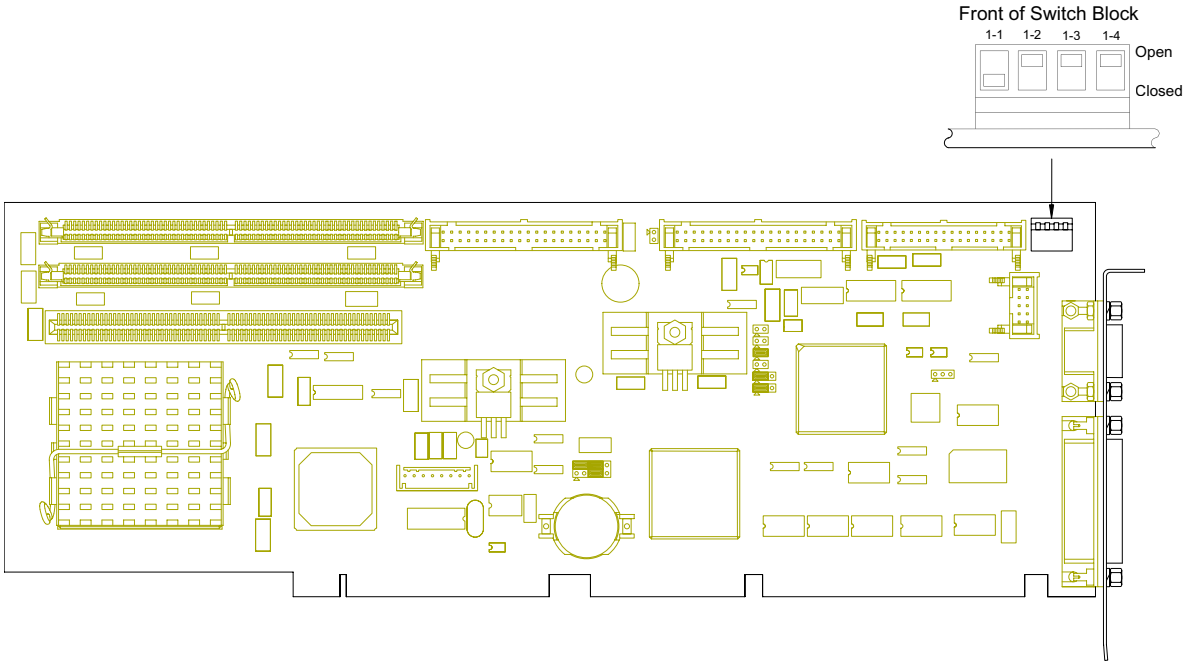
Settings

Settings for the switches are provided in the following table:

SW1-1	**Default Monitor Type**	
	Open	Monochrome monitor
	Closed (default)	Color monitor
SW1-2	**On-Board ROM Access**	
	Open (default)	Flash memory enabled; Crisis Recovery mode disabled
	Closed	Flash memory disabled; Crisis Recovery mode enabled
SW1-3	**CMOS RAM**	
	Open (default)	Normal operation of CMOS RAM
	Closed	Factory default values for the Setup Utility are loaded into CMOS RAM
SW1-4	**Reserved**	
	Open (default)	Do Not Alter

The system will not operate without Memory Bank 0 (SIMM's 1 and 2) filled. For more information on Memory Modules, see page 28.

Figure 5. Switch Block Location



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

A Note on Crisis Recovery

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

Before using Crisis Recovery mode, attempt to load factory CMOS default values by closing Switch 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 vi. After downloading the proper release BIOS of the utility, follow the instructions contained in the file README.TXT to generate the diskette.

Step 3: Install the SBC

Overview

Before you connect any peripheral devices to the EPC-2104, install the SBC onto a passive backplane in a chassis (Figure 6).

Procedure

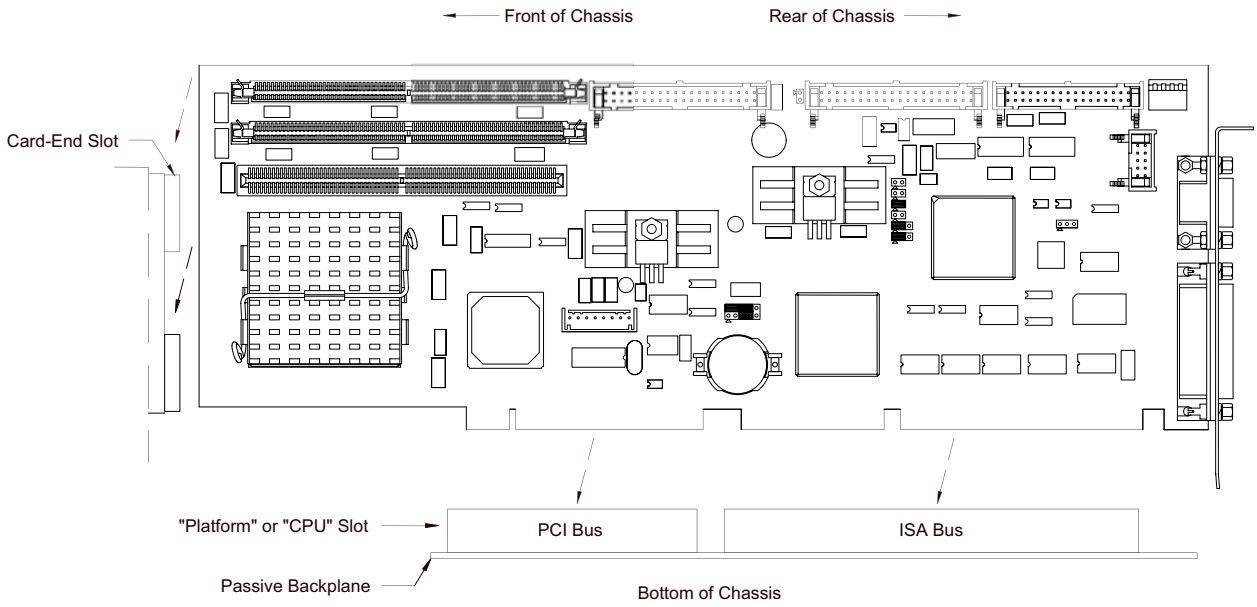
The procedure for installing the SBC is outlined in the following table:

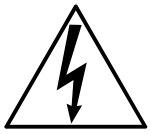
Step	Action
1	Power-off the system and disconnect all power cords. **Note:** Use the grounding wrist strap provided with the system to discharge static electricity.
2	Remove the chassis cover.
3	Detach the circuit card hold-down bracket (if required). This bracket reaches across the tops of the circuit cards and holds them in place.
4	Locate the “Platform” or “CPU” slot on the passive backplane. **Note:** The SBC will not function to its fullest capabilities if it is not installed in the proper slot. For example, if installed in an ISA slot, the SBC will operate, but it will not be able to communicate with 3rd party PCI devices.
5	Remove the I/O bracket spacer from the rear of the chassis (if required). This spacer occupies the area where the SBC’s I/O bracket is accessed from the rear of the chassis.
6	Insert the SBC into the chassis with the card edge aligned in the card-end slot and the I/O bracket in the chassis I/O slot. Lower the SBC to the “Platform” or “CPU” slot on the backplane. Carefully push the SBC connectors into the slot on the backplane. Ensure that the I/O bracket is accessible through the rear of the chassis.
7	Secure the I/O bracket to the fastening lip on the chassis.
Note: To install the EPC-2104 onto a passive backplane not manufactured by RadiSys, follow the instructions provided by the manufacturer.	

If the SBC is installed into a chassis not manufactured by RadiSys, a custom cable might be needed to adapt the keyboard header to the wiring in the chassis. RadiSys does *not* provide such a cable.

The SBC requires a minimum airflow of 200 linear feet per minute (LFM) unimpeded across the CPU within 0 to 60 °C (32 to 140 °F) ambient temperature. Operations outside these specifications could void the warranty.

Figure 6. Installing the SBC





To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment. To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Step 4: Attach Peripherals to Headers

After you have installed the EPC-2104 onto a passive backplane in a chassis, attach the necessary peripheral devices to the appropriate headers on the SBC (Figure 7).

EIDE Drive

Two (2) EIDE (backwards-compatible with IDE) devices can be attached to each EIDE header via a 40-conductor flat cable.
Note: The "red stripe" on the cable should be near Pin 1 on the header.

The BIOS will support up to four (4) IDE drives. Use the primary controller for drives 1 and 2, the secondary controller for drives 3 and 4. The BIOS will automatically configure the IRQ's and I/O Ports for the controllers.

IDE Activity LED

This header connects the IDE activity LED cable to the SBC.
Note: Pin 1 is the anode; Pin 2 is the cathode.

FDD

Two (2) floppy disk drives can be attached to this header via a 34-conductor flat cable.
Note: The "red stripe" on the cable should be near Pin 1 on the header.

Serial Port 2

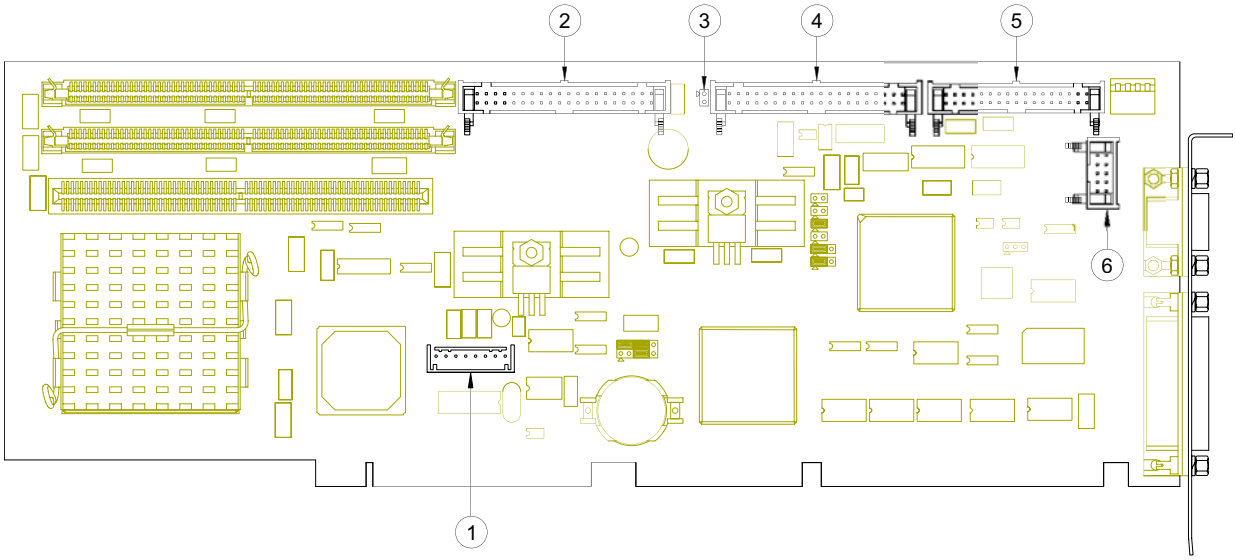
A serial device can be attached to this header (16550-compatible) via a 10-conductor flat cable. If connecting a serial mouse, be sure to use a shielded cable.
Note: The "red stripe" on the cable should be near Pin 1 on the header.

Improperly connecting the cable to this header can cause damage to the cable, SBC, and external serial device, and could void the warranty.

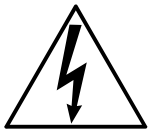
Keyboard

An AT or PS/2 keyboard can be attached to this header with an appropriate 8-pin cable.
Note: The sockets on the RadiSys keyboard header cable are numbered in reverse order when compared to the pinout of the keyboard header on the SBC.

Figure 7. Peripheral Header Locations



1. Keyboard
2. EIDE Drive (Primary)
3. IDE Activity LED
4. EIDE Drive (Secondary)
5. Floppy Drive
6. Serial Port 2



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

For pin signals and positions, see page 26.

Step 5: Attach Peripherals to Connectors

Overview

After you have attached peripheral devices to the headers on the EPC-2104, attach devices to the connectors on the SBC (Figure 8).

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before connecting or disconnecting any cables for the SBC.

Serial Port 1

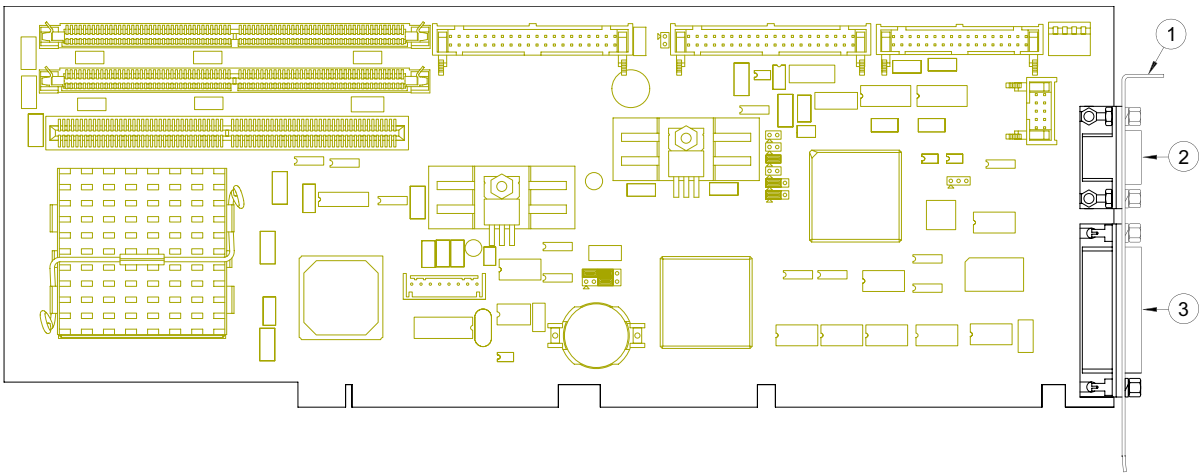
This serial port (16550-compatible) is a DB-9 male connector.

Parallel Port

The IEEE 1284 parallel port:

- Is a DB-25 female connector
- Provides a Centronics-compatible printer interface
- Supports AT-compatible/bi-directional/EPP/ECP operations

Figure 8. Peripheral Connector Locations



1. I/O Bracket
2. Serial Port 1
3. Parallel Port

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

For pin signals and positions, see page 26.

Step 6: Power-On the System

Overview

After you have installed the EPC-2104 and connected all devices, 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 at (800) 627-8700 or (713) 541-8200 between 8:00 a.m. and 5:00 p.m., Central Time, USA. For more information, see "Customer Support," page vi.

Startup

After you power-on the system, it will:

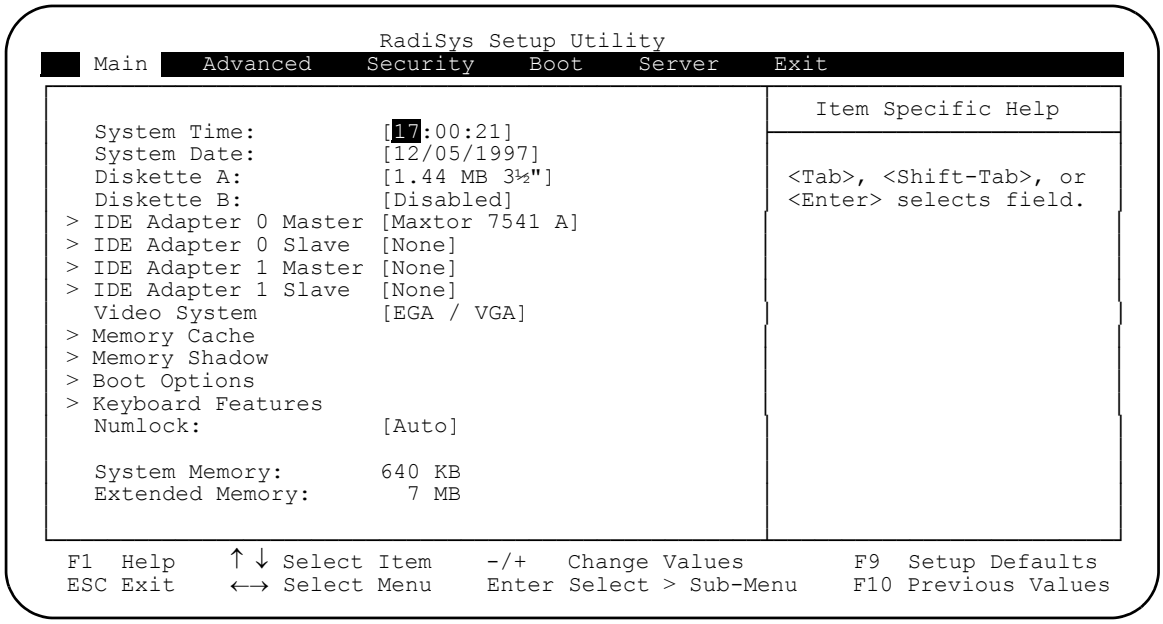
- Execute the Power-On Self Test (POST) to ensure that the system is functional and properly configured
- Start the operating system

Setup

During the POST, you can access the Setup Utility (Figure 9) to configure the system.

Before using the SBC for the first time, you should verify the system settings in the Setup Utility. See page 18.

Figure 9. Setup Utility Main Menu



Step 7: Run the Setup Utility

Overview

The BIOS (**B**asic **I**nput/**O**utput **S**ystem) Setup Utility allows you to configure the operations of the EPC-2104.

Access

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

Display

The Setup Utility display (Figure 9) contains two areas:

1. Options: The options for the current menu are on the left side of the screen
2. 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
- 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 (when an item with the sub-menu character > is highlighted)
F1	Access Help for the Setup Utility
F9	Load default values for the setup options
F10	Cancel the changes you have made and load the previous values for the setup options
Esc	Access the Exit menu

Main Menu

The options and item values for the Main menu are listed in the table below:

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
Diskette A	N/A	1.44 MB 3½"	Not Installed, 720 KB 3½", 2.88 MB 3½", 360 KB 5¼", 1.2 MB 5¼"
Diskette B	N/A	Not Installed	720 KB 3½", 1.44 MB 3½" 2.88 MB 3½", 360 KB 5¼", 1.2 MB 5¼"
> IDE Adapter 0/1 Master/Slave	Type	Auto (All 4 IDE devices)	None, User, 1-39, CD
		Note: If Type is set to Auto, the only option available is 32-Bit I/O.	
	• Cylinders • Heads • Sectors/Track	Enter a value	N/A
	Write Precomp	None	N/A
	Multi-Sector Transfers	Disabled	2 Sectors, 4 Sectors, 8 Sectors, 16 Sectors
	LBA Mode Control	Enabled	Disabled
	32-Bit I/O	Disabled	Enabled
	Transfer Mode	Standard	Fast PIO 1, Fast PIO 2, Fast PIO 3, Fast PIO 4
Video System	N/A	EGA / VGA	CGA 80x25, Monochrome
> Memory Cache	External Cache	Enabled	Disabled
	Cache System BIOS Area	Enabled	Disabled
	Cache Video BIOS Area	Enabled	Disabled
	Cache C800—DFFF	Disabled (All regions)	Enabled
> Memory Shadow	System Shadow	Enabled	N/A
	Video Shadow	Enabled	Disabled
	Regions with Legacy Expansion ROMs	ROM	Shadow RAM
		Note: This feature is available only for ISA ROMs.	
> Boot Options	Summary Screen	Enabled	Disabled
	Floppy Check	Disabled	Enabled
	Quiet Boot (Graphic)	Disabled	Enabled
	POST Errors	Enabled	Disabled
> Keyboard Features	Numlock	Auto	On, Off
	Key Click	Disabled	Enabled
	Keyboard Auto-Repeat Rate	30/sec	26.7/sec, 21.8/sec, 18.5/sec, 13.3/sec, 10/sec, 6/sec, 2/sec
	Keyboard Auto-Repeat Delay	1/2 sec	1/4 sec, 3/4 sec, 1 sec
System Memory	N/A	Display only	N/A
Extended Memory	N/A	Display only	N/A

Advanced

The options and item values for the Advanced menu are listed in the table below:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
> Integrated Peripherals	COM Port (Serial 1)	3F8 IRQ 4 (COM 1)	2F8 IRQ 3 (COM 2), 338 IRQ 4, 238 IRQ 3, 3E8 IRQ 4 (COM 3), 2E8 IRQ 3 (COM 4), 2E8 IRQ 4, 2E0 IRQ 3, 220 IRQ 4, 228 IRQ 3, Auto, Disabled
	COM Port (Serial 2)	2F8 IRQ 3 (COM 2)	3F8 IRQ 4 (COM 1), 338 IRQ 4, 238 IRQ 3, 3E8 IRQ 4 (COM 3), 2E8 IRQ 3 (COM 4), 2E8 IRQ 4, 2E0 IRQ 3, 220 IRQ 4, 228 IRQ 3, Auto, Disabled
	LPT Port	378 IRQ 7	278 IRQ 7, Auto, Disabled
	LPT Mode	Output Only	Bi-Directional, ECP
	Diskette Controller	Enabled	Disabled
	Local Bus IDE Adapter	Both Enabled	Disabled, Primary Enabled, Secondary Enabled
		Note: Use Secondary Enabled to disable CompactFlash.	
> Advanced Chipset Control	DRAM Speed	70 ns	60 ns
	DMA Aliasing	Enabled	Disabled
	8-Bit I/O Recovery	4.5	3.5, 5.5, 6.5, 7.5, 8.5, 9.5, 10.5, 11.5
	16-Bit I/O Recovery	4.5	3.5, 5.5, 6.5, 7.5
	Memory Gap	Disabled	Hole at 512 KB — 640 KB, Hole at 15 MB — 16 MB, Hole at 14 MB — 16 MB
	Watchdog Timer Status	Disabled	Enabled
	Watchdog Timer Delay	1.2 sec	150 ms
	Onboard Speaker	On	Off
	ISA Guaranteed Access	Off	On
	ISA Bus Speed	PCI Clock ÷ 4 (8.33 MHz)	PCI Clock ÷ 3 (11 MHz)
	ECC/Parity Config	Disabled	Parity, ECC
> PCI Devices	PCI IRQ Line 1 / 2 / 3 / 4	Auto Select	Disabled, 3 (COM2/ COM4), 4 (COM1/COM3), 5 (2nd LPT), 7 (1st LPT), 14 (Primary IDE), 15 (Secondary IDE) 9, 10, 11, 12 (Open)
		Note: Incorrect settings may cause system malfunction.	
Plug & Play O/S	N/A	No	Yes
Large Disk Access Mode	N/A	DOS	Other

Security

The options and item values for the Security menu are listed in the table below:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
Supervisor Password Is	N/A	Disabled (Display only)	Enabled (Display only)
User Password Is	N/A	Disabled (Display only)	Enabled (Display only)
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
Diskette Access	N/A	Supervisor	User
Fixed Disk Boot Sector	N/A	Normal	Write Protect
System Backup Reminder	N/A	Disabled	Daily, Weekly, Monthly
Virus Check Reminder	N/A	Disabled	Daily, Weekly, Monthly

Server

The options and item values for the Server menu are listed in the table below:

Option / Sub-Menu	Item	Default Setting	Alternate Settings
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), 3E8 IRQ 3, 2E8 IRQ 4, 338 IRQ 3, 338 IRQ 4, 238 IRQ 3, 238 IRQ 4, 228 IRQ 3, 228 IRQ 4, 220 IRQ 3, 220 IRQ 4,
Console Redirect Baud Rate	N/A	9600	19200, 38400, 57600

Notes

3 Technical Data

This chapter provides the following information:

- System specifications and environmental tolerances
- Pin positions and signal listings for all headers and connectors
- Notes on installing memory modules

Specifications

Overview

Listed in the table below are system specifications and environmental tolerances for the EPC-2104 series SBC.

Note: These specifications are subject to change without notice.

Environmental

Environmental tolerances are listed in the following table:

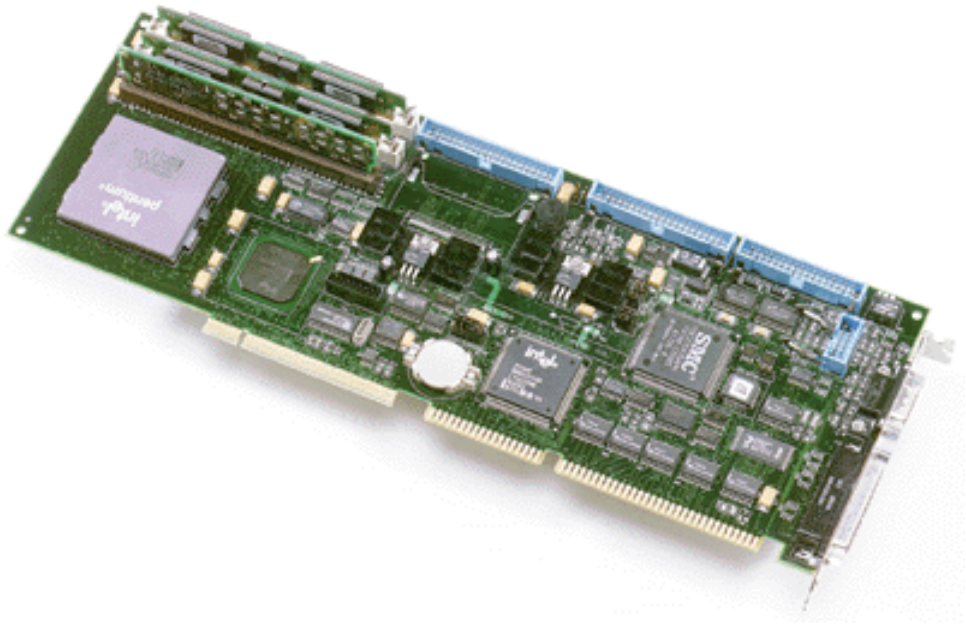
Temperature **Note:** See page 25.	Operating: 0 to +60 °C (32 to 140 °F) Non-Operating: -40 to +70 °C (-40 to 158 °F)
Humidity	Operating: 5 — 95% @ 40 °C, non-condensing Non-Operating: 0 — 95% @ 40 °C, non-condensing
Shock	Operating: 1 G @ 11 ms Non-Operating: 10 G @ 11 ms
Vibration	Operating: .5 G @ 5 — 200 Hz Non-Operating: 2 G @ 5 — 200 Hz
Altitude	Operating: 15,000 ft (4,572 m) Non-Operating: 50,000 ft (15,240 m)

System

System specifications are listed in the following table:

CPU	100/133/166 MHz Intel™ Pentium® Processor (P54C)
Chipset	Intel 430HX PCIset
Cache	256 KB or 512 KB Level 2 write-back cache: Zero wait state at 66 MHz 8 ns synchronous pipeline burst COAST RAM
Memory	Two 72-pin sockets organized in one bank, supporting: Up to 128 MB 1/2/4/8/16 x 32/36, 60/70 ns, Fast Page Mode DRAM SIMM's Parity/FPM or Non-Parity ECC or EDO 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 bus access
Data Path	64-bit on board: 16-bit on ISA bus access, 32-bit on PCI local bus
Flash Memory	2 Mb (256 KB x 8)
Clock/Calendar	DS1287 compatible Real Time Clock accurate to +/- 12 minutes/year, at 25 °C; includes CMOS
Power Requirements w/ 8 — 128 MB DRAM	Input Power 21 — 35 W +5 V 4.3 — 7.0 A
Form Factor	13.28" (33.73 cm) x 4.80" (12.19 cm)

Figure 10. The EPC-2104 Series SBC



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 watts of power. The 233 MHz Pentium® processor with MMX™ technology requires up to 6.5 A and dissipates as much as 17 W. Power levels have finally increased to a level that greatly affects the ability of the equipment to effectively dissipate energy.

RadiSys is continually working to ensure that its products will conform to thermal specifications. However, we can only work within known or anticipated hardware and software configurations. One peripheral device installed within a chassis can significantly alter operating temperature. Also, 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” possible hardware and software configuration, that will maximize the power supply draw and generate a worst-case scenario. However, despite these efforts, the specifications are only benchmarks and should be regarded as such.

The SBC requires a minimum airflow of 200 linear feet per minute (LFM) unimpeded across the CPU within 5 to 60 °C (41 to 140 °F) ambient temperature. Operations outside these specifications could void the warranty.

Pin Signals

Overview

The tables below list the pin signals for the headers and connectors. The following illustration (Figure 11) indicates the pin positions for each.

Serial Port 1				
RS-232		RS-422		
Pin	Description	Pin		Description
		DB9	10-Pin	
1	Data Carrier Detect (In)	1	1	/Z Output (TX-)
2	Data Set Ready (In)	6	2	/B Receive (RX-)
3	Receive Data (In)	2	3	Y Output (TX+)
4	Request to Send (Out)	8	6	A Receive (RX+)
5	Transmit Data (Out)			
6	Clear to Send (In)			
7	Data Terminal Ready (Out)			
8	Ring Indicator (In)			
9	Ground			
10	+5V			

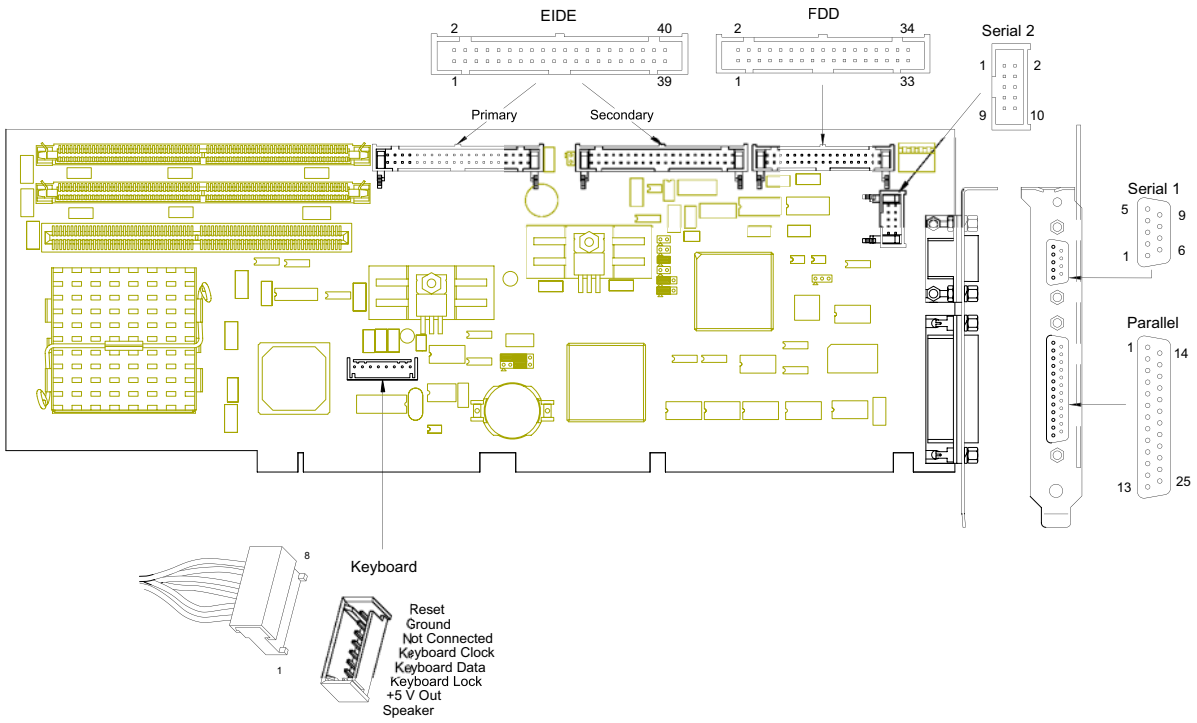
Serial Port 2	
RS-232	
Pin	Description
1	Data Carrier Detect (In)
2	Receive Data (In)
3	Transmit Data (Out)
4	Data Terminal Ready (Out)
5	Ground
6	Data Set Ready (In)
7	Request to Send (Out)
8	Clear to Send (In)
9	Ring Indicator (In)

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

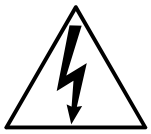
Primary & Secondary EIDE Drives			
Pin	Description	Pin	Description
1	Reset (Out)	21	DMA Request (I/O)
3	Data 7 (I/O)	23	- I/O Write (Out)
4	Data 8 (I/O)	25	- I/O Read (Out)
5	Data 6 (I/O)	27	I/O Channel Ready (In)
6	Data 9 (I/O)	28	+ ALE
7	Data 5 (I/O)	29	DMA Acknowledge (Out)
8	Data 10 (I/O)	31	+ IRQ14 (In)
9	Data 4 (I/O)	32	I/O CS16 (Out)
10	Data 11 (I/O)	33	+ ADDR1 (Out)
11	Data 3 (I/O)	34	Passed Diagnostics
12	Data 12 (I/O)	35	+ ADDR0 (Out)
13	Data 2 (I/O)	36	+ ADDR2 (Out)
14	Data 13 (I/O)	37	- CS0 (Out)
15	Data 1 (I/O)	38	- CS1 (Out)
16	Data 14 (I/O)	39	Activity Light (Out)
17	Data 0 (I/O)	2, 19, 22, 24, 26, 30, 40	Ground
18	Data 15 (I/O)		
20	Not Connected		

Keyboard	
Pin	Description
1	Reset
2	Ground
3	Not Connected
4	Keyboard Clock
5	Keyboard Data
6	Keyboard Lock
7	+5V Out
8	Speaker

Figure 11. Headers and Connectors



To connect two RS-422 devices, use a shielded twisted-pair (STP) cable no longer than 4,000 feet, configured as listed below:		
Machine A Pin Signal		**Machine B Pin Signal**
/Z Output (TX-)	⟷	/B Receive (RX-)
Y Output (TX+)	⟷	A Receive (RX+)
/B Receive (RX-)	⟷	/Z Output (TX-)
A Receive (RX+)	⟷	Y Output (TX+)



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Installing Memory

Overview

The EPC-2104 supports up to 128 MB of on-board dynamic RAM modules in Parity/FPM or Non-Parity, ECC or EDO.

Memory Bank

The EPC-2104 contains two (2) 72-pin SIMM sockets for DRAM memory modules (Figure 12). These two sockets comprise one (1) memory bank, providing a 64-bit wide data path and 8 parity bits (x36 SIMM's only).

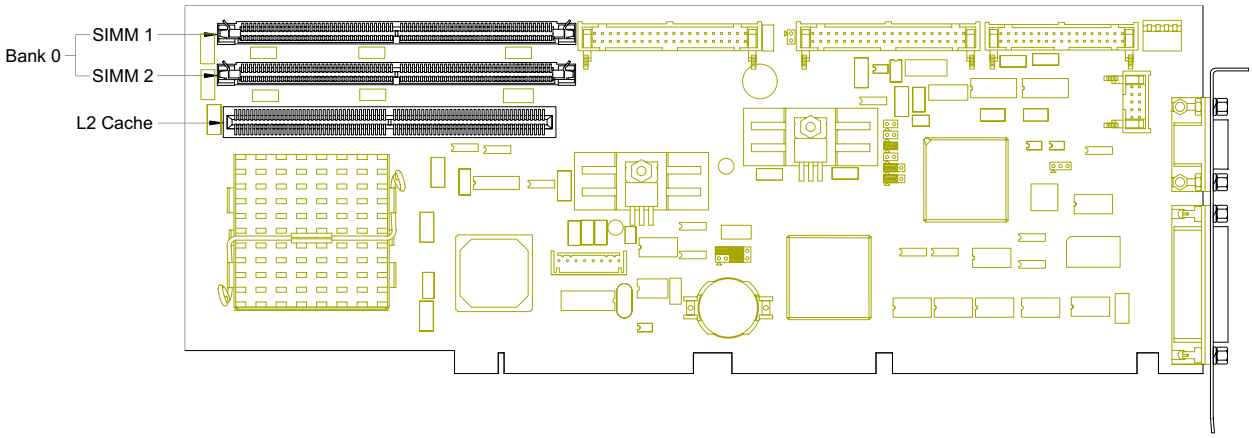
The bank must be completely filled to be operable. Also, both sockets in the bank must be filled with SIMM's of identical size. For example, if an 16 MB SIMM is installed in Socket 1, another 16 MB SIMM must be installed in Socket 2.

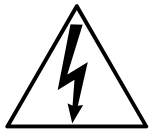
SIMM Types

Five SIMM memory sizes (4, 8, 16, 32, and 64 MB) are supported. Memory size is detected by the system BIOS. Memory timing requires 70 ns or faster page devices. Parity generation and checking is provided for each byte.

The SIMM sockets are gold and require gold SIMM's. Use of tin/lead SIMM's can cause damage to the motherboard and could void the warranty.

Figure 12. Memory Sockets





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