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SBC-410

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

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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-410 CPU card
- 1 6-pin mini-DIN dual outlet adapter for keyboard and PS/2 mouse
- 1 3½" Hard disk drive (IDE) interface cable (40 pin)
- 1 2½" Hard disk drive (IDE) interface cable (44 pin)
- 1 Floppy disk drive interface cable (34 pin)
- 1 Parallel port adapter (26 pin)
- PC/104 Expansion connector converter (pin headers)
- PC/104 Module mounting supports

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

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CHAPTER 1

General Information

This chapter gives background information on the SBC-410.

Sections include:

- Card specifications
- Board layout

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Introduction

The SBC-410 is an all-in-one CPU card that **supports L2 cache sizes from 128 KB to 512 KB** (32 KB x 8, 64 KB x 8, or 128 KB x 8). This CPU card uses the M1489/M1487 chipsets, which accept Intel, AMD, Cyrix, or other compatible 486-based CPUs. The SBC-410 is fully PC/AT compatible, so your software will run without modifications.

On-board features include two high-speed serial ports (RS-232 and **RS-232/422/485**) with 16C550 UARTs, one bi-directional parallel port, and a floppy drive controller. If program execution is halted by a program bug or EMI, the board's 15-stage watchdog timer can automatically reset the CPU or generate an interrupt. This ensures reliability in unmanned or stand-alone systems.

The SBC-410 is built with two high speed local bus Enhanced IDE controllers. This controller supports (through ATA PIO) mode 3 and mode 4 hard disks, which enable data transfer rates of over 11 MB/second. It connects up to four IDE devices, including large hard disks, CD-ROM drives, tape backup drives, etc. 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.

The SBC-410 **supports 5V EDO DRAM**. It also provides two 72-pin SIMM (Single In-line Memory Module) sockets for on-board DRAM. This gives you the flexibility to configure your system memory from 1 ~ 64 MB using the most economical combination of SIMMs.

The SBC-410 also features power management to minimize power consumption. It uses CMOS components and complies with the "**Green Function**" standard.

If you need any additional functions, you can add industry-standard PC/104 expansion modules. We provide numerous PC/104 modules to meet your system requirements.

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Features

- Accepts any Intel, AMD, Cyrix, or other compatible processor
- Half-size ISA bus CPU card, fully 486SX/DX/DX2/DX4/5x86/Pentium Over Drive compatible
- Built-in 128 KB secondary cache, up to 512 KB
- Up to 64 MB of on-board DRAM; supports 5V EDO DRAM
- Built-in IDE (AT bus) hard disk drive interface, floppy drive controller
- One RS-232 and one RS-232/422/485 selectable serial port; uses 16C550 UARTs with 16-byte FIFO
- One bi-directional parallel port
- 32 to 140°F (0 to 60°C) operating temperature
- Watchdog timer, software programmable from 2 to 32 seconds (15 steps, 2 seconds per step)
- On-board keyboard connector and/or PS/2 mouse
- IDE HDD auto-detection
- Connectors for PC/104 module expansion
- Single +5V power supply
- "Green" function, supports power management

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Specifications

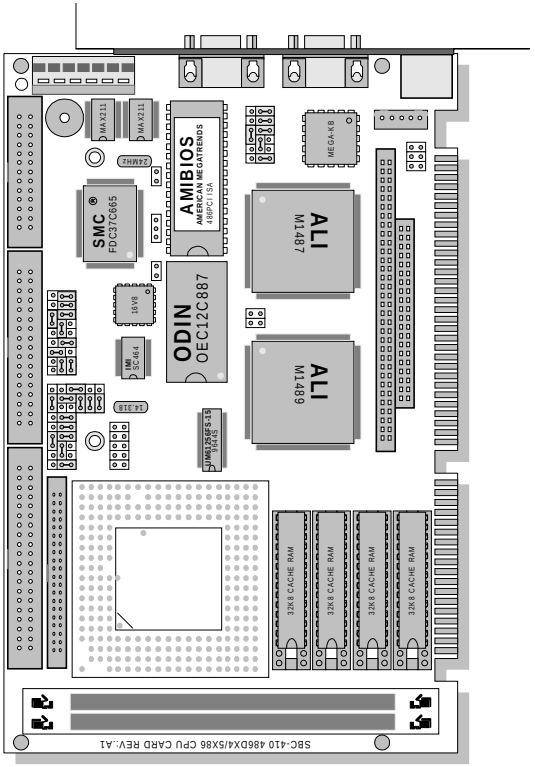
- **CPU**: **Intel** 486SX/DX/DX2/DX4/Pentium Over Drive;
  AMD Am486DX/DX2/DX4/5x86;
  IBM/SGS/Cyrix Cx486DX/DX2/M7/5x86;
  TI 486DX2/DX4
- **Bus interface**: ISA (PC/AT) bus
- **Data bus**: 32 bit
- **Processing ability**: 32 bit
- **Chipset**: ALI 1489/1487
- **RAM memory**: 1 MB to 64 MB, two 72-pin sockets
- **Shadow RAM memory**: Supports system and video BIOS up to 256 KB in 32 KB blocks
- **L2 Cache memory**: On-board 128 KB, up to 512 KB (DIP package)
- **Enhanced IDE HDD interface**: Supports up to four enhanced IDE (ATA-2 bus) large hard disk drives or other enhanced IDE devices. Supports mode 3 and mode 4 hard disks (minimum data transfer rate of 11.1 MB/sec).
- **Floppy disk drive interface**: Supports up to two floppy disk drives, 5.25" (360 KB and 1.2 MB) and/or 3.5" (720 KB, 1.44 and 2.88 MB).
- **Bi-directional parallel port**: SPP/EPP/ECP standards.
- **Serial ports**: One serial RS-232 port and one serial RS-232/RS-422/ RS-485 port, jumper selectable. Both with 16C550 UARTs with 16-byte FIFO buffer.
- **IRQ SELECTION FOR COM PORTS:**
  COMA: Supports COM 1/2/3/4 & address is selectable;
  COMB: Supports COM 1/2/3/4 & address is selectable;
- **BIOS**: AMI Flash WinBIOS
- **Watchdog timer**: The time interval is software selectable from 2 to 32 seconds (15 steps, 2 seconds per step). Can generate a system reset or IRQ15.
- **PC/104**: 104-pin connector for a 16-bit bus

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- **DMA channels**: 7
- **Interrupt levels**: 15
- **Keyboard connector**: A 6-pin mini DIN keyboard connector is located on the mounting bracket for easy access. An on-board keyboard 5-pin header connector is also available.
- **PS/2 Mouse connector**: Shared with keyboard connector.
- **Bus speed**: 8 MHz
- **System performance:** 325 MHz in 80486DX4-100 (Landmark V2.0)
- **Max. power requirements**: +5 V @ 2.5 A
- **Power supply voltage**: Single +5 V (4.75 V to 5.25 V)
- **Operating temperature**: 32 to 140°F (0 to 60°C); must use a cooling fan when using a DX4-100 CPU or above
- **Board size**: 7.3" (L) x 4.8" (W) (185 mm x 122 mm)
- **Board weight**: 1.2 lbs (0.5 Kg)
- **Green Function**: Yes

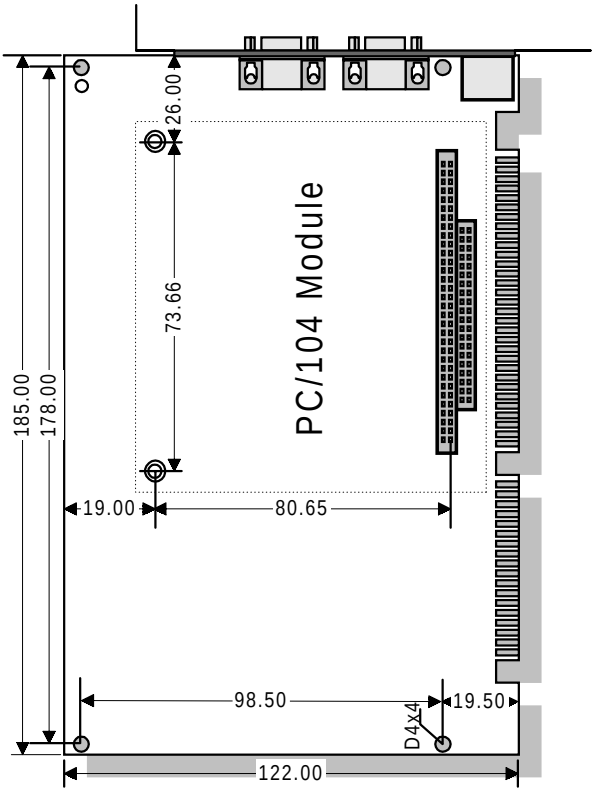
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Board layout



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Card dimensions



Units=mm

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CHAPTER 2

Installation

This chapter describes how to set up the SBC-410 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.

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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.

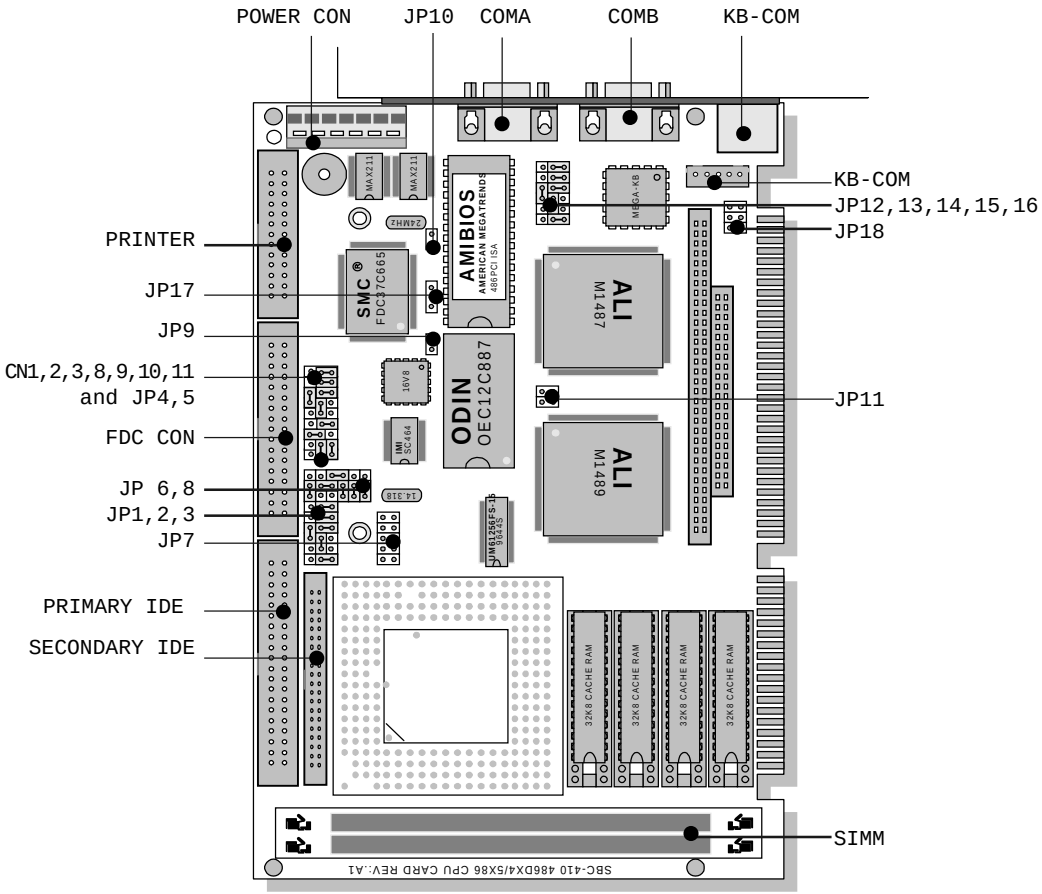
The table below lists the function of each of the board jumpers and connectors.

Jumpers and connectors

Label	Function
CN1	Reset switch
CN2	Turbo LED
CN3	IDE LED
CN8	Turbo switch
CN9	Power LED and keylock voltage
CN10	External speaker
CN11	SMI SWITCH
JP1, 2, 3	CPU type select
JP4	Watchdog timer time-out signal select
JP6,8	CPU clock select
JP7	CPU Vcc select
JP9	Clear CMOS
JP10	Flash BIOS Protect
JP11	Cache memory select
JP12, 13, 14, 15, 16	RS-232/422/485 select
JP17	Flash BIOS Write-enable
JP18	Keyboard or PS/2 mouse select
PRIMARY IDE	Primary Enhanced IDE connector
SECONDARY IDE	Secondary Enhanced IDE connector
FDC CON	FDD connector
PRINTER	Parallel connector
POWER CON	Power connector
KB-CON	External keyboard connector
KB-CON	Keyboard and/or PS/2 mouse connector
COMA	Serial port 1
COMB	Serial port 2

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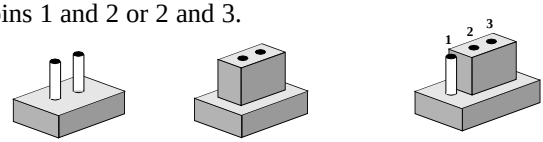
Locating jumpers and connectors



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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.

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Safety Precantions

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 the CPU

The SBC-410 CPU card supports most 486 CPUs. The system's performance depends on the CPU you choose. You can install or upgrade the CPU in the board's PGA socket by following the procedures outlined below. If your system has an existing CPU, you need to remove it before installing the new CPU.

Removing a CPU

1. Disconnect power from the chassis, and unplug all connections to the CPU card. Then, remove the CPU card from the chassis by following the instructions in the user's manual for your chassis.
2. Lift the CPU out of the PGA socket. The old chip may be difficult to remove. You may find spray chip lubricant, designed for pin-grid-array (PGA) devices, and a chip puller helpful. These are available at electronics hobbyists' supply stores.

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Installing a CPU

To install the CPU, follow the instructions that came with it. If no documentation is provided, the general procedure for installing a CPU are outlined below:

1. Lubricate the pins on the CPU with lubricant for PGA devices. This makes the CPU slide in much easier and greatly reduces the chance of damaging the pins and other components.
2. Carefully align the CPU so that it is parallel to the socket. Make sure that the notch on the corner of the CPU matches the notch on the inside of the socket.
3. Gently push the CPU into the socket. There will probably be a small gap between the CPU and the socket even when it is fully seated. DO NOT USE EXCESSIVE FORCE!

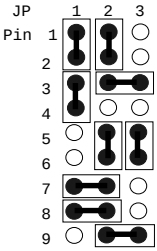
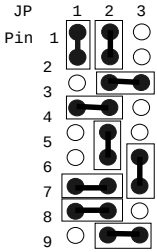
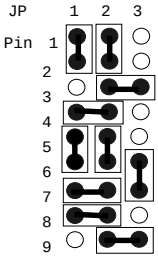
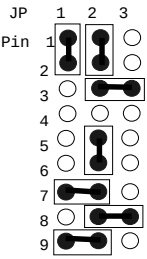
When you install a new CPU, you may have to adjust other settings on the board, such as CPU type, CPU clock and PCI speed, to accommodate it. Make sure that the settings are correct for your CPU. **Improper settings may damage the CPU.**

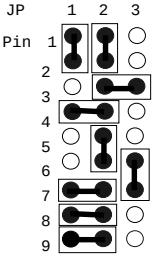
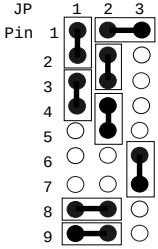
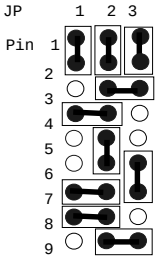
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CPU type select (JP1, JP2, JP3)

JP1, JP2, and JP3 must be set to match the CPU type. The chart below shows the proper jumper setting for their respective CPU.

CPU Type select (JP1, JP2, JP3)

Intel P24T	AMD/Intel DX4 Series Intel P24D Intel DX2-66 AMD DE2-66	*AMDX5-133/ AMD DX2-66(WB) (default)	Intel 486SX
			

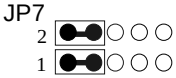
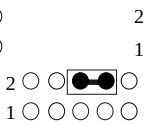
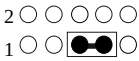
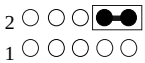
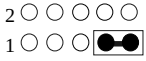
Cyrix/IBM/ST 5x86 , DX4 Series	Cyrix/IBM/ST/TI DX2 Series	AMD DX2-66(WT)
		

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CPU Vcc select (JP7)

JP7 must be set to match its CPU type. The chart below shows the proper jumper settings for itsV_{cc}.

CPU Vcc select (JP7)

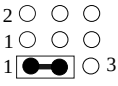
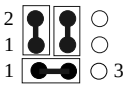
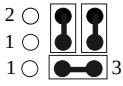
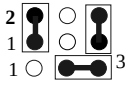
5.0 V	3.3 V	3.45 V*	3.6 V	4.0 V
				

***default**

CPU clock select (JP6, JP8)

JP6 and JP8 are used to synchronize the CPU clock with the CPU type. Set the CPU clock according to the base CPU speed.

CPU clock select (JP6, JP8)

25 MHz	33 MHz*	40 MHz	50MHz
			

***default**

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Installing DRAM (SIMMs)

The SBC-410 CPU card provides two 72-pin SIMM (Single In-line Memory Module) sockets and supports between 1 MB to 64 MB of RAM.

When installing SIMMs, make sure that Bank 1 is filled first.

Installing SIMMs

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.
3. Repeat steps 1 and 2 for each module you install.

Removing SIMMs

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.
4. Repeat the above steps for each module you remove.

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Selecting cache memory size

The SBC-410 features a 2nd level memory cache that supports 128, 256, or 512 KB of cache memory. Higher cache memory can improve your system's performance.

The cache uses SRAM chips in three sizes: 32 KB, 64 KB and 128 KB. The on-board cache memory banks consists of four SRAM chip sockets, each of which accepts one "Tag" chip. All SRAM chips must have a speed of 20 ns or faster. The table below shows the possible cache configurations:

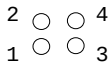
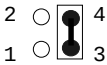
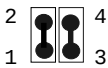
Cache Configuration

Cache size	Tag RAM	Data RAM
128 KB	one 32 K x 8	four 32 KB x 8 SRAMs
256 KB	one 32 K x 8	four 64 KB x 8 SRAMs
512 KB	one 32 K x 8	four 128 K x 8 SRAMs

Cache memory select (JP11)

When the cache size changes, you must make sure that JP11 is set to match the new cache memory size. The following chart shows the proper jumper setting for each cache configuration:

Cache memory select (JP11)

128 KB*	256 KB	512 KB
		

*default

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IDE hard drive connections (Primary/ Secondary IDE)

You can attach up to four Enhanced Integrated Device Electronics hard disk drives to the SBC-410's internal controllers. The card comes with a 40-pin and a 44-pin flat-cable piggyback cables. The 40-pin flat-cable has three identical 40-pin connectors.

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 Primary IDE or Secondary IDE 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 one as the slave. You do this using jumpers on the drives. If you install just one drive, set it as the master.

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IDE LED (CN3)

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 pin assignments (CN3)

Pin	Function
1	-R/W IDE
2	Pull high

Pin assignments

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

40 Pin IDE hard drive connector (PRIMARY IDE)

Enhanced IDE connector (PRIMARY IDE)

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

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44 Pin IDE hard drive connector (SECONDARY IDE)

Enhanced IDE connector (SECONDARY IDE)			
Pin	**Signal**	**Pin**	**Signal**
1	IDE RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA 0	18	DATA15
19	SIGNAL GND	20	N.C.
21	N.C.	22	GND
23	IO WRITE	24	GND
25	IO READ	26	GND
27	IO CHANNEL READY	28	N.C.
29	N.C.	30	GND
31	IRQ 14	32	IOCS16
33	ADDR 1	34	N.C.
35	ADDR 0	36	ADDR 2
37	HARD DISK SELECT 0	38	HARD DISKSELECT 1
39	IDE ACTIVE	40	GND
41	VCC	42	MVCC
43	GND	44	N/C

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Floppy drive connections (FDC CON)

You can attach up to two floppy disks to the SBC-410's on-board 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 SBC-410 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 FDC CON 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 assignments for FDC CON:

Floppy disk connector (FDC CON)

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		

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Parallel port (PRINTER)

Normally, the parallel port is used to connect the card to a printer. The SBC-410 includes an on-board 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 to 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 PRINTER 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 PRINTER connector. Pin 1 is on the right side of PRINTER.

Pin assignments

Parallel port connector (PRINTER)

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

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Power supply connections

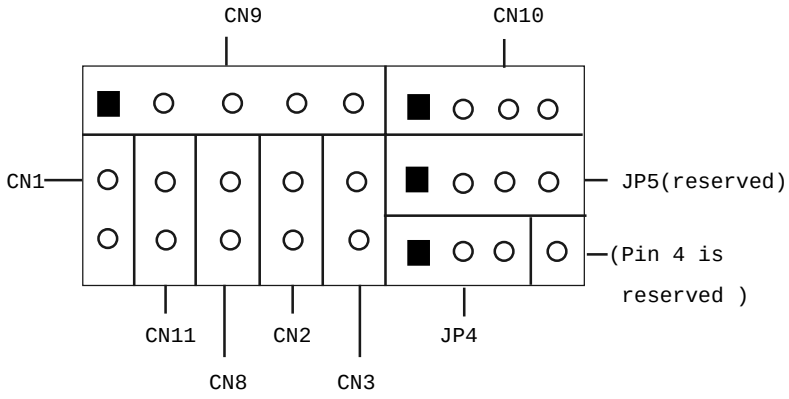
Power supply connector (POWER CON)

In single-board-computer (non-passive-backplane) applications you will need to connect power directly to the SBC-410 board using POWER CON. This connector is fully compatible with the standard PC power supply connector. See the following table for its pin assignments:

Power connector (POWER CON)

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

CN1,2,3,8,9,10,11,JP4 AND JP5 locations



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Keyboard and PS/2 mouse connectors (KB-CON)

The SBC-410 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 single-board-computer applications. The card comes with an adapter to convert the 6-pin mini-DIN connector, used for the mouse, and the standard AT keyboard connector.

5-pin Keyboard or PS/2 mouse connector (KB-CON)

Pin	Function
1	K.B. clock or PS/2 clock (select by JP18)
2	K.B. data or PS/2 data (select by JP18)
3	N.C.
4	GND
5	+5 V_{DC}

6-pin mini-DIN Keyboard or PS/2 mouse connector (KB-CON)

Pin	Function
1	K.B. data
2	PS/2 mouse data
3	GND
4	+5 V_{DC}
5	K.B. clock
6	PS/2 mouse clock

Keyboard or PS/2 mouse select (JP18)

You can select keyboard input or PS/2mouse input for 5-pin KB-CON connector.

Keyboard or PS2 mouose select (JP18)

KB*	PS/2 mouse
2 ● ○ 6	2 ○ ● 6
1 ● ○ 5	1 ○ ● 5

*default

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Serial ports

The SBC-410 offers two serial ports: one RS-232 and one RS-232/422/485. Using the BIOS Peripheral Setup program, you can select the address for each port or disable it.

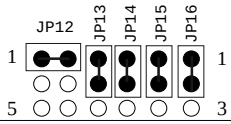
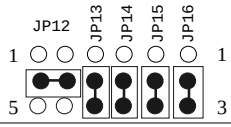
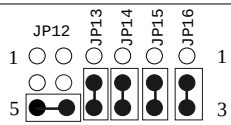
The card mounting bracket has two serial port connectors. The DB-9 connector on the top of the bracket is COMA, the RS-232 serial port. The DB-9 connector on the bottom of the bracket is COMB, the RS-232/422/485 serial port.

RS-232/422/485 select for COMB (JP12, JP13, JP14, JP15, JP16)

RS-232 serial ports are widely used for external input/output devices. The RS-422 and RS-485, however, are popular for industrial and laboratory applications because they offer high noise resistance and long range communication (up to 4000 ft, 1200 m). The RS-422 is commnly used for two-way communication between two devices, where as RS-485 is used for communication between a single master and a network of slave modules.

COMA is the RS-232 serial port, and COMB can function as an RS-232, RS-422, or RS-485, depending on the jumper settings from JP12, JP13, JP14, JP15 and JP16. To select the desired serial port type for COMB, adjust JP12, JP13, JP14, JP15, and JP16:

RS-232/422/485 select for COMB (JP12, JP13, JP14, JP15, JP16)

RS-232*	
RS-422	
RS-485	

*default

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RS-232/422/485 serial port connections (COMA, COMB)

Pin assignments

The following table shows the pin assignments for the card's RS-232 and RS-422/485 (COMB) serial port connectors:

RS-232 (COMA, COMB)		RS-422/485 (COMB)	
Pin	**Signal**	**Pin**	**Signal**
1	DCD	1	TX- (DTE)
2	RX	2	TX+ (DTE)
3	TX	3	RX+ (DTE)
4	DTR	4	RX- (DTE)
5	GND	5	Ground
6	DSR	6	RTS-
7	RTS	7	RTS+
8	CTS	8	CTS-
9	RI	9	CTS-

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RS-422 signal wiring

RS-422 is used for long-distance point-to-point connections. RS-422 originally used four wires for one-way communication (with devices such as display terminals or printer) but was later adopted by the industry for simultaneous two-way communication by doubling the number of wires.

Each pin on the first device connects to a corresponding device on the second. Flow control lines manage the communication. The following table shows pin connections.

Computer A			Computer B	
Pin	**Signal**		**Pin**	**Signal**
1	TX-	——————>	4	RX-
2	TX+	——————>	3	RX+
3	RX+	<——————	2	TX+
4	RX-	<——————	1	TX-
5	Ground	<——————	5	Ground
6	RTS-	——————>	9	CTS-
7	RTS+	——————>	8	CTS+
8	CTS+	<——————	7	RTS+
9	CTS-	<——————	6	RTS-

RS-485 signal wiring

In a typical RS-485 application, the host device requests data from a slave module then listens for the response. The host transmits and receives data on the same pair of wires. Software handles the flow control; no other wires are needed.

Pin assignments appear in the following table. Pins 1 and 4 share the Data- wire. Pins 2 and 3 share the Data+ wire.

Computer A			Device B	
Pin	**Signal**		**Pin**	**Signal**
1 4	TX- RX-	] Data-	1 4	[TX- RX-
2 3	TX+ RX+	] Data+	2 3	[TX+ RX+
5	Ground		5	Ground

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Watchdog timer setup

Watchdog timer time-out signal select (JP4)

If CPU processing comes to a halt because of EMI or software bug, the watchdog timer can either reset the CPU or signal an interrupt on IRQ15.

Watchdog timer time-out signal select (JP4)

Reset CPU*	IRQ15
	

* default

Watchdog timer programming

The watchdog timer must be programmed to write to I/O port address 443 at an interval shorter than the timer's preset interval. The timer's interval has a tolerance of ±5%, so you should program an instruction that will refresh the timer before a time-out occurs. The following steps illustrate how you might program the watchdog timer.

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1. Write to I/O port 443 (Hex) and designate a time-out interval. This will enable the watchdog and set up its time-out interval.
2. Write to I/O port 080 (Hex) and any random value. This will in turn disable the watchdog timer.

The watchdog timer-out interval can be set at 15 levels between 2 and 32 seconds. The following table shows the Hex values for the appropriate time-out intervals:

Watchdog timer delay values

Delay time	Value (Hex)	Delay time	Value (Hex)
0~2	F	16~18	7
2~4	E	18~20	6
4~6	D	20~22	5
6~8	C	22~24	4
8~10	B	24~26	3
10~12	A	26~28	2
12~14	9	28~30	1

SMI (System Management interrupt) switch (CN11)

You can connect an extrnal switch to allow your computer to enter suspend mode.

SMI switch (CN11)

Pin	Function	Suspend mode	Normal mode*
1	SMI		
2	Ground		

*default

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External Switches and LEDs

Power LED and keylock (CN9)

You can connect an LED to indicate when the CPU card is on. Pin 1 of CN9 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 (CN9)

Pin	Function
1	LED Power (+5 V)
2	No Connector
3	Ground
4	Keyboard lock
5	Ground

External speaker (CN10)

The CPU card has its own buzzer. You can disable the internal buzzer and connect an external speaker to CN10. Enabling the external speaker automatically disables the internal buzzer.

External speaker (CN10)

Pin	Function
1	Vcc
2	Speaker output
3	Buzzer in
4	Speaker output

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Reset switch (CN1)

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 the CN1.

Reset switch (CN1)

Pin	Function
1	Ground
2	Reset

Turbo LED (CN2)

You can connect a LED indicator across CN2 to indicate when the CPU is in Turbo mode. Marks on the circuit board indicate LED polarity (the pin on the left is positive).

Turbo LED (CN2)

Pin	Function
1	Turbo
2	Ground

Turbo switch (CN8)

You can connect a switch across the pins of CN8 to change the CPU speed between Turbo and non-Turbo mode. When you leave the pins open, the CPU card operates at full speed. When you close the pins, the card operates at slow speed for compatibility with older software.

Turbo switch (CN8)

Pin	Function	Low speed	High Speed*
1	- Deturbo		○ ○
2	Pull low		

*default

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Clear CMOS (JP9)

You can connect an external switch to clear CMOS. This switch closes JP9 and turns off the power, at which time the CMOS setup can be cleared.

Clear CMOS (JP9)

Protect*	Clear CMOS
○ ○	

*default

Flash BIOS Protect (JP10)

You can set the JP10 to protect BIOS write-enable. The configuration is as follows:

Flash BIOS Protect (JP10)

Write protect*	Write-enable
○ ○	

*default

Flash BIOS Write-enable Voltage (JP17)

This jumper sets the voltage supplied to the Flash BIOS Write-enable. The figure below shows the proper jumper settings for both 5 V and 12 V voltage.

Flash BIOS Write-enable Voltage (JP17)

5 V *	12 V
	

*default

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CHAPTER 3

AMIBIOS Setup

This chapter describes the card's diagnostic tests and how to set BIOS configuration data in a Windows environment.

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General information

AMIBIOS Setup configures system information that is stored in CMOS RAM. Unlike conventional BIOS setup programs, AMI-BIOS features a graphical user interface that is easy to use.

Starting AMIBIOS setup

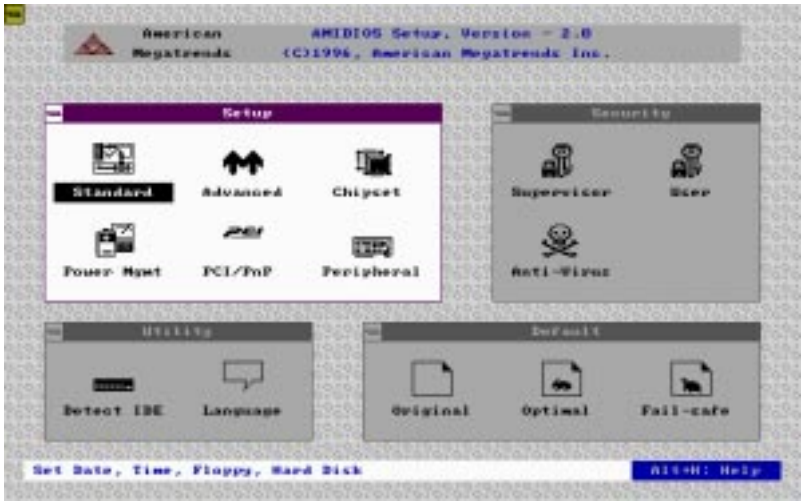
As POST executes, the following appears;

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

Press <DEL> to run AMIBIOS setup.

AMIBIOS main menu

The AMIBIOS setup screen appears as follows:



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Using a mouse with AMIBIOS SETUP

AMIBIOS Setup can be accessed via keyboard, mouse, or pen. 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:

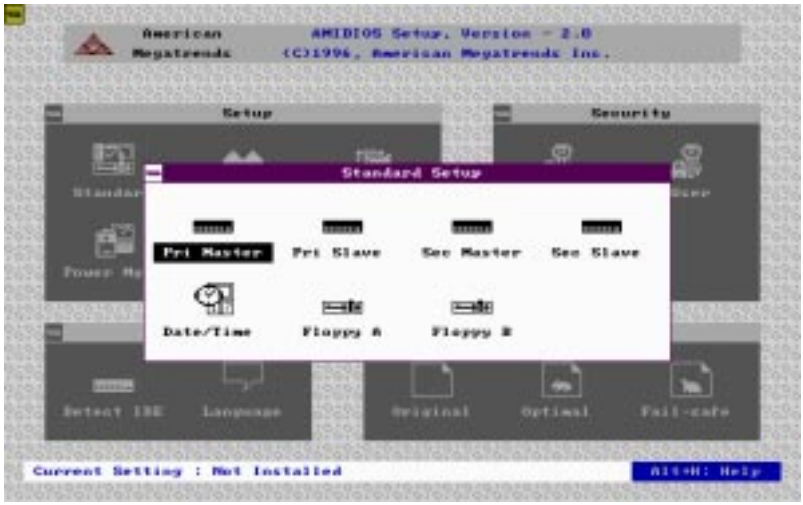
Keystroke	Function
<tab>	Move to the next window or field.
→, ←, ↑, ↓	Move to the next field to the right, left, above, or below.
<ENTER>	Select in the current field.
+	Increments a value.
-	Decrements a value.
<ESC>	Close the current operation and return to previous level.
<PgUp>	Return to the previous 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.

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Standard Setup

The AMIBIOS Setup options described in this section are selected by choosing the Standard icon from the AMIBIOS Setup main menu selection screen, as shown below.

The Standard Setup screen appears:



Pri Master, Pri Slave, Sec Master and Sec Slave

Choose these icons to configure the hard disk drive named in the option. When you click on an icon, the following parameters are listed: Type, LBA/Large Mode, Block Mode, 32Bit Mode, and PIO Mode. All parameters relate to IDE drives except **Type.**

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User-Defined Drive

If you are configuring a SCSI drive or an MFM, RLL, ARLL, or ESDI drive with drive parameters that do not match drive types 1-46, you can select the *User* in the **Type** field. You must then enter the drive parameters on the screen that appears. The drive parameters include:

- Cylinder (number of cylinders),
- Hd (number of headers),
- WP(starting write precompensation cylinder),
- Sec (number of sectors),
- Size (drive capacity).

Date, Day 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.

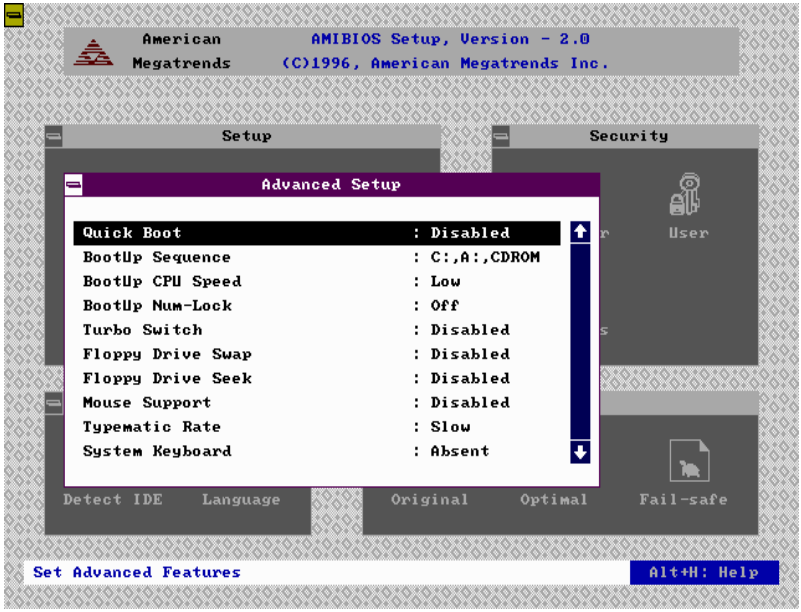
Floppy A, Floppy B

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.

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Advanced Setup

Select the Advanced icon from the AMIBIOS Setup main menu to enter Advanced setup.



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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 1 MB Memory Test Advanced Setup option. The default setting is Disabled.

Setting	Description
Disabled	AMIBIOS test 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 1 MB. 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. You cannot run AMIBIOS Setup at system boot, because there is no delay for the *Hit <Del> to run Setup* message.

Boot Up Sequence:

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

Boot Up Num Lock:

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

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Turbo Switch:
Set this option to *Enabled* to permit AMIBIOS to control the hardware turbo (speed) switch. The settings are *Enabled* or *Disabled.*

Floppy Drive Swap:
Set this option to Enabled to permit drives A: or B: to be Swapped. The settings are *Enabled* or *Disabled*. The default settings are *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 *Enabled or Disabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Mouse Support:
When this option is set to Enabled, AMIBIOS supports a PS/2-type mouse. The settings are *Enabled* or *Disabled.* The default settings are *Enabled.*

System Keyboard:
This option specifies that a keyboard is attached to the computer. The settings are *Present* or *Absent.* The Optimal and Fail-Safe default settings are *Present.*

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. The Optimal and Fail-Safe default settings are VGA/EGA.*

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Password Check:
This option enables password checking every time the computer is powered on or every time AMINBIOS 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 every time AMIBIOS is executed. The Optimal and Fail-Safe defaults are *Setup*.

Parity Check:
Set this option to Enabled to check the parity of all system memory. The settings are *Enabled* or *Disabled.* The Optimal and Fail-Safe default settings are *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.* The default settings are *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.* The Optimal and Fail-Safe default settings are *Enabled.*

Hit 'Del' Message Display:
Set this option to Disabled to prevent :

```
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.* The Optimal and Fail-Safe default settings are *Enabled.*

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Internal Cache

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

Setting	Description
Disabled	Neither L1 internal cache memory on the CPU nor L2 secondary 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 secondary cache memory is enabled.
WriteBack	Use the write-back caching algorithm.
WriteThru	Use the write-through 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.* The Fail-Safe default setting is *Disabled.*

Numeric Processor Test

Set this option to *Enbabled* to permit numeric processor to be tested. The deault setting is *Disabled.*

Hard Disk Delay

This option allows you to select hard disk delay time from 5 Sec to 15 Sec. The default setting is *Disabled.*

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C000,16k Shadow
C400,16k Shadow
C800,16k Shadow
CC00,16k Shadow
D000,16k Shadow
D400,16k Shadow
D800,16k Shadow
DC00,16k Shadow
E000,64k Shadow

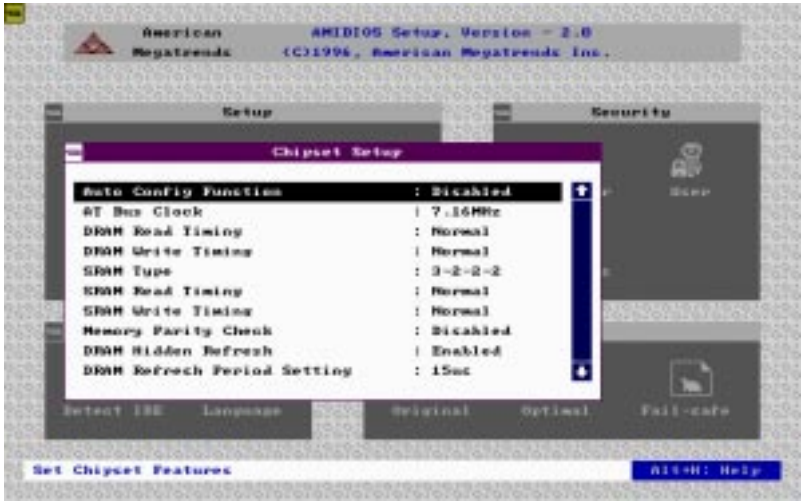
These options control the location of the contents of the 16KB of ROM beginning at the specified memory location. If no adapter ROM is using the named ROM area, this area is made available to the local bus. The settings are:

Setting	Description
Enabled	The contents of the named ROM area are written to the same address in system memory (RAM) for faster execution, if an adapter 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.

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Chipset Setup

The AMIBIOS Setup options described in this section are selected by choosing the Chipset icon from the AMIBIOS setup main menu,shown below.



The following is an option list offered by Chipset Setup

Chipset setup options

Function	Options
Auto Configuration Function	Disabled/Enabled
AT Bus Clock	7.16 MHz 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

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Function	Options
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
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

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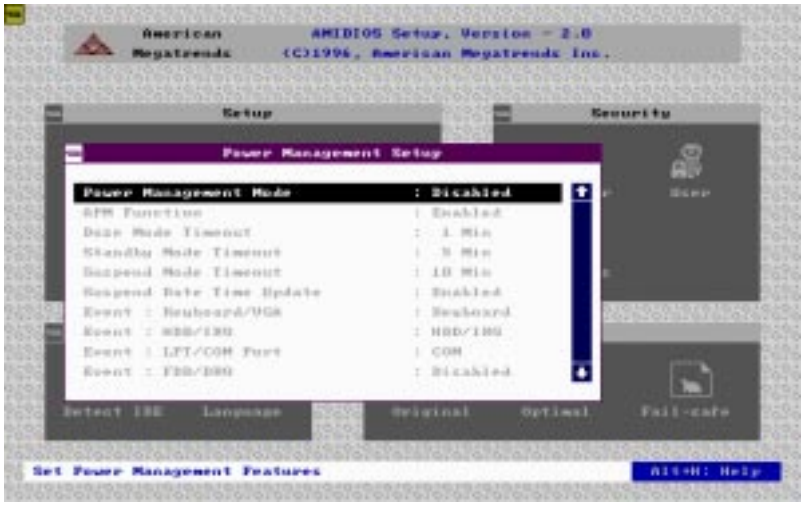
Power Management Setup

As part of the "Green" function, the Power Management setup offers options to help reduce power consumption. To see the options in this group, choose the Power Management Setup icon from the AMIBIOS Setup main menu.

Power Management Mode/APM Funtion

Set this option to *Enabled* to enable the power management and APM (Advanced Power Management) features.

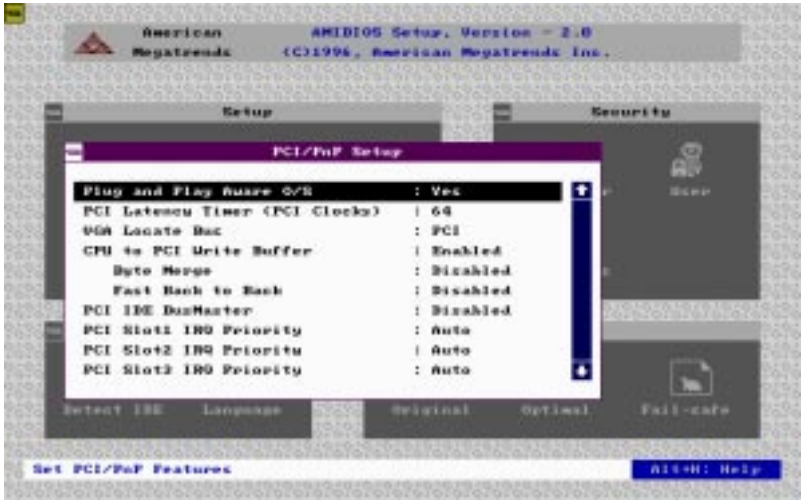
The settings are *Enabled* or *Disabled.* The default settings are *disabled.*



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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 detects and enables all other PnP-aware adapter cards. Windows 95 is PnP-aware. 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 *No* or *Yes*. The Optimal and Fail-Safe default settings are *Yes*.

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PCI Latency Timer (in PCI Clocks)

This option sets 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.* The Optimal and Fail-Safe default settings are *64*.

VGA Locate Bus

This option allows you to select VGA bus. The setting is PCI and ISA (Default).

CPU to PCI Write Buffer

This option sets the write buffer between CPU and PCI bus. The default setting is Enabled.

Byte Merge

Set this option to *Enabled* to specify the IDE contraller to transmit data with byte merge. This will improve the data transimitting performonce.

PCI IDE BusMaster

Set this option to *Enabled* to specify that the IDE controller on the PCI local bus has bus mastering capability. The settings are *Disabled* or *Enabled*. The Optimal and Fail-safe default settings are *Disabled*.

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 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. The Optionmal and Fail-Safe default settings are *Auto*.

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PCI Slot1 IRQ Priority
PCI Slot2 IRQ Priority
PCI Slot3 IRQ Priority
PCI Slot4 IRQ Priority

This option sets PCI slot IRQ priority.

The selectable settings are *Auto*,3,4,5,7,9,10,11. The default setting is *Auto*.

IRQ3
IRQ4
IRQ5
IRQ7
IRQ9
IRQ10
IRQ11
IRQ14
IRQ15

These options specify the bus that the named interrupt request lines (IRQs) are used on. 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 onboard I/O are configured as *PCI/PnP*.

The settings are *PCI/PnP* or *ISA/EISA*. The Optimal and Fail-Safe default settings are *PCI/PnP*.

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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* and Fail-Safe default settings are *Disabled.*

Reserved Memory Address

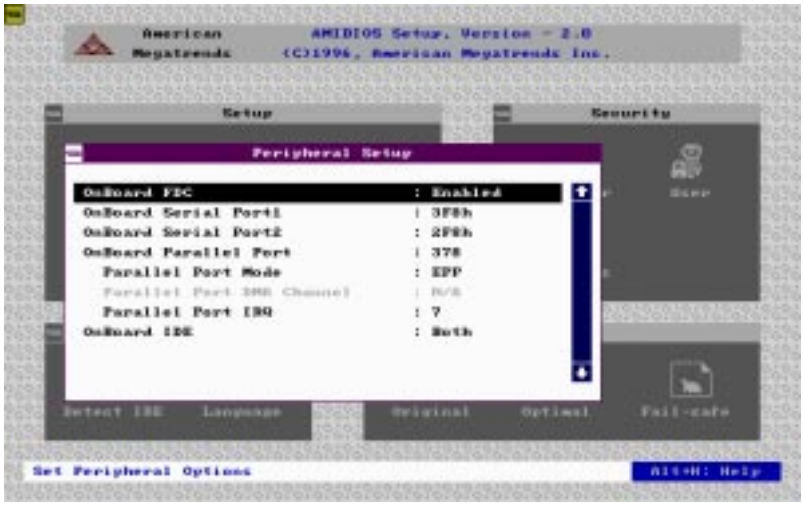
This option specifies the beginning address (in hex) of the reserved memory area. The specified ROM memory area is reserved for use by legacy ISA adapter cards.

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

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Peripheral Setup

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



Onboard FDC

This option enables the floppy drive controller on the motherboard. The settings are *Auto*, *Enabled* or *Disabled.*

Onboard Serial Port 1

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, 3E8h, 2E8h,2F8h.* The Fail-Safe default setting is *Auto*.

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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, 2E8h.* The Fail-Safe default setting is *Auto*.

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, 3BC*. The Fail-Safe default setting is *Auto*.

Parallel Port Mode

This option specifies the parallel port mode. ECP and EPP are both bidirectional data transfer sechemes that adhere to the IEEE P1284 specification. The settings are:

Setting	Description
Normal	The normal parallel port mode is used. This is the default setting.
EPP	The parallel port can be used with devices that adhere to the Enhanced Parallel Port (EPP) specification. EPP uses the exiting 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 communla-tions.

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Parallel Port DMA Channel

This option is only available if the setting for the **Parallel Port Mode** option is *ECP.*

The settings are *0 (channel 0) ,1 (channel 1) , 3 (channel 3)* .

Parallel Port IRQ

IRQ7 is used for the Parallel Port(LPT 1). The IRQ can be changed to IRQ5.

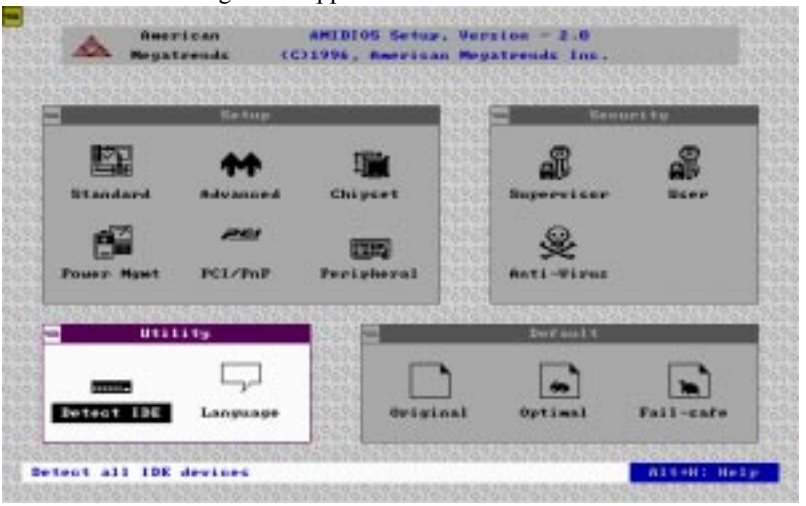
Onboard IDE

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

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Utility

The following icons appear in this section:



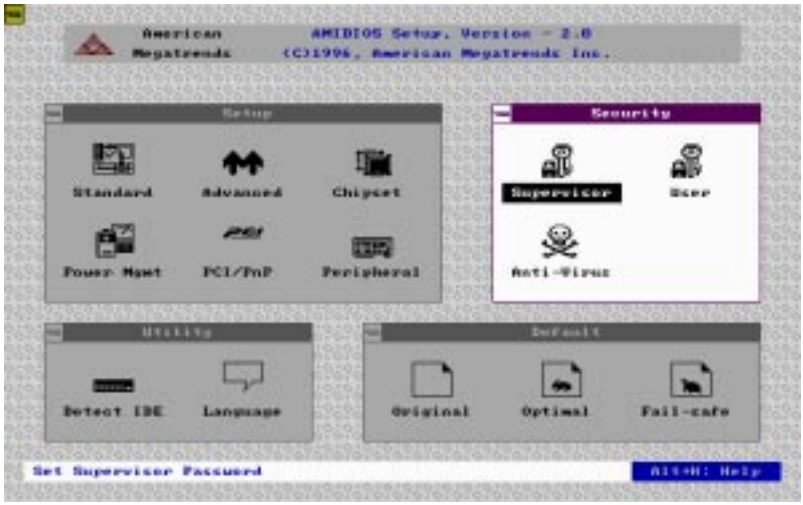
Detect IDE:
If drive C: is an IDE drive, the hard disk drive parameters for drive C: are automatically detected and reported to the Hard Disk Drive C: screen in Standard Setup, so you can easily configure drive C:. Drive D and CD-ROM could also be automatically detected and reported to screen if drive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

Language:
The default setting is *English*.

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Security

The following icons appear in this section:

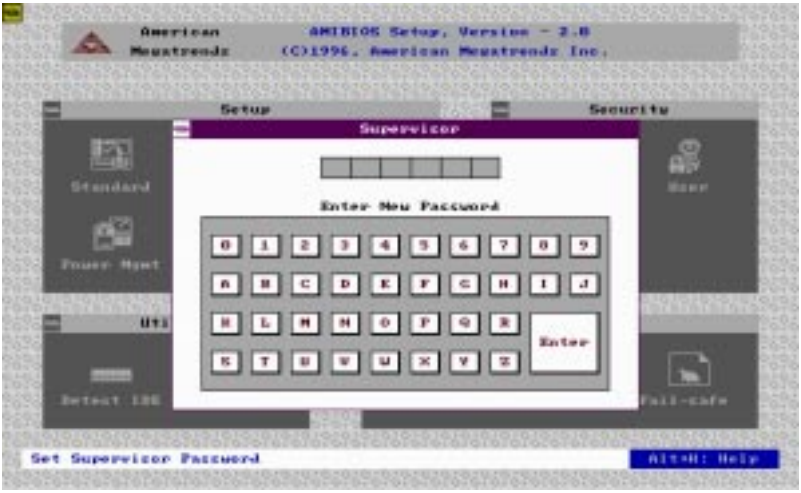


AMIBIOS password support

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.

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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.)

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 drain CMOS RAM and reconfigure the system.

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Changing a password

1. Select the Supervisor or User icon 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.

Anti-virus

Select the Anti-virus icon from the Security section of the AMIBIOS 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. The settings are Enabled or Disabled.

If enabled, the following appears when a write is attempted to the boot sector. You may have to type N several times to prevent the boot sector write.

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


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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)? _
```

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 also 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 begin this WinBIOS Setup session.

Optimal

You can load the optimal default settings for the AMIBIOS Setup options by selecting the Optimal icon. The Optimal default setting is the best-case values that could optimize system

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performance. If CMOS RAM is corrupted, the Optimal settings are loaded automatically.

Fail-Safe

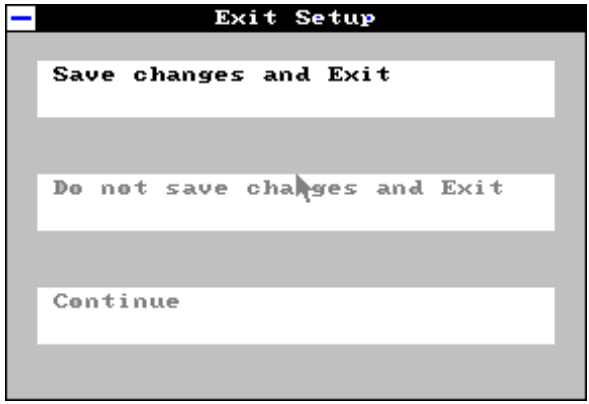
You can load the Fail-Safe AMIBIOS Setup options settings by selecting the Fail-Safe icon.

The Fail-Safe setting provides 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 boot up sequence.

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APPENDIX A

Watchdog Timer Demo Program

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

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```
#include<stdio.h> #include<dos.h> #include<conio> #in-
clude
<time.h> #include<graphics.h> void mydelay(void);
/* MAIN PROGRAM */ void main (void) {
unsigned int  dog=0
              run_time=0;
          char inkey;
clrscr();
gotoxy(15,  6);printf("AAEON  TECHNOLOGY,  INC.");
gotoxy(15,  7);printf("WATCHDOG  TIMER  TEST  &  DEMO
PROGRAM");
gotoxy(15,  9);printf("Please  setup  watchdog  delay
time:(2  Sec-30  Sec)");
/* Set watchdog timer time-out interval */
scanf("%2d",&dog);   /* Input watchdog timer time-
out interval (Sec) */
dog=dog/2;           /* Convert time-out interval
to designated Hex */
dog=15-dog;
outportb (0x443,dog);       /* Enable watchdog timer */
/* Setup screen display format */
gotoxy(15,11);printf("Now enable watchdog!");
gotoxy(15,12);printf("You can put keyboard reset or
disable watchdog.");
gotoxy(15,13);printf("      [1]. Reset watchdog.");
gotoxy(15,14);printf("      [2]. Disable watchdog.");
gotoxy(15,15);printf("      [3]. Return to O.S.");
/* Read key pressed */
while(1){
       if(kbhit()){
              inkey=getch();
              switch(inkey){
                     case '1': /* Reset Watchdog timer */
                            gotoxy(15,11);printf("Now
enable
                            watchdog timer!");
                            outportb(0x443,dog);
                            run_time=0;
                            break;
                     case '2': /* Disable Watchdog timer
*/
                            gotoxy(15,12);printf("Now
                            disable watchdog timer!");
                            outportb (0x80,dog);
                            return;
```


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```
                        default       :  break;
                }
        }
        mydelay();
        run_time=run_time+1;

        /* Display time elapsed */
        gotoxy(45,11);printf(%2d.%1d sec",run_time/
        10,run_time%10);
 }
}
/* USER FUNCTION LIBRARY */ void mydelay(void) /*
Delay program: */ /* Delay 109.89ms (18.2Hz*2) */{
        clock_t start,end;
        start=clock();
        end=start;
        while((end-start)<2){
                end=clock();
        }
}
```


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APPENDIX B

Installing PC/104 Modules

This appendix gives instructions for installing PC/104 module.

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Installing PC/104 modules

The SBC-410'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 save space and valuable slots. Modules include:

- **PCM-3600** FAX/Modem Module
- **PCM-3420** Fast SCSI-2 Module
- **PCM-3200** Sound Module
- **PCM-3810** Solid State Disk Module
- **PCM-3820** High Density Flash Disk Module
- **PCM-3115** PCMCIA Module (two slots)
- **PCM-3610** Isolated RS-232 and RS-422/485 Module
- **PCM-3660** Ethernet Module
- **PCM-3718** 30 KHz A/D Module
- **PCM-3724** 48-channel DIO Module
- **PCM-3910** Breadboard Module

To install these modules on the SBC-400 is a quick and simple operation. The following steps show how to mount the PC/104 modules:

Step 1 Remove the SBC-410 from your system paying particular attention to the safety instructions already mentioned above.

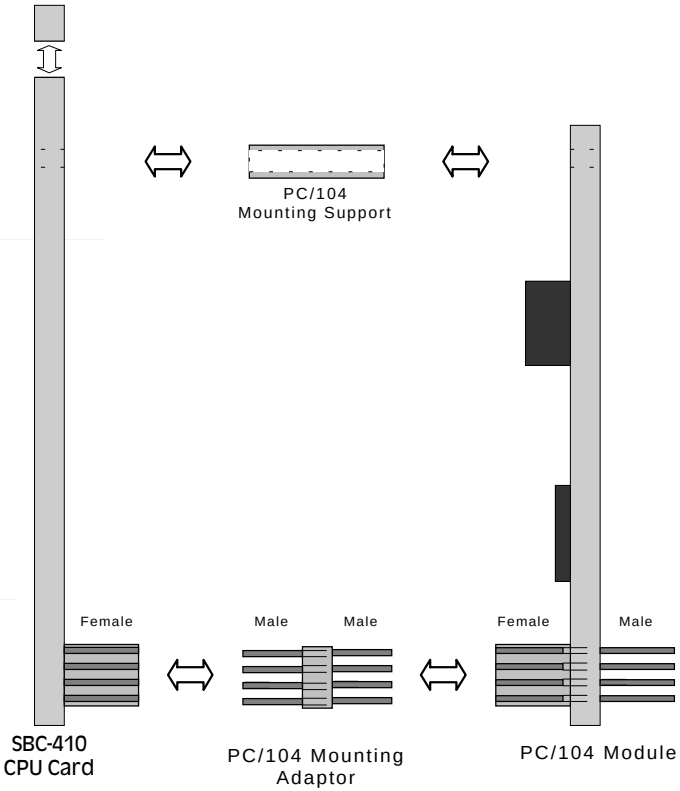
Step 2 Make any jumper or link changes required to the CPU card now. Once the PC/104 module is mounted you may have difficulty in accessing these.

Step 3 Normal PC/104 modules have "male" connectors and mount directly onto the main card. However, for reasons that ensure better bus matching, the connectors on the SBC-410 and the PC/104 module are both "female". For this reason you need to plug-in a "male-male" adapter connecter (included with the SBC-410). Please refer to the following PC/104 module mounting diagram on the following page. After this is in place you then have the correct mounting connector to accept your PC/104 module.

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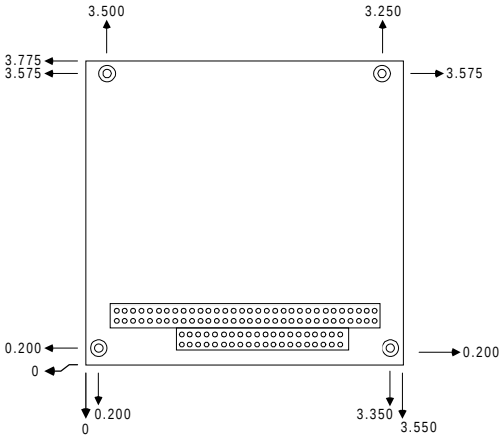
Step 4 Mount the PC/104 module onto the CPU card. Do this by pressing the module firmly but carefully onto the mounting connectors.

Step 5 Secure the PC/104 module onto the CPU card using the four mounting spacers and srews.



PC/104 Module Mounting Diagram

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PC/104 module dimensions (inches ±5 %)

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