SBC-411/411E

Half-size 486 All-in-One CPU Card with Cache

FCC STATEMENT

THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE. (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

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 AGAINTST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQENCY ENERGY AND , IF NOT INSTATLLED AND USED IN ACCORDANCE WITH THE 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 HIS OWN EXPENSE.

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Packing list

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 SBC-411/411E CPU card

- 1 user manual (this book)

- 1 6-pin to 5-pin adapter for keyboard

- 1 3½" Hard disk drive (IDE) interface cable (40 pin)

- 1 Floppy disk drive interface cable (34 pin)

- 1 Parallel port adapter (26 pin) and COM port (10-9 Pin) adapter kit

- 1 Serial port adapter (10 to 9 pin)

- PC/104 Module mounting supports

- 1 Ethernet 8029 Utility Driver Disk (for SBC-411E only)

- 1 bag of screws and miscellaneous parts

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Contents

General Information

This chapter gives background information on the SBC-411/411E.

Sections include:

- Card specifications

- Board layout

Introduction

The SBC-411/411E is an all-in-one single board 486 computer with an **onboard PCI Ethernet interface (SBC-411E)**. It packs all the functions of an industrial computer and its display capabilities into a single, half-size card. This means the SBC-411/411E is your absolute best solution for embedded applications.

The onboard Ethernet Realtek RTL 8029AS PCI bus Ethernet controller supports remote boot ROM functions (SBC-411E only).

The SBC-411/411E supports the M-Systems DiskOnChip 2000 (optional) which is a new generation of high performance single-chip Flash Disk. It provides a Flash Disk (as a BIOS expansion) which doesn't require any bus, slots, or connectors. It is also the optimal solution for Single Board Computers because of its small size, easy integration, plug-and-play functionality, and its low power consumption. The DiskOnChip is available in capacities from 2MB to 72MB and fits in a standard 32-pin DIP socket.

Another feature of the SBC-411/411E is the inclusion of a high speed, local bus IDE controller. This controller supports (through ATA PIO) mode 3 and mode 4 hard disks, enabling data transfer rates in excess of 11 MB/second. Up to four IDE devices can be connected, including large hard disks, CD-ROM drives, tape backup drives, or other IDE devices. The built-in, enhanced IDE controller provides a 4-layer, 32-bit, posted write buffer and a 4-layer, 32-bit read-prefetch buffer to boost IDE performance.

Onboard features include two high speed RS-232 serial ports, one bidirectional SPP/EPP/ECP parallel port and a floppy drive controller. In addition to the 486's 16 KB of on-chip cache memory, the SBC-411/411E includes an extra 128 KB of L2 onboard cache memory.

If program execution is halted by a program bug or EMI, the board's watchdog timer can automatically reset the CPU or generate an interrupt. This ensures reliability in unmanned or standalone systems.

All configuration display and Ethernet (SBC-411E) is done through software. A single Flash chip holds the system BIOS, VGA BIOS. This minimizes the number of chip and eases configuration. You can change the display BIOS or install a boot ROM simply by programming the Flash chip.

The SBC-411/411E **supports 5 V EDO DRAM**. It also provides one 72-pin SIMM (Single In-line Memory Module) sockets for its onboard system DRAM. These sockets give you the flexibility to configure your system from 4 MB to 32 MB of DRAM using the most economical combination of SIMMs.

Features

- CPU: AMD DX5-133 CPU (SQFP Type)
- Half-size: ISA bus CPU card
- BIOS: AMI Flash BIOS
- Chipset: ALi M1489/M1487
- Level 2 cache: Onboard 128KB L2 cache
- DiskOnChip: One 32-pin DIP socket supports the M-Systems' DiskOnChip 2000 Series, memory capacity from 2MB to 72MB
- Ethernet Interface (SBC-411E): Supports 10Base-T, remote boot ROM function

Specifications

CPU: AMD DX5-133, (SQFP Type)

Bus Interface: ISA bus

BIOS: AMI Flash BIOS

Chipset: ALi 1489/1487

System memory: 4MB to 32MB. One 72-pin SIMM socket onboard supports BEDO, EDO, Fast Page DRAM

L2 cahce memory F.D.D. : Onbaord 128KB L2 cache memory. Supports up to two floppy disk drives, 5.25" (360KB and 1.2MB) and/or 3.5" (720KB, 1.44MB, and 2.88MB)

Enhanced IDE: Supports two hard disk drive. Supports PIO mode 3/4

Multi-mode parallel port: Configured to LPT1, LPT2, LPT3 or disabled. Supports SPP, ECP, and EPP modes

Serial port: Two RS-232 ports. Ports can be individually configured from COM1 to COM4 or disabled.

Keyboard connector: 6-pin mini-DIN connector supports standard PC/AT keyboard

Ethernet controller (SBC-411E): Realtek RTL8029AS 10-Base PCI-Bus Ethernet controller

Etherent Interface: Software drivers available. Supports remote boot ROM function

SSD interface: One 32-pin DIP socket supports the M-Systems DiskOnChip 2000 series, memory capacity from 2MB to 72MB

PC/104 connector: 104-pin connector for a 16-bit bus

Watchdog Timer: Can generate a system reset or IRQ15. The time interval is software selectable (2sec~128min, 1sec/step)

DMA channels: 7

Interrupt levels: 15

Power management: I/O Peripheral devices support power saving and doze/standby/suspend modes

Power supply voltage: +5V (4.75V to 5.25V)

+12V (11.4V to 12.6V)

Max. power requirement: +5V @ 3A

Operating temperature: 32 to 140°F (0 to 60°C)

Board size: 7.3"(L) x 4.8"(W) (185mm x 122mm)

Weight: 0.23 kg

Board layout

PCI 10Base-T

Power connector

Keyboard

Parallel port connector

COM2

PC-104 connector

COM1

RTL8019A

M48T86PCI

RTL8029AS

FDD interface

AMI Flash BIOS

ALi Chipset

Socket for DiskOnChip

IDE connector

ALi Chipset

AMD 486 DX5-133 CPU

Up to 32MB DRAM
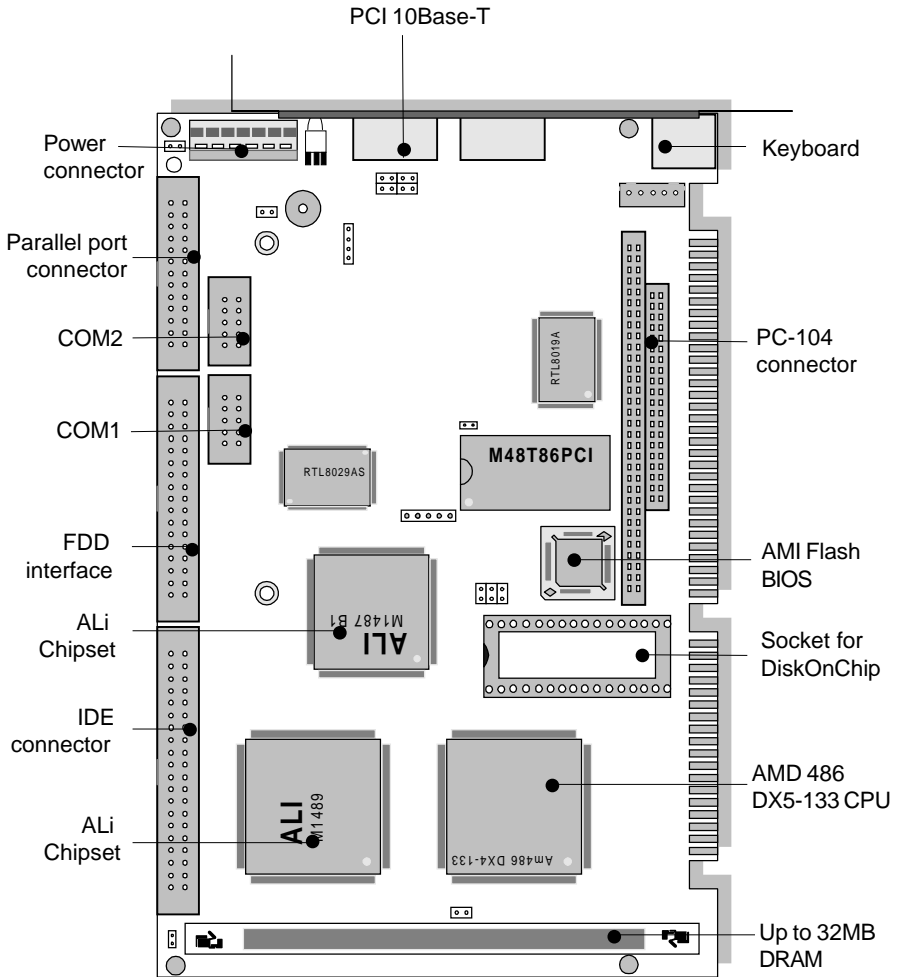
Card dimensions
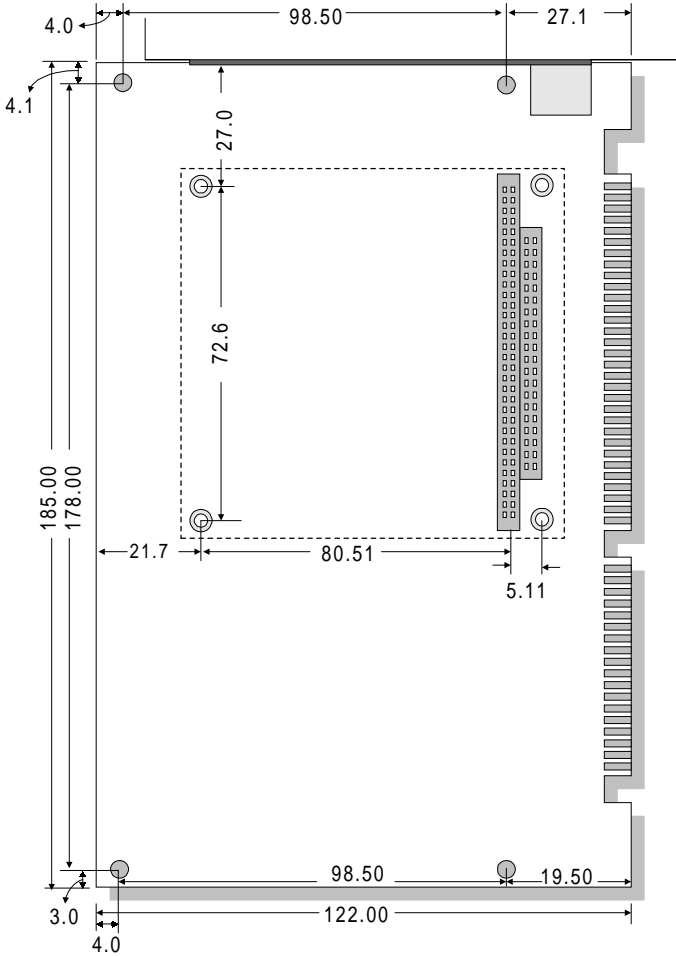
Installation

This chapter describes how to set up the SBC-411/411E hardware, including instructions on setting jumpers and connecting peripherals, switches, and indicators. Be sure to read all safety precautions before you begin the installation procedure.

Jumpers and connectors

Connectors on the board link it to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your applications.

The table below lists the function of each of the board jumpers and connectors.

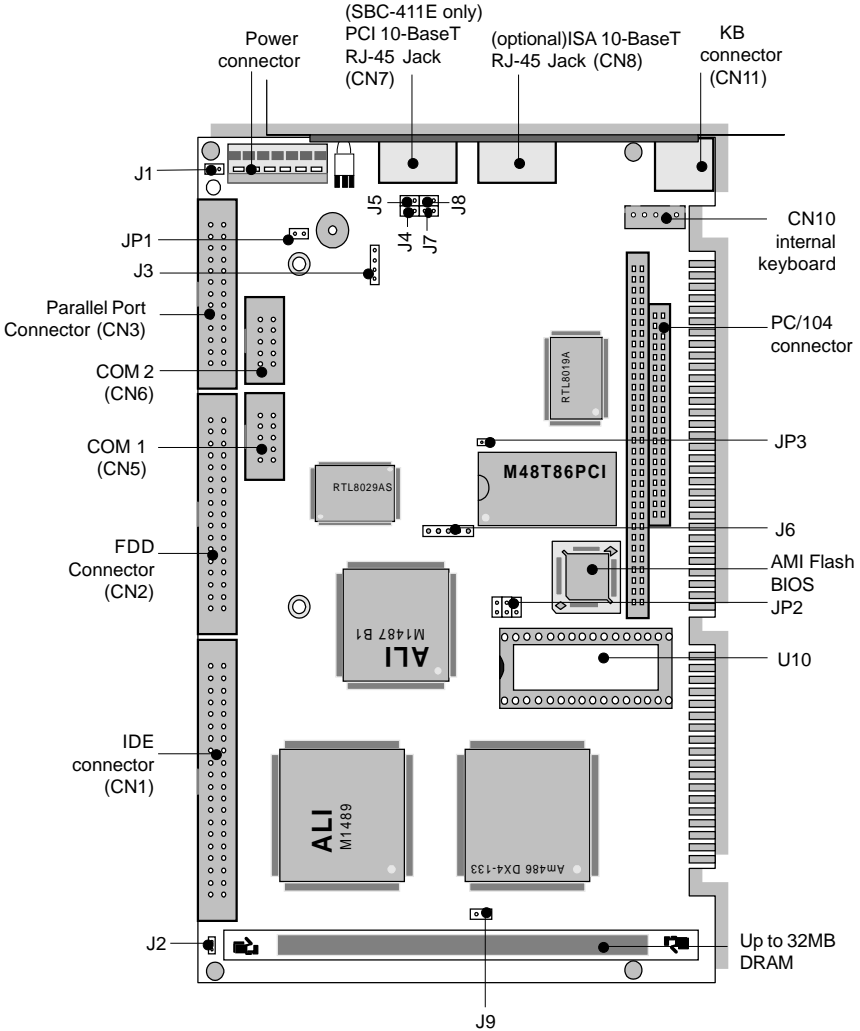| Jumpers and connectors	
Label	**Function**
CN1	IDE hard drive connector
CN2	Floppy drive connector
CN3	Parallel port connector
CN4	Power connector
CN5	COM1 connector
CN6	COM2 connector
CN7	Ethernet connector
CN8 (optional)	ISA 10Base-T
CN9 (optional)	DC_JACK connector
CN10	Internal keyboard connector
CN11	Keyboard connector
J1	Power LED connector
J2	IDE LED connector
J3	Int/Ext buzzer
J4	Ethernet link signal LED
J5	Ethernet active signal LED
J6	Power LED & KB_LOCK
J7 (optional)	LED_LINK ISA 10Base-T
J8 (optional)	LED_RX ISA 10Base-T
J9	CPU fan power connector
JP1	Reset switch
JP2	DOC address setting
JP3	Clear CMOS

Locating jumpers and connectors

Power connector

(SBC-411E only) PCI 10-BaseT RJ-45 Jack (CN7)

(optional)ISA 10-BaseT RJ-45 Jack (CN8)

KB connector (CN11)

J1

J5

J8

J4

J7

JP1

J3

CN10 internal keyboard

Parallel Port Connector (CN3)

PC/104 connector

COM 2 (CN6)

RTL8019A

COM 1 (CN5)

RTL8029AS

M48T86PCI

JP3

J6

FDD Connector (CN2)

AMI Flash BIOS

M1487 B1

ALI

JP2

IDE connector (CN1)

U10

ALI
M1489

Am486 DX4-133

J2

J9

Up to 32MB DRAM

Setting jumpers

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2 or 2 and 3.
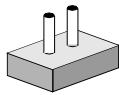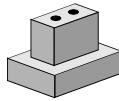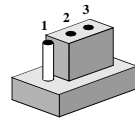
Open   Closed   Closed 2-3

The jumper settings are schematically depicted in this manual as follows:

Open   Closed   Closed 2-3

A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Generally, you simply need a standard cable to make most connections.

Safety Precautions

Warning! Always completely disconnect the power cord from your chassis whenever you are working on it. Do not make connections while the power is on, sensitive electronic components can be damaged by the sudden rush of power. Only experienced electronics personnel should open the PC chassis.

Caution! Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.

Installing DRAM (SIMMs)

The SBC-411/411E CPU card provides one 72-pin SIMM (Single In-line Memory Module) socket and supports between 4 MB to 32 MB of RAM.

Installing SIMM

Note: that the modules can only fit into a socket one way.

1. Insert the memory module into the socket at a moderate angle.

2. Push the module toward the vertical posts at both ends of the socket until the module is upright, and the retaining clips at both ends of the module click into place. When positioned correctly, the pins on top of the vertical posts should correspond to the circular holes on the ends of the module.

Removing SIMM

If you need to remove a SIMM, follow the procedures below:

1. Supporting the SIMM with a finger, use a pen or a similarly shaped object and press one retaining clip straight down.

2. Repeat for the other side. When released, the retaining clips will push the SIMM up and out of its upright position.

3. Carefully pull the SIMM out of the socket with your fingers.

IDE hard drive connector (CN1)

You can attach up to two Enhanced Integrated Device Electronics (IDE) hard disk drives to the SBC-411/411E internal controllers. The card comes with a 40-pin cable.

Connecting the hard drive

Wire number 1 on the cable is red or blue, and the other wires are gray.

1. Connect one end of the cable to CN1 on the CPU card. Make sure that the red (or blue) wire corresponds to pin 1 on the connector, which is labeled on the board (on the right side).

2. Plug the other end of the cable to the Enhanced IDE hard drive, with pin 1 on the cable corresponding to pin 1 on the hard drive. (See your hard drive's documentation for the location of the connector.)

Unlike floppy drives, you can make the connections with any of the connectors on the cable. If you install two drives, you will need to set one as the master and the other as the slave. You do this using jumpers on the drives. If you install just one drive, set it as the master.

Pin assignments

The following table lists the pin numbers and their respective signals:

40 Pin IDE hard drive connector (CN1)

Enhanced IDE connector (CN1)			
Pin	**Signal**	**Pin**	**Signal**
1	Reset	2	GND
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	GND	20	N.C.
21	N.C.	22	GND
23	IOW	24	GND
25	IOR	26	GND
27	IORDY	28	BALE
29	N.C.	30	GND
31	IRQ	32	-I/O CS16
33	A1	34	N.C.
35	A0	36	A2
37	CS0	38	CS1
39	-ACT	40	GND

Floppy drive connector (CN2)

You can attach up to two floppy disks to the SBC-411/411E/486's onboard controller. You can use any combination of 5.25" (360 KB and 1.2 MB) and/or 3.5" (720 KB, 1.44 MB, and 2.88 MB) drives.

The CPU card comes with a 34-pin daisy-chain drive connector cable. On one end of the cable is a 34-pin flat-cable connector. There are two sets of floppy disk drive connectors, one in the middle, and one on the other end. Each set consists of a 34-pin flat-cable connector (usually used for 3.5" drives) and a printed-circuit board connector (usually used for 5.25" drives).

Connecting the floppy drive

1. Plug the 34-pin flat-cable connector into CN2 on the CPU card.

2. Attach the appropriate connector on the other end of the cable to the floppy drive(s). You can use only one connector in the set. The set on the end (after the twist in the cable) connects to the A: floppy. The set in the middle connects to the B: floppy.

Pin assignments

The following table lists the pin numbers and their respective signals:

Floppy disk connector (CN2)

Pin	Signal	Pin	Signal
1~33(odd)	GND	2	High density
4, 6	Unused	8	Index
10	Motor enable A	12	Driver select B
14	Driver select A	16	Motor enable B
18	Direction	20	Step pulse
22	Write data	24	Write enable
26	Track 0	28	Write protect
30	Read data	32	Select head
34	Disk change		

Parallel port connector (CN3)

Normally, the parallel port is used to connect the card to a printer. The SBC-411/411E includes an onboard parallel port, which is accessed through a 26-pin flat-cable connector. The CPU card comes with an adapter cable, which lets you use a traditional DB-25 connector. The cable has a 26-pin connector on one end and a DB-25 connector on the other, mounted on a retaining bracket.

Installing the retaining bracket

The retaining bracket installs at an empty slot in your system's chassis. It provides an external port that allows your parallel peripheral access to the card's parallel port connector.

1. Find an empty slot in your chassis.

2. Unscrew the plate that covers the end of the slot.

3. Screw in the bracket in place of the plate.

4. Next, attach the flat-cable connector to CN3 on the CPU card. Wire 1 of the cable is red or blue, and the other wires are gray. Make sure that wire 1 connects to Pin 1 of the CN3 connector. Pin 1 is on the right side of connector.

Pin assignments

Parallel port connector (CN3)			
Pin	**Signal**	**Pin**	**Signal**
1	Strobe	2	Data 0
3	Data 1	4	Data 2
5	Data 3	6	Data 4
7	Data 5	8	Data 6
9	Data 9	10	-Acknowledge
11	Busy	12	Paper empty
13	+Select	14	-Auto feed
15	-Error	16	-Init printer
17	-Select input	18~25	GND

Power connector (CN4)

In SBC (non-passive backplane) applications you will need to connect power directly to the SBC-411/411E board using CN4. CN4 is fully compatible with the standard PC power supply connector. See the following table for its pin assignments:

Power connector (CN4)

Pin	Function
1	N.C.
2	+5 V$_{DC}$
3	+12 V$_{DC}$
4	-12 V$_{DC}$
5	GND
6	GND

* CN9 is the connector for a 5V, 4A DC jack (optional).

RS-232 connectors (CN5, CN6)

The SBC-411/411E offers two RS-232 serial ports. Using the BIOS Peripheral Setup program, you can select the address for each port or disable it. See the following table for the pin assignment.

RS-232 connector pin assignment (CN5, CN6)

Pin	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI
10	NC

Ethernet connector (CN7)

A 10Base-T RJ-45 connector (CN7) ethernet adapter cable connects to CN7 on the SBC-411E.

Keyboard connectors (CN10, CN11)

The SBC-411/411E board provides two keyboard connectors. A 5-pin connector supports passive backplane applications. A second 6-pin mini-DIN connector on the card mounting bracket supports SBC applications. The card comes with an adapter to convert the 6-pin mini-DIN connector, used for the standard AT keyboard connector.

5-pin Keyboard (CN10)	
Pin	**Function**
1	KB_CLK
2	KB_DATA
3	N.C.
4	GND
5	Vcc

6-pin mini-DIN Keyboard connector (CN11)	
Pin	**Function**
1	K.B. data
2	N.C.
3	GND
4	+5 V_{DC}
5	K.B. clock
6	N.C.

Power LED connector (J1)

You can connect a LED to indicate when the CPU card is on.

Power LED connector (J1)	
Pin	**Function**
1	LED Power (+5V)
2	Ground

IDE LED connector (J2)

You can connect a LED to indicate that an IDE device is in use. The pin assignments for this jumper are as follows:

IDE LED connector (J2)	
Pin	**Function**
1	-R/W IDE
2	Pull high

Int/Ext Buzzer (J3)

The CPU card has its own buzzer. You can connect an external speaker to pin1 and pin4. Enabling the external speaker automatically disables the internal buzzer.

Connecting pin3 and pin4 will enable the internal buzzer and disable the external buzzer.

Int/Ext Buzzer (J3)	
Pin	**Function**
1	speaker
2	signal
3	buzzer
4	signal

Ethernet link/active signal LED (J4)(J5)

The SBC-411E supports two sets of LED connector for external LEDs.

Ethernet active signal LED (J4)

A flashing LED indicates that the SBC-411E is transmitting or receiving data.

Ethernet link signal LED (J5)

A continvously lit LED indicates good linkage between the SBC-411E and its supporting hub.

Power LED and keylock (J6)

You can connect an LED to indicate when the CPU card is on. Pin 1 of J6 supplies power to the LED and Pin 3 is the ground.

You can use a switch (or a lock) to disable the keyboard. In this state the PC will not respond to any input. This is useful if you don't want anyone to change or stop a running program. Simply connect the switch between Pins 4 and 5. The pin assignments appear in the following table:

Power LED and keylock (J6)

Pin	Function
1	LED Power (+5 V)
2	NC
3	Ground
4	Keyboard lock
5	Ground

CPU fan power connector (+5V)(J9)

You can connect a fan on the CPU. The SBC-411/411E offer (5V)(plus) to drive a can for CPU.

CPU fan power connector (J9)	
1	+5V
2	GND

Reset switch (JP1)

You can connect an external switch to easily reset your computer. This switch restarts your computer as if you had turned off the power then turned it back on. The following table shows the pin assignments for JP1.

Reset switch (JP1)	
Pin	**Function**
1	Ground
2	Reset

DOC address setting (JP2)

The DiskOnChip 2000 occupies a 8 Kbyte window in the upper memory address range of C800 to E000. You should ensure this does not conflict with any other device's memory address. JP2 controls the memory address of the Flash disk. (refer to the DiskOnChip U10, please)

DiskOnChip address select (JP2)

CC00	D000*	D400
1 □ ○ 2	1 ■━● 2	1 □ ○ 2
3 ○ ○ 4	3 ○ ○ 4	3 ●━● 4
5 ○ ○ 6	5 ○ ○ 6	5 ○ ○ 6

D800	DC00	
1 ■━● 2	1 □ ○ 2	
3 ●━● 4	3 ○ ○ 4	
5 ○ ○ 6	5 ●━● 6	

* default

Clear CMOS (JP3)

You can connect an external switch to clear the CMOS. This switch closes JP3 and turns off the power, at which time the CMOS setup can be cleared.

Clear CMOS (JP3)

Protect(default)	Clear CMOS
○ ○	●━●

DiskOnChip socket (U10)

The DiskOnChip 2000 family of products provides a single chip solid-state flash disk in a standard 32-pin DIP package. The DiskOnChip 2000 is a solid-state disk with no moving parts, resulting in a significant reduction in power consumption and an increase in reliability. The DiskOnChip is a small, plug and play Flash disk. It is easy to use and saves integration overhead.

The DiskOnChip 2000 family of products is available in capacities ranging from 2MB up to 72 MB, unformatted. Therefore, the same socket on the target platform will not have to be changed. In order to manage the disk, the DiskOnChip 2000 includes the TrueFFS, M-Systems' Flash File System proprietary software. The DiskOnChip 2000 package is pin-to-pin compatible with standard 32-pin EPROM device.

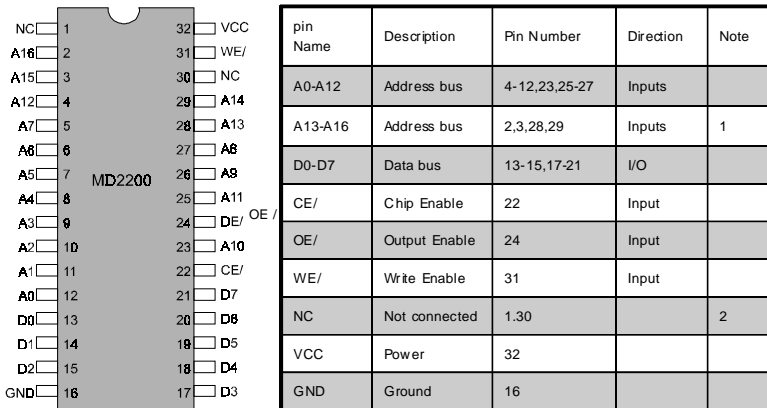| pin Name	Description	Pin Number	Direction	Note
A0-A12	Address bus	4-12,23,25-27	Inputs	
A13-A16	Address bus	2,3,28,29	Inputs	1
D0-D7	Data bus	13-15,17-21	I/O	
CE/	Chip Enable	22	Input	
OE/	Output Enable	24	Input	
WE/	Write Enable	31	Input	
NC	Not connected	1.30		2
VCC	Power	32		
GND	Ground	16		

Figure1-MD2200 Pin-out

Note 1: Pins A13 through A16 are not used by the MD2200. They are kept for socket backward compatibility with ED 1100 (DiskOnChip 1000)

Note 2: Pins 1 and 30 are not used by MD2200

* Refer to the instructions for configuring the DOC address setting (JP2).

DiskOnChip (DOC) 2000 Installation

When the DOC is installed correctly, a DOC will work like a HDD or a FDD. To install the DOC on the mainboard, follow the instructions below:

1. Plug the DOC into the socket. Make sure pin 1 of the DOC is aligned with pin 1 of the socket.

2. Push the DOC into the socket until it is firmly seated in the socket.

Caution: the DOC may be permanently damaged if it is installed incorrectly.

3. Set the jumper for the memory address of the DOC.

Note:

The memory shadow function sometimes will create conflicts with the memory window. You should disable the memory shadow from the BIOS SETUP if the DOC cannot be accessed.

Configure DOC as a boot device

To configure a DOC as a boot drive, you should copy the operating system files into the DOC. The following procedure is an example of the initialization process.

1. Install a DOC into your system.

2. Insert a bootable floppy disk in drive A: and boot the system.

3. At the DOS prompt, type **SYS C:** to transfer the DOS system files to the DOC (assuming the DiskOnChip is installed as drive C:). Reboot the system.

4. Go to the BIOS Setup Utility by hitting the <DEL> key. Set the type of Primary Master or C: Drive as *Not Installed*.

5. Remove the floppy disk from the drive A: and leave the BIOS Setup Utility. The system should boot from the DOC.

AMIBIOS Setup

This chapter describes how to configure the BIOS

General information

The AMIBIOS Setup program configures system information that is stored in CMOS RAM. Unlike conventional BIOS setup programs, AMIBIOS features an easy-to-use, graphical interface.
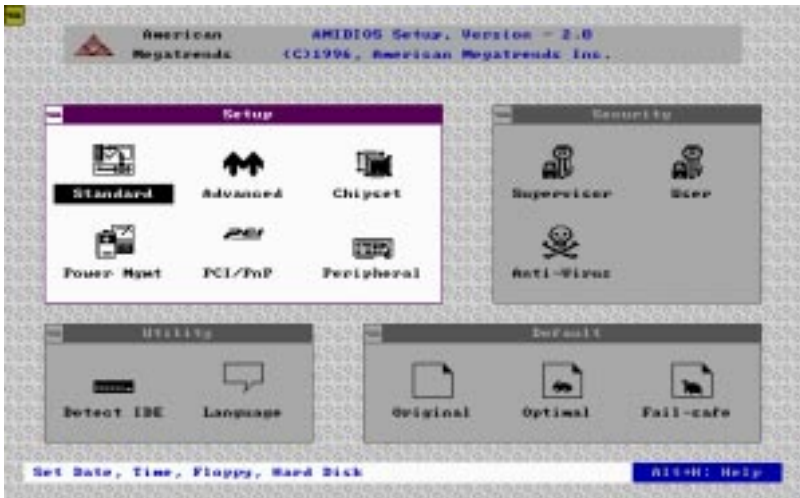
Starting AMIBIOS setup

As POST executes, the following appears;

```
Hit <DEL> if you want to run SETUP
```

Press <DEL> to run the AMIBIOS setup program.

AMIBIOS main menu

The AMIBIOS setup screen appears as follows:

Using a mouse with AMIBIOS setup

AMIBIOS Setup can be accessed via keyboard, mouse. The mouse click functions are:

- single click to change or select both global and current fields

- double click to perform an operation in the selected field

Using the keyboard with AMIBIOS setup

AMIBIOS Setup has a built-in keyboard driver that uses simple keystroke combinations:

Keystroke	Function
\<tab\>	Move to the next window or field.
→, ←, ↑, ↓	Move to the next field which is to the right, left, above, or below.
\<ENTER\>	Select the current field.
+	Increment a value.
-	Decrement a value.
\<ESC\>	Close the current operation and return to the previous level.
\<PgUp\>	Return to the previous page.
\<PgDn\>	Advance to the next page.
\<Home\>	Return to the beginning of the text.
\<End\>	Advance to the end of the text.
\<ALT\>+H	Access a help window.
\<ALT\>+\<Spacebar\>	Exit AMIBIOS Setup.
Alphabetic keys	A to Z are used in the virtual keyboard, and are not case sensitive.
Numeric keys	0 to 9 are in the virtual keyboard and numeric keypad.

Standard Setup

The AMIBIOS Setup options described in this section are selected by choosing the Standard icon from the AMIBIOS Setup window as shown below.

The Standard Setup screen appears:
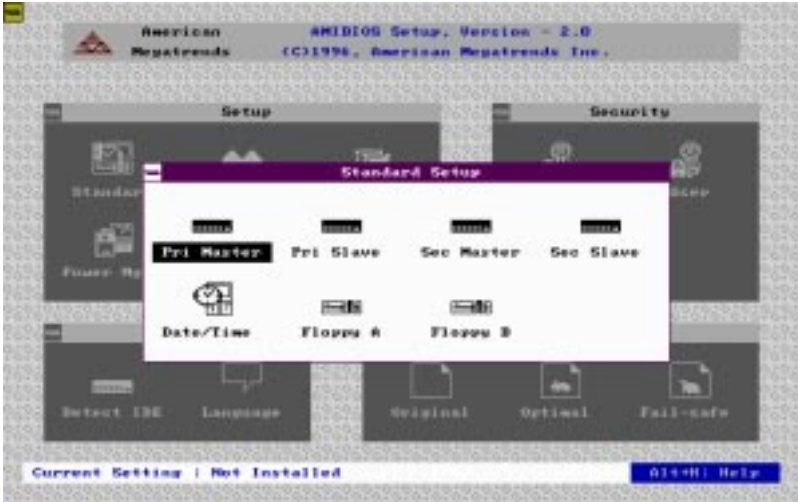
Primary Master/Slave Disk, Secondary Master/Slave Disk
Select these icons to configure the hard disk type you are using for the master and the slave. The settings have not been pre-installed.

When you click on an icon, the following parmeters are listed: Type, LBA/Large Mode, Block Mode, 32 bit Mode, and PIO Mode. If you are configuring a drive with drive parameters that do not match drive types 1-46, you can select the User in the Type field.

- Cyl (number of cylinders),

- Hd (number of headers),

- WP (starting write precompensation cylinder),

- Sec (number of sectors),

- Size (drive capacity).

Date and Time Configuration

Select the Date and Time icon in the Standard setup. The current values for each category are displayed. Enter new values through the keyboard or hit "+" or "-" key to change values.

Floppy A, Floppy B

Select these icons to configure the type of floppy drive that is attached to the system: 360 KB 5-1/4", 1.2 MB 5-1/4", 720 KB 3-1/2", 1.44 MB 3-1/2", and/or 2.88 MB 3-1/2". The settings have not been pre-installed.

Advanced Setup

Advanced Setup options are displayed by choosing the Advanced icon from the AMIBIOS Setup main menu. All Advanced Setup options are described in this section.

Quick Boot

Set this option to *Enabled* to instruct AMIBIOS to boot quickly when the computer is powered on. This option replaces the old Above 4 MB Memory Test Advanced Setup option. The settings are:

Setting	Description
Disabled	AMIBIOS tests all system memory. AMIBIOS waits up to 40 seconds for a READY signal from the IDE hard disk drive. AMIBIOS waits for .5 seconds after sending a RESET signal to the IDE drive to allow the IDE drive time to get ready again. AMIBIOS checks for a <Del> key press and runs AMIBIOS Setup if the key has been pressed.
Enabled	AMIBIOS does not test system memory above 1MB. AMIBIOS does not wait up to 40 seconds for a READY signal from the IDE hard disk drive. If a READY signal is not received immediately from the IDE drive, AMIBIOS does not configure that drive. AMIBIOS does not wait for .5 seconds after sending a RESET signal to the IDE drive to allow the IDE drive time to get ready again.

BootUp Sequence

This option sets the sequence of boot drives (floppy drive A:, hard disk drive C:, or a CD-ROM drive) that the AMIBIOS attempts to boot from after AMIBIOS POST completes. The settings are *C:,A:,CDROM*

CDROM,A:,C:

A:,C:, CDROM.

BootUp Num-Lock

Set this option to *Off* to turn the Num Lock key off when the computer is booted. When it is off, you can use the arrow keys on both the numeric keypad and the keyboard. The settings are *On* or *Off*.

Floppy Drive Swap

Set this option to *Enabled* to permit drives A: and B: to be swapped. The settings are *Enabled* or *Disabled.*

Floppy Drive Seek

Set this option to *Enabled* to specify that floppy drive A: will perform a seek operation at system boot. The settings are *Disabled* or *Enabled.*

System Keyboard

This option specifies that a keyboard is attached to the computer. The settings are *Present* or *Absent.*

Primary Display

This option specifies the type of display monitor and adapter in the computer. The settings are *Mono, CGA40x25, CGA80x25, VGA/EGA,* or *Absent*.

Password Check

This option enables password checking every time the computer is powered on or every time AMIBIOS Setup is executed. If *Always* is chosen, a user password prompt appears every time the computer is turned on. If *Setup* is chosen, the password prompt appears if AMIBIOS is executed.

Parity Check
Set this option to *Enabled* to check the parity of all system memory. The settings are *Enabled* or *Disabled*.

OS/2 Compatible Mode
Set this option to *Enabled* to permit AMIBIOS to run with IBM OS/2. The settings are *Enabled* or *Disabled.*
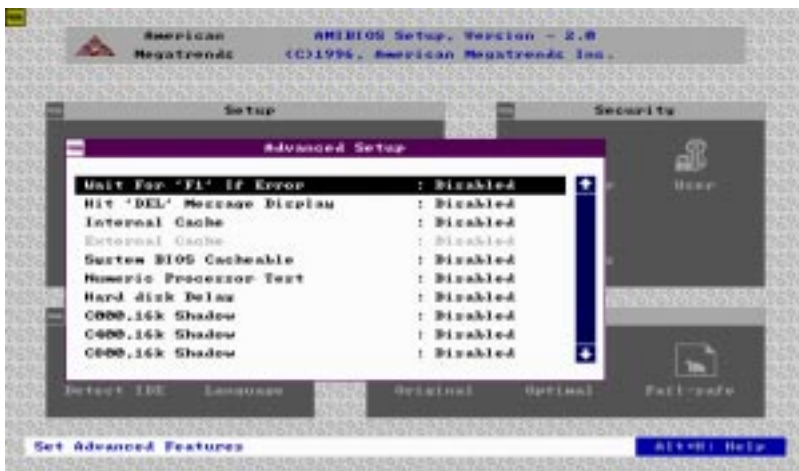
Wait For 'F1' If Error
AMIBIOS POST error messages are followed by:

```
 Press <F1> to continue
```

If this option is set to *Disabled,* AMIBIOS does not wait for you to press the <F1> key after an error message. The settings are *Enabled* or *Disabled*.

Hit 'Del' Message Display
Set this option to *Disabled* to prevent the message.

```
Hit <DEL> if you want to run Setup
```

from appearing on the first AMIBIOS screen when the computer boots. The settings are *Enabled* or *Disabled*.

Internal Cache

This option specifies the caching algorithm used for the L1 internal cache memory. The settings are:

Setting	Description
Disabled	Neither L1 internal cache memory on the CPU nor L2 cache memory is enabled.
WriteBack	Use the write-back caching algorithm.

External Cache

This option specifies the caching algorithm used for L2 secondary (external) cache memory. The settings are:

| Setting	Description
Disabled	Neither L1 internal cache memory on the CPU nor L2 cache memory is enabled.
WriteThru	Use the write-through caching algorithm.
WriteBack	Use the write-back caching algorithm.

System BIOS Cacheable

When this option is set to *Enabled,* the contents of the F0000h system memory segment can be read from or written to L2 secondary cache memory. The contents of the F0000h memory segment are always copied from the BIOS ROM to system RAM for faster execution.

The settings are *Enabled* or *Disabled.*

Numeric Processor Test
Set this option to *Enabled* to permit the numeric processor to be
tested. The deault setting is *Disabled*.
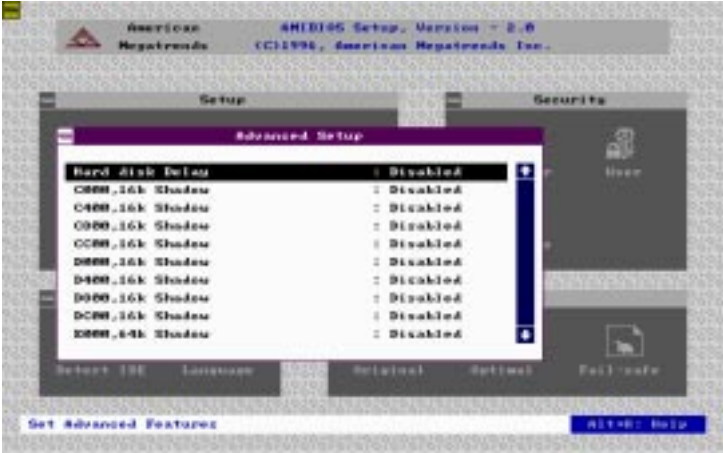
Hard Disk Delay
This option allows you to select the hard disk delay time from 5 sec
to 15sSec. The default setting is *Disabled*.

C000,16K Shadow	**: Enabled**
C400,16K Shadow	**: Enabled**
C800,16K Shadow	**: Disabled**
CC00,16K Shadow	**: Disabled**
D000,16K Shadow	**: Disabled**
D400,16K Shadow	**: Disabled**
D800,16K Shadow	**: Disabled**
DC00,16K Shadow	**: Disabled**
E000,64K Shadow	**: Disabled**

These options control the location of the contents of the 16KB of ROM beginning at the specified memory location. If no adaptor ROM is using the named ROM area, this area is made available to the local bus. The settings are:

| Setting	Description
Shadow	The contents of C0000h - C3FFFh are written to the same address in system memory (RAM) for faster execution.
Cache	The contents of the named ROM area are written to the same address in system memory (RAM) for faster execution, if an adaptor ROM will be using the named ROM area. Also, the contents of the RAM area can be read from and written to cache memory.
Disabled	The video ROM is not copied to RAM. The contents of the video ROM cannot be read from or written to cache memory.

The default setting is *Cache*.

Chipset Setup

This section allows you to configure the system based on the specific features of the installed chipset. This chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache. It is recommended to set the **Auto Config Function** to *Enabled* which selects pre-defined values for DRAM and cache timing according to CPU type & system check.

The only time you might consider making any changes would be if you discovered that data was being lost while using your system.
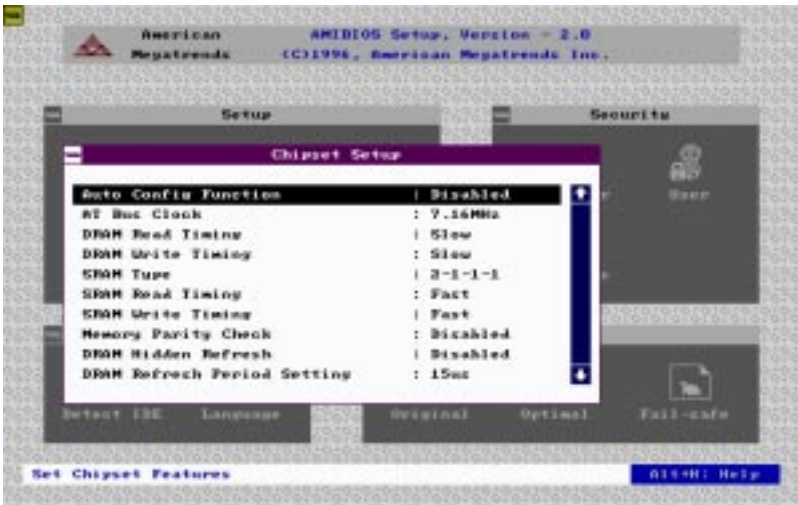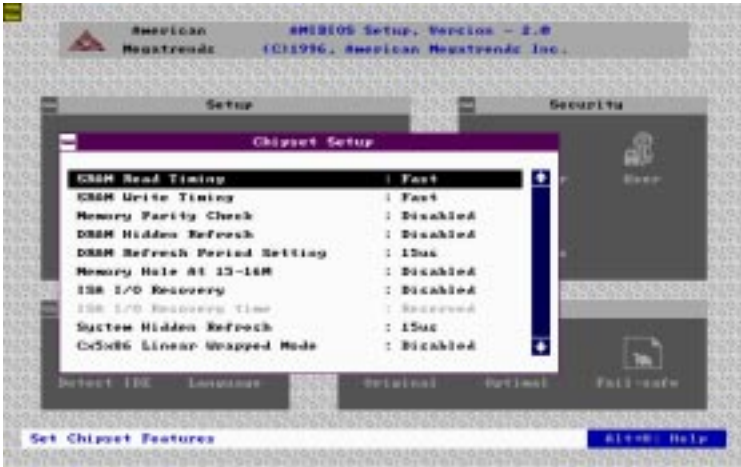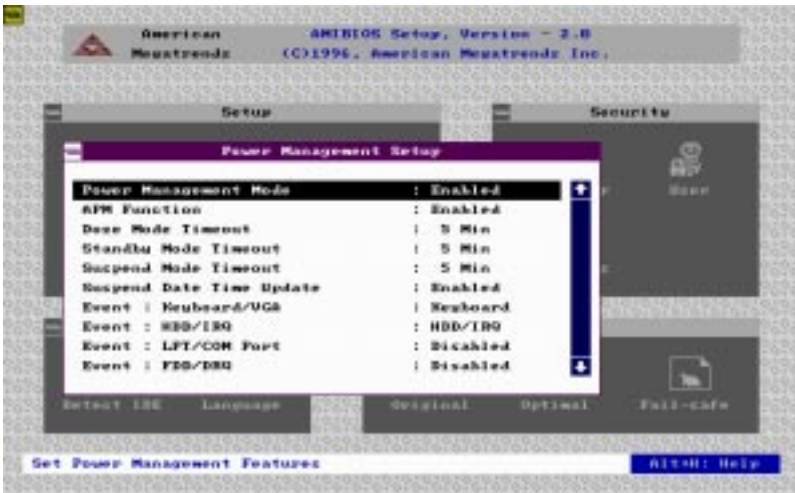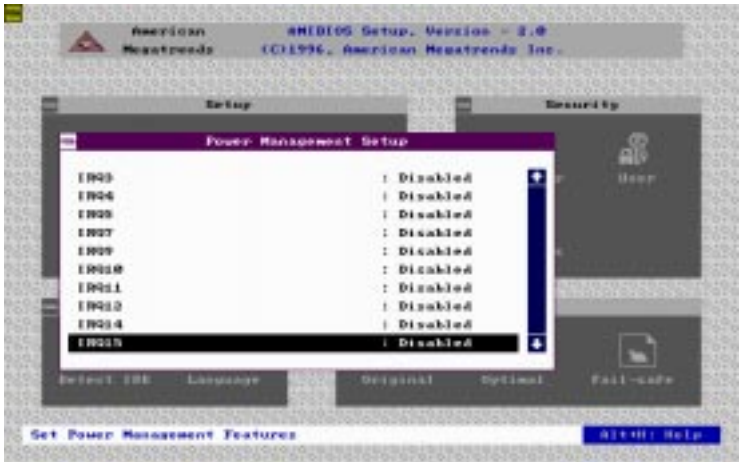
Chipset setup options

Function	Options
Auto Configuration Function	Disabled/Enabled
AT Bus Clock	7.16
	CPU Bus Speed/3
	CPU Bus Speed/4
	CPU Bus Speed/5
	CPU Bus Speed/6
	CPU Bus Speed/8
DRAM Read Timing	Slow
	Normal
	Faster
	Fastest
DRAM Write Timing	Slow
	Normal
	Faster
	Fastest
SRAM Type	2-1-1-1
	3-1-1-1
	3-2-2-2
	4-2-2-2

Function	Options
SRAM Read Timing	Fast
	Normal
SRAM Write Timing	FAST
	Normal
Memory Parity Check	Disabled
	Enabled
DRAM Hidden Refresh	Disabled
	Enabled
DRAM Refresh Period Setting	15 ms
	30 ms
	60 ms
	120 ms
Memory Hole at 15-16 M	Disabled
	Enabled
ISA I/O Recovery	Disabled
	Enabled
ISA I/O Recovery Time	0.5 ms
	1.0 ms
	1.5 ms
	2.0 ms
	2.5 ms
	3.0 ms
	3.5 ms
System Hidden Refresh	15 ms
	30 ms
	60 ms
	120 ms
Cx5x86 Linear Wrapped Mode	Disabled
	Enabled

Power Management Setup

The Power Management setup offers options to help reduce power consumption. You can choose the Power Mgmt icon from the AMIBIOS Setup main menu and see the options in this group as shown below:
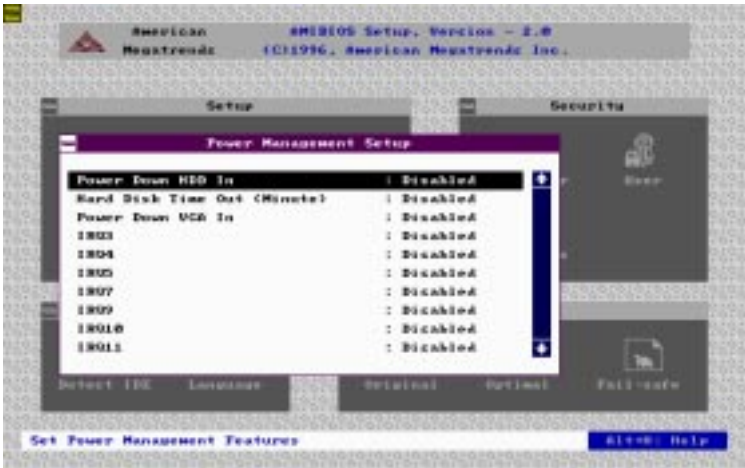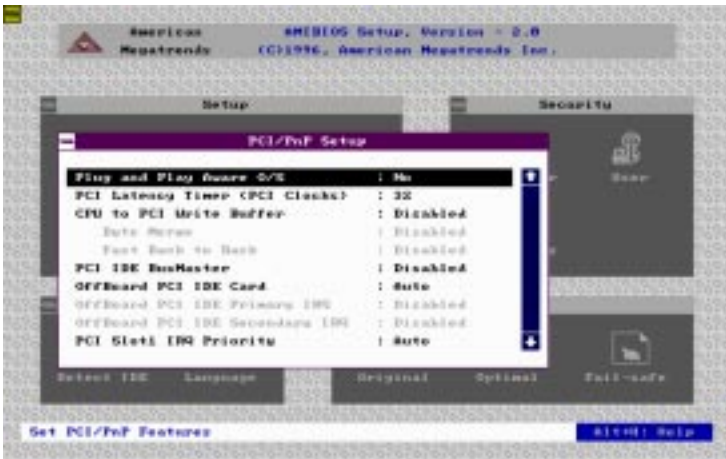
Power Management Mode/APM Funtion
Set this option to *Enabled* to enable the power management and
APM (Advanced Powed Management) features.

PCI/PnP Setup

PCI/PnP Setup options are displayed by choosing the PCI/PnP Setup icon from the AMIBIOS Setup main menu. All PCI/PnP Setup options are described in this section

Plug and Play Aware OS

Set this option to *Yes* if the operating system installed in the computer is Plug and Play-aware. AMIBIOS only detects and enables PnP ISA adapter cards that are required for system boot. The Windows 95 operating system is PnP aware and detects and enables all other PnP-aware adapter cards. Set this option to *No* if the operating system (such as DOS, OS/2, Windows 3.x) does not use PnP.

You must set this option correctly or PnP-aware adapter cards installed in your computer will not be configured properly.

The settings are *Yes* or *No*.

PCI Latency Timer (PCI Clocks)
This option sets the latency of all PCI devices on the PCI bus. The settings are in units equal to PCI clocks. The settings are *32, 64, 96, 128, 160, 192, 224,* or *248*.

CPU to PCI Write Buffer
This option sets the write buffer between CPU and PCI bus.

Byte Merge
Set this option to *Enabled* to specify that the IDE controller will transmit data in "Byte Merge" mode. This will improve the data transmitting performance.

PCI IDE BusMaster
Set this option to *Enabled* to specify the IDE controller on the PCI local bus has bus mastering capability. The settings are *Disabled* or *Enabled*.

Offboard PCI IDE Card
This option specifies if an offboard PCI IDE controller adapter card is used in the computer. You must also specify the PCI expansion slot on the motherboard where the offboard PCI IDE controller card is installed. If an offboard PCI IDE controller is used, the onboard IDE controller on the motherboard is automatically disabled. The settings are *Auto*, *Slot1*, *Slot2*, *Slot3*, *Slot4*, *Slot5,* or *Slot6*.

If *Auto* is selected, AMIBIOS automatically determines the correct setting for this option.

Offboard PCI IDE Primary IRQ
This option specifies the PCI interrupt used by the primary IDE channel on the offboard PCI IDE controller. The settings are *Disabled*, *INTA*, *INTB*, *INTC*, *INTD,* or *Hardwired*.

Offboard PCI IDE Secondary IRQ
This option specifies the PCI interrupt used by the secondary IDE channel on the offboard PCI IDE controller. The settings are *Disabled*, *INTA*, *INTB*, *INTC*, *INTD,* or *Hardwired*.
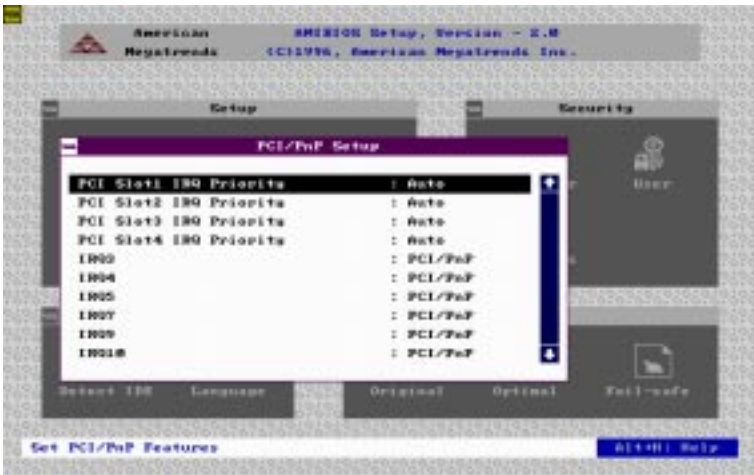
PCI Slot1 IRQ Priority : Auto
PCI Slot2 IRQ Priority : Auto
PCI Slot3 IRQ Priority : Auto
PCI Slot4 IRQ Priority : Auto
This option sets PCI slot IRQ Priority.

IRQ3
IRQ4
IRQ5
IRQ7
IRQ9
IRQ10
IRQ11
IRQ14
IRQ15

These options specify the type of the bus that the named interrupt request lines (IRQs) use. These options allow you to specify IRQs for use by Legacy ISA adapter cards.

These options determine if AMIBIOS should remove an IRQ from the pool of available IRQs passed to BIOS configurable devices. The available IRQ pool is determined by reading the ESCD NVRAM. If more IRQs must be removed from the pool, the end user can use these PCI/PnP Setup options to remove the IRQ by assigning the option to the *ISA/EISA* setting. Onboard I/O is configurable by AMIBIOS. The IRQs used by the onboard I/O are configured as *PCI/PnP*.

The settings are *PCI/PnP* or *ISA/EISA* (The default settings are PCI-PnP).

Reserved Memory Size
This option specifies the size of the memory area reserved for legacy ISA adapter cards.

The settings are *Disabled, 16K, 32K,* or *64K.*

Reserved Memory Address
This option specifies the beginning address (in hex) of the reserved memory area. The specified ROM memory area is reserved for use by legacy ISA adapter cards.

The settings are *C0000, C4000, C8000, CC000, D0000, D4000, D8000,* or *DC000.*

Peripheral Setup

To access Peripheral Setup, select the Peripheral icon in the AMIBIOS main menu. The following screen appears:
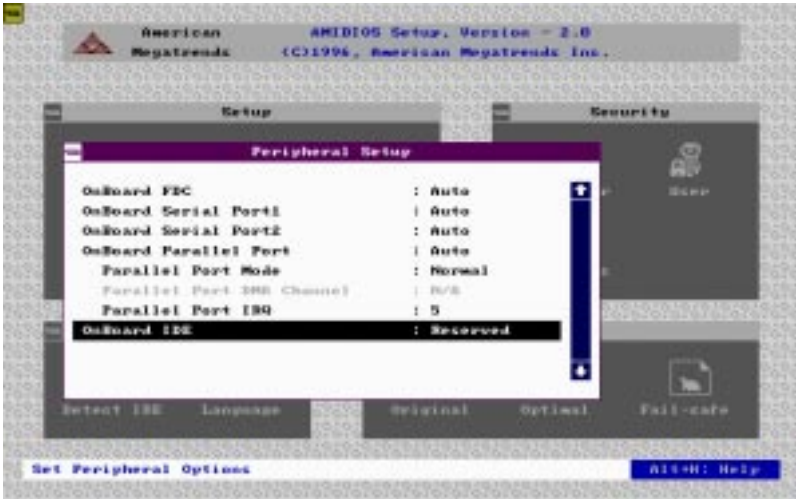
Onboard FDC
This option enables the floppy drive controller on the motherboard. The settings are *Auto, Enabled* or *Disabled.*

Onboard Serial Port1
This option enables serial port 1 on the motherboard and specifies the base I/O port address for serial port 1.

The settings are *Auto, Disabled, 3F8h, 2F8h, 3E8h,* or *2E8h*.

Onboard Serial Port2
This option enables serial port 2 on the motherboard and specifies the base I/O port address for serial port 2.

The settings are *Auto, Disabled, 3F8h, 2F8h, 3E8h,* or *2E8h*.

Onboard Parallel Port
This option enables the parallel port on the motherboard and
specifies the parallel port base I/O port address. The settings are
Auto, Disabled, 378, 278, or *3BC*.

Parallel Port Mode
This option specifies the parallel port mode. ECP and EPP are both
bidirectional data transfer schemes that adhere to the IEEE P1284
specifications. The settings are:

Setting	Description
Normal	The normal parallel port mode is used.
EPP	The parallel port can be used with devices that adhere to the Enhanced Parallel Port (EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bidirectional data transfer driven by the host device.
ECP	The parallel port can be used with devices that adhere to the Extended Capabilities Port (ECP) specification. ECP uses the DMA protocol to achieve transfer rates of approximately 2.5 Mbs. ECP provides symmetric bidirectional communications.

Parallel Port DMA Channel
This option is only available if the setting for the Parallel Port
Mode option is *ECP*. The settings are *0, 1,* or *3*.
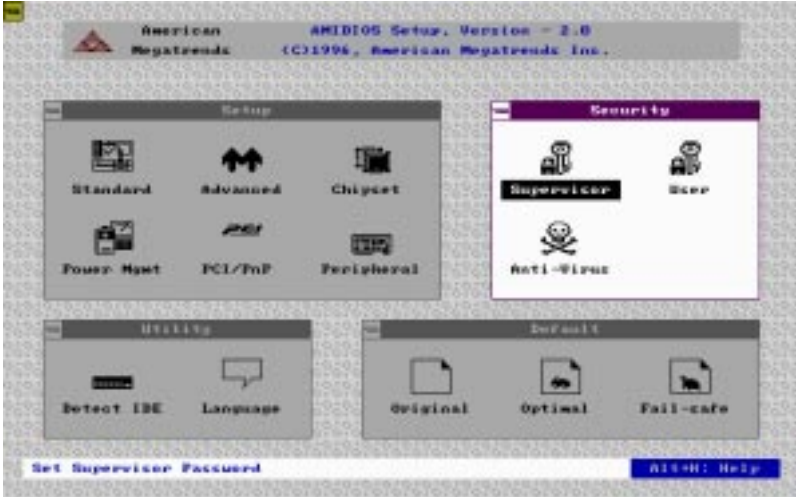
Parallel Port IRQ
IRQ7 is used for the parallel port (LPT1). The IRQ can be changed
to IRQ5.

Onboard IDE
This option specifies the onboard IDE controller channels that will
be used. The settings are *Primary* or *Disabled*.

Security

The following icons appear in this section:

AMIBIOS password support

AMIBIOS Setup has an optional password feature. The system can be configured so that all users must enter a password every time the system boots or when AMIBIOS Setup is executed. You can either set a Supervisor password or a User password. The following screen appears when you select the password icon.

You can enter a password by:

- typing the password on the keyboard
- selecting each letter via the mouse
- selecting each letter via the pen stylus (pen access must be customized for each specific hardware platform.)

If you do not want to use a password, simply press <ENTER> when the password prompt appears

Setting a Password
The password check option is enabled in Advanced Setup by choosing either *Always* or *Setup*. Here, you determine the password to be used. The password is stored in CMOS RAM.

To assign a password,

1. Enter a 1-6 character password. The password does not appear on the screen when typed.

2. Retype the password when prompted by AMIBIOS.

A message box will appear when the password is confirmed.

Keep a record of the password. If you forget the password, you must reset the CMOS RAM and reconfigure the system.

Changing a password

1. Select the appropriate password icon (i.e., supervisor or user from the Security section of the AMIBIOS Setup main menu.)

2. Enter the password and press <ENTER>. The screen does not display the characters entered.

3. After the new password is entered, retype the new password as prompted and press <ENTER>.

If the password confirmation is incorrect, an error message appears. If the new password is entered without error, press <ESC> to return to the AMIBIOS Setup Main Menu. The password is stored in CMOS RAM after AMIBIOS Setup completes. The next time the system boots, you are prompted for the password if the password function is present and is enabled.

Remember your password!

Keep a record of your password. If you forget your password, remove the computer cover, set switch 1-2 (the DIAG switch) to ON, and power on the computer. AMIBIOS will erase the password.
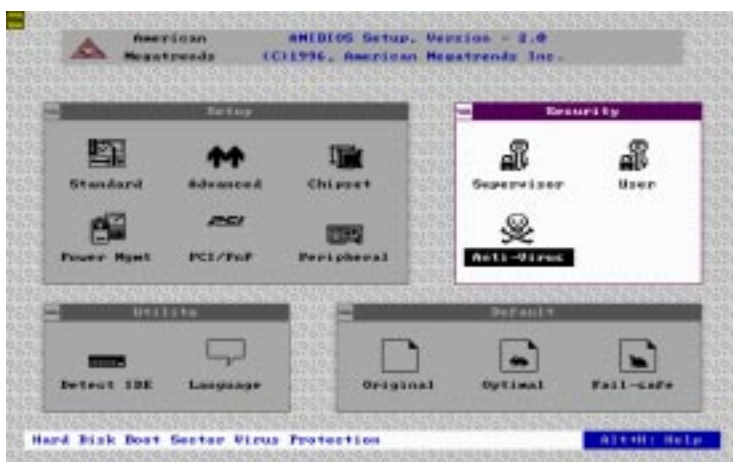
Anti-virus

Select the Anti-virus icon from the Security section of the AMI-BIOS Setup main menu. AMIBIOS issues a warning when any program (or virus) issues a Disk format command or attempts to write to the boot sector of the hard disk drive.

If enabled, the following appears when a write is attempted to the boot sector.

```
              Boot  Sector  Write !!!
      Possible  VIRUS: Continue  (Y/N)?  _
```

You may have to type N several times to prevent the boot sector write.

The following is displayed after any attempt to format any cylinder, head, or sector of any hard disk drive via the BIOS INT 13 Hard Disk Drive Service:

```
                   Format!!!
      Possible  VIRUS: Continue  (Y/N)?  _
```

Utility

The following icons appear in this section:

Detect IDE
If drive C: is an IDE drive, the hard disk drive parameters for drive
C: are automatically detected and reported to the Hard Disk Drive
C: screen in Standard Setup, so you can easily configure drive C:.
Drive D and the CD-ROM could also be automatically detected and
reported to screen if drive D and CD-ROM are IDE drives.

Language
If this feature is enabled, you can select AMIBIOS. The setup
messages are in different languages. The default setting is English.

Default

The icons in this section permit you to select a group of settings for all AMIBIOS Setup options. Not only can you use these icons to quickly set system configuration parameters, you can choose a group of settings that have a better chance of working when the system is having configuration-related problems.

Original
Choose the Original icon to return to the system configuration values present in AMIBIOS Setup when you first began this AMIBIOS Setup session.

Optimal
You can load the optimal default settings for the WinBIOS Setup options by selecting the Optimal icon. The Optimal default settings are the best-case values that could optimize system performance. If CMOS RAM is corrupted, the Optimal settings are loaded automatically.

Fail-Safe
You can load the Fail-Safe AMIBIOS Setup options by selecting the Fail-Safe icon.

The Fail-Safe settings provide the most stable settings, though they do not provide optimal performance. Use this option as a diagnostic aid if the system is behaving erratically.

Exiting AMIBIOS

You can exit AMIBIOS by pressing the <ESC> key while in the
AMIBIOS main menu screen.

The following screen appears:
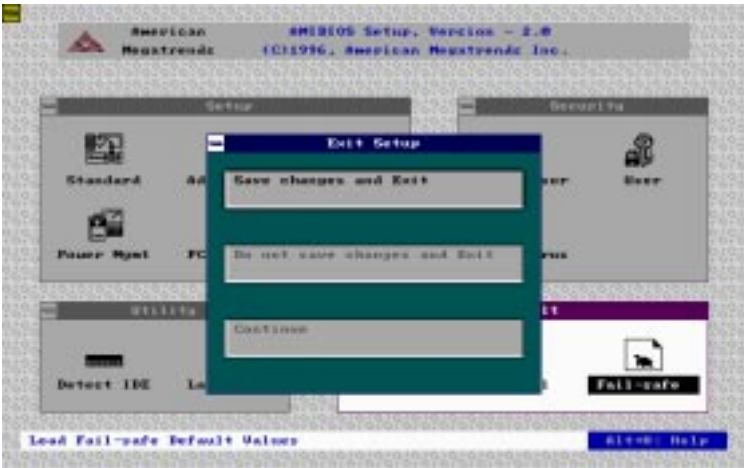
Select the option you desire, and the system will continue its
bootup sequence.

Ethernet Software Configuration

This chapter details the Ethernet software configuration information. It shows you how to configure the card to match your application requirements.

Ethernet software configuration

The onboard Ethernet interface supports all major network operating systems. I/O addresses and interrupts are easily configured via the Award Setup. To configure the medium type, to view the current configuration, or to run diagnostics, please refer to the following istructions:

1. Power the mainboard on. Ensure that the RSET8139.EXE file is located in the working drive.

2. Choose RSET8029.EXE from:

    cd-rom : \CD ROM\mode name\ driver\ethernet\
       Oem8029.exe and press <ENTER>.

    The Ethernet configuration program will then be displayed.

    "**cd-rom**" : the drive letter of your CD-ROM drive

    "**model name**" : the model number of your product

3. This simple screen shows all the available options for the Ethernet interface. Just highlight the option you wish to change by using the Up and DOWN keys. To change a selected item, press <ENTER>, and a screen will appear with the available options. Highlight your option and press <ENTER>. Each highlighted option has a helpful message guide displayed at the bottom of the screen for additional information.

4. After you have made your selections and the configuration is what you want, press <ESC>. A prompt will appear asking if you want to save the configuration. Press "Y" if you want to save.

The Ethernet Setup Menu also offers three very useful diagnostic functions. These are:

1. Run EEPROM test

2. Run Diagnostics on Board

3. Run Diagnostics on Network

Each option has its own display screen which shows the format and result of any diagnostic tests undertaken.

A

Watchdog Timer
Demo Program

The following demo program illustrates the programming steps required to enable, set, and disable the watchdog timer.

Programming the watchdog timer

If you decide to program the watchdog timer, you must write data to I/O port 443 (hex). The output data is a value timer. You can write from 80 (hex) to FF (hex) for input minute data plus from 00 (hex) to 7F (hex) for input second data, and the related timer is 2 seconds to 127 minutes plus 127 seconds.

After data entry, your program must refresh the watchdog timer by rewriting the I/O port 443 (hex) while simultaneously setting it. When you want to disable the watchdog timer, your program should write I/O port 80 (hex) a Hex value.

The following procedure is a sample program for the watchdog timer:

• To start the watchdog timer and set the "Reset" function type;
  o 444 0 <Enter>; out 444h data 0

• To input watchdog timers time-out interval of 3 minutes type;
  o 443 83 <Enter>; out 443h data 83

• To input watchdog timers time-out interval of 5 seconds type;
  o 443 05 <Enter>; out 443h data 05

• To disable the watchdog timer type;
  o 80 x <Enter>; out 080h data x (x can be any Hex value)

The time interval data of the watchdog timer is shown in binary code (8 bits).

8	7	6	5	4	3	2	1
x							

If bit 8 is "1" = To input "minute"

If bit 8 is "0" = To input "second"

Sample 1: 3 minutes

1	0	0	0	0	0	1	1

Sample 2: 5 seconds

0	0	0	0	0	1	0	1

B

Installing PC/104 Modules

This appendix gives instructions for installing the PC/104 module.

Installing PC/104 modules

The SBC-411/411E's PC/104 connectors give you the flexibility to attach PC/104 expansion modules. These modules perform the functions of traditional plug-in expansion cards, but saves space and valuable slots. Modules include:

- **PCM-3110B**   PCMCIA Module (one-slot)
- **PCM-3115B**   PCMCIA Module (two-slot)
- **PCM-3200**   PC/104 Sound Module
- **PCM-3420**   PC/104 Fast SCSI Module
- **PCM-3521**   Advanced Flat-Panel/CRT VGA Module
- **PCM-3522**   LCD Panel Adapter
- **PCM-3600**   PC/104 Fax/Modem Module
- **PCM-3610**   Isolated RS-232 and RS-422/485 Module
- **PCM-3640**   PC/104 4-port RS-232 Module
- **PCM-P50**   PC/104 Vehicle Power Supply
- **PCM-3660**   Ethernet Module
- **PCM-3718**   30 KHz A/D Module
- **PCM-3724**   48-channel DIO Module
- **PCM-3910**   Breadboard Module
- **PCM-3810**   Solid State Disk Module
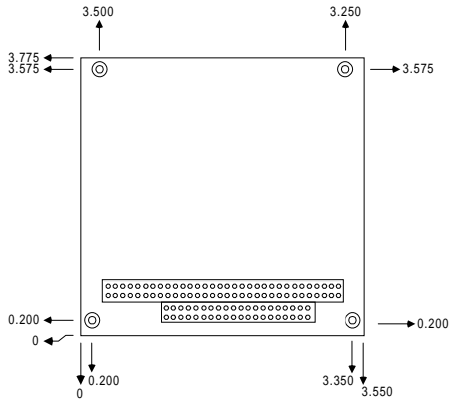- **PCM-3820**   High Density Flash Solid State Disk Module

Installing these modules on the SBC-411/411E is a quick and simple operation. The following steps show how to mount the PC/104 modules:

Step 1   Remove the SBC-411/411E from your system paying particular attention to the safety instructions already mentioned above.

Step 2   Make any jumper or link changes required to the CPU card now. Once the PC/104 module is mounted you may have difficulty in accessing these.

Step 3   Mount the PC/104 module onto the CPU card. Do this by pressing the module firmly but carefully onto the mounting connectors.

Step 4   Secure the PC/104 module onto the CPU card using the four mounting spacers and srews.

PC/104 module dimensions (inches ±5 %)
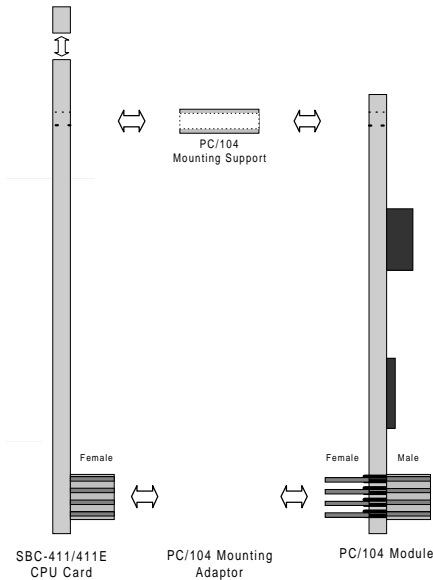
PC/104 Module Mounting Diagram

PC/104 Module dimensions (inches ±5%)